NEC

DB2000

Help

Service Manual

Introduction

This is the Electronic Service Manual for the MP5J1L1 Dual Band GSM Digital Cellular Telephone from NEC. It contains specific information on repair and test procedures.
For details on user functions, general operation and installation, please refer to the User Guide.

The Service Manual is set out in the following sections.

1. Precautions for Repair Work provides general guidelines for undertaking safe and efficient repair work.

2. Unit Specification provides the technical specifications for the MP5J1L1 GSM Digital Cellular Telephone.

3. Circuit Description provides functional details of the circuits, block diagrams and component purpose descriptions.

4. Servicing defines the jigs, fixtures and test configurations required for servicing the product; and describes the processes of assembly and disassembly.

5. Troubleshooting provides an aid to fault finding the product. Includes; using the engineering functions, signal levels and plots at various parts of the circuit and fault codes.

6. Device Information provides functional information and pin-outs of most of the semiconductor devices within the HHP.

7. Parts provides information for the ordering of replacement parts.

8. Circuit Diagrams and Board Maps contains all the schematics and component layout diagrams.

9. Glossary, terms used in this manual.

Section 1

Precautions for Repair Work

Important

Please read the following cautions, notes and warnings before progressing through this manual or undertaking any repair action.
Remember : SAFETY FIRST!

CAUTION:

AC Power Cord :

Care must be taken not to damage the AC power cord as fire or electric shock may result.

Battery Pack :

Only use the specified batteries and chargers with this equipment.
Do not short the battery terminals together.
Keep the battery pack away from fire and sources of ignition.
Remember to recharge the battery pack after each use.

Use of the Engineering Functions :

Care must be taken not to enter adjustment modes by accident. Always ensure the correct command is being used and you understand its function.
One incorrect adjustment may result in the need for many more and result in extra work.
Only make adjustments if you are sure it is necessary.

Before Powering up the Equipment :

- Only switch on the telephone's power once the test or installation set-up is complete.
- Switching on at the wrong time may result in electric shock or damage to system components.
- Always ensure that the power is switched off before making connections / disconnections.
- It is important to check that the correct DC voltage is applied to the equipment to prevent electrical damage.

Component Polarity :

Always check the polarity of connections and components before soldering. Particular attention must be paid to I.C.s, diodes, transistors, capacitors and any other semiconductor device which is polarity dependent.

Electrostatic Damage (ESD) :

Semiconductor devices are easily damaged by electrostatic discharge. Many of the procedures detailed in this manual involve disassembly of the equipment and therefore handling of the printed circuit boards.
To protect these devices from ESD a wrist strap connected to ground must be worn. In addition to this the work surface must be covered with an anti-electrostatic mat, which should also be grounded.
If printed circuit boards are to be stored without being re-assembled into their equipment, then they must be kept in an anti-electrostatic bag.

Grounding :

Each piece of test equipment should be electrically grounded. A third (grounding) pin is provided as a safety feature. Ensure that the electrical outlet also contains this feature.

Cosmetic Protection during Repair Work :

Always ensure that the working surface is kept clean and free from abrasive materials.
The LCD is very susceptible to scratches and damage. It should be covered with clear adhesive vinyl while the equipment is disassembled.

Storage of Faulty Components :

Any components that are replaced due to failure should be kept safely in an anti-electrostatic container. NEC`s Quality or Research & Development Departments may require them to make quality and reliability investigations.

No Fault Found Equipment :

In some cases the reported symptom may not be apparent. You may subject the equipment to a controlled amount of stress, vibration and temperature variation to see if the fault occurs.
Care should be taken not to apply excessive stress or vibration or extreme temperature variations as further faults may develop.

Soldering and Desoldering :

Fast, accurate and high quality soldering is required to minimise the risk of heat damage to the electronic components.
The soldering tip should not be in contact with components or PCB tracks for longer than 2 seconds.
Heat the pad on the PCB and the lead, quickly apply solder, remove heat and cool.
After soldering is complete, ensure that all solder joints are of good quality - no dry joints, solder bridges, cracks or excess solder.
The majority of chip components are machine mounted using solder paste. Removal of the solder is not sufficient for chip component removal. Each solder point must be heated simultaneously and quickly (to prevent component and PCB damage). When the solder has melted, remove the component with tweezers.

Short Circuits :

Care must be taken to avoid short circuits. Soldering, solder dust, screws, metal clippings, metal wrist watches etc. can cause short circuits on PCBs which may result in component damage.

Test Equipment Calibration :

Your test equipment should be calibrated before use. Frequent calibration is essential to ensure high quality and reliable repairs.

Cleaning :

Before cleaning ensure that the telephone is switched off and disconnected from the power source. Cleaning should be done using a soft dry cloth. If the equipment is heavily soiled a soft cloth dampened with a mild synthetic detergent diluted in water may be used.
Never use benzene or any other chemicals to clean the equipment.

RF Shielding :

It is advisable to carry out detailed measurements and repair (in particular RX) in a shielded area to minimise RF interference.

AC Adapter and Battery Charger :

The AC adapter and battery charger are for indoor use only. Ensure that the devices are not exposed to rain or moisture.

Electrical Safety :

Electrical equipment is hazardous if misused. Any repairs must be carried out with care and only by authorised personnel.
Ensure all power sources are switched off and power cords removed before undertaking any repairs.

Hazardous Waste :

The battery pack, if incorrectly disposed of, is an environmental hazard. It must be disposed of in accordance with the regulations of the country concerned. Never dispose of the battery pack in fire or water.

Confidentiality :

The circuitry within this equipment contains several components which are regarded as company confidential. Only use NEC specified parts as replacements.

RF Injury :

To avoid RF injury, direct exposure to radio frequency energy should be avoided. In particular, exposed parts of your body (especially the eyes and face) should not come into contact with the antenna while the equipment is transmitting.

Storage Conditions :

It is recommended that the following storage conditions should be avoided to prevent damage to the equipment :-

dusty.
humid.
near to magnetic equipment.
in direct sunlight.

Ventilation :

Repair areas should be well ventilated and fume extraction systems should be installed where necessary. Potential hazardous substances are solder fumes, flux, alcohol etc..

PCB Handling :

It is recommend that cotton gloves are worn during repair work. This is to protect your hands from chemical contamination and to protect the PCBs from fingerprints and humidity.

SIM Card :

- Do not bend.
- Clean by using a soft dry cloth.

Section 2

Unit Specifications

Performance

General

	DB2000 (Standard Battery)
Talktime	150 mins
Standby	300 hours
Dimensions	130 x 45.5 x17.5
Volume	100cc
Weight	130g
SIM Size	Plug in SIM
RF power output	Class 4 GSM

Transmitting Frequency Range:	GSM: 890 - 915 Mhz PCN: 1710 - 1785 Mhz
Receiving Frequency Range:	GSM: 935 - 960 Mhz PCN: 1805 - 1880 Mhz
TX - RX Duplex Spacing:	GSM: 45 MHz / PCN: 95Mhz
Channel Spacing:	GSM: 200 Khz / PCN: 200 Khz
Number of Channels:	GSM: 124 (Numbered 1 to 124) PCN: 374 (Numbered 512 to 885)

Transmitter (GSM)

Frequency Stability	< +/- 90Hz
RF Power Output	33dBm
Power Levels	11, decrementing in 2dB steps
Power Control Level 5	33dBm +/-2dB
Power Control Level 6	31dBm +/-3dB
Power Control Level 7	29dBm +/-3dB
Power Control Level 8	27dBm +/-3dB
Power Control Level 9	25dBm +/-3dB
Power Control Level 10	23dBm +/-3dB
Power Control Level 11	21dBm +/-3dB
Power Control Level 12	19dBm +/-3dB
Power Control Level 13	17dBm +/-3dB
Power Control Level 14	15dBm +/-3dB
Power Control Level 15	13dBm +/-3dB
Power Control Level 16	11dBm +/-5dB
Power Control Level 17	9dBm +/-5dB
Power Control Level 18	7dBm +/-5dB
Power Control Level 19	5dBm +/-5dB
TX Frequency Output	
Low Channel (Ch 1)	890.2 MHz
Mid Channel (Ch 62)	902.4 MHz
High Channel (Ch 124)	914.8 MHz
TX Frequency Calculation (F_{tx})	890 + (ARFCN x 0.2) = F_{tx} MHz
TX UHF VCO Frequency	
Low Channel (Ch 1)	1160.2 MHz
Mid Channel (Ch 62)	1172.4 MHz
High Channel (Ch 124)	1184.8 MHz
TX UHF VCO Freq. Calculation (F_{tuhf})	F_{tx} + 270 = F_{tuhf} MHz
TX VCO Frequency	270 MHz
Phase Error	
Peak Phase Error	< 20 degrees
RMS Phase Error	< 5 degrees

Transmitter (PCN)

Frequency Stability	< +/- 180Hz
RF Power Output	
Power Levels	
Power Control Level 0	30dBm +/-2dB
Power Control Level 1	28dBm +/-3dB
Power Control Level 2	26dBm +/-3dB
Power Control Level 3	24dBm +/-3dB
Power Control Level 4	22dBm +/-3dB
Power Control Level 5	20dBm +/-3dB
Power Control Level 6	18dBm +/-3dB
Power Control Level 7	16dBm +/-3dB
Power Control Level 8	14dBm +/-3dB
Power Control Level 9	12dBm +/-4dB
Power Control Level 10	10dBm +/-4dB
Power Control Level 11	8dBm +/-4dB
Power Control Level 12	6dBm +/-4dB
Power Control Level 13	4dBm +/-4dB
Power Control Level 14	2dBm +/-5dB
Power Control Level 15	0dBm +/-5dB
TX Frequency Output	
Low Channel (Ch 512)	1710.2 MHz
Mid Channel (Ch 699)	1747.6 Mhz
High Channel (Ch 885)	1784.8 Mhz
TX Frequency Calculation (F_{tx})	1710.2 + (0.2 x (ARFCN - 512)) = F_{tx} Mhz
TX UHF VCO Frequency	
Low Channel (Ch 512)	1530.2 Mhz
Mid Channel (Ch 699)	1567.6 Mhz
High Channel (Ch 885)	1604.8 Mhz
TX UHF VCO Freq. Calculation (F_{tuhf})	F_{tx} - 180 = F_{tuhf} MHz
TX VCO Frequency	180 Mhz
Phase Error	
Peak Phase Error	< 20 degrees
RMS Phase Error	< 5 degrees

Receiver (GSM)

RX Frequency Input	
Low Channel (Ch 1)	935.2 MHz
Mid Channel (Ch 62)	947.4 MHz
High Channel (Ch 124)	959.8 MHz
RX Frequency Calculation (F_{rx})	935 + (ARFCN x 0.2) = F_{rx} MHz
RX UHF VCO Frequency	1160-1230 MHz
Low Channel (Ch 1)	1205.2 MHz
Mid Channel (Ch 62)	1217.4 MHz
High Channel (Ch 124)	1229.8 MHz
RX UHF VCO Freq. Calculation (F_{ruhf})	F_{rx} + 270 = F_{ruhf} MHz
RX VCO Frequency	540 MHz
Demodulation Frequency	270 MHz (540/ 2)
IF Frequency	270 MHz
BER (Bit Error Ratio)	Type II BER <2.4% at -102dBm
	Type II BER <0.1% at -15dBm

Receiver (PCN)

RX Frequency Input	
Low Channel (Ch 1)	1805.2 MHz
Mid Channel (Ch 62)	1842.6 MHz
High Channel (Ch 124)	1879.8 MHz
RX Frequency Calculation (F_{rx})	F_{tx} + 95 Mhz = F_{rx} MHz
RX UHF VCO Frequency	1535-1610 MHz
Low Channel (Ch 1)	1535.2MHz
Mid Channel (Ch 62)	1572.6 MHz
High Channel (Ch 124)	1609.8 MHz
RX UHF VCO Freq. Calculation (F_{ruhf})	F_{rx} - 270 = F_{ruhf} MHz
RX VCO Frequency	540 MHz
Demodulation Frequency	270 MHz (540/ 2)
IF Frequency	270 MHz
BER (Bit Error Ratio)	Type II BER <2.4% at -102dBm
	Type II BER <0.1% at -15dBm

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Section 3

Circuit Description

Part 1 : Receiver

The front end

The RF receive signal (GSM 935Mhz - 960Mhz, PCN 1805Mhz-1880Mhz) is input via the antenna or coaxial connector S400. The coaxial connector has a built in switch, which is used to switch between the antenna and auxiliary RF input. See *Fig.1: The Receiver.*

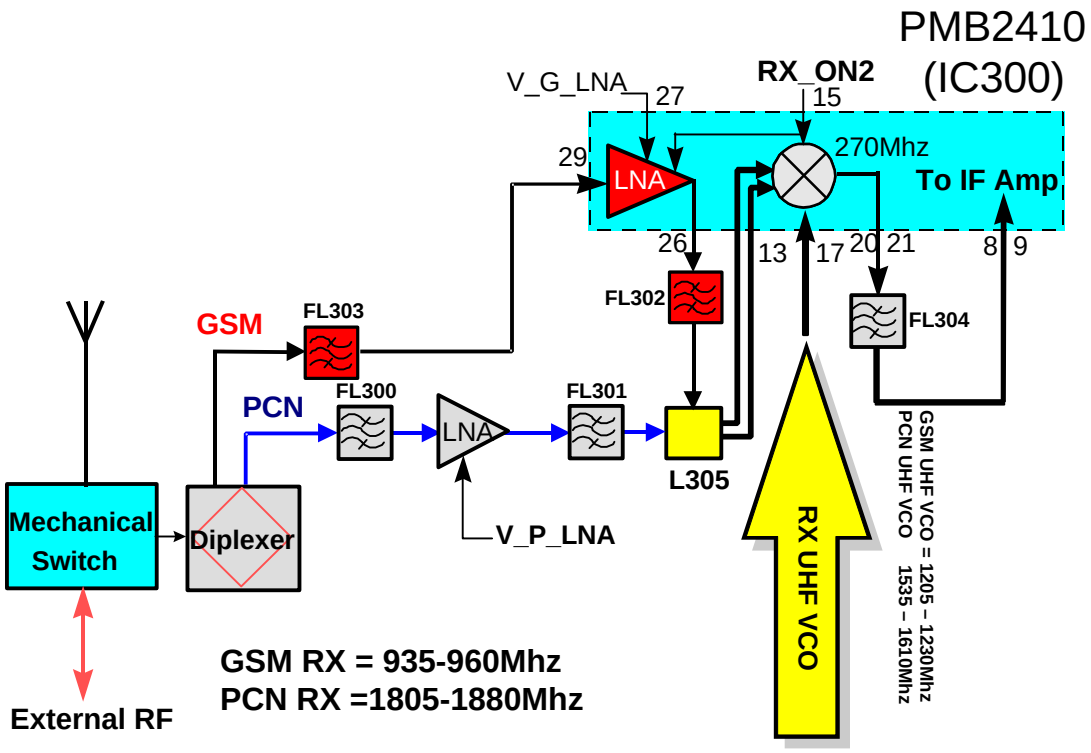
The Diplexor IC400 and D400/D401 diode packs are used to control the Tx and Rx paths. These diodes are enabled by the control signals:- GSM_PRE_ON (Tx), V_G_LNA (Rx), PCN_PRE_ON (Rx) and V_P_LNA (Tx) respectively. When combined with the diplexor they provide sufficient protection for the receiver LNA's from Tx signals. The receiver front end requires Band Pass Filter's (BPF) FL303 and FL300 to further protect the LNA's from out-of-band signals and Tx signals. For the GSM path the RF signal passes into the BPF FL303, through a matching circuit and into IC300 #29.

At this stage the signal passes through a LNA within IC300 to improve the signal to noise characteristics. This LNA is controlled by the enable supply:- V_G_LNA (derived from IC27-#29) and the output from IC300 #26 is then fed to the input of BPF-FL302. After this the RF signal is then passed to the Dual Balanced Balun-L305 for filtering and then fed via balanced outputs to IC300 #13-14 for conversion into an intermediate frequency (IF).

In the PCN path the RF signal passes through FL300 into a discrete LNA (TR300), which is controlled by the enable supply:- V_P_LNA (derived from IC27- #30) and then passed through BPF-FL301 to L305.

The interstage filters provide further out-of-band signal rejection and further image rejection. The two balanced outputs from L305 are then passed into the PMB2410 IC300 ready for conversion into an intermediate frequency.

Fig.1: The Receiver



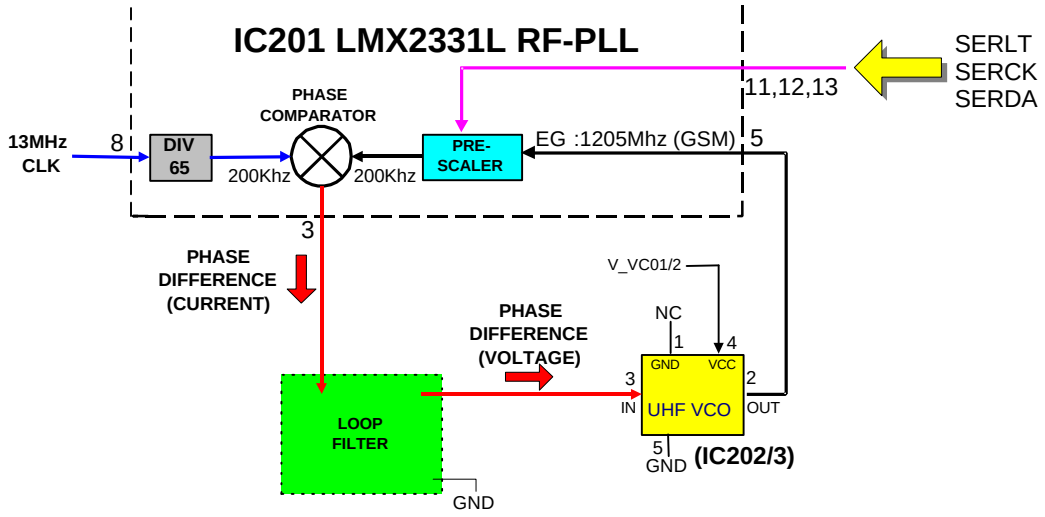
The rf signals from L305 form the inputs to the active double-balanced rf mixer of IC300 #13-#14. These are mixed with the UHF VCO (GSM 1205Mhz-1230Mhz, PCN 1535Mhz -1610Mhz) which is input to IC300 #17-18. When these two rf signals are mixed a resultant signal of 270Mhz is produced, this is the intermediate frequency (IF). The signal RX_ON2 (derived from IC27-#28) is the control input which enables the mixer. Outputs from the mixer are differential with the signals phase shifted by + and - 90 degrees. These are then fed into a Dual IF SAW filter (FL304) and then back into IC300 #8-#9.
The RX IF of 270Mhz has been selected based on the number of image response and intermodulation products in the IF band, subject also to the constraints that harmonics of the IF do not fall within any RX and TX band and harmonics of the 13Mhz TCXO do not fall in the IF band.

The differential IF signal is then fed to the IF amplifier, within IC300 (see figure.3: The IF Amp and demodulator). The gain of the amplifier is controlled by the Superchip – IC27, using 3 AGC Control lines:

SYGCDT: AGC Programming Data Line (#75)
PGCSTR: AGC Programming Enable Line (#72)
SYGCCL: AGC Programming Clock Line (#74)

These signals are output from IC27 on the logic board. The IF amp can be programmed to a range of 0dB to 70dB in 2dB steps, some 36 levels.

Fig.2:The UHF Synthesiser (RX)



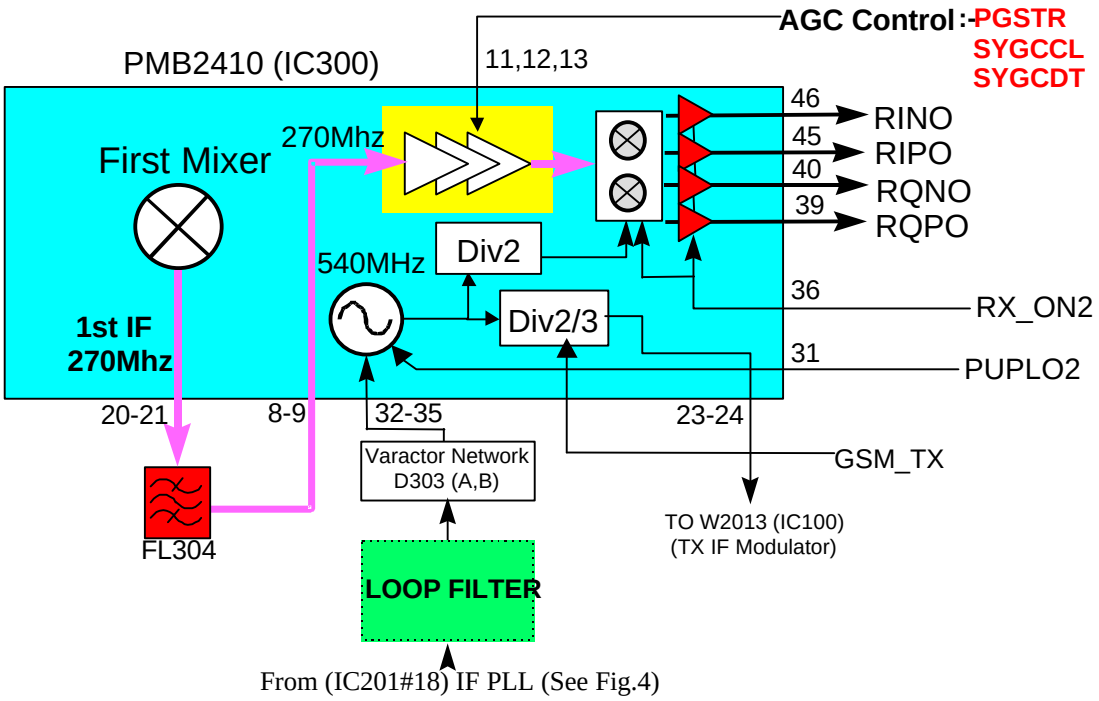
UHF Synthesiser (Rx)

The RX & TX UHF Synthesisers are implemented within IC201- LMX2331L. The RX UHF VCO output is fed to IC201 #5, where it is divided down (via a Prescalar) to a 200khz signal and input to a phase comparator. The phase comparator compares this signal with a 200khz reference signal (which is derived down from the 13Mhz clock). A current phase difference signal is produced, which is in turn converted to a voltage phase difference and filtered at the output on #3, using the loop filter:- (R205,R206,R207,C215,C216 & C217). This voltage is then applied to the control input #3 of the UHF VCO (IC202/3). This voltage determines the RX UHF VCO oscillator frequency, i.e.: RX GSM :1205 -1230Mhz / RX PCN:1535 - 1610Mhz. There are three control inputs for the UHF synthesiser:-

SERDA: Synthesiser Programming Data (#12)
SERCK: Synthesiser Programming Clock (#11)
SERLT: Synthesiser Programming Enable (#13)

The SERDA input sets and controls the Pre-scalar inside IC201, this is totally dependant on the chosen traffic channel that is active at the time.

Fig.3:The IF AMP and Demodulator

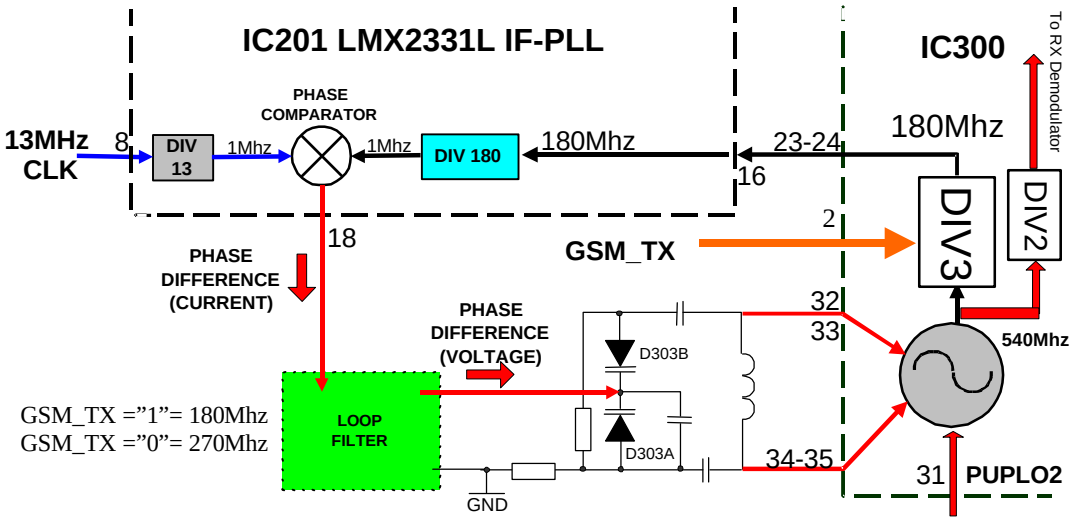


Rx I&Q Demodulator

The modulated IF signal of 270Mhz is demodulated by mixing it with another 270Mhz signal, which is derived from an 540Mhz oscillator located inside IC300. The 540Mhz is reduced by a pre-selectable divider, which can be set by the control signal GSM_TX (from IC27#23). The output from the 540Mhz oscillator is divided down by a factor of 2 or 3 to produce either a 180 or 270Mhz signal, depending on whether the mobile is in TX or RX modes . It is this signal which is mixed with that from the IF amplifier to produce the baseband I and Q signals. The I and Q signals are then buffered and fed differentially to the Superchip (IC27) for filtering and digitising.

The signal RX_ON2 (from IC27#28) enables both the demodulator and internal buffers. The signal PUPLO2 which is supplied from IC27 #26, enables the 540Mhz internal oscillator.

Fig.4:The IF Synthesiser (RX)



The RX IF Synthesiser

The IF synthesiser (IF- PLL) is contained within IC201 - LMX2331L. It is used to tune the 540Mhz TX/RX IF oscillator inside IC300.

The 540Mhz oscillator output is first divided down by a factor of 3 within IC300. This is achieved by an internal pre-selectable divider, which is set by the signal GSM_TX from IC27 #23. In receive mode the signal is high, which sets the divider to 3 so therefore the 540Mhz is reduced to 180 Mhz, which is output on pins #23 and #24. This signal is then fed to #16 of IC201, where it is then divided down by a factor of 180 to give a 1Mhz signal.

A 1Mhz reference signal derived from the 13Mhz clock is input to the phase comparator and compared with the 1Mhz signal derived from the 270Mhz signal. The phase comparator then derives a current phase difference of the two signals and outputs it to the loop filter on pin #18 of the device.

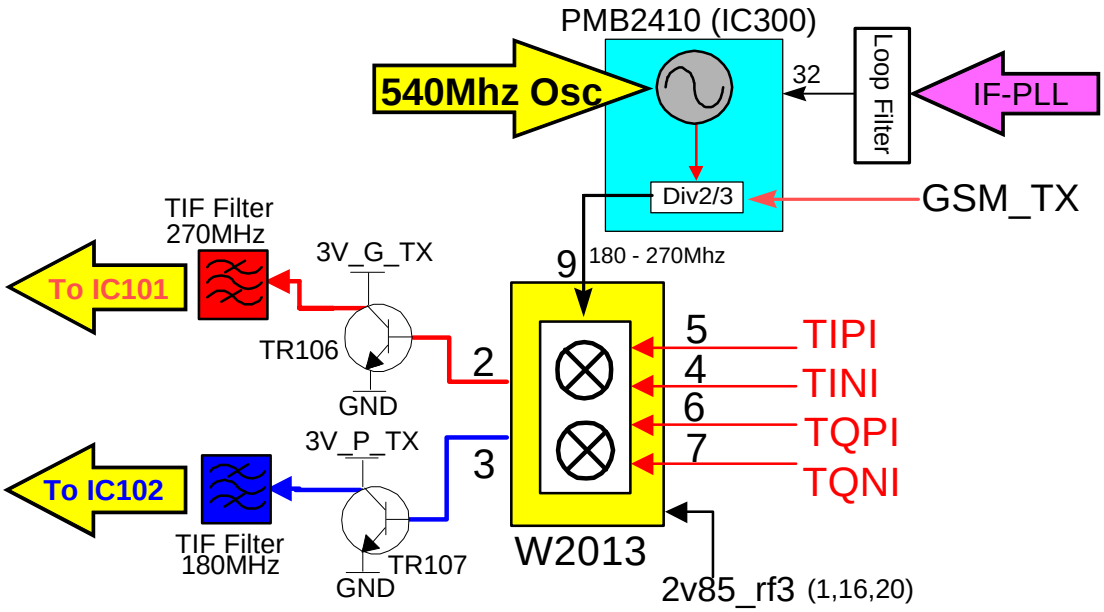
The loop filter (C218, C219, C220,R202,R204 & L205) then uses the current phase difference to produce a voltage phase difference and outputs this to the Varactor network (D303 A/B).

The Varactor network and circuit at #33-35 form part of the 540Mhz oscillator circuit, which is tuned by the phase voltage applied to the network.

The control signal: PUPLO2 from IC27 #26 is used to switch the 540Mhz signal ON or OFF.

Part 2 : Transmitter

Fig.5:TRX -The TX IF Modulator W2013 (IC100)



The TX IF Modulator

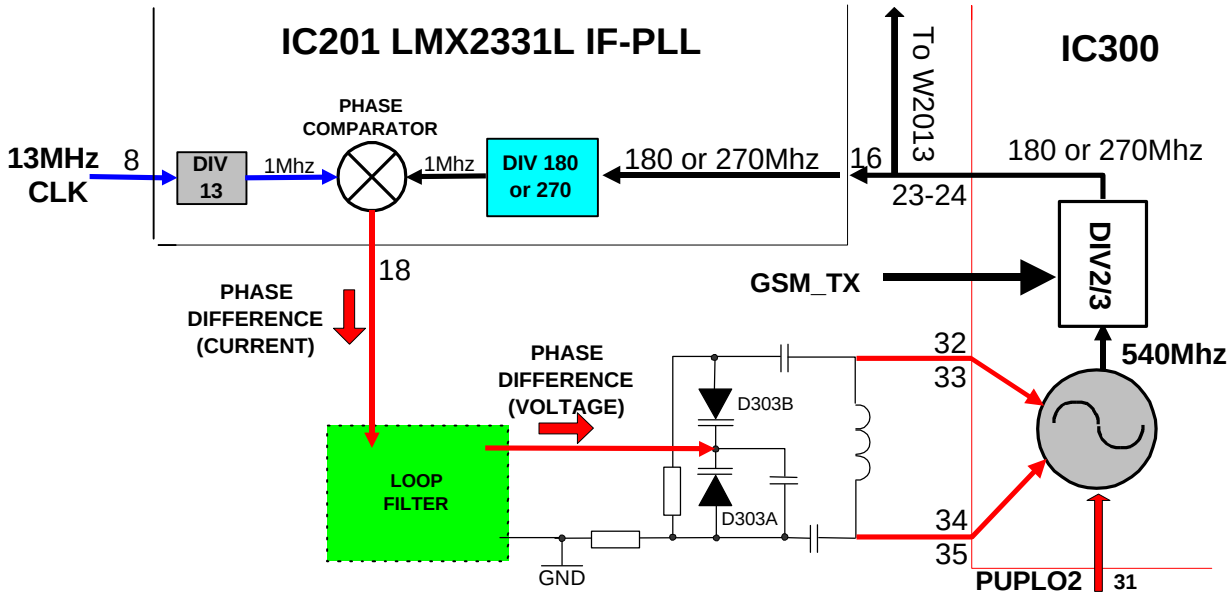
The TX I & Q signals from IC27 #86-89 are fed to #4-7 of the W2013 TX modulator (IC100), where they are then modulated onto either a TX IF of 270Mhz (for GSM- TX) or 180Mhz (for PCN-TX) by the quadrature mixer inside IC100.

The signal TX LO IF (180-270Mhz) is input on #9 of IC100 (W2013) from (IC300) #24. This signal is produced by the internal 540Mhz oscillator within IC300, which has been divided down by a factor of 2 for GSM-TX or 3 for PCN-TX. This division factor is set by the control signal GSM_TX from IC27 #23.

The TX modulated IF signal of 270Mhz is output on #2 of IC100 for GSM or a modulated IF signal of 180Mhz is output on #3 of IC100 for PCN.

Pre-amp transistors TR106 and TR107 amplify the signal and then pass it through to BPF's: FL100 or FL101 for filtering and then after to the RF Mixer's (IC101 or IC102).

Fig.5: The IF Synthesiser (TX)



The TX IF Synthesiser

TX IF Synthesiser(IF-PLL) is the same PLL as used in the RX process and is located within the LMX2331L (IC201). In this case the synthesiser is used to tune the 540Mhz TX IF oscillator inside IC300.

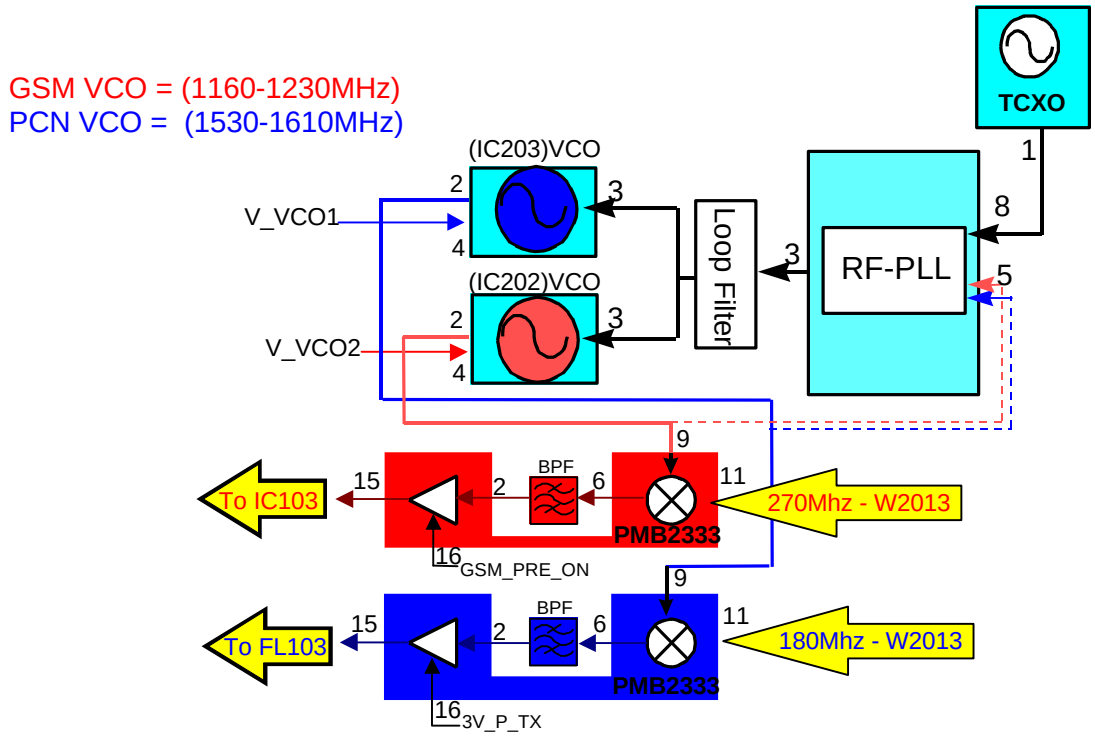
The 540Mhz signal from IC300 is divided by a factor of 2 (for GSM) to produce a 270Mhz signal or divided by 3 (for PCN) to produce a 180Mhz signal.

This signal is then fed to #16 (IC201) and #9 (IC100) the TX modulator.

At IC201, it is divided down further by a factor of 180 or 270, dependant on which tx band the mobile is set to. This produces a 1Mhz signal which is then input to a phase comparator where it is compared with a 1Mhz signal derived from the 13Mhz clock to produce a current phase difference signal. This signal is output from IC201 on #18 to the loop filter (C218, C219, R202, C228, R283, R204 & L205), which aswell as filtering the signal also converts it to a phase difference voltage. The phase difference voltage is then applied to the varactor network (D303 A/B).

The varactor network forms part of the 540Mhz oscillator circuit inside IC300 and is tuned by the applied voltage.

Fig.6: The UHF Mixer / Amplifier (IC101 / IC102)



The UHF Mixer Amplifier

The PM2333 IC's (IC101/102) converts the IF modulated signal to RF and incorporates an active double-balanced mixer.

The modulated TX IF signal GSM(270Mhz) or PCN(180Mhz) is mixed onto the GSM(890Mhz-915Mhz) or PCN(1710Mhz-1785Mhz) TX RF frequency.

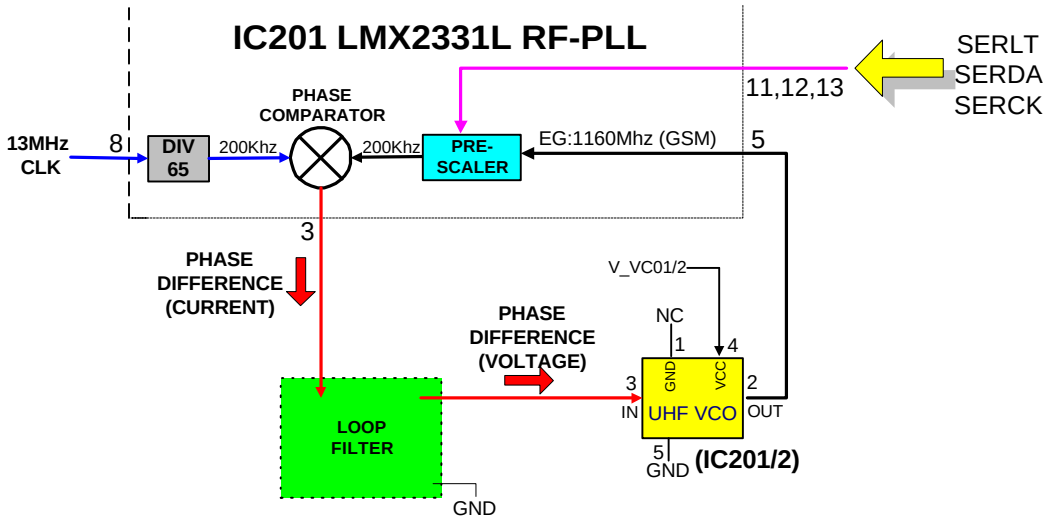
This is achieved by mixing the TX IF signal with the TX UHF VCO output from IC202 for GSM and IC203 for PCN.
Hence:-

GSM TX = UHF VCO – 270 ie, (1160 – 270 = 890Mhz)
PCN TX = UHF VCO +180 ie, (1530 + 180 = 1710 Mhz)

The modulated RF signal is then output on #6 to a BPF and then re-enters the PMB2333 (IC101/102) at #2. The RF modulated signal is then amplified by the pre-driver within the PMB333 IC .GSM_PRE_ON and 3V_P_TX are control lines for the pre-driver amplifier.

The RF signal is then output on #15 of the PMB2333 and passed through another stage of filtering (BPF:FL103) and pre-amplified via IC103/104 before the power amplifier stage (See *Fig.8: The P.A. Circuit and its Control*).

Fig.7: The UHF Synthesiser (TX)



The TX UHF Synthesiser

The TX UHF Synthesiser (RF-PLL) is the same as the PLL used in the RX and is contained in the LMX2331L (IC201).

In TX mode the TX UHF VCO output is fed to #5 (IC201) and then pre-scaled down to 200khz.

The phase comparator within IC201 compares this signal with a 200khz signal derived from the 13Mhz clock and outputs a current phase difference at #3.

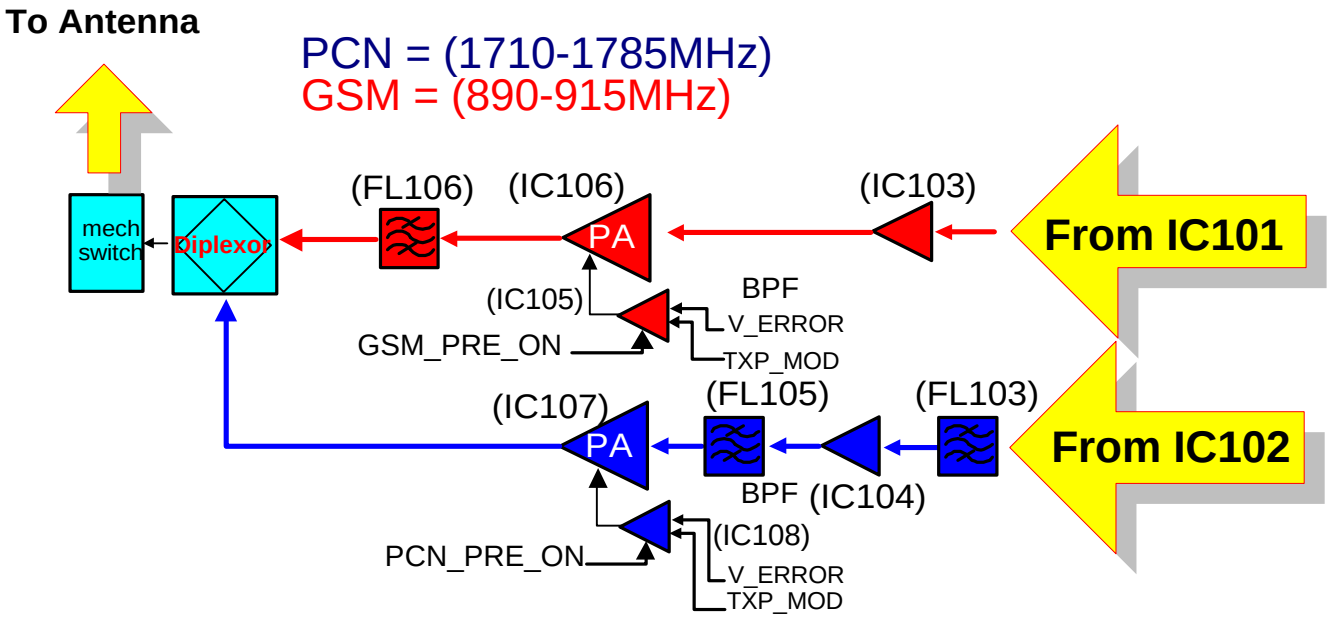
A loop filter then converts this signal into a voltage phase difference and feeds it to #3 (IC201) or (IC202).

The voltage phase difference determines the UHF VCO frequency i.e. GSM TX 1160Mhz -1185Mhz, PCN TX 1530Mhz - 1610Mhz .

Three control inputs are used in the UHF Synthesiser SERDA, SERCK, SERLT. It is the SERDA control input which initially sets the TX VCO frequency. This is totally dependent on the chosen traffic channel the logic circuit has selected at the time.

Part 3 : The P.A. Circuit and its Control

Fig.8: The Power Amp Circuit



The P.A Circuit and its control

The power amplifier control circuit ensures that the RF signal is regulated to the required limits of operation.

The TX RF signal is input on #1(IC106) or (IC107) and the power amplifier outputs the signal at #4.

IC105 and IC108 are op-amps, which output a control signal to the P.A.

Power control is carried out by measuring the current drawn by the P.A (see *Fig.9: P.A Circuit Control*). The current drawn by the P.A. is directly proportional to the output power and is measured as a voltage drop across a known resistance path or “Fixed Control Loop Stripline”. This consists of a 47mOhm resistor (R144) for GSM or two resistors in series, a 47mOhm (R144) and 27mOhm (R136) for PCN.

The voltage drop (V_ERROR) is then integrated by the operational amplifier (IC108) to give an error voltage, which regulates the TXP signal.

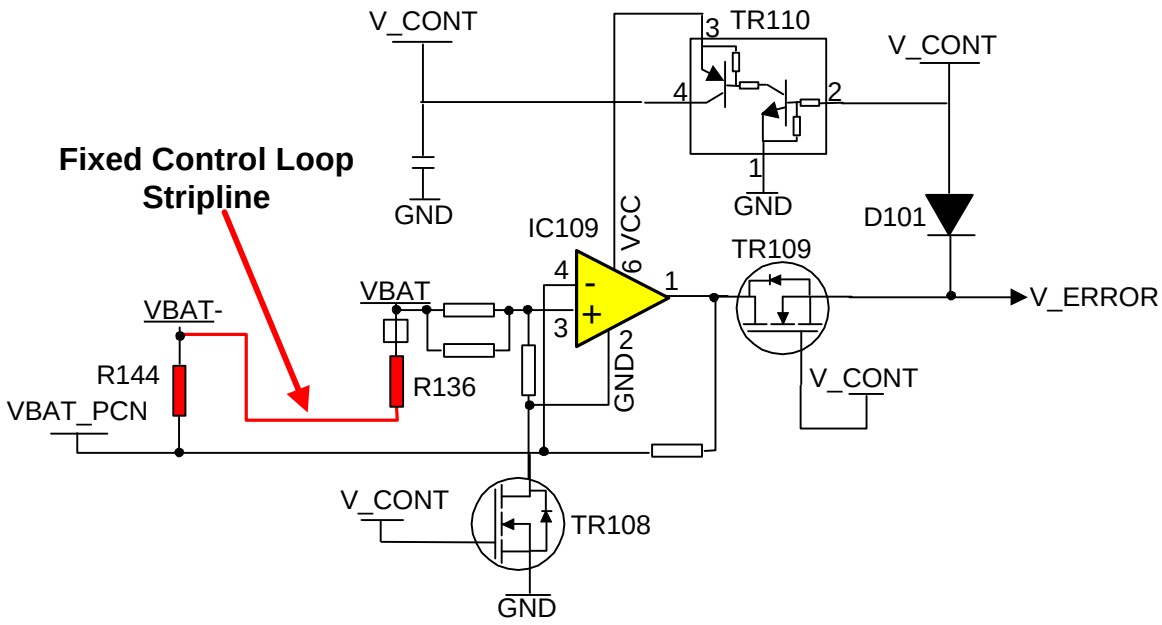
The TXP input signal to the power control circuit is generated by the IC27 #90. TXP provides a limit for the frequency spectrum caused by burst modulation.

The signals 3V_P_TX and 3V_G_TX are controls supplies used to enable the two power control op-amps IC105 and IC108.

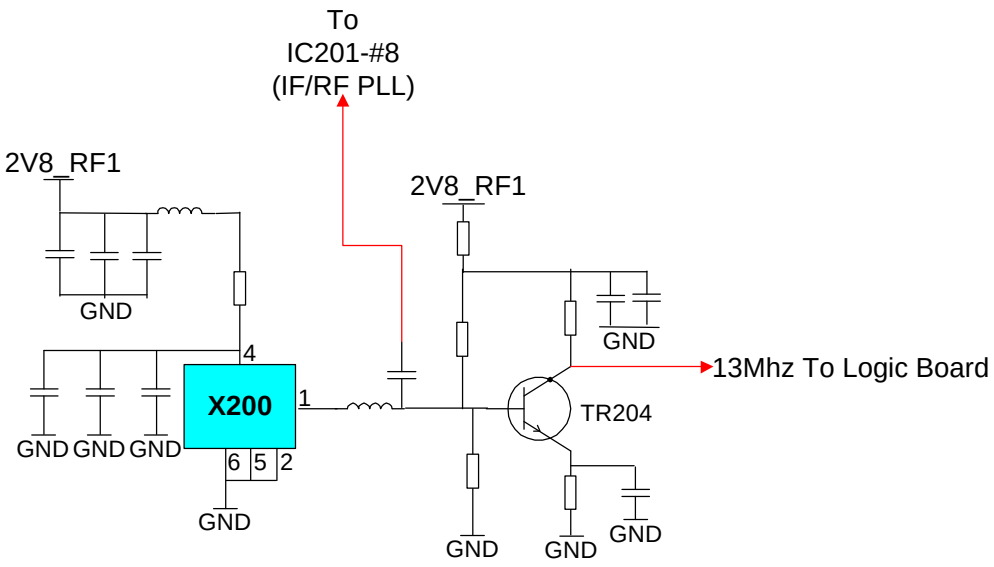
The output from the P.A follows the TX path, which uses the control supplies:- GSM_PRE_ON or PCN_PRE_ON to enable the TX switching diodes D400/D401. The RF signal then passes through the diplexor and onto the antenna.

The diplexor is tuned to the GSM or PCN duplex spacing so enabling selectivity between GSM and PCN Rx or Tx.

Fig. 9. The PA Control Circuit



Part 4 : 13Mhz Clock



The 13Mhz-clock (X200) consists of a TCXO (Temperature Compensated Crystal Oscillator) which oscillates at a frequency of 13Mhz.

It is used within the LMX2331A Synthesisers on the TRX board and also in the Superchip and Nell on the logic board.

TR204 and TR205 buffer the output to the logic board.

Part 5: Power Supplies and Control signals (RF Board)

5.1: MicroMoe IC204 – Power Supply IC

The RF section has its own dedicated power supply device called: MicroMoe. This is a smaller version of the ASIC MiniMoe, which is located on the logic board. MicroMoe performs all power supply requirements of the RF circuitry, except for a dedicated 5-volt supply (5VRF) for the UHF VCO's which is supplied from MiniMoe. The device consists of three voltage regulators that supply the power rails for the RF circuits and is supplied from VBAT. See: *Fig.6.C: Power Supplies MiniMoe (IC19) & MicroMoe (IC204).*
MicroMoe provides the following outputs:-

2V8_RF1	(Regulator 3): 2.85V RF supply for the 13Mhz clock and LMX2331 synthesiser.
2V8_RF2	(Regulator 2): 2.85V RF supply which supplies V_G_LNA and V_P_LNA.
2V8_RF3	(Regulator 1): 2.85V RF supply used in the transmitter circuitry.

There are two enable signals which control the regulator's:-

TCXO_ON	Enables supplies: 2V8_RF1 and 2V8_RF2. Signal derived from NELL #P2.
TX_ON	Enables supply: 2V8_RF3, signal derived from IC27 #17.

5.2: Control signals and additional power supplies

The RF board has the following additional voltage supplies and control signals.

5V_RF	Regulated 5V supply for the VCO circuits and to supply V_CONT. 5V derived from MiniMoe on logic board.
V_CONT	Switched version of the 5V_RF. This is supplied to the power control circuitry and is switched on a frame before the TX burst.
V_G_LNA	Switched version of 2V8_RF2 to power the GSM LNA and the RX switching diode: D400.
V_P_LNA	Switched version of 2V8_RF2 to power the PCN LNA and RX switching diode: D401.

GSM_TX	Control signal from IC27 #23 which switches the 2V8_RF3 supply to give 3V_G_TX. It also sets the internal frequency divider inside IC300.
PCN_TX	Control signal from the superchip, which switches the 2V8_RF3 supply to give 3V_P_TX.
3V_G_TX	Switched version of 2V8_RF3 to power the PMB2333 IC in the GSM TX path.
3V_P_TX	Switched version of 2V8_RF3 to power the PMB2333 IC in the PCN TX path.
GSM_PRE_ON	Switched version of 2V8_RF3 used to turn on the preamplifier MMIC (µPC2771) in the GSM TX path and the TX switching diode: D400 .
PCN_PRE_ON	Switched version of 2V8_RF3 used to turn on the preamplifier MMIC (µPC2771) in the PCN TX path and the TX switching diode: D401.
GSM_LNA	Control signal from the IC27 #29 which switches V_G_LNA.
RX_ON2	Control signal for the 1st mixer, RX demodulator and internal buffers.
PCN_ON	Control signal from IC27 #19 which switches 2.85V through to PCN_PRE_ON.
GSM_ON	Control signal from IC27 #18 which switches 2.85V through to GSM_PRE_ON.
PRE_ON	Control signal from IC27 #22 which switches 2.85V through to GSM/PCN_PRE_ON.

Part 6: Logic Circuit Description

This section describes the architecture and hardware functionality of the logic circuit. The logic circuit performs the following functions:

- Channel coding/ decoding
- Speech coding / decoding
- Data encryption
- Layer 1,2 and 3 software tasks
- I/O System interface
- SIM interface and management
- Audio and tone control
- Vibrator control
- Power supply and battery management
- RF power control
- Synchronisation
- Real time clock
- Key-Pad control and scanning
- LCD control and driver

The logic and RF circuits are primarily controlled and administered by two main devices, these being:-

- "Superchip"- CSP and DSP Combined (IC27)

  The "Superchip" combines the functions of both the CSP and DSP in a single package. The device performs channel and speech coder/decoder tasks, equalisation, encryption, frame timing, A/D conversion, RF power control and audio interfacing, including tone generation.

- Nell - (IC8)

  Nell incorporates the main CPU for the mobile and controls the functions; Layer 1,2 and 3 software, the SIM, system interfaces, real time clock, buzzer, vibrator, battery management, Key-Pad scanning and LCD control. Nell also controls the integrated power supply devices:- "MiniMoe" and "MicroMoe" .

The Logic circuit is divided into six main functional areas:

1) Superchip (CSP and DSP combined)
2) Nell and CPU Memory
3) Battery Interface and Power Supply
4) Keypad, Display and SIM
5) Audio and Miscellaneous Interfaces
6) System Connector - P5

6.1 “Superchip” (CSP and DSP combined) - (IC27)

The superchip is the interface between the RF circuitry, the audio circuits and the digital domain. It also carries out layer 1 signal processing, this includes data coding/decoding, data interleaving/de-interleaving, error detection/correction and provides burst generation data. Unlike previous versions of DSP package which used external static random access memory (SRAM) devices for data storage of signal processing operations. The superchip incorporates its own internal 8K * 16 RAM capability to perform these functions.

The device has the following control functions and connections:-

- Transmit power control
  O/P: The signal TXP (#90) controls the ramp shape from the RF Power amplifier.

- Transmit I and Q outputs
  O/P: TIPI,TINI,TQPI and TQNI (#86-89)

- Digital Audio Interface
  O/P: DAICK, DAIRN, DAIDI and DAIDO (#6-9)

- Control outputs for the RF Circuit
  O/P: VCO_ON (#16) : Power enable for VCO
  TX_ON (#17) : Power enable for transmit circuitry
  GSM_ON (#18): Power enable for GSM circuitry
  PCN_ON (#19) : Power enable for PCN circuitry
  PRE_ON (#22) : Power enable for RF pre amplifier
  GSM_TX (#23) : Power enable for GSM TX path
  PCN_TX (#24) : Power enable for PCN TX path
  PUPLO2 (#26) : Power enable for 2nd local Osc
  RX_ON1 (#27) : Power enable for RX circuitry
  RX_ON2 (#28) : Power enable for RX circuitry
  GSM_LNA (#29) : Power enable for GSM RX path
  PCN_LNA (#30) : Power enable for PCN RX path

- RF Synthesiser controls - (IC201)
  O/P: SERLT (#12) : Synthesiser data latch enable
  SERCK (#13) : Synthesiser data clock
  SERDA (#14) : Synthesiser serial data

- 13MHz system clock
  I/P: 13MHz (#59)

- Receive I and Q inputs

  I/O: RQNO, RQPO, RINO and RIPO (#77-80)

- Audio outputs for hands free operation

  O/P: RXAF- and RXAF+ (#95-96)

- Audio output to earpiece

  O/P: AOUTN and AOUTP (#93-94)

- Audio inputs from microphone

  I/P: MICOUT and MICIN (#4-5)

- Audio inputs for hands free operation

  I/P: TXAF- and TXAF+ (#98-99)

- Tone Generation

- GMSK modulation, transmit frequency correction

- Digital to analogue conversion of the transmit I and Q signals

- A/D and D/A conversion / gain control for audio inputs/outputs

- Serial Interface to NELL

  This is a direct serial I/O interface to the NELL device used to pass data destined for the PCMCIA interface:

  I/O: ICK (#67), OCK (#70)
  OLD (#71), ILD (#66), OBE (#63),
  DSP RXD (#64) and DSP TXD (#65)

- Parallel Host Interface (PHIF) to CPU in NELL

  The DSP communicates with the CPU in NELL via a dedicated interface called the (PHIF) Parallel Host Interface:

  I/O: PB0-PB7 (#32-40) = Data I/O lines to CPU
  POBE (#47), OE (#43) and WE (#41) = Interface control

- Receiver IF Gain Control

  The DSP sets the receiver IF gain to IC300 via control signals:

  O/P: PGCSTR (#72) - Receiver gain control
  SYGCCL (#74) - Receiver gain control clock
  SYGCDT (#75) - Receiver gain control data

- Interrupt generation to NELL

  I/O: This bit I/O port performs interrupt control of NELL: EXTINT(#73)

- Superchip interrupt and reset inputs

  The superchip has the following interrupt and reset inputs:

  I/P: DSP INTO (#48) - DSP Interrupt 0
  DSPRSTB (#50) - DSP Reset bar

- JTAG test interface

  The JTAG interface provides extensive test and diagnostic functions to be utilised in the repair process. This is controlled by:-

  I/O: TCK (#54) - JTAG test clock
  TMS (#55) - JTAG test mode select
  TDI (#57) - JTAG test data input
  TDO (#56) - JTAG test data output

- Supply and ground connections

  +3VSC = (#10,21,36,49,62 & 92)
  +3VAUDIO = (#2,85,58)
  GND = (#11,20,31,42,52,69,76,91 & 61)
  AGND1 = (#1)

A functional block diagram of the Superchip can be seen in Figure 10a.

6.2 NELL

The NELL device is an in-house designed ASIC (Applications Specific Integrated Circuit) which has been developed to replace the existing Albert and CPU devices currently used in G9 and G9D. The NELL performs the following functions:-

-
- CPU
- CPU Interface
- Interrupt Controller
- Baseband Power Control
- Keypad Control
- Display Interface
- EEPROM Interface
- SIM Interface
- Buzzer Control
- UART control/interface: (Universal Asynchronous Receiver Transmitter)
- PCMCIA Data Interface: (Personal Computer Memory Card International Association)

- I/O System Connector Interface - P5
- Analogue Signal Measurement
- Charge Control
- Real Time Clock
- CPU Timers

The NELL is divided into two main function blocks:-

1. The Isolated Logic Block (ILB)
2. The CPU core, peripherals and interfaces.

6.2.1 The ILB Block

The ILB's main functions are:-

- To control and monitor the application of power to various key sections of the mobile, which creates the various power saving conditions.

- A real time clock (RTC) with programmable alarm

- Event detection/monitoring of the following:
    1. A key-board entry
    2. The power key being pressed
    3. Charger voltage being applied to the mobile
    4. The external sense line being activated
    5. RTC alarm
    6. Data being received from either the PCMCIA card or the hands free kit via the system connector.
    7. Keyboard scanning and decoding
    8. Isolation, reset and power control of the SIM interface
    9. Control through a external device register that allows the display, CPU RAM and Flash ROM CS lines to be activated.

A functional block diagram of NELL can be seen in Figure 10b

6.2.2 The CPU, Peripherals and Interface

The remainder of NELL performs the following functions:-

- CPU and ARM interface (Advanced Risk Machine)
- Address decoding and data multiplexing
- Timer and watch-dog timer generation
- Serial interface to and from the SIM
- UART administration for the system connector serial port
- Pulse width modulator used to drive the buzzer;

- A 5 channel 8 bit A/D converter used for battery management and to measure the pcb temperature

6.3 CPU Memory

Flash PROM - (ICI 5)
An 8Mbit programmable ROM which is capable of being written to while still in circuit. Contains all the main command software for the HHP

Static Random Access Memory (SRAM) - (IC9)
A 16 bit (64k by 16) temporary memory device which is used by NELL for CPU program execution.

EEPROM - (IC10)
A 4Kbyte electrically erasable and programmable ROM, which communicates via the EECLK / EEDAT (#5-6) lines to NELL. It contains all the user memories and calibration data.

The location of these devices relative to NELL can be seen in Figure 10b.

6.4 Battery Interface and Power Supply

6.4.1 Battery Monitors and PCB Temperature Interface

The HHP can monitor the state of the battery through the battery interface connector P8. This can be done during both normal and charging operations. The battery provides a number of interface connections that enable the HHP to determine the battery type, its capacity, temperature and whether it is possible to re-charge the cell(s). The thermister (R124) which is attached to the logic board pcb is used to produce an analogue reading of the board's own surface temperature. The P8 connector provides a connection between the battery power contacts VBAT/GND to the RF board and BATTEMPMON/BATID battery monitoring circuits to the battery. IC30 #2 provides the bias/reference supply: VREF for these analogue monitors and is also fed to IC29.

Battery voltage monitoring (BATVMON) is performed by the circuit:IC30/IC29, with the output of the regulator IC30 #2 feeding the comparator IC29 #3. IC29 uses this input as a stabilised voltage reference level, which it compares to VBAT to produce the analogue output BATVMON. This output is then supplied to NELL #M9 for A/D conversion. BATVMON enables the HHP to measure the battery voltage and hence determine how much charge remains in the cells.
The remainder of the analogue inputs from these circuits are also fed to NELL for A/D conversion.

These monitor’s being :-

BATTEMPMON (Battery Temperature Monitor) - NELL (#L9)
BATID (Battery Identification) - NELL (#N9)

The battery pack includes an internal thermister, which is used to produce the analogue signal BATTEMPMON. This enables the HHP and external charger to determine the battery temperature, which is used to protect the battery from overheating while charging.

Figure 10a. CSP and DSP Functional block diagram

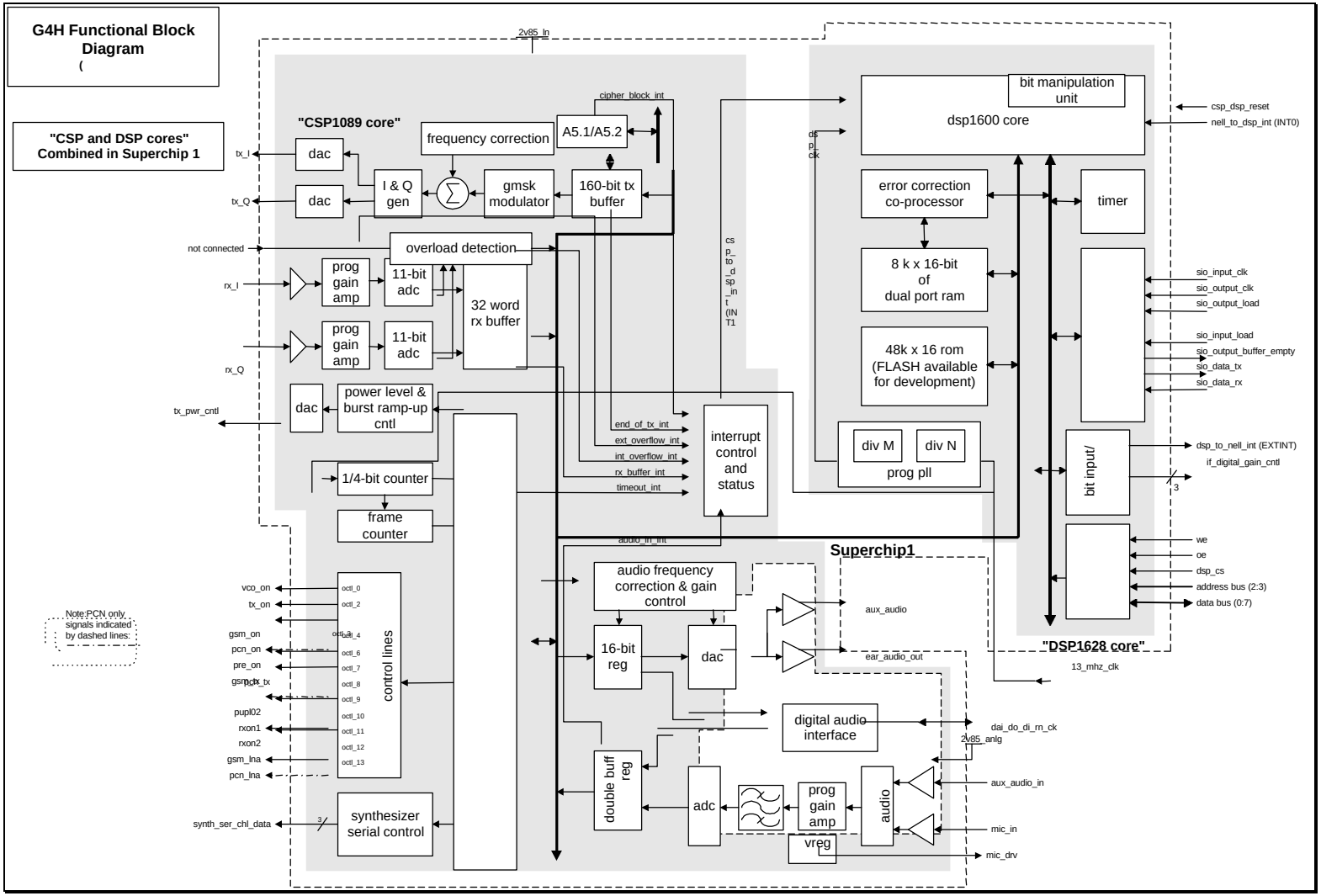
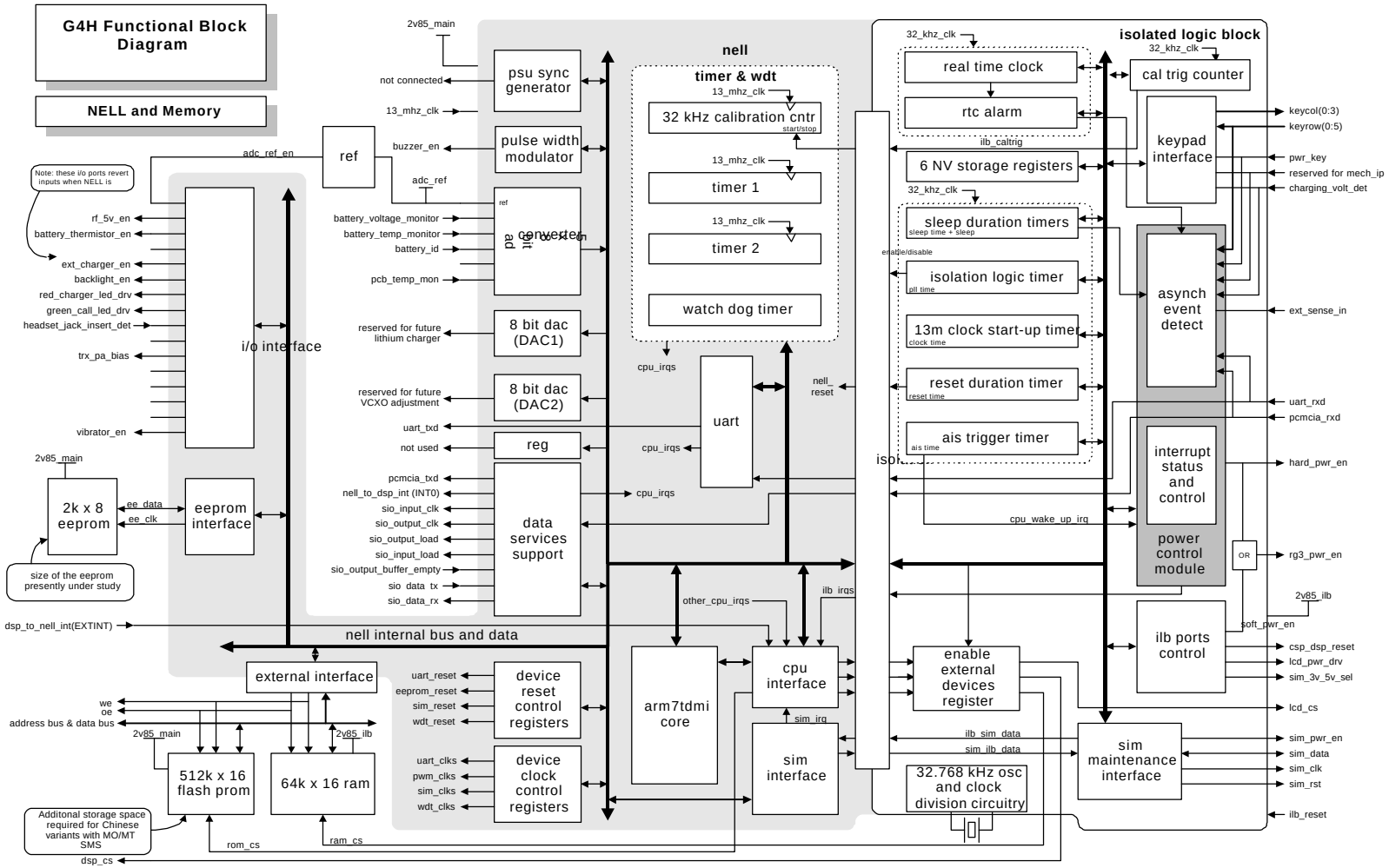


Figure 10b. NELL and Memory



6.4.2 Power Supply

MiniMoe - (IC19)

MiniMoe is a dedicated power supply, which provides most of the power requirements for the logic circuit. The RF section has its own dedicated power supply device MicroMoe which is separate to MiniMoe, except for a dedicated 5 volt supply (5VRF) for the VCO's. MiniMoe consists of six voltage regulators that supply the power rails for the logic circuit.
MiniMoe provides the following functions:-

- Generation of a reset pulse to ILB - when battery voltage is at cut-off threshold (2.85V- 3.1V) or UVLO2- (Under Volts Lock Off 2).
- A function that disables the regulators 2, 3, 5, 6 and 7 when the battery voltage is less than UVLO2.
- Back-up battery management: (BUB - #12)
- ILB power supply: (+3VILB - #31)
- Logic supply rail: (+3VNELL - #3)
- SIM supply, configurable between 3 and 5 volt operation: (SIMVCC - #6)
- Dedicated 5 volt supply for the transceiver VCO: (5VRF - #10)
- A low noise regulator for the handset audio and CSP analogue sections: (+3VSC -#4) and (+3VAUDIO - #2)

With the exception of regulator 1, each of these regulators can be controlled by individual enable signals. These are configured as shown in Figure 6c and table1.

Regulator outputs.

Regulator	Pin	Voltage	Powers	Enable Signal/PIN
Regulator 1 +3VOILB	31	2.85 ±0.15V	ILB part of NELL CPU, RAM, LCD	Supplied from battery
Regulator 2 +3VNELL	3	2.85 ±0.15V	NELL, Flash ROM, EEPROM & 13MHz Oscillator	HARD_PWR(28)
Regulator 3 +3VSC	4	2.85 ±0.15V	SC1 digital circuitry	+RG3VPWR(21)
Regulator 5 SIMVCC	6	3.0 ±0.15V 4.75 ±0.25V	SIM	SIMPWR(20) SIMVSEL(18)
Regulator 6 +5VRF	10	5.0V± 0.25V	VCO	5VRFON(19)
Regulator 7 +3VAUDIO	2	2.85 ±0.15V	CSP Audio circuitry	+RG3VPWR (21)

Table1. - MiniMoe

6.4.3 Reset :- ILBRST / UVLO2

The MiniMoe generates a reset pulse (active low) to the NELL (#L4 -ILBRST) when it detects that the battery voltage is below the UVLO2 threshold of (2.85V- 3.1V). The device also disables internal regulators R2, R3, R5, R6, and R7, this then holds the ILB in reset mode, allowing only the real time clock to run. When the battery is recharged or replaced the ILB reset pulse is reversed and the regulator's re-activated.

There is another under volt lock off point (UVLO1) which is activated when the battery voltage reaches the range of between (2.6V-2.85V). This then disables regulator 1 (ILB/RTC regulator) and via the output pin (BUB-#12) drives the external FET TR25, which switches ILB/RTC supply over to the back-up battery BATT1.

6.4.4 Power Control

The ILB section of NELL performs the power control management of the HHP. It is this power control management that enables the HHP to execute its power saving functions. The ILB runs the 32kHz clock and controls the transition of the HHP between various power modes.
The ILB controls the power mode(s) of the HHP via two signals:

1. +RG3VPWR
   This connects to MiniMoe (IC19) #21 (EN3). A high on this pin switches regulator 3 (+3VSC) on thus powering IC27and the SRAM (IC9).
   A low switches it off.

2. HARD_PWR
   This connects to MiniMoe #28 (EN2). A high on this pin switches regulator 2 (+3VNELL) on thus powering the NELL (IC8), the flash ROM (IC15), and the EEPROM (IC10). A low switches it off and powers down NELL etc.

3. SIMPWR (NELL#L5)
   This output from NELL connects to MiniMoe (IC19) #20. A logic high switches The output SIMVCC (#1) to on, and supplies power to the SIM connector(#6).

4. SIMVSEL (SIM Voltage Select) (NELL#L3)
   This output from NELL connects to MiniMoe #18. A logic high on this pin selects the SIMVCC supply voltage to either 3v or 5v.

5. +5VRFON
   This output from NELL connects to MiniMoe #19. A logic high on this pin switches the output +5VRF on and is then fed to the RF board.

There are four main power states that the HHP can be set into. These are :-

1. ILB Reset

When the battery is disconnected (or very low), the ILB is held in a reset state via the generation of an ILB reset pulse from MinMoe (UVLO2OUT-#22). Only the real time clock remains in operation. The rest of the HHP, including the NELL and 3VSC supply, is powered off. Hence the ILB will not respond to any asynchronous event such as key-presses etc. In this mode the ILB may be powered from the back-up battery if the main battery voltage is too low e.g. (<UVLO1 threshold, 2.6V-2.85V).

2. Hard off

In this mode a charged battery has been fitted or re-charged to a level greater than the UVLO2 threshold (2.85V-3.1V) or the charger connected. The ILB is operational, but the remainder of the HHP, including the NELL, flash ROM, EEPROM and the main 3VSC supply is powered down.

3. Soft off

In Soft off mode the CPU in NELL has removed power from large portions of the HHP's circuitry and the 13mhz clock is also disabled. This is achieved by the suspension of the HARD_PWR (NELL#P2) signal which inturn di-activates both regulator 2 internal to MiniMoe and IC204 (MicroMoe). The ILB has a "sleep " function that allows its operation to be suspended for short periods of time.
If while the ILB is in "sleep" mode an asynchronous event is detected such as: keypad press etc, then it will automatically re-activate and continue operation.

4. On

In this mode all the logic circuit is powered and the RF sections are switched on as required.

The different modes and power states are illustrated in table.2

Functional Block	Table 2 - DB2000 Power States			
	ILB Reset	Hard Off	Soft Off	On
13 Mhz clock and driver	OFF	OFF	OFF	ON
RF	OFF	OFF	OFF	RF sections powered on as needed.
CSP	OFF	OFF	In Idle state	ON
DSP	OFF	OFF	In S/W stop mode.	ON
NELL (ILB)	ON	ON	ON	ON
NELL (CPU)	OFF	OFF	OFF	ON
EEPROM	OFF	OFF	OFF	ON
CPU FLASH ROM	OFF	OFF	OFF	ON
CPU SRAM	OFF	OFF	ON	ON
SIM	OFF	OFF	ON	ON
LCD DISPLAY	OFF	OFF	ON	ON
LED's	OFF	OFF	OFF	ON
Back-Light	OFF	OFF	OFF	ON
Back-up Battery	Powering ILB	Kept charged from the battery via Reg 1.	Kept charged from the battery via Reg 1.	Kept charged from the battery via Reg 1.

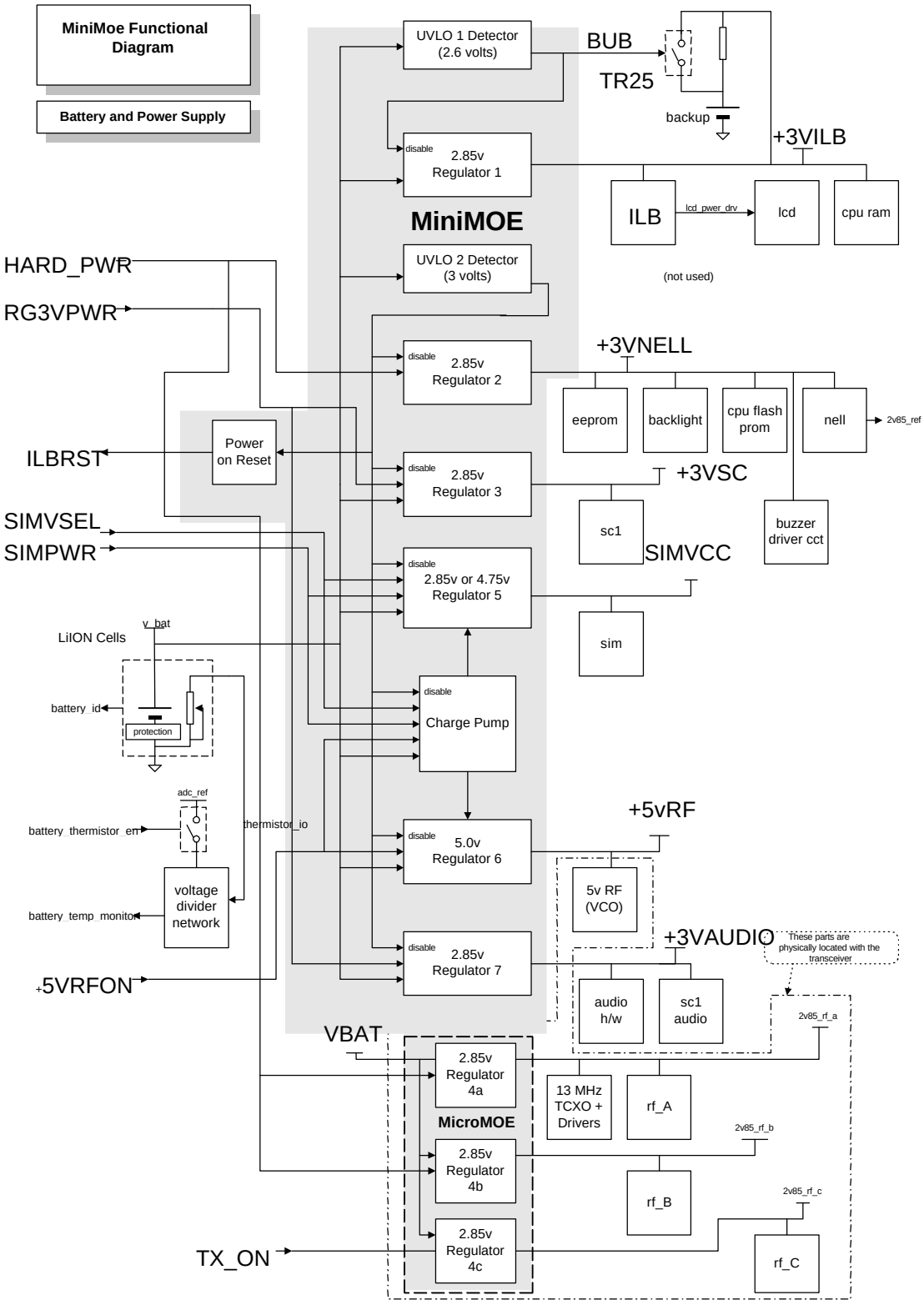


Figure 10c. Power Supplies MiniMoe (IC19) & MicroMoe (IC204)

6.4.5 Power Up

Power up of the mobile can be initiated by one of three ways:-

1. Power Key Press

The Power key button is connected to the input KEY1 of NELL #H2. The input (KEY1) has an internal pull-up resistor, which is grounded, when the power key (SW20) is pressed. This then causes a failing edge on the input, which generates an interrupt to ILB notifying it that the power key has been pressed.

2. Power up through the I/O connector - SNSINT

When an external accessory is connected to the HHP an interrupt is generated on the SNSINT input (#7) of the system I/O connector (P5). This interrupt is then received by ILB (#P3) of NELL (EXTSENSE).

3. Alarm Wake up

If the alarm wake up has been set by the user and it activates, then an interrupt is generated internal to NELL and the HHP initiates its power up routine.

When an interrupt is detected by NELL from one of the aforementioned inputs then the ILB circuit will commence its power up routine. The ILB will firstly output a high voltage on HARD_PWR (#P2), this is then fed to the input EN2 (#28) on MiniMoe which in-turn activates regulator 2 internally and this then powers up the +3VNELL line. The NELL, flash PROM, and EEPROM will now power up. The HARD_PWR signal also activates the power supply “MicrMoe” (IC204) which supplies the outputs:2V8_RF1, 2V8_RF2 and 2V8_RF3 to sections of the RF circuitry.

The ILB then sets the RG3VPWR (NELL- #H1) line high, which enables regulator’s 3 and 7 internally within MinMoe (EN3 - #21). Both the +3VSC and +3VAUDIO lines are now activated and so power up the CSP, DSP, SRAM (IC9) and Audio. Once the main control devices are active the ILB enables +5VRFON (#19) and SIMPWR (#20) to power up the 5VRF and SIMVCC lines.

6.4.6 Power Down

When the power key is pressed the interrupt is detected by KEY1 (#H1) on NELL, which outputs a low voltage onto the HARD_PWR, RG3VPWRN, 5VORFON and SIMPWR control lines. This in-turn switches off the regulator’s 2, 3, 5, 6, 7, and MicroMoe (IC204), thus powering down the HHP. The power down sequence is done in stages, so as to ensure that all data and control operations are accomplished in order and to prevent data corruption.

6.5 Keypad, Display and SIM Interface

6.5.1 Keypad and Display

The keypad and display forms part of the logic board and consists of the following:

- Key switches (4 [N1]x 5 Matrix)
- LCD module (72 x 32 Graphical based display module)
- Back-Light illumination (10 green LED's, six for keys and four for the LCD)
- Indicator LED (Red/Green bicolour LED, to indicate charging and call status)

All control and I/O interface to the keypad and display is performed by the Nell device.
The Key switches, LCD module, Backlights, Call / charger LED's and SIM interface are shown in Figure 10d.

6.5.2 Keypad switches and Scanning

The key switches are metal domes which make contact between two concentric pads on the top layer of the PCB when pressed. There are 18 switches (SW1-18), connected in a matrix of 5 rows by four columns, as shown in fig 10d, except for the power switch (SW20) which is connected independently. Two additional momentary action push-button switches are mounted on a flexible PCB on the side of the handset and connected to the row/column matrix by three gold pads (SW21). These perform the volume "UP" and "DOWN" functions.

The row and column lines of the keypad are connected to ports on the ILB section of Nell. The rows (KEYROW: 0-5) are inputs with 50kΩ pull-up resistors, while the columns (KEYCOL: 0-3) are outputs. When a key is pressed, the corresponding row and column are connected together, causing the row input to go low and generate an interrupt. The columns/rows are then scanned by Nell to identify the pressed key.

6.5.3 Display and Interface

Power to the LCD is controlled by NELL #N3 and can be switched on and off via ILBPORT0 (LCDPWR). A high on this output powers the LCD; a low switches it off. There is also the control output LCDCS which is also derived from NELL #N3, this acts as the chip select enable for the LCD module. There is also a 20 way address bus, which carries the address coding information for displaying graphical text onto the LCD. In addition to the address bus there is also a 15-way data bus for relaying display data to the LCD. The connections DE (Data Enable) and WE (Write Enable) from NELL #H11/H14 perform data enable and write enable functions.
See Figure.10d: KeyPad, Display and SIM Interface

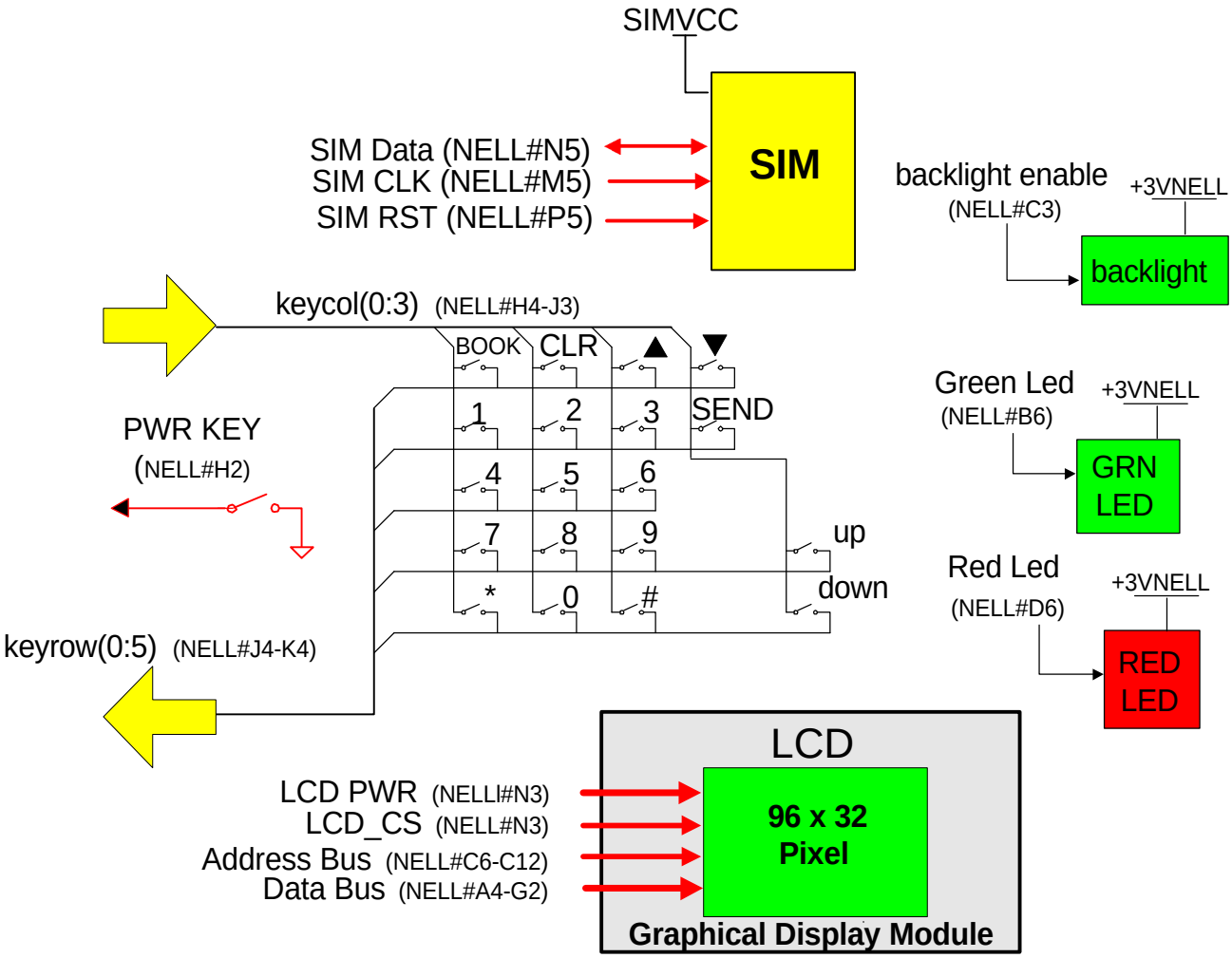


Figure.10d: KeyPad, Display and SIM Interface

6.5.4 SIM Interface

The SIM interface includes a voltage level shifting circuit, which allows the DB2000 to operate with both 3 and 5 volt SIMs.The SIM interface is managed by NELL via five control signals:

1. SIMPWR (NELL#L5)
This output from NELL connects to MiniMoe (IC19) #20. A logic high switches the output SIMVCC (#1) to on, and supplies power to the SIM connector(#6).

2. SIMRST (NELL#P5)
This output connects to the SIM connector (#2). It provides a reset function on the SIM card when performing data operations.

3. SIMCLK (NELL#M5)

This output connects to the SIM connector (#3). It is used to clock data to and from the SIM card and can be switched off when not required in order to save power.

4. SIMDT (NELL#N5 - SIMDATA)

This output connects to SIM connector (#6). All data to and from the SIM Card is transferred along this line.

5. SIMVSEL (NELL#L3)

This control signal from NELL is used to select the operating voltage of the SIM card. Setting the SIMVSEL high switches regulator 5 in MiniMoe to 5v which in turn is output to the SIMVCC rail. A low switches the SIM supply to 3v.

6.6 Audio and Miscellaneous Interfaces

The audio and miscellaneous interfaces include the following:

1. Microphone
2. Ear-piece
3. Hands free Interface
4. Buzzer driver
5. Battery charging circuit
6. Vibrator
7. Simple Hands Free Interface (SHF)

6.6.1 Microphone

The microphone is mounted in the handset front cover and connects to the logic board via two sprung contacts on the P5 connector. The audio signal is passed to the logic board and to pin D4 of the P6 Simple Hands Free (SHF) socket. Inside the socket there is a miniature switch which is closed when there is no SHF connected. With this switch closed this allows the audio signal through to the MIC IN (#4) pin of IC27. The voltage supply VREG is output from IC27 #3, and is a bias voltage for both the MIC Audio path (through R156) and +TXAF lines.
See *Figure:10E. Audio and Miscellaneous Interfaces*

The microphone or TXAF signal is then A/D converted by the CSP part of Superchip (IC27). The digitised speech is then passed to the DSP section of IC27 for processing (coding, interleaving etc.). The coded speech data returns to the CSP for GMSK modulation, D/A conversion and output as TXI and TXQ signals – IC27 #86-89 - to the W2013 transceiver (IC100) for modulation onto the air interface.

6.6.2 Earpiece

The earpiece is driven directly from IC27 AOUTP(#94) and AOUTN(#93) pins. The gain is controlled by the DSP software element within IC27. The earpiece is located in the handset front panel, and the signals are routed to it via two connection pads on the front of the logic board.

RXI and RXQ signals from IC300 (PMB2410) are fed to IC27 #77-80 (Superchip) where they are amplified and then A/D converted. The I and Q samples are stored in lots of 32 before the DSP part of Superchip (IC27) is interrupted to process them. The DSP will carry out error detection and correction, and assemble the speech data into a form acceptable to the D/A converter in the CSP section. After D/A conversion the signal is output on IC27 #93/94) - earpiece - and / or #95/96) - RXAF.

6.6.3 Hands-Free Interface

The audio out (RXAF+/-) to the hands-free kit consists of a pair of differential signals from IC27's auxiliary outputs (#95-96), which are tracked down the board to the system connector (P5) at the base of the handset.

The audio in (TXAF+/-) from the hands-free is converted to a single signal using the op-amp (IC13). The bias voltage VREF from IC27 #3 is used as a reference voltage for this amplifier. The TXAF signal is then input to the AUXIN (#99) of IC27. The DC level of the signal is supplied to the AUXOUT pin.

6.6.4 Buzzer Driver

The buzzer or alerter is a piezo-electric transducer which is driven by a pulse-width modulated square wave from the PWMOUT output of NELL (#M14). TR4 and TR11 amplify the signal in order to achieve the specified loudness of 100dBa.
See *Figure:6E. Audio and Miscellaneous Interfaces.*

6.6.5 Battery Charging

The battery is charged via a constant 850mA current source, which is plugged into the DC jack in the system connector P5 #2. Charge control is implemented in software using the analogue to digital converter in NELL. It then determines the type and capacity of the battery connected by reading the battery ID resistor (BATID), on an A/D converter port, from which it determines the charging algorithm. When an external charging source is connected via the P5 connector an interrupt signal EXTCHG is sent to NELL #N4. When NELL receives this interrupt it initiates the charger enable signal CHGEN, this action switches on TR28 which activates FET –TR3. When TR3 is conducting it allows the battery to be charged. Battery charging current is measured by means of a fixed loop stripline or "shunt" which is mounted internally within the layers of the PCB. When

charging the stripline gives a voltage value directly proportional to the charging current of the battery, this voltage CHGSENSE is sent to NELL #P9 on a A/D converter port, from which it determines the charge current. See G4H Logic circuit diagram, page 1.

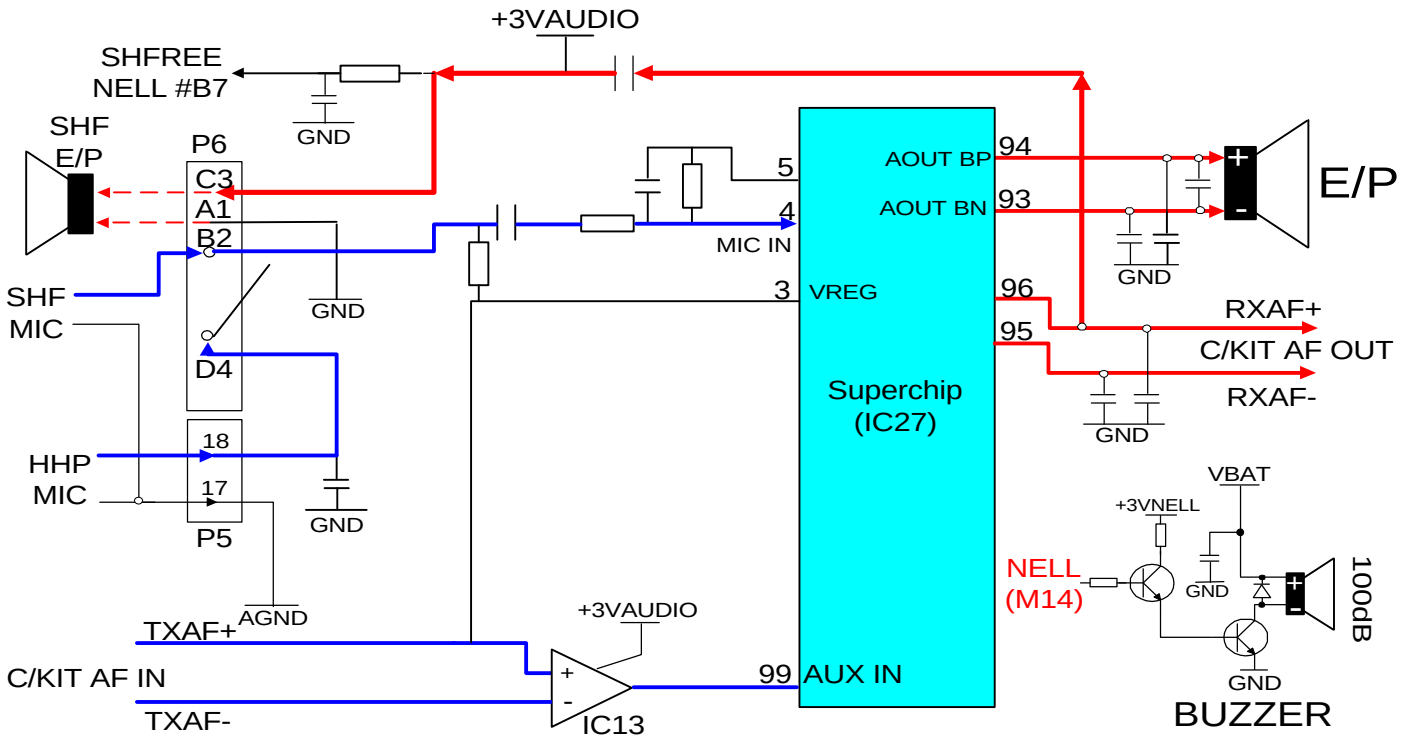
6.6.6 Vibrator

The vibrator is located on the board to board shield and is connected to the logic board via a connector cable, which plugs into socket: P2-A1 & P2-B2. The vibrator is driven by the signal VIB, which is output from NELL (#F2). The signal is amplified by the transistors TR4-B and TR12 and is supplied from VBAT.
See G4H Logic circuit diagram, page 2.

6.6.7 Simple Hands Free Interface

The simple hands free (SHF) interface allows the user to communicate via a single earpiece, which fits into the ear and a mic, which is joined to the interface cable. The SHF lead is connected to the DB2000 via a small jack plug, which plugs into a socket mounted into the side of the mobile. When the SHF lead is plugged in, the mobiles mic and earpiece are disconnected. When the SHF lead is not connected, the mobiles internal microphone (connected across:P5- #17 & #18) output passes through a switch (normally closed) fitted inside the SHF socket (P6- #B2 & #D4) and onto IC27 #4 for processing. If the SHF lead is connected then the switch contact is opened, thus disconnecting the mobiles own internal mic.
The SHF earpiece connects across contacts C3 and A1 of the P6 connector. The output RXAF+ of IC27-#96 provides the audio output for the SHF earpiece. The mobile detects that the SHF is connected by the monitoring the voltage level at the point:SHFREE (NELL # B7), which is biased by the supply +3VAUDIO. When the SHF earpeice is connected the voltage level at the point SHFREE is taken low by the earpeice, which connects it to ground by the contact: A1 of the P6 connector. NELL will then instruct IC27 to disable the mobiles audio outputs (#93-94) and instead route the audio through the auxiliary output:RXAF+ (#96) to the SHF earpeice.

Figure.10E: Audio and Miscellaneous Interfaces



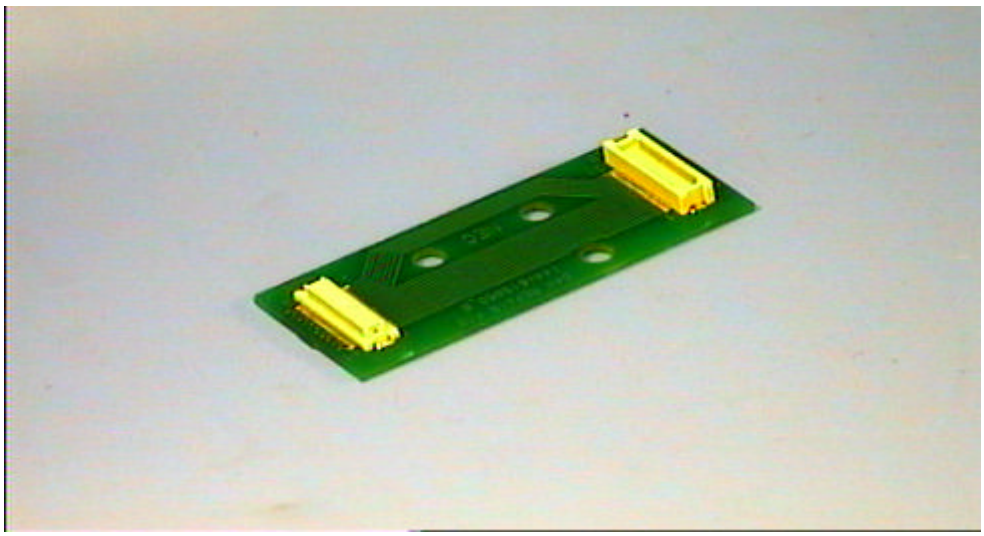
Section 4

Servicing

Part 1: Cables, Jigs and Fixtures

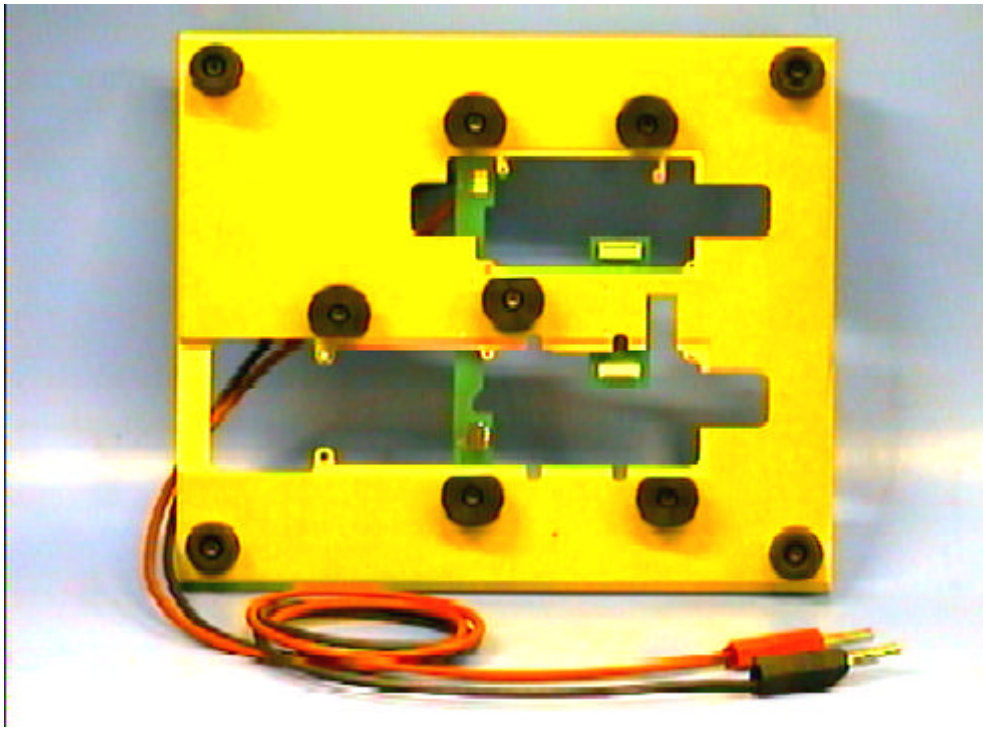
Detailed below are a range of cables, jigs and fixtures available for use on repair and test/calibration stations.

1.1 Inter-board Connector Assembly (M5-SP0104)



This provides the connection between the logic and the TRX boards, while the HHP is disassembled. It allows maximum access to both sides of the boards for fault finding and repair.

1.2 Repair Fixture (M5-SP0109/A)



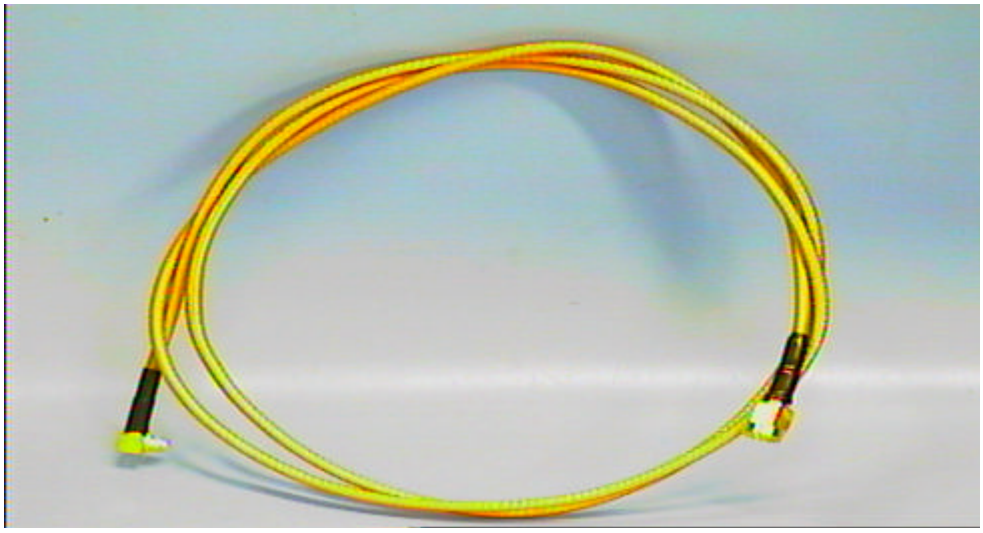
This provides a stable platform for both the logic and TRX boards, while undertaking repair and fault finding. It is designed to allow access to both sides of the boards and should be used in conjunction with the Inter-board Connector Assembly.

1.2a Repair Fixture (M5-SP0109/B)

The upgraded repair fixture allows for a more comprehensive test. The fixture incorporates a microphone, earpiece and sim test facility.

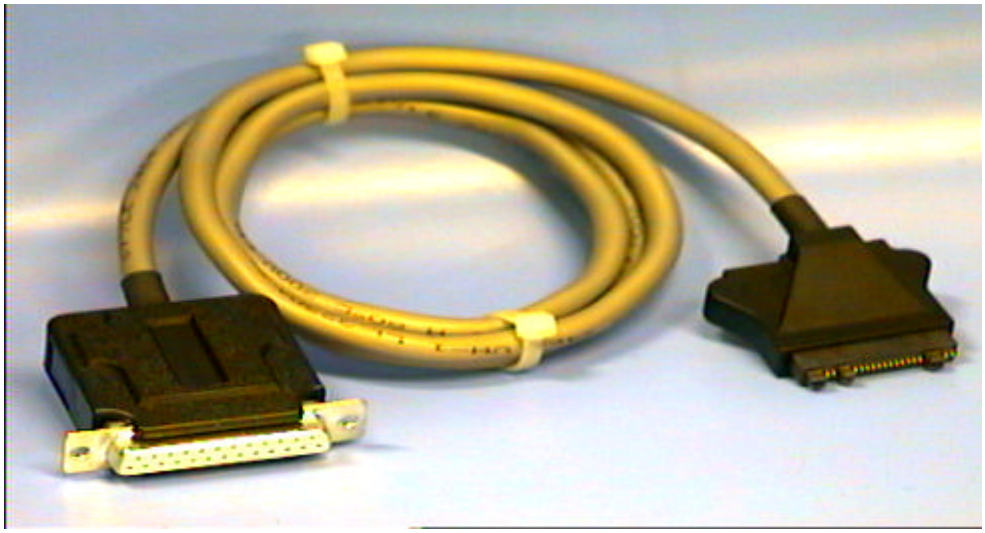
NOTE: The microphone, earpiece and sim test facility is also available as a separate upgrade, ***(M5-SP0109/C).***

1.3 RF Measuring Cable (M5-SP0100)



This provides a RF connection to the HHP for signal monitoring/injection or HHP call sequence testing. It is approx. 1metre in length and is terminated in a SMA connector.

1.4 Data Test Cable (M5-SP0101)



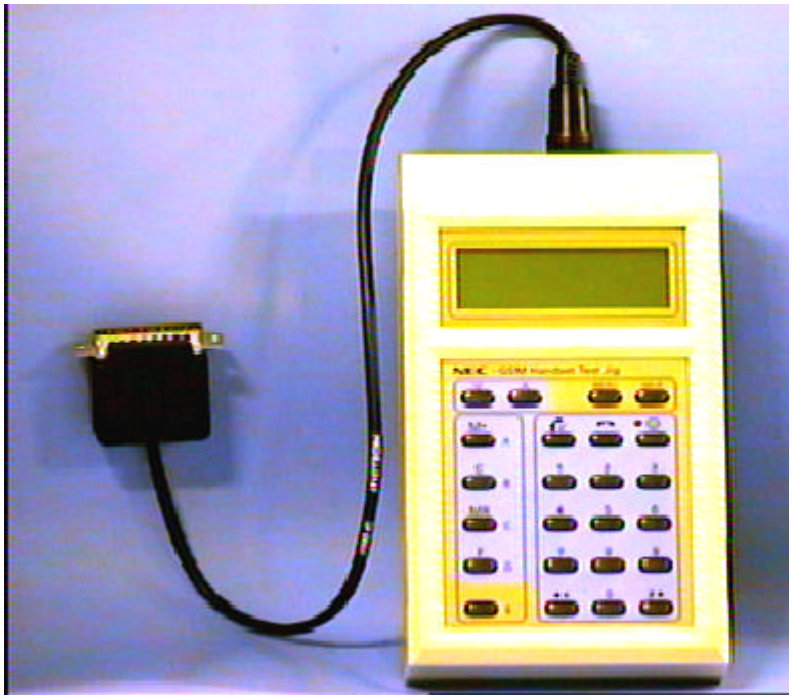
The Data cable can be used on both repair and test/calibration systems to enable control of the HHP through the I/O port.

The data cable will be terminated with a 25-way female D-type connector for compatibility with the test-box or PC.

1.5 Dummy Battery (M5-SP0102)

The *Dummy Battery* will supply d.c. power to a fully assembled HHP. It can be connected to a d.c. power supply or to the *GSM Test Jig*.

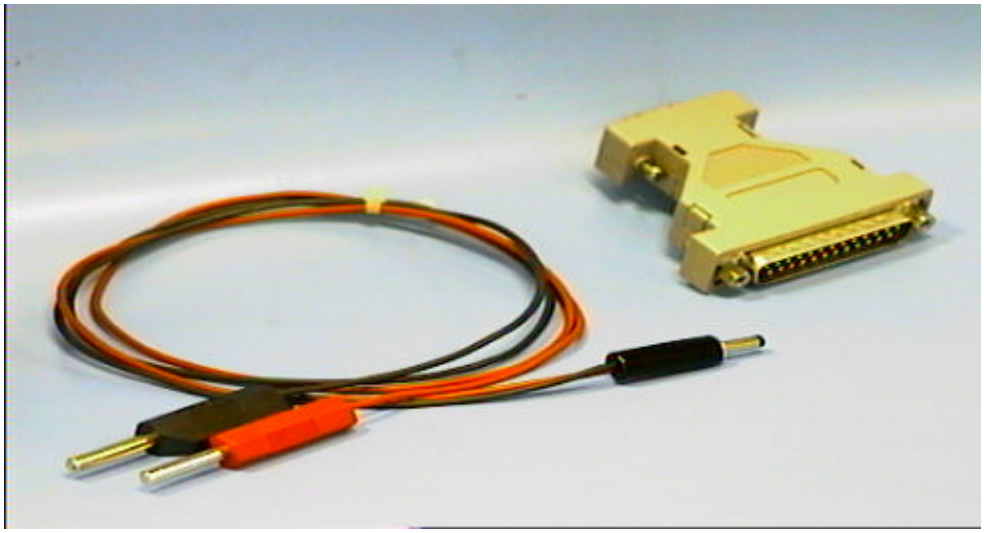
1.6 GSM Test Jig (M5-SP0110)



This unit enables Test Mode on the HHP and allows entry of commonly used test sequences via a menu system. It also provides remote operation of the HHP keypad.
The LCD unit indicates the menu status and displays information from the HHP LCD.
A 5v supply is required.

This unit is for use on a repair bench in conjunction with:
DC Power Leads, Dummy battery, RF and Data Test Cable

1.7 DB2000 Serial Level Converter (M5-SP0106)

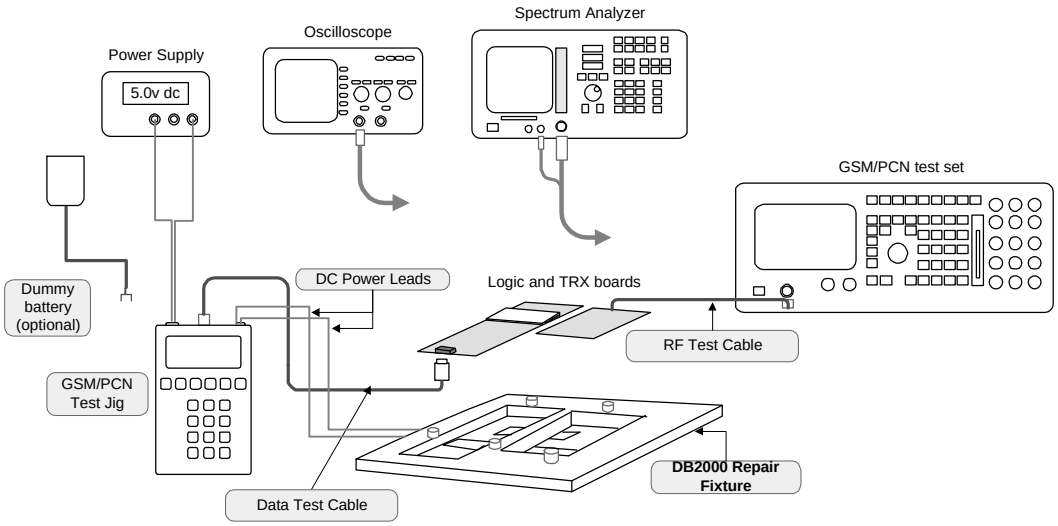


The DB2000 Serial level converter acts as a 25 to 9 way interface between the PC controller and the HHP in the test/calibration system.
The DB2000 Serial level converter requires an external 3.8V supply. The D.C socket and lead with banana plugs is used to supply the converter.

Part 2: Equipment configurations

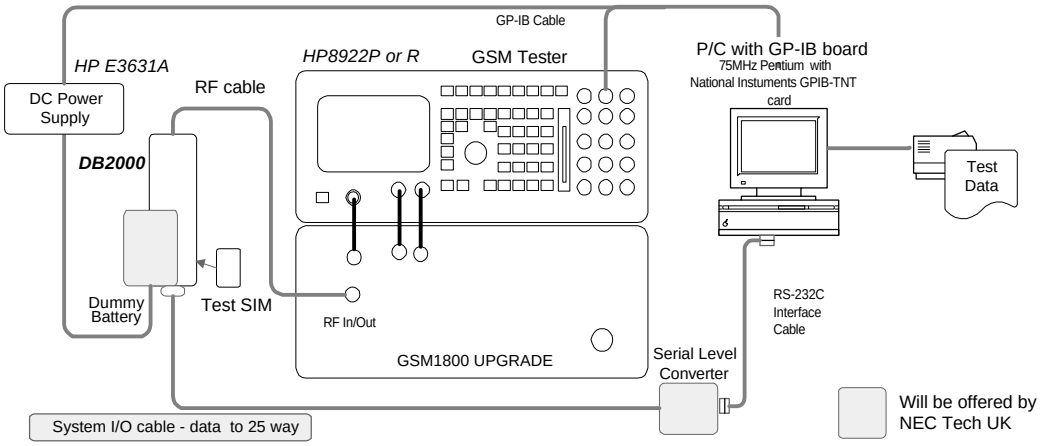
The test equipment configurations for repair, test/calibration and simple functional testing are shown below. Where specific items of test equipment are required, make and model numbers are quoted.

2.1 Repair bench configuration



This configuration is only an illustration of the types of equipment required. The requirement for a Spectrum Analyser in each set up will be dependent upon which GSM Test Set is chosen.

2.2 Test/calibration configuration



This configuration is essential for component level repair, as calibration of RX and TX circuits is required on every repair. The system will be controlled by software provided by NEC Technologies (UK) Ltd, which supports the equipment detailed in the illustration. This equipment is:

• GSM Test Set	Hewlett Packard	HP8922P or R
• DC Power Supply	Hewlett Packard	HPE3631A
• Controlling PC	A minimum specification of P133/16Mb RAM. Windows NT 3.5 A HP-IB board should be fitted.	
• Flash down-loader	NEC Tech (UK)	M5-SP0107
• System I/O cable	NEC Tech (UK)	M5-SP0101
• Dummy battery	NEC Tech (UK)	M5-SP0102
• Serial Level Converter	NEC Tech (UK)	M5-SP0106
• RF Cable	NEC Tech (UK)	M5-SP0100
• GPIB Card	National Instruments	ATGPIB/TNT
• GPIB Cables	Double shielded GPIB Cables	
• N-Type to SMA Adapter		
• GSM Test Sim		
• Printer and Cable	Centronix Printer (Optional)	

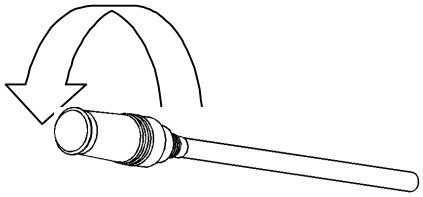
The calibration items are:

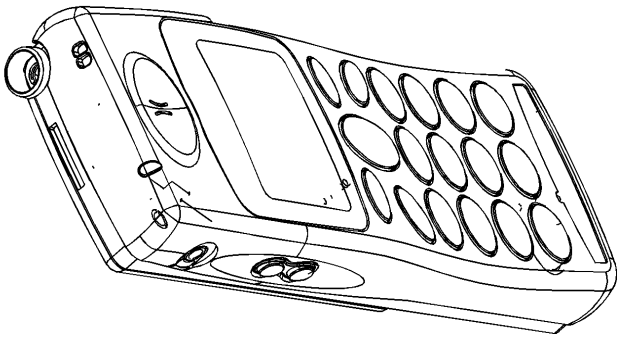
- TX power vs. time template at GSM power levels 5 to 15 and PCN power levels 0 to 15
- Receiver signal path loss compensation

Part 3a: Disassembly

Caution: Ensure an Anti-Static strap is worn and connected to an earth bonded bench before handling any components.

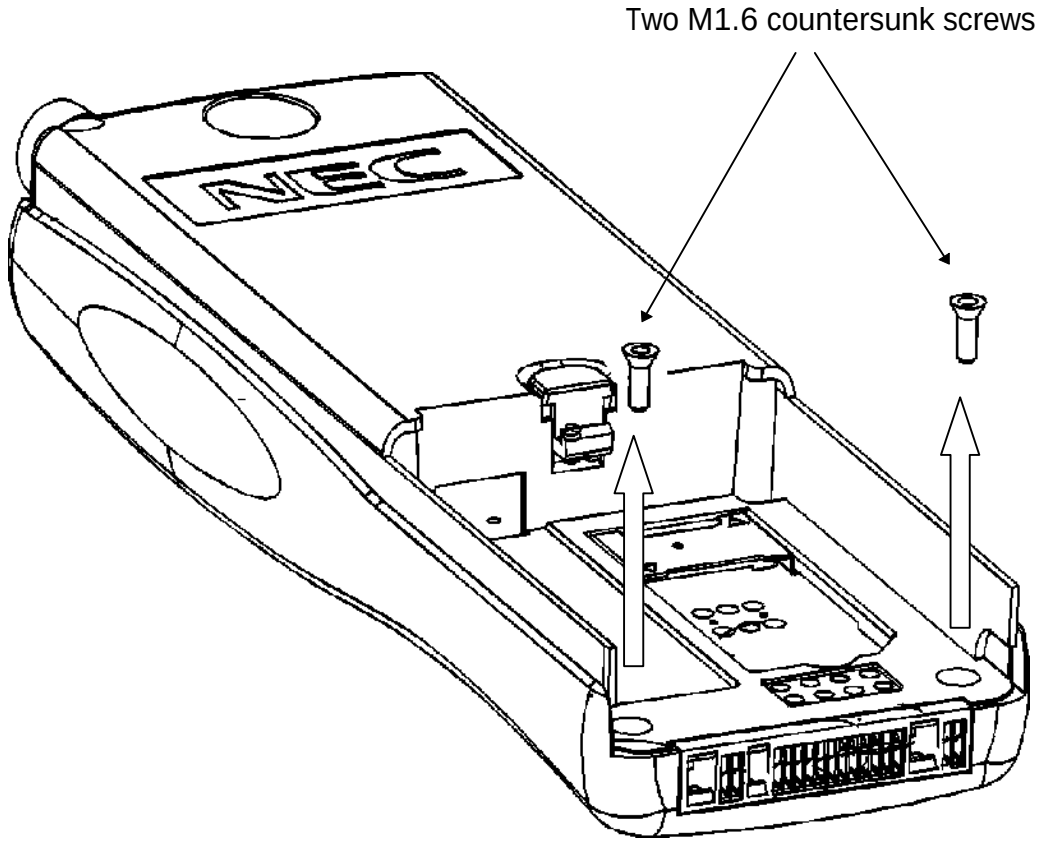
Antenna Removal.





The Thread Antenna can be removed from the HHP assembly by hand. Simply grip the wide part of the antenna and turn it anti-clockwise until it is completely free and slide it out of the HHP assembly.

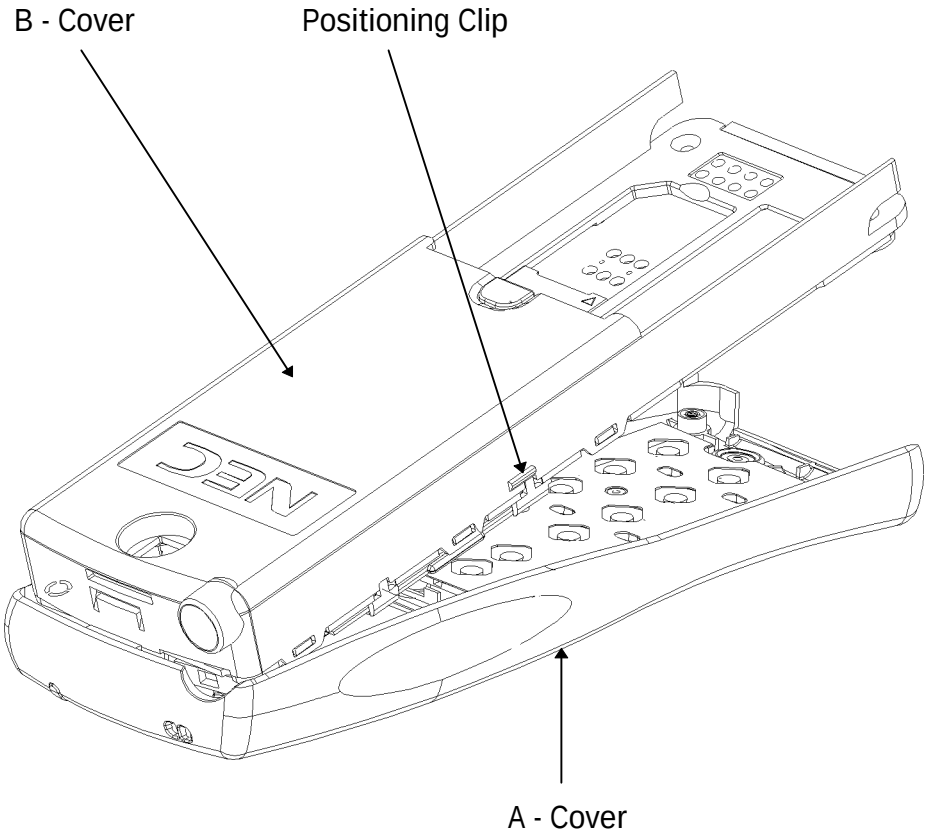
Removal of screws from the B - Cover



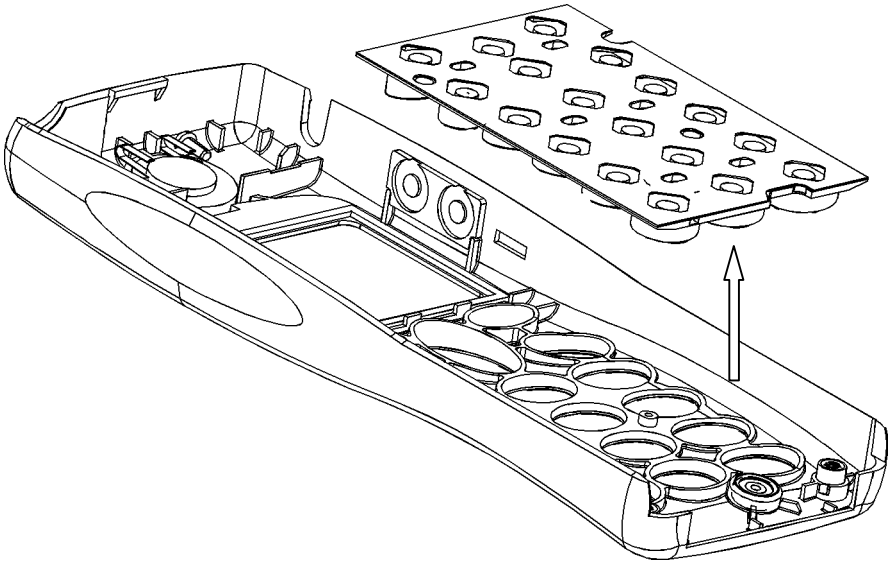
Using a T6 Torx Screwdriver Remove the two M1.6 countersunk screws located towards the bottom of the HHP assembly.

Removal of the HHP assembly from the A - cover

Grip the bottom of the HHP assembly and gently lift the B – cover with Assembly away from the A - cover. This is made easier by gently easing the A - cover sidewalls out, since this will disengage the positioning clips on the B- cover.



Removal of keymat from A-Cover assembly

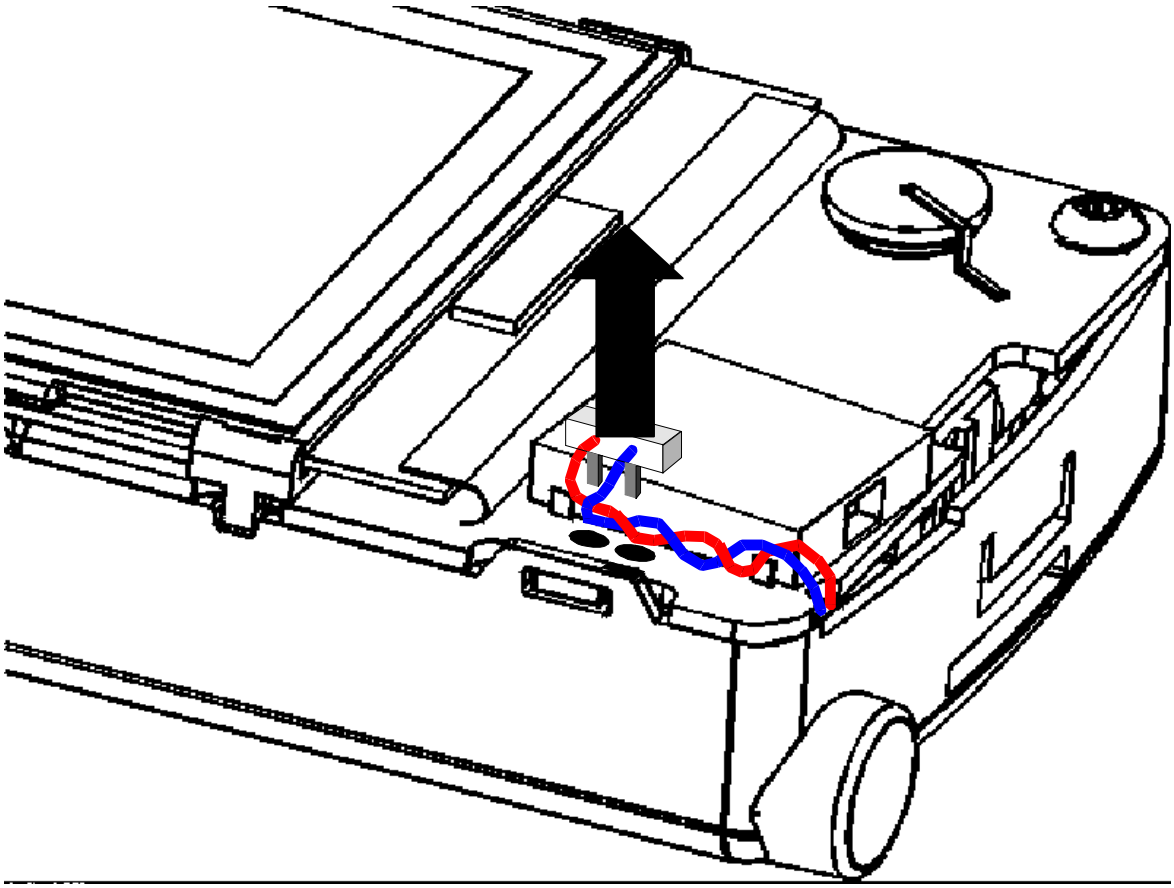


Remove Keymat from A-Cover, ensuring that the metal pads remain in the back of the keymat.

Removal of the Window assembly from the A-Cover.

By gently pressing against the Window assembly from the rear side of the A-Cover the Window will push out.

Disconnecting the Vibrator



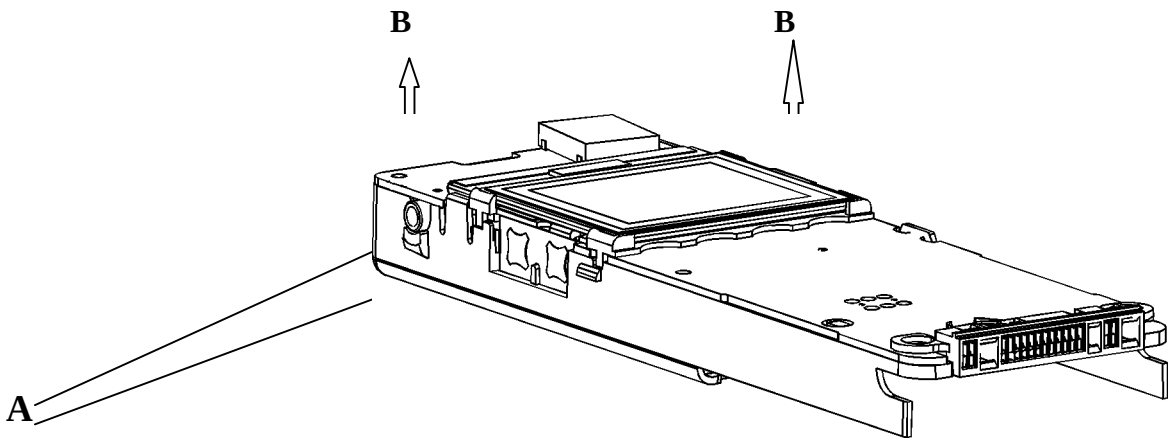
Disconnect the vibrator by gently pulling the vibrator connector from the socket.

NB: Ensure the vibrator wires are kept away from the Baseband Assembly when removing the Baseband board.

Removing the Baseband board Assembly screws

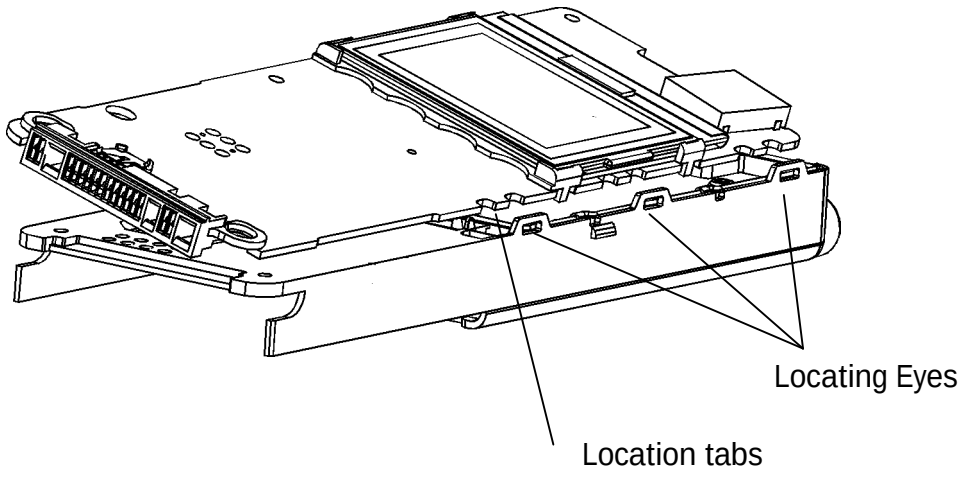
The two 1.8 x 12mm pan head screws need to be removed using a torx T6 screwdriver. This will allow access to the Baseband and TRX Assembly.

Removal of Baseband board from B-Cover Assembly



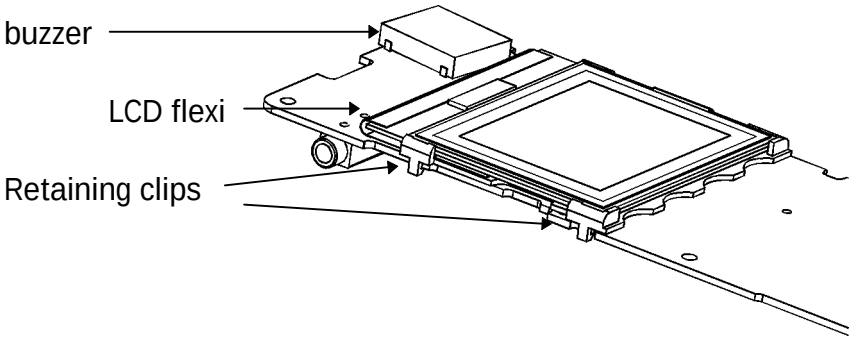
A – Pull the retaining clips gently outwards and lift the baseband board slightly to release the SK500 socket from PL400.

B - Raise the baseband board from the retaining clip side. This will make dis-assembly easier.



The next stage is to remove the baseband board away from the assembly. This should be done in order to dislocate the location tabs from the locating holes. The baseband board will then be free from the B–Cover assembly.

Removing the LCD from the Baseband board

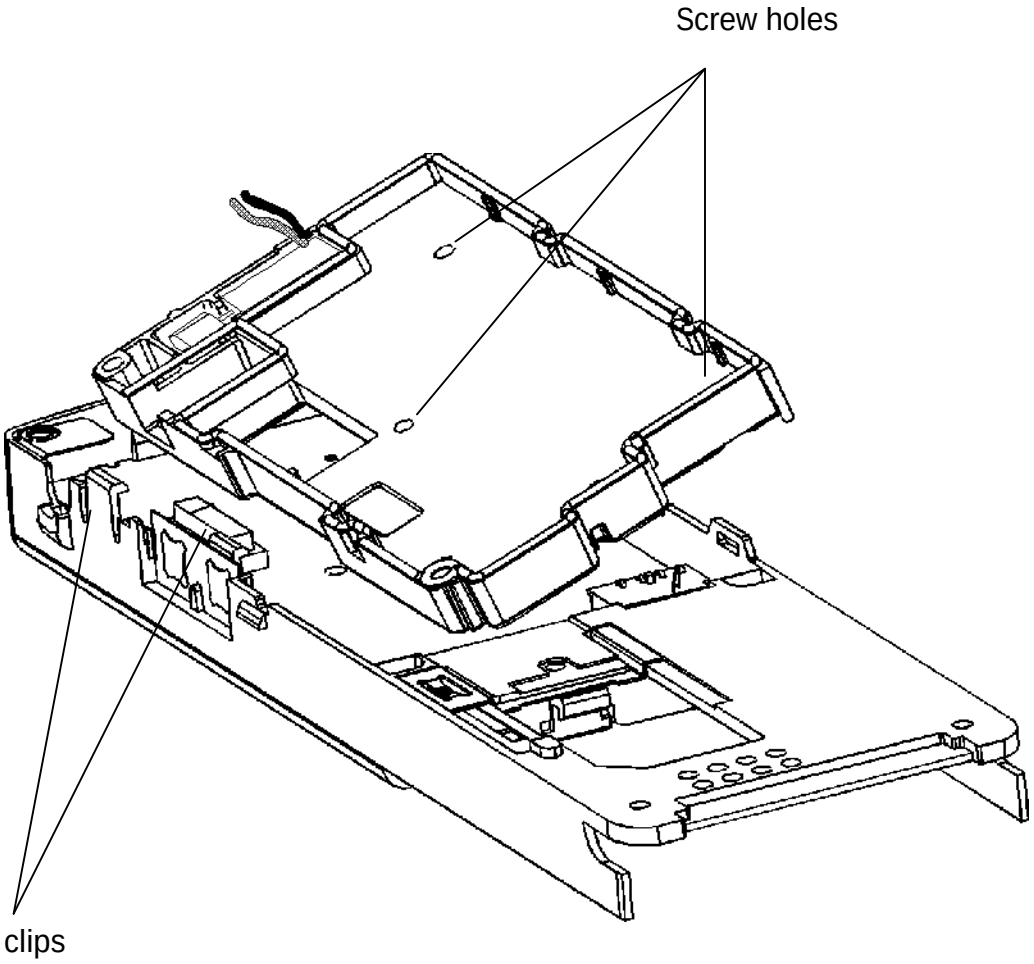


To remove the LCD, first unclip the retaining clips and then fold the LCD back over the buzzer.
Then from under the LCD, remove the ‘mylar’ tape fitted over the ‘Ziff’ connector and flexi.
The locking wedges on either side of the connector should then be unlocked to free the LCD from the board.

Removal of I/O Connector

This can be simply removed by carefully pulling the connector away from the baseband board.

Removing Board to Board shield.



Remove the three 1.8 x 8mm pan head screws from the board to board shield. Then lift the shield out at the angle shown. This will allow the shield to be pulled out from under the clips and out of the B-Cover assembly

Removing the RF board from the B-Cover

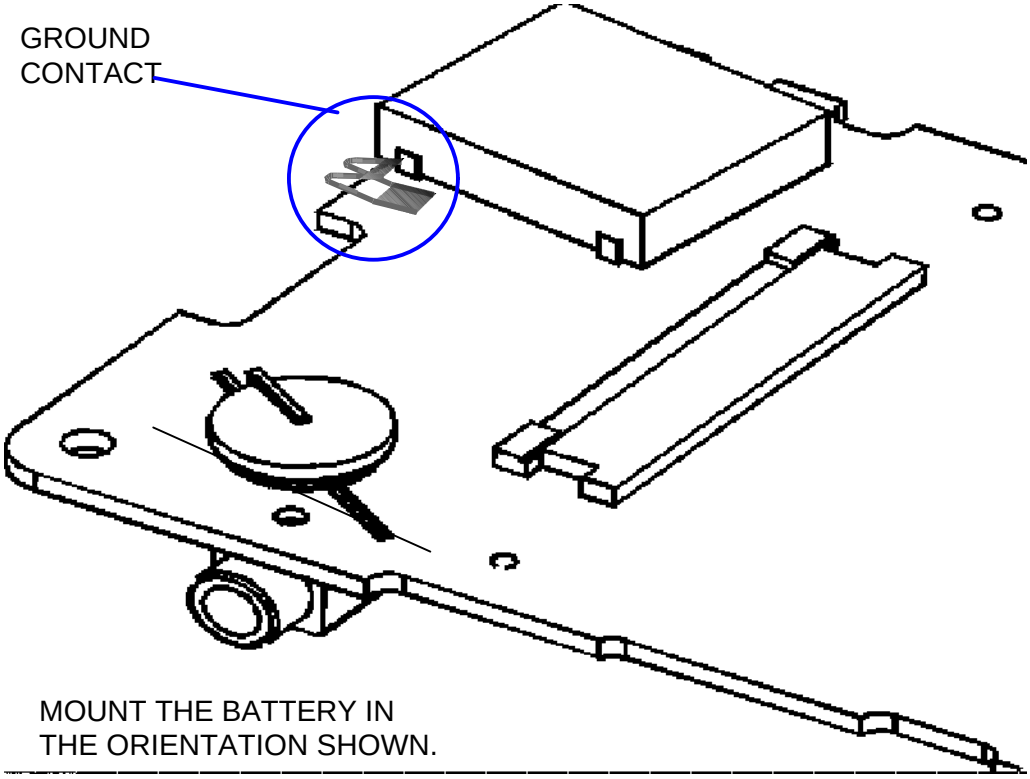
The RF board is removed in a similar way to the board to board shield. The screws that hold the RF board in position are removed with the board to board shield, so the RF board is simply lifted out at an angle from under the positioning clips.

Part 3b: Assembly

Fitting the Back-up battery

Ensure Anti-Static strap is worn and connected to the earth bonded table before handling any components.

Inspect all components for any obvious damage.

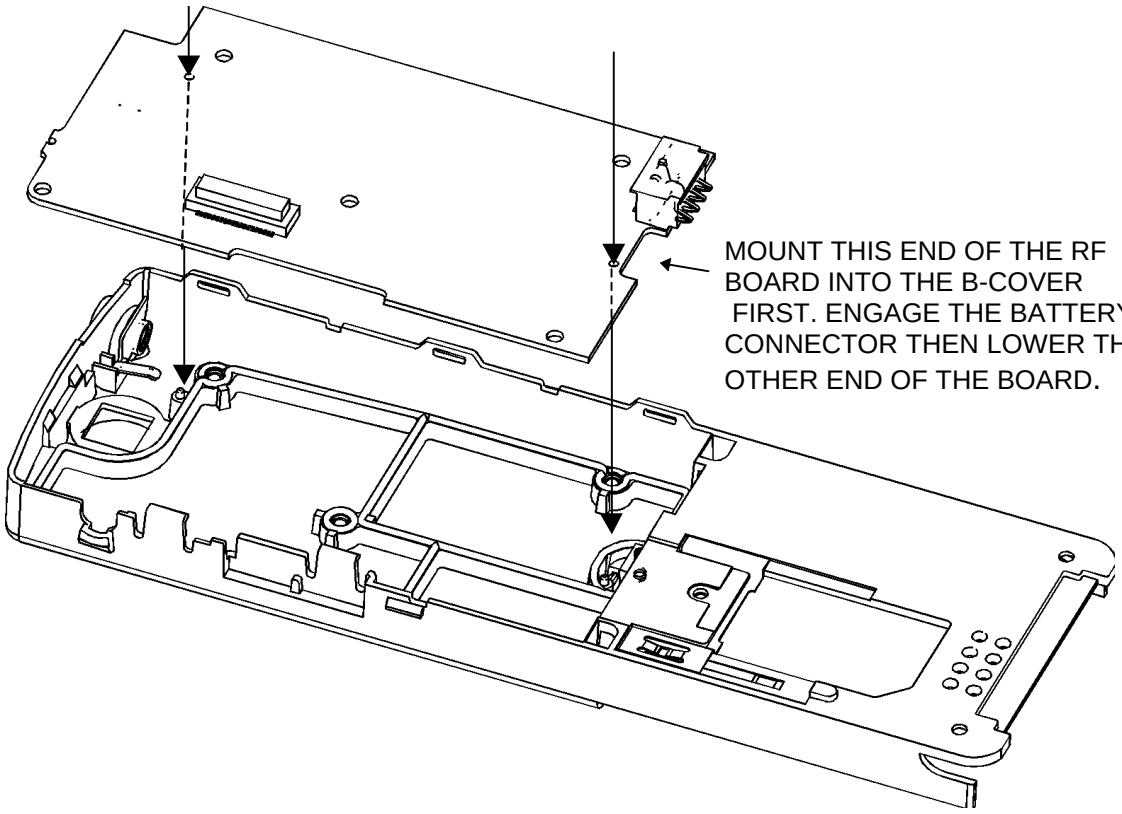


CAREPOINT:
Check the ground contact, (shown above), for any damage, or solder on the raised face of the spring.

NOTE:
Only tweezers with *covered tips,* or *Plastic* tweezers are to be used when fitting the battery.

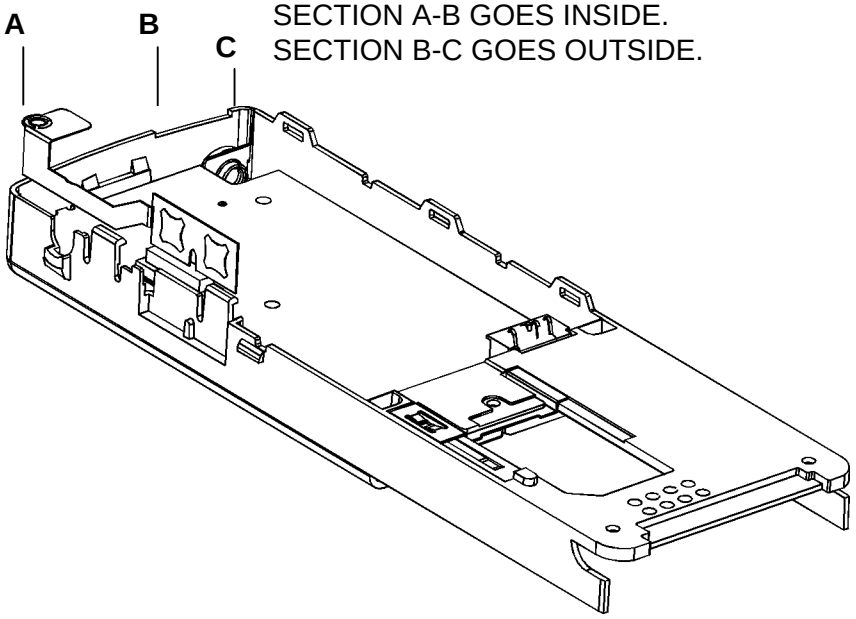
Mounting the RF board into the B-Cover

MOUNT RF BOARD INTO THE B-COVER.
NOTE TWO LOCATION POINTS.

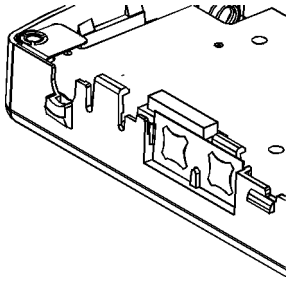


Mounting the volume switch into the B-Cover

MOUNT VOLUME KEY SWITCH
INTO THE B-COVER.



SECTION A-B GOES INSIDE.
SECTION B-C GOES OUTSIDE.

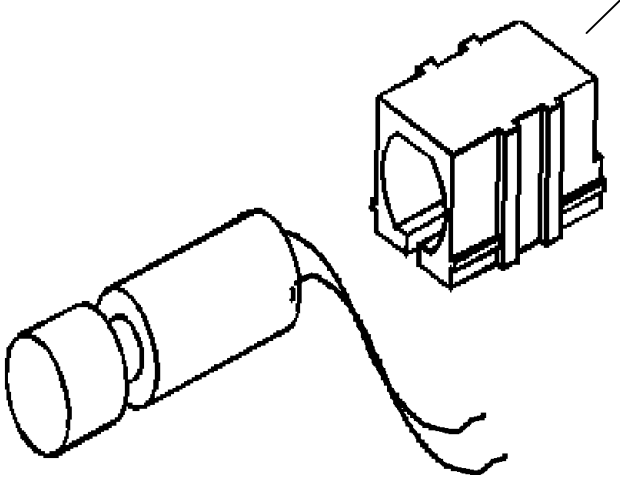


THIS VIEW SHOWS
THE KEYSWITCH IN
PLACE.

The Vibrator Assembly

NOTE: THE VIBRATOR WILL BE SUPPLIED IN ITS HOLDER. BUT NOTE THE CORRECT WAY THEY FIT TOGETHER

NOTE THAT THE HOLDER HAS FILLED IN CORNERS AT THIS END TO ACT AS STOPS.



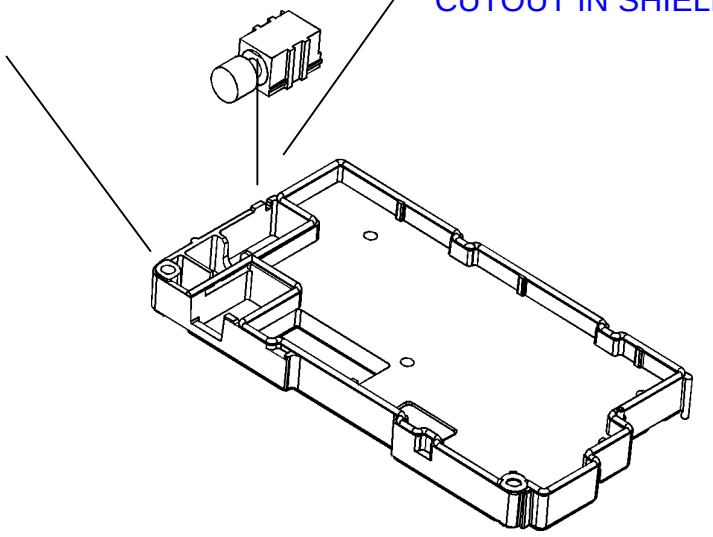
INSERT THE VIBRATOR INTO THE HOLDER.
THE LEADS MUST PASS THROUGH THE HOLDER.
THE FLAT SURFACES ON THE VIBRATOR GO TOP TO BOTTOM IN THE HOLDER.

Mounting the vibrator assembly

INSERT THE VIBRATOR ASSEMBLY INTO THE BOARD TO BOARD SHIELD.

WORK FROM THIS END OF THE SHIELD.
TAKE CARE NOT TO TOUCH THE GASKET MATERIAL.

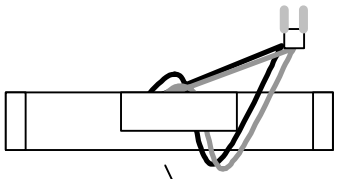
NOTE POSITION OF CUTOUT IN SHIELD.



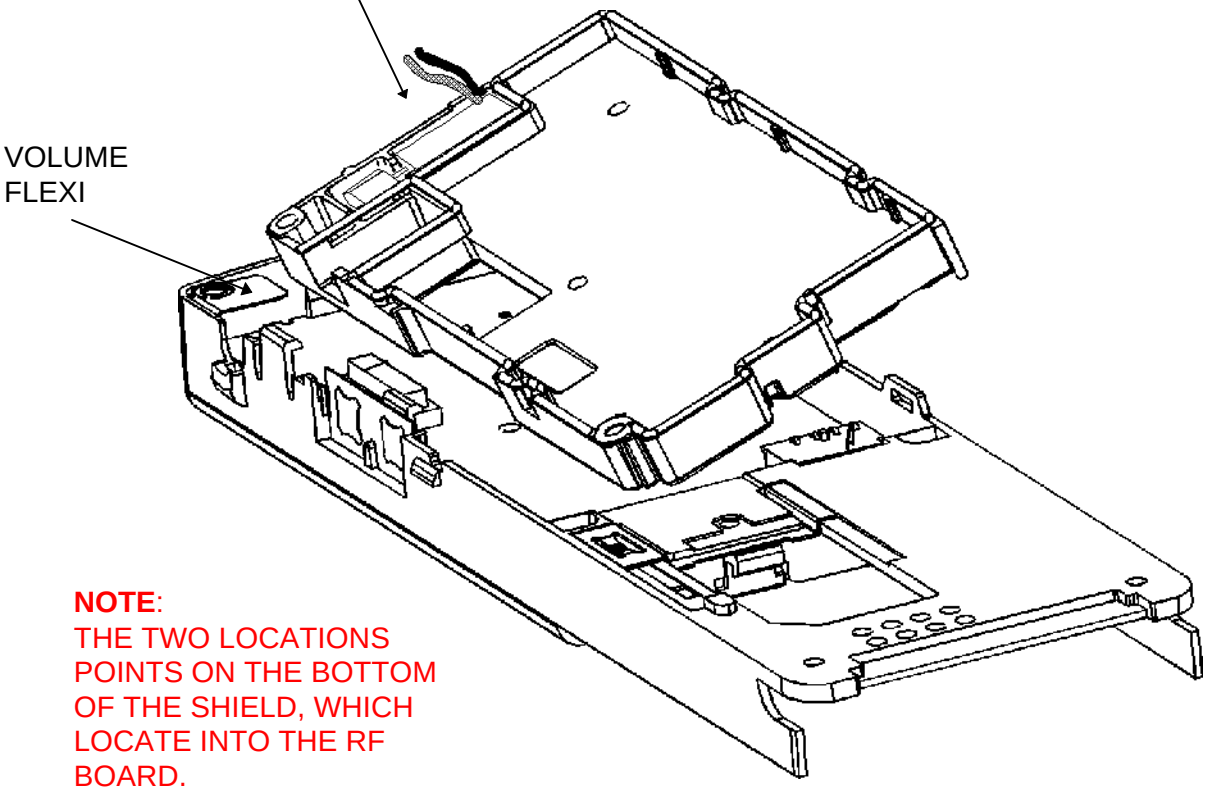
WHEN THE VIBRATOR IS IN PLACE DRESS THE LEADS THROUGH THE CUTOUT IN THE SHIELD.

Board to Board shield into the B-Cover

BEND THE WIRES *DOWN* THE SIDE OF THE SHIELD AND USING A LABEL STICK THE WIRES TO THE SHIELD. THEN BEND THE REMAINING WIRE *UPWARDS*. THIS SHOULD KEEP THE WIRES IN PLACE TO HELP EASE ASSEMBLY OF SHIELD INTO B-COVER.



INSERT THE SHIELD AT A SLIGHT ANGLE FROM THE SIDE SHOWN, SO THAT IT GOES UNDER THE VOLUME FLEXI AND THE MOULDED CLIPS ON THE B-COVER.

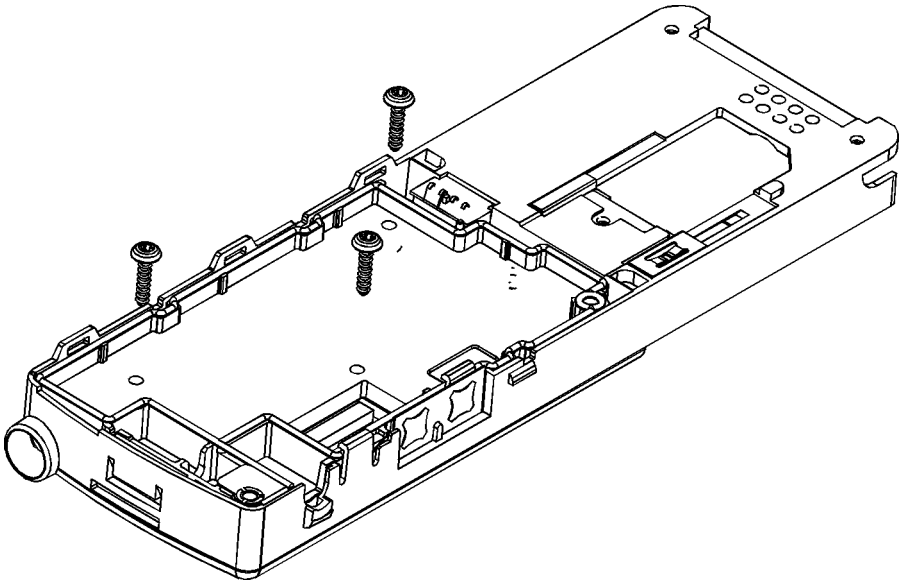


NOTE:
THE TWO LOCATIONS POINTS ON THE BOTTOM OF THE SHIELD, WHICH LOCATE INTO THE RF BOARD.

NOTE:
Ensure the flexi stays in the correct position and does not get damaged during this process.

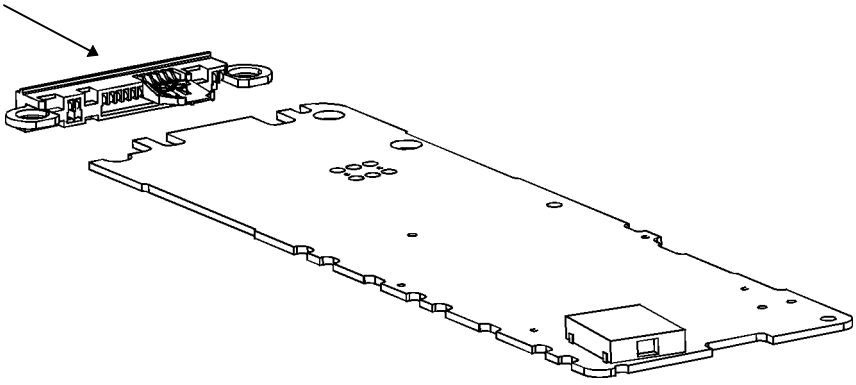
Fitting three 8mm screws

FIT AND TIGHTEN THE THREE SCREWS TO A TORQUE OF 0.2NM. +/-0.02
TORX T6 BIT REQUIRED FOR SCREWDRIVER.
FIT CENTRE SCREW FIRST.



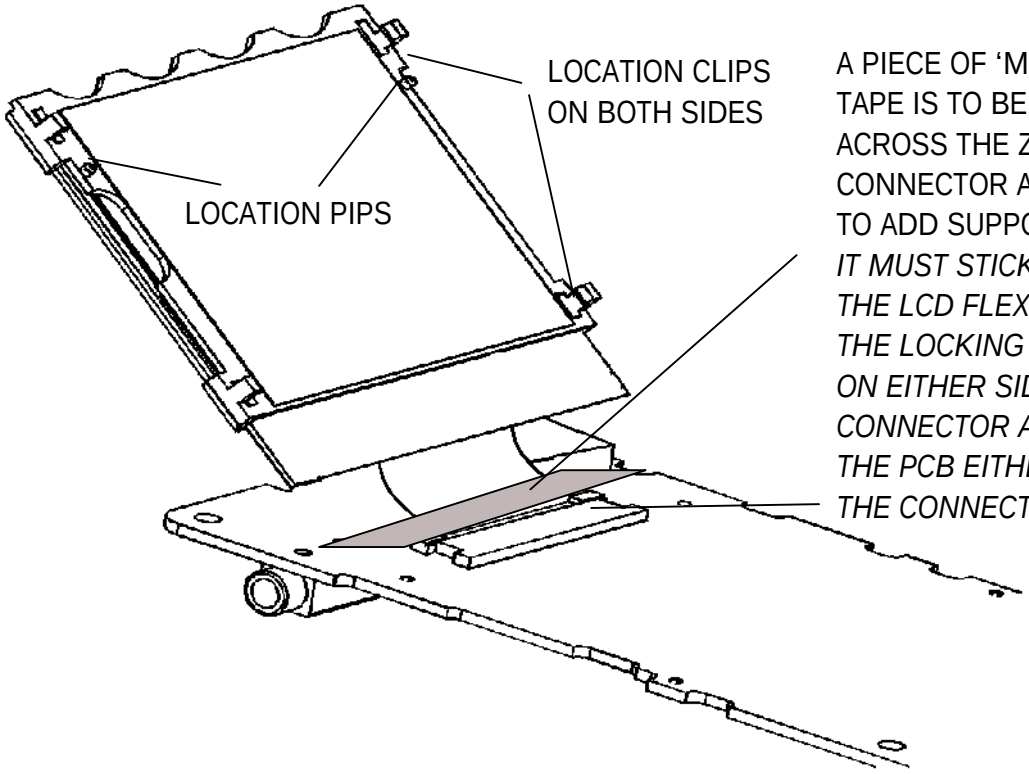
Fit I/O connector to board

Push the I/O Connector onto the PCB until it locks into place. Take care not to contaminate the PCB connections by touching them.



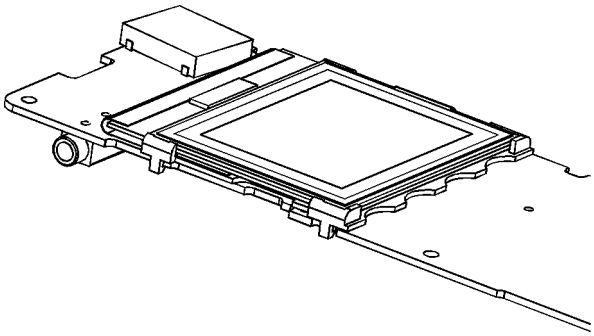
Fitting the LCD.

BEFORE FITTING ENSURE THAT LCD IS FITTED WITH FLEXY SUPPORT LABEL.
OPEN THE ZIFF CONNECTOR BY PULLING OUT THE WHITE LOCKING WEDGE.
TAKE THE LCD WITH THE GOLD PADS ON THE FLEXY FACING UP AND INSERT THE FLEXY INTO THE ZIF CONNECTOR.
WHEN THE FLEXY IS *FULLY INSERTED* AND THE TOP EDGE OF THE PADS ARE *PARALLEL* TO THE CONNECTOR BODY, **PUSH THE LOCKING WEDGE FULLY IN**.
(THIS MAY REQUIRE PRESSURE APPLIED AT THE CENTRE OF THE CONNECTOR AS WELL AS THE TWO OUTER LUGS).



A PIECE OF 'MYLAR ' TAPE IS TO BE FITTED ACROSS THE ZIFF CONNECTOR AND FLEXI TO ADD SUPPORT.
IT MUST STICK TO: -
THE LCD FLEXI,
THE LOCKING WEDGES ON EITHER SIDE OF THE CONNECTOR AND
THE PCB EITHER SIDE OF THE CONNECTOR.

FOLD THE LCD OVER SO THAT THE LOCATION PIPS ON THE LCD ENGAGE IN THE LOCATION HOLES IN THE BOARD, AND THE RETAINING CLIPS ENGAGE OVER THE EDGES OF THE BOARD.



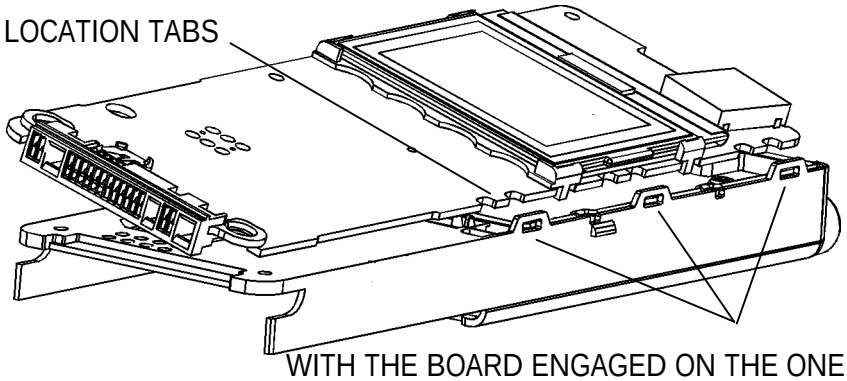
TAKE CARE WHEN PUSHING DOWN ON THE LCD TO ENGAGE THE RETAINING CLIPS, PUSH ON THE PLASTIC EDGES NOT THE LCD GLASS.

Baseband board to B-Cover Assembly

TAKE THE BASE BAND BOARD AND PRESENT IT TO THE B-COVER ASSEMBLY AT AN ANGLE AS SHOWN. LOCATE THE TABS ON THE BOARD INTO THE EYES ON THE B-COVER.

NOTE:

ENSURE THE ANGLE IS GREAT ENOUGH NOT TO DAMAGE ANY COMPONENTS ON THE UNDERSIDE OF THE BOARD.



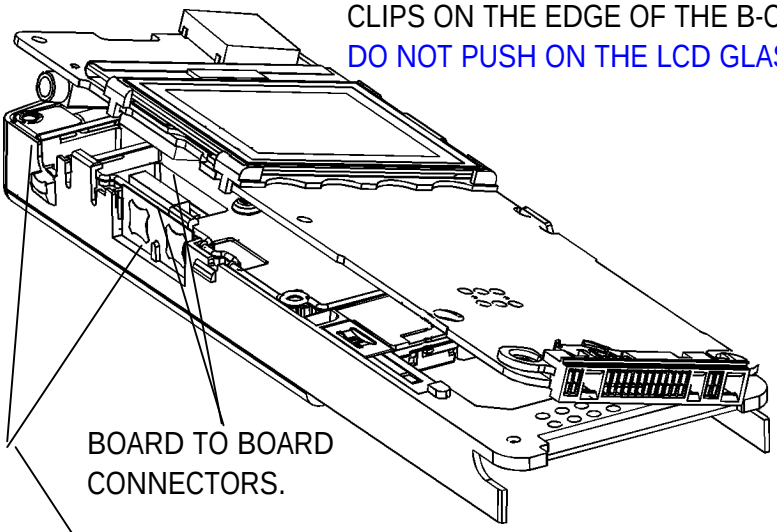
WITH THE BOARD ENGAGED ON THE ONE SIDE, LOWER THE OTHER SIDE OF THE BOARD DOWN.

AS THE BOARD IS LOWERED THE CONNECTOR ON THE UNDERSIDE MUST MATE WITH THE ONE ON THE RF BOARD.

ENSURE THERE IS NO *SLIDING* ACTION OF THE BOARD AGAINST THE SHIELD, AT THIS STAGE.

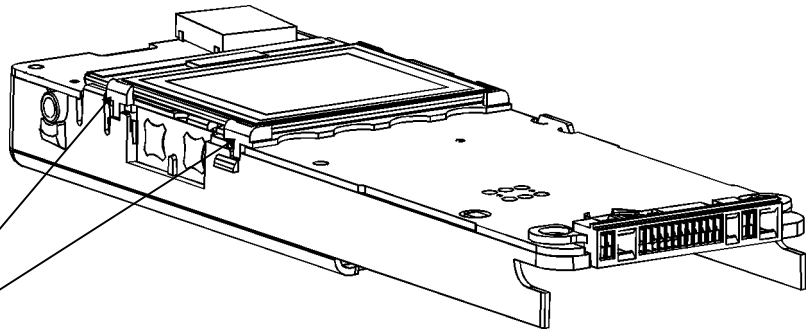
WHEN THE CONNECTORS ARE ENGAGED THE BOARD SHOULD BE PUSHED DOWN TO ENGAGE THE RETAINING CLIPS ON THE EDGE OF THE B-COVER.

DO NOT PUSH ON THE LCD GLASS.



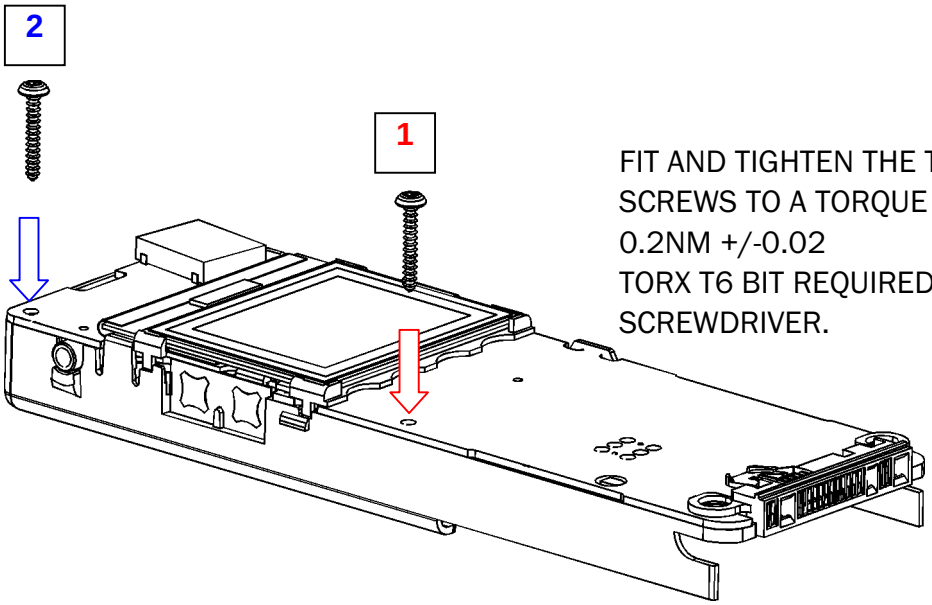
ENSURE THAT THE VOLUME SWITCH FLEXY IS LOCATED CORRECTLY IN ITS SLOT AND THE HOLE IN THE FLEXY IS POSITIONED CENTRALY OVER THE TOP LEFT SCREW HOLE.

TAKE CARE WHEN FITTING THE BOARD THAT THE VIBRATOR WIRES ARE NOT TRAPPED AND THAT THEY ARE GUIDED THROUGH THE CUT OUT AT THE TOP OF THE BOARD.



RETAINING CLIPS ENGAGE OVER BASEBAND BOARD

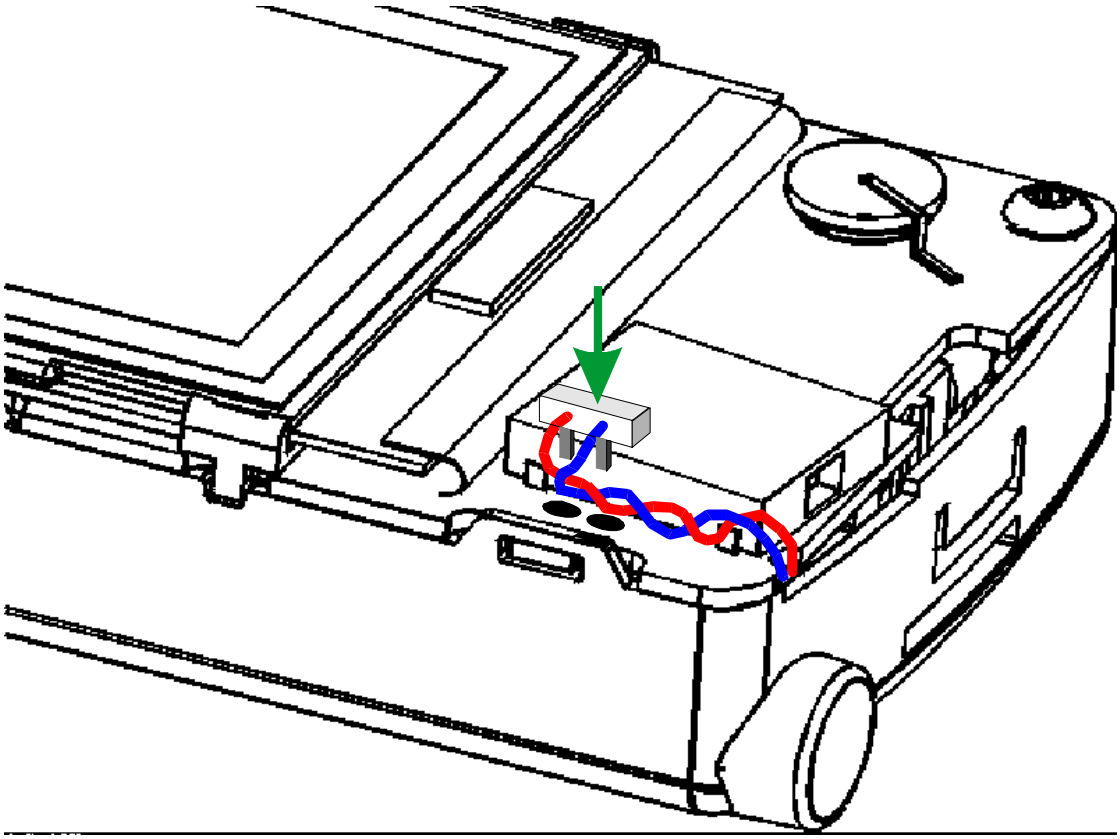
Fitting the screws



FIT AND TIGHTEN THE TWO SCREWS TO A TORQUE OF 0.2NM +/-0.02
TORX T6 BIT REQUIRED FOR SCREWDRIVER.

***CARE POINT**: THAT THESE ARE **12**MM LONG SCREWS, **NOT** 8MM.*

Connecting Vibrator

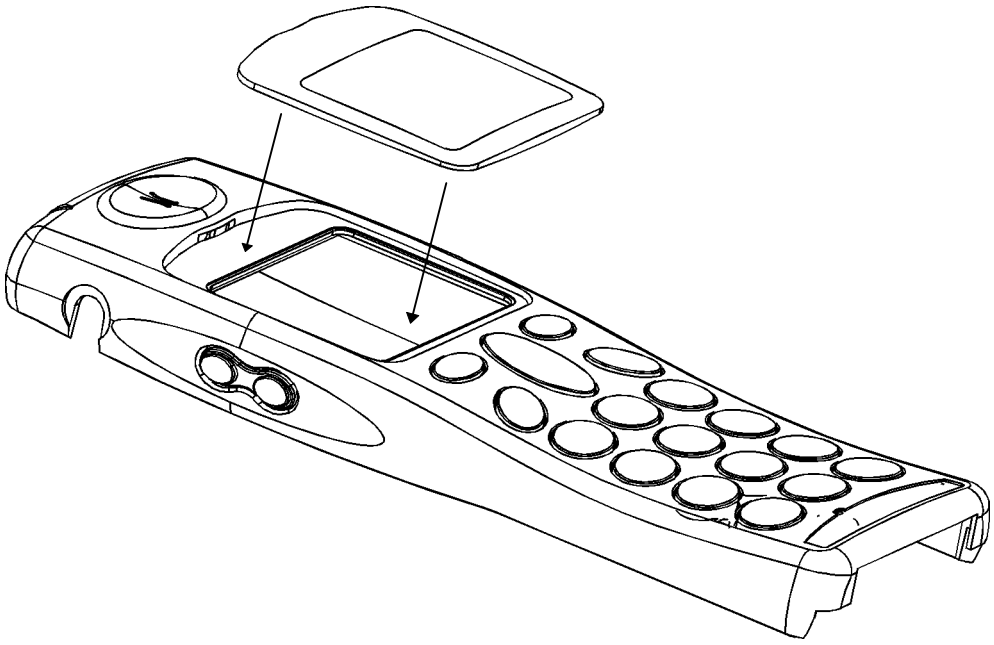


INSERT THE CONNECTOR PINS INTO THE TWO HOLES IN THE BOARD. YOU WILL FEEL THE PIN GO INTO THE HOLES ALMOST ALL THE WAY. AT THIS POINT THE PINS ARE NOT YET ENGAGED INTO THE CONNECTOR ON THE OTHER SIDE OF THE BOARD. PUSH THE CONNECTOR IN ALL THE WAY AND FEEL IT ENGAGE.
DRESS THE WIRES INTO THE GAP AT THE TOP OF THE BOARD, THEN CAREFULLY FEED ANY EXCESS WIRE INTO THE CAVITY BETWEEN B-COVER AND BOARD TO BOARD SHIELD.

Fit Screen to A-Cover

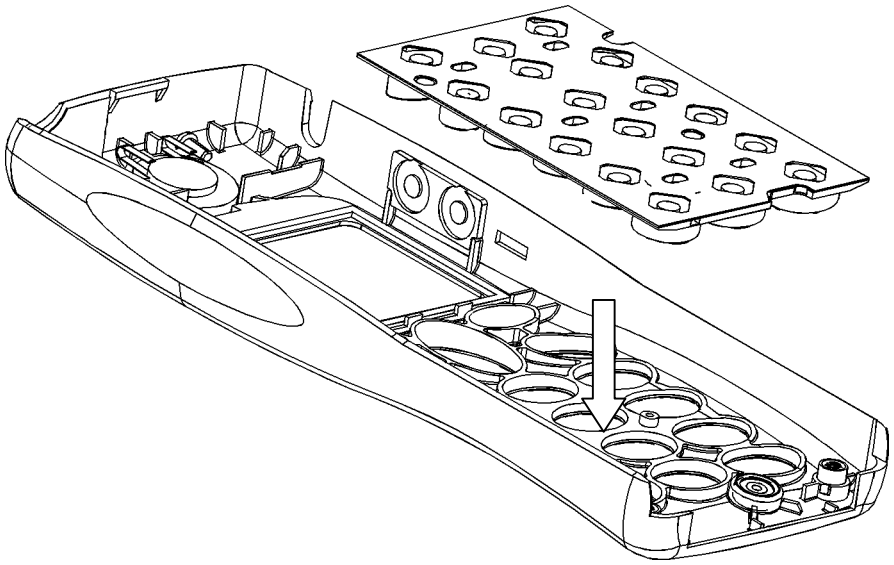
REMOVE THE COVER FROM THE ADHESIVE ON THE BACK OF THE WINDOW AND INSERT THE WINDOW INTO THE A-COVER.

INSERT THE TAB AT THE TOP OF THE WINDOW INTO THE GAP IN THE A-COVER.



NOTE:
ENSURE THE WINDOW IS FULLY PUSHED TOWARDS THE TOP OF THE PHONE BEFORE LOWERING IT INTO POSITION.
WHEN IT IS STUCK IN POSITION, CHECK THERE IS *NO GAP AT THE TOP OF THE WINDOW*.

Mount Keymat into A-Cover

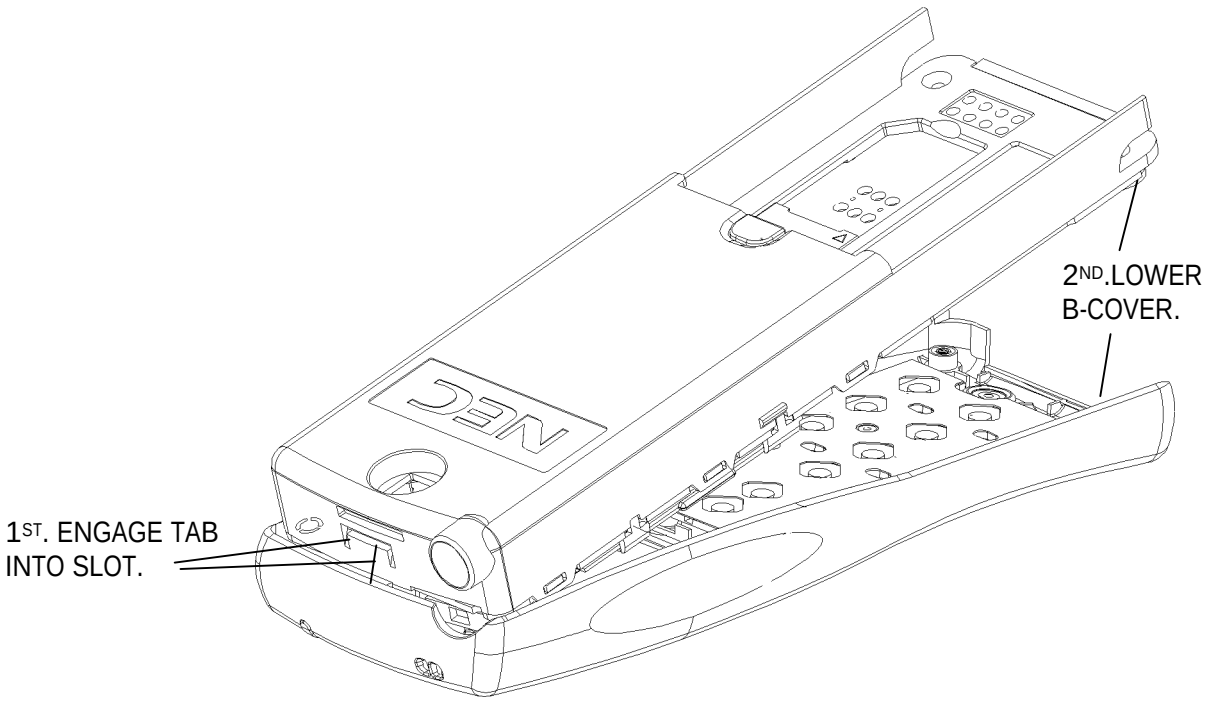


NOTE:
ENSURE *ALL* THE METAL PADS ARE IN PLACE ON THE BACK OF THE KEYPAD, **AFTER** IT IS FITTED.

Mounting B-Cover Assembly into A-Cover Assembly

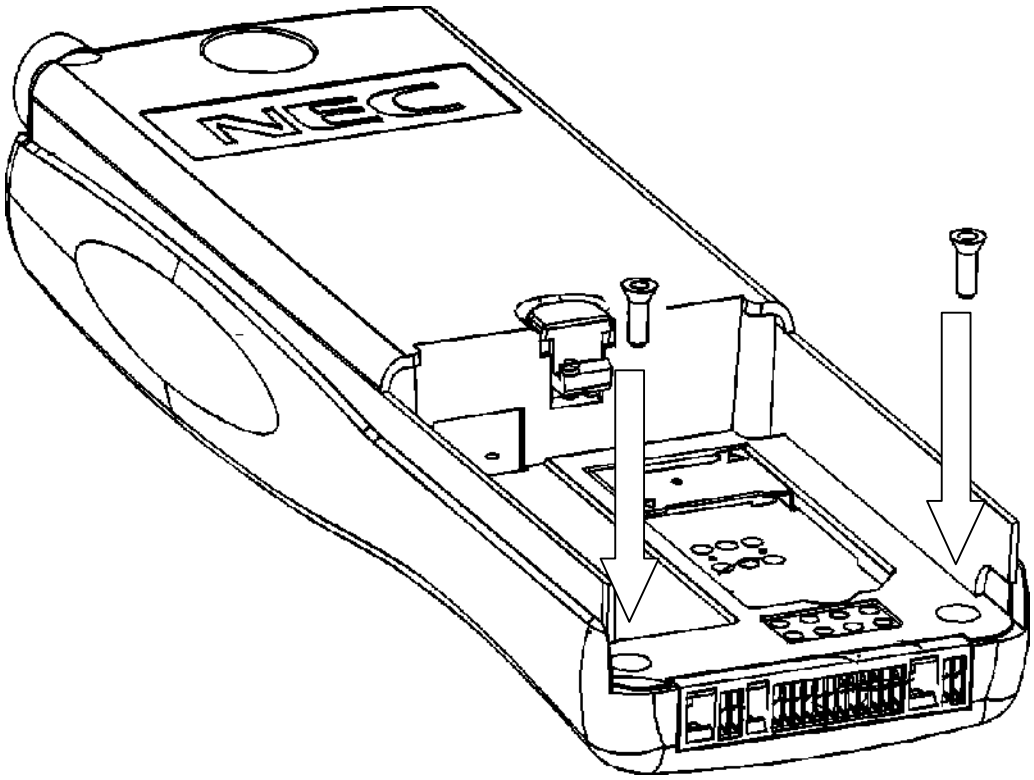
- REMOVE ANY PROTECT SHEET FROM THE LCD.
- USING COMPRESSED AIR BLOW ANY DUST FROM THE SURFACES OF THE LCD AND INSIDE FACE OF THE LCD WINDOW. CLEAN WITH A LENSE CLOTH IF REQUIRED.
- HOLDING THE B-COVER ASSEMBLY AT AN ANGLE BRING IT STRAIGHT DOWN INTO THE A-COVER SO THE TAB AT THE TOP OF THE A-COVER ENGAGES IN THE SLOT AT THE TOP OF THE B-COVER.
- LOWER THE OTHER END OF THE B-COVER ASSY INTO PLACE
- INSPECT THE DISPLAY FOR ANY DUST OR MARKS. IF DUST OR MARKS ARE FOUND OPEN AND REPEAT BLOW OUT AND CLEAN.
- SQUEEZE THE TWO PARTS TOGETHER UNTIL YOU FEEL THE CLIPS ON THE SIDE OF THE ASSEMBLY ENGAGE.
- ***CARE POINT**: CHECK SPEAKER CONTACTS ARE NOT BENT FLAT OR DEFORMED FROM A 45 ^{O} ANGLE IN THE VERTICAL PLANE, AND MORE THAN 2^{O} IN THE HORIZONTAL PLANE.*

NOTE:
WHEN BLOWING AWAY DUST USING COMPRESSED AIR, DO SO IN AN OPEN MANNER TO ALLOW THE DUST TO ESCAPE.



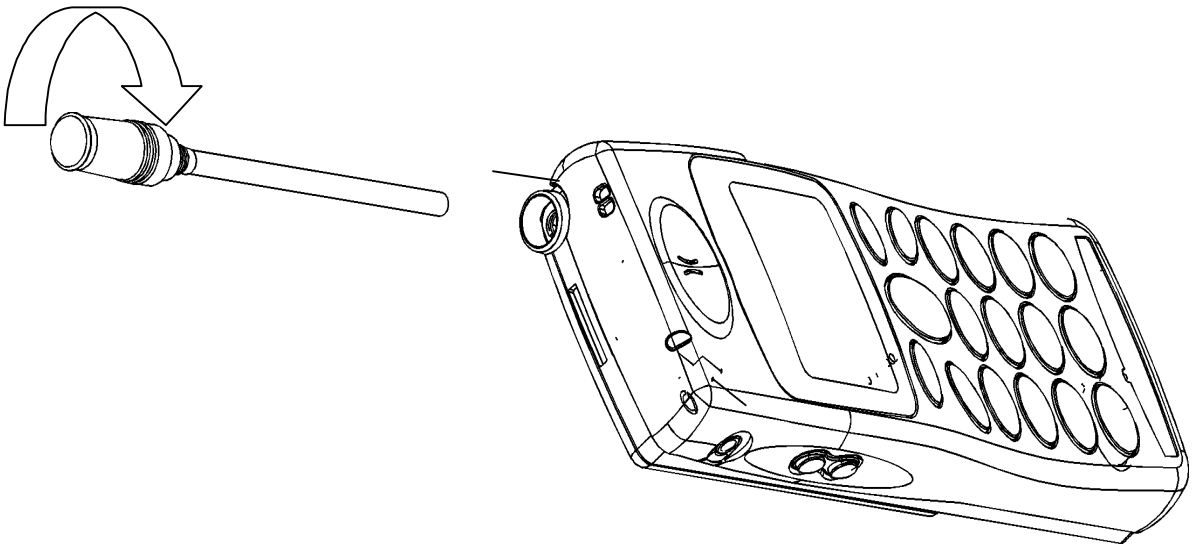
Insert Screws into B - Cover

FIT AND TIGHTEN THE TWO SCREWS TO A TORQUE OF 0.15NM +/-0.02
TORX T6 BIT REQUIRED FOR SCREWDRIVER.



Fit Antenna

INSERT AND SCREW THE ANTENNA INTO THE ASSEMBLY.



Section 5

Troubleshooting

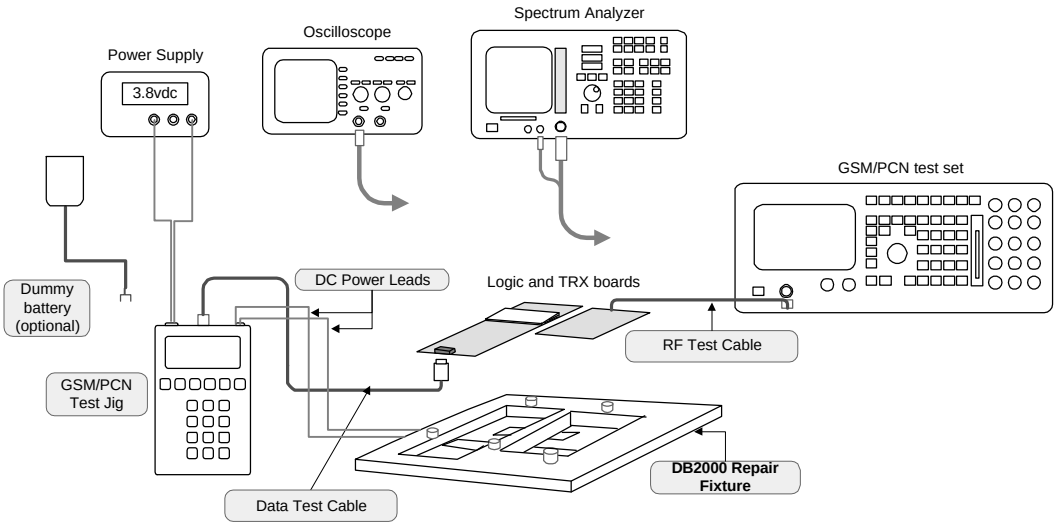
Introduction

This troubleshooting guide has been prepared to help assist engineers' in the process of repairing the DB2000 mobile phone. A comprehensive range of RF readings, signals and voltage values have been recorded from key parts of the DB2000's logic and RF circuits. These readings can then be utilised by the engineer and used as a reference guide from which they can compare these signals with one's taken from faulty or suspect boards.

Part 1 : Equipment configurations

The test equipment configurations for repair and testing are shown below.

Figure: 1.1 Repair bench configuration



This configuration is only an illustration of the types of equipment required. The requirement for a Spectrum Analyser will be dependent upon which GSM/PCN Test Set is chosen.

Part 2: Engineering Function Commands

This section describes the engineering functions which are available in the DB2000 and DB500 HHP's and also sets out to demonstrate their use.

Engineering functions are normally hidden from the operator and can only be accessed by placing the HHP in suspend mode. This can only be achieved by connecting the HHP to an instrument such as the GSM test jig* or a PC with the appropriate software**.

* An upgrade for the GSM test jig is available. This is required because theDB2000 and DB500 serial interface differs from that of G8/G9.

** A software package which provides access to the engineering functions will be available in the near future.

The Engineering functions which are listed here are those which have been implemented in the GSM Test Jig and are not a complete list of existing engineering
functions.

ALT_SYNTH

The synthesiser is alternatively programmed between two specified frequencies if the flag is set. This is disabled through resending the message with the flag field set to 0.

Function Id Number	1
Mode	Suspend

Parameter	Range	Purpose/Result
Flag	0 - stop alternating 1 - alternate between the specified frequencies	
Frequency One	0 - 1023	Set the ARFCN
Frequency Two	0 - 1023	Set the ARFCN

BACKLIGHT

Sets the backlight to any specified level. If the product cannot alter brightness any level other than zero equates to ON.

Function Id Number	4
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Level	0 - 255	0 = off, 1-255 = on

BATTERY

Reads the voltage, charge current, temperature and Id of the battery.

Function Id Number	5
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Voltage	0 -255 ADC steps	digital representation of the battery voltage
Charge Current	0 -255 ADC steps	digital representation of the Charge current
Temperature	0 -255 ADC steps	digital representation of the battery temperature
ID	0 -255 ADC steps	digital representation of the battery ID

CALL

A mobile originated call can be made. The mobile should be fitted with a test SIM and camped onto a carrier in order for this attempt to be successful. The “length” field must contain the number of digits contained within the message, the specified digits will be appended to any digits already on the display.

Function Id Number	6
Mode	Non Suspend

Parameter	Range	Purpose/Result
Length	1 - 20	Number of digits in message.
BCD Coded digits	0 - 9	

CALL_STATE

This function gives an indication of the HHP’s overall call state.

Function Id Number	7
Mode	Non Suspend

Parameter	Range	Purpose/Result
Call State		0 = Idle 1 = MT Alert 2 = MO Alert 3 = In Call 4 = No Service

CHECK_SUM

This function calculates a 32-bit Checksum of the code image. A flag will be returned to indicate if the calculated checksum matches a checksum stored in a known location at power up. The checksum will be for the whole of the software image, which does not necessarily mean the whole of the flash device.

Note also that the checksum is 32 bits long, however only the least significant 16 bits (2 bytes) will be returned in the response.

Function Id Number	12
Mode	Suspend

Parameter	Range	Purpose/Result
Sum	0 - 65535	Checksum
Flag	0 - FAIL, 1 - PASS	Indicates the result

DROP

This function will release an active call.

Function Id Number	16
Mode	Non Suspend

GAIN

This allows the receiver AGC to be disabled and the in message values (see below) to be used instead.

Function Id Number	23
Mode	Suspend

Parameter	Range	Purpose/Result
Function Id Number	23	
Mode	0 - Fixed 1 - Automatic 2 - Absolute	
pmb2410 Gain	Value of bit field settings for turning on individual gain stages (only valid if mode field is set to 0)	
CSP1089 Gain	0 -9 (only valid if mode field set to 0)	
Absolute Gain	0 -70 (gain in dB - only valid if mode field set to 2)	
LNA set	0 = LNA off 1 = LNA on	

HOOKSWITCH

This function allows the state of the hook-switch to be read. This has not been implemented in DB2000 and will therefore always return the open condition.

LED

Sets the LED to the specified colour or off.

Function Id Number	27
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Led colour	0 = Off, 1 = Red, 2 = Green, 3 = Yellow	Changes the colour of the LED

LOOP

This function allows the microphone, including the hands free microphone, to be routed to a specified device.

Function Id Number	28
Mode	Suspend

Parameter	Range	Purpose/Result
On/Off	0 = Normal, 1 = Loop-back	Select audio loop-back
Audio source	1 = microphone, 2 = Hands-free microphone	Select microphone
Audio destination	1 = Earpiece, 2 = Carkit speaker	Select Loudspeaker

READ_PORT

This function reads the status of the CIF port lines and indicates whether they are configured as input or output.

Function Id Number	39
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
CIF Port	0 - 65535	Indicates the port address
CIF Port Config	0 - 65535	Each bit represents the configuration of the represented port line e.g. bit 0 represents the red LED. If the bit is set then the line is output only, if the bit is low then the line is input only.

RECEIVER

Allows the receiver mode to be changed.

Function Id Number	40
Mode	Suspend

Parameter	Range	Purpose/Result
Receiver Mode	Off = 0, Normal/Burst = 1, Continuous = 2	sets the operating mode of the receiver
Frequency	0 -1023	sets the ARFCN

RESET

This function resets the HHP and exits test mode.

Function Id Number	45
Mode	Suspend /Non Suspend

RX_NOISE

This function allows the receiver noise to be measured.

Function Id Number	46
Mode	Suspend

Parameter	Range	Purpose/Result
Signal + Noise + Distortion	0 - 65535	Digital representation of the SINAD measurement
Noise + Distortion	0 - 65535	Digital representation of the noise and distortion

RXLEV

This function returns the RXLEV and RSSI values of the current assigned channel.

Function Id Number	47
Mode	Suspend

Parameter	Range	Purpose/Result
RxLev	0 - 63	
RSSI raw value	0 - 432	

SET_ALARM

This function allows the alarm to be set or reset.

Function Id Number	48
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Alarm On/Off	0 = Off, 1 = On	
Hour	0 -23	sets the hour
Minute	0 - 59	sets the minutes
Second	0 - 59	sets the seconds

SET_LINE

This function allows any control pin of the RF stage to be modified.

Function Id Number	49
Mode	Suspend

Parameter	Range	Purpose/Result
RX ON	0 = low, 1 = high, 2 = leave	sets the Rx On signal
TX ON	0 = low, 1 = high, 2 = leave	sets the Tx On signal
V Idle	0 = low, 1 = high, 2 = leave	sets the V Idle signal
VCO ON	0 = low, 1 = high, 2 = leave	sets the VCO On signal

SET_TOD

This function allows the clock to be set.

Function Id Number	50
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Year	1996 - 2200	Sets the year
Month	1 -12	Sets the month
Day	1 - 31	Sets the Day
Hour	0 - 23	Sets the Hour
Minute	0 - 59	Sets the minute
Second	0 - 59	Sets the second

SIM

This function allows SIM information such as clock-stop mode and power requirements to be read.

Function Id Number	51
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Card Status		0 = SIM Card OK 1 = SIM Card Failed 2 = SIM Card Not Present
Voltage	Only valid if “SIM Card OK”	0 = 3V 1 = 5V 2 = Either

Clock-Stop	Only valid if "SIM Card OK"	0 = None 1 = High Preferred 2 = High Only 3 = Low Preferred 4 = Low Only 5 = Either
SIM Phase	Only valid if "SIM Card OK"	0 = Phase 1 1 = Phase 1 with bits of Phase 2 2 = Phase 2 3 = Phase 2+
IMSI		Returns the SIM's IMSI

SUSPEND

This function allows the HHP to be placed into suspend mode.

Function Id Number	52
Mode	Non Suspend

READ_ALARM

This function reads the current alarm setting.

Function Id Number	56
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Alarm On/Off	0 - Off, 1 = On	
Hour	0 - 23	
Minutes	0 - 59	
Seconds	0 - 59	

READ_TOD

This function allows the current time of day to be read from the clock.

Function Id Number	57
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Year	1996 - 2200	
Month	1 -12	
Day	1 - 31	
Hour	0 - 23	
Minute	0 - 59	
Second	0 - 59	

TONE

This function allows a named tune to be played to a specified device.

Function Id Number	58
Mode	Suspend

Parameter	Range	Purpose/Result
Tune	Tune/Tone = 0, Stop = 1	
Tune Number	1 = DTMF 1 2 = DTMF 2 3 = DTMF 3 4 = DTMF 4 5 = DTMF 5 6 = DTMF 6 7 = DTMF 7 8 = DTMF 8 9 = DTMF 9 10 = DTMF 10 11 = DTMF * 12 = DTMF # 13 = Key Tune FB 14 = Busy Tone 15 = Congestion Tone 16 = Drop Tone 17 = Error Tone 18 = Ring Back Tone 19 = Alert Tone 1 20 = Alert Tone 1 HF 21 = Alert Tone 2 22 = Alert Tone 2 HF 23 = Alert Tone 3 24 = Alert Tone 4 25 = Wake up Tone 26 = Alarm tone 27 = Battery Tone 28 = Message Tone 29 = Happy Tone 30 = Sad Tone 31 = Waiting Tone 32 = Waiting Tone B 33 = Notification Tone 34 = Silence Forever 35 = Short silence 36 = Silence 37 = Alert Tone 5 38 = Alert Tone 6 39 = Alert Tone 7 40 = Auto redial tone 41 = Quiet Auto redial tone 42 = End Stop Tune 43 = Alert Tone 3 HF 44 = Alert Tone 4 HF 45 = Good Bye Tune 46 = Test Tune 1 47 = Test Tune 2	

	48 = Test Tune 3 49 = Test Tune 4 50 = Test Tune 5 51 = Test Tune 6 52 = Test Tune 7 53 = Loud Alert Tune 54 = Jingle 2 55 = Jingle 3 56 = Jingle 4 57 = Fur Elise 58 = Bach Tune 59 = Traviata Tune 60 = Carmen Tune 61 = EEPROM Tune 62 = Last Tune	
Volume	0 - 15	
Device	0 = Alerter 1 = Earpiece 2 = Car Speaker	

TRANSMITTER

This function allows the transmitter to be configured.

Function Id Number	59
Mode	Suspend

Parameter	Range	Purpose/Result
ARFCN	0 - 1023	sets the channel number
Transmit Burst Type	0 = Off 1 = Normal 2 = Access 3 = Continuous (Not supported in DB2000/DB500)	Selects the type of transmit burst.
Modulation	0 = Zeroes 1 = Ones 2 = Pseudo-random	selects the modulation type
Power Level	0 - 31	selects the Tx power level

VERSION

This function allows the hardware and software version numbers to be read.

Function Id Number	60
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Model Number	DB2000 = 6	
S/W Release Number	Alphanumeric string	
CPU S/W Version	Alphanumeric string	
DSP S/W Version	Alphanumeric string	
IMEI	Alphanumeric string	
IMEI_SV	0 - 65535	
Logic Version (Board1	0 - 65535	
RF Version (Board 2)	0 - 65535	

VIBRATOR

This function physically enables or disables the vibrator.

Function Id Number	69
Mode	Suspend / Non Suspend

Parameter	Range	Purpose/Result
Vibrator Setting	0 - Disable 1 = Enable	

DISPLAY PATTERN

This function displays a specified pre-defined test pattern.

Function Id Number	77
Mode	Suspend

Parameter	Range	Purpose/Result
Test Pattern	0 - Checker board (all icons on) 1 - Reverse Checker Board (all icons on) 2 - LCD off (i.e no display) 3 - All segments on 4 - Normal	

There are also two other responses to engineering functions. These relate to problems with processing an engineering function request and are identified as follows:

Functions requiring longer than default time.

Function Id Number	254
Mode	N/A

Parameter	Range	Purpose/Result
Requested EF Id	1 - 78	
Extra time required	1 - 255 seconds	

Error Response

This function returns the reason for the engineering function processing error.

Function Id Number	255
Mode	N/A

Parameter	Range	Purpose/Result
Reason	0 - Currently processing engineering function. 1 - Invalid Parameters 2 - Not supported 3 - Incompatible version number. 4 - Incorrect Mode 5 - Invalid state 6 - General failure	

Part 3 : Receiver RF Levels and Checks

This section shows the typical RF levels expected throughout the receiver path and the expected control voltages for both the UHF and IF synthesisers. A block diagram showing the locations of the RF measurement points and levels is shown in *figure: 3.1.*

Part 3.1 : Receiver Testing Set-up

To check the receiver the following conditions have to be set:-

1. On a signal generator or a GSM/PCN test box, output a CW signal of amplitude = - 40dbm's at either:-
   947.467708 Mhz (CH62) when testing the GSM rx path
   or
   1842.467708 Mhz (CH699) when testing the PCN rx path

2. Set the d.c. power supply to 3.8volts.

3. Using the GSM/PCN test jig power up the hhp and via the keypad enter the following menu options to put the hhp into receive mode:-

- Press "C"- (RX Options). Once this key is pressed the hhp should display:-
  "Suspend Mode
  Function Id"
  This message indicates that the HHP has entered engineering test mode.

- Press "A or B" according to which rx frequency band is required.
  A = GSM900 (ARFCN:62), B = GSM1800 (ARFCN:699)
  The hhp is now set to receive mode = Continuous on channel 62 or 699 respectively.

- The receiver parameters can be altered by another sub menu, these being:-

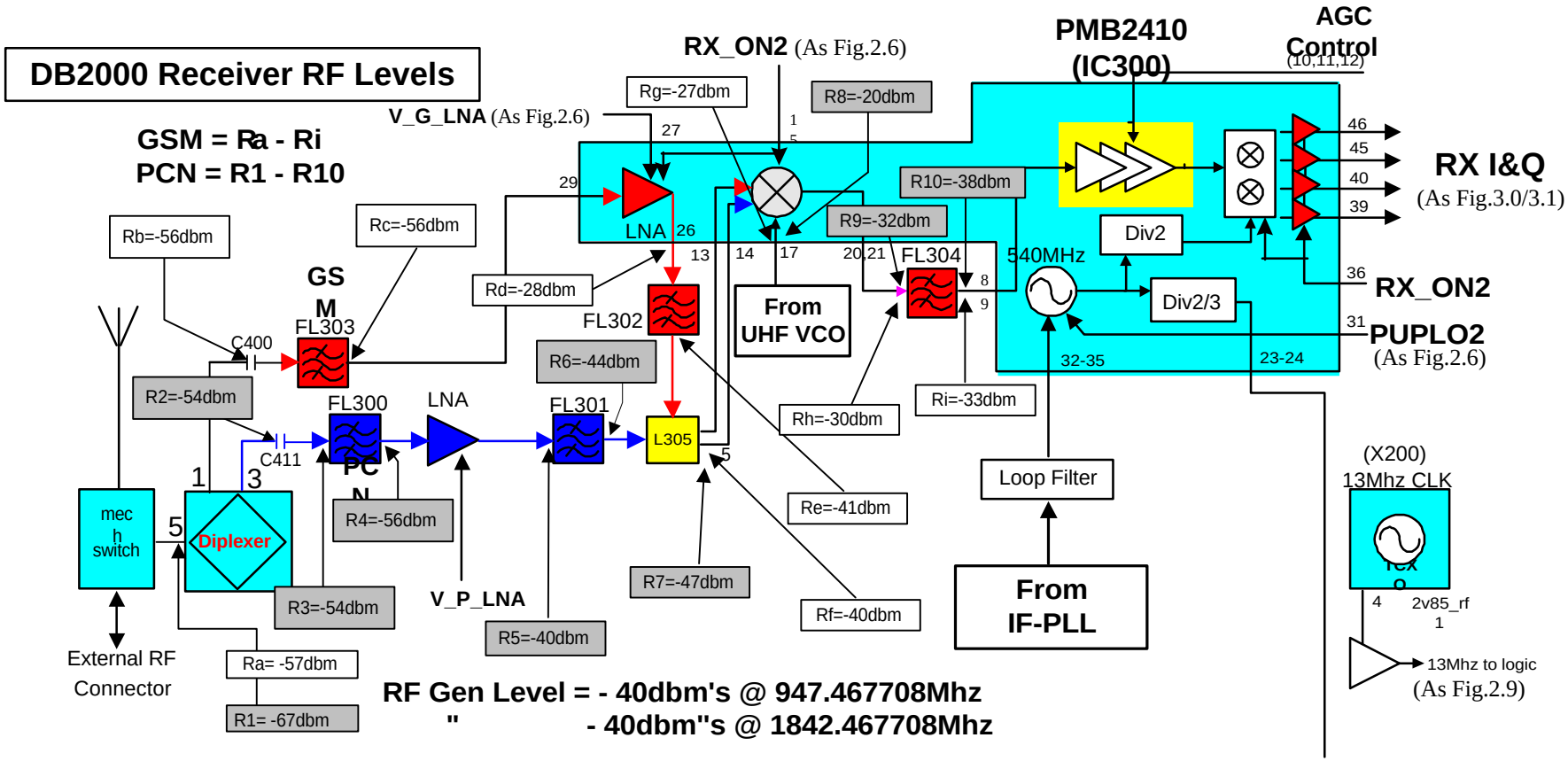
  A. Change Channel
  B. Set Receiver Mode
  C. RX Lev Report

Note:

The additional 67.708 Khz on top of the carrier frequency is used to simulate a logic 1 Equivalent on the I and Q outputs of the PMB2410.

All RF values shown are only intended as a guide figure and may differ from readings taken with other test equipment and leads. Lead and connector losses should always be taken into account when performing such rf measurements.

Figure 3.1: Receiver Block Diagram



Part 3.2 : Testing the Receiver

Using a suitable high frequency probe measure the RF levels at the relevant points shown in fig 3.1 and compare your measurements with those shown in the diagram. If there are any major differences between the readings taken and those indicated then further investigation of that particular point will be required. It will also be necessary to ensure that all the following power supplies and signals are present which control this part of the receiver circuit:-

1. V_G_LNA (2.85V supply which powers the GSM LNA and TX/RX switching diode pack: D400). See figure 3.4.

2. V_P_LNA (2.85V supply which powers the PCN LNA and TX/RX switching diode pack: D401). See figure 3.5.

3. RX_ON2 (Control signal which supplies the GSM LNA, the RX demodulator and internal buffer's). See figure 3.6.

4. 2V85_RF2 (A 2.85V power supply derived from MicroMoe IC204, which supplies V_G_LNA and V_P_LNA)

5. GSM_LNA (Control signal from Superchip pin 29 which switches V_G-LNA). See figure 3.7.

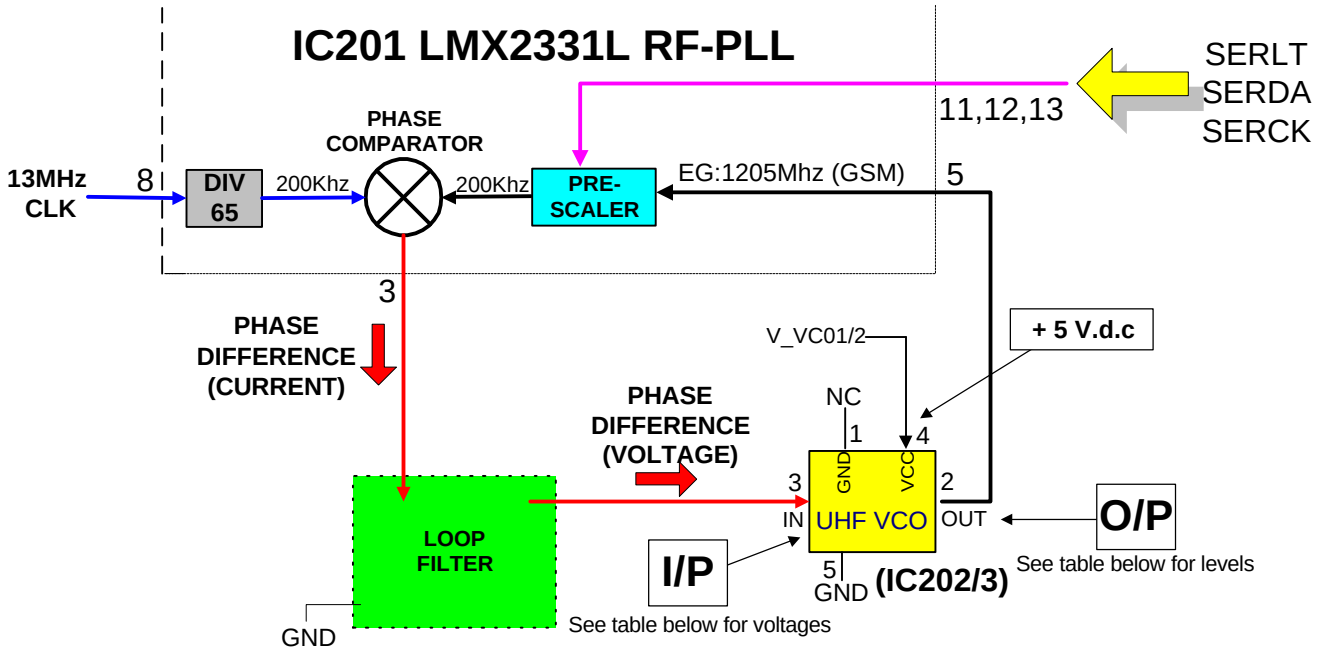
6. PCN_LNA (Control signal from Superchip pin 30 which switches V_G_LNA). See figure 3.8.

7. TCXO (X200) - 13 Mhz clock on Test Point 413, see figure 4.9.

Part 3.3: The UHF VCO and Synthesiser

The UHF VCO and Synthesiser can be checked with the receiver set to the same setting as previously described. Obviously being a dual band product DB2000 has two UHF VCO's, so therefore both VCO's need to be checked. Please refer to figure 3.2: UHF VCO's and Synthesiser, for signal levels and control voltages.

Figure 3.2: UHF VCO's and Synthesiser

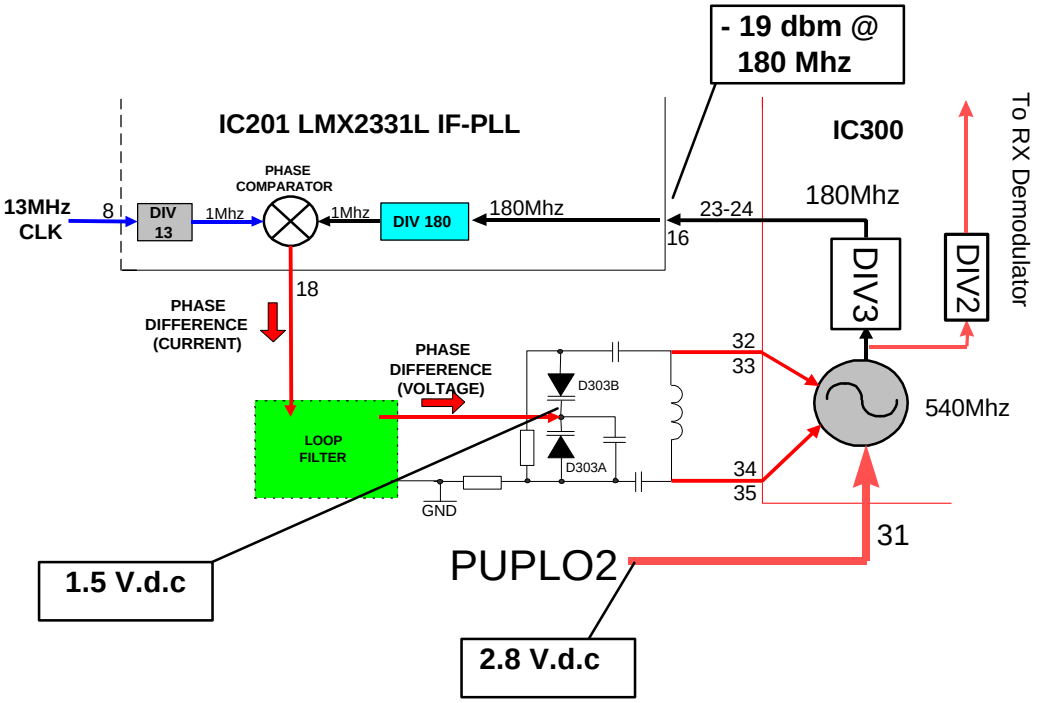


RX Channel	VCO Input Voltage	Output Level in dbm's	VCO Frequency
1	2.5 V.d.c	-21dbm	1205 Mhz
62	2.8 V.d.c	-21dbm	1217.4 Mhz
512	1.8 V.d.c	-11dbm	1535 Mhz
698	2.5 V.d.c	-11dbm	1572.4 Mhz

Part 3.4 : The RX IF Synthesiser

The IF Synthesiser can be checked with the receiver set to the same setting as previously described. Please refer to figure 3.4: The RX IF Synthesiser for the relevant control voltages and RF levels.

Figure 3.4 : The RX IF Synthesiser



Part 3.5 : Receiver demodulated I and Q Signals

When it has been established that all the afore mentioned signals, supplies and RF levels are correct, then on IC300 (pins 39,40,45 & 46) there should be output the demodulated I and Q signals. These are then presented to the logic board for conversion into data. Please refer to figure 3 for the correct waveform shape and characteristics.

Note:
When checking the PCN RX I & Q's, the RF gen level must be reduced to a value of -68 dbm's so that the signal measured will match the one displayed in Fig.4.1. Otherwise the Peak-Peak voltage levels of the measured signal and that in Fig.4.1 will be of differing amplitudes.

Part 4: Transmitter RF Levels and checks

This section shows the typical RF levels expected throughout the transmitter path and the expected control voltages for both the UHF and IF synthesisers. A block diagram showing the locations of the RF measurement points is shown in figure 4.1.

Part 4.1 : Transmitter Testing Set-up

To check the transmitter the following conditions have to be set:-

1. Set the d.c. power supply to 3.8volts.

2. Using the GSM/PCN test jig power up the hhp and via the keypad enter the following menu options to put the hhp into receive mode:-

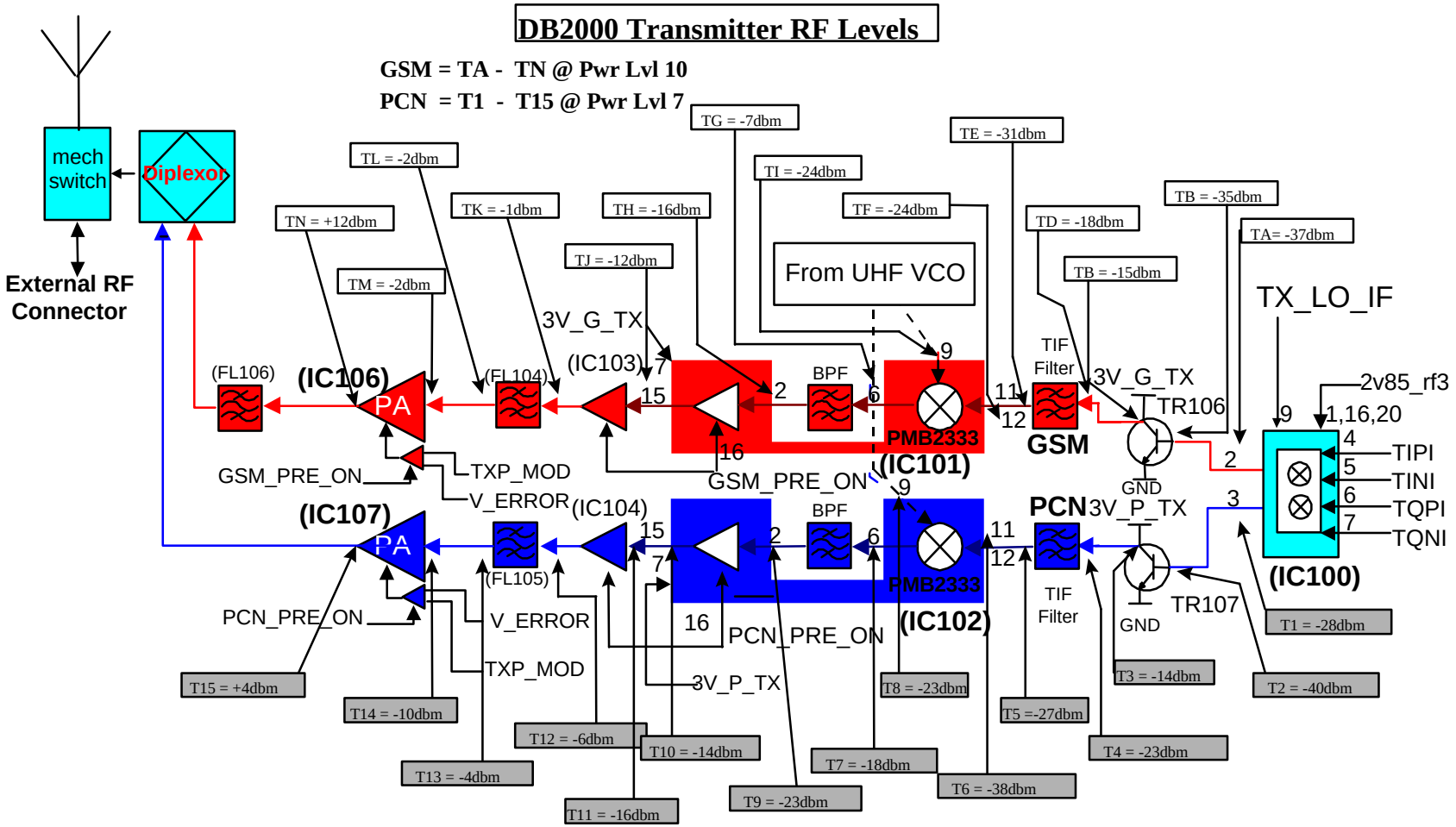
- Press “B”- (TX Options). Once this key is pressed the hhp should display:-
  “Suspend Mode
  Function Id”
  This message indicates that the hhp has entered engineering test mode.

- Press “A or B” according to which tx frequency band is required.
  Option A = GSM900 (ARFCN:62, Transmit burst type:Normal, Modulation: Ones and Power Level: 5)
  Option B = GSM1800 (ARFCN:699, Transmit burst type: Normal, Modulation: Ones and Power Level: 0)
  The HHP is now set to Normal transmit burst on channel 62 or 699 on power level 5 or 0 respectively.

- The Transmitter parameters can be altered by another sub menu, these being:-

  A. Change Channel
  B. Change power level
  C. Set modulation type (0’s, 1’s or random)

Figure 4.1: Transmitter Block Diagram



Part 4.2: Transmitter RF Levels and Checks

Using a suitable high frequency probe measure the RF levels at the relevant points shown in fig 4.1 and compare your measurements with those shown in the diagram. If there are any major differences between the readings taken and those indicated then further investigation of that particular point will be required. It will also be necessary to ensure that all the following power supplies and signals are present which control this part of the transmitter circuit:-

1. GSM_TX (Control signal from Superchip which switches 2.85V through to 3V_G_TX.). See figure 4.3.

2. PCN_TX (Control signal from Superchip which switches 2.85V through to 3V_P_TX.). See figure 4.4.

3. 3V_G_TX (A 2.85V supply which feeds parts of the GSM TRX path). See figure 4.5.

4. 3V_P_TX (A 2.85V supply which feeds parts of the PCN TRX path). See figure 4.6.

5. GSM_ON (Control signal from Superchip which switches 2.85V through to GSM_PRE_ON). See figure 4.7.

6. PCN_ON (Control signal from Superchip which switches 2.85V through to PCN_PRE_ON). See figure 4.8.

7. PRE_ON (Control signal from Superchip which enables 2V8_RF2 through to GSM / PCN_PRE_ON). See figure 4.9.

8. GSM_PRE_ON (A 2.85V supply which feeds parts of the GSM TRX path). See figure 4.10.

9. PCN_PRE_ON (A 2.85V supply which feeds parts of the PCN TRX path). See figure 4.11.

10. TIPI,TINI,TQPI,TQNI (TX I and Q signals which are modulated onto an IF of 180/270 Mhz by the W2013 - IC100). See figure 4.12.

11. TXP/TXP_MOD (Burst control profile from Superchip to control power ramp characteristics). See figure 4.13

12. V_ERROR (Feed back loop control for P.A. regulation). See figure 4.14 / 4.15

Part 4.3: The TX IF Synthesiser

The IF Synthesiser can be checked with the transmitter set to the same setting as previously described. Please refer to *figure 4.2: The TX IF Synthesiser* for the relevant control voltages and RF levels.

Figure 4.2: The TX IF Synthesiser

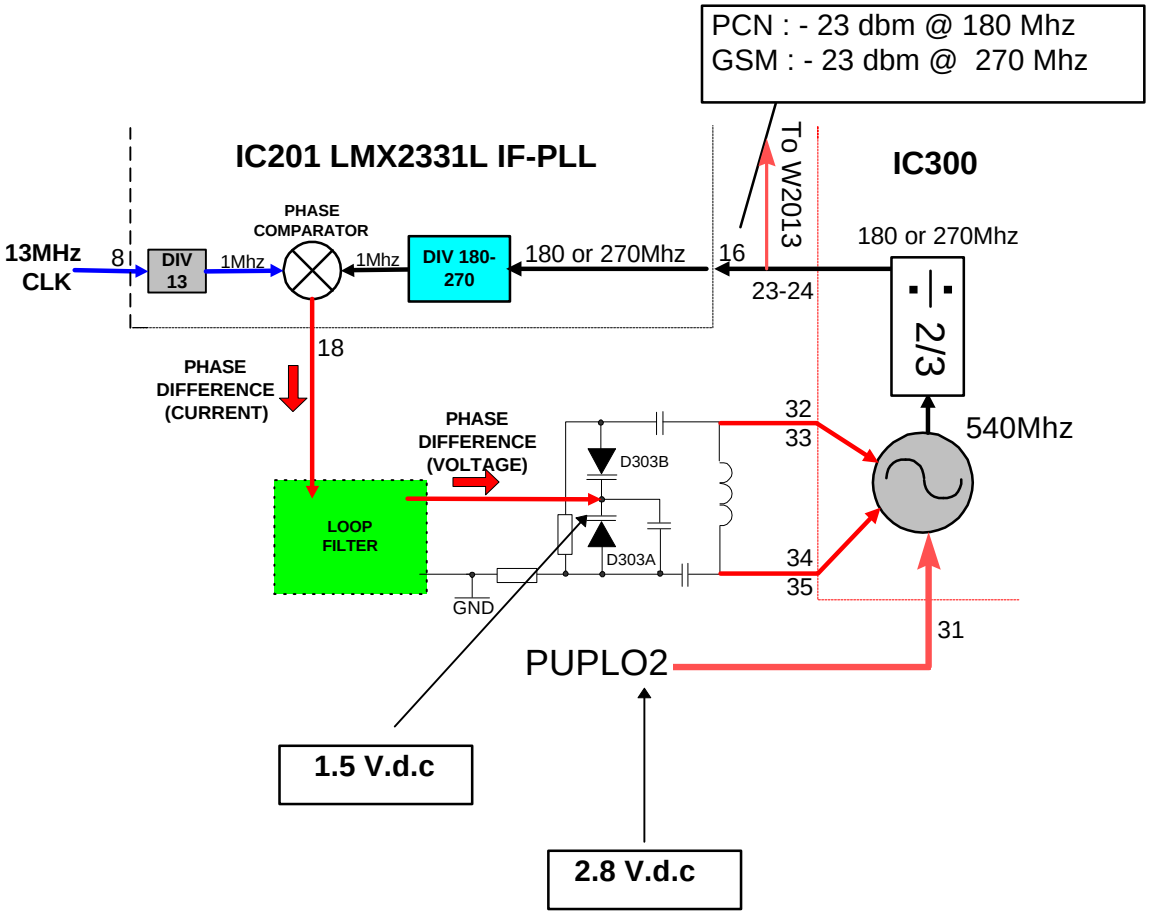


Fig. 3.4 V_G_LNA Pg. 3-5I TP300

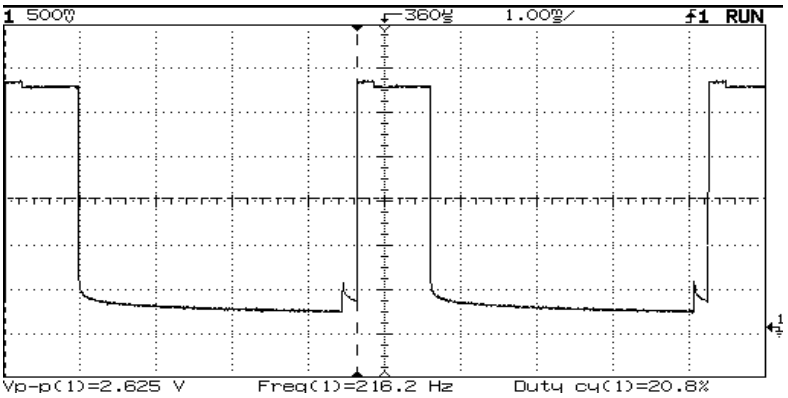


Fig.3.5 V_P_LNA Pg. 3-5J TP301

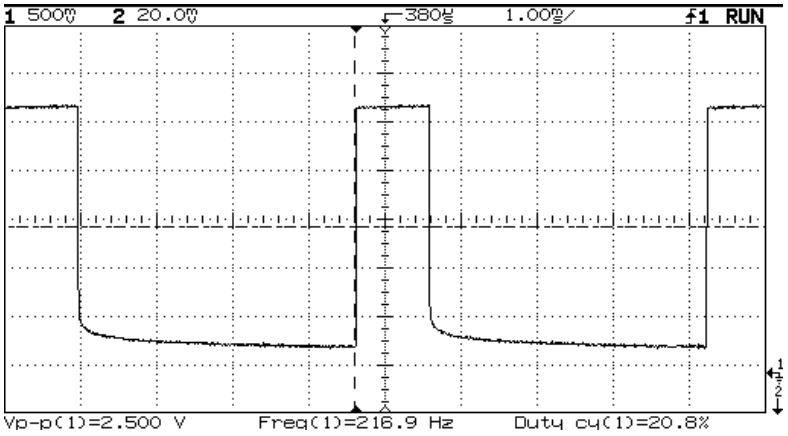


Fig.3.6 RX_ON2 Pg. 3-16G TP405

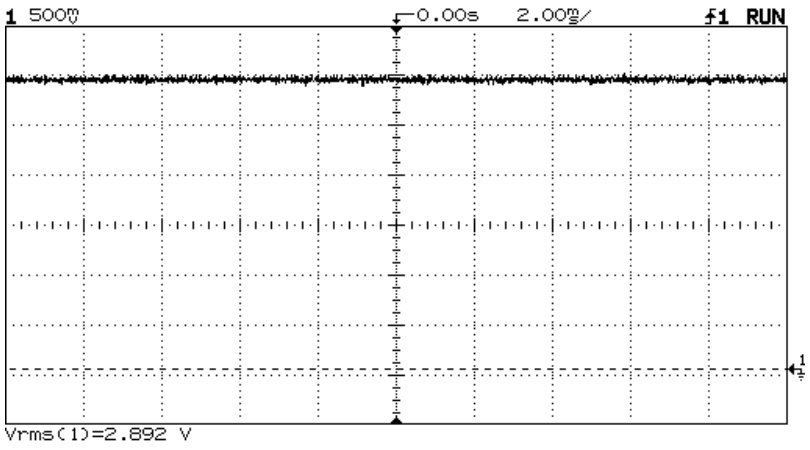


Fig. 3.7 GSM_LNA Pg. 3-3I TP419

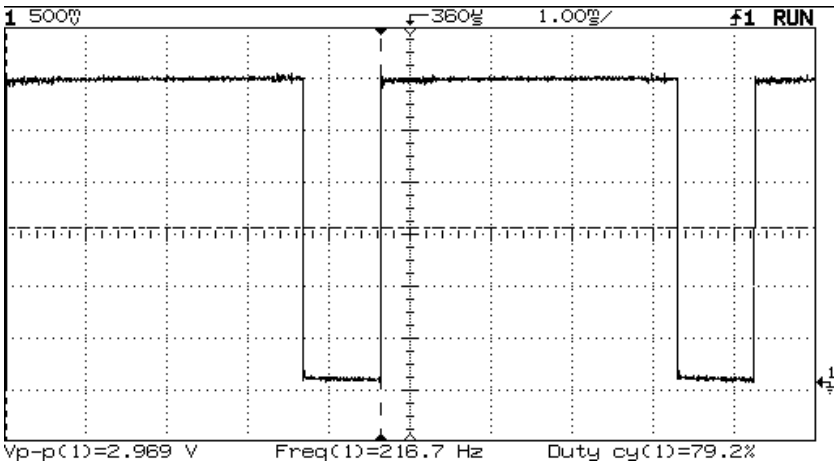


Fig. 3.8 PCN_LNA Pg. 3-3J TP420

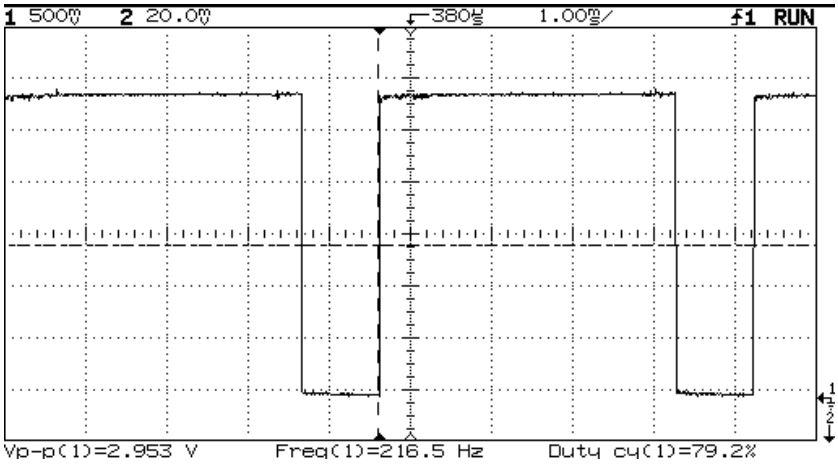


Fig. 4.9 TCXO Pg. 2- H11 TP413

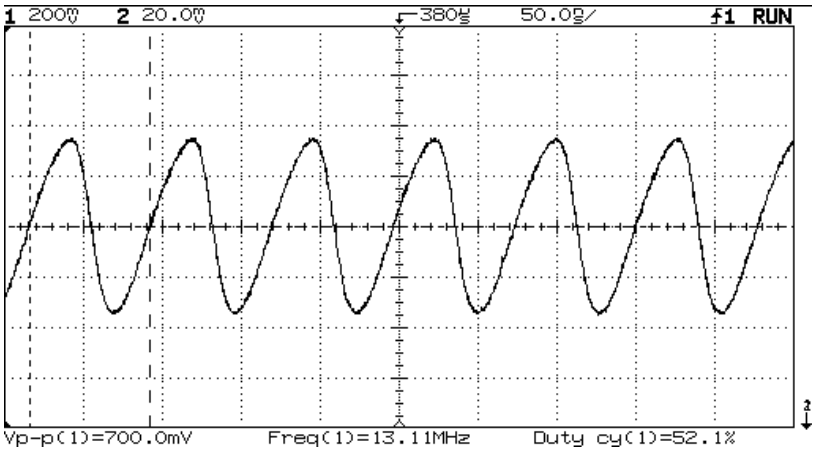


Fig. 4.0 GSM Rx I&Q's Pg. 3-E/F15 TP406/7

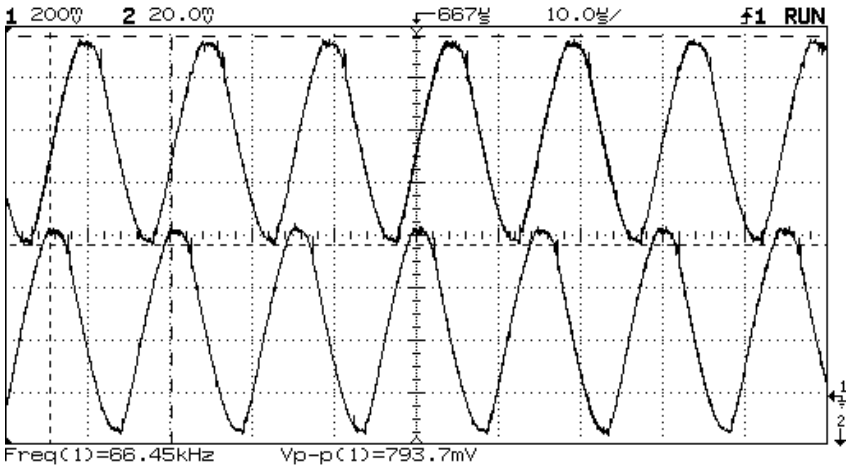


Fig.4.1 PCN Rx I & Q Pg.3-E/F15 TP406/7

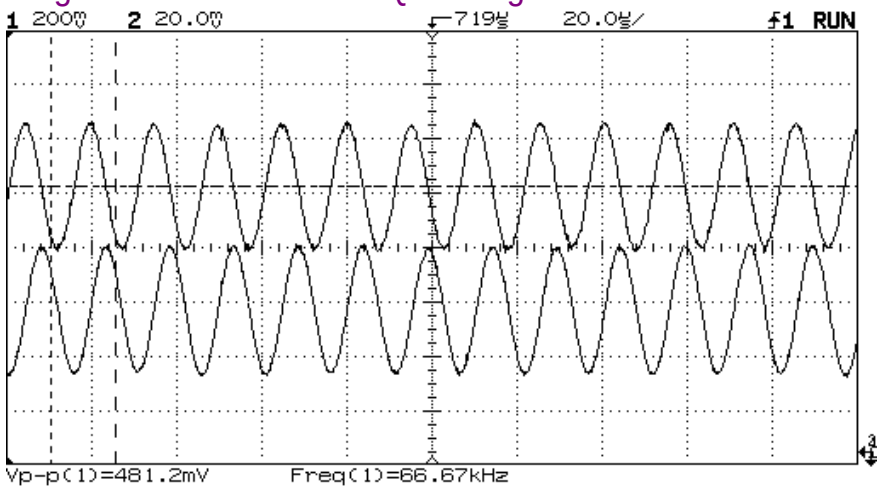


Fig. 4.2 GSM_TX Pg. 1-1I TP403

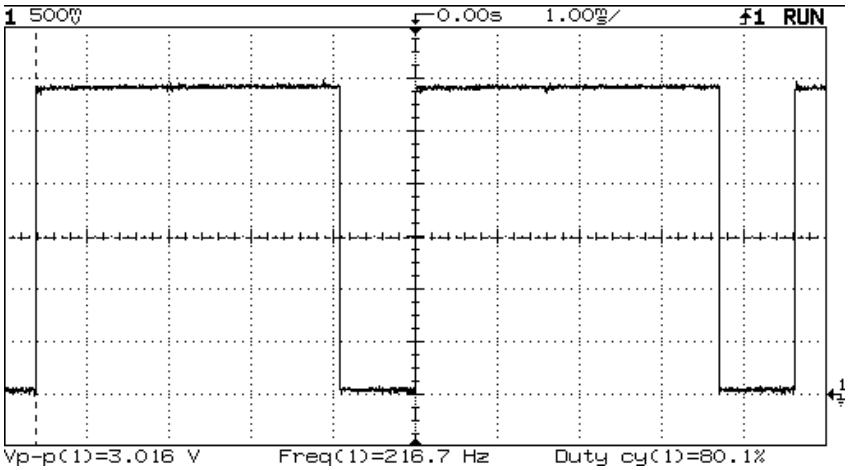


Fig. 4.3 PCN_TX Pg. 1-1J TP417

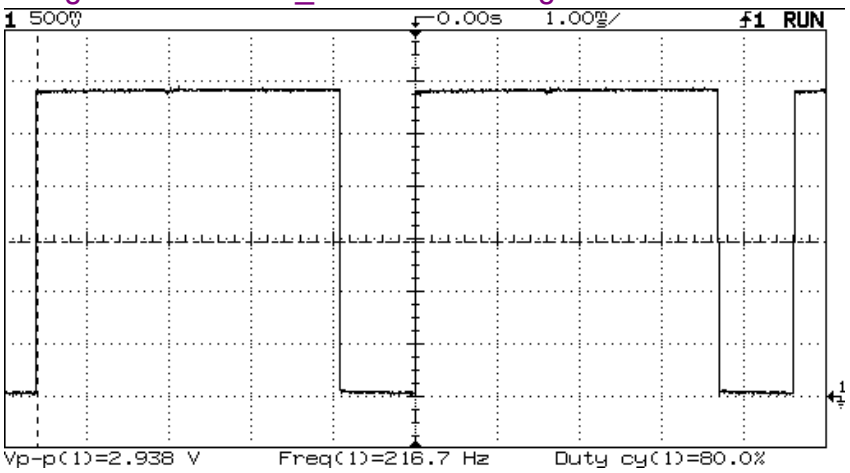


Fig. 4.4 3V_G_TX Pg. 1-4I TP100

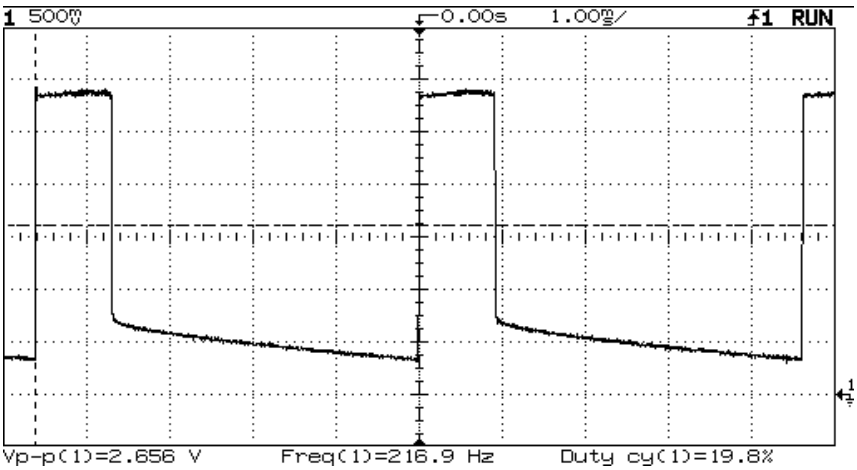


Fig. 4.5 3V_P_TX Pg. 1-4J TP101

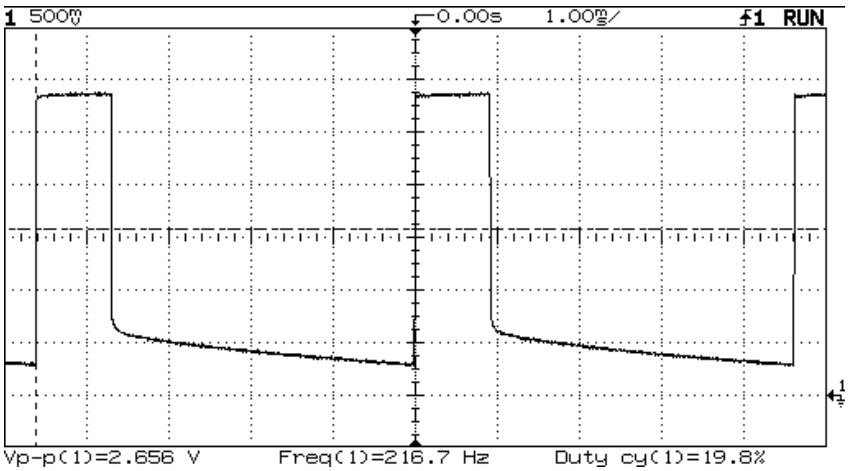


Fig. 4.6 GSM_ON Pg. 1-2K TP402

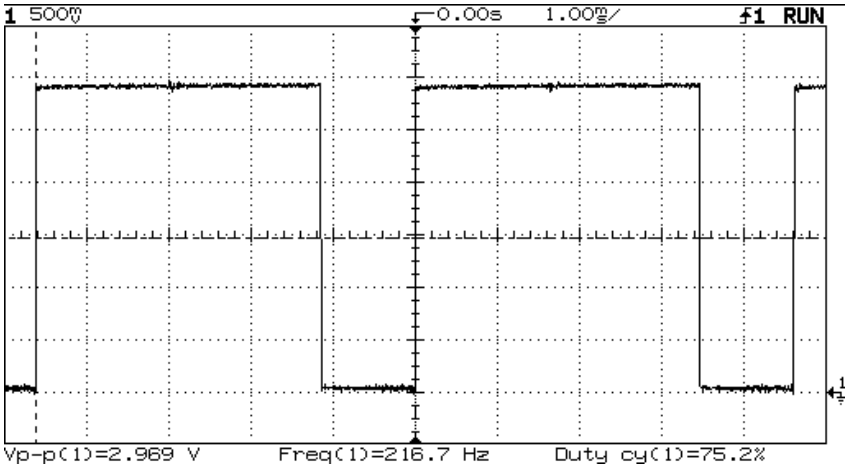


Fig. 4.7 PCN_ON Pg. 1-1K TP415

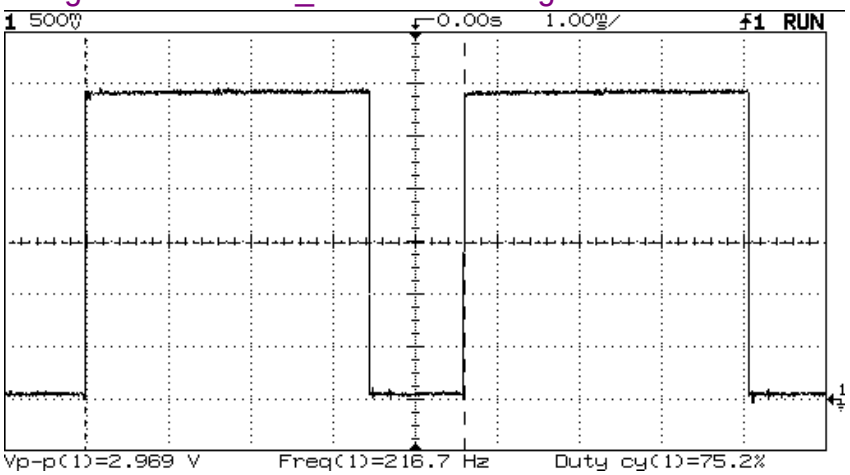


Fig. 4.8 PRE_ON Pg. 1-4J TP416

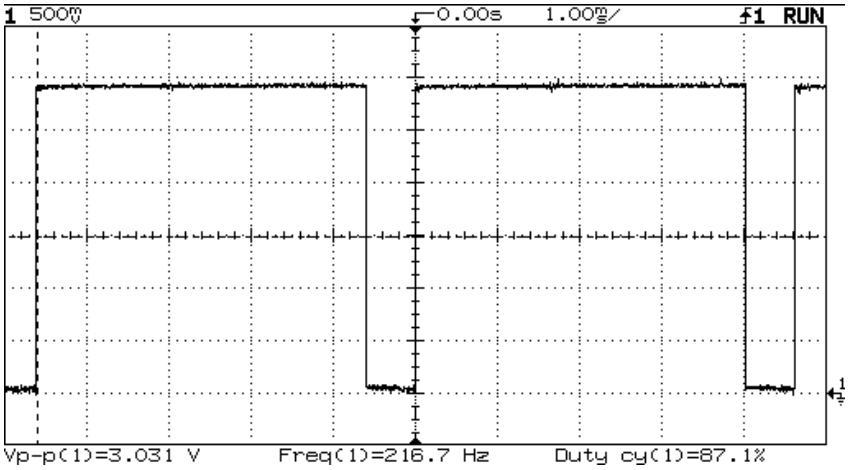


Fig. 4.9 GSM_PRE_ON Pg. 1-3K TP102

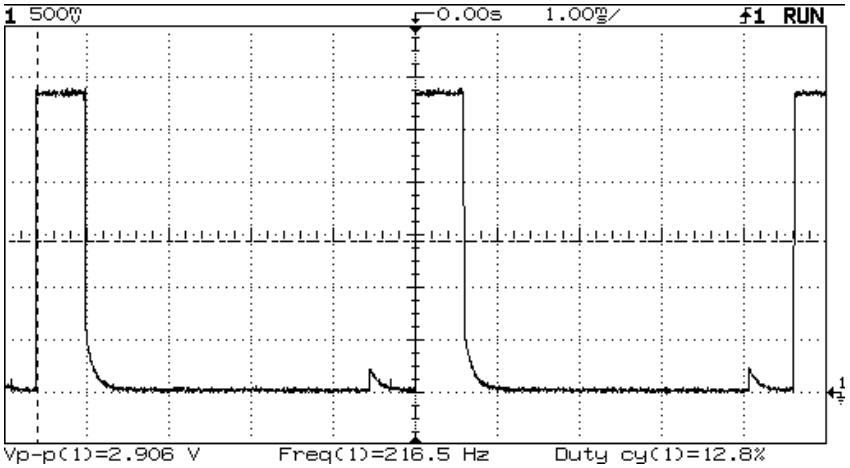


Fig. 4.10 PCN_PRE_ON Pg. 1-4K TP103

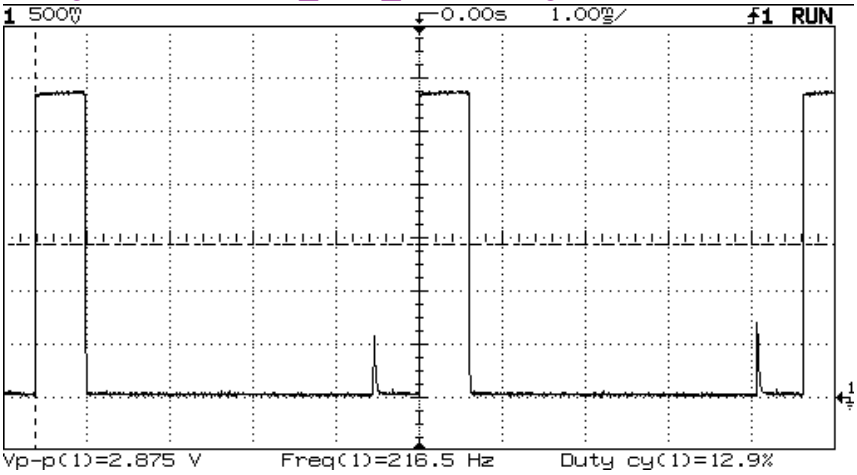
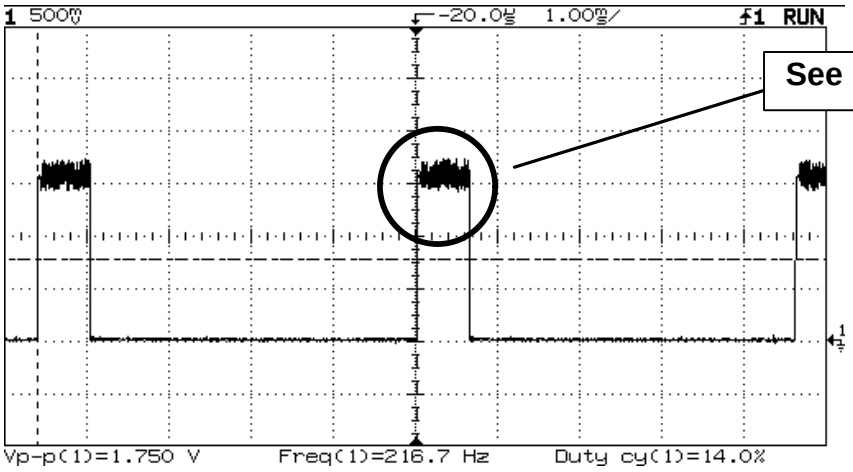


Fig. 4.11a Tx I & Q Burst Pg.1-1E TP408/22



See Fig 4.11b

Fig. 4.11b TX I&Q's (Expanded) Pg. 1-1E TP408/22

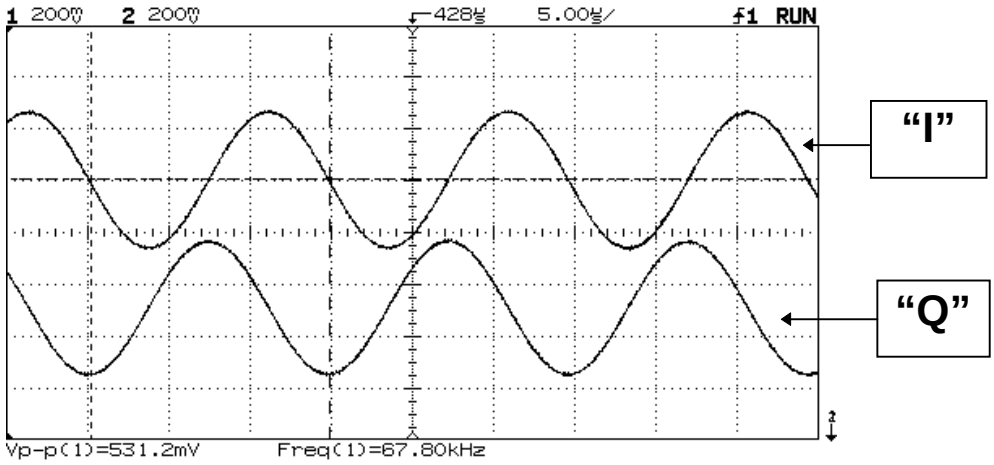


Fig. 4.12 TXP @ GSM @ Pwr Lvl 10 Pg. 1-15D TP421

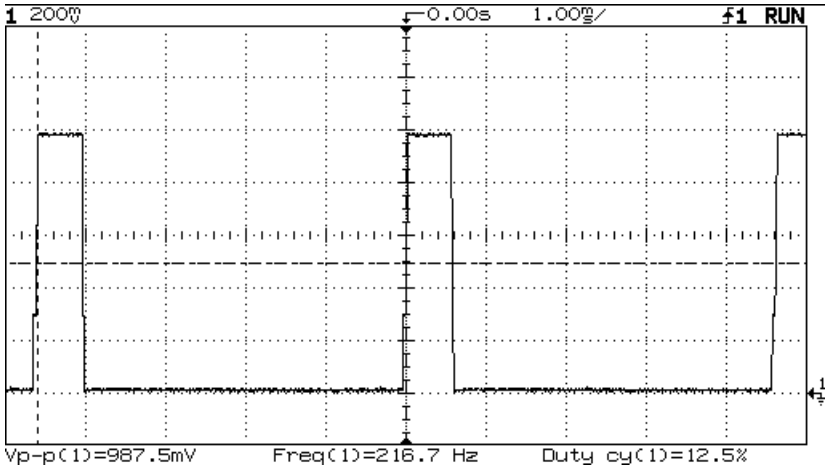


Fig. 4.13 V_ERROR GSM @ Pwr Lvl 10 Pg. 1-16I

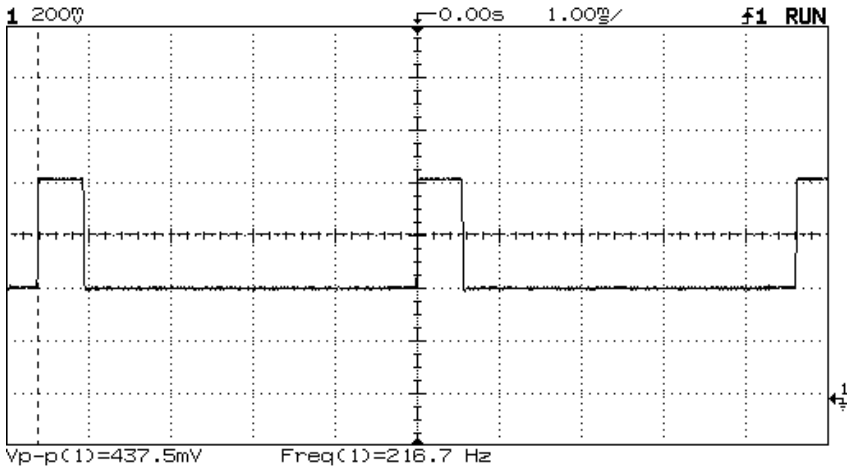


Fig. 4.14 V_ERROR PCN @ Pwr Lvl 7Pg.1-16I

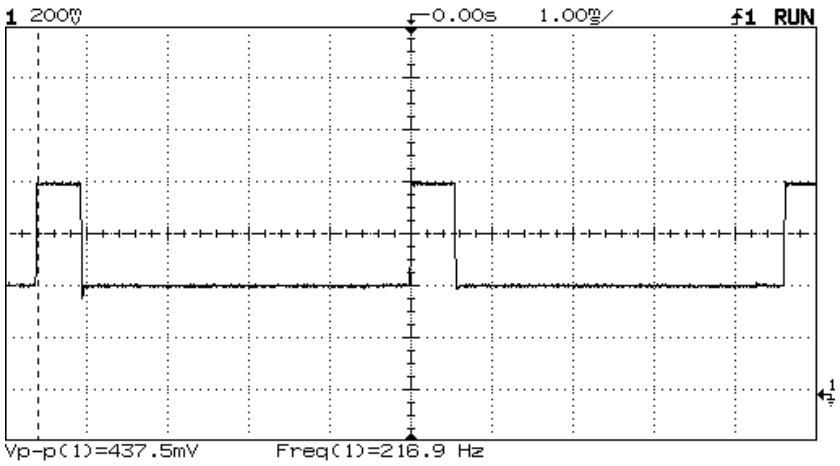
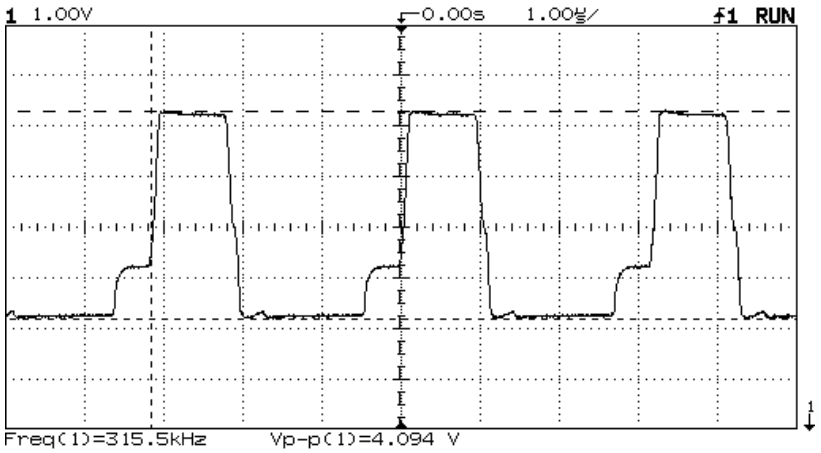


Fig.4.15 300khz Charge Pump Pg.1 Log-9G



Part 6: Fault Codes

The DB2000 can display a number of ‘Return to Service Centre Codes’ to indicate a fault within the HHP as per the list below.

Code 3

This indicates that the secure areas of memory within the HHP, such as the IMEI, have become corrupt. This can only be overcome by reprogramming the IMEI - a function not available to Service Centres.

Code 101

This indicates a power up ROM checksum failure.

Code 102

This indicates a power up RAM check failure i.e a failure in writing to or reading from the RAM locations.

Code 111

This indicates a difference in the layer 1 calibration checksum stored in EEPROM compared to the calculated checksum value.

Code 120

This indicates a difference in the Battery Management checksum stored in EEPROM compared to the calculated checksum value.

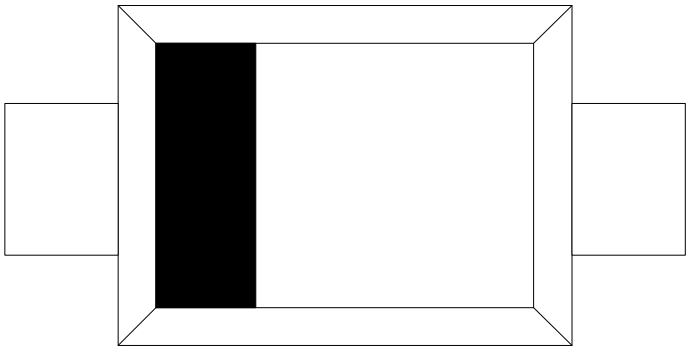
Code 130

This indicates that a key is stuck on power up (this could be either the keypad or volume keys).

Section 6

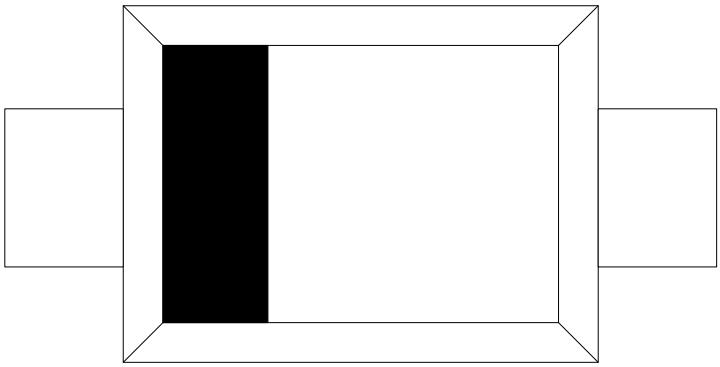
Device Information

M5-TV0443	1SS355TE-17	D2,D4



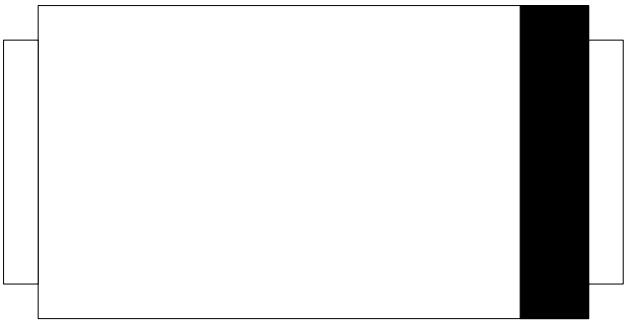
This is a surface mount high speed switching diode

M5-TV0404	UDZTE-1751B ZENER DIODE	D25



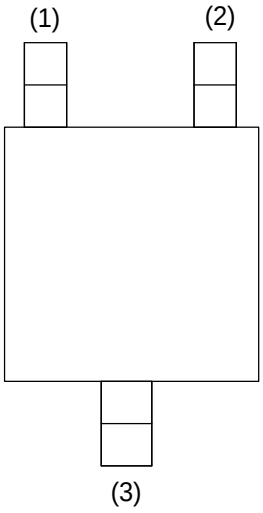
This is a Surface Mount 5.1V Zener Diode

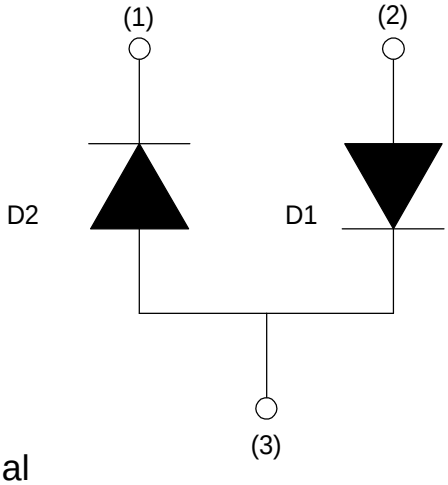
M5-TV0522 BYS10 SCHOTTKY DIODE D26



Schottky barrier rectifying diode

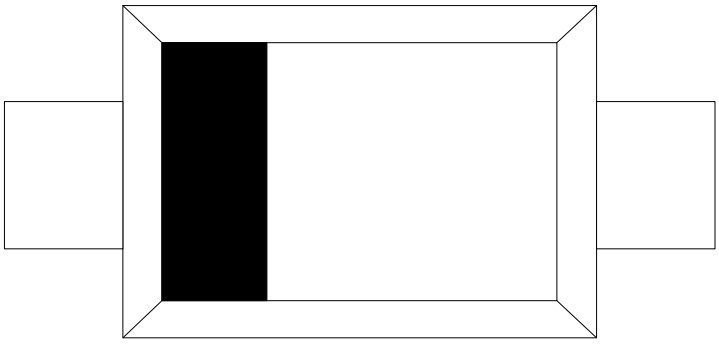
M5-TV0417 DA204UT106 DIODE D47, D200





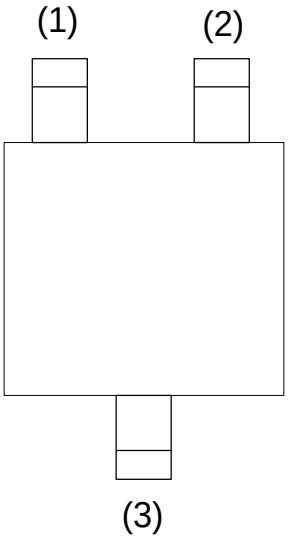
This is a Silicon Epitaxial Rectifying Schottky Barrier Diode

M5-TV0525 UDZTE-1739B ZENER DIODE D49

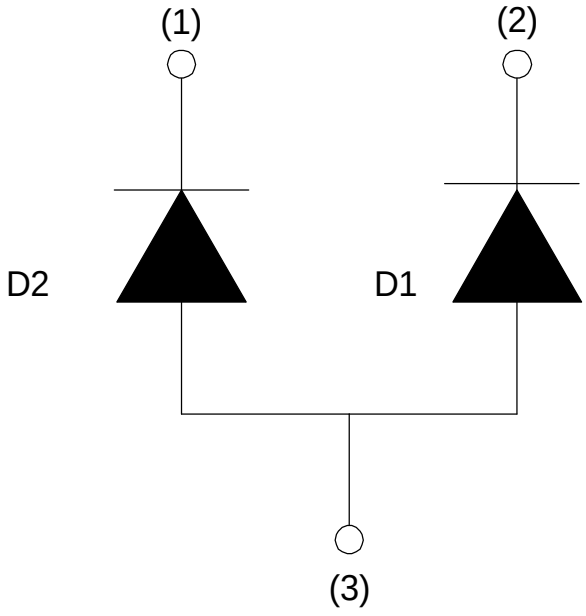


This is a surface mount 3.9V zener diode

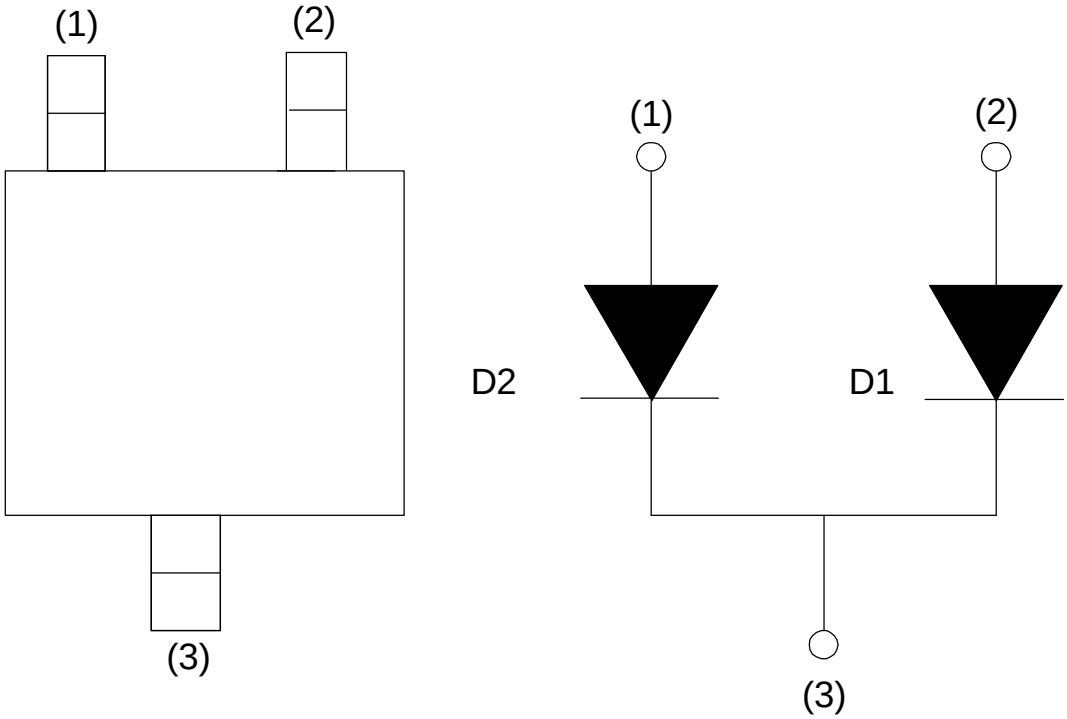
M5- TV0521 DAP222 DIODE D100



This is a epitaxial planar switching diode

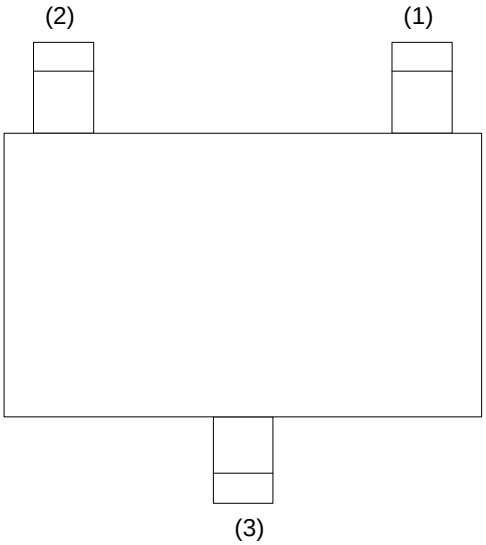


M5-TV0514 BAR64-05 SILICON DIODE D300, D400, D401



High voltage, silicon diode, for frequencies up to 3Ghz

M5-TV0519 B8Y51 SILICON DIODE D303



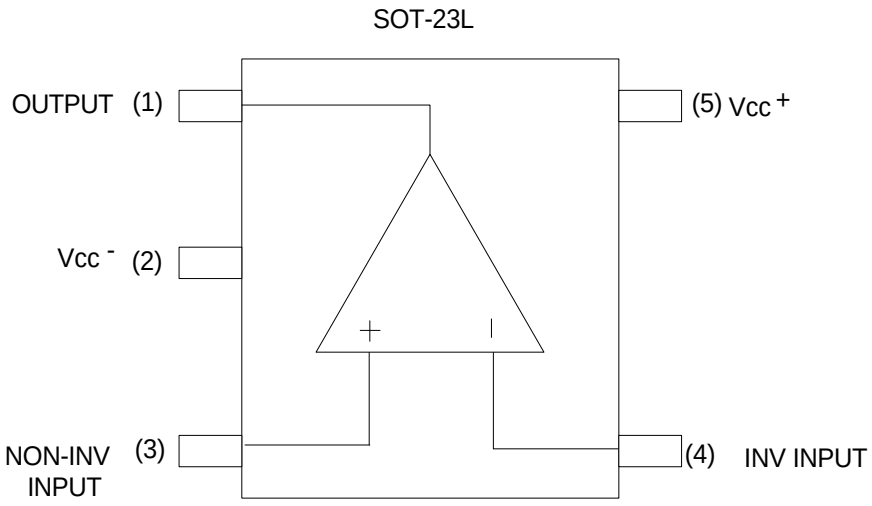
This is a dual tuning diode

PIN DESCRIPTION

PAD No.	PAD FUNCTION	PAD No.	PAD FUNCTION	PAD No.	PAD FUNCTION
1	GND	31	KEYROW3	61	N/C
2	DATA4	32	KEYROW4	62	VDD
3	DATA5	33	KEYROW5	63	ADC_AGND1
4	DATA6	34	ILBPORT2	64	ADC_AIN0
5	DATA7	35	OSC32KM	65	ADC_AIN1
6	PORT13	36	OSC32KP	66	ADC_AIN2
7	PORT14	37	GND	67	ADC_AIN3
8	DATA8	38	VDD2	68	ADC_AIN4
9	DATA9	39	MECHIP	69	VREF ADC
10	VDD	40	VDD2	70	ADC_AVDD
11	DATA10	41	HARDPWR	71	ADC_AGND2
12	DATA11	42	ILBPORT0	72	DAC_AGND1
13	PORT15	43	EXTSENSE	73	DAC_AVDD
14	DATA12	44	CHARGER	74	DAC1
15	DATA13	45	GND	75	DAC2
16	DATA14	46	ILBTST	76	VREFDAC
17	DATA15	47	ILBRST	77	DAC_AGND2
18	PSUSYNC	48	SIMDATA	78	VDD
19	UARTTX0	49	SIMRST	79	GND
20	DSPINTO	50	SIMCLK	80	PCNC1ATX
21	GND	51	SIMPWR	81	DSPRXD
22	RG3VPWR	52	PCMCIARX	82	PWMOUT
23	KEY1	53	RAMCS	83	DSPTXD
24	KEYCOL0	54	LCDCS	84	EECLK
25	KEYCOL1	55	DSPCS	85	EEDATA
26	KEYCOL2	56	ILBPORT1	86	OBE
27	KEYCOL3	57	UARTRXD	87	ILD
28	KEYROW0	58	VDD2	88	OLD
29	KEYROW1	59	GND	89	VDD
30	KEYROW2	60	CLK13M	90	GND

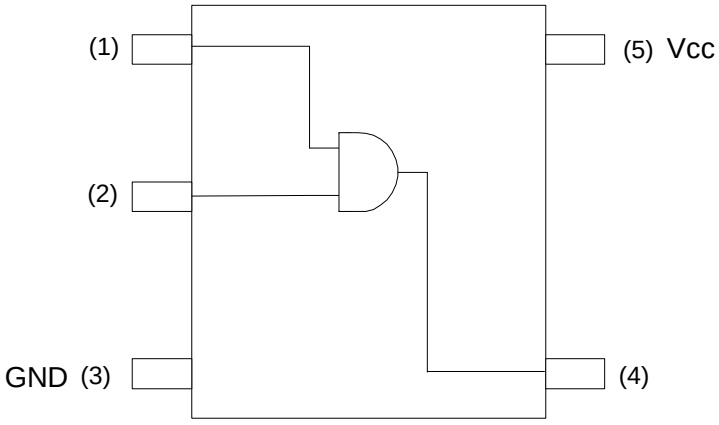
PAD No.	PAD FUNCTION	PAD No.	PAD FUNCTION	PAD No.	PAD FUNCTION
91	OCK	113	TEST1	135	A15
92	ICK	114	TEST0	136	A16
93	UBS	115	A1	137	VDD
94	LBS	116	A2	138	A17
95	ROMCS	117	GND	139	A18
96	WE	118	VDD	140	PORT4
97	OE	119	A3	141	PORT5
98	TEST5	120	A4	142	A19
99	TEST4	121	A5	143	A20
100	TEST3	122	PORT0	144	PORT6
101	TESTT2	123	PORT1	145	PORT7
102	EXTINT	124	A6	146	VDD
103	LCDDATA	125	A7	147	PORT8
104	nTRST	126	A8	148	PORT9
105	TDO	127	A9	149	PORT10
106	VDD	128	A10	150	DATA0
107	GND	129	PORT2	151	DATA1
108	TDI	130	PORT3	152	DATA2
109	TMS	131	A11	153	DATA3
110	TCK	132	A12	154	PORT1
111	MODE	133	A13	155	PORT2
112	FLASHRST	134	A14	156	VDD

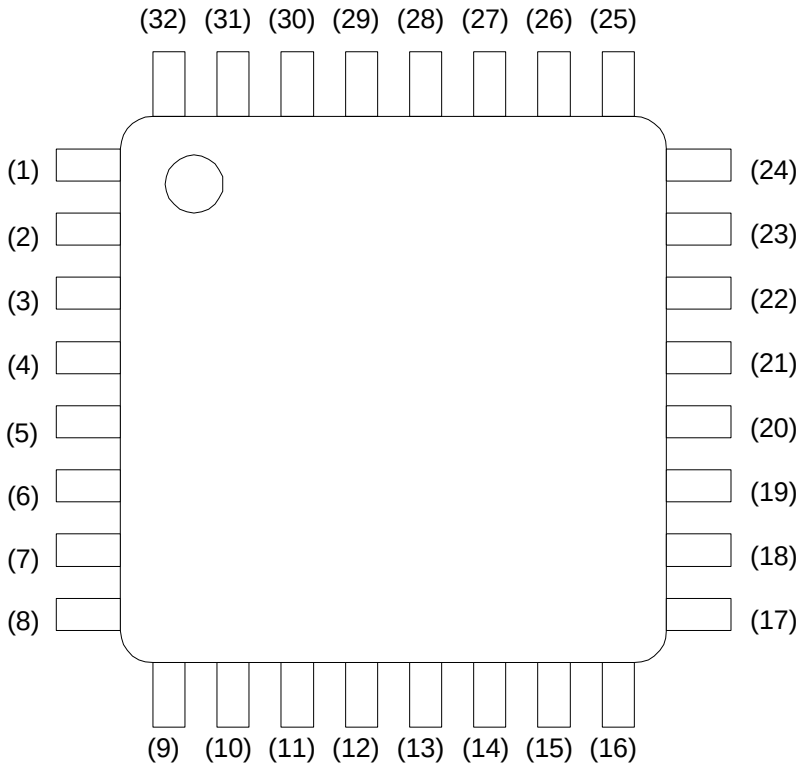
M5-TQ0442 TS951 OPERATIONAL AMPLIFIER IC13, 29, 105, 108, 109



Low Power Rail to Rail Single Operational Amplifier

M5-TY0003 SOT23-5 2-INPUT AND GATE IC18



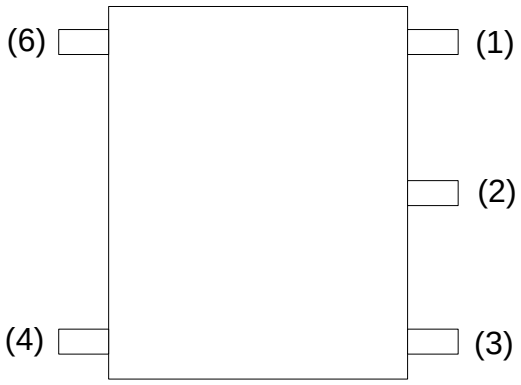


Pin Configuration.

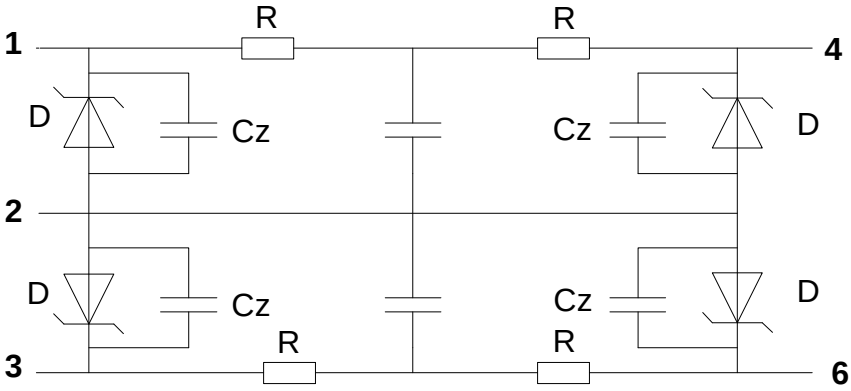
NAME	No.	I/O	DESCRIPTION
GND	1	I	Ground
OUT7	2	O	Regulator 7 Output. Filter Capacitor Connection
OUT2	3	O	Regulator 2 Output. Filter Capacitor connection
OUT3	4	O	Regulator 3 Output. Filter Capacitor Connection
VCC	5	I	Battery supply of 3V LDO's
OUT5	6	O	Regulator 5 Output. Filter Capacitor Connection
GND_1	7	I	Ground for Charge Pump
GND	8	I	Ground
GND	9	I	Ground
OUT6	10	O	Regulator 6 Output. Filter Capacitor Connection
VIN	11	I	Supply Voltage of 5V LDO's (Charge Pump output)
BUB	12	O	Backup battery buffer output (gate of external PMOS)
D1	13	O	Square Wave out for Charge Pump
VS1IN	14	I	Battery Supply of Charge Pump
B1	15	I	Boost Voltage
GND	16	I	Ground
GND	17	I	Ground
SEL	18	I	Regulator 5 voltage selection between 3V and 5V mode
EN6	19	I	R6 enable. A logic low on EN6 turns off regulator 6
EN5	20	I	R5 enable. A logic low on EN5 turns off regulator 5
EN3	21	I	R3 enable. A logic low on EN3 turns off regulator 3

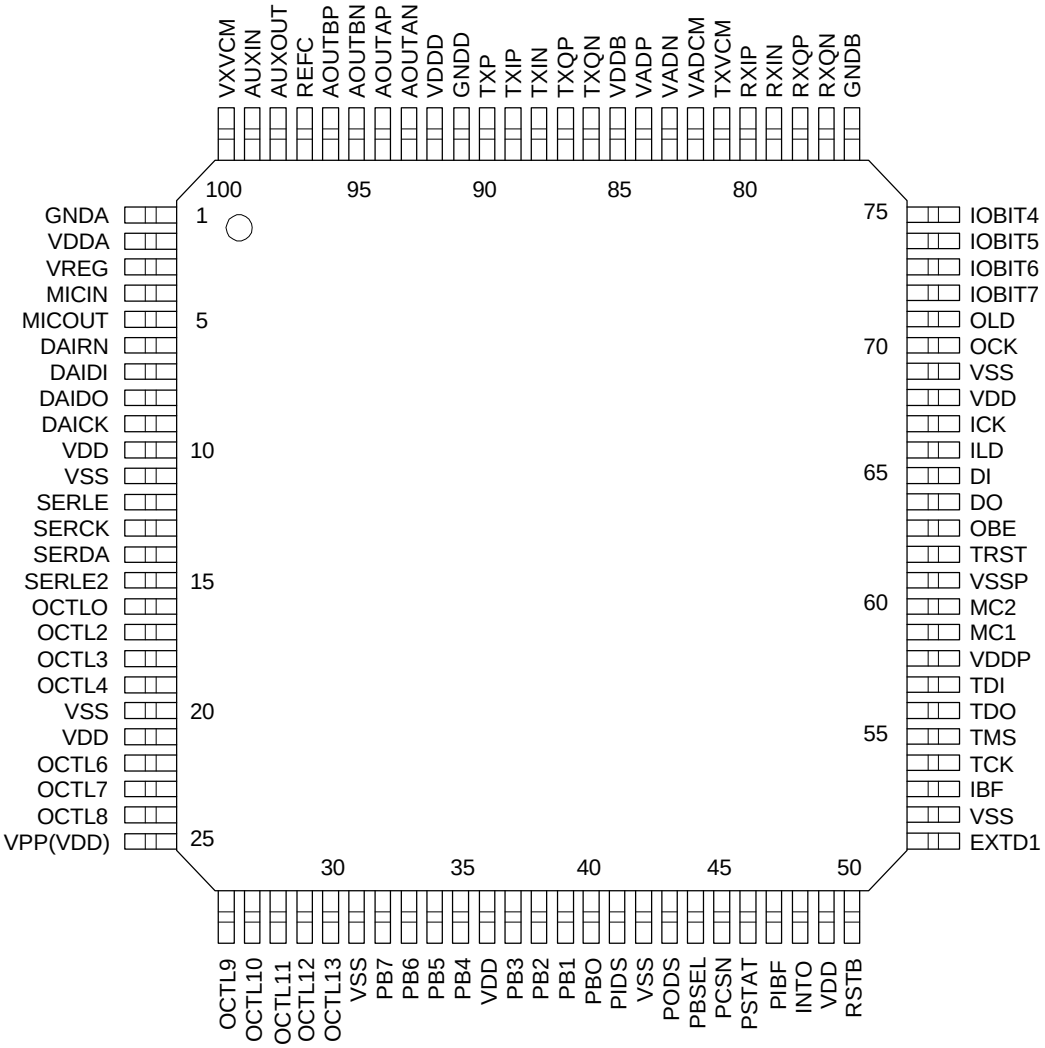
UVLO2OUT	22	O	Under Voltage Lock Out 2 Output
POR	23	O	Microprocessor Reset Output - Power-On Reset
GND	24	I	Ground
GND	25	I	Ground
CBYP	26	O	External Bypass Capacitor for low noise performance
ENRS	27	I	Reset Enable. A logic high will prevent R2, R3, R5, R6 and R7 from being switched off by UVLO2
EN2	28	I	R2 Enable. A logic low on EN2 turns off regulator 2
VCC2	29	I	Battery Supply Voltage (entire chip disabled if this pin is disconnected)
EN7	30	I	R7 Enable. A Logic low on EN7 turns off regulator 7
OUT1	31	O	Regulator 1 Output. Filter Capacitor Connection
GND	32	I	Ground

M5-TY0004	EMI FILTER WITH ESD PROTECTION	IC22, 23, 24, 25, 31, 32



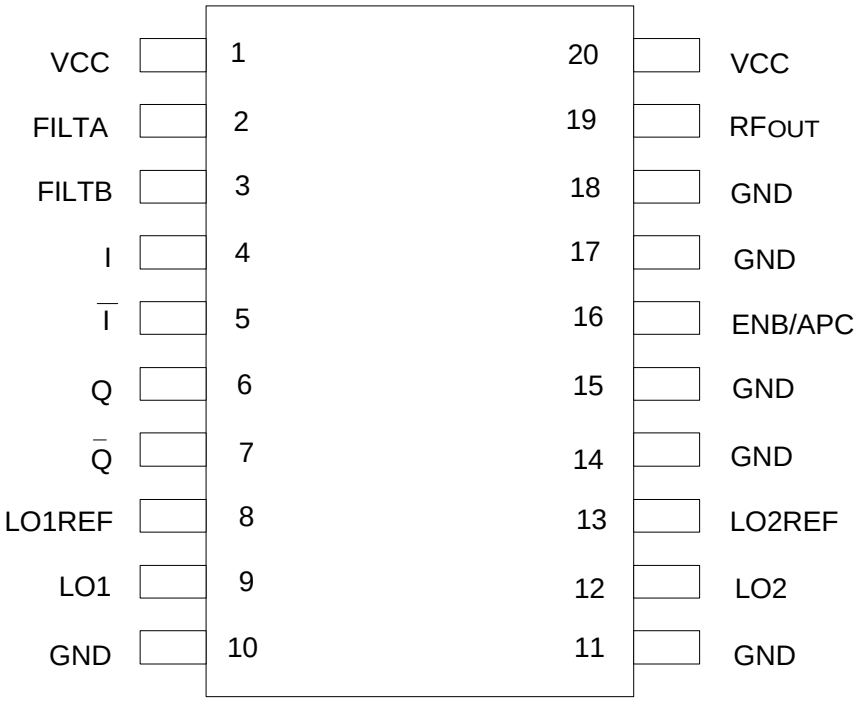
FUNCTION DIAGRAM

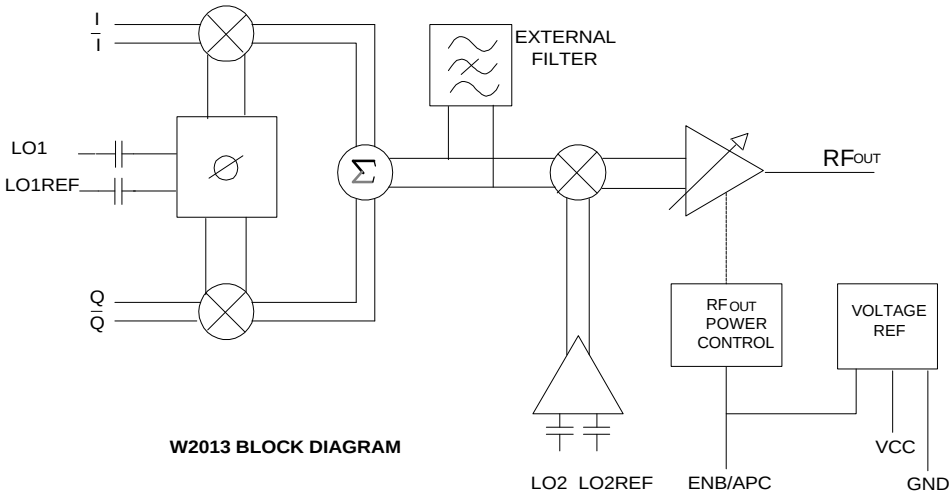



VXVCM
AUXIN
AUXOUT
REFC
AOUTBP
AOUTBN
AOUTAP
AOUTAN
VDDD
GNDD
TXP
TXIP
TXIN
TXQP
TXQN
VDDB
VADP
VADN
VADCM
TXVCM
RXIP
RXIN
RXQP
RXQN
GNDB
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1
GNDA
VDDA
VREG
MICIN
MICOUT
DAIRN
DAIDI
DAIDO
DAICK
VDD
VSS
SERLE
SERCK
SERDA
SERLE2
OCTLO
OCTL2
OCTL3
OCTL4
VSS
VDD
OCTL6
OCTL7
OCTL8
VPP(VDD)
IOBIT4
IOBIT5
IOBIT6
IOBIT7
OLD
OCK
VSS
VDD
ICK
ILD
DI
DO
OBE
TRST
VSSP
MC2
MC1
VDDP
TDI
TDO
TMS
TCK
IBF
VSS
EXTD1
OCTL9
OCTL10
OCTL11
OCTL12
OCTL13
VSS
PB7
PB6
PB5
PB4
VDD
PB3
PB2
PB1
PBO
PIDS
VSS
PODS
PBSEL
PCSN
PSTAT
PIBF
INTO
VDD
RSTB

Pin	Symbol	Type	Description
1	GNDA	gnd	Voice band analog ground.
2	VDDA	pwr	3V voice band analog supply.
3	VREG	O, A	Voice band regulated voltage for electret condenser mic.
4	MICIN	I, A	Voice band microphone input.
5	MICOUT	O, A	Voice band microphone output.
6	DAIRN	I, D, PD*	Voice band digital audio interface reset not. Active-Low.
7	DAIDI	I, D, PD*	Voice band digital audio interface data in.
8	DAIDO	O, D	Voice band digital audio interface data out. Reset state is low.
9	DAICK	O, D	Voice band digital audio interface clock. Reset state is high.
10	VDD	pwr	3V digital supply.
11	VSS	gnd	Digital ground.
12	SERLE	O, D	Serial data latch for programming external synthesizer. Programmable active state. Reset state is high.
13	SERCK	O, D	Serial clock for programming external synth. Reset state low.
14	SERDA	O, D	Serial data output for programming external synthesizer. Reset state is low.
15	SERLE2	O, D	Serial data latch 2 for programming external synthesizer. Programmable active state. Reset state is high.
16-17	OCTL(0, 2)	O, D	Output control pins 0, 2 are controlled by the state machine or controlled by OCTLC/OCTLD (manual control). Low reset.
18	OCTL3	I/O	Control output control pin 3.
19	OCTL4	O/D	Control output control pin 4.
20	VSS	gnd	Digital ground.
21	VDD	pwr	3V digital supply.
22-24	OCTL(6:8)	O, D	Output control pins 6,7, 8 are controlled by state machine or controlled by OCTLC/OCTLD (manual control). Low reset.
25	VPP/VDD	pwr	Flash ROM supply/digital supply.
26-27	OCTL(9:10)	O, D	Output control pins 9,10 are controlled by state machine or controlled by OCTLC/OCTLD (manual control). Low reset.
28	OCTLC11/POBE	O, D	Control output pin 11. Also PHIF output buffer empty flag. Controlled by software.
29	OCTL12/IACK	O, D	Control output pin12. Also interrupt acknowledge controlled by software.
30	OCTL13	O,D	Output control pin 13 is controlled by state machine or controlled by OCTLC/OCTLD (manual control). Low reset.
31	VSS	gnd	Digital ground.
32-35	PB(7:4)	I/O**	PHIF data bus bit (7:4).
36	VDD	pwr	3V digital supply.
37-40	PB(3:0)	I/O**	PHIF data bus bit (3:0).
41	PIDS	I	PHIF input data strobe.
42	VSS	gnd	Digital ground.
43	PODS	I	PHIF output data strobe.
44	PBSEL	I	PHIF byte select.
45	PCSN	I	PHIF chip select not.
46	PSTAT	I	PHIF status register select.
47	PIBF	O	PHIF input buffer full.
48	INTO	I	Vectored interrupt.
49	VDD	pwr	3V digital supply.

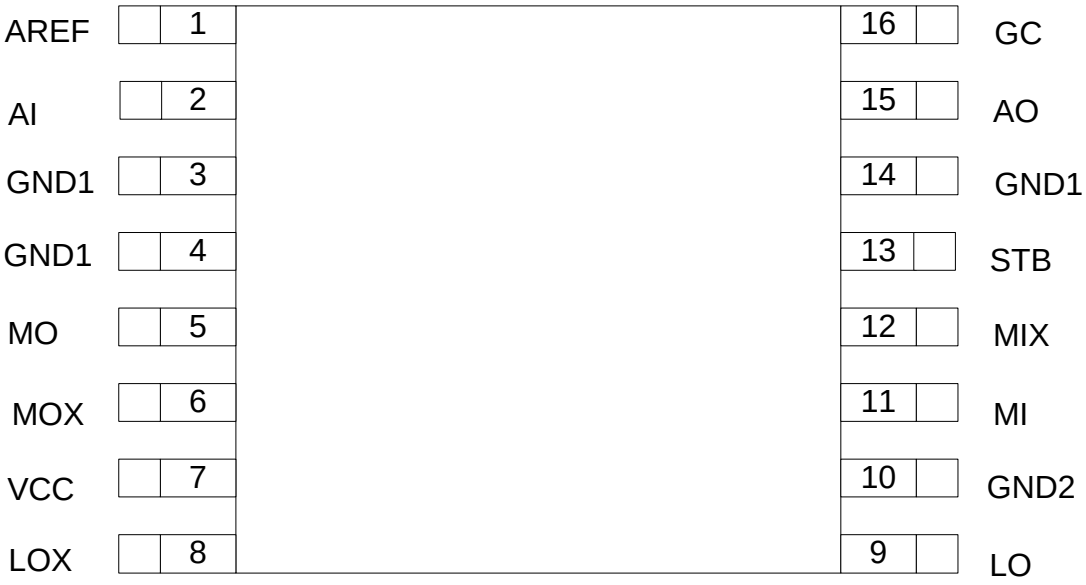
50	RSTB	I	Reset bar.
51	EXTDI	I, PD*	External digital input. Clears prior to each Rx buffer.
52	VSS	gnd	Digital ground.
53	IBF	I	SIO input buffer full.
54	TCK	I	JTAG test clock.
55	TMS	I, PU***	JTAG test mode select.
56	TDO	O	JTAG test data output.
57	TDI	I, PU***	JTAG test data input.
58	VDDP	pwr	PLL supply.
59--60	MC(1:2)	I	Small signal master clock input.
61	VSSP	gnd	PLL ground.
62	TRST	I,PU***	JTAG test reset.
63	OBE	O**	SIO output buffer empty.
64	DO	O**	SIO data output.
65	DI	I	SIO data input.
66	ILD	I/O**	SIO input load.
67	ICK	I/O**	SIO input clock.
68	VDD	pwr	3V digital supply.
69	VSS	gnd	Digital ground.
70	OCK	I/O**	SIO output clock.
71	OLD	I/O**	SIO output load.
72-75	IOBIT(7:4)	I/O**	Status/control bits (7-4).
76	GNDB	gnd	Baseband analog ground.
77	RXQN	I, A	Baseband receive Q component negative output.
78	RXQP	I, A	Baseband receive Q component positive output.
79	RXIN	I, A	Baseband receive I component negative output.
80	RXIP	I,A	Baseband receive I component positive output.
81	TXVCM	I/O, A	Baseband TX external ref. Sets common mode of I's and Q's.
82	VADCM	O, A	Baseband 1.4V analog reference for ADC.
83	VADN	O, A	Baseband reference for ADC negative.
84	VADP	O, A	Baseband reference for ADC positive.
85	VDDB	pwr	3V baseband analog supply.
86	TXQN	O, A	Baseband transmit Q component negative output.
87	TXQP	O, A	Baseband transmit Q component positive output.
88	TXIN	O, A	Baseband transmit I component negative output.
89	TXIP	O, A	Baseband transmit I component positive output.
90	TXP	O, A	Baseband transmit power control.
91	GNDD	gnd	Quiet digital ground.
92	VDDD	pwr	3V quiet digital supply.
93	AOUTAN	O, A	Voice band negative output number 1.
94	AOUTAP	O, A	Voice band positive output number 1.
95	AOUTBN	O, A	Voice band negative output number 2.
96	AOUTBP	O, A	Voice band positive output number 2.
97	REFC	A	Voice band external cap for internal voltage regulator.
98	AUXOUT	O, A	Voice band auxiliary output.
99	AUXIN	I, A	Voice band auxiliary input.
100	VXVCM	A	Voice band external bypass capacitor, reference.
* On-Chip pull-down resistor.			
** 3-states when RSTB = 0, or by JTAG control.			
*** On-chip, pull-up resistor.			





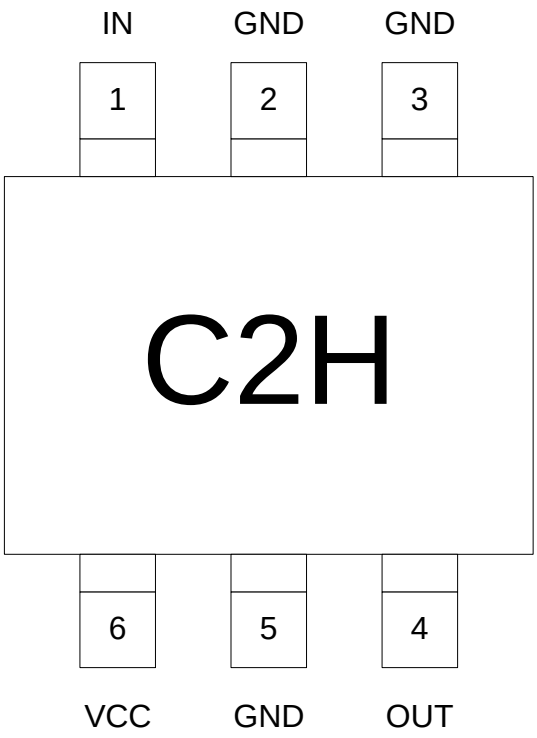
W2013 BLOCK DIAGRAM

Pin	Symbol	Description
1	VCC	Positive Supply Voltage. For low-power/small signal subcircuit.
2, 3	FILTA, FILTB	Filter. Nodes A & B for parallel resonant LC.
4, 5	I, $\overline{I}$	Differential baseband inputs.
6, 7	Q, $\overline{Q}$	Differential baseband inputs.
8, 9	LO1REF, LO1	First local Oscillator Input. Either pin may be directly grounded.
10, 11, 14, 15, 17, 18	GND	Power Supply Ground.
12, 13	LO2, LO2REF	Second Local Oscillator Input. Either pin may be directly grounded.
16	ENB/APC	Enable/Automatic Power Control.
19	RF_{OUT}	RF Output.
20	VCC	Positive Supply Voltage. For high-power output stage.



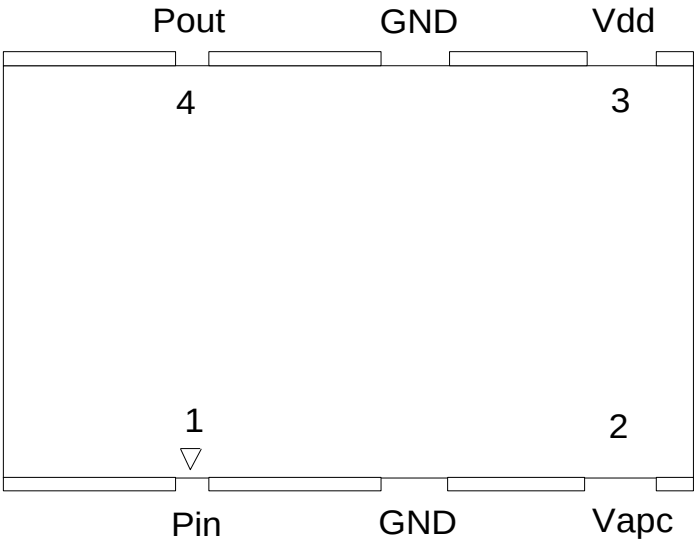
Pin No.	Symbol	Function
1	AREF	Amplifier bias supply for signal input
2	AI	Amplifier signal base input
3	GND1	Amplifier ground
4	GND1	Amplifier ground
5	MO	Mixer signal open collector output
6	MOX	Mixer signal open collector output, inverted
7	VCC	Voltage supply total circuit
8	LOX	Mixer local oscillator signal base input, inverted
9	LO	Mixer local oscillator signal base input
10	GND2	Mixer Ground
11	MI	Mixer signal emitter input
12	MIX	Mixer signal emitter input, inverted
13	STB	Standby mixer and bandgap
14	GND1	Amplifier ground
15	AO	Amplifier signal open collector output
16	GC	Amplifier gain control

M5-TY0413 PC2771T MED POWER AMP IC103, IC104

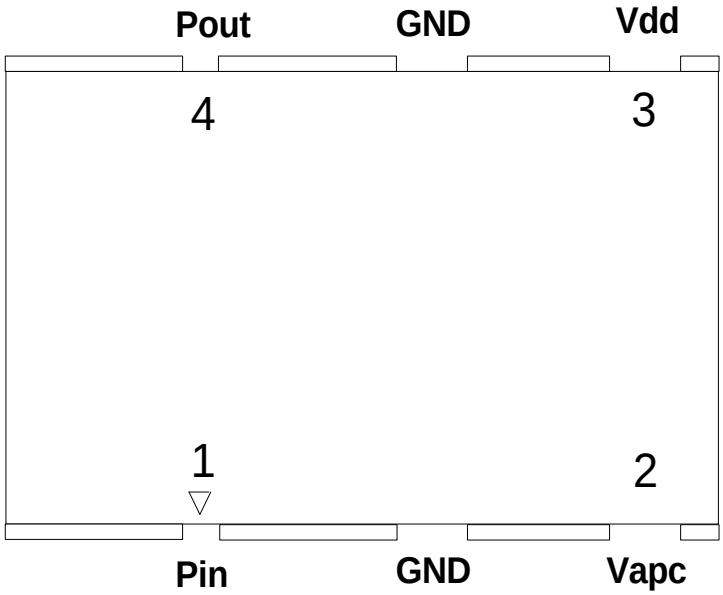


Surface Mount Silicon Monolithic Medium Power
High Frequency Amplifier

M5-TQ0433 PF01411B 5W POWER AMP (GSM) IC106

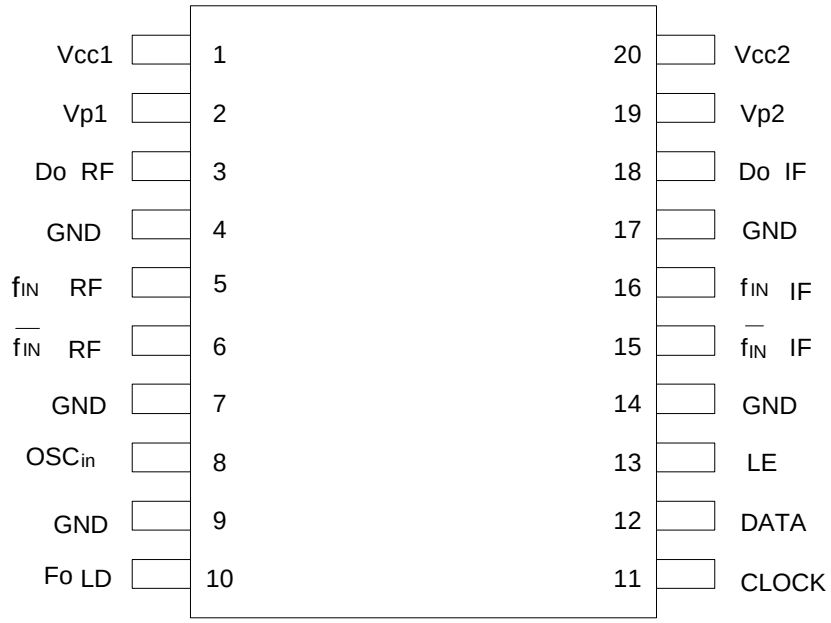


Usable Frequency Range ~ 880 to 915 MHz
Typical Output Power ~ 34.2 dBM @ 3volts

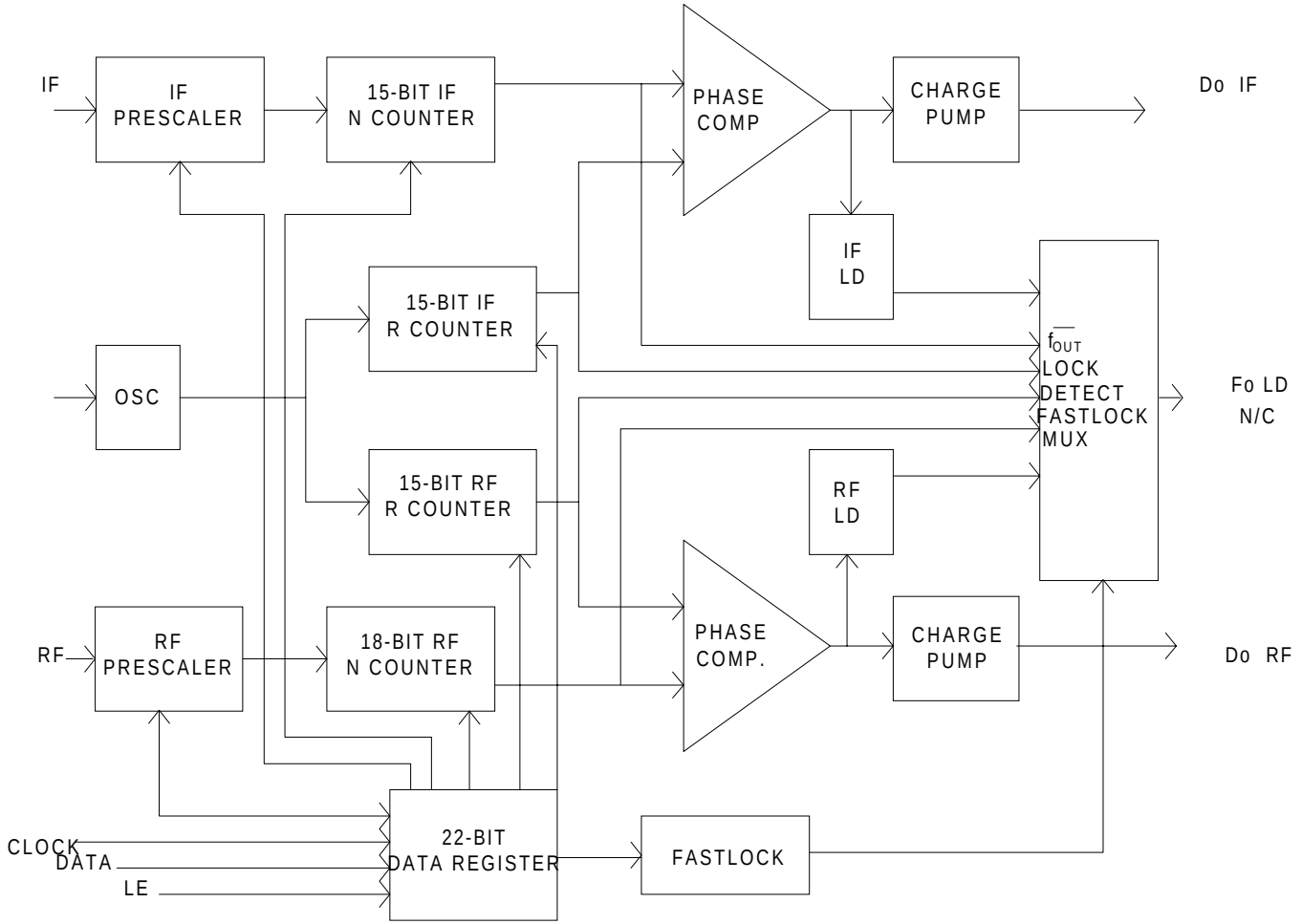


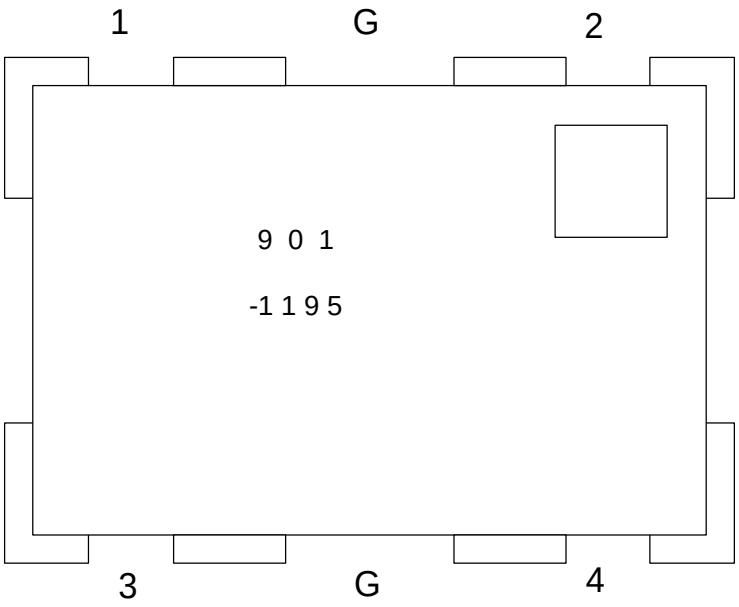
Usable Frequency Range ~ 1710 to 1785 MHz
Typical Output Power ~ 31.5 dBM @ 3volts

M5-TY0429 DUAL FREQUENCY SYNTHESIZER IC201



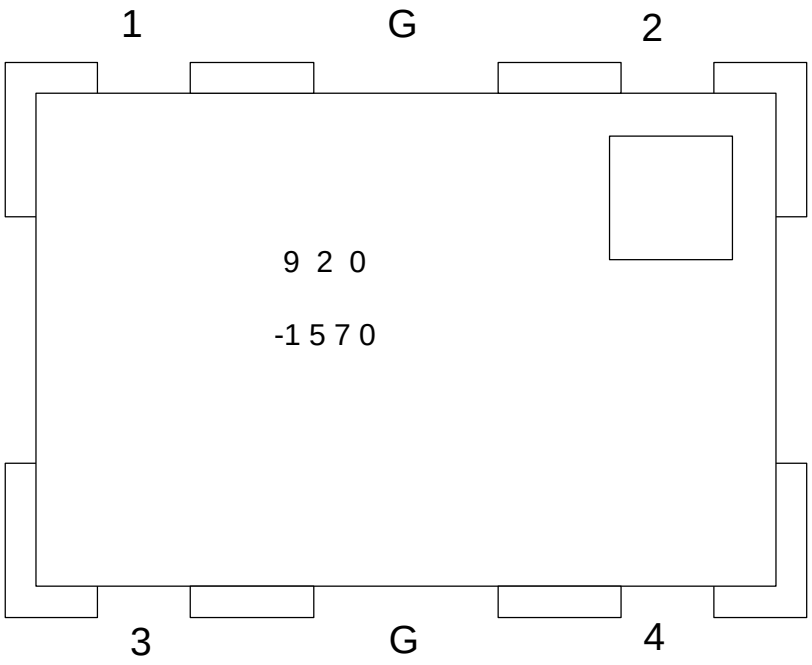
PIN	PIN NAME	I/O	DESCRIPTION
1	VCC1	-	Input power supply voltage (2.7V -5.5V), for RF analogue/digital circuits. VCC1 must equal VCC2.
2	Vp1	-	Power supply for charge pump. Must be ≥ VCC.
3	Do RF	O	Internal charge pump output.
4	GND	-	Ground for digital circuitry
5	f IN RF	-	RF prescaler input. Small signal input from VCO.
6	$\overline{f_{IN}}$ RF	-	RF prescaler complementary input.
7	GND		Ground for RF analogue circuitry.
8	OSCin	-	Oscillator input.
9	GND	-	Digital ground.
10	Fo LD	O	N/C
11	CLOCK	I	Clock input. Data is clocked in on the rising edge.
12	DATA	I	Binary serial data input.
13	LE	I	Load enable control input, for internal shift registers.
14	GND	-	Ground for IF analogue circuitry
15	$\overline{f_{IN}}$ IF	-	RF prescaler complementary input.
16	f IN IF	-	IF prescaler input. Small signal input from the VCO.
17	GND	-	Digital ground.
18	Do IF	O	Internal charge pump IF output.
19	Vp2	-	Power supply for charge pump. Must be ≥ VCC.
20	VCC	-	Input power supply voltage for IF analogue/digital and internal oscillator circuits.


IF
IF PRESCALER
15-BIT IF N COUNTER
PHASE COMP
CHARGE PUMP
Do IF
IF LD
15-BIT IF R COUNTER
OSC
f_{OUT}
LOCK DETECT
FASTLOCK MUX
Fo LD
N/C
15-BIT RF R COUNTER
RF LD
RF
RF PRESCALER
18-BIT RF N COUNTER
PHASE COMP.
CHARGE PUMP
Do RF
CLOCK
DATA
LE
22-BIT DATA REGISTER
FASTLOCK



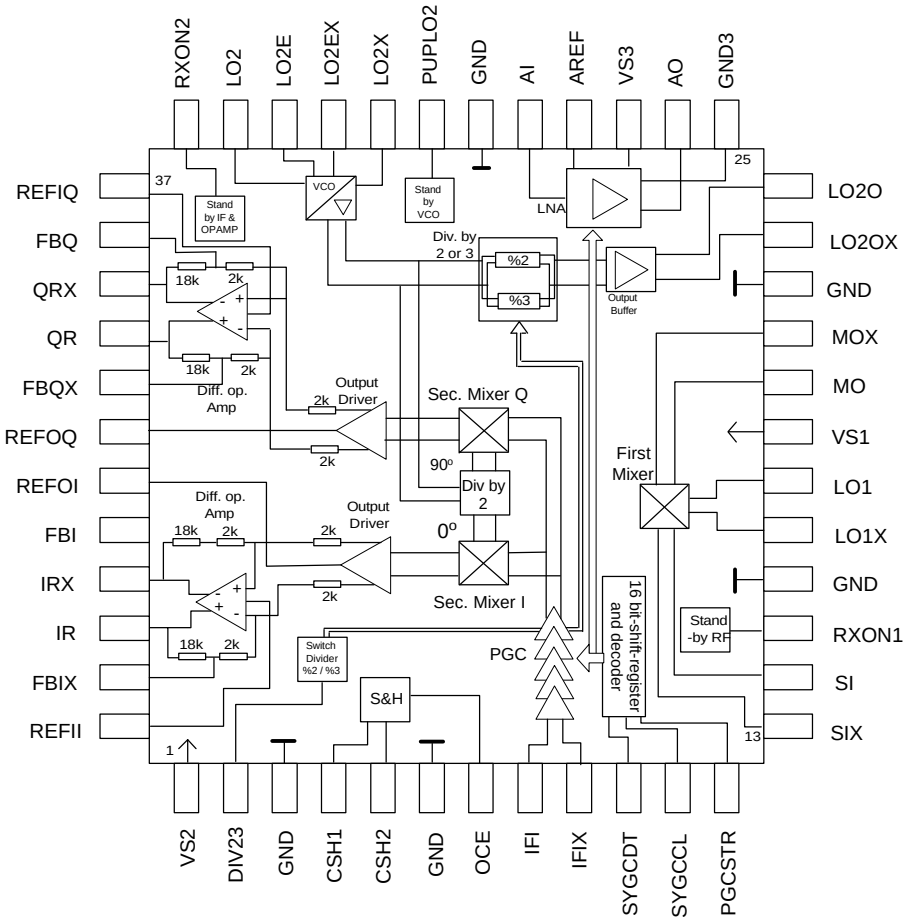
GSM Voltage Controlled Oscillator

PIN	DESCRIPTION
1	N/C
2	OUTPUT
3	CONTROL VOLTAGE
4	POWER SUPPLY

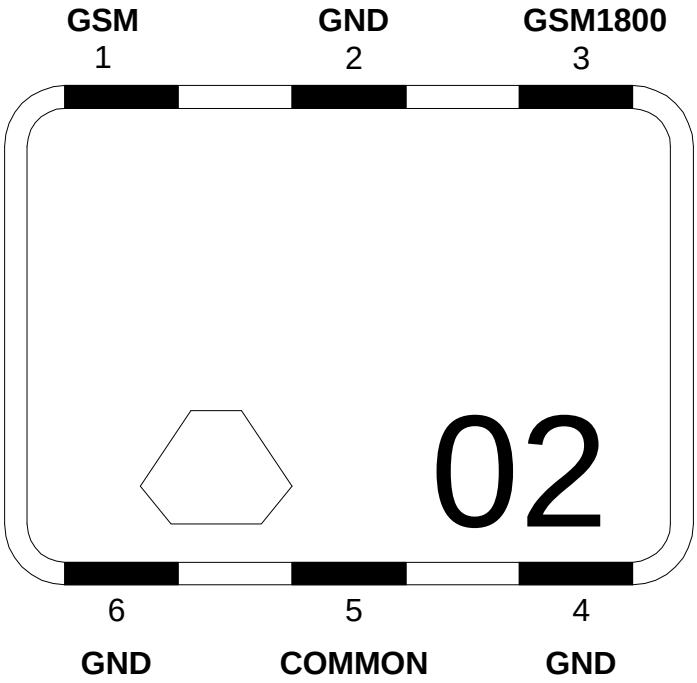


PCN Voltage Controlled Oscillator

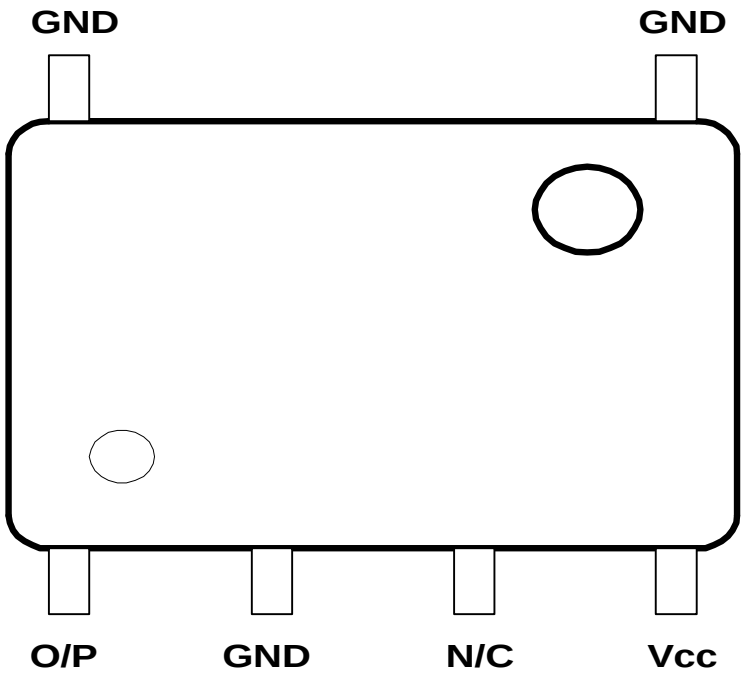
PIN	DESCRIPTION
1	N/C
2	OUTPUT
3	CONTROL VOLTAGE
4	POWER SUPPLY


RXON2
LO2
LO2E
LO2EX
LO2X
PUPLO2
GND
AI
AREF
VS3
AO
GND3
REFIQ
FBQ
QRX
QR
FBQX
REFOQ
REFOI
FBI
IRX
IR
FBIX
REFII
LO2O
LO2OX
GND
MOX
MO
VS1
LO1
LO1X
GND
RXON1
SI
SIX
VS2
DIV23
GND
CSH1
CSH2
GND
OCE
IFI
IFIX
SYGCDT
SYGCCL
PGCSTR
37
25
1
13
VCO
Stand by IF & OPAMP
Stand by VCO
LNA
Div. by 2 or 3
%2
%3
Output Buffer
18k
2k
Diff. op. Amp
Output Driver
Sec. Mixer Q
90º
Div by 2
0º
Sec. Mixer I
First Mixer
PGC
16 bit-shift-register and decoder
Stand -by RF
Switch Divider %2 / %3
S&H

M5-TY0442	DPX321880OT	DIPLEXOR	IC400

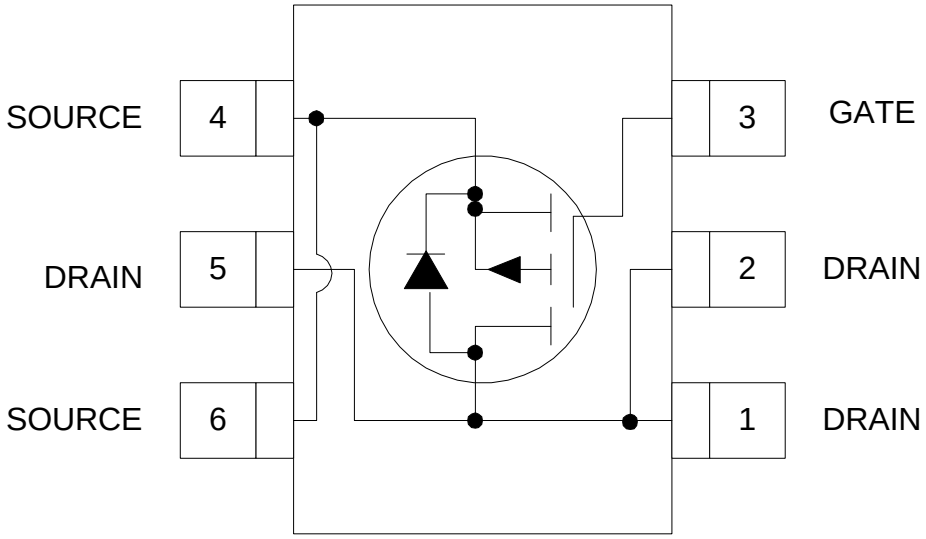


M5-TQ0426	13Mhz TCXO	X200



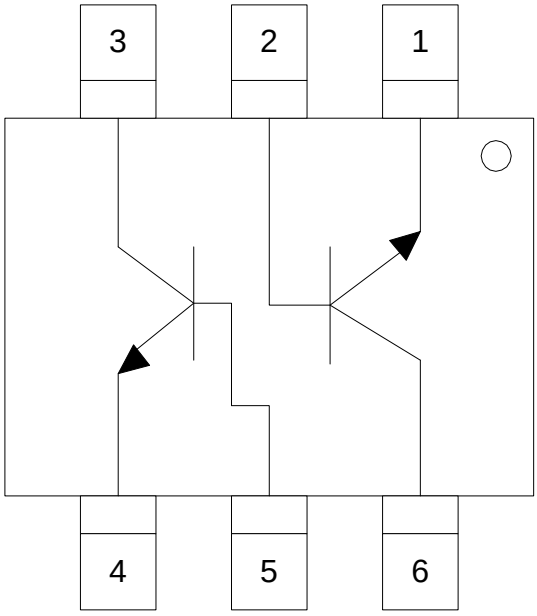
13 Mhz TCXO (Temperature compensated crystal oscillator)

M5-TV0485 NDC652P P-CHANNEL FET TR3



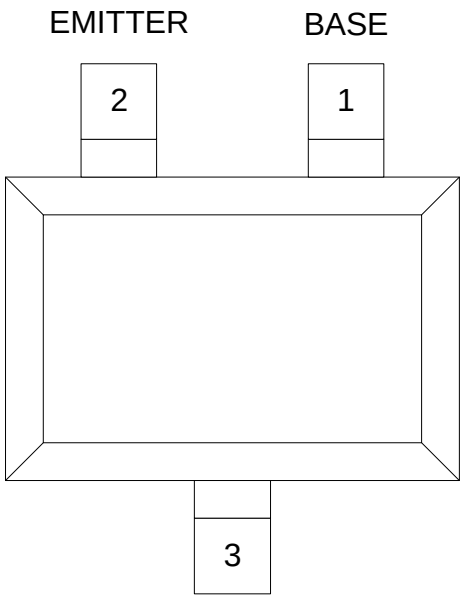
Surface Mount P-Channel Logic Level
Enhancement Mode FET

M5-TV0470 UMX1NTR NPN TRANSISTOR TR4, 28, 32



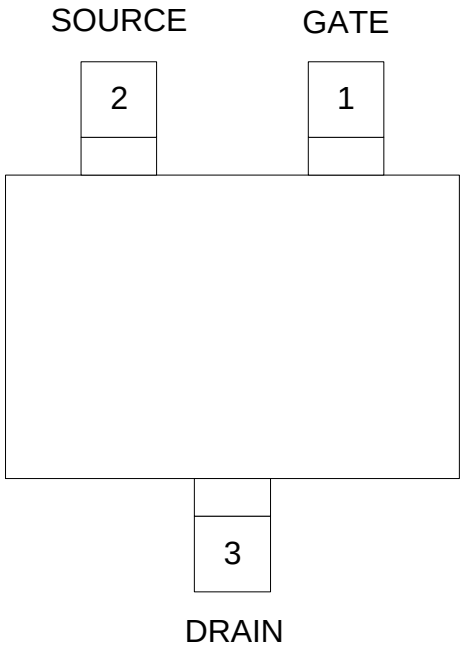
Surface Mount NPN Silicon
Epitaxial Planar Transistor Pack

M5-TV0466 2SC2411KT146 TRANSISTOR TR11, 12, 29, 108, 109



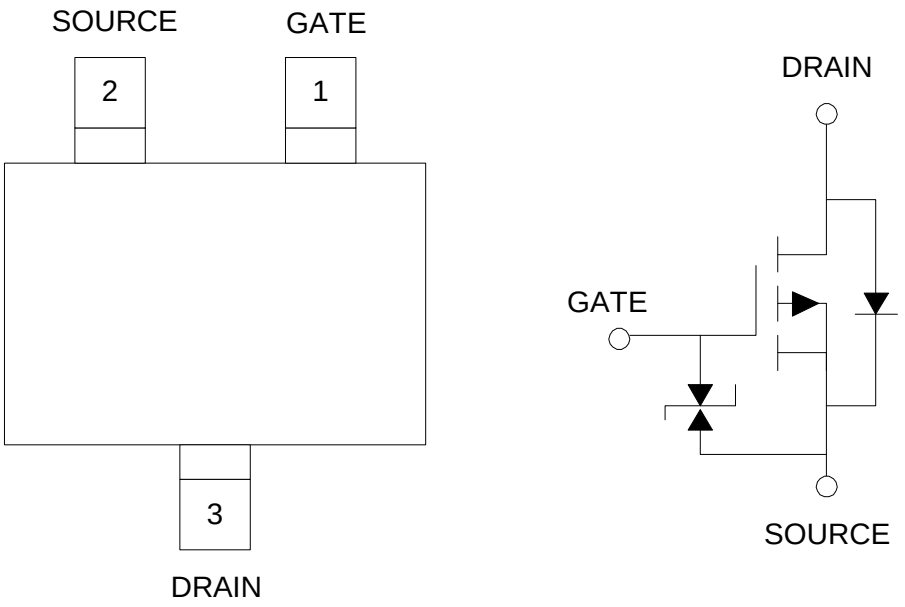
Surface Mount NPN Silicon
Epitaxial Planar Transistor

M5-TV0487 2SJ203-T2B P-CHANNEL MOSFET TR25, 301 ,302



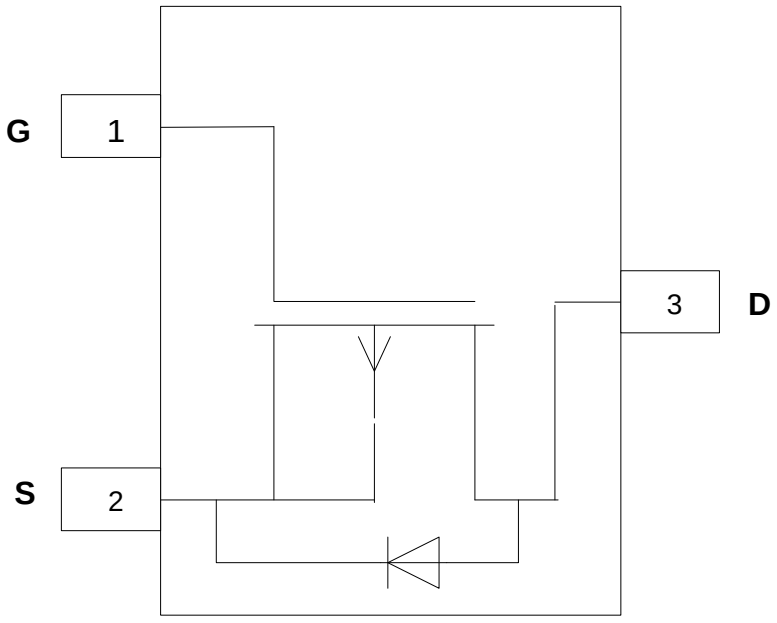
Surface Mount P-Channel Mosfet Switch

M5-TV0454 2SJ204 P-CHANNEL MOSFET TR100, 201, 202, 203



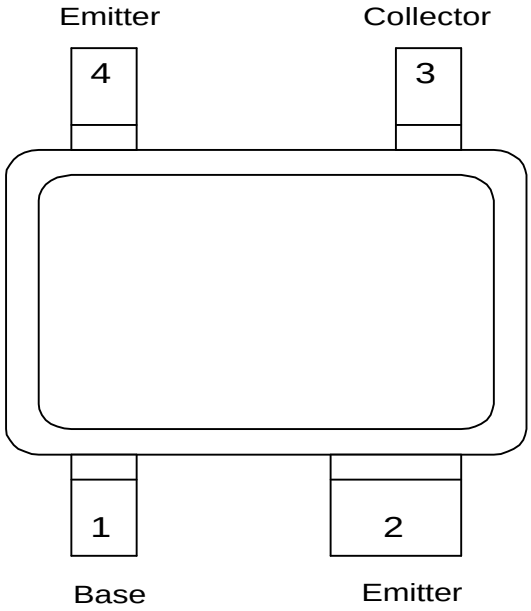
Surface Mount P-Channel MOSFET with
Parasitic Drain-Source Diode

M5-TV0516 SI2301DS P-CHANNEL MOSFET TR101, 102, 103, 104, 105



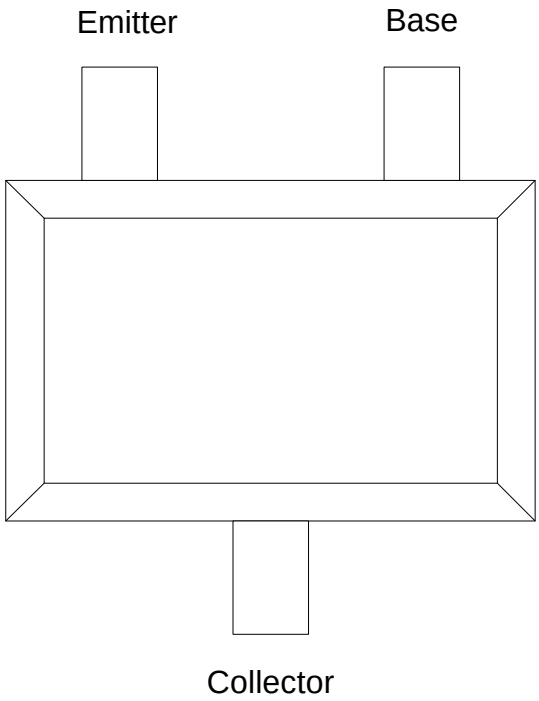
Surface Mount P-Channel MOSFET

M5-TV0518 BFP405 RF TRANSISTOR TR106, 300

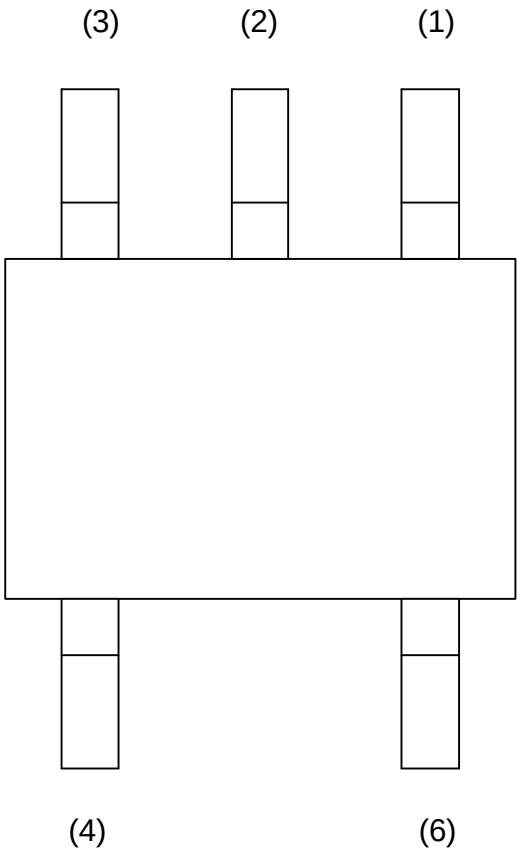


This is a surface mount NPN Silicon RF Transistor.

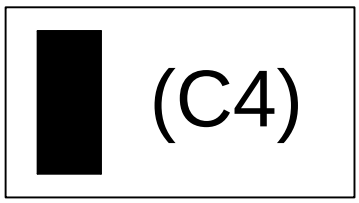
M5-TV0517 MRF1047T NPN TRANSISTOR TR107, 205



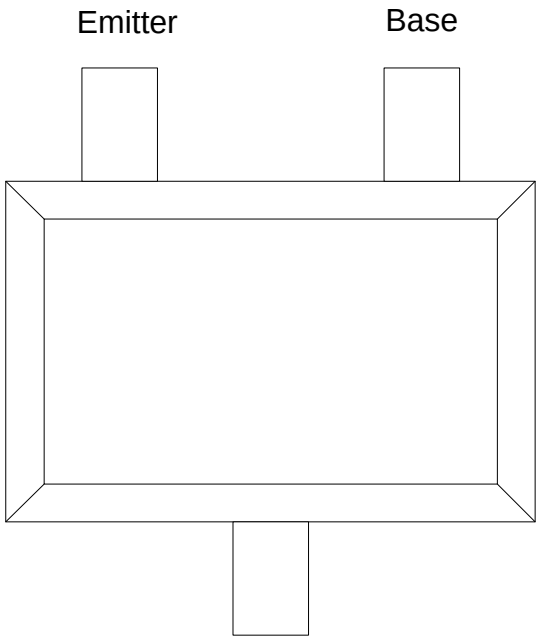
Surface Mount NPN Transistor



This is a Dual Surface Mount Silicon
Epitaxial Planar Transistor Package



Marking

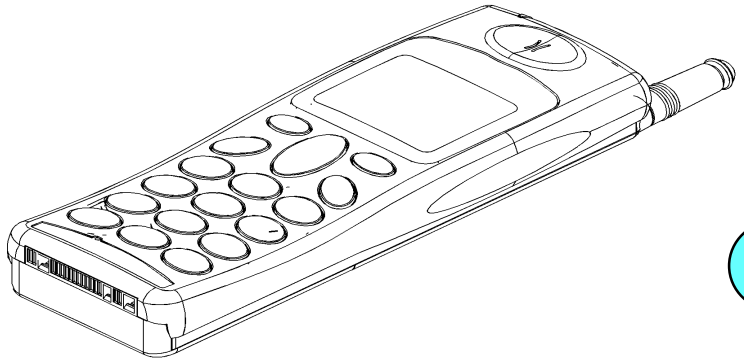


Surface Mount NPN Epitaxial Planar Transistor

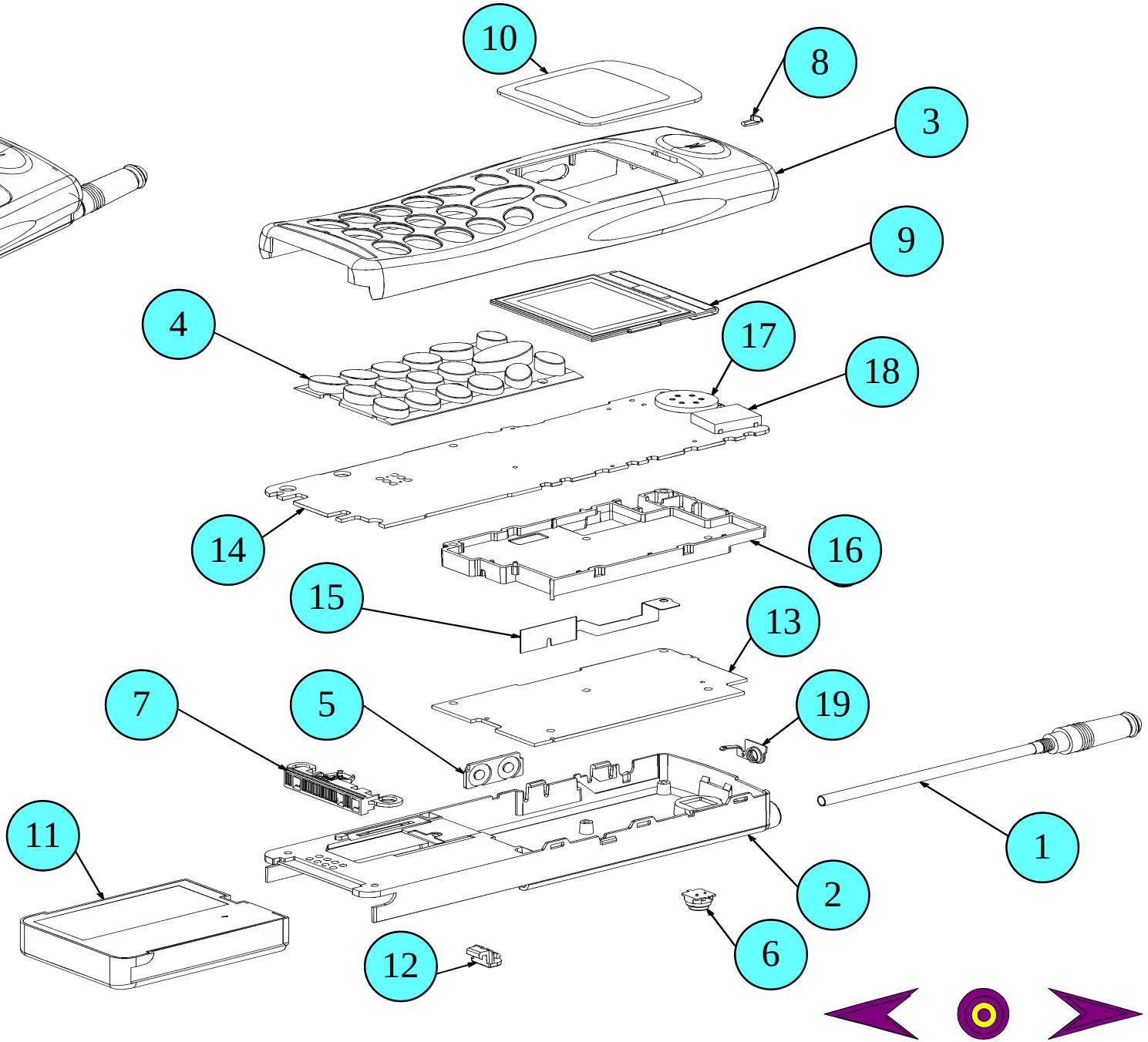
Section 7

Parts

EXPLODED VIEW OF DB2000



Item	Description	Stock No.
1	Retractable Antenna	M5-NE0402-0A
2	B Cover	M5-N50498-0A
3	A Cover	Various
4	Keymat Assembly	M5-N50490-0A
5	Volume Keymat	M5-N50491-0A
6	Coaxial Switch Connector	M5-NJ0439
7	IO Connector	M5-NJ0432-0A
8	Lightguide	M5-ND0425-0A
9	LCD Assy	M5-NP0409-0A
10	Window Assembly	M5-N50314-0A
11	950mah Battery Pack Assy	-
12	Battery Pack Latch	M5-N50450-0A
13	RF PCB	-
14	Baseband PCB	-
15	Volume Switch	M5-NS0405-0A
16	Board to Board Shield	M5-N60439-0A
17	Receiver	M5-ND0431-0A
18	Buzzer	M5-ND0423
19	Antenna Spring Contact	M5-N60442



DB2000 Assembly Parts List

Stock Number	Description	Part Number
M5-N50314-0A	G4H WINDOW ASSEMBLY	144-619446
M5-N50450-0A	G4H LATCH BATT PACK	144-619357
M5-N50453-0A	G4H VIBRATOR HOLDER	144-619390
M5-N50483	JUNO SIM MODULE	MRD-JMU-0027-01
M5-N50490-0A	G4H KEYMAT ASSEMBLY	144-619368
M5-N50023-0A	A COVER ASSEMBLY (Standard)	144-619416
M5-N50498-0A	B COVER ASSEMBLY	144-619430
M5-N50712-0A	A COVER ASSEMBLY (Lavender Silver)	144-619346-C029
M5-N50713-0A	A COVER ASSEMBLY (Garnet Red)	144-619346-C032
M5-N50715-0A	A COVER ASSEMBLY (Olive Green)	144-619346-C031
M5-N50716-0A	A COVER ASSEMBLY (Ink Blue)	144-619346-C030
M5-N50717-0A	A COVER ASSEMBLY (Silver Blue)	144-619346-C008
M5-N50718-0A	A COVER ASSEMBLY (Cerene Silver)	144-619346-C009
M5-N60005	EARTH CONTACT	MRD-MMP-0003-01
M5-N60439-0A	BOARD TO BOARD SHIELD	144-619374
M5-N60440	G4H COAXIAL CONNECTOR SEAL	144-619371
M5-N60442-0B	G4H ANTENNA CONTACT	144-619369
M5-N60446-0A	G4H B COVER SHIELDED	144-619419
M5-N60447-0A	B COVER - GASKETED	144-619420
M5-N60448-0A	M1.6 THREADED INSERT	MRD-SCW-0016-02
M5-N60449-0A	M1.6 x 5 CSK TORX M/C SCREW	MRD-SCW-0016-01
M5-N60451-0A	BATTERY PACK LATCH SPRING	144-619387
M5-N60453-0A	1.8 X 12 PAN TORX SCREW	MRD-SCW-0017-01
M5-N60454-0A	1.8 X 8 PAN TORX SCREW	MRD-SCW-0018-01
M5-N80422-0A	BUZZER DUST SHIELD	144-619411
M5-ND0425-0A	G4H LIGHTGUIDE	144-619377
M5-ND0429-0A	MIC ASSEMBLY	144-619597
M5-ND0431-0A	RECEIVER	MRD-SPK-0010-03
M5-NE0402-0A	G4H DUAL BAND RETRACTABLE ANTENNA	MRD-ANT-0003-01
M5-NS0405-0A	G4H VOLUME SWITCH	144-619366

DB2000 Baseband Parts List

Circuit Ref.	Stock Number	Description	Part Number
B1	M5-ND0423	MB17A, Buzzer Magnetic 13x10.6 Primo (SM), P0, M5-ND0423	MRD-SPK-0011-01
BATT1	M5-NB0496	KE95.00, Vanadium Lithium 3v Rechargeable Battery, E1, M5-NB0496	MRD-BAT-0001-02
C2	M5-TC3168	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3168	MRD-CAP-0496-04
C3	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C8	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C22	M5-TC3030	1n, Capacitor 50V 5% X7R 0402, P0, M5-TC3030	MRD-CAP-0807-13
C23	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C33	M5-TC0009	47n, Capacitor 25V 10% X7R 0402, P0, M5-TC0009	MRD-CAP-0844-26
C38	M5-TC1976	10p, Capacitor 50V 1% COG 0402, P0, M5-TC1976	MRD-CAP-0803-13
C40	M5-TC3169	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3169	MRD-CAP-0496-05
C50	M5-TC3170	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3170	MRD-CAP-0496-06
C54	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C55	M5-TC1976	10p, Capacitor 50V 1% COG 0402, P0, M5-TC1976	MRD-CAP-0803-13
C56	M5-TC3171	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3171	MRD-CAP-0496-07
C57	M5-TC3172	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3172	MRD-CAP-0496-08
C64	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C70	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C74	M5-TC3030	1n, Capacitor 50V 5% X7R 0402, P0, M5-TC3030	MRD-CAP-0807-13
C78	M5-TC3036	3n3, Capacitor 50V 5% X7R 0402, P0, M5-TC3036	MRD-CAP-0807-19
C89	M5-TC3173	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3173	MRD-CAP-0496-09
C90	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C91	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C92	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C93	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C94	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C95	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C96	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C97	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C98	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C99	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19

DB2000 Baseband Parts List

Circuit Ref.	Stock Number	Description	Part Number
C100	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C101	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C107	M5-TC3030	1n, Capacitor 50V 5% X7R 0402, P0, M5-TC3030	MRD-CAP-0807-13
C114	M5-TC2049	100p, Capacitor 50V 5% COG 0402, P0, M5-TC2049	MRD-CAP-0805-25
C124	M5-TC3030	1n, Capacitor 50V 5% X7R 0402, P0, M5-TC3030	MRD-CAP-0807-13
C125	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C126	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C127	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C129	M5-TC3174	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3174	MRD-CAP-0496-10
C130	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C131	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C135	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C137	M5-TC3036	3n3, Capacitor 50V 5% X7R 0402, P0, M5-TC3036	MRD-CAP-0807-19
C139	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C140	M5-TC2053	220p, Capacitor 50V 5% COG 0402, P0, M5-TC2053	MRD-CAP-0805-29
C151	M5-TC3188	22n, Capacitor 16V 10% X7R 0402, P0, M5-TC3188	MRD-CAP-0803-33
C152	M5-TC3188	22n, Capacitor 16V 10% X7R 0402, P0, M5-TC3188	MRD-CAP-0803-33
C155	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C163	M5-TC1976	10p, Capacitor 50V 1% COG 0402, P0, M5-TC1976	MRD-CAP-0803-13
C165	M5-TC0524	22u, Capacitor tant 10V 10% case size a, P0, M5-TC0524	MRD-CAP-0579-01
C166	M5-TC3175	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3175	MRD-CAP-0496-11
C167	M5-TC3176	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3176	MRD-CAP-0496-12
C173	M5-TC3030	1n, Capacitor 50V 5% X7R 0402, P0, M5-TC3030	MRD-CAP-0807-13
C183	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C200	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C201	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C203	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C204	M5-TC3177	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3177	MRD-CAP-0496-13
C206	M5-TC3178	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3178	MRD-CAP-0496-14
C207	M5-TC3179	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3179	MRD-CAP-0496-15

DB2000 Baseband Parts List

Circuit Ref.	Stock Number	Description	Part Number
C208	M5-TC3180	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3180	MRD-CAP-0496-16
C211	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C212	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C213	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C215	M5-TC3170	2u2, Capacitor 6.3V 10% X5R 0805, P0, M5-TC3170	MRD-CAP-0496-06
C216	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C217	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C218	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C219	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C220	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C221	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C222	M5-TC2049	100p, Capacitor 50V 5% COG 0402, P0, M5-TC2049	MRD-CAP-0805-25
C230	M5-TC2049	100p, Capacitor 50V 5% COG 0402, P0, M5-TC2049	MRD-CAP-0805-25
C235	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C236	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C237	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C238	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C239	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C240	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C241	M5-TC0459	100n, Capacitor 16V 10% X7R 0603, P0, M5-TC0459	MRD-CAP-0416-37
C242	M5-TC0459	100n, Capacitor 16V 10% X7R 0603, P0, M5-TC0459	MRD-CAP-0416-37
C243	M5-TC0459	100n, Capacitor 16V 10% X7R 0603, P0, M5-TC0459	MRD-CAP-0416-37
C244	M5-TC0459	100n, Capacitor 16V 10% X7R 0603, P0, M5-TC0459	MRD-CAP-0416-37
C245	M5-TC0459	100n, Capacitor 16V 10% X7R 0603, P0, M5-TC0459	MRD-CAP-0416-37
C248	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C249	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C251	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C252	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C253	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C257	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25

DB2000 Baseband Parts List

Circuit Ref.	Stock Number	Description	Part Number
C258	M5-TC3181	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3181	MRD-CAP-0496-17
C262	M5-TC3182	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3182	MRD-CAP-0496-18
C263	M5-TC0459	100n, Capacitor 16V 10% X7R 0603, P0, M5-TC0459	MRD-CAP-0416-37
C266	M5-TC9876	22u, Capacitor 6.3V 10% 1812 X5R, P0, M5-TC9876	MRD-CAP-0496-98
C267	M5-TC0009	47n, Capacitor 25V 10% X7R 0402, P0, M5-TC0009	MRD-CAP-0844-26
C269	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C270	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C271	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C272	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C273	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C274	M5-TC3183	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3183	MRD-CAP-0496-19
C275	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C276	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C277	M5-TC1988	100p, Capacitor 50V 1% COG 0402, P0, M5-TC1988	MRD-CAP-0803-25
C278	M5-TC3184	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3184	MRD-CAP-0496-20
C282	M5-TC0459	100n, Capacitor 16V 10% X7R 0603, P0, M5-TC0459	MRD-CAP-0416-37
C283	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C284	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C286	M5-TC2049	100p, Capacitor 50V 5% COG 0402, P0, M5-TC2049	MRD-CAP-0805-25
C287	M5-TC0009	47n, Capacitor 25V 10% X7R 0402, P0, M5-TC0009	MRD-CAP-0844-26
C289	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C290	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C291	M5-TC2043	18p, Capacitor 50V 5% COG 0402, P0, M5-TC2043	MRD-CAP-0805-16
C292	M5-TC2043	18p, Capacitor 50V 5% COG 0402, P0, M5-TC2043	MRD-CAP-0805-16
C293	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C294	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C295	M5-TC0012	1u, Capacitor 6.3V 10% X5R 0603, P0, M5-TC0012	MRD-CAP-0496-09
C296	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C297	M5-TC2053	220p, Capacitor 50V 5% COG 0402, P0, M5-TC2053	MRD-CAP-0805-29
C298	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25

DB2000 Baseband Parts List

Circuit Ref.	Stock Number	Description	Part Number
C299	M5-TC2053	220p, Capacitor 50V 5% COG 0402, P0, M5-TC2053	MRD-CAP-0805-29
C300	M5-TC3042	10n, Capacitor 50V 5% X7R 0402, P0, M5-TC3042	MRD-CAP-0807-25
C301	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C302	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C303	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C304	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C307	M5-TC3185	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3185	MRD-CAP-0496-21
C308	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C309	M5-TC2043	18p, Capacitor 50V 5% COG 0402, P0, M5-TC2043	MRD-CAP-0805-16
C328	M5-TC3186	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3186	MRD-CAP-0496-22
D2	M5-TV0443	1SS355, High Speed Switching Diode 100mA sod323, P0, M5-TV0443	MRD-DSI-0018-01
D4	M5-TV0443	1SS355, High Speed Switching Diode 100mA sod323, P0, M5-TV0443	MRD-DSI-0018-01
D25	M5-TV0404	UDZTE-1751B, Zener Diode 5.1V 2% sod323, P0, M5-TV0404	MRD-DSI-0049-01
D26	M5-TV0528	STPS1L30A, SCHOTTKY RECTIFIER, P0, M5-TV0528	MRD-DSI-0052-01
D33	M5-TV0524	BAT54S, Schottky Diode 30V 200mA sot23, P0, M5-TV0524	MRD-DSI-0048-01
D36	M5-TV0527	CL220YG, Right Angle Mount LED, P0, M5-TV0527	MRD-LED-0009-01
D37	M5-TV0420	CL170YG, LED 2.6V Dual Colour Yellow/Green, P0, M5-TV0420	MRD-LED-0002-01
D38	M5-TV0527	CL220YG, Right Angle Mount LED, P0, M5-TV0527	MRD-LED-0009-01
D39	M5-TV0527	CL220YG, Right Angle Mount LED, P0, M5-TV0527	MRD-LED-0009-01
D40	M5-TV0527	CL220YG, Right Angle Mount LED, P0, M5-TV0527	MRD-LED-0009-01
D41	M5-TV0420	CL170YG, LED 2.6V Dual Colour Yellow/Green, P0, M5-TV0420	MRD-LED-0002-01
D42	M5-TV0420	CL170YG, LED 2.6V Dual Colour Yellow/Green, P0, M5-TV0420	MRD-LED-0002-01
D43	M5-TV0420	CL170YG, LED 2.6V Dual Colour Yellow/Green, P0, M5-TV0420	MRD-LED-0002-01
D44	M5-TV0420	CL170YG, LED 2.6V Dual Colour Yellow/Green, P0, M5-TV0420	MRD-LED-0002-01
D45	M5-TV0462	SML020MVTT87, LED 4V Dual Colour Red/Green, P0, M5-TV0462	MRD-LED-0005-01
D47	M5-TV0417	DA204U, Schottky Barrier Dual Diode 20V, P0, M5-TV0417	MRD-DSI-0009-01
D48	M5-TV0420	CL170YG, LED 2.6V Dual Colour Yellow/Green, P0, M5-TV0420	MRD-LED-0002-01
D49	M5-TV0404	UDZTE-1751B, Zener Diode 5.1V 2% sod323, P0, M5-TV0404	MRD-DSI-0049-01
D50	M5-TV0443	1SS355, High Speed Switching Diode 100mA sod323, P0, M5-TV0443	MRD-DSI-0018-01
IC8	M5-NY0445	NELL_V3, Application Specific IC NELL V3, P0, M5-NY0445	MRD-UAS-0007-01

DB2000 Baseband Parts List

Circuit Ref.	Stock Number	Description	Part Number
IC9	M5-TY0002	KM616FS1010Z-15, RAM, P0, M5-TY0002	MRD-URU-0010-01
IC10	M5-TY0006	M24C32-W, EEPROM 2.5-5.5V 32K CMOS, P0, M5-TY0006	MRD-URE-0003-02
IC13	M5-TQ0442	TS951, Rail-Rail Single Op-Amp Low Power, P0, M5-TQ0442	MRD-UAN-0051-01
IC15	M5-TY0438	JAGUAR, FLASH Intel Jaguar, P0, M5-TY0438	MRD-URU-0009-01
IC18	M5-TY0003	NC7ST08, 2 Input AND Gate TinyLogic (SMD), P0, M5-TY0003	MRD-ULG-0022-01
IC19	M5-TY0436	MINIMOE, ASIC MINIMOE PC33283FTB, P0, M5-TY0436	MRD-UAS-0002-02
IC22	M5-TY0004	EMIF01-5250SC5, EMI Filter with ESD Protection, P0, M5-TY0004	MRD-UAS-0005-01
IC23	M5-TY0004	EMIF01-5250SC5, EMI Filter with ESD Protection, P0, M5-TY0004	MRD-UAS-0005-01
IC24	M5-TY0004	EMIF01-5250SC5, EMI Filter with ESD Protection, P0, M5-TY0004	MRD-UAS-0005-01
IC25	M5-TY0004	EMIF01-5250SC5, EMI Filter with ESD Protection, P0, M5-TY0004	MRD-UAS-0005-01
IC27	M5-TY0005	SUPERCHIP1, ASIC SUPERCHIP (DSP + CSP), P0, M5-TY0005	MRD-UAS-0006-01
IC29	M5-TQ0442	TS951, Rail-Rail Single Op-Amp Low Power, P0, M5-TQ0442	MRD-UAN-0051-01
IC30	P0, NF_P0	NF_P0, Voltage Reference 3 Pin Low Dropout TBA, P0, NF_P0	DEV-UAN-0123
IC31	M5-TY0004	EMIF01-5250SC5, EMI Filter with ESD Protection, P0, M5-TY0004	MRD-UAS-0005-01
IC32	M5-TY0004	EMIF01-5250SC5, EMI Filter with ESD Protection, P0, M5-TY0004	MRD-UAS-0005-01
L2	M5-TL0401	10uH, Inductor Low DC Res 10% Ferrite Core 1008, P0, M5-TL0401	MRD-LLF-0002-12
P2	M5-TJ0003	5607xx-1, AMP 2 Way Vibrator Connector G4H, P0, M5-TJ0003	MRD-JMU-0043-01
P5	M5-NJ0432	338431, System Connector G4H, E1, M5-NJ0432	MRD-JMU-0028-01
P6	M5-TS0400	LGK2009, 2.5mm Audio Jack (2 Pole), P0, M5-TS0400	MRD-JPJ-0002-01
P9	M5-TJ0002	CPR-0571-12, 30 Way JST LCD ZIF Connector, P0, M5-TJ0002	MRD-JMU-0039-01
R10	M5-TR0959	20k, Resistor 1/16W 1% 0402, P0, M5-TR0959	MRD-RES-0095-30
R11	M5-TR9876	10M, Resistor 0402, P0, M5-TR9876	MRD-RES-0022-98
R14	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R19	M5-TR1026	100k, Resistor 1/16W 1% 0402, P0, M5-TR1026	MRD-RES-0096-01
R20	M5-TR1027	100k, Resistor 1/16W 1% 0402, P0, M5-TR1027	MRD-RES-0096-02
R21	M5-TR1028	100k, Resistor 1/16W 1% 0402, P0, M5-TR1028	MRD-RES-0096-03
R22	M5-TR1029	100k, Resistor 1/16W 1% 0402, P0, M5-TR1029	MRD-RES-0096-04
R32	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R43	M5-TR1432	330R, Resistor 1/16W 1% 0402, P0, M5-TR1432	MRD-RES-0105-47
R50	M5-TR0834	1k, Resistor 1/16W 1% 0402, P0, M5-TR0834	MRD-RES-0094-01

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Circuit Ref.	Stock Number	Description	Part Number
R51	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R57	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R58	M5-TR0947	15k, Resistor 1/16W 1% 0402, P0, M5-TR0947	MRD-RES-0095-18
R64	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R70	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R73	M5-TR0161	33R, Resistor 1/4W 5% 1206, P0, M5-TR0161	MRD-RES-0055-13
R77	M5-TR0959	20k, Resistor 1/16W 1% 0402, P0, M5-TR0959	MRD-RES-0095-30
R79	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R84	M5-TR1446	1k8, Resistor 1/16W 1% 0402, P0, M5-TR1446	MRD-RES-0105-61
R85	M5-TR1450	3k, Resistor 1/16W 1% 0402, P0, M5-TR1450	MRD-RES-0105-65
R87	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R89	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R90	M5-TR1485	220k, Resistor 1/16W 1% 0402, P0, M5-TR1485	MRD-RES-0106-01
R91	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R96	M5-TR1446	1k8, Resistor 1/16W 1% 0402, P0, M5-TR1446	MRD-RES-0105-61
R98	M5-TR1450	3k, Resistor 1/16W 1% 0402, P0, M5-TR1450	MRD-RES-0105-65
R101	M5-TR1030	100k, Resistor 1/16W 1% 0402, P0, M5-TR1030	MRD-RES-0096-05
R102	M5-TR0834	1k, Resistor 1/16W 1% 0402, P0, M5-TR0834	MRD-RES-0094-01
R105	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R120	M5-TR1031	100k, Resistor 1/16W 1% 0402, P0, M5-TR1031	MRD-RES-0096-06
R123	M5-TR1447	2k2, Resistor 1/16W 1% 0402, P0, M5-TR1447	MRD-RES-0105-62
R124	M5-NV0401	100k, Neg Temp Coefficient Thermistor, P0, M5-NV0401	MRD-RTH-0001-01
R127	M5-TR1032	100k, Resistor 1/16W 1% 0402, P0, M5-TR1032	MRD-RES-0096-07
R133	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R134	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R135	M5-TR1450	3k, Resistor 1/16W 1% 0402, P0, M5-TR1450	MRD-RES-0105-65
R138	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R149	M5-TR1122	1M, Resistor 1/16W 1% 0402, P0, M5-TR1122	MRD-RES-0097-01
R153	M5-TR1122	1M, Resistor 1/16W 1% 0402, P0, M5-TR1122	MRD-RES-0097-01
R156	M5-TR1447	2k2, Resistor 1/16W 1% 0402, P0, M5-TR1447	MRD-RES-0105-62

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Circuit Ref.	Stock Number	Description	Part Number
R157	M5-TR0834	1k, Resistor 1/16W 1% 0402, P0, M5-TR0834	MRD-RES-0094-01
R158	M5-TR1450	3k, Resistor 1/16W 1% 0402, P0, M5-TR1450	MRD-RES-0105-65
R161	M5-TR0834	1k, Resistor 1/16W 1% 0402, P0, M5-TR0834	MRD-RES-0094-01
R162	M5-TR0738	100R, Resistor 1/16W 1% 0402, P0, M5-TR0738	MRD-RES-0093-01
R163	M5-TR0214	18R, Resistor 1/16W 5% 0603, P0, M5-TR0214	MRD-RES-0009-07
R164	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R165	M5-TR1474	47k, Resistor 1/16W 1% 0402, P0, M5-TR1474	MRD-RES-0105-89
R166	M5-TR1427	180R, Resistor 1/16W 1% 0402, P0, M5-TR1427	MRD-RES-0105-42
R167	M5-TR1427	180R, Resistor 1/16W 1% 0402, P0, M5-TR1427	MRD-RES-0105-42
R168	M5-TR0214	18R, Resistor 1/16W 5% 0603, P0, M5-TR0214	MRD-RES-0009-07
R173	M5-TR1033	100k, Resistor 1/16W 1% 0402, P0, M5-TR1033	MRD-RES-0096-08
R174	M5-TR1034	100k, Resistor 1/16W 1% 0402, P0, M5-TR1034	MRD-RES-0096-09
R183	M5-TR1428	220R, Resistor 1/16W 1% 0402, P0, M5-TR1428	MRD-RES-0105-43
R184	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R185	M5-TR1489	330k, Resistor 1/16W 1% 0402, P0, M5-TR1489	MRD-RES-0106-05
R188	M5-TR1474	47k, Resistor 1/16W 1% 0402, P0, M5-TR1474	MRD-RES-0105-89
R194	M5-TR1474	47k, Resistor 1/16W 1% 0402, P0, M5-TR1474	MRD-RES-0105-89
R195	M5-TR1432	330R, Resistor 1/16W 1% 0402, P0, M5-TR1432	MRD-RES-0105-47
R196	M5-TR1122	1M, Resistor 1/16W 1% 0402, P0, M5-TR1122	MRD-RES-0097-01
R197	M5-TR1122	1M, Resistor 1/16W 1% 0402, P0, M5-TR1122	MRD-RES-0097-01
R201	M5-TR1389	2R2, Resistor 1/16W 1% 0402, P0, M5-TR1389	MRD-RES-0105-04
R202	M5-TR1389	2R2, Resistor 1/16W 1% 0402, P0, M5-TR1389	MRD-RES-0105-04
R203	M5-TR0834	1k, Resistor 1/16W 1% 0402, P0, M5-TR0834	MRD-RES-0094-01
R205	M5-TR1035	100k, Resistor 1/16W 1% 0402, P0, M5-TR1035	MRD-RES-0096-10
R206	M5-TR0738	100R, Resistor 1/16W 1% 0402, P0, M5-TR0738	MRD-RES-0093-01
R207	M5-TR0642	10R, Resistor 1/16W 1% 0402, P0, M5-TR0642	MRD-RES-0092-01
R208	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R209	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R210	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R211	M5-TR0834	1k, Resistor 1/16W 1% 0402, P0, M5-TR0834	MRD-RES-0094-01

DB2000 Baseband Parts List

Circuit Ref.	Stock Number	Description	Part Number
R212	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R213	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R215	M5-TR1438	560R, Resistor 1/16W 1% 0402, P0, M5-TR1438	MRD-RES-0105-53
R216	M5-TR1397	4R7, Resistor 1/16W 1% 0402, P0, M5-TR1397	MRD-RES-0105-12
R217	M5-TR1397	4R7, Resistor 1/16W 1% 0402, P0, M5-TR1397	MRD-RES-0105-12
R224	M5-TR1036	100k, Resistor 1/16W 1% 0402, P0, M5-TR1036	MRD-RES-0096-11
SIM1	M5-N50483	JST_CPR0635_2, Sim Reader 6 Way, P0, M5-N50483	MRD-JMU-0027-01
SW21	M5-NS0405	VOLUME_SWITCH, Volume Key Switch, E1, M5-NS0405	MRD-SWT-0003-01
SK500	M5-NJ0442	CPB7240-0311, 40 Way Connector P=0.5mm(female), P0, M5-NJ0442	MRD-JMU-0038-01
T1	M5-N60005	415CSS-086-51, SMK Spring Terminal, P0, M5-N60005	MRD-MMP-0003-01
TR3	M5-TV0485	NDC652P, P-Channel Logic Enhancement Mode FET, 1.6W, P0, M5-TV0485	MRD-QBL-0041-01
TR4	M5-TV0470	UMX1N, Dual Planar NPN Transistor 150mW, P0, M5-TV0470	MRD-QBL-0035-01
TR11	M5-TV0466	2SC2411K, Planar NPN Transistor 200mW, P0, M5-TV0466	MRD-QBL-0039-01
TR12	M5-TV0466	2SC2411K, Planar NPN Transistor 200mW, P0, M5-TV0466	MRD-QBL-0039-01
TR25	M5-TV0487	2SJ203, P-Channal Mosfet For Switching 200mW, P0, M5-TV0487	MRD-QBL-0043-01
TR28	M5-TV0470	UMX1N, Dual Planar NPN Transistor 150mW, P0, M5-TV0470	MRD-QBL-0035-01
TR29	M5-TV0466	2SC2411K, Planar NPN Transistor 200mW, P0, M5-TV0466	MRD-QBL-0039-01
TR31	M5-TV0501	2SC4180-T1, High Gain NPN Transistor 150mW, P0, M5-TV0501	MRD-QBL-0057-01
TR32	M5-TV0470	UMX1N, Dual Planar NPN Transistor 150mW, P0, M5-TV0470	MRD-QBL-0035-01
TR33	M5-TV0412	2SC4081T106, Planar NPN Transistor 200mW, P0, M5-TV0412	MRD-QBL-0006-01
XT1	M5-TQ0420	MC306, Watch Crystal 32.768MHz, P0, M5-TQ0420	MRD-XTL-0003-01

DB2000 RF Board Parts List

Circuit Ref	Stock Number.	Description	Part Number
C100	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C101	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C102	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C103	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C104	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C105	M5-TC2794	470p, Capacitor 16V 5% X7R 0402, P0, M5-TC2794	MRD-CAP-0836-09
C106	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C107	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C108	M5-TC2794	470p, Capacitor 16V 5% X7R 0402, P0, M5-TC2794	MRD-CAP-0836-09
C109	M5-TC2794	470p, Capacitor 16V 5% X7R 0402, P0, M5-TC2794	MRD-CAP-0836-09
C110	M5-TC2794	470p, Capacitor 16V 5% X7R 0402, P0, M5-TC2794	MRD-CAP-0836-09
C111	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C112	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C113	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C114	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C115	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C116	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C117	M5-TC1152	47p, Capacitor 16V 5% COG 0402, P0, M5-TC1152	MRD-CAP-0822-21
C118	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C119	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C120	M5-TC3179	4p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3179	MRD-CAP-0822-37
C121	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35
C122	M5-TC2046	47p, Capacitor 50V 5% COG 0402, P0, M5-TC2046	MRD-CAP-0805-21
C123	M5-TC2040	10p, Capacitor 50V 5% COG 0402, P0, M5-TC2040	MRD-CAP-0805-13
C124	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C125	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C126	M5-TC1154	68p, Capacitor 16V 5% COG 0402, P0, M5-TC1154	MRD-CAP-0822-23
C128	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C129	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C131	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35

DB2000 RF Board Parts List

Circuit Ref	Stock Number.	Description	Part Number
C133	M5-TC1134	1p5, Capacitor 16V 5% COG 0402, P0, M5-TC1134	MRD-CAP-0822-03
C133	M5-TC1134	1p5, Capacitor 16V 5% COG 0402, P0, M5-TC1134	MRD-CAP-0822-03
C134	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C134	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C135	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35
C136	M5-TC1134	1p5, Capacitor 16V 5% COG 0402, P0, M5-TC1134	MRD-CAP-0822-03
C137	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C138	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C139	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C140	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C141	M5-TC3178	5p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3178	MRD-CAP-0822-36
C142	M5-TC3175	8p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3175	MRD-CAP-0822-34
C143	M5-TC1134	1p5, Capacitor 16V 5% COG 0402, P0, M5-TC1134	MRD-CAP-0822-03
C144	M5-TC3179	4p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3179	MRD-CAP-0822-37
C145	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35
C146	M5-TC3179	4p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3179	MRD-CAP-0822-37
C147	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C148	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C149	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C150	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C151	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C152	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C153	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C154	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C155	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C156	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C157	M5-TC0972	1p, Capacitor 16V +/-0.1p COG 0402, P0, M5-TC0972	MRD-CAP-0817-01
C158	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35
C159	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C160	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38

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Circuit Ref	Stock Number.	Description	Part Number
C161	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C163	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C165	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C166	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C167	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C169	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C170	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C172	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C175	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C176	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C177	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C178	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C179	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C180	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C181	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C188	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C188	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C189	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C193	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C194	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C200	M5-TC0456	6u8, Capacitor 16V +80/-20% Y5V 1210, P0, M5-TC0456	MRD-CAP-0104-14
C201	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C202	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C203	M5-TC1160	220p, Capacitor 16V 5% COG 0402, P0, M5-TC1160	MRD-CAP-0822-29
C204	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C205	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C206	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C207	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C208	M5-TC1160	220p, Capacitor 16V 5% COG 0402, P0, M5-TC1160	MRD-CAP-0822-29
C209	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25

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Circuit Ref	Stock Number.	Description	Part Number
C210	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C211	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C212	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C213	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C214	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C215	M5-TC3183	3n3, Capacitor 16V 5% 1210, P0, M5-TC3183	MRD-CAP-0270-43
C216	M5-TC1162	330p, Capacitor 16V 5% COG 0402, P0, M5-TC1162	MRD-CAP-0822-31
C217	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C218	M5-TC2801	1n8, Capacitor 16V 5% X7R 0402, P0, M5-TC2801	MRD-CAP-0836-16
C219	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C220	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C221	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C222	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C223	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C224	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C225	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C226	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C227	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C228	M5-TC2040	10p, Capacitor 50V 5% COG 0402, P0, M5-TC2040	MRD-CAP-0805-13
C229	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C230	M5-TC3181	3p, Capacitor 16V 5% COG 0402, P0, M5-TC3181	MRD-CAP-0822-39
C231	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C232	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C233	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C234	M5-TC0525	1u, Capacitor 10V 10% X7R 0805, P0, M5-TC0525	MRD-CAP-0487-45
C235	M5-TC3036	3n3, Capacitor 50V 5% X7R 0402, P0, M5-TC3036	MRD-CAP-0807-19
C236	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C237	M5-TC1160	220p, Capacitor 16V 5% COG 0402, P0, M5-TC1160	MRD-CAP-0822-29
C238	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C239	M5-TC3168	100n, Capacitor 6.3V 10% X5R 0402, P0, M5-TC3168	MRD-CAP-0496-04

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Circuit Ref	Stock Number.	Description	Part Number
C240	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C241	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C242	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C243	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C244	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C245	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C246	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C247	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C248	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C249	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C251	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C252	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C253	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C254	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C255	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C300	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C301	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C302	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C303	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C304	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C305	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35
C306	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C307	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C308	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C309	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C310	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C313	M5-TC1148	22p, Capacitor 16V 5% COG 0402, P0, M5-TC1148	MRD-CAP-0822-17
C314	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13
C315	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C316	M5-TC2823	1n, Capacitor 16V 10% X7R 0402, P0, M5-TC2823	MRD-CAP-0837-13

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Circuit Ref	Stock Number.	Description	Part Number
C317	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C318	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C320	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C321	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C322	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C323	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C324	M5-TC1160	220p, Capacitor 16V 5% COG 0402, P0, M5-TC1160	MRD-CAP-0822-29
C325	M5-TC1160	220p, Capacitor 16V 5% COG 0402, P0, M5-TC1160	MRD-CAP-0822-29
C326	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C327	M5-TC1160	220p, Capacitor 16V 5% COG 0402, P0, M5-TC1160	MRD-CAP-0822-29
C328	M5-TC1160	220p, Capacitor 16V 5% COG 0402, P0, M5-TC1160	MRD-CAP-0822-29
C329	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C331	M5-TC3181	3p, Capacitor 16V 5% COG 0402, P0, M5-TC3181	MRD-CAP-0822-39
C332	M5-TC3181	3p, Capacitor 16V 5% COG 0402, P0, M5-TC3181	MRD-CAP-0822-39
C333	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C335	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C336	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C337	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C338	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C339	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C340	M5-TC2835	10n, Capacitor 16V 10% X7R 0402, P0, M5-TC2835	MRD-CAP-0837-25
C341	M5-TC0408	1u, Capacitor 10/16V +80/-20% Y5V 0603, P0, M5-TC0408	MRD-CAP-0104-06
C342	M5-TC0510	56p, Capacitor 50V 5% COG 0402, P0, M5-TC0510	MRD-CAP-0805-22
C343	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C344	M5-TC1147	18p, Capacitor 16V 5% COG 0402, P0, M5-TC1147	MRD-CAP-0822-16
C345	M5-TC1147	18p, Capacitor 16V 5% COG 0402, P0, M5-TC1147	MRD-CAP-0822-16
C346	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C347	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35
C348	M5-TC3179	4p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3179	MRD-CAP-0822-37
C349	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35

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Circuit Ref	Stock Number.	Description	Part Number
C350	M5-TC3179	4p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3179	MRD-CAP-0822-37
C351	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C352	M5-TC3180	7p, Capacitor 16V +/-0.5p COG 0402, P0, M5-TC3180	MRD-CAP-0822-38
C353	M5-TC1134	1p5, Capacitor 16V 5% COG 0402, P0, M5-TC1134	MRD-CAP-0822-03
C354	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C355	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C356	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C400	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C401	M5-TC1149	27p, Capacitor 16V 5% COG 0402, P0, M5-TC1149	MRD-CAP-0822-18
C402	M5-TC1149	27p, Capacitor 16V 5% COG 0402, P0, M5-TC1149	MRD-CAP-0822-18
C403	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C404	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C405	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35
C406	M5-TC3177	2p, Capacitor 16V +/-0.25p COG 0402, P0, M5-TC3177	MRD-CAP-0822-35
C407	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
C409	M5-TC2040	10p, Capacitor 50V 5% COG 0402, P0, M5-TC2040	MRD-CAP-0805-13
C410	M5-TC2040	10p, Capacitor 50V 5% COG 0402, P0, M5-TC2040	MRD-CAP-0805-13
C411	M5-TC1156	100p, Capacitor 16V 5% COG 0402, P0, M5-TC1156	MRD-CAP-0822-25
C412	M5-TC2044	33p, Capacitor 50V 5% COG 0402, P0, M5-TC2044	MRD-CAP-0805-19
D100	M5-TV0521	DAP222, Dual Switching Diode 80V 150mW, P0, M5-TV0521	MRD-DSI-0046-01
D101	M5-TV0443	1SS355, High Speed Switch Diode 100mA sod323, P0, M5-TV0443	MRD-DSI-0018-01
D200	M5-TV0417	DA204U, Schottky Barrier Dual Diode 20V, P0, M5-TV0417	MRD-DSI-0009-01
D303	M5-TV0519	BBY51, Dual Tuning Diode 20mA 7V, P0, M5-TV0519	MRD-DSI-0044-01
D400	M5-TV0514	BAR64-05, Diode Pair SMD, P0, M5-TV0514	MRD-DSI-0043-01
D401	M5-TV0514	BAR64-05, Diode Pair SMD, P0, M5-TV0514	MRD-DSI-0043-01
FL100	M5-TF0406	MAS4015, RF Filter Low Loss 270MHz, P0, M5-TF0406	MRD-FSW-0010-01
FL101	M5-TF0407	MAS4016, RF Filter Low Loss 180MHz, P0, M5-TF0407	MRD-FSW-0011-01
FL102	M5-TF0413	MAS4013, GSM Saw TX Filter 902.5MHz, P0, M5-TF0413	MRD-FSW-0017-01
FL103	M5-TF0415	DGL612M01, RF Filter Low Loss 1747.5MHz, P0, M5-TF0415	MRD-FSW-0019-01
FL104	M5-TF0413	MAS4013, GSM Saw TX Filter 902.5MHz, P0, M5-TF0413	MRD-FSW-0017-01

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Circuit Ref	Stock Number.	Description	Part Number
FL105	M5-TF0415	DGL612M01, RF Filter Low Loss 1747.5MHz, P0, M5-TF0415	MRD-FSW-0019-01
FL300	M5-TF0423	L672B, Low Loss Filter 1842.5MHz PCN, P0, M5-TF0423	MRD-FSW-0015-02
FL301	M5-TF0412	MFL1842CBL01, Dielectric Filter 1842.5MHz, P0, M5-TF0412	MRD-FSW-0016-01
FL302	M5-TF0439	B4684, RF Filter SMD 935-960MHz, P0, M5-TF0439	MRD-FSW-0018-02
FL303	M5-TF0438	B4686, RF Filter SMD 935-960MHz, P0, M5-TF0438	MRD-FSW-0013-02
FL304	M5-TF0434	MAS4014, RF Filter IF GSM RX, P0, M5-TF0434	MRD-FSW-0009-03
IC100	M5-TY0428	W2013, Indirect Quad Modulator With Gain Control, P0, M5-TY0428	MRD-UAN-0036-01
IC101	M5-TY0426	PMB2333, Mixer/Amplifier 2.7-4.5v, P0, M5-TY0426	MRD-UAN-0038-01
IC102	M5-TY0426	PMB2333, Mixer/Amplifier 2.7-4.5v, P0, M5-TY0426	MRD-UAN-0038-01
IC103	M5-TY0413	uPC2771T, High Freq Amplifier 3V, P0, M5-TY0413	MRD-UAN-0026-01
IC104	M5-TY0413	uPC2771T, High Freq Amplifier 3V, P0, M5-TY0413	MRD-UAN-0026-01
IC105	M5-TQ0442	TS951, Rail-Rail Single Op-Amp Low Power, P0, M5-TQ0442	MRD-UAN-0051-01
IC106	M5-TQ0433	PF01411B, GSM Power Amplifier 3.6V, P0, M5-TQ0433	MRD-UAN-0041-01
IC107	M5-TQ0003	PF0414B, PCN PA 3.6V (Selected Part), P0, M5-TQ0003	MRD-UAN-0040-02
IC108	M5-TQ0442	TS951, Rail-Rail Single Op-Amp Low Power, P0, M5-TQ0442	MRD-UAN-0051-01
IC109	M5-TQ0442	TS951, Rail-Rail Single Op-Amp Low Power, P0, M5-TQ0442	MRD-UAN-0051-01
IC201	M5-TY0429	LMX2331A, Dual Frequency Synth 2GHz/510MHz, P0, M5-TY0429	MRD-UAN-0039-01
IC202	M5-TQ0443	MQE901-1195, VCO GSM 1160-1230MHz, P0, M5-TQ0443	MRD-VCO-0002-03
IC203	M5-TQ0444	MQE920-1570, VCO PCN 1530-1610MHz, P0, M5-TQ0444	MRD-VCO-0003-03
IC204	M5-TY0440	MICROMOE, ASIC MICROMOE, P0, M5-TY0440	MRD-UAS-0004-01
IC300	M5-TY0427	PMB2410, RF IC, P0, M5-TY0427	MRD-UAN-0037-01
IC400	M5-TY0442	DPX321880DT, Duplexer GSM/DCS 1800, P0, M5-TY0442	MRD-DPX-0005-01
L101	M5-TL0487	220nH, Inductor 5% Ceramic 0805, P0, M5-TL0487	MRD-LLF-0014-21
L102	M5-TL0504	180nH, Inductor 10% Ceramic 0603, P0, M5-TL0504	MRD-LLF-0098-07
L103	M5-TL0011	22nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0011	MRD-LLF-0095-16
L104	M5-TL0511	56nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0511	MRD-LLF-0075-21
L105	M5-TL0011	22nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0011	MRD-LLF-0095-16
L106	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L107	M5-TL0462	100nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0462	MRD-LLF-0075-24
L108	M5-TL0013	27nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0013	MRD-LLF-0095-17

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Circuit Ref	Stock Number.	Description	Part Number
L109	M5-TL0010	39nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0010	MRD-LLF-0095-19
L110	M5-TL0422	330nH, Inductor 10% 145MHz Self Res Freq 0805, P0, M5-TL0422	MRD-LLF-0019-23
L111	M5-TL0422	330nH, Inductor 10% 145MHz Self Res Freq 0805, P0, M5-TL0422	MRD-LLF-0019-22
L112	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L113	M5-TL0501	15nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0501	MRD-LLF-0095-14
L114	M5-TL0478	10nH, Inductor 10% High Q Multilayer 0603, P0, M5-TL0478	MRD-LLF-0095-12
L116	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L117	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L118	M5-TL0462	100nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0462	MRD-LLF-0075-24
L119	M5-TL0462	100nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0462	MRD-LLF-0075-24
L120	M5-TL0013	27nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0013	MRD-LLF-0095-17
L121	M5-TL0485	3nH9, Inductor +/-0n3 High Q Multilayer 0603, P0, M5-TL0485	MRD-LLF-0097-07
L122	M5-TL0499	12nH, Inductor 10% High Q Multilayer 0603, P0, M5-TL0499	MRD-LLF-0095-13
L123	M5-TL0011	22nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0011	MRD-LLF-0095-16
L124	M5-TL0500	68nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0500	MRD-LLF-0095-22
L125	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L126	M5-TL0500	68nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0500	MRD-LLF-0095-22
L127	M5-TL0485	3nH9, Inductor +/-0n3 High Q Multilayer 0603, P0, M5-TL0485	MRD-LLF-0097-07
L129	M5-TL0485	3nH9, Inductor +/-0n3 High Q Multilayer 0603, P0, M5-TL0485	MRD-LLF-0097-07
L200	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L201	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L202	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L203	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L204	M5-TL0436	150nH, Inductor 10% 150MHz Self Res Freq 0805, P0, M5-TL0436	MRD-LLF-0019-19
L205	M5-TL0511	56nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0511	MRD-LLF-0075-21
L300	M5-TL0014	4nH7, Inductor 10% High Q Multilayer 0603, P0, M5-TL0014	MRD-LLF-0097-08
L301	M5-TL0008	5nH6, Inductor +/-0n3 High Q Multilayer 0603, P0, M5-TL0008	MRD-LLF-0097-09
L302	M5-TL0487	220nH, Inductor 5% Ceramic 0805, P0, M5-TL0487	MRD-LLF-0014-21
L303	M5-TL0012	18nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0012	MRD-LLF-0095-15
L304	M5-TL0010	39nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0010	MRD-LLF-0095-19

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Circuit Ref	Stock Number.	Description	Part Number
L305	M5-TT0402	LDB25D500A0004, Dual Balun GSM900/DCS1800, P0, M5-TT0402	MRD-THF-0002-01
L306	M5-TL0462	100nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0462	MRD-LLF-0075-24
L307	M5-TL0511	56nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0511	MRD-LLF-0075-21
L309	M5-TL0509	33nH, Inductor 5% Multilayer 0603, P0, M5-TL0509	MRD-LLF-0075-18
L310	M5-TL0509	33nH, Inductor 5% Multilayer 0603, P0, M5-TL0509	MRD-LLF-0075-18
L311	M5-TL0008	5nH6, Inductor +/-0n3 High Q Multilayer 0603, P0, M5-TL0008	MRD-LLF-0097-09
L312	M5-TL0469	6nH8, Inductor 5% High Q Multilayer 0603, P0, M5-TL0469	MRD-LLF-0095-10
L313	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L314	M5-TL0500	68nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0500	MRD-LLF-0095-22
L315	M5-TL0500	68nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0500	MRD-LLF-0095-22
L316	M5-TL0010	39nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0010	MRD-LLF-0095-19
L317	M5-TL0011	22nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0011	MRD-LLF-0095-16
L400	M5-TL0007	8nH2, Inductor 5% High Q Multilayer 0603, P0, M5-TL0007	MRD-LLF-0095-11
L401	M5-TL0009	82nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0009	MRD-LLF-0095-23
L402	M5-TL0511	56nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0511	MRD-LLF-0075-21
L403	M5-TL0007	8nH2, Inductor 5% High Q Multilayer 0603, P0, M5-TL0007	MRD-LLF-0095-11
L404	M5-TL0485	3nH9, Inductor +/-0n3 High Q Multilayer 0603, P0, M5-TL0485	MRD-LLF-0097-07
L406	M5-TL0005	8nH2, Inductor 5% High Q Multilayer 0805, P0, M5-TL0005	MRD-LLF-0099-01
L409	M5-TL0511	56nH, Inductor 5% High Q Multilayer 0603, P0, M5-TL0511	MRD-LLF-0075-21
L410	M5-TL0007	8nH2, Inductor 5% High Q Multilayer 0603, P0, M5-TL0007	MRD-LLF-0095-11
PL400	M5-NJ0450	CPB7140-0311, 40 Way Conn 3.1mm High (male), P0, M5-NJ0450	MRD-JMU-0037-02
PL401	M5-NJ0429	AMP699562-1, Amp battery and board conn, P0, M5-NJ0429	MRD-JMU-0024-01
R100	M5-TR1455	4k7, Resistor 1/16W 1% 0402, P0, M5-TR1455	MRD-RES-0105-70
R101	M5-TR1455	4k7, Resistor 1/16W 1% 0402, P0, M5-TR1455	MRD-RES-0105-70
R102	M5-TR1455	4k7, Resistor 1/16W 1% 0402, P0, M5-TR1455	MRD-RES-0105-70
R103	M5-TR1455	4k7, Resistor 1/16W 1% 0402, P0, M5-TR1455	MRD-RES-0105-70
R104	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R105	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R106	M5-TR1428	220R, Resistor 1/16W 1% 0402, P0, M5-TR1428	MRD-RES-0105-43
R107	M5-TR1460	8k2, Resistor 1/16W 1% 0402, P0, M5-TR1460	MRD-RES-0105-75

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Circuit Ref	Stock Number.	Description	Part Number
R108	M5-TR0755	150R, Resistor 1/16W 1% 0402, P0, M5-TR0755	MRD-RES-0093-18
R109	M5-TR0755	150R, Resistor 1/16W 1% 0402, P0, M5-TR0755	MRD-RES-0093-18
R110	M5-TR1465	18k, Resistor 1/16W 1% 0402, P0, M5-TR1465	MRD-RES-0105-80
R111	M5-TR1409	18R, Resistor 1/16W 1% 0402, P0, M5-TR1409	MRD-RES-0105-24
R112	M5-TR1430	270R, Resistor 1/16W 1% 0402, P0, M5-TR1430	MRD-RES-0105-45
R113	M5-TR1414	33R, Resistor 1/16W 1% 0402, P0, M5-TR1414	MRD-RES-0105-29
R114	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R115	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R116	M5-TR1414	33R, Resistor 1/16W 1% 0402, P0, M5-TR1414	MRD-RES-0105-29
R117	M5-TR0738	100R, Resistor 1/16W 1% 0402, P0, M5-TR0738	MRD-RES-0093-01
R118	M5-TR0738	100R, Resistor 1/16W 1% 0402, P0, M5-TR0738	MRD-RES-0093-01
R122	M5-TR1436	470R, Resistor 1/16W 1% 0402, P0, M5-TR1436	MRD-RES-0105-51
R124	M5-TR1459	6k8, Resistor 1/16W 1% 0402, P0, M5-TR1459	MRD-RES-0105-74
R125	M5-TR1430	270R, Resistor 1/16W 1% 0402, P0, M5-TR1430	MRD-RES-0105-45
R126	M5-TR0659	15R, Resistor 1/16W 1% 0402, P0, M5-TR0659	MRD-RES-0092-18
R127	M5-TR1430	270R, Resistor 1/16W 1% 0402, P0, M5-TR1430	MRD-RES-0105-45
R129	M5-TR1414	33R, Resistor 1/16W 1% 0402, P0, M5-TR1414	MRD-RES-0105-29
R130	M5-TR1455	4k7, Resistor 1/16W 1% 0402, P0, M5-TR1455	MRD-RES-0105-70
R131	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R133	M5-TR1026	100k, Resistor 1/16W 1% 0402, P0, M5-TR1026	MRD-RES-0096-01
R134	M5-TR1474	47k, Resistor 1/16W 1% 0402, P0, M5-TR1474	MRD-RES-0105-89
R135	M5-TR1026	100k, Resistor 1/16W 1% 0402, P0, M5-TR1026	MRD-RES-0096-01
R136	M5-TR1523	0R027, Resistor 5% 0805, P0, M5-TR1523	MRD-RES-0046-03
R137	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R138	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R139	M5-TR1484	180k, Resistor 1/16W 1% 0402, P0, M5-TR1484	MRD-RES-0105-99
R140	M5-TR1484	180k, Resistor 1/16W 1% 0402, P0, M5-TR1484	MRD-RES-0105-99
R141	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R142	M5-TR1026	100k, Resistor 1/16W 1% 0402, P0, M5-TR1026	MRD-RES-0096-01
R143	M5-TR1026	100k, Resistor 1/16W 1% 0402, P0, M5-TR1026	MRD-RES-0096-01

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Circuit Ref	Stock Number.	Description	Part Number
R144	M5-TR1522	0R047, Resistor 1/16W 1% 0805, P0, M5-TR1522	MRD-RES-0046-02
R145	M5-TR1494	510k, Resistor 1/16W 1% 0402, P0, M5-TR1494	MRD-RES-0106-10
R146	M5-TR1474	47k, Resistor 1/16W 1% 0402, P0, M5-TR1474	MRD-RES-0105-89
R147	M5-TR1474	47k, Resistor 1/16W 1% 0402, P0, M5-TR1474	MRD-RES-0105-89
R149	M5-TR1474	47k, Resistor 1/16W 1% 0402, P0, M5-TR1474	MRD-RES-0105-89
R152	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R153	M5-TR1419	51R, Resistor 1/16W 1% 0402, P0, M5-TR1419	MRD-RES-0105-34
R155	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R156	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R158	M5-TR1414	33R, Resistor 1/16W 1% 0402, P0, M5-TR1414	MRD-RES-0105-29
R159	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R160	M5-TR1447	2k2, Resistor 1/16W 1% 0402, P0, M5-TR1447	MRD-RES-0105-62
R200	M5-TR0934	11k, Resistor 1/16W 1% 0402, P0, M5-TR0934	MRD-RES-0095-05
R201	M5-TR1436	470R, Resistor 1/16W 1% 0402, P0, M5-TR1436	MRD-RES-0105-51
R202	M5-TR1450	3k, Resistor 1/16W 1% 0402, P0, M5-TR1450	MRD-RES-0105-65
R203	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R204	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R205	M5-TR1462	12k, Resistor 1/16W 1% 0402, P0, M5-TR1462	MRD-RES-0105-77
R206	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R207	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R208	M5-TR1419	51R, Resistor 1/16W 1% 0402, P0, M5-TR1419	MRD-RES-0105-34
R209	M5-TR0642	10R, Resistor 1/16W 1% 0402, P0, M5-TR0642	MRD-RES-0092-01
R210	M5-TR1468	27k, Resistor 1/16W 1% 0402, P0, M5-TR1468	MRD-RES-0105-83
R211	M5-TR1446	1k8, Resistor 1/16W 1% 0402, P0, M5-TR1446	MRD-RES-0105-61
R212	M5-TR0947	15k, Resistor 1/16W 1% 0402, P0, M5-TR0947	MRD-RES-0095-18
R213	M5-TR1440	680R, Resistor 1/16W 1% 0402, P0, M5-TR1440	MRD-RES-0105-55
R214	M5-TR0947	15k, Resistor 1/16W 1% 0402, P0, M5-TR0947	MRD-RES-0095-18
R215	M5-TR1468	27k, Resistor 1/16W 1% 0402, P0, M5-TR1468	MRD-RES-0105-83
R216	M5-TR1446	1k8, Resistor 1/16W 1% 0402, P0, M5-TR1446	MRD-RES-0105-61
R217	M5-TR1432	330R, Resistor 1/16W 1% 0402, P0, M5-TR1432	MRD-RES-0105-47

DB2000 RF Board Parts List

Circuit Ref	Stock Number.	Description	Part Number
R300	M5-TR1468	27k, Resistor 1/16W 1% 0402, P0, M5-TR1468	MRD-RES-0105-83
R301	M5-TR1430	270R, Resistor 1/16W 1% 0402, P0, M5-TR1430	MRD-RES-0105-45
R302	M5-TR1440	680R, Resistor 1/16W 1% 0402, P0, M5-TR1440	MRD-RES-0105-55
R303	M5-TR1414	33R, Resistor 1/16W 1% 0402, P0, M5-TR1414	MRD-RES-0105-29
R304	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R305	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R306	M5-TR0834	1k, Resistor 1/16W 1% 0402, P0, M5-TR0834	MRD-RES-0094-01
R307	M5-TR0834	1k, Resistor 1/16W 1% 0402, P0, M5-TR0834	MRD-RES-0094-01
R310	M5-TR1443	1k2, Resistor 1/16W 1% 0402, P0, M5-TR1443	MRD-RES-0105-58
R311	M5-TR1443	1k2, Resistor 1/16W 1% 0402, P0, M5-TR1443	MRD-RES-0105-58
R312	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R313	M5-TR0930	10k, Resistor 1/16W 1% 0402, P0, M5-TR0930	MRD-RES-0095-01
R314	M5-TR1519	0R, Resistor zero ohm link 0402, P0, M5-TR1519	MRD-RES-0107-01
R400	M5-TR1432	330R, Resistor 1/16W 1% 0402, P0, M5-TR1432	MRD-RES-0105-47
R401	M5-TR1432	330R, Resistor 1/16W 1% 0402, P0, M5-TR1432	MRD-RES-0105-47
R402	M5-TR1432	330R, Resistor 1/16W 1% 0402, P0, M5-TR1432	MRD-RES-0105-47
R403	M5-TR1432	330R, Resistor 1/16W 1% 0402, P0, M5-TR1432	MRD-RES-0105-47
R404	M5-TR1026	100k, Resistor 1/16W 1% 0402, P0, M5-TR1026	MRD-RES-0096-01
R405	M5-TR0451	0R, Resistor zero ohm link 0805, P0, M5-TR0451	MRD-RES-0022-04
R406	M5-TR1026	100k, Resistor 1/16W 1% 0402, P0, M5-TR1026	MRD-RES-0096-01
S400	M5-NJ0439	IMS_COAX_SW, Switched RF Coax Conn, P0, M5-NJ0439	MRD-JMU-0035-01
TR100	M5-TV0454	2SJ204, P-Channel Mosfet with Diode 200mW, P0, M5-TV0454	MRD-QBL-0029-01
TR101	M5-TV0516	Si2301DS, P-Channel Mosfet with Diode, P0, M5-TV0516	MRD-QBL-0063-01
TR102	M5-TV0516	Si2301DS, P-Channel Mosfet with Diode, P0, M5-TV0516	MRD-QBL-0063-01
TR103	M5-TV0516	Si2301DS, P-Channel Mosfet with Diode, P0, M5-TV0516	MRD-QBL-0063-01
TR104	M5-TV0516	Si2301DS, P-Channel Mosfet with Diode, P0, M5-TV0516	MRD-QBL-0063-01
TR105	M5-TV0516	Si2301DS, P-Channel Mosfet with Diode, P0, M5-TV0516	MRD-QBL-0063-01
TR106	M5-TV0518	BFP405, NPN RF Transistor, P0, M5-TV0518	MRD-QBL-0061-01
TR107	M5-TV0517	MRF1047T, Planar NPN Transistor, P0, M5-TV0517	MRD-QBL-0062-01
TR108	M5-TV0446	2SK1581, N-Channel Mosfet With Diode, P0, M5-TV0446	MRD-QBL-0023-01

DB2000 RF Board Parts List

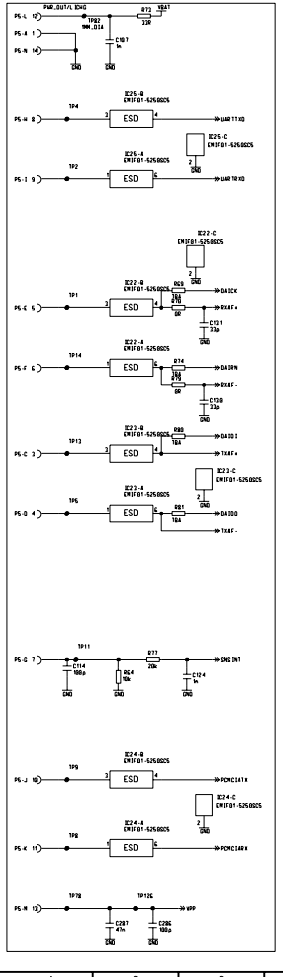
Circuit Ref	Stock Number.	Description	Part Number
TR109	M5-TV0446	2SK1581, N-Channel Mosfet With Diode, P0, M5-TV0446	MRD-QBL-0023-01
TR110	M5-TV0403	UMC4, Dual Digital Planar Transistor 150mW, P0, M5-TV0403	MRD-QBL-0003-01
TR111	M5-TV0403	UMC4, Dual Digital Planar Transistor 150mW, P0, M5-TV0403	MRD-QBL-0003-01
TR200	M5-TV0529	2SC4180-T1D18, High Gain NPN Transistor 150mW, P0, M5-TV0529	MRD-QBL-0057-02
TR201	M5-TV0454	2SJ204, P-Channel Mosfet with Diode 200mW, P0, M5-TV0454	MRD-QBL-0029-01
TR202	M5-TV0454	2SJ204, P-Channel Mosfet with Diode 200mW, P0, M5-TV0454	MRD-QBL-0029-01
TR203	M5-TV0454	2SJ204, P-Channel Mosfet with Diode 200mW, P0, M5-TV0454	MRD-QBL-0029-01
TR204	M5-TV0529	2SC4180-T1D18, High Gain NPN Transistor 150mW, P0, M5-TV0529	MRD-QBL-0057-02
TR205	M5-TV0517	MRF1047T, Planar NPN Transistor, P0, M5-TV0517	MRD-QBL-0062-01
TR300	M5-TV0518	BFP405, NPN RF Transistor, P0, M5-TV0518	MRD-QBL-0061-01
TR301	M5-TV0487	2SJ203, P-Channal Mosfet For Switching 200mW, P0, M5-TV0487	MRD-QBL-0043-01
TR302	M5-TV0487	2SJ203, P-Channal Mosfet For Switching 200mW, P0, M5-TV0487	MRD-QBL-0043-01
X200	M5-TQ0426	TCXO_PCN, TCXO For PCN, P0, M5-TQ0426	MRD-UAN-0033-01

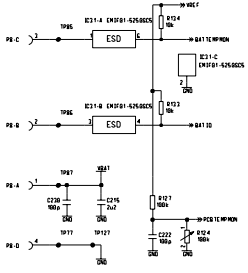
<<	Previous Section	
	Next Section	>>
	Main Menu	

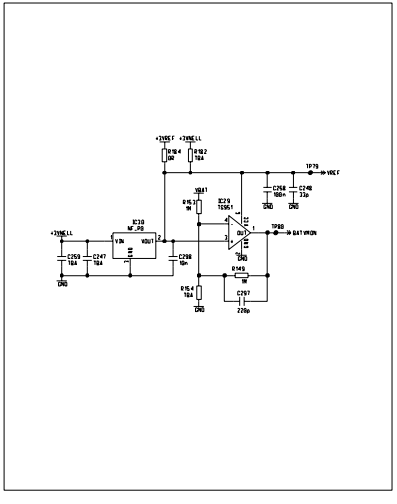
Section 8

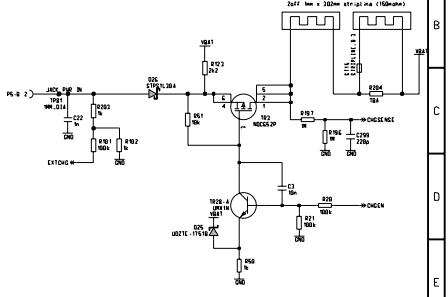
Circuit Diagrams and Board Maps

NOT TO SCALE. IF IN DOUBT ASK!.

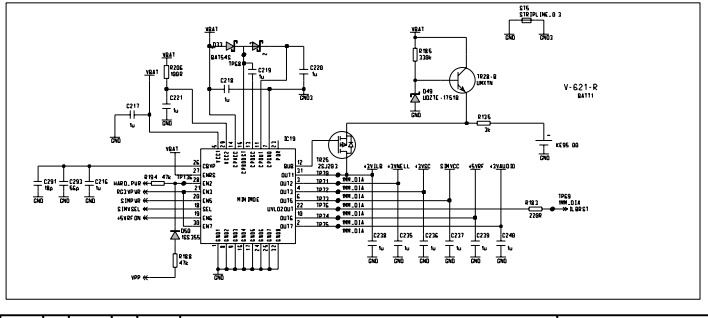








BATTERY CHARGING



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2.02	CR/R98/242	C.B.	7/10/98	T.B	7/10/98	M.C	7/10/98	
	253,261,264							
2.01	CR/R98/229	C.B.	29/9/98	T.B	29/9/98	M.C	29/9/98	
2	MP1 Build	C.B.	17/9/98	T.B	17/9/98	M.C	17/9/98	
1	MP1 Build	C.B.	9/9/98	T.B	9/9/98	M.C	9/9/98	
G	MP1 Build	C.B.	26/8/98	T.B	26/8/98	M.C	26/8/98	
ISS	DETAILS	DRN	DATE	CHK	DATE	APP.	DATE	

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Engineer: M. CORBRIDGE
CAD Engineer: C. BRAIN

Size: A3

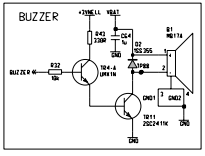
TITLE:

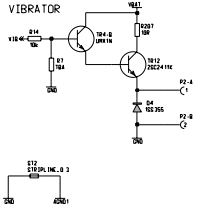
G4H LOGIC

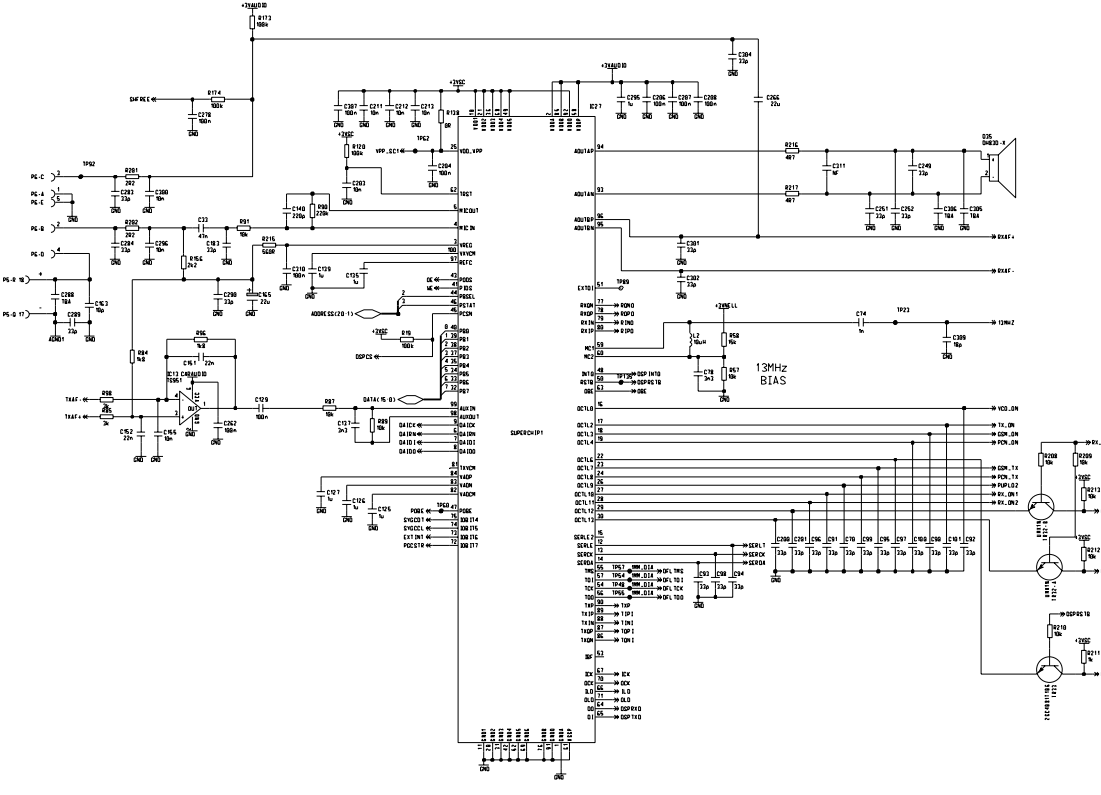
Drawing Number: 147-279804-CD

Page: 1 OF 4

NOT TO SCALE. IF IN DOUBT ASK!.







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G	MP1 Build	C.B	26/8/98	T.B	26/8/98	M.C	26/8/98
ISS	DETAILS	DRN	DATE	CHK	DATE	APP.	DATE

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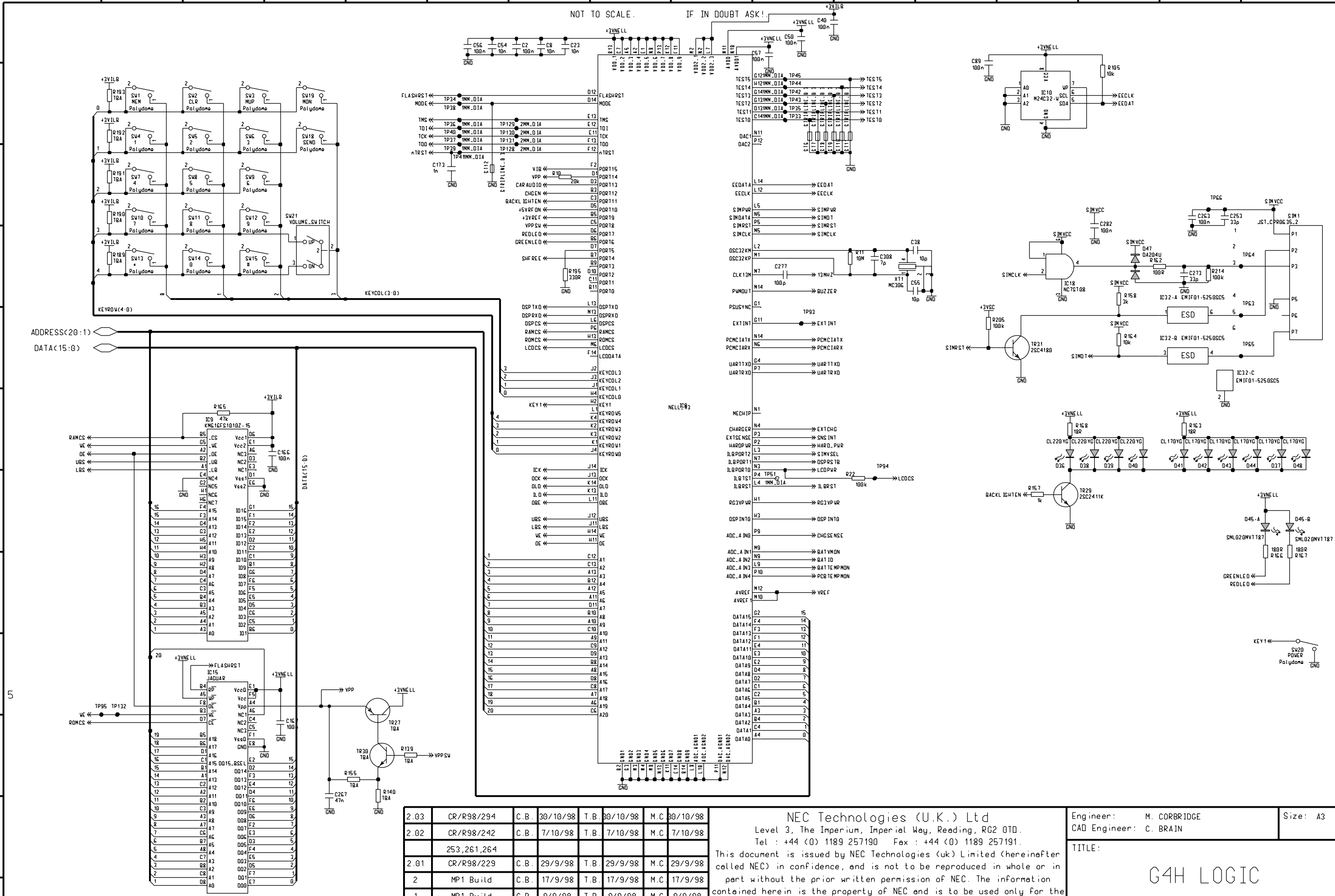
Page: 2 OF 4



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G	MP1 Build	C.B.	26/8/98	T.B.	26/8/98	M.C.	26/8/98
ISS	DETAILS	DRN	DATE	CHK.	DATE	APP.	DATE

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G4H LOGIC

Drawing Number: 147-279804-CD

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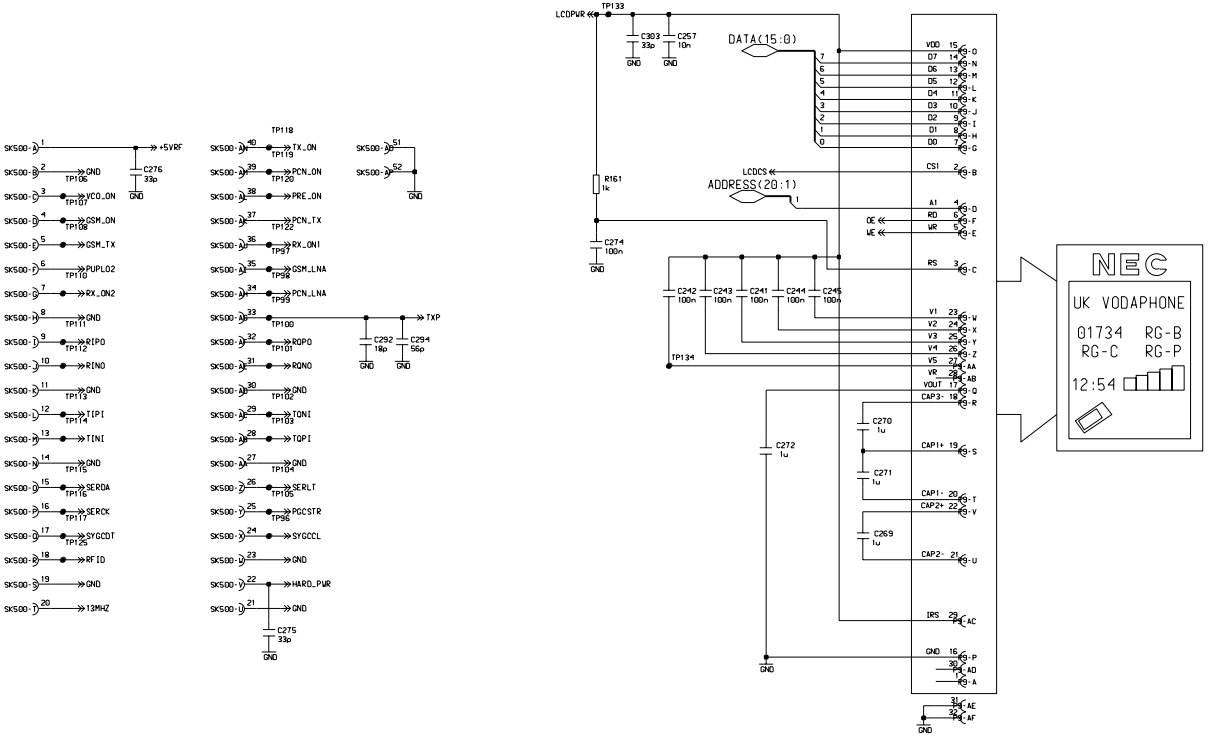

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ISS	DETAILS	DRN	DATE	CHK.	DATE	APP.	DATE

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Engineer: M. Corbridge
CAD Engineer: C. Brain

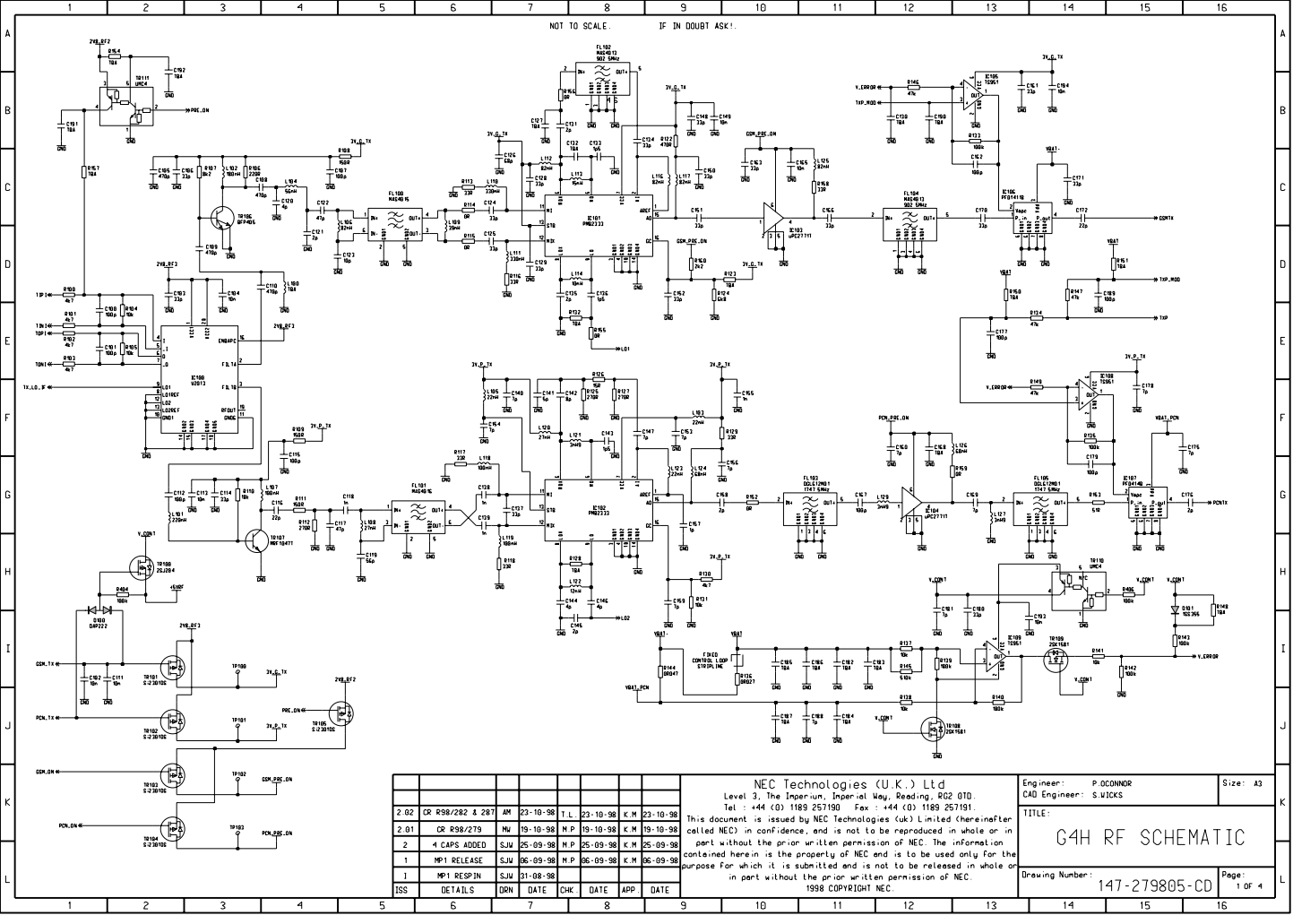
Size: A4

TITLE:

G4H Logic

Drawing Number: 147-279804-CD

Page: 4 OF 4



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2	4 CAPS ADDED	SJW	25-09-98	M.P	25-09-98	K.M	25-09-98
1	MP1 RELEASE	SJW	06-09-98	M.P	06-09-98	K.M	06-09-98
1	MP1 RESPIN	SJW	31-08-98				

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Engineer: P.OCONNOR
CAD Engineer: S.WICKS

Size: A3

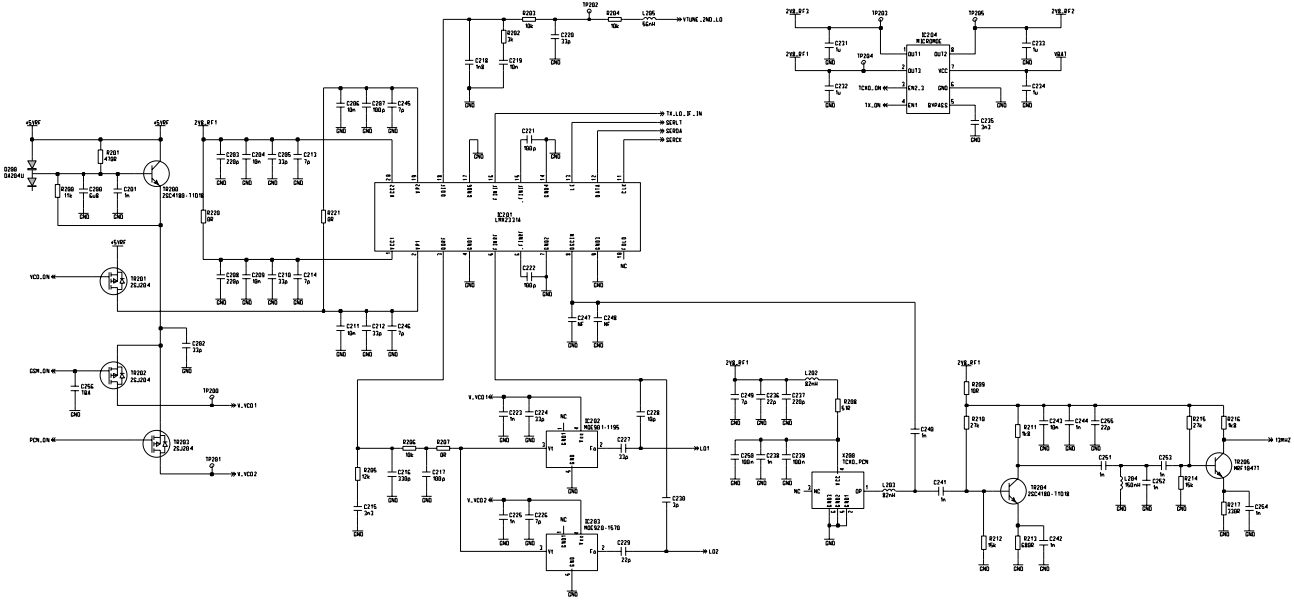
TITLE:

G4H RF SCHEMATIC

Drawing Number: 147-279805-CD

Page: 1 OF 4

NOT TO SCALE. IF IN DOUBT ASK!.



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1	MP1 RELEASE	SJW	06-09-98	M.P	06-09-98	K.M	06-09-98
1	MP1 RESPIN	SJW	31-08-98				

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Engineer:	P.OCONNOR
CAD Engineer:	S.WICKS
Size:	A3
TITLE:	G4H RF SCHEMATIC
Drawing Number:	147-279805-CD
Page:	2 OF 4

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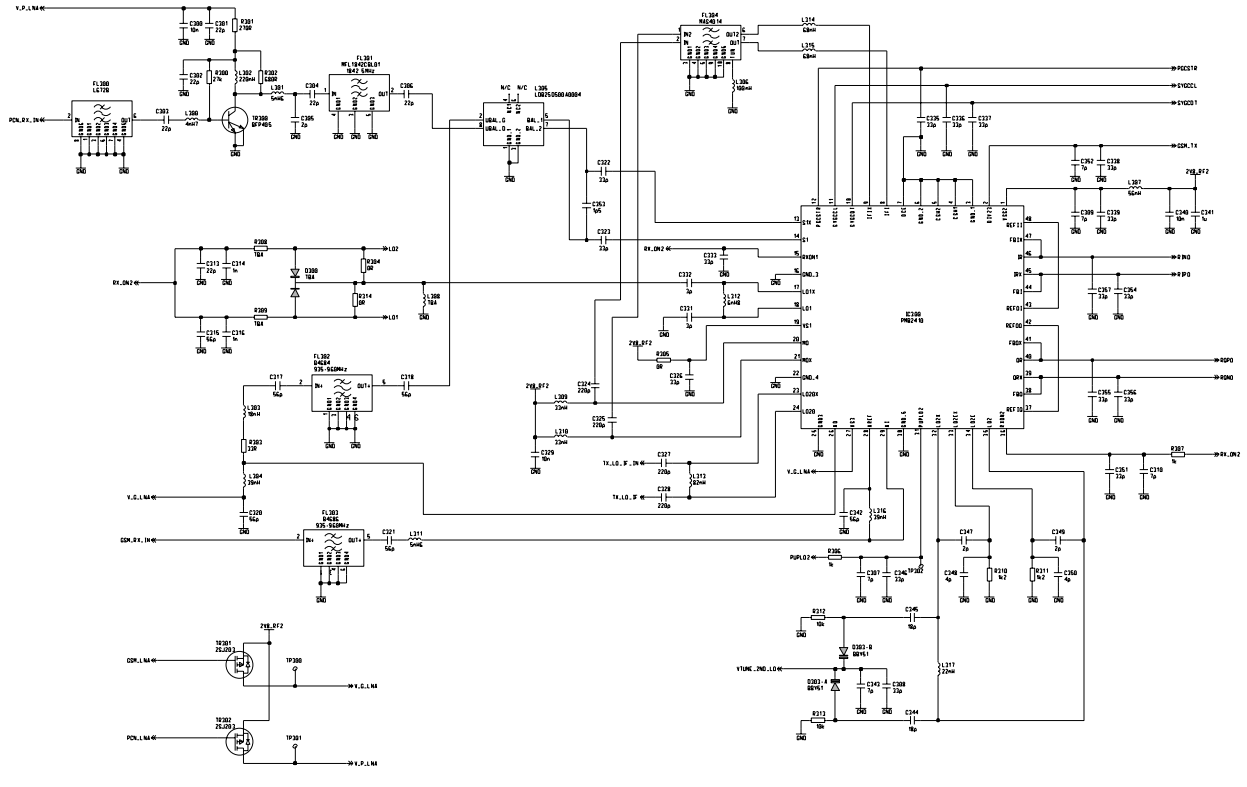

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2.01	CR R98/279	MJ	19-10-98	M.P	19-10-98	K.M	19-10-98
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1	MP1 RELEASE	SJW	06-09-98	M.P	06-09-98	K.M	06-09-98
1	MP1 RESPIN	SJW	31-08-98				

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CAD Engineer: S.WICKS

Size: A3

TITLE:

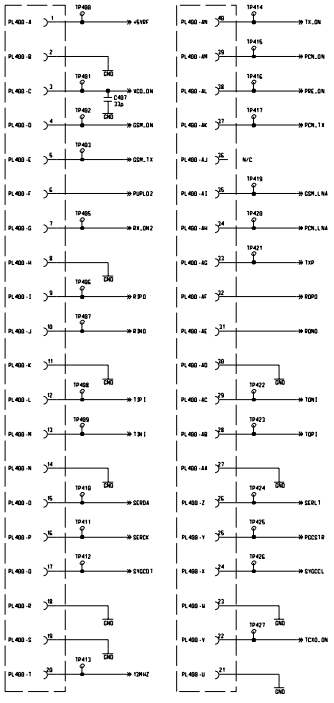
G4H RF SCHEMATIC

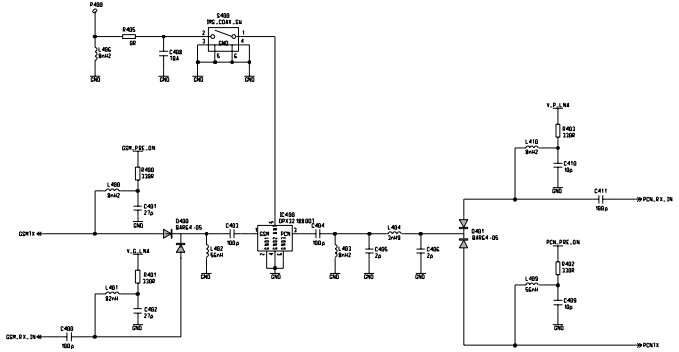
Drawing Number: 147-279805-CD

Page: 3 OF 4

NOT TO SCALE. IF IN DOUBT ASK!.

BOARD TO BOARD CONNECTOR





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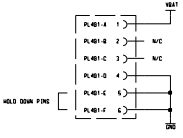

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2	4 CAPS ADDED	SJW	25-09-98	M.P	25-09-98	K.M	25-09-98
1	MP1 RELEASE	SJW	06-09-98	M.P	06-09-98	K.M	06-09-98
1	MP1 RESPIN	SJW	31-08-98				

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G4H RF SCHEMATIC

Drawing Number: 147-279805-CD
Page: 4 OF 4

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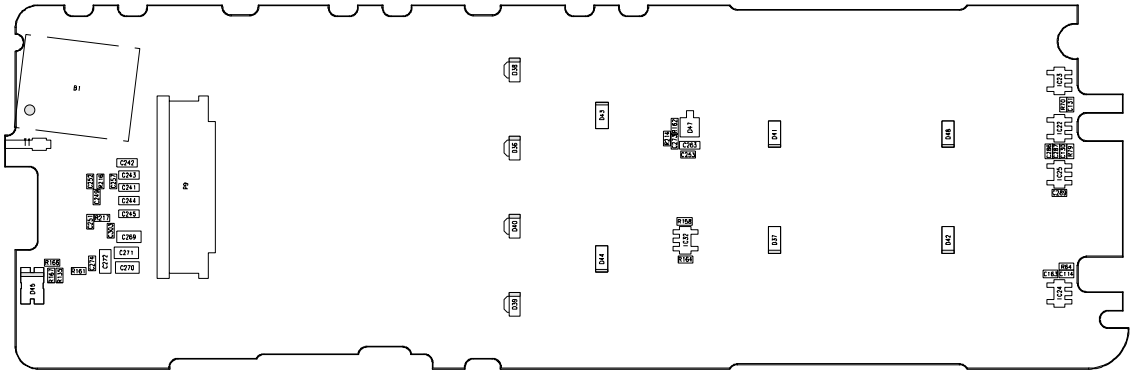
147-279804-E1



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IC32 TY0004
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2 01	CR/R98/229	CB	29-09-98	TB	29-09-98	MC	29-09-98
2	MP1 BUILD	CB	17-09-98	TB	17-09-98	MC	17-09-98
1	MP1 BUILD	CB	9-09-98	TB	09-09-98	MC	09-09-98
G	MP1 BUILD	CB	26-08-98	TB	26-08-98	MC	26-08-98
F	MP1 BUILD	CB	30-07-98	TB	06-08-98	MC	06-08-98
E	EP3 BUILD	CB	28-07-98	TB	28-07-98	MC	28-07-98

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TITLE G4H LOGIC COMPONENT MAP M1

DRG.NO 147-279804-CM

SCALE NTS

SHT 1 OF 4

A3 (297x420)

REV. 1.0 NEC

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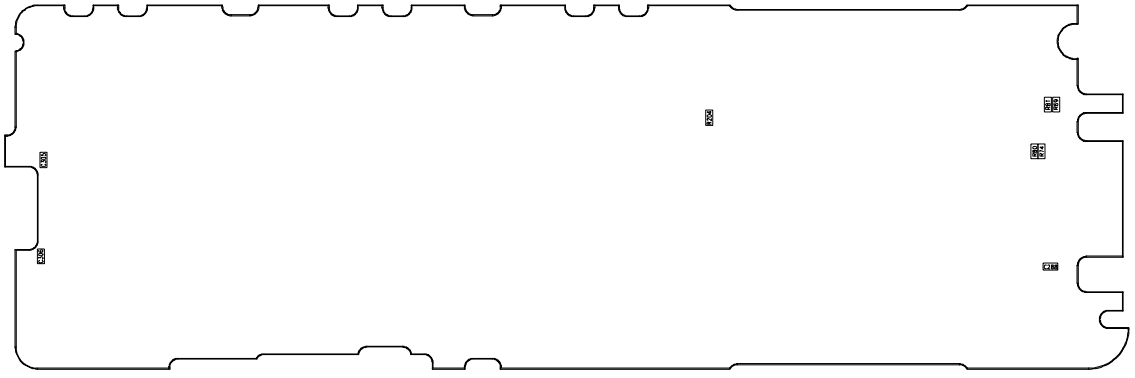
147-279804-E1



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G	MP1 BUILD	CB	26-08-98	TB	26-08-98	MC	26-08-98
F	MP1 BUILD	CB	30-07-98	TB	06-08-98	MC	06-08-98
E	EP3 BUILD	CB	28-07-98	TB	28-07-98	MC	28-07-98

NEC Technologies (UK) Ltd

Level 3, Imperium, Imperial Way, Reading, RG2 0TD

TITLE G4H LOGIC NON FIT COMPS M1

DRG.NO 147-279804-CM

SCALE NTS

SHT 2 OF 4

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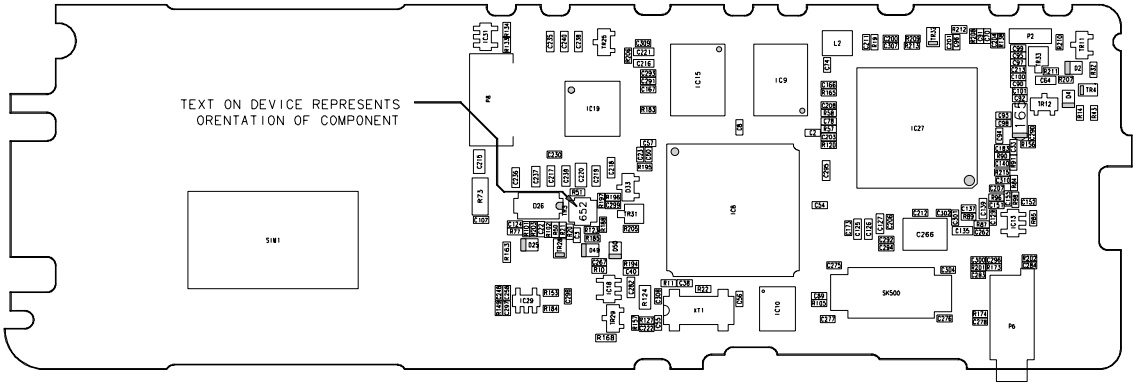

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C107	TC3030	C208	TC3168	C267	TC0009	C309	TC2043	C98	TC2044	R105	TR0930	R195	TR1432	R73	TR0161
C124	TC3030	C211	TC3042	C275	TC2044	C310	TC3168	C99	TC2044	R11	TR9876	R196	TR1122	R77	TR0959
C125	TC0012	C212	TC3042	C276	TC2044	C33	TC0009	D2	TV0443	R120	TR1026	R197	TR1122	R84	TR1446
C126	TC0012	C213	TC3042	C277	TC1988	C38	TC1976	D25	TV0404	R123	TR1447	R20	TR1026	R85	TR1450
C127	TC0012	C215	TC3170	C278	TC3168	C40	TC3168	D26	TV0528	R124	NV0401	R201	TR1389	R87	TR0930
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C167	TC3168	C235	TC0012	C297	TC2053	C89	TC3168	IC29	TQ0442	R165	TR1474	R212	TR0930	TR28	TV0470
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C183	TC2044	C237	TC0012	C299	TC2053	C91	TC2044	IC8	NY0445	R173	TR1026	R215	TR1438	TR3	TV0485
C2	TC3168	C238	TC0012	C3	TC3042	C92	TC2044	IC9	TY0002	R174	TR1026	R22	TR1026	TR31	TV0501
C200	TC2044	C239	TC0012	C300	TC3042	C93	TC2044	L2	TL0401	R183	TR1428	R32	TR0930	TR32	TV0470
C201	TC2044	C240	TC0012	C301	TC2044	C94	TC2044	P2	TJ0003	R184	TR1519	R43	TR1432	TR33	TV0412
C203	TC3042	C248	TC2044	C302	TC2044	C95	TC2044	P6	TS0400	R185	TR1489	R50	TR0834	TR4	TV0470
C204	TC3168	C258	TC3168	C304	TC2044			R10	TR0959	R188	TR1474	R51	TR0930	XT1	TQ0420

ISS	DETAILS	DRN	DATE	CHK	DATE	APP	DATE
2.03	CR/R98/294	CB	30-10-98	TB	30-10-98	MC	30-10-98
2.02	242,253,261,264,270	CB	7-10-98	TB	7-10-98	MC	7-10-98
2.01	CR/R98/229	CB	29-09-98	TB	29-09-98	MC	29-09-98
2	WP1 BUILD	CB	17-09-98	TB	17-09-98	MC	17-09-98
1	WP1 BUILD	CB	09-09-98	TB	09-09-98	MC	09-09-98
G	WP1 BUILD	CB	26-08-98	TB	26-08-98	MC	26-08-98
F	WP1 BUILD	CB	30-07-98	TB	06-08-98	MC	06-08-98
E	EP3 BUILD	CB	28-07-98	TB	28-07-98	MC	28-07-98

NEC Technologies (UK) Ltd

Level 3, Imperium, Imperial Way, Reading, RG2 0TD

TITLE G4H LOGIC COMPONENT MAP M2

DRG.NO 147-279804-CM

SCALE NTS

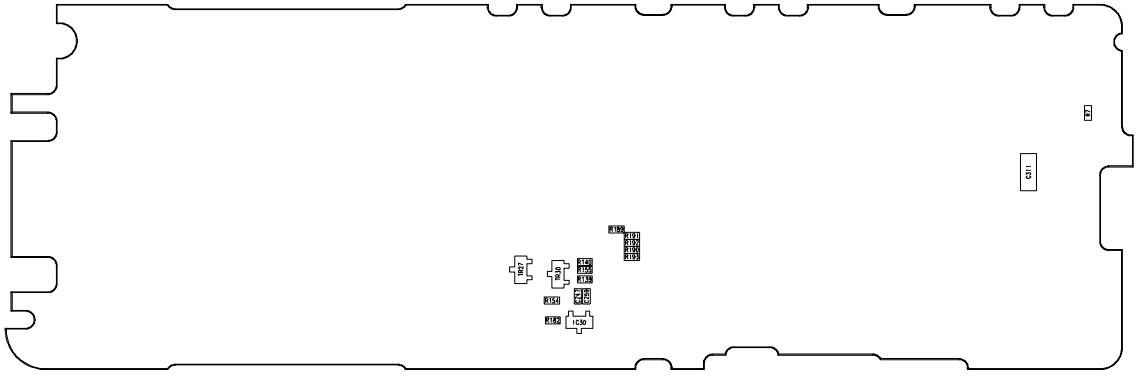
SHT 3 OF 4

A3 (297×420)

REV. 1.0 NEC

USED ON:

147-279804-E1



ISS	DETAILS	DRN	DATE	CHK	DATE	APP	DATE
2.03	CR/R98/294	CB	30-10-98	TB	30-10-98	MC	30-10-98
2.02	242,253,261,264,270	CB	7-10-98	TB	7-10-98	MC	7-10-98
2.01	CR/R98/229	CB	29-9-98	TB	29-09-98	MC	29-09-98
2	MP1 BUILD	CB	17-0-98	TB	17-09-98	MC	17-09-98
1	MP1 BUILD	CB	09-0-98	TB	09-09-98	MC	09-09-98
G	MP1 BUILD	CB	26-08-98	TB	26-08-98	MC	26-08-98
F	MP1 BUILD	CB	30-07-98	TB	06-08-98	MC	06-08-98
E	EP3 BUILD	CB	28-07-98	TB	28-07-98	MC	28-07-98

NEC Technologies (UK) Ltd
Level 3, Imperium, Imperial Way, Reading, RG2 0TD

TITLE G4H LOGIC
NON FIT COMPS M2

DRG.NO
147-279804-CM

SCALE NTS

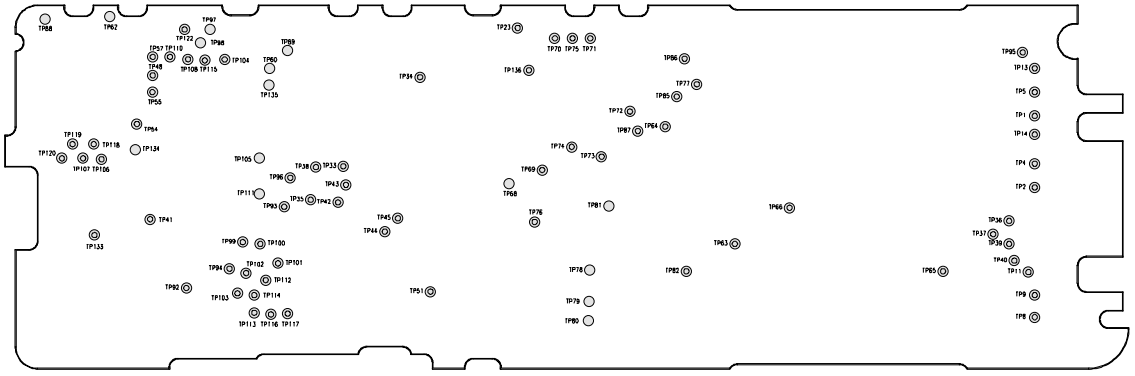
SHT 4
OF 4

A3 (297×420)

REV. 1.0 NEC

USED ON:

147-279804-00-BA



ISS	DETAILS	DRN	DATE	CHK	DATE	APP	DATE
2.03	CR/R98/294	CB	30-10-98	TB	30-10-98	MC	30-10-98
2 02	242,253,261,264,270	CB	7-10-98	TB	7-10-98	MC	7-10-98
2 01	CR/R98/229	CB	29-09-98	TB	29-09-98	MC	29-09-98
2	MP1 BUILD	CB	17-09-98	TB	17-09-98	MC	17-09-98
1	MP1 BUILD	CB	09-09-98	TB	09-09-98	MC	09-09-98
G	MP1 BUILD	CB	26-08-98	TB	26-08-98	MC	26-08-98
F	MP1 BUILD	CB	30-07-98	TB	06-08-98	MC	06-08-98
E	EP3 BUILD	CB	28-07-98	TB	28-07-98	MC	28-07-98

NEC Technologies (UK) Ltd
Level 3,Imperium,Imperial Way,Reading,RG2 0TD

TITLE G4H LOGIC TESTPOINT REF M1

DRG.NO 147-279804-TP

SCALE NTS

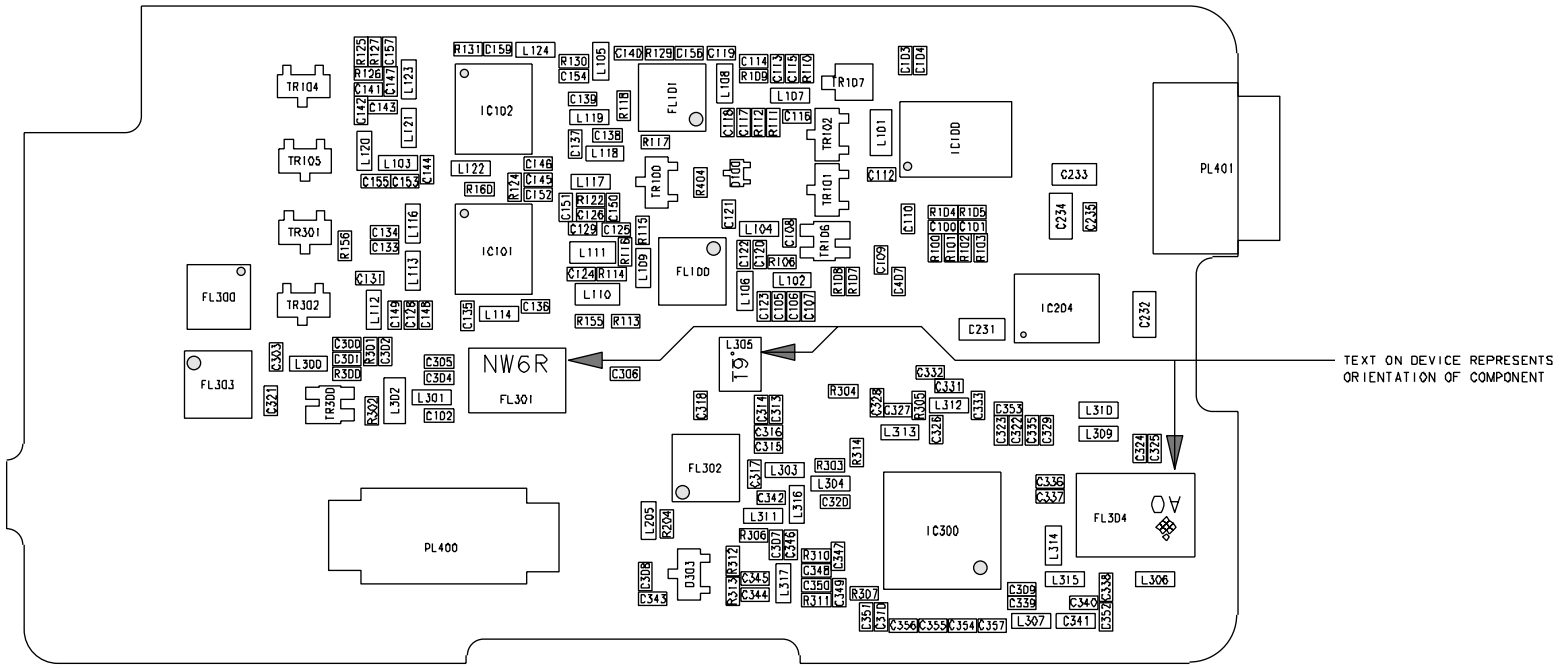
SHT 1 OF 2

A3 (297x420)

REV. 1.0 NEC

USED ON:

147-279805-P0



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C118 M5-TC2823
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C120 M5-TC3179
C121 M5-TC3177
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C123 M5-TC2040
C124 M5-TC2044
C125 M5-TC2044
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C141 M5-TC3178
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C407 M5-TC2044
D100 M5-TV0521
D303 M5-TV0519
FL100 M5-TF0406
FL101 M5-TF04D7
FL300 M5-TF0423
FL301 M5-TF0412
FL302 M5-TF0439
FL303 M5-TF043B
FL304 M5-TF0434
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IC102 M5-TY0426
IC204 M5-TY0440
IC300 M5-TY0427
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L104 M5-TL0511
L105 M5-TL0011
L106 M5-TL0009
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L121 M5-TLD485
L122 M5-TL0499
L123 M5-TLD011
L124 M5-TL0500
L205 M5-TLD511
L300 M5-TL0014
L3D1 M5-TL0008
L302 M5-TL0487
L303 M5-TLD012
L304 M5-TL0010
L3D5 M5-TTD402
L3D6 M5-TL0462
L3D7 M5-TLD511
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L311 M5-TL0008
L312 M5-TLD469
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L314 M5-TL0500
L315 M5-TL0500
L316 M5-TL0010
L317 M5-TL0011
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PL401 M5-NJ0429
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R102 M5-TR1455
R103 M5-TR1455
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R124 M5-TR1459
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R127 M5-TR143D
R129 M5-TR1414
R130 M5-TR1455
R131 M5-TR093D
R155 M5-TR1519
R156 M5-TR1519
R16D M5-TR1447
R204 M5-TR0930
R30D M5-TR1468
R301 M5-TR1430
R302 M5-TR1440
R303 M5-TR1414
R304 M5-TR1519
R305 M5-TR1519
R306 M5-TR0834
R307 M5-TR0834
R31D M5-TR1443
R311 M5-TR1443
R312 M5-TR0930
R313 M5-TR0930
R314 M5-TR1519
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TR102 M5-TV0516
TR104 M5-TV0516
TR105 M5-TV0516
TR106 M5-TV0518
TR107 M5-TV0517
TR300 M5-TV0518
TR301 M5-TV04B7
TR302 M5-TV04B7

ISS	DETAILS	DRN	DATE	CHK	DATE	APP	DATE
2.02	CR R98/282 & 287	AM	23-10-98	T L.	23-10-98	K.M	23-10-98
2 01	CR R98/279	MW	19-10-98	M P	19-10-98	K.M	19-10-98
2	4 CAPS ADDED	SJW	25-9-98	M.P	25-9-98	K.M	25-9-98
1.03	CR R98/193 & 245	SJW	23-9-98	M.P	23-9-98	K.M	23-9-98
1.02	CR R98/231 & 232	SJW	18-9-98	M.P	18-9-98	K.M	18-9-98
1 01	CR R98/220 & 226	SJW	16-9-98	M P	16-9-98	K M	16-9-98
1	MP1 RELEASE	SJW	09-9-98	M P	09-9-98	K.M	09-9-98

NEC Technologies (UK) Ltd
Level 3, Imperium, Imperial Way, Reading, RG2 0TD

TITLE G4H PCB COMPONENT MAP M1

DRG.NO 147-279805-CM

SCALE NTS

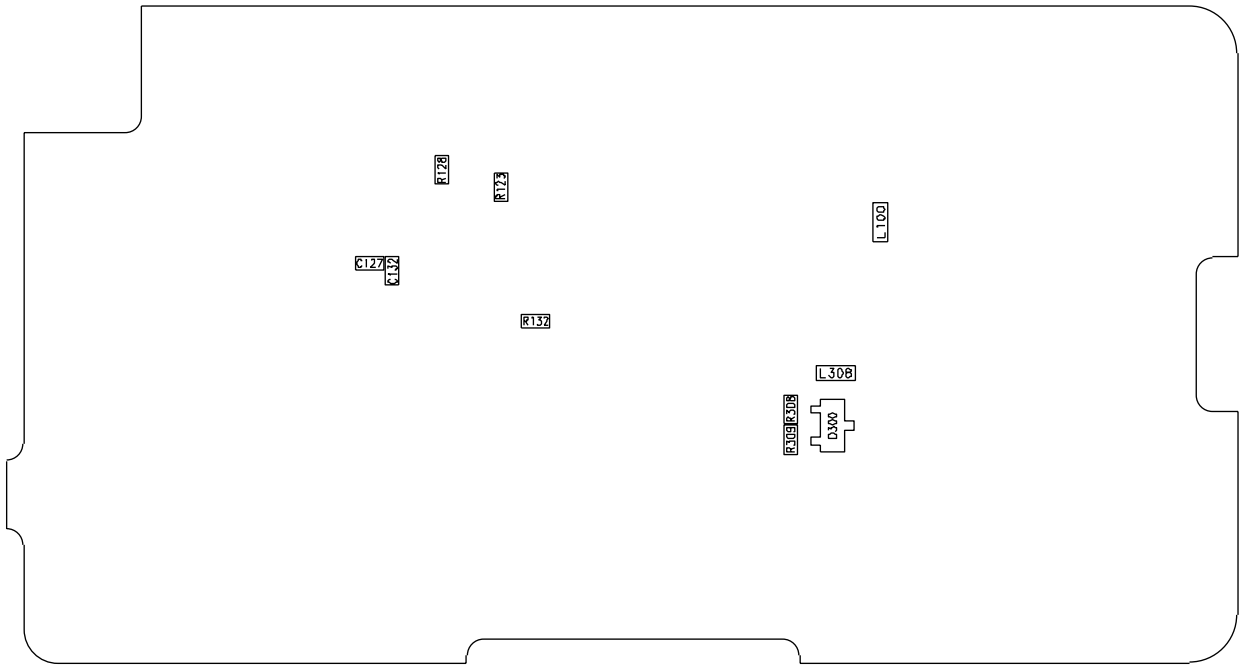
SHT 1 OF 4

A3 (297x420)

REV 1 1 NEC

USED ON:

147-279805-P0



ISS	DETAILS	DRN	DATE	CHK	DATE	APP	DATE
2.02	CR R98/282 & 287	AM	19-10-98	T.L.	23-10-98	K.M	23-10-98
2.01	CR R98/279	MW	19-10-98	M P	19-10-98	K.M	19-10-98
2	4 CAPS ADDED	SJW	25-9-98	M.P	25-9-98	K.M	25-9-98
1.03	CR R98/193 & 245	SJW	23-9-98	M P	23-9-98	K.M	23-9-98
1.02	CR R98/231 & 232	SJW	18-9-98	M.P	18-9-98	K M	18-9-98
1.01	CR R98/220 & 226	SJW	16-9-98	M.P	16-9-98	K M	16-9-98
1	MP1 RELEASE	SJW	09-9-98	M.P	09-9-98	K.M	09-9-98

NEC Technologies (UK) Ltd

Level 3, Imperium, Imperial Way, Reading, RG2 0TD

TITLE G4H PCB
NON FIT COMPS MAP M1
(FOR REFERENCE ONLY)

DRG.NO
147-279805-CM

SCALE NTS

SHT 2 OF 4

A3 (297×420)

REV 1 1

NEC

USED ON:

147-279805-P0

C111 M5-TC2835
C158 M5-TC3177
C160 M5-TC3180
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C163 M5-TC2044
C165 M5-TC2835
C166 M5-TC2044
C167 M5-TC1156
C169 M5-TC3180
C170 M5-TC2044
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C172 M5-TC1148
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D400 M5-TV0514
D401 M5-TV0514
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IC105 M5-TQ0442
IC106 M5-TQ0433
IC107 M5-TQ0003
IC108 M5-TQ0442
IC109 M5-TQ0442

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IC203 M5-TQ0444
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L127 M5-TL0485
L129 M5-TL0485

L202 M5-TL0009
L203 M5-TL0009
L204 M5-TL0436
L400 M5-TL0007
L401 M5-TL0009
L402 M5-TL0511
L403 M5-TL0007

L404 M5-TL0485
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L410 M5-TL0007
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R208 M5-TR1419
R209 M5-TR0642
R210 M5-TR1468
R220 M5-TR0445
R221 M5-TR0445

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R213 M5-TR1440
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R215 M5-TR1468
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R217 M5-TR1432
R400 M5-TR1432
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R403 M5-TR1432
R405 M5-TR0451
R406 M5-TR1026
S400 M5-NJ0439
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TR110 M5-TV0403
TR111 M5-TV0403
TR200 M5-TV0529
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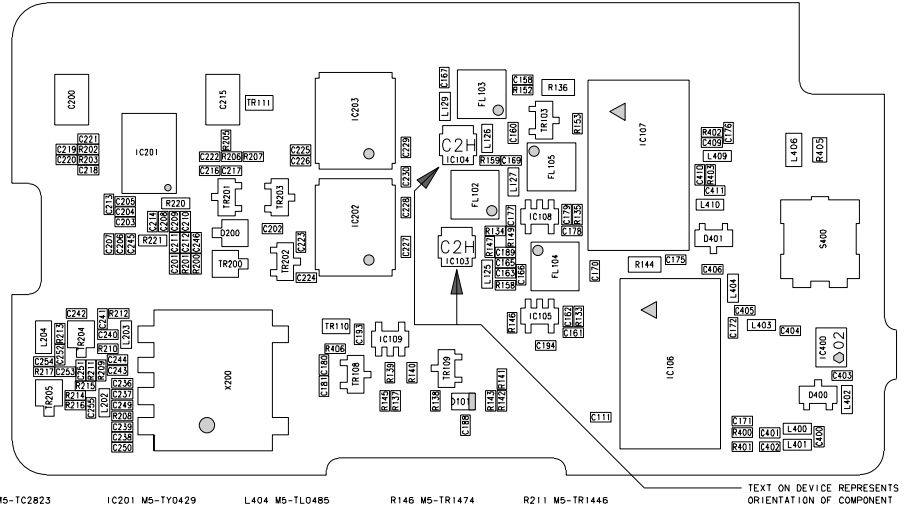
X200 M5-TQ0426



ISS	DETAILS	DRN	DATE	CHK	DATE	APP	DATE
2.02	CR R98/282 & 287	AM	23-10-98	T.L.	23-10-98	K.M	23-10-98
2.01	CR R98/279	MW	19-10-98	M.P	19-10-98	K.M	19-10-98
2	4 CAPS ADDED	SJW	25-9-98	M.P	25-9-98	K.M	25-9-98
1.03	CR R98/193 & 245	SJW	23-9-98	M.P	23-9-98	K.M	23-9-98
1.02	CR R98/231 & 232	SJW	18-9-98	M.P	18-9-98	K.M	18-9-98
1.01	CR R98/220 & 226	SJW	16-9-98	M.P	16-9-98	K.M	16-9-98
1	MP1 RELEASE	SJW	09-9-98	M.P	09-9-98	K.M	09-9-98

NEC Technologies (UK) Ltd
Level 3, Imperium, Imperial Way, Reading, RG2 0TD

TITLE G4H PCB COMPONENT MAP M2

DRG.NO 147-279805-CM

SCALE NTS

SHT 3 OF 4

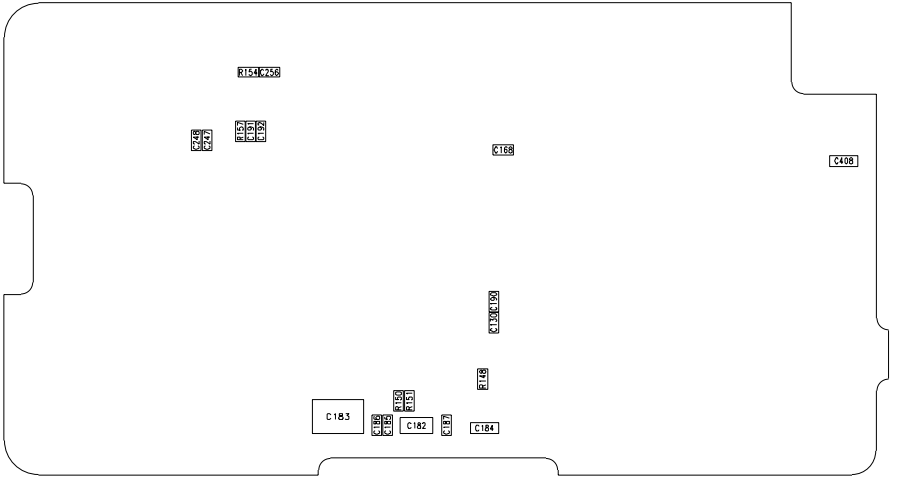
A3 (297x420)

REV. 1.1

NEC

USED ON:

147-279805-P0



ISS	DETAILS	DRN	DATE	CHK	DATE	APP	DATE
2 02	CR R98/282 & 287	AM	19-10-98	T L	23-10-98	K.M	23-10-98
2 01	CR R98/279	MW	19-10-98	W P	19-10-98	K.M	19-10-98
2	4 CAPS ADDED	SJW	25-9-98	M.P	25-9-98	K.M	25-9-98
1.03	CR R98/193 & 245	SJW	23-9-98	M.P	23-9-98	K.M	23-9-98
1.02	CR R98/231 & 232	SJW	18-9-98	M.P	18-9-98	K.M	18-9-98
1.01	CR R98/220 & 226	SJW	16-9-98	M.P	16-9-98	K.M	16-9-98
1	MP1 RELEASE	SJW	09-9-98	M.P	09-9-98	K.M	09-9-98

NEC Technologies (UK) Ltd

Level 3, Imperium, Imperial Way, Reading, RG2 0TD

TITLE G4H PCB
NON FIT COMPONENTS M2
(FOR REFERENCE ONLY)

DRG.NO
147-279805-CM

SCALE NTS

SHT 4
OF 4

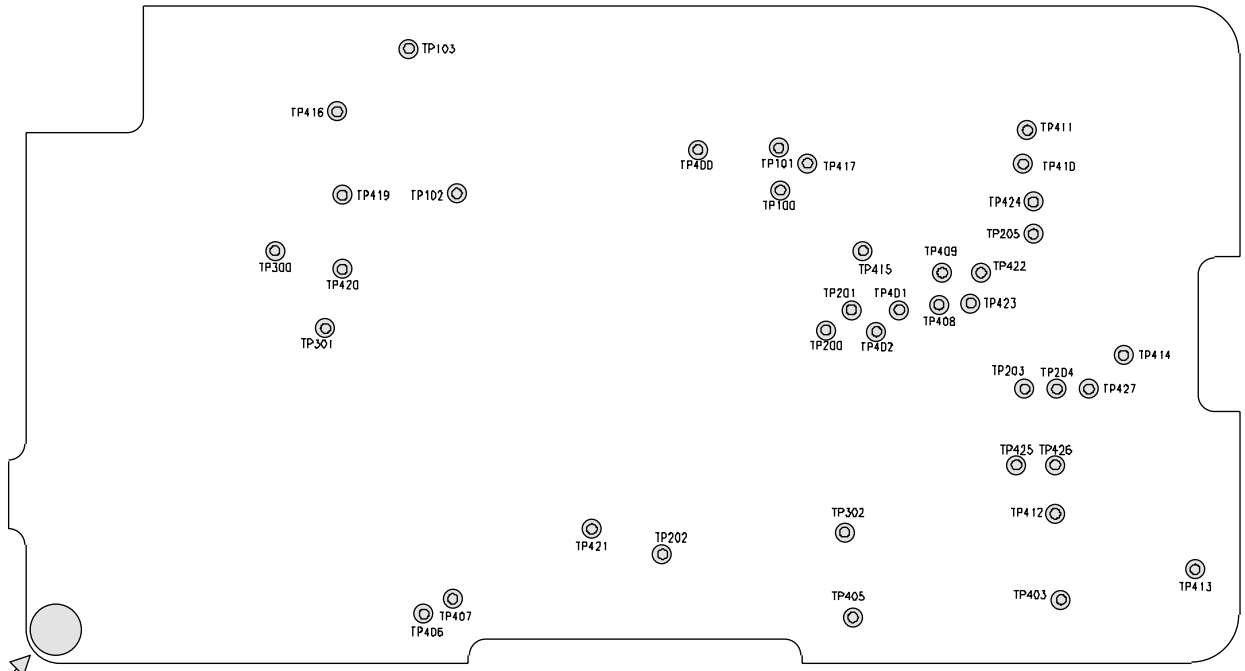
A3 (297×420)

REV. 1.1

NEC

USED ON:

147-279805-P0



TESTPOINT CO-ORDINATE ORIGIN
(CENTRE OF FIXING HOLE)

TP427	61.3	14 3
TP426	59.3	9.8
TP425	57.0	9.8
TP424	58.0	25.4
TP423	54.3	19.4
TP422	54.9	21.2
TP421	31.8	6.0
TP420	17.0	21 4
TP419	17.0	25.8
TP418	55.2	12 0
TP417	44.6	27.7
TP416	16.7	3D 75
TP415	47.9	22.5
TP414	63.35	16 3
TP413	67.6	3.6
TP412	59.3	6.9
TP411	57.65	29.65

TP410	57.4	27 65
TP409	52.6	21.2
TP408	52.4	19.3
TP407	23.55	1.85
TP406	21.85	0.95
TP405	47.3	0.75
TP404	46.8	5.8
TP403	59.65	1.8
TP402	48.7	17.7
TP401	50.05	19 0
TP400	38.1	28.5
TP301	16.0	17 9
TP300	13.0	22.5
TP205	58.0	23 5
TP204	59.4	14.3
TP203	57.5	14 3

2	4 CAPS ADDED	SJW	25-9-98	M.P	25-9-98	K M	25-9-98
1	MP1 RELEASE	SJW	09-9-98	M.P	09-9-98	K M	09-9-98
1	MP1 RESPIN	SJW	31-8-98				
H	MP1 DESIGN	SJW	28-8-98				
G	EP3 RESPIN	SJW	21-8-98				
F	EP3 BUILD	SJW	28-7-98				
E	EP2 RESPIN	SJW	6-7-98				
D	EP2 BUILD	SJW	29-5-98				
ISS	DETAILS	DRN	DATE	CHK	DATE	APP	DATE

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TITLE G4H PCB
TESTPOINT REF M1

DRG.NO
147-279805-TP

SCALE NTS

SHT 1
OF 1

A3 (297x420)

REV 1 1 NEC

Glossary of Terms

List of General Acronyms and Abbreviations

This section provides a list of acronyms and abbreviations used in this manual and generally in GSM.

A

A	Ampere
AC	Alternating Current
AD, A/D	Analogue to Digital Converter
ADJ	Adjust, Adjustment
AF	Audio Frequency
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
AGCH	Access Grant Channel
AH	Ampere Hour
AID	Area Identification Number
ALC	Automatic Level Control
ALM	Alarm
ALU	Arithmetic and Logic Unit
AM	Amplitude Modulation
AMP	Amplifier
ANT	Antenna
APQ	Automatic Repeat Request
ASCII	American Standard Code for Information Interchange
ASSY	Assembly
ATT	Attenuator, Attenuation
AUX	Auxiliary

B

b	Base terminal on a Transistor
B/S, b/s	Bits per Second
BATT	Battery
BB	Base Band
BCCH	Broadcast Control Channel
BCD	Binary Coded Decimal
BCH	Broadcast Channel
BER	Bit Error Rate
BIT	Binary Digit (1 or 0)
BNC	Type of connector
BPF	Band Pass Filter
BS	Base Station
BSC	Base Station Controller
BSS	Base Station System
BTS	Base Transceiver Station

C

c	Collector terminal on a Transistor
C	Capacitor, Centigrade
CAL	Calibrate, Calibration
CAP	Capacitor
CCCH	Common control Channel
CCITT	International Consultative Committee for Telegraphy and
Cd	Telephony
Ch	Cadmium
CHG	Channel
CLK	Charge
CLR	Clock
CMOS	Clear
CO-AX	Complimentary Metal Oxide Semiconductor
CODEC	Coaxial Cable
CON	Encoder and Decoder
CONT	Connector
CPU	Control, Controller
CRC	Central Processing Unit
CSP	Cyclic Redundancy Coding
	Conversion Signal Processor

D

DA, D/A	Digital to Analogue Converter
dB	Decibels
dBm	Decibels relative to 1mW
DC, dc	Direct Current
DEMOD	Demodulator
DET	Detector
DEV	Deviation
DG	Differential Gain
DISC	Discriminator
DIST	Distortion
DIV	Divide
DP	Differential Phase
DSP	Digital Signal Processor
DTMF	Dual Tone Multiple Frequency
DTX	Discontinuous Transmit
DUP	Duplex

E

e	Emitter Terminal of a Transistor
ECL	Emitter Coupled Logic
EIR	Equipment Identity Register
ENBL	Enable
EPROM	Erasable and Programmable Read Only Memory

E²PROM	Electrically Erasable and Programmable Read Only Memory
EXP	Expander
EXT	External, Extension

F

F	Farad
FACCH	Fast Associated Control Channel
FCH	Frequency Control Channel
FCN	Function
FDMA	Frequency Division Multiple access
FET	Field Effect Transistor
FIL	Filter
FM	Frequency Modulation
FREQ	Frequency
FSK	Frequency Shift Keying

G

GMSK	Gaussian Minimum Shift Keying
GND	Ground
GP	Guard Period
GSM	Global System for Mobile Communications

H

H	Height, Henry
HF	Hands Free, High Frequency
HHP	Hand Held Portable
HLR	Home Location Register
Hz	Hertz

I

I	In Phase signal
I/F	Interface
I/O	Input / Output
IC	Integrated circuit
ID	Identity
IF	Intermediate Frequency
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
INIT	Initialise
INT	Internal, Interrupt
ISDN	Integrated Services Digital Network

L

L	Length, Inductor
LCD	Liquid Crystal Display

LED	Light Emitting Diode
LNA	Low Noise Amplifier
LO	Local Oscillator
LSI	Large Scale Integrated Circuit

M

MAX	Maximum
MHz	Mega Hertz
MIC	Microphone
MID	Middle
MIN	Minimum
MIX	Mixer
MOD	Modulate, Modulator
MODEM	Modulator and Demodulator
MON	Monitor
MS	Mobile Station
MSC	Mobile switching centre
MSK	Minimum Shift Keying
MSS	Mobile Subscriber set
MUX	Multiplexer

N

NC	No Connection
NG	No Good
NiCd	Nickel Cadmium

O

Op Amp	Operational Amplifier
OPT	Option
OSC	Oscillate, Oscillator

P

PA	Power Amplifier
PCB	Printed Circuit Board
PCH	Paging Channel
PCM	Pulse Code Modulation
PCN	Personal Communication Network
PLL	Phase Locked Loop
PM	Phase Modulation
PROM	Programmable Read Only Memory
PS	Power Supply
PSK	Phase Shift Keying
PSTN	Public Switched Telephone Network
PWB	Printed Wiring Board
PWR	Power

Q

Q	Quadrature Phase Signal
QTY	Quantity
QPSK	Quadrature phase Shift Keying

R

R	Resistor
RACH	Random Access Channel
RAM	Random Access Memory
RCL	Recall
REC	Receiver, Earpiece
REF	Reference
RES	Resistor
RF	Radio Frequency
ROM	Read only Memory
RSSI	Receive Signal Strength Indication
RST	Reset
RX	Receive, Receiver
RXAF	Receive Audio Frequency
RXLev	RX level (as defined in GSM specifications)
RXQual	RX Quality (as defined in GSM specifications)

S

S/N	Signal to Noise Ratio
SACCH	Slow Associated Control Channel
SAW	Surface Acoustic Wave
SCH	Synchronisation Channel
SCL	Serial Clock
SDA	Serial Data
SDCCH	Stand Alone Dedicated Control Channel
SENS	Sensitivity
SERCK	Serial Clock
SERDA	Serial Data
SERLT	Serial Latch
SIG	Signal
SIM	Subscriber Identity Module
SPK	Speaker, Sounder, Horn
STD	Standard
STO	Store
SYNC	Synchronise, Synchronisation
SYNTH	Synthesiser

T

TB	Tail bits
TCH	Traffic Channel

TCXO	Temperature Controlled Oscillator
TDMA	Time Division Multiple Access
TE	Test Equipment
TEMP	Temperature
TNC	A type of connector
TP	Test Point
TR	Transistor
TRX	Transmitter and Receiver
TX	Transmit, Transmitter
TXAF	Transmit Audio Frequency

U

m	Micro
mF	Micro Farad
UHF	Ultra High Frequency
mP	Microprocessor

V

V	Volts
VCO	Voltage Controlled Oscillator
VLR	Visitor Location Register
VOL	Volume

W

W	Watts, Width

X

XTAL	Crystal
XTL	Crystal

Symbols

<	Less than
>	Greater than
#	Pin number/number

Points of Contact for further Information.

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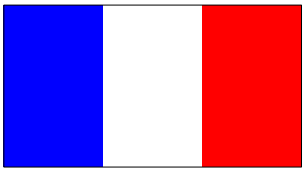

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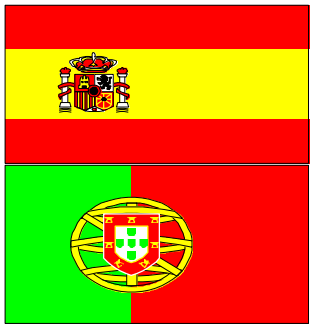

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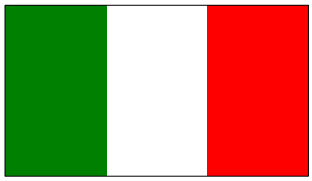

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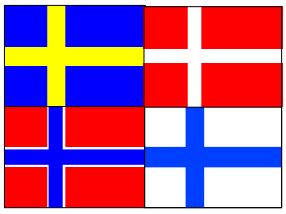

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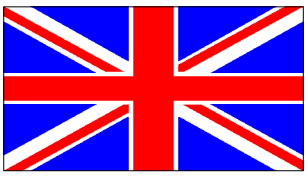

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DB2000 Service Manual Guide.

All sections of the service manual can be accessed from the keypad of the DB2000 on this page of the manual. For instance, clicking the number ‘3’ on the keypad will take you to section 3 of the manual. Moving the mouse over each of the numeric keys will show the title of the related section on the DB2000 display.

Navigating the manual from the keypad in this manner will result in each of the sections being presented in the form of an article which can be scrolled through by placing the hand tool within the article and clicking the left mouse button.

If you do not wish to read the section in the article format selecting the page button from the Acrobat Reader Toolbar will display the whole page. Scrolling through the pages can be achieved by using the toolbar or by using the buttons on each of the pages in the manual. The ‘bullet’ button (in between the page up and page down buttons) returns you to the beginning of the particular section that you are in at the time.

Alternatively the manual can be read by using the bookmarks to select the various section and subsection headings. See the Acrobat Reader Help for more information on displaying and using bookmarks.

The first page of each section also contains links to the next section, from the previous section and back to the main menu (the first page) as well as page up and page down buttons.

The manual also contains many links which will become apparent when moving the mouse around a page of the document (The hand tool will change to a pointer when the mouse moves over a link).

Most of the links can be found in the schematic diagrams, where they have been used to inter-link signals between various parts or pages of the circuit diagram. In most cases this will result in a magnified view with the required signal in the centre of the screen.

To zoom in to parts of the manual (most useful for drawings and circuit diagrams) select the magnifier tool from the Acrobat Reader toolbar.

Exit

DB2000 Service Manual - MRDCS-1011
Revision 1.1 - 27th January 1999
NEC Technologies (UK) Ltd.

Exit