

AKAI

SERVICE MANUAL

Model:

LCT2716

Safety Instructions
Production specification.
Block Diagram
Circuit Diagram
Disassembly
Pin Descriptions
LCD Panel specification
Exploded View Diagram
Spare parts list
V-chip password and software upgrade

This manual is the latest at the time of printing, and does not include the modification which may be made after the printing, by the constant improvement of product.

I. Safety Instructions



CAUTION

**RISK OF ELECTRIC SHOCK
DO NOT OPEN**



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.



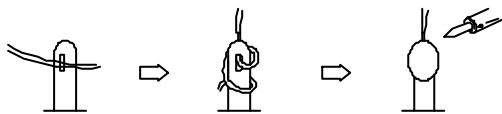
The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

PRECAUTIONS DURING SERVICING

1. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation. These must also be replaced only with specified replacements. Examples: RF converters, tuner units, antenna selection switches, RF cables, noise-blocking capacitors, noise-blocking filters, etc.
2. Use specified internal Wiring. Note especially:
 - 1) Wires covered with PVC tubing
 - 2) Double insulated wires
 - 3) High voltage leads
3. Use specified insulating materials for hazardous live parts. Note especially:
 - 1) Insulating Tape
 - 2) PVC tubing
 - 3) Spacers (insulating barriers)
 - 4) Insulating sheets for transistors
 - 5) Plastic screws for fixing micro switches
4. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.



5. Make sure that wires do not contact heat generating parts (heat sinks, oxide metal film resistors, fusible resistors, etc.)
6. Check if replaced wires do not contact sharply edged or pointed parts.
7. Make sure that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

MAKE YOUR CONTRIBUTION TO PROTECT THE ENVIRONMENT

Used batteries with the ISO symbol for recycling as well as small accumulators (rechargeable batteries), mini-batteries (cells) and starter batteries should not be thrown into the garbage can. Please leave them at an appropriate depot.



WARNING:

Before servicing this TV receiver, read the X-RAY RADIATION PRECAUTION, SAFETY INSTRUCTION and PRODUCT SAFETY NOTICE.

X-RAY RADIATION PRECAUTION

1. Excessively high can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The normal value of the high voltage of this TV receiver is 27 KV at zero beam current (minimum brightness). The high voltage must not exceed 30 KV under any circumstances. Each time when a receiver requires servicing, the high voltage should be checked. The reading of the high voltage is recommended to be recorded as a part of the service record. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-RAY RADIATION in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type as specified in the parts list.
3. Some parts in this TV receiver have special safety related characteristics for X-RADIATION protection. For continued safety, the parts replacement should be under taken only after referring the PRODUCT SAFETY NOTICE.

SAFETY INSTRUCTION

The service should not be attempted by anyone unfamiliar with the necessary instructions on this TV receiver. The following are the necessary instructions to be observed before servicing.

1. An isolation transformer should be connected in the power line between the receiver and the AC line when a service is performed on the primary of the converter transformer of the set.
2. Comply with all caution and safety related provided on the back of the cabinet, inside the cabinet, on the chassis or picture tube.
3. To avoid a shock hazard, always discharge the picture tube's anode to the chassis ground before removing the anode cap.

4. Completely discharge the high potential voltage of the picture tube before handling. The picture tube is a vacuum and if broken, the glass will explode.
5. When replacing a MAIN PCB in the cabinet, always be certain that all protective are installed properly such as control knobs, adjustment covers or shields, barriers, isolation resistor networks etc.
6. When servicing is required, observe the original lead dressing. Extra precaution should be given to assure correct lead dressing in the high voltage area.
7. Keep wires away from high voltage or high temperature components.
8. Before returning the set to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as antennas, terminals, screwheads, metal overlay, control shafts, etc., to be sure the set is safe to operate without danger of electrical shock. Plug the AC line cord directly to the AC outlet (do not use a line isolation transformer during this check). Use an AC voltmeter having 5K ohms volt sensitivity or more in the following manner.

Connect a 1.5K ohm 10 watt resistor paralleled by a 0.15 μ F AC type capacitor, between a good earth ground (water pipe, conductor etc.,) and the exposed metallic parts, one at a time.

Measure the AC voltage across the combination of the 1.5K ohm resistor and 0.15 μ F capacitor. Reverse the AC plug at the AC outlet and repeat the AC voltage measurements for each exposed metallic part.

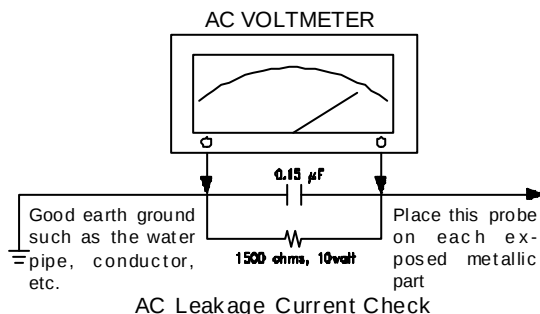
The measured voltage must not exceed 0.3V RMS.

This corresponds to 0.5mA AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.

The resistance measurement should be done between accessible exposed metal parts and power cord plug prongs with the power switch "ON". The resistance should be more than 6M ohms.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this TV receiver have special safety-related characteristics. These characteristics are offer passed unnoticed by visual spection and the protection afforded by them cannot necessarily be obtained by using replacement components rates for a higher voltage, wattage, etc. The replacement parts which have these special safety characteristics are identified by $\triangle$ marks on the schematic diagram and on the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire, X-RAY RADIATION or other hazards.



KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE

Product Specification

Reference No. : LC27HAB002
Revision : 0
Date : 2005.08.10
Page : P.1 of 8

Model No. : LC27HAB
Customer Model No. : LCT2716
Design Code : LC26HABCUSXM1-A02

BOM No. : LC26HABCUSXM1-A02

Artwork Ass'y No. : 797-L26AB01-01

Description : AKAL LCD TV 26" NTSC AC100V-240 V AC USA

Checked By: **Electronic Engineer** _____

Mechanical Engineer _____

Approved By: **Engineering Manager** _____

Approved By: **PM Department Head** _____

DOC Rev NO.	The Latest Revision Details	DATE
0	Initial Release	

KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE

Reference No : LC27HAB002
Revision : 0
Date : 2005.8.10
Page : P. 2 of 8

General Description

1. Main features	
Production Description	AKAL LCD TV 27" NTSC AC100V-240VAC USA
Panel Supplier and Model	CHIMEI V270W1-L03
Chips Solution	MK8205
Market	USA
1.1 VIDEO SECTION	
Display size	27"/16:9
Display Resolution	1280×720
Pixel Pitch	0.1555mm×0.4665mm
Peak Brightness	550(nits)
Contract Ratio	600:1, Typical (1/100 White Window, Dark Room)
View Angle	Hor. And Vert. ≥170 degree
Color Deeps	16.7M Color
PC Resolution Supporting	VGA, SVGA, XGA, WXGA
HDTV Compatible	480p, 576P, 720p, 1080i
Progressive Scanning	Yes
Film Mode Pull Down	Yes
"GAMMA" Correction	Yes
Color Temperature Control	Yes
Comb Filter	Yes
Second De-interlace for Sub picture	No
Wide Mode	Full, Fill Aspect Ratio, Nonliner, LB to 16:9, LB subtitles to 16:9 or Anamorphic
TV System	NTSC M
Dual Tuner System	No
AV Input Color System	PAL /NTSC
PIP	Basic mode (video on graphic mode, resolution ≥1024×768)
1.2 AUDIO SECTION	
Audio Output Power	6W×2 Max.(8 ohm)
Sound Effect	NO
Tone Control	Yes
1.3 Input Terminals	Analog-RGB Input (D-Sub 15 Pin Type) ×1 D-Sub 9 Pin (RS-233 Input) ×1 Antenna Input (F Type) ×1 S-Video Input (Mini Din 4Pin) ×1 CVBS Input (RCA Type) ×1 Y / Pb / Pr, Y / Cb / Cr (RCA Type) ×2 Stereo Audio Input (RCA Type) ×3 (3.5mm Phone Type) ×1
1.4 Output Terminals	Audio Output (RCA Type) ×1
1.5 Others	
Closed Caption / V-Chip	Yes
Teletext	No
OSD Language	English, Français, Español

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Stereo Decode	MTS with SAP
Power Rating	AC 100-240V, 50/60Hz
Power Consumption	200W

1.6 Support the Signal Mode

This machine can support the different from VGA signal mode in 19 kinds

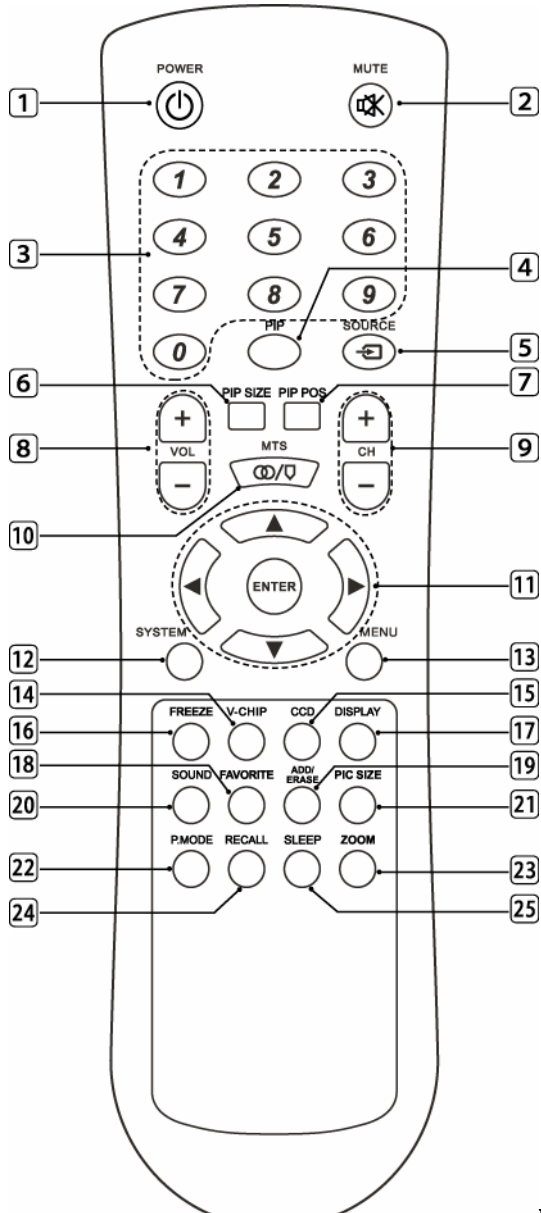
No	Resolution	Horizontal Frequency(Hz)	Vertical Frequency(KHz)	Dot Clock Frequency(MHz)
1)	640×480	31.50	60.00	25.18
2)	640×480	35.00	67.00	30.24
3)	640×480	37.50	75.00	31.50
4)	640×480	37.86	72.81	31.50
5)	720×400	31.47	70.08	36.00
6)	800×600	35.16	56.25	36.00
7)	800×600	37.90	60.32	40.00
8)	800×600	46.90	75.00	49.50
9)	800×600	48.08	72.19	50.00
10)	832×624	49.00	75.00	57.27
11)	1024×768	48.40	60.00	65.00
12)	1024×768	56.50	70.00	75.00
13)	1024×768	60.00	75.00	78.75
14)	1152×864	63.86	70.02	94.51
15)	1152×864	67.52	75.02	108.03
16)	1280×960	60.02	60.02	108.04
17)	1280×1024	64.00	60.01	108.00

1.7 HDTV Mode (YPbPr)

No	Resolution	Horizontal Frequency(KHz)	Vertical Frequency(Hz)	Dot Clock Frequency(MHz)
1)	480i	15.734	59.94	13.50
2)	480p(720×480)	31.468	59.94	27.00
3)	576p(720×576)	31.25	50.00	27.00
4)	720p(1280×720)	37.50	50.00	74.25
5)	720p(1280×720)	45.00	60.00	74.25
6)	1080i(1920×1080)	33.75	60.00	74.25

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2. LCD local control button	Main power : push switch Channel +/- volume up/down menu input. standby : soft touch
3. Led indicators :	Power on: Green Standby: Red
4. OSD language	English, Français, Español
5. OSD	Full on screen display
6. Remote control unit Customer Remote Code: 609F(NEC)	 1 POWER button 2 MUTE button 3 0-9 DIGITAL button 4 PIP button 5 SOURCE button 6 PIP SIZE button 7 PIP POS button 8 VOL +/- button 9 CH +/- button 10 MTS button 11 UP/DOWN,LEFT/RIGHT ENTER buttons 12 SYSTEM button 13 MENU button 14 V-CHIP button 15 CCD button 16 FREEZE button 17 DISPLAY buttons 18 FAVORITE button 19 ADD/ERASE buttons 20 SOUND button 21 PIC SIZE button 22 P.MODE button 23 ZOOM button 24 RECALL button 25 SLEEP button E7501-051001
7. Safety standard	UL/CSA/cUL
8. EMC standard	15 Parts of the FCC rules,CLASS B
9. Performance standard	LCD-TV Standard
10. Accessories	Battery 2pcs User Manual 1pcs AC Cable 1pcs Remote Control 1pcs The Accessories box 1pcs

KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE

Reference No : LC27HAB002
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Technical Data

1. Chassis		MICO
2. Power supply	TV	AC 100-240 V, 50/60Hz
	Remote controller	Battery 3V (UM-4/R03/AAA×2)
3. TV system	RF input	NTSC M
	Video input	PAL/NTSC 3.58/NTSC 4.43
4. Receiving channels	TV	VHF-L : 2~6CH VHF-H : 7~13CH UHF : 14~69CH
	CATV	1~125CH
5. Intermediate frequencies	Picture	45.75MHz
6. Scanning	Horizontal (Hz)	15625/15750
	Vertical (Hz)	50/60
7. AC plug		UL Plug
8. Panel		V270W1-L03
9. Speaker	Internal	8 ohm 10W (max) ×2
10. Operating temperature	Fulfill all specifications	15°C ~ 30°C
	Accept picture/sound reproduction	5°C ~ 33°C
11. Operating relative humidity	Fulfill all specifications	45% ~ 75%
	Accept picture/sound reproduction	20% ~ 80%
12. Electrical & optical specification		See the attachment 1.
13. Circuit diagram drawing No.		LC26HAB
15. Cabinet		
16. Cabinet color		
17. Packing		1 set per
18. Container stuffing method		RD/05/P/LC26HAB/CSI/02 REV: 01
19. Dimension (mm) (No packing)	LCD-TV	883(W) × 468(H) × 110(D)mm (w/o Stand)
		883(W) × 532(H) × 250(D)mm (with Stand)
	Remote control unit	183(L) × 53(W) × 28(T)mm
20. Net weight	LCD-TV	14.1Kg (with Stand) approx.
	Remote controller	70g (approx.)
21. Cell Defect		Subject to Panel supplier specification

KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE

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Attachment 1: Electrical & Optical Specification

No.	Items		Instruction		Typical	Limit	Unit
1	Video sensitivity		For 30dB S/N		44	≤ 51	dBuV
2	FM sound sensitivity		For 30dB S/N		21	≤ 35	dBuV
3	Color sensitivity		For RF transmission		37	≤ 40	dBuV
4	CCD sensitivity		TV screen refreshes 40 times number of mistakes ≤ 8		43	≤ 50	dBuV
5	Minimum NICAM threshold		Without crackline noise		N/A	N/A	dBuV
6	Stereo Channel Separation		BTSC.		18	≥ 15	dB
7	AGC static characteristic		Accept. Picture/Sound repr.		90	≥ 90	dBuV
8	Selectivity		Adjacent sound carrier		30	≥ 28	dB
			Below adjacent sound carrier		30	≥ 30	
			Adjacent picture carrier		45	≥ 40	
			Up adjacent picture carrier		40	≥ 30	
9	IF rejection				55	≥ 45	dB
10	Image rejection		VHF		57	≥ 45	dB
			UHF		55	≥ 40	
11	AFT pull-in range				± 1.0	$\geq \pm 1.0 $	MHz
12	Chroma sync pull-in range				± 500	$\geq \pm 200 $	Hz
13	Color killer function				-11	≤ -10	dB
14	Resolution	RF	Horizontal	PAL	300	≥ 300	Lines
				NTSC	260	≥ 240	Lines
			Vertical	PAL	410	≥ 400	Lines
				NTSC	320	≥ 300	Lines
		Video	Horizontal		450	≥ 450	Lines
			Vertical		400	≥ 400	Lines

15	Color Coordination	White	Xw	Full Pattern	0.295	0.295±0.02	
			Yw		0.300	0.300±0.02	
16	View Angle(Lo/3)	Horizontal			170	≥170	Degree
		Vertical					
17	Overscan			Cross hatch signal	96	94~98	%
18	Picture position			In all direction	±2	≤ ±3	mm
19	H sync pull-in range				±400	≥ ±200	Hz
20	V sync pull-in range				6	≥6	Hz
21	Audio frequency response			±3dB ref. to 1KHz	0.15~12	0.2~12	KHz

KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE

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22	Max Audio Output Power		7×2	≥5.0×2	W
23	Audio output power 10% THD	1KHz 10% THD	6×2	≥4.0×2	W
24	THD	Po=0.5W	0.5	≤3	%
25	Signal to buzz ratio	coeighting	50	≥30	dB
26	Minimum volume hum	coeighting	6	≤10	mVrms
27	Maximum woofer output power		N/A	N/A	W
28	Woofer audio frequency response	±3dB ref. to 15Hz AV mode	N/A	N/A	Hz
29	Tone low frequency	100Hz ref. to 1KHz AV mode	±8	≥ ±3	dB
30	Tone high frequency	10KHz ref. to 1KHz AV mode	±8	≥ ±3	dB
31	Balance	Center	0	≤ ±2	dB
		Max.	3	>2	
		Min.	-35	≤-30	

32	Video input level			1.0	1±0.3	Vpp
33	Audio input level*（1）			1.0 *	0.5±0.3	Vrms
34	Video output level			N/A	N/A	Vrms
35	Audio output level*（2）			0.3 *	0.5±0.3	Vrms
36	AV Audio input max. level			2	≤2	Vrms dB
37	AV Audio output L/R Separation			35	≥30	
38	Power consumption		Operating	200	≤200	W
			Stand by	3	≤5	W
39	IR receiving distance		0 Degree	7	≥6	m
40	IR receiving angle	left/right	5m	60	≥45	Degree
		Up/down		20	≥15	Degree
41	Dielectric strength		DC 3KV 1min.	5	≤10	mArms
42	The vibration noise from electromagnetic devices in LCD-TV set		The distance between the tester and the LCD-TV set is four times as many as the screen height	No obvious vibration noise can be heard		

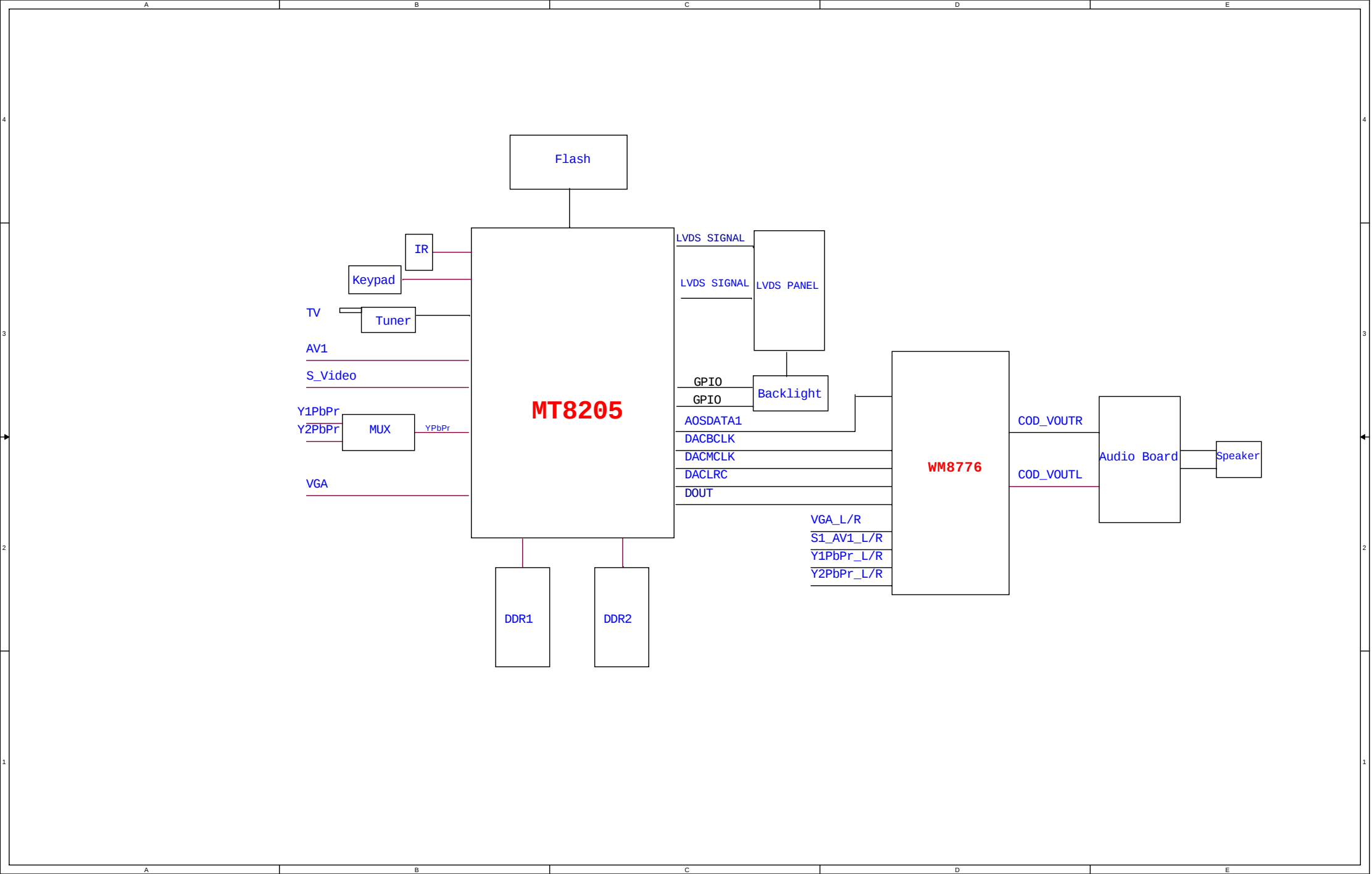
KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE

Reference No : LC27HAB002
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Test Condition

All tests shall be performed under the following conditions unless otherwise specified

1	Picture Modulation	87.5%
2	Sound Modulation	27KHz Dev. For DK/I/BG 15KHz Dev. For M/N
3	Picture to Sound Ratio	10dB
4	Sound Artificial Load Resistor	8 ohm
5	Video signal	Stair and Special
6	Audio signal	1KHz sine wave 0.5Vrms
7	Other conditions: A. Switch LCD-TV on and let it warm up for more than 30 minutes. Viewing distance: 3H (H: Panel High) in front of LCD, about 2M. Ambient light: $\leq 0.1 \text{ cd/m}^2$ B. Brightness, Contrast, Saturation, Tint, sharpness set at normal. C. Connect RMS volt meter to speaker terminals and adjust the LCD volume to get 500mW RMS power at each terminals. D. With image sticking protection of LCD module. The luminance will descend by time on a same still screen and rapidly go down in 5 minutes, when measuring the color tracking and luminance of a same still screen, be sure to accomplish the measurement in one minute to ensure its accuracy. E. Due to the structure of LCD module. The extra-high-bright same screen should not hold over 5 minutes for fear of branding on the panel. F. RF test point: Video output.	
8	Note: *(1) Now this project cannot fit the limited spec. the typical audio input level is 1.0 Vrms, *(2) The audio out level is controlled by the volume level, the range is from 0 to 0.5Vrms.	

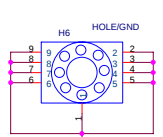
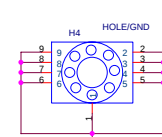
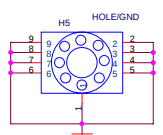
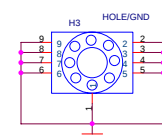
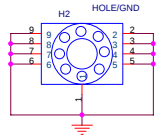
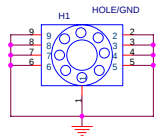


MT8205P1V3.2

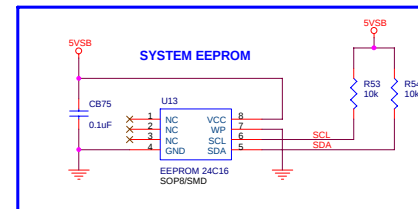
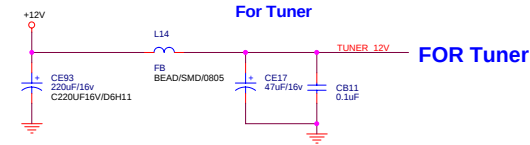
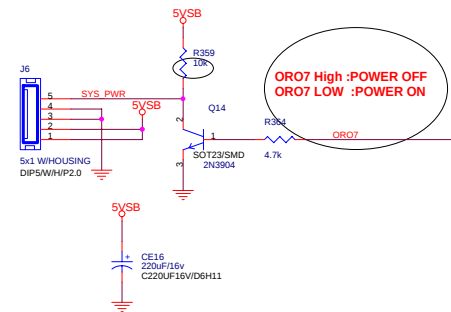
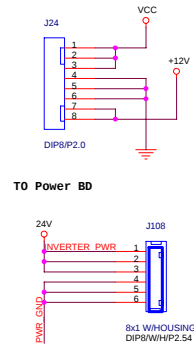
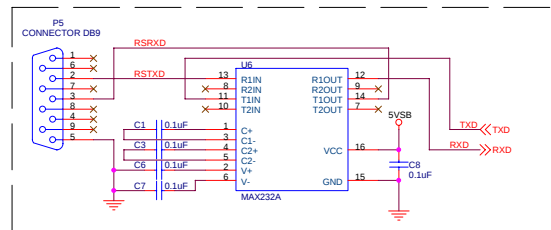
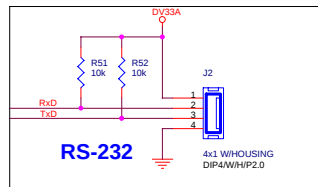
MT8205E (PBGA388) LCDTV BOARD 4 LAYERS

1. INDEX
2. LDO
3. MT8205E PBGA388
4. MT8205 ANALOG DECOUPLING
5. MT8205 DIGITAL DECOUPLING
6. ICE I/F
7. DDR MEMORY & FLASH
8. DVI INPUT
9. AD9883
10. VGA IN & PC AUDIO IN
11. VIDEO IN & TUNER I/O
12. AUDIO / VIDEO IN CIRCUIT
13. WM8776 AUDIO CODEC
14. LVDS / CRT / TTL OUT
15. BACK LIGHT / KEYPAD
16. READER CARD I/F

UP3_0 BLACKLIGHT ON/OFF
MUTE<-->UP1_5



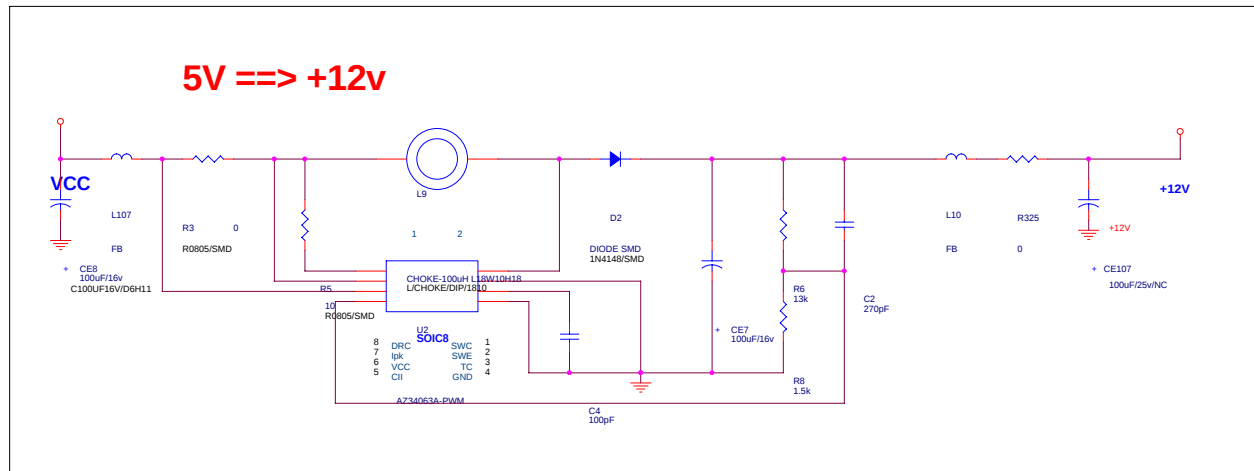
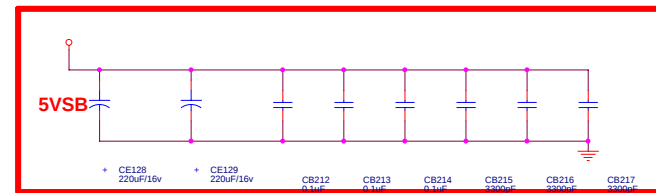
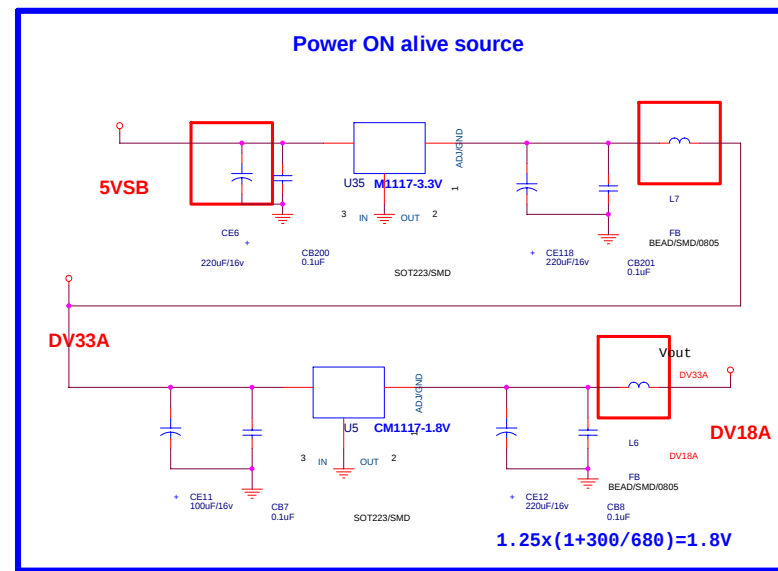
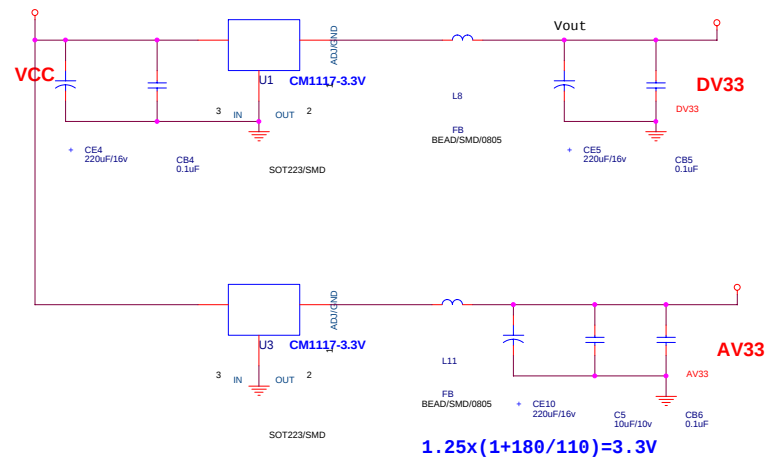
AUDIO INOUT GND ANALOG INPUT GND DIGITAL GND



Rev	History	P#	Date
V0.1	1.FIRST VERSION		2004/11/29
V0.2	1. 2.5V use 5VSB conversion. All 0402 change to 0603 2. LED_RED/GRN CIRCUIT CHANGE 3. Change Power on/off circuit(ORO7 CTRL PIN) 4. WM8776 DVDD Needed 5. Del the Si9936 LVDS Parts 6. Del DVI&AD9883 PARTS		2005/03/09

TXD	TXD	3
RXD	RXD	3
SCL	SCL	6.9.11.13
SDA	SDA	6.9.11.13
+12V	+12V	2
TUNER_12V	TUNER_12V	11
ORO7	ORO7	3
MUTE	UP1_5	6

Title			
LCD TV - MediaTek MT8205 Solution			
Size	Doc Number	Rev	
C	INDEX	V0.1	
Date:	Tuesday, May 10, 2005	Sheet	1 of 16



XTALI XTALI 4
XTALO XTALO 4

ANALOGVDD ANALOGVDD 4
ADCVDD ADCVDD 4

APLLVDD APLLVD 4
VPLLVD VPLLVD 4

ADCLLVDD1 ADCLLVDD1 4
ADCLLVDD ADCLLVDD 4

AUXTOP AUXTOP 4
AUXBOTTOM AUXBOTTOM 4

REXTA REXTA 4
APLL_CAP APLL_CAP 4

PWMZVREF PWMZVREF 4
ADCVDD0 ADCVDD0 4

AVCM AVCM 4
VOCM VOCM 4
VICM VICM 4

VREFP4 VREFP4 4
VREFN4 VREFN4 4

DACFS DACFS 4
DACVREF DACVREF 4
DACVDD DACVDD 4

LVDDA LVDDA 4
GND GND

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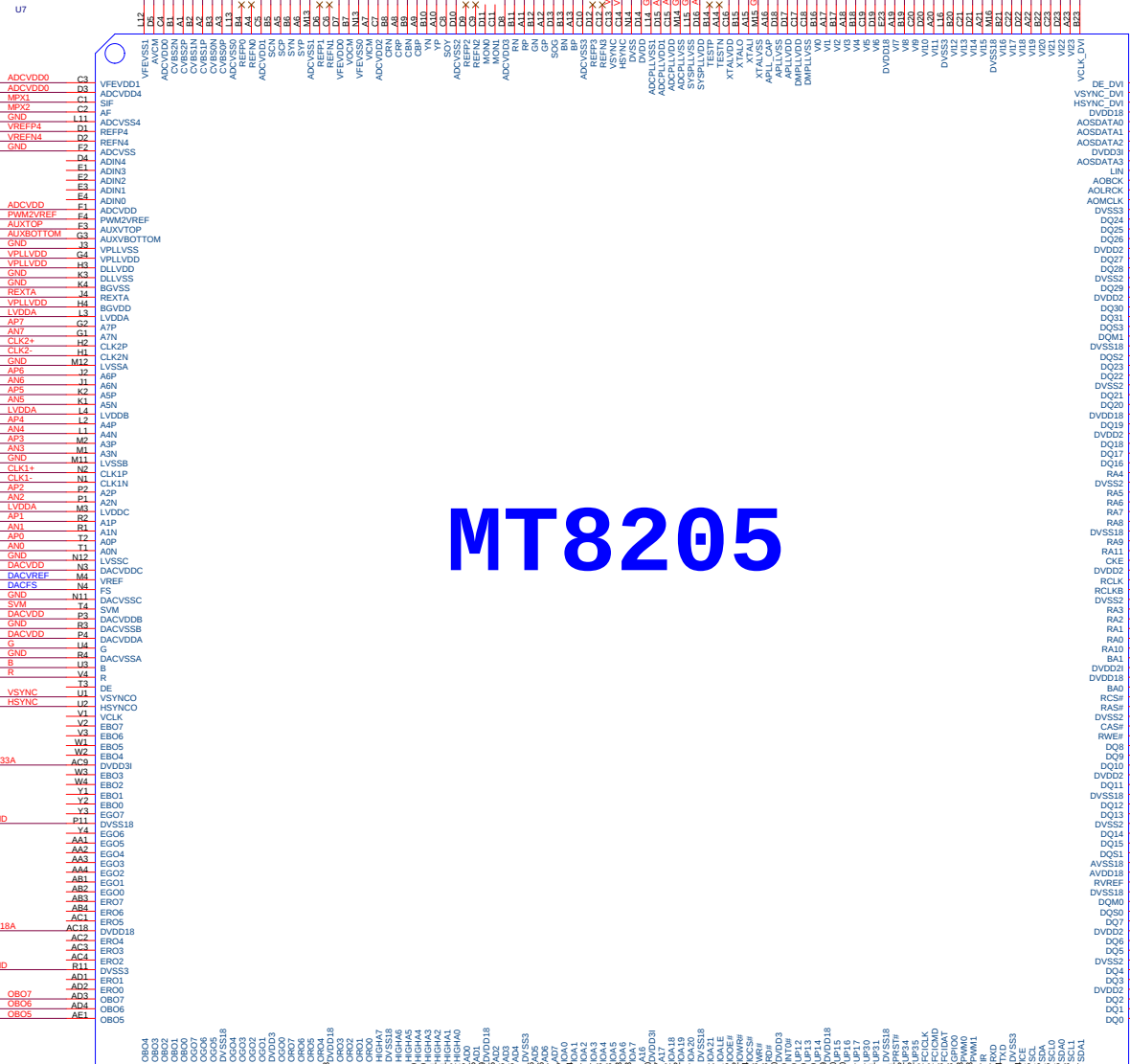
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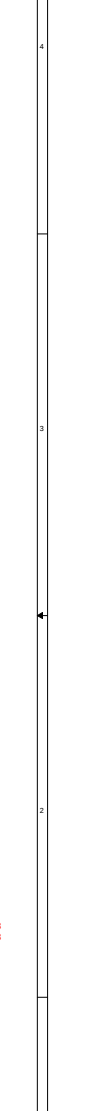
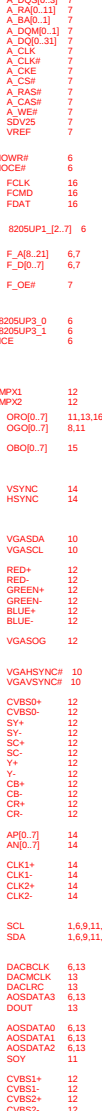
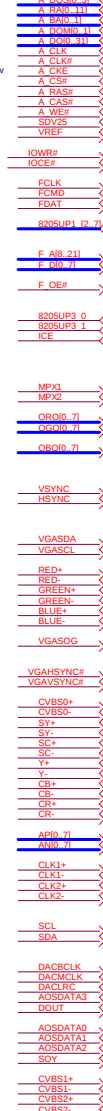
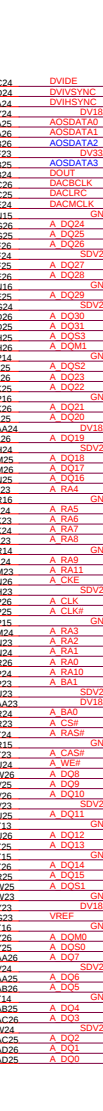
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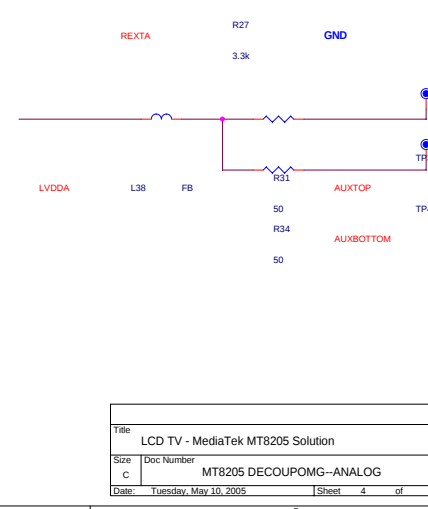
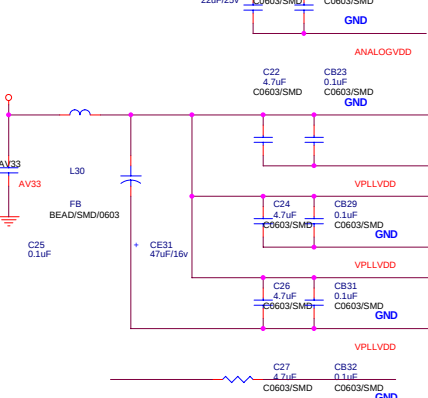
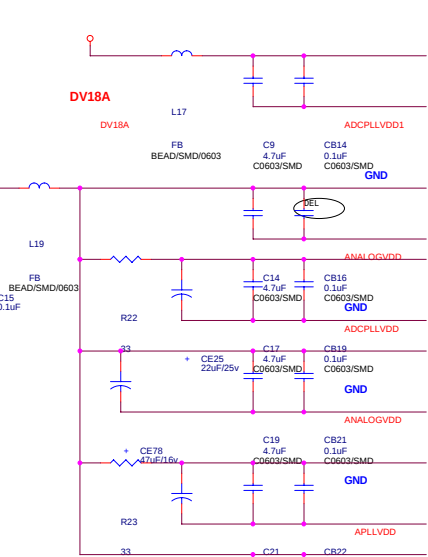
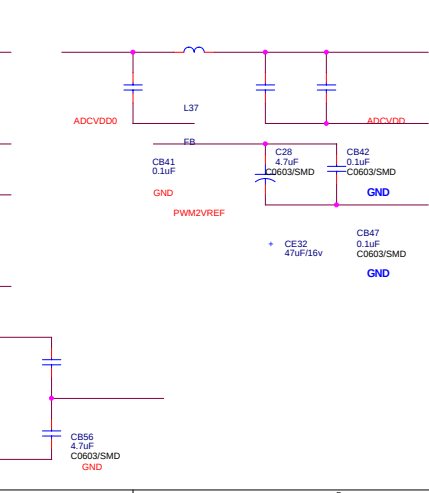
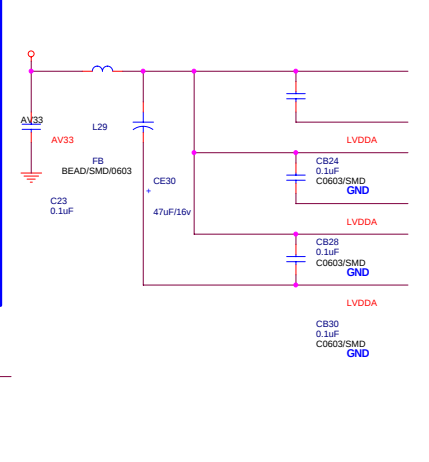
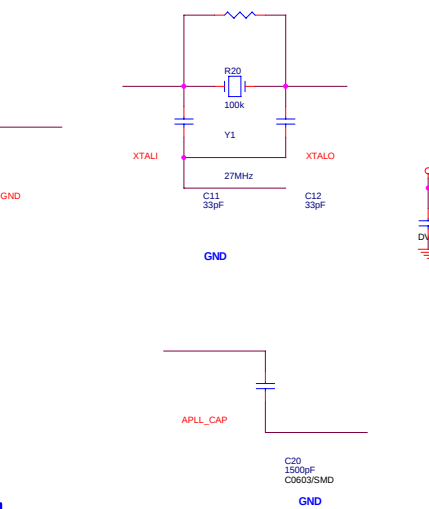
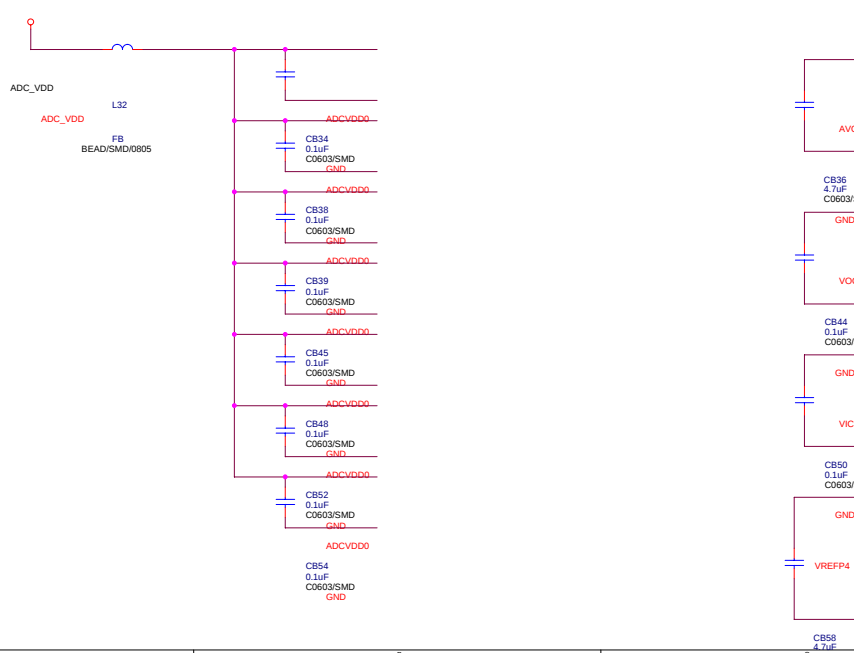
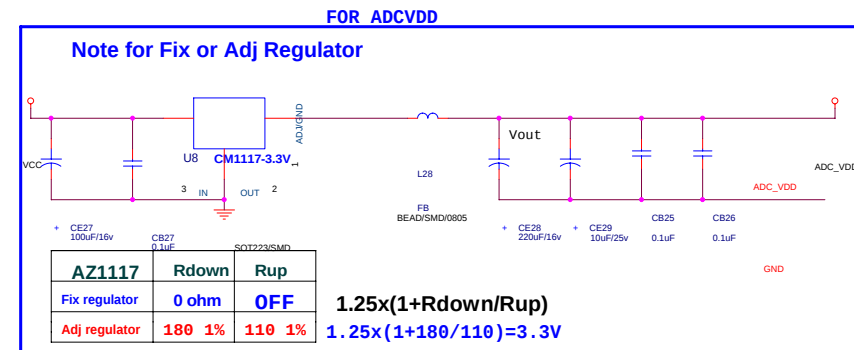
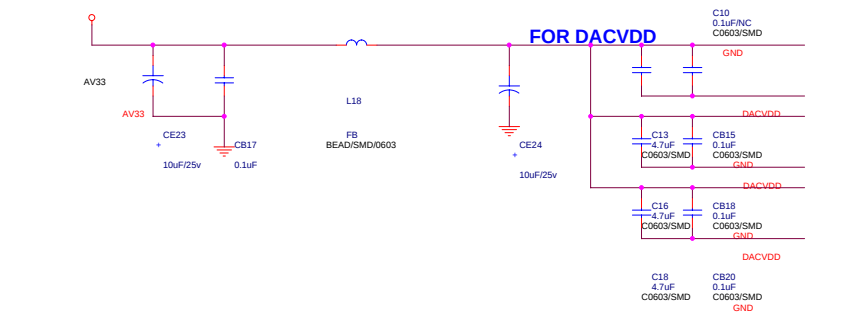
MT8205



Title			
LCD TV - MediaTek MT8205 Solution			
Size	Doc Number	Rev	
C	MT5205BGA388	V0.1	
Date:	Tuesday, May 10, 2005	Sheet	3 of 16

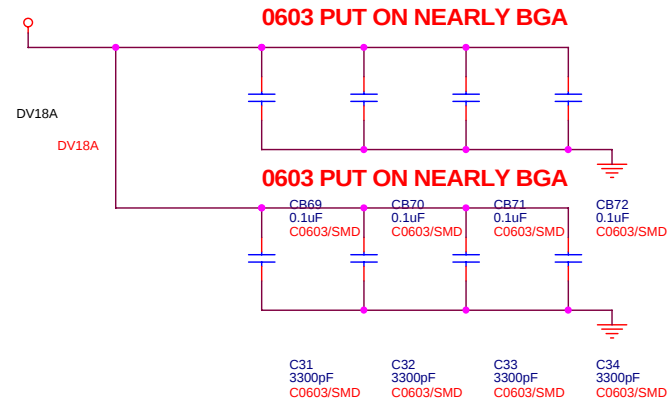
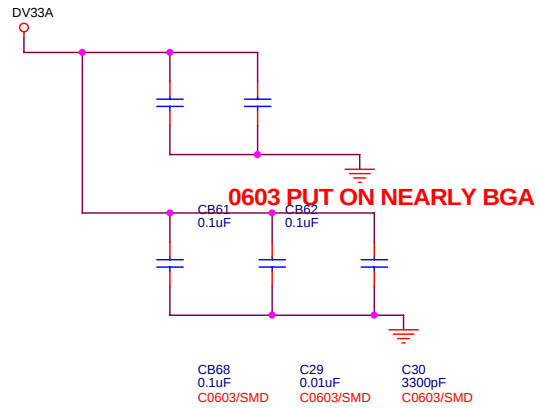
MT8205 ANALOG DECOUPLING

- DACVREF 3
- DACFS 3
- ADCPDLLVD1 3
- ADCPDLLVD 3
- APLLVD 3
- ANALOGVDD 3
- VPLLVD 3
- LVDDA 3
- ADCVDD 3
- DACVDD 3
- AVCM 3
- VOCM 3
- VICM 3
- VREFP4 3
- VREFN4 3
- ADCVD0 3
- PWM2VREF 3
- AUXTOP 3
- AUXBOTTOM 3
- REXTA 3
- APLL_CAP 3
- XTALI 3
- XTALO 3

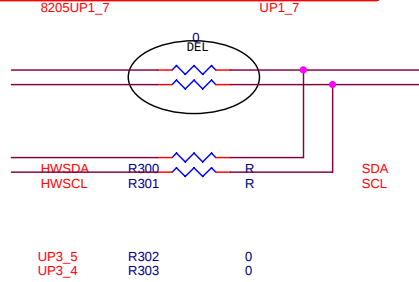
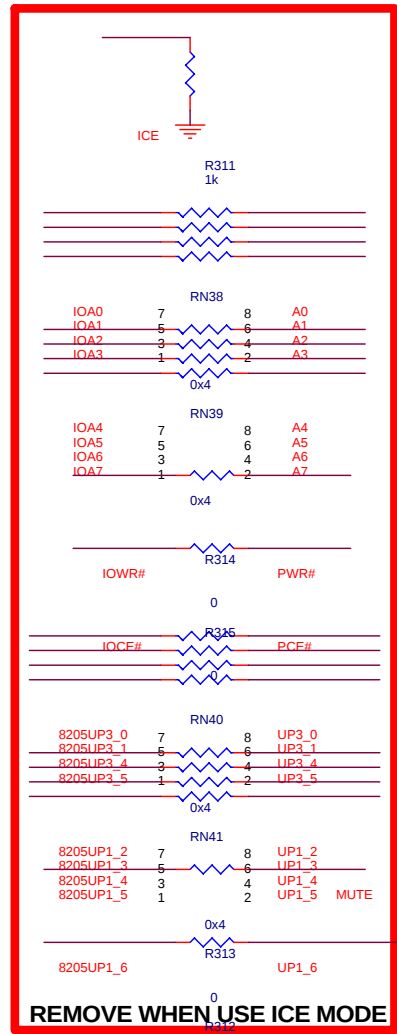
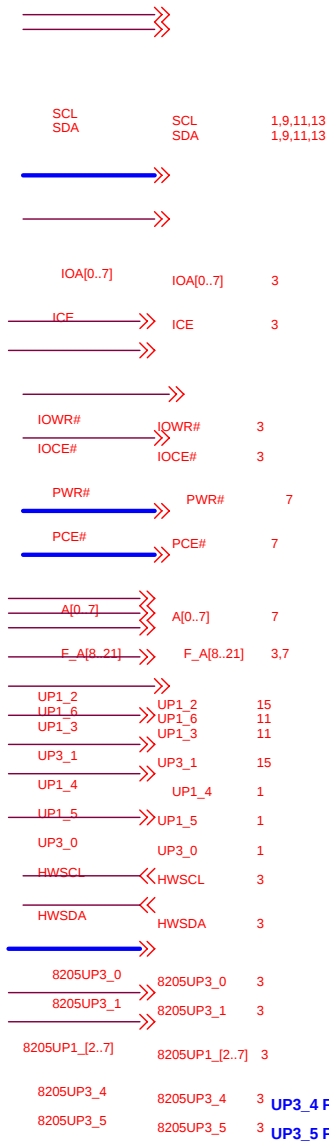


Title			
LCD TV - MediaTek MT8205 Solution			
Size	Doc Number	Rev	
C	MT8205 DECOUPOMG--ANALOG	V0.1	
Date	Tuesday, May 10, 2005	Sheet	4 of 16

MT8205 DIGITAL POWER & DECOUPLING



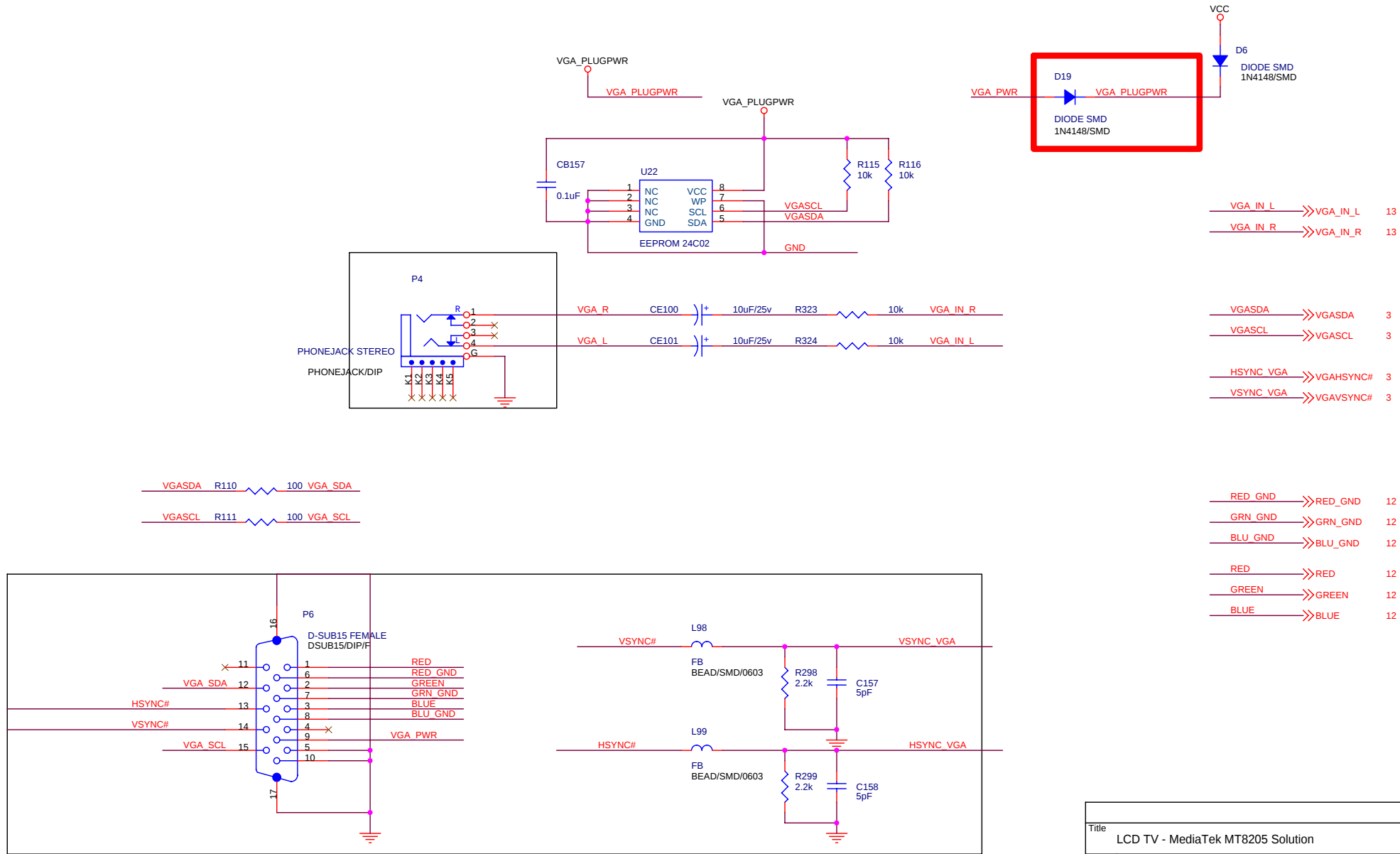
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LCD TV - MediaTek MT8205 Solution		
Size B	Doc Number MT8205 DECOUPOMG--DIGITAL	Rev V0.1
Date: Tuesday, May 10, 2005	Sheet 5 of	16



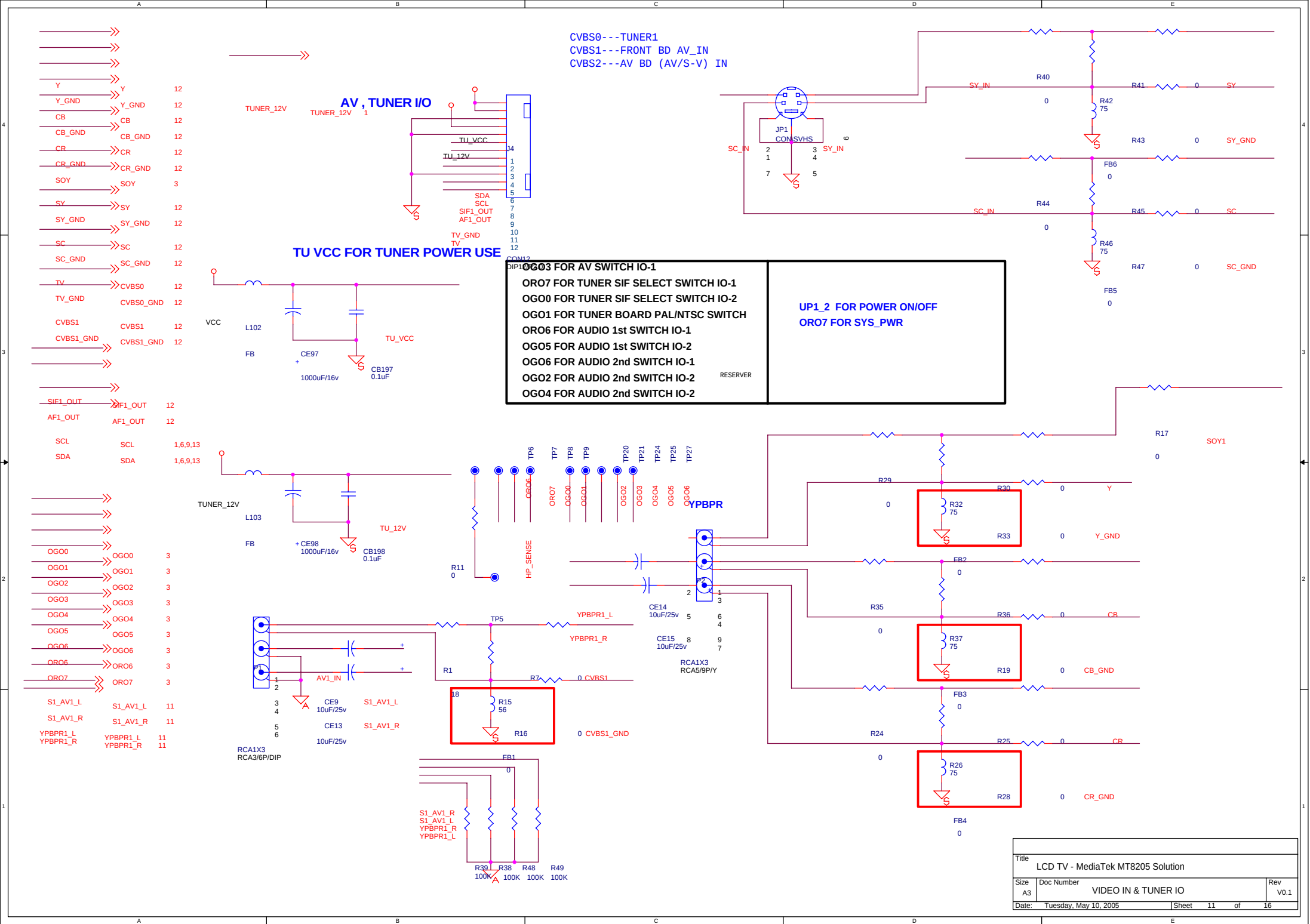
TP28

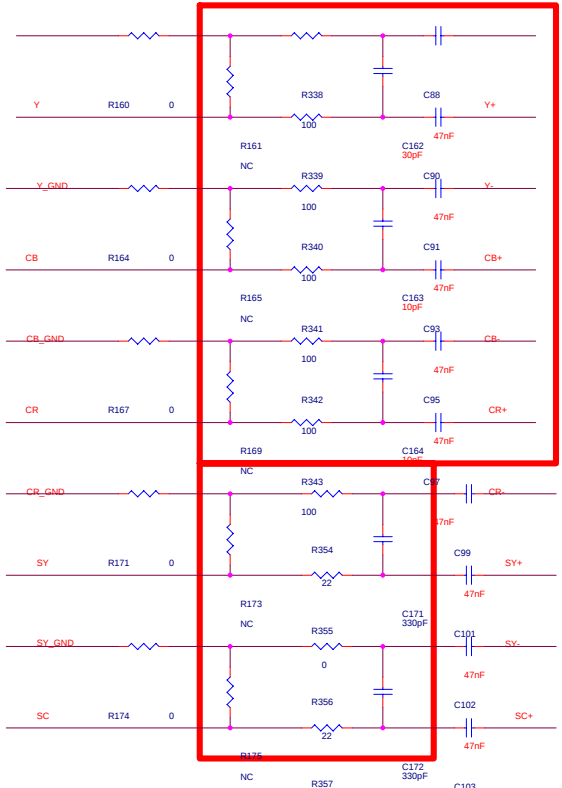
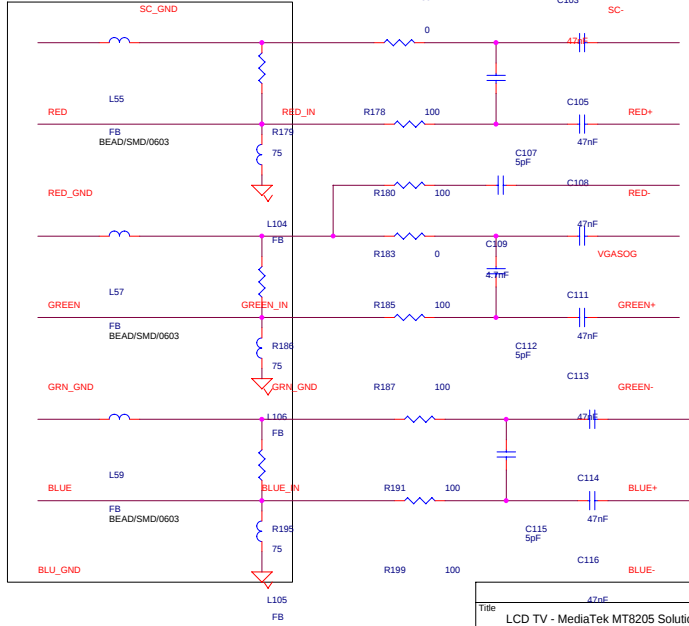
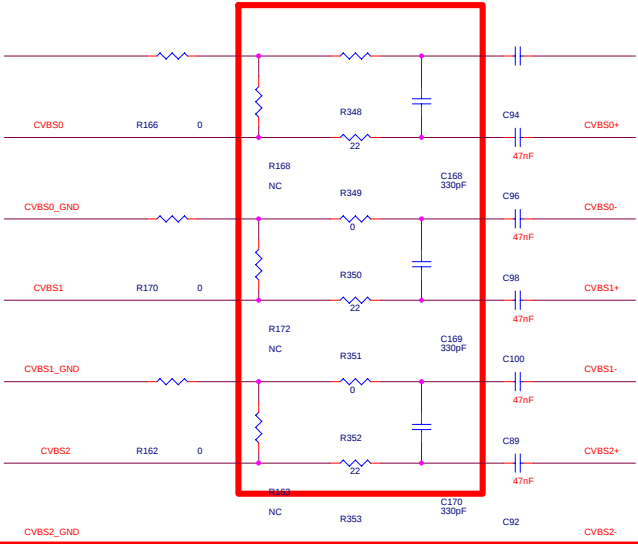
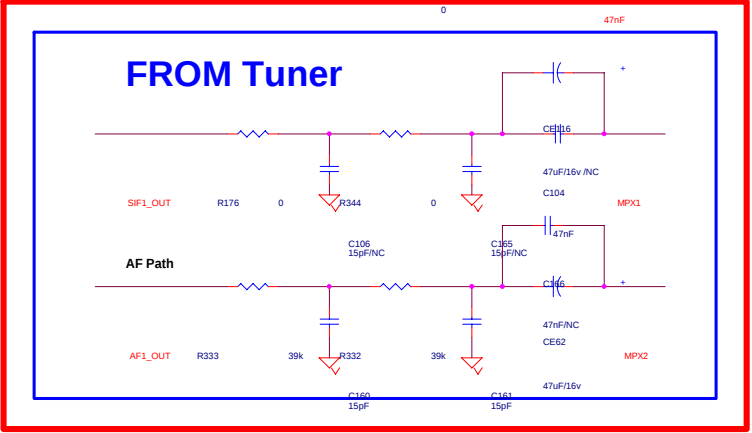
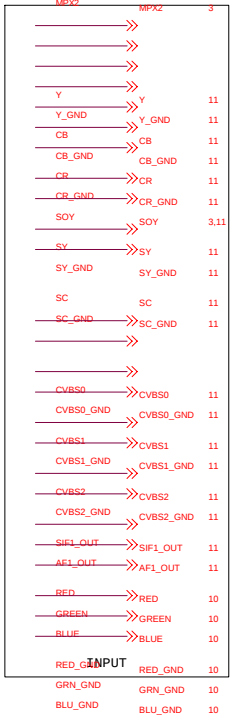
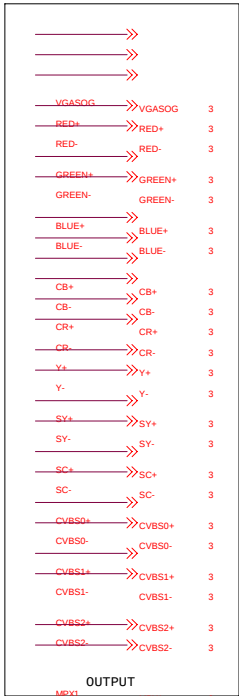
TEST POINT DIP1.0
TP/DIP/D1.0

Title		
LCD TV - MediaTek MT8205 Solution		
Size	Doc Number	Rev
B	MT8205 DECOUPOMG--DIGITAL	V0.1
Date:	Tuesday, May 10, 2005	Sheet 6 of 16

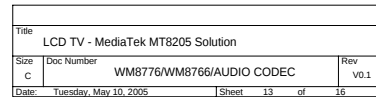
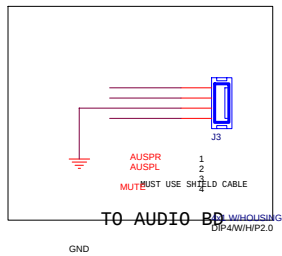


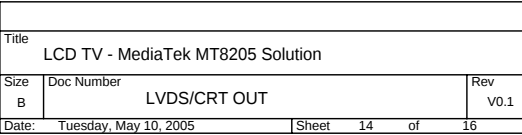
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LCD TV - MediaTek MT8205 Solution		
Size	Doc Number	Rev
B	VGA IN&PC AUDIO IN	V0.1
Date:	Tuesday, May 10, 2005	Sheet 10 of 16

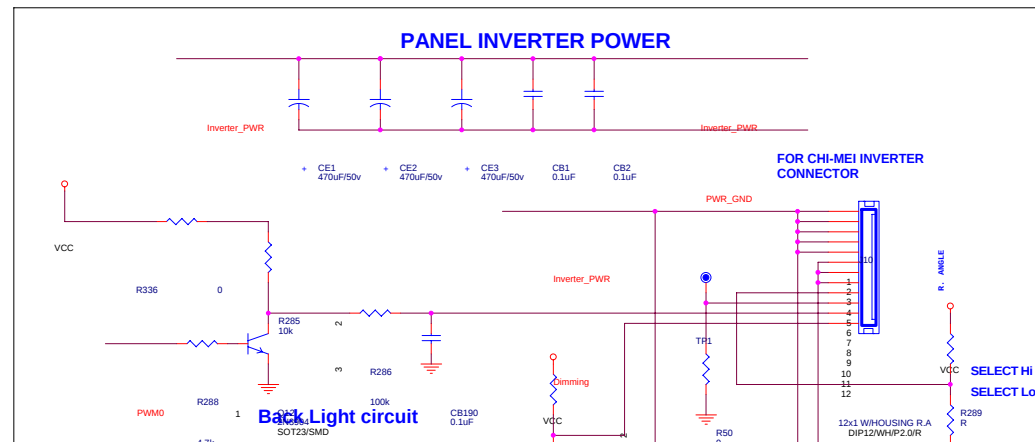
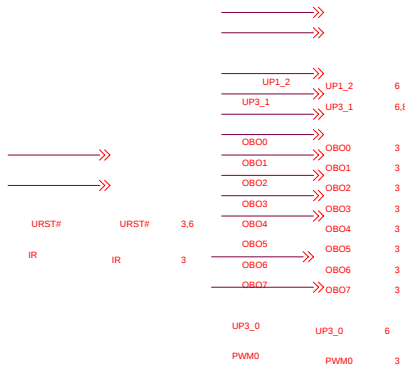




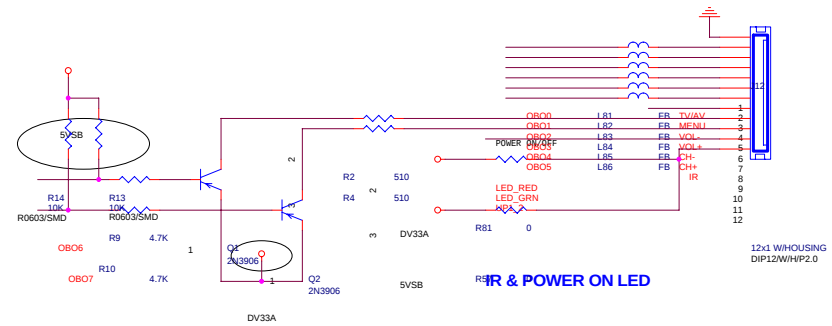
Title	LCD TV - MediaTek MT8205 Solution		
Size	Doc Number	Rev	
C	AUDIO/VIDEO IN CIRCUIT		V0.1
Date:	Tuesday, May 10, 2005	Sheet	12 of 16

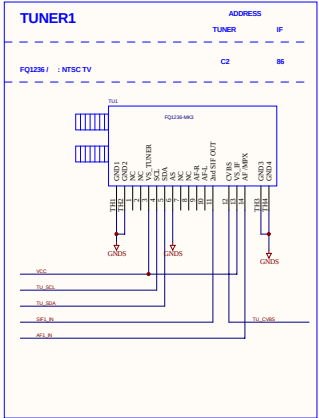




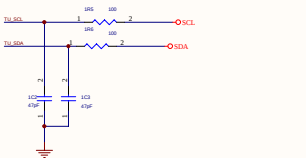
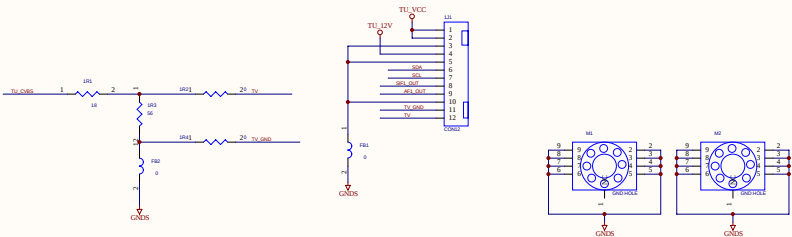


KEYPAD - MAX 8-KEYS

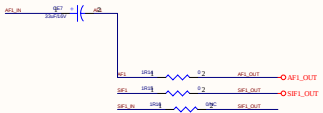
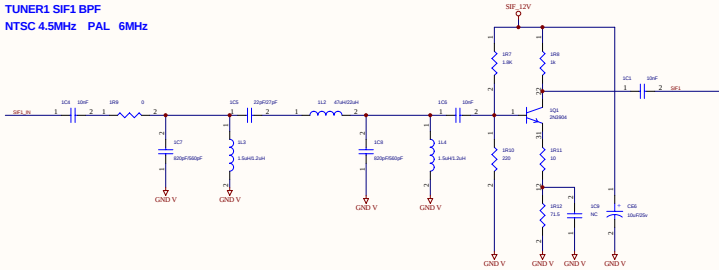




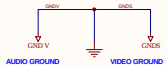
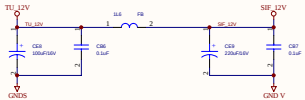
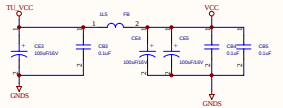
AV_TUNER IO

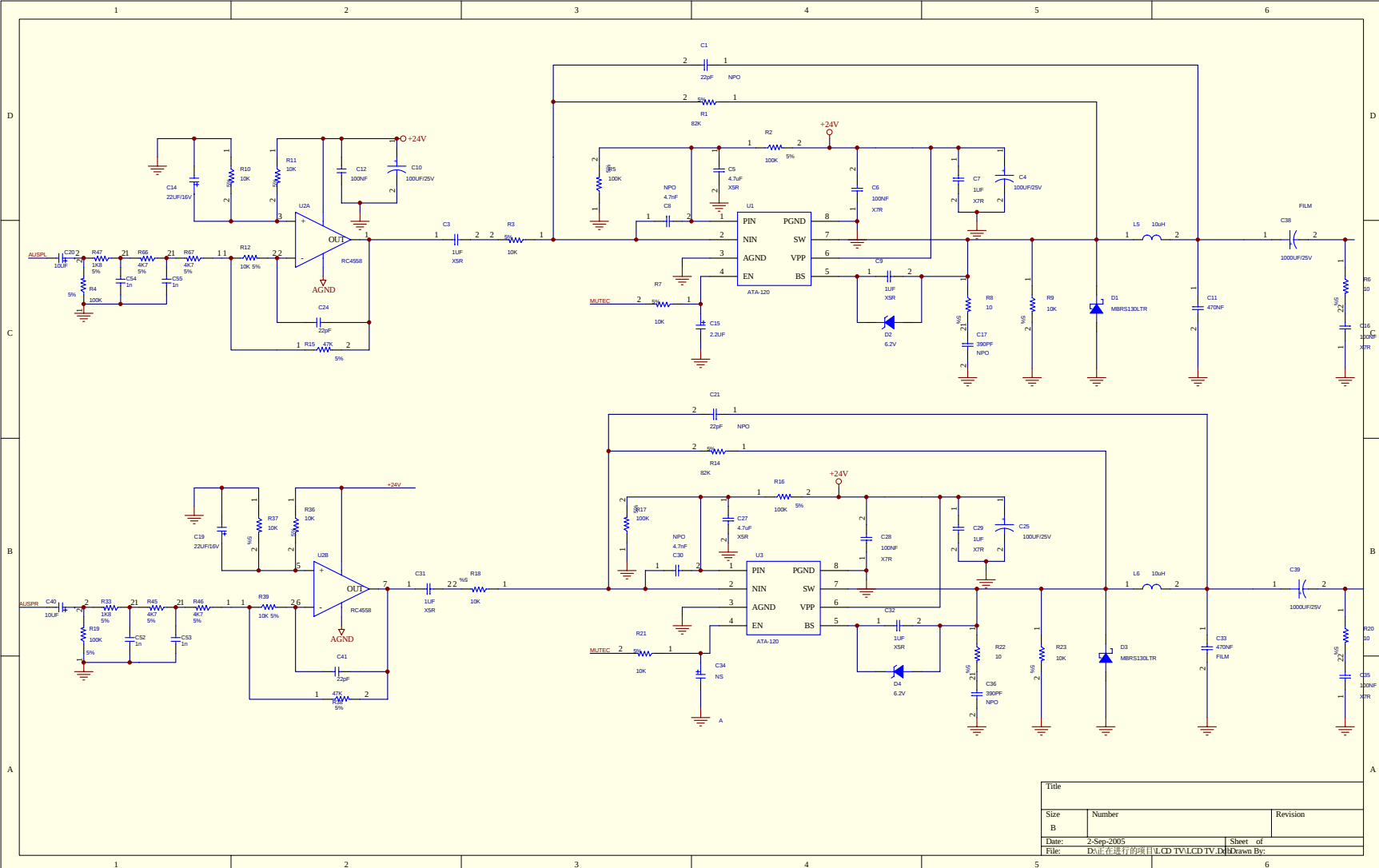


TUNER1 SIF1 BPF
NTSC 4.5MHz PAL 6MHz



TUN1_12V
TUN1_VCC



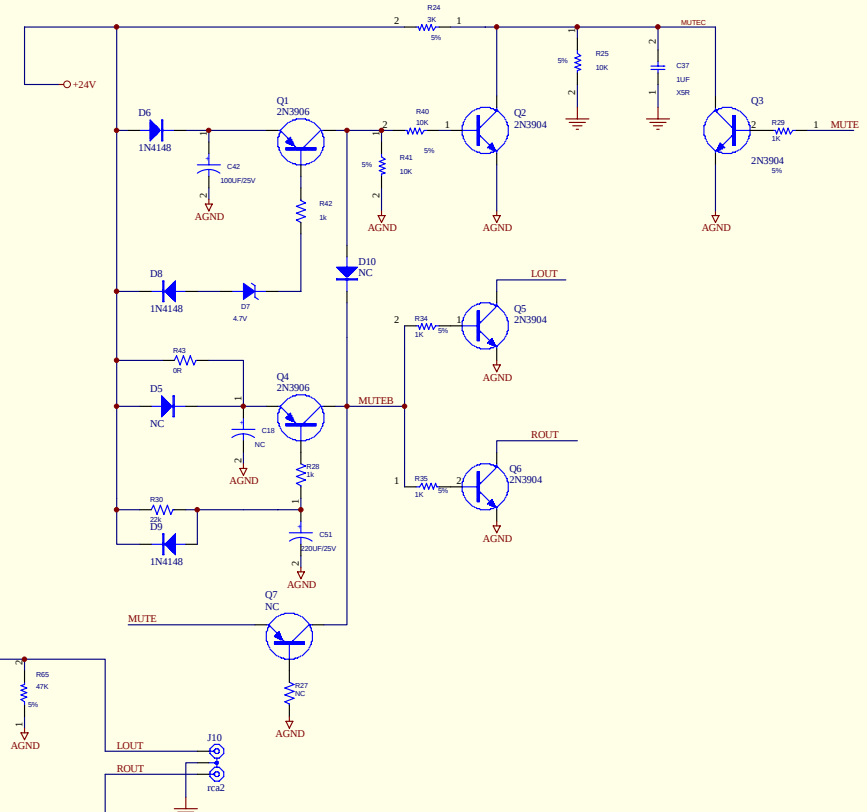
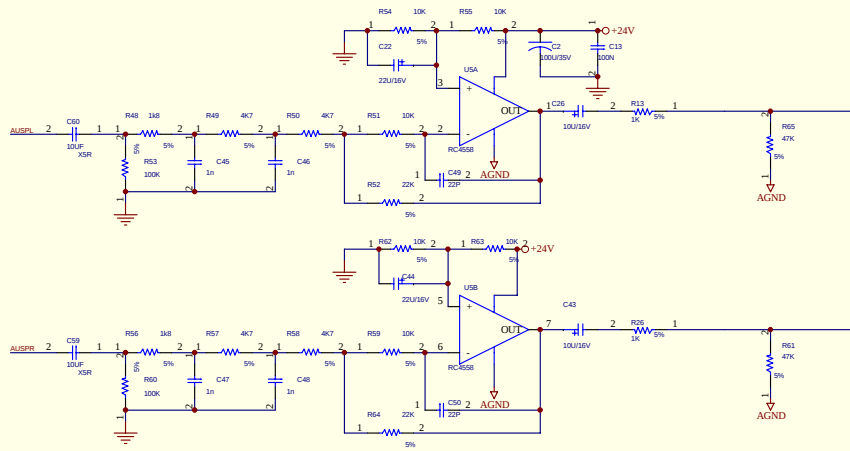


D

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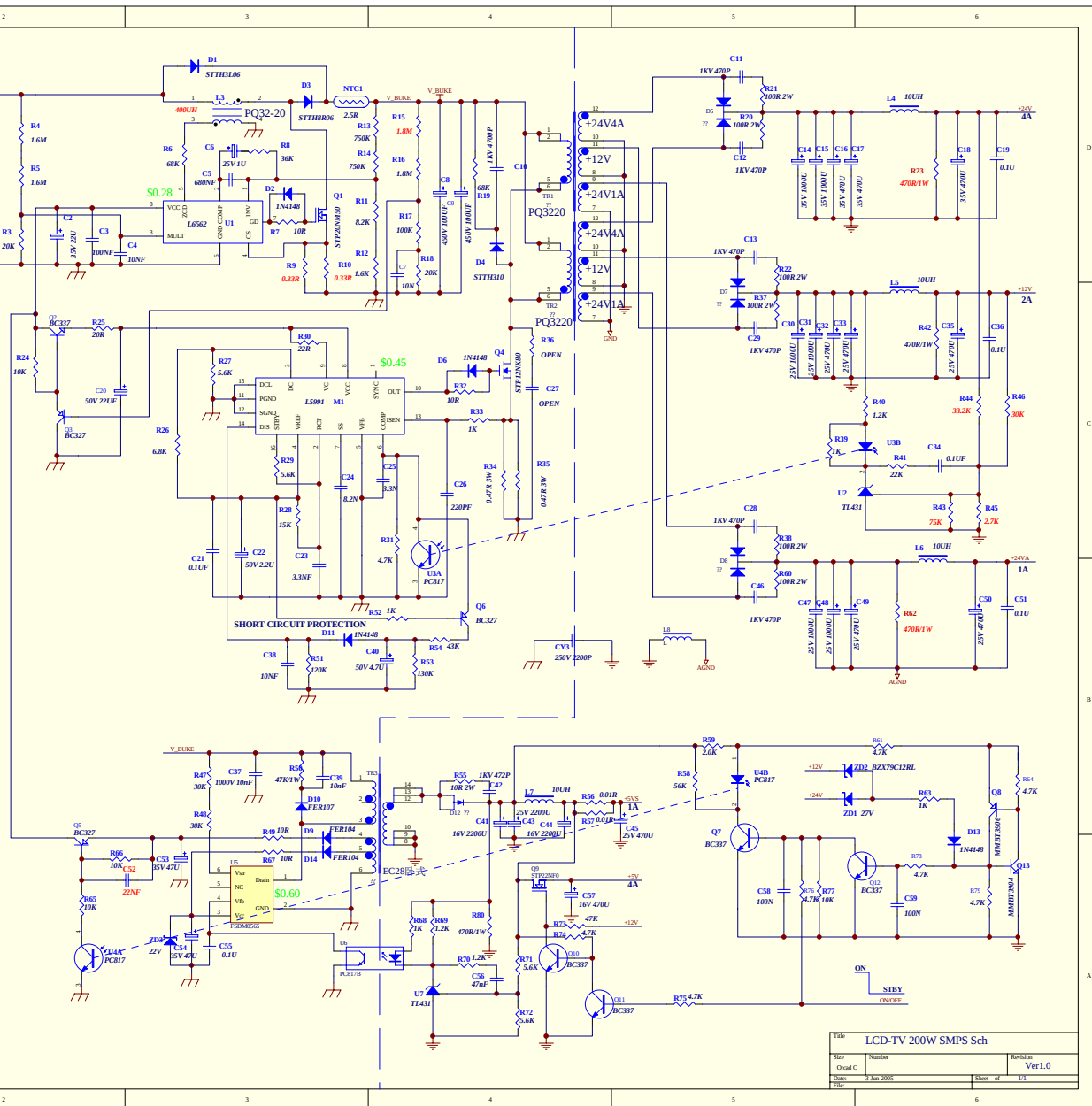
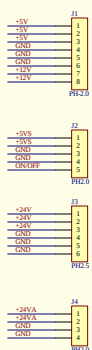
A



Title		
Size	Number	Revision
B		
Date:	2-Sep-2005	Sheet of
File:	Ex: 液晶显示器LCD TV LCD TV.D4	Down By:

LCD-TV 200W SMPS SPEC:

1. +5V 4A
2. +5VS 1A (Standby 5V)
3. +12V 2A
4. +24V 4A
5. +24VA 1A



Title			LCD-TV 200W SMPS Sch		
Size		Number		Revision	
Orcad C				Ver1.0	
Date:		3-Jan-2005		Sheet of 1/1	

Basic Operations & Circuit Description

Main Electric Components

(1). MODULE:

There are 1 pc. panel and 2 pcs. PCB including 1 pc. INVERTER board(L), 1 pc. T-CONTROL board,

(2).SIGNAL PROCESS

There are 4 pcs. PCBs including

- 1 pc. Audio&Tuner board,
- 1 pc. Main digital board,
- 1 pc. Keypad board,
- 1 pc. Remote Control Receiver board,

(3).POWER

There are 1 pc. PCB for power.

PCB function

1. Power:

- (1). Input voltage: AC 100V~240V, 47Hz~63Hz.
Input range: AC 90V(Min)~264V(Max) auto regulation.
- (2). To provide power for PCBs.
 - a). +24V for Inverter.
 - b). +5Vsb for standby,
 - c). +5V for signal power,
 - d). +24V for Audio Amp power and converter to
 - e). +12V for Tuner power.

2. Main (Video InterFace) board:

- (1). Decoder the video signal (TV,CVBS,S-VIDEO) from analog to digital signal.
- (2). Converter the Video signals(TV,CVBS,S-VIDEO) and graphics signal (VGA,YPbPr) from internace to progressive,
- (3). Converter the Digital to fit the panel display mode and output the LVDS signal to Panel.

3. Tuner & Audio Board :

- (1) Convert TV RF signal to video and audio signal to Main board.
- (2). Decoder the TV SIF signal to audio signal,
- (3). Converter the audio to audio Ampifile and out put to the speaker.

4. KEYBOARD

To get the main button control on LCD_TV as SOURCE,MENU, CHANEL +,CHANEL -, VOL +,VOL-, STANDBY functions.

5. Remote control board

Receive the remote signal and active for the control.

6. T-CONTROL board

Converter the LVDS signal to the digital signal for fitting the PANEL.

7. INVERTER board

Converter the low DC voltage +24V to high AC voltage to drive the backlight.

PCB failure analysis

1. CONTROL:

- a. Abnormal noise on screen.
- b. No picture.

2. MAIN (VIDEO):

- a. Lacking color, Bad color scale.
- b. No voice.
- c. No picture but with signals output, OSD and back light.
- d. Abnormal noise on screen.

3. POWER:

No picture, no power output.

Basic operation of LCD-TV

1. After turning on power switch, power board sends 5Vst-by Volt to Micro Processor IC waiting for ON signals from Key Switch or Remote Receiver.

2. When the ON signal from Key Switch or Remote Receiver is detected, Micro Processor will send ON Control signals to Power. Then Power sends (5Vsc, 12Vsc, 24V and RLY ON, Vs ON) to PCBs working. This time VIF will send signals to display back light, OSD on the panel and start to search available signal sources. If the audio signals input, them will be amplified by Audio AMP and transmitted to Speakers.

3. If some abnormal signals are detected (for example: over volts, over current, over temperature and under volts), the system will be shut down by Power off.

LCD basic display theory.

When an electrical field is applied to the LC planes, the LC molecules re-align themselves so that they are parallel to the electrical field. This electrical process is known as **twisted nematic field effect** or **TNFE**. In this alignment, polarized light is not twisted as it passes through the LC material (see Diagram 3A and 3B). If the front polarizer is oriented perpendicular to the rear polarizer, light will pass through the energized display but will be blocked by the rear polarizer. An LCD in this form is acting as a light shutter.

Displays with variable characters are created by selectively etching away the conductive surface that was originally deposited on the glass. Etched areas become the display's background; unetched areas become the display's characters.

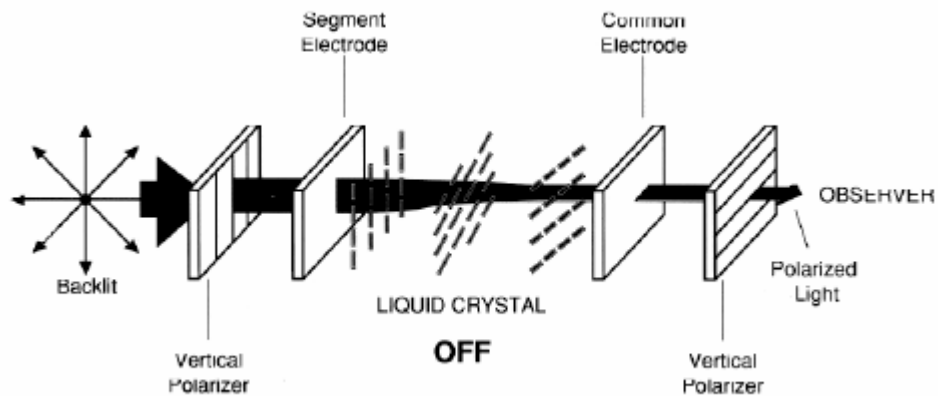


Diagram 3A. The "off" state of a TN LCD—the LC molecules form a twist and therefore cause polarized light to twist as it passes through.

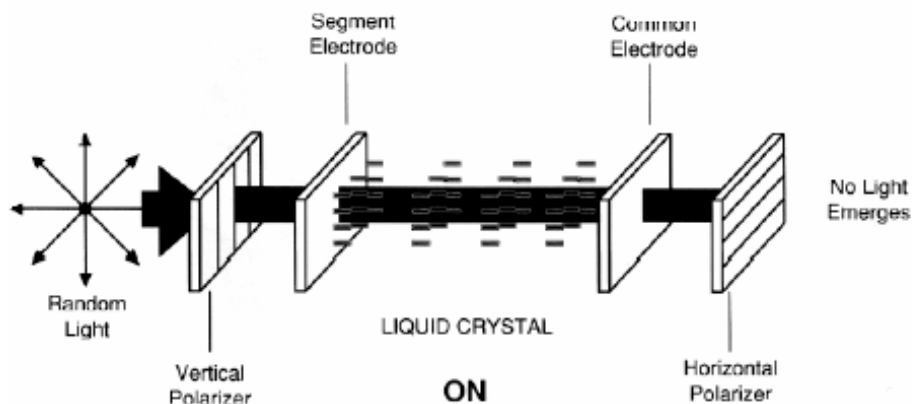


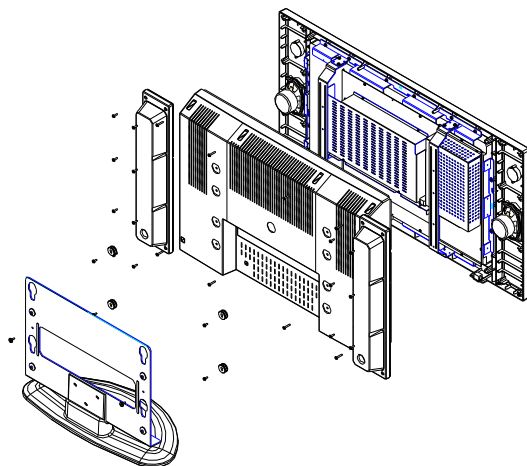
Diagram 3B. The "on" state—the electrical field re-aligns the LC molecules so they do not twist the polarized light.

Disassembly

In case of trouble, etc., Necessitating disassemble, please disassemble in the order shown in the illustrations.

Reassemble in the reverse order.

1. Removal of the Back Cover



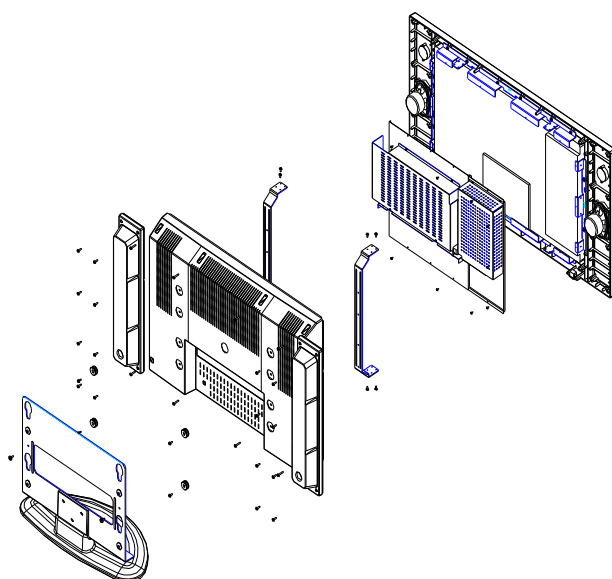
2. Removal of the MAIN PCB

a. Remove the screws.

b. Slide out the LCD chassis slightly; pull up the connector of AC cord from PCB; pull up the LCD PCB from LCD.

c. Remove the Anode cap from The picture tube. To avoid a shock hazard, be sure to discharge

d. Take out the LCD chassis.



IC DESCRIPTION

-MT8205G

-AT24C02

-MX29LV160BBTC

-LP2996

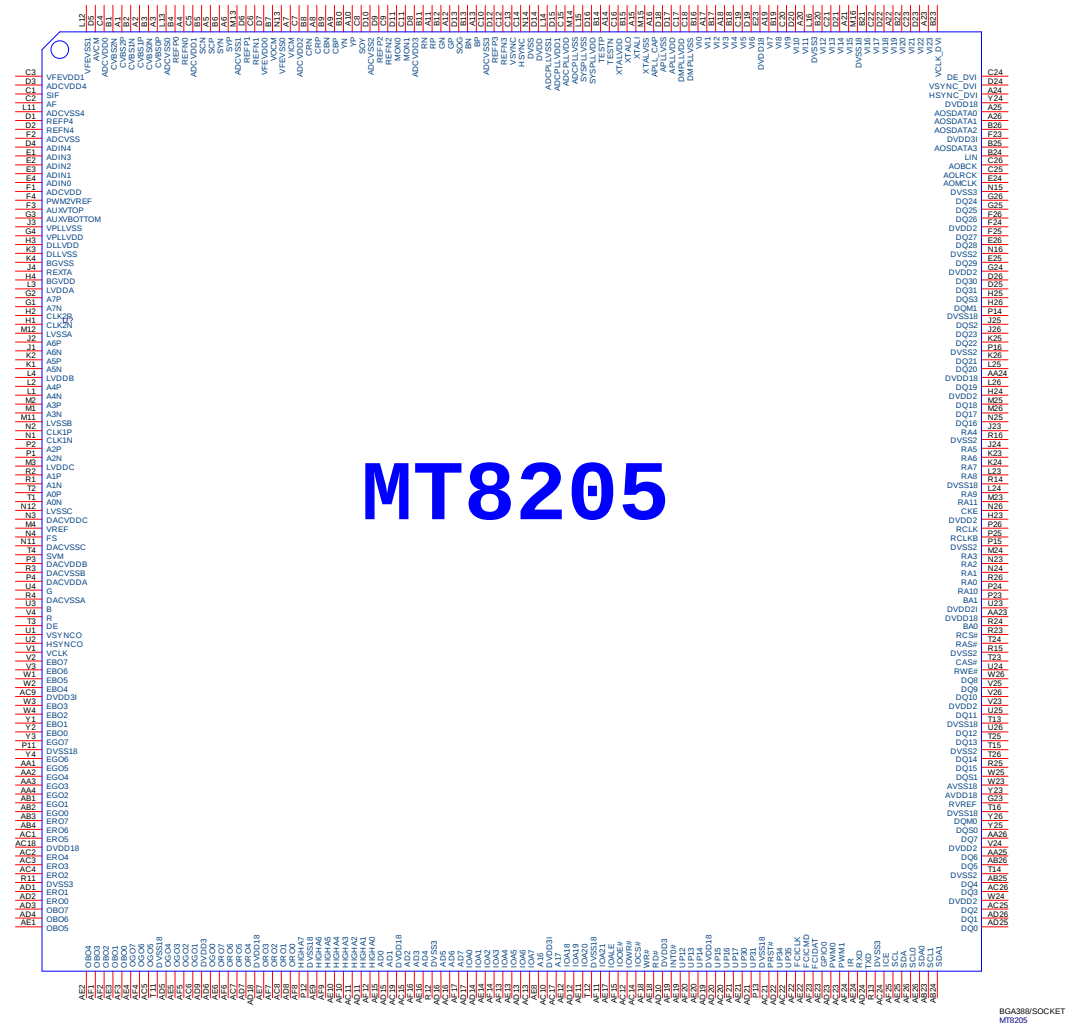
-AZ1117/H

-WM8776

-MX232A

-ISAV330

Pinout information



Pin Descriptions

2.3 Pin Descriptions

Table 2-1 provides detail video/audio port pin descriptions.

Table 2-1 video/audio port pin descriptions.

Pin	Symbol	Type	Description
E24	AOMCLK	O	Audio out master clock
C25	AOLRCK	O	Audio out left-right clock
C26	AOBCK	O	Audio out bit clock
A25	AOSDATA0	O	Audio out data line 0
A26	AOSDATA1	O	Audio out data line 1
B26	AOSDATA2	O	Audio out data line 2
B25	AOSDATA3	O	Audio out data line 3
B24	LIN	I	Audio line in
A3	CVBS0P	I	Composite Video input 0
A2	CVBS1P	I	Composite Video input 1
A1	CVBS2P	I	Composite Video input 2
C1	SIF	I	Tuner Sound SIF
C2	AF	I	Tuner Sound AF

Features

- Low Voltage and Standard Voltage Operation
 - 5.0 (V_{CC} = 4.5V to 5.5V)
 - 2.7 (V_{CC} = 2.7V to 5.5V)
 - 2.5 (V_{CC} = 2.5V to 5.5V)
 - 1.8 (V_{CC} = 1.8V to 5.5V)
- Internally Organized 128 x 8 (1K), 256 x 8 (2K), 512 x 8 (4K), 1024 x 8 (8K) or 2048 x 8 (16K)
- 2-Wire Serial Interface
- Bidirectional Data Transfer Protocol
- 100 kHz (1.8V, 2.5V, 2.7V) and 400 kHz (5V) Compatibility
- Write Protect Pin for Hardware Data Protection
- 8-Byte Page (1K, 2K), 16-Byte Page (4K, 8K, 16K) Write Modes
- Partial Page Writes Are Allowed
- Self-Timed Write Cycle (10 ms max)
- High Reliability
 - Endurance: 1 Million Cycles
 - Data Retention: 100 Years
- Automotive Grade and Extended Temperature Devices Available
- 8-Pin and 14-Pin JEDEC SOIC and 8-Pin PDIP Packages

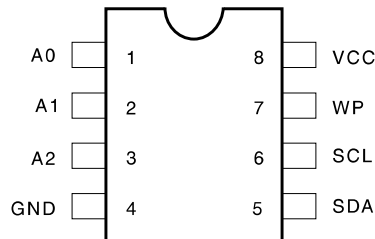
Description

The AT24C01A/02/04/08/16 provides 1024/2048/4096/8192/16384 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 128/256/512/1024/2048 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low power and low voltage operation are essential. The AT24C01A/02/04/08/16 is available in space saving 8-pin PDIP, 8-pin and 14-pin SOIC packages and is accessed via a 2-wire serial interface. In addition, the entire family is available in 5.0V (4.5V to 5.5V), 2.7V (2.7V to 5.5V), 2.5V (2.5V to 5.5V) and 1.8V (1.8V to 5.5V) versions.

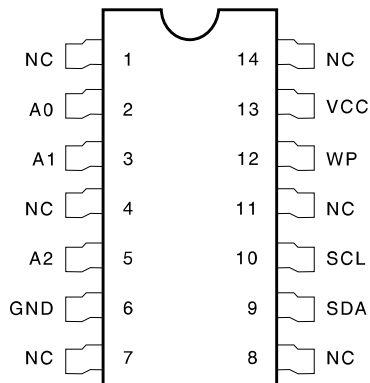
Pin Configurations

Pin Name	Function
A ₀ to A ₂	Address Inputs
SDA	Serial Data
SCL	Serial Clock Input
WP	Write Protect
NC	No Connect

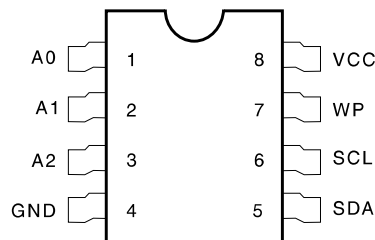
8-Pin PDIP



14-Pin SOIC



8-Pin SOIC



2-Wire Serial CMOS E²PROM

1K (128 x 8)

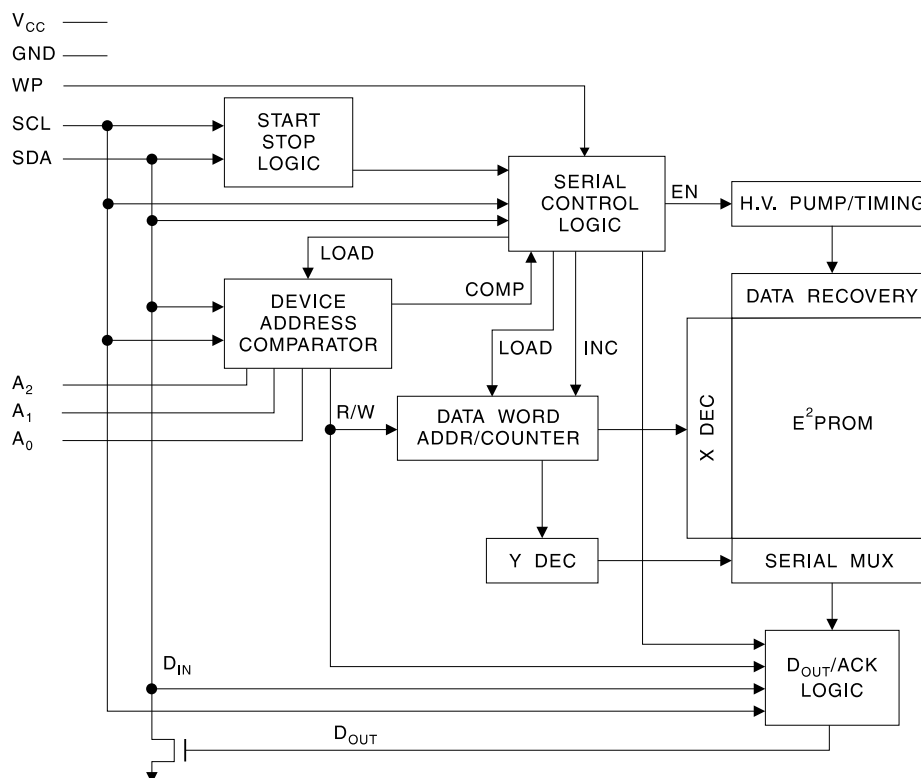
2K (256 x 8)

4K (512 x 8)

8K (1024 x 8)

16K (2048 x 8)

Operating Temperature.....	-55°C to +125°C
Storage Temperature.....	-65°C to +150°C
Voltage on Any Pin with Respect to Ground	-0.1V to +7.0V
Maximum Operating Voltage	6.25V
DC Output Current.....	5.0 mA





MX29LV160BT/BB

16M-BIT [2Mx8/1Mx16] CMOS SINGLE VOLTAGE 3V ONLY FLASH MEMORY

FEATURES

- Extended single - supply voltage range 2.7V to 3.6V
- 2,097,152 x 8/1,048,576 x 16 switchable
- Single power supply operation
 - 3.0V only operation for read, erase and program operation
- **Fully compatible with MX29LV160A device**
- Fast access time: 70/90ns
- Low power consumption
 - 30mA maximum active current
 - 0.2uA typical standby current
- Command register architecture
 - Byte/word Programming (9us/11us typical)
 - Sector Erase (Sector structure 16K-Byte x1, 8K-Byte x2, 32K-Byte x1, and 64K-Byte x31)
- Auto Erase (chip & sector) and Auto Program
 - Automatically erase any combination of sectors with Erase Suspend capability.
 - Automatically program and verify data at specified address
- Erase Suspend/Erase Resume
 - Suspends sector erase operation to read data from, or program data to, any sector that is not being erased, then resumes the erase.
- Status Reply
 - Data polling & Toggle bit for detection of program and erase operation completion.
- Ready/Busy pin (RY/BY)
 - Provides a hardware method of detecting program or erase operation completion.
- Sector protection
 - Hardware method to disable any combination of sectors from program or erase operations
 - Temporary sector unprotect allows code changes in previously locked sectors.
- CFI (Common Flash Interface) compliant
 - Flash device parameters stored on the device and provide the host system to access
- 100,000 minimum erase/program cycles
- Latch-up protected to 100mA from -1V to VCC+1V
- Boot Sector Architecture
 - T = Top Boot Sector
 - B = Bottom Boot Sector
- Low VCC write inhibit is equal to or less than 1.4V
- Package type:
 - 44-pin SOP
 - 48-pin TSOP
 - 48-ball CSP
- Compatibility with JEDEC standard
 - Pinout and software compatible with single-power supply Flash
- 10 years data retention

GENERAL DESCRIPTION

The MX29LV160BT/BB is a 16-mega bit Flash memory organized as 2M bytes of 8 bits or 1M words of 16 bits. MXIC's Flash memories offer the most cost-effective and reliable read/write non-volatile random access memory. The MX29LV160BT/BB is packaged in 44-pin SOP, 48-pin TSOP and 48-ball CSP. It is designed to be reprogrammed and erased in system or in standard EPROM programmers.

The standard MX29LV160BT/BB offers access time as fast as 70ns, allowing operation of high-speed microprocessors without wait states. To eliminate bus contention, the MX29LV160BT/BB has separate chip enable ($\overline{CE}$) and output enable ($\overline{OE}$) controls.

MXIC's Flash memories augment EPROM functionality with in-circuit electrical erasure and programming. The MX29LV160BT/BB uses a command register to manage this functionality. The command register allows for

100% TTL level control inputs and fixed power supply levels during erase and programming, while maintaining maximum EPROM compatibility.

MXIC Flash technology reliably stores memory contents even after 100,000 erase and program cycles. The MXIC cell is designed to optimize the erase and programming mechanisms. In addition, the combination of advanced tunnel oxide processing and low internal electric fields for erase and program operations produces reliable cycling. The MX29LV160BT/BB uses a 2.7V~3.6V VCC supply to perform the High Reliability Erase and auto Program/Erase algorithms.

The highest degree of latch-up protection is achieved with MXIC's proprietary non-epi process. Latch-up protection is proved for stresses up to 100 milliamps on address and data pin from -1V to VCC + 1V.

LP2996 DDR Termination Regulator

General Description

The LP2996 linear regulator is designed to meet the JEDEC SSTL-2 specifications for termination of DDR-SDRAM. The device contains a high-speed operational amplifier to provide excellent response to load transients. The output stage prevents shoot through while delivering 1.5A continuous current and transient peaks up to 3A in the application as required for DDR-SDRAM termination. The LP2996 also incorporates a V_{SENSE} pin to provide superior load regulation and a V_{REF} output as a reference for the chipset and DIMMs.

An additional feature found on the LP2996 is an active low shutdown ($\overline{SD}$) pin that provides Suspend To RAM (STR) functionality. When $\overline{SD}$ is pulled low the V_{TT} output will tri-state providing a high impedance output, but, V_{REF} will remain active. A power savings advantage can be obtained in this mode through lower quiescent current.

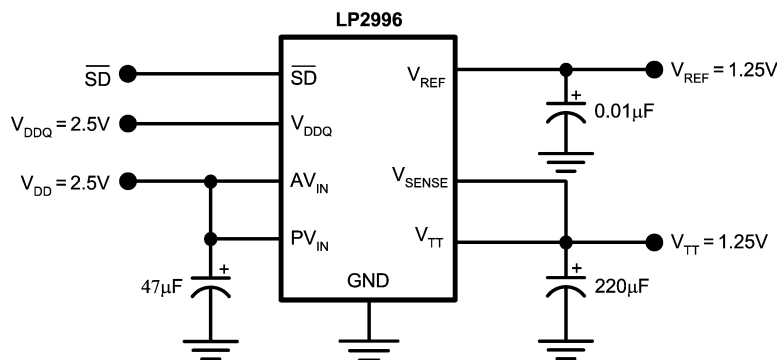
Features

- Source and sink current
- Low output voltage offset
- No external resistors required
- Linear topology
- Suspend to Ram (STR) functionality
- Low external component count
- Thermal Shutdown
- Available in SO-8, PSOP-8 or LLP-16 packages

Applications

- DDR-I and DDR-II Termination Voltage
- SSTL-2 and SSTL-3 Termination
- HSTL Termination

Typical Application Circuit



20057518

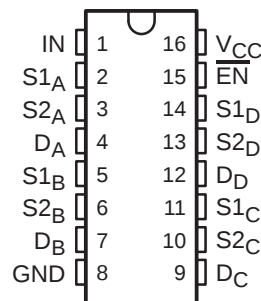
TS5V330

QUAD SPDT WIDE-BANDWIDTH VIDEO SWITCH WITH LOW ON-STATE RESISTANCE

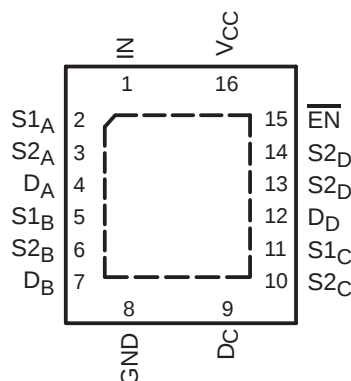
SCDS164A – MAY 2004 – REVISED MAY 2004

- Low Differential Gain and Phase ($D_G = 0.64\%$, $D_P = 0.1$ Degrees Typ)
- Wide Bandwidth (BW = 300 MHz Min)
- Low Crosstalk ($X_{TALK} = -63$ dB Typ)
- Low Power Consumption ($I_{CC} = 3 \mu A$ Max)
- Bidirectional Data Flow, With Near-Zero Propagation Delay
- Low ON-State Resistance ($r_{on} = 3 \Omega$ Typ)
- V_{CC} Operating Range From 4.5 V to 5.5 V
- I_{off} Supports Partial-Power-Down Mode Operation
- Data and Control Inputs Provide Undershoot Clamp Diode
- Control Inputs Can Be Driven by TTL or 5-V/3.3-V CMOS Outputs
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Performance Tested Per JESD 22
 - 2000-V Human-Body Model (A114-B, Class II)
 - 1000-V Charged-Device Model (C101)
- Suitable for Both RGB and Composite-Video Switching

D, DBQ, OR PW PACKAGE
(TOP VIEW)



RGY PACKAGE
(TOP VIEW)



description/ordering information

The TI TS5V330 video switch is a 4-bit 1-of-2 multiplexer/demultiplexer with a single switch-enable ($\overline{EN}$) input. When $\overline{EN}$ is low, the switch is enabled and the D port is connected to the S port. When $\overline{EN}$ is high, the switch is disabled and the high-impedance state exists between the D and S ports. The select (IN) input controls the data path of the multiplexer/demultiplexer.

ORDERING INFORMATION

T_A	PACKAGE [†]		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	QFN – RGY	Tape and reel	TS5V330RGYR	TE330
		Tube	TS5V330D	TS5V330
	SOIC – D	Tape and reel	TS5V330DR	
		Tape and reel	TS5V330DBQR	TE330
	TSSOP – PW	Tube	TS5V330PW	TE330
		Tape and reel	TS5V330PWR	

[†] Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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24-bit, 192kHz Stereo CODEC with 5 Channel I/P Multiplexer

DESCRIPTION

The WM8776 is a high performance, stereo audio CODEC with five channel input selector. The WM8776 is ideal for surround sound processing applications for home hi-fi, DVD-RW and other audio visual equipment.

A stereo 24-bit multi-bit sigma delta ADC is used with a five stereo channel input mixer. Each ADC channel has programmable gain control with automatic level control. Digital audio output word lengths from 16-32 bits and sampling rates from 32kHz to 96kHz are supported.

A stereo 24-bit multi-bit sigma delta DAC is used with digital audio input word lengths from 16-32 bits and sampling rates from 32kHz to 192kHz. The DAC has an input mixer allowing an external analogue signal to be mixed with the DAC signal. There are also Headphone and line outputs, with volume controls for the headphones.

The WM8776 supports fully independent sample rates for the ADC and DAC. The audio data interface supports I²S, left justified, right justified and DSP formats.

The device is controlled in software via a 2 or 3 wire serial interface, selected by the MODE pin, which provides access to all features including channel selection, volume controls, mutes, and de-emphasis facilities.

The device is available in a 48-pin TQFP package.

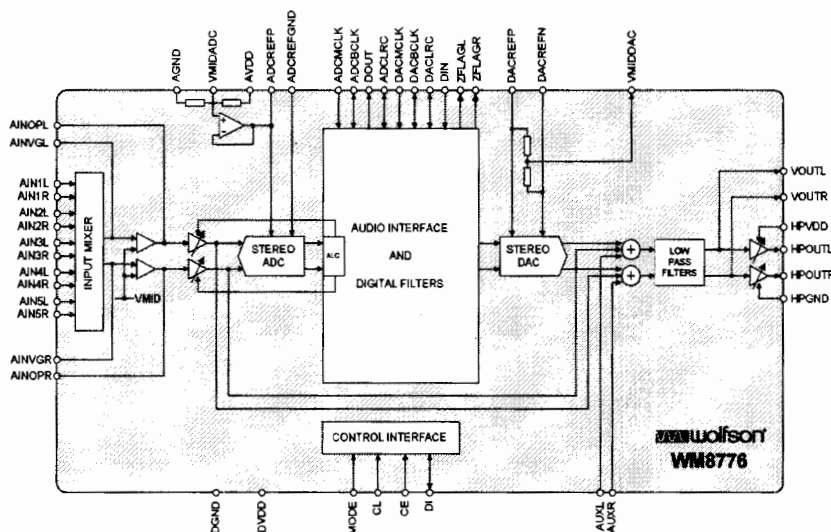
FEATURES

- Audio Performance
 - 108dB SNR ('A' weighted @ 48kHz) DAC
 - 102dB SNR ('A' weighted @ 48kHz) ADC
- DAC Sampling Frequency: 32kHz – 192kHz
- ADC Sampling Frequency: 32kHz – 96kHz
- Five stereo ADC inputs with analogue gain adjust from +24dB to –21dB in 0.5dB steps
- Programmable Limiter or Automatic Level Control (ALC)
- Stereo DAC with independent analogue and digital volume controls
- Stereo Headphone and Line Output
- 3-Wire SPI Compatible or 2-Wire Software Serial Control Interface
- Master or Slave Clocking Mode
- Programmable Audio Data Interface Modes
 - I²S, Left, Right Justified or DSP
 - 16/20/24/32 bit Word Lengths
- Analogue Bypass Path Feature
- Selectable AUX input to the volume controls
- 2.7V to 5.5V Analogue, 2.7V to 3.6V Digital supply Operation

APPLICATIONS

- Surround Sound AV Processors and Hi-Fi systems
- DVD-RW

BLOCK DIAGRAM





±15kV ESD-Protected, +5V RS-232 Transceivers

General Description

The MAX202E–MAX213E, MAX232E/MAX241E line drivers/receivers are designed for RS-232 and V.28 communications in harsh environments. Each transmitter output and receiver input is protected against ±15kV electrostatic discharge (ESD) shocks, without latchup. The various combinations of features are outlined in the *Selection Guide*. The drivers and receivers for all ten devices meet all EIA/TIA-232E and CCITT V.28 specifications at data rates up to 120kbps, when loaded in accordance with the EIA/TIA-232E specification.

The MAX211E/MAX213E/MAX241E are available in 28-pin SO packages, as well as a 28-pin SSOP that uses 60% less board space. The MAX202E/MAX232E come in 16-pin narrow SO, wide SO, and DIP packages. The MAX203E comes in a 20-pin DIP/SO package, and needs no external charge-pump capacitors. The MAX205E comes in a 24-pin wide DIP package, and also eliminates external charge-pump capacitors. The MAX206E/MAX207E/MAX208E come in 24-pin SO, SSOP, and narrow DIP packages. The MAX232E/MAX241E operate with four 1μF capacitors, while the MAX202E/MAX206E/MAX207E/MAX208E/MAX211E/MAX213E operate with four 0.1μF capacitors, further reducing cost and board space.

Applications

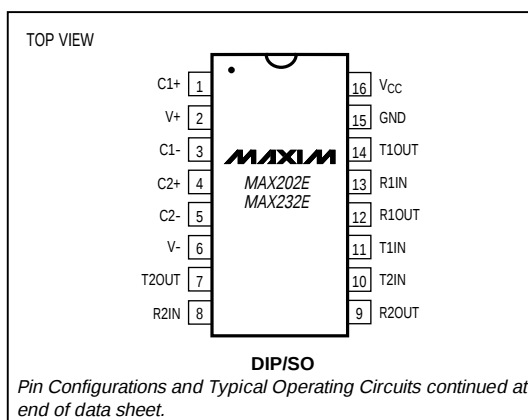
Notebook, Subnotebook, and Palmtop Computers
Battery-Powered Equipment
Hand-Held Equipment

Ordering Information appears at end of data sheet.

Features

- ♦ ESD Protection for RS-232 I/O Pins:
 - ±15kV—Human Body Model
 - ±8kV—IEC1000-4-2, Contact Discharge
 - ±15kV—IEC1000-4-2, Air-Gap Discharge
- ♦ Latchup Free (unlike bipolar equivalents)
- ♦ Guaranteed 120kbps Data Rate—LapLink™ Compatible
- ♦ Guaranteed 3V/μs Min Slew Rate
- ♦ Operate from a Single +5V Power Supply

Pin Configurations



Selection Guide

PART	No. of RS-232 DRIVERS	No. of RS-232 RECEIVERS	RECEIVERS ACTIVE IN SHUTDOWN	No. of EXTERNAL CAPACITORS	LOW-POWER SHUTDOWN	TTL THREE-STATE
MAX202E	2	2	0	4 (0.1μF)	No	No
MAX203E	2	2	0	None	No	No
MAX205E	5	5	0	None	Yes	Yes
MAX206E	4	3	0	4 (0.1μF)	Yes	Yes
MAX207E	5	3	0	4 (0.1μF)	No	No
MAX208E	4	4	0	4 (0.1μF)	No	No
MAX211E	4	5	0	4 (0.1μF)	Yes	Yes
MAX213E	4	5	2	4 (0.1μF)	Yes	Yes
MAX232E	2	2	0	4 (1μF)	No	No
MAX241E	4	5	0	4 (1μF)	Yes	Yes

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Maxim Integrated Products 1

For free samples & the latest literature: <http://www.maxim-ic.com>, or phone 1-800-998-8800

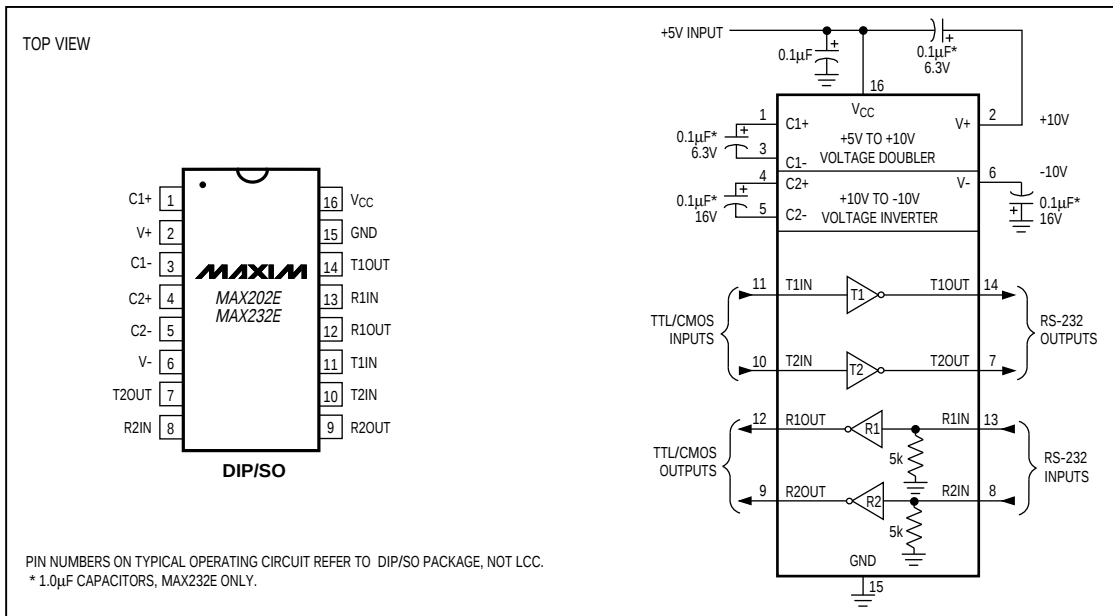
MAX202E–MAX213E, MAX232E/MAX241E

±15kV ESD-Protected, +5V RS-232 Transceivers

Table 3. DB9 Cable Connections
Commonly Used for EIA/TIAE-232E and V.24 Asynchronous Interfaces

PIN	CONNECTION	
1	Received Line Signal Detector (sometimes called Carrier Detect, DCD)	Handshake from DCE
2	Receive Data (RD)	Data from DCE
3	Transmit Data (TD)	Data from DTE
4	Data Terminal Ready	Handshake from DTE
5	Signal Ground	Reference point for signals
6	Data Set Ready (DSR)	Handshake from DCE
7	Request to Send (RTS)	Handshake from DTE
8	Clear to Send (CTS)	Handshake from DCE
9	Ring Indicator	Handshake from DCE

Pin Configurations and Typical Operating Circuits (continued)



TFT LCD Approval Specification

MODEL NO.: V270W1 - L03

Customer: _____

Approved by: _____

Note:

LCD TV Head Division	
Director	鄧振隆

QRA Dept.	TD Division	DDII	DDI
Approval	Approval	Approval	Approval
陳永一	李冠輝	鈴木慶	林文聰

LCD TV Marketing and Project Management Dept.	
Project Manager	胡崇銘、陳立宜

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REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 1.0	August 1,03	All	All	Preliminary Specification is first issued.
Ver 2.0	Sep. 18,03	17	7.2	Contrast ratio:Typ. (600)→600 Response time T_R :Typ. (15)→15 T_F : Typ. (10)→10 Gray to Gray: Typ (16.6)→16.6 Center Luminance of White: Min. (450)→450 Typ. (550)→550 Average Luminance of White: Min. (400)→400 Typ. (450)→450 Color Chromaticity Min. Typ. Max. Min. Typ. Max. Red Rx (0.616)(0.646)(0.676)→0.616 0.646 0.676 Ry (0.302)(0.332)(0.362)→0.302 0.332 0.362 Green Gx(0.239)(0.269)(0.299)→0.239 0.269 0.299 Gy(0.570)(0.600)(0.630)→0.570 0.600 0.630 Blue Bx(0.112)(0.142)(0.172)→0.112 0.142 0.172 By(0.042)(0.072)(0.102)→0.042 0.072 0.102 Viewing Angle Horizontal θ_x + Typ. (85)→85 θ_x - Typ. (85)→85 Vertical θ_y + Typ. (85)→85 θ_y - Typ. (85)→85
		5	2.1	Shock (Non-Operating) Max. Value (100)→100 Vibration (Non-Operating) Max. Value (1.0)→1.0

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V270W1- L03 is a 27" TFT Liquid Crystal Display module with 14-CCFL Backlight unit and 1ch-LVDS interface. This module supports 1280 x 720 WXGA format and can display true 16.7M colors (8-bit/color). The inverter module for backlight is build-in.

1.2 FEATURES

- Ultra wide viewing angle – Super MVA technology
- High brightness (550 nits)
- High contrast ratio (600:1)
- Fast response time
- High color saturation NTSC 75%
- WXGA (1280 x 720 pixels) resolution, true HDTV format.
- DE (Data Enable) only mode
- LVDS (Low Voltage Differential Signaling) interface

1.3 APPLICATION

- TFT LCD TVs

1.4 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	597.12(H) x 335.88 (V) (26.97" diagonal)	mm	(1)
Bezel Opening Area	603.22 (H) x 341.98 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1280 x R.G.B. x 720	pixel	-
Pixel Pitch (Sub Pixel)	0.1555 (H) x 0.4665 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.7M	color	-
Display Operation Mode	Transmissive mode / Normally black	-	-
Surface Treatment	Anti-glare with anti-reflective coating Hard coating (2H), Haze: 40% Reflection Rate: < 2%	-	-

1.5 MECHANICAL SPECIFICATIONS

Item			Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)			637.55		mm	Module Size Depth(D)
	Vertical(V)			379.8		mm	
	Depth(D)	W/O INV	-		36	mm	
		W/I INV	40	40.5	41	mm	
Weight			-	4300		g	-

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) Module Depth does not include connectors.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-20	+60	°C	(1)
Operating Ambient Temperature	T _{OP}	0	+50	°C	(1), (2)
Shock (Non-Operating)	S _{NOP}	-	100	G	(3), (5)
Vibration (Non-Operating)	V _{NOP}	-	1.0	G	(4), (5)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ($T_a \leq 40$ °C).

(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).

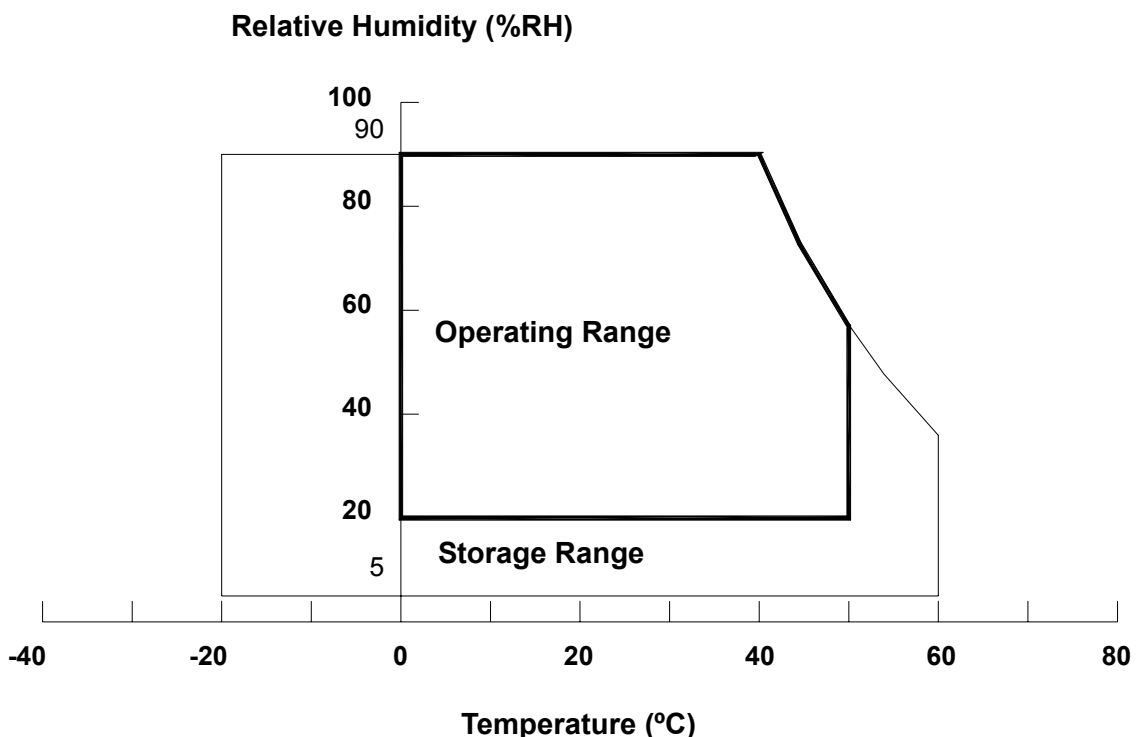
(c) No condensation.

Note (2) The temperature of panel display area surface should be 0 °C Min. and 60 °C Max.

Note (3) 2 ms, half sine wave, 1 time for $\pm X$, $\pm Y$, $\pm Z$.

Note (4) 10 ~ 500 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V _{CC}	-0.3	+6.0	V	(1)
Logic Input Voltage	V _{IN}	-0.3	4.3	V	

2.2.2 BACKLIGHT UNIT

Item	Symbo	Test	Min.	Type	Max.	Unit	Note
Lamp Voltage	V _L	—	0	—	3.0K	V _{RMS}	(1), (2), I _L = 4.7 mA
On/Off Control Voltage	V _{BLON}	—	-0.3	—	7	V	
Internal/External PWM Select Voltage	V _{SEL}	—					
Internal PWM Control Voltage	V _{IPWM}	—					
External PWM Control Voltage	V _{EPWM}	—					
Operating Temperature	T _{OP}	5~95% RH	0	—	75	°C	(3)
Storage Temperature	T _{ST}	5~95% RH	-30	—	80	°C	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for lamp (Refer to 3.2 for further information).

Note (3) Protect inverters from moisture condensation and freezing.

3. ELECTRICAL CHARACTERISTICS

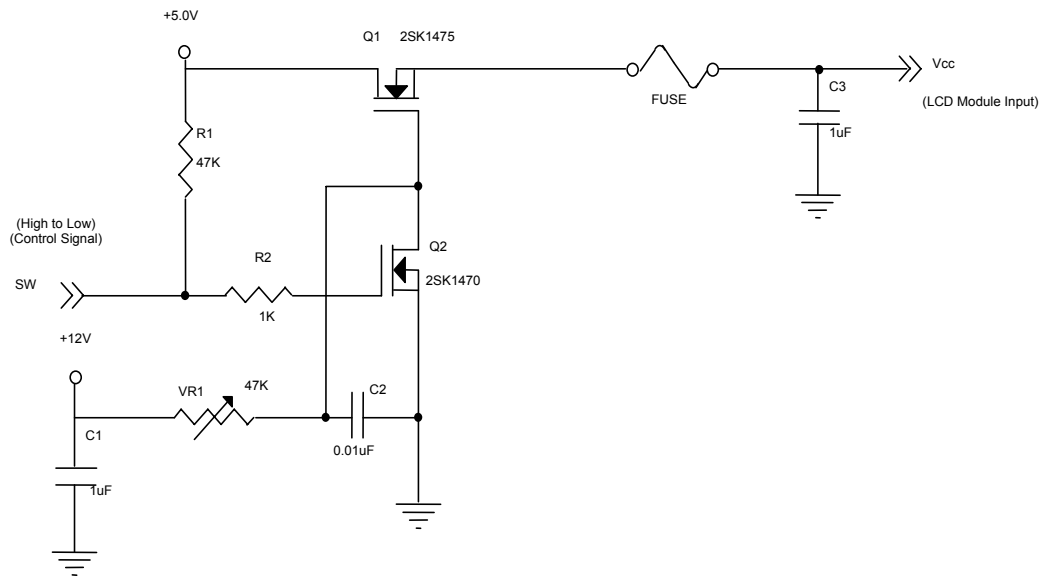
3.1 TFT LCD MODULE

T_a = 25 ± 2 °C

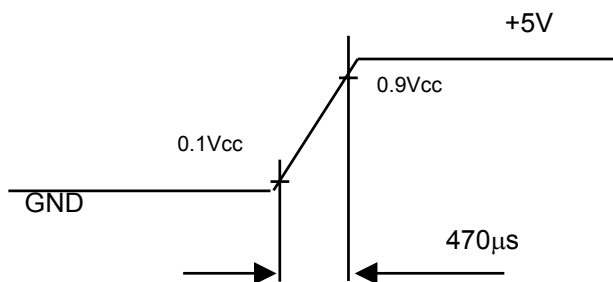
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V _{CC}	4.5	5.0	5.5	V	-
Ripple Voltage		V _{RP}	-	-	200	mV	-
Rush Current		I _{RUSH}	-	2.1	3	A	(2)
Power Supply Current	White	I _{CC}	-	1.4	-	A	(3)a
	Black		-	1	-	A	(3)b
	Vertical Stripe		-	1.2	-	A	(3)c
LVDS differential input high threshold voltage		V _{TH}	-	-	+100	mV	
LVDS differential input low threshold voltage		V _{TL}	-100	-	-	mV	
LVDS common input voltage		V _{IC}	1.125	1.25	1.375	V	
Terminating Resistor		R _T	-	100	-	ohm	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:



Vcc rising time is 470 μ s



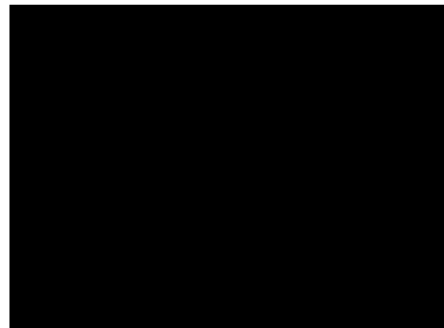
Note (3) The specified power supply current is under the conditions at $V_{cc} = 5\text{ V}$, $T_a = 25 \pm 2\text{ }^\circ\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



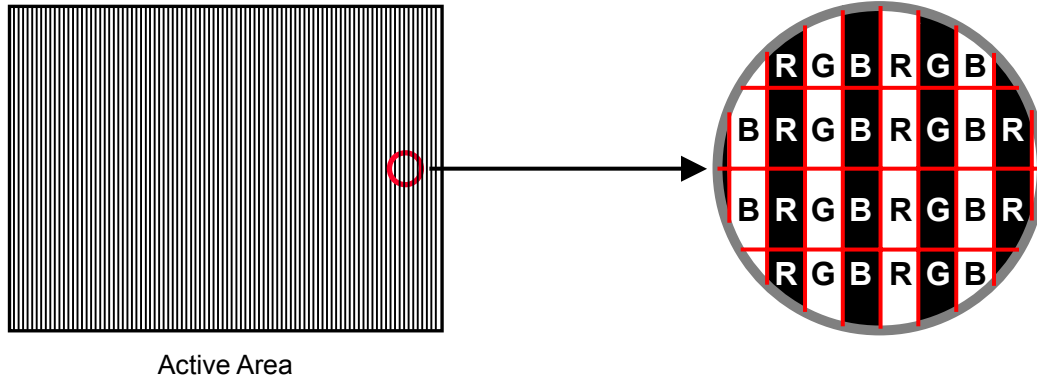
Active Area

b. Black Pattern



Active Area

c. Vertical Stripe Pattern

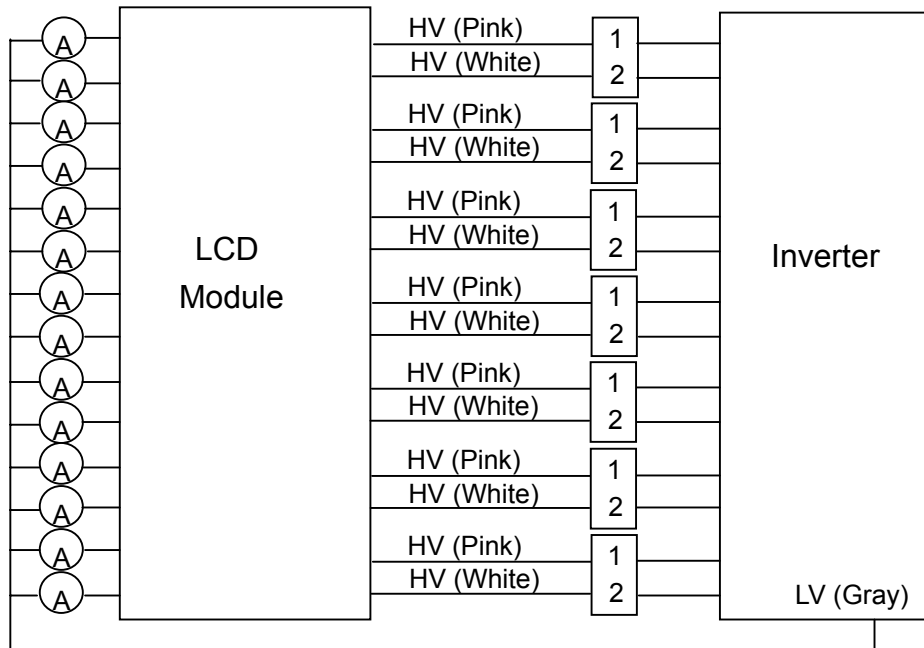


3.2 BACKLIGHT UNIT

Ta = 25 ± 2 °C

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V _L	1008	1120	1232	V _{RMS}	I _L = 4.7 mA
Lamp Current	I _L	4.4	4.7	5.0	mA _{RMS}	(1)
Lamp Turn On Voltage	V _s	1200	-	3000	V _{RMS}	(2), Ta = 25 °C
		1790	-	3000	V _{RMS}	(2), Ta = 0 °C
Operating Frequency	F _L	54	56	58	KHz	(3)
Lamp Life Time	L _{BL}	50K	-	-	Hrs	(5)
Power Consumption	P _L	-	92	-	W	(4), Inverter Input

Note (1) Lamp current is measured by utilizing high frequency current meters as shown below:



Note (2) The voltage shown above should be applied to the lamp for more than 1 second after startup.

Otherwise the lamp may not be turned on.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) $P_L = (\sum \text{lamp1-lamp14 } I_L \times V_L) / 0.8$, P_L is based on the inverter efficiency, which is 80%.

Note (5) The lifetime of a lamp is defined as the time in which it continues to operate under the condition $T_a = 25 \pm 2^\circ\text{C}$ and $I_L = (4.35) \sim (4.95)$ mArms until one of the following events occurs:

(a) When the brightness becomes equal or less than 50% of its original value.

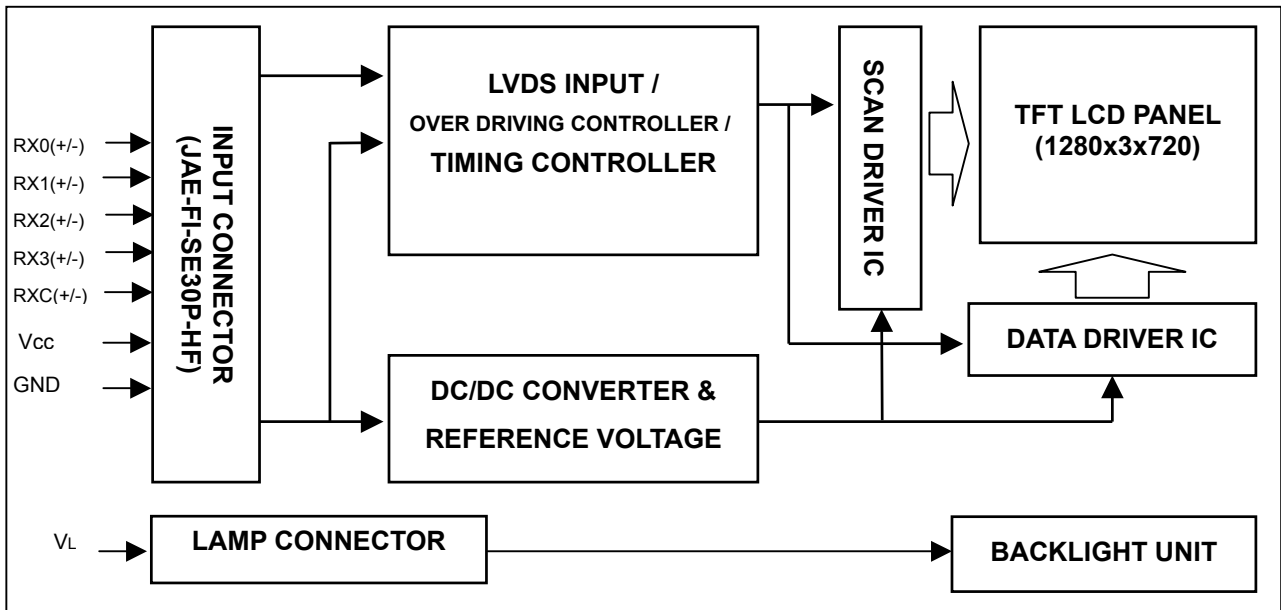
(b) When the effective discharge length becomes equal or less than 80% of its original value.

(Effective discharge length is defined as an area that has equal or more than 70% brightness compared to the brightness at the center point.)

Note (6) The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid producing too much current leakage from high voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE

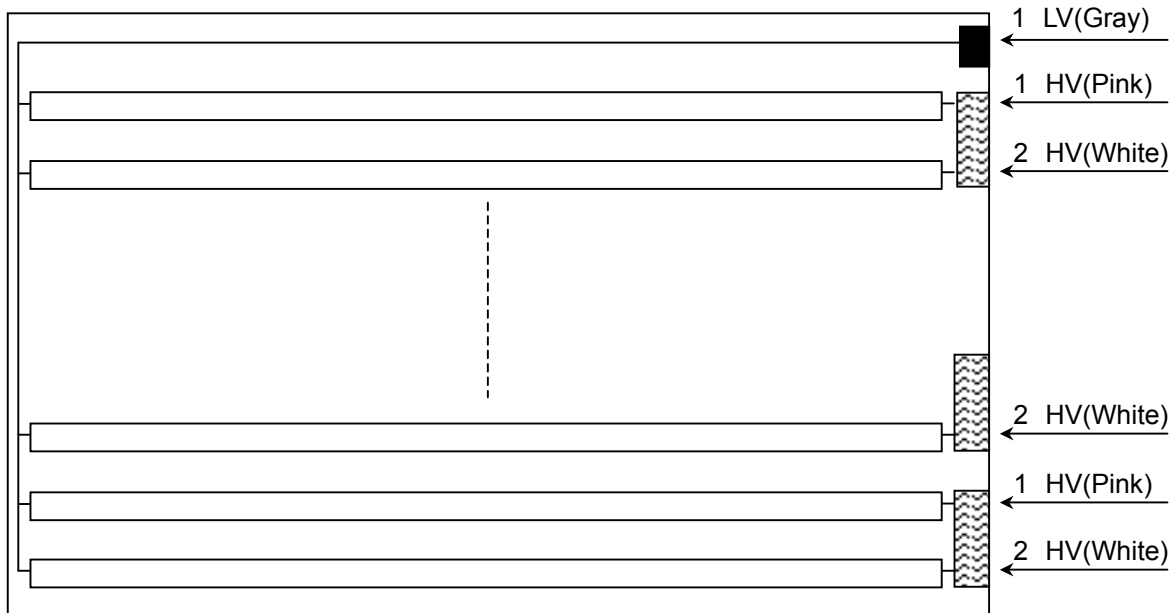


4.2 BACKLIGHT UNIT

Lamp connector

HV : BHR-03-VS-1(JST) *7

LV : ZHR-2 (JST) *1



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin	Name	Description
1	NC	No Connection
2	NC	No Connection
3	NC	No Connection
4	NC	No Connection
5	NC	No Connection
6	NC	No Connection
7	NC	No Connection
8	GND	Ground
9	RX3+	Positive LVDS differential data input. Channel 3
10	RX3-	Negative LVDS differential data input. Channel 3
11	RXCLK+	Positive LVDS differential clock input.
12	RXCLK-	Negative LVDS differential clock input.
13	GND	Ground
14	GND	Ground
15	RX2+	Positive LVDS differential data input. Channel 2
16	RX2-	Negative LVDS differential data input. Channel 2
17	RX1+	Positive LVDS differential data input. Channel 1
18	RX1-	Negative LVDS differential data input. Channel 1
19	RX0+	Positive LVDS differential data input. Channel 0
20	RX0-	Negative LVDS differential data input. Channel 0
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	GND	Ground
25	GND	Ground
26	VCC	+5.0V power supply
27	VCC	+5.0V power supply
28	VCC	+5.0V power supply
29	VCC	+5.0V power supply
30	VCC	+5.0V power supply

Note (1) Connector Part No.: FI-SE30P-HF (JAE)

Note (2) The first pixel is even.

5.2 BACKLIGHT UNIT

Pin	Symbol	Description	Color
1	HV	High Voltage	Pink
2	HV	High Voltage	White

Note (1) Connector Part No.: BHR-03VS-1 (JST) or equivalent

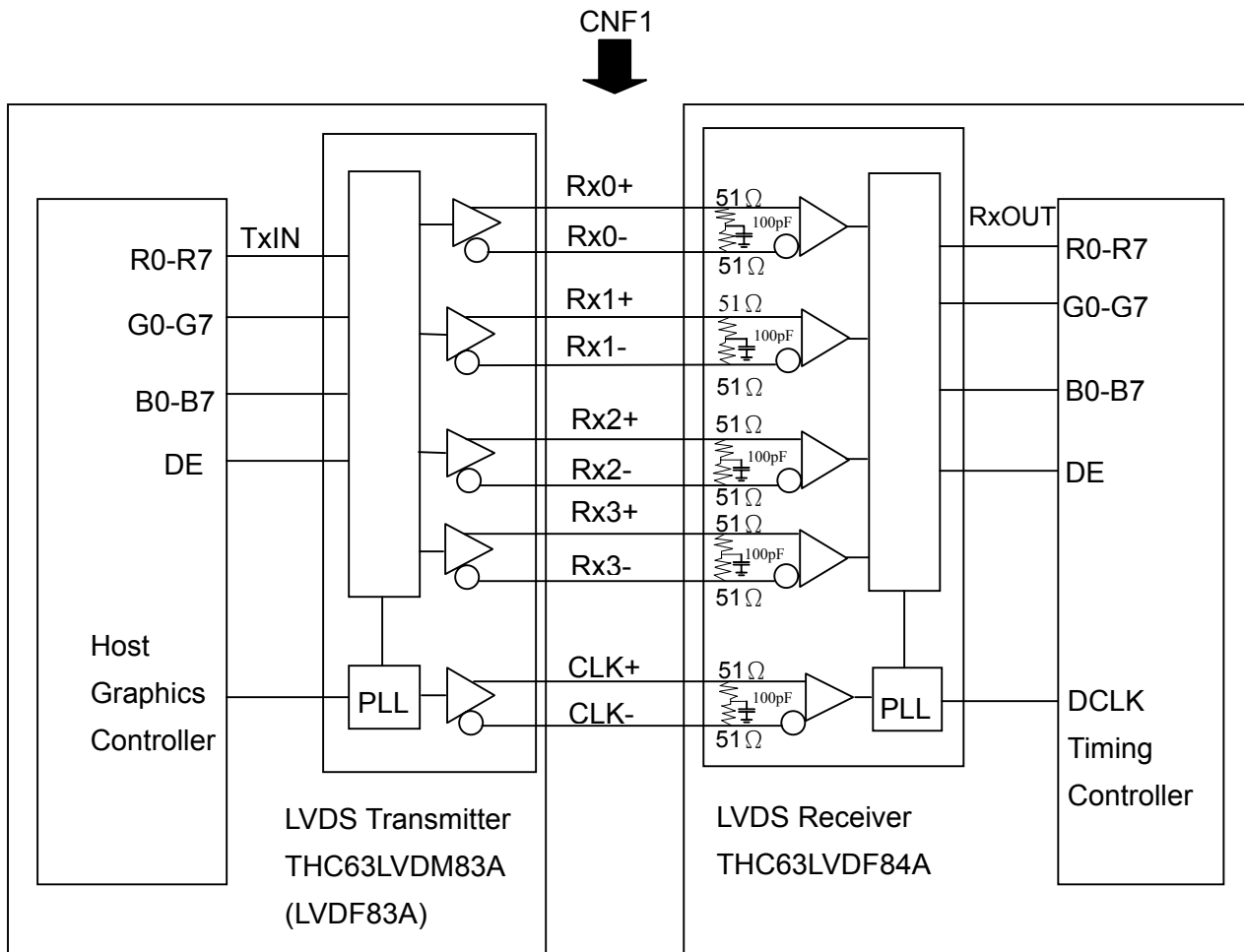
Note (2) User's connector Part No.: SM02(8.0)B-BHS-1TB (JST) or equivalent

Pin	Symbol	Description	Color
1	LV	Low Voltage	Gray
2	NC	No Connection	

Note (1) Connector Part No.: ZHR-2 (JST) or equivalent

Note (2) User's connector Part No.: S2B-ZR-SM3A-TF (JST) or equivalent

5.3 BLOCK DIAGRAM OF INTERFACE



R0~R7 : Pixel R Data
 G0~G7 : Pixel G Data
 B0~B7 : Pixel B Data
 DE : Display timing signal

- Notes:
- 1) The system must have the transmitter to drive the module.
 - 2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

5.4 LVDS INTERFACE

	SIGNAL	TRANSMITTER THC63LVDM83A		INTERFACE CONNECTOR		RECEIVER THC63LVDF84A		TFT CONTROL INPUT
		PIN	INPUT	Host	TFT-LCD	PIN	OUTPUT	
24bit	R0	51	TxIN0	TA OUT0+	Rx 0+	27	Rx OUT0	R0
	R1	52	TxIN1			29	Rx OUT1	R1
	R2	54	TxIN2			30	Rx OUT2	R2
	R3	55	TxIN3			32	Rx OUT3	R3
	R4	56	TxIN4	TA OUT0-	Rx 0-	33	Rx OUT4	R4
	R5	3	TxIN6			35	Rx OUT6	R5
	G0	4	TxIN7			37	Rx OUT7	G0
	G1	6	TxIN8			38	Rx OUT8	G1
	G2	7	TxIN9	TA OUT1+	Rx 1+	39	Rx OUT9	G2
	G3	11	TxIN12			43	Rx OUT12	G3
	G4	12	TxIN13			45	Rx OUT13	G4
	G5	14	TxIN14			46	Rx OUT14	G5
	B0	15	TxIN15	TA OUT1-	Rx 1-	47	Rx OUT15	B0
	B1	19	TxIN18			51	Rx OUT18	B1
	B2	20	TxIN19			53	Rx OUT19	B2
	B3	22	TxIN20			54	Rx OUT20	B3
	B4	23	TxIN21	TA OUT2+	Rx 2+	55	Rx OUT21	B4
	B5	24	TxIN22			1	Rx OUT22	B5
	DE	30	TxIN26			6	Rx OUT26	DE
	R6	50	TxIN27			7	Rx OUT27	R6
	R7	2	TxIN5	TA OUT2-	Rx 2-	34	Rx OUT5	R7
	G6	8	TxIN10			41	Rx OUT10	G6
	G7	10	TxIN11			42	Rx OUT11	G7
	B6	16	TxIN16			49	Rx OUT16	B6
	B7	18	TxIN17	TA OUT3+	Rx 3+	50	Rx OUT17	B7
	RSVD 1	25	TxIN23			2	Rx OUT23	Not connect
	RSVD 2	27	TxIN24			3	Rx OUT24	Not connect
	RSVD 3	28	TxIN25			5	Rx OUT25	Not connect
	DCLK	31	TxCLK IN	TxCLK OUT+ TxCLK OUT-	RxCLK IN+ RxCLK IN-	26	RxCLK OUT	DCLK

R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE : Display timing signal

Notes: 1)RSVD(reserved)pins on the transmitter shall be "H" or "L".

5.5 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	G5	G4	G3	G2	G1	G0	R7	R6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

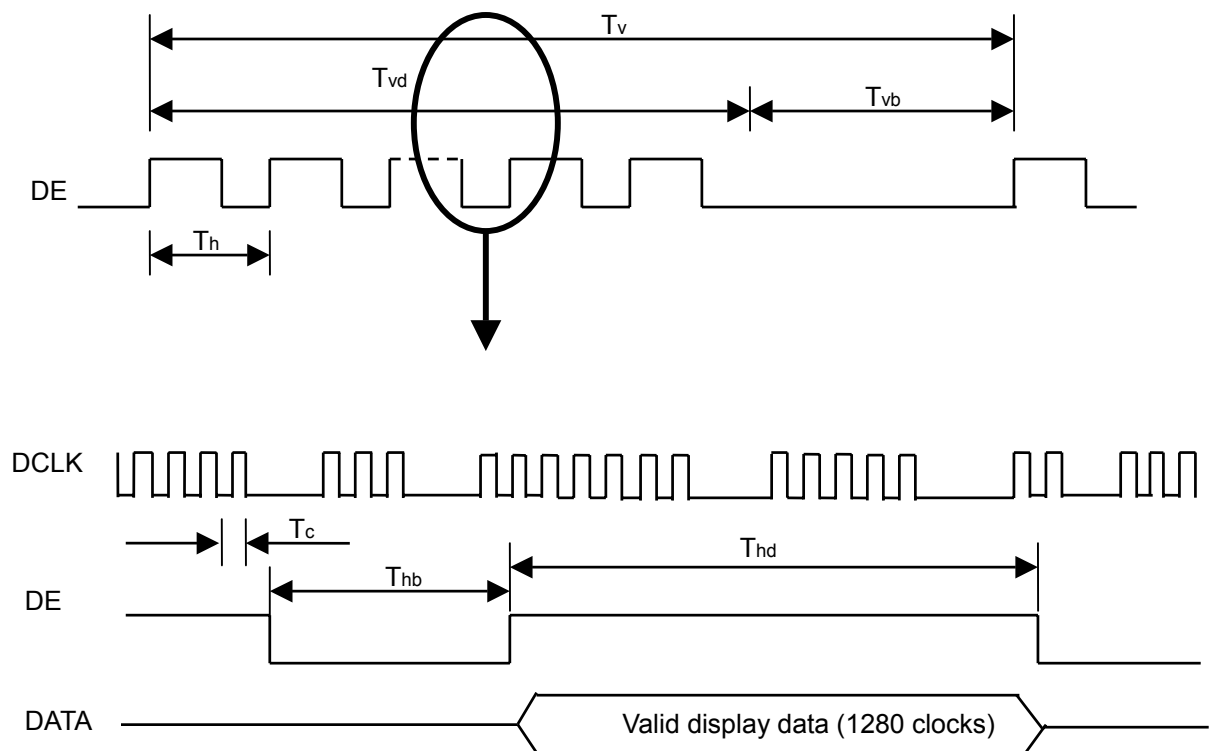
6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Clock	Frequency	1/Tc	70	74.25	80	MHZ	-
Vertical Active Display Term	Frame Rate	Fr	48	60	-	Hz	$T_v = T_{vd} + T_{vb}$
	Total	T_v	730	750	850	Th	-
	Display	T_{vd}	720	720	720	Th	-
	Blank	T_{vb}	10	30	130	Th	-
Horizontal Active Display Term	Total	T_h	1450	1650	2000	Tc	$T_h = T_{hd} + T_{hb}$
	Display	T_{hd}	1280	1280	1280	Tc	-
	Blank	T_{hb}	170	370	720	Tc	-

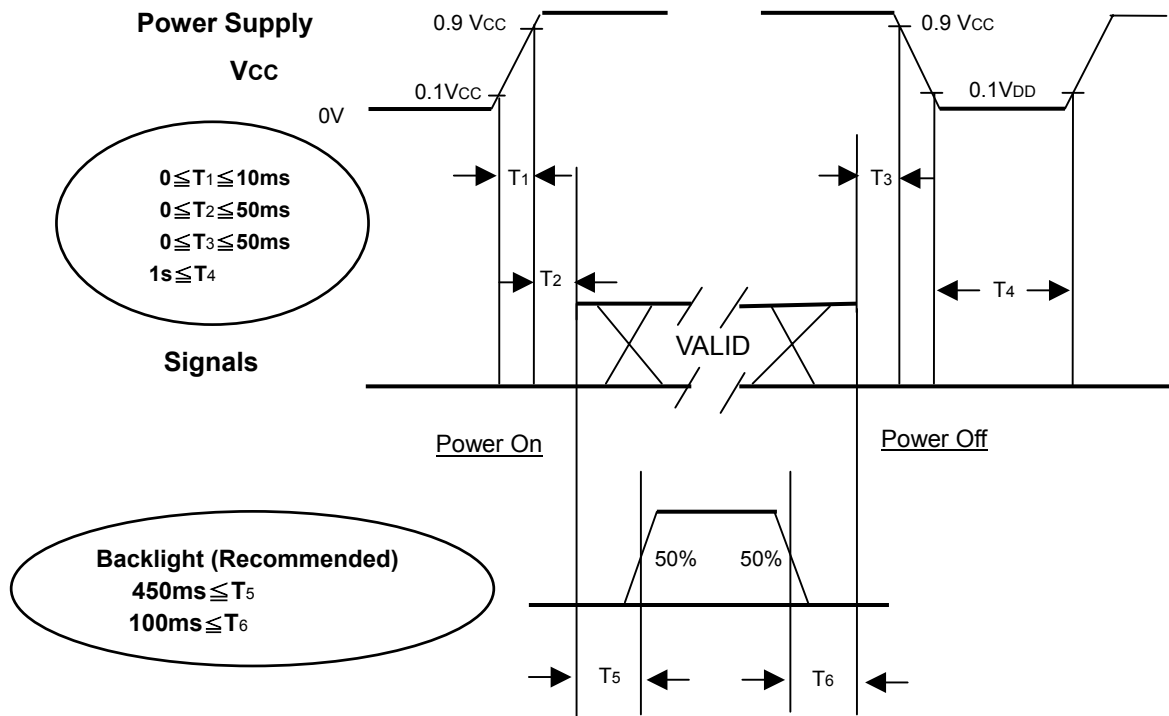
Note: Because of this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Power ON/OFF Sequence

Note.

- (1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.
- (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation of the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.
- (3) In case of VCC = off level, please keep the level of input signals on the low or keep a high impedance.
- (4) T4 should be measured after the module has been fully discharged between power of and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I _L	4.7	mA
Inverter Driving Frequency	F _L	56	KHz
Inverter		--	

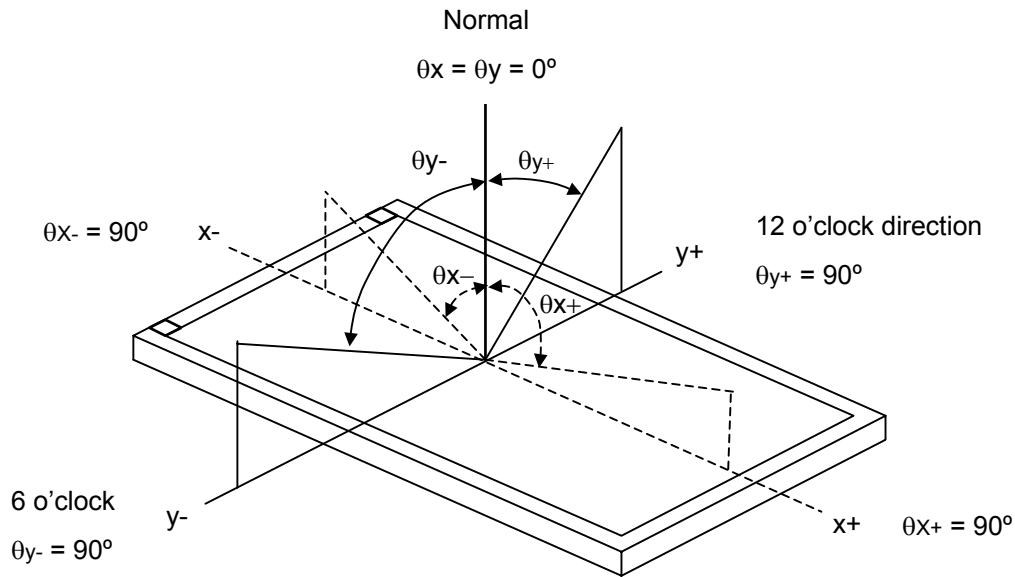
7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (7).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	400	600	-	-	Note(2)
Response Time		T _R		-	15	25	ms	Note(3)
		T _F		-	10	20	ms	
		Gray to gray			16.6		ms	Note(4)
Center Luminance of White		L _C		450	550	-	cd/m ²	Note(5)
Average Luminance of White		L _{AVE}		400	450	-	cd/m ²	
White Variation		ΔW		-	-	1.6	-	Note(8)
Cross Talk		CT		-	-	4.0	%	Note(6)
Color Chromaticity	Red	R _x		0.616	0.646	0.676	-	
		R _y		0.302	0.332	0.362	-	
	Green	G _x		0.239	0.269	0.299	-	
		G _y		0.570	0.600	0.630	-	
	Blue	B _x		0.112	0.142	0.172	-	
		B _y		0.042	0.072	0.102	-	
	White	W _x		0.255	0.285	0.315	-	9, 300K
		W _y		0.263	0.293	0.323	-	
Viewing Angle	Horizontal	θ _{x+}	CR≥10		85	-	Deg.	No gray scale inversion
		θ _{x-}			85	-		
	Vertical	θ _{y+}			85	-		
		θ _{y-}			85	-		

Note (1) Definition of Viewing Angle (θ_x , θ_y):

Viewing angles are measured by Eldim EZ-Contrast 160R



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

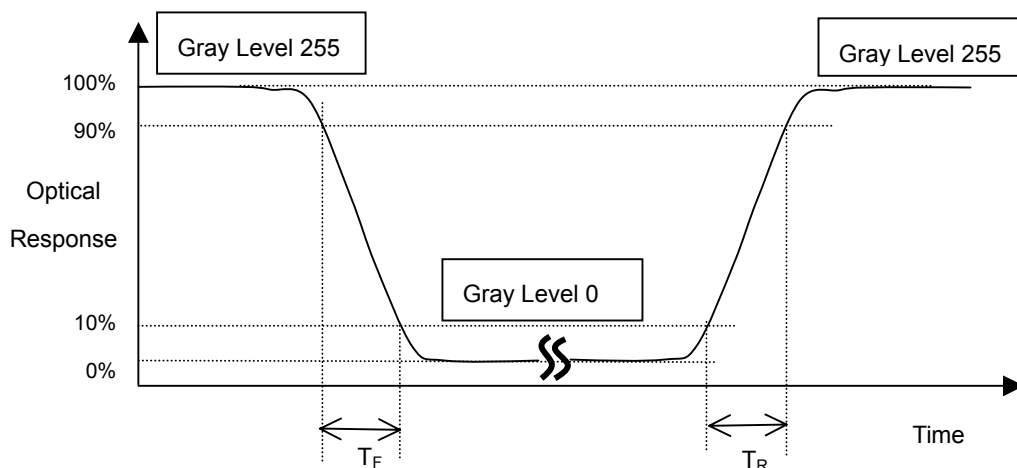
L_{255} : Luminance of gray level 255

L_0 : Luminance of gray level 0

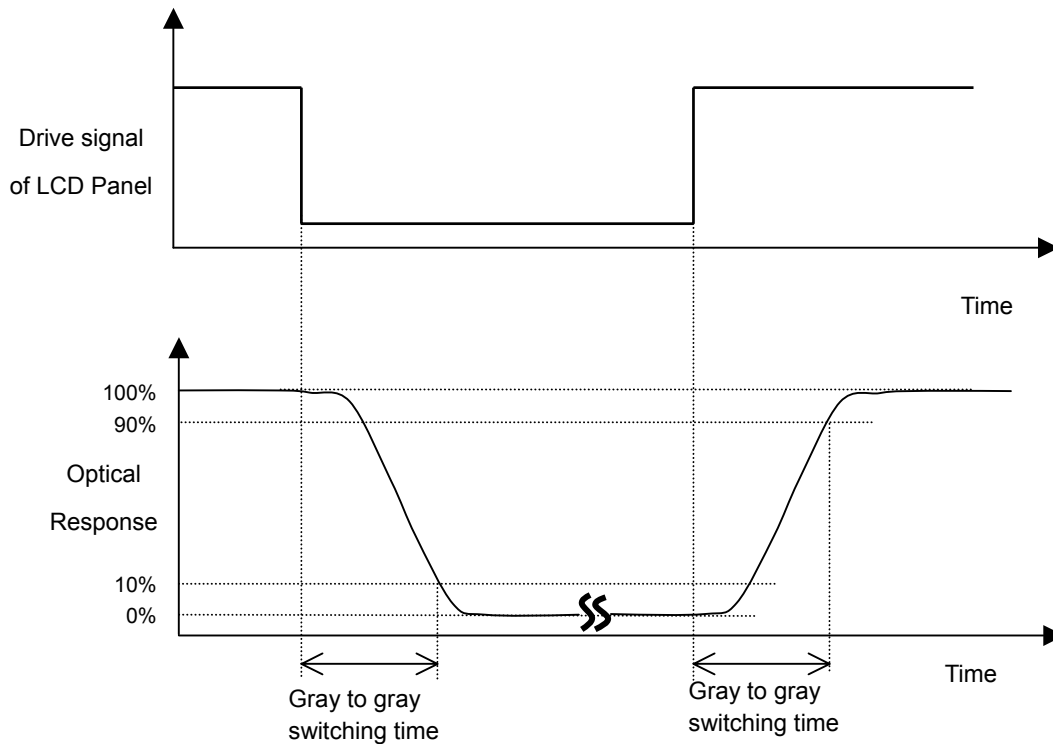
$$CR = CR(5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (8).

Note (3) Definition of Response Time (T_R , T_F):



Note (4) Definition of Gray to Gray Switching Time:



The driving signal means the signal of gray level 0,63,127,191,255.

Note (5) Definition of Luminance of White (L_C , L_{AVE}):

Measure the luminance of gray level 255 at center point and 5 points

$$L_C = L(5)$$

$$L_{AVE} = [L(1) + L(2) + L(3) + L(4) + L(5)] / 5$$

$L(x)$ is corresponding to the luminance of the point X at the figure in Note (8).

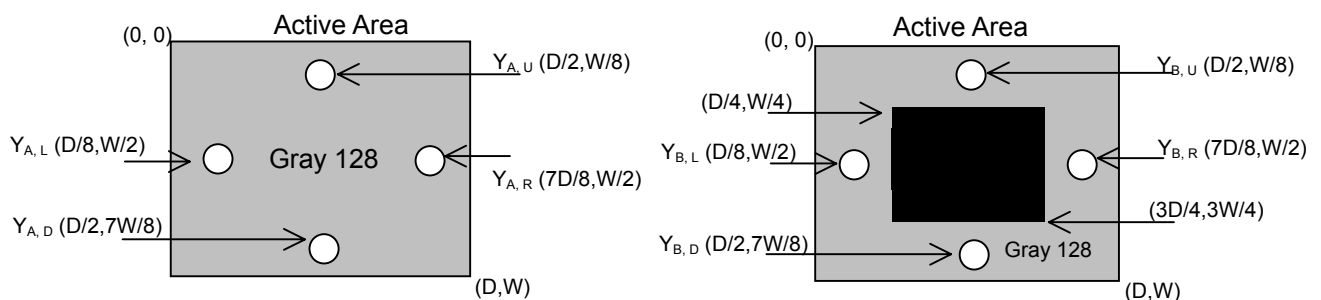
Note (6) Definition of Cross Talk (CT):

$$CT = |Y_B - Y_A| / Y_A \times 100 (\%)$$

Where:

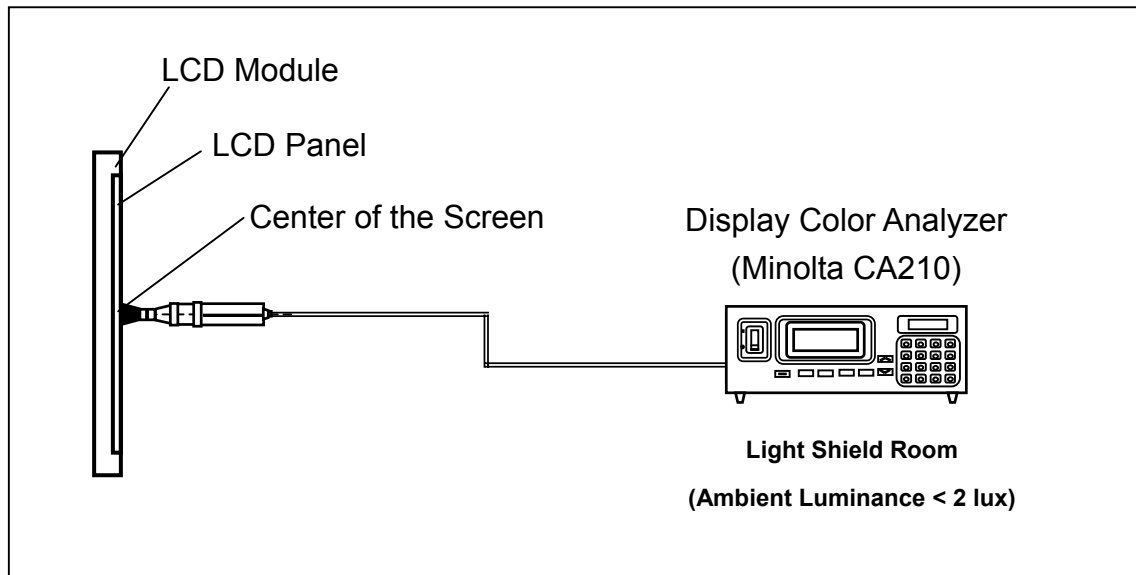
Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)



Note (7) Measurement Setup:

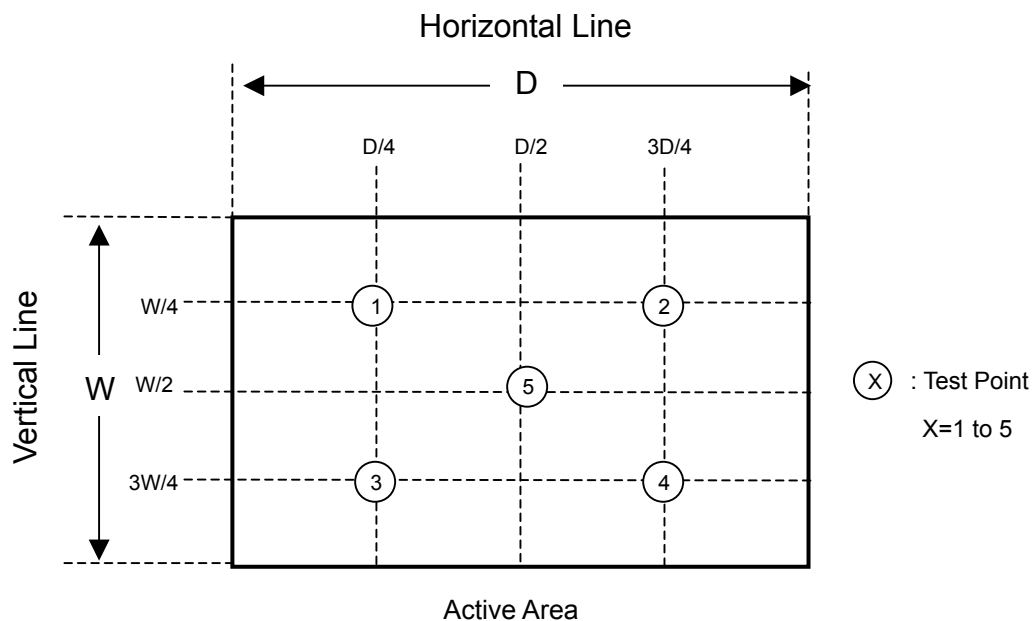
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



Note (8) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum} [L(1), L(2), L(3), L(4), L(5)]$$



8. PACKAGING

8.1 PACKING SPECIFICATIONS

- (1) 4 LCD TV Modules / Carton
- (2) Carton Dimensions : 742(L) X 327 (W) X 510 (H)
- (3) Weight : Approximately 19Kg (4 Modules Per Carton)

8.2 PACKING METHOD

Figures 8-1 and 8-2 are the packing method

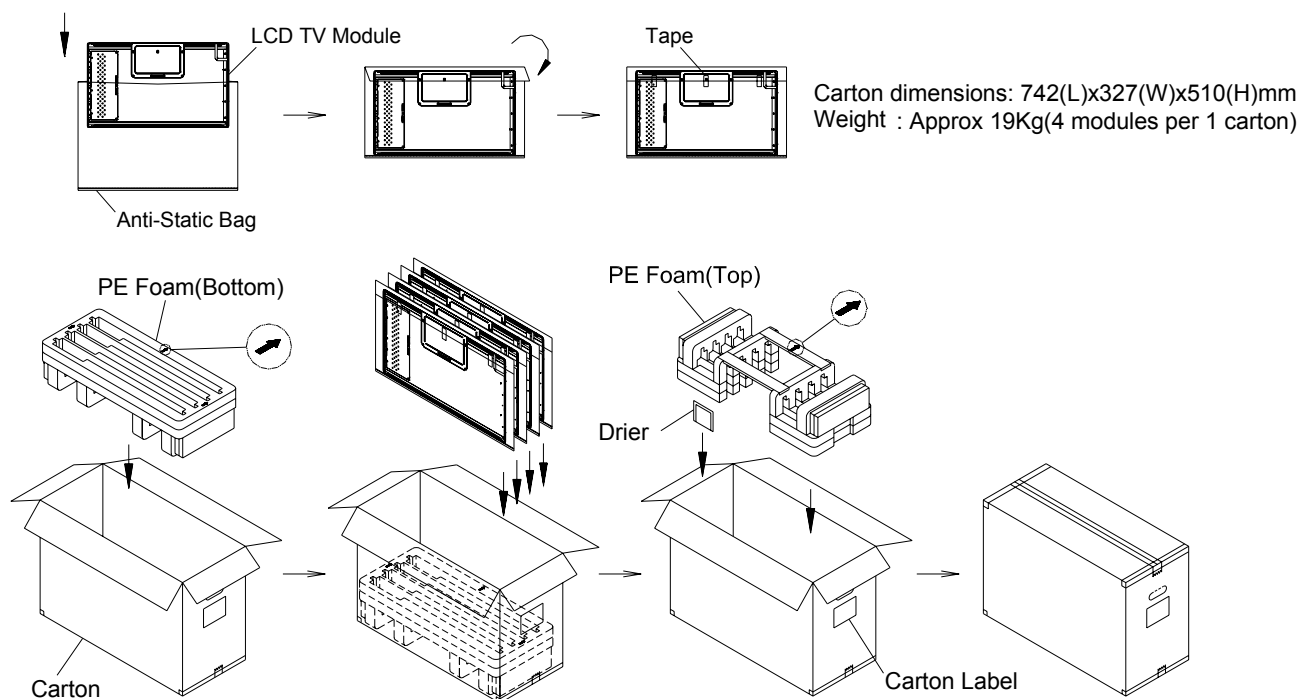


Figure.8-1 packing method

Corner Protector:L1020*50mm*50mm

Pallet:L1100*W1100*H135mm

Bottom Cap:L1100*W1100*H120mm

Pallet Stack:L1100*W1100*H1163mm

Gross Weight:180kg

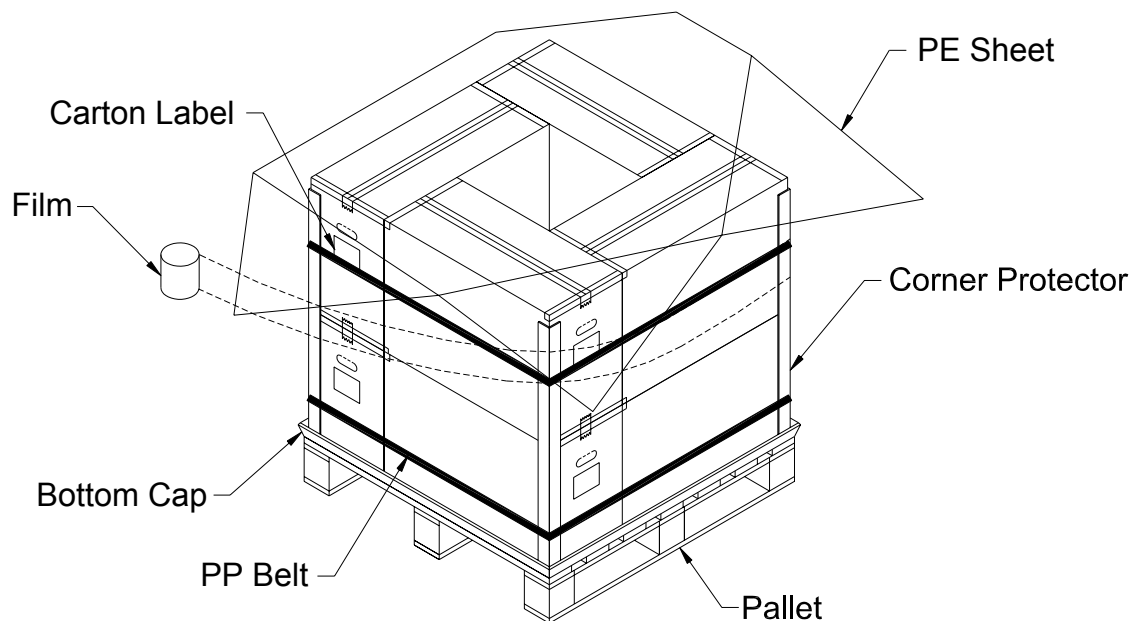
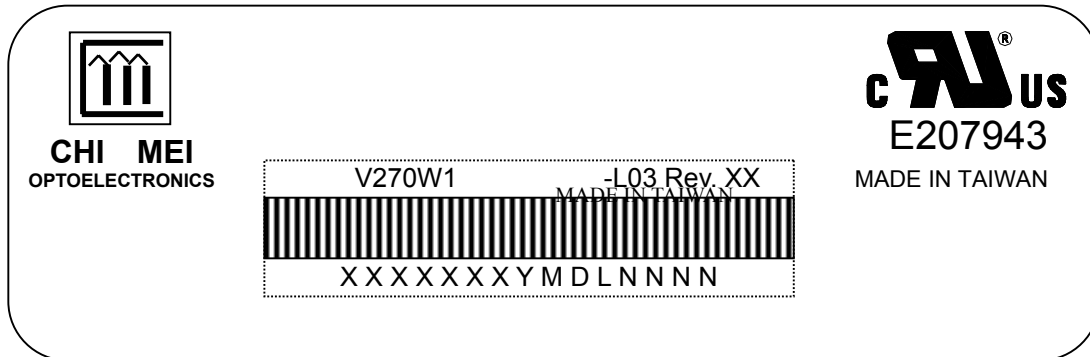


Figure. 8-2 packing method

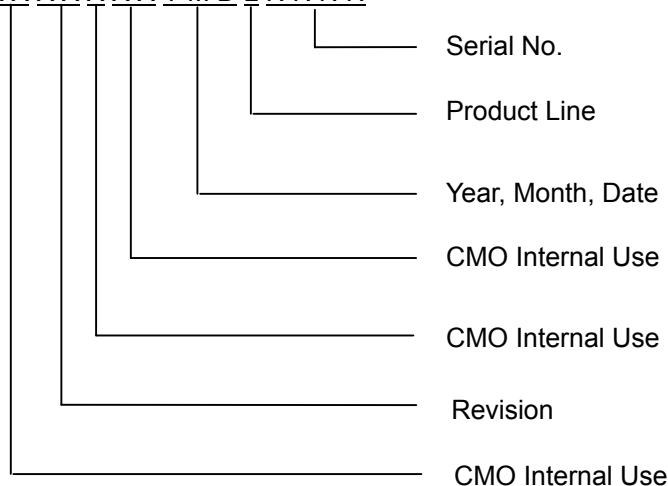
9. DEFINITION OF LABELS

9.1 CMO MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



- (a) Model Name: V270W1-L03
- (b) Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.
- (c) Serial ID: X X X X X X Y M D L N N N N



Serial ID includes the information as below:

- (a) Manufactured Date: Year: 1~9, for 2000~2009
Month: 1~9, A~C, for Jan. ~ Dec.
Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.
- (b) Revision Code: Cover all the change
- (c) Serial No.: Manufacturing sequence of product
- (d) Product Line: 1 -> Line1, 2 -> Line 2, ...etc.

10. PRECAUTIONS

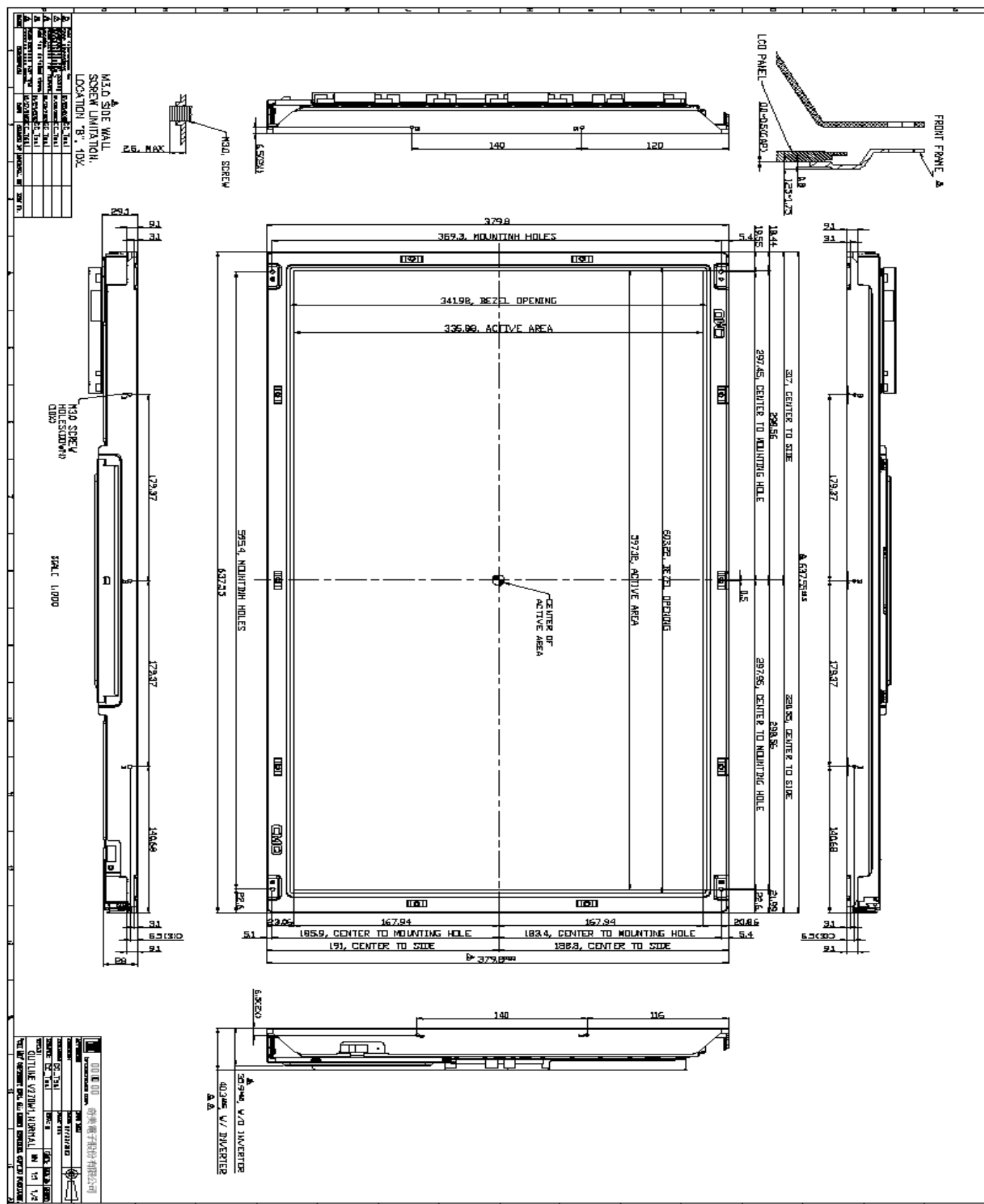
10.1 ASSEMBLY AND HANDLING PRECAUTIONS

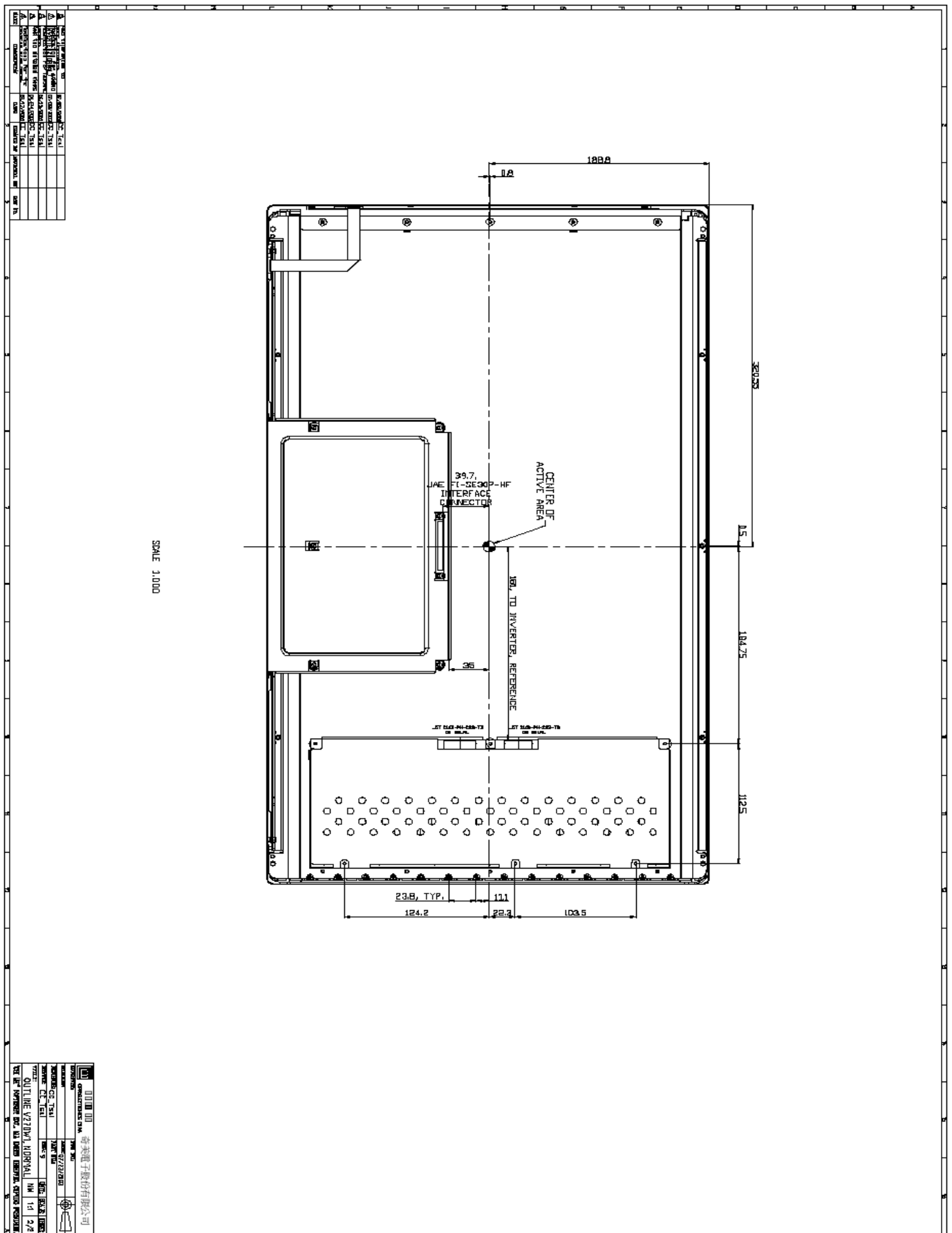
- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It is recommended to assemble or to install a module into the user's system in clean working areas.
The dust and oil may cause electrical short or worsen the polarizer.
- (3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of CCFL will be higher than that of room temperature.

10.2 SAFETY PRECAUTIONS

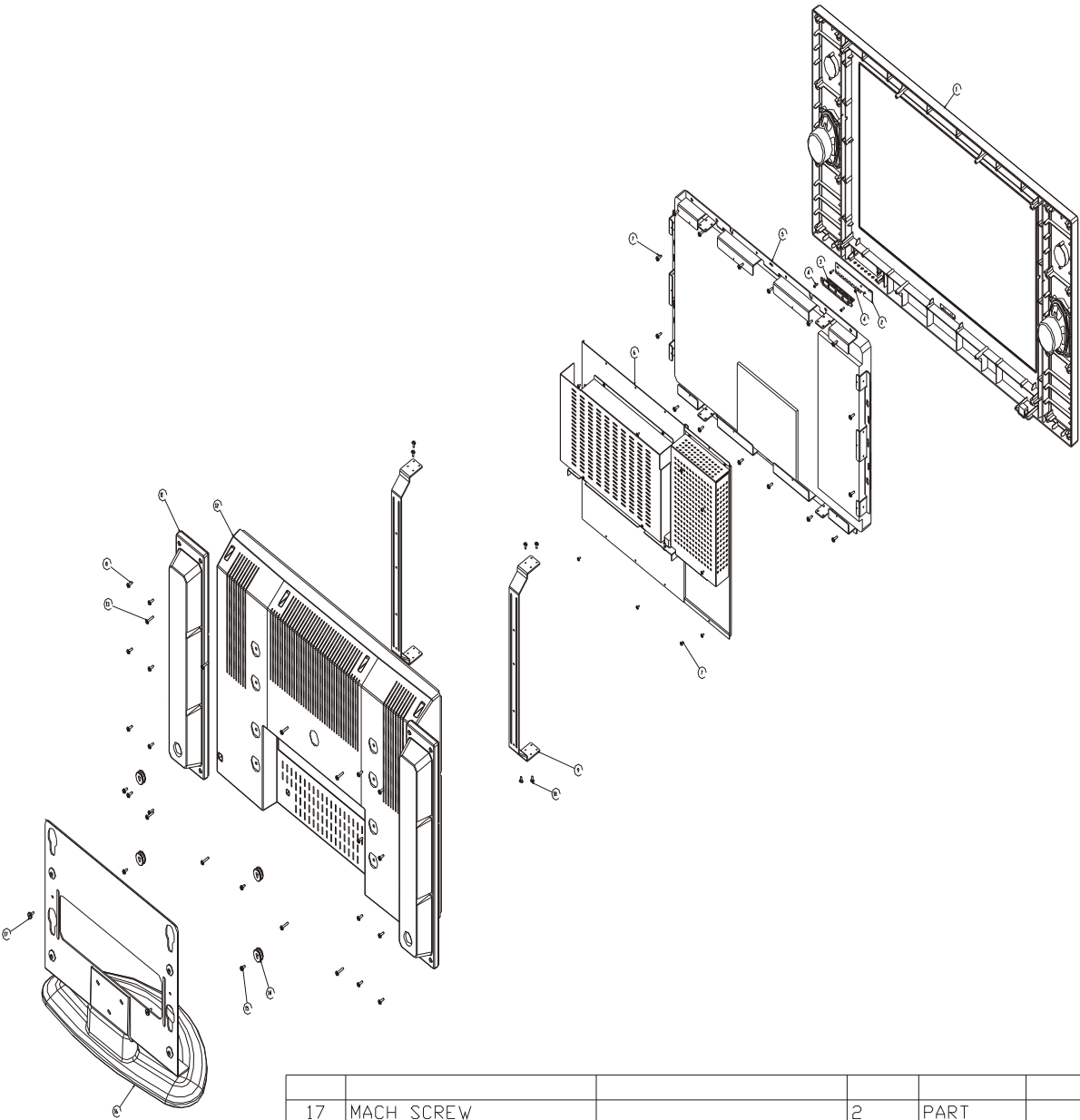
- (1) The startup voltage of a Backlight is approximately 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the Backlight unit.
- (2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (3) After the module's end of life, it is not harmful in case of normal operation and storage.

11. MECHANICAL CHARACTERISTICS





Exploded View Diagram



17	MACH SCREW		2	PART	
16	SEAT_ASS		1	ASSEMBLY	
-	SPCKET_PVC_PLATE		1	PART	
15	MACH SCREW		4	PART	
14	BKT_1		4	PART	
13	SELF TAPPING SCREW		8	PART	
12	BACK_CAB_26_1		1	PART	
11	SPK_ВПХ_В1		2	PART	
10	MACH SCREW		8	PART	
9	MTG_BKT_26_2		2	PART	
8	SELF TAPPING SCREW		32	PART	
7	MACH SCREW		9	PART	
6	MAIN_PCB_MTG_ASS_2		1	ASSEMBLY	
5	27PANEL_ASS		1	ASSEMBLY	
4	SELF TAPPING SCREW		4	PART	
3	F_KEY_L26_1		1	PART	
2	KEY_PCB_ASS_26_1		1	ASSEMBLY	
1	FRPNT_CAB_ASS_LC27		1	ASSEMBLY	
ITEM	DESCRIPTION	PART №	QTY.	TYPE	REMARK

SPARE PART LIST

LC26HABCUSXM1-A02

AKAI

MICO

USA

LCT2716(FULL PIP)

Item	Component	Description/Country Origin	Unit	Quantity
一, ELECT PART				
1	E1301-041090	CAPACITOR EC V A SAIL 100M 16DC T05	PCS	1
2	E1501-001001	RESISTOR CBF H 1/6W 100J T52	PCS	1
3	E1501-001004	RESISTOR CBF H 1/6W 103J T52	PCS	7
4	E2509-094001	DIODE LED A D3.0 GR/RD (LT036	PCS	1
5	E2701-023002	DETECTOR IR AT138A	PCS	1
6	E3101-171001	PLUG V HX2007(PH)-12A P2.0 12P WHT	PCS	1
7	E3204-023001	SOCKET AC HF-301 FOR 26LA	PCS	1
8	E3403-001001	TUBE SHRINKABLE D30.0 BLK 600V	M	0.04
9	E3403-004001	TUBE SUMITUBE D5.0 BLK 600V	M	0.105
10	E3403-005001	TUBE SHRINKABLE D20.0 BLK	M	0.03
11	E3421-229007	WIRE ASSY 1H3.96-2KN3 0N2 L400 CJ	PCS	1
12	E3421-925029	WIRE ASSY PH2.0-12Y/12Y L=550MM KEY	PCS	1
13	E3421-925030	WIRE ASSY PH2.0-8Y/8Y 5V/12V L=220	PCS	1
14	E3421-925031	WIRE ASSY PH2.0-5Y/5Y L=250MM 5VSB	PCS	1
15	E3421-925032	WIRE ASSY PH2.0-4Y/4Y L=450MM AMP2	PCS	1
16	E3421-925033	WIRE ASSY PH2.0-12Y/12Y L=250MM IN	PCS	1
17	E3421-925034	WIRE ASSY PH2.0-10Y/10Y L=250MM INV	PCS	1
18	E3421-925035	WIRE ASSY PH2.0-4Y/4Y L=100MM AUDI	PCS	1
19	E3421-925036	WIRE ASSY PH2.0-12Y/12Y L=280MM TU	PCS	1
20	E3421-925037	WIRE ASSY TTJC3-2Y L=450MM SPK-R	PCS	1
21	E3421-925038	WIRE ASSY TJC3-2Y L=850MM SPK-L	PCS	1
22	E3421-925039	WIRE ASSY LVDS L=300MM 30P/30P	PCS	1
23	E3421-925040	WIRE ASSY TJC3-6Y/6Y L=350MM POWER	PCS	1
24	E3421-941001	WIRE ASSY 1KN5-2TKN0 45 L110 BJ	PCS	1
25	E3451-000406	WIRE WD 1672#20 RED L=250MM	PCS	1
26	E3451-000407	WIRE WD 1672#20 BLACK L=250MM	PCS	1
27	E3731-052020	PCB KEY V0 124.5X20.5MM W 1.6MM 2 LA	PCS	1
28	E4101-027001	SWITCH POW MR-22-N2BB-F2 ROCKET	PCS	1
29	E4102-044001	SWITCH TACT H 6*6*5W	PCS	7
30	E4801-123001	SPEAKER 8 OHM 10W D2.5X4" YDT711 (SG	PCS	2
31	E6203-024001	DISPLAY LCD 27" V270W1-L03	PCS	1
32	E7802-004001	PCB ASSY MAIN BOARD FOR 27" LCD MICO	SET	1
33	E7802-004002	PCB ASSY POWER200 BOARD FOR 27" LCD	SET	1
34	E7802-004003	PCB ASSY TUNER AMP BOARD FOR 27" LCD	SET	1
二, MECH PART				
1	200-26LA21-03AV	CABINET FRONT SIL (L/S-01) + BLK (SA	PCS	1
2	202-26LA11-01AV	BACK CABINET 26LA A (470+70%)	PCS	1
3	206-26LA01-01PV	THE BACK COVER SPEAKER 26LA P (470	PCS	2
4	230-26LA11-01RV	STAND COVER 26LA R (470+70%)	PCS	1
5	269-290803-01S	POWER LENS (D) 2908	PCS	1
6	269-290804-01L	SENSOR LENS (D) 2908	PCS	1
7	277-26LA01-01S	FUNCTION KNOB 26LA	PCS	1
8	361-101261-01	CABLE TIE	PCS	5

9	370-42D101-01	RUBBER FOOT 20X20X7.0MM 42D1	PCS	4
10	379-972501-01Y	SPECIAL RUBBER PARTS SPK 9725	PCS	8
11	379-972502-01Y	SPECIAL RUBBER PARTS 9725	PCS	8
12	388-L27AB01-01H	POWER PLATE AKAI LC26HAB H	PCS	1
13	389-26LA01-05H	PVC PLATE AKAI FOR TERMINAL SHEET LC	PCS	1
14	389-26LA02-01H	OTHER PVC PLATE 26LA	PCS	2
15	389-27LA01-01H	PVC SHEET FOR BACK CABINET GATE	PCS	1
16	423-27LA07-01	STAND SUPPORT PLATE SPCC 27LA	PCS	1
17	423-27LA08-01	METAL PLATE FOR STAND SUPPORT PLATE	PCS	1
18	423-27LA09-01	METAL PLATE FOR WALL BRACKET 27LA	PCS	2
19	426-27LA11-01	SUPPORT BRACKET FOR POWER JACK 27LA	PCS	1
20	428-27LA11-01	MAIN METAL PLATE FOR PANEL 27LA	PCS	1
21	436-27LA01-01	BACK TERMINAL SHEET 27LA	PCS	1
22	449-27LA01-01	METAL PLATE FOR STAND BASE	PCS	1
23	481-27LA01-01	SHIELD COVER FOR MAIN PCB 27LA TINPL	PCS	1
24	481-27LA02-01	SHIELD COVER FOR POWER PCB 27LA TINP	PCS	1
25	486-M32111-01	NAME PLATE M AKAI	PCS	1
26	521-100105-01	FELT PAPER 100X10X0.5	PCS	10
27	521-150105-01	FELT PAPER 150X10X0.5	PCS	25
28	563-119-	SERIAL NO. LABEL	PCS	1
29	579-LC2701-02	UPC LABEL (50X23MM) OF UNIT LCT2716	PCS	1
30	579-LC2702-02	UPC LABEL OF G/B LCT2716	PCS	2
31	580-L26AB01-03	IB E FOR AKAI LC26HAB USA MICO	PCS	1
32	590-LC2701-02	WARRANTY CARD AKAI LCT2716 216X279	PCS	1
33	590-LC2701-03	INSERTION CARD AKAI LC26HAB	PCS	1
34	601-305008-00	MACH.SCREW CTS 3X8 BZN +	PCS	3
35	601-305010-00	MACH.SCREW CTS 3X10 BZN +	PCS	5
36	602-305004-10	MACH. SCREW PAN-WASHER M3X4 NIP +H	PCS	30
37	602-305008-10	MACH.SCREW WHR 3X8 NIP +	PCS	12
38	604-305022-00	MACH. SCREW BINDING M3X22MM B ZNP +H	PCS	2
39	604-508022-00	MACH. SCREW BINDING M5X22MM B ZNP +H	PCS	8
1	610-300210-10	TS RBD3X10 A NIP +H	PCS	11
2	614-300108-10	S-TAP SCREW BID 3.0X8	PCS	4
3	614-400412-10	S-TAP.SCREW BID 4X12 D NIP +	PCS	40
4	614-400420-10	S-TAP.SCREW BID 4X20 T NIP +	PCS	8
5	615-400414-10	S-TAP.SCREW BWH 4X14 T NIP +	PCS	8
6	802-005005-20	TAPE 2S T4000 5X50M	RLS	0.0198

三, PACKING

1	300-27AB01-02C	POLYFOAM TOP 27AB	PCS	1
2	300-27AB02-02C	POLYFOAM BOTTOM 27AB	PCS	1
3	310-111404-07V	POLYBAG 11"X14"X0.04	PCS	1
4	310-453510-07V	BAG LAMIFILM	PCS	1
5	510-27LA02-02K	GIFT BOX AKAI LCT2716 (MICO) K	PCS	1
7	E3404-157001	AC CORD UL 1.88M MET-4D7+SJT 16AWG/	PCS	1
8	E7301-010002	BATTERY AAA R03P1.5V <2>	PCS	2
9	E7501-051004	REMOTE CRTL FOR 27" USA LCT2716	SET	1

If you forget your V-Chip Password

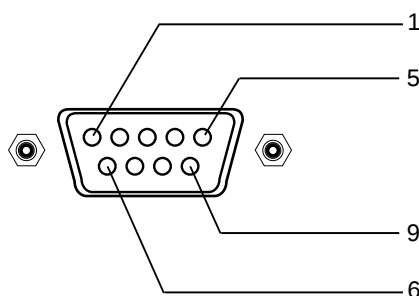
- Omnipotence V-Chip Password: **8205**.
- Press **MENU** button.
- Press **LEFT RIGHT** buttons to highlight "MISC" Menu.
- Press **Up, Down** buttons to highlight "Parental".
- Press **ENTER** button to pop up "Input your Password Please".
- Use the **Number buttons** (0~9) to enter an omnipotence Password.
- Press **ENTER** button to confirm and you can select "CHANGE PASSWORD".
- Suggest: Change to your familiar Password again.

Software upgrade

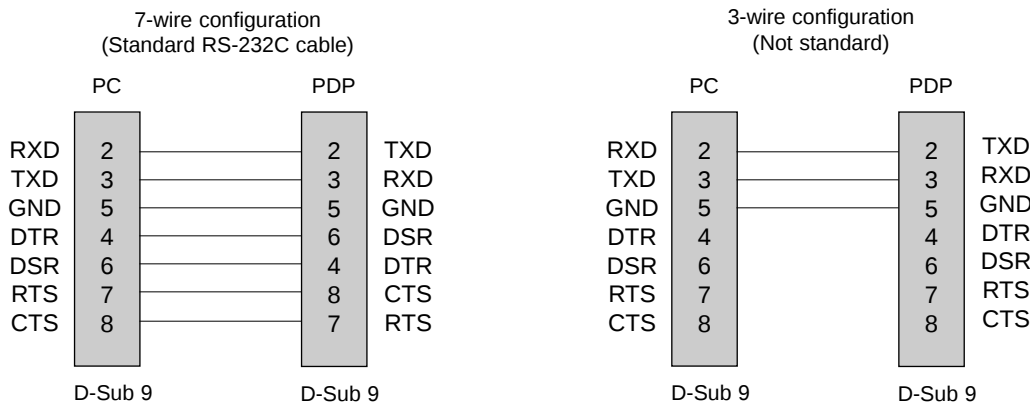
- Connect the RS-232C input jack to an external control device (such as a computer) and software upgrade.

Type of connector; D-Sub 9-pin male

No.	Pin name
1	No connection
2	RXD (Receive data)
3	TXD (Transmit data)
4	DTR (DTE side ready)
5	GND
6	DSR (DCE side ready)
7	RTS (Ready to send)
8	CTS (Clear to send)
9	No Connection



RS-232C configurations



Software upgrade Process

- Power Switch OFF.
- Connect the serial port of the control device to the RS-232 jack on the LCD-TV back panel.
RS-232C connection cables are not supplied with the LCD-TV.
- Power Switch ON. The power indicator on the front of the panel should now display red, means that the LCD-TV is in standby mode.
- Copy the software (MTKTOOL) to the computer.
- Open the software (MTKTOOL.EXE)
- Select MTK 8205 and Point "browse" on the interface of the MTKTOOL.exe.
- Select the file which will be update.
- Point "update" on the interface of the MTKTOOL.exe.
- Waiting for the upgrader programing, when it is finished, the bar will display 100%.
- After the upgrader is finished, shut down the power switch, take out the RS-232C connection after the power indicator is extinguished.

Note: After upgrading, the first time of power on will be some long.