AD3710
QPSK DIGITAL MODULATOR

USER'S MANUAL

CONTENTS

1 Safety instruction

1.1 Before starting using this unit, please be sure to refer to this manual.

1.2 Do not to open the cabinet, otherwise the guarantee to repair are not available. Meanwhile touching the inside makes you in great danger of electric shock.

1.3 Please make sure to cut off the power supply if you will not use this unit in long term, and do not use any broken jack, which could result in fire or electric shock.

1.4 Wet hands are forbidden to touch the power jack, to avoid risk of electric shock.

1.5 Please pull the plug itself instead of the wire when you pull out power plug,.

1.6 Any thing flammable and metal or liquid, which will destroy the unit, must be kept out the box.

1.7 Do not place this unit in a location near a heat source such as radiator or air ducts, or in a place exposed to direct sunlight, excessive dust, moisture, rain, mechanical vibration.

1.8 Keep the device working in a good ventilative environment, if not the destruction will occur.

1.9 Please keep the packaging for the safety of transit.

NOTE: After all parameters are set up, please press the LOCK button. When LCD display is dark, the protection function takes effect.

2. Composition of system and operating principle

2.1 Composition of system
THE SYSTEM CONSISTS UNITS OF THE FOLLOWING CHART
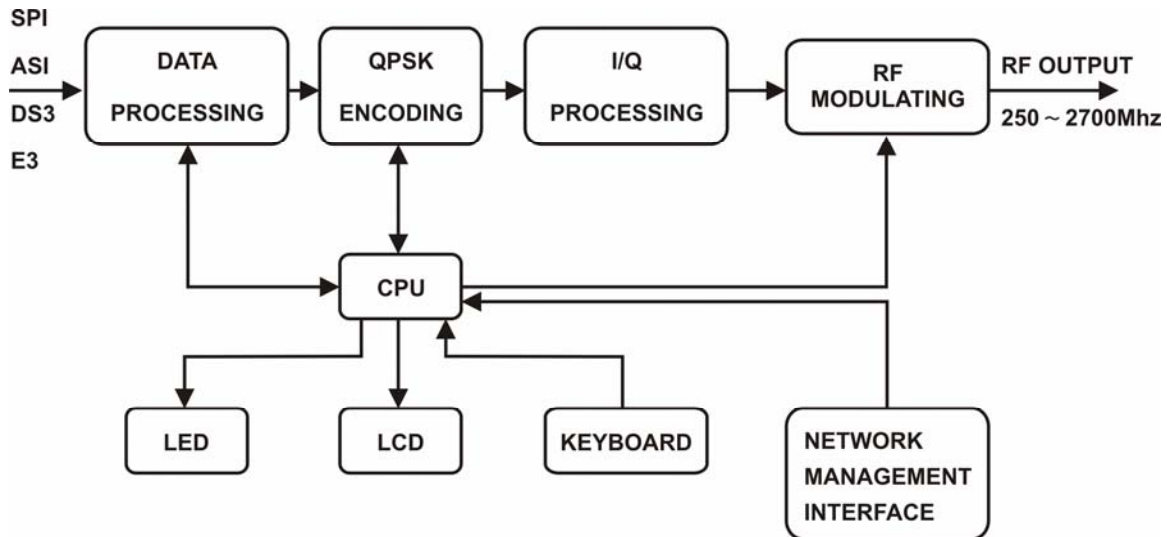
QPSK Digital Modulator is mainly composed of the following modules:
◆Data processing unit
The unit converts signals from different interfaces into standard signal, then make data processing to carry out the preprocess of QPSK modulating.
◆QPSK modulating unit
The unit modulates data stream into frequency spectrum signal.
RF output250MHz～2700MHz
◆CPU/LCD/LED/Keyboard unit
The unit carries out keyboard input, LED display and intelligent control, etc.

2.2 Operating principle
AD3710 QPSK Digital modulator converts input data streams into frequency signals, it meets to DVB-S standard. Signals from MPEG-II compact encoder or multiplexer was sent into QPSK modulator. According to DVB standard, such as interlacing, RS error correction encoding, etc. After up-converting into the range of TV channels, signals can be transmitted through HFC and MMDS networks. It's widely used in digital TV, data broadcasting, VOD, Internet, video conference etc.

3. Main features

DVB-S Standard for error correction encoding,

Input bit rate:：1～60M bps

Output symbol rate:：1～45Mbaud(adjustable)，1Kbaud step

Output band width:：1.25～56.25MHz(Roll-fall modulus0.25)

Output level：100dBuV～110dBuV(step adjustable)

188 and 204 packet automatic identification

Output frequency 250MHz～2700MHz(adjustable in segment)，min step:50KHz

NIT mapping and sending, support 44 NIT mapping

PID filtering and re-mapping

PSI/SI information pick-up, parse and modification

SI information replacement and insert

Input data null packet filtering and output data filling.

PCR correction

Show and inspect system input bit rate and valid bit rate real time

4. Technical specification

4.1 Data interface

4.1.1 ASI interface (Asynchronous Serial interface)

A：Input:
 Connector: BNC
 Impedance: 75Ω
 Packet format: 188/204 bits
 Access data rate: 270Mbps
 Max valid bit rate: 60Mbps
 DVB standard

B: Loop output:
Connector: BNC
Impedance: 75Ω

4.1.2 SPI input interface (Synchronous Parallel interface)
 Connector: DB-25 female
 Packet format: 188 or 204 bits
 DVB Standard: LVDS

4.2 RF interface
A. RF output:
Connector: BNC
Impedance: 75Ω
Output Frequency: 250MHz～500MHz, 450MHz～950MHz，950MHz～1800MHz（Supplied by different unit）
Reflect loss ≥15dB
Output level: 100~110dBuV (adjustable)
Carrier rejection: > 55dB
SNR(out of band):≥45dB
B: RF output for test
Connector: BNC
Impedance: 75Ω
Output level: 85dBuV~100dBuV (adjustable)

4.3 Channel signal encoding

Constellation: QPSK

Channel encoding: RS encode, DVB-C/DVB-S standard

MER:≥40dB

SNR(out of band):≥45dB

4.4 Network management interface

IEEE802.3 ETHERNET, RJ45 interface

Software protocol: SNMP protocol

4.5 Power supply

Voltage: 165~265VAC or 85V~265V AC

Frequency: 50Hz±2%

Power consumption: 50W

4.6 Operation environment

Operation temperature: +5~45°C;

Storage temperature: -25~+55°C.

Relative humidity: 10~75%

4.7 Radiation and safety

Up to GB13837-92 and GB8898-88

4.8 Mechanic characteristics

Dimension: 44.5mm(1U)*483mm*(19")*400mm

Weight: 6kg

4.9 E3 /DS3 Interface (optional)

A: Input (G.703 standard)

Connector: BNC

Impedance: 75Ω

Packet format 188/204 bits

Bit rate: E3/DS3 No-frame format (34.368Mbps/44.736Mbps)

B: Output (loop)

Connector: BNC

Impedance: 75Ω

Note: The information contained herein is subject to change without notice.

5. Equipment connection

5.1 Panel display and keyboard

A. Panel display
  a. LED instruction
    Power
    Sync
    Alarm
  b: LCD
B: Keyboard
    ARROW KEYS (UP/DOWN/LEFT/RIGHT)
    ENTER
    LOCK: press once to lock; press once again to unlock
    MENU

5.2 Front Panel Sketch

5-1 Front panel

5.3 Rear panel sketch
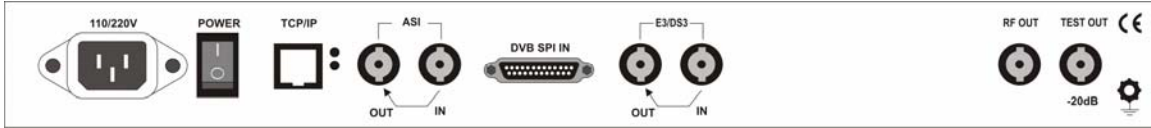
5-2 Rear panel

5.4 SPI input and output interface characteristics

No	Signals	Description	No	Signals	Description
1	CLK-A	Signal clock	14	CLK-B	Signal clock
2	GND	GROUND	15	GND	GROUND
3	D7-A	DATA 7	16	D7-B	DATA 7
4	D6-A	DATA 6	17	D6-B	DATA 6
5	D5-A	DATA 5	18	D5-B	DATA 5
6	D4-A	DATA 4	19	D4-B	DATA 4
7	D3-A	DATA 3	20	D3-B	DATA 3
8	D2=A	DATA 2	21	D2-B	DATA 2
9	D1-A	DATA 1	22	D1-B	DATA 1
10	D0-A	DATA 0	23	D0-B	DATA 0
11	DVALID-A	DATA AVAILABLE	24	DVALID-B	DATA AVAILABLE
12	PSYNC-A	PACK SYNCHRONOUS	25	PSYNC-B	PACK SYNCHRONOUS
13	CABLE	SHEILD CABLE			

6.Parameter check and setup

6.1 Keyboard Function

Move Right/Left key: choose sub-menu/move cursor
Move up/down key: setup cursor/change parameters
Enter: confirm operations
Lock: lock/unlock the keyboard /remote-control/exit menu
MENU: Select main menu and cancel operations

Note: 1.Be sure to press ENTER key after setup the parameters, all new parameters will take effect only without *, otherwise the old parameters will be kept.
    2. Under any status of setting parameters, press LOCK key will make unit return to the status of showing operating parameters.

6.2 Operation mode select (keyboard unlocked)
Press MENU to display main menu circularly

ONCE   1.0 VIEW ALARMS ALARMS LIST EMPTY

TWICE 2.0 QPSK OUTPUT SYMBOL 27.500MBd[38.014Mbps]

THRICE 3.0 RF OUT FREQUENCY 200.0000MHz

FOUR TIMES 4.0 SIGNAL IN PORT ASI

FIVE TIMES 5.0 BYPASS SWITCH OFF

SIX TIMES 6.0 NIT TABLE MODE KEEP ORIGINAL NIT

SEVEN TIMES 7.00.0 INPUT TS ALL HAVE: 011

EIGHT TIMES 8.00.0 OUTPUT TS OUT PROGRAMS:011

NINE TIMES 9.0 QPSK OUTPUT MODE WORK AS INPUT TS

6.3 How to set and change parameters

6.3.1 Set system parameters

A、 Press MENU once: display as follows
       1.0 VIEW ALARMS
    ALARMS LIST EMPTY or NO INPUT SIGNAL or RF UNLOCK or
    BUFFER FULL or SYSTEM ERROR

B、 Press UP/DOWN key to view/change parameters /select functions
      ▾ 1.0 VIEW ALARMS
        CLRAR ALL ALARMS

C、 Press（Enter）：to store change or confirm operation
     1.0 VIEW ALARMS
       ALL ALARMS BE CLEARED

D、Press LEFT/RIGHT to view sub-menu
      ▸ 1 1.1 SET IP ADDRESS
        120.120.120.160
      ▸ 2 1.2 SET NET MASK
        255.255.255.000
      ▸ 3 1.3 SET NET GATE
        120.120.120.001
      ▸ 4 1.4 NET STATUS
        NOT CONNETTED - CONNETTED
      ▸ 5 1.5 SERIAL No.:
       XXXXXXXXXXXXXXXXXX (18-digits)
      ▸ 6 1.6 VERSION
        H：XX.XX S:XX.XX
      ▸ 7 1.7 GET PRESET PARAMETER
        *FACTORY PRESET
    Press ENTER to store exchange.
      ▸ 8 1.8 RELOAD IN INFO（Reload input parameters）
        *RELOAD IN CHANNEL(Reload input channel parameters)

E、In any status, press LOCK to exit

6.3.2 Set QPSK parameters

A、Press MENU twice: display as follows
      2.0 QPSK OUTPUT SYMBOL

    27.500MBd[38.014Mbps] or 27.500MBd[34.375MHz]

B、Press UP/DOWN to view/change parameters or select function

C、Press ENTER to store exchange or confirm operation

D、Press LEFT/RIGHT to view sub-menu

▸1   2.1 FEC MODE
          3/4 ▾ *5/6 ▾ *7/8 ▾ *1/2 ▾ *2/3

▸2   2.2 BW PREFERENCES UNIT
          uc Bitrate （valid data rate）

6.3.3 Set RF parameters

A、Press MENU three times, display as follows

3.0 RF OUT FREQUENCY：

200.0000MHz

Please refer to SET SYMBOL RATE to set new frequency.

B、Press LEFT/RIGHT to view sub-menu

▸1   3.1 RF OUTPUT LEVEL：
          115dBuV or 110dBuV

C、Press UP/DOWN to plus or minus 0.5dBuV(don't need to press ENTER)

▸2   3.2 QPSK MODULATION
          ON ▾ *OFF

▸3   3.3 RF POWER SWITCH （RF output control）
          ON ▾ *OFF

D、Press（Enter）：to store exchange or confirm operation

E、In any status, press LOCK will exit.

6.3.4 Select input interface

A、Press MENU four times：display as follows

4.0 SIGNAL INPUT IN PORT （select input interface）

INPUT FROM ASI ▾ * INPUT FROM SPI ▾ * INPUT FROM E3 ▾ * INPUT FROM DS3

▸1   4.1 SIGNAL TYPE
          188 BYTES PACKET–204 BYTES PACKET–IN PORT NO SIGNAL

▸2   4.2 IN TS ALL RATE(The total rate of input signal)
          038.051Mbps

▸3   4.3 TS EFFECT RATE(The valid rate of input signal)
          033.160Mbps

6.3.5 PID mapping and Filter

A、Press MODE 5 times：display as follows

       5.0 BYPASS SWITCH

       ON ▼*OFF

▶1   5.1 BYPASS PID0

       CH1 0032 → 0032（D）(PID bypass)

▼2   5.2 BYPASS PID1

       CH1 0032 → 0120（D）（PID mapping）

▼3   5.3 BYPASS PID2

       CH1 0032 → 8191（D）（PID filter）

▼4   5.4 BYPASS PID3

       CH1 8191 → 8191（D）（Null packet filter）

▼5   5.5 BYPASS PID4

       CH1 8191 → 8191（D）（Null packet filter）

▼6   5.6 BYPASS PID5

       CH1 8191 → 8191（D）（Null packet filter）

▼7   5.7 BYPASS PID6

       CH1 8191 → 8191（D）（Null packet filter）

▼8   5.8 BYPASS PID7

       CH1 8191 → 8191（D）（Null packet filter）

B、Press UP/DOWN key to view/change parameters or select functions

C、Press ENTER to store exchange or confirm operation

D、Press LEFT/RIGHT to view sub-menu.

E、In any status, Press LOCK to exit.

6.3.6 Insert NIT

A、Press MENU six times, display as follows

       6.0 NIT TABLE MODE

       KEEP ORIGINAL NIT ▼*EXCHANGE OLD NIT

▶1   6.1 NETWORK ID

   00001（read only）

▼2   6.2 NETWORK NAME

       TEST （ ready only）

▼3   6.3 CHANNELS IN NIT

       001（ ready only）

B、Above is controlled by NMS.

6.3.7 Check input TS parameters

A、Press MENU seven times or ENTER three times,display as follows

     7.00.0 INTPUT TS（Check input parameters）

    ALL HAVE:011（The quantity for input program）

B、Press LEFT/RIGHT to check TS identity No.

   ▶1   7.00.1 INPUT SIGNAL(The packet format of input signal)
         INPUT 188 TS PACKET（read only）

   ▶2   7.00.2 IN TS TS_ID(The ID for input TS)
         00010（read only）

   ▶3   7.00.3 IN TS ON_ID(ID for original input TS)
         00001（read only）

   ▶4   7.00. 4 IN ALL RATE(Total rate of input signal)
          038.051Mbps（read only）

   ▶5   7.00.5 IN TS EFFECT (Valid rate of input signal)
         033.160Mbps（read only）

C、Press UP/DOWN to view signal source

   ▲1   7.01.0 PROG01 NAME
         CCTV 4（read only）

   ▲2   7.02.0 PROG02 NAME
         CCTV 9（read only）

   ▲3   7.03.0 PROG03 NAME
         CCTV OPERA（read only）

         |
         |
         |

   ▲16   7.16.0 PROG16 NAME
         SHENZHEN（read only）

D、Press UP/DOWN to view/change parameters of all programs, press ENTER to tore the
   change,press MENU to exit current operation.

       ▶7.01.0 PROG01 NAME

CCTV 4（read only）

▶1　　7.01.1 PROG01(CHA01) (Select output program 1)
　　　　REMULTIPLEXED/*NOT BE MULTIPLEXED（setable）

▶2　　7.01.2 P01 CODE RATE(CHA01) (Valid rate for input program 1)
　　　　004.075Mbps（read only）

▶3　　7.01.3 P01 PMT PID(PMT PID for program 1)
　　　　0100(HEX) 0256(DEC) （read only）

▶4　　7.01.4 P01 PCR PID(PCR PID for program 1)
　　　　0902(HEX) 2306(DEC) （read only）

▶5　　7.01.5 P01 MPEG-2 V (Video PID for program 1)
　　　　0200(HEX) 0512(DEC) （read only）

▶6　　7.01.6 P01 MPEG-1 A(Audio PID for program 1)
　　　　028A(HEX) 0650(DEC) （read only）

The operation is the same as above for the parameters setup of other programs

6.3.8 Output TS setup

A、Press MENU eight times or ENTER twice, display as follows:
　　　　8.00.0 OUTPUT TS
　　　　OUT PROGRAMS:011

B、Press UP/DOWN to view/change TS ID.
　　▶1　　8.00.1 OUTPUT TS_ID
　　　　　00010 （changeable）
　　▶2　　8.00.2 OUTPUT ON_ID (Original Output TS ID)
　　　　　00001（changeable）
　　▶3　　8.00.3 CAT WORK MODE (CAT control mode)
　　　　　MAKE A NEW TABLE (Insert new CAT)
　　　　　▲*NOT MAKE NEW TABLE (Not insert new CAT)
　　▶4　　8.00.4 SDT WORK MODE (SDT control mode)
　　　　　MAKE A NEW TABLE (Insert new SDT)
　　　　　▲*NOT MAKE NEW TABLE (Not insert new SDI)

C、Press UP/DOWN to view all program source

▲1   8.01.0 P01 FROM
        PROGRAM 01 IN CHA01 (Program 1 is from channel 1)

▲2   8.02.0 P02 FROM
        PROGRAM 02 IN CHA01 (Program 2 is from channel 1)

▲3   8.03.0 P03 FROM
        PROGRAM 01 IN CHA01

        |

        |

        |

▲16   1 8.16.0 P16 FROM
        PROGRAM 11 IN CHA01

D、Press UP/DOWN to view/change parameters of all programs, press ENTER to tore the change,press MENU to exit current operation.

►1   8.01.1 P01 NAME
        CCTV 4 (changeable)

►2   8.01.2 P01 NUMBER (Program ID NO. of output program 1)
        00001（changeable）

►3   8.01.3 P01 PMT PID(PMT PID of output program 1)
        0100(HEX) 0256(DEC)
        (Re-mapping available，setup to be 8191 to filter PID)

►4   8.01.4 P01 PCR PID(PCR PID for program 1)
        0902(HEX) 2306(DEC)
        (Re-mapping available，setup to be 8191 to filter PID)

►5 8.01.5 P01 MPEG-2 V(Video PID for program 1)
      0200(HEX) 0512(DEC)
    (Re-mapping available，setup to be 8191 to filter PID)

►6 8.01.6 P01 MPEG-1 A(Audio PID for program 1)
     028A(HEX) 0650(DEC)
     (Re-mapping available，setup to be 8191 to filter PID)

The operation is the same as above for the parameters setup of other output programs

6.3.9 NIT setup

A、Press MENU nine times or ENTER once9,display as follows:

    9.0 QPSK OUTPUT MODE

    WORK AS INPUT TS

    ▾ * WORK AS OUTPUT TS

B、Press LEFT/RIGHT to view/change NIT info, press ENTER to confirm the exchange and press MENU to exit current operation.

    ▸ 1   9.1 QPSK OUTPUT PARA

       WORKING AS SETTING

       ▾ * REBUILDING PARA

       Or NEED REBUILD PARA

7、 System errors and debugging

7.1 Indicator lights

There are three LED indicator lights.

1)"POWER" lights up (Red) means power switch on and working orderly.
2) " STATUS" lights up(Green) means synchronization clock working orderly.
3) "ALARM" lights up(Green) means data processing working orderly.

7.2 Trouble Shooting

7.2.1 The "POWER" indicator light does not illuminate.
Please check the wire to make sure the wire is connected to the socket properly and the power switch is on.

7.2.2"STATUS" illuminates (in red)
This means lack of synchronal signals or input data abnormal or no valid data input, please check the input data cable is connected properly, and the input interface is selected correctly. If the answer is yes, it means the unit is broken, needs to be replaced.

7.2.3"AIARM"flashes
This means the equipment is out of order for some faults. Please debug according to the instruction from LCD.

8、Network management

The unit could be controlled remotely via network management software.
Please refer to 《NMS user's manual》