

AKAI




SERVICE MANUAL

Model: LCT3701AD
J

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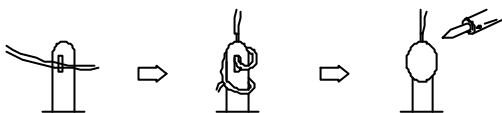
.....
: This manual is the latest at the time of printing, and does not
: include the modification which may be made after the printing,
: by the constant improvement of product.
:

I. Safety Instructions

  	<p>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.</p> <p>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.</p>
<p>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.</p>	

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.

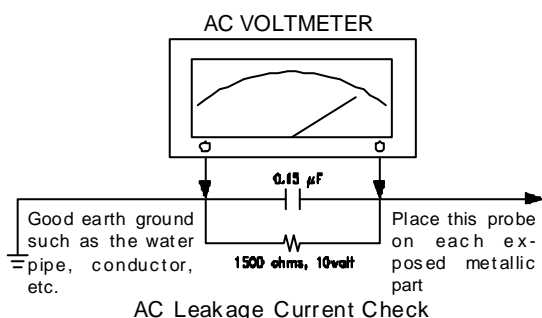
Measure the AC voltage across the combination of the 1.5K ohm resistor and 0.15 uF capacitor. Reverse the AC plug at the AC outlet and repeat the AC voltage measurements for each exposed metallic part.

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.



Product Specification

1.1 VIDEO SECTION	AUO(T370XW01-V1) MK8202 USA
Display size	37"/16:9
Display Resolution	1366 X 768
Pixel Pitch	600µm (H) x 600µm (V)
Peak Brightness	500(nits)
Contract Ratio	1000:1, Typical (1/100 White Window, Dark Room)
View Angle	Hor. And Vert. ≥170 degree
Color Deeps	16.7M Color (R / G/ B each 256 Scales)
PC Resolution Supporting	VGA, SVGA, XGA, WXGA
HDTV Compatible	480p /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, 4:3 and Panoramic.
TV System	NTSC M
Dual Tuner System	No
AV Input Color System	PAL /NTSC
PIP	Yes
1.2 AUDIO SECTION	
Audio Output Power	7W×2(8 ohm)
Sound Effect	Spatial Effect and Surround
Tone Control	Yes
1.3 Input Terminals	D-Sub 15 Pin Type (Analog-RGB Input) ×1 HDMI (Ver 1.1) Connector x 1 D-Sub 9 Pin (RS-232) RF (F-type Input) ×2 (ATV, DTV) Component Video-YPbPr × 1 RCA Terminals S-Video Input (Mini Din 4Pin) ×1 Video Input RCA Terminals Stereo Audio Input x 4
1.4 Output Terminals	Audio Output (RCA ; L&R Type) ×1
1.5 Others	
Closed Caption / V-Chip	Yes
Teletext	No
OSD Language	English,

Stereo Decode	MTS with SAP
Power Rating	AC 120V, 60Hz
Power Consumption	≤220W

1.6 Support the Signal Mode

This machine can support the different from VGA signal mode in 6 kinds

Resolution	Horizontal Frequency (kHz)	Vertical Frequency (kHz)
640 x 480	31.50	60.00
	37.86	72.81
800 x 600	35.16	56.25
	37.90	60.32
	48.08	72.19
1024 x 768	48.40	60.00

1.7 HDTV Mode (YPbPr)

Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)
480i	15.734	59.94
480p(720x480)	31.468	59.94
720p(1280x720)	45.00	60.00
1080i(1920x1080)	33.75	60.00

DVD player's spec. For LCD-TV Combo

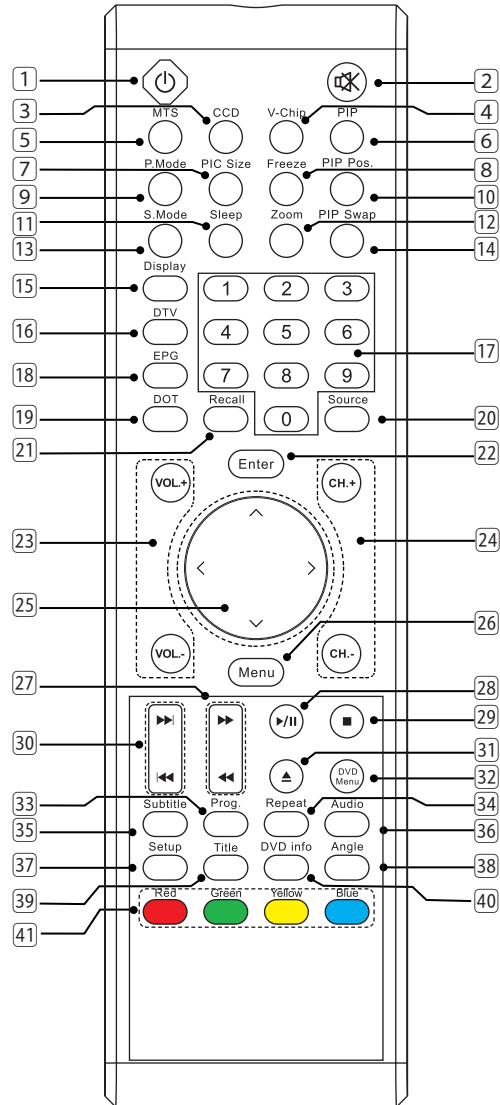
Division	Section	Remarks
General	name	AKAI
	Marketing Area(setup default language)	USA
	Power supply	+5v,+3.3v
	Power Consumption	15W
	Manufactruer of Loader mechanism	Foryou DL06-LS
DVD Module	Opitcal Pick UP	Sanyo HD-62/65
	Chipset used	MTK 1389FE
Playback Disc Type	Playable Media Type	Playable Disc Type: DVD, CD,
	Playable Disc Type	DVD(Single/ Dual layer, Double sided), CD
	Disc Size	8cm/12cm
	Regional code	Regional 1
	NTSC/ PAL Disc playback	O/O
Video	Video output signal	NTSC
	Video DAC	27MHz/ 10bit
Audio	Audio DAC	48Khz/ 96KHz/24-bit:selectable
	Dynamic range	Present
	Dolby digital decoder	Present
	DTS decoder	optional
	SRS + TruSurround for 2 channel	Not present
	3D Virtual surround for 2 channel	Not present
Playback Features	Fast forward/backward	x2,x4,x8,x16,x32
	Slow motion forward	x1/2,x1/4,x1/8,x1/16
	Slow motion backward	optional
	Still picture	Present
	Frame by frame forward/reverse	Forward only (Step function)
	Skip forward/reverse	Present
	Repeat function	Present
	DVD closed caption	Present
	Transition Effect for picture CD	Not present
	Rotation of picture for picture CDs	Present
	Last Memory	Present
Display user operation	Graphical user interface	Not present
	OSD Language	3 (ENG is base ,SPA and French)
	Subtitle	Present
	Screen saver	Present
	Resume play	Present
	Program function	Present
	PBC ON/OFF	Default on PCB
	Parental lock	Passward : 0000
	Picture mode selector	16:9, 4:3 LB, 4:3 PS(4:3 PS as default)
	Intro scan	Not present
	Digest in VCD	Present, only for PIC CD
	Time search	Present
	Multi angle	Present
	Selectable audio language streams	Present
Front Panel	kalaoke function	x
	VFD/ LED	x
	No. of keys	3(Open/Close, Play, Stop)
Rear Panel	Composite Video output	x
	Component Video output	x
	Progressive scan output (480P)	Present
	2 channel audio output	Present
	Coaxial audio output	Present

Technical Data

1. Power supply	TV	AC 120V, 60Hz	
	Remote control	Battery 3V (UM-3/R6P/AAA×2)	
2. TV system	TV System	NTSC M	ATSC
	Stereo Decode	MTS	MPEG-2
	Closed Caption/V-Chip	Yes	Yes
	Channel	181 CH	2-69 CH
3. Intermediate frequencies	Picture	45.75MHz	
4. Scanning	Horizontal (Hz)	15625/15750	
	Vertical (Hz)	50/60	
5. AC plug		UL Plug	
6. Panel		CLAA370WAC02	
7. Speaker	Internal	8 ohm 10W ×2	
8. Operating temperature	Fulfill all specifications	15°C ~ 30°C	
	Accept picture/sound reproduction	5°C ~ 33°C	
9. Operating relative humidity	Fulfill all specifications	45% ~ 75%	
	Accept picture/sound reproduction	20% ~ 80%	
10. Electrical & optical specification		See the attachment 1.	
11. Circuit diagram drawing No.			
12. Cabinet			
13. Cabinet color			
14. Packing		1 set per	
15. Container stuffing method		RD/05/P/LC26HAB/CSI/02 REV: 01	
16. Dimension (mm) (No packing)	LCD-TV	925.8(W) × 657.8(H) × 113(D)mm (w/o Stand)	
		925.8(W) × 724.2(H) × 267.5(D)mm (with Stand)	
	Remote control unit	183(L) × 53(W) × 28(T)mm	
17. Net weight	LCD-TV	18.4Kg (with Stand) approx.	
	Remote control	93g	
18. Cell Defect		Subject to Panel supplier specification	

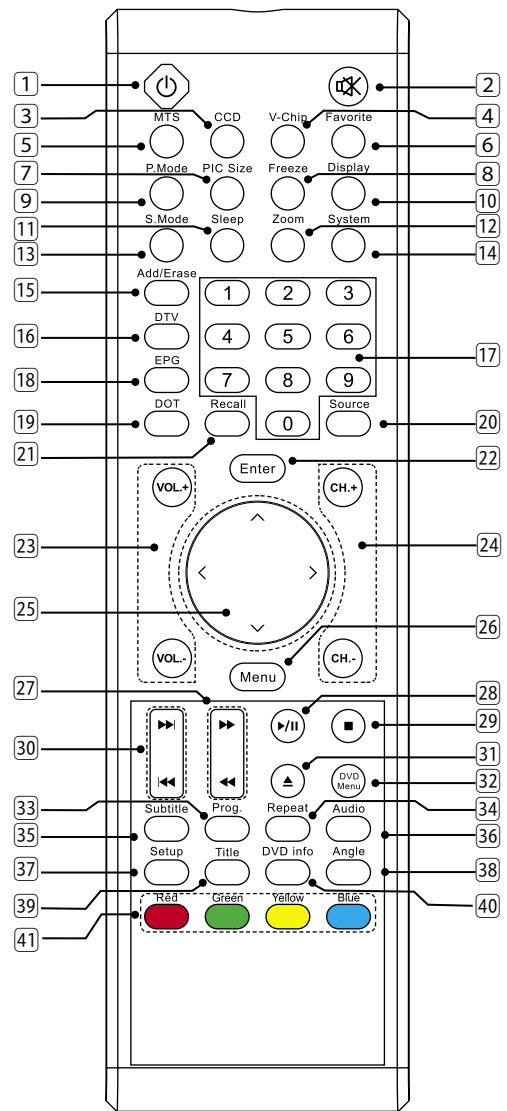
Remote Control

- 1 **Power** (⏻): Press to turn on and off.
- 2 **Mute** (🔇): Press to mute the sound. Press again or press VOL+/- to restore the sound.
- 3 **CCD**: Press to select the Closed Caption mode.
- 4 **V-Chip**: Press to select the child protect mode.
- 5 **MTS**: Press repeatedly to cycle through the Multi-channel TV sound (MTS) options: Mono, Stereo and SAP (Second Audio Program).
- 6 **PIP**: Press this button to enter PIP function.
- 7 **PIC.Size**: Press to change the screen size, such as Full, 4:3, Panoramic. (Note: In VGA mode, it can select picture size is Full. While in DTV mode, it can select picture size is: Full and 4:3.)
- 8 **Freeze**: Press to freeze the picture, press again to restore the picture. (This button is not available for VGA mode.)
- 9 **P.Mode**: Press repeatedly to cycle through the picture mode: Hi-Bright, User, Cinema, Normal and Vivid.
- 10 **PIP Pos.:** Press to change the PIP window position under PIP mode.
- 11 **Sleep**: Press repeatedly until it displays the time in minutes (15 Min, 30 Min, 60Min, 90 Min ,120 Min and, OFF) that you want the TV to remain on before shutting off. To cancel sleep time, press **Sleep** button repeatedly until sleep OFF appears.
- 12 **Zoom**: Press to zoom the image. (This button is not available for VGA mode.)
- 13 **S.Mode**: Press repeatedly to cycle through the sound mode: Normal, News, Cinema, Concert and User.
- 14 **PIP Swap**: Press to switches the Main window or Sub window picture.
- 15 **Display**: Press to display the channel information and it disappear after 3 seconds.
- 16 **DTV**: Press to select Digital TV mode.
- 17 **0~9 Number Buttons**: In TV mode, press 0~9 to select a channel; the channel changes after 2 seconds. In DVD mode, press 0~9 to input the items.
- 18 **EPG**: Press to display EPG (Electronic Program Guide) menu.
- 19 **DOT**: Press number buttons with it to select the channels directly in DTV.
- 20 **Source**: Press to select the signal source.
- 21 **Recall**: Press to return previous channel.
- 22 **Enter**: To select an item, press Enter to confirm.
- 23 **VOL +/-**: Press to adjust the volume.
- 24 **CH +/-**: Press to scan through channels. To scan quickly through channels, press and hold down either channels.
- 25 **<,^,∨,>**: Press **<,^,∨,>** to move the on-screen cursor.

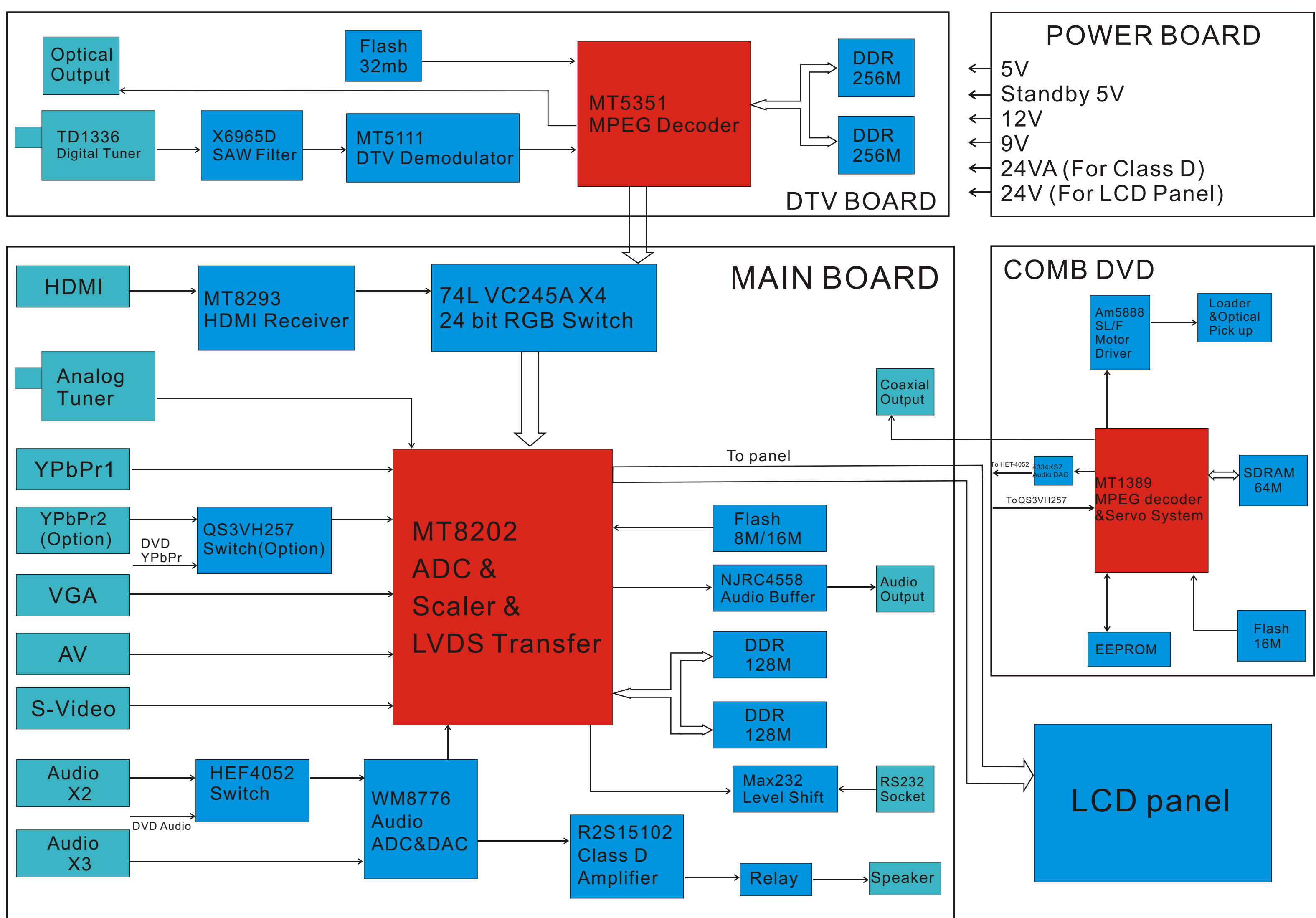


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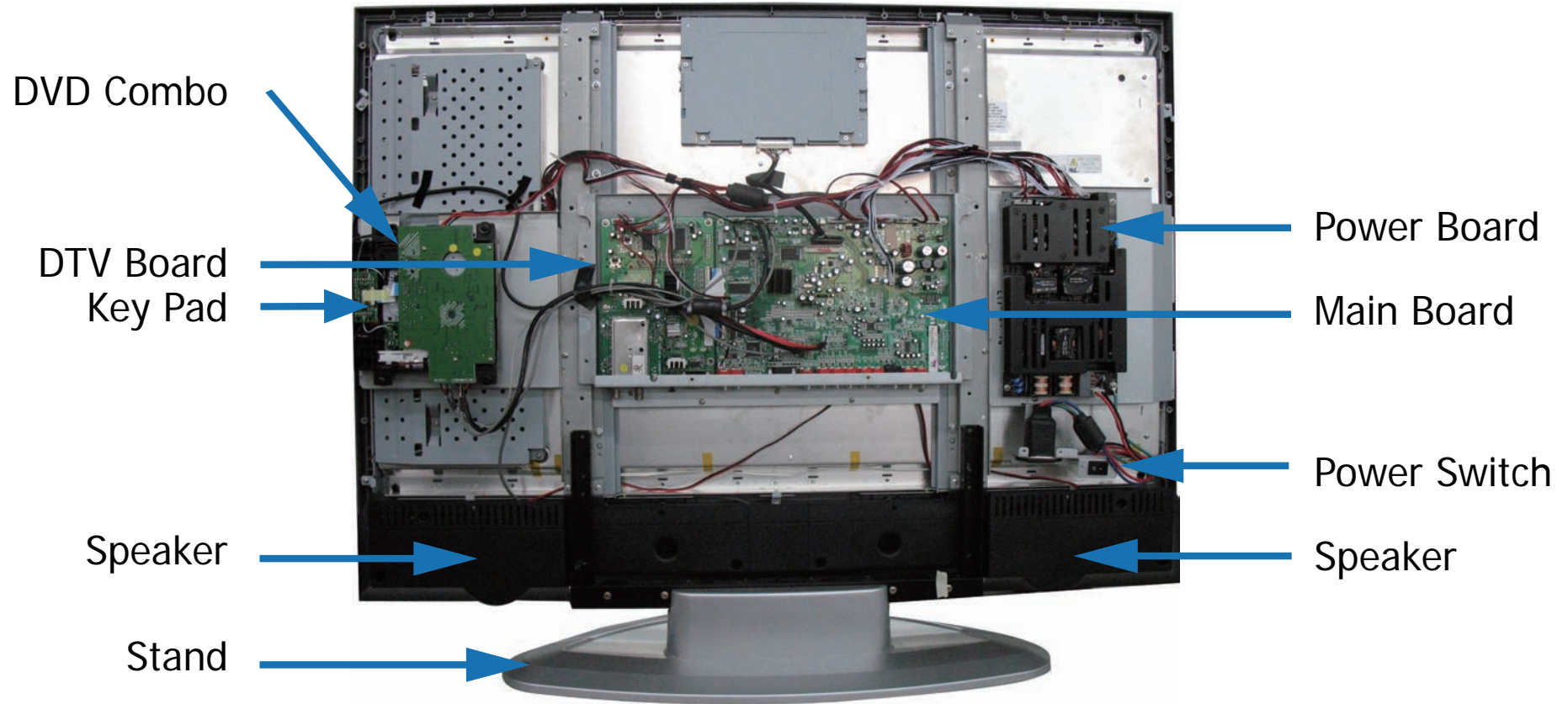
- 26 **Menu:** Press to enter on-screen setup menu, press again to exit.
- 27 **◀, ▶:** Press to search the backward or forward.
- 28 **▶/||:** Press to play or pause the DVD disc.
- 29 **■:** Press to stop playing the disc.
- 30 **◀, ▶:** Press to skip the backward or forward.
- 31 **▲:** Press to open or close the disc tray.
- 32 **DVD Menu:** Press to return DVD disc menu.
- 33 **Prog.:** Press to display the program menu. Press it again to exit.
- 34 **Repeat:** Press repeatedly to cycle through the options: CHAPTER, TITLE, ALL and nothing.
- 35 **Subtitle:** Press to select desired DVD subtitle.
- 36 **Audio:** Press to select desired audio track.
- 37 **Setup:** Press to display a menu. Press it again to exit menu.
- 38 **Angle:** Press to select desired viewing angle of the Video (disc feature).
- 39 **Title:** Press to display to DVD disc title.
- 40 **DVD Info:** Press to display DVD information.
- 41 **Color Buttons:**
 (Only available in DTV EPG mode)
Red: Press this button to access the red item or page.
Blue: Press this button to access the blue item or page.
Green: Press this button to access the green item or page.
Yellow: Press this button to access the yellow item or page.



Note: Press CH+/- on the remote control can turn on TV set from last preview mode.

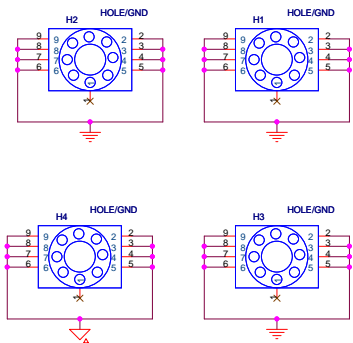


Parts Position

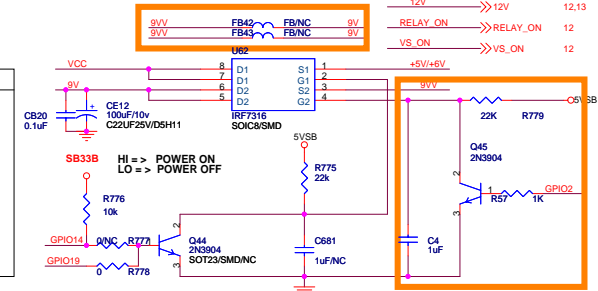


MT8202E (PBGA388) LCDTV BOARD 4 LAYERS FOR AKAI

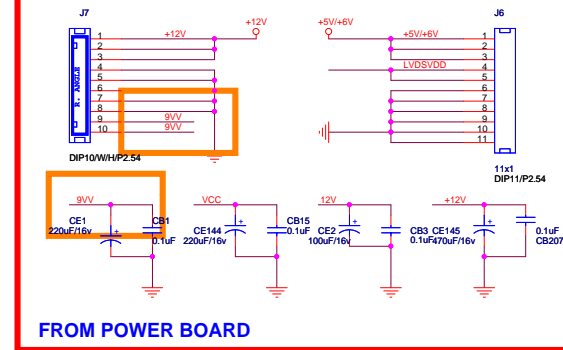
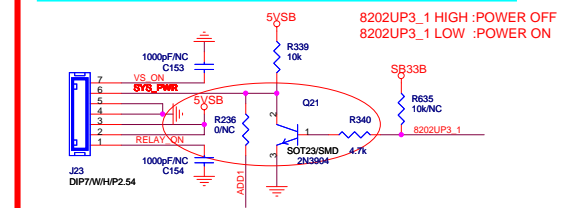
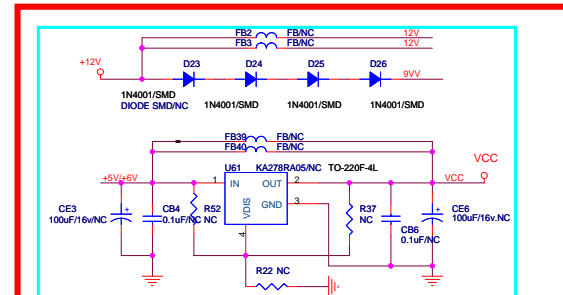
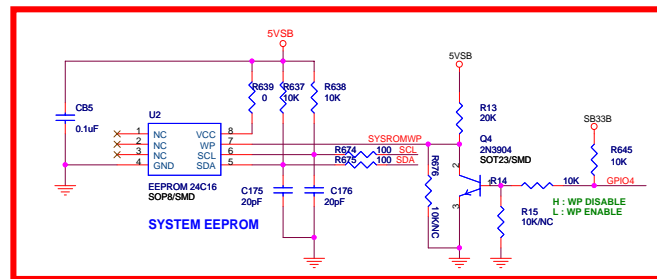
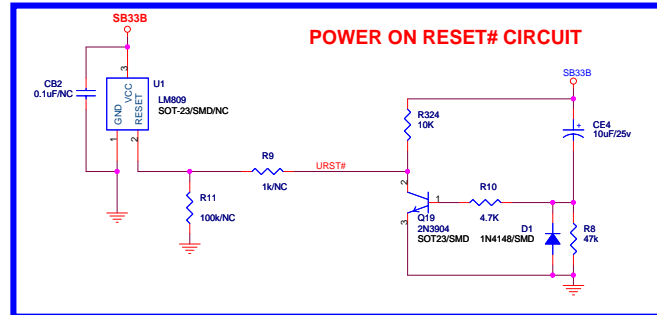
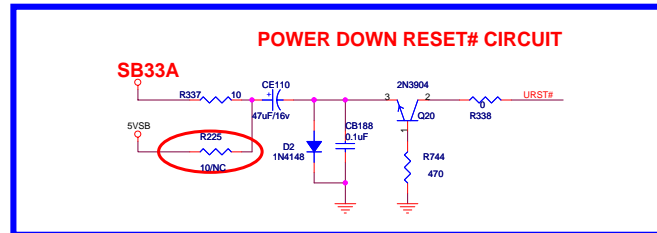
1. INDEX / POWER / RESET / EEPROM
2. LDO
3. MT8202E PBGA388
4. MT8202 DECOUPLING
5. DDR MEMORY & FLASH
6. MT5351 INTERFACE
7. HDMI MT8293
8. DAUGHTER BOARD IN
9. WM8776 & VIDEO BYPASS
10. AUDIO / VIDEO IN CIRCUIT
11. VGA & PC AUDIO IN
12. LVDS OUT
13. BACK LIGHT / KEYPAD
14. TUNER IN
15. AV IN
16. AUDIO IN
17. AUDIO Amplifier



Rev	History	P#	Date
AKAI_MT8202_27US_LVDS_V0.0	New		2005/11/22
AKAI_MT8202_27US_HDMI_LVDS_V0.0	ADD HDMI / VIDEO / AUDIO CONNECTOR INPUT IN		

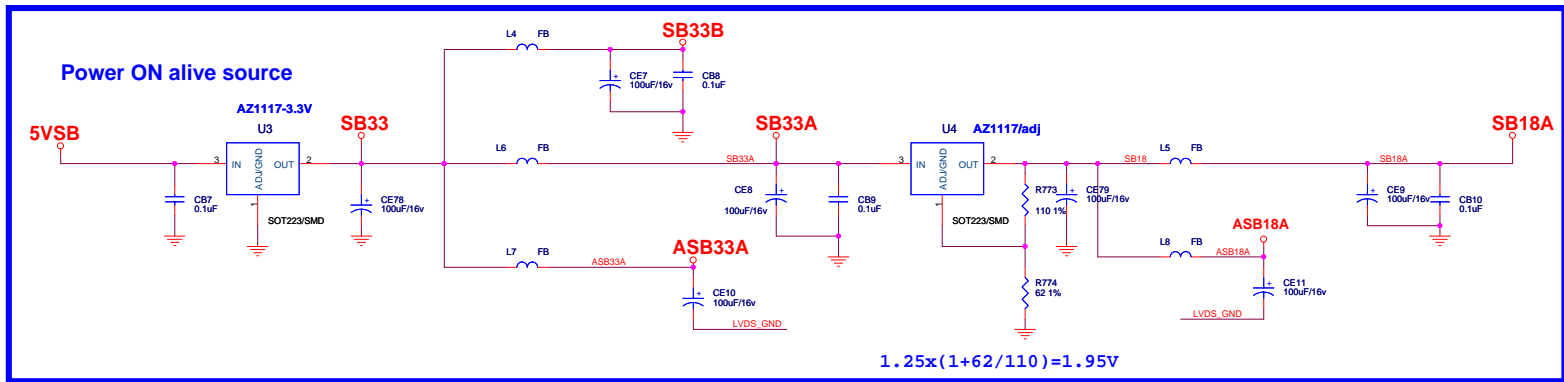


- LVDSVDD >> LVDSGND 2,3,4
- SCL >> SCL 9,14
- SDA >> SDA 9,14
- URST# >> URST# 3
- 8202UP3_1 >> 8202UP3_1 3
- GPIO2 >> GPIO2 3,12
- GPIO4 >> GPIO4 3
- GPIO14 >> GPIO14 3,13
- GPIO19 >> GPIO19 3,13
- 9V >> 9V 7,9,14
- 12V >> 12V 12,13
- RELAY_ON >> RELAY_ON 12
- VS_ON >> VS_ON 12

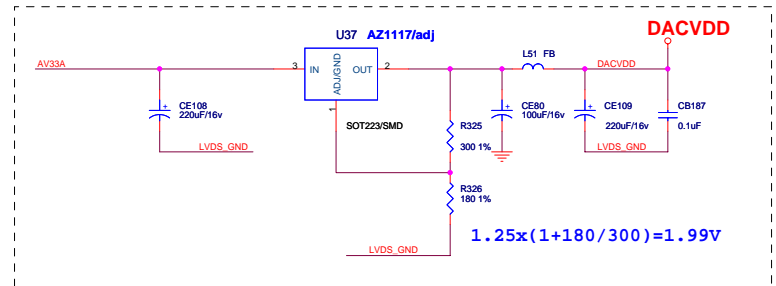
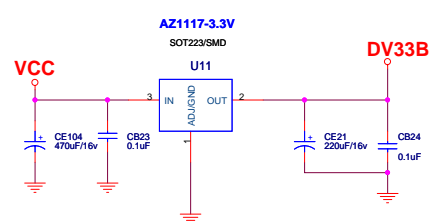
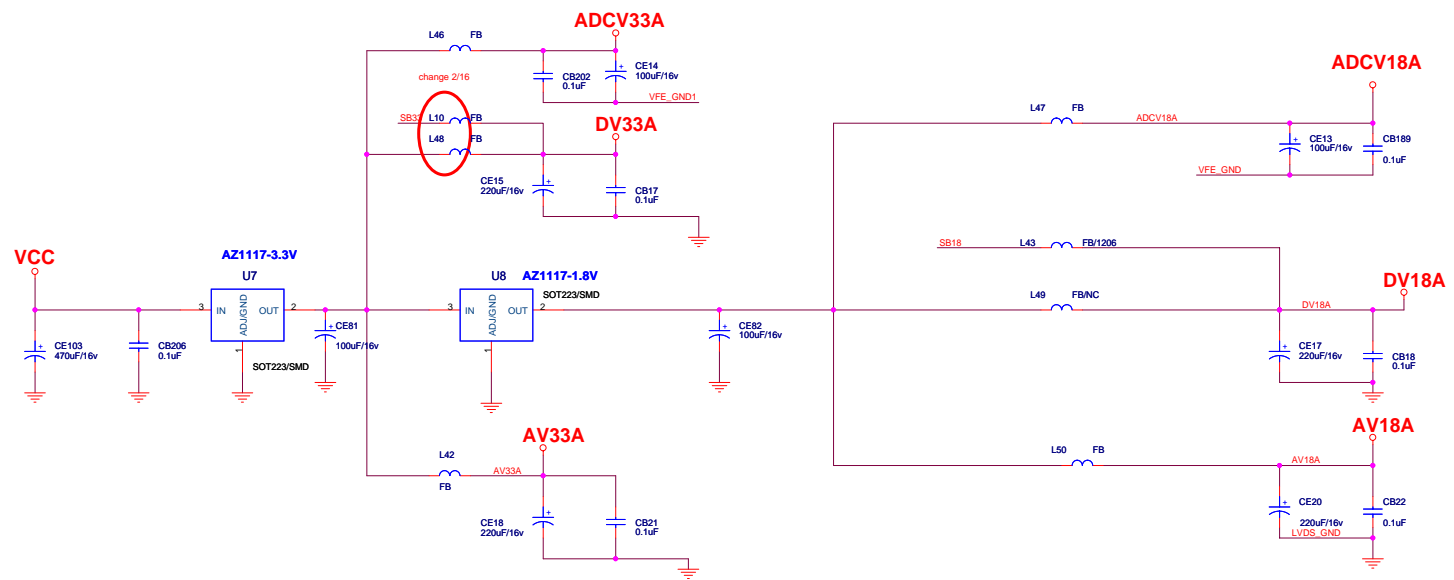


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- LVDS_GND >>> LVDS_GND 3.4,12
- VFE_GND >>> VFE_GND 3.4,8,11
- VFE_GND1 >>> VFE_GND1 3.4,8,11

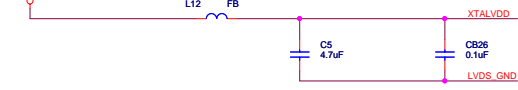


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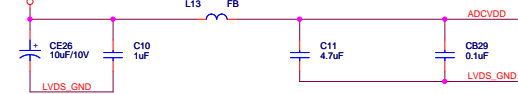
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STANDBY ANALOG POWER

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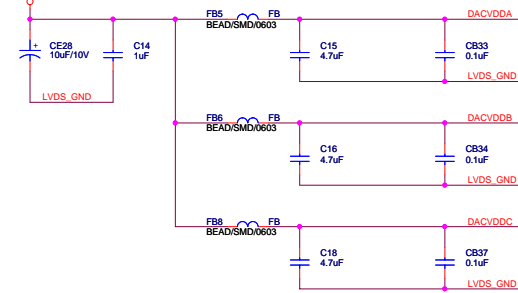


ASB33A



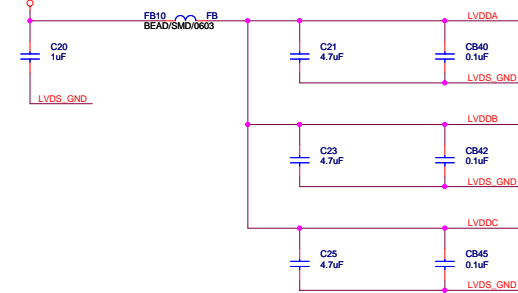
NORMAL VIDEO DAC POWER

DACVDD



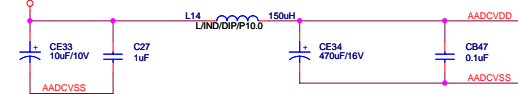
NORMAL VIDEO DAC POWER

AV33A

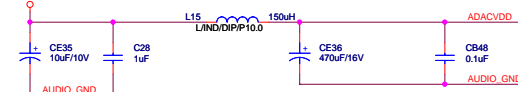


NORMAL AUDIO ADC / DAC POWER

ADC33A

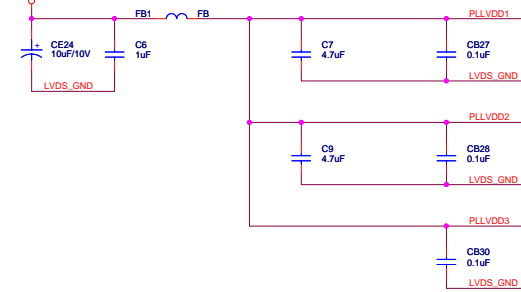


ADC33A

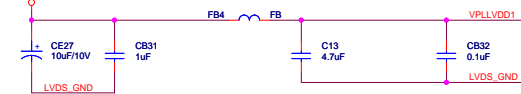


NORMAL ANALOG POWER

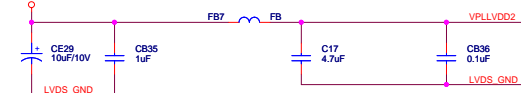
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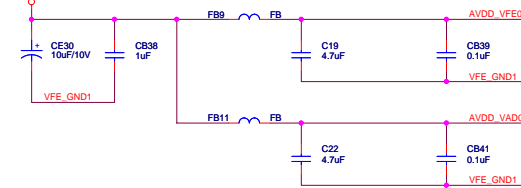


AV33A

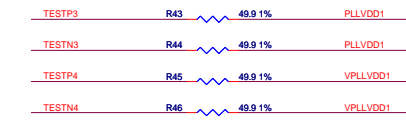
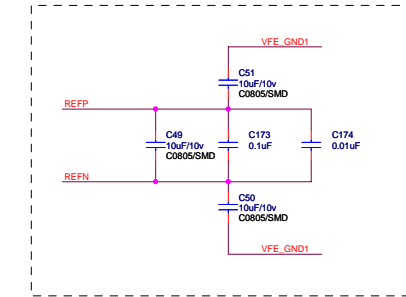
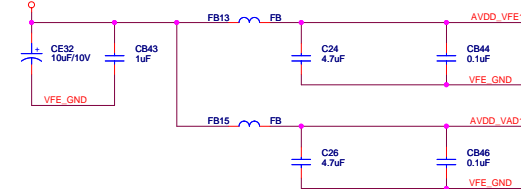


NORMAL VIDEO ADC POWER

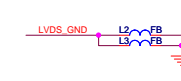
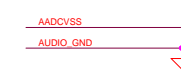
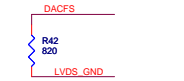
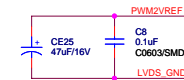
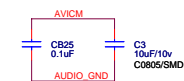
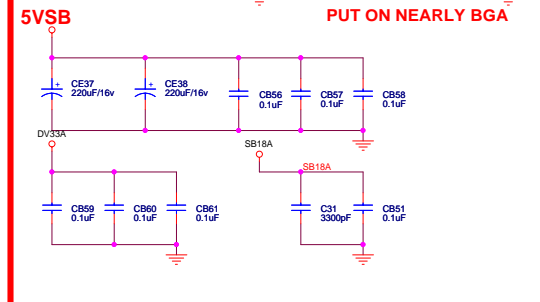
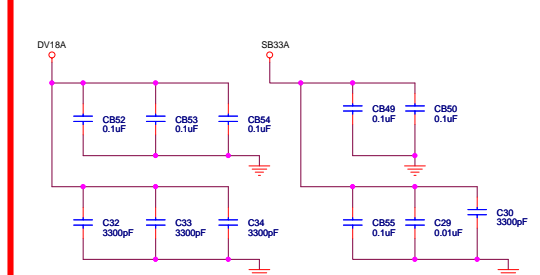
ADC33A



ADC18A



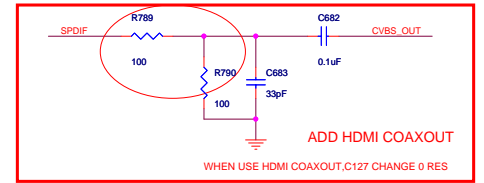
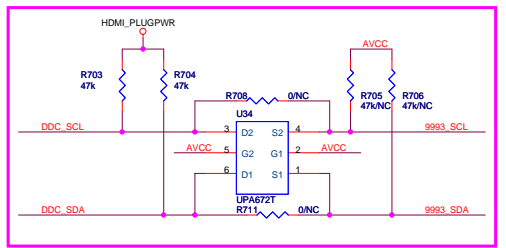
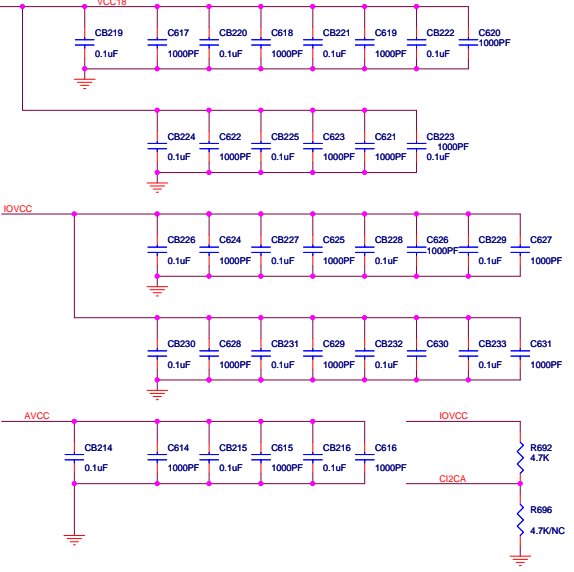
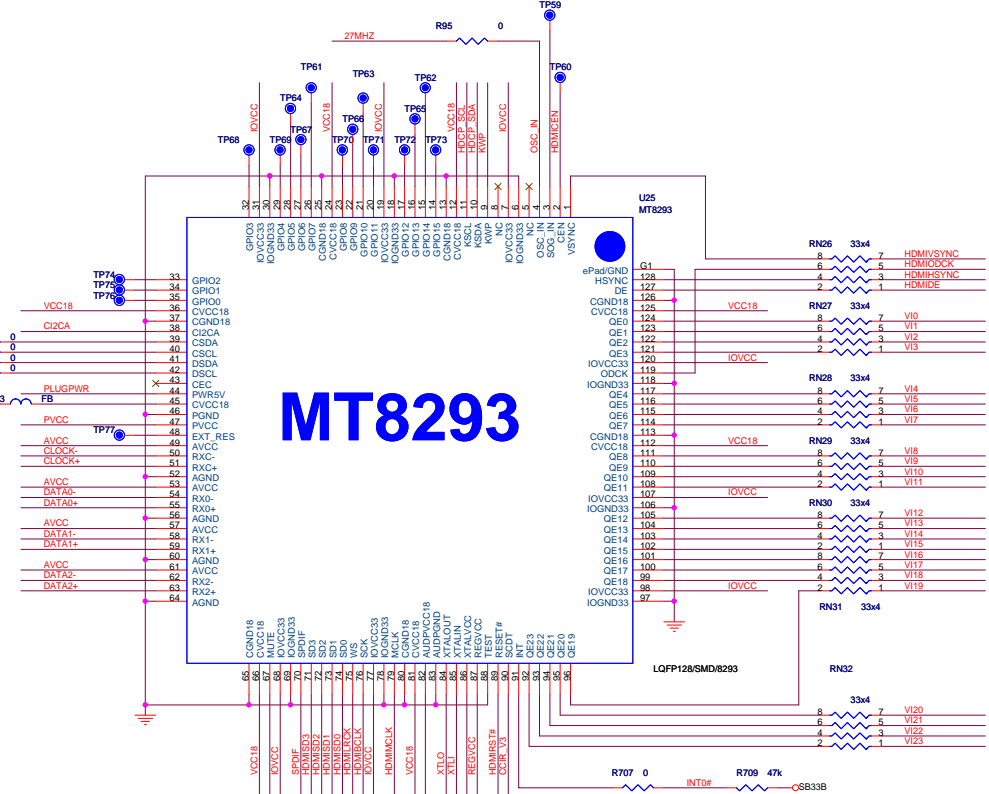
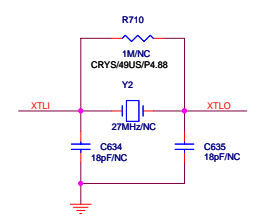
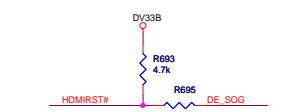
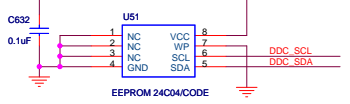
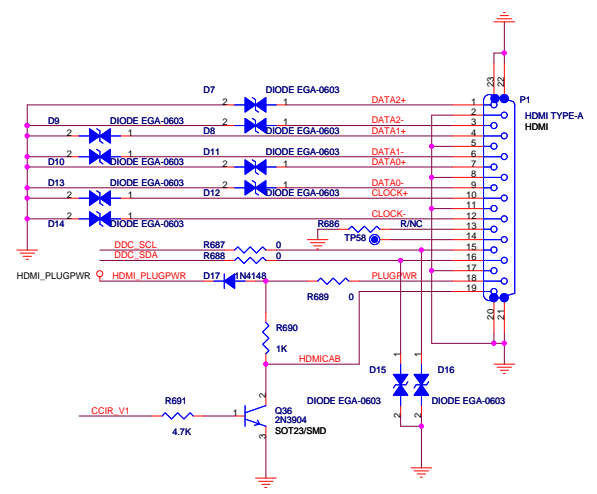
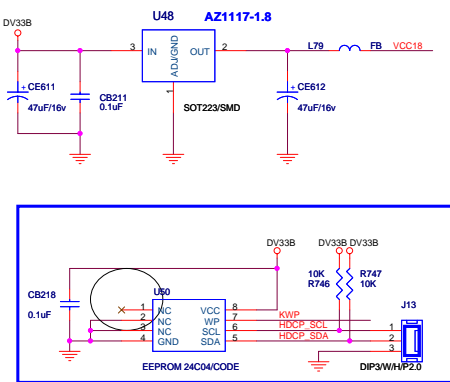
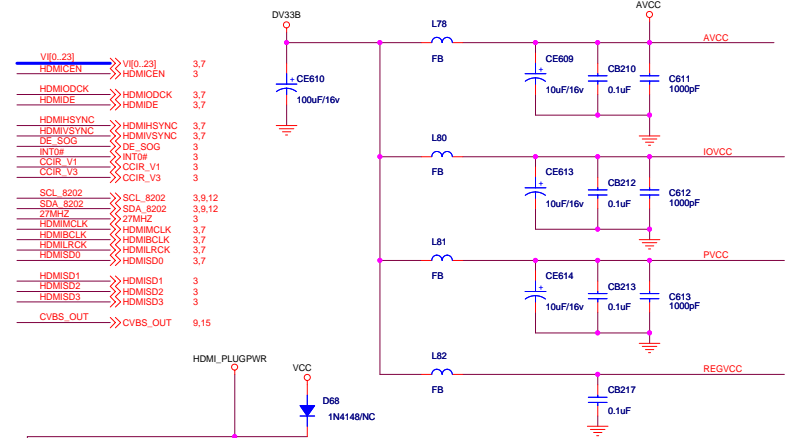
MT8202 DIGITAL POWER & DECOUPLING



PUT ON NEARLY BGA

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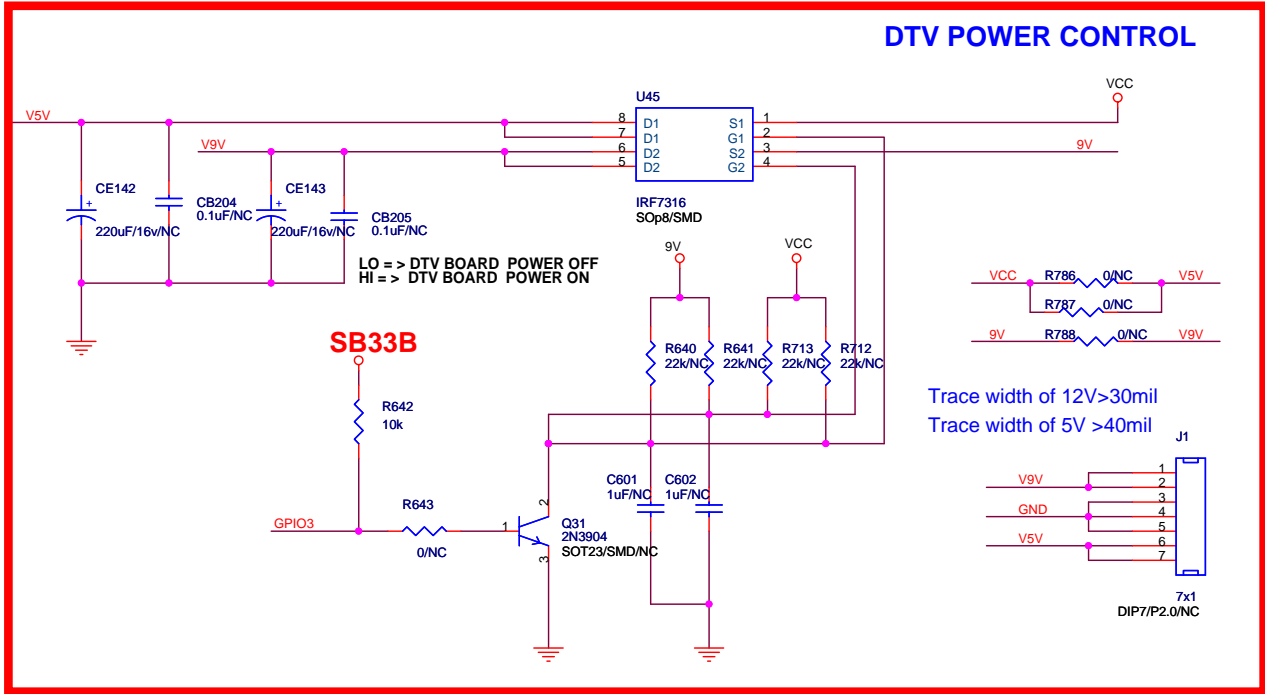
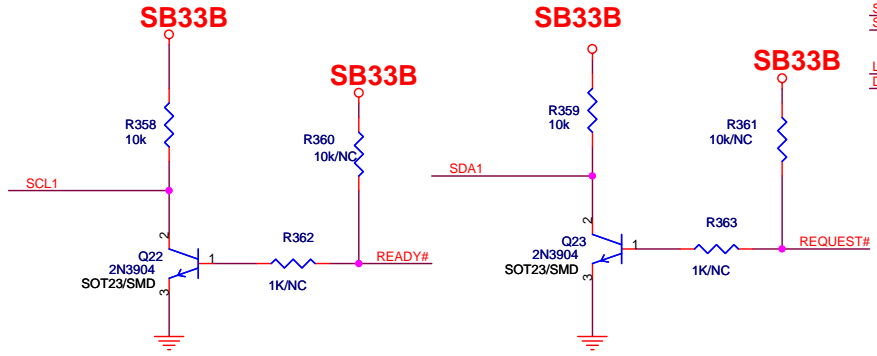
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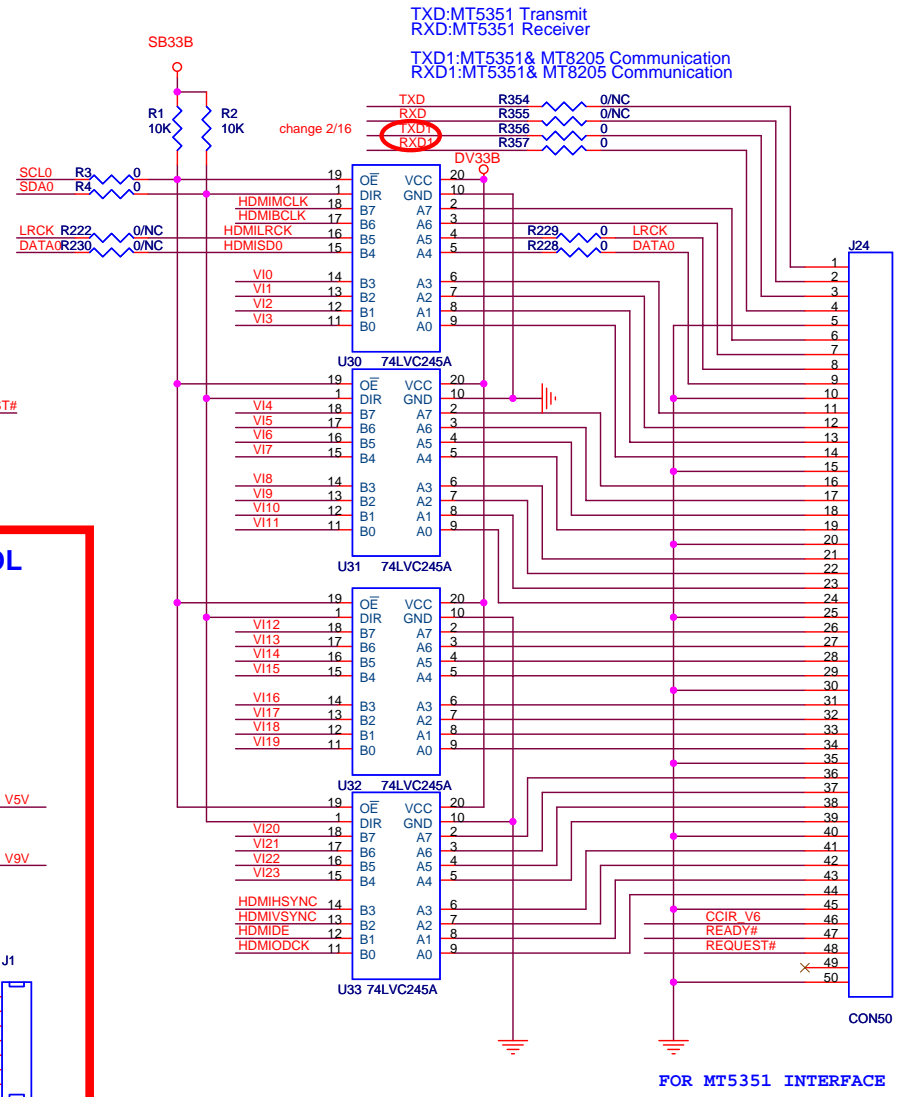
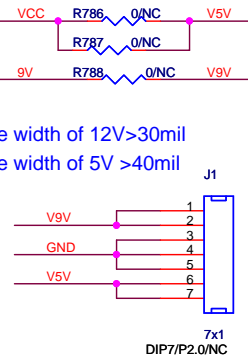
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HDMI INPUT MT8293			
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HDMIMCLK	>>	HDMIMCLK	3,6
HDMIBCLK	>>	HDMIBCLK	3,6
HDMILRCK	>>	HDMILRCK	3,6
HDMISD0	>>	HDMISD0	3,6
HDMIDE	>>	HDMIDE	3,6
HDMIODCK	>>	HDMIODCK	3,6
HDMIHSYNC	>>	HDMIHSYNC	3,6
HDMIVSYNC	>>	HDMIVSYNC	3,6
VI[0..23]	>>	VI[0..23]	3,6
TXD	>>	TXD	3,11
RXD	>>	RXD	3,11
TXD1	>>	TXD1	3
RXD1	>>	RXD1	3
SCL1	>>	SCL1	3
SDA1	>>	SDA1	3
GPIO3	>>	GPIO3	3
CCIR_V6	>>	CCIR_V6	3
SCL0	>>	SCL0	3
SDA0	>>	SDA0	3
9V	>>	9V	1,9,14



Trace width of 12V > 30mil
Trace width of 5V > 40mil



FOR MT5351 INTERFACE

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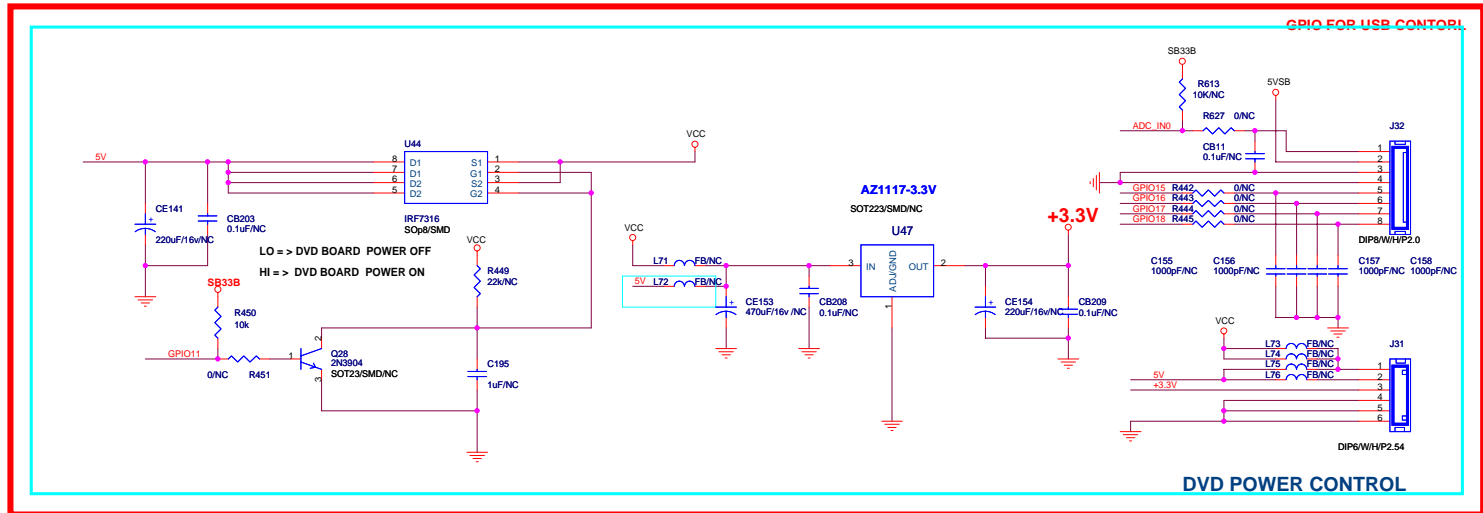
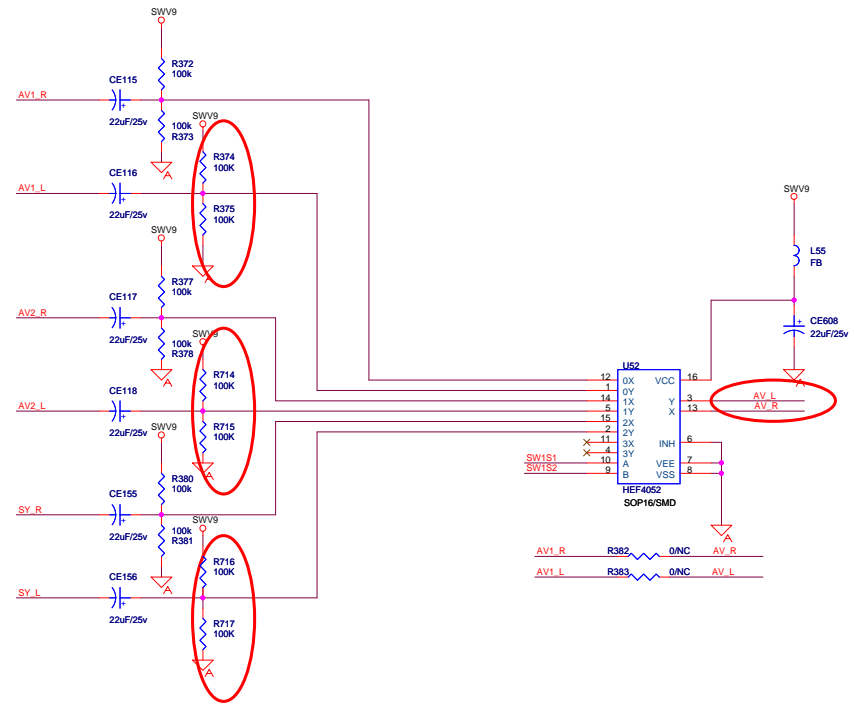
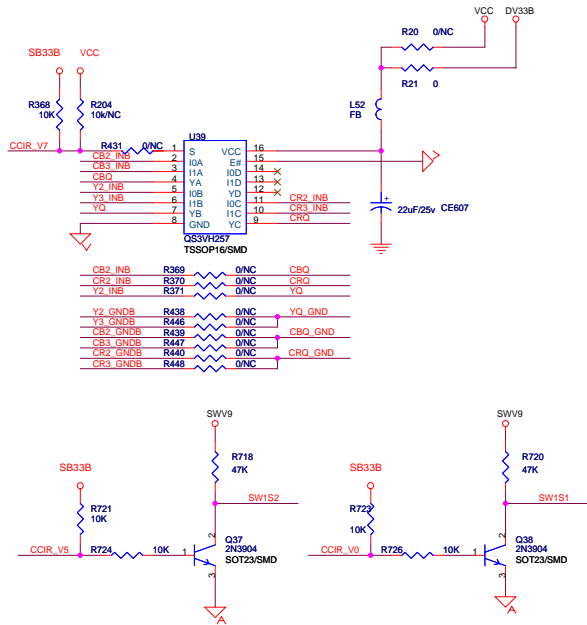
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Size	Document Number	<Designer>	Rev
B	AKAL_MT8202_27US_LVDS_V0.0	Checked: <Checker>	1
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INPUT

ADC_IN0	ADC_IN0	3
CCIR_V0	CCIR_V0	3
CCIR_V5	CCIR_V5	3
CCIR_V7	CCIR_V7	3
GPIO11	GPIO11	3
GPIO15	GPIO15	3
GPIO16	GPIO16	3
GPIO17	GPIO17	3
GPIO18	GPIO18	3
VFE_GND	VFE_GND	2,3,4,11
AADC_VSS	AADC_VSS	3,4,10
AUT_R	AUT_R	15
AV1_L	AV1_L	15
AV2_R	AV2_R	15
AV2_L	AV2_L	15
SV_R	SV_R	15
SV_L	SV_L	15
YZ_INB	YZ_INB	15
YZ_GNDB	YZ_GNDB	15
CB2_INB	CB2_INB	10,15
CB2_GNDB	CB2_GNDB	10,15
CR2_INB	CR2_INB	15
CR2_GNDB	CR2_GNDB	10,15
Y3_INB	Y3_INB	15
Y3_GNDB	Y3_GNDB	15
CB3_INB	CB3_INB	15
CB3_GNDB	CB3_GNDB	15
CR3_INB	CR3_INB	15
CR3_GNDB	CR3_GNDB	15
SV	SV	1,7,9,14

OUTPUT

AV_R	AV_R	9
AV_L	AV_L	9
YO	YO	10
CBQ	CBQ	10
CRQ	CRQ	10
YQ_GND	YQ_GND	10
CBQ_GND	CBQ_GND	10
CRQ_GND	CRQ_GND	10



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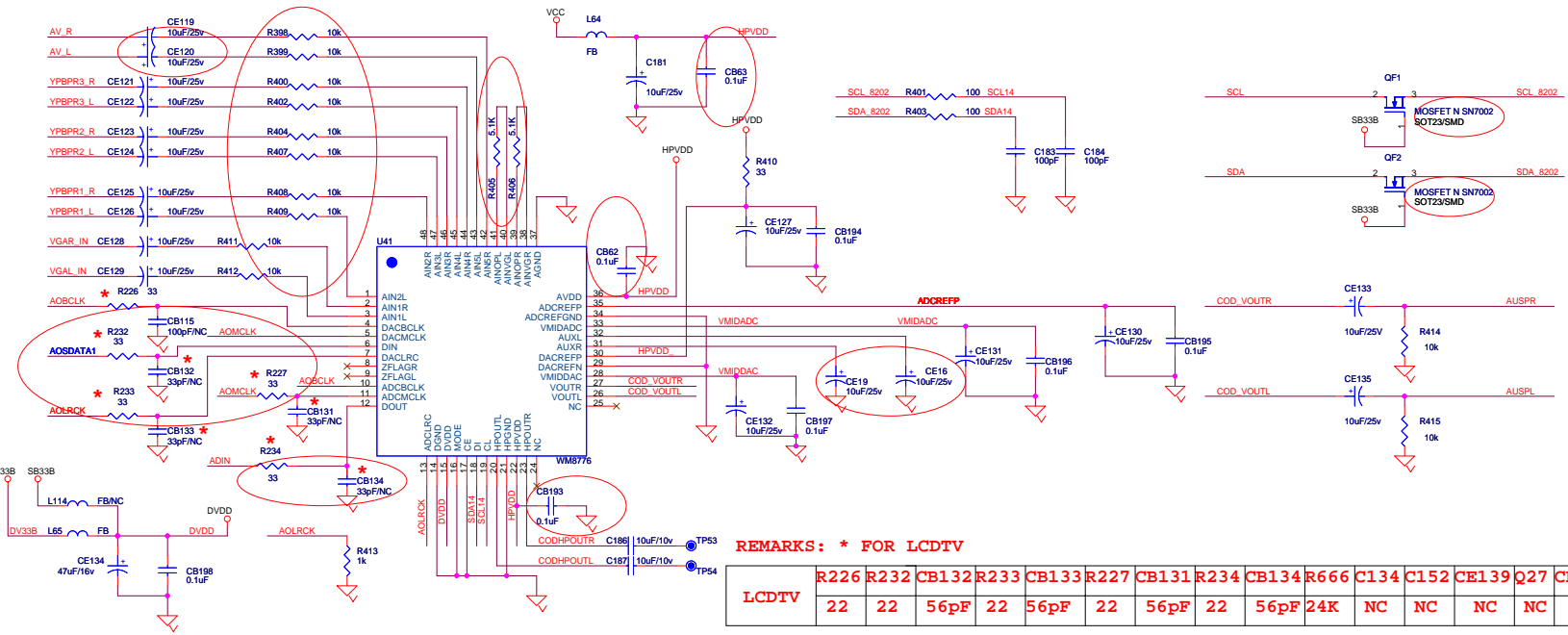
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DAUGHTER BOARD IN			
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INPUT

GPIO7	GPIO7	3
SCL	SCL	1,14
SDA	SDA	1,14
SDA_8202	SDA_8202	3,6,12
SCL_8202	SCL_8202	3,6,12
AOSDATA1	AOSDATA1	3
AOMCLK	AOMCLK	3,16
AOBCLK	AOBCLK	3,16
AOLRCK	AOLRCK	3,16
ADIN	ADIN	3,16
AIZ	AIZ	3
AV_L	AV_R	8
YPBPR1_L	YPBPR1_L	15
YPBPR1_R	YPBPR1_R	15
YPBPR2_R	YPBPR2_R	15
YPBPR2_L	YPBPR2_L	15
YPBPR3_R	YPBPR3_R	15
YPBPR3_L	YPBPR3_L	15
VGAR_IN	VGAR_IN	11
VGAL_IN	VGAL_IN	11
TESTP2	TESTP2	3
AR	AR	3
MU	MU	16
A_MUTE	A_MUTE	17
9V	9V	1,7,14

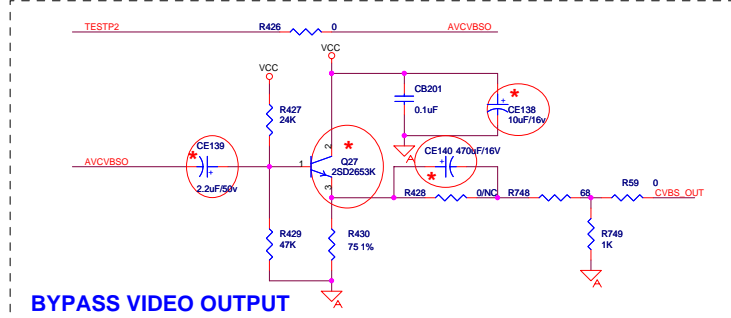
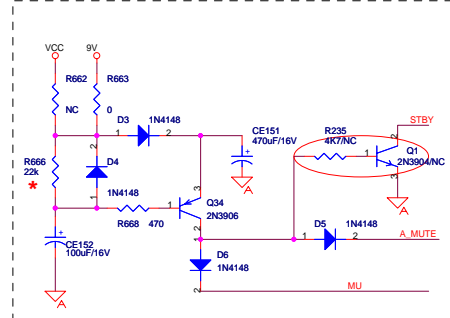
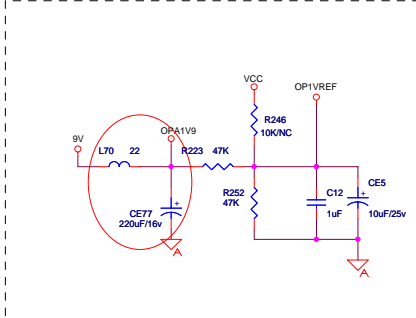
OUTPUT

AUSPR	AUSPR	16
AUSPL	AUSPL	16
AVL_OUT	AVR_OUT	15
AVL_OUT	AVL_OUT	15
CVBS_OUT	CVBS_OUT	6,15



REMARKS: * FOR LCDTV

LCDTV	R226	R232	CB132	R233	CB133	R227	CB131	R234	CB134	R666	C134	C152	CE139	Q27	CE140	CE138
	22	22	56pF	22	56pF	22	56pF	22	56pF	24K	NC	NC	NC	NC	NC	NC



CVBS0 >>> CVBS0 3
 CVBS1 >>> CVBS1 3
 CVBS2 >>> CVBS2 3

SY0 >>> SY0 3
 SC0 >>> SC0 3

SY1 >>> SY1 3
 SC1 >>> SC1 3

Y0+ >>> Y0+ 3
 Y0- >>> Y0- 3
 PB0+ >>> PB0+ 3
 PB0- >>> PB0- 3
 PR0+ >>> PR0+ 3
 PR0- >>> PR0- 3
 SOY0 >>> SOY0 3

Y1+ >>> Y1+ 3
 Y1- >>> Y1- 3
 PB1+ >>> PB1+ 3
 PB1- >>> PB1- 3
 PR1+ >>> PR1+ 3
 PR1- >>> PR1- 3
 SOY1 >>> SOY1 3

MPX1 >>> MPX1 3
 MPX2 >>> MPX2 3

TO MT8202

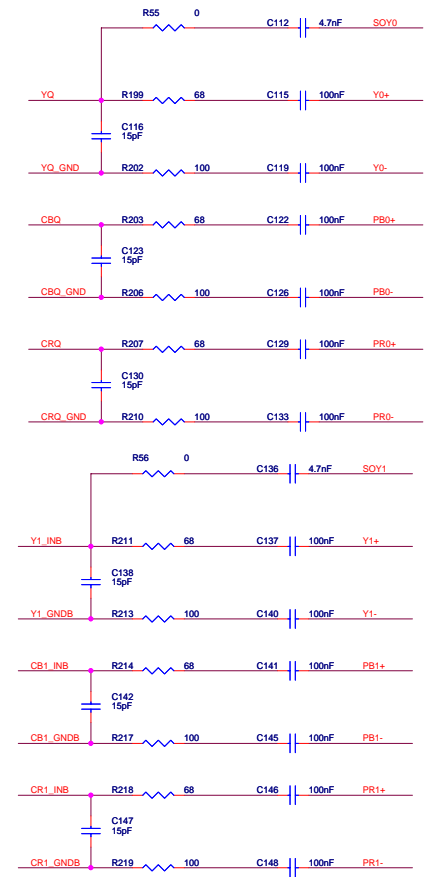
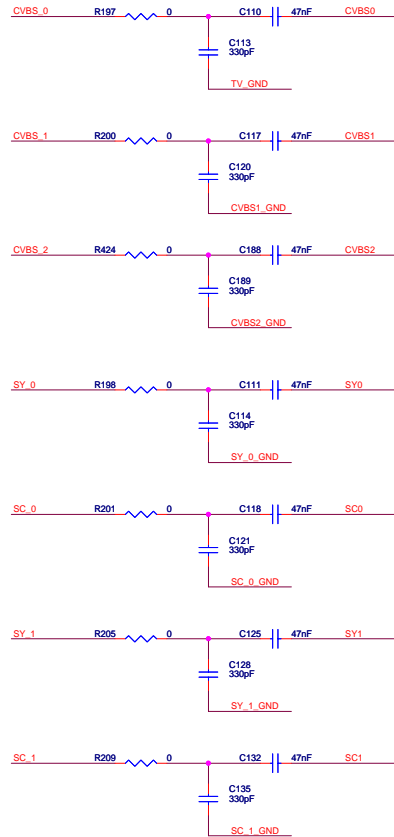
TV_GND >>> TV_GND 14
 CVBS_0 >>> CVBS_0 14
 SIF >>> SIF 14
 AF >>> AF 14
 CVBS_1 >>> CVBS_1 15
 CVBS1_GND >>> CVBS1_GND 15
 CVBS_2 >>> CVBS_2 15
 CVBS2_GND >>> CVBS2_GND 15
 SY_1 >>> SY_1 15
 SY_1_GND >>> SY_1_GND 15
 SC_1 >>> SC_1 15
 SC_1_GND >>> SC_1_GND 15
 SY_0 >>> SY_0 15
 SY_0_GND >>> SY_0_GND 15
 SC_0 >>> SC_0 15
 SC_0_GND >>> SC_0_GND 15

SOY1 >>> SOY1 3
 SOY0 >>> SOY0 3
 Y1_INB >>> Y1_INB 15
 Y1_GNDB >>> Y1_GNDB 8,15
 CR1_INB >>> CR1_INB 15
 CR1_GNDB >>> CR1_GNDB 8,15
 CB1_INB >>> CB1_INB 15
 CB1_GNDB >>> CB1_GNDB 8,15
 CRO >>> CRO 8
 YQ >>> YQ 8
 YQ_GND >>> YQ_GND 8
 CRO_GND >>> CRO_GND 8
 CRQ_GND >>> CRQ_GND 8

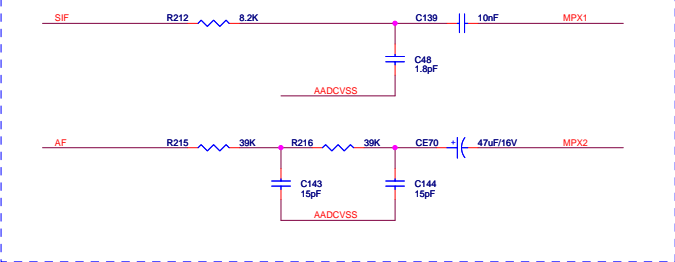
FROM AV BOARD

AADCSS >>> AADCSS 3,4

THIS PAGE NEARLY IC



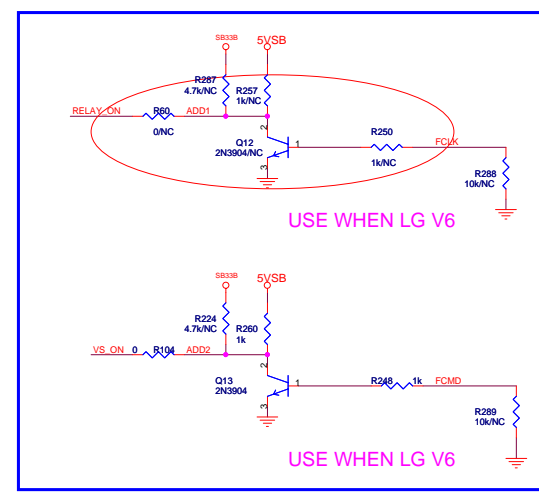
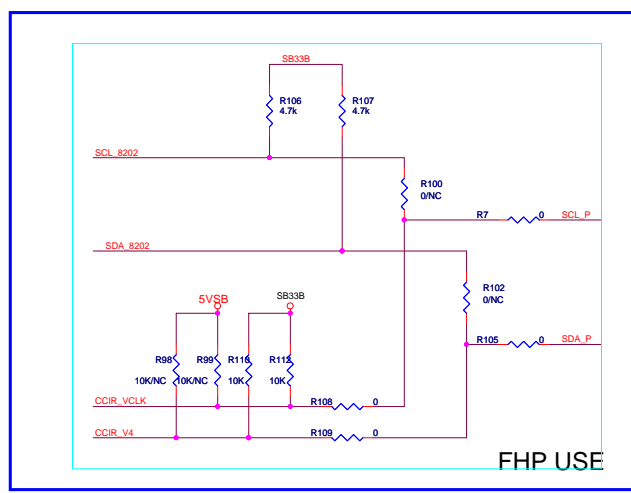
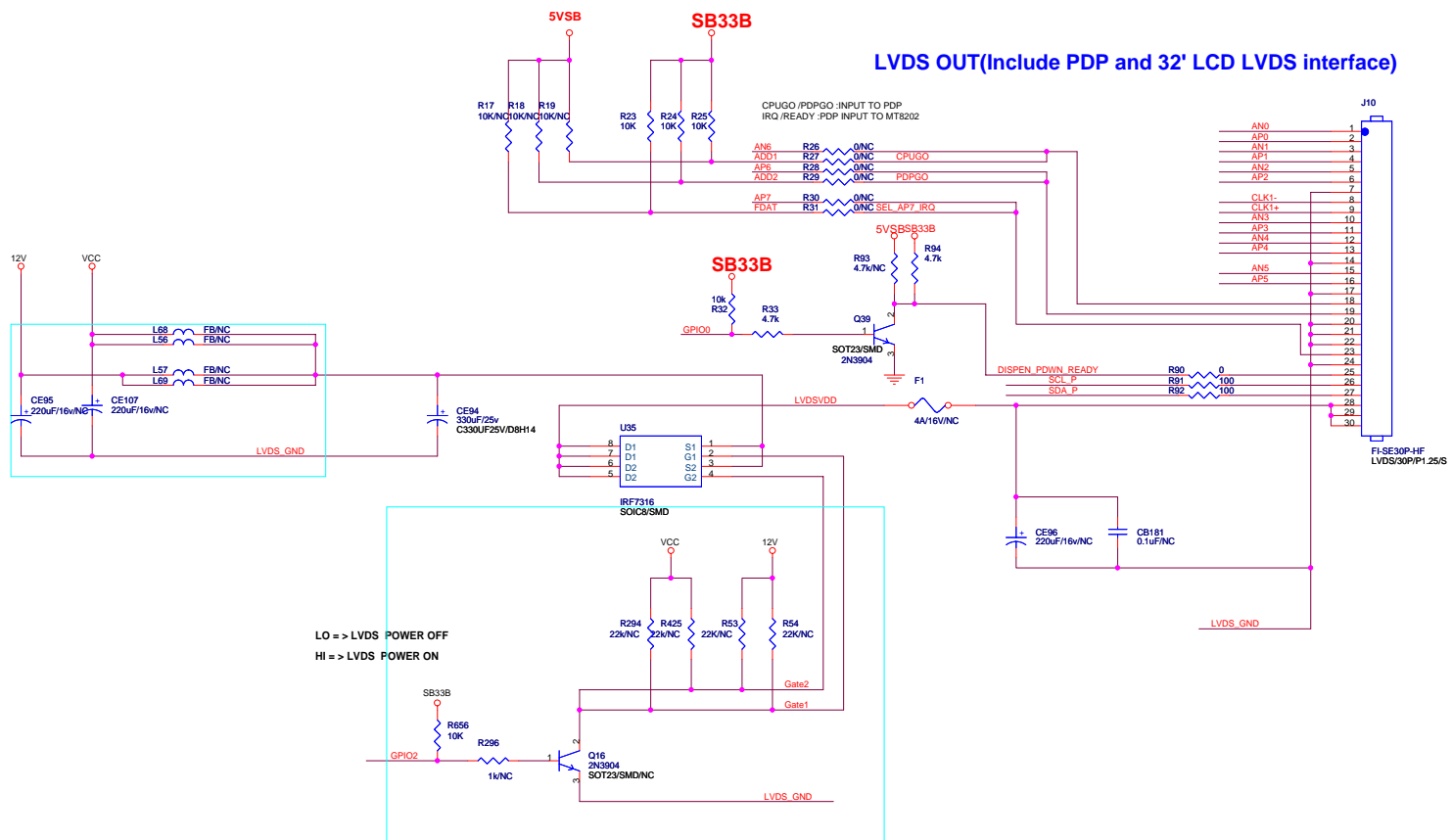
FROM Tuner



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Title			
AUDIO / VIDEO IN CIRCUIT			
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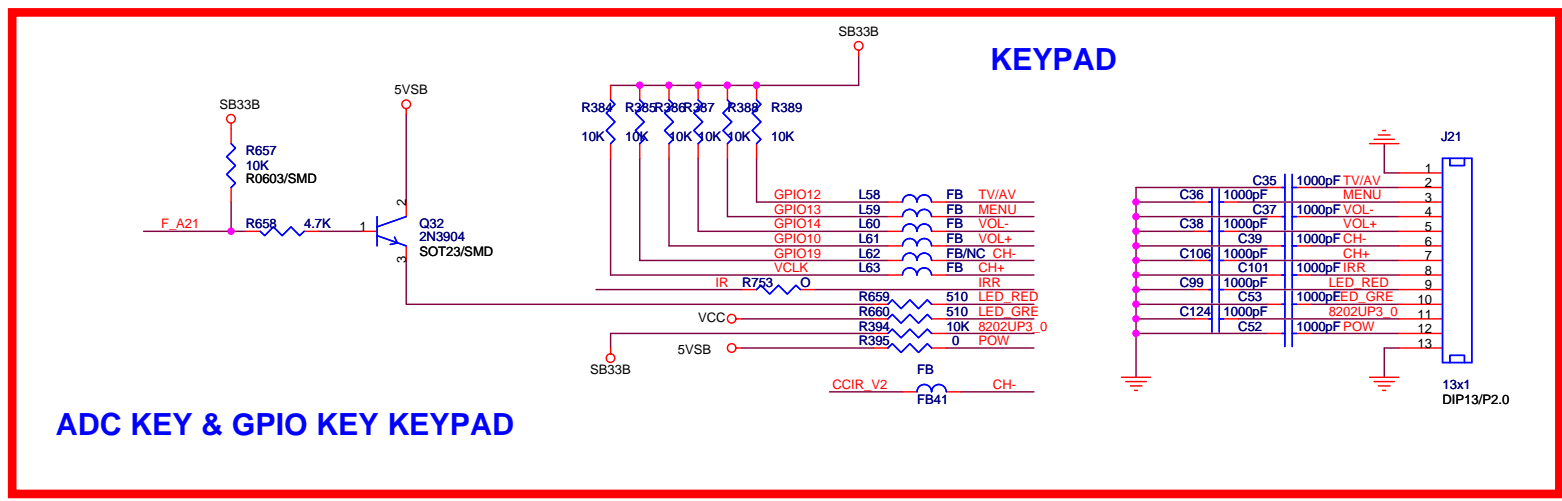
GPI00	>>	GPI02	3
CLK1+	>>	CLK1+	3
CLK1-	>>	CLK1-	3
AP0_7	>>	AP0_7	3
AP0_6	>>	AP0_6	3
LVDS_GND	>>	LVDS_GND	2,3,4
LVDSVDD	>>	LVDSVDD	2,3,4
CCIR_VCLK	>>	CCIR_VCLK	3
CCIR_V4	>>	CCIR_V4	3
FCLK	>>	FCLK	3
FCMD	>>	FCMD	3
FDAT	>>	FDAT	3
SCL_8202	>>	SCL_8202	3,6,9
SDA_8202	>>	SDA_8202	3,6,9
RELAY_ON	>>	RELAY_ON	1
VS_ON	>>	VS_ON	1
12V	>>	12V	1,13



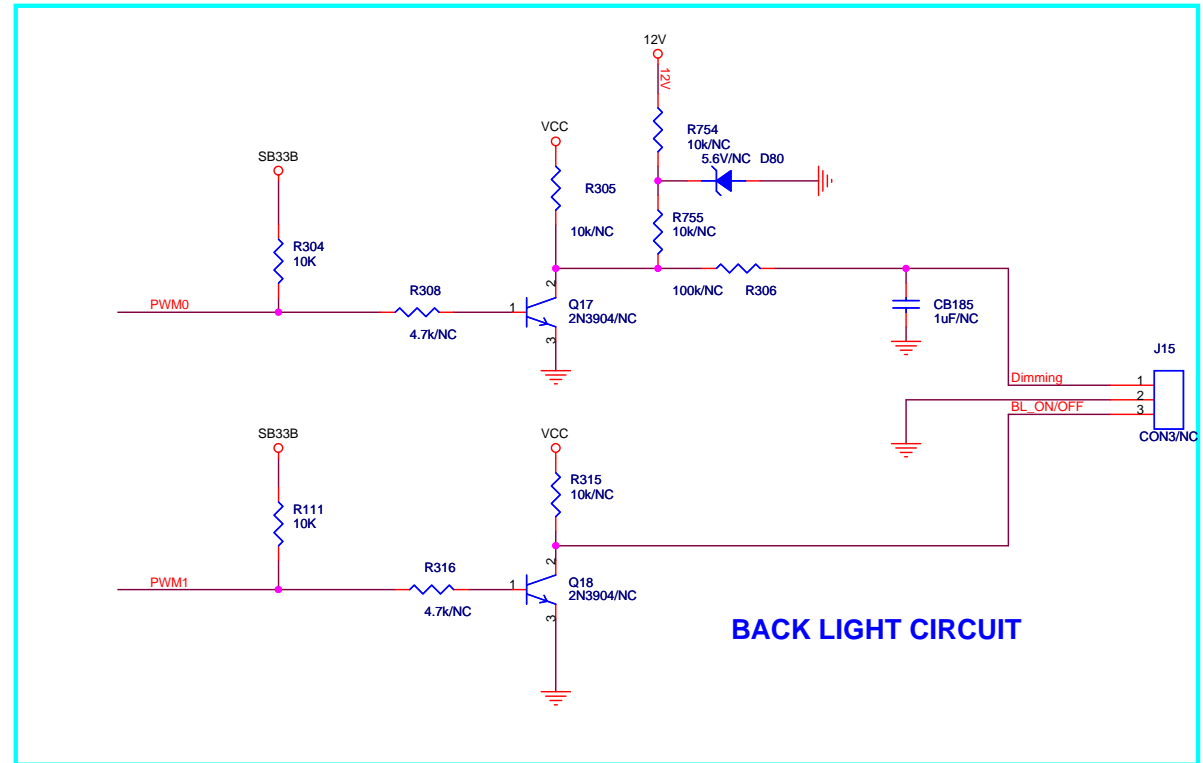
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Title			
LVDS OUT			
Size	Document Number	<Designer>	Rev
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IR	>>>IR	3,15
GPIO10	>>>GPIO10	3
GPIO12	>>>GPIO12	3
GPIO13	>>>GPIO13	3
GPIO14	>>>GPIO14	1,3
PWM0	>>>PWM0	3
PWM1	>>>PWM1	3
8202UP3_0	>>>8202UP3_0	3
GPIO14	>>>GPIO14	1,3
GPIO19	>>>GPIO19	1,3
VCLK	>>>VCLK	3
F_A21	>>>F_A21	3
CCIR_V2	>>>CCIR_V2	3
12V	>>>12V	1,12



ADC KEY & GPIO KEY KEYPAD

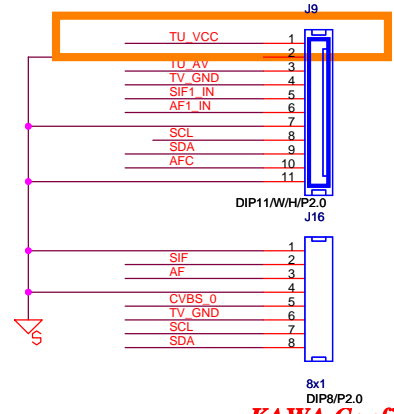
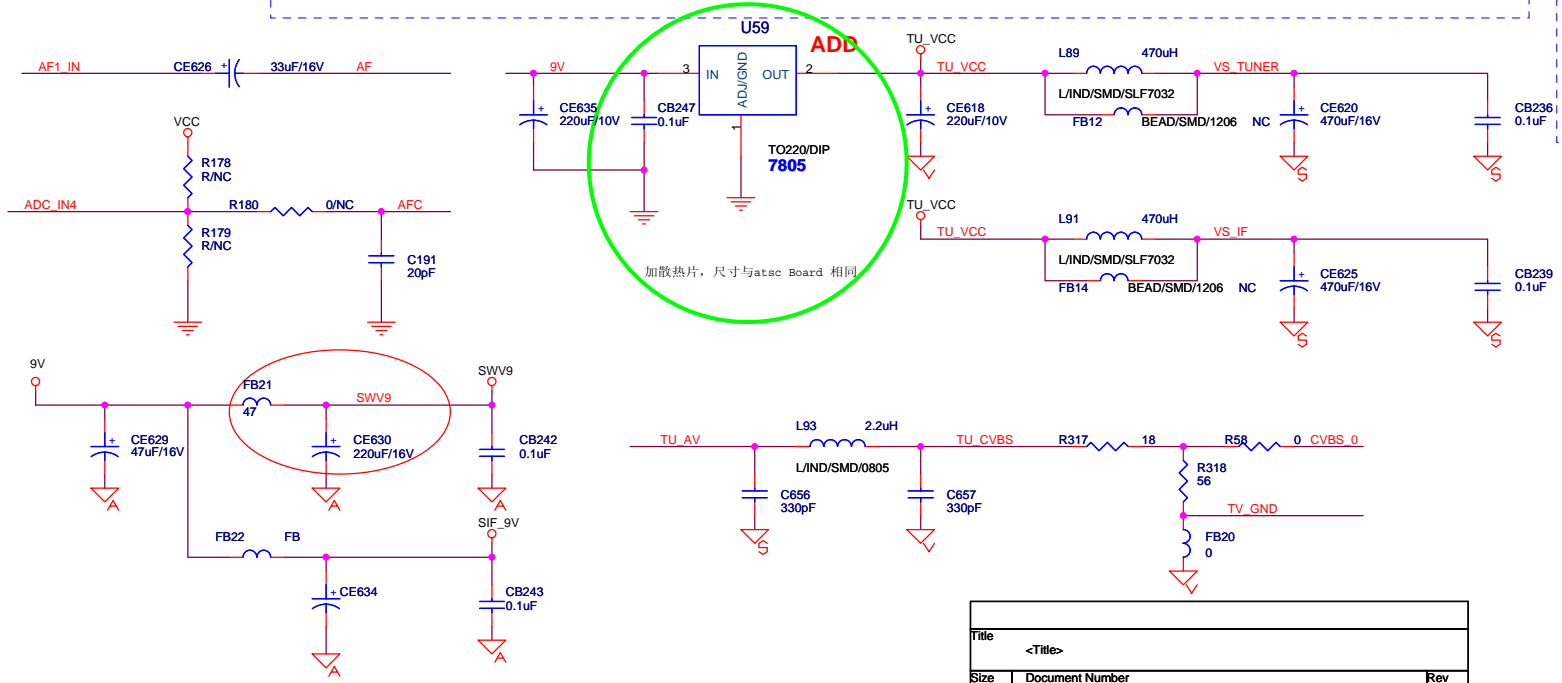
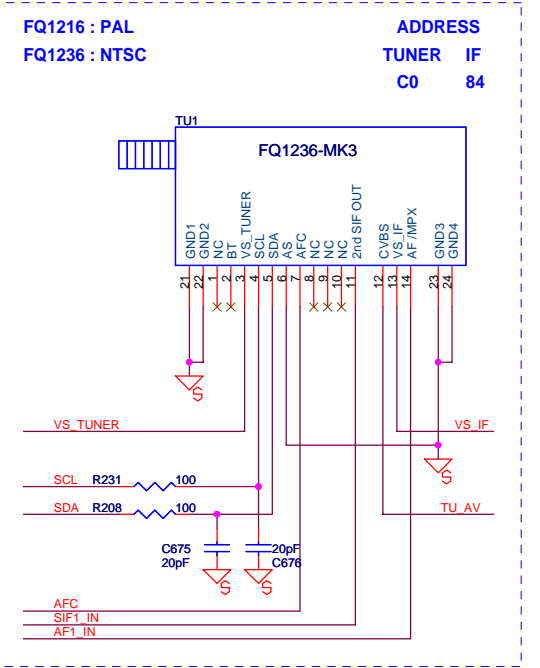
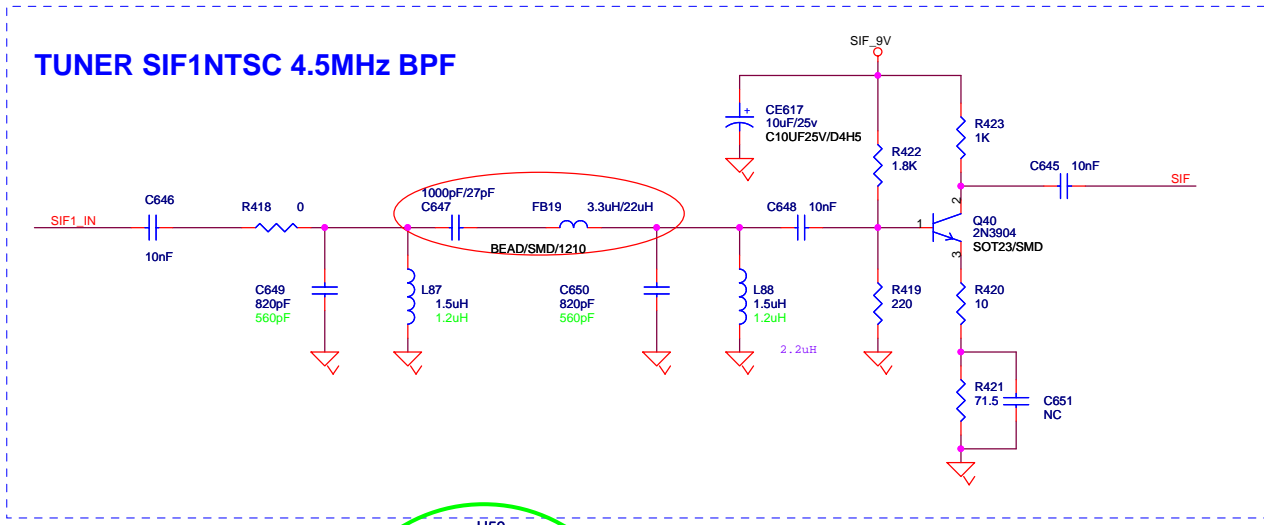


BACK LIGHT CIRCUIT

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Title			
BACK LIGHT / KEYPAD			
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B	AKAI_MIT8202_27US_LVDS_V0.0	Checked: <Checker>	1
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SCL	SCL	1,9
SDA	SDA	1,9
CVBS_0	CVBS_0	10
TV_GND	TV_GND	10
AF	AF	10
SIF	SIF	10
ADC_IN4	ADC_IN4	3
9V	9V	1,7,9

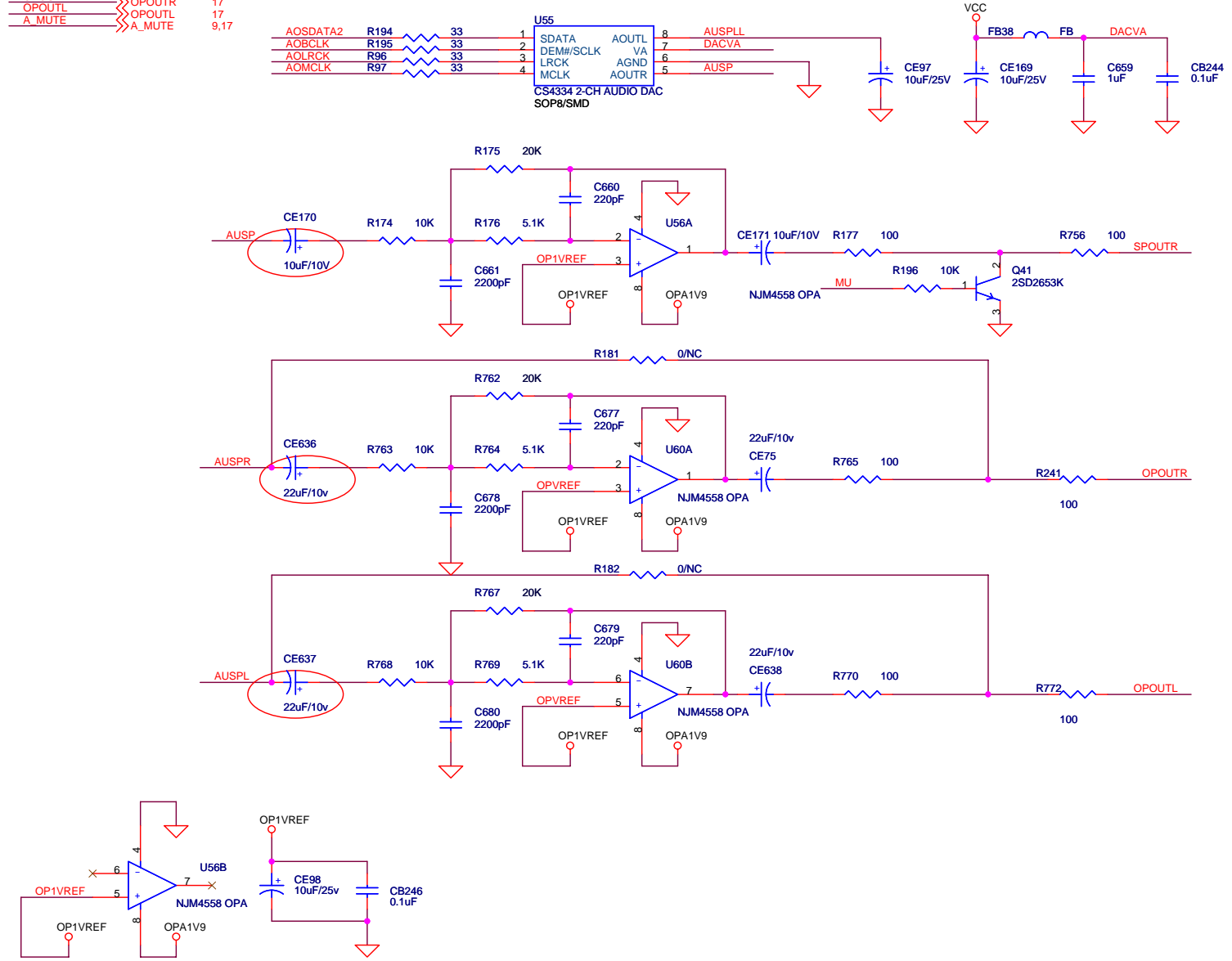


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Custom-Doc	<Rev Code>
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Title	TUNER IN		
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AOSDATA2 >>> AOSDATA2 3
 AOMCLK >>> AOMCLK 3,9
 AOBCLK >>> AOBCLK 3,9
 AOLRCK >>> AOLRCK 3,9
 MU >>> MU 9
 SPOUTR >>> SPOUTR 15
 AUSPR >>> AUSPR 9
 AUSPL >>> AUSPL 9
 OPOUTL >>> OPOUTL 17
 OPOUTR >>> OPOUTR 17
 A_MUTE >>> A_MUTE 9,17



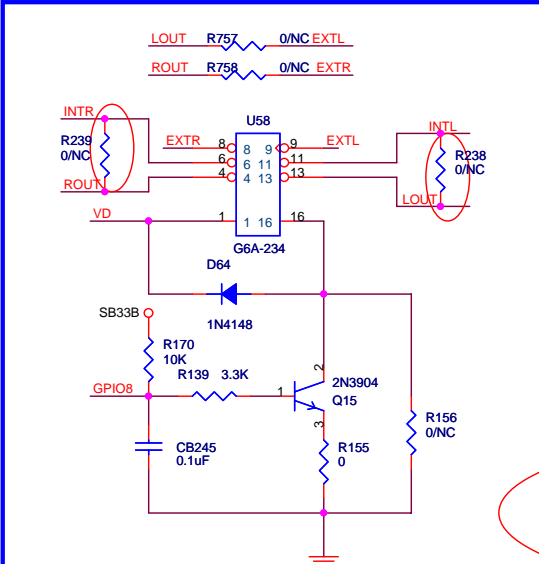
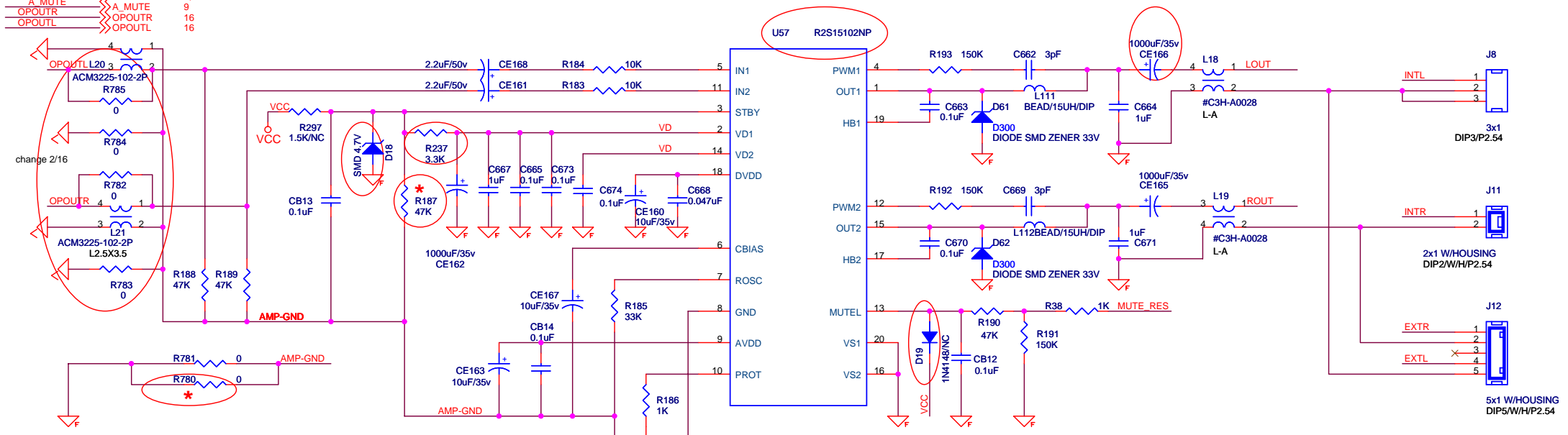
GPIO DECRPTION

- UP3_4 : SW SCL
- UP3_5 : SW SDA
- ERO0/UP3_0 :KEYPAD POWER
- ERO1/UP3_1 : MAIN POWER SWITCH
- VCLK : KEPAD CH+
- GPIO19 : KEPAD CH-
- DE/GPIO : DVD IR
- CCIR_CLK : PDP USE
- CCIR_V4 : PDP USE
- GPIO0 : PDP USE
- GPIO1 : NO USE
- GPIO2 : LVDS POWER SW
- GPIO3 : DTV POWER CONTROL
- GPIO4 : EEPROM WRITE PROTECT
- GPIO5/TXD : 2nd UART FOR MT5351
- GPIO6/RXD : 2nd UART FOR MT5351
- GPIO7 : AUDIO BYPASS MUTE CONTROL
- GPIO8 : SPEAKER SWITCH
- GPIO9 : AUDIO MUTE
- GPIO10 : Indicates active video at HDMI port
- GPIO11 : DVD POWER CONTROL
- GPIO12 : AV SWITCH
- GPIO13 : HDMI Hot Plug Detect
- GPIO14 : NO USE
- GPIO[15..18] : FOR DVD CONTROL
- GPIO/PWM0 : DIMMING
- GPIO/PWM1 : BACKLIGHT ON/OFF
- OUT_27Mhz/GPIO : HDMI CRYSTAL
- SDA1 : TO MT5351 I/F REQUEST
- SCL1 : TO MT5351 I/F READY
- F_A21 : KEYPAD(LED RED)
- ADCIN0 : KEYPAD
- ADCIN3:PDP 5VD DETECT
- ADCIN4:FOR TUNER AFC
- CCIR_V[0-3] : KEYPAD
- CCIR_V5 : AUDIO SWITCH
- CCIR_V6 : RESET DTV
- CCIR_V7 : YBPBR VIDEO SWITCH

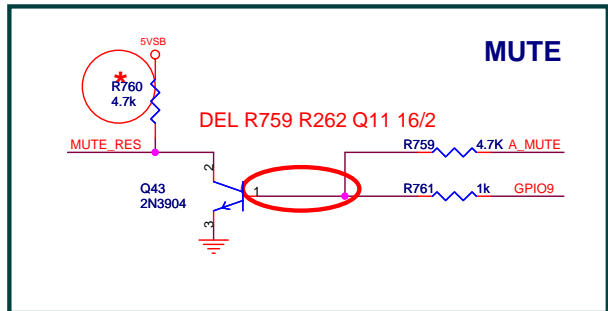
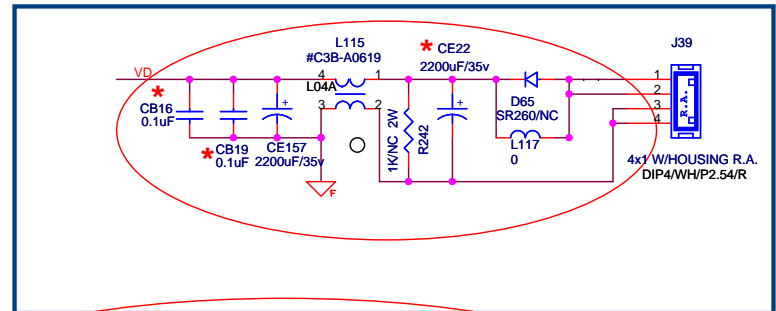
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SUB WOOFER			
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GPIO8 >>> GPIO8 3
 GPIO9 >>> GPIO9 3
 AUSPR >>> AUSPR 9,16
 AUSPL >>> AUSPL 9,16
 A_MUTE >>> A_MUTE 9
 OPOUTR >>> OPOUTR 16
 OPOUTL >>> OPOUTL 16



GPIO8: SPEAKER SWITCH (INTERNAL OR EXTERNAL)



REMARKS: * FOR LCDTV

LCDTV	R780	R187	R760	CB16	CB19	CE22
	NC	51K	2.2K	NC	NC	NC

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Title			
AUDIO Amplifier			
Size	Document Number	<Designer>	Rev
B	AKAI_MT8202_27US_LVDS_V0.0	Checked: <Checker>	1
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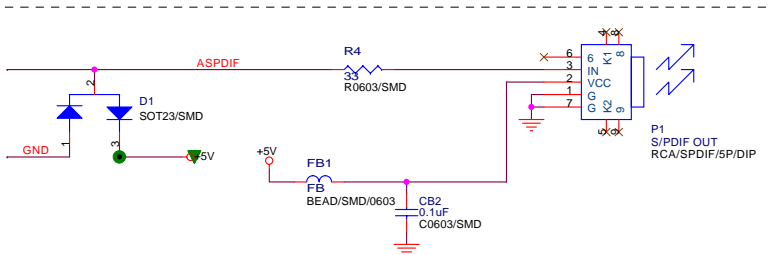
MT5111 / MT5351 REFERENCE DESIGN - 4 LAYERS

Rev	History	P#	DATE
RA-V1	INITIAL VERSION		2005/06/15
RA-V2	ADDED AUDIO SWITCH / REFINE POWER CIRCUIT		2005/07/14

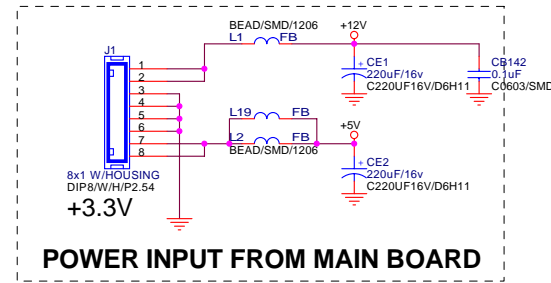
- 01. INDEX AND INTERFACE
- 02. POWER
- 03. TUNER
- 04. MT5111 ASIC
- 05. MT5351 ASIC
- 06. MT5351 PERIPHERAL
- 07. DDR MEMORY
- 08. NOR FLASH / JTAG / UART

NS : NON-STUFF

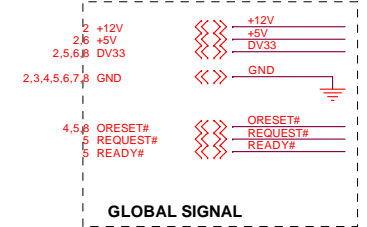
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+5V	POWER +5V	POWER SUPPLY
+5V_tuner	POWER +5V	TUNER POWER
DV33_DM	POWER +3V3	MT5111 POWER
DV18	POWER +1V8	MT5111 POWER
DV33	POWER +3V3	MT5351 POWER
AV33	POWER +3V3	MT5351 ANALOG POWER
DV25	POWER +2V5	MT5351 DDR POWER
DV12	POWER +1V2	MT5351 POWER
GND	GROUND	GROUND



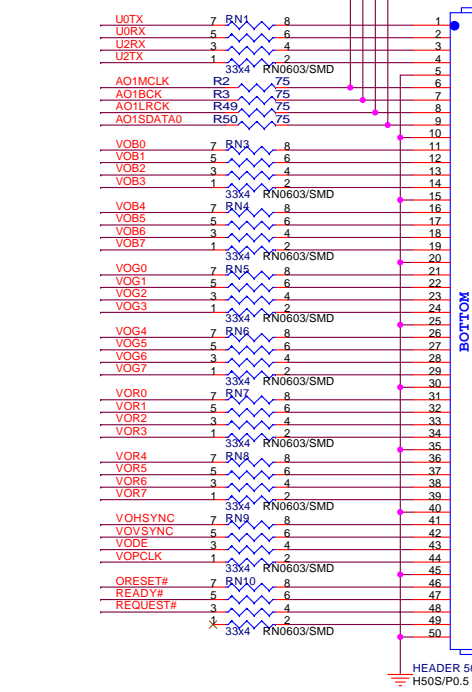
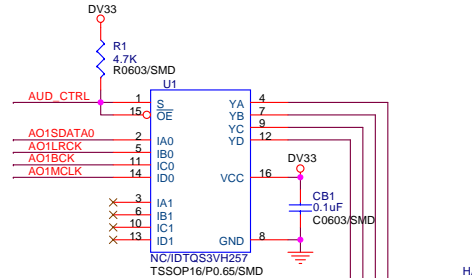
SPDIF CIRCUIT



POWER INPUT FROM MAIN BOARD



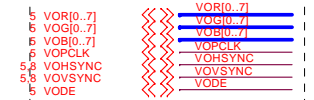
GLOBAL SIGNAL



DIGITAL OUTPUT



UART (RS232)



DIGITAL VIDEO OUTPUT



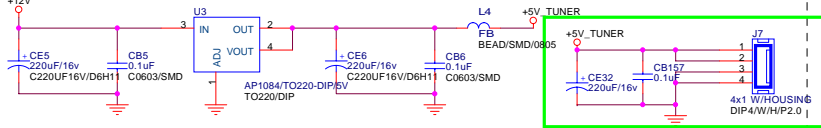
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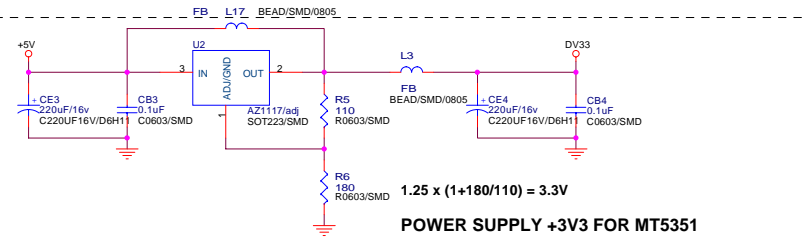
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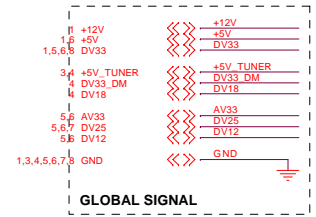
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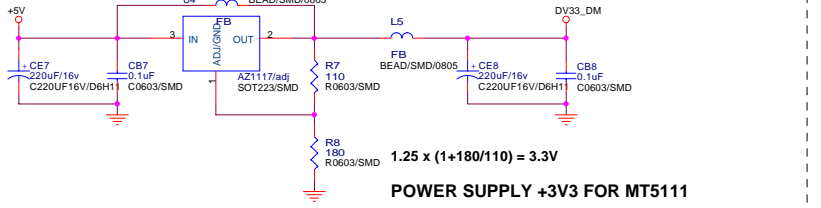
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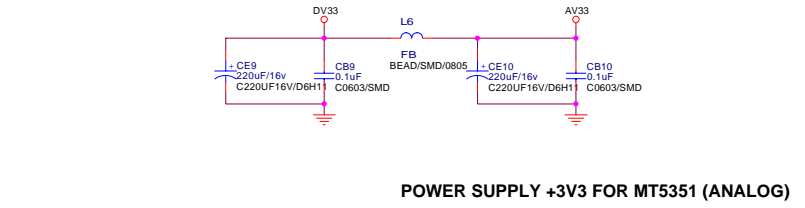
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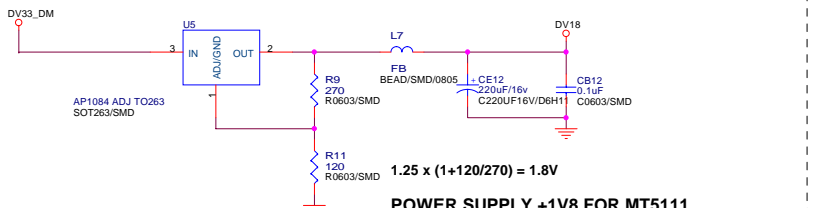
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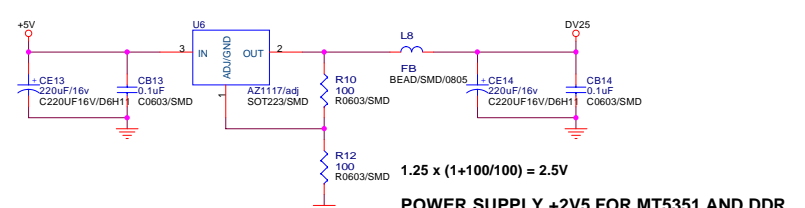
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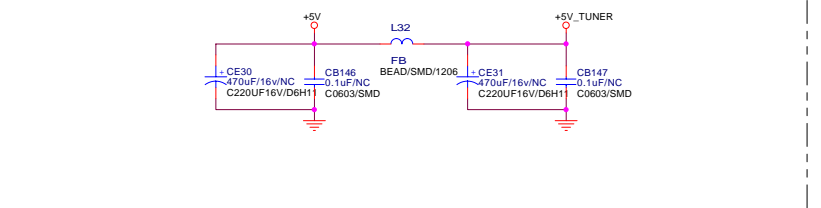
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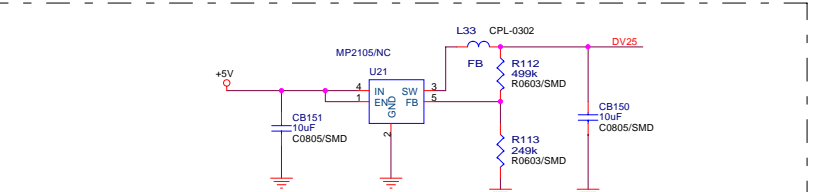
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POWER SUPPLY +2V5 FOR MT5351 AND DDR



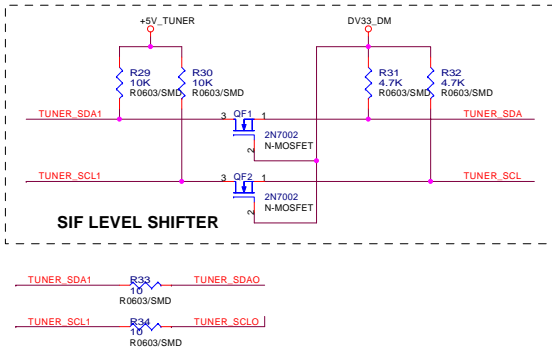
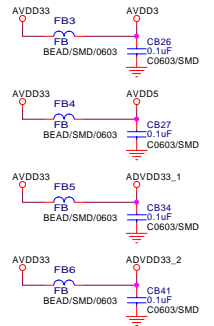
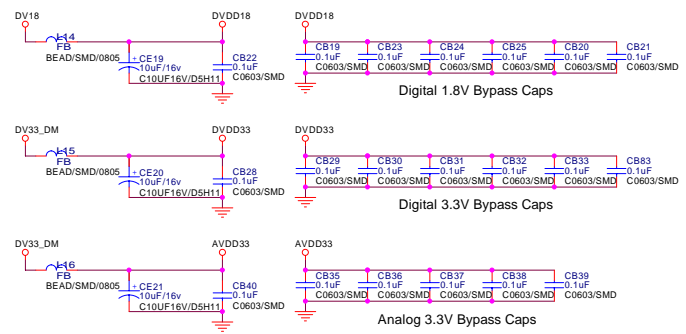
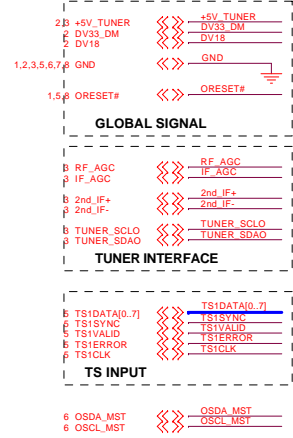
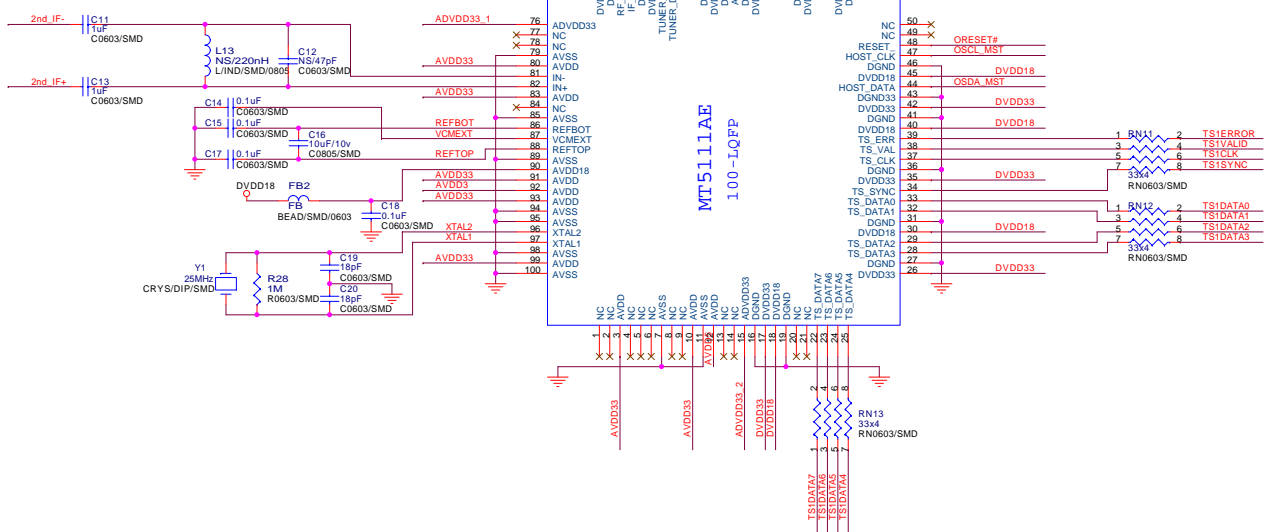
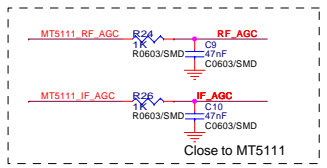
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Compatible With U6

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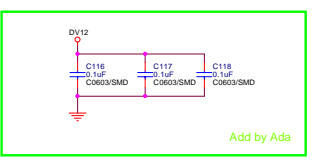
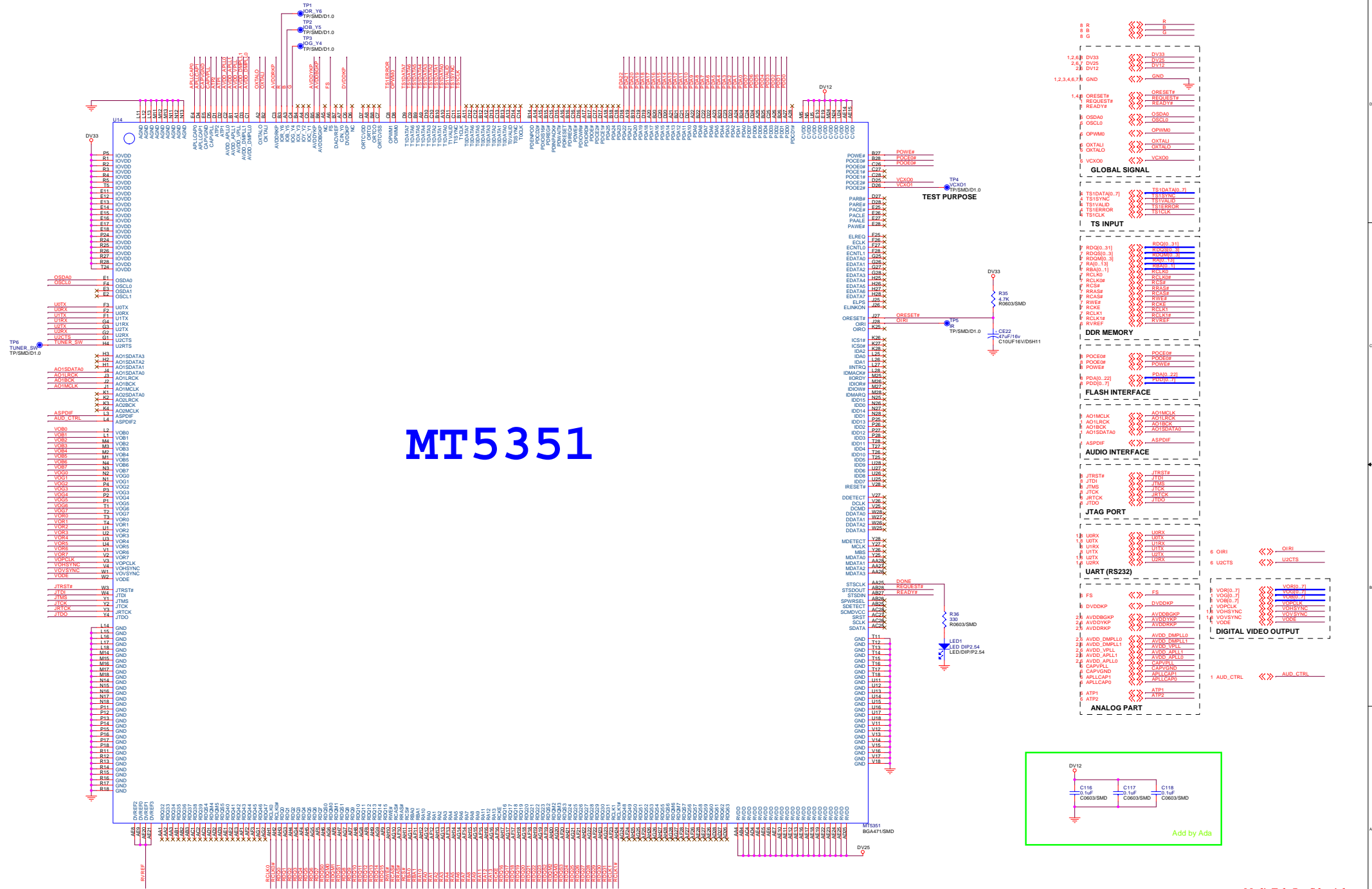
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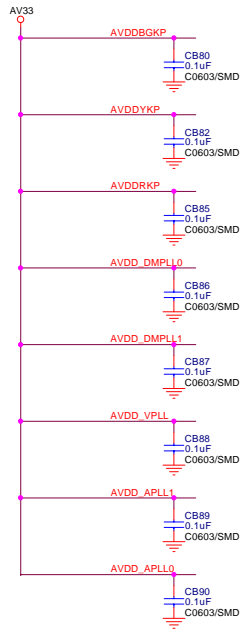
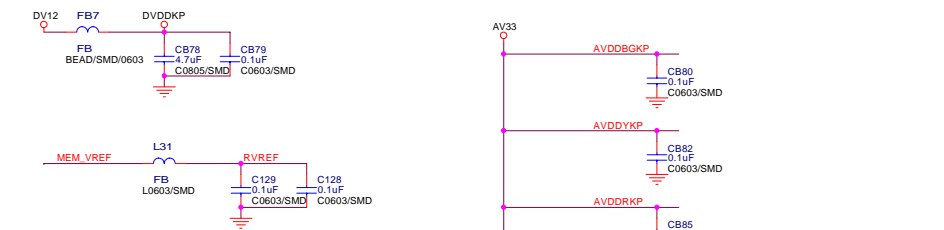
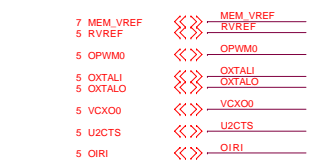
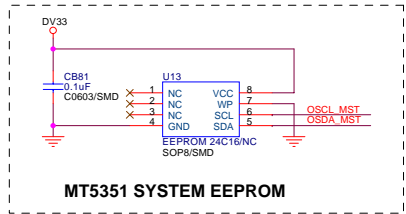
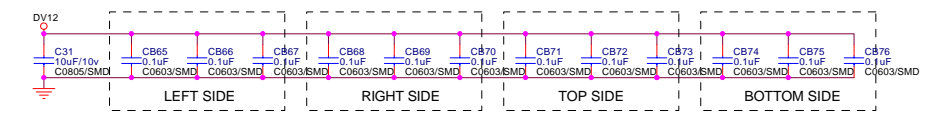
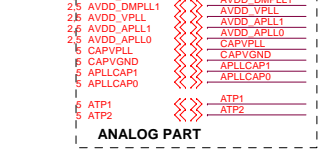
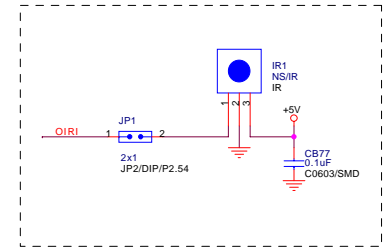
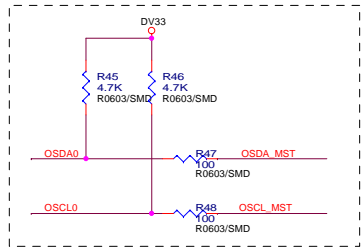
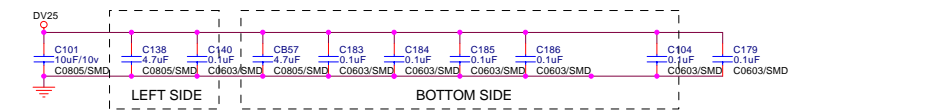
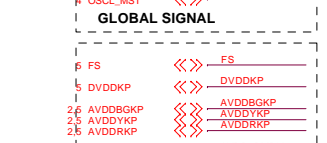
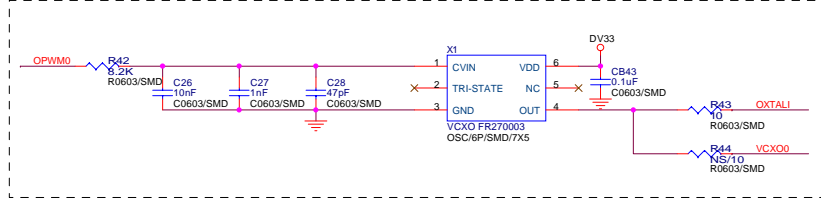
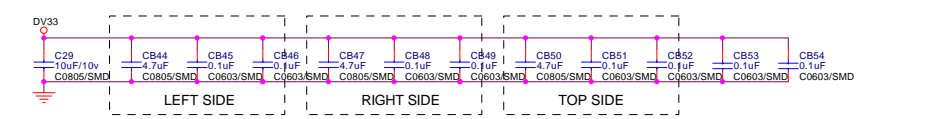
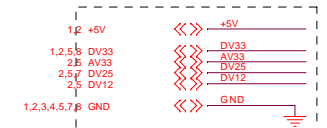
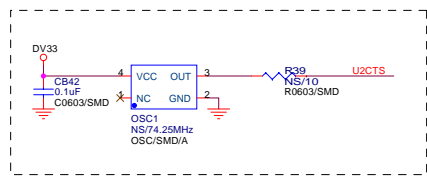
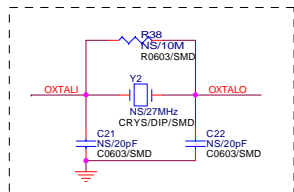
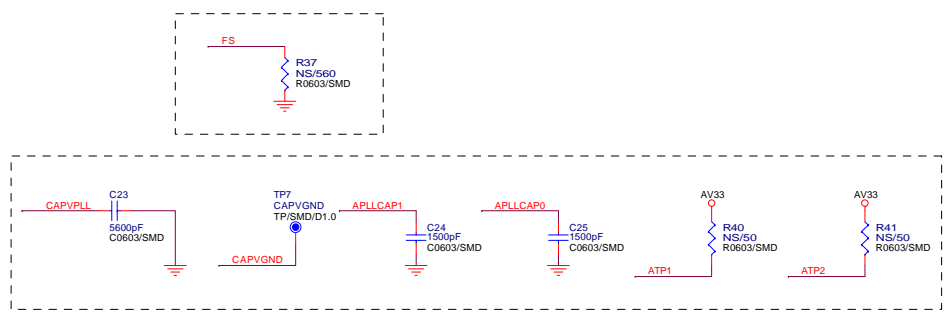
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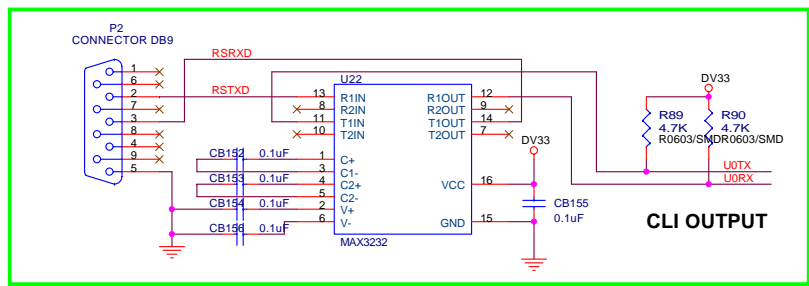
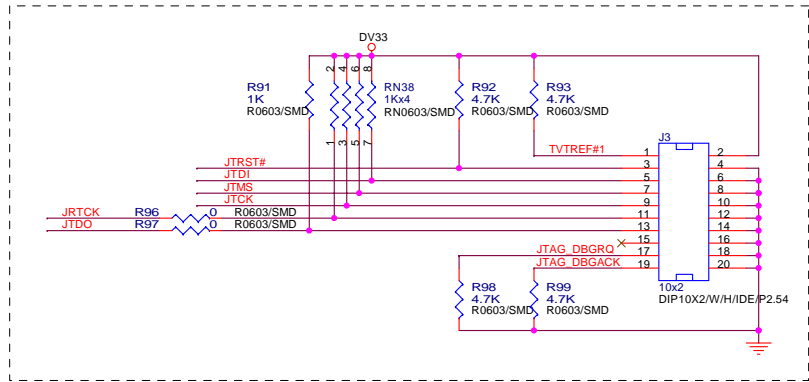
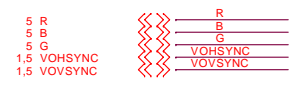
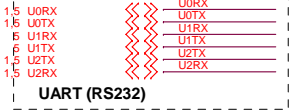
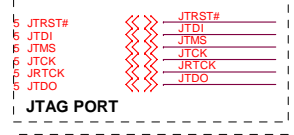
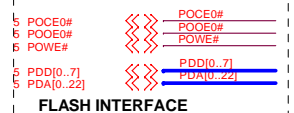
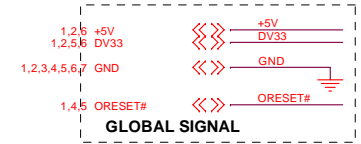
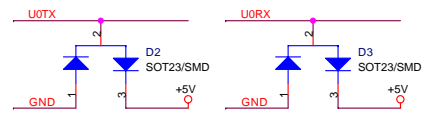
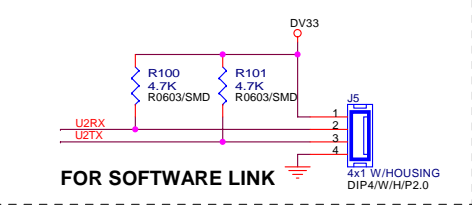
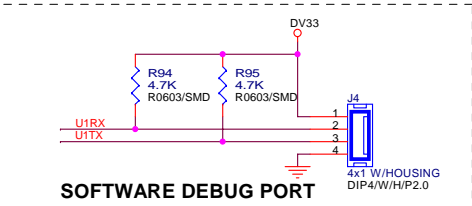
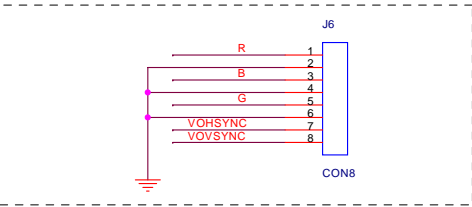
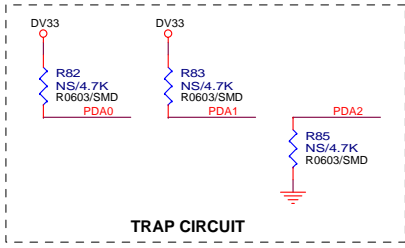
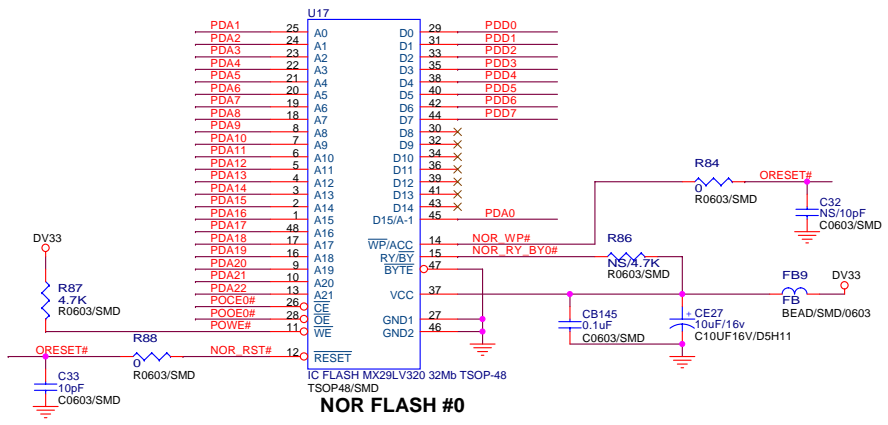
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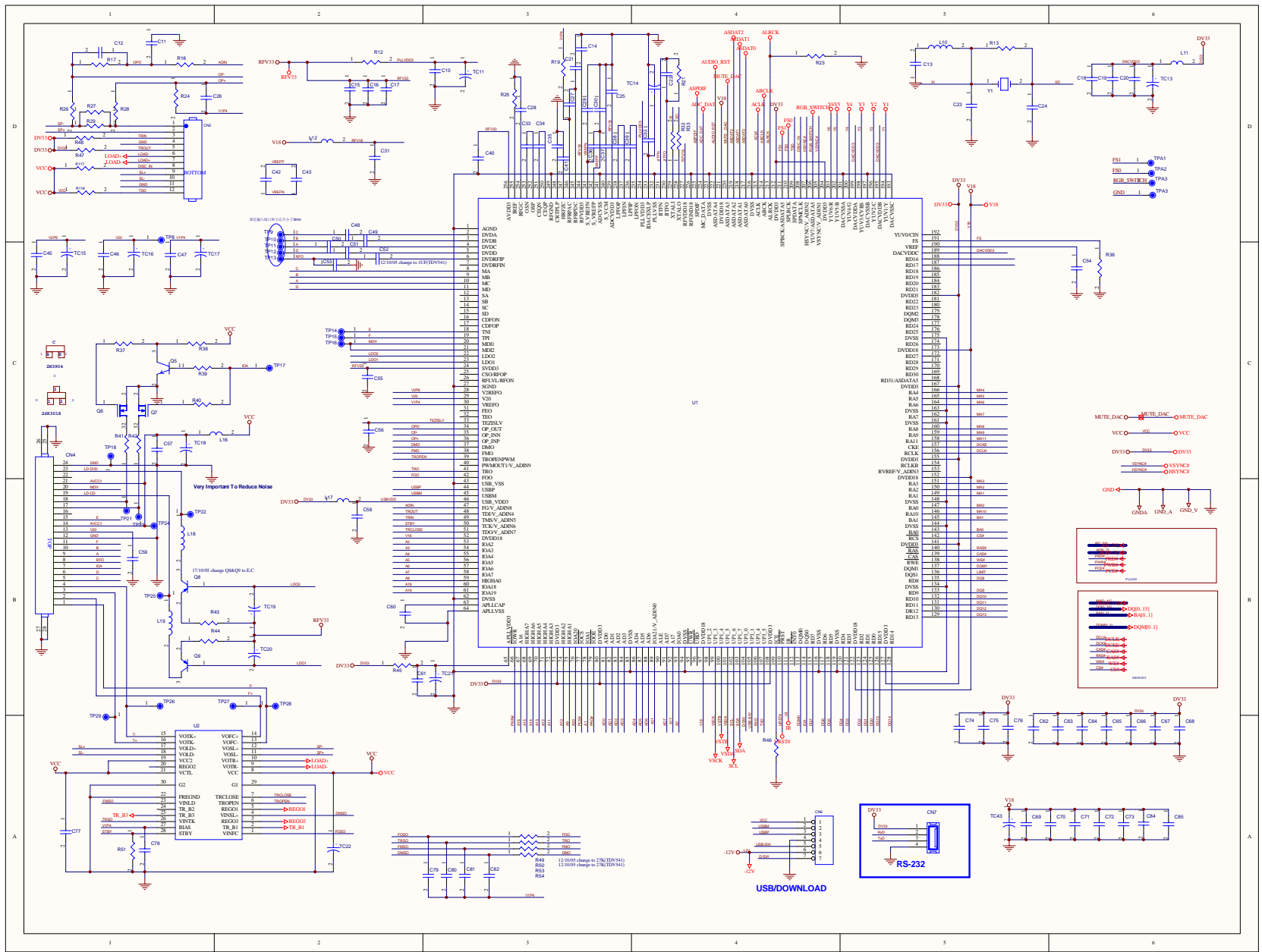
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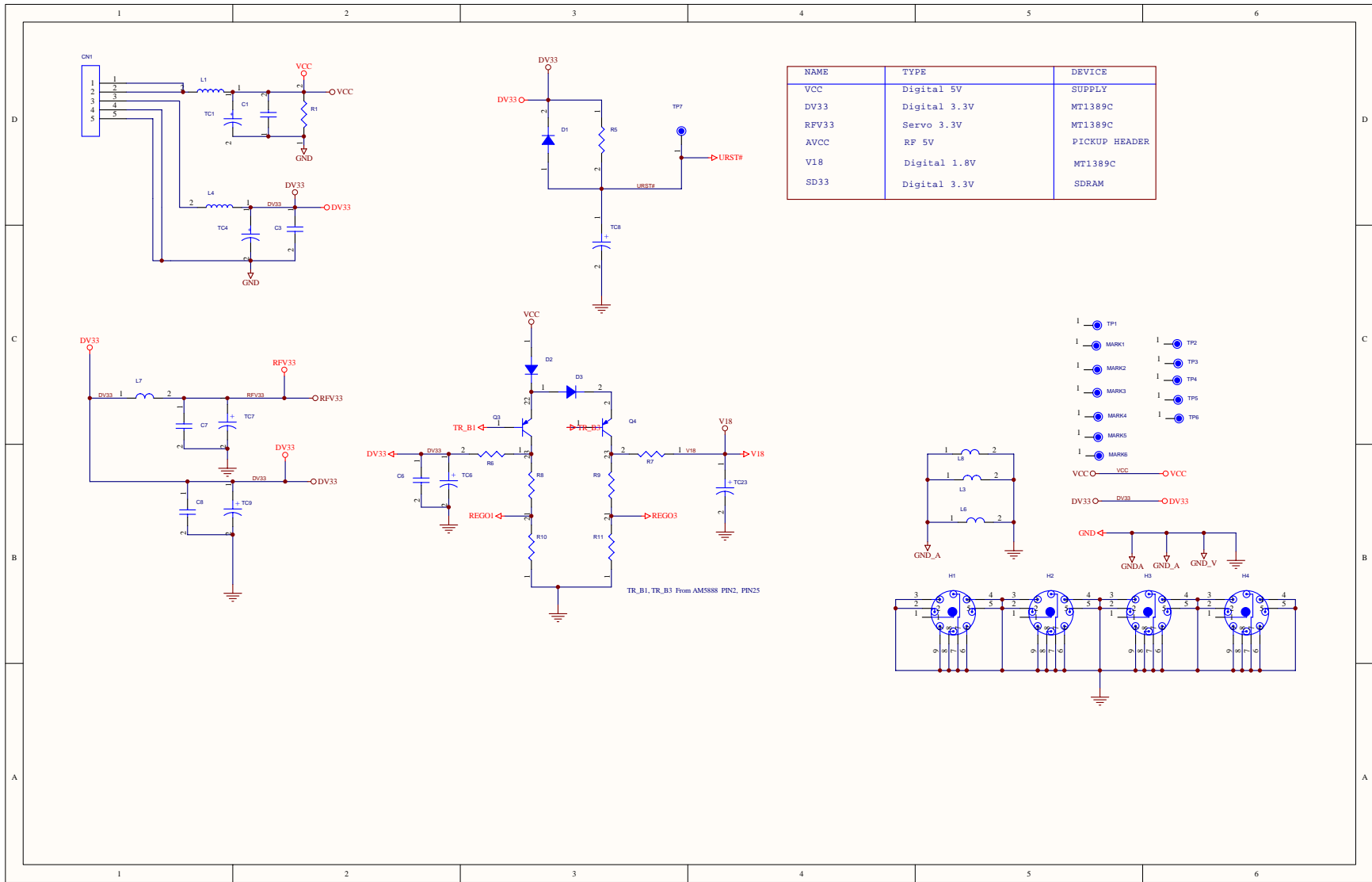
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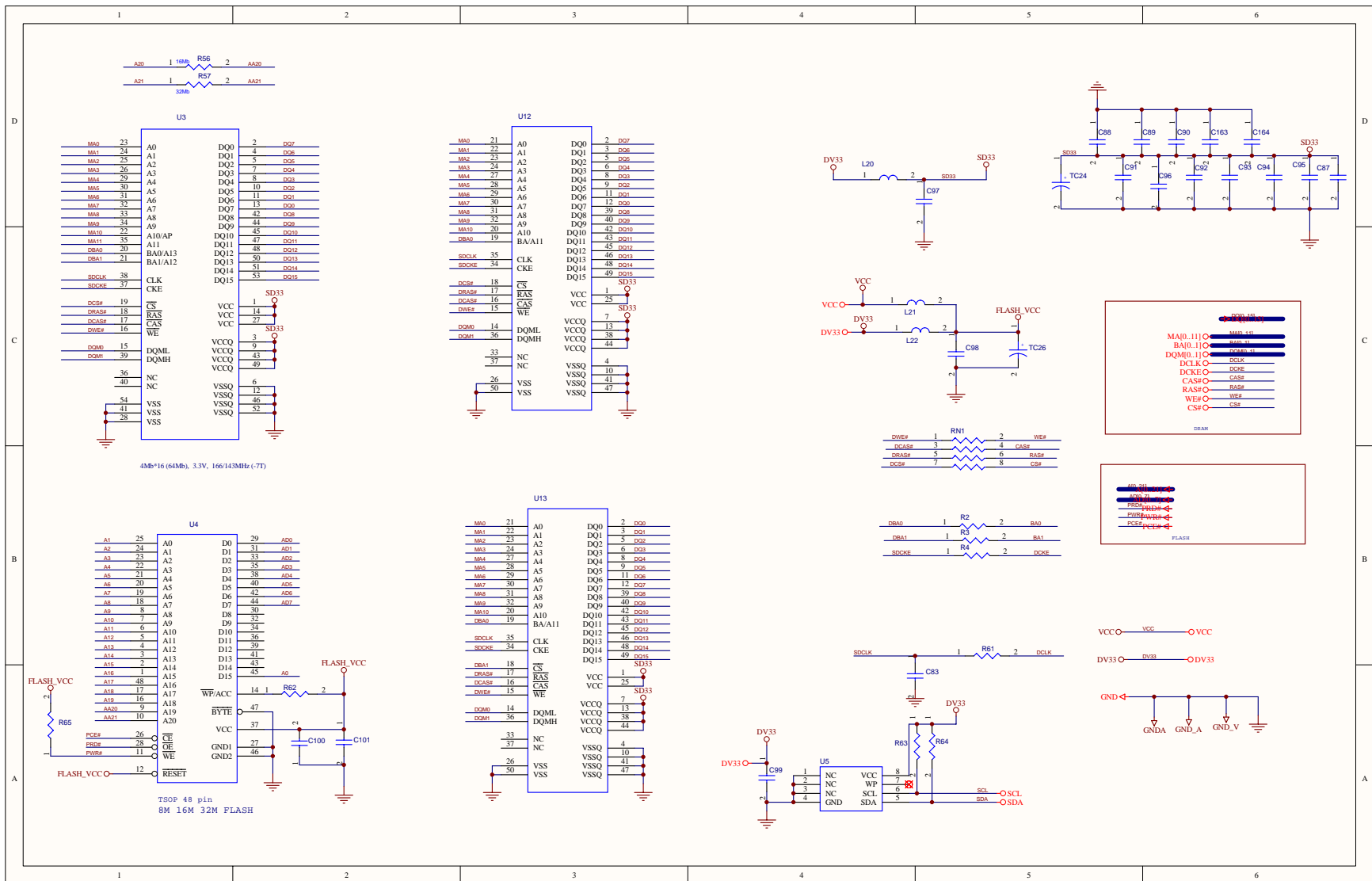


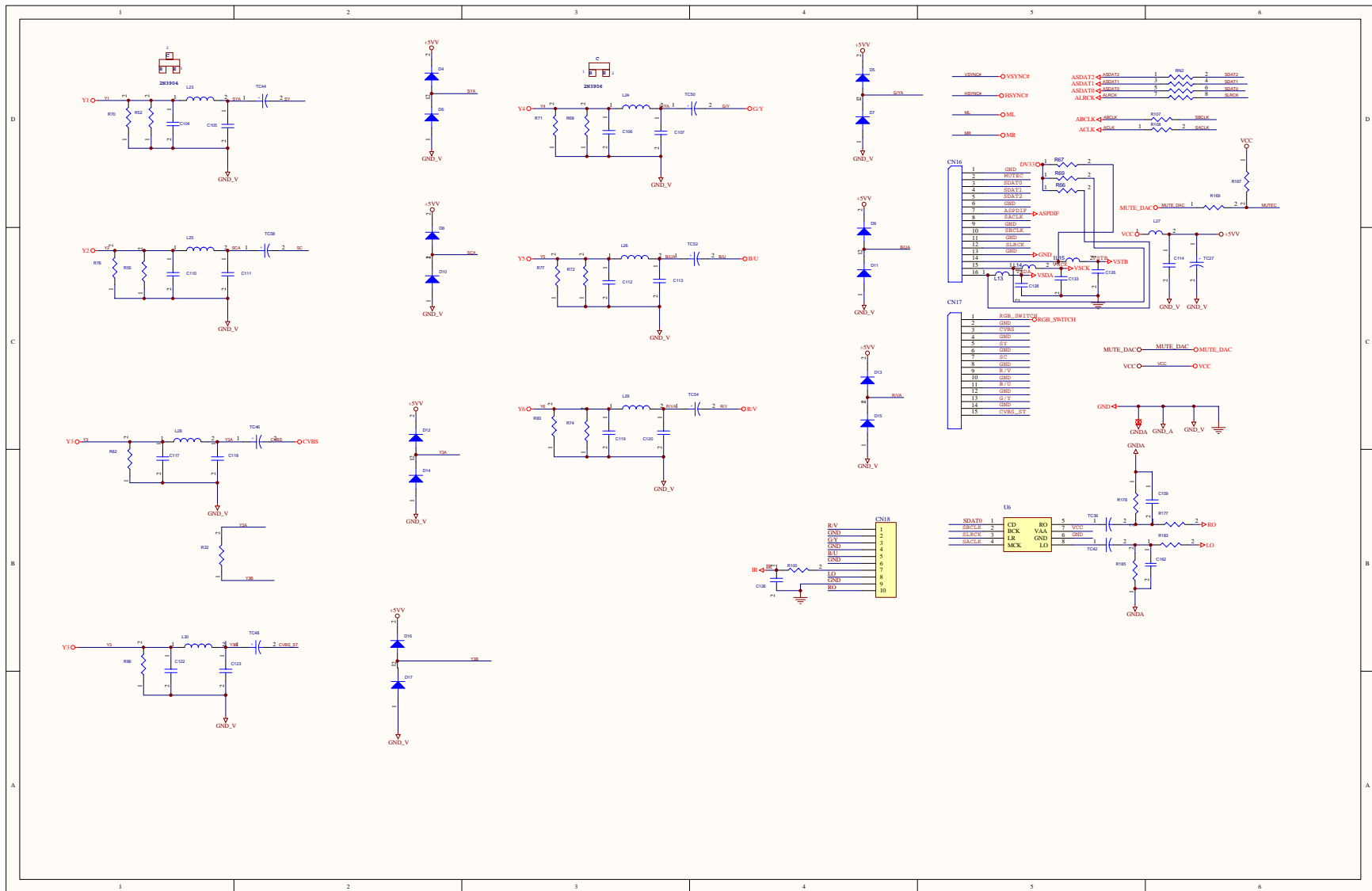
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Basic Operations & Circuit Description

MODULE

There are 1 pcs panel and 5 pcs PCB including 3 pcs Extension PCB, 1 pcs Timming controller board and 1 pcs Back Light board in the Module.

SET

There are 6 pcs PCBs including 1 pcs ATV Tuner board, 1 pcs keypad board, 1 pcs Remote Control Receiver board, 2 pcs L/R Speakers and 1 pcs Main(Video)board, 1 pcs ATSC board in the SET.

PCB funtion

1. Power :

(1). Input voltage: AC 120V, 60Hz.

(2). To provide power for PCBs.

2. Main board : To converter TV signals, S signals, AV signals, Y Pb/Cb Pr/Cr signals, DVI/HDMI signals and D-SUB signals to digital ones and to transmit to Control board.

3. Control board : Dealing with the digital signal for output to panel.

4. Extension board : Output addressing signals.

5. ATV Tuner Board : To convert TV RF signal to video and SIF audio signal to Main board.

6. ATSC Board : Receiver and converter ATSC TV signal to transmit to main board.

PCB failure analysis

1. CONTROL : a. Abnormal noise on screen. b. No picture.
2. MAIN :
 - a. Lacking color, Bad color scale.
 - b. No voice. (Make sure status: Mute / Internal, External speaker)
 - c. No picture but with signals output, OSD and back light.
 - d. Abnormal noise on screen.
3. POWER : NO picture, no power output.
4. Back Light :
 - a. No picture.
 - b. Flash on screen.
 - c. Darker picture with signals.
5. ATV Tuner :
 - a. No ATV Noise
 - b. No ATV signals
6. ATSC: a No ATSC TV signal

Main IC Specifications

- M13S128168A (ESMT)
2M x 16 Bit x 4 Banks Double Data Rate SDRAM
- MT5111CE
Single-Chip HDTV/CATV Demodulator
- MT5351
MT5351 is a DTV Backend Decoder SOC which support flexible transport demux, HD MPEG-2 video decoder, MPEG1,2, MP3, AC3 audio decoder, HDTV encoder. MT5351 is powered by ARM 926EJ with 16K I-Cache and 16K D-Cache. It can support 64Mb to 1Gb DDR DRAM devices with configurable 32/64 bit data bus interface.
- MT8202
MT8202G is a highly integrated Single-Chip for LCD TV supporting video input and output format up to HDTV. It includes 3D comb filter TV decoder to retrieve the best image from popular composite signals.
- MT8293
HDMI PanelLink Cinema Receiver
- R2S15102NP
Digital Power Amplifier R2S15102NP
- WM8776
24-bit, 192kHz Stereo CODEC with 5 Channel I/P Multiplexer

MT5111CE

Single-Chip HDTV/CATV Demodulator

Key Features

- Compliant with ATSC digital television standard
- Supports SCTE DVS-031 and ITU J.83 Annex B digital CATV standard
- Accepts direct IF (44 MHz or 43.75MHz) and low IF (5.38MHz)
- Differential IF input with programmable input signal level: 0.5Vpp to 2Vpp
- NTSC interference rejection capability
- Compensate echo up to -5 to +47us range for terrestrial HDTV reception
- On-chip 10-bit ADC for HDTV/CATV demodulator
- On-chip programmable gain amplifier
- 25MHz crystal for clock generation
- On-chip PLL clock generation
- Full-digital timing recovery, no VCXO is required
- Full-digital frequency offset recovery with wide acquisition range ± 1 MHz for ATSC and ± 250 KHz for CATV reception
- Dual digital AGC controls for IF and RF respectively
- MPEG-2 transport stream output in parallel or serial format
- On-chip error rate estimators for TS packets, TCM decoder, and equalizer
- EIA/CEA-909 antenna interface
- Controlled by I²C interface
- Supports sleep mode to save power consumption
- Core power supply: 1.8V, peripheral power supply: 3.3V
- 100-LQFP package
- Lead Free

Functional Block Diagram

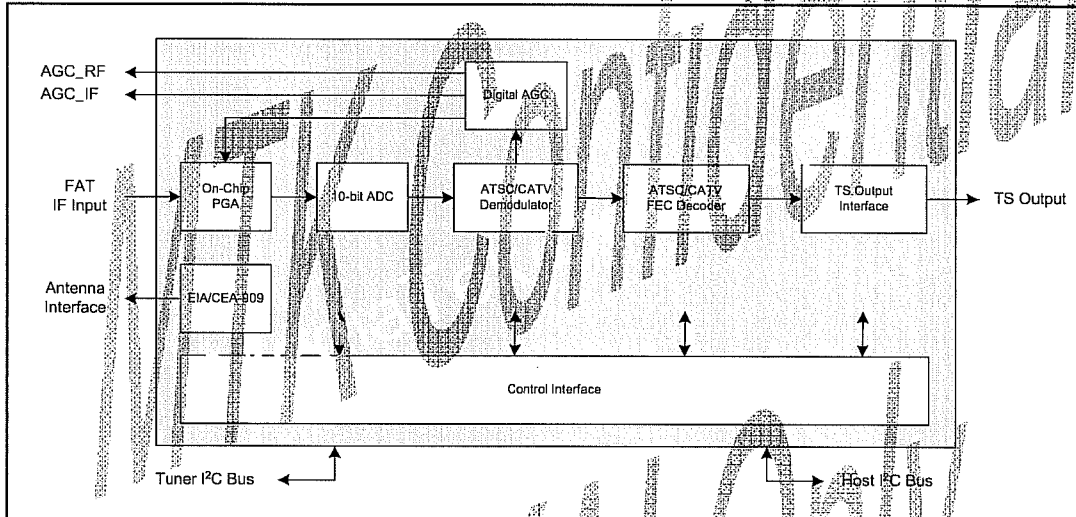


Figure 1: MT5111CE Functional Block Diagram

General Description

MT5111CE is a fully integrated single-chip 8-VSB and 64/256-QAM demodulator. The chip is designed specifically for the digital terrestrial HDTV and CATV receivers, and is fully compliant with ATSC A/53, SCTE DVS-031, and ITU J.83 Annex B standards.

MT5111CE includes a 10-bit A/D converter, 8-VSB/QAM demodulator, TCM (Trellis-Coded Modulation) decoder, and Reed-Solomon Forward Error Correction decoder. Moreover, an internal controller handles the acquisition and tracking to ensure the best receiving performance. The internal controller communicates with the external host controller via the I2C-compatible interface, and also provides direct control to the RF tuner via the second I2C-compatible

interface.

MT5111CE accepts either the direct IF signals centered at 44MHz or 43.75MHz, or the low IF signals centered at 5.38MHz. The center frequency of the incoming IF signal can also be programmed to other frequencies for various applications. An On-chip programmable gain-controlled amplifier is designed to provide sufficient signal amplitude when the received RF signal is weak. The IF signal is first sampled by a 10-bit A/D converter. Afterward, the digitized samples are further processed for adjacent channel interference rejection.

MT5111CE measures the power level of the digitized sequence, and feeds the control voltages back to the RF tuner and the IF amplifier respectively. The control voltages are converted to analog signals through the on-chip 1-bit sigma-delta D/A converters plus the off-chip R-C low-pass filters. The automatic gain control keeps the received power level at a desired level and maximizes the received SNR.

The carrier frequency offset and symbol timing offset are both estimated and compensated by a fully digital synchronizer. The synchronizer also controls the rate conversion in the digital re-sampling device by estimating the sampling frequency offset. All synchronization in MT5111CE are integrated in digital circuits, no external VCXO is required.

The equalizer is adopted to cancel the effect of multi-path fading channel during signal propagation in the air or over cable networks. The equalizer is not only capable of acquiring correct coefficients combination by specified adaptive algorithms, but also programmable to different configurations for various channel conditions.

The following FEC decoder corrects most of the errors by the concatenation

of TCM and Reed-Solomon decoders. For CATV reception, MT5111CE detects and aligns de-puncturing timing of the received sequence. The timing synchronization is also automatically performed to lock the FEC frames. The on-chip error rate estimator can simultaneously monitor the receiving qualities at the three stages: equalizer output, TCM decoder, and transport stream packets. The chip finally outputs the decoded MPEG-2 packets in either the serial or parallel transport stream format.

In addition to the demodulation of HDTV signal, MT5111CE also provides the capability to remove the NTSC co-channel interference. To achieve the best reception condition, an antenna interface compliant with EIA/CEA-909 is designed to control the antenna parameters.

MT5111CE is designed with efficient mechanisms of power saving. When configured to enter the sleep mode by the system host, it can immediately turn off almost all embedded hardware except the on-chip controller to reduce the power consumption. Resuming from sleep mode is also triggered by the system host. Upon returning to the operation mode, the chip will try to re-acquire the DTV signal automatically.

Pin Out

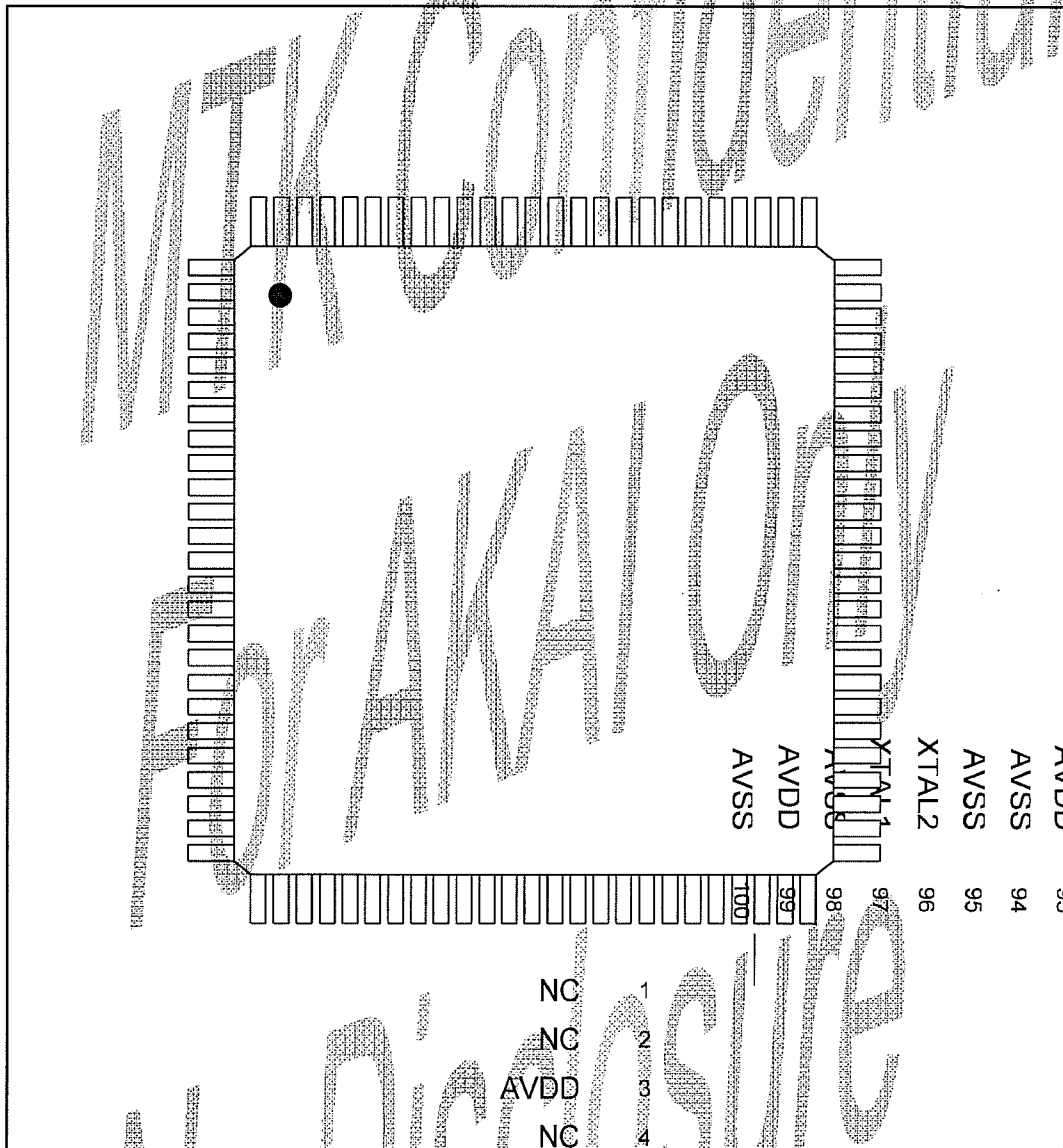


Figure 2: MT5111CE Pin Out

AVSS	7
NC	8
NC	9
AVDD	10
AVSS	11
AVDD	12
NC	13
NC	14
ADVDD3.3	15

Pin Description

Signal Name	Pin No	I/O	Description
Transport Stream			
TSDATA[7:0]	22,23,24,25,28, 29,32,33	O	TS data output
TSSYNC	34	O	TS packet start signal
TSVAL	38	O	TS output valid signal
TSCLK	37	O	TS output clock
TSERR	39	O	TS packet error indicator
Analog Signal			
IN+	82	I	Analog differential IF input
IN-	81	I	
REFTOP	88	O	ADC reference top voltage. Decouple with a capacitor to AVSS
REFBOT	86	O	ADC reference bottom voltage. Decouple with a capacitor to AVSS
VCMEXT	87	O	ADC common mode voltage
Antenna Interface			
ANTIF	62	O	CEA-909 Antenna Control Interface
Clock Generation			
XTAL1	97	I	25MHz crystal input
XTAL2	96	I	
Control Signals			
HOST_CLK	47	I	Host processor serial clock input, 5 volt compatible
HOST_DATA	44	I/O	Host processor serial data pin, 5 volt compatible
TUNER_CLK	69	O	Tuner serial clock output, 5 volt compatible
TUNER_DATA	68	I/O	Tuner serial data pin, 5 volt compatible
IF_AGC	72	O	IF AGC output
RF_AGC	73	O	RF AGC output
RESET	48	I	Power reset pin, low active
SA0	66	I	Chip slave address selection pin, tie to VDD3.3 or DGND
SA1	67	I	Chip slave address selection pin, tie to VDD3.3 or DGND
Power Supply			
VDD3.3	17,26,35,42, 52,60,70	P	Digital power supply, tie to 3.3V
VDD1.8	18,30,40,45, 55,64,75	P	Digital power supply, tie to 1.8V
DGND	16,19,27,31, 36,41,43,46,51,56, 61,63,65,71,74	P	Digital ground, tie to digital ground plane
AVDD	3,10,12,80,83,91, 92,93,99	P	Analog power supply, tie to 3.3V
AVSS	7,11,79,85,89,94, 95,98,100	P	Analog ground, tie to analog ground plane
ADVDD3.3	15,76	P	Digital power supply for analog component, tie to 3.3V
AVDD1.8	90	P	Digital power supply for analog component, tie to 1.8V
Others			
NC	1,2,4,5,6,8,9,13,14, 20,21,49,50,53,54, 57,58,59,77,78,84		Not Connected

Table 1: Pin Description

Electrical Characteristic

Recommended Operating Condition

Symbol	Description	Min	Typical	Max	Unit
T _j	Chip Junction Temperature	-	-	125	°C
VDD1.8	1.8V Digital Core Power Supply Voltage	1.62	1.8	1.98	Volt
AVDD	3.3V Analog Power Supply Voltage	3.15	3.3	3.45	Volt
VDD3.3	3.3V Digital IO Power Supply Voltage	3	3.3	3.6	Volt
AVDD1.8	1.8V Analog Power Supply Voltage	1.7	1.8	1.9	Volt
V _{IH}	Digital Input High Voltage	3	3.3	3.6	Volt
V _{IL}	Digital Input Low Voltage	-	0	-	Volt

Table 2: Recommend Operating Condition

Typical Current and Power Dissipation (ASTC Mode)

Symbol	Description	Typical	Unit
I_VDD1.8	1.8V Digital Core Power Supply Current	350	mA
I_AVDD	3.3V Analog Power Supply Current	70	mA
I_VDD3.3	3.3V Digital I/O Power Supply Current	16	mA
I_AVDD1.8	1.8V Analog Power Supply Current	2	mA
P_VDD1.8	1.8V Digital Core Power Dissipation	630	mW
P_AVDD	3.3V Analog Power Dissipation	231	mW
P_VDD3.3	3.3V Digital IO Power Dissipation	52.8	mW
P_AVDD1.8	1.8V Analog Power Dissipation	3.6	mW
P_Total	Total Power Dissipation	917.4	mW
P_Sleep	Total Power Dissipation (Sleep Mode)	130	mW

Table 3: Typical Current and Power Dissipation (ATSC Mode)

Typical Current and Power Dissipation (QAM Mode)

Symbol	Description	Typical	Unit
I_VDD1.8	1.8V Digital Core Power Supply Current	175	mA
I_AVDD	3.3V Analog Power Supply Current	70	mA
I_VDD3.3	3.3V Digital I/O Power Supply Current	19	mA
I_AVDD1.8	1.8V Analog Power Supply Current	2	mA
P_VDD1.8	1.8V Digital Core Power Dissipation	315	mW
P_AVDD	3.3V Analog Power Dissipation	231	mW
P_VDD3.3	3.3V Digital I/O Power Dissipation	62.7	mW
P_AVDD1.8	1.8V Analog Power Dissipation	3.6	mW
P_Total	Total Power Dissipation	612.3	mW
P_Sleep	Total Power Dissipation (Sleep Mode)	130	mW

Table 4: Typical Current and Power Dissipation (QAM Mode)



Specifications are subject to change without notice.

HDMI PanelLink Cinema Receiver

MT8293 is a low-cost, fully HDMI-compliant receiver that fits directly into home theater products such as LCD TVs, plasma TVs and HDTVs. The receiver is capable of supporting bandwidths up to 165MHz and video resolutions up to 1080p and UXGA. The MT8293 supports the DVD-Audio standard, including 7.1- surround audio at 96kHz and stereo audio at 192kHz.

The built-in High-bandwidth Digital Content Protection (HDCP) decryption engine secures the digital link for transmission of valuable high-definition video and audio. Built-in HDCP self-test engine simplifies manufacturing testing.

FEATHRES

■ Industry-Standard

- HDMI 1.1
- DVI 1.0
- EIA/CEA-861B
- HDCP 1.1

■ Digital Video Output

- Integrated PanelLink Core
- Supports DTV (480i/576i/480p/576p/720p/1080i/1080p) and PC (VGA/XGA/SXGA/UXGA) resolution up to 165MHz (using dual edge to transmit video data for pixel clock over 112MHz)
- Flexible digital video interface
 - 24-bit RGB/YCbCr 4:4:4
 - 16-bit YCbCr 4:2:2
 - 8-bit YCbCr 4:2:2 (ITU-R BT.656)
- Integrated RGB <-> YCbCr color space conversion (both 601 and 709)
- 4:2:2 <-> 4:4:4 converter
- Integrated Deinterlacer for 480i/576i (SDTV only)
- Integrated Down-Scaler (with CEN)

■ Digital Audio Output

- Industry-standard S/PDIF and 3-wire output

- Supports high-end audio including DVD-Audio
 - 2-ch. 32-192kHz or
 - 8-ch. 32-96kHz
- Programmable 3-wire output supports numerous low-cost I2S audio DACs
- Supports IEC60958 2-channel PCM
- Capable of carrying IEC61937 compressed audio (Dolby Digital, DTS, etc.)

■ Content Protection

- Integrated HDCP cipher engine
- External EEPROM for encrypt HDCP keys
- Built-in HDCP self-test
- Decrypts both video and audio

■ System Operation

- Register-programmable via slave I2C interface
- Auto video mode
- Auto audio mode
- Flexible interrupt registers with interrupt pin

■ Power Management

- 1.8V core provides low-power operation
- Flexible power-down modes

■ Outline

- 128-pin QFP package



MT8293

PRELIMINARY, SUBJECT TO CHANGE WITHOUT NOTICE

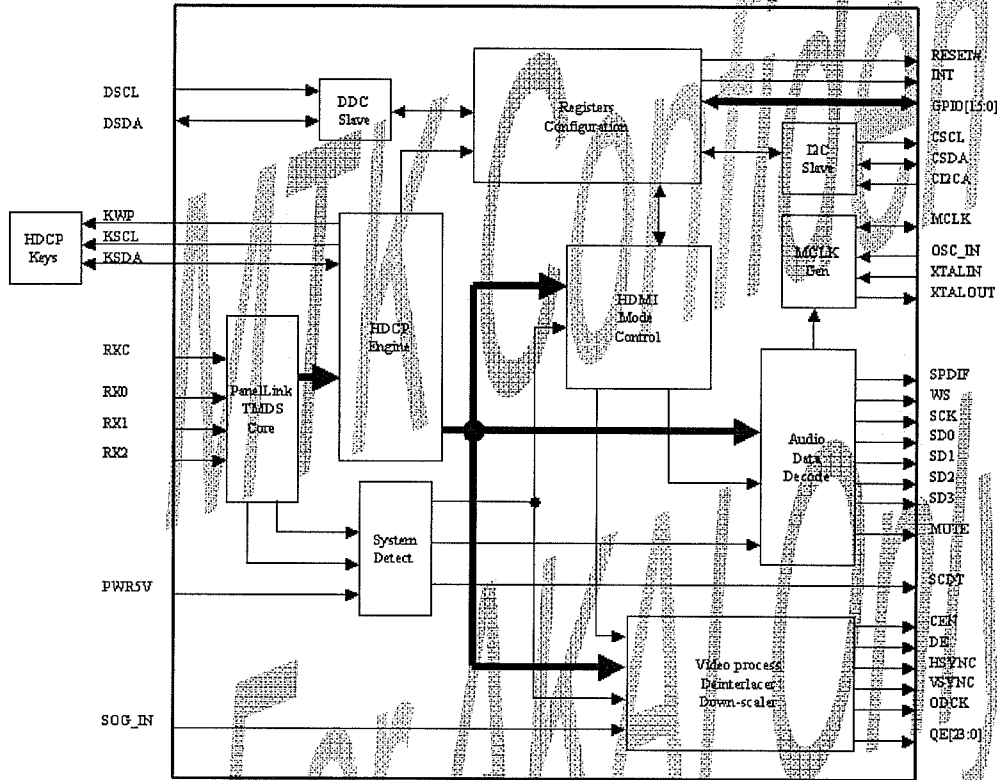
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CGND18	85	32	GP103
CVCC18	86	31	IOVCC33
MUTE	87	30	IOGND33
IOVCC33	88	29	GP104
IOGND33	89	28	GP105
SPDIF	70	27	GP106
SD3	71	26	GP107
SD2	72	25	CGND18
SD1	73	24	CVCC18
SD0	74	23	GP108
WS	75	22	GP109
SCK	76	21	GP110
IOVCC33	77	20	GP111
IOGND33	78	19	IOVCC33
MCLK	79	18	IOGND33
CGND18	80	17	GP112
CVCC18	81	16	GP113
AUXP_VCC18	82	15	GP114
AUXPGND	83	14	GP115
XTALOUT	84	13	CGND18
XTALIN	85	12	CVCC18
XTALVCC	86	11	KSCL
REGVCC	87	10	KSDA
RSVDL	88	9	KMP
RESET#	89	8	NC
SCDT	90	7	IOVCC33
INT	91	6	IOGND33
QE23	92	5	NC
QE22	93	4	OSC_IN
QE21	94	3	SOG_IN
QE20	95	2	CEN
QE19	96	1	VSYN
		126	HSYNC
		127	DE
		128	CGND18
		125	CVCC18
		124	DEB
		123	DEI
		122	DE2
		121	DE3
		120	IOVCC33
		119	IOVCC33
		118	IOGND33
		117	IOGND33
		116	DE4
		115	DE5
		114	DE6
		113	CGND18
		112	CVCC18
		111	DE8
		110	DE9
		109	DE10
		108	DE11
		107	IOVCC33
		106	IOGND33
		105	DE12
		104	DE13
		103	DE14
		102	DE15
		101	DE16
		100	DE17
		99	CEN
		98	IOVCC33
		97	IOGND33



MT8293

No Disclosure



FOR ANALYSIS ONLY

NO DISCLOSURE



Item	Symbol	Pin #	Type	Description
DIGITAL				
Power/Ground (45)				
1	CVCC18	12,24,36,45,66,81,112,125	I	Digital Logic 1.8V power
2	CGND18	13,25,37,65,80,113,126	I	Digital Logic ground
3	IOVCC33	7,19,31,68,77,98,107,120	I	Input/Output Pin 3.3V power
4	IOGND33	6,18,30,69,78,97,106,118	I	Input/Output Pin ground
5	AVCC	49,53,57,61	I	TMDS Analog 3.3V power
6	AGND	52,56,60,64	I	TMDS Analog ground
7	PVCC	47	I	TMDS PLL 3.3V power
8	PGND	46	I	TMDS PLL ground
9	AUDPVCC18	82	I	ACR PLL 1.8V power
10	AUDPGND	83	I	ACR PLL ground
11	XTALVCC	86	I	ACR PLL crystal input 3.3V power
12	REGVCC	87	I	ACR PLL regulator 3.3V power
Configuration/Programming (20)				
1	INT	91	O	Interrupt output
2	RESET#	89	I	Reset Pin. Active low
3	DSCL	42	I	DDC I2C clock, 5V tolerance
4	DSDA	41	I/O	DDC I2C data, 5V tolerance
5	CSCL	40	I	Configuration I2C clock
6	CSDA	39	I/O	Configuration I2C data
7	KSCL	11	O	KEYS EEPROM I2C clock
8	KSDA	10	I/O	KEYS EEPROM I2C data
9	KWP	9	O	KEYS EEPROM write protect
10	SCDT	90	O	Indicates active video at HDMI input port
11	CISCA	38	I	I2C device address select



Item	Symbol	Pin #	Type	Description
12	PWR5V	44	I	TMDS port transmitter detect (hot plug), 5V tolerance
13	RSVDL	88	I	Must be tied low
14	RSVD	48	O	
15	NC	43	-	No connect
16	NC	8,5	-	No connect
17	OSC_IN	4	I	Oscillator input, External in
18	SOG_IN	3	I	SOG input, External AD in
19	CEN	2	O	Clock enable, for 8202 CEN input
Digital Audio Interface (9)				
1	MCLK	79	I/O	Audio master clock input reference
2	SCK	76	O	I2S serial clock output
3	WS	75	O	I2S word select output
4	SD0	74	O	I2S serial data output
5	SD1	73	O	I2S serial data output
6	SD2	72	O	I2S serial data output
7	SD3	71	O	I2S serial data output
8	SPDIF	70	O	S/PDIF audio output
9	MUTE	67	O	Mute audio output
GPIO Interface (16)				
1	GPIO0	35	I/O	GPIO
2	GPIO1	34	I/O	GPIO
3	GPIO2	33	I/O	GPIO

Item	Symbol	Pin #	Type	Description
4	GPIO3	32	I/O	GPIO
5	GPIO4	29	I/O	GPIO
6	GPIO5	28	I/O	GPIO
7	GPIO6	27	I/O	GPIO
8	GPIO7	26	I/O	GPIO
9	GPIO8	23	I/O	GPIO
10	GPIO9	22	I/O	GPIO
11	GPIO10	21	I/O	GPIO
12	GPIO11	20	I/O	GPIO
13	GPIO12	17	I/O	GPIO
14	GPIO13	16	I/O	GPIO
15	GPIO14	15	I/O	GPIO
16	GPIO15	14	I/O	GPIO
TTL Interface (28)				
1	DE	127	O	Data enable
2	VSYNC	1	O	Vertical sync
3	HSYNC	128	O	Horizontal sync
4	ODCK	119	O	Output data clock
5	QE0	124	O	24-bit Even pixel
6	QE1	123	O	24-bit Even pixel
7	QE2	122	O	24-bit Even pixel

Item	Symbol	Pin #	Type	Description
8	QE3	121	O	24-bit Even pixel
9	QE4	117	O	24-bit Even pixel
10	QE5	116	O	24-bit Even pixel
11	QE6	115	O	24-bit Even pixel
12	QE7	114	O	24-bit Even pixel
13	QE8	111	O	24-bit Even pixel
14	QE9	110	O	24-bit Even pixel
15	QE10	109	O	24-bit Even pixel
16	QE11	108	O	24-bit Even pixel
17	QE12	105	O	24-bit Even pixel
18	QE13	104	O	24-bit Even pixel
19	QE14	103	O	24-bit Even pixel
20	QE15	102	O	24-bit Even pixel
21	QE16	101	O	24-bit Even pixel
22	QE17	100	O	24-bit Even pixel
23	QE18	99	O	24-bit Even pixel
24	QE19	96	O	24-bit Even pixel
25	QE20	95	O	24-bit Even pixel
26	QE21	9	O	24-bit Even pixel
27	QE22	93	O	24-bit Even pixel
28	QE23	92	O	24-bit Even pixel



Item	Symbol	Pin #	Type	Description
ANALOG (8)				
Differential signal				
1	RXC+	51	I	TMDS input clock pair
1	RXC-	50	I	TMDS input clock pair
1	RX0	55	I	TMDS input data pair
1	RX0	54	I	TMDS input data pair
1	RX1	59	I	TMDS input data pair
1	RX1	58	I	TMDS input data pair
1	RX2	63	I	TMDS input data pair
1	RX2	62	I	TMDS input data pair
PLL group(2)				
68	XTALIN	85	I	Crystal input PAD
69	XTALOUT	84	O	Crystal output PAD

No Disclosure



MTK

MT8202

Specifications are subject to change without notice.

HDTV-Ready LCD TV Chip

MT8202 is a highly integrated single chip for LCD TV supporting video input and output format up to HDTV. It includes 3D comb filter TV decoder to retrieve the best image from popular composite signals. Embedded HDTV/VGA decoders let the high bandwidth input signals perfectly reproduced. 24/16/8 bits digital port may accept all kinds of external digital input video source. New 2nd generation advanced motion adaptive de-interlacer converts accordingly the interlace video into progressive one with overlay of a 2D Graphic processor. Advanced full function color processing with fully 10-bit path provides high quality video contents. Independent two Flexible scalers provide wide adoption to various LCD panels for two of different video sources at the same time. Its on-chip audio processor decodes analog signals from tuner with lip sync control, delivering high quality post-processed sound effect to customers. On-chip microprocessor reduces the system BOM and shortens the schedule of UI design by high level C program. MT8202 is a cost-effective and high performance HDTV-ready solution to LCD TV manufactures.

FEATURES

■ Video Input

- Support fully programmable 8 Composite/SV input pins
- Support 2 Component inputs with SDTV format & HDTV 480p/720p/1080i format
- Support 1 VGA input up to SXGA (1280x1024x75Hz) including SOG signals
- Support DVI 24-bit RGB digital input
- Support CCIR-656/601 digital input

■ TV decoder

- Full 10-bit data path to enhance the video resolution and reduce digital truncation errors
- Support PAL (B, G, D, H, M, N, I, Nc), PAL (Nc), PAL, NTSC, NTSC-4.43, SECAM
- Automatic Luma/Chroma gain control

- Automatic TV standard detection
- 2nd generation NTSC/PAL Motion Adaptive 3D comb filter with huge improvement
- Motion Adaptive 3D Noise Reduction
- VBI decoder for Closed-Caption/XDS/Teletext/WSS/VPS
- High speed advanced Teletext/Closed-Caption drawing engine directly on OSD plane
- Macrovision detection
- Adjustable horizontal delay for combination of SCART Composite/RGB input

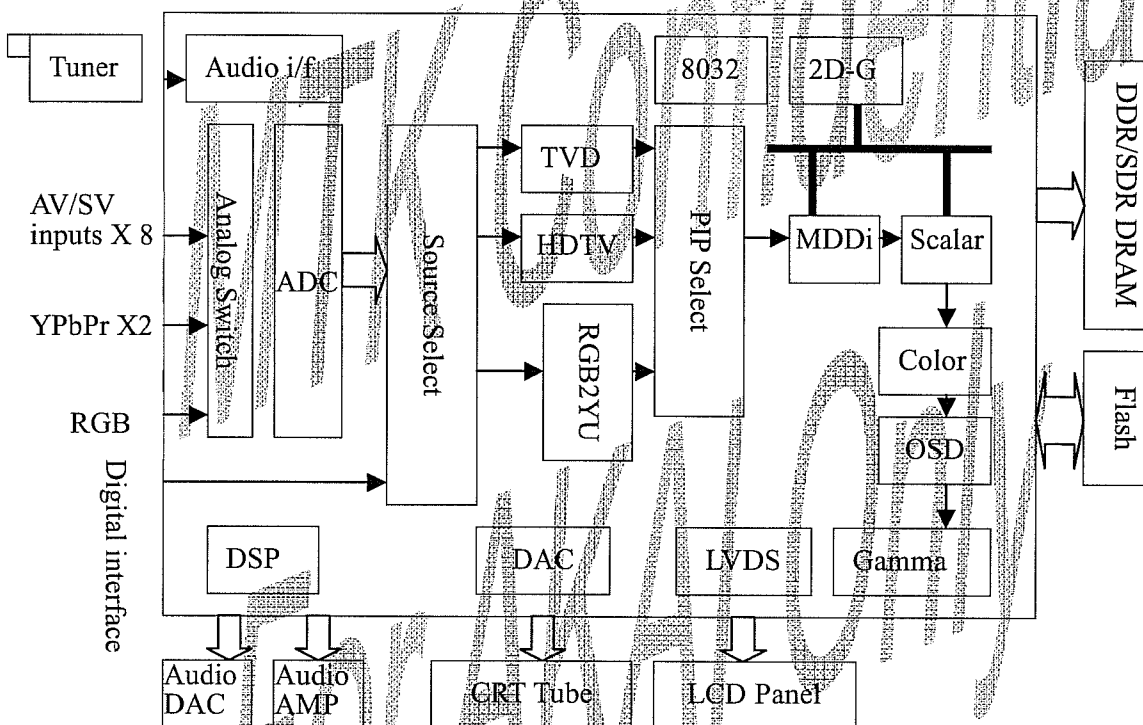
■ Video Processor

- Fully 10-bit processing to enhance the video quality
- Advanced flesh tone and color processing
- Gamma/anti-Gamma correction
- Advanced Color Transient Improvement (CTI)
- 2D Peaking
- Advanced horizontal/vertical sharpness
- Saturation/hue adjustment
- Brightness and contrast adjustment
- Black level extender
- White peak level limiter
- Adaptive Luma/Chroma management
- Automatic detect film or video source
- 3:2/2:2 pull down source detection
- 2nd generation Advanced Motion adaptive de-interlacing
- Arbitrary ratio vertical/horizontal scaling of video, from 1/32X to 32X
- Advanced linear and non-linear Panorama scaling
- Programmable Zoom viewer
- Progressive scan output
- Picture-in-Picture (PIP)
- Picture-Out-Picture (POP)
- Advanced dithering processing for LCD display with 6/8/10 bit output
- Frame rate conversion, 50Hz to 75Hz

■ Audio DSP

- Support BTSC/EIAJ/A2/NICAM decode
- Stereo demodulation, SAP demodulation

- Noise reduction
- Mode selection (Main/SAP/Stereo)
- Pink noise and white noise generator
- Equalizer
- Sub-woofer/Bass enhancement
- Noise auto mute
- 3D surround processing include virtual surround
- Audio and video lip synchronization
- Support Reverberation
- Audio Input/Output
 - Decode audio AF from Tuner
 - 2 channel audio L/R digital line in
 - 7.1-channel slave digital line in
 - Including full 7.1-channels digital output, 2-channel bypass and 2-channel headphone output
 - Embedded 3 internal DAC output
- DRAM Controller
 - Supports up to 32M-byte SDR/DDR DRAM
 - Supports 2x16 bit SDR/DDR bus interfaces
 - Build in a DRAM interface programmable clock to optimize the DRAM performance
 - Programmable DRAM access cycle and refresh cycle timings
 - Support 3.3/2.5-Volt SDR/DDR interface
- Video Output
 - TV pattern generator for testing
 - Interlaced 50Hz to 120Hz
 - Support up to 1366 horizontal points
 - 6/8/10-bit single channel or 6/8/10-bit dual channel LVDS output
 - Support video output mirror and upside down
- 2D-Graphic/3 OSD processor
 - Embedded Two backend RGB domain OSD planes and one YUV domain OSD
 - Support Text/Bitmap decoder
 - Support line/rectangle/gradient fill
 - Support bitblt
 - Support color Key function
 - Support Clip Mask
 - Support Alpha blending with video output
 - 65535/256/16/4/2-color bitmap format OSD,
 - Automatic vertical scrolling of OSD image
 - Support OSD mirror and upside down
- Host Micro controller
 - Turbo 8032 micro controller
 - Built-in internal 373 and 8-bit programmable lower address port
 - 2048-bytes on-chip RAM
 - Up to 4M bytes FLASH-programming interface
 - Supports 5/3.3-Volt FLASH interface
 - Supports power-down mode
 - Supports additional serial port
 - IR control serial input
 - Support 2 RS232 interface for external source communication
 - Support 2 PWM output
 - Support DDC2Bi/DDC2B/DDC1/DDCCI
 - Programmable GPIO setting for complex external device control
- Outline
 - 388-pin BGA package
 - Lead Free
 - 3.3/2.5/1.8-Volt operating voltages
 - 0.18um process

BLOCK DIGRAM

Analog Switch

Analog switches are built in MT8202 to connect to 17 input signals and there is need to add external components to add analog video multiplexes on board.

There are 9 high-speed differential input pairs for 3 sets of YPRPB/VGA input signals.

The 8 Composite/S signal input pins can be fully programmed to connect to any AV/SV inputs.

ADC/ Source Select

The video ADC sample analog input signals. After ADC, all signal processing is digital domain. The source select multiplex all inputs from digital and analog video ports and route them into data path.

Audio Interface

Audio interface accept analog audio signal from Tuner, e.g. AF. It also includes preprocessing circuit to filter the noisy audio signals. Audio decoder will decode the BTSC or NICAM, and output best sound with enhanced 3D surround post-processing.

Embedded 7.1 channel digital audio input (slave) and 2 channels (master) digital audio inputs.

Embedded 3 high performance audio DACs.

DSP



DSP handle audio decoding as well as computing intensive jobs. The downloadable micro code enables fast function convergence for various audio standards in the world.

Advanced DSP engine supports full functions of sound effects.

MDDi/Scaler

MDDi is MTK proprietary de-interlacing technology. 2nd generation MDDi solution provides improved low angle processing and more accurate motion detection for all interlace sources. The techniques reduce jagged edges and broken images. The MDDi engine supports both Main and Sub channel SDTV inputs or one channel 1080i high quality de-interlacing.

Two totally independent scaler support full functions of PIP/POP and frame rate conversion.

With MDDi and high quality scaler, MT8202 guarantee all input format could be translated to output format with best video quality for motion and still pictures.

Color/Gamma

MT8202 includes advanced color management function to allow user to improve video quality with fully flexibility. With contrast/hue/saturation/Gamma/anti-Gamma/flesh tone function, MT8202 deliver the best video quality with vivid color.

Advanced dither function support 6/8/10-bit video output for any kinds of display unit (LCD, PDP, CRT).

8032

On-chip Turbo8032 provide the most cost effective development environment for system house. Well-proven FW could speed up the system design significantly.

2D-G/OSD

On-chip graphic engine draw bitmap OSD and store them into DRAM. OSD read data from DRAM and display on screen. With 2D-G and OSD. The computing power requirement of μP will be minimized.

One YUV space OSD added to support Main/PIP Teletext/Close-caption functions.



MTK

MT5351

DTV Backend Decoder SOC

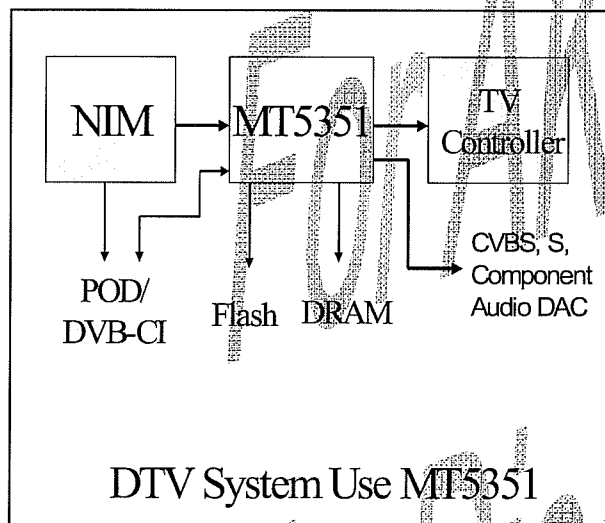
Specifications are subject to change without notice.

MediaTek MT5351 is a DTV Backend Decoder SOC which support flexible transport demux, HD MPEG-2 video decoder, JPEG decoder, MPEG1,2, MP3, AC3 audio decoder, HD TV encoder. The MT5351 enables consumer electronics manufacturers to build high quality, feature-rich DTV, STB or other home entertainment audio/video device.

World-Leading Technology: HW support worldwide major broadcast network and CA standards, include ATSC, DVB, OpenCable, DirectTV, MHP.

Rich Feature for high value product: To enrich the feature of DTV, the MT5351 support 1394-5C component to external DVHS. Dual display, PIP/POP and quad pictures provide user a whole new viewing experience.

Credible Audio/Video Quality: The MT5351 use advanced motion-adaptive de-interlace algorithm to achieve the best movie/video playback. The embedded 4X over-sample video DAC could generate very fine display quality. Also, the audio 3D surround and equalizer provide professional entertainment



Key Features:

1. Flexible Demuxer
2. Dual HD MPEG2 Video Decoder
3. Dual MPEG1,2, MP3, AC3 Audio decode
4. Dual Display
5. PIP/POP/Quad Mode
6. IEEE1394-5C
7. POD/DVB-CI

Application:

1. DTV
2. Set-top Box
3. DTV Recorder
4. Home Media Center

Order Information:

MT5351AG → one HD decoder
 MT5351CG → two HD decoder
 All Package are Lead Free

M ARM
 MT5351AG
 DDDD-B#L
 LLLLL

IC Top View:
 DDDD: Date Code
 #: Subcontractor Code
 LLLLL: Lot Number

General Feature List

- Host CPU
 - ARM 926EJ
 - 16K I-Cache and 16K D-Cache
 - 8K Data TCM and 8K Instruction TCM
 - JTAG ICE interface
 - Watch Dog timers
- Transport Demuxer
 - Support 3 independent transport stream inputs
 - Support serial / parallel interface for each transport stream input.
 - Support ATSC, DVB, and MPEG2 transport stream inputs
 - Programmable sync detection.
 - Support DES/3-DES de-scramble
 - 96 PID filter and 128 section filters.
 - Support TS recording via IEEE1394 interface
- MPEG2 Decoder
 - Support dual MPEG-2 HD decoder or up to 8 SD decoder
 - Complaint to MP@ML, MP@HL and MPEG-1 video standards
- JPEG Decoder
 - Decode Base-line or progressive JPEG file
- 2D Graphics
 - Support multiple color modes
 - Point, horizontal/vertical line primitive drawing
 - Rectangle fill and gradient fill functions
 - Bitblt with transparent, alpha blending, alpha composition and stretch
 - Font rendering by color expansion
 - Support clip masks
 - YCbCr to RGB color space transfer
- OSD Display
 - 3 linking list OSDs with multiple color mode
 - OSD scaling with arbitrary ratio from 1/2x to 2x
 - Square size, 32x32 or 64x64 pixel, hardware cursor
- Video Processing
 - Advanced Motion adaptive de-interlace on SDTV resolution
 - Support clip
 - 3:2:2 pull down source detection
 - Arbitrary ratio vertical/horizontal scaling of video, from 1/15X to 16X
 - Support Edge preserve
 - Support horizontal edge enhancement
 - Support Quad-Picture
- Main Display
 - Mixing two video and three OSD and hardware cursor
 - Contrast/Brightness adjustment
 - Gamma correction
 - Picture-in-Picture (PIP)
 - Picture-Out Picture (POP)
 - 480i/576i/480p/576p/720p/1080i output
- Auxiliary Display
 - Mixing one video and one OSD
 - 480i/576i output
- TV Encoder
 - Support NTSC M/N, PAL M/N/B/D/G/H/I
 - Macrovision Rev 7.1.L1
 - CGMS/WSS
 - Closed Captioning
 - Six 12-bit video DACs for CVBS, S-video or RGB/YPbPr output
- Digital Video Interface
 - Support SA/EAV
 - Support 8/16 for SD/HD digital video input
 - Support 8/16/24 bits digital output for main display
 - Support 8 bits digital output for aux display
- DRAM Controller
 - Supports 64Mb to 1Gb DDR DRAM devices
 - Configurable 32/64 bit data bus interface
 - Support DDR266, DDR333, DDR400 JEDEC specification compliant SDRAM
- Peripheral Bus Interface
 - Support NOR/NAND flash
 - Support CableCard host control bus
- Audio

- Support Dolby Digital AC-3 decoding
 - MPEG-1 layer I/II, MP3 decoding
 - Dolby prologic II
 - Main audio output: 5.1ch + 2ch (down mix)
 - Auxiliary audio output: 2ch
 - Pink noise and white noise generator
 - Equalizer
 - Bass management
 - 3D surround processing include virtual surround
 - Audio and video lip synchronization
 - Support reverberation
 - SPDIF out
 - I2S I/F
- Peripherals
- Three UARTs with Tx and Rx FIFO, two of them have hardware flow control
 - Two serial interfaces, one is master only, the other can be set to master mode or slave mode
 - Two PWMs
 - IR blaster and receiver
 - IEEE 1394 link controller
 - IDE bus: ATA/ATAPI7 UDMA mode 5, 100 MB/s
 - Real-time clock and watchdog controller
 - Memory card I/F: MS/MS-Pro, SD, CF, and MMC
 - PCMCIA/POD/CI interface
- IC Outline
- 471 Pin BGA Package
 - 3.3V/1.2V dual Voltage

Electrical Characteristics

Absolute Maximum Rating

Symbol	Parameters	Value	Unit
IOVDD	3.3V supply voltage	-0.5 to 4.6	V
CVDD	1.2V supply voltage	-0.5 to 1.8	V
AVDD	Analog supply voltage	-0.5 to 4.6	V
RVDD	DDR supply voltage	-0.5 to 3.5	V
VIN(3.3V)	Input Voltage(3.3V IO)	VSS-1.0 to 3.63	V
VIN(5V tolerance)	Input Voltage(5V tolerance IO)	VSS-1.0 to 5.5	V
Vout	Output Voltage	-0.3 to VDD3+0.3	V
Ts	Storage Temperature	-40 to 150	C
Ta	Ambient Temperature	0 to 70	C

DC Characteristics

Symbol	Parameters	Min	Typ	Max	Unit
IOVDD	3.3V supply voltage	2.97	3.3	3.63	V
CVDD	1.2V supply voltage	1.08	1.2	1.32	V
AVDD	Analog supply voltage	2.97	3.3	3.63	V
VIH(3.3V)	3.3V input voltage high	2.0			V
VIL(3.3V)	3.3V input voltage low			0.8	V
VOH(3.3V)	3.3V output voltage high	2.4			
VOL(3.3V)	3.3V output voltage low			0.4	
VIH(3/5V)	3/5V tolerance input voltage high	2.0			V
VIL(3/5V)	3/5V tolerance input voltage low			0.8	V
VOH(3/5V)	3/5V tolerance output voltage high	2.4			V
VOL(3/5V)	3/5V tolerance output voltage low			0.4	V
Tj	Junction operation temperature	-40	25	125	C
PD(estimate)	Power dissipation		1.5		W
Pdown	Power down mode		2		mW



DDR ELECTRICAL Characteristics and DC Operating Condition

Symbol	Parameters	Min	Typ	Max	Unit
RVDD(DDR333)	DDR I/O supply voltage for DDR266 or DDR333	2.3	2.5	2.7	V
RVDD(DDR400)	DDR I/O supply voltage for DDR400	2.5	2.6	2.7	V
DVREF	DDR I/O reference voltage	0.49*RVDD	0.5*RVDD	0.51*RVDD	V
VTT	DDR I/O termination voltage	VREF-0.04	VREF	VREF+0.04	V
VIH	DDR input voltage high	VREF+0.15		RVDD+0.3	V
VIL	DDR input voltage low	-0.3		VREF-0.15	V

DDR AC Operating Condition

Symbol	Parameters	Min	Typ	Max	Unit
VIH	Input high voltage, DQ, DQS	DVREF+0.31			V
VIL	Input low voltage, DQ, DQS			DVREF-0.31	V
Vslew	Input minimum slew rate	1.0			V/ns
Vswing	Input maximum swing			1.5	V

Digital Power Amplifier R2S15102NP

10Wx2ch(SE)/20Wx1ch(BTL) Digital Audio Power Amplifier

1.Outline

R2S15102NP is a Digital Power Amplifier IC developed for TV.
R2S15102NP can realize maximum Power 10W × 2ch
(VD = 24V, THD = 10%, SE) at 8 Ω load.
It is possible to replace from the conventional analog amplifier system to the digital amplifier system easily.

2.Feature

High Output Power(THD=10%)without external Heat Sink
(note) the thermal pad is soldered the thermal pad with the printed-circuit board directly.

Recommended Power Condition

SE operation mode :10Wx2ch(VD=24V) at 8 Ω

BTL operation mode: 20Wx1ch(VD=18V) at 8 Ω

The RENESAS original circuits realize high power efficiency, low noise and low distortion characteristics.

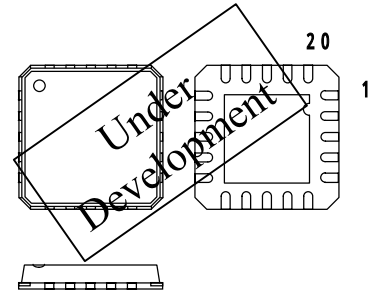
Pop sound Less

Built-in protection function

(Over Current, Over Temperature and Under Voltage)

Built-in Mute and Stand-by function

Fig. 1 Package



20pin QFN

Body : 6 x 6 mm

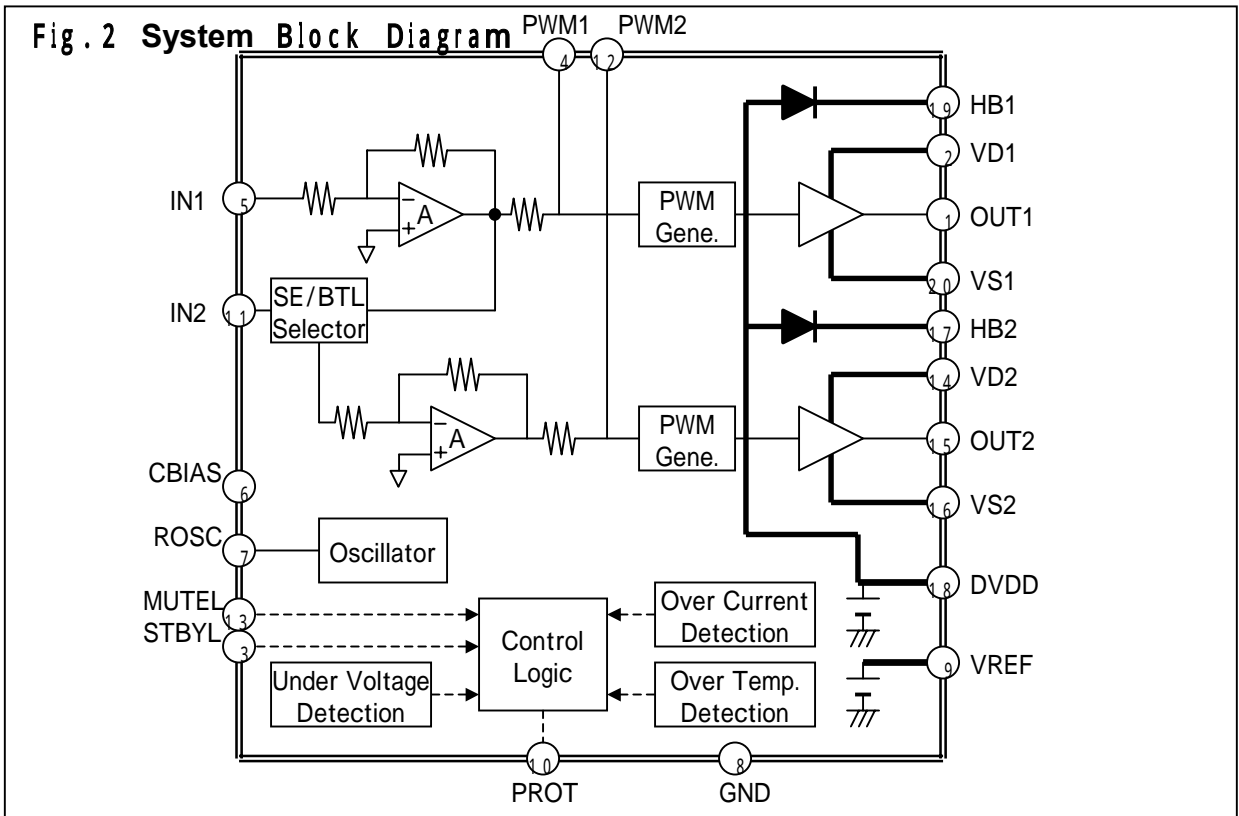
Lead pitch : 0.8 mm

3.Operating Condition

Recommended Power supply voltage : from 11V to 25V

Recommended Speaker Impedance : from 4 to 8Ω

4.Block Diagram



Digital Power Amplifier R2S15102NP

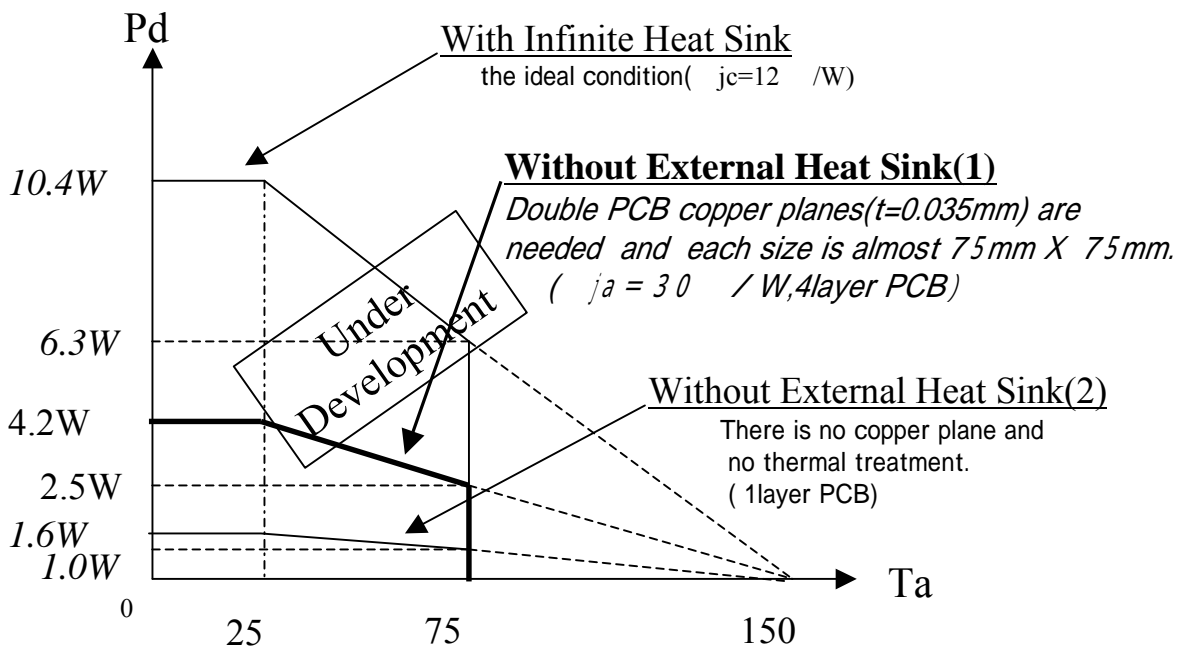
5 . Pin Configuration(Table.1)

No.	NAME	I/O	Description	
1	OUT1	O	Power Output pin #1	
2	VD1	-	Power supply pin for power output stage #2	
3	STBYL	I	Stand-by control pin. When this is “L”, circuit current is reduced. There is the pull-down resistor:50Kohm(typ.).	
4	PWM1	I	PWM input pin #1 (for phase compensation)	
5	IN1	I	Analog input #1. The gain is depended on the external resistance .	
6	CBIAS	I/O	A capacitor is connected so that it may not be influenced of power supply change(Ripple Filter).	
7	ROSC	I	Control pin for PWM carrier frequency	
8	GND	-	GND pin for analog block	
9	VREF	I/O	Capacitor connection pin for analog block reference voltage source	
10	PROT	O	Protection Timer pin. At protection mode,the output becomes “L”-level. (The timing capacitor is connected)	
11	IN2	I	SE operation	Analog input #2(as same as IN1)
		I	BTL operation	When this is connected to DVDD pin via the resistor, Reversed signal of OUT1 is output to OUT2.
12	PWM2	I	PWM input pin#2 (for phase compensation)	
13	MUTEL	I	Mute control pin. When this is “L”, it becomes mute status.	
14	VD2	-	Power supply pin for power output stage #2	
15	OUT2	O	Power Output pin #2	
16	VS2	-	Ground pin for power output stage #2	
17	HB2	I/O	Capacitor connection pin for bootstrap	
18	DVDD	O	Built-in power supply pin for internal digital block.	
19	HB1	I/O	Capacitor connection pin for bootstrap #1	
20	VS1	-	Ground pin for power output stage #1	

6 . Absolute Maximum Rating(Table.2)

Symbol	Parameter	Condition	Value	Unit
VD max	Maximum VD Voltage	VD1,VD2 pin voltage	27	V
HB max	Maximum HB Voltage	HB1, HB2 pin voltage	40	V
Pd	Power dissipation	Ta = 25°C :See Fig.3	4.2	W
ja	Thermal Resistance	See Fig.3	30	/W
Tj	Junction temperature	Maximum Temperature	150	
Ta	Operating ambient temperature	Temperature range	-20 ~ 75	
Tstg	Storage temperature	Temperature range	-40 ~ 150	

Fig.3 Thermal De-rating(on PCB: printed-circuit board):Size 75mm x 75mm

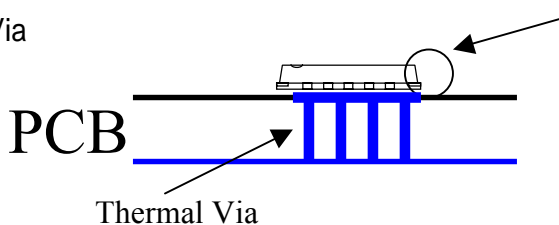


(NOTE)

PCB pattern design for high effective thermal conductivity

(1)The exposed die pad is **directly** soldered with the printed-circuit board pattern .

(2)Thermal Via



(caution)

There are side expositions of the die pad at corners of the package.

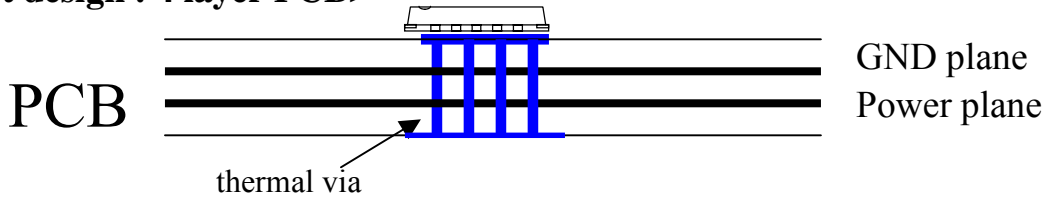
(The die pad is grounded.)

Consideration about the PCB design

The Power dissipation at 10Wx2ch(SE) or 20Wx1ch(BTL) is estimated almost 2W. It has enough margin, designing the PCB at $j_a=30$ /W.

(1)PCB basic design (copper plane)

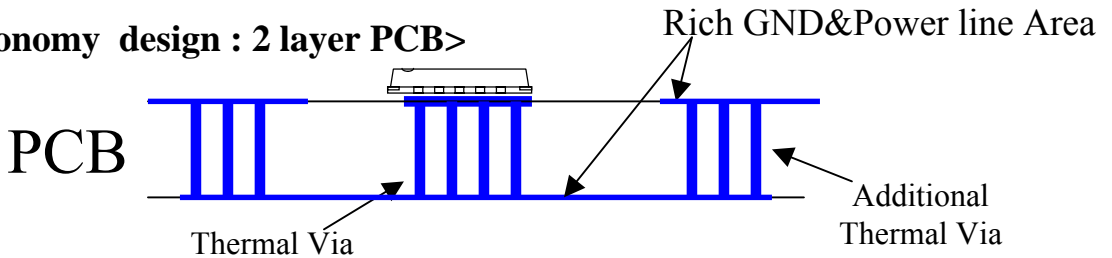
<the best design : 4 layer PCB>



<PCB size estimation >

10Wx2ch: 75mm x 75mm

<the economy design : 2 layer PCB>



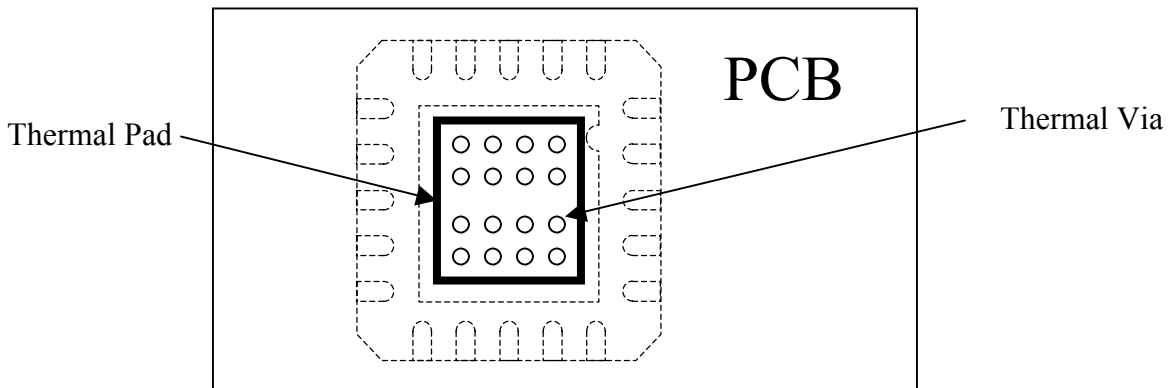
The GND&Power line total area size is also equal to the above GND&Power line total area size of the 4layer PCB.

<PCB size estimation >

10Wx2ch: (75+)mm x (75+) mm

(2)PCB Thermal Pad

The exposed die pad is **directly** soldered with the printed-circuit board pattern .



Digital Power Amplifier R2S15102NP

7 . Recommended Operating condition(Table.3)

Symbol	Parameter	Condition	MIN	TYP	MAX	Unit
VD	Supply Voltage	VD1,VD2 pin voltage	11	-	25	V
VH	Control voltage of high level	STBYL, MUTEL	2	-	5	V
VL	Control voltage of low level	STBYL, MUTEL	0	-	0.8	V
fosc	Carrier Frequency	R= 33k	300	400	600	kHz

- (note)
- STBYL: High level:normal operation Low level:Stand-by
 - MUTEL:High level:normal operation Low level:Mute
 - The carrier frequency can be changed by the resistance at Pin#.7 .

8 . Electronic Characteristics(Table.4)

(Unless otherwise noted, Ta=25°C, VD=24V, Carrier Frequency=400kHz, f=1kHz,SE operation)

Symbol	Parameter		Condition	MIN	TYP	MAX	Unit
IVD	Circuit Current		No Signal	TBD	28	TBD	mA
			MUTE	TBD	-	TBD	mA
			Stand-by	-	-	10	uA
VDPR	Detection Voltage		VD under-voltage	TBD	9.8	TBD	V
TPR	Protection Temperature		Thermal Shut-dawn	-	150	-	
TRL	Release Temperature		Thermal Shut-dawn	-	120	-	
IPR	Protection Current		Output over-current	-	6	-	A
Pomax	Maximum output power	at SE	THD=10%, VD=24V, RL=8	TBD	10	-	W/ch
		at BTL	THD=10%, VD=18V, RL=8	TBD	20	-	W
THD	Total Harmonic Distortion		Po=1W	-	0.1	TBD	%
No	Output Noise level		A-Weighted filter	-	(100)	TBD	uVrms
Eff	Power Efficiency	at SE	Po=10+10W	TBD	93	-	%
		at BTL	Po=20W	TBD	89	-	%
Mute	Mute Attenuation			TBD	80	-	dB
PSRR	Ripple Rejection Ratio		dVD=100mVrms,f=100 Hz	TBD	50	-	dB

9 . Application Examples

(note)

“R for GND” ‘s are for the evaluation only and not needed actually.

Fig.4 SE operation mode(10Wx2ch)

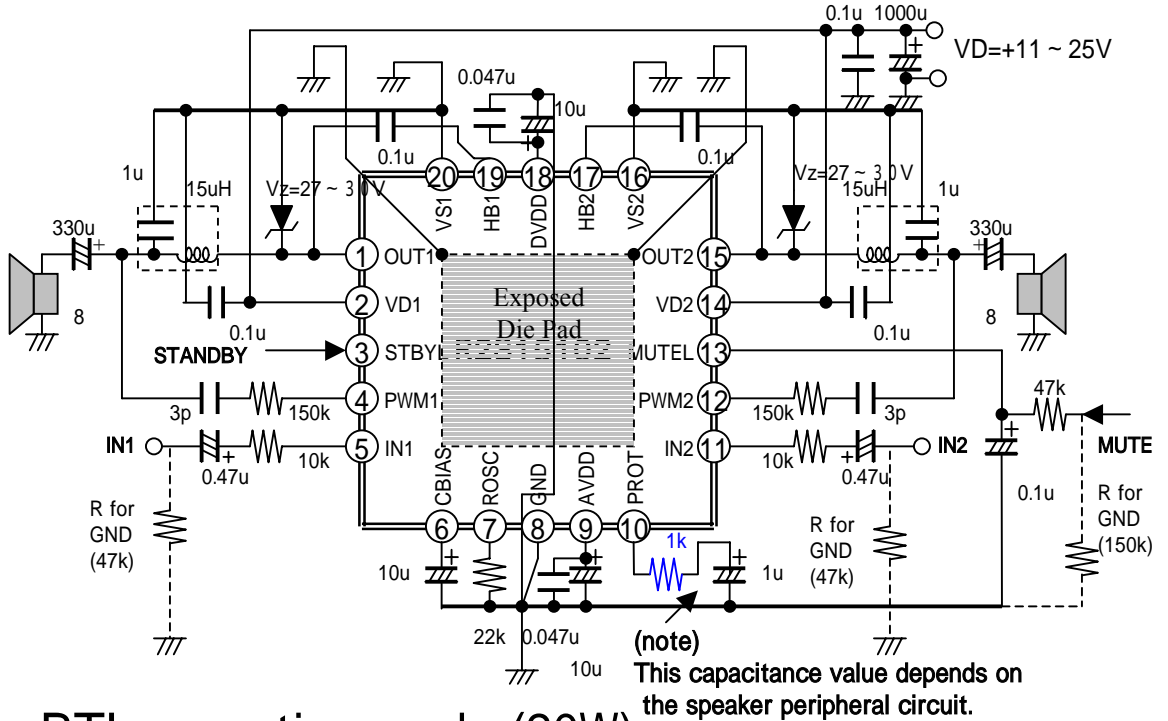
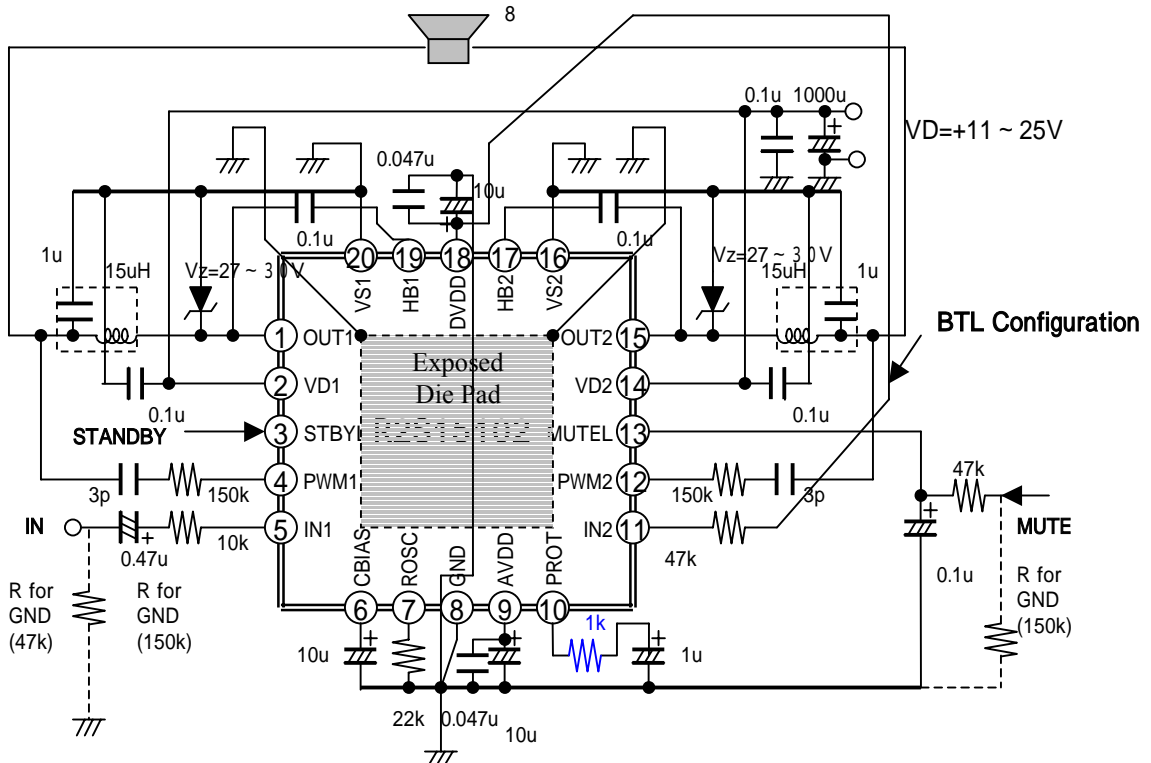


Fig.5 BTL operation mode (20W)



Digital Power Amplifier R2S15102NP

Fig.6 BTL operation mode(20W) with PWM direct input

(note)
“R for GND” ‘s are for the evaluation only and not needed actually.

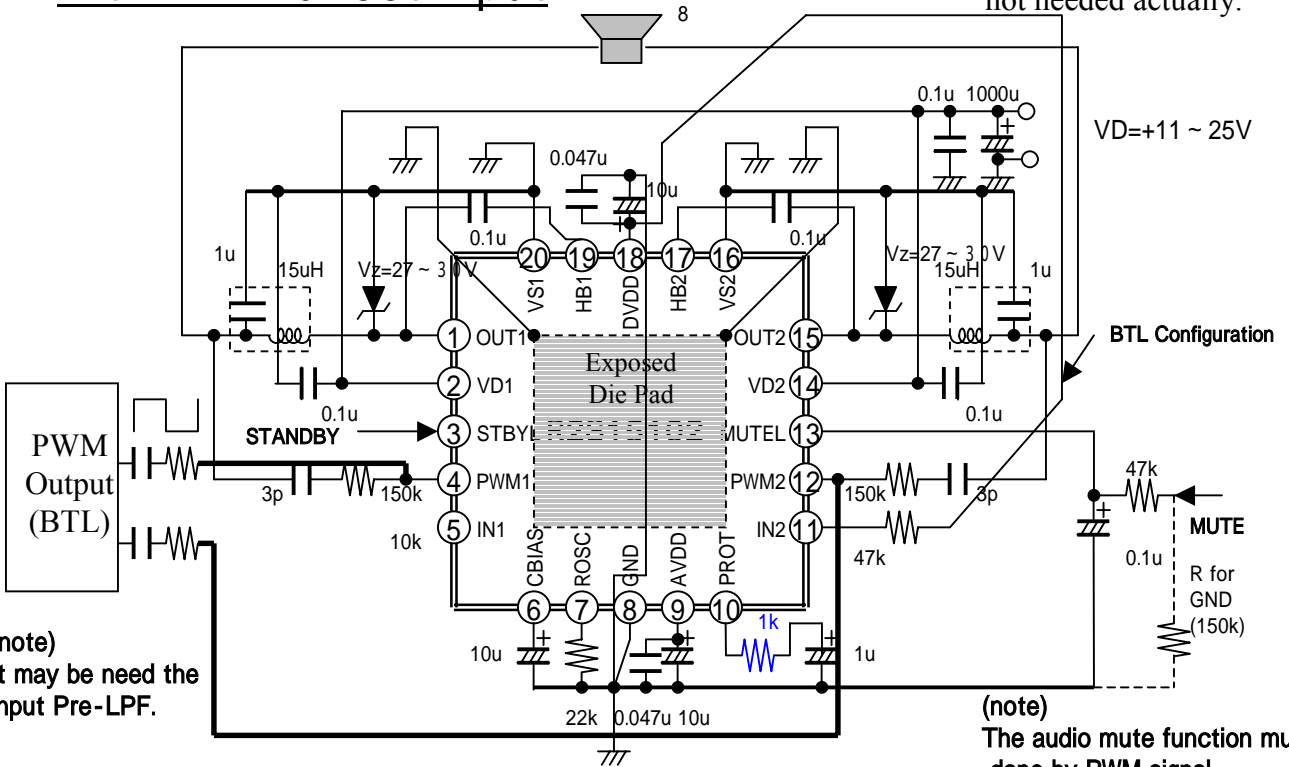
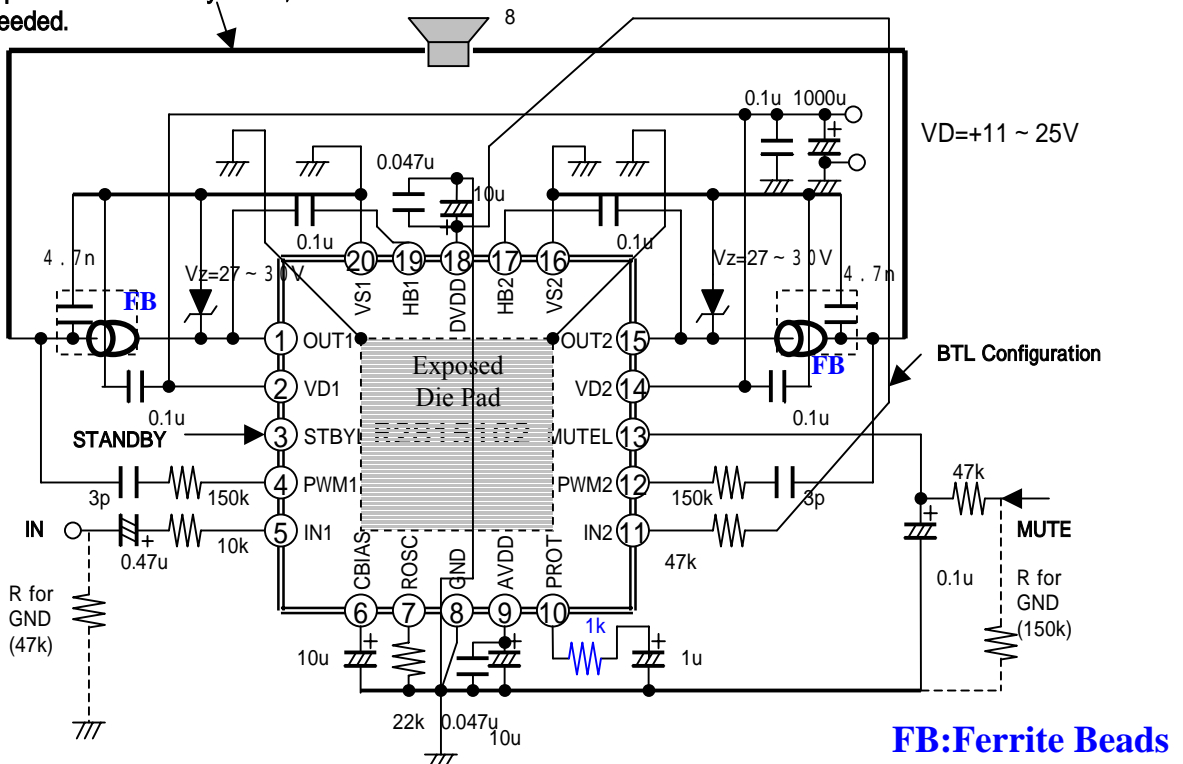


Fig.7 BTL operation mode without output LPF coil

If this speaker lines is very short, the LPF coil is not needed.



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.

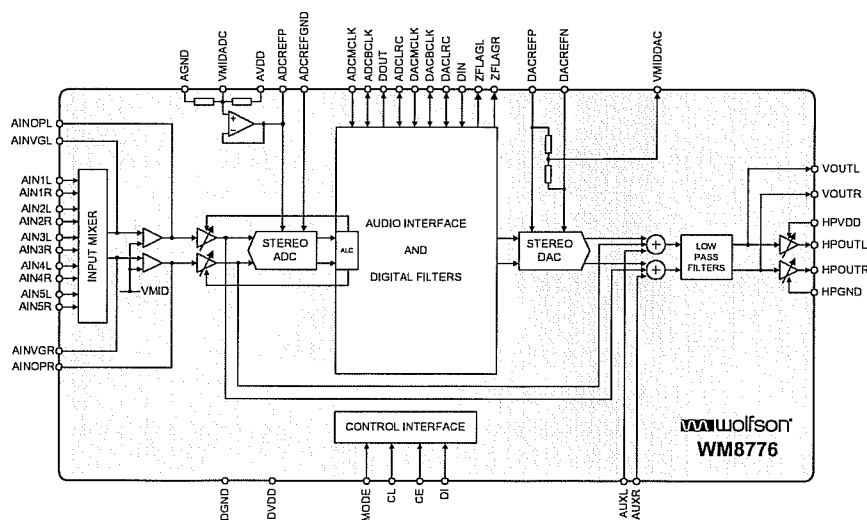
A stereo 24-bit multi-bit sigma delta DAC is used with digital audio input word lengths from 16-32 bits and sampling rates from 32kHz to 192kHz. The DAC has an input mixer allowing an external analogue signal to be mixed with the DAC signal. There are also Headphone and line outputs, with volume controls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

BLOCK DIAGRAM



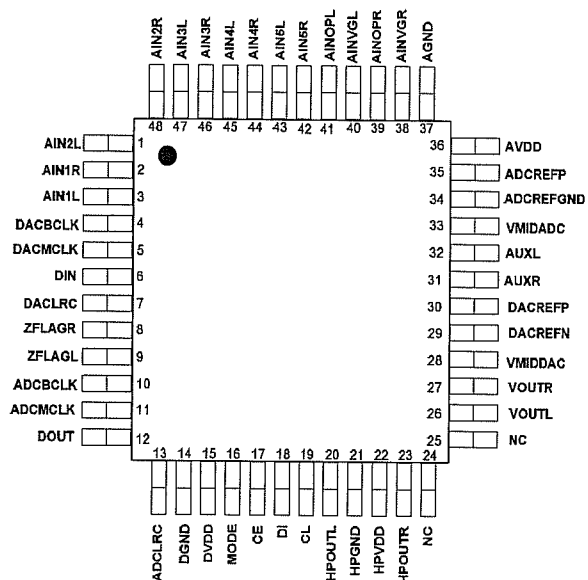
FEATURES

- 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

PIN CONFIGURATION



ORDERING INFORMATION

DEVICE	TEMPERATURE RANGE	PACKAGE	MOISTURE SENSITIVITY LEVEL	PEAK SOLDERING TEMPERATURE
WM8776EFT/V	-25 to +85°C	48-pin TQFP	MSL2	240°C
WM8776EFT/RV	-25 to +85°C	48-pin TQFP (tape and reel)	MSL2	240°C
WM8776SEFT/V	-25 to +85°C	48-pin TQFP (lead free)	MSL2	260°C
WM8776SEFT/RV	-25 to +85°C	48-pin TQFP (lead free, tape and reel)	MSL2	260°C

Note:

Reel quantity = 2,200

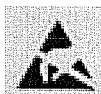
PIN DESCRIPTION

PIN	NAME	TYPE	DESCRIPTION
1	AIN2L	Analogue Input	Channel 2 left input multiplexor virtual ground
2	AIN1R	Analogue Input	Channel 1 right input multiplexor virtual ground
3	AIN1L	Analogue Input	Channel 1 left input multiplexor virtual ground
4	DACBCLK	Digital input/output	DAC audio interface bit clock
5	DACMCLK	Digital input	Master DAC clock; 256, 384, 512 or 768fs (fs = word clock frequency)
6	DIN	Digital Input	DAC data input
7	DACLRC	Digital input/output	DAC left/right word clock
8	ZFLAGR	Open Drain output	DAC Right Zero Flag output (external pull-up resistor required)
9	ZFLAGL	Open Drain output	DAC Left Zero Flag output (external pull-up resistor required)
10	ADCBCLK	Digital input/output	ADC audio interface bit clock
11	ADCCLK	Digital input	ADC audio interface master clock
12	DOUT	Digital output	ADC data output
13	ADCLRC	Digital input/output	ADC left/right word clock
14	DGND	Supply	Digital negative supply
15	DVDD	Supply	Digital positive supply
16	MODE	Digital input	Control interface mode select (5V tolerant)
17	CE	Digital input	Serial interface Latch signal (5V tolerant)
18	DI	Digital input	Serial interface data (5V tolerant)
19	CL	Digital input	Serial interface clock (5V tolerant)
20	HPOUTL	Analogue Output	Headphone left channel output
21	HPGND	Supply	Headphone negative supply
22	HPVDD	Supply	Headphone positive supply
23	HPOUTR	Analogue Output	Headphone right channel output
24	NC	Not bonded	
25	NC	Not bonded	
26	VOUTL	Analogue output	DAC channel left output
27	VOUTR	Analogue output	DAC channel right output
28	VMIDDAC	Analogue output	DAC midrail decoupling pin ; 10uF external decoupling
29	DACREFN	Analogue input	DAC negative reference input
30	DACREFP	Analogue input	DAC positive reference input
31	AUXR	Analogue input	DAC mixer right channel input
32	AUXL	Analogue input	DAC mixer left channel input
33	VMIDADC	Analogue Output	ADC midrail divider decoupling pin; 10uF external decoupling
34	ADCREFGND	Supply	ADC negative supply and substrate connection
35	ADCREFP	Analogue Output	ADC positive reference decoupling pin; 10uF external decoupling
36	AVDD	Supply	Analogue positive supply
37	AGND	Supply	Analogue negative supply and substrate connection
38	AINVGR	Analogue Input	Right channel multiplexor virtual ground
39	AINOPR	Analogue Output	Right channel multiplexor output
40	AINVGL	Analogue Input	Left channel multiplexor virtual ground
41	AINOPL	Analogue Output	Left channel multiplexor output
42	AIN5R	Analogue Input	Channel 5 right input multiplexor virtual ground
43	AIN5L	Analogue Input	Channel 5 left input multiplexor virtual ground
44	AIN4R	Analogue Input	Channel 4 right input multiplexor virtual ground
45	AIN4L	Analogue Input	Channel 4 left input multiplexor virtual ground
46	AIN3R	Analogue Input	Channel 3 right input multiplexor virtual ground
47	AIN3L	Analogue Input	Channel 3 left input multiplexor virtual ground
48	AIN2R	Analogue Input	Channel 2 right input multiplexor virtual ground

Note : Digital input pins have Schmitt trigger input buffers and pins 16, 17, 18 and 19 are 5V tolerant.

ABSOLUTE MAXIMUM RATINGS

Absolute Maximum Ratings are stress ratings only. Permanent damage to the device may be caused by continuously operating at or beyond these limits. Device functional operating limits and guaranteed performance specifications are given under Electrical Characteristics at the test conditions specified.



ESD Sensitive Device. This device is manufactured on a CMOS process. It is therefore generically susceptible to damage from excessive static voltages. Proper ESD precautions must be taken during handling and storage of this device.

Wolfson tests its package types according to IPC/JEDEC J-STD-020B for Moisture Sensitivity to determine acceptable storage conditions prior to surface mount assembly. These levels are:

MSL1 = unlimited floor life at <30°C / 85% Relative Humidity. Not normally stored in moisture barrier bag.

MSL2 = out of bag storage for 1 year at <30°C / 60% Relative Humidity. Supplied in moisture barrier bag.

MSL3 = out of bag storage for 168 hours at <30°C / 60% Relative Humidity. Supplied in moisture barrier bag.

CONDITION	MIN	MAX
Digital supply voltage	-0.3V	+3.63V
Analogue supply voltage	-0.3V	+7V
Voltage range digital inputs (DI, CL, CE and MODE)	DGND -0.3V	+7V
Voltage range digital inputs (MCLK, DIN, ADCLRC, DACLRC, ADCBCLK and DACBCLK)	DGND -0.3V	DVDD + 0.3V
Voltage range analogue inputs	AGND -0.3V	AVDD +0.3V
Master Clock Frequency		37MHz
Operating temperature range, T _A	-25°C	+85°C
Storage temperature	-65°C	+150°C

Notes:

- Analogue and digital grounds must always be within 0.3V of each other.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Digital supply range	DVDD		2.7		3.6	V
Analogue supply range	AVDD, HPVDD, DACREFP		2.7		5.5	V
Ground	AGND, DGND, DACREFN, ADCREFGND			0		V
Difference DGND to AGND			-0.3	0	+0.3	V

Note: digital supply DVDD must never be more than 0.3V greater than AVDD.

ELECTRICAL CHARACTERISTICS

Test Conditions

AVDD = 5V, DVDD = 3.3V, AGND = 0V, DGND = 0V, T_A = +25°C, f_s = 48kHz, MCLK = 256fs unless otherwise stated.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Digital Logic Levels (TTL Levels)						
Input LOW level	V _{IL}				0.8	V
Input HIGH level	V _{IH}		2.0			V
Output LOW	V _{OL}	I _{OL} =1mA			0.1 x DVDD	V
Output HIGH	V _{OH}	I _{OH} =1mA	0.9 x DVDD			V
Analogue Reference Levels						
Reference voltage	V _{V_{MID}}			AVDD/2		V
Potential divider resistance	R _{V_{MID}}			50k		Ω
DAC Performance (Load = 10k Ω, 50pF)						
0dBfs Full scale output voltage				1.0 x AVDD/5		V _{rms}
SNR (Note 1,2)		A-weighted, @ f _s = 48kHz		108		dB
SNR (Note 1,2)		A-weighted @ f _s = 96kHz		108		dB
Dynamic Range (Note 2)	DNR	A-weighted, -60dB full scale input		108		dB
Total Harmonic Distortion (THD)		1kHz, 0dBfs		-97	-90	dB
DAC channel separation				100		dB
Power Supply Rejection Ratio	PSRR	1kHz 100mVpp		50		dB
		20Hz to 20kHz 100mVpp		45		dB
Headphone Buffer						
Maximum Output voltage				0.9		V _{rms}
Max Output Power (Note 4)	P _o	R _L = 32 Ω		25		mW
		R _L = 16 Ω		50		mW
SNR (Note 1,2)		A-weighted	85	92		dB
Headphone analogue Volume Gain Step Size			0.5	1	1.5	dB
Headphone analogue Volume Gain Range		1kHz Input	-73		+6	dB
Headphone analogue Volume Mute Attenuation		1kHz Input, 0dB gain		100		dB
Total Harmonic Distortion +Noise	THD+N	1kHz, R _L = 32Ω @ P _o = 10mW rms		-80 0.01	-60 0.1	dB %
		1kHz, R _L = 32Ω @ P _o = 20mW rms		-77 0.014	-40 1.0	dB %
Power Supply Rejection Ratio	PSRR	20Hz to 20kHz, without supply decoupling		-40		dB
ADC Performance						
Input Signal Level (0dB)				1.0 x AVDD/5		V _{rms}
SNR (Note 1,2)		A-weighted, 0dB gain @ f _s = 48kHz		102		dB
SNR (Note 1,2)		A-weighted, 0dB gain @ f _s = 96kHz 64 x OSR		100		dB
Dynamic Range (note 2)		A-weighted, -60dB full scale input		102		dB
Total Harmonic Distortion (THD)		1kHz, 0dBfs		-90	-80	DB

Test Conditions

AVDD = 5V, DVDD = 3.3V, AGND = 0V, DGND = 0V, T_A = +25°C, f_s = 48kHz, MCLK = 256fs unless otherwise stated.

		1kHz, -3dBFS		-95	-85	dB
ADC Channel Separation		1kHz Input		90		dB
Programmable Gain Step Size			0.25	0.5	0.75	dB
Programmable Gain Range (Analogue)		1kHz Input	-21		+24	dB
Programmable Gain Range (Digital)		1kHz Input	-103		-21.5	dB
Mute Attenuation (Note 6)		1kHz Input, 0dB gain		76		dB
Power Supply Rejection Ratio	PSRR	1kHz 100mVpp		50		dB
		20Hz to 20kHz 100mVpp		45		dB
Analogue input (AIN) to Analogue output (VOUT) (Load=10k Ω, 50pF, gain = 0dB) Bypass Mode						
0dB Full scale output voltage				1.0 x AVDD/5		V _{rms}
SNR (Note 1)			90	100		dB
THD		1kHz, 0dB		-90		dB
		1kHz, -3dB		-95		dB
Power Supply Rejection Ratio	PSRR	1kHz 100mVpp		50		dB
		20Hz to 20kHz 100mVpp		45		dB
Mute Attenuation		1kHz, 0dB		100		dB
Supply Current						
Analogue supply current		AVDD = 5V		48		mA
Digital supply current		DVDD = 3.3V		8		mA

Notes:

- Ratio of output level with 1kHz full scale input, to the output level with all zeros into the digital input, measured 'A' weighted.
- All performance measurements done with 20kHz low pass filter, and where noted an A-weight filter. Failure to use such a filter will result in higher THD+N and lower SNR and Dynamic Range readings than are found in the Electrical Characteristics. The low pass filter removes out of band noise; although it is not audible it may affect dynamic specification values.
- VMID decoupled with 10uF and 0.1uF capacitors (smaller values may result in reduced performance).
- Harmonic distortion on the headphone output decreases with output power.
- All performance measurement done using certain timings conditions (Please refer to section 'Digital Audio Interface').
- A better MUTE Attenuation can be achieved if the ADC gain is set to minimum.

TERMINOLOGY

- Signal-to-noise ratio (dB) - SNR is a measure of the difference in level between the full scale output and the output with no signal applied. (No Auto-zero or Automute function is employed in achieving these results).
- Dynamic range (dB) - DNR is a measure of the difference between the highest and lowest portions of a signal. Normally a THD+N measurement at 60dB below full scale. The measured signal is then corrected by adding the 60dB to it. (e.g. THD+N @ -60dB = -32dB, DR = 92dB).
- THD+N (dB) - THD+N is a ratio, of the rms values, of (Noise + Distortion)/Signal.
- Stop band attenuation (dB) - Is the degree to which the frequency spectrum is attenuated (outside audio band).
- Channel Separation (dB) - Also known as Cross-Talk. This is a measure of the amount one channel is isolated from the other. Normally measured by sending a full scale signal down one channel and measuring the other.
- Pass-Band Ripple - Any variation of the frequency response in the pass-band region.



Product Description: T370XW01_V1 TFT-LCD PANEL			
AUO Model Name: T370XW01 V1			
Customer Part No/Project Name:			
Customer Signature	Date	AUO	Date
		Approved By: Frank Ko	
		Reviewed By: Hong Jye Hong	
		Prepared By: Andrew Liang	



Product Specifications

37.0" WXGA Color TFT-LCD Module Model Name: T370XW01 V.1

**() Preliminary Specifications
(*) Final Specifications**

Note: This Specification is subject to change without notice.



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Record of Revision

Version	Date	No	Description	Remark
0.0	Sep. 30, '05		First Draft	
0.1	Oct. 04, '05		Update P.9 3-3 Input Timing Specifications	
0.2	Oct. 30, '05		Update P.9 3-3 Input Timing Specifications	
			Update P22,23 Packing Spec	



1. General Description

This specification applies to the 37.0 inch Color TFT-LCD Module T370XW01. This LCD module has a TFT active matrix type liquid crystal panel 1366x768 pixels, and diagonal size of 37.0 inch. This module supports 1366x768 XGA-Wide mode (Non-interlace).

Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 8-bit gray scale signal for each dot.

The T370XW01 has been designed to apply the 8-bit 1 channel LVDS interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.

* General Information

Items	Specification	Unit	Note
Active Screen Size	37.02	Inches	
Display Area	819.6 (H) x 460.8(V)	mm	
Outline Dimension	877.0(H) x 514.6(V) x 54.7(D)	mm	With inverter
Driver Element	a-Si TFT active matrix		
Display Colors	16.7M	Colors	
Number of Pixels	1366x768	Pixel	
Pixel Arrangement	RGB vertical stripe		
Pixel pitch	0.6(H) x 0.6(W)		
Surface Treatment	Hard-Coating (3H), Anti-Glare		



2. Absolute Maximum Ratings

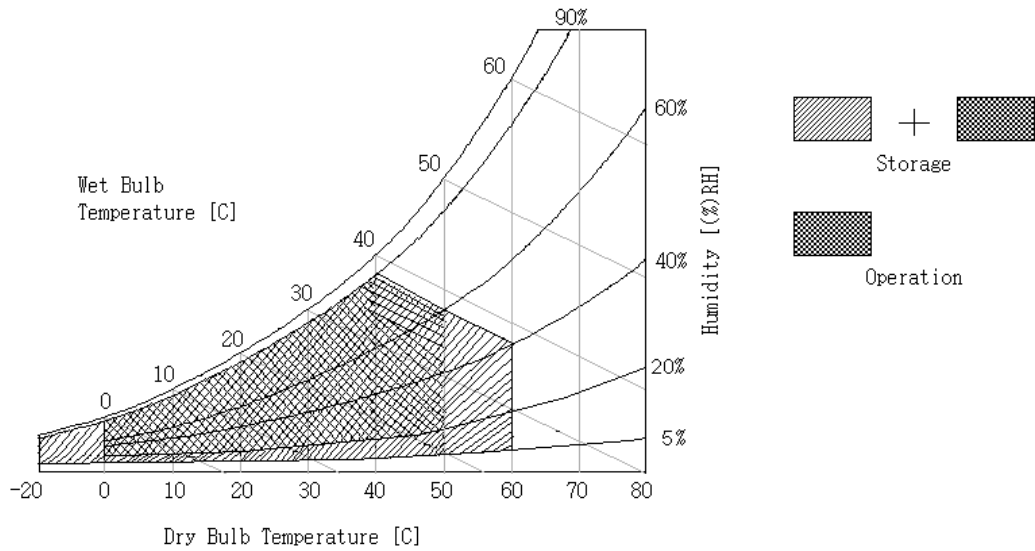
The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Parameter	Symbol	Min.	Max.	Unit	Note
Logic/LCD Driving Voltage	V_{LCD}	-0.3	13.2	V.	1
Input Voltage of Signal	V_{in}	-0.3	3.6	V.	1
BLU Input Voltage	V_{BL}	-0.3	26.4	V	1
BLU Control Voltage	BL_{ON}	-0.3	7.0	V	1
Operating Temperature	T_{OP}	0	50	°C	2
Storage Temperature	H_{ST}	-20	60	°C	2
Operating Ambient Humidity	H_{OP}	10	90	%RH	2
Storage Humidity	H_{ST}	10	90	%RH	2

Note 1 : Duration = 50msec

Note 2 : Maximum Wet-Bulb should be 39°C and No condensation.

The relative humidity must not exceed 90% non-condensing at temperatures of 40°C or less. At temperatures greater than 40°C, the wet bulb temperature must not exceed 39°C.





3. Electrical Specification

3-1 Electrical Characteristics

The T370XW01 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the CCFL, is typically generated by an inverter.

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LCD						
Power Supply Input Voltage	V_{LCD}	10.8	12.0	13.2	V.	
Power Supply Input Current	I_{LCD}	-	0.55	0.66	A.	1
Power Consumption	P_{LCD}	-	6.6	7.92	W	1
Inrush Current	I_{RUSH}	-	-	3	A	2
Backlight Power Consumption		-	135	155	W	
Lamp Life Time		60,000			hr	3

Note :

1. $V_{cc}=12.0V$, $f_v = 60Hz$, $f_{CLK}=81.5Mhz$, $25^{\circ}C$, Test pattern : white pattern.
2. Duration = 1 *ms*
3. The performance of the Lamp in LCM, for example life time or brightness, is extremely influenced by the characteristics of the DC-AC Inverter. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter. When you design or order the inverter, please make sure unwanted lighting caused by the mismatch of the lamp and the inverter (no lighting, flicker, etc) never occurs. When you confirm it, the LCD Assembly should be operated in the same condition as installed in your instrument.
4. Do not attach a conducting tape to lamp connecting wire. If the lamp wire attach to conducting tape, TFT-LCD Module have a low luminance and the inverter has abnormal action because leakage current occurs between lamp wire and conducting tape.
5. The relative humidity must not exceed 80% non-condensing at temperatures of $40^{\circ}C$ or less. At temperatures greater than $40^{\circ}C$, the wet bulb temperature must not exceed $39^{\circ}C$. When operate at low temperatures, the brightness of CCFL will drop and the life time of CCFL will be reduced.



3-2 Interface Connections

LCD Connector (CN1): FI-X30SSL-HF

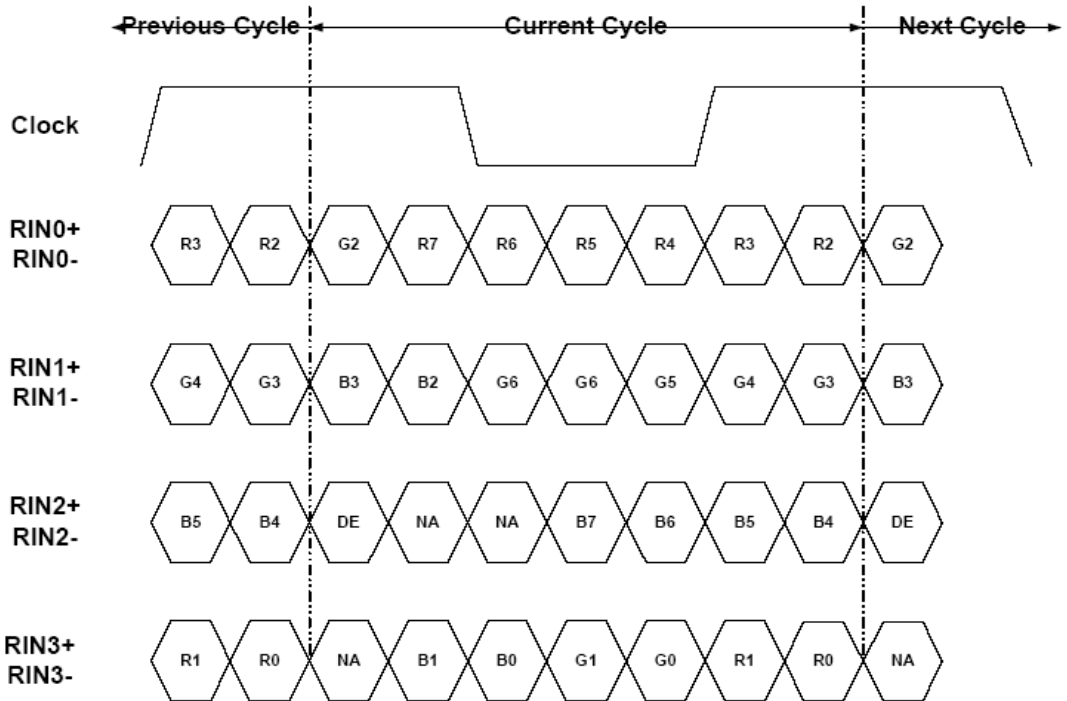
LVDS Transmitter:

Pin No	Symbol	Function
1	V _{LCD}	Power Supply +12.0V
2	V _{LCD}	Power Supply +12.0V
3	V _{LCD}	Power Supply +12.0V
4	V _{LCD}	Power Supply +12.0V
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	SEL LVDS	LVDS Data Format Selection
10	NC	NC
11	GND	Ground
12	RIN0-	Negative LVDS Data Input
13	RIN0+	Positive LVDS Data Input
14	GND	Ground
15	RIN1-	Negative LVDS Data Input
16	RIN1+	Positive LVDS Data Input
17	GND	Ground
18	RIN2-	Negative LVDS Data Input
19	RIN2+	Positive LVDS Data Input
20	GND	Ground
21	CLKIN-	Negative LVDS Data Input
22	CLKIN+	Positive LVDS Data Input
23	GND	Ground
24	RIN3-	Negative LVDS Data Input
25	RIN3+	Positive LVDS Data Input
26	GND	Ground
27	Reserved	Not Available
28	Reserved	Not Available
29	Reserved	Not Available
30	Reserved	Not Available

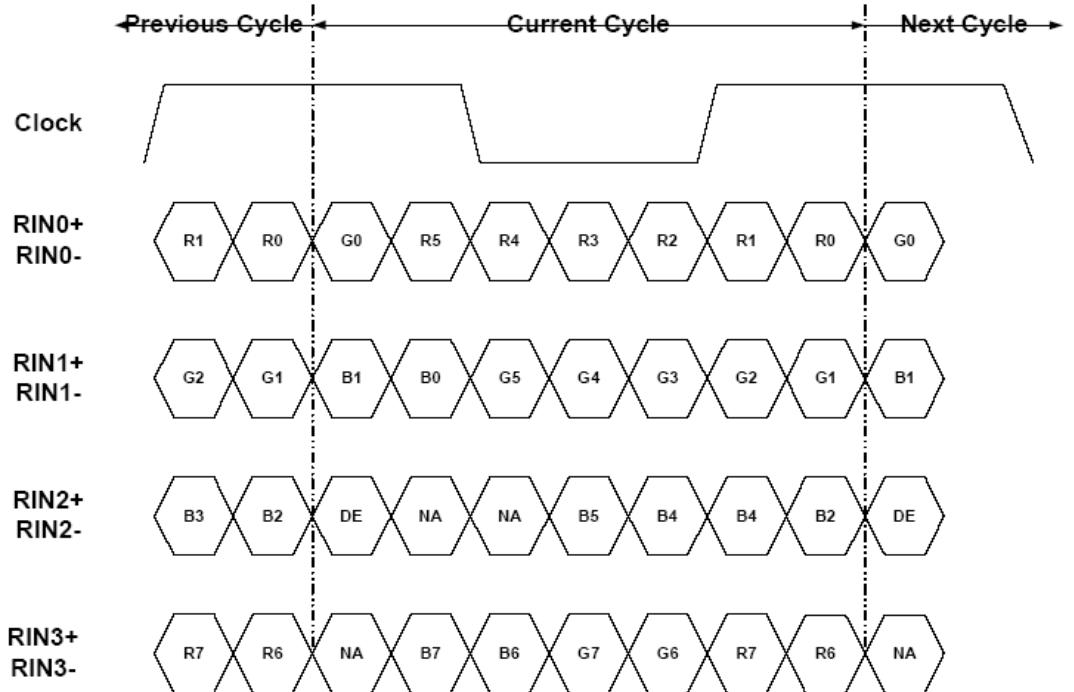


I LVDS Data Format Selection

1. SEL LVDS = High (3.3V) = JAIDA



2. SEL LVDS = Low(GND) or Open = NS





I BACKLIGHT CONNECTOR PIN CONFIGURATION -

1. Electrical specification

No	Item	Symbol	Test Condition	Min	Typ	Max	Unit	Note	
1	Power Input Voltage	V _{BL}		21.6	24	26.4	V		
2	Power Input Current	I _{BL}	VDD=24V,DimMax	-	5.6	6.5	A		
3	Power Consumption	P _{BL}	VDD=24V,DimMax	-	135	156	W		
5	Lamp Oscillating Frequency	F _{LO}	VDD=24V,DimMax	40	42	44	kHz		
6	Dimming Frequency	F _{BLD}	VDD=24V	150	-	300	Hz		
7	On/Off Control Voltage	On	BL _{ON}	VDD=24V	2	-	5	V	*2
		Off	BL _{ON}	VDD=24V	0	-	0.8	V	
8	DC Dimming Control *6	Max	Vdim	VDD=24V	-	3.3	-	V	*1
		Min	Vdim	VDD=24V	-	0	-	V	
9	PWM Dimming Control *6	Max	E_PWM	VDD=24V	-	100	-	%	
		Min	E_PWM	VDD=24V	-	30	-	%	Duty Ratio

(Ta=25±2°C)

※1: Connection of brightness control terminal

Bright control by the voltage

0V : Min. brightness

3.3V : Max. brightness

※2: BLON Logic

H(5V) : Back Light ON

L (0V) : Back Light OFF

OPEN : Back Light OFF



3. Input specification

CN1 : S14B-PH-SM3-TB(JST)

CN2 : S10B-PH-SM3-TB(JST)

No	Signal Name	Feature	No	Signal Name	Feature
1	V _{BL}	+24V	1	V _{BL}	+24V
2	V _{BL}	+24V	2	V _{BL}	+24V
3	V _{BL}	+24V	3	V _{BL}	+24V
4	V _{BL}	+24V	4	V _{BL}	+24V
5	V _{BL}	+24V	5	V _{BL}	+24V
6	GND	GND	6	GND	GND
7	GND	GND	7	GND	GND
8	GND	GND	8	GND	GND
9	GND	GND	9	GND	GND
10	GND	GND	10	GND	GND
11	V _{DIM}	Brightness control signal input (0V: min ~ 3.3V:Max)			
12	V _{BLOn}	5V : On, 0V : Off			
13	E-PWM	External PWM Dimming Control			
14	PWM SEL * ¹	High(2~5V) : internal PWM (pin11) Low(0~0.8V) : external PWM (pin13)			

*¹ PWM SEL setting

Pin \ Setting	Pin 14 : High	Pin 14 : Low
V _{DIM} (pin 11)	Internal PWM Dimming	Analog Dimming
E-PWM (pin13)	Disable	External PWM Dimming



3-3 Input Timing Specifications (DE only node)

60Hz Driving Timing

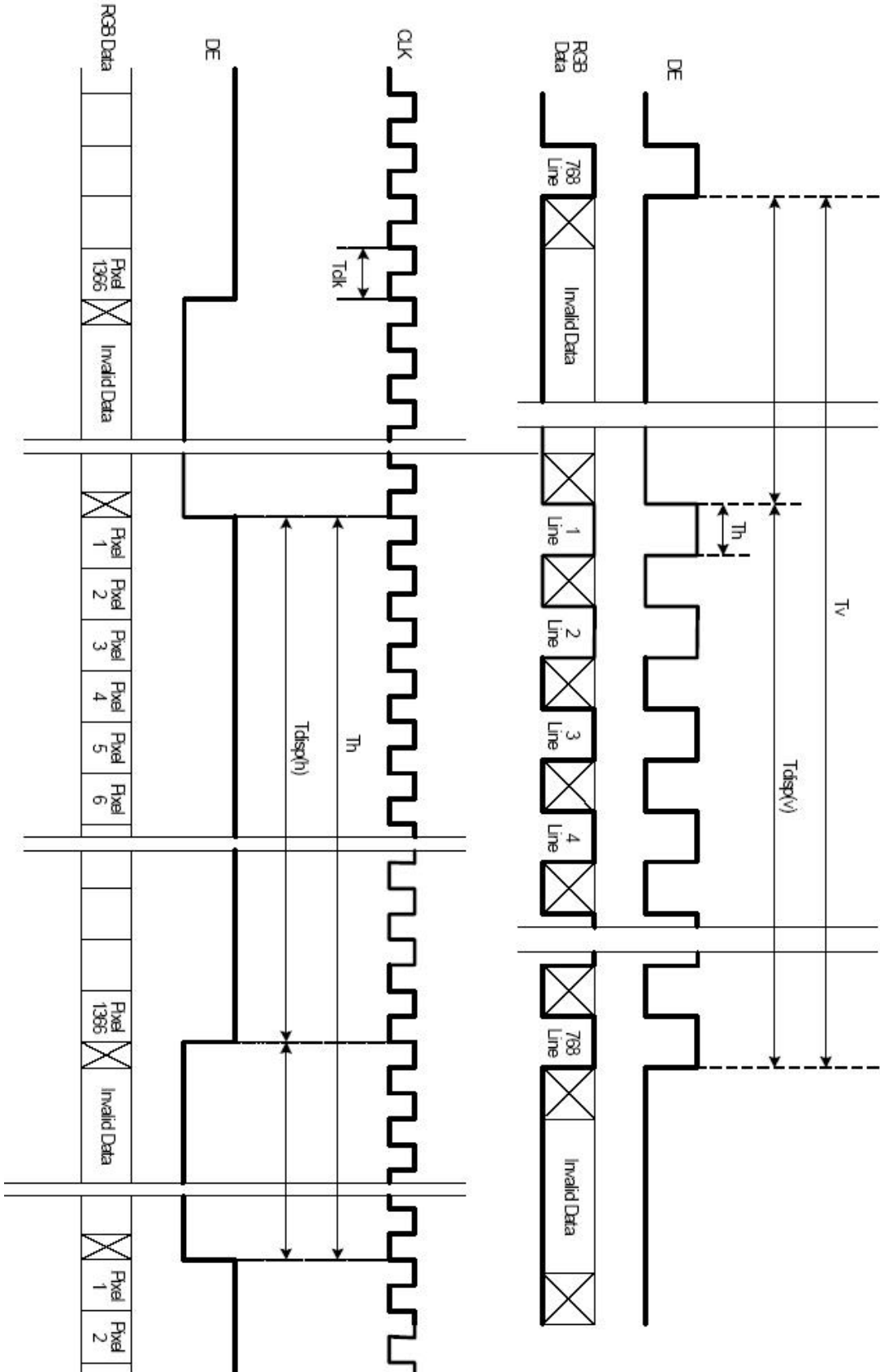
Signal	Item	Symbol	Min.	Type.	Max.	Unit
Vertical Section	Period	Tv	940	960	980	Th
	Active	Tdisp(V)	768			Th
	Blanking	Tblk(V)	172	192		212
Horizontal Section	Period	Th	1414	1480	1515	Tclk
	Active	Tdisp(H)	1366			Tclk
	Blanking	Tblk(H)	48	114		149
Clock	Frequency	1/Tclk	78.42	85.25	88.00	MHz
Vertical Frequency		Freq.	59	60	61	Hz
Horizontal Frequency		Freq.	55.46	57.60	59.78	KHz

50Hz Driving Timing

Signal	Item	Symbol	Min.	Type.	Max.	Unit
Vertical Section	Period	Tv	940	960	980	Th
	Active	Tdisp(V)	768			Th
	Blanking	Tblk(V)	172	192		212
Horizontal Section	Period	Th	1414	1480	1560	Tclk
	Active	Tdisp(H)	1366			Tclk
	Blanking	Tblk(H)	48	114		194
Clock	Frequency	1/Tclk	65.13	71.04	77.97	MHz
Vertical Frequency		Freq.	49	50	51	Hz
Horizontal Frequency		Freq.	47.00	48.00	49.00	KHz



3-4 Signal Timing Waveforms





3-5 Color Input Data Reference

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 a reference for color versus data input.

COLOR DATA REFERENCE

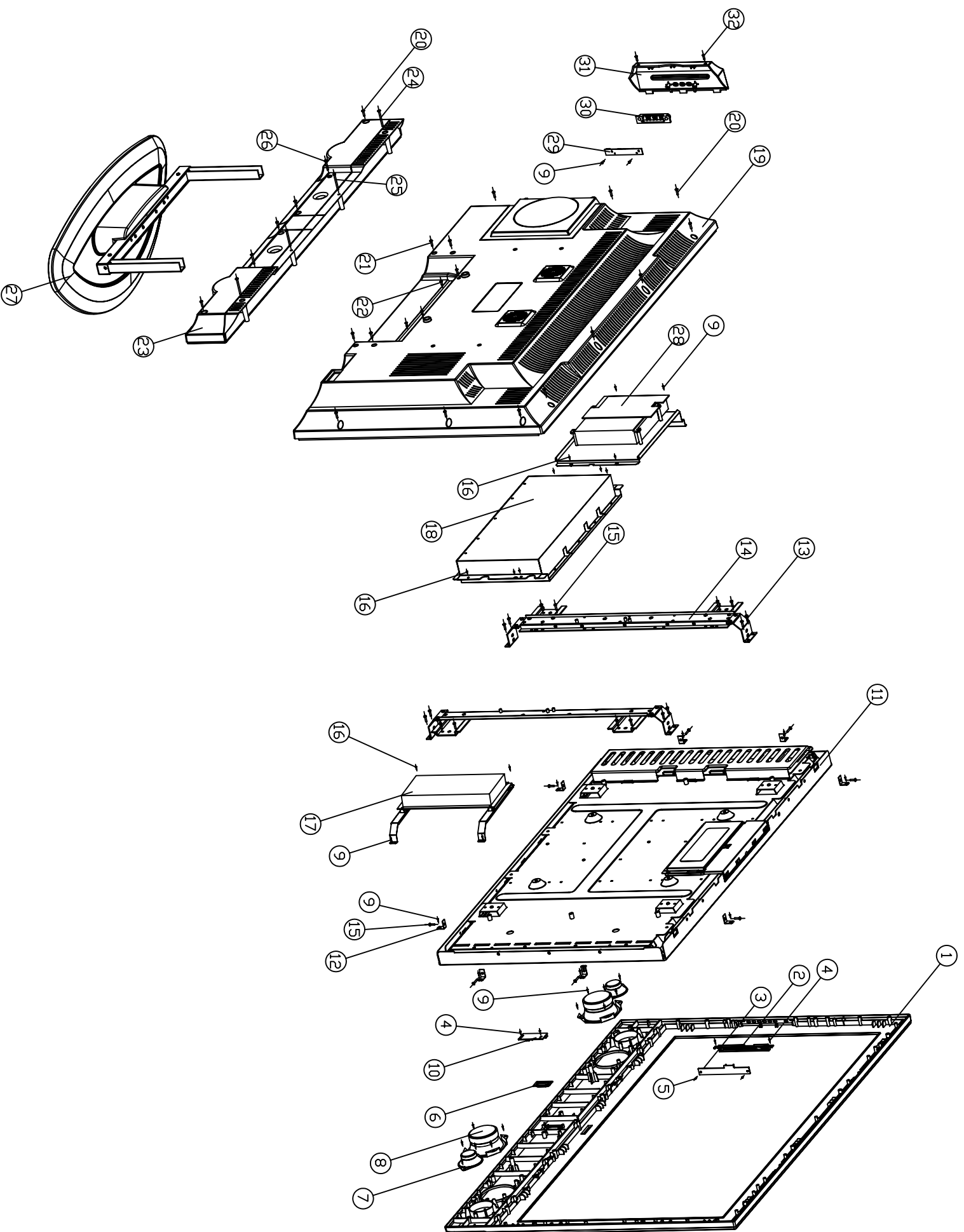
Color		Input Color Data																							
		RED								GREEN								BLUE							
		MSB				LSB				MSB				LSB				MSB				LSB			
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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
	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
	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	
RED	RED(000)	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(001)	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(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
GREEN	GREEN(000)	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(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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
BLUE	BLUE(000)	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(001)	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(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 : THIS RELEASED DRAWING WAS PRODUCED BY COMPUTER , DO NOT UPDATE MASTER MANUALLY



DWG. REV.	ZONE	DESCRIPTION	DATE	REVISDR
		REL FOR TOOLING		LJ

ITEM	DESCRIPTION	PART	QTY	REMARK
32	TAPPING SCREW	PART	2	
31	DVD KEY COVER	PART	1	
30	DVD KEY	PART	1	
29	DVD KEY PCB	ASSEMBLY	1	
28	DVD ASSY	ASSEMBLY	1	
27	BASE ASSY	ASSEMBLY	1	
26	TAPPING SCREW	PART	2	
25	TAPPING SCREW	PART	2	
24	TAPPING SCREW	PART	2	
23	SPEAKER CABINET BACK	PART	1	
22	MACH SCREW	PART	4	
21	MACH SCREW	PART	4	
20	TAPPING SCREW	PART	14	
19	BACK CABINET	PART	1	
18	MAIN BOARD ASSY	ASSEMBLY	1	
17	POWER ASSY	ASSEMBLY	1	
16	MACH SCREW	PART	10	
15	MACH SCREW	PART	16	
14	MAIN SUPPRT	PART	2	
13	TAPPING SCREW	PART	8	
12	1" BKT FRD PANEL	PART	8	
11	37" PANEL ASSY	ASSEMBLY	1	
10	REMOTE PCB	PART	1	
9	TAPPING SCREW	PART	26	
8	BURBDON SPEAKER	PART	2	
7	ALT SPEAKER	PART	2	
6	REMOTE LENS	PART	1	
5	TAPPING SCREW	PART	2	
4	TAPPING SCREW	PART	4	
3	FUNCTION KEY PCB ASSY	ASSEMBLY	1	
2	FUNCTION KEY	PART	1	
1	FRONT CABINET	PART	1	

DRAWN.	LJ	TOLERANCE UNLESS OTHERWISE SPECIFIED	KAWA ELECTRONIC R & D CENTRE	TITLE	LCT3701AD-EXP
CHECKED		±0.30	MATL.	MODEL NO.	LCT37AD
APPRD.		±0.10	FINISH	PART NO.	DWG. NO.
3rd ANGLE PROJECTION		±0.05		A3 LCT37ADADADA1AS-A01	LCT37ADADADA1AS-A01
		ANGULAR: ±0.3°		SCALE 1:10	QTY. 1
		UNIT : mm			SHEET 1 OF 1

Spare part list for LCT3701ADJ

Item	Part Number	Part Description	Usage / unit	Unit	Key/Spare
1>	LCT37ADADA1AS-A01	AKAI LCT37AD(LCT3701AD) (II) S-MT8202+DVD AUO AC120V/60HZ USA SILVER/BLACK			
	510-L37SD01-10AK	CARTON BOX AKAI LCT3701AD S-MT8202 AUO PANEL K	1.000000	Piece	K
2>	580-L37AD6A-02AP	IB E FOR AKAI LCT3701AD DTV+DVD S-MT8202 AU USA	1.000000	Piece	K
3>	E3407-081001	CORD FFC P0.5 50P L=110 B-0.5-50X110-4(8)X4(8)-0.3X0.035	1.000000	Piece	K
4>	E7501-061001	REMOTE CONTROL K002 AKAI FOR MT8202 COMBO 60KEYS SIL/BLK	1.000000	SET	K
5>	E7801-P02003	PCB ASSY PSU BOARD MEGMEET MLT386X FOR 37LCD AC110-240V OUTPUT 12V/8V/24V 250W	1.000000	SET	K
6>	771EL37AD02-04	PCB ASS'Y MAIN S-MT8202 +DVD FOR LCT37" AUO	1.000000	SET	K
7>	771S42D102-02	ATSC TUNER PCB ASS'Y (MT5111CE) W/O MAX3232	1.000000	SET	K
8>	200-L37AD03-01AA	CABINET FRONT SILVER/BLACK LCT37" AUO PANEL A	1.000000	Piece	S
9>	202-L37AD07-01AA	CABINET BACK BLACK LCT3701AD(II) W/DVD A	1.000000	Piece	S
10>	206-L37AD01-01R	SPEAKER BACK COVER BLACK	1.000000	Piece	S
11>	258-L20AD01-01A	DVD FUNCTION KNOB COVER BLACK	1.000000	Piece	S
12>	269-42SD01-01L	REMOTE RECEIVE LENS	1.000000	Piece	S
13>	277-L27AD11-01S	DVD FUNCTION KNOB BLK LCT2701TD S	1.000000	Piece	S
14>	277-L32AD11-03S	FUNCTION KEY SILVER AKAI LCT32AD (MATERIAL:GREY) S	1.000000	Piece	S
15>	300-L37AD07-01C	POLYFOAM RIGHT BOTTOM	1.000000	Piece	S
16>	300-L37AD08-01C	POLYFOAM LEFT BOTTOM	1.000000	Piece	S
17>	300-L37AD09-01C	POLYFOAM RIGHT TOP	1.000000	Piece	S
18>	300-L37AD0A-01C	POLYFOAM LEFT TOP	1.000000	Piece	S

Spare part list for LCT3701ADJ

19>	310-030404-01	POLYBAG 110MMX80MMX0.04MM	1.000000	Piece	S
20>	310-111404-07V	POLYBAG 11"X14"X0.04 FV	1.000000	Piece	S
21>	310-444750-07V	POLYBAG 44X47X50	1.000000	Piece	S
22>	370-42D102-01	PAD CORD SPONG FOR SPK	1.000000	Piece	S
23>	388-42SB04-01H	POWER PLATE SANSUI 42SB H	1.000000	Piece	S
24>	389-L32AB01-01	PVC SHEET L32AB	2.000000	Piece	S
25>	420-L37AD14-01S	MAIN SUPPORT "R"	1.000000	Piece	S
26>	426-L37AD02-01S	AC JACK BRACKET	1.000000	Piece	S
27>	429-L37AD0B-01S	POWER SUPPORT	2.000000	Piece	S
28>	436-L32AB0H-01S	TERMINAL SHEET S-MT8202 WITH CAND D	1.000000	Piece	S
29>	481-L32AB06-01S	SHIELDING BOTTOM MT8202	1.000000	Piece	S
30>	481-L37AD03-01S	DVD (NEON) SHIELDING BOTTOM	1.000000	Piece	S
31>	483-L32AB32-01S	SHIELDING COVER	1.000000	Piece	S
32>	486-M32111-01	NAME PLATE M AKAI	1.000000	Piece	S
33>	522-421D01-01	MASKING PAPER	1.000000	Piece	S
34>	560-L37AD01-03AP	MODEL LABEL AKAI LCT3701AD(J) S- MT8202 USA P	1.000000	Piece	S
35>	563-119-	SERIAL NO. LABEL	1.000000	Piece	S
36>	568-P46T02-02	WARNING LB ENG 42SF NIL	1.000000	Piece	S
37>	578-L37AD01-03AP	FUNCTION SHEET FOR TERMINAL LCT3701AD(II) S-MT8202 W/DVD P	1.000000	Piece	S
38>	579-42D102-09	SERIAL NO/BAR CODE LABEL 42D1	1.000000	Piece	S

Spare part list for LCT3701ADJ

39>	579-42D105-01	PROTECTIVE EARTH LABEL FOR ESA 42TD1	1.000000	Piece	S
40>	579-L27AD09-01	CAUTION LABEL ENG AKAI	1.000000	Piece	S
41>	579-L32AD03-02	CLASS I LASER PRODUCT LOGO	1.000000	Piece	S
42>	579-L37AD01-03AP	BAR CODE NO LABEL (W/SERIAL NO) FOR LCT3701AD USA P	2.000000	Piece	S
43>	590-L37AD01-05AP	WARRANTY CARD AKAI ENG LCT3701AD(II) USA P	1.000000	Piece	S
44>	593-L37AD01-05AP	AKAI INSERTION CARD ENG LCT3701AD(II) USA P	1.000000	Piece	S
45>	E3219-002003	EI I LET EMI FILTER WIT WIRES IOSSI- R-Q(B) HIGH&LOW	1.000000	Piece	S
46>	E3404-157004	AC CORD UL 1.88M (YY-3/ST3 YUNBIAO)	1.000000	Piece	S
47>	E3421-925118	WIRE ASSY 8P2.5/7P2.0 L170MM 5V 12V SIGNAL POWER MT8202	1.000000	Piece	S
48>	E3421-925127	WIRE ASSY TJC3-2Y L860 SPK-R MT8202	1.000000	Piece	S
49>	E3421-925138	WIRE ASSY P2.5/4P 4P2.0 L360MM AMP 24V MT8202 37" COMBO	1.000000	Piece	S
50>	E3421-925139	WIRE ASSY TJC3-3Y L760MM LCD37" MT8202 SPK-L	1.000000	Piece	S
51>	E3421-925151	WIRE ASSY 16P/2.0/11P/2.5/10P/2.5/8P/2.0 FOR MT8202 5V/12V/9V	1.000000	Piece	S
52>	E3421-925153	WIRE ASSY 250MM 3WIRES 20# 1617 FOR POWER IN PUT	1.000000	Piece	S
53>	E3461-064039	WIRE ASSY 5P2.5 L560MM 5V 3.3V SIGNAL WIRE EMI MT8202	1.000000	Piece	S
54>	E3461-064042	WIRE ASSY 1H2.5-2H2.0 20099 L350 7P/5P FOR MT8202 37" STANDBY	1.000000	Piece	S
55>	E3471-000048	WIRE WS SHIELD WIRE FOR 32LCD TV +COMBO KEY WIRE FOR DVD	1.000000	Piece	S
56>	E3471-000054	WIRE WS SHIELD 6P2.0/2P2.5/8P2.0 L440MM COMBO 37LCD MT8202	1.000000	Piece	S
57>	E3471-000055	WIRE WS SHIELD 11P/10P2.0 TV +COMBO DVD 37LCD MT8202 L480MM	1.000000	Piece	S
58>	E3471-000072	WIRE WS SHIELD FOR MT8202 MICO KEY 13P/8P+5P L650/L750MM W/O EMI	1.000000	Piece	S

Spare part list for LCT3701ADJ

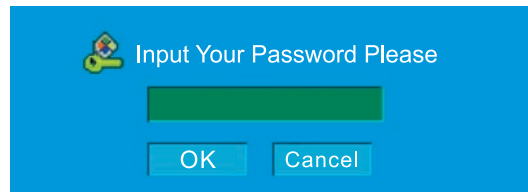
59>	E4801-124001	SPEAKER 8 OHM 10W D3" YD78-1	2.000000	Piece	S
60>	E6203-37AD01	DISPLAY LCD 37" AUO WXGA T370XW01-V1	1.000000	Piece	S
61>	E7301-010002	BATTERY AAA R03P1.5V <2>	2.000000	Piece	S
62>	E7801-D02001	DVD PCB ASSY NEON FOR MT8202 NEW	1.000000	SET	S
63>	734-L37AD03-02	PLASTIC BASE LCD37" SILVER	1.000000	SET	S
64>	771BL27AD01-01	IR RECEIVE PCB ASSY FOR LCT27AD ATSC & DVD S-MT8202G	1.000000	SET	S
65>	771KL27AD01-01	KEY PCB ASSY FOR TV S-MT8202G ATSC & DVD	1.000000	SET	S

If you forget your V-Chip Password

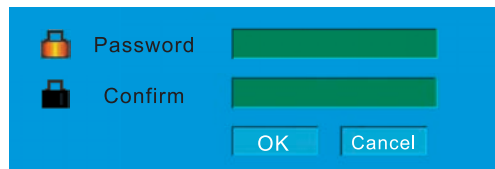
- Omnipotence V-Chip Password: 8202.

Using the “Change Password” item

- ❶ When enter the “V-Chip” menu, select “Change Password”.
- ❷ Press ▲ or ▼ button to highlight the “Change Password” item.
- ❸ Press **Enter** button to confirm and pop up a menu.



- ❹ Use 0~9 buttons input the omnipotence password (8202), then Press **Enter** button to enter and pop up a menu.



- ❺ Use 0~9 buttons input your new password.
- ❻ Press ▼ button to move to confirm blank.
- ❼ Use 0~9 buttons input your new password again.
- ❽ Press **Enter** button to confirm

-Suggest: Change to your familiar Password again.

Software Upgrade

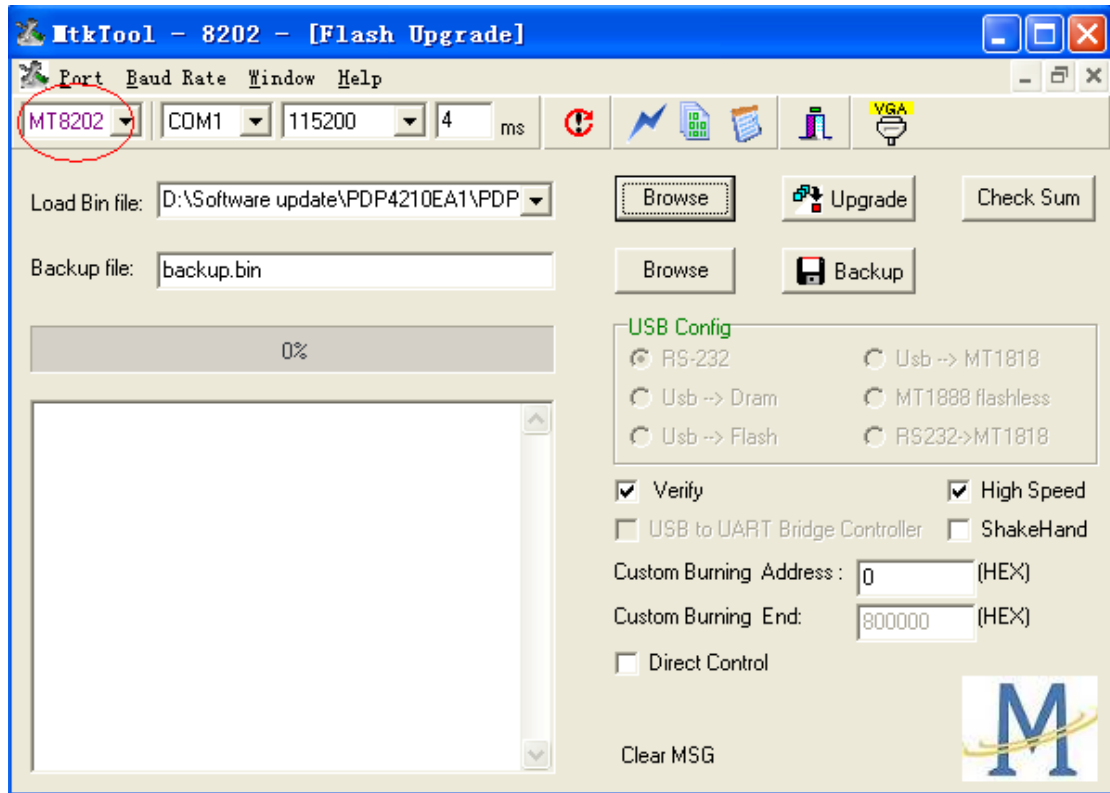
Process of update MT8202

Preparing :

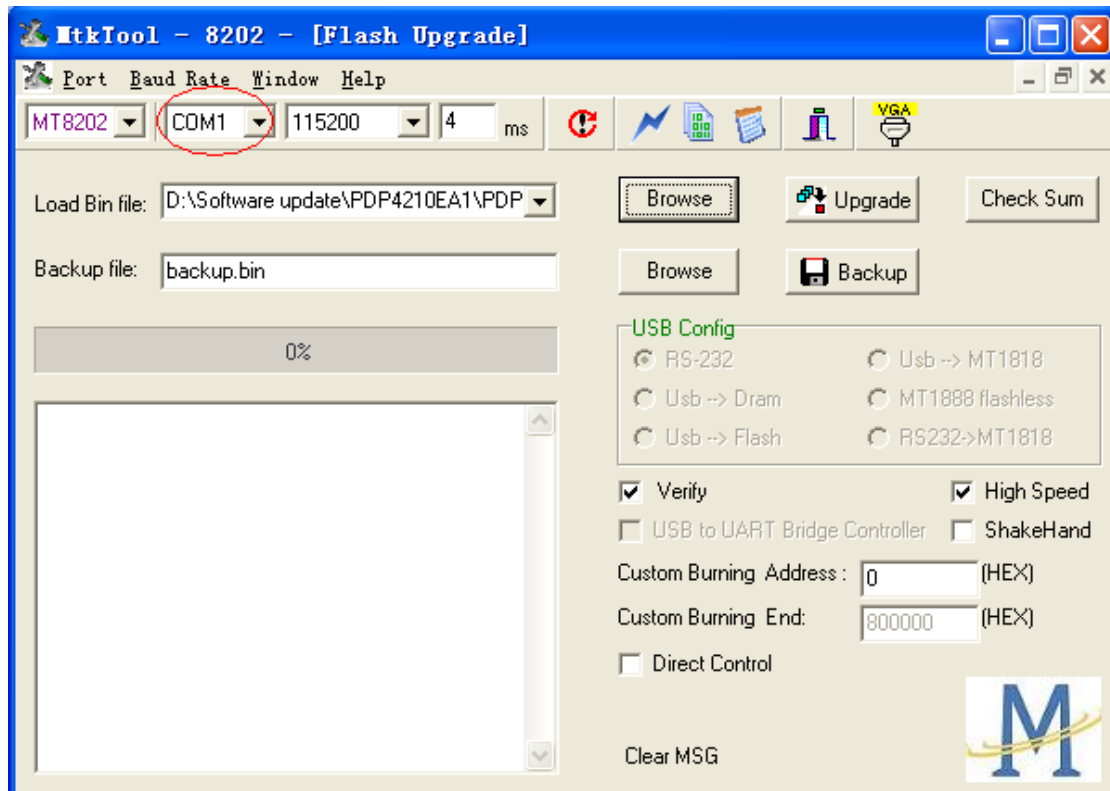
1. Connect the Plasma/LCD TV and PC with the **Software Upgrade Board**. Please find the details for connecting **referring to the appendix at the end of this file**.
2. Store the MtkTool into the PC .

Downloading :

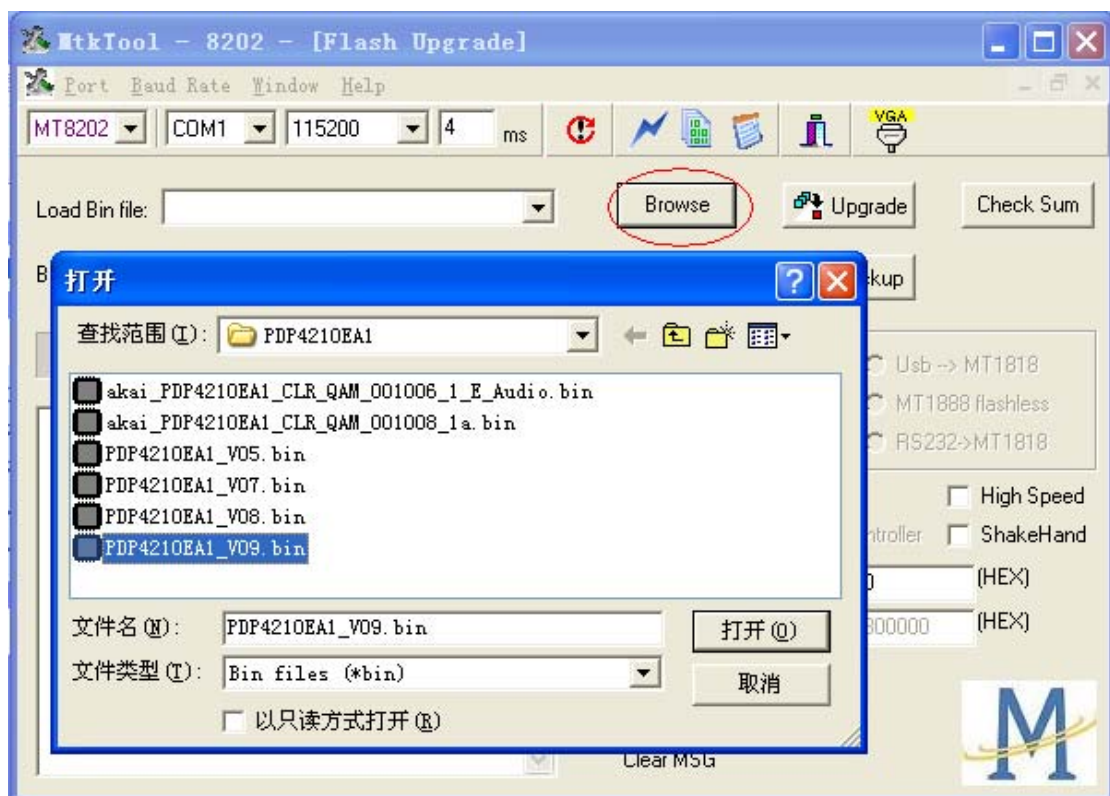
3. Turn on AC power of the TV and then press the button “standby” of the remote control . The image could be found on the screen of the Plasma TV while the color of the power indicator is green . (the mode of the TV will be standby mode if after turn on the main power only .)
4. Execute MTKtool and select the chipset as MT8202. (the software of MTKtool will be sent to your side)



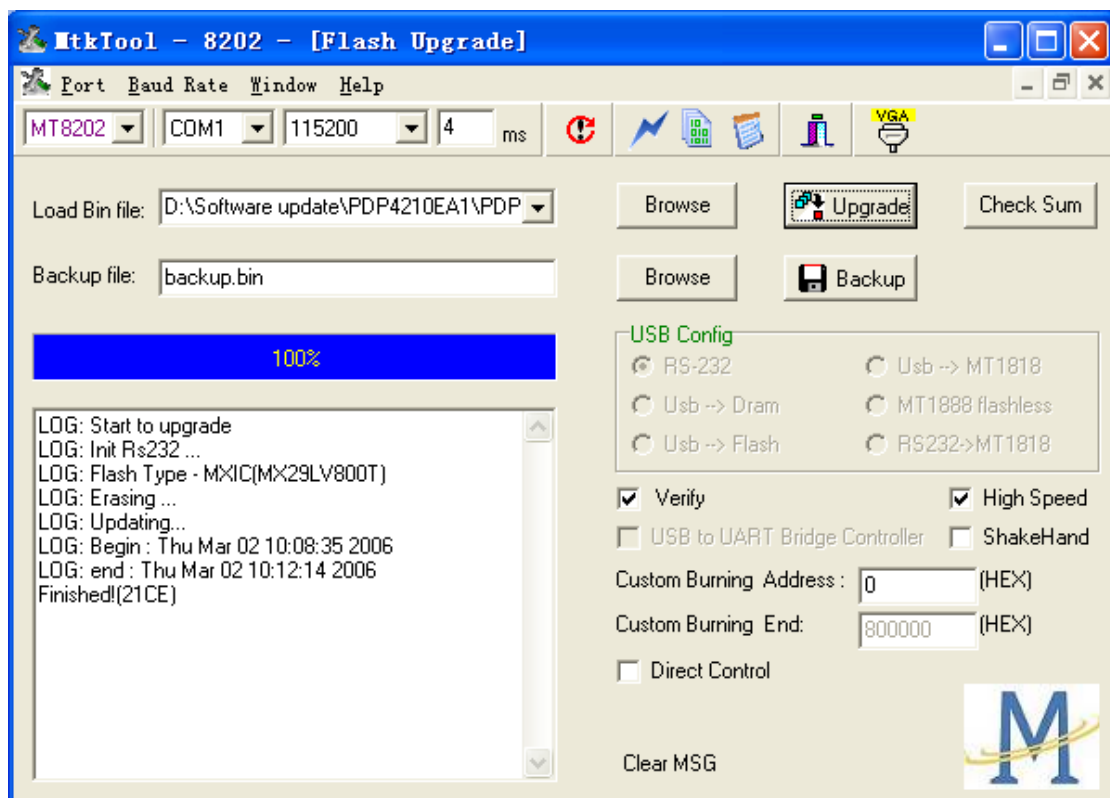
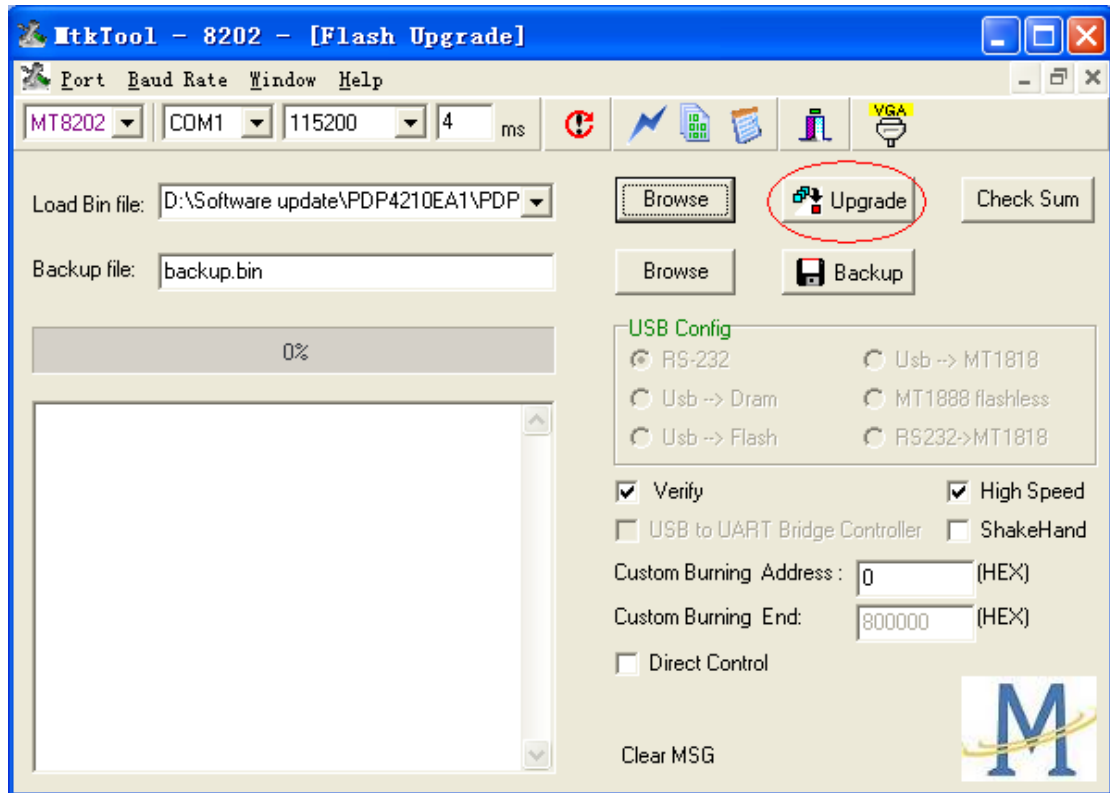
5. Select current COM port. (please try to check the COM port of your PC).



6. Choose the bit rate as 115200.
7. Select the update binary by pressing browse button. For example, the binary file name is PDP4210EA1_V09.bin. (this update firmware will be sent to your side)



8. Press Upgrade button and start update process.



9. The update process is successful as the progress bar is 100%. After the update process is ok,

turn off power and wait indicator light is off. Turn on power and TV can work.

Checking

It is needed to check the version of the firmware for MT8202 which has been download into the Plasma TV .

Press Menu button of the remote control, following input “8202” of the remote control and OSD menu for Factory Setting is appeared on the screen .

Use the remote control and select the mode of Firmware Version and then enter the mode of Firmware Version . It is easy to be found the version of the current firmware for MT8202 is as the following : “Factory ID : PDP4210EA1_VXX ”

Appendix:

Quick Installation Guide For Software Upgrade Board

1. Parts List

- Software upgrade board x 1 (#1)
- RS232 null cable x 1 for PC (#2)
- RS232 – VGA cable (#4)
- USB cable x 1 (#5)

2. Installation for ATV upgrade

2.1 Connect RS232 cable (#2) to PC serial port



Connect another side of RS232 cable (#2) to the board (#1)



2.2 Connect RS232-VGA cable (#4) (RS232 side) to the board (#1)



Connect RS232-VGA cable (#4) (VGA side) to the TV



2.3 Connect USB cable (#5) to the board (#1)

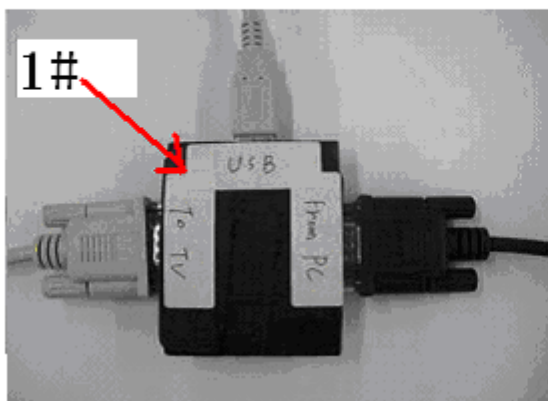


Connect another side of USB cable (#5) to PC

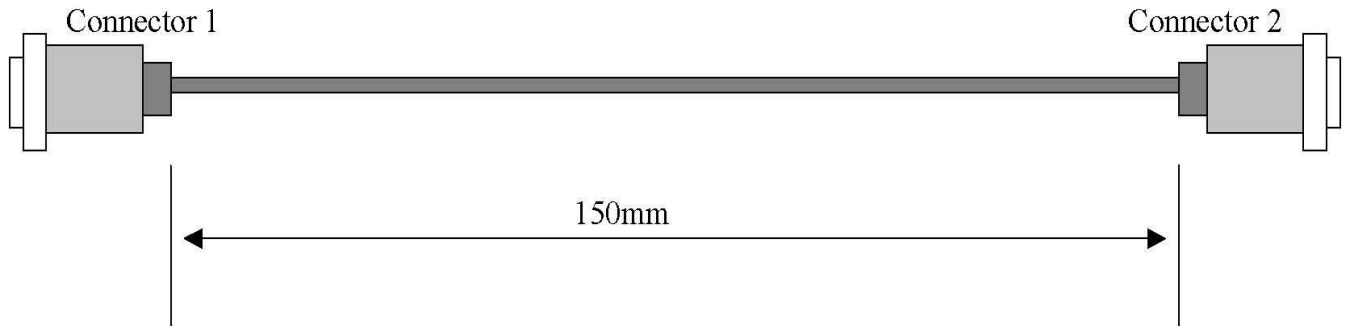


3. Cables Standard for Upgrade Board

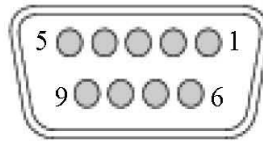
Software upgrade board x 1 (#1)



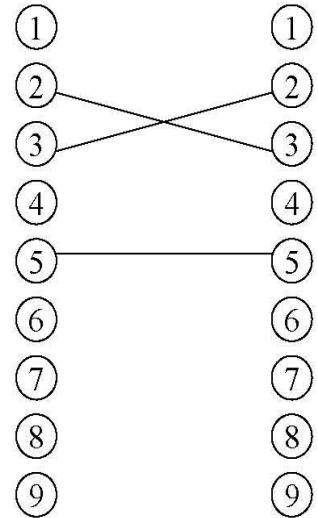
RS232 Null Cable for PC (#2)



Pin Assignment
Of DB9 Female

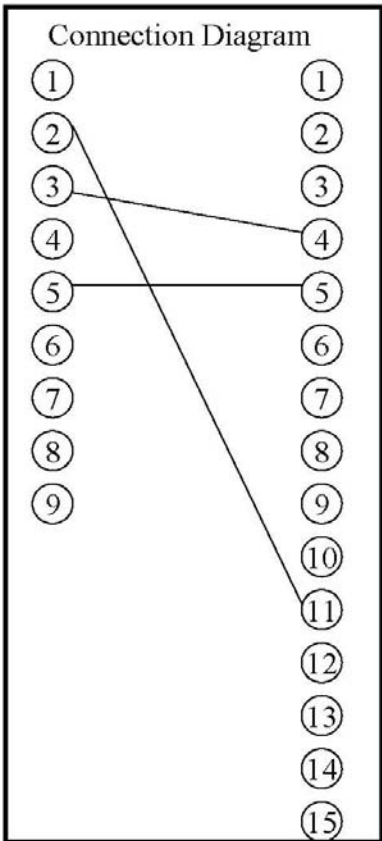
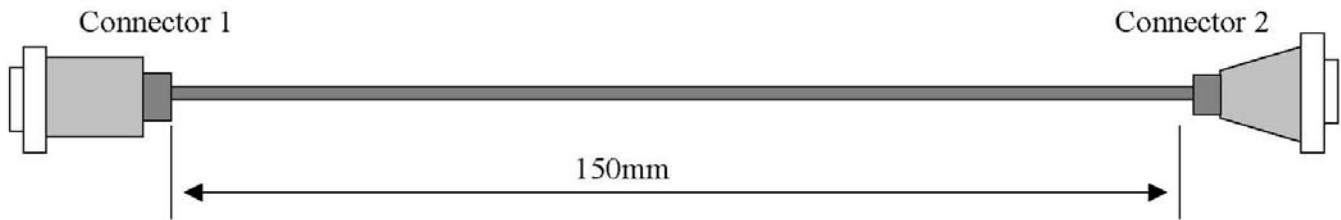


Connection Diagram



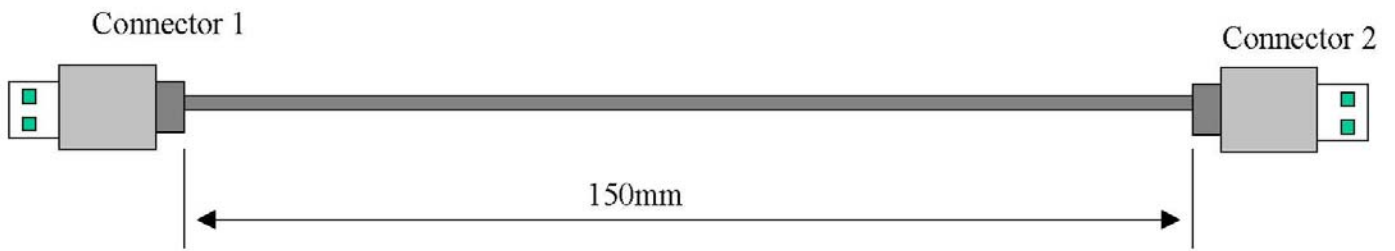
Connector 1: DB9 Female
Connector 2: DB9 Female

RS232 - VGA Cable (#4)



Connector 1: DB9 Female
 Connector 2: VGA Male

USB Cable (#5)



Connector 1: Standard USB Male

Connector 2: Standard USB Male

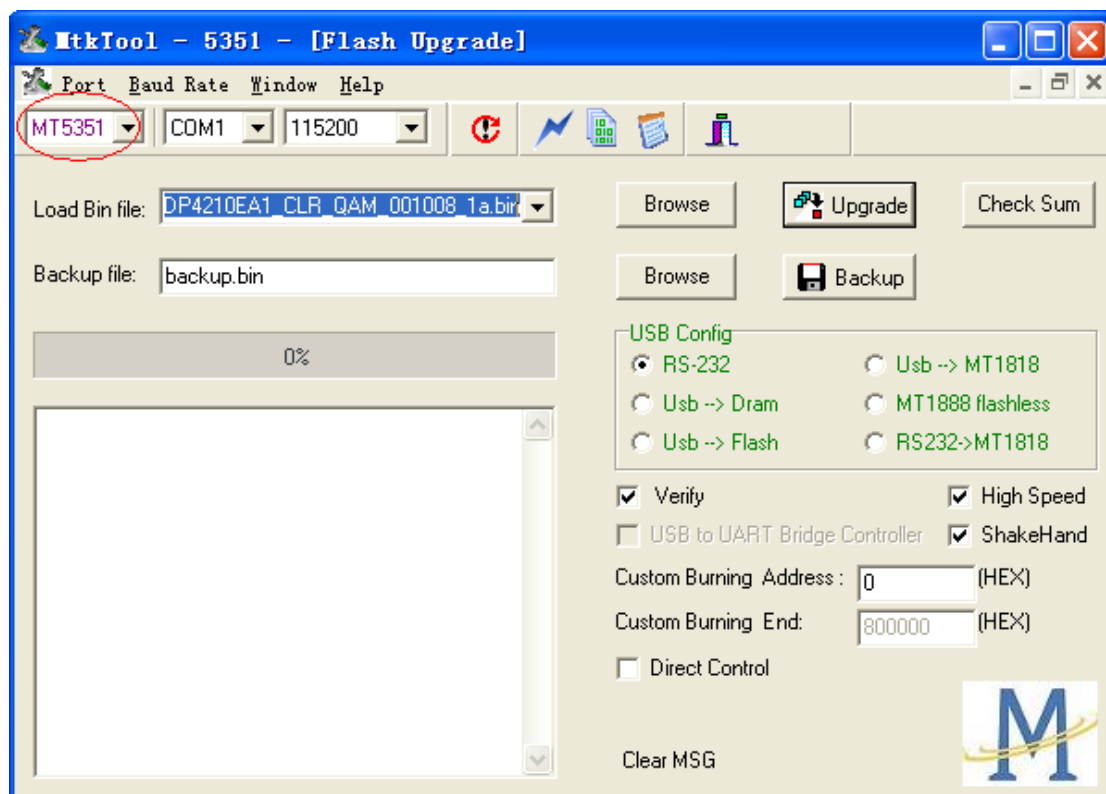
Process of update MT5351AG

Preparing :

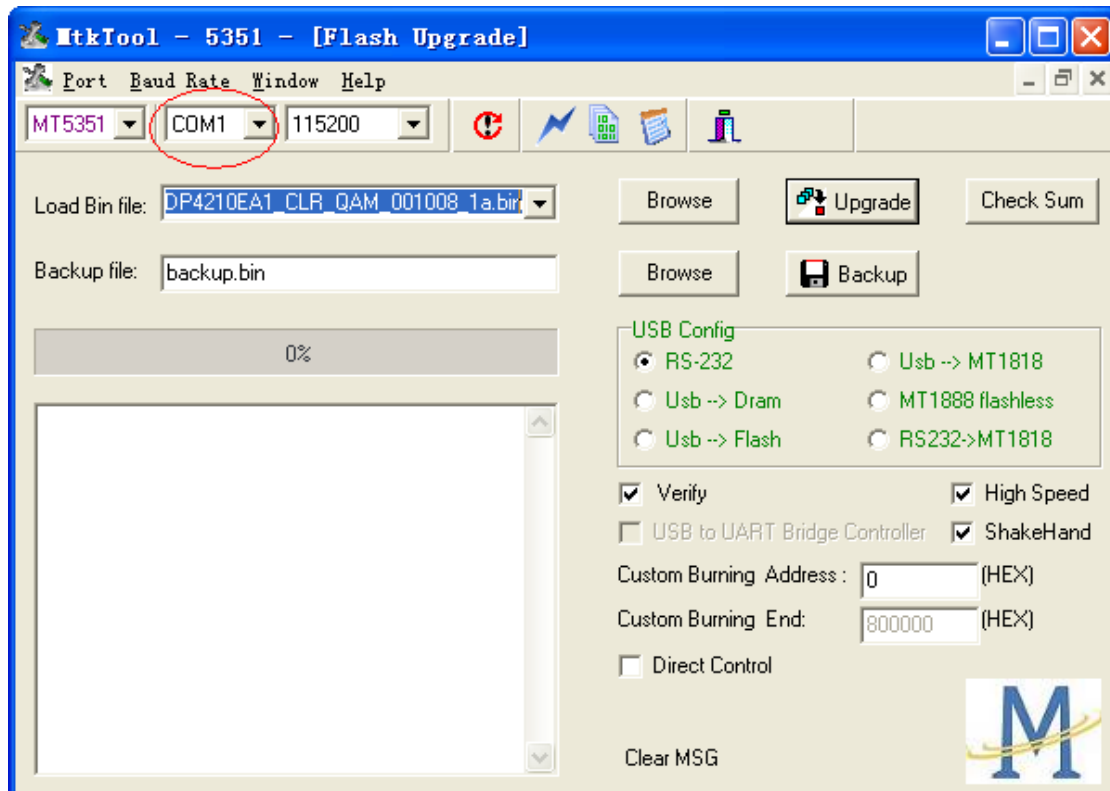
1. Connect the Plasma/LCD TV and PC with the **Software Upgrade Board**. Please find the details for connecting **referring to the appendix at the end of this file**.
2. Store the MtkTool into the PC

Downloading :

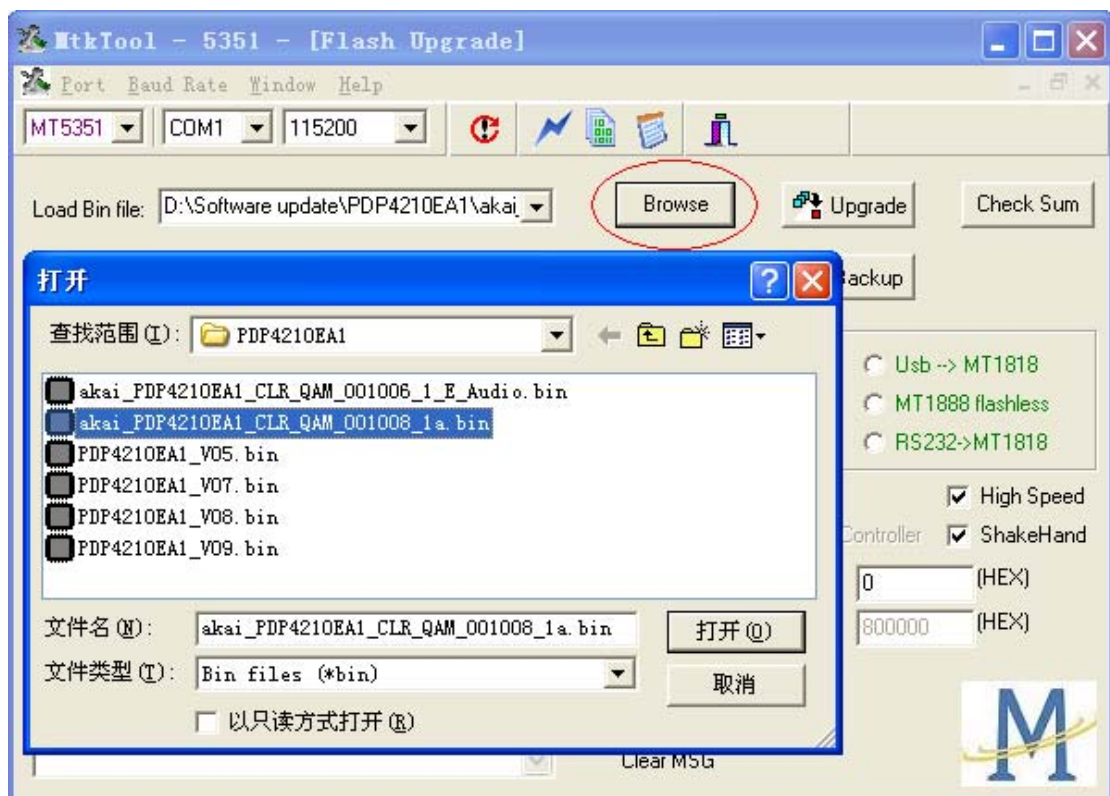
3. Turn on AC power of the TV and then press the button “standby” of the remote control . The image could be found on the screen of the Plasma TV while the color of the power indicator is green . (the mode of the TV will be standby mode if after turn on the main power only .)
4. Execute MTKtool and select the chipset as MT5351. (the software of MTKtool will be sent to your side)



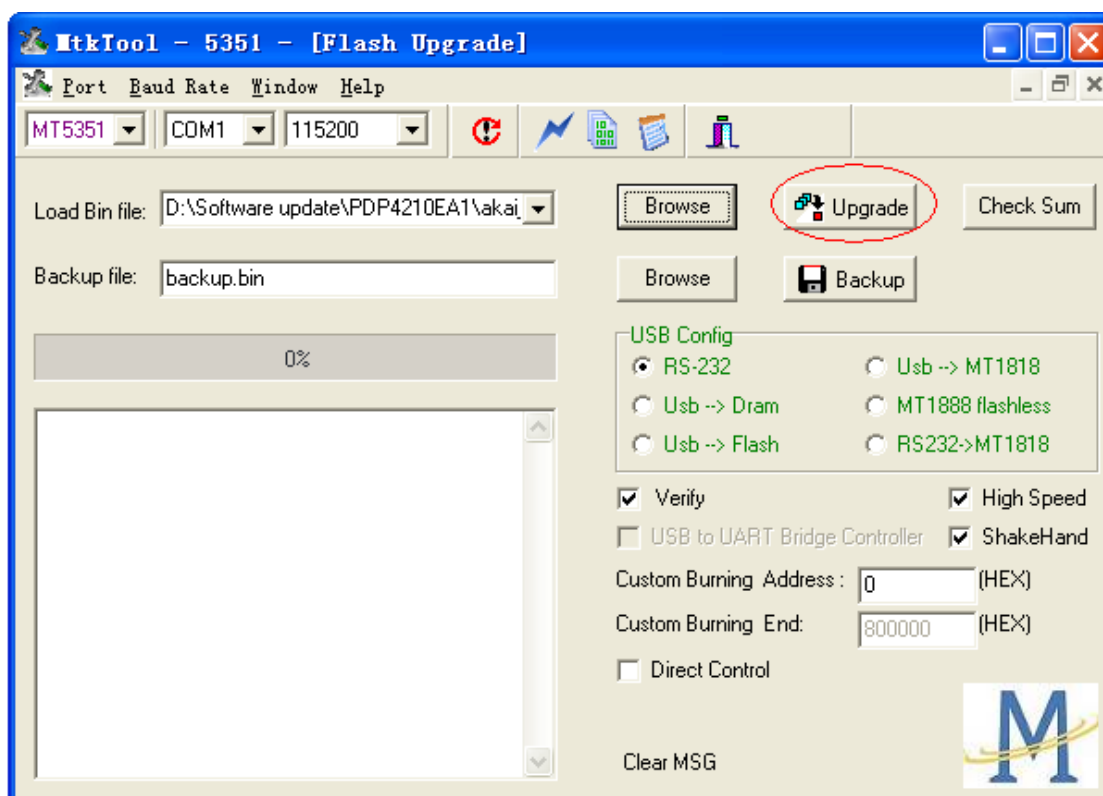
5. Select current COM port. (please try to check the COM port of your PC).



6. Choose the bit rate as 115200.
7. Select the update binary by pressing browse button. For example, the binary file name is XXXX_PDP4210EA1_000000XX_X_P.bin. (this update firmware will be sent to your side)



8. Press Upgrade button and start update process.



9. The update process is successful as the progress bar is 100%. After the update process is ok, turn off power and wait indicator light is off. Turn on power and TV can work.

Checking :

It is needed to check the version of the firmware for MT5351AG which has been download into the Plasma TV .

Press Menu button of the remote control and the main OSD menu is appeared on the screen .

Use the remote control and select the DTV menu . following input “0000” (zero , zero , zero , zero) of the remote control .Then enter the mode of factory after input the digits .

It is easy to be found the version of the current firmware for MT5351AG is “PDP4210EA1 CLA_QAM_XXXXXX_XX”under the mode of factory .

Appendix:

Quick Installation Guide For Software Upgrade Board

1. Parts List

- Software upgrade board x 1 (#1)
- RS232 null cable x 1 for PC (#2)
- RS232 null cable x 1 for DTV (#3)
- USB cable x 1 (#5)

2. Installation for DTV upgrade

2.1 Connect RS232 cable (#2) to PC serial port



Connect another side of RS232 cable (#2) to the board (#1)



2.2 Connect RS232 cable for DTV (#3) to the board (#1)



Connect another side of RS232 cable for DTV (#3) to the TV



2.3 Connect USB cable (#5) to the board (#1)

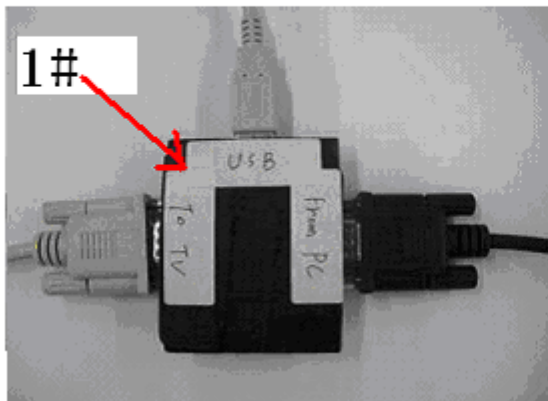


Connect another side of USB cable (#5) to PC

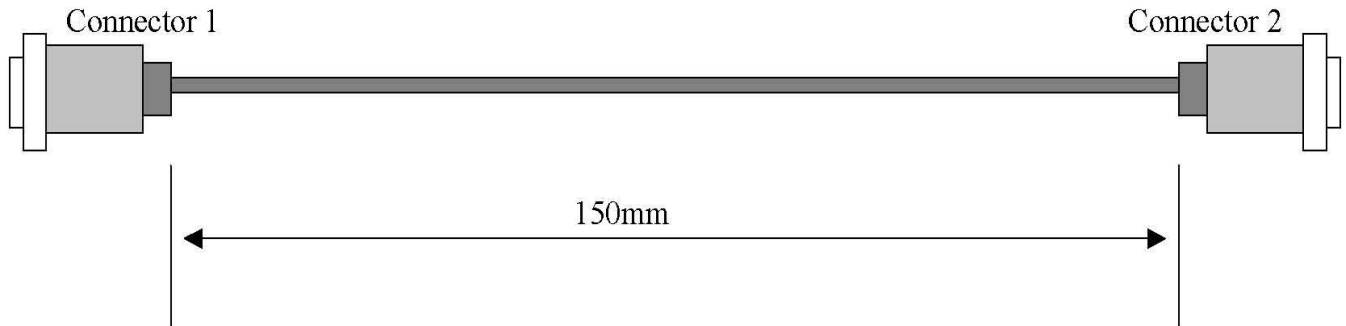


3. Cables Standard for Upgrade Board

Software upgrade board x 1 (#1)



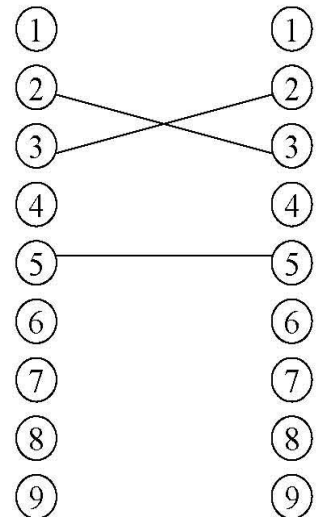
RS232 Null Cable for PC (#2)



Pin Assignment
Of DB9 Female

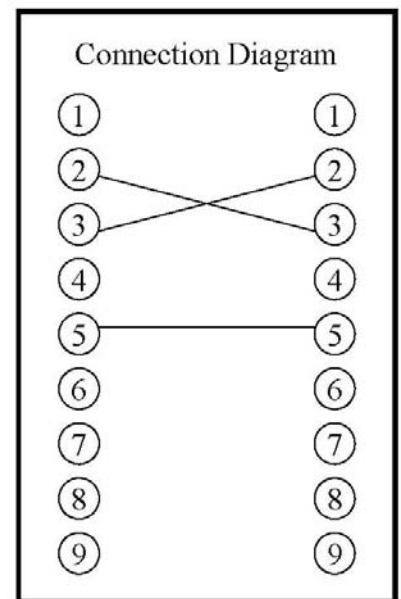
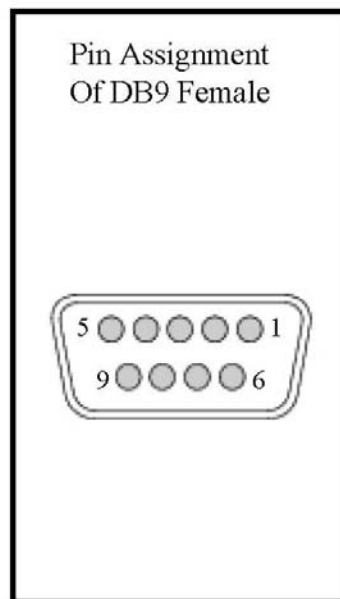
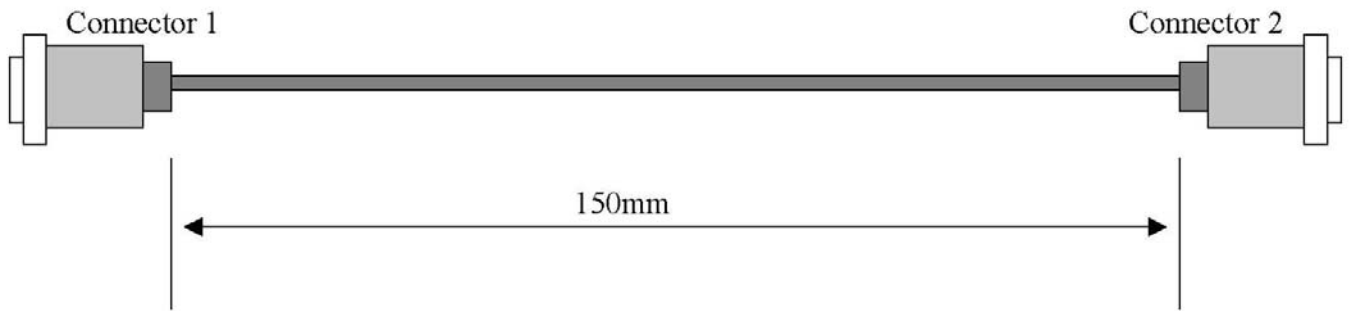


Connection Diagram



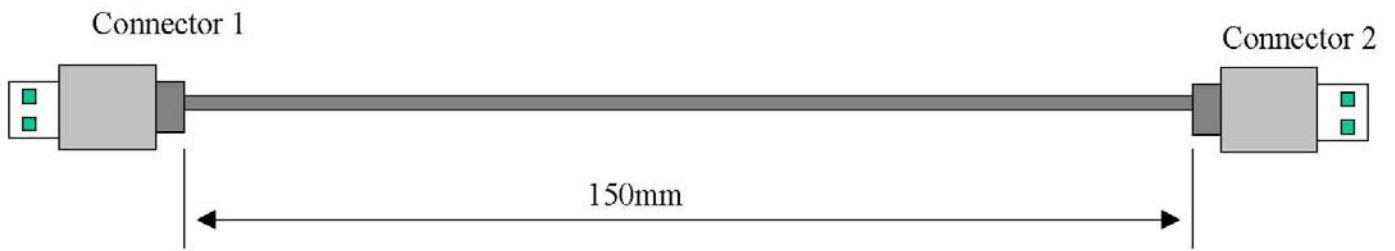
Connector 1: DB9 Female
Connector 2: DB9 Female

RS232 Null Cable for DTV (#3)



Connector 1: DB9 Female
Connector 2: DB9 Female

USB Cable (#5)



Connector 1: Standard USB Male

Connector 2: Standard USB Male