



# AKAI

# SERVICE MANUAL

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**Model:**

**LCT2765TD**






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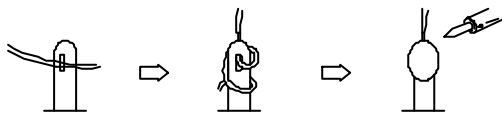
This manual is the latest at the time of printing, and does not include the modification which may be made after the printing, by the constant improvement of product.

# 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><b>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.</b></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>

## 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 $\mu$ F AC type capacitor, between a good earth ground (water pipe, conductor etc.) and the exposed metallic parts, one at a time.

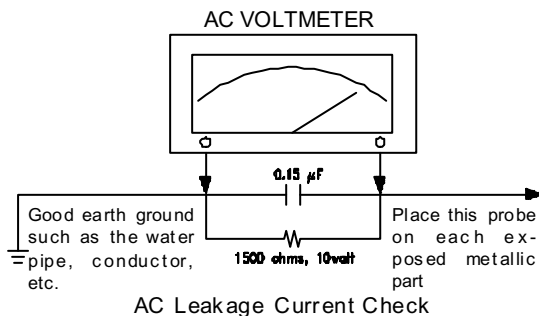
Measure the AC voltage across the combination of the 1.5K ohm resistor and 0.15 uF capacitor. Reverse the AC plug at the AC outlet and repeat the AC voltage measurements for each exposed metallic part.

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

<b>1.1 VIDEO SECTION</b>	<b>CHIMEI V270B1-L01</b> <b>MK8205</b> <b>USA</b>
<b>Display size</b>	<b>27"/16:9</b>
<b>Display Resolution</b>	<b>1366 X 768</b>
<b>Pixel Pitch</b>	<b>0.1460mm×0.4365mm</b>
<b>Peak Brightness</b>	<b>550(nits)</b>
<b>Contract Ratio</b>	<b>1000:1, Typical (1/100 White Window, Dark Room)</b>
<b>View Angle</b>	<b>Hor. And Vert. 170 degree</b>
<b>Color Deeps</b>	<b>16.7M Color (R / G/ B each 256 Scales)</b>
<b>PC Resolution Supporting</b>	<b>VGA, SVGA, XGA, WXGA</b>
<b>HDTV Compatible</b>	<b>480i / 480p / 720p / 1080i</b>
<b>Progressive Scanning</b>	<b>Yes</b>
<b>Film Mode Pull Down</b>	<b>Yes</b>
<b>“GAMMA” Correction</b>	<b>Yes</b>
<b>Color Temperature Control</b>	<b>Yes</b>
<b>Comb Filter</b>	<b>Yes</b>
<b>Second De-interlace for Sub picture</b>	<b>No</b>
<b>Wide Mode</b>	<b>Normal, Full, Wide 1, Wide 2, Wide 3, 4:3, No scale and Panoramic.</b>
<b>TV System</b>	<b>NTSC M</b>
<b>Dual Tuner System</b>	<b>No</b>
<b>AV Input Color System</b>	<b>PAL /NTSC</b>
<b>PIP</b>	<b>Basic mode (video on graphic mode,resolution 1024×768)</b>
<b>1.2 AUDIO SECTION</b>	
<b>Audio Output Power</b>	<b>6W×2 Max.(8 ohm)</b>
<b>Sound Effect</b>	<b>Spatial Effect and Surround</b>
<b>Tone Control</b>	<b>Yes</b>
<b>1.3 Input Terminals</b>	<b>D-Sub 15 Pin Type(Analog-RGB Input ) ×1</b> <b>D-Sub 9 Pin (RS-232)</b> <b>RF (F-type Input) ×1</b> <b>Component Video-YPbPr ×1 RCA Terminals</b> <b>S-Video Input (Mini Din 4Pin) ×1</b> <b>Video Input RCA Terminals</b> <b>Stereo Audio Input for YPbPr x 1</b> <b>(3.5mm Phone Type) x 1</b>
<b>1.4 Output Terminals</b>	<b>Audio Output (RCA ; L&amp;R Type) ×1</b>
<b>1.5 Others</b>	
<b>Closed Caption / V-Chip</b>	<b>Yes</b>
<b>Teletext</b> No	
<b>OSD Language</b>	<b>English, Français, Español</b>

# **KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE**

Reference No : LCT2765TD

<b>Stereo Decode</b>	<b>MTS with SAP</b>
<b>Power Rating</b>	<b>AC 120 V, 60Hz</b>
<b>Power Consumption</b>	<b>200W</b>

## **1.6 Support the Signal Mode**



**This machine can support the different from VGA signal mode in 7 kinds**

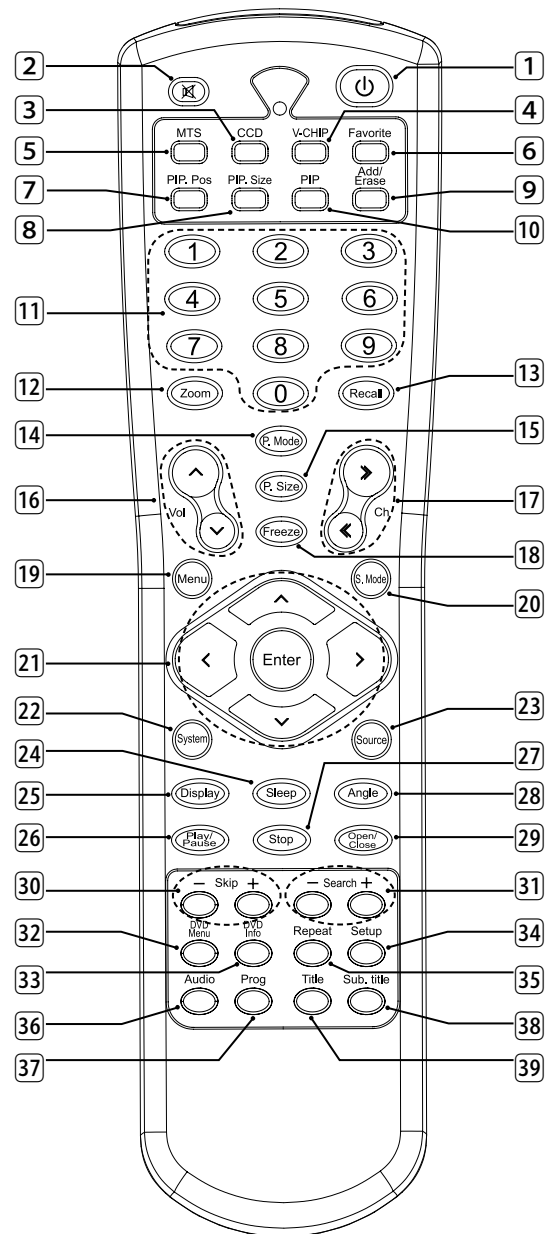
<b>No</b>	<b>Resolution</b>	<b>Horizontal Frequency(Hz)</b>	<b>Vertical Frequency(KHz)</b>	<b>Dot Clock Frequency(MHz)</b>
1)	640×480	31.50	60.00	25.18
2)	640×480	37.86	72.81	31.50
3)	800×600	35.16	56.25	36.00
4)	800×600	37.90	60.32	40.00
5)	800×600	46.90	75.00	49.50
6)	800×600	48.08	72.19	50.00
7)	1024×768	48.40	60.00	65.00

## **1.7 HDTV Mode (YPbPr)**

<b>No</b>	<b>Resolution</b>	<b>Horizontal Frequency(KHz)</b>	<b>Vertical Frequency(Hz)</b>	<b>Dot Clock Frequency(MHz)</b>
1)	480i	15.734	59.94	13.50
2)	480p(720×480)	31.468	59.94	27.00
3)	720p(1280×720)	45.00	60.00	74.25
4)	1080i(1920×1080)	33.75	60.00	74.25

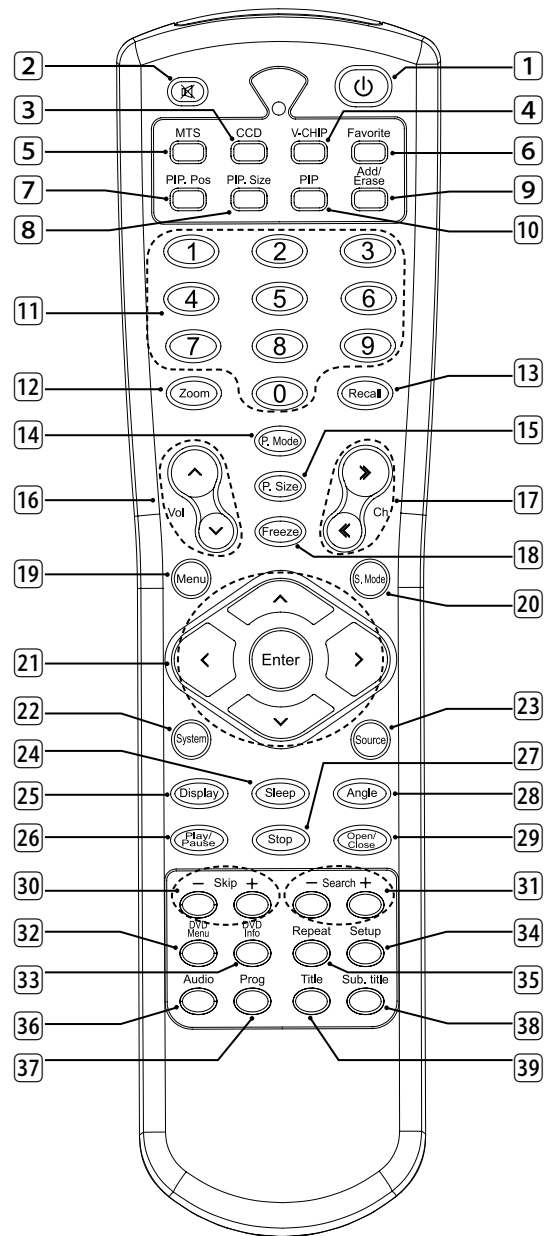
## 1.8 Remote Control

- 1 **Power** (  ): Press to turn on and off.
- 2 **Mute** (  ): Press to mute the sound. Press again or press < , > 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 **Favorite**: Press repeatedly to cycle through the favorite channel list.
- 7 **PIP. Pos**: Press to change the PIP window position under PIP mode.
- 8 **PIP. Size**: Press to cycle through the PIP size, such as Large, Medium, Small.
- 9 **Add/Erase**: Press to add or delete favorite channel.
- 10 **PIP**: Press to cycles through the different POP or PIP modes, such as Basic PIP, LR POP, and exit.
- 11 **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.
- 12 **Zoom**: Press to zoom the image max from 8 times to minimally 1/8 times.
- 13 **Recall**: Press to return to previous channel.
- 14 **P.Mode**: Press repeatedly to cycle through the picture mode: Hi-Bright, User, Dark, Normal and Vivid.
- 15 **P.Size**: Press repeatedly to cycle through the picture size that best corresponds your viewing requirements: Normal, Full, Wide1, Wide2, Wide3, 4:3, No scale, Panoramic and Normal. When in POP mode, it can select picture size is: Full, 4:3 and Normal.
- 16 **Vol**  $\wedge$  /  $\vee$ : Press to adjust the volume.
- 17 **Ch**  $\gg$  /  $\ll$  : Press to scan through channels. To scan quickly through channels, press and hold down either channels.
- 18 **Freeze**: Press to freeze the picture, press again to restore the picture.



(Continued on next page)

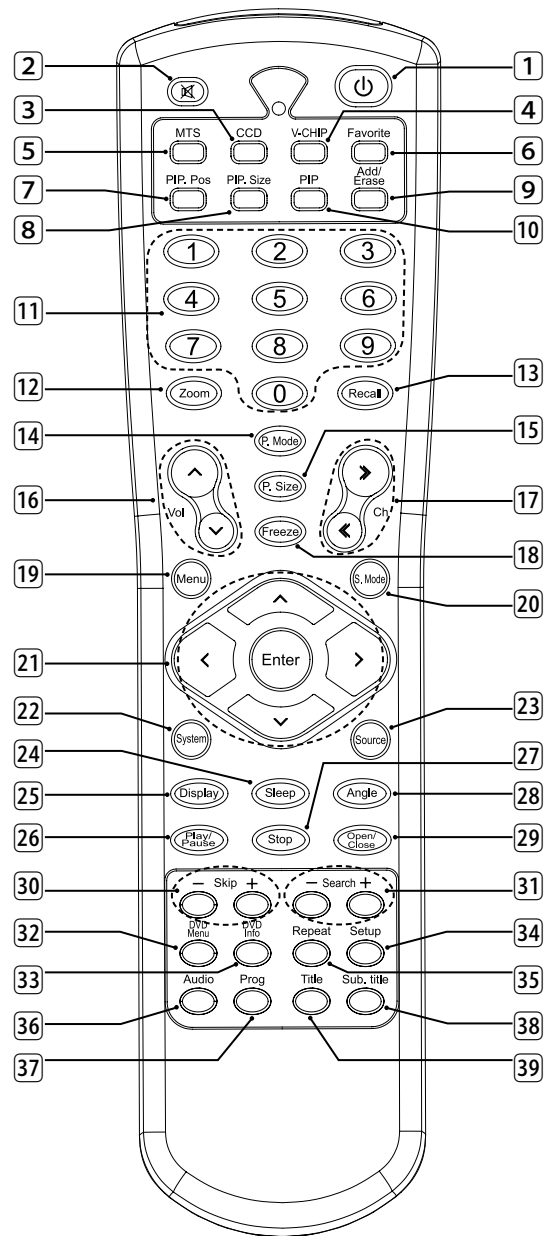
- 19 **Menu:** Press to enter into the on-screen setup menu, press again to exit.
- 20 **S.Mode:** Press repeatedly to cycle through the sound mode: Normal, News, Cinema, Flat and User.
- 21 **<, ^, v, >, Enter:** Press <, ^, v, > to move the on-screen cursor. To select an item, press ENTER to confirm. And it can also press ^ or v to scan through channels, press < or > to adjust the volume excepting DVD mode.
- 22 **System:** Press repeatedly to cycle through the system options: AUTO and NTSC3.58.  
(This button is inactive for TV, VGA, COMPONENT input source.)
- 23 **Source:** Press to select the signal source, such as TV, AV, S-Video, Component, DVD or VGA.
- 24 **Sleep:** Press repeatedly until it displays the time in minutes (5 Min, 10 Min, 15 Min, 30 Min, 60 Min, 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.
- 25 **Display:** Press to display the channel information and it disappear after 3 seconds.
- 26 **Play/Pause:** Press to play or pause the DVD disc.
- 27 **Stop:** Press to stop playing the disc.
- 28 **Angle:** Press to select desired viewing angle of the Video (disc feature).
- 29 **Open/Close:** Press to open or close the disc tray.
- 30 **Skip+/-:** Press to skip the forward or backward.
- 31 **Search+/- :** Press to search the forward or backward.
- 32 **DVD Menu:** Press to return DVD disc menu.



(Continued on next page)

- 33 **DVD Info:** Press to display DVD information.
- 34 **Setup:** Press to display a menu. Press it again to exit menu.
- 35 **Repeat:** Press repeatedly to cycle through the options: CHAPTER, TITLE, ALL and nothing.
- 36 **Audio:** Press to select desired audio track.
- 37 **Prog:** Press to display the program menu. Press it again to exit.
- 38 **Sub. title:** Press to select desired DVD subtitle.
- 39 **Title:** Press to display to DVD disc title.

*Note: Press **Ch** >< on the remote control can turn on TV set from last preview mode.*



# KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE

Reference No : LCT2765TD

## Technical Data

1. Power supply	TV	AC 120V, 60Hz
	Remote control	Battery 3V (UM-3/R6P/AA×2)
2. TV system	RF input	NTSC M
	Video input	PAL/NTSC 3.58/NTSC 4.43
3. Receiving channels	TV	VHF-L : 2~6CH VHF-H : 7~13CH UHF : 14~69CH
	CATV	1~125CH
4. Intermediate frequencies	Picture	45.75MHz
5. Scanning	Horizontal (Hz)	15625/15750
	Vertical (Hz)	50/60
6. AC plug		UL Plug
7. Panel		V270B1-L01
8. Speaker	Internal	8 ohm 6W (max) ×2
9. Operating temperature Accept	Fulfill all specifications	15 C ~ 30 C
	picture/sound reproduction	5 C ~ 33 C
10. Operating relative humidity Accept	Fulfill all specifications	45% ~ 75%
	picture/sound reproduction	20% ~ 80%
11. Electrical & optical specification		See the attachment 1.
12. Circuit diagram drawing No.		LCT2765TD
13. Cabinet		
14. Cabinet color		
15. Packing		1 set per
16. Container stuffing method		RD/05/P/LC26HAB/CSI/02 REV: 01
17. Dimension (mm) (No packing)	LCD-TV	698(W) x 513(H) x 99(D)mm (w/o Stand)
		698(W) x 554(H) x 250(D)mm (with Stand)
	Remote control unit	183(L) x 53(W) x 28(T)mm
18. Net weight	LCD-TV	13.9Kg (with Stand) approx.
	Remote control	70g (approx.)
19. Cell Defect		Subject to Panel supplier specification

## Attachment 1:Electrical &Optical Specification

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

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

# KAWA ELECTRONIC RESEARCH & DEVELOPMENT CENTRE

Reference No : LCT2765TD

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

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



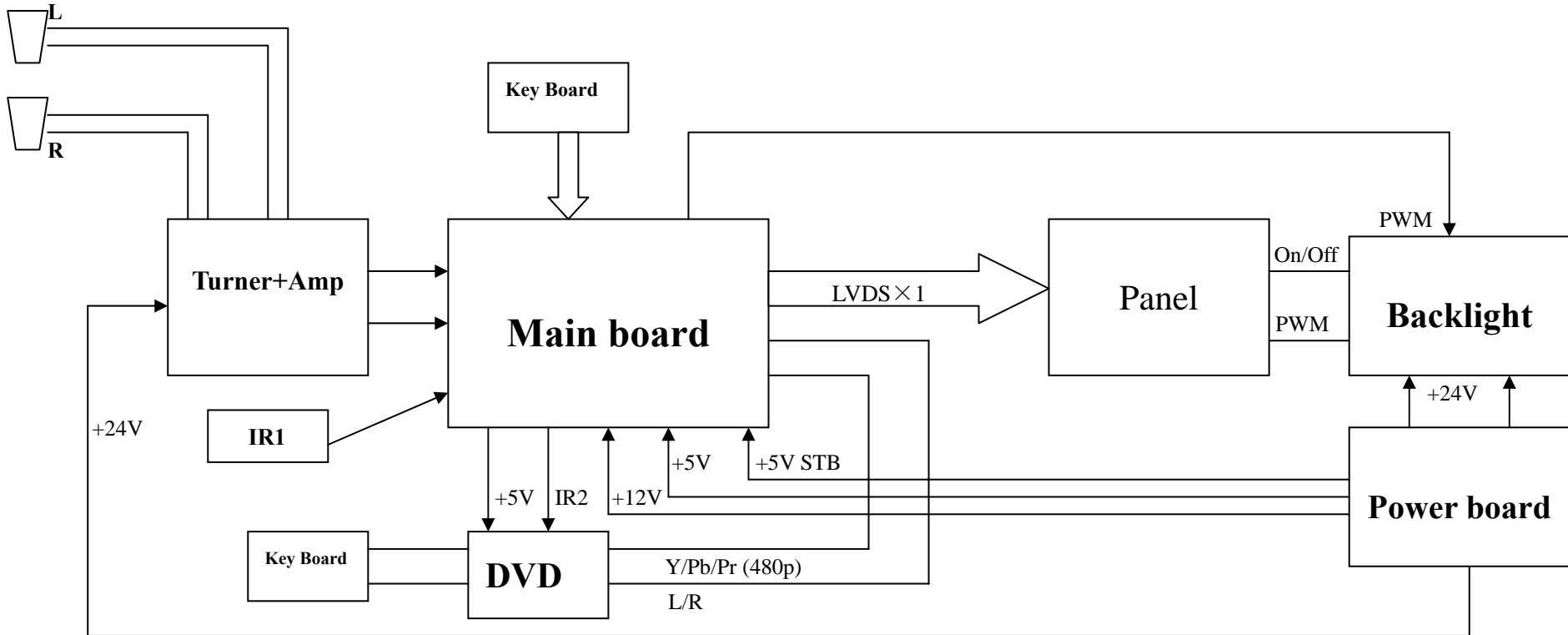
**Test Condition****All tests shall be performed under the following conditions unless otherwise specified**

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

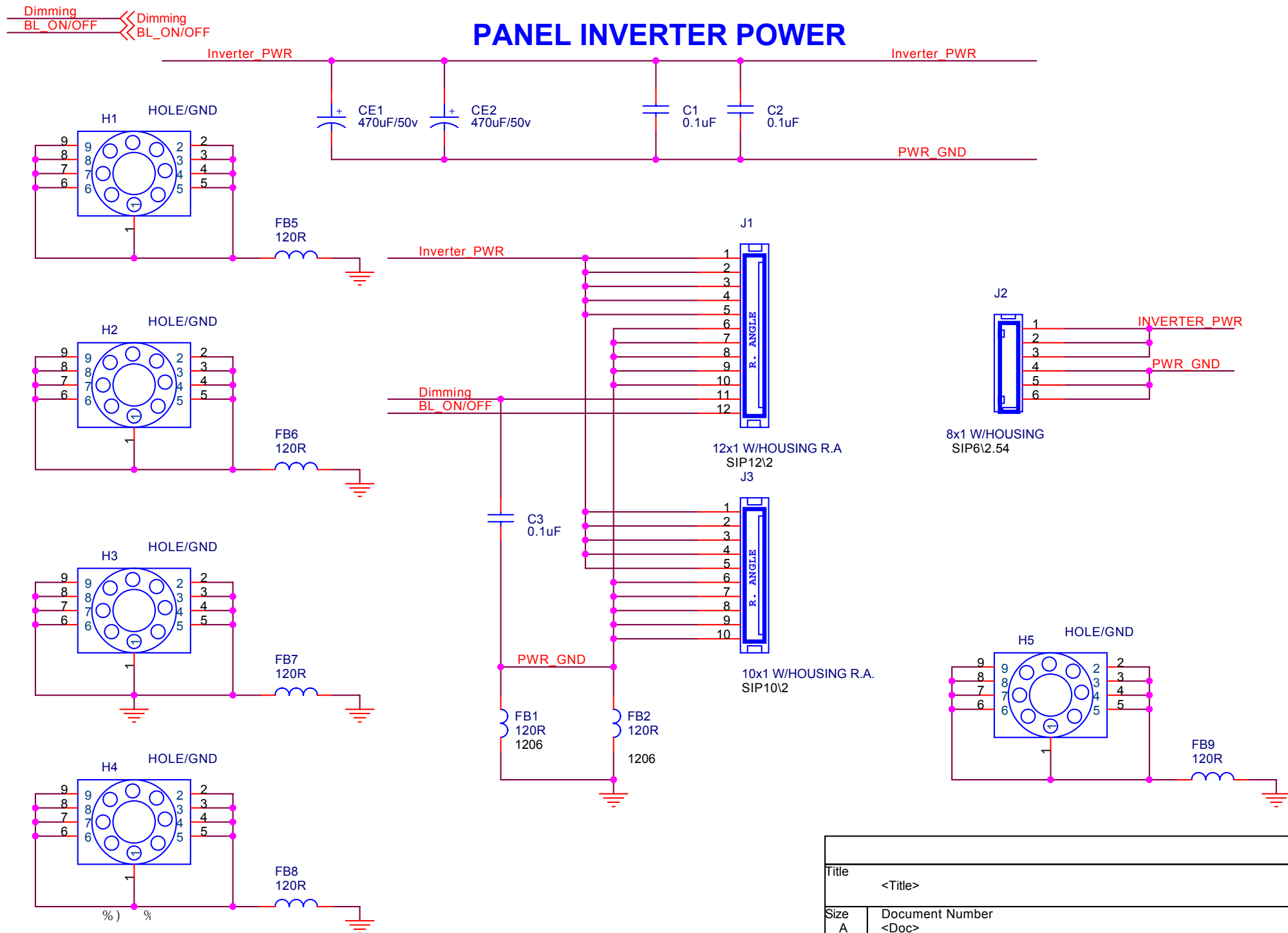
## DVD player's spec. For LCD-TV Combo

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
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		Password : 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

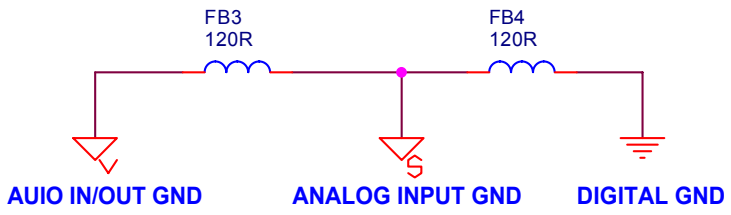
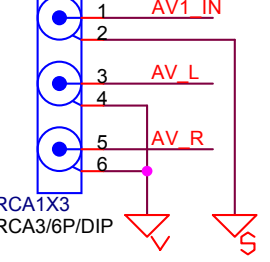
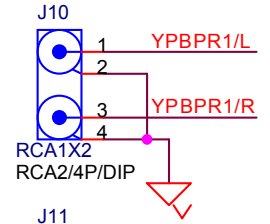
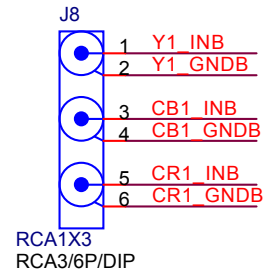
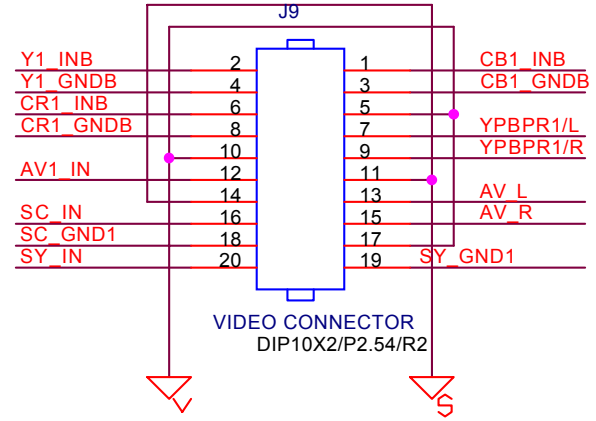
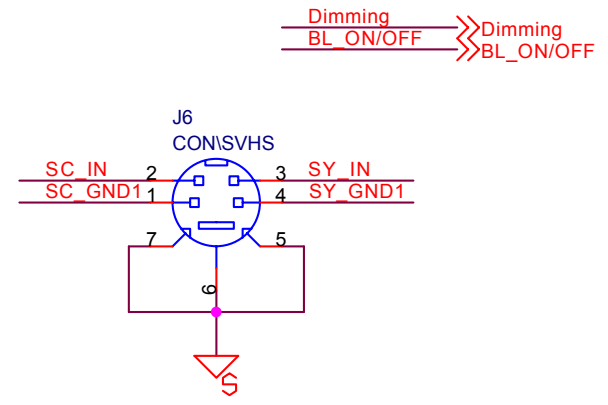
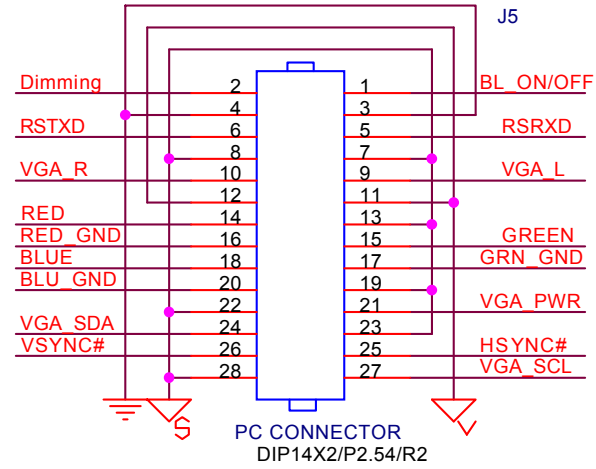
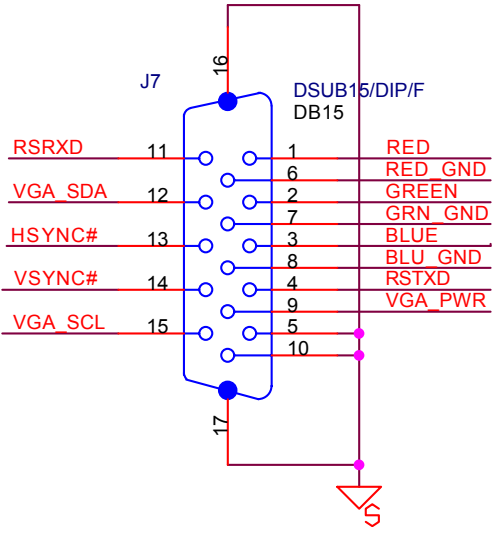
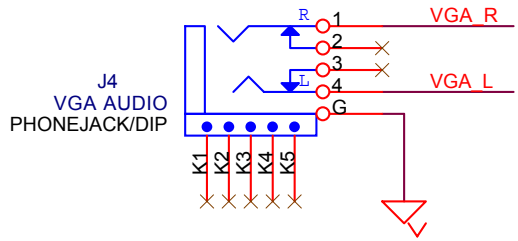
# LCD COMBO Connection



# PANEL INVERTER POWER



Title		
<Title>		
Size	Document Number	Rev
A	<Doc>	<RevCode>
Date:	Wednesday, August 24, 2005	Sheet 1 of 2

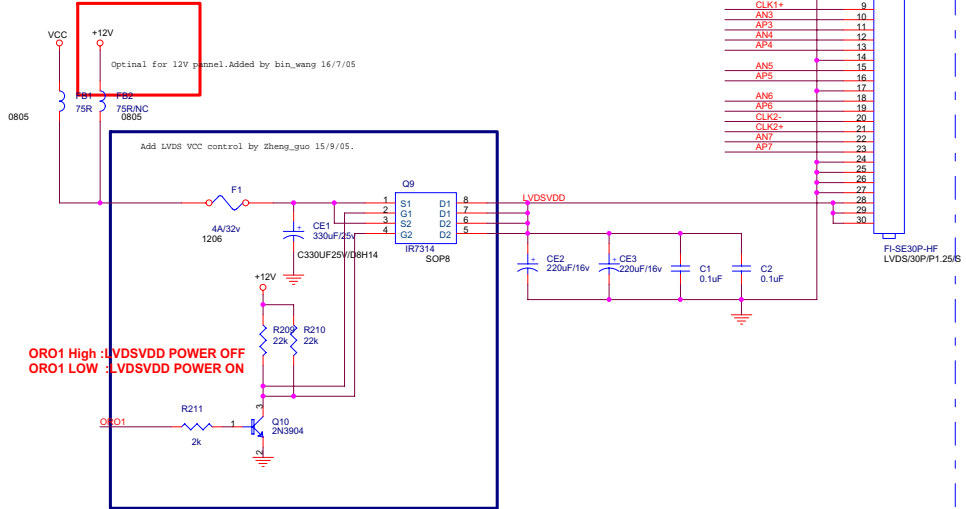


Title <Title>		
Size A	Document Number <Doc>	Rev <RevCode>
Date:	Wednesday, August 24, 2005	Sheet 2 of 2

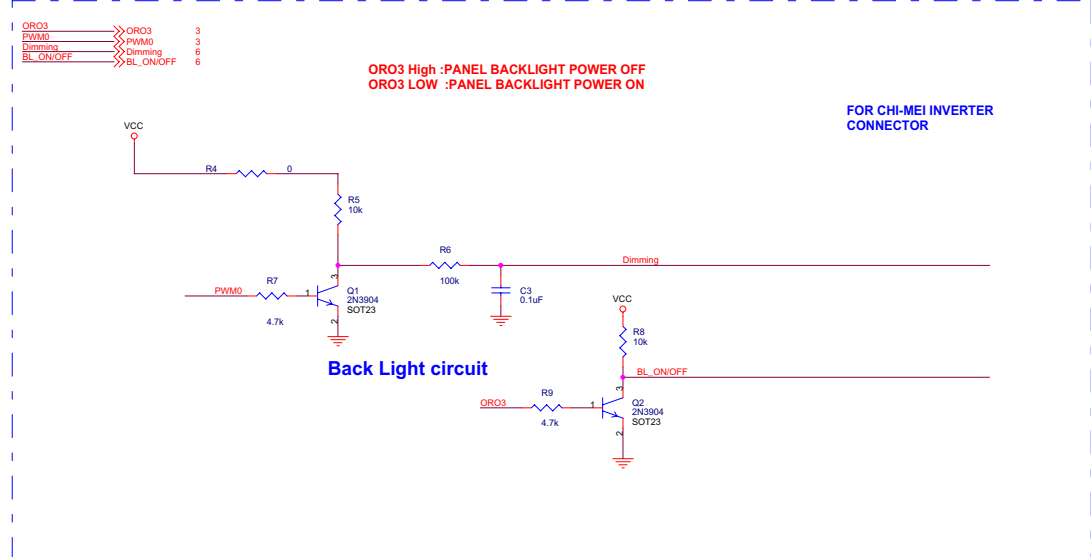
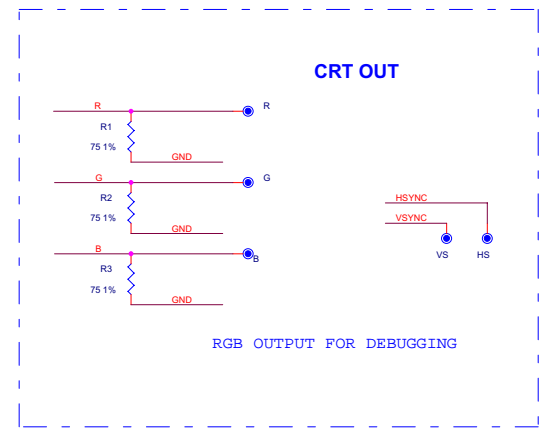
% \* %

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- VSYNC >>> VSYNC 3
- HSYNC >>> HSYNC 3
- R >>> R 3
- G >>> G 3
- B >>> B 3
- CLK1+ >>> CLK1+ 3
- CLK1- >>> CLK1- 3
- CLK2+ >>> CLK2+ 3
- CLK2- >>> CLK2- 3
- OR01 >>> OR01 3
- API0\_7 >>> API0\_7 3
- AN0\_7 >>> AN0\_7 3
- +12V >>> +12V 1



- AN0 1
- AP0 2
- AN1 3
- AP1 4
- AN2 5
- AP2 6
- 7
- CLK1- 8
- CLK1+ 9
- AN3 10
- AP3 11
- AN4 12
- AP4 13
- 14
- AN5 15
- AP5 16
- 17
- AN6 18
- AP6 19
- CLK2- 20
- CLK2+ 21
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30



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MICO Confidential		
Title MICO LCD TV - MediaTek MT8203 Solution		
Size C	Doc Number LVDS/CRT/BACKLIGHT CONTROL	Rev V0.1
Date: Wednesday, September 28, 2005	Sheet 1	of 10

VGASOG	>>>VGASOG	3
RED+	>>>RED+	3
RED-	>>>RED-	3
GREEN+	>>>GREEN+	3
GREEN-	>>>GREEN-	3
BLUE+	>>>BLUE+	3
BLUE-	>>>BLUE-	3
CB+	>>>CB+	3
CB-	>>>CB-	3
CR+	>>>CR+	3
CR-	>>>CR-	3
Y+	>>>Y+	3
Y-	>>>Y-	3
SY+	>>>SY+	3
SY-	>>>SY-	3
SC+	>>>SC+	3
SC-	>>>SC-	3
CVBS0+	>>>CVBS0+	3
CVBS0-	>>>CVBS0-	3
CVBS1+	>>>CVBS1+	3
CVBS1-	>>>CVBS1-	3

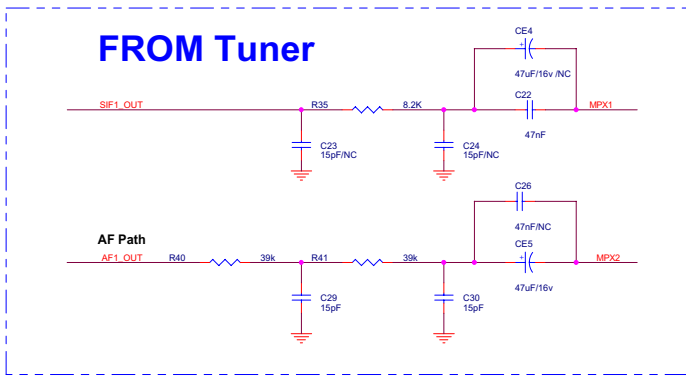
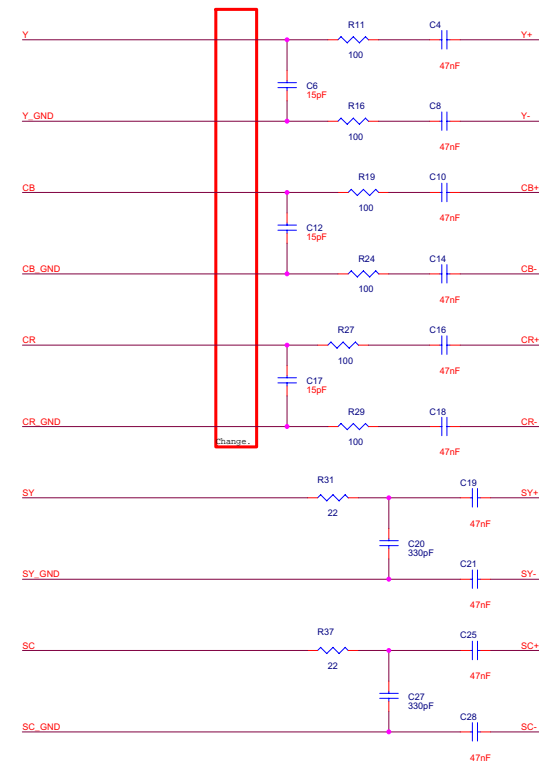
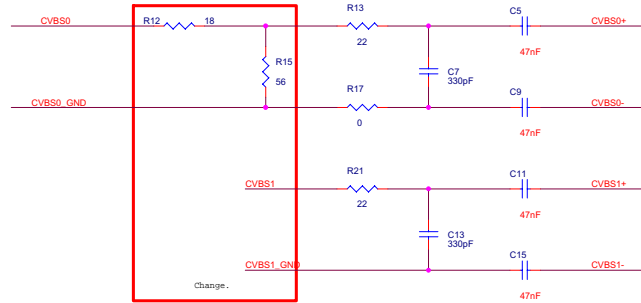
OUTPUT

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

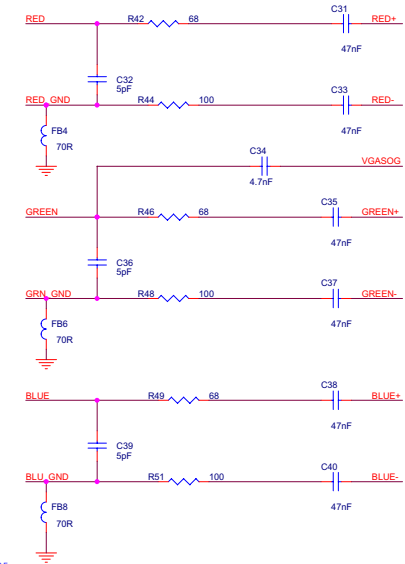
Y	>>>Y	7
Y_GND	>>>Y_GND	7
CB	>>>CB	7
CB_GND	>>>CB_GND	7
CR	>>>CR	7
CR_GND	>>>CR_GND	7
SOY	>>>SOY	3,7
SY	>>>SY	7
SY_GND	>>>SY_GND	7
SC	>>>SC	7
SC_GND	>>>SC_GND	7

INPUT

CVBS0	>>>CVBS0	7
CVBS0_GND	>>>CVBS0_GND	7
CVBS1	>>>CVBS1	7
CVBS1_GND	>>>CVBS1_GND	7
SIF1_OUT	>>>SIF1_OUT	7
AF1_OUT	>>>AF1_OUT	7
RED	>>>RED	6
GREEN	>>>GREEN	6
BLUE	>>>BLUE	6
RED_GND	>>>RED_GND	6
GRN_GND	>>>GRN_GND	6
BLU_GND	>>>BLU_GND	6



ATTENTION:WHEN PCB LAYOUT,MUST NEAR VGA INPUT PORT! BIN\_WANG. 16/7/05



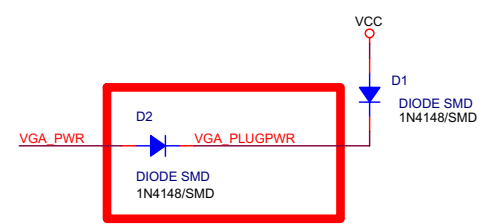
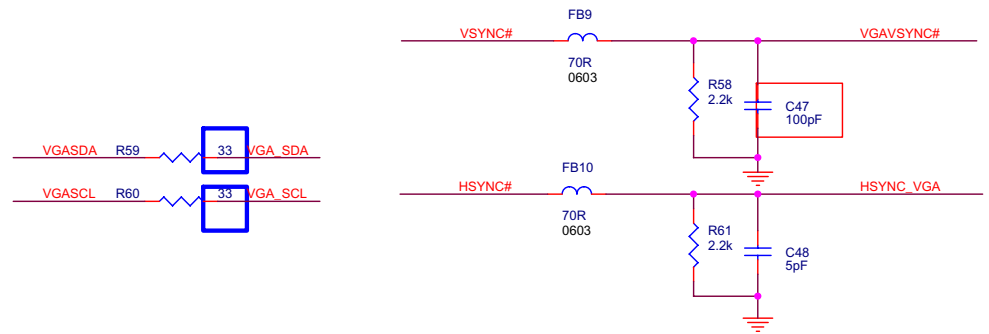
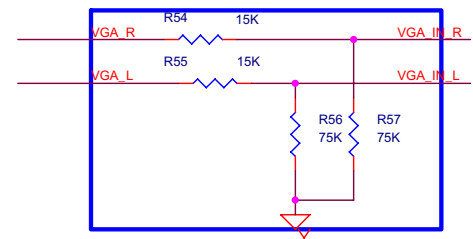
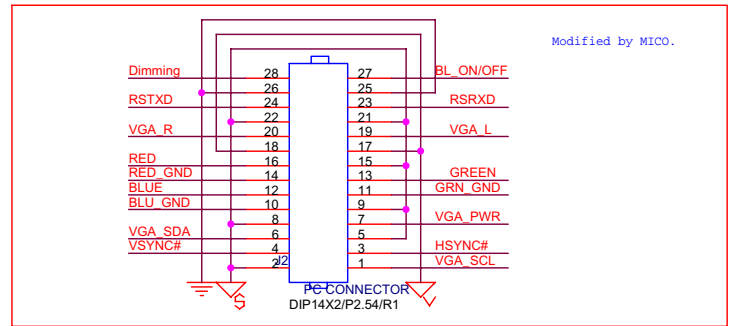
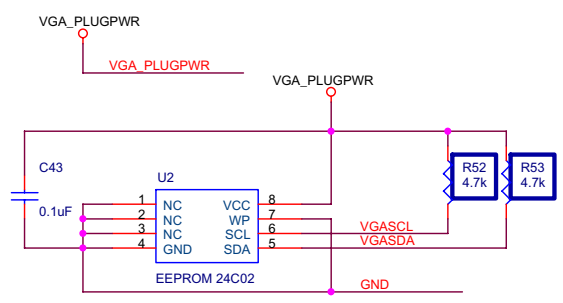
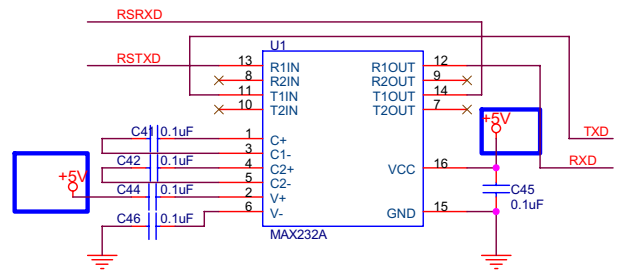
MODIFIED BY BIN\_WANG 16/7/05.

MICO Confidential			
Title	MICO LCD TV - MediaTek MT8203 Solution		
Size	Doc Number	AV IN	Rev V0.1
Date:	Thursday, September 15, 2005	Sheet 2 of 10	

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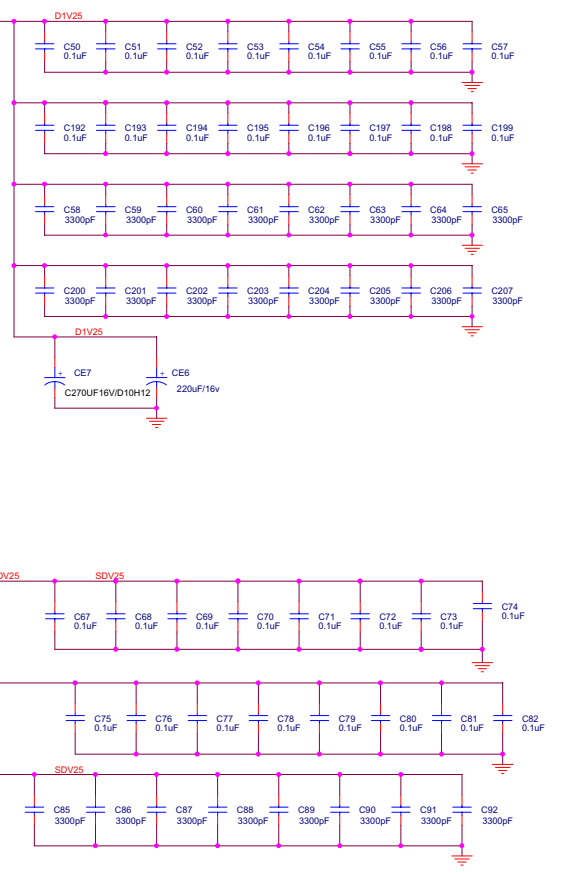
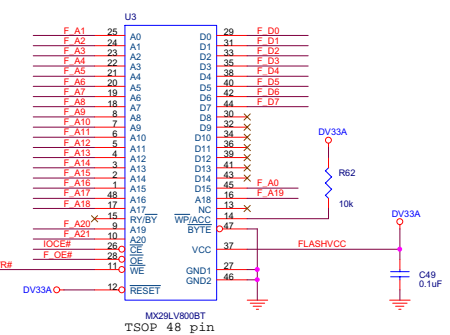
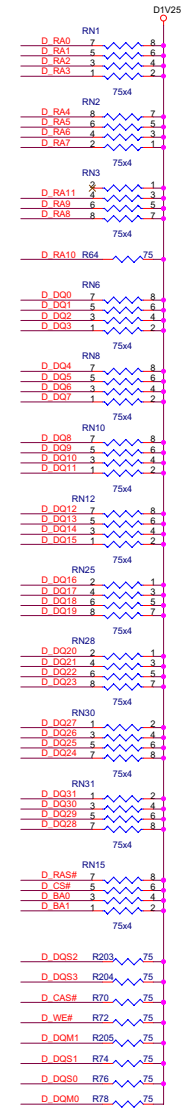
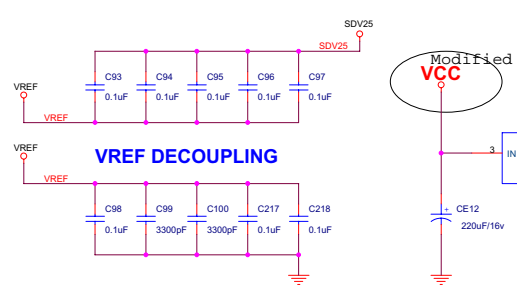
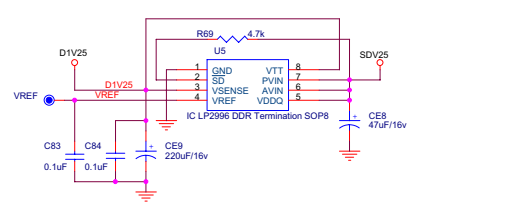
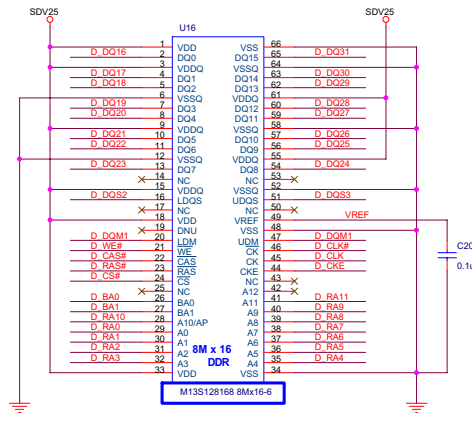
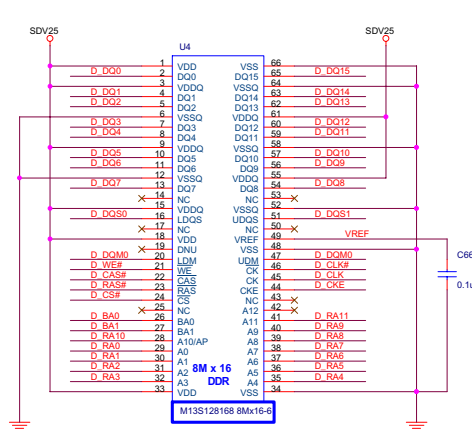
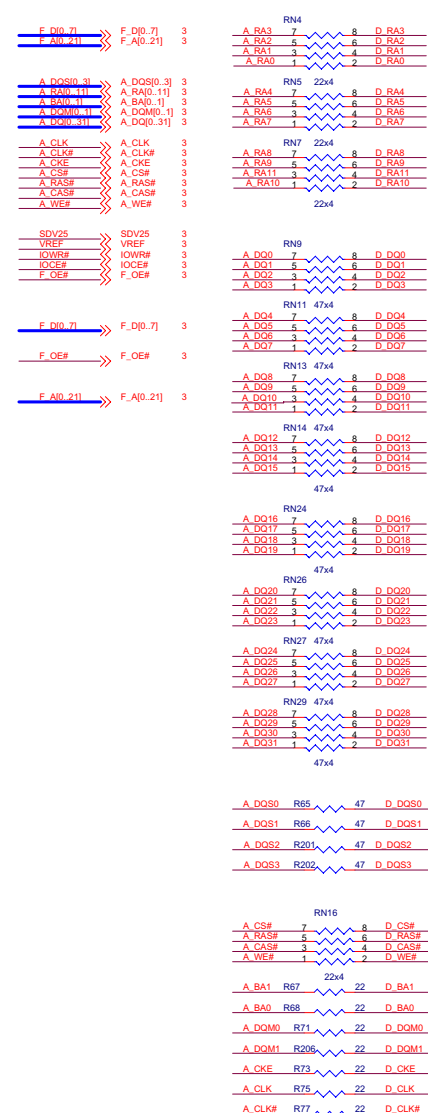
TXD >>> TXD 3  
 RXD >>> RXD 3  
 Dimming >>> Dimming 9  
 BL\_ON/OFF >>> BL\_ON/OFF 9

VGA\_IN\_L >>> VGA\_IN\_L 10  
 VGA\_IN\_R >>> VGA\_IN\_R 10  
 VGASDA >>> VGASDA 3  
 VGASCL >>> VGASCL 3  
 HSYNC\_VGA >>> HSYNC\_VGA 3  
 VAVSYNC# >>> VAVSYNC# 3  
 RED\_GND >>> RED\_GND 8  
 GRN\_GND >>> GRN\_GND 8  
 BLU\_GND >>> BLU\_GND 8  
 RED >>> RED 8  
 GREEN >>> GREEN 8  
 BLUE >>> BLUE 8



<b>MiCO Confidential</b>		
Title MiCO LCD TV - MediaTek MT8203 Solution		
Size B	Doc Number VGA IN & PC AUDIO IN	Rev V0.1
Date: Thursday, September 15, 2005	Sheet 3	of 10





Modified by BIN\_WANG.

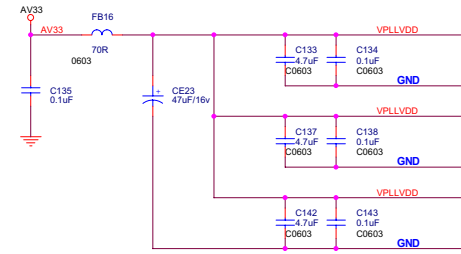
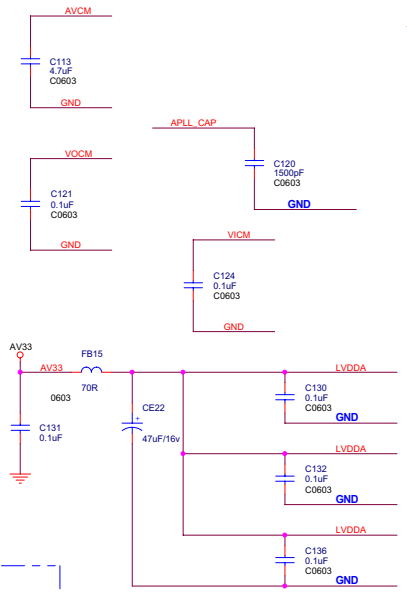
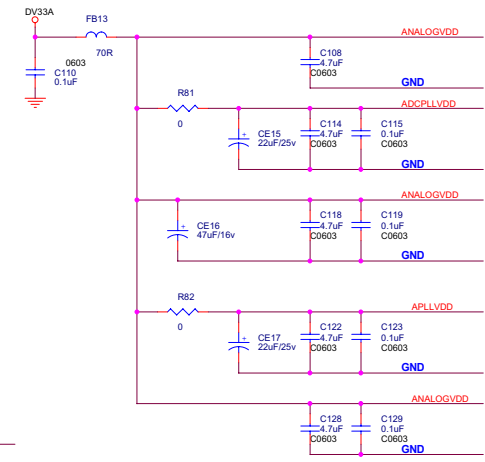
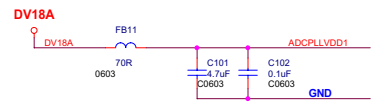
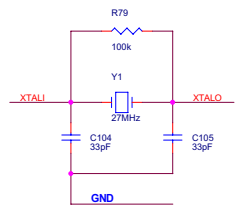
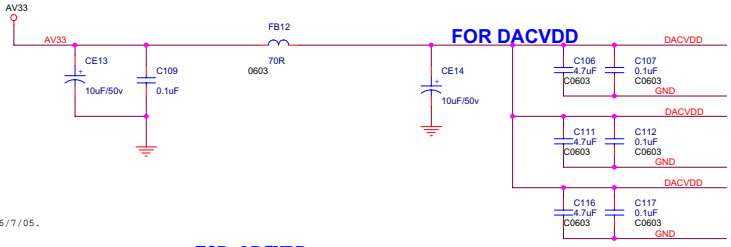
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MICO Confidential		
Title MICO LCD TV - MediaTek MT8203 Solution		
Size C	Doc Number DDR MEMORY & FLASH	Rev V0.1
Date: Thursday, September 15, 2005	Sheet 4	of 10

# MT8203 ANALOG&DIGITAL DECOUPLING

- DACVREF >>> DACVREF 3
- DACFS >>> DACFS 3
- ADCPLLVDD1 >>> ADCPLLVD1 3
- ADCPLLVDD >>> ADCPLLVD 3
- APLLVDD >>> APLLVD 3
- ANALOGVDD >>> ANALGVDD 3
- VPLLVDD >>> VPLLVD 3
- LVDDA >>> LVDDA 3
- ADCVD0 >>> ADCVDD 3
- DACVD0 >>> DACVDD 3
- AVCM >>> AVCM 3
- VOCM >>> VOCM 3
- VICM >>> VICM 3
- VREFP4 >>> VREFP4 3
- VREFN4 >>> VREFN4 3
- ADCVD00 >>> ADCVDD0 3
- PWM2VREF >>> PWM2VREF 3
- AUXTOP >>> AUXTOP 3
- AUXBOTTOM >>> AUXBOTTOM 3
- REXTA >>> REXTA 3
- APLL\_CAP >>> APLL\_CAP 3
- XTALI >>> XTALI 3
- XTALO >>> XTALO 3
- ADCVD04 >>> ADCVDD4 3

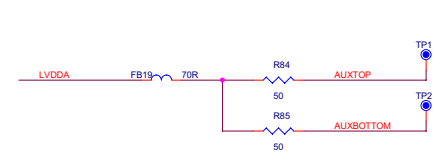
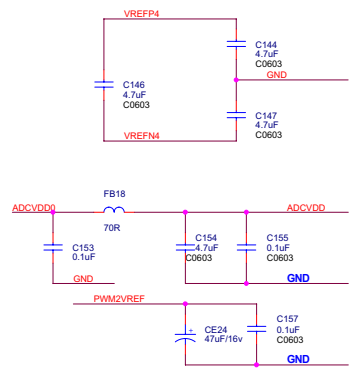
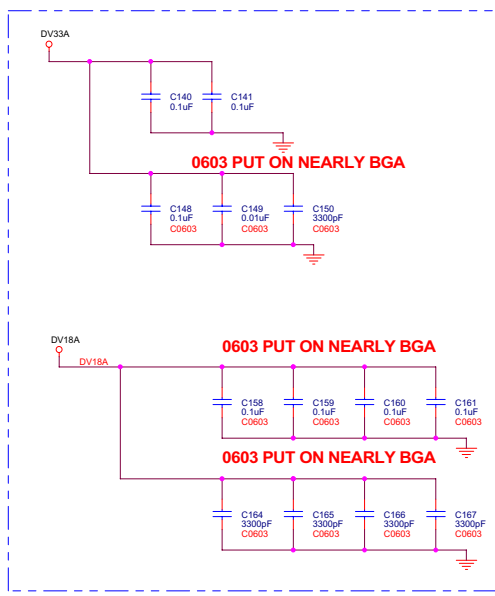
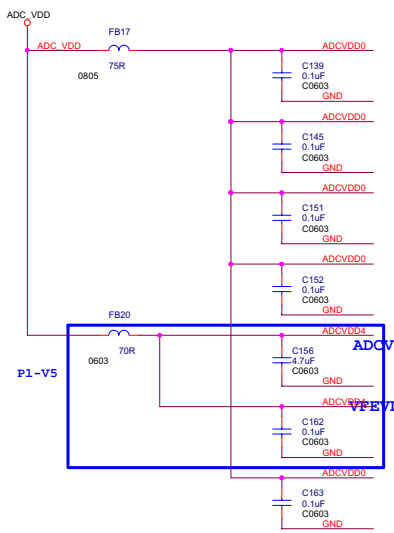
ADDED BASE ON P135 COMMON BOARD BY BIN\_WANG 16/7/05.



**FOR ADCVDD**

**Note for Fix or Adj Regulator**

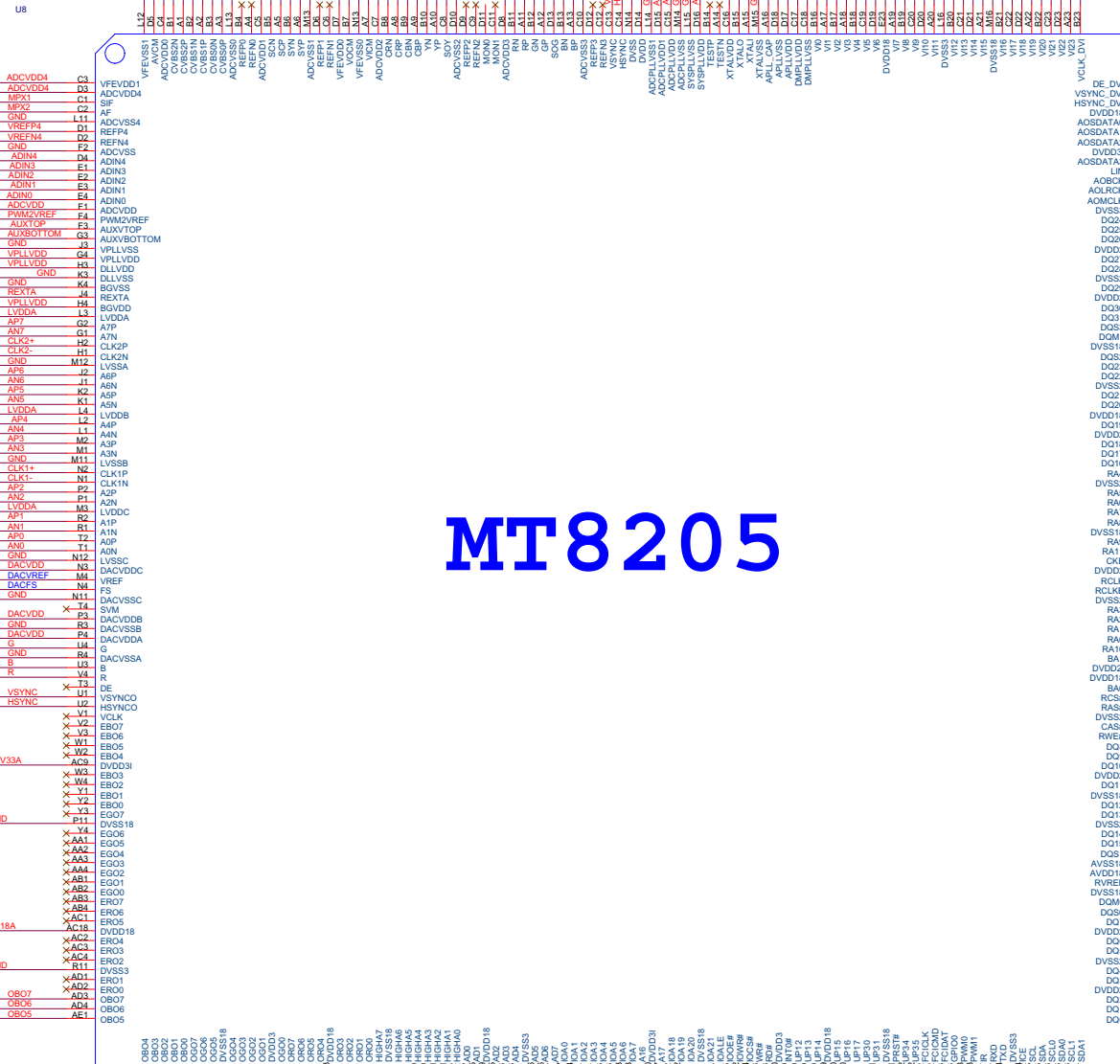
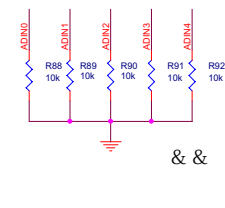
AZ1117	Rdown	Rup	
Fix regulator	0 ohm	OFF	$1.25 \times (1 + R_{down}/R_{up})$
Adj regulator	180 1%	110 1%	$1.25 \times (1 + 180/110) = 3.3V$



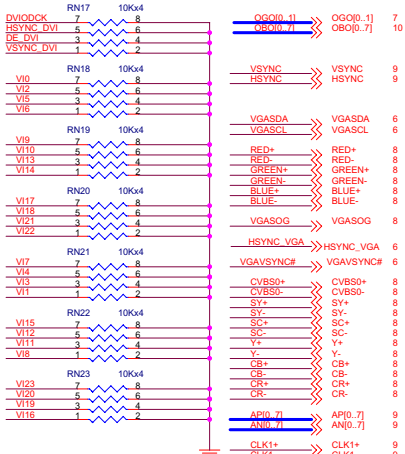
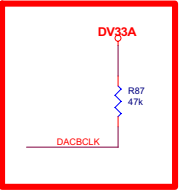
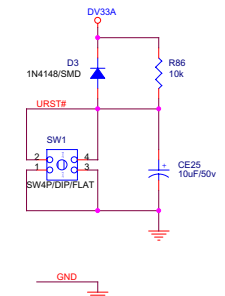
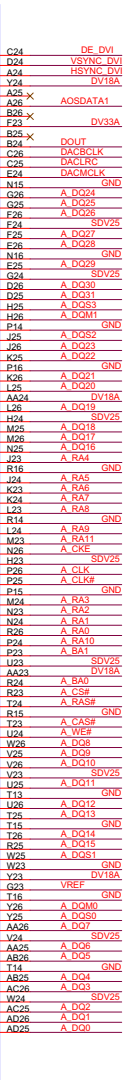
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MICO Confidential			
Title	MICO LCD TV - MediaTek MT8203 Solution		
Size	Doc Number	MT8203 ANALOG&DIGIT DECOUPLE	Rev V0.1
Date:	Thursday, September 15, 2005	Sheet	5 of 10

XTALI >> XTALI 4  
 XTALO >> XTALO 4  
 ANALOGVDD >> ANALOGVDD 4  
 ADCVDD >> ADCVDD 4  
 APLLVDD >> APLLVDD 4  
 VPLLVDD >> VPLLVDD 4  
 ADGPLLVD1 >> ADGPLLVD1 4  
 ADCPLLVD >> ADCPLLVD 4  
 AUXTOP >> AUXTOP 4  
 AUXBOTTOM >> AUXBOTTOM 4  
 REXTA >> REXTA 4  
 APLL\_CAP >> APLL\_CAP 4  
 PWM2VREF >> PWM2VREF 4  
 ADCVDD0 >> ADCVDD0 4  
 AVCM >> AVCM 4  
 VOCM >> VOCM 4  
 VICM >> VICM 4  
 VREFP4 >> VREFP4 4  
 VREFN4 >> VREFN4 4  
 DACFS >> DACFS 4  
 DACVREF >> DACVREF 4  
 DACVDD >> DACVDD 4  
 LVDDA >> LVDDA 4  
 IR >> IR 7,10  
 ADCVDD4 >> ADCVDD4 4



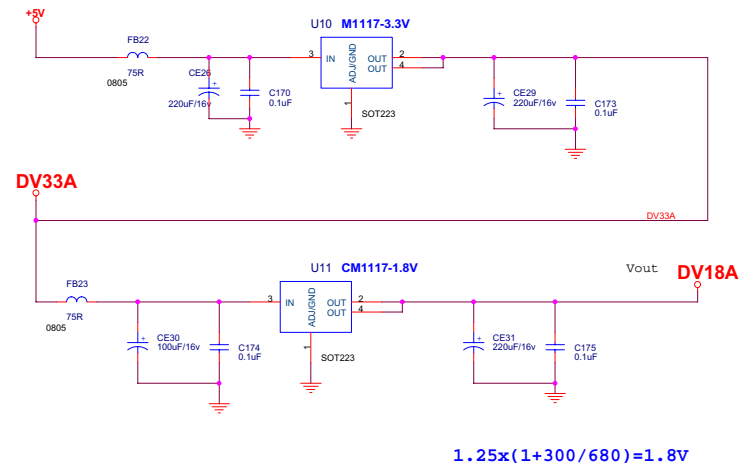
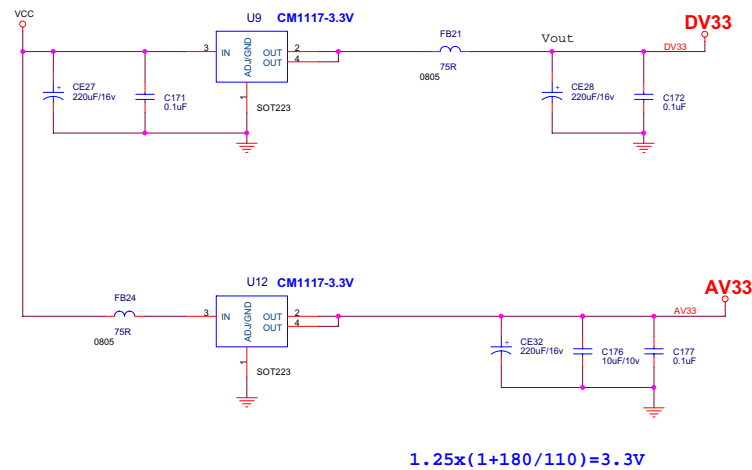
# MT8205



BGA388  
 MT8203  
 UP3\_4 FOR SW SCL  
 UP3\_5 FOR SW SDA

MICO Confidential			
Title MICO LCD TV - MediaTek MT8203 Solution			
Size C	Doc Number MT8205 PBGA 388	Rev V0.1	
Date: Thursday, September 15, 2005	Sheet 6	of 10	

Power ON alive source



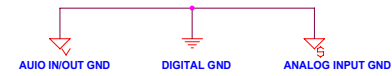
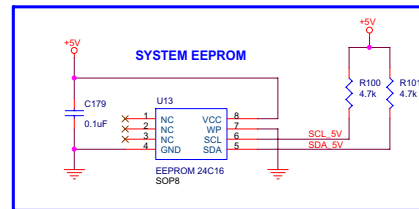
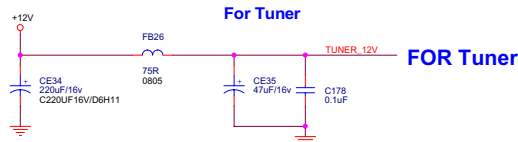
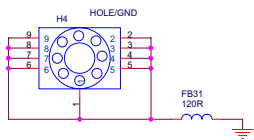
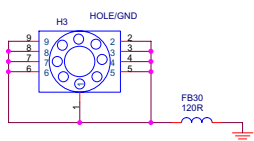
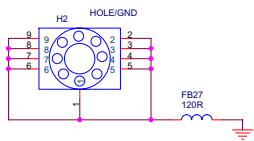
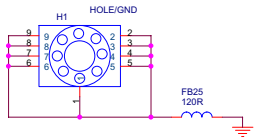
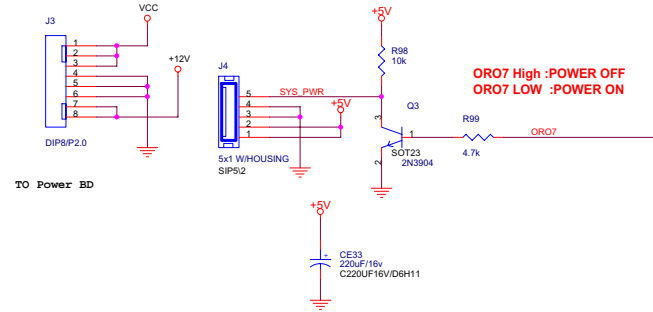
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MICO Confidential		
Title MICO LCD TV - MediaTek MT8203 Solution		
Size C	Doc Number LDO	Rev V0.1
Date: Thursday, September 15, 2005	Sheet 7	of 10

# MT8203E (PBGA388) LCDTV BOARD 4 LAYERS

- 01. INDEX & POWER CONNECTOR
- 02. LDO
- 03. MT8203 PBGA 388
- 04. MT8203 ANALOG & DIGIT DECOUPLE
- 05. DDR MEMORY & FLASH
- 06. VGA IN & PC AUDIO IN
- 07. VIDEO IN & TUNER IO
- 08. AV IN
- 09. LVDS/CRT/BACK LIGHT CONTROL
- 10. AUDIO WM8776/ KEYPAD

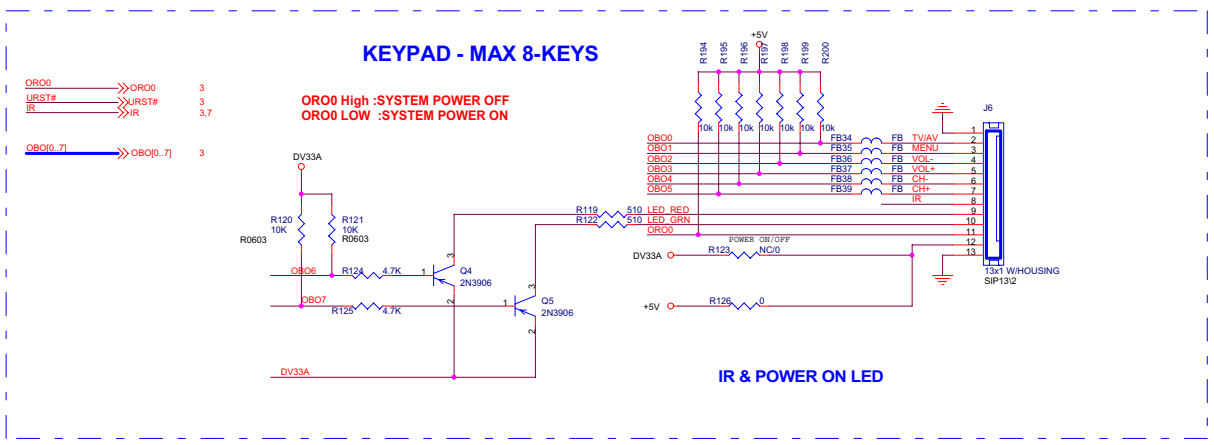
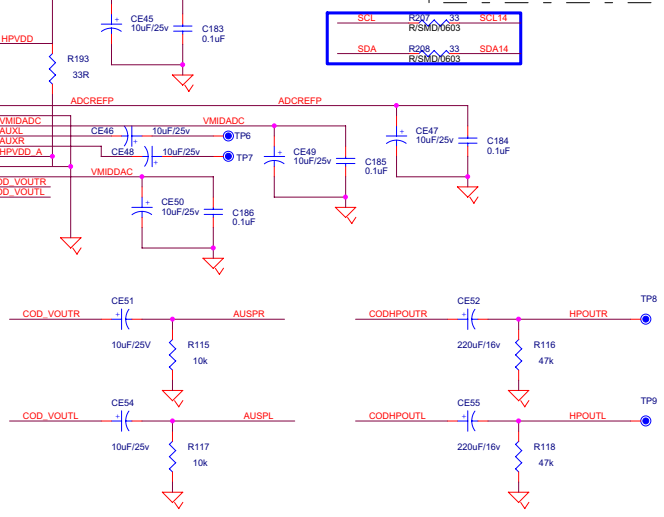
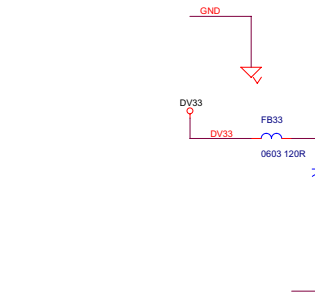
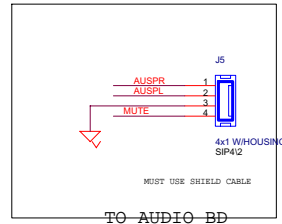
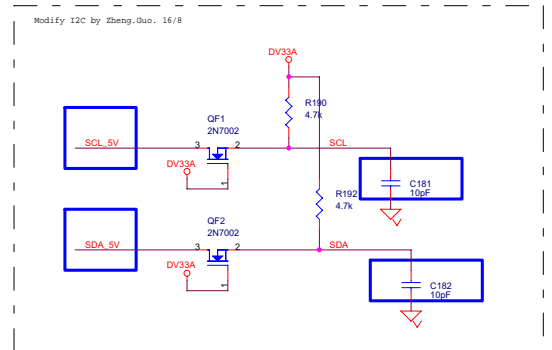
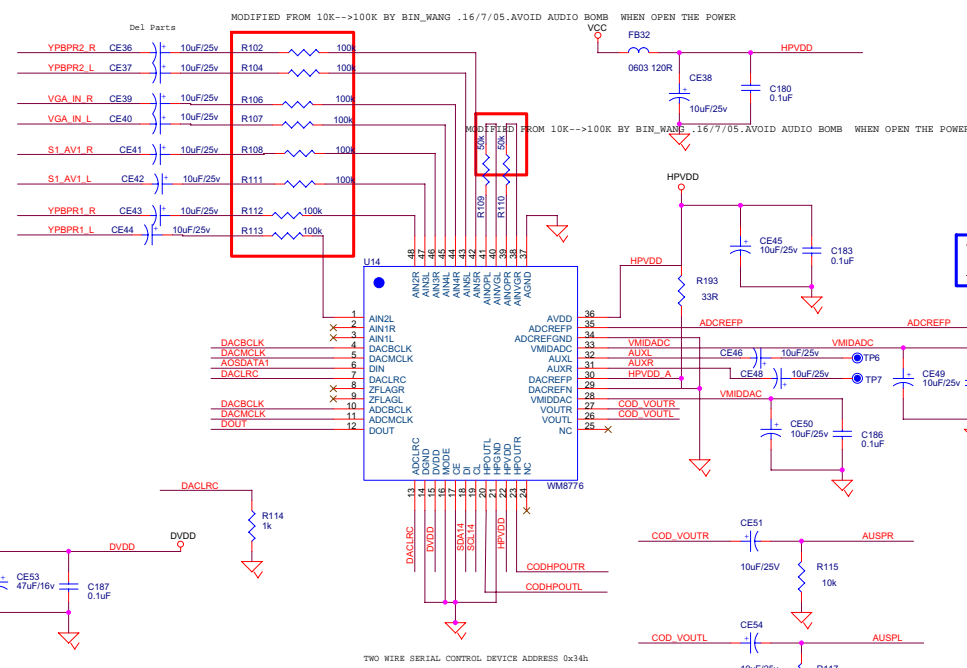
TXD	TXD	3,6
RXD	RXD	3,6
SCL_5V	SCL_5V	7,10
SDA_5V	SDA_5V	7,10
+12V	+12V	9
TUNER_12V	TUNER_12V	7
OR07	OR07	3



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MICO Confidential		
Title	MICO LCD TV - MediaTek MT8203 Solution	
Size	Doc Number	Rev
C	INDEX & POWER CONNECTOR	V0.1
Date:	Thursday, September 15, 2005	Sheet 8 of 10

- S1\_AV1\_L >> S1\_AV1\_L 7
- S1\_AV1\_R >> S1\_AV1\_R 7
- VGA\_IN\_L >> VGA\_IN\_L 6
- VGA\_IN\_R >> VGA\_IN\_R 6
- YPBPR1\_L >> YPBPR1\_L 7
- YPBPR1\_R >> YPBPR1\_R 7
- YPBPR2\_L >> YPBPR2\_L 7
- YPBPR2\_R >> YPBPR2\_R 7
- SDA >> SDA 3
- SCL >> SCL 3
- DACBCLK >> DACBCLK 3
- DACMCLK >> DACMCLK 3
- DA CLR C >> DA CLR C 3
- DOUT >> DOUT 3
- AOSDATA1 >> AOSDATA1 3
- PWM1 >> PWM1 3
- MUTE >> MUTE 1,7
- SCL\_5V >> SCL\_5V 1,7
- SDA\_5V >> SDA\_5V 1,7



<b>MICO Confidential</b>			
Title MICO LCD TV - MediaTek MT8203 Solution			
Size C	Doc Number	AUDIO WM8776/ KEYPAD	Rev V0.1
Date: Wednesday, September 28, 2005	Sheet	9	of 10

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**AV, TUNER I/O**

- Y GND >> Y\_GND 8
- CB >> CB\_GND 8
- CR >> CR\_GND 8
- SOY >> SOY\_GND 8
- SY >> SY\_GND 8
- SC >> SC\_GND 8
- CVBS0 >> SC\_GND 8
- CVBS0 >> CVBS0\_GND 8
- CVBS1 >> CVBS1\_GND 8
- SIF1\_OUT >> SIF1\_OUT 8
- AF1\_OUT >> AF1\_OUT 8
- SCL\_5V >> SCL\_5V 1,10
- SDA\_5V >> SDA\_5V 1,10
- TUNER\_12V >> TUNER\_12V 1
- OG00[0..1] >> OG00[0..1] 3
- OR06 >> OR06 3
- OR04 >> OR04 3
- OR05 >> OR05 3
- OR02 >> OR02 3
- S1\_AV1\_L >> S1\_AV1\_L 10
- S1\_AV1\_R >> S1\_AV1\_R 10
- YPBPR1\_L >> YPBPR1\_L 10
- YPBPR1\_R >> YPBPR1\_R 10
- YPBPR2\_L >> YPBPR2\_L 10
- YPBPR2\_R >> YPBPR2\_R 10
- +12V >> +12V 1,9
- IR >> IR 3,10

- Y1\_INB >> Y1\_INB 22
- Y1\_GNDB >> Y1\_GNDB 18
- CR1\_INB >> CR1\_INB 16
- CR1\_GNDB >> CR1\_GNDB 14
- CVBS1 >> CVBS1\_GND 12
- CVBS1\_GND >> CVBS1\_GND 10
- SC >> SC\_GND 8
- SC\_GND >> SC\_GND 4
- SY >> SY\_GND 2

- Y2\_INB >> Y2\_INB 21
- Y2\_GNDB >> Y2\_GNDB 17
- CB1\_INB >> CB1\_INB 15
- CB1\_GNDB >> CB1\_GNDB 13
- CR2\_INB >> CR2\_INB 11
- CR2\_GNDB >> CR2\_GNDB 9
- Y2\_GNDB >> Y2\_GNDB 7
- Y2\_INB >> Y2\_INB 5
- Y2\_GNDB >> Y2\_GNDB 3
- Y2\_INB >> Y2\_INB 1

- Y2\_INB >> Y2\_INB 22
- Y2\_GNDB >> Y2\_GNDB 18
- CB2\_INB >> CB2\_INB 16
- CB2\_GNDB >> CB2\_GNDB 14
- CR2\_INB >> CR2\_INB 12
- CR2\_GNDB >> CR2\_GNDB 10
- Y2\_GNDB >> Y2\_GNDB 8
- Y2\_INB >> Y2\_INB 6
- Y2\_GNDB >> Y2\_GNDB 4
- Y2\_INB >> Y2\_INB 2

- Y2\_INB >> Y2\_INB 21
- Y2\_GNDB >> Y2\_GNDB 17
- CB2\_INB >> CB2\_INB 15
- CB2\_GNDB >> CB2\_GNDB 13
- CR2\_INB >> CR2\_INB 11
- CR2\_GNDB >> CR2\_GNDB 9
- Y2\_GNDB >> Y2\_GNDB 7
- Y2\_INB >> Y2\_INB 5
- Y2\_GNDB >> Y2\_GNDB 3
- Y2\_INB >> Y2\_INB 1

- Y2\_INB >> Y2\_INB 22
- Y2\_GNDB >> Y2\_GNDB 18
- CB2\_INB >> CB2\_INB 16
- CB2\_GNDB >> CB2\_GNDB 14
- CR2\_INB >> CR2\_INB 12
- CR2\_GNDB >> CR2\_GNDB 10
- Y2\_GNDB >> Y2\_GNDB 8
- Y2\_INB >> Y2\_INB 6
- Y2\_GNDB >> Y2\_GNDB 4
- Y2\_INB >> Y2\_INB 2

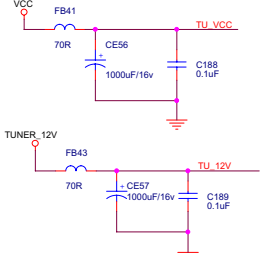
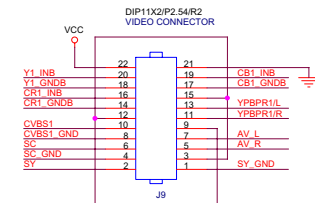
- Y2\_INB >> Y2\_INB 21
- Y2\_GNDB >> Y2\_GNDB 17
- CB2\_INB >> CB2\_INB 15
- CB2\_GNDB >> CB2\_GNDB 13
- CR2\_INB >> CR2\_INB 11
- CR2\_GNDB >> CR2\_GNDB 9
- Y2\_GNDB >> Y2\_GNDB 7
- Y2\_INB >> Y2\_INB 5
- Y2\_GNDB >> Y2\_GNDB 3
- Y2\_INB >> Y2\_INB 1

- Y2\_INB >> Y2\_INB 22
- Y2\_GNDB >> Y2\_GNDB 18
- CB2\_INB >> CB2\_INB 16
- CB2\_GNDB >> CB2\_GNDB 14
- CR2\_INB >> CR2\_INB 12
- CR2\_GNDB >> CR2\_GNDB 10
- Y2\_GNDB >> Y2\_GNDB 8
- Y2\_INB >> Y2\_INB 6
- Y2\_GNDB >> Y2\_GNDB 4
- Y2\_INB >> Y2\_INB 2

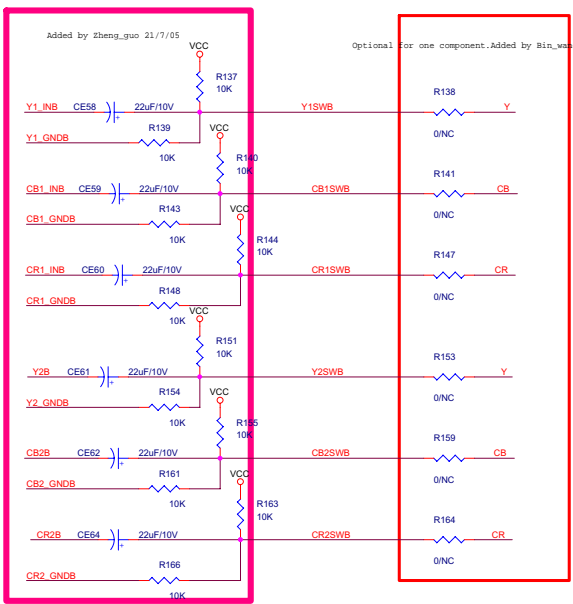
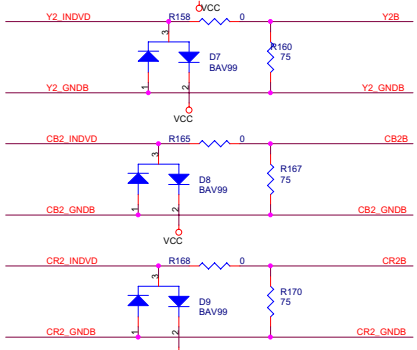
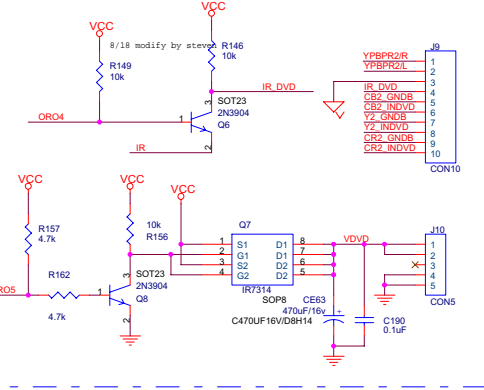
- Y2\_INB >> Y2\_INB 21
- Y2\_GNDB >> Y2\_GNDB 17
- CB2\_INB >> CB2\_INB 15
- CB2\_GNDB >> CB2\_GNDB 13
- CR2\_INB >> CR2\_INB 11
- CR2\_GNDB >> CR2\_GNDB 9
- Y2\_GNDB >> Y2\_GNDB 7
- Y2\_INB >> Y2\_INB 5
- Y2\_GNDB >> Y2\_GNDB 3
- Y2\_INB >> Y2\_INB 1

- Y2\_INB >> Y2\_INB 22
- Y2\_GNDB >> Y2\_GNDB 18
- CB2\_INB >> CB2\_INB 16
- CB2\_GNDB >> CB2\_GNDB 14
- CR2\_INB >> CR2\_INB 12
- CR2\_GNDB >> CR2\_GNDB 10
- Y2\_GNDB >> Y2\_GNDB 8
- Y2\_INB >> Y2\_INB 6
- Y2\_GNDB >> Y2\_GNDB 4
- Y2\_INB >> Y2\_INB 2

**CVBS0---TUNER1  
CVBS1---FRONT BD AV\_IN**



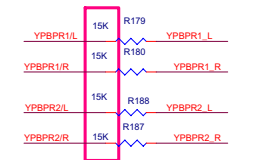
**DVD Connector**



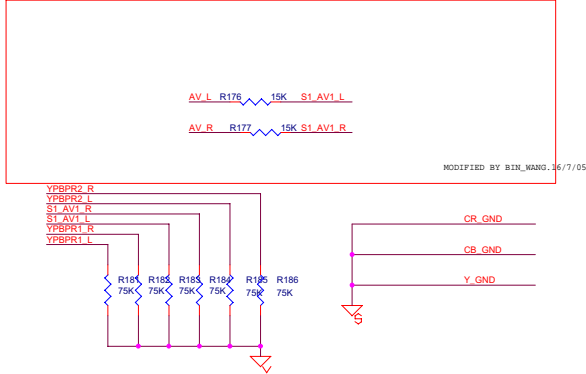
**NEARLY YPBPR1-CON.**



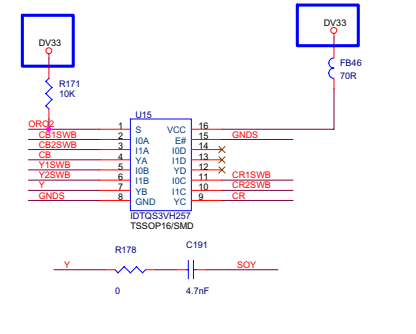
**NEARLY YPBPR2-CON.**



MODIFIED FROM 15K-->0 BY BIN\_WANG 16/7/05.

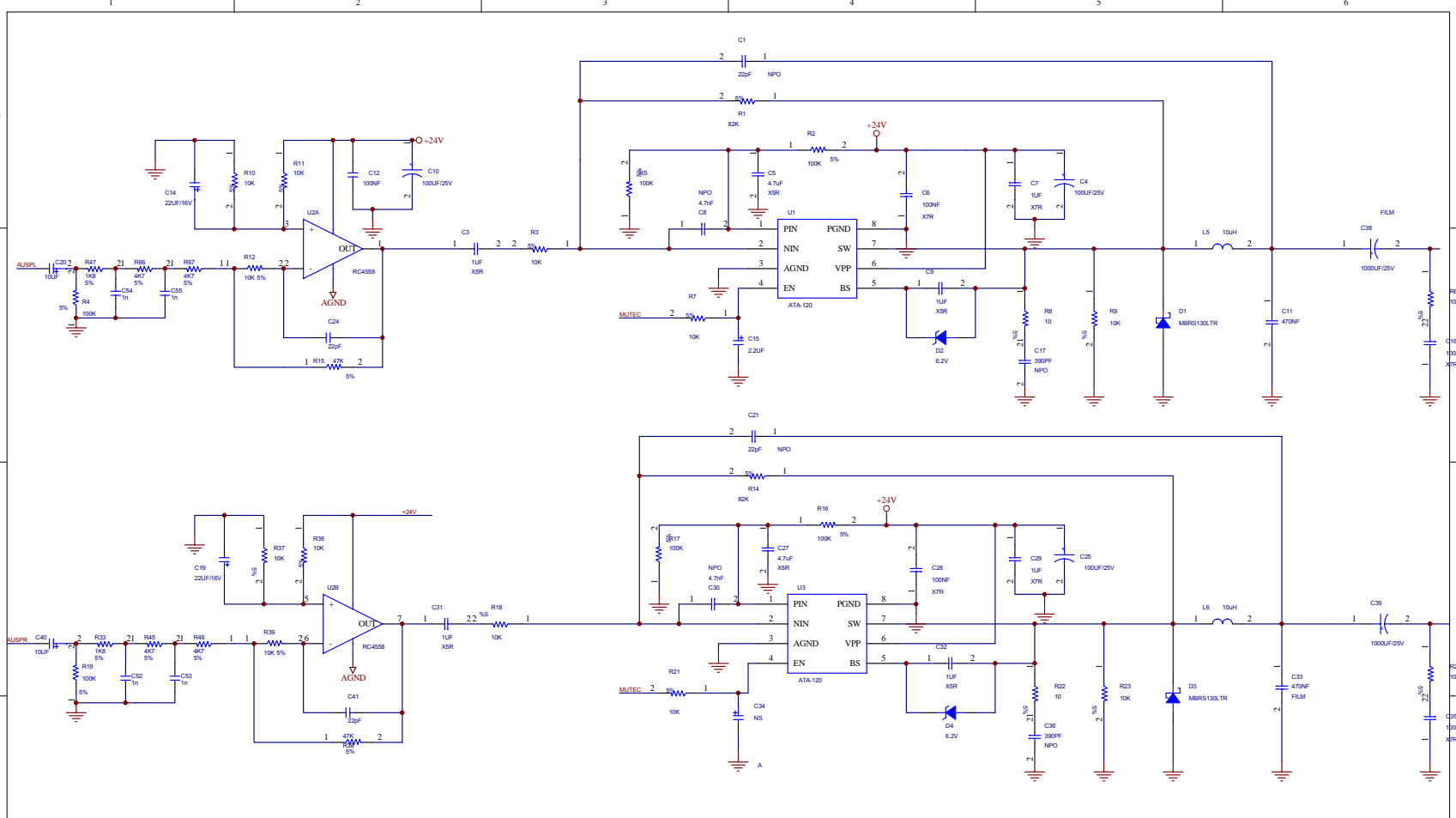


**COMPONENTS SWITCH.**



& \* %

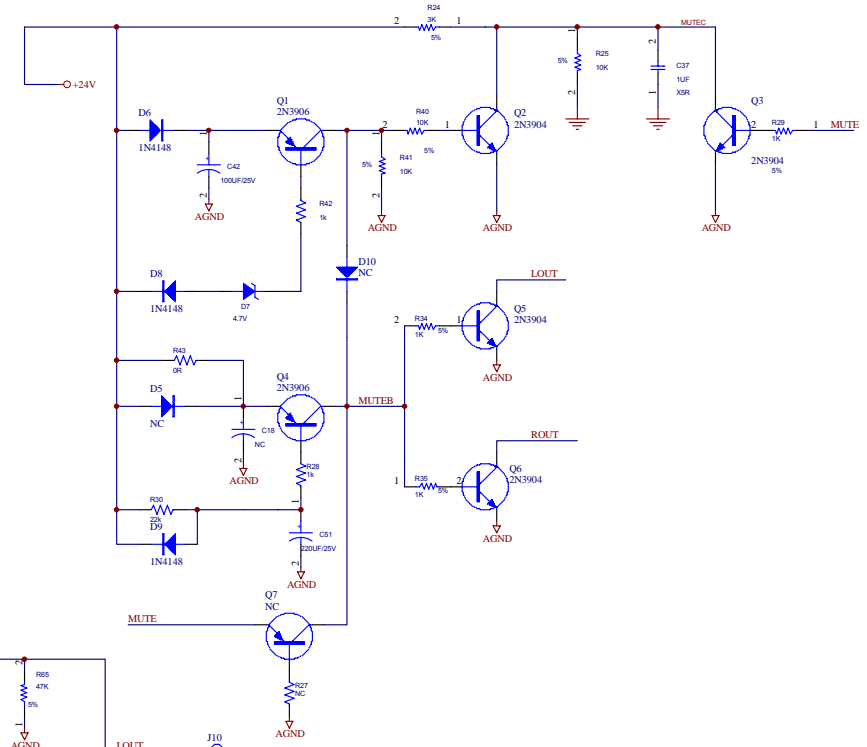
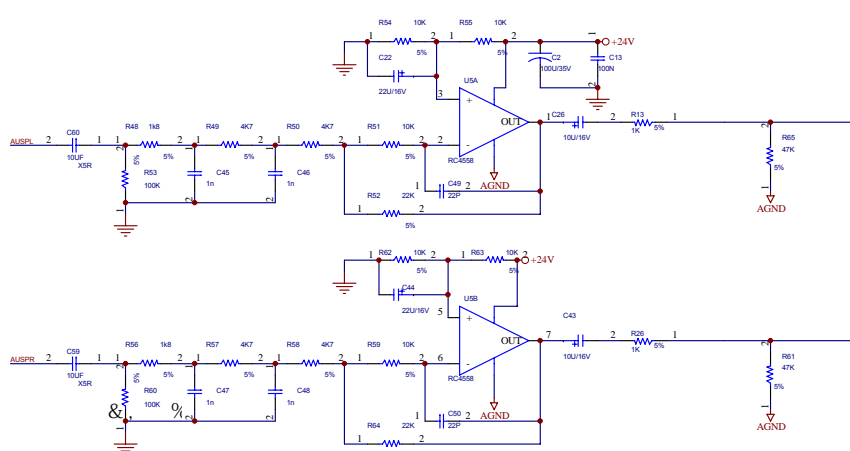
<b>MICO Confidential</b>		
Title MICO LCD TV - MediaTek MT8203 Solution		
Size C	Doc Number VIDEO IN & TUNER IO	Rev V0.1
Date: Thursday, September 15, 2005	Sheet 10	of 10



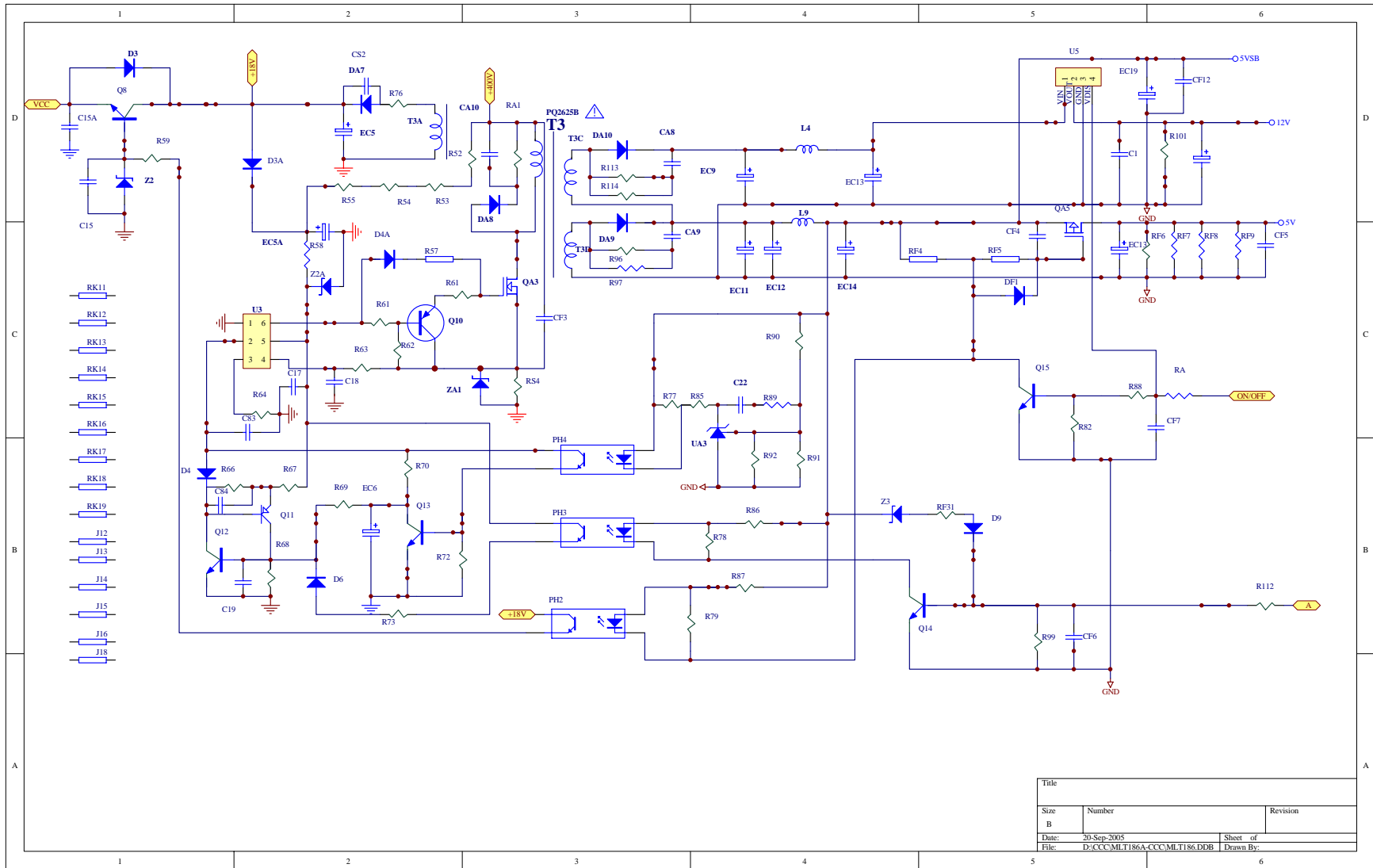
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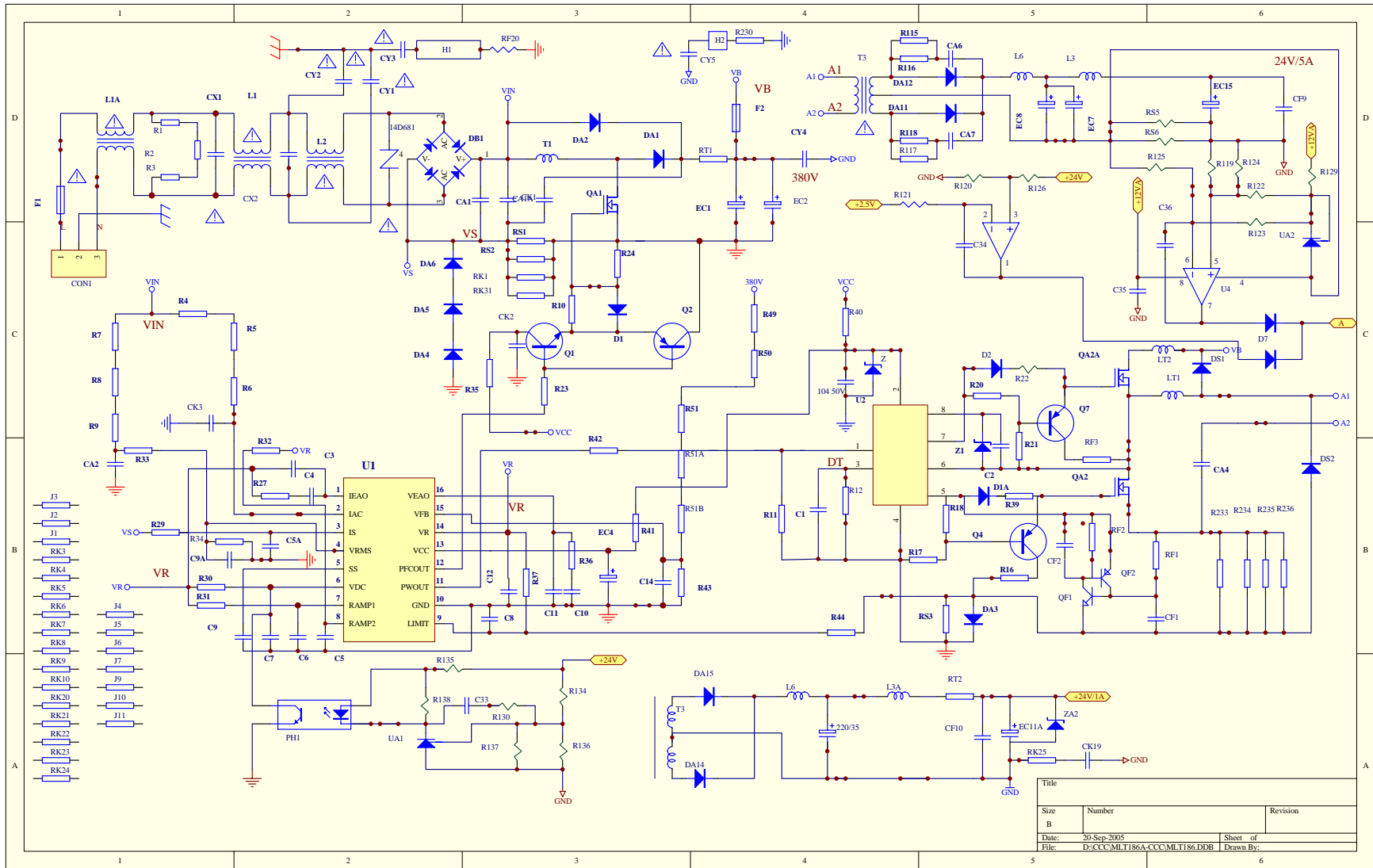




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# Basic Operations & Circuit Description

## Main Electric Components

### (1). MODULE:

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

### (2).SIGNAL PROCESS

There are 5 pcs. PCBs including

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

### (3).POWER

There are 1 pc. PCB for power.

# PCB function

## 1. Power:

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

## 2. Main (Video InterFace) board:

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

## 3. Tuner & Audio Board :

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

## 4. KEYBOARD

To get the main button control on LCD\_TV as SOURCE,MENU, CHANNEL +,CHANNEL -, VOL +,VOL-, STANDBY functions.

## 5. Remote control board

Receive the remote signal and active for the control.

## 6. T-CONTROL board

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

## 7. INVERTER board

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

# PCB failure analysis

## 1. CONTROL:

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

## 2. MAIN (VIDEO):

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

## 3. POWER:

- No picture, no power output.

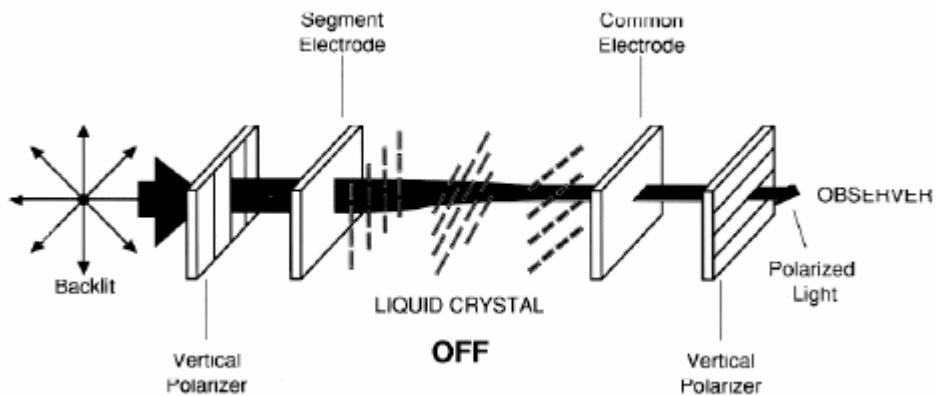
# Basic operation of LCD-TV

1. After turning on power switch, power board sends 5Vst-by Volt to Micro Processor IC waiting for ON signals from Key Switch or Remote Receiver.
2. When the ON signal from Key Switch or Remote Receiver is detected, Micro Processor will send ON Control signals to Power. Then Power sends (5Vsc, 12Vsc, 24V and RLY ON, Vs ON) to PCBs working. This time VIF will send signals to display back light, OSD on the panel and start to search available signal sources. If the audio signals input, they will be amplified by Audio AMP and transmitted to Speakers.
3. If some abnormal signals are detected (for example: over volts, over current, over temperature and under volts), the system will be shut down by Power off.

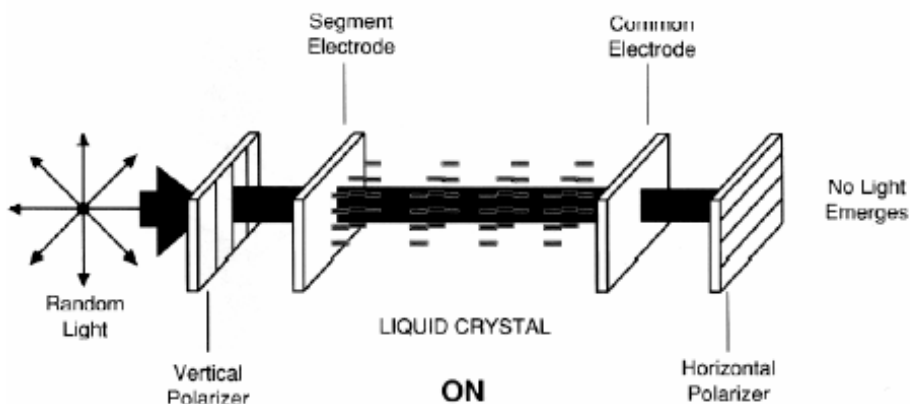
## LCD basic display theory.

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

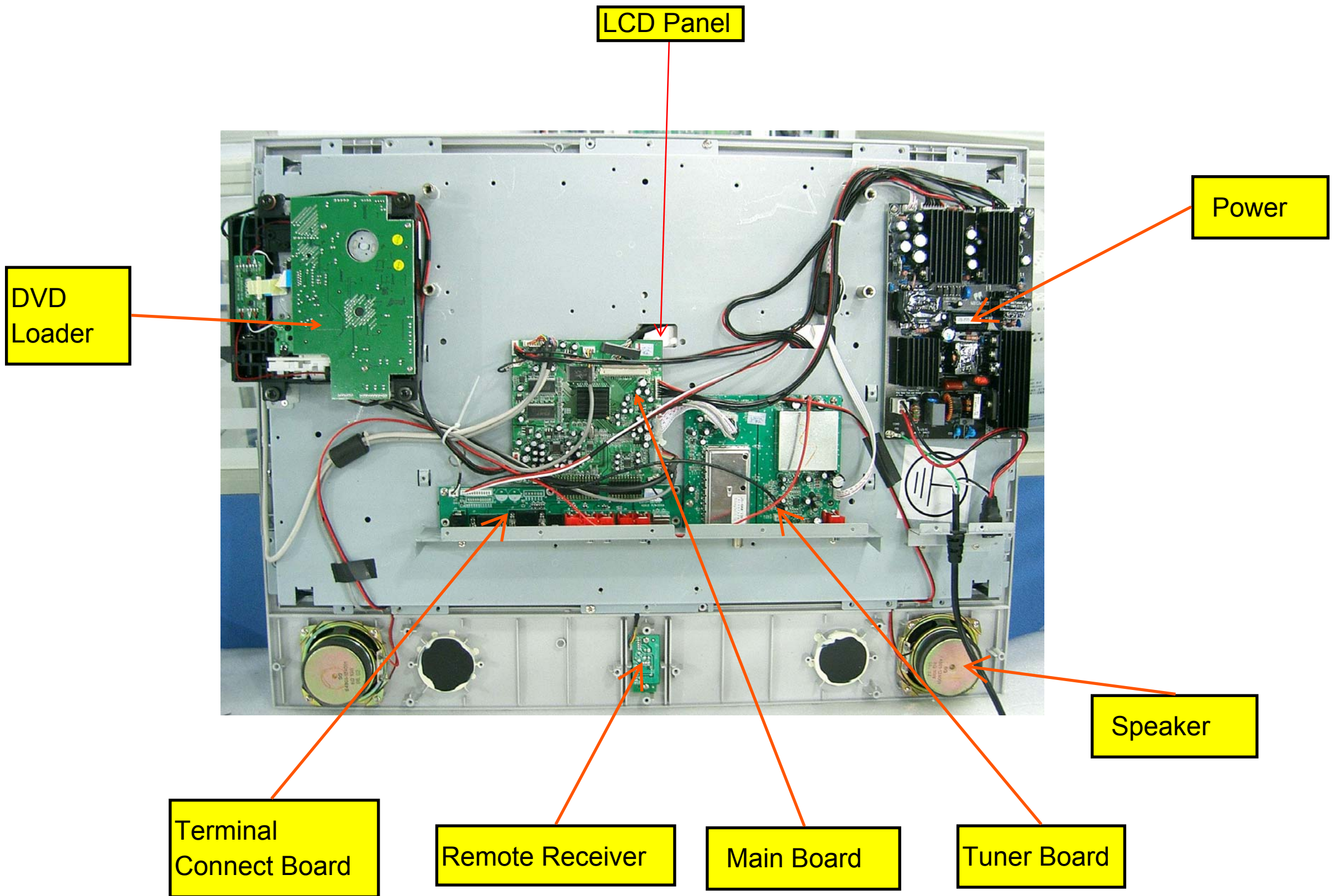
Displays with variable characters are created by selectively etching away the conductive surface that was originally deposited on the glass. Etched areas become the display's background; unetched areas become the display's characters.



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



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





## IC DESCRIPTION

-MT8205G

-AT24C02

-MX29LV160BBTC

-LP2996

-AZ1117/H

-WM8776

-MX232A

-ISAV330

# Pinout information

U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15	U16	U17	U18	U19	U20	U21	U22	U23	U24	U25	U26	U27	U28	U29	U30	U31	U32	U33	U34	U35	U36	U37	U38	U39	U40	U41	U42	U43	U44	U45	U46	U47	U48	U49	U50	U51	U52	U53	U54	U55	U56	U57	U58	U59	U60	U61	U62	U63	U64	U65	U66	U67	U68	U69	U70	U71	U72	U73	U74	U75	U76	U77	U78	U79	U80	U81	U82	U83	U84	U85	U86	U87	U88	U89	U90	U91	U92	U93	U94	U95	U96	U97	U98	U99	U100	U101	U102	U103	U104	U105	U106	U107	U108	U109	U110	U111	U112	U113	U114	U115	U116	U117	U118	U119	U120	U121	U122	U123	U124	U125	U126	U127	U128	U129	U130	U131	U132	U133	U134	U135	U136	U137	U138	U139	U140	U141	U142	U143	U144	U145	U146	U147	U148	U149	U150	U151	U152	U153	U154	U155	U156	U157	U158	U159	U160	U161	U162	U163	U164	U165	U166	U167	U168	U169	U170	U171	U172	U173	U174	U175	U176	U177	U178	U179	U180	U181	U182	U183	U184	U185	U186	U187	U188	U189	U190	U191	U192	U193	U194	U195	U196	U197	U198	U199	U200	U201	U202	U203	U204	U205	U206	U207	U208	U209	U210	U211	U212	U213	U214	U215	U216	U217	U218	U219	U220	U221	U222	U223	U224	U225	U226	U227	U228	U229	U230	U231	U232	U233	U234	U235	U236	U237	U238	U239	U240	U241	U242	U243	U244	U245	U246	U247	U248	U249	U250	U251	U252	U253	U254	U255	U256	U257	U258	U259	U260	U261	U262	U263	U264	U265	U266	U267	U268	U269	U270	U271	U272	U273	U274	U275	U276	U277	U278	U279	U280	U281	U282	U283	U284	U285	U286	U287	U288	U289	U290	U291	U292	U293	U294	U295	U296	U297	U298	U299	U300	U301	U302	U303	U304	U305	U306	U307	U308	U309	U310	U311	U312	U313	U314	U315	U316	U317	U318	U319	U320	U321	U322	U323	U324	U325	U326	U327	U328	U329	U330	U331	U332	U333	U334	U335	U336	U337	U338	U339	U340	U341	U342	U343	U344	U345	U346	U347	U348	U349	U350	U351	U352	U353	U354	U355	U356	U357	U358	U359	U360	U361	U362	U363	U364	U365	U366	U367	U368	U369	U370	U371	U372	U373	U374	U375	U376	U377	U378	U379	U380	U381	U382	U383	U384	U385	U386	U387	U388	U389	U390	U391	U392	U393	U394	U395	U396	U397	U398	U399	U400	U401	U402	U403	U404	U405	U406	U407	U408	U409	U410	U411	U412	U413	U414	U415	U416	U417	U418	U419	U420	U421	U422	U423	U424	U425	U426	U427	U428	U429	U430	U431	U432	U433	U434	U435	U436	U437	U438	U439	U440	U441	U442	U443	U444	U445	U446	U447	U448	U449	U450	U451	U452	U453	U454	U455	U456	U457	U458	U459	U460	U461	U462	U463	U464	U465	U466	U467	U468	U469	U470	U471	U472	U473	U474	U475	U476	U477	U478	U479	U480	U481	U482	U483	U484	U485	U486	U487	U488	U489	U490	U491	U492	U493	U494	U495	U496	U497	U498	U499	U500	U501	U502	U503	U504	U505	U506	U507	U508	U509	U510	U511	U512	U513	U514	U515	U516	U517	U518	U519	U520	U521	U522	U523	U524	U525	U526	U527	U528	U529	U530	U531	U532	U533	U534	U535	U536	U537	U538	U539	U540	U541	U542	U543	U544	U545	U546	U547	U548	U549	U550	U551	U552	U553	U554	U555	U556	U557	U558	U559	U560	U561	U562	U563	U564	U565	U566	U567	U568	U569	U570	U571	U572	U573	U574	U575	U576	U577	U578	U579	U580	U581	U582	U583	U584	U585	U586	U587	U588	U589	U590	U591	U592	U593	U594	U595	U596	U597	U598	U599	U600	U601	U602	U603	U604	U605	U606	U607	U608	U609	U610	U611	U612	U613	U614	U615	U616	U617	U618	U619	U620	U621	U622	U623	U624	U625	U626	U627	U628	U629	U630	U631	U632	U633	U634	U635	U636	U637	U638	U639	U640	U641	U642	U643	U644	U645	U646	U647	U648	U649	U650	U651	U652	U653	U654	U655	U656	U657	U658	U659	U660	U661	U662	U663	U664	U665	U666	U667	U668	U669	U670	U671	U672	U673	U674	U675	U676	U677	U678	U679	U680	U681	U682	U683	U684	U685	U686	U687	U688	U689	U690	U691	U692	U693	U694	U695	U696	U697	U698	U699	U700	U701	U702	U703	U704	U705	U706	U707	U708	U709	U710	U711	U712	U713	U714	U715	U716	U717	U718	U719	U720	U721	U722	U723	U724	U725	U726	U727	U728	U729	U730	U731	U732	U733	U734	U735	U736	U737	U738	U739	U740	U741	U742	U743	U744	U745	U746	U747	U748	U749	U750	U751	U752	U753	U754	U755	U756	U757	U758	U759	U760	U761	U762	U763	U764	U765	U766	U767	U768	U769	U770	U771	U772	U773	U774	U775	U776	U777	U778	U779	U780	U781	U782	U783	U784	U785	U786	U787	U788	U789	U790	U791	U792	U793	U794	U795	U796	U797	U798	U799	U800	U801	U802	U803	U804	U805	U806	U807	U808	U809	U810	U811	U812	U813	U814	U815	U816	U817	U818	U819	U820	U821	U822	U823	U824	U825	U826	U827	U828	U829	U830	U831	U832	U833	U834	U835	U836	U837	U838	U839	U840	U841	U842	U843	U844	U845	U846	U847	U848	U849	U850	U851	U852	U853	U854	U855	U856	U857	U858	U859	U860	U861	U862	U863	U864	U865	U866	U867	U868	U869	U870	U871	U872	U873	U874	U875	U876	U877	U878	U879	U880	U881	U882	U883	U884	U885	U886	U887	U888	U889	U890	U891	U892	U893	U894	U895	U896	U897	U898	U899	U900	U901	U902	U903	U904	U905	U906	U907	U908	U909	U910	U911	U912	U913	U914	U915	U916	U917	U918	U919	U920	U921	U922	U923	U924	U925	U926	U927	U928	U929	U930	U931	U932	U933	U934	U935	U936	U937	U938	U939	U940	U941	U942	U943	U944	U945	U946	U947	U948	U949	U950	U951	U952	U953	U954	U955	U956	U957	U958	U959	U960	U961	U962	U963	U964	U965	U966	U967	U968	U969	U970	U971	U972	U973	U974	U975	U976	U977	U978	U979	U980	U981	U982	U983	U984	U985	U986	U987	U988	U989	U990	U991	U992	U993	U994	U995	U996	U997	U998	U999	U1000	U1001	U1002	U1003	U1004	U1005	U1006	U1007	U1008	U1009	U1010	U1011	U1012	U1013	U1014	U1015	U1016	U1017	U1018	U1019	U1020	U1021	U1022	U1023	U1024	U1025	U1026	U1027	U1028	U1029	U1030	U1031	U1032	U1033	U1034	U1035	U1036	U1037	U1038	U1039	U1040	U1041	U1042	U1043	U1044	U1045	U1046	U1047	U1048	U1049	U1050	U1051	U1052	U1053	U1054	U1055	U1056	U1057	U1058	U1059	U1060	U1061	U1062	U1063	U1064	U1065	U1066	U1067	U1068	U1069	U1070	U1071	U1072	U1073	U1074	U1075	U1076	U1077	U1078	U1079	U1080	U1081	U1082	U1083	U1084	U1085	U1086	U1087	U1088	U1089	U1090	U1091	U1092	U1093	U1094	U1095	U1096	U1097	U1098	U1099	U1100	U1101	U1102	U1103	U1104	U1105	U1106	U1107	U1108	U1109	U1110	U1111	U1112	U1113	U1114	U1115	U1116	U1117	U1118	U1119	U1120	U1121	U1122	U1123	U1124	U1125	U1126	U1127	U1128	U1129	U1130	U1131	U1132	U1133	U1134	U1135	U1136	U1137	U1138	U1139	U1140	U1141	U1142	U1143	U1144	U1145	U1146	U1147	U1148	U1149	U1150	U1151	U1152	U1153	U1154	U1155	U1156	U1157	U1158	U1159	U1160	U1161	U1162	U1163	U1164	U1165	U1166	U1167	U1168	U1169	U1170	U1171	U1172	U1173	U1174	U1175	U1176	U1177	U1178	U1179	U1180	U1181	U1182	U1183	U1184	U1185	U1186	U1187	U1188	U1189	U1190	U1191	U1192	U1193	U1194	U1195	U1196	U1197	U1198	U1199	U1200	U1201	U1202	U1203	U1204	U1205	U1206	U1207	U1208	U1209	U1210	U1211	U1212	U1213	U1214	U1215	U1216	U1217	U1218	U1219
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## Pin Descriptions

### 2.3 Pin Descriptions

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

**Table 2-1 video/audio port pin descriptions.**

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

## Features

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

## Description

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

## 2-Wire Serial CMOS E<sup>2</sup>PROM

1K (128 x 8)

2K (256 x 8)

4K (512 x 8)

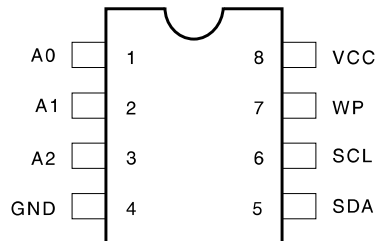
8K (1024 x 8)

16K (2048 x 8)

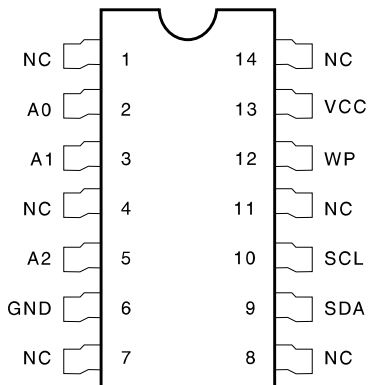
## Pin Configurations

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

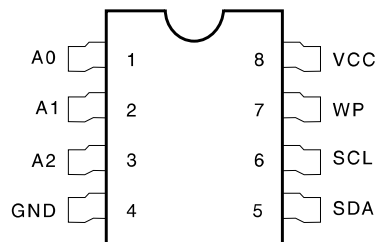
8-Pin PDIP



14-Pin SOIC



8-Pin SOIC

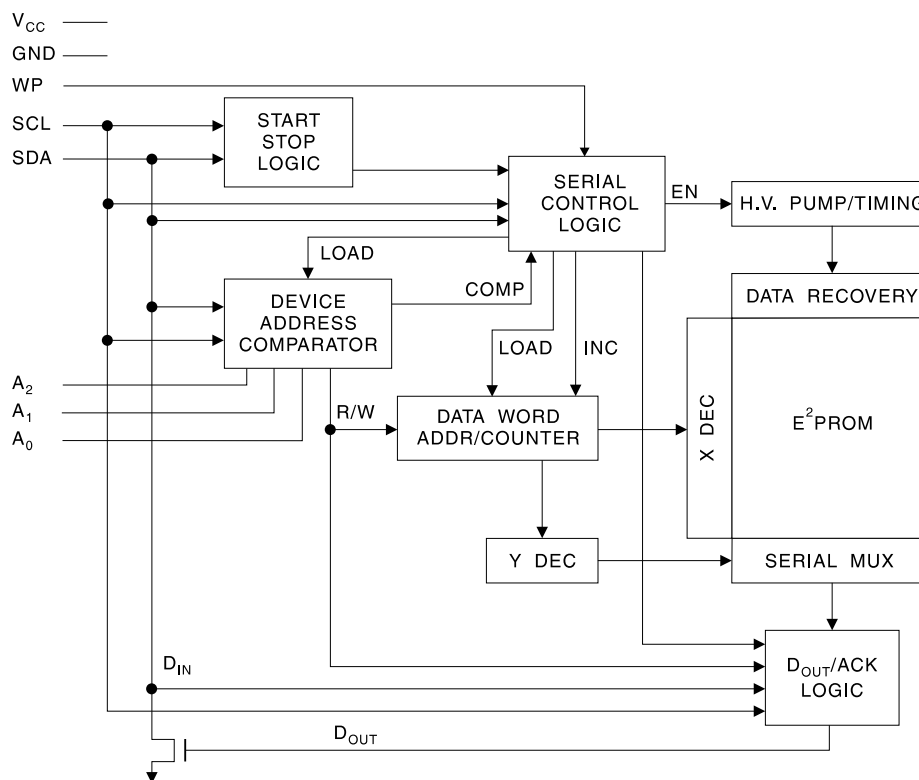


## Absolute Maximum Ratings\*

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

\*NOTICE: Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## Block Diagram



## Pin Description

**SERIAL CLOCK (SCL):** The SCL input is used to positive edge clock data into each E<sup>2</sup>PROM device and negative edge clock data out of each device.

**SERIAL DATA (SDA):** The SDA pin is bidirectional for serial data transfer. This pin is open-drain driven and may be wire-ORed with any number of other open-drain or open collector devices.

**DEVICE/PAGE ADDRESSES (A2, A1, A0):** The A2, A1 and A0 pins are device address inputs that are hard wired for the AT24C01A and the AT24C02. As many as eight 1K/2K devices may be addressed on a single bus system (device addressing is discussed in detail under the Device Addressing section).

The AT24C04 uses the A2 and A1 inputs for hard wire addressing and a total of four 4K devices may be addressed on a single bus system. The A0 pin is a no connect.

The AT24C08 only uses the A2 input for hardwire addressing and a total of two 8K devices may be addressed on a single bus system. The A0 and A1 pins are no connects.

The AT24C16 does not use the device address pins which limits the number of devices on a single bus to one. The A0, A1 and A2 pins are no connects.

(continued)



# MX29LV160BT/BB

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

### FEATURES

- Extended single - supply voltage range 2.7V to 3.6V
- 2,097,152 x 8/1,048,576 x 16 switchable
- Single power supply operation
  - 3.0V only operation for read, erase and program operation
- **Fully compatible with MX29LV160A device**
- Fast access time: 70/90ns
- Low power consumption
  - 30mA maximum active current
  - 0.2uA typical standby current
- Command register architecture
  - Byte/word Programming (9us/11us typical)
  - Sector Erase (Sector structure 16K-Bytex1, 8K-Bytex2, 32K-Bytex1, and 64K-Byte x31)
- Auto Erase (chip & sector) and Auto Program
  - Automatically erase any combination of sectors with Erase Suspend capability.
  - Automatically program and verify data at specified address
- Erase Suspend/Erase Resume
  - Suspends sector erase operation to read data from, or program data to, any sector that is not being erased, then resumes the erase.
- Status Reply
  - Data polling & Toggle bit for detection of program and erase operation completion.
- Ready/Busy pin (RY/BY)
  - Provides a hardware method of detecting program or erase operation completion.
- Sector protection
  - Hardware method to disable any combination of sectors from program or erase operations
  - Temporary sector unprotect allows code changes in previously locked sectors.
- CFI (Common Flash Interface) compliant
  - Flash device parameters stored on the device and provide the host system to access
- 100,000 minimum erase/program cycles
- Latch-up protected to 100mA from -1V to VCC+1V
- Boot Sector Architecture
  - T = Top Boot Sector
  - B = Bottom Boot Sector
- Low VCC write inhibit is equal to or less than 1.4V
- Package type:
  - 44-pin SOP
  - 48-pin TSOP
  - 48-ball CSP
- Compatibility with JEDEC standard
  - Pinout and software compatible with single-power supply Flash
- 10 years data retention

### GENERAL DESCRIPTION

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

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

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

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

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

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

# LP2996 DDR Termination Regulator

## General Description

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

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

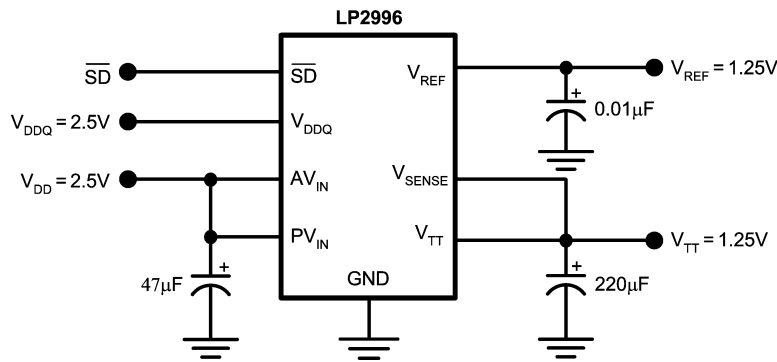
## Features

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

## Applications

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

## Typical Application Circuit



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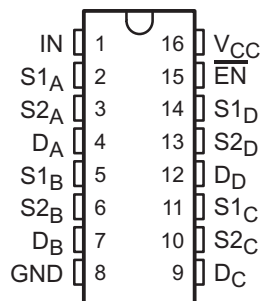
# TS5V330

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

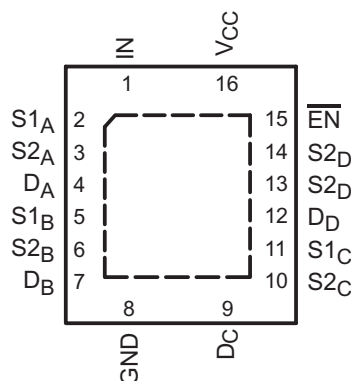
SCDS164A – MAY 2004 – REVISED MAY 2004

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

D, DBQ, OR PW PACKAGE  
(TOP VIEW)



RGY PACKAGE  
(TOP VIEW)



### description/ordering information

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

### ORDERING INFORMATION

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

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



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

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

### DESCRIPTION

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

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

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

The WM8776 supports fully independent sample rates for the ADC and DAC. The audio data interface supports I<sup>2</sup>S, left justified, right justified and DSP formats.

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

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

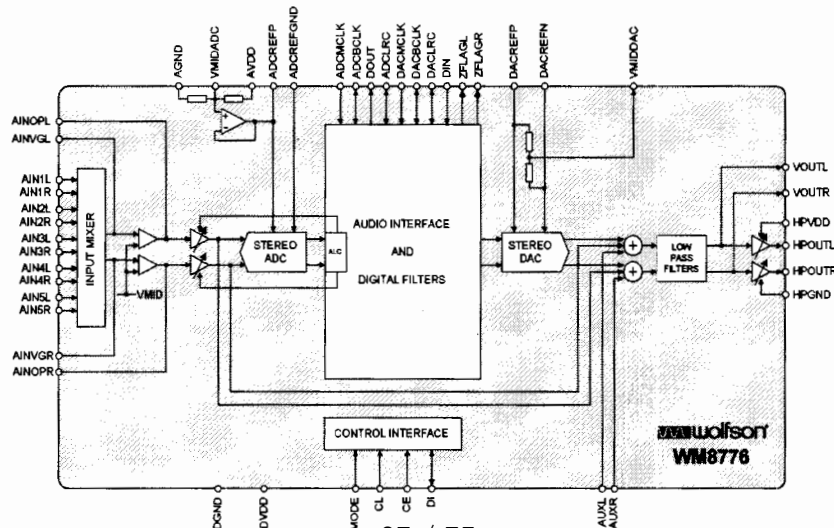
### FEATURES

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

### APPLICATIONS

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

### BLOCK DIAGRAM





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

### General Description

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

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

### Applications

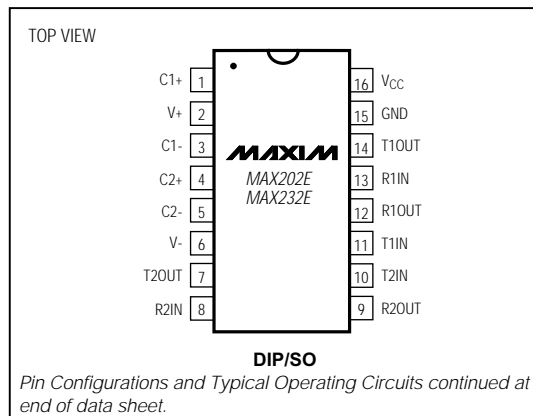
Notebook, Subnotebook, and Palmtop Computers  
Battery-Powered Equipment  
Hand-Held Equipment

Ordering Information appears at end of data sheet.

### Features

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

### Pin Configurations



### Selection Guide

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

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Maxim Integrated Products 1

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

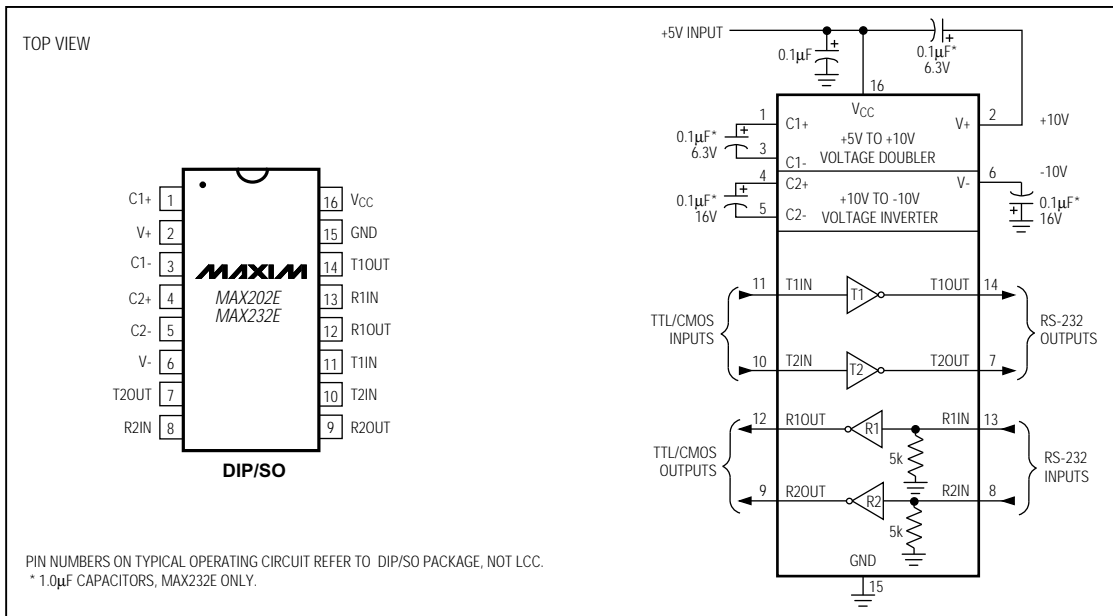
MAX202E-MAX213E, MAX232E/MAX241E

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

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

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

### Pin Configurations and Typical Operating Circuits (continued)



**SPECIFICATION FOR APPROVAL**

Part No. MLT186A

Description: LCD Power Supply Specification

Revision: 1.0

Customer. SANSUI ELECTRIC

Customer Approval No. : \_\_\_\_\_

Please return to us one original of “SPECIFICATION FOR APPROVAL” with your approved signatures.

<b>APPROVED SIGNATURES</b>	
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CHOP & SIGNATURES:	

**SHENZHEN MEGMEET ELECTRICAL TECHNOLOGY CO.,LTD**

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<b>09-12-2005</b>	QIU	ZHANGZHI	TONY YANG	<b>MLT186-1.0</b>	<b>1.0</b>



# Section

## 1. Power supply overview

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### 1.2 Output Electrical Characteristics Overview

- 1.2.1 Output Voltage ,Current & Regulation.
- 1.2.2 DC Output Ripple & Noise.
- 1.2.3 Output Transient Response.
- 1.2.4 DC Output Hold-Up Time.
- 1.2.4 DC Output Overshoot At Turn On & Turn Off.
- 1.2.6 DC output voltage rise time

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### 1.4 Protection:

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- 1.4.2 DC Output Over current Protection.
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- 5.2 Humidity
- 5.3 Altitude
- 5.4 Cooling Method
- 5.5 Vibration
- 5.6 Impact

## 6. Dimension

## 7. Weight

## 8. Pin Connection

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## 9. Power Supply mounting

### 1. Power Supply Overview:

#### 1.1 Table 1 Input Electrical Characteristics Overview

Input voltage range	90Vac to 264Vac
Normal voltage range	100Vac to 240Vac
Frequency range	50Hz/60Hz $\pm$ 5%
Max input ac current	3.5A <sub>max</sub> at full load condition
Inrush current (cold start)	50A <sub>typ</sub> peak, 120Vac; 100A <sub>typ</sub> peak, 220Vac
Efficiency(full load)	84% <sub>min</sub> at 90Vac; 87% <sub>min</sub> at 220Vac
Harmonic current	Meet GB17625.1-1998/IEC61000-3-2 class D
Leakage Current	Less Than 0.75mA, 230Vac input
Standby Power Loss	$\leq$ 0.8W, 265Vac input
Input Fuse	T5A/250Vac

#### 1.2 Output Electrical Characteristics Overview

##### 1.2.1 Table 2 Output Voltage ,Current & Regulation.

Output Voltage	Regulation	Min. current	Rated current	Peak current
+V1(+24V)	$\pm$ 3%	0.3A	5A	6A*
+V2(+24V)	$\pm$ 8%	0	1A	1.5A
+V3(+12V)	$\pm$ 3%	0.2A	1.5A	2A*
+5V	$\pm$ 5%	0.1A	6A	6A
+5.1VSB	$\pm$ 3%	0.01A	1A	1A

Note:\* pulse width within 100ms

##### 1.2.2 Table 3 DC Output Ripple & Noise.

Output Voltage	Ripple & Noise (Max.)
+V1/V2(+24V)	240mVp-p@25°C ; 350mVp-p@-10°C
+V3(+12V)	120mVp-p@25°C ; 200mVp-p@-10°C
+5V	60mVp-p@25°C ; 200mVp-p@-10°C
+5.1VSB	60mVp-p@25°C ; 200mVp-p@-10°C ; 150mVpp when STB

Note: 1) Measurements shall be made with an oscilloscope with 20MHz bandwidth.

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z) Outputs shall be bypassed at the connector with a 0.1µF ceramic capacitor and a 10µF electrolytic capacitor to simulate system loading.

### 1.2.3 Output Transient Response.

Table 4. Test condition.

Voltage Tolerance Limit	Slew Rate	Load Change
V1/V3 ± 5%	0.2A/µS	Min. to 50% load and 50% to Max load
+V2 ± 10%		
+5V ± 5%		
+5.1VSB ± 5%		
all outputs ± 10%	0.2A/µS	Min. load to Max load
Note: Transient response measurements shall be made with a load changing repetition rate of 50Hz to 10kHz.		

### 1.2.4 Table 5 DC Output Hold-Up Time.

Output Voltage	120Vac input	220Vac input
+V1/+V2(+24V)	≥ 10 mS	≥ 10 mS
+V3(+12V)	≥ 10 mS	≥ 10 mS
+5V/+5.1VSB	≥ 10 mS	≥ 10 mS
Note: All of dc output at full load.		

### 1.2.5 Table 6 DC Output Overshoot At Turn On & Turn Off.

Output Channel	Output (V)	Over shoot voltage (V)	
		Turn on	Turn off
+V1	+24V	2%	2%
+V2	+24V	5%	5%
+V3	+ 12V	2%	2%
+5V	+5V	5%	5%
+5.1VSB	+5. 1V	5%	5%
Note: All of dc output current from Min. to Max.			

### 1.2.6 Table 7 DC output voltage rise time

Output Voltage	120Vac input & Full Load	220Vac input & Full Load
+V1/+V2(+24V)	≤ 100 mS	≤ 100 mS

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+V3(+12V)	$\leq 100$ mS	$\leq 100$ mS
+5V	$\leq 100$ mS	$\leq 100$ mS
+5.1VSB	$\leq 100$ mS	$\leq 100$ mS

Note: The output voltages shall rise from 10% to 90% of their output voltage.

### 1.3 Remote On/Off Control:

The power supply DC outputs (without +5.1Vsb) shall be enable with an active-high TTL( $\geq 2.0$ V/2.0mA)-compatible signal(Ps-on). The +5.1Vsb is on whenever the AC power is present.

- \* When Ps-on is pulled to TTL high, the DC outputs are to be enabled.
- \* When Ps-on is pulled to TTL low or open circuit, the DC outputs are to be disabled.

Table 8.

Ps-on Signal	Comments	Outputs
Ps-on- high	$\geq 2.5$ V & 2.0mA ( source)	Enable
Ps-on- low	$\leq 1.5$ V	X
Ps-on-open	--	X

### 1.4 Protection:

#### 1.4.1 Table 9 DC output Over Voltage Protection.

Output Voltage	Max. Over Voltage	Comments
+V1(+24V)	28V	Power supply latch into shutdown state
+5.0V	7Vtyp	Hiccup

Note: The power supply shall be test at max AC voltage (270Vac) and min load or no load.

#### 1.4.2 Table 10 DC Output Over current Protection.

Output Voltage	Over Current	Comments

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+V1(+24V)	$\geq 7A_{typ}$	Shutdown
+V2(+24V)	$\geq 2A_{typ}$	Shutdown
+V3(+12V)	$\geq 3A$	Shutdown
+5V/+5.1VSB	$\geq 9A$ type	Hiccup

#### 1.4.3 Table 11 DC Output Short Circuit Protection.

Output Voltage	Comments
+V1(+24V)	Shutdown
+V2(+24V)	Shutdown
+V3(+12V)	Shutdown
+5V/5.1VSB	Hiccup

#### 1.4.4 Reset After Shutdown.

Recycle the ps-on signal, the power supply will restart after the fault removed.

## 2. Isolation

### 2.1 Table 12

Input To Output	DC500V 50M $\Omega$ min (at room temperature)
Input To FG	DC500V 50M $\Omega$ min (at room temperature)
Output To FG	Non Isolated

### 2.2 Table 13

Input To Output	3000Vac 50Hz 1minute $\leq 10mA$
Input To FG	1500Vac 50Hz 1minute $\leq 10mA$
Output To FG	Non Isolated

Note: Open FG and Output return.

## 3. Safety

The power supply shall compliance with the following Criterion:

- 1) UL60950
- 2) EN60950
- 3) GB4943-1995/GB8898-2001

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DATE	PREPARED	CHECKED	APPROVED	Document No. :	REV:
09-12-2005	QIU	ZHANGZHI	TONY YANG	MLT186-1.0	1.0

## 4. EMC

### 4.1 EMI

The power supply shall compliance with the following Criterion:

1) Conduction Emission :

- \*EN55013, CLASS B
- \*GB13837-2003, CLASS B
- \*CISPR13:2001

2) Radiated Emission :

- \*EN55013, CLASS B
- \*GB13837-2003, CLASS B
- \*CISPR13:2001

### 4.2 EMS

The power supply shall compliance with the following Criterion:

1) ESD

\*GB17626. 2-1998/IEC61000-4-2                      Lever 3

2) EFT

\*GB17626. 4-1998/IEC61000-4-4                      Lever 3

3) SURGE

\*GB17626. 5-1998/IEC61000-4-5                      Lever 3

4) DIP

\*GB17626. 11-1998/IEC61000-4-11                      Class B/C

## 5. Environmental Requirement

### 5.1 Temperature

- \* Operating:                      -10°C to +50°C.
- \* Store:                              -20°C to +80°C.

### 5.2 Humidity

- \* Operating:    From 10%to90% relative humidity (non-condensing).
- \* Store:        From 5 to 95% relative humidity (non-condensing).

### 5.3 Altitude

- \* Operating:    to10,000 ft.
- \* Store:                to 20,000ft.

### 5.4 Cooling Method

- \* Ventilation cooling .

### 5.5 Vibration

- \* 10-55Hz, 49.0m/s<sup>2</sup> (5G), 3minutes period, 20minutes each along X, Y and Z axis.

### 5.6 Impact

- \* 196.1m/s<sup>2</sup> (20G),11ms, once each X, Y and Z axis.

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REV:

09-12-2005

QIU

ZHANGZHI

TONY YANG

MLT186-1.0

1.0

## 6. Dimension (物理尺寸)

\* 200mm X 130mm X 25mm (L \* W \* H).

## 7. Weight

\* 680g

## 8. Pin Connection

**Table 15 CN3**

**VENTER:**

NO.	Pin Connection	Function
1	+24VAUDIO	+24VDC OUTPUT
2	+24VAUDIO	+24VDC OUTPUT
3	GND	+24VDC RETURN
4	GND	+24VDC RETURN

Note: CN3 -- JST VA CONNEETION, TYPE : pitch:2.0mm

**Table 16 CN2**

**VENTER:**

NO.	Pin Connection	Function
1	+24V	+24VDC OUTPUT
2	+24V	+24VDC OUTPUT
3	+24V	+24VDC OUTPUT
4	+24V	+24VDC OUTPUT
5	GND	+24VDC RETURN
6	GND	+24VDC RETURN
7	GND	+24VDC RETURN
8	GND	+24VDC RETURN

Note: CN2 -- JST VA CONNEETION, TYPE : pitch:2.54mm

**Table 17 CN1**

**VENTER:**

NO.	Pin Connection	Function
1	+12V	+12DC OUTPUT
2	+12V	+12DC OUTPUT
3	+12V	+12DC OUTPUT
4	GND	+12V/+5VDC RETURN
5	GND	+12V/+5VDC RETURN

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**SPECIFICATION**

Model No. :

**MLT186**

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6	GND	+12V/+5VDC RETURN
7	+5V	+5DC OUTPUT
8	+5V	+5DC OUTPUT
9	+5V	+5DC OUTPUT
10	+5V	+5DC OUTPUT
11	+5V	+5DC OUTPUT

Note: CN2 -- JST VA CONNEETION, TYPE : pitch:2.0mm

**Table 15 CN4 VENTER:**

NO.	Pin Connection	Function
1	+5VSB	+5VSB OUTPUT
2	+5VSB	+5VSB OUTPUT
3	GND	+5VSB RETURN
4	GND	+5VSB RETURN
5	PS-ON	PS-ON

Note: CN3 -- JST VA CONNEETION, TYPE : pitch:2.0mm

**Table 18 CON1 VENTER:**

NO.	Pin Connection	Function
①	AC-L	AC INPUT LINE
②	NC	NC
③	AC-N	AC INPUT NUTURE

Note: CN3 -- JST VA CONNEETION, TYPE : pitch:3.96mm

**Fig.8.1 Pin Connection (Top View)**

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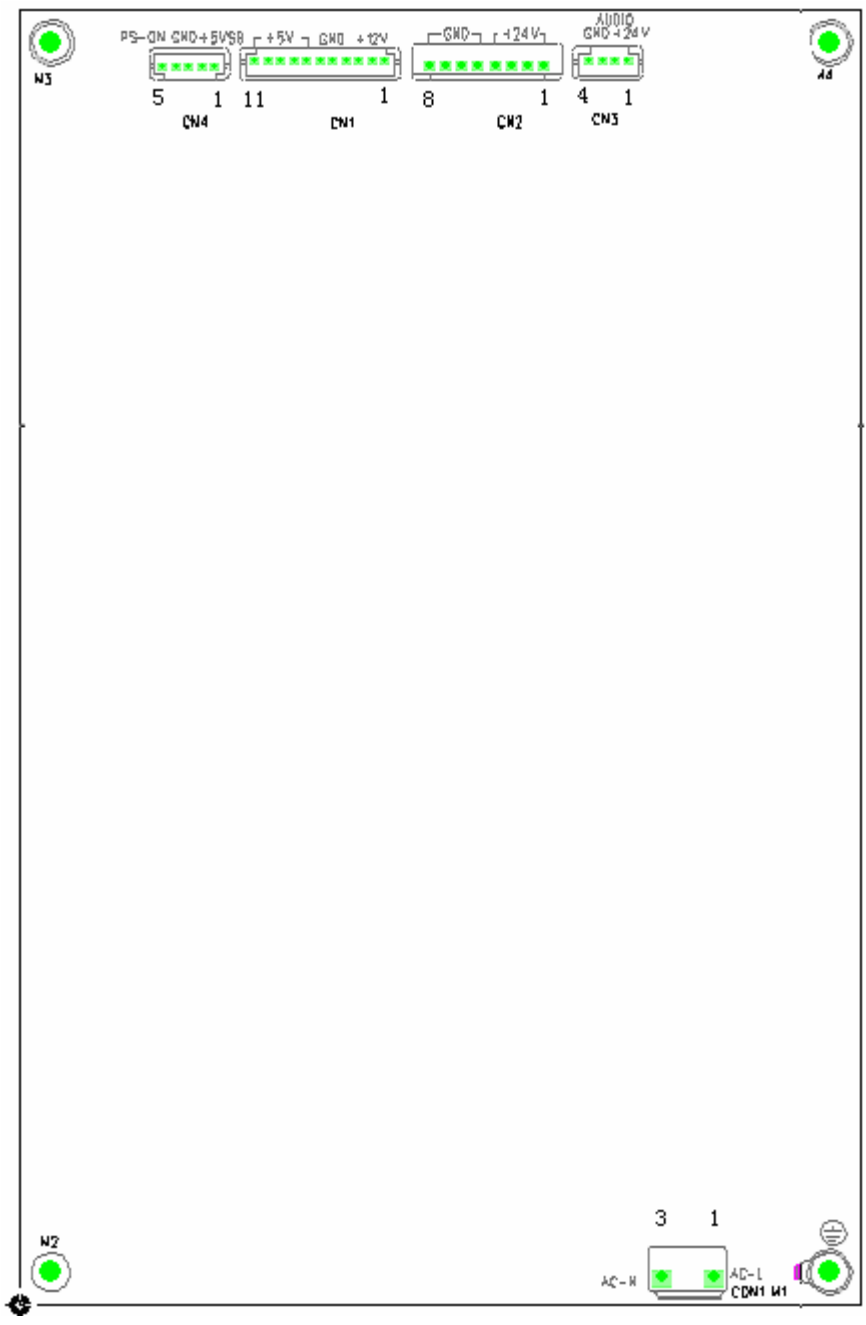
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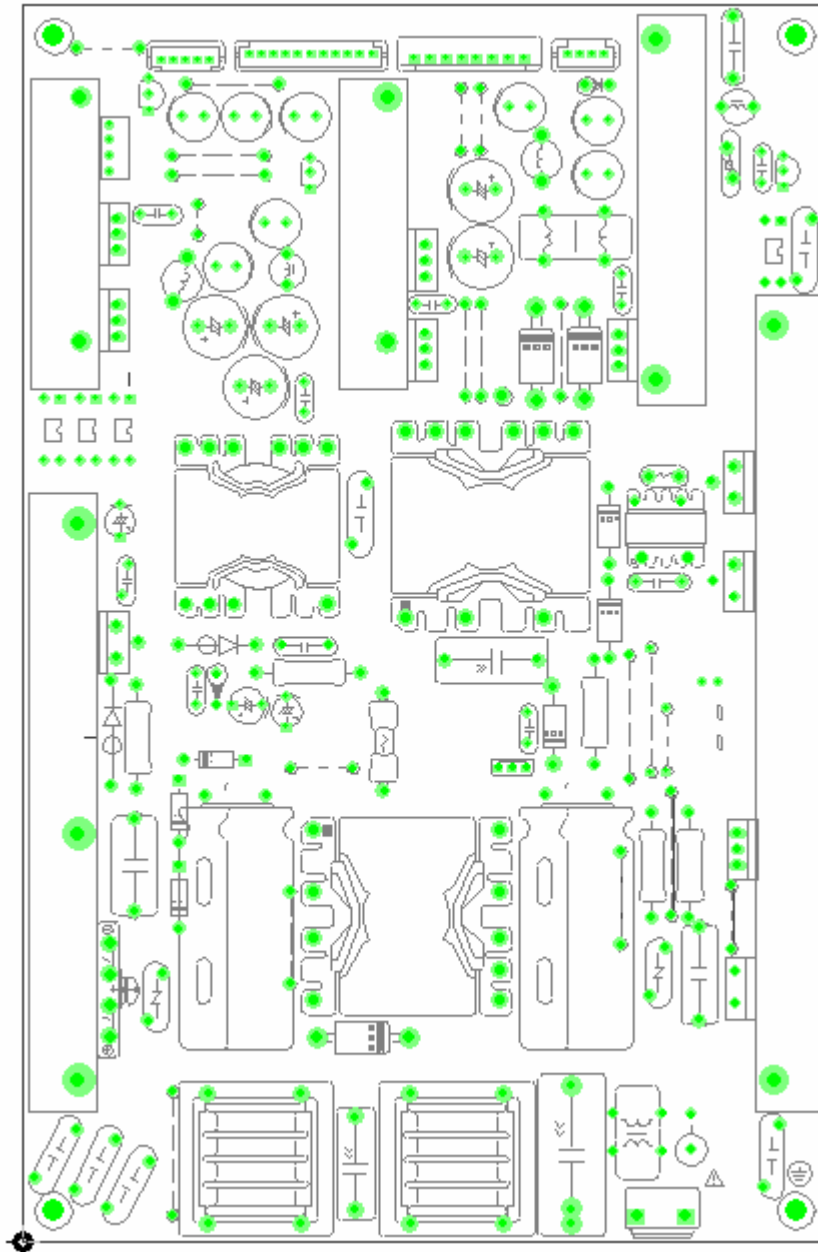
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**SPECIFICATION**

Model No. :

**MLT186**

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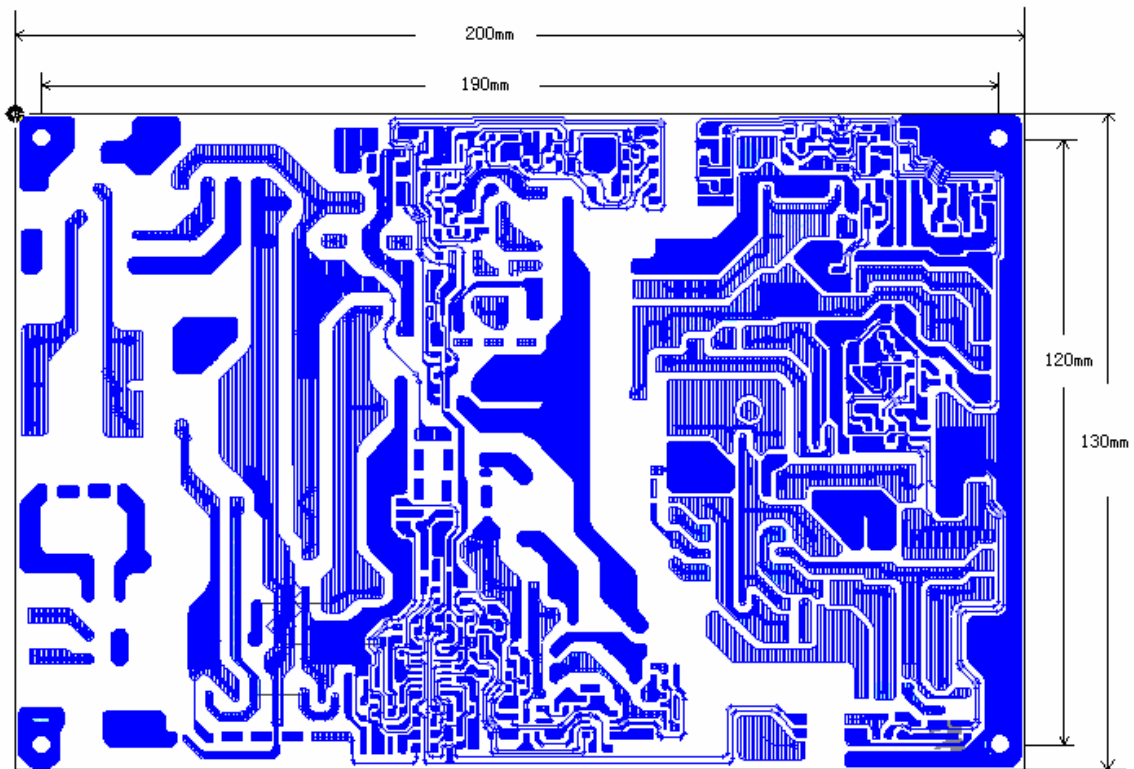
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## 9. Power Supply Mounting



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DESCRIPTION:

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Document No. :

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**1.0**

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**09-12-2005**

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**QIU**

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**ZHANGZHI**

APPROVED  
**TONY YANG**



# SPECIFICATION

CUSTOMER: \_\_\_\_\_

DESCRIPTION: Slot-in DVD LOADER

MODEL: DL-06 series(DL-06\*\*)

ISSUE DATE: 2005.11.02

CUSTOMER	APPROVED

Approved	Checked by Sales Dept.	Checked by Technical Dept.	Prepared

**FORYOU** 惠州市华阳多媒体电子有限公司  
HUIZHOU FORYOU MULTIMEDIA ELECTRONICS CO., LTD.

- 
1. Scope
    - 1.1 This specification applies to Slot-in DVD mechanism for DVD player (thereafter called DVD mechanism ). Foryou model : DL-06\*\*.
    - 1.2 Any query over the specification shall be expressed by R&D dept. of Foryou Multimedia Electronics Co.,Ltd.
    - 1.3 For improving performance purpose, this specification is subject to change according to pre-agreement established between us.
    - 1.4 Hardware and software or manufacturing process may subject to change for improvements within the rang of the specifications.
  2. Dimension of shell and installation
    - 2.1 See attachment for details of dimension of shell and installation.
  3. General specification
    - 3.1 Mechanism
      - 3.1.1 Disc loading: Motorized loading.
      - 3.1.2 Disc ejecting: Motorized ejection.
      - 3.1.3 Play: Loading → auto play
      - 3.1.4 Skew adjusting: adjust two points on the base of spindle motor.
      - 3.1.5 Pick-up feed mode: gear and rack drive.
      - 3.1.6 Range of pick-up movement: 22.5mm ~ 59mm, from the center of spindle motor.

## 3.1.7

Anti vibration: two steps of dampers to reduce the vibration.

## 3.2 Power supply

DC12  $\pm$ 1V (600 mA) & DC5 $\pm$ 0.2V (660 mA) .

## 3.3 Pick-up

3.3.1 Pick-up: PVR-520T、PVR-502W (MITSUMI)、HOP-1200S (W) (HITACHI)、  
OPU-3153 (SANKYO)、SF-HD62 (SANYO)、SF-HD65 (SANYO) two laser diode and  
single object lens pickup.

## 3.4 Motor

3.4.1 Spindle motor: DC brush motor: CCM03-030R1-26O ( Moretech).

3.4.2 Sled motor: WRF-300CA-09600.

3.4.3 Loading motor: WFF-050SB-10200.

## 3.5 Detect switch

3.5.1 Pick-up inner position detecting SW: (WI-A278)、(DS3-A-0001)

3.5.2 Disc chucking detecting SW: ESE22 (Type B) $\times$ 1pcs

3.5.3 Disc detecting SW: ESE22 (Type B) $\times$ 2pcs (Panasonic).

3.6 Weight: approximate 476 g.

## 4. General performance

## 4.1 Disc specification

Diameter of disc:  $\Phi$ 120 $\pm$ 0.3,  $\Phi$ 80 $\pm$ 0.3

Thickness of Disc: 1.2(+0.3,-0.1)

Type of disc:

DVD Video;  
CD-DA;  
Video CD;  
CD-R, CD-RW;

## 4.2

Prevention from the 2<sup>nd</sup> disc insertion: the second disc can't be loaded when there is a disc in mechanism.

## 4.3

Noise Spec.  $\leq 65$  dB (A)

Noise level tests shall be carried out in an anechoic room with background noise 20 dB (A) or less. Noise shall be measured at a position 10cm from the front of the mechanical section.

## 5. Conditions of operation and storage

5.1 Operation temperature range: 0°C ~ +45°C.

5.2 Range of storage: -20°C ~ +60°C

5.3 Operation moisture range: 10% ~ 80% RH.

5.4 Storage moisture range: 0% ~ 90% RH.

5.5 Atmospheric pressure: 860mBar ~ 1060 mBar.

## 6. Condition of performance evaluation

6.1 Installation: see attachment. Tightened on work table; Installation angle:  
forth and back:  $\pm 10^\circ$ , left and right:  $\pm 10^\circ$ .

## 6.2 Environment of evaluation

Temperature :  $25 \pm 2^\circ\text{C}$

Humidity :  $60 \pm 5\%$  (RH)

But, if have no doubt to the evaluation result, you can also according to the following items:

Temperature : +15°C ~ +30°C

Humidity : 45% ~ 75%RH

Noise: in an anechoic room with background noise 20dB (A) or less.

### 6.3 Test circuit and equipment

#### 6.3.1

Refer FORYOU's standard circuit and equivalent.

## 7. Reliability test

### 7.1 Environment test

Item	Specification
7.1.1 Test of high temperature storage	After 24hours kept at +60°C, and then 16 hours at room temperature, the mechanism shall be able to load/eject and playback within this process.(Test disc:TCD-792 and TDV-520A)
7.1.2 Test of low temperature storage	After 24hours kept at -20°C, and then 16 hours at room temperature, the mechanism shall be able to load/eject and playback within this process.(Test disc:TCD-792 and TDV-520A)
7.1.3 Test of high temperature and high moisture storage	After 48hours kept at +40°C, 90%RH, and then 16 hours at room temperature, the mechanism shall be able to load/eject and playback within this process.(Test disc:TCD-792 and TDV-520A)

<p>7.1.4</p> <p>High and low temperature cycling test</p>	<p>Applied <math>-20^{\circ}\text{C}(1\text{H})\leftrightarrow 60^{\circ}\text{C}(1\text{H})</math>(temperature slope <math>80^{\circ}\text{C}/\text{H}</math>), 5cycles,then place at normal temperature for 16 hours, the mechanism shall be able to load/eject and playback within this process.(Test disc:TCD-792 and TDV-520A)</p>
<p>7.1.5</p> <p>Test of high temperature operation</p>	<p>DVD mechanism shall be kept in <math>45^{\circ}\text{C}</math> for 4 hours, and then operate, the mechanism shall be able to load/eject and playback within this process.(Test disc:TCD-792 and TDV-520A)</p>
<p>7.1.6</p> <p>Test of low temperature operation</p>	<p>DVD mechanism shall be kept in <math>0^{\circ}\text{C}</math> for 4 hours, and then operate, the mechanism shall be able to load/eject and playback within this process.(Test disc:TCD-792 and TDV-520A)</p>

## 7.2 Life test

Item	Specification
<p>7.2.1</p> <p>Continue playback ability</p>	<p>When a mechanism is executed for continuous playing at room temperature for 1,000H, the mechanism shall be able to playback standard disc TDV-520A and TCD-792.</p>
<p>7.2.2</p> <p>Feed motion</p>	<p>After conduct 200,000 times of pick-up feeding motion at room temperature, mechanism shall be able to playback standard disc TDV-520A and TCD-792. (One cycle: inner <math>\rightarrow</math>outer<math>\rightarrow</math> inner).</p>
<p>7.2.3</p> <p>Loading and ejection</p>	<p>At normal room temperature, after 10,000 times of disc loading and ejection circulation, mechanism shall be able to playback standard disc TDV-520A and TCD-792. (One cycle :Disc in <math>\rightarrow</math>playback <math>\rightarrow</math> disc out)</p>

## 7.3 Drop and impact test:

Item	Specification
------	---------------

7.3.1 Shock test	(1 time ,6ms), 70G crash impact on each of 6 sides of mechanism. Mechanism shall be able to playback standard disc TDV-520A and TCD-792.
7.3.2 Drop test	<p>After one time of drop test with surface, edge and corner (packing with 10sets per carton), the mechanism shall be able to playback standard disc TDV-520A and TCD-792.</p> <p>Drop with surface: drop height 600mm, Drop sequence: bottom, front, left, back, right. Each surface drop one time.</p> <p>Drop with corner: drop height 450mm, Drop one of corners of carton bottom one time.</p> <p>Drop with edge: drop height 450mm, Each edge of drop corner (three edges) drop one time.</p>

#### 7.4 Durability test of vibration

Item	Specification
7.4.1 Durability test of vibration	Acceleration 2.5G, Frequency 10~50Hz, sweep time 5minutes, test time is 20minutes with each of 3 directions. After that test, mechanism shall be able to playback standard disc TDV-520A and TCD-792.

#### 7.5

The test environment is the same as item 6.2 except for special note.

#### 8.

Ref appearance drawing

#### 9. Caution:

##### 9.1

It is not allowed to disassembly and re-tune the mechanism without special training because the mechanism is assembled and tuned using special method.

##### 9.2

Storage: avoid storing the mechanism in high temperature, heavy wet and dusty place.

- 
- 9.3 Handling: avoid extra force to the mechanism when handling.
- 9.4 Static-proof action should be taken when touch the mechanism since LD and OEIC can be easily damaged by static.
- 9.5 Hand touch pickup is forbidden.
- 9.6 Must avoid laser beam shooting at eyes directly since the laser beam can hurt eyes.
10. Attachment
- 10.1 《Model Description in detail》
- 10.2 《Appearance drawing of DL-06》
- 10.3 《Mechanism schematic diagram of DL-06, set in PCB of customer》
- 10.4 《customer Servo PCB of DL-06》
- 10.5 《Package specification of DL-06》
- 10.6 《Guide of Mechanism installation and cantions on assembly》
- 10.7 《installation screw》



## 10.1 《Model of list》

Series No.	Model No.	Pick-Up	SPINDLE MOTOR	Loading motor:	Sled motor:
1	DL-06L	PVR-520T (MITSUMI)	CCM03-030R1-26 O (Moretech)	WFF-050SB-102 00	WRF-300CA-09 600
2	DL-06LH	HOP-1200 (HITACHI)	Same as above	Same as above	Same as above
3	DL-06H	HOP-1200 (HITACHI)	Same as above	Same as above	Same as above
4	DL-06LS	SF-HD62(65) (SANYO)	Same as above	Same as above	Same as above
5	DL-06LS- M	SF-HD62 (65) (SANYO)	Same as above	Same as above	Same as above
6	DL-06LW	PVR-502W (MITSUMI)	Same as above	Same as above	Same as above

## TFT LCD Preliminary Specification

# MODEL NO.: V270B1 - L01

LCD TV Head Division			
AVP	郭振隆		
QRA Dept.	TVHD / PDD		
	DDIII	DDII	DDI
	Approval	Approval	Approval
陳永一	李汪洋	藍文錦	林文聰
LCD TV Marketing and Product Management Division			
Product Manager	陳立宜 謝芳宜		

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**REVISION HISTORY**

<b>Version</b>	<b>Date</b>	<b>Page (New)</b>	<b>Section</b>	<b>Description</b>
Ver 1.0	Jun. 15,'05	All	All	Preliminary Specification was first issued.

## 1. GENERAL DESCRIPTION

### 1.1 OVERVIEW

V270B1- L01 is a TFT Liquid Crystal Display module with 14-CCFL Backlight unit and 1ch-LVDS interface. The display diagonal is 27". This module supports 1366 x 768 WXGA format and can display true 16.7M colors(8-bits colors). The inverter module for backlight is built-in.

### 1.2 FEATURES

- Excellent brightness (550 nits)
- Ultra high contrast ratio (1000:1)
- Fast response time (8ms)
- High color saturation NTSC 75%
- WXGA (1366 x 768 pixels) resolution
- DE (Data Enable) only mode
- LVDS (Low Voltage Differential Signaling) interface
- Optimized response time for both 50/60 Hz frame rate
- Ultra wide viewing angle: 176(H)/176(V) (CR>20) Super MVA technology
- 180 degree rotation display option
- Low color shift function option
- Color reproduction (Nature color)

### 1.3 APPLICATION

- TFT LCD TVs
- High brightness, multi-media displays

### 1.4 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	596.259 (H) x 335.232 (V) (27" diagonal)	mm	(1)
Bezel Opening Area	603.22 (H) x 341.98 (V)	mm	
Driver Element	a-si TFT active matrix	-	
Pixel Number	1366 x R.G.B. x 768	pixel	
Pixel Pitch (Sub Pixel)	0.1460 (H) x 0.4365 (V)	mm	
Pixel Arrangement	RGB vertical stripe	-	
Display Colors	16.7M	color	
Display Operation Mode	Transmissive mode / Normally black	-	
Surface Treatment	Hardness : 3H, Haze : 40% Anti-reflective coating < 2% reflection	-	

### 1.5 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note	
Module Size	Horizontal(H)	636.85	637.55	638.25	mm	
	Vertical(V)	379.1	379.8	380.5	mm	
	Depth(D)	33.9	35.4	36.9	mm	To PCB cover
	Depth(D)	39.2	40.7	42.2	mm	To inverter cover
Weight	3700	4000	4300	g		

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

## 2. ABSOLUTE MAXIMUM RATINGS

### 2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T <sub>ST</sub>	-20	+60	°C	(1)
Operating Ambient Temperature	T <sub>OP</sub>	0	+50	°C	(1), (2)
Shock (Non-Operating)	S <sub>NOF</sub>	-	50	G	(3), (5)
Vibration (Non-Operating)	V <sub>NOF</sub>	-	1.0	G	(4), (5)

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

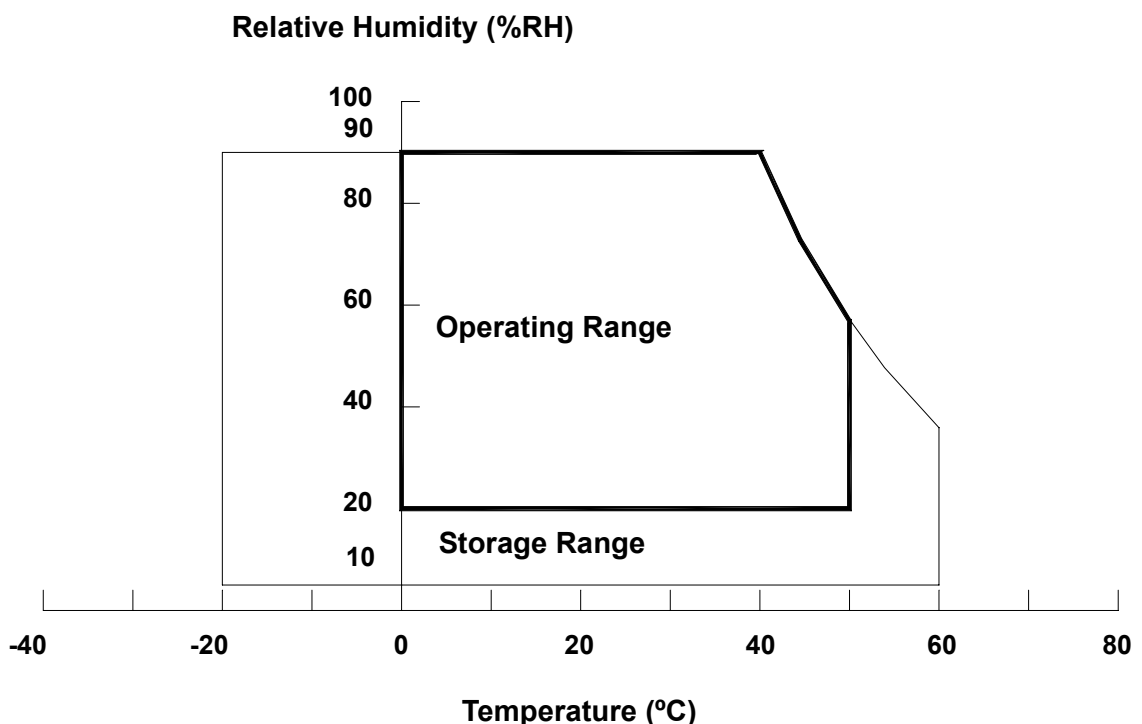
- (a) 90 %RH Max. (Ta ≤ 40 °C).
- (b) Wet-bulb temperature should be 39 °C Max. (Ta > 40 °C).
- (c) No condensation.

Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 60 °C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 60 °C. The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half sine wave, 1 time for ± X, ± Y, ± Z.

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

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



## 2.2 ELECTRICAL ABSOLUTE RATINGS

### 2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V <sub>CC</sub>	-0.3	6.0	V	(1)
Input Signal Voltage	V <sub>IN</sub>	-0.3	3.6	V	

### 2.2.2 BACKLIGHT UNIT

Item	Symbol	Test Condition	Min.	Type	Max.	Unit	Note
Lamp Voltage	V <sub>W</sub>	T <sub>a</sub> = 25	-	-	3000	V <sub>RMS</sub>	
Power Supply Voltage	V <sub>BL</sub>	-	0	-	30	V	(1)
Control Signal Level	-	-	-0.3	-	7	V	(1), (3)

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Functional operation should be restricted to the conditions described under normal operating conditions.

Note (2) No moisture condensation or freezing.

Note (3) The control signals includes Backlight On/Off Control, Internal PWM Control, External PWM Control and Internal/External PWM Selection.

### 3. ELECTRICAL CHARACTERISTICS

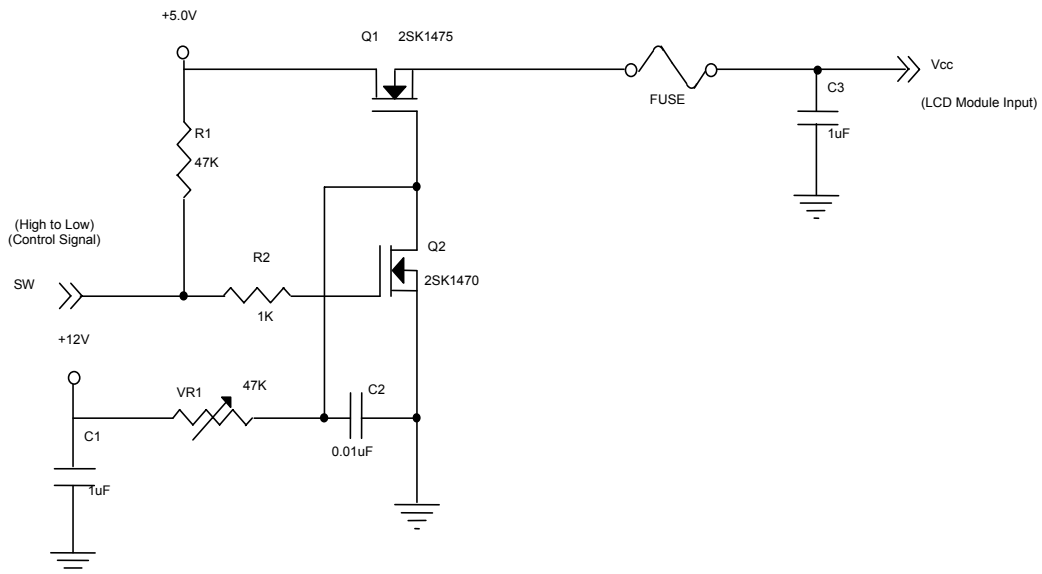
#### 3.1 TFT LCD MODULE

Ta = 25 ± 2 °C

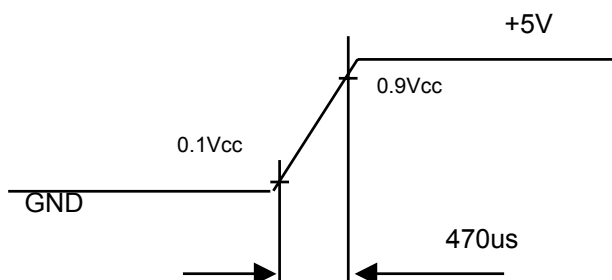
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V <sub>CC</sub>	4.5	5.0	5.5	V	(1)
Power Supply Ripple Voltage		V <sub>RP</sub>	-	-	150	mV	
Rush Current		I <sub>RUSH</sub>	-	-	3.0	A	(2)
Power Supply Current	White	I <sub>CC</sub>	-	1.8	-	A	(3)
	Black		-	1.2	-	A	
	Vertical Stripe		-	1.65	-	A	
LVDS Interface	Differential Input High Threshold Voltage	V <sub>LVTH</sub>	-	-	+100	mV	
	Differential Input Low Threshold Voltage	V <sub>LVTL</sub>	-100	-	-	mV	
	Common Input Voltage	V <sub>LVC</sub>	1.125	1.25	1.375	V	
	Terminating Resistor	R <sub>T</sub>		100		ohm	
CMOS interface	Input High Threshold Voltage	V <sub>IH</sub>	2.7	-	3.3	V	
	Input Low Threshold Voltage	V <sub>IL</sub>	0	-	0.7	V	

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

Note (2) Measurement Conditions:



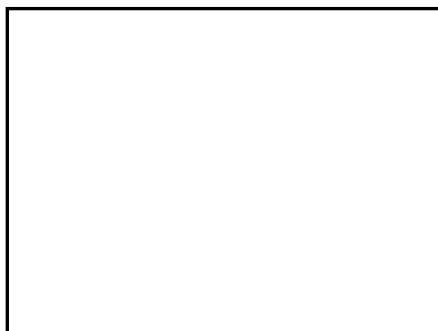
**Vcc rising time is 470us**





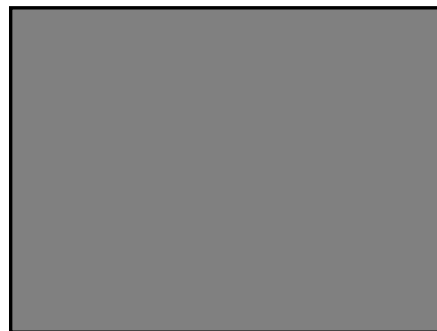
Note (3) The specified power supply current is under the conditions at  $V_{cc} = 5\text{ V}$ ,  $T_a = 25 \pm 2\text{ }^\circ\text{C}$ ,  $f_v = 60\text{ Hz}$ , whereas a power dissipation check pattern below is displayed.

a. White Pattern



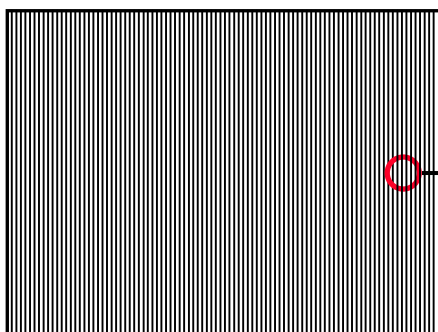
Active Area

b. Black Pattern

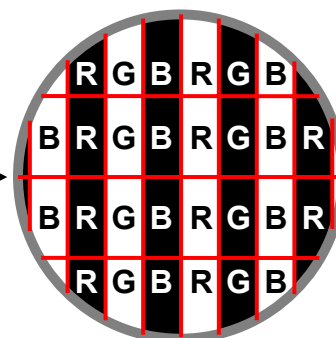


Active Area

c. Vertical Stripe Pattern



Active Area



### 3.2 BACKLIGHT INVERTER UNIT

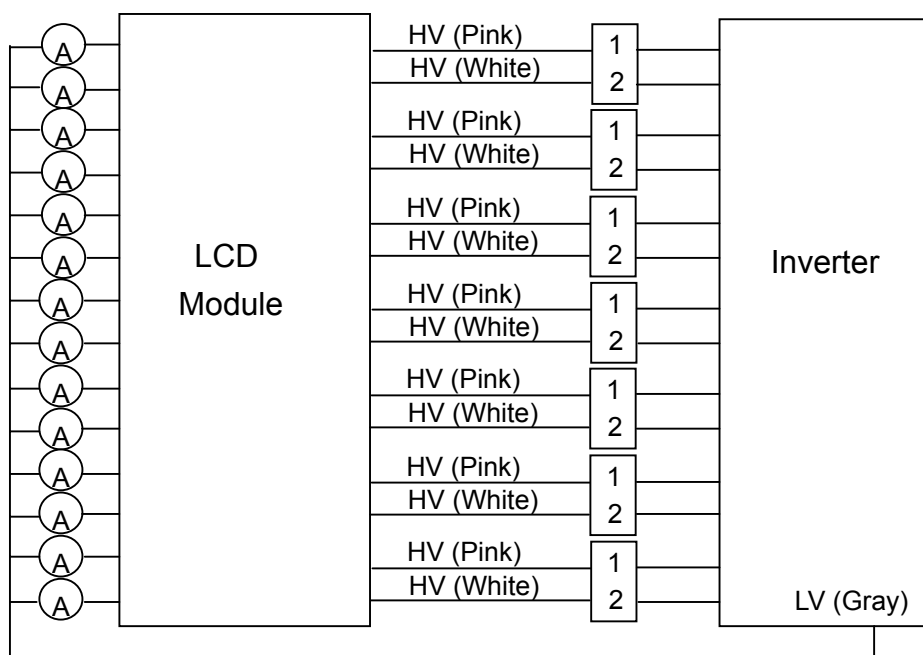
#### 3.2.1 CCFL (Cold Cathode Fluorescent Lamp) CHARACTERISTICS ( $T_a = 25 \pm 2\text{ }^\circ\text{C}$ )

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Voltage	$V_w$	-	1120	-	$V_{RMS}$	$I_L = 4.7\text{mA}$
Lamp Current	$I_L$	4.2	4.7	5.2	$\text{mA}_{RMS}$	(1)
Lamp Starting Voltage	$V_s$	-	-	1650	$V_{RMS}$	(2), $T_a = 0\text{ }^\circ\text{C}$
		-	-	1500	$V_{RMS}$	(2), $T_a = 25\text{ }^\circ\text{C}$
Operating Frequency	$F_o$	50	-	70	KHz	(3)
Lamp Life Time	$L_{BL}$	50,000	60,000	-	Hrs	(4)

### 3.2.2 INVERTER CHARACTERISTICS (Ta = 25 ± 2 °C)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Consumption	P <sub>BL</sub>	-	92	-	W	(5), I <sub>L</sub> = 4.7mA
Power Supply Voltage	V <sub>BL</sub>	22.8	24	25.2	V <sub>DC</sub>	
Power Supply Current	I <sub>BL</sub>	-	3.8	-	A	Non Dimming
Input Ripple Noise	-	-	-	500	mV <sub>P-P</sub>	V <sub>BL</sub> = 22.8V
Backlight Turn on Voltage	V <sub>BS</sub>	1790	-	-	V <sub>RMS</sub>	Ta = 0 °C
		1200	-	-	V <sub>RMS</sub>	Ta = 25 °C
Oscillating Frequency	F <sub>W</sub>	53	56	59	kHz	
Dimming Frequency	F <sub>B</sub>	150	160	170	Hz	
Minimum Duty Ratio	D <sub>MIN</sub>	-	10	-	%	

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



Note (2) The lamp starting voltage V<sub>s</sub> should be applied to the lamp for more than 1 second under starting up duration. Otherwise the lamp could not be lighted on completed.

Note (4) The life time of a lamp is defined as when the brightness is larger than 50% of its original value and the effective discharge length is longer than 80% of its original length (Effective discharge length is defined as an area that has equal to or more than 70% brightness compared to the brightness at the center point.) as the time in which it continues to operate under the condition  $T_a = 25 \pm 2$  and  $I_L = 4.2 \sim 5.2 \text{ mA}_{\text{RMS}}$ .

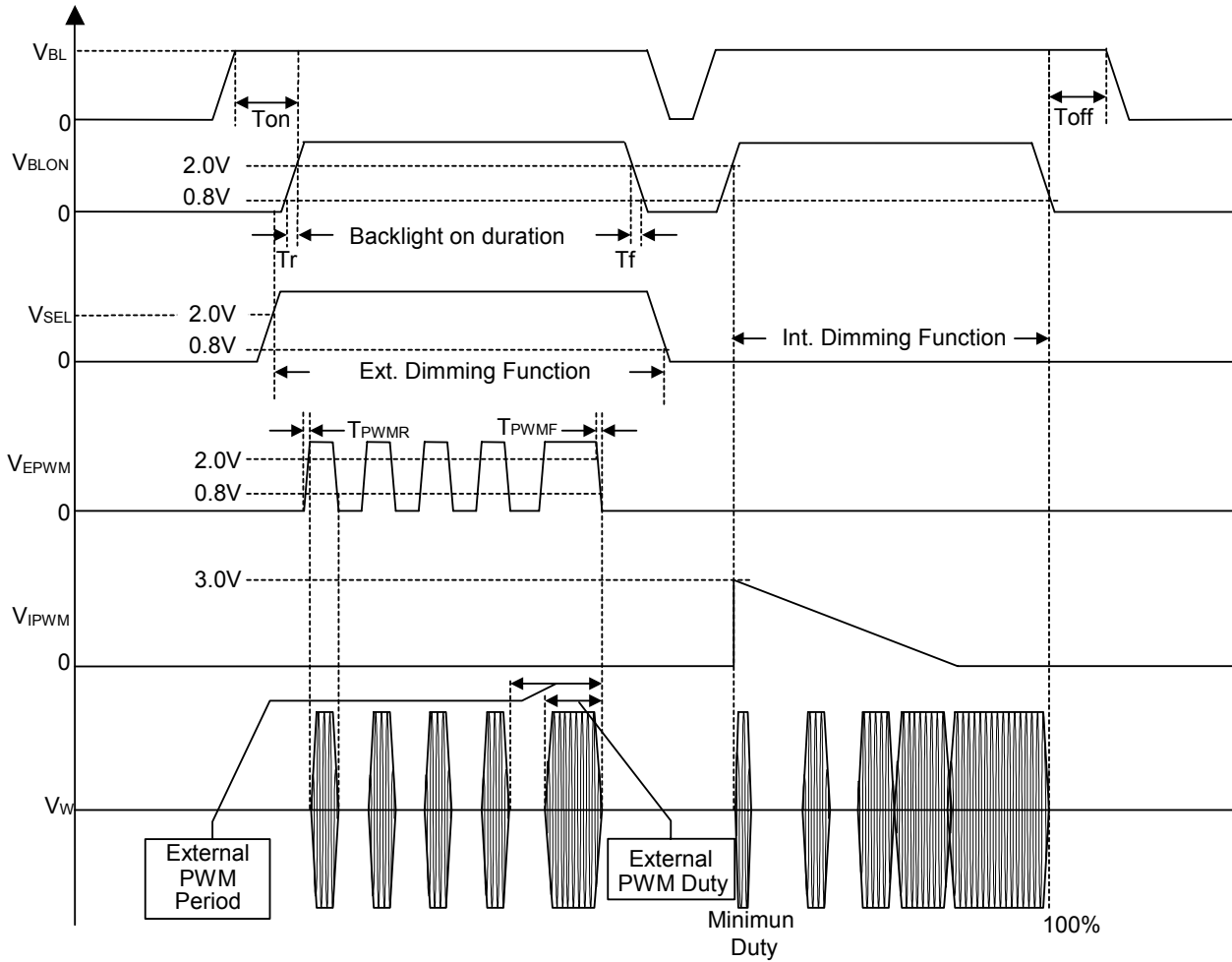
Note (5) The power supply capacity should be higher than the total inverter power consumption  $P_{\text{BL}}$ . Since the pulse width modulation (PWM) mode was applied for backlight dimming, the driving current changed as PWM duty on and off. The transient response of power supply should be considered for the changing loading when inverter dimming.

### 3.2.3 INVERTER INTERFACE CHARACTERISTICS

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit	Note	
On/Off Control Voltage	ON	$V_{\text{BLON}}$	-	2.0	-	5.0	V	
	OFF		-	0	-	0.8	V	
Internal/External PWM Select Voltage	HI	$V_{\text{SEL}}$	-	2.0	-	5.0	V	
	LO		-	0	-	0.8	V	
Internal PWM Control Voltage	MAX	$V_{\text{IPWM}}$	$V_{\text{SEL}} = \text{L}$	-	-	3.0	V	minimum duty ratio
	MIN			-	0	-	V	maximum duty ratio
External PWM Control Voltage	HI	$V_{\text{EPWM}}$	$V_{\text{SEL}} = \text{H}$	2.0	-	5.0	V	duty on
	LO			0	-	0.8	V	duty off
Control Signal Rising Time	$T_r$	-	-	-	100	ms		
Control Signal Falling Time	$T_f$	-	-	-	100	ms		
PWM Signal Rising Time	$T_{\text{PWMR}}$	-	-	-	50	us		
PWM Signal Falling Time	$T_{\text{PWMF}}$	-	-	-	50	us		
Input impedance	$R_{\text{IN}}$	-	1	-	-	M		
BLON Delay Time	$T_{\text{on}}$	-	1	-	-	ms		
BLON Off Time	$T_{\text{off}}$	-	1	-	-	ms		

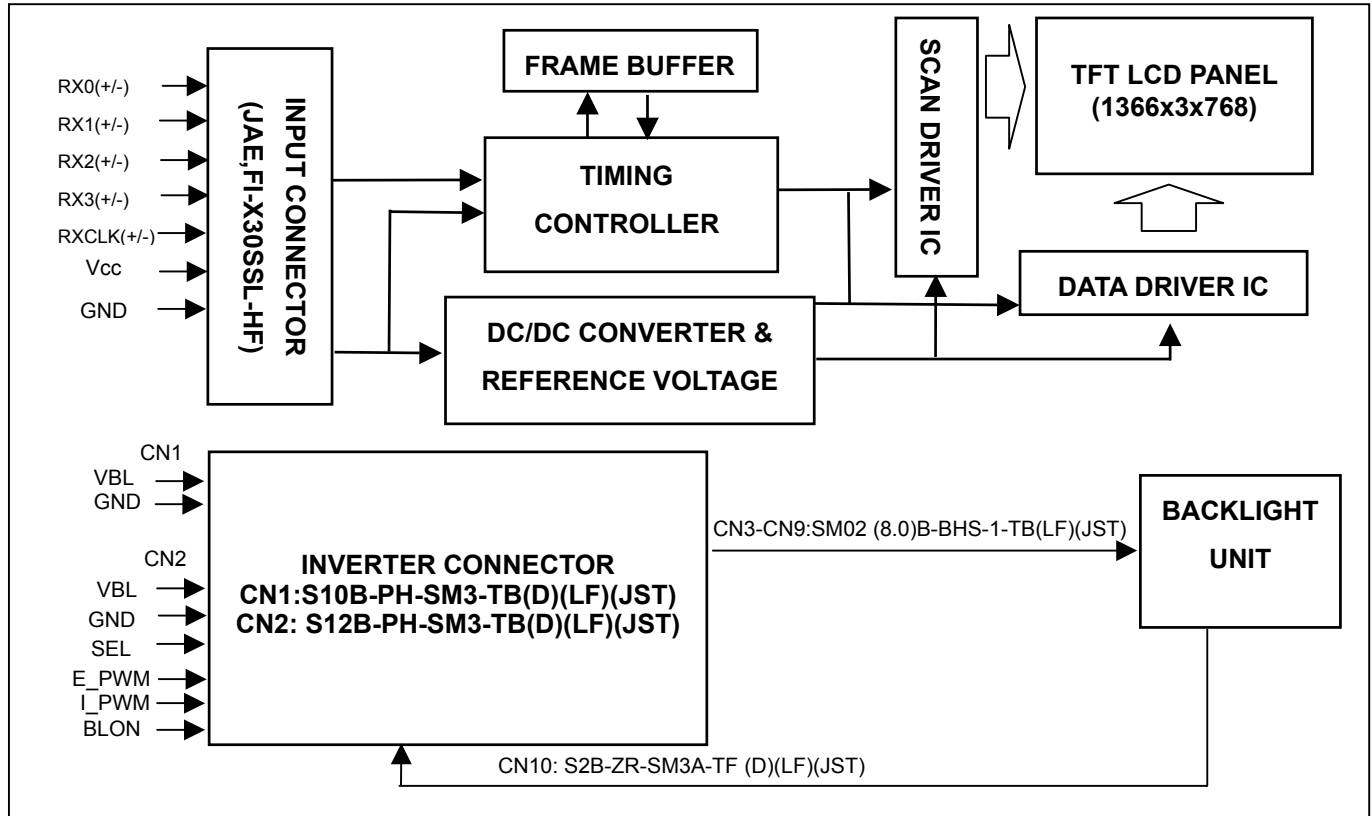
Note (1) The SEL signal should be valid before backlight turns on by BLON signal. It is inhibited to change the internal/external PWM selection (SEL) during backlight turn on period.

Note (2) The power sequence and control signal timing are shown as the following figure.



## 4. BLOCK DIAGRAM

### 4.1 TFT LCD MODULE



## 5. INTERFACE PIN CONNECTION

### 5.1 TFT LCD MODULE

#### CNF1 Connector Pin Assignment

Pin No.	Symbol	Description	Note
1	GND	Ground	
2	RPF	Display Rotation	(3)
3	SELLVDS	Select LVDS data format	(5)
4	NC	No Connection	(2)
5	NC	No Connection	
6	ODSEL	Overdrive Lookup Table Selection	(4)
7	EN LCS	Low Color Shift	(6)
8	GND	Ground	
9	RX0-	Negative transmission data of pixel 0	
10	RX0+	Positive transmission data of pixel 0	
11	RX1-	Negative transmission data of pixel 1	
12	RX1+	Positive transmission data of pixel 1	
13	RX2-	Negative transmission data of pixel 2	
14	RX2+	Positive transmission data of pixel 2	
15	RXCLK-	Negative of clock	
16	RXCLK+	Positive of clock	
17	RX3-	Negative transmission data of pixel 3	
18	RX3+	Positive transmission data of pixel 3	
19	GND	Ground	
20	GND	Ground	
21	GND	Ground	
22	GND	Ground	
23	GND	Ground	
24	GND	Ground	
25	GND	Ground	
26	VCC	Power supply: +5V	
27	VCC	Power supply: +5V	
28	VCC	Power supply: +5V	
29	VCC	Power supply: +5V	
30	VCC	Power supply: +5V	

Note (1) Connector Part No.: FI-X30SSL-HF(JAE) or compatible

Note (2) Reserved for internal use. Left it open.

Note (3) Low : normal display (default), High : display with 180 degree rotation

Note (4) Overdrive lookup table selection. The Overdrive lookup table should be selected in accordance to the frame rate to optimize image quality.

ODSEL	Note
L	Lookup table was optimized for 60 Hz frame rate.
H	Lookup table was optimized for 50 Hz frame rate.

Note (5) Please refer to 5.5 LVDS INTERFACE (Page 17)

Note (6) Enable Low color shift function.

EN LCS	Note
L	Low color shift off
H	Low color shift on

## 5.2 BACKLIGHT UNIT

The pin configuration for the housing and leader wire is shown in the table below.

CN3-CN9 (Housing): BHR-03VS-1 (JST)

Pin No.	Symbol	Description	Wire Color
1	HV	High Voltage	Pink
2	HV	High Voltage	White

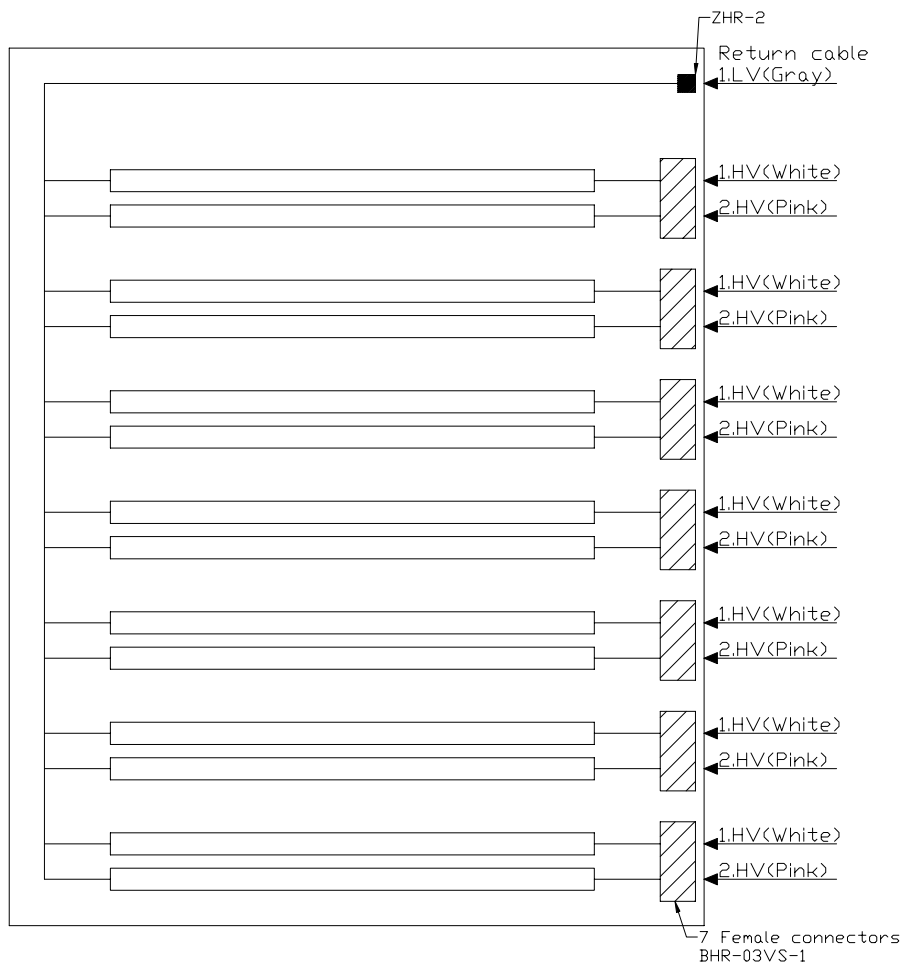
Note (1) The backlight interface housing for high voltage side is a model BHR-03VS-1, manufactured by JST.

The mating header on inverter part number is SM02(8.0)B-BHS-1-TB(LF) or equivalent.

CN10 (Housing): ZHR-2 (JST) or equivalent

Pin No.	Symbol	Description	Wire Color
1	LV	Low Voltage (+)	Gray
2	NC	No Connection	-

Note (2) The backlight interface housing and return cable for low voltage side is a model ZHR-2, manufactured by JST or equivalent. The mating header on inverter part number is S2B-ZR-SM3A-TF(D)(LF) or equivalent.



### 5.3 INVERTER UNIT

CN1(Header):S10B-PH-SM3-TB(D)(LF)(JST) or equivalent.

Pin	Name	Description
1	VBL	+24V Power input
2		
3		
4		
5		
6	GND	Ground
7		
8		
9		
10		

CN2(Header): S12B-PH-SM3-TB(D)(LF)(JST) or equivalent.

Pin	Name	Description
1	VBL	+24V Power input
2		
3		
4		
5		
6	GND	Ground
7		
8		
9	SEL	Internal/external PWM selection High : external dimming Low : internal dimming
10	E_PWM	External PWM control signal E_PWM should be connected to low when internal PWM was selected (SEL = low).
11	I_PWM	Internal PWM control signal I_PWM should be connected to ground when external PWM was selected (SEL = high).
12	BLON	Backlight on/off control

CN3-CN9(Header): SM02(8.0)B-BHS-1-TB(LF)(JST) or equivalent

Pin	Name	Description
1	CCFL HOT	CCFL high voltage
2	CCFL HOT	CCFL high voltage

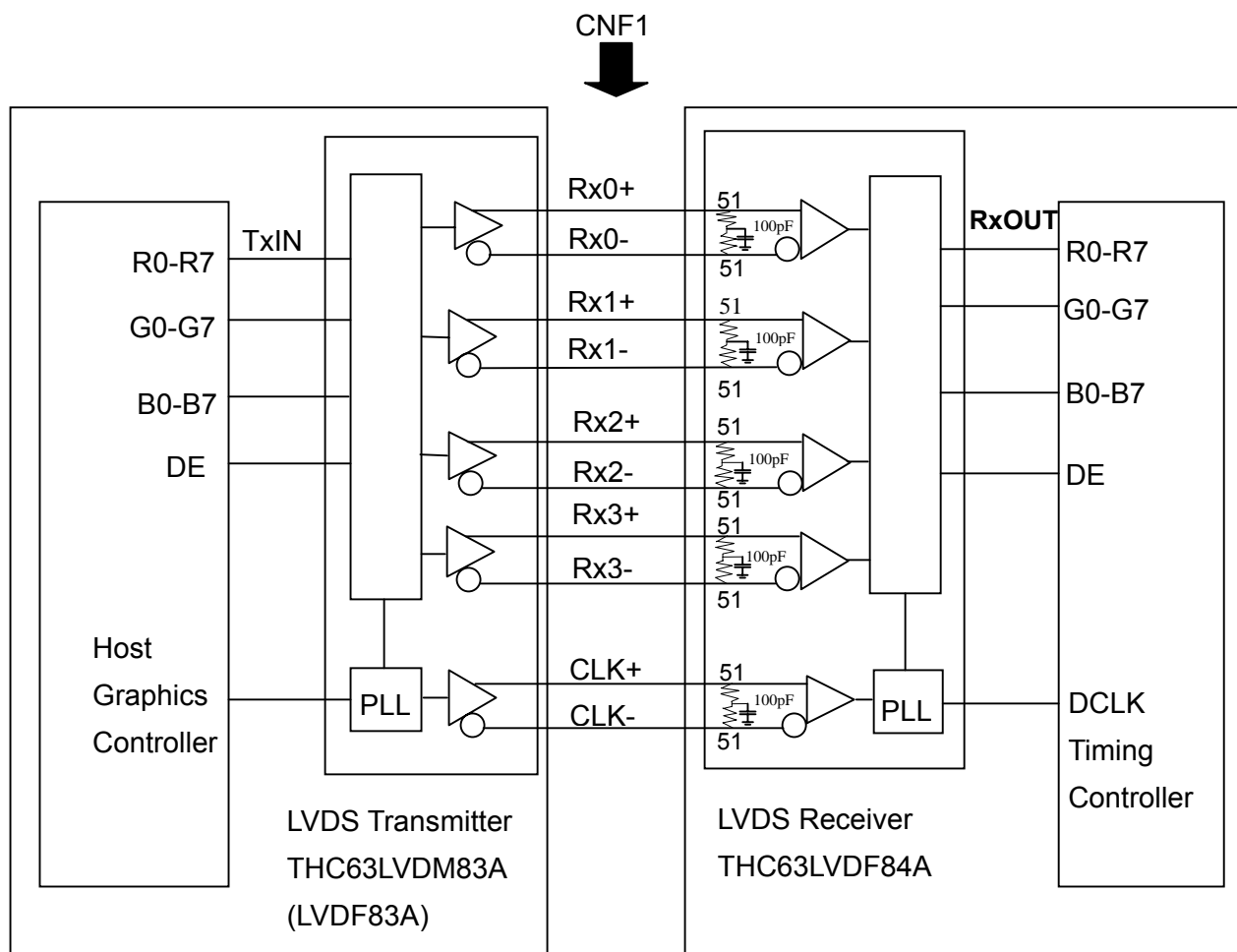
CN10(Header): S2B-ZR-SM3A-TF(D)(LF)(JST) or equivalent

Pin	Name	Description
1	CCFL COLD	CCFL low voltage
2	NC	-

Note (1) Floating of any control signal is not allowed.



### 5.4 BLOCK DIAGRAM OF INTERFACE



- R0~R7 : Pixel R Data ,
- G0~G7 : Pixel G Data ,
- B0~B7 : Pixel B Data ,
- DE : Data enable signal

Note (1) The system must have the transmitter to drive the module.

Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

### 5.5 LVDS INTERFACE

	SIGNAL		TRANSMITTER THC63LVDM83A		INTERFACE CONNECTOR		RECEIVER THC63LVDF84A		TFT CONTROL INPUT			
	SELLVDS =L	SELLVDS =H	PIN	INPUT	Host	TFT-LCD	PIN	OUTPUT	SELLVDS =L	SELLVDS =H		
24 bit	R0	R2	51	TxIN0	TA OUT0+	Rx 0+	27	Rx OUT0	R0	R2		
	R1	R3	52	TxIN1			29	Rx OUT1	R1	R3		
	R2	R4	54	TxIN2			30	Rx OUT2	R2	R4		
	R3	R5	55	TxIN3			32	Rx OUT3	R3	R5		
	R4	R6	56	TxIN4			33	Rx OUT4	R4	R6		
	R5	R7	3	TxIN6			TA OUT0-	Rx 0-	35	Rx OUT6	R5	R7
	G0	G2	4	TxIN7			TA OUT1+	Rx 1+	37	Rx OUT7	G0	G2
	G1	G3	6	TxIN8	38	Rx OUT8			G1	G3		
	G2	G4	7	TxIN9	39	Rx OUT9			G2	G4		
	G3	G5	11	TxIN12	43	Rx OUT12			G3	G5		
	G4	G6	12	TxIN13	45	Rx OUT13			G4	G6		
	G5	G7	14	TxIN14	46	Rx OUT14			G5	G7		
	B0	B2	15	TxIN15	TA OUT1-	Rx 1-			47	Rx OUT15	B0	B2
	B1	B3	19	TxIN18	TA OUT2+	Rx 2+	51	Rx OUT18	B1	B3		
	B2	B4	20	TxIN19			53	Rx OUT19	B2	B4		
	B3	B5	22	TxIN20			54	Rx OUT20	B3	B5		
	B4	B6	23	TxIN21			55	Rx OUT21	B4	B6		
	B5	B7	24	TxIN22			1	Rx OUT22	B5	B7		
	DE	DE	30	TxIN26			TA OUT2-	Rx 2-	6	Rx OUT26	DE	DE
	R6	R0	50	TxIN27					7	Rx OUT27	R6	R0
	R7	R1	2	TxIN5	34	Rx OUT5			R7	R1		
	G6	G0	8	TxIN10	41	Rx OUT10			G6	G0		
	G7	G1	10	TxIN11	42	Rx OUT11			G7	G1		
	B6	B0	16	TxIN16	TA OUT3+	Rx 3+			49	Rx OUT16	B6	B0
	B7	B1	18	TxIN17	TA OUT3-	Rx 3-			50	Rx OUT17	B7	B1
RSVD 1	RSVD 1	25	TxIN23	2			Rx OUT23	NC	NC			
RSVD 2	RSVD 2	27	TxIN24	3			Rx OUT24	NC	NC			
RSVD 3	RSVD 3	28	TxIN25	5			Rx OUT25	NC	NC			
	DCLK	31	TxCLK IN	TxCLK OUT+			RxCLK IN+	26	RxCLK OUT	DCLK		
				TxCLK OUT-			RxCLK IN-					

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

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

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

DE: Data enable signal

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

### 5.6 COLOR DATA INPUT ASSIGNMENT

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

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

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

## 6. INTERFACE TIMING

### 6.1 INPUT SIGNAL TIMING SPECIFICATIONS

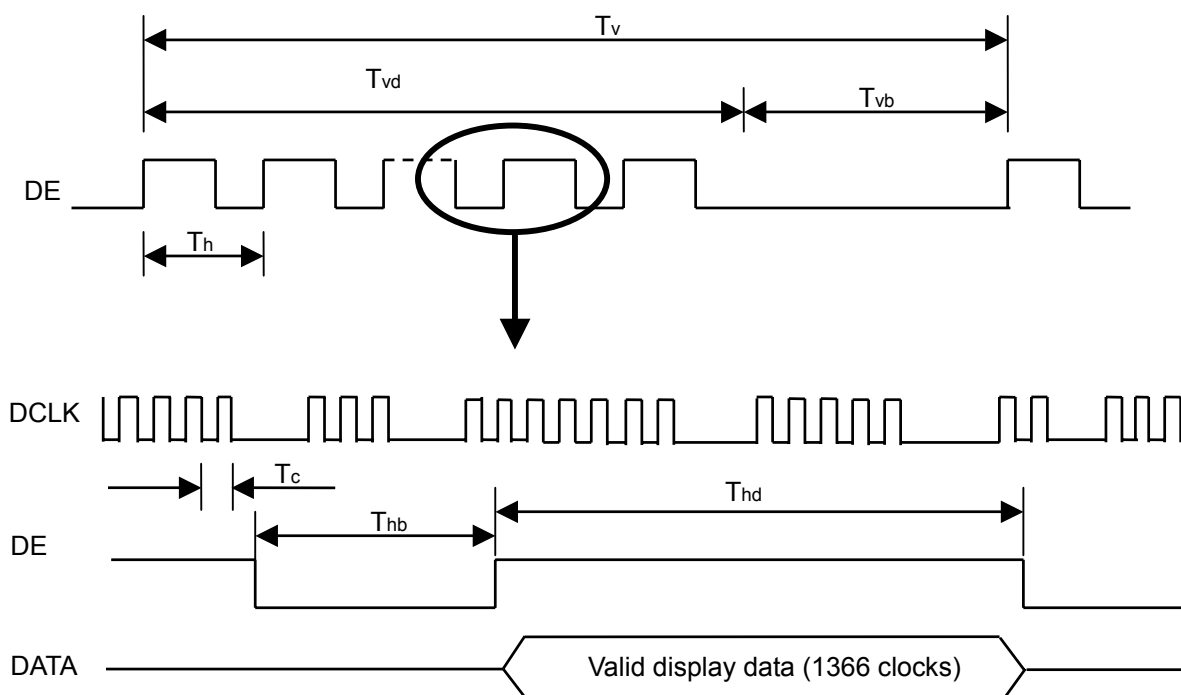
The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	1/Tc	60	86	88	MHz	
	Input cycle to cycle jitter	Trcl	-	-	200	ps	
LVDS Receiver Data	Setup Time	Tlvsu	600	-	-	ps	
	Hold Time	Tlvhd	600	-	-	ps	
Vertical Active Display Term	Frame Rate	Fr5	47	50	53	Hz	(2)
		Fr6	57	60	63	Hz	
	Total	Tv	770	795	888	Th	Tv=Tvd+Tvb
	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	2	27	120	Th	-
Horizontal Active Display Term	Total	Th	1436	1798	1936	Tc	Th=Thd+Thb
	Display	Thd	1366	1366	1366	Tc	-
	Blank	Thb	70	432	570	Tc	-

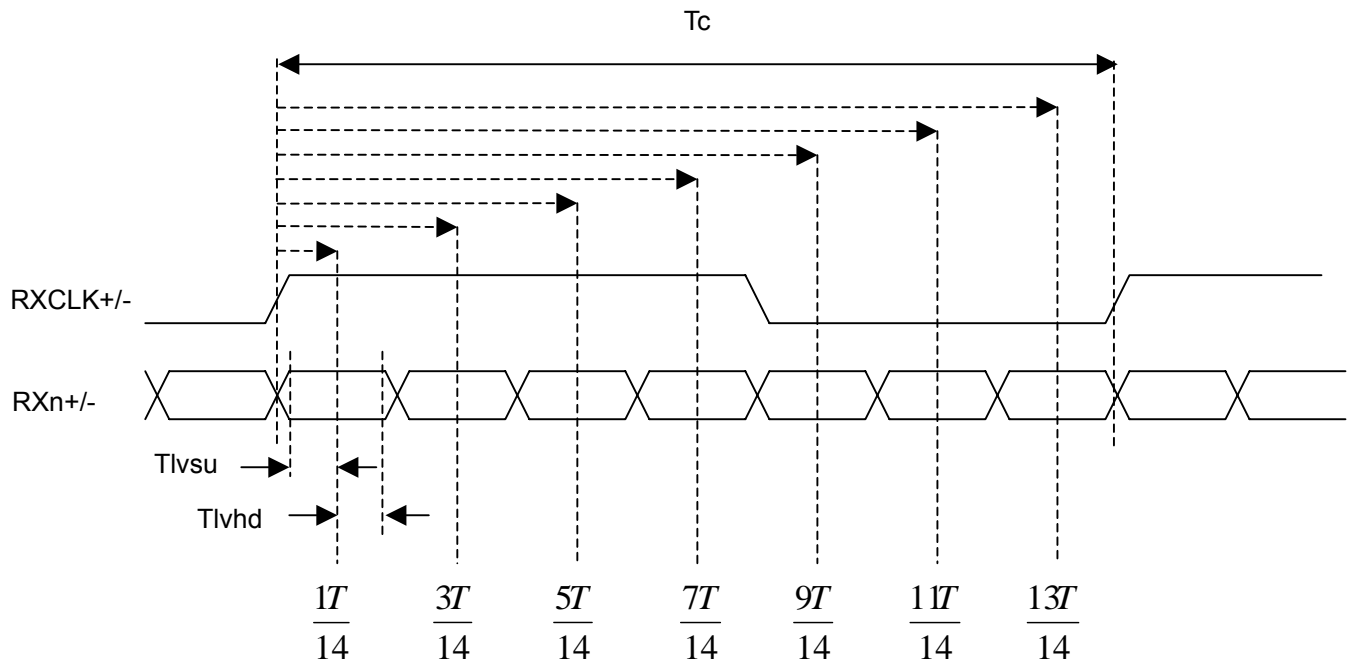
Note (1) Since this module is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this module would operate abnormally.

(2) Please refer to 5.1 for detail information.

### INPUT SIGNAL TIMING DIAGRAM

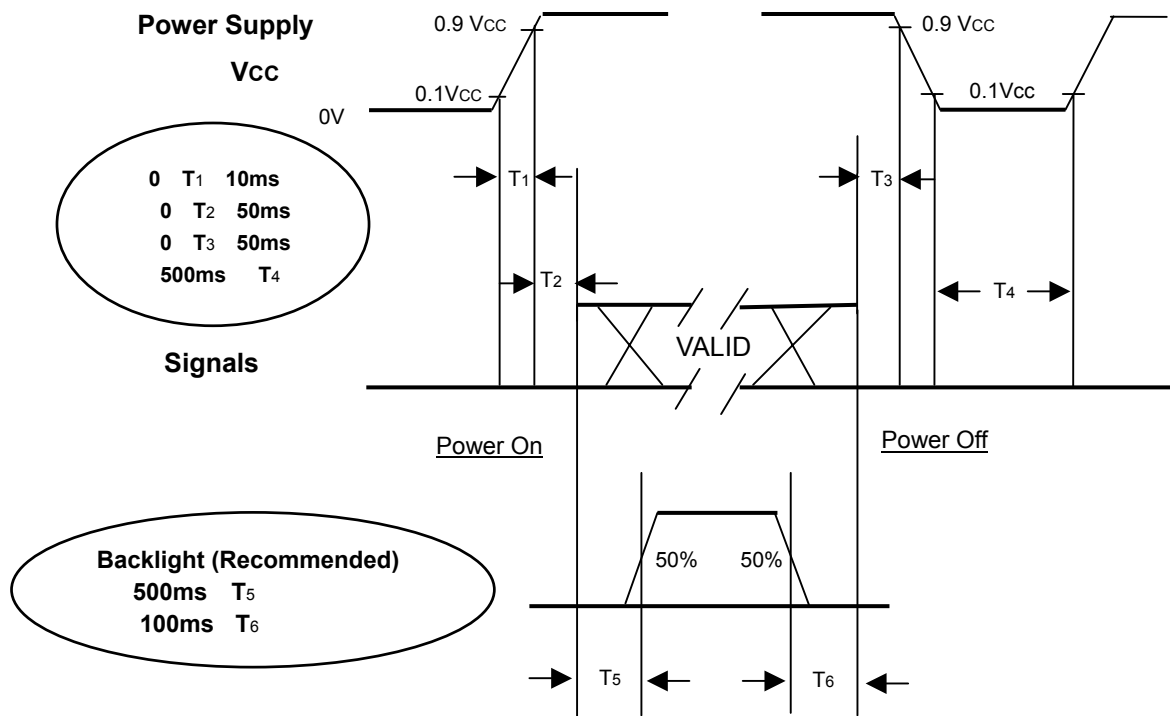


**LVDS RECEIVER INTERFACE TIMING DIAGRAM**



## 6.2 POWER ON/OFF SEQUENCE

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



**Power ON/OFF Sequence**

Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

## 7. OPTICAL CHARACTERISTICS

### 7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V <sub>CC</sub>	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lamp Current	I <sub>L</sub>	4.7 ± 0.5	mA
Oscillating Frequency (Inverter)	F <sub>w</sub>	56 ± 3	KHz

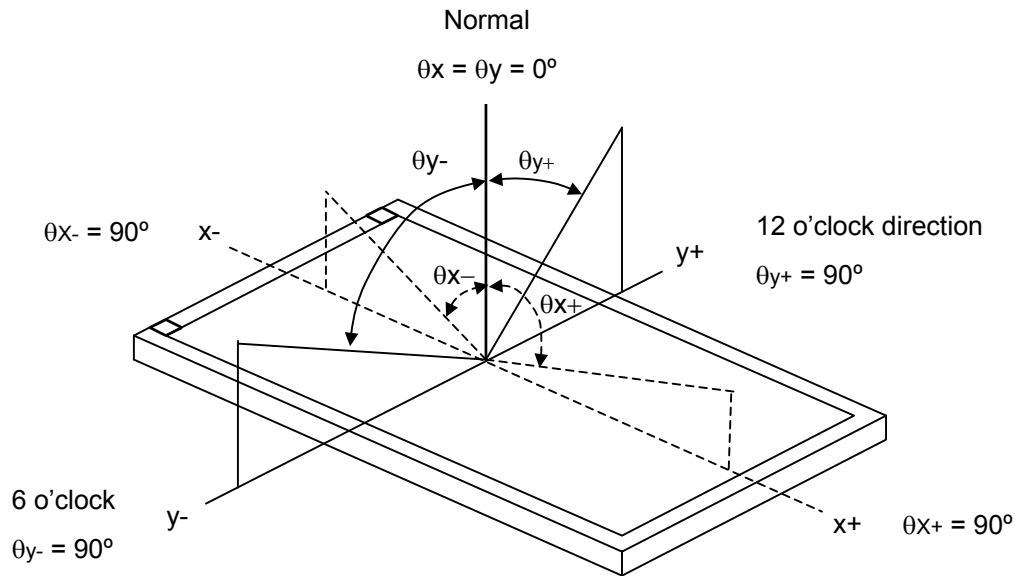
### 7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	Viewing Normal Angle $\theta_x=0^\circ, \theta_y=0^\circ$		(1000)		-	(2)
Response Time		Gray to gray average			(8)		ms	(3)
Center Luminance of White		L <sub>c</sub>			(550)		cd/m <sup>2</sup>	(4)
White Variation		δW				(1.3)	-	(7)
Cross Talk		CT				(4)	%	(5)
Color Chromaticity	Red	R <sub>x</sub>			(0.652)		-	(6)
		R <sub>y</sub>			(0.331)		-	
	Green	G <sub>x</sub>			(0.275)		-	
		G <sub>y</sub>			(0.597)		-	
	Blue	B <sub>x</sub>			(0.143)		-	
		B <sub>y</sub>		(0.063)		-		
	White	W <sub>x</sub>		(0.285)		Target		
W <sub>y</sub>		(0.293)						
Color Gamut		CG		(75)		%	NTSC	
Viewing Angle	Horizontal	θ <sub>x+</sub>	CR≥20		(88)		Deg.	(1)
		θ <sub>x-</sub>			(88)			
	Vertical	θ <sub>y+</sub>			(88)			
		θ <sub>y-</sub>			(88)			

Note (1) Definition of Viewing Angle ( $\theta_x, \theta_y$ ):

Viewing angles are measured by EZ-Contrast 160R (Eldim)



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

The contrast ratio can be calculated by the following expression.

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

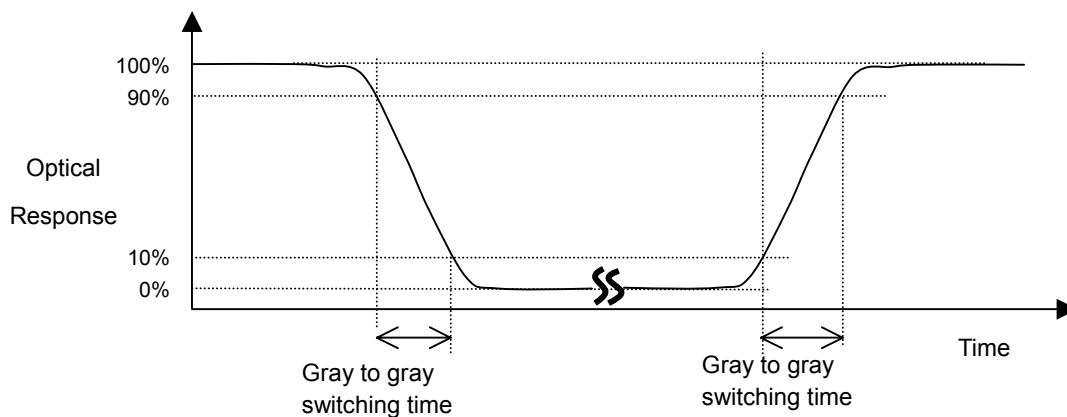
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (7).

Note (3) Definition of Gray to Gray Switching Time :



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

Gray to gray average time means the average switching time of gray level 0, 63, 127, 191, 255 to each other .



Note (4) Definition of Luminance of White ( $L_C, L_{AVE}$ ):

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

$$L_C = L(5)$$

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

$L(x)$  is corresponding to the luminance of the point X at the figure in Note (7).

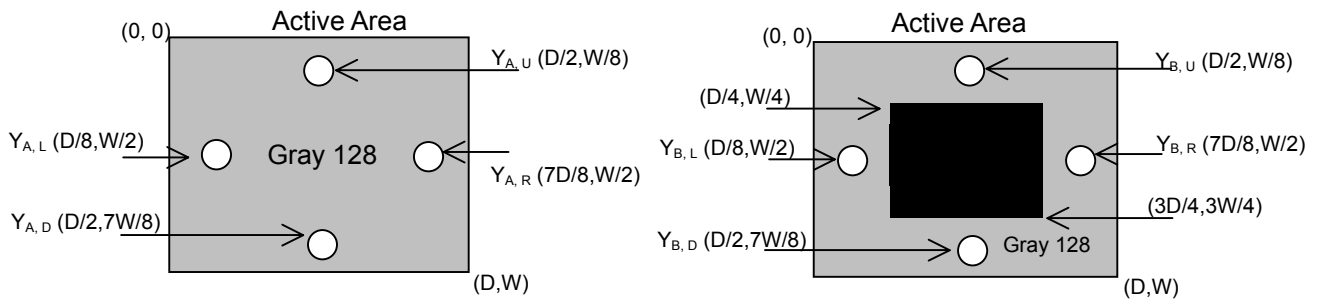
Note (5) Definition of Cross Talk (CT):

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

Where:

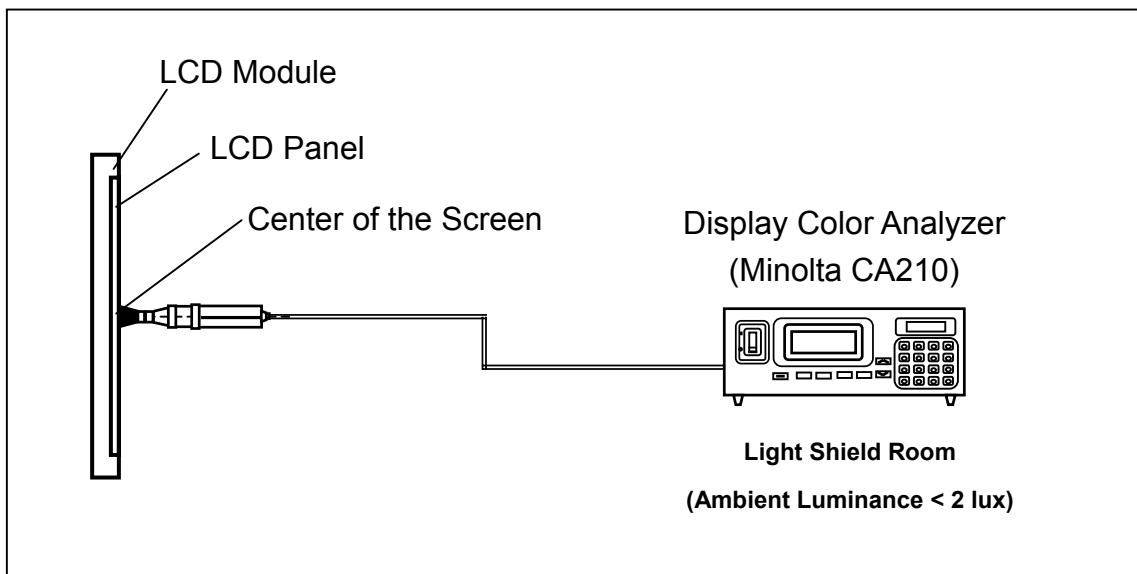
$Y_A$  = Luminance of measured location without gray level 0 pattern ( $cd/m^2$ )

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



Note (6) Measurement Setup:

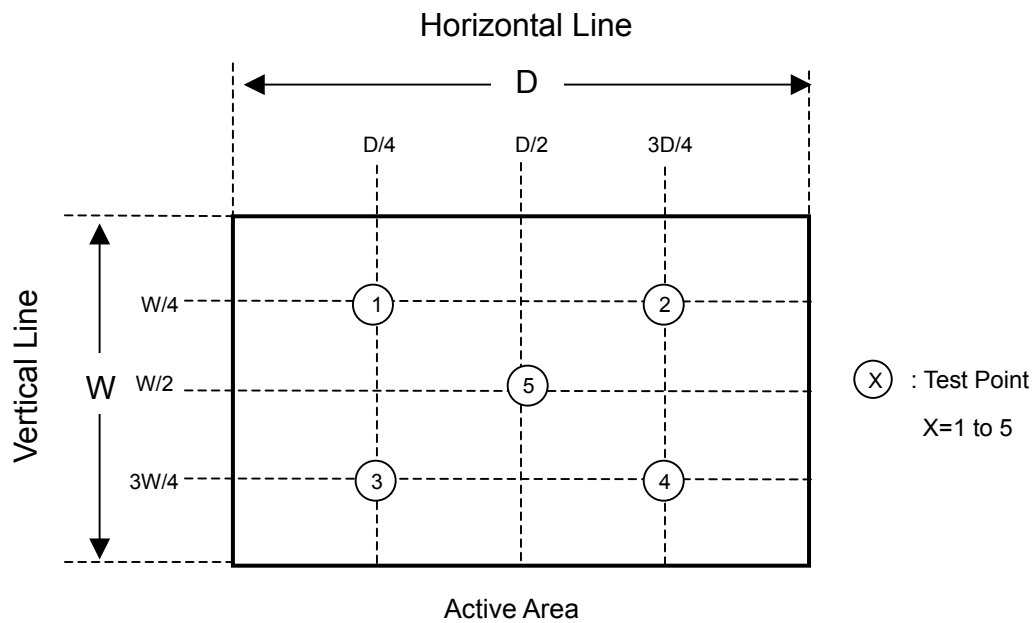
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



Note (7) Definition of White Variation ( $\delta W$ ):

Measure the luminance of gray level 255 at 5 points

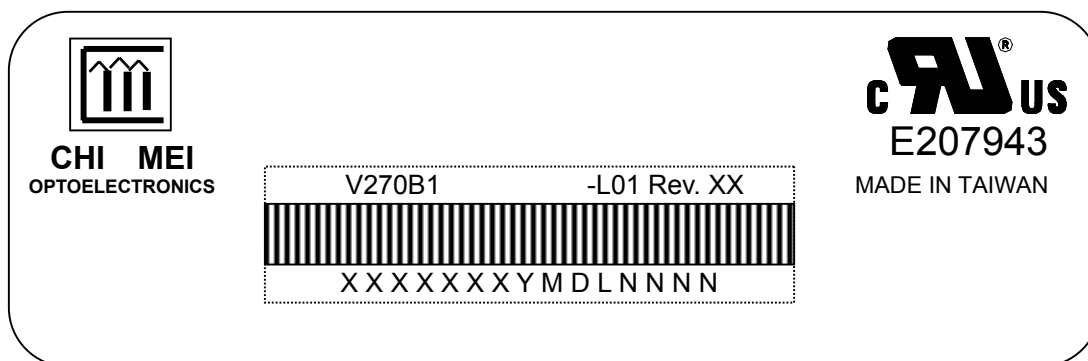
$$\delta W = \text{Maximum } [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum } [L(1), L(2), L(3), L(4), L(5)]$$



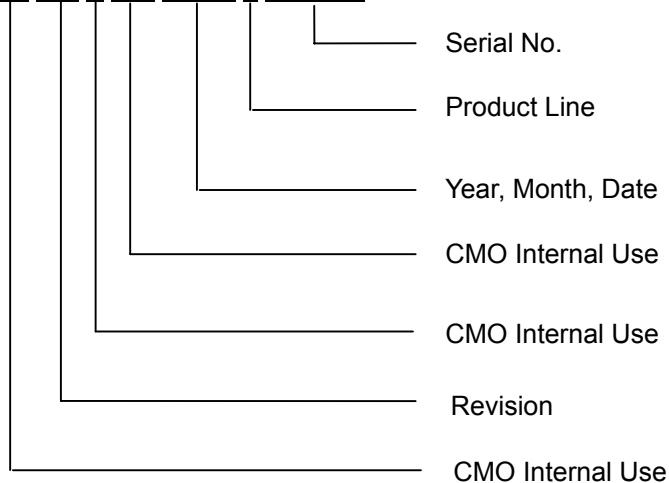
## 8. DEFINITION OF LABELS

### 8.1 CMO MODULE LABEL

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



- (a) Model Name: V270B1-L01
- (b) Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.
- (c) Serial ID: XXXXXXXXYMDLNNNN



Serial ID includes the information as below:

- (a) Manufactured Date: Year: 1~9, for 2001~2009  
 Month: 1~9, A~C, for Jan. ~ Dec.  
 Day: 1~9, A~Y, for 1<sup>st</sup> to 31<sup>st</sup>, exclude I, O, and U.
- (b) Revision Code: Cover all the change
- (c) Serial No.: Manufacturing sequence of product
- (d) Product Line: 1 -> Line1, 2 -> Line 2, ...etc.

## 9. PACKAGING

### 9.1 PACKING SPECIFICATIONS

- (1) 4 LCD TV modules / 1 Box
- (2) Box dimensions : 742(L) X 327 (W) X 510 (H)
- (3) Weight : approximately 19Kg ( 4 modules per box)

### 9.2 PACKING METHOD

Figures 9-1 and 9-2 are the packing method

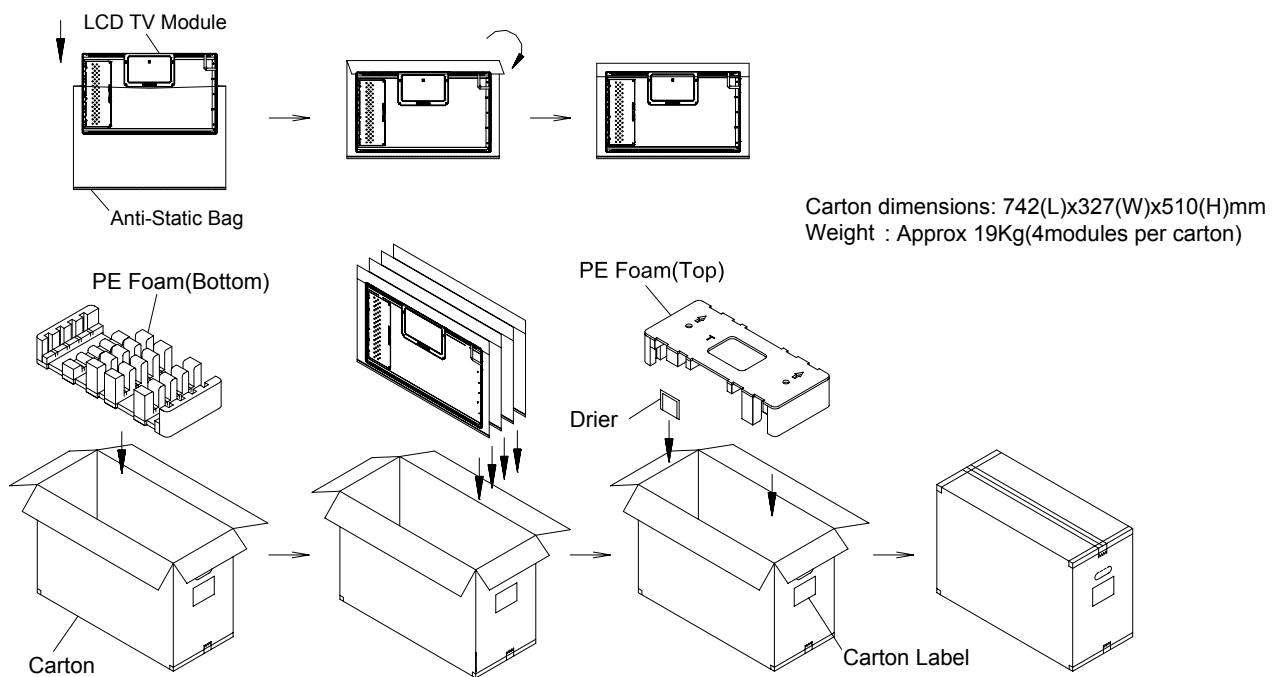


Figure.9-1 packing method

Corner Protector:L1020\*50mm\*50mm  
Pallet:L1100\*W1100\*H135mm  
Corrugated Fiberboard:L1100\*W1100mm  
Pallet Stack:L1100\*W1100\*H1160mm  
Gross:168kg

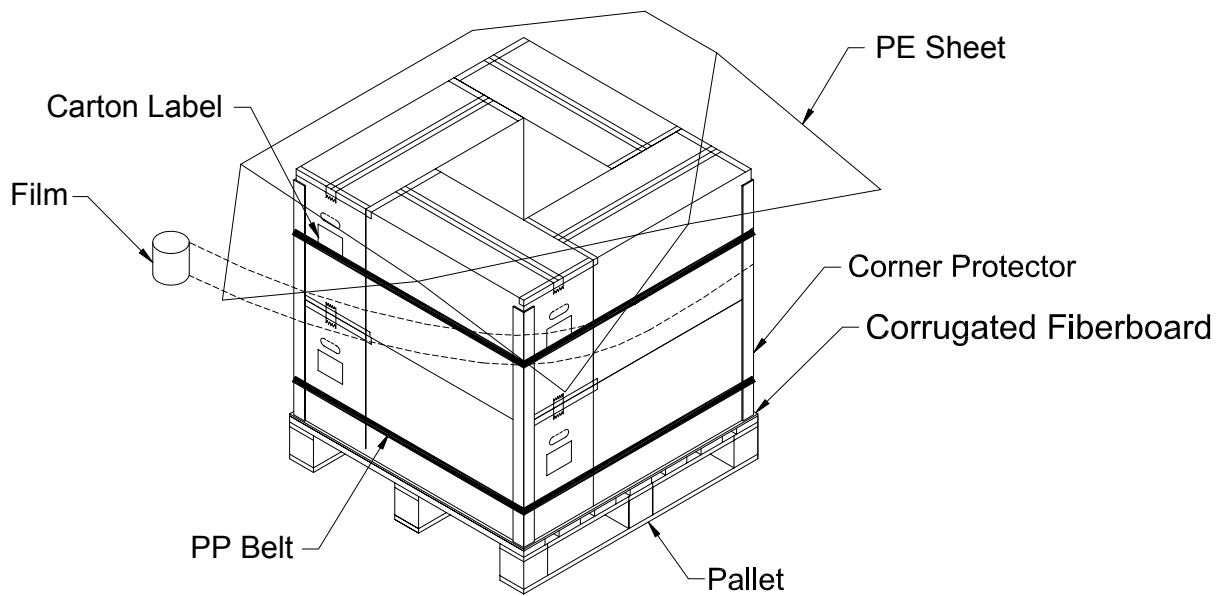


Figure. 9-2 packing method

## 10. PRECAUTIONS

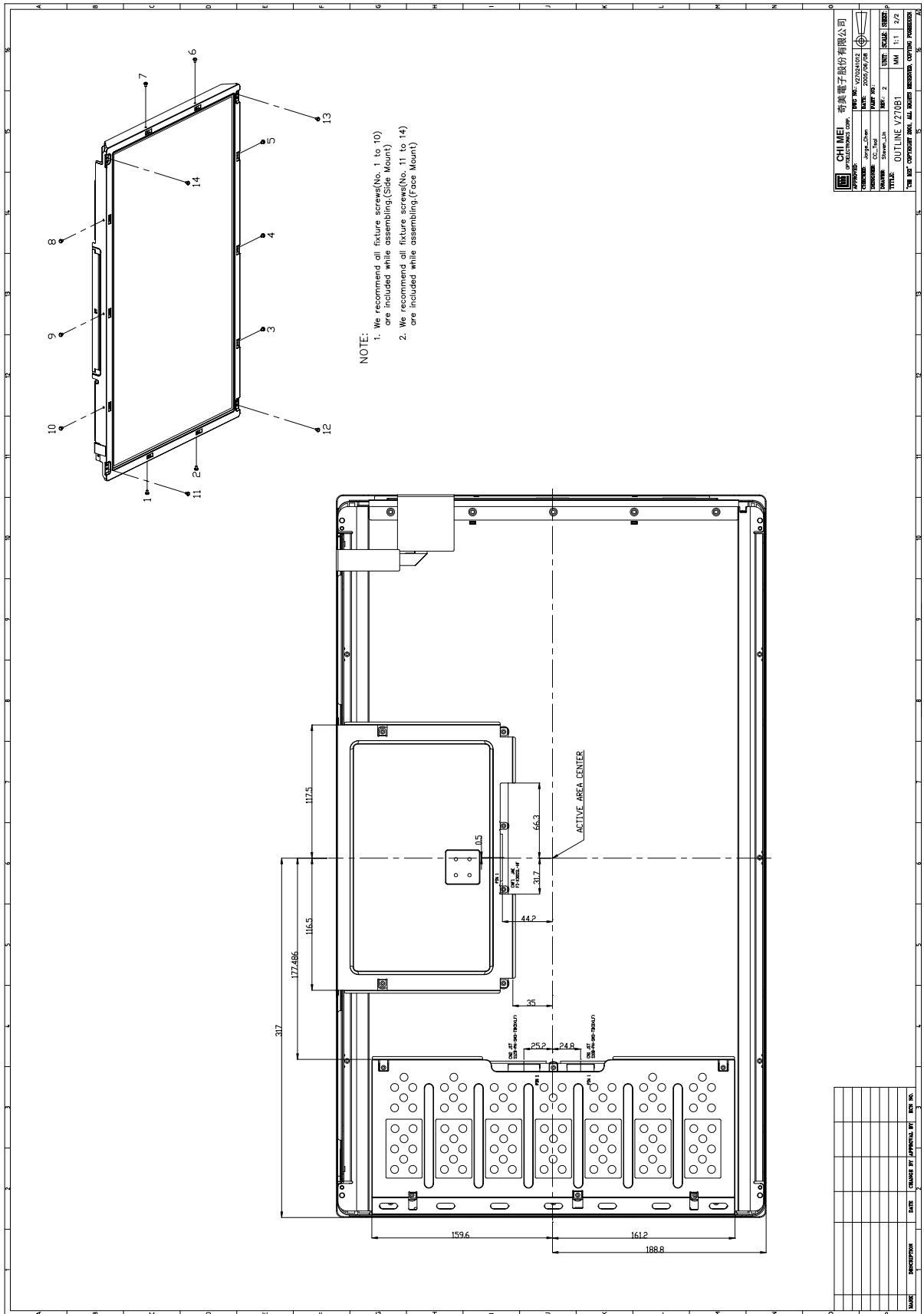
### 10.1 ASSEMBLY AND HANDLING PRECAUTIONS

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

### 10.2 SAFETY PRECAUTIONS

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





CHI MEI 奇美電子股份有限公司	DATE: 2007/09/28
OPTOELECTRONICS CORP.	FORM NO: 103-001-001
DESIGNER: JONG-CHIN	DATE: 2007/09/28
DRAWN: CC-Fai	FORM NO:
CHECKER: Steven-Jin	REV: 2
UNIT: MM	SCALE: 1:1
TYPE: OUTLINE V270B1	NO: 1-1 2/2

MARKS	DESCRIPTION	DATE	DESIGNED BY	APPROVAL BY	DATE INK

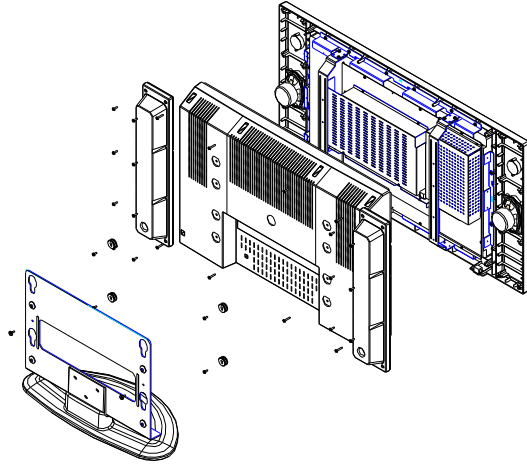


## Disassembly

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

Reassemble in the reverse order.

### 1. Removal of the Back Cover



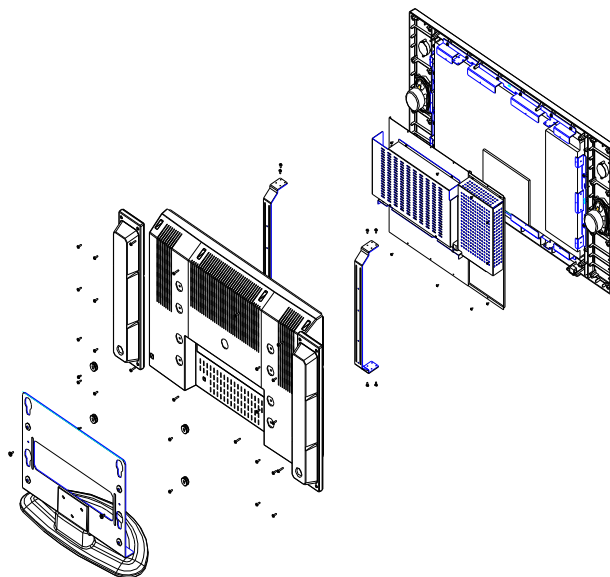
### 2. Removal of the MAIN PCB

a. Remove the screws.

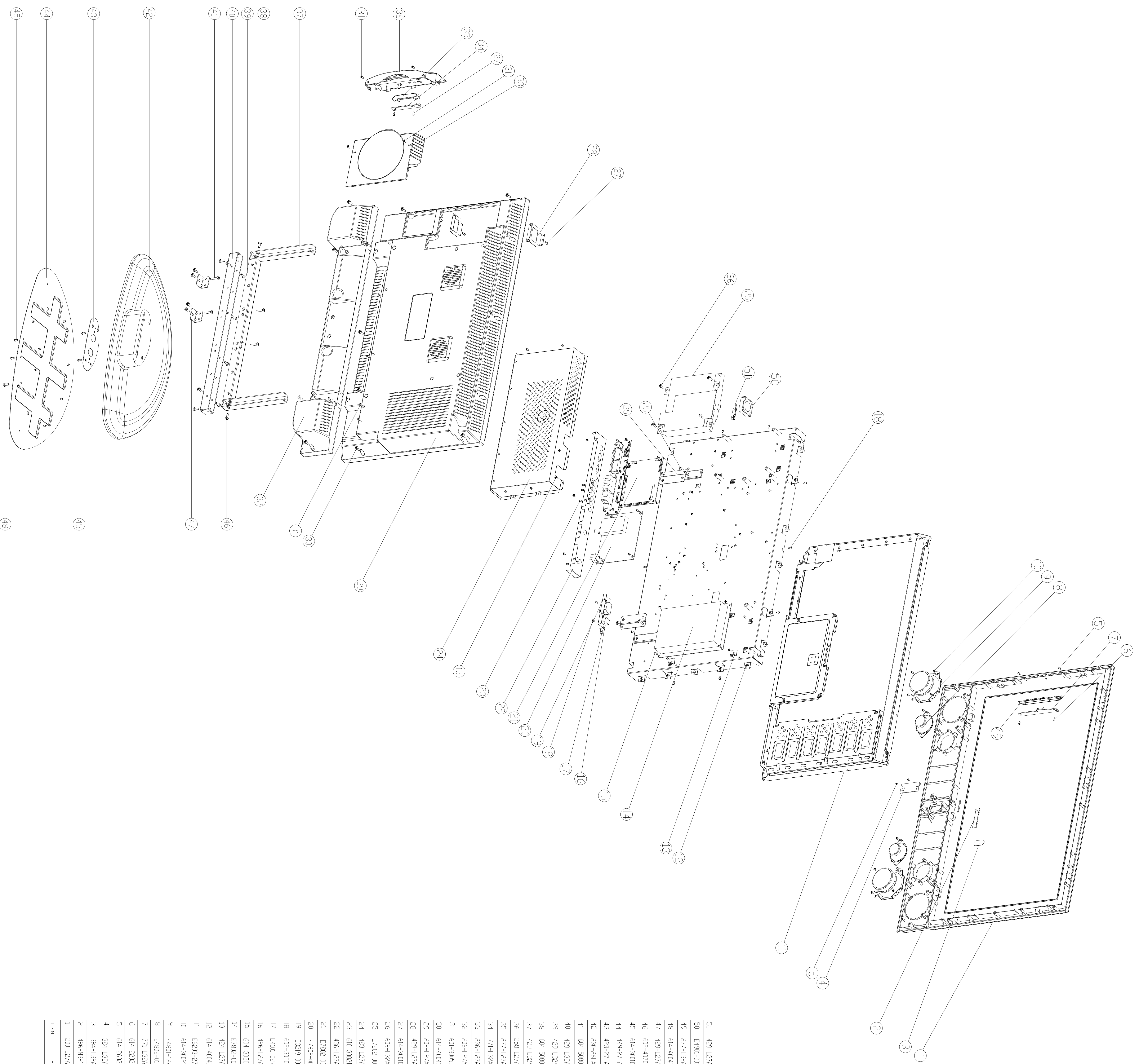
b. Slide out the LCD chassis slightly; pull up the connector of AC cord from PCB; pull up the LCD PCB from LCD.

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

d. Take out the LCD chassis.



DWG.Rev.	ZONE	DESCRIPTION	DATE	REVISOR
0		RELEASE	22-Jan-06	tzi



ITEM	PART No.	DESCRIPTION	QTY
51	429-127A05-01S	FAN BRACKET FOR SPEC-010	1
50	E49H-001005	FAN 40X50X10MM DC 12V	1
49	271-123A01-01S	FUNCTION KEY LC12340 SILVER	1
48	614-400412-10	S-TAP SCREW BID 4X12	10
47	429-127A06-01S	L-BRACKET SHEET	2
46	632-407008-010	WASH SCREW BID M3X8	16
45	614-300108-10	S-TAP SCREW BID 3X8	4
44	449-271A01-01	METAL PLATE FOR STAND BASE	4
43	423-271A08-01	MIDDLE PLATE	1
42	230-261A11-01RV	STAND COVER	1
41	604-308822-00	WASH SCREW BID M3X22	2
40	429-1-23A825-01	1" TOP CROSSBAR	1
39	429-1-23A825-01	1" TOP CROSSBAR	1
38	604-308845-00	WASH SCREW BID M3X45	2
37	429-123A003-01	SECURE LEG	2
36	258-127A001-01RV	DVD FUNCTION KNOB COVER	1
35	271-127A001-01S	DVD FUNCTION KNOB	1
34	771-123A001-01S	DVD KEY PCB	1
33	236-127A001-01RV	DVD COVER	1
32	206-127A001-01RV	SPEAKER BACK CABINET	1
31	601-300508-00	WASH SCREW C13 M3X8	6
30	614-400416-10	S-TAP SCREW BID 4X16	12
29	202-127A001-01RV	BACK CABINET	1
28	429-127A002-01S	DVD COVER BRACKET	2
27	614-300108-10	S-TAP SCREW BID 3X8	4
26	609-123A001-01	SPECIAL WASH SCREW M4X15	4
25	E7802-065006	DVD ASSY	1
24	403-127A001-01S	SHIELD COVER -MAIN PCB	1
23	601-300201-10	S-TAP SCREW BID 3X10	4
22	426-127A001-01S	TERMINAL SHEET	1
21	E7802-014408	MAIN PCB	1
20	E7802-065007	TUNER PCB	1
19	E2019-062003	POWER JACK	1
18	602-300041-10	WASH SCREW BID M3X4	12
17	E4011-02701	POWER SWITCH	1
16	426-127A001-01S	POWER CABLE BRACKET	1
15	604-300045-10	WASH SCREW BID M3X5	29
14	E7801-065008	POWER PCB	1
13	424-127A001-01S	POWER PCB BRACKET	2
12	614-400412-10	S-TAP SCREW BID 4X12	21
11	E4203-27002	LCD PANEL OMI	1
10	614-300201-10	S-TAP SCREW BID 3X10	8
9	E4801E-124001	SPEAKER	2
8	E4801E-014001	HIGH SPEAKER	2
7	771-123A001-01	KEY-ASSEMBLY	1
6	614-202006-10	S-TAP SCREW BID 2X6	2
5	614-366008-10	S-TAP SCREW BID 2X8	4
4	384-123A005-01H	REMOTE CONTROL PCB	1
3	384-123A005-01H	REMOTE RECEIVE LENS	1
2	406-342311-01	NAME PLATE	1
1	200-127A001-01000AV	FRONT CABINET	1

DESIGN		DATE	22-Jan-06
CHECKED		SCALE	1:1
APPROV		TITLE	ELECTRONIC R & D CENTER
PROJ		MODEL NO.	LC12340
PROJ		PART NO.	EP-127A001-01
PROJ		SCALE	1:1
PROJ		SHEET	1 OF 1

## Spare Part List for LCT2765TD

Item	Part Number	Part Description	Usage / unit	Unit
1	E6203-27CD02	DISPLAY LCD	1	piece
2	E7802-004008	MAIN BOARD	1	set
3	E7802-005006	DVD BOARD	1	piece
4	E7802-005007	TUNER BOARD	1	set
5	E7802-005008	POWER PCBA	1	set
6	771-L32AD01-02	KEY PCB ASSY	1	set
7	771-L32AD01-03	KEY PCB ASSY MICO DVD	1	set
8	771-L32AD01-01	REMOTE RECEIVE PCBA	1	set
9	774PL32AB01-02 (without power jack bracket)	POWER INPUT ASSY FOR MICO	1	set
10	E4101-027001	POWER SWITCH	1	piece
11	E4801-124001	SPEAKER	2	piece
12	E4802-014001	TWEETER	2	piece
13	E3219-002003	POWER SOCKET	1	piece
14	E3471-000048	KEY WIRE FOR DVD	1	piece
15	E3471-000049	DVD SILGNAL WIRE	1	piece
16	E3461-064017	DVD POWER WIRE	1	piece
17	E3461-064019	TV+COMBO FOR DVD POWER WIRE	1	piece
18	E3421-925038	WIRE ASSY TJC3-2Y L=850MM SPK-L	3	piece
19	E3421-925053	WIRE ASSY FOR TV&DVD AUDIO L/R/MUTE	1	piece
20	E3421-925054	WIRE ASSY FOR TV&DVD TUNER	1	piece
21	E3421-925061	POWER SOCKET CABLE	1	piece
22	E3421-924009	WIRE ASSY 2P L120	2	piece
23	E3421-925032	WIRE ASSY L=450MM	1	piece
24	E3421-229007	WIRE 3P	1	piece
25	E3471-000044	SHIELD WIRE FOR 32LCD COMBO MICO KEY 13P/8P+5P	1	piece
26	E3471-000046	SHIELD WIRE FOR MICO CMO(1366X768)	1	piece
27	E3461-064021	FLAT WIRE FOR 32LCD COMBO DVD BOARD +SV POWER	1	piece
28	E3461-064018	FLAF WIRE FOR TV+COMBO DVD STANDBY POWER WIRE	1	piece
29	E3471-000050	SHIELD WIRE FOR TV+COMBO DVD COAXIAL WIRE	1	piece
30	E3461-064016	FLAF WIRE FOR TV+COMBO INVERTER WIRE	1	piece
31	E3404-157001	AC CORD	1	piece

## Spare Part List for LCT2765TD

Item	Part Number	Part Description	Usage / unit	Unit
32	230-26LA11-01RV	STAND COVER	1	piece
33	200-L27AD01-MTD01AV	CABINET FRONT SIL/BLK	1	piece
34	202-L27AD01-01AV	BACK CABINET BLACK	1	piece
35	370-42D101-01	RUBBER FOOT	4	piece
36	E7301-011002	BATTERY AA	2	piece
37	790-R00105-01	REMOTE CONTROL	1	set
38	E4901-001005	FAN	1	piece
39	236-L27AD01-01RV	DVD COVER	1	piece
40	258-L27AD01-01RV	DVD FUNCTION KNOB COVER	1	piece
41	277-L32AD01-01S	FUNCTION KEY	1	piece
42	483-L27AD01-01S	SHIELD COVER-MAIN PCB	1	piece
43	436-L27AD01-01S	TERMINAL SHEET	1	piece
44	426-L27AD01-01S	POWER JACK BRACKET	1	piece
45	263-R00101-01L	REMOTE LENS	1	piece
46	277-L27AD01-01S	DVD FUNCTION KNOB	1	piece
47	510-L27AD01-MTU01K	CARTON BOX AKAI LCT2765CD	1	piece
48	300-L27AD02-02C	POLFOAM TOP	1	piece
49	300-L27AD01-02C	POLFOAM BOTTOM	1	piece
50	310-383550-07V	POLYBAG 38"X35"X0.5MM	1	piece
51	310-111404-07V	POLYBAG FOR INSTRUCTION MANUAL 11"X14"X0.04	1	piece
52	580-L27ADHM-TU01L	INSTRUCTION MANUAL	1	piece
53	388-42D103-01H	CAUTION LABEL	1	piece
54	388-42SB04-01H	POWER PLATE	1	piece
55	387-L32AB01-MTU01H	MODEL PLATE	1	piece
56	384-L32AD01-MTU01H	SHEET FOR TERMINAL	1	piece
57	590-L27AD01-01	WARRANTY CARD	1	piece
58	593-L27AD01-01	INSERTION CARD	1	piece
59	579-L27AD02-01	UPC LABEL OF G/B	2	piece
60	579-L27AD03-01	POP LABEL ONE	1	piece
61	579-L27AD04-01	POP LABEL TWO	1	piece
62	568-P46T02-02	WARNING LABEL	1	piece
63	579-L32AD04-01	LASER WARNING LABEL	1	piece
64	579-42D103-02	ON/OFF LB ENG	1	piece
65	579-42D102-09	SERIAL NO/BAR CODE LABEL	1	piece
66	590-L27AD01-02	WARNING NOTICE	1	piece
67	579-L32AD03-01	LASER CLASSIFICATION LABEL	1	piece
68	579-42D105-01	PROTECTIVE EARTH LABEL	1	piece

# If you forget your V-Chip Password

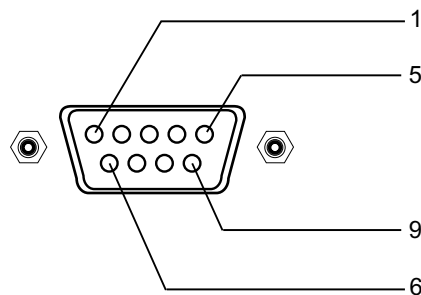
- Omnipotence V-Chip Password: **8205**.
- Press **MENU** button.
- Press **LEFT RIGHT** buttons to highlight "MISC" Menu.
- Press **Up, Down** buttons to highlight "ParentalD".
- Press **ENTER** button to pop up "Input your Password Please".
- Use the **Number buttons** (0~9) to enter an omnipotence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

## Software upgrade

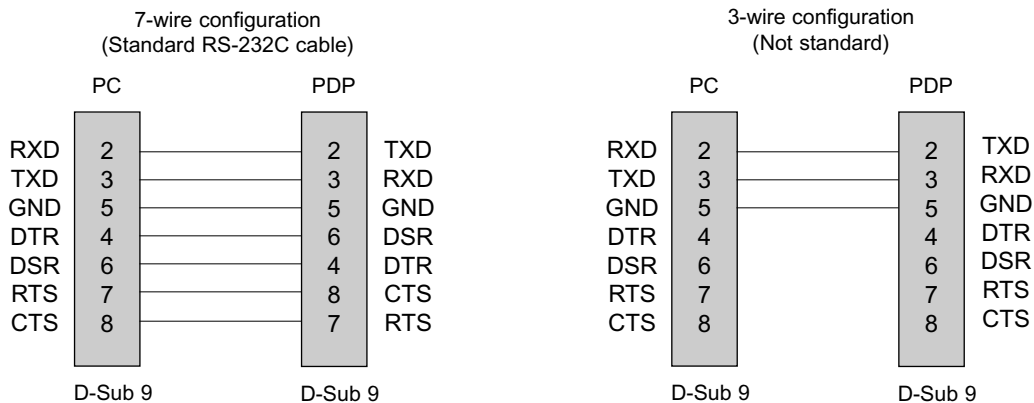
- Connect the RS-232C input jack to an external control device (such as a computer) and software upgrade.

### Type of connector; D-Sub 9-pin male

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



### RS-232C configurations



## Software upgrade Process

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

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