Service Manual

LCD Monitor Acer BV203H

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Acer BV203H Service Manual

Important Safety Notice

1. Safety precautions

This monitor is manufactured and tested on a ground principle that a user's safety comes first. However, improper used or installation may cause damage to the monitor as well as to the user.

Warning:

- **This monitor should be operated only at the correct power sources indicated on the label on the rear of the monitor. If you're unsure of the power supply in you residence, consult your local dealer or Power Company.**
- **Do not try to repair the monitor by yourself, as it contains no user-serviceable parts. This monitor should only be repaired by a qualified technician.**
- **Do not remove the monitor cabinet. There are high-voltage parts inside that may cause electric shock to human bodies.**
- **Stop using the monitor if the cabinet is damaged. Have it checked by a service technician.**
- **Put your monitor only in a lean, cool, dry environment. If it gets wet, unplug the power cable immediately and consult your closed dealer.**
- **Always unplug the monitor before cleaning it. Clean the cabinet with a clean, dry cloth. Apply non-ammonia based cleaner onto the cloth, not directly onto the class screen.**
- **Do not place heavy objects on the monitor or power cord.**

2. Product safety notice

Many electrical and mechanical parts in this chassis have special safety visual inspections and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. 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, or other hazards.

3. Service notes

- **When replacing parts or circuit boards, clamp the lead wires around terminals before soldering.**
- **Keep wires away from high voltage, high temperature components and sharp edges.**
- **Keep wires in their original position so as to reduce interference.**
- **Adjustment of this product please refers to the user' manual.**

01 Product Specification

1. General:

Acer BV203H is designed with LVDS interface and dual (analog and digital signal) input, it featured with embedded universal AC power supplies and audio input. It's a green product and meets all ROHS standard. The power button and display control buttons are on the front of the monitor. The monitors shall automatically to display lower resolution video modes into 1600x900 full screen display. The image can be adjusted through OSD control.

1.1 Main Features

Features		Specifications
Panel source		LTM200KT01
Maximum resolution		1600 x 900
Back light system		4 CCFL (top & bottom edge side)
Actual Resolution display		1600 x 900
Pixel pitch		0.2768(H) mmx 0.2768(V)mm
Display area		442.8 (H) x249.075 (V)
Contrast ratio		1000:1 (typ.)，600:1 (min.)
Response time (Tr+Tf)		5ms (typ.),
Viewing angle		80˚(L)/ 80˚(R), 80˚(U)/80˚(D) typ. CR>=10)
Input interface		Analog(D-sub 15 pin) Digita(DVI-D connector)----option
Audio-In		Reserved
Earphone		NO
Speakers		Reserved
Video Signal Inputs		D-sub, DVI-D
Knobs and Indicators		Power switch button, MENU button, Auto button, eColour, Down button, Down button
Security Features		Kensington® lock port, VESA® Wall-mountable interface, 100 mm
Power management		Compatible with VESA,EPA,NUTEK,DPMS
Plug & Play		VESA
University AC power supply		YES
OSD language	For Non-EMEA	English (US), French, Italian, Finnish, Spanish, German, Dutch, Russian
	For EMEA	English (US), French, Italian, Simplified Chinese, Spanish, German a Dutch, Traditional Chinese, Japanese
	Russia	English (US), French, Italian, Finnish, Spanish, German, Dutch, Russian

1.2 Accessories

Items	VGA cable	DVI cable	User's manual	Warranty card	Quick-start Guide	Installation Guide
Description	1.8m	1.8m	Multi	English		
	●	●	●	●		

2. Operation Specifications

The unit should suffer no visible cosmetic damage and should operate with no degradation in display quality during exposure to the operating conditions and after exposure to the non-operating conditions, in any sequence.

2.1 Environmental conditions

Operating	Specification
Temperature range	0°C to 40°C
Relative humidity	20% to 80%
Altitude	0 to 3048M (10000 ft)
Storage	
Temperature range	-25°C to 60°C
Relative humidity	5% to 80%
Altitude	0 to 9144M (30000 ft)

2.2 Safety, EMC, Ergonomics and Compatibility Requirements

Items	Description						
Safety	UL/cUL	CB	TUV/GS	CCC			Other
	●	●	●	●			
EMC	FCC	CE	CCC	VCCI-B			
	●	●	●	●			
Ergonomics	TCO99	TCO03					
	●	●					
Compatibility	Windows		Windows 2000		Windows XP		vista
	●		●		●		●
Power Management	Energy Star						
	●						

2.3 Electrostatic Discharge Requirements

Item	Condition	Spec	
Electrostatic Discharge	IEC61000-4-2(EN55024)	Contact discharge : ±4KV	
		Contact discharge : ±8KV	●
		Air discharge : ± 8KV	
		Air discharge : ±15KV	●

2.4 Reliability

Items	Condition	Spec	Note
MTBF		≧ 50,000 Hours	Excluding the LCD, CCFL
CCFL Life time	Luminance becomes 50%	≧ 40,000 Hours(min)	Note1

Note1. Display an all WHITE field at mid Brightness and Contrast settings.

3. Electrical and Optical Characteristics and Performance

3.1 Main Power Supply

3.1.1 Input characteristics

Items	Condition	Spec	Note

AC Input Voltage range	Universal input full range	90~264Vac	
AC Input Voltage rating	Universal input full range	100~240Vac	
AC input frequency range	90~264Vac	47~63Hz	
AC input frequency rating	100~240Vac	50~60Hz	
AC Input Current	100Vac	1.2A(max)	
	240Vac	0.6A(max)	
Inrush Current	100Vac,cold star,25°C	40A (max)	See Note2
	240Vac,cold star,25°C	60A(max)	
AC-DC power Efficiency	DC output full loading	≥75%	

Note2. Before each test, the buck capacitor need to be discharged.
Before each test, it must be 10 minutes at least after the latest test.
Hot star not component be damaged.

3.1.2 Output characteristics

Items	Condition	Spec	Note
Ripple and Noise	+16V output	<800mv	See note 3
	+5V output	<500mv	
DC Output Voltage	16v loading:0.3A~2.0A 5v loading:0.75A~1.5A	Vcc16V:15.2V~17.6V Vcc5V: 4.95V~5.45V	For system active
	5v loading:0.04A~1.5A 16V loading: 0A	Vcc16V: 15.2V~20V Vcc5V: 4.95V~5.45V	For power saving or DC off
DC output loading capability		Vcc5V/1.5A, Vcc16V/2.0A	
Rise Time		<20mS	
Dynamic load change			
Hold-up time	AC input: 100V~240V	>10mS	
Overshoot		<10%	
Turn on delay time		2S	
Power management			See Table-1

Note3: Paralleled a 0.1uF ceramic Cap. And 47uF aluminum Cap. Between the end of DC loading side, Measured band-width=20MHz.

3.1.3 Protection characteristics

Protection	Condition	Spec
OCP(Over current protection)	nominal AC input	50W (min)
SCP(short circuit protection)	with auto-recovery function	
OVP(Over voltage protection)		
OTP(Over temperature protection)		
Fuse protection		

Table-1

Status	H-sync	V-sync	Video	Power	LED
Power On	on	on	active	≤ 45W	BLUE
Power Saving	off	on	blanked	< 2W	Amber
	on	off	blanked	< 2W	Amber
	off	off	blanked	< 2W	Amber
Power Off	--	--	--	< 1W	Off

3.2 Backlight Power Supply

Panel: LTM200KT01

Items	Specification
Lamp	4 CCFL
Input Voltage	15.2V~18.2V
Input current	1.6A (Typ.), 2.0A (Max.)
On/Off switch level	5.5V≧Von≧ 2.0 V (on) -0.3v ≤ Voff ≤ 0.8 V (off)
Brightness PWM duty	35%~100% PWM:High=3.3V(3.0~3.6V),Low=0.0V
CCFL operating Voltage	840Vrms (Typ.),
CCFL Current	2.0 mA (min.)(With PWM Dim)
	6.5mA (Typ.)
	8.0mA (Max.)
CCFL startup voltage	≧1700 Vrms (0˚C)
Operating frequency	40~80 KHz
Protect delay time	> 1 second
Efficiency	≥70%(with dummy load)

3.2 Brightness output

The test to verify specifications in this section shall be performed under the following standard conditions unless otherwise noted.

Temperature : 25 ± 5°C
Test pattern : white
Video Resolution : 1600 x 900
Video input level : 700 mV ± 2%
Warm-up time : 30 minutes

LCD Module	BL
LTM200KT01	>=250 cd/m^2

Set brightness control and also contrast control at maximum, to measure the screen center, the light output shall ≥ BL cd/m^2 (as panel spec)

3.3 White balance

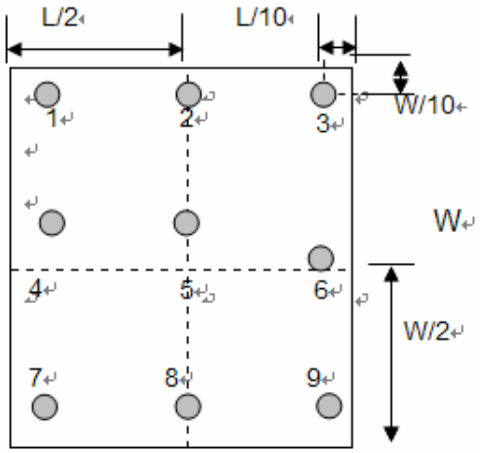
Mode		Chromaticity Coordinate	
		x	y
Cool	9300K	0.283 ± 0.030	0.297 ± 0.030
Warm	6500K	0.313 ± 0.030	0.329 ± 0.030
User		Panel While x	Panel While y

The test standard conditions refer to Sec 3.3. (Brightness and contrast are under default value)

3.4 Brightness uniformity

The test standard conditions refer to Sec 3.3.

$$\frac{\text{Min. luminance of nine points (backlight)}}{\text{Max. luminance of nine points (backlight)}} \geq 75\%$$



4. Input / Output Signal Specifications

4.1 Video signals

Items	Condition	Specification
Analog RGB signal	Input impedance =75 Ohm	0.7Vp-p
Sync	Input impedance ≧ 1k Ohm	TTL level, Separate H/V-sync(+/-)

4.2 Signal Timing

4.2.1 D-SUB Inputs

Through D-SUB connectors, this unit can support F_H= 31.5 ~ 80 KHz, Fv=55 ~ 75Hz and SXGA display modes as below:

VESA MODES							
Mode	Resolution	Total	Horizontal		Vertical		Nominal Pixel Clock (MHz)
			Nominal Frequency +/-0.5KHz	Sync Polarity	Nominal Frequency +/-1Hz	Sync Polarity	

VGA	640*480@60Hz	800*525	31.469	N	59.941	N	25.175
	640*480@72Hz	832*520	37.861	N	72.809	N	31.500
	640*480@75Hz	840*500	37.500	N	75.000	N	31.500
SVGA	800*600@56Hz	1024*625	35.156	P	56.250	P	36.000
	800*600@60Hz	1056*628	37.879	P	60.317	P	40.000
	800*600@72Hz	1040*666	48.077	P	72.188	P	50.000
	800*600@75Hz	1056*625	46.875	P	75.000	P	49.500
XGA	1024*768@60Hz	1344*806	48.363	N	60.004	N	65.000
	1024*768@70Hz	1328*806	56.476	N	70.069	N	75.000
	1024*768@75Hz	1312*800	60.023	P	75.029	P	78.750
VESA	1152*864@75Hz	1600*900	67.500	P	75.000	P	108.000
	1280*960@60Hz	1800*1000	60.000	P	60.000	P	108.000
	720x400@70Hz	900*449	31.469	N	70.087	P	28.322
	1280*720@60Hz	1650x750	44.955	N	59.940	P	74.176
SXGA	1280*1024@60Hz	1688*1066	63.981	P	60.020	P	108.000
	1280*1024@75Hz	1688*1066	79.976	P	75.025	P	135.000
MAX	640*480@66.7Hz	864*525	35.000	P	66.667	P	30.240
	1152*870@75Hz	1568*909	68.775	N	75.00	N	84.520
	832*624@75Hz	1152*667	49.725	N	74.550	N	57.283
WXGA	1280*800@60Hz	1680*831	49.702	N	59.810	P	83.500
WXGA+	1600x900@60Hz	2122x934	55.99	N	59.946	P	118.250

Note: 1. Non-interlace signals only (An interlace signal cannot be display)
2. Please refer to F/W specification for more detail
3. Each frequency of Power Macintosh and Sun Ultra is a reference value

For DVD Player Input, Attached timing is supported: (Optional)

Mode	Resolution (active dot)	Resolution (total dot)	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Nominal Pixel Clock (MHz)	Remark
DVD Player	480P@60Hz	858x525	31.5	60.000	27.027	
	576P@50Hz	864x625	31.250	50.000	27.000	
	720P@60Hz	1650x750	45.000	60.000	74.250	

4.2.2 Digital signals

TMDS Signal: (min) ±200mVpp@24Bit

4.2.3 DDC signals

DDC signals: 5V@50mA TTL level

4.3 Timing requirements

Scan Frequency	Condition	Specification
Horizontal	Sync polarity: (+) or (-)	31.5 ~ 80 KHz.
Vertical	Sync polarity: (+) or (-)	55-75Hz
Out of range	Excluding Horizontal 31.5~80 KHz or Vertical 55-75 Hz	Message “Input Not Supported” on screen

4.4 DDC data

4.4.1 EDID Standard Compliance

EDID File Format : VESA’s EDID Standard Version #3, Revision #0,
EDID Structure : Version #1, Revision #3.
EDID Data Table : See the attached table (for example)

B203H VGA EDID table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	04	72	94	00	00	00	00	00
1	00	00	01	03	08	2C	19	78	EA	DE	95	A3	54	4C	99	26
2	0F	50	54	BF	EF	80	71	4F	81	40	81	80	81	C0	81	00
3	01	01	01	01	01	01	31	2E	40	00	62	84	22	30	58	A8
4	35	00	BB	F9	10	00	00	1D	00	00	00	FD	00	37	4B	1F
5	50	0C	00	0A	20	20	20	20	20	20	00	00	00	FF	00	30
6	30	30	30	30	30	30	30	30	30	30	30	0A	00	00	00	FC
7	00	42	32	30	33	48	0A	20	20	20	20	20	20	20	00	CS

B203H DVI EDID table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	04	72	94	00	00	00	00	00
1	00	00	01	03	80	2C	19	78	EA	DE	95	A3	54	4C	99	26
2	0F	50	54	BF	EF	80	71	4F	81	40	81	80	81	C0	81	00
3	01	01	01	01	01	01	31	2E	40	00	62	84	22	30	58	A8
4	35	00	BB	F9	10	00	00	1D	00	00	00	FD	00	37	4B	1F
5	50	0C	00	0A	20	20	20	20	20	20	00	00	00	FF	00	30
6	30	30	30	30	30	30	30	30	30	30	30	0A	00	00	00	FC
7	00	42	32	30	33	48	0A	20	20	20	20	20	20	20	00	cs

V203H VGA EDID table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	04	72	95	00	00	00	00	00
1	00	00	01	03	08	2C	19	78	EA	DE	95	A3	54	4C	99	26
2	0F	50	54	BF	EF	80	71	4F	81	40	81	80	81	C0	81	00
3	01	01	01	01	01	01	31	2E	40	00	62	84	22	30	58	A8
4	35	00	BB	F9	10	00	00	1D	00	00	00	FD	00	37	4B	1F
5	50	0C	00	0A	20	20	20	20	20	20	00	00	00	FF	00	30
6	30	30	30	30	30	30	30	30	30	30	30	0A	00	00	00	FC
7	00	56	32	30	33	48	0A	20	20	20	20	20	20	20	00	cs

V203H DVI EDID table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	04	72	95	00	00	00	00	00
1	00	00	01	03	80	2C	19	78	EA	DE	95	A3	54	4C	99	26
2	0F	50	54	BF	EF	80	71	4F	81	40	81	80	81	C0	81	00
3	01	01	01	01	01	01	31	2E	40	00	62	84	22	30	58	A8
4	35	00	BB	F9	10	00	00	1D	00	00	00	FD	00	37	4B	1F
5	50	0C	00	0A	20	20	20	20	20	20	00	00	00	FF	00	30
6	30	30	30	30	30	30	30	30	30	30	30	0A	00	00	00	FC

7	00	56	32	30	33	48	0A	20	20	20	20	20	20	20	00	cs

4.5 Audio signal

Items	Specification
Input impedance	≧ 10K ohm
Frequency response range	200Hz – 10kHz
Signal to noise ratio	≧ 40 dB
Output power	≧ 1.0 W + 1.0W (10%THD)

5. Function Specifications

All the tests to verify specifications in this section shall be performed under the following standard conditions unless otherwise noted. The standard conditions are:

Temperature : 25 ± 5°C
Warm-up time : 30 minutes minimum
Checking display modes : All the specified modes

5.1 Panel general specifications

5.1.1 General specifications

Supplier	SEC
Model name	LTM200KT01
Display Area	442.8 (H) x249.075 (V)
Pixel Pitch	0.2768(H) mmx 0.2768(V)mm
Display Colors:	16.7 Million (6-bit + HI-- FRC)
Number of Pixel	1600x900 pixels
Pixel Arrangement	RGB vertical stripe
Brightness	300cd/m^2 (Typ.) 250cd/m^2 (Min.)
Contrast Ratio	1000:1 (typ.)
Viewing Angle	Hor:160°, Ver: 160° (Typical, CR>10)
Display Mode	Normally White
Frame rate	60Hz
Response Time	Tr + Tf = 5ms Typical
Surface Treatment	Anti-glare, Haze = 25%, Hard coating (3H)
Lamp	4 CCFL
Outline Dimension	463.3(W)x272.5(H)x17.5(D) Max

5.1.2 LCD module defects

LCD module defects check follow to the IIS.

5.2 Keypad Function

5.2.1 Control buttons on the front bezel

CONTROL KEY	KEYS FUNCTION
[AUTO]	A. When OSD un-displays, press [AUTO] to perform auto-adjustment B. When OSD displays, press [AUTO] to return to previous level menu C. When “e Color OSD” OSD displays, press [AUTO] to exit the OSD

[MENU]	A. When OSD isn't shown on screen, press [MENU] to enter OSD interface. The OSD interface uses "ACER e Color Management" and "User" to instead "Contrast" and "Brightness" separately. When press "ACER e Color Management" to show "e Color OSD", and press "User" to show OSD interface before. The translations of "ACER e Color Management" and "User" are always English. B. When OSD displays, press [MENU] to perform function of menu icon that is highlight or enter next level menu
[►], [◄]	A. When "MENU OSD" displays, press these keys to change the contents of an adjustment item, or change an adjustment value B. When "MENU OSD" un-displays, if it is with audio, press [►] to show "Audio" OSD and increase the volume, press [◄] to show "Audio" OSD and decrease the volume; else it has no use to press these keys.
[e Color]	A. When OSD un-displays, press [e Color] to show "e Color OSD", and press again the OSD can not disappear, but the time of "e Color OSD" disappearing is reset 10 second again. B. When OSD disappear not including "e Color OSD", press [e Color] to show "e Color OSD" OSD, the OSD before disappears, but the parameters of it should be saved
[POWER]	Power on or power off the monitor

5.2.2 Hot Key Operation

FUNCTION	HOT KEY OPERATION						
	AUTO	e Color	◄	►	MENU	POWER	
FACTORY MODE		●				ON	Press [e Color], and then press [POWER] for DC power on. OSD menu will be shown with "F" on the left top. Select "F" for entering factory mode.

5.3 OSD Structure

The On-Screen Display (OSD) shall be an easy to use icon based menu through keypad OSD buttons or remote control unit. The unit shall leave the factory with all OSD controls set to their default values.

First	Second	Third	Control Range	Default Value	
Brightness	ACER e COLOR Management	Empowering Technology			
	User	Contrast		User mode	50
				Text mode	50
				Standard mode	50
				Graphics mode	60
				Movie mode	56
		Brightness		User mode	77

					Text mode	44
					Standard mode	77
					Graphics mode	97
					Movie mode	77
			ACM		OFF	
Image	Focus		---	0 ~ 100	Depend on each timing	
	Clock		---	0 ~ 100	50 ①	
Position	Horizontal		---	0 ~ 100	50	
	Vertical		---	0 ~ 100	Depend on each timing	
Color	Warm (6500K)		---	---		
	Cool (9300K)		---	---		
	User		Red	0 ~ 100	80	
			Green	0 ~ 100	80	
			Blue	0 ~ 100	80	
Language	NO-EMEA	EMEA				
	English	English	---	---	English	
	Deutsch	Deutsch	---	---		
	Español	Español	---	---		
	简体中文	Hollands	---	---		
	繁體中文	Русский	---	---		
	Français	Français	---	---		
	Italiano	Italiano	---	---		
	日本語	Suomalainen	---	---		
OSD	Hor. Position		---	0 ~ 100	50	
	Ver. Position		---	0 ~ 100	50	
	OSD Timeout		---	10~ 120	20	
Input (Dual)	Analog		---	---	---	
	Digital		---	---	---	
	DDCCI ON/OFF				ON	
Input (Analg only)	DDCCI ON/OFF				ON	
Info	Resolution		---	---	---	
	H. Freq		---	---	---	
	V. Freq		---	---	---	
	S/N				ETL000….0000(22)	
	Analog/Digital Input					
Reset	---		---	---	---	
Exit	---		---	---	---	

Notes; ① Clock default 50 is for Visa timing. Others depend on timing.

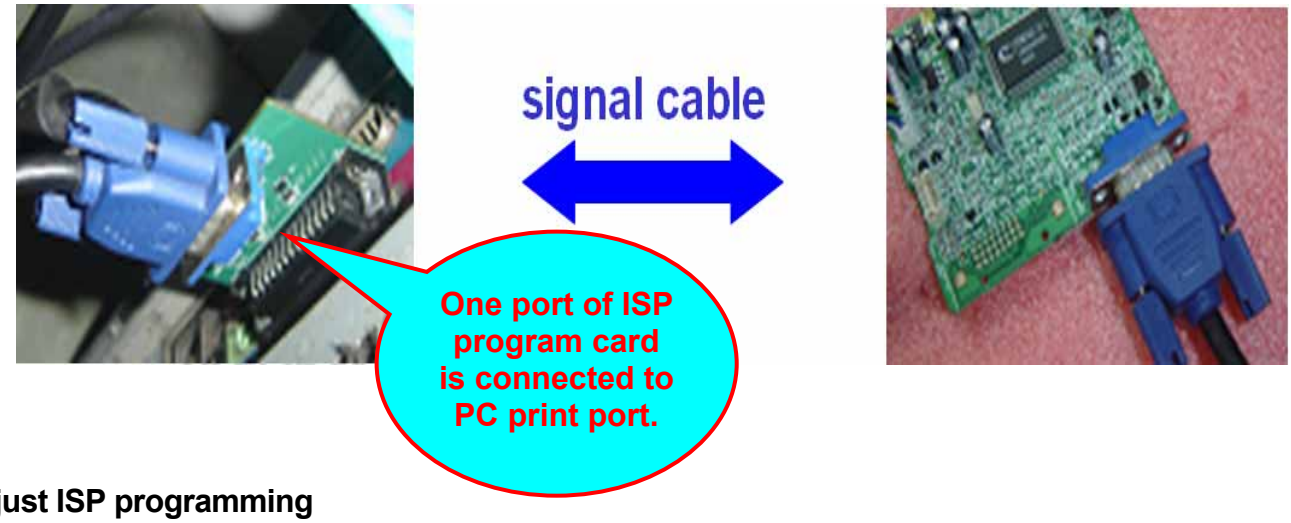
6. SOP of PCBA ISP Programming

6.1 Operational condition:

Equipment: PC, ISP card, signal cable and power cable.
ESD requirements: antistatic wrists, antistatic gloves (fingers), and connecting cable
Name of ISP program: ISP_Tool_v3.7.5.3
Manufacture of FW IC：PMC/SST/MX

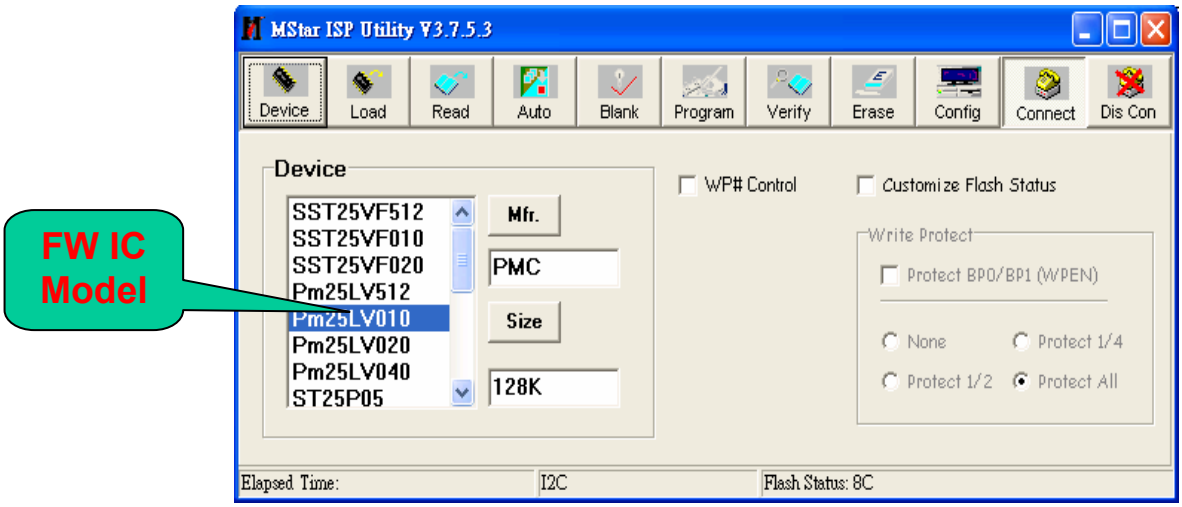
6.2 Operational steps:

1.Connection: connect PC to PCBA with signal cable, and then keep AC and DC in open state

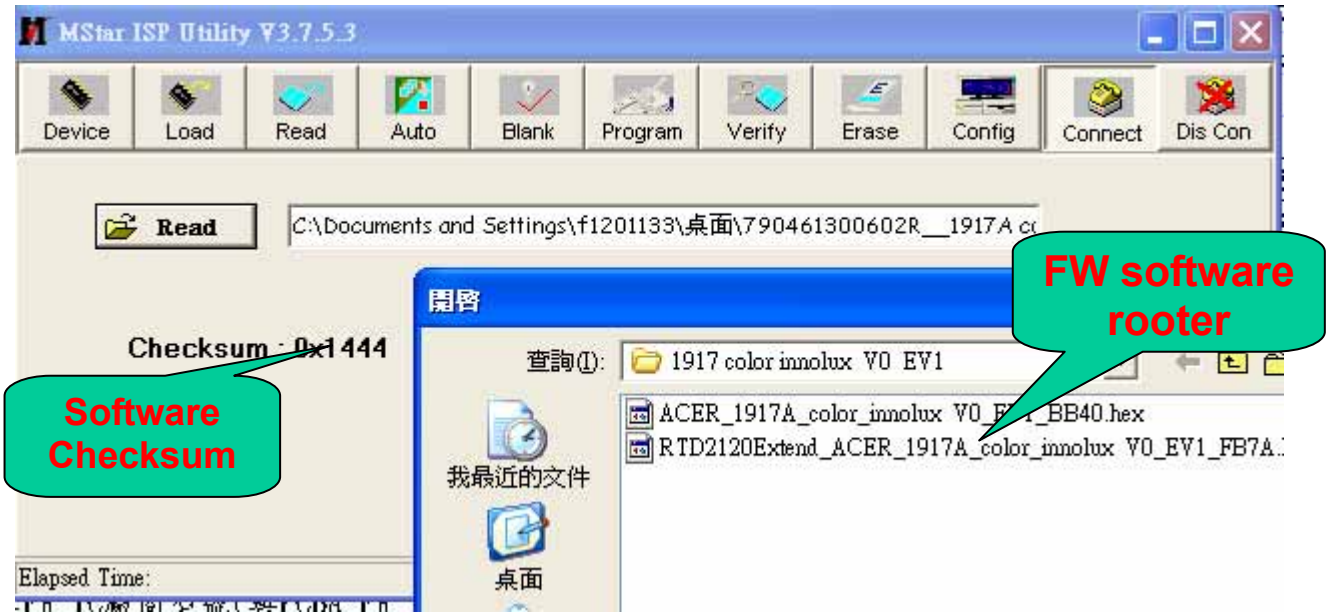


2. Adjust ISP programming

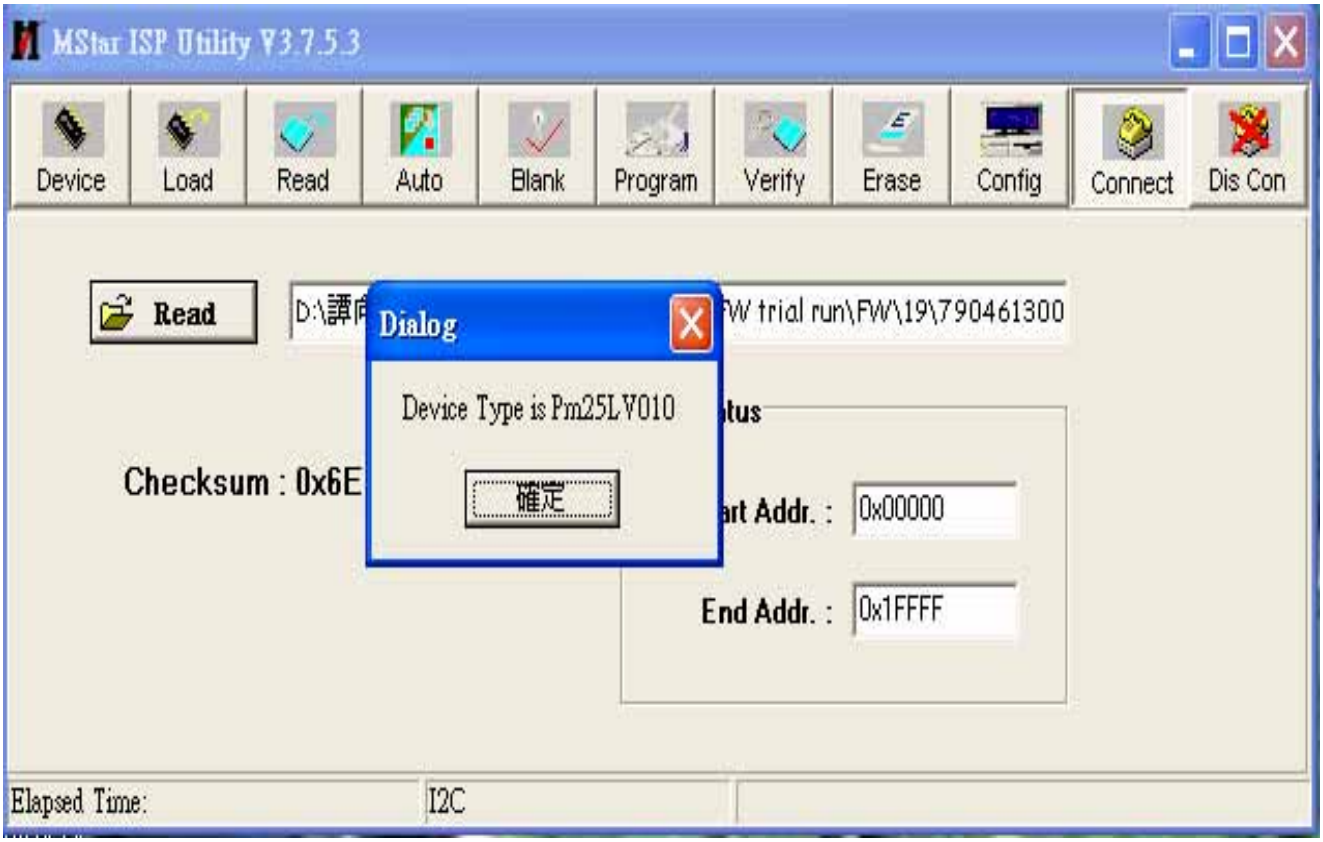
Firstly, double click ISP_Tool_v3.7.5EXEI and open ISP program, then select “Device”, next select manufacturer model of FW IC, which should be correspondent with that of PCBA FW IC. Double click Figure One.



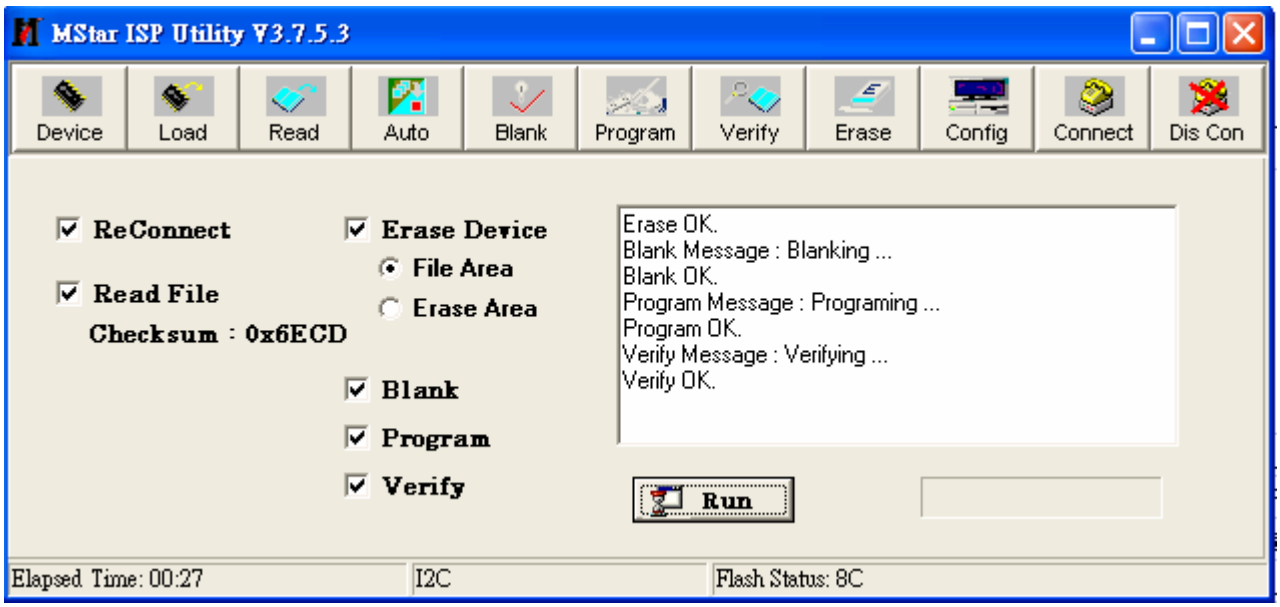
Secondly，download FW software:　first select “READ”, and then load　FW software in Rooter (Fig.2).



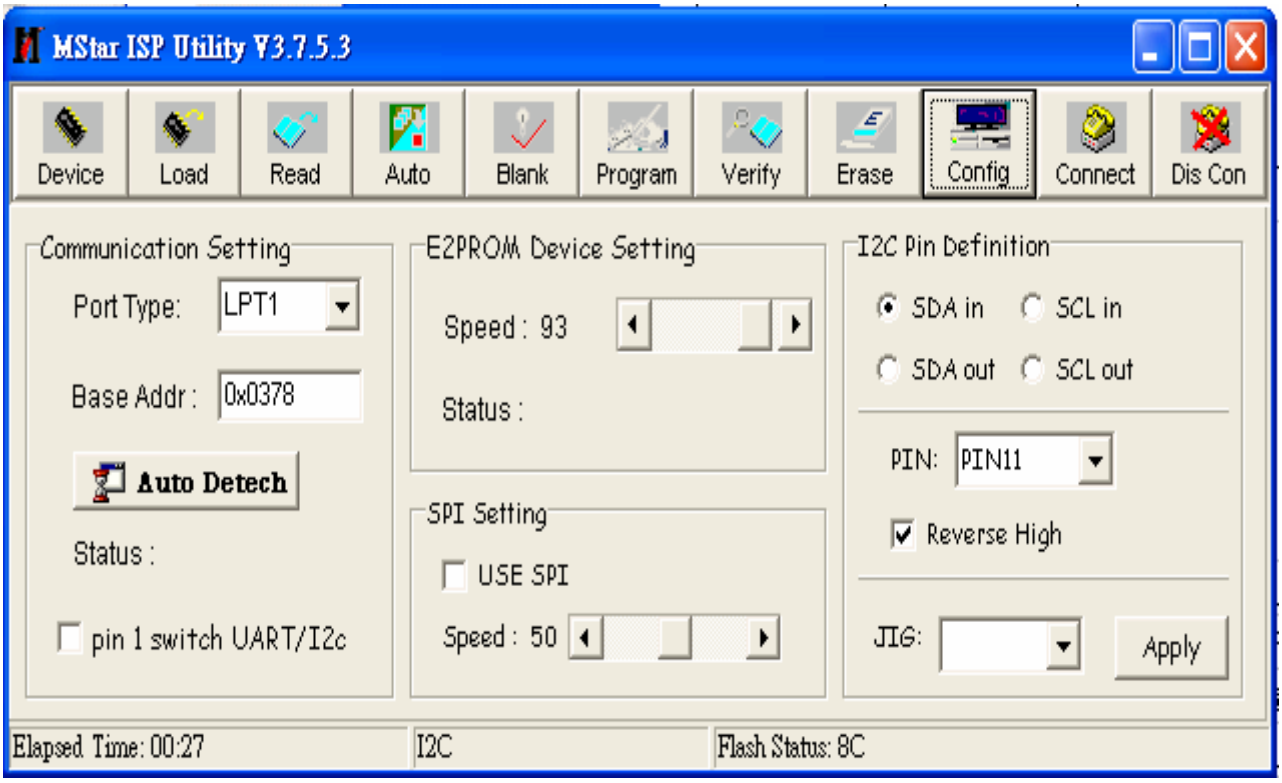
Thirdly, select “Connect” and enter ISP MODE as in the following Figure 3.

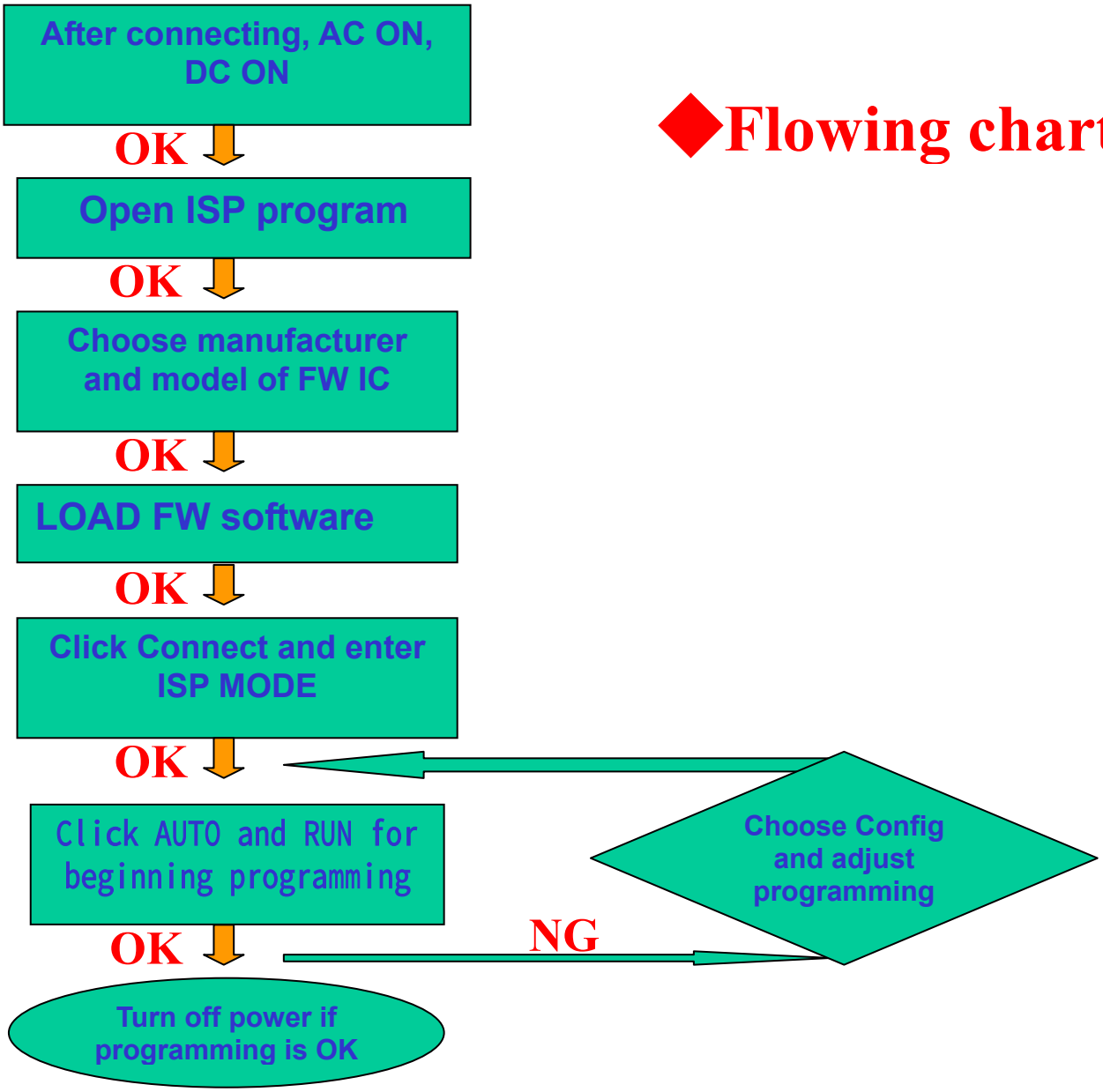


Fourthly, select “AUTO”, and keep its default value. Click “RUN” for beginning programming. There will be prompting if programming is OK



Note: if programming fails or success rate is not high, click “Config” and adjust its speed in “E2PROM DEVICE SETTING”



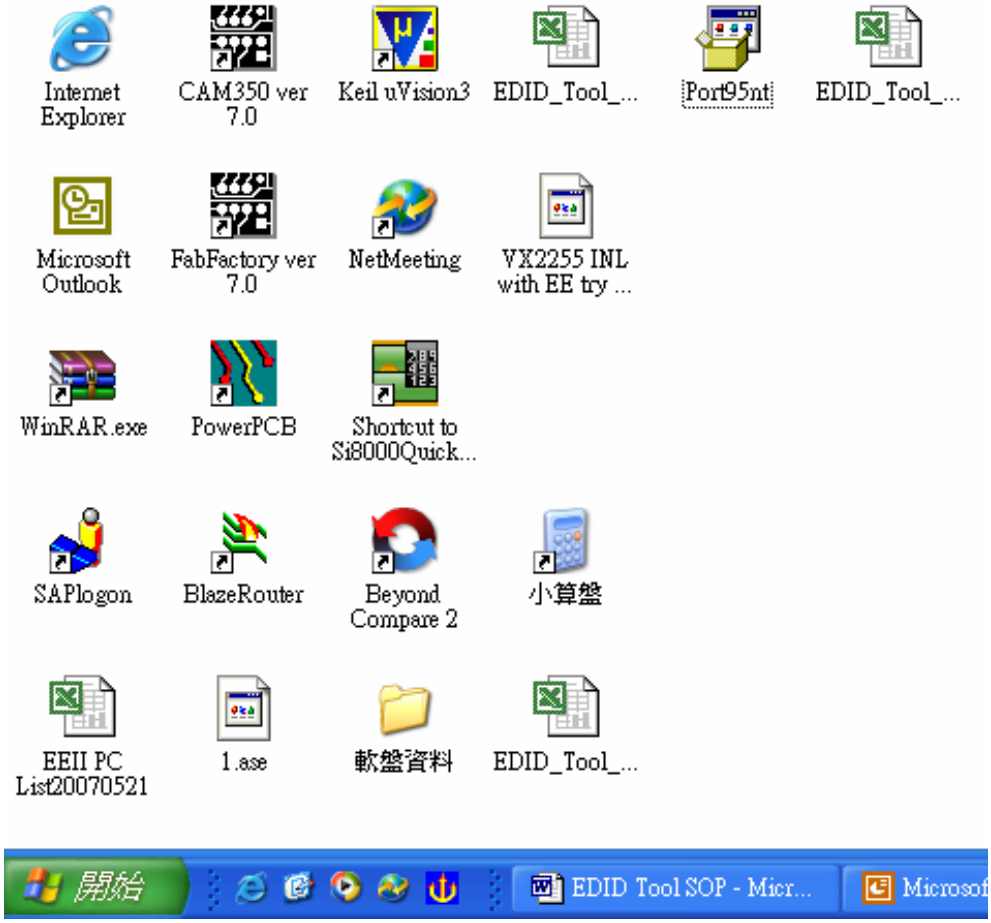


◆Flowing chart

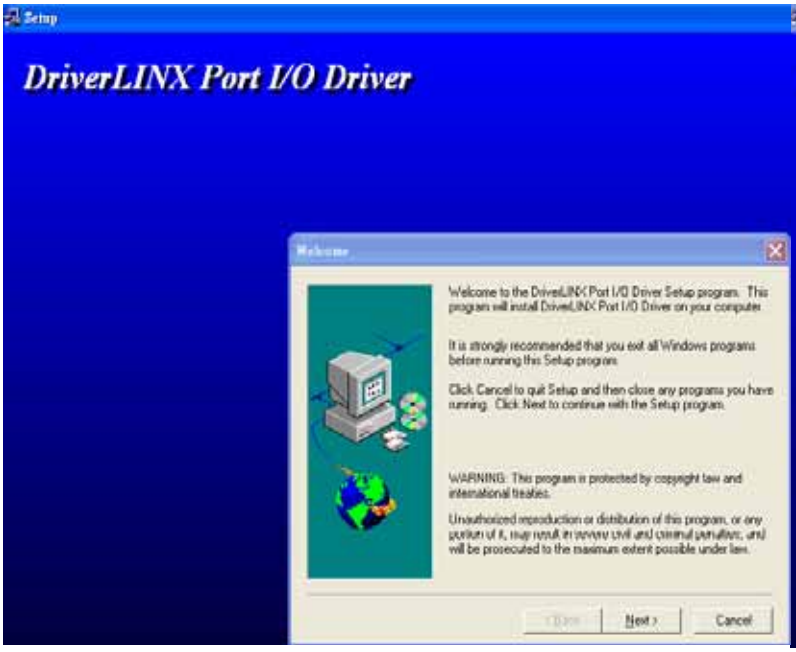
7. BV203HQ EDID SOP

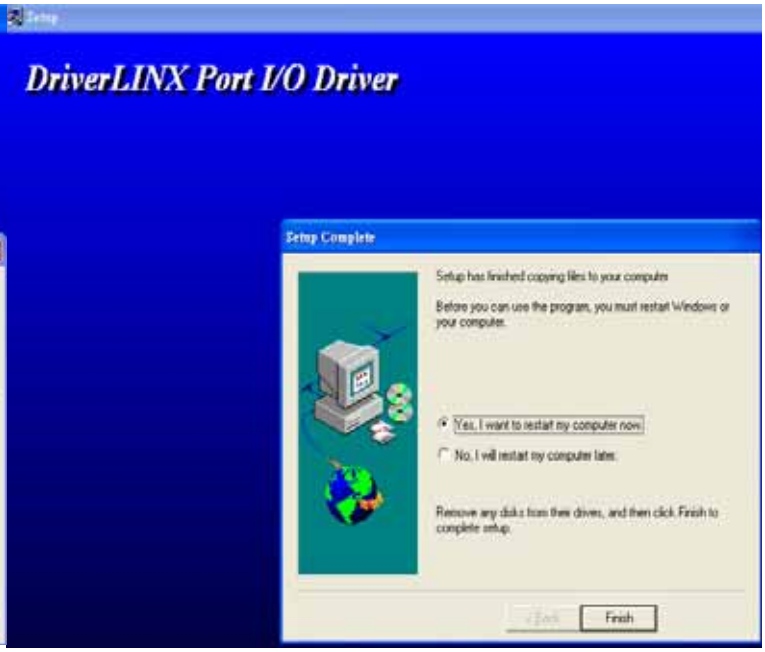
1、 Software
a.port95nt.exe
b.Edidtool.exe
c.X203H model
2、Hardware
a.PC（winXP or win2000）1PCS；
b.Tool（EDID Card、VGA cable & DVI cable)

3. .First set up Port95nt.exe

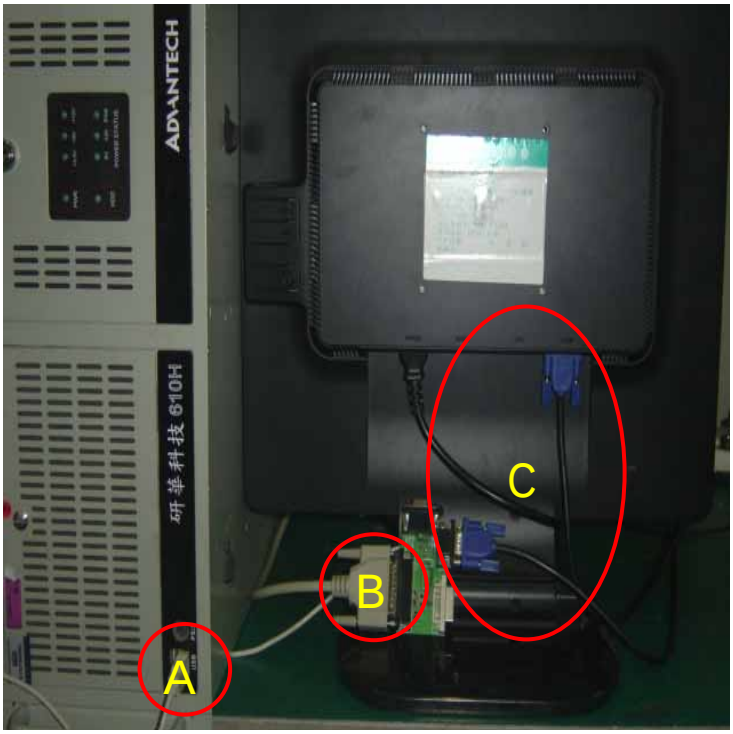


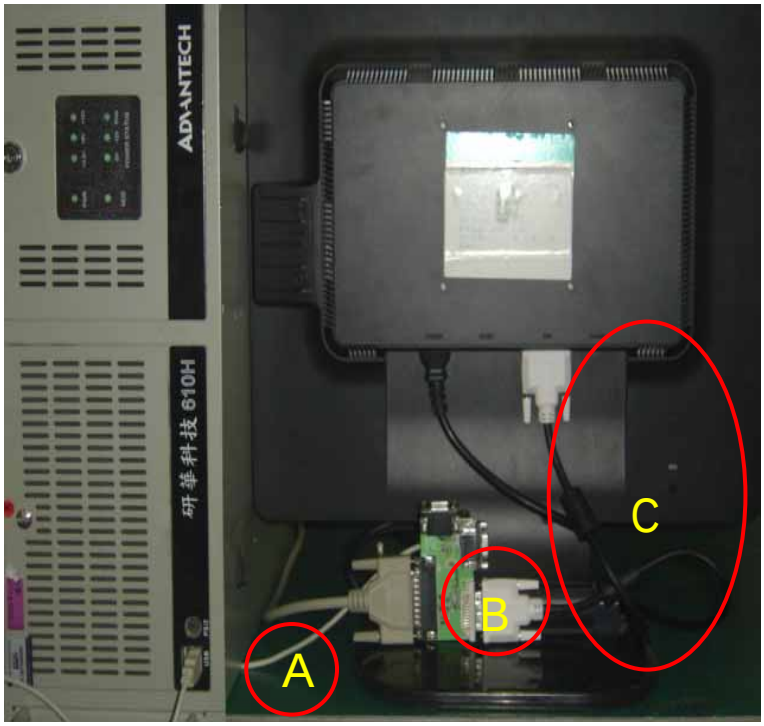
4 . Click next button continually then can finish setting.





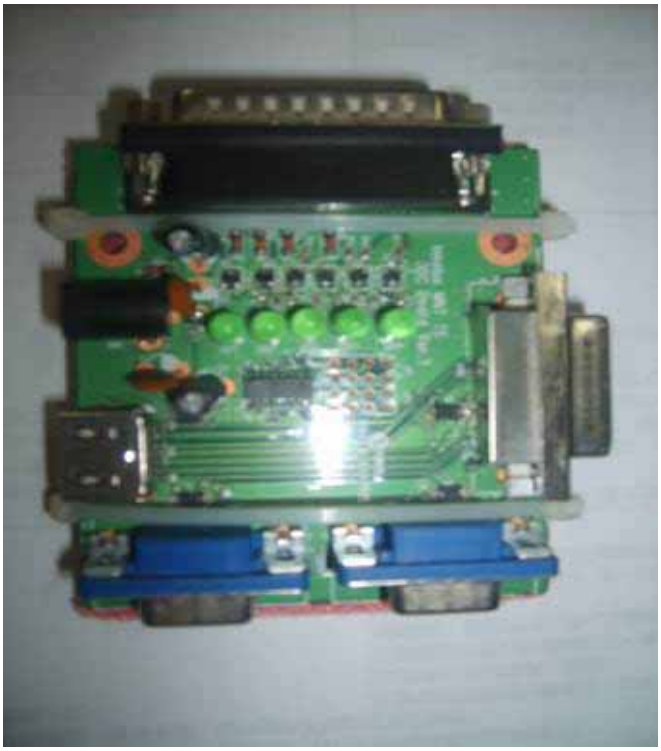
5. EDID Tool Set up





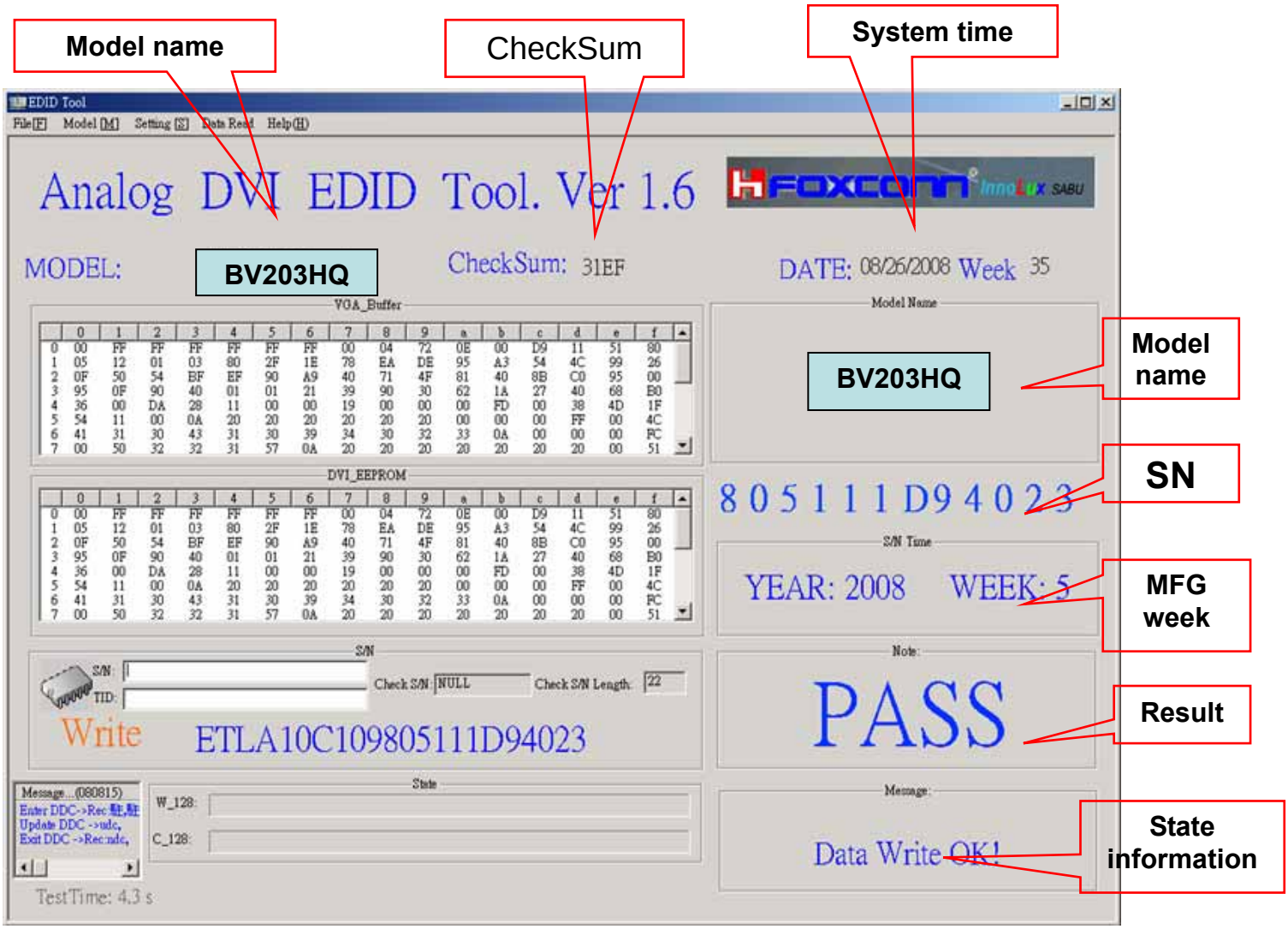
A : USB interface provide +5V DC power（No Power is ok ）
B : Connect DDC Card and PC with collateral interface ；
C :VGA、DVI use different cable to link DDC and PC

6. EDID ISP Card:

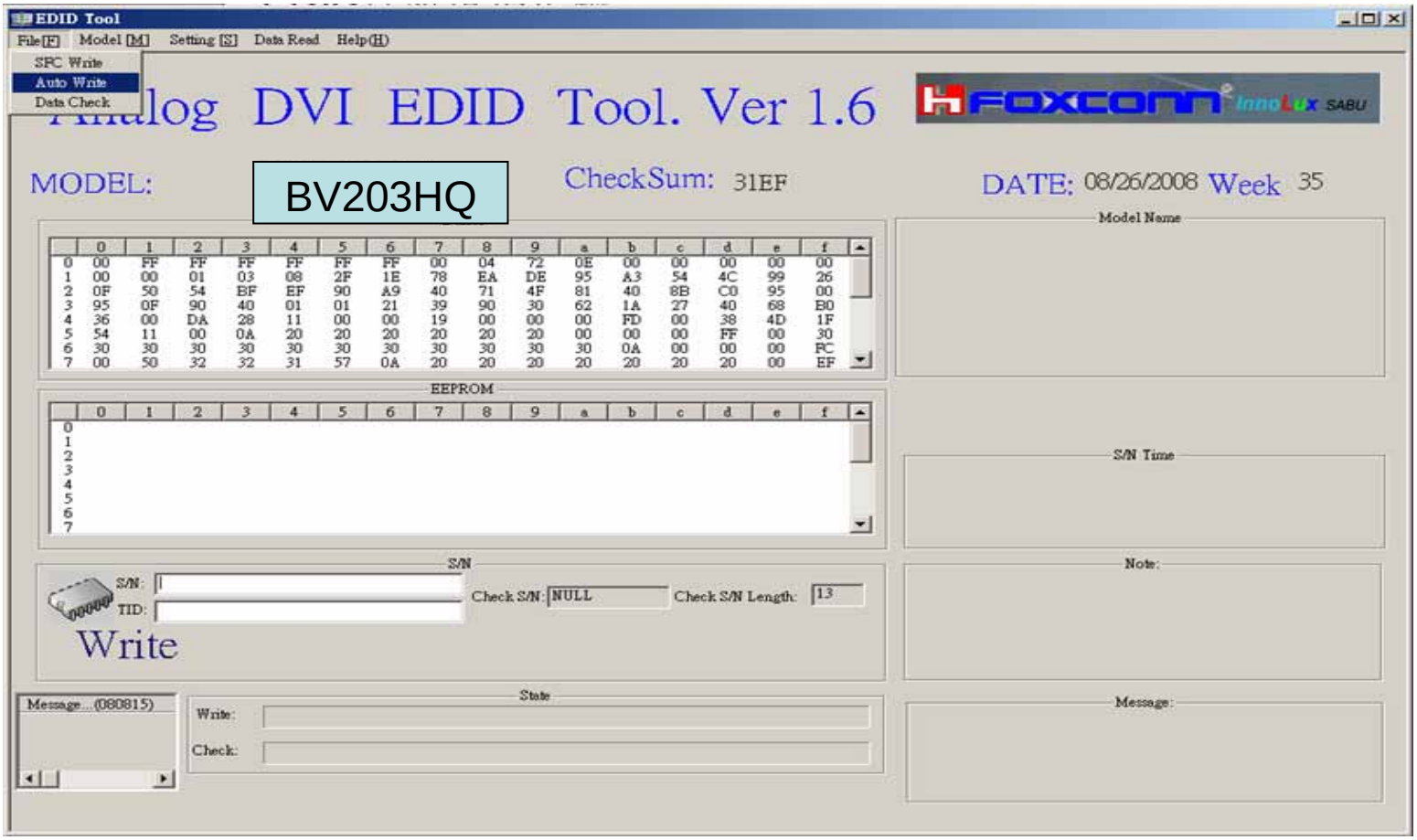


A：Collateral printing interface (connect with PC)
B:VGA interface (one VGA connect with PC to provide signal for monitor the other one connect with PC VGA interface to write VGA EDID, Write EDID can without providing signal)
C : DVI interface (connect with PC)
D : HDMI Interface
E : Connect DC power+5V

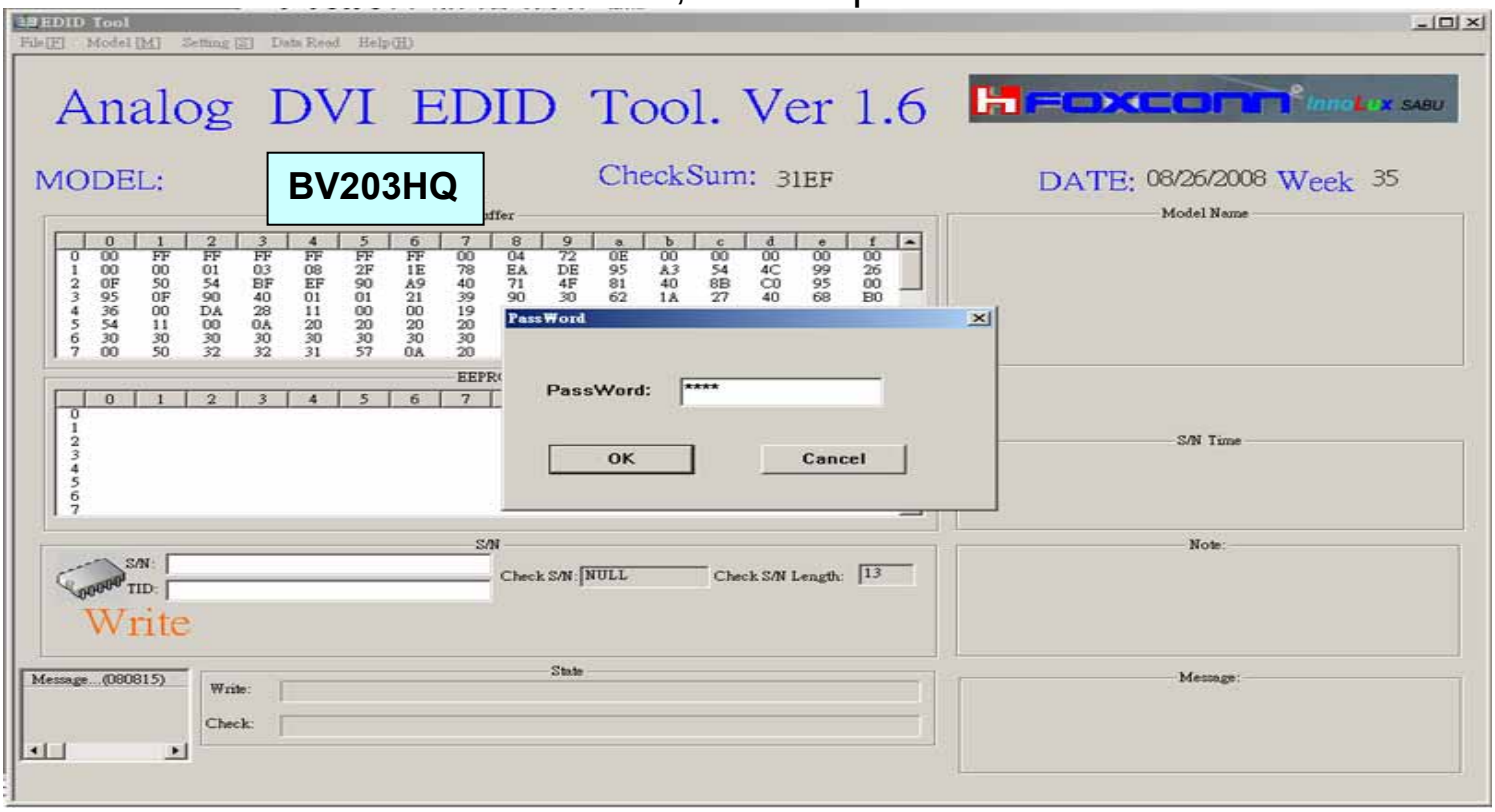
7. Writing EDID process :



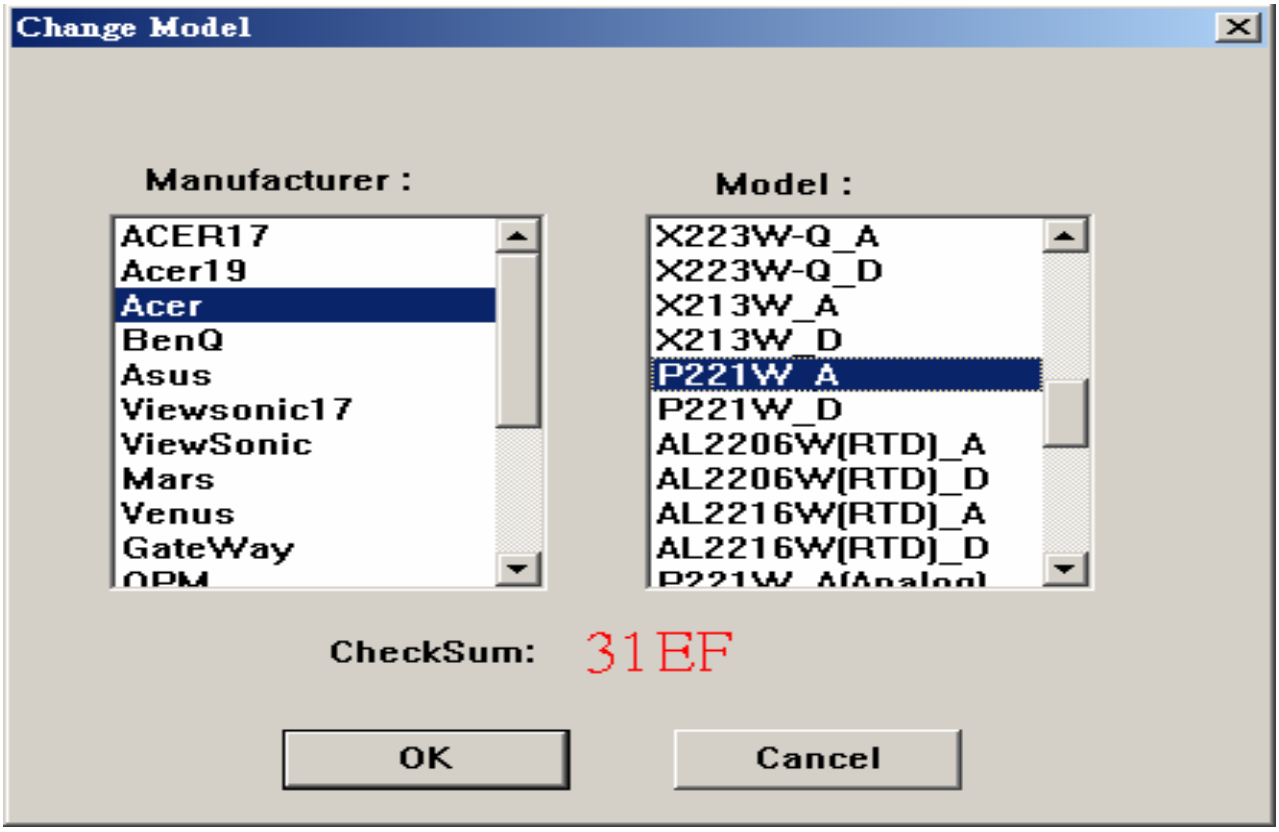
7.1 Choose File menu in main menu ， choose Auto Write button， click S/N blank .



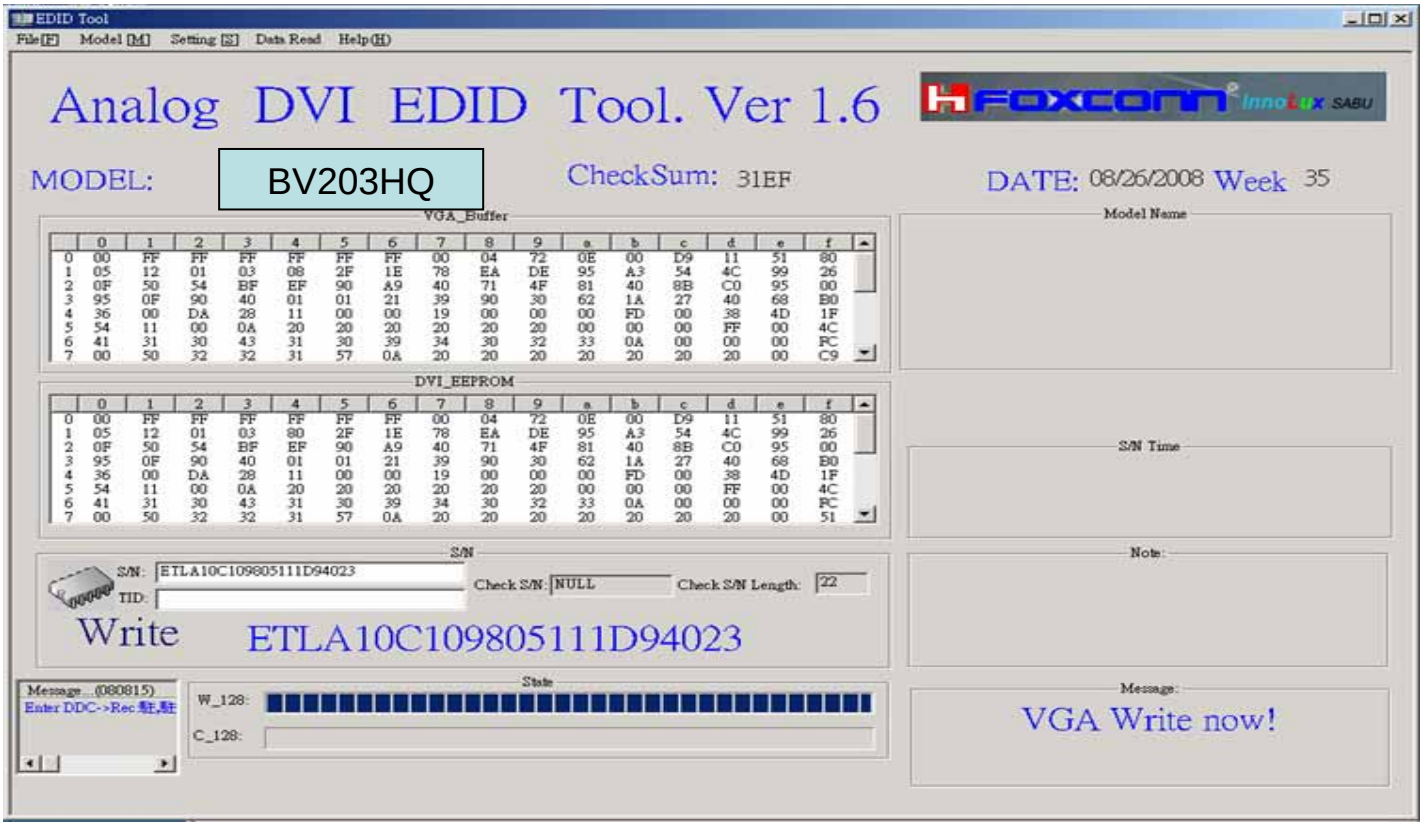
7.2 Cloose the Model in main menu, and the password is 1234.



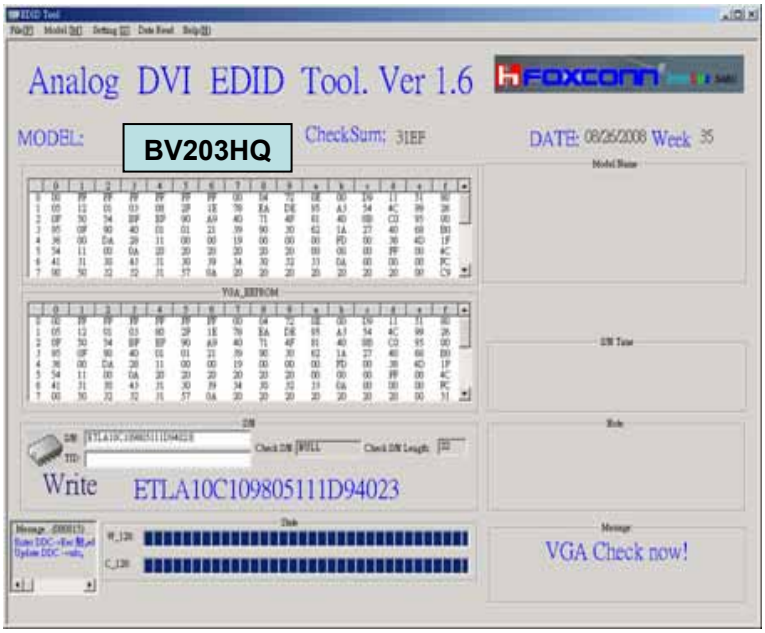
7.3.Choose the model, such as Acer，



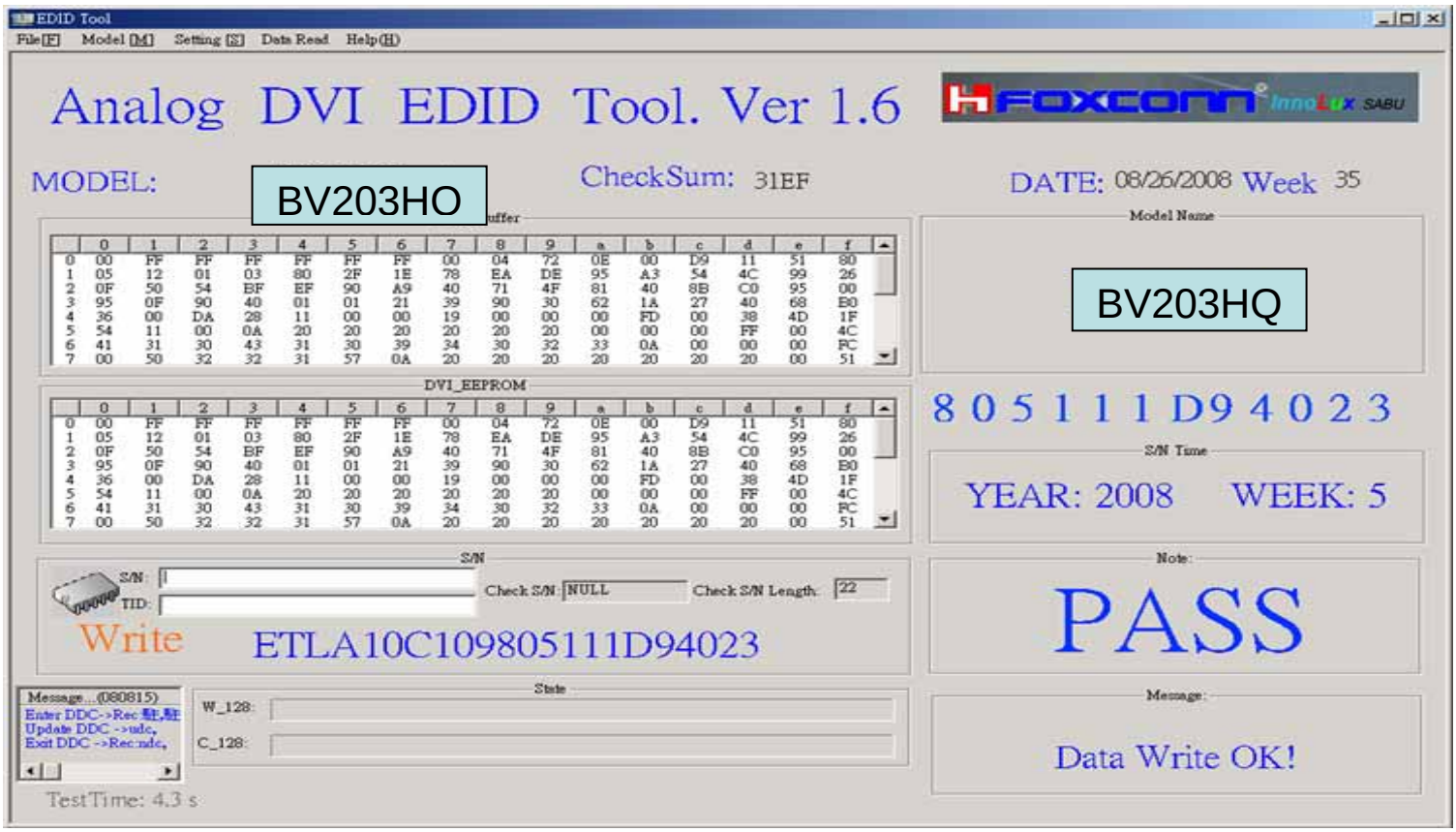
7.4 Input S/N in the Blank, Eg：ETL7777777777777777，the program can write directly



7.5 The program can CHECK VGA&DVI by itself after writing EDID



7.6 If write successfully , you can see PASS in the right.



02. Flat Panel Specification

Approval Specification

General Description

Description

LTM200KT01 is a color active matrix liquid crystal display (LCD) that uses amorphous silicon TFT(Thin Film Transistor) as switching components. This model is composed of a TFT LCD panel, a driver circuit and a back light unit. The resolution of a 20.0" is 1600 x 900 and this model can display up to 16.7 millions colors.

Features

- High contrast ratio, high aperture structure
- TN (Twisted Nematic) mode
- Wide Viewing Angle
- High speed response
- HD+ (1600 x 900 pixels) resolution
- Low power consumption
- 2 dual CCFTs (Cold Cathode Fluorescent Tube)
- DE (Data Enable) only mode
- LVDS (Low Voltage Differential Signaling) interface (2pixel/clock)
- Compact Size Design
- RoHS compliance
- TCO'03 compliance

Applications

- Workstation & desktop monitors
- Display terminals for AV application products
- Monitors for industrial machine

* If the module is used to other applications besides the above, please contact SEC in advance.

General Information

Items	Specification	Unit	Note
Pixel Pitch	0.2768(H) x 0.2768(W)	mm	
Active Display Area	442.8(W) x 249.075(H)	mm	
Surface Treatment	Haze 25%, Hard-coating(3H)		
Display Colors	16.7M (6bit Hi-FRC)	colors	
Number of Pixels	1600 x 900	pixel	
Pixel Arrangement	RGB vertical stripe		
Display Mode	Normally White		
Power Consumption	28.4 Watt (Typ.)		
Luminance of White	300(Typ.)	cd/㎡	

Approval Specification

Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	462.3	462.8	463.3	mm	w/o inverter ass'y
	Vertical (V)	271.5	272.0	272.5	mm	
	Depth (D)	-	-	17.5	mm	
Weight		-	-	2,600	g	LCD module only

Note (1) Mechanical tolerance is ± 0.5mm unless there is a special comment.

1. Absolute Maximum Ratings

If the condition exceeds maximum ratings, it can cause malfunction or unrecoverable damage to the device.

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	GND-0.5	6.5	V	(1)
Storage temperature	T_{STG}	-25	60	℃	(2)
Glass surface temperature (Operation)	T_{OPR}	0	50	℃	(2)
Shock (non - operating)	S_{nop}	-	50	G	(3)
Vibration (non - operating)	V_{nop}	-	1.5	G	(4)

Note (1) Ta= 25 ± 2 °C

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(2) Temperature and relative humidity range are shown in the figure below.
a. 90 % RH Max. (Ta ≤ 39 °C)
b. Maximum wet-bulb temperature at 39 °C or less. (Ta ≤ 39 °C)
c. No condensation
(3) 11ms, sine wave, one time for ±X, ±Y, ±Z axis
(4) 10-300 Hz, Sweep rate 10min, 30min for X,Y,Z axis

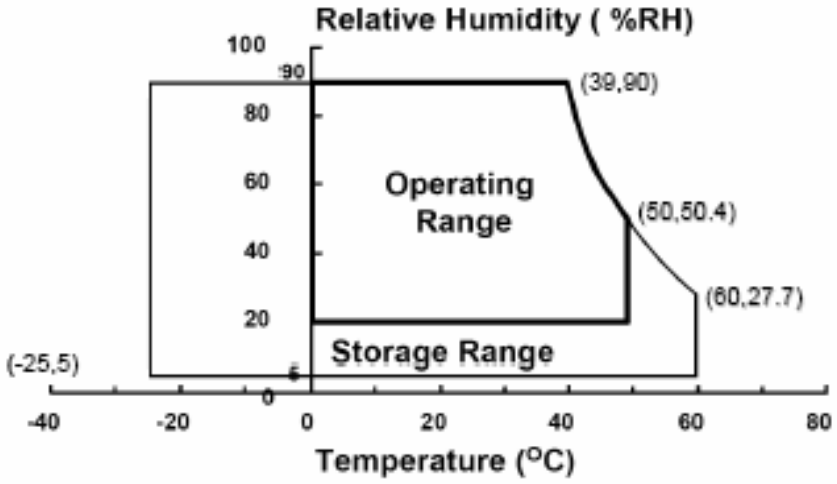


Fig. Temperature and Relative humidity range

2. Optical Characteristics

Approval Specification

The optical characteristics should be measured in a dark room or equivalent.
Measuring equipment : SR-3, RD-80S (TOPCON), EZ-Contrast (Eldim)

(Ta = 25 ± 2°C, VDD=5V, fv= 60Hz, fDCLK=59.1MHz, IL = 6.5mArms)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center of screen)		C/R		600	1000	-		(3) SR-3
Response Time	On/Off	Tr+Tf		-	5	10	msec msec	(5) RD-850S
Luminance of White (Center of screen)		Y_L		250	300	-	cd/m2	(6) SR-3
Color Chromaticity (CIE 1931)	Red	Rx	Normal $\theta_{L,R}=0$ $\theta_{U,D}=0$ Viewing Angle	-0.030	0.650	+0.030		(7),(8) SR-3
		Ry			0.335			
	Green	Gx			0.295			
		Gy			0.605			
	Blue	Bx			0.145			
		By			0.075			
	White	Wx			0.313			
		Wy			0.329			
Color Chromaticity (CIE 1976)	Red	Ru'		-	0.455	-		
		Rv'		-	0.527	-		
	Green	Gu'		-	0.122	-		
		Gv'		-	0.563	-		
	Blue	Bu'		-	0.161	-		
		Bv'		-	0.187	-		
	White	Wu'		-	0.198	-		
		Wv'		-	0.468	-		
C.G.L	White	△u'v'		-	-	0.02		(9)

* C.G.L : Color Grayscale Linearity

(continue to the next page)

Approval Specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Gamut		-		-	72	-	%	
Color Temperature		-		-	6500	-	K	
Viewing Angle	Hor.	θ_L	CR≥10	70	80	-	Degrees	(8) EZ-Contrast
		θ_R		70	80	-		
	Ver.	θ_U		70	80	-		
		θ_D		70	80	-		
Brightness Uniformity (9 Points)		B_{uni}		-	-	25	%	(4) SR-3

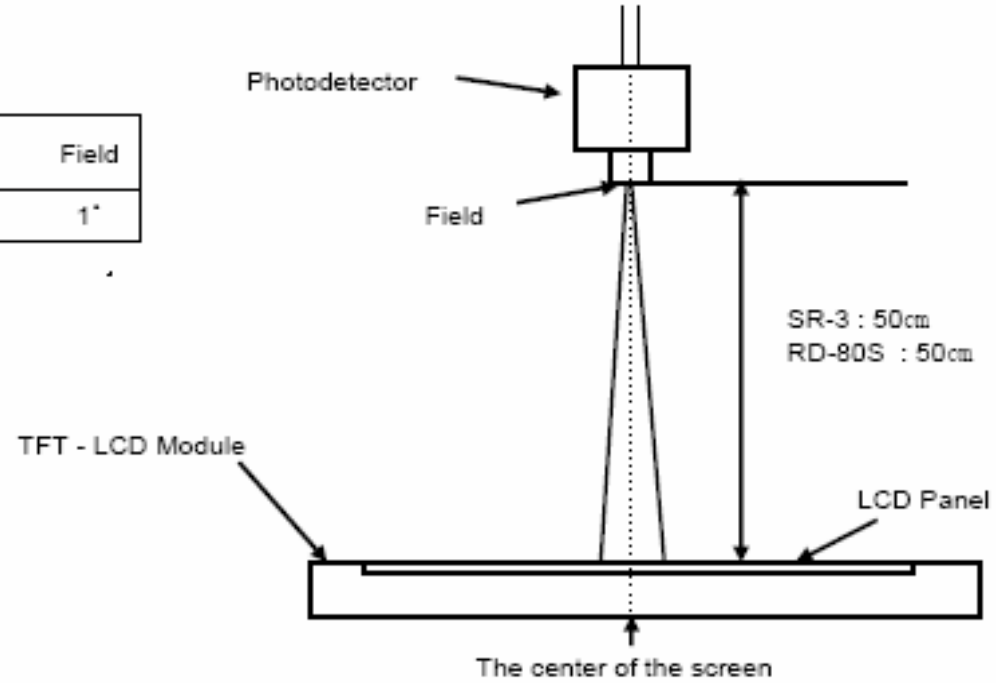
Note (1) Test Equipment Setup

The measurement should be executed in a stable, windless and dark room between 30min after lighting the back light at the given temperature for stabilization of the back light. This should be measured in the center of screen.

Single lamp current : 6.5mA

Environment condition : Ta = 25 ± 2 °C

Photodetector	Field
SR-3	1°



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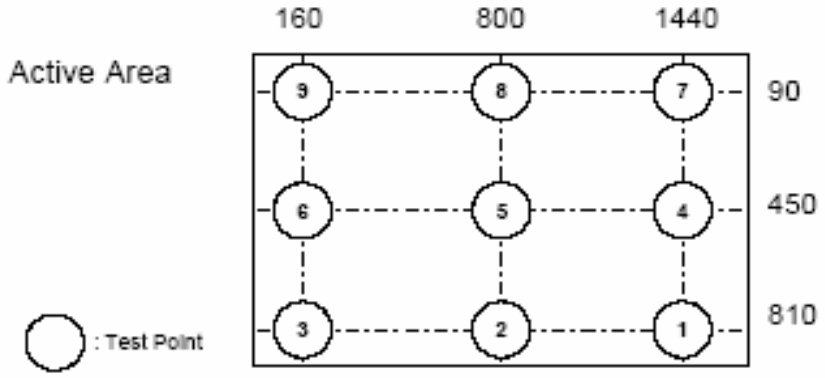
Note (2) Definition of test point



Note (3) Definition of Contrast Ratio (C/R)

: Ratio of gray max (Gmax) & gray min (Gmin) at the center point⑤ of the panel

$$CR = \frac{G\max}{G\min}$$

Gmax : Luminance with all pixels white

Gmin : Luminance with all pixels black

Note (4) Definition of 9 points brightness uniformity

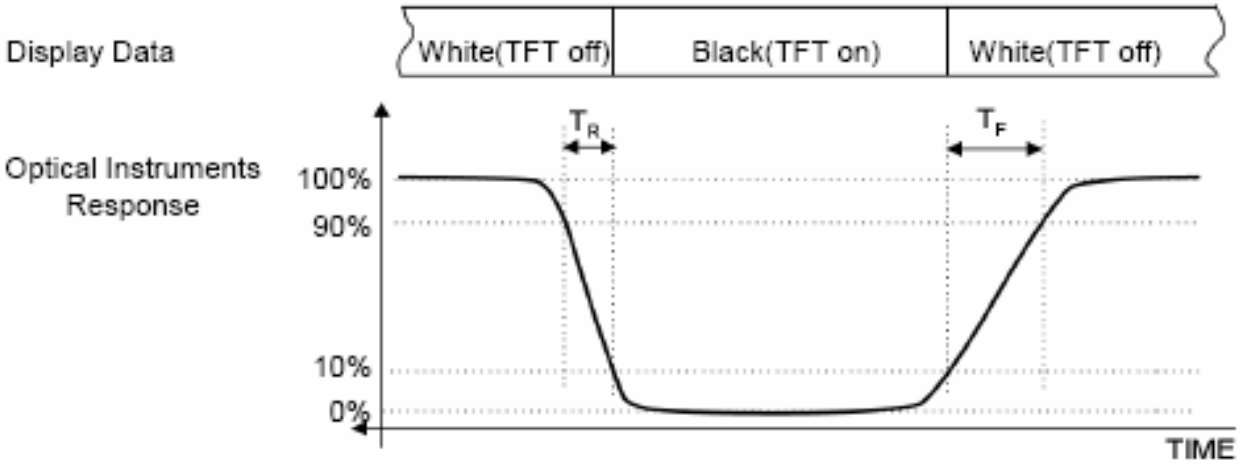
$$Buni = 100 \times \frac{(B\max - B\min)}{B\max}$$

Bmax : Maximum brightness

Bmin : Minimum brightness

Note (5) Definition of Response time

a. On/Off response time : Sum of Tr, Tf



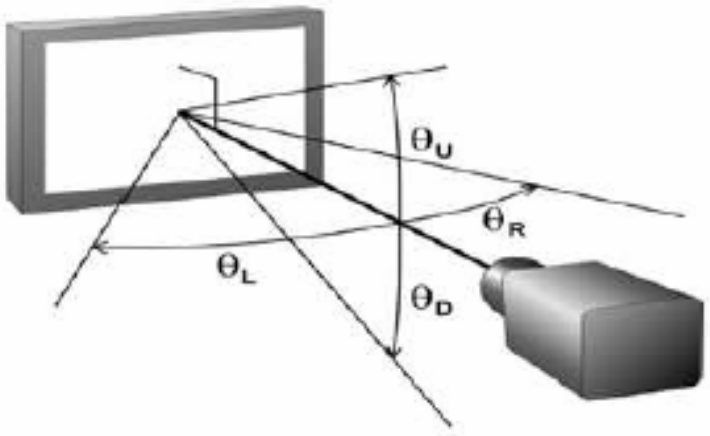
Note (6) Definition of Luminance of White : Luminance of white at center point⑤

Note (7) Definition of Color Chromaticity (CIE 1931, CIE1976)

Color coordinate of Red, Green, Blue & White at center point⑤

Note (8) Definition of Viewing Angle

: Viewing angle range (CR ≥10)

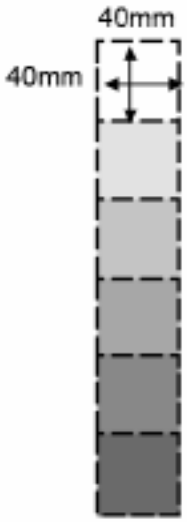


Approval Specification

Note (9) Color Grayscale Linearity

a. Test image : 100% full white pattern with a test pattern as below

b. Test pattern : Squares, 40mm by 40mm in size, filled with 255, 225, 195, 165, 135 and 105 grays steps should be arranged at the center⑤ of the screen.



c. Test method

-1st gray step : move a square of 255 gray level should be moved into the center of the screen and measure luminance and u' and v' coordinates.

- Next gray step : Move a 225 gray square into the center and measure both luminance and coordinates, too.

d. Test evaluation

$$\Delta u'v' = \sqrt{(u'_A - u'_B)^2 + (v'_A - v'_B)^2}$$

Where A, B : 2 gray levels found to have the largest color differences between them

i.e. get the largest Δu' and Δv' of each 6 pair of u' and v' and calculate the Δu'v'.

Approval Specification

3. Electrical Characteristics

3.1 TFT LCD Module

The connector for display data & timing signal should be connected.

Ta = 25°C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	4.5	5.0	5.5	V	(1)
LVDS Input Characteristics	Differential Input Voltage for LVDS Receiver Threshold	High	-	-	+100	mV	(2)
		Low	-100	-	-	mV	
	LVDS skew	t_{SKEW}	-300		300		(3)
	Differential input voltage	$\|V_{ID}\|$	200		600	mV	(4)
	Input voltage range (single-ended)	V_{IN}	0		2.4	V	(4)
	Common mode voltage	V_{CM}	0+ $\|V_{ID}\|/2$	1.2	2.4- $\|V_{ID}\|/2$	V	(4)
Current of Power Supply	(a) Black	I_{DD}	-	800	-	mA	(5),(6)
	(b) White		-	600	-	mA	
	(c) Dot		-	1000	1500	mA	
Vsync Frequency		f_V	50	60	75	Hz	
Hsync Frequency		f_H	46.3	56.0	70.4	kHz	
Main Frequency		f_{DCLK}	48.5	59.2	76.1	MHz	
Rush Current		I_{RUSH}	-	-	3.0	A	(7)

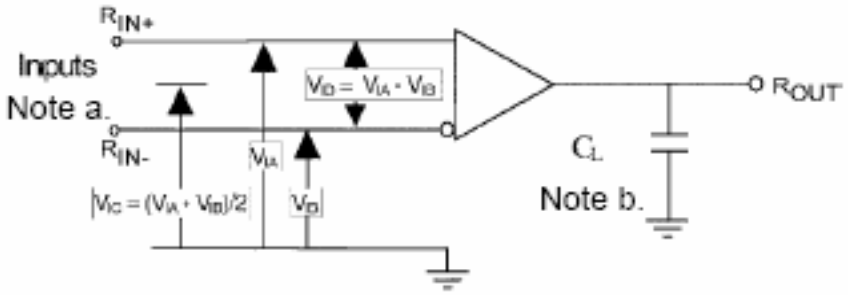
Note (1) The ripple voltage should be controlled under 10% of V_{DD}.

Approval Specification

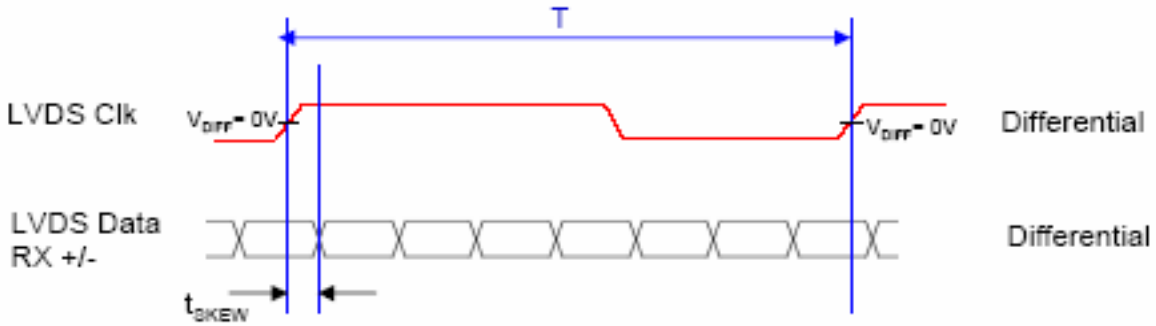
(2) Differential receiver voltage definitions and propagation delay and transition time test circuit

a. All input pulses have frequency = 10MHz, t_R or t_F=1ns

b. C_L includes all probe and fixture capacitance



(3) LVDS Receiver DC parameters are measured under static and steady conditions which may not be reflective of its performance in the end application.

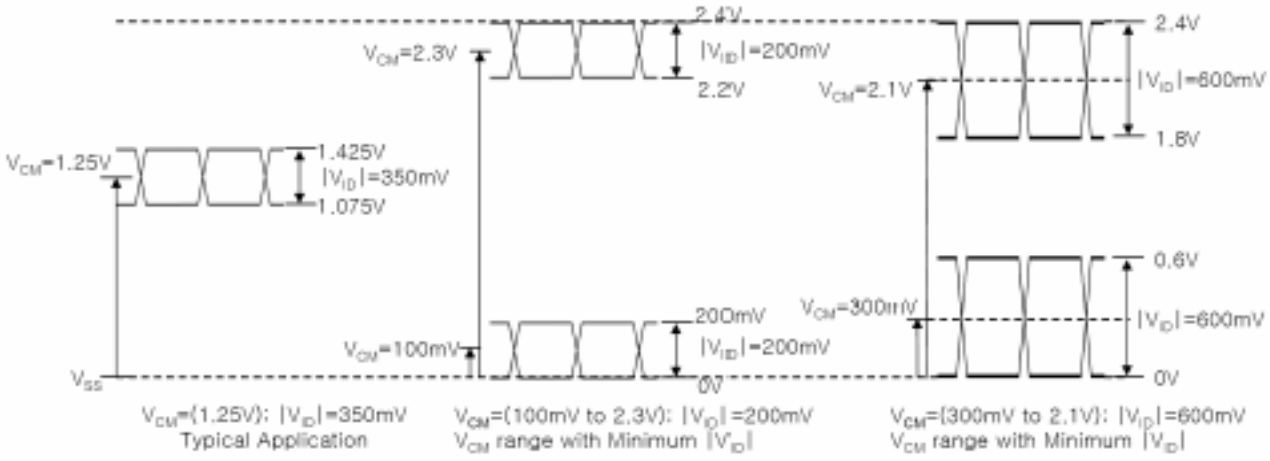


where tskew : skew between LVDS clock & LVDS data,

T : 1 period time of LVDS clock

cf) (-/+) of 300psec means LVDS data goes before or after LVDS clock.

(4) Definition of V_{ID} and V_{CM} using single-end signals

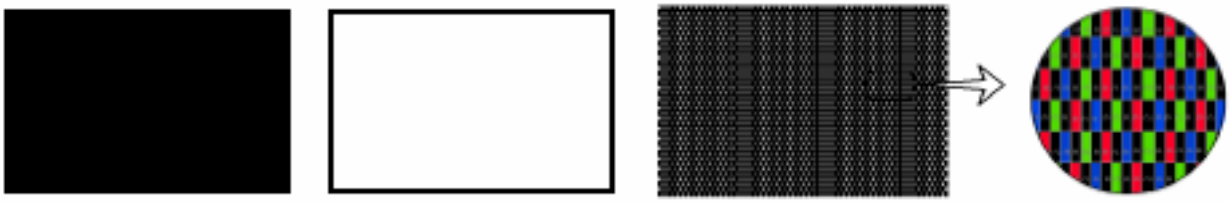


Approval Specification

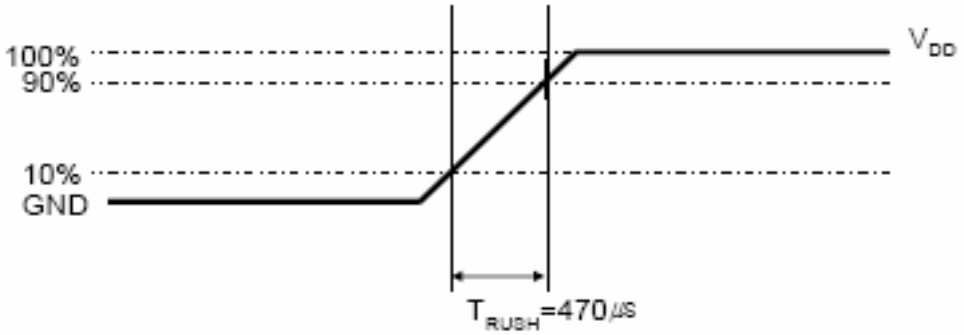
(5) fV=60Hz, fDCLK = 59.1MHz, VDD = 5.0V, DC Current.

(6) Power dissipation check pattern (LCD Module only)

a) Black Pattern b) White Pattern c) Dot Pattern



(7) Measurement Condition



Rush Current I_{RUSH} can be measured when T_{RUSH} is 470㎲.

3.2 Back Light Unit

The back light unit is an edge - lighting type with 2 dual CCFTs (Cold Cathode Fluorescent Tube) The characteristics of two dual lamps are shown in the following tables.

Ta=25 ± 2°C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Lamp Current		I_L	3.0	6.5	8.0	mArms	(1)
Lamp Voltage		V_L	-	840	-	Vrms	
Lamp Frequency		f_L	40	-	60	kHz	(2)
Operating Life Time		Hr	50,000	-	-	Hour	(3)
Inverter waveform	Asymmetry rate	Wasy	-	-	10	%	(4)
	Distortion rate	Wdis	1.2726	1.414	1.5554		
Startup Voltage		Vs	-	-	0℃ : 1,700 25℃: 1,400	Vrms	(5)

Note (1) Specified values are for a single lamp.
Lamp current is measured with current meter for high frequency as shown below.
Refer to the following block diagram of the back light unit for more information.

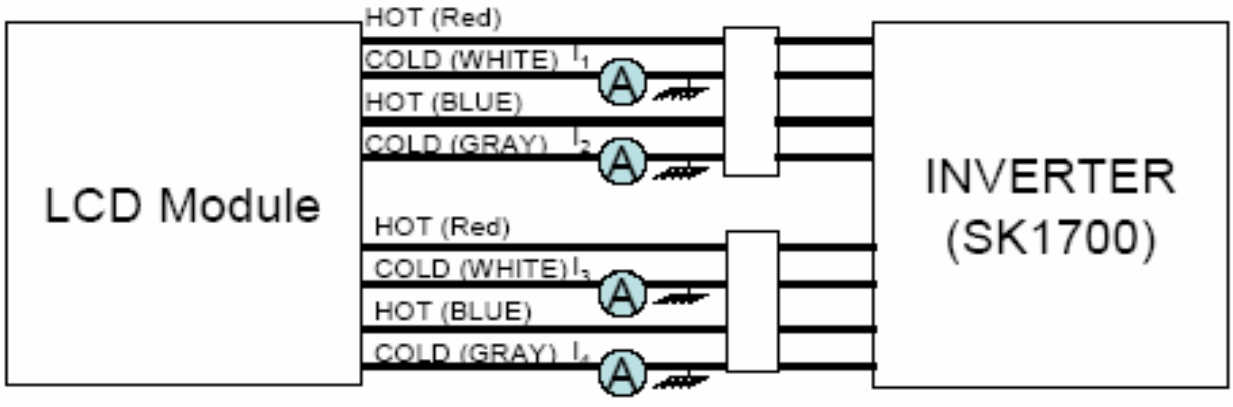


Fig. Measurement point of Lamp Current

(2) Lamp frequency which may produce interference with horizontal synchronous frequency may cause line flow on the display. Therefore lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

(3) Life time (Hr) is defined as the time when brightness of a lamp unit itself becomes 50% or less than its original value at the condition of Ta = 25±2°C and I_L = 6.5mArms

(4) Designing a system inverter intended to have better display performance, power efficiency and lamp reliability.

They would help increase the lamp lifetime and reduce leakage current.

a. The measurement should be done at typical lamp current.

b. The asymmetry rate of the inverter waveform should be less than 10%.

c. The distortion rate of the waveform should be √2 with ±10% tolerance.

- Inverter output waveform had better be more similar to ideal sine wave.

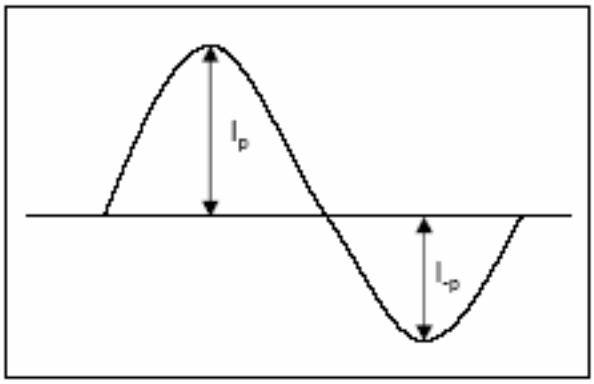


Fig. Wave form of the inverter

▪ Asymmetry rate

$$\frac{|I_p - I_{-p}|}{I_{rms}} \times 100$$

▪ Distortion rate

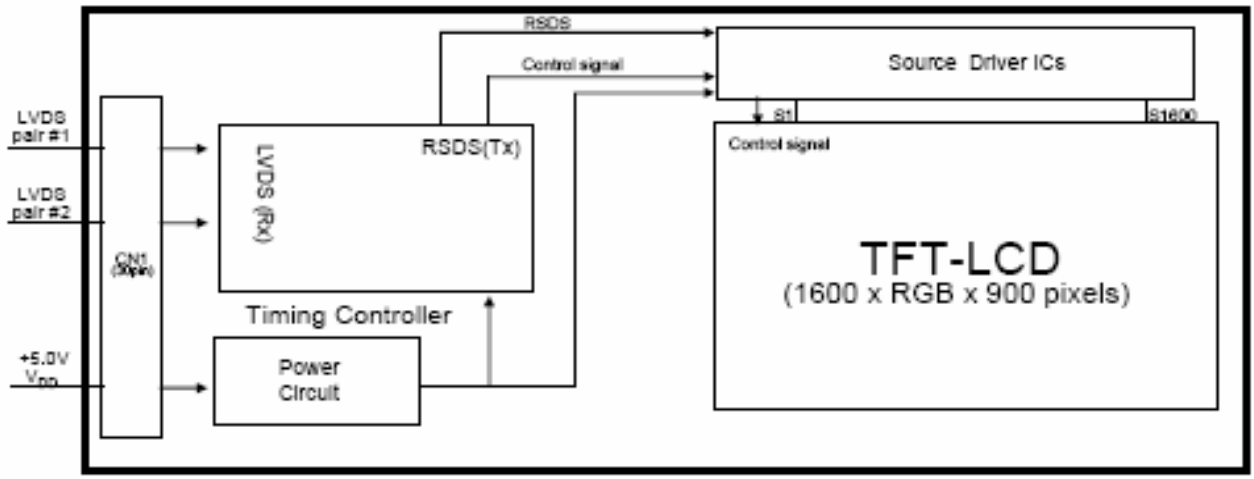
$$\left|\frac{I_p}{I_{rms}}\right| \text{ or } \left|\frac{I_{-p}}{I_{rms}}\right|$$

(5) If an inverter has shutdown function, it should keep its output for over 1 second even if the lamp connector is open. Otherwise the lamps may not be turned on.

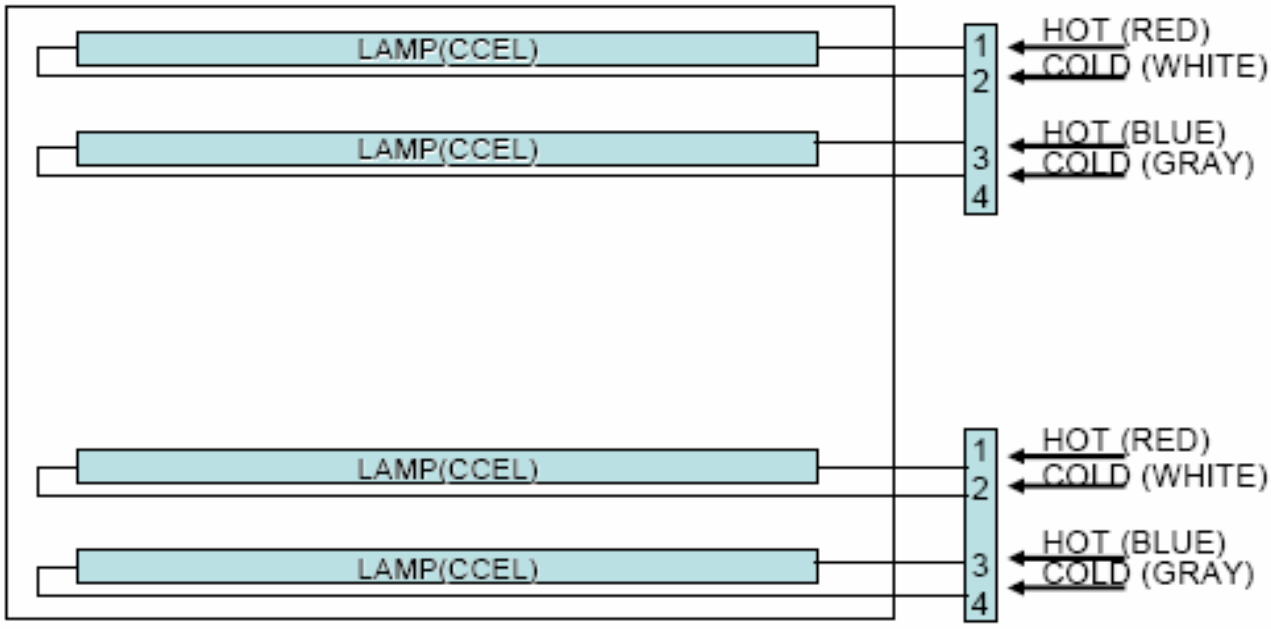
4. BLOCK DIAGRAM

Approval Specification

4.1 TFT LCD Module



4.2 Back Light Unit



5. Input Terminal Pin Assignment

5.1. Input Signal & Power (Connector : UJU IS100-L30O-C23 or Compatible)

PIN NO	SYMBOL	FUNCTION
1	RXO0-	Negative Transmission Data of Pixel 0 (ODD data)
2	RXO0+	Positive Transmission Data of Pixel 0 (ODD data)
3	RXO1-	Negative Transmission Data of Pixel 1 (ODD data)
4	RXO1+	Positive Transmission Data of Pixel 1 (ODD data)
5	RXO2-	Negative Transmission Data of Pixel 2 (ODD data)
6	RXO2+	Positive Transmission Data of Pixel 2 (ODD data)
7	GND	Power Ground
8	RXOC-	Negative Sampling Clock (ODD data)
9	RXOC+	Positive Sampling Clock (ODD data)
10	RXO3-	Negative Transmission Data of Pixel 3 (ODD data)
11	RXO3+	Positive Transmission Data of Pixel 3 (ODD data)
12	RXE0-	Negative Transmission Data of Pixel 0 (EVEN data)
13	RXE0+	Positive Transmission Data of Pixel 0 (EVEN data)
14	GND	Power Ground
15	RXE1-	Negative Transmission Data of Pixel 1 (EVEN data)
16	RXE1+	Positive Transmission Data of Pixel 1 (EVEN data)
17	GND	Power Ground
18	RXE2-	Negative Transmission Data of Pixel 2 (EVEN data)
19	RXE2+	Positive Transmission Data of Pixel 2 (EVEN data)
20	RXEC-	Negative Sampling Clock (EVEN data)
21	RXEC+	Positive Sampling Clock (EVEN data)
22	RXE3-	Negative Transmission Data of Pixel 3 (EVEN data)
23	RXE3+	Positive Transmission Data of Pixel 3 (EVEN data)
24	GND	Power Ground
25	NC	* CE (For LCD internal use only. Do not connect)
26	NC	* CTL (For LCD internal use only. Do not connect)
27	NC	No Connection
28	V_{DD}	Power Supply : +5V
29	V_{DD}	
30	V_{DD}	

* If the system already uses the 5, 6pins, it should keep under GND level
The voltage applied to those pins should not exceed -200mV.

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Note) Pin number starts from Left side

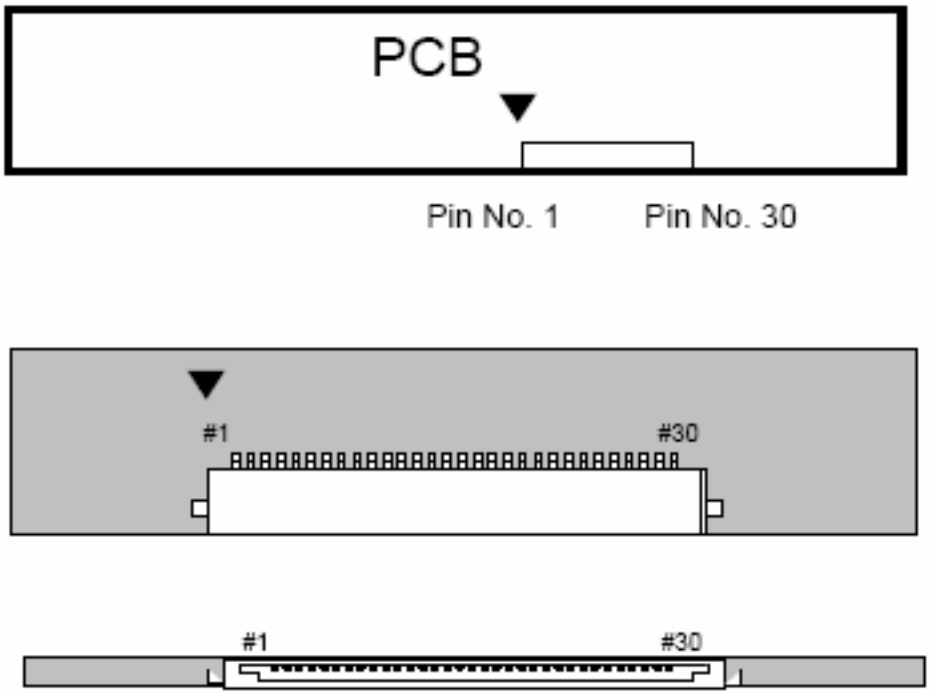

Fig. Connector diagram

a. All GND pins should be connected together and also be connected to the LCD's metal chassis.
b. All power input pins should be connected together.
c. All NC pins should be separated from other signal or power.

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5.2 LVDS Interface

5.2.1 Odd Pixel Data (1st pixel data)

1st LVDS Transmitter (*DS90C383, DS90C385*) Signal Interface						
Device Input Pin		Device Input Signal		Output Signal	To LTM200KT01 Interface (CN1)	
No	Symbol	Symbol	Function		Terminal	Symbol
51	TXIN0	RO0	Red Odd Pixel Data (LSB)	TXOUT0- TXOUT0+	No. 1 No. 2	RXO0- RXO0+
52	TXIN1	RO1	Red Odd Pixel Data			
54	TXIN2	RO2	Red Odd Pixel Data			
55	TXIN3	RO3	Red Odd Pixel Data			
56	TXIN4	RO4	Red Odd Pixel Data			
2	TXIN5	RO7	Red Odd Pixel Data (MSB)	TXOUT3- TXOUT3+	No. 10 No. 11	RXO3- RXO3+
3	TXIN6	RO5	Red Odd Pixel Data	TXOUT0- TXOUT0+	No. 1 No. 2	RXO0- RXO0+
4	TXIN7	GO0	Green Odd Pixel Data (LSB)			
6	TXIN8	GO1	Green Odd Pixel Data	TXOUT1- TXOUT1+	No. 3 No. 4	RXO1- RXO1+
7	TXIN9	GO2	Green Odd Pixel Data			
8	TXIN10	GO6	Green Odd Pixel Data	TXOUT3- TXOUT3+	No. 10 No. 11	RXO3- RXO3+
10	TXIN11	GO7	Green Odd Pixel Data (MSB)			
11	TXIN12	GO3	Green Odd Pixel Data	TXOUT1- TXOUT1+	No. 3 No. 4	RXO1- RXO1+
12	TXIN13	GO4	Green Odd Pixel Data			
14	TXIN14	GO5	Green Odd Pixel Data			
15	TXIN15	BO0	Blue Odd Pixel Data (LSB)			
16	TXIN16	BO6	Blue Odd Pixel Data	TXOUT3- TXOUT3+	No. 10 No. 11	RXO3- RXO3+
18	TXIN17	BO7	Blue Odd Pixel Data (MSB)			
19	TXIN18	BO1	Blue Odd Pixel Data	TXOUT1- TXOUT1+	No. 3 No. 4	RXO1- RXO1+
20	TXIN19	BO2	Blue Odd Pixel Data	TXOUT2- TXOUT2+	No. 5 No. 6	RXO2- RXO2+
22	TXIN20	BO3	Blue Odd Pixel Data			
23	TXIN21	BO4	Blue Odd Pixel Data			
24	TXIN22	BO5	Blue Odd Pixel Data			
50	TXIN27	RO6	Red Odd Pixel Data	TXOUT3- TXOUT3+	No. 10 No. 11	RXO3- RXO3+

5.2.2 Even Pixel Data (2nd pixel data)

2nd LVDS Transmitter (*DS90C383, DS90C385*) Signal Interface						
Device Input Pin		Device Input Signal		Output Signal	To LTM200KT01 Interface (CN1)	
No	Symbol	Symbol	Function		Terminal	Symbol
51	TXIN0	RE0	Red Even Pixel Data (LSB)	TXOUT0- TXOUT0+	No. 12 No. 13	RXE0- RXE0+
52	TXIN1	RE1	Red Even Pixel Data			
54	TXIN2	RE2	Red Even Pixel Data			
55	TXIN3	RE3	Red Even Pixel Data			
56	TXIN4	RE4	Red Even Pixel Data			
2	TXIN5	RE7	Red Even Pixel Data (MSB)	TXOUT3- TXOUT3+	No. 22 No. 23	RXE3- RXE3+
3	TXIN6	RE5	Red Even Pixel Data	TXOUT0- TXOUT0+	No. 12 No. 13	RXE0- RXE0+
4	TXIN7	GE0	Green Even Pixel Data (LSB)			
6	TXIN8	GE1	Green Even Pixel Data	TXOUT1- TXOUT1+	No. 15 No. 16	RXE1- RXE1+
7	TXIN9	GE2	Green Even Pixel Data			
8	TXIN10	GE6	Green Even Pixel Data	TXOUT3- TXOUT3+	No. 22 No. 23	RXE3- RXE3+
10	TXIN11	GE7	Green Even Pixel Data (MSB)			
11	TXIN12	GE3	Green Even Pixel Data	TXOUT1- TXOUT1+	No. 15 No. 16	RXE1- RXE1+
12	TXIN13	GE4	Green Even Pixel Data			
14	TXIN14	GE5	Green Even Pixel Data			
15	TXIN15	BE0	Blue Even Pixel Data (LSB)			
16	TXIN16	BE6	Blue Even Pixel Data	TXOUT3- TXOUT3+	No. 22 No. 23	RXE3- RXE3+
18	TXIN17	BE7	Blue Even Pixel Data (MSB)			
19	TXIN18	BE1	Blue Even Pixel Data	TXOUT1- TXOUT1+	No. 15 No. 16	RXE1- RXE1+
20	TXIN19	BE2	Blue Even Pixel Data	TXOUT2- TXOUT2+	No. 18 No. 19	RXE2- RXE2+
22	TXIN20	BE3	Blue Even Pixel Data			
23	TXIN21	BE4	Blue Even Pixel Data			
24	TXIN22	BE5	Blue Even Pixel Data			
50	TXIN27	RE6	Red Even Pixel Data	TXOUT3- TXOUT3+	No. 22 No. 23	RXE3- RXE3+

5.3 LVDS Interface(2)

5.3.1 Odd Pixel Data (1st pixel data)

LVDS Transmitter (*DS90C387*) Signal Interface						
Device Input Pin		Device Input Signal		Output Signal	To LTM200KT01 Interface (CN1)	
No	Symbol	Symbol	Function		Terminal	Symbol
10	R10	RO0	Red Odd Pixel Data (LSB)	A0M A0P	No. 1 No. 2	RXO0- RXO0+
9	R11	RO1	Red Odd Pixel Data			
8	R12	RO2	Red Odd Pixel Data			
7	R13	RO3	Red Odd Pixel Data			
6	R14	RO4	Red Odd Pixel Data			
3	R17	RO7	Red Odd Pixel Data (MSB)	A3M A3P	No. 10 No. 11	RXO3- RXO3+
5	R15	RO5	Red Odd Pixel Data	A0M A0P	No. 1 No. 2	RXO0- RXO0+
2	G10	GO0	Green Odd Pixel Data (LSB)			
1	G11	GO1	Green Odd Pixel Data	A1M A1P	No. 3 No. 4	RXO1- RXO1+
100	G12	GO2	Green Odd Pixel Data			
94	G16	GO6	Green Odd Pixel Data	A3M A3P	No. 10 No. 11	RXO3- RXO3+
93	G17	GO7	Green Odd Pixel Data (MSB)			
99	G13	GO3	Green Odd Pixel Data	A1M A1P	No. 3 No. 4	RXO1- RXO1+
96	G14	GO4	Green Odd Pixel Data			
95	G15	GO5	Green Odd Pixel Data			
92	B10	BO0	Blue Odd Pixel Data (LSB)			
86	B16	BO6	Blue Odd Pixel Data	A3M A3P	No. 10 No. 11	RXO3- RXO3+
85	B17	BO7	Blue Odd Pixel Data (MSB)			
91	B11	BO1	Blue Odd Pixel Data	A1M A1P	No. 3 No. 4	RXO1- RXO1+
90	B12	BO2	Blue Odd Pixel Data	A2M A2P	No. 5 No. 6	RXO2- RXO2+
89	B13	BO3	Blue Odd Pixel Data			
88	B14	BO4	Blue Odd Pixel Data			
87	B15	BO5	Blue Odd Pixel Data			
4	R16	RO6	Red Odd Pixel Data	A3M A3P	No. 10 No. 11	RXO3- RXO3+

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5.3.2 Even Pixel Data (2nd pixel data)

LVDS Transmitter (*DS90C387*) Signal Interface						
Device Input Pin		Device Input Signal		Output Signal	To LTM200KT01 Interface (CN1)	
No	Symbol	Symbol	Function		Terminal	Symbol
84	R20	RE0	Red Even Pixel Data (LSB)	A4M A4P	No. 12 No. 13	RXE0- RXE0+
81	R21	RE1	Red Even Pixel Data			
80	R22	RE2	Red Even Pixel Data			
79	R23	RE3	Red Even Pixel Data			
78	R24	RE4	Red Even Pixel Data			
75	R27	RE7	Red Even Pixel Data (MSB)	A7M A7P	No. 22 No. 23	RXE3- RXE3+
77	R25	RE5	Red Even Pixel Data	A4M A4P	No. 12 No. 13	RXE0- RXE0+
74	G20	GE0	Green Even Pixel Data (LSB)			
73	G21	GE1	Green Even Pixel Data	A5M A5P	No. 15 No. 16	RXE1- RXE1+
72	G22	GE2	Green Even Pixel Data			
66	G26	GE6	Green Even Pixel Data	A7M A7P	No. 22 No. 23	RXE3- RXE3+
65	G27	GE7	Green Even Pixel Data (MSB)			
71	G23	GE3	Green Even Pixel Data	A5M A5P	No. 15 No. 16	RXE1- RXE1+
70	G24	GE4	Green Even Pixel Data			
69	G25	GE5	Green Even Pixel Data			
64	B20	BE0	Blue Even Pixel Data (LSB)			
58	B26	BE6	Blue Even Pixel Data	A7M A7P	No. 22 No. 23	RXE3- RXE3+
57	B27	BE7	Blue Even Pixel Data (MSB)			
63	B21	BE1	Blue Even Pixel Data	A5M A5P	No. 15 No. 16	RXE1- RXE1+
62	B22	BE2	Blue Even Pixel Data	A6M A6P	No. 18 No. 19	RXE2- RXE2+
61	B23	BE3	Blue Even Pixel Data			
60	B24	BE4	Blue Even Pixel Data			
59	B25	BE5	Blue Even Pixel Data			
76	R26	RE6	Red Even Pixel Data	A7M A7P	No. 22 No. 23	RXE3- RXE3+

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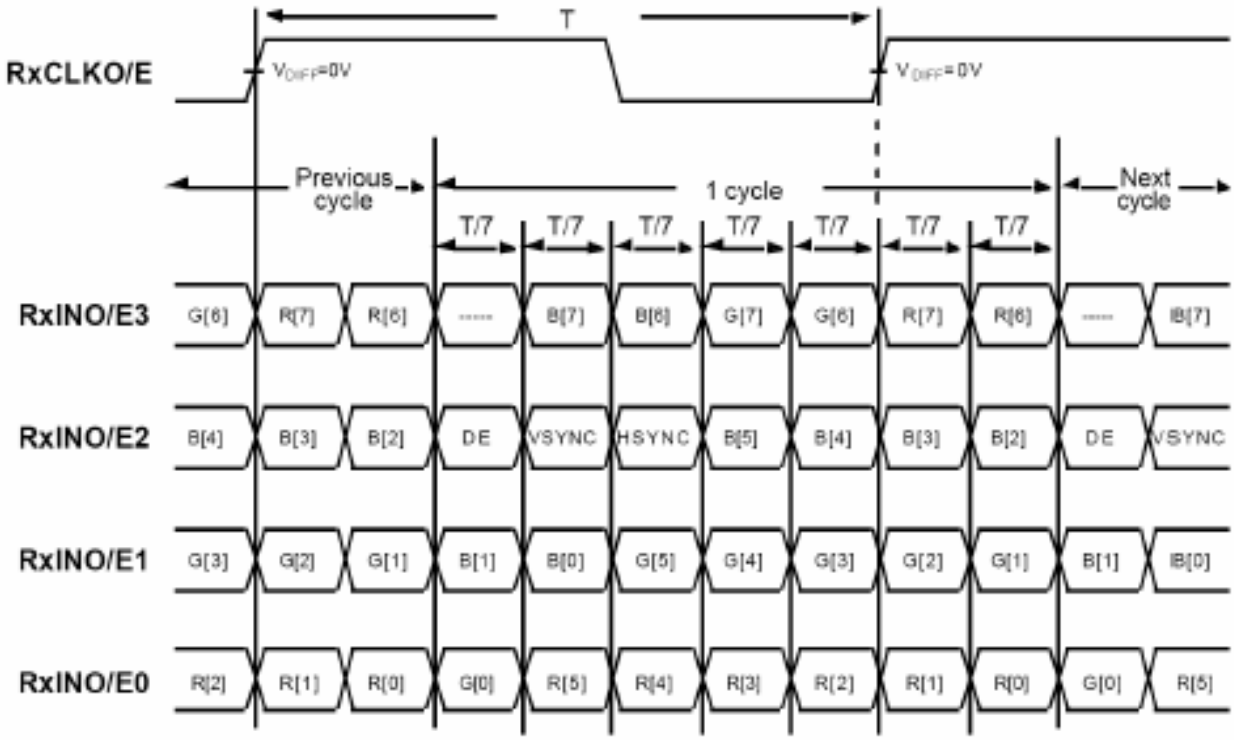
5.3.3 Timing Diagrams of LVDS For Transmitting

LVDS Receiver : Integrated T-CON



5.4 Back Light Unit

	Pin No.	Input	Color	Function
Upper	1	Hot – 1	Red	High Voltage
	2	Cold – 1	White	Ground
	3	Hot – 2	Blue	High Voltage
	4	Cold – 2	Gray	Ground
Lower	1	Hot – 1	Red	High Voltage
	2	Cold – 1	White	Ground
	3	Hot – 2	Blue	High Voltage
	4	Cold – 2	Gray	Ground
	Connect or Part No.	Yeonho 35001HS-04L or equivalent		

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5.5 Input Signals, Basic Display Colors and Gray Scale of Each Color

COLOR	DISPLAY (8bit)	DATA SIGNAL																								GRAY SCALE LEVEL
		RED								GREEN								BLUE								
		R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7	
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	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	-
	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	-
	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	-
	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	-
	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	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	R0
	DARK ↑	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
		:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			R3~R252
	↓ LIGHT	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R253
		0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R254
	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	R255
GRAY SCALE OF GREEN	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	G0
	DARK ↑	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G1
		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G2
		:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			G3~G252
	↓ LIGHT	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G253
		0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G254
	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	G255
GRAY SCALE OF BLUE	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	B0
	DARK ↑	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	B1
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	B2
		:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			B3~B252
	↓ LIGHT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	B253
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	B254
	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	B255

Note (1) Definition of Gray :
Rn : Red Gray, Gn : Green Gray, Bn : Blue Gray (n = Gray level)
Input Signal : 0 = Low level voltage, 1 = High level voltage

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6. Interface Timing

6.1 Timing Parameters (DE only mode)

SIGNAL	ITEM	SYMBOL	MIN.	TYP.	MAX.	Unit	NOTE
Clock	Frequency	$1/T_C$	48.5	59.2	76.1	MHz	-
Hsync		F_H	46.3	56.0	70.4	KHz	-
Vsync		F_V	50	60	75	Hz	-
Vertical Display Term	Active Display Period	T_{VD}	900	900	900	lines	-
	Vertical Total	T_{VB}	906	934	955	lines	-
Horizontal Display Term	Active Display Period	T_{HD}	800	800	800	clocks	-
	Horizontal Total	T_H	950	1056	1150	clocks	-

Note (1) This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

(2) Test Point : TTL control signal and CLK at LVDS Tx input terminal in system

(3) Internal Vcc = 3.3V

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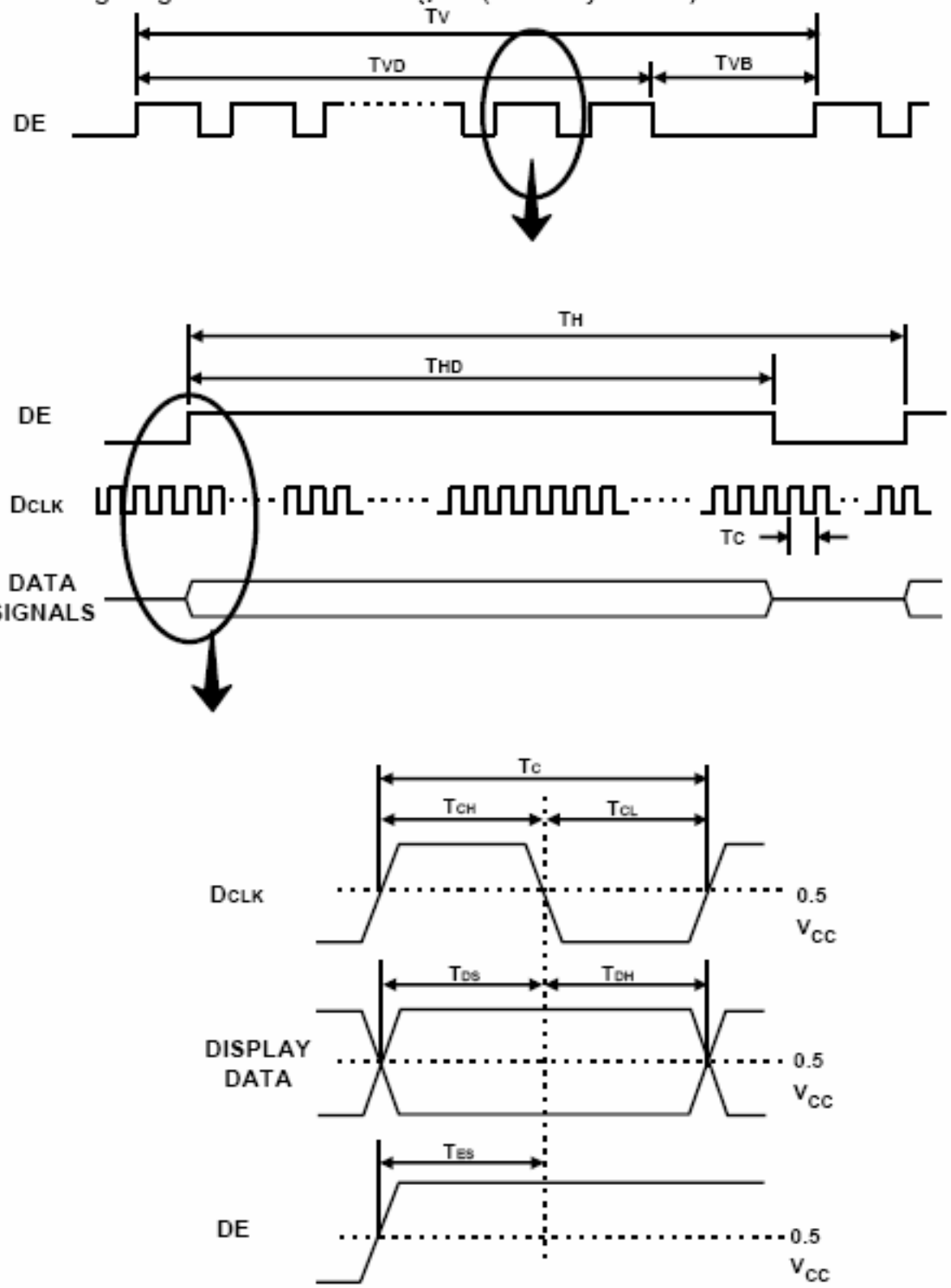
6.2 Timing diagrams of interface signal (DE only mode)



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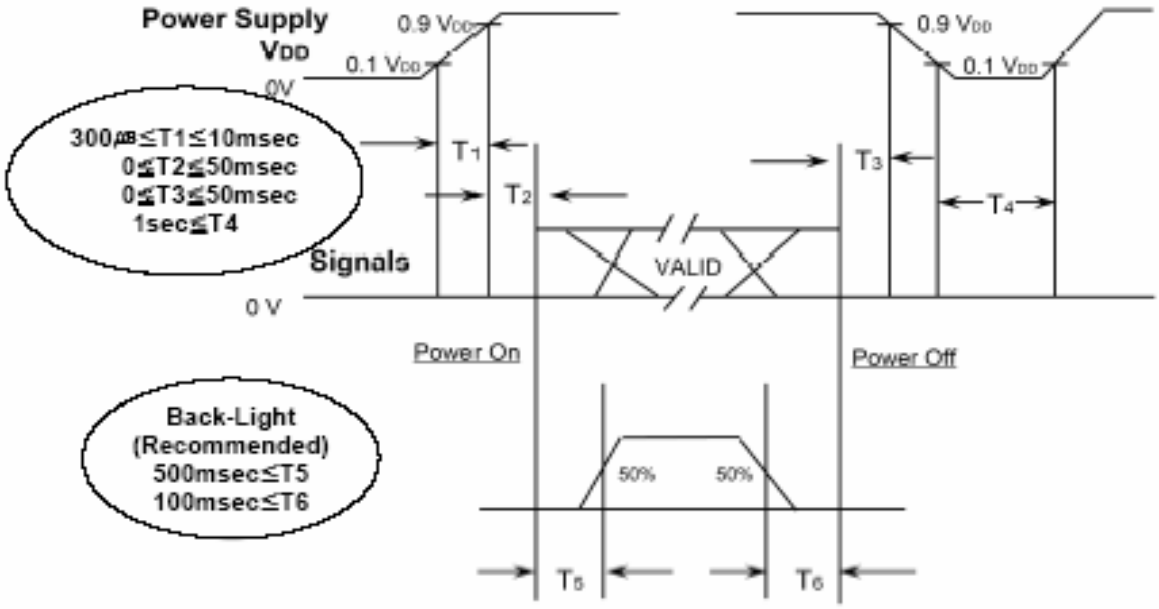
6.3 Power ON/OFF Sequence

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



T1 : V_{DD} rising time from 10% to 90%
T2 : The time from V_{DD} to valid data at power ON.
T3 : The time from valid data off to V_{DD} off at power Off.
T4 : V_{DD} off time for Windows restart
T5 : The time from valid data to B/L enable at power ON.
T6 : The time from valid data off to B/L disable at power Off.

- The supply voltage of the external system for the Module input should be the same as the definition of V_{DD}.
- Apply the lamp voltage within the LCD operation range. When the back light turns on before the LCD operation or the LCD turns off before the back light turns off, the display may momentarily show abnormal screen.
- In case of V_{DD} = off level, please keep the level of input signals low or keep a high impedance.
- T4 should be measured after the Module has been fully discharged between power off and on period.
- Interface signal should not be kept at high impedance when the power is on.

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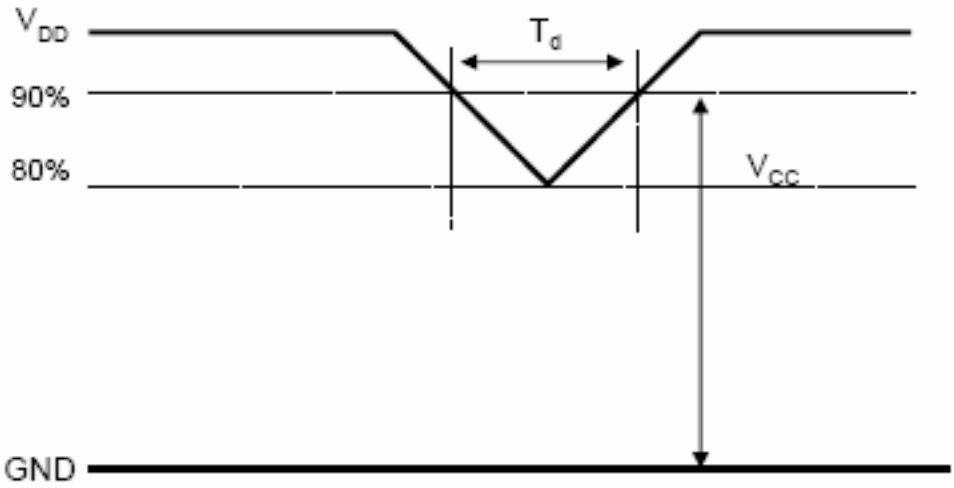
6.4 VDD Power Dip Condition



$4.5V \leq V_{DD} \leq 5.5V$
If V_{DD}(typ.) x 80% $\leq V_{CC} \leq V_{DD}$(typ) x 90%
Then, 0<Td ≤20msec

Note (1) The above conditions are for the glitch of the input voltage.

(2) For stable operation of an LCD Module power, please follow them.
i.e., if typ VDD x 80% ≤ Vcc ≤ typ VDD x 90%, then T_d should be less than 20ms.

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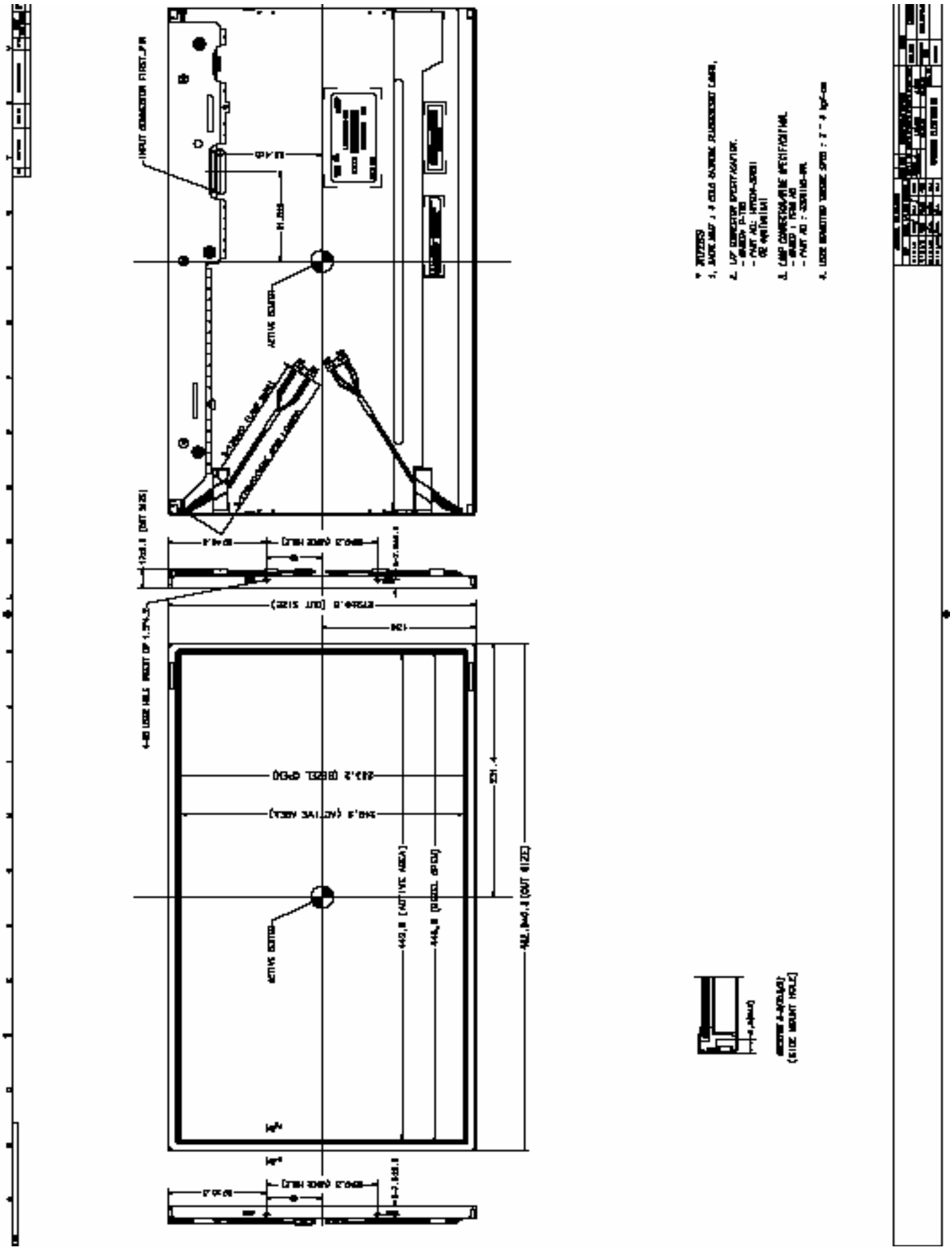
7. Outline Dimension

[Refer to the next page]



8. Reliability Test

Test Items		Conditions	Time/Cycle	Sample
HTOL*		50°C , Bias	500 hrs	12
LTOL*		0°C , Bias	500 hrs	5
THB**		40°C / 95% , Bias	500 hrs	5
HTS***		70°C , No Bias	500 hrs	5
LTS***		-20°C , No Bias	500 hrs	5
Thermal Cycle		-20°C/30min ~ +60°C/30min , No bias	100 cycle	5
Box Drop		1 angle , 3 edge , 6 side , 76 cm		2 Box
Shock (Non-operating)		50G , 11msec Sine wave , ± x/y/z axis	1 time/axis	3
Vibration (Non-operating)		1.47Grms , 5~200 Hz ± x/y/z axis , sweep rate : 10 min	30min/axis	3
ESD	Non-Operating	CDM : 150pF, 330Ω, 9point, 3 times/point	± 10kV	3
	Operating	Contact : 150pF, 330Ω, 100point, once/point	± 8kV	3
		Air(non-contact) : 150pF, 330Ω, 100point, once/point	± 15kV	3
Altitude		Thermal :-10~50℃, 15000ft(Operating), 40000ft(Non-operating)	8Hr	3
		Normal :45℃, 15000ft	10Hr	3

[Result Evaluation Criteria]

Under the display quality test conditions with normal operation state, these should be no change which may affect practical display functions.

* HTOL/ LTOL : High/Low Temperature Operating Life

** THB : Temperature Humidity Bias

*** HTS/LTS : High/Low Temperature Storage

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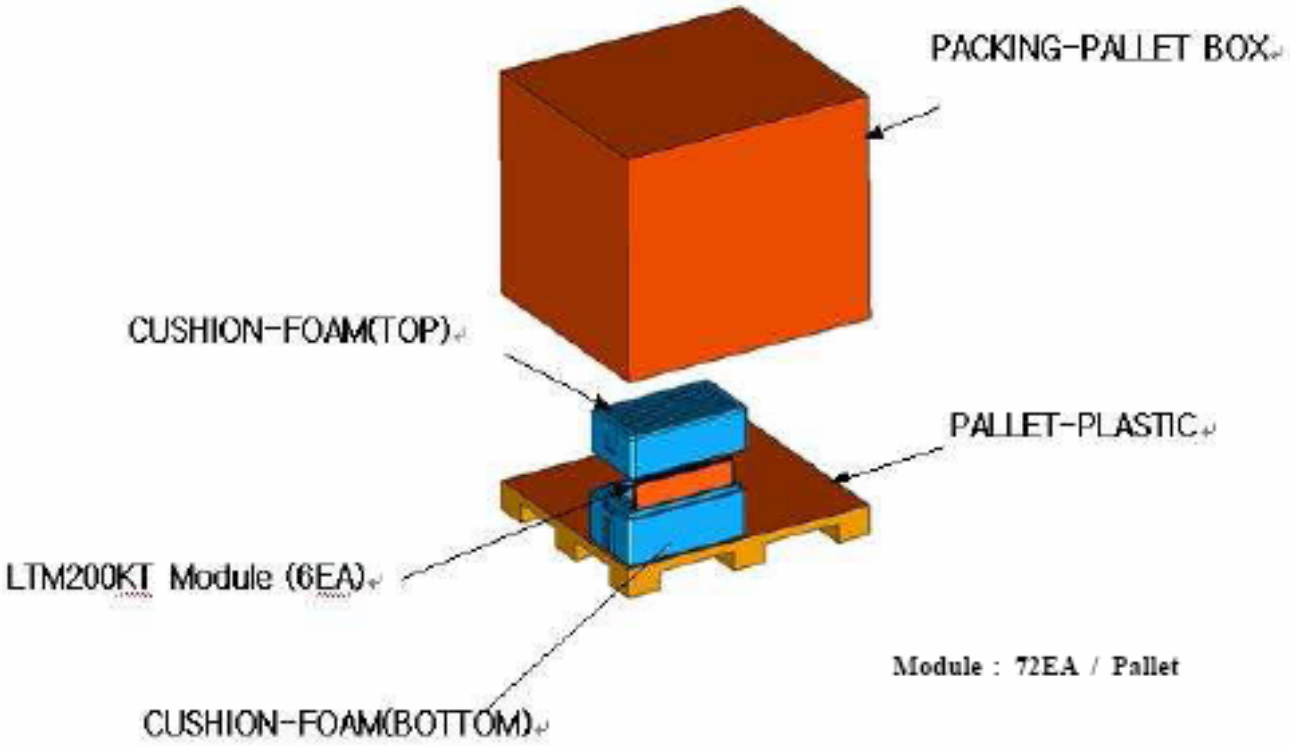
9. PACKING

9.1 CARTON (Internal Package)

(1) Packing Method

a. Without Inverter



NOTE 1) TOTAL (Packing BOX) : Approx. 16.0㎏

2) Acceptance number of piling : 4 Boxs

3) Packing Case size : 380(W) * 350(D) * 492(H)

4) Packing Pallet Box size : 1074(W) * 778(D) * 1008(H)

10. MARKING & OTHERS

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A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

(1) Parts number : LTM200KT01

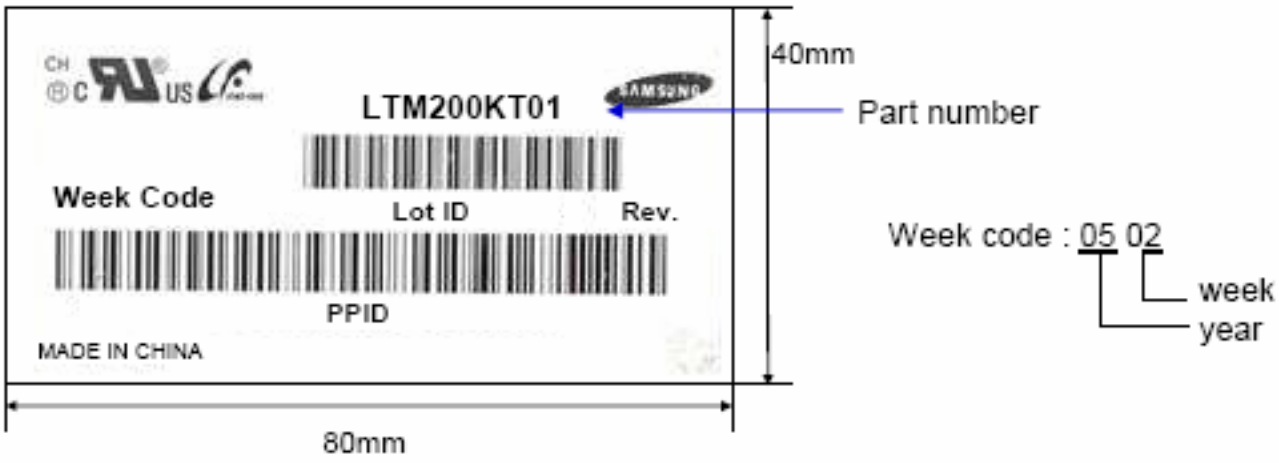
(2) Revision: Three letters

(3) Lot number : X X X X XXX XX X

- X: Line
- X: Product code
- X: Year (Note1)
- X: Month
- XXX: Lot No. (Glass)
- XX: Glass No. (In the one Lot)
- X: Cell Position No. (In the Glass)

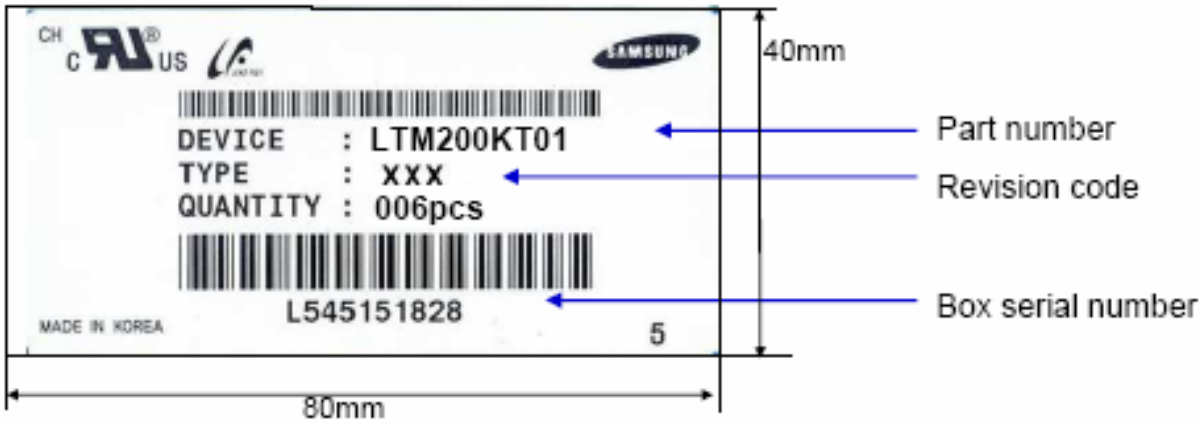
Note (1) This code indicating year is omitted in the products of KIHENG site.

(4) Nameplate Indication



Approval Specification

(5) Packing box attach



(6) Others

a. After service part

Because of narrow bezel structure, lamp cannot be replaced.

Approval Specification

11. General Precautions

11.1 Handling

(a) When the module is assembled, it should be attached to the system firmly using all mounting holes. Be careful not to twist and bend the module.

(b) Because the inverter uses high voltages, it should be disconnected from power source before it is assembled or disassembled.

(c) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, it may cause improper operation or damage to the module and CCFT back light.

(d) Note that polarizer films are very fragile and could be damaged easily. Do not press or scratch the surface harder than a HB pencil lead.

(e) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining or discoloration may occur.

(f) If the surface of the polarizer is dirty, clean it using absorbent cotton or soft cloth.

(g) Desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might cause permanent damage to the polarizer due to chemical reaction.

(h) 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, legs or clothes, it must be washed away with soap thoroughly.

(i) Protect the Module from static, or the CMOS Gate Array IC would be damaged.

(j) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(k) Do not disassemble the Module.

(l) Do not pull or fold the lamp wire.

(m) Do not adjust the variable resistor located on the Module.

(n) Protection film for polarizer on the Module should be slowly peeled off just before use so that the electrostatic charge can be minimized.

(o) Pins of I/F connector should not be touched directly with bare hands.

11.2 Storage

(a) Do not leave the Module in high temperature, and high humidity for a long time. It is highly recommended to store the Module with temperature from 0 to 35℃ and relative humidity of less than 70%.

(b) Do not store the TFT-LCD Module in direct sunlight.

(c) The Module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storing.

11.3 Operation

(a) Do not connect or disconnect the Module in the "Power On" condition.

(b) Power supply should always be turned on/off by the item 6.3 "Power on/off sequence"

(c) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

(d) The cable between the back light connector and its inverter power supply should be connected directly with a minimized length. A longer cable between the back light and the inverter may cause lower luminance of lamp(CCFT) and may require higher startup voltage(Vs).

11.4 Operation Condition Guide

(a) The LCD product should be operated under normal conditions.
Normal condition is defined as below;
- Temperature : 20±15℃
- Humidity : 65±20%
- Display pattern : continually changing pattern (Not stationary)

(b) If the product will be used in extreme conditions such as high temperature, humidity, display patterns or operation time etc.., It is strongly recommended to contact SEC for Application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at Airports, Transit Stations, Banks, Stock market, and Controlling systems.

Approval Specification

11.5 Others

(a) Ultra-violet ray filter is necessary for outdoor operation.

(b) Avoid condensation of water. It may result in improper operation or disconnection of electrode.

(c) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on)
Otherwise the Module may be damaged.

(d) If the Module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.
To avoid image sticking, it is recommended to use a screen saver.

(e) This Module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

(f) Please contact SEC in advance when you display the same pattern for a long time.

03 Exploded Diagram

3.1 Screw List

LE20N9Screw List

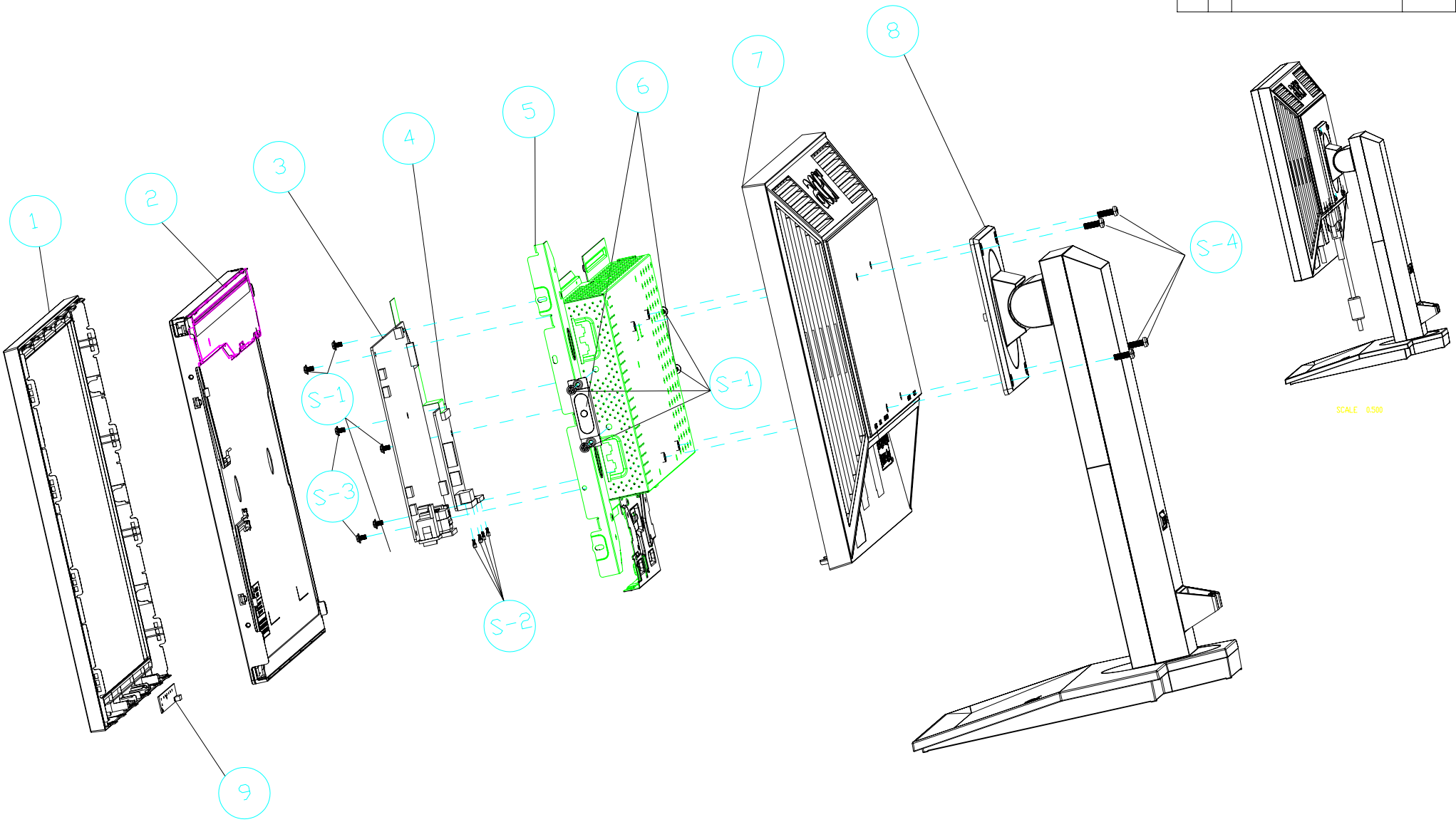
Item	Part No.	Description	Qty	Fixed T(kg*cm)	Remark
1	509146306200R	SCREW,P,CROSS,W/WAS,M3*6,Zn-Cc	7	6.5±0.5	I/F Board to Chassis*1 Power Board to Chassis*6
2	509000000700R	BOLT,#4-40x11.8,Ni ROHS	4	3.75±0.25	D-SUB CON*2 DVI CON*2
3	509412610500R	SCREW,B,CROSS,B.T-4*10,BLK, ROHS	2	10±0.5	Hinge to Stand
4	509216608110R	SCREW,F,CROSS,M4*8,Zn,ROHS(NYLOK,35F)	4	12±0.5	Hinge to backcover

LE20N8 Screw List

Item	Part No.	Description	Qty	Fixed T(kg*cm)	Remark
1	509146306200R	SCREW,P,CROSS,W/WAS,M3*6,Zn-Cc	7	6.5±0.5	I/F Board to Chassis*1 Power Board to Chassis*6
2	509000000700R	BOLT,#4-40x11.8,Ni ROHS	4	3.75±0.25	D-SUB CON*2 DVI CON*2
3	509116612102R	SCREW,B,CROSS,M4*12,BLK-Zn,ROHS(NYLOK)#	4	12±0.5	Hinge to backcover

3.2 .LCD Exploded drawing

ZONE	REV	DESCREPTION	DATE	APPRO



Item	Part No.	Description	Q'ty
S-4	5091166121102R	SCREW,B,CROSS,M4*12,BLK-Zn,ROHS(NYLOK)#	4
S-3	5091463062OOR	SCREW,P,CROSS,W/WAS,M3*6,Zn-Cc	7
S-2	5090000007OOR	BOLT,#4-40x11.8,Ni FOR D-SUB/DVI CONN.RO	4
S-1			
9	79140150*****R	PCBA,KEYPAD BOARD,LE9D0-612 ROHS	1
8	714011203001R	ASSY, STAND, B173 H	1
7	714050022404R	ASSY COVER,ALL ,BLACK,LE20N8-SEC	1
6	xxxx	Speaker	1
5	701000014304R	ASSY,CHASSIS,ALL,SEC ,LE20N8	1
4	xxxx	PCBA,P/I BOARD,	1
3	xxxx	PCBA,I/F BOARD	1
2		LCD PANEL20.'w	1
1	714030023801R	ASSY, BEZEL,BLACK,SEC,LE20N8	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS.
DECIMALS: ANGLES:
X = .X =
.XX = .XX =

MATL. ABS

FINISH

SI - METRIC
THIRD ANGLE PROJECTION

MODEL NO.
LE20N8

SIGNATURE	DATE
DRAWN. George	10.11/08
CHK.	
ISSUED.	

FOXCONN CORP. (INNOLUX)

TITLE
B203H EXPLORED DRAWING

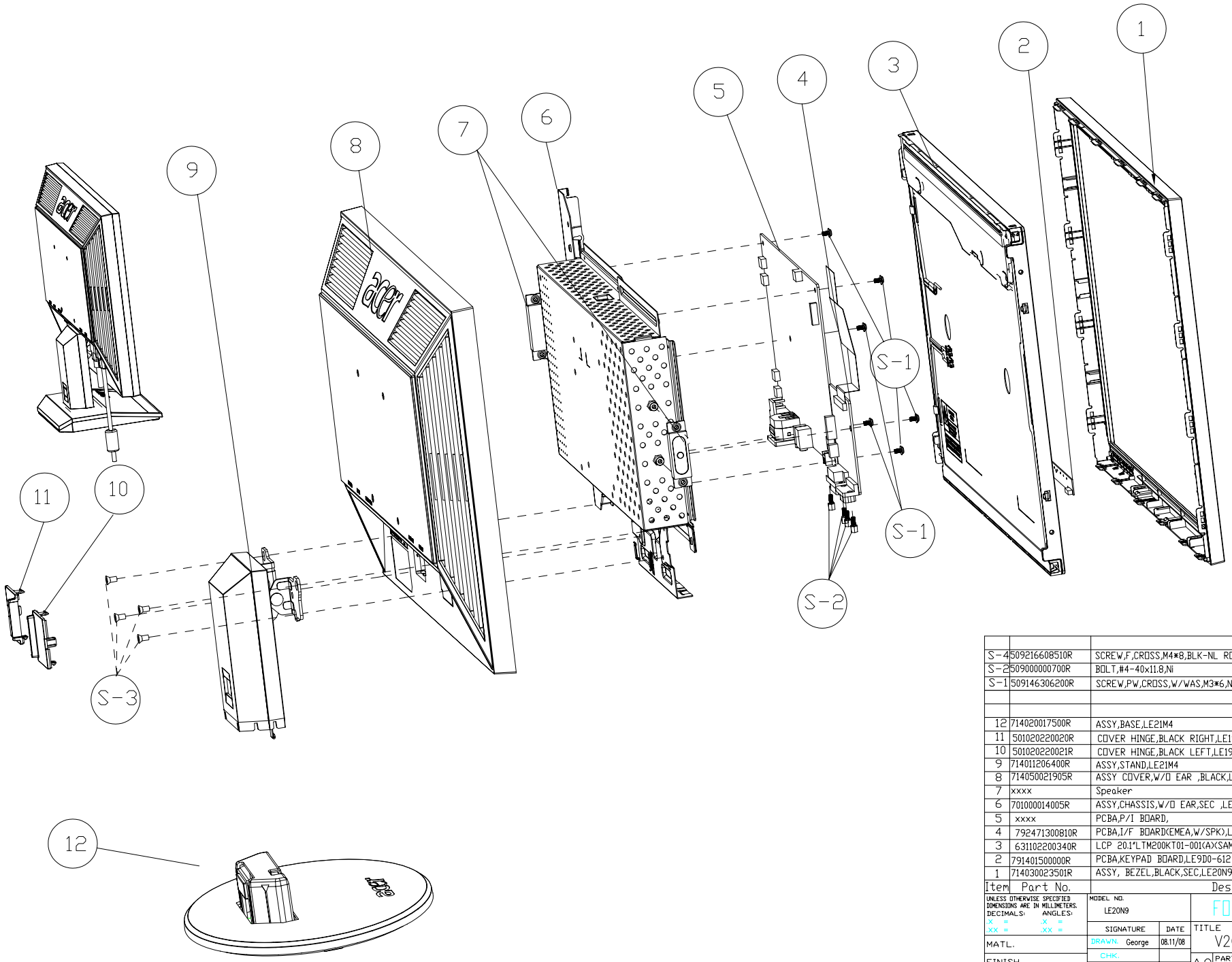
A0 PART NO.

SCALE: 1:1 DWG NO. SHEET 1/2

23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

P I N F L I G H T E D C A B

ZONE	REV	DESCREPTION	DATE	APPRO



Item	Part No.	Description	Q
S-4	5092166085 10R	SCREW,F,CROSS,M4*8,BLK-NL ROHS(NYLOK)	
S-2	509000000700R	BOLT,#4-40x11.8,Ni	
S-1	509146306200R	SCREW,PW,CROSS,W/WAS,M3*6,NI	
12	714020017500R	ASSY,BASE,LE21M4	
11	501020220020R	COVER HINGE,BLACK RIGHT,LE19D1	
10	501020220021R	COVER HINGE,BLACK LEFT,LE19D1	
9	714011206400R	ASSY,STAND,LE21M4	
8	714050021905R	ASSY COVER,W/O EAR ,BLACK,LE20N9-SEC	
7	xxxx	Speaker	
6	701000014005R	ASSY,CHASSIS,W/O EAR,SEC ,LE20N9	
5	xxxx	PCBA,P/I BOARD,	
4	792471300810R	PCBA,I/F BOARD(EMEA,W/SPK),LE20N8-812 RO	
3	631102200340R	LCP 20.1"LTM200KT01-001(A)(SAMSUNG)ROHS	
2	791401500000R	PCBA,KEYPAD BOARD,LE9D0-612 ROHS	
1	714030023501R	ASSY, BEZEL,BLACK,SEC,LE20N9	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS.
DECIMALS: ANGLES:
X = .X =
XX = .XX =

MATL.

FINISH

SI - METRIC
THIRD ANGLE PROJECTION

MODEL NO.
LE20N9

SIGNATURE	DATE
DRAWN. George	08.11/08
CHK.	
ISSUED.	

FOXCONN CORP. (INNOLUX)

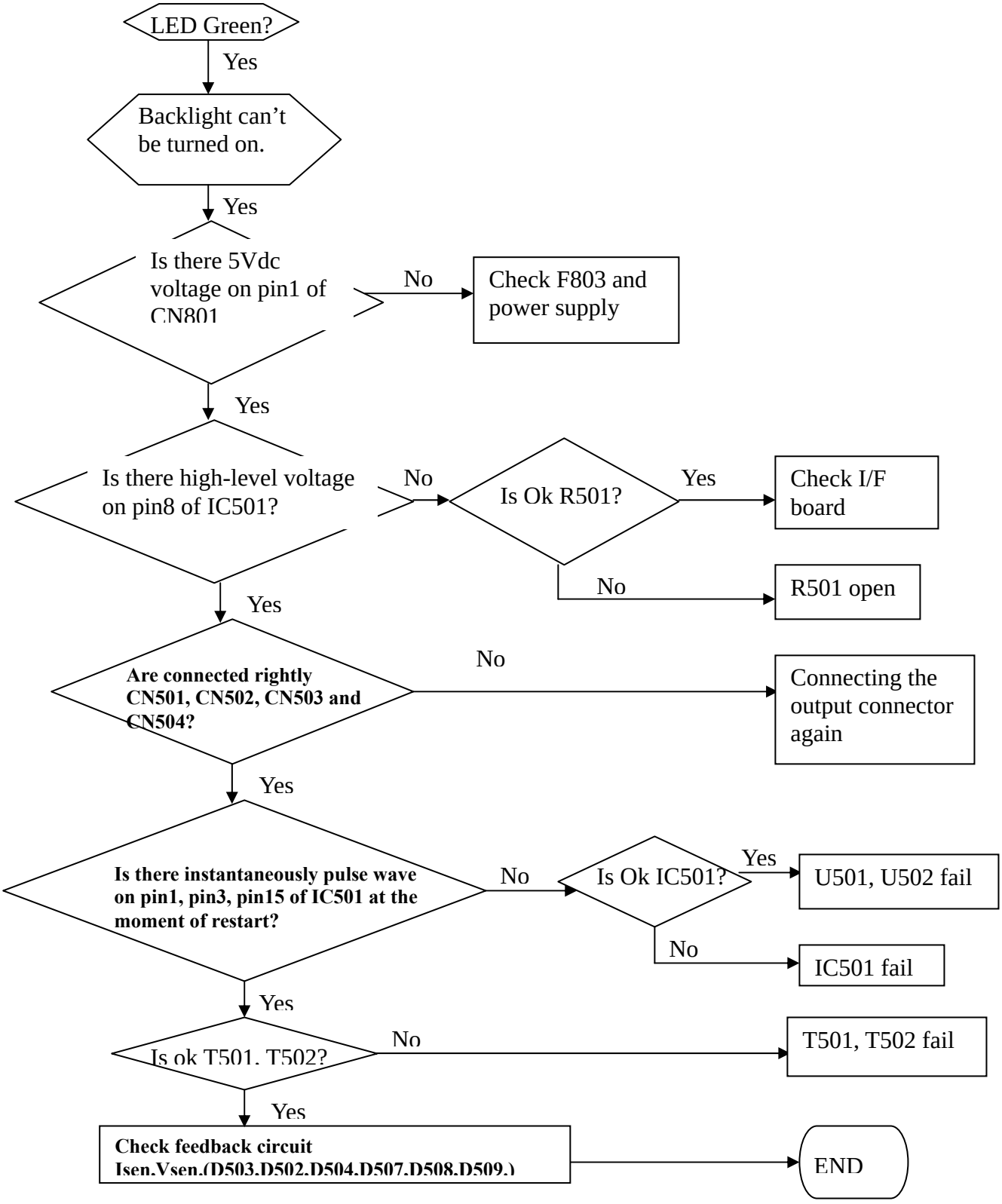
TITLE
V203H EXPLORED DRAWING

A0 PART NO.

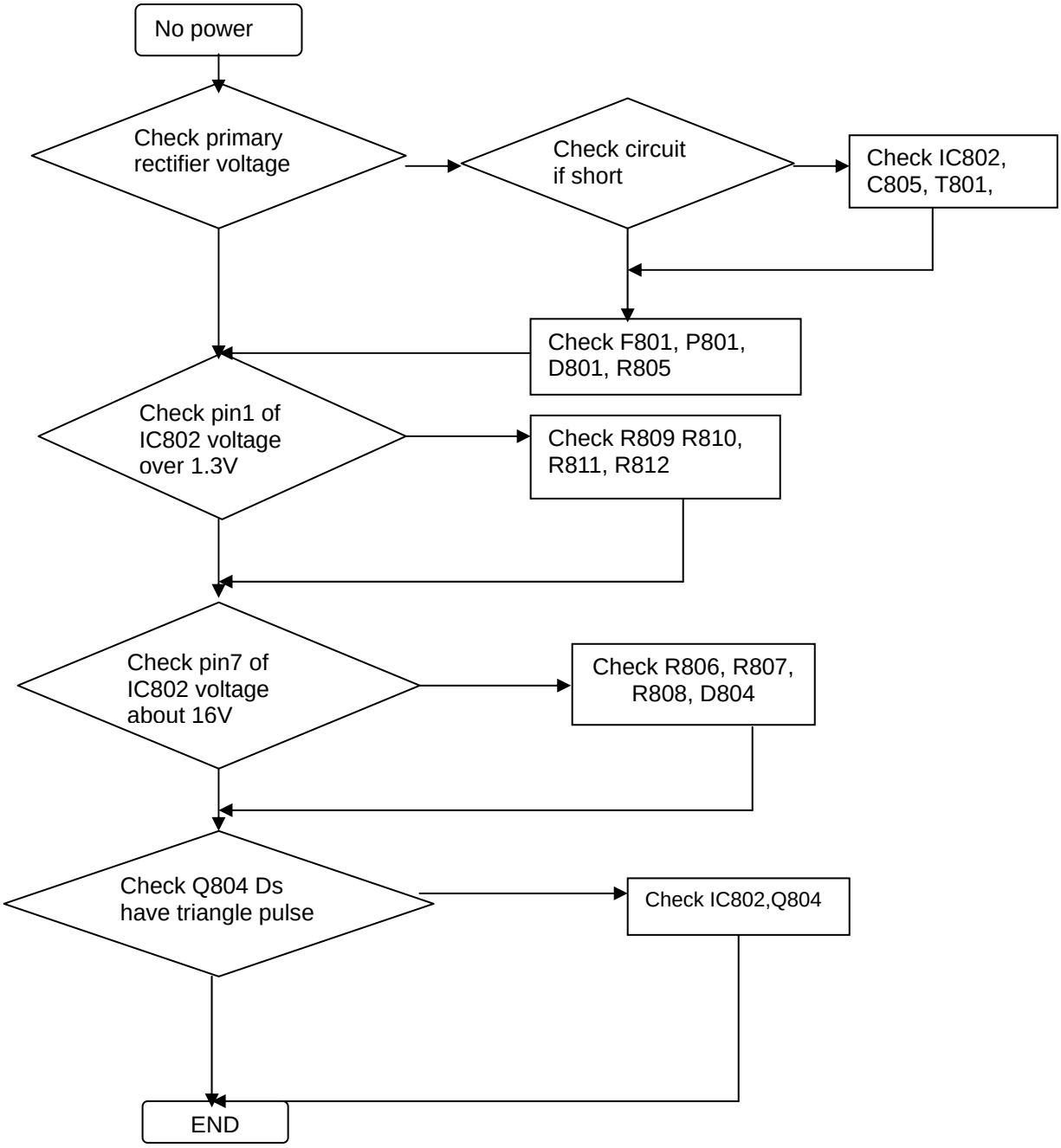
SCALE: 1:1 DWG NO. SHEET 1/2

04 Troubleshooting

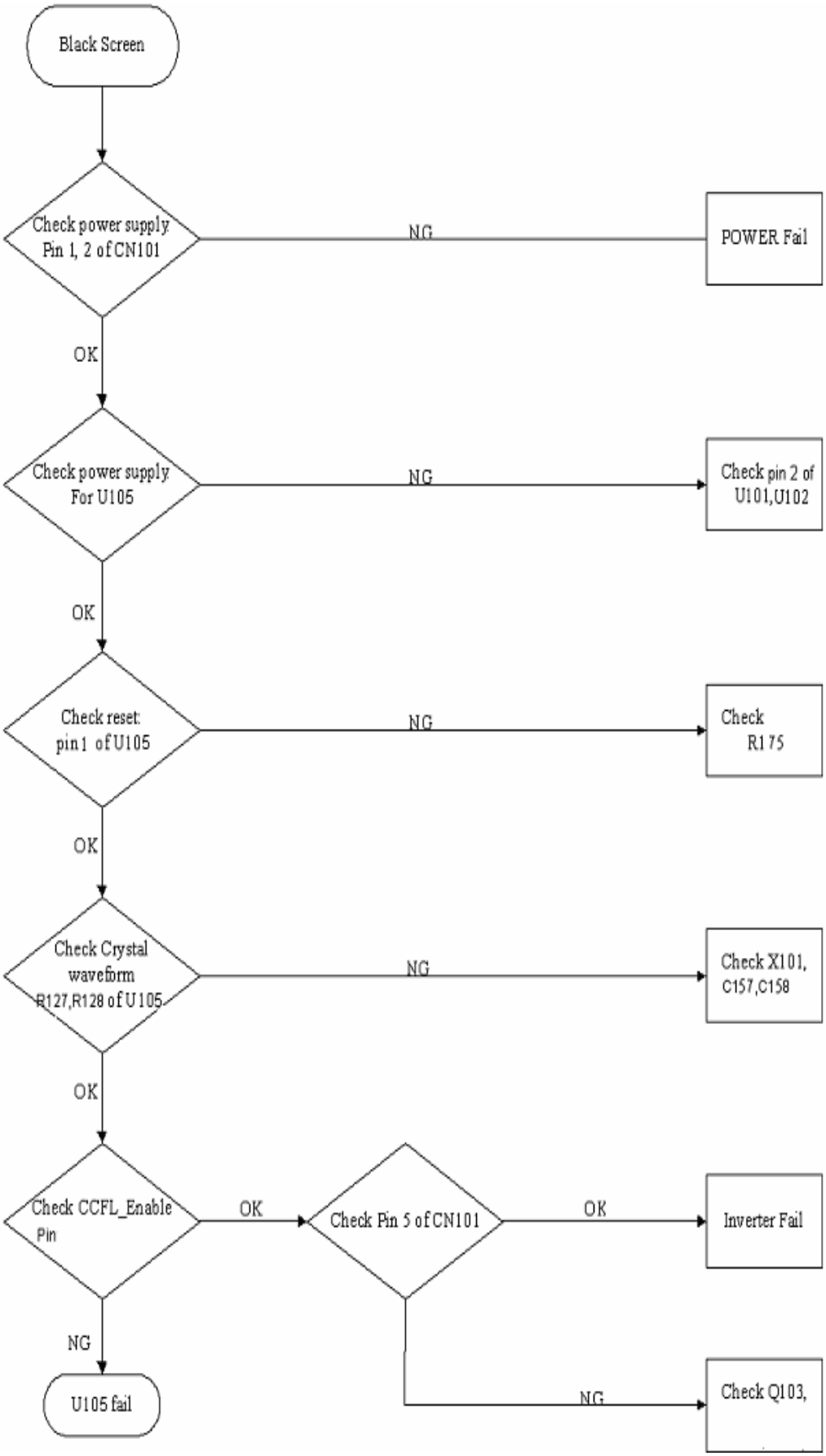
4.1 Inverter circuit on power board



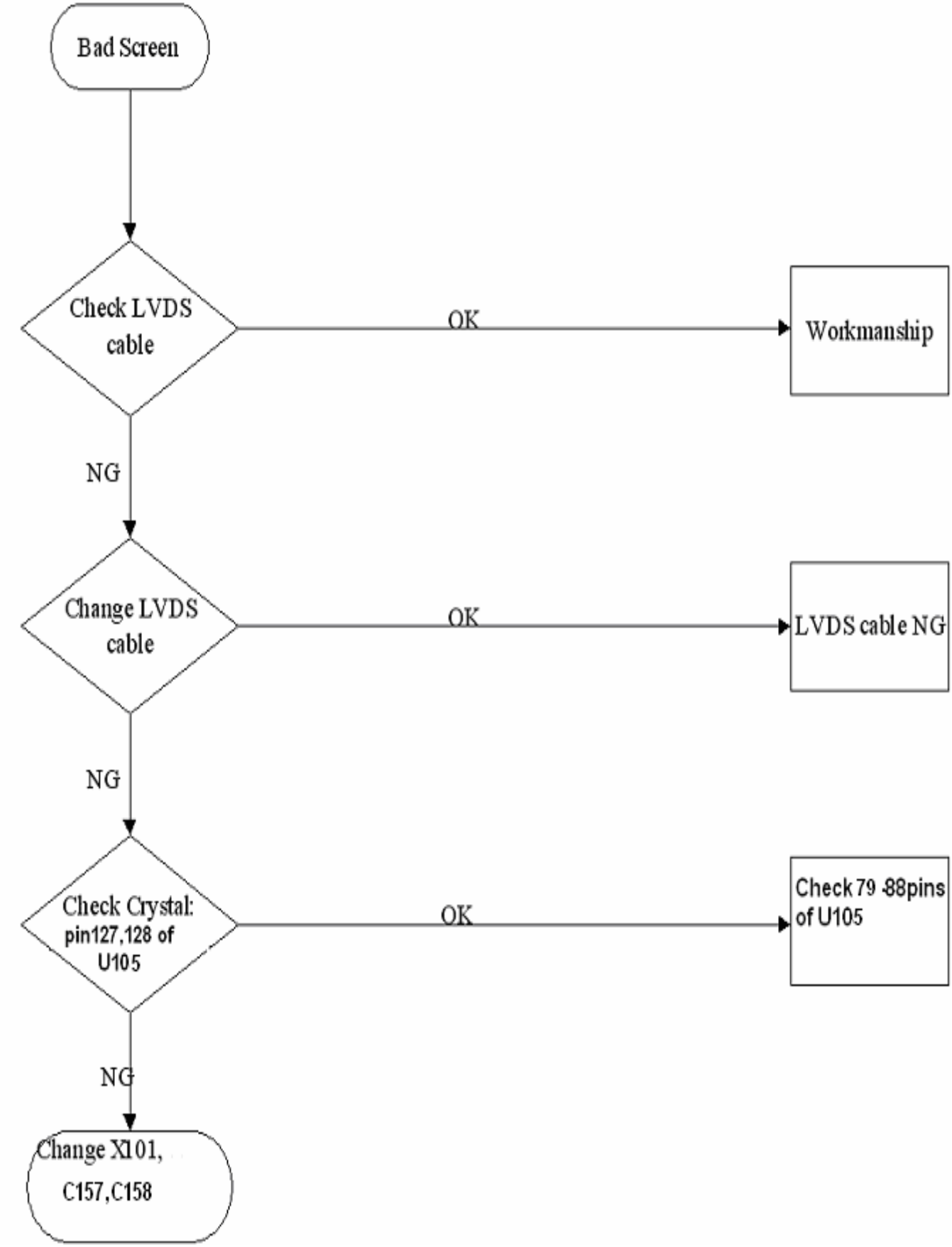
4.2 power board



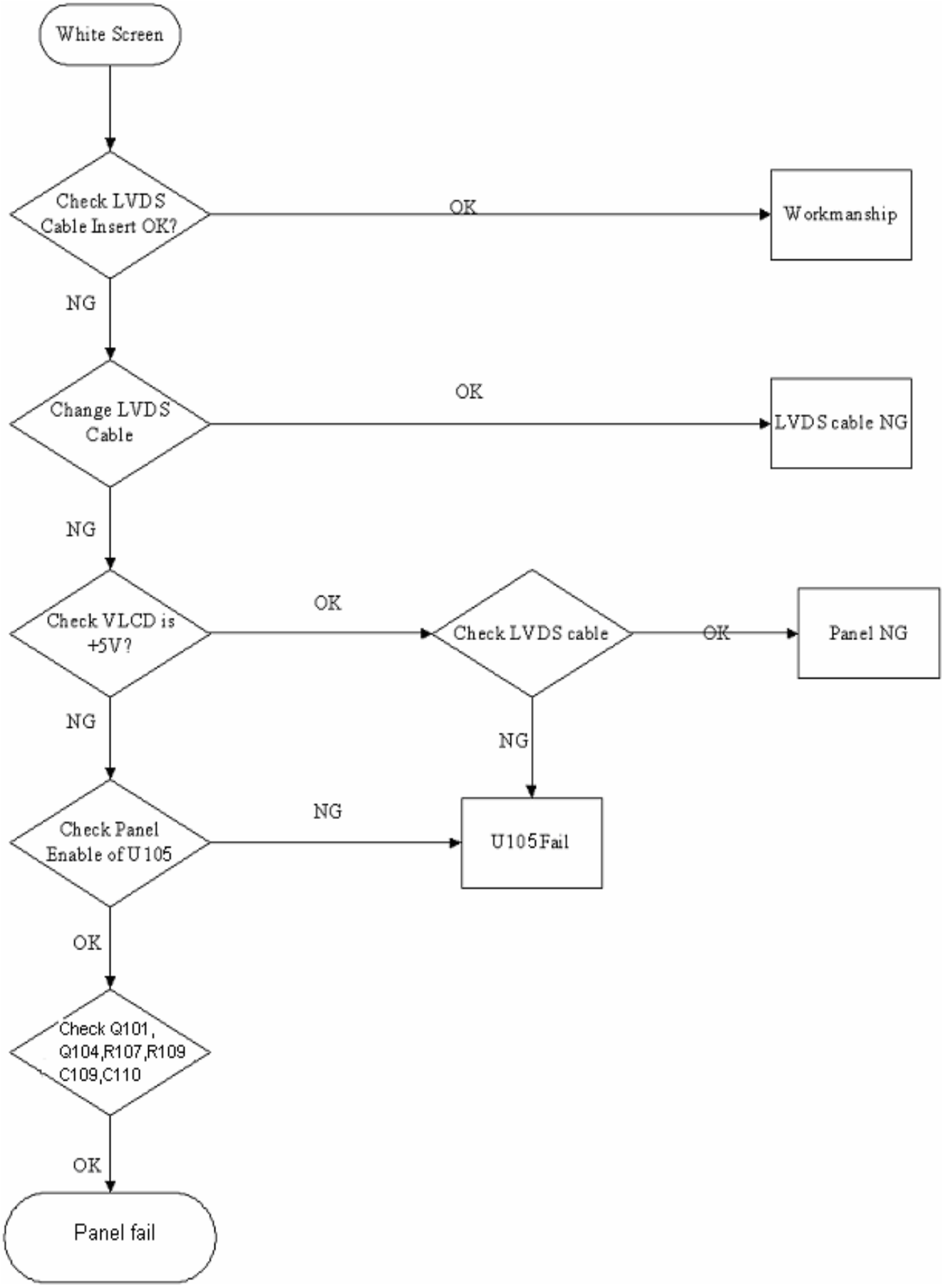
4.3 Black Screen



4.4 Bad Screen



4.5 White Screen



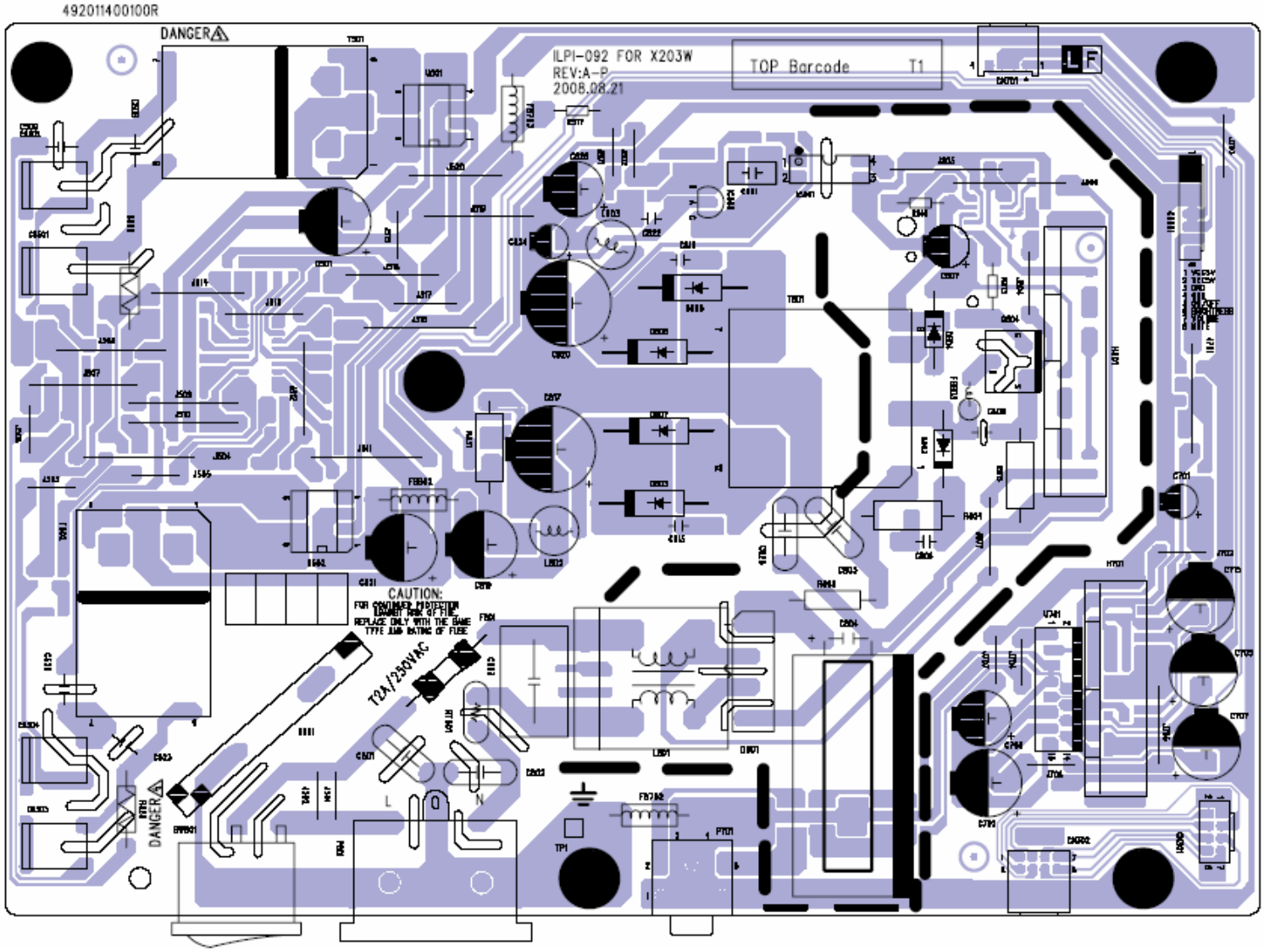
05 Spare parts List

Acer P/N : ET.LFF07.005	ODM PN Description	MOQ
792471300811R	PCBA,I/F BOARD(EMEA,W/O),LE20N8-812 ROHS	50
792291400810R	PCBA,P/I BOARD,W/O SPK,LE20M2-812 ROHS	50
791401500000R	PCBA,KEYPAD BOARD,LE9D0-612 ROHS	50
714050021903R	ASSY COVER,W/O SPK ,BLACK,LE20N9-SEC	50
714030023501R	ASSY, BEZEL,BLACK,SEC,LE20N9	50
714011206400R	ASSY,STAND,LE21M4	50
714020017500R	ASSY,BASE,LE21M4	50
501020220020R	COVER HINGE,BLACK RIGHT,LE19D1	50
501020220021R	COVER HINGE,BLACK LEFT,LE19D1	50
453070800240R	PWRCORD 10A /250V BLK 6FT SWISS H05VV-F	50
453010100380R	CABLE,D-SUB 15P MALE 6FT BLACK/BLUE, ROH	50
453030300370R	CABLE,DVI-D 18+1P MALE 6FT BLACK , ROHS	50
430300801800R	HRN ASSY 2x4P 75mm UL1571#28,ROHS	50
430300801680R	HRN ASSY 2x4P to 8P 200mm UL1571#28,ROHS	50
430303001500R	HRN LVDS FFC 30P 182mm ROHS	50
701000014003R	ASSY,CHASSIS,W/O SPK,SEC ,LE20N9	50
631102200450RA	LCP 20.0"LTM200KT01-A02(A)(SAMSUNG)ROHS	50

06 Schematics and Layouts

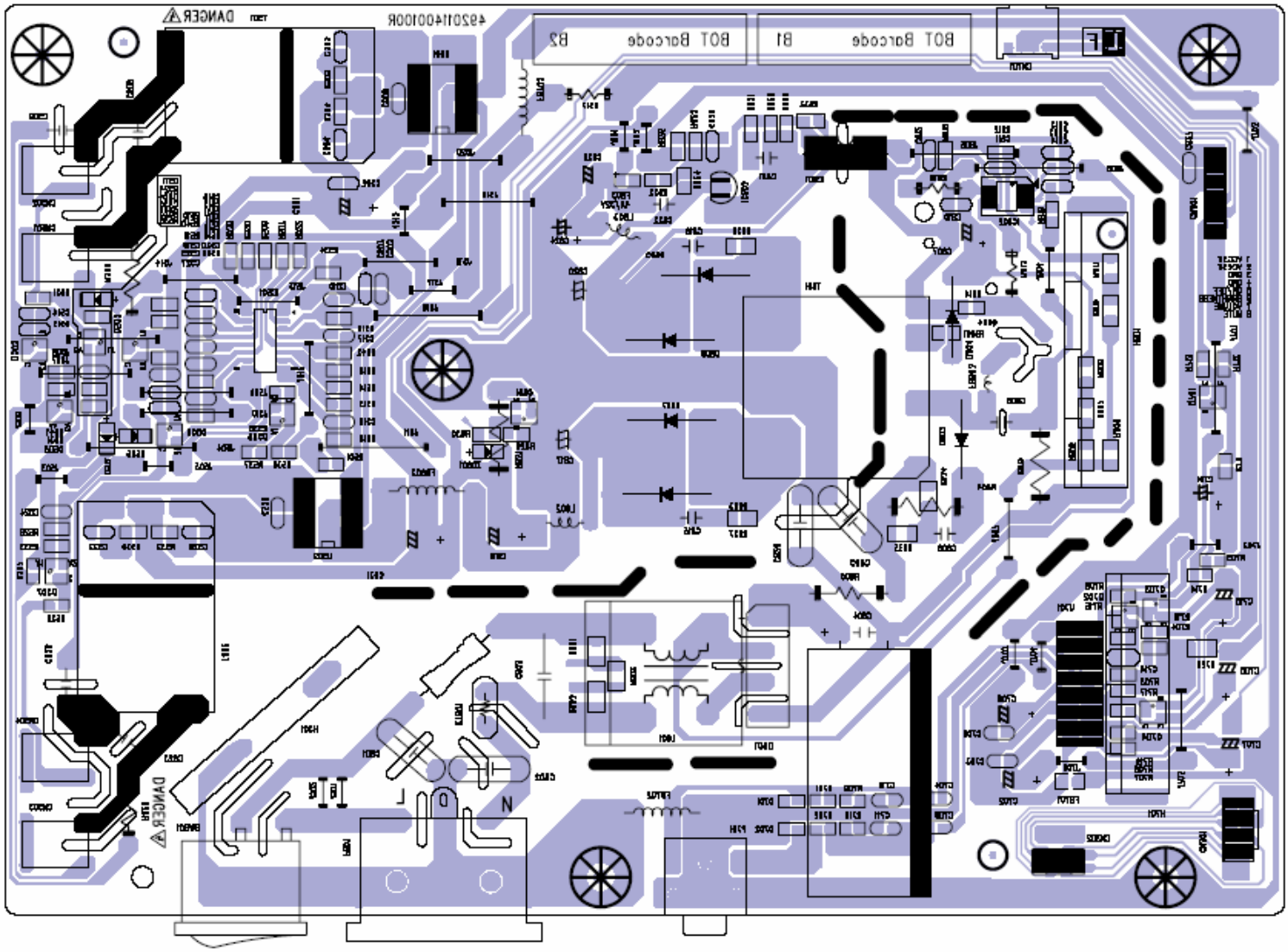
6.1 PI BD Layout

LAYER	SILKSCREEN TOP			
PCB NO :	492011400100R	REV :	A-P	DESIGNER: HUANG LM
FILE NAME :	ILPI-092.PCB	DATE :	2008.08.21	



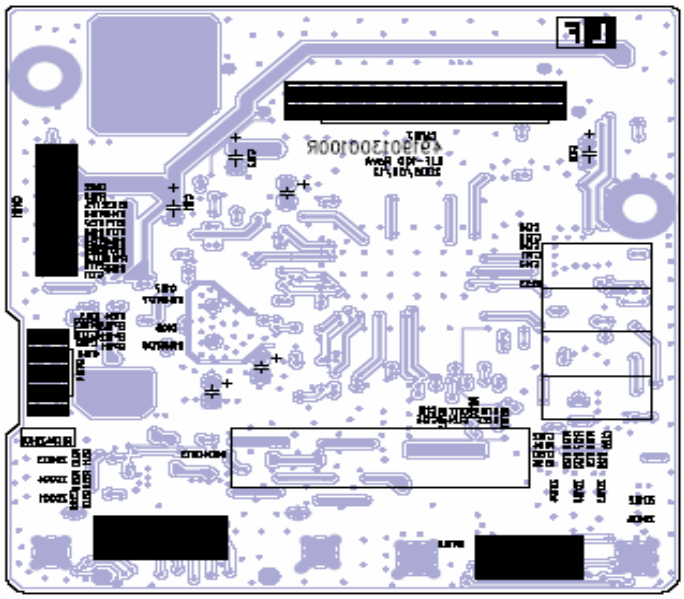
6.2 PI BD Layout

LAYER	SILKSCREEN BOTTOM			
PCB NO :	492011400100R	REV :	A-P	DESIGNER: HUANG LM
FILE NAME :	ILPI-092.PCB	DATE :	2008.08.21	



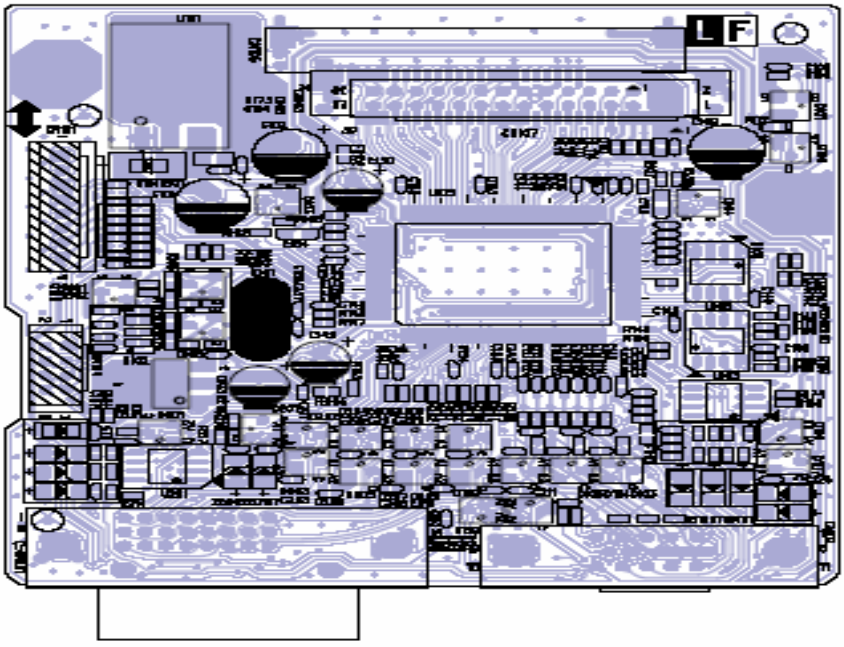
6.3 IF BD Layout

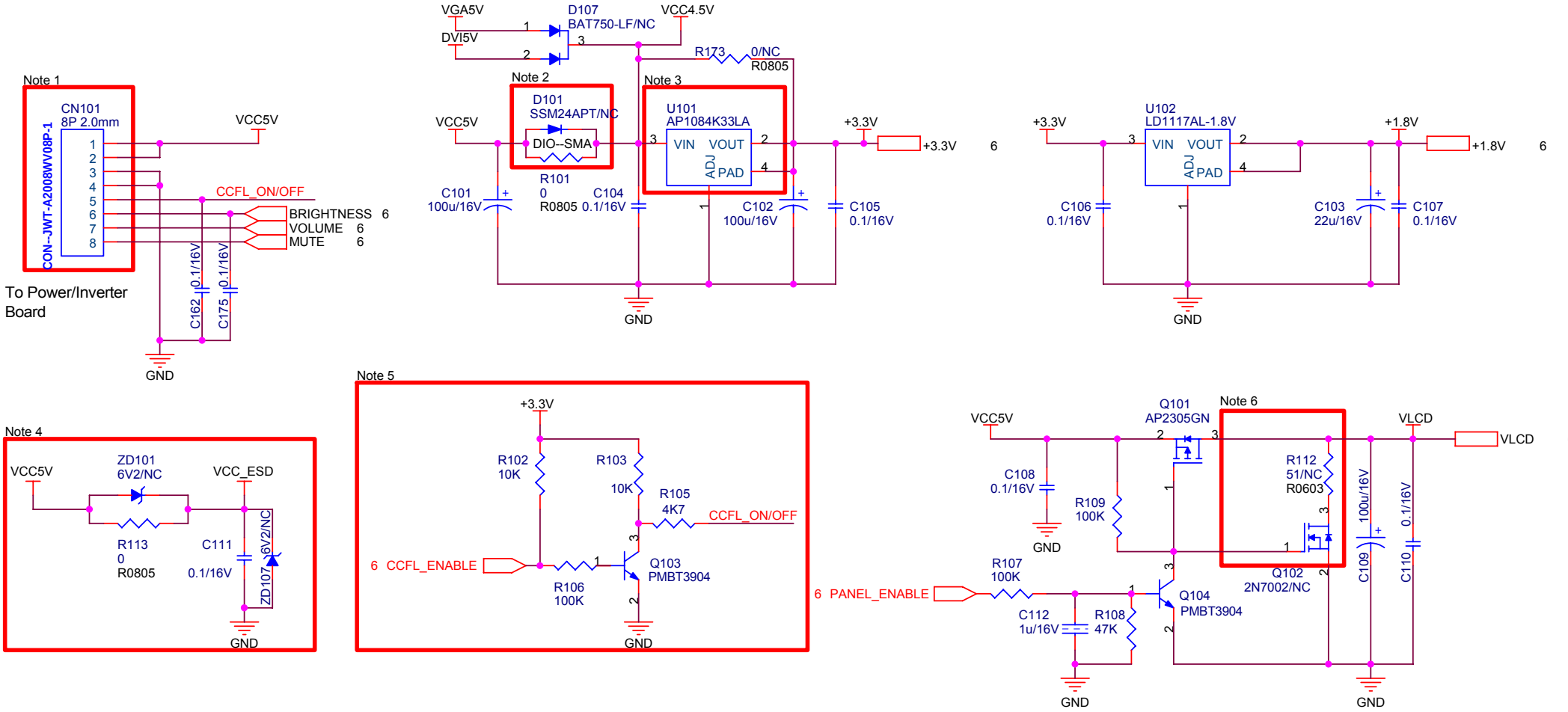
LAYER	SILKSCREEN BOTTOM			
PCB NO :	491901300100R	REV :	A	DESIGNER: Apple Chen
FILE NAME :	ILIF-100	DATE :		2008/08/12



6.4 IF BD Layout

LAYER	SILKSCREEN TOP			
PCB NO :	491901300100R	REV :	A	DESIGNER: Apple Chen
FILE NAME :	ILIF-100	DATE :		2008/08/12

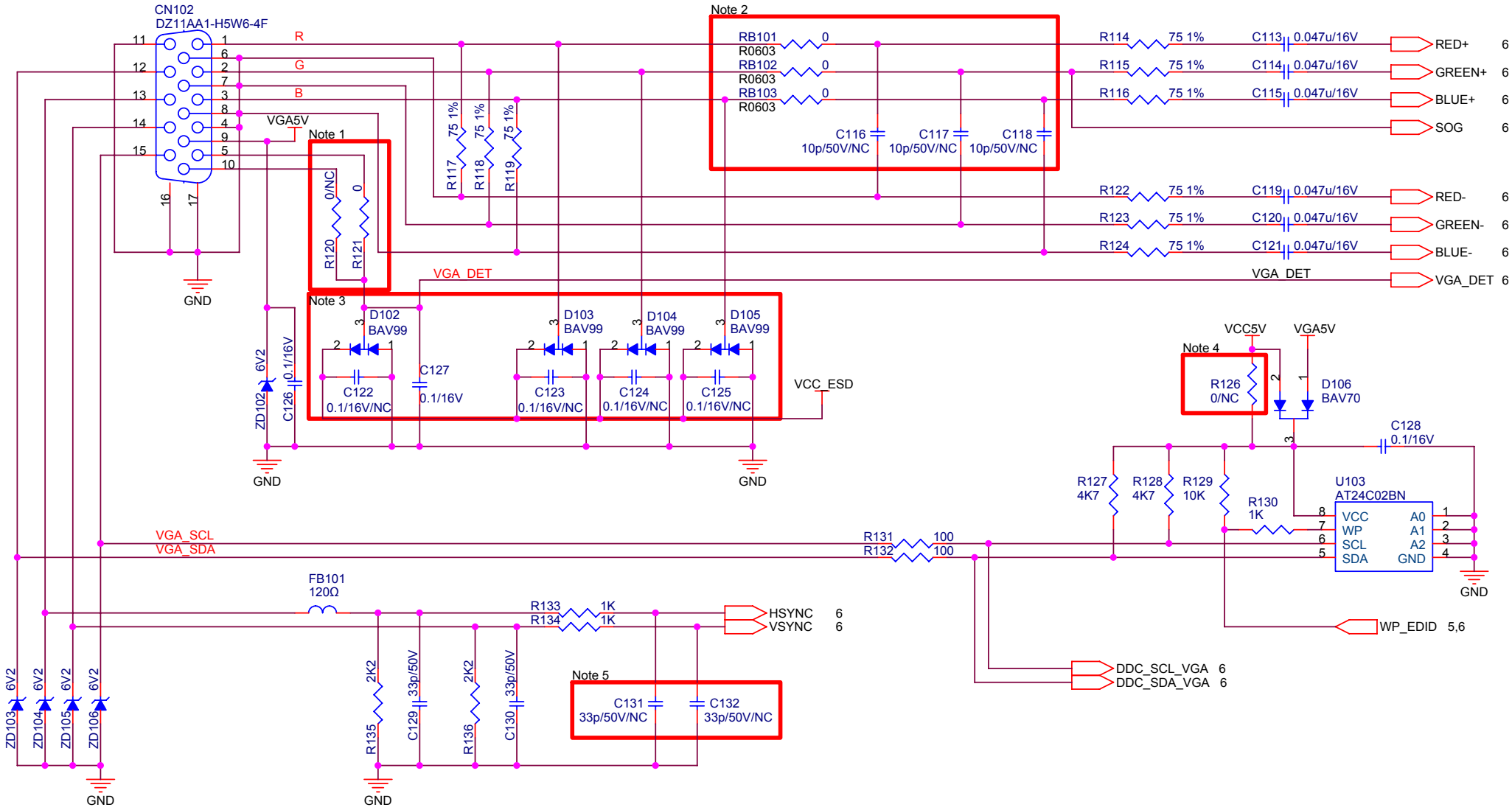




Note:

1. CN101 is no locked packgae for normal model.CN101 is locked packgae for special model(Dell).
2. D101 must be co-layed with R101
3. U101 must contain TO263, TO252 and SOT223 package
4. ZD101 must be co-layed with R113. ZD101 is used for ESD back drive.Reserved C111 for EMI issue.
5. P/I Board High Enable.
6. Reserved R111,R112,Q102 for panel power discharge.

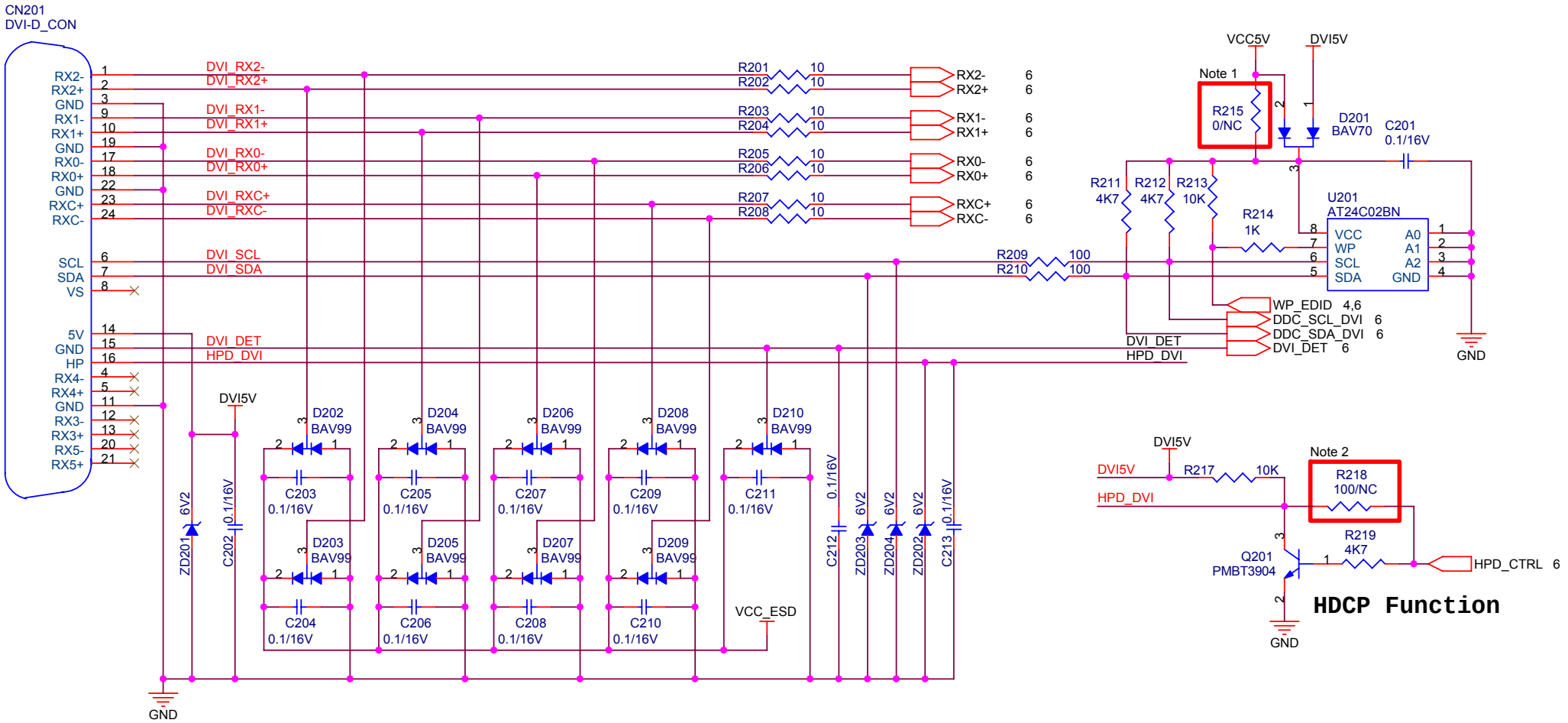
InnoLux MSTAR_TSUMU5PEHJ		
Document Number : COMMON	**SIZE :** A4	**APPRO BY :**
TITLE : POWER (DC TO DC)		**CHECK BY :**
DATE : 2008-1-30		**DRAWN BY :** STONE
SHEET 3 **OF** 6	**Rev :** V01	



Note:

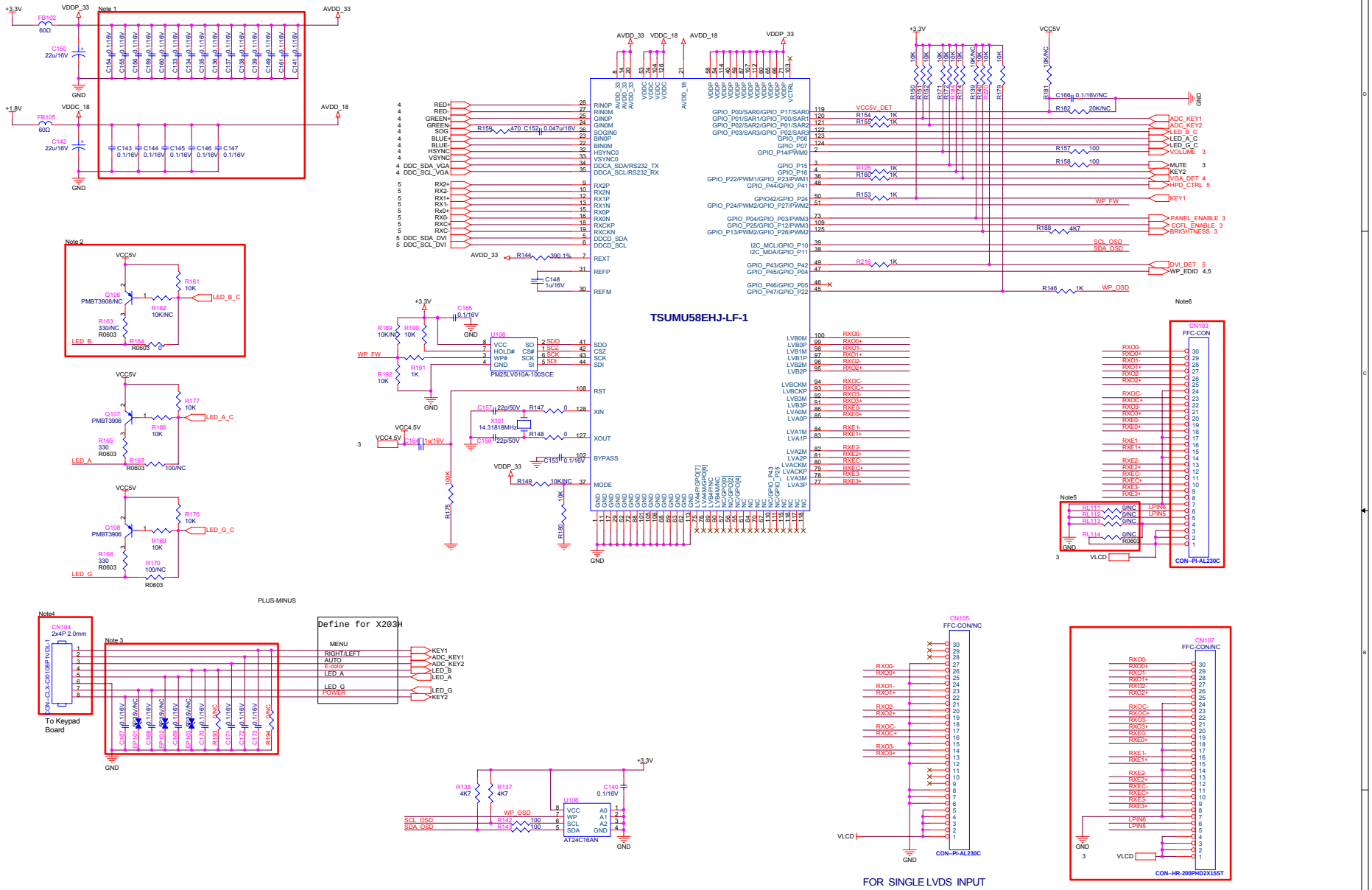
1. R120 is reserved for Samsung model.
2. R0603 package for Bead. C116,C117,C118 are reserved for EMI or performance issue.
3. C122,C123,C124,C125 are reserved for ESD or EMI issue.
4. R126 is reserved for Samsung model.
5. C131,C132 are reserved for tuning performance issue.

InnoLux	MSTAR_TSUMU5PEHJ		
Document Number : COMMON		**SIZE :** A4	**APPRO BY :**
TITLE : VGA-INPUT			**CHECK BY :**
DATE : 2008-1-30			**DRAWN BY :** STONE
SHEET 4 **OF** 6		**Rev :** V01	



Note:
1. R215 is reserved for Samsung model.
2. R218 is reserved for some model.

InnoLux	MSTAR_TSUM5PEHJ		
Document Number : COMMON		**SIZE :** A4	**APPRO BY :**
TITLE : DVI-INPUT			**CHECK BY :**
DATE : 2008-1-30			**DRAWN BY :** STONE
SHEET 5 **OF** 6		**Rev :** V01	



Note:

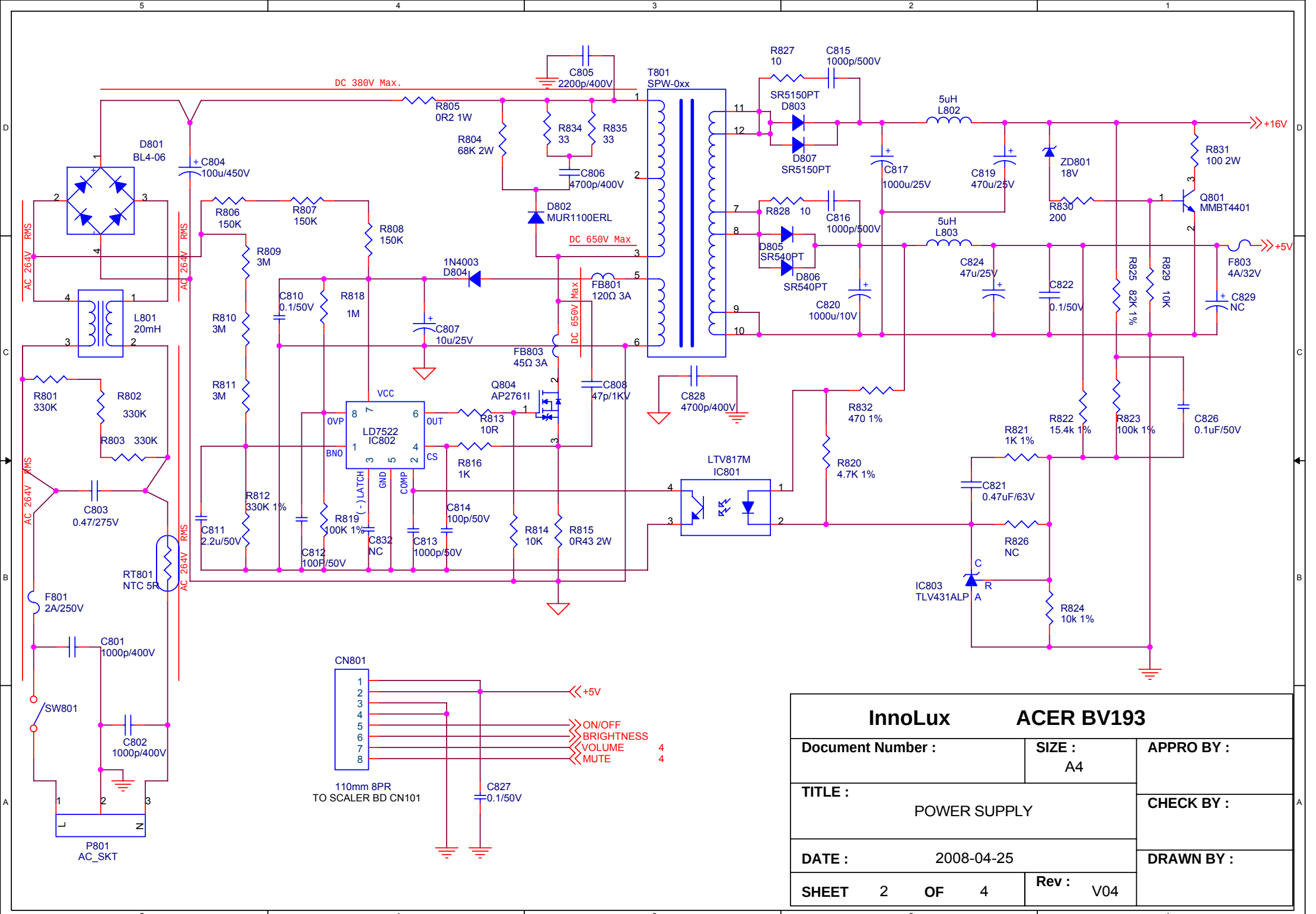
1. Each bypass capacitor (0.1u/16V) must be respectively closed to pin that is DC power input of scaler IC.
2. LED blue driving circuit is reserved for BenQ model.
3. Bypass capacitor C167,C168,C169,C170,C171,C172,C173 are for ESD and EMI issue. ESD component EP101,EP102,EP103 are for GPIO direct driving LED. Reserved R193&R194 for Dell 18.5W
4. CN104 is no locked packgae for normal model.CN104 is locked packgae for special model(Dell).
5. RL111,RL112,RL113,RL114 are reserved for some panel spec.
6. CN103 is no locked packgae for normal model.CN103 is locked packgae for special model(Dell).

InnoLux MSTAR_TSUM5PEHJ		
Document Number : COMMON	**SIZE :** Custom	**APPRO BY :**
TITLE : SCALER		**CHECK BY :**
DATE : 2008-1-30		**DRAWN BY :**
SHEET 6 **OF** 6	**Rev :** V01	

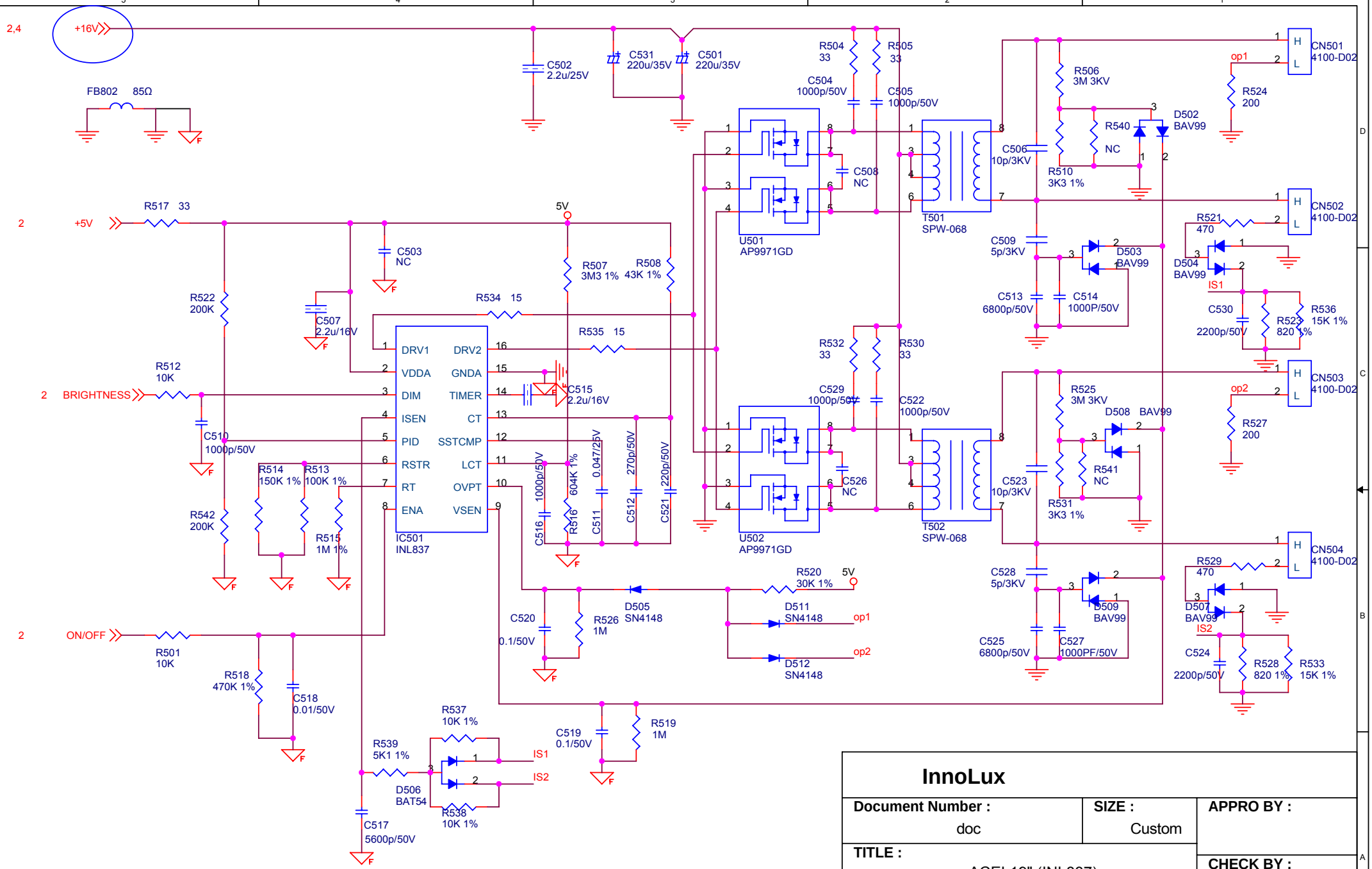
Pin Define

IF CN102	CON CN301	CON CN302	KEYPD CON
2x4p 2.0mm 180degree	2x4p 2.0mm 180degree	2x4p 2.0mm 90degree	1x8p 1.25mm180degree
1	2	1	8
2	1	2	7
3	4	3	6
4	3	4	5
5	6	5	4
6	5	6	3
7	8	7	2
8	7	8	1

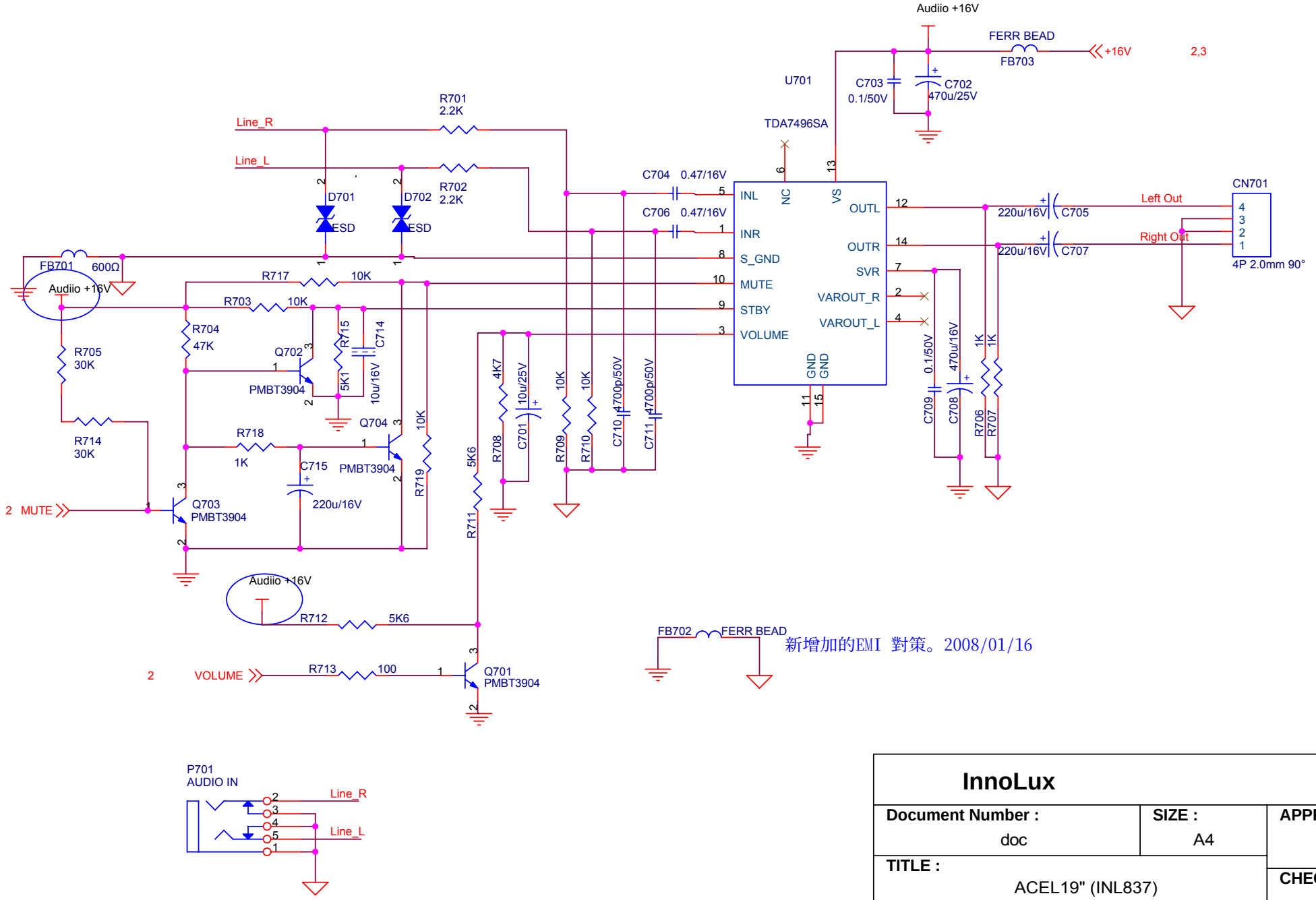
Title	<Title>	
Size A	Document Number <Doc>	Rev <RevCode>
Date: Thursday, July 17, 2008	Sheet 1 of 1	



InnoLux	**ACER BV193**	
Document Number :	**SIZE :** A4	**APPRO BY :**
TITLE : POWER SUPPLY		**CHECK BY :**
DATE : 2008-04-25		**DRAWN BY :**
SHEET 2 **OF** 4	**Rev :** V04	



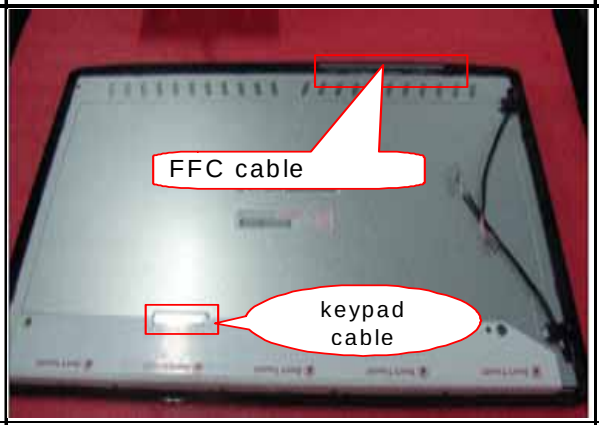
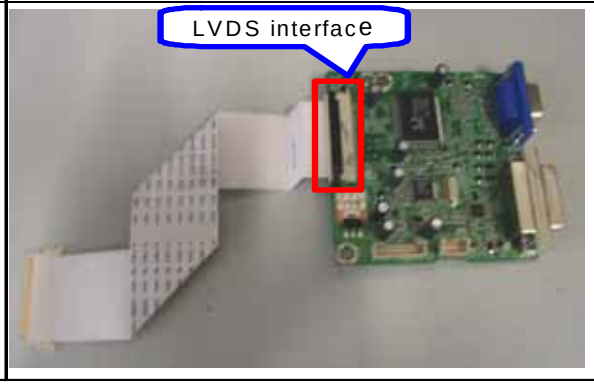
InnoLux		
Document Number : doc	**SIZE :** Custom	**APPRO BY :**
TITLE : ACEL19" (INL837)		**CHECK BY :**
DATE : 2007-12-12		**DRAWN BY :**
SHEET 4 **OF** 4	**Rev :** V04	



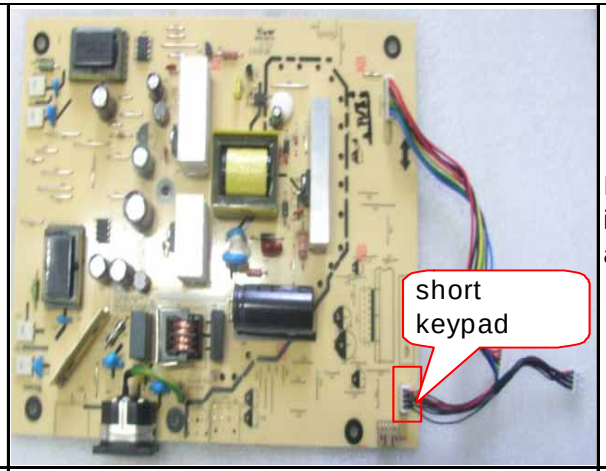
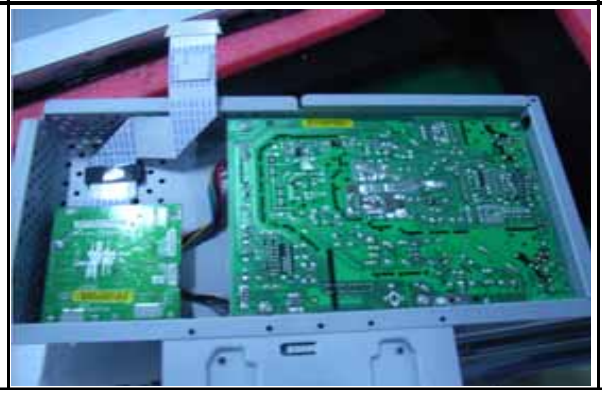
InnoLux		
Document Number : doc	**SIZE :** A4	**APPRO BY :**
TITLE : ACEL19" (INL837)		**CHECK BY :**
DATE : 2007-10-16		**DRAWN BY :**
SHEET 4 **OF** 4	**Rev :** 01	

7.0 Assembly and Disassembly

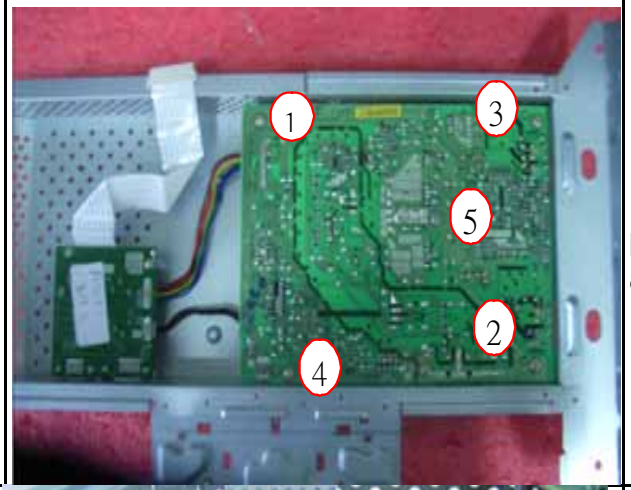
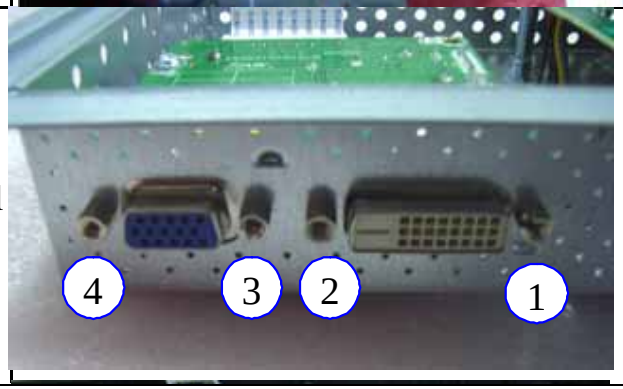
The tool of Assembly and disassembly : 1) Electrostatic gloves 2) Electric screwdriver: the lengthe of screwdriver top is 6±0.5cm and 15±0.5cm ; the diameter of screwdriver top is Φ5*H5mm

Sequence	Item	Photo	Procedures	P/N	Description
S1	Place panel		(1).Take panel out of box and place it on the foam. (2).Tear open the PE bag and put it in the designated carton. (3).Place panel on the foam like the attached picture. Remark:Do not touch the lamp cord and place the surface of panel downsides on the cushion.	631102200450RA	LCP 20.0"LTM200KT01-A02(A)(SAMSUNG)ROHS
S2	Assemble front bezel		1.Reverse the panel by 180 degree,put the surface of panel upsides and insert front bezel in the panel. 2.Reverse the panel by 180 degree using both hands,put the surface of panel downsides and make sure FFC interface is closer to operator. 3.Paste tinfoil on the position which refers to attached picture,in order to cover the gap in the panel completely. Remark:Make sure the fixed job is finished properly and lamp wire is closer to right hand;Make the tinfoil smooth in the corner of panel	714030023501R	ASSY, BEZEL,BLACK,SEC,LE20N9
S3	Fix mainboard		Insert FFC wire into its relevant interface of mainboard properly like attached picture	792471300811R	PCBA,I/F BOARD(EMEA,W/O),LE20N8-812 ROHS

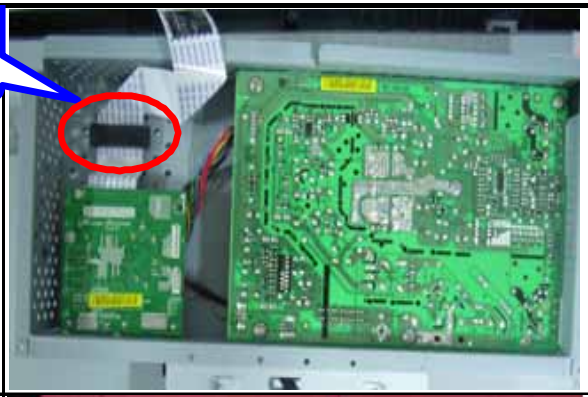
Assembly and Disassembly (continue)

S4	Fix powerboa rd		Insert short keypad cable its relevant interface of powerboard properly like attached picture	792291400810R	PCBA,P/I BOARD,W/O SPK,LE20M2-812 ROHS
S5	Fix chassis &powebo ard		Place the chassis on the cushion after check ing , put the powerboard into the cushion as picture	701000014003R	ASSY,CHASSIS ,W/O SPK,SEC ,LE20N9
S6	link main board and powerboa rd		1.Link main board and power board as picture, and make sure the cable in the correct position 2. Put the main board into the chassis and make sure the FFC cable is OK	792291400810R	PCBA,P/I BOARD,W/O SPK,LE20M2-812 ROHS

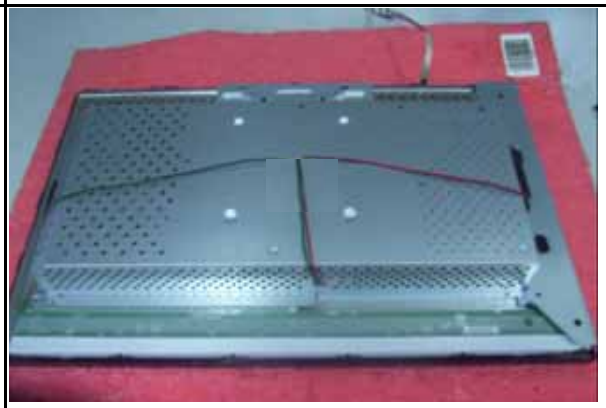
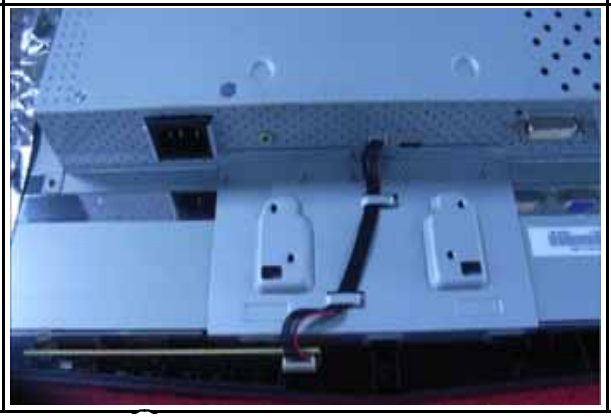
Assembly and Disassembly (continue)

S7	Twist PCBA screw		Handle electric opener and one pcs of M3*6 screw		
S8	Twist PCBA screw		Fix 5 pcs of screws separately on the poweboard and mainboard like the attached Picture1		
S9	Twist Hexagonal screws		(1). Handle hexagonal screws and electric opener (2). Twist screw in the interface like the attached Picture1. (3). Place cushion on the designated location after iron frame is taken away.		

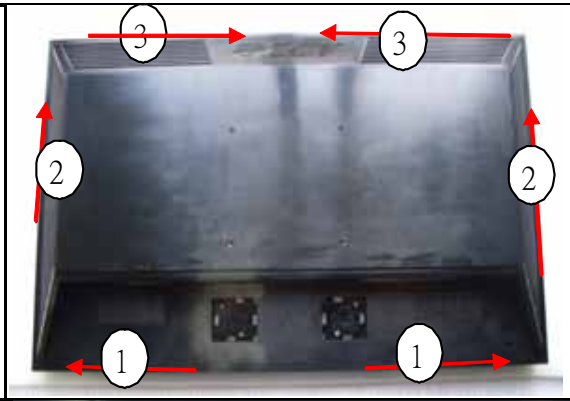
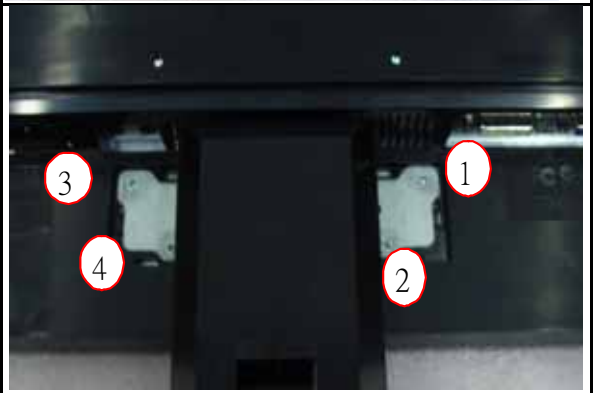
Assembly and Disassembly (continue)

S10	magnet loop Fix chassis		put the magnet loop fix into the front bezel as picture	701000014003R	ASSY,CHASSIS ,W/O SPK,SEC ,LE20N9
S11	Assemble chassis		1)Fix chassis on the back of panel and front bezel 2)Put lamp wire and FFC wire in order as picture	701000014003R	ASSY,CHASSIS ,W/O SPK,SEC ,LE20N9
S12	Insert FFC cable		1.Tear off the adhensive tape of FFC wire; 2.Insert FFC wire into the interface of panel 3.Put FFC wire in order and paste them on the panel 4.Fix chassis on the back of panel	430303001500R	HRN LVDS FFC 30P 182mm ROHS

Assembly and Disassembly (continue)

S13	Insert light wire		Insert 4pcs light wire into the relevant position as picture		
S14	Assemble Speaker		Put 2pcs speaker into the chassis of right and left as picture		
S15	Assemble keypad cable		Put the kaypad cable into the right position of chassis as picture		

Assembly and Disassembly

S16	Fix back cover		Check if back cover is fixed properly	714050021903R	ASSY COVER,W/O SPK ,BLACK,LE20N9-SEC
S17	Fix stand		Use 4pcs screw fix stand on the back of assemble like attached Picture	501020220020R	COVER HINGE,BLACK RIGHT,LE19D1
S19	Assemble cover hinge		Assemble the cover hinge into the stand as picture	714020017500R	ASSY,BASE,LE21 M4