TOSHIBA

LIQUID CRYSTAL DISPLAY
PRODUCT INFORMATION

15 type Analog Input LCD Module LTM15C441 (a-Si TFT)

TENTATIVE

FEATURES

(1) 15 type XGA display size for display
(2) Video signal : Analog R,G,B Input
(3) With FL inverter, DC12V only
(4) Expansion (ex. VGA signal to XGA display)
(5) User interface by OSD

MECHANICAL SPECIFICATION

Item	Specification
Dimensional Outline (typ.)	(340)(*W*) x (257)(*H*) x 29max(*D*) (mm)
Number of Pixel	1024(*W*) x 768(*H*) pixels
Active Area	304.128(*W*) x 228.096(*H*) (mm)
Pixel Pitch	0.297(*W*) x 0.297(*H*)
Weight	(2300 g)
Backlight	Two CCFL, Side light

ELECTRICAL SPECIFICATION

Item		Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	(V_{DD})	---	12	---	V_{DC}	
Input Signal		---	0.7	---	$V_{(p-p)}$	75Ω terminated
Synchronization Signal		---	TTL Level	---	V	
Current Consumption	(I_{DD})	---	TBD	---	mA	
Power Consumption (Target)		---	(21)	---	W	@200cd/m^2 1)

Note 1) Not include the AC adapter unit.

OPTICAL SPECIFICATION (*Ta*=25°C)

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Racio (*CR*)		100	(250)	---	---	
Viewing Angle (*CR*>=10)	(Upper+Lower)	---	(90)	---	°	
	(Left+Right)	---	(120)	---	°	
Response Time	(τr) L: 10-90%	---	(40)	---	ms	Rise
	(τf) L: 90-10%	---	(10)	---	ms	Fall
Luminance		---	200	---	cd/m^2	
Luminance adjustment limit		30% to 100%				2)

Note 2) Adjust by operating OSD(On Screen Display) menu.

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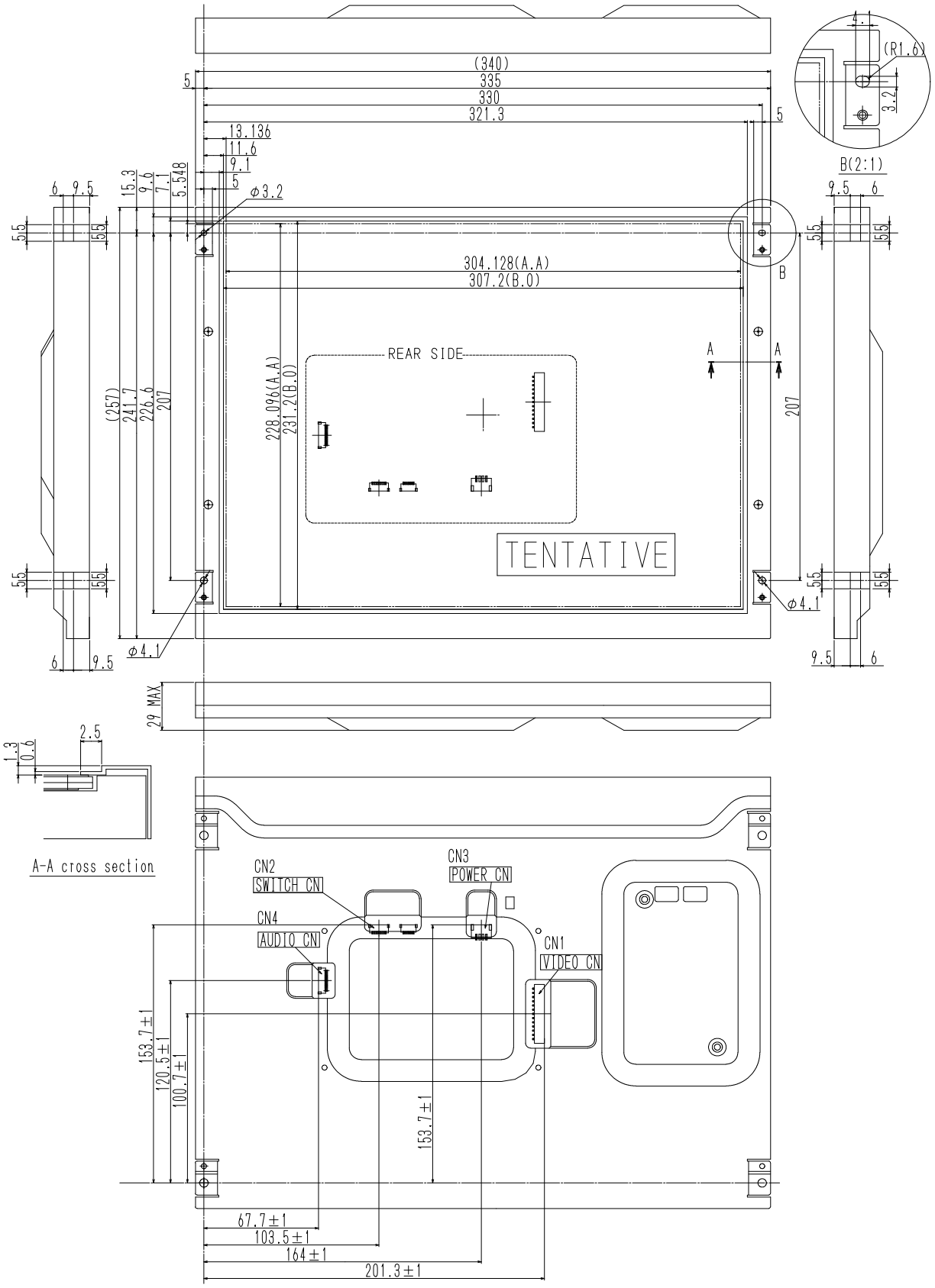
*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba before proceeding with the design of equipment incorporating this product.

DIMENSIONAL OUTLINE

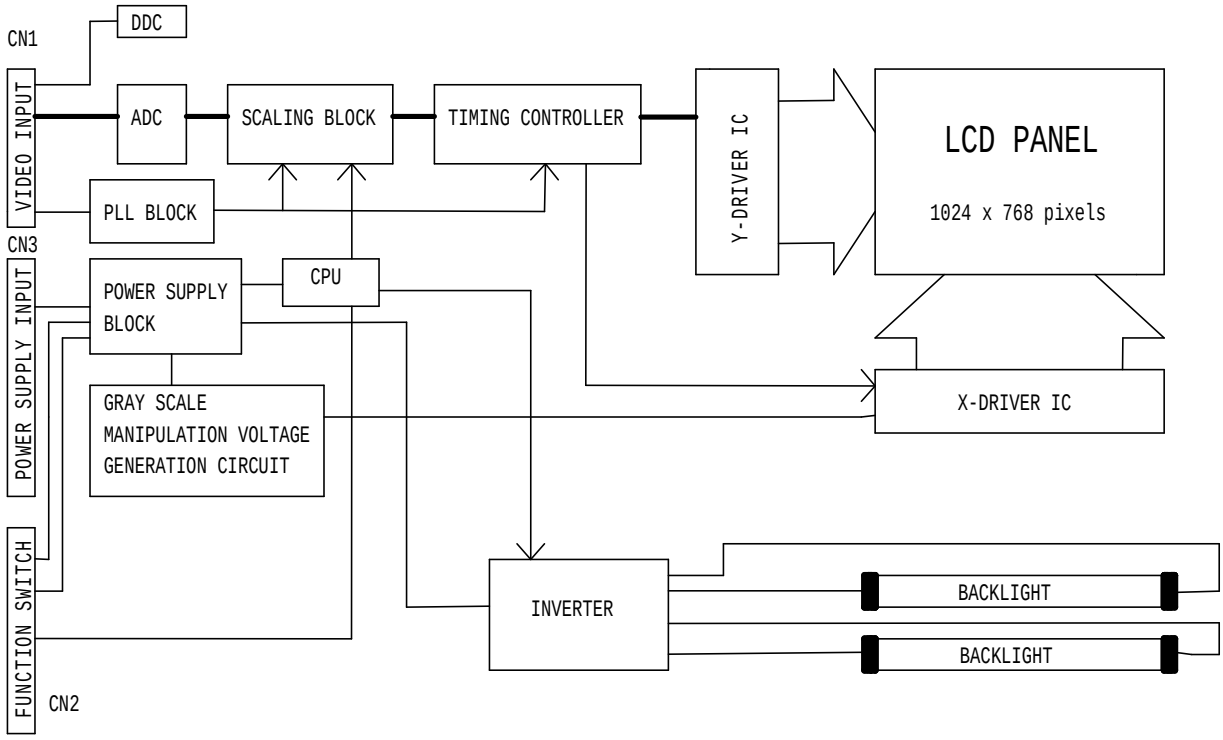
TENTATIVE

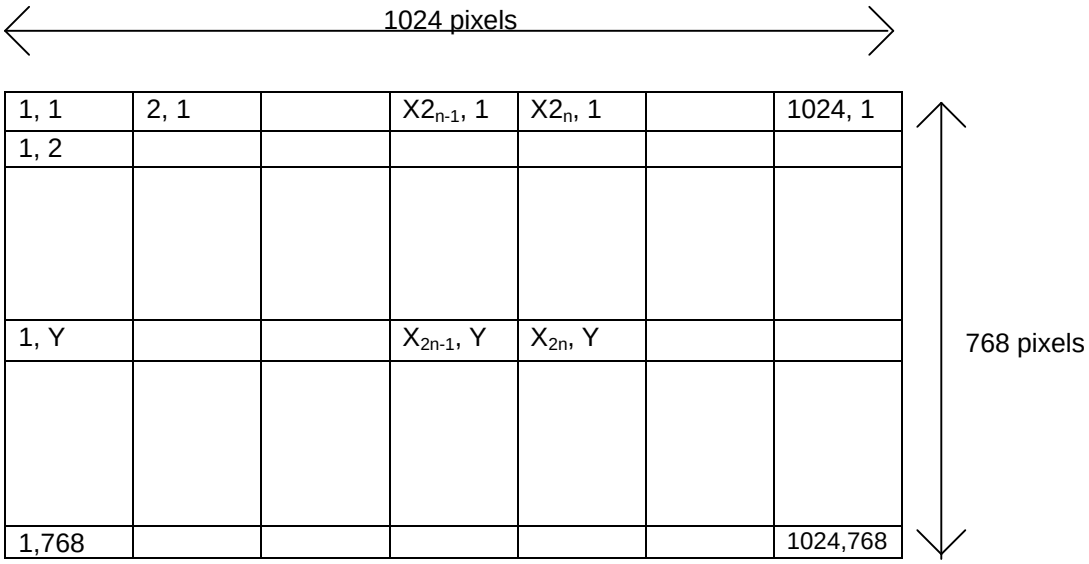
Unit : mm

Standard tolerance : 0.5



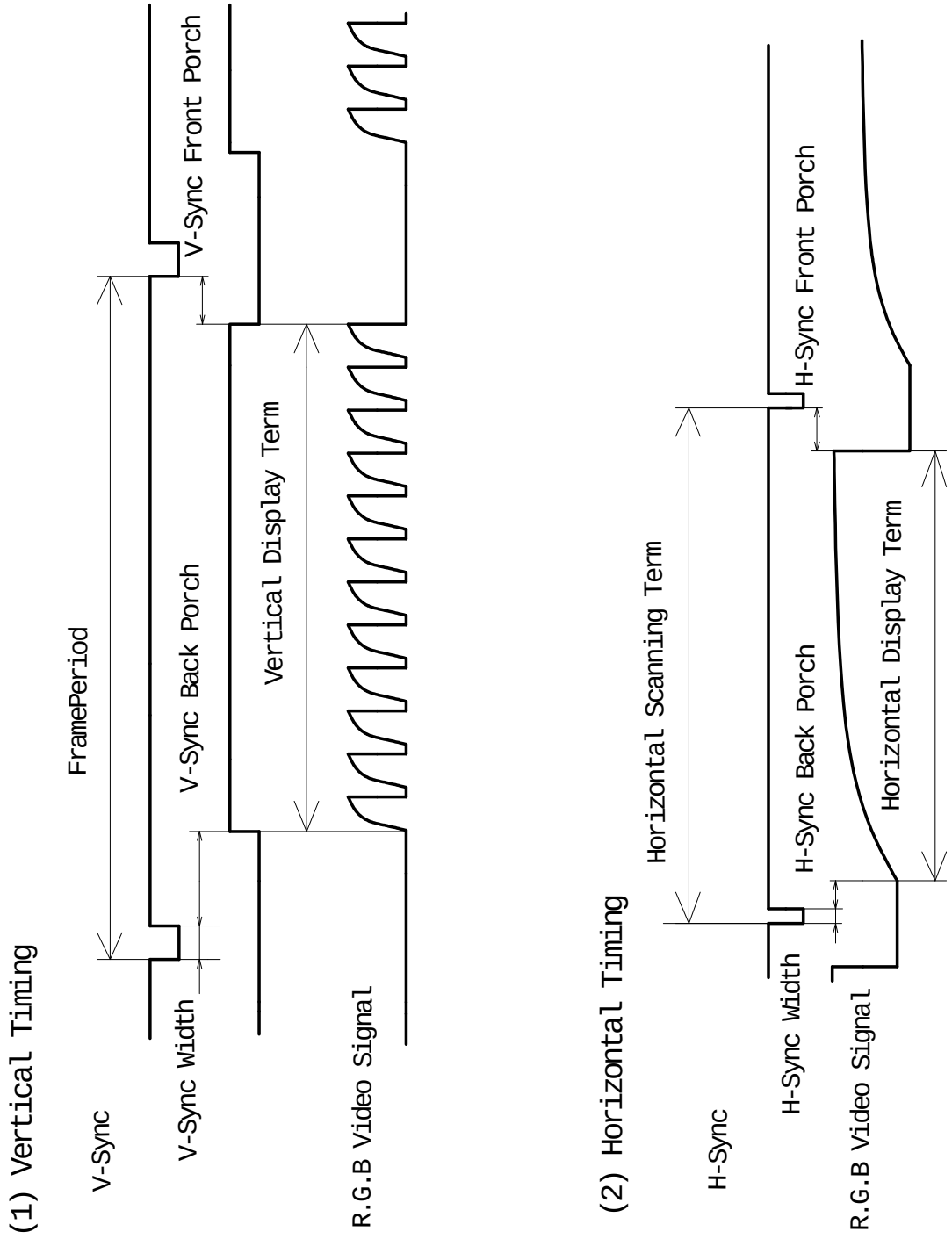
BLOCK DIAGRAM





1, 1	2, 1		$X2_{n-1}$, 1	$X2_n$, 1		1024, 1
1, 2						
1, Y			X_{2n-1}, Y	X_{2n}, Y		
1,768						1024,768

TIMING CHART



CORRESPONDED DISPLAY MODE [3)]

The timing mode shown as below is standard.

	Displayed Pixel	Frame Rate [Hz]	Vertical Display Term [lines]	V-Back porch + Vsync Width [lines]	Horizontal Scanning Time [kHz]	Horizontal Display Term [pixels]	H-Back porch + Hsync Width [pixels]	H,V Sync Polarity Note 4)
Ditto	640 x 480	59.94	480	35	31.469	640	144	H:N, V:N
Ditto	680 x 480	72.81	480	31	37.861	640	168	H:N, V:N
Ditto	640 x 480	75.00	480	19	37.500	640	184	H:N, V:N
Ditto	800 x 600	56.25	600	24	35.156	800	200	H:P, V:P
Ditto	800 x 600	60.32	600	27	37.879	800	216	H:P, V:P
Ditto	800 x 600	72.19	600	29	48.077	800	184	H:P, V:P
Ditto	800 x 600	75.00	600	24	46.875	800	240	H:P, V:P
Ditto	1024 x 768	60.00	768	35	48.363	1024	296	H:N, V:N
Ditto	1024 x 768	70.07	768	35	56.476	1024	280	H:N, V:N
Ditto	1024 x 768	75.03	768	31	60.023	1024	272	H:P, V:P

Note 3) If you operate LTM15C441 with a different timing from the above specification table, please consult with Toshiba before designing.

Note 4) H= H-Sync V=V-Sync P= Positive N= Negative

INPUT SIGNAL

CN1 Video Connector

Connector : S13B-EH / JST

Terminal No.	Symbol	Function
1	GND	NC
2	NC	
3	SCL	DDC Clock
4	SDA	DDC Data
5	GND	
6	VS	V-Sync : TTL
7	HS	H-Sync : TTL
8	BR	BLUE Return
9	B	BLUE Video Signal : $0.7V_{(p-p)}$
10	GR	GREEN Return
11	G	GREEN Video Signal : $0.7V_{(p-p)}$
12	RR	RED Return
13	R	RED Video Signal : $0.7V_{(p-p)}$

CN2 Switch Connector

Connector : SM09B-SRSS-TB / JST

Terminal No.	Symbol	Function
1	GND	
2	ON/OFF	Power Supply ON/OFF ON: High impedance OFF: GND
3	RED	Red LED Connect with anode terminal of LED [5)]
4	GREEN	Green LED Connect with anode terminal of LED [5)]
5	UP	Function switch "UP" Input : GND Normally : NC
6	DOWN	Function switch "DOWN" Input : GND Normally : NC
7	ENTER	Function switch "ENTER" Input : GND Normally : NC
8	MENU	Function switch "MENU" Input : GND Normally : NC
9	NC	

Note 5) LED Drive Condition

Power OFF	LED OFF
Power ON	GREEN : Video Signal In
	ORANGE : No Video

CN3 POWER Connector

Connector : S4B-PH-SM3-TB / JST

Terminal No.	Symbol	Function
1	12V	Power Supply : 12V
2	12V	Power Supply : 12V
3	GND	GND
4	GND	GND

CN4 AUDIO Connector

Connector : SM13B-SRSS-TB /JST

Terminal No.	Symbol	Function
1	GND	Audio Input GND
2	IN-R	Audio Input R
3	IN-L	Audio Input L
4	VOLU	Volume Uper
5	VOLC	Volume Control
6	VGND	Volume GND
7	NC	
8	GND	GND
9	SPL+	Speaker Output L+
10	SPL-	Speaker Output L-
11	GND	GND
12	SPR-	Speaker Output R-
13	SPR+	Speaker Output R+

FOR SAFETY

LCD module is generally designed with precise parts to achieve light weighted thin mechanical dimensions.
In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed in Engineering Information No.EE-N001,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA LCD MODULES".
Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

1) SPECIAL PURPOSES

A) Toshiba's Standard LCD Modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life-threatening or otherwise catastrophic.

B) Since Toshiba's Standard LCD Modules have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to abnormally high levels of vibration or shock which exceed Toshiba's published specification limits.

C) In addition, since Toshiba Standard LCD Modules have not been designed for use in applications where performance failures could be life-threatening or catastrophic, they must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

2) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display.
Toshiba doses not warrant the module, if customer disassembled or modified it.

3) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT CONTACT the material with skin, if LCD panel is broken and liquid crystal material spills out.
If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately.
If this material contacts with skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

4) GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GLASS that may cause injuring fingers or skin, when the glass is broken.

5) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD module.
DO NOT TOUCH the parts inside LCD module and the fluorescent lamp's connector or cables in order to prevent electric shock, because high voltage is supplied to these parts from the inverter unit while power supply is turned on.

6) ABSOLUTE MAXIMUM RATINGS AND POWER PROTECTION CIRCUIT

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.
Employ protection circuit for power supply, whenever the specification or TD specifies it.
Suitable protection circuit should be applied for each system design.

7) DISPOSAL

When dispose LCD module, obey to the applicable environmental regulations.