

PRODUCT INFORMATION

FEATURES

- (1) 15.4WIDE-UXGA(1920x1200 pixels) display size for notebook PC
- (2) LVDS interface system (H-Sync, V-Sync)

TENTATIVE

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (typ.)	344.5max(W) x 222.5max(H) x 6.5max(D) mm
Number of Pixels	1920(W) x 1200(H) pixels
Active Area	331.2 (W) x 207(H) mm
Pixel Pitch	0.1725(W) x 0.1725(H)
Weight (approximately)	570 g
Backlight	Single CCFL, Sidelight type

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Checked Terminal
Supply Voltage	V_{DD}	-0.3	+4.0	V	$V_{DD} - GND$
Input Voltage of Signals	V_{IN}	-0.3	$V_{DD}+0.3$	V	LVDS interface
Operating Ambient Temperature	T_{OP}	0	50	°C	
Operating Ambient Humidity	H_{OP}	10	90	%(RH)	
Storage Temperature	T_{STG}	-20	+60	°C	
Storage Humidity	H_{STG}	10	90	%(RH)	
Operating Temperature for Panel	-	0	+60	°C	

ELECTRICAL SPECIFICATION(T.B.D)

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply Voltage ¹⁾	V_{DD}	3.0	3.3	3.6	V	
	V_{FL}	---	710	---	V(rms)	$I_{FL}=6.0\text{mA(rms)}$
FL Start Voltage ($T_a=0^\circ\text{C}$)	V_{SFL}	1550	---	1800	V(rms)	
Differential Input Voltage ²⁾	V_{ID}	100	-	600	mV	
Common Mode Input Voltage ²⁾	V_{CM}	1.0	-	$2.4 - (V_{ID})/2$	V	
Current Consumption	I_{DD}	---	515	---	mA	
	I_{FL}	---	6.0	6.0	mA(rms)	
Power Consumption		---	5.96	---	W	$I_{FL}=6.5\text{mA(rms)}$

*1) The module should be always operated within these ranges. The "Typ." shows the recommendable value.

*2) Recommended LVDS transmitter: DS90CF365

OPTICAL SPECIFICATION ($T_a=25^\circ\text{C}$)

Item	Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (CR)	150	350	---	---	
Response Time	(t_{ON})	---	---	50	ms
	(t_{OFF})	---	---	50	ms
Luminance (L)	160	190	---	cd/m^2	$I_{FL}=6.5\text{mA(rms)}$

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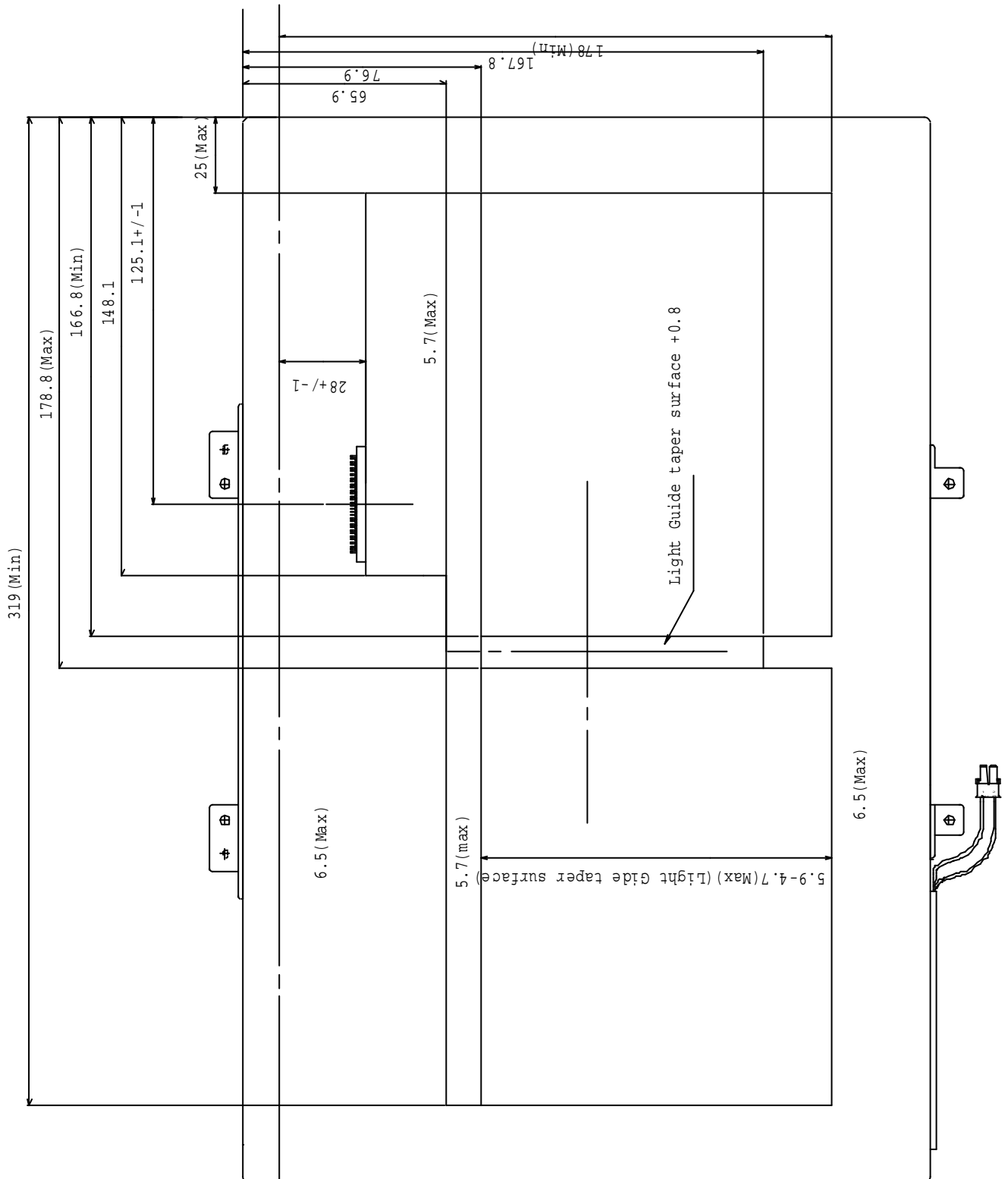
*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba before proceeding with the design of equipment incorporating this product.

DIMENSIONAL OUTLINE

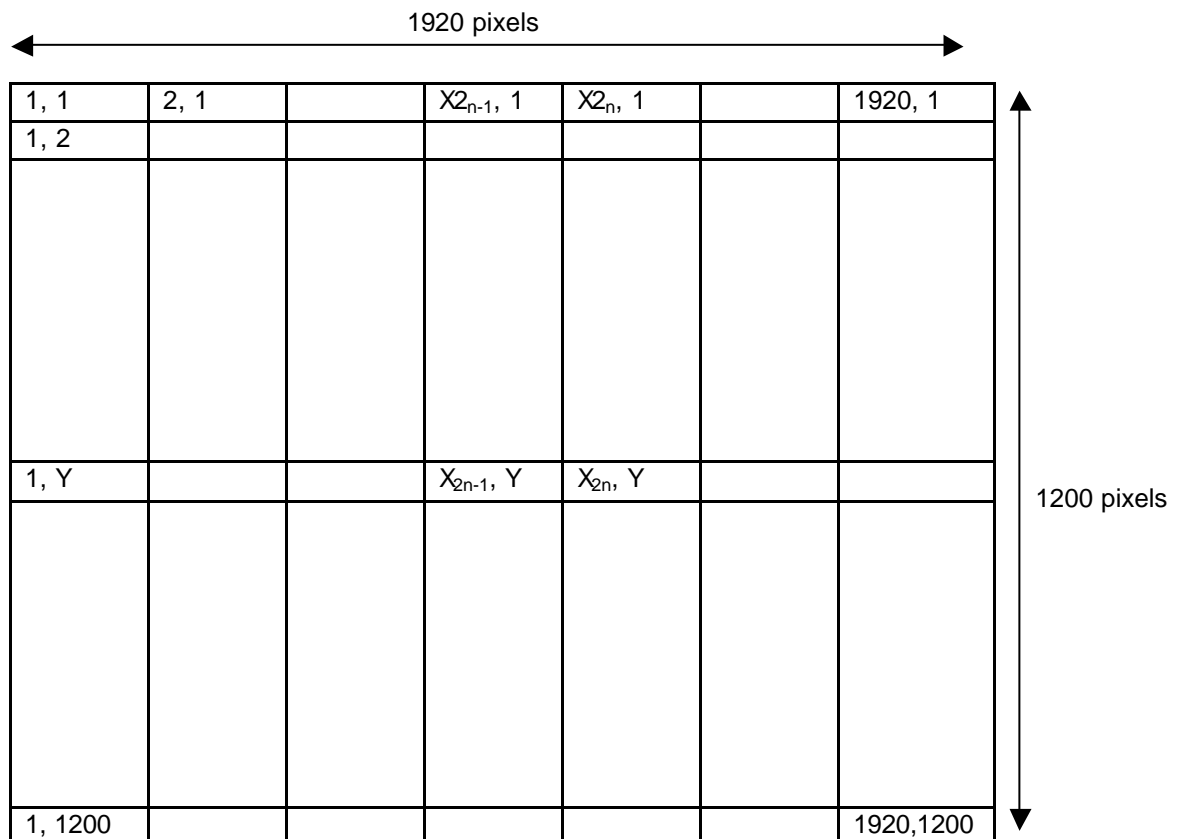
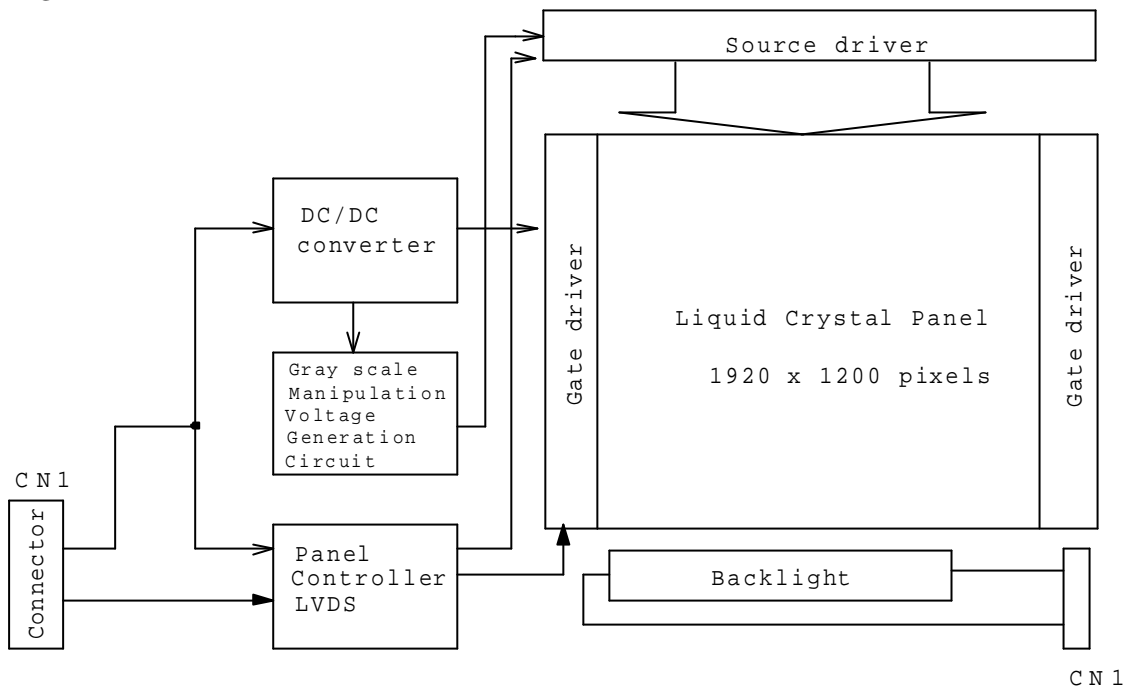
(Back side)

Unit : mm

Standard tolerance : ±0.5

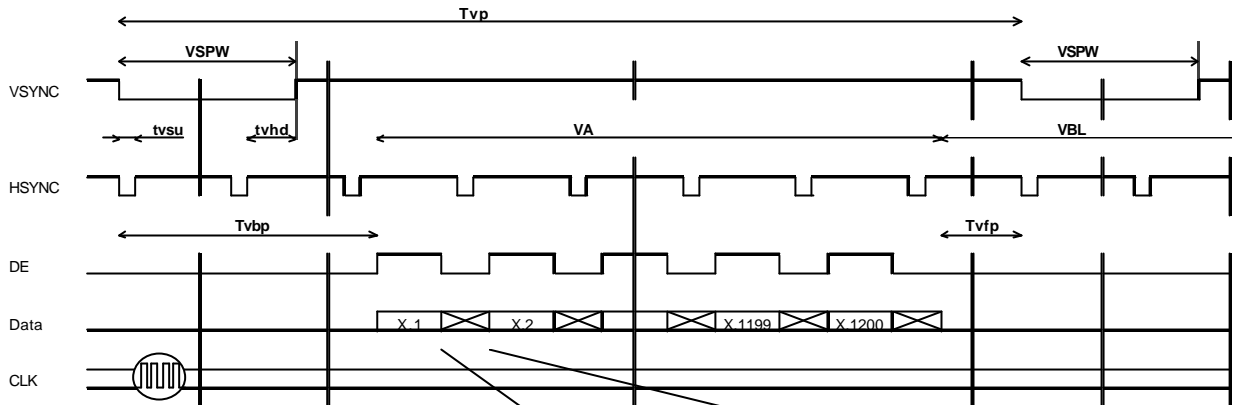


BLOCK DIAGRAM

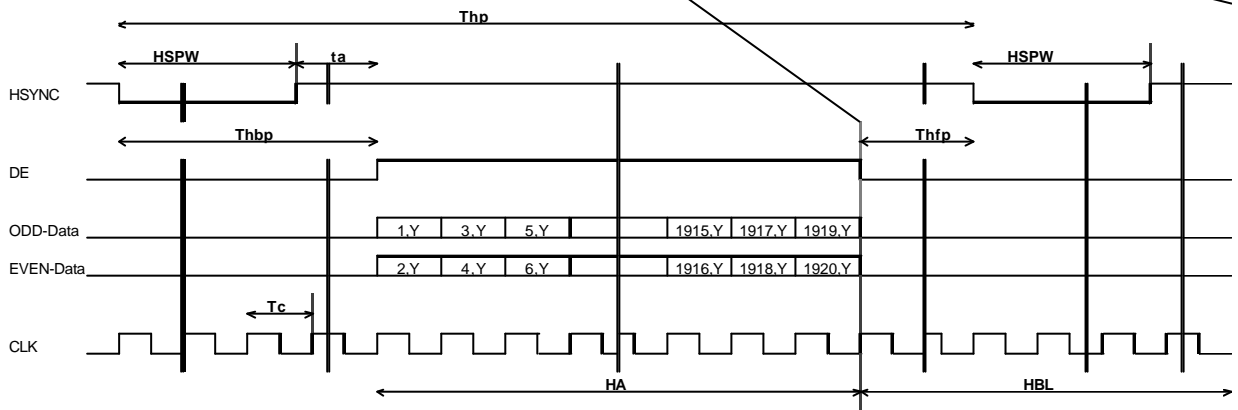


TIMING CHART

(1) Vertical Timing



(2) Horizontal Timing



TIMING SPECIFICATION ^{1) 2) 3) 4) 5) 6)}

Item	Symbol	min.	typ.	max.	unit
Horizontal Scanning Term	Thp	-	1024	-	Tc
		-	13.50	-	us
H-sync Pulse Width ⁸⁾	HSPW	4	-	136	Tc
Horizontal Front Porch	thfp	4	-	136	Tc
Horizontal Back Porch ⁸⁾	Thbp	16	-	-	Tc
Horizontal Sync Term	ta	4	-	-	Tc
Horizontal Blanking Term	HBL	-	64	-	Tc
Horizontal Display Term	HA	960	960	960	Tc
Frame Period	Tvp	-	1235	-	Thp
		-	16.67	16.67	ms
V-sync Pulse Width	VSPW	1	-	-	Thp
V-sync Set Up Time (to H-sync)	tsu	8	-	-	Tc
V-sync Hold Time	tvd	8	-	-	Tc
Vertical Front Porch	tfp	8	-	-	Tc
Vertical Back Porch ⁸⁾	Tvbp	4	-	-	Tc
Vertical Blanking Term	VBL	-	35	-	Thp
Vertical Display Term	VA	1200	1200	1200	Thp
DE Pulse Width	HA	960	960	960	Tc
Clock Period	Tc	13.179	13.179	-	ns

Note 1) Refer to "TIA/EIATiming Chart"

Note 2) If ENAB is fixed to "H" or "L" level for certain period while NCLK is supplied, the panel displays black with some flicker.

Note 3) If NCLK is fixed to "H" or "L" level for certain period while ENAB is supplied, the panel may be damaged.

Note 4) Please adjust LCD operating signal timing and FL driving frequency, to optimize the display quality.

There is a possibility that flicker is observed by the interference of LCD operating signal timing and FL driving condition (especially driving frequency), even if the condition satisfies above timing specifications and recommended operating conditions shown in 3.

Note5) Do not make t_v , t_{vdh} and t_{vds} fluctuate.

If t_v , t_{vdh} , and t_{vds} are fluctuate, the panel displays black.

Note6) In case of using the long frame period, the deterioration of display quality, noise etc. may be occurred.

Note7) NCLK count of each Horizontal Scanning Time should be always the same.

V-Blanking period should be " n " X "Horizontal Scanning Time". (n : integer)

Frame period should be always the same.

Note 8) Please keep below equations.

$$VBL = Tvp + Tvbp$$

$$HSPW = HBL - Thfp - ta$$

$$Thbp = HSPW + ta$$

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

Connector : FI-XB30SR-HF11(Locking Type) / JAPAN AVIATION ELECTRONICS INDUSTRY,LTD.

Mating Connector :

Wire Type:FI-X30H (Housing), FI-XC3-A-15000 (Contact)

FPC Type:FI-X30M or FI-X30M R, Coax Type:FI-X30C or FI-X30C2(Housing), FI-X30CH-7000(Shell)

Terminal No.	Symbol	Function
1	GND	Ground
2	VDD	Power Supply : +3.3V
3	VDD	Power Supply : +3.3V
4	V _{EEDID}	DDC 3.3V Power
5	NC	Non-Connection
6	Clk _{EEDID}	DDC Clock
7	DATA _{EEDID}	DDC Data
8	RxOIN0-	Odd Negative LVDS differential data input (R0-R5,G0)
9	RxOIN0+	Odd Positive LVDS differential data input (R0-R5,G0)
10	GND	Ground
11	RxOIN1-	Odd Negative LVDS differential data input (G1-G5, B0-B1)
12	RxOIN1+	Odd Positive LVDS differential data input (G1-G5, B0-B1)
13	GND	Ground
14	RxOIN2-	Odd Negative LVDS differential data input (B2-B5, HS, VS, DE)
15	RxOIN2+	Odd Positive LVDS differential data input (B2-B5, HS, VS, DE)
16	GND	Ground
17	OCLK-	Odd Clock Signal(-)
18	OCLK+	Odd Clock Signal(+)
19	GND	Ground
20	RxEIN0-	Even Negative LVDS differential data input (R0-R5,G0)
21	RxEIN0+	Even Positive LVDS differential data input (R0-R5,G0)
22	GND	Ground
23	RxEIN1-	Even Negative LVDS differential data input (G1-G5, B0-B1)
24	RxEIN1+	Even Positive LVDS differential data input (G1-G5, B0-B1)
25	GND	Ground
26	RxEIN2-	Even Negative LVDS differential data input (B2-B5, HS, VS, DE)
27	RxEIN2+	Even Positive LVDS differential data input (B2-B5, HS, VS, DE)
28	GND	Ground
29	ECLK-	Even Clock Signal(-)
30	ECLK+	Even Clock Signal(+)

Note 1) Please connect GND pin to ground. Don't use it as no-connect nor connection with high impedance.

CN2 CCFL POWER SOURCE

Connector : BHSR-02VS-1 / JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

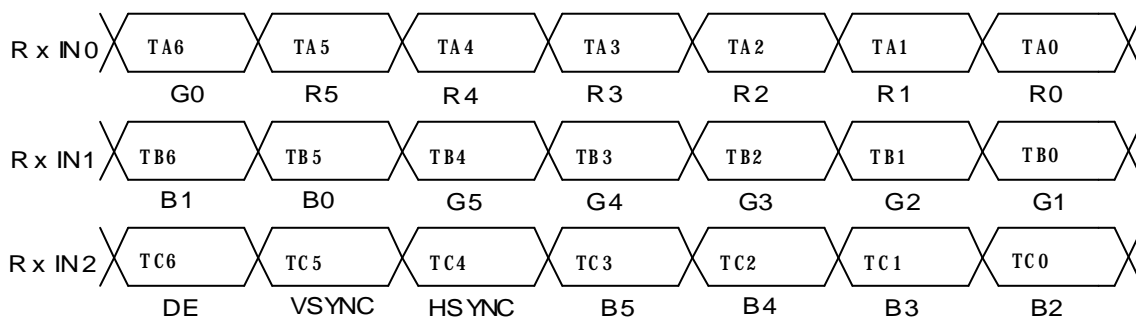
Mating Connector : SM02B-BHS-1 / JAPAN SOLDERLESS TERMINAL MFG CO., LTD.

Terminal No.	Symbol	Function
1	V _{FLH}	CCFL Power Supply (high voltage)
2	V _{FLL}	CCFL Power Supply (low voltage)

**RECOMMENDED TRANSMITTER (DS90CF365)
TO LTM154AX0S INTERFACE ASSIGNMENT**

Case1: 6bit Transmitter

(DS90CF365)				LTM154EZ0S Interface (CN1)		
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	Terminal	Symbol
Symbol	Terminal	Symbol	Function			
TA0	44	R0	Red Pixels Display Data (LSB)	TA- TA+	No.5 No.6	RxIN0- RxIN0+
TA1	45	R1	Red Pixels Display Data			
TA2	47	R2	Red Pixels Display Data			
TA3	48	R3	Red Pixels Display Data			
TA4	1	R4	Red Pixels Display Data			
TA5	3	R5	Red Pixels Display Data (MSB)			
TA6	4	G0	Green Pixels Display Data (LSB)			
TB0	6	G1	Green Pixels Display Data	TB- TB+	No.8 No.9	RxIN1- RxIN1+
TB1	7	G2	Green Pixels Display Data			
TB2	9	G3	Green Pixels Display Data			
TB3	10	G4	Green Pixels Display Data			
TB4	12	G5	Green Pixels Display Data (MSB)			
TB5	13	B0	Blue Pixels Display Data (LSB)			
TB6	15	B1	Blue Pixels Display Data			
TC0	16	B2	Blue Pixels Display Data	TC- TC+	No.11 No.12	RxIN2- RxIN2+
TC1	18	B3	Blue Pixels Display Data			
TC2	19	B4	Blue Pixels Display Data			
TC3	20	B5	Blue Pixels Display Data (MSB)			
TC4	22	HSYNC	Horizontal Synchronization Signal			
TC5	23	VSYNC	Vertical Synchronization Signal			
TC6	25	DE	Compound Synchronization Signal			
CLK IN	26	CLK	Data Sampling Clock	TCLK- TCLK+	No.14 No.15	CLK- CLK+



256k (k=1024) COLORS COMBINATION TABLE

	Display	R5 R4 R3 R2 R1 R0	G5 G4 G3 G2 G1 G0	B5 B4 B3 B2 B1 B0	Gray Scale Level
Basic Color	Black	L L L L L L L	L L L L L L L	L L L L L L L	-
	Blue	L L L L L L L	L L L L L L L	H H H H H H H	-
	Green	L L L L L L L	H H H H H H H	L L L L L L L	-
	Light Blue	L L L L L L L	H H H H H H H	H H H H H H H	-
	Red	H H H H H H H	L L L L L L L	L L L L L L L	-
	Purple	H H H H H H H	L L L L L L L	H H H H H H H	-
	Yellow	H H H H H H H	H H H H H H H	L L L L L L L	-
	White	H H H H H H H	H H H H H H H	H H H H H H H	-
Gray Scale of Red	Black	L L L L L L L	L L L L L L L	L L L L L L L	L 0
	Dark ↑ ↓ Light	L L L L L L H	L L L L L L L	L L L L L L L	L 1
		L L L L L H L	L L L L L L L	L L L L L L L	L 2
		: :	: :	: :	L3... L60
		H H H H L H	L L L L L L L	L L L L L L L	L61
		H H H H H L	L L L L L L L	L L L L L L L	L62
	Red	H H H H H H H	L L L L L L L	L L L L L L L	Red L63
	Gray Scale of Green	Black	L L L L L L L	L L L L L L L	L L L L L L L
Dark ↑ ↓ Light		L L L L L L L	L L L L L L H	L L L L L L L	L 1
		L L L L L L L	L L L L H L	L L L L L L L	L 2
		: :	: :	: :	L3... L60
		L L L L L L L	H H H H L H	L L L L L L L	L61
		L L L L L L L	H H H H H L	L L L L L L L	L62
Green		L L L L L L L	H H H H H H H	L L L L L L L	Green L63
Gray Scale of Blue		Black	L L L L L L L	L L L L L L L	L L L L L L L
	Dark ↑ ↓ Light	L L L L L L L	L L L L L L L	L L L L L H	L 1
		L L L L L L L	L L L L L L L	L L L L H L	L 2
		: :	: :	: :	L3... L60
		L L L L L L L	L L L L L L L	H H H H L H	L61
		L L L L L L L	L L L L L L L	H H H H H L	L62
	Blue	L L L L L L L	L L L L L L L	H H H H H H H	Blue L63
	Gray Scale of White & Black	Black	L L L L L L L	L L L L L L L	L L L L L L L
Dark ↑ ↓ Light		L L L L L L H	L L L L L L H	L L L L L H	L 1
		L L L L H L	L L L L H L	L L L L H L	L 2
		: :	: :	: :	L3... L60
		H H H H L H	H H H H L H	H H H H L H	L61
		H H H H H L	H H H H H L	H H H H H L	L62
White		H H H H H H H	H H H H H H H	H H H H H H H	White L63

**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 Matsushita Display Technology'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 Matsushita Display Technology'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 Matsushita Display Technology's 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 Matsushita Display Technology does 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 contact 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.