

Toshiba Mobile Display Co., Ltd.

PRODUCT INFORMATION

31cm COLOUR TFT-LCD MODULE
(12.1 TYPE)
LT121EE16000
(p-Si TFT)

All information is subject to change without notice. Please read bottom notes.

FEATURES

- (1) 12.1"XGA-WIDE(1280x800 pixels) display size for notebook PC
- (2) Light weight design
- (3) LVDS interface system (H-Sync, V-Sync)
- (4) Wide Viewing Angle

TENTATIVE

MECHANICAL SPECIFICATIONS

Item	Specifications
Dimensional Outline (typ.)	288.8(W) x 182.0 (H) x 5.9(D) mm
Number of Pixels	1280 (W) x 800(H) pixels
Active Area	261.12(W) x 163.2(H) mm
Pixel Pitch	0.204(W) x 0.204(H)
Weight (approximately)	222 g(Typ)
Backlight	LED backlight, Sidelight type

ABSOLUTE MAXIMUM RATINGS

Item	Min.	Max.	Unit
Supply Voltage (V_{DD})	-0.3	3.0	V
LED Reverse Voltage (V_{RLED})	-	5	V
LED Forward Current (I_{FLED})	-	30	mA
Input Signal Voltage (V_{IN})	-0.3	$V_{DD}+0.3$	V
Operating Temperature	0	50	°C
Storage Temperature	-20	60	°C
Storage Humidity	10	90	%(RH)

ELECTRICAL SPECIFICATION

Item	Min.	Typ.	Max.	Unit	Remarks	
Supply Voltage	V_{DD}	2.35	2.5	2.7	V	
Common Mode Input Voltage	V_{CM}	0.7	1.2	1.75	V	
Differential Input amplitude	V_{ID}	0.1	-	0.6	V	

*1 : 8 color bars pattern

*2 : Excepting the efficiency FL inverter

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

Item	Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (CR)	550	800	---	---	
Viewing Angle(U/D/R/L)	140	160	-	deg	
Response Time(t_{ON})+ (t_{OFF})	---	40	60	ms	
Luminance (L)	200	280	---	cd/m ²	ILED=18mA

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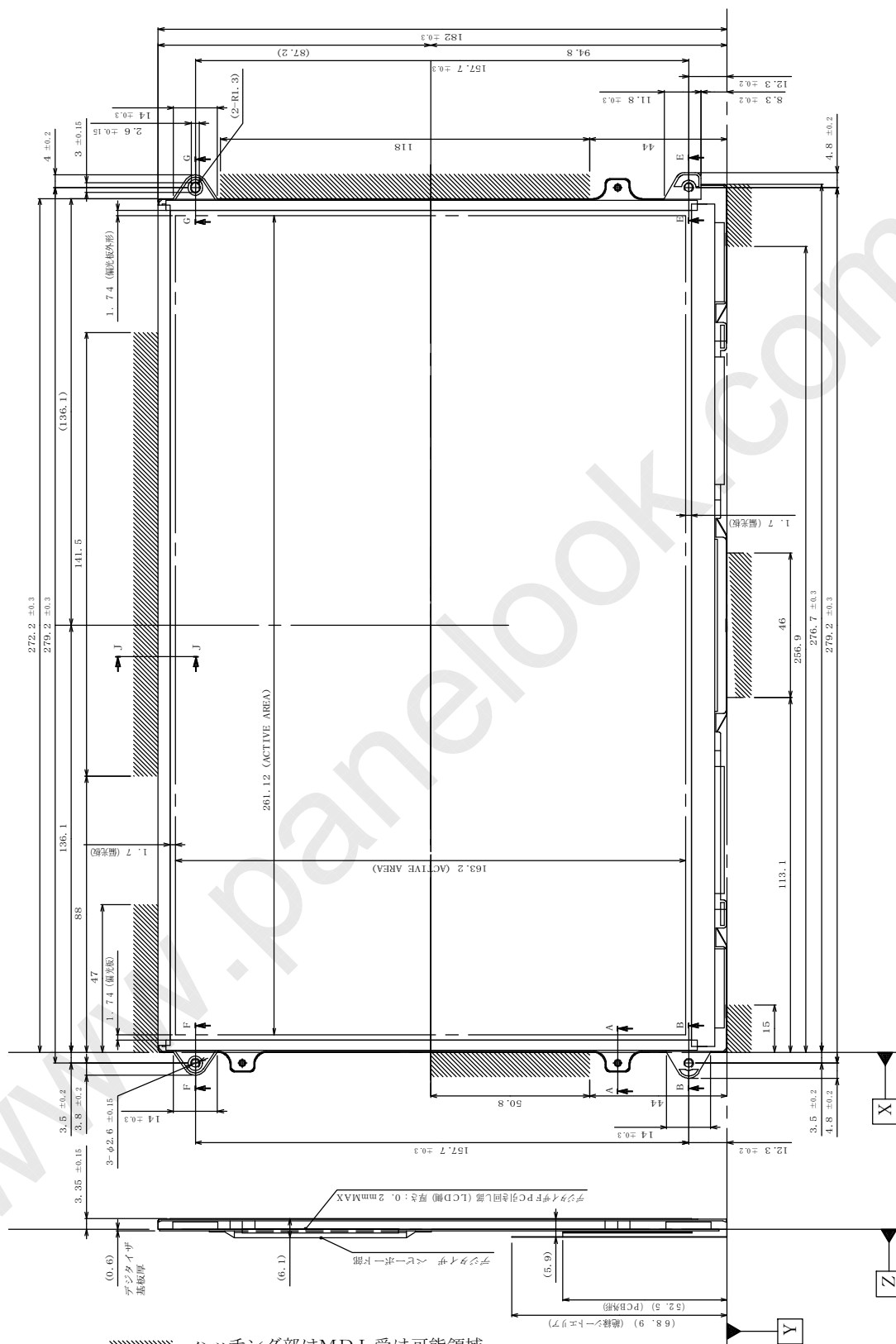
*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba Mobile Display before proceeding with the design of equipment incorporating this product.

LT121EE16000

Unit : mm

Standard tolerance : ±0.5

DIMENSIONAL OUTLINE



ハッチング部はMDL受け可能領域

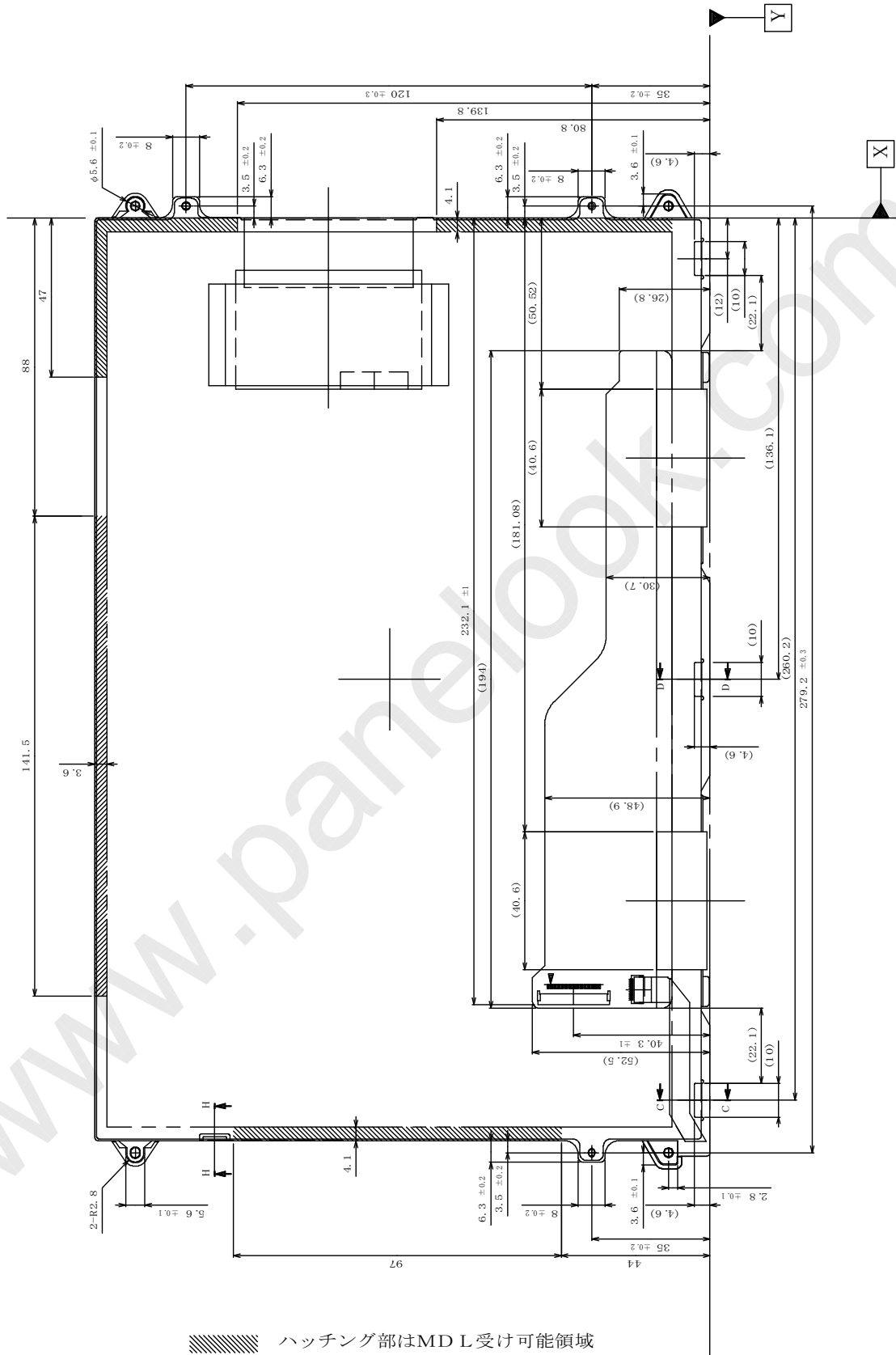
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LT121EE16000

DIMENSIONAL OUTLINE

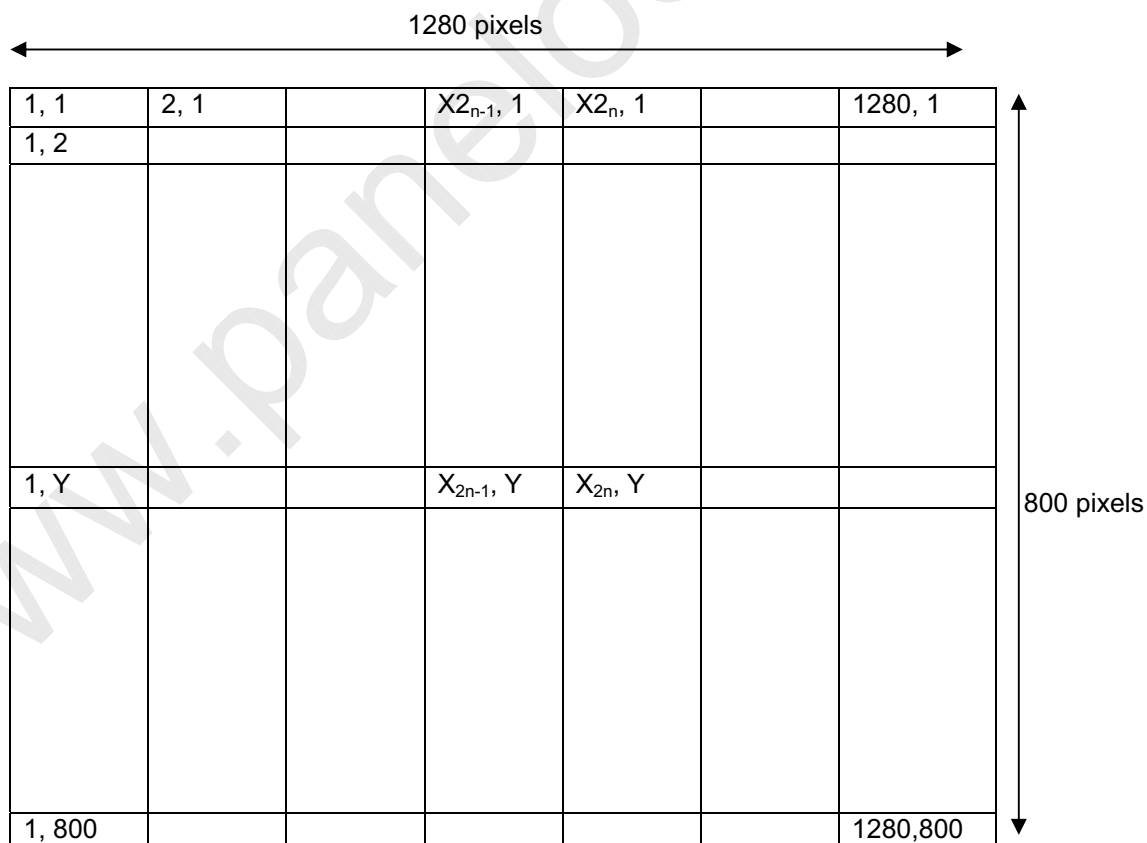
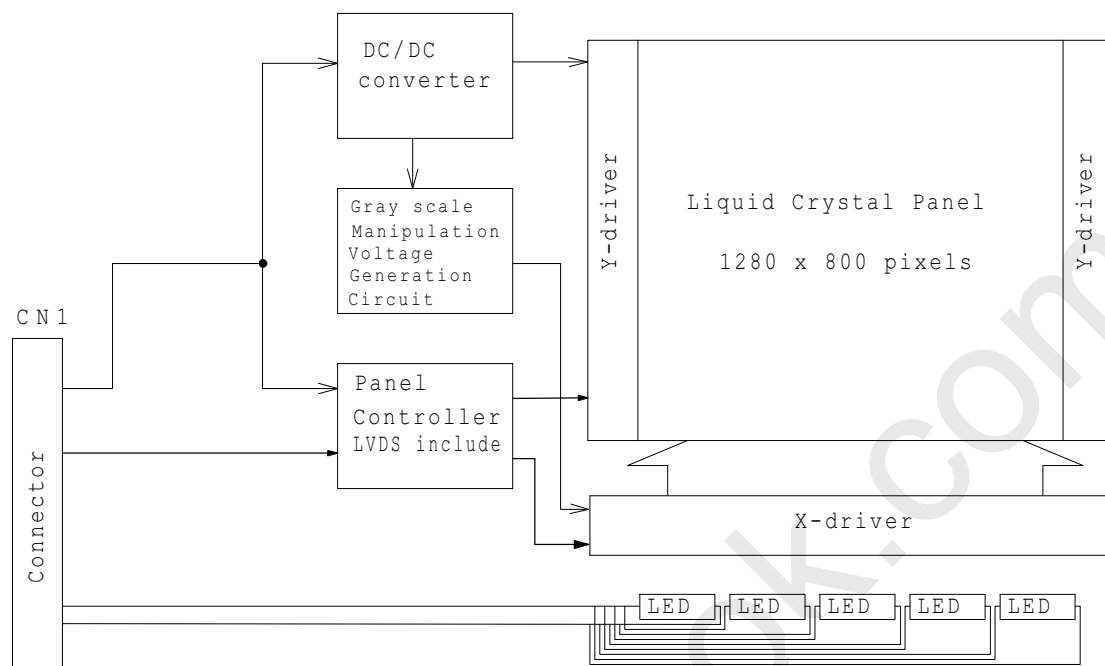
Unit : mm

Standard tolerance : ± 0.5



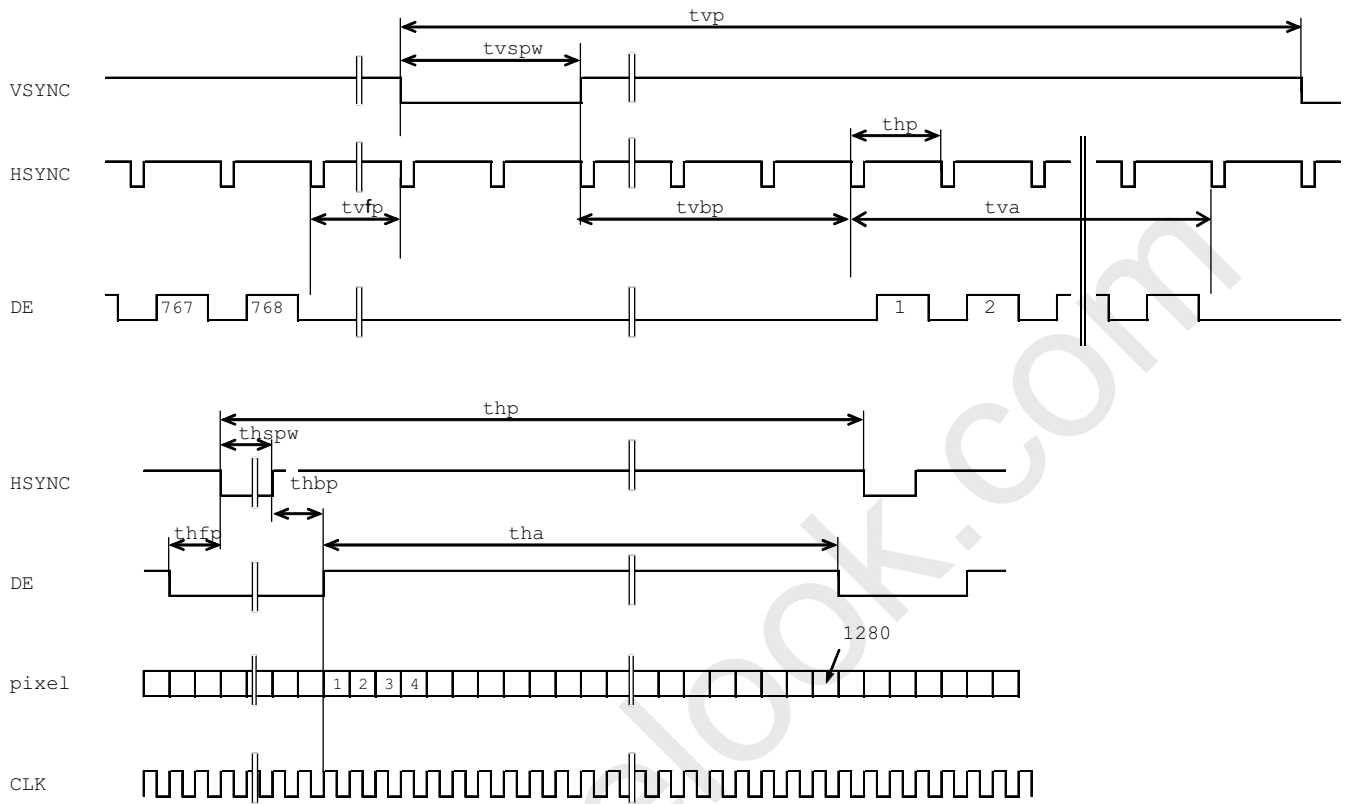
LT121EE16000

BLOCK DIAGRAM



LT121EE16000

TIMING CHART



TIMING SPECIFICATION ^{1) 2) 3) 4) 5) 6) 7)}

Item	Symbol	min.	typ.	max.	unit
Horizontal Scanning Term	thp	1408 x tc	1440 x tc	1680	clock
H-sync Pulse Width	thspw	4 x tc	32 x tc	-	clock
Horizontal Front Porch	thfp	4 x tc	48 x tc	-	clock
Horizontal Back Porch	thbp	4 x tc	80 x tc	-	clock
Horizontal Display Term	tha	1280 x tc	1280 x tc	1280 x tc	clock
Frame Period	tv	805 x th	823 x th	831 x th	line
V-sync Pulse Width	tvspw	1 x th	6 x th	-	line
Vertical Front Porch	tvfp	1 x th	3 x th	-	line
Vertical Back Porch	tvbp	2 x th	14 x th	-	line
Vertical Display Term	tvd	800 x th	800 x th	800 x th	line
Clock Period	tc	14.71	14.08	11.98	ns

Note 1) Refer to "Timing Chart" and LVDS (THC63LVDF84A-85) specifications by Thine Electronics, Inc. corporation.

Note 2) If DE 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 DE 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 tv, tvhd and tvds fluctuate.

If tv, tvhd, and tvds 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.

Note8) $thb = thw + thfp + thbp$

Note9) $tvb = tvw + tvfp + tvbp$

CONNECTOR PIN ASSIGNMENT FOR INTERFACE

CN1 INPUT SIGNAL

Connector : DF19KR-20P-1H / HIROSE

Mating Connector : DF19G-20S-1F (Cable), DF19G-20S-1C (FPC)

Terminal No.	Symbol	Function
1	V _{SS}	GND
2	V _{SS}	GND
3	V _{SS}	GND
4	V _{SS}	GND
5	V _{SS(or NC)}	GND (or Not Connection)
6	V _{DD}	Power Supply : +2.5V
7	V _{DD}	Power Supply : +2.5V
8	V _{DD}	Power Supply : +2.5V
9	V _{DD}	Power Supply : +2.5V
10	NC	Do Not Connect
11	V _{EDID}	DDC 2.5V
12	CLK _{EDID}	DDC Clock
13	DATA _{EDID}	DDC Data
14	V _{SS}	GND
15	RxIN0-	Negative LVDS differential data input (R0-R5,G0)
16	RxIN0+	Positive LVDS differential data input (R0-R5,G0)
17	V _{SS}	GND
18	RxIN1-	Negative LVDS differential data input (G1-G5, B0-B1)
19	RxIN1+	Positive LVDS differential data input (G1-G5, B0-B1)
20	V _{SS}	GND
21	RxIN2-	Negative LVDS differential data input (B2-B5, HS, VS, DE)
22	RxIN2+	Positive LVDS differential data input (B2-B5, HS, VS, DE)
23	NC	Do Not Connect
24	CLK-	Clock Signal(-)
25	CLK+	Clock Signal(+)
26	V _{SS}	GND
27	NC	Do Not Connect
28	VCD11	LED Power Supply
29	VCD12	LED Power Supply
30	VCD21	LED Power Supply
31	VCD22	LED Power Supply
32	VCD31	LED Power Supply
33	VCD32	LED Power Supply
34	NC	Do Not Connect
35	VAD11	LED Power Supply
36	VAD12	LED Power Supply
37	VAD21	LED Power Supply
38	VAD22	LED Power Supply
39	VAD31	LED Power Supply
40	VAD32	LED Power Supply

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

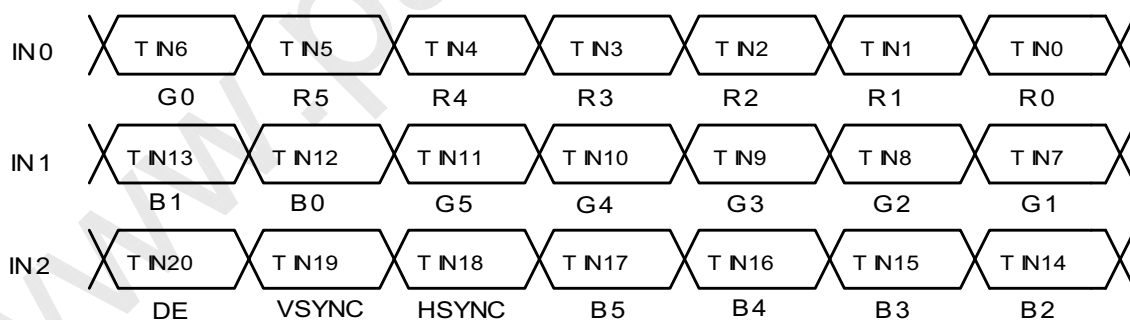
Note 2) Please connect NC to nothing. Don't connect it to ground nor to other signal input.

RECOMMENDED TRANSMITTER (THC63LVDM63B) TO LT121EE16000 INTERFACE ASSIGNMENT

Case1: 6bit Transmitter

THC63LVDM63B				LT121EE16000 Interface (CN1)		
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	Terminal	Symbol
Symbol	Terminal	Symbol	Function			
TIN0	44	R0	Red Pixels Display Data (LSB)	TOUT0- TOUT0+	No.15 No.16	IN0- IN0+
TIN1	45	R1	Red Pixels Display Data			
TIN2	47	R2	Red Pixels Display Data			
TIN3	48	R3	Red Pixels Display Data			
TIN4	1	R4	Red Pixels Display Data			
TIN5	3	R5	Red Pixels Display Data (MSB)	TOUT1- TOUT1+	No.18 No.19	IN1- IN1+
TIN6	4	G0	Green Pixels Display Data (LSB)			
TIN7	6	G1	Green Pixels Display Data			
TIN8	7	G2	Green Pixels Display Data			
TIN9	9	G3	Green Pixels Display Data			
TIN10	10	G4	Green Pixels Display Data	TOUT2- TOUT2+	No.21 No.22	IN2- IN2+
TIN11	12	G5	Green Pixels Display Data (MSB)			
TIN12	13	B0	Blue Pixels Display Data (LSB)			
TIN13	15	B1	Blue Pixels Display Data			
TIN14	16	B2	Blue Pixels Display Data			
TIN15	18	B3	Blue Pixels Display Data	TCLK OUT- TCLK OUT+	No.24 No.25	CLK- CLK+
TIN16	19	B4	Blue Pixels Display Data			
TIN17	20	B5	Blue Pixels Display Data (MSB)			
TIN18	22	HSYNC	H-Sync			
TIN19	23	VSYNC	V-Sync			
TIN20	25	DE	Compound Synchronization Signal			
CLK IN	26	CLK	Data Sampling Clock			

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.

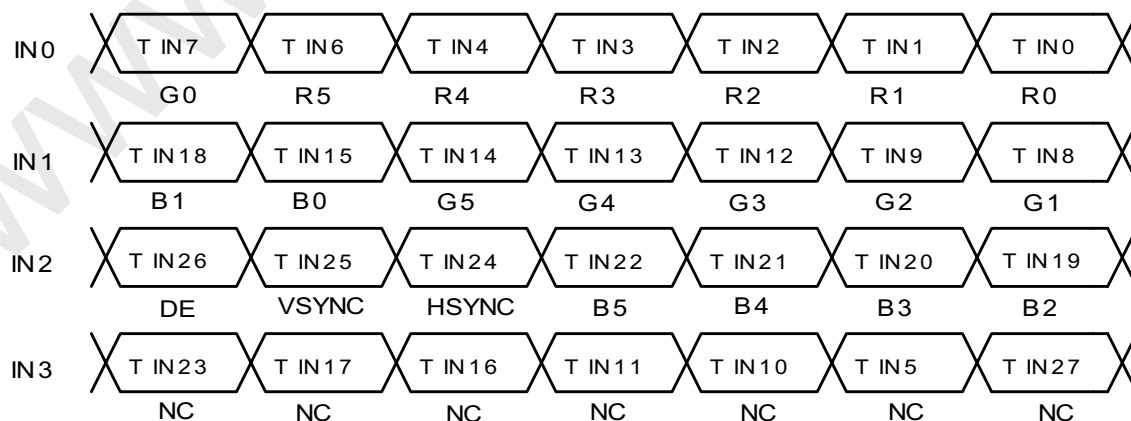


RECOMMENDED TRANSMITTER (THC63LVDM83R) TO LT121EE16000 INTERFACE ASSIGNMENT

Case2: 8bit Transmitter

THC63LVDM83R				LT121EE16000 Interface (CN1)		
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	Terminal	Symbol
Symbol	Terminal	Symbol	Function			
TIN0	51	R0	Red Pixels Display Data (LSB)	TOUT0- TOUT0+	No.15 No.16	IN0- IN0+
TIN1	52	R1	Red Pixels Display Data			
TIN2	54	R2	Red Pixels Display Data			
TIN3	55	R3	Red Pixels Display Data			
TIN4	56	R4	Red Pixels Display Data			
TIN6	3	R5	Red Pixels Display Data (MSB)			
TIN7	4	G0	Green Pixels Display Data(LSB)	TOUT1- TOUT1+	No.18 No.19	IN1- IN1+
TIN8	6	G1	Green Pixels Display Data			
TIN9	7	G2	Green Pixels Display Data			
TIN12	11	G3	Green Pixels Display Data			
TIN13	12	G4	Green Pixels Display Data			
TIN14	14	G5	Green Pixels Display Data(MSB)			
TIN15	15	B0	Blue Pixels Display Data (LSB)	TOUT2- TOUT2+	No.21 No.22	IN2- IN2+
TIN18	19	B1	Blue Pixels Display Data			
TIN19	20	B2	Blue Pixels Display Data			
TIN20	22	B3	Blue Pixels Display Data			
TIN21	23	B4	Blue Pixels Display Data			
TIN22	24	B5	Blue Pixels Display Data (MSB)			
TIN24	27	HSYNC	H-Sync	TOUT3- TOUT3+		
TIN25	28	VSYNC	V-Sync			
TIN26	30	DE	Compound Synchronization Signal			
TIN27	50	NC	Non Connection (open)			
TIN5	2	NC	Non Connection (open)			
TIN10	8	NC	Non Connection (open)			
TIN11	10	NC	Non Connection (open)	TCLK OUT- TCLK OUT+	No.24 No.25	CLK- CLK+
TIN16	16	NC	Non Connection (open)			
TIN17	18	NC	Non Connection (open)			
TIN23	25	NC	Non Connection (open)			
CLK IN	31	CLK	Data Sampling Clock			

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.



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	-
Gray Scale of Red	White	H H H H H H H	H H H H H H H	H H H H H H H	-
	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	L 0
	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 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	L 0
	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	L 0
	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-D-001A,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA MOBILE DISPLAY CO., LTD LCD MODULES".

Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

1) SPECIAL PURPOSES

A) Toshiba Mobile Display'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 Mobile Display'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 Mobile Display technology's published specification limits.

C) In addition, since Toshiba Mobile Display technology 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 Mobile Display 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.