



ASI-T-280DA2MU6/AF

No	Item	Specification	Remark
1	Display Mode	Normally White	
2	Screen Size	2.8inch (diagonal)	
3	Resolution	240 × RGB × 320	
4	Color Number	262K	
5	Color Arrangement	TFT Active matrix	
6	Driver IC	ILI9341V	
7	Back Light	White LED*4	
8	Viewing Direction	6 o'clock	
9	Interface	MCU	
10	Surface Treatment	UV Cut	
11	touch panel	With CTP	
12	CTP Driver IC	FT6236U	
13	Connector Type of CTP	I ² C	

Parameter	Specifications	Unit
Outline dimensions	50.0(W) × 69.20(H) × 4.0(D) (LCM, not include FPC)	mm
Active area	43.2(W) × 57.6(H)	mm
Resolution	240(H)RGB × 320(V) dots	-
Dot size	0.180 x 0.180	mm



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1. Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
A	2017-11-23	First Release.		

2. General Description

ASI-T-280DA2MU6/AF is a transmissive type a-Si TFT-LCD (amorphous silicon thin film transistor liquid crystal display) module, which is composed of a TFT-LCD panel, a driver circuit a backlight unit, The panel size is 2.8 inch and the resolution is 240 × 320. High image quality a-Si TFT LCD module. Partial-screen display function is available. Sleep and Stand-by modes are available for power saving.

2.1 Features

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2.2 Application

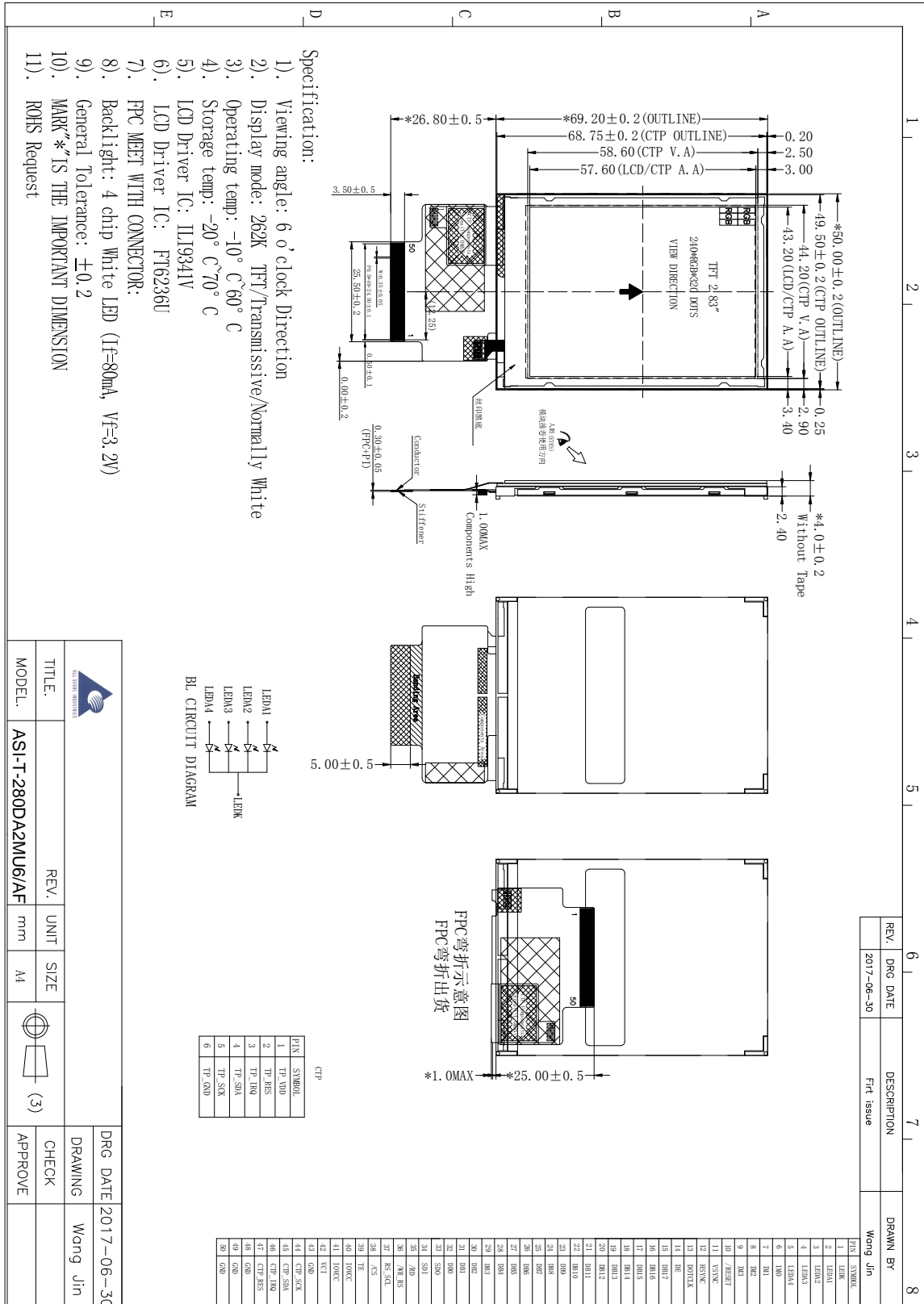
- ◆ Mobile phone.
- ◆ Portable multimedia device.

3. Outline Dimension

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Parameter	Specifications	Unit
Outline dimensions	50.0(W) × 69.20(H) × 4.0(D) (LCM, not include FPC)	mm
Active area	43.2(W) × 57.6(H)	mm
Resolution	240(H)RGB × 320(V) dots	-
Dot size	0.180 x 0.180	mm

Figure 1: Module specification of the module





4.TFT -LCM Interface Specification

Pin No	Symbol	Description	Note
1	LEDK	Power supply Cathode input for backlight	
2-5	LEA1-LEDA4	Power supply Anode input for backlight	
6-9	IM0-IM3	Interface selection	
10	RESET	Reset signal input Pin	
11	VSYNC	Vertical synchronizing signal in DPI interface. Let to open or connected to VSSD	
12	HSYNC	Horizontal synchronizing signal in DPI interface. Let to open or connected to VSSD.	
13	DOTCLK	High speed interface CLOCK differential signal inputpins	
14	DE	Data enable pin	
15-32	DB17-DB0	Data bus	
33	SDO	Serial output Data BUS	
34	SDI	Serial input Data BUS	
35	RDX	Read enable pin I80 parallel bus system	
36	WRX/D/CX	Write enable pin I80 parallel bus system	
37	D/CX(SCL)	Command/parameter or display data	
38	CSX	Chip select input pin.	
38	TE	Tearing effect output	
40-41	IOVCC	Power supply input for LCM: 1.8V	
42	VCI	Power supply input for LCM: 2.8	
43	GND	Ground	
44	CTP_SCK	Serial clock signal	
45	CTP_SDA	Serial data input signal	
46	CTP_IRQ	Interrupt signal	
47	CTP_RES	Interrupt signal	
48-50	GND	Ground	



CTP Interface Specification

Pin No	Symbol	Description	Note
1	CTP_VDD	Power supply input for CTP: 2.8V	
2	CTP_RES)	Interrupt signal	
3	CTP_IRQ	Interrupt signal	
4	CTP_SDA	Serial data input signal	
5	CTP_SCK	Serial clock signal	
6	CTP_GND	System Ground	

MODE

IM3	IM2	IM1	IM0	MCU-Interface Mode	DB Pin in use	
					Register/Content	GRAM
0	0	0	0	80 MCU 8-bit bus interface I	D[7:0]	D[7:0]
0	0	0	1	80 MCU 16-bit bus interface I	D[7:0]	D[15:0]
0	0	1	0	80 MCU 9-bit bus interface I	D[7:0]	D[8:0]
0	0	1	1	80 MCU 18-bit bus interface I	D[7:0]	D[17:0]
0	1	0	1	3-wire 9-bit data serial interface I	SDA: In/OUT	
0	1	1	0	4-wire 8-bit data serial interface I	SDA: In/OUT	
1	0	0	0	80 MCU 16-bit bus interface II	D[8:1]	D[17:10], D[8:1]
1	0	0	1	80 MCU 8-bit bus interface II	D[17:10]	D[17:10]
1	0	1	0	80 MCU 18-bit bus interface II	D[8:1]	D[17:0]
1	0	1	1	80 MCU 9-bit bus interface II	D[17:10]	D[17:9]
1	1	0	1	3-wire 9-bit data serial interface II	SDI: In SDO: Out	
1	1	1	0	4-wire 8-bit data serial interface II	SDI: In SDO: Out	

5. Absolute Maximum Ratings

5.1 Electrical Maximum Ratings – for IC Only

Table 3: Electrical Maximum Ratings – for IC

Parameter	Symbol	Min.	Max.	Unit	Note
Power supply voltage (VCC)	VCC	-0.3	+4.0	V	1
Power supply voltage (IOVCC)	IOVCC	-0.3	+3.6	V	1

Note:

1. IOVCC, VCC, GND must be maintained.
2. The modules may be destroyed if they are used beyond the absolute maximum ratings.

5.2 Environmental Condition

Table 4

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-10°C	+60°C	-20°C	+70°C	Dry
Humidity (Note 1)	80% max. RH for Ta 40°C < 50% RH for 40°C < Ta Maximum operating temperature				No condensation

Note 1: Product cannot sustain at extreme storage conditions for long time.

6. Electrical Specifications

Typical Electrical Characteristics

At Ta = 25 °C, VCC = 2.6V to 3.3V, IOVCC = 1.65V to 3.3V GND = 0V.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (analog)	VCI -GND		2.6	2.8	3.3	V
Supply voltage (logic)	IOVDD -GND		1.65	1.8	3.3	V
Supply current (Logic & LCD)	ICC	VCI=2.8V	-	-	10	mA
Supply voltage of white LED backlight	VLED =V(BL+)-V(BL-)	Forward current =80 mA	-	3.2	-	V
Luminance (on the module surface)		Number of LED dies = 4	-	TBD	-	cd/m ²

7. Timing Characteristics

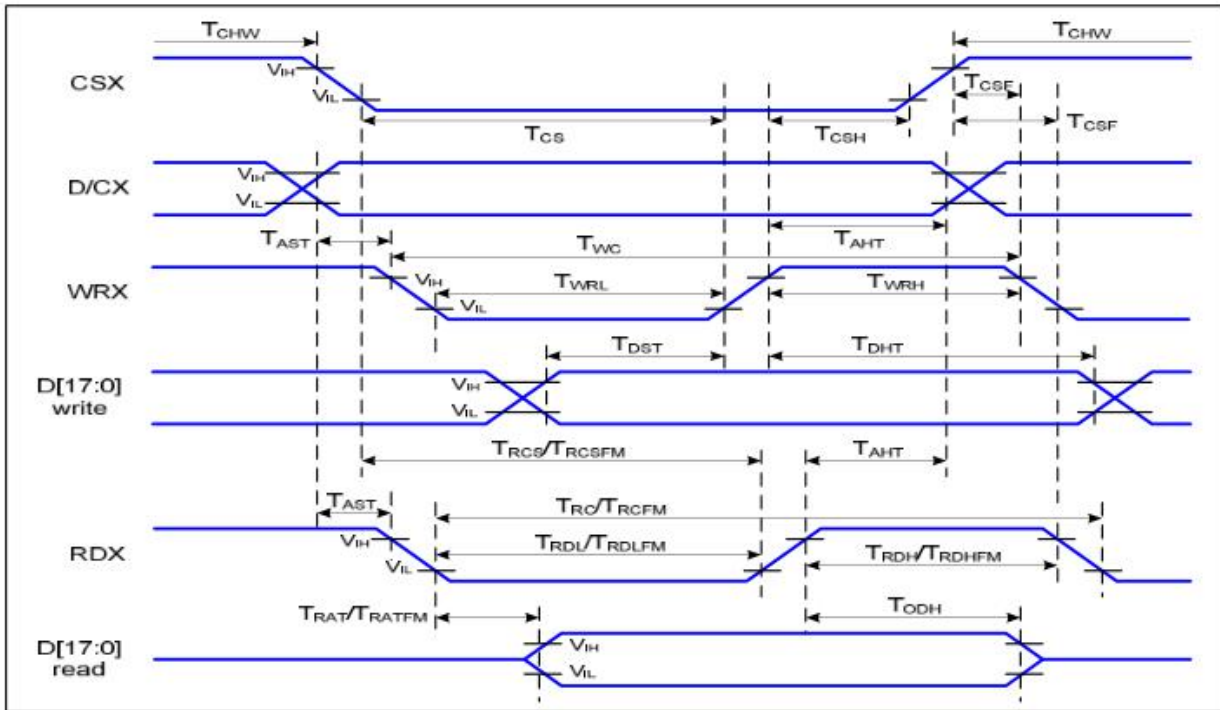


Figure 1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)



VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta= -30 to 70 °C

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T _{AST}	Address setup time	0		ns	-
	T _{AHT}	Address hold time (Write/Read)	10		ns	
CSX	T _{CHW}	Chip select "H" pulse width	0		ns	-
	T _{CS}	Chip select setup time (Write)	15		ns	
	T _{RCS}	Chip select setup time (Read ID)	45		ns	
	T _{RCSFM}	Chip select setup time (Read FM)	355		ns	
	T _{CSF}	Chip select wait time (Write/Read)	10		ns	
	T _{CSH}	Chip select hold time	10		ns	
WRX	T _{WC}	Write cycle	66		ns	
	T _{WRH}	Control pulse "H" duration	15		ns	
	T _{WRL}	Control pulse "L" duration	15		ns	
RDX (ID)	T _{RC}	Read cycle (ID)	160		ns	When read ID data
	T _{RDH}	Control pulse "H" duration (ID)	90		ns	
	T _{RDL}	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T _{RCFM}	Read cycle (FM)	450		ns	When read from frame memory
	T _{RDHFM}	Control pulse "H" duration (FM)	90		ns	
	T _{RDLFM}	Control pulse "L" duration (FM)	355		ns	
D[17:0]	T _{DST}	Data setup time	10		ns	For CL=30pF

T_{DHT}	Data hold time	10		ns
T_{RAT}	Read access time (ID)		40	ns
T_{RATFM}	Read access time (FM)		340	ns
T_{ODH}	Output disable time	20	80	ns

Table 4 8080 Parallel Interface Characteristics

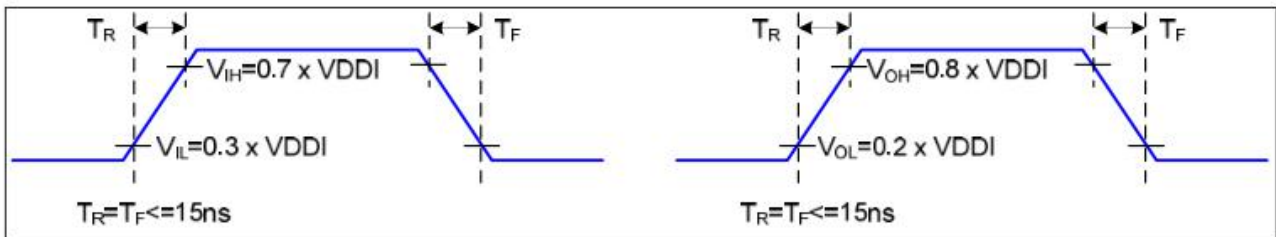


Figure 2 Rising and Falling Timing for I/O Signal

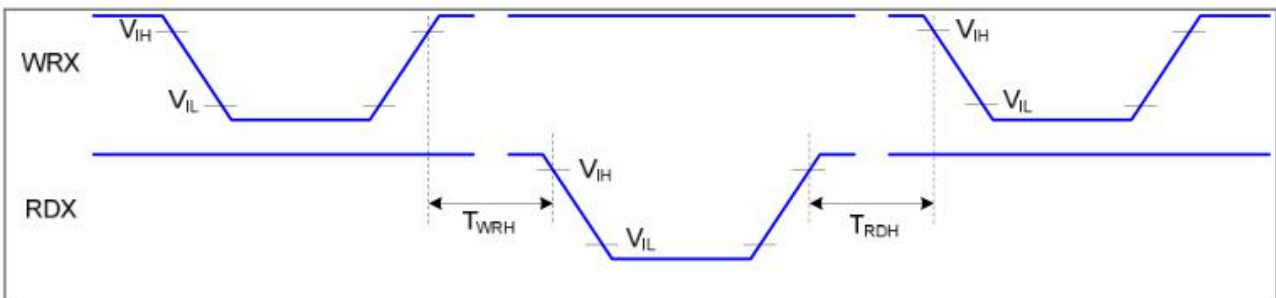
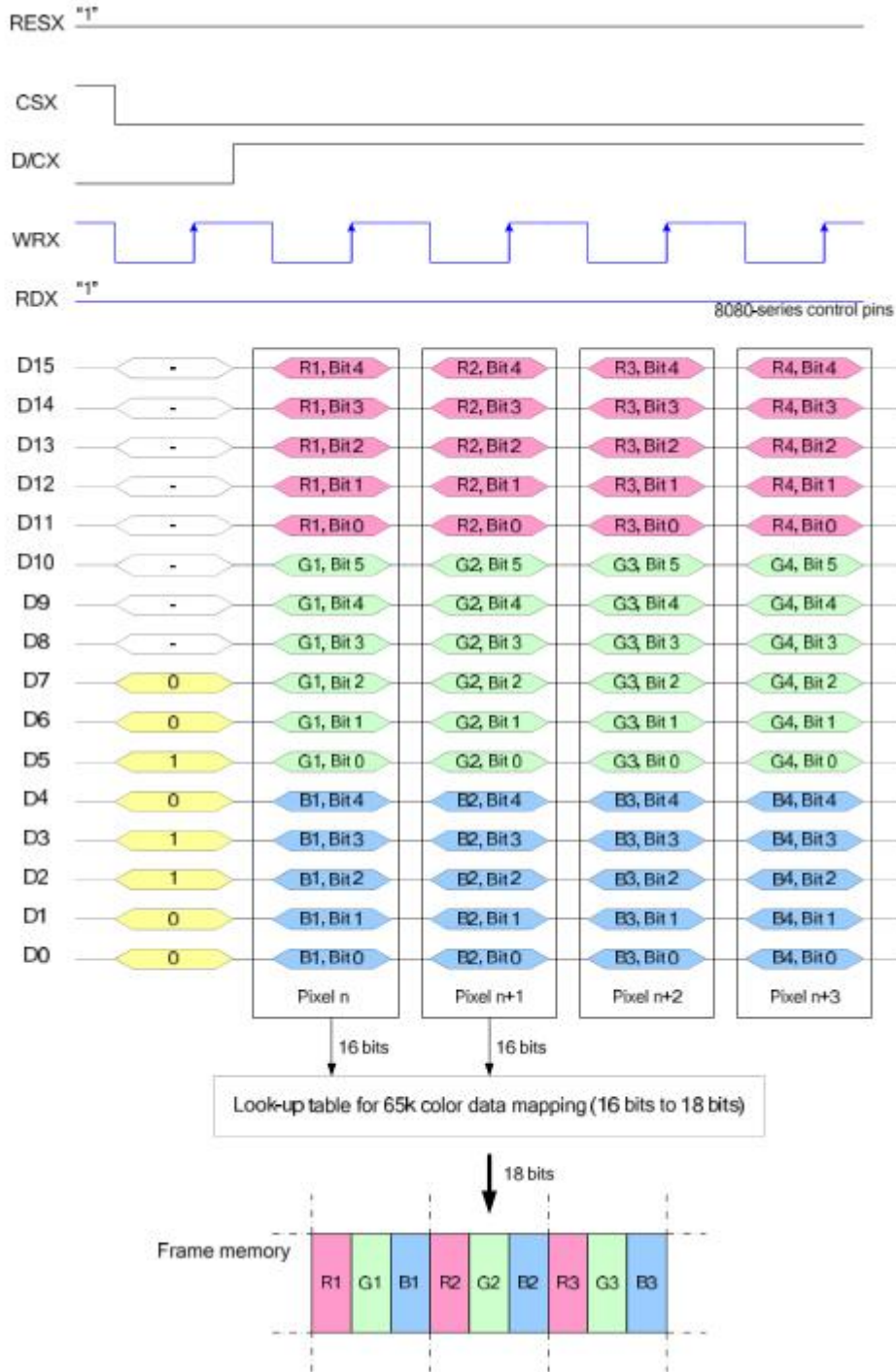


Figure 3 Write-to-Read and Read-to-Write Timing



8. Power Supply Configuration

19.4.1. Power Structure

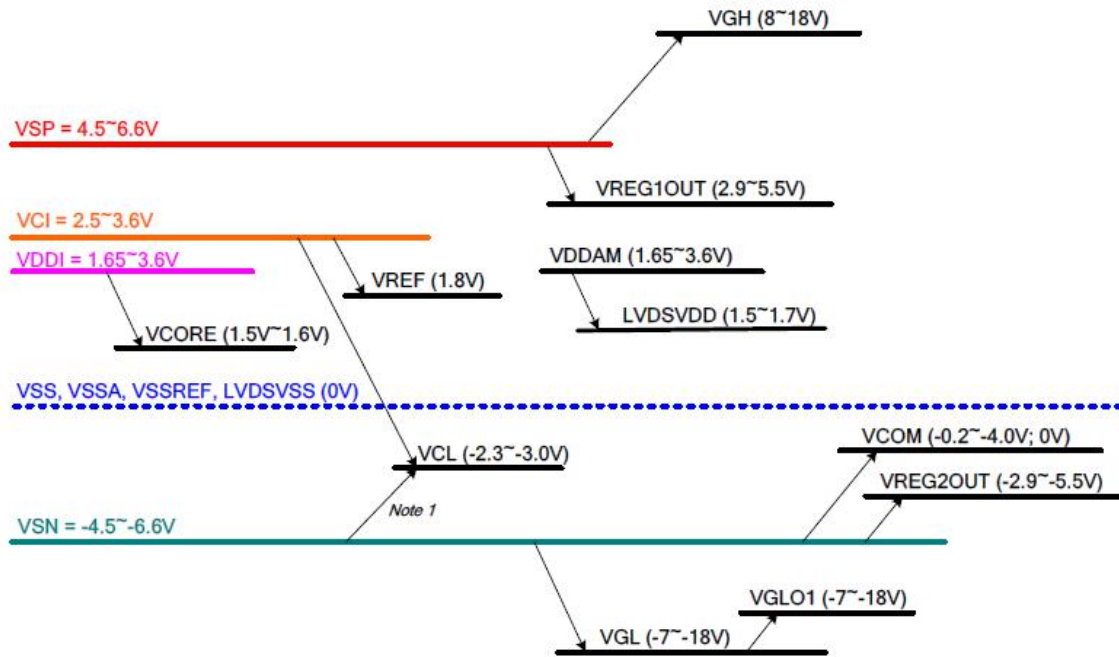


Figure 130: Power Structure of Power Mode 4

9.Optical Specification

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time (By Quick)	Tr+Tf	$\theta = 0^\circ$	-	16	-	ms	Note 5
Contrast ratio	CR	$\theta = 0^\circ$	-	500	-		Note 2,6
Viewing angle	Top	$CR \geq 10$	-	80	-	deg.	Note 2,6,7
	Bottom	$CR \geq 10$	-	80	-		
	Left	$CR \geq 10$	-	80	-		
	Right	$CR \geq 10$	-	80	-		
Color chromaticity (CF only with ITO, light source is C light, CIE 1931)	Wx	$\theta = 0^\circ$		0.301			Note 3
	Wy			0.337			
	Rx			0.621			
	Ry			0.332			
	Gx			0.294			
	Gy			0.577			
	Bx			0.141			
	By			0.157			
NTSC			-	55	-	%	Note 3
Transmittance	Trans		-	6.4	-	%	Note 9

Note 1: Ambient temperature = 25°C.

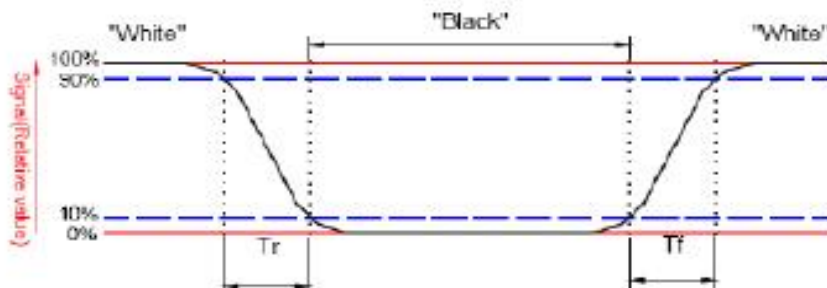
Note 2: To be measured with a viewing cone of 2° by Topcon luminance meter BM-5A.

Note 3: To be measured with Otsuta chromaticity meter LCF-2100M, CF only measure under C light simulation.

Note 4: CTC shipping status is cell without polarizer. Transmittance of Specification is cell with polarizer. The tolerance of Transmittance is $\pm 10\%$.

Note 5: Definition of response time:

The output signals of TRD-100 are measured when the input signals are changed to "White" (falling time) and from "White" to "Black" (rising time), respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.

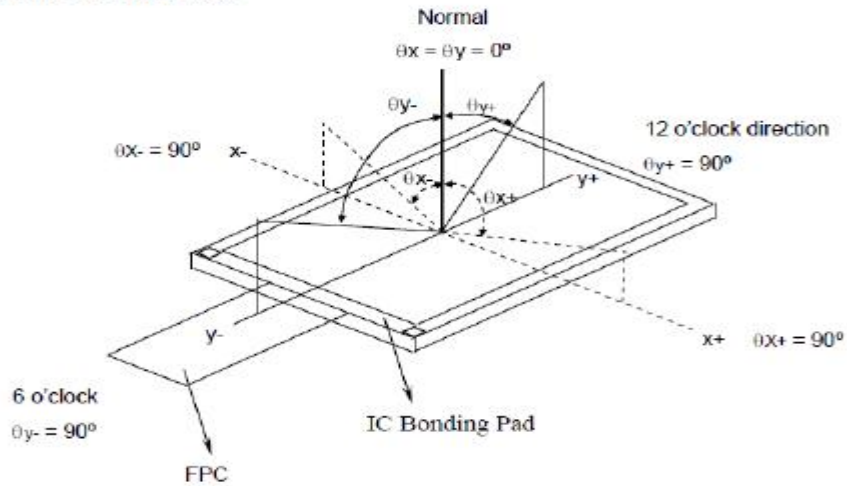


Note 6: Definition of contrast ratio:

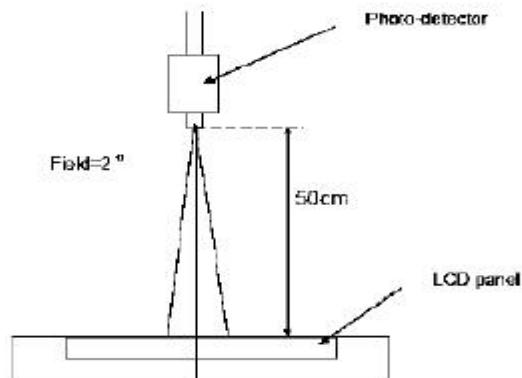
Contrast ratio is calculated by the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

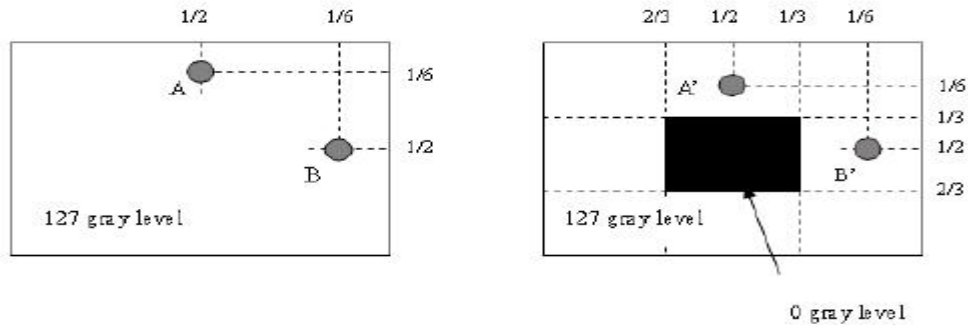
Note 7: Definition of viewing angle



Note 8: Optical characteristic measurement setup.



Note 9:

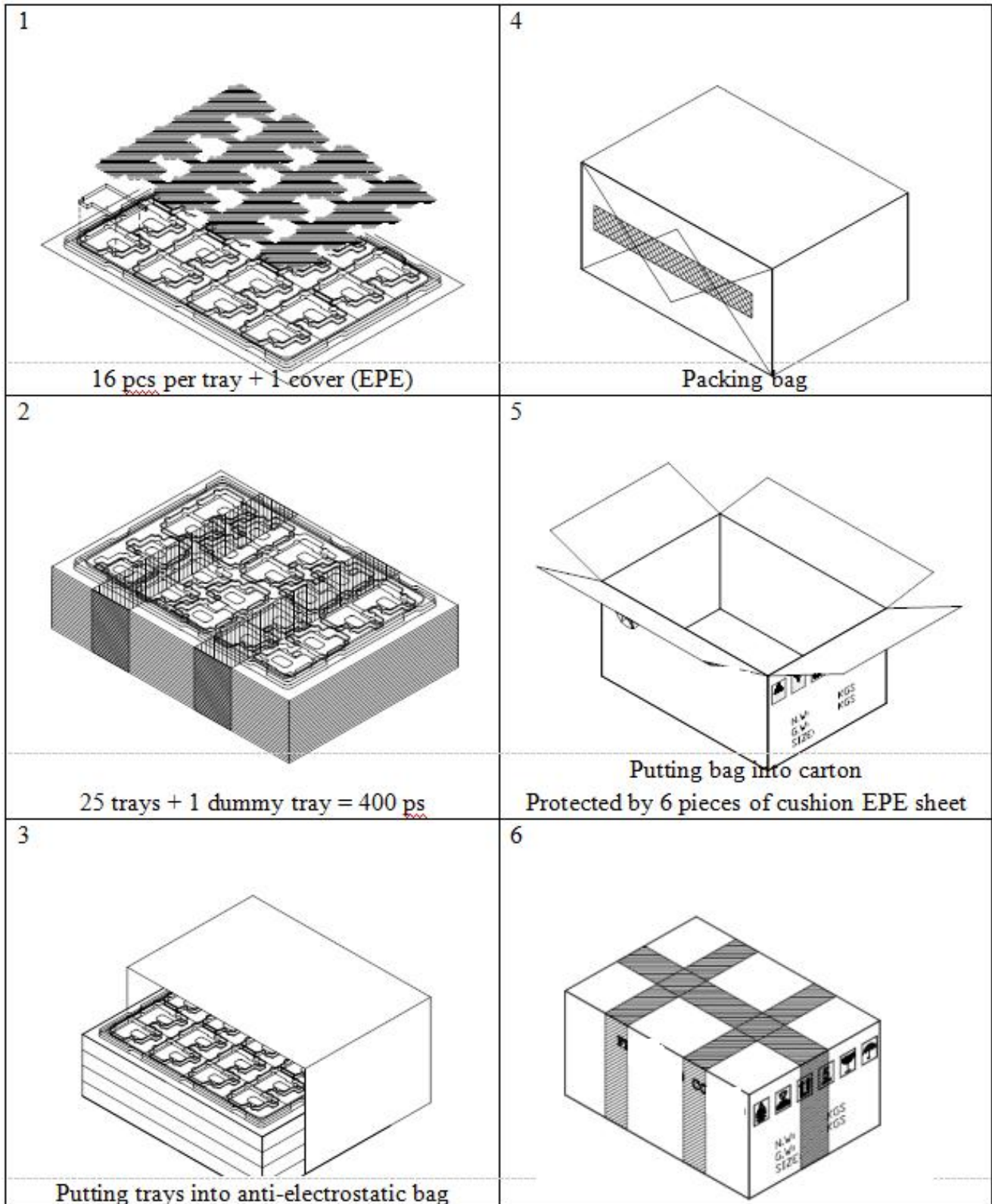


$|LA-LA'| / LA \times 100\% = 2\% \text{ max.}$, LA and LA' are brightness at location A and A'.
 $|LB-LB'| / LB \times 100\% = 2\% \text{ max.}$, LB and LB' are brightness at location B and B'.

10. Reliability Test Items

Item	Test Condition		Criterion
High Temperature Storage	70 °C, 120 hrs		There should be no change which might affect the practical display function when the display quality test is conducted under normal operating condition.
Low Temperature Storage	-20 °C, 120 hrs		
High Temp. & High Humidity Storage	60 °C, 90% RH, 120 hrs		
Vibration Test (Non-operating)	Freq.:10~55~10 Hz, Amp.:1.5mm 1 hr for each direction of X, Y, Z		
Electrostatic Discharge Test (Non-operating)	Terminals	150 pF, 0 Ω, ±300 V, Contact	
	Panel	150 pF, 330 Ω, ±8 KV, Air	
Thermal Shock (Static)	-20°C, 30 min /70°C, 30 min, 20 cycles		
High Temperature Operation	60 °C, 120 hrs		
Low temperature Operation	-10 °C, 120 hrs		
High Temperature & High Humidity (Operating)	50 °C, 90% RH, 120 hrs		
FPC Peeling Strength Test	Pull speed: 50 mm/min, +90°,		> 400gf/cm

11. Package





12. Precautions

Please pay attentions to the followings as using the LCD module.

Handling

- (a) Do not apply strong mechanical stress like drop, shock or any force to LCD module. It may cause improper operation, even damage.
- (b) Because the polarizer is very fragile and easy to be damaged, do not hit, press or rub the display surface with hard materials.
- (c) Do not put heavy or hard material on the display surface, and do not stack LCD modules.
- (d) If the display surface is dirty, please wipe the surface softly with cotton swab or clean cloth.
- (e) Avoid using Ketone type materials (e.g. Acetone), Toluene, Ethyl acid or Methyl chloride to clean the display surface. It might damage the touch panel surface permanently. The recommended solvents are water and Isopropyl alcohol.
- (f) Wipe off water droplets or oil immediately.
- (g) Protect the LCD module from ESD. It will damage the LSI and the electronic circuit.
- (h) Do not touch the output pins directly with bare hands.
- (i) Do not disassemble the LCD module.
- (j) Do not lift the FPC of Touch Panel.

Storage

- (a) Do not leave the LCD modules in high temperature, especially in high humidity for a long time.
- (b) Do not expose the LCD modules to sunlight directly.
- (c) The liquid crystal is deteriorated by ultraviolet. Do not leave it in strong ultraviolet ray for a long time.
- (d) Avoid condensation of water. It may cause improper operation.
- (e) Please stack only up to the number stated on carton box for storage and transportation. Excessive weight will cause deformation and damage of carton box.

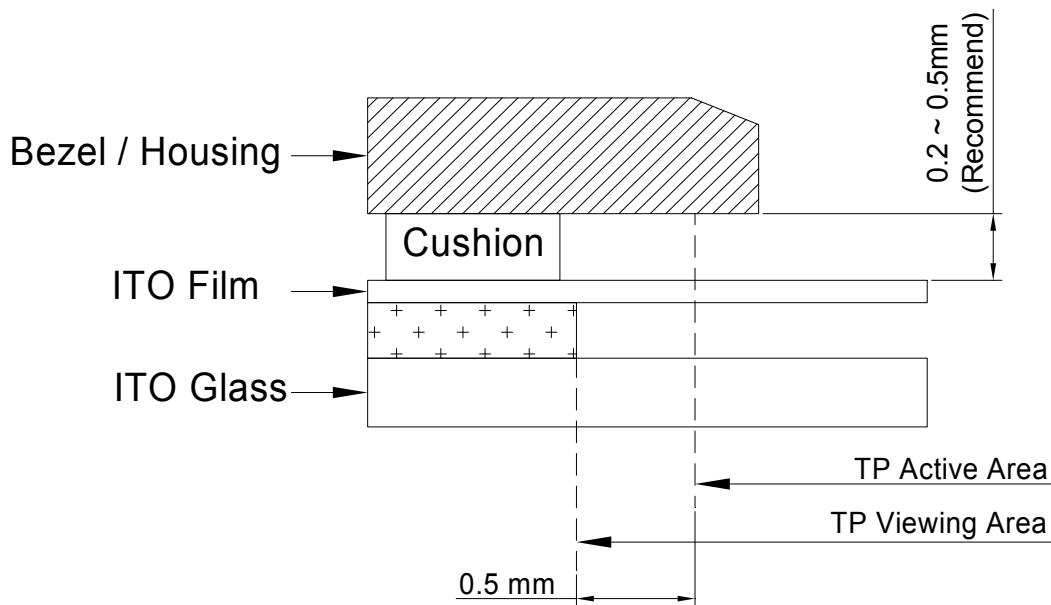


Operation

- (a) When mounting or dismounting the LCD modules, turn the power off.
- (b) Protect the LCD modules from electric shock.
- (c) The Driver IC control algorithms stated above should always be obeyed to avoid damaging the LSI and electronic circuit.
- (d) Be careful to avoid mixing up the polarity of power supply for backlight.
- (e) Absolute maximum rating specified above has to be always kept in any case. Exceeding it may cause non-recoverable damage of electronic components or, nevertheless, burning.
- (f) When a static image is displayed for a long time, remnant image is likely to occur.
- (g) Be sure to avoid bending the FPC to an acute shape, it might break FPC.
- (h) Most of the touch screens have air vent to equalize the inside air pressure to the outside one. The air vent must be open and liquid contact must be avoided as the liquid may be absorbed if the liquid is accumulated near the air vent.
- (i) For the fragility of ITO film, it should avoid to use too tapering pen as the input material.

Touch Panel Mounting Notes

- (a) If a cushion is used between bezel/housing and film must be chosen as free as enough to absorb the expansion and contraction to avoid the distortion of film.
- (b) The cushion must be placed out of the Viewing Area.
- (c) Bezel/Housing edge must be positioned between Key Area and Viewing Area. The edge entering the Key Area may cause unexpected input if the gap is too narrow or foreign particles like dusts exist between Bezel/Housing and ITO film.
- (d) Mounting example:



The corner part has conductivity. Do not touch any metal part after mounting.

Others

- If the liquid crystal leaks from the panel, it should be kept away from the eyes or mouth.
- For the fragility of polarizer, it is recommended to attach a transparent protective plate over the display surface.
- It is recommended to peel off the protection film on the polarizer slowly so that the electrostatic charge can be minimized.

13. Inspection standard

TBD