

TFT LCD Specification

Model Name: TD019THEC1

Part No.: TD019THEC1

Customer Signature
Date

This technical specification is subjected to change without notice.

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Record of Revision

Rev	Issued Date	Description
1.0	May. 27, 2008	New Release
1.1	Jun. 26,2008	Add LED SPEC
1.2	Jul. 21, 2008	Modified power consumption

1. FEATURES

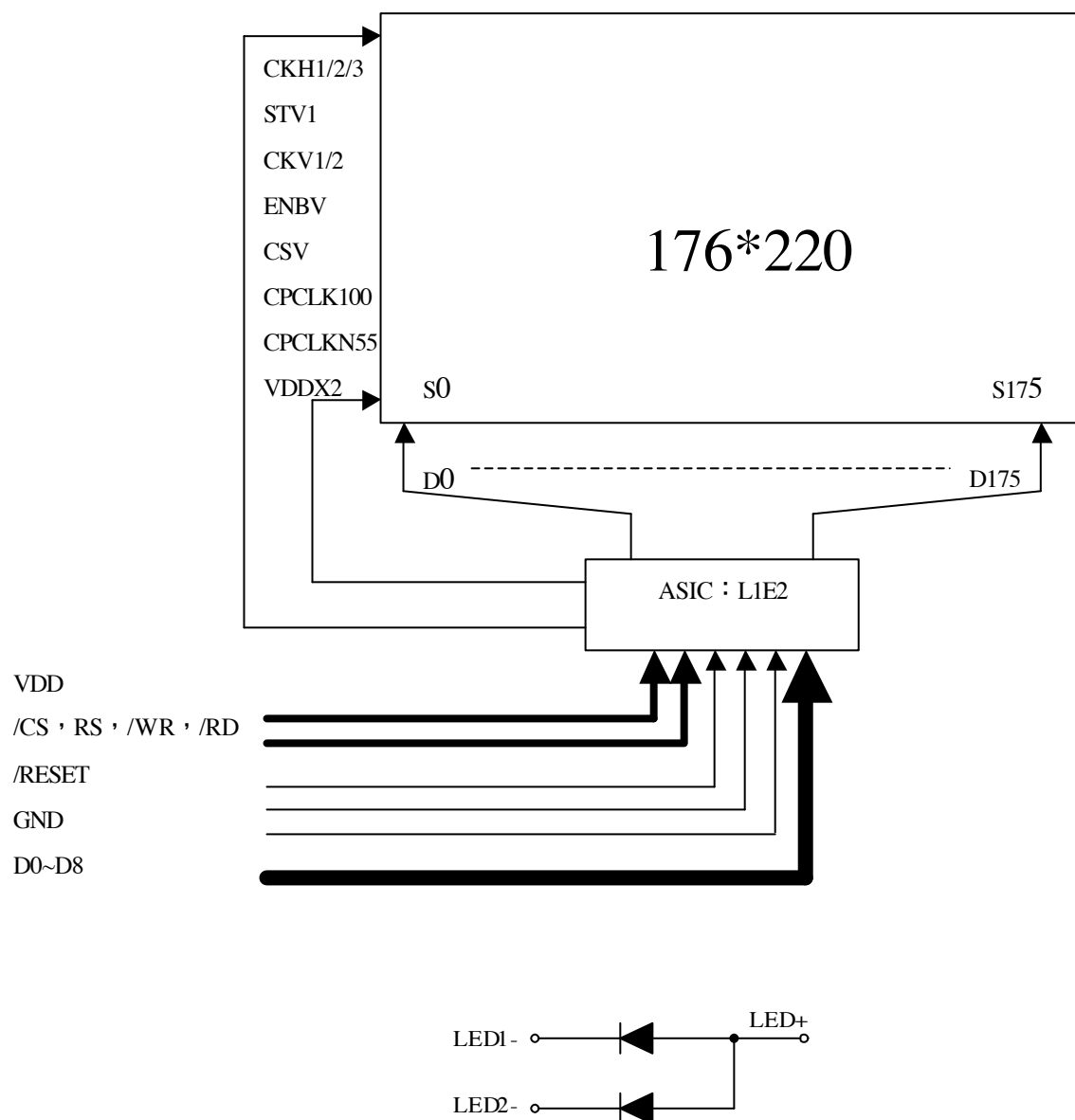
The 1.88" (4.7752 cm) LCD module is an active matrix color TFT LCD module. LTPS (Low Temperature Poly Silicon) TFT technology is used. Vertical and horizontal drivers are built on the panel.

2. GENERAL SPECIFICATIONS

	Item	Description	Unit
1	Display Method	LTPS Active Matrix TFT	
2	Display Type	Transmissive	
3	Display Size (Diagonal)	1.88"	Inch
4	Resolution	176 x RGB x 220	
5	Pixel Pitch (HxV)	0.0565 x 0.1695	mm
6	Display Color	262K	
7	Glass Thickness(mm) Vendor	0.3 mm (NHT)	mm
8	Active Area (HxV)	29.83 x 37.29	mm
9	Viewing Area (HxV)	31.96 x 38.62	mm
10	Module Dimension (HxVxT) *	36.3 x 50 x 2.05 (2D, 3D)	mm
11	Weight	8.3 +/- 0.5	g
12	Interface	9 bits CPU I/F	
13	Pin No	31	
14	Surface treatment	3H Hard coating	
15	Driver IC vendor	NTK NT39160	
16	Connector vendor	JST BM02B-ACHKS-GAN-TF (Receiver connector)	
17	FPC vendor	旗勝	
18	Backlight LED Type vendor	凱鼎 2 pcs	
19	Operating Temperature Range	-20 ~ 70°C	
20	Storage Temperature Range	-30 ~ 80°C	
21	Operating Life	30000	Hr

* Exclude FPCa and protrusions.

3. Block Diagram of Display



4. PIN Connection

Interfaces: CPU mode 8080 (Parallel)		
Connector TYPE: NA		
Pin No	Pin Name	Pin Description
1	VSS	Ground
2	D0	Data 0
3	D1	Data 1
4	D2	Data 2
5	D3	Data 3
6	D4	Data 4
7	D5	Data 5
8	D6	Data 6
9	D7	Data 7
10	D8	Data 8
11	/CS	Chip Select
12	RS	Data/ Command (DC = 0: command; DC = 1: data)
13	/WR	Write Enable
14	/RD	Read control signal
15	TE	Tear effect signal output
16	VSS	Ground
17	LED+	LED Supply Voltage (LED1 & LED2 Anode)
18	LED2-	LED2 Cathode
19	LED1-	LED1 Cathode
20	I_LED_G	Green LED control pin
21	I_LED_O	Amber LED control pin
22	I_LED_B	Blue LED control pin
23	/RESET	Reset
24	VSS	Ground
25	VBAT	RGB LED power
26	VDD	DC/DC Supply Voltage (2.5V~3.6V)
27	VSS	Ground
28	VSS	Ground
29	EARN	Receiver pin
30	EARP	Receiver pin
31	VSS	Ground

5. Absolute Maximum Ratings

VSS=0V

Parameter	Symbol	Rating	Unit
Power supply	VDD	-0.3 to VDDA+0.3	V

6. Typical Operation Conditions

VSS=0V, Ta=25°C

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Power Supply Voltage	VDD	Operating Voltage	2.5	3.0	3.6	V
Logic High level input voltage	VIH		0.8VDDI		VDDI	V
Logic Low level input voltage	VIL		VSS		0.2VDDI	V
Logic High level output voltage	VOH	IOUT= -1mA	0.8VDDI		VDDI	V
Logic Low level output voltage	VOL	IOUT=1mA	VSS		0.2VDDI	V
Logic High level input current	IIH	Except D[7..0]			10	A
	IIHD	D[7..0]			10	uA
Logic Low level input current	IIL	Except D[7..0]	-10			uA
	IILD	D[7..0]	-10			uA

7. Power Consumption

Normal mode:

Full Screen 176x220 262K colors at 70Hz frame frequency

Input Voltage (VDD=2.8 V, VDDI=1.8/2.8 V)

Display Pattern: Color Bar

Operating Temp.: 25°C



Partial mode:

Partial Screen 176x32 8 colors at 70Hz frame frequency

Input Voltage (VDD=2.8 V, VDDI=1.8/2.8 V)

Display Pattern: Partial 8 Color Bar

Operating Temp.: 25°C



Standby mode:

Display Off ; Oscillator off; internal regulator

Item	Characteristics	Symbol	Min	Typical	Max	Unit
1	Power consumption in Normal Mode	P _{Normal}	--	5.35	6.89	mW
2	VDD Current consumption in Normal Mode	I _{VDD-Normal}	--	1.91	2.46	mA
3	Power consumption in Partial Mode	P _{Partial}	--	1.29	1.6	mW
4	VDD Current consumption in Normal Mode	I _{VDD-Partial}	--	0.46	0.55	mA
5	Power consumption in Standby Mode	P _{STBY}	--	--	90	uW
6	VDD Current consumption in Standby Mode	I _{VDD-STDBY}	--	--	30	uA

8. Backlight driving condition

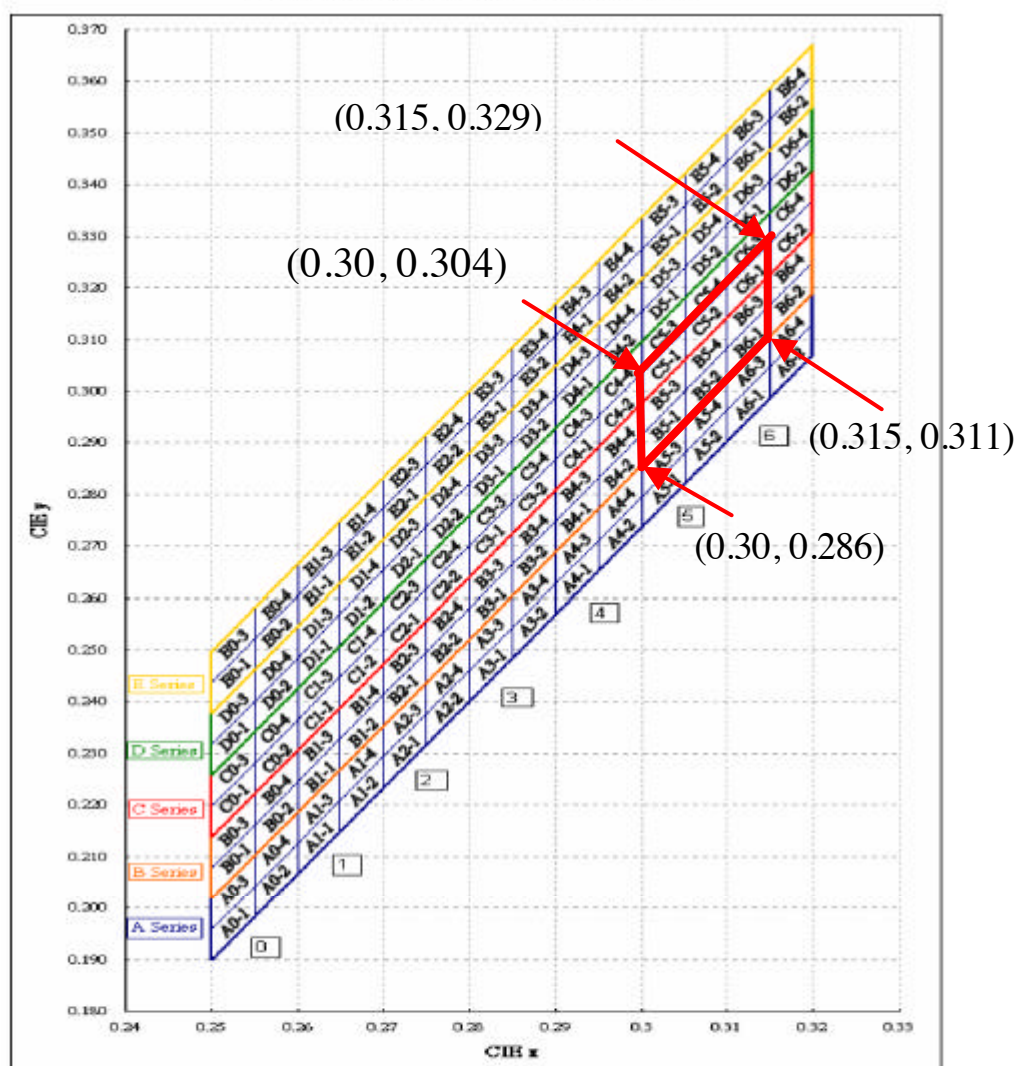
Ta=25°C

Parameter	Symbol	Min	Typical	Max	Unit	Remark
LED Voltage	V _L	3.0	3.2	3.3	V	
LED Current (V _L =3.3V)	I _L		20		mA	Tolerance with +/-5%
Power Consumption	W _L	--	128	--	mW	2 LEDs

8.1 LED SPEC (For LCM Module use only)

LED Part Name	SPEC
Light House-LT-15056C1 WD-CA1-0A	Luminous: Rank V2 (1520-1600 mcd) at 20 mA/ Ta= 25°C. Rank V3(1600~1690 mcd) at 20 mA/ Ta= 25°C. Color Ranks: C5-1, C5-2, C6-1, B5-3, B5-4, B6-3, B5-1, B5-2, B6-1 rank at 20 mA/ Ta= 25°C Volt Rank(Vf) : 3.0V~3.1V 、 3.1V~3.2V 、 3.2V~3.3V 、 3.3V~3.4V 、 3.4V~3.5V 、 3.5V~3.6V at 20 mA/ Ta= 25°C,
AOT-0603GS31A-Z0-N-3 LED_GREEN	Wavelength :520~530 Brightness:60~110mcd
AOT-0603BL31A-N0-N-3 SMT Blue Color LED_Blue	Wavelength :465~475 Brightness:9~23mcd
AOT-0603AM31A-N0-N-3 SMD LED:Amber color	Wavelength :600~610 Brightness:24~60mcd

Chromaticity Diagram



Color Coordinates Measurement allowance is ± 0.01 .

WDCS-1		WDCS-2		WDCS-3	
X	Y	X	Y	X	Y
0.31	0.305	0.305	0.304	0.31	0.314
0.31	0.304	0.305	0.312	0.31	0.320
0.305	0.312	0.31	0.300	0.305	0.320
0.305	0.306	0.31	0.314	0.315	0.322

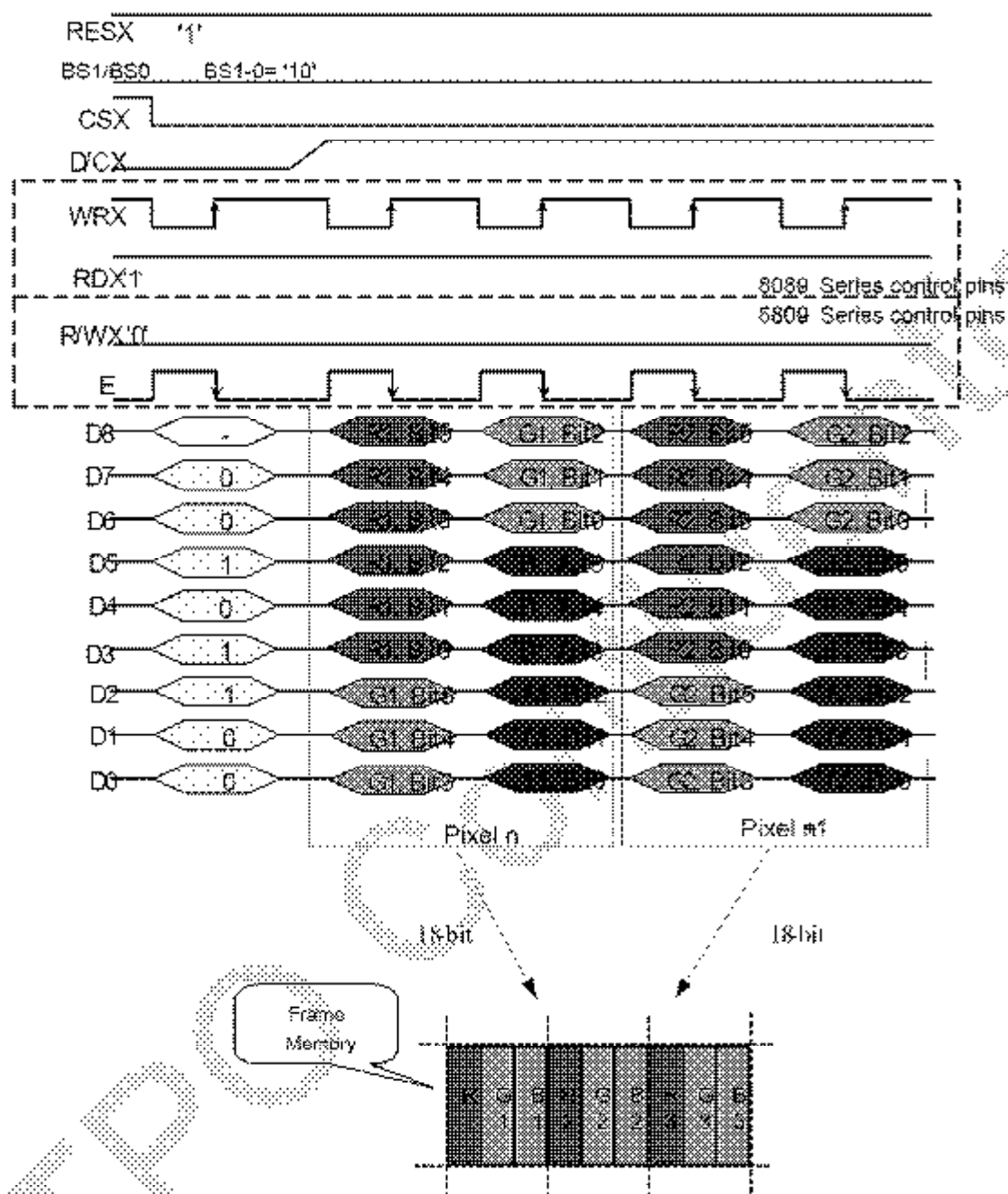
WDCS-1		WDCS-2		WDCS-3	
X	Y	X	Y	X	Y
0.31	0.304	0.305	0.312	0.31	0.320
0.31	0.305	0.305	0.318	0.31	0.326
0.305	0.315	0.31	0.300	0.315	0.325
0.305	0.312	0.31	0.310	0.315	0.320

WDCS-1		WDCS-2		WDCS-3	
X	Y	X	Y	X	Y
0.31	0.304	0.305	0.312	0.31	0.320
0.31	0.305	0.305	0.318	0.31	0.326
0.305	0.315	0.31	0.300	0.315	0.325
0.305	0.312	0.31	0.310	0.315	0.320

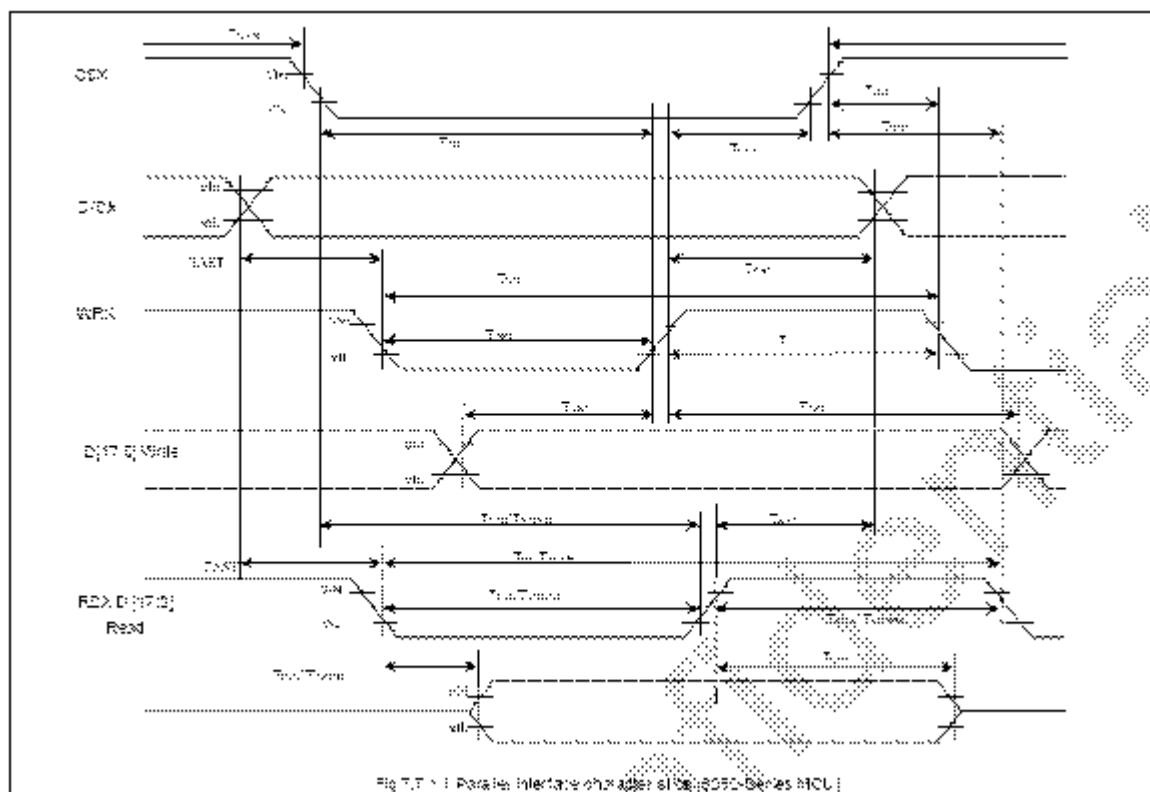
9. AC Timing Characteristics

Write 9-bit data for RGB 6-6-6-bits input (262k-color)_

There are 2 pixels (6 sub-pixels) per 4-transfer, 18-bits/pixel. 3AH="06h"

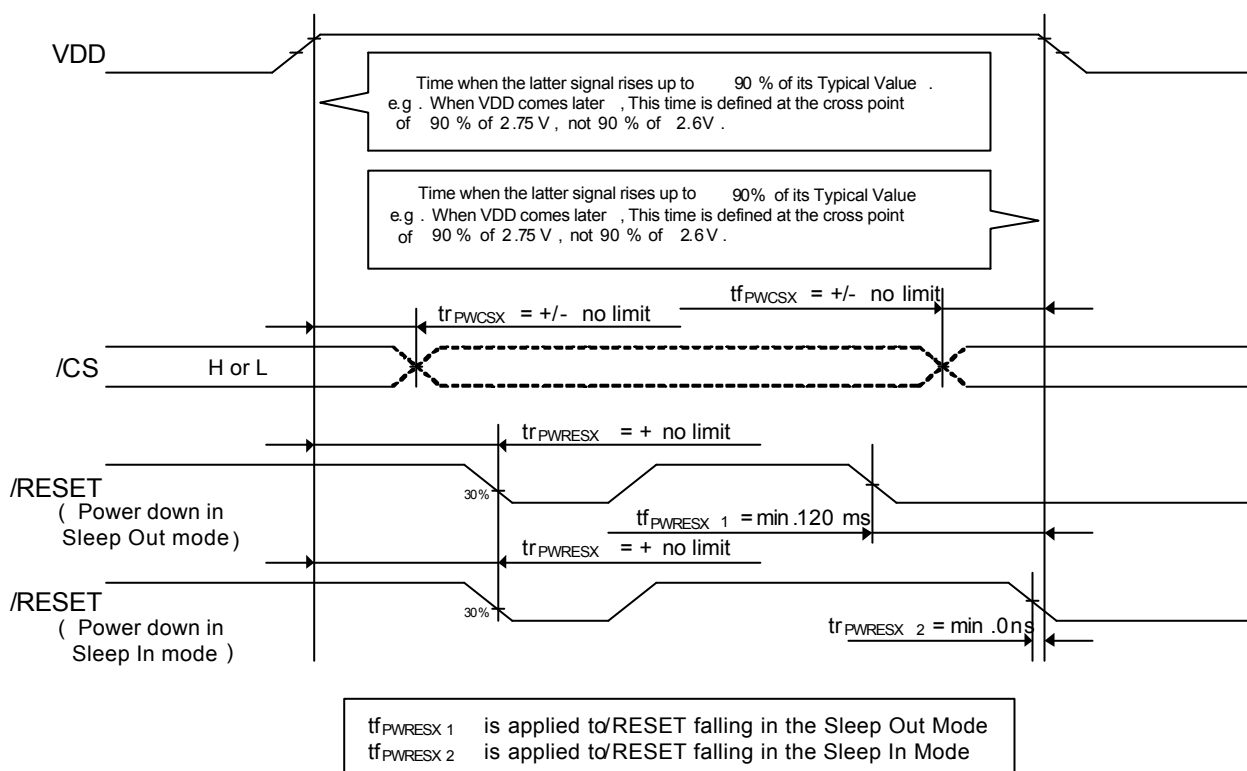
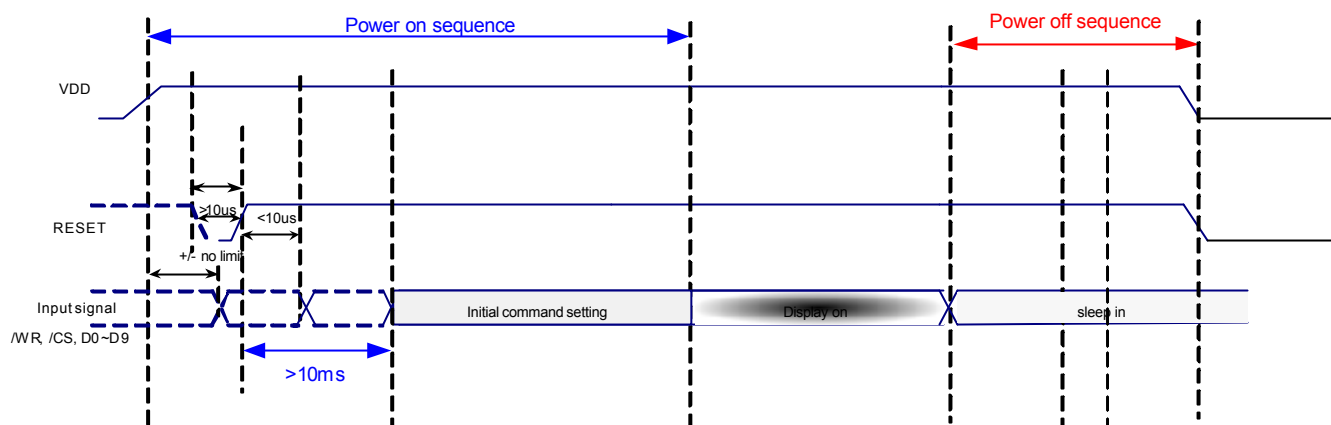


CPU Interface 8080 Mode

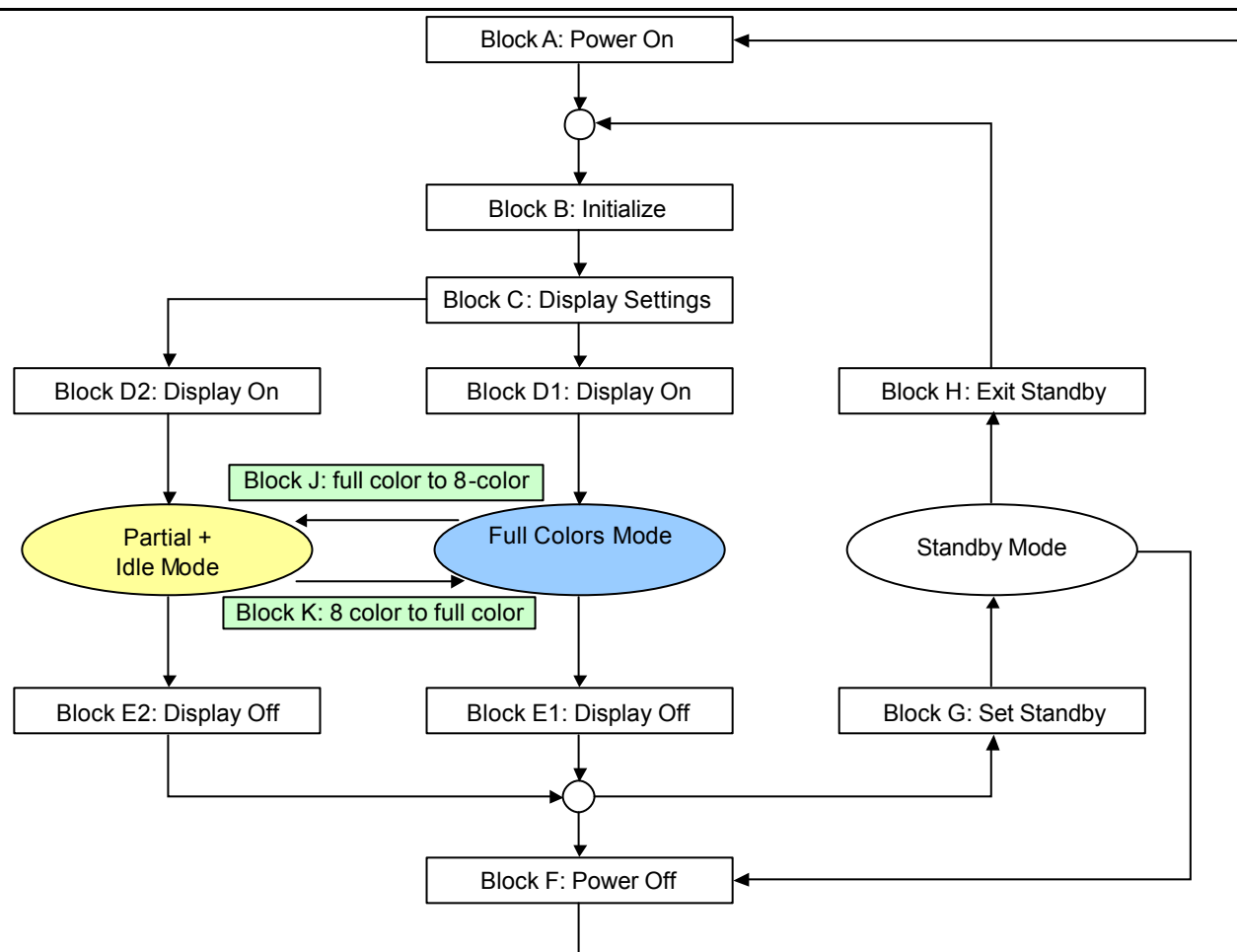


Signal	Symbol	Parameter	MIN	MAX	Unit	Description
D/CX	tAST	Address setup time	10		ns	
	tAHT	Address hold time (Write/Read)	10		ns	
CSX	tCHW	Chip select "H" pulse width	0		ns	
	tCS	Chip select setup time (Write)	35		ns	
	tRCS	Chip select setup time (Read ID)	45		ns	
	tRCSFM	Chip select setup time (Read FM)	355		ns	
	tCSF	Chip select wait time (Write/Read)	10		ns	
	tCSH	Chip select hold time	10		ns	
WRX	tWC	Write cycle	80		ns	
	tWRH	Control pulse "H" duration	35		ns	
	tWRL	Control pulse "L" duration	35		ns	
RDX (ID)	tRC	Read cycle (ID)	160		ns	When read ID data
	tRDH	Control pulse "H" duration (ID)	90		ns	
	tRDL	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	tRCFM	Read cycle (FM)	450		ns	When read from frame memory
	tRDHFM	Control pulse "H" duration (FM)	90		ns	
	tRDLFM	Control pulse "L" duration (FM)	355		ns	
D[17:0]	tDST	Data setup time	10		ns	For maximum CL=30pF For minimum CL=8pF
	tDHT	Data hold time	10		ns	
	tRAT	Read access time (ID)		40	ns	
	tRATFM	Read access time (FM)		340	ns	
	tODH	Output disable time	20	80	ns	

10. Display Power on/down Sequence



Note : Unless otherwise specified , timings herein show cross point at 50 % of signal/power level



L1E2-01 Software Flow

Power on Sequence:

Block A: Power On

Step	Register	Setting	Operation
1	HW reset		
2	Delay 120ms		
3	11h	-	Sleep out
4	CEh	0x0F 0x01	Close the VDC voltage for Panel control power
5	Delay 120ms		
6	Initialize		

Block B: Initialize setting

Step	Register	Parameter Setting		Operation
3	AAh			GAMMA Separate off
4	0xC0	1 st	0x04	GAMMA reference voltage setting
5	0xE6	1 st	0x01	GAMMA setting enable
6	0xE2	1 st	0x1B	GAMMA 2.4 Positive setting
		2 nd	0x17	
		3 rd	0x0A	
		4 th	0x0B	
		5 th	0x07	
		6 th	0x09	
		7 th	0x09	
		8 th	0x0D	
		9 th	0x09	
		10 th	0x06	
		11 th	0x00	
		12 th	0x00	
		13 th	0x03	
		14 th	0x02	
		15 th	0x0C	
		16 th	0x2B	
		17 th	0x38	
7	0xE3	1 st	0x18	GAMMA 2.4 Negative setting
		2 nd	0x13	
		3 rd	0x14	
		4 th	0x18	
		5 th	0x15	
		6 th	0x16	
		7 th	0x12	
		8 th	0x0D	
		9 th	0x05	
		10 th	0x1A	
		11 th	0x23	
		12 th	0x1F	
		13 th	0x2B	
		14 th	0x28	

		15 th	0x20	
		16 th	0x43	
		17 th	0x0C	
8	35h	0X00 or 0X01		TE mode 1,2 select (optional)

Block C: Display Settings (176X220)

Step	Register	Setting	Operation
1	13h	-	Normal display on
2	2Ah	MV=0(0x00~0XAF) MV=1(0x00~0XDB)	Column address set (Parameter range: 0<XS[15:0]< XE[15:0]<175) , MV=" 0" (Parameter range: 0<XS[15:0]< XE[15:0]<219) , MV=" 1"
4	2Bh	MV=0(0x00~0XDB) MV=1 (0x00~0XAF)	Row address set (Parameter range: 0<YS[15:0]< YE[15:0]<219) , MV=" 0" (Parameter range: 0<YS[15:0]< YE[15:0]<175) , MV=" 1"
5	30h	0x00~0XDB	Partial area (PSL, PEL)
6	33h	TFA: 0x00~0XDC VSA: 0x00~0XDC BFA: 0x00~0XDC	Scroll area (TFA+VSA+BFA=220)
7	37h	0x00~0XDB	Vertical scroll start address of RAM
8	3Ah	0x55	Interface pixel format (base application)

Block D1: Display On

Step	Register	Setting	Operation
1	29h	-	Display on
2	Full Color Mode Display On		

Block D2: Set Idle and partial mode

Step	Register	Setting	Operation
1	39h	-	Idle mode on
2	12h	-	Partial mode on
3	29h	-	Display on
4	8 Color Mode Display On (Idle Mode)		

Block E1,E2: Display Off

Step	Register	Setting	Operation
1	28h	-	Display off
	Display off mode		

Block G: Set Standby

Step	Register	Setting	Operation
1	10h	-	Sleep in
	Standby mode		

Block H: Exit Standby

Step	Register	Setting	Operation
1	11h	-	Sleep out
2	Delay 120ms		
	Normal mode		

Block J: Full color to 8-color mode

Step	Register	Setting	Operation
1	12h	-	Partial mode on
2	39h	-	Idle mode on
	Partial + 8 Color Mode (Idle Mode)		

Block K: 8-colors to Full color mode

Step	Register	Setting	Operation
1	38h	-	Idle mode off
2	13h	-	Normal display on
	Full Color Mode		

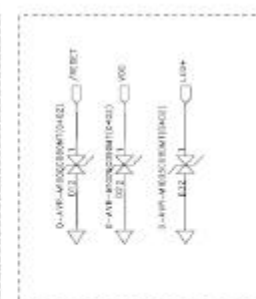
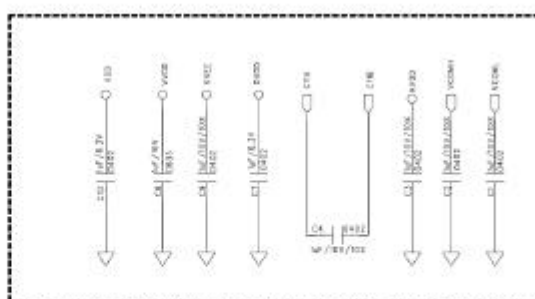
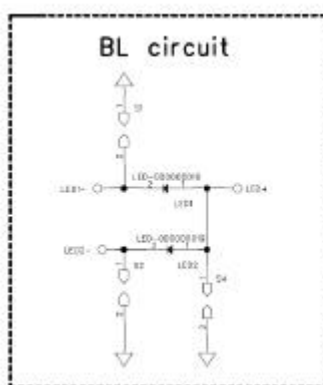
Power down Sequence:**Block F: Power Off**

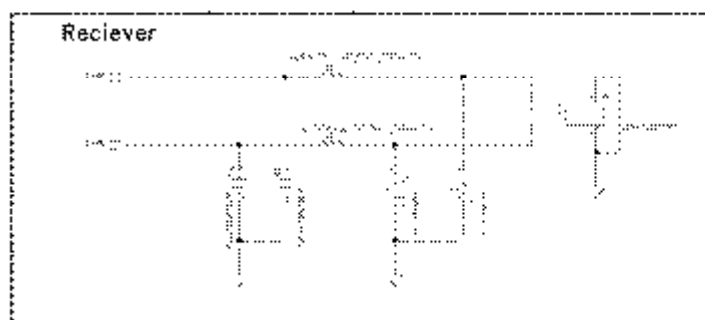
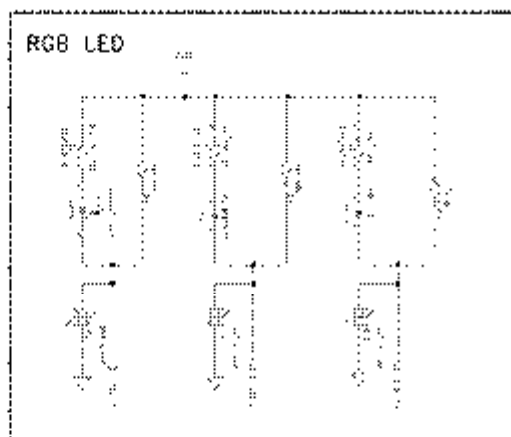
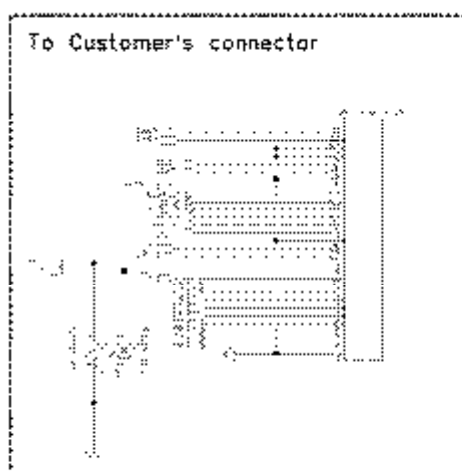
Step	Register	Setting	Operation
1	10h	-	Sleep in
2	Delay (120msec)		
3	RES = L		
4	VDD OFF		
5	VDDI OFF		

11. FPC

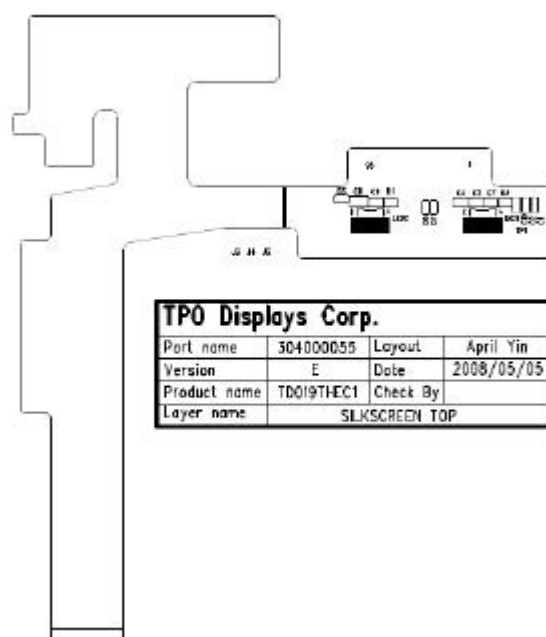
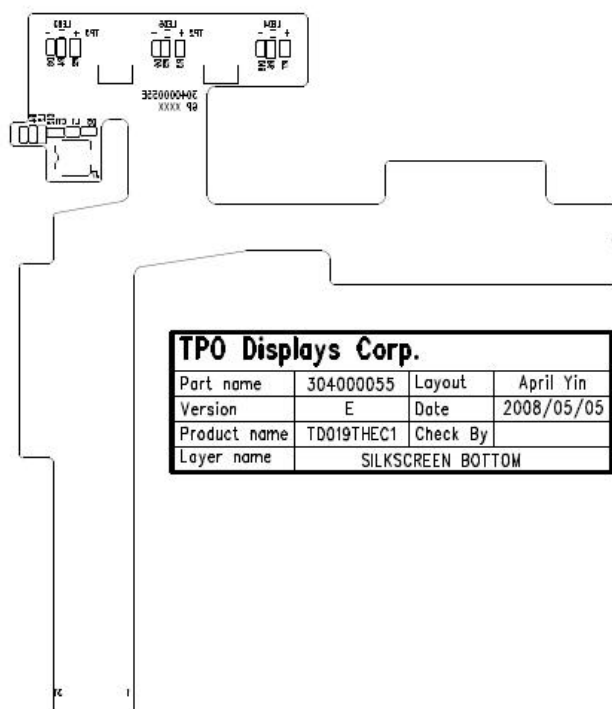
a. BOM

TPD Opnordentia Corp.									
Item	Part Name	Ref Name	Qty	Unit	Material	Spec	Unit	Unit	Unit
1	C-01EXAAA	C7 C10	2	0402	14F	±10% 6.3V	0206		
2	C-01EXABA	C14 C9	5	0402	14F	±10% 11V	0206		
3	C-01TAAE	C11-12	2	0402	15AF	±10% 94V	0206		
4	C-01EXCCA	C8	0402	14F	±10% 11V	0206			
5	LED-00000009	LED1-2	2	0402	1008C3	±10% 10V	0206		
6	B-010EAE	B4-6	3	0402	1008C3	±10% 10V	0206		
7	B-0015AE	B3	1	402	200Q	±10%	0206		
8	B-010TAC	B2	1	0402	100Q	±10%	0206		
9	B-0010AE	B7	1	0402	10Q	±10%	0206		
10	VAS-00000	D3	1	0402			0206		
11	VAS-00000	D4-18	7	0402			0206		
12	LED-00000	LED3	1	0402			0206		
13	LED-00000	LED4	1	0402			0206		
14	LED-00000	LED5	1	0402			0206		
15	LED-00000	LED6	1	0402			0206		
16	LED-00000	LED7	1	0402			0206		
17	LED-00000	LED8	1	0402			0206		
18	LED-00000	LED9	1	0402			0206		
19	LED-00000	LED10	1	0402			0206		
20	LED-00000	LED11	1	0402			0206		
21	LED-00000	LED12	1	0402			0206		
22	LED-00000	LED13	1	0402			0206		
23	LED-00000	LED14	1	0402			0206		
24	LED-00000	LED15	1	0402			0206		
25	LED-00000	LED16	1	0402			0206		
26	LED-00000	LED17	1	0402			0206		
27	LED-00000	LED18	1	0402			0206		
28	LED-00000	LED19	1	0402			0206		
29	LED-00000	LED20	1	0402			0206		
30	LED-00000	LED21	1	0402			0206		
31	LED-00000	LED22	1	0402			0206		
32	LED-00000	LED23	1	0402			0206		
33	LED-00000	LED24	1	0402			0206		
34	LED-00000	LED25	1	0402			0206		
35	LED-00000	LED26	1	0402			0206		
36	LED-00000	LED27	1	0402			0206		
37	LED-00000	LED28	1	0402			0206		
38	LED-00000	LED29	1	0402			0206		
39	LED-00000	LED30	1	0402			0206		
40	LED-00000	LED31	1	0402			0206		
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44	LED-00000	LED35	1	0402			0206		
45	LED-00000	LED36	1	0402			0206		
46	LED-00000	LED37	1	0402			0206		
47	LED-00000	LED38	1	0402			0206		
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50	LED-00000	LED41	1	0402			0206		
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59	LED-00000	LED50	1	0402			0206		
60	LED-00000	LED51	1	0402			0206		
61	LED-00000	LED52	1	0402			0206		
62	LED-00000	LED53	1	0402			0206		
63	LED-00000	LED54	1	0402			0206		
64	LED-00000	LED55	1	0402			0206		
65	LED-00000	LED56	1	0402			0206		
66	LED-00000	LED57	1	0402			0206		
67	LED-00000	LED58	1	0402			0206		
68	LED-00000	LED59	1	0402			0206		
69	LED-00000	LED60	1	0402			0206		
70	LED-00000	LED61	1	0402			0206		
71	LED-00000	LED62	1	0402			0206		
72	LED-00000	LED63	1	0402			0206		
73	LED-00000	LED64	1	0402			0206		
74	LED-00000	LED65	1	0402			0206		
75	LED-00000	LED66	1	0402			0206		
76	LED-00000	LED67	1	0402			0206		
77	LED-00000	LED68	1	0402			0206		
78	LED-00000	LED69	1	0402			0206		
79	LED-00000	LED70	1	0402			0206		
80	LED-00000	LED71	1	0402			0206		
81	LED-00000	LED72	1	0402			0206		
82	LED-00000	LED73	1	0402			0206		
83	LED-00000	LED74	1	0402			0206		
84	LED-00000	LED75	1	0402			0206		
85	LED-00000	LED76	1	0402			0206		
86	LED-00000	LED77	1	0402			0206		
87	LED-00000	LED78	1	0402			0206		
88	LED-00000	LED79	1	0402			0206		
89	LED-00000	LED80	1	0402			0206		
90	LED-00000	LED81	1	0402			0206		
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93	LED-00000	LED84	1	0402			0206		
94	LED-00000	LED85	1	0402			0206		
95	LED-00000	LED86	1	0402			0206		
96	LED-00000	LED87	1	0402			0206		
97	LED-00000	LED88	1	0402			0206		
98	LED-00000	LED89	1	0402			0206		
99	LED-00000	LED90	1	0402			0206		
100	LED-00000	LED91	1	0402			0206		

[illegible]



c. Components Location



12. ESD test

Test Item			SPEC	Note
Module	Power On	HBM R=1.5k ohm ,C=100pF	+/- 5.0kV	VDD, VDDI ,Reset
ASIC		HBM (R=1.5k ohm ,C=100pF)	\cong +/-2.5kV	Refer to ESD report of ASIC Vendor
		MM (R=0k ohm ,C=200pF)	\cong +/-200V	
		Latch Up	\cong 200mA	

13. OPTICAL CHARACTERISTICS

13.1 Optical Specification (Back Light On, LED current = 20mA)

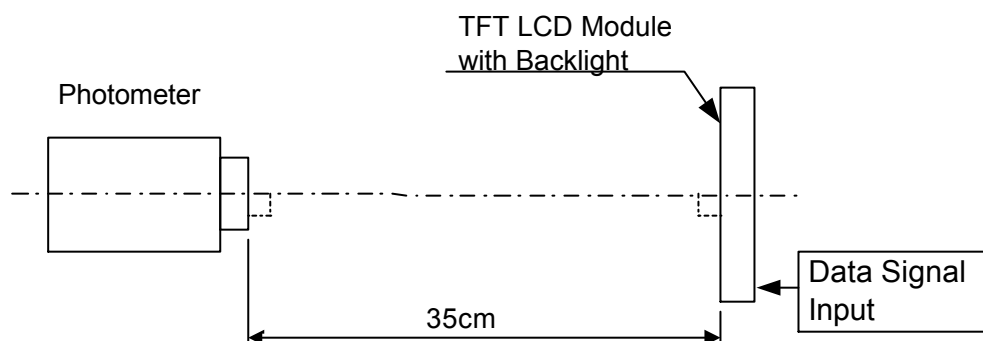
Ta=25°C

Test Item					SPEC		
					Min	Typ	Max
1	CR				200	350	---
2	CR	High T(60deg)			220	380	---
		Low T(-20deg)			140	250	---
3	Viewing Angle (Iso-CR plot)	Theta=45, phi = 0			15	25	---
		Theta=45, phi = 90			5	10	---
		Theta=45, phi = 180			0.5	2	---
		Theta=45, phi = 270			5	10	---
4	Viewing Direction	CR>10, phi = 0			40	50	---
		CR>10, phi = 90			35	45	---
		CR>10, phi = 180			10	20	---
		CR>10, phi = 270			35	45	---
5	Brightness				220	260	---
6	Brightness uniformity (%)				80	---	---
7	Flicker (dB)				---	---	-30
8	Cross talk (%)				---	---	6
9	Gamma-12GS (plot)				---	2.2	---
10	Color Chromaticity (defined by DMS-900 spectrum meter)	White	x	0.266	0.316	0.366	
			y	0.289	0.339	0.389	
		Red	x	0.582	0.632	0.682	
			y	0.296	0.346	0.396	
		Green	x	0.253	0.303	0.353	
			y	0.546	0.596	0.646	
		Blue	x	0.086	0.136	0.186	
			y	0.045	0.095	0.145	
11	NTSC				55	65	---
12	Response Time (ms)				---	35	45
13	Response Time (ms)	High T(60deg)			---	20	---
		Low T(-20deg)			---	400	---
14	MSA (Gauge R&R)	Luminance			---	30%	---

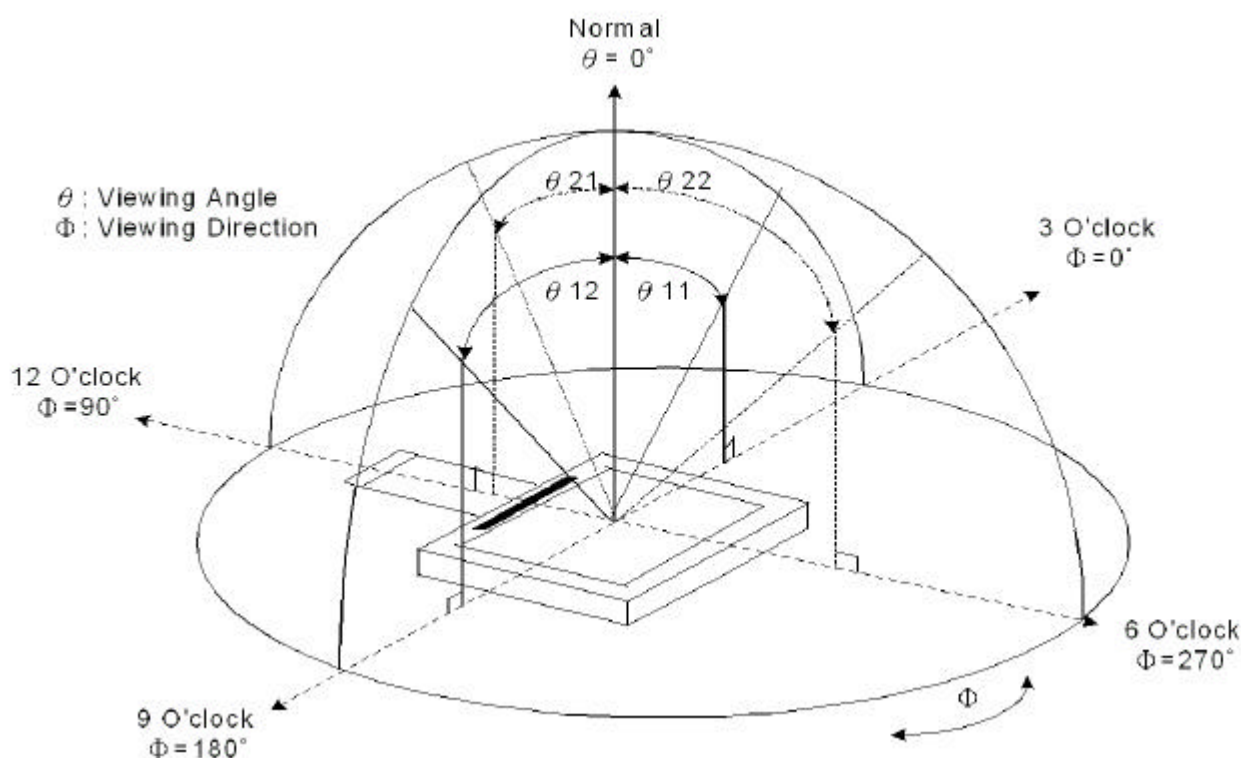
		CR	---	---	---
		Uniformity	---	---	---
		Flicker	---	---	---
15	Cpk (Luminance, CR , Uniformity, Flicker)		>1.33		
16	Polarizing Angle (absorption axis)		UP = 135 deg/Down =45 deg		
17	BEF Angle		45 deg.		

13.2 Basic Measure Condition

- (1) Ambient Temperature: $T_a=25^{\circ}\text{C}$
- (2) Testing Point: Measure in the display center point and the test angle $T=0^{\circ}$
- (3) Measuring System
 - a. Measure System A



13.2.1: Viewing angle diagram:

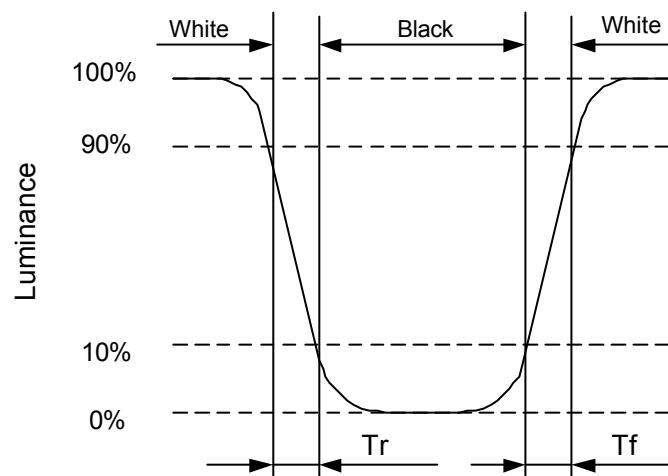


13.2.2: Contrast Ratio as Backlight On: (Measure System A)

Contrast ratio is measured in optimum common electrode voltage. The signal amplitude

$$CR = \frac{\text{Luminance with white image}}{\text{Luminance with black image}}$$

13.2.3: Definition of response time: (Measure System A)



13.2.4: Luminance: (Measure System A)

Test Point: Display Center

LED Current $I_F = 20 \text{ mA}$

13.2.5: Chromaticity: The same test condition as 13.2.4

13.2.6: Contrast Ratio as Backlight Off (Measure System A)

Contrast ratio is measured in optimum common electrode voltage. The signal amplitude

$$CR = \frac{\text{Luminance with white image}}{\text{Luminance with black image}}$$

13.2.7: White chromaticity as back light off (Measure System A)

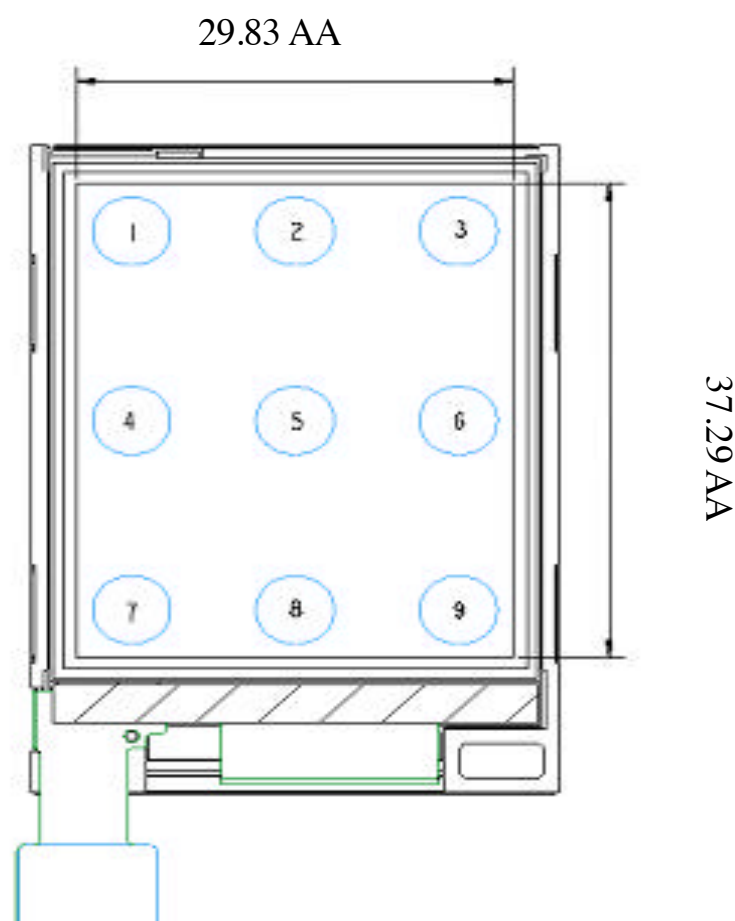
13.2.8: Reflectance (Measure System A)

$$\text{Reflection ratio}(R) = \frac{\text{Light detected level of reflection by the LCD module}}{\text{Light detected level of reflection by the standard white}}$$

13.2.9: Definition of uniformity: Light on backlight 5 minutes before test.

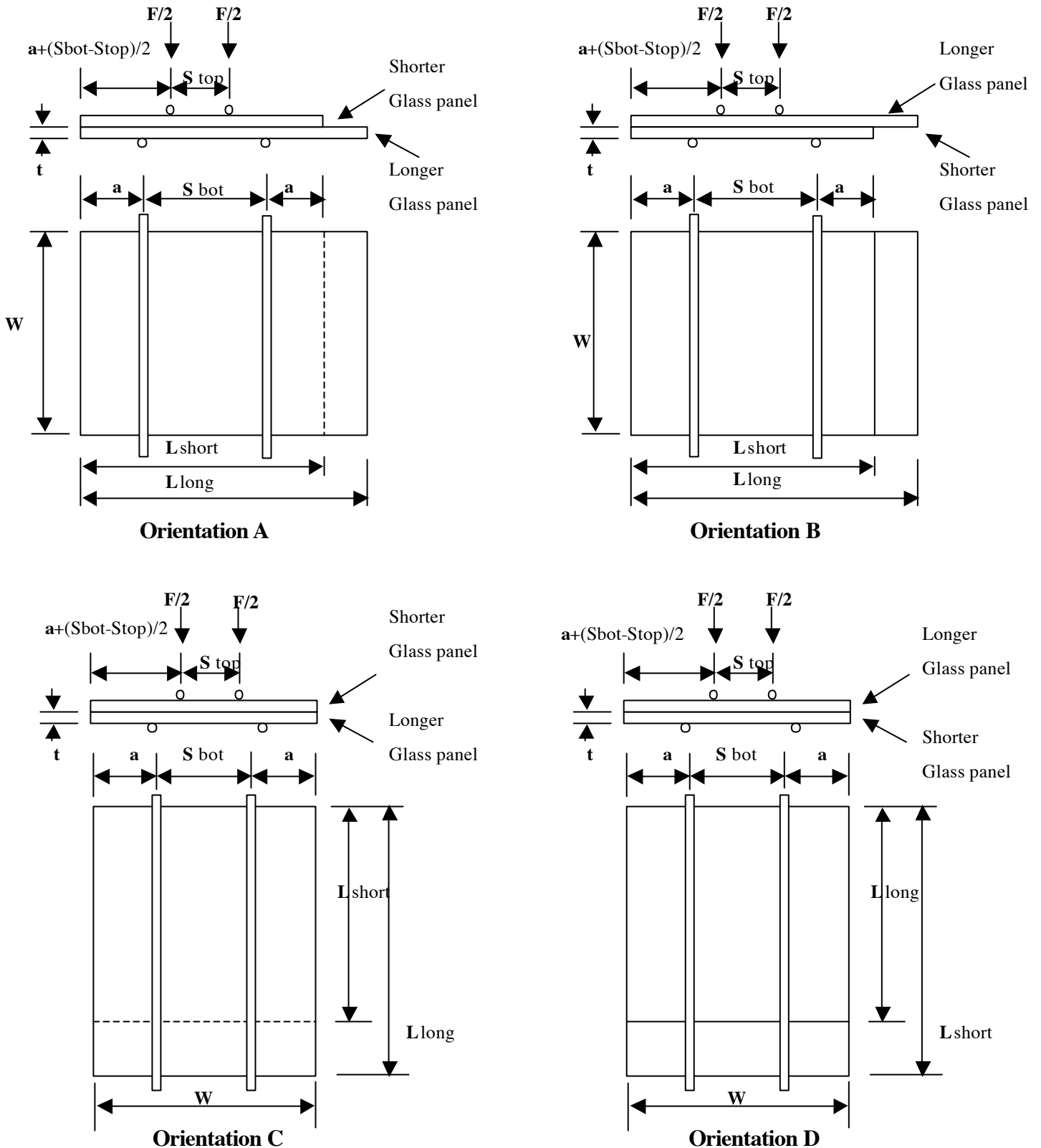
$$\text{Uniformity (Lu)} = \frac{\text{Minimum}}{\text{Maximum}}$$

The definition of 3 columns X 3 rows test points:



14. GLASS QUALITY REQUIREMENT

14.1 The LCD glass strength (failure load) will be defined at a single 90% survival rate value. The B10 strain shall be meet 0.15% on both orientation A & orientation B. LCD glass strength test setup as below attached drawing.



14.2 The Anisotropic Conductive Film (ACF) joint between glass and flex must have minimum of 1 lb/in peel strength.

15. RELIABILITY

No	Test Item	Condition
1	High Temperature Operation	Ta = +70°C, 240hrs
2	High Temperature & High Humidity Operation	Ta = +60°C, 90% RH, 88hrs
3	Low Temperature Operation	Ta = -30°C, 240hrs
4	High Temperature Storage (non-operation)	Ta = +85°C, 240hrs
5	Low Temperature Storage (non-operation)	Ta = -40°C, 240hrs
6	Heat Shock (non-operation)	-40°C \leftarrow \rightarrow 85°C, 27cycles (30min / 30min)
7	Electrostatic Discharge (Machine mode; non-operation)	\pm 250V, C=200pF, R=0 Ω ; Once for each terminal
8	Electrostatic Discharge (Human body mode; non-operation)	\pm 2.5KV, C=100pF, R=1.5K Ω ; Once for each terminal
9	Electrostatic Discharge (Operation)	HBM \pm 5kV, (VCC, VCI, Reset) C=100pF, R=1.5K Ω ;
10	Shock Test (Package state)	Height: 80cm 1 Corner, 3edges, 6 surfaces (Once for each direction)

Note: Ta: Ambient Temperature

16. HANDLING CAUTIONS

A. ESD (Electrical Static Discharge) Strategy

ESD will cause serious damage of the panel, ESD strategy is very important in handling.

Following items are the recommended ESD strategy

- i. In handling LCD panel, please wear non-charged material gloves. Connect the wrist conduction ring to the earth and the conducting shoes to the earth are necessary.
- ii. The machine and working table for the panel should have ESD protection strategy.
- iii. In handling the panel, using ionized air to decrease the charge in the environment is necessary.
- iv. In the process of assembly the module, shield case should connect to the ground.

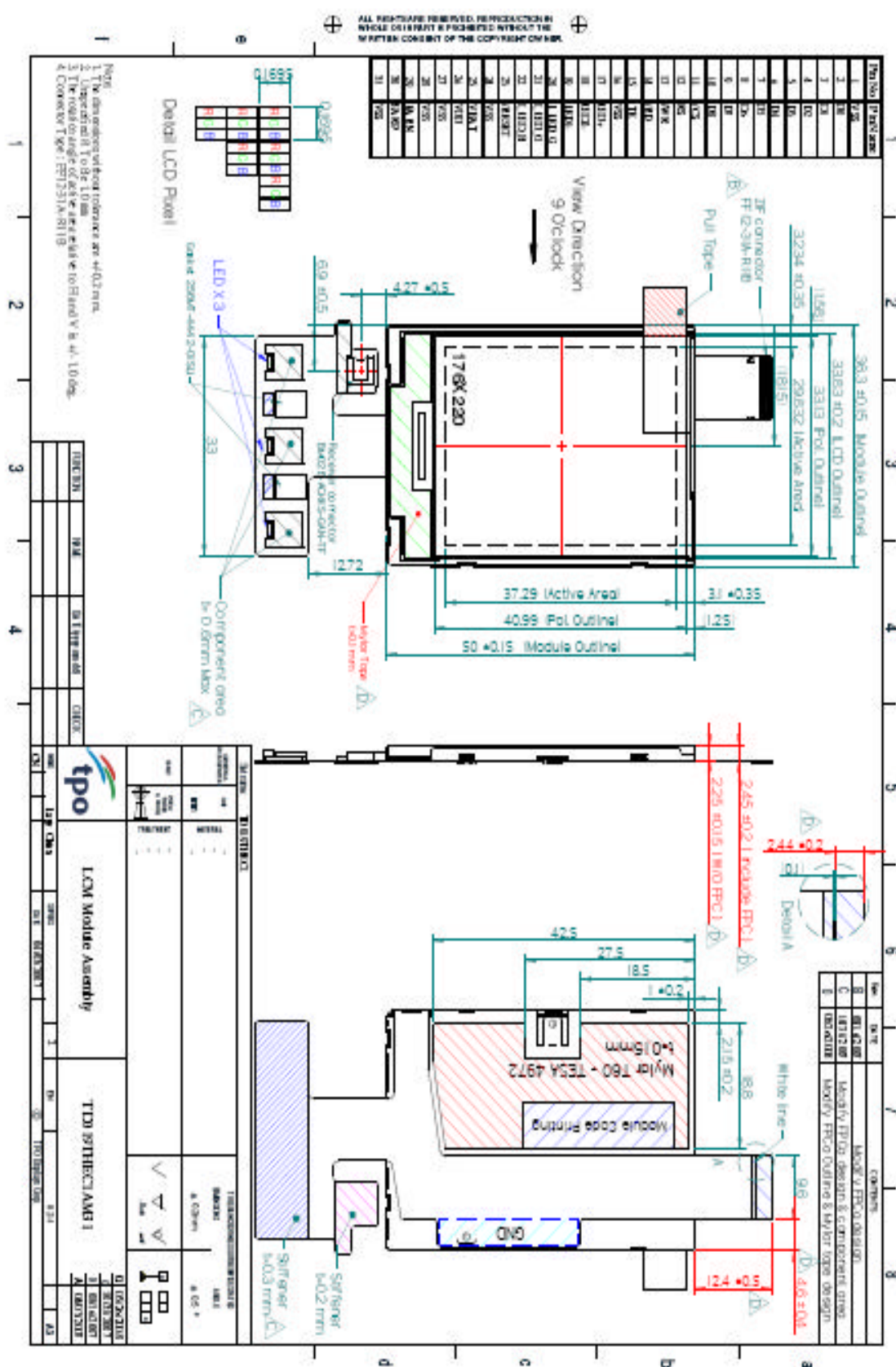
B. Environment

- v. Working environment of the panel should be in the clean room.
- vi. The front polarizer is easy damaged. Handle it carefully and do not scratch it by sharp material.
- vii. Panel has polarizer protective film in the surface. Please remove the protection film of polarizer slowly with ionized air to prevent the electrostatic discharge.

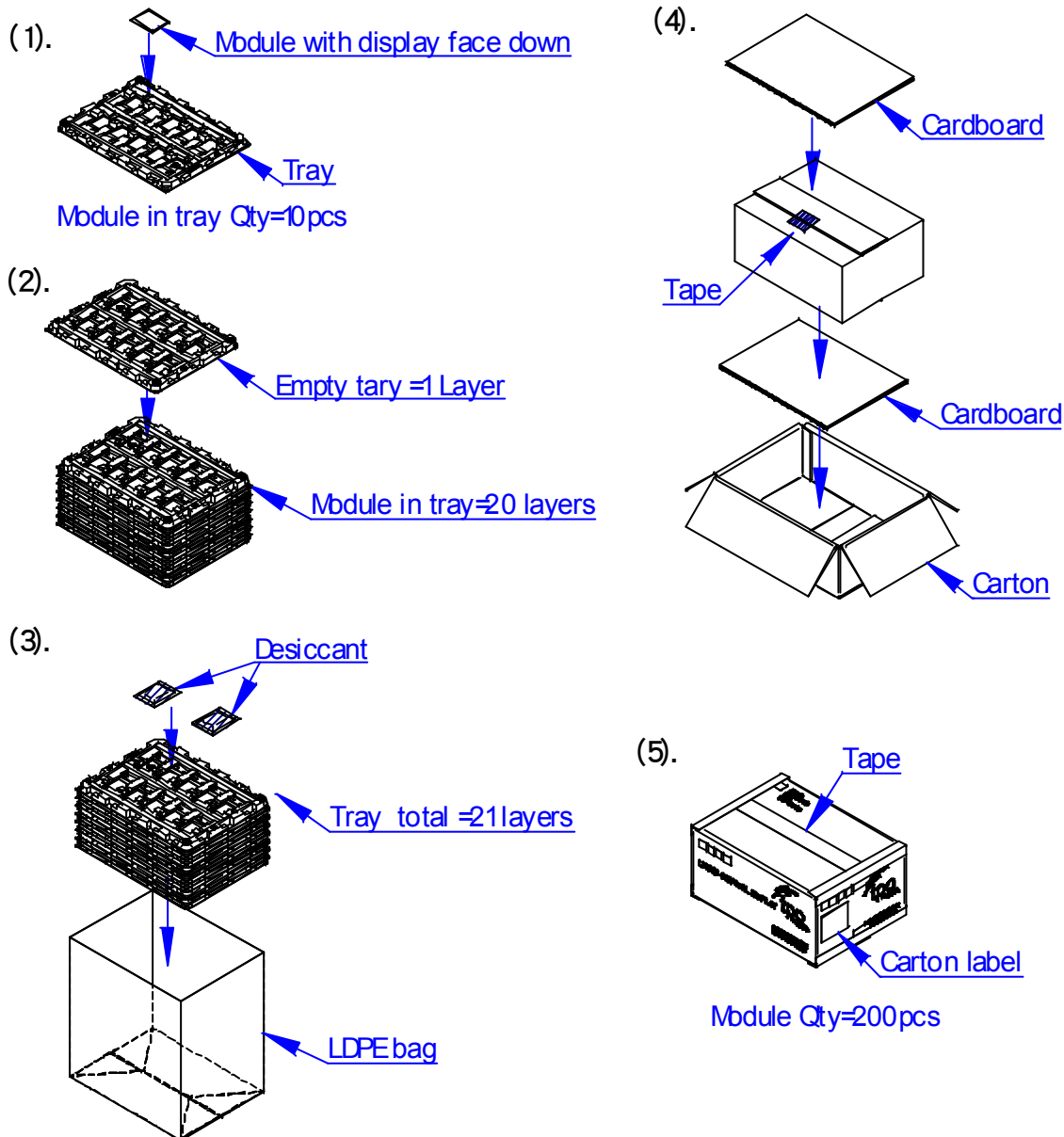
C. Others

- viii. Turn off the power supply before connecting and disconnecting signal input cable.
- ix. Water drop on the surface or condensation as panel power on will corrode panel electrode.
- x. As the packing bag open, watch out the environment of the panel storage. High temperature and high humidity environment is prohibited.
- xi. When the TFT LCD module is broken, please watch out whether liquid crystal leaks out or not. If your hand touches liquid crystal, wash your hand cleanly by water and soap as soon as possible.

17.MECHANICAL DRAWING



18. PACKING DRAWING



1.9" module (TD019THEC1) delivery packing method

- (1). Module packed into tray cavity (with Module display face down).
- (2). Tray stacking with 20 layers and with 1 empty tray above the stacking tray unit.
2 pcs desiccant put above the empty tray
- (3). Stacking tray unit put into the LDPE bag and fix by adhesive tape.
- (4). Put 1 pc cardboard inside the carton bottom, and then pack the package unit into the carton.
Put 1 pc cardboard above the package unit.
- (5). Carton tapping with adhesive tape.