



Product Specification

Part Name: 7 inch TFT DISPLAY MODULE

Customer Part ID:

Topovision Part ID: TVT0700KD2-CP

Ver: A

Customer:
Approved by

From: Topovision Technology Co., Ltd.
Approved by

Notes:

1. Please contact Topovision Technology Co., Ltd. before assigning your product based on this module specification
2. The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by Topovision Technology Co., Ltd. for any intellectual property claims or other problems that may result from application based on the module described herein.

Revision History

Rev.	Date	Contents	Written	Approved
A	2021/07/22	Preliminary Specification	ZHENG	YUAN

Special Notes

Note1.	

1. Introduction

1.1 Scope of application

This specification applies to the LCD module that is supplied by Topovision Technology CO., LTD.

LCD specification: Dots 800xRGBx1280

As to basic specification of the driver IC, refer to the IC (ILI9881C) specification and data book.

All material & processing of the LCD module should be Lead Free.

1.2 TFT features:

Structure: TFT PANNEL+IC +FPC+BL+CTP;

ALL Viewing Type LCD

800 dot-segment and 1280 dot-common outputs;

16.7M color by 8bit R.G.B. signal input.

White LED back light;

4lane MIPI interface

2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally Black	--
Drive element	TFT active matrix	--
Number of pixels	800*3RGB(H)X1280(V)	Dots
Pixel arrangement	RGB Vertical Stripe	--
Pixel Pitch (W*H)	0.11775(H) X 0.11775(V)	mm
Active area	94.20(H) x 150.72(V)	mm
Viewing direction	ALL O'CLOCK	-
TFT Driver IC	ILI9881C	
TFT interface	4lane MIPI interface	-
Approx. Weight	TBD	g
LCM Size(W*H*T)	99.65(W) ×160.85(H) ×2.40(T)	mm
LCM+CTP Size(W*H*T)	111.22(W) ×174.44(H) ×4.45(T)	mm
Touch structure	G+G	
Touch Driver IC	GT911	-
Touch Interface	I2C	



3. Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit
LCM Operating Temperature	T _{OPR}	-20	+60	°C
LCM Storage Temperature	T _{STG}	-30	+70	°C
TP Operating Temperature & Humidity (20% ~ 90%RH)	T _{OPR}	-20	+60	°C
TP SStorage Temperature & Humidity (20% ~ 90%RH)	T _{STG}	-30	+70	°C
Humidity	RH	-	90	%

4. Electrical Characteristics

4.1 TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage for I/O	VDDIO	1.65	1.8	3.6	V
Supply Voltage for(DC/DC)	VDD	2.7	3.3	3.6	V
Current Consumption	I _{DD}	--	--	--	mA
	I _{DD-SLEEP}	--	--	--	uA

4.2 Back-Light Unit Characteristics

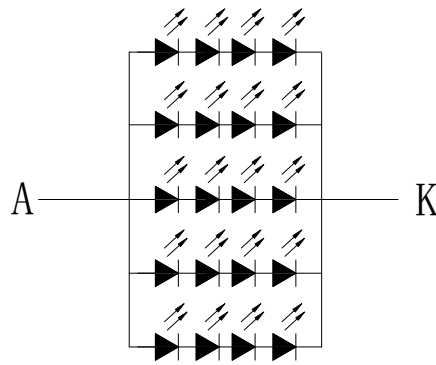
The back-light system is an edge-lighting type with 20 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _F	11.2		12.8	V	-
Forward current	I _F	--	100	-	mA	-
Luminance(With LCD+CTP)	L _V		300	--	cd/m ²	-
LED life time	N/A	----	30,000	--	Hr	Note 1

Note:

- (1) The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I_L=20mA/LED. The LED life time could be decreased if operating I_L is larger than 25mA/LED.

Backlight circuit diagram shown in below:



5. Module Function Description

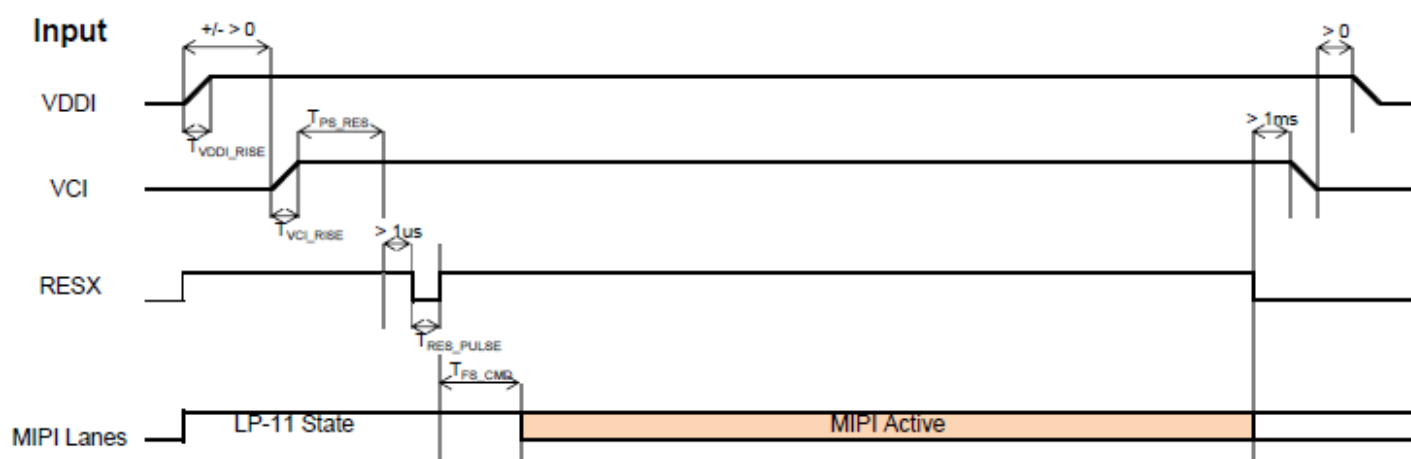
Pin No.	Symbol	LCM Functional	Notes
1	NC	NC	
2~3	VDD/3.3V	power supply for DC/DC circuit	
4	GND	Power Ground	
5	RESET/1.8V	Reset pin. Setting either pin low initializes the LSI	
6	NC	NC	
7	GND	Power Ground	
8	MIPI_D2-	MIPI-DSI Data differential signal input pins	
9	MIPI_D2+	MIPI-DSI Data differential signal input pins	
10	GND	Power Ground	
11	MIPI_D1-	MIPI-DSI Data differential signal input pins	
12	MIPI_D1+	MIPI-DSI Data differential signal input pins	
13	GND	Power Ground	
14	MIPI_CLK-	MIPI-DSI CLOCK differential signal input pins	
15	MIPI_CLK+	MIPI-DSI CLOCK differential signal input pins	
16	GND	Power Ground	
17	MIPI_D0-	MIPI-DSI Data differential signal input pins	
18	MIPI_D0+	MIPI-DSI Data differential signal input pins	
19	GND	Power Ground	
20	MIPI_D3-	MIPI-DSI Data differential signal input pins	
21	MIPI_D3+	MIPI-DSI Data differential signal input pins	
22	GND	Power Ground	
23~24	NC	NC	
25	GND	Power Ground	
26~29	NC	NC	
30	GND	Power Ground	
31~32	LEDK	Power supply for backlight cathode input terminal.	
33~38	NC	NC	
39~40	LEDA	Power supply for backlight anode input terminal.	

CTP PIN Description:

Pin No.	Symbol	CTP Functional	Notes
1	CTP_VCC 3.3V	Touch panel Power supply 2.8~3.3V	
2	CTP_RST 1.8V	Touch panel reset	
3	CTP_SCL 1.8V	Touch panel I2C clock	
4	CTP_SDA 1.8V	Touch panel I2C data	
5	CTP_INT 1.8V	Touch panel interrupt output	
6	GND	Power Ground	

6. Timing Characteristics

Power on/off sequence



Symbol	Characteristics	Min.	Typ.	Max.	Units
T_{VDDI_RISE}	VDDI Rise time	20	-	-	us
T_{VCI_RISE}	Case A: VCI Rise time	200	-	-	us
	Case B: VCI Rise time	40			
T_{PS_RES}	VDDI/VCI on to Reset high	5	-	-	ms
T_{RES_PULSE}	Reset low pulse time	10	-	-	us
T_{FS_CMD}	Reset to first command	10	-	-	ms

High Speed Mode – Data Clock Channel Timing

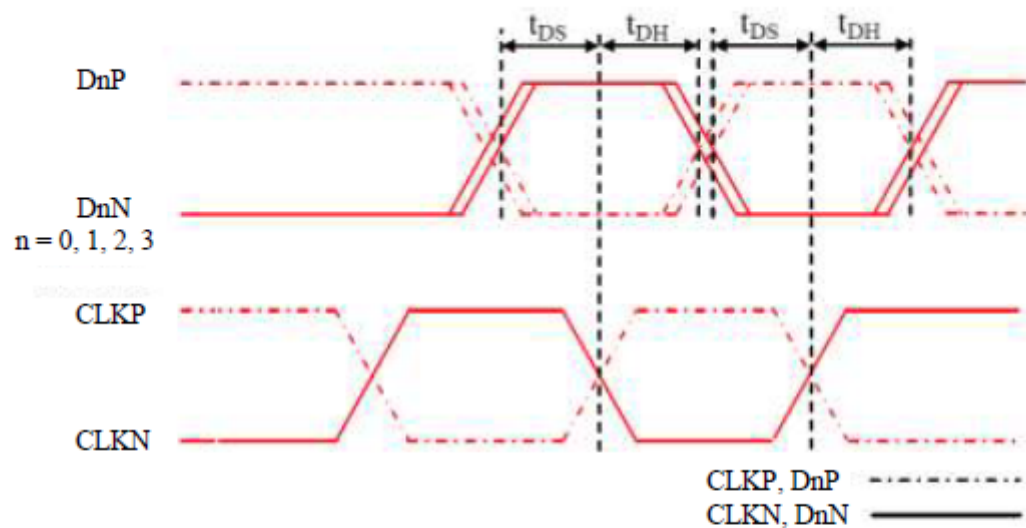


Figure 117: DSI Data to Clock Channel Timings

Table 40: DSI Data to Clock Channel Timings

Signal	Symbol	Parameter	Min	Max
DnP/N , n=0 and 1	t_{DS}	Data to Clock Setup time	$0.15 \times UI$	-
	t_{DH}	Clock to Data Hold Time	$0.15 \times UI$	-

18.4.5. Low Speed Mode – Bus Turn Around

Lower Power Mode and its State Periods on the Bus Turnaround (BTA) from the MCU to the Display Module (ILI9881C-0D) are illustrated for reference purposes below.

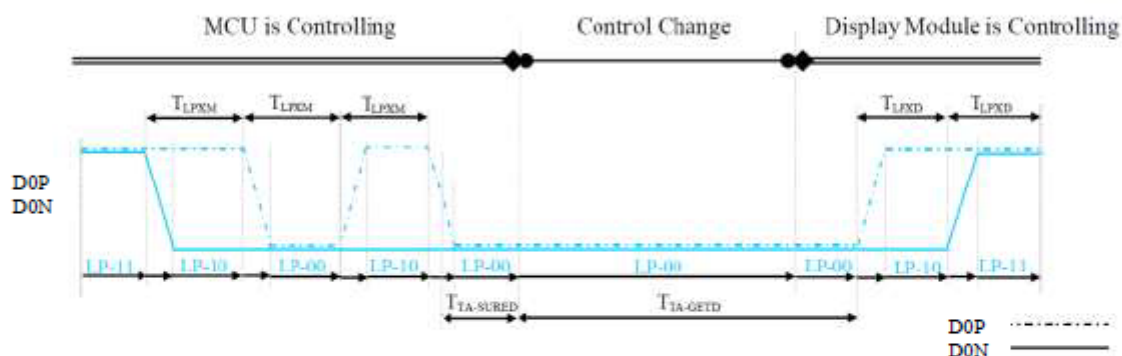


Figure 119: BTA from the MCU to the Display Module

Lower Power Mode and its State Periods on the Bus Turnaround (BTA) from the Display Module (ILI9881C-0D) to the MCU are illustrated for reference purposes below.

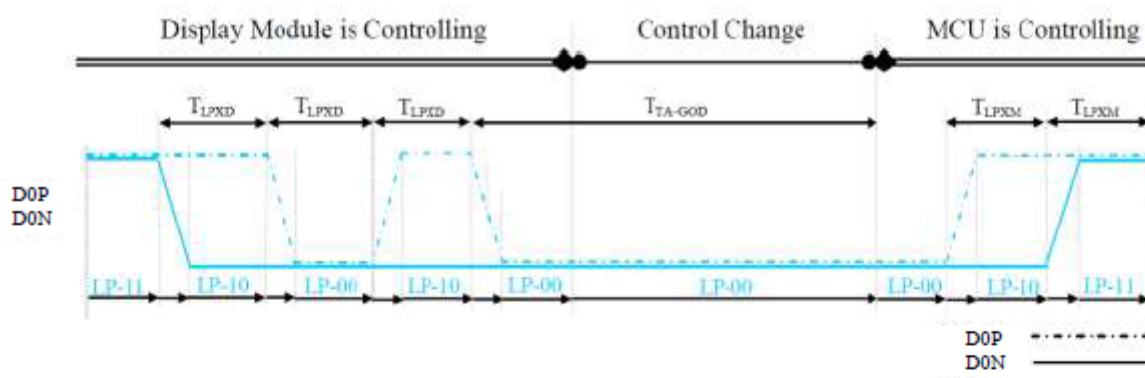


Figure 120: BTA from the Display Module to the MCU

Table 42: Low Power State Period Timings – A

Signal	Symbol	Description	Min	Max	Unit
D0P/N	T_{LPXM}	Length of LP-00, LP-01, LP-10 or LP-11 periods MCU → Display Module (ILI9881C-0D)	50	75	ns
D0P/N	T_{LPXD}	Length of LP-00, LP-01, LP-10 or LP-11 periods Display Module (ILI9881C-0D) → MCU	50	75	ns
D0P/N	$T_{TA-SURED}$	Time-out before the Display Module (ILI9881C-0D) starts driving	T_{LPXD}	$2 \times T_{LPXD}$	ns

Table 43: Low Power State Period Timings – B

Signal	Symbol	Description	Time	Unit
D0P/N	$T_{TA-GETD}$	Time to drive LP-00 by Display Module (ILI9881C-0D)	$5 \times T_{LPXD}$	ns
D0P/N	T_{TA-GOD}	Time to drive LP-00 after turnaround request - MCU	$4 \times T_{LPXD}$	ns

18.4.6. Data Lanes from Low Power Mode to High Speed Mode

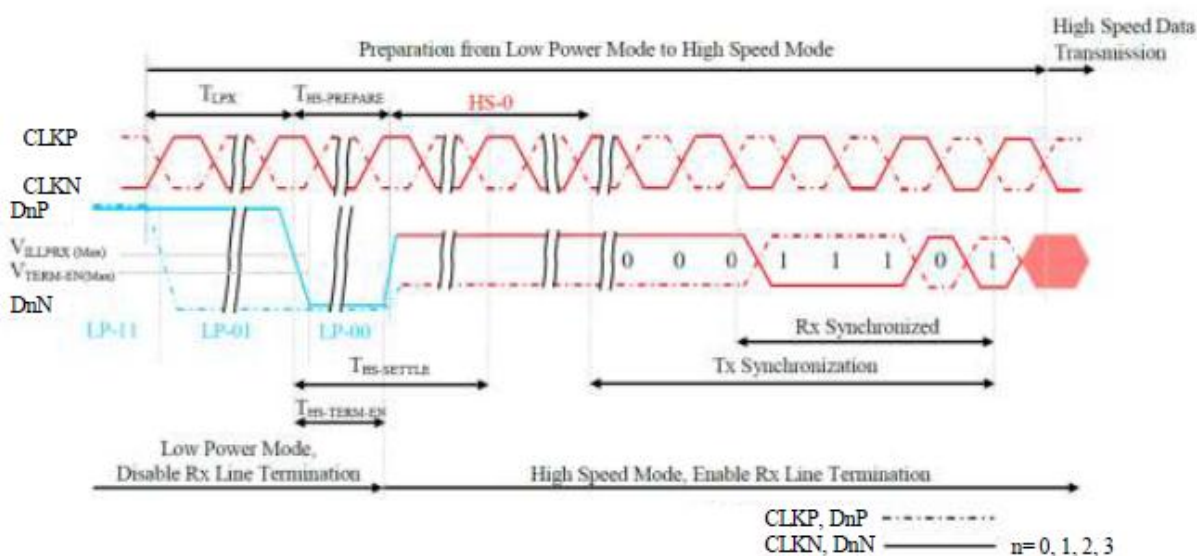


Figure 121: Data Lanes - Low Power Mode to High Speed Mode Timings

Table 44: Data Lanes - Low Power Mode to High Speed Mode Timings

Signal	Symbol	Description	Min	Max	Unit
DnP/N, n = 0 and 1	T_{LPX}	Length of any Low Power State Period	50	-	ns
DnP/N, n = 0 and 1	$T_{HS-PREPARE}$	Time to drive LP-00 to prepare for HS Transmission	$40+4 \times UI$	$85+6 \times UI$	ns
DnP/N, n = 0 and 1	$T_{HS-TERM-EN}$	Time to enable Data Lane Receiver line termination measured from when Dn crosses V_{ILMAX}	-	$35+4 \times UI$	ns

Reset Timing

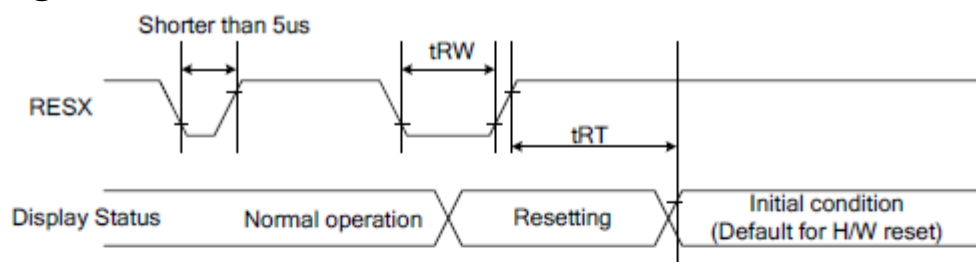


Figure 124: Reset Timing

Table 47: Reset Timing

Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5) 120 (note 1,6,7)	mS

Notes:

1. The reset cancel also includes required time for loading ID bytes, VCOM setting and other settings from EEPROM to registers. This loading is done every time when there is H/W reset cancel time (tRT) within 5 ms after a rising edge of RESX.
2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the Table 48.

Table 48: Reset Descript

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 10us	Reset
Between 5us and 10us	Reset starts

3. During the Resetting period, the display will be blanked (The display enters the blanking sequence, which maximum time is 120 ms, when Reset Starts in the Sleep Out mode. The display remains the blank state in the Sleep In mode.) and then return to Default condition for Hardware Reset.
4. Spike Rejection can also be applied during a valid reset pulse, as shown below:

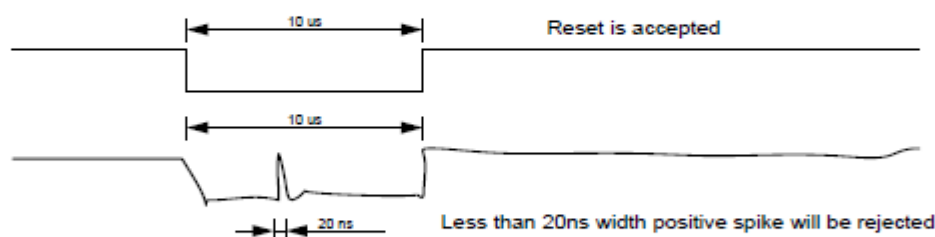


Figure 125: Positive Noise Pulse during Reset Low

5. When Reset applied during Sleep In Mode.
6. When Reset applied during Sleep Out Mode.
7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

7. Optical Characteristics

7.1 Optical Specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (with Polarizer)		T (%)	$\Theta=0$ Normal viewing angle	4.62	5.14	—	%	Measuring with Polarizer , Vop=5.1V Reference Only
Transmittance (without Polarizer)		T (%)		15.74	17.49	—	%	
Contrast		CR		600	800	—	—	(1)(2)
Response time		T _R		—	10	15	msec	(1)(3)
		T _F		—	20	25		
Color gamut	(%)			55	60	—	%	C-light
Color chromaticity (CIE1931)	White	W _x		-0.02	0.321	+0.02	—	(1)(4) CF glass
		W _y	0.346		—			
	Red	R _x	0.645		—			
		R _y	0.333		—			
	Green	G _x	0.324		—			
		G _y	0.570		—			
		Blue	B _x				0.134	
B _y			0.124					
Viewing angle	Hor.	Θ_L	CR>10	80	85	—	—	(1)(4) Measuring with Polarizer , Reference Only
		Θ_R		80	85	—		
	Ver.	Θ_U		80	85	—		
		Θ_D		80	85	—		
Optima View Direction		Free						(5)

7.2 Measuring Condition

- Measuring surrounding: dark room
- Ambient temperature: 25±2℃
- 15min. warm-up time.

7.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

Diagram illustrating the geometry of a crystal plate (thickness $2d$) and the relationship between angles θ_U , θ_D , θ , and θ_L . The diagram shows the plate tilted at an angle Φ relative to the horizontal. The angles are defined as follows:

- θ_U : Angle between the vertical axis and the upper surface normal.
- θ_D : Angle between the vertical axis and the lower surface normal.
- θ : Angle between the two surface normals.
- θ_L : Angle between the vertical axis and the plate's longitudinal axis.

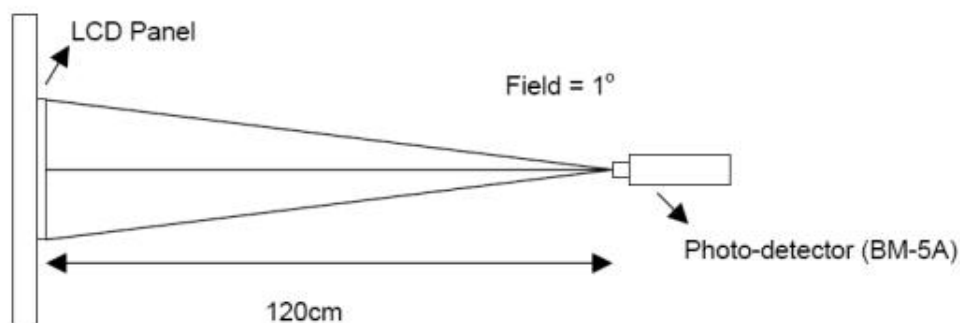
The phase difference Φ is indicated, with specific values marked:

- $\Phi = 0^\circ$ (labeled "12' o'clock")
- $\Phi = 270^\circ$ (labeled "6' o'clock")

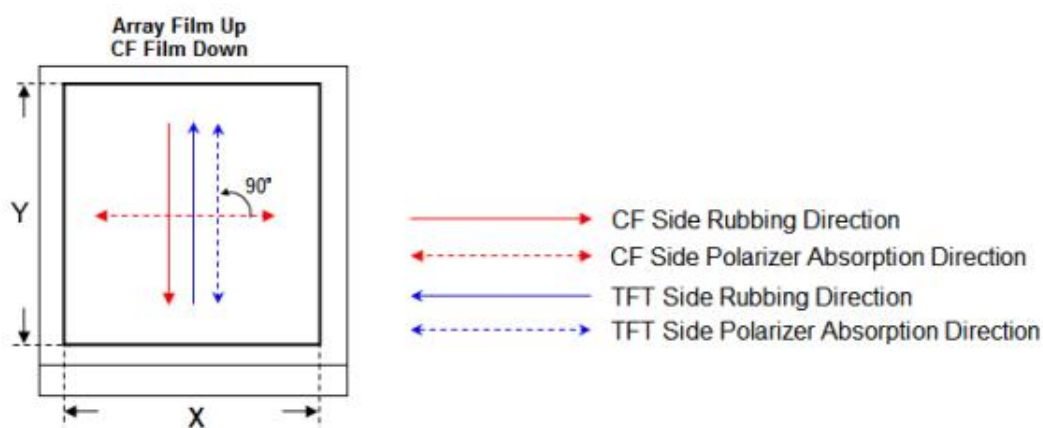
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

A graph showing the optical response over time. The y-axis is labeled 'Optical response' and has markers at 0%, 10%, 90%, and 100%. The x-axis is labeled 'time'. The response starts at 100%, falls to 10% over a time interval T_f (fall time), remains at 10% for a duration, and then rises back to 100% over a time interval T_r (rise time). The rising and falling edges are smooth curves, while the flat portions are horizontal lines. A break symbol is shown on the x-axis between the two flat portions.

Note (4) Definition of optical measurement setup



Note (5) Rubbing Direction & Polarizer Absorption Direction



Item	Specifications	Unit	Note
Rubbing Direction	90° (TFT) / -90° (CF)	degree	2-domain IPS-pro
Absorption axis of Polarizer	90° (TFT) / 0° (CF)	degree	Array Film Up CF Film Down

8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+70°C / 96H	1. Functional test is OK. Missing Segment, short, unclear segment non-display, display abnormally and liquid crystal leakage un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-30°C / 96H	
3	High Temp. Operating	+60°C / 96H	
4	Low Temp. Operating	-20°C / 96H	
5	High Temperature / Humidity storage	50°C x 90%RH / 96H	
6	Thermal and cold shock	Static state, -20°C (30min) ~60°C (30min), 50 cycles	

9. Packing Method----TBD

- END -