PRODUCT SPECIFICATION FOR LCD MODULE

Revision: 1.0

Model No: LSC055I16-MP-V1

Module Type: COG+FPC+B/L+CTP

APPROVED SIGNATURE

■ Approved Product Specification only

□ Approved Product Specification and Samples

Prepared By	Checked By	Approved By

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1. General Description

LSC055I16-MP-V1 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 and a backlight unit. The panel size is 5.5 inch and the resolution is 1080(RGB)*1920, the panel can display up to 16.7M colors.

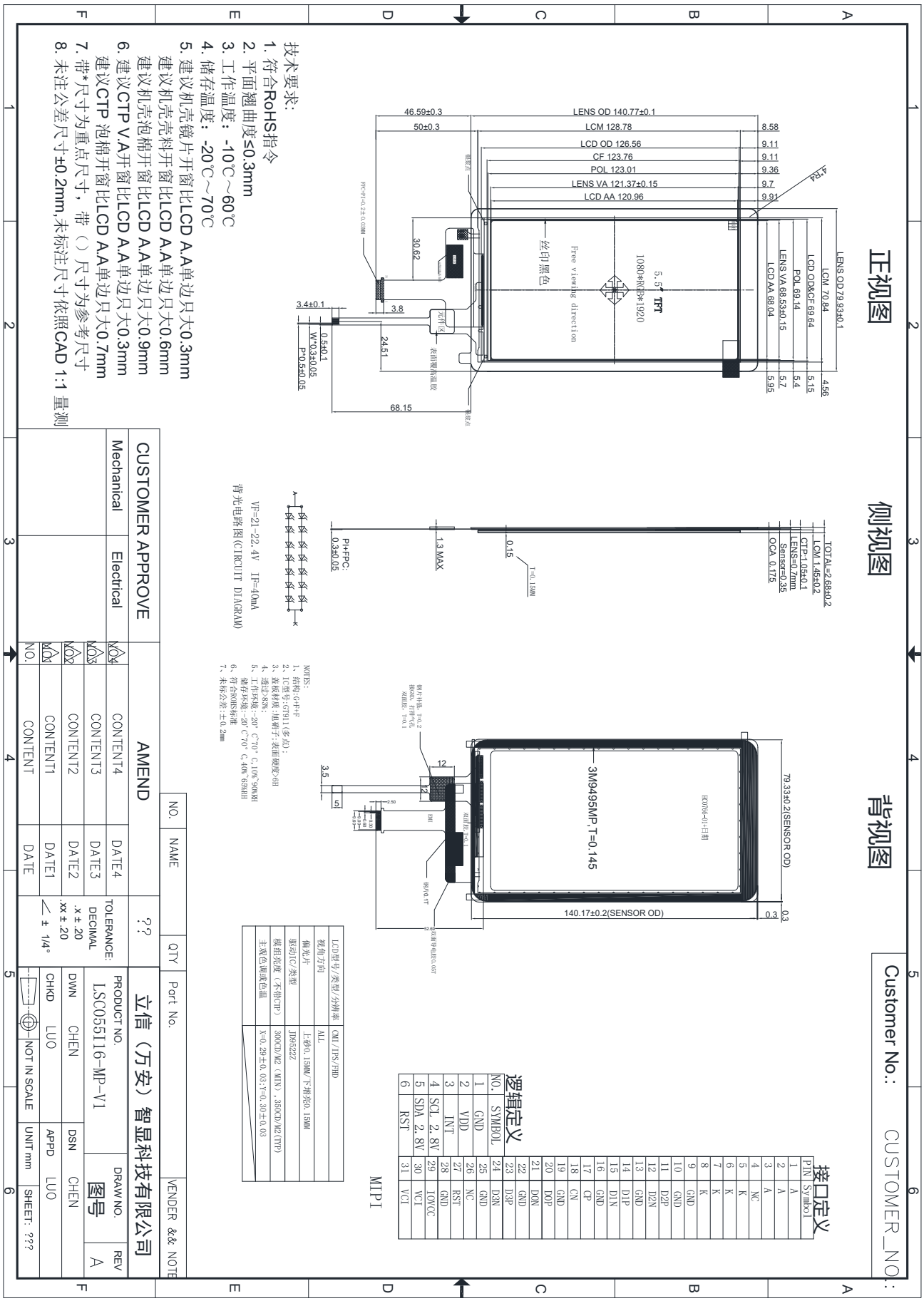
2. Physical Features

Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 1080(RGB)×1920 Dot-matrix
Input Data	MIPI
Viewing Direction （Grayscale Inversion）	Free（IPS）
Drive	JD9522Z

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	79.93 ×140.77 ×2.68	mm
Number of dots	1080(RGB) ×1920	pixel
Active area (H×V)	68.04×120.96	mm

4. Outline Dimension



5. Absolute Maximum Ratings

(Ta=25±2°C, Vss=GND=0V)

Characteristics	Symbol	Min.	Typ	Max.	Unit	Notes
Supply Voltage	IOVCC	-0.3	-	3.6	V	
	VCI	-0.3	-	4.8	V	
TFT Gate On voltage	VGH	-0.3	-	16	V	
TFT Gate Off voltage	VGL	0.3	-	-16	V	
Backlight Forward Current	I_F	-		40	mA	
Operating Temperature	T_{OPR}	-20		+70	°C	(1), (3)
Storage Temperature	T_{STG}	-30		+80	°C	(2), (3)
Humidity	RH	-		90	%	Max. 60 °C

Notes:

(1) In case of below 0°C, the response time of liquid crystal (LC) becomes slower and the color of panel becomes darker than normal one. Level of retardation depends on temperature, because of the LC characteristics.

(2) If product is exposed to high temperatures for extended time, there is a possibility of the polarizer film damage which could degrade the optical characteristics.

(3) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.
Functional operation should be restricted to the conditions described under normal operating conditions.

6. Electrical Characteristics

(Ta=25±2°C)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage 1	IOVCC	1.65	-	3.6	V	
Power Supply Voltage 2	VCI	2.5	-	4..8	V	
Power Supply Voltage 3	-	-	-	-	V	
Power Supply for MTP	VPP	-	-	-	V	
Current Consumption	I_{DD}	-	TBD	-	mA	Normal mode
	$I_{DD-SLEEP}$		TBD		uA	Sleep mode
Input voltage “L” Level	V_{IL}	-0.3	-	0.3IOVCC	V	IOVCC=1.65~3.3
Input voltage “H” Level	V_{IH}	0.7IOVCC	-	IOVCC	V	
Output voltage “L” Level	V_{oL}	0	-	0.2IOVCC	V	I_{OL}=1mA
Output voltage “H” Level	V_{oH}	0.8IOVCC	-	IOVCC	V	I_{OH}=-1mA
Analog operating voltage	VSP	4.5	-	6.6	V	
Analog operating voltage	VSN	-6.6	-	-4.5	V	

BACK-LIGHT UNIT CHARACTERISTICS

The back-light system is an edge-lighting type with 12 white LEDs. The characteristics of the back-light are shown in the following tables.

(Ta=25±2°C)

Characteristics	Symbol	Condition	Min.	Type	Max.	Unit	Notes
Forward Voltage	Vf	I_L=40mA	-	21	22.4	V	-
Forward current	I_L		-	40	-	mA	-
Luminance	Lv	I_L=40mA	--	330	--	cd/m^2	-
LED life time	-	I_L=40mA	20,000	25,000	--	Hr	Note 1

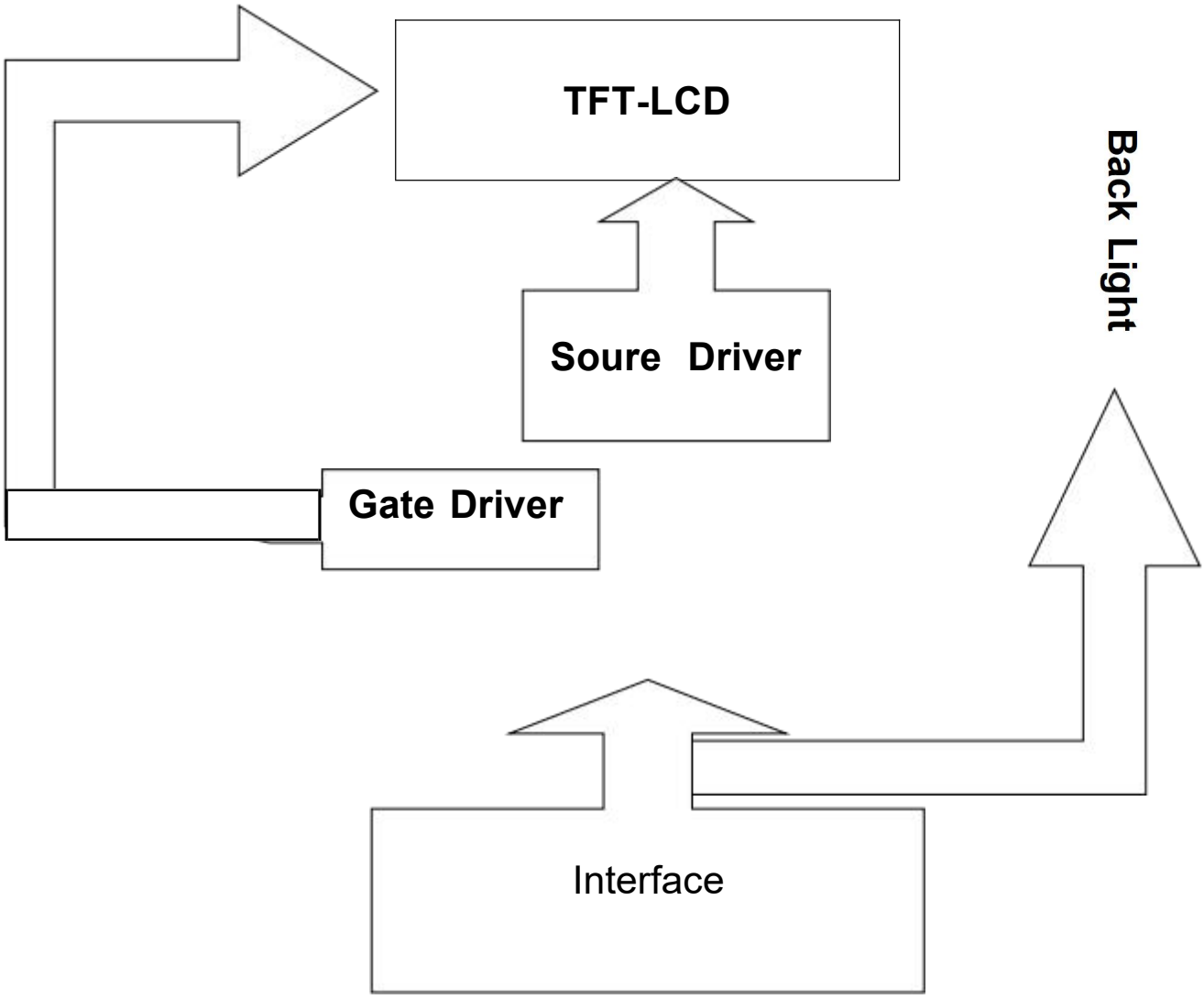
Note:

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

Bcklight circuit diagram shown in below:

7. Module Function Description

7-1. Block Diagram Of LCM



7-2. Pin Description

Pin No.	Symbol	Description
1	A	Back-light Anode
2	A	Back-light Anode
3	A	Back-light Anode
4	NC	NC
5	K	Back-light Cathode
6	K	Back-light Cathode
7	K	Back-light Cathode
8	K	Back-light Cathode
9	GND	Power Ground
10	GND	Power Ground
11	D2P	MIPI-DSI DATE signal input
12	D2N	MIPI-DSI DATE signal input
13	GND	Power Ground
14	D1P	MIPI-DSI DATE signal input
15	D1N	MIPI-DSI DATE signal input
16	GND	Power Ground
17	CP	MIPI-DSI DATE signal input
18	CN	MIPI-DSI DATE signal input
19	GND	Power Ground
20	D0P	MIPI-DSI DATE signal input
21	D0N	MIPI-DSI DATE signal input
22	GND	Power Ground
23	D3P	MIPI-DSI DATE signal input
24	D3N	MIPI-DSI DATE signal input
25	GND	Power Ground
26	NC	NC
27	RST	Reset input pin
28	GND	Power Ground
29	IOVCC	Power supply for I/O block. 1.8V
30	VCI	Power supply for I/O block. 2.8-3.3V
31	VCI	Power supply for I/O block. 2.8-3.3V

TP Pin

1	GND	Ground
2	VDD2.8V	Power voltage
3	INT	Interrupt signal for TP
4	SCL	SCL pin for TP
5	SDA	SDA pin for TP
6	RST	Reset Pin for TP

7-3 Timing Characteristics

11.3.1.Reset input timings

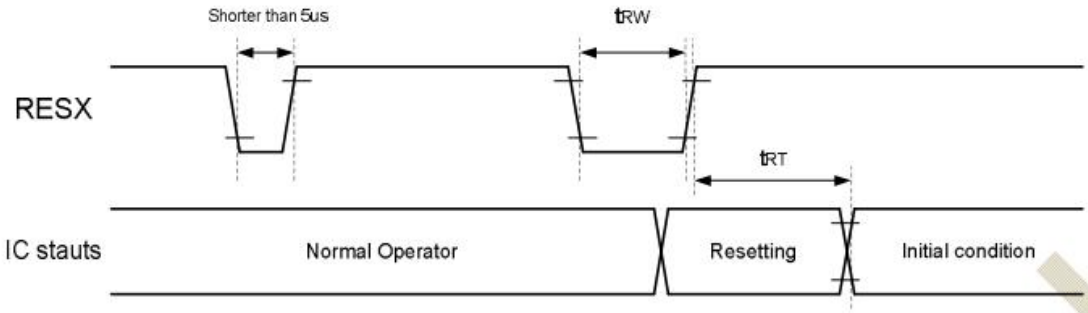


Figure 11.1: Reset input timings

Symbol	Parameter	Related pins	Min.	Max.	Unit
t_{RW}	Reset pulse width(2)	RESX	10	-	μs
t_{RT}	Reset complete time(3)	-	-	5 (Note 5)	ms
		-	-	120 (Note 6, 7)	ms

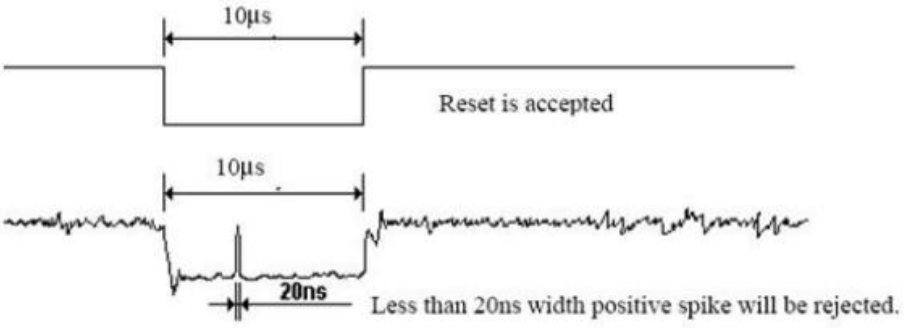
Note: (1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

(2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 μs	Reset Rejected
Longer than 10 μs	Reset
Between 5 μs and 10 μs	Reset Start

(3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then returns to Default condition for H/W reset.

(4) Spike Rejection also applies during a valid reset pulse as shown below:



(5) When Reset is applied during Sleep In Mode.

(6) When Reset is 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.

Table 11.3: Reset timings

Vertical Timings

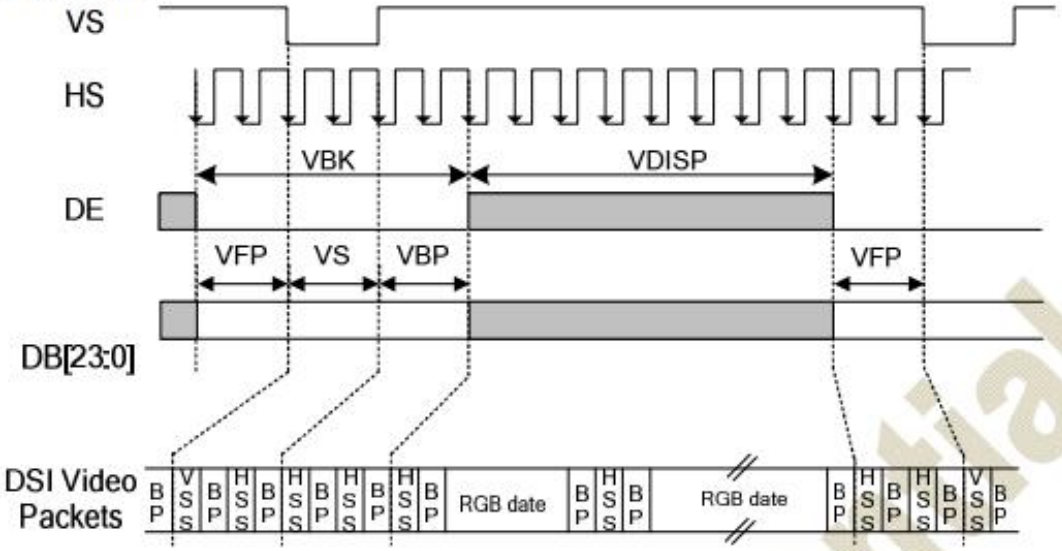


Figure 11.9: Vertical Timings for DPI I/F

RGB Resolution=1080x1920 (T_A=25°C, VCCH=IOVCC=1.8V, VCIP=2.8V, VCI=2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical low pulse width	VS	-	2(1)	-	-	Line
Vertical back porch	VBP	-	2(1)	-	-	Line
Vertical front porch	VFP	-	2(1)	-	-	Line
Vertical blanking period	VBL	VS+VBP+VFP	6	-	-	Line
Vertical active area	-	VDISP	-	1920	-	Line
Vertical Refresh rate	VRR	-	-	60(2)	66(3)	Hz

RGB Resolution=1200x1920 (T_A=25°C, VCCH=IOVCC=1.8V, VCIP=2.8V, VCI=2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical low pulse width	VS	-	2(1)	-	-	Line
Vertical back porch	VBP	-	2(1)	-	-	Line
Vertical front porch	VFP	-	2(1)	-	-	Line
Vertical blanking period	VBL	VS+VBP+VFP	6	-	-	Line
Vertical active area	-	VDISP	-	1920	-	Line
Vertical Refresh rate	VRR	-	-	60(4)	66(5)	Hz

Note: 1. The VS and VBP pulse width are related to GIP start pulse and GIP clock pulse timing. The GIP start pulse and GIP clock pulse must be set at corresponding position for LCD normal display.
2. DSI speed = 850Mbps/Lane, 1080 pixels & VS=VBP=VFP=2, frame rate can up to 60HZ (typ.).
3. Under burst mode, DSI speed = 950Mbps/Lane & 1080 pixels, fast frame rate can up to 66HZ (Max.).
4. DSI speed = 950Mbps/Lane, 1200 pixels & VS=VBP=VFP=2, frame rate can up to 60HZ (typ.).
5. Under burst mode, DSI speed = 1.05Gbps/Lane & 1200 pixels, fast frame rate can up to 66HZ (Max.).
6. Frame rate will changed by differential Vertical porch setting.

Table 11.13: Vertical Timings for RGB I/F

Horizontal Timings

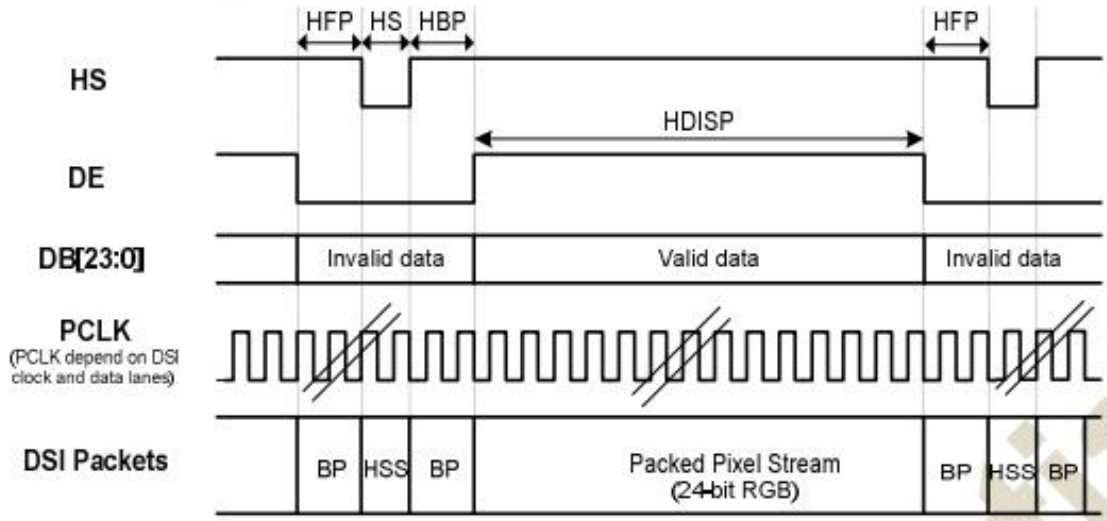


Figure 11.10: Horizontal Timing for DSI Video mode I/F

RGB Resolution=1080x1920 (T_A=25°C,VCCH= IOVCC=1.8V, VCIP=2.8V, VCI=2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	30(1)	-	-	ns
Horizontal back porch	HBP	-	220(1)	-	-	ns
Horizontal front porch	HFP	-	250(1)	-	-	ns
Horizontal blanking period	HBLK	HS+HBP+HFP	-	500	-	ns
Horizontal active area	HDISP	1080 pixels	-	8.25(2)	-	us

RGB Resolution=1200x1920 (T_A=25°C,VCCH= IOVCC=1.8V, VCIP=2.8V, VCI=2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	30(1)	-	-	ns
Horizontal back porch	HBP	-	220(1)	-	-	ns
Horizontal front porch	HFP	-	250(1)	-	-	ns
Horizontal blanking period	HBLK	HS+HBP+HFP	-	500	-	ns
Horizontal active area	HDISP	1200 pixels	-	8.25(2)	-	us

Note: 1. Below time limitation will apply in all DSI speed range.
(1) HS+HBP >= 250ns.
(2) HFP >= 250ns.
2. Base on frame rate = 60HZ.

Table 11.14: Horizontal Timings for DSI Video mode I/F

8. Electro-Optical Characteristics

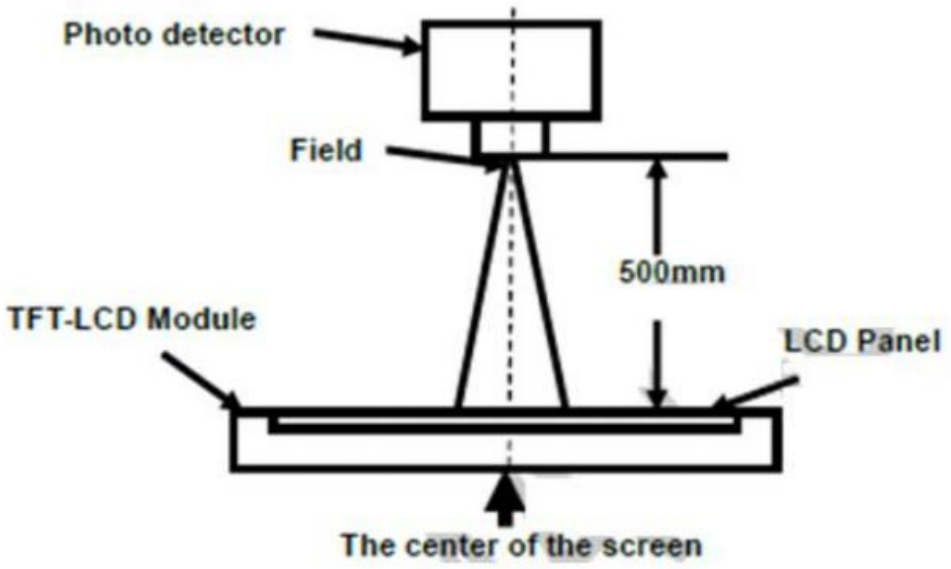
(Ta=25±2°C)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center point)		C/R	-	700	1000	-	-	BM-7 Note(2)
Luminance of white (Center point)		L_w	B/L on	15%	TBD	15%	cd/m²	CA-210
Luminance uniformity		U_W	θ = 0. Normal viewing angle B/L On Note(1)	80	-	-	%	BM-7 Note(3)
Response Time		Tr + Tf		-	35	45	ms	BM-5AS Note(4)
Color Chromaticity (CIE 1931)	White	W_X		-	0.299	-	-	CA-210 Note(5)
		W_X		-	0.316	-		
	Red	R_X		-	-	-		
		R_Y		-	-	-		
	Green	G_X		-	-	-		
		G_y		-	-	-		
	Blue	B_X		-	-	-		
		B_Y		-	-	-		
Viewing Angle	Hor.	θ_T	C/R≥10	-	80	-	Deg	EZ Contrast Note(6)
		θ_B		-	80	-		
	Ver.	θ_L		-	80	-		
		θ_R		-	80	-		
Optima View Direction			ALL					Note(7)

* This condition will be changed by the evaluation circumstance. If product is exposed to high temperatures for extended time, there is a possibility of the polarizer film damage which could degrade the optical characteristics.

Notes:

(1) Test Equipment Setup: After stabilizing and leaving the panel alone at a given temperature for 30min, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room 30min after lighting the back-light. This should be measured in the center of screen.

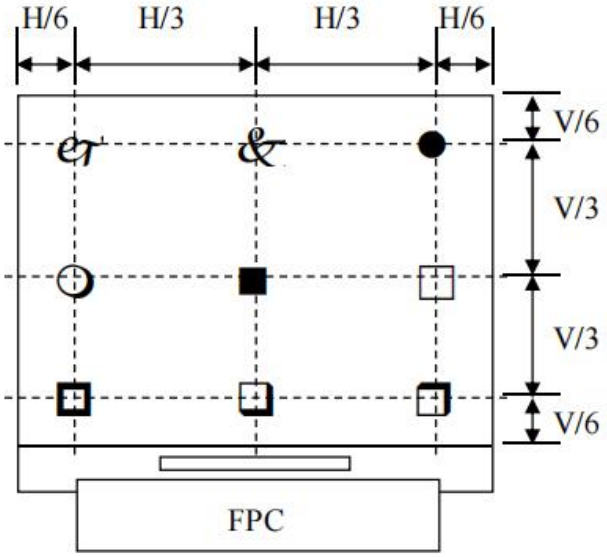


(2) Definition of Contrast Ratio (CR):

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance measured when LCD on the “white” state}}{\text{Luminance measured when LCD on the “black” state}}$$

(3) Definition of Luminance Uniformity: Active area is divided into 9 measuring areas (Shown in below), every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among 9-points}} \times 100\%$$

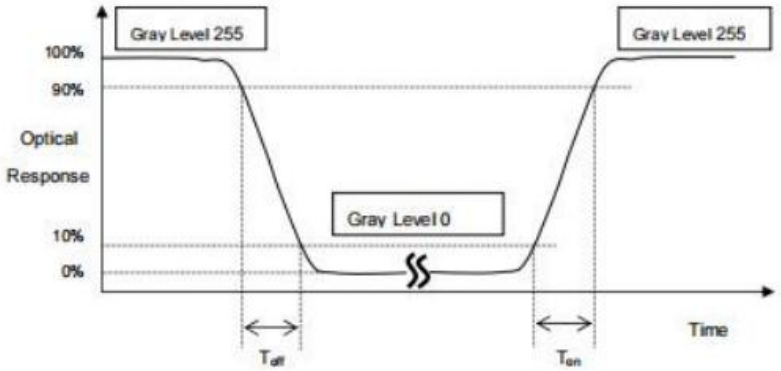


The spot locations for luminance measurement

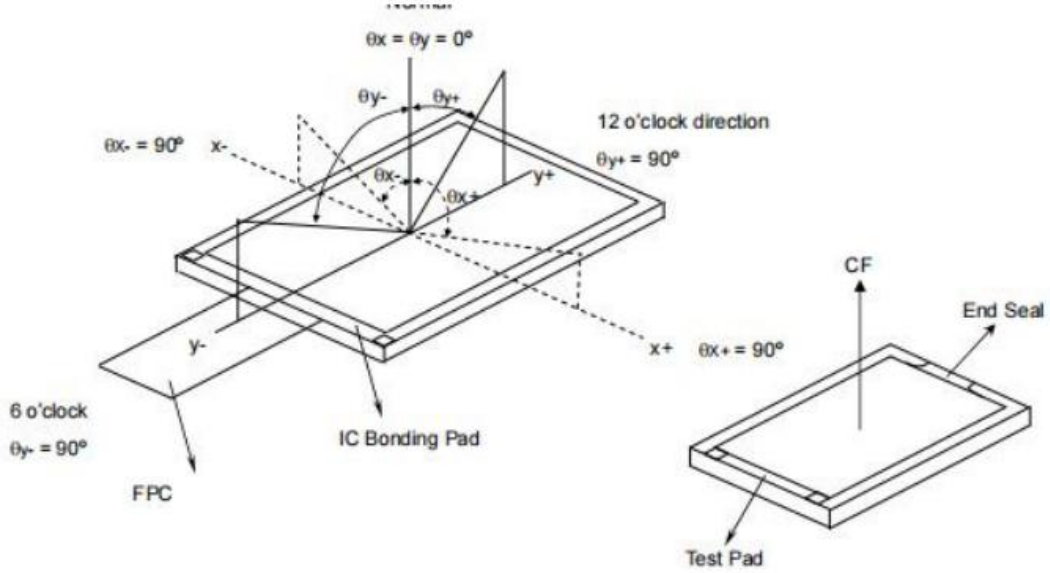
(4) Definition of Response time:

The output signals of photo detector are measured when the input signals are Changed from “black” to “white” (rising time) and from time “white” to “black” (falling time), Respectively.

The response time is defined as the time interval between the 10% and 90% of Amplitudes. Refer to figure as below.



(5) Definition of viewing angle , 0 . Refer to figure as below



(6) Definition of Color Chromaticity (CIE 1931)
Color coordinate of white & red, green, blue at center point.

(7) The different Rubbing Direction will cause the different optima view direction.

9.Records Of Version

Version	Revise Date	Page	Content
00	2025-9-10	ALL	New released