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Custom Display

Mechanical design



Project No. 项目编号	ET055WU10-TT
Customer 客户名称	
Module No. 客户型号	
Product type 产品内容	Standard LCD Module TFT: 1080*RGBx1920Dots 5.46" TFT LCD With touch panle

客户确认Customer Approval

项目负责人Project Manager	
品质主管Director of Quality	
采购工程师Purchasing Engineer	

PREPARED BY	CHECKED BY	APPROVED BY



1. Introduction

1.1 Scope of application

This specification applies to the LCD module that is supplied by YOURITECH TECHNOLOGY

LCD specification: Dots 1080xRGBx1920.

As to basic specification of the driver IC, refer to the IC (Himax:HX8399C) 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;

IPS Type LCD

1080 dot-segment and 1920 dot-common outputs;

16.7M Color can be selected by software;

White LED back light;

4Lane MIPI interface

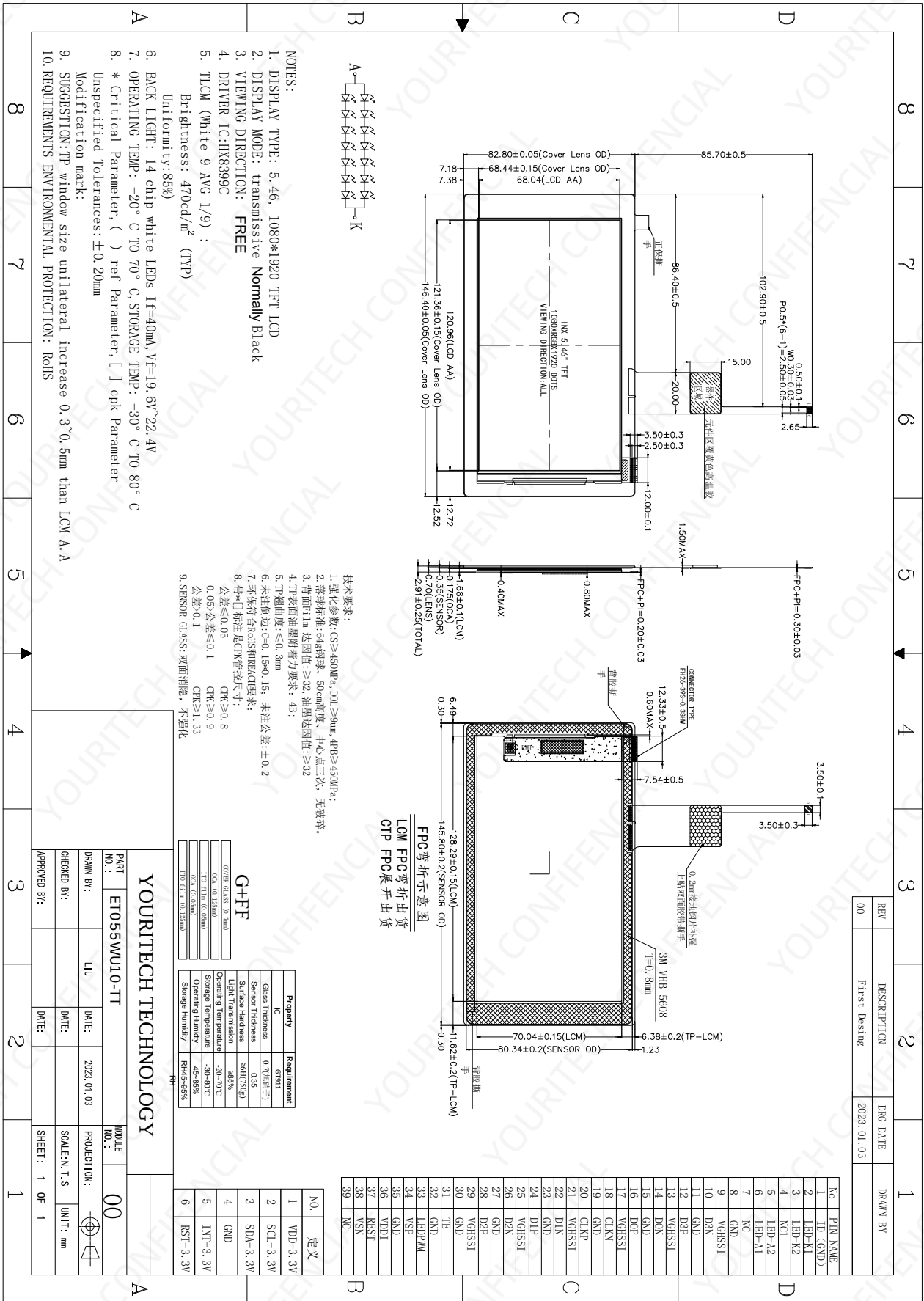
1.3 Applications:



2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally black	--
Drive element	TFT active matrix	--
Number of pixels	1080*3RGB(H)X1920(V)	Dots
Pixel arrangement	RGB stripe	--
Pixel Pitch (H*V)	63 (H) x63 (V)	um
Active area(H*V)	68.04(H) x 120.96(V)	mm
Viewing direction	ALL O'CLOCK	--
TFT Driver IC	HX8399-C	--
TFT interface	4Lane MIPI Interface	--
Approx. Weight	TBD	g
LCM Size(W*H*T)	70.04(W) x 128.29(H) x1.68(T)	mm
LCM+CTP Size(W*H*T)	82.80(W) x 146.40(H) x2.91(T)	mm
Touch structure	G+FF	--
Touch Driver IC	GT911	--
Touch Interface	I2C	--





3. Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit
LCM Operating Temperature	T _{OPR}	-20	+70	°C
LCM Storage Temperature	T _{STG}	-30	+80	°C
TP Operating Temperature & Humidity(20% ~ 90%RH)	T _{OPR}	-20	+70	°C
TP SStorage Temperature & Humidity(20% ~ 90%RH)	T _{STG}	-30	+80	°C
Humidity	RH	--	90	%

4. Electrical Characteristics

4.1 TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage for I/O	VDDIO	1.65	1.8	3.3	V	--
Supply Voltage for(DC/DC)	VDD	--	--		V	--
External Input Voltage for(DC/DC)	VSP	4.8	--	6.0	V	--
External Input Voltage for(DC/DC)	VSN	-4.8	--	-6.0	V	--
TFT Gate ON Voltage	VGH	--	11	--	V	Note 2
TFT Gate OFF Voltage	VGL	--	-7	--	V	Note 2
TFT Common Voltage	Vcom	-2	--	0	V	Note 1

Note 1: VCOM value should be adjusted by different condition to optimize Flicker Value.

Note 2: VGH and VGL are the operating voltages of TFT gate.

4.2 Back-Light Unit Characeristics

The back-light system is an edge-lighting type with 14 white LEDs. The characteristics of the back-light are shown in the following tables.

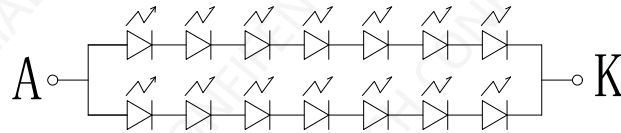
Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _F	19.6	--	22.4	V	--
Forward current	I _F	--	40	--	mA	--
Luminance(With LCD+CTP)	L _v	--	470	--	cd/m ²	--
LED life time	N/A	--	30,000	--	Hr	Note 1



Note:

- (1) The “LED life time” is defined as the module brightness decrease to 50% of original brightness at $I_L=20\text{mA/LED}$. 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	Description
1	ID (GND)	Power Ground
2	LEDK1	Power supply for backlight cathode input terminal.
3	LEDK2	Power supply for backlight cathode input terminal.
4	NC	NC
5	LEDA2	Power supply for backlight anode input terminal.
6	LEDA1	Power supply for backlight anode input terminal.
7	NC	NC
8	GND	Power Ground
9	GND	Power Ground
10	D3N	Negative polarity of low voltage differential data 3 signal
11	GND	Power Ground
12	D3P	Positive polarity of low voltage differential data 3 signal
13	GND	Power Ground
14	D0N	Negative polarity of low voltage differential data 0 signal
15	GND	Power Ground
16	D0P	Positive polarity of low voltage differential data 0 signal
17	GND	Power Ground
18	CLKN	Negative polarity of low voltage differential clock signal
19	GND	Power Ground
20	CLKP	Positive polarity of low voltage differential clock signal
21	GND	Power Ground



22	D1N	Negative polarity of low voltage differential data 1 signal
23	GND	Power Ground
24	D1P	Positive polarity of low voltage differential data 1 signal
25	GND	Power Ground
26	D2N	Negative polarity of low voltage differential data 2 signal
27	GND	Power Ground
28	D2P	Positive polarity of low voltage differential data 2 signal
29	GND	Power Ground
30	GND	Power Ground
31	TE	Tearing effect signal is used to synchronize MCU to frame memory
32	GND	Power Ground
33	PWM	This pin is connecting with the external LED driver.
34	VSP	External input voltage (4.8V~6V)
35	GND	Power Ground
36	IOVCC	Power Supply For I/O.
37	RESET	Reset signal input terminal. Active at 'L'.
38	VSN	External input voltage (-4.8V~-6V)
39	NC	NC

CTP PIN Description:

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



6. Timing Characteristics

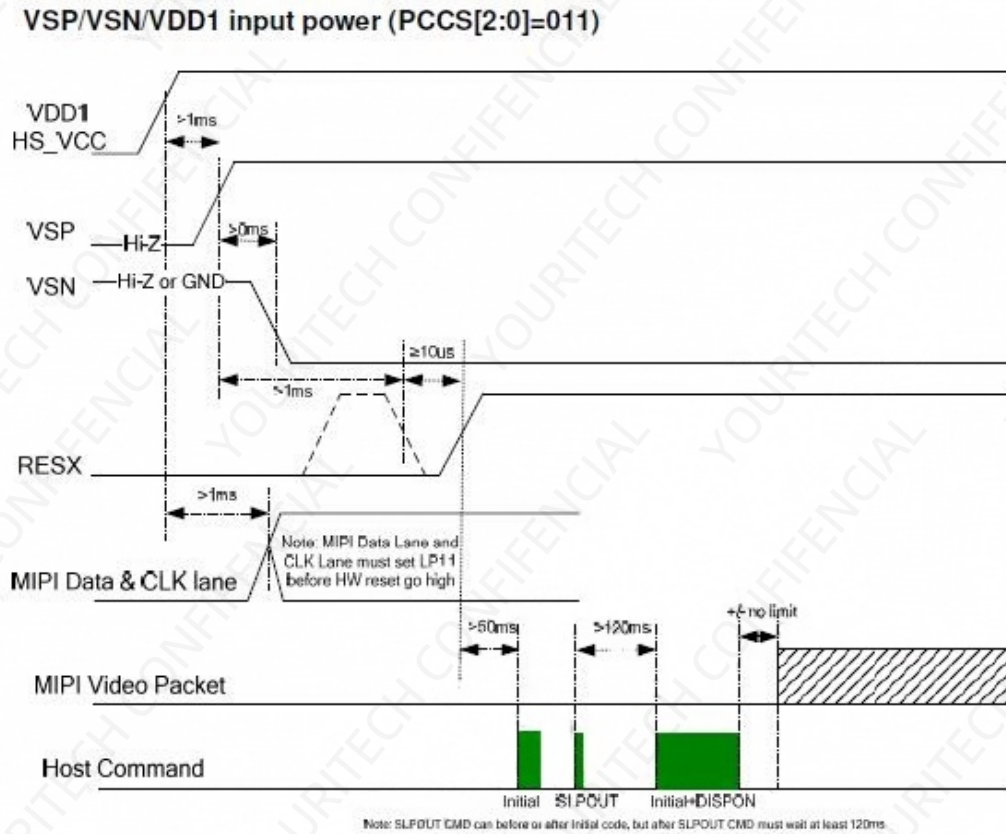


Figure 5.34: VSP/VSN/VDD1 input power on sequence (PCCS[2:0]=011)

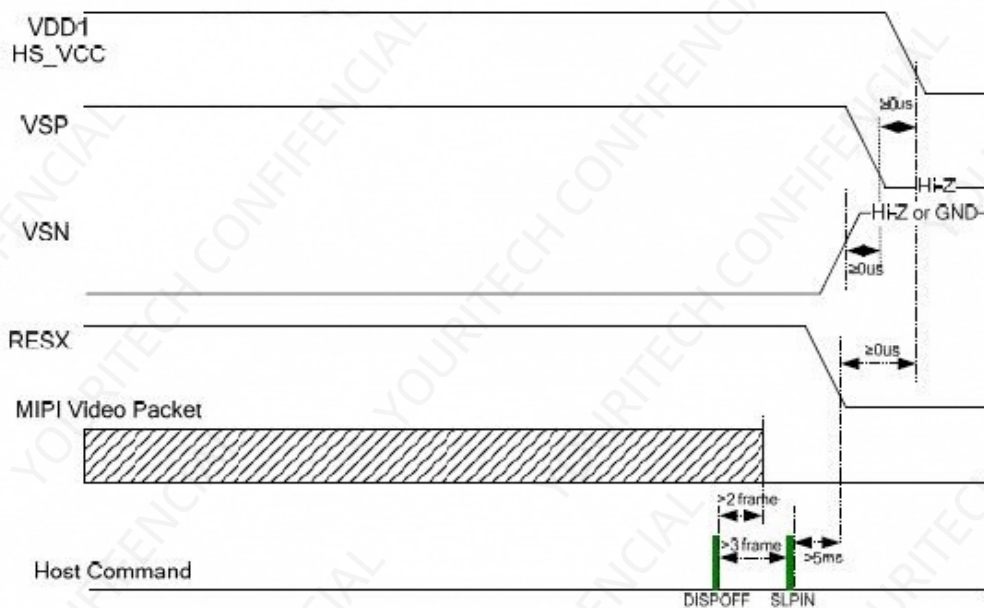


Figure 5.35: VSP/VSN/VDD1 input power off sequence (PCCS[2:0]=011)



Timings for DSI video mode

Vertical Timings

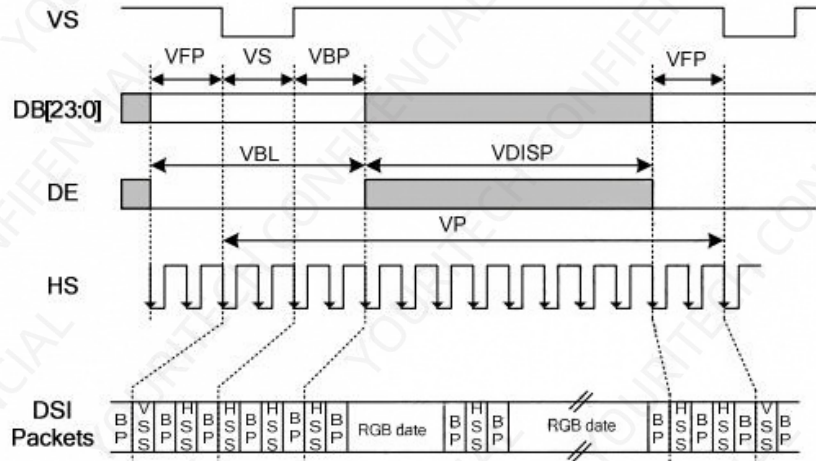


Figure 8.10: Vertical timings for DSI I/F

Vertical Resolution=528+8xNL (VSSA=0V, VDD1=1.8V, VDD3=2.8V, T_A=25 °C)

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Vertical cycle	VP	-	534+8xNL	-	-	Line
Vertical low pulse width	VS	-	2	-	Note ⁽¹⁾	Line
Vertical front porch	VFP	-	2	-	-	Line
Vertical back porch	VBP	-	2	-	Note ⁽¹⁾	Line
Vertical data start point	-	VS+VBP	4	-	Note ⁽¹⁾	Line
Vertical blanking period	VBL	VS+VBP+VFP	6	-	-	Line
Vertical active area	-	VDISP	-	528+8xNL	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

Note: (1) The VS and VBP pulse width are related to GSP and GCK timing. The GSP and GCK must be set at corresponding position for LCD normal display.

Table 8.14: Vertical timings for DSI I/F

Horizontal Timings

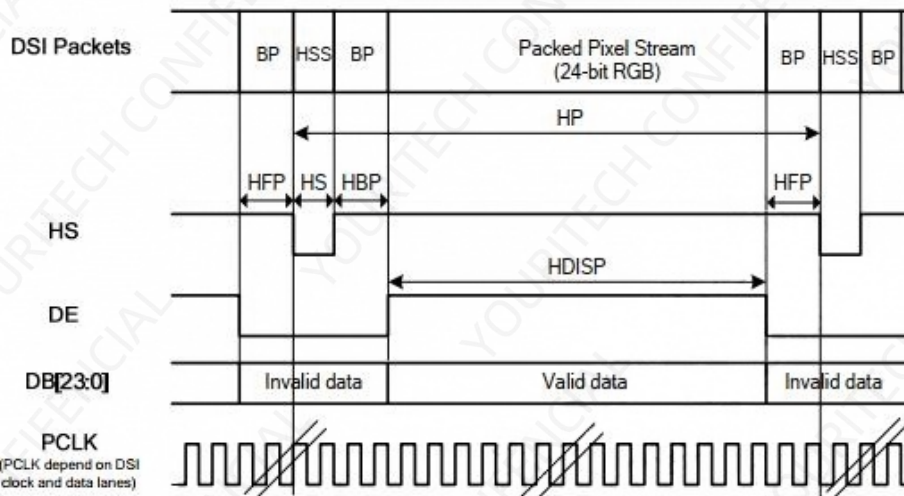


Figure 8.11: Horizontal timing for DSI video mode I/F



Horizontal Resolution=H_RES(1200/1080/1024/960/900/800/720) (VSSA=0V, VDD1=1.8V, VDD3 = HS_VCC =2.8V, T_A=25°C)

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
HS cycle	HP	-	H_RES+15	-	-	DCK
HS low pulse width	HS	-	5	-	-	DCK
Horizontal back porch	HBP	-	5	-	-	DCK
Horizontal front porch	HFP	-	5	-	-	DCK
Horizontal data start point	-	HS+HBP	10	-	-	DCK
Horizontal blanking period	HBLK	HS+HBP+HFP	15	-	-	DCK
Horizontal active area	HDISP	-	-	H_RES	-	DCK

Table 8.15: Horizontal timings for DSI video mode I/F

Reset input timing

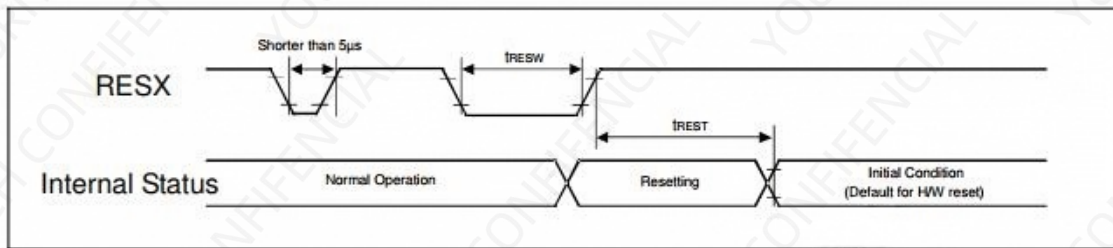


Figure 8.12: Reset input timing

Symbol	Parameter	Related pins	Spec.			Unit	Note
			Min.	Typ.	Max.		
t _{RESW}	Reset low pulse width ⁽¹⁾	RESX	10	-	-	µs	-
t _{REST}	Reset complete time ⁽²⁾	-	-	-	50	ms	-

Note: (1) 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 5µs	Reset Rejected
Longer than 10µs	Reset
Between 5µs and 10µs	Reset Start

(2) During Reset Complete Time, OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (t_{REST}) within 5ms after a rising edge of RESX.

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

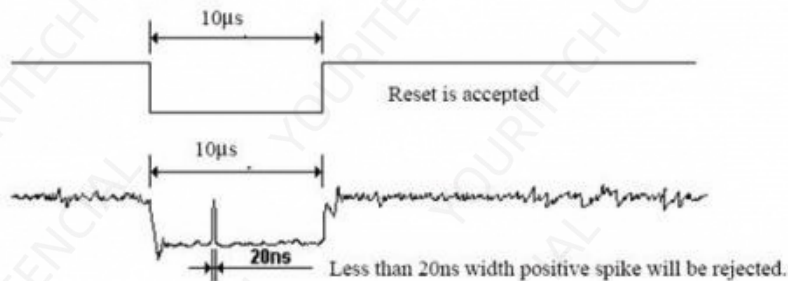


Table 8.16: Reset timing



7.Optical Characteristics

Item	Symbol	Conditions	Specifications			Unit	Note
			Min.	Typ.	Max.		
Transmittance (Polarizer with APCF @ EBBG BL)	Trans	$\theta = 0^{\circ}$	3.6	4.2		%	1.POL without APCF 2.BL rank: AOT 3004C-W3M3 (avg. Bt09&29) (0.285,0.262) 3.Metrology : DMS900 4.wo TOD 5.VLC dark <0.2V, VLC white=5.3V
Contrast Ratio	CR		700	1000			
Response Time (By Quick)	Tr + Tf			35	45	ms	
Viewing Angle	Top	$CR \geq 10$	--	80	--	deg.	
	Bottom		--	80	--		
	Left		--	80	--		
	Right		--	80	--		
LCM Chromaticity	Rx	$\theta = 0^{\circ}$		0.6447			
	Ry			0.3367			
	Gx			0.3161			
	Gy			0.6228			
	Bx			0.1501			
	By			0.0438			
	Wx			0.3147			
	Wy			0.3284			
NTSC		$\theta = 0^{\circ}$	60	70	-	--	

*Note(1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

L255 : Luminance of gray level 255

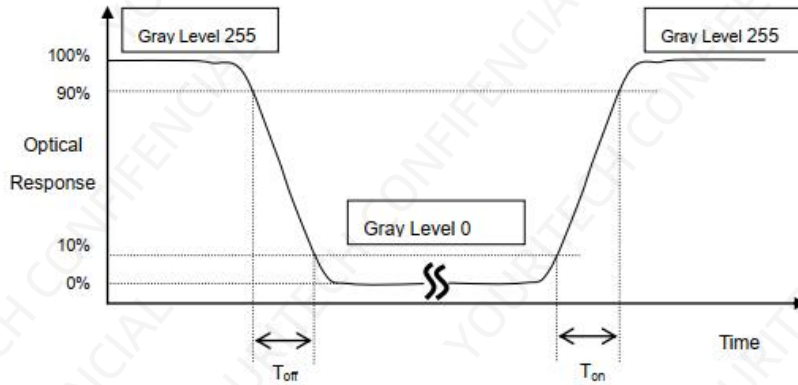
L 0: Luminance of gray level 0

CR = CR (5)

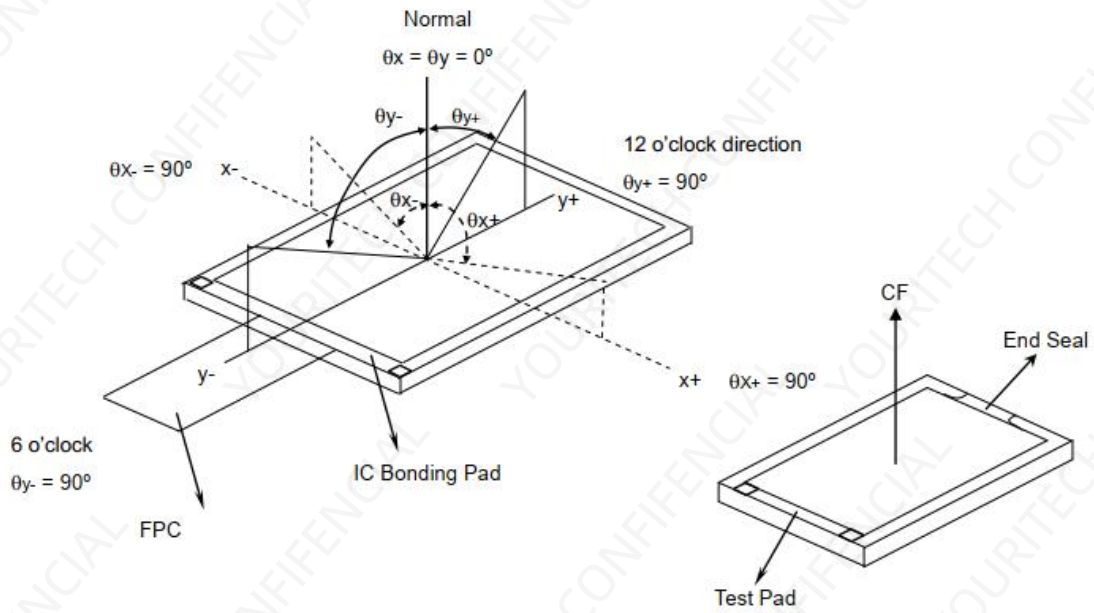
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).



*Note (2) Definition of Response Time (T_{on} , T_{off}):

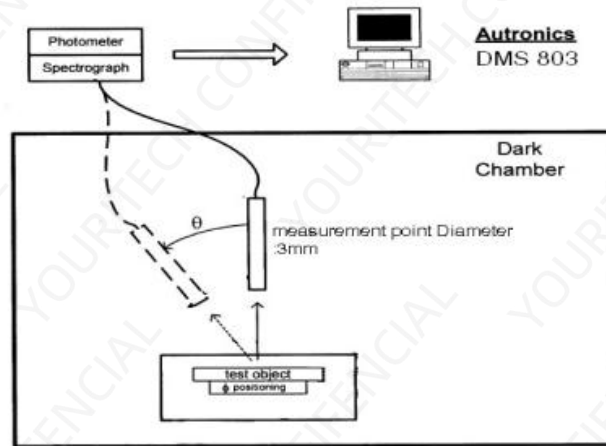


*Note(3) Definition of Viewing Angle

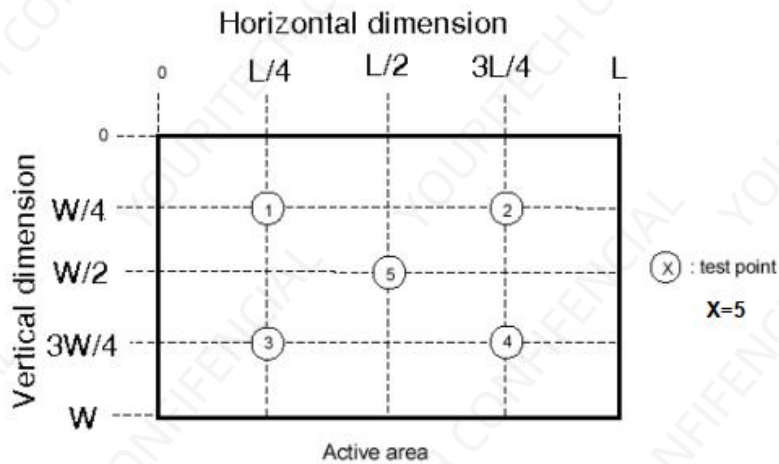


***Note (4) Measurement Set-Up:**

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



***Note (5)**



8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+80°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	+70°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), 10 cycles	

9. Packing Method----TBD

- END -

