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Cover glass

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OEM Solutions

Custom Display

Production Custom designs Installation

Mechanical design



Customer : _____

CustomerP/N _____

Model No. : ET093HD01-GX

Version : V00

Date : 2022-05-23

Final Approval by Customer

LCM Machinery OK ☐	Checked By	
LCM Display OK ☐	Checked By	
LCM NG ☐ LCM OK ☐	Approved By	

ShenZhen GX Confirmed :

DESIGN	CHECK	APPROVAL



1. GENERAL DESCRIPTION

1.1 DESCRIPTION

ET093HD01-GX is a transmissive type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module (TFT-LCD panel, driver IC and FPC), a back-light unit and. The resolution of 600*1600 pixels.

1.2 GENERAL INFORMATION

Items	Specification	Unit	Note
Display mode	a-si Normally Black	-	-
LCM outline size	89(H) x 231(V) x4.6(T)	mm	Note (1)(2)
Active area	82.944(H)x221.184(V)	mm	-
Number of pixels	600x1600	pixels	-
Pixel arrangement	RGB stripe	-	-
Pixel size	0.04608(H)x0.13824(V)	mm	-
Display color	16.7M	color	-
Viewing direction	ALL	-	-
Data interface	MIPI	-	
Backlight	6 White LEDs In Series 3 Parallels	-	
Weight	TBD	g	

Notes:

- (1) Touch panel and back-light unit are included.
- (2) FPC no included. (Refer to the module outline dimension for further information). Please see module specification drawing in Page14 for more details.



2. ELECTRICAL CHARACTERISTICS

2.1 LCM DC CHARACTERISTICS

(Ta=25±2°C)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage 1	DVDD	2.8V	3.3V	3.6V	V	
Power Supply Voltage 2	AVDD	-	-	-	V	
Power Supply Voltage 3	VGH	-	-	-	V	
Power Supply Voltage 4	VGL	-	-	-	V	
Power Supply Voltage 5	VCOM	-	-	-	V	Note 1
Current Consumption	I _{DD}	-	40	-	mA	Normal mode
	I _{DD-SLEEP}	-	2	-	mA	Sleep mode
Input voltage "L" Level	V _{IL}	GND	-	0.3VDD1	V	DVDD=3.0~3.6 6
Input voltage "H" Level	V _{IH}	0.7VDD1	-	VDD1	V	
Output voltage "L" Level	V _{OL}	0	-	0.2VDD1	V	I _{OL} =1mA
Output voltage "H" Level	V _{OH}	0.8VDD1	-	VDD1	V	I _{OH} =-1mA

Note:

(1) vcom must be adjusted to optimize display quality_flicker pattern.

2.2 BACK-LIGHT UNIT CHARACTERISTICS

The back-light system is an edge-lighting type with 27 white LEDs. The characteristics of the back-light are shown in the following tables.

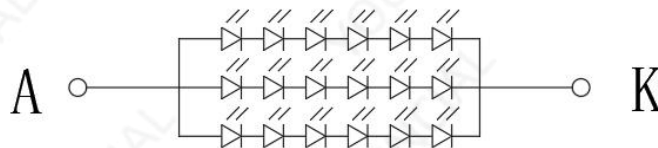
(Ta=25±2°C)

Characteristics	Symbol	Condition	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _f	I _L =150mA	--	18	19.2	V	-
Forward current	I _L		150	180	--	mA	-
LED life time	--	I _L =150mA	20,000	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=150mA. The LED life time could be decreased if operating I_L is larger than 150mA.

Backlight circuit diagram shown in below:



3. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room.

Measuring equipment: BM-5AS, BM-7, EZ-Contrast.

(Ta=25±2°C)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center point)		C/R	-	1000	1200	-	-	BM-7 Note(2)
Luminance of white (Center point)		L _w	B/L on	700	750	-	cd/m ²	BM-7
Luminance uniformity		U _w	θ = 0. Normal viewing angle B/L On Note(1)	75	80	-	%	BM-7 Note(3)
Response Time		Tr + Tf		-	20	30	ms	BM-5AS Note(4)
Color Chromaticity (CIE 1931)	White	W _x		-	-	-	-	BM-7 Note(5)
		W _y		-	-	-		
	Red	R _x		-0.03	0.647	+0.03		
		R _y		-0.03	0.322	+0.03		
	Green	G _x		-0.03	0.262	+0.03		
		G _y		-0.03	0.557	+0.03		
	Blue	B _x		-0.03	0.134	+0.03		
		B _y		-0.03	0.106	+0.03		
Viewing Angle	Hor.	θ _L	C/R≥10	-	85	-	Deg	EZ Contrast Note(6)
		θ _R		-	85	-		
	Ver.	θ _u		-	85	-		
		θ _D		-	85	-		
Optima View Direction			ALL					Note(7)

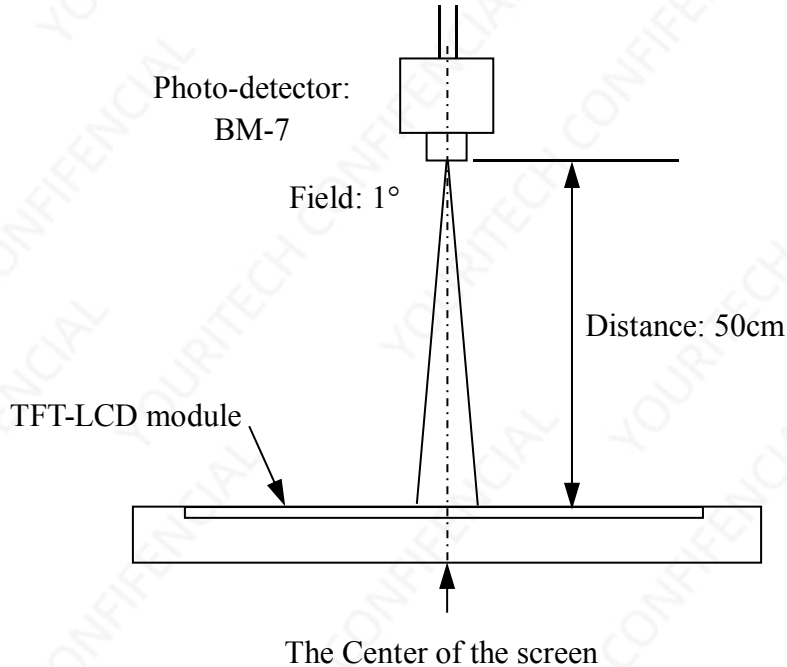
* This condition will be changed by the evaluation circumstance. If product is exposed to high temperatures for extended time, there is a possibility of the polarizer film damage which could degrade the optical characteristics.

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,



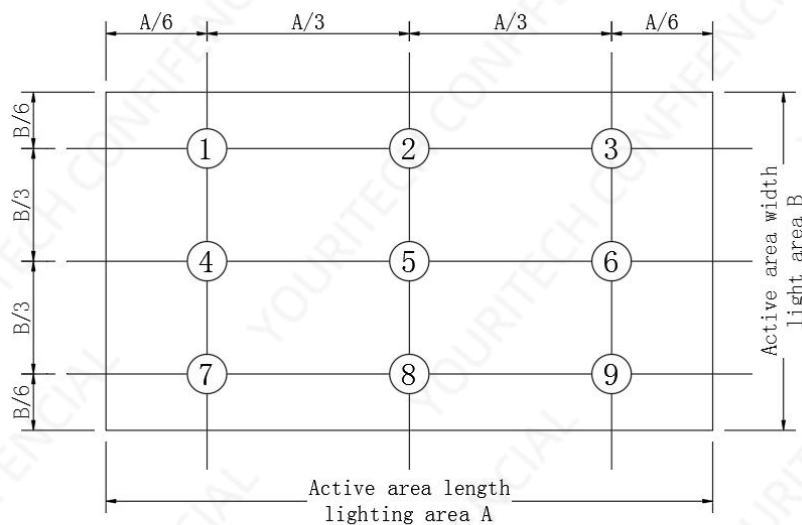
windless, and dark room 30min after lighting the back-light. This should be measured in the center of screen.



- (2) Definition of Contrast Ratio (CR):

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

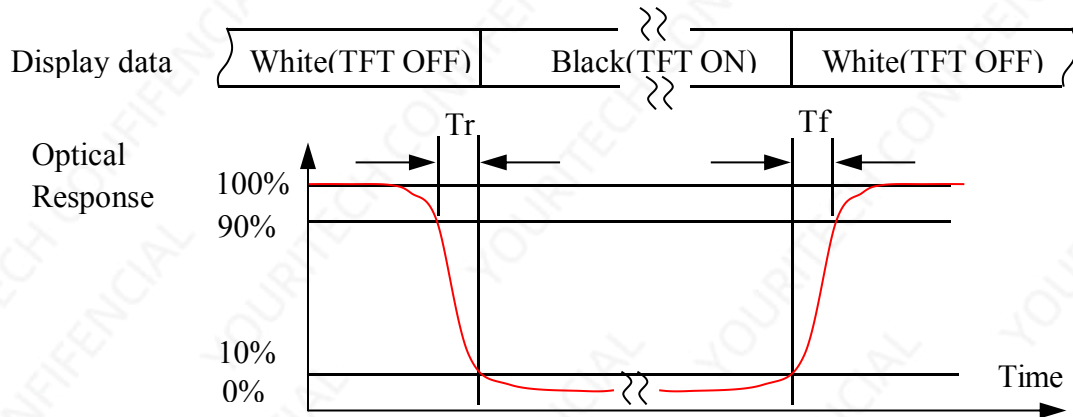
- (3) Definition of Luminance Uniformity: Active area is divided into 9 measuring areas (Shown in below), every measuring point is placed at the center of each measuring area.



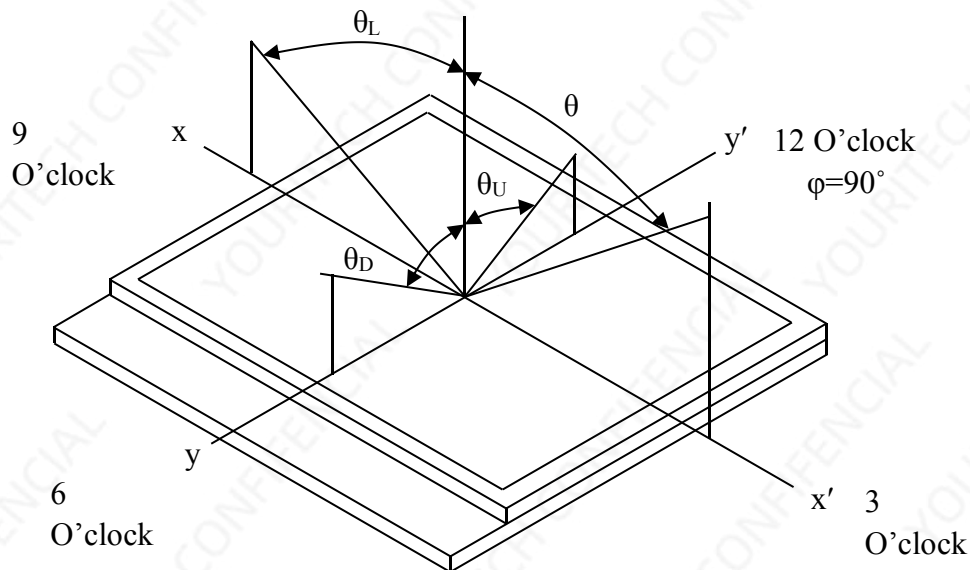
$$\Delta \text{Uniformity} = \frac{\text{Minimum Luminance of 9points}}{\text{Maximum Luminance of 9points}} * 100\%$$



- (4) Definition of Response time: Sum of T_r and T_f .



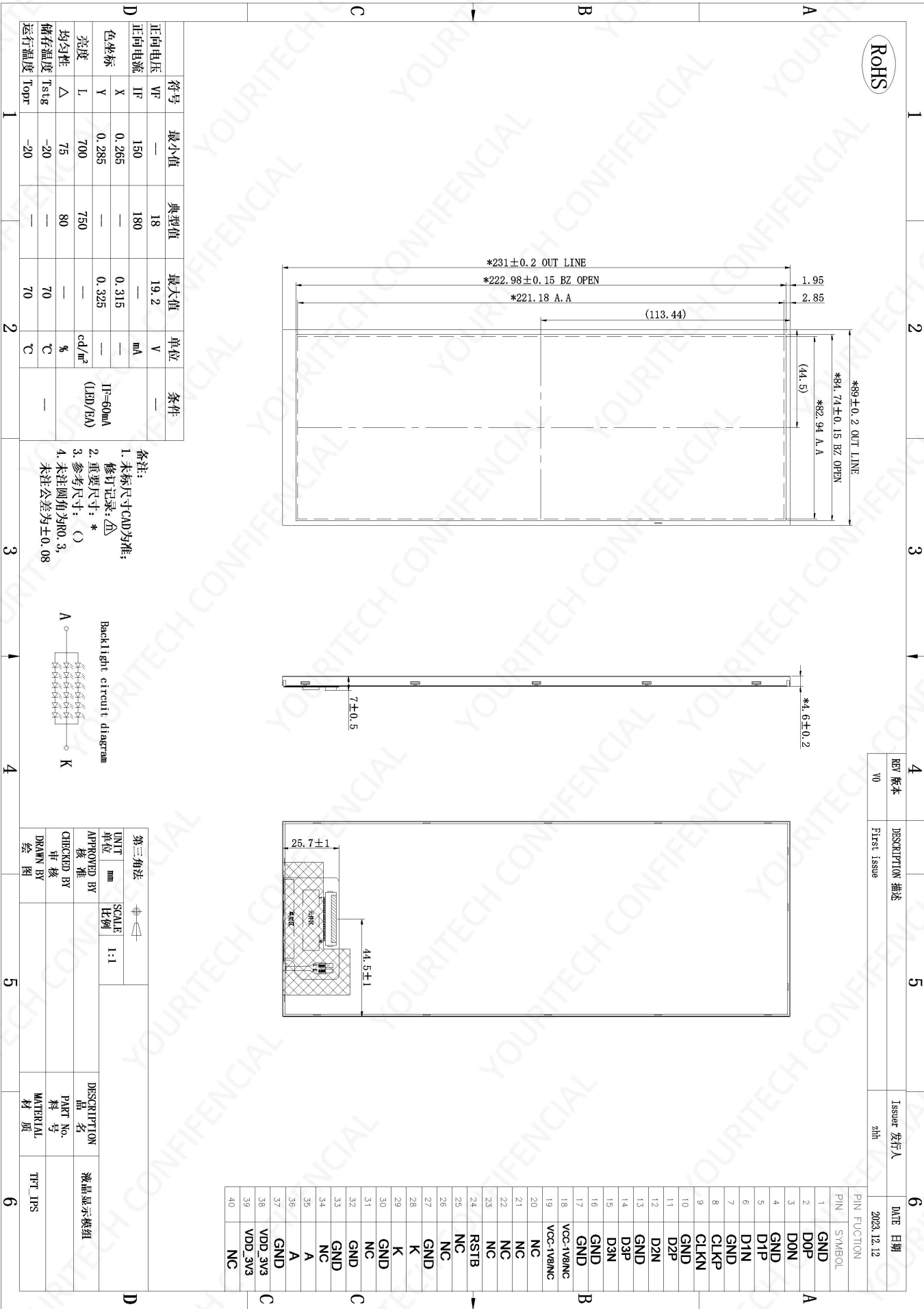
- (5) Definition of Viewing Angle: The viewing angle range that the $CR \geq 10$.



- (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.



4. MODULE OUTLINE DIMENSION



5. MODULE INTERFACE DESCRIPTION

No.	Symbol	Function
1	GND	Ground
2	D0N	High speed interface data differential signal input/output pins.
3	D0P	High speed interface data differential signal input/output pins.
4	GND	Ground
5	D1N	High speed interface data differential signal input pins
6	D1P	High speed interface data differential signal input pins
7	GND	Ground
8	CLKP	High speed interface CLOCK differential signal input pins.
9	CLKN	High speed interface CLOCK differential signal input pins.
10	GND	Ground
11	D2N	High speed interface data differential signal input pins
12	D2P	High speed interface data differential signal input pins
13	GND	Ground
14	D3N	High speed interface data differential signal input pins
15	D3P	High speed interface data differential signal input pins
16	GND	Ground
17	GND	Ground
18	NC	No Connection
19	NC	No Connection
20~23	NC	No Connection
24	RESET	Device reset signa
25~26	NC	No Connection
27	GND	Ground
28~29	LED_K	BL -
30	GND	Ground
31	NC	No Connection
32~33	GND	Ground
34	NC	No Connection
35~36	LED_A	BL +
37	GND	Ground
38~39	VCC	3.3V
40	NC	No Connection



6. REFERENCE APPLICATION CIRCUIT

Please consult our technical department for detail information.

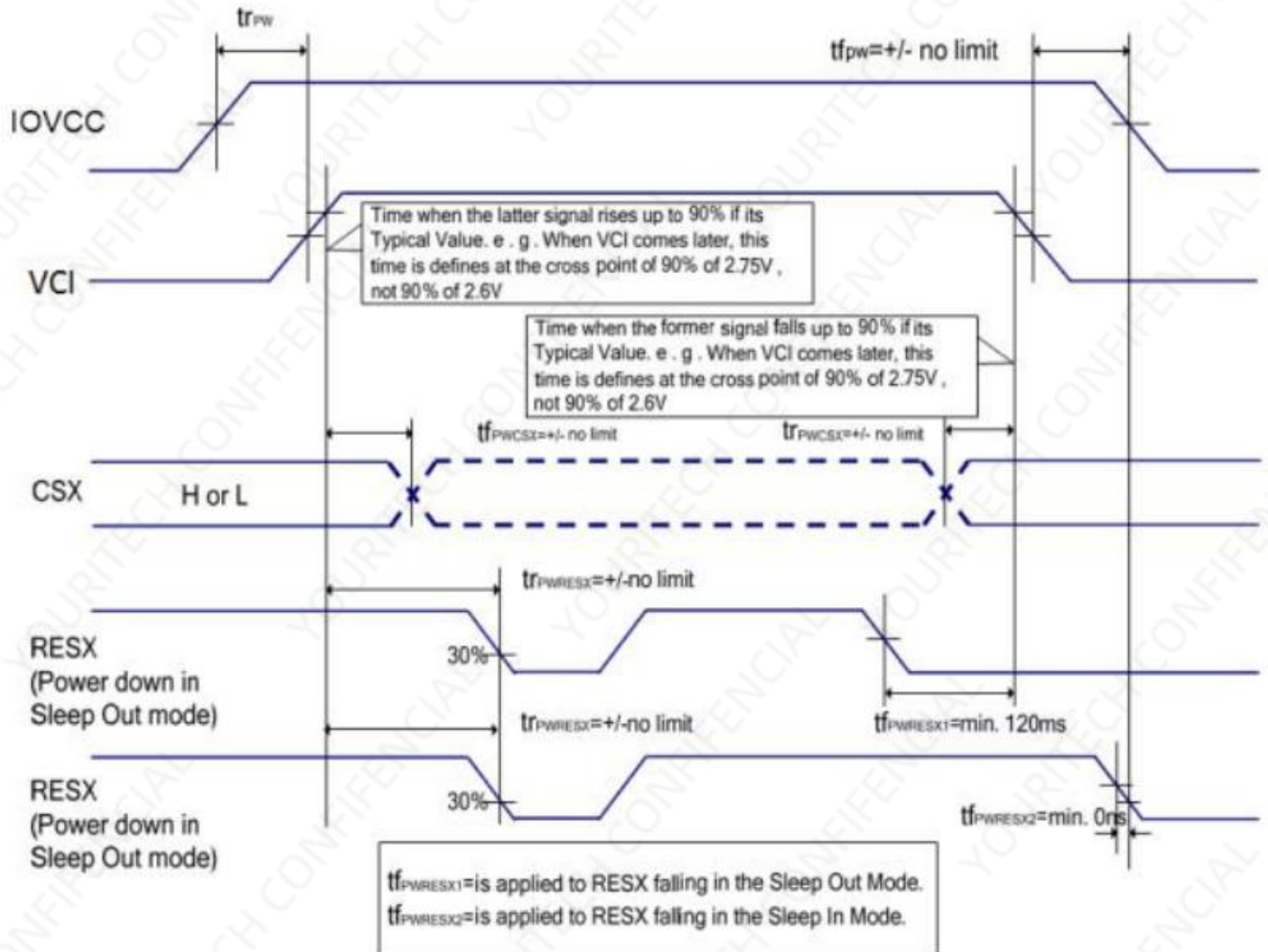
7. TIMINGS FOR MIPI Interface

7.1 Timing Waveform



7.2 Power on/off

If RESX line is held High or unstable by the host during Power On, then a Hardware Reset must be applied after both VCI and IOVCC have been applied – otherwise correct functionality is not guaranteed. There is no timing restriction upon this hardware reset.



8. RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition	Notes
1	High Temperature Storage	+70°C / 120H	Non-operation
2	Low Temperature Storage	-20°C / 120H	Non-operation
3	High Temperature Operating	+70°C / 120H	Operation
4	Low Temperature Operating	-20°C / 120H	Operation
5	Vibration Test	60°C x 90%RH / 120H	Non-operation
6	Thermal Shock	Cycle display from -20°C 0.5hr~20°C 5mins ~ 60°C 0.5hr~20°C 5min,.100 cycles	Non-operation



9. PACKING SPECIFICATION

