深圳市華宇彩晶科技有限公司
SHENZHEN UNICO DISPLAY TECHNOLOGY CO.,LTD

PRODUCT SPECIFICATION

Rev. 3

Customer Name:

Customer No:

Module No: UD0088PS069

CUSTOMER'S APPROVAL:		
A:尺寸（Structure）	**□OK**	**□NG**
B:效果（Effection）	**□OK**	**□NG**
C:可靠性（Reliability）	**□OK**	**□NG**
D:其他（Other）		
客户签字/日期（**Customer's Signature&Date**）：		

Please sign the cover page of the spec for your approval and return it to our local sales within a month after your receipt of the spec from Unico Display. In the case Unico Display does not receive the signed spec even after one month later; in general we will consider that the spec was already accepted by your company.

Address: 深圳市南山區深圳軟件園二期九棟四樓東 402

Prepared	Checked	Approved	Date

Tel: 0755-86555255 **Fax: 0755-86555256**

History of Versions and Modifications

Rev.	Date	Modifications	Page
1	2013.10.11	First issue	All
2	2013.11.14	增加导电布	4
3	2013.12.16	修正品质标准	14

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1. GENERAL DESCRIPTION

1.1 Introduction

Shenzhen Unico Display model **UD0088PS069** is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back-light system. This TFT LCD has a **6.95** inch diagonally measured active display area with **HD** (**720** horizontal by **1280**vertical pixel) resolution.

1.2 Features

- **6.95** inch configuration
- **MIPI** interface
- **LED** Backlight
- RoHS Compliance

1.3 Applications

- Multimedia applications
- Mobile Phone applications

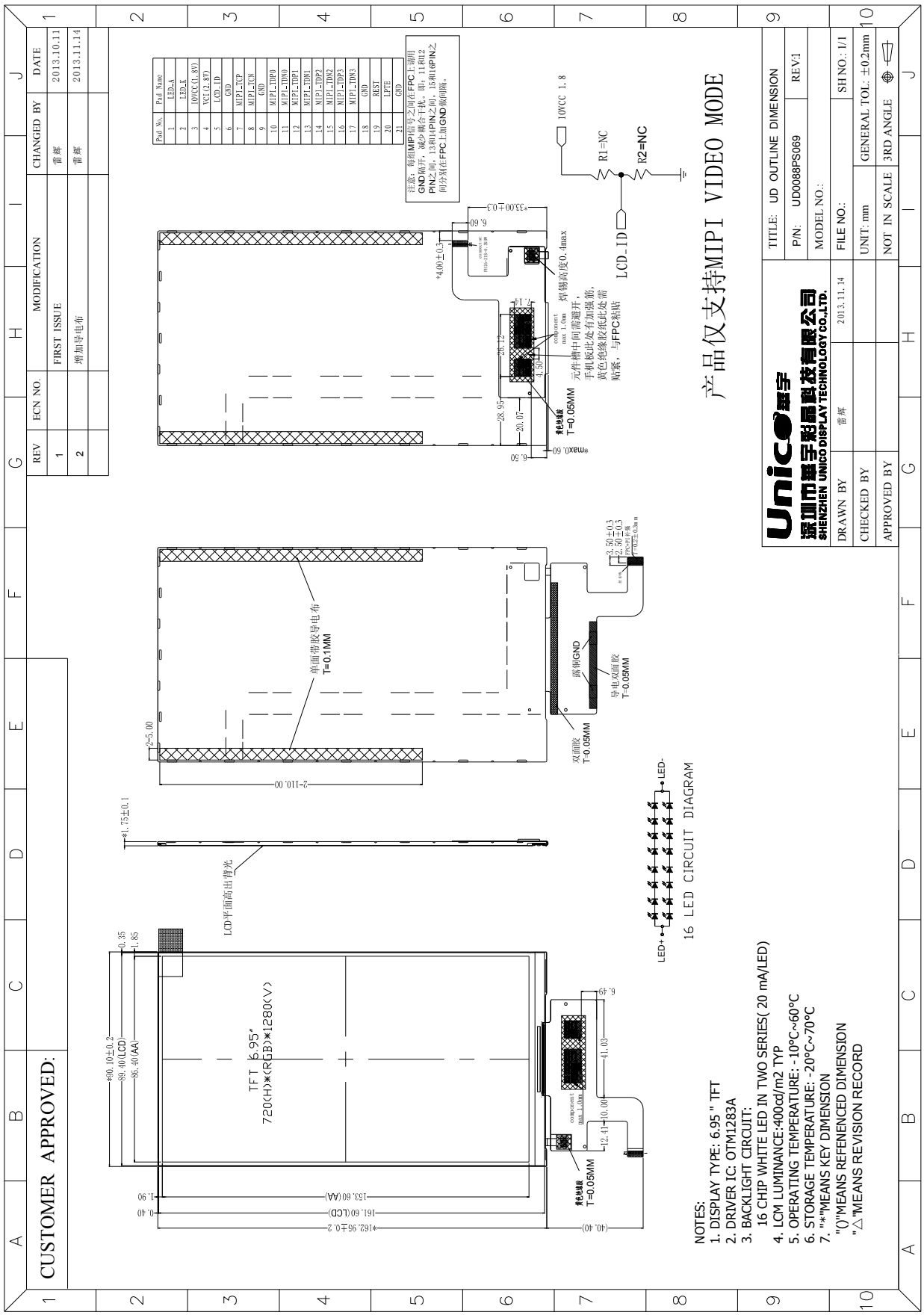
1.4 General information

Size	6.95"
Display Type	16.7M TFT
Display Mode	NORMAL BLACK
Viewing Direction	IPS
Connection Type	ZIF
Interface	MIPI
ColorPixel Arrangement	RGB Vertical Stripe
Driving IC	OTM1283A

1.5 Mechanical Description

Item	Standard Value	Unit	Remark
Number of dots	720RGB×1280dots	-	
LCM dimension	90.1(W)×162.95(H)×1.75(T)	mm	
Active area	86.4(W)×153.6(H)	mm	
Dot pitch	0.12(W)×0.12(H)	mm	
Backlight	16-CHIP-white LEDS two Series	/	
The KEY and accessory materials of our product according with ROHS standard			

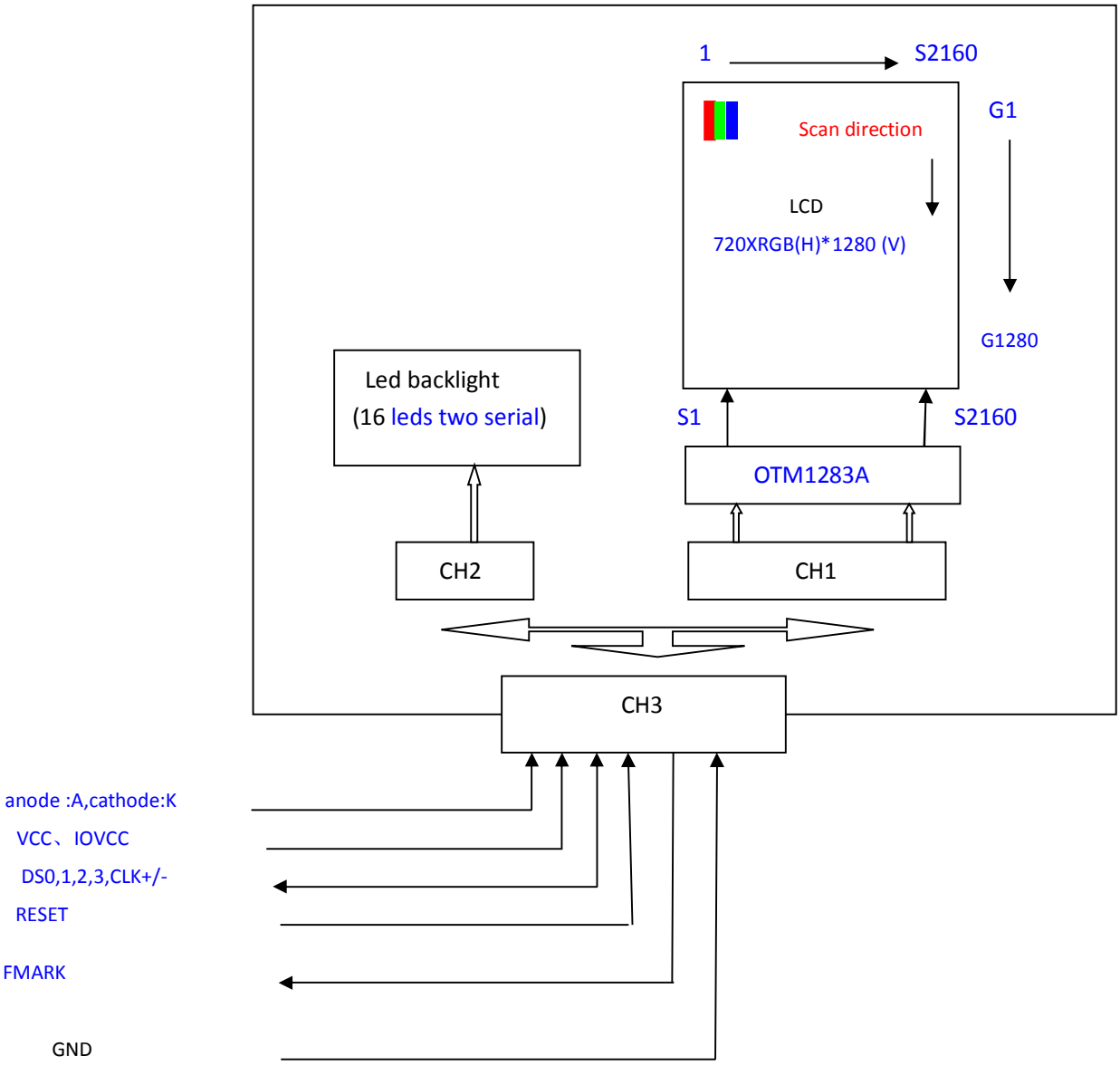
2. OUTLINE DIMENSION



3.PIN ASSIGNMENTS

No.	Signal	I/O	Fuction	
1	LED_A	P	LED Anode(+)	
2	LED_K	P	LED Cathode(-)	
3	IOVCC(1.8V)	P	Power supply(1.8v)	
4	VCI(2.8V)	P	Power supply(2.8v)	
5	LCD_ID	--	Open	
6	GND	P	Ground	
7	MIPI_TCP	I	MIPI-DSI clock Lane positive-end input pin	
8	MIPI_TCN	I	MIPI-DSI clock Lane negative-end input pin	
9	GND	P	Ground	
10	MIPI_TDP0	I/O	MIPI-DSI data Lane 0 positive -end input/output pin	
11	MIPI_TDN0	I/O	MIPI-DSI data Lane 0 negative -end input/output pin	
12	MIPI_TDP1	I	MIPI-DSI data Lane 1 positive -end input/output pin	
13	MIPI_TDN1	I	MIPI-DSI data Lane 1 negative -end input/output pin	
14	MIPI_TDP2	I	MIPI-DSI data Lane 2 positive -end input/output pin	
15	MIPI_TDP2	I	MIPI-DSI data Lane 2 negative -end input/output pin	
16	MIPI_TDP3	I	MIPI-DSI data Lane 3 positive -end input/output pin	
17	MIPI_TDN3	I	MIPI-DSI data Lane 3 negative -end input/output pin	
18	GND	P	Ground	
19	REST	I	Reset signal	
20	LPTE	O	Tearing effect output pin	
21	GND	P	Ground	

4.BLOCK DIAGRAM



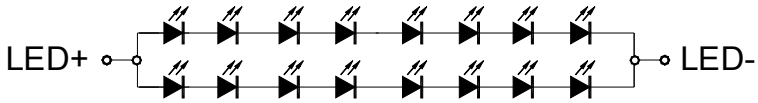
5. BACKLIGHT CHARACTERISTICS

5.1 Backlight specification

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	Vf	Ta=25℃,If=20mA	--	24	-	V
Forward Current	If	Ta=25℃,Vf=19.2V	--	40	--	mA
Uniformity	Avg		80			%
Reverse Current	Ir				20	uA
Power consumption	Pd			960		mW
Drive method	Constant current 40mA/LED					

LED configuration	16 LEDs in two series

5.2 LED Circuit Diagram



16 LED CIRCUIT DIAGRAM

6.ELECTRICAL CHARACTERISTICS

LCD MODULE DC CHARACTERISTICS **VSS=0,Ta=25℃**

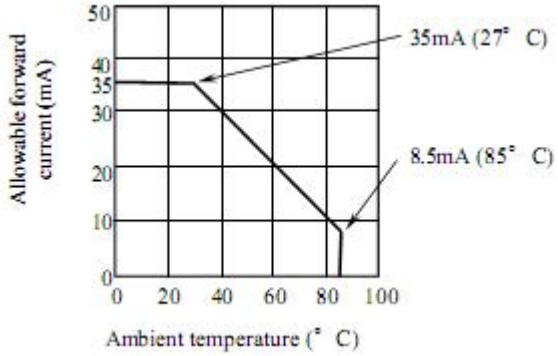
Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Power Supply Voltage for I/O Interface	IOVCC	-----	1.65	1.8	3.3	V	
Power Supply Voltage for Analog and MIPI-DSI	VCC	-----	2.3	2.8	4.8	V	
Power Supply for Switching Regurater	VCI	-------	2.3	2.8	4.8	V	
Input Voltage for Logic Circuits	Vi	"H" level	0.80×IOVCC	-	IOVCC	V	
		"L" level	0		0.20×IOVCC	V	
Output Voltage for Logic Circuits	Vo	"H" level	0.80×IOVCC	-	IOVCC	V	
		"L" level	0		0.20×IOVCC	V	
Power Supply Current for IOVCC	Iio	Display on	-	-	TBD	mA	
		Sleep IN	-	-	TBD	uA	
Power Supply Current for VCC and VCI	Icc+Ici	Display on	-	-	TBD	mA	
		Sleep IN	-	-	TBD	uA	

7. ABSOLUTE MAXIMUM RATINGS

7.1ELECTRICAL ABSOLUTE MAXIMUM RATINGS OF LCD **VSS=0,Ta=25℃**

Item	Symbol	Min	Max	Unit	Note
Power Supply for Interface	IOVCC	-0.3	6.0	V	(1) (4)
Power Supply for Analog and MIPI-DSI	VCC	-0.3	4.5	V	(1)
Power Supply for Switching Regurater	VCI	-0.3	4.5	V	(1)
Input Voltage	Vi	-0.3	4.5	V	(2)
LED Reverse Voltage	Vr	-	5	V	Per led
LED Forward Current	Iled	-	Note(3)	mA	Per led

Notes (1) Keep all Voltages no lower than GND.
(2) Applies to the RES.
(3) Ambient Temperatures vs. Allow able Forward Current.



(4) IOVCC < VCI

7.2ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

Item	Operating		Storage		Remark
	Min	Max	Min	Max	
Ambient temperature	-20°C	70°C	-30°C	80°C	Note(2)
Humidity	Note(1)		Note(1)		No condensation

Notes (1) Ta < 40°C 85%RH max.
Ta > 40°C Absolute humidity must be lower than the humidity of 85%RH at 40°C.
(2) Background color slightly changes depending on ambient temperature and viewing angle.

8. OPTICAL CHARACTERISTICS

8.1Optical specification

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Contrast		CR	Θ=0 Normal viewing angle	-	600	-		(1)(2)
Response time		Tr+Tf		-	30	40	ms	(1)(3)
White Brightness (Center)		L		-	400	-	cd/m2	(1)(4)
Viewing angle	Hor	Θ_L	CR>10	-	85	-		
		Θ_R		-	85	-		
	Ver	Θ_U		-	85	-		
		Θ_D		-	85	-		
Brightness uniformity		U	Θ=0	-	80	-		(5)
Color Tone (Primary Color)	red	x	Θ=0	-	TBD	-	-	CF glass-
		y		-	TBD	-		
	green	x		-	TBD	-		
		y		-	TBD	-		
	blue	x		-	TBD	-		
		y		-	TBD	-		
	white	x		-	TBD	-		
		y		-	TBD	-		
NTSC Ratio		-		-	60	-	%	
Optima View Direction		IPS						(6)

8.2 Measuring Condition

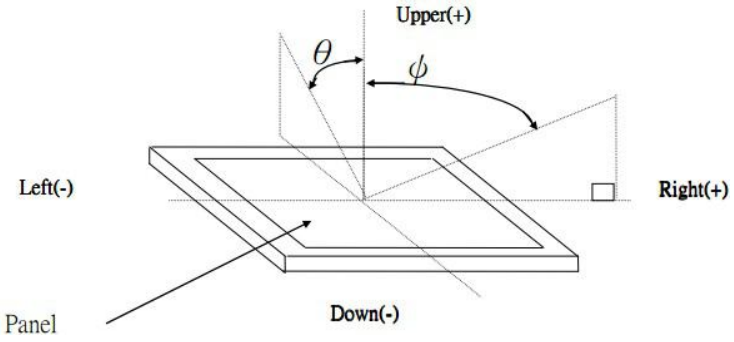
- Measuring surrounding: dark room
- LED current I_L: 40mA
- Ambient temperature: 25±2°C

■Power supply voltage : IOVCC=1.8V, VCC=VCI=2.8V
■Backlight current : ILED=20mA

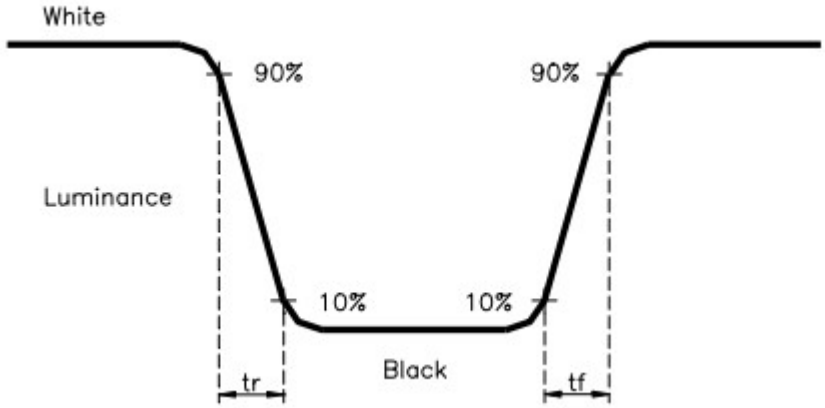
8.3 Measuring Equipment

■ BM-7

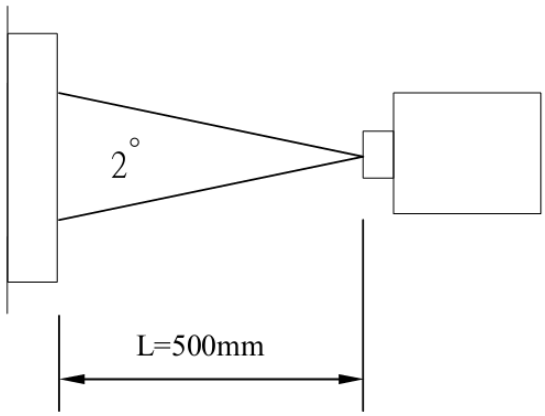
Note (1) Definition of Viewing Angle:



Note (2) Definition of response time：The response time is defined as the time interval between the 10% and 90% amplitudes

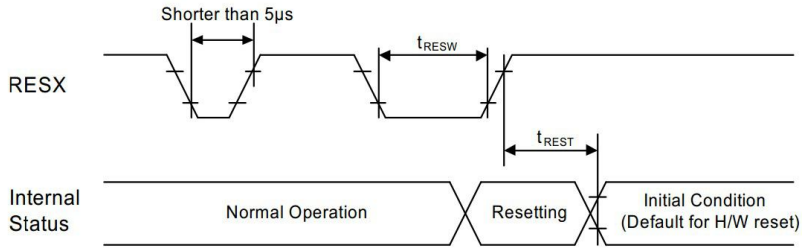


Note (3) Definition of optical measurement setup



9. SEQUENTIAL CHART

9.1 RESET TIMING CHARACTERISTICS



(VSS=VSSI=DVSS=0V, VDDI=1.65V to 3.3V, VDD=2.3V to 4.8V,Ta = -30 to 70°C)

Signal	Symbol	Parameter	MIN	TYP	MAX	Unit	Description
RESX	tRESW	Reset ″L″ pulse width (Note 1)	10	--	--	US	
	tREST	Reset complete time (Note 2)	--	--	5	MS	When reset applied during Sleep In Mode
			--	--	120	MS	When reset applied duringSleepOut Mode

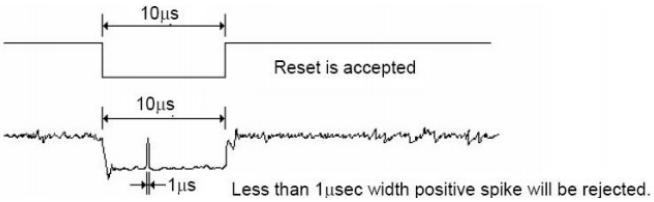
Note 1) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

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

Note 2) 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 return to Default condition for H/W reset.

Note 3) During Reset Complete Time, values in OTP memory will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (tREST) within 5ms after a rising edge of RESX.

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



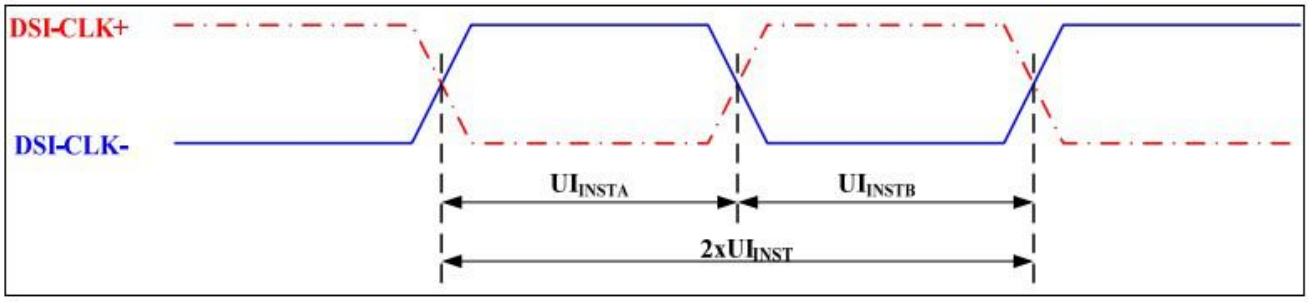
Note 5) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command

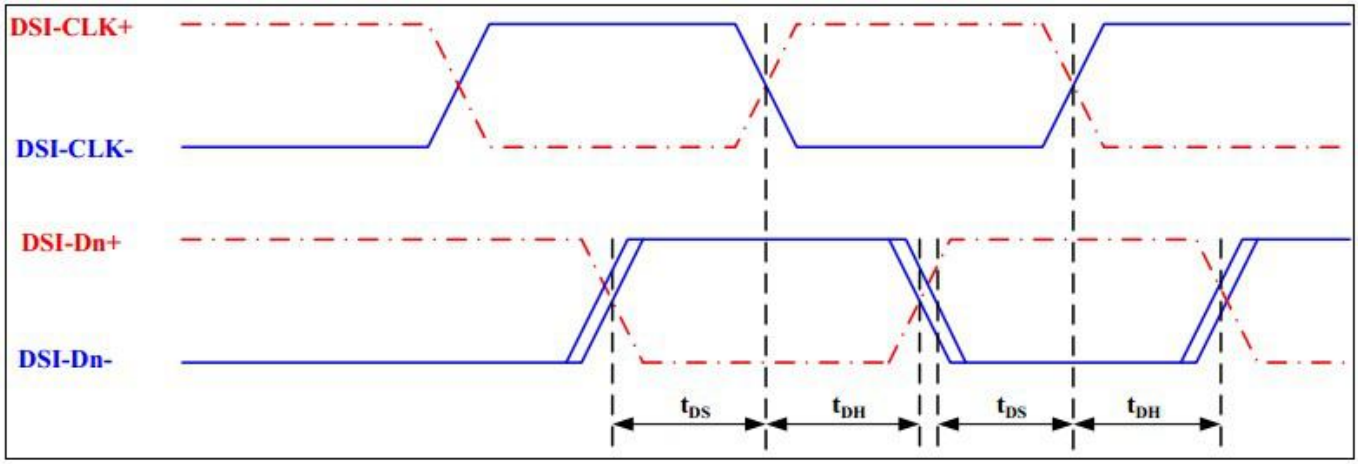
cannot be sent for 120msec

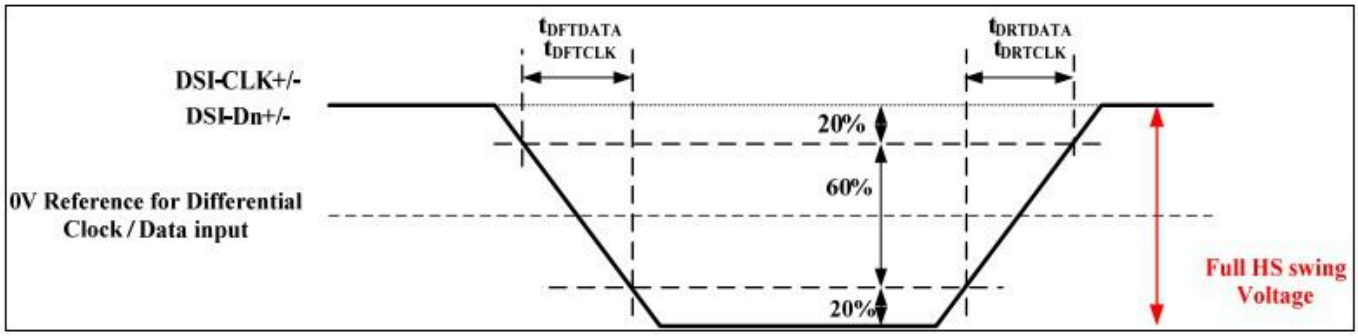
9.2 MIPI-DSI characteristcs

9.2.1, High speed mode

Parameter	Symbol	Parameter	Specification			Unit
			MIN	TYP	MAX	
High Speed mode						
DSI-CLK+/-	$2xUI_{INST}$	Double UI instantaneous	4	-	25	ns
DSI-CLK+/-	UI_{INSTA} , UI_{INSTB}	UI instantaneous Halfs	2	-	12.5	ns
DSI-Dn+/-	t_{DS}	Data to clock setup time	0.15	-	-	UI
DSI-Dn+/-	t_{DH}	Data to clock hold time	0.15	-	-	UI
DSI-CLK+/-	t_{DRTCLK}	Differential rise time for clock	150	-	0.3UI	ps
DSI-Dn+/-	$t_{DRTDATA}$	Differential rise time for data	150	-	0.3UI	ps
DSI-CLK+/-	t_{DFTCLK}	Differential fall time for clock	150	-	0.3UI	ps
DSI-Dn+/-	$t_{DFTDATA}$	Differential fall time for data	150	-	0.3UI	ps



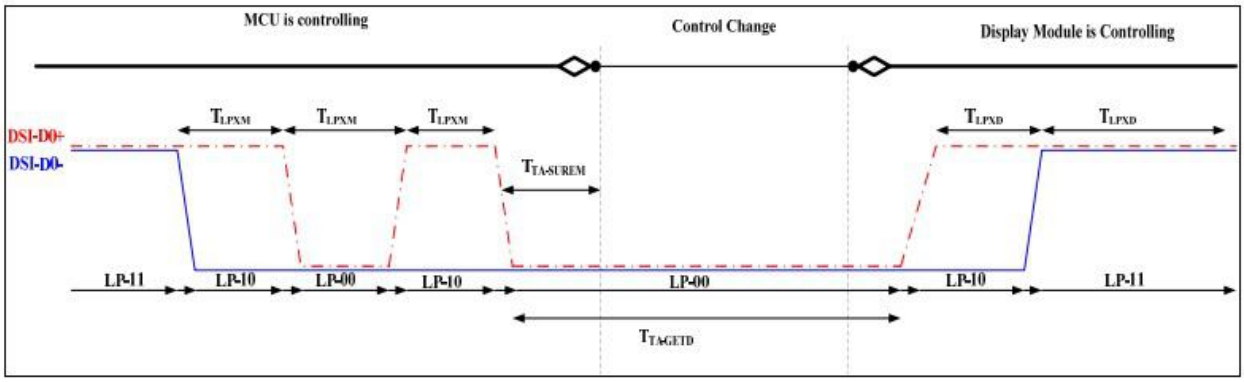




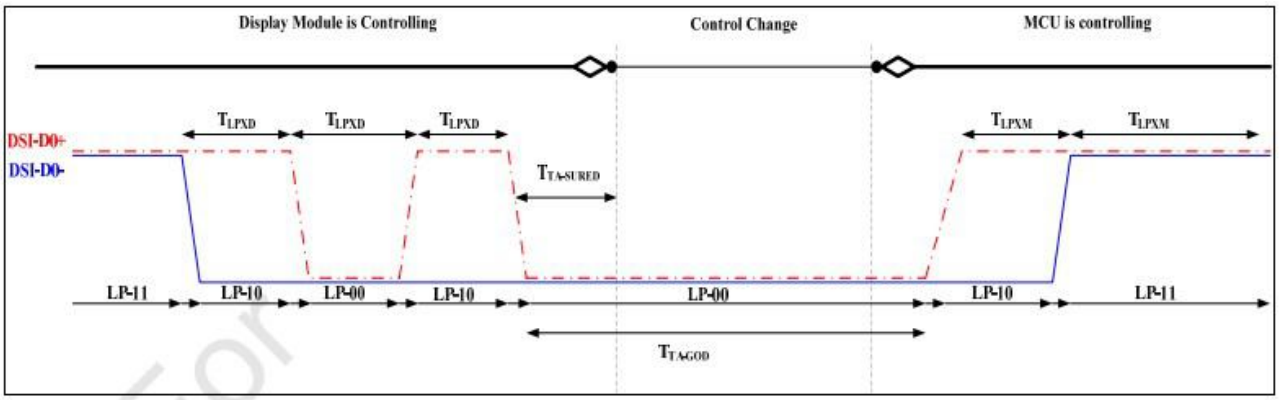
AC characteristics for MIPI-DSI High speed mode

9.2.2Low power mode

Parameter	Symbol	Parameter	Specification			Unit
			MIN	TYP	MAX	
Low Power mode						
DSI-D0+/-	T_{LPXM}	Length of LP-00, LP-01, LP-10 or LP-11 periods MPU → Display Module	50	-	-	ns
DSI-D0+/-	T_{LPXD}	Length of LP-00, LP-01, LP-10 or LP-11 periods Display Module → MPU	58	-	-	ns
DSI-D0+/-	$T_{TA-SURED}$	Time-out before the MPU start driving	T_{LPXD}	-	$2XT_{LPXD}$	ns
DSI-D0+/-	$T_{TA-GETD}$	Time to drive LP-00 by display module	$5XT_{LPXD}$	-	-	ns
DSI-D0+/-	T_{TA-GOD}	Time to drive LP-00 after turnaround request - MPU	$4XT_{LPXD}$	-	-	ns
DSI-D0+/-	Ratio T_{LPX}	Ratio of T_{LPXM} / T_{LPXD} between MCU and display module	2/3	-	3/2	



BTA from the MCU TO THE DISPLAY MODULE



BTA from the MCU TO THE DISPLAY MODULE

10.RELIABILITY TEST ITEMS

NO	ITEM	CONDTTION	STANDARD
1	High Temp. Storage	70℃, 12 hours	1. Functional test is OK.Missing Segment, short,unclear segment, non-display,display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-20℃, 12 hours	
3	High Temp. Operation	60℃, 12 hours	
4	Low Temp. Operation	-20℃, 12 hours	
5	High temperature and high Humidity storage	40℃,90%RH ,12 hours	
6	Thermal and cold shock	Static state， -20℃（30 Min）~70℃ （30 Min）~ -20℃（30Min），packaging，10 cycles	
7	Vibration test	Packaging，Frequency : 10-55Hz Amplitude : 1.0mm， Each direction on X,Y axe 0.5 houre，circle 2 hours	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
8	Dropping test	Pack products into the carton box. Drop it from 80cm height to ground. Once for each side of the carton	

NOTE：

2.1 The reliability items will be fully performed in new sample qualification,

2.2 The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.

2.3 All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.

2.4 Vibration test: It is not necessary to test for those products without assembly frame , back light ,PCB and so on.

2.5 Dropping test : It is necessary for affirming new package.

2.6 For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.

2.7 Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.

2.8 The quantity of LCM examination for each test item is 5pcs to 10pcs.

11. VISUAL & FUNCTION INSPECTION STANDARD

1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

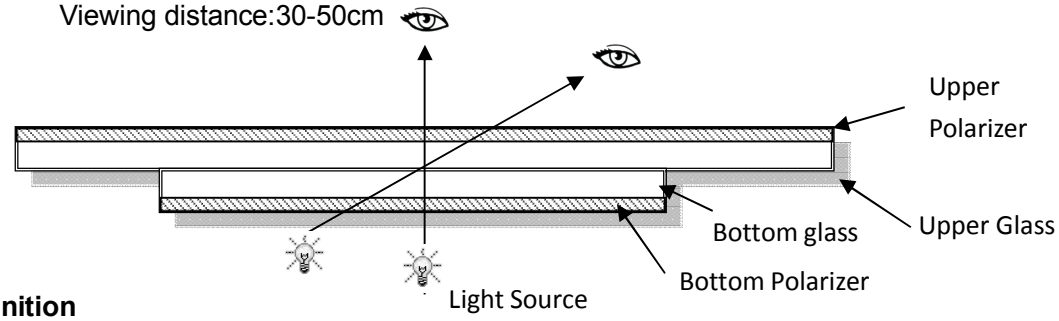
Temperature : 25±5℃

Humidity : 65%±10%RH

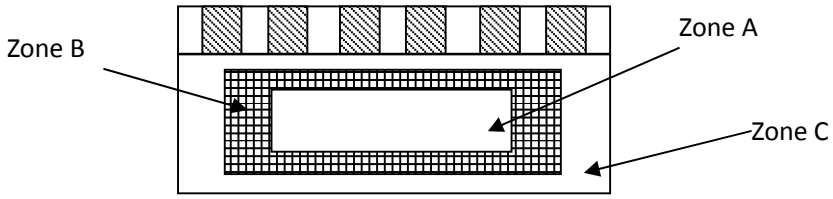
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Note: As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function

or appearance after assembly by customer.

1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class Ⅱ

AQL:

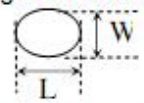
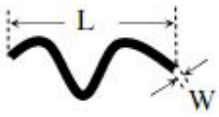
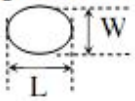
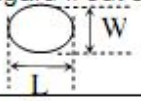
	Major	Minor
Cosmetic	1.0%	1.5%
Electrical-display	0.4%	0.65%

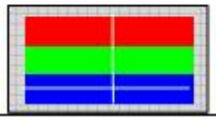
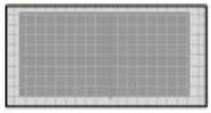
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

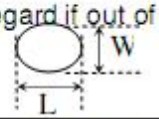
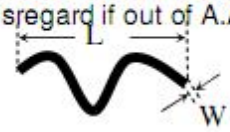
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor

5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

1.4 Criteria (Visual)

No	Defect	Criteria		Remark
1	Round type (Minor)	Spec.	Permissible Q'ty	1. ϕ =(L+W)/2, L: Length, W: Width 2. Disregard if out of A.A. 
		ϕ <0.10mm	Disregard	
		0.10mm≦ ϕ ≦0.2mm	3	
		0.2mm< ϕ	0	
2	Line type(Scratch) (Minor)	Spec.	Permissible Q'ty	1.L: Length, W: Width 2. Disregard if out of A.A. 
		W≦0.03mm	Disregard	
		0.03mm<W≦0.05mm and L≦3mm	2	
		0.05mm<W≦0.1mm and L≦3mm	1	
		W>0.1mm or L>3mm	0	
3	Fiber (Minor)	Spec.	Permissible Q'ty	1.L: Length, W: Width 2. Disregard if out of A.A. 
		W≦0.03mm	Disregard	
		0.03mm<W≦0.05mm and L≦3mm	2	
		0.05mm<W≦0.1mm and L≦3mm	1	
		W>0.1mm or L>3mm	0	
4	Polarizer bubble (Minor)	Spec.	Permissible Q'ty	1. ϕ =(L+W)/2 , L: Length, W: Width 2. Disregard if out of A.A. 
		ϕ ≦0.20mm	Disregard	
		0.20mm< ϕ ≦0.3mm	2	
		0.30mm< ϕ ≦0.5mm	1	
		0.5mm< ϕ	0	
5	Polarizer Dent / Bulge (Minor)	Spec.	Permissible Q'ty	1. ϕ =(L+W)/2 , L: Length, W: Width 2. Disregard if out of A.A. 
		ϕ ≦0.10mm	Disregard	
		0.10mm< ϕ ≦0.2mm	3	
		0.2mm< ϕ	0	

No	Defect	Criteria		Remark
1	No display (Major)	Not allowed		
2	Missing line (Major)	Not allowed		
3	Darker or lighter line (Major)	Not allowed		
4	Bright / Dark point (Minor)	spec	Permissible Q'ty	1.1sub-pixel: 1R or 1G or 1B
		Bright point	0	
		Dark dot point	2	
		Bright +Dark point	2	

5	Round type (Minor)	Spec.	Permissible Q'ty	1. ϕ =(L+W)/2, L: Length, W: Width 2. Disregard if out of A.A. 
		$\phi \leqq 0.10$mm	Disregard	
		0.10mm< $\phi \leqq$ 0.2mm	3	
		0.2mm< ϕ	0	
6	Line type(Scratch) (Minor)	Spec.	Permissible Q'ty	1.L: Length, W: Width 2. Disregard if out of A.A. 
		W≦0.03mm	Disregard	
		0.03mm<W≦0.05mm and L≦3mm	2	
		0.05mm<W≦0.1mm and L≦3mm	1	
		W>0.1mm or L>3mm	0	
7	Fiber (Minor)	Spec.	Permissible Q'ty	1.L: Length, W: Width 2. Disregard if out of A.A. 
		W≦0.03mm	Disregard	
		0.03mm<W≦0.05mm and L≦3mm	2	
		0.05mm<W≦0.1mm and L≦3mm	1	
		W>0.1mm or L>3mm	0	

8	Polarizer Bubble (Minor)	Spec.	Permissible Q'ty	1. ϕ =(L+W)/2 , L: Length, W: Width 2. Disregard if out of A.A.
		$\phi \leqq$0.10mm	Disregard	
		0.10mm< $\phi \leqq$0.2mm	3	
		0.2mm< ϕ	0	
9	Polarizer Dent / Bulge (Minor)	Spec.	Permissible Q'ty	1. ϕ =(L+W)/2 , L: Length, W: Width 2. Disregard if out of A.A.
		$\phi \leqq$0.10mm	Disregard	
		0.10mm< $\phi \leqq$0.2mm	3	
		0.2mm< ϕ	0	
10	Mura (Minor)	By 5% ND filter invisible		

12.SUGGESTIONS FOR USING LCD MODULES

- **Safety instructions**

1. If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.
2. If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

- **Handling Precautions**

1. Avoid static electricity damaging the LSI.
2. Do not remove the panel or frame from the module .
3 .The polarizing plate of the display is very fragile . So, please handle it very carefully.
4. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.
5. The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.
6. Pay attention to the working environment, as the element may be destroyed by static electricity.
   --Be sure to ground human body and electric appliance during work.
   --Avoid working in a dry environment to minimize the generations of static electricity.
   --Static electricity may be generated when the protective film is fast peeled off.
7. When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.
8. If the display surface becomes contaminated ,breathe on the surface and gently wipe it with a soft-dry- clean cloth .If it is heavily contaminated ,moisten cloth with the following solvent(ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially ,do not use them .ex: Warter / Ketone)

- **Operation instructions**

1. It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.
2. Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order, It will recover when it returns to the specified

temperature range.

3. If the display area is pushed hard during operation, the display will become abnormal.
4. Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

- **Storage instructions**

1. Store LCDs in a sealed polyethylene bag.
2. Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0℃and 35℃.
3. Avoid the polarizer touch any other object, (It is recommended to store them in the container in which they were shipped.)

- **Limited Warranty**

1. LEAD will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with LEAD LCM acceptance standards (copies available upon request) for a period of 12 months from ink- print date on product
2. Any defects must be returned to LEAD within 60 days since ship-out. Confirmation of such date shall be based on freight documents. The warranty liability of LEAD limited to repair and/or replacement on defects above (7.1,7.2)
3. No warranty can be granted if the precautions stated above have been disregarded. The typical samples are as below:
   -- LCD glass crack/break
   --PCB outlet is damaged or modified.
   --PCB conductors damaged.
   --Circuit modified with by grinding, engraving or painting varnish.
   --FPC crack
4. Modules must be returned with sufficient description of the failures of defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB outlet, conductors and terminals. Modules must be packed with the container in which they were shipped.

12.PACKAGE SPECIFICATION

TBD