



秋田微电子
AVDISPLAY

深圳秋田微电子股份有限公司

地址：深圳市龙岗区园山街道荷坳金源工业区金源路 39 号

电话:(086)0755-8886 0696

传真: (086)0755 -2691 1092

网址: <http://www.av-display.com.cn>

SHENZHEN AV-DISPLAY CO.,LTD

ADDRESS: No.39, Jin Yuan Road, He Ao Jin Yuan Industrial Park, Yuanshan, Long Gang, Shenzhen, Guangdong Province, 518115 China

TEL: (086)0755-8886 0696

FAX: (086)0755-2691 1092

WEB: <http://www.av-display.com>

SPECIFICATION FOR TFT MODULE

MODULE NO. : T1011071-01A-GDC

CUSTOMER NO. :

Rev No. : O

AVD	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE	Yanxi.Chen	Mengxiang.Li	Shiping.Zhang
DATE	2021.08.25	2021.08.25	2021.08.25

CUSTOMER APPROVAL	SIGNATURE	DATE

Notes :

- 1、 Please contact AVD before assigning your product based on this module specification.
- 2、 To improve the quality of product, and this product specification is subject to change without any notice.

REVISION RECORD

[illegible]

CONTENTS

1. GENERAL INFORMATION.....	3
2. ABSOLUTE MAXIMUM RATINGS.....	3
3. ELECTRICAL CHARACTERISTICS.....	4
4. BACKLIGHT CHARACTERISTICS.....	4
5. TOUCH PANEL CHARACTERISTICS.....	4
6. EXTERNAL DIMENSIONS.....	5
7. ELECTRO-OPTICAL CHARACTERISTICS.....	6
8. INTERFACE DESCRIPTION.....	8
9. AC CHARACTERISTICS.....	9
10. POWER SEQUENCE.....	16
11. RELIABILITY TEST CONDITIONS.....	18
12. INSPECTION CRITERION.....	19
13. HANDLING PRECAUTIONS.....	19
14. PRECAUTION FOR USE.....	20
15. PACKING SPECIFICATION.....	20
16. INITIALIZATION CODE.....	20
17. HSF COMPLIANCE.....	20

1. GENERAL INFORMATION

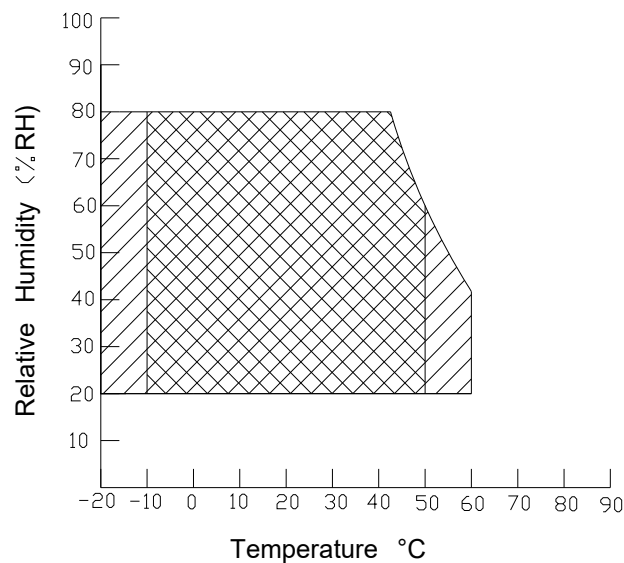
No.	Item	Contents	Unit
1	LCD size	10.1 inch (Diagonal)	/
2	Display mode	a-si TFT&CTP IPS/Normally black/Transmissive	/
3	Viewing direction(eye)	FREE	/
4	Gray scale inversion direction	-	/
5	Resolution(H*V)	800 *1280 Pixels(TFT)/ 800 *1280 Dots(CTP)	/
6	Module size (L*W*H)	186.92*270.06*4.69	mm
7	Active area (L*W)	135.36*216.58	mm
8	Pixel pitch (L*W)	0.1692*0.1692	mm
9	Interface type	MIPI interface(TFT)/I2C(CTP)	/
10	Color Depth	16.7M	/
11	Module power consumption	2.33	W
12	Back light type	LED	/
13	Driver IC	ILI9881C OR COMPATIBLE(TFT) GT9271(CTP)	/
14	Weight	387.0	g
15	Treatment of Lens	AF (Anti-Fingerprint) coating	

2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power supply input voltage for TFT	VCC	-0.3	4.5	V	
Backlight current (normal temp.)	ILED	-	125	mA	
Operation temperature	Top	-10	+50	°C	Note1
Storage temperature	Tst	-20	+60	°C	Note1
Humidity	RH	20%	90%	RH	Note1

Note1 :

- 1).The relative humidity and temperature range are as below sketch,80%RH Max.
- 2).The maximum wet bulb temperature $\leq 40^{\circ}\text{C}$ and without dewing.



Operating Range  Storage Range  + 

3. ELECTRICAL CHARACTERISTICS

TFT DC CHARACTERISTICS(at Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply input voltage	VCC-LCD	3.0	3.3	3.6	V	
I/O logic voltage	VDDIO	-	-	-	V	
Input voltage 'H' level	VIH	0.7VDDIO	-	VDDIO	V	
Input voltage 'L' level	VIL	VSS	-	0.3VDDIO	V	
Power supply current	IVDD	-	-	-	mA	
TFT gate on voltage	VGH	-	-	-	V	
TFT gate off voltage	VGL	-	-	-	V	
Analog power supply voltage	AVDD	-	-	-	V	
Differential input common mode voltage	Vcom	-	-	-	V	Note1

Note1 : The value is just the reference value. The customer can optimize the setting value by the different D-IC
Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..

CTP DC CHARACTERISTICS(at Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Note	
Power supply input voltage	VCC	2.8	3.3	3.6	V	Note2	
Input Power ripple	Vpp	-	-	50	mV		
I/O Signal Voltage	VCCIO	1.7	1.8	1.9	V	Note2	
Input voltage 'H' level	VIH	0.7VCCIO	-	VCCIO	V		
Input voltage 'L' level	VIL	VSS	-	0.3VCCIO	V		
Operating Current (Normal Mode)	IVCC	-	13	18	mA		
Operating Current (Sleep mode)	IVCC	-	100	150	uA		

Note2 : If you need more information of CTP, please refer to our Spec of CTP.

4. BACKLIGHT CHARACTERISTICS

(at Ta=25°C, RH=60%)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED forward voltage	VF	20.3	21.0	23.8	V	
LED forward current	IF	-	100	-	mA	IF=25*4mA
LED power consumption	PLED	-	2.1	-	W	Note1
Number of LED	-		28		PCS	
Connection mode	-	7 in series 4 in parallel			/	
LED life-time	-	20000	-	-	Hrs	Note2

Note1 : Calculator value for reference : IF*VF = PLED

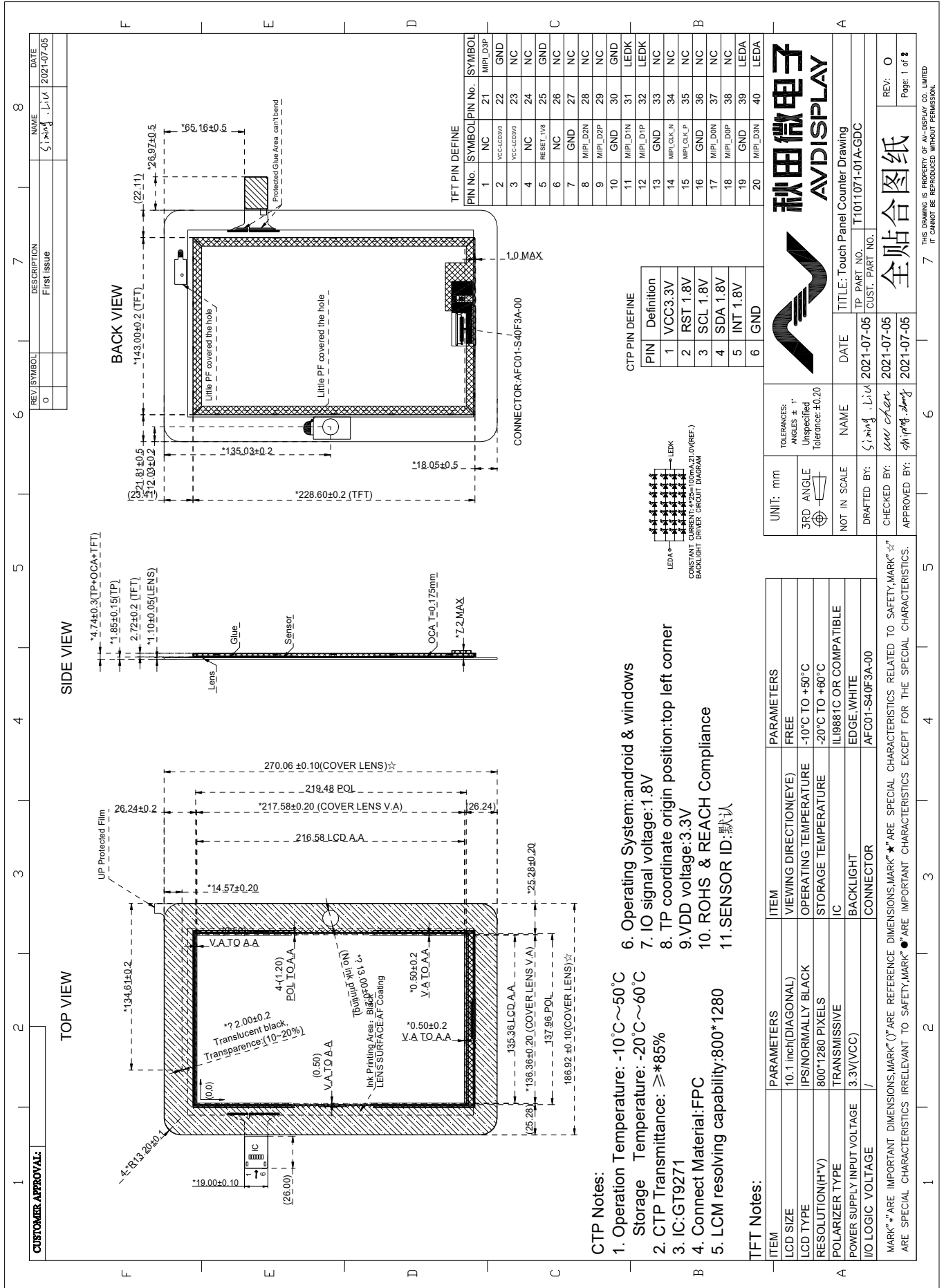
Note2 : The LED life-time define as the estimated time to 50% degradation of initial brightness at Ta=25°C and IF =100mA. The LED lifetime could be decreased if operating IF is larger than 100mA.

5. TOUCH PANEL CHARACTERISTICS

(at Ta=25°C)

Item	Description	Remark
Product Structure	G+G	
Surface Hardness	≤6H	Pencil, Loading 500g, 45 deg
Ball-falling Test	≤80cm	Steel ball weight 64g
Touch Count Max	10 point	
I2C Slave Address*	0xBA, 0xBB / 0X28, 0X29	
Origin of Coordinate*	Top left corner	

6. EXTERNAL DIMENSIONS



7. ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time	Tr+ Tf	-	-	30	-	ms	FIG.1	Note 1
Contrast ratio	Cr		800	1000	-	-	FIG.2	Note 2
Surface luminance	Lv	$\theta=0^\circ$	200	300	-	cd/m ²	FIG.2	Note 3
Luminance uniformity	Yu	$\theta=0^\circ$	75	80	-	%	FIG.2	Note 4
NTSC	-	$\theta=0^\circ$	-	50	-	%	FIG.2	Note 5
Viewing angle	θ	$\phi=90^\circ$	75	80	-	deg	FIG.3	Note 6
		$\phi=270^\circ$	75	80	-	deg	FIG.3	
		$\phi=0^\circ$	75	80	-	deg	FIG.3	
		$\phi=180^\circ$	75	80	-	deg	FIG.3	
CIE (x,y) chromaticity	Red x	$\theta=0^\circ$ $\phi=0^\circ$ Ta=25°C	Typ -0.04	0.61	Typ +0.04	-	FIG.2 CIE1931	Note 5
	Red y			0.36		-		
	Green x			0.32		-		
	Green y			0.58		-		
	Blue x			0.16		-		
	Blue y			0.08		-		
	White x			0.27		-		
	White y			0.27		-		

Note1. Definition of response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%. For additional information see FIG1.

Note2. Definition of contrast ratio

Contrast ratio(Cr) is defined mathematically by the following formula.
For more information see FIG.2.

Contrast ratio= $\frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$

Measured at the center area of the LCD

Note3. Definition of surface luminance

Surface luminance is the luminance with all pixels displaying white.
For more information see FIG.2.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3,,Pn)

Note4. Definition of luminance uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.2.

$Y_u = \frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}$

Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity, The x,y value is determined by screen active area center position P5. For more information see FIG.2.

Note6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10. angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.
For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope or DMS series Instruments or compatible. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on TOPCON's BM-5or BM-7 photo detector or compatible.

FIG.1. The definition of response Time

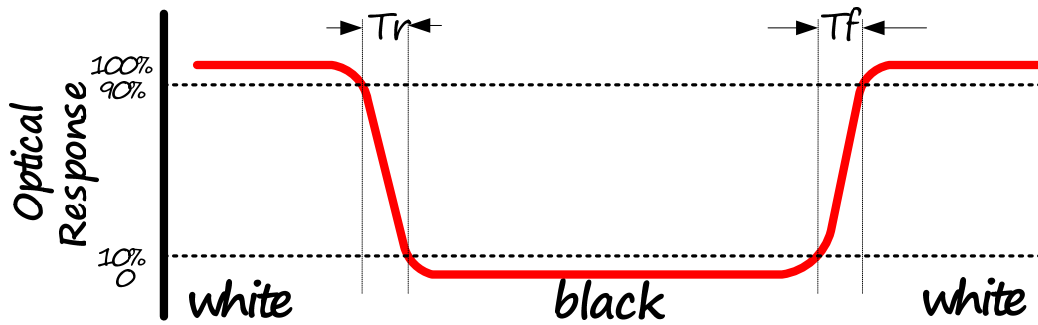


FIG.2. Measuring method for contrast ratio, surface luminance, luminance uniformity, CIE (x,y) chromaticity

H,V : Active area

Light spot size $\varnothing=5\text{mm}$ (BM-7) 50cm distance or compatible distance from the LCM surface to detector lens.

Test spot position : see Figure a.

measurement instrument : TOPCON's luminance meter BM-7 or compatible ,see Figure b.

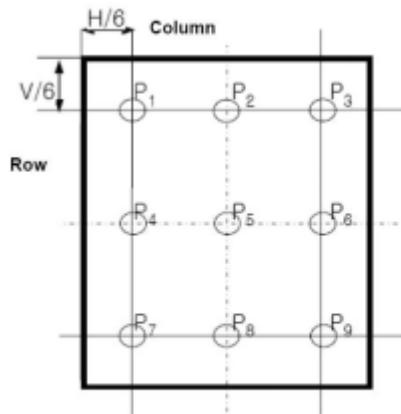


Figure a

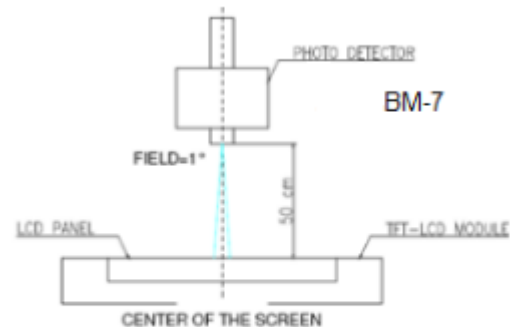
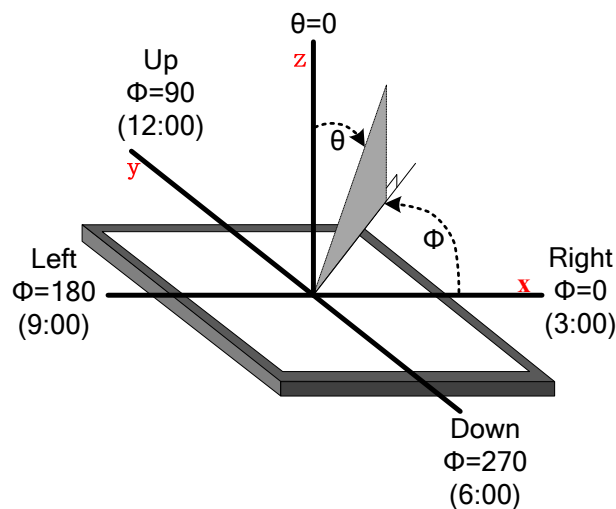


Figure b

FIG.3. The definition of viewing angle



8. INTERFACE DESCRIPTION

TFT Module Interface description

Interface No.	Name	I/O or connect to	Description
1	NC	/	/
2-3	VCC-LCD3V3	P	Power for LCD
4	NC	/	/
5	RESET	I	The external reset input
6	NC	/	/
7	GND	P	Power ground
8	MIPI_D2N	I	Negative DSI Data2 differential signal input pins
9	MIPI_D2P	I	Positive DSI Data2 differential signal input pins
10	GND	P	Power ground
11	MIPI_D1N	I	Negative DSI Data1 differential signal input pins
12	MIPI_D1P	I	Positive DSI Data1 differential signal input pins
13	GND	P	Power ground
14	MIPI_CLKN	I	Positive DSI clock differential signal input pins
15	MIPI_CLKP	I	Negative DSI clock differential signal input pins
16	GND	P	Power ground
17	MIPI_D0N	I	Negative DSI Data0 differential signal input pins
18	MIPI_D0P	I	Positive DSI Data0 differential signal input pins
19	GND	P	Power ground
20	MIPI_D3N	I	Negative DSI Data3 differential signal input pins
21	MIPI_D3P	I	Positive DSI Data3 differential signal input pins
22	GND	P	Power ground
23-24	NC	/	/
25	GND	P	Power ground
26-29	NC	/	/
30	GND	P	Power ground
31-32	LEDK	P	Power for LED backlight(Cathode)
33-38	NC	/	/
39-40	LEDA	P	Power for LED backlight(Anode)

CTP interface description

Interface No.	Name	I/O or connect to	Description
1	VCC3V3	P	Power Supply of CTP
2	RST1.8V	I	Reset low
3	SCL1.8V	I	Serial interface clock
4	SDA1.8V	I/O	Serial interface data
5	INT1.8V	O	State change interrupt
6	GND	P	Ground

9. AC CHARACTERISTICS

High Speed Mode – Clock Channel Timing

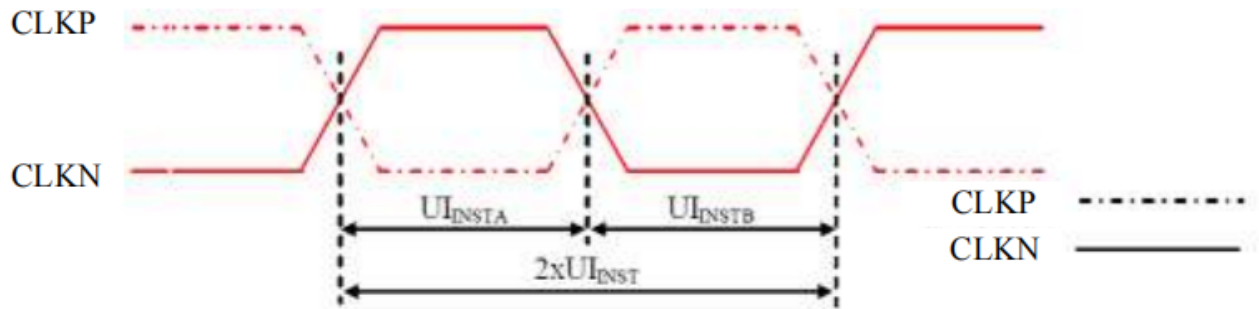


Figure 105: DSI Clock Channel Timing

Table 38: DSI Clock Channel Timing

Signal	Symbol	Parameter	Min	Max	Unit
CLKP/N	$2xUI_{INST}$	Double UI instantaneous	Note 2	25	ns
CLKP/N	UI_{INSTA}, UI_{INSTB} (Note 1)	UI instantaneous Half	Note 2	12.5	ns

Notes:

1. $UI = UI_{INSTA} = UI_{INSTB}$
2. Define the minimum value, see Table 39.

Table 39: Limited Clock Channel Speed

Data type	Two Lanes speed	Three Lanes speed	Four Lanes speed
Data Type = 00 1110 (0Eh), RGB 565, 16 UI per Pixel	566 Mbps	466 Mbps	366 Mbps
Data Type = 01 1110 (1Eh), RGB 666, 18 UI per Pixel	637 Mbps	525 Mbps	412 Mbps
Data Type = 10 1110 (2Eh), RGB 666 Loosely, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps
Data Type = 11 1110 (3Eh), RGB 888, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps

High Speed Mode – Data Clock Channel Timing

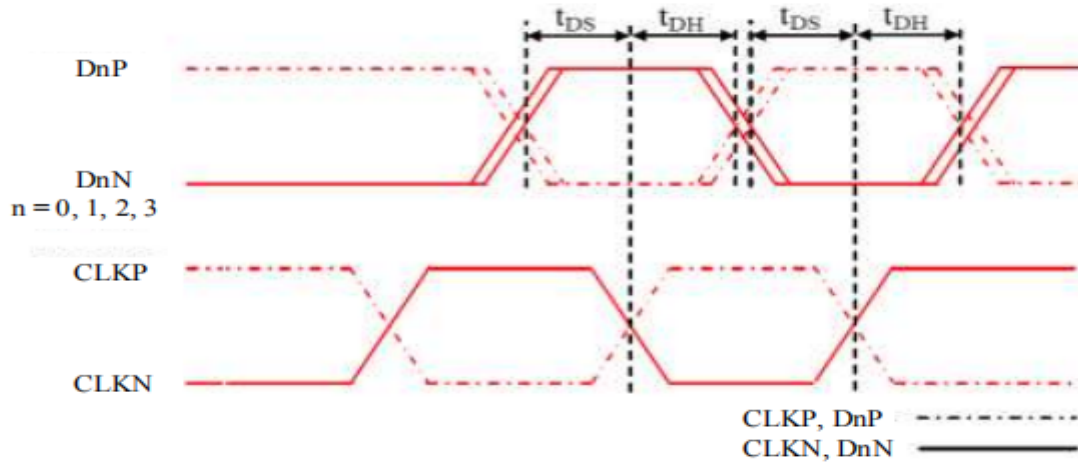


Figure 106: DSI Data to Clock Channel Timings

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	$0.15 \times UI$	-

High Speed Mode – Rising and Falling Timings

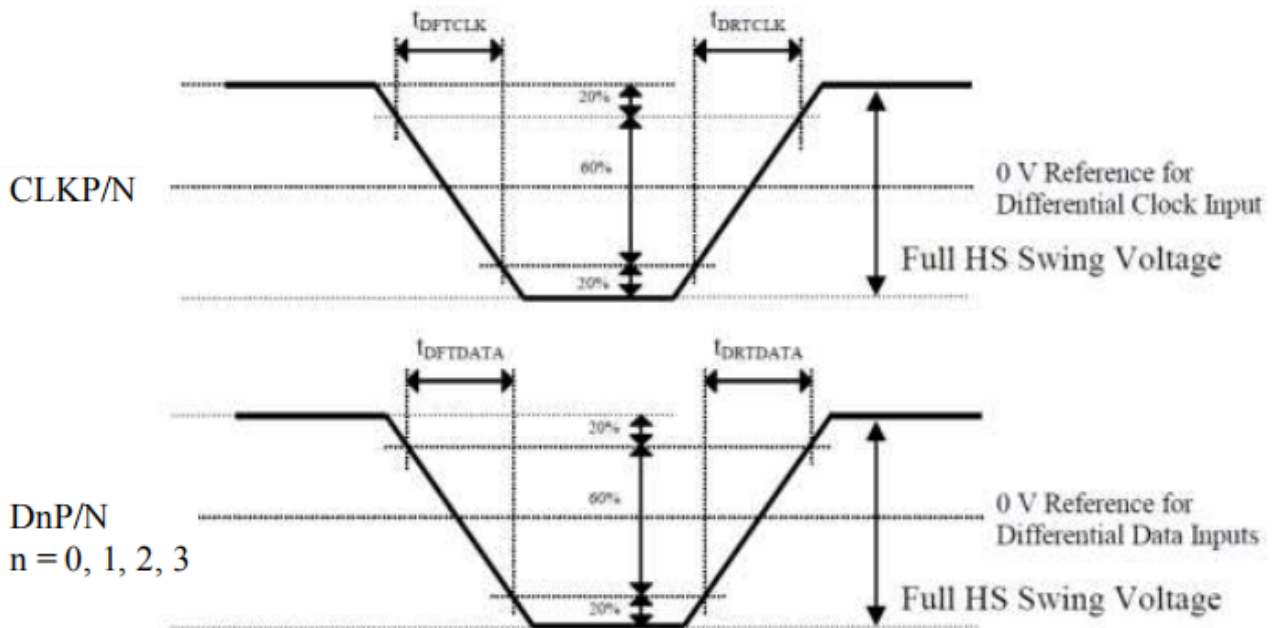


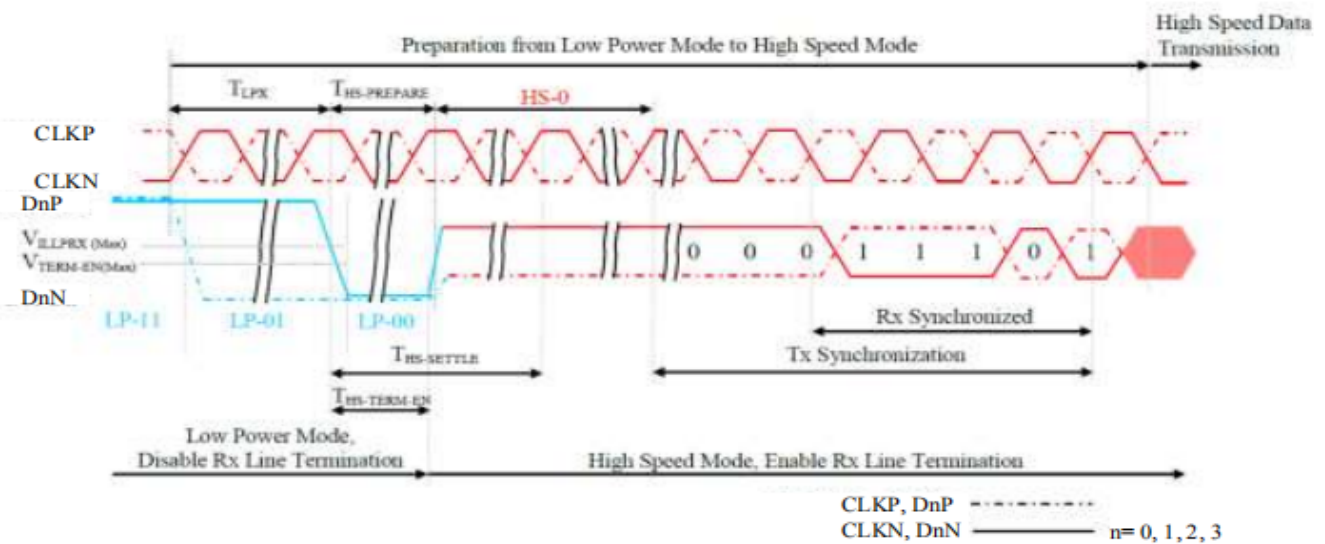
Figure 107: Rising and Falling Timings on Clock and Data Channels

Table 41: Rise and Fall Timings on Clock and Data Channels

Parameter	Symbol	Condition	Specification		
			Min	Typ	Max
Differential Rise Time for Clock	t_{DRTCLK}	CLKP/N	150 ps	-	0.3UI (Note)
Differential Rise Time for Data	$t_{DRTDATA}$	DnP/N n=0 and 1	150 ps	-	0.3UI (Note)
Differential Fall Time for Clock	t_{DFTCLK}	CLKP/N	150 ps	-	0.3UI (Note)
Differential Fall Time for Data	$t_{DFTDATA}$	DnP/N n=0 and 1	150 ps	-	0.3UI (Note)

Note: The display module has to meet timing requirements, which are defined for the transmitter (MCU) on MIPI D-Phy standard.

Data Lanes from Low Power Mode to High Speed Mode


Figure 110: 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	$40+4xUI$	$85+6xUI$	ns
DnP/N, n = 0 and 1	$T_{HS-TERM-EN}$	Time to enable Data Lane Receiver line termination measured from when Dn crosses VILMAX	-	$35+4xUI$	ns

Data Lanes from High Speed Mode to Low Power Mode

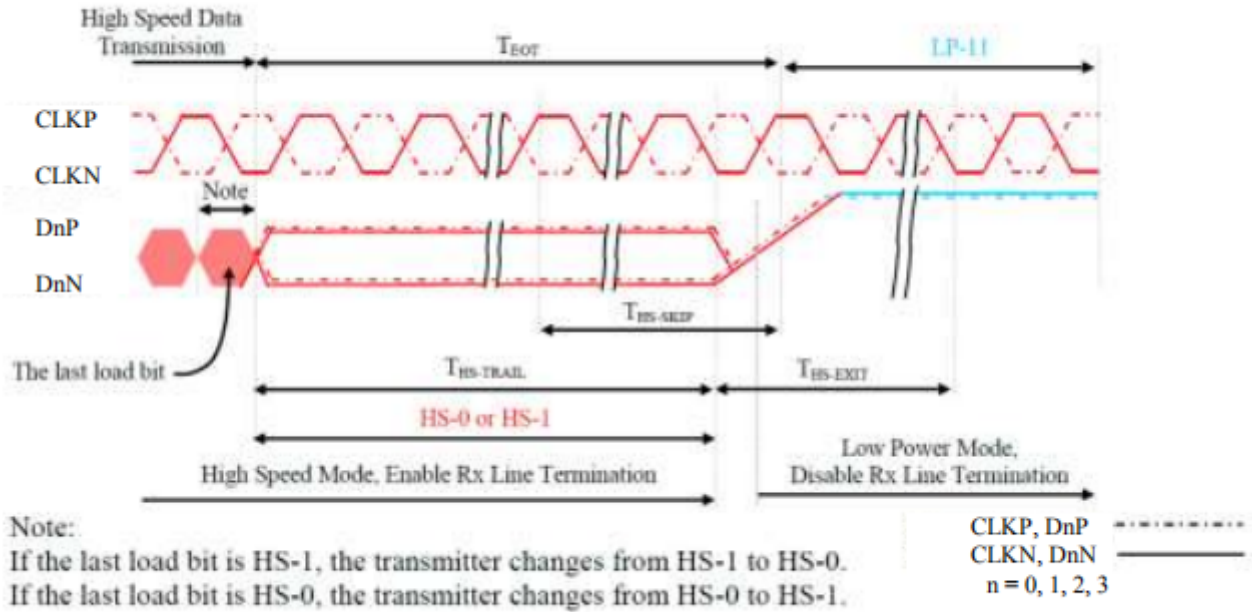


Figure 111: Data Lanes - High Speed Mode to Low Power Mode Timings

Table 45: Data Lanes - High Speed Mode to Low Power Mode Timings

Signal	Symbol	Description	Min	Max	Unit
DnP/N, n = 0 and 1	$T_{HS-SKIP}$	Time-Out at Display Module (ILI9881C-03) to ignore transition period of EoT	40	$55+4xUI$	ns
DnP/N, n = 0 and 1	$T_{HS-EXIT}$	Time to driver LP-11 after HS burst	100	-	ns

DSI Clock Burst – High Speed Mode to/from Low Power Mode

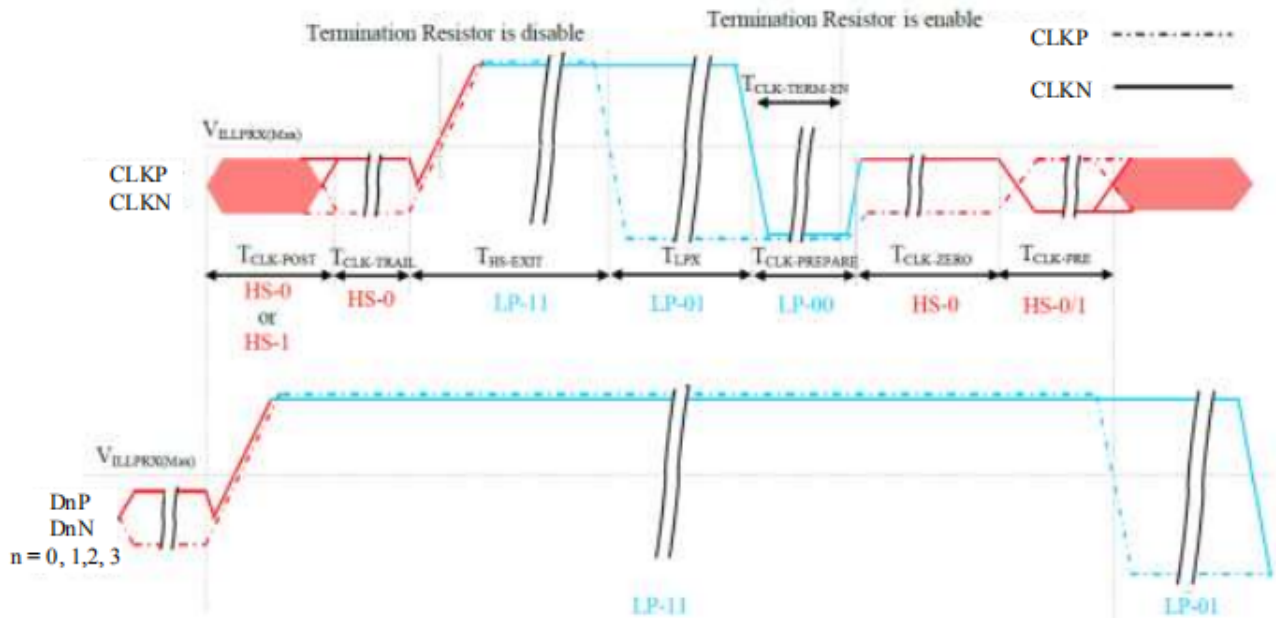
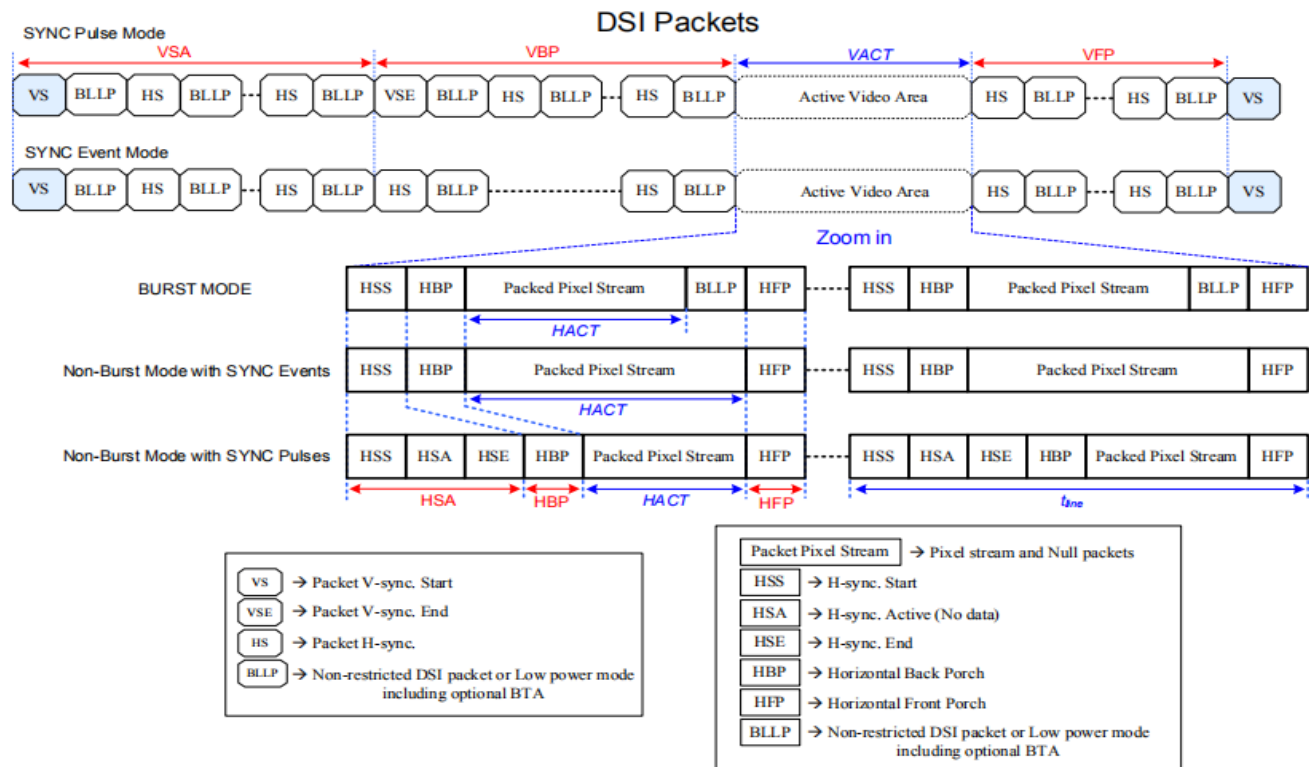


Figure 112: Clock Lanes - High Speed Mode to/from Low Power Mode Timings

Table 46: Clock Lanes - High Speed Mode to/from Low Power Mode Timings

Signal	Symbol	Description	Min	Max	Unit
CLKP/N	$T_{CLK-POST}$	Time that the MCU shall continue sending HS clock after the last associated Data Lanes has transitioned to LP mode	$60+52 \times UI$	-	ns
CLKP/N	$T_{CLK-TRAIL}$	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60	-	ns
CLKP/N	$T_{HS-EXIT}$	Time to drive LP-11 after HS burst	100	-	ns
CLKP/N	$T_{CLK-PREPARE}$	Time to drive LP-00 to prepare for HS transmission	38	95	ns
CLKP/N	$T_{CLK-TERM-EN}$	Time-out at Clock Lane to enable HS termination	-	38	ns
CLKP/N	$T_{CLK-PREPARE} + T_{CLK-ZERO}$	Minimum lead HS-0 drive period before starting Clock	300	-	ns
CLKP/N	$T_{CLK-PRE}$	Time that the HS clock shall be driven prior to any associated Data Lane beginning the transition from LP to HS mode	$8 \times UI$	-	ns

Timing for DSI video mode



Parameters	Symbols	Min.	Typ.	Max.	Units
Vertical sync. active	VSA	2 (Note 6)	-	-	Line
Vertical Back Porch	VBP	14 (Note 6)	-	-	Line
Vertical Front Porch	VFP	8 (Note 6)	-	-	Line
Active lines per frame	VACT	-	1280	-	Line
Horizontal sync. active	HSA	2	-	-	Pixel
Horizontal Porch period	HSA + HBP + HFP	1.6	-	-	us
Active pixels per line	HACT	-	720	-	Pixel
Bit rate	BR _{bps}	385		Note 5	Mbps/lane

1 UI=1/Bit rate

HSA(pixel)= (tHSA*lane number) / (UI* pixel format)

HBP(pixel)= (tHBP*lane number) / (UI* pixel format)

HFP(pixel)= (tHFP*lane number) / (UI* pixel format)

$$\text{Frame Rate} = \frac{\text{BR}_{\text{bps}} \times \text{Lane}_{\text{num}}}{(\text{VACT} + \text{VSA} + \text{VBP} + \text{VFP}) \times (\text{HACT} + \text{HSA} + \text{HBP} + \text{HFP}) \times \text{Pixel Format}}$$

Example : BR_{bps} = 457Mbps/lane, 1UI=2.1883ns, Frame rate=60Hz, VACT=1280, VSA=2, VBP=30, VFP=20, HACT=720, HSA=33, HBP=100, HFP=100, Lane_{num}=4(lane), Pixel Format=24(bit).

Note:

1. Lane_{num}: Data lane of MIPI-DSI.
2. Pixel Format: Please reference to "4.1DSI System Interface".
3. The formula exists slightly error because of the host-transmission way.
4. The best frame rate setting : 2 data lanes : 50~60 Hz / 3 data lanes : 50~70 Hz / 4 data lanes : 50~70 Hz.
5. Please reference to "Table 39: Limited Clock Channel Speed".
6. The minimum values of this table mean the limitation of IC without considering the panel GIP. The actual values of VSA, VBP and VFP will be changed by different panel GIP setting.

Reset Timing

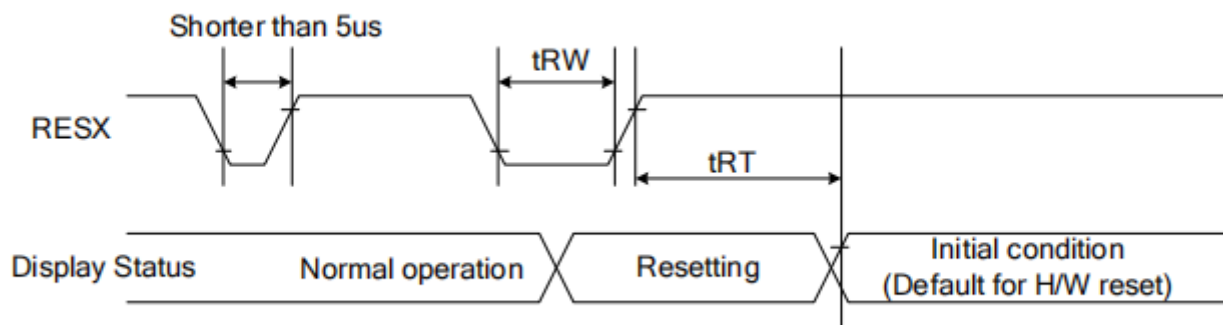


Figure 113: Reset Timing

Table 47: Reset Timing

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

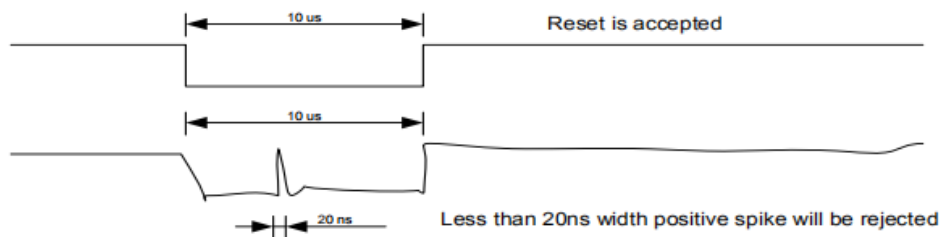
Notes:

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

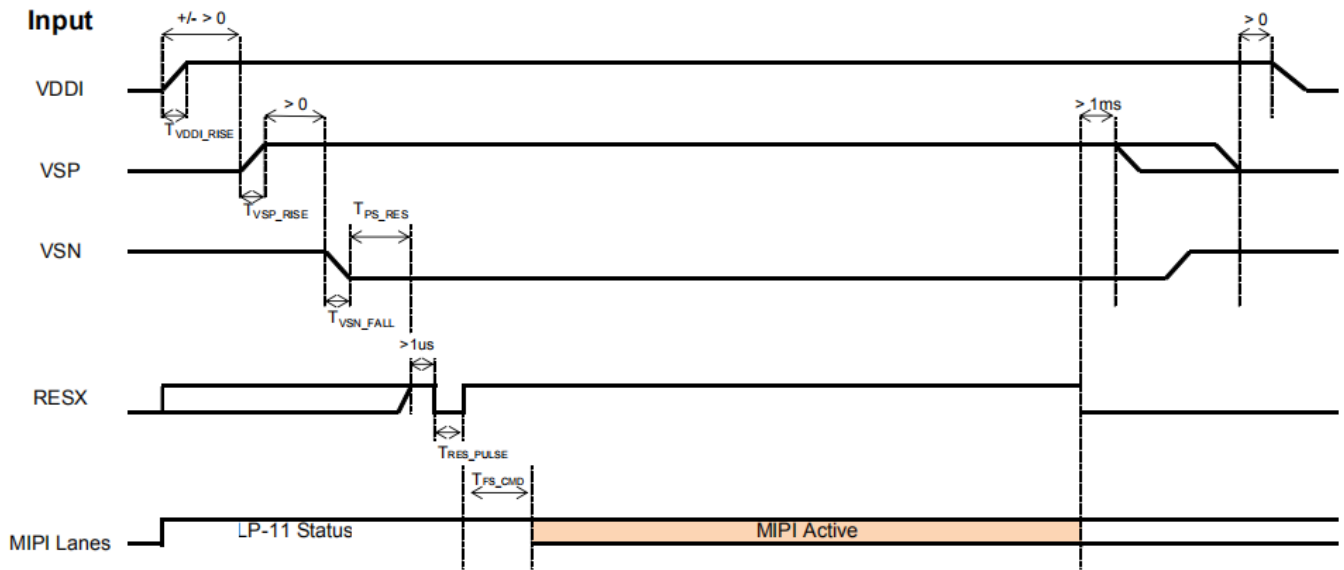
3. During the Resetting period, the display will be blanked (The display enters the blanking sequence, which maximum time is 120 ms, when Reset Starts in the Sleep Out mode. The display remains the blank state in the Sleep In mode.) and then return to Default condition for Hardware Reset.
4. Spike Rejection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


Figure 114: 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.

10. POWER SEQUENCE

To prevent the device damage from latch up and Improve subjective display effect, the power ON/OFF sequence shown below must be followed.



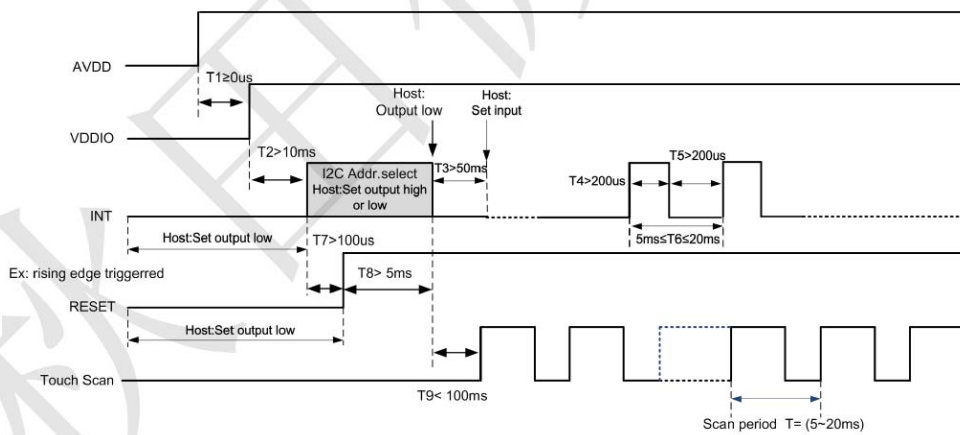
Symbol	Characteristics	Min.	Typ.	Max.	Units
T_{VDDI_RISE}	VDDI Rise time	10	-	-	us
T_{VSP_RISE}	VSP Rise time	130	-	-	us
T_{VSN_FALL}	VSN Fall time	200	-	-	us
T_{PS_RES}	VDDI/VSP on to Reset high	5	-	-	ms
T_{RES_PULSE}	Reset low pulse time	10	-	-	us
T_{FS_CMD}	Reset to first command	10	-	-	ms

Uncontrolled Power Off

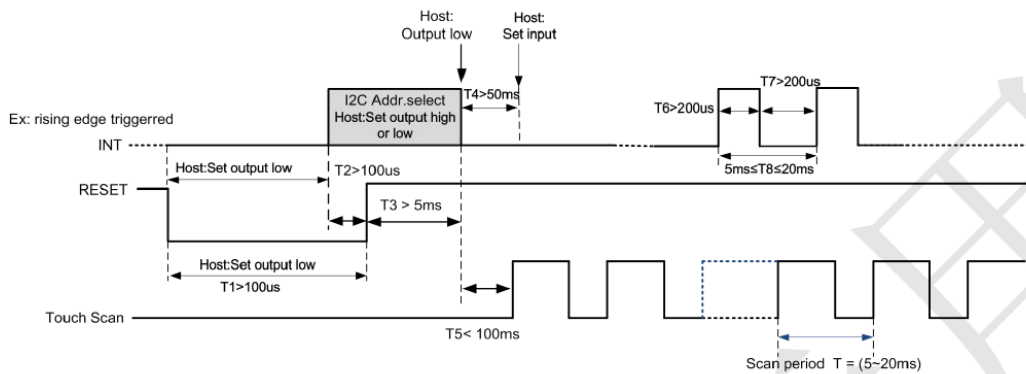
The uncontrolled power off means a situation when a battery is removed without the controlled power off sequence. There will not be any damages for the display module, or the display module will not cause any damages for the host or lines of the interface. At an uncontrolled power off event, the ILI9881C-03 will force the display to become blank and will not have any abnormal visible effects within 1 second on the display and remains blank until the Power On Sequence powers it up.

CTP POWER SEQUENCE

Power-on Timing:

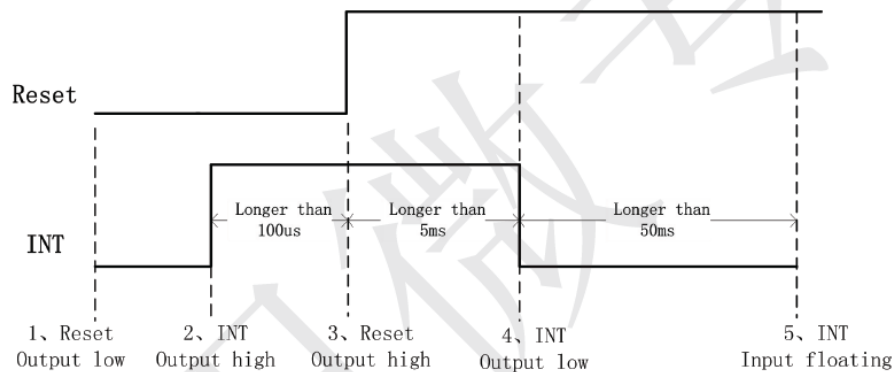


Timing for host resetting GT9271:

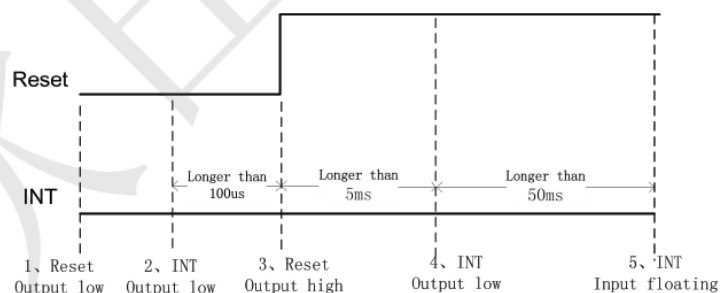


Reset Sequence

Timing for setting slave address to 0x28/0x29:



Timing for setting slave address to 0xBA/0xBB:



11. RELIABILITY TEST CONDITIONS

No.	Test item	Test condition	Inspection after test	
11.1	High temperature storage test	+60°C/120 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects : 1.Current changing value before test and after test is 50% larger; 2. Function defect : Non-display,abnormal-d isplay,missing lines, Short lines,ITO corrosion; 3.Visual defect : Air bubble in the LCD,Seal leak,Glass crack.	
11.2	Low temperature storage test	-20°C/120 hours		
11.3	High temperature operating test	+50°C/120 hours		
11.4	Low temperature operating test	-10°C/120 hours		
11.5	Temperature cycle storage test	-20°C ~ 25°C ~ +60°C/10cycles (30min.) (10min.) (30min.)		
11.6	High temperature high humidity test	+50°C*80% RH/120 hours		
11.7	Vibration test	Frequency : 250 r/min Amplitude : 1 inch Time: 45min		
11.8	Drop test	Drop direction: 1 corner/3 edges/6 sides 10 times		
		Packing weight(kg)		Drop height(cm)
		<11	80±1.6	
		11≦G<21	60±1.2	
		21≦G<31	50±1.0	
		31≦G<40	40±0.8	
11.9	ESD test	Air discharge: ±8KV, 10times Contact discharge: ±4KV, 10times		

Remark :

- 1.The test samples should be applied to only one test item.
- 2.Sample size for each test item is 3~5pcs.
- 3.For High temperature high humidity test, Pure water(Resistance>10MΩ) should be used.
- 4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
- 5.B/L evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence B/L has.
- 6.Failure judgment criterion: Basic specification, Electrical characteristic, Mechanical characteristic, Optical characteristic.
- 7.After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

12. INSPECTION CRITERION

Refer to《Inspection Criterion for MTP Products--To customer》V2.0, DOCUMENT NO.: AVD (WI)-00-QA-009

13. HANDLING PRECAUTIONS

13.1 Mounting method

The LCD module consists of two thin glass plates with polarizers which easily be damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

13.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly :

- .Isopropyl alcohol
- .Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent :

- .Water
- .Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated :

- .Soldering flux
- .Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happens by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

13.3 Caution against static charge

The LCD module uses C-MOS LSI drivers, so we recommend that you :

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

13.4 Packing

Module employs LCD elements and must be treated as such.

- .Avoid intense shock and falls from a height.
- .To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity.

13.5 Caution for operation

- .It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life.
- .An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- .Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- .If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- .A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.
- .Usage under the maximum operating temperature, 50%Rh or less is required.
- .When fixed patterns are displayed for a long time, remnant image is likely to occur.

13.6 Storage

In the case of storing for a long period of time for instance, for years for the purpose of replacement use, the following ways are recommended.

- .Storing in an ambient temperature 10°C to 30°C, and in a relative humidity of 45% to 75%. Don't expose to sunlight or fluorescent light.
- .Storing in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- .Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature

range.

- .Storing with no touch on polarizer surface by the anything else.

It is recommended to store them as they have been contained in the inner container at the time of delivery from us.

13.7 Safety

- .It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- .When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

14. PRECAUTION FOR USE

14.1 A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

14.2 On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- .When a question is arisen in this specification.
- .When a new problem is arisen which is not specified in this specifications.
- .When an inspection specifications change or operating condition change in customer is reported to AVD, and some problem is arisen in this specification due to the change.
- .When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

15. PACKING SPECIFICATION

Please consult our technical department for detail information.

16. INITIALIZATION CODE

- TBD

17. HSF COMPLIANCE

- .This products complies with ROHS 2011/65/EU and 2015/863/EU、REACH 1907/2006/EC requirements, and the packaging complies with 94-62-EC.



AVIDISPLAY

Management System of Third-order Document

Inspection Criterion for MTP Products --To customer

File No.	AVD (WI) -00-QA-009	Prepared by	
Rev.	V2.0	Checked by	
Pages	18	Customer approval	
Effective date		Control No.	
Controlled Document Keeping Properly			

 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 2 of 18

1. Objective

The CTP test criterion are set to formalize CTP quality standards for AVD with reference to those of the customer for inspection, release and acceptance of finished CTP products in order to guarantee the quality of CTP products required by the customer.

2. Scope

This specification is applicable to capacitive touch panel manufactured by AVD.

3. Equipment for Inspection

lamp-box、ionizing fan 、10X microscopes 、film card、alcohol/oil ether/acetone、finger cots、 vernier caliper、 anti-static wrist straps, microcalliper、 feeler、 pencil hardness tester、 spectrophotometer 、 drop ball test,etc.

4. Sampling Plan and Reference Standards

Sampling plan:Refer to National Standard GB/T 2828.1---2012/ISO2859-1:1999 , level II of normal levels:

Product Category	Consumer	Non-consumer	Industrial	Automobile
AQL	MA=0.4 MI=1.5	MA=0.4 MI=1.0	MA=0.25 MI=0.65	MA=0.15 MI=0.40

5. Inspection Conditions and Inspection Reference

5.1. Inspection environment : temperature : $23\pm 3^{\circ}\text{C}$; humidity : 40~70%RH ; cleanness : 10000 grade ;

5.2 .Inspection distance : $30\text{cm}\pm 5\text{cm}$;

5.3. Inspection angle : vertical rotate angle : $\pm 45^{\circ}$, up->down;horizontal rotate angle: $\pm 45^{\circ}$,left->right

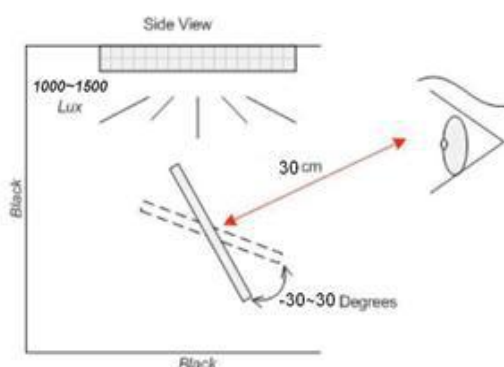
5.4 .Inspection luminance :

(1) appearance inspection : Inspection luminance is 800~1200Lux

5.5 background: white/black

5.6. Inspection time : 10~15s/ pcs ;

Black Booth or Black Background



 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 3 of 18

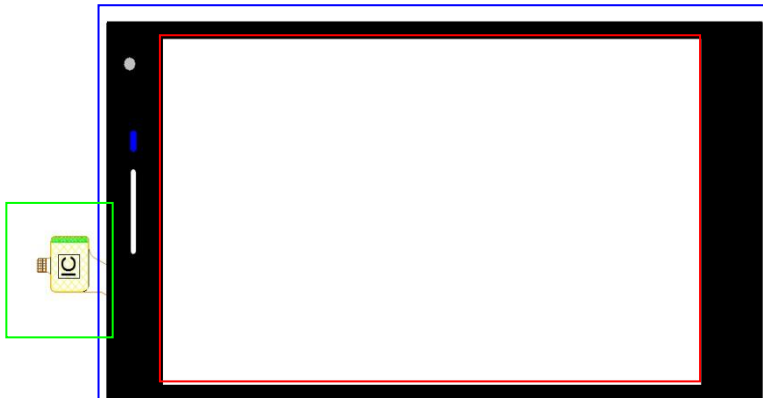
5.7 .Area partition :

5.7.1 AA area: Active area ;

5.7.2 VA area: Visual Windows area (refer to below sketch Red blank);

5.7.3 Area A: visual area from front side view((refer to below sketch Blue blank))

5.7.4 Area B: four sides and FPC area((refer to below sketch Green blank))



5.7. Undefined items or other special items, refer to mutual agreement and limited sample.If criterion does not match product specifications/ technical requirement, both should be subject to special inspection criterion agreed by customer.

5.8 Defect define:

5.8.1 Defect in AA area: pixel defect, function defect (no display, miss line , dark line, wrong polarizer angle, image retention, flicker, abnormal display, dim/bright display, Contrast ratio, dot defect(white dot, black dot, dark dot, Convex-concave point, bubble, foreign material), visual line defect(fiber, scratch, foreign material) , stain and so on

5.8.2 Defect in VA area: dot defect(white dot, black dot, dark dot, Convex-concave point, bubble, foreign material), visual line defect(fiber, scratch, foreign material) , stain and so on

5.8.3 Defect in A area: Line defect (scratch、 soft flocks、 fibre) 、 dot defect (white dot、 black dot、 same color dot、 different color dot、 dust、 bubble) 、 surface stain、 pin-hole、 light leak、 scratch.

5.8.4 Defect in B area: Broken、 crack/chipping、 FPC defect

5.9 Undefined items or other special items, refer to mutual agreement and limited sample. If criterion does not match product specifications/ technical requirement, both should be subject to special inspection criterion agreed by customer.

5.10.To the touch screen and display size of different products: : The defects of TFT screen are determined according to the corresponding TFT screen size. ; The defects in TP VA area are determined according to the corresponding criteria of the corresponding VA area, and the outside of the VA area is determined by the dimension standard.

6. Defects and Acceptance Standards

6.1 Function defect for TP

6.1 Electrical properties test

Check in AVD tester. The program will release result automatically. There are “OK”、 “PASS” 、

 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 4 of 18

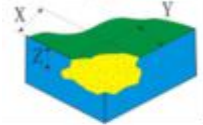
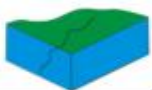
“NG”and the final judgment must be“OK”“PASS”,and we need to pass the draw line test.

Refer to 《**serie IC test program》

No.	Defects	Descriptions	Accepted standard	MAJ	MIN
6.1.1	Short	Measured data has much difference compared with normal;line is not stable	Reject	√	
6.1.2	Open	Measured data has no change.Line is open	Reject	√	
6.1.3	No reaction	No reaction and there is no line in screen	Reject	√	
6.1.4	Mis-display/ abnormal display	Screen has display but line is open or bent	Reject	√	
6.1.5	Button no reaction	Press the button but no reaction	Reject	√	
6.1.6	Button not correct	Press the button .Reaction is not stable	Reject	√	

6.2 Appearance inspection

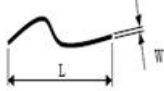
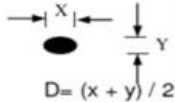
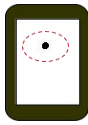
6.2.1lens breakdown standard

Defect	≦5"	5~10"	10~15"	>15"	Accepted standard	MAJ	MIN
LENS breakage 	X≤0.3mm, Y≤0.3mm, one side ≤1	X≤0.3mm, Y≤0.4mm, one side≤1	X≤0.4mm, Y≤0.4mm, one side≤1	X≤0.5mm, Y≤0.5mm, one side≤1	Accept		√
	X>0.3mm, Y>0.3mm	X>0.3mm, Y>0.4mm	X>0.4mm, Y>0.4mm	X>0.5mm, Y>0.5mm	Reject		√
Sensor breakage	Not affect ITO line, not lengthen,function test is OK And be non-visual after attaching Lens				Accept		√
	affect ITO line and be visual				Reject		√
Glass crack 	Crack lengthen to outside				Accept		√
	Crack lengthen to inside				Reject		√

6.2.2 special lens standard

 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 5 of 18

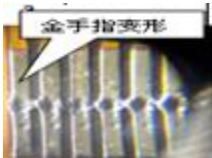
Lens thickness is greater than or equal to 1.8mm product(with/without ink printing)

Defect	≤5"	5~10"	10~15"	>15"	Accepted standard
<u>S/C , line defect</u> <u>W:width</u> <u>L:length</u> 	<u>W≤0.08 ignore except dense</u>		<u>W≤0.1 ignore except dense</u>		<u>accept</u>
	<u>0.08<W≤0.15</u> <u>L≤18 mm; N≤3</u> <u>0.15<W≤0.3</u> <u>L≤18; N≤2</u>	<u>0.08<W≤0.15</u> <u>L≤20mm; N≤3</u> <u>0.15<W≤0.3</u> <u>L≤20mm; N≤3</u>	<u>0.1<W≤0.2</u> <u>L≤25mm; N≤4</u> <u>0.2<W≤0.5</u> <u>L≤25mm; N≤3</u>	<u>0.1<W≤0.2</u> <u>L≤30mm; N≤5</u> <u>0.2<W≤0.5</u> <u>L≤30mm; N≤4</u>	<u>accept</u>
	<u>W>0.3, L>18</u>	<u>W>0.3, L>20</u>	<u>W>0.5mm, L>25mm</u>	<u>W>0.5mm, L>30mm</u>	<u>reject</u>
<u>Dot defect</u> <u>D:Diameter</u>  $D = (x + y) / 2$	<u>D≤0.2mm</u> <u>Ignore, except dense</u>	<u>D≤0.2mm</u> <u>Ignore, except dense</u>	<u>D≤0.3mm</u> <u>Ignore, except dense</u>	<u>D≤0.3mm</u> <u>Ignore, except dense</u>	<u>accept</u>
	<u>0.2<D≤0.25, N≤2</u>	<u>0.2<D≤0.5, N≤5</u>	<u>0.3<D≤0.8, N≤5</u>	<u>0.3<D≤0.8, N≤6</u>	<u>accept</u>
	<u>D>0.25mm</u>	<u>D>0.50mm</u>	<u>D>0.80mm</u>	<u>D>0.80mm</u>	<u>reject</u>
<u>Side damage</u>	<u>X ≤0.5 mm Y ≤0.5 mm Z≤1/2 T</u> <u>Unilateral:N≤1</u>	<u>X ≤0.5 mm Y≤0.5 mm Z≤1/2 T</u> <u>Unilateral:N≤1</u>	<u>X ≤0.5 mm Y≤0.5 mm Z≤1/2 T</u> <u>Unilateral:N≤2</u>	<u>X ≤0.5 mm Y≤0.5 mm Z≤1/2 T</u> <u>Unilateral:N≤2</u>	<u>accept</u>
<u>Angle damage</u>	<u>X ≤0.5 mm Y≤0.5 mm Z≤1/2 T, Unilateral:N≤1</u>				<u>accept</u>
<u>Glass crack</u>	<u>The crack is extended to the outer edge and is calculated according to the collapse; Progressive cracks extending to the inner edge are not allowed</u>				
<u>Sand edge</u>	<u>W≤0.25mm , ignore; W>0.25mm , reject</u>				
<u>Sawtooth</u>	<u>The width of the sawtooth near the VA area : W≤0.3mm , allow, W>0.3 mm , reject;</u>				
<u>Main color ink light leak</u>	<u>Edge area leakage width : W≤0.25mm Only unilateral leakage is allowed; Edge area leakage width > 0.25mm reject</u>				
<u>Screen printing</u>	<u>W≤0.15mm , allow, W>0.15mm , reject</u>				
<u>Main color ink pinhole</u>	<u>Outside the 2mm edge of the VA area, Reflection conditions check for invisible permission, Any pinholes are not allowed within 2mm of the area of the VA area</u>				
<u>Defects in the main color ink layer</u>	<u>The ink layer has fiber, impurity reference visual area standard;</u> <u>Standards for scratch within the ink layer: 0.05mm<W≤0.08mm, L≤3mm,N≤1, allow; W>0.08mm, L>3mm, reject</u>				
<u>Ink pattern spillage</u>	<u>D≤0.15mm; N≤2, allow; D>0.15mm , reject</u>				
<u>Ink pattern gap</u>	<u>Gap width≤1/4h (h is the height of the pattern) or gap width≤1/2w (w is the width of the pattern) allow</u>				

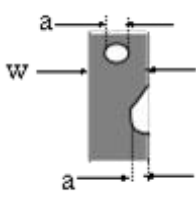
 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 6 of 18

<u>Dirty mark</u>	<u>Printing main color stain $W \leq 0.3\text{mm}$ ignore, Not visible under fluorescent lamps, allow;</u> <u>Printing main color stain $W > 0.3\text{mm}$, visible under fluorescent lamps, reject</u>
<u>IR semi-permeable area ink pinhole</u>	<u>$D \leq 0.15\text{mm}$, $N \leq 1$, allow; $D > 0.15\text{mm}$, reject;</u>
<u>IR semi-permeable area ink color difference</u>	<u>Reflector is not visible in black background, acceptable</u>
<u>IR semi-permeable area ink internal impurities</u>	<u>$D \leq 0.35\text{mm}$; $N \leq 5$, allow; $D > 0.35\text{mm}$; $N > 5$, reject</u>
<u>Note: 1. 5 or more defects within 10mm are called intensive. (intensive defects: not allowed). The spacing of all defects is 10mm</u> <u>2. inspection distance: $750 \pm 50\text{mm}$, if appearance is invisible, ignore</u>	

6.2.3 . FPC defect

Defect	Description	Accepted standard	MAJ	MIN
FPC folding 	FPC is folding and can not restore-> Reject FPC is folding and can restore->compare with limited sample	Reject		√
FPC cover layer defect	FPC cover layer peeling off	Reject		√
FPC color shift and bubble	PI layer have color shift or bubbled due to high welding temperature or long welding time.	Reject		√
Golden finger defect 	peeling off、bonding deformed、glue remained、oxidized, stained	Reject		√
Joggle defect 	bent, broken, peeling off	Reject		√
FPC defect	(golden finger) dented, pin hole $a \leq w/3$	Accept		√

 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 7 of 18

	open/scratch/cracked/Gold finger has glue/FPC surface has glue accumulation	Reject		√
	oxidized, stained	Reject		√
FPC loophole	<u>In the protected line area Or not affecting normal lines, The soft batch ≤ 2.5 mm, accept , Hard board (PCB, PC, steel sheet reinforcing plate)The soft batch ≤ 1.0mm Or less than half of the edge of the wire to the edge (Take a smaller value)</u>	Accept		√

6.2.4. Attaching defect (protective film/adhesive tape/foam/PC...)

Defect	Description	Accepted standard	MAJ	MIN
High temperature glue paper	1.Glue paper attached in FPC doesn't cover component or FPC cove layer. 2.Glue paper attached in golden finger doesn't cover golden finger or peel off	Reject		√
Protective film	Clean、 attaching flat、 no shifting or bubble	Accept		√
	Protective film attaching bubble in VA: $D \leq 2.0$ mm $N \leq 5$ distance ≤ 20 mm	Accept		√
	Protective film attaching bubble in VA: $D > 2.0$ mm $N > 5$ distance > 20 mm	Reject		√
Tape	Attach position refer to the drawing	Accept		√
Foam	<u>1. Follow the drawings first</u> <u>2. If the drawings are not specified in size, refer to the following requirements</u> <u>Gap spec:0.5+/-0.5mm, foam must be smaller than sensor edge side and can not enter into VA.</u>	Accept		√
PC board/ adhesive tape	Tape must be smaller than LENS edge side and can not be folding ,dent or shifting.Do not obstruct the hole;	Accept		√
Anti-explosion fim/Anti-glare film/blue film/AG film	Impression print refer to the limited sample	Accept		√
	Attach position refer to the drawing	Accept		√
	<u>The bubbles are not allowed in the OCA rubber layer, and the bubbles are ignored between the lens and the AG layer or the explosion-proof film layer</u>	Accept		√

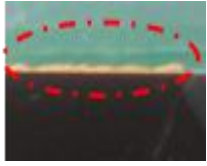
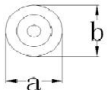
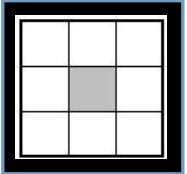
 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 8 of 18

6.2.5. Metal frame (Metal Bezel)

No.	Item	Description	Accepted criterion	MAJ	MIN
6.2.7.1	Material & surface treatment	Metal frame/surface treatment do not conform to the specifications.	Rejected	√	
6.2.7.2	Tab twist Unconformity/ Tab not twisted	Wrong twist method or direction and twist tabs are not twisted as required.	Rejected	√	
6.2.7.3	Bezel paint loss	Scratch/paint loss/Bezel surface concave-convex dot/dent	1.Front surface: Paint peel off and scratch to the bottom Dot: $D \leq 0.5\text{mm}$, exceeds 3; Line: $L \leq 3.0\text{mm}$, $W \leq 0.05\text{mm}$ exceeds 2; 2.Front dent, air bubble and side with paint peeling off scratch to the bottom Dot: $D \leq 1.0\text{mm}$, exceeds 3; Line: $L \leq 3.0\text{mm}$, $W \leq 0.05\text{mm}$, exceeds 2;	√	
6.2.7.4	Bezel scratch			√	
6.2.7.5	Painting peel off, discoloration, dent, and scratch			√	
6.2.7.6	Burr	Burr(s) on metal bezel is so long as to get into viewing area.	Rejected	√	

 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 9 of 18

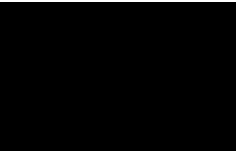
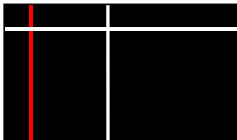
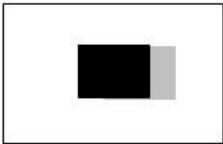
6.2.6. Others

Defect	Description	Accepted standard	MAJ	MIN
Glue flow 	Insulation oil flow in VA area	Reject		√
	ACF/insulation oil flow in VA area	Reject		√
	Sensor edge side glue flow	Accept		√
IC/FPC gap glue	FPC gap glue:cover FPC connect point totally IC glue: cover IC line connect totally	Accept		√
	Glue height : follow the technology spec	Accept		√
Newton circles (rainbow) 	Circles quantity> 2	Reject		√
Layering	LENS/Sensor layering	Reject	√	
Surface	Stain defect which can be removed by cleaning solvent and cloth Defect quantity≤10% Lot total quantity->Accept Remark: defect product which is sorted out by AQL is not included in the 10% part.Unmovable stain refer to 6.1.1 specification.	Reject		√
Isolation point  VA diagram	Gray area In 8X8mm area, all isolation points are missing	Reject		√
	White area In 15X15mm area,all isolation points are missing	Reject		√
	5mm within VA (black area) , isolation points missing ->Ignored	Accept		√
	Isolation points are overlaid	Accept		√

6.3 .Function inspection standard for TFT-LCM final goods

6.3.1 normal defect in TFT screen

 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 10 of 18

Defects	Inspection Criterion	Pictures	Inspection method/tools	Defect category
No display /reaction	shows no picture/display in normal connected situation. ->Rejected		Naked eyes/ testers	MA
Missing segment	Shows missing lines in normal display		Naked eyes/ testers	MA
Image retention (sticking)	The previous picture stays in the next picture. Disappear time <10s, OK; time >10s, NG		Naked eyes/ testers	MA
Flicker	Not accepted		Naked eyes/ testers	MA
Display abnormal	Not accepted		Naked eyes/ testers	MA
Display dim/bright	Refer to limited sample	/	Naked eyes/ limited sample	MA
Contrast	Refer to limited sample	/	Naked eyes/ limited sample	MA
White dot	Refer to dot criterion	/	Naked eyes	MI
White speckle	Refer to limited sample	/	Naked eyes/ limited sample	MI
Yellow speckle	Refer to limited sample	/	Naked eyes/ limited sample	MI

6.3.2 LCD pixel dot defect in TFT screen (defect category: MI)

Item	Inspection criterion			
Size	<u>S < 5"</u>	<u>5 ≤ S < 10"</u>	<u>10 ≤ S < 15"</u>	> 15"
Color pixel dot defect (RGB dot)	1	2	2	3

 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 11 of 18

Item	Inspection criterion			
2 connected bright dot	0	0	1	1
3 connected bright dot or more	0	0	0	0
Bright dot quantity	1	2	3	4
Random dark dot quantity	2	3	4	5
2 connected dark dot	1	1	2	2
3 connected dark dot or more	0	0	0	0
Dark dot quantity	3	4	5	6
Multi-bright dot	ND 5 % hidden, OK			
Remark: 2 bright dots distance DS≥15mm 2 dark dots distance DS≥5mm				
1) Bright dot: Power on TFT and RGB dot in black display				
2) Dark dot: Power on TFT and gray or black dot in RGB display				
3) Multi-bright dot: Power on TFT and fluorescent tiny dot in black display(only visible in black display)				

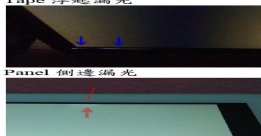
6.3.3 Backlight components

Item	Description	Accepted criterion	MAJ	MIN
No backlight wrong Color	/	Rejected	√	
Color deviation	When powered on, the LCD color differs from its sample and found that the color not conforming to the drawing after testing.	Refer to sample and drawing.		√
Brightness deviation	When powered on, the LCD brightness differs from its sample and is found after testing not conforming to the drawing; or if it conforms to the drawing but the brightness over $\pm 40\%$ than its typical value.	Refer to sample and drawing.		√
Uneven brightness	Uneven on the same LCD and out of the specification of the drawing. The no specification evenness= (the max value-the min value)/ mean value $< 70\%$.	Refer to sample and drawing.		√
Spot/line /scratch	When power on, it has dirty spot, scratches and so on spot and line defects.	Refer to dot/line standard		√

6.3.4. Others

Item	Description	Accepted criterion	MAJ	MIN
Assembly foreign material	Dot/linear stain after assembly backlight and diffuse film	Invisible when power on->OK		√

 AVIDISPLAY		File name	Inspection Criterion for MTP Products	Rev.	V2.0
File type	Class three	File NO.	AVD (WI) -00-QA-009	Page	Page 12 of 18

	TP assembly foggy stain	Refer to 6.1.1 dot/line spec		
Product mark	Missing, unclear, incorrect, or misplaced part	Rejected		√
Newton's rings	Area<1/6 screen area quantity≤1	Accepted		√
Mura	1.In black display ND 5% invisible ->OK; visible->NG 2.Naked eyes inspection RGB display invisible Black display, area<1/4 screen area	Refer to limited sample 		√
Light leak	1.LCD edge (near backlight) shadow by LCD lamps irregular illuminate 2.Judge in black/white/gray display (slight leaky is yellowish,greenish, blueish ->NG) ; 	Refer to limited sample		√
Polarizer	1.Polarizer slant.Cover VA and not over LCD edge 2.No unmovable stain or finger print in polarizer VA 3.Bubble/warped but not enter VA	Accepted		√

6.4.General Appearance and Dimension(Major)

Common inspection equipment :micro calliper 、 vernier caliper 、 pencil hardness tester 、 spectrophotometer 、 drop ball test and etc.

Items	Spec
Dimension	According to drawing
Curl	≤0.3% -> OK, "S" curl ->NG
Surface hardness	According to drawing
VA TT (550nm)	According to drawing
IR TT-- (550nm & 850nm)	According to drawing
Intensity (drop ball test)	According to drawing

Remark: the criterion is common for all product and if some components are not included, just ignore it.

7. Others

Items not specified in this document or released on compromise should be inspected with reference to mutual agreement and limit samples.