

# TFT SPECIFICATION

Part Number	USMP-T011-013013MDV-A0
Size	1.1"
Resolution	132 x 132
Brightness	800 cd/m <sup>2</sup>
Contrast	1000:1
Viewing Angle	85/85/85/85
Operating Temp.	-30 ~ 80°C

FOR ADDITIONAL INFORMATION  
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Issue Date	Approved by (customer use)	Checked by	Prepared by

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# 1. GENERAL DESCRIPTION

USMP-T011-013013MDV-A0 is 1.1 Inch color TFT LCM. It is a trans-missive type color active matrix liquid crystal display (LCD), which uses amorphous thin film transistor (TFT) as switching devices. The 1.1" screen produces is composed of 132\*RGB\*132 pixel elements in a stripe arrangement. This product is composed of a TFT LCD panel, LCD driver IC, LCM FPC, Backlight.

# 2. FEATURES

Display Mode	Normal Black FFS
Screen Size	1.1 inch
Color	262K color
Display Format	132*RGB*132 stripe type
Input Data	MIPI 1 Lane SPI
Viewing Direction	Full angle
LCM Driver IC	ST7789DW

# 3. MECHANICAL SPECIFICATION

## 3.1. LCD Panel parameters

Item	Specifications	Unit
Dimensional outline	22.84 (W)×27.01 (H)×1.8 (T)*	mm
Resolution	132XRGBX132	dot
LCD Active area	19.1268 (W)×19.1268 (H)	mm
Dot pitch	0.0483(W)×0.1449 (H)	mm

\* The thickness is without FPC

# 4. MECHANICAL DIMENSION

Customer's Approval

Customer \_\_\_\_\_

Date \_\_\_\_\_

**Dimensions:**

- LCM DD: 22.84 (0.56)
- LCM DD: 27.01 (0.8)
- LCM DD: 25.35 (1.8)
- LCM DD: 21.73 (1.3)
- A.A.: 19.1268 (11.42)
- A.A.: 19.1268 (11.36)
- Scan Origin
- 1.32xRGBx132\_DOTS
- 2-R0.7
- AU PAD 2-?1.0
- 11
- 30
- 6.92±0.5
- 15.86±0.15
- 1.49±0.5
- (11.42)
- 4±0.3
- 1.8±0.15
- 1.0 Max. (A, K PAD處 -含TAPE)

**Components:**

- Bezel (SUS 304, 0.15t)
- Peeling Tape
- Stiffener (SUS 304, 0.15t)
- Connector AXG720047 (H=0.6mm)
- LED+ LED- LED Circuit
- Component PAD\*4
- Single Layer Area
- Stiffener (SUS304), t=0.15mm
- Mylar Tape (Amber), t=0.1mm Max.

**Legend:**

- LED+ LED- LED Circuit
- Component PAD\*4
- Single Layer Area
- Stiffener (SUS304), t=0.15mm
- Mylar Tape (Amber), t=0.1mm Max.

**Display Scale 50:1**

**Notes:**

- Tuffly applied to cover whole pin surface, but excluded IC and cross alignment mark.
- Silicone can not over top polarizer.
- Connector: Panasonic · AXG720047 or compatible.
- The dimension in brackets ( ) are for reference only.
- Important dimension.
- The glue between LCD and FPC used Tuffly.

**FPC Pin Function:**

No	Pin Name
1	VPP
2	GND
3	GND
4	RESXP
5	GND
6	GND
7	TEP
8	VDDA
9	GND
10	LED-
11	LED+
12	GND
13	VDDI
14	GND
15	MIPI_CLK_P
16	MIPI_CLK_N
17	GND
18	MIPI_DATA_P
19	MIPI_DATA_N
20	GND

**Table 1: Electrical & Physical Data**

ITEM	ELECTRICAL & PHYSICAL DATA	REVISIED RECORD
LCD_Type	1.1" TFT	△ Add Component PAD*4
Viewing Direction	Full View	B
Display Mode	Transmissive/Negative	C
Operating Temp.	-30°C ~ 80°C	D
Storage Temp.	-40°C ~ 85°C	E
Connector(C)	ST7789DW	

**Table 2: Tolerance & Project Info**

SCALE	TOLERANCE	ORG DATE	PROJECT NO:
UNIT	±0.2	10.31.18	USMP-T011-013013MDV-A0
MATERIAL	DRAWN BY	Bo-Cin	
FINISH	CHECKED BY		
	APPROVED BY		
	DWG NO.		
	DCN	A4	VERSION
	P. 1 OF 1		B

## 5. MAXIMUM RATINGS

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

Item	Symbol	Range	Unit
Supply Voltage (Analog)	VCI	- 0.3 ~ +4.6	V
Supply Voltage (I/O)	VDDI	- 0.3 ~ +4.6	V
Supply Voltage (Logic)	VCC	-0.3 ~ +2	V
Driver Supply Voltage	VGH-VGL	-0.3 ~ +30.0	V
Logic Input Voltage Range	VIN	0.5 ~ VDDI + 0.5	V
Logic Output Voltage Range	VO	0.5 ~ VDDI + 0.5	V
Operating Temperature Range	TOPR	-30 ~ +85	°C
Storage Temperature Range	TSTG	-40 ~ +125	°C

## 6. ELECTRICAL CHARACTERISTIC

### 6.1. LCD Characteristics

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage (analog)	$V_{DDA}$	(2.9)	(3.0)	(3.1)	V
Supply voltage (I/O)	$V_{DDI}$	(1.7)	(1.8)	(1.9)	V
Logic Low input voltage	$V_{IL}$	0	-	$0.2 \cdot V_{DDI}$	V
Logic High input voltage	$V_{IH}$	$0.7 \cdot V_{DDI}$	-	$V_{DDI}$	V
Logic Low output voltage	$V_{OL}$	0	-	$0.2 \cdot V_{DDI}$	V
Logic High output voltage	$V_{OH}$	$0.8 \cdot V_{DDI}$	-	$V_{DDI}$	V
Current consumption	$I_{\text{analog}} + I_{I/O}$		(14.5)		mA
Frame rate	$f_{FR}$		(60)		Hz

### 6.2. Backlight

ITEM	SYMBOL	MIN.	TYP.	MAX	UNIT	Condition
Forward voltage	$V_f$		(6.4)		V	$T_a = 25^\circ\text{C}$
Forward Current	$I_f$		(18)	(20)	mA	$T_a = 25^\circ\text{C}$
Power dissipation	$P_d$		(132)		mW	$T_a = 25^\circ\text{C}$
Configuration	2 White LEDs in series					
Drive method	Constant current					

## 6.3. LCM IC-ST7789DW

### Typical operating conditions-ST7789DW

Parameter	Symbol	Condition	Specification			Unit	Related Pins
			MIN.	TYP.	MAX.		
Power & Operation Voltage							
System Voltage	VDD / VDDA	Operating voltage	2.5	2.75	3.3	V	-
Interface Operation Voltage	VDDI	I/O Supply Voltage	1.65	1.8	3.3	V	-
Gate Driver High Voltage	VGH	-	12.54	-	15.46	V	-
Gate Driver Low Voltage	VGL	-	-12.5	-	-7.15	V	-
Gate Driver Supply Voltage	-	VGH-VGL	-	-	27.96	V	-
Input / Output							
Logic-High Input Voltage	VIH	-	0.7VDDI	-	VDDI	V	Note 1
Logic-Low Input Voltage	VIL	-	VSS	-	0.3VDDI	V	Note 1
Differential Input High Threshold Voltage	VIT+	-	-	0	50	mV	MIPI_CLK, MIPI_DATA
Differential Input Low Threshold Voltage	VIT-	-	-50	0	-	mV	
Single-ended Receiver Input Operation Voltage Range	VIR	-	0.5	-	1.2	V	
Logic-High Output Voltage	VOH	IOH = -1.0mA	0.8VDDI	-	VDDI	V	Note 1
Logic-Low Output Voltage	VOL	IOL = +1.0mA	VSS	-	0.2VDDI	V	Note 1
Logic-High Input Current	IIH	VIN = VDDI	-	-	1	uA	Note 1
Logic-Low Input Current	IIL	VIN = VSS	-1	-	-	uA	Note 1
Input Leakage Current	ILI	IOH = -1.0mA	-0.1	-	+0.1	uA	Note 1
VCOM Voltage							
VCOM Voltage	VCOM	-	-	VSS	-	V	-
Source Driver							
Gamma Reference Voltage(Positive)	VAP	-	4.45	-	6.4	V	-
Gamma Reference Voltage(Negative)	VAN	-	-4.6	-	-2.65	-	-
Source Output Settling Time	Tr	Below with 99% precision	-	-	20	us	Note 2
Output Offset Voltage	VOFFSET	-	-	-	35	mV	Note 3



## 7. MODULE FUNCTION DESCRIPTION

### 7.1. PIN Description

Pin NO.	Pin Name	I/O	Pin Function
1	VPP	NC	Test pin
2	GND	P	Power Ground
3	GND	P	Power Ground
4	RESXP	I	This signal will reset the device and it must be applied to properly initialize the chip.
5	GND	P	Power Ground
6	GND	P	Power Ground
7	TEP	O	Tearing effect output
8	VDDA	P	Power supply for analog and booster circuits
9	GND	P	Power Ground
10	LED-	P	Backlight Cathode
11	LED+	P	Backlight Anode
12	GND	P	Power Ground
13	VDDI	P	Power supply for I/O system.
14	GND	P	Power Ground
15	MIPI_CLK_P	I	Positive polarity of low voltage differential clock signal
16	MIPI_CLK_N	I	Negative polarity of low voltage differential clock signal
17	GND	P	Power Ground
18	MIPI_DATA_P	I/O	Positive polarity of low voltage differential data signal
19	MIPI_DATA_N	I/O	Negative polarity of low voltage differential data signal.
20	GND	P	Power Ground

## 7.2. Timing Characteristics

TBD

## ELECTRO-OPTICAL CHARACTERISTICS

### 7.3. Optical Characteristics

LED backlight transmissive module:

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time	Tr + Tf	$\theta = 0^\circ$	-	25	--	ms	
Contrast ratio	CR	$\theta = 0^\circ$	700	1000			
Viewing angle	Top	$CR \geq 10$	70	85	-	deg.	
	Bottom	$CR \geq 10$	70	85	-		
	Left	$CR \geq 10$	70	85	-		
	Right	$CR \geq 10$	70	85	-		
Brightness (Center)	YL	$\theta = 0^\circ$	700	800		nit	
Color chromaticity(CIE)	$X_R$	$\theta = 0^\circ$	0.61	0.64	0.67	CIE 1931	By BM-5
	$Y_R$		0.30	0.33	0.36		
	$X_G$		0.27	0.30	0.33		
	$Y_G$		0.57	0.60	0.63		
	$X_B$		0.120	0.150	0.180		
	$Y_B$		0.030	0.060	0.090		
	$X_W$		0.279	0.309	0.339		
	$Y_W$		0.289	0.319	0.349		
Color gamut	NTSC	$\theta = 0^\circ$	65	71	-	%	
Cross talk	Ct	$\theta = 0^\circ$	-	3	--	%	
Luminance Uniformity		$\theta = 0^\circ$	70	80		%	9 pts

Ta=25±2°C

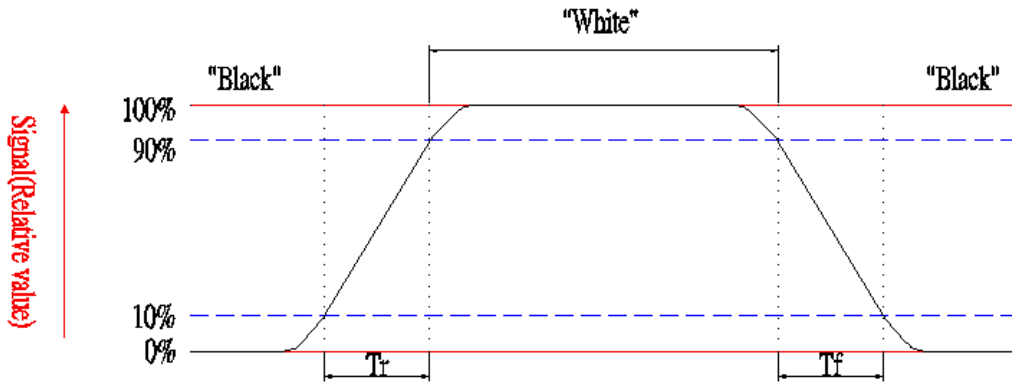
Note1: Ambient temperature=25°C

Note2: To be measured in the dark room.

Note3: Optical specifications are measured by Topcon BM-5(fast) with a viewing angle of 1° at a distance of 50cm and normal direct ion.

Note4: Definition of response time:

Tr is the time it takes to change from non-selected state with relative luminance 10% to selected state with relative luminance 90%;  
Tf is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%.



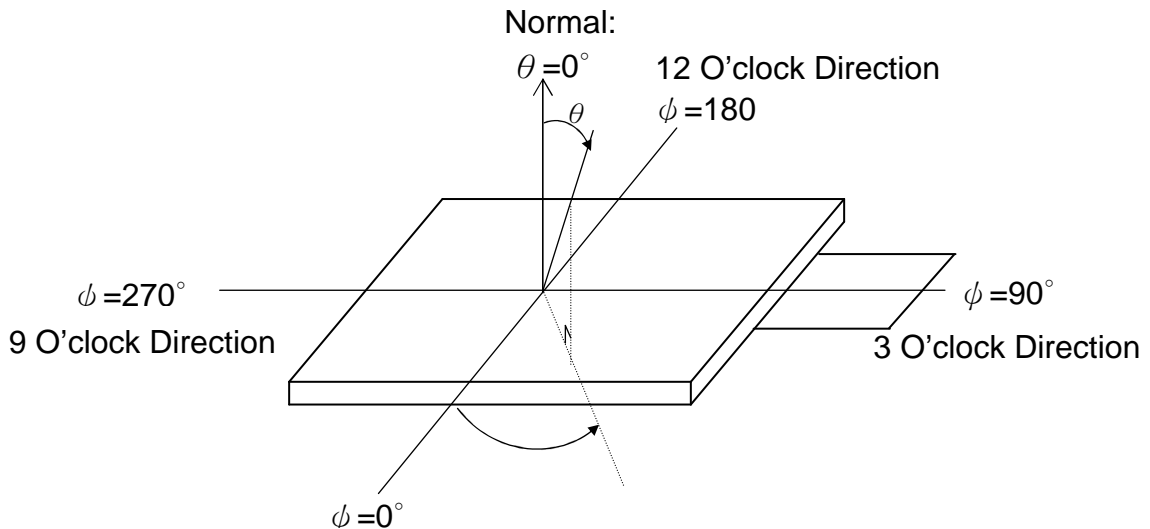
Note5: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

Note6: Definition of viewing angle:

Refer to figure as below.



## 8. RELIABILITY

### 8.1. TESTS

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Operation	T=+80 degree C for 240 hours	<ul style="list-style-type: none"> <li>◦ No Defect Of Operational Function In Room Temperature Are Allowable(23±5°C) .</li> <li>◦ IDD of LCD in Pre-and post-test should follow specification</li> </ul>
2	Low Temperature Operation	T=-30 degree C for 240 hours	
3	High Temperature Storage	T=+85 degree C for 240 hours	
4	Low Temperature Storage	T=-40 degree C for 240 hours	
5	High Temperature High Humidity Operation	T=+50 degree C. RH=90% for 240 hours	
6	Thermal Shock (non-operation)	T=-30 degree C (30mins) --> +85 degree C(30mins) 100cycles	
7	Package Vibration Test	Frequency:10Hz to 55Hz to 10Hz, 0.5G X,Y,Z 2hours ea Total 6hours	
8	Package Drop Test	On concrete surface, 1 corner, 3 edges, 6 surfaces.	
9	Mechanic Shock Test (non operation)	100G 6ms, X,Y,Z 1 time for each direction	
10	ESD (Electro Static Discharge)	150pF, 330Ω,±10KV Contact, 150pF, 330Ω,±15KV Air	
11	Ball drop test	TBD	
12	FPC bend test	For FPC, it need Bend testing per drawing for specific application of bend radius or to IPC-TM-650 Method 2.4.3. Mandrel diameter: 0.250 inch.	
13	LCD Static Pressure Test	Apply pressure to LCD and determine when LCD fails	

Note 1: Test after 24 hours in room temperature(23±5°C).

Note 2: The sampling above is individually for each reliability testing condition.

Note 3: The color fading of polarizing filter should not care.

Note 4: All of the reliability testing chamber above, is using D.I. water. (Min value: 1.0 MΩ-cm)

Note 5: In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after software resetting, it would be judged as a good part. Air and contact discharge are at the center of the screen 5 times.

## 8.2. Color performance

No.	ITEM	Criterion (initial)
1	Luminance	>50%
2	NTSC	>70%
3	Contrast Ratio	>50%

# 9. INSPECTION CRITERIA

## 9.1. Inspection Conditions

### 9.1.1. Environmental conditions

The environmental conditions for inspection shall be as follows

Room temperature:  $23\pm 5^{\circ}\text{C}$  Humidity:  $50\pm 20\% \text{RH}$

### 9.1.2. The external visual inspection

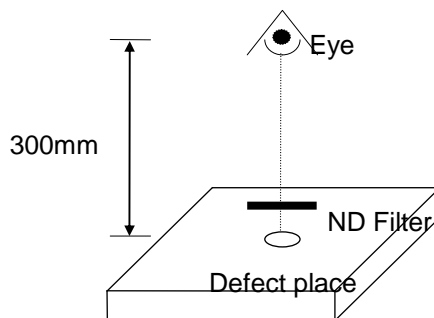
With a single  $1000\pm 200$ lux fluorescent lamp as the light source, the inspection was in the distance of 300mm or more from the LCD to the inspector's eyes.

## 9.2. Light Method

### 9.2.1. Environment lamp under $1000\pm 200$ lux, Viewing direction for inspection

over 300mm The distance from eye to defect around 300mm, the distance from ND

Filter to defect around 25~30mm



### 9.3. Classification Of Defects

#### 9.3.1. Major defect

A major defect refers to a defect that may substantially degrade usability for product applications.

#### 9.3.2. Minor defect

A minor defect refers to a defect which is not considered to be able substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation.

Notes: If the LCD/LCM 's cosmetic and display performance do not specify in "inspection criterion", it should be based on these delivered samples.

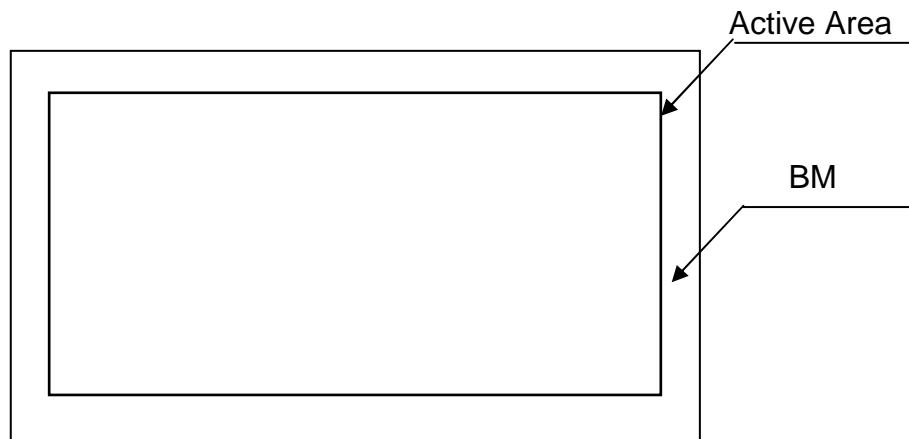
### 9.4. Sampling & Acceptable Quality Level

Level II, MIL-STD-105E

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

### 9.5. Definition Of Inspection Area

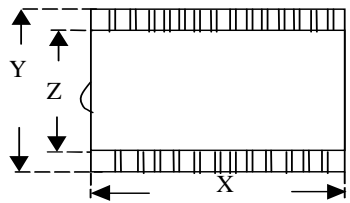
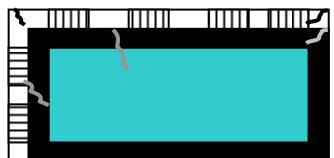
A.A: Active Area



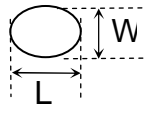
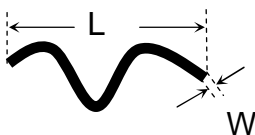
## 9.6. Items and Criteria

### 9.6.1. Visual inspection criterion in cosmetic

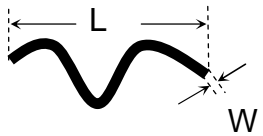
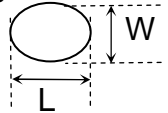
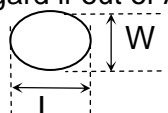
#### (1) Glass defect

No	Defect	Criteria	Remark
1	Dimension (Minor)	By engineering diagram	
2	Cracks (Major)	Extensive crack <b>【Reject】</b>	

#### (2) LCM appearance defect with in A.A

No	Defect	Criteria	Remark	
1	Round type (Minor)	Spec.	Permissible Qty	1. $\phi = (L+W)/2$ , L: Length, W: Width 2. Disregard if out of A.A. 
		$\phi \leq 0.20\text{mm}$	Disregard	
		$0.20\text{mm} < \phi \leq 0.30\text{mm}$	3	
		$0.30\text{mm} < \phi$	0	
2	Line type (Minor)	Spec.	Permissible Qty	1. L: Length, W: Width 2. Disregard if out of A.A. 
		$W \leq 0.05\text{mm}$	Disregard	
		$L \leq 5.0\text{mm}$ and $0.05\text{mm} < W \leq 0.10\text{mm}$	2	
		$L \leq 5.0\text{mm}$ and $0.10\text{mm} < W \leq 0.20\text{mm}$	1	
		$W > 0.20\text{mm}$ or $L > 5.0\text{mm}$	0	



3	Scratch  (Minor)	Spec.	Permissible Qty	1. L: Length, W: Width 2. Disregard if out of A.A.  
		$W \leq 0.05\text{mm}$	Disregard	
		$L \leq 5.0\text{mm}$ and $0.05\text{mm} < W \leq 0.10\text{mm}$	2	
		$L \leq 5.0\text{mm}$ and $0.10\text{mm} < W \leq 0.20\text{mm}$	1	
		$W > 0.20\text{mm}$ or $L > 5.0\text{mm}$	0	
4	Polarizer bubble  (Minor)	Spec.	Permissible Qty	1. $\phi = (L+W)/2$ , L: Length, W: Width 2. Disregard if out of A.A.  
		$\phi \leq 0.20\text{mm}$	Disregard	
		$0.20\text{mm} < \phi \leq 0.30\text{mm}$	2	
		$0.30\text{mm} < \phi \leq 0.50\text{mm}$	2	
		$0.50\text{mm} < \phi$	0	
5	Polarizer Dent  (Minor)	Spec.	Permissible Qty	2. $\phi = (L+W)/2$ , L: Length, W: Width 2. Disregard if out of A.A.  
		$\phi \leq 0.20\text{mm}$	Disregard	
		$0.20\text{mm} < \phi \leq 0.30\text{mm}$	2	
		$0.30\text{mm} < \phi \leq 0.50\text{mm}$	2	
		$0.50\text{mm} < \phi$	0	

(3) FPC

No	Defect	Criteria	Remark
1	Copper peeling  (Minor)	Copper peeling  <b>【Reject】</b>	


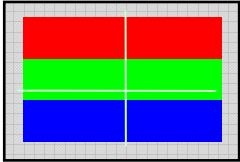
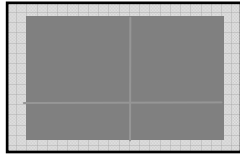
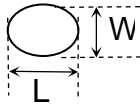
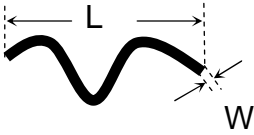
(4) Black tape

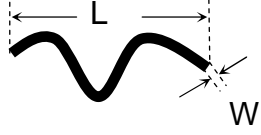
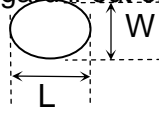
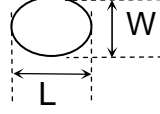
No	Defect	Criteria	Remark
1	Shift  (Minor)	IC exposed  <b>【Reject】</b>	
2	No black tape  (Minor)	No black tape  <b>【Reject】</b>	

(5) Silicon

No	Defect	Criteria	Remark
1	Amount of silicon  (Minor)	ITO exposed  <b>【Reject】</b>	

## 9.6.2. LCM electrical criterion

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 Qty	1:1sub-pixel: 1R or 1G or 1B
		Bright point	1	
		Dark dot point	2	
		Bright +Dark point	2	
5	Slight bright spot (Minor)		Spec.	
		$\geq 1/2\text{dot}$	For No.4 Bright / Dark point	
		$< 1/2\text{dot}$	By ND 5% Invisible	
6	Round type (Minor)	Spec.	Permissible Qty	2. $\phi = (L+W)/2$ , L: Length, W: Width 2. Disregard if out of A.A. 
		$\phi \leq 0.20\text{mm}$	Disregard	
		$0.20\text{mm} < \phi \leq 0.30\text{mm}$	3	
		$0.30\text{mm} < \phi$	0	
7	Line type (Minor)	Spec.	Permissible Qty	1. L: Length, W: Width 2. Disregard if out of A.A. 
		$W \leq 0.05\text{mm}$	Disregard	
		$L \leq 5.0\text{mm}$ and $0.05\text{mm} < W \leq 0.10\text{mm}$	2	
		$L \leq 5.0\text{mm}$ and $0.10\text{mm} < W \leq 0.20\text{mm}$	1	

8	Scratch  (Minor)	Spec.	Permissible Qty	1. L: Length, W: Width 2. Disregard if out of A.A. 
		$W \leq 0.05\text{mm}$	Disregard	
		$L \leq 5.0\text{mm}$ and $0.05\text{mm} < W \leq 0.10\text{mm}$	2	
		$L \leq 5.0\text{mm}$ and $0.10\text{mm} < W \leq 0.20\text{mm}$	1	
		$W > 0.20\text{mm}$ or $L > 5.0\text{mm}$	0	
9	Polarizer bubble  (Minor)	Spec.	Permissible Qty	3. $\phi = (L+W)/2$ , L: Length, W: Width 2. Disregard if out of A.A. 
		$\phi \leq 0.20\text{mm}$	Disregard	
		$0.20\text{mm} < \phi \leq 0.30\text{mm}$	2	
		$0.30\text{mm} < \phi \leq 0.50\text{mm}$	2	
		$0.50\text{mm} < \phi$	0	
10	Polarizer Dent  (Minor)	Spec.	Permissible Qty	4. $\phi = (L+W)/2$ , L: Length, W: Width 2. Disregard if out of A.A. 
		$\phi \leq 0.20\text{mm}$	Disregard	
		$0.20\text{mm} < \phi \leq 0.30\text{mm}$	2	
		$0.30\text{mm} < \phi \leq 0.50\text{mm}$	2	
		$0.50\text{mm} < \phi$	0	
11	Mura  (Minor)	By 5% ND filter invisible		

9.6.3. Others

1. Issues that are not defined in this document shall be discussed and agreed with both parties. (Customer and supplier)
2. Unless otherwise agreed upon in writing, the criteria shall be applied to both parties. (Customer and supplier)
3. Polarizer, more than 0.5mm in size reduction rejected.

## 10. ILLUSTRATION OF LCD DATE CODE

TBD

## 11. RoHS COMPLIANT WARRANTY

RoHS Hazardous substances including:

- Cd < 100 ppm
- Pb < 1000 ppm
- Hg < 1000 ppm
- Cr +6 < 1000 ppm
- PBDE < 1000 ppm
- PBB < 1000 ppm

## 12. PRECAUTIONS FOR USE

### 12.1. Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 12.2. Storage Conditions

- (1) Store the panel or module in a dark place where the temperature is  $23\pm 5^{\circ}\text{C}$  and the humidity is below  $50\pm 20\% \text{RH}$ .
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.
- (6) Do not exposed to direct sun light of fluorescent lamps.

### 12.3. Installing LCD Module

Attend to the following items when installing the LCM.

- (1) Cover the surface with a transparent protective plate or touch panel to protect the polarizer and LC cell.

### 12.4. Precautions For Operation

- (1) Viewing angle varies with the change of liquid crystal driving voltage ( $V_0$ ). Adjust  $V_0$  to show the best contrast.
- (2) Driving the LCD in the voltage above the limit will shorten its lifetime.
- (3) Response time is greatly delayed at temperature below the 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.

- (4) When turning the power on, input each signal after the positive/negative voltage becomes stable.
- (5) Do not apply mater or any liquid on product, which composed of T/P.

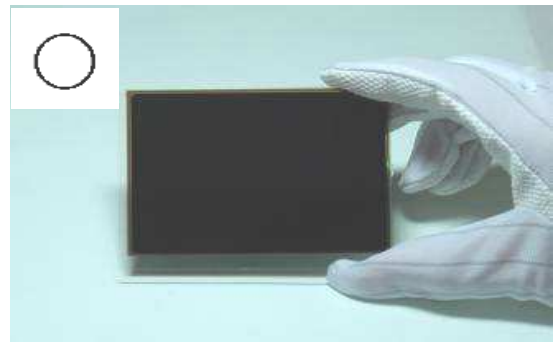
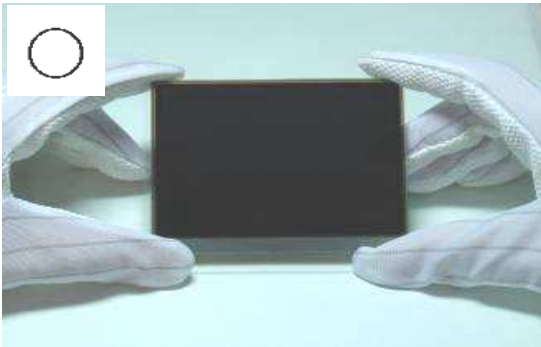
## 12.5. Handling Precautions

- (1) Avoid static electricity that can damage the CMOS LSI; please wear the wrist strap when handling.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface; it may cause display abnormal.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) Do not apply mater or any liquid on product, which composed of T/P.

### 12.5.1. Handling precaution for LCD

LCD is easy to be damaged.  
Please note below and be careful for handling!

#### **Correct handling:**

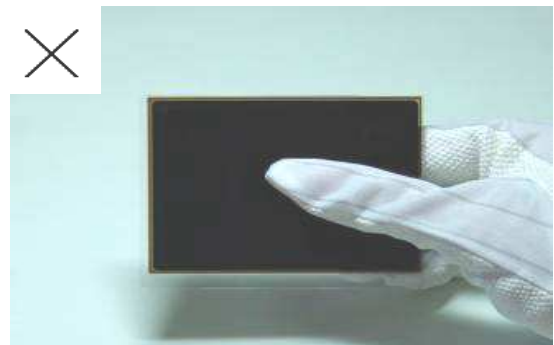


As above photo, please handle with anti-static gloves around LCD edges.

#### **Incorrect handling:**



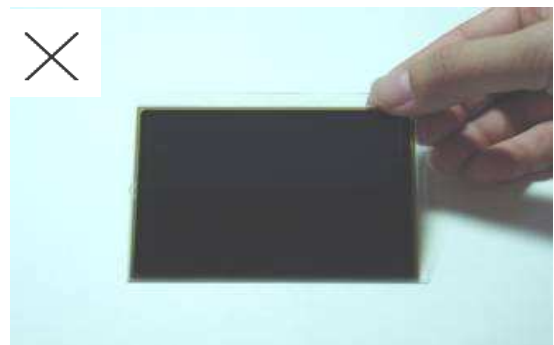
Please don't stack the LCDS.



Please don't hold the surface of LCD.



Please don't operate with sharp stick such as pens.



Please don't touch ITO glass without anti-static gloves.

### 12.5.2. Handling precaution for LCM

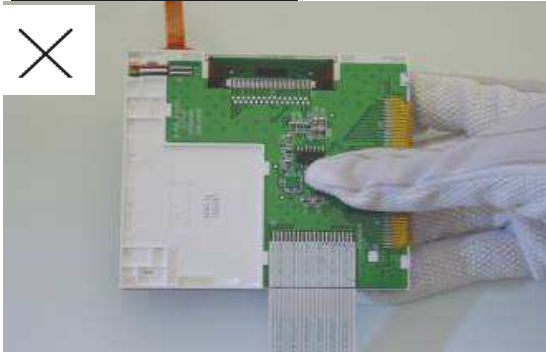
LCM is easy to be damaged.  
Please note below and be careful for handling!

#### **Correct handling:**

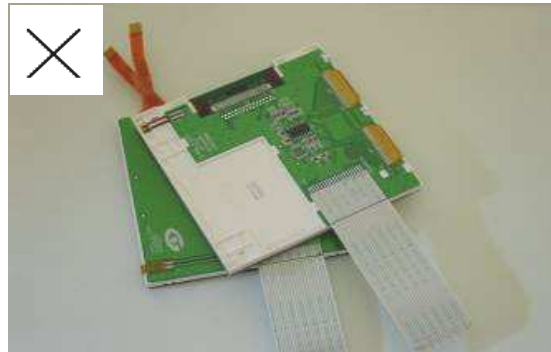


As above picture, please handle with anti-static gloves around LCM edges.

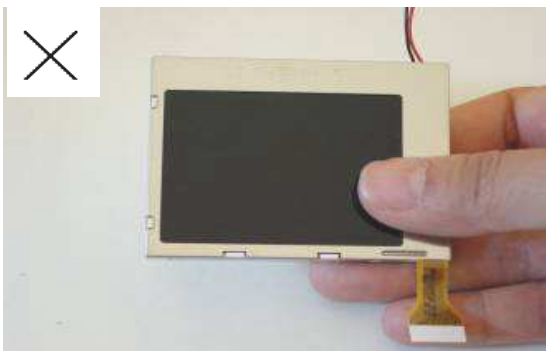
#### **Incorrect handling:**



Please don't touch IC directly.



Please don't stack LCM.



Please don't hold the surface of panel.



Please don't stretch interface of output, such as FPC cable.



## 12.6. Guarantee

- 12.6.1. The period is within 12 months since the date of shipping out under normal using and storage conditions.
- 12.6.2. Any defect not caused by USMP is not guaranteed to the customer. The defect phenomenon should be agreed by both parties.

## 13. REVISION HISTORY

Version	Revise record	Date
A	New version	2018/7/2
B	Updated Pin Description and LCD Characteristics	2018/7/10
C	Updated ME Drawing and Pin Description	2018/7/18
D	Modified ME Drawing	2018/10/31