Microtips Technology
Innovative Solutions. Your Vision. Our Goal.

TFT Module Specification

MODEL: AWH-1024600T70PC01

This module uses ROHS material

CUSTOMER
APPROVED BY
DATE:

Approved by	Checked by		Made by
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Revision Record

Rev No.	Rev Date	Contents	Note
A	2024/04/16	New issue.	

Table of Contents

1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by Micotips Technology. If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

2.Application Fields

Industrial Control, Visual Intercom, Instrumentation, Medical Equipment, Security Monitoring, Vehicle Display, Bank Instrument Acceptance, POS Machine and Other Occasions.

3.General Information

LCM

ITEM	STANDARD VALUES	UNITS
LCD type	7.0’’TFT	--
Dot arrangement	1024 (RGB)×600	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black / IPS	-
Eyes Viewing Direction	80/80/80/80	
Driver IC	HX8282+HX8696 or EQU	--
Module size	165.0(W)×100.0(H)×18.3(T)	mm
Active area	154.21(W)×85.92(H)	mm
Dot pitch	0.0502(W)×0.1432(H)	mm
Interface	HDMI	--
Operating temperature	-20 ~ +70	℃
Storage temperature	-30 ~ +80	℃
Back Light	30 White LEDS	--

CTP

Item	Standard Values	Units
CTP type	Glass + Glass + FPC	--
CTP Driver IC	GT911	--
Surface hardness	6	H
Transmittance	≥85	%
Operation Voltage	2.8 - 3.6	V
CTP size	165.0 (W)×100.0 (H)×2.3(T)	mm
LENS Viewing area	154.91(W)×86.62(H)	mm
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
CTP Interface	USB	-
Pointing Stick	5	-

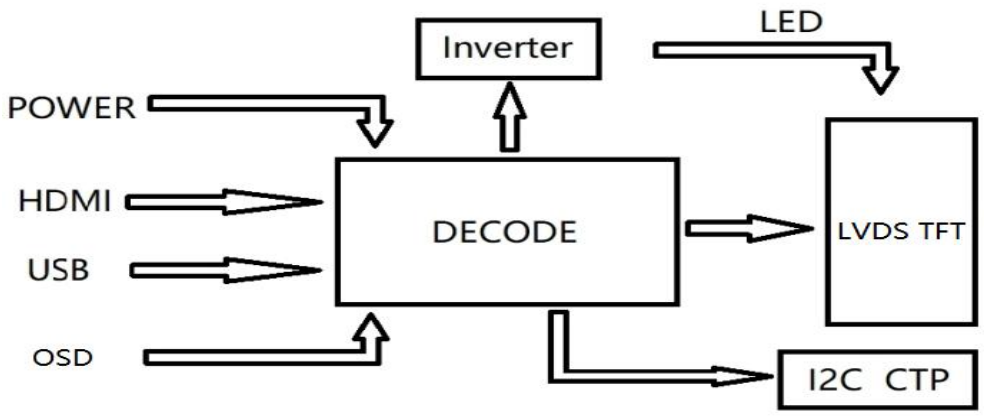
PCB

ITEM	STANDARD VALUES	UNITS
PCBA size	100.0(W)×60.0(H)×8.5(T)	mm
Interface	HDMI	--

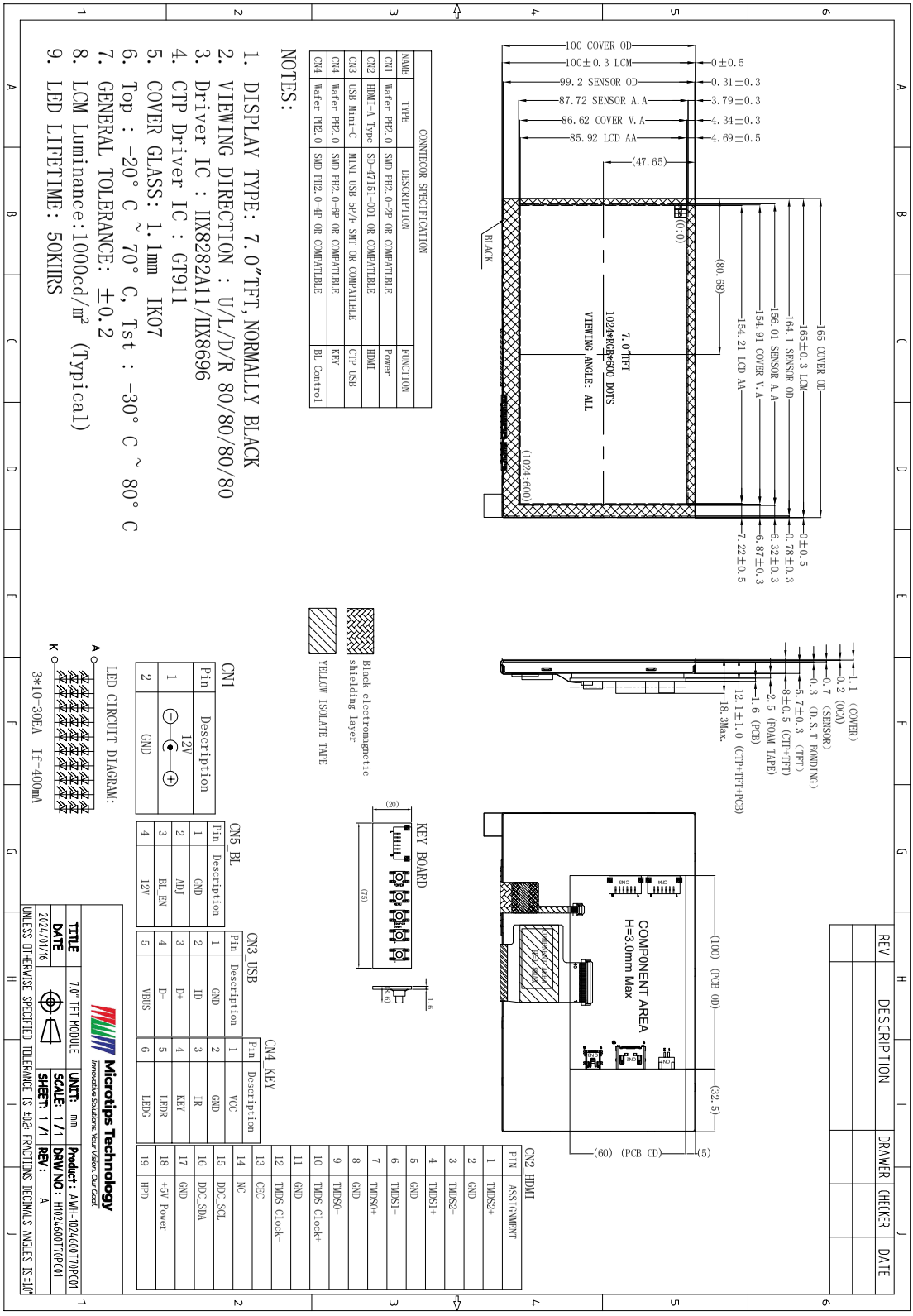
KEY BOARD

ITEM	STANDARD VALUES	UNITS
PCBA size	75.0(W)×20.0(H)×8.6(T)	mm

4. Block Diagram



5. External Dimensions



6. Interface DescriptionCN1:

(PH2.0-2P)

PIN NO.	PIN NAME	DESCRIPTION
1	12V	Power Supply
2	GND	Ground

CN2: (HDMI-A Type)

PIN NO.	PIN NAME	DESCRIPTION
1	TMDS Data2+	TMDS + data pair
2	TMDS Data2 Shield	Ground
3	TMDS Data2-	TMDS – data pair
4	TMDS Data1+	TMDS + data pair
5	TMDS Data1 Shield	Ground
6	TMDS Data1-	TMDS – data pair
7	TMDS Data0+	TMDS + data pair
8	TMDS Data0 Shield	Ground
9	TMDS Data0-	TMDS – data pair
10	TMDS Clock+	TMDS + clock pair
11	TMDS Clock Shield	Ground
12	TMDS Clock-	TMDS – clock pair
13	CEC	NO connection
14	Reserved(NC)	NO connection
15	DDC_SCL	Serial Clock
16	DDC_SDA	Serial Data
17	DDC/CEC Ground	Ground
18	+5v Power	Power
19	Hot Plug Detect	Hot Plug Detect

CN3:(USB:PH2.0-6P)

PIN NO.	PIN NAME	DESCRIPTION
1	GND	Ground
2	ID	NO connection
3	D+	DATA +
4	D-	DATA -
5	VBUS	+5V

CN4:(KEY:Mini-USB)

PIN NO.	PIN NAME	DESCRIPTION
1	VCC	Keypad power supply
2	GND	Ground
3	IR	Infrared Reception
4	KEY	KEY Board AD Interface
5	LEDR	LED (RED)
6	LEDG	LED (GREEN)

CN5: (External Backlight PWM Control Interface)

PIN NO.	PIN NAME	DESCRIPTION
1	GND	Ground
2	ADJ	PWM Dimming
3	BL_EN	Enable PIN
4	12V	Power Supply

7. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Power Voltage	12V	10	14	V
Keypad power supply	VCC	-0.3	3.6	
Operating Temperature	TOP	-20	70	℃
Storage Temperature	TST	-30	80	℃
Storage Humidity	HD	20	90	%RH

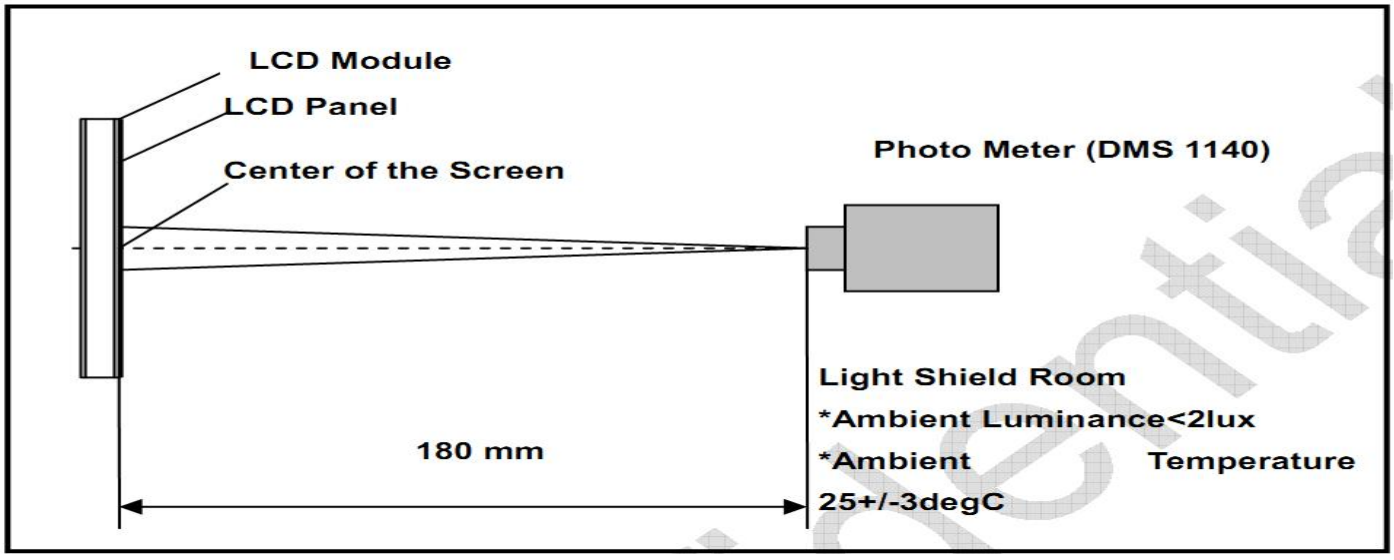
8. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Voltage	12V	10	12.0	14	V	If=1A
Keypad power supply	VCC	3.0	3.3	3.6	V	

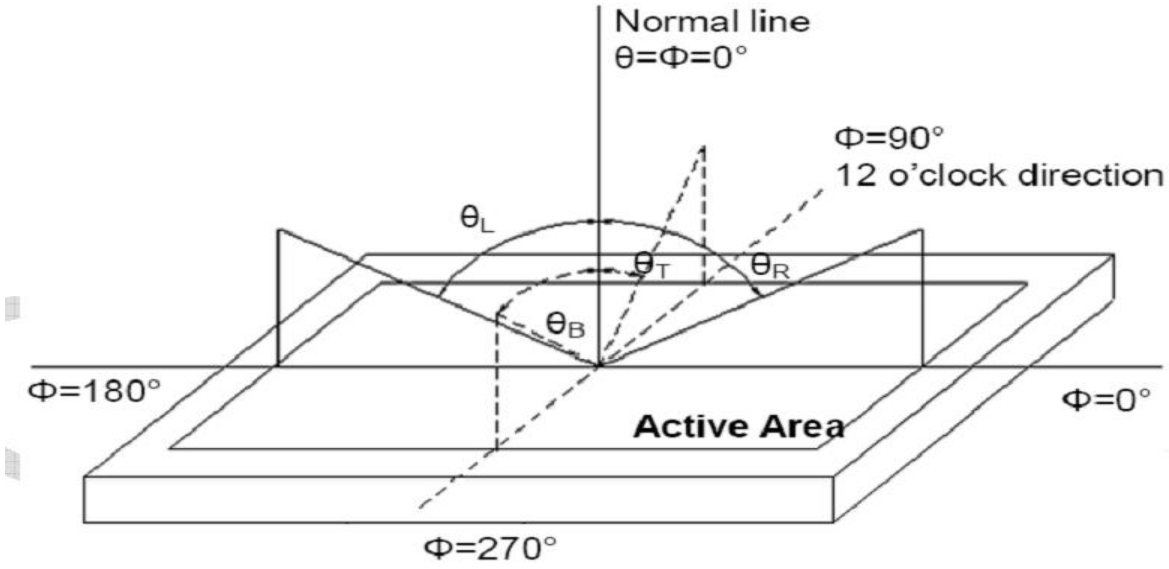
9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	80	-	degree	(1),(2),(6)
		θR	-	80	-		
	Vertical	θT	-	80	-		
		θB	-	80	-		
Luminous Intensity for LCM	-		900	1000	-	cd/m²	--
Uniformity for LCM	-		75	80	-	%	--
Contrast Ratio	Center		500	800	-	-	(1),(3),(6)
Response Time	Rising +Falling		-	25	40	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	White x		TBD	TBD	TBD	-	(1), (6)
	White y		TBD	TBD	TBD	-	
	Red x		TBD	TBD	TBD	-	
	Red y		TBD	TBD	TBD	-	
	Green x		TBD	TBD	TBD	-	
	Green y		TBD	TBD	TBD	-	
	Blue x		TBD	TBD	TBD	-	
	Blue y		TBD	TBD	TBD	-	

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note (2) Definition of Viewing Angle



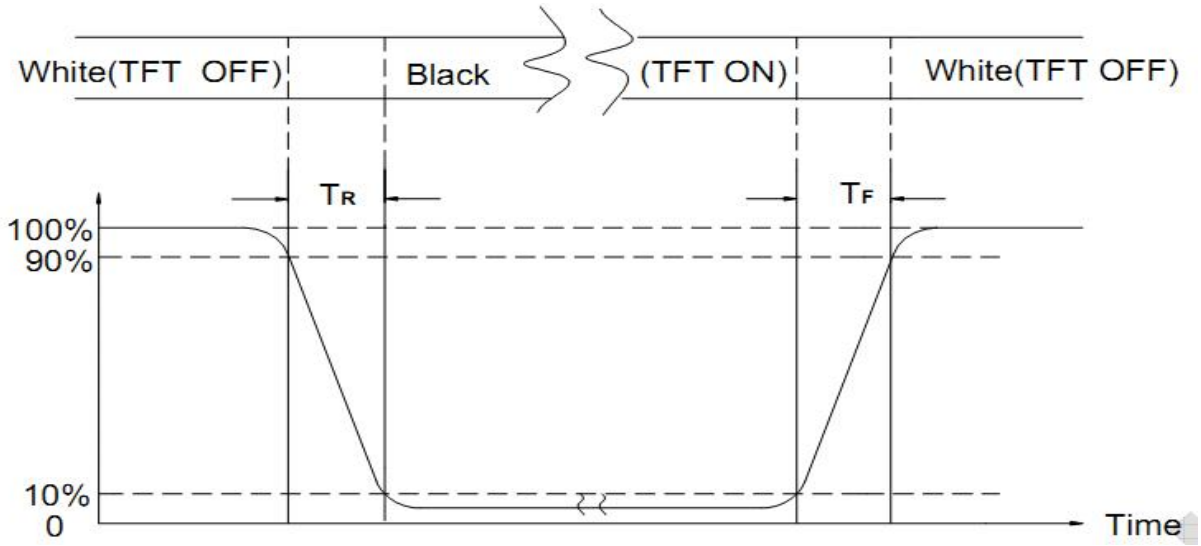
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note (4) Definition of response time



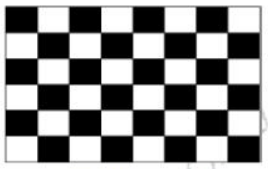
Note (5) Definition of Transmittance (Module is without signal input)

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

10. Reliability Test Conditions and Methods

No.	Test Items	Test Condition	Inspection After Test
1	High Temperature Storage	80°C±2°C×96Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
2	Low Temperature Storage	-30°C±2°C×96Hours	
3	High Temperature Operating	70°C±2°C×96Hours	
4	Low Temperature Operating	-20°C±2°C×96Hours	
5	Temperature Cycle(Storage)	-20°C (30min) ⇔ 25°C (5min) ⇔ 60°C (30min) 1cycle Total 10cycle	
6	Damp Proof Test (Storage)	50°C±5°C×90%RH×96Hours	
7	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5mm X,Y,Z direction for total 3hours (packing condition test will be tested by a carton)	
8	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
9	ESD Test	Voltage:±6KV,R:330Ω,C:150PF,Air Mode,10times	
10	Image Sticking Test	25 ± 2°C Operation with test pattern sustained for 2 hrs, then change to gray pattern immediately. After 5 mins, the mura must be disappeared completely  Image Sticking –pattern  Mid-Gray pattern	

REMARK:
1, The Test samples should be applied to only one test item.
2, Sample side for each test item is 5~10pcs.
3,For Damp Proof 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 judge as a good part.
5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

11. Inspection Standard

11.1 Scope

Specifications contain

11.1.1 Display Quality Evaluation

11.1.2 Mechanics Specification

11.2 Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E.

11.2.1 Lot size: Quantity per shipment as one lot (different model as different lot).

11.2.2 Sampling type: Normal inspection, single sampling.

11.2.3 Sampling level: Level II.

11.2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.5

11.3 Panel Inspection Condition

11.3.1 Environment:

Room Temperature: 25±5°C.

Humidity: 65±5% RH.

Illumination: 300 ~ 700 Lux.

11.3.2 Inspection Distance:

35±5 cm

11.3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

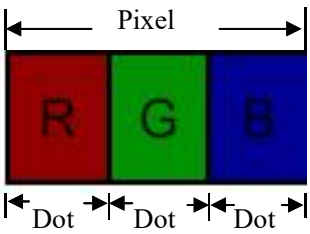
11.3.4 Inspection time：

Perceptibility Test Time: 20 seconds max.

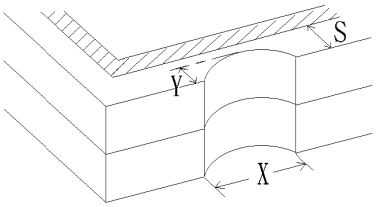
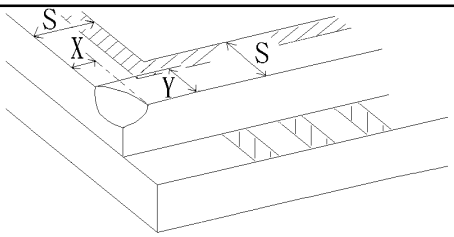
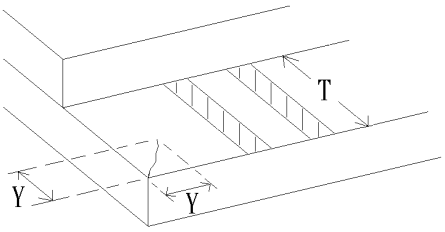
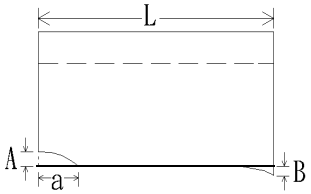
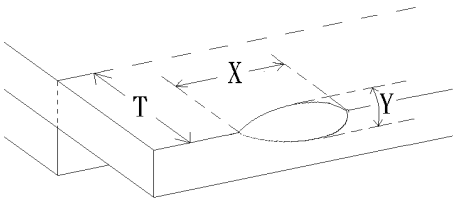
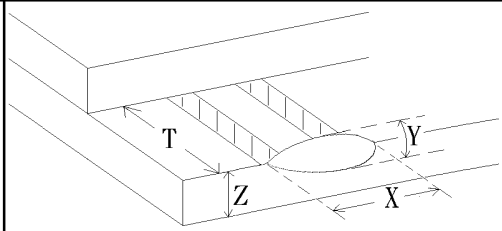
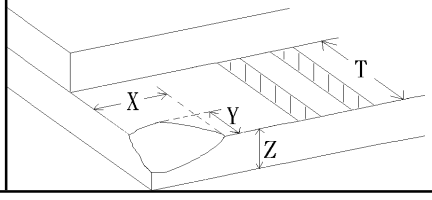
11.4 Inspection Plan

Class	Item	Judgment	Class
Packing & Indicate	1. Outside and inside package.	"MODEL NO.", "LOT NO." and "QUANTITY" should indicate on the package.	Minor
	2. Model mixed and quantity.	Other model mixed Quantity short or over	Major
	3. Product indication.	"MODEL NO." should indicate on the product.	Major
Assembly	4. Dimension, LCD glass scratch and scribe defect.	According to specification or drawing.	Major
Appearance	5. Viewing area.	Polarizer edge or LCD's sealing line is visible in the viewing area…….Rejected.	Minor
	6. Blemish, black spot, white spot in the LCD and LCD glass cracks.	According to standard of visual inspection.(inside viewing area)	Minor
	7. Blemish, black spot, white spot and scratch on the polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	8. Bubble in polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	9. LCD's rainbow color.	Strong deviation color (or newton ring) of LCD…….....Rejected. Or according to limited sample.(if needed, and inside viewing area)	Minor
Electrical	10. Electrical and optical characteristics.(contrast Vop chromaticity….etc)	According to specification or drawing.(inside viewing area)	Major
	11. Missing line.	Missing dot line character	Major
	12.Short circuit. Wrong pattern display.	No display, wrong pattern display, current consumption. Out of specification	Major
	13. Dot defect.(for color and TFT)	According to standard of visual Inspection.	Minor

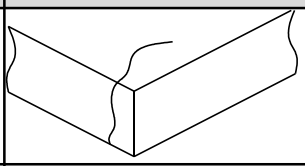
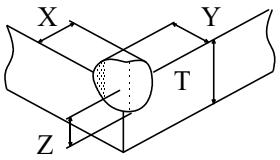
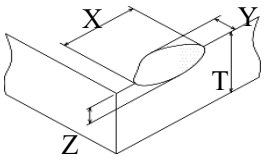
11.5 Standard Of Visual Inspection

<table>
<tr><th>No.</th><th>Class</th><th>Item</th><th>Judgment</th></tr>
<tr><td>11.5.1</td><td>Minor</td><td>Black and white spot.
Foreign materiel.
Dust.
Blemish.
Scratch.</td><td>(A) Round type: Unit: mm
<table>
<tr><th>Diameter (mm.)</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.2</td><td>Disregard</td></tr>
<tr><td>0.2 < Φ≦0.5</td><td>3(Distance>5mm)</td></tr>
<tr><td>0.5 < Φ</td><td>0</td></tr>
</table>
Note: Φ = (length+width)/2
(B) Linear type: Unit: mm
<table>
<tr><th>Length</th><th>Width (mm.)</th><th>Acceptable Q'ty</th></tr>
<tr><td>--</td><td>W≦0.03</td><td>Disregard</td></tr>
<tr><td>L≦5.0</td><td>0.03< W≦0.07</td><td>3(Distance>5mm)</td></tr>
<tr><td>--</td><td>0.07 < W</td><td>FOLLOW ROUND TYPE</td></tr>
</table></td></tr>
<tr><td>11.5.2</td><td>Minor</td><td>Dent on polarizer.</td><td>Unit: mm.
<table>
<tr><th>Diameter</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.2</td><td>Disregard</td></tr>
<tr><td>0.2 < Φ≦0.5</td><td>3(Distance>5mm)</td></tr>
<tr><td>0.5 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>11.5.3</td><td>Minor</td><td>Bubble in polarizer.</td><td>Unit: mm.
<table>
<tr><th>Diameter</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.2</td><td>Disregard</td></tr>
<tr><td>0.2< Φ≦0.5</td><td>3(Distance>5mm)</td></tr>
<tr><td>0.5 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>11.5.4</td><td>Minor</td><td>Dot defect</td><td>
<table>
<tr><th>Items</th><th>Acceptable Q'ty</th></tr>
<tr><td>Bright dot</td><td>N ≦2</td></tr>
<tr><td>Dark dot</td><td>N ≦3</td></tr>
<tr><td>Total dot</td><td>N ≦5</td></tr>
</table>
Pixel define : 

Note1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
Note 3: The bright dot defect must be visible through 2% ND filter
Note 4: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.</td></tr>
<tr><td>11.5.5</td><td>Minor</td><td>Mura</td><td>ND 5% (In 50% gray screen)</td></tr>
</table>

No.	Class	Item	Judgment
11.5.6	Minor	LCD glass chipping.	 Y>S Reject
11.5.7	Minor	LCD glass chipping.	 X or Y>S Reject
11.5.8	Major	LCD glass crack.	 Y>(1/2) T Reject
11.5.9	Major	LCD glass scribe defect.	 1. a>L/3, A>1.5mm Reject 2. B : According to dimension
11.5.10	Minor	LCD glass chipping. (on the terminal area)	 Φ = (x+y)/2>2.5mm Reject
11.5.11	Minor	LCD glass chipping. (on the terminal surface)	 Y>(1/3)T Reject
11.5.12	Minor	LCD glass chipping.	 Y>T Reject

11.6. Inspection Standard Of Touch Panel

No.	Class	Items		Judgment	
11.6.1	Major	Touch panel crack.			Reject
11.6.2	Minor	Touch panel chipping.	Corner.		X≦0.5mm, Y≦0.5mm, Z≦T, N≦4, Accept
			Edge.		X≦0.5mm, Y≦0.5mm, Z≦T, N≦5, Accept
11.6.3	Minor	Scratch. Dust and foreign materiel. (linear type)		W≦0.03	Accept
				0.03mm<W≦0.07mm, L≦5.0mm (Distance>5mm)	Accept 2 ea Max.
				W>0.07mm	Reject
11.6.4	Minor	Scratch. Dust and foreign materiel (round type: φ = (length+width)/2)		Φ≦0.2mm	Accept
				0.2mm＜Φ≦0.25mm (Distance>5mm)	Accept 1 ea Max.
				Φ＞0.25mm	Reject
11.6.5	Minor	Touch panel dent / fish eyes.		Φ≦0.2mm	Accept
				0.2mm＜Φ≦0.5mm (Distance>5mm)	Accept 2 ea Max.
				Φ＞0.5mm	Reject
11.6.6	Minor	Touch panel air bubble.		Φ≦0.2mm	Accept
				0.2mm＜Φ≦0.5mm (Distance>5mm)	Accept 2 ea Max.
				Φ＞0.5mm	Reject
11.6.7	Minor	Touch panel printing area scratch.		W≦0.03mm	Accept
				0.03mm＜W≦0.05mm, L≦5.0mm (Distance>5mm)	Accept 2 ea Max.
				W＞0.05 (W>0.05 follow 11.6.4 round type)	Reject
11.6.8	Minor	Touch panel white haze mark / dust.		Can not be removed	Reject

12. Handling Precautions

12.1 Mounting Method

The LCD panel of MTUSATFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module in 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.

12.2 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 happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution Against Static Charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

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

12.4 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

12.5 Caution for operation

It is an indispensable condition to drive LCD's within the specified voltage limit since the higher

- voltage then the limit cause 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 then the operating temperature range and on the other hand at higher temperature LCD's how 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.
- 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.

12.6 Storing

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

- Storage 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

12.7 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

13. Precaution for Use

13.1

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.

13.2

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 MTUSA TFT , 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.

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