

SPECIFICATION

PRODUCT NO. : **TCXD121ABLMR-125**

VERSION : **Ver 1.1**

ISSUED DATE : **2022-3-30**

This module uses ROHS material

FOR CUSTOMER: _____

: APPROVAL FOR SPECIFICATION

: APPROVAL FOR SAMPLE

DATE	APPROVED BY

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ISSUE History

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1 Overview

This specification document is issued for the 12.1" TFT Liquid Crystal Display bonded with Capacitive-Type Touch Panel. This document defined the general provisions for the specific module listed at the front page of this document. In the event of conflict between this document and other documents, this document including the attachments and drawing, is highest-level specification for this products.

2 Display Specification

2.1 Size

Size: 12.1"

2.2 Brightness

Typical Brightness: $\geq 1000\text{cd}/\text{m}^2$

Min. Brightness: $\geq 800\text{cd}/\text{m}^2$

Measured at Cover lens surface.

2.3 Contrast

Typical Contrast: ≥ 1000

Min contrast: ≥ 700

2.4 Resolution

Resolution: 1280x800

2.5 Viewing Angle

Typical Viewing Angle: $\geq 85^\circ$

Min Viewing Angle $\geq 70^\circ$

2.6 Aspect ratio

Aspect Ratio: 16:10

3 Touch Specification

Touch controller interface is I2C.

3.1 Driving Touch Panel

Parameter		Sym.	Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	
Power Supply Current	Active	Icc			200	mA	
Input Voltage	High	Vih	0.6*Vcc		Vcc+0.5	V	
	Low	Vil	0		0.3*Vcc	V	
Output Voltage	High	Voh	0.7*Vcc			V	
	Low	Vol			0.3*Vcc	V	
Permissible Ripple Voltage		Vrp		100		mVpp	
SCL Clock Frequency		Fscl	0	100	400	kHz	

*SCL: For 400 kHz clock stretching mode is permitted.

3.2 Touch Panel Specification

Parameter		Sym.	Min.	Typ.	Max.	Unit	Remarks
Accuracy	Center	Acrc			1.5	mm	
	Border	Acrb			2.5	mm	
Number of Touches		NUM	5			Point	
Min. distance for dual touch	Horizontal	Tdist H			20	mm	
	Vertical	Tdist V			20	mm	
Scan Speed	Active	Sspd A		100		Hz	
	Idle	Sspd I		30		Hz	
Resolution	Horizontal				16384		
	Vertical				16384		
Response Area	Horizontal			256		mm	
	Vertical			167		mm	

4 Cover Lens Specification

4.1 Cover Glass Thickness

Cover glass thickness: min. 1.8mm

4.2 Hardening

Hardening: Chemical or Thermal

4.3 Glass surface treatment

Glass surface treatment: AG (etching), gloss 85+/-15%

4.4 Backside printing

Backside printing: 1 color black printing.

For Details see corresponding 3D model and 2D drawing.

4.5 Bonding Display-Touch-cover lens

Bonding Display-Touch-cover lens: Optical Bonding

4.6 Glass Surface hardness

Surface hardness: >=7H

4.7 Glass Parameter

CS >= 400 MPa

DOL >= 8 μ m

4.8 Glass material

Glass material: Soda-lime / white glass / clear glass

5 Environmental Specification

5.1 UV Resistance

UV Resistance: DIN EN ISO 4892-2:2013 table 3, procedure B, cycle 2 for 300h

5.2 Operating Temperature

Operating Temperature: -30°C ... +85°C

5.3 Storage Temperature

Storage Temperature: -30°C ... +85°C

5.4 Chemical Resistance

Chemical Resistance of surface materials against diesel fuel, "Bio" diesel fuel, engine oil, transmission fluid, hydraulic fluid, grease, anti-freeze, urea, cold cleaner, contact spray, ammonium hydroxide, liquid agricultural lime, NPK compound fertilizer, agricultural chemicals

5.5 EMC

Immunity against radiation	150 V/m	ISO 11452- 1, -2, -4 and -5
ESD, powered-up, air discharge	+/- 15kV	ISO 10605
ESD, unpowered, contact discharge	+/- 4kV	ISO 10605
ESD, unpowered, air discharge	+/- 8kV	ISO 10605

6 Incoming Inspection Standard

6.1 Scope

The incoming inspection standards shall be applied to the combination of display, touch and cover lens.

6.2 Inspection conditions

	Display inspection	Appearance inspection	note
Temperature	$25\pm5^{\circ}\text{C}$	$25\pm5^{\circ}\text{C}$	
Humidity	$60\pm5\%$ RH	$60\pm5\%$ RH	
View distance	$30\pm5\text{cm}$	$30\pm5\text{cm}$	Note1
Luminance	$150\pm50\text{ lux}$	$700\pm200\text{ lux}$	Note2
Inspection direction	$0<\text{OL}<20^{\circ}$ $0<\text{OR}<20^{\circ}$ $0<\text{OU}<20^{\circ}$ $0<\text{OD}<20^{\circ}$	$0<\text{OL}<45^{\circ}$ $0<\text{OR}<45^{\circ}$ $0<\text{OU}<45^{\circ}$ $0<\text{OD}<45^{\circ}$	Note3

Note1. Viewing distance : The distance between the inspector's eyes and screen

Note2. Inspection Luminance : The luminance at an inspection desk surface

Note3. Inspection direction : Viewing line should be perpendicular to the surface of the module.

Refer to the figure 1 as following :

Note4. ND filter use: put the ND filter between the inspector's eyes and screen, the viewing distance is 2 cm from the screen, inspection time is 3sec.

Note5. To normal view modules, OL / OR / OU / OD = 0°

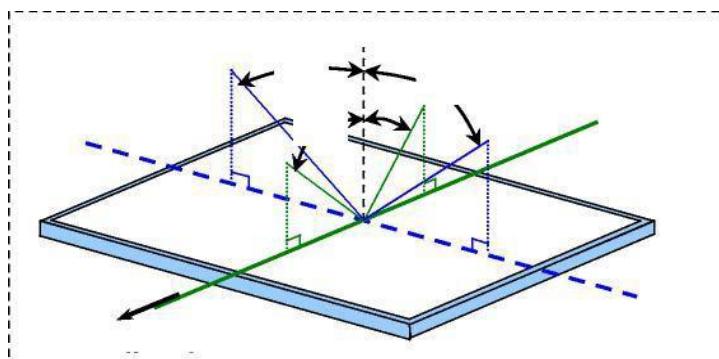


Figure 1: Inspection direction

6.3 Classification of defects:

Defects are classified as major defects and minor defects according to the defect classification defined herein.

6.3.1 Major defects:

A major defect is a defect that is likely to result in failure, or to reduce the usability of the product for its intended purpose evidently.

6.3.2 Minor defects:

A minor defect is either a defect that is not likely to reduce the usability of the product for its intended purpose evidently, or a stray from an intended purpose with little bearing on the effective usage.

Specific criteria of judgment on major and minor defects shall be in accordance with "the Classification of Defect" table below.

Defect items	Criterion for defects	Severity
Line Defect	Not allowed any vertical, horizontal and cross line	Major
Display abnormal	Not allowed any display abnormal at any pattern	Major
Foreign Material	shall be in accordance with the item 5-1-4"Foreign Material "in this standard	Minor
Polarizer Defect	Shall be in accordance with the item 5-2-1"Polarizer Defect "in this standard	Minor
Dot Defect	Shall be in accordance with the item 5-1-1"Dot defect" in this standard	Minor
Mura	Shall be in accordance with the item 5-1-5"Mura defect" in this standard	Minor
Touch Panel Defect	Shall be in accordance with the item 5-2-2"Mura defect" in this standard	Minor

6.4 Inspection Criteria

6.4.1 Display inspection

6.4.1.1 Dot Defect

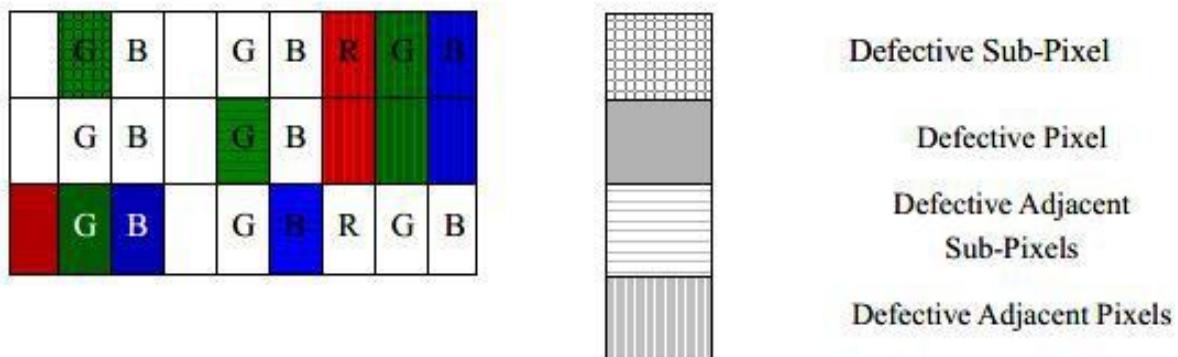
- A. Every dot is a Sub-Pixel (each Red, Green or Blue color).
- B. Dot defect is defined as that the defective area of the dot is larger than 50% of the dot area.,
- C. Dot defect isn't defined as that the defective area of the single dot defect less than 50% of the dot area.
- D. The luminance of the dots should be judged by ND 8%.

Defect	Item	Max. Number of Defects	Min. Distance Between Defects	Test Condition
Bright Points (R, G, or B)		N ≤ 1	15mm	Black
Bright Point Pairs (2 bright sub-pixels in 2 adjacent pixels or single pixel)		N = 0	--	Black
3 or More Bright Sub-Pixels in 2 Adjacent Pixels		N = 0	--	Black

Dark Points (R,G, or B)	$N \leq 3$	15 mm	White& R/G/B Pattern
Dark Point Pairs (2 dark sub-pixels in 2 adjacent pixels or single pixel)	$N = 0$	--	White& R/G/B Pattern
3 or More Dark Sub-Pixels in 2 Adjacent Pixels	$N = 0$	--	White& R/G/B Pattern
Total Defective Sub-Pixels (bright and/or dark points)	$N \leq 4$	--	Black/White /R/G/B

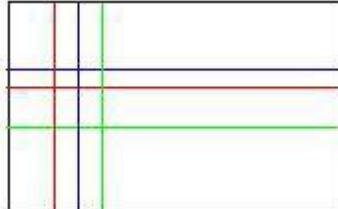
6.4.1.2 Pixel Definition

11.5.1.2 Pixel Definition

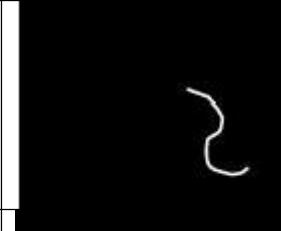
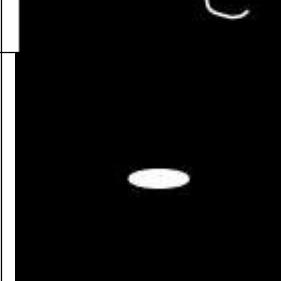


6.4.1.3 Line Defects

Line defect : Not allowed any vertical, horizontal and cross line at any Pattern

Defect item	Visual Description	Specifications	Test Condition
Line defect		Not allowed	Any video pattern

6.4.1.4 Foreign Material

Defect Item	Visual Description	Line width [mm]	Line length [mm]	Judgment
Line shape		W<= 0.05	--	Allowed
		0.05 < W <= 0.1	L <= 7	N <= 4
		0.1 < W <= 0.2	L <= 7	N <= 1
		--	7.0 < L	N = 0
		0.2 < W	--	
Dot shape		Diameter [mm]	Space >= 10	Judgment
		D <= 0.2		Allowed
		0.2 < D <= 0.3		N <= 10
		0.3 < D <= 0.5		N <= 3
		D > 0.5		N = 0

Note1. D : diameter, W : width, L : length, N : count

Note2. Translucent edge is ignored in measuring the diameter of spot.

Note3. Line shape & Dot shape figure are as follows:

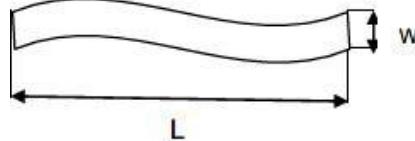


Figure 1

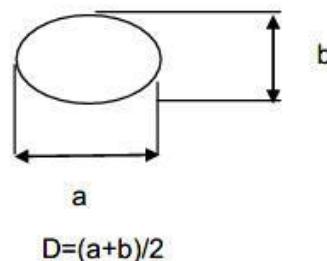


Figure 2

6.4.1.5 Mura

Defect item	Visual Description	Specifications	Test Condition
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Mura		ND 5%	51/255Grayscale
Light leakage		No recognized	51/255Grayscale

6.4.2 Exterior inspection

- A. Extraneous substances that can be wiped off such as Finger Prints, particles are not considered as defects.
- B. Defects on the Black Matrix (outside the Active Area) are not considered defects.

Defect Item	Visual Description	Area(mm ²)	Judgment
Polarizer scratch		$S \leq 0.20$	Allowed
		$S > 0.20$	Not allowed
Bubbles、 Wrinkles、 Dent、 convex、 pinhole		Diameter(mm)	Judgment
		$D \leq 0.30$	Allowed
		$0.30 < D \leq 0.40$	$N \leq 3$
		$D > 0.40$	$N = 0$
		$space \geq 10$	

Note1. D: diameter, S: area, N: count

Note2. Translucent edge is ignored in measuring the diameter of spot

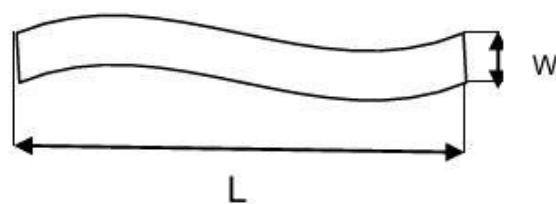


Figure 1

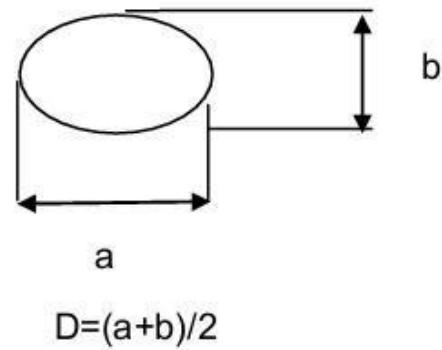
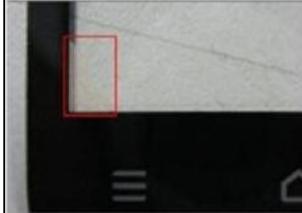


Figure 2

		Acceptable Quantity
Broken/ cracks		Not allowed
Touch panel fragment	Corner Fragment:	$X \leq 1.5$ $Y \leq 1.0$ $Z \leq T$
	Side Fragment:	$X \leq 1.5$ $Y \leq 1.0$ $Z \leq T$
Dirt/foreign matter		Can't be wiped and foreign matter Not allowed

		Erasable dirt	Ignore(Wipe clean)
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6.5 Inspection judgment:

6.5.1 Lot size: Quantity per shipment lot per model

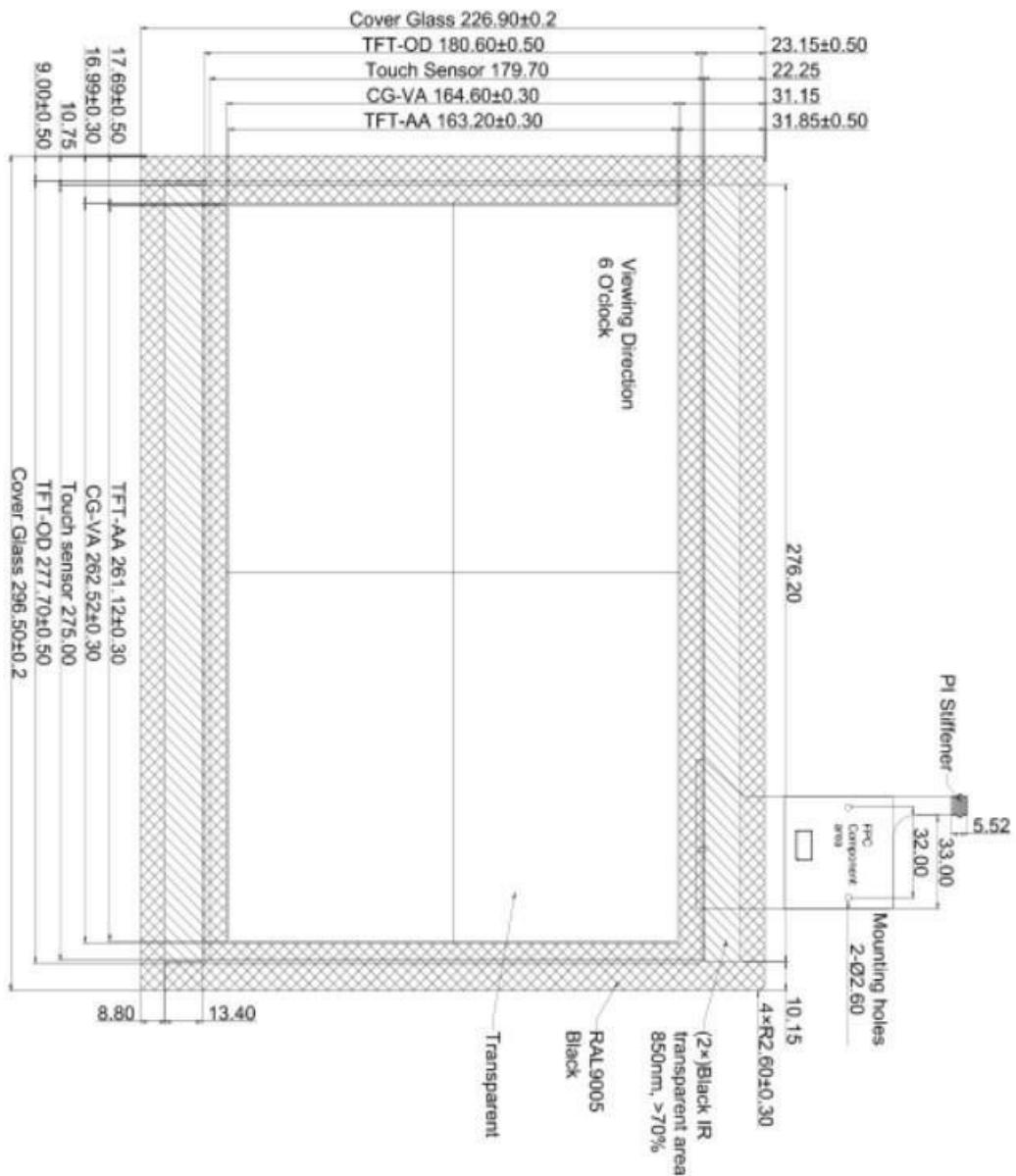
Sampling type: Normal inspection

Inspection level: 100%

6.5.2 Issue

Which is not defined in this criteria shall be discussed by both parties, Customer and Supplier, for better solutions.

7 Mechanical Drawing:

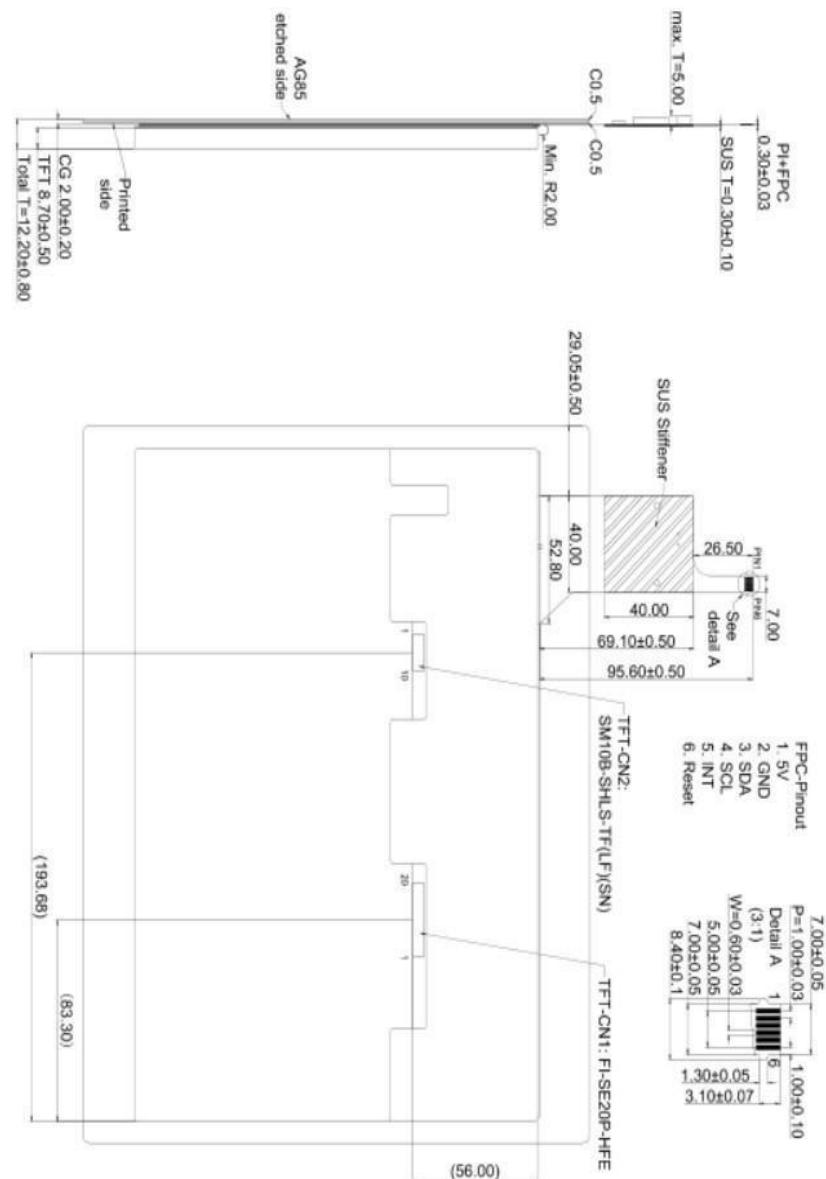


Front View

Notes:

1. Cover glass chemical strengthened, AG85±15, surface hardness ≥7H;
2. Touch sensor resolution 25X*40Y with SIS9509 controller ;
3. Optical bonding between TFT and touch panel;
4. All display details please refer to spec TIANMA NL12880BC20-32F;
5. Operation & Storage Temperature: refer to general GE STAR TOUCH SPEC A_23.

Right View



Rear View

Bill of Material	
Cover Glass	2mm AG85 glass with printing
Anti-UV SCA	0.25mm
Touch Sensor	0.55mm DITO glass
Optical Bonding	0.7mm
TFT	TIANMA NL12880BC20-32F