PRODUCT SPECIFICATION

5.0” IPS LCD Module with RGB Interface

DT050CTFT-IPS-SHB, DT050CTFT-IPS-SHB-PTS

Displaytech
a seacomp company

Revision 1.1
14 July 2025

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Revision History

REV	CHANGE DESCRIPTION	DATE	APPR
1.0	Initial Release	14 APR 2025	BHI
1.1	Corrected interface spec in drawings	14 JULY 2025	BHI

Table of Contents

1 Overview

The **DT050CTFT-IPS-SHB** and **DT050CTFT-IPS-SHB-PTS** are 5.0” color IPS LCD modules with wide formfactor. Each composed of an LCD panel, display drivers, FPC display cable with RGB interface, and adjustable LED backlight unit. The display’s active area has a resolution of 800 x 480 pixels. The DT050CTFT-IPS-SHB-PTS, is equipped with an additional capacitive touch panel.

1.1 Applications

- Industrial devices
- Consumer devices
- Medical devices

1.2 LCD Features

Model No.		DT050CTFT-IPS-SHB	DT050CTFT-IPS-SHB-PTS
LCD Panel	Display Size	5.0”	5.0”
	Resolution	800 (RGB) x 480	800 (RGB) x 480
	Viewing Angle (U/D/L/R)	80° / 80° / 80° / 80°	80° / 80° / 80° / 80°
	Brightness	1,000 cd/m^2	850 cd/m^2
	Backlight Life	30,000 hrs	30,000 hrs
	Contrast Ratio	1000:1	1000:1
	Response Time	30 ms	30 ms
	Voltage	3.3 V Power	3.3 V Power
	Signal Interface	24-bit RGB	24-bit RGB
	Dimension (W x H x D)	114 x 75 x 2.95 mm	114 x 78 x 5.00 mm
Touch Screen	Touch Screen	N/A	Capacitive Touch Screen
	Signal Interface		I^{2}C
	Surface Hardness		≥ 7H
Environment	Operating Temperature	-20°C to +70°C	-20°C to +70°C
	Storage Temperature	-30°C to +80°C	-30°C to +80°C

2 Pin Descriptions

LCD INTERFACE			
PIN	NAME	TYPE	DESCRIPTION
1	LED-A	PWR	LED backlight, anode
2~4	LED-K	PWR	LED backlight, cathode
5	VDD	PWR	Power supply
6	R0	I	8 bit data bus display Red data
…	…	…	
13	R7	I	
14	G0	I	8 bit data bus display Green data
…	…	…	
21	G7	I	
22	B0	I	8 bit data bus display Blue data
…	…	…	
29	B7	I	
30	GND	PWR	Ground
31	DOTCLK	I	Dot clock signal for RGB interface operation.
32	DISP	I	Set the display mode
33	HSYNC	I	Horizontal (Line) synchronizing input signal for RGB interface operation.
34	VSYNC	I	Vertical (Frame) synchronizing input signal for RGB interface operation.
35	DE(ENABLE)	I	Data enable signal for RGB interface operation.
36	TP_GND[1]	PWR	CTP Power ground
37	TP_RST[1]	I	CTP Reset pin
38	TP_INT[1]	O	CTP Interrupt signal
39	TP_SDA[1]	IO	CTP Data signal
40	TP_SCL[1]	I	CTP Clock signal.
41	TP_IOVCC[1]	PWR	CTP I/O power supply
42	TP_VDD[1]	PWR	CTP Power supply
43~45	NC		Not Connected

[1] Only DT050CTFT-IPS-SHB-PTS. For DT050CTFT-IPS-SHB, these pins are Not Connected (NC).

3 Specifications

3.1 Absolute Maximum Ratings

Operation outside of the maximum ratings listed below may result in permanent damage to the LCD.

ELECTRICAL				
PARAMETER		MIN	MAX	UNIT
Supply Voltage	V_{DD}	-0.3	4.0	V
Logic Input Voltage	V_{IN}	-0.3	V_{DDIO} + 0.3	V
Logic Output Voltage	V_{OUT}	-0.3	V_{DDIO} + 0.3	V

ENVIRONMENTAL				
PARAMETER		MIN	MAX	UNIT
Operating Temperature	T_{OP}	-20	+70	°C
Storage Temperature	T_{ST}	-30	+80	°C

3.2 Electrical Characteristics

POWER					
PARAMETER		MIN	TYP	MAX	UNIT
Supply Voltage	V_{DD}	3.3	–	3.45	V
Supply Current	I_{DD}	–	–	TBD	mA

LOGIC					
PARAMETER		MIN	TYP	MAX	UNIT
Input Voltage, High	V_{IH}	0.7 x V_{DDIO}	–	V_{DDIO}	V
Input Voltage, Low	V_{IL}	0	–	0.3 x V_{DDIO}	V
Output Voltage, High	V_{OH}	0.8 x V_{DDIO}	–	V_{DDIO}	V
Output Voltage, Low	V_{OL}	0	–	0.2 x V_{DDIO}	V

3.3 Backlight Characteristics

LED BACKLIGHT						
PARAMETER		MIN	TYP	MAX	UNIT	Remark
Forward Current	I_F	–	60	–	mA	6 LEDs
Forward Voltage	V_F	16.2	18.3	19.8	V	6 LEDs
Reverse Current	Ir	–	–	25	uA	Vr=5.0V, 1LED
Luminous Tolerance	Iv-m	80	–	–	%	(min/max)*100%
Power dissipation	Pd	–	–	–	mW	18 LEDs
Reverse voltage	VR	–	–	5	V	1 LED
LED Lifetime[2]	–	–	30,000	–	Hr	

3.3.1 LED Backlight Circuit Diagram

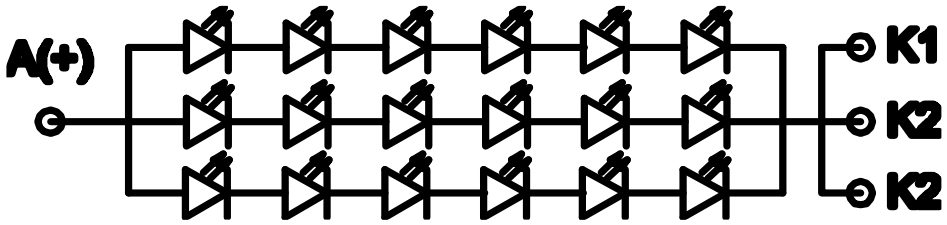


Figure 1 Backlight
3 x 6 = 18 LEDs, I_F = 60 mA

[2] LED lifetime is defined as the amount of time it takes for brightness to decrease to 50% of its original value at T_A=25°C and I_F=60mA. LED lifetime may decrease if operating current, I_F, is higher than 60mA.

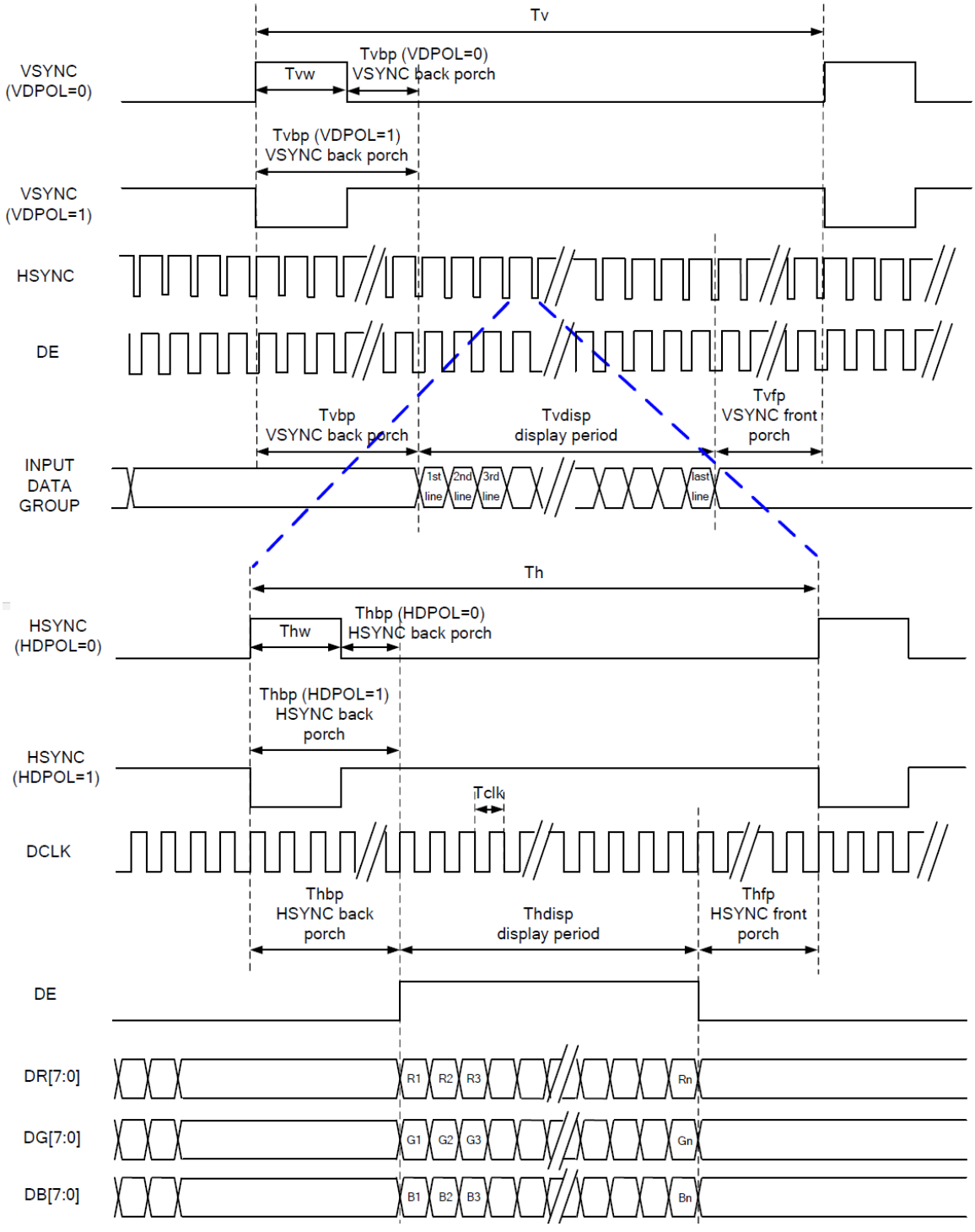
4 Timing Characteristics

4.1 RGB Interface

The following are timing characteristics for 24-bit RGB input in SYNC-DE Mode. For additional options, refer to the ST7262 data sheet.

TIMING, PARALLEL 24-BIT RGB INPUT[3]						
PARAMETER			MIN	TYP	MAX	UNIT
DCLK Frequency		F_{CLK}	23	25	27	MHz
HSYNC	Period	T_H	808	816	896	DCLK
	Display period	T_{HDISP}	–	800	–	DCLK
	Back porch	T_{HBP}	4	8	48	DCLK
	Front porch	T_{HFP}	4	8	48	DCLK
	Pulse width	T_{HW}	2	4	8	DCLK
VSYNC	Period	T_V	488	496	504	HSYNC
	Display period	T_{VDISP}	–	480	–	HSYNC
	Back porch	T_{VBP}	4	8	12	HSYNC
	Front porch	T_{VFP}	4	8	12	HSYNC
	Pulse width	T_{VW}	2	4	8	HSYNC

[3] V_{DD} = 3.3 V, GND = 0 V, T_A = 25 °C


Tv
VSYNC (VDPOL=0)
Tvw
Tvbp (VDPOL=0) VSYNC back porch
Tvbp (VDPOL=1) VSYNC back porch
VSYNC (VDPOL=1)
HSYNC
DE
Tvbp VSYNC back porch
Tvdisp display period
Tvfp VSYNC front porch
INPUT DATA GROUP
1st line
2nd line
3rd line
last line
Th
HSYNC (HDPOL=0)
Thw
Thbp (HDPOL=0) HSYNC back porch
Thbp (HDPOL=1) HSYNC back porch
HSYNC (HDPOL=1)
Tclk
DCLK
Thbp HSYNC back porch
Thdisp display period
Thfp HSYNC front porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

4.4 CTP Power Sequence

In power down mode, all the clocks of ST1633i are stopped. The way to exit power down mode is by a hardware reset or I2C.

Host application can reset ST1633i through RESET pin. The RESET pin is active low and needs to be held low for 1 uS to take effect.

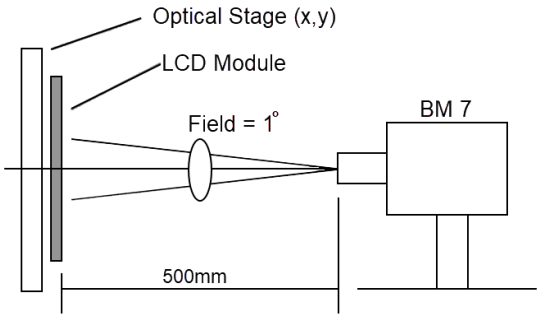
5 Optical Characteristics

OPTICAL CHARACTERISTICS[4]						
PARAMETER			MIN	TYP	MAX	UNIT
Contrast Ratio[5,6]		CR	800	1000	–	–
Response Time[7]		T_{ON} / T_{OFF}	–	30	40	mS
Viewing Angles[8,9]		ΘT	70	80	–	°
		ΘB	70	80	–	
		ΘL	70	80	–	
		ΘR	70	80	–	
Chromaticity[10]		X_{RED}	–	TBD	–	–
		Y_{RED}	–	TBD	–	
		X_{GRN}	–	TBD	–	
		Y_{GRN}	–	TBD	–	
		X_{BLU}	–	TBD	–	
		Y_{BLU}	–	TBD	–	
		X_{WHT}	–	TBD	–	
		Y_{WHT}	–	TBD	–	
Luminance[13]	DT050CTFT-IPS-SHB	L	800	1000	–	cd/m²
	DT050CTFT-IPS-SHB-PTS		650	850	–	
Uniformity[13]		U	75	–	–	%

[4] See Section 5.1, Figure 5
[5] Viewing Angle (Θ) = 0°
[6] See Section 5.1, Figure 7
[7] See Section 5.1, Figure 6
[8] Contrast Ratio (CR) ≥ 10
[9] See Section 5.1, Figure 7
[10] See Section 5.1, Figure 9

5.1 Figures

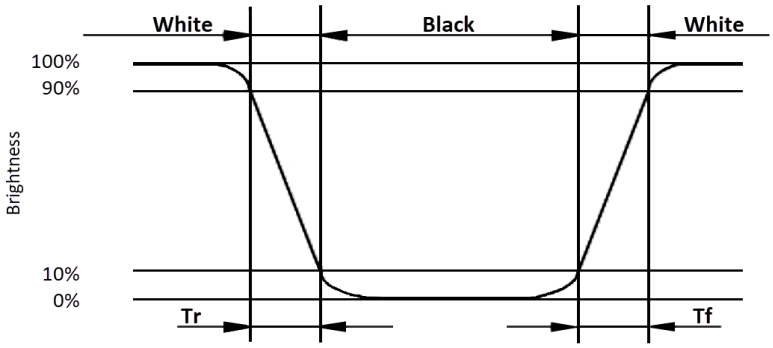
Figure 5: Optical Measurement System



Conditions:

I_F = 60 mA, T_A = 25 °C, ambient brightness < 150 lx

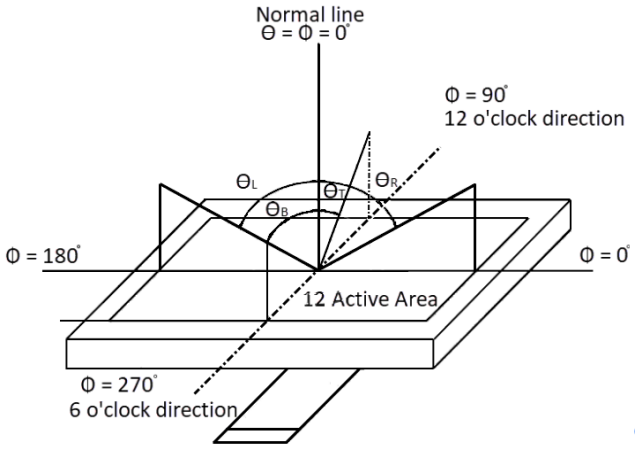
Figure 6: Response Times



Decay Time (TF) = Time required for display to transition from white to black

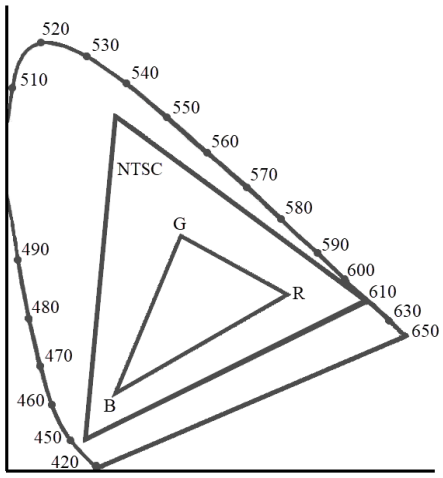
Rise Time (TR) = Time required for display to transition from black to white

Figure 7: Viewing Angles



Viewing angle is measured from center point of LCD

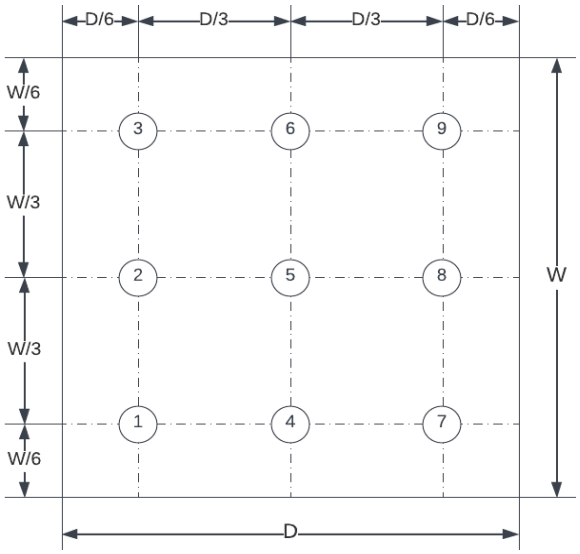
Figure 8: Chromaticity (CIE 1931)



Chromaticity = Area of $\triangle_{RGB}$ / Area of $\triangle_{NTSC}$

* Color coordinates measured at center point of LCD

Figure 9: Luminance Uniformity



Luminance is defined as the brightness of all white pixels at the center of the display area at optimum contrast.

Uniformity is determined by measuring Luminance at 9 points and calculating $Luminance_{MIN}$ / $Luminance_{MAX}$

$$\textbf{Contrast Ratio} = \frac{\text{Surface Luminance}_{\text{WhitePixels}}}{\text{Surface Luminance}_{\text{BlackPixels}}}$$

6 Environmental/Reliability Testing

Judgment is based on inspection performed after test, per the Inspection Criteria table.[11]

ITEM UNDER TEST	TEST CONDITION
High Temperature Operation	T_A = 70°C, 120 Hrs
Low Temperature Operation	T_A = -20°C, 120 Hrs
High Temperature Storage	T_S = 80°C, 120 Hrs
Low Temperature Storage	T_S = -30°C, 120 Hrs
High Temperature & Humidity Storage	T_S = 60°C, 120 Hrs, 90% RH
Thermal Shock (Non-Operation)	-30°C (30 min) ~ 80°C (30 min) Change time: 5 min, 10 cycles
ESD (Operation)	C = 150pF, R = 330Ω, 5 points/panel Air: 8KV (5x), Contact: 4KV (5x)
Vibration (Non-Operation)	Frequency Range: 10Hz ~ 55Hz Stroke: 1.5mm Sweep: 10Hz ~ 55Hz ~ 10Hz 2 Hrs each in X, Y, Z directions
Package Drop Test	Height: 80cm 1 corner, 3 edges, 6 surfaces

6.1 Inspection Criteria

INSPECTION ITEM	CRITERIA
Appearance	No cracks present on FPC No cracks present on LCD panel
LCD Panel Alignment	No bubbles present on/in LCD panel No alignment defects in active area
Electrical Current	Within device specifications
Function/Display	No broken circuits nor short circuits present No black lines present on LCD panel No other display defects

[11] Functional test shall be conducted after 4 hours of storage at normal temperature and humidity, after LCD is removed from test chamber.

7 Precautions for Use of LCD Modules

7.1 Safety

Liquid crystal in LCD is poisonous. Do not put in mouth. If liquid crystal comes in contact with skin or clothes, wash off immediately using soap and water.

7.2 Handling

A. LCD panel is made of plate glass. Do not subject panel to mechanical shock or excessive force on its surface.
B. In order to ensure reliability, do not hold product by flexible printed circuit (FPC) cable.
C. Provide space so that panel does not come into contact with other components.
D. Transparent electrodes may be disconnected if panel is used in an environment where dew condensation is present.
E. Properties of semiconductor devices may be affected when exposed to light, possibly resulting in integrated circuit (IC) malfunctions. To prevent such malfunctions, design and mounting layout should be done in such a way that IC is not exposed to light during use.

7.3 Static electricity

A. Ground soldering iron tips, tools, and testers while in use.
B. Ground your body when handling LCD products.
C. Power on the LCD module before applying the voltage to the input terminals.
D. Do not apply any voltage that exceeds absolute maximum rating.
E. Store products in an anti-electrostatic bag or container.

7.4 Storage

A. Store product in a dark place at 25°C ± 10°C with low humidity (40% RH ~ 60% RH). Do not expose display to sunlight or fluorescent light.
B. Storage in a clean environment, free from dust, active gas, and solvents.

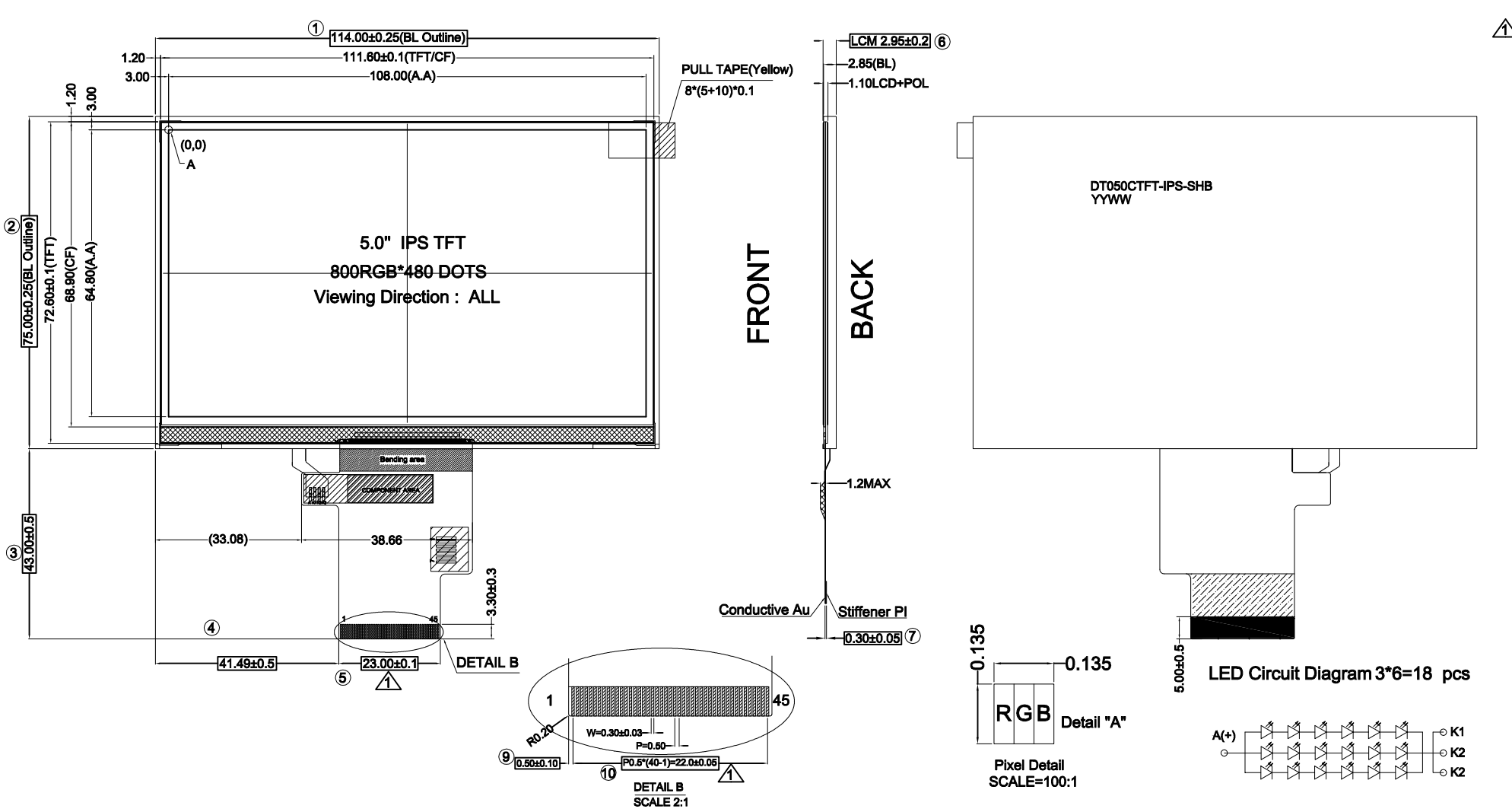
7.5 Cleaning

A. To clean the product, wipe with a soft cloth moistened with ethanol. Do not allow ethanol to get between upper film and bottom glass, as this may cause peeling issues and/or defective operation. Do not use any organic solvent or detergent other than ethanol.

7.6 Cautions for installation and assembly

A. Bezel edge must be positioned between Active area and Viewing area.
B. For stable display assembly, Displaytech recommends designing a support for the backside of the display.
C. Do not display any fixed pattern for long periods of time. If a fixed pattern must be displayed, use a screen saver in order to avoid image persistence.

CUSTOMER		CUSTOMER'S CODE		CUSTOMER'S APPROVAL	



DISPLAY INTERFACE

⚠1 PIN NO.	NAME
1	LED-A
2	LED-K
3	LED-K
4	LED-K
5	VDD
6	R0
7	R1
8	R2
9	R3
10	R4
11	R5
12	R6
13	R7
14	G0
15	G1
16	G2
17	G3
18	G4
19	G5
20	G6
21	G7
22	B0
23	B1
24	B2
25	B3
26	B4
27	B5
28	B6
29	B7
30	GND
31	CLK
32	DISP
33	HSYNC
34	VSYNC
35	DE
36	NC
37	NC
38	NC
39	NC
40	NC
41	NC
42	NC
43	NC
44	NC
45	NC

Specification

1.Display mode: 5.0" -TFT,Normally Black,IPS mode,Transmissive,16.7M color
2.Driving condition: 800 RGB(H) x 480(V), VDD=3.3V
3.Back light:18PCS WHITE LED , Vf=18.3V(Typ) ; If=60mA
4.Operating temp: -20°C to 70°C , Storage temp: -30°C to 80°C
5.LCM Luminace(cd/㎡): 1000(TYP.) 6.Viewing angle:All,80/80/80/80
7.TFT Driver IC : ST7262-G4-1-H2 8.Connector: FPC
9.Interface : 24 Bit RGB 10.Unspecified tolerance: ±0.3mm
11.():REFERENCE DIMENSION 12.□IMPORTANT DIMENSION
13.YYWW: Date code (year week) 14.Remark: RoHS

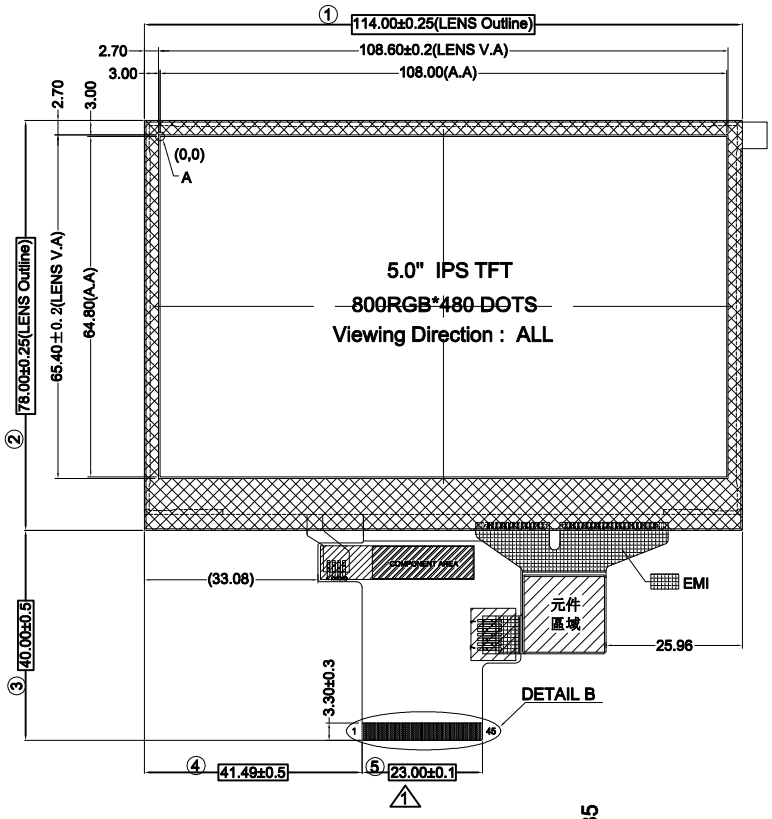
Count drawing & Spec.revision record during discussion with customer

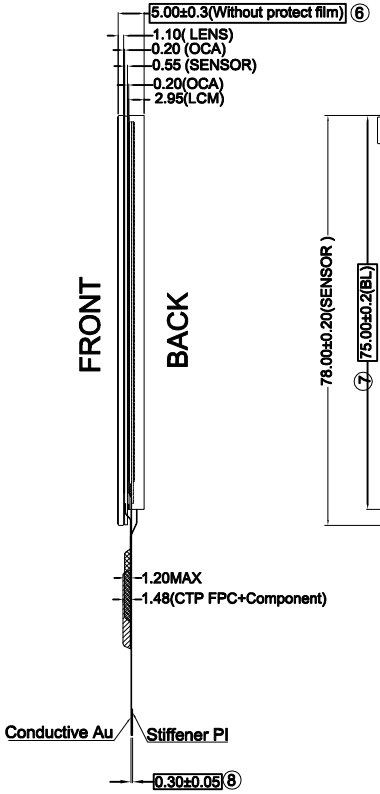
Rec.	Revision content description	Date
#00	FIRST ISSUE	2024.10.18
#01	The PIN number changes from 40 to 45. ⚠1	2025.03.31

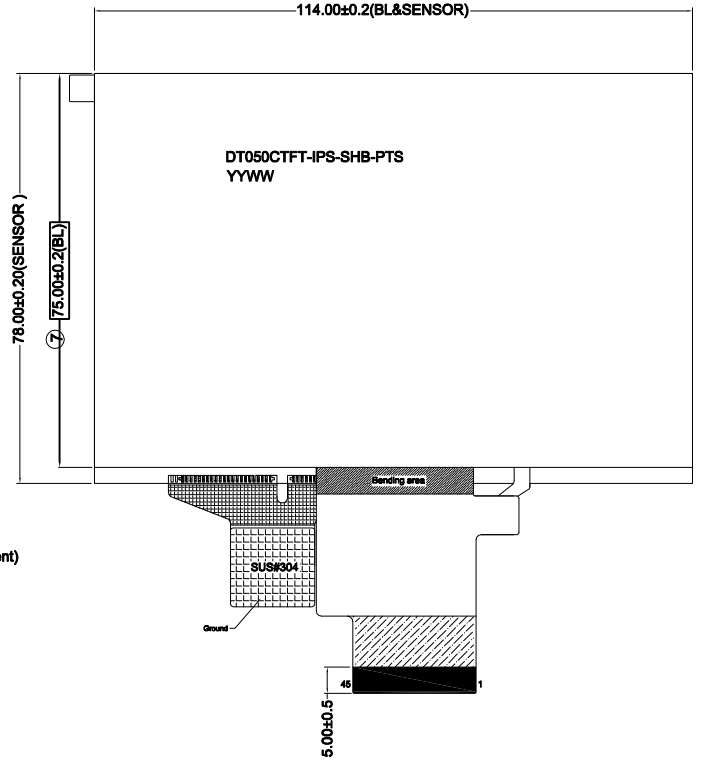
Displaytech

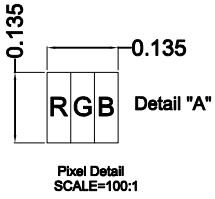
Mod.Name	DT050CTFT-IPS-SHB					SCALE	SHEET
						NTS	1/1
UNIT	SIZE	M.E	M.E	Checker	APPROVER	FILE NAME	
mm	A4	LI Li	Lucas Zhan	Ken li	Jony Chen	Count Dwg.	

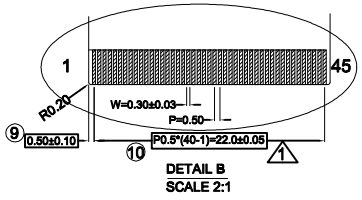
CUSTOMER		CUSTOMER'S CODE		CUSTOMER'S APPROVAL	



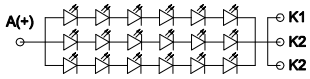








LED Circuit Diagram 3*6=18 pcs



DISPLAY INTERFA	
PIN NO.	NAME
1	LED-A
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3	LED-K
4	LED-K
5	VDD
6	R0
7	R1
8	R2
9	R3
10	R4
11	R5
12	R6
13	R7
14	G0
15	G1
16	G2
17	G3
18	G4
19	G5
20	G6
21	G7
22	B0
23	B1
24	B2
25	B3
26	B4
27	B5
28	B6
29	B7
30	GND
31	CLK
32	DISP
33	HSYN(
34	VSYN(
35	DE
36	TP_GND
37	TP_RST
38	TP_INT
39	TP_SDA
40	TP_SCL
41	TP_IOVD
42	TP_VDD
43	NC
44	NC
45	NC

Specification

1.Display mode: 5.0" IPS TFT,Normally Black,Transmissive,16.7M color	
2.Driving condition: 800 RGB(H) x 480(V), VDD=3.3V	
3.Back light:18PCS WHITE LED , Vf=18.3V(Typ) ; If=60mA	
4.Operating temp: -20°C to 70°C , Storage temp: -30°C to 80°C	
5.Surface Luminace(cd/㎡): 850(TYP.)	6.Viewing angle: All,80/80/80/80
7.TFT Driver IC : ST7262-G4-1-H2	8.Connector: FPC
9.CTP Driver IC : ST1633I	
10.Interface :24 Bit RGB	11.Unspecified tolerance: ±0.3mm
12.():REFERENCE DIMENSION	13.□IMPORTANT DIMENSION
14.YYWW: Date code (year week)	15.Remark: RoHS

Count drawing & Spec.revision record during discussion with customer

Rec.	Revision content description	Date
#00	FIRST ISSUE	2024.10.19
#01	Modify dimension marking. ⚠1	2025.04.01

Displaytech

Mod.Name	DT050CTFT-IPS-SHB-PTS	SCALE	SHEE
		NTS	1/1

UNIT	SIZE	DESIGNER	CHECK	APPROVER	FILE NAMI
mm	A4	LI Li	Amy Tu	Jony Chen	Count Dwg