深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.： TST070CBOT-01

Version： V1.0

☐ APPROVAL FOR SPECIFICATION ☐ APPROVAL FOR SAMPLE

For Customer’ s Acceptance：	
Approved by	**Comment**

Team Source Display：		
Presented by	**Reviewed by**	**Organized by**

Version No.	Date	Content	Remark
V1.0	2017-7-10	Initial Release	

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

Team Source Display TST070CBOT-01 is a color active matrix thin film transistor(TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 7.0 (16:9) inch diagonally measured active display area with WVGA (800 horizontal by 480 vertical pixel) resolution.

1.2 Features

7.0 (16:9 diagonal) inch configuration.
6 bits + FRC driver with 1 channel TTL interface
LED Backlight
Up/Down, Lefct/Right reversion selection
Resistive Touch Panel with >94% Transmittance
Capacitive touch panel driver IC:FT5446

1.3 Applications

Mobile NB
Digital Photo frame
Multimedia applications and Others AV system

1.4 General information

Item	Specification	Unit
Screen Size	7.0 inches	Diagonal
Number of Pixel	800 RGB (H) x 480(V)	Pixels
Display area	154.00(H) x 85.92(V)	mm
Outline Dimension	164.90 x 100.00 x 4.70 (Typ)	mm
Display mode	Normally white	--
Pixel arrangement	RGB Vertical stripe	--
Pixel pitch	0.0632(H) x 0.179(V)	mm
Back-light	LED Side-light type	--
Surface treatment	Antiglare, Hard-Coating (3H) with EWV film	--

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	164.60	164.9	165.20	mm
	Vertical (V)	99.70	100.0	100.30	mm
	Depth (D)	--	3.5	3.65	mm

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Note
Power supply voltage	VCC	-0.3	6.0	V	GND=0
	VDH	0.3	40	V	GND=0
	VGL	-20	0.3	V	GND=0
	AVDD	0.5	15	V	AGND=0
	VCOM	0	6	V	
Logic Signal Input Level	Vi	-0.3	VDD +0.3	V	

2.1.2 Back-Light Unit

Item	Symbol	Typ	Max	Unit	Note
LED current	IL	40	-	mA	(1)(2)(3)
LED voltage	VL	22.4	--	V	(1)(2)(3)

Note

(1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) Ta =25±2℃

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T_{STG}	-30	80	℃	
Operating temperature	T_{OPR}	-20	70	℃	

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Without any touch panel

Item		Symbol	Condition	Min	Type	Max	Unit	Note
White luminance (Center)		YL	Θ=0 Normal Viewing Angle	-	250	-	cd/m2	(1)(4)(6) (I L=60mA)
Response time		Tr		-	5	7	msec	(1)(3)
		Tf		--	20	28		
Contrast ratio		CR		--	500	--	--	(1)(2)
Color Chromaticity (CIE 1931)	white	Wx		0.260	0.310	0.360		
		Wy		0.280	0.330	0.380		
Viewing Angle	Hor.	ΘL	CR≥10	--	65	--		(1)(4)
		ΘR		--	60	--		
	Ver.	ΘU		--	60	--		
		ΘD		--	60	--		
Brightness uniformity		BUNI	Θ=0	70	--	--	%	(6)
Optima View Direction		12 o'clock						(5)

With Resistive touch panel

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle	Top	CR≧10	-	60	-	Deg.	Note 2,6,7
	Bottom	CR≧10	-	50	-		
	Left	CR≧10	-	60	-		
	Right	CR≧10	-	60	-		
Luminous	L	Viewing normal angle	---	230	--	Cd/m2	

With Capacitive touch panel

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle	Top	CR≧10	-	55	-	Deg.	Note 2,6,7
	Bottom	CR≧10	-	45	-		
	Left	CR≧10	-	55	-		
	Right	CR≧10	-	55	-		
Luminous	L	Viewing normal angle	---	220	--	Cd/m2	

3.2 Measuring Condition

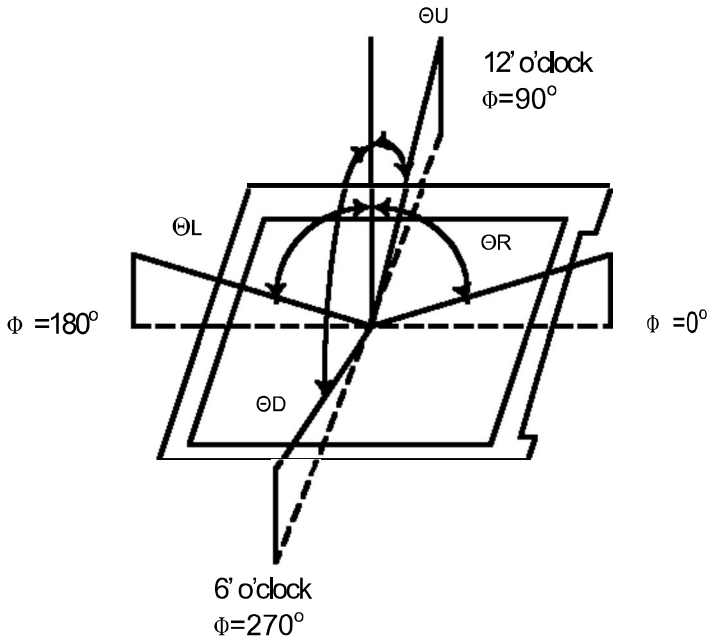
Measuring surrounding: dark room

LED current IL: 40mA

Ambient temperature: 25±2℃

15min. warm-up time

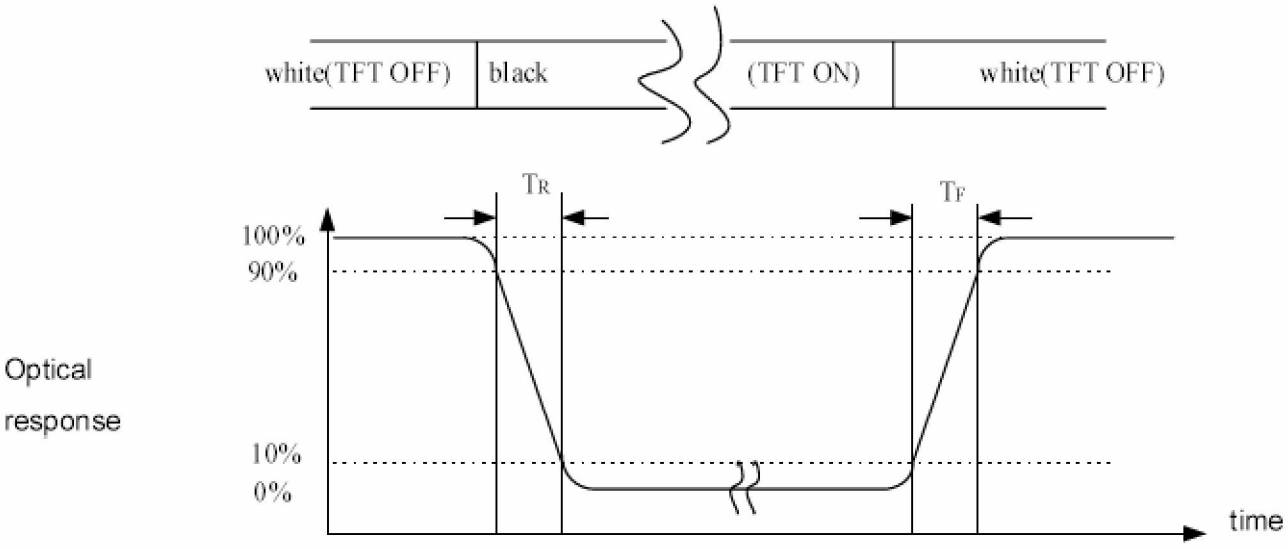
Note (1) Definition of Viewing Angle



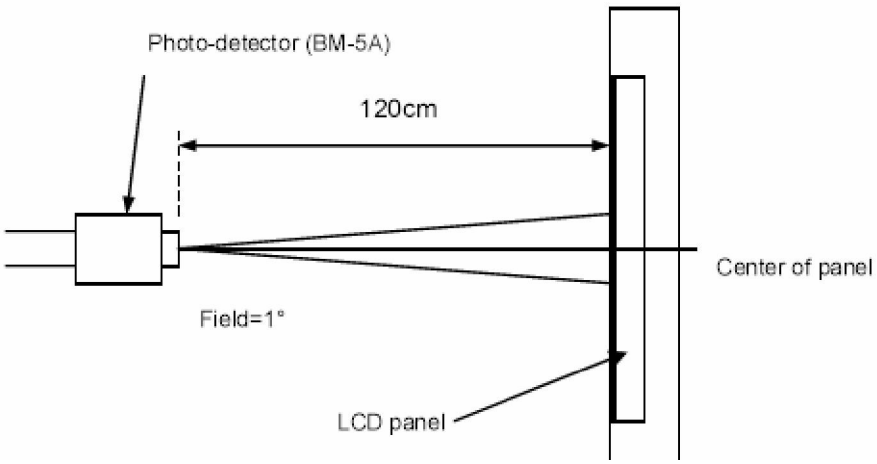
Note (2) Definition of Contrast Ratio(CR):
Measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

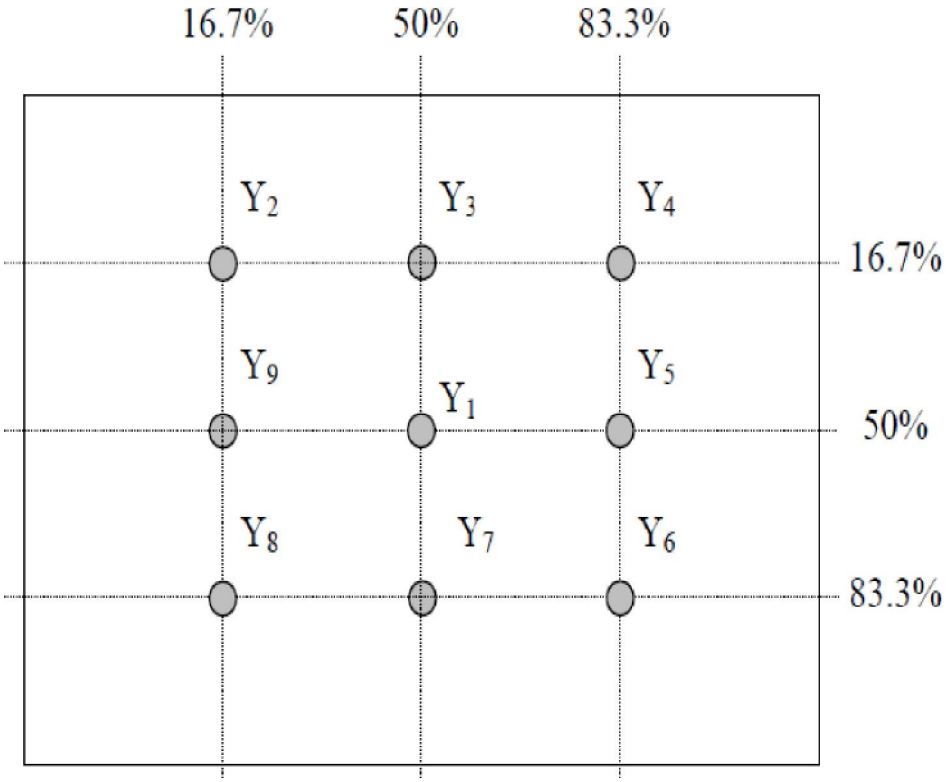
Note (3) Definition of Response Time: Sum of TR and TF



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



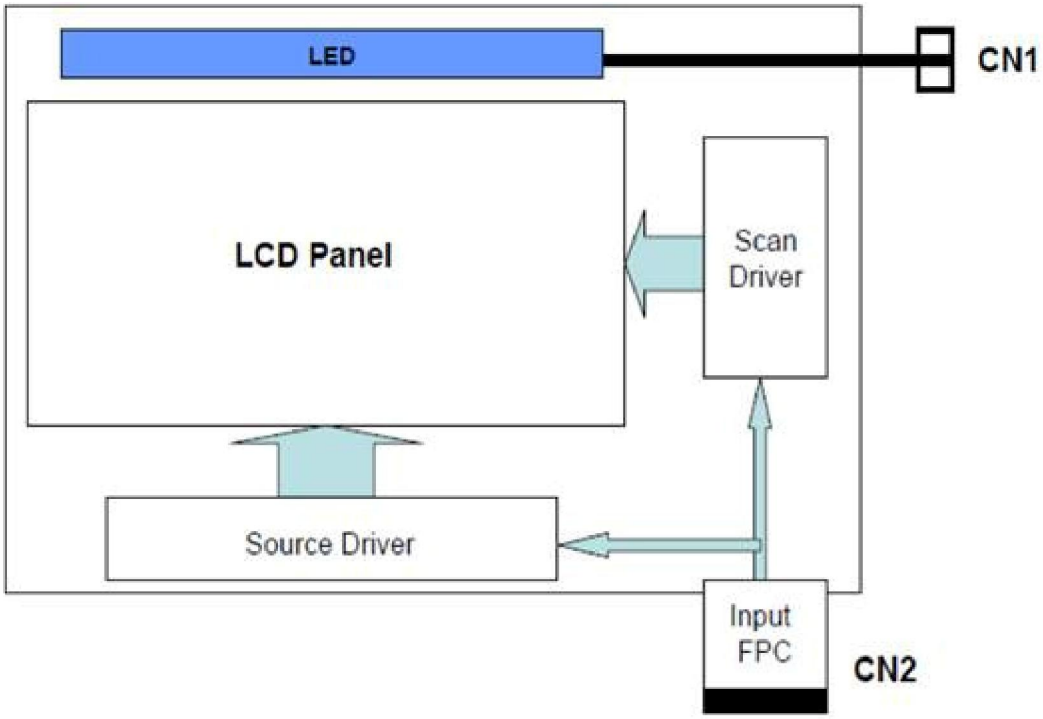
$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\ \%$$

Note (6) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

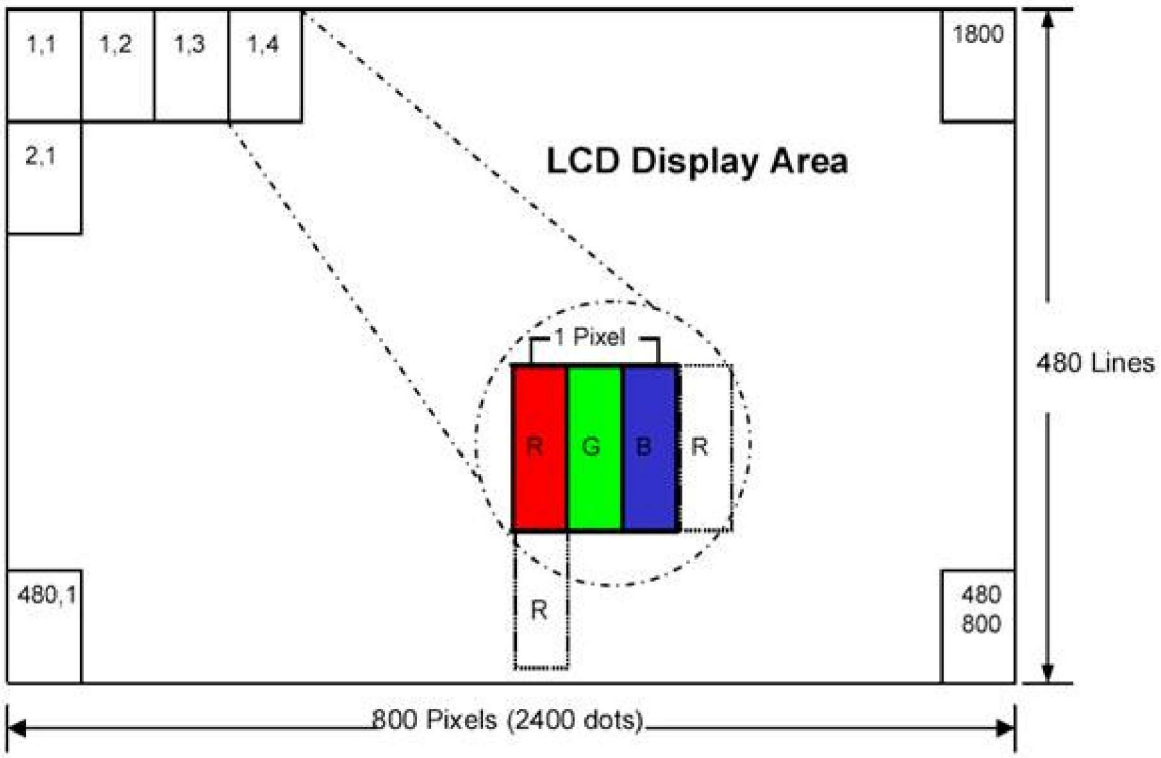
Note (7) Measured at the brightness of the panel when all terminals of LCD panel are electrically open.

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 Pixel Format



5.0 INPUT INTERFACE PIN ASSIGNMENT

5.1 TFT LCD Module

CN2(Input signal): FPC Down Connector,(FH28-40S-0.5SH (HIROSE),40pin,pitch=0.5mm)

Pin No.	Symbol	Function
1	VLED-	LED Power Cathode
2	VLED+	LED Power Anode
3	GND	Analog Ground
4	Vcc	Power supply
5	R0	Input data Red
6	R1	Input data Red
7	R2	Input data Red
8	R3	Input data Red
9	R4	Input data Red
10	R5	Input data Red
11	R6	Input data Red
12	R7	Input data Red
13	G0	Input data Green
14	G1	Input data Green
15	G2	Input data Green
16	G3	Input data Green
17	G4	Input data Green
18	G5	Input data Green
19	G6	Input data Green
20	G7	Input data Green
21	B0	Input data Blue
22	B1	Input data Blue
23	B2	Input data Blue
24	B3	Input data Blue
25	B4	Input data Blue
26	B5	Input data Blue
27	B6	Input data Blue
28	B7	Input data Blue
29	DGND	Ground
30	CLK	clock signal
31	DISP	Display on/of
32	HSYNC	Horizontal sync input in RGB mode

33	VSYNC	Vertical sync input in RGB mode
34	DE	Data enble
35	NC	No Connection
36	GND	Ground
37	X_R	Touch panel X-right
38	Y_D	Touch panel Y-bottom
39	X_L	Touch panel X-left
40	Y_U	Touch panel Y-upl

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage	VCC	2.7	3.0	3.5	V	
	VGH	14.5	15	20	V	
	VGL	-10	-7	-6.5	V	
	AVDD	9.85	10	10.15	V	
VCOM	VCOMin	–	3.9	–	V	
Input signal Voltage	VIH	0.7 VCC	-	VCC	V	Note (1)
	VIL	0	-	0.3 VCC	V	
Current Power Supply	IDD	–	5.426	–	mA	VCC =3.3V
	IADD	–	24.1	–	mA	**AVDD=10V(Black)**
	IGH	–	0.128	–	mA	VGH=15V
	IGL	–	0.344	–	mA	VGL= -7V
Input level of V1~V5	Vx	AVDD/2-	-	AVDD-0.1-	V	
Input level of V6~V10	Vx	0.1-		AVDD/2-	V	

Note (1): HSYNC, VSYNC, DE, R/G/B Data

Note (2): Be sure to apply the power Voltage as the power sequence spec.

Note (3): GND=0V

6.2 Back-Light Unit

The backlight system is an edge-lighting type with 14 LED.

The characteristics of the LED are shown in the following tables.

Item	Symbol	Min	Typ	Max	Unit	Note
LED current	IL	-	40	-	mA	(2)
LED voltage	VL	-	22.4		V	
Operating LED life time	Hr	30000	50000	-	Hour	(1)(2)

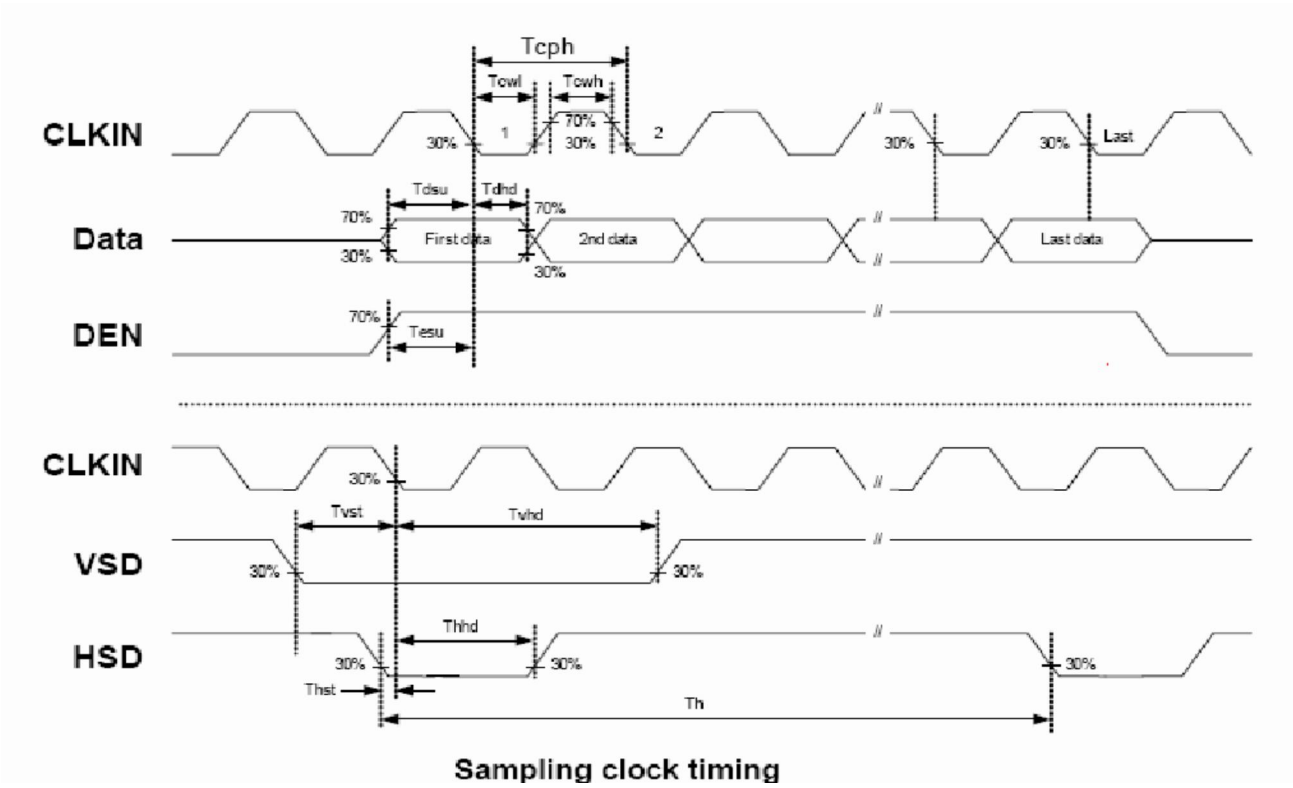
Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA. The constant current driving method is suggested.

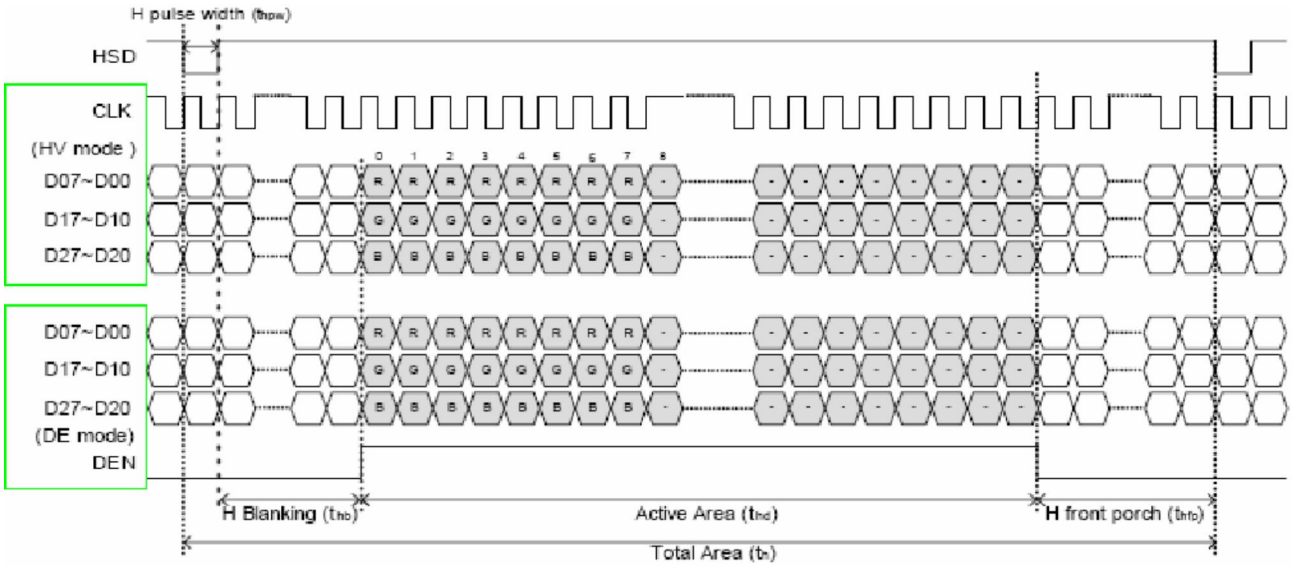
6.3 AC Characteristics

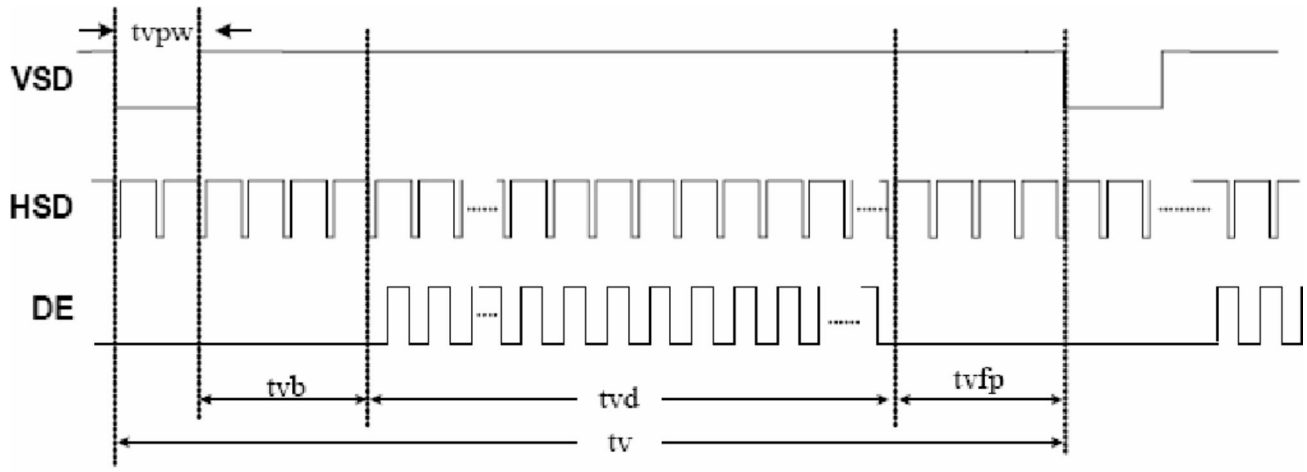
Item	Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK cycle time	Tclk	25	-	-	ns	
DCLK frequency	Fclk	-	30	40	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8	-	-	ns	
VSD hold time	Tvhd	8	-	-	ns	
HSD setup time	Thst	8		-	ns	
HSD hold time	Thhd	8		-	ns	
Data setup time	Tdasu	8		-	ns	
Data hold time	Tdahd	8		-	ns	
DE setup time	Tdesu	8		-	ns	
DE hold time	Tdehd	8		-	ns	
Horizontal display area	Thd		800	-	Tcph	
HSD period time	Th		928	-	Tcph	
HSD width	Thwh	1	48	-	Tcph	
HSD back porch	Thbp		40	-	Tcph	
HSD front porch	Thfp		40	-	Tcph	
Vertical display area	Tvd		480	-	th	
VSD period time	Tv		525	-	th	
VSD width	Tvwh		3	-	th	
VSD back porch	Tvbp		29	-	th	
VSD front porch	Tvfp		13	-	th	

6.4 Timing Diagram of Interface Signal



Sampling clock timing

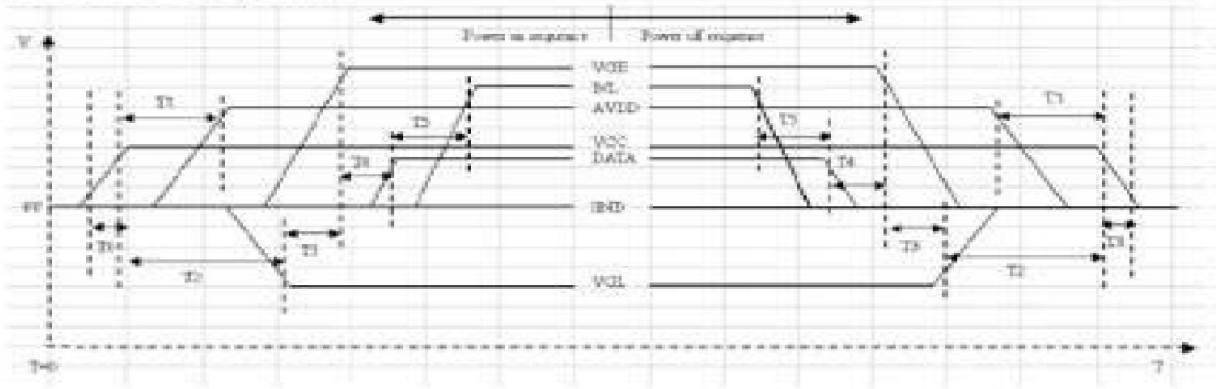




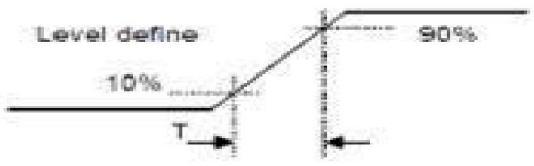
Vertical timing

6.5 Power Sequence

6.5 Power Sequence



Item	Min.	Typ.	Max.	Unit
T0	0.5	_	20	msec
T1	16			msec
T2	20			msec
T3	10			msec
T4	10		50	msec
T5	50			msec



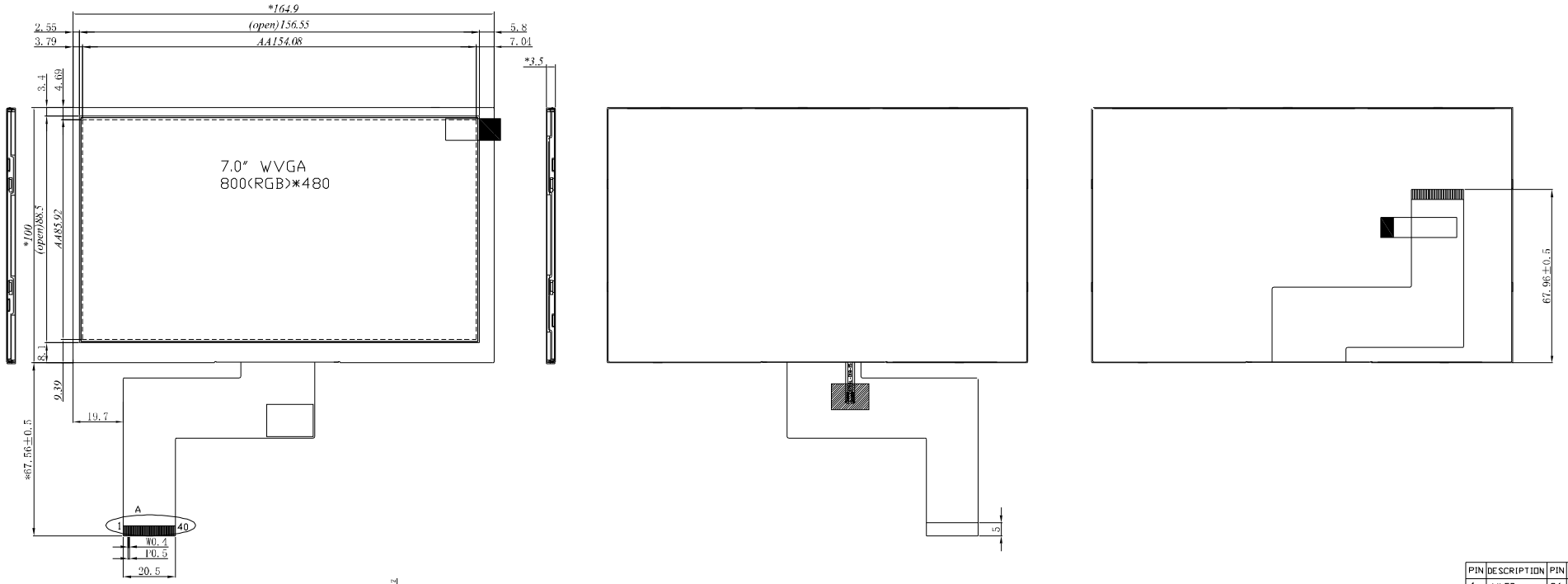
Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L
Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

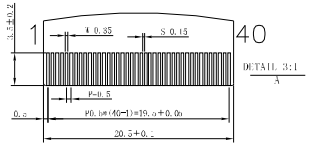
Notes : Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, SHLR, UPDN, DE MODE, RSTB, STBYB, SHLR, UPDN, DITH

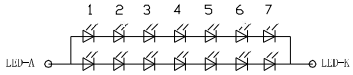
7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Notes
1	High Temperature Storage	Ta=+80℃, 240hrs	
2	Low Temperature Storage	Ta=-30℃, 240hrs	
3	High Temperature Operation	Ta=+70℃, 240hrs	
4	Low Temperature Operation	Ta=-20℃, 240hrs	
5	High Temperature and High Humidity (operation)	Ta=+60℃ 90%RH, 240hrs	
6	Thermal Cycling Test (non operation)	-30℃(30min) → +80℃(30min), 200cycles	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/each terminal	
8	Vibration	1 .Random: 1 .04Grms, 5~500Hz, X/Y/Z, 30min/each direction 2. Sine: Freq. Range: 8~33.3Hz Stoke: 1.3mm Sweep: 2.9G, 33.3~400Hz X/Z: 2hr, Y: 4hr, cyc: 15min	
9	Shock	100G, 6ms, ±X, ±Y, ±Z 3 time for each direction	JIS C7021, A-10 (Condition A)
10	Vibration (with carton)	Random: 0.015G^2/Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ each direction: 2hr	
11	Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.







GENERAL TOLERANCE:±0.2

LCD Type	7.0"TFT,Transmissive, Normally white,TN
Resolution	800(RGB)*480
View Direction	12 O'CLOCK
Driver IC	OTD9960/OTA7001
Color Depth	16.7M
Interface Types	RGB24-bit
Operating voltage	3.3V
With/without TP	Without
Backlight LEDs	14 LEDs，40mA,22.4V
Surface luminance	250 cd/m2
Operating temperature	-20 C° ~70 C°
Storage Temperature	-30 C° ~80 C°
Storage Humidity	10RH ~ 40RH

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VLED-	21	B0
2	VLED+	22	B1
3	GND	23	B2
4	VDD	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	DCLK
11	R6	31	STBYB
12	R7	32	HS
13	G0	33	VS
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	XR/NC
18	G5	38	YD/NC
19	G6	39	XL/NC
20	G7	40	YU/NC

the key size with *

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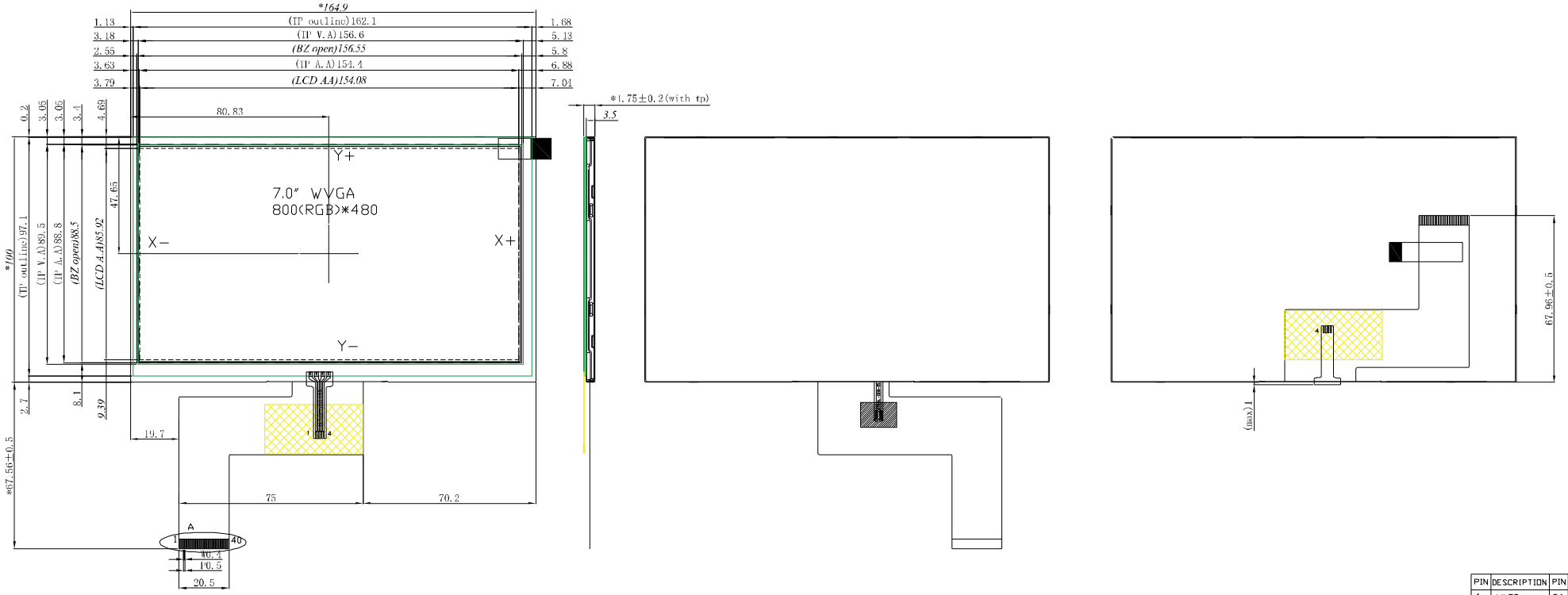
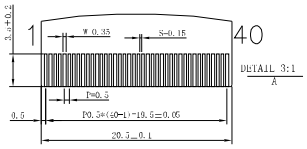
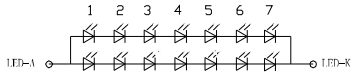
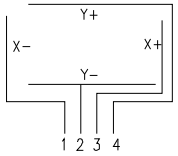
版本(Version)	变更记录(Change History)	日期(Date)
V1		
V2		
V3		

视 角 (View):		比例(Proportion):	1 : 1	设 计 (DESIGN)	审 核 (AUDITING)	批 准 (APPROVED)
单 位 (Unit):	M M	页 面 (Page):	1 / 1			
产品型号 (Product Type):		TST070CB0T-01		Aron	Penix	
版 本 (Version):		V1				









TP logic

PIN	OUT
1	X-
2	Y-
3	X+
4	Y+

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VLED-	21	B0
2	VLED+	22	B1
3	GND	23	B2
4	VDD	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	DCLK
11	R6	31	STBYB
12	R7	32	HS
13	G0	33	VS
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	XR/NC
18	G5	38	YD/NC
19	G6	39	XL/NC
20	G7	40	YU/NC

GENERAL TOLERANCE:±0.2

LCD Type	7.0"TFT,Transmissive, Normally white,TN
Resolution	800(RGB)*480
View Direction	12 O'CLOCK
Driver IC	OTD9960/OTA7001
Color Depth	16.7M
Interface Types	RGB24-bit
Operating voltage	3.3V
With/without TP	With RTP
Backlight LEDs	14 LEDs，40mA,22.4V
Surface luminance	230 cd/m2
Operating temperature	-20 ℃~70 ℃
Storage Temperature	-30 ℃~80 ℃

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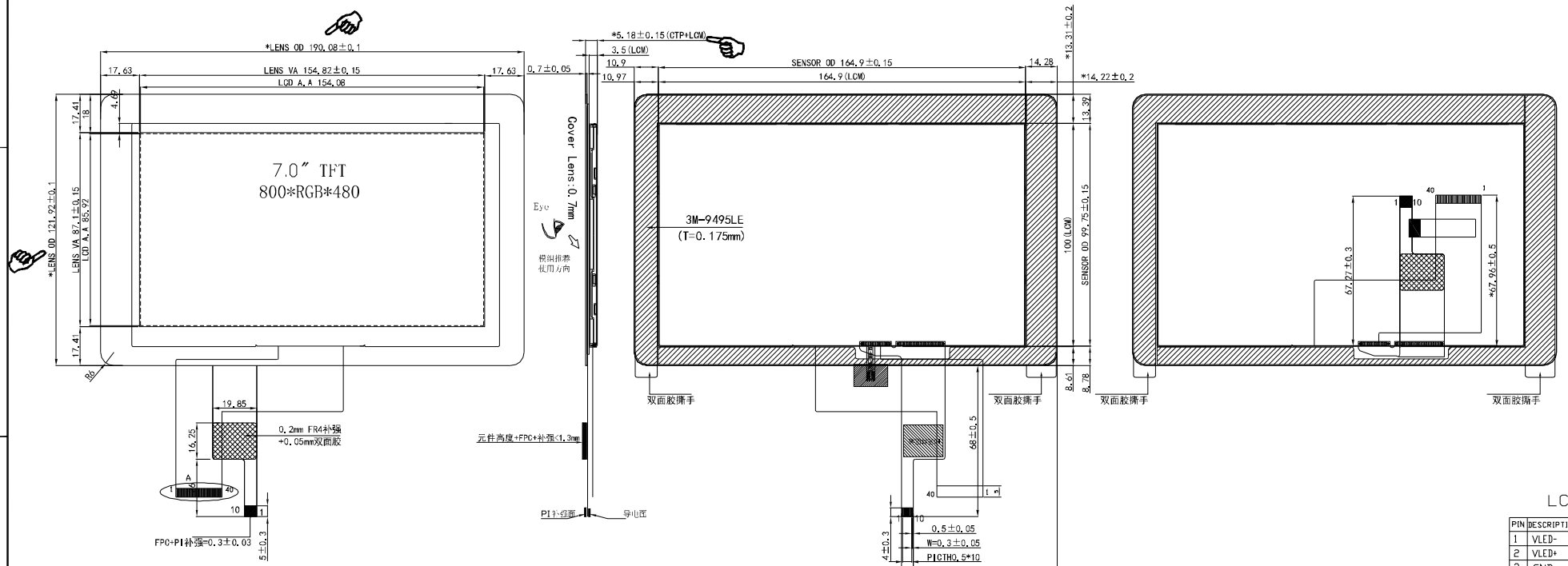
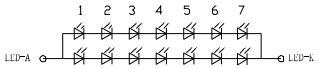
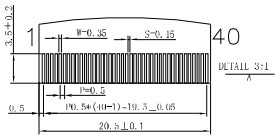
版 本 (Version):		V1				



LCD Type	7.0"TFT,Transmissive, Normally white,TN
Resolution	800*(RGB)*480
View Direction	12 O'CLOCK
Driver IC	OTD9960/OTA7001
Color Depth	16.7M
Interface Types	TTL(RGB24-bit)
Operating voltage	VDD=3.3V
Backlight LEDs	14 LEDs, 40mA,22.4V
Operating temperature	-20 C° ~70 C°
Storage Temperature	-30 C° ~80 C°
Storage Humidity	10RH ~ 40RH



If=40MA Vf=22.4V



Touch Panel PIN

PIN NO	DINFINATION
1	NC
2	NC
3	RST
4	GND
5	INT
6	SDA
7	SCL
8	GND
9	GND
10	VDD

CTP Driver IC: FT5446

LCM

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VLED-	21	B0
2	VLED+	22	B1
3	GND	23	B2
4	VDD	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	DCLK
11	R6	31	STBYB
12	R7	32	HS
13	G0	33	VS
14	G1	34	DE
15	G2	35	NC
16	G3	36	GND
17	G4	37	XR/NC
18	G5	38	YD/NC
19	G6	39	XL/NC
20	G7	40	YU/NC

" " Need to pay attention to the key size with *

东莞市一众显示科技有限公司
DONG GUAN TEAM SOURCE DISPLAY TECH. CO, LTD.

版本(Version)	变更记录(Change History)	日期(Date)
V1		
V2		
V3		

视 角 (View):		比例(Proportion):	1 : 1	设 计 (DESIGN)	审 核 (AUDITING)	批 准 (APPROVED)
单 位 (Unit):	M M	页 面 (Page):	1 / 1			
产品型号 (Product Type):		TST070CB0T-01C				
版 本 (Version):		V0				

10 Touch Panel specifications

RTP

ITEM	VALUE			UNIT	REMARK
	Min	Typ	Max		
Linearity	-	-	1.5	%	Analog X and Y directions
Terminal Resistance	400	-	1000	Ω	x
	150	-	400		y
Insulation Resistance	20	-	-	MΩ	DC 25V
Voltage	-	3	10	V	DC
Chattering	-	-	10	ms	100kΩ pull-up
Transparency	90	-	-	%	-
Operation Force	30	-	120	g	-
Endurance	1,000,000	-	-	Touches	100g Operation Force
	-	-	30,000	Slides	
Surface Hardness	3	-	-	H	-

Capacitive Touch Panel specifications

Mechanical characteristics

DESCRIPTION	INL SPECIFICATION	REMARK
Touch Panel Size	7.0	
Outline Dimension (OD)	190.08x121.92mm	Cover Lens Outline
Product Thickness	1.6mm(max)	
Glass Thickness	0.7mm	
Ink View Area	154.82x87.1mm	
Sensor Active Area	154.82x87.1mm	
Input Method	5 Fingers	
Activation Force	Touch	
Surface Hardness	≥6H	

Electrical characteristics

DESCRIPTION		SPECIFICATION
Operating Voltage		DC 2.8~3.3V
Power Consumption (IDD)	Active Mode	12~4.5mA
	Sleep Mode	TBD
Interface		I^2C
Controller IC		FT5446
I^2C address		0x70
Resolution		800x480

Interface description

PIN NO.	SYMBOL	DESCRIPTION	REMARK
1	NC	Not Connected	
2	NC	Not Connected	
3	RST	Reset pin	
4	GND	Ground	
5	INT	Interrupt signal from CTP	
6	SDA	I2C data signal	
7	SCL	I2C clock input	
8	GND	Ground	
9	GND	Ground	
10	VCC	Power supply	

Interface timing characteristics

PARAMETER	MIN	MAX	UNIT
SCL Frequency	-	400K	Hz
Bus Free Time Between a STOP and START Condition	4.7	-	uS
Hold Time (repeated) START Condition	4.0	-	uS
Data Setup Time	250	-	nS
Setup Time for Repeated START Condition	4.7	-	uS
Setup Time for STOP Condition	2.0	-	uS

Packing-NoTouch

PARAMETER	**Specification**	**Unit**
Outside box	390(L) x 350(W) x 480(H)	mm
Inside box	373(L) x 333(W) x 220(H)	mm
Product quantity of Inside box	40	pcs
Total product quantity	40*2=80	pcs
Total weight	8.5±0.5	KG