
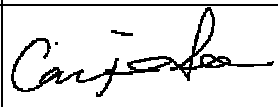


4. 3寸 TFT-LCD

承 认 书

Customer 客 户 名 称	
Part NO. 产 品 型 号	TQ043TSCM_V0.1_40P
Product type 产 品 内 容	Mode: Transmissive type .Normally white. TFT LCD Module LCD Module: Graphic 480RGB*272 Dot-matrix
Remarks 备 注 栏	<input type="checkbox"/> APPROVAL FOR SEPCIFICATIONS AND SAMPLE <input checked="" type="checkbox"/> APPROVAL FOR SEPCIFICATIONS ONLY
Signature by Customer: 客户确认签章	

Issued by	Checked by	Approved	
		P	Q
	2009.06.10		Jimmy 2009.06.10

1. SUMMARY

TQ043TSCM is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of **TFT**

LCD panel, driver ICs, FPC and a backlight unit. The following table described the features of TQ043TSCM_V0.1_40P .

2. FEATURES

High Resolution: 391,680 Dots (480 RGB x 272).

Application: Portable Navigation

PMP (Personal Multimedia Player), MP4 application product

DVB-S

3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	4.3(Diagonal)	inch
Display Format	480 RGB x 272	Dot
Active Area	95.04(H) x 53.856(V)	mm
Pixel Pitch	0.198(H) x 0.198(V)	mm
Surface Treatment	Anti-glare	
Pixel Configuration	RGB-Stripe	
Outline Dimension	105.5(W) x 67.2(H) x 2.9(D)	mm
Weight	45	g
View Angle Direction	6 o'clock	
Temperature Range	Operation	-20~70
	Storage	-30~80

4. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Condition
		Min.	Max.		
Power Voltage	VDD	0.3	5.0	V	
Logic Input Signal	Vin	-0.3	VDD+0.3	V	
Logic Output Signal	Vout	-0.3	VDD+0.3	V	

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

5. ELECTRICAL CHARACTERISTICS

5.1. Operating conditions:

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Supply	VDD	3.0	3.3	3.6	V	
Operating Current	IDD	-	15	-	mA	Black patter
Frame frequency	fFrame	-	60	90	Hz	
Dot Data Clock	DCLK	-	9.0	15	MHz	
Power Consumption	PLCD	-	49.5	-	mW	Black patter

5.2 LED driving conditions

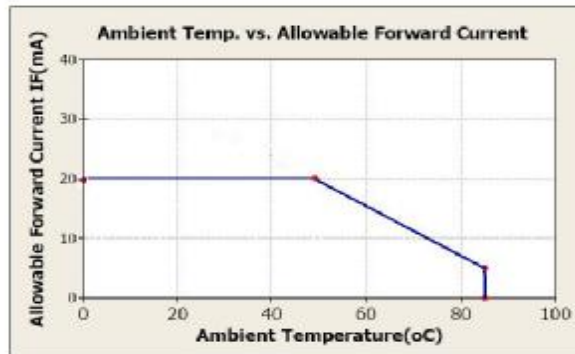
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Consumption	PLED	-	462	-	mW	
LED Current	If	-	20	-	mA	(1)
Backlight Voltage	Vb	-	23.1	-	V	(2)

Ta = 25

Brightness to be decreased to 50% of the initial value

Note (1) 7 LEDs serial type

(2) Where If=20mA, Vb= PLED / If



6. DC CHARATERISTICS

Parameter	Symbol	Rating			Unit	Condition
		Min.	Typ.	Max.		
Low level input voltage	V _{IL}	0	-	0.3*VDD	V	
Hight level input voltage	V _{IH}	0.7*VDD	-	VDD	V	

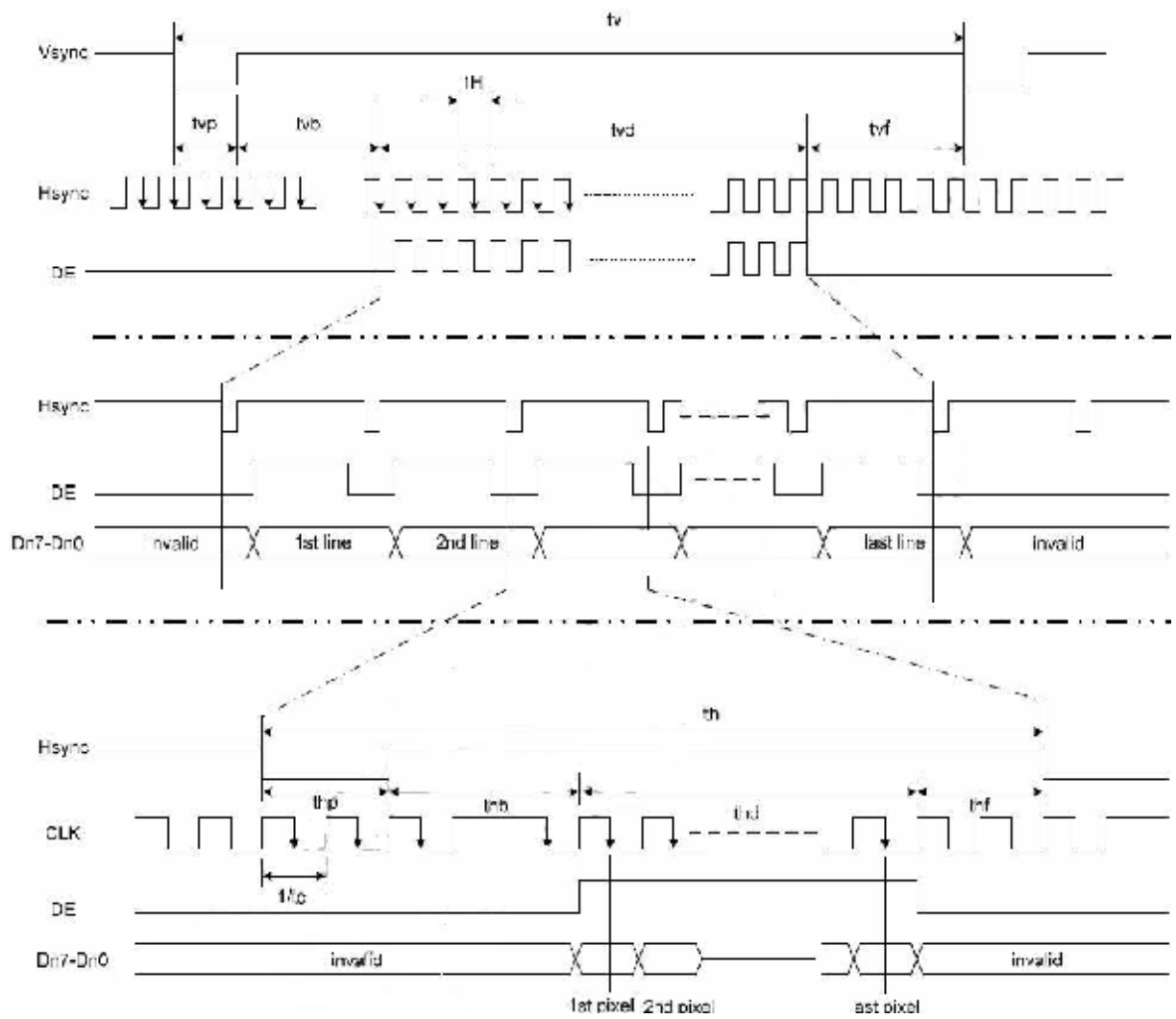
7. Timing CHARACTERISTICS**7.1 DC Timing Characteristics**

Signal	Item	Symbol	Min	Typ	Max	Unit	Note
Dclk	Frequency	DCLK	-	9.0	15	MHZ	
Hsyn	Period	TH 525	-	DCLK	(1)		
	Pulse Width	Thp	2	41	-	DCLK	(2)
	Back-Porch	Thb	2	-	-	DCLK	(2)
	Display Period	Thd	-	480	-	DCLK	
	Front-Porch	Thf	2	-	-	DCLK	(2)
Vsyn	Period	Tv	-	286	-	TH	
	Pulse Width	Tvp	1	10	-	TH	
	Back-Porch	Tvb	1	2	-	TH	
	Display Period	Tvd	-	272	-	TH	
	Front-Porch	Tvf	1	2	-	TH	

Note1: Thd=480 DCLK, Thf=2 DCLK, Thp= 41 DCLK, Thb=2 DCLK

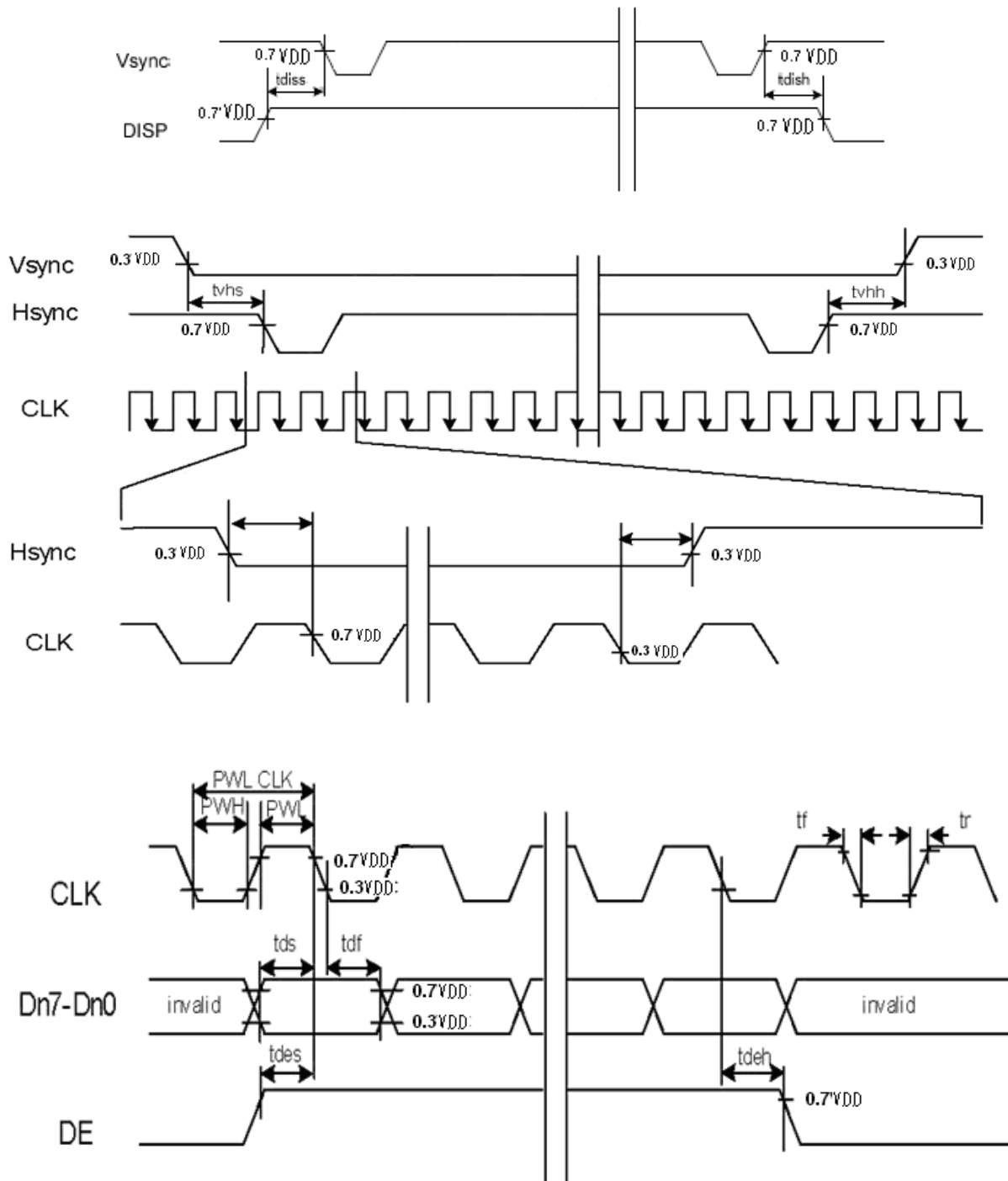
525 DCLK= 480 + 2 + 41 + 2 (DCLK)

Note2: Thf+ Thp+ Thb >44



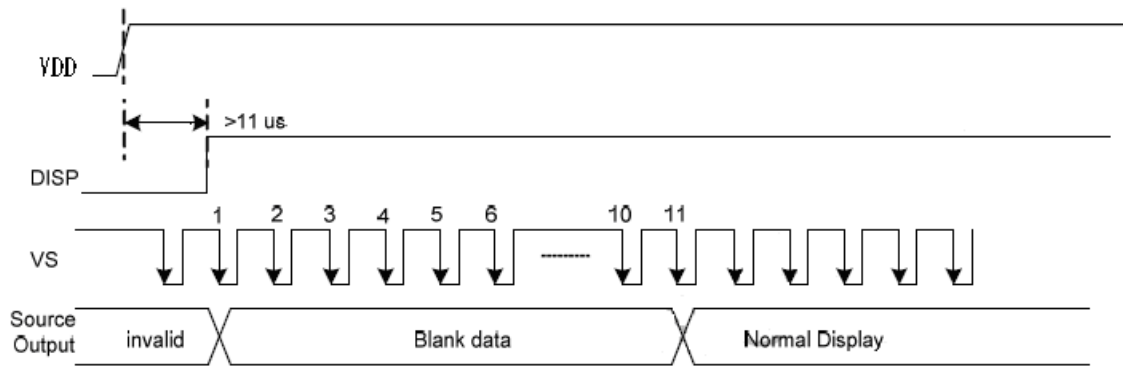
7.2 AC Timing Characteristics

Parameter	Symbol	Spec.			Unit
		Min	Typ	Max	
DISP setup time	t_{diss}	10			ns
DISP hold time	t_{dish}	10			ns
Clock period	$PW_{CLK}^{(2)}$	66.7	-	-	ns
Clock pulse high period	$PWH_{(2)}$	26.7	-	-	ns
Clock pulse low period	$PWL_{(2)}$	26.7	-	-	ns
Hsync setup time	t_{hs}	10	-	-	ns
Hsync hold time	t_{hh}	10	-	-	ns
Data setup time	t_{ds}	10	-	-	ns
Data hold time	t_{dh}	10	-	-	ns
DE setup time	t_{des}	10	-	-	ns
DE hold time	t_{deh}	10	-	-	ns
Vsync setup time	t_{vhs}	10	-	-	ns
Vsync hold time	t_{vhh}	10	-	-	ns

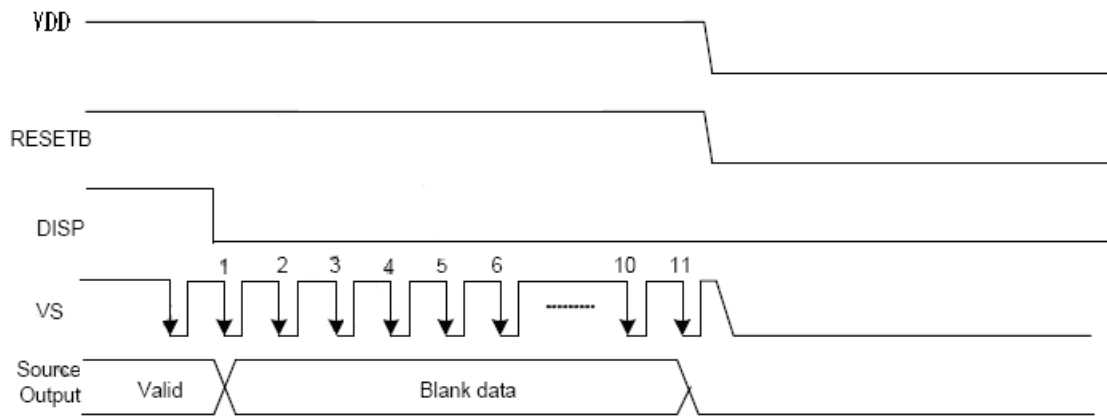


7.3 Power Sequence

The LCD panel power ON/OFF sequence is as below.



Power On Sequence



Power Off Sequence

8. OPTICAL CHARACTERISTIC

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Brightness				300	350	-	cd/m2	
Response time		TR	Θ=0	-	15	-	ms	(3)(5)
		TF		-	15	-	ms	
Contrast ratio		CR	At optimized viewing angle	450	550	-	-	(4)
Color Chromaticity	White	Wx	Θ=0	0.26	0.31	0.36	-	(2)(6)(7)
		Wy		0.28	0.33	0.38		
Viewing Angle	Hor.	ΘR	CR 10	50	70	-	-	(1)
		ΘL		50	70	-		
	Ver.	φH		40	55	-		
		φL		50	70	-		
Uniformity				75	80		%	(8)

Ta=25±2 , ILED=20mA

Note 1: Definition of viewing angle

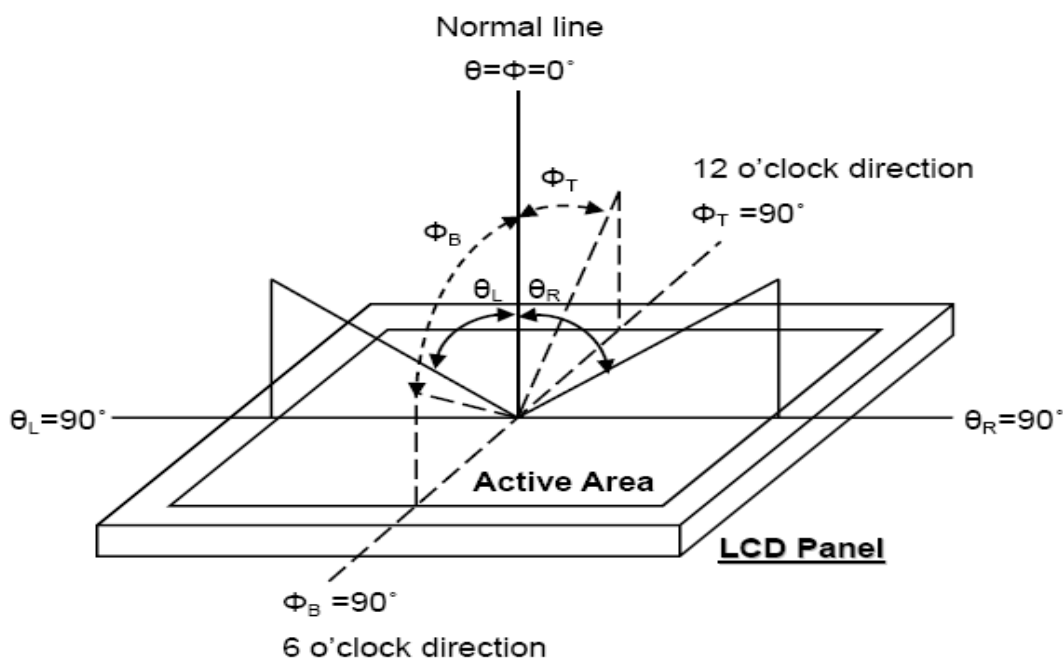


Fig. 8-1 Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

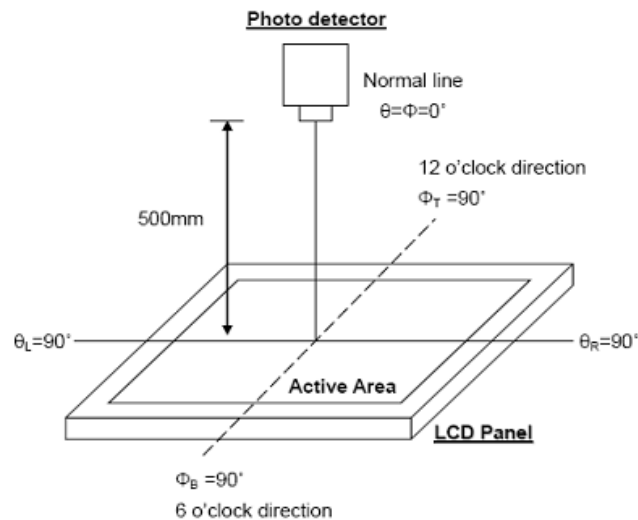


Fig. 8-2 Optical measurement system setup

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, T_r , is the time between photo detector output intensity changed from 10% to 90%. And fall time, T_f , is the time between photo detector output intensity changed from 90% to 10%.

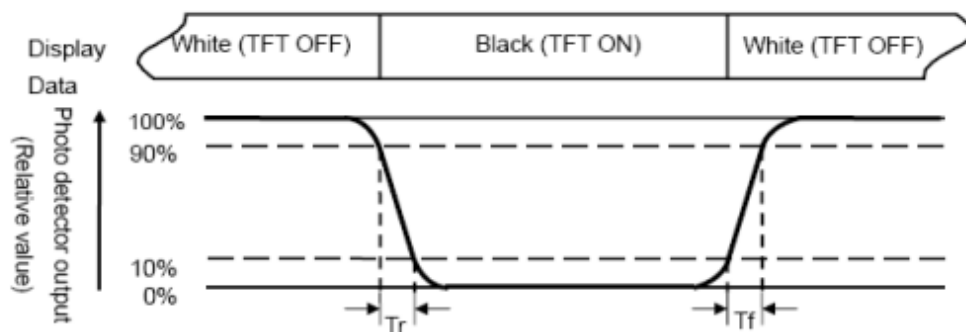


Fig. 3-3 Definition of response time

Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.

“±” means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals

of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 8 : Uniformity (U) =
$$\frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$$

10. INTERFACE**10.1. LCM PIN Definition** (Connector type : 40Pin / 0.5mm pitch / Top contact)
- Hirose : FH12 series

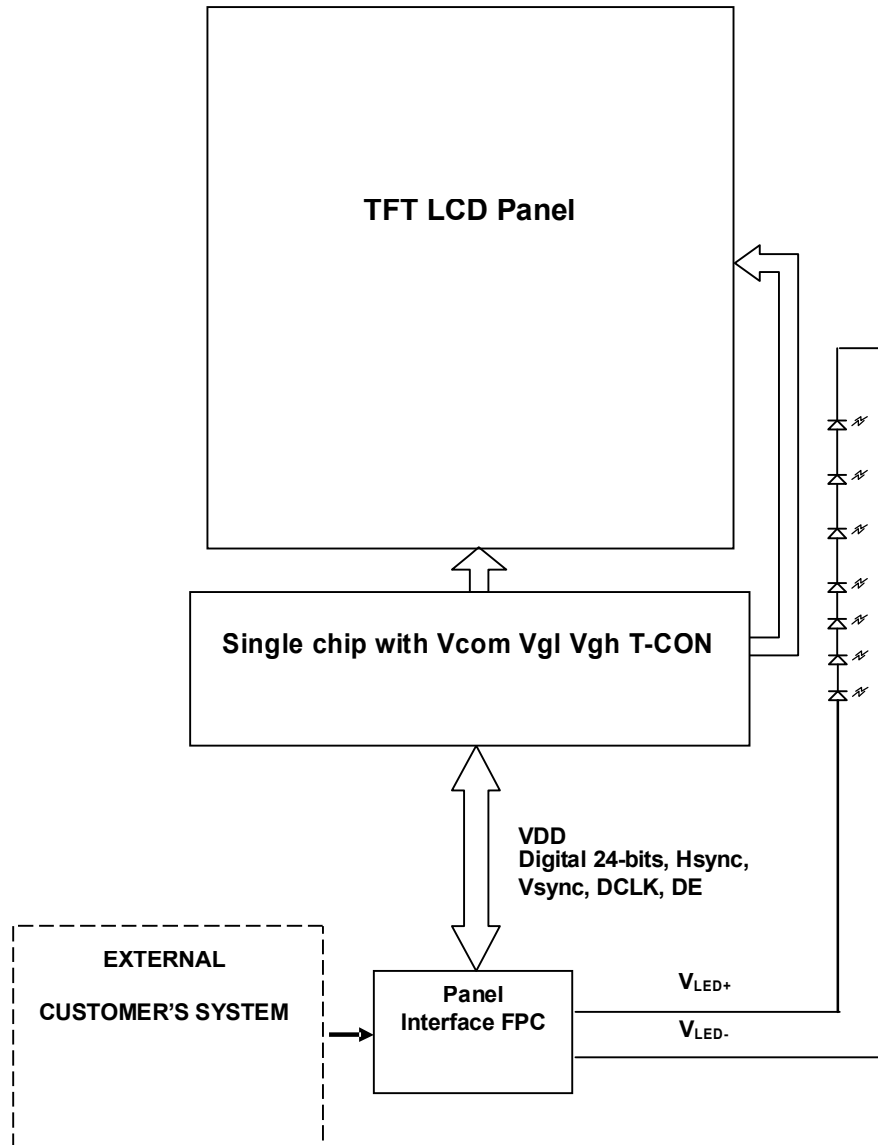
Pin	Symbol	I/O	Function	Remark
1	VLED-	I	LED Ground	
2	VLED+	I	LED Power	
3	GND	I	Ground	
4	VDD	I	Power Supply (+3.3 V)	
5	R0	I	Red Data Bit0 (LSB)	
6	R1	I	Red Data Bit1	
7	R2	I	Red Data Bit2	
8	R3	I	Red Data Bit3	
9	R4	I	Red Data Bit4	
10	R5	I	Red Data Bit5	
11	R6	I	Red Data Bit6	
12	R7	I	Red Data Bit7 (MSB)	
13	G0	I	Green Data Bit0 (LSB)	
14	G1	I	Green Data Bit1	
15	G2	I	Green Data Bit2	
16	G3	I	Green Data Bit3	
17	G4	I	Green Data Bit4	
18	G5	I	Green Data Bit5	
19	G6	I	Green Data Bit6	
20	G7	I	Green Data Bit7 (MSB)	
21	B0	I	Blue Data Bit0 (LSB)	
22	B1	I	Blue Data Bit1	
23	B2	I	Blue Data Bit2	
24	B3	I	Blue Data Bit3	
25	B4	I	Blue Data Bit4	
26	B5	I	Blue Data Bit5	
27	B6	I	Blue Data Bit6	
28	B7	I	Blue Data Bit7 (MSB)	
29	GND	I	Ground	
30	DCLK	I	Dot Data Clock	
31	DISP	I	Display On/Off	Note 1
32	Hsync	I	Horizontal Sync Input	
33	Vsync	I	Vertical Sync Input	

34	DE	I	Data Enable Control	Note 2
35	NC	I	No Connect	
36	GND	I	Ground	
37	X1	I	Right (TP)	
38	Y1	I	Bottom(TP)	
39	X2	I	Left(TP)	
40	Y2	I	Up(TP)	

Note1: During set to DISP=" H ", input data are valid. During set to DISP=" L ", input data are invalid and white display data is written to data register automatically.

Note2: DE=" H ": data can be access, DE=" L ": data cannot be access

11. BLOCK DIAGRAM



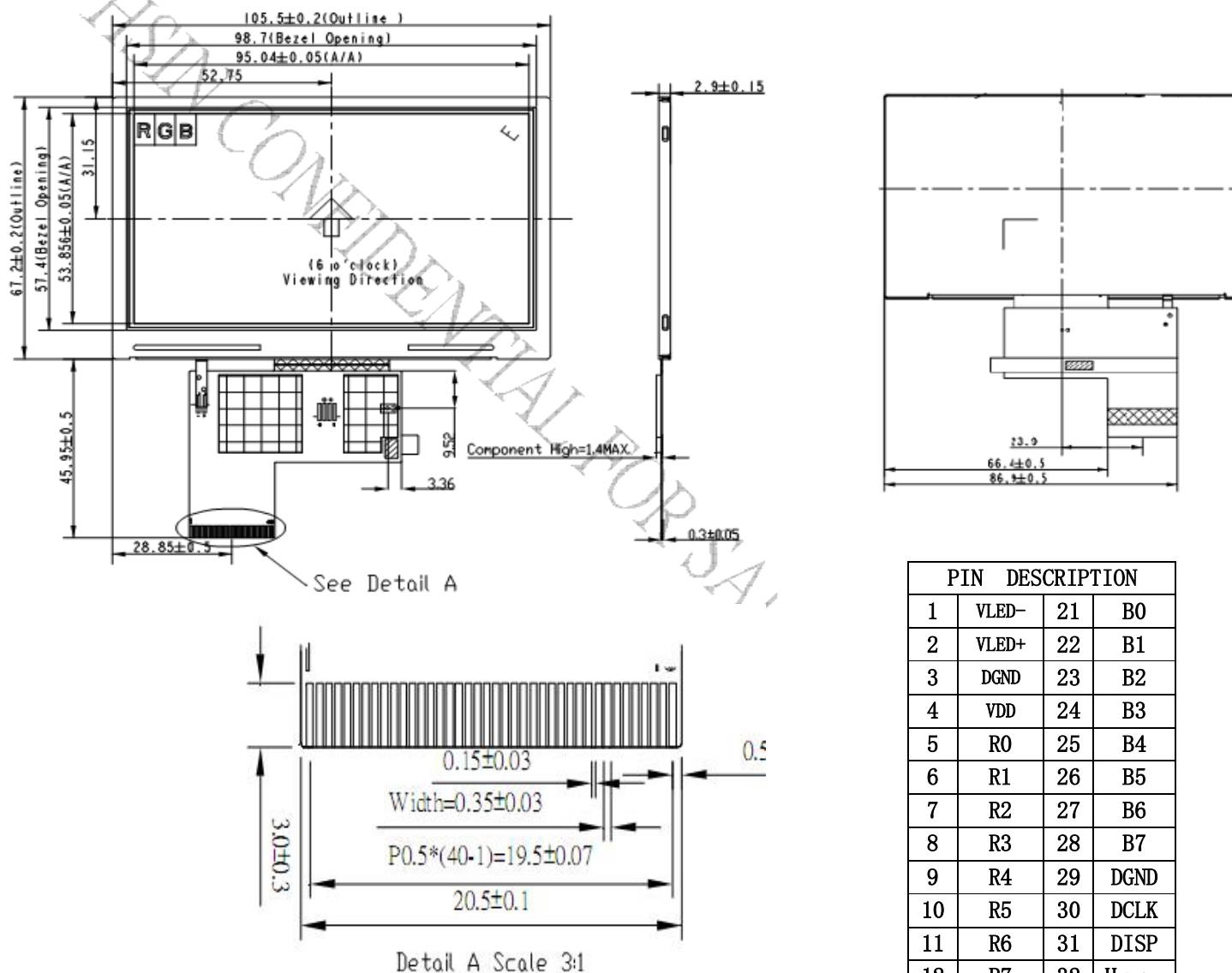
12. QUALITY ASSURANCE

No.	Test Items	Test Condition	REMARK
1	High Temperature Storage Test	Ta=80 Dry 240h	
2	Low Temperature Storage Test	Ta=-30 Dry 240h	
3	High Temperature Operation Test	Ta=70 Dry 240h	
4	Low Temperature Operation Test	Ta=-20 Dry 240h	
	High Temperature and High Humidity Operation Test	Ta=60 90%RH 240h	
6	Electro Static Discharge Test	Panel surface / top case Contact / Air $\pm 6\text{KV}$ / $\pm 8\text{KV}$ 150pF 330 Ω	Non-operating
7	Shock Test (non-operating)	Shock Level : 180G Waveform: Half Sinusoidal wave Shock Time : 2ms 3 Axis for all six faces/ each	
8	Vibration Test (non-operating)	Frequency Range: 10~500Hz/ Sweep: 1.5G Amplitude: 0.37 oct/min For 3 Axis 1hrs/axis	
9	Thermal Shock Test	-30 (0.5Hr) ~ +80 (0.5H) for 100 cycles	

Note1: The test samples have recovery time for 4 hours at room temperature before the function check. In the standard conditions, there is no display function NG issue occurred.

Note2: All the cosmetic specifications are judged before the reliability stress.

13. OUTLINE DRAWING

**Specification:**

LCD Driver IC: HX8257A-01×1.

Display Format: 480 RGB x 272 Dot

Active Area: 95.04(H) x 53.856(V) mm

Operating temp: $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$ Storage temp: $-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$

Construction: 4.3" a-Si color TFT-LCD/FPC/TP.

PIN DESCRIPTION			
1	VLED-	21	B0
2	VLED+	22	B1
3	DGND	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	DGND
10	R5	30	DCLK
11	R6	31	DISP
12	R7	32	Hsync
13	G0	33	Vsync
14	G1	34	DE
15	G2	35	AVDD
16	G3	36	DGND
17	G4	37	X1
18	G5	38	Y1
19	G6	39	X2
20	G7	40	Y2

4.3 寸液晶---40 PIN(CMO 玻璃)

型号: TQ043TSCM_V0.1_40P

广州天嵌计算机科技有限公司

14. PRECAUTIONS

Please pay attention to the following when you use this TFT LCD module.

14.1 MOUNTING PRECAUTIONS

- (1) You must mount a module using arranged in four corners or four sides.
- (2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module.
And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- (3) Please attach a transparent protective plate to the surface in order to protect the polarizer.
Transparent protective plate should have sufficient strength in order to resist external force.
- (4) You should adopt radiation structure to satisfy the temperature specification.
- (5) Acetic acid type and chlorine type materials for the cover case are not described because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- (6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than H pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are determined to the polarizer)
- (7) When the surface becomes dusty, please wipe gently with adsorbent cotton or other soft materials like chamois soaked with petroleum benzene. Normal hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- (8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- (9) Do not open the case because inside circuits do not have sufficient strength.

14.2 OPERATING PRECAUTIONS

- (1) The spike noise causes the misoperation of circuits. It should be lower than following voltage $V=\pm 200\text{mV}$ (Over and under shoot voltage)
- (2) Response time depends on the temperature. (In lower temperature, it becomes longer.)
- (3) Brightness depends on the temperature. (In lower temperature, it becomes lower)
And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.
- (4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
- (6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers.
Grounding and shielding methods may be important to minimize the interference.

14.3 ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wristband etc. And don't touch interface pin directly.

14.4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

14.5 STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

- (1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5 and 35 at normal humidity.

- (2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

14.6 HANDLING PRECAUTIONS FOR PROTECTION FILM

- (1) When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- (2) The protection film is attached to the polarizer with a small amount of glue. Is apt to remain on the polarizer. Please carefully peel off the protection film without rubbing it against the polarizer.
- (3) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.
- (4) You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other softmaterial like chamois soaked with normal-hexane.