

Displays & Touch Screens

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DATA IMAGE CORPORATION

CTP Module Specification

Preliminary

ITEM NO.: SCF0507255GGU02

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Customer Companies	QA Approval	QA Check	R&D Approval	R&D Check
	<i>pretty</i>	<i>Seven</i>	<i>Gromer</i>	<i>Max</i>
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	1	25/MAR/16'		24

3. GENERAL SPECIFICATIONS

Composition: A touch panel module with 5.7 inches Capacitive Touch Panel (CTP).
CTP Interface: USB.

Parameter	Specifications	Unit
Display resolution	(640X R.G.B) (W) x480(H)	dot
LCD Active area	115.2(W) x 86.4(H)	mm
Sensor Active area	117.78(W) x 88.8(H)	
Screen size	5.7(Diagonal)	inch
Pixel pitch	0.18(W) x 0.18(H)	mm
Color configuration	R.G.B. Stripe	
Overall dimension	142.75 (W) x 113.95(H) x 9Max.(T)	mm
Weight	TBD	g
Surface treatment	Glare	
View Angle direction	12 o'clock	
LCM model number	FG050720DSSWDGL4	
Our components and processes are compliant to RoHS and REACH standard		

4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power supply voltage	V _{CC}	-0.3	5.0	V	
Logic input voltage	V _I	-0.3	V _{CC} +0.3	V	
Operating temperature	T _{op}	-20	+70	°C	Ambient temperature
Storage temperature	T _{st}	-30	+80	°C	Ambient temperature

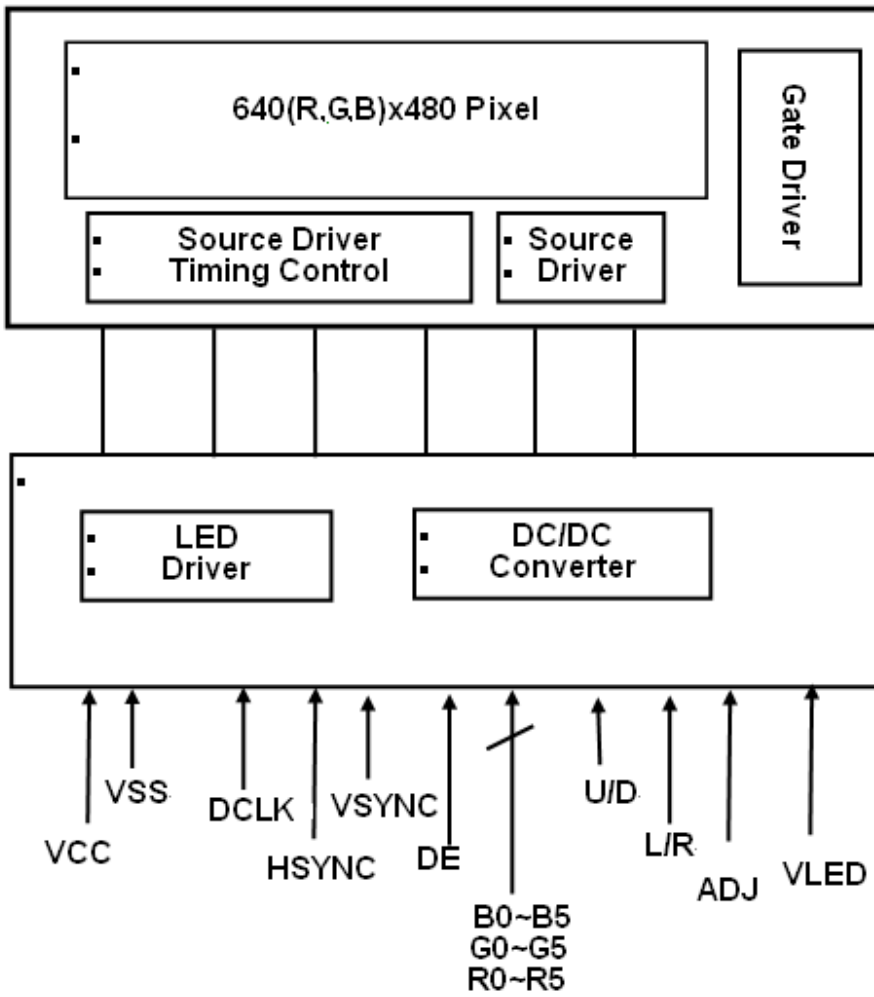
5. ELECTRICAL CHARACTERISTICS

VSS=0V, DCLK=25MHz, Ta=25°C

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power Supply voltage for LCD	V _{CC}	+3.0	+3.3	+3.6	V	
Power Supply Current for LCD	I _{CC}		111	140	mA	V _{CC} =3.3V
Power Supply voltage for LED	V _{LED}	4.5	5	5.5	V	
Power Supply Current for LED	I _{LED}		333	400	mA	V _{LED} =5.0V
Ripple voltage	V _{RF}	-	-	100	mV _{P-P}	
"H" level logical input voltage	V _{IH}	0.7V _{CC}	--	V _{CC}	V	
"L" level logical input voltage	V _{IL}	0	--	0.3V _{CC}	V	
ADJ frequency		19K	20K	21K	Hz	
ADJ input voltage	V _{IH}	3.0	-	3.3	V	
	V _{IL}	0	-	0.3	V	
LED Dice life time		--	50000	--	Hr	Note 1

Note 1: The "LED dice life time" is defined as the brightness decrease to 50% original brightness that the ambient temperature is 22°C and LED dice current=20mA.

6. BLOCK DIAGRAM



7. PIN CONNECTIONS

Pin NO.	SYMBOL	DESCRIPTION
1	U/D	Up or Down Display Control
2	NC	No Connection
3	HSYNC	Horizontal SYNC.
4	VLED	Power Supply for LED Driver circuit
5	VLED	Power Supply for LED Driver circuit
6	VLED	Power Supply for LED Driver circuit
7	V _{cc}	Power Supply for LCD
8	VSYNC	Vertical SYNC.
9	DE	Data Enable
10	VSS	Power Ground
11	VSS	Power Ground
12	ADJ	Brightness control for LED B/L
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V _{ss}	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V _{ss}	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V _{ss}	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V _{ss}	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V _{ss}	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0
36	VSS	Power Ground
37	VSS	Power Ground
38	DCLK	Clock Signals ; Latch Data at the Falling Edge
39	V _{ss}	Power Ground
40	L/R	Left or Right Display Control

Remarks :

- 1) ADJ is brightness control Pin. The larger of the pulse duty is, the higher of the brightness.
- 2) ADJ signal is 0~3.3V. Operation frequency is 20KHz
- 3) VSS PIN must be grounding, can not be floating.

4) U/D and L/R control Function

L/R	U/D	Function
1	0	Normally display
0	0	Left and Right opposite
1	1	Up and Down opposite
0	1	Left and Right opposite · Up and Down opposite

5) If DE signal is fixed low, SYNC mode is used. Otherwise, DE mode is used.

7.1 Power Signal Sequence

Remarks:

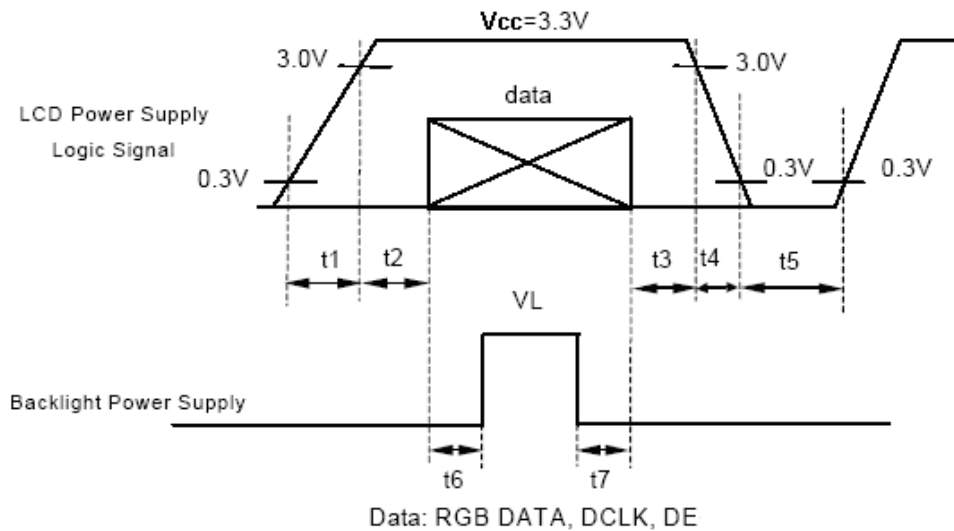
*1) Power Signal sequence:

$t1 \leq 10\text{ms}$: $1 \text{ sec} \leq t5$

$50\text{ms} \leq t2$: $200\text{ms} \leq t6$

$0 < t3 \leq 50\text{ms}$: $200\text{ms} \leq t7$

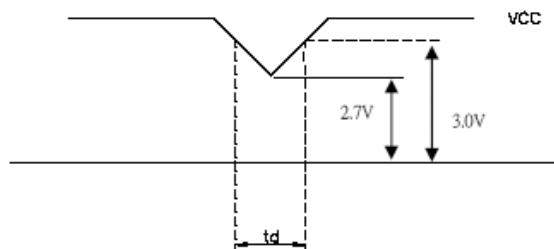
$0 < t4 \leq 10\text{ms}$



*2) VCC-dip condition:

(1) $2.7 \text{ V} \leq V_{CC} < 3.0\text{V}$, $t_d \leq 10 \text{ ms}$

(2) $V_{CC} > 3.0\text{V}$, VCC-dip condition should be the same with VCC-turn-on condition.



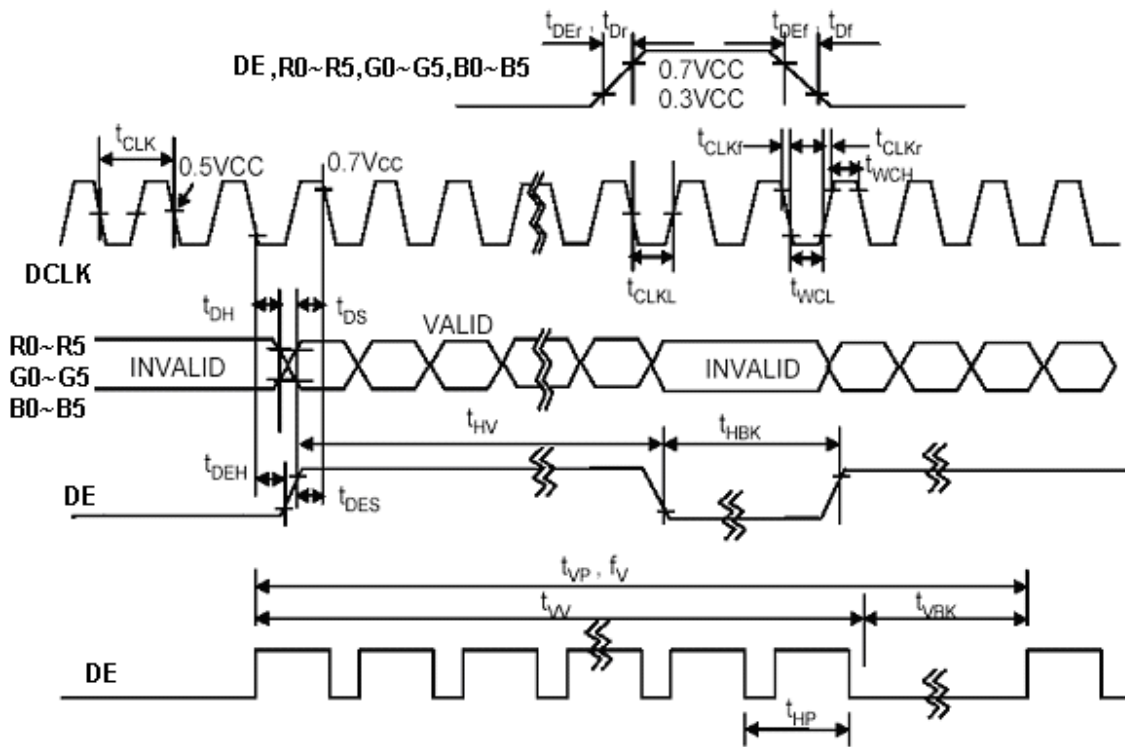
8. INTERFACE SPECIFICATIONS

8.1 DE mode Input signal characteristics

Signal	Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
DCLK	Period	t _{CLK}	33	40	43	ns	
	Frequency	f _{CLK}	23	25	30	MHz	
	Low Level Width	t _{WCL}	6	-	-	ns	
	High Level Width	t _{WCH}	6	-	-	ns	
	Rise, Fall Time	t _{CLKr} , t _{CLKf}	-	-	3	ns	
	Duty ⁽¹⁾	-	0.45	0.50	0.55	-	
DE (Data Enable)	Setup Time	t _{DES}	5	-	-	ns	
	Hold Time	t _{DEH}	10	-	-	ns	
	Rise, Fall Time	t _{DEr} , t _{DEf}	-	-	16	ns	
	Horizontal Period	t _{HP}	750	800	900	t _{CLK}	
	Horizontal Valid	t _{HV}	640	640	640	t _{CLK}	
	Horizontal Blank	t _{HBK}	110	160	260	t _{CLK}	
	Vertical Period	t _{VP}	515	525	560	t _{HP}	
	Vertical Valid	t _V	480	480	480	t _{HP}	
	Vertical Blank	t _{VBK}	35	45	80	t _{HP}	
	Vertical Frequency	f _v	55	60	65	Hz	
Data R,G,B	Setup Time	t _{DS}	5	-	-	ns	
	Hold Time	t _{DH}	10	-	-	ns	
	Rise, Fall Time	t _{Dr} , t _{Df}	-	-	3	ns	

Note: (1) t_{CLKL} / t_{CLK}.

8.1.1 DE mode timing waveform



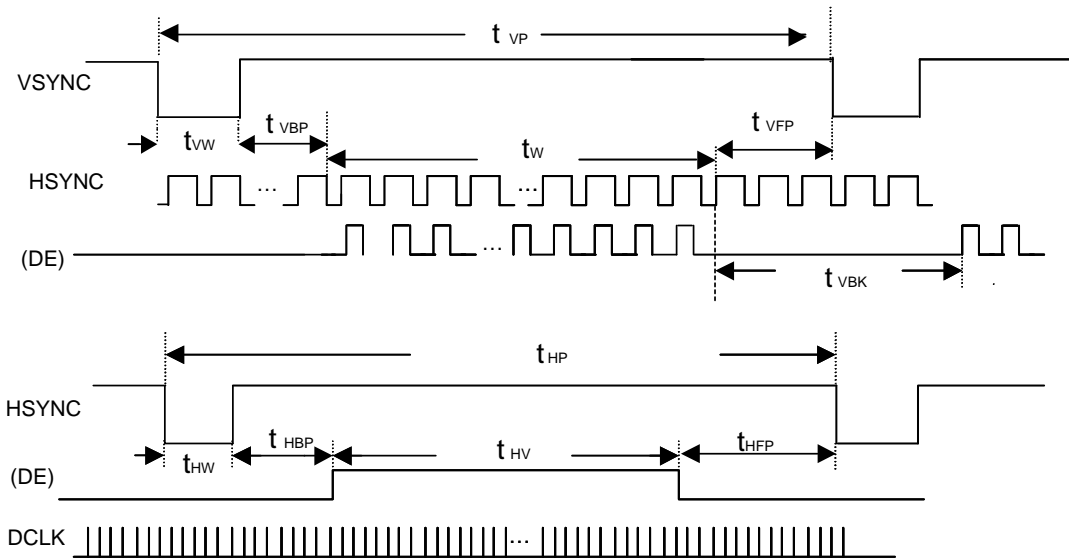
8.2 SYNC mode Input signal characteristics

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Clock Period	t_{CLK}	33	40	43	ns	
Clock Frequency	f_{CLK}	23	25	30	MHz	
Clock Low Level Width	t_{WCL}	6	-	-	ns	
Clock High Level Width	t_{WCH}	6	-	-	ns	
Clock Rise, Fall Time	t_{CLKr}, t_{CLKf}	-	-	3	ns	
HSYNC Period	t_{HP}	750	800	900	t_{CLK}	
HSYNC Pulse Width	t_{HW}	5	30	-	t_{CLK}	
HSYNC Front Porch	t_{HFP}	1	16	116	t_{CLK}	
HSYNC Back Porch	t_{HBP}	1	114	139	t_{CLK}	
HSYNC Width + Back Porch	$t_{HW} + t_{HBP}$	144	144	144	t_{CLK}	
Horizontal Blank	t_{HBK}	1	160	260	t_{CLK}	
Horizontal Valid	t_{HV}	640	640	640	t_{CLK}	
VSYNC Period	t_{VP}	515	525	560	t_{HP}	
VSYNC Pulse Width	t_{VW}	1	3	5	t_{HP}	
VSYNC Front Porch	t_{VFP}	1	10	45	t_{HP}	
VSYNC Back Porch	t_{VBP}	30	32	34	t_{HP}	
VSYNC Width + Back Porch	$t_{VW} + t_{VBP}$	35	35	35	t_{CLK}	
Vertical Blank	t_{VBK}	35	45	80	t_{HP}	
Valid data Width	t_W	480	480	480	t_{HP}	
Data Setup Time	t_{DS}	5	-	-	ns	
Data Hold Time	t_{DH}	10	-	-	ns	

Note: (1) $t_{HBK} = t_{HFP} + t_{HW} + t_{HBP}$

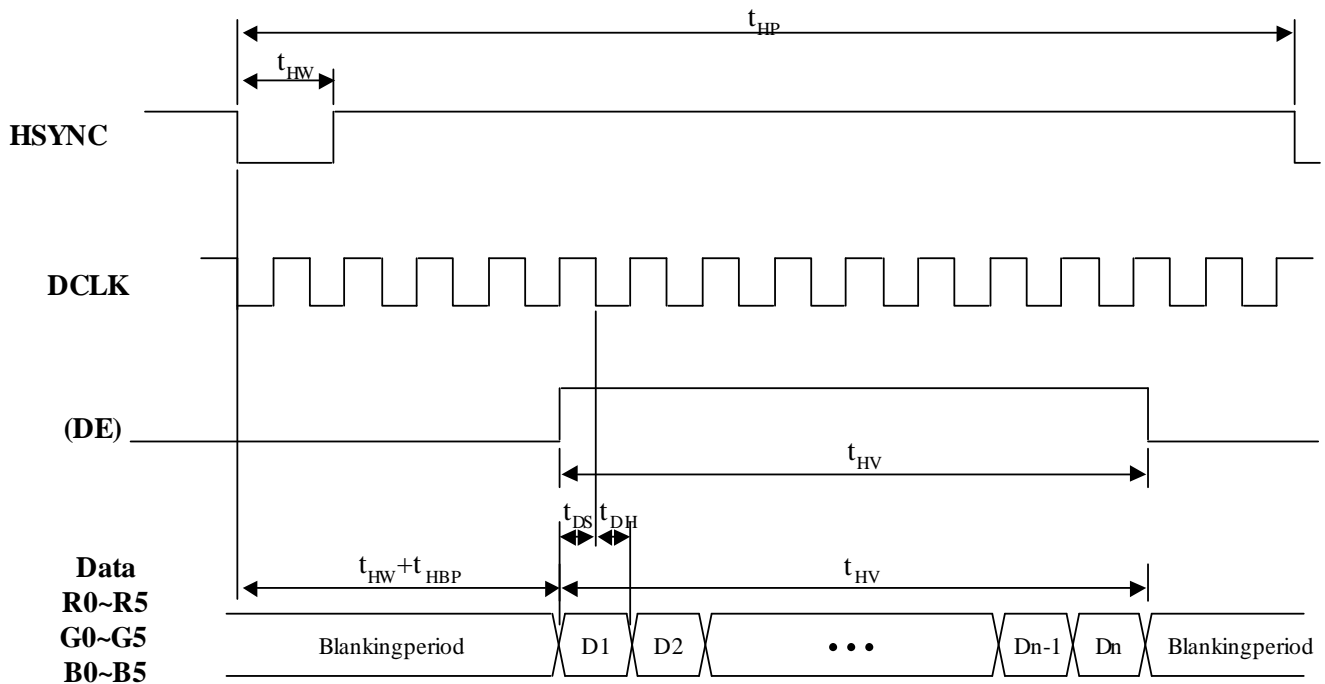
8.2.1 SYNC mode timing waveform

8.2.1.1 Input vertical timing



Remark : If SYNC mode is used, please fix DE signal to low, DE timing waveform is for reference only.

8.2.1.2 Input horizontal timing



Remark : If SYNC mode is used, please fix DE signal to low, DE timing waveform is for reference only.

8.3 Color Data Assignment

COLOR	INPUT	R DATA						G DATA						B DATA					
		DATA	R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
		MSB					LSB	MSB					LSB	MSB					LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	GREEN(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	BLUE(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

Remarks:(1) Definition of Gray Scale
 color(n):n is series of Gray Scale
 The more n value is, the bright Gray Scale.

(2)Data:1-High,0-Low

Correspondence between Data and Display Position

	S0001	S0002	S0003	S0004	S0005	S0006	S0007	S0008	-----	S1919	S1920
C001	R001	G001	B001	R002	G002	B002	R003	G003		G640	B640
C480	R001	G001	B001	R002	G002	B002	R003	G003		G640	B640

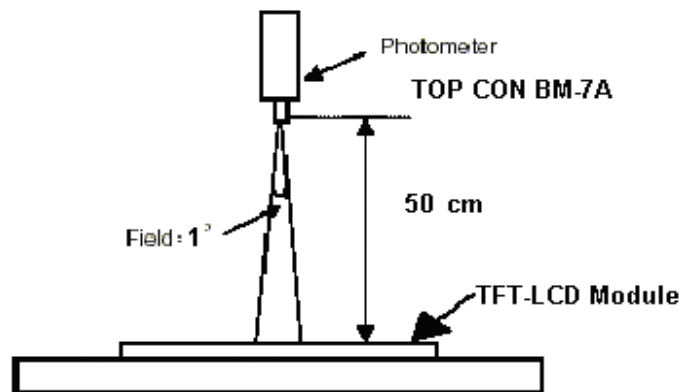
9. OPTICAL CHARACTERISTIC

9-1. Specification:

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks	
Viewing Angle	Horizontal	θ_{x+}	60	70	--	deg	Note 1,4	
		θ_{x-}	60	70	--			
	Vertical	θ_{y+}	50	60	--			
		θ_{y-}	30	40	--			
Contrast Ratio	CR	at optimized viewing angle	200	300			Note 1,3	
Response time	Rise	Tr	-	15	50	ms	Note 1,6	
	Fall	Tf	-	35	50	ms		
Uniformity		B-uni	$\theta_{x=\theta y = 0^\circ}$	70	80	--	%	Note1,5
Brightness		L	$\theta_{x=\theta y = 0^\circ}$ ADJ=3.3V	610	760	--	cd/m ²	Note 1,2
Chromaticity	x_W	Center $\theta_{x=\theta y = 0^\circ}$	0.259	0.309	0.359		Note 1,7	
	y_W		0.270	0.320	0.370			
	x_R		0.565	0.615	0.665			
	y_R		0.310	0.360	0.410			
	x_G		0.295	0.345	0.395			
	y_G		0.490	0.540	0.590			
	x_B		0.098	0.148	0.198			
	y_B		0.056	0.106	0.156			
Image sticking	tis	2 hours			2	Sec	Note 8	

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance ≤ 1 lux, and at room temperature). The operation temperature is $25^\circ\text{C} \pm 2^\circ\text{C}$. The measurement method is shown in Note1.

Note1: The method of optical measurement:

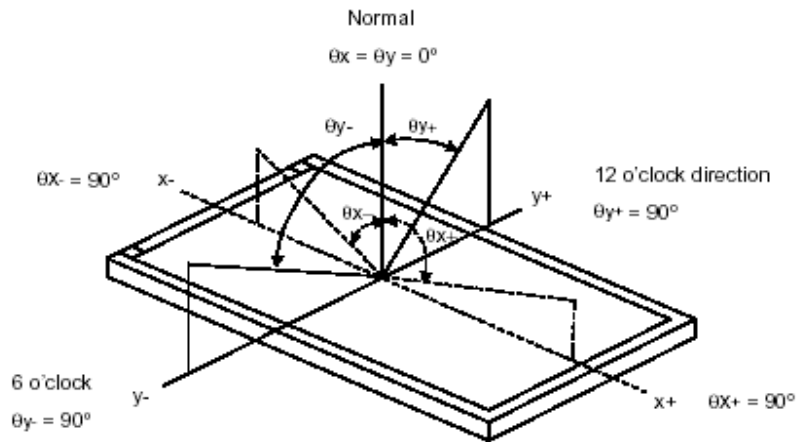


Note2: Measured at the center area of the panel and at the viewing angle of the $\theta_x = \theta_y = 0^\circ$

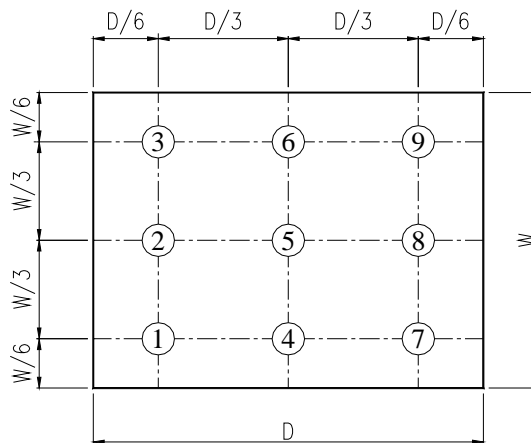
Note3: Definition of Contrast Ratio (CR):

$$CR = \frac{\text{Luminance with all pixels in white state}}{\text{Luminance with all pixels in Black state}}$$

Note4: Definition of Viewing Angle



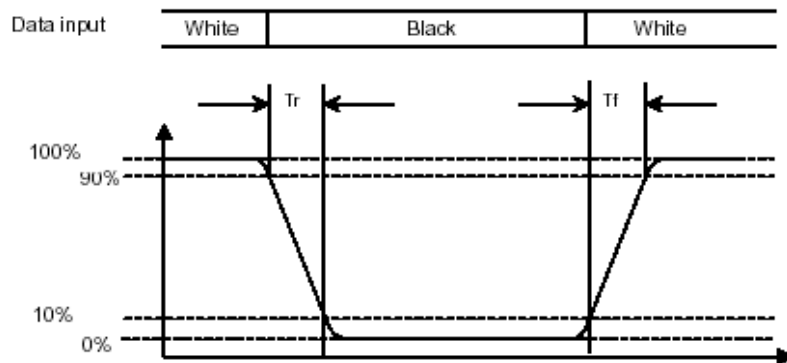
Note 5: Definition of Brightness Uniformity (B-uni):



$$B\text{-uni} = \frac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9 points}} \quad (\text{Note 5}).$$

Note6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (Tr)” and the “Falling Time (Tf)” respectively. Tr and Tf are defined as following figure.



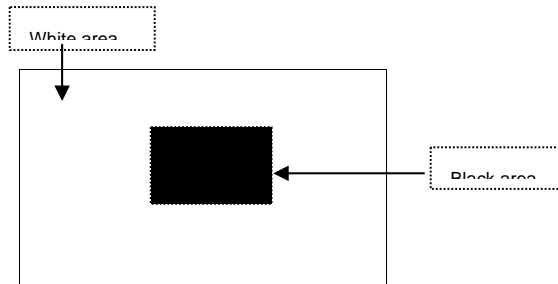
Note 7: Definition of Chromaticity:

The color coordinates (x_w, y_w) , (x_r, y_r) , (x_g, y_g) , and (x_b, y_b) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

Note 8: Definition of Image sticking (tis):

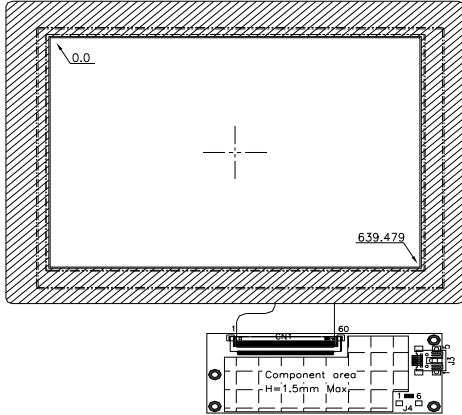
Continuously display the test pattern shown in the figure below for 2 hours. Then display a completely white screen. The previous image shall not persist more than 2 sec at 25 °C

Image sticking pattern

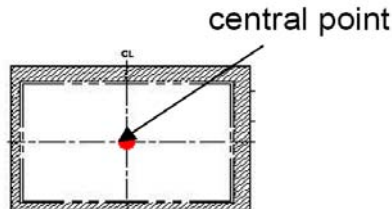


10. CTP GENAL SPECIFICATIONS

10.1 CTP main feature

Item	Specification	Unit
Type	Transparent type projected capacitive touch panel	
Input mode	Human's finger	
Finger	5	Points
CTP Interface	USB	
Response time	10	ms
Report rate	100	Hz
(X,Y)position		
F/W: TBD		
Point hitting life time	1,000,000 times min.	Note 1

Note 1: Use 8 mm diameter silicon rubber/force 3N to knock on central point twice per second (no-operating), function pass after test.



10.2 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	VCC	-0.3	5	6.5	V

10.3 DC CHARACTERISTICS

VCC=5V+/-5%, GND=0V,

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	VCC	4.75	5	5.25	V

10.4 PIN CONNECTIONS

No.	Name	I/O	Description
1	VCC	P	Power;
2	D-		USB D-
3	D+		USB D+
4	NC	--	No connect
5	GND	P	Ground

11. QUALITY ASSURANCE

11.1 Test Condition

11.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $65 \pm 5\%$

11.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

11.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

11.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

11.1.5 Test Method

No.	Reliability Test Item & Level	Test Level	Remark
1	High Temperature Storage Test	T=80°C,240hrs	IEC68-2-2
2	Low Temperature Storage Test	T=-30°C,240hrs	IEC68-2-1
3	High Temperature Operation Test	T=70°C,240hrs	IEC68-2-2
4	Low Temperature Operation Test	T=-20°C,240hrs	IEC68-2-1
5	High Temperature and High Humidity Operation Test	T=60°C,90% RH,240hrs	IEC68-2-3
6	Thermal Cycling Test (No operation)	-30°C → +25°C → +80°C,200 Cycles 30 min 5min 30 min	IEC68-2-14
7	Vibration Test	Frequency:10 ~ 55 Hz Amplitude:1.5 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z	IEC68-2-6
8	Drop Test	Height :60cm 1 conner,3edges,6surfaces	IEC68-2-32
9	Shock Test	100G,6ms,Direction:±X±Y±Z Cycle:3times	IEC68-2-27
10	ESD Test	State: operating Location: LCM/TP surface Condition:150pf 330Ω Contact +/- 4kV Air +/-8kV Criteria: Class C	IEC61000-4-2

11.2 Inspection condition

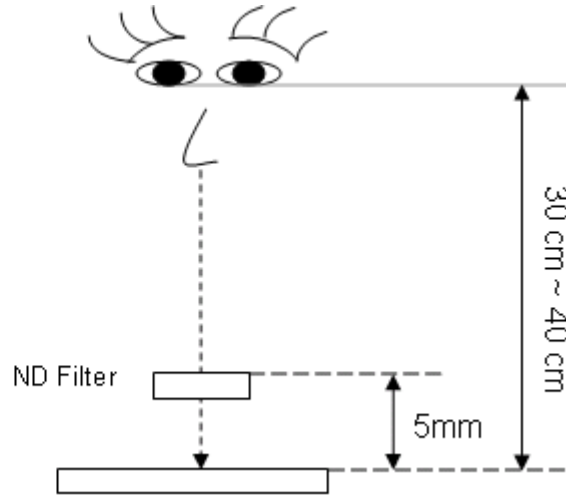
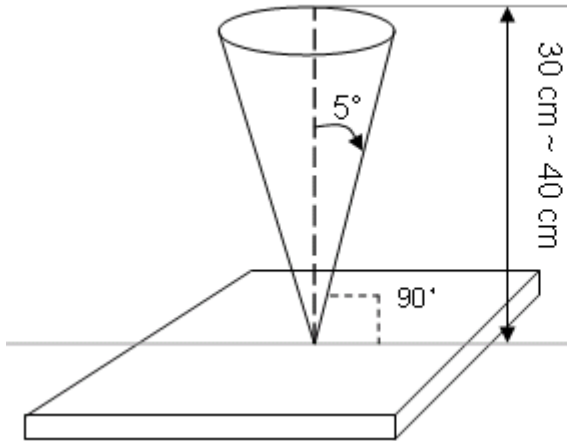
11.2.1 Inspection condition

11.2.1.1 Inspection conditions

11.2.1.2 Inspection Distance : 35 ± 5 cm

11.2.1.3 View Angle :

- (1) Inspection that light pervious to the product: $\pm 5^\circ$
- (2) Inspection that light reflects on the product: $\pm 45^\circ$

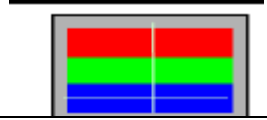


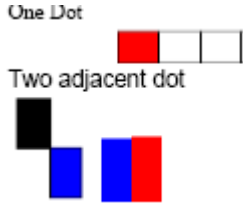
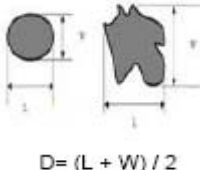
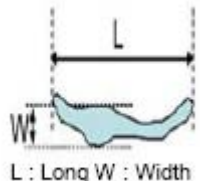
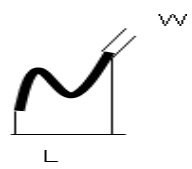
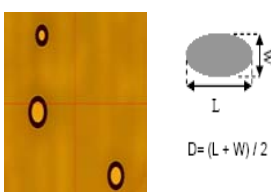
11.2.1.4 Environment conditions :

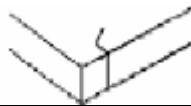
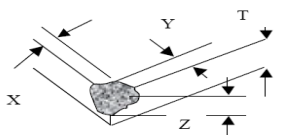
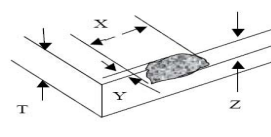
Ambient Temperature :	$25 \pm 5^\circ\text{C}$
Ambient Humidity :	30~75%RH
Ambient Illumination	600~800 lux

11.3 Inspection Parameters

Appearance inspection standard (D: diameter, L: length; W: width, Z: height, T: glass thickness, n: number)

Inspection item	Inspection standard	Description
No image	Prohibited	
Image abnormal	Prohibited	
Bright line	Prohibited	
Mura	It is acceptable that the defect can not be seen with 2% ND filter.	

Dot	Item	Acceptable Visible area	Total	 <p>One Dot</p> <p>Two adjacent dot</p>
	Bright dot	2		
	Dark dot	4		
	Bright adjacent dots	1	1	
	Dark adjacent dots	2	2	
	Adjacent dots with a bright dot and a dark dot	1	1	
Foreign material in dot shape	SPEC (unit: mm)		Acceptable	 <p>$D = (L + W) / 2$</p>
	$D \leq 0.3$		Ignored	
	$0.3 < D \leq 0.5$, distance > 5		$n \leq 5$	
	$D > 0.5$		0	
Inspection item	Inspection standard		Description	
Foreign material in line shape	SPEC (unit: mm)		Acceptable	 <p>L : Long W : Width</p>
	$W \leq 0.05$ and $L \leq 7$		Ignored	
	$0.05 < W \leq 0.1$, $L \leq 7$, distance > 5		$n \leq 5$	
	$W > 0.1$ or $L > 7$		0	
Contamination	It is acceptable if the dirt can be wiped.			
Inspection item	Inspection standard		Description	
Scratch	SPEC (unit: mm)		Acceptable	
	$W \leq 0.05$ and $L \leq 7$		Ignored	
	$0.05 < W \leq 0.08$, $L \leq 7$, distance > 5		$n \leq 5$	
	$0.08 < W \leq 0.1$, $L \leq 7$, distance > 5		$n \leq 3$	
	$W > 0.1$ or $L > 7$		0	
Bubble	SPEC (unit: mm)		Acceptable	 <p>$D = (L + W) / 2$</p>
	$D \leq 0.2$		Ignored	
	Non visible area		Ignored	
	$0.2 < D \leq 0.3$, distance > 5		$n \leq 5$	
	$D > 0.3$		0	
Insufficient glue	SPEC (unit: mm)		Acceptable	
	Non visible area		Ignored	
	Visible area		0	

Cover & Sensor Crack	Prohibited		
Sensor angle missing & edge break	SPEC (unit: mm)	Acceptable	
	Damage circuit or effect function	0	
Cover/Sensor angle missing	SPEC (unit: mm)	Acceptable	
	$X \leq 3.0, Y \leq 3.0, Z \leq T$	Ignored	
	$X > 3.0, Y > 3.0, Z > T$	0	
Cover/Sensor edge break	SPEC (unit: mm)	Acceptable	
	$X \leq 3.0, Y \leq 3.0, Z \leq T$	Ignored	
	$X > 3.0, Y > 3.0, Z > T$	0	
Inspection item	SPEC		Description
Ink	SPEC (unit: mm)	Acceptable	
	word unclear, inverted, mistake, break line	0	
Bubble under protection film	SPEC (unit: mm)	Acceptable	
	NA		
Function	Prohibited		

11.4 Sampling Condition

Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.

Lot size: Quantity of shipment lot per model.

Sampling type: normal inspection, single sampling

Sampling table: ISO2859

Inspection level: Level II

Class of defects	Definition		
	Major	AQL 0.65	It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
	Minor	AQL 1.5	It is a defect that will not result in functioning problem with deviation classified.

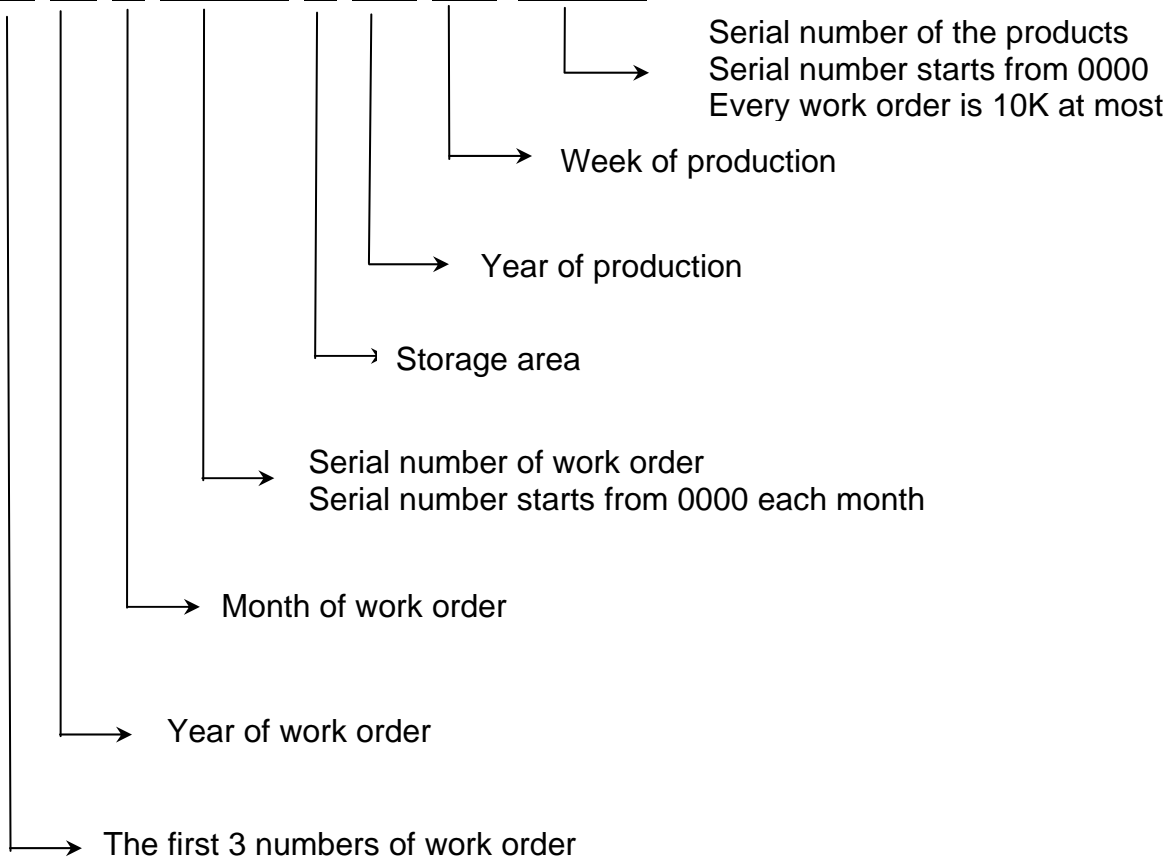
12. CTP PRODUCT LABEL DEFINE

Product Label style:

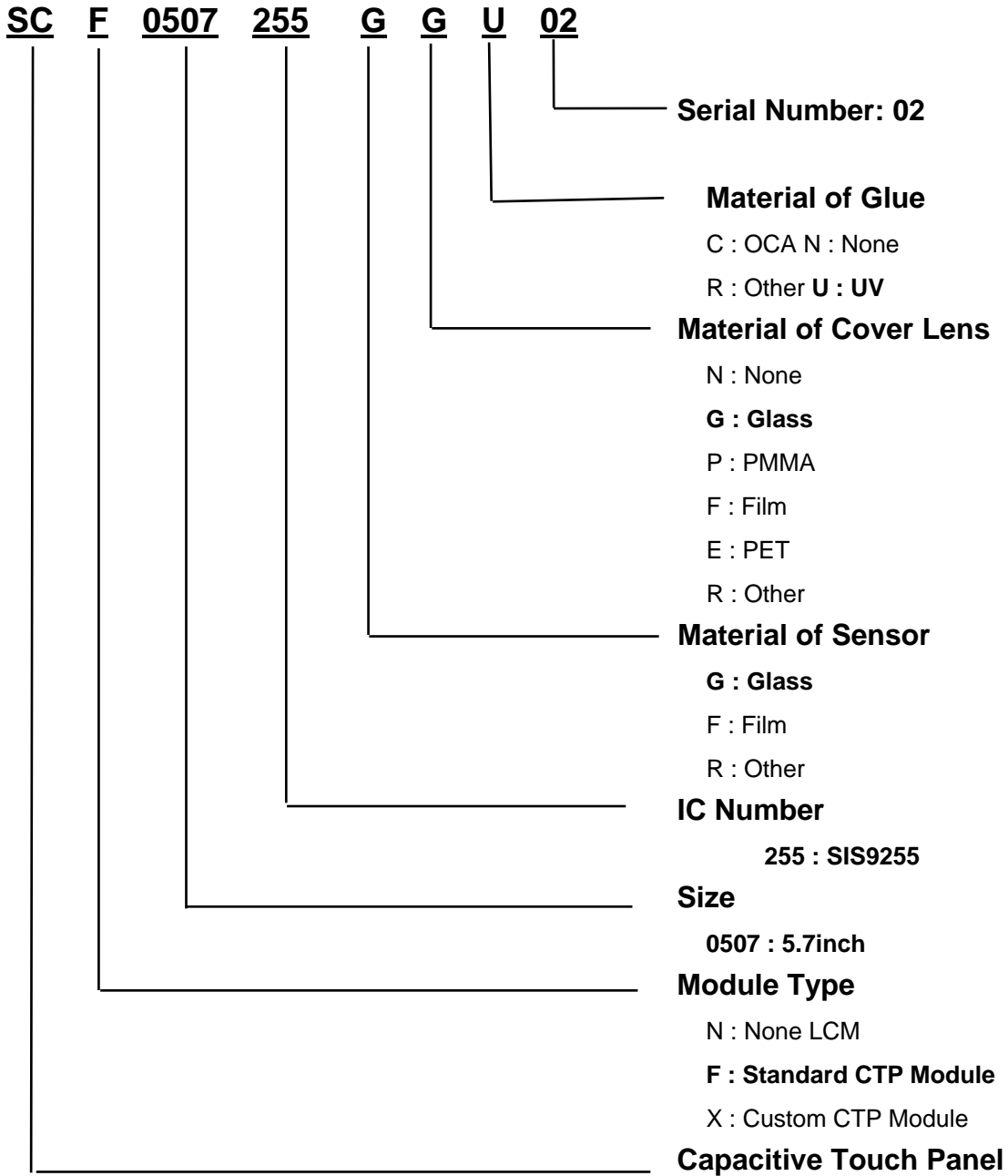


BarCode Define:

A A 6 0014 2 10 26-0013



Product Name Define:



13. PRECAUTION FOR USING LCM

1. ASSEMBLY PRECAUTIONS

- (1) You must mount a module using holes 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) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
- (4) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- (5) Do not open the case because inside circuits do not have sufficient strength.
- (6) Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.
- (7) Please do not touch metal frames with bare hands and soiled gloves. A color change of the metal frames can happen during a long preservation of soiled LCD modules.
- (8) Please pay attention to handling lead wire of backlight so that it is not tugged in connecting with inverter.

2. OPERATING PRECAUTIONS

- (1) Please be sure to turn off the power supply before connecting and disconnecting signal input cable.
- (2) Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification
- (3) 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.
- (4) When fixed patterns are displayed for a long time, remnant image is likely to occur.
- (5) 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.
- (6) Please consider that LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.

3. ELECTROSTATIC DISCHARGE CONTROL

- (1) The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such the copper leads on the PCB and the interface terminals with any

parts of the human body.

- (2) The modules should be kept in antistatic bags or other containers resistant to static for storage.
- (3) Only properly grounded soldering irons should be used.
- (4) If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.
- (5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended
- (6) Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

4. STORAGE PRECAUTIONS

- (1) When you store LCDs for a long time, it is recommended to keep the temperature between 0°C-40°C without the exposure of sunlight and to keep the humidity less than 90%RH.
- (2) Please do not leave the LCDs in the environment of high humidity and high temperature such as 60°C 90%RH
- (3) Please do not leave the LCDs in the environment of low temperature; below -20°C.

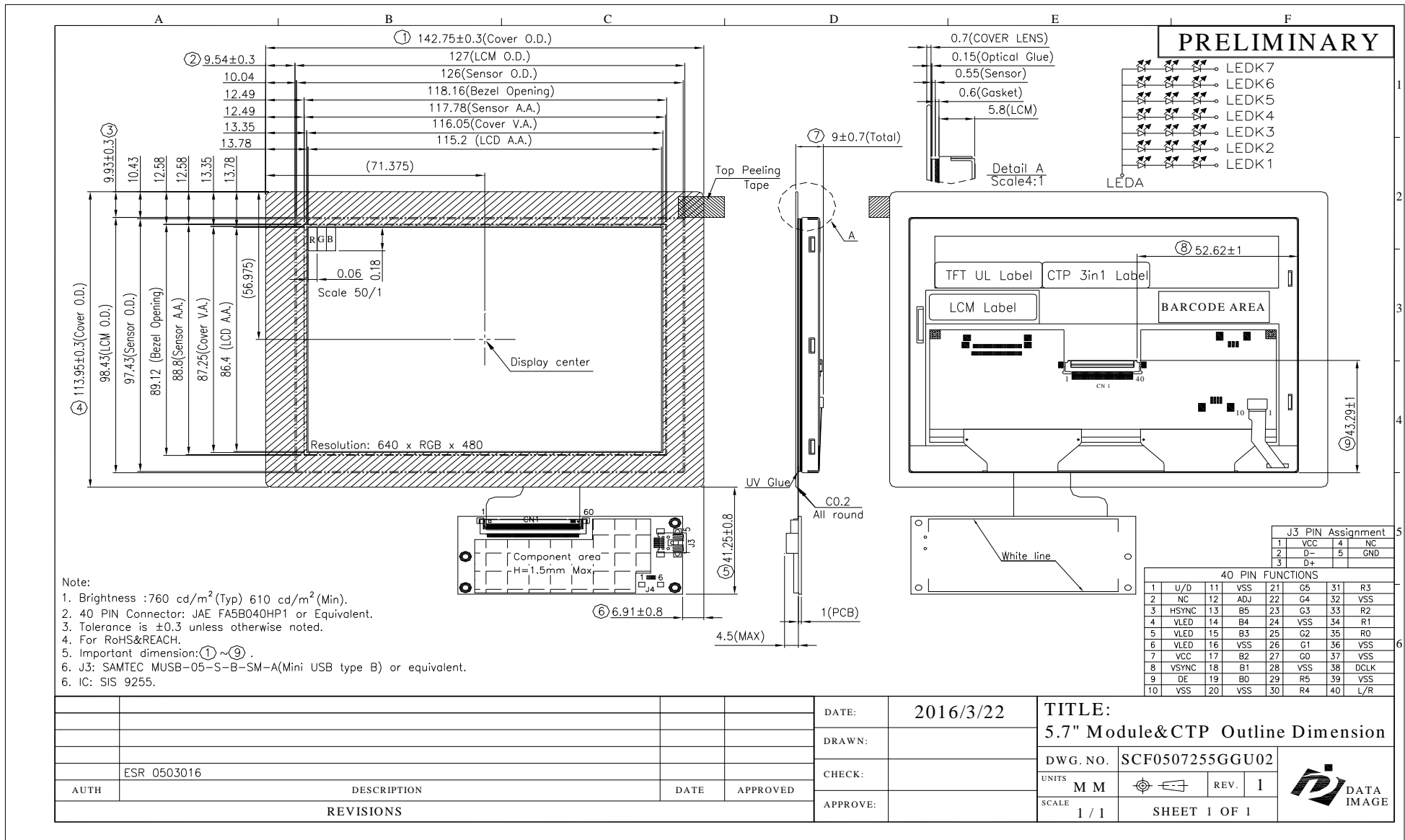
5. OTHERS

- (1) A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight and strong UV rays
- (2) Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.
- (3) For the packaging box, please pay attention to the followings:
 - (1) Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
 - (2) Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
 - (3) Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

6. LIMITED WARRANTY

Unless otherwise agreed between DATA IMAGE and customer, DATA IMAGE will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DATA IMAGE acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of DATA IMAGE is limited to repair and/or replacement on the terms set forth above. DATA IMAGE will not responsible for any subsequent or consequential events.

14. OUTLINE DRAWING



15. PACKAGE INFORMATION

TBD