TFT-Display Datasheet

FG080450USWMG01| DataImage

Features

Active Screen Area	170.4x127.8 [mm]
Size | Format	8,4“ | 4:3
Resolution	800x600
Backlight	LED
Brightness	600 cd/m^2
LED Life Time	50K (h)
Interface	LVDS
Viewing Angle	L/R 80/80 - U/D 80/80
Touchscreen	no
Power Supply	3.3V [Typ.]
Module Outline	203.0x142.5x8.0 [mm]
Operation Temperature	-20… + 70°C
Storage Temperature	-30… + 85°C

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DATA IMAGE CORPORATION

TFT Module Specification

Preliminary

ITEM NO.: FG080450DUSWMG01

Table of Contents

1. COVER & CONTENTS ····· 1
2. RECORD OF REVISION ····· 2
3. GENERAL SPECIFICATIONS ····· 3
4. ABSOLUTE MAXIMUM RATINGS ····· 3
5. ELECTRICAL CHARACTERISTICS ····· 3
6. TIMING CHARACTERISTICS ····· 6
7. OPTICAL CHARACTERISTIC ····· 9
8. PIN CONNECTIONS ····· 12
9. BLOCK DIAGRAM ····· 14
10. QUALITY ASSURANCE ····· 15
11. LCM PRODUCT LABEL DEFINE ····· 19
12. PRECAUTIONS IN USE LCM ····· 21
13. OUTLINE DRAWING ····· 22
14. PACKAGE INFORMATION····· 23

Customer Companies	QA Approval	QA Check	R&D Approval	R&D Check
	pretty	wendy	Gomer	Terry
Customer Approved by	Version:	Issued Date:	Total Pages:	Prepared by
	1	18/OCT/16'		23

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment	Source
1	18/OCT/16''			Initial Preliminary	ESR0509025

3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	8.4 (diagonal)	inch
Display Format	800(H) x (R,G,B) x 600(V)	dot
Active Area	170.4(H) x 127.8 (V)	mm
Pixel Pitch	0.213 (H) x 0.213 (V)	mm
Pixel Configuration	R.G.B.-Stripe	
Outline Dimension	203(W) x 142.5(H) x 8(Max.)(D)	mm
Surface treatment	O-Film Anti-glare, Hardness 3H, Haze 40%	
Back-light	LED Side-light type.	
Support Color	262K(6-bit) / 16.2M(8-bit)	
Weight	250	g
View Angle direction	All	
Our components and processes are compliant to RoHS and REACH standard		

4. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	+3.6	V	
Operating Temperature	TOP	-20	70	°C	
Storage Temperature	TST	-30	85	°C	

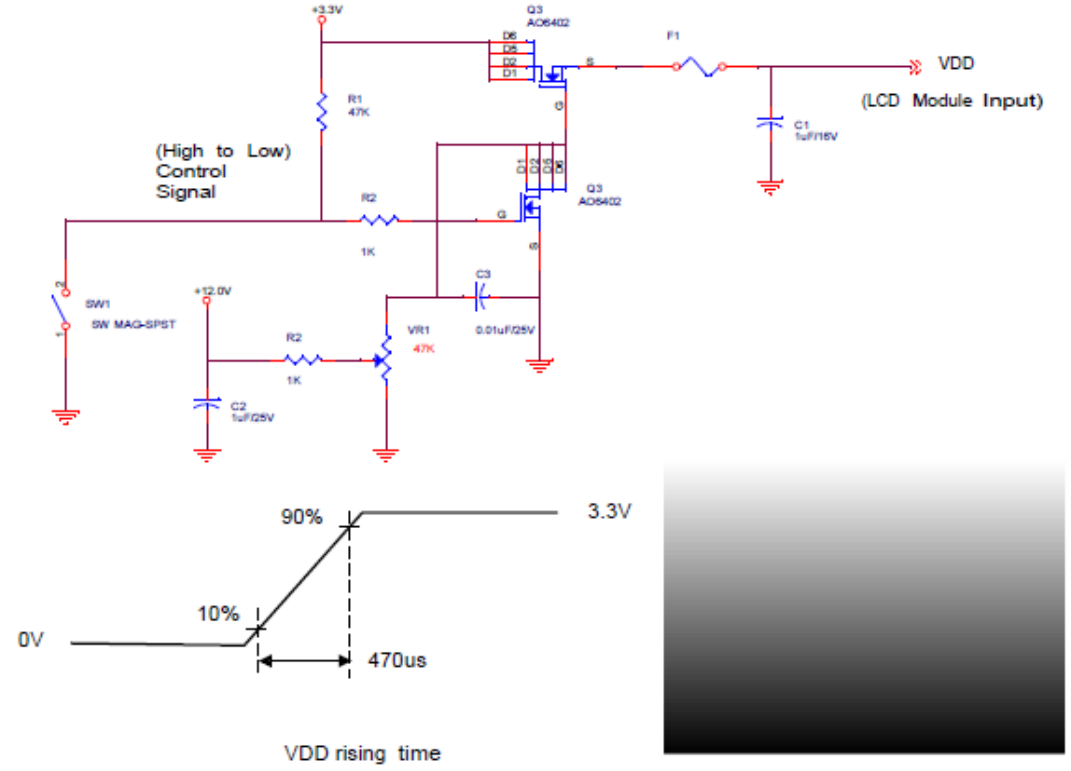
5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25℃

Symbol	Parameter	Min	Typ	Max	Unit	Remark
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	V	±10%
I_{VDD}	VDD Current	-	270	330	mA	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
P_{VDD}	VDD Power	-	0.9	1.2	W	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)

Note 1: Measurement condition:

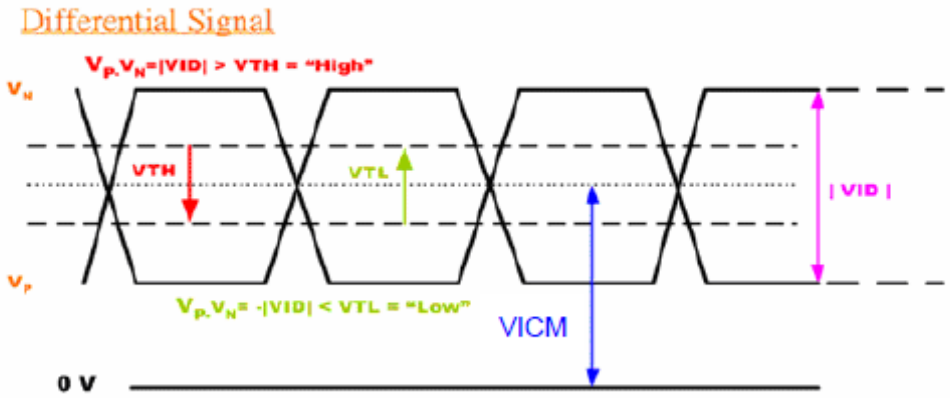


5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VTH	Differential Input High Threshold	-	-	100	mV	VICM=1.2V
VTL	Differential Input Low Threshold	-100			mV	VICM=1.2V
| VID |	Input Differential Voltage	100	400	600	mV	
VICM	VICM Differential Input Common Mode Voltage	1.1		1.6	V	VTH/VTL=±100mV

Note: LVDS Signal Waveform.



5.2 BACKLIGHT UNITS

Ta=25℃

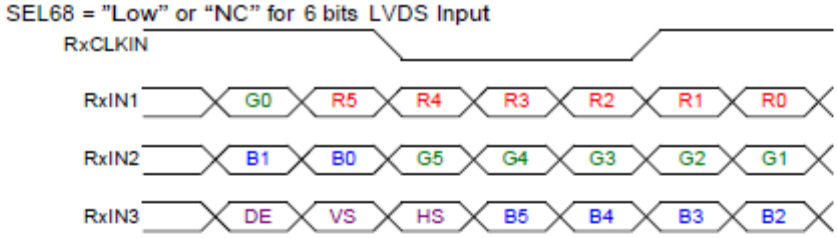
Symbol	Parameter	Min	Typ	Max	Units	Remark
VCC	Input Voltage	10.8	12.0	12.6	V	
I_{VCC}	Input Current	-	0.33	-	A	100% PWM Duty
P_{VCC}	Power Consumption	-	3.96	-	W	100% PWM Duty
F_{PWM}	Dimming Frequency	200	-	12K	Hz	
	Dimming Voltage	3.3	5		V	
	Dimming Duty Cycle	5	-	100	%	
I_F	LED Forward Current	-	200		mA	Ta = 25oC
V_F	LED Forward Voltage		18			I = 200mA, Ta = 85℃
P_{LED}	LED Power Consumption		3.6		W	IF = 200mA, Ta = 25℃ (total power)
Operation Lifetime		50,000		-	Hrs	IF = 200mA, Ta = 25℃

Note 1: Ta means ambient temperature of TFT-LCD module.
Note 2: VCC, Ivcc, P_{VCC}, are defined for LED B/L.(100% duty of PWM dimming)
Note 3: I_F, V_F are defined for LED Light Bar.
Note 4: If module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.
Note 5: Operating life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.

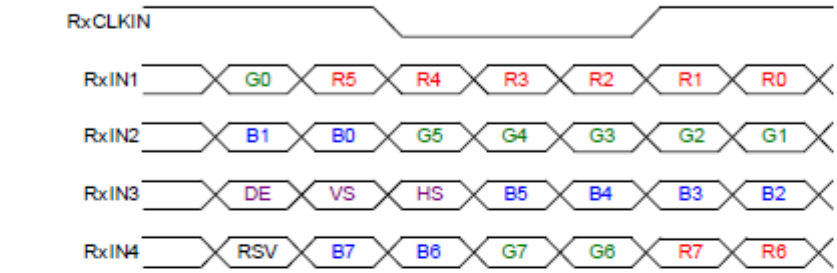
6.TIMING CHARACTERISTICS

6.1 The Input Data Format

SEL68 = "Low" or "NC" for 6 bits LVDS Input



SEL68 = "High" for 8 bits LVDS Input



Note1: Please follow PSWG.
Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Data 7 (MSB) GreenData 6 GreenData 5 GreenData 4 GreenData 3 GreenData 2 GreenData 1 GreenData 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
RxCLKIN+ RxCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

6.2 Interface Timing

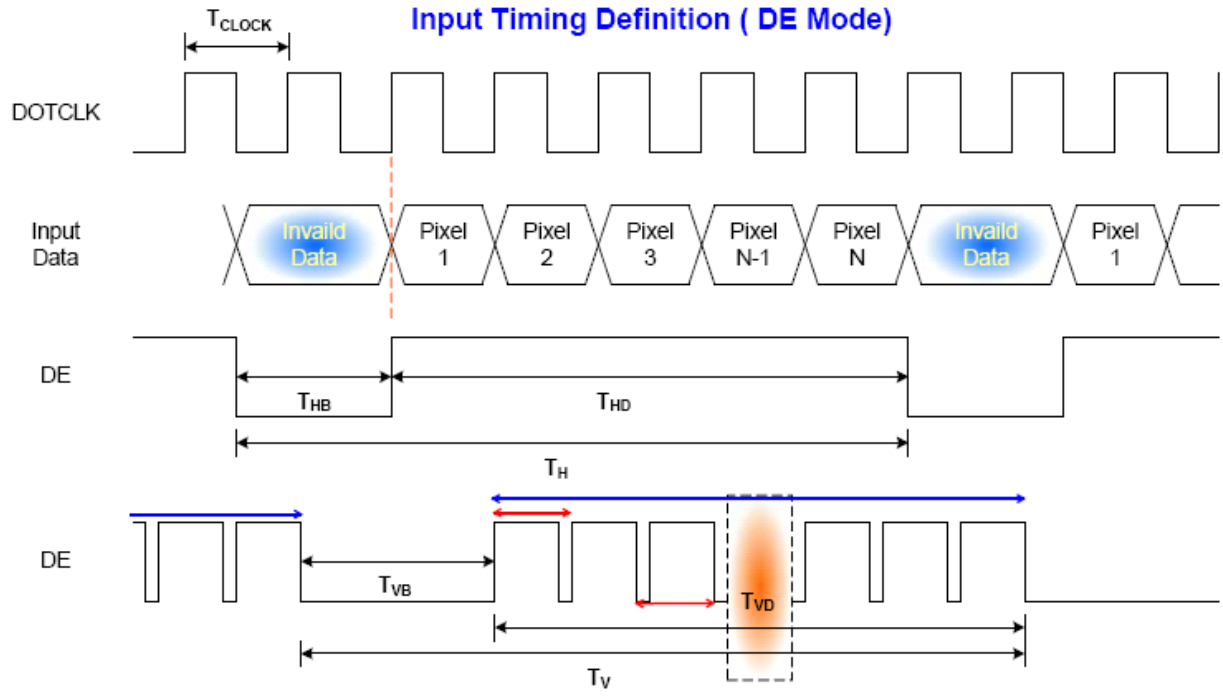
6.2.1 Timing Characteristics

DE mode only

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency		1/ T_{Clock}	33.6	39.8	48.3	MHz	
Vertical Section	Period	T_V	608	628	650	T_H	
	Active	T_{VD}	600	600	600		
	Blanking	T_{VB}	8	28	50		
Horizontal Section	Period	T_H	920	1056	1240	T_{Clock}	
	Active	T_{HD}	800	800	800		
	Blanking	T_{HB}	120	256	440		

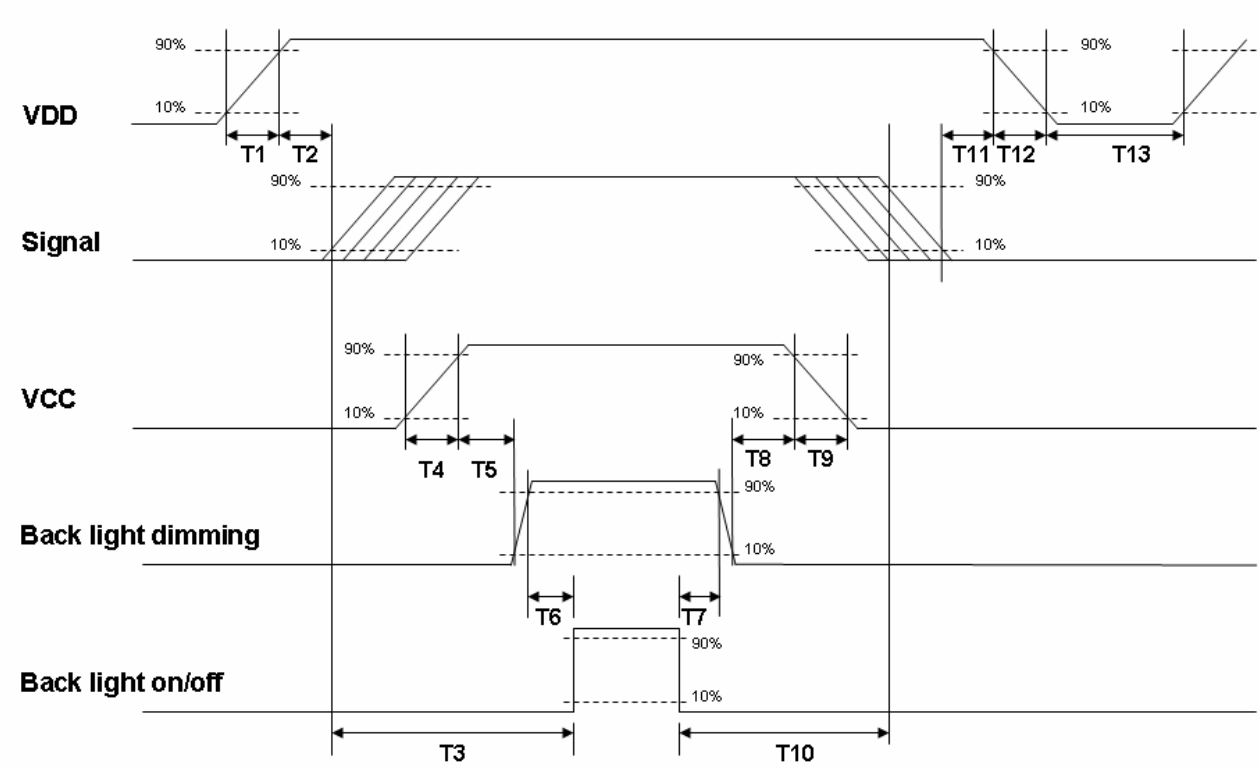
Note: Frame rate is 60 Hz.
Note: DE mode.

6.2.2 Input Timing Diagram



6.3 Power ON/OFF Sequence

VDD power and Backlight on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power ON/OFF sequence timing

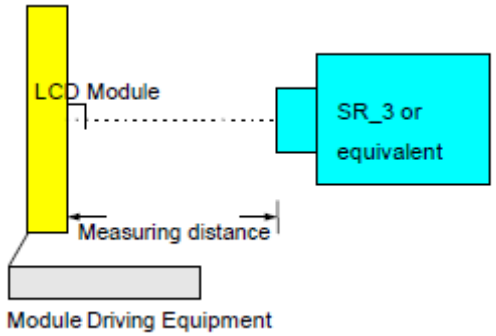
Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	--	10	[ms]
T2	30	40	50	[ms]
T3	200	--	--	[ms]
T4	0.5	--	10	[ms]
T5	10	--	--	[ms]
T6	10	--	--	[ms]
T7	0	--	--	[ms]
T8	10	--	--	[ms]
T9	--	--	10	[ms]
T10	110	--	--	[ms]
T11	0	16	50	[ms]
T12	--	--	10	[ms]
T13	1000	--	--	[ms]

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

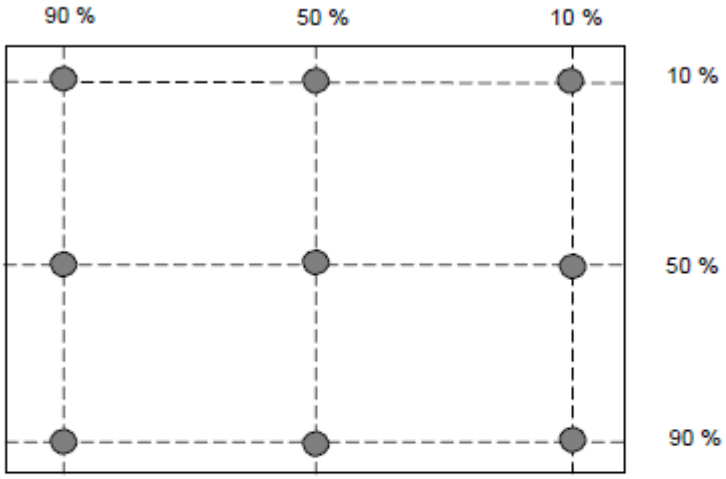
7. OPTICAL CHARACTERISTIC

Item	Unit	Condition	MIN.	TYP.	MAX.	Note
White Luminance	[cd/m2]	IF= 200mA (center point)	480	600	--	1
Uniformity	%	9 Points	70	75	--	1,2,3
Contrast Ratio			400	600	--	4
Response Time	[msec]	Rising	-	20	30	5
	[msec]	Falling		10	20	
	[msec]	Raising + Falling		30	50	
Viewing Angle	[degree]	Horizontal (Right) CR ≧ 10 (Left)	70 70	80 80	- -	6
		Vertical (Upper) CR ≧ 10 (Lower	65 50	80 80	- -	
Color / Chromaticity Coordinates (CIE1931)		Red x	0.559	0.609	0.659	1
		Red y	0.283-	0.333	0.383	
		Green x	0.315	0.365	0.415	
		Green y	0.520	0.570	0.620	
		Blue x	0.101	0.151	0.201	
		Blue y	0.056	0.106	0.156	
		White x	0.26	0.31	0.36	
		White y	0.28	0.33	0.38	
Color Gamut	%			45	-	1

Note 1: Measurement method
Equipment : Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (SR_3 or equivalent)
Aperture 1° with 50cm viewing distance
Test Point Center
Environment < 1 lux



Note 2: Definition of 9 points position (Display active area : 170.4(H) x 127.8(V))



Note 3: The luminance uniformity of 9 points is defined by dividing the minimum luminance value by the maximum test point luminance

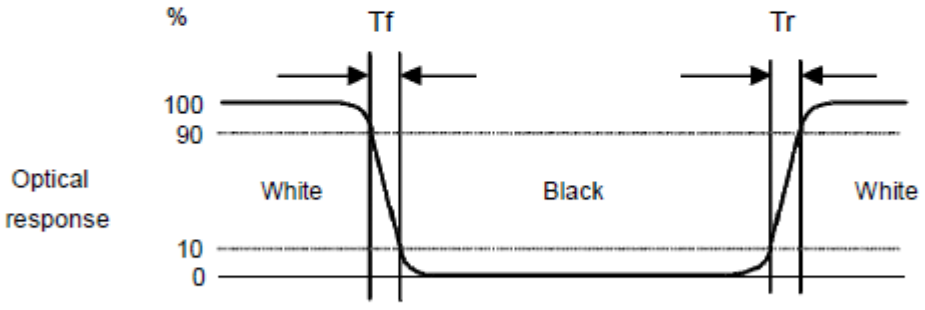
$$\delta_{W9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

Note 4 : Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

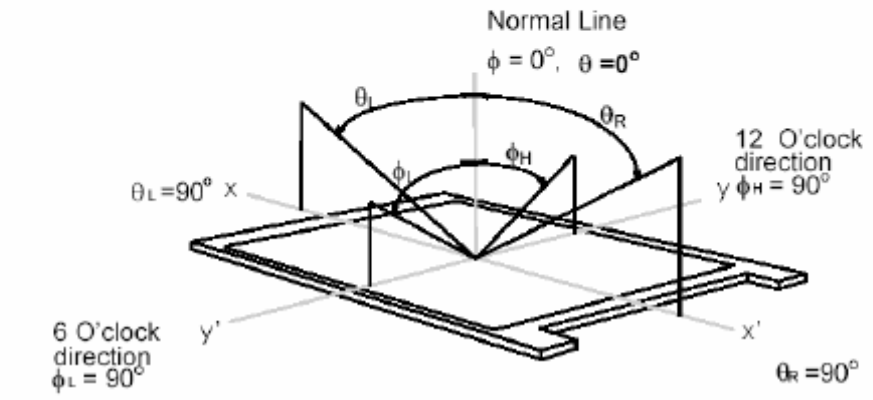
Note 5: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "White" to "Black" (falling time) and from "Black" to "White" (rising time), respectively. The response time interval is between 10% and 90% of amplitudes. Please refer to the figure as below.



Note 6: Definition of viewing angle

Viewing angle is the measurement of contrast ratio ≥10, at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (è) horizontal left and right, and 90° (Ō) vertical high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated to its center to develop the desired measurement viewing angle.



8. PIN CONNECTIONS

8.1 LCM PANEL DRIVING SECTION

LVDS is a differential signal technology for LCD interface and high speed data transfer device. The connector pin definition is as below.

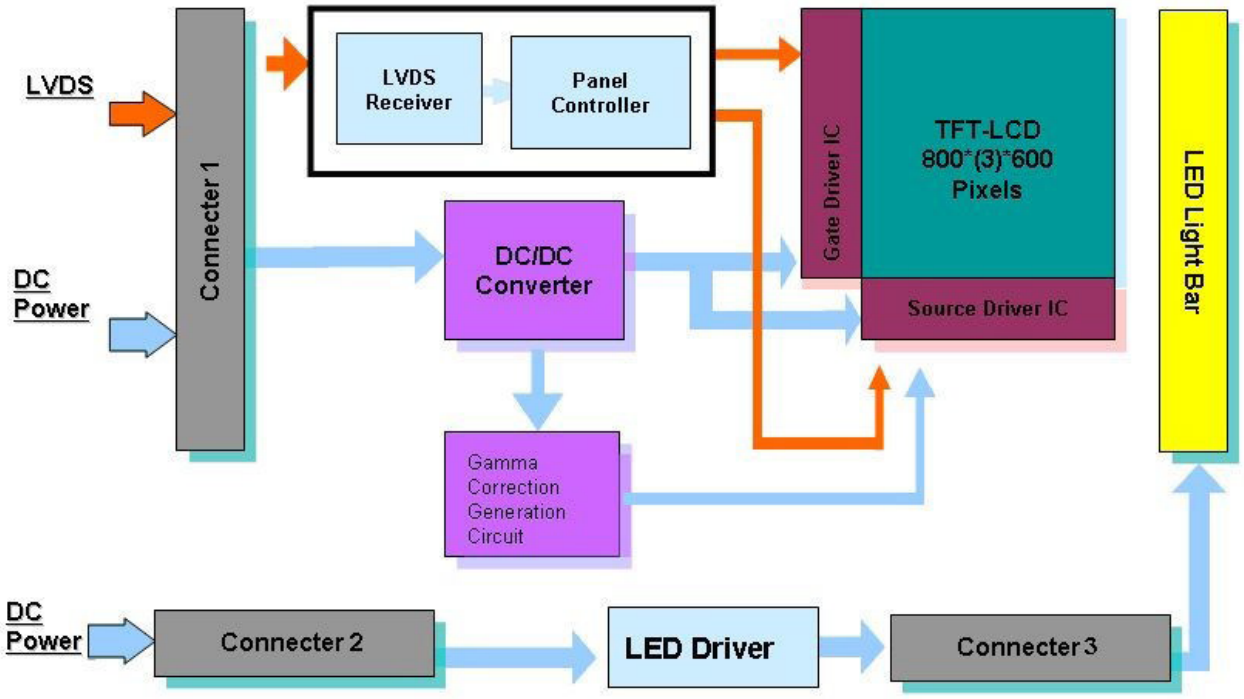
Pin No	Symbol	Description
1	VDD	Power Supply For Digital Circuit
2	VDD	Power Supply For Digital Circuit
3	UD	Vertical Reverse Scan Control, When UD=Low or NC → Normal Mode. When UD=High → Vertical Reverse Scan. Note
4	LR	Horizontal Reverse Scan Control, When LR=Low or NC → Normal Mode. When LR=High → Horizontal Reverse Scan. Note
5	RxIN1-	LVDS differential data input Pair 0
6	RxIN1+	
7	GND	Ground
8	RxIN2-	LVDS differential data input Pair 1
9	RxIN2+	
10	GND	Ground
11	RxIN3-	LVDS differential data input Pair 2
12	RxIN3+	
13	GND	Ground
14	CLKIN-	LVDS differential Clock input Pair
15	CLKIN+	
16	GND	Ground
17	SEL 68	LVDS 6/8 bit select function control, Low or NC → 6 Bit Input Mode. High → 8 Bit Input Mode. Note
18	NC	NC
19	RxIN4-	LVDS differential data input Pair 3. Must be set to NC in 6 bit input mode.
20	RxIN4+	

Note : “Low” stands for 0V. “High” stands for 3.3V. “NC” stands for “No Connected.”

8.2 BACKLIGHT DRIVING SECTION

Pin No	SIGNAL	Pin Description
1	VCC	12V input
2	VCC	12V input
3	VCC	12V input
4	GND	GND
5	Dimming	PWM
6	GND	GND
7	Display_ON/OFF	+5.0V:ON, 0V:OFF

9. BLOCK DIAGRAM



10. QUALITY ASSURANCE

10.1 Test Condition

10.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C
Humidity : 65 ± 5%

10.1.2 Operation

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

10.1.3 Container

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

10.1.4 Test Frequency

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

10.1.5 Test Method

No.	Reliability Test Item & Level	Test Level	Remark
1	High Temperature Storage Test	T=85°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=40°C,90% RH,240hrs	IEC68-2-3
6	Thermal Cycling Test (No operation)	-20°C → +25°C → +70°C, 100Cycles 30 min 5min 30 min	IEC68-2-14
7.	Vibration Test	Frequency:10~55HZ Amplitude:1.5mm Sweep time:11min Test period:6Cycles for each direction of X,Y,Z	IEC68-2-6
8	Shock Test	100G, 6ms Direction：± X,± Y,± Z Cycle：3 times	IEC68-2-27
9	Drop Test	Height:60cm 1 conner,3edges,6surfaces	IEC68-2-32
10.	ESD test	State: operating Standard: IEC 61000-4-2 Location: LCM/TP surface Condition:150pf 330Ω Contact +/- 8kV Air +/-15kV Criteria: Class C	IEC61000-4-2

10.2 Inspection condition

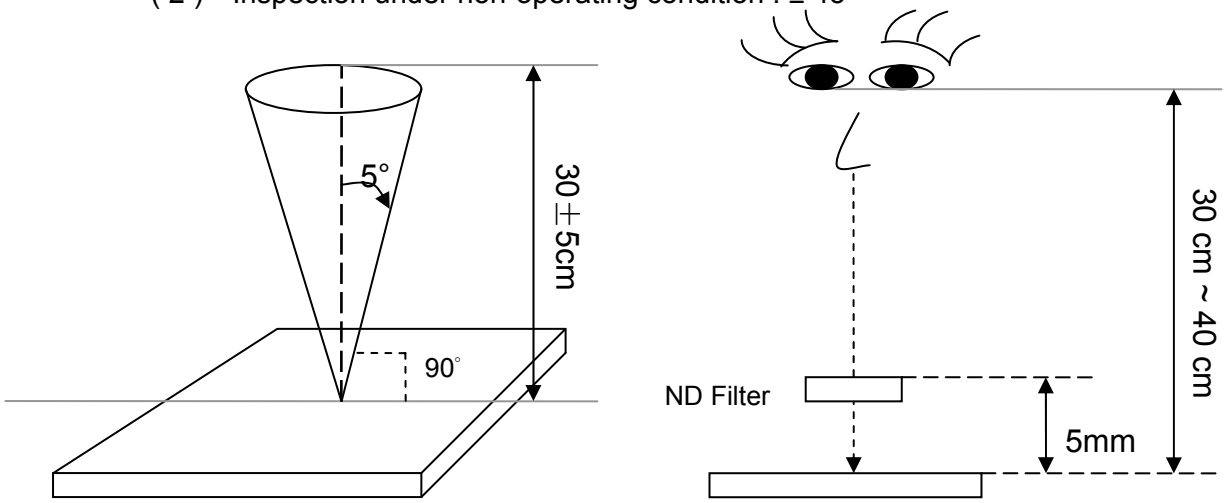
10.2.1 Inspection conditions

10.2.1.1 Inspection Distance: 35 ± 5 cm

10.2.1.2 View Angle:

(1) Inspection under operating condition : ±5°

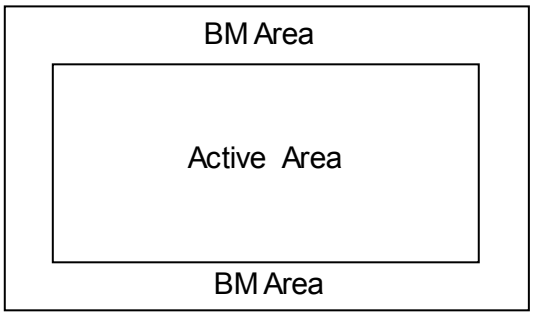
(2) Inspection under non-operating condition : ± 45°



10.2.1.3Environment conditions:

Ambient Temperature :		25±5℃
Ambient Humidity :		65±5%
Ambient Illumination	Cosmetic Inspection	More than 600lux
	Functional Inspection	300 ~ 800lux

10.2.2 Definition of applicable Zones



10.3 Inspection Parameters

<table>
<tr><th>No.</th><th>Parameter</th><th>Criteria</th></tr>
<tr><td rowspan="6">1</td><td rowspan="6">Operating</td><td>Display function: No Display malfunction (Major)</td></tr>
<tr><td>Contrast ratio (Black, White):
Does not meet specified range in the spec. (Major) (Note:3)</td></tr>
<tr><td>Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and colored. (Major) (Note:1)</td></tr>
<tr><td>Point Defect (Red, green, blue, dark): Active area ≤8dots (Minor)(Note:1)
<table>
<tr><th>Item</th><th>Acceptable number</th><th>Total</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>Bright</td><td>4</td><td rowspan="2">8</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>Dark</td><td>4</td></tr>
<tr><td>Adjacent Bright</td><td>1</td><td>1</td></tr>
<tr><td>Adjacent Dark</td><td>1</td><td>1</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Non-uniformity:
Visible through 2%ND filter white, R, G, B and gray 50%pattern. (Minor)</td></tr>
<tr><td>Foreign material in Black or White spots shape (W>1/4L) (Note: 5)
<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>D ≤ 0.3</td><td>*</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>0.3 < D ≤0.5</td><td>4</td></tr>
<tr><td>D> 0.5</td><td>0</td></tr>
</table>
D = (Long + Short) / 2 ＊ : Disregard</td></tr>
<tr><td>Foreign Material in Line or spiral shape (W≤1/4L) (Note: 4)
<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>W>0.1mm,L>5mm</td><td>0</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>L≦5mm,0.07mm<W≦0.1mm</td><td>4</td></tr>
<tr><td>L≦5mm,W<0.07mm</td><td>*</td></tr>
</table>
L : Length W : Width ＊ : Disregard</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">External Inspection (non-operating)</td><td>Dimension: Outline (Major)</td></tr>
<tr><td>Bezel appearance: uneven (Minor)</td></tr>
<tr><td>Scratch on the Polarize : (Note:2)
<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>W>0.1mm,L>5mm</td><td>0</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>L≦5mm,0.07mm<W≦0.1mm</td><td>4</td></tr>
<tr><td>L≦5mm,W<0.07mm</td><td>*</td></tr>
</table>
L : Length W : Width ＊ : Disregard</td></tr>
<tr><td>Dent and spots shape on the polarize (Note:2): (Note: 5)
<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>D ≤ 0.3</td><td>*</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>0.3 < D ≤0.5</td><td>4</td></tr>
<tr><td>D> 0.5</td><td>0</td></tr>
</table>
D = (Long + Short) / 2 ＊ : Disregard</td></tr>
</table>

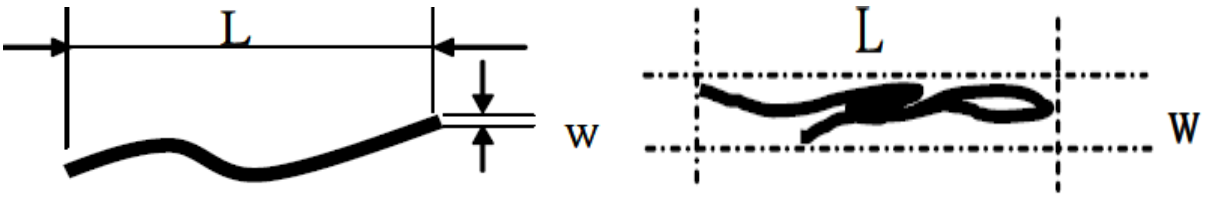
3	TP Newton Rings if LCM with TP		Dimension	Acceptable number	Class Of Defects	AQL Level
			The area of the Newton ring is more than 1/6 view area of the touch panel.	0	Minor	1.5
			The area of the Newton ring is less than 1/6 view area of the touch panel; and no character affected and line distorted after touch panel lightening.	Ignore		
Class of defects	**Major**	AQL 0.65	**Definition**			
			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.			

Note:1.(a)Bright point defect is defined as point defect of R,G,B with area >1/2 dot respectively
(b)Dark point defect is defined as visible in full white pattern.
(c)The point defect must under 2% ND Filter visible .

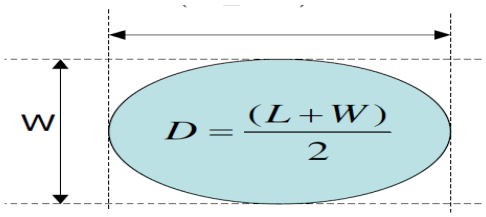
Note:2 The external inspection should be conducted at the distance 35± 5cm between the eyes of inspector and the panel .

Note:3 Luminance measurement for contrast ratio is at the distance 50± 5cm between the detective head and the panel with ambient luminance less than 1 lux. Contrast ratio is obtained at optimum view angle.

Note:4 W-Width in mm , L-length of Max.(L1,L2) in mm.



Note:5 Spot Foreign Material (W≧L/4)

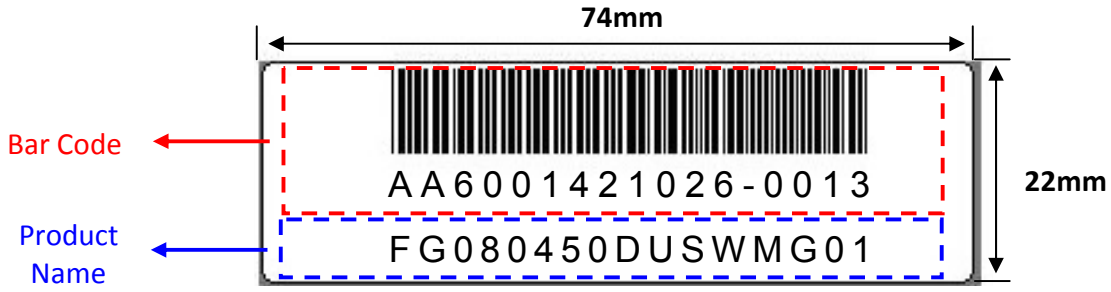


10.4 Sampling Condition

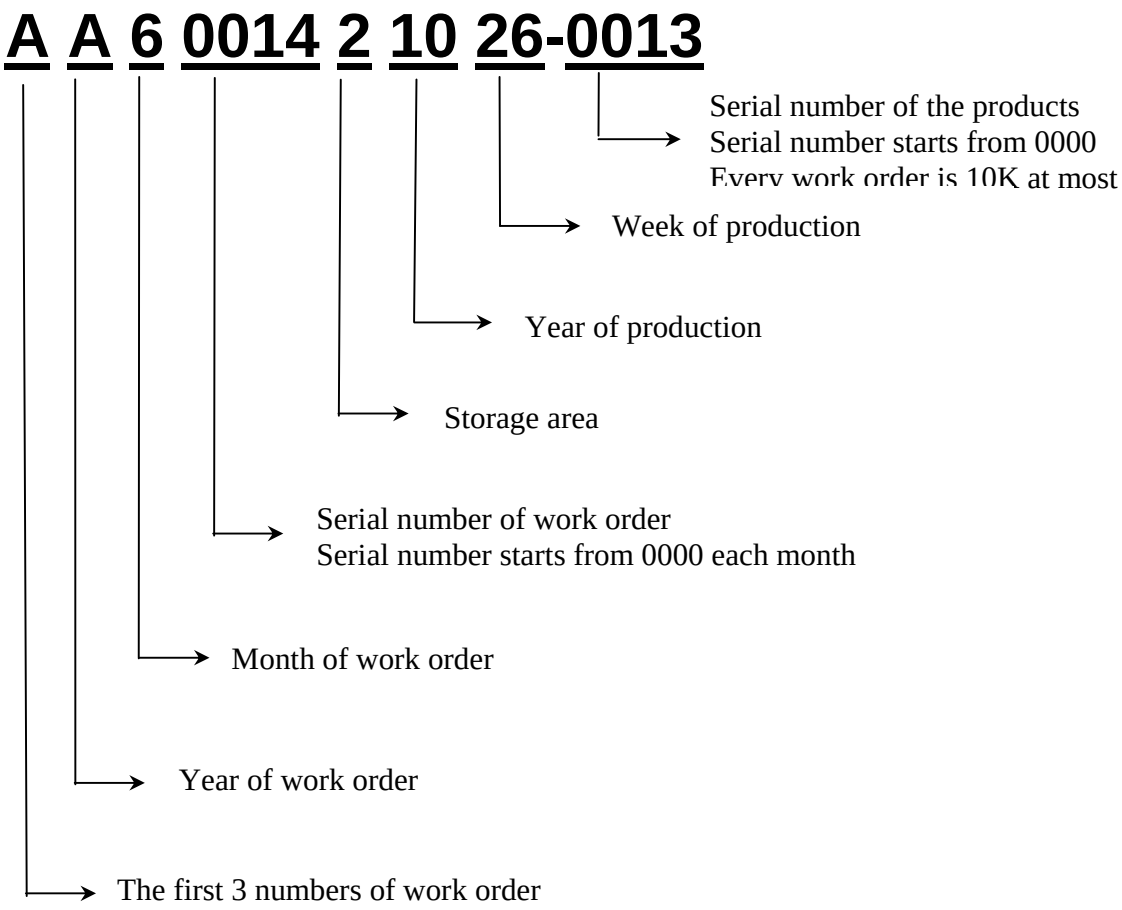
Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.
Lot size: Quantity of shipment lot per model.
Sampling type: normal inspection, single sampling
Sampling table: ISO2859
Inspection level: Level II

11. LCM PRODUCT LABEL DEFINE

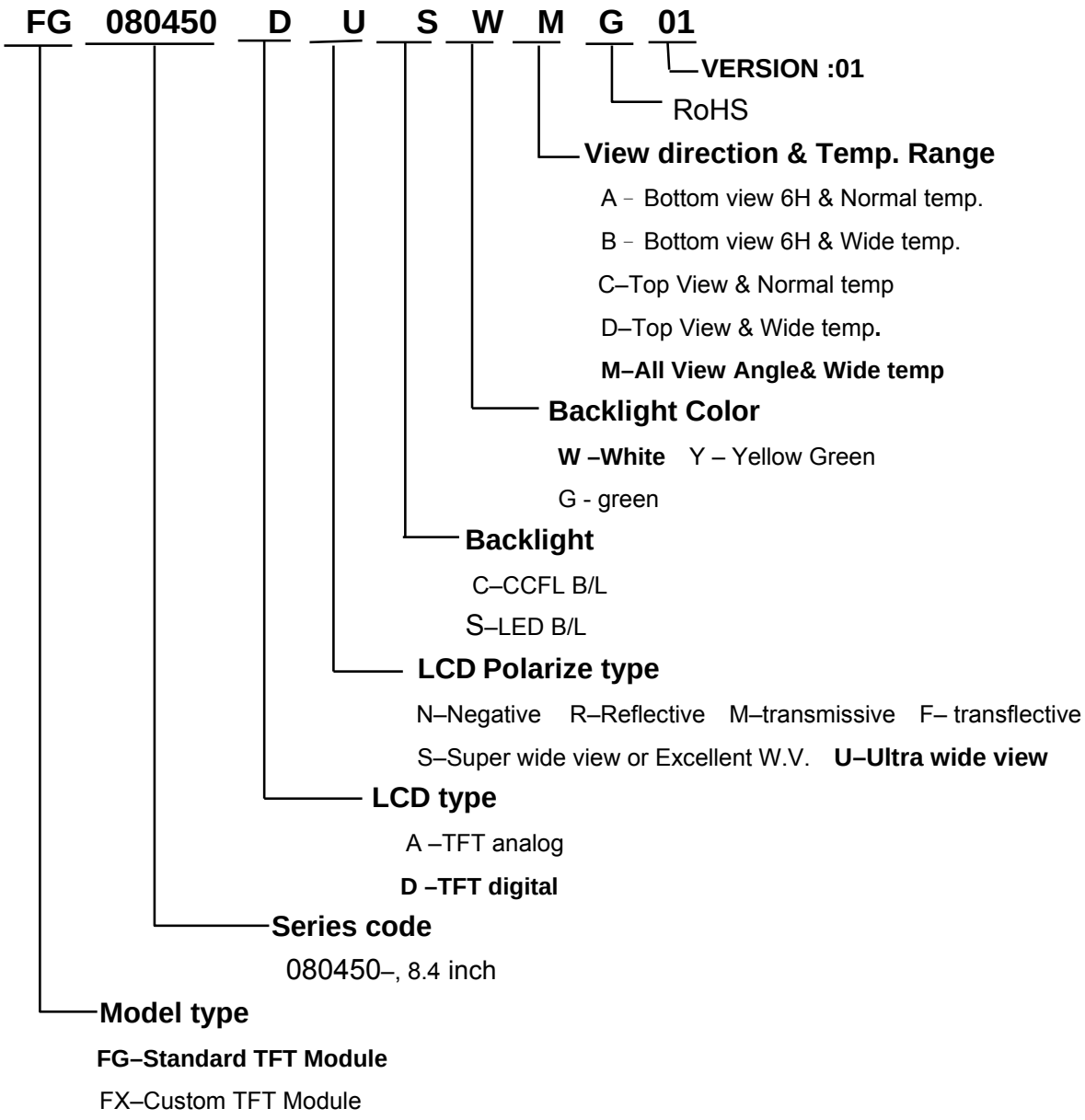
Product Label style:



BarCode Define:



Product Name Define:

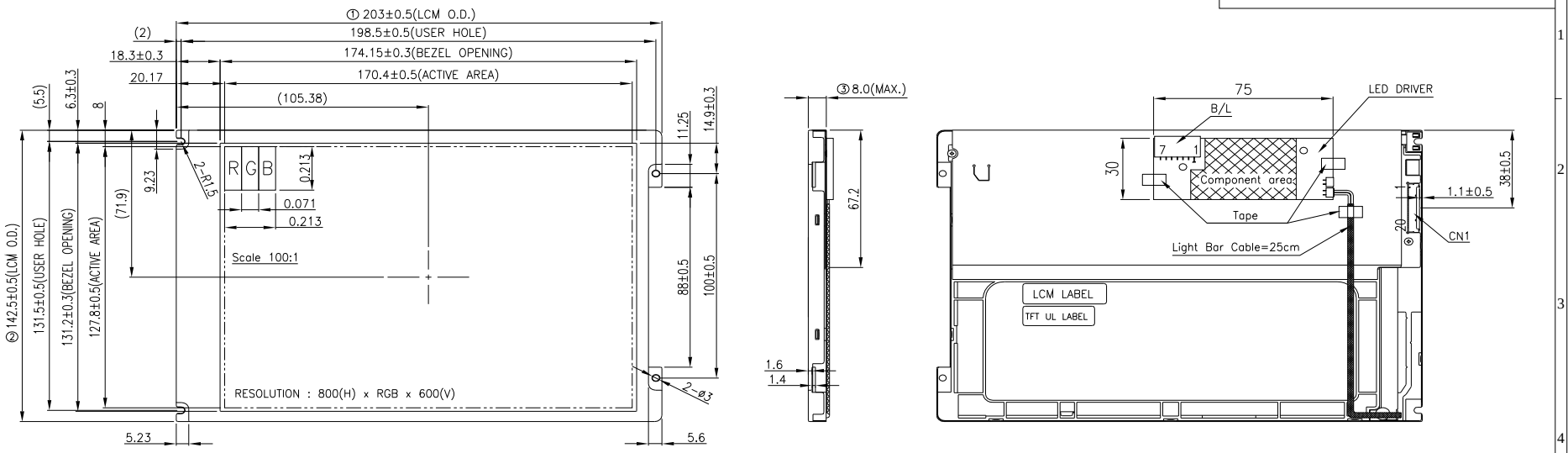


12. PRECAUTIONS IN USE LCM

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 Land 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:
      a. Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
      b. Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
      c. 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.)
   (4) Waste
      Liquid crystal module products shall not be arbitrarily discarded, the water and soil have a negative impact on the environment, the need to be handled by a qualified unit.
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.

13. OUTLINE DRAWING

PRELIMINARY



B/L PIN	
1	VCC
2	VCC
3	VCC
4	GND
5	Dimming
6	GND
7	Display_ON/OFF

CN1 PIN			
1	VDD	11	RxIN3−
2	VDD	12	RxIN3+
3	UD	13	GND
4	LR	14	RxCKIN−
5	RxIN1−	15	RxCKIN+
6	RxIN1+	16	GND
7	GND	17	SEL68
8	RxIN2−	18	NC
9	RxIN2+	19	RxIN4−
10	GND	20	RxIN4+

Note:
1. For RoHS & REACH.
2. Tolerance is ±0.5 unless otherwise noted.
3. Important dimension : ① ~ ③ .
4. CN1 connector : STM MSB24013P20HA, Hirose DF19LA−20P−1H or equivalent;
   Match connector : STM P24013P20, Hirose DF19−20S−1C or equivalent.
5. B/L connector : JST S7B−PH−SM4−TB.
6. Center luminance : 480cd/m²(Min.), 600cd/m²(Typ.).
7. Uniformity : 70%(Min.).

AUTH	DESCRIPTION	DATE	APPROVED
	ESR0509025		

REVISIONS

DATE:	2016/10/12
DRAWN:	
CHECK:	
APPROVE:	

TITLE: LCM Outline Dimension

DWG. NO.	FG080450UG01		
UNITS M M		REV.	1
SCALE 1 / 1	SHEET 1 OF 1		

DATA IMAGE

14. PACKAGE INFORMATION

TBD

Confidential Document

DATA IMAGE CORPORATION

TFT Module Specification

Preliminary

ITEM NO.: FG080450DUSWMG01

Table of Contents

1. COVER & CONTENTS ····· 1
2. RECORD OF REVISION ····· 2
3. GENERAL SPECIFICATIONS ····· 3
4. ABSOLUTE MAXIMUM RATINGS ····· 3
5. ELECTRICAL CHARACTERISTICS ····· 3
6. TIMING CHARACTERISTICS ····· 6
7. OPTICAL CHARACTERISTIC ····· 9
8. PIN CONNECTIONS ····· 12
9. BLOCK DIAGRAM ····· 14
10. QUALITY ASSURANCE ····· 15
11. LCM PRODUCT LABEL DEFINE ····· 19
12. PRECAUTIONS IN USE LCM ····· 21
13. OUTLINE DRAWING ····· 22
14. PACKAGE INFORMATION····· 23

Customer Companies	QA Approval	QA Check	R&D Approval	R&D Check
	pretty	wendy	Gomer	Terry
Customer Approved by	Version:	Issued Date:	Total Pages:	Prepared by
	1	18/OCT/16'		23

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment	Source
1	18/OCT/16''			Initial Preliminary	ESR0509025

3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	8.4 (diagonal)	inch
Display Format	800(H) x (R,G,B) x 600(V)	dot
Active Area	170.4(H) x 127.8 (V)	mm
Pixel Pitch	0.213 (H) x 0.213 (V)	mm
Pixel Configuration	R.G.B.-Stripe	
Outline Dimension	203(W) x 142.5(H) x 8(Max.)(D)	mm
Surface treatment	O-Film Anti-glare, Hardness 3H, Haze 40%	
Back-light	LED Side-light type.	
Support Color	262K(6-bit) / 16.2M(8-bit)	
Weight	250	g
View Angle direction	All	
Our components and processes are compliant to RoHS and REACH standard		

4. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	+3.6	V	
Operating Temperature	TOP	-20	70	°C	
Storage Temperature	TST	-30	85	°C	

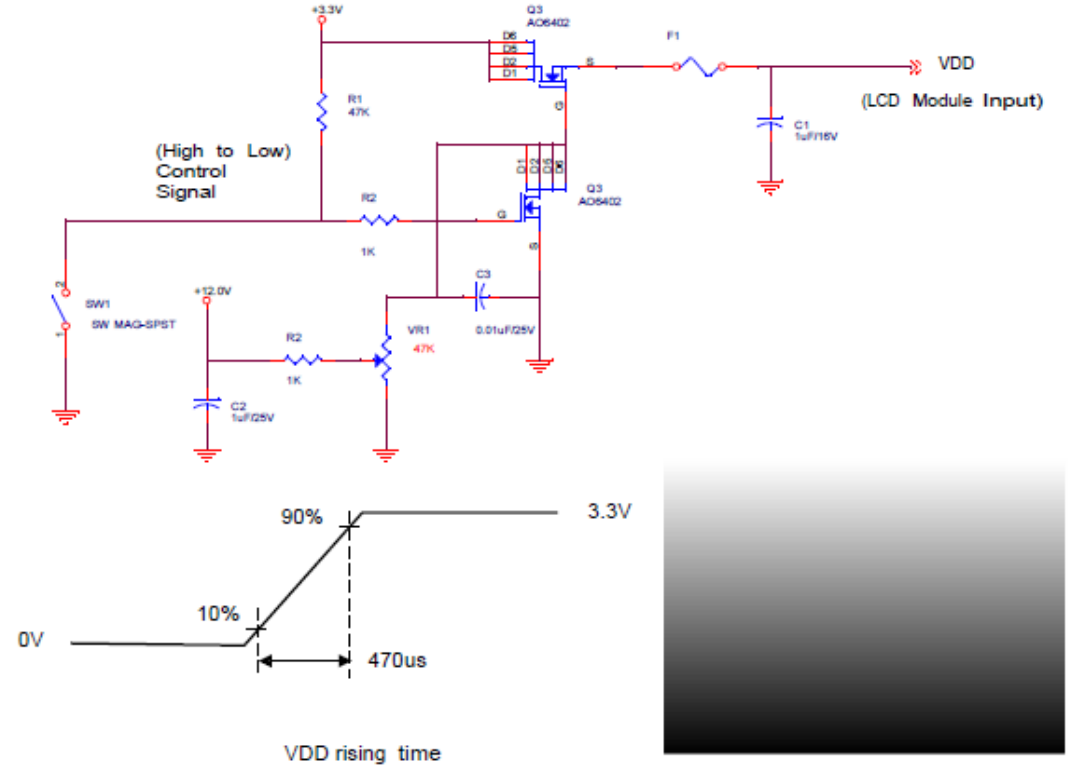
5. ELECTRICAL CHARACTERISTICS

5.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25℃

Symbol	Parameter	Min	Typ	Max	Unit	Remark
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	V	±10%
I_{VDD}	VDD Current	-	270	330	mA	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
P_{VDD}	VDD Power	-	0.9	1.2	W	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)

Note 1: Measurement condition:

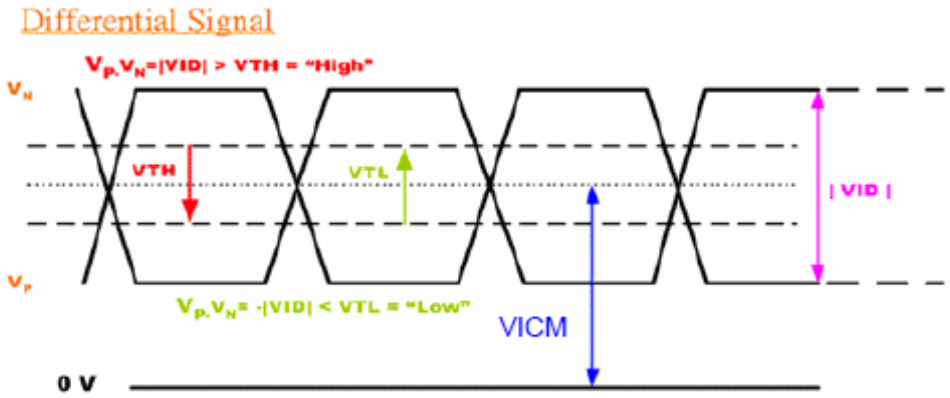


5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VTH	Differential Input High Threshold	-	-	100	mV	VICM=1.2V
VTL	Differential Input Low Threshold	-100			mV	VICM=1.2V
| VID |	Input Differential Voltage	100	400	600	mV	
VICM	VICM Differential Input Common Mode Voltage	1.1		1.6	V	VTH/VTL=±100mV

Note: LVDS Signal Waveform.



5.2 BACKLIGHT UNITS

Ta=25℃

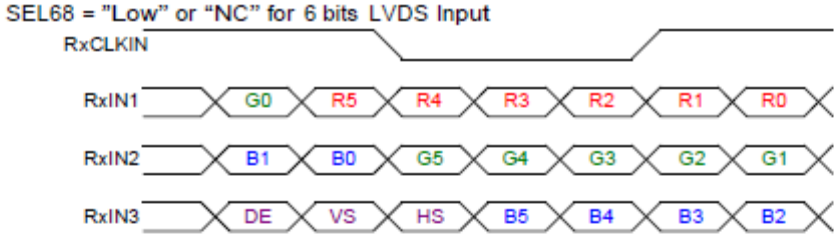
Symbol	Parameter	Min	Typ	Max	Units	Remark
VCC	Input Voltage	10.8	12.0	12.6	V	
I_{VCC}	Input Current	-	0.33	-	A	100% PWM Duty
P_{VCC}	Power Consumption	-	3.96	-	W	100% PWM Duty
F_{PWM}	Dimming Frequency	200	-	12K	Hz	
	Dimming Voltage	3.3	5		V	
	Dimming Duty Cycle	5	-	100	%	
I_F	LED Forward Current	-	200		mA	Ta = 25oC
V_F	LED Forward Voltage		18			I = 200mA, Ta = 85℃
P_{LED}	LED Power Consumption		3.6		W	IF = 200mA, Ta = 25℃ (total power)
Operation Lifetime		50,000		-	Hrs	IF = 200mA, Ta = 25℃

Note 1: Ta means ambient temperature of TFT-LCD module.
Note 2: VCC, Ivcc, P_{VCC}, are defined for LED B/L.(100% duty of PWM dimming)
Note 3: I_F, V_F are defined for LED Light Bar.
Note 4: If module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.
Note 5: Operating life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.

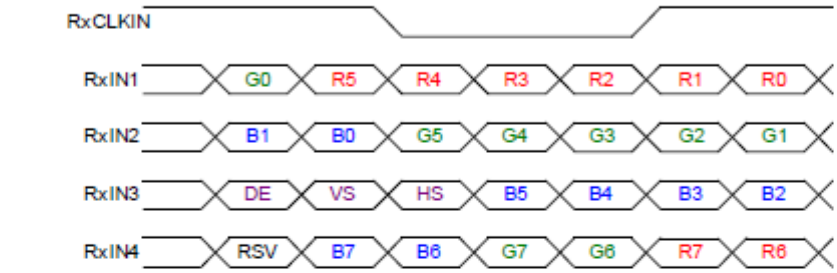
6.TIMING CHARACTERISTICS

6.1 The Input Data Format

SEL68 = "Low" or "NC" for 6 bits LVDS Input



SEL68 = "High" for 8 bits LVDS Input



Note1: Please follow PSWG.
Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Data 7 (MSB) GreenData 6 GreenData 5 GreenData 4 GreenData 3 GreenData 2 GreenData 1 GreenData 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
RxCLKIN+ RxCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

6.2 Interface Timing

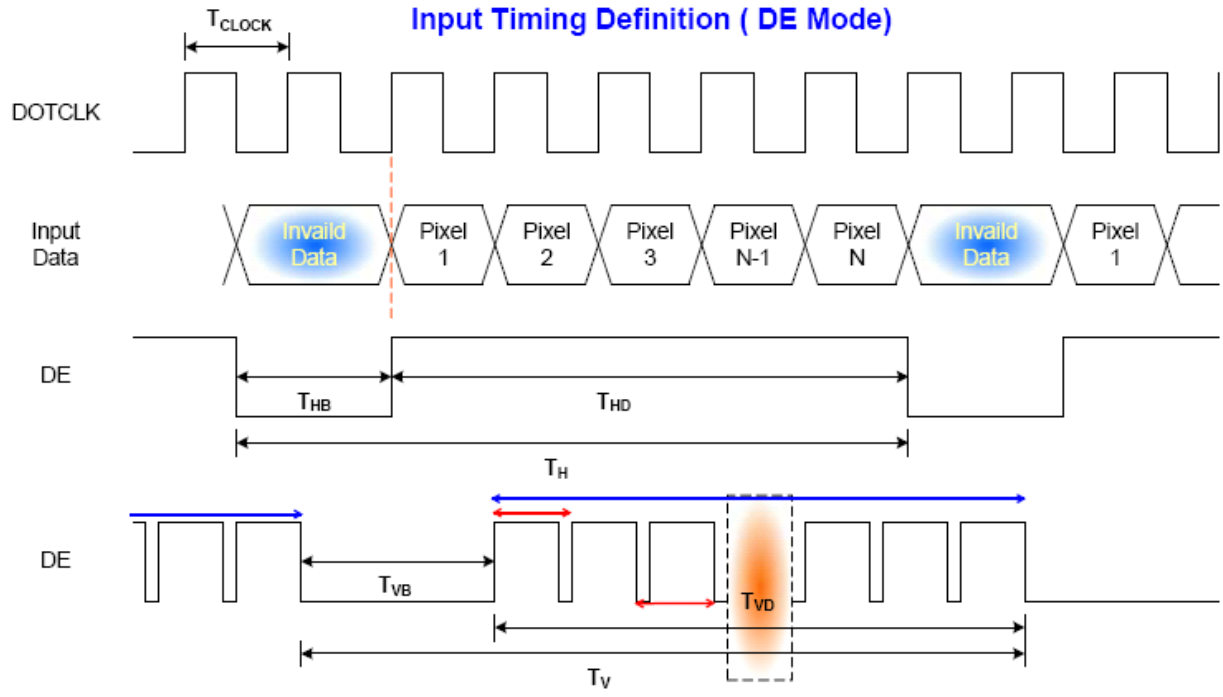
6.2.1 Timing Characteristics

DE mode only

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency		1/ T_{Clock}	33.6	39.8	48.3	MHz	
Vertical Section	Period	T_V	608	628	650	T_H	
	Active	T_{VD}	600	600	600		
	Blanking	T_{VB}	8	28	50		
Horizontal Section	Period	T_H	920	1056	1240	T_{Clock}	
	Active	T_{HD}	800	800	800		
	Blanking	T_{HB}	120	256	440		

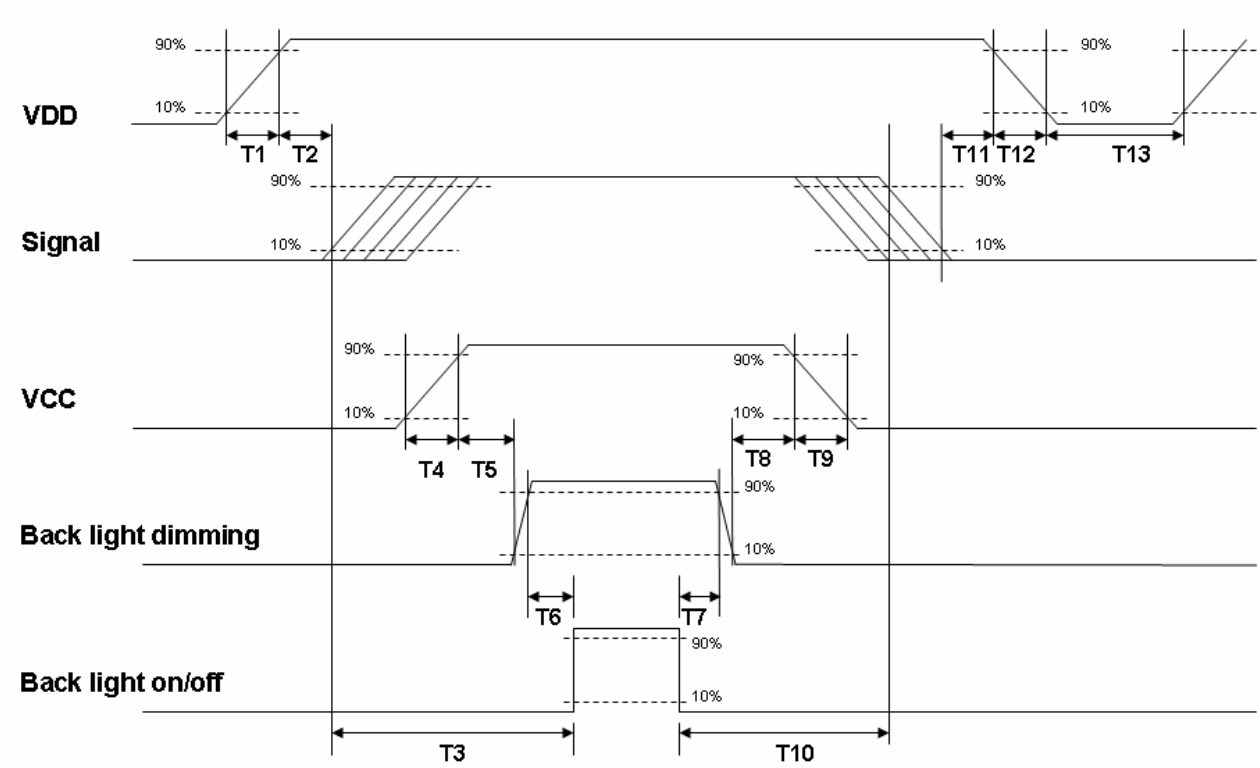
Note: Frame rate is 60 Hz.
Note: DE mode.

6.2.2 Input Timing Diagram



6.3 Power ON/OFF Sequence

VDD power and Backlight on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power ON/OFF sequence timing

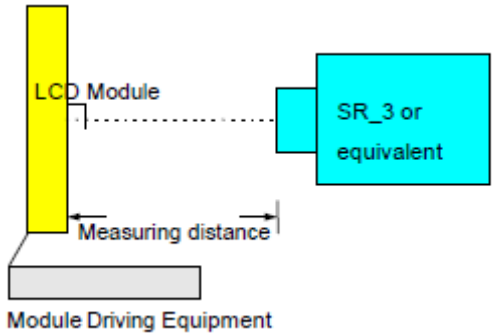
Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	--	10	[ms]
T2	30	40	50	[ms]
T3	200	--	--	[ms]
T4	0.5	--	10	[ms]
T5	10	--	--	[ms]
T6	10	--	--	[ms]
T7	0	--	--	[ms]
T8	10	--	--	[ms]
T9	--	--	10	[ms]
T10	110	--	--	[ms]
T11	0	16	50	[ms]
T12	--	--	10	[ms]
T13	1000	--	--	[ms]

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

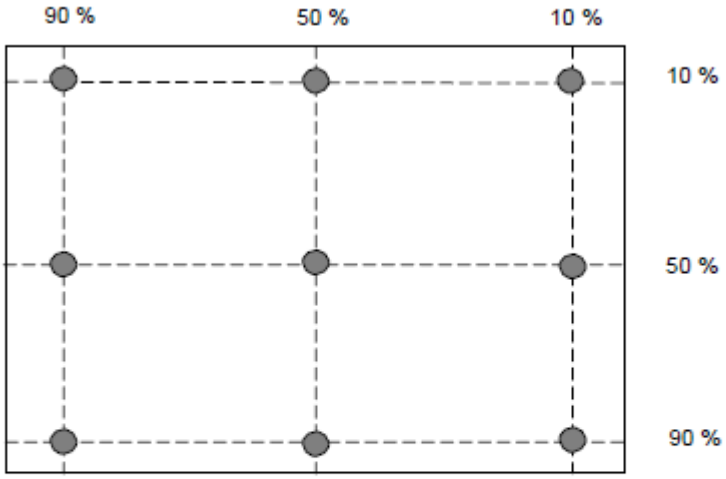
7. OPTICAL CHARACTERISTIC

Item	Unit	Condition	MIN.	TYP.	MAX.	Note
White Luminance	[cd/m2]	IF= 200mA (center point)	480	600	--	1
Uniformity	%	9 Points	70	75	--	1,2,3
Contrast Ratio			400	600	--	4
Response Time	[msec]	Rising	-	20	30	5
	[msec]	Falling		10	20	
	[msec]	Raising + Falling		30	50	
Viewing Angle	[degree]	Horizontal (Right) CR ≧ 10 (Left)	70 70	80 80	- -	6
		Vertical (Upper) CR ≧ 10 (Lower	65 50	80 80	- -	
Color / Chromaticity Coordinates (CIE1931)		Red x	0.559	0.609	0.659	1
		Red y	0.283-	0.333	0.383	
		Green x	0.315	0.365	0.415	
		Green y	0.520	0.570	0.620	
		Blue x	0.101	0.151	0.201	
		Blue y	0.056	0.106	0.156	
		White x	0.26	0.31	0.36	
		White y	0.28	0.33	0.38	
Color Gamut	%			45	-	1

Note 1: Measurement method
Equipment : Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (SR_3 or equivalent)
Aperture 1° with 50cm viewing distance
Test Point Center
Environment < 1 lux



Note 2: Definition of 9 points position (Display active area : 170.4(H) x 127.8(V))



Note 3: The luminance uniformity of 9 points is defined by dividing the minimum luminance value by the maximum test point luminance

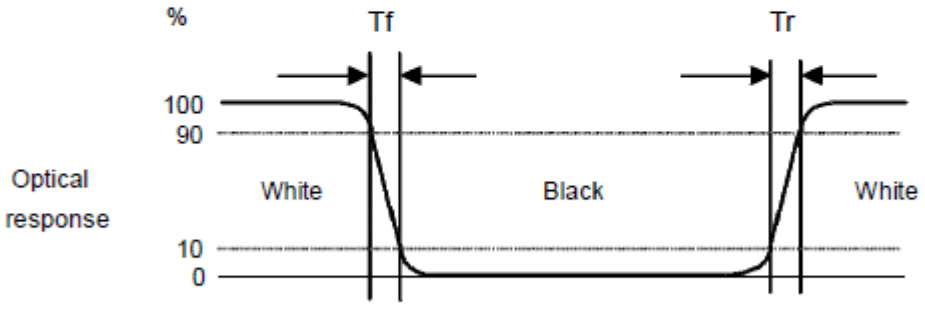
$$\delta_{W9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

Note 4 : Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

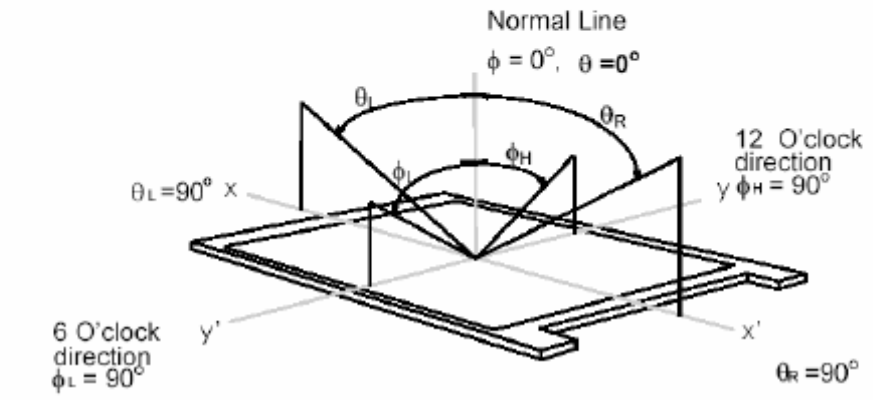
Note 5: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "White" to "Black" (falling time) and from "Black" to "White" (rising time), respectively. The response time interval is between 10% and 90% of amplitudes. Please refer to the figure as below.



Note 6: Definition of viewing angle

Viewing angle is the measurement of contrast ratio ≥10, at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (è) horizontal left and right, and 90° (Ō) vertical high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated to its center to develop the desired measurement viewing angle.



8. PIN CONNECTIONS

8.1 LCM PANEL DRIVING SECTION

LVDS is a differential signal technology for LCD interface and high speed data transfer device. The connector pin definition is as below.

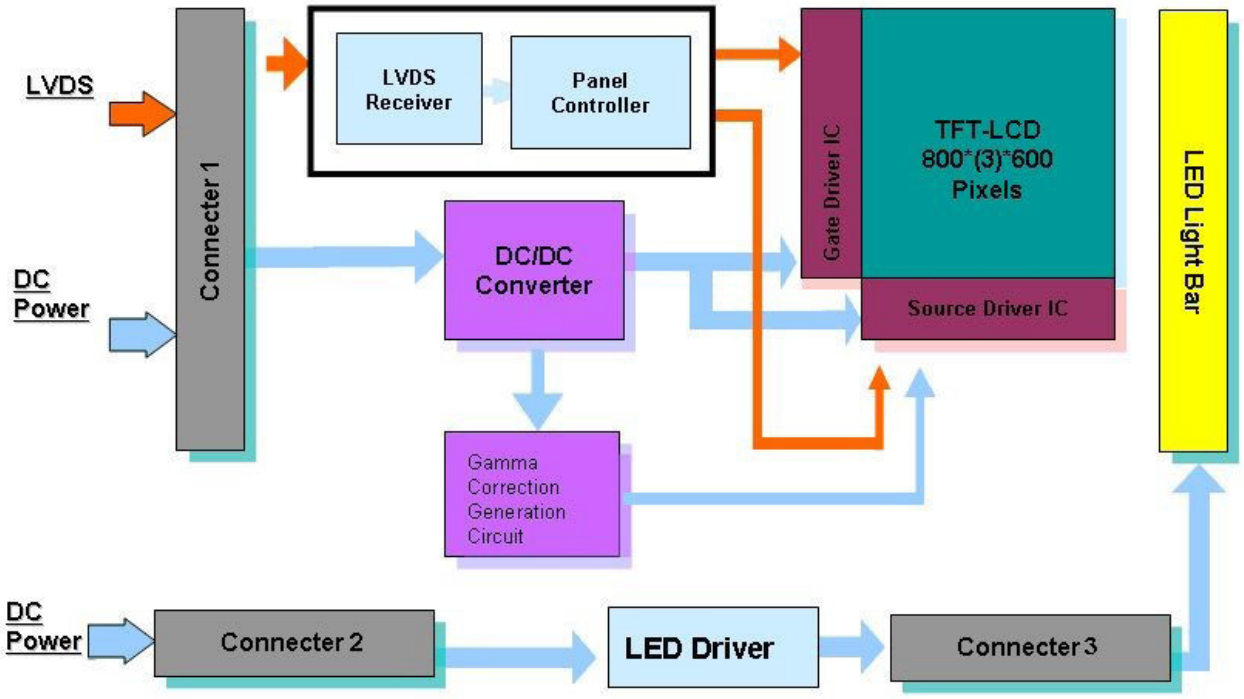
Pin No	Symbol	Description
1	VDD	Power Supply For Digital Circuit
2	VDD	Power Supply For Digital Circuit
3	UD	Vertical Reverse Scan Control, When UD=Low or NC → Normal Mode. When UD=High → Vertical Reverse Scan. Note
4	LR	Horizontal Reverse Scan Control, When LR=Low or NC → Normal Mode. When LR=High → Horizontal Reverse Scan. Note
5	RxIN1-	LVDS differential data input Pair 0
6	RxIN1+	
7	GND	Ground
8	RxIN2-	LVDS differential data input Pair 1
9	RxIN2+	
10	GND	Ground
11	RxIN3-	LVDS differential data input Pair 2
12	RxIN3+	
13	GND	Ground
14	CLKIN-	LVDS differential Clock input Pair
15	CLKIN+	
16	GND	Ground
17	SEL 68	LVDS 6/8 bit select function control, Low or NC → 6 Bit Input Mode. High → 8 Bit Input Mode. Note
18	NC	NC
19	RxIN4-	LVDS differential data input Pair 3. Must be set to NC in 6 bit input mode.
20	RxIN4+	

Note : “Low” stands for 0V. “High” stands for 3.3V. “NC” stands for “No Connected.”

8.2 BACKLIGHT DRIVING SECTION

Pin No	SIGNAL	Pin Description
1	VCC	12V input
2	VCC	12V input
3	VCC	12V input
4	GND	GND
5	Dimming	PWM
6	GND	GND
7	Display_ON/OFF	+5.0V:ON, 0V:OFF

9. BLOCK DIAGRAM



10. QUALITY ASSURANCE

10.1 Test Condition

10.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C
Humidity : 65 ± 5%

10.1.2 Operation

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

10.1.3 Container

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

10.1.4 Test Frequency

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

10.1.5 Test Method

No.	Reliability Test Item & Level	Test Level	Remark
1	High Temperature Storage Test	T=85°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=40°C,90% RH,240hrs	IEC68-2-3
6	Thermal Cycling Test (No operation)	-20°C → +25°C → +70°C, 100Cycles 30 min 5min 30 min	IEC68-2-14
7.	Vibration Test	Frequency:10~55HZ Amplitude:1.5mm Sweep time:11min Test period:6Cycles for each direction of X,Y,Z	IEC68-2-6
8	Shock Test	100G, 6ms Direction：± X,± Y,± Z Cycle：3 times	IEC68-2-27
9	Drop Test	Height:60cm 1 conner,3edges,6surfaces	IEC68-2-32
10.	ESD test	State: operating Standard: IEC 61000-4-2 Location: LCM/TP surface Condition:150pf 330Ω Contact +/- 8kV Air +/-15kV Criteria: Class C	IEC61000-4-2

10.2 Inspection condition

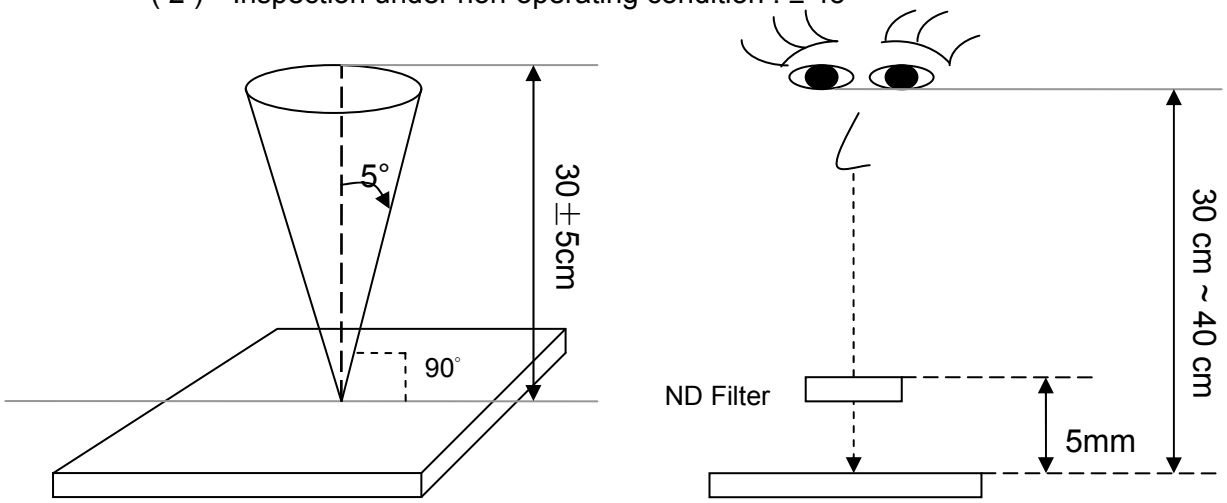
10.2.1 Inspection conditions

10.2.1.1 Inspection Distance: 35 ± 5 cm

10.2.1.2 View Angle:

(1) Inspection under operating condition : ±5°

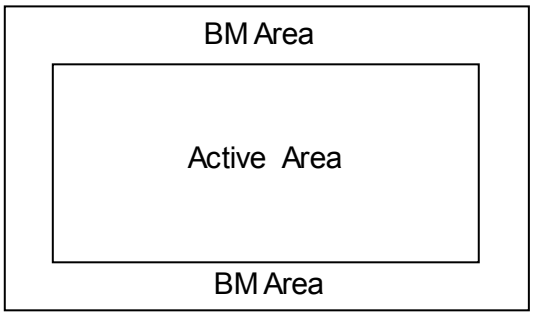
(2) Inspection under non-operating condition : ± 45°



10.2.1.3Environment conditions:

Ambient Temperature :		25±5℃
Ambient Humidity :		65±5%
Ambient Illumination	Cosmetic Inspection	More than 600lux
	Functional Inspection	300 ~ 800lux

10.2.2 Definition of applicable Zones



10.3 Inspection Parameters

<table>
<tr><th>No.</th><th>Parameter</th><th>Criteria</th></tr>
<tr><td rowspan="6">1</td><td rowspan="6">Operating</td><td>Display function: No Display malfunction (Major)</td></tr>
<tr><td>Contrast ratio (Black, White):
Does not meet specified range in the spec. (Major) (Note:3)</td></tr>
<tr><td>Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and colored. (Major) (Note:1)</td></tr>
<tr><td>Point Defect (Red, green, blue, dark): Active area ≤8dots (Minor)(Note:1)
<table>
<tr><th>Item</th><th>Acceptable number</th><th>Total</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>Bright</td><td>4</td><td rowspan="2">8</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>Dark</td><td>4</td></tr>
<tr><td>Adjacent Bright</td><td>1</td><td>1</td></tr>
<tr><td>Adjacent Dark</td><td>1</td><td>1</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Non-uniformity:
Visible through 2%ND filter white, R, G, B and gray 50%pattern. (Minor)</td></tr>
<tr><td>Foreign material in Black or White spots shape (W>1/4L) (Note: 5)
<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>D ≤ 0.3</td><td>*</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>0.3 < D ≤0.5</td><td>4</td></tr>
<tr><td>D> 0.5</td><td>0</td></tr>
</table>
D = (Long + Short) / 2 ＊ : Disregard</td></tr>
<tr><td>Foreign Material in Line or spiral shape (W≤1/4L) (Note: 4)
<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>W>0.1mm,L>5mm</td><td>0</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>L≦5mm,0.07mm<W≦0.1mm</td><td>4</td></tr>
<tr><td>L≦5mm,W<0.07mm</td><td>*</td></tr>
</table>
L : Length W : Width ＊ : Disregard</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">External Inspection (non-operating)</td><td>Dimension: Outline (Major)</td></tr>
<tr><td>Bezel appearance: uneven (Minor)</td></tr>
<tr><td>Scratch on the Polarize : (Note:2)
<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>W>0.1mm,L>5mm</td><td>0</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>L≦5mm,0.07mm<W≦0.1mm</td><td>4</td></tr>
<tr><td>L≦5mm,W<0.07mm</td><td>*</td></tr>
</table>
L : Length W : Width ＊ : Disregard</td></tr>
<tr><td>Dent and spots shape on the polarize (Note:2): (Note: 5)
<table>
<tr><th>Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>D ≤ 0.3</td><td>*</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>0.3 < D ≤0.5</td><td>4</td></tr>
<tr><td>D> 0.5</td><td>0</td></tr>
</table>
D = (Long + Short) / 2 ＊ : Disregard</td></tr>
</table>

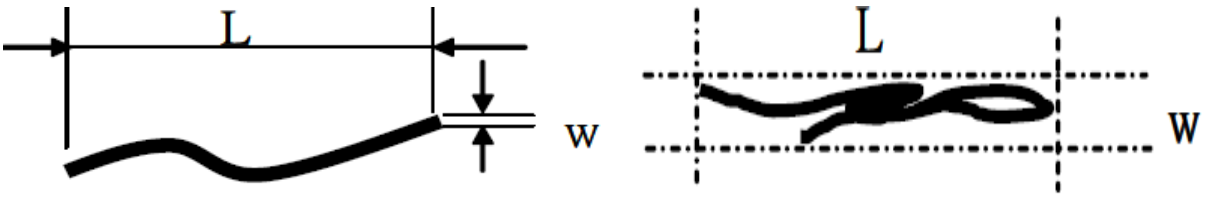
3	TP Newton Rings if LCM with TP		Dimension	Acceptable number	Class Of Defects	AQL Level
			The area of the Newton ring is more than 1/6 view area of the touch panel.	0	Minor	1.5
			The area of the Newton ring is less than 1/6 view area of the touch panel; and no character affected and line distorted after touch panel lightening.	Ignore		
Class of defects	**Major**	AQL 0.65	**Definition**			
			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.			

Note:1.(a)Bright point defect is defined as point defect of R,G,B with area >1/2 dot respectively
(b)Dark point defect is defined as visible in full white pattern.
(c)The point defect must under 2% ND Filter visible .

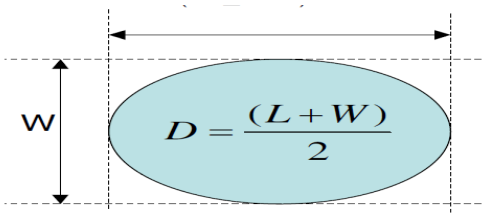
Note:2 The external inspection should be conducted at the distance 35± 5cm between the eyes of inspector and the panel .

Note:3 Luminance measurement for contrast ratio is at the distance 50± 5cm between the detective head and the panel with ambient luminance less than 1 lux. Contrast ratio is obtained at optimum view angle.

Note:4 W-Width in mm , L-length of Max.(L1,L2) in mm.



Note:5 Spot Foreign Material (W≧L/4)

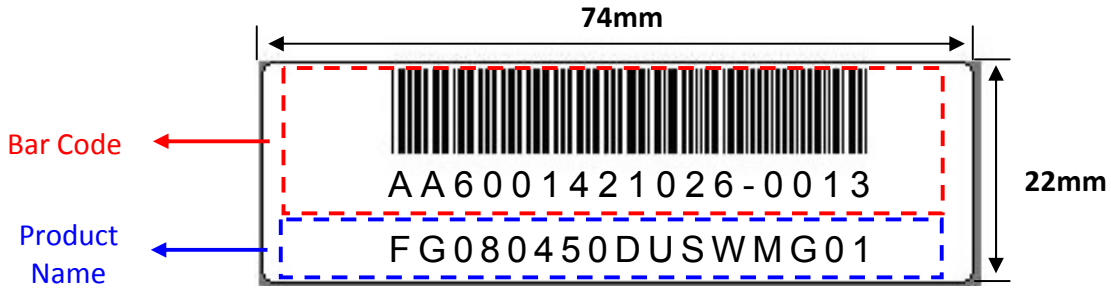


10.4 Sampling Condition

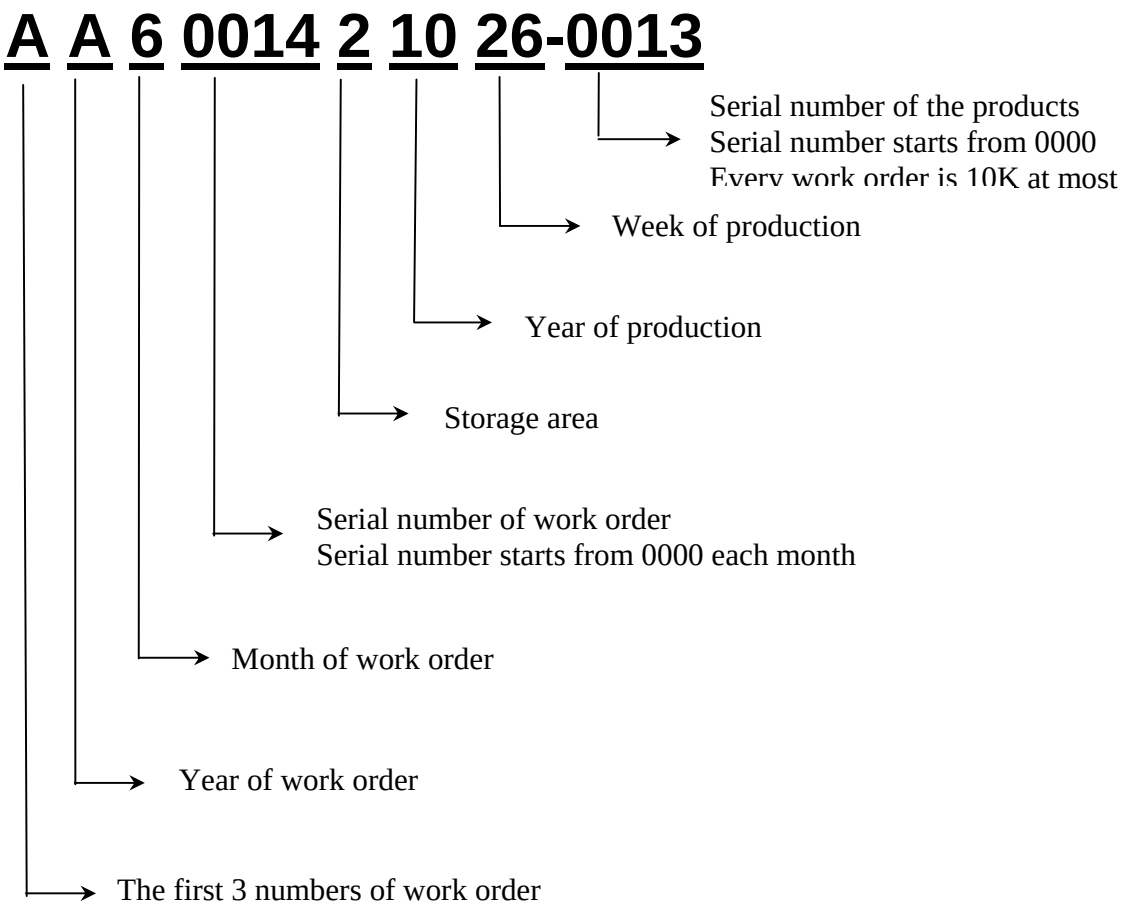
Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.
Lot size: Quantity of shipment lot per model.
Sampling type: normal inspection, single sampling
Sampling table: ISO2859
Inspection level: Level II

11. LCM PRODUCT LABEL DEFINE

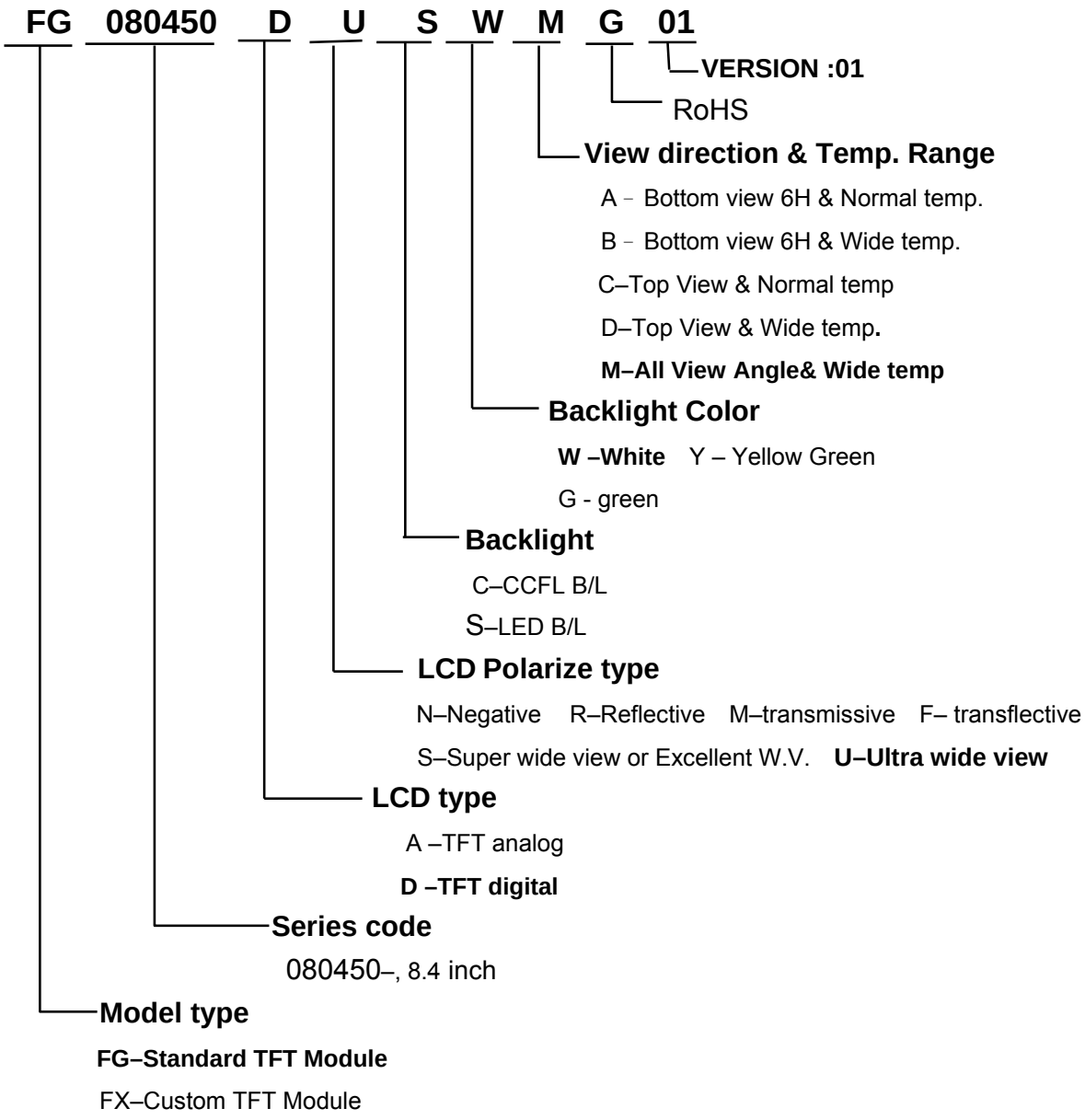
Product Label style:



BarCode Define:



Product Name Define:

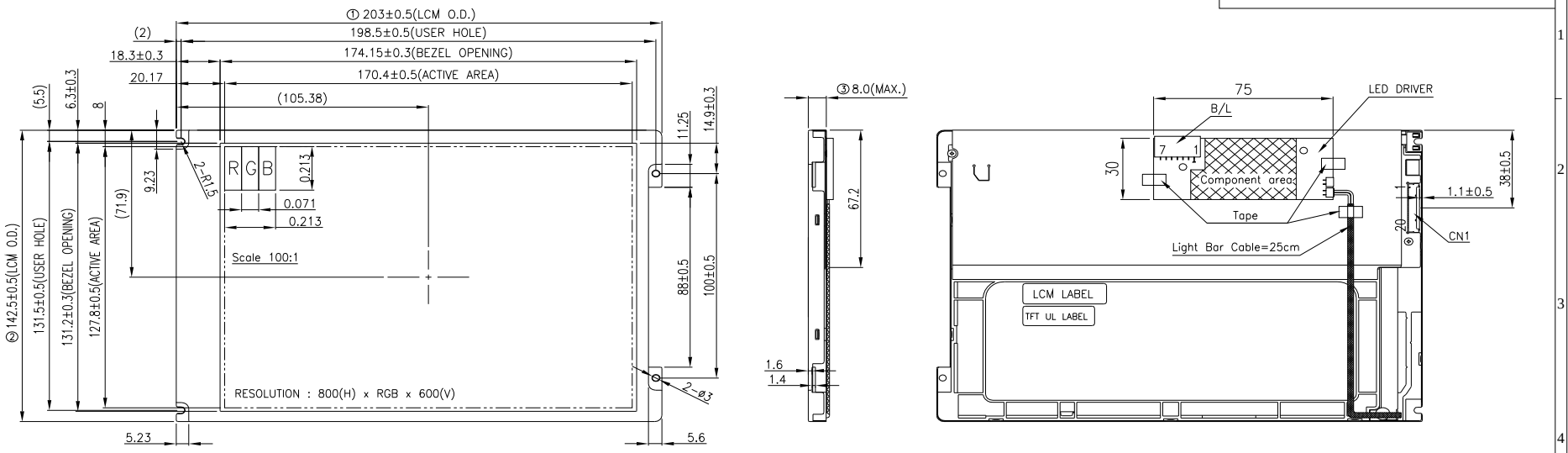


12. PRECAUTIONS IN USE LCM

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 Land 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:
      a. Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
      b. Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
      c. 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.)
   (4) Waste
      Liquid crystal module products shall not be arbitrarily discarded, the water and soil have a negative impact on the environment, the need to be handled by a qualified unit.
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.

13. OUTLINE DRAWING

PRELIMINARY



B/L PIN	
1	VCC
2	VCC
3	VCC
4	GND
5	Dimming
6	GND
7	Display_ON/OFF

CN1 PIN			
1	VDD	11	RxIN3−
2	VDD	12	RxIN3+
3	UD	13	GND
4	LR	14	RxCKIN−
5	RxIN1−	15	RxCKIN+
6	RxIN1+	16	GND
7	GND	17	SEL68
8	RxIN2−	18	NC
9	RxIN2+	19	RxIN4−
10	GND	20	RxIN4+

Note:
1. For RoHS & REACH.
2. Tolerance is ±0.5 unless otherwise noted.
3. Important dimension : ① ~ ③ .
4. CN1 connector : STM MSB24013P20HA, Hirose DF19LA−20P−1H or equivalent;
   Match connector : STM P24013P20, Hirose DF19−20S−1C or equivalent.
5. B/L connector : JST S7B−PH−SM4−TB.
6. Center luminance : 480cd/m²(Min.), 600cd/m²(Typ.).
7. Uniformity : 70%(Min.).

AUTH	DESCRIPTION	DATE	APPROVED
	ESR0509025		

REVISIONS

DATE:	2016/10/12
DRAWN:	
CHECK:	
APPROVE:	

TITLE: LCM Outline Dimension

DWG. NO.	FG080450UG01		
UNITS M M		REV.	1
SCALE 1 / 1	SHEET 1 OF 1		

DATA IMAGE

14. PACKAGE INFORMATION

TBD