

DATA IMAGE CORPORATION

TFT Module Specification

ITEM NO.: FG1001F0DSSWNG01

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 SPECIFICATIONS	6
7.	OPTICAL CHARACTERISTIC	8
8.	PIN CONNECTIONS	11
9.	QUALITY ASSURANCE	13
10.	LCM PRODUCT LABEL DEFINE	17
11.	PRECAUTIONS IN USE LCM ······	19
12.	OUTLINE DRAWING	20
13.	PACKAGE INFORMATION	21

Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	ALEX	JOE	GARY	KEN
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	Α	09/SEP/14'		21



2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	17/OCT/13'			Initial PRELIMINARY
2	08/JUL/14'	5 7	3 8, 10	Modify Remarks Modify Optical Characteristic Test Conditions and note6.
3	02/SEP/14'	10 12	17 20	 Modify Product Label Size. Modify Outline Drawing Rev.1 to 2.
Α	09/SEP/14'	12	20	 Modify Outline Drawing from Rev.2 to A. Release Rev: A for production.



3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen Size	10.1 (diagonal)	inch
Display Format	1280(H) x (R,G,B) x 800(V)	dot
Active Area	216.96(W) × 135.60(H)	mm
Dot Pitch	0.0565(W) × 0.1695(H)	mm
Pixel Configuration	RGB-Stripe	
Outline Dimension	229.46(W) ×149.1(H) ×2.50(D)	mm
Surface treatment	HC	
Interface	LVDS	
Weight	183	g
Display mode	Normally Black, Transmissive	

4. ABSOLUTE MAXIMUM RATINGS

(Note 1)

Parameter	Symbol	MIN.	MAX.	Unit	Remark
	V _{DD}	-0.3	3.9	V	
	AV _{DD}	-0.3	14	V	
Power voltage	Vgн	-0.3	42	V	
	VgL	-19	0.3	V	
	Vgh-Vgl	12	40	V	
Operating temperature	TOP	0	50	°C	
Storage temperature	Tst	-20	60	°C	

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

5. ELECTRICAL CHARACTERISTICS

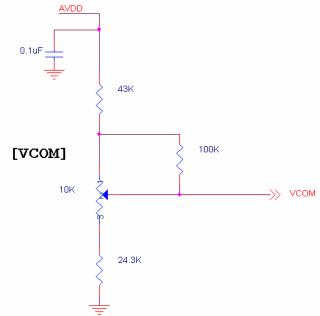
Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
	VDD	2.3	2.5	2.7	V	Note 2
Power veltage	AVDD	8.0	8.2	8.4	V	
Power voltage	Vgh	21.7	22	22.3	V	
	VgL	-7.3	-7	-6.7	V	
Input signal voltage	Vсом	2.7	3.0	3.3	V	Note 3
Input logic high voltage	Vih	0.8Vpd	-	3.6	V	Note 2
Input logic low voltage	VIL	0	-	0.2 V _{DD}	V	Note 2

Note 1: Be sure to apply VDD and VGL to the LCD first, and then apply VGH.

Note 2: VDD setting should match the signals output voltage of customer's system board.

Note 3: Typ. VCOM is only a reference value; it must be optimized according to each LCM. Be sure to use VR.





5.1 Backlight Driving Conditions

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Unit
Voltage for LED backlight	VL	8.1	8.8	9.3	V	Note1
Current for LED backlight	IL	180	200	220	mA	
LED life time	-	15,000		-	Hr	Note2

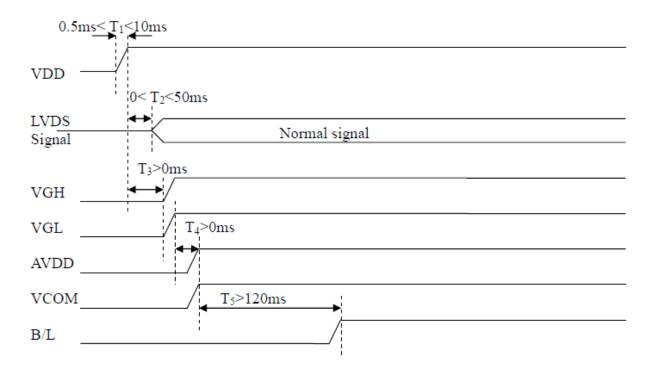
Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IL =200mA.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at $Ta=25^{\circ}$ C and IL=200mA. The LED lifetime could be decreased if operating IL is lager than 200mA.

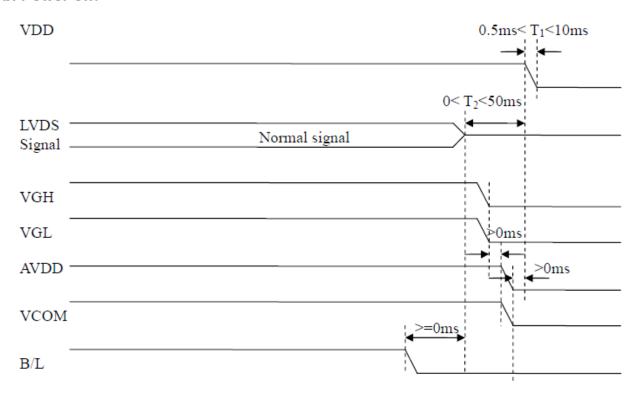


5.2 Power Sequence

a. Power on:



b. Power off:

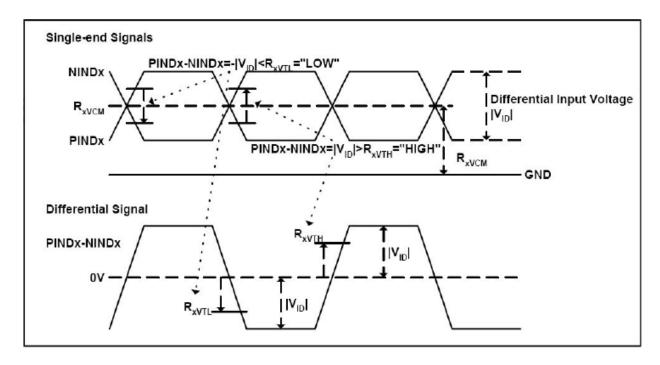




6. INPUT SIGNAL CHARACTERISTICS

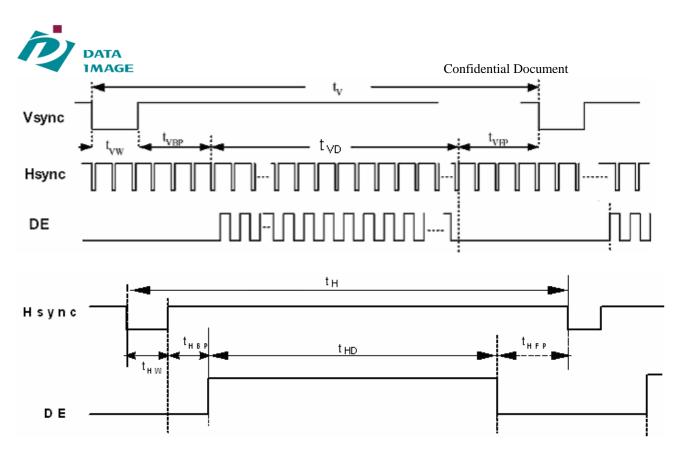
6.1 AC Characteristics

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Differential input high Threshold voltage	Rхvтн	1	-	+100	mV	Rxvcm=1.2V
Differential input low Threshold voltage	RXVTL	-100	-	-	mV	RXVCM=1.2V
Differential input common mode voltage	Rxvсм	0.7	-	1.6	V	
Differential voltage	Vid	200	-	600	mV	

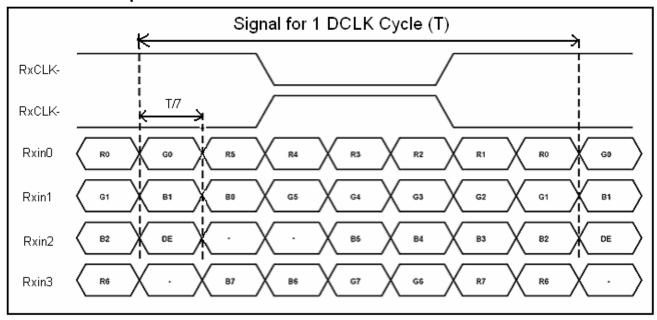


6.2 Timing Table

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Clock Frequency	1/Tc	(68.9)	(71.11)	(73.4)	MHz	Frame rate=60Hz
Horizontal display area	tHD		1280		Tc	
HS period time	tн	(1410)	(1440)	(1470)	Tc	
HS Width +Back Porch	thw+thbp	(60)	160	(190)	Тс	
+Front Porch	+tHFP	()		(100)		
Vertical display area	tvd		800		tн	
VS period time	tv	(815)	823	(833)	tн	
VS Width +Back Porch +Front Porch	tvw+ tvbp +tvfp	15	23	33	tн	



6.3 LVDS Data Input Format





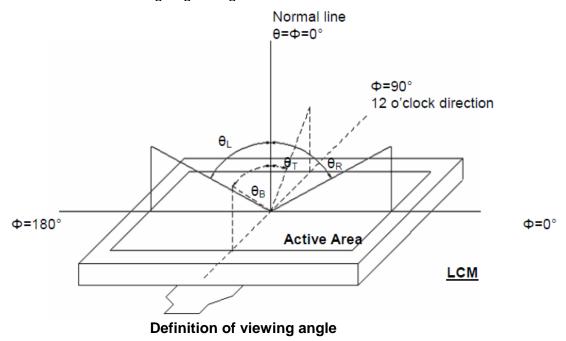
7. OPTICAL CHARACTERISTIC

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
	θ_{L}	Φ=180°(9 o'clock)	75	85	-		
Viewing Angle	θ_{R}	Φ=0°(3 o'clock)	75	85	-	doa	Note 1
(CR≥10)	θ_{T}	Φ=90°(12 o'clock)	75	85	-	deg	Note i
	θ_{B}	Φ=270°(6 o'clock) 75 85		85	-		
Contrast Ratio	CR		600	800	-		Note 4
Response time	Ton		-	10	20	ms	Note 3
Kesponse une	Toff	Niswasi	-	15	30	ms	Note 3
Color chromaticity	Wx	Normal θ=Φ=0°	0.26	0.31	0.36	-	Note 2 F 6
	WY		0.28	0.33	0.38	-	Note 2,5,6
Luminance	L		300	350	-	Cd/m ²	Note 6
Luminance uniformity	Yυ		75	80	-	%	Note 7

Test Conditions:

- 1. VDD=2.5V, IL=200mA (Backlight current), the ambient temperature is 25℃.
- 2. The test systems refer to Note 2.

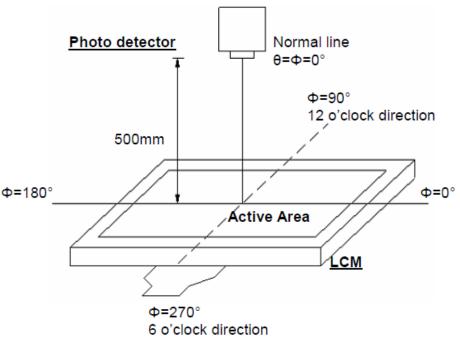
Note 1: Definition of viewing angle range



Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.)

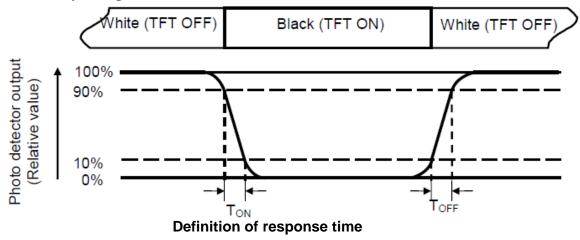




Optical measurement system setup

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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



Note 4: Definition of contrast ratio

Contrast ratio (CR) = Luminance measured when LCD on the "White" state

Luminance measured when LCD on the "Black" state



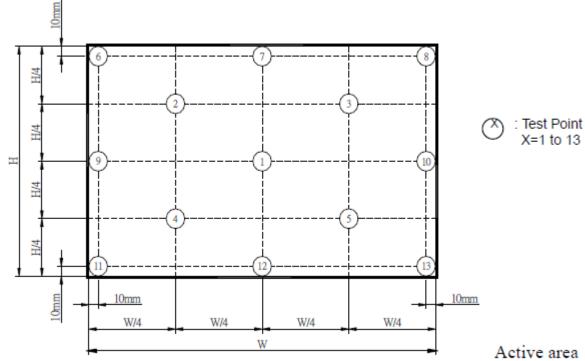
Note 5: Definition of color chromaticity (CIE1931) Color coordinates measured at center point of LCD.

Note 6: Measuring the center area of the panel. The LED driving condition is IL=200mA.

Note 7: Definition of Luminance Uniformity

Measure the luminance of gray level 63 at 9 points

 $\delta W9p = \{ Minimum [L (1) + L (6) + L (7) + L (8) + L (9) + L (10) + L (11) + L (12) + L (13)] / Maximum [L (1) + L (6) + L (7) + L (8) + L (9) + L (10) + L (11) + L (12) + L (13)] \}^* 100\%$





FPC Connector is used for the module electronics interface. The model is F62240-H1210A manufactured by Vigorconn.

Pin No	Symbol	I/O	Function	Remark
1	VCOM	Р	Common Voltage	
2	VDD	Р	Power Voltage for digital circuit	
3	VDD	Р	Power Voltage for digital circuit	
4	NC	-	No connection	
5	NC	-	No connection	
6	NC	-	No connection	
7	GND	Р	Ground	
8	RIN0-	I	-LVDS differential data input	
9	RIN0+	I	+LVDS differential data input	
10	GND	Р	Ground	
11	RIN1-	I	-LVDS differential data input	
12	RIN1+	I	+LVDS differential data input	
13	GND	Р	Ground	
14	RIN2-	I	-LVDS differential data input	
15	RIN2+	I	+LVDS differential data input	
16	GND	Р	Ground	
17	RXCLKIN-	I	-LVDS differential clock input	
18	RXCLKIN+	I	+LVDS differential clock input	
19	GND	Р	Ground	
20	RXIN3-	I	-LVDS differential data input	
21	RXIN3+	I	+LVDS differential data input	
22	GND	Р	Ground	
23	NC	-	No connection	
24	NC	-	No connection	
25	GND	Р	Ground	
26	NC	-	No connection	

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		_	
LED_PWN	-	Backlight CABC controller signal output	Note2
NC	-	No connection	
AVDD	Р	Power for Analog Circuit	
GND	Р	Ground	
LED-	Р	LED Cathode	
LED-	Р	LED Cathode	
NC	-	No connection	
NC	-	No connection	
VGL	Р	Gate OFF Voltage	
NC	-	No connection	
CABC_EN	-	CABC Enable Input	Note1
VGH	Р	Gate ON Voltage	
LED+	Р	LED Cathode	
LED+	Р	LED Cathode	
	NC AVDD GND LED- LED- NC NC VGL NC CABC_EN VGH LED+	NC - AVDD P GND P LED- P LED- P NC - NC - VGL P NC - CABC_EN - VGH P LED+ P	NC - No connection AVDD P Power for Analog Circuit GND P Ground LED- P LED Cathode LED- P LED Cathode NC - No connection NC - No connection VGL P Gate OFF Voltage NC - No connection CABC_EN - CABC Enable Input VGH P Gate ON Voltage LED+ P LED Cathode

I: input, O: output, P: Power

Note1: The setting of CABC function are as follows.

_			
	Pin	Enable	Disable
	CABC_EN	High Voltage	Low Voltage or open

Note2: LED_PWM is used to adjust backlight brightness.





9. QUALITY ASSURANCE

9.1. Test Conditions

No.	Item	Test Conditions		Remark	
1	High Temperature Storage Test	Ta = 60°C	120hrs	Note 1,4 (IEC68-2-2)	
2	Low Temperature Storage Test	Ta = -20°C	120hrs	Note 1,4 (IEC68-2-1)	
3	High Temperature Operation Test	Ts = 50°C	120hrs	Note 2,4 (IEC68-2-2)	
4	Low Temperature Operation Test	Ta = 0°C	120hrs	Note 1,4 (IEC68-2-1)	
5	Operate at High Temperature and Humidity	+40°C, 90%RH	120hrs	Note 4 (IEC68-2-2)	
6	Thermal Shock	_	C/30 min for a total 100 cold temperature and perature.	Note 4 (IEC68-2-14)	
7	Vibration Test	Frequency range: Stroke:1.5mm Sweep:10Hz~55H 2 hours for each of (6 hours for total)		(IEC68-2-6)	
8	Mechanical Shock	100G 6ms,±X, ±Y direction	, ±Z 3 times for each		
9	Package Vibration Test	Random Vibration ISTA-3A 1Hz~200 Half hours for dire)Hz,Grms=0.53		
10	Package Drop Test	Height:60 cm 1 corner, 3 edges	, 6 surfaces		

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.



9.2 Inspection condition

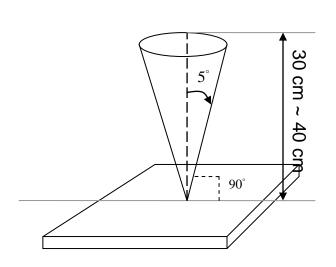
9.2.1 Inspection conditions

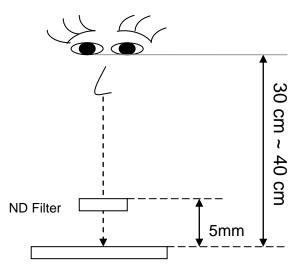
9.2.1.1 Inspection Distance : 35 ± 5 cm

9.2.1.2 View Angle:

(1) Inspection under operating condition: ±5°

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

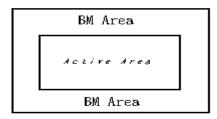




9.2.2 Environment conditions:

Ambien	t Temperature :	25±5 ℃		
Ambie	ent Humidity :	65±5%		
Ambient	Cosmetic Inspection	400 ~ 600lux		
Illumination	Functional Inspection	300 ~ 500lux		

9.2.3 Definition of applicable Zones





9.2.4 Inspection Parameters									
No.	Parameter	Criteria							
		Display function: No Display malfunction (Major)							
		Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and						rk and col	ored.
		Point Defect: Active area ≤ 6 dots (Minor) (Note:1)							
			Accepta			ptable nun	nber	Total	
			Item		Д	Active Area		Total	
		Bright		Random		3		6	
		Bright	Two	dots adjacer	nt	1			
		Dark		Random		4			
			Two	dots adjacer	nt	2			
		Non-uniformity: Visibl					d gray 5	50% patter	n.
		Foreign material in B		nite spots sha	ape (W>1/	4L)			
1	Operating	Zon	Zone Acceptable number		e number	per Class of Defects		efects	
		D> 0.5	D> 0.5						
		0.3 < D ≤	€ 0.5	0.5 5		Minor		•	
		0.3≦ □)	*					
			D = (Long + Short) / 2 *: Disregard						
		Foreign Material in Li	oreign Material in Line or spiral shape (W ≤1/4L) (Note: 4)		ote: 4)			1	
		Zone		Zone		Acceptable		ass of	
		L (mm)	W	W(mm)		number		efects	-
		L >10		W>0.1	2.1	0		4.	
		L ≦10 L ≦10		0.05 <w≤0< td=""><td colspan="2">5</td><td colspan="2">Minor</td></w≤0<>		5		Minor	
						J			
		Dimension: Outline (Major)							
		Bezel appearance: uneven (Minor)							
	External		cratch on the polarize: (Note:2)						
2	Inspection	Zone		Zone	Acceptable		Cla	ass of	
	(non-operating)	L (mm)	W(mm)		number		De	efects	
		L >10	W>0.1		0		N.	linor	
		L ≦10	0.05 <	<w≦ 0.1<="" td=""><td>5</td><td></td><td colspan="2">Minor</td><td></td></w≦>	5		Minor		

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	- IMAGE	Confidential Document							
			L ≦10	W≦ 0	.05	*			
			L : Length		W : Width * : Disregar				
		Den	t or bubble on the polarize (Note:2)						
			Zone Dimension		Acceptable number		Class of Defects		
			D> (0.5		0			
			0.3 < [0.5 ≤ 0.5		5		Minor	
			0.3≦	≦ D		*			
		D = (Long + Short) / 2 *: Disregard							
		Polai	arizer flaw or leak out resin : Defect is defined as the active area.						
3	Others	Issues which is not defined defect :defect must be visible through 5% ND Filter.							

ſ		Definition					
	Class of	AQL 0.65% It is a defect that is likely to result in failure or to reduce materially the usability					
	defects		of the product for the intended function.				
		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.

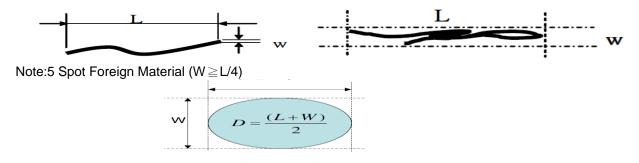
(c)Definition of distribution of point defect is as follows:

-minumum separation between dark point defects should be larger than 5mm.

-minumum separation between bright point defects should be larger than 5mm.

Note:2 The external inspection should be conducted at the distance $35\pm$ 5cm between the eyes of inspctor 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 illuminance 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.



9.2.5 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: MIL-STD-105E

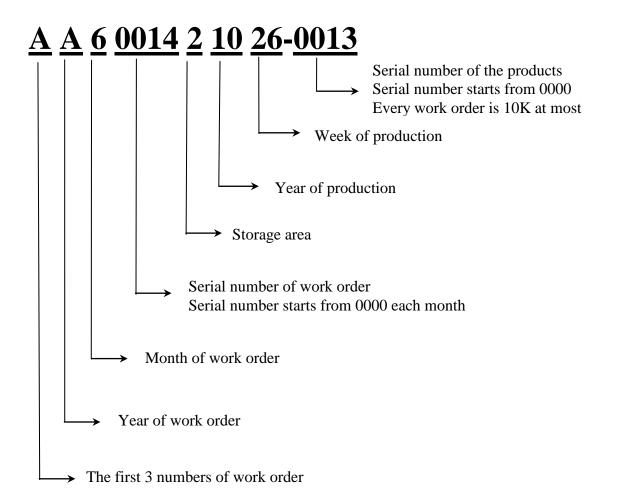
Inspection level: Level II



Product Label style:

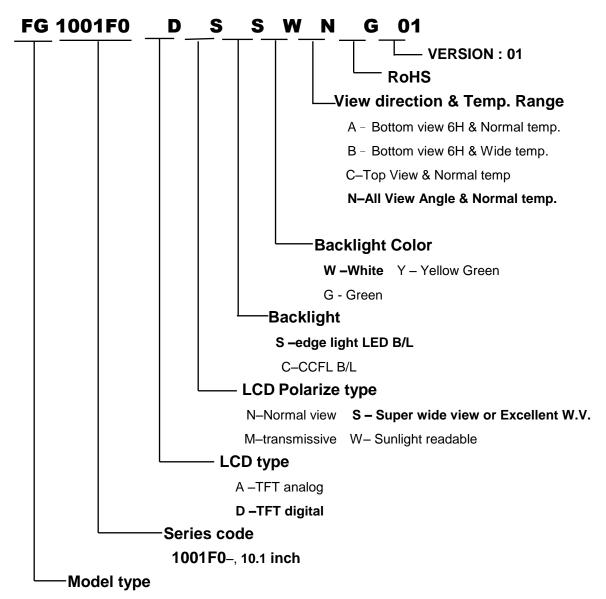


BarCode Define:





Product Name Define:



FG-Standard TFT Module

FX-Custom TFT Module



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

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- parts of the human body.
- (2) The modules should be kept in antistatic bags or other containers resistant to static for storage.
- 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.)

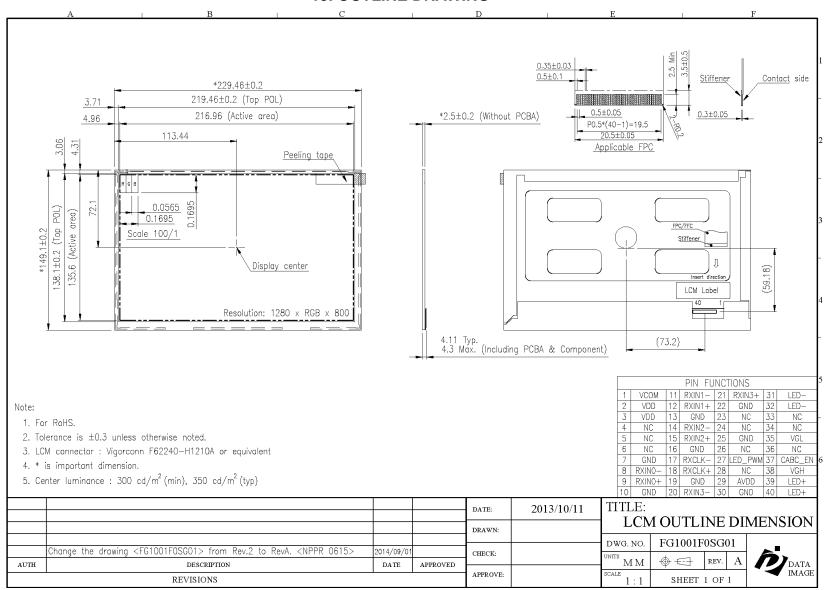
6. LIMITED WARRANTY

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.



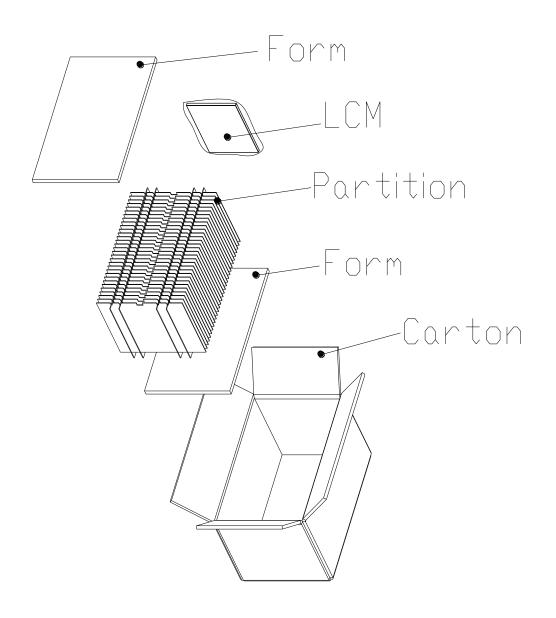
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13. OUTLINE DRAWING





14. PACKAGE INFORMATION



1 Carton = 16 PCS

Carton size : 482L x 282W x 279H (mm)