

## **DATA IMAGE** CORPORATION

## **TFT Module Specification**

## **Preliminary**

ITEM NO.: FX080074DSSWBGL1

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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:
	2	29/SEP14'		21



## 2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	05/SEP14'			Initial PRELIMINARY
2	29/SEP14'	5	4	Modify LED Life Time.



## 3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit								
Screen Size	8 (diagonal)	inch								
Display Format	800(H) x (R,G,B) x 600(V)	dot								
Active Area	162(H) x 121.5 (V)	mm								
Dot Pitch	0.0675 (H) x 0.2025 (V)	mm								
Pixel Configuration	R.G.BStripe									
Outline Dimension	183(W) x 141(H) x8.8Max(D)	mm								
Surface treatment	Anti-glare									
Back-light	LED									
Display mode	Normally white									
Weight	TBD	g								
View Angle direction	6 o'clock									
Our components and processes are compliant to RoHS standard										

## 4. ABSOLUTE MAXIMUM RATINGS

GND= 0V

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power supply voltage	VCC	-0.3	4.0	V	Ta=25°C
Logic input voltage	VI	-0.3	VCC+0.3	V	
Operating temperature	Тор	-20	70	°C	
Storage temperature	Tst	-30	80	°C	

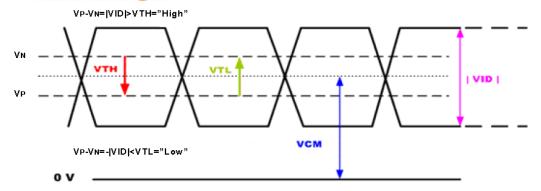
## 5. ELECTRICAL CHARACTERISTICS

## Module

Parameter	Symbol	MIN.	Тур.	MAX.	Unit	Remark
Power Supply voltage	VCC	3.0	3.3	3.6	V	
Power Supply Current	I <sub>cc</sub>		200	300	mA	VCC =3.3V
Differential Input High	VTH	-	-	100	[mV]	VCM=1.2V
Threshold	VTL	-100	-	-	[mV]	Note 1
Ripple voltage	$V_{RF}$	-	-	100	$mV_{P-P}$	

Note 1: LVDS Signal Waveform.

## Differential Signal





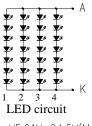
## **Backlight Driving Conditions**

Ta= 25 °C

Parameter	Symbol	Min.	Тур.	Max.	Unit	Remark
VLED voltage	$V_L$	21	-	24.5	V	Note 1
LED current	IF		120		mA	
LED Life Time decay to 50%		30,000	50,000		hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at  $Ta=25^{\circ}C$  and IF =120mA.

Note 2:The "LED life time" is defined as the module brightness decrease to 50% original brightness at  $Ta=25^{\circ}C$  and IF =120mA. The LED lifetime could be decreased if operating IL is lager than 120mA.



VF:21V~24.5V(MAX)

IF:120mA(Fix)

## 6. Timing Characteristics

## 6.1 Input signal characteristics

### **6.1.1 AC Electrical Characteristics**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Data setup time	T <sub>dsu</sub>	8	-	-	ns
Data hold time	Tdhd	8	-	-	ns
DEN setup time	Tesu	8	-	-	ns

### 6.1.2 Resolution: 800x600

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
DCLK frequency	<b>F</b> CPH	-	40	50	MHz
DCLK period	Тсрн	20	25	-	ns
DCLK pulse duty	Тсwн	40	50	60	%
DE period	TDEH+TDEL	862	1056	1200	Тсрн
DE pulse width	Трн	-	800	-	Тсрн
DE frame blanking	T <sub>DEB</sub>	24	35	100	TDEH+TDEL
DE frame width	T <sub>DE</sub>	-	600	-	TDEH+TDEL



# **6.2 Timing Controller Timing Chart 6.2.1 Clock and Data input waveforms**

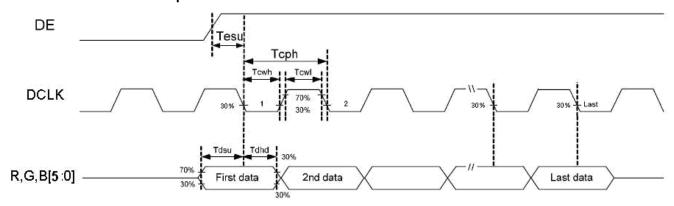


Figure 1 Clock and Data input waveforms.

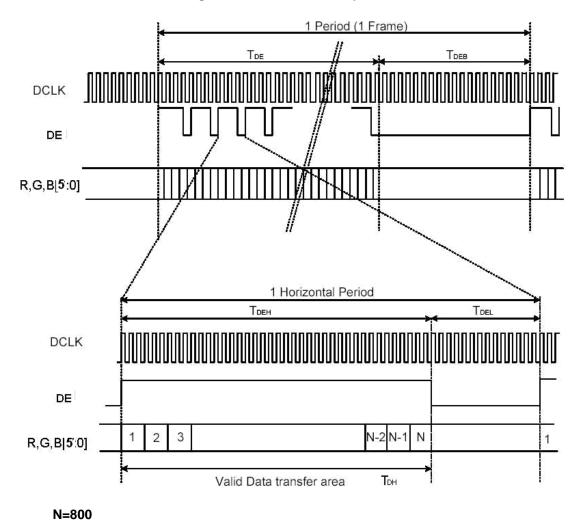
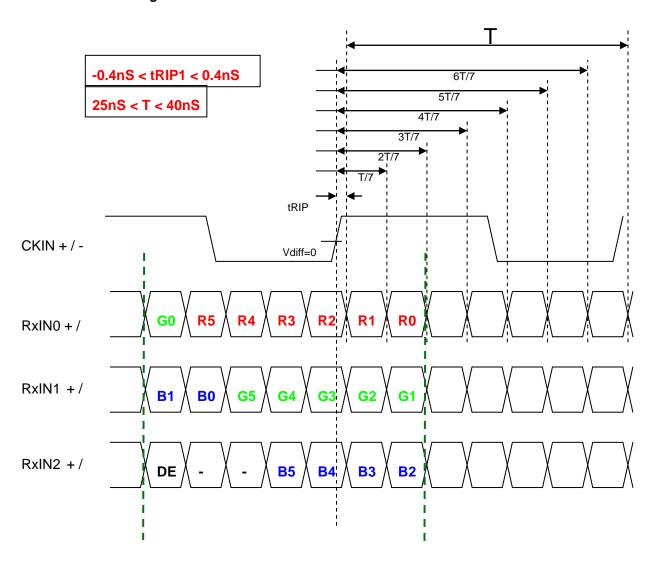


Figure 2 DE Mode Data Format



## 6.2.2 LVDS Timing Chart





## **6.3 Color Data Input Assignment**

									Da	ata :	Sigr	nal							
				R	ed					Gre	en					BI	ue		
C	olor	R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	В5	В4	ВЗ	B2	В1	B0
	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Basic	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Colors	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(0) / Dark	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
Gray Scale	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
of Red	:	:	:	<b>:</b>	:	:	:	:	:	:	:	:	:	:	:	<b>:</b>	:	:	:
	Red(61)	1	1	1	1	0	1	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(0)/ Dark	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
001-	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Gray Scale	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
of Green	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1 1	1	0	0	0	0	0	0	0
	Green(63) Blue(0)/ Dark	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 (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Gray Scale	• •		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		:
of Blue	•	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
OI DIGE	Blue (61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	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

## 6.4 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format:

							•		 • • • •	 -1-			,	 	 	_					
		1			2											79	99		80	00	
1st Line	R	G	в	R	G	В		-	 				-			R	G	в	R	G	в
		:			:						:						-			-	$\neg$
		:		l	:					:							:			:	
		:		l	:												:			:	
		:		l	:					-							:			:	
		:		l	:												:			:	
	L	-			•					_	•				$\perp$		-			-	
600th Line	R	G	В	R	G	В						-				R	G	В	R	G	в

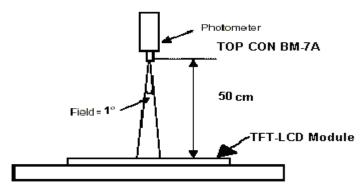


## 7. OPTICAL CHARACTERISTIC

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
	Horizontal	$\theta_x$ +		60	70		deg	Note 1,4
Viewing		$\theta_{x}$ -	Center	60	70			
Angle	Vertical	$\theta_{Y}$ +	CR≥10	40	50			
		θ <sub>Y</sub> -		60	70			
Contrast Ratio		CR max.	Center	400	500			Note 1,3
Response time	Rise	Tr	Center	-	10	20	ms	Note 1,6
Response time	Fall	Tf	$\theta x = \theta y = 0^{\circ}$	-	15	30	ms	
Brightness Unifor	mity	B-uni	$\theta x = \theta y = 0^{\circ}$	70	75		%	Note1,5
Central Luminand	e	L	IL=mA	400	500		cd/m²	Note 1,2
White Chromoticit	h. ,	X <sub>W</sub>	Center	0.26	0.31	0.36		Note 1,2
White Chromaticit	ıy	y <sub>W</sub>	$\theta x = \theta y = 0^{\circ}$	0.28	0.33	0.38		
Image sticking		tis	2 hours			2	Sec	Note 7

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°C±2°C, and LED current IF=120mA. The measurement method is shown in Note1.

Note1: The method of optical measurement:



Note2: Measured at the central point of the LCD module and at the viewing angle of the  $\theta x=\theta y=0^{\circ}$ 

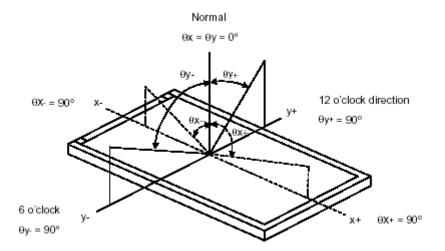
Note3: Definition of Contrast Ratio (CR):

CR = Luminance with all pixels in white state

Luminance with all pixels in Black state

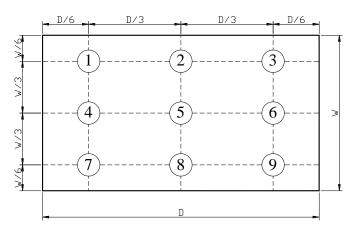


Note 4: Definition of Viewing Angle(CR≥10):



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

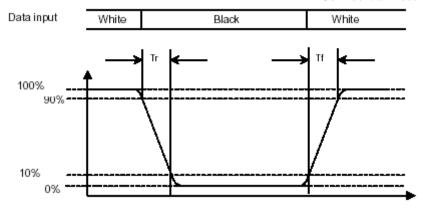
### **Luminance Measuring Points**



 $B\text{-uni } = \frac{ \text{Minimum luminance of 9 points} }{ \text{Maximum luminance of 9points} }$ 

Note6: Definition of Response Time:

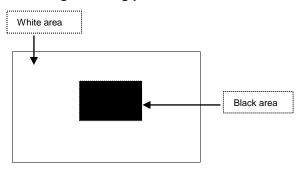
The Response Time is set initially by defining the "Rising Time (Tr)" and the "Falling Time (Tf)" respectively. Tr and Tf are defined as following figure.



## Note 7: Definition of 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  $^{\circ}$ C

### Image sticking pattern





## **8. PIN CONNECTIONS**

8.1 TFT LCD Panel Driving Section

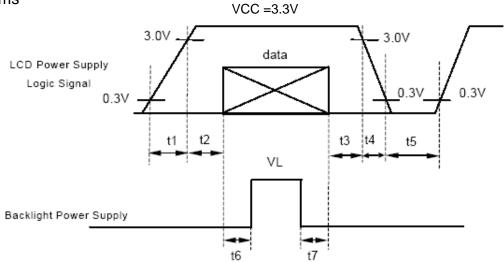
Pin	Name	Description	Remark
1	VCC	Power Supply	
2	VCC	Power Supply	
3	GND	Ground	
4	GND	Ground	
5	RXIN0-	Differential Data Input, CH0 (Negative)	R0 ~ R5, G0
6	RXIN0+	Differential Data Input, CH0 ( Positive )	10 ~ 10, 00
7	GND	Ground	
8	RXIN 1-	Differential Data Input, CH1 ( Negative )	G1 ~ G5, B0, B1
9	RXIN 1+	Differential Data Input , CH1 ( Positive )	G1 ~ G3, b0, b1
10	GND	Ground	
11	RXIN 2-	Differential Data Input, CH2 (Negative)	B2 ~ B5, NC, NC,DE
12	RXIN 2+	Differential Data Input , CH2 ( Positive )	D2 ~ D3, NO, NO,DE
13	GND	Ground	
14	CKIN-	Differential Clock Input ( Negative )	DCLK
15	CKIN+	Differential Clock Input ( Positive )	DOLK
16	GND	Ground	
17	NC	No connection	
18	NC	No connection	
19	GND	Ground	
20	GND	Ground	



## 8.2 Power Signal Sequence

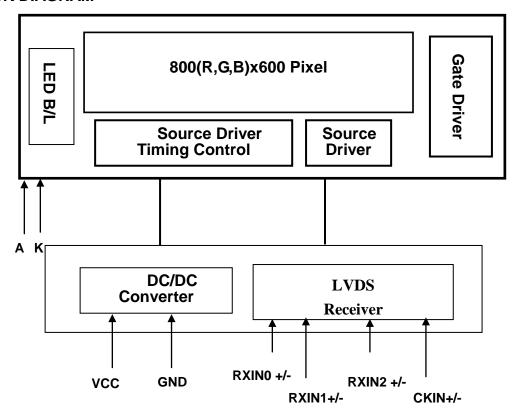
 $t1 \le 10ms$  :  $1 \sec \le t5$   $50ms \le t2$  :  $200ms \le t6$  $0 < t3 \le 50ms$ :  $200ms \le t7$ 





Data: RXINO(+/-), RXIN1(+/-), RXIN2(+/-), CKIN(+/-)

### 9. BLOCK DIAGRAM





# 10. QUALITY ASSURANCE 10.1 Test Condition

## 10.1.1 Temperature and Humidity(Ambient Temperature)

Temperature :  $25 \pm 5^{\circ}$ C Humidity :  $65 \pm 5\%$ 

### 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

	Reliability Test Item & Level	Test Level	Remark	
No.	Test Item	Test Level		
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)	$-30^{\circ}$ C → $+25^{\circ}$ C → $+80^{\circ}$ C,100 Cycles 30 min 5 min 30 min	IEC68-2-14	
7	Vibration Test (No operation)	Frequency: 10 ~ 55 Hz Amplitude: 1.5 mm Sweep Time: 11mins Test Period: 6 Cycles for each Direction of X,Y,Z	IEC68-2-6	
8	Shock Test (No operation)	100G, 6ms Direction: ± X,± Y,± Z Cycle: 3 times	IEC68-2-27	



## 10.2 Inspection condition

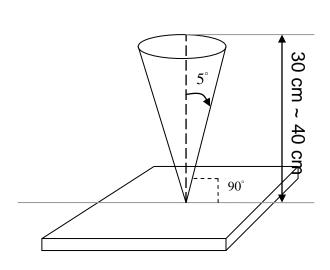
10.2.1 Inspection conditions

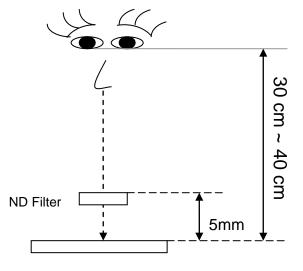
10.2.1.1 Inspection Distance :  $35 \pm 5$  cm

10.2.1.2 View Angle:

( 1 ) Inspection under operating condition :  $\pm 5^{\circ}$ 

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

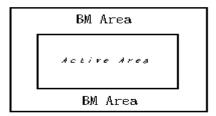




10.2.2 Environment conditions:

Ambien	t Temperature :	<b>25±5</b> ℃		
Ambie	ent Humidity :	65±5%		
Ambient	Cosmetic Inspection	More than 600lux		
Illumination	Functional Inspection	300 ~ 800lux		

### 10.2.3 Definition of applicable Zones





10.2.4 Inspection Parameters

No.	.2.4 Inspection Parame  Parameter	Criteria							
		Display function: No Display malfunction (Major)							
		Contrast ratio (Black, White): Does not meet specified range in the spec. (Major) (Note:3)							
		Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and colored. (Major) (Note:1)							
		Point Defect (Red,	green, blue	, dar	k): Active	area	a ≤5dots (I	Minor)(No	te:1)
		Item	Acceptable number	e	Total		lass Of efects	AQL Level	
		Bright Dark	4		8	ı	Minor	1.5	
		Adjacent Bright	11		1		IVIII IOI	1.0	
		Adjacent Dark	1		1				
1	Operating	Non-uniformity: Visible through 2% Foreign material in						· ·	nor)
		Dimension		Acc	ceptable	Cla	ss Of	AQL	
				nun	nber	Def	ects	Level	
		D ≤ 0.3			*				
		0.3 < D ≤0.5			4		Minor	1.5	
		D> 0.5			0				
		D = (Long + Short)				4 / 4 !			
		Foreign Material in	Line or spir	raı sr	nape (vv≤ Accepta		Class O		
		Dimen	sion		numbe		Defects		
		W>0.1mm,L>5mi	m		0		3.03.0		-
		-		<u> </u>	4		Minor	1.5	
		$L \leq 5$ mm,0.07mm $<$ W $\leq 0.1$ mm		11	*				
		L : Length W : Width * : Disregard							
		<u> </u>		Disre	egard				
		Dimension: Outline	• • •						
		Bezel appearance: uneven (Minor)							
		Scratch on the Polarize : (Note:2)							
2	External Inspection	Dimen	sion		Accepta numbe		Class O Defects		
	(non-operating)	W>0.1mm,L>5mm			0				
		│ │	ı <w≦0.1mr< td=""><td>m</td><td>4</td><td></td><td>Minor</td><td>1.5</td><td>;</td></w≦0.1mr<>	m	4		Minor	1.5	;
					*				
		L ≤ 5mm,W<0.07mm							
	l	L. Lengur VV. V	vidui *.L	וטוכ	yaru -				



Dent and spots shape on the pol	arize: (Note:2)	: (Note: 5)		
Dimension	Acceptable	Class Of	AQL	
Dimension	number	Defects	Level	
D ≤ 0.3	*			
0.3 < D ≤0.5	4	Minor	1.5	
D> 0.5	0			
D = (Long + Short) / 2 * : Disre	egard			_
	Dimension $D \le 0.3$ $0.3 < D \le 0.5$ $D > 0.5$	$\begin{array}{c c} Dimension & Acceptable \\ number \\ \hline D \leq 0.3 & * \\ \hline 0.3 < D \leq 0.5 & 4 \\ \hline \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

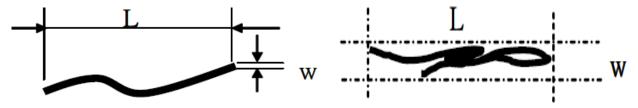
				Definition
	defects	Major		It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
		Minor	1AU1 1 5%	It is a defect that will not result in functioning problem with deviation classified.

Note:1.(a)Bright point defect is defined as point defect of R,G,B with area >1/2 dot respectively

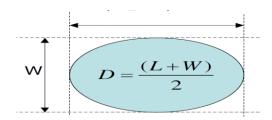
- (b)Dark point defect is defined as visible in full white pattern.
- (c)The point defect must under 2% ND Filter visible.

Note:2 The external inspection should be conducted at the distance  $35\pm 5$ cm 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 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.



Note:5 Spot Foreign Material (W ≥ L/4)



### **10.3 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

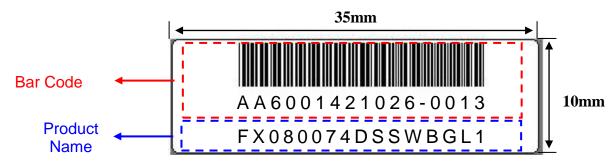
Sampling table: MIL-STD-105E

Inspection level: Level II

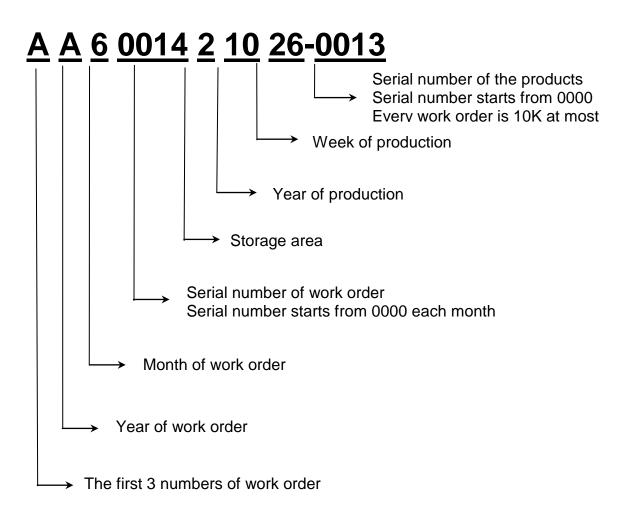
FX080074DSSWBGL1 REV: 2



## **Product Label style:**

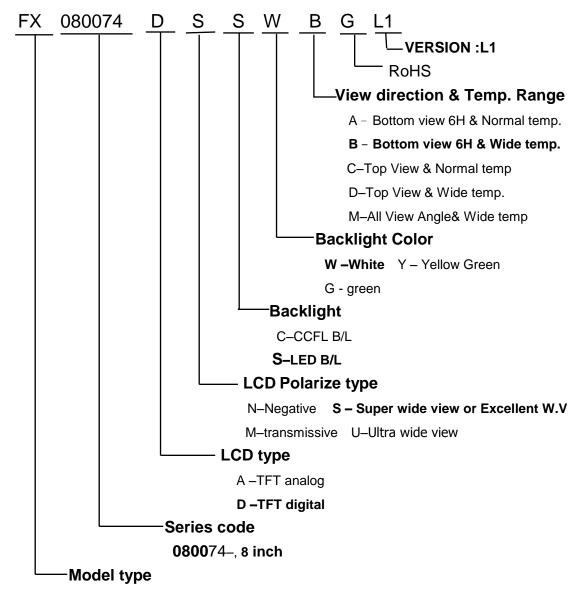


## **BarCode Define:**





### **Product Name Define:**



FG-Standard TFT Module

**FX-Custom TFT Module** 



### 12. PRECAUTIONS IN USE LCM

### 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

- 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.

- (3) The modules should be kept in antistatic bags or other containers resistant to static for storage.
- (4) Only properly grounded soldering irons should be used.
- (5) If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.
- (6) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended
- (7) 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:
- (4) Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
- (5) Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
- (6) 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

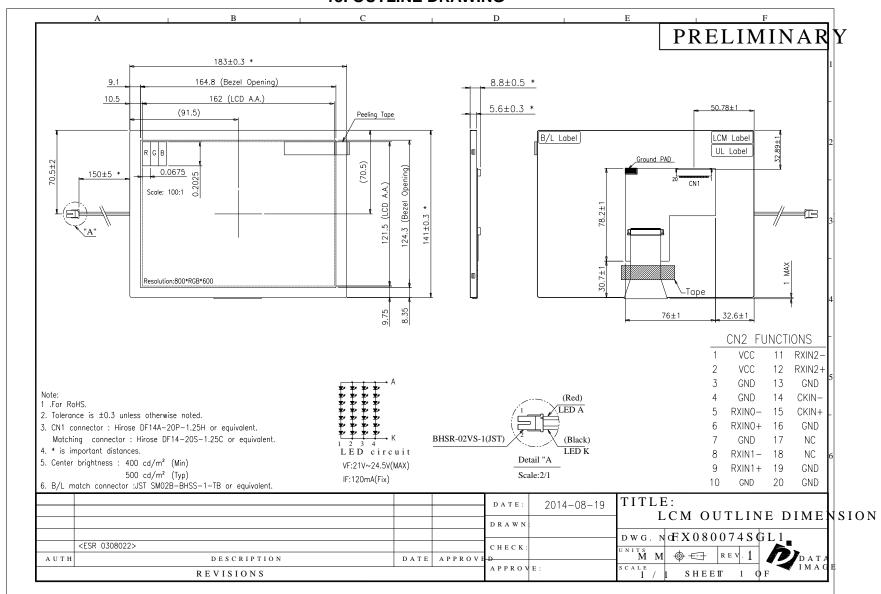
Unless otherwise agreed between DATA IMAGE and customer, DATA IMAGE will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DATA IMAGE acceptance standards, for a period on one year from date of shipment. Confirmation of 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

