

TFT-Display Datenblatt

Modell FG120140DSSWAG01

Kurzdaten

Hersteller	Data Image
Diagonale	12,1" / 30,7 cm
Format	4:3
Auflösung	800 x 600
Backlight	LED / 350 cd/m ²
Interface	LVDS
Touchscreen	nein
Temperatur	-10... +65°C (Betrieb)



DATA IMAGE CORPORATION

TFT Module Specification

PRELIMINARY

ITEM NO.: FG120140DSSWAG01

Table of Contents

1. COVER & CONTENTS	1
2. RECORD OF REVISION	2
3. GENERAL DESCRIPTIO	3
4. ABSOLUTE MAXIMUM RATINGS	4
5. OPTICAL CHARACTERISTIC	5
6. SIGNAL INTERFACE	8
7. INTERFACE TIMINGS.....	13
8. ELECTRICAL CHARACTERISTICS.....	16
9. POWER ON/OFF SEQUENCE.....	18
10. QUALITY ASSURANCE.....	19
11. LOT NUMBERING SYSTEM	20
12. LCM NUMBERING SYSTEM	20
13. PRECAUTION IN USE LCM.....	21
14. OUTLINE DRAWING	22
15. PACKAGE SPECIFICATION.....	23

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2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	26/MAR/08			Initial PRELIMINARY

3. GENERAL DESCRIPTION

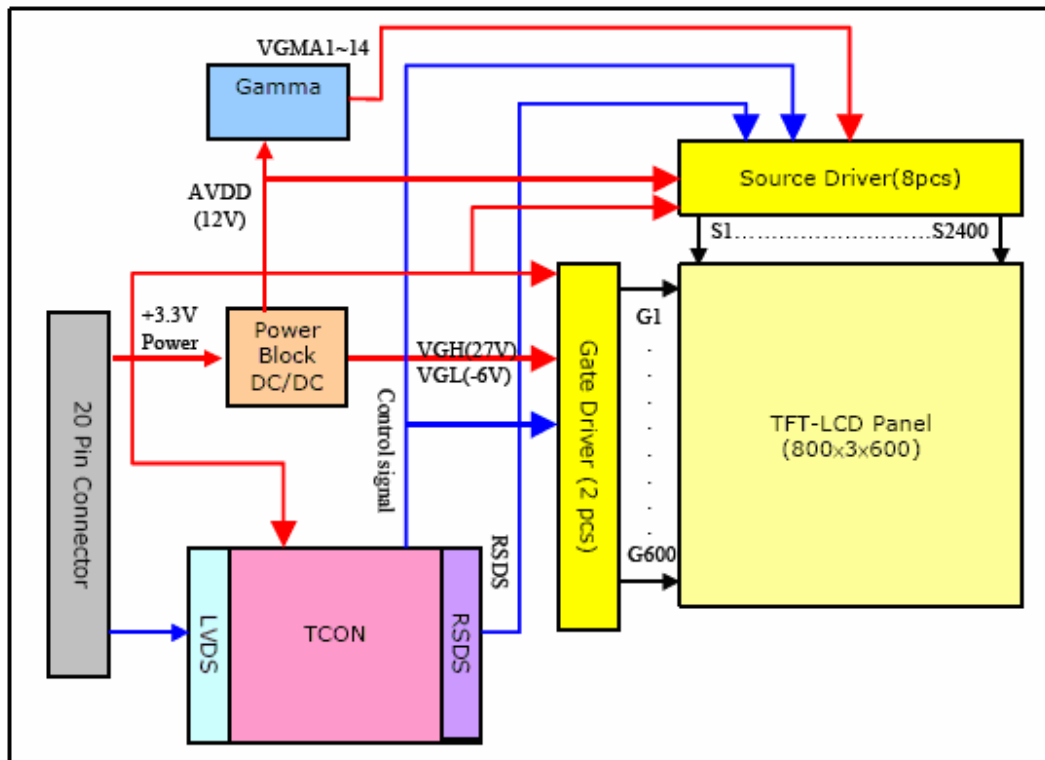
This module is designed for display units of Industrial Applications.
 The screen format is intended to support the SVGA (800(H) x 600(V)) screen and 262k colors (RGB 6-bits data driver).
 All input signals are LVDS interface compatible.

3.1 Display Characteristics

The following items are characteristics summary on the table under 25°C condition :

Items	Unit	Specifications
Screen Diagonal	[mm]	310 (12.1")
Active Area	[mm]	246.0(H) x 184.5(V)
Pixel H x V		800(x3) x 600
Pixel Pitch	[mm]	0.3075(H) x 0.3075(V)
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN mode, Normally White
Weight	[Grams]	TBD ±10
Physical Size	[mm]	279.0(W) x 209.0(H) x 11(D)
Electrical Interface		LVDS (1 channel)
Surface treatment		Anti-glare (AG)
Temperature Range		
Operating	[°C]	-10 to +65
Storage(Shipping)	[°C]	-30 to +70

3.2 Functional Block Diagram

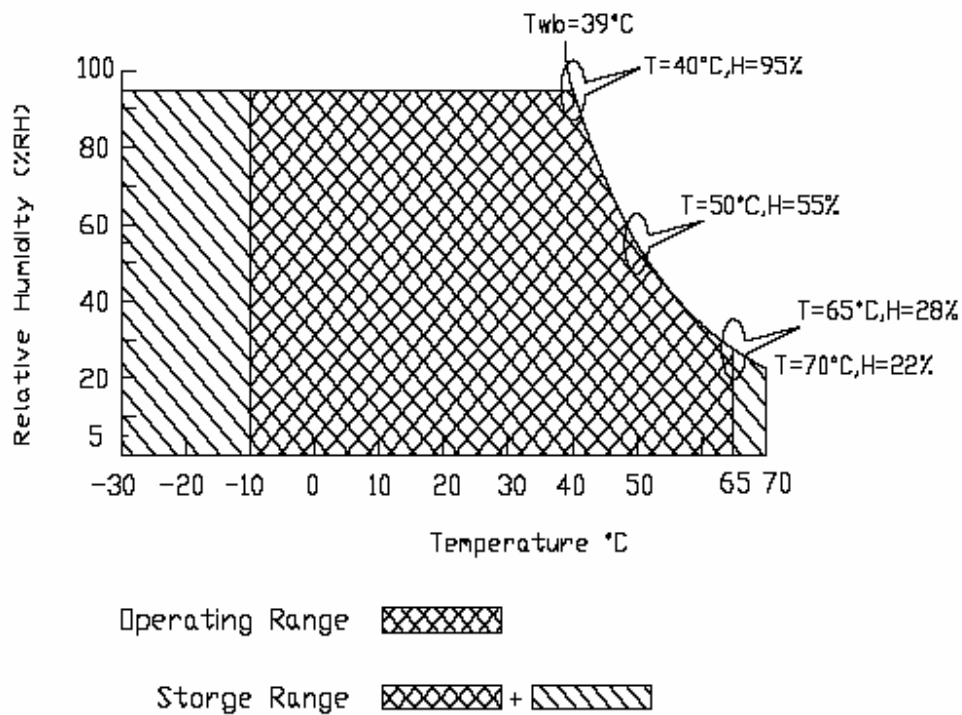


4. ABSOLUTE MAXIMUM RATINGS

Absolute maximum ratings of the module is as follows :

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	+4.0	[Volt]	
Input Voltage of Signal	Vin	-0.3	VDD+0.3	[Volt]	
Operating Temperature	TOP	-10	+65	[°C]	Note1
Operating Humidity	HOP	8	95	[%RH]	Note1
Storage Temperature	TST	-30	+70	[°C]	Note1
Storage Humidity	HST	5	95	[%RH]	Note1

Note1 : Maximum Wet-Bulb should be 39°C and no condensation.

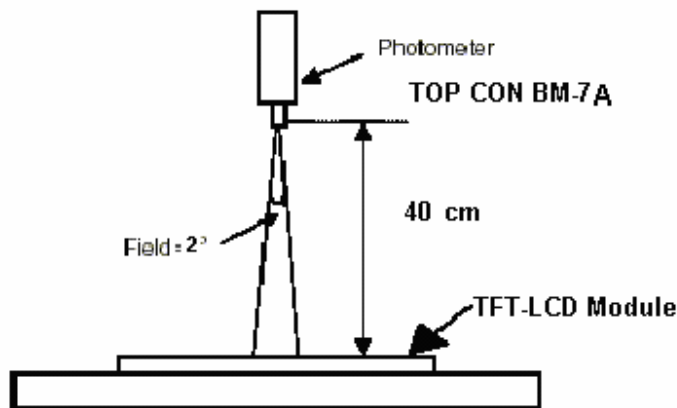


5. OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks	
Viewing Angle	Horizontal	θ_{x+}	60	70	--	deg	Note 1,4	
		θ_{x-}	60	70	--			
	Vertical	θ_{y+}	CR \geq 10	45	50			--
		θ_{y-}		55	60			--
Contrast Ratio	CR	at optimized viewing angle	400	500			Note 1,3	
Response time	Rise	Tr	-	10	20	ms	Note 1,6	
	Fall	Tf	$\theta_{x=\theta y}=0^\circ$	-	25	30		ms
Uniformity	B-uni	$\theta_{x=\theta y}=0^\circ$	70	80	--	%	Note1,5	
Brightness	L	$\theta_{x=\theta y}=0^\circ$	300	350	--	cd/m ²	Note 1,2	
Chromaticity	x_W	Center $\theta_{x=\theta y}=0^\circ$		TBD			Note 1,7	
	y_W			TBD				
	x_R			TBD				
	y_R			TBD				
	x_G			TBD				
	y_G			TBD				
	x_B			TBD				
	y_B			TBD				
Image sticking	tis	2 hours			2	Sec	Note 8	

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance ≤ 1 lux, and at room temperature). The operation temperature is $25^\circ\text{C} \pm 2^\circ\text{C}$ and LED current = $I_L * 2 = 400\text{mA}$. The measurement method is shown in Note1.

Note1: The method of optical measurement:

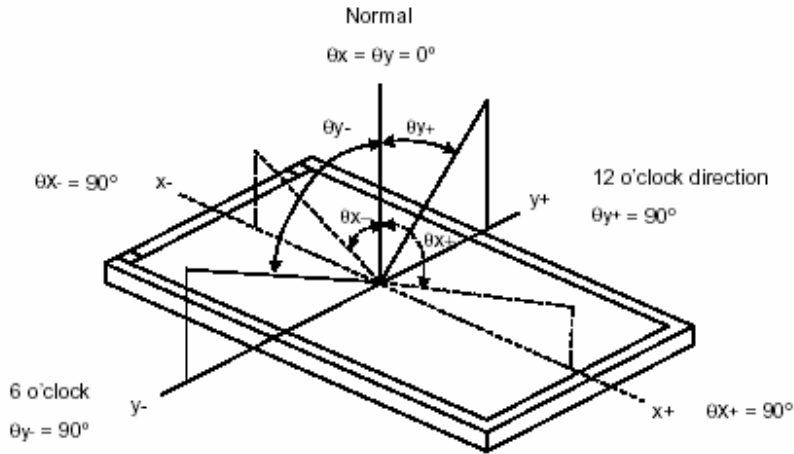


Note2: Measured at the center area of the panel and at the viewing angle of the $\theta_x = \theta_y = 0^\circ$

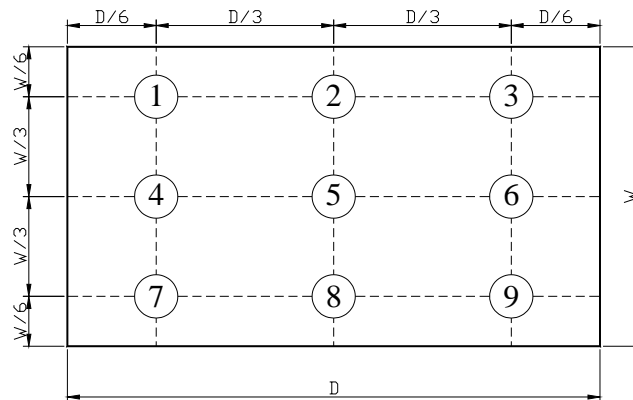
Note3: Definition of Contrast Ratio (CR):

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

Note4: Definition of Viewing Angle



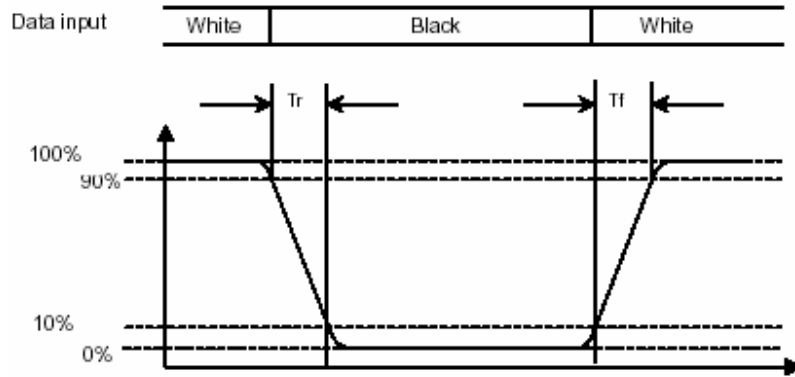
Note 5: Definition of Brightness Uniformity (B-uni):



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

Note6: Definition of Response Time:

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



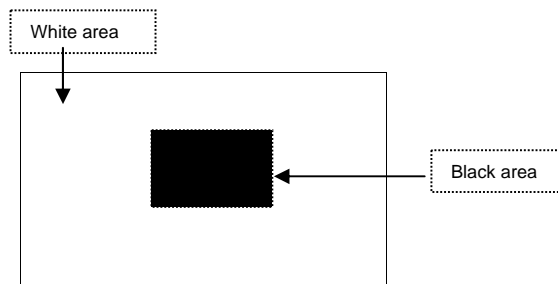
Note 7: Definition of Chromaticity:

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

Note 8: Definition of Image sticking (tis):

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

Image sticking pattern



6. SIGNAL INTERFACE

6.1 Connectors

Connector Name / Designation	For Signal Connector
Manufacturer	JAE
Type / Part Number	FI-S20S or compatible
Mating Connector / Part Number	FI-SEB20P-HF13E

Connector Name / Designation	For LED Connector
Manufacturer	JST
Type / Part Number	JST BHR-03VS-1 or compatible
Mating Connector / Part Number	JST SM03(4.0)B-BHS-1-TB

6.2 Signal Pin

Pin No.	Signal Name	Pin No.	Signal Name
1	VDD	2	VDD
3	GND	4	GND
5	RxIN0-	6	RxIN0+
7	GND	8	RxIN1-
9	RxIN1+	10	GND
11	RxIN2-	12	RxIN2+
13	GND	14	CKIN-
15	CKIN+	16	GND
17	NC/GND	18	NC/GND
19 (Note1)	NC/GND	20	NC/GND

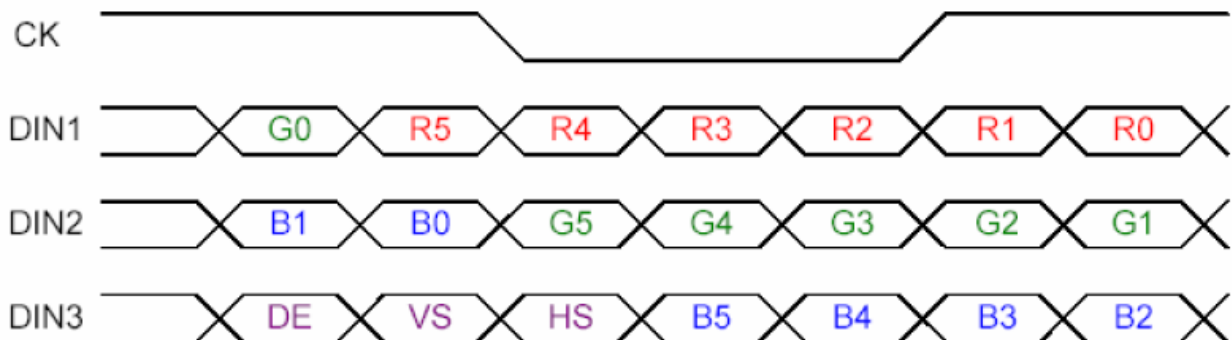
Note1: Pin19 can be used for enabling “reverse scan” function. Refer to section 6.7 for scanning direction.

6.3 Signal Description

The module using a LVDS receiver . LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS84 (negative edge sampling) or compatible.

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

Signal Name	Description
RxIN0-, RxIN0+	LVDS differential data input (Red0-Red5, Green0)
RxIN1-, RxIN1+	LVDS differential data input (Green1-Green5, Blue0-Blue1)
RxIN2-, RxIN2+	LVDS differential data input (Blue2-Blue5, Hsync, Vsync, DE)
CKIN-, CKIN+	LVDS differential clock input
VDD	+3.3V Power Supply
GND	Ground
NC	No Connection



Signal Name	Description	
+RED5 +RED4 +RED3 +RED2 +RED1 +RED0	Red Data 5 (MSB) Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB) Red-pixel Data	Red-pixel Data Each red pixel's brightness data consists of these 6 bits pixel data.
+GREEN5 +GREEN4 +GREEN3 +GREEN2 +GREEN1 +GREEN0	Green Data 5 (MSB) Green Data 4 Green Data 3 Green Data 2 Green Data 1 Green Data 0 (LSB) Green-pixel Data	Green-pixel Data Each green pixel's brightness data consists of these 6 bits pixel data.
+BLUE5 +BLUE4 +BLUE3 +BLUE2 +BLUE1 +BLUE0	Blue Data 5 (MSB) Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB) Blue-pixel Data	Blue-pixel Data Each blue pixel's brightness data consists of these 6 bits pixel data.
CLK	Data Clock	The typical frequency is 40MHz. The signal is used to strobe the pixel data and DE signals. All pixel data shall be valid at the falling edge when the DE signal is high.
DE	Display Timing	This signal is strobed at the falling edge of CLK. When the signal is high, the pixel data shall be valid to be displayed.
VSYNC	Vertical Sync	The signal is synchronized to CLK.
HSYNC	Horizontal Sync	The signal is synchronized to CLK.

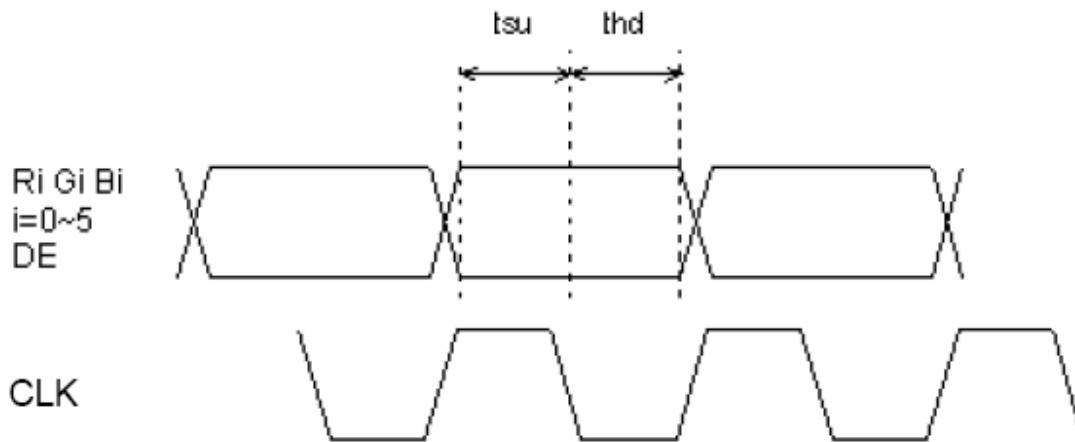
Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

6.4 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.
Signal electrical characteristics are as follows :

Item	Symbol	Min.	Typ.	Max.	Unit
The differential level	VID	0.25	0.35	0.45	V
The common mode input voltage	VIC	1.125	1.25	1.375	V
The input setup time (Note1)	tsu	1.05	-	-	ns
The input hold time (Note1)	thd	1.05	-	-	ns
Clock frequency	CLK	30	40	50	MHz

Note1: Condition: @40MHz



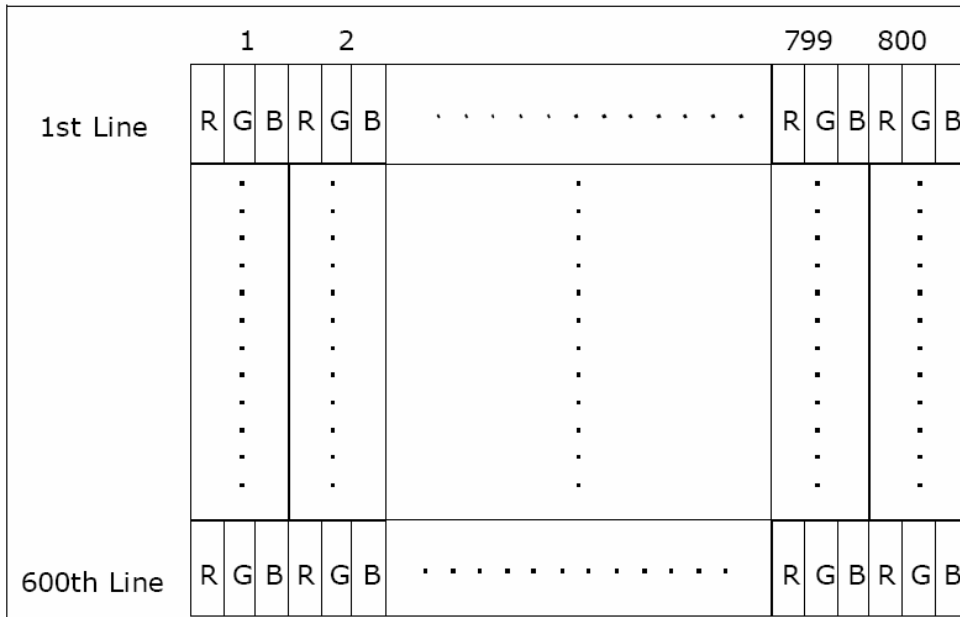
6.5 Signal for LED Connector

Note: CN2 connector (backlight): JST BHR-03VS-1
Mating connector: JST SM03(4.0)B-BHS-1-TB

Pin no.	Symbol	Function	Remark
1	LEDA	LED Anode	Cable color :Red
2	LEDK	LED Cathode	Cable color: Black

6.6 Pixel Format Image

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



6.7 Scanning Direction

Following picture figures shows the image seen from the front view. The arrow indicate the direction of scan.

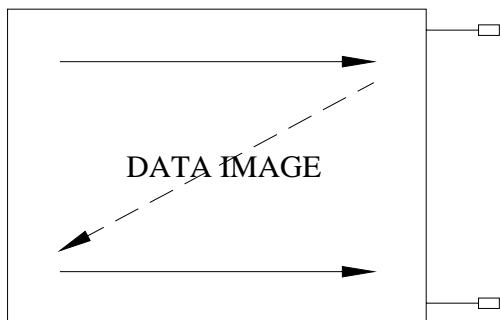


Fig. 1 Normal scan (Pin19= GND/NC)

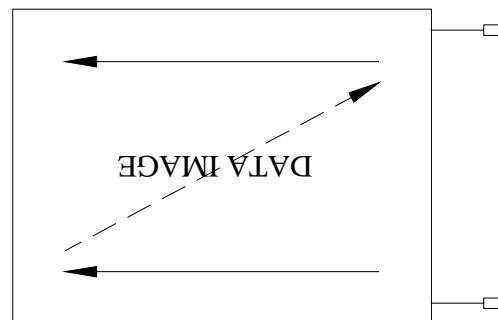


Fig. 2 Reverse scan (Pin19= High)

7. INTERFACE TIMINGS

Basically, interface timing should match the VESA 800x600 /60Hz(VG901101) manufacturing guide line timing.

7.1 Timing Characteristics

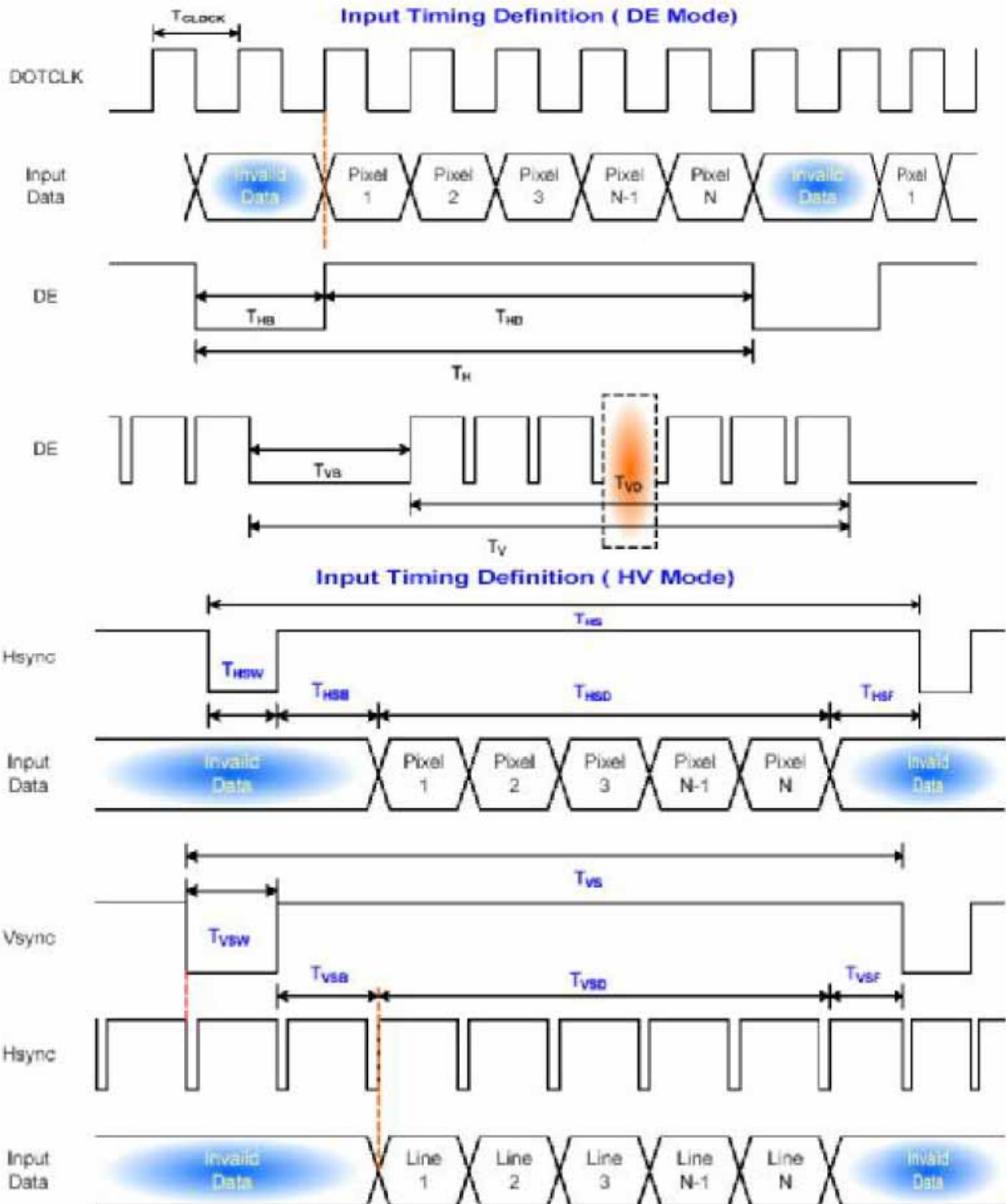
(a) DE mode

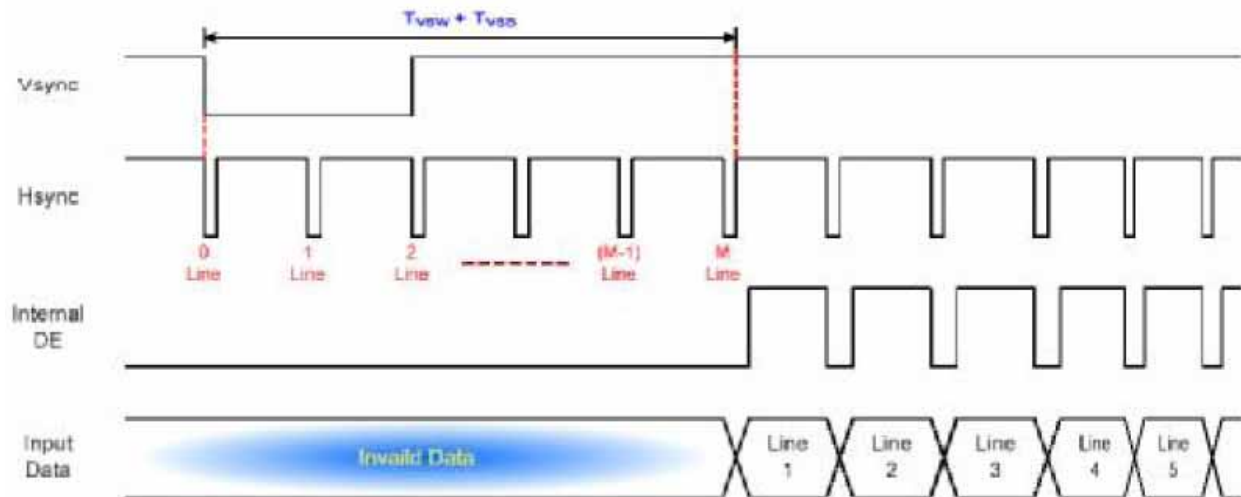
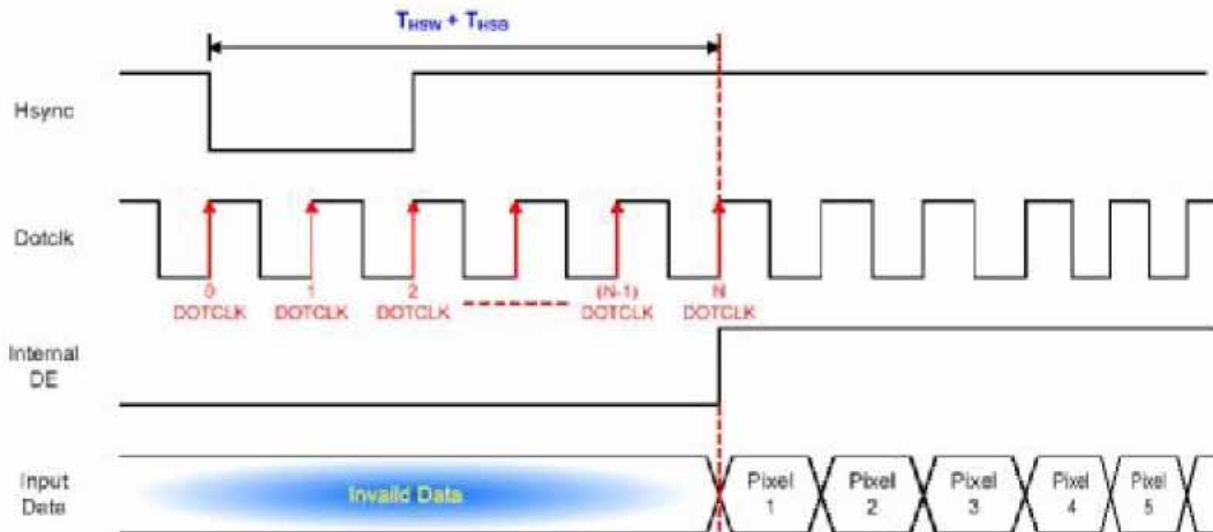
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency	Fck	30	40	50	MHz	
Horizontal blanking	Thb1	160	256	260	Clk	
Vertical blanking	Tvb1	28	28	28	Th	

(b) HV mode

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency	Fck	30	40	50	MHz	
Hsync period	Th	960	1056	1060	Clk	
Hsync active	Thsd	800			Clk	
Hsync front porch	Thf	114	210	214	Clk	
Hsync pulse width + back porch	Thw + Thb	46	46	46	Clk	
Hsync blanking	Thb1	160	256	260	Clk	
Vsync period	Tv	628	628	628	Th	
Vsync active	Tvsd	600			Th	
Vsync front porch	Tvf	1	1	1	Th	
Vsync pulse width + back porch	Tvw + Tvb	27	27	27	Th	
Hsync / Vsync phase shift	Ths	2			Th	

Item	Symbol	Value	Unit	Description
Horizontal display start	The	46	Clk	After falling edge of Hsync, counting 218clk, then getting valid data from 219th clk's data.
Vertical display start	Tve	1	Th	After falling edge of Vsync, counti25th, then getting 26th Th 's data. ng

7.2 Timing Definition


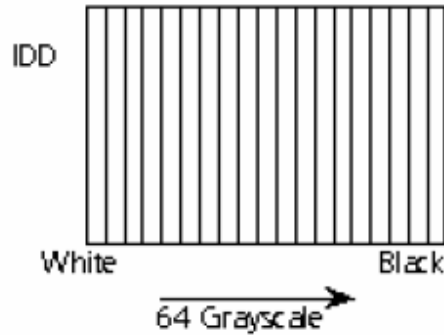
7.3 Timing Chart
Vertical Backporch Definition (HV Mode)

Horizontal Backporch Definition (HV Mode)


8. ELECTRICAL CHARACTERISTICS

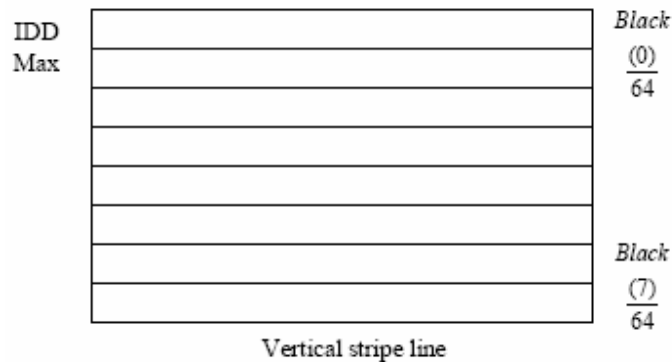
8.1 TFT-LCD Driving Conditions

Symbol	Parameter	Min	Typ	Max	Units	Condition
Module						
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	V	Load Capacitance 20uF
PDD	VDD Power	-	0.86	-	W	All Black Pattern
PDD Max	VDD Power max	-	0.88	-	W	Max Pattern Note
IDD	IDD Current	-	235	-	mArms	64 Grayscale Pattern Note 1
IDD Max	IDD Current max	-	268	-	mArms	Vertical stripe line Pattern Note 2
V _{RP}	Power Ripple Voltage	-	100	-	mVp-p	
I _{RUSH}	Inrush Current	-	500	-	mApeak	

Note 1: Effective value (mArms) at V_{CC} = 3.3 V/25°C.



Note 2:



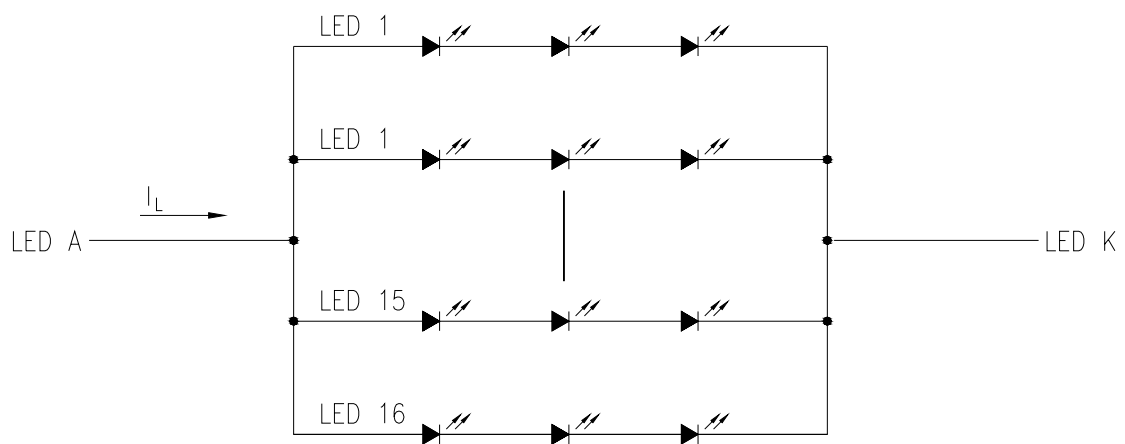
8.2 Backlight driving conditions

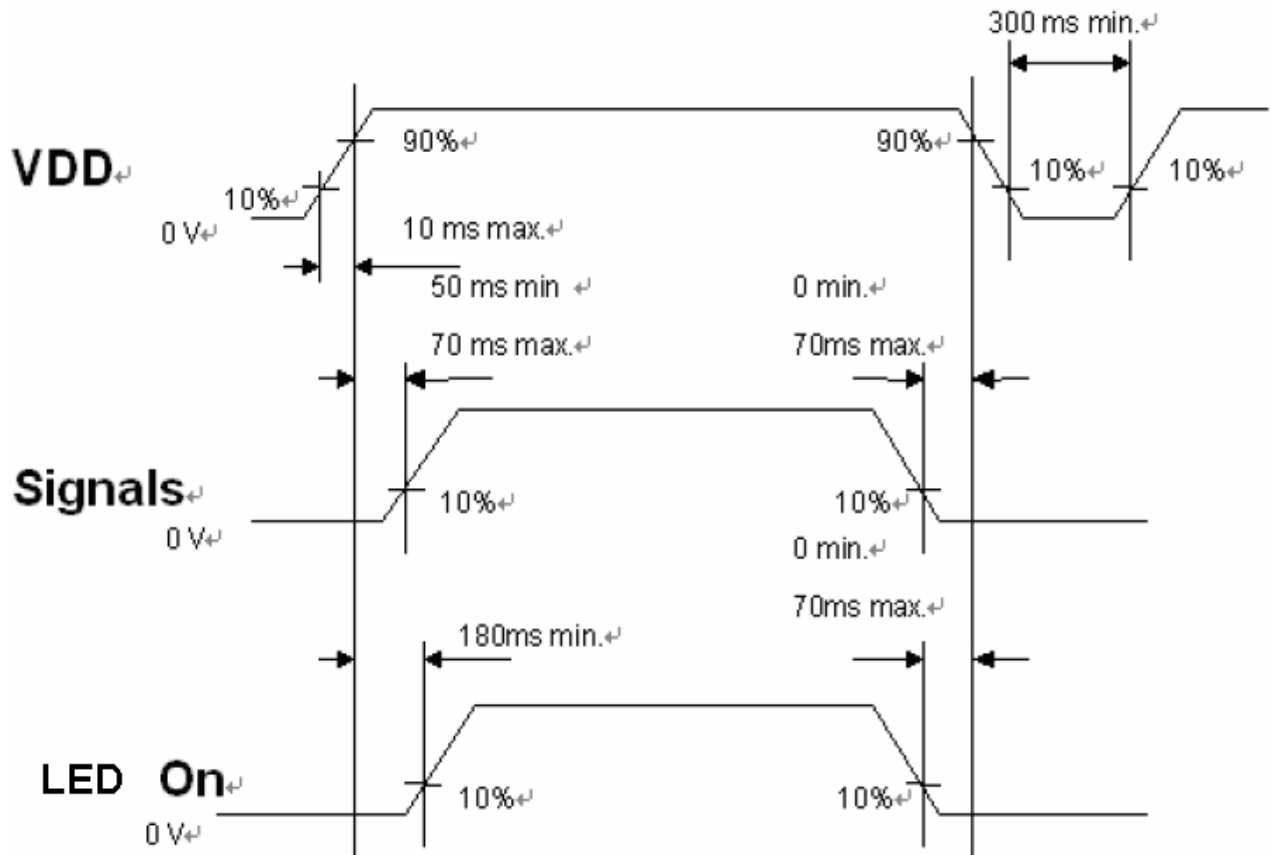
Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
LED voltage	VL	-	9.4	-	V	Note 1
LED Current	IL	-	200	-	mA	
LED Life Time	-	TBD	--	-	Hours	Note 1

Note 1: The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and $I_L = 200\text{mA}$.

Note 2: $V_L = V_{LED A} - V_{LED K}$

Note 3: LED backlight total current = $I_L * 2$



9. POWER ON/OFF SEQUENCE


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

10. QUALITY ASSURANCE

10.1 Test Condition

10.1.1 Temperature and Humidity(Ambient Temperature)

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

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.

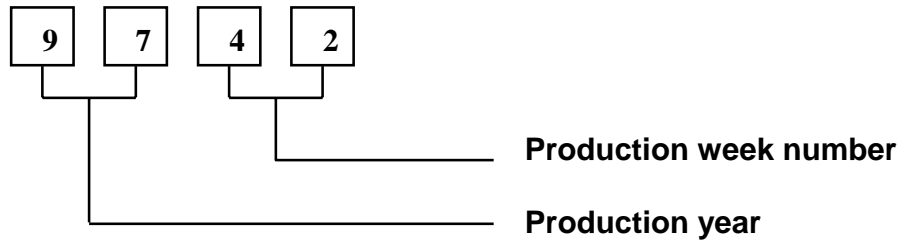
10.1.4 Test Frequency

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

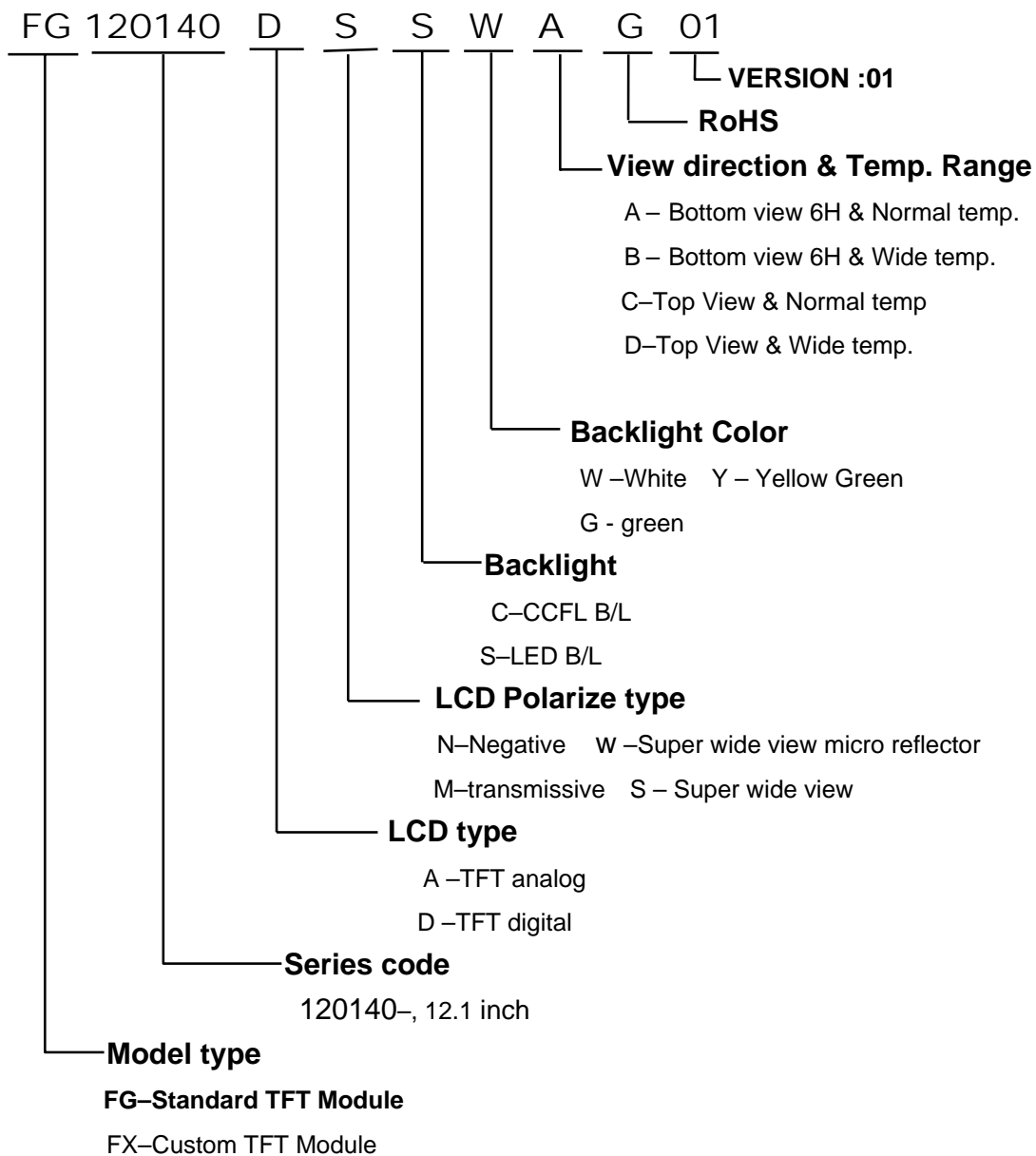
10.1.5 Test Method

Reliability Test Item & Level		Test Level
No.	Test Item	
1	High Temperature Storage Test	T=70°C,240hrs
2	Low Temperature Storage Test	T=-30°C,240hrs
3	High Temperature Operation Test	T=65°C,240hrs
4	Low Temperature Operation Test	T=-10°C,240hrs
5	High Temperature and High Humidity Operation Test	T=40°C,90%RH,240hrs
6	Thermal Cycling Test (No operation)	-10°C +25°C +65°C ,100 Cycles 30 min 5 min 30 min
7	Vibration Test (No operation)	Frequency : 10 ~ 57 Hz Amplitude : 1.0 mm 58 ~ 500 Hz, 1G Sweep Time : 11min Test Period : 3hrs (1hrs for each Direction of X,Y,Z)
8	Shock Test (No operation)	80G, 6ms Direction : $\pm X, \pm Y, \pm Z$ Cycle : 1 times

11. LOT NUMBERING SYSTEM



12. LCM NUMBERING SYSTEM



13. PRECAUTION IN USE LCM

1. LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handling,

- (1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel off or bubble.
- (2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzin.
- (3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.
- (4). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.
- (5). Do not drive LCD with DC voltage.

2. Liquid Crystal Display Modules

2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

- (1). Do not tamper in any way with the tabs on the metal frame.
- (2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.
- (3). Do not touch the elastomer connector, especially insert a backlight panel (for example, EL).
- (4). When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
- (5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

2.2. Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

- (1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, 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.

2.3 Soldering

- (1). Solder only to the I/O terminals.
- (2). Use only soldering irons with proper grounding and no leakage.
- (3). Soldering temperature : $280^{\circ}\text{C} \pm 10^{\circ}\text{C}$
- (4). Soldering time: 3 to 4 sec.
- (5). Use eutectic solder with resin flux fill.
- (6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed after wards.

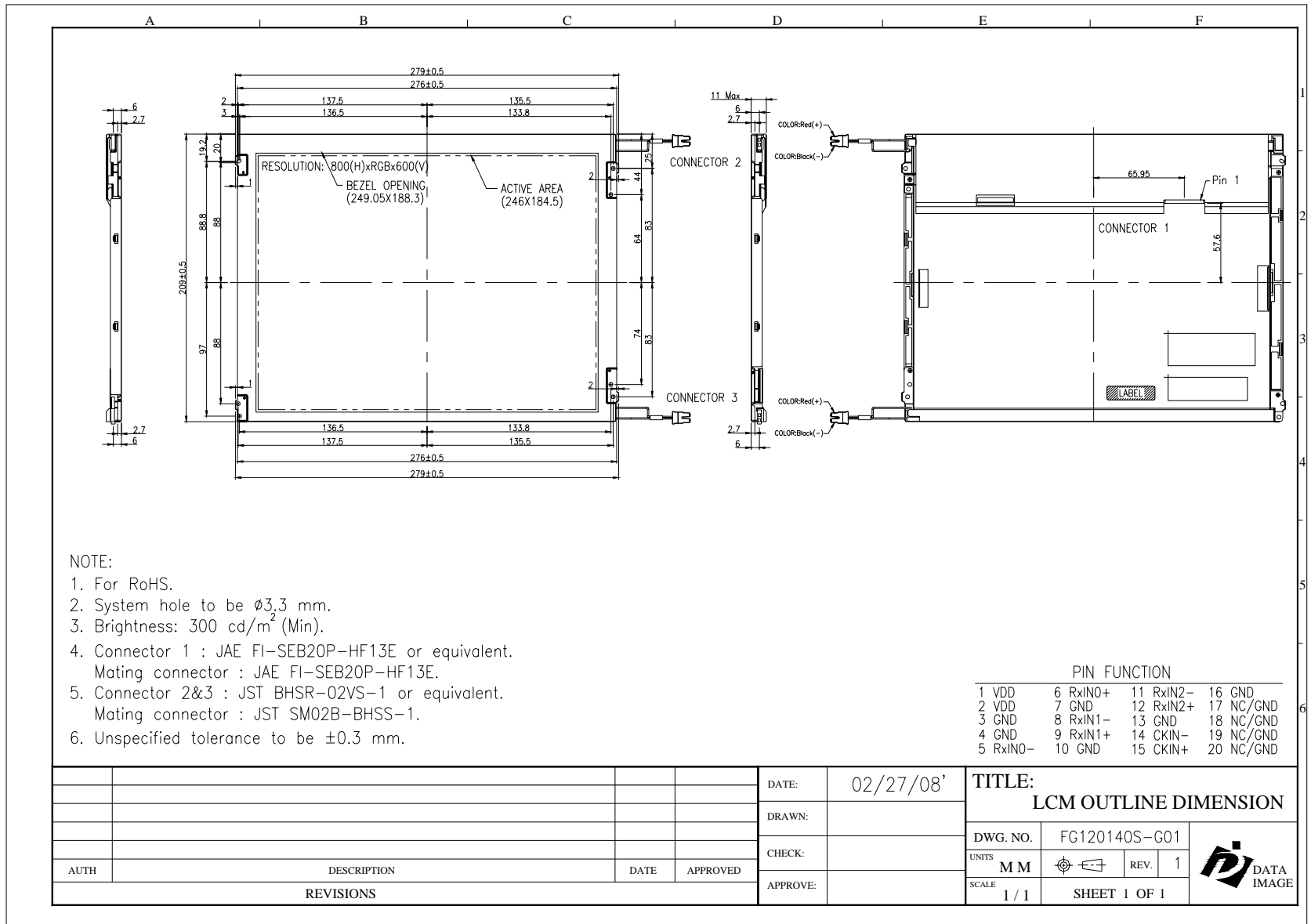
2.4 Operation

- (1). Driving voltage should be kept within specified range; excess voltage shortens display life.
- (2). Response time increases with decrease in temperature.
- (3). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".
- (4). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

2.5 Storage

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

Confidential Document
14. OUTLINE DRAWING



15. PACKAGE SPECIFICATION

1. Max. Capacity: 20pcs LCD Modules / per carton
2. Max. Weight: 17 kg / per carton
3. The outside dimension of carton is 576(L) mm x 326(L) mm x 420(H) mm

