

TFT-Display Datenblatt

Modell FG100120DSSWAG01

Kurzdaten

Hersteller	Datimage
Diagonale	10,2" / 25,9cm
Format	17:10
Auflösung	1024x600
Backlight	LED/350cd/m ²
Temperatur	0...+70°C (Betrieb)



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DATA IMAGE CORPORATION

TFT Module Specification

PRELIMINARY

ITEM NO.: FG100120DSSWAG01

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	JACK	ERIC	GANY	HUANG
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	3	2010/1/28		20

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	13/AUG/09			Initial PRELIMINARY
2	15/DEC/09'	3,5,7,8,9, 11,13	3,5,7,10,14, 16,19	1.Modify: Surface Treatment 2.Modify: Module Weight 3. Modify: ELECTRICAL CHARACTERISTICS 4. Modify: INPUT TERMINAL 5. Modify: INTERFACE TIMING 6. Modify: OPTICALCHARACTERISTICS 7.Delete ITEM .11 (PRECAUTIONS) 8.Change OUTLINE DRAWING from Rev: 1 to Rev:2
3	28/JAN/10'	13	19	Change OUTLINE DRAWING from Rev: 2 to Rev:3

3. GENERAL DESCRIPTION

3.1 OVERVIEW

This is a 10.1" TFT Liquid Crystal Display Module with LED Backlight unit and 40 pin LVDS interface. This module supports 1024 X 600 WSVGA mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction.

3.2 FEATURES

- 1 Channel LVDS interface with 1 pixel / clock
- Thin and light weight
- 6-bit color depth, display 262K colors
- Single LED Lighting Bar. (Top side/Horizontal Direction)
- Data enable signal mode
- Green Product (RoHS & Halogen free product)
- On board LED Driving circuit
- On board EDID chip

3.3 APPLICATION

TFT LCD Notebook

3.4 GENERAL SPECIFICATIONS

Parameter	Specifications	Unit	Note
Active Area	222.72(H) x 125.28(V)	mm	1
Bezel Opening Area	225.92(H) x 128.48(V)	mm	1
Driver Element	a-Si TFT active matrix	-	-
Display Format	1024 x R.G.B x 600	dot	-
Pixel Pitch	0.2175(H) x 0.2088(V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262,144	color	-
Treatment Mode	Normally white	-	-
Surface Treatment	Hard coating(3H) Glare type	-	-

3.5 MECHANICAL SPECIFICATIONS

Item	MIN.	Typ.	MAX.	Unit	Note	
Module Size	Horizontal (H)	--	--	235.5	mm	Note1
	Vertical (V)	--	--	143.5		
	Depth (D)	--	--	5.2		
Weight	--	--	195	g	-	

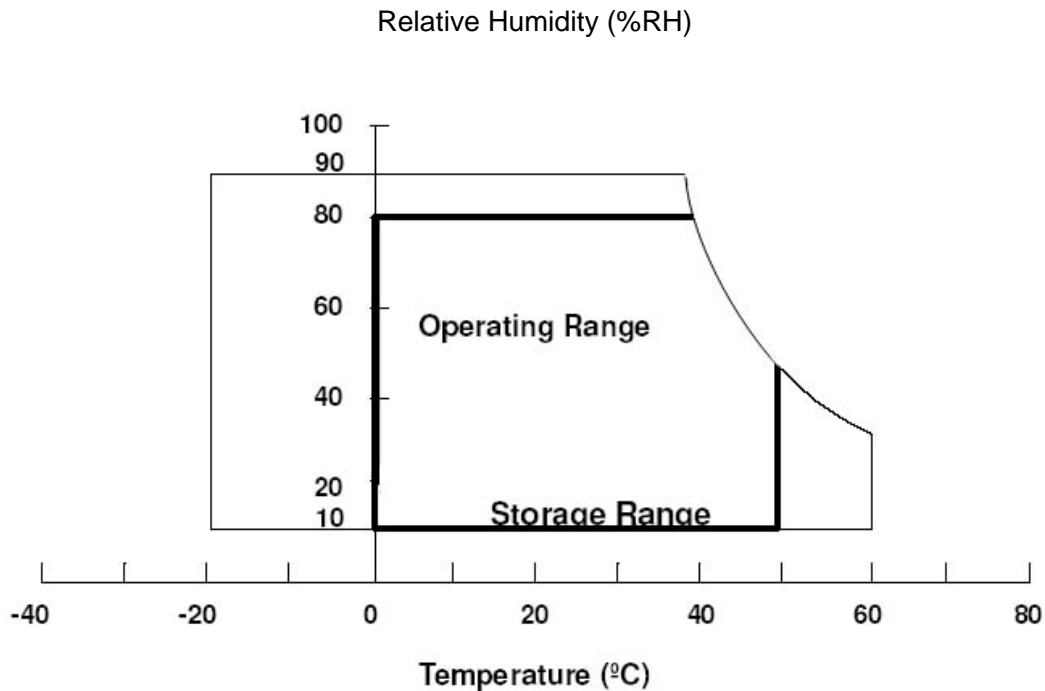
Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

4. ABSOLUTE MAXIMUM RATINGS

4.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	TST	-20	+60		1
Operating Ambient Temperature	TOP	0	+50		1

Note 1. (a) 90%RH Max. ($T_a \leq 40$)
 (b) Wet-bulb temperature should be 39 Max. ($T_a > 40$)
 (c) No condensation.



4.2 ELECTRICAL ABSOLUTE RATINGS

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VDDIN	-0.3	+4.0	V	Note 1

Note 1. Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under normal operating conditions.

5. ELECTRICAL CHARACTERISTICS

5.1 Electrical Specifications

Ta=25+/-2

Parameter	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
Power Supply Voltage	VDD	3.0	3.3	3.6	V	Note1
Permissible Input Ripple Voltage	VRF	-	-	100	mV	At VDD=3.3v
In-Rush Current	IRUSH	-	-	1000	mA	Note 2
Power Supply Current	IDD	-	200	260	mA	Note 1
Positive-going Input Threshold voltage	VIT+	-	-	100	mV	Vcm=1.2V typ.
Negative-going Input Threshold voltage	VIT-	-100	-	-	mV	
Differential Input Voltage	VID	100	-	600	mV	Note 2

Note 1. The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for 3.3V at 25 °C.

a) Typ: Window XP pattern

b) Max: Vertical 2 line skip pattern

Note 2. Duration of rush current is about 2ms and rising time of VDD is 520us ± 20%.

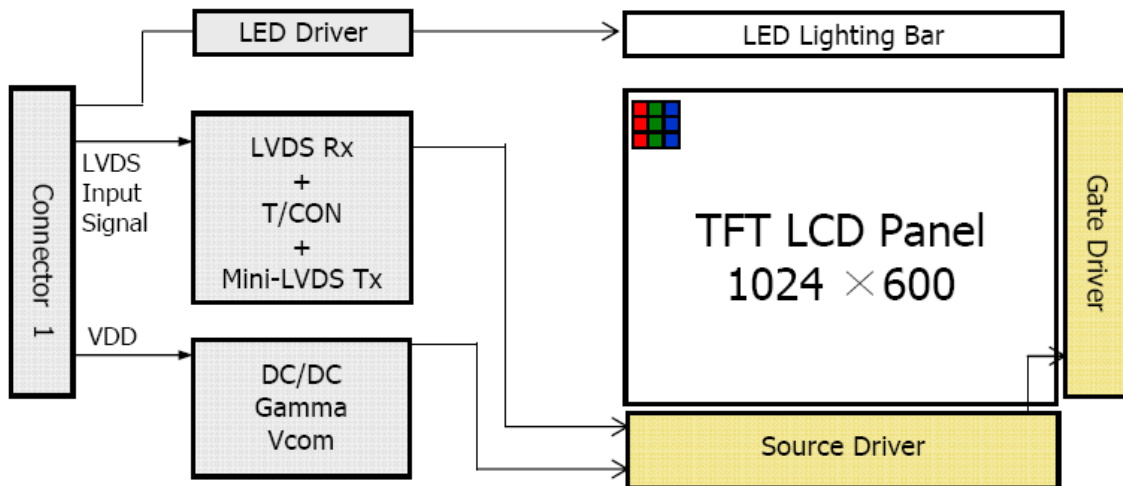
5.2 Backlight Unit

Ta=25+/-2

Parameter		MIN.	TYP.	MAX.	UNIT	Note
LED Power Supply Voltage	VLED	7	12	20	V	-
LED Power Supply Current	ILED	-	TBD		mA	-
LED Life-Time	N/A	15,000	-	-	Hour	IF=20mA
PWM Control Frequency	FPWM	180	200	220	Hz	
EN Control Level	Backlight on	2.0	-	5.0	V	
	Backlight off	0	-	1.0	V	
PWM Control Level	PWM High Level	2.0	-	5.0	V	
	PWM Low Level	0	-	0.1	V	
Duty Ratio	-	20	-	100	%	

Note 1: The LED Life-time define as the estimated time to 50% degradation of initial luminous.

6. BLOCK DIAGRAM



7 INPUT TERMINAL

7.1 Electrical Interface Connection

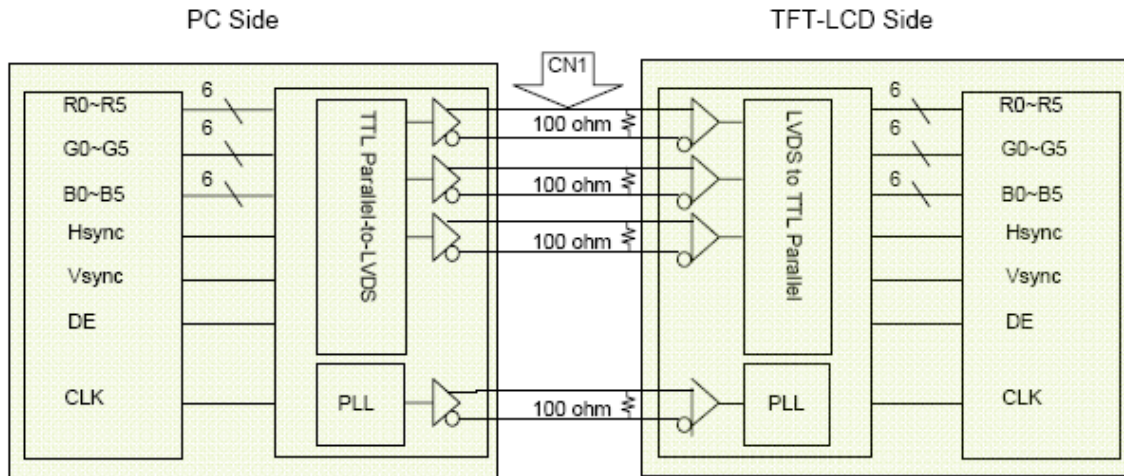
The electronics interface connector is I-PEX 20455-040E-12 or Compatible or equivalent. The mating connector part number is I-PEX 20455-040T-11 or Compatible.

Pin	Symbol	Description
1	NC	Connection to Pin 34
2	VDDIN	Power Supply 3.3V (typ).
3	VDDIN	Power Supply 3.3V (typ).
4	VDC	VDC 3.3V power for EDID
5	BISTC	For BIST Control (Note. 1)
6	CLK EDID	EDID clock
7	Data EDID	EDID data
8	RXIN0-	Transmission Data of 0 Negative-
9	RX IN0+	Transmission Data of 0 Positive+
10	GND	Ground
11	RXIN1-	Transmission Data of 1 Negative-
12	RXIN1+	Transmission Data of 1 Positive+
13	GND	Ground
14	RXIN2-	Transmission Data of 2 Negative-
15	RXIN2+	Transmission Data of 2 Positive+
16	GND	Ground
17	RXCLKIN-	Sampling Clock of Negative-
18	RXCLKIN+	Sampling Clock of Positive+
19	GND	Ground
20	NC	No Connection
21	NC	No Connection
22	GND	Ground
23	NC	No Connection
24	NC	No Connection
25	GND	Ground
26	NC	No Connection
27	NC	No Connection
28	GND	Ground
29	NC	No Connection
30	NC	No Connection
31	VLED_GND	LED Ground
32	VLED_GND	LED Ground
33	VLED_GND	LED Ground
34	NC	Connection to Pin 1
35	PWM	System PWM Signal Input
36	LED_EN	LED enable pin(+3V Input)
37	NC	No Connection (Reserve)
38	VLED	LED Power Supply 7V-21V
39	VLED	LED Power Supply 7V-21V
40	VLED	LED Power Supply 7V-21V

Note. 1

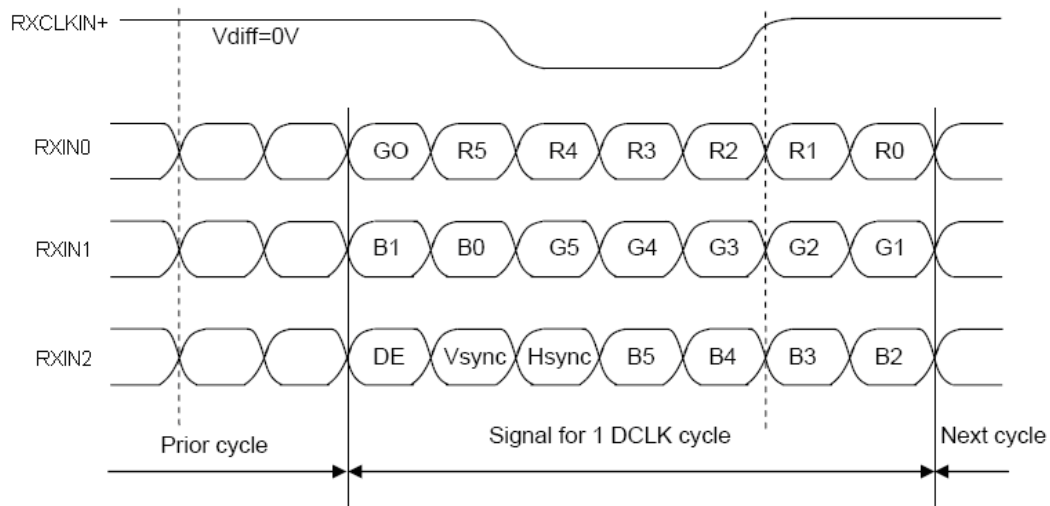
- BIST = "H (3.3V)" : Display BIST pattern @ No LVDS CLK or DE (White->Black->Red->Green->Blue->White....)
- BIST = "L (GND or NC)" : Display Black Patten @ No LVDS CLK or DE

7.2 LVDS Interface



Note. Transmitter :Thine THC63LVDM63A or equivalent.
Transmitter is not contained in Module.

7.3 LVDS Input signal



Note: Pin connection in case of using THine's THC63LVDM63A

7.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

	Colors & Gray scale	Data signal																	
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Light Blue	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Purple	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	
Gray scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△				↑						↑						↑		
	▽				↓						↓						↓		
	Brighter	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
▽	0	1	1	1	1	1	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	
Gray scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	△				↑						↑						↑		
	▽				↓						↓						↓		
	Brighter	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
▽	0	0	0	0	0	0	0	1	1	1	1	1	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	
Gray scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	△				↑						↑						↑		
	▽				↓						↓						↓		
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
▽	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	
Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	
Gray scale of White & Black	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
	△				↑						↑						↑		
	▽				↓						↓						↓		
	Brighter	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1
▽	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	
White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Note 1: 0: Low Level Voltage, 1: High Level Voltage

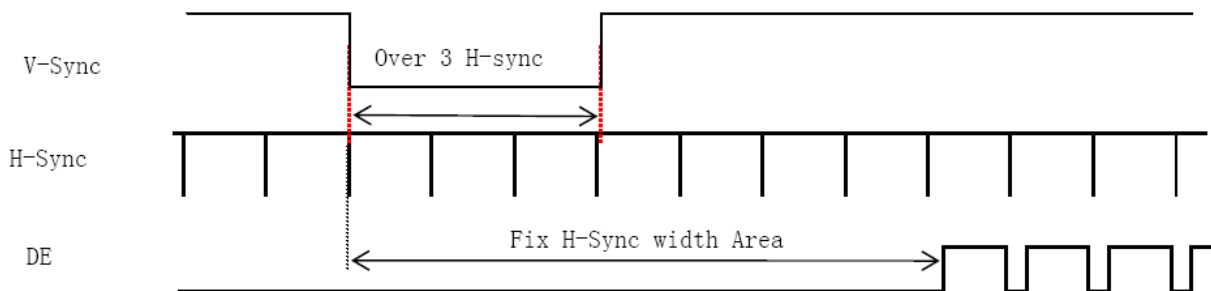
8. INTERFACE TIMING

8.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

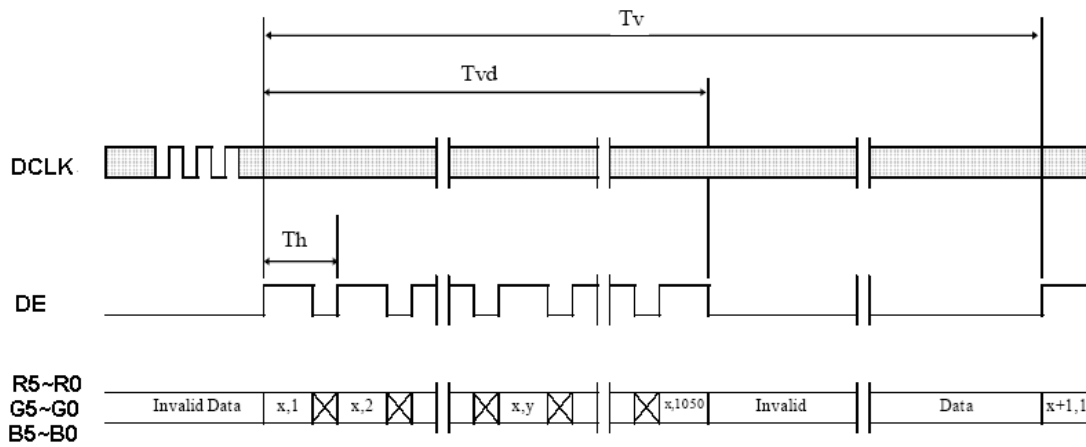
Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	30	57.70	72	MHz
	High Time	Tch	-	4/7	-	Tc
	Low Time	Tcl	-	3/7	-	Tc
Frame Period		Tv	-	642	-	lines
			40	60	-	Hz
			-	17	25ms	ms
Vertical Display Period		Tvd	-	600	-	lines
One line Scanning Period		Th	-	1498	-	clocks
Horizontal Display Period		Thd	1024	1024	1024	clocks

8.1.1 Sync Timing Waveforms

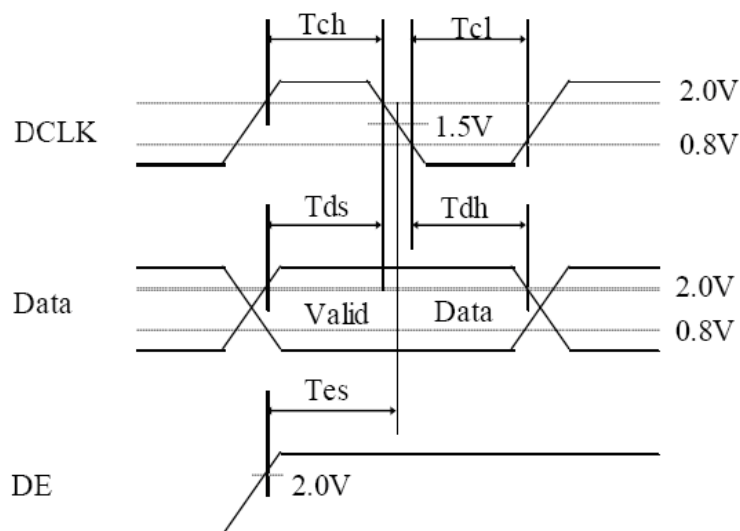
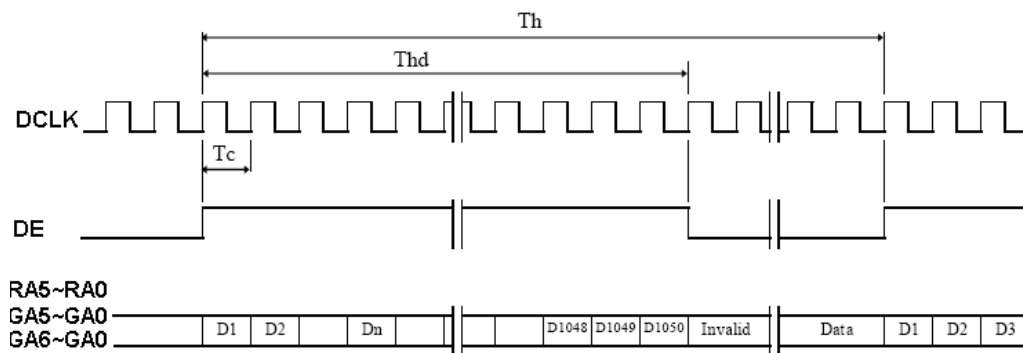


- 1) Need over 3 H-sync during V-Sync Low
- 2) Fix H-Sync width from V-Sync falling edge to first rising edge

8.1.2 Vertical Timing Waveforms

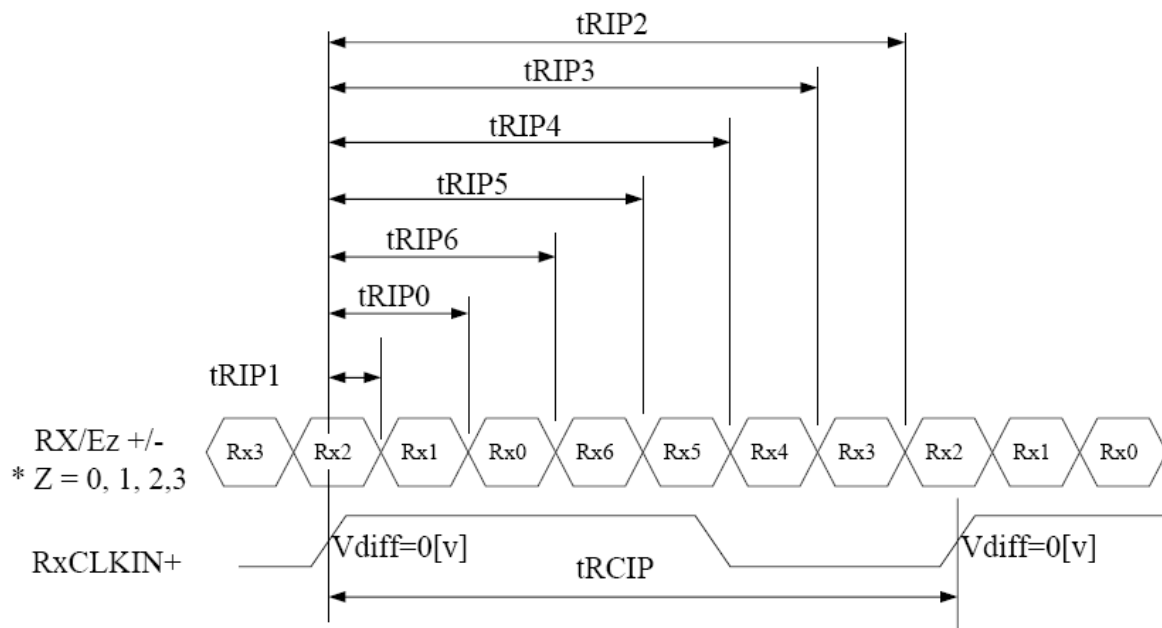


8.1.3 Horizontal Timing Waveforms



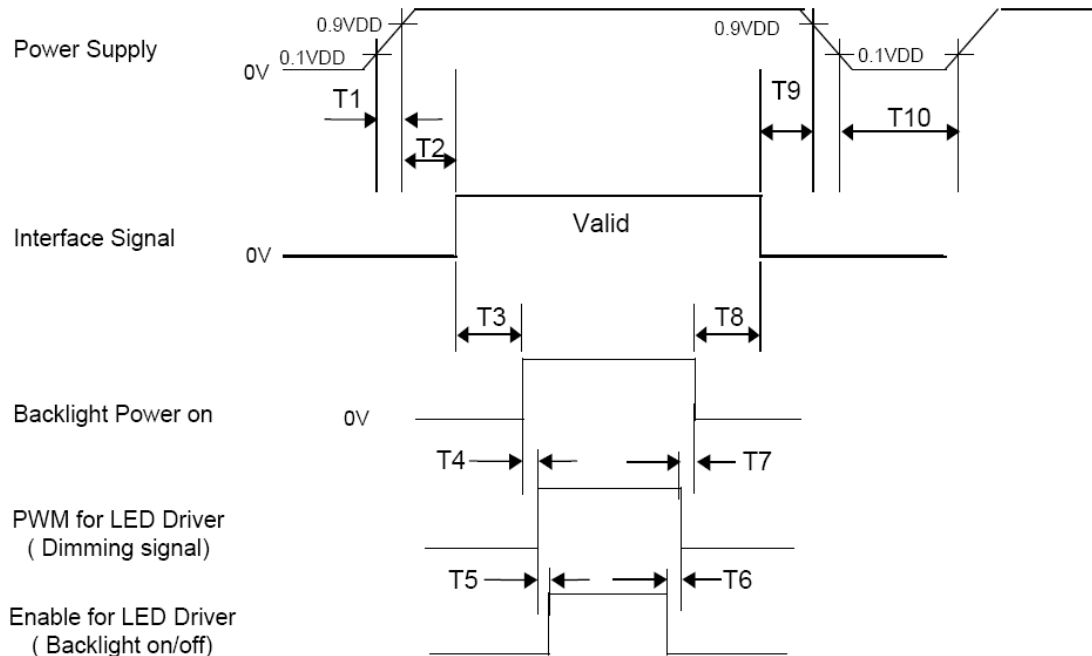
8.2 LVDS Rx Interface Timing Parameter

Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCIP	13.89	17.33	33.3	nsec	
CLK Difference	tCdiff	-tRCIP*(3/7)	0	+tRCIP*(3/7)	nsec	
Input Data 0	tRIP1	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP0	tRCIP/7-0.4	tRCIP/7	tRCIP/7+0.4	nsec	
Input Data 2	tRIP6	2 xtRCIP/7-0.4	2 xtRCIP/7	2 xtRCIP/7+0.4	nsec	
Input Data 3	tRIP5	3 xtRCIP/7-0.4	3 xtRCIP/7	3 xtRCIP/7+0.4	nsec	
Input Data 4	tRIP4	4 xtRCIP/7-0.4	4 xtRCIP/7	4 xtRCIP/7+0.4	nsec	
Input Data 5	tRIP3	5 xtRCIP/7-0.4	5 xtRCIP/7	5 xtRCIP/7+0.4	nsec	
Input Data 6	tRIP2	6 xtRCIP/7-0.4	6 xtRCIP/7	6 xtRCIP/7+0.4	nsec	



8.3 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below.



- $T1 \leq 10 \text{ ms}$
- $0 \text{ ms} \leq T2 \leq 50 \text{ ms}$
- $200 \text{ ms} \leq T3$
- $10 \text{ ms} \leq T4$
- $10 \text{ ms} \leq T5$
- $0 \text{ ms} \leq T6$
- $10 \text{ ms} \leq T7$
- $200 \text{ ms} \leq T8$
- $0 \text{ ms} \leq T9 \leq 50 \text{ ms}$
- $1 \text{ s} \leq T10$

Notes:

- When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
- Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

9. OPTICAL CHARACTERISTICS

9.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25	
Ambient Humidity	Ha	50	%RH
Supply Voltage	VDD	3.3	V
Input Signal	According to typical value in "5. ELECTRICAL CHARACTERISTICS"		
PWM duty		100%	

9.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 9.2. The following items should be measured under the test conditions described in 9.1 and stable environment shown in Note: 5.

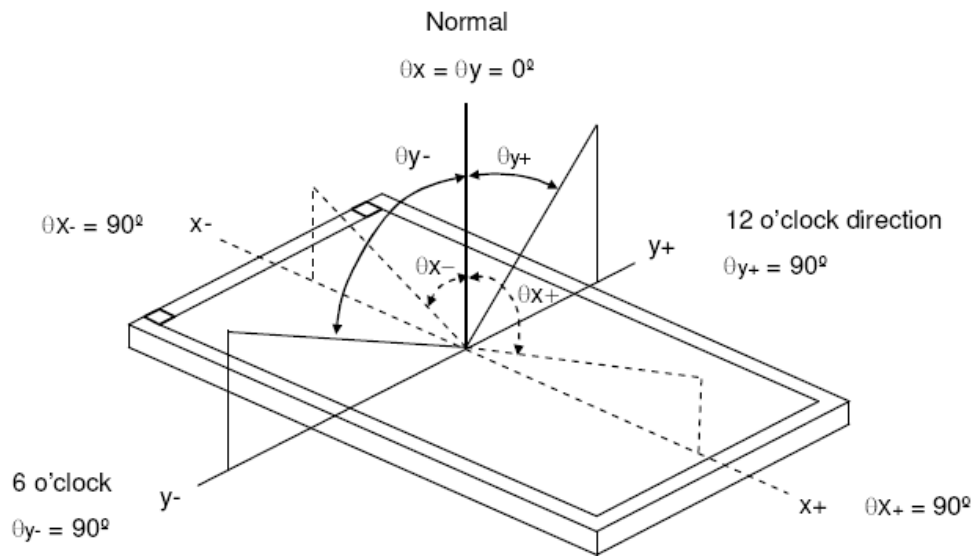
Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ_{x+}	Center CR \geq 10	40	45	--	deg	Note 1,5
		θ_{x-}		40	45	--		
	Vertical	θ_{y+}		15	15	--		
		θ_{y-}		30	35	--		
Contrast Ratio		CR		500	600	--	--	Note 2,5
Response time	Rising + Falling	Tr+Tf		-	8	16	ms	Note 3
Average Luminance of White		L5P		180	200	--	cd/m ²	Note 4,5
White Luminance uniformity		Y5	$\theta_x=\theta_y=0^\circ$	80	-	-	-	Note 5,6
Color Chromaticity	Red	Rx	Viewing Normal Angle	0.550	0.580	0.610	--	Note 1,5
		Ry		0.310	0.340	0.370	--	
	Green	Gx		0.280	0.310	0.340	--	
		Gy		0.520	0.550	0.580	--	
	Blue	Bx		0.125	0.155	0.185	--	
		By		0.125	0.155	0.185	--	
	White	Wx		0.283	0.313	0.343	--	
		W y		0.299	0.329	0.359	--	

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance \leq 1 lux, and at room temperature).

The operation temperature is 25°C \pm 2°C.

The measurement method is shown in Note5.

Note1: Definition of Viewing Angle (θ_x, θ_y)



Note2: Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63}/L_0$$

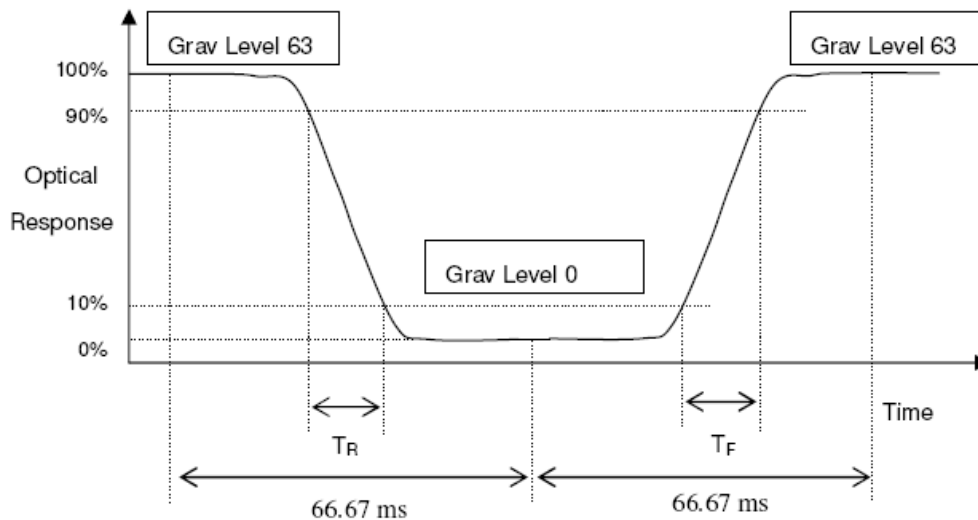
L63: Luminance of gray level 63

L0: Luminance of gray level 0

CR = CR(1)

CR(x) is corresponding to the Contrast Ratio of the point X at Figure in Note 6.

Note 3: Definition of Response Time(T_R, T_F):



Note 4: Definition of Average Luminance of White (LAVE):

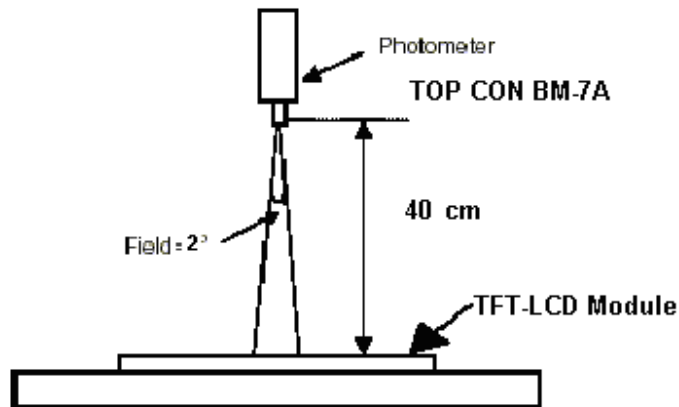
Measure the luminance of gray level 63 at 5 points

$$LAVE = [L(1)+L(2)+L(3)+L(4)+L(5)] / 5$$

L(X) is corresponding to the luminance of the point X at Figure in Note 6

Note 5: Measurement Setup:

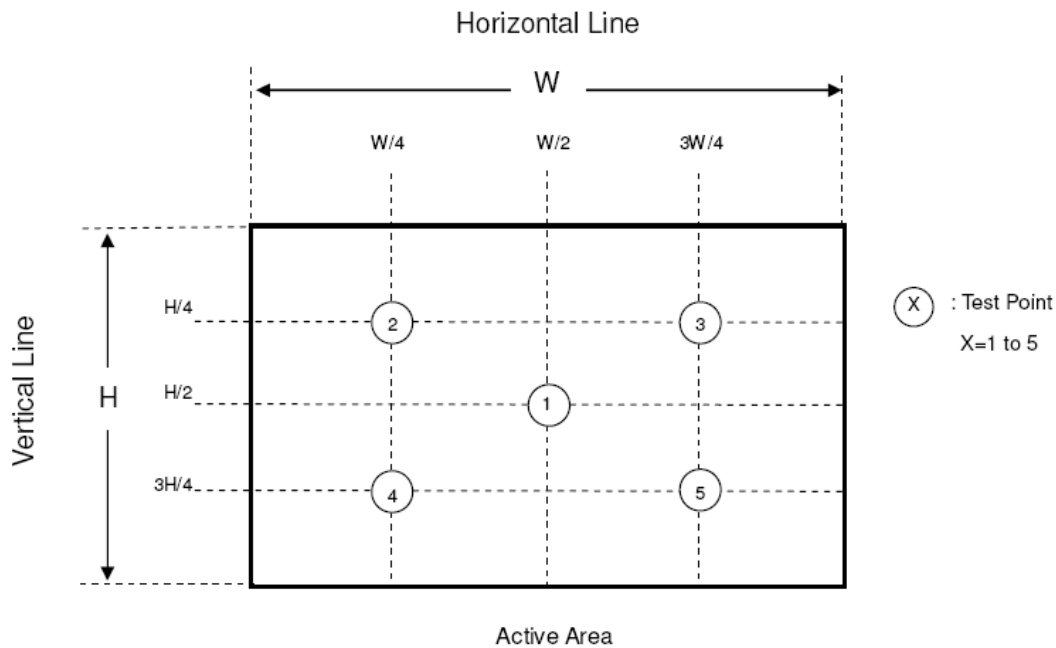
The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 3 minutes in a windless room.



Note 6: Definition of White Variation:

Measure the luminance of gray level 63 at 5 points

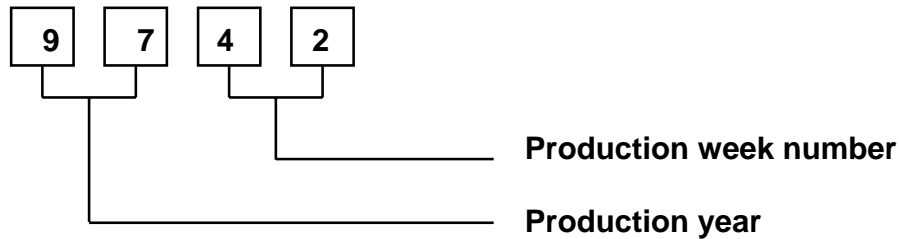
The White luminance uniformity on LCD surface is then expressed as : $Y = \text{Minimum Luminance of 5 points} / \text{Maximum Luminance of 5 points}$.



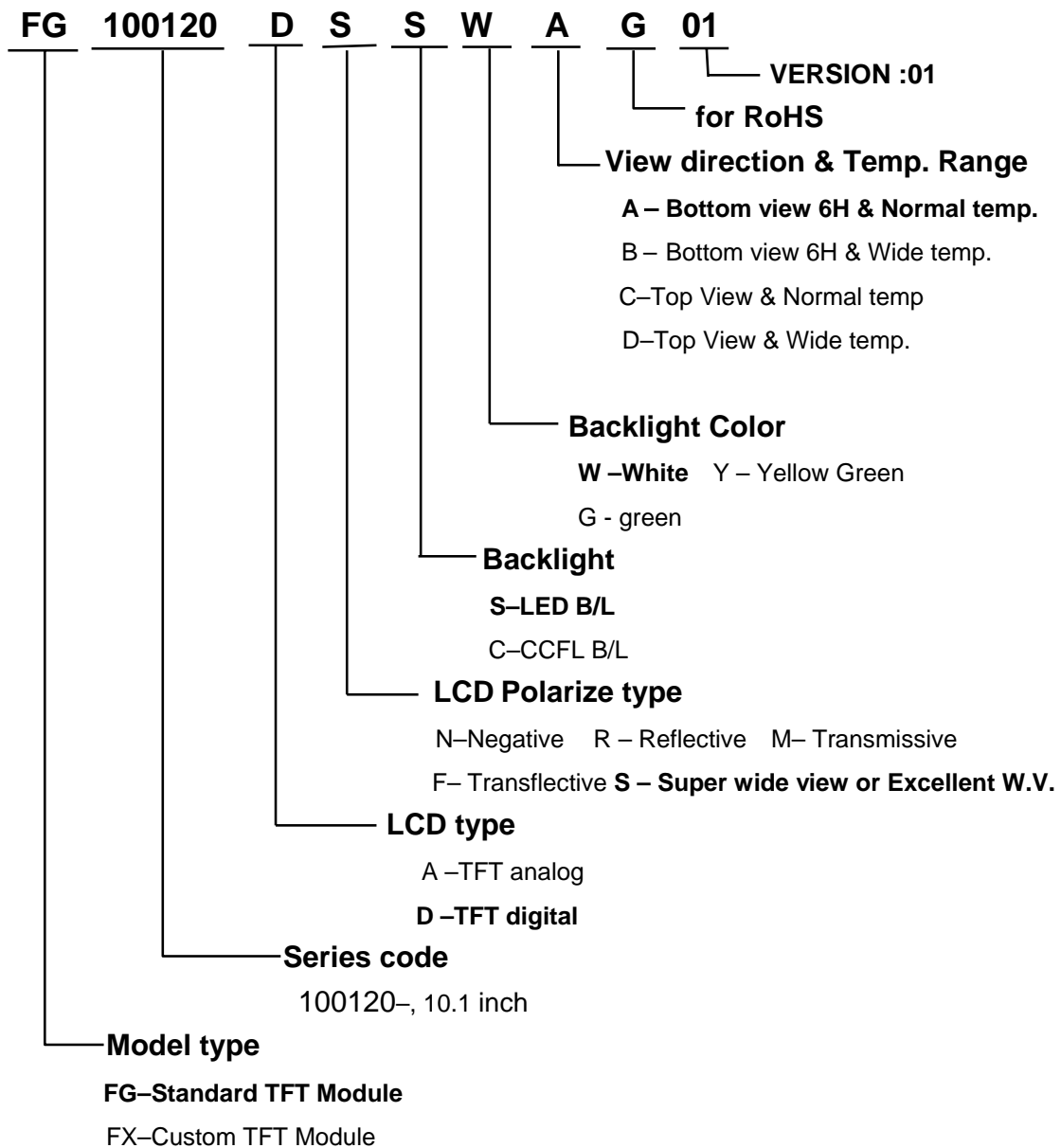
10. RELIABILITY TEST

No.	Test Item	Conditions
1	High Temperature Storage Test	Ta=60 ,240hrs
2	Low Temperature Storage Test	Ta=-20 ,240hrs
3	High Temperature & high humidity Operation Test	Ta=50 ,80%RH, 240hrs
4	High Temperature Operation Test	Ta=50 ,240hrs
5	Low Temperature Operation Test	Ta=0 ,240hrs
6	Thermal shock	Ta=-20 ←→60 (0.5hr), 100 cycle
7	Vibration Test (Non-operation)	1.5G, 10~500Hz Sign X,Y,Z / Sweep rate : 0.5hour
8	Shock Test (No operation)	220G, Half Sine Wave 2msec ±X, ±Y, ±Z Once for each direction
9	Electro-static discharge test (Non-operating)	Air: 150 pF, 330 , 15KV Contact: 150 pF, 330 , 8KV

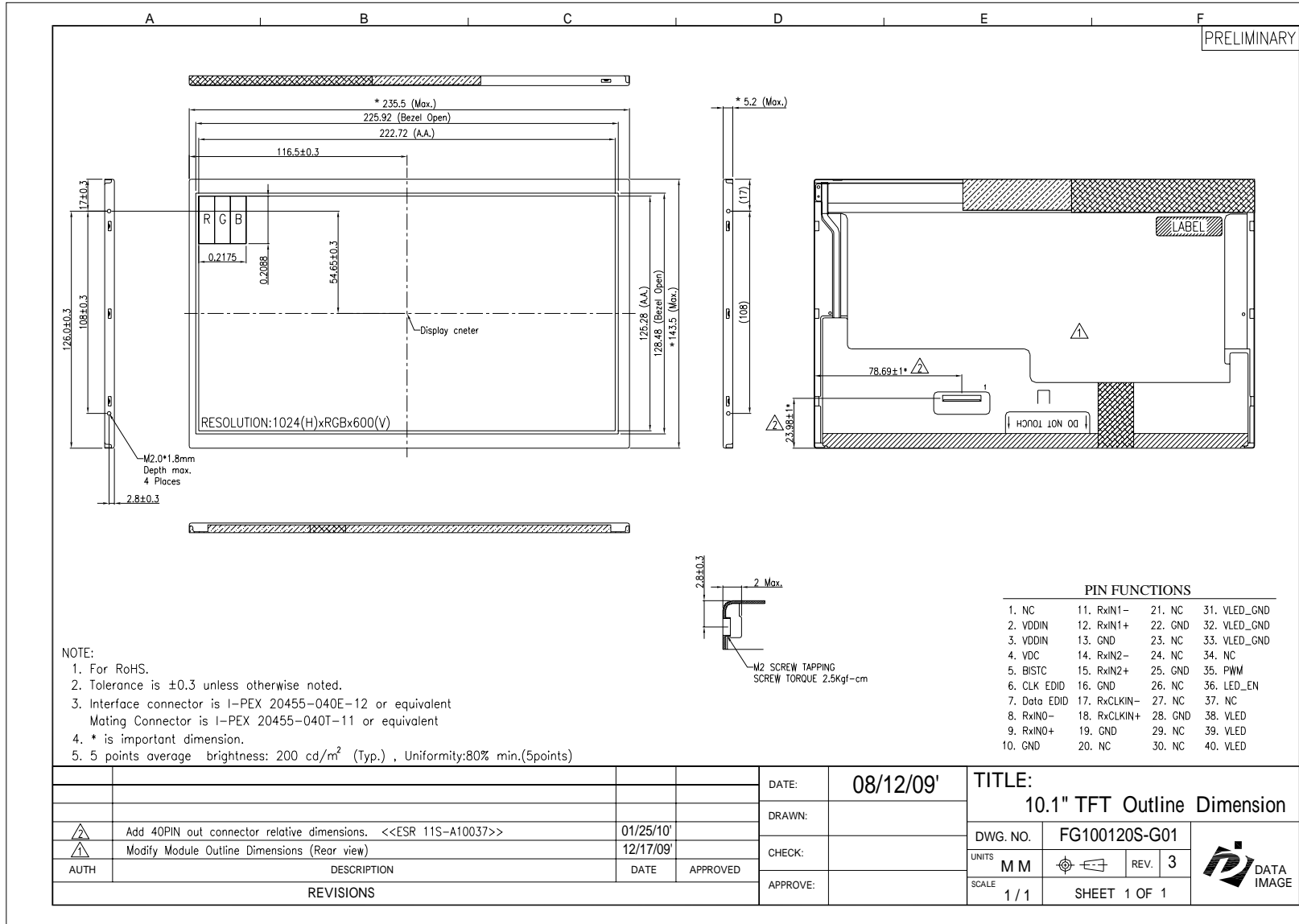
11. LOT NUMBERING SYSTEM



12. LCM NUMBERING SYSTEM



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13. OUTLINE DRAWING



14. PACKAGE INFORMATION

TBD