DATA IMAGE CORPORATION

TFT Module Specification

PRELIMINARY

ITEM NO.: FG1004B2DSSWBGL1

Table of Contents

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:
	2	2009/9/25		17

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	30/APR/09			Initial PRELIMINARY
2	25/SEP/09	10,17	8,16	1. Modify Brightness: Min 250→200; Typ 350→250. 2. Modify OUTLINE DRAWING from Rev:1 to Rev:2 to Rev:3.

3. SUMMARY

The module is a transmissive type color active matrix liquid crystal display (LCD), which uses amorphous thin film transistor (TFT) as switching devices. This panel has a 10.4 inches diagonally measured active display area with SVGA (800 RGB X 600) resolution. The following describes the features of this product.

4. FEATURES

- 10.4" (diagonal) inch configuration
- SVGA (800 X 600 pixels) resolution

5. GENERAL SPECIFICATIONS

Parameter		Specifications	Unit
Screen Size		10.4 (Diagonal)	inch
Display Format		Normally white, Transmissive type	
Number of Pixel		800 RGB X 600	dot
Display Color		16.2M	color
Active Area		211.2(H) x 158.4(V)	mm
Pixel Pitch		88(H) x 264 (V)	um
Dot Configuration		RGB-Stripe	
NTSC		50	%
Interface		LVDS	
View Angle direction (Gray inversion)		6 o'clock	
Outline Dimension		228.4(W) x 175.4(H) x 10.5(D)	mm
Weight		TBD	g
Temperature Range	Operation	-20~70	℃
	Storage	-30~80	℃

6. ABSOLUTE MAXIMUM RATINGS

GND=0V

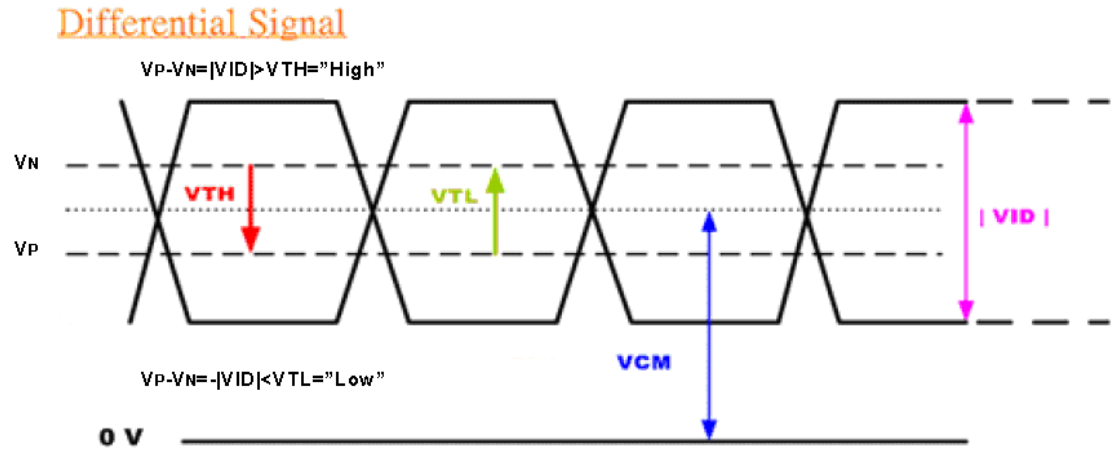
Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power supply voltage	Vcc	-0.3	5.0	V	
Logic input voltage	VI	-0.3	V_{CC}+0.3	V	
Operating temperature	Top	-20	70	°C	
Storage temperature	Tst	-30	+80	°C	

7. ELECTRICAL CHARACTERISTICS

GND=0V, f_{CLK}=40MHz, Ta=25℃

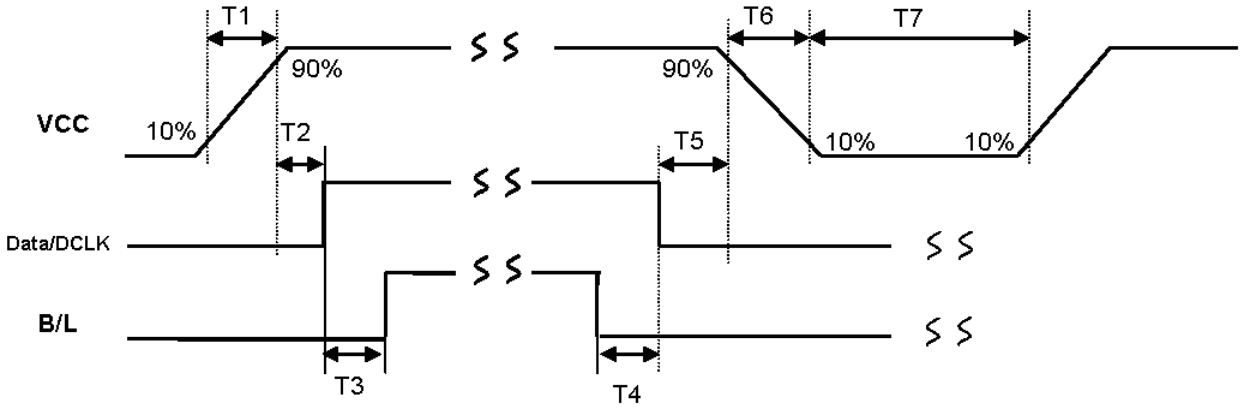
Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power Supply voltage for LCD	V_{CC}	+3.0	+3.3	+3.6	V	
Power Supply Current for LCD	I_{CC}		(360)	(560)	mA	V_{CC} =3.3V
Power Supply voltage for LED	VDD	4.5	5	5.5	V	
Power Supply Current for LED	IDD		(660)	(760)	mA	V_{DD} =5.0V
Ripple voltage	V_{RF}	-	-	100	mV_{P-P}	
"H" level logical input voltage	V_{IH}	0.7Vcc	--	Vcc	V	
"L" level logical input voltage	V_{IL}	0	--	0.3Vcc	V	
ADJ frequency		19K	20K	21K	Hz	
ADJ input voltage	VIH	3.0	-	3.3	V	
	VIL	0	-	0.3	V	
LED dice life time		10,000		-	Hr	Note 1
Differential Input High Threshold	VTH	-	-	100	[mV]	VCM=1.2V
Differential input Low Threshold	VTL	-100	-	-	[mV]	VCM=1.2V
Input Differential Voltage	| VID |	100	400	600	[mV]	
Differential Input Common Mode Voltage	VCM	1.1	1.2	1.45	[V]	VTH/VTL=± 100mV

Note 1: The "LED dice life time" is defined as the brightness decrease to 50% original brightness that the ambient temperature is 18℃~28℃ and LED dice current=20mA.
Note 2: LVDS Signal Waveform.



8. Power sequence

The LCD panel power ON/OFF sequence is as below



	Min.	Typ.	Max.	Unit
T1	1			ms
T2	50	100	200	ms
T3	200			ms
T4	200			ms
T5	1	5	50	ms
T6	1		10	ms
T7	1000			ms

9. AC CHARATERISTICS

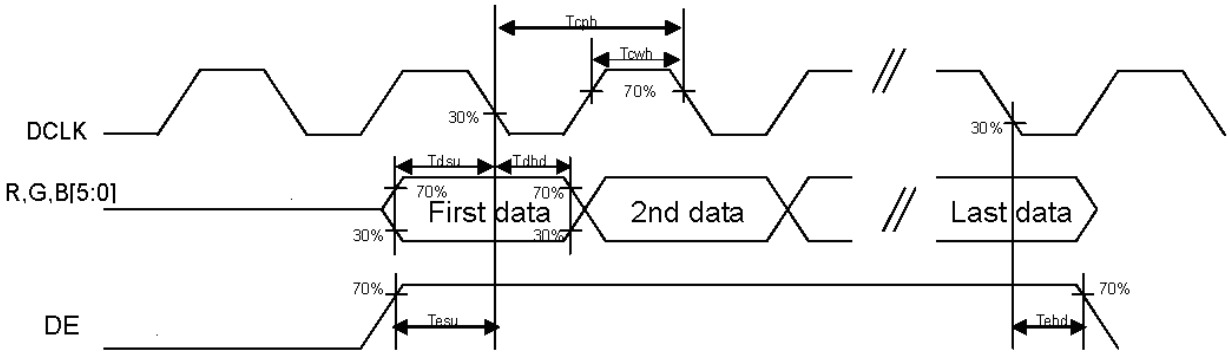
9.1 AC Electrical characteristic

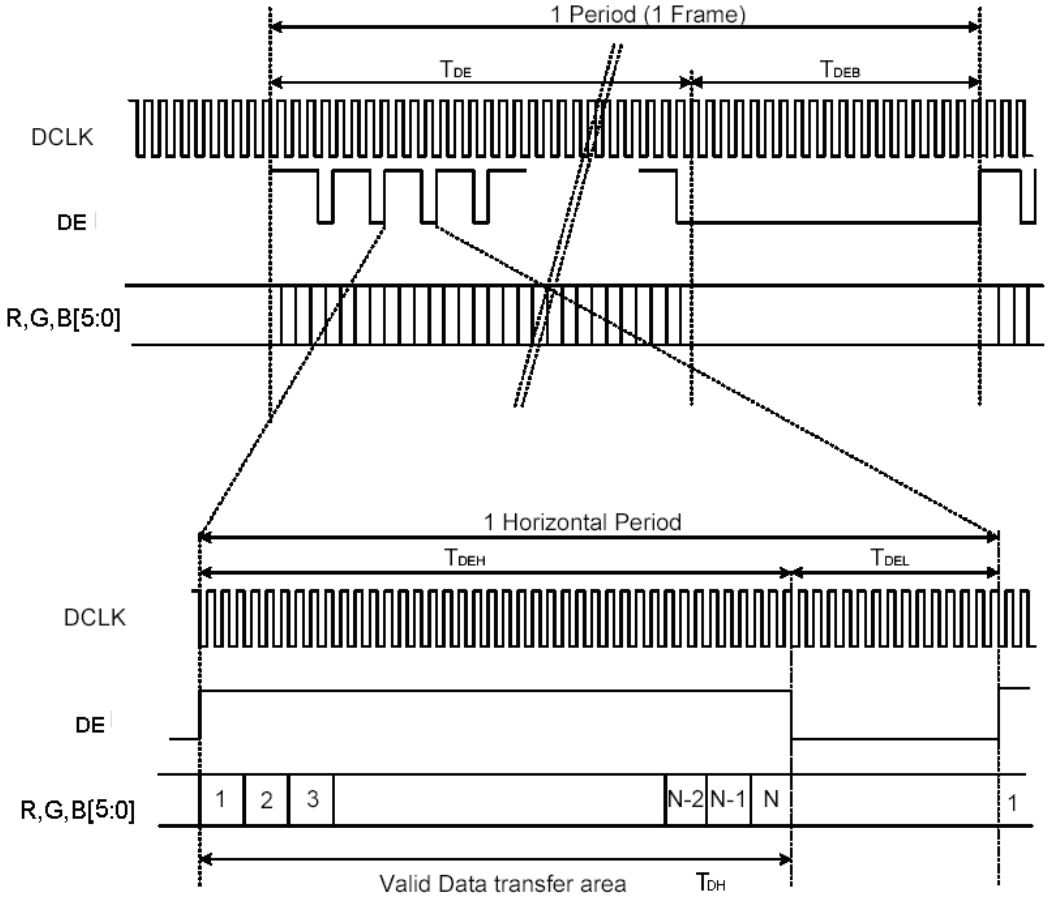
Parameter	Symbol	Min	Typ	Max	Unit
Data Setup Time	Tdsu	10			ns
Data Hold Time	Tdhd	10			ns
DE Setup Time	Tesu	10			ns
DE Hold Time	Tehd	10			ns

9.2 Data timing

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
DCLK frequency	F_{CPH}	35	40	45	MHz
DCLK period	T_{CPH}	23	25	28.5	ns
DCLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	880	1056	1190	T_{CPH}
DE pulse width	T_{DH}	800	800	800	T_{CPH}
DE frame blanking	T_{DEB}	27	35	80	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	600	600	600	$T_{DEH}+T_{DEL}$

9.3 Timing wave form

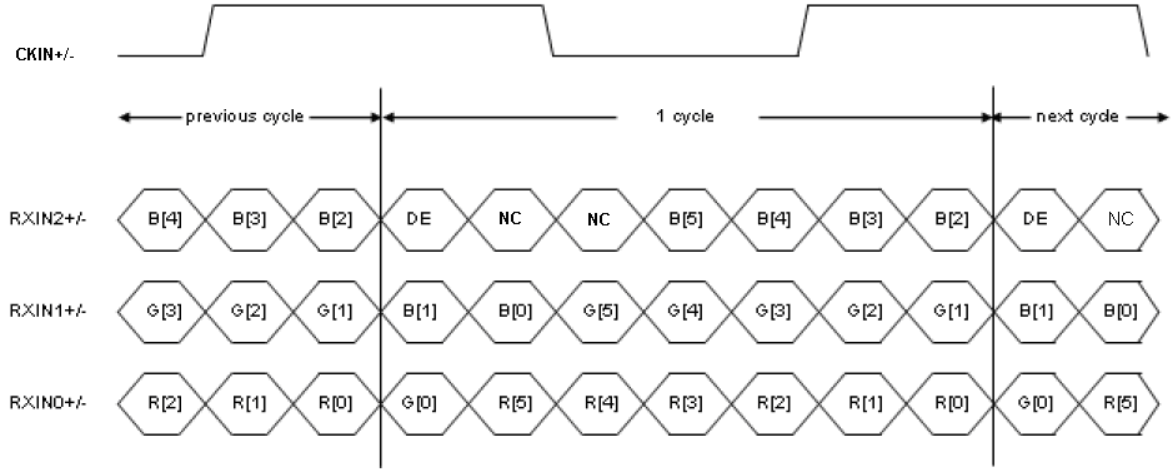




N=800

Figure 1 DE Mode Data Format

9.4 LVDS Input Data Mapipng



10. OPTICAL CHARACTERISTIC

Ta=25℃

Item		Symbol	Conditon	Min	Typ	Max	Unit	Note
Response time		TR	Viewing normal angle Θ=Φ=0, Center of Display	-	5	10	ms	3
		TF		-	15	20	ms	
Contrast ratio		CR		300	500	-	-	4
Color Chromaticity	White	Wx		0.261	0.311	0.361	-	5
		Wy		0.283	0.333	0.383		
Viewing Angle	Hor.	ΘR	CR≧10	60	70	-	Degree	1
		ΘL		60	70	-		
	Ver.	ΦT		40	50	-		
		ΦB		50	60	-		
Brightness		-	-	200	250	-	Cd/m^2	6

Note 1: Definition of viewing angle range

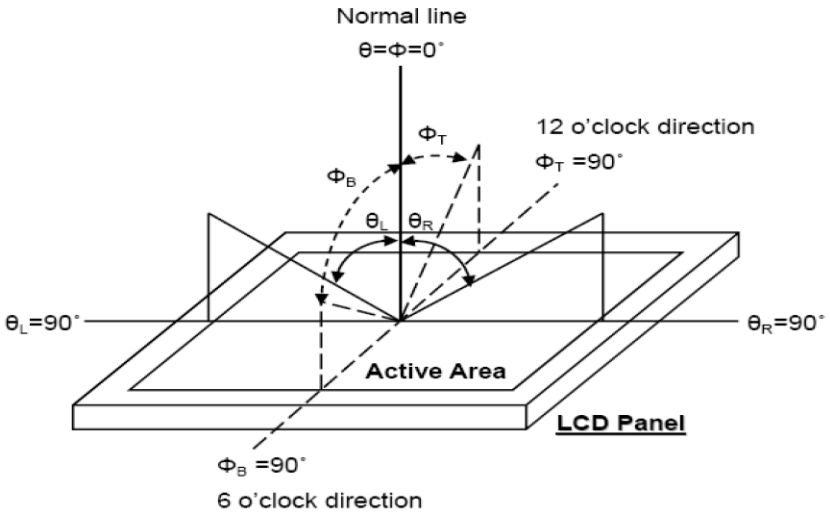


Fig.10-1 Definition of viewing angle

Note 2: Test equipment setup:
After stabilizing and leaving the panel alone at a driven temperature and Adj=3.3V for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7A luminance meter 1.0° field of view at a distance of 50cm and normal direction.

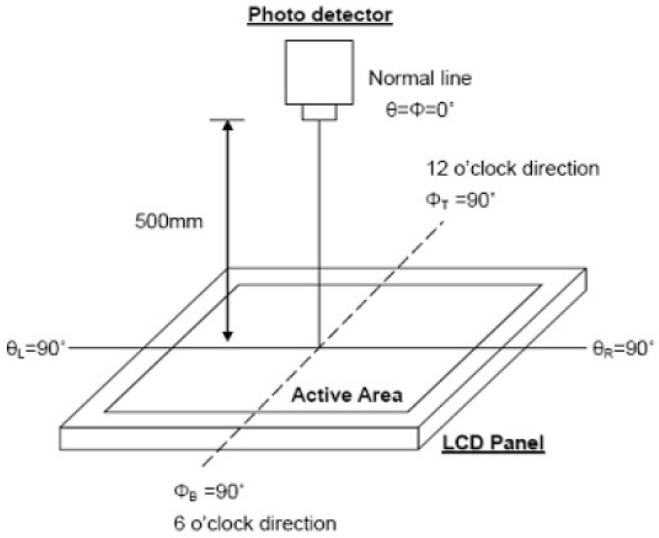


Fig. 10-2 Optical measurement system setup

Note 3: Definition of Response time:
The response time is defined as the LCD optical switching time interval between and “Black” state. Rise time, Tr, is the time between photo detector output intensity changed from 90% to 10%. And fall time, Tf, is the time between photo detector output intensity changed from 10% to 90%.

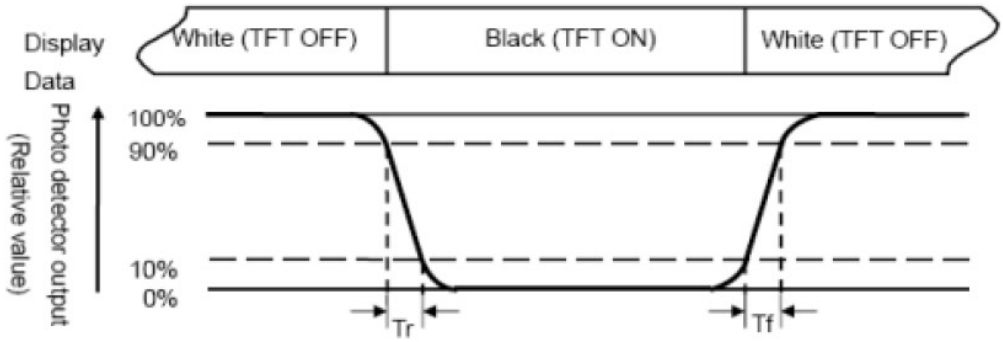


Fig 10-3 Definition of response time

Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$CR = \frac{\text{Luminance measured when LCD on the “white” state}}{\text{Brightness measured when LCD on the “black” state}}$$

Note 5: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 6: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

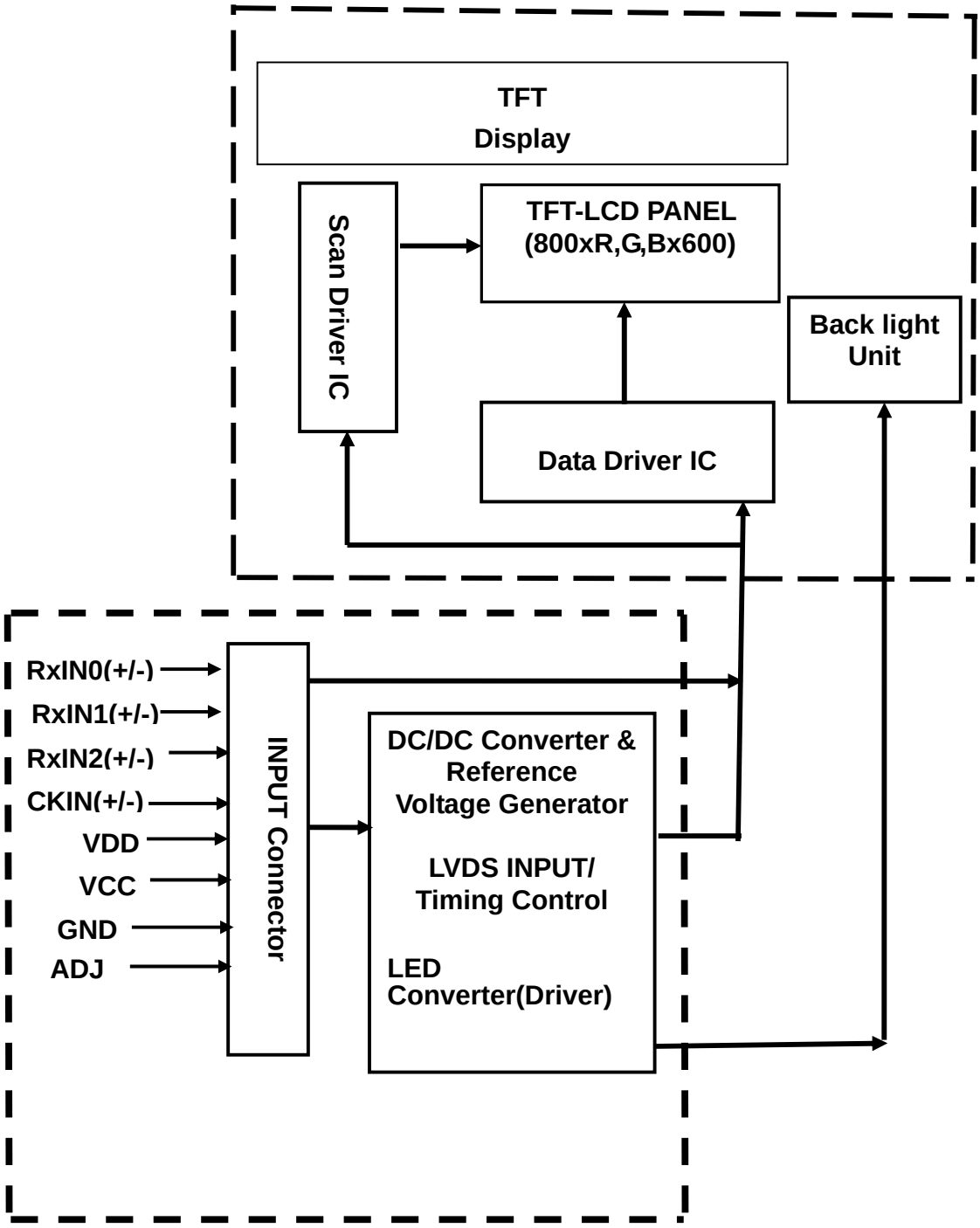
11. INTERFACE

Pin No	Symbol	Function	Remark
1	VCC	power supply for Digital Circuit	
2	VCC	power supply for Digital Circuit	
3	GND	Ground	
4	GND	Ground	
5	RxIN0-	Differential Data Input ,CH0(Negative)	
6	RxIN0+	Differential Data Input ,CH0(Positive)	
7	GND	Ground	
8	RxIN1-	Differential Data Input ,CH1(Negative)	
9	RxIN1+	Differential Data Input ,CH1(Positive)	
10	GND	Ground	
11	RxIN2-	Differential Data Input ,CH2(Negative)	
12	RxIN2+	Differential Data Input ,CH2(Positive)	
13	GND	Ground	
14	CKIN-	Differential Clock Input (Negative)	
15	CKIN+	Differential Clock Input (Positive)	
16	GND	Ground	
17	VDD	Power Supply for LED Driver Circuit	
18	VDD	Power Supply for LED Driver Circuit	
19	GND	Ground	
20	ADJ	Brightness control for LED B/L	

Remarks：

1) ADJ is brightness control Pin. The larger of the pulse duty is, the higher of the brightness.
2) ADJ signal is 0~3.3V.Operation frequency is 20 KHz
3) GND PIN must be grounding, can not be floating.

12. BLOCK DIAGRAM



13.QUALITY ASSURANCE

13.1 Test Condition

13.1.1 Temperature and Humidity(Ambient Temperature)

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

13.1.2 Operation

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

13.1.3 Container

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

13.1.4 Test Frequency

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

13.1.5 Test Method

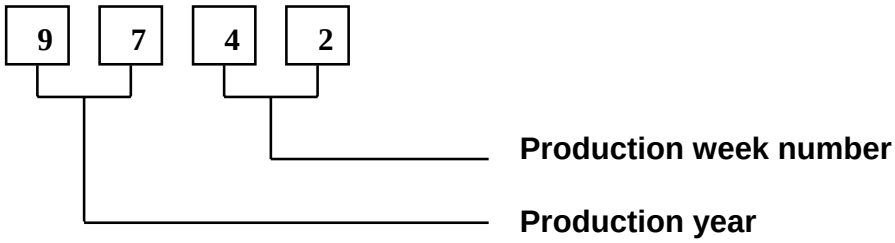
Reliability Test Item & Level		Test Level
No.	Test Item	
1	High Temperature Storage Test	Ta=80℃,240hrs
2	Low Temperature Storage Test	Ta=-30℃,240hrs
3	High Temperature Operation Test	Ta=70℃,240hrs
4	Low Temperature Operation Test	Ta=-20℃,240hrs
5	High Temperature and High Humidity Operation Test	Ta=60℃,90%RH,240hrs
6	Electro Static Discharge Test	150pF, 330Ω, ±8KV(Contact)/±15KV(Air), 5 Point/panel
7	Thermal Cycling Test (No operation)	-30℃ → +25℃, →80℃ 100 Cycles (Dry) 30 min 5 min 30 min
8	Vibration Test (No operation)	Sine wave, 10~500Hz, 1.5G, 0.37oct/min 3axis, 1 hour/axis
9	Mechanical Shock Test (No operation)	Gravity: 180g; Time: 2ms 3 axis: for all six faces Every face for one time

* Ta= Ambient Temperature

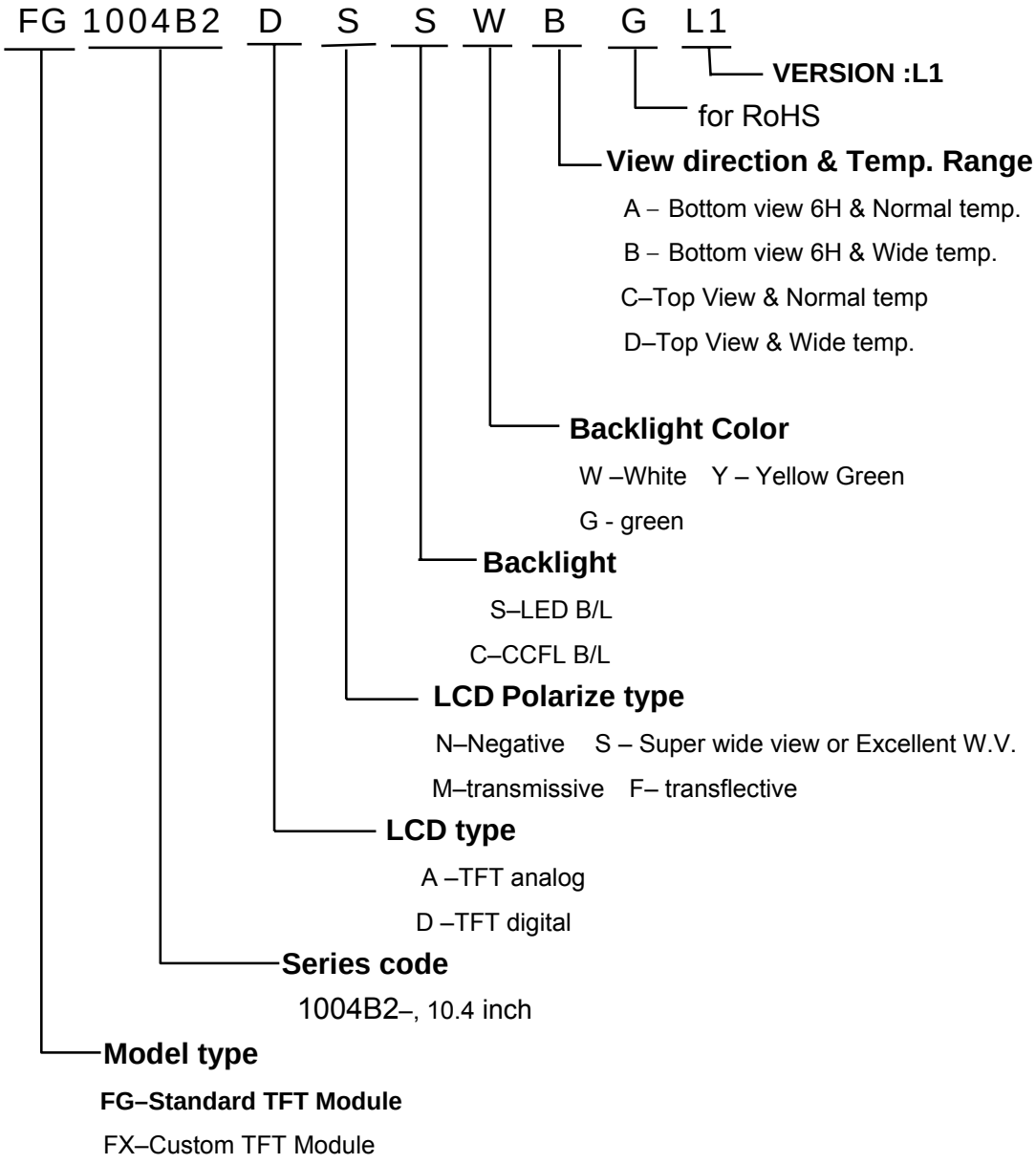
Note 1: The test samples have recovery time for 4 hours at room temperature before the function check. In the standard conditions, there is no display function NG issue occurred.

Note 2: All the cosmetic specifications are judged before the reliability stress.

14. LOT NUMBERING SYSTEM



15. LCM NUMBERING SYSTEM



16. PRECAUTION FOR USING LCM

Please pay attention to the following when you use this TFT LCD panel with IC and FPC.

16.1 MOUNTING PRECAUTIONS

(1) You must mount a module using 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) Please attach a transparent protective plate to the surface in order to protect the polarizer.
Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not describe because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizer with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are determined to the polarizer)
(7) When the surface becomes dusty, please wipe gently with adsorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizer. Do not use acetone. Toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

16.2 OPERATING PRECAUTIONS

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage: V=±200mV(Over and under shoot voltage)
(2) Response time depends on the temperature. (In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower)
And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.
(4) 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.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) 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.

16.3 ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, is not strong to electrostatic discharge.

Make certain that treatment persons are connected to ground through wristband etc. And don't touch interface pin directly.

16.4 ELECTROSTATIC DISCHARGE CONTROL

Strong light exposure causes degradation of polarizer and color filter.

16.5 STORGE

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5℃ at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

16.6 HANDLING PRECUTIONS FOR PROTECTION FILM

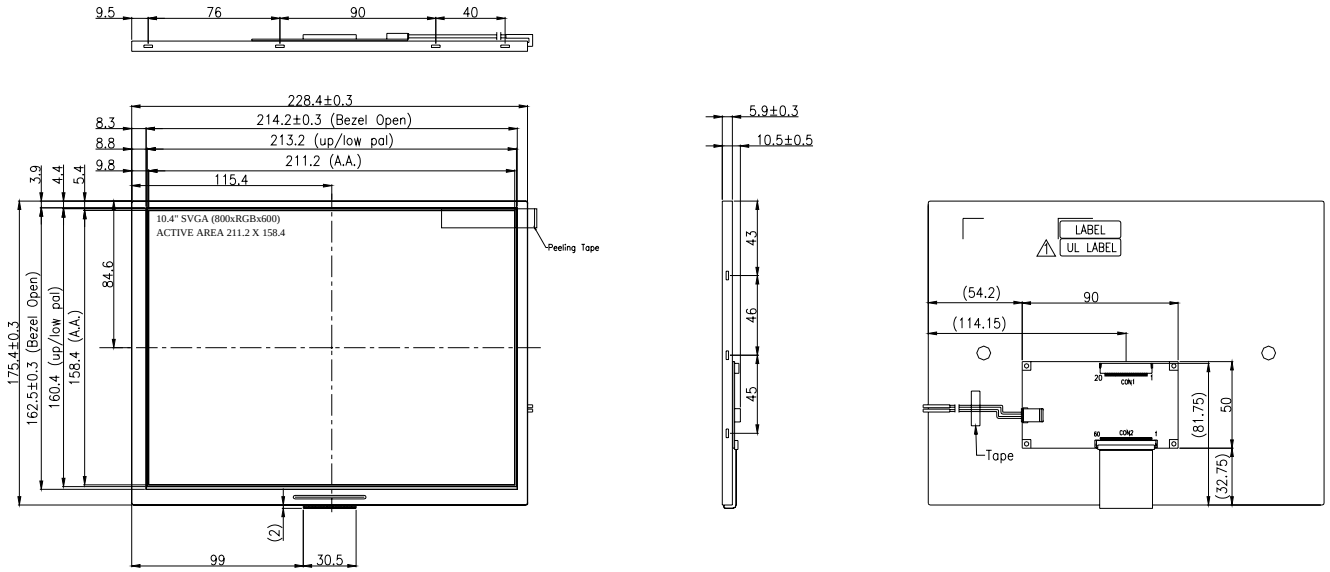
(1) When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.

(2) The protection film is attached to the polarizer with a small amount of glue. Is apt to remain on the polarizer. Please carefully peel off the protection film without rubbing it against the polarizer.

(3) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.

(4) You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

17. OUTLINE DRAWING



NOTE:

1.For RoHS
2.Tolerance is ±0.5 unless otherwise noted.
3.Center Brightness : 250 cd/m² (TYP.)
4.CON1 connector : Hirose DF14A-20P-1.25H or equivalent.
  Matching connector : Hirose DF14-20S-1.25C or equivalent.

CON1 PIN FUNCTION

1 Vcc	6 RxIN0+	11 RxIN2-	16 GND
2 Vcc	7 GND	12 RxIN2+	17 VDD
3 GND	8 RxIN1-	13 GND	18 VDD
4 GND	9 RxIN1+	14 CKIN-	19 GND
5 RxIN0-	10 GND	15 CKIN+	20 ADJ

AUTH	DESCRIPTION	DATE	APPROVED
2	ECR 110-990008 modify brightness from 350 to 250 cd/m²	10/09/09'	
1	ECR 11S-980027 add UL label.	09/14/09'	

REVISIONS

DATE:	04/28/09'
DRAWN:	
CHECK:	
APPROVE:	

TITLE: LCM OUTLINE DIMENSION

DWG. NO.	FG1004B2S-GL1		
UNITS M M		REV.	3
SCALE 1 / 1	SHEET 1 OF 1		

DATA IMAGE

18.PACKAGE INFORMATION

TBD