

TFT-Display Datenblatt

Modell FG040320DWSWBG03

Kurzdaten

Hersteller	Datamagic
Diagonale	4,3" / 10,9cm
Format	16:9
Auflösung	480x272
Backlight	LED/450cd/m ²
Temperatur	-20...+70°C (Betrieb)



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DATA IMAGE CORPORATION

TFT Module Specification

Preliminary

ITEM NO.: FG040320DWSWBG03

Table of Contents

1. COVER & CONTENTS	1
2. RECORD OF REVISION	2
3. FEATURE	3
4. GENERAL SPECIFICATIONS	3
5. ELECTRICAL CHARACTERISTICS	3
6. BLOCK DIAGRAM	4
7. PIN CONNECTIONS	5
8. AC CHARACTERISTICS	6
9. OPTICAL CHARACTERISTIC	11
10. TOUCH PANEL CHARACTERISTICS	13
11. QUALITY ASSURANCE	14
12. LOT NUMBERING SYSTEM	15
13. LCM NUMBERING SYSTEM	15
14. PRECAUTIONS IN USE LCM	16
15. OUTLINE DRAWING	17
16. PACKAGE INFORMATION	18

Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	JACK	ERIC	PAUL	HELEN
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	1	2009/7/9		18



2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	9/JUL/09'			Initial preliminary

3. FEATURE

- 64 gray level with 2 bit dithering function to realize 16M colors
- This module is sunlight readable type.

4. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Display resolution	480X R.G.B x 272	dot
Active area	95.04(W) x 53.856(H)	mm
Screen size	4.3(Diagonal)	inch
Dot pitch	0.066 (W) x 0.198(H)	mm
Color configuration	R.G.B. Stripe	
Overall dimension	105.5 (W) x 67.2(H) x 4.3(D)	mm
Weight	62	g
Surface treatment	Anti-glare	
View Angle direction	6 o'clock	
Our components and processes are compliant to RoHS standard		

5. ELECTRICAL CHARACTERISTICS

GND=0V, Ta=25°C

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power Supply voltage	V _{CC}	3.0	3.3	3.6	V	Note1
Power Supply Current	I _{CC}		17	20	mA	V _{CC} =3.3V
Ripple Voltage	V _{RPVCC}			100	mVp-p	
"H" level logical input voltage	V _{IH}	0.8V _{CC}	--	V _{CC}	V	
"L" level logical input voltage	V _{IL}	0	--	0.2V _{CC}	V	
Operating temperature	Topa	-20	--	70	°C	Ambient temperature
Storage temperature	Tstg	-30	--	80	°C	Ambient temperature

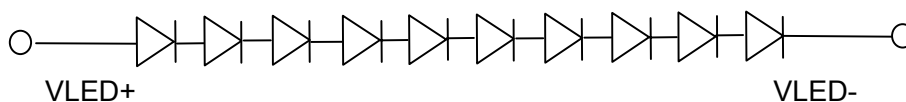
Note1:VCC Absolute Maximum Ratings -0.3V~+6V

5.1 Backlight driving for power conditions

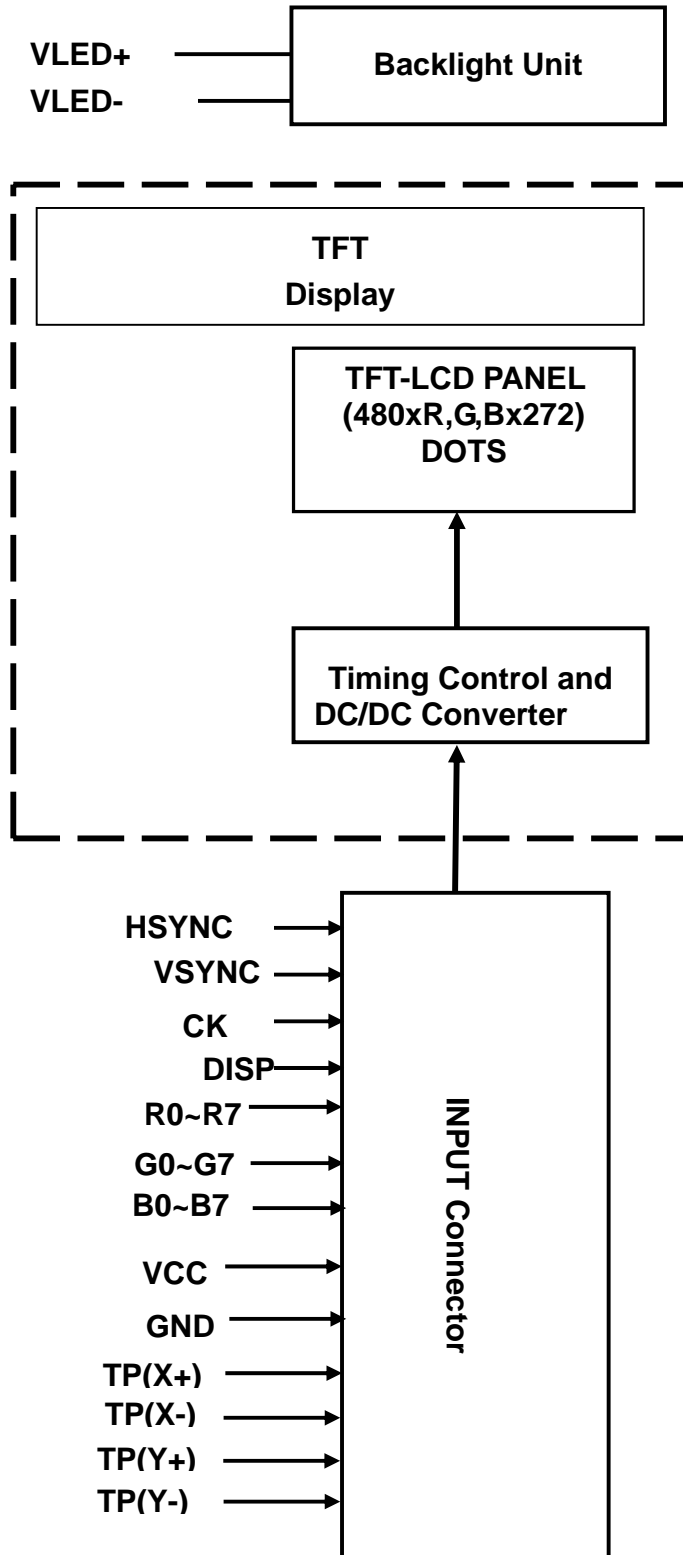
Ta= 25 °C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I _L	--	20	--	mA	
VLED voltage	V _L	--	33	--	V	I _L =20 mA
LED Dice Life Time		30000	--	--	Hours	Note 1

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.



6. BLOCK DIAGRAM



7. PIN CONNECTIONS

7.1 Input Pins Connection

Pin No	Symbol	Function	Remark
1	GND	Ground	
2	GND	Ground	
3	Vcc	Power Supply : +3.3V	
4	Vcc	Power Supply : +3.3V	
5	R0	Digital data input. R0 is LSB and R7 is MSB	
6	R1		
7	R2		
8	R3		
9	R4		
10	R5		
11	R6		
12	R7		
13	G0	Digital data input. G0 is LSB and G7 is MSB	
14	G1		
15	G2		
16	G3		
17	G4		
18	G5		
19	G6		
20	G7		
21	B0	Digital data input. B0 is LSB and B7 is MSB	
22	B1		
23	B2		
24	B3		
25	B4		
26	B5		
27	B6		
28	B7		
29	GND	Ground	
30	CK	clock signal to sample each data	
31	DISP	Display ON/OFF Control ON=H(VCC), OFF=L(GND)	
32	HSYNC	Horizontal synchronous signal	
33	VSYNC	Vertical synchronous signal	
34	NC	No Connection	
35	NC	No Connection	
36	NC	No Connection	
37	TP(X-)	X-Left	
38	TP(Y-)	Y-Bottom	
39	TP(X+)	X+ Right	
40	TP(Y+)	Y+ Top	

7.2 Backlight Pins Connection

No.	Signal	Function
1	VLED-	LED Power Source input terminal (Cathode side)
2	NC	No Connection
3	NC	No Connection
4	VLED+	LED Power Source input terminal (Anode side)

8. AC CHARACTERISTICS
8.1 Input Timing Requirement

(480RGBx272, Ta =25°C, VCC=3.3V GND= 0V)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Clock cycle	f _{CLK(1)}	-	9	15	MHz
Hsync cycle	1/th	-	17.14	-	KHz
Vsync cycle	1/tv	-	59.94	-	Hz
Horizontal Signal					
Horizontal cycle	th	525	525	605	CLK
Horizontal display period	thd	480	480	480	CLK
Horizontal front porch	thf	2	2	82	CLK
Horizontal pulse width	thp ₍₂₎	2	41	41	CLK
Horizontal back porch	thb ₍₂₎	2	2	41	CLK
Vertical Signal					
Vertical cycle	tv	285	286	511	H ₍₁₎
Vertical display period	tvd	272	272	272	H ₍₁₎
Vertical front porch	tvf	1	2	227	H ₍₁₎
Vertical pulse width	tvp ₍₂₎	1	10	11	H ₍₁₎
Vertical back porch	tvb ₍₂₎	1	2	11	H ₍₁₎

Note: (1) Unit: CLK=1/ f_{CLK}, H=th,

(2) It is necessary to keep tvp+tvb=12 and thp+thb=43 in sync mode.

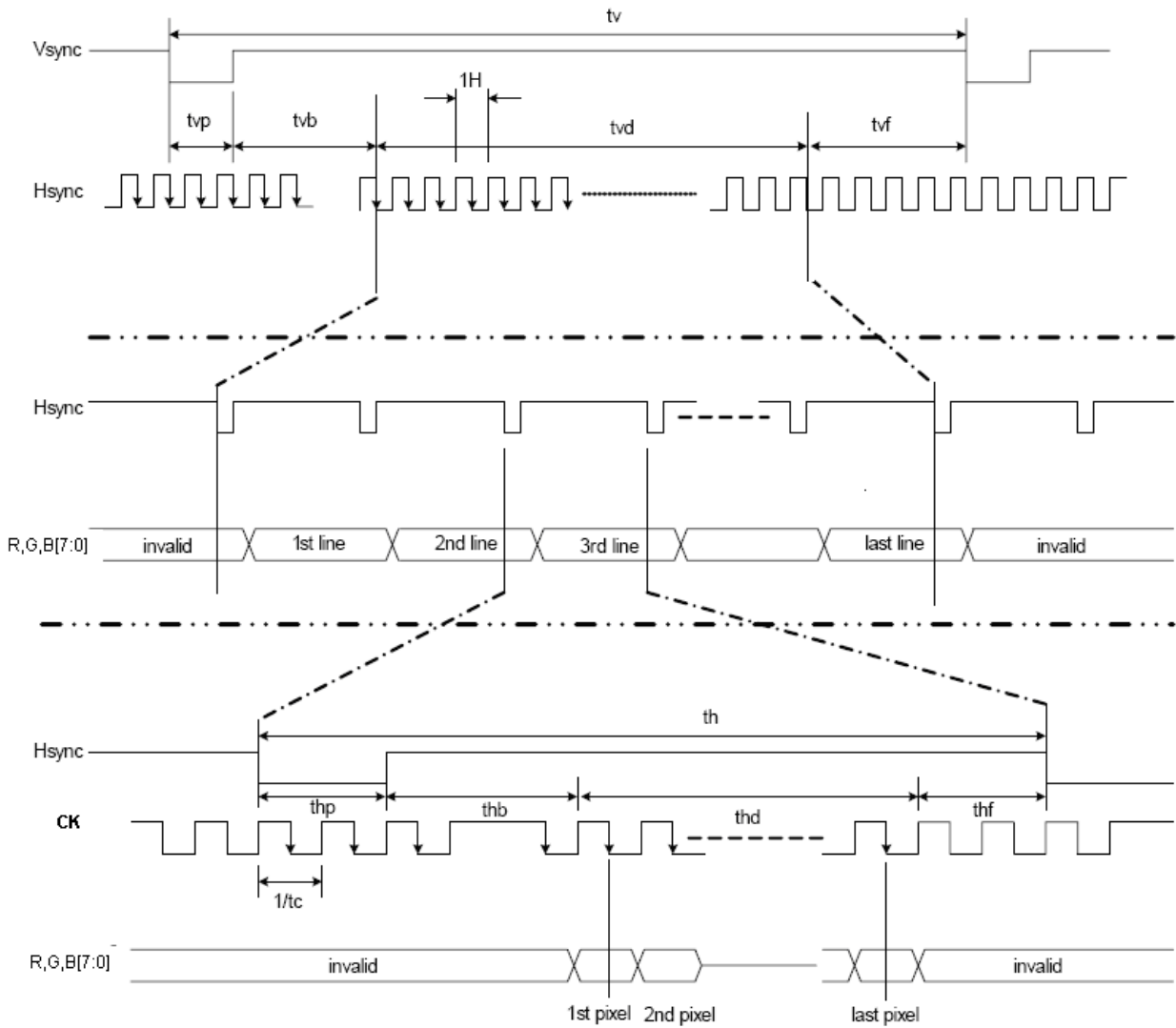


Fig 1. Parallel RGB input timing

8.2 Input Setup Timing Requirement

(Ta =25°C, VCC=3.3V ,GND= 0V, tr (1)=tf (1)=2ns)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
DISP setup time	t _{diss}	10	-	-	ns
DISP hold time	t _{dish}	10	-	-	ns
Clock period	PW _{CLK(2)}	66.7	-	-	ns
Clock pulse high period	PWH ₍₂₎	26.7	-	-	ns
Clock pulse low period	PWL ₍₂₎	26.7	-	-	ns
Hsync setup time	t _{hs}	10	-	-	ns
Hsync hold time	t _{hh}	10	-	-	ns
Data setup time	t _{ds}	10	-	-	ns
Data hold time	t _{dh}	10	-	-	ns
Vsync setup time	t _{vhs}	10	-	-	ns
Vsync hold time	t _{vhh}	10	-	-	ns

Note: (1) tr, tf is defined 10% to 90% of signal amplitude.

(2) For parallel interface, maximum clock frequency is 15MHz.

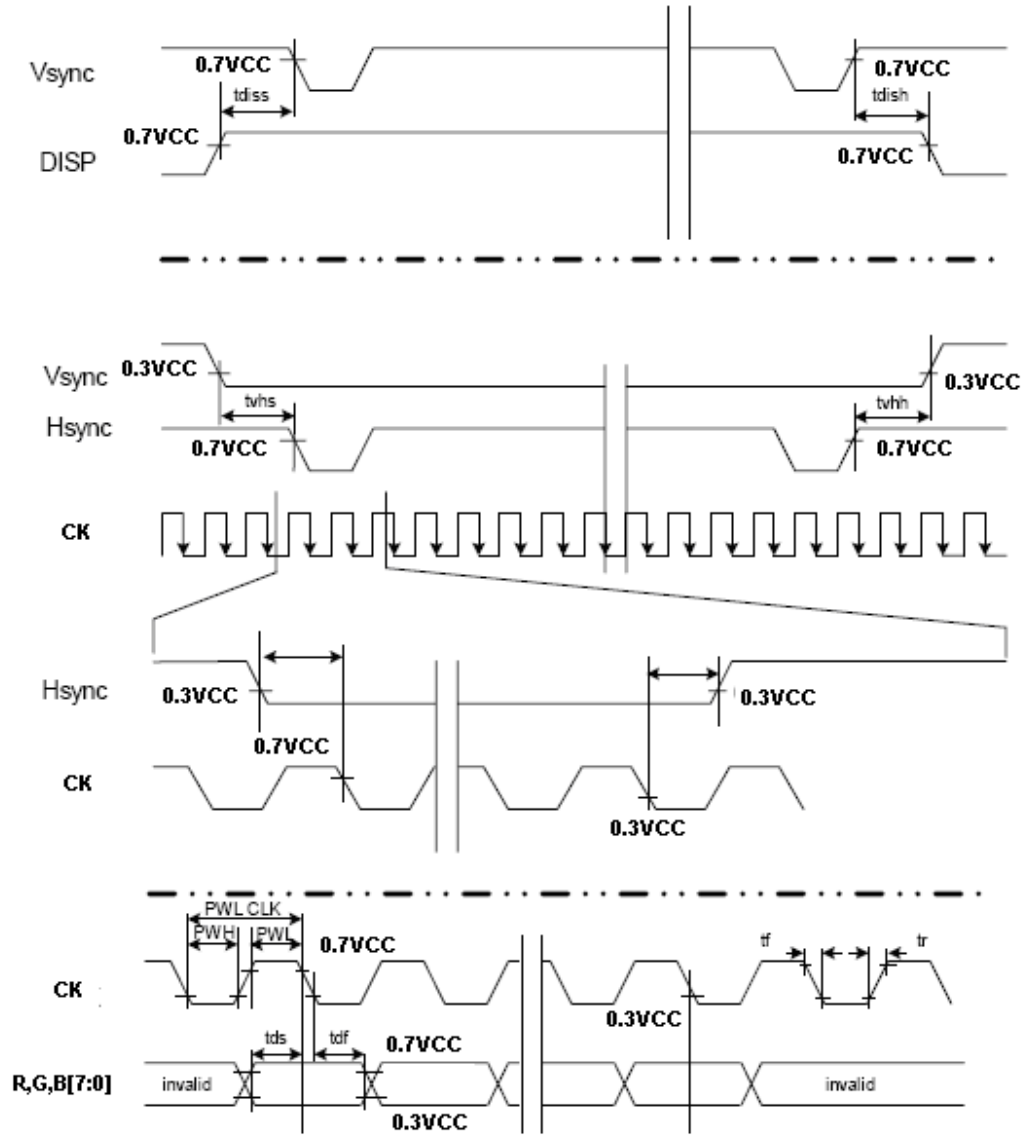


Fig 2. Input setup timing requirement

8.3 TCON Power ON/OFF Control

The TCON IC has a power ON/OFF sequence control function. When DISP pin is pulled "H", blank data is outputted for 10-frames first, from the falling edge of the following VSYNC signal. Similarly, when DISP is pulled "L", 10-frames of blank data will be outputted from the falling edge of the following VSYNC, too.

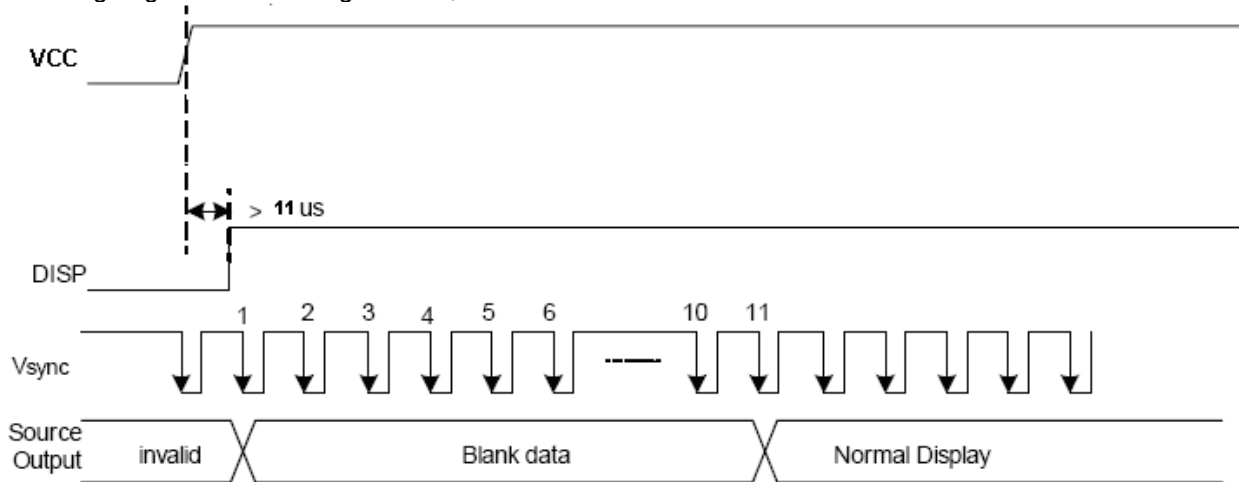


Fig 3. Power On Sequence

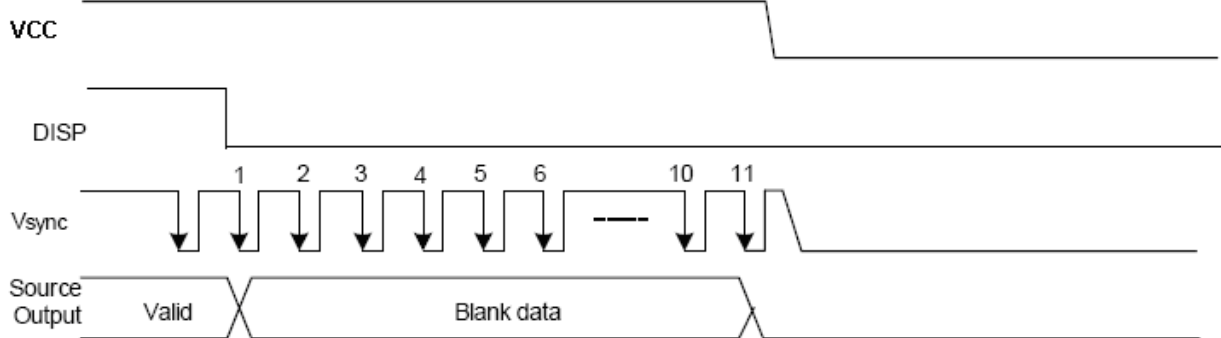


Fig 4. Power Off Sequence

9. Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time	Rise	Tr	$\theta=0^\circ$	-	5	8	ms	Note 4
	Fall	Tf		-	15	20	ms	
Contrast ratio		CR	At optimized viewing angle	100	400			Note 5
Viewing angle	Top		$CR \geq 10$	40	50	-	Deg.	Note 6
	Bottom			60	70	-		
	Left			60	70	-		
	Right			60	70	-		
Luminance of white			$\theta=0^\circ$	400	450	--	cd/m ²	Note 7
Uniformity				70	--		%	
White chromaticity	X		$\theta=0^\circ$	0.27	0.32	0.37		Note 7
	y			0.28	0.33	0.38		

Note 1: Ambient temperature =25°C. LED current $I_L= 20$ mA.

Note 2: To be measured in the dark room.

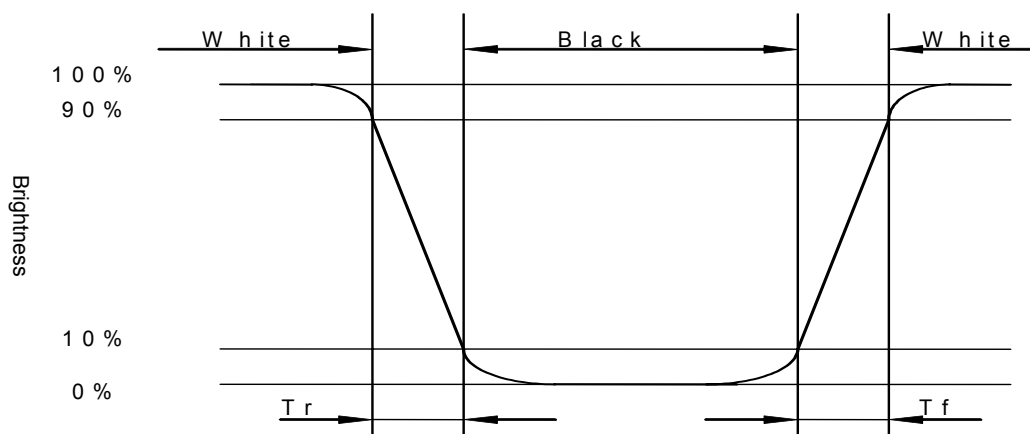
Note 3: To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7A, after 2 minutes operation.

Note 4: Definition of response time:

The output signals of photo-detector are measured when the input signals are changed from “white” to “black”(rising time) and from “black” to “white”(falling time),respectively.

The response time is defined as the time interval between the 10% and 90% of amplitudes.

Refer to figure as shown below.



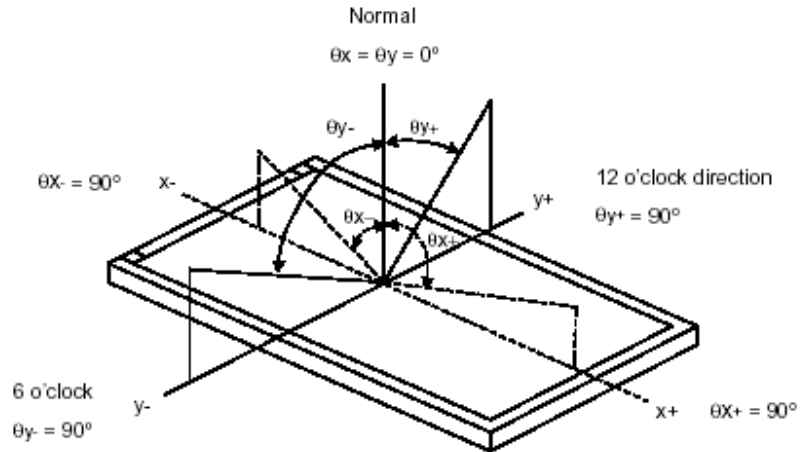
Note5: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Photo-detector output when LCD is at "White" state}}{\text{Photo-detector output when LCD is at "Black" state}}$$

Note 6. Definition of viewing angle:

Refer to figure as below.



Note 7. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

10. TOUCH PANEL CHARACTERISTICS

1. Input Method and Activation Force

Input Method	Average Activation Force
1.6mm dia. Delrin stylus	60g Max.
16mm dia .Silicon "finger"	60g Max.

2. Typical Optical Characteristics

ITEM	Parameter
Visible Light Transmission	82% typ.
Haze	7% typ

3. Electrical Specification

ITEM	Parameter
Operating Voltage	Dc 7V Max.
Contact current	According to individual design
Circuit close resistance	X 350Ω~1300Ω
	Y 70Ω~800Ω
Circuit open resistance	≥20MΩ at DC25V
Contact bounce	20ms Max.
Linear Test	<1.5%
Capacitance	<100nF

4. Linearity

ITEM	Parameter
Linear Test Specification Direction	X <1.5%
	Y <1.5%

5. Specification

ITEM	Parameter
Operating Temperature	-20°C~+70°C
Storage Temperature	-30°C~+80°C

6. Durability test:

6.1 Touch panel is hit 1 millions times with a silicone rubber of R8 finger, hitting rate is by 250g at 2 times per second. The measurement must satisfy the following:

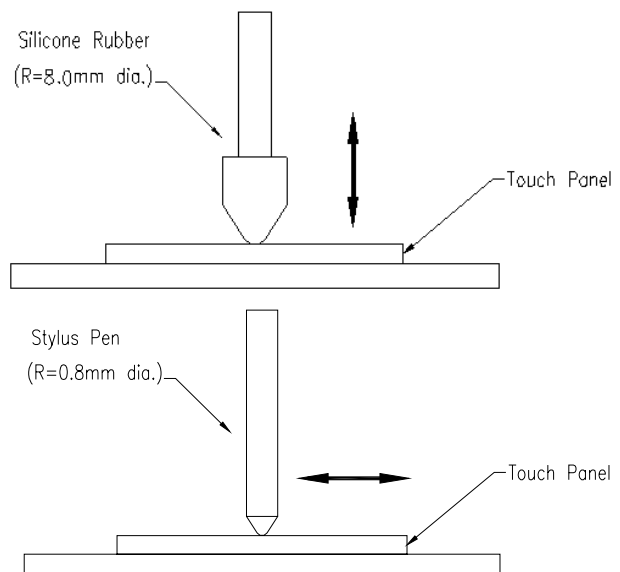
- Circuit close resistance: x 350Ω~1300Ω ;
y 70Ω~800Ω
- Circuit open resistance: ≥20MΩ at DC25V
- Contact bounce: <20ms
- Linearity test: <3%

6.2 Stylus writing

Touch panel is drawn by R0.8 Darling stylus pen, at 150g forces, repeat one inch by 100k times.

The measurement must satisfy the following:

- Circuit close resistance: x 350Ω~1300Ω ;
y 70Ω~800Ω
- Circuit open resistance: ≥20MΩ at DC25V
- Contact bounce: <20ms
- Linearity test: <3%



11. QUALITY ASSURANCE

11.1 Test Condition

11.1.1 Temperature and Humidity(Ambient Temperature)

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

Humidity : $65 \pm 5\%$

11.1.2 Operation

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

11.1.3 Container

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

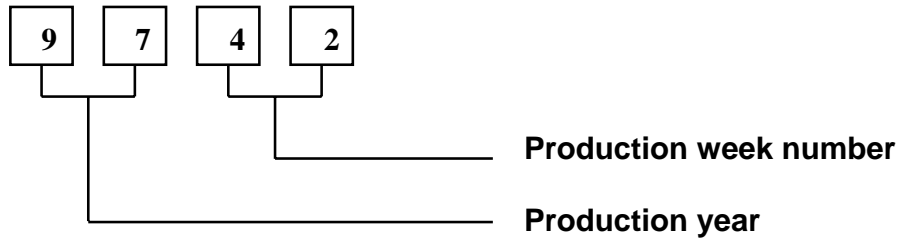
11.1.4 Test Frequency

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

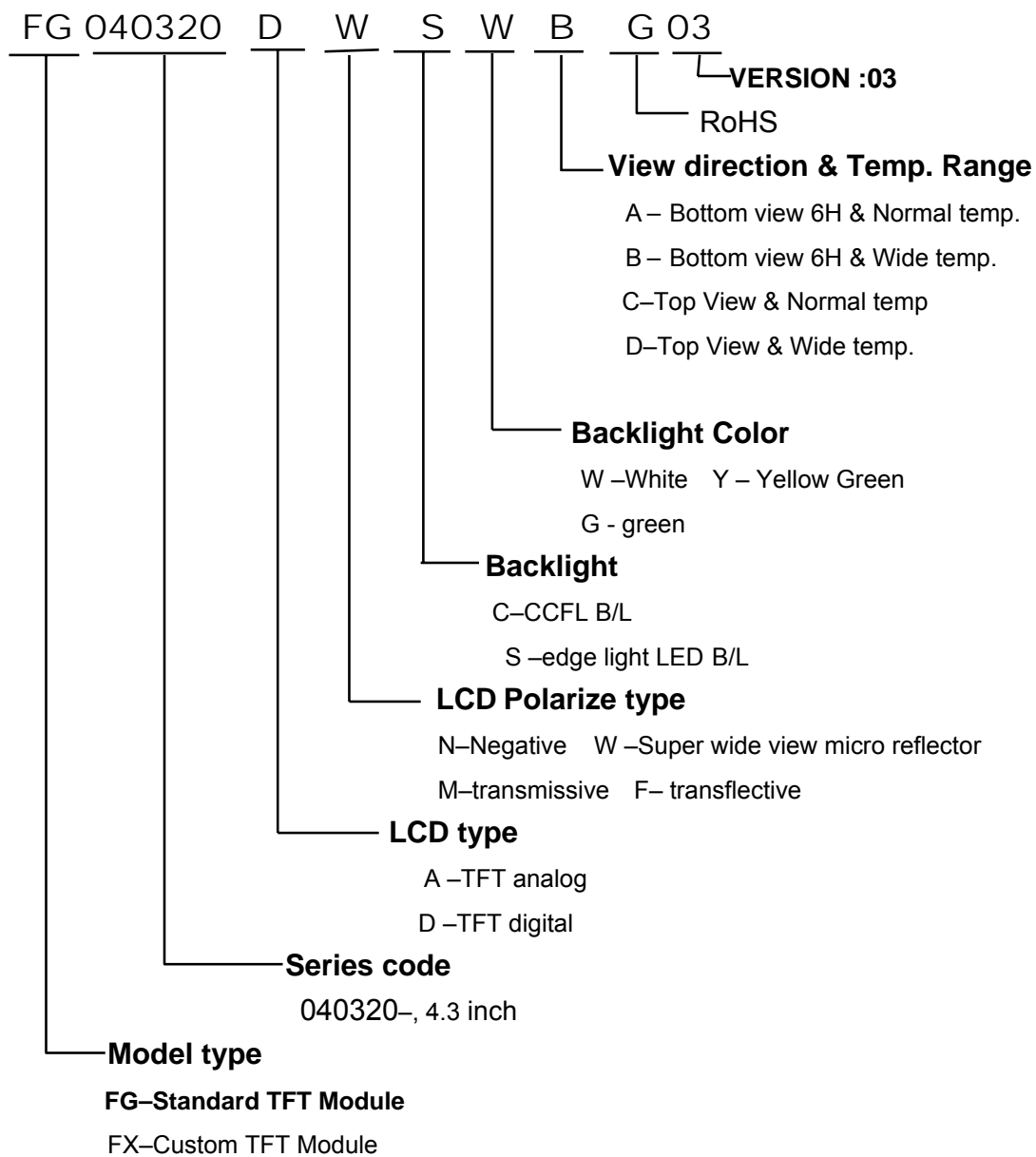
11.1.5 Test Method

No.	Reliability Test Item & Level	Test Level
1	High Temperature Storage Test	T=80°C,240hrs
2	Low Temperature Storage Test	T=-30°C,240hrs
3	High Temperature Operation Test	T=70°C,240hrs
4	Low Temperature Operation Test	T=-20°C,240hrs
5	High Temperature and High Humidity Operation Test	T=38°C, 70% RH,240hrs
6	Thermal Cycling Test (No operation)	-30°C → +25°C → +80°C,200 Cycles 30 min 5min 30 min
7	Vibration Test (No operation)	Frequency:0 ~ 55 Hz Amplitude:1.5 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z
8	Electrostatic Discharge Test (No operation)	150pF,330Ω Air:± 15KV;Contact: ± 8KV 10 times/point;4 points/panel face

12. LOT NUMBERING SYSTEM



13. LCM NUMBERING SYSTEM



14. PRECAUTIONS 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 an 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 afterwards.

2.4 Operation

- (1). The viewing angle can be adjusted by varying the LCD driving voltage V0.
- (2). Driving voltage should be kept within specified range; excess voltage shortens display life.
- (3). Response time increases with decrease in temperature.
- (4). 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".
- (5). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

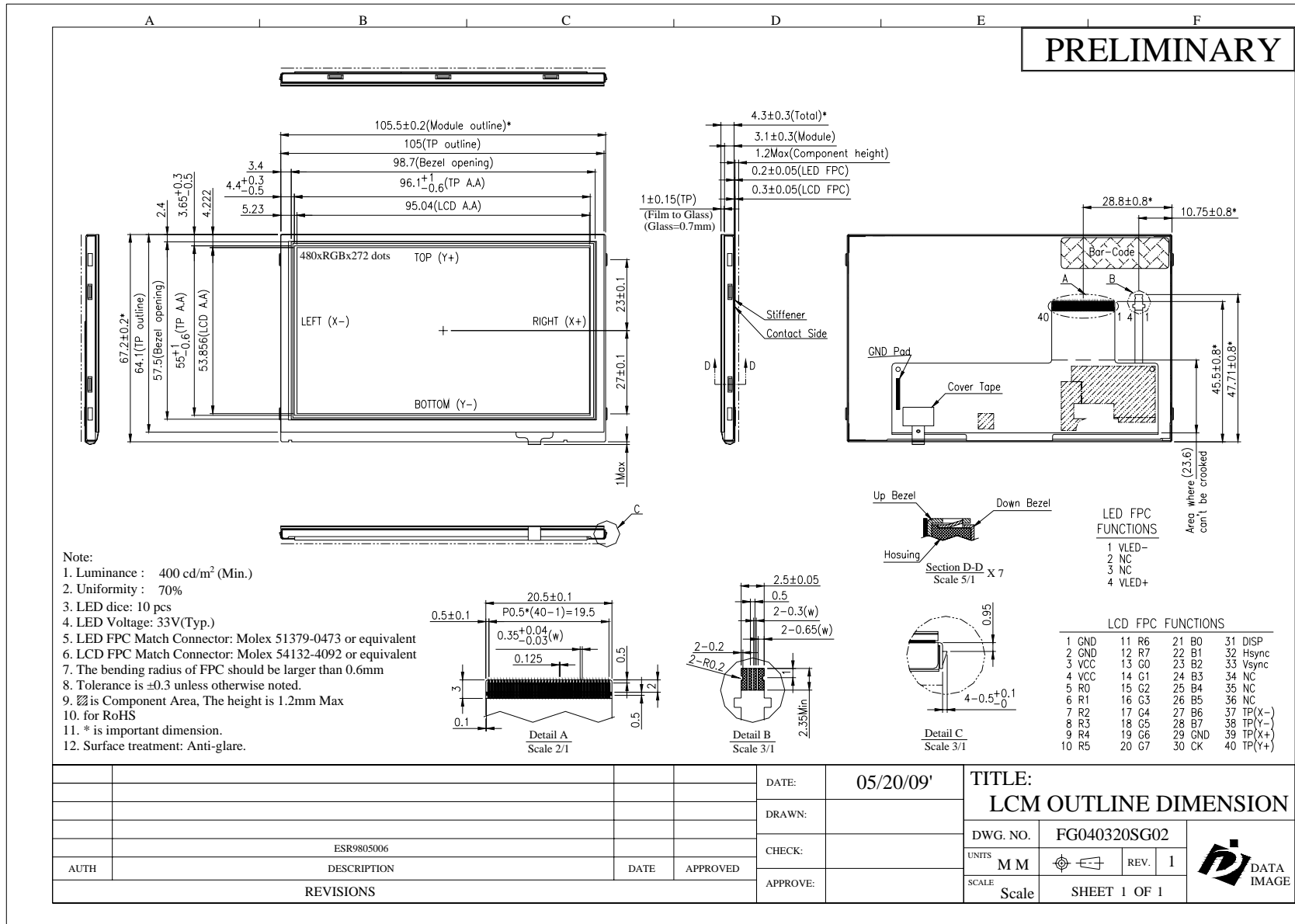
2.5 Storage

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.

2.6 Limited Warranty

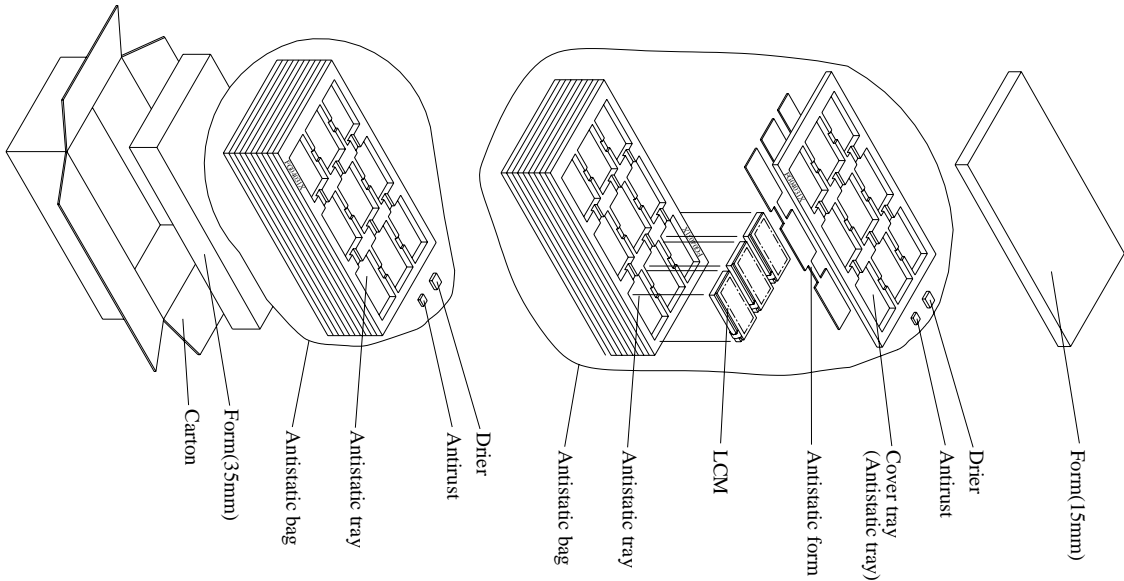
Unless otherwise agreed between DATA IMAGE and customer, DATA IMAGE will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DATA IMAGE acceptance standards, for a period on one year from date of shipment. Confirmation of 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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15. OUTLINE DRAWING



					DATE: 05/20/09'	TITLE: LCM OUTLINE DIMENSION	
					DRAWN:	DWG. NO. FG040320SG02	
	ESR9805006				CHECK:	UNITS M M	
AUTH	DESCRIPTION	DATE	APPROVED		APPROVE:	SCALE Scale	
REVISIONS							REV. 1 SHEET 1 OF 1

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16.PACKAGE INFORMATION



Material

1 Carton + 1 Form (15mm) + 2 Anti-static bag + 20 Anti-static tray
+ 2 Drier + 2 Antirust + 1 Form (35mm)

Total pcs

1 Antistatic tray = 9 pcs (modules)
1 Anti-static bag = 9 Anti-static tray + cover tray = 9*9 + 1*0 = 81 pcs
1 Carton = 2 Anti-static bag = 2*81 = 162 pcs
1 Carton size : 465L x 380W x 395H (mm)
Total Weight ÷ 11,6 kgw

FG040320+TP TFT LCM PACKING