HY-LINE®
COMPUTER COMPONENTS

TFT-Display Datenblatt

Modell   FG040346DSSWBG04

Kurzdaten

Hersteller	Data Image
Diagonale	4,3" / 10,9 cm
Format	wide
Auflösung	480 x 272
Backlight	LED / 320 cd/m²
Interface	RGB
Touchscreen	ja
Temperatur	-20… +70°C (Betrieb)

DATA
IMAGE

Confidential Document

DATA IMAGE CORPORATION

TFT Module Specification

ITEM NO.: FG040346DSSWBG04

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
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2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	02/DEC/11'			Initial preliminary
A	06/JAN/12'	14	16	Modify OUTLINE DRAWING from Rev: 1 to A Release Rev. A for production
B	16/JAN/12'	8 9	6 9	1.Modify AC CHARACTERISTICS 2.Update Viewing angle
C	27/MAR/12'	7 8.3 14	5 8 16	1.Modify PIN CONNECTIONS 2.Modify Power on sequence 3.Modify OUTLINE DRAWING from Rev: A to B

FG040346DSSWBG04 REV:C

3. FEATURE
● 64 gray level with 2 bit dithering function to realize 16M colors

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	61	g
Surface treatment	Anti-glare, Anti-Smudge	
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_{DD}	3.0	3.3	3.6	V	Note1
Power Supply Current	I_{DD}		21	30	mA	V_{DD} =3.3V
Ripple Voltage	V_{RPVDD}			100	mVp-p	
"H" level logical input voltage	V_{IH}	0.7VDD	--	VDD	V	
"L" level logical input voltage	V_{IL}	0	--	0.3VDD	V	
Operating temperature	Topa	-20	--	70	°C	Ambient temperature
Storage temperature	Tstg	-30	--	80	°C	Ambient temperature

Note1: VDD Absolute Maximum Ratings -0.3V~+5V

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	21	23.1	25.2	V	$I_{L=20}$ Ma
LED dice life time		20,000	30,000		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 25   and LED dice current=20mA

VLED+   VLED-
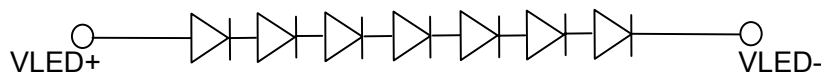
6. BLOCK DIAGRAM
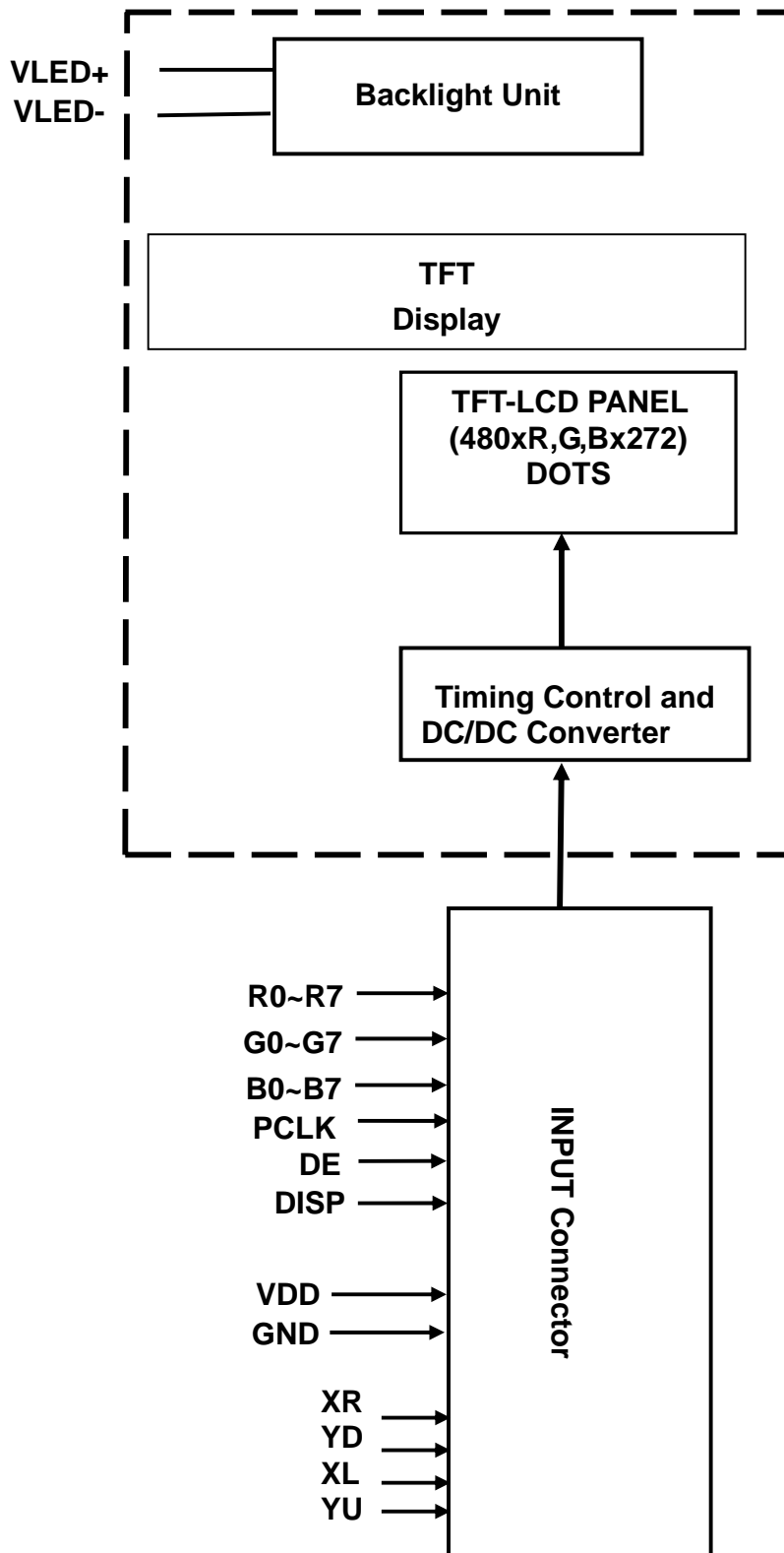
7. PIN CONNECTIONS

7.1 Input Pins Connection

Pin No	Symbol	Function	Remark
1	VLED-	LED Power Supply Cathode.	
2	VLED+	LED Power Supply Anode.	
3	NC	No Connection	
4	VDD	Power Supply : +3.3V	
5	R0		
6	R1		
7	R2		
8	R3	Digital data input. R0 is LSB and R7 is MSB	
9	R4		
10	R5		
11	R6		
12	R7		
13	G0		
14	G1		
15	G2		
16	G3	Digital data input. G0 is LSB and G7 is MSB	
17	G4		
18	G5		
19	G6		
20	G7		
21	B0		
22	B1		
23	B2		
24	B3	Digital data input. B0 is LSB and B7 is MSB	
25	B4		
26	B5		
27	B6		
28	B7		
29	GND	Ground	
30	PCLK	clock signal to sample each data	
31	DISP	Display ON/OFF Control ON=H(VDD), OFF=L(GND)	
32	NC	NC connection	
33	NC	NC connection	
34	DE	Data enable single	
35	NC	No Connection	
36	GND	Ground	
37	XR	Touch panel Right	
38	YD	Touch panel Down	
39	XL	Touch panel Left	
40	YU	Touch panel Up	

8. AC CHARACTERISTICS
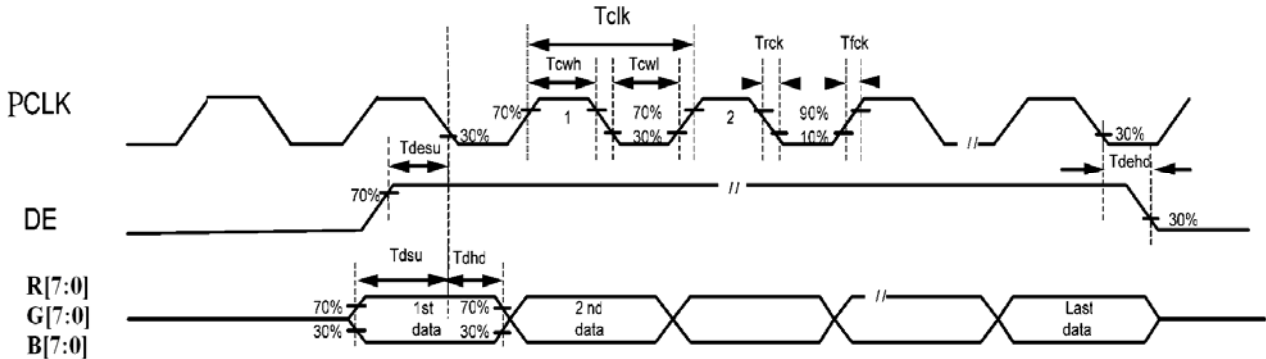### 8.1 Clock and Data Input Waveforms

Fig 1. Parallel RGB input timing

(VCC = 3.0 to 3.6V, GND=0V, TA=-20 to +85)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
CK clock time	Tclk	33.3	-	-	ns	CK =30MHz
CK clock low period	Tcwl	40	-	60	%	
CK clock high period	Tcwh	40	-	60	%	
Clock rising time	Trck	-	-	9	ns	
Clock falling time	Tfck	-	-	9	ns	
Data setup time	Tdasu	12	-	-	ns	
Data hold time	Tdahd	12	-	-	ns	

Clock and data input timing

8.2 Data Input Format
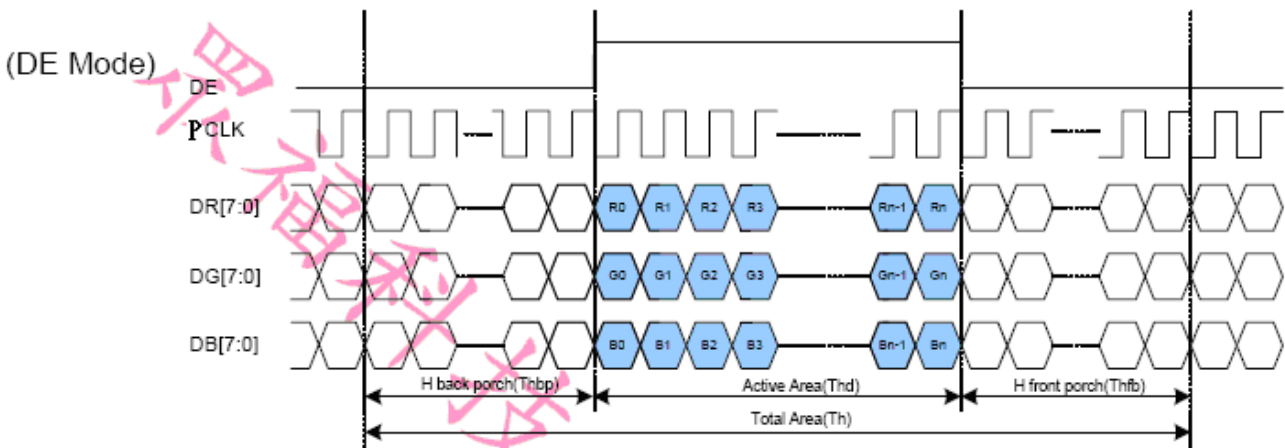
Fig 2. DE Mode Date Format
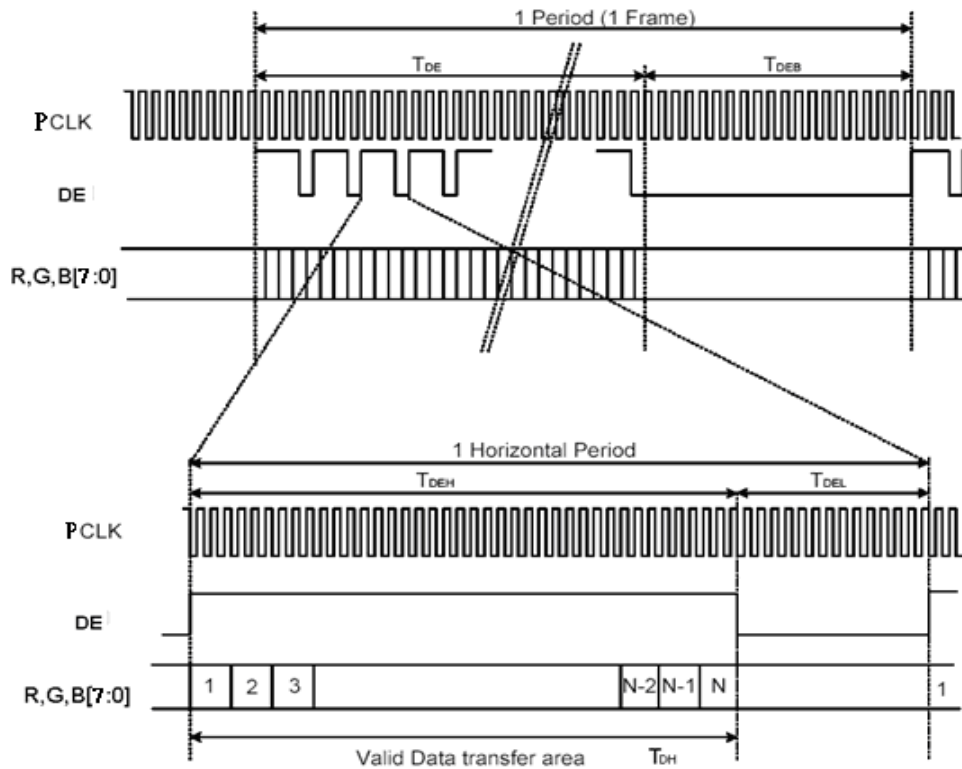
(480xRGBx272, Ta =25ºC, VCC=3.3V GND= 0V)

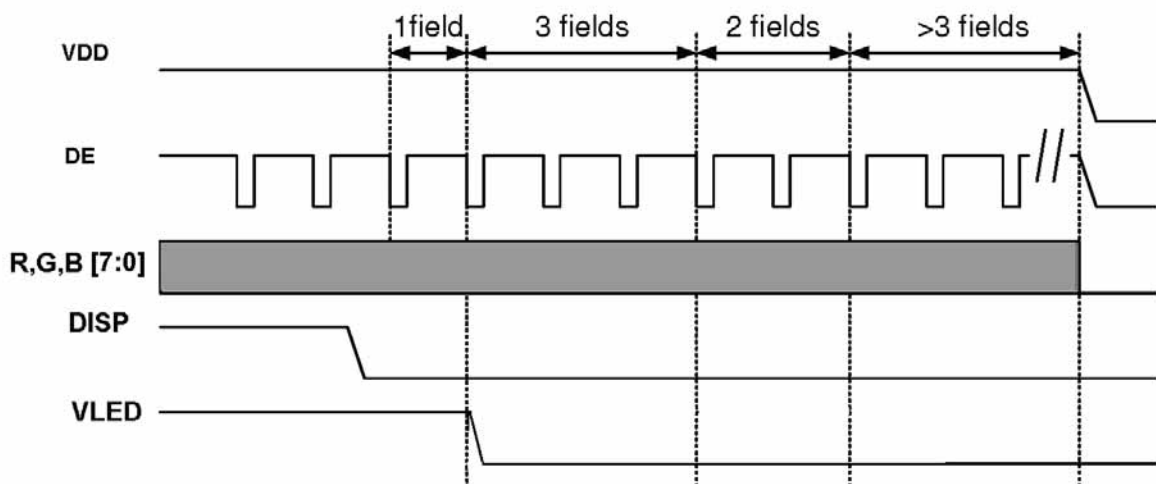| Parameter	Symbol	Min.	Typ. Value	Max.	Unit
CK frequency	fclk	5	9	12	MHz
DE set-up time	Tdesu	12	-	-	ns
DE hold time	Tdehd	12	-	-	ns
DE period	$T_{DEH} + T_{DEL}$	-	480 + 45	-	PCLK
DE pulse width	T_{DH}	-	480	-	PCLK
DE frame blanking	T_{DEB}	-	16	-	$T_{DEH} + T_{DEL}$
DE frame width	T_{DE}	-	272	-	$T_{DEH} + T_{DEL}$

8.3 Power on/off sequence:

● **Power on sequence**
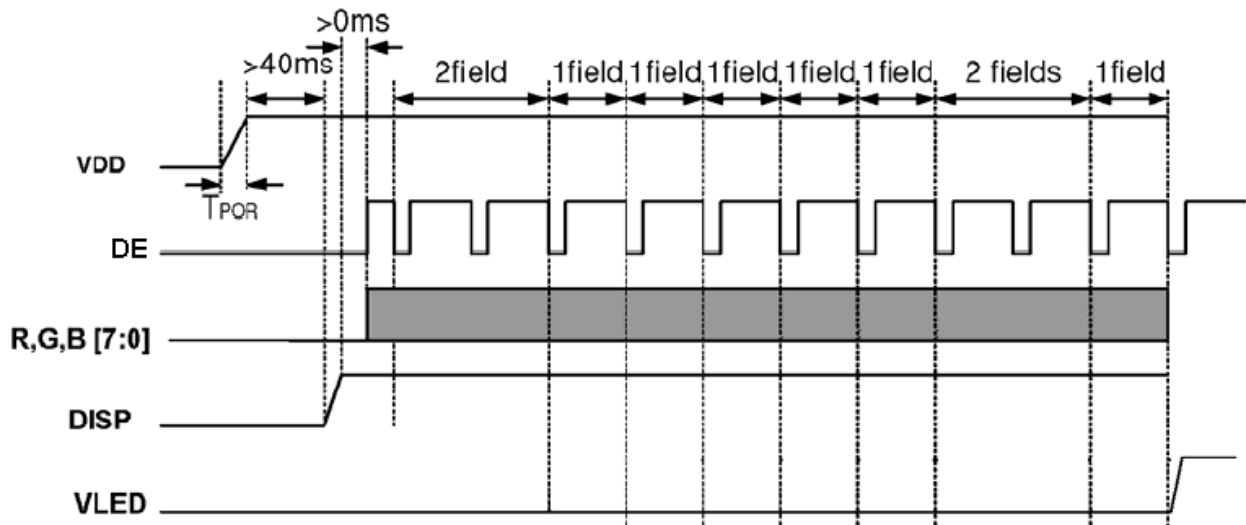
● **Power off sequence**

9. Optical Characteristics

| Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time		Tr+Tf	θ=0°	-	25	-	ms	Note 4
Contrast ratio		CR	At optimized viewing angle	100	400			Note 5
Viewing angle	Top	y+	CR≥10	40	50	-	Deg.	Note 6
	Bottom	y-		60	70	-		
	Left	x-		60	70	-		
	Right	x+		60	70	-		
Luminance of white			θ=0°	250	320	--	cd/m2	Note 7,8
Uniformity				70	--		%	Note 8,9
White chromaticity	X		θ=0°	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
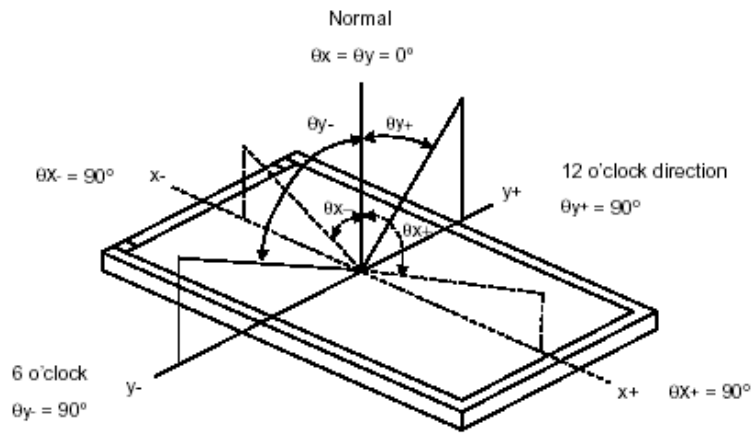   amplitudes.   Refer to figure as shown below.
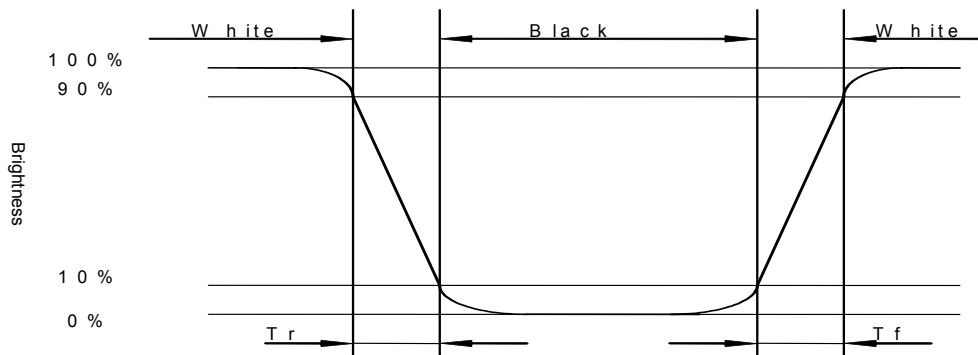
Note5: Definition of contrast ratio:
   Contrast ratio is calculated with the following formula.

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

Note 6: Definition of viewing angle:
Refer to figure as below.

Normal
θx = θy = 0°

θy-   θy+

θX- = 90°   x-

12 o'clock direction
θy+ = 90°
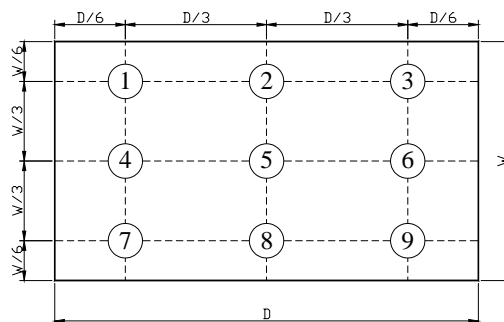
y+

θx-   θx+

6 o'clock
y-

θy- = 90°

x+   θX+ = 90°

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

Note8: The method of optical measurement

Photometer
TOP CON BM-7A

40 cm

Field:1°

TFT-LCD Module
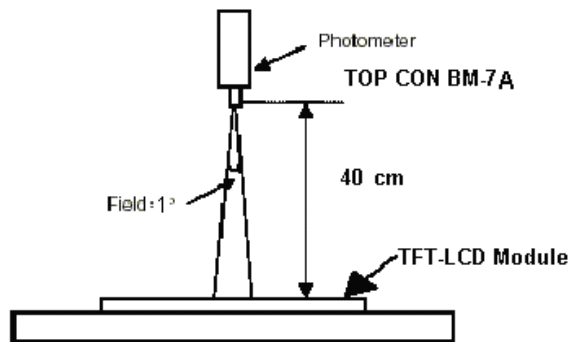
Note 9: Definition of Brightness Uniformity (B-uni):

D/6   D/3   D/3   D/6

W/6

W/3

① ② ③

W/3

④ ⑤ ⑥

W/6

⑦ ⑧ ⑨

W

D

B-uni $\dfrac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9points}}$.

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		$\geq$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: $\geq$20MΩ at DC25V
- Contact bounce: <20ms
- Linearity test: <3%

6.2 Stylus writing
Touch panel is drawn by R0.8 Delrin 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: $\geq$20MΩ at DC25V
- Contact bounce: <20ms
- Linearity test: <3%

Silicone Rubber
(R=8.0mm dia.)
Touch Panel

Stylus Pen
(R=0.8mm dia.)
Touch Panel
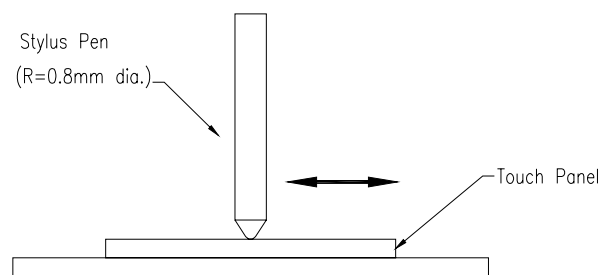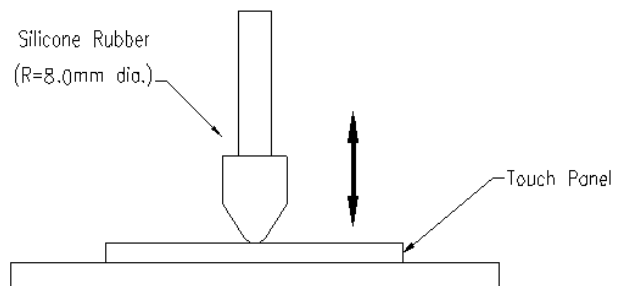
11. QUALITY   ASSURANCE
11.1 Test Condition

11.1.1 Temperature and Humidity(Ambient Temperature)
Temperature   : $25 \pm 5°C$
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.
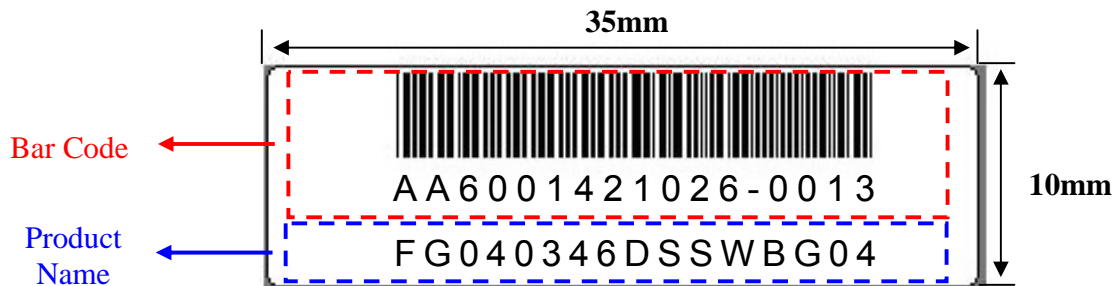
11.1.4 Test Frequency
In case of related to deterioration such as shock test.   It will be conducted only once.

11.1.5 Test Method

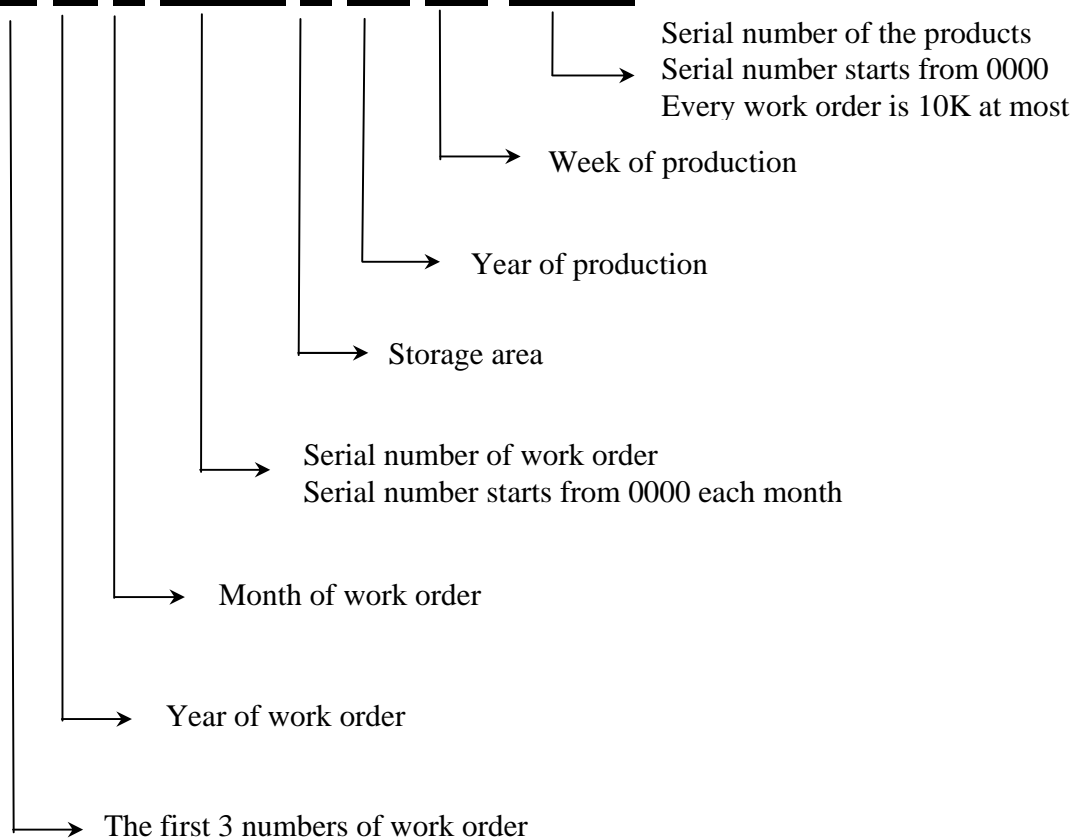| No.	Reliability Test Item & Level	Test Level
1	High Temperature Storage Test	T=80°C,240hrs
2	Low Temperature Storage Test	T=-30°C,240hrs
3	High Temperature Operation Test	T=70°C,240hrs
4	Low Temperature Operation Test	T=-20°C,240hrs
5	High Temperature and High Humidity Operation Test	T=60°C,90% RH,240hrs
6	Thermal Cycling Test (No operation)	-30°C $\to$ +25°C $\to$ +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:$\pm$ 15KV;Contact: $\pm$ 8KV 10 times/point;4 points/panel face

12. LCM PRODUCT LABEL DEFINE

Product Label style:

35mm

Bar Code ←

A A 6 0 0 1 4 2 1 0 2 6 - 0 0 1 3

10mm

Product Name ←

F G 0 4 0 3 4 6 D S S W B G 0 4

BarCode Define:

A A 6 0014 2 10 26-0013

Serial number of the products
Serial number starts from 0000
Every work order is 10K at most

Week of production

Year of production

Storage area

Serial number of work order
Serial number starts from 0000 each month

Month of work order

Year of work order

The first 3 numbers of work order

Product Name Define:

FG 040346   D   S   S   W   B   G   04

└─── **VERSION :04**

└─── RoHS

└─── **View direction & Temp. Range**

A– Bottom view 6H & Normal temp.

B– Bottom view 6H & Wide temp.

C–Top View & Normal temp

D–Top View & Wide temp.

└─── **Backlight Color**

W –White   Y – Yellow Green

G - green

└─── **Backlight**

S –edge light LED B/L

C–CCFL B/L

└─── **LCD Polarize type**

N–Normal view   **S – Super wide view or Excellent W.V.**

M–transmissive   W– Sunlight readable

└─── **LCD type**

A –TFT analog

D –TFT digital

└─── **Series code**

040346**–, 4.3 inch**

└─── **Model type**

FG–Standard TFT Module

FX–Custom TFT Module

13. 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 handing,

(1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degredation, 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 : $280°C \pm 10°C$

(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). 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.
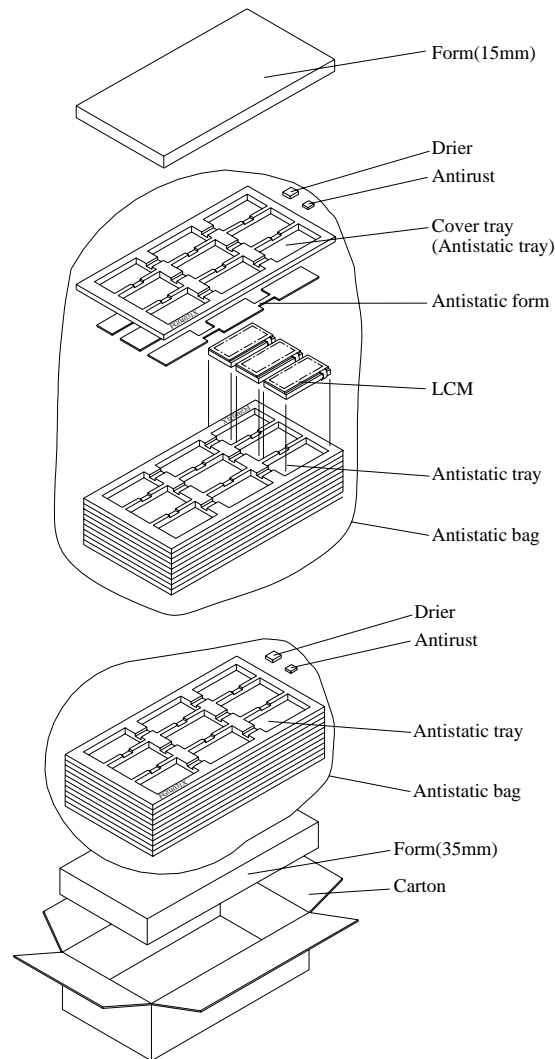
14. OUTLINE DRAWING
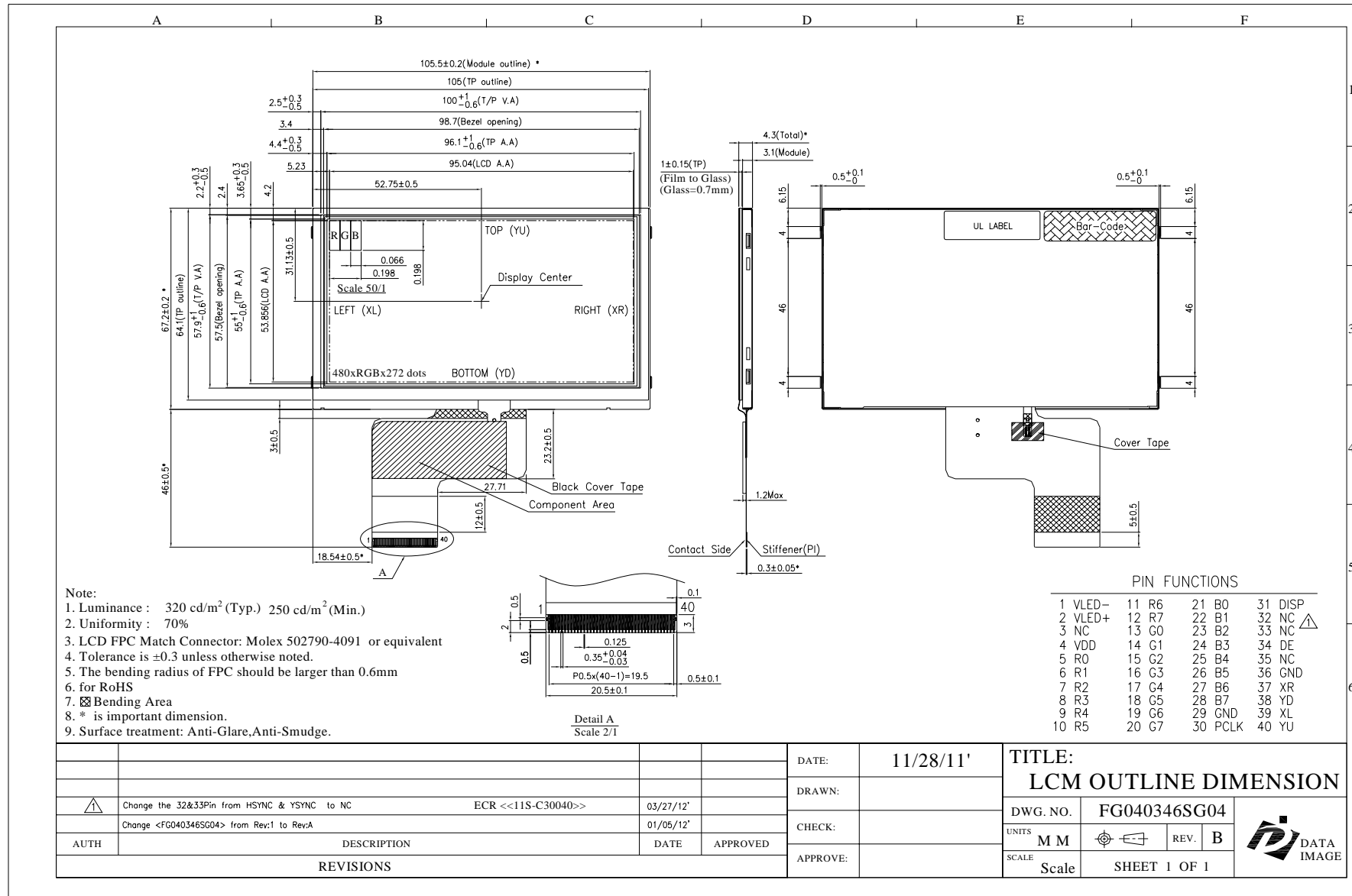
Note:
1. Luminance : 320 cd/m^2 (Typ.) 250 cd/m^2 (Min.)
2. Uniformity : 70%
3. LCD FPC Match Connector: Molex 502790-4091 or equivalent
4. Tolerance is ±0.3 unless otherwise noted.
5. The bending radius of FPC should be larger than 0.6mm
6. for RoHS
7. ⊠Bending Area
8. * is important dimension.
9. Surface treatment: Anti-Glare, Anti-Smudge.

Detail A
Scale 2/1

PIN FUNCTIONS

1 VLED−	11 R6	21 B0	31 DISP
2 VLED+	12 R7	22 B1	32 NC
3 NC	13 G0	23 B2	33 NC
4 VDD	14 G1	24 B3	34 DE
5 R0	15 G2	25 B4	35 NC
6 R1	16 G3	26 B5	36 GND
7 R2	17 G4	27 B6	37 XR
8 R3	18 G5	28 B7	38 YD
9 R4	19 G6	29 GND	39 XL
10 R5	20 G7	30 PCLK	40 YU

REVISIONS

AUTH	DESCRIPTION	DATE	APPROVED
⚠	Change the 32&33Pin from HSYNC & YSYNC to NC ECR <<11S-C30040>>	03/27/12'	
	Change <FG040346SG04> from Rev:1 to Rev:A	01/05/12'	

DATE: 11/28/11'
DRAWN:
CHECK:
APPROVE:

TITLE:
LCM OUTLINE DIMENSION

DWG. NO. FG040346SG04

UNITS M M   REV. B

SCALE Scale   SHEET 1 OF 1

15.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 = 162 pcs

Carton size : 465L x 380W x 395H (mm)

Total Weight ≒ 12.8 kgw

FX040346+TP TFT LCM PACKING