

LIQUID CRYSTAL DISPLAY MODULE

Product Specification

PRODUCT NUMBER	DCR80571FW640G480WTT
---------------------------	-----------------------------

INTERNAL APPROVALS		
Product Manager	Engineering	Document Control
	Ray Tai 06/27/18	

TABLE OF CONTENTS

1	MAIN FEATURES.....	4
2	MECHANICAL DRAWING.....	5
3	ABSOLUTE MAXIMUM RATINGS.....	6
3.1	ABSOLUTE RATINGS OF ENVIRONMENT	6
3.2	ELECTRICAL ABSOLUTE RATINGS.....	6
4	ELECTRICAL CHARACTERISTICS	7
4.1	TFT-LCD MODULE.....	7
4.2	BACKLIGHT UNIT.....	8
5	INTERFACE TIMING	9
5.1	INPUT SIGNAL CHARACTERISTICS.....	9
5.2	WAVEFORM.....	10
6	OPTICAL CHARACTERISTICS	12
7	INTERFACE PIN ASSIGNMENT.....	15
7.1	TFT-LCD MODULE.....	15
7.2	BACKLIGHT UNIT.....	17
7.3	COLOR DATA INPUT ASSIGNMENT	18
8	BLOCK DIAGRAM	19
9	RELIABILITY	20
10	PACKAGING	21
11	LABELLING DESCRIPTION	22
12	INCOMING INSPECTION STANDARDS	23
12.1	THE ENVIRONMENTAL CONDITION OF INSPECTION.....	23
12.2	THE DEFECTS CLASSIFY OF AQL AS FOLLOWING:.....	23
13	HANDLING PRECAUTIONS	27

REVISION RECORD

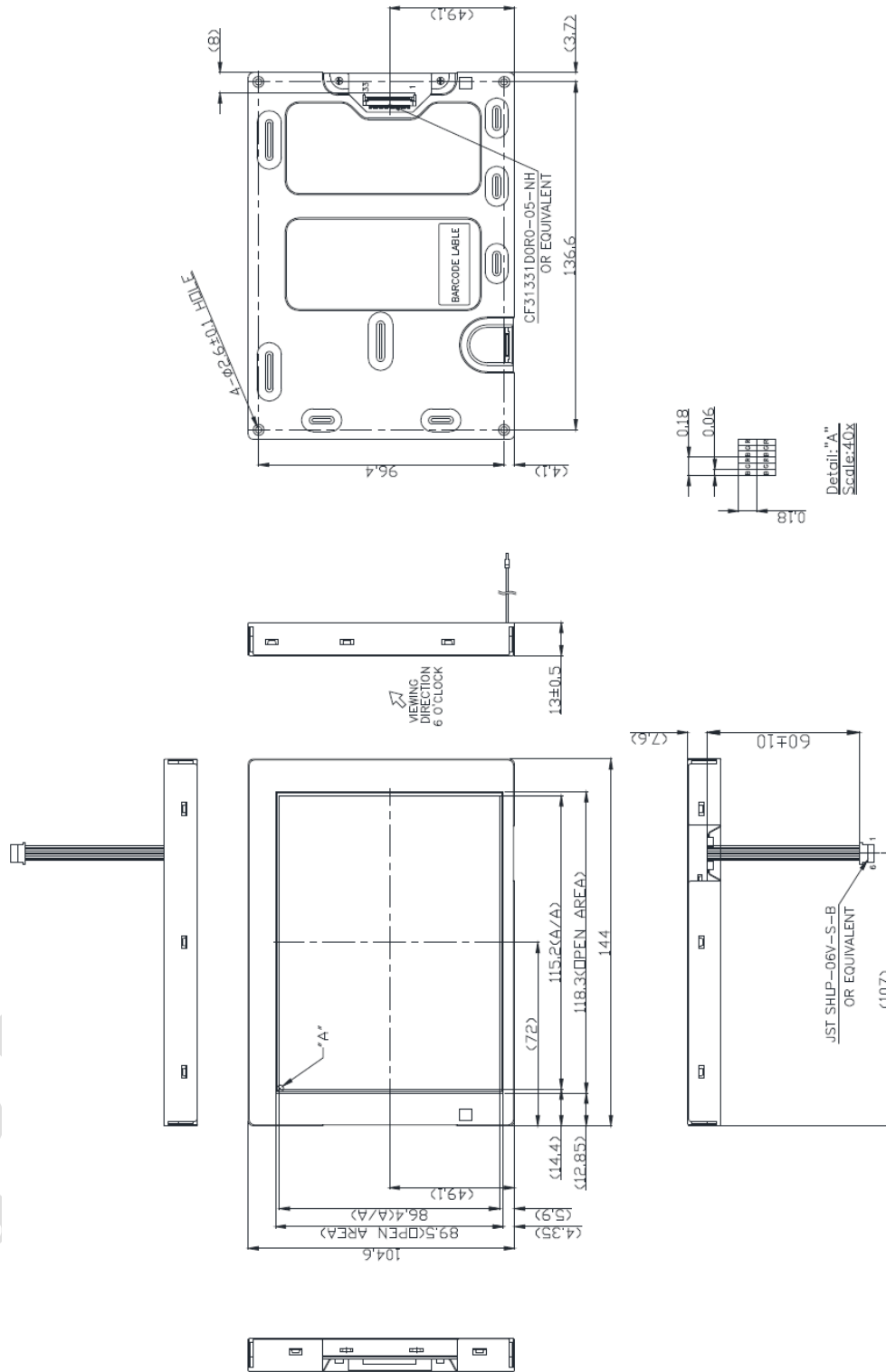
Rev.	Date	Comment	ECN No.
00	06/25/18	Preliminary DCA Specification	TBD

PRELIMINARY

1 MAIN FEATURES

ITEM	DESCRIPTION	UNIT
Screen Size	5.7 (Diagnol)	inch
Display Format	640 (W) x 480 (H)	dots
Outline Dimension	144.0 (W) x 104.6 (H) x 13.0 (D)	mm
Viewing Area	118.3 (W) x 8.95 (H)	mm
Active Area	115.2 (W) x 86.4 (H)	mm
LCD Type	TN / Transmissive / Normally White	--
Backlight Type	LED	--
Viewing Angle	6:00 Gray Inversion	--
Interface	18 bit Parallel	--
Operating Temperature	-20 ~ +70	°C
Storage Temperature	-30 ~ +80	°C
RoHS Compliant	Yes	--

2 MECHANICAL DRAWING



Product No.	DCR80571FW640G480WTT	REV. 00
-------------	----------------------	---------

Page	5 / 27
------	--------

3 ABSOLUTE MAXIMUM RATINGS

3.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Operating Temperature	T _{OP}	-20	+70	°C	1, 2
Storage Temperature	T _{ST}	-30	+80	°C	1, 2

Note:

1. Background color changes slightly depending on ambient temperature. This phenomenon is reversible.
2. Please refer to Section 9, [RELIABILITY](#).

3.2 ELECTRICAL ABSOLUTE RATINGS

3.2.1 TFT-LCD MODULE

(T_a = 25 ± 2 °C, GND = VSS = 0V)

Item	Symbol	Value		Unit	Note
		Min	Max		
Digital Power Supply Voltage	VCC	-0.3	4.3	V	--

3.2.2 BACKLIGHT UNIT

(T_a = 25 ± 2 °C)

Item	Symbol	Value		Unit	Note
		Min	Max		
Forward Current	I _F	--	120	mA	1
Reverse Voltage	V _R	--	20	V	1

Notes:

1. This value is for each 1 line.

4 ELECTRICAL CHARACTERISTICS

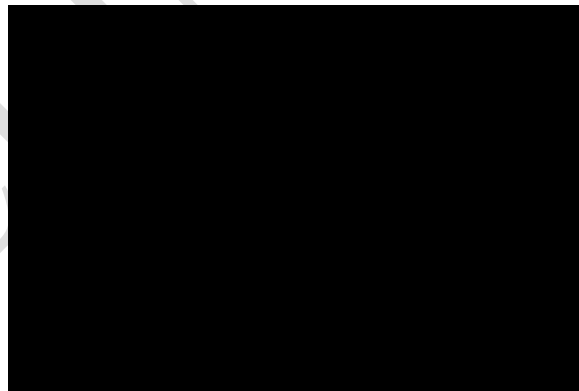
4.1 TFT-LCD MODULE

Item	Symbol	Value			Unit	Note
		Min	Typ	Max		
Power Supply Voltage	VCC	3.0	3.3	3.6	V	--
Input High Threshold Voltage	VIH	0.7VCC	--	VCC	V	--
Input Low Threshold Voltage	VIL	0	--	0.3VCC	V	--
Current dissipation	ICC	--	(TBD)	(TBD)	mA	--
Frame Frequency	F _v	--	60	--	Hz	--
Dot Clock	DCLK	--	25.175	7	MHz	--

Notes:

- The specified power consumption is under the conditions at VCC = 3.3V, F_v = 60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray



Active Area

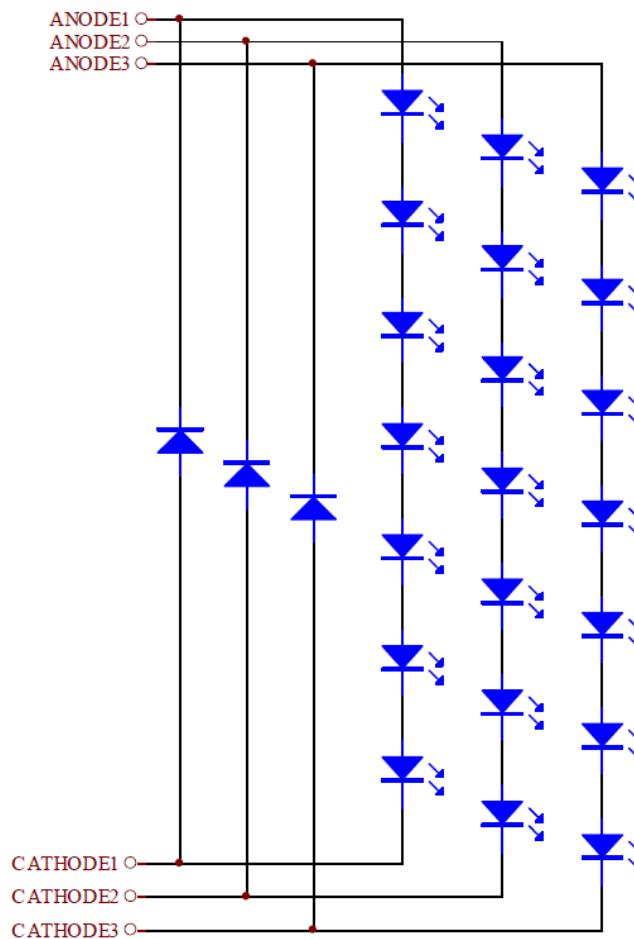
4.2 BACKLIGHT UNIT

(Ta = 25±2°C)

Item	Symbol	Value			Unit	Note
		Min	Typ	Max		
Current of LED Driver Unit	I _B	--	25	--	mA	1 line
Voltage of LED Driver Unit	V _B	--	(20.3)	--	V	I _B = 25 mA/ 1 line Note 2
LED Life Time (25°C)	--	70000	78000	--	hr	Note 1, 3

Note

1. Lamp life time is defined as under 25±2°C, when the average brightness decreases to 50% of original brightness.
2. The backlight unit is driven by constant current, the voltage value is for reference only.
3. Use Global patent LED



5 INTERFACE TIMING

5.1 INPUT SIGNAL CHARACTERISTICS

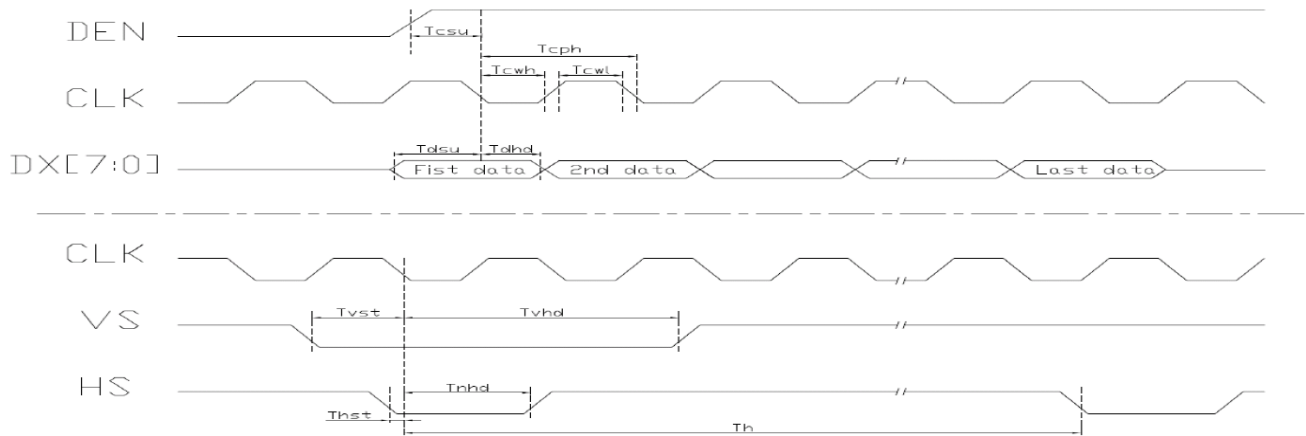
Parameter	Symbol	Value			Unit
		Min	Typ	Max	
HS Setup Time	T_{hst}	10	--	--	ns
HS Hold Time	T_{hhd}	10	--	--	ns
VS Setup Time	T_{vst}	10	--	--	ns
VS Hold Time	T_{vhd}	10	--	--	μ s
Data Setup Time	T_{dsu}	10	--	--	ns
Data Hold Time	T_{dhd}	10	--	--	ns
DEN Setup Time	T_{esu}	10	--	--	ns
VS falling to HS falling time on odd field @ RGB mode	T_{HV_O}	-4	0	+4	T_{CPH}
VS falling to HS falling time on even field @ RGB mode	T_{HV_E}	0.4	0.5	0.6	T_H
CLK Frequency	F_{CPH}	--	25.175	--	MHz
CLK Period	T_{CPH}	--	39.7	--	ns
CLK Pulse Duty	T_{CWH}	40	50	60	%
HS Period	T_H	--	800	--	T_{CPH}
HS Pulse Width	T_{WH}	5	30	--	T_{CPH}
HS First Horizontal Data Time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	--	640	--	T_{CPH}
VS Pulse Width	T_{wv}	1	3	5	T_H
VS-DEN Time	T_{STV}	--	35	--	T_H
VS Period	T_V	--	525	--	T_H

Notes:

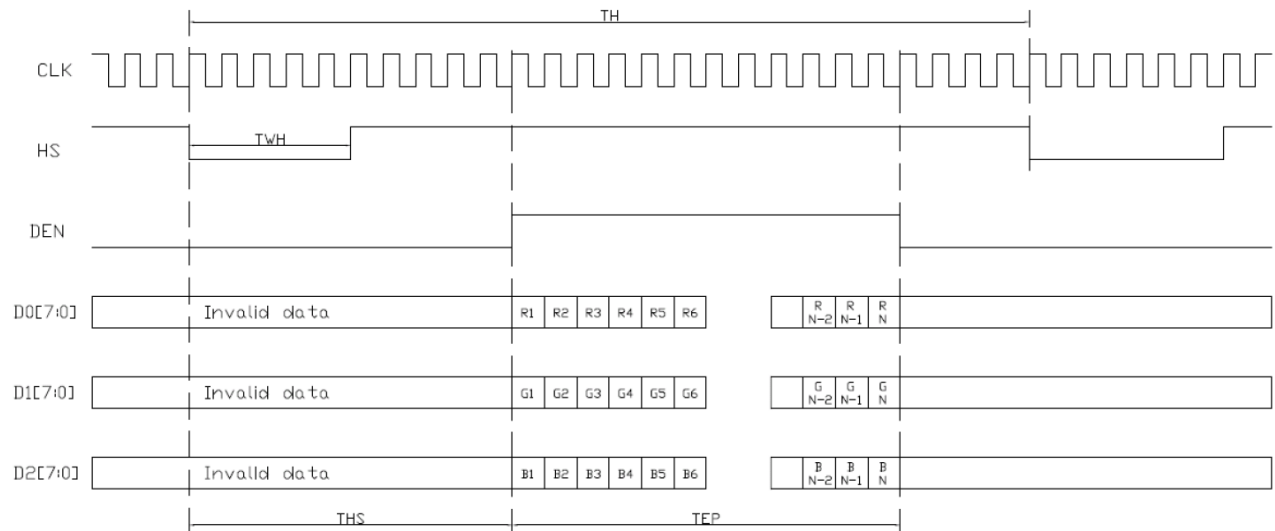
1. When SYNC mode is used, 1st data starts from the 68th CLK after IHS falling.

5.2 WAVEFORM

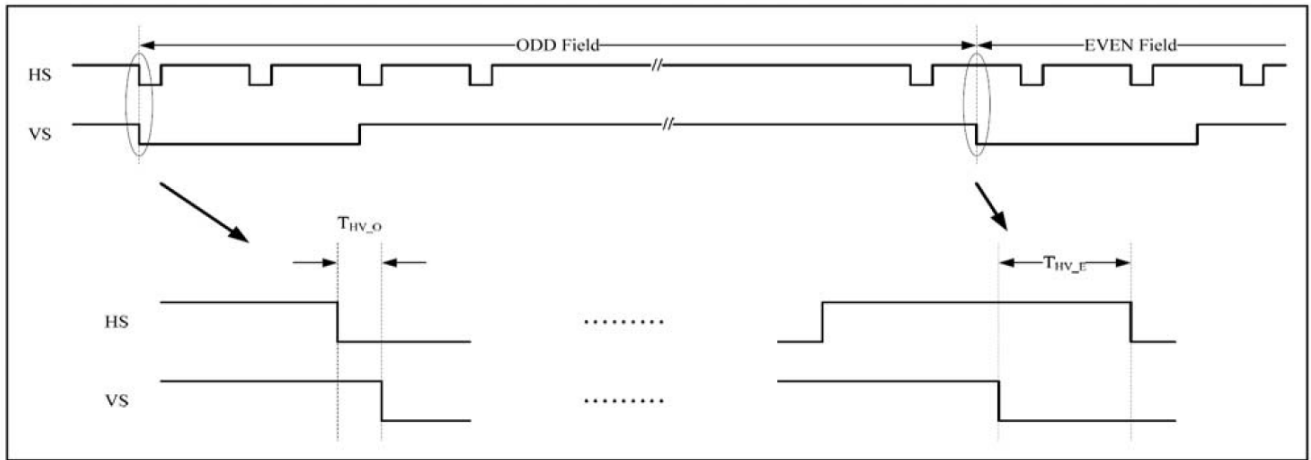
5.2.1 CLOCK AND DATA INPUT WAVEFORMS



5.2.2 DATA INPUT FORMAT FOR RGB MODE



5.2.3 The HS & VS timing of the ODD/EVEN field



PRELIMINARY

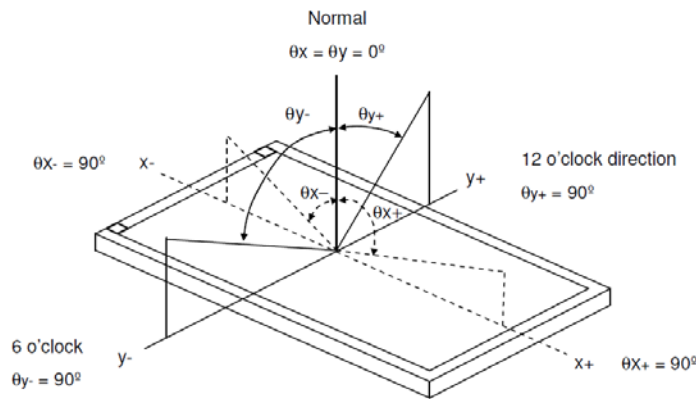
6 OPTICAL CHARACTERISTICS

The optical characteristics should be measured in a dark environment (≤ 1 lux) or equivalent state with the methods shown in note 4.

Item		Symbol	Conditions	Value			Unit	Note
				Min	Typ	Max		
Contrast Ratio		CR	$\theta_X = 0^\circ, \theta_Y = 0^\circ$ Viewing Normal Angle	300	(500)	--	--	2
Response Time		T_R		--	15	--	ms	3
		T_F		--	35	--	ms	
Luminance (Center)		Y		500	(630)	--	cd/m ²	4
Brightness Uniformity		BUNI		70	(75)	--	%	5
Color Chromaticity	Red	R_x		(TBD)	(TBD)	(TBD)	--	1, 4
		R_y		(TBD)	(TBD)	(TBD)	--	
	Green	G_x		(TBD)	(TBD)	(TBD)	--	
		G_y		(TBD)	(TBD)	(TBD)	--	
	Blue	B_x		(TBD)	(TBD)	(TBD)	--	
		B_y	(TBD)	(TBD)	(TBD)	--		
	White	W_x	(TBD)	(TBD)	(TBD)	--		
		W_y	(TBD)	(TBD)	(TBD)	--		
Viewing Angle	Horizontal	θ_{X+}	CR ≥ 5	60	(80)	--	deg	
		θ_{X-}		60	(80)	--		
	Vertical	θ_{Y+}		60	(80)	--		
		θ_{Y-}		60	(80)	--		

Notes:

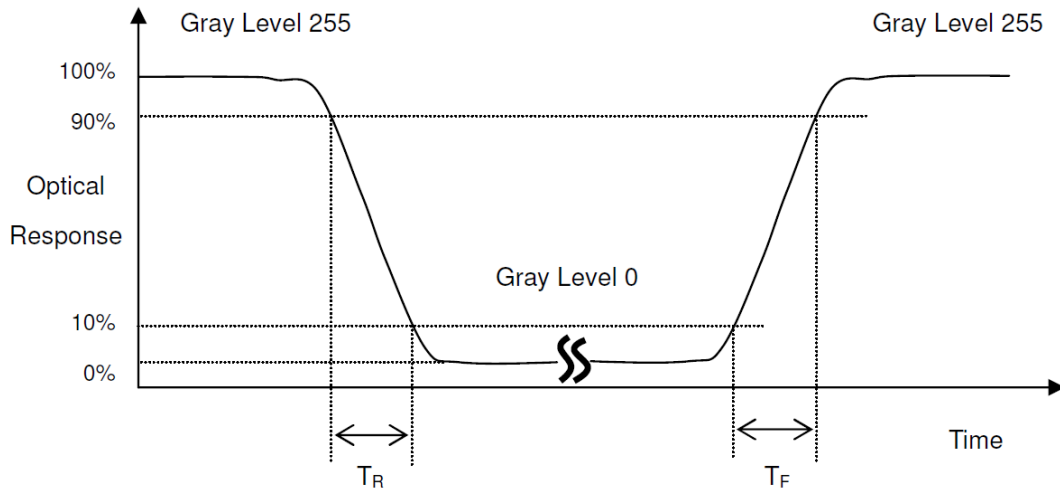
1. Definition of viewing angle (θ_x, θ_y)



2. Definition of contrast ratio (CR):

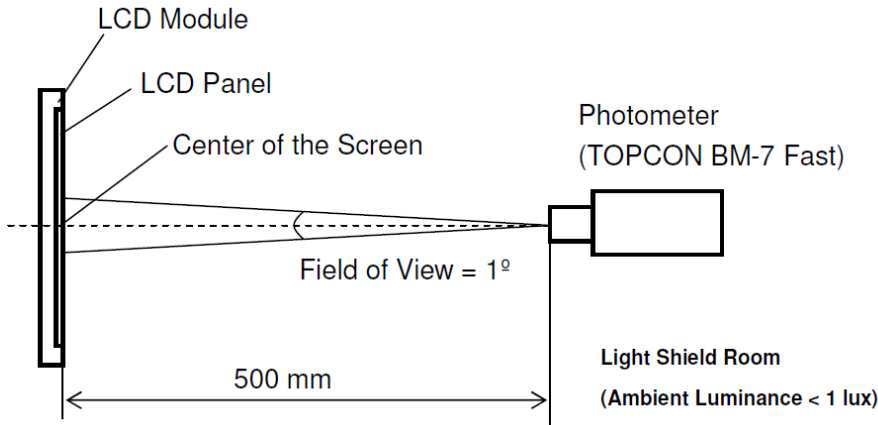
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance Measured when LCD on the "White" state}}{\text{Luminance Measured when LCD on the "Black" state}}$$

3. Definition of response time (T_R, T_F)



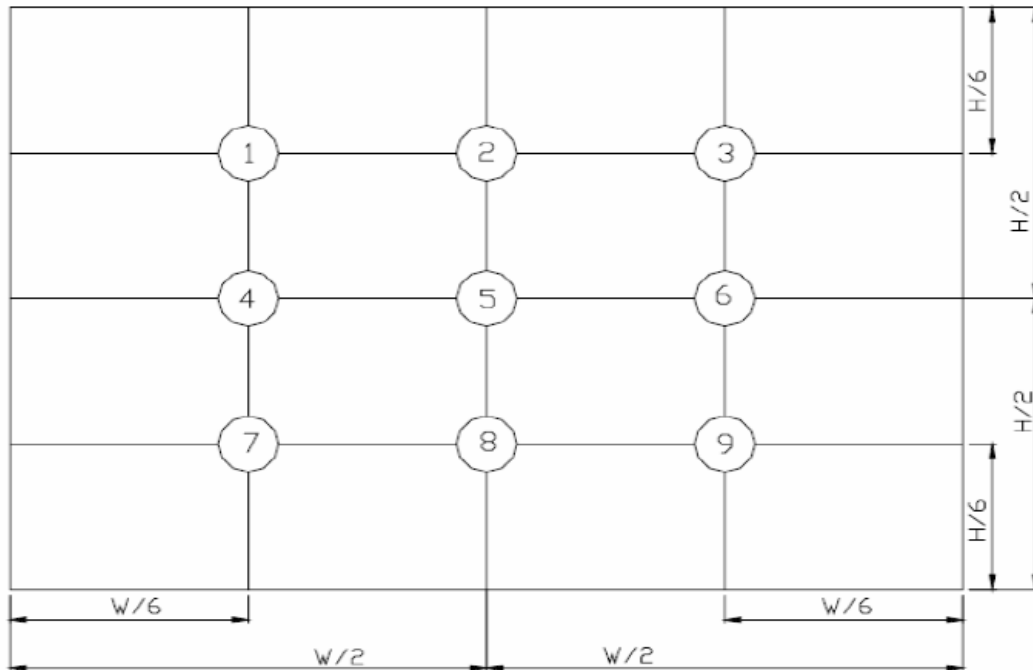
4. Measurement set-up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in a dark room or equivalent condition.



5. Definition of brightness uniformity

$$\text{Brightness uniformity} = (\text{Min luminance of 9 points}) / (\text{Max luminance of 9 points}) \times 100\%$$



7 INTERFACE PIN ASSIGNMENT

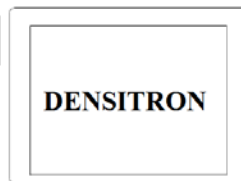
7.1 TFT-LCD MODULE

Pin No.	Symbol	Description
1	GND	Ground
2	CLK	Clock signal
3	HSYC	Horizontal synchronous signal
4	VSYC	Vertical synchronous signal
5	GND	Ground
6	R0	Red data (LSB)
7	R1	Red data
8	R2	Red data
9	R3	Red data
10	R4	Red data
11	R5	Red data (MSB)
12	GND	Ground
13	G0	Green data (LSB)
14	G1	Green data
15	G2	Green data
16	G3	Green data
17	G4	Green data
18	G5	Green data
19	GND	Ground

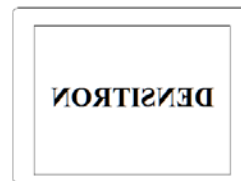
20	B0	Blue data (LSB)
21	B1	Blue data
22	B2	Blue data
23	B3	Blue data
24	B4	Blue data
25	B5	Blue data (MSB)
26	GND	Ground
27	ENAB	Input data enable control
28	VCC	Power supply for Logic
29	VCC	Power supply for Logic
30	R/L	Selection signal for horizontal scanning direction. Note 1.
31	U/D	Selection signal for vertical scanning direction. Note 1.
32	NC	No connection
33	GND	Ground

Notes:

1.



R/L=L, U/D=H



R/L=H, U/D=H



R/L=L, U/D=L



R/L=H, U/D=L

7.2 BACKLIGHT UNIT

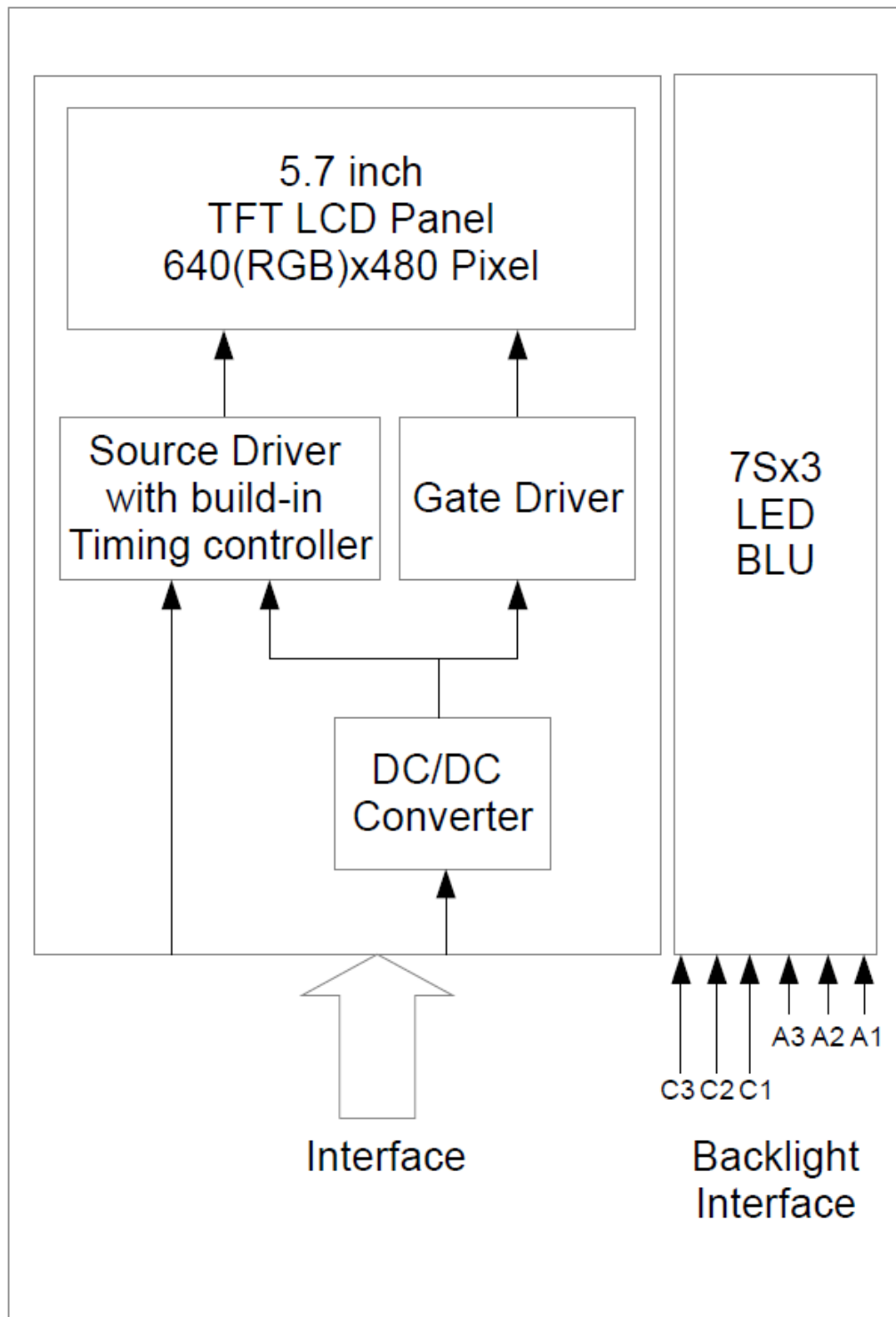
Pin No.	Symbol	Description
1	Anode 1	LED Anode Terminal
2	Anode 2	LED Anode Terminal
3	Anode 3	LED Anode Terminal
4	Cathode 1	LED Cathode Terminal
5	Cathode 2	LED Cathode Terminal
6	Cathode 3	LED Cathode Terminal

7.3 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 provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		D05	D04	D03	D02	D01	D00	D15	D14	D13	D12	D11	D10	D25	D24	D23	D22	D21	D20
Basic Colors	Black	0	0	0	0	0	0	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
	Green	0	0	0	0	0	0	1	1	1	1	1	1	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
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	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	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

8 BLOCK DIAGRAM



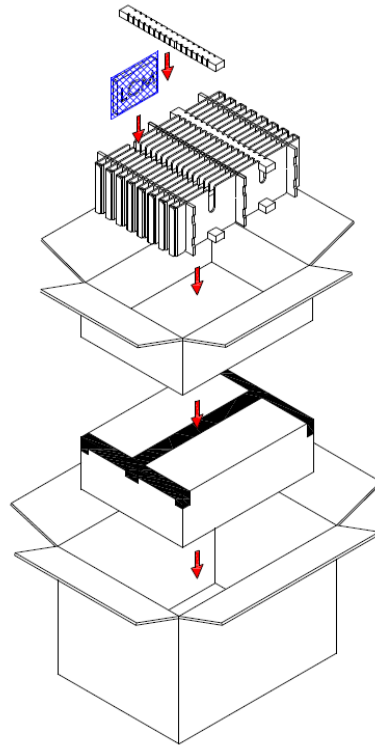
9 RELIABILITY

Item	Test Conditions	Notes
High Temperature Storage	T _a = 80°C 240 hrs	1, 3, 4
Low Temperature Storage	T _a = -30°C 240 hrs	1, 3, 4
High Temperature Operation	T _s = 70°C 240 hrs	2, 3, 4
Low Temperature Operation	T _a = -20°C 120 hrs	1, 3, 4
Operate at High Temperature and Humidity	T _a = 40°C 90% RH 240 hrs	3, 4
Electro Static Discharge Test (non-operating)	-Panel Surface / Top Case : 150pF, 330Ω Air: ±15kV, Contact: ±8kV	3
Mechanical Shock Test (non-operating)	Half sine wave, 100G, 6ms 3 times shock of each six surfaces	3
Mechanical Shock	100G 6ms, ±X, ±Y, ±Z 3 times for each direction	3
Vibration Test (non-operating)	Sine wave: 10 ~ 55 ~ 10Hz amplitude: 1.5mm 3 axis, 2 hrs/axis	3
Thermal Shock Test (non-operating)	-20°C (30min) ~ 70°C (30min), 10 cycles	3, 4
Drop Test (with carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	3

Notes:

1. T_a is the ambient temperature of samples.
2. T_s is the temperature of panel's surface.
3. In the standard condition, there shall be no practical problem that may affect the display function, after the reliability test, the product only guarantees operation, but does not guarantee all of the cosmetic specifications.
4. Before the cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.
5. When OP reaches -30 degrees, the reaction of the display will be slower. However, this phenomenon is reversible after the ambient temperature returns to higher values.

10 PACKAGING



Parts List				
	Item	Size (LxWxH) unit:mm	Material	Quantity
1	Static Shielding Bags	300.0 x 145.0 x 0.09	--	60
2	EPE Pad	345.0 x 30.0 x 20.0	EPE	8
3	Cardboard	345.0 x 150.0 x 3.5	Carton	6
4	Cardboard	450.0 x 23.0 x 150.0	Carton	16
5	Internal Box	455.0 x 350.0 x 164.0	Carton	2
6	External Box	475.0 x 370.0 x 375.0	Carton	1
7	Product	144.0 x 104.6 x 13.0	--	60

11 LABELLING DESCRIPTION

All parts must be labelled, or etched (in the case of glass), with its Densitron Part Number and Revision.



DCR80571FW640G480WTTX



ABCDEFGHIJKL

** Where X denotes the current Revision and YY and MM the 2-digit Year and Month of manufacture*

Product No.	DCR80571FW640G480WTT	REV. 00
-------------	----------------------	---------

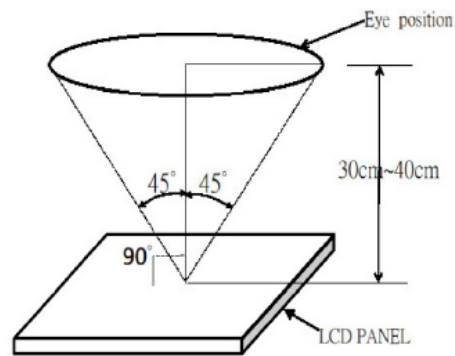
Page	22 / 27
------	---------

12 INCOMING INSPECTION STANDARDS

12.1 THE ENVIRONMENTAL CONDITION OF INSPECTION

The environmental condition and visual inspection shall be conducted as below.

1. Ambient temperature $25 \pm 5^{\circ}\text{C}$
2. Humidity: 45 ~ 65% RH
3. Viewing distance is approximately 30 ~ 40 cm
4. Viewing angle is normal to the LCD panel as Fig_1 ($\pm 45^{\circ}$)
5. Ambient Illumination: 300 ~ 500 Lux for external appearance inspection




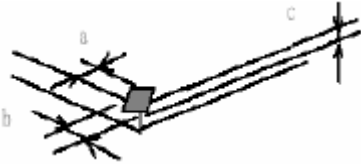

Fig_1

12.2 THE DEFECTS CLASSIFY OF AQL AS FOLLOWING:

1. Test method: According to ANSI/ASQC Z 1.4. General inspection level II takes one single time.
2. The defects classify of AQL as following:

Class of Defects	AQL	Definition
Major	0.65%	It is a defect that is likely to result in failure to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in a functioning problem with the deviation classified.

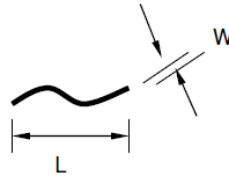
Item		Specification/Description			Note	
Display	Function	No display			--	
		Malfunction			--	
Operating	Contrast Ratio	Item	Acceptable number			1, 4, 5, 6
	Line Defect		A	B	Total	
	Point Defect (red, green, blue, dark, white)	Bright dot	$N \leq 2$	$N \leq 2$	$N \leq 7$	
		Dark dot	$N \leq 3$	$N \leq 4$		
		Total dot	$N \leq 4$	$N \leq 5$		
		Two adjacent dots	Not allowed			
Three or more adjacent dots		Not allowed				
External inspection (non-operating or operating)	Scratch (in display area)	L (mm)	W (mm)	Acceptable Number	2	
		$L \leq 2.5$	$W \leq 0.1$	4		
		$L > 2.5$	$W > 0.1$	0		
	Polarizer dent or bubble (in display area)	Dimension (mm)		Acceptable Number	3	
		$D \leq 0.25$		Disregard		
		$D \leq 0.5$		4		
	Line Shape (Particles and lint in display area)	L (mm)	W (mm)	Acceptable Number	2	
		--	$W \leq 0.07$	Disregard		
		$L \leq 5$	$W \leq 0.1$	4		
	Dot Shape (Particle in display area)	Dimension (mm)		Acceptable Number	3	
		$D \leq 0.25$		Disregard		
		$D \leq 0.5$		4		
	Missing figure on the polarizer (in display area)	Inactive dot		Acceptable Number	2, 3	
		$D < 0.2\text{mm}$		Disregard		
		$0.2 \leq D \leq 0.3\text{mm}$ $L \leq 1\text{mm}, W \leq 0.1\text{mm}$		Line & dot number $N \leq 4$		

Item		Specification/Description			Note	
Touch Panel	Scratch	L (mm)	W (mm)	Acceptable number	2	
				$W < 0.05$		Disregard
				$0.05 \leq W < 0.1$		$D \leq 4$
	Foreign Materials (Linear Shape)	L (mm)	W (mm)	$W < 0.05$	Disregard	2
				$0.05 \leq W < 0.1$	$N \leq 3$	
				$W \geq 0.1$	0	
	Foreign Materials (Circular Shape)	Dimension (mm)	Acceptable number	$D \leq 0.25$	Disregard	3
				$0.25 < D \leq 0.5$	$N \leq 6$	
				$D > 0.5$	0	
	Glass Chipping		a ≤ 5mm b ≤ 3mm c ≤ t (t: Glass think)	7		
					a ≤ 3mm b ≤ 3mm c ≤ t (t:Glass think)	7
Newton-ring	(In case of doubtful situations) Observe on 60° from the product surface under a white fluorescent lamp (3-wavelength lamp)	Average diameter ≤ 1/3 Touch Panel area disregard.	7			
Membrane Drum		H ≤ 0.35mm	--			

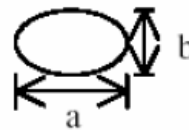
Notes:

1. The definition of dot defect: The dot defect was judged after repair and the size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

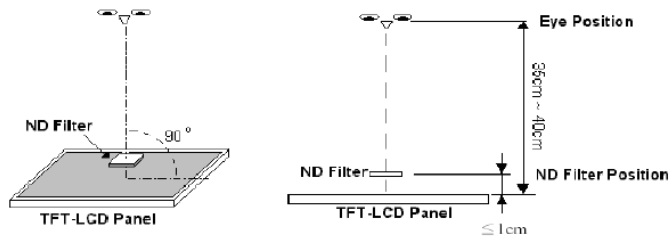
2.



3. D: Diameter $D = (a+b)/2$



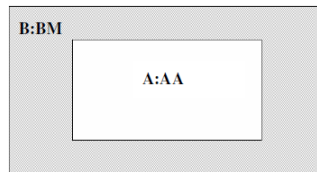
4. Bright dot is defined through 2% transmission ND Filter as following.



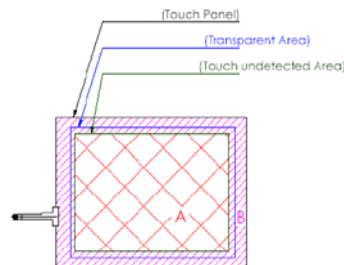
5. Adjacent dot



6.



7.



A area: Without any effect point on operation

B area: None-specify

13 HANDLING PRECAUTIONS

Safety

If the LCD panel breaks, be careful not to get the liquid crystal fluid in your mouth or in your eyes.
If the liquid crystal touches your skin or clothes, wash it off immediately using soap and plenty of water.

Mounting and Design

Place a transparent plate (e.g. acrylic, polycarbonate or glass) on the display surface to protect the display from external pressure. Leave a small gap between the transparent plate and the display surface.
When assembling with a zebra connector, clean the surface of the pads with alcohol and keep the surrounding air very clean. Design the system so that no input signal is given unless the power supply voltage is applied.

Caution during LCD Cleaning

Lightly wipe the display surface with a soft cloth soaked with Isopropyl alcohol, Ethyl alcohol or Trichlorotrifluoroethane. Do not wipe the display surface with dry or hard materials that will damage the polarizer surface. Do not use aromatic solvents (toluene and xylene), or ketonic solvents (ketone and acetone).

Caution against Static Charge

As the display uses C-MOS LSI drivers, connect any unused input terminals to VDD or VSS. Do not input any signals before power is turned on. Also, ground your body, work / assembly table and assembly equipment to protect against static electricity.

Packaging

Displays use LCD elements, and must be treated as such. Avoid strong shock and drop from a height.
To prevent displays from degradation, do not operate or store them exposed directly to sunlight or high temperature / humidity.

Caution during Operation

It is indispensable to drive the display within the specified voltage limit since excessive voltage shortens its life. Direct current causes an electrochemical reaction with remarkable deterioration of the display quality. Give careful consideration to prevent direct current during ON/OFF timing and during operation.
Response time is extremely delayed at temperatures lower than the operating temperature range while, at high temperatures, displays become dark. However, this phenomenon is reversible and does not mean a malfunction or a display that has been permanently damaged. If the display area is pushed on hard during operation, some graphics will be abnormally displayed but returns to a normal condition after turning off the display once. Even a small amount of condensation on the contact pads (terminals) can cause an electro-chemical reaction which causes missing rows and columns. Give careful attention to avoid condensation.

Storage

Store the display in a dark place where the temperature is $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and the humidity below 50% RH.
Store the display in a clean environment, free from dust, organic solvents and corrosive gases.
Do not crash, shake or jolt the display (including accessories).

Product No.	DCR80571FW640G480WTT	REV. 00
-------------	----------------------	---------

Page	27 / 27
------	---------