

FEATURES

- Display Diagonal: 11.8"
- Display Format: 1024 × 768
- Overall Dimensions:
314 (W) × 258 (H) × 25 (D) mm
- Active Area: 239.6 (W) × 179.7 (H) mm
- Dot Pitch: 0.234 (W) × 0.234 (H) mm
- Viewing Angle: 6 O'Clock

DESCRIPTION

The SHARP LQ12D011 Color TFT-LCD module is a color active matrix Liquid Crystal Display (LCD) incorporating amorphous silicon Thin Film Transistor (TFT). The module is composed of a color TFT-LCD panel, driver ICs, control circuit, and a power supply circuit. Graphics and text can be displayed on a 1024 × 768 pixel panel in 512 colors by supplying 9 × 2 bit parallel data signals, three kinds of timing signals, +5 VDC and +12 VDC supply voltages for TFT-LCD panel driving and supply voltage for DC/AC inverter. Optimum viewing angle is at the 6 o'clock direction.

MECHANICAL SPECIFICATIONS

PARAMETER	SPECIFICATIONS	UNIT
Screen Size	11.8 (Diagonal)	Inch
Effective Display Area	239.6 (W) × 179.7 (H)	mm
Display Pixels	1024 × 768	Pixel
	(1 Pixel = R + G + B Dots)	–
Pixel Pitch	0.234 (W) × 0.234 (H)	mm
Pixel Configuration	RGB Vertical Stripe	–
Display Mode	Normally White	–
Outline Dimensions	314 (W) × 258 (H) × 25 (D)	mm
Weight	1300 ± 50	g
Surface Treatment	Anti-Glare and Hard-Coating 2H	–

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	CONDITION	RATINGS	UNIT	NOTE
V_I	Input Voltage	$t_A = 25^\circ\text{C}$	-0.3 to $V_{CC} + 0.3$	V	1
V_{CC}	+5 V Supply Voltage		-0.3 to +7.0	V	–
V_{DD}	+12 V Supply Voltage		-0.3 to +14.0	V	–
V_{BL}	Input Voltage for Inverter		-0.3 to +14.0	V	–
V_{CTL}	Voltage for Lamp Control		-0.3 to +7.0	V	–
DIM	Voltage for Dimming		-0.3 to +5.0	V	–
Tstg	Storage Temperature	–	-25 to +60	°C	2
Topa	Operating Temperature (Ambient)	–	0 to +40	°C	

NOTES:

- CK, Hsync, Vsync, R00 to R02, G00 to G02, B00 to B02, R10 to R12, G10 to G12, B10 to B12
- Humidity: 95% RH maximum at $t_A \leq 40^\circ\text{C}$. Maximum wet-bulb temperature 39°C or less at $t_A > 40^\circ\text{C}$.
No condensation.

INPUT TERMINALS – TFT-LCD PANEL DRIVING SECTION

CN1 (Interface Signal) ^{1,2}

PIN NUMBER	SYMBOL	FUNCTION	POLARITY
1	GND	–	–
2	CK	Clock Signal for Sampling Each Data Signal	–
3	GND	–	–
4	Vsync	Vertical Sync Signal	Negative
5	GND	–	–
6	Hsync	Horizontal Sync Signal	Negative
7	GND	–	–
8	R00	RED Data Signal of the Odd Pixels (LSB)	Positive
9	R01	RED Data Signal of the Odd Pixels	Positive
10	R02	RED Data Signal of the Odd Pixels (MSB)	Positive
11	GND	–	–
12	R10	RED Data Signal of the Even Pixels (LSB)	Positive
13	R11	RED Data Signal of the Even Pixels	Positive
14	R12	RED Data Signal of the Even Pixels (MSB)	Positive
15	GND	–	–
16	G00	GREEN Data Signal of the Odd Pixels (LSB)	Positive
17	G01	GREEN Data Signal of the Odd Pixels	Positive
18	G02	GREEN Data Signal of the Odd Pixels (MSB)	Positive
19	GND	–	–
20	G10	GREEN Data Signal of the Even Pixels (LSB)	Positive
21	G11	GREEN Data Signal of the Even Pixels	Positive
22	G12	GREEN Data Signal of the Even Pixels (MSB)	Positive
23	GND	–	–
24	B00	BLUE Data Signal of the Odd Pixels (LSB)	Positive
25	B01	BLUE Data Signal of the Odd Pixels	Positive
26	B02	BLUE Data Signal of the Odd Pixels (MSB)	Positive
27	GND	–	–
28	B10	BLUE Data Signal of the Even Pixels (LSB)	Positive
29	B11	BLUE Data Signal of the Even Pixels	Positive
30	B12	BLUE Data Signal of the Even Pixels (MSB)	Positive

NOTES:

1. Connector used: 006200 307 032 800 (ELCO INTERNATIONAL).
2. See Figure 1.

CN2 (Signal & Power Supply) ^{1,2}

PIN NUMBER	SYMBOL	FUNCTION
1	V _{DD}	+12 V Power Supply
2	V _{DD}	+12 V Power Supply
3	GND	—
4	GND	—
5	V _{CC}	+5 V Power Supply
6	V _{CC}	+5 V Power Supply
7	GND	—
8	GND	—
9	NC	This is Electrically Opened During Operation
10	SD1	
11	SD2	
12	SD3	
13	GND	—
14	TST1	This is Electrically Opened During Operation
15	TST2	

NOTES:

1. Connector used: 006200 157 032 800 (ELCO INTERNATIONAL).
2. See Figure 2.

CN3 (DC/AC Inverter)

PIN NUMBER	SYMBOL	FUNCTION	NOTE
1	V _{BL}	+12 V Input Power Supply Voltage	—
2	V _{CTL}	Backlight Lamps Enable	5 V: ON, GND: OFF
3	GND	—	—
4	NC	This Shall Be Electrically Opened During Operation	—
5	DIM _H	Brightness Control (High)	1
6	DIM _L	Brightness Control (Low)	—

NOTES:

1. 0.5 V: Minimum brightness to 4.0 V: Maximum brightness

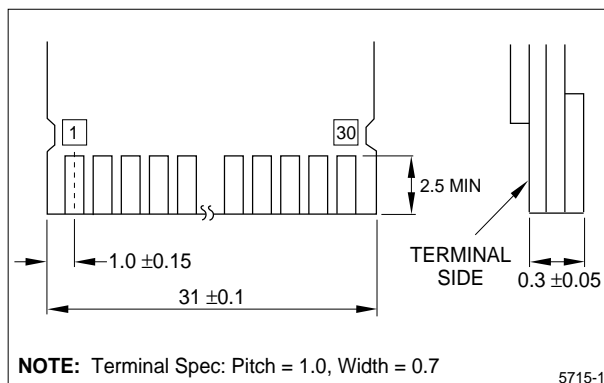


Figure 1. CN1 Corresponding FPC/FFC

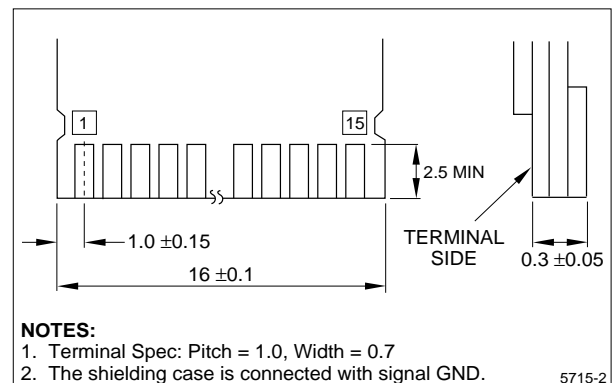


Figure 2. CN2 Corresponding FPC/FFC

ELECTRICAL CHARACTERISTICS AND CURRENT DISSIPATION

TFT-LCD PANEL DRIVING ($t_A = 25^\circ\text{C}$)

SYMBOL	PARAMETER	CONDITION	MIN.	TYP.	MAX.	UNIT
V_{CC}	+5 V Supply Voltage	–	+4.75	+5.0	+5.25	V
I_{CC}	+5 V Current Dissipation	–	–	250	350	mA
V_{DD}	+12 V Supply Voltage	–	+11.4	+12.0	+12.6	V
I_{DD}	+12 V Current Dissipation	–	–	300	470	mA
V_{IL}	Input Signal Voltage (Low)	$V_{CC} = +5\text{ V}$	–	–	+1.5	V
V_{IH}	Input Signal Voltage (High)		+3.5	–	–	V
V_{RP}	Permissive Input Ripple Voltage	V_{CC}, V_{DD}	–	–	50	mV _{P-P}
I_{OL}	Input Leakage Current	$V_1 = 0\text{ V}$	-10	–	0	μA
I_{OH}		$V_1 = V_{CC}$	0	–	+10	μA

DC/AC INVERTER ($t_A = 25^\circ\text{C}$)

The DC/AC inverter drives a couple of HCFT.

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT	NOTE
V_{BL}	Supply Voltage	+10.8	+12.0	+13.2	V	–
I_{BL}	Input Current	–	1300	1500	mA	1
$V_{CTL\ ON}$	Control Voltage (ON)	+4.0	+5.0	–	V	–
$V_{CTL\ OFF}$	Control Voltage (OFF)	–	0	+0.8	V	–
I_{CTL}	Control Current (ON)	–	–	10	mA	–
V_{DIMH}	Input Dimming Voltage	+0.5	–	+4.0	V	–
I_{DIM}	Dimming Current	–	–	2.0	mA	–
T_{PH}	Preheat Time	–	–	5	Sec	2
F_L	Frequency	20	40	60	KHz	–
–	Lamp Life Time	8,000	10,000	–	Hour	3

NOTES:

1. On the stable lighting.
2. The lamp lighted after preheating.
3. Brightness becomes TBD of the original brightness at standard condition.
4. Measurement taken TBD minutes after turning on.

INPUT SIGNALS, BASIC DISPLAY COLORS, AND GRAY SCALE OF EACH COLOR

COLOR AND GRAY SCALE	DATA SIGNAL ¹									
	ODD	R00	R01	R02	G00	G01	G02	B00	B01	B02
	EVEN	R10	R11	R12	G10	G11	G12	B10	B11	B12
Basic Color	Black	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	1	1	1
	Green	0	0	0	1	1	1	0	0	0
	Light Blue	0	0	0	1	1	1	1	1	1
	Red	1	1	1	0	0	0	0	0	0
	Purple	1	1	1	0	0	0	1	1	1
	Yellow	1	1	1	1	1	1	0	0	0
	White	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0
	↑	1	0	0	0	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	0	0
	↑	1	1	0	0	0	0	0	0	0
	↓	0	0	1	0	0	0	0	0	0
	Brighter	1	0	1	0	0	0	0	0	0
	↓	0	1	1	0	0	0	0	0	0
	Red	1	1	1	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0
	↑	0	0	0	1	0	0	0	0	0
	Darker	0	0	0	0	1	0	0	0	0
	↑	0	0	0	1	1	0	0	0	0
	↓	0	0	0	0	0	1	0	0	0
	Brighter	0	0	0	1	0	1	0	0	0
	↓	0	0	0	0	1	1	0	0	0
	Green	0	0	0	1	1	1	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0
	↑	0	0	0	0	0	0	1	0	0
	Darker	0	0	0	0	0	0	0	1	0
	↑	0	0	0	0	0	0	1	1	0
	↓	0	0	0	0	0	0	0	0	1
	Brighter	0	0	0	0	0	0	1	0	1
	↓	0	0	0	0	0	0	0	1	1
	Blue	0	0	0	0	0	0	1	1	1

NOTE:

1. 0 = Low Level Voltage
1 = High Level Voltage

OPTICAL CHARACTERISTICS ($t_A = 25^\circ\text{C}$, $V_{CC} = +5\text{ V}$, $V_{DD} = +12\text{ V}$)

SYMBOL	PARAMETER		CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
$\theta_{21.22}$	Viewing Angle Range	Horizontal	CR > 10	45	–	–	degrees	2
θ_{11}	Viewing Angle Range	Vertical		10	–	–		
θ_{12}				30	–	–		
CR	Contrast Ratio		$\theta = 0^\circ$	60	–	–	–	3
t_R	Response Time	Rise		–	30	–	ms	4
t_F	Response Time	Fall		–	50	–	ms	
B_W	Surface Brightness	White		50	70	–	nt	–
B_{BK}		Black		–	–	2.0	nt	
δ_W	White Uniformity			–	–	1.25	–	5
–	Dimming			40	–	100	%	–
BR0	Brightness Ratio of Each Gray Level	Black		0	0.8	a	%	6
BR1		Gray1		b	1.5	c	%	
BR2		Gray2		d	4.1	e	%	
BR3		Gray3		f	9.8	g	%	
BR4		Gray4		h	26.0	i	%	
BR5		Gray5		j	50.4	k	%	
BR6		Gray6		l	76.6	m	%	
BR7		White		–	100	–	%	
S	Shadowing			–	–	5	%	7
X_W	Chromaticity of Color	White		–	0.313	–	–	–
Y_W				–	0.329	–	–	
X_R		Red		–	0.570	–	–	
Y_R			–	0.356	–	–		
X_G		Green	–	0.323	–	–		
Y_G			–	0.502	–	–		
X_B		Blue	–	0.156	–	–		
Y_B			–	0.139	–	–		

NOTES:

- The measurement shall be executed 15-20 minutes after the module has been lit at the proper rating. The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Figure 5. These characteristics, except for White Uniformity and Shadowing, are measured at the center of the screen.
- Figure 6 shows the definitions of the viewing angle range.
- The Contrast Ratio is defined as follows: $\text{Contrast Ratio} = \frac{\text{Luminance(brightness) with all pixels white}}{\text{Luminance(brightness) with all pixels black}}$
- The Response Time is measured as shown in Figure 7 by switching the input signals for 'black' ON and OFF.
- White Uniformity is defined as the following with five measurements (A-E) (as shown in Figure 8):

$$\frac{\text{Maximum Luminance(brightness)}}{\text{Minimum Luminance(brightness)}}$$
- Definitions of Brightness ratio of each gray level is shown in the Gray Levels Table. Brightness ratio of each gray level is defined as follows:

$$\frac{\text{Luminance (brightness) of each gray level}}{\text{Luminance (brightness) of white}}$$
- Definition of Shadowing as shown in Figure 9. Shadowing is defined as: $(Y_A - Y_B)/Y_A \times 100$ (%).

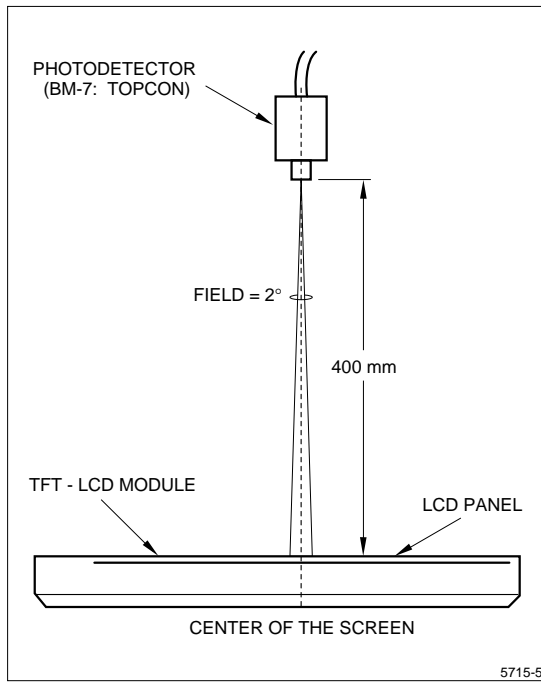


Figure 5. Optical Characteristics Measurement Method

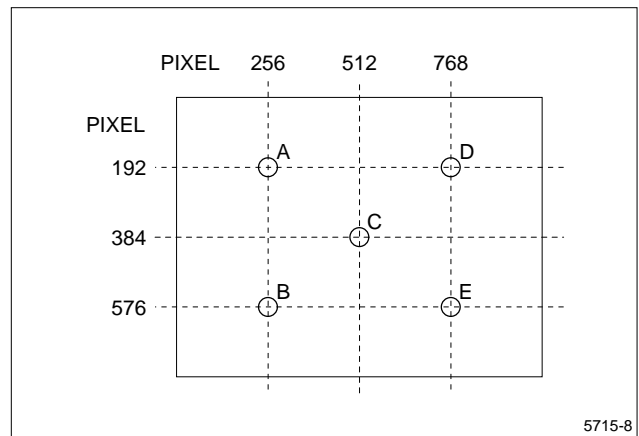


Figure 8. Definition of White Uniformity

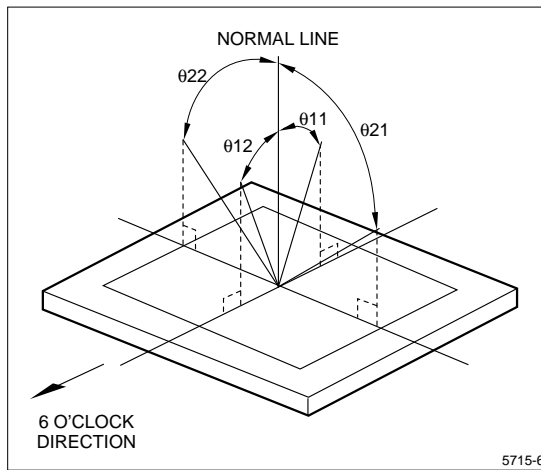


Figure 6. Definition of Viewing Angle

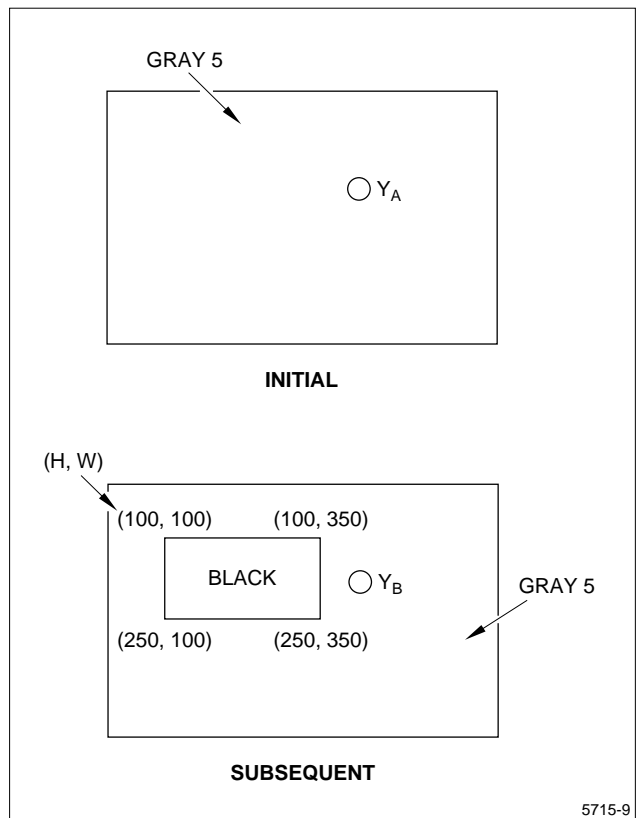


Figure 9. Definition of Shadowing

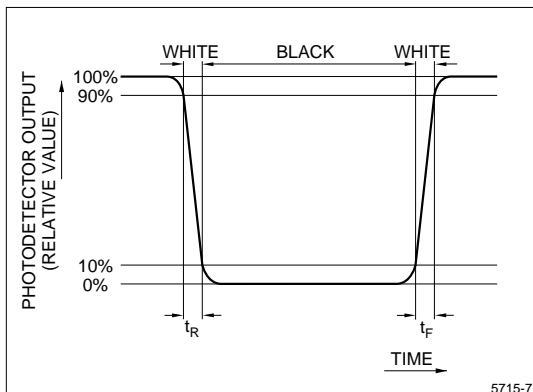


Figure 7. Definition of Response Time

Gray Levels Table

DATA	R00	R01	R02	G00	G01	G02	B00	B01	B02
	R10	R11	R12	G10	G11	G12	B10	B11	B12
Black	0	0	0	0	0	0	0	0	0
Gray1	1	0	0	1	0	0	1	0	0
Gray2	0	1	0	0	1	0	0	1	0
Gray3	1	1	0	1	1	0	1	1	0
Gray4	0	0	1	0	0	1	0	0	1
Gray5	1	0	1	1	0	1	1	0	1
Gray6	0	1	1	0	1	1	0	1	1
White	1	1	1	1	1	1	1	1	1

NOTES:

- 0 = Low level; 1 = High level
- Should be satisfied below relationship on one module: $a < b < c < d < e < f < g < h < i < j < k < l < m < 100$

DISPLAY QUALITY

The display quality of the color TFT-LCD module shall be in compliance with the Delivery Inspection Standard.

HANDLING PRECAUTIONS

- Be sure to insert the cable into the connector or take it out of the connector after turning off the power supply on the set side.
- Power ON/OFF sequential timing – To prevent the latch-up of the circuit in the module, keep the sequential timing between input signals and supply voltages as shown in Figure 10.

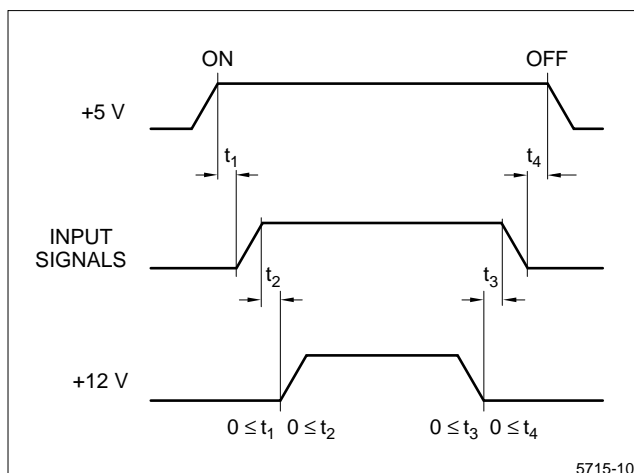


Figure 10. Power ON/OFF Sequential Timing

- When installing the module, be sure to fix the module on the same plane, taking care not to warp or twist the module.
- Handle the front polarizer carefully since it scratches easily.
- Wipe off liquid immediately since it can cause color changes and staining.
- If the surface of the LCD cells need cleaning, wipe it with a soft cloth.
- The LCD is made of glass plates. Use care when handling it to avoid breakage.
- This unit contains CMOS LSIs which are sensitive to electrostatic charges. Use care to protect the unit from electrostatic discharges.
- Adjusting volumes have been optimally set before shipment, so do not change any adjusted values. If adjusted values are changed, the specifications described here may not be satisfied.
- Do not disassemble the unit.
- Observe all other precautionary requirements in handling components.

PACKING SPECIFICATIONS

Refer to the Packing Form shown in Figure 11.

- Piling number of cartons: 7 (MAX)
- Package quantity in one carton: 5 (MAX)
- Carton size:
500 mm (W) × 410 mm (H) × 415 mm (D)

RESULT EVALUATION CRITERIA

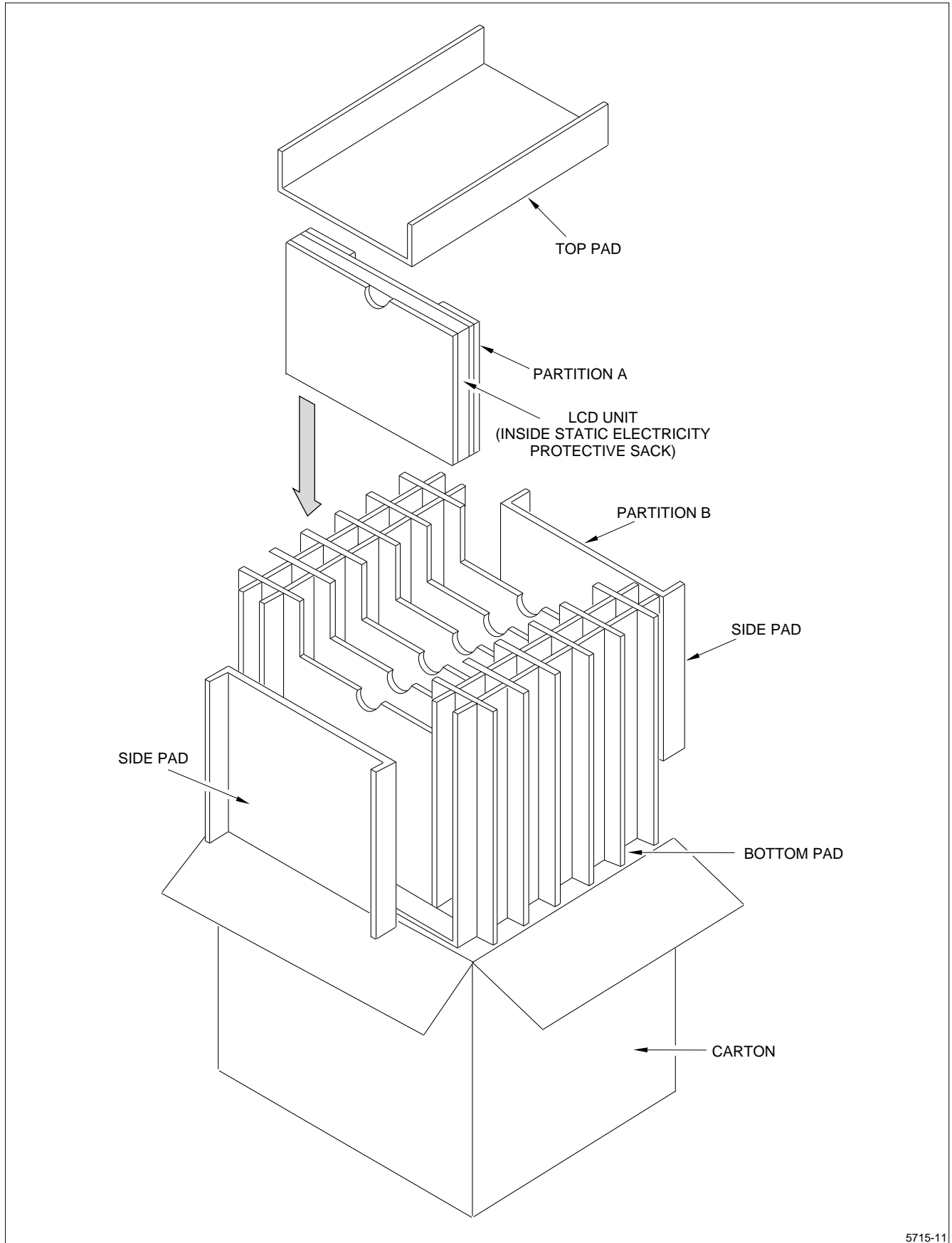
Under the display quality test conditions with normal operation state, there shall be no change which may affect practical display functions.

OTHER INFORMATION

If any problem should arise from this specification, the supplier and user should work out a mutually acceptable solution.

RELIABILITY TEST ITEMS

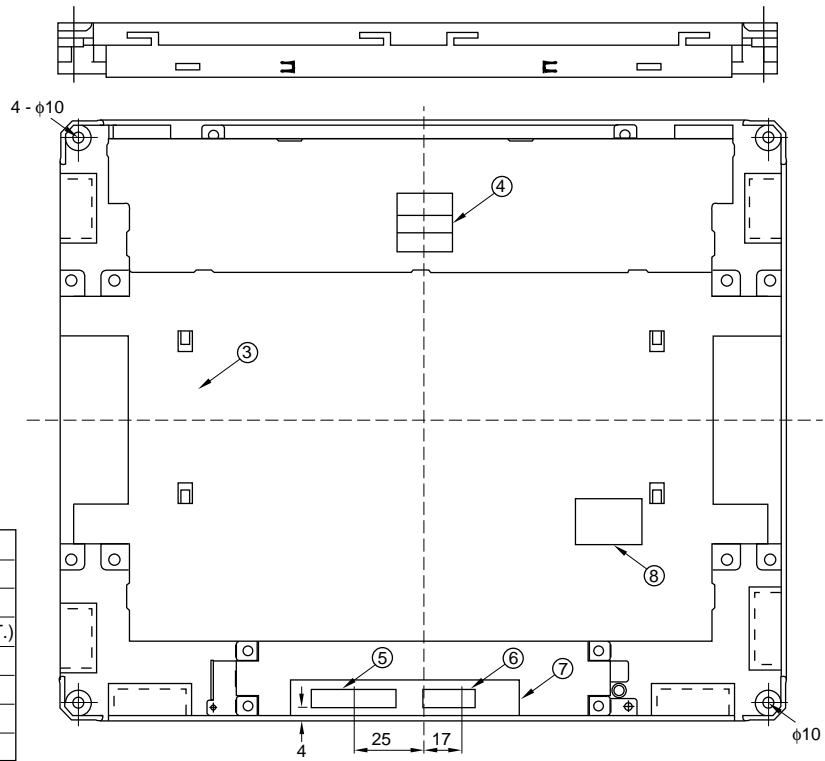
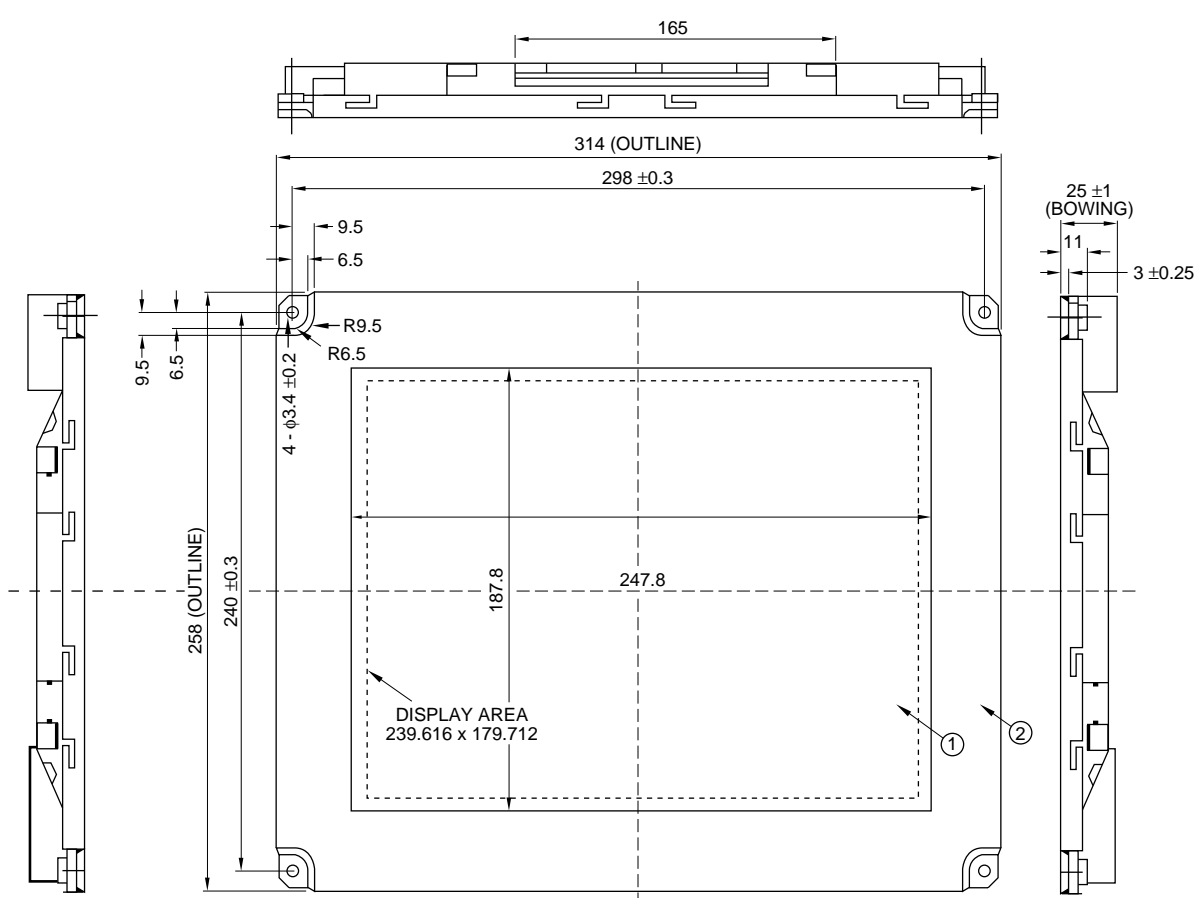
NUMBER	TEST ITEM	CONDITIONS
1	High Temperature Storage Test	$t_A = 60^\circ\text{C}$, 240 H
2	Low Temperature Storage Test	$t_A = -25^\circ\text{C}$, 240 H
3	High Temperature and High Humidity Operation Test	$t_A = 40^\circ\text{C}$, 95% RH, 240 H (No condensation)
4	High Temperature Operation Test	$t_A = 40^\circ\text{C}$, 240 H (The panel temp. must be less than 60°C)
5	Low Temperature Operation Test	$t_A = 0^\circ\text{C}$, 240H
6	Vibration Test (Non-Operating)	Frequency: 10 Hz to 57 Hz/Vibration width (one side): 0.075 mm, 58 Hz to 500 Hz/Gravity: 1 G Sweep Time: 11 minutes Test Period: three hours in total (one hour for each direction of X/Y/Z)
7	Shock Test (Non-Operating)	Maximum Gravity: 50 G Pulse Width: 11 ms, sine wave Direction: $\pm X/\pm Y/\pm Z$, once for each direction



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Figure 11. Packing Form

OUTLINE DIMENSIONS



PARTS LIST

①	TFT-LCD Panel
②	Bezel
③	Backlight Unit
④	Connector (Power for H.C.F.T.)
⑤	I.E. Connector (CN1)
⑥	I.E. Connector (CN2)
⑦	Control PWB
⑧	Lot No. Label

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