FORTEC
ELEKTRONIK AG

OUR GLOBAL COMPETENCE CENTRES

APOLLO DISPLAY TECHNOLOGIES

DISTEC

DISPLAY TECHNOLOGY

FORTEC
ELEKTRONIK AG

Datasheet

InnoLux

G104ACJ-L01_Rev.C1

CH-01-065

Doc. Number :

☐ Tentative Specification
☐ Preliminary Specification
■ Approval Specification

MODEL NO.:G104ACJ
SUFFIX:L01

Customer: Common

APPROVED BY **SIGNATURE**

Name / Title _____ _____

Note
Product Version C1

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
陳立錚	林秋森	黃致偉

CONTENTS

REVISION HISTORY

Version	Date	Page	Description
2.0	2 Jul, 2019	All	Spec Ver.2.0 was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

The G104ACJ-L01 model is a 10.4” TFT-LCD IAV module with a white LED Backlight Unit and a 50-pin 1ch-LVDS interface. This module supports 960 x 1280 mode and displays 16.7M colors.

1.2 FEATURES

- Wide viewing angle
- High contrast ratio
- Fast response time
-960 x 1280 pixels resolution
- Wide operating temperature
- DE (Data Enable) mode
- LVDS (Low Voltage Differential Signaling) interface
- Reversible-scan direction
- RoHS Compliance

1.3 APPLICATION

-- TFT LCD Monitor
- Industrial Application
- Amusement

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Diagonal Size	10.4	inch	(1)
Active Area	158.4 (H) x 211.2 (V)	mm	
Bezel Opening Area	160.6 x 213.9	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	960 x R.G.B. x 1280	pixel	-
Pixel Pitch	0.165(H) x 0.165(V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.7M	color	-
Transmissive Mode	Normally black	-	-
Surface Treatment	Hard coating (3H), Anti-Glare	-	-
Module Power Consumption	8.82	W	Typ. (2)

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	172.9	173.4	173.9	mm	(1)
	Vertical (V)	228.2	228.7	229.2	mm	
	Depth (D)	13.27	13.77	14.27	mm	
Weight		-	435	452	g	-

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) The Module Power Consumption is specified at 3.3V, white pattern and 100% duty for LED backlight.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Operating Ambient Temperature	T_{OP}	-40	+85	ºC	(1)(2)
Storage Temperature	T_{ST}	-40	+90	ºC	(1)(2)

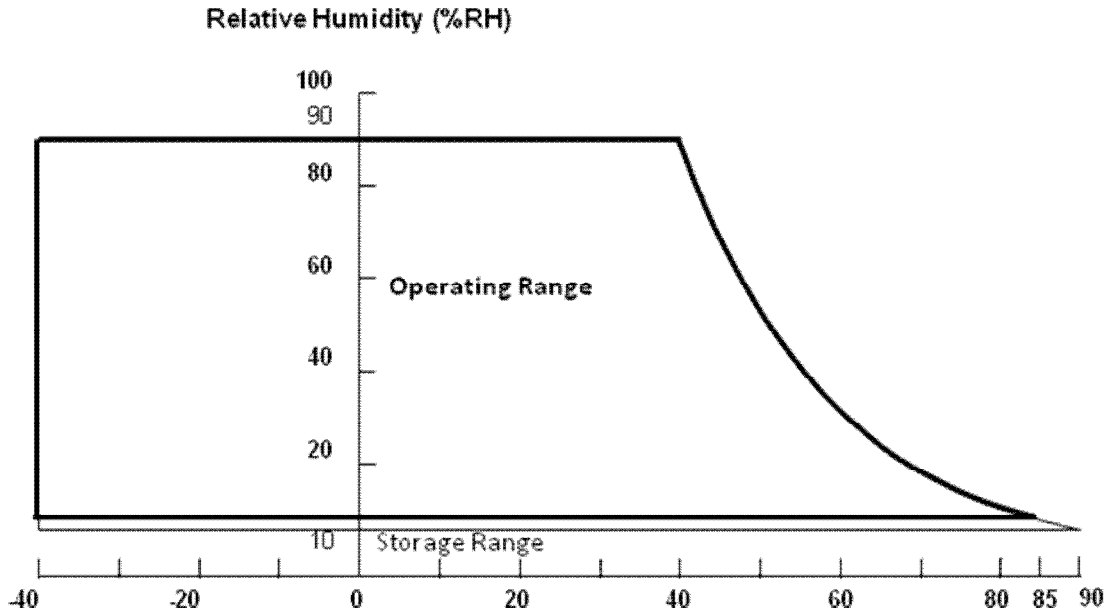
Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The absolute maximum rating values of this product are not allowed to be exceeded at any times. The module should not be used over the absolute maximum rating value. It will cause permanently unrecoverable function fail in such an condition



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCC	-0.3	4	V	(1)
Logic Input Voltage	VIN	-0.3	4	V	(1)

2.2.2 BACKLIGHT UNIT

Item	Symbol	Value			Unit	Note
		Min.	Typ	Max.		
LED Forward Current Per Input Pin	I_F	-	95	100	mA	(1), (2) Duty=100%
LED Reverse Voltage Per Input Pin	V_R	-	-	50	V	
LED Pulse Forward Current Per Input Pin	I_P	-	-	300	mA	(1), (2) Pulse Width≦10msec. and Duty≦10%

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for input pin of LED light bar at Ta=25±2 ℃ (Refer to 3.2 for further information).

3. ELECTRICAL CHARACTERISTICS

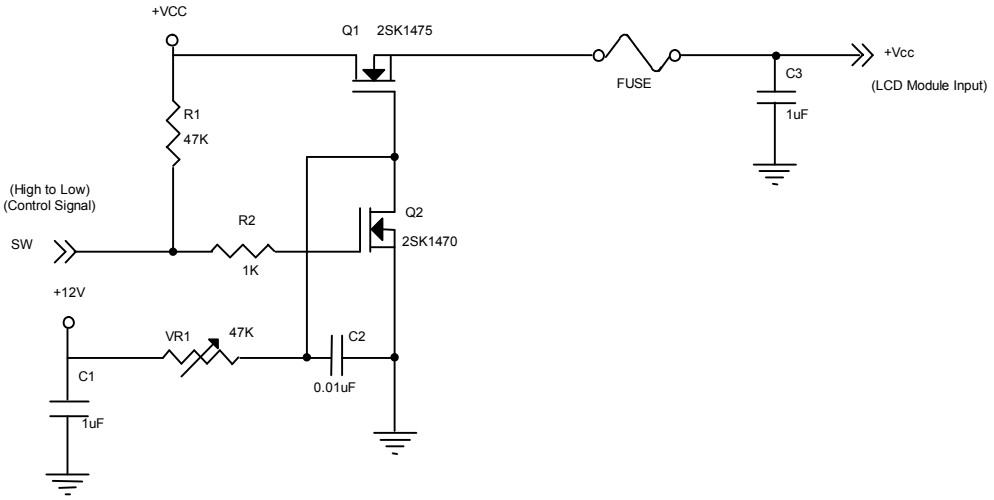
3.1 TFT LCD MODULE

Ta = 25 ± 2 ºC

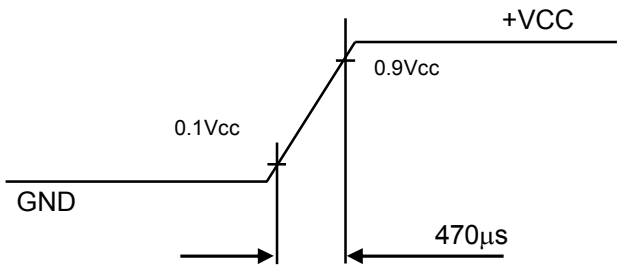
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	3.0	3.3	3.6	V	(1) at Vcc=3.3V
Ripple Voltage		V_{RP}	-	-	300	mV	-
Rush Current		I_{RUSH}	-	-	2	A	(2)
Power Supply Current	White	-	-	150	200	mA	(3)a, at Vcc=3.3V
	Black		-	140	190	mA	(3)b, at Vcc=3.3V
Power Consumption		P_L	-	0.50	0.66	W	(4)
Logic high input voltage		V_{IH}	0.7 Vcc	-	Vcc	V	
Logic low input voltage		V_{IL}	GND	-	0.3Vcc	V	
LVDS differential input voltage		Vid	200		600	mV	(5)
LVDS common input voltage		Vic	1.0	1.2	1.4	V	(5)
Differential input high threshold voltage		V_{TH}	-	-	100	mV	(5)
Differential input low threshold voltage		V_{TL}	-100	-	-	mV	(5)

Note (1) The assembly should be always operated within above ranges.

Note (2) Measurement Conditions:



Vcc rising time is 470μs



Note (3) The specified power supply current is under the conditions at Vcc = 3.3V, Ta = 25 ± 2 ºC, fv = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

Active Area

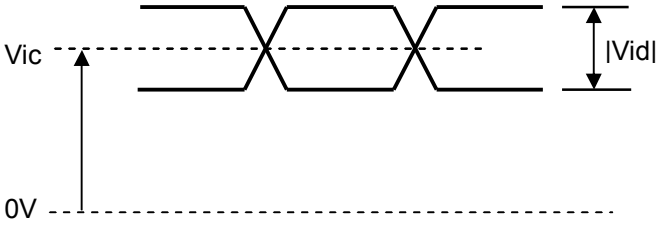
b. Black Pattern

Active Area

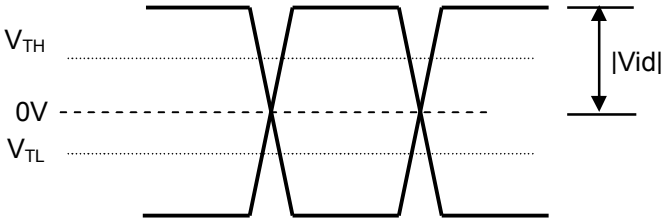
Note (4) The power consumption is specified at the pattern with the maximum current.

Note (5) Vid waveform condition.

Single Ended



Differential



3.2 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

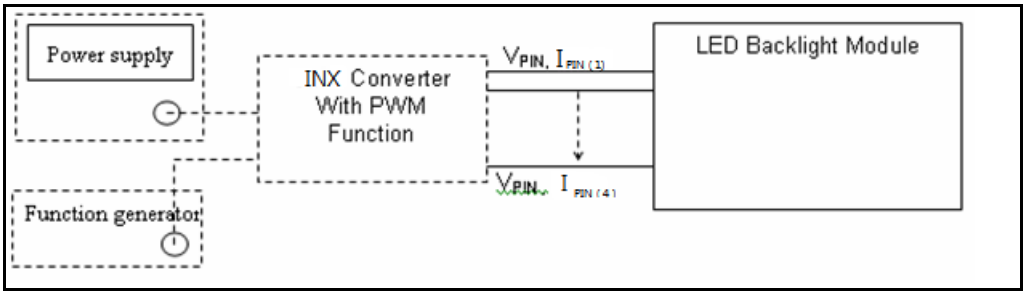
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Input Voltage Per Input Pin	VPIN	26.5	29.2	32.9	V	(1), Duty=100%, IPIN=95mA
LED Light Bar Current Per Input Pin	IPIN	-	95	100	mA	(1), (2) Duty=100%
LED Life Time	LLED	50,000	-	-	Hrs	(3)
Power Consumption	PBL	-	8.32	9.38	W	(1) Duty=100%, IPIN=95mA

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

Note (2) PBL = IPIN × VPIN × (3) input pins ,

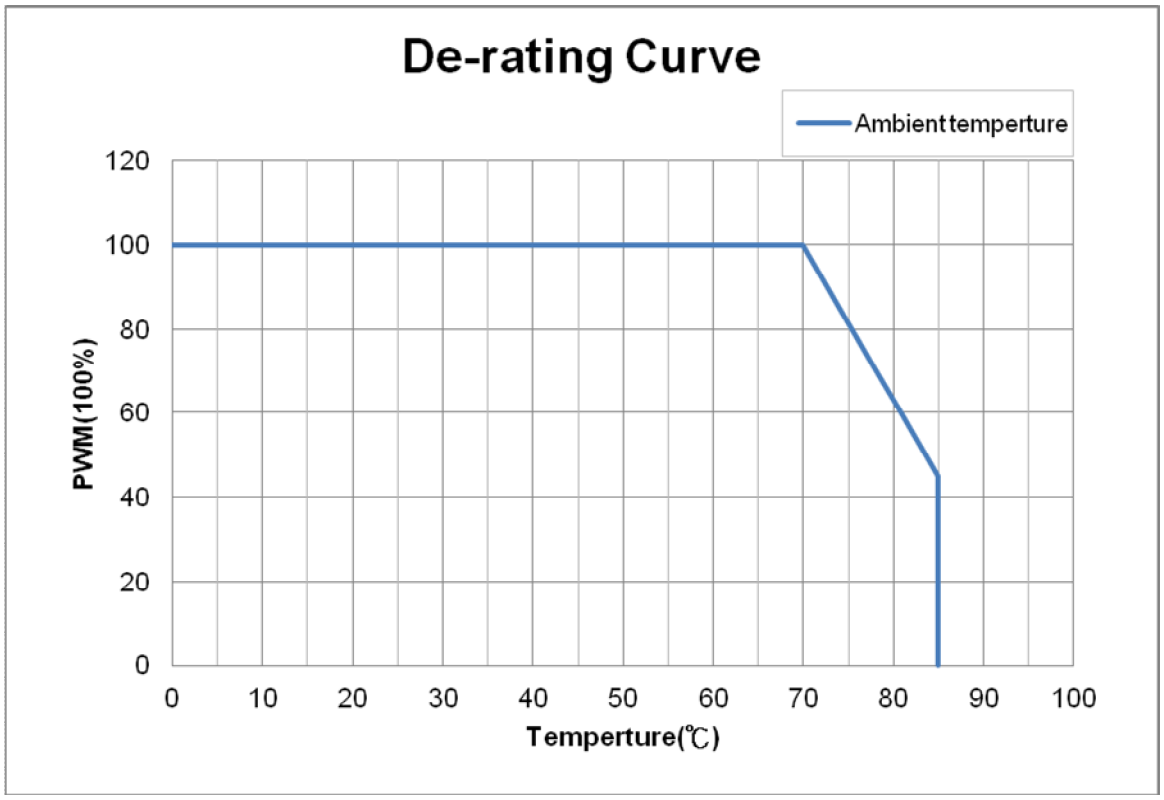
Note (3) The lifetime of LED is estimated data and defined as the time when LED packages continue to operate under the conditions at Ta = 25 ±2 ℃ and I= (95)mA (per chip) until the brightness becomes ≦ 50% of its original value.

Note (4) The module must be operated with constant driving current.



Note (5) De-rating curve

De-rating the BLU from 70℃ and 45% PWM at 85 ℃ to avoid damaging the module.



3.3 LIGHTBAR CONNECTOR PIN ASSIGNMENT

CN1 (LED backlight)

Pin number	Description
1	VLED
2	VLED
3	VLED
4	No Connection
5	NTC Thermistor +
6	NTC Thermistor -
7	No Connection
8	Cathode of LED string
9	Cathode of LED string
10	Cathode of LED string

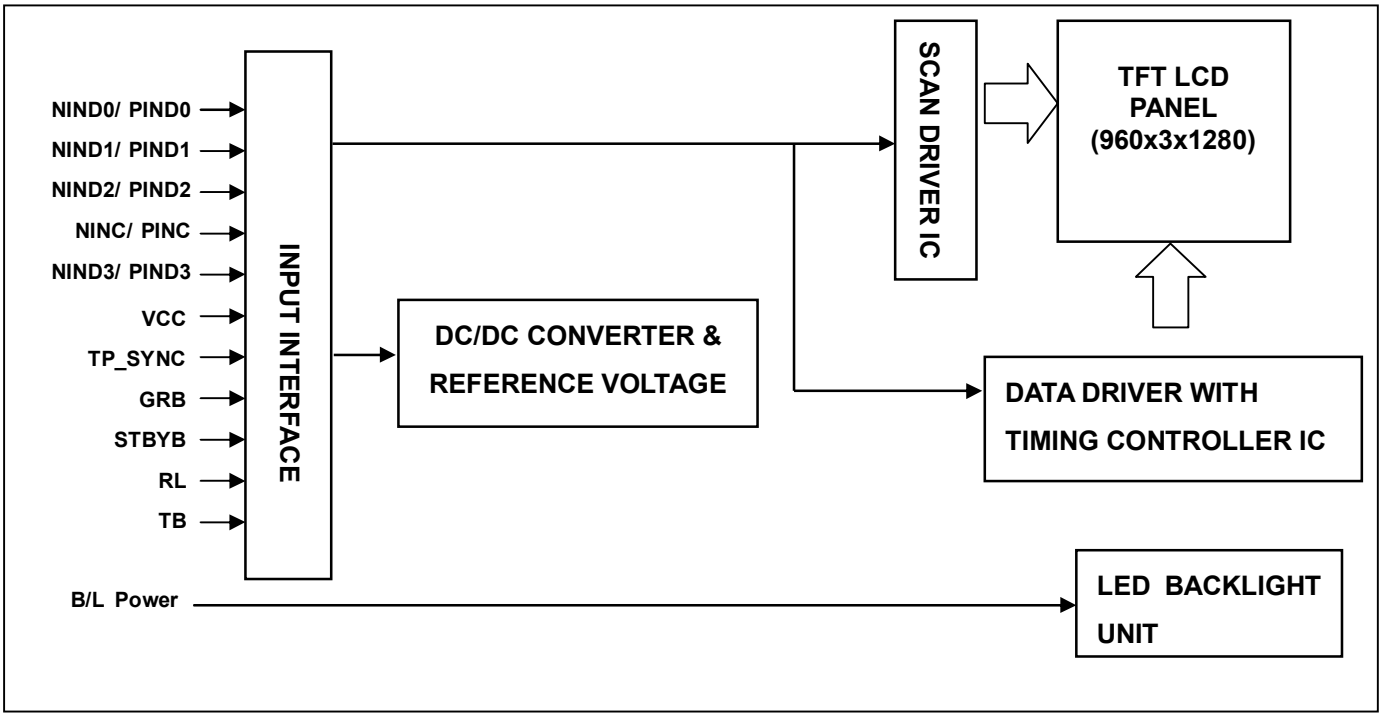
Note(1) Connector type: FH52-10S-0.5SH (HIROSE) or equivalent.

Note(2) NTC Thermistor type : Murata NCU15XH103F6SRC.

Note(3) To prevent self-heating of the NTC and improve the measurement accuracy, recommend operating current of the NTC is less than 0.031mA.

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



5. INTERFACE PIN ASSIGNMENT

5.1 TFT LCD MODULE

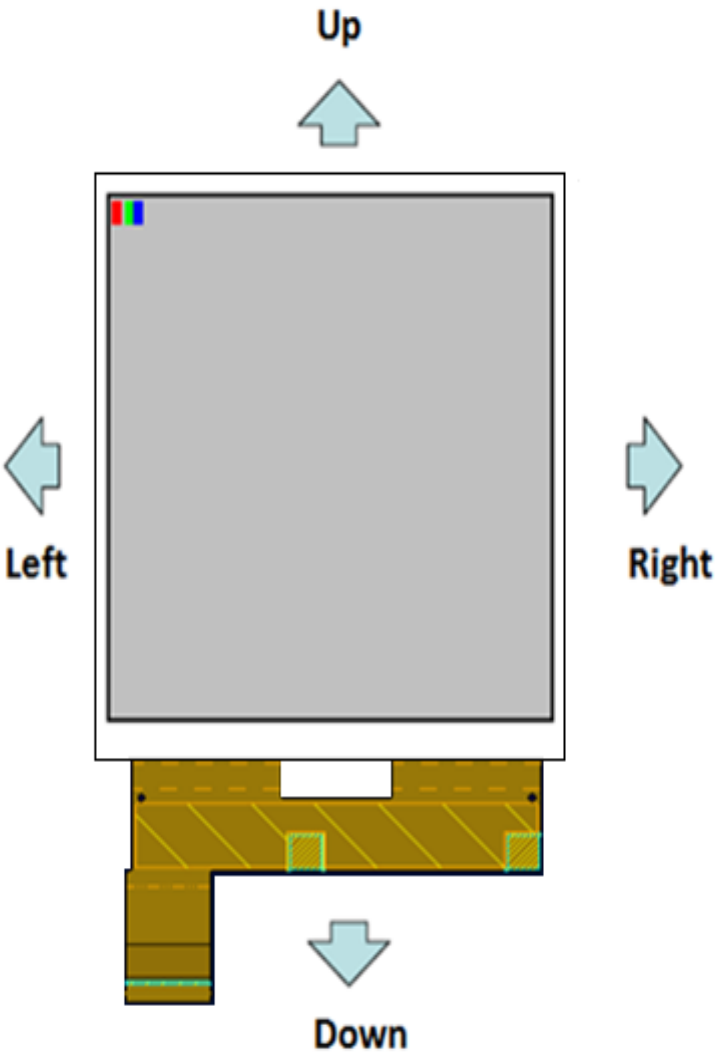
Pin	Name	Description	Remark
1	NC	For test, please keep it floating.	
2	TP_SYNC	Output V_sync signal for touch	
3	GND	Analog ground	
4	GND	Analog ground	
5	NC	For test, please keep it floating.	
6	NC	Not Connect	
7	NC	Not Connect	
8	NC	Not Connect	
9	NC	For test, please keep it floating.	
10	NC	Not Connect	
11	NC	Not Connect	
12	NC	Not Connect	
13	NC	For test, please keep it floating.	
14	VCC	Digital power (typ. 3.3V)	
15	VCC	Digital power (typ. 3.3V)	
16	NC	Not Connect	
17	GND	Analog ground	
18	GND	Analog ground	
19	GND	Analog ground	
20	GND	Analog ground	
21	NIND0	LVDS signal data line 0 negative	
22	PIND0	LVDS signal data line 0 positive	
23	GND	Analog ground	
24	NIND1	LVDS signal data line 1 negative	
25	PIND1	LVDS signal data line 1 positive	
26	GND	Analog ground	
27	NIND2	LVDS signal data line 2 negative	
28	PIND2	LVDS signal data line 2 positive	
29	GND	Analog ground	
30	NINC	LVDS signal clock line negative	
31	PINC	LVDS signal clock line positive	
32	GND	Analog ground	
33	NIND3	LVDS signal data line 3 negative	
34	PIND3	LVDS signal data line 3 positive	
35	GND	Analog ground	
36	GRB	Reset pin, low active	
37	STBYB	Standby pin, low active	
38	RL	Left/right scan control, internal pull high	Note 3
39	VCC	Digital power (3.3V)	
40	TB	Up/down scan control, internal pull high	Note 3
41	NC	For test, please keep it floating.	
42	NC	For test, please keep it floating.	
43	NC	For test, please keep it floating.	
44	GND	Analog ground	
45	NC	For test, please keep it floating.	
46	NC	Not Connect	
47	NC	For test, please keep it floating.	
48	NC	Not Connect	
49	NC	Not Connect	
50	GND	Analog ground	

Note (1) User's connector Part No.: FH52-50S-0.5SH(HIROSE) or equivalent.

Note (2) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected"

Note (3): RL and TB control function.

RL	TB	Data shifting
GND	GND	Right → Left, Down → Up
VDD	GND	Left → Right, Down → Up
GND	VDD	Right → Left, Up → Down
VDD	VDD	Left → Right, Up → Down (default)



5.2 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	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	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	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	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	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	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	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	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

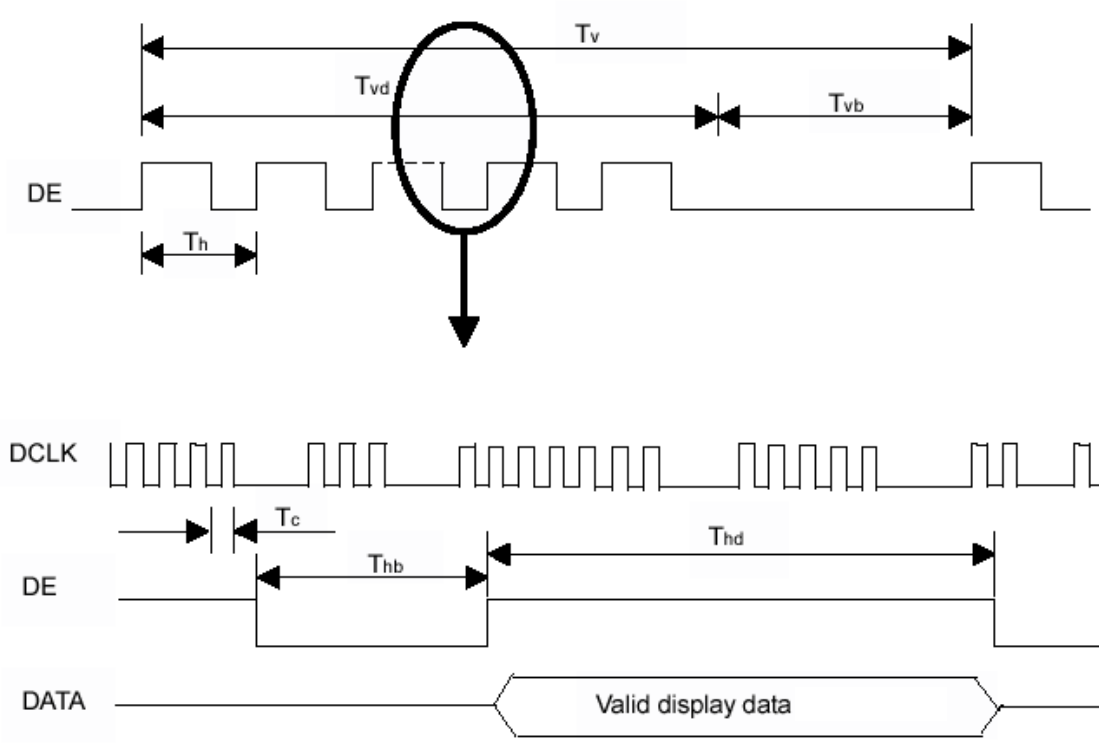
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	Fc	78.1	79.1	82.9	MHz	
Vertical Active Display Term	Total	Tv	1020	1024	1072	Th	Tv=Tvd+Tvb
	Display	Tvd	-	960	-	Th	-
	Blank	Tvb	60	64	112	Th	-
Horizontal Active Display Term	Total	Th	1286	1288	1290	Tc	Th=Thd+Thb
	Display	Thd	-	1280	-	Tc	-
	Blank	Thb	6	8	10	Tc	-

Note (1) Since this assembly is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this assembly would operate abnormally.

Note (2) Frame rate is 60Hz

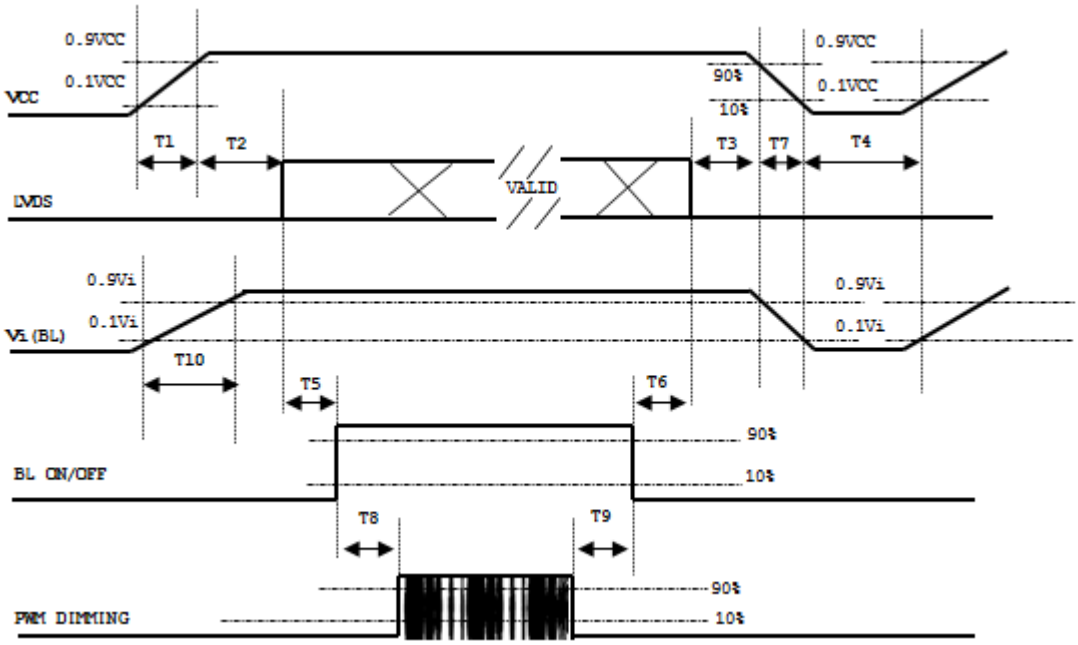
Note (3) The Tv(Tvd+Tvb) must be integer, otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM



6.2 POWER AND SIGNAL ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below.



Power ON/OFF sequence

Note (1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.

Note (2) When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.

Note (3) In case of VCC = off level, please keep the level of input signals on the low or keep a high impedance.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

Note (6) INX won't take any responsibility for the products which are damaged by the customers not following the Power Sequence.

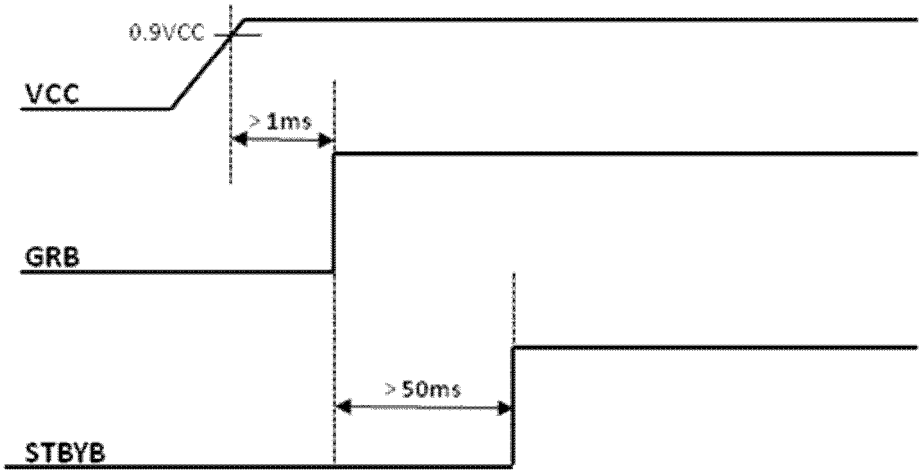
Note (7) There might be slight electronic noise when LCD is turned off (even backlight unit is also off). To avoid this symptom, we suggest "Vcc falling timing" to follow "T7 spec".

Parameter	Value			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms

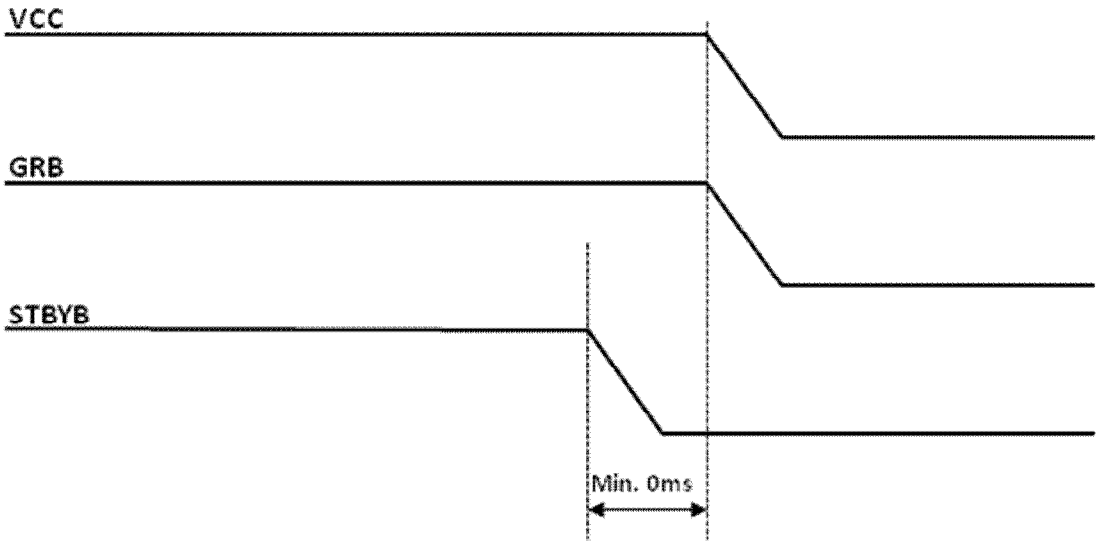
T4	500	-	-	ms
T5	450	-	-	ms
T6	200	-	-	ms
T7	10	-	100	ms
T8	10	-	-	ms
T9	10	-	-	ms
T10	20	-	50	ms

6.3 POWER AND CONTROL PINS ON/OFF SEQUENCE

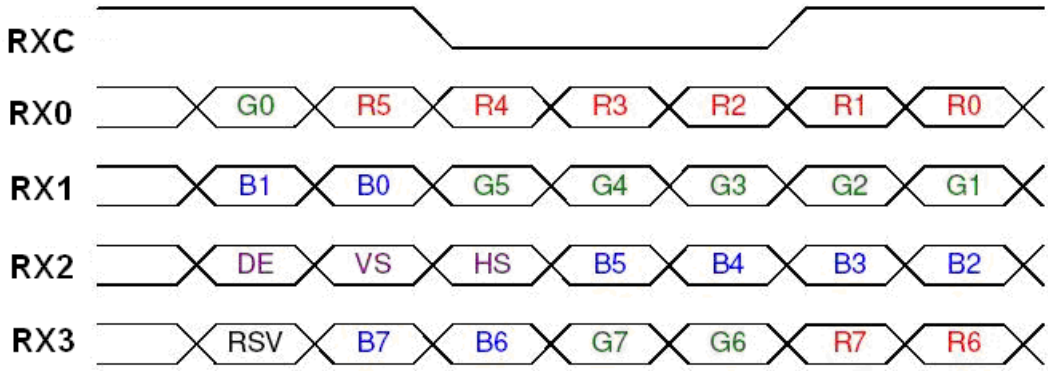
Power on sequence:



Power off sequence:



6.4 THE INPUT DATA FORMAT



Note (1) R/G/B data 7: MSB, R/G/B data 0: LSB

Note (2) Please follow PSWG

Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Data 7 (MSB) GreenData 6 GreenData 5 GreenData 4 GreenData 3 GreenData 2 GreenData 1 GreenData 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
RXCLKIN+ RXCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note (3) Output signals from any system shall be low or Hi-Z state when VCC is off.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

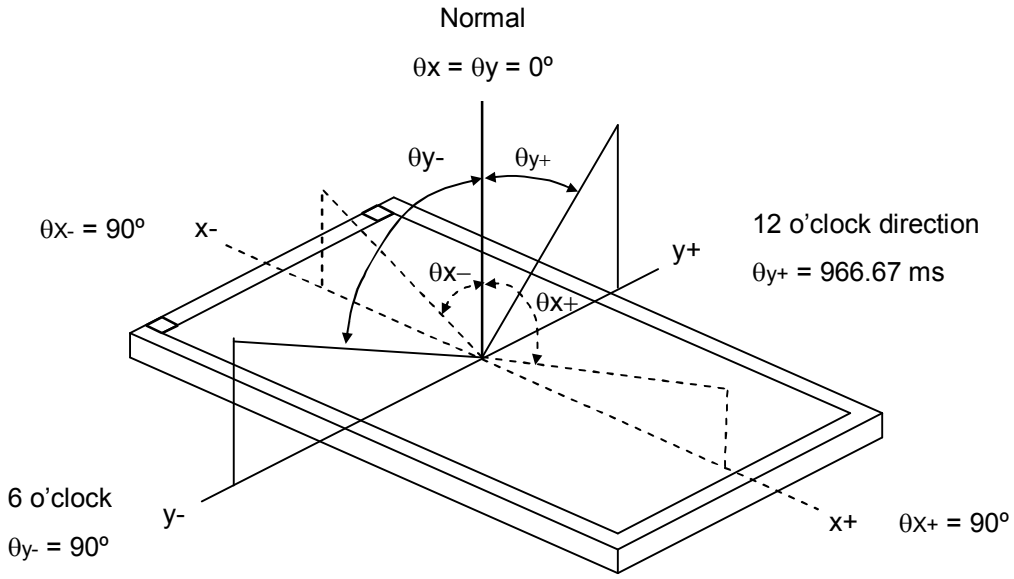
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	According to typical value in "ELECTRICAL CHARACTERISTICS"		
Input Signal			
LED Light Bar Input Current Per Input Pin			

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2 and all items are measured at the center point of screen except white variation. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (5).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rx	θ_x=0°, θ_Y =0° CS-1000	Typ - 0.05	0.652	Typ + 0.05	-	(1), (5)
		Ry			0.338		-	
	Green	Gx			0.333		-	
		Gy			0.613		-	
	Blue	Bx			0.150		-	
		By			0.050		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
Center Luminance of White		L_C		720	900	-	cd/m²	(4), (5)
Contrast Ratio		CR		800	1000	-	-	(2), (5)
Response Time		T_R	θ_x=0°, θ_Y =0°	-	13	18	ms	(3)
		T_F		-	12	17	ms	
White Variation		δW_9	θ_x=0°, θ_Y =0°			1.42	-	(5), (6).
Viewing Angle	Horizontal	θ_x+	CR≥10	80	85	-	Deg.	(1), (5)
		θ_x-		80	85	-		
	Vertical	θ_Y+		80	85	-		
		θ_Y-		80	85			

Note (1) Definition of Viewing Angle (θx, θy):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = *L255* / L0

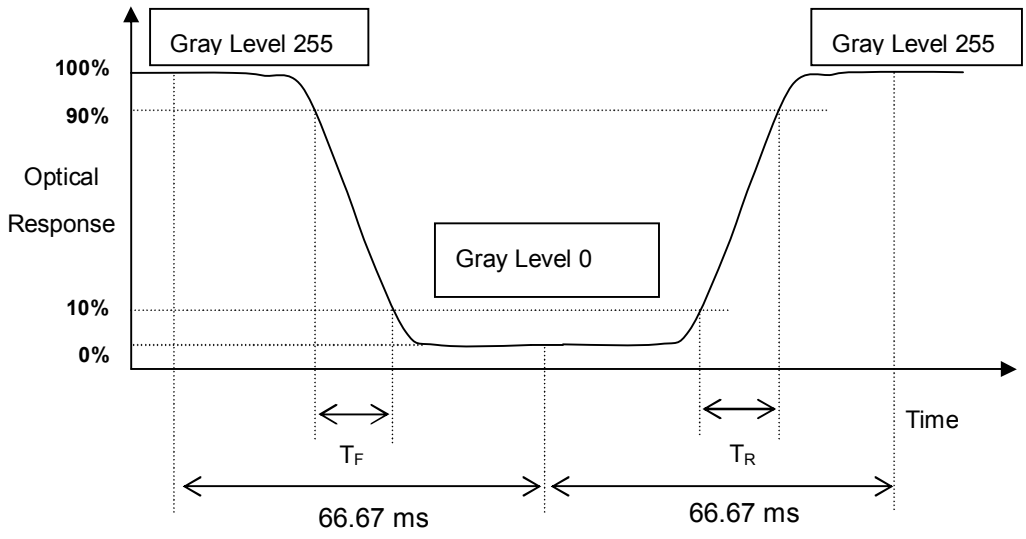
L255: Luminance of gray level *255*

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (TR, TF) and measurement method:



Note (4) Definition of Luminance of White (L_C):

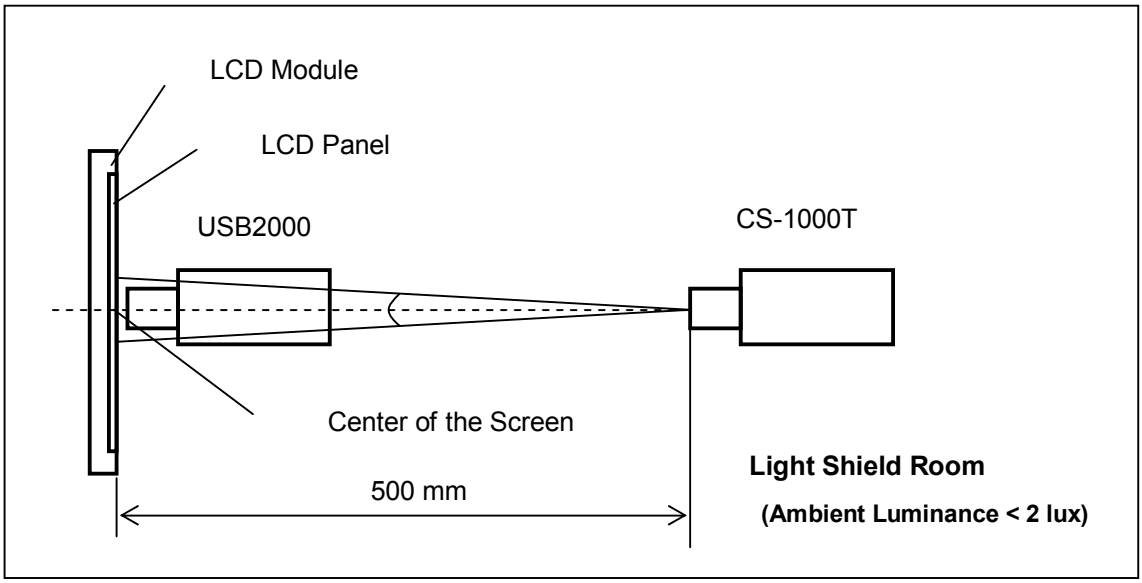
Measure the luminance of gray level 255 at center point

L_C = L (5)

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

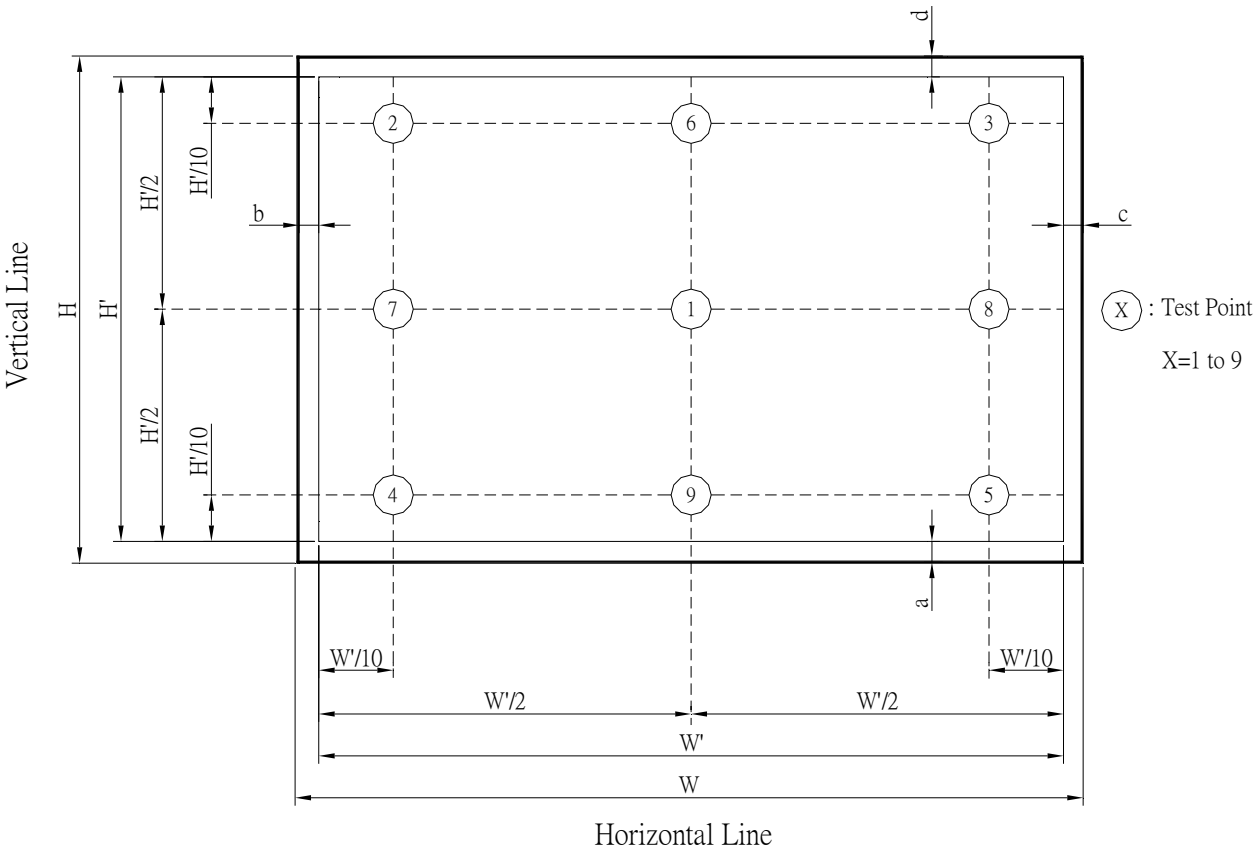


Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

$$\delta W = \frac{\text{Maximum [L (1), L (2), ..., L (8), L (9)]}}{\text{Minimum [L (1), L (2), ..., L (8), L (9)]}}$$

圖a. 9-point Positions



8. RELIABILITY TEST CRITERIA

Test Item	Test Condition	Note
High Temperature Storage Test	90ºC, 504 hours	(1)(2) (4)(5)
Low Temperature Storage Test	-40ºC, 504 hours	
Thermal Shock Storage Test	-40ºC, 0.5 hour⟷85℃, 0.5 hour; 1hour/cycle,100cycles	
High Temperature Operation Test	85ºC, 504 hours	
Low Temperature Operation Test	-40ºC, 504 hours	
High Temperature & High Humidity Operation Test	60ºC, 90%RH, 504 hours	(1)(2) (4)(6)
Shock (Non-Operating)	50G, 11ms, half sine wave, 1 time for ± X, ± Y, ± Z.	(2)(3)
Vibration (Non-Operating)	1.5G, 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z	(2)(3)

Note (1) There should be no condensation on the surface of panel during test.

Note (2) Temperature of panel display surface area should be 100 ºC Max.

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note (4) In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before reliability test.

Note (5) Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note (6) Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

9. PACKAGING

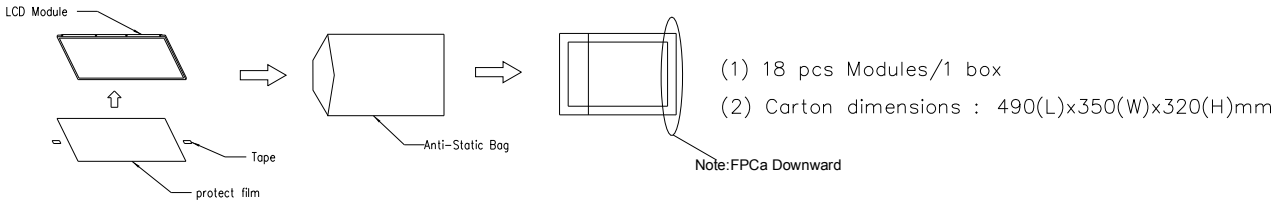
9.1 PACKING SPECIFICATIONS

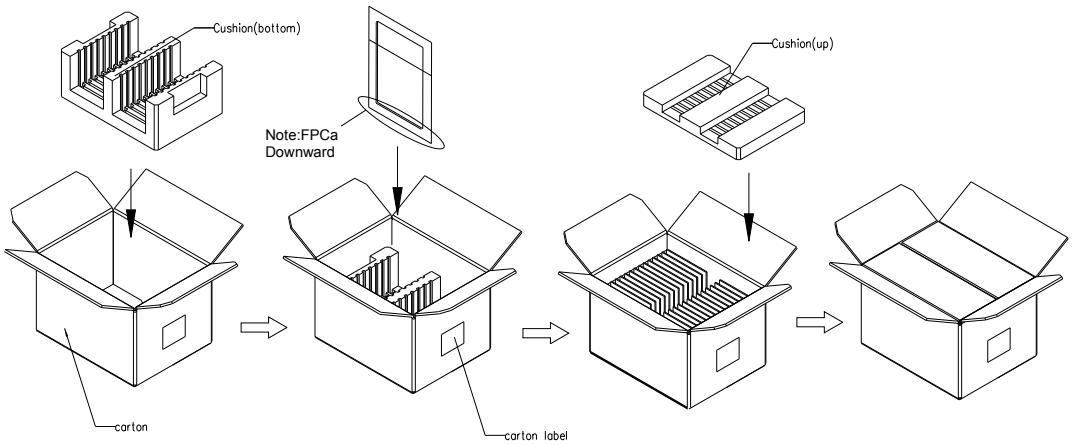
(1) 18pcs LCD modules / 1 Box

(2) Box dimensions: 490 (L) X 350 (W) X 320 (H) mm

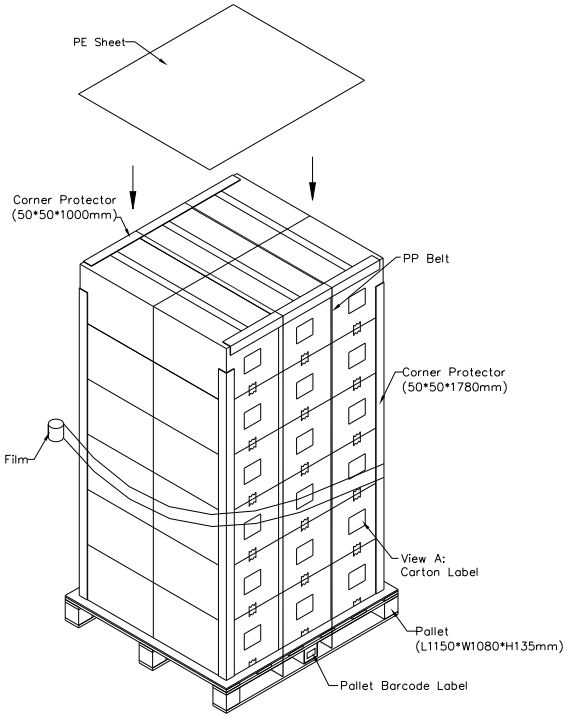
(3) Weight: approximately 10.1Kg (18 modules per box)

9.2 PACKING METHOD

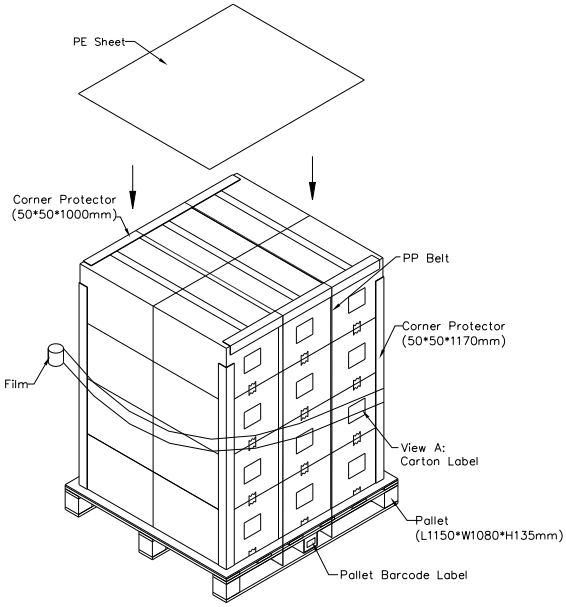




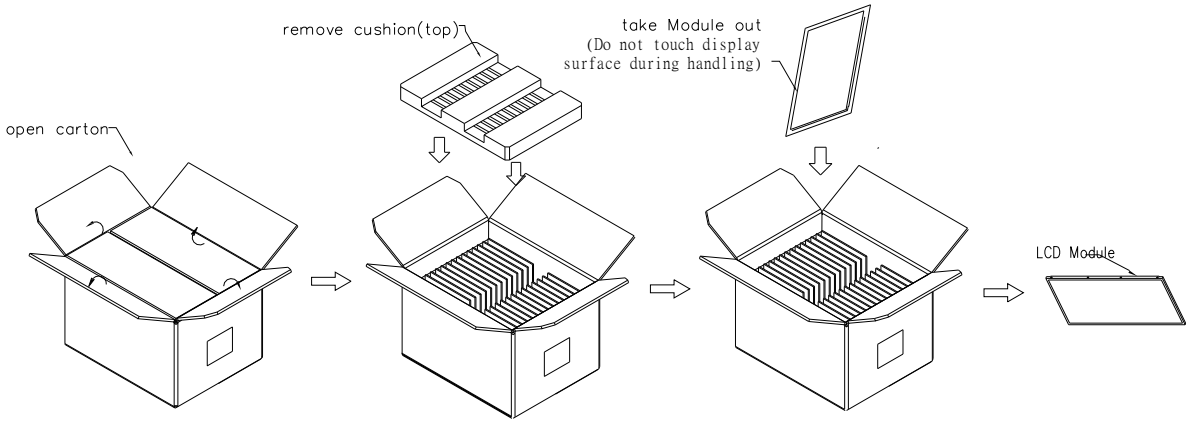
Sea & Land Transportation



Air Transportation



9.3 UN-PACKING METHOD



10. DEFINITION OF LABELS

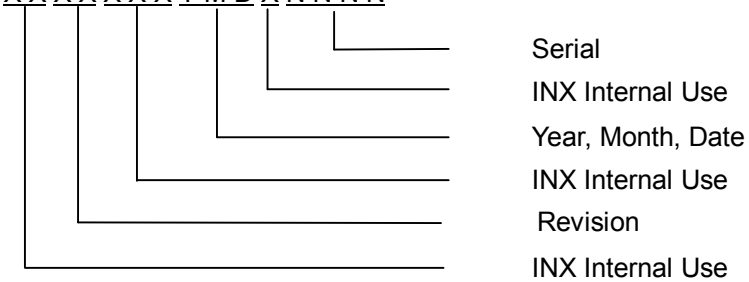
10.1 INNOLUX MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.

(a) Model Name: G104ACJ-L01

(b) Revision: Rev. XX, for example: A1, …C1, C2 …etc.

(c) Serial ID: X X X X X X Y M D X N N N N



(d) ＊＊＊＊: Factory ID

Serial ID includes the information as below:

(a) Manufactured Date: Year: 1~9, for 2011~2019

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I , O and U

(b) Revision Code: cover all the change

(c) Serial No.: Manufacturing sequence of product

11. PRECAUTIONS

11.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.

(4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.

(5) Do not pull the I/F connector in or out while the module is operating.

(6) Do not disassemble the module.

(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

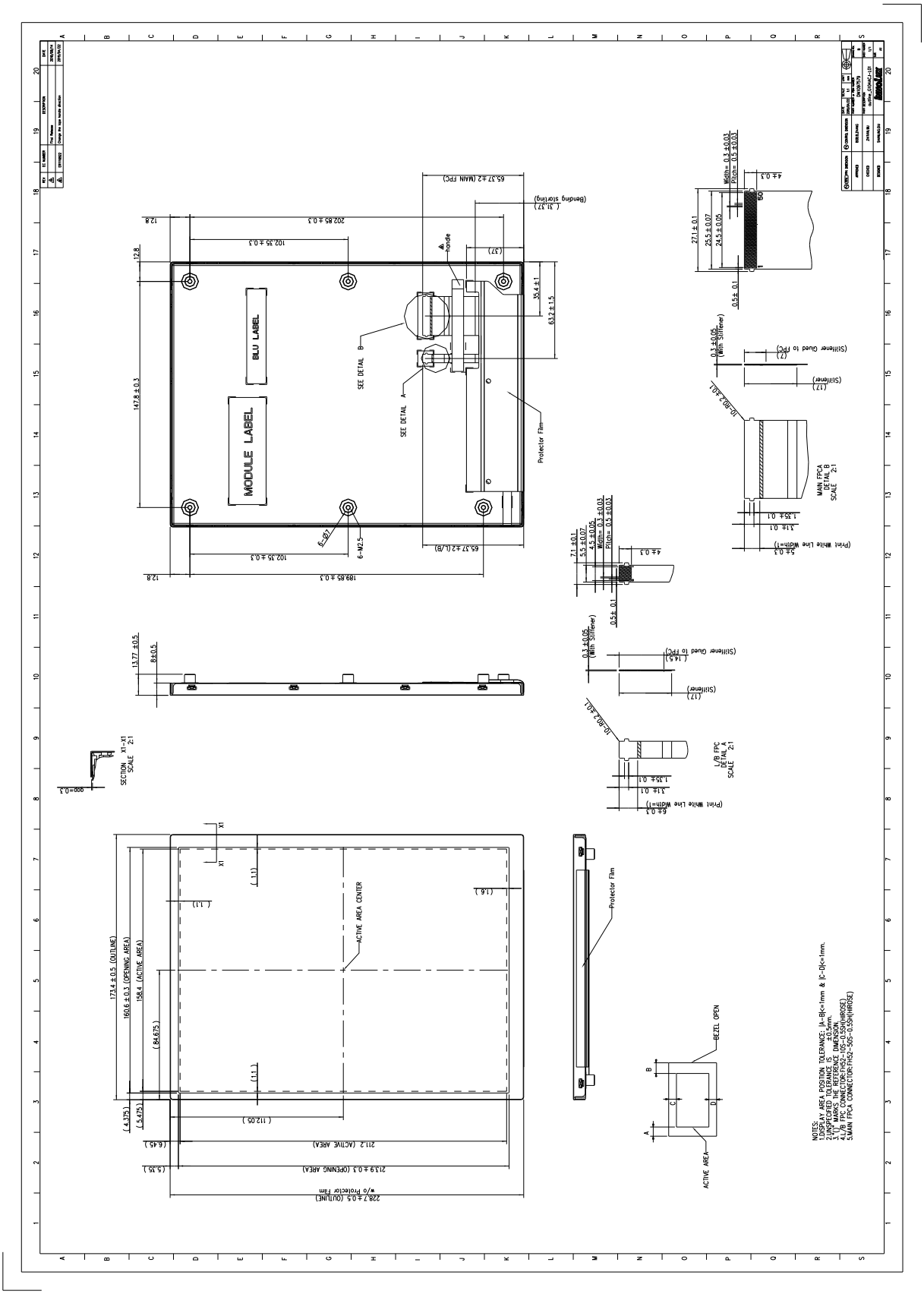
(8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.

(9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

(10) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

(11) Do not keep same pattern in a long period of time. It may cause image sticking on LCD normal operation and storage.

12. MECHANICAL CHARACTERISTIC



Our company network supports you worldwide with offices in Germany, Austria, Switzerland, the UK and the USA. For more information please contact:

Headquarters

Germany

FORTEC Elektronik AG
Augsburger Str. 2b
82110 Germering

Phone: +49 89 894450-0
E-Mail: info@fortecag.de
Internet: www.fortecag.de

Fortec Group Members

Austria

Distec GmbH Office Vienna
Nuschinggasse 12
1230 Wien

Phone: +43 1 8673492-0
E-Mail: info@distec.de
Internet: www.distec.de

Germany

Distec GmbH
Augsburger Str. 2b
82110 Germering

Phone: +49 89 894363-0
E-Mail: info@distec.de
Internet: www.distec.de

Switzerland

ALTRAC AG
Bahnhofstraße 3
5436 Würenlos

Phone: +41 44 7446111
E-Mail: info@altrac.ch
Internet: www.altrac.ch

United Kingdom

Display Technology Ltd.
Osprey House, 1 Osprey Court
Hichingbrooke Business Park
Huntingdon, Cambridgeshire, PE29 6FN

Phone: +44 1480 411600
E-Mail: info@displaytechnology.co.uk
Internet: www. displaytechnology.co.uk

USA

Apollo Display Technologies, Corp.
87 Raynor Avenue,
Unit 1Ronkonkoma,
NY 11779

Phone: +1 631 5804360
E-Mail: info@apollodisplays.com
Internet: www.apollodisplays.com