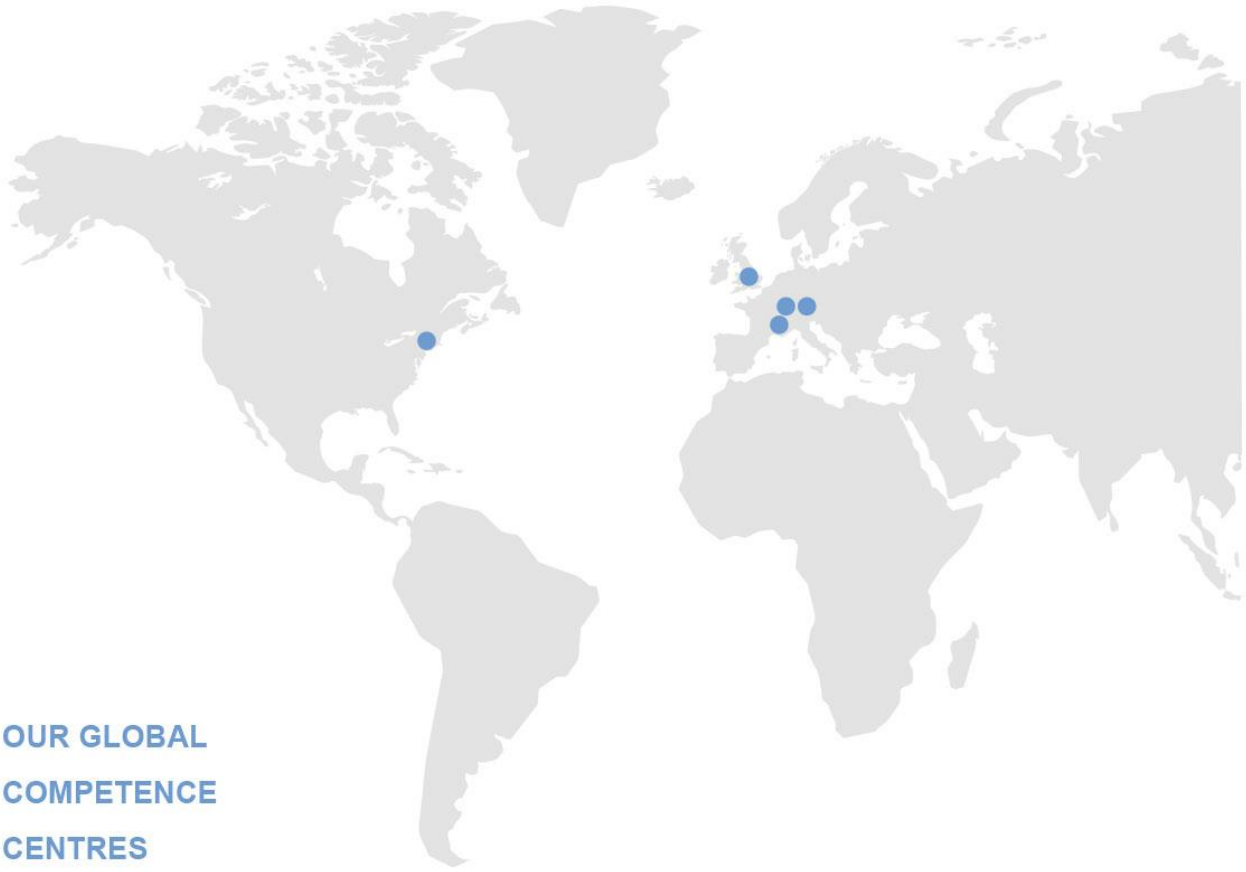
FORTEC
ELEKTRONIK AG



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Datasheet

LG Display

LD101WX1-SL01

HD-10-092

SPECIFICATION
FOR
APPROVAL

( ) **Preliminary Specification**
(●) **Final Specification**

Title	10.1" WX TFT LCD

Customer	
MODEL	

SUPPLIER	LG Display Co., Ltd.
*MODEL	LD101WX1
Suffix	SL01

*When you obtain standard approval,
please use the above model name without suffix

APPROVED BY	SIGNATURE
/	
/	
/	

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

APPROVED BY	SIGNATURE

REVIEWED BY

PREPARED BY

Products Engineering Dept.
LG Display Co., Ltd

Contents

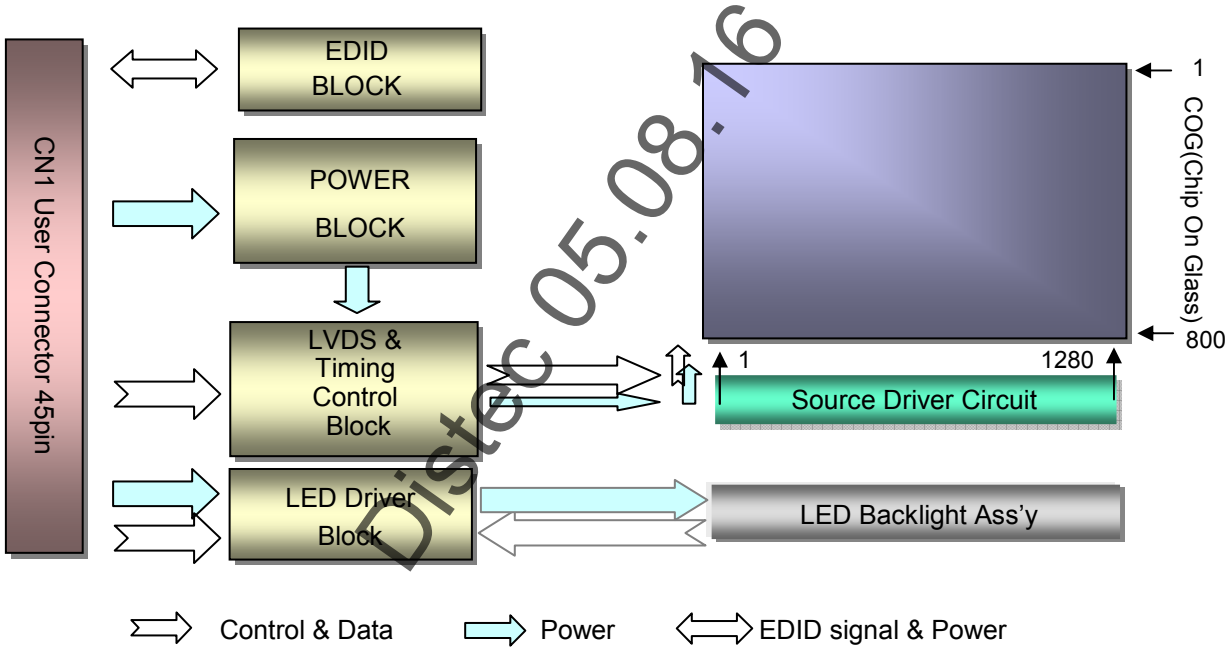
RECORD OF REVISIONS

Revision No	Revision Date	Page	Description	EDID ver
0.0	Mar. 15, 2012	All	First Draft (Preliminary Specification)	
0.2	Jul. 31, 2012	8	3-2. Interface connections, - add connector header's part name	
		13	3-7. Power sequence for LCD, - revised sequence of LED input voltage	
0.3	Aug. 21, 2012	4	1. General description, - Power consumption: Total 3.13W → 3.02W	
		20	6. Reliability - added high temperature & humidity test condition, revised high temperature test condition	
0.4	Sep.16.2012	19	5. Mechanical Characteristics(REAR VIEW_LCM) - Change the Format of Serial Label (2D→1D)	
0.5	Mar.04.2013	17	5. Mechanical Characteristics - Change the weight of LCM(145g Max.→176g Max.)	
		19	5. Mechanical Characteristics(REAR VIEW_LCM) - Change the shape of cut out hole	

1. General Description

The LD101WX1 is a Color Active Matrix Liquid Crystal Display with an integral LED backlight system. The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive type display operating in the normally black mode. This TFT-LCD has 10.1 inches diagonally measured active display area with WXGA resolution (1280 horizontal by 800 vertical pixel array). Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 6bit + 2bit FRC gray scale signal for each dot, thus, presenting a palette of 16,777,216 colors. The LD101WX1 has been designed to apply the interface method that enables low power, high speed, low EMI. The LD101WX1 is intended to support applications where thin thickness, low power are critical factors and graphic displays are important. In combination with the vertical arrangement of the sub-pixels, the LD101WX1 characteristics provide an excellent flat display.

The LCD Module is standard Industrial product which occurs possibility of Lamination Mura when using Direct bonding type Touch and cannot be modified In order prevent Mura. Lamination Mura require Pre-Matching with LCD module when Touch setting on set side.



General Features

Active Screen Size	10.1 inches diagonal
Outline Dimension	LCD : 228.96(H) × 148.5(V) x 2.5(D,Max), 4.8(D,Max. W/PCB) mm
Pixel Pitch	0.1695mm × 0.1695 mm
Pixel Format	1280 horiz. By 800 vert. Pixels RGB strip arrangement
Color Depth	6-bit + FPC, 16.7M colors
Luminance, White	400 cd/m^2 (Typ.) / 320cd/m^2 (min.)
Power Consumption	Total 3.02 W(typ.) (Logic :0.6 W (typ. @ Mosaic), B/L : 2.42W
Weight	145g (Max.)
Display Operating Mode	Transmissive mode, normally Black
Surface Treatment	Hard coat on polarizer
RoHS Compliance	Yes

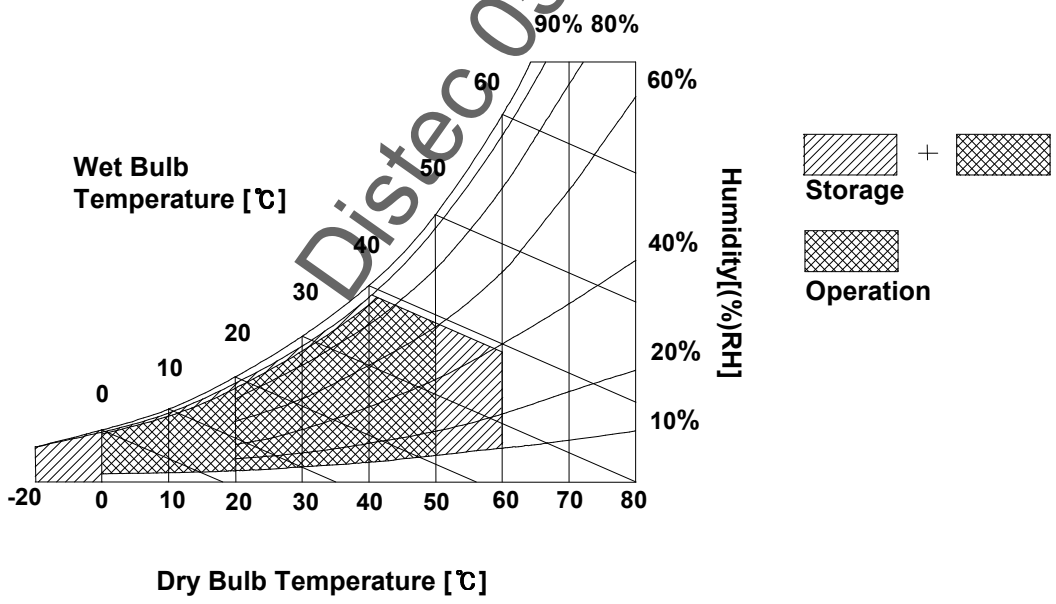
2. Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Values		Units	Notes
		Min	Max		
Power Input Voltage	VCC	-0.3	4.0	Vdc	at 25 ± 5°C
Operating Temperature	TOP	0	50	°C	1
Storage Temperature	HST	-20	60	°C	1

Note : 1. Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39°C Max, and no condensation of water.



3. Electrical Specifications

3-1. Electrical Characteristics

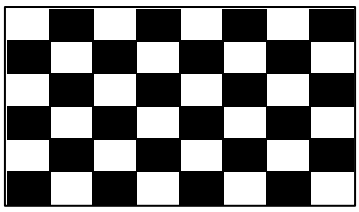
The LD101WX1 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the LED BL.

Table 2. ELECTRICAL CHARACTERISTICS

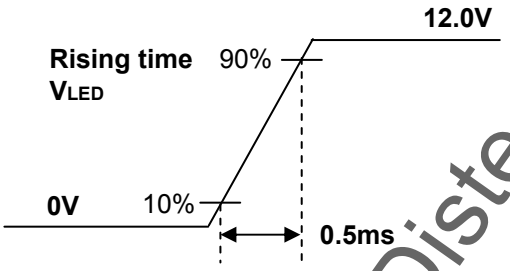
Parameter		Symbol	Values			Unit	Notes
			Min	Typ	Max		
LOGIC :							
Power Supply Input Voltage		VCC	3.0	3.3	3.6	V	1
Power Supply Input Current	Mosaic	ICC	-	181	208	mA	2
Power Consumption		PCC	-	0.6	0.69	W	2
Power Supply Inrush Current		ICC_P	-	1500	3000	mA	
LVDS Impedance		ZLVDS	90	100	110	Ω	3
BACKLIGHT : (with LED Driver)							
LED Power Input Voltage		VDD+(VLED)	7	12	15	V	4
LED Power Input Current		ILED	-	202	205	mA	5
LED Power Consumption		PLED	-	2.42	2.46	W	5
LED Power Inrush Current		ILED_P	-		3000	mA	6
PWM Duty Ratio			5	-	100	%	7
PWM Jitter		-	0	-	0.2	%	8
PWM Frequency		FPWM	100	-	20000	Hz	
PWM High Level Voltage		LED_PWM_H	3.0	3.3	3.6	V	
PWM Low Level Voltage		LED_PWM_L		0		V	Ground
LED_EN High Voltage		LED_EN_H	3.0	3.3	3.6	V	
LED_EN Low Voltage		LED_EN_L		0		V	Ground

Note)

1. The measuring position is the connector of LCM and the test conditions are under 25℃, fv = 60Hz, Black pattern.
2. The specified Icc current and power consumption are under the Vcc = 3.3V , 25℃, fv = 60Hz condition and Mosaic pattern.



3. This impedance value is needed for proper display and measured form LVDS Tx to the mating connector.
4. The measuring position is the connector of LCM and the test conditions are under 25℃.
5. The current and power consumption with LED Driver are under the Vled = 3.0V , 25℃, Dimming of Max luminance and White pattern with the normal frame frequency operated(60Hz).
6. The below figures are the measuring Vled condition and the Vled control block LGD used.
   VLED control block is same with Vcc control block.



7. The operation of LED Driver below minimum dimming ratio may cause flickering or reliability issue. The PWM resolution is 8bit (256 step).
8. This Spec. is not effective at 100% dimming ratio as an exception because it has DC level equivalent to 0Hz. In spite of acceptable range as defined, the PWM Frequency should be fixed and stable for more consistent brightness control at any specific level desired.

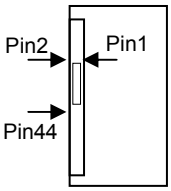
3-2. Interface Connections

This LCD employs two interface connections, a 44 pin connector used for the module electronics interface and the other connector used for the integral backlight system.

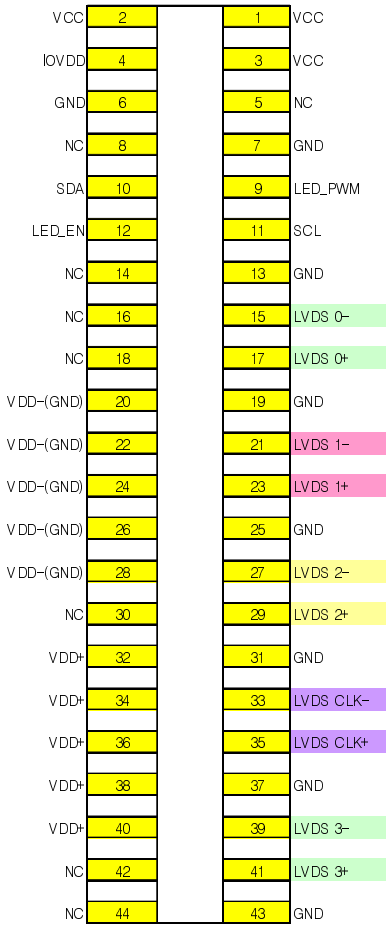
Pin	Symbol	Description
1	VCC	LCD Logic and driver power(3.3V)
2	VCC	LCD Logic and driver power(3.3V)
3	VCC	LCD Logic and driver power(3.3V)
4	IOVDD	Power supply for EDID (3.3V)
5	NC	No connection
6	GND	Ground
7	GND	Ground
8	NC	No connection
9	LED_PWM	Back light LED driver PWM (equal to IOVDD level)
10	SDA	DDC Data (Only for EDID) (equal to IOVDD level)
11	SCL	DDC clock (Only for EDID) (equal to IOVDD level)
12	LED_EN	LED enable input level (equal to IOVDD level)
13	GND	Ground
14	NC	NC
15	LVDS 0-	LVDS0 data negative signal
16	NC	NC
17	LVDS 0+	LVDS0 data positive signal
18	NC	No connection
19	GND	Ground
20	VDD-	Ground
21	LVDS 1-	LVDS1 data negative signal
22	VDD-	Ground
23	LVDS 1+	LVDS1 data positive signal
24	VDD-	Ground
25	GND	Ground
26	VDD-	Ground
27	LVDS 2-	LVDS2 data negative signal
28	VDD-	Ground
29	LVDS 2+	LVDS2 data positive signal
30	NC	No connection
31	GND	Ground
32	VDD+	Power supply for LED (12V)
33	LVDS CLK-	LVDS Clock negative signal
34	VDD+	Power supply for LED (12V)
35	LVDS CLK+	LVDS Clock positive signal
36	VDD+	Power supply for LED (12V)
37	GND	Ground
38	VDD+	Power supply for LED (12V)
39	LVDS 3-	LVDS3 data negative signal
40	VDD+	Power supply for LED (12V)
41	LVDS 3+	LVDS3 data positive signal
42	NC	No connection (LGD Only)
43	GND	Ground
44	NC	No connection (LGD Only)

[Connector]
Socket(LGD): Panasonic AXE54412
Header: Panasonic AXE644124

[Connector pin arrangement]

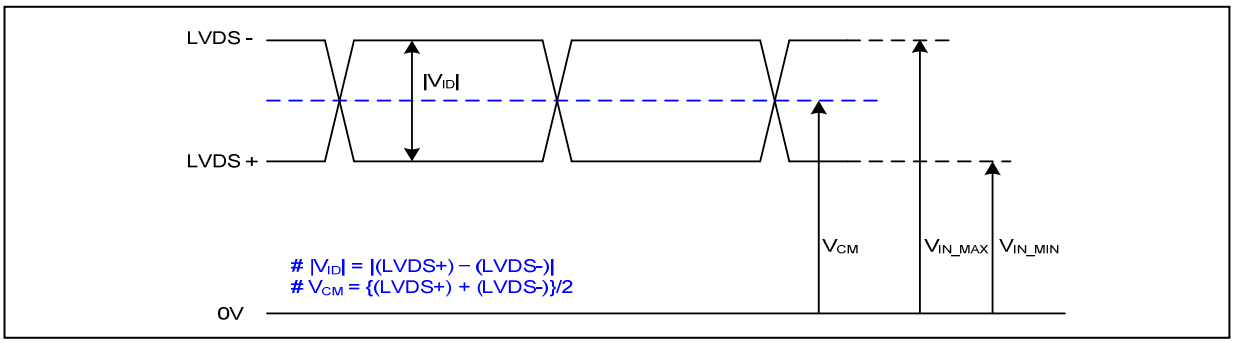


[LCD Module Rear View]



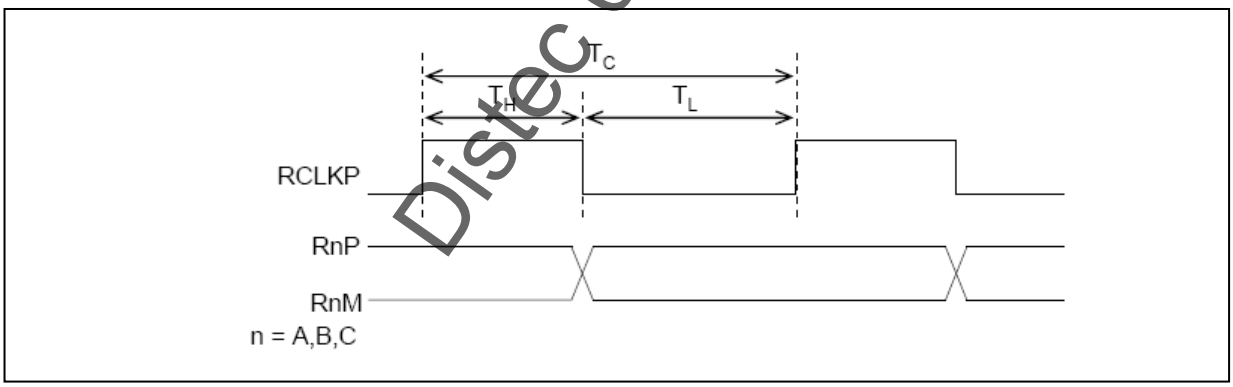
3-3. LVDS Signal Timing Specifications

3-3-1. DC Specification

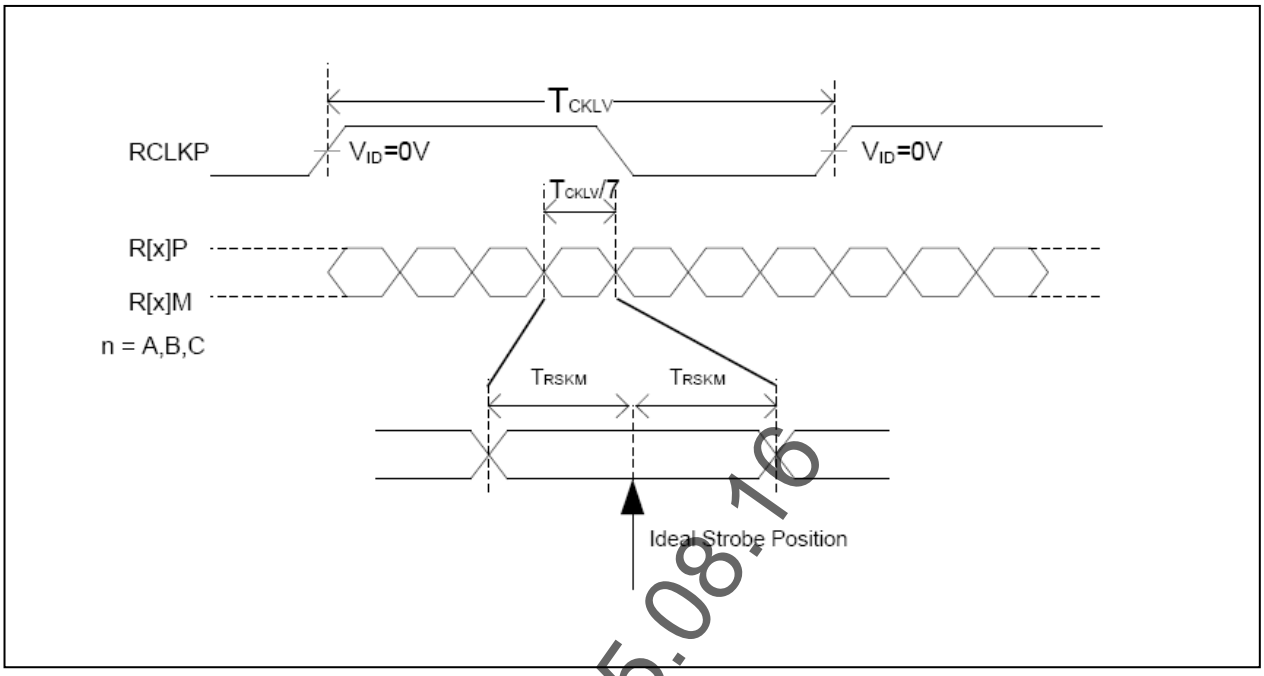


Description	Symbol	Min	Max	Unit	Notes
LVDS Differential Voltage	$\|V_{ID}\|$	200	600	mV	-
LVDS Common mode Voltage	V_{CM}	0.6	1.8	V	-
LVDS Input Voltage Range	V_{IN}	0.3	2.1	V	-

3-3-2. AC Specification



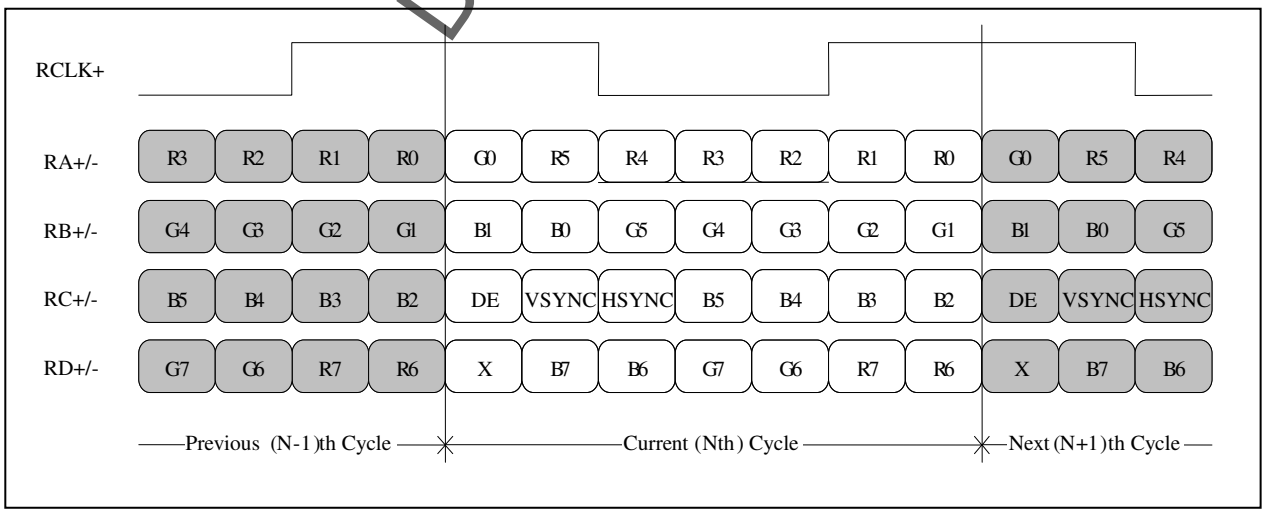
Description	Symbol	Min	Max	Unit	Notes
Clock Frequency	F_{CLKLV}	25	85	MHz	
Input Clock High Period	T_H	0.43	0.57	T_C	-
Input Clock Low Period	T_L	0.43	0.57	T_C	-
LVDS Rx Skew Margin	t_{TRSKM}	400	-	ps	85MHz ≥ Fclk > 60MHz
	t_{TRSKM}	600	-	ps	60MHz ≥ Fclk ≥ 25MHz



< LVDS input Skew timing >

3-3-3. Data Format

- LVDS 1 Port



< LVDS Data Format >

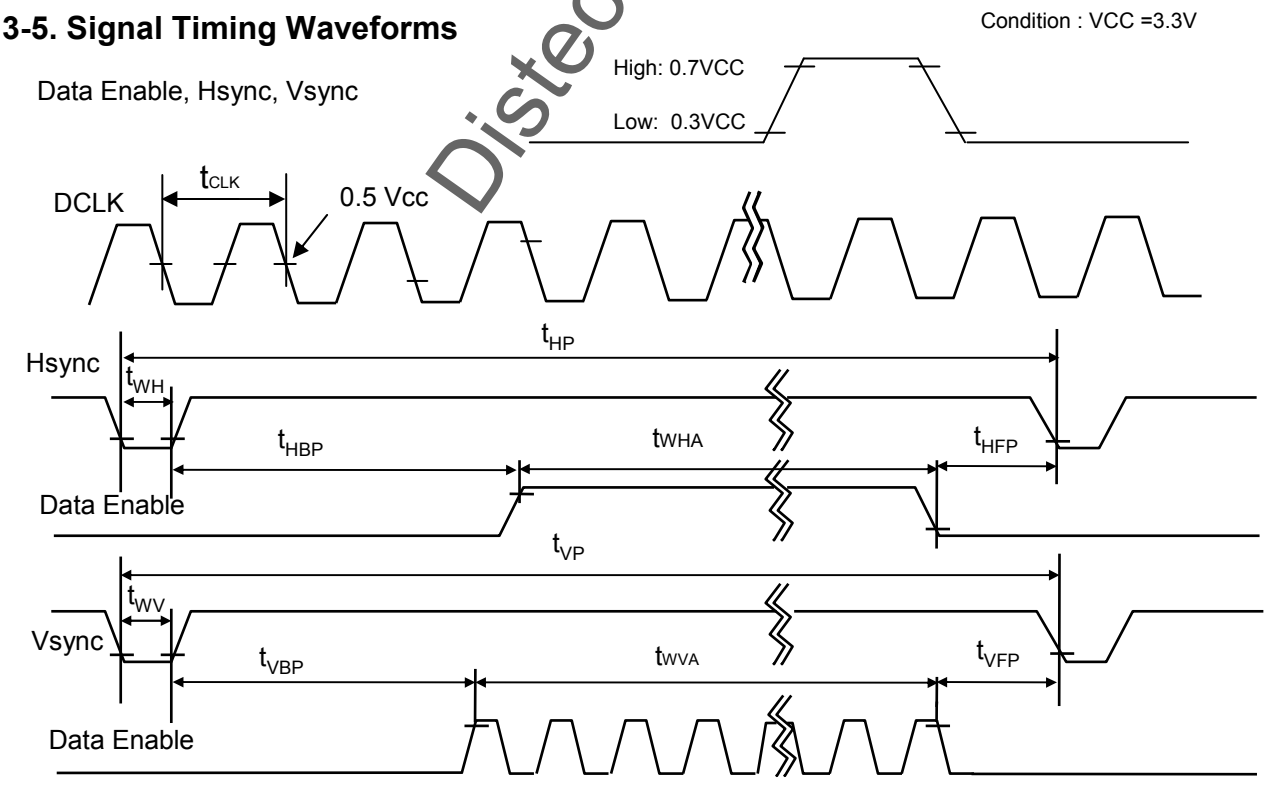
3-4. Signal Timing Specifications

This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications and specifications of LVDS Tx /Rx for its proper operation.

Table 5. TIMING TABLE

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Frequency	f_{CLK}	67.5	71.0	74.5	MHz	
Hsync	Period	T_{hp}	1366	1440	1488	tCLK	
	Width	t_{WH}	16	32	48		
	Width-Active	t_{WHA}	1280	1280	1280		
Vsync	Period	t_{VP}	811	822	847	tHP	
	Width	t_{WV}	3	6	9		
	Width-Active	t_{WVA}	800	800	800		
Data Enable	Horizontal back porch	t_{HBP}	54	80	98	tCLK	
	Horizontal front porch	t_{HFP}	16	48	62		
	Vertical back porch	t_{VBP}	7	14	35	tHP	
	Vertical front porch	t_{VFP}	1	2	3		

3-5. Signal Timing Waveforms



3-6. Color Input Data Reference

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 a reference for color versus data input.

Table 7. COLOR DATA REFERENCE

Colors & Gray Scale	Gray Scale Levels	Data Signal																							
		RED								GREEN								BLUE							
		R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7
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
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
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
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
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
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
Black	R0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darker	R1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Brighter	R253	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	R254	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red	R255	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black	G0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darker	G1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	G2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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Brighter	G253	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	G254	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Green	G255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Black	B0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darker	B1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	B2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
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Brighter	B253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
	B254	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Blue	B255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

3-7. Power Sequence for LCD

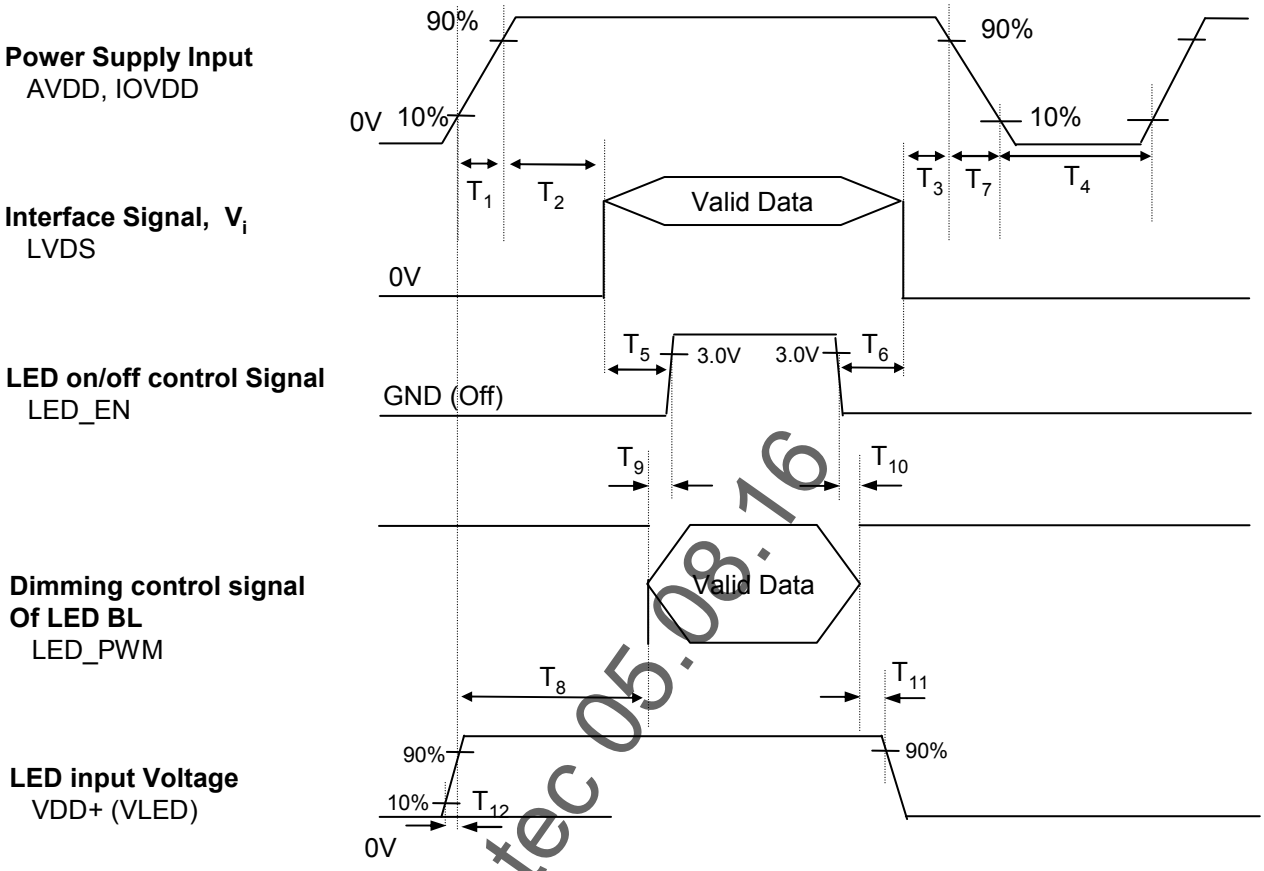


Table 6. POWER SEQUENCE TABLE

Logic Parameter	Value			Units	LED Parameter	Value			Units
	Min.	Typ.	Max.			Min.	Typ.	Max.	
T_1	0.5	-	10	ms	T_8	10	-	-	ms
T_2	0	-	50	ms	T_9	0	-	-	ms
T_3	0	-	50	ms	T_{10}	0	-	-	ms
T_4	400	-	-	ms	T_{11}	10	-	-	ms
T_5	300	-	-	ms	T_{12}	0.5	-	-	ms
T_6	200	-	-	ms					
T_7	3	-	10	ms					

Note)
1. Do not insert the mating cable when system turn on.
2. Valid Data have to meet "3-3. LVDS Signal Timing Specifications"
3. LVDS, LED_EN and PWM need to be on pull-down condition on invalid status.
   low status of LED_EN needs to be set as ground. Floating LED_EN makes LED_EN high at the same time with AVDD rising time
4. If wave form is not served as PWM, PWM keeps status as a high level.

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and Θ equal to 0°.
FIG. 1 presents additional information concerning the measurement equipment and method.

FIG. 1 Optical Characteristic Measurement Equipment and Method

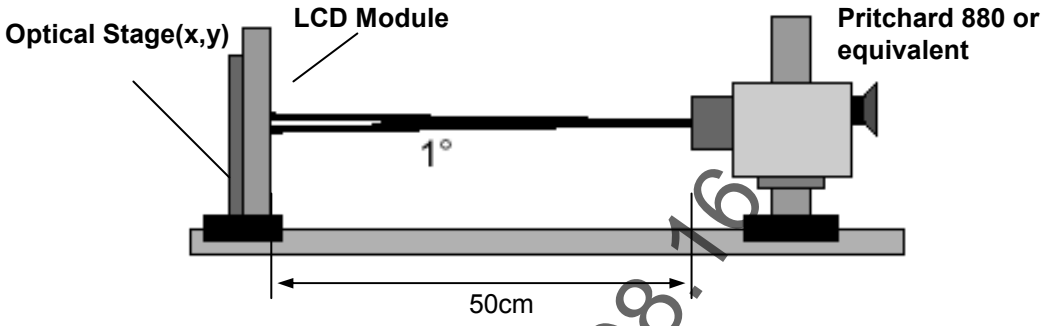


Table 8. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, fv=60Hz, f_{CLK}= 69.4 MHz

Parameter	Symbol	Values			Units	Notes
		Min	Typ	Max		
Contrast Ratio	CR	500	700	-		1
Surface Luminance, white	L_{WH}	320	400	-	cd/m^2	2
Luminance Variation	δ_9	70	80			3
Response Time	$Tr_R + Tr_D$	-	35	50	ms	4
Color Coordinates(w/o TSP)						
RED	RX	0.560	0.595	0.630		
	RY	0.317	0.352	0.387		
GREEN	GX	0.300	0.335	0.370		
	GY	0.525	0.560	0.595		
BLUE	BX	0.121	0.156	0.191		
	BY	0.084	0.119	0.154		
WHITE	WX	0.275	0.310	0.345		
	WY	0.290	0.325	0.360		
Viewing Angle						5
x axis, right(Φ=0°)	Θr	85	-	-	degree	
x axis, left (Φ=180°)	Θl	85	-	-	degree	
y axis, up (Φ=90°)	Θu	85	-	-	degree	
y axis, down (Φ=270°)	Θd	85	-	-	degree	
Gray Scale			2.2			

Note)

1. Contrast Ratio(CR) is defined mathematically as

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the center point across the LCD surface 50cm from the surface with all pixels displaying white.

3. Luminance % uniformity is measured for 9 point For more information see FIG 2..

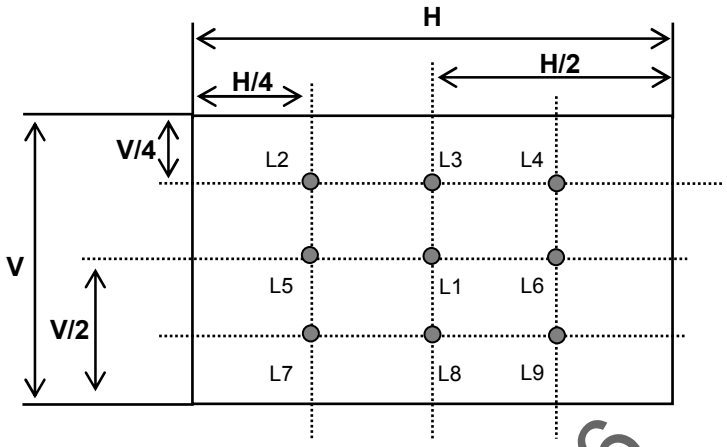
$$\delta 9 = \frac{\text{Minimum}(L1, L2, \ldots L9)}{\text{Maximum}(L1, L2, \ldots L9)}$$

4. Response time is the time required for the display to transition from white to black (rise time, Tr_R) and from black to white(Decay Time, Tr_D). For additional information see FIG 3.

5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4.

FIG. 2 Luminance

<measuring point for surface luminance & measuring point for luminance variation>



***H,V : ACTIVE AREA**

FIG. 3 Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.

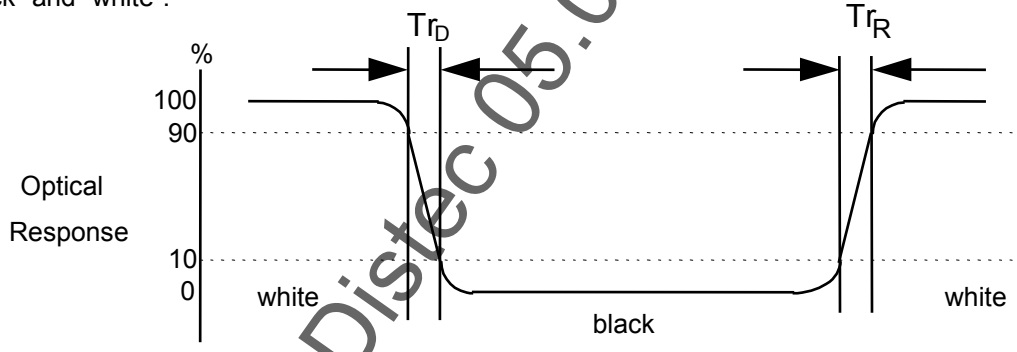
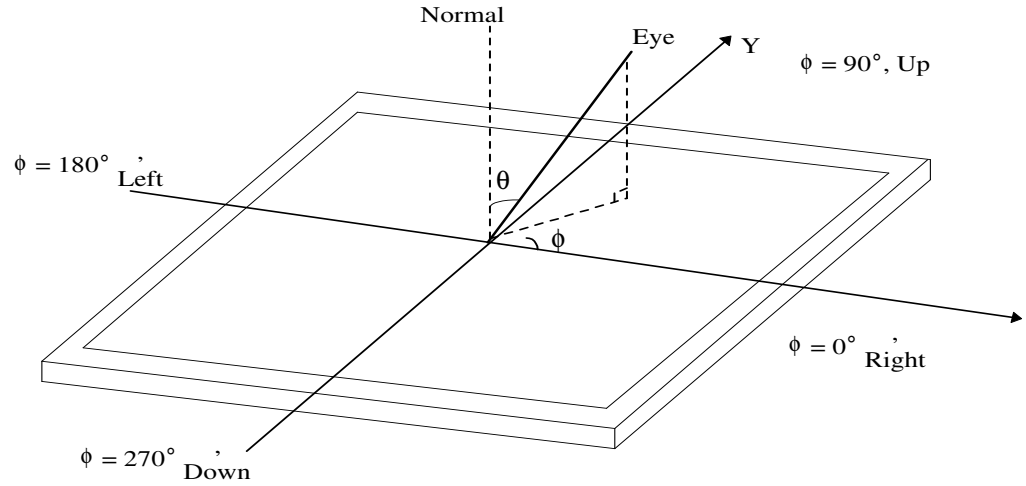


FIG. 4 Viewing angle



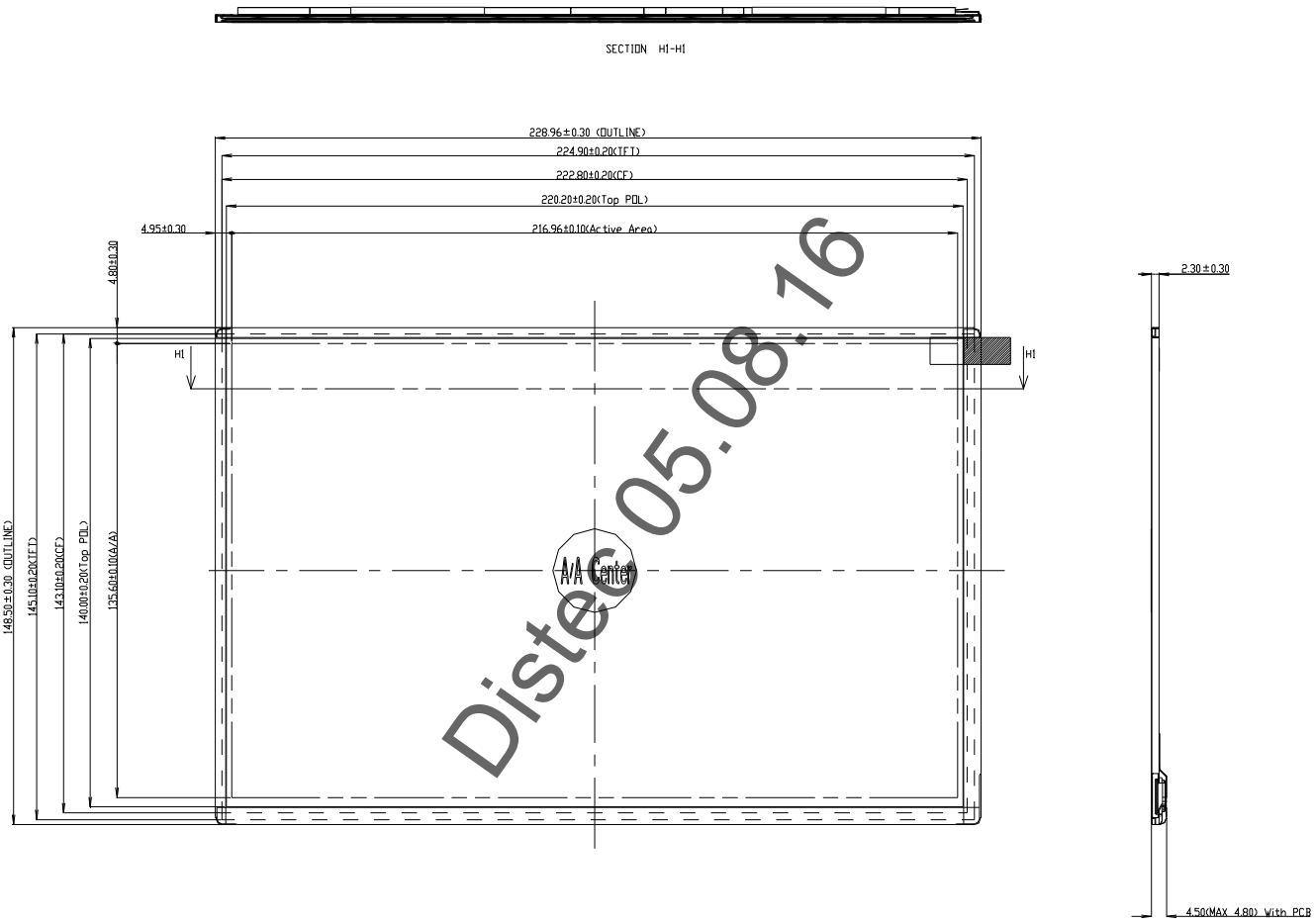
5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LD101WX1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal	228.96 ± 0.2mm
	Vertical	148.5 ± 0.2mm
	Thickness	2.50mm (max), 4.8mm w/ PCB (max)
Active Display Area	Horizontal	216.96 mm
	Vertical	135.60 mm
Weight	176g (Max.)	
Surface Treatment	Hard coating	

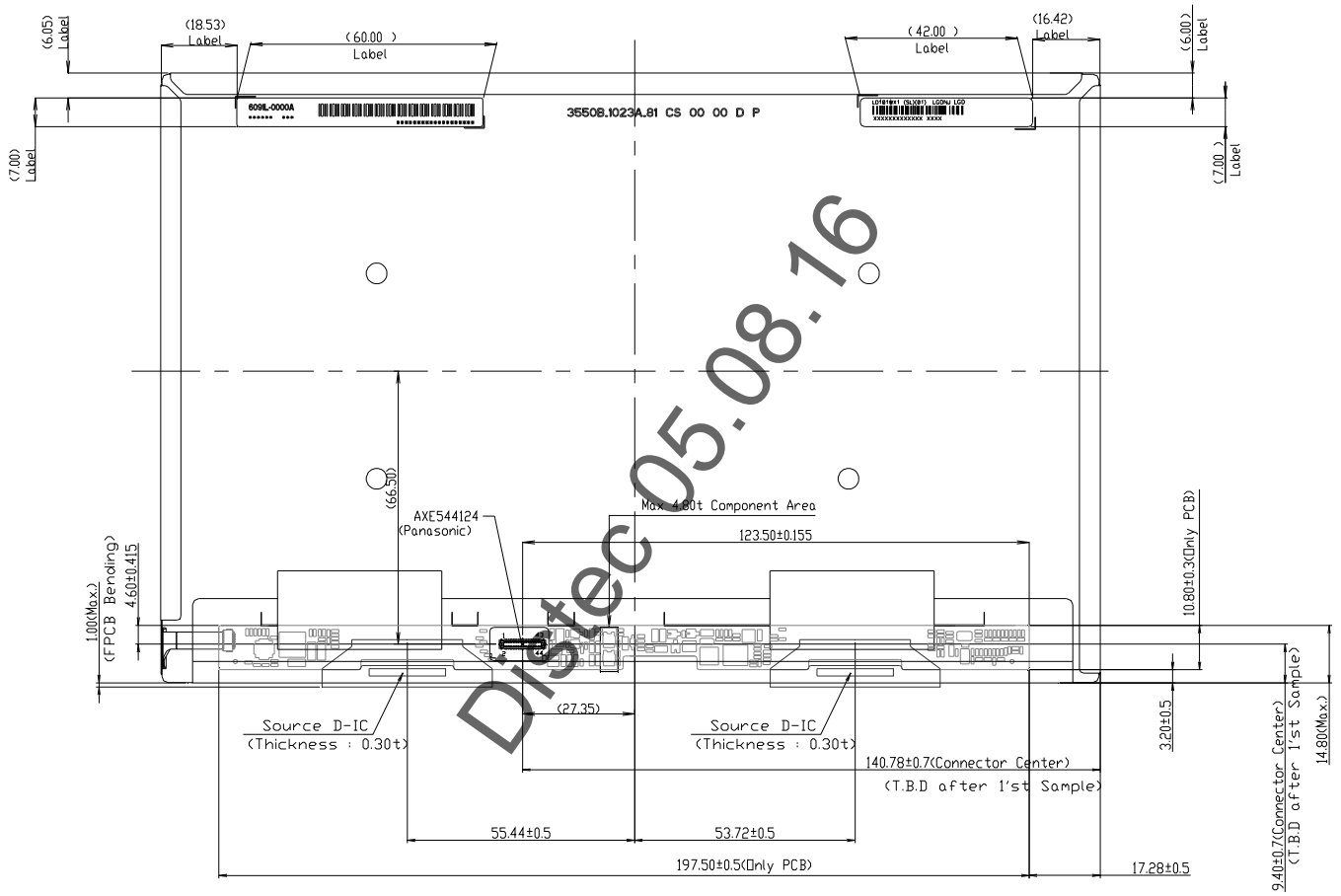
<FRONT VIEW_LCM>

Note) Unit: [mm], General tolerance: ± 0.3mm



<REAR VIEW_LCM>

Note) Unit: [mm], General tolerance: ± 0.3mm



6. Reliability

Environment test condition

No.	Test Item	Conditions
1	High temperature storage test	Ta= 60°C, 240h
2	Low temperature storage test	Ta= -20°C, 240h
3	High temperature operation test	Ta= 50°C, 240h
4	High temperature & Humidity operation test	Ta= 50°C, 50%RH, 240h
5	Low temperature operation test	Ta= 0°C, 240h
6	Thermal shock (non-operating)	-10~60℃, 100Cycle
7	Altitude (non-operating)	40,000ft, room temperature, 24Hrs
8	Sine Vibration test (non-operating)	Sine wave, 10 ~ 500 ~ 10Hz, 1.5G, 0.37oct/min 3 axis, 1hour/axis
9	Random Vibration test (non-operating)	Random, 1.5Grms, Z axis 1hr
10	Shock test (non-operating)	Half sine wave, 180G, 2ms one shock of each six faces

{ Result Evaluation Criteria }
There should be no change which might affect the practical display function when the display quality test is conducted under normal operating condition.

7. International Standards

7-1. Safety

a) UL 60950-1, Underwriters Laboratories Inc.
Information Technology Equipment - Safety - Part 1 : General Requirements.

b) CAN/CSA C22.2 No.60950-1-07, Canadian Standards Association.
Information Technology Equipment - Safety - Part 1 : General Requirements.

c) EN 60950-1, European Committee for Electrotechnical Standardization (CENELEC).
Information Technology Equipment - Safety - Part 1 : General Requirements.

7-2. EMC

a) ANSI C63.4 "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." American National Standards Institute (ANSI), 2003.
b) CISPR 22 "Information technology equipment – Radio disturbance characteristics – Limit and methods of measurement." International Special Committee on Radio Interference (CISPR), 2005.
c) CISPR 13 "Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and method of measurement." International Special Committee on Radio Interference (CISPR), 2006.

7-3. Environment

a) RoHS, Directive 2002/95/EC of the European Parliament and of the council of 27 January 2003

8. Packing

8-1. Designation of Lot Mark

a) Lot Mark

A	B	C	D	E	F	G	H	I	J	K	L	M

A,B,C : SIZE(INCH)
D : YEAR
E : MONTH
F ~ M : SERIAL NO.

Note

1. YEAR

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Mark	A	B	C	D	E	F	G	H	J	K

2. MONTH

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mark	1	2	3	4	5	6	7	8	9	A	B	C

b) Location of Lot Mark

Serial No. is printed on the label. The label is attached to the backside of the LCD module.
This is subject to change without prior notice.

8-2. Packing Form

a) Package quantity in one box : 20 pcs

b) Box Size : 355 mm x 468 mm x 220 mm

9. PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD module.

9-1. MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.
(2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

9-2. OPERATING PRECAUTIONS

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage :
V=± 200mV(Over and under shoot voltage)

(2) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.

9-3. ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

9-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

9-5. STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.

9-6. HANDLING PRECAUTIONS FOR PROTECTION FILM

(1) When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
(2) The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt to remain on the polarizer.
Please carefully peel off the protection film without rubbing it against the polarizer.
(3) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.
(4) You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 1/3

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)
Header	0	00	Header	00	00000000
	1	01	Header	FF	11111111
	2	02	Header	FF	11111111
	3	03	Header	FF	11111111
	4	04	Header	FF	11111111
	5	05	Header	FF	11111111
	6	06	Header	FF	11111111
	7	07	Header	00	00000000
Vendor / Product EDID Version	8	08	EISA manufacture code (3 Character ID) LGD	30	00110000
	9	09	EISA manufacture code (Compressed ASC II)	E4	11100100
	10	0A	Panel Supplier Reserved - Product Code 0324h	24	00100100
	11	0B	(Hex. LSB first)	03	00000011
	12	0C	LCD Module Serial No - Preferred but Optional ("0" If not used)	00	00000000
	13	0D	LCD Module Serial No - Preferred but Optional ("0" If not used)	00	00000000
	14	0E	LCD Module Serial No - Preferred but Optional ("0" If not used)	00	00000000
	15	0F	LCD Module Serial No - Preferred but Optional ("0" If not used)	00	00000000
	16	10	Week of Manufacture 00 weeks	00	00000000
	17	11	Year of Manufacture 2012 years	16	00010110
	18	12	EDID structure version # = 1	01	00000001
	19	13	EDID revision # = 3	03	00000011
Display Parameters	20	14	Video input Definition = Digital signal	80	10000000
	21	15	Max H image size (Rounded cm) = 22 cm	16	00010110
	22	16	Max V image size (Rounded cm) = 14 cm	0E	00001110
	23	17	Display gamma = (gamma*100)-100 = Example (2.2*100)-100=120 = 2.2 Gamma	78	01111000
	24	18	Feature Support (no_DPMS, no_Active Off/Very Low Power, RGB color display, Timing BLK 1,no_ GTF)	0A	00001010
Panel Color Coordinates	25	19	Red/Green Low Bits (RxRy/GxGy)	4D	01001101
	26	1A	Blue/White Low Bits (BxBy/WxWy)	25	00100101
	27	1B	Red X Rx = 0.595	98	10011000
	28	1C	Red Y Ry = 0.352	5A	01011010
	29	1D	Green X Gx = 0.335	55	01010101
	30	1E	Green Y Gy = 0.560	8F	10001111
	31	1F	Blue X Bx = 0.156	28	00101000
	32	20	Blue Y By = 0.119	1E	00011110
	33	21	White X Wx = 0.310	4F	01001111
	34	22	White Y Wy = 0.325	53	01010011
Established Timings	35	23	Established timing 1 (00h if not used)	00	00000000
	36	24	Established timing 2 (00h if not used)	00	00000000
	37	25	Manufacturer's timings (00h if not used)	00	00000000
Standard Timing ID	38	26	Standard timing ID1 (01h if not used)	01	00000001
	39	27	Standard timing ID1 (01h if not used)	01	00000001
	40	28	Standard timing ID2 (01h if not used)	01	00000001
	41	29	Standard timing ID2 (01h if not used)	01	00000001
	42	2A	Standard timing ID3 (01h if not used)	01	00000001
	43	2B	Standard timing ID3 (01h if not used)	01	00000001
	44	2C	Standard timing ID4 (01h if not used)	01	00000001
	45	2D	Standard timing ID4 (01h if not used)	01	00000001
	46	2E	Standard timing ID5 (01h if not used)	01	00000001
	47	2F	Standard timing ID5 (01h if not used)	01	00000001
	48	30	Standard timing ID6 (01h if not used)	01	00000001
	49	31	Standard timing ID6 (01h if not used)	01	00000001
	50	32	Standard timing ID7 (01h if not used)	01	00000001
	51	33	Standard timing ID7 (01h if not used)	01	00000001
	52	34	Standard timing ID8 (01h if not used)	01	00000001

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 2/3

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)
Timing Descriptor #1	54	36	Pixel Clock/10,000 (LSB) 71 MHz @ 60Hz	BC	10111100
	55	37	Pixel Clock/10,000 (MSB)	1B	00011011
	56	38	Horizontal Active (lower 8 bits) 1280 Pixels	00	00000000
	57	39	Horizontal Blanking(Thp-HA) (lower 8 bits) 160 Pixels	A0	10100000
	58	3A	Horizontal Active / Horizontal Blanking(Thp-HA) (upper 4:4bits)	50	01010000
	59	3B	Vertical Avtive 800 Lines	20	00100000
	60	3C	Vertical Blanking (Tvp-HA) (DE Blanking typ.for DE only panels) 22 Lines	16	00010110
	61	3D	Vertical Active : Vertical Blanking (Tvp-HA) (upper 4:4bits)	30	00110000
	62	3E	Horizontal Sync. Offset (Thfp) 48 Pixels	30	00110000
	63	3F	Horizontal Sync Pulse Width (HSPW) 32 Pixels	20	00100000
	64	40	Vertical Sync Offset(Tvfp) : Sync Width (VSPW) 2 Lines : 6 Lines	26	00100110
	65	41	Horizontal Vertical Sync Offset/Width (upper 2bits)	00	00000000
	66	42	Horizontal Image Size (mm) 218 mm	DA	11011010
	67	43	Vertical Image Size (mm) 135 mm	87	10000111
	68	44	Horizontal Image Size / Vertical Image Size	00	00000000
	69	45	Horizontal Border = 0 (Zero for Notebook LCD)	00	00000000
	70	46	Vertical Border = 0 (Zero for Notebook LCD)	00	00000000
	71	47	Non-Interlace, Normal display, no stereo, Digital Separate (Vsync_NEG, Hsync_NEG), DE only note : LSB is set to '1' if panel is DE-timing only. H/V can be ignored.	19	00011001
Timing Descriptor #2	72	48	Flag	00	00000000
	73	49	Flag	00	00000000
	74	4A	Flag	00	00000000
	75	4B	Data Type Tag (Monitor Name, stored as ASCII)	FC	11111100
	76	4C	Flag	00	00000000
	77	4D	Panel supplier P/N #1 = L	4C	01001100
	78	4E	Panel supplier P/N #2 = D	44	01000100
	79	4F	Panel supplier P/N #3 = 1	31	00110001
	80	50	Panel supplier P/N #4 = 0	30	00110000
	81	51	Panel supplier P/N #5 = 1	31	00110001
	82	52	Panel supplier P/N #6 = W	57	01010111
	83	53	Panel supplier P/N #7 = X	58	01011000
	84	54	Panel supplier P/N #8 = 1	31	00110001
	85	55	Panel supplier P/N #9 = -	2D	00101101
	86	56	Panel supplier P/N #10 = S	53	01010011
	87	57	Panel supplier P/N #11 = L	4C	01001100
	88	58	Panel supplier P/N #12 = 0	30	00110000
	89	59	Panel supplier P/N #13 = 1	31	00110001
Timing Descriptor #3	90	5A	Flag	00	00000000
	91	5B	Flag	00	00000000
	92	5C	Flag	00	00000000
	93	5D	Data Type Tag (Monitor Range limits, Binary coded)	FD	11111101
	94	5E	Flag	00	00000000
	95	5F	Min. Vertical (for interlace this refers to field rate) Binary coded rate in Hz., interger only = 53 Hz	35	00110101
	96	60	Max. Vertical (for interlace this refers to field rate) Binary coded rate in Hz., interger only = 63 Hz	3F	00111111
	97	61	Min. Horizontal in KHz., integer only, binary coded = 49 KHz	31	00110001
	98	62	Max. Horizontal in KHz., integer only, binary coded = 50 KHz	32	00110010
	99	63	Max. Supported Pixel Clock(Manufacturer's defn.) Binary coded clock rate in MHz/10 e.g. 130MHz is 0Dh = 74.5 MHz	07	00000111
	100	64	VESA GTF Reserved, set = 00h if unused for GTF	00	00000000
	101	65	VESA GTF Reserved, set = 0Ah if unused for GTF	0A	00001010
	102	66	VESA GTF Reserved, set = 20h if unused for GTF	20	00100000
	103	67	VESA GTF Reserved, set = 20h if unused for GTF	20	00100000
	104	68	VESA GTF Reserved, set = 20h if unused for GTF	20	00100000
	105	69	VESA GTF Reserved, set = 20h if unused for GTF	20	00100000
	106	6A	VESA GTF Reserved, set = 20h if unused for GTF	20	00100000
	107	6B	VESA GTF Reserved, set = 20h if unused for GTF	20	00100000

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 3/3

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)
Timing Descriptor #4	108	6C	Flag	00	00000000
	109	6D	Flag	00	00000000
	110	6E	Flag	00	00000000
	111	6F	Data Type Tag (ASCII String)	FE	11111110
	112	70	Flag	00	00000000
	113	71	Panel supplier P/N #1 = L	4C	01001100
	114	72	Panel supplier P/N #2 = D	44	01000100
	115	73	Panel supplier P/N #3 = 1	31	00110001
	116	74	Panel supplier P/N #4 = 0	30	00110000
	117	75	Panel supplier P/N #5 = 1	31	00110001
	118	76	Panel supplier P/N #6 = W	57	01010111
	119	77	Panel supplier P/N #7 = X	58	01011000
	120	78	Panel supplier P/N #8 = 1	31	00110001
	121	79	Panel supplier P/N #9 = -	2D	00101101
	122	7A	Panel supplier P/N #10 = S	53	01010011
	123	7B	Panel supplier P/N #11 = L	4C	01001100
	124	7C	Panel supplier P/N #12 = 0	30	00110000
	125	7D	Panel supplier P/N #13 = 1	31	00110001
Checksum	126	7E	Extension flag (# of optional 128 panel ID extension block to follow, Typ = 0)	00	00000000
	127	7F	Check Sum (The 1-byte sum of all 128 bytes in this panel ID block shall = 0)	31	00110001

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