

31.5 inch TFT LCD without Touch Panel SPECIFICATION MODEL NAME: LMTJ315ZM11

Date: 2013 / 12 / 23

Customer Signature										
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Approved Date	Approved By	Reviewed By								

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No		
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Record of Revision

Version	Date	Page	Description
0.1	2013/12/23		First release



1. General Description

This specification applies to the 31.5 inch Color TFT-LCD model LMTJA315ZM11 This LCD module has a TFT active matrix type liquid crystal panel 1,920x1080 pixels, and diagonal size of 31.5 inch. This module supports 1,920X1080 mode. 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 8-bit gray scale signal for each dot.

The LMTJA315ZM11 has been designed to apply the 8-bit 2 channel LVDS interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.

General Information

Items	Specification	Unit	Note
Active Screen Size	31.5	Inch	
Display Area	698.4(H) x 392.85(V)	mm	
Outline dimension	734.284(L)x428.856(W)x52.12(T)	mm	TBD
Driver Element	a-Si TFT active matrix		
Display Colors	8 bit, 16.7M	Color	
Number of Pixels	1,920 x 1080	pixel	
Pixel Pitch	0.3637(H)x 0.3637(W)	mm	
Pixel Arrangement	RGB vertical stripe		
Disply Operation Mode	Normally Black		
Surface Treatment	Anti-Glare,3H		Haze=2%
Rotate Function	Unachievable		Note 1

Note 1: Rotate Function refers to LCD display could be able to rotate.

2. Absolute Maximum Ratings

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

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	Vdd	-0.3	14	VDC	Note1
Input Voltage of Signal	Vin	-0.3	4	VDC	Note1
BLU Input Voltage	Vddb	-0.3	28	VDC	Note1
BLU on/off Control Voltage	VBLON	-0.3	7	VDC	Note1
BLU Brightness Control Voltage	Vdim	-0.3	7	VDC	Note1
Operating Temperature	TOP	0	+50	[°C]	Note2
Operating Humidity	HOP	10	90	[%RH]	Note2
Storage Temperature	TST	-20	+60	[°C]	Note2
Storage Humidity	HST	10	90	[%RH]	Note2
Panel Surface Temperature	PST		65	[°C]	Note3

Note 1: Duration 50 msec.

Note 2 : Maximum Wet-Bulb should be 39 $^\circ\!\mathrm{C}$ and No condensation.

The relative humidity must not exceed 90% non-condensing at temperatures of $40^\circ C$ or less. At temperatures greater

than $40^\circ\!\mathrm{C}$, the wet bulb temperature must not exceed $39^\circ\!\mathrm{C}$.

Note 3 : Surface temperature is measured at 50 $^\circ\! \mathbb C$ Dry condition.



3. Electrical Specification

The N320HVN01.2 requires tow power input. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The other is to power Back Light Unit

3.1 Electrical Characteristics

3.1.1: DC Characteristics

	Peremotor	ovmbol		Value		Unit	Noto
	Faiailetei	Symbol	Min.	Тур.	Max.	Onit	Note
LCD							
Power Su	pply Input Voltage	VDD	10.8	12	13.2	VDC	
Power Su	pply Input Current	ldd		0.39	0.56	А	1
Inrush Cu	rrent	IRUSH			5	А	2
Permissib	le Ripple of Power Supply Input	V _{RP}			660	$mV_{pk\text{-}pk}$	3
Voltage							
LVDS	Input Differential Voltage	V _{ID}	200	400	600	mV _{DC}	4
Interface	Differential Input High Threshold	Vth	+100		+300	mV _{DC}	4
	Voltage						
	Differential Input Low Threshold		-300		-100	mVDC	4
	Voltage						
	Input Common Mode Voltage	VICM	1.1	1.25	1.4	VDC	4
DCR	DIM_IN	Fdim_in	140		240		5
Interface		Ddim_in	5		100		5
	DIM_OUT	Fdim_out		180			5
		DDIM_OUT	5		100		5
CMOS	Input High Threshold Voltage	Vін	2.7		3.3	VDC	6
Interface		(High)					
	Input Low Threshold Voltage		0		0.6	VDC	6
		(Low)					
Backlight	PBL		34.9	39.3	Watt		
Life time			30,000			Hour	10,11

3.1.2: AC Characteristics

	Parameter		V		Ilmit	Noto		
	Falametei	Symbol	Min.	Тур.	Max	Onit	NOIC	
	Receiver Clock : Spread		Fclk		Fclk		0	
	Spectrum Modulation range	FCIK_SS	-3%		+3%		0	
	Receiver Clock : Spread				200	KHz		
LVDS	Spectrum Modulation	Fss	30				8	
Interface	frequency							
	Receiver Data Input Margin		0.4		0.4			
	Fclk = 85 MHz	tRMG	-0.4		0.4	ns	9	
	Fclk = 65 MHz		-0.5		0.5			

Note :

- 1. Test Condition:
 - (1) VDD = 12.0V
 - (2) Fv = Type Timing, 60Hz
 - (3) FCLK = Max freq.
 - (4) Temperature = $25^{\circ}C$
 - (5) Test Pattern : White Pattern
- 2. Measurement condition : Rising time = 400us



3. Test Condition

- (1) The measure point of Vpp is in LCM side after connecting the System Board and LCM
- (2) Under Max. Input current spec. condition.

4. VICM = 1.25V



5. DCR Interface: Function Table

Inp	Input							
DCR_Enable	DIM_IN	DIM_OUT						
High	PWM Input	DCR Dimming Out						
Low	PWM Input	PWM Input						
NC	NC	Keep High						

Note.(5-1) : During the deep duty control, partial darkness or center darkness might happen due to insufficient lamp current.

Note.(5-2) : At low temperature, more warm up time may be needed.

6. The measure points of VIH and VIL are in LCM side after connecting the System Board and LCM.

7. Input Channel Pair Skew Margin





8. LVDS Receiver Clock SSCG (Spread spectrum clock generator) is defined as below figures



Parameter	Symbol			Unit	Note	
Falameter	Symbol	Min	Туре	max	Onit	Note
Input Clock Frequency	Fclk	Fclk (min)		Fclk (max)	MHz	T=1/Fclk
Input Data Position0	tRIP1	- tRMG	0	tRMG	ns	
Input Data Position1	tRIP0	T/7+ tRMG	T/7	T/7+ tRMG	ns	
Input Data Position2	tRIP6	2T/7+ tRMG	2T/7	2T/7+ tRMG	ns	
Input Data Position3	tRIP5	3T/7+ tRMG	3T/7	3T/7+ tRMG	ns	
Input Data Position4	tRIP4	4T/7+ tRMG	4T/7	4T/7+ tRMG	ns	
Input Data Position5	tRIP3	5T/7+ tRMG	5T/7	5T/7+ tRMG	ns	
Input Data Position6	tRIP2	6T/7+ tRMG	6T/7	6T/7+ tRMG	ns	

9. Receiver Data Input Margin



- 10. The relative humidity must not exceed 80% non-condensing at temperatures of 40°C or less. At temperatures greater than 40°C, the wet bulb temperature must not exceed 39°C. When operate at low temperatures, the brightness of LED will drop and the life time of LED will be reduced.
- **11.** The lifetime [MTBF] is defined as the time which luminance of the LED light bar is 50% compared to its original value. [Operating condition: Continuous operating at $Ta = 25\pm2^{\circ}C$]

3.2 Interface Connections

LCD connector: FI-RE51S-HF (JAE, LVDS connector)

Mating connector:

PIN	Symbol	Description	PIN	Symbol	Description
1	Open	No connection (Internal Open)	26	GND	Ground
2	N.C.	AUO Internal Use Only	27	GND	Ground
3	N.C.	AUO Internal Use Only	28	CH2_0-	LVDS Channel 2, Signal 0-
4	N.C.	AUO Internal Use Only	29	CH2_0+	LVDS Channel 2, Signal 0+
5	N.C.	AUO Internal Use Only	30	CH2_1-	LVDS Channel 2, Signal 1-
6	N.C.	AUO Internal Use Only	31	CH2_1+	LVDS Channel 2, Signal 1+
7	LVDS_SEL	Open/High(3.3V) for NS, Low(GND) for JEIDA	32	CH2_2-	LVDS Channel 2, Signal 2-
8	N.C.	No connection (Internal Open)	33	CH2_2+	LVDS Channel 2, Signal 2+
9	N.C.	No connection	34	GND	Ground
10	GND	Ground	35	CH2_CLK-	LVDS Channel 2, Clock -
11	GND	Ground	36	CH2_CLK+	LVDS Channel 2, Clock +
12	CH1_0-	LVDS Channel 1, Signal 0-	37	GND	Ground
13	CH1_0+	LVDS Channel 1, Signal 0+	38	CH2_3-	LVDS Channel 2, Signal 3-
14	CH1_1-	LVDS Channel 1, Signal 1-	39	CH2_3+	LVDS Channel 2, Signal 3+
15	CH1_1+	LVDS Channel 1, Signal 1+	40	N.C.	AUO Internal Use Only
16	CH1_2-	LVDS Channel 1, Signal 2-	41	N.G.	AUO Internal Use Only
17	CH1_2+	LVDS Channel 1, Signal 2+	42	GND	Ground
18	GND	Ground	43	GND	Ground
19	CH1_CLK-	LVDS Channel 1, Clock -	44	GND	Ground
20	CH1_CLK+	LVDS Channel 1, Clock +	45	GND	Ground
21	GND	Ground	46	GND	Ground
22	CH1_3-	LVDS Channel 1, Signal 3-	47	N.C.	No connection
23	CH1_3+	LVDS Channel 1, Signal 3+	48	V _{DD}	Power Supply, +12V DC Regulated
24	N.C.	AUO Internal Use Only	49	VDD	Power Supply, +12V DC Regulated
25	N.C.	AUO Internal Use Only	50	VDD	Power Supply, +12V DC Regulated
			51	Vpp	Power Supply, +12V DC Regulated

Note: N.C. : please leave this pin unoccupied. It can not be connected by any signal. (Low/GND/High).





Note: x = 1, 2, 3, 4...

LVDS Option = Low_JEIDA



Note: x = 1, 2, 3, 4...

3.3 Signal Timing Specification

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 for its proper operation.

Signal	Item	Symbol	Min.	Min. Typ.		Unit
	Period	Τv	1096	1125	1048	Th
Vertical Section	Active	Tdisp (v)				
	Blanking	Tblk (v)	16	42	400	Th
Horizontal Section	Period	Th	1030 1100		1325	Tclk
	Active	Tdisp (h)		960		
	Blanking	Tblk (h)	70	140	365	Tclk
Clock	Frequency	Fclk=1/Tclk	50	74.25	82	MHz
Vertical Frequency	Frequency	Fv	47	60	63	Hz
Horizontal Frequency	Frequency	Fh	60	67.5	73	KHz

Timing Table (DE only Mode)

Notes:

(1) Display position is specific by the rise of DE signal only.

Horizontal display position is specified by the rising edge of 1st DCLK after the rise of 1st DE, is displayed on the left edge of the screen.

- (2)Vertical display position is specified by the rise of DE after a "Low" level period equivalent to eight times of horizontal period. The 1st data corresponding to one horizontal line after the rise of 1st DE is displayed at the top line of screen.
- (3) If a period of DE "High" is less than 1366 DCLK or less than 768 lines, the rest of the screen displays black.
- (4)The display position does not fit to the screen if a period of DE "High" and the effective data period do not synchronize with each other.



3.4 Signal Timing Waveforms



3.5 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.

									Input Color Data																
	Color				R	ED							GRI	EEN				BLUE							
	COIOI	MS	MSB				LSB			MSB				LS	LSB MSB			LSE				ЗB			
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
	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(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
	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
Basic Color	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
	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
	RED(000)	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(001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R													•												
	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
	GREEN(000)	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(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
G																									
	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
	BLUE(000)	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(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
В																									
	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



3.6 Power Sequence for LCD



Deveneter					
Parameter	Min. Type.		Max.	Unit	
t1	0.4		30	ms	
t2	0.1		50	ms	
t3	450			ms	
t4	0 ^{*1}			ms	
t5	0			ms	
t6			*2	ms	
t7	500			ms	
t8	10 ^{*3}		50	ms	
t9	0			ms	

Note:

(1) t4=0 : concern for residual pattern before BLU turn off.

(2) t6 : voltage of VDD must decay smoothly after power-off. (customer system decide this value)

(3) When CMOS Interface signal is N.C. (no connection), opened in Transmitted end, t8 timing spec can be negligible.



3.7 Backlight Specification (independent driver board)

The backlight unit contains 1pcs light bar.

3.7.1 Electrical specification

	Itom		bol	Condition	spec			Unit	Note
	ltem	Symbol		Condition	Min.	Тур.	Max.	Onit	Note
1	Input Voltage	VD	DB	-	22.8	24	25.2	VDC	-
2	Input Current	D	DB	VDDB=24V		TBD		ADC	1
3	Input Power	PD	DB	VDDB=24V		TBD		W	1
4	Inrush Current	IRU	ISH	VDDB=24V			7	Apeak	2
5	Control signal voltage				2	- 5.5			-
5	Control signal voltage	V Signal	Low	VDDD=24V	0	-	0.8	VDC	3
6	Control signal current	Signal		VDDB=24V	-	-	1.5	mA	-
7	External PWM Duty ratio	D_EPWM			0		100	0/	1
/	(input duty ratio)			VDDD=24V	0	-	100	%	4
0	External PWM				00	100	240	11-	4
o	Frequency			VDDD=24V	90	160	240	ΠΖ	4
0	DET status signal	Hi			Open Collector			F	
9		Lo	VUUD=24V	0	-	0.8	VDC	Э	
10	Input Impedance	Rin		VDDB=24V	300			Kohm	-

Note 1: Dimming ratio= 100%, (Ta=25±5°C, Turn on for 45minutes)

Note 2: MAX input current at all operating mode, measurement condition Rising time = 20ms (VDDB: 10%~90%)

Note 3: When BLU off (VDDB = 24V, VBLON = 0V), IDDB (max) = 0.1A

Note 4: Less than 5% dimming control is functional well and no backlight shutdown happened

Note 5: Normal: 0~0.8V; Abnormal: Open collector



3.7.2 Pin Assignment

14pin pin assignment

Connector : CI0114M1HR0-NH(CviLux) or equivalent

Pin	Symbol	Description	
1	VDDB	Operating Voltage Supply, +24V DC regulated	
2	VDDB	Operating Voltage Supply, +24V DC regulated	
3	VDDB	Operating Voltage Supply, +24V DC regulated	
4	VDDB	Operating Voltage Supply, +24V DC regulated	
5	VDDB	Operating Voltage Supply, +24V DC regulated	
6	BLGND	Ground and Current Return	
7	BLGND	Ground and Current Return	
8	BLGND	Ground and Current Return	
9	BLGND	Ground and Current Return	
10	BLGND	Ground and Current Return	
11	DET	BLU status detection: Normal : 0~0.8V ; Abnormal : Open collector (Recommend Pull high R > 10K, VDD = 3.3V)	
12	VBLON	BLU On-Off control: High/Open (2~5V) : BL On ; Low (0~0.8V/GND) : BL Off	
13	NC	NC	
14	PDIM(*)	External PWM (0%~100% Duty, open for 100%)	



IF External PWM function less than 5% dimming ratio, Judge condition as below:

(1)Backlight module must be lighted ON normally.

(2)All protection function must work normally.

(3)Uniformity and flicker could not be guaranteed



3.7.3 Power Sequence for Backlight



Dip condition for Inverter



Decemeter		Unite		
Parameter	Min	Тур	Max	Onits
T1	20	•	-	ms
T2	500	-	-	ms
T3	250	-	-	ms
T4	0	-	-	ms
T5	1	-	-	ms
T6	-	-	10	ms



4. Optical Specification

Optical characteristics are determined after the BLU unit has been 'ON' (note 1.) and stable for approximately 45 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.



Parameter		Symbol		Values		Unit	Notos
		Symbol	Min.	Тур.	Мах	Unit	notes
С	contrast Ratio	CR	2,400	3,000			1
Surface	Luminance (White)	Lwн		1000		Cd/m ²	2
Lum	inance Variation	δwнiте(9Р)			1.33		3
Respo	onse Time (G to G)	Ту		6.5		ms	4
	Color Gamut	NTSC	67	72		%	
	Red	Rx		0.630	Тур.+0.03		
		Ry		0.330			
	Green	Gx		0.320			
Color		Gy		0.620			
Coordinates	Blue	Bx	тур0.03	0.150			
		Ву		0.040			
	White	Wx		0.285			
		Wy		0.293			
	x axis, right (φ=0 °)	θr		89		Degree	5
Viewing	x axis, left (φ=180 °)	θi		89		Degree	5
Angle	y axis, up (φ=90 [°])	θu		89		Degree	5
	y axis, down (φ=270 °)	θd		89		degree	5

Note:

1. Contrast Ratio (CR) is defined mathematically as:

_	Surface Luminance of Lon5
Contrast Ratio=	Surface Luminance of Loff5

- Surface luminance is luminance value at point 5 across the LCD surface 50cm from the surface with all pixels displaying white. From more information see FIG 2. LED input VDDB=24V, IDDB.=Typical value(with driver board), LWH=Lon5 where Lon5 is the luminance with all pixels displaying white at center 5 location.
- 3. The variation in surface luminance, δ WHITE is defined (center of Screen) as:

δwHITE(9P)= Maximum(Lon1, Lon2,...,Lon9)/ Minimum(Lon1, Lon2,...Lon9)

4. Response time $T_{\rm Y}$ is the average time required for display transition by switching the input signal for five

Luminance ratio (0%, 25%, 50%, 75%, 100% brightness matrix) and is based on Fv=60Hz to optimize.

Measured		Target					
Response Time		0%	25%	50%	75%	100%	
	0%		0% to 25%	0% to 50%	0% to 75%	0% to 100%	
Start	25%	25% to 0%		25% to 50%	25% to 75%	25% to 100%	
	50%	50% to 0%	50% to 25%		50% to 75%	50% to 100%	
	75%	75% to 0%	75% to 25%	75% to 50%	/	75% to 100%	
	100%	100% to 0%	100% to 25%	100% to 50%	100% to 75%		

 T_{Y} is determined by 10% to 90% brightness difference of rising or falling period. (As illustrated) The response time is defined as the following figure and shall be measured by switching the input signal for "any level of grey(bright) " and "any level of gray(dark)".



FIG. 2 Luminance





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 FIG3.

FIG.3 Viewing Angle





5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LMTJA315M11 In addition the figures in the next page are detailed mechanical drawing of the LCD.

		Dimension	Unit	Note
	Horizontal	734.248	mm	
Outline Dimension	Vertical	428.856	mm	
	Depth(Dmin)	52.12	mm	
Weight	Т	BD	g	



Front View

2	
3	Boarder: 15.3
	Boarder: 15.3 Boarder: 15.3
I	Boarder: 15.3

Outline Dimension: 734.284(L)x428.856(W)x52.12(T) Active Area: 698.4x392.85

Side View



Back View





6. Reliability Test Items

	Test Item	Q'ty	Condition
1	High temperature storage test	3	60°C , 300hrs
2	Low temperature storage test	3	-20°C , 300hrs
3	High temperature operation test	3	50°C , 300hrs
4	Low temperature operation test	3	-5°C , 300hrs
			Wave form: random
			Vibration level : 1.0G RMS
5	Vibration test (non-operation)	3	Bandwidth : 10-300Hz
			Duration : X,Y,Z 10min per axes
			X,Y,Z: Horizontal, face up
		3	Shock level
	Shock test (non-operation)		50G ,20ms ±X,Y,Z axis
6			Waveform: half sine wave
			Direction: One time each direction
			Random wave (1.05Grms 10~200Hz)
7	Vibration test (With carton)	1CTN/7PCS	Duration : X,Y,Z 10min per axes
			Light: 20 F on (ACTMD4100 I)
8	Drop test (With carton)	1CTN/7PCS	1 corner, 3 edges, 6 surfaces
			(reter ASTM D 5276)



7. International Standard

7.1 Safety

- UL 60950-1, UL 60065; Standard for Safety of Information Technology Equipment Including electrical Business Equipment.
- (2) IEC 60950-1 : 2001, IEC 60065:2001 ; Standard for Safety of International Electrotechnical Commission
- (3) EN 60950 : 2001+A11, EN 60065:2002+A1:2006; European Committee for Electrotechnical Standardization (CENELEC), EUROPEAN STANDARD for Safety of Information Technology Equipment Including Electrical Business Equipment.

7.2 EMC

- ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHz to 40GHz. "American National standards Institute(ANSI), 1992
- (2) C.I.S.P.R "Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment." International Special committee on Radio Interference.
- (3) EN 55022 "Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment." European Committee for Electrotechnical Standardization. (CENELEC), 1998



8. PRECAUTIONS

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

8-1 MOUNTING PRECAUTIONS

- 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 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 cause circuit broken by electro-chemical reaction.
- (6) Do not touch, push or rub the exposed polarizer 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 polarizer. 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.

8-2 OPERATING PRECAUTIONS

- The device listed in the product specification sheets was designed and manufactured for TV application
- (2) The spike noise causes the mis-operation of circuits. It should be lower than following voltage: V=±200mV(Over and under shoot voltage)
- (3) Response time depends on the temperature. (In lower temperature, it becomes longer..)
- (4) Brightness of CCFL 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.
- (5) 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.
- (6) When fixed patterns are displayed for a long time, remnant image is likely to occur.

- (7) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufactures. Grounding and shielding methods may be important to minimize the interface.
- 8-3 ELECTROSATIC 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 wristband etc. And don't touch interface pin directly.

8-4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter

8-5 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 $^{\circ}$ C and 35 $^{\circ}$ 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.

8-6 HANDLING PRECAUTIONS FOR PROTECTION FILM

- (1) The protection film is attached to the bezel with a small masking tape. 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-blow equipment or in such a condition, etc.
- (2) 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 bezel after the protection film is peeled off.
- (3) You can remove the glue easily. When the glue remains on the bezel or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

9 .Inspection Specifications

The buyer (customer) shall inspect the modules within twenty calendar days since the delivery date (the "inspection period") at its own cost. The results of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller.

The buyer may, under commercially reasonable reject procedures, reject an entire lot in the delivery involved if, within the inspection period, such samples of modules within such lot show an unacceptable number of defects in accordance with this incoming inspection standards, provided however that the buyer must notify the seller in writing of any such rejection promptly, and not later than within three business days of the end of the inspection period.

Should the buyer fail to notify the seller within the inspection period, the buyer's right to reject the modules shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

10. Warranty

Inteltronic Inc. warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for one year from the date of purchase.

Inteltronic Inc. will be limited to replace or repair any of its module which is found and confirmed defective electrically or visually when inspected in accordance with Inteltronic Inc. general module inspection standard.

This warranty does not apply to any products which have been on customer's production line, repaired or altered by persons other than repair personnel authorized by Inteltronic Inc., or which have been subject to misuse, abuse, accident or improper installation. Inteltronic Inc. assumes no liability under the terms of this warranty as a consequence of such events.

If an Inteltronic Inc. product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. In returning the modules, they must be properly packaged with original package; there should be detailed description of the failures or defect.

11. RMA

Products purchased through Inteltronic Inc. and under warranty may be returned for replacement. Contact support@inteltronicinc.com for RMA number and procedures



Office Locations

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