ENRICH YOUR VISUAL WORLD…

LITEMAX SSF2822

Spanpixel

28" LED B/L Ultra-Wide LCD

(1st Edition 2011/8/12)

All information is subject to change without notice.

Approved by	Checked by	Prepared by

LITEMAX Electronics Inc.
8F, No.137, Lane 235, Bau-Chiau Rd.,
Xindian Disty, New Taipei City, Taiwan R.O.C.
Tel : 886-2-8919-1858
Fax: 886-2-8919-1300
Homepage: http://www.litemax.com/

RECORD OF REVISION

Version and Date	Page	Old Description	New Description	Remark
Aug,12,2011	all		Preliminary Release	

Contents

1.0 GENERAL DESCRIPTION

SSF2822 is 28" ultra wide TFT Liquid Crystal Display module with LED Backlight unit. It has been designed to apply the 8-bit 1 channel LVDS interface method. This module supports 1366 x 254 and can display 16.7M colors. It provides LCD panel with specific ratios for digital signage, public transportation, exhibition hall, department store, vending machine and industrial applications.

1.1 FEATURES

- Brightness: Higher than 500nits
- LED Backlight
- Ultra wide aspect ratio
- High Definition
- Low Power Consumption
- Low EMI Noise
- Built in LED driving converter

1.2 GENERAL SPECIFICATIONS

Model No.	SSF2822
Description	28" Resizing LCD, 500nits, LED backlight, 1366x254
Display Area	697.7 x 129.7 mm
Brightness	Higher than 500nits
Resolution	1366 x 254
Aspect Ratio	16 : 3
Contrast Ratio	3000:1
Pixel Pitch (mm)	0.51 x 0.51
Viewing Angle	178°(H), 178°(V)
Display Colors	16.7M
Response Time (Typical)	6.5 ms
Operation temperature	0~50°C
Power Consumption	50W
Dimensions (mm)	735.4x170.5x17.8mm
Weight (Net)	3.5Kg

1.3 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	Vcc	-0.3	14	[Volt]	Note 1
Input Voltage of Signal	Vin	-0.3	4	[Volt]	Note 1
Operating Temperature	TOP	0	+50	[°C]	Note 2
Operating Humidity	HOP	10	90	[%RH]	Note 2
Storage Temperature	TST	-20	+60	[°C]	Note 2
Storage Humidity	HST	10	90	[%RH]	Note 2
Panel Surface Temperature	PST	--	65	[°C]	Note 3

Note 1: Duration:50 msec.

Note 2 : Maximum Wet-Bulb should be 39℃ and No condensation.

The relative humidity must not exceed 90% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃, the wet bulb temperature must not exceed 39℃.

Note 3: Surface temperature is measured at 50℃ Dry condition
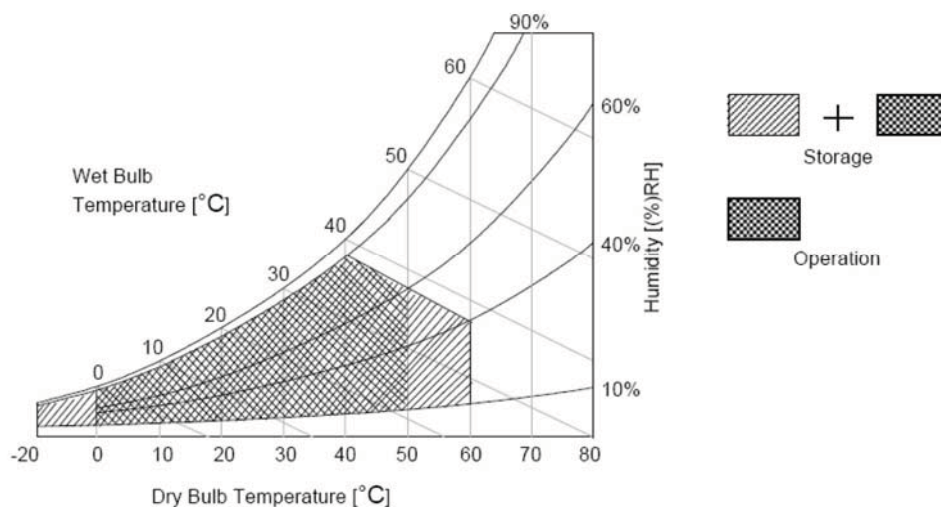
2.0 Electrical characteristics

2.1 TFT LCD Module Power Specification

The T315XW06 V5 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input for BLU is to power inverter.

Electrical Characteristics

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max		
LCD							
Power Supply Input Voltage		V_{DD}	10.8	12	13.2	V_{DC}	1
Power Supply Input Current		I_{DD}	--	0.26	0.33	A	2
Power Consumption		P_C	--	3.12		Watt	2
Inrush Current		I_{RUSH}	--	--	3	A	3
LVDS Interface	Differential Input High Threshold Voltage	V_{TH}	+100	--	+300	mV	4
	Differential Input Low Threshold Voltage	V_{TL}	-300	--	-100	mV	4
	Input Common Mode Voltage	V_{ICM}	1.1	1.25	1.4	V_{DC}	4
CMOS Interface	Input High Threshold Voltage	V_{IH} (High)	2.7	--	3.3	V_{DC}	--
	Input Low Threshold Voltage	V_{IL} (Low)	0	--	0.6	V_{DC}	--
Backlight Power Consumption		P_{BL}	--	38.4	--	Watt	--
Life Time			30,000	--	--	Hours	7

Note :
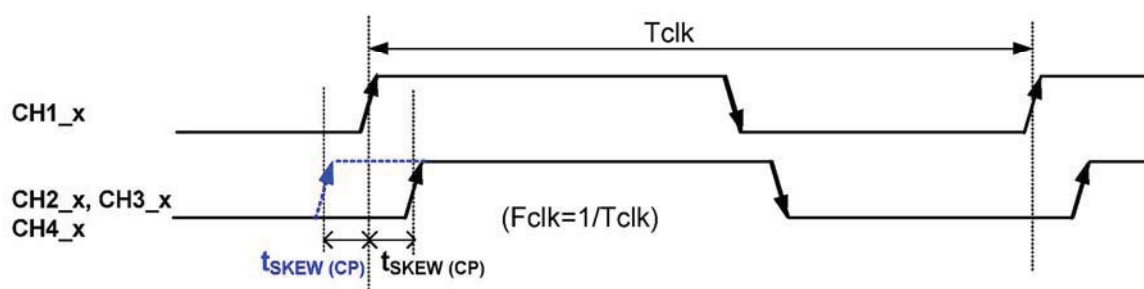
1. The ripple voltage should be controlled under 10% of V_{CC}
2. Test Condition:
   (1) V_{DD} = 12.0V
   (2) Fv = 60Hz
   (3) F_{CLK} = 80 Mhz (typ.), 86Mhz (max)
   (4) Temperature = 25 ℃
   (5) Test Pattern : White Pattern

3. Measurement condition : Rising time = 400us
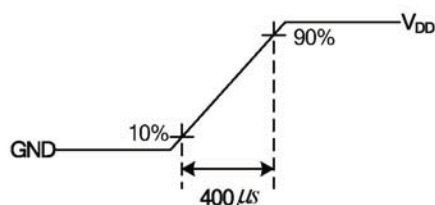
4. $V_{ICM} = 1.25V$
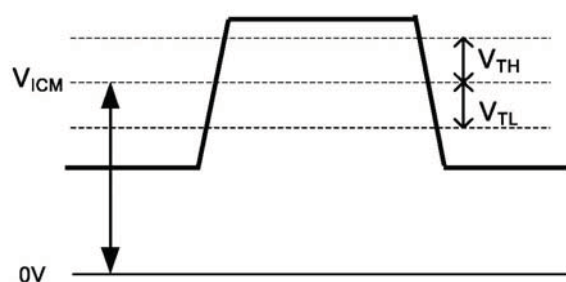
5. Input Channel Pair Skew Margin

6. The relative humidity must not exceed 80% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃, the wet bulb temperature must not exceed 39℃. When operate at low temperatures, the brightness of LED will drop and the life time of LED will be reduced.

7. The lifetime is defined as the time which luminance of LED is 50% compared to its original value.
   [Operating condition: Continuous operating at Ta = 25±2℃]

3.0 INPUT TERMINAL PIN ASSIGNMENT

**LCD Connector - LVDS connector on transfer board : Starconn 093G30-B0001A-1**

PIN	Symbol	Description
1	V_{DD}	Power Supply, +12V DC Regulated
2	V_{DD}	Power Supply, +12V DC Regulated
3	V_{DD}	Power Supply, +12V DC Regulated
4	V_{DD}	Power Supply, +12V DC Regulated
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	LVDS_SEL	Open/High(3.3V) for NS, Low(GND) for JEIDA
10	Reserved	AUO Internal Use Only
11	GND	Ground
12	CH1_0-	LVDS Channel 1, Signal 0-
13	CH1_0+	LVDS Channel 1, Signal 0+
14	GND	Ground
15	CH1_1-	LVDS Channel 1, Signal 1-
16	CH1_1+	LVDS Channel 1, Signal 1+
17	GND	Ground
18	CH1_2-	LVDS Channel 1, Signal 2-
19	CH1_2+	LVDS Channel 1, Signal 2+
20	GND	Ground
21	CH1_CLK-	LVDS Channel 1, Clock -
22	CH1_CLK+	LVDS Channel 1, Clock +
23	GND	Ground
24	CH1_3-	LVDS Channel 1, Signal 3-
25	CH1_3+	LVDS Channel 1, Signal 3+
26	GND	Ground
27	Reserved	AUO Internal Use Only
28	Reserved	AUO Internal Use Only
29	GND	Ground
30	GND	Ground

- **LVDS Option = High/Open → NS**
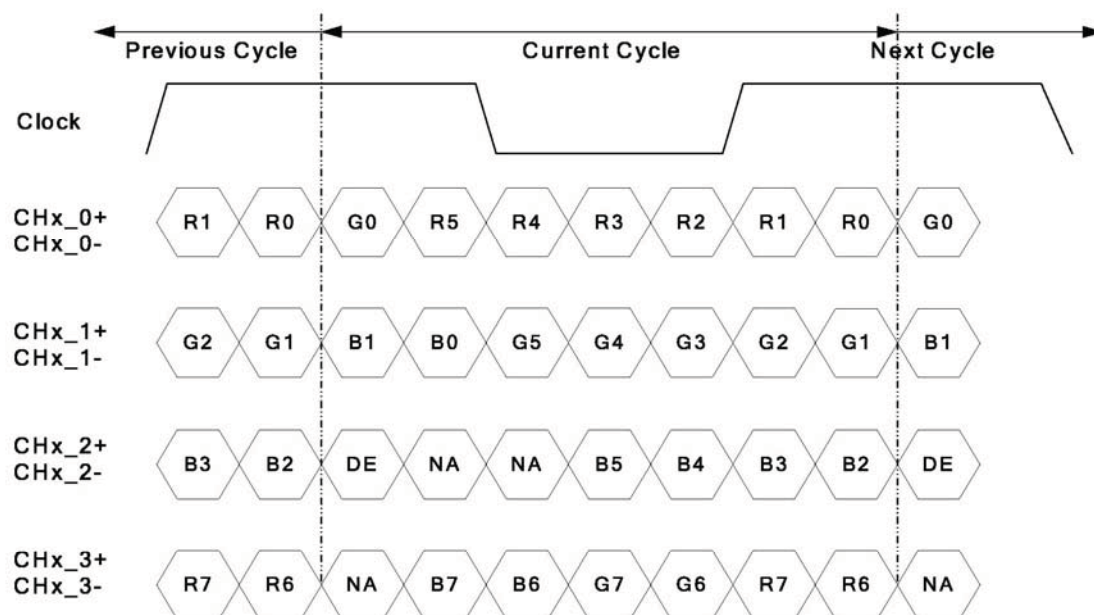
Note: x = 1, 2, 3, 4…

- **LVDS Option = Low → JEIDA**
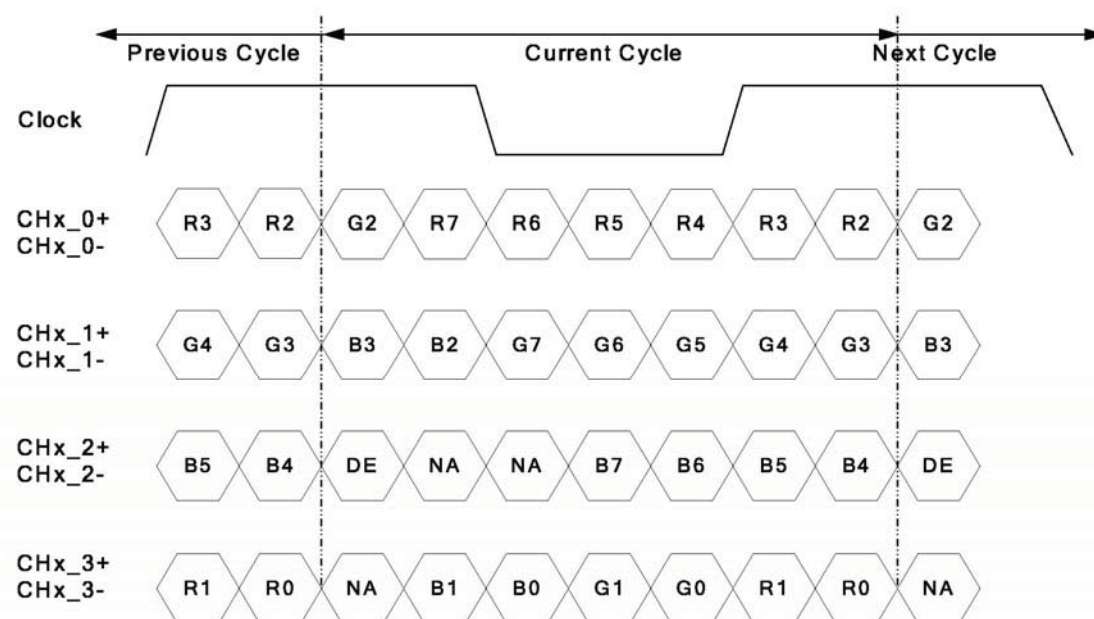
Note: x = 1, 2, 3, 4…

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.	Typ.	Max	Unit
Vertical Section	Period	Tv	784	810	1015	Th
	Active	Tdisp (v)		768		Th
	Blanking	Tblk (v)	16	42	247	Th
Horizontal Section	Period	Th	1460	1648	2000	Tclk
	Active	Tdisp (h)		1366		Tclk
	Blanking	Tblk (h)	94	282	634	Tclk
Clock	Frequency	Fclk=1/Tclk	50	80	86	MHz
Vertical Frequency	Frequency	Fv	47	60	63	Hz
Horizontal Frequency	Frequency	Fh	43	48	53	KHz

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 1,366 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.

Signal Timing Waveforms
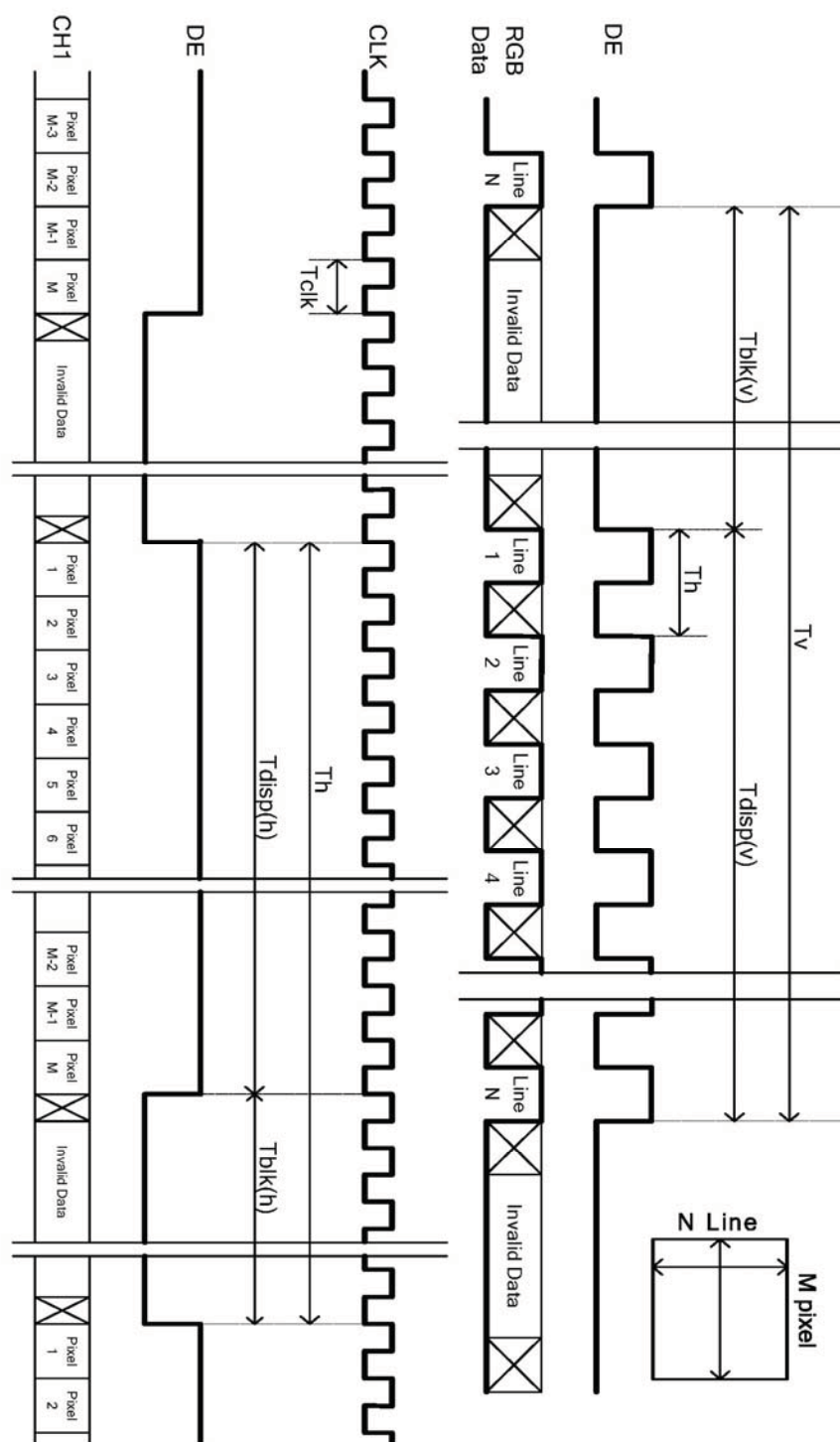
Color Input Data Reference

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.

● **Color Data Reference**

Color		Input Color Data																							
		RED								GREEN								BLUE							
		MSB							LSB	MSB							LSB	MSB							LSB
		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 Color	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
	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
R	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

	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
G	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

	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
B	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

	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

Power Sequence for LCD
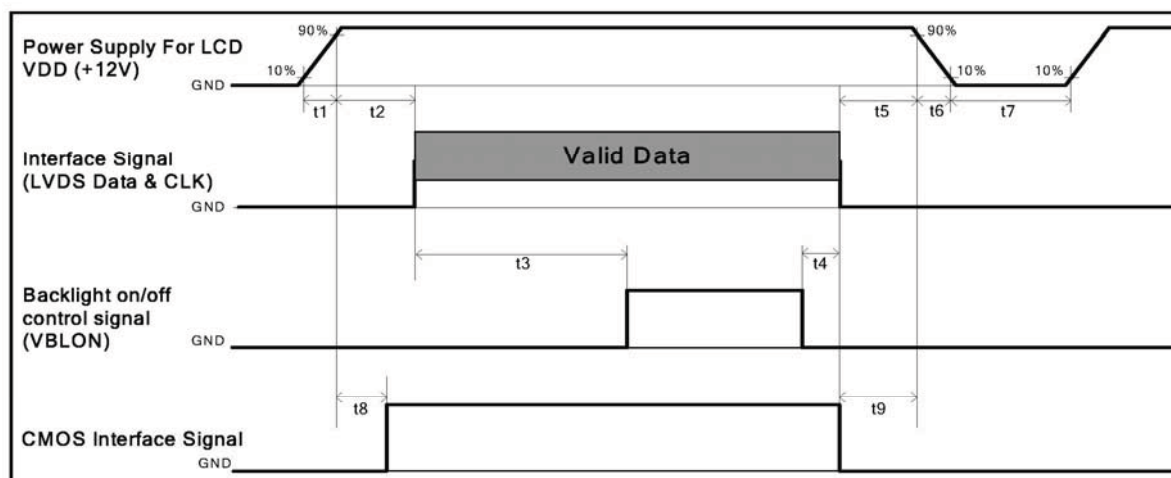
Parameter	Values			Unit
	Min.	Type.	Max.	
t1	0.4	---	30	ms
t2	0.1	---	**50**	ms
t3	**450**	---	---	ms
t4	0 [*1]	---	---	ms
t5	0	---	---	ms
t6	---	---	--- [*2]	ms
t7	500	---	---	ms
t8	10	---	50	ms
t9	0	---	---	ms

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)

Backlight Specification

The backlight unit contains 1-side lightbar.

Electrical Specification

	Item	Symbol		Condition	Spec			Unit	Note
					Min	Typ	Max		
1	Input Voltage	VDDB		-	22.8	24	25.2	VDC	-
2	Input Current	I_{DDB}		VDDB=24V		1.6	1.69	ADC	1
3	Input Power	P_{DDB}		VDDB=24V		38.4	40.66	W	1
4	Inrush Current	I_{RUSH}		VDDB=24V			5	ADC	2
5	On/Off control voltage	V_{BLON}	ON	VDDB=24V	2	-	5.5	VDC	-
			OFF		0	-	0.8		3
6	On/Off control current	I_{BLON}		VDDB=24V	-	-	1.5	mA	-
7	Dimming Control Voltage	V_DIM	MAX	VDDB=24V	3.1	-	5.5	VDC	4
			MIN		-	0	-	VDC	-
8	Dimming Control Current	I_DIM		VDDB=24V	-	-	2	mADC	-
9	Internal Dimming Ratio	DIM_R		VDDB=24V	5	-	100	%	5
10	External PWM Control Voltage	V_EPWM	MAX	VDDB=24V	2	-	5.5	VDC	-
			MIN	VDDB=24V	0	-	0.8		-
11	External PWM Control Current	I_EPWM		VDDB=24V	-	-	2	mADC	-
12	External PWM Duty ratio	D_EPWM		VDDB=24V	5	-	100	%	5
13	External PWM Frequency	F_EPWM		VDDB=24V	140	180	240	Hz	-
14	DET status signal	DET	HI	VDDB=24V	Open Collector			VDC	6
			Lo		0	-	0.8	VDC	6
15	Input Impedance	Rin		VDDB=24V	300			Kohm	-

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

Note 2: Measurement condition Rising time = 20ms (VDDB : 10%~90%);

Note 3: When BLU off (VDDB = 24V , VBLON = 0V) , IDDB (max) = 0.02A

Note 4: V_DIM voltage of 100% duty ratio =3.1V~3.3V means Burst Mode entry point should be located between 3.1V and 3.3V.

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

Note 6: Normal : 0~0.8V ; Abnormal : Open collector

Interface Connection

LED driver board connector : Cvilux   CI1114M1HR0-NH

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 (2~5.5V) : BL On ; Low (0~0.8V/GND) : BL Off
13	NC	NC
14	PDIM(*)	External PWM (5%~100% Duty, open for 100%)

Control range: 0% — 100%
External PWM Dimming: 5% — 100%

PWM Dimming
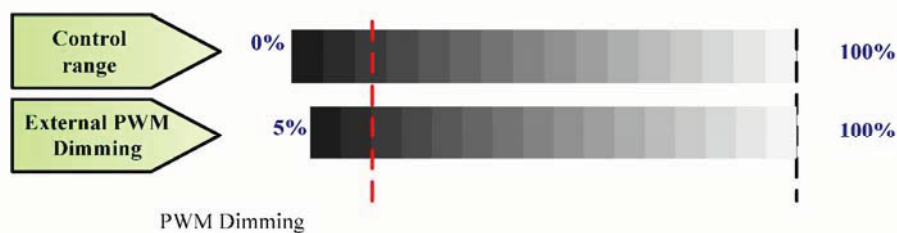
(Note*) IF External PWM function less than 5 % dimming ratio. Judge condition as below:
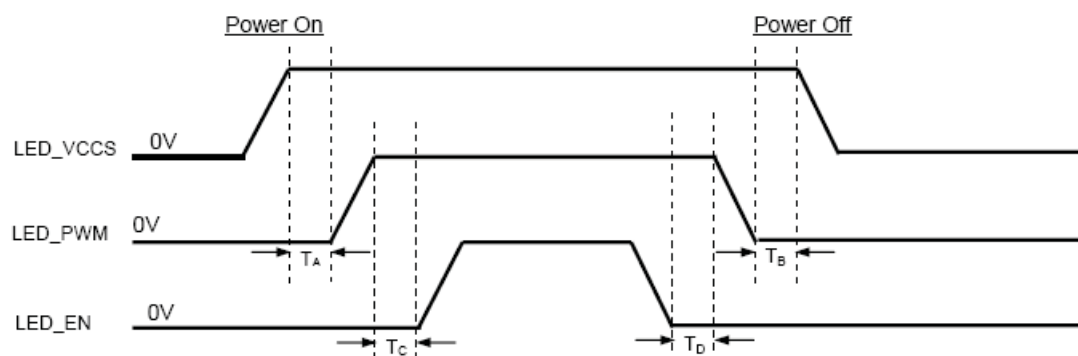(1) Backlight module must be lighted ON normally.
(2) All protection function must work normally.
(3) Uniformity and flicker could NOT be guaranteed

Power Sequence for LED Driver
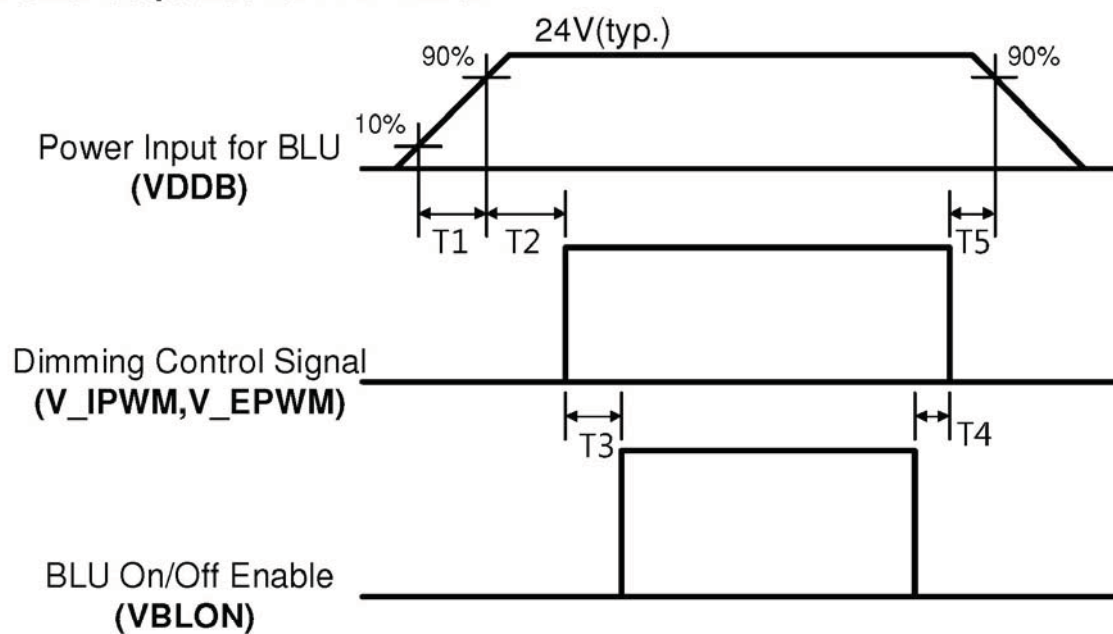
Dip condition for LED

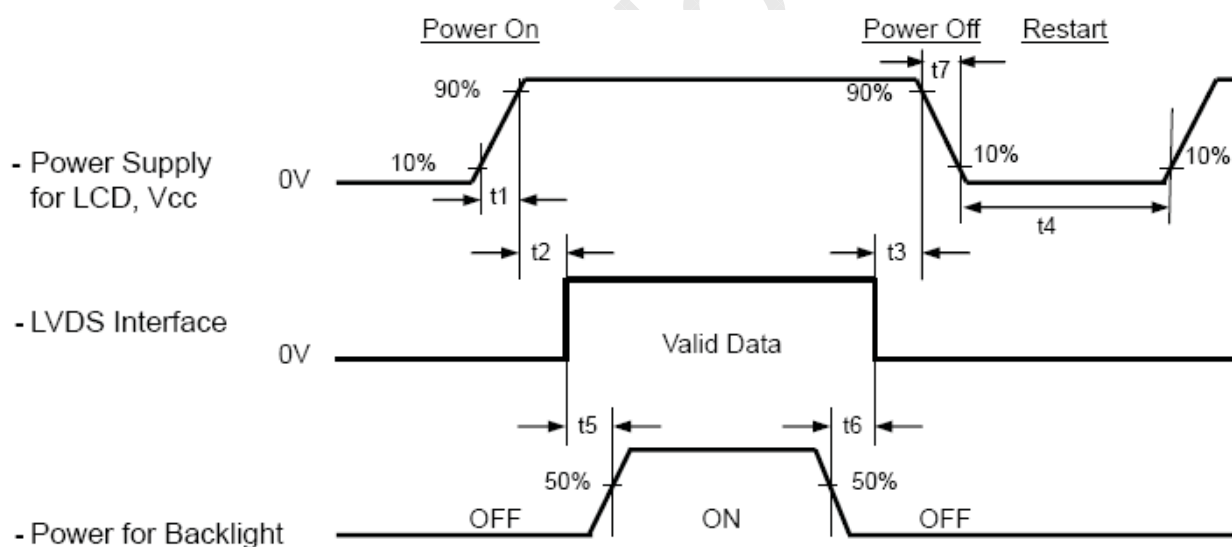| Parameter	Value			Units
	Min	Typ	Max	
T1	20	-	-	ms
T2	500	-	-	ms
T3	250	-	-	ms
T4	0	-	-	ms
T5	1	-	-	ms
T6	-	-	10	ms

Timing Specifications:

$$T_A \geq 0ms$$

$$T_B \geq 0ms$$

$$T_C \geq 10ms$$

$$T_D \geq 0ms$$

Note (1) Please follow the LED backlight power sequence as above. If the customer could not follow, it might cause backlight flash issue during display ON/OFF or damage the LED backlight controller

Timing Specifications:

$$0.5 \leq t1 \leq 10 \ ms$$

$$0 \leq t2 \leq 50 \ ms$$

$$0 \leq t3 \leq 50 \ ms$$

$$t4 \geq 500 \ ms$$

$$t5 \geq 200 \ ms$$

$$t6 \geq 200 \ ms$$

4.0 OPTICAL SPECIFICATION

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 45 minutes in a dark environment at 25℃. 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.
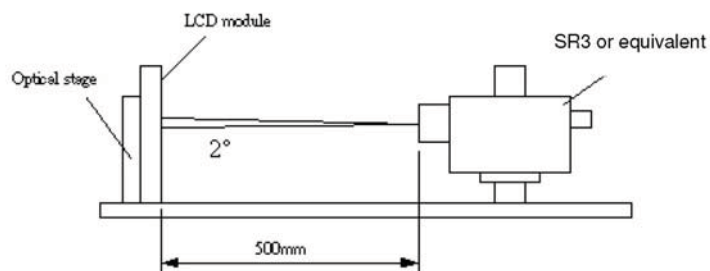
Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max		
Contrast Ratio		CR	2,400	3,000	--	--	1
Surface Luminance (White)		L_{WH}		500	--	cd/m^2	2
Luminance Variation		$\delta_{WHITE(9P)}$	--	--	1.33	--	3
Response Time (G to G)		Tγ	--	6.5	--	Ms	4
Color Gamut		NTSC	--	72	--	%	--
Color Coordinates	Red	R_X	Typ.-0.03	0.64	Typ.+0.03	--	--
		R_Y		0.33		--	--
	Green	G_X		0.31		--	--
		G_Y		0.62		--	--
	Blue	B_X		0.15		--	--
		B_Y		0.06		--	--
	White	W_X		0.280		--	--
		W_Y		0.290		--	--
Viewing Angle	x axis, right(φ=0°)	θ_r	--	89	--	degree	5
	x axis, left(φ=180°)	θ_l	--	89	--	degree	5
	y axis, up(φ=90°)	θ_u	--	89	--	degree	5
	y axis, down (φ=270°)	θ_d	--	89	--	degree	5

5.0 MECHANICAL DRAWING
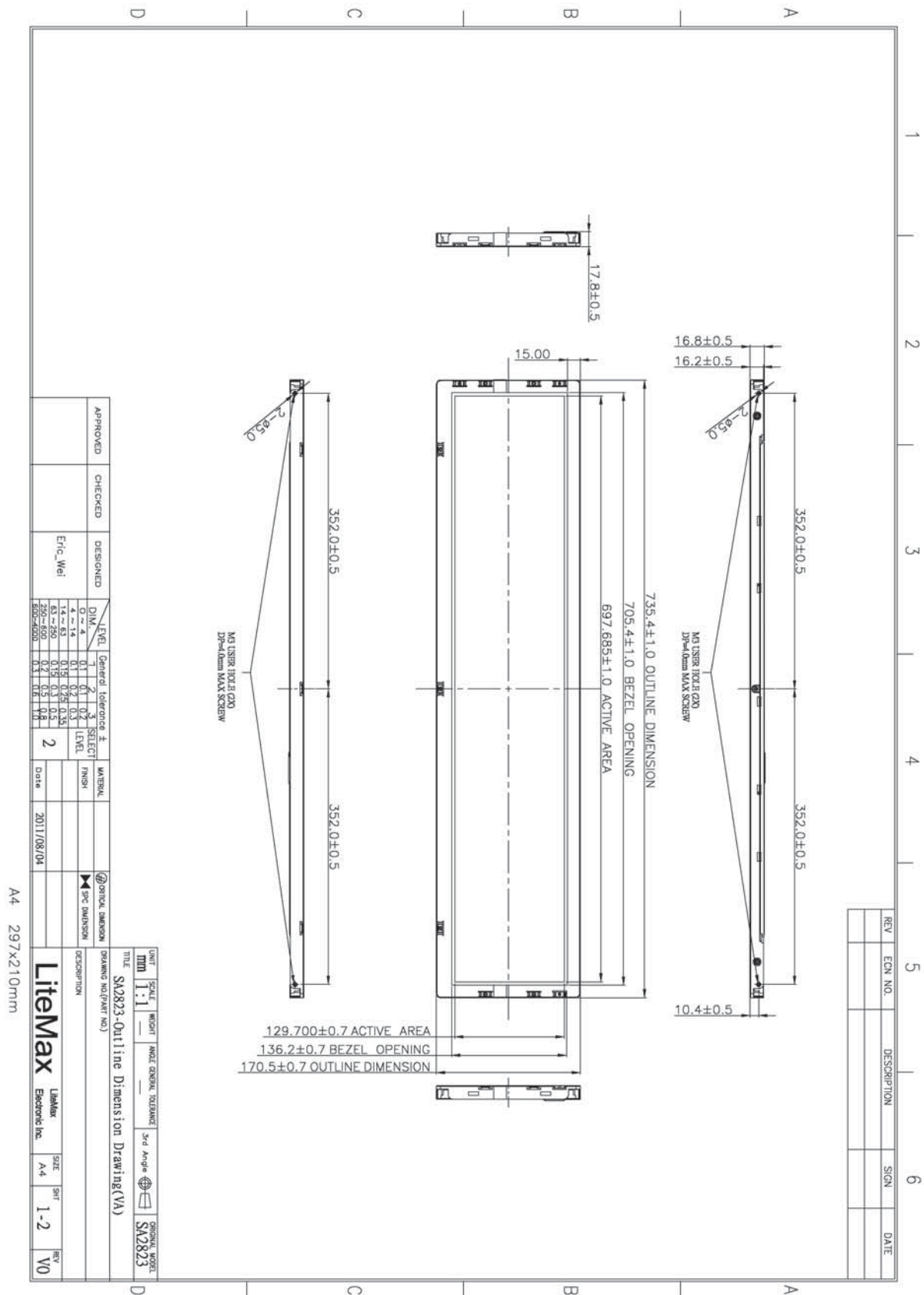
7.0 PRECAUTIONS

HANDLING PRECAUTIONS
(1)   The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
(2)   While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
(3)   Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
(4)   Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
(5)   If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
(6)   Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
(7)   If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
(8)   Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
(9)   Do not disassemble the module.
(10) Do not pull or fold the lamp wire.
(11) Pins of I/F connector should not be touched directly with bare hands.

STORAGE PRECAUTIONS

(1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
(2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
(3) It may reduce the display quality if the ambient temperature is lower than 10 ºC. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

OPERATION PRECAUTIONS
(1) Do not pull the I/F connector in or out while the module is operating.
(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.