

MODEL NO. : TM121SDS01

MODEL VERSION: 05

ISSUED DATE: 2016/08/26

VERSION : 1.0

☒ **Preliminary Specification**

☐ **Final Product Specification**

Customer : _____

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Bin Wang	Longping Deng	Minhong_Kim

This technical specification is subjected to change without notice

TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
RECORD OF VERSION.....	3
1 GENERAL SPECIFICATIONS	4
2 INPUT/OUTPUT TERMINALS.....	5
3 ABSOLUTE MAXIMUM RATINGS.....	8
4 ELECTRICAL CHARACTERISTICS.....	9
5 DISPLAY COLORS AND INPUT DATA SIGNALS.....	12
6 TIMING CHART.....	12
7 OPTICAL CHARACTERISTICS.....	13
8 ENVIRONMENTAL / RELIABILITY TEST.....	20
9 MECHANICAL DRAWING.....	21
10 MARKINGS.....	22
11 PACKING, TRANSPORTATION AND DELIVERY.....	24
12 PRECAUTIONS.....	26

RECORD OF REVISION

Rev	Issued Date	Description	Editor
1.0	2016-08-26	Preliminary Release	Bin Wang

1 GENERAL SPECIFICATIONS

Feature		Spec
Display Spec.	Size	12.1 inch
	Resolution	800xRGBx600
	Technology Type	a-Si
	Pixel Configuration	RGB vertical stripe
	Pixel pitch(mm)	0.3075(H) × 0.3075(V)
	Display Mode	TM with Normally White
	Surface Treatment	Anti Glare
	Viewing Direction	12:00
	Gray Scale Inversion Direction	6:00
Mechanical Characteristics	LCM (W x H x D) (mm)	279.0 (H) × 209.0 (V) × 9.0 (D)
	Active Area(mm)	246.0 (H) × 184.5 (V) (typ.)
	With /Without TSP	Without TSP
	Connection Type	Socket
	Weight (g)	TBD(typ.)
	Backlight	LED backlight type Replaceable lamp holder for backlight
Electrical Characteristics	Interface	LVDS 1 port
	Color Depth	16.2M/262K
	Driver IC	NT39411DH-D/4IA*2+ SV39539H-D/4EA*2

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: ± 5%

2 Input/Output Terminals

2.1 LVDS

CN1: MSB240420HE (Produced by STM) or equivalent.

Pin	Name	Description
1	VCC	3.3V Power Supply
2	VCC	3.3V Power Supply
3	GND	Ground
4	6-8Bit SEL	Select 6 or 8 Bits LVDS Input (VCC:8Bits ; GND/NC: 6Bits)
5	RIN0-	Negative(-) LVDS differential data input
6	RIN0+	Positive(+) LVDS differential data input
7	GND	Ground
8	RIN1-	Negative(-) LVDS differential data input
9	RIN1+	Positive(+) LVDS differential data input
10	GND	Ground
11	RIN2-	Negative(-) LVDS differential data input
12	RIN2+	Positive(+) LVDS differential data input
13	GND	Ground
14	CLKIN-	Clock Signal(-)
15	CLKIN+	Clock Signal(+)
16	GND	Ground
17	RIN3-	Negative(-) LVDS differential data input (Used for 8Bits LVDS Input; NC for 6Bits)
18	RIN3+	Positive(+) LVDS differential data input (Used for 8Bits LVDS Input; NC for 6Bits)
19	REVERSE	Display Reversed Function (VCC: Display Reverse; GND/NC: Normal Display)
20	NC/GND	Test Function Pin(Do not set this pin to High)

2.2 BACKLIGHT

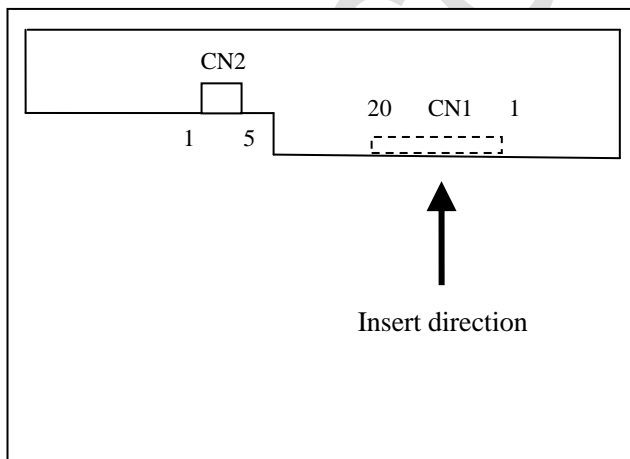
CN2: MSB24038P5 (Produced by STM) or equivalent.

Pin	Symbol	Signal Name
1	VCC	12V
2	GND	GND
3	Enable	5V-On / 0V-Off
4	Dimming	PWM Dimming
5	NC	NC

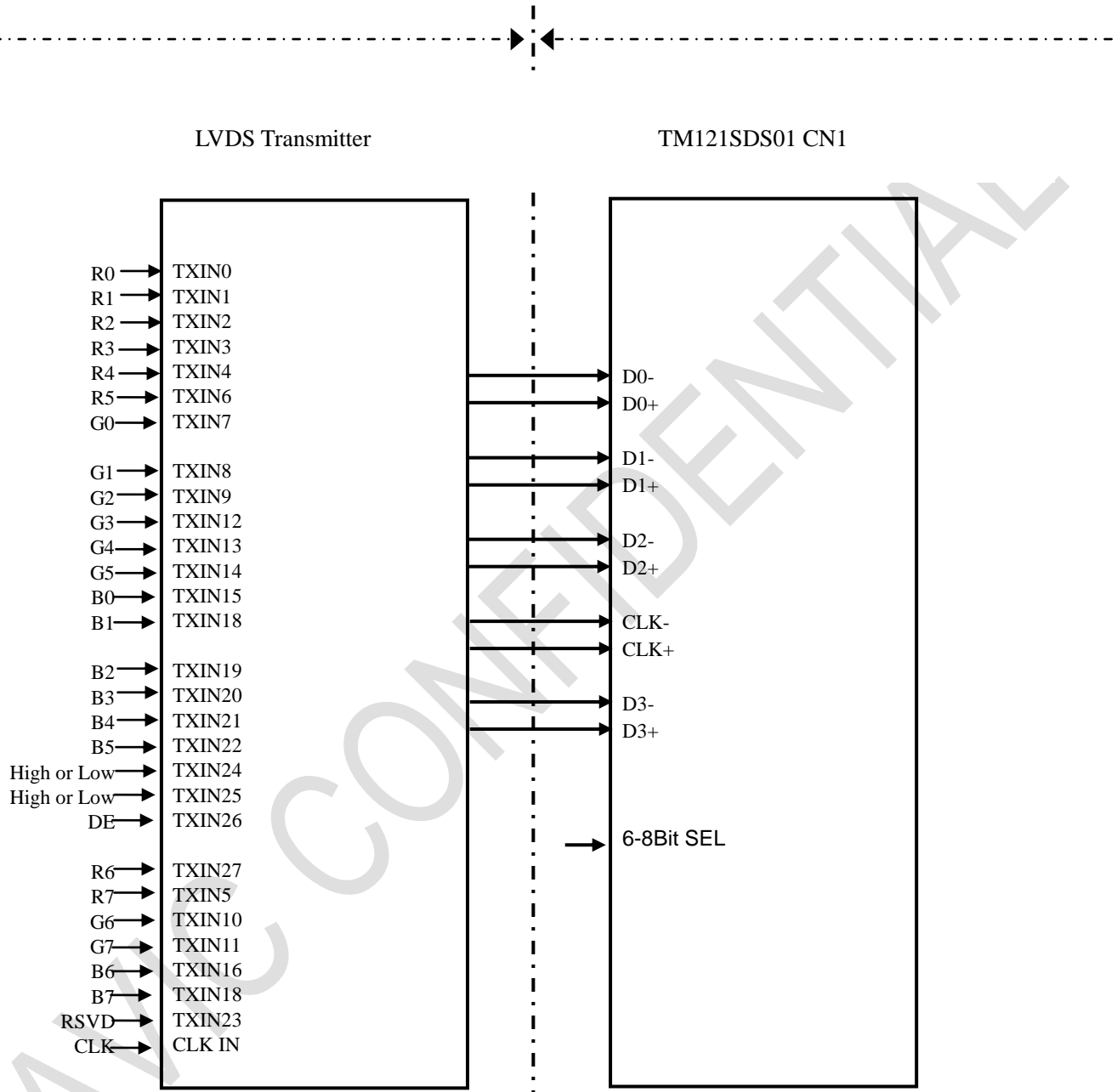
PWM Dimming:

Parameter		Symbol	min.	typ.	max.	Unit
PWM Input Threshold Voltage	Logic-High	V_{PWMH}	1.2	-	5.0	V
	Logic-Low	V_{PWML}	-	-	0.4	V
PWM Input Frequency		$1/T_{PWM}$	100	200	10K	Hz

2.3 POSITION OF PLUGS AND A SOCKET



2.4 CONNECTION BETWEEN RECEIVER AND TRANSMITTER FOR LVDS



Note1: The lowest bit (R0, G0, B0), the upper bit (R7, G7, B7)

Note2: Connecting cable between LCD panel's connector and transmitter should use 100Ω twisted line.

Note3: If only Hsync and Vsync, the product don't work. Make sure DE signal has been input.

3 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Unit	Remarks
Power Supply Voltage	VCC	-0.3 ~ +3.6	V	Ta = 25°C
Input voltage for signals	Vi	-0.3 ~ +3.6 and Vi < VCC + 0.3	V	Ta = 25°C
Light bar peak forward current	I _F	≤ 150	mArms	Note 3
Storage temperature	T _{st}	-30 ~ +80	°C	Note 4
Operating temperature	T _{op}	-20 ~ +70	°C	Note 4, 5
Absolute humidity	AH	≤ 70	g/m ³	Ta > 50°C
Operating altitude	-	≤ 4,850	m	-20°C ≤ Ta ≤ 70°C
Storage altitude	-	≤ 13,600	m	-30°C ≤ Ta ≤ 80°C

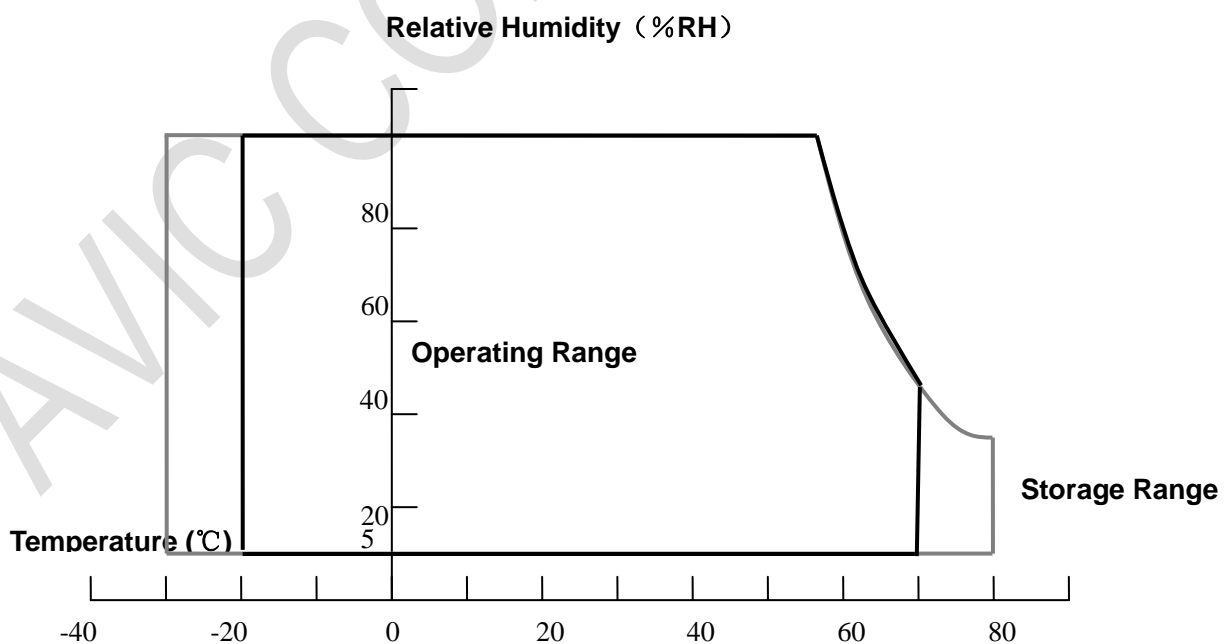
Note1: Display signals are DA0+/-, DA1+/-, DA2+/-, DA3+/-, CKA+/-, DB0+/-, DB1+/-, DB2+/-, DB3+/-, and CKB+/-.

Note2: Function signal is MSL.

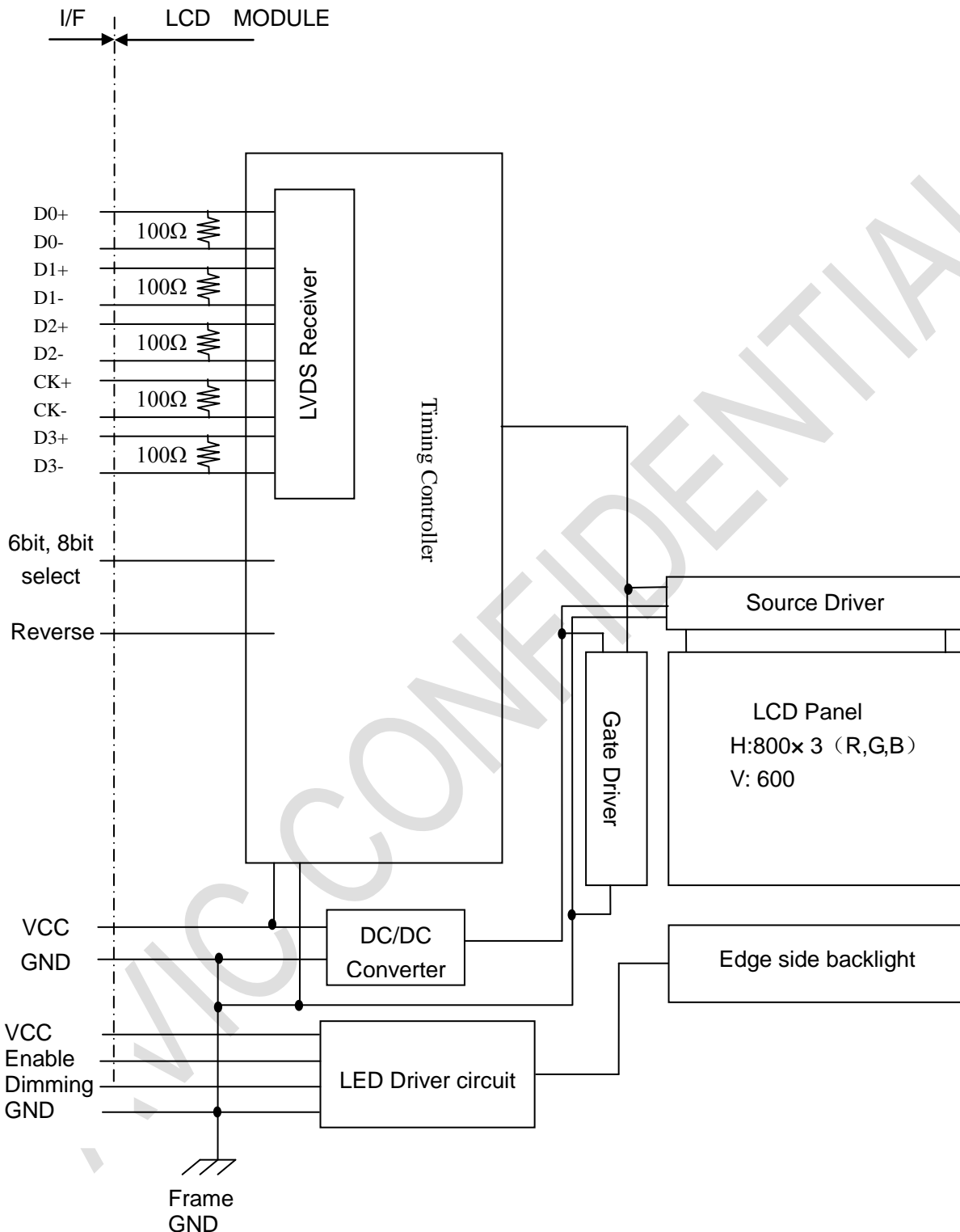
Note3: Temperature and relative humidity range is shown in the figure below.

- (a) 90%RH Max. (Ta ≤ 40°C)
- (b) Wet-bulb temperature should be 39°C Max. (Ta > 40°C)
- (c) No condensation.

Note4: The temperature of panel display surface area should be -20°C Min and 80°C Max.



4 Electrical Characteristics



Note1: System ground (GND), Frame ground in the product should be connected together in customer equipment.

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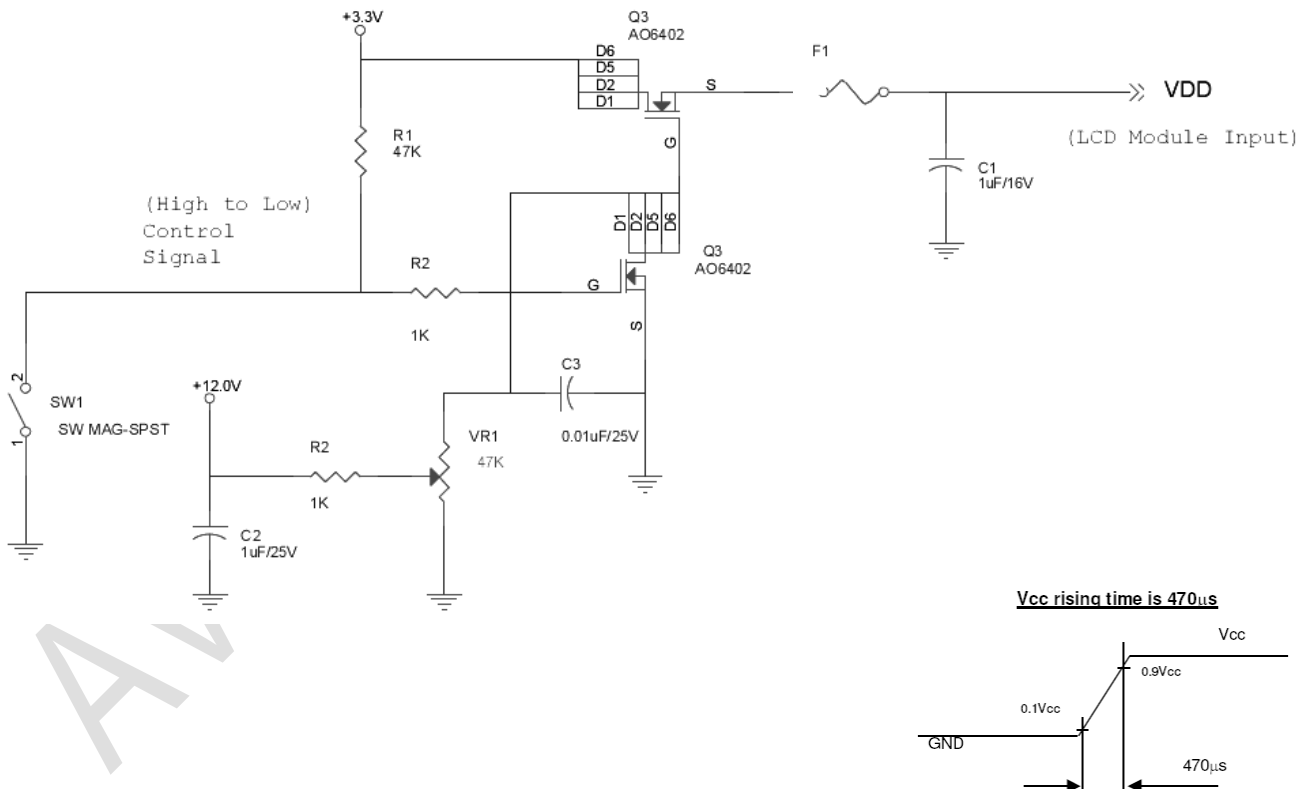
4.1 DRIVING FOR LCD

Parameter	Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage	VCC	3.0	3.3	3.6	V	-
Power supply current	ICC	-	270	325	mA	at VCC = 3.3V Note 1
Permissible ripple voltage	VRP	-	-	100	mV	VCC
Differential input voltage	Vid	250		450	mV	
Differential input threshold voltage for LVDS receiver	Low	VTL	-100	-	mV	VCM = 1.25V Note2
	High	VTH	-	100	mV	
Input voltage width for LVDS receiver	Vi	0	-	2.4	V	-
LVDS Terminating resistor	RT	-	100	-	Ω	-
Rush current	I _{rush}	-	-	1.5	A	Note3

Note 1: All black pattern

Note 2: Common mode voltage for LVDS receiver

Note 3: Measurement Conditions:



4.2 DRIVING FOR BACKLIGHT

(Ta=25 °C) Note1

Parameter	Symbol	min.	typ.	max.	Unit	Remarks
Voltage for backlight	VDD	10.8	12.0	13.2	V	Operating with fixed driving current
Current for backlight	IDD	-	480	660	mA	Note1
Light bar operating lifetime	Hr	50000	-	-	Hour	Note3

Note1: The backlight of this product is made up of 1 light bar, LED to be 3020, 20pieces, 10 serials and 2 parallels.

Note2: The light bar can work normally if the PWM dimming ratio range is from 0% to 100% and the operation current is 80mA.

Note3: The operating lifetime is mean time to half-luminance. In case the product works under room temperature environment.

5 DISPLAY COLORS AND INPUT DATA SIGNALS

This product can display in equivalent to 16.2M colors in 256 scales. Also the relation between display colors and input data signals is as the following table.

Display colors		Data signal (0:Low level, 1:High Level)																							
		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
	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
	Red	1	1	1	1	1	1	1	1	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	
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	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	
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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	
Red grayscale	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	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Dark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	↑	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Bright	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Green grayscale	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
	↑	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Bright	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
Blue grayscale	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
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	↓	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Bright	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	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	

6 TIMING Chart

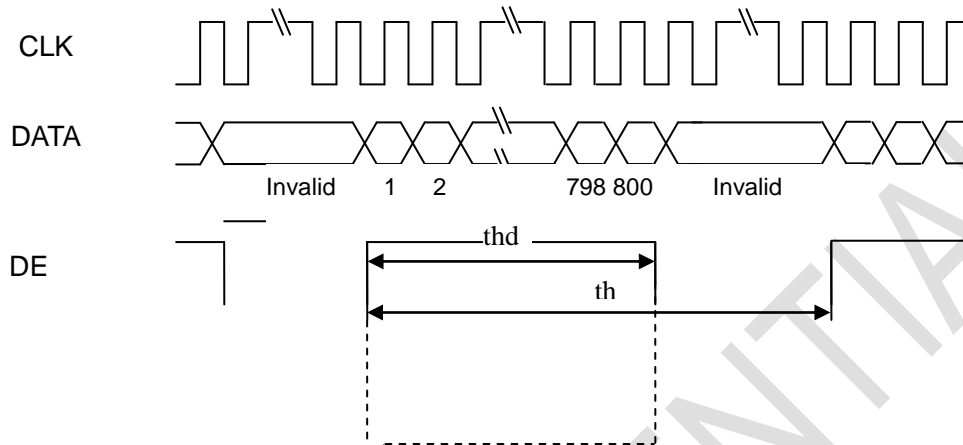
6.1 TIMING CHARACTERISTICS

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Clock	Frequency	1/tc	33.16	39.80	49.74	MHz	LVDS
		tc	30.16	25.13	20.10	ns	transmitter input
	Rise time, Fall time	-	Refer to the timing characteristics of LVDS transmitter			ns	Note 1
	Duty	-				-	
Horizontal signals	Cycle	th	14.8	18.0	26.5	μs	55.5kHz(typ.)
			920	1056	1240	CLK	
	Display period	thd	800			CLK	-
Vertical signals	Cycle	tv	13.3	16.67	20	ms	60.0Hz(typ.)
			608	628	650	H	
	Display period	tvd	600			H	-
DE/Data	Setup time	-	Refer to the timing characteristics of LVDS transmitter			ns	Note 1
	Hold time	-				ns	
	Rise time, Fall time	-				ns	

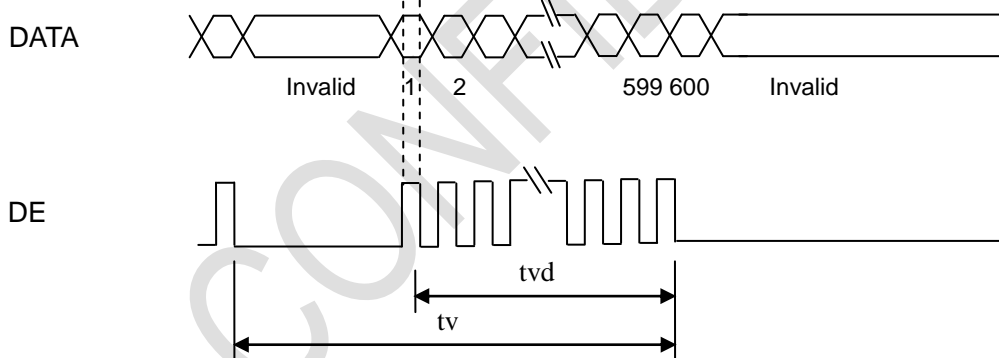
Note1: See the data sheet of LVDS transmitter.

6.2 INPUT SIGNAL TIMING CHART

Horizontal timing



Vertical timing



6.3 PIXEL DATA ALIGNMENT OF DISPLAY IMAGE

The following chart is the coordinates of per pixel

D(1,1)

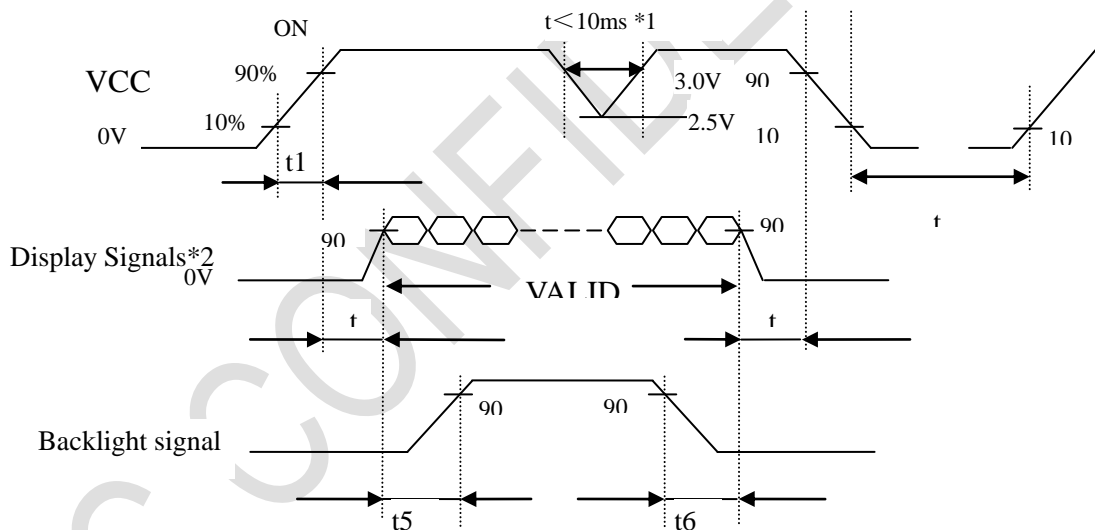
R	G	B
---	---	---

←

D(1,1)	D(2,1)	D(3,1)	...	D(800,1)
D(1,2)	D(2,2)	D(3,2)	...	D(800,2)
D(1,3)	D(2,3)	D(3,3)	...	D(800,3)
•	•	•	...	•
•	•	•	...	•
•	•	•	...	•
D(1,600)	D(2,600)	D(3,600)	...	D(800,600)

6.4 POWER SUPPLY VOLTAGE SEQUENCE

9.4.1 The sequence of backlight and power



Timing Specifications:

- t1 :0.47ms<t1 <10ms;
- t2 :0.5 ms<t2 <50ms;
- t3 :0ms<t3 <50ms;
- t4 :t4 >1000ms;
- t5 :t5 >200ms;
- t6 :t6 >200ms;

*1. When VCC is on, but the value is lower than 2.5V, a protection circuit may work, then the module may not display.

*2 The signal line is not connected with the module, at the end of cable the terminal resistor of 100Ω should be added.

Note1: Display signals (D0+/-, D1+/-, D2+/-, D3+/- and CK+/-) must be "0" voltage, exclude the VALID period (See above sequence diagram). If these signals are higher than 0.3 V, the internal circuit is damaged.

If some of display signals of this product are cut while this product is working, even if the signal input to it once again, it might not work normally. If customer stops the display signals, they should cut VCC.

Note2: When VCC is on, it should be set above 2.5V.

Note3: The backlight power supply voltage should be inputted within the valid period of display and function signals, in order to avoid unstable data display.

6.4.2 Power supply voltage ripple

When the power supply is designed, the next form can give the reference. If the voltage ripple is over the value in next form, the noise should be seen in display area.

Ripple (Measured at input terminal of power supply)

	VCC (3.3V to drive the panel)
Ripple voltage	≤200mVP-P (Including spike noise)

6.4.3 Fuse

Parameter	Fuse		Rating	Fusing current	Remarks
	Type	Supplier			
VCC	FCC16152ABTP	KAMAYA	1.5A 32V	3.0A	Note1

Note1: There are different power supply systems from the power input terminal. The power supply capacity should be less than the fusing current. If the power supply capacity is above the fusing current, the fuse may blow in a short time, and then nasty smell, smoking and so on may occur.

7 Optical Characteristics

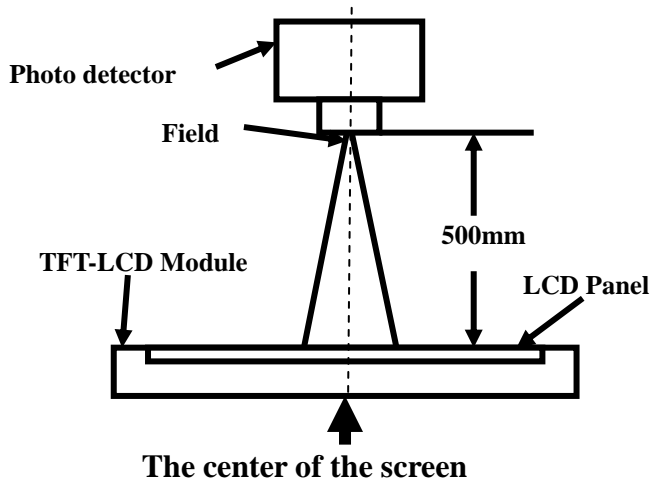
Item		Symbol	Condition	Min	Typ.	Max	Unit	Remark
View Angles		θT	CR ≧ 10	55	65	-	Degree	Note 2
		θB		65	75	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	500	700	-	-	Note1 Note3
Luminance uniformity		U		-	1.25	1.33	-	Note6
Response Time		T _{ON}	25℃	-	25	30	ms	Note1 Note4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.259	0.309	0.359	-	Note5 Note1
		y		0.283	0.333	0.383		
	Red	x		0.545	0.595	0.645		
		y		0.296	0.346	0.396		
	Green	x		0.278	0.328	0.378		
		y		0.544	0.594	0.644		
	Blue	x		0.098	0.148	0.198		
		y		0.055	0.105	0.155		
NTSC				50	55	-	%	Note5
Luminance		L		400	450	-	cd/m²	Note7

Test Conditions:

1. The ambient temperature is $25^\circ C$. VDD= 3.3V, VCC=12V, 100% brightness,
2. The test systems refer to Note 1 and Note2.

Note 1: Definition of optical measurement system.

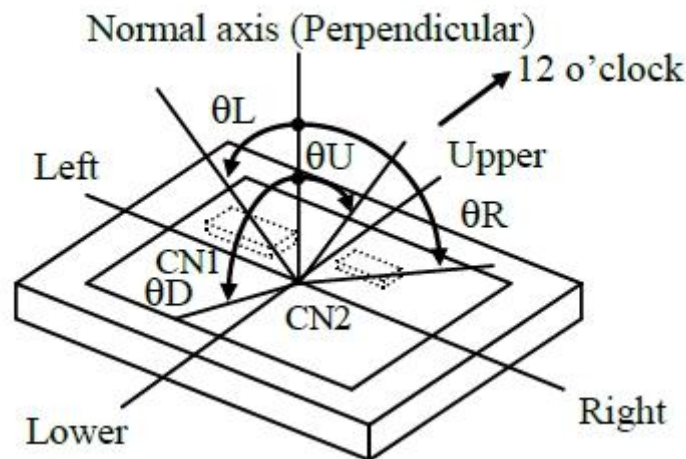
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

“White state “: The state is that the LCD should drive by V_{white} .

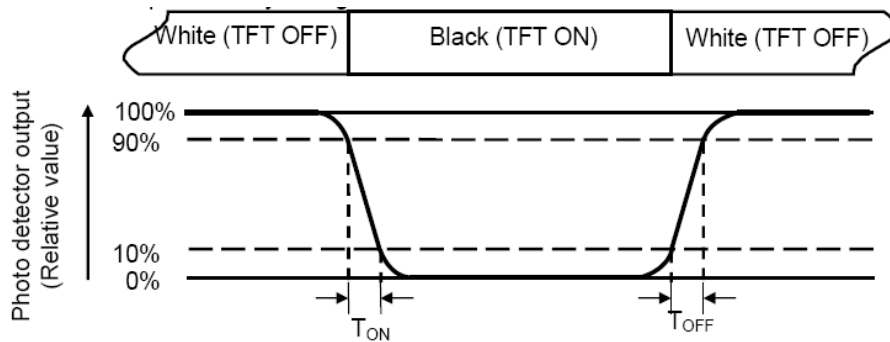
“Black state”: The state is that the LCD should drive by V_{black} .

V_{white} : To be determined V_{black} : To be determined.

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Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.


Note 5: Definition of color chromaticity (CIE1931)

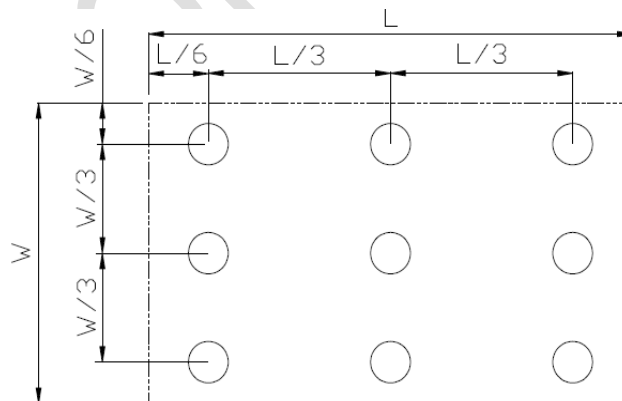
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{\min} / L_{\max}$$

L-----Active area length W----- Active area width



L_{\max} : The measured Maximum luminance of all measurement position.

L_{\min} : The measured Minimum luminance of all measurement position.

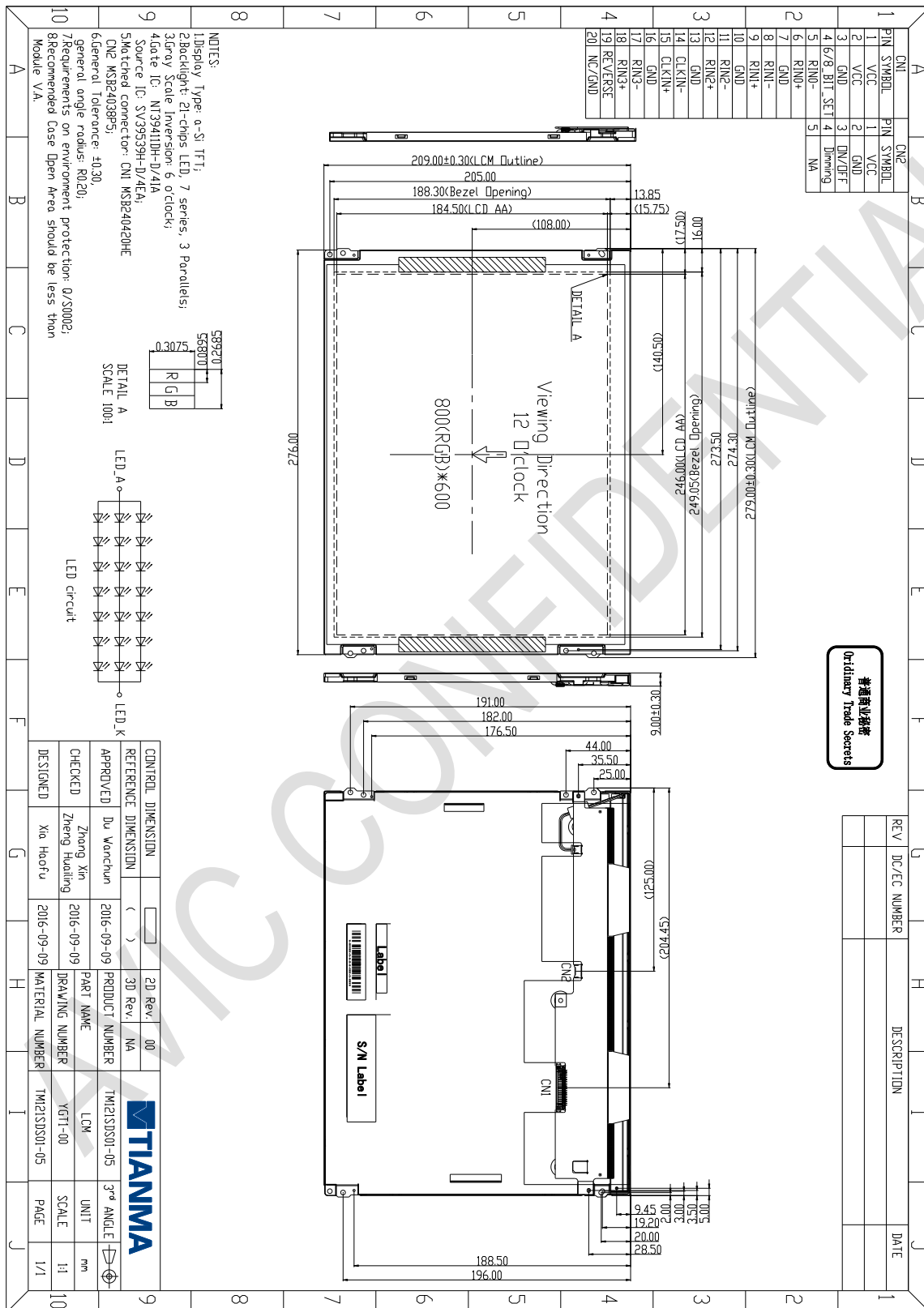
Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

8 Environmental / Reliability Test

No.	Test Item	Condition	Remark
1	High Temperature & High Humidity Operation	50℃, 85%RH, All black, 240hrs	IEC60068-2-78 GB/T2423.3
2	High Temperature Storage	+80℃, 240hrs	IEC60068-2-1 GB2423.2
3	Low Temperature Storage	-30℃, 240hrs	EC60068-2-1 GB2423.1
4	High Temperature Operation	+65℃, All black, 240hrs	IEC60068-2-1,GB2423.2
5	Low Temperature Operation	0℃, All black, 240hrs	IEC60068-2-1 GB2423.1
6	Thermal Shock (Non-operation)	-20℃,30min;60℃,30min;1H/cycle, Change time:5min, 100 Cycles	Start with cold temperature nd with high temperature, EC60068-2-14,GB2423.22
7	Vibration	Frequency range:5Hz~100Hz~5Hz, 1.2G,50cycles,1min for each direction of X.Y.Z. (Package condition)	IEC60068-2-6:1982 GB/T2423.10—1995
8	Mechanical Shock (Non Op)	Half Sine Wave 50G 11ms, ±X,±Y,±Z 3times for each direction	
9	ESD	C=150pF,R=330Ω; Air:±15kV,9points,25times/point; Contact:±8kV,9points,25times/point	IEC61000-4-2 GB/T17626.2

9 Mechanical Drawing



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10 MARKINGS

The various markings are attached to this product. See “11.2 INDECATION LOCATIONS” for attachment positions.

10.1 PRODUCT LABEL



Note1: The meaning of OEM number, Example: S190M50A12SA1SA109A0001

<u>S190M50A</u>	<u>12</u>	<u>SA1SA1</u>	<u>09A</u>	<u>0001</u>
Module Number	Source & Gate Driver IC Code	Location Line#	Date code	Serial Number

Date code:

1st Character Year Codes

Month	2010	2011	2012	2013	2014	2015	2016	2017	2018	So on
Code	0	1	2	3	4	5	6	7	8	

2nd Character Month Codes

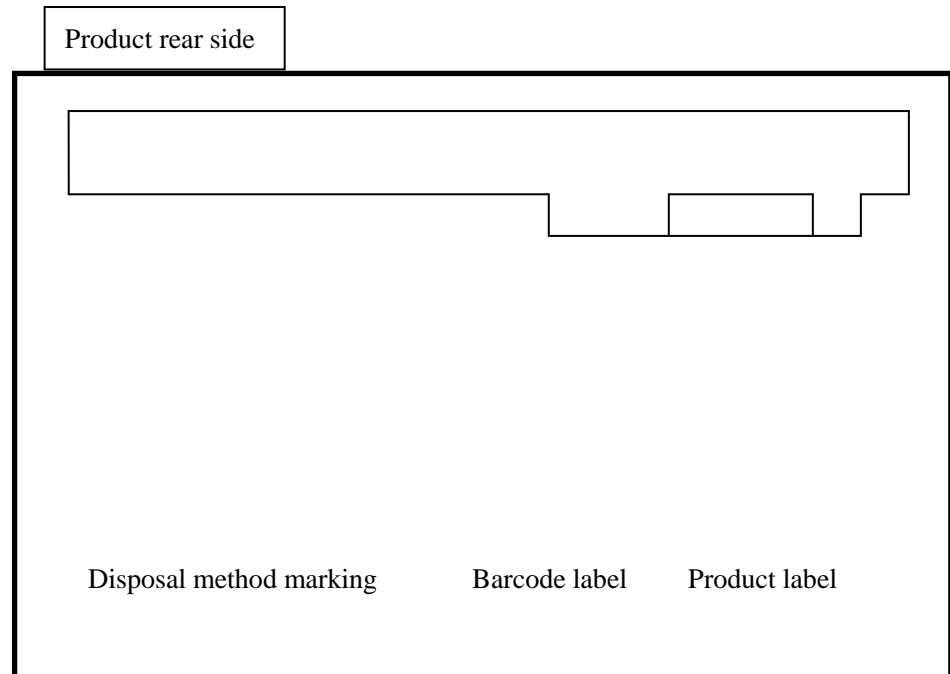
Month	January	February	March	April	May	June	July	August	September	October	November	December
Code	1	2	3	4	5	6	7	8	9	A	B	C

3rd Character Day Codes

Day	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11st
Code	1	2	3	4	5	6	7	8	9	A	B
Day	12nd	13rd	14th	15th	16th	17th	18th	19th	20th	21st	22nd
Code	C	D	E	F	G	H	I	J	K	L	M
Day	23rd	24nd	25st	26nd	27rd	28th	29th	30th	31st		
Code	N	O	P	Q	R	S	T	U	V		

Note2: Do not attach anything such as label and so on, on the product label! In case repair the product, AVIC needs the contents of product label such as the lot number, inspection date and so on, to identify the warranty period with individual product. If AVIC cannot decipher the contents of product label, such repair shall be entitled to charge. Also AVIC may give a new lot number to reconditioned products.

10.2 INDICATION LOCATIONS



11 PACKING, TRANSPORTATION AND DELIVERY

AVIC will pack products to deliver to customer in accordance with AVIC packing specifications, and will deliver products to customer in such a state that products will not suffer from a damage during transportation .The delivery conditions are as follows.

11.1 PACKING

(1) Packing box

8 products are packed up with the maximum in a packing box(See “**12.5 OUTLINE FIGURE FOR PACKING** “). Products are put into a plastic bag for prevention of moisture with cushion, and then the bag is sealed up with heat sealing.

The type name and quality are shown on outside of the packing box, either labeling or printing.

(2) Pallet Packing (See”**12.5 OUTLINE FIGURE FOR PACKING** “)

- ① Packing boxes are tired on a cardboard pallet.(8 boxes×4 tiers maximum)
- ② Cardboard sleeve and top cap are attached to the packing boxes, then they are fixed by a band.

11.2 INSPECTION RECORD SHEET

Inspection record sheets are included in the packing box with delivery products to customer. It is summarized to a number of products for pass/fail assessment.

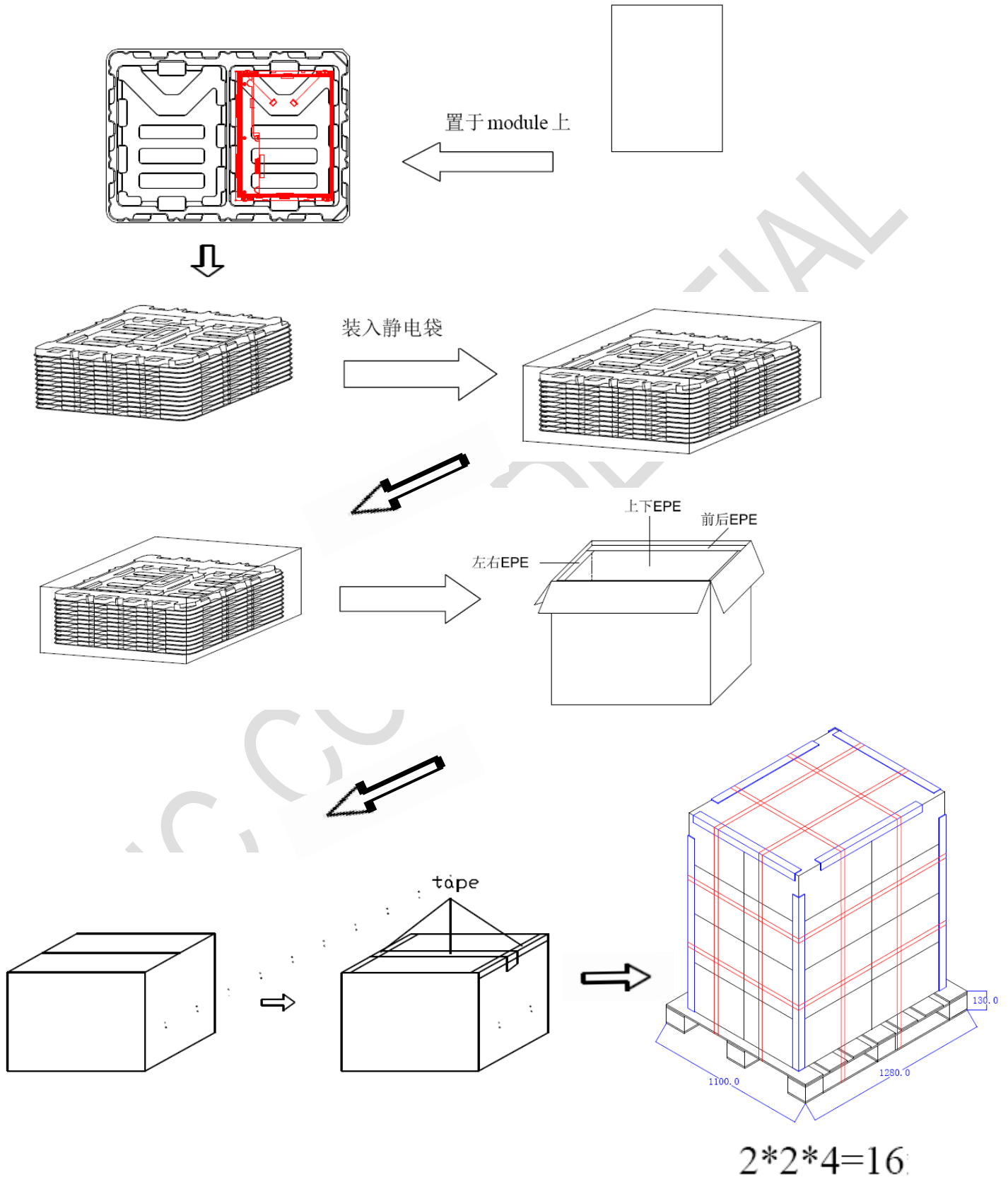
11.3 TRANSPORTATION

The product is transported by vehicle, aircraft or shipment in the state of pallet packing.

11.4 SIZE AND WEIGHT FOR PACKING BOX

Parameter	Packing box	Unit
Size	577 (L) ×421 (W) ×326 (H) (typ.)	mm
LCD Weight	TBD (typ.)	kg
Total weight	TBD (typ.)	kg

11.5 OUTLINE FIGURE FOR PACKING



12 PRECAUTIONS

12.1 MEANING OF CAUTION SIGNS

The following caution signs have very important meaning .**Be sure to read “13.2 CAUTIONS” and “13.3 ATTENTIONS”, after understanding these contents!**



This sign have the meaning that customer will be injured by himself or the product will sustain a damage, if customer has wrong operations.



This sign has the meaning that customer will get an electrical shock, if customer has wrong operations.



This sign has the meaning that customer will be injured by himself, if customer has wrong operations.

12.2 CAUTIONS



Do not touch lamp cables while turn on .Customers will be in danger of an electric shock



- * **Do not touch the working backlight and IC. Customers will be in danger of burn injury.**
- * **Do not shock and press the LCD panel and the backlight! There is a danger of breaking, because they are made of glass.(shock :To be not greater 294m/s^2 and to be not greater 11ms, Pressure: To be not greater 19.6N)**

12.3 ATTENTIONS



12.3.1 Handling of the product

Take hold of both ends without touch the circuit board when customer pulls out products (LCD modules) from inner packing box. If customer touches it, products may be broken down or out of adjustment, because of stress to mounting parts.

Do not hook cables nor pull connection cables such as flexible cable and so on , for fear of damage.

If customer puts down the product temporarily, the product puts on flat subsoil as a display side turns down.

Take the measures of electrostatic discharge such as earth band, ionic shower and so on, when customer deal with the product, because products may be damaged by electrostatic.

The torque for mounting screws must never exceed 0.34N-m. Higher torque values might result in distortion of the bezel.

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The product must be installed using mounting holes without undue stress such as bends or twist (See outline drawings). And do not add undue stress to any portion (such as bezel flat area) except mounting hole portion. Bends or twist described above and undue stress to any portion except mounting hole portion may cause display un-uniformity.

Do not press or rub on the sensitive display surface. If customer clean on the panel surface, AVIC recommends using the cloth with ethanolic liquid such as screen cleaner for LCD.

Do not push-pull the interface connectors while the product is working, because wrong power sequence may break down the product.

Do not bend or unbend the lamp cable at the near part of the lamp holding rubber, to avoid the damage for high voltage side of the lamp. This damage may cause a lamp breaking and abnormal operation of high voltage circuit.

12.3.2 Environment

Do not operate or store in high temperature, high humidity, dewdrop atmosphere or corrosive gases. Keep the product in antistatic pouch in room temperature, because of avoidance for dusts and sunlight, if customer stores the product.

In order to prevent dew condensation occurring by temperature difference, the product packing box must be opened after leave under the environment of an unpacking room temperature enough. Because a situation of dew condensation occurring is changed by the environment temperature and humidity, evaluate the leaving time sufficiently. (Recommendation leaving time: 6 hour or more with packing state)

Do not operate in a high magnetic field. Circuit boards may be broken down by it.

This product is not designed as radiation hardened.

Use an original protection sheet on the product surface (polarizer). Adhesive type protection sheet should be avoided, because it may change color or properties of the polarizer.

12.3.3 Characteristics

The following items are neither defects nor failures.

ambient temperature.

The LCD may be seemed luminance non-uniformity, flicker, vertical seam or small spot by display patterns.

Optical characteristics (e.g. luminance, display uniformity, etc.) gradually is going to change depending on operating time, and especially low temperature, because the LCD has cold cathode fluorescent lamps.

Do not display the fixed pattern for a long time because it may cause image sticking. Use a screen saver, if the fixed pattern is displayed on the screen.

The display color may be changed by viewing angle because of the use of condenser sheet in the backlight.

Optical characteristics may be changed by input signal timings.

The interference noise of input signal frequency for this product and luminance control frequency of customer's backlight inverter may appear on a display. Set up luminance control frequency of backlight inverter so that the interference noise does not appear.

12.4 Other

- ① All GND and VCC terminals should be used without a non-connected line.
- ② Do not disassemble a product or adjust volume without permission of AVIC.

Pay attention not to insert waste materials inside of products, if customer uses screw nails.

Pack the product with original shipping package, because of avoidance of some damages during transportation, when customer returns it to AVIC for repair and so on .

Not only the module but also the equipment should be packed and transported as the module. becomes vertical .Otherwise, there is the fear that a display dignity decreases by an impact or vibrations.

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