MODEL NO. : TM150TDSGxx

MODEL VERSION: 00

ISSUED DATE: 2018-05-31

VERSION : 1.0

■**Preliminary Specification**
□**Final Product Specification**

Customer :_____

Approved by	Notes

TIANMA Confirmed : PDB-工业 1-18-C-037

Prepared by	Checked by	Approved by
Yutaka Takeishi	------	**Takanori Sumiya**

This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2018-05-31	Preliminary Release	Yutaka Takeishi

1 General Specifications

Feature		Spec
Display Spec.	Size	15 inch
	Resolution	1024xRGBx768
	Technology Type	a-Si
	Pixel Configuration	RGB vertical stripe
	Pixel pitch(mm)	0.297(H) × 0.297(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)	326.5(H)×253.5 (V) ×11.8 (D) (typ.)
	Active Area(mm)	304.128(W) x 228.096 (V) (typ.)
	With /Without TSP	Without TSP
	Connection Type	Socket
	Weight (g)	1000g(typ.)
	Backlight	LED backlight type Replaceable lamp holder for backlight
Electrical Characteristics	Interface	LVDS 1 port
	Color Depth	16.2M/262K

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 LCD PINS

CN1 socket(Module side): 185083-20121 (P-TWO ELECTRIC TECHNOLOGY CO., LTD.)

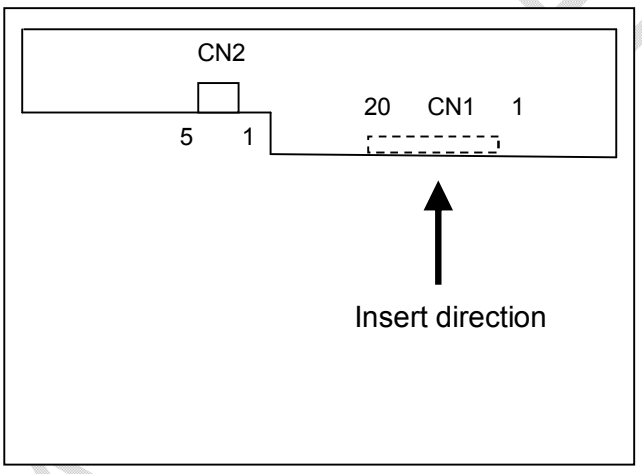
Pin No.	Symbol	Signal	Input data signal: 8bit	Input data signal:6bit	Remarks
1	VCC	Power supply	Power supply		
2	VCC				
3	GND	Ground	Ground		
4	REVERSE	Selection of scan direction	High: Reverse scan Low or Open: Normal scan		
5	D0-	Pixel data	R0-R5,G0		
6	D0+				
7	GND	Ground	Ground		
8	D1-	Pixel data	G1-G5,B0-B1		
9	D1+				
10	GND	Ground	Ground		
11	D2-	Pixel data	B2-B5,DE		
12	D2+				
13	GND	Ground	Ground		
14	CLK-	Pixel clock	Pixel clock		
15	CLK+				
16	GND	Ground	Ground		
17	D3-	Pixel data	R6-R7, G6-G7, B6-B7	Ground	
18	D3+				
19	NC	Non connection	-		
20	6-8Bit SEL	Selection of the number of colors	Low	High or Open	

2.2 BACKLIGHT PINS

CN2: MSB24038P5 (Produced by STM) or equivalent.

Pin	Symbol	Description
1	NC	NC
2	PWM	PWM Luminance control
3	BRTC	Back light ON/OFF control: 5V-On / 0V-Off
4	GND	Ground
5	VDD	12V

2.3 POSITIONS OF PLUG AND SOCKET

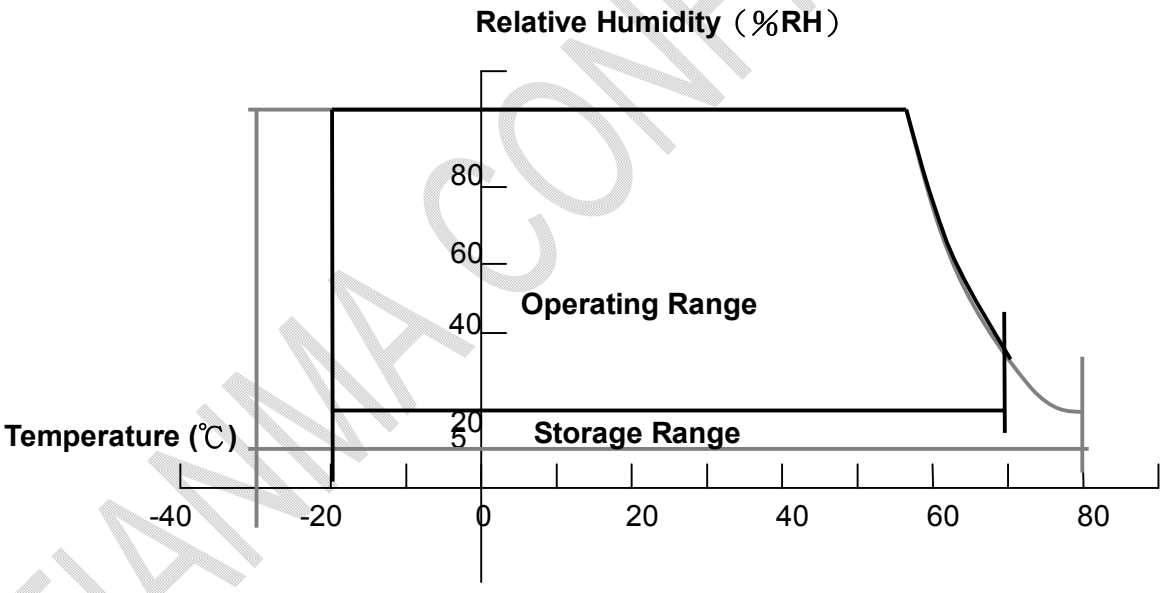


3 Absolute Maximum Ratings

AGND=GND=0V, Ta = 25℃

Parameter	Symbol	Rating	Unit	Remarks
Power Supply Voltage for LCD	VCC	-0.3~+3.96	V	Ta = 25°C
Input voltage for signals	Vi	-0.5~+3.96	V	Ta = 25°C
Power Supply Voltage for LED	VDD	TBD	V	Ta = 25°C
Storage temperature	Tst	-30 ~ +80	°C	Note 1
Operating temperature	Top	-20 ~ +70	°C	Note 1, 2
Absolute humidity	AH	≤ 70	g/m^3	Ta > 50°C

Note1: Temperature and relative humidity range is shown in the figure below.
(a) 90%RH Max. (Ta≤ 40°C)
(b) Wet-bulb temperature should be39°C Max. (Ta> 40°C)
(c) No condensation.
Note2: The temperature of panel display surface area should be -20°C Min and 70°C Max.



4 Electrical Characteristics

4.1 Driving For LCD

AGND=GND=0V, Ta = 25℃

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage		VCC	3.0	3.3	3.6	V	-
Power supply ripple		Vp-p			200	mV	Including spike noise
Power supply current		ICC	-	550	-	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	High	VTH	-	-	100	mV	VCM = 1.25V Note2
	Low	VTL	-100	-		mV	
Input voltage width for LVDS receiver		Vi	0	-	1.90	V	-
Terminating resistor		RT	-	100	-	Ω	-
Rush current		I_{rush}	-	-	1.5	A	Note3
Input voltage for REVERSE and 6-8Bit SEL signals	High	VFH	0.7VCC		VCC	V	
	Low	VFL	0		0.3VCC	V	

Note 1: Black mode, 65MHz
Note 2: Common mode voltage for LVDS receiver
Note 3: Measurement Conditions:

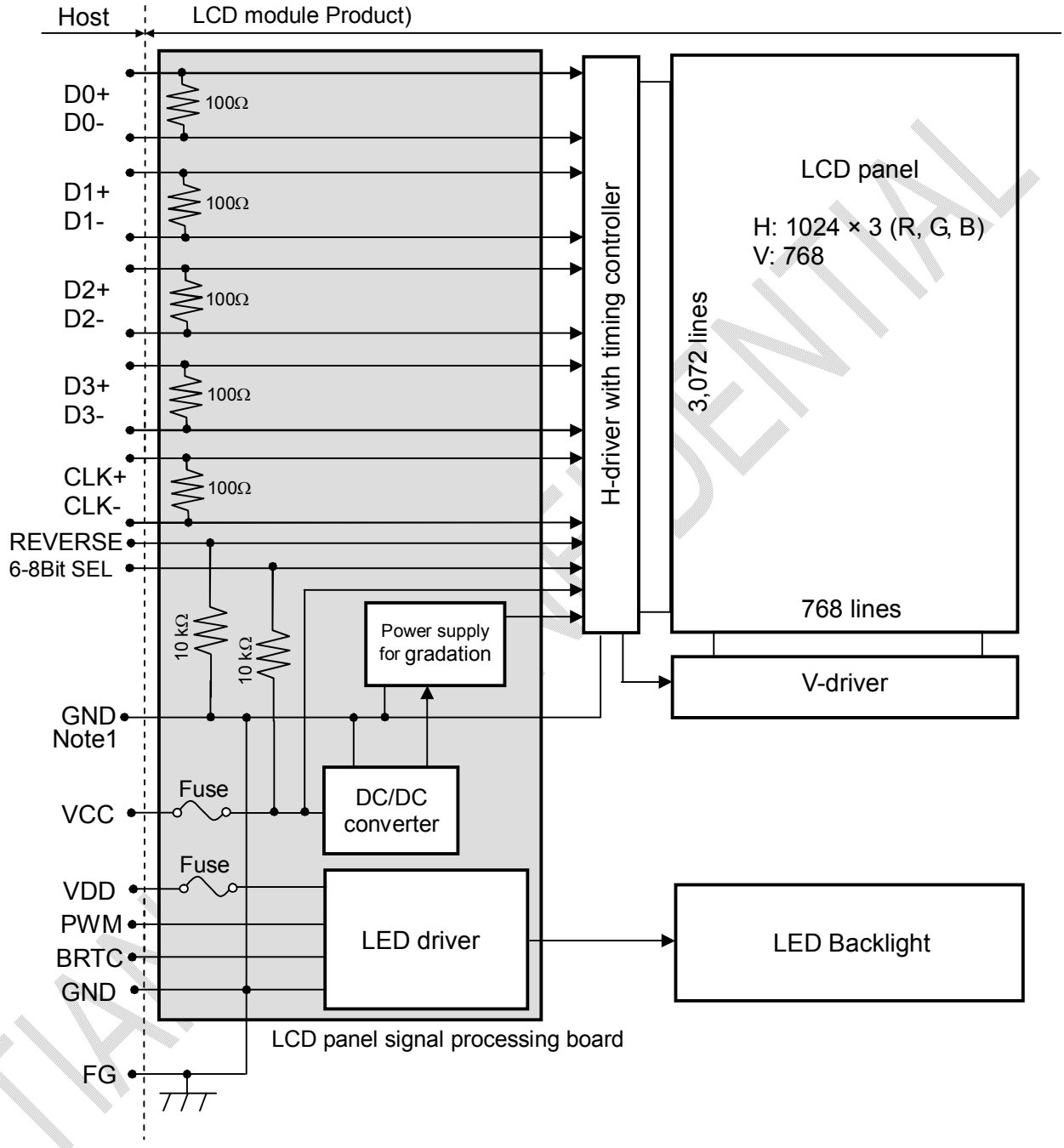
4.2 Driving For Backlight

(Ta=25°C) Note1

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage		VDD	10.8	12.0	12.6	V	
Power supply current		IDD	-	(630)	-	mA	
Light bar life time		Hr	30000	-	-	Hour	Note1
Input voltage for PWM signal	High	VDFH1	2.0		5.0	V	
	Low	VDFL1	0		0.4	V	
Input voltage for BRTC signal	High	VDFH2	2.0		5.0	V	
	Low	VDFL2	0		0.4	V	
PWM frequency		fpwm	200		(20K)	Hz	
PWM pulse width		tPWH	10			us	

Note1: The operating lifetime is mean time to half-luminance. In case the product works under room temperature environment.

4.3 Block Diagram



Note1: Relations between GND (Signal ground and LED driver ground) and FG (Frame ground) in the LCD module are as follows:

GND - FG	Connected

Note2: GND and FG must be connected to customer equipment's ground, and it is recommended that these grounds be connected together in customer equipment.

5 DISPLAY COLORS AND INPUT DATA INFORMATION

5.1 DISPLAY COLORS AND DATA SIGNAL

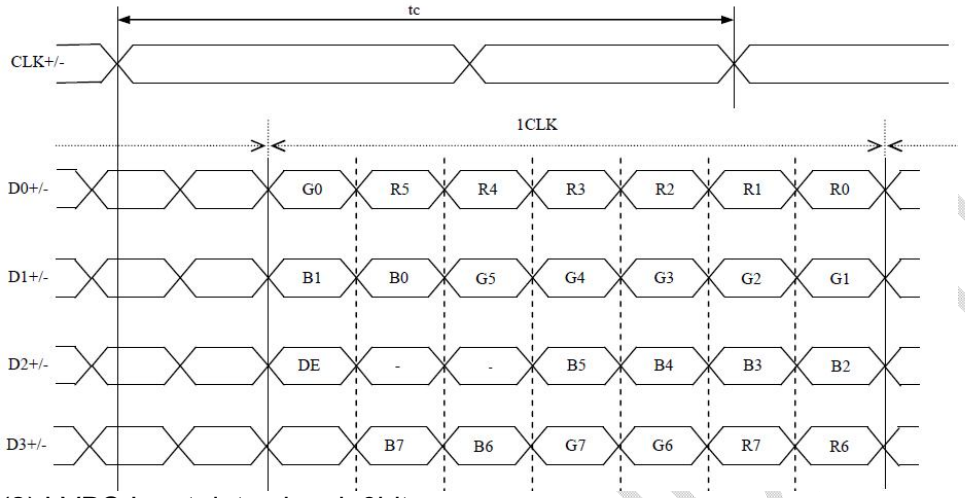
This product can display in equivalent to 16,194,277 colors in 253 scales. Also the relation between display colors and input data signals is as the following table. And it can display in equivalent to 262,144 colors in 64 scales, without data signals R7, R6, G7, G6, B7, B6 in the following table.

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	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
	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
	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 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
	Dark	0	0	0	0	0	0	0	1	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	0	0
						:								:								:			
	Bright Red	1	1	1	1	1	1	0	1	0	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	0
		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 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
	Dark	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	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
						:								:								:			
	Bright Green	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	0	1	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	1	1	0	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
	Dark	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	0	0	0	0	0	0	0	1	0
						:								:								:			
	Bright Blue	0	0	0	0	0	0	0	0	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	0	1	1	1	1	1	1	1	0

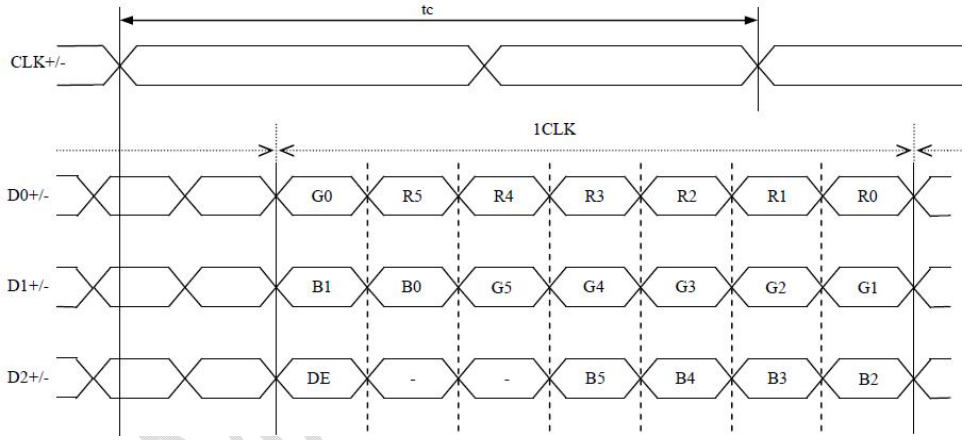
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

5.2 DATA MAP

(1) LVDS Input data signal: 8bit



(2) LVDS Input data signal: 6bit

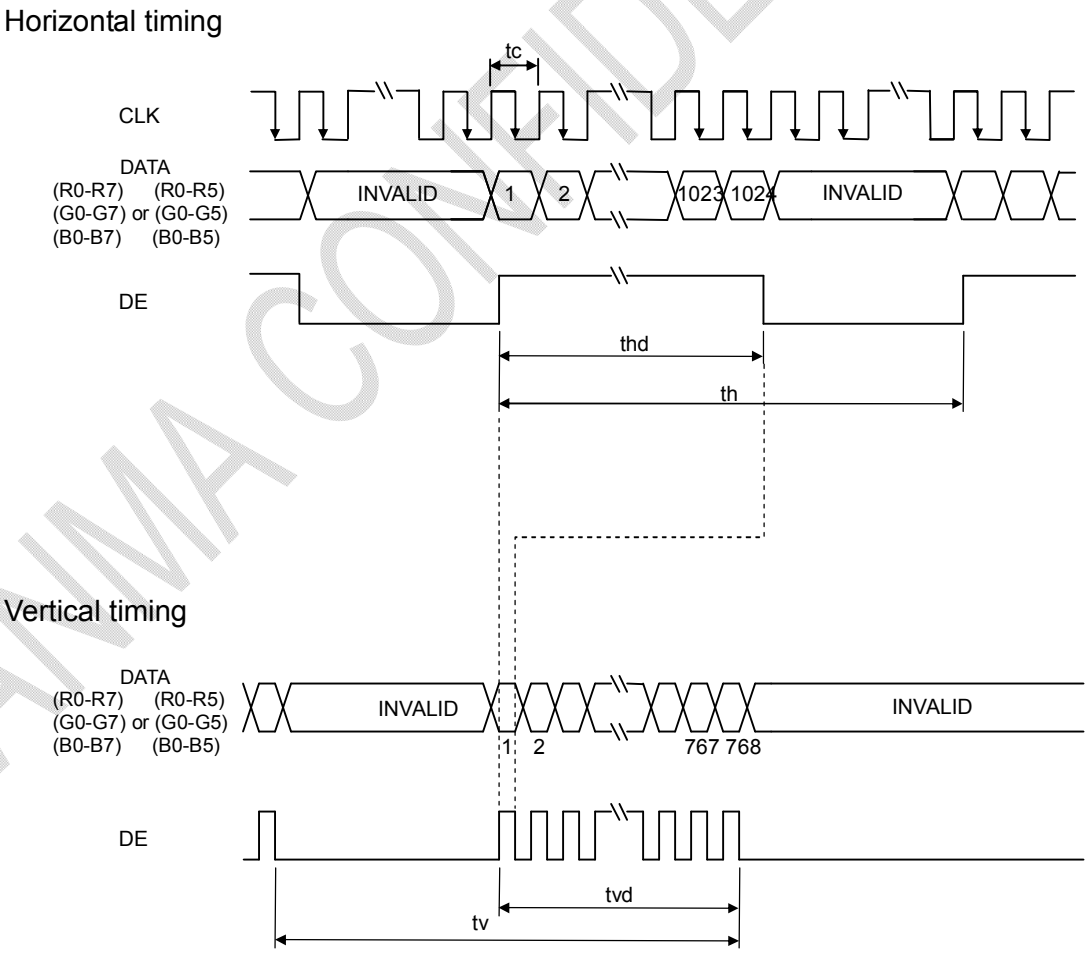


6 Timing Chart

6.1 TIMING CHARACTERISTICS

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Clock	Frequency	1/tc	52	65	71	MHz	17.58ns (typ.)
		tc	19.23	15.38	14.08	ns	
Horizontal signals	Cycle	th	1114	1344	1400	CLK	
	Display period	thd	1024				-
Vertical signals	Cycle	tv	778	806	845	H	60.0Hz(typ.)
	Display period	tvd	768				-

6.2 INPUT SIGNAL TIMING CHART



6.3 PIXEL DATA ALIGNMENT OF DISPLAY IMAGE

The following chart is the coordinates of per pixel

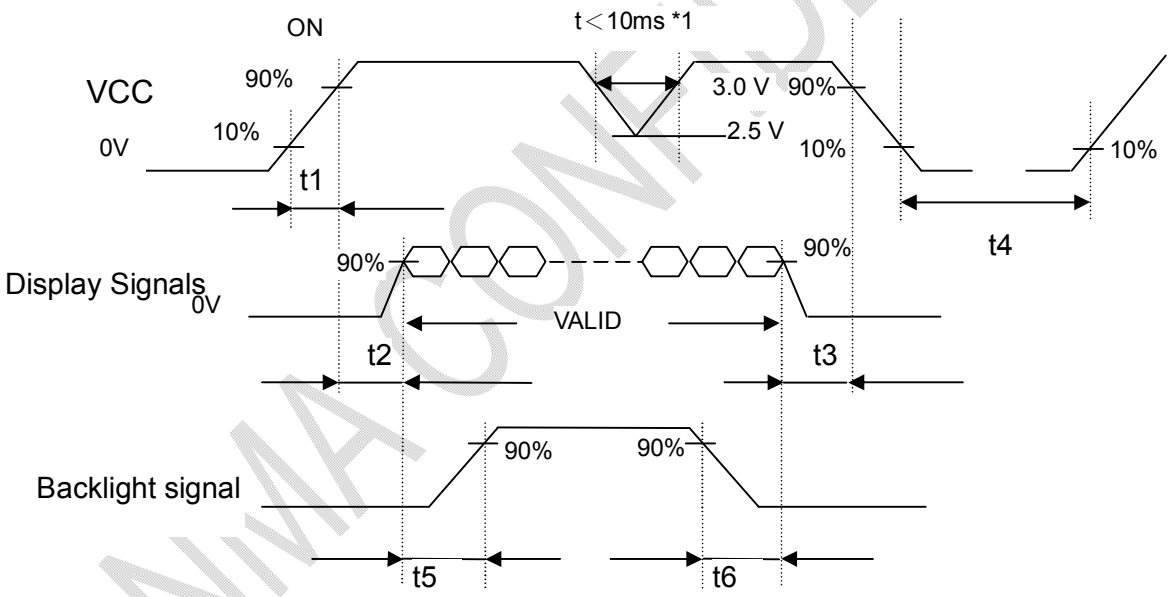
D(1,1)

B	G	R

D(1,1)	D(2,1)	D(3,1)	•••	D(1024,1)
D(1,2)	D(2,2)	D(3,2)	•••	D(1024,2)
D(1,3)	D(2,3)	D(3,3)	•••	D(1024,3)
⋮	⋮	⋮	⋮	⋮
D(1,768)	D(2,768)	D(3,768)	•••	D(1024,768)

6.4 POWER SUPPLY VOLTAGE SEQUENCE

6.4.1 The sequence of backlight and power



Timing Specifications:

t1 :0.5ms<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.

7 Optical Characteristics

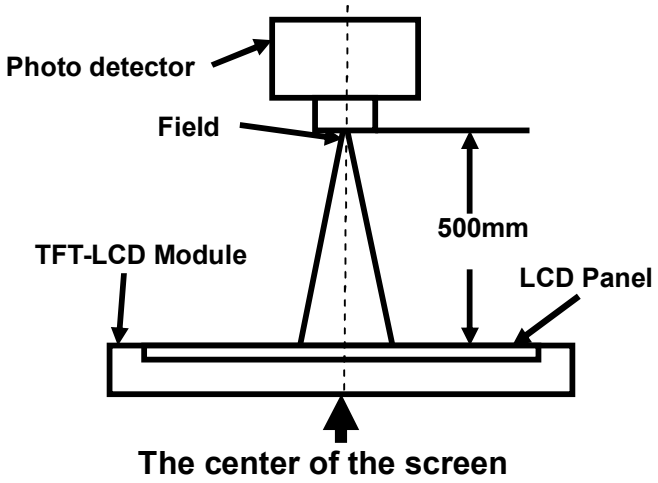
Item		Symbol	Condition	Min	Typ.	Max	Unit	Remark
View Angles		θT	CR≧10	70	80	-	Degree	Note 2
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	600	800	-	-	Note1 Note3
Luminance uniformity		U		-	1.25	1.33	-	Note6
Response Time		T_{ON}	25°C	-	8	12	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.263	0.313	0.363	-	Note5 Note1
		y		0.279	0.329	0.379		
	Red	x		-	(0.632)	-		
		y		-	(0.355)	-		
	Green	x		-	(0.344)	-		
		y		-	(0.608)	-		
	Blue	x		-	(0.157)	-		
		y		-	(0.087)	-		
NTSC				50	60	-	%	Note5
Luminance		L		250	300	-	cd/㎡	Note7

Test Conditions:

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

Note 1: Definition of optical measurement system.

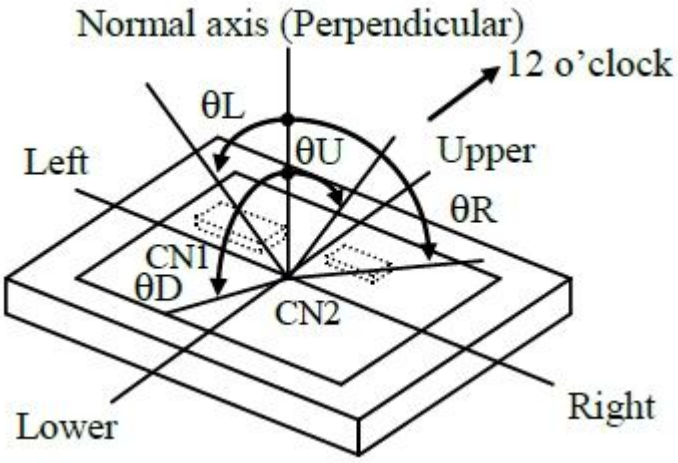
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



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

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

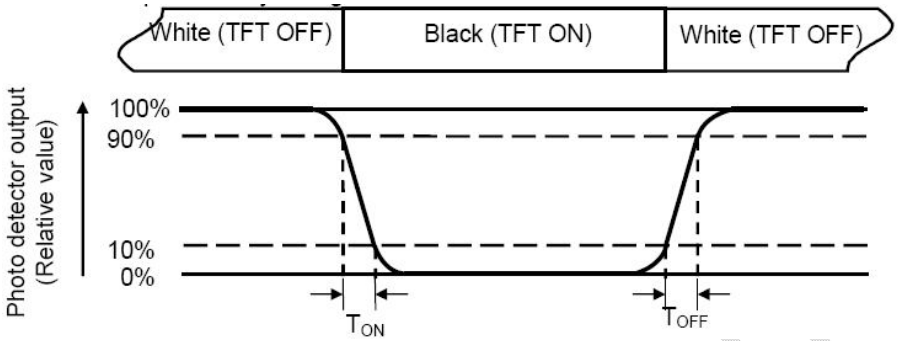
“White state “: The state is that the LCD should drive by Vwhite.

“Black state”: The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.

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)

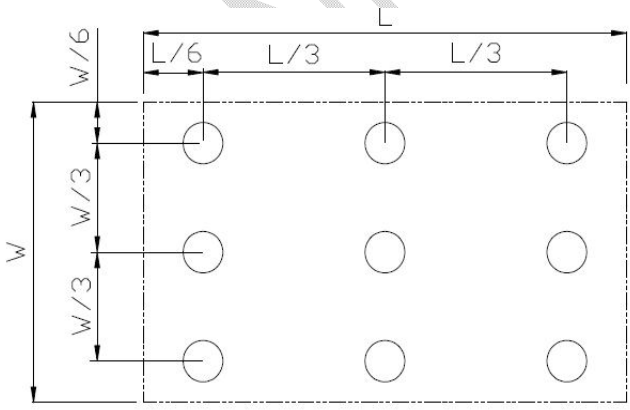
Color coordinates measured at center point of LCD.

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.

Luminance Uniformity (U) = Lmin/ Lmax

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



Lmax: The measured Maximum luminance of all measurement position.

Lmin: 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	Remarks
1	High Temperature Operation	Ts = +70°C, 240 hours (Note1)	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20°C, 240 hours (Note1)	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80°C, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30°C, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta = +50°C, 80% RH max, 240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-20°C 30 min ~ +60°C 30 min, Change time:5min, 20 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:1984, GB2423.22-2002
7	ESD(Operation)	C=150pF, R=330Ω, 5point/panel Air: ±15Kv, 9points,25times/point; Contact: ±8Kv, 9points,25times/point (Environment: 15°C ~35°C, 30%~60%. 86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Package Drop Test	Height: 60cm, 1corner, 3edges, 6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995
9	Vibration (Non-operation)	Frequency range:5~100Hz,11.76m/s^2 1minute/cycle X,Y,Z directions 50times each directions	IEC600682-6:1982 GB2423.10-1995
10	Shock (Non-operation)	30G,11ms,±X,Y,Z directions,3times For each direction	IEC60068-2-27:1987 GB/T2423.5—1995

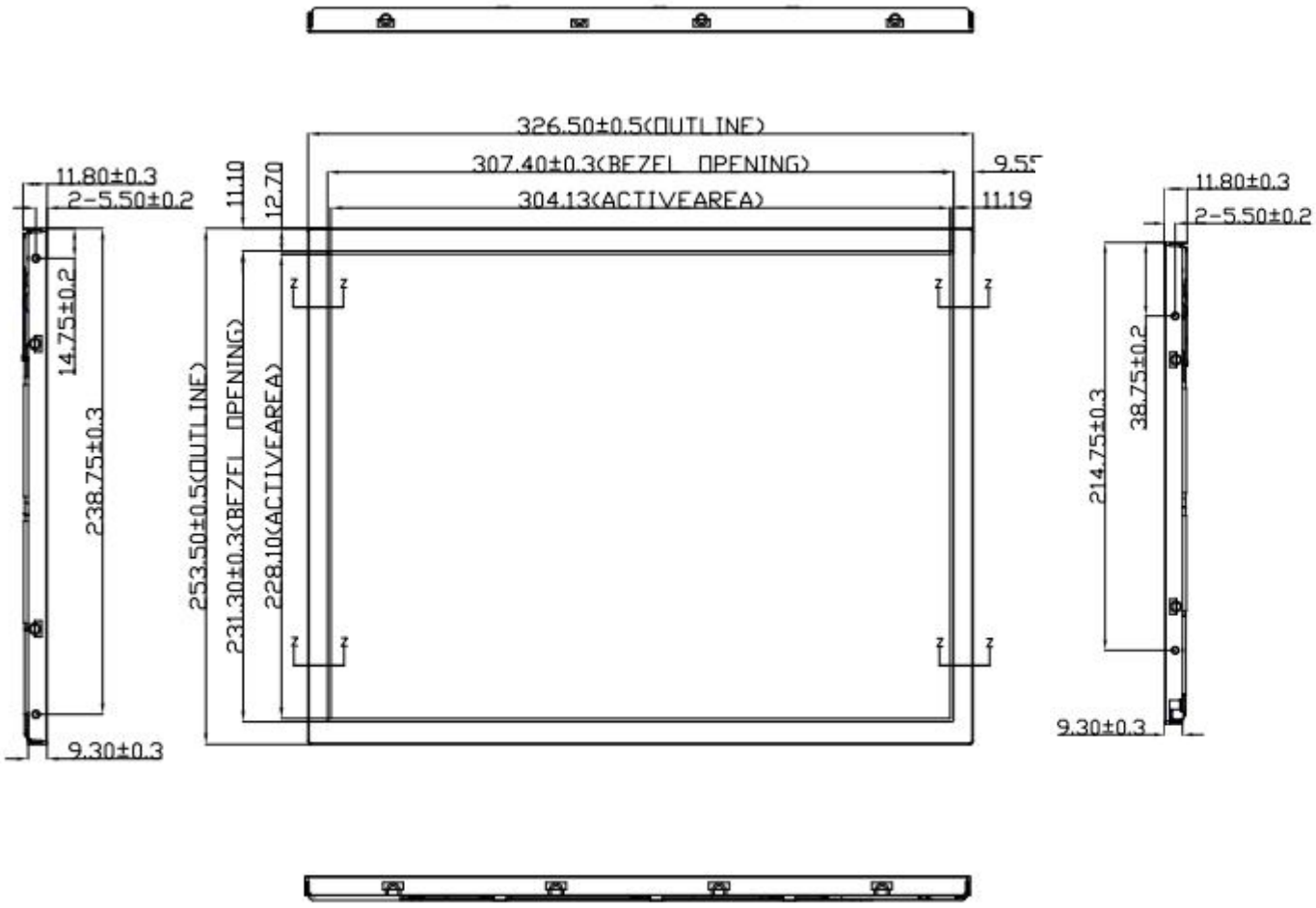
Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

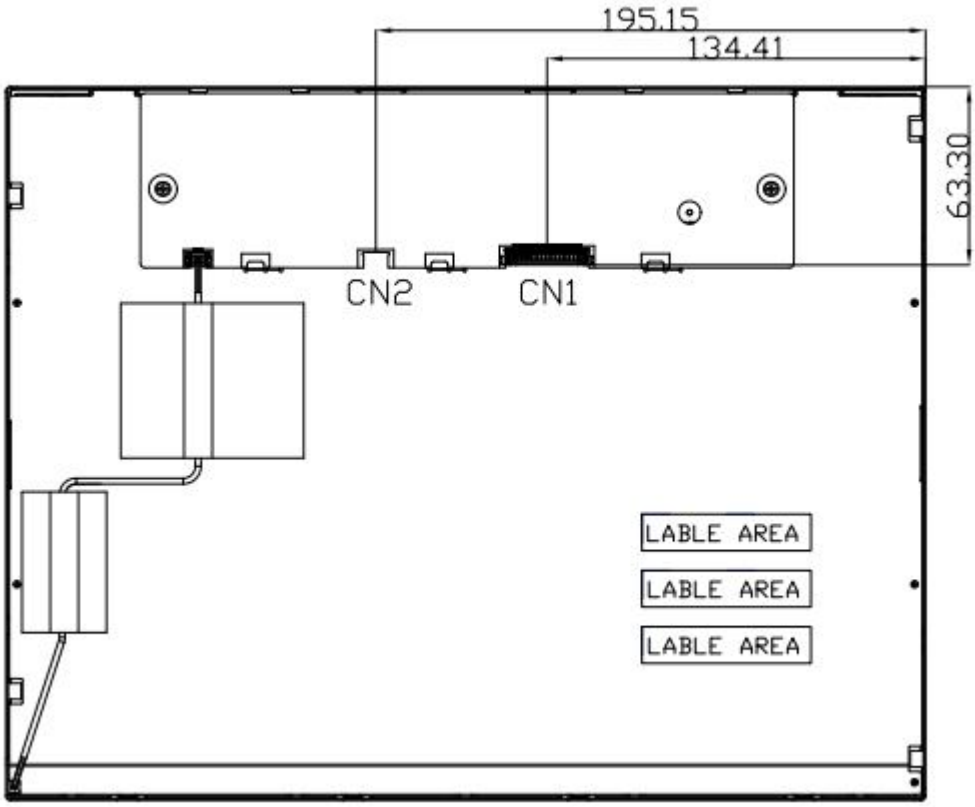
Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

9 Mechanical Drawing



SECTION Z-Z
4 PLACES



10 MARKINGS

The various markings are attached to this product. See “10.2 INDECATION LOCATIONS” for attachment positions.

10.1 PRODUCT LABEL

Product label

Note1: The meaning of OEM number

•Example: TM5XG10A55SA1SA19CF0001

TM5XG10A55SA1SA1	9CF	0001
TIANMA internal code	**Date code**	**S/N**

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.

11 PACKING, TRANSPORTATION AND DELIVERY

Tianma will pack products to deliver to customer in accordance with Tianma 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
10 products are packed up with the maximum in a packing box (See "11.5 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
① Packing boxes are tied on a cardboard pallet. (4 boxes×3 tiers maximum)
② Cardboard sleeve and top cap are attached to the packing boxes, and 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

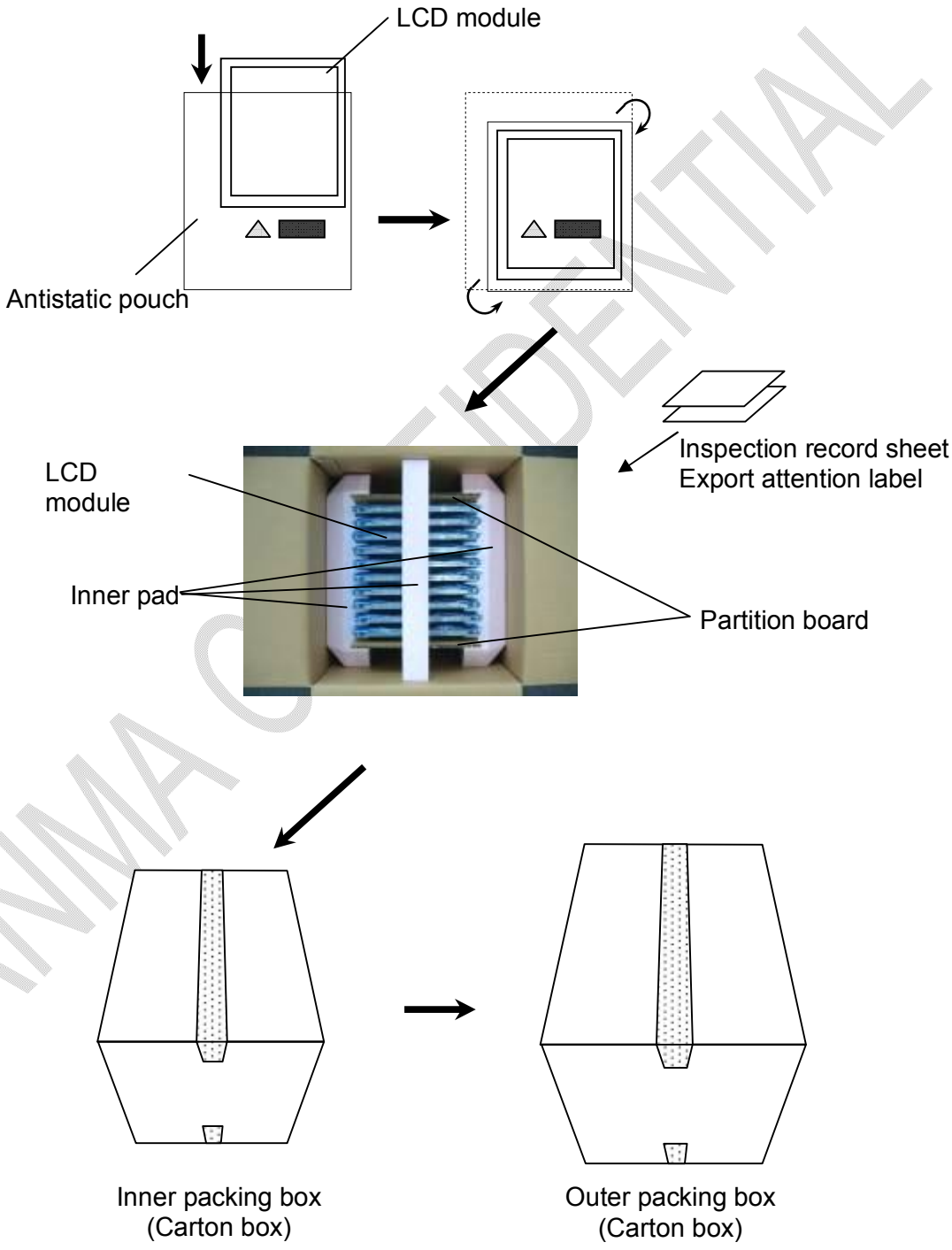
The product is transported by vehicle, aircraft or shipment in the state of pallet packing.

11.4 Packing Material

No	Item	Model(Material)	Dimensions (mm)	Unit Weigt (Kg)	Quantity	Remark
1	LCM module	TM150TDSGxx-00	326.5x253.5x11.8	1	10	
2	Partition broad	Corrugated paper	TBD	TBD	TBD	
3	Anti-static Bag	LD-PE	TBD	TBD	TBD	Anti-static
4	EPP1	EPP	TBD	TBD	TBD	
5	EPP2	EPP	TBD	TBD	TBD	
6	Carton-inside	Corrugated paper	TBD	TBD	TBD	
7	Model Label	Paper	TBD	TBD	TBD	
8	Barcode Label	Paper	TBD		TBD	

9	Total weight	TBD Kg±5%

11.5 OUTLINE FIGURE FOR PACKING



12 PRECAUTIONS

12.1 MEANING OF CUTION 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 TBD N-m. Higher torque values might result in distortion of the bezel.
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 doses 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.