DOCUMENT NUMBER AND REVISION

VL-FS-COG-TC30F325P-L3 REV. B

(COG-TC30F325P-L3)

DOCUMENT TITLE:

SPECIFICATION

OF

LCD MODULE TYPE

CUSTOMER	
CUSTOMER PART NO.	**NA**
MODEL NUMBER	**COG-TC30F325P-L3**
CUSTOMER APPROVAL	
DATE	

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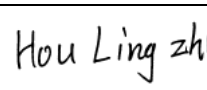
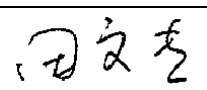
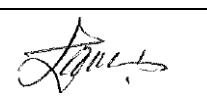
APPROVED BY OE	HOU LING ZHI /WANG YAN QING		2020.03.04
APPROVED BY ME	TIAN WEN ZHUAN /TONY CAO		2020.03.04
QUALITY BY QA	JAMES LAM		2020.03.04

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BOE VARITRONIX LIMITED

Specification
Of
LCD Module Type
Model No.: COG-TC30F325P-L3

1. General Description

- 12.3" (diagonal) HD, 8:3, Landscape, Transmissive, Normally black, ADS type, Amorphous silicon TFT LCD module
- Display resolution: 1920 x RGB x 720
- Viewing direction: All directions
- Dual LVDS interface
- TFT-LCD logic voltage (VDD): 3.3V (TYP.)
- Anti-glare front polarizer
- Connection BJD_101049-206050.
- RG LED
- “RoHS” compliance

2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1: Module mechanical detail

Parameters		Specifications	Unit
Outline dimensions		308.23(W) x 126.4(H) x 8.0(D) (Exclude FPC, cables & component and mounting screws)	mm
Color TFT 1920 x RGB x 720	Bezel opening	294.032(W) x 111.512(H)	mm
	Active area	292.032(W) x 109.512(H)	dots
	Display format	1920 x RGB x 720	-
	Color configuration	RGB vertical stripes	mm
	Dot pitch	0.0507 (*3) (W) x 0.1521(H)	mm
Backlight		White LED	-
Weight		442	gram

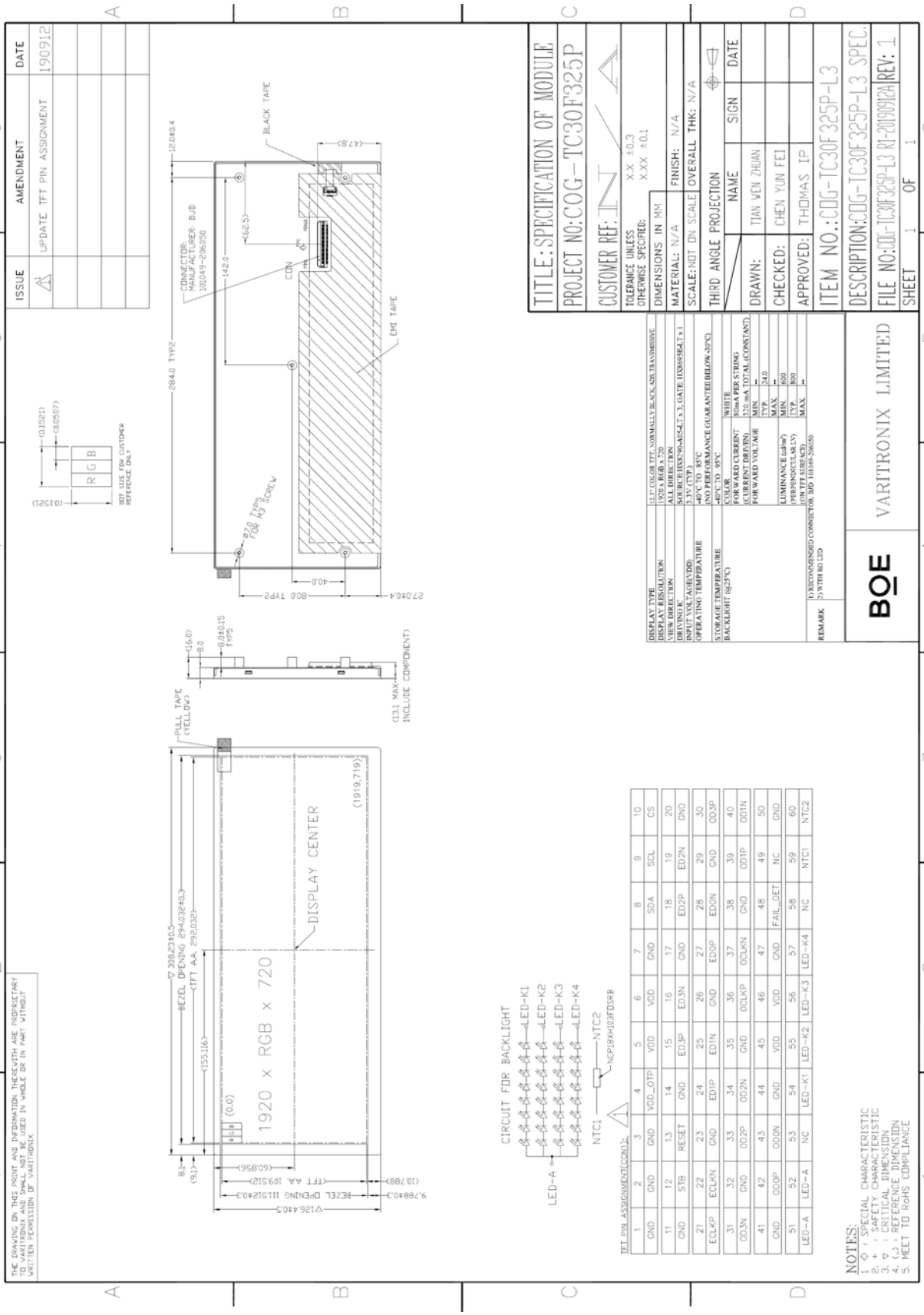


Figure 1: Module specification

3. Interface Signals

3.1 TFT-LCD Panel and Backlight Driving

Recommended connector model: HRS: FH28D-50S-0.5SH

Table 2: Connector Pin Assignments

Pin No.	Symbol	I/O	Description	Remarks
1	GND	P	Ground	
2	GND	P	Ground	
3	GND	P	Ground	
4	VDD_OTP	I	OTP PIN	User set it to 3.3V
5	VDD	P	Power pin for Logic	3.3V typ.
6	VDD	P	Power pin for Logic	3.3V typ.
7	GND	P	Ground	
8	SDA	I/O	SPI Data pin	User set it to “0”
9	SCL	I	SPI Clock pin	User set it to “0”
10	CS	I	SPI chip select pin	User set it to “1”
11	GND	P	Ground	
12	STB	I	Standby Pin	L: Standby H: Normal
13	RESET	I	Reset Pin	L: reset H: Normal
14	GND	P	Ground	
15	ED3P	I	Even Data channel 3 +	
16	ED3N	I	Even Data channel 3 -	
17	GND	P	Ground	
18	ED2P	I	Even Data channel 2+	
19	ED2N	I	Even Data channel 2 -	
20	GND	P	Ground	
21	ECLKP	I	Even Clock channel +	
22	ECLKN	I	Even Clock channel -	
23	GND	P	Ground	
24	ED1P	I	Even Data channel 1 +	
25	ED1N	I	Even Data channel 1 -	
26	GND	P	Ground	
27	ED0P	I	Even Data channel 0 +	
28	ED0N	I	Even Data channel 0 -	
29	GND	P	Ground	
30	OD3P	I	Odd Data channel 3 +	
31	OD3N	I	Odd Data channel 3 -	
32	GND	P	Ground	
33	OD2P	I	Odd Data channel 2 +	
34	OD2N	I	Odd Data channel 2 -	

35	GND	P	Ground	
36	OCLKP	I	Odd Clock channel +	
37	OCLKN	I	Odd Clock channel -	
38	GND	P	Ground	
39	OD1P	I	Odd Data channel 1 +	
40	OD1N	I	Odd Data channel 1 -	
41	GND	P	Ground	
42	OD0P	I	Odd Data channel 0 +	
43	OD0N	I	Odd Data channel 0 -	
44	GND	P	Ground	
45	VDD	P	Power pin for Logic	3.3V typ.
46	VDD	P	Power pin for Logic	3.3V typ.
47	GND	P	Ground	
48	FAIL_DET	O	Fail detect output pin	
49	NC	-	Dummy Pin	
50	GND	P	Ground	
51	LED-A	P	Anode	
52	LED-A	P	Anode	
53	NC	-	Dummy Pin	
54	LED-K1	P	Cathode 1	
55	LED-K2	P	Cathode 2	
56	LED-K3	P	Cathode 3	
57	LED-K4	P	Cathode 4	
58	NC	-	Dummy Pin	
59	NTC1	C	NTC thermistor terminal	
60	NTC2	C	NTC thermistor terminal	

Remarks: For I/O, “I” is Input, “O” is Output. “P” is for Power, and “C” is for passive

4. Absolute Maximum Ratings

The product or its functions may subject to permanent damage if it's stressed beyond those absolute maximum ratings listed below.

+-Exposure to absolute maximum rating conditions for extended periods may affect display module reliability.

Table 3: Absolute Maximum Rating & Environmental Condition

Item	Symbol	Min.	Max.	Unit
Supply voltage for logic	VDD	-0.3	+3.96	V
Digital I/O input signal	V_{IO}	-0.3	VDD + 0.3	V
Single LED forward current (at 25°C)	I_F	-	150	mA
Relative Humidity (at 60°C)	RH	-	90	%
Operating temperature range (Note 2,3)	T_{OPR}	-40	85	℃
Storage Temperature range	T_{STG}	-40	95	℃

Note 1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

Note 2: No optical performance guarantee under -30°C

Note 3: Panel surface temperature should not exceed 85°C.

Note 4: No condensation allowed under any condition.

Note 5: GND = 0V.

[Caution]

Do not display fixed pattern for prolonged hours because it may develop image sticking on the display.

5. Electrical Specifications

5.1 Block Diagram

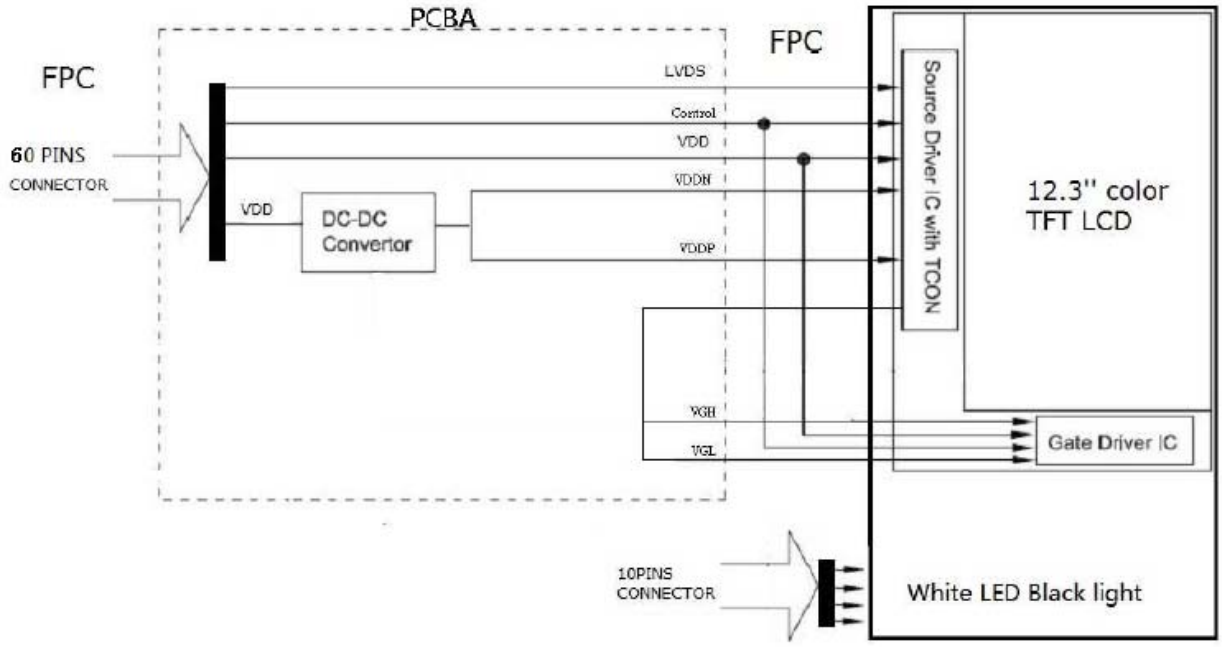


Figure 2: Block diagram

5.2 TFT LCD Module DC Characteristics

Table 4: DC characteristic

Parameter	Symbol	Min	Typ	Max	Unit
Power supply voltage for logic	VDD(Note 1)	3.0	3.3	3.6	V
Power supply current for logic	IDD	-	350	550	mA
Driver input high signal voltage (Note 1)	VIH	0.7*VDD	-	VDD	V
Driver input low signal voltage (Note 1)	VIL	GND	-	0.3* VDD	V

Note 1: For SDA, SCL, CS, STB, RST signal.

Table 5: LVDS DC Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Differential input high Threshold voltage	R_{TH}	-	-	+0.1	V
Differential input low threshold voltage	R_{TL}	-0.1	-	-	V
Differential input common Mode voltage	R_{CM}	1	1.2	1.7-| V_{ID} |/2	V
LVDS input voltage	V_{INLV}	0.7	-	1.7	V
Differential input voltage	| V_{ID} |	0.1	-	0.6	V
Differential input leakage Current	RV_{Xliz}	-10	-	+10	uA

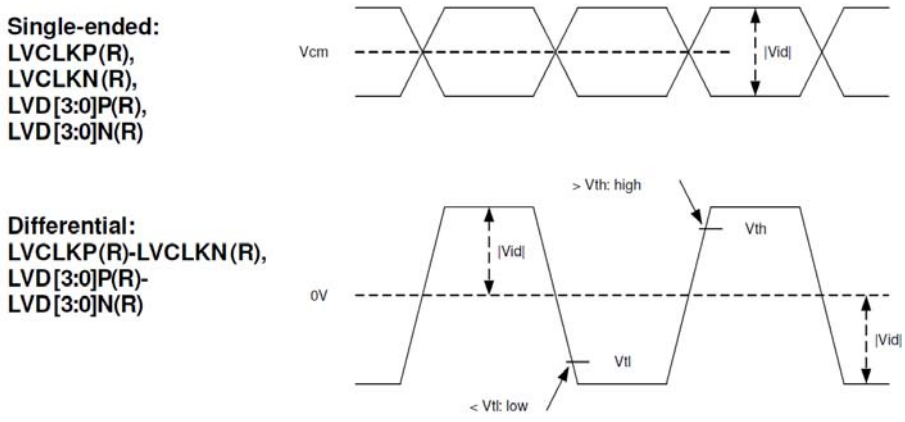


Figure 3: LVDS DC character

5.3 Recommended Driving Condition for LED Backlight

Table 6: DC characteristics of LED backlight

Parameter	Symbol	Min	Typ	Max	Unit	Remark
LED Forward Voltage	VF_{LED}	-	24	-	V	-
LED Forward Current	IF_{LED}	-	80	-	mA	-
LED Forward Current Total	IF_{LED} (total)		320	-	mA	-
LED Power Consumption	P_{LED}	-	7.68	-	W	Note 1
LED Life time	-	30000	-	-	Hrs	Note 2

Note 1: Calculator Value for reference $VF_{LED} \times IF_{LED} = P_{LED}$.

Note 2: The LED Life-time was defined as the estimated time to 50% degradation of initial luminous.

Note 3: VF_{LED} and IF_{LED} refers to the condition between the Anode (A) & the Cathode (K) as FIG below.

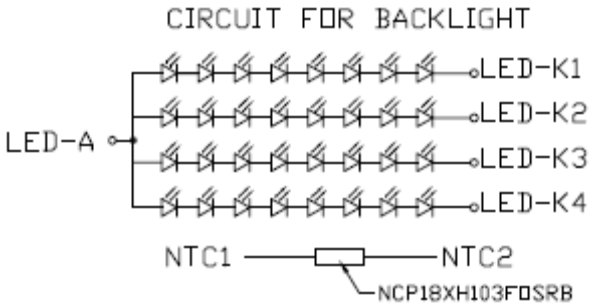


Figure 4: LED circuit diagram

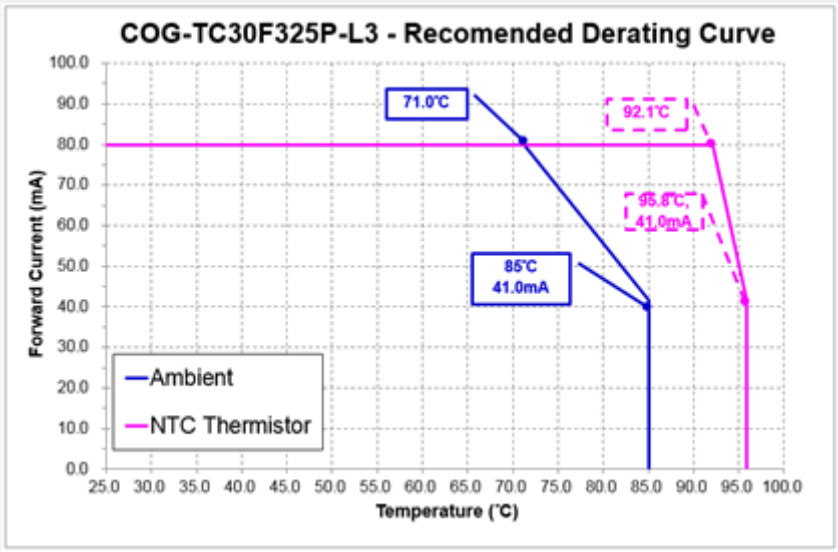


Figure 5: LED driving duty derating curve

5.4 Signal Specification

5.4.1 LVDS AC electrical characteristics

Table 7: AC characteristics of LVDS

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	F_{LVCYC}	20	-	85	MHz
Clock period	T_{LVCYC}	11.76	-	-	ns
1 data bit time	UI	-	1/7	-	T_{LVCYC}
Clock high time	TLVCH	2.8	4	4.2	UI
Clock low time	TLVCL	2.8	3	4.2	UI
Position 1	T_{POS1}	-0.2	0	0.2	UI
Position 0	T_{POS0}	0.8	1	1.2	UI
Position 6	T_{POS6}	1.8	2	2.2	UI
Position 5	T_{POS5}	2.8	3	3.2	UI
Position 4	T_{POS4}	3.8	4	4.2	UI
Position 3	T_{POS3}	4.8	5	5.2	UI
Position 2	T_{POS2}	5.8	6	6.2	UI
Input eye width	T_{EYEW}	0.6	-	-	UI
Input eye border	T_{EX}	-	-	0.2	UI
LVDS wake up time	T_{ENLVDS}	-	-	150	us

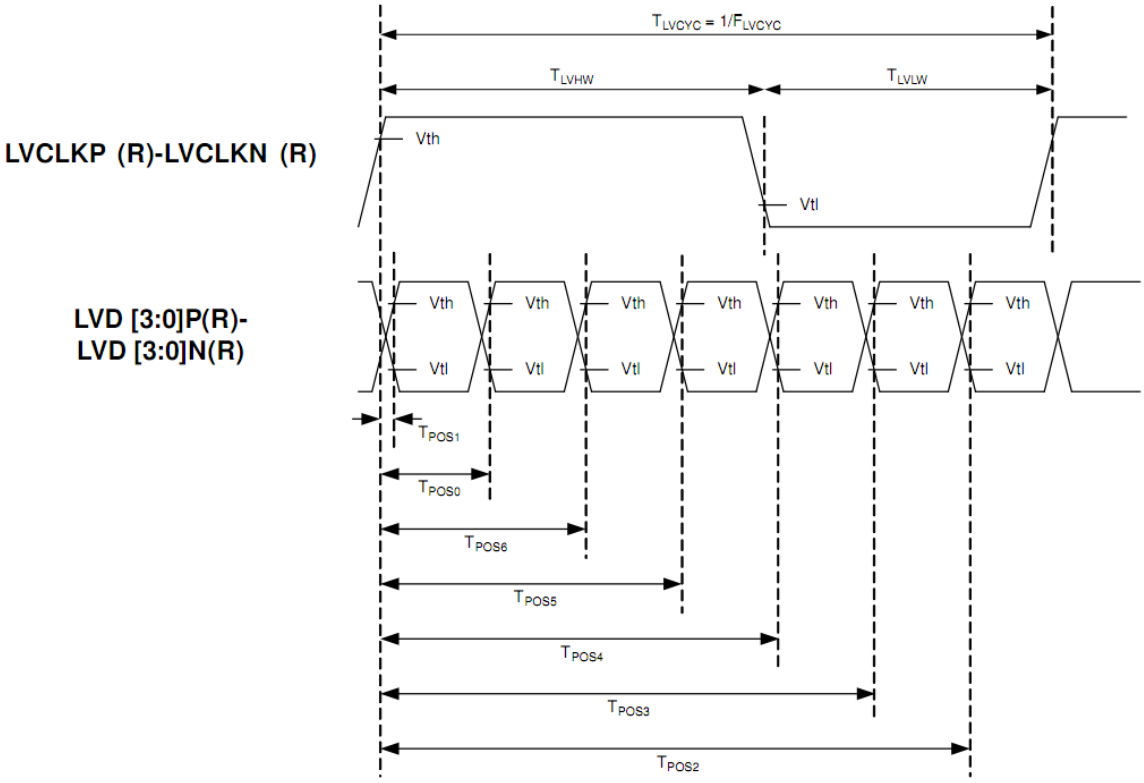
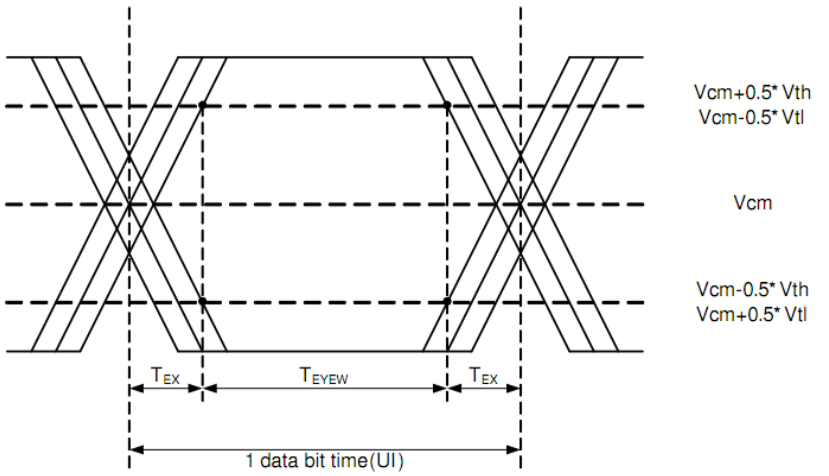
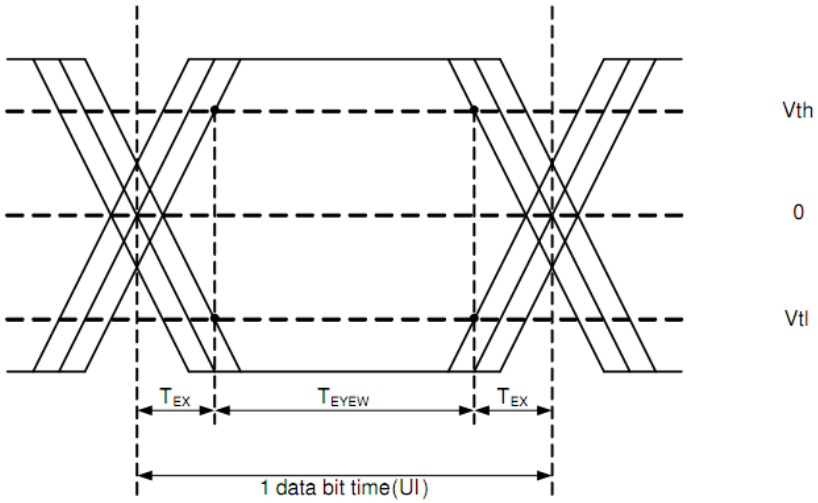


Figure 6

Single-ended:
LVD[3:0]P,
LVD[3:0]N



Differential:
LVD[3:0]P-LVD[3:0]N



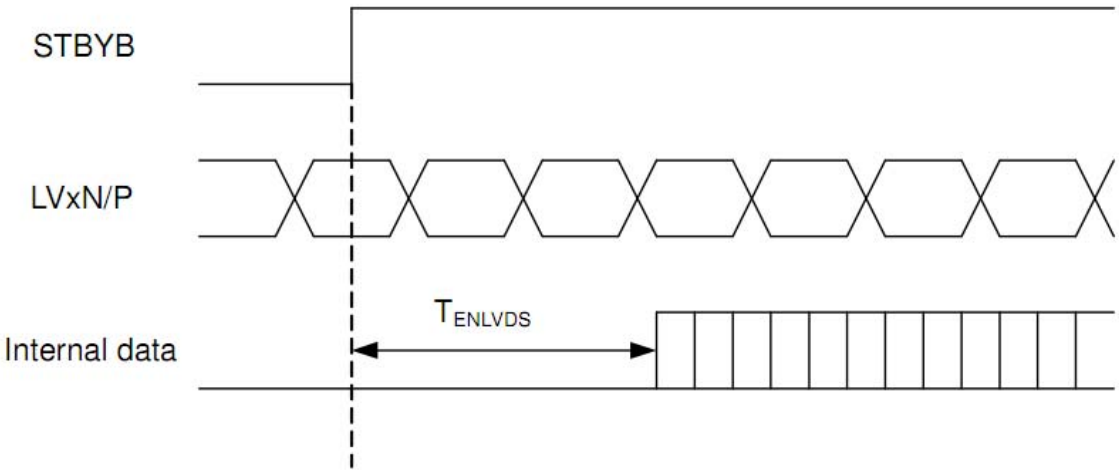


Figure 7

5.4.2 LVDS Input Format (VESA 8bit)

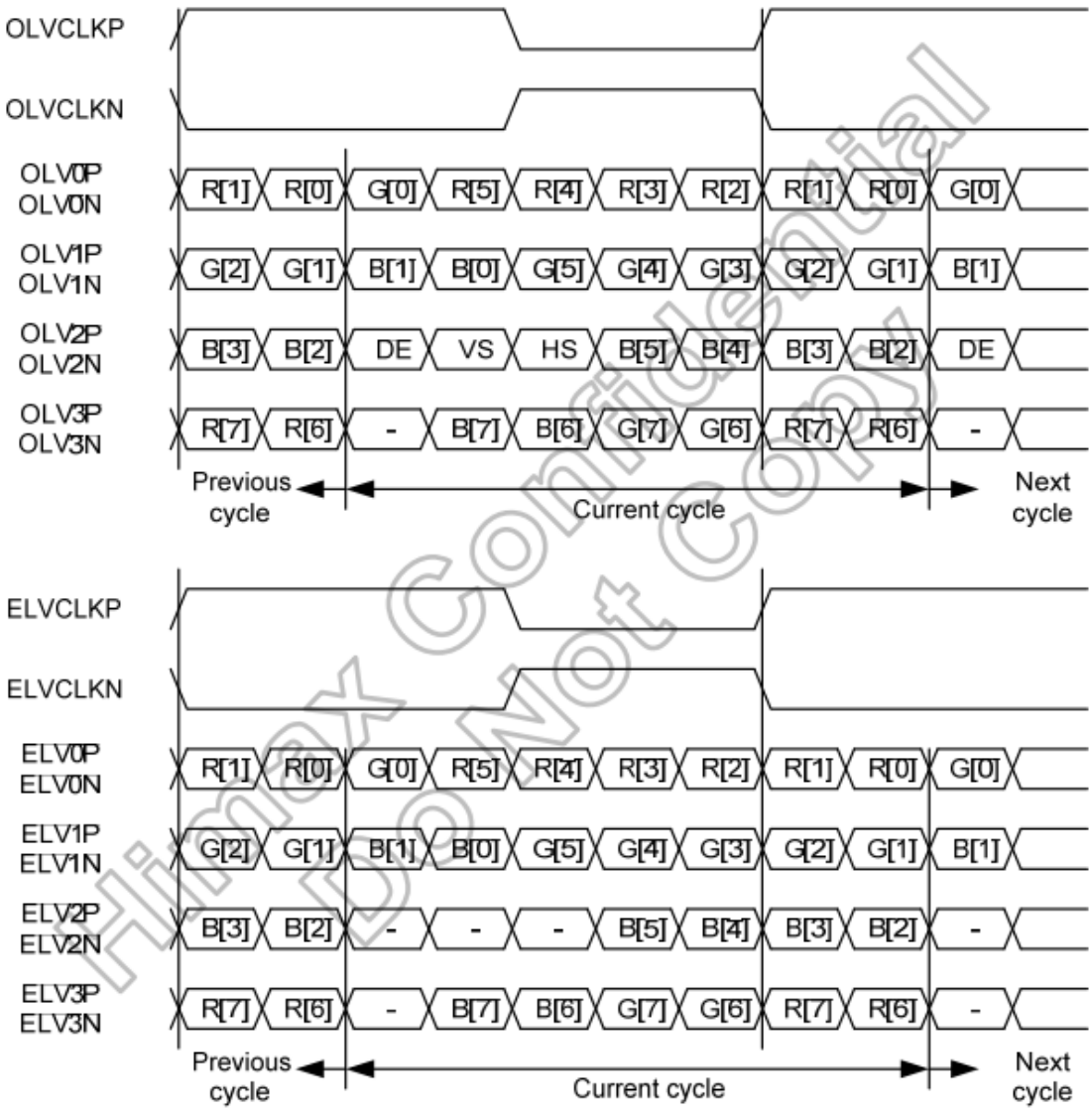


Figure 8: LVDS input data format (VESA format)

5.4.3 Video Signal Timing

Table 8: Video signal timing(DE Mode)

Symbol	Parameter	Conditions	Related Pins	Min.	Typ.	Max.	Unit
t_{hd}	Horizontal valid data	-	HSYNC	-	960	-	Line
t_h	1 Horizontal line	-	HSYNC	989	1002	1152	Line
t_{vd}	Vertical valid data	-	VSYNC	-	720	-	Line
t_v	1 Vertical field	-	VSYNC	727	733	740	Line
F_{frame}	Frame Frequency	-	CLK	-	60	-	Hz
F_{CLK}	CLK frequency		CLK	43.1	44.1	51.1	MHz

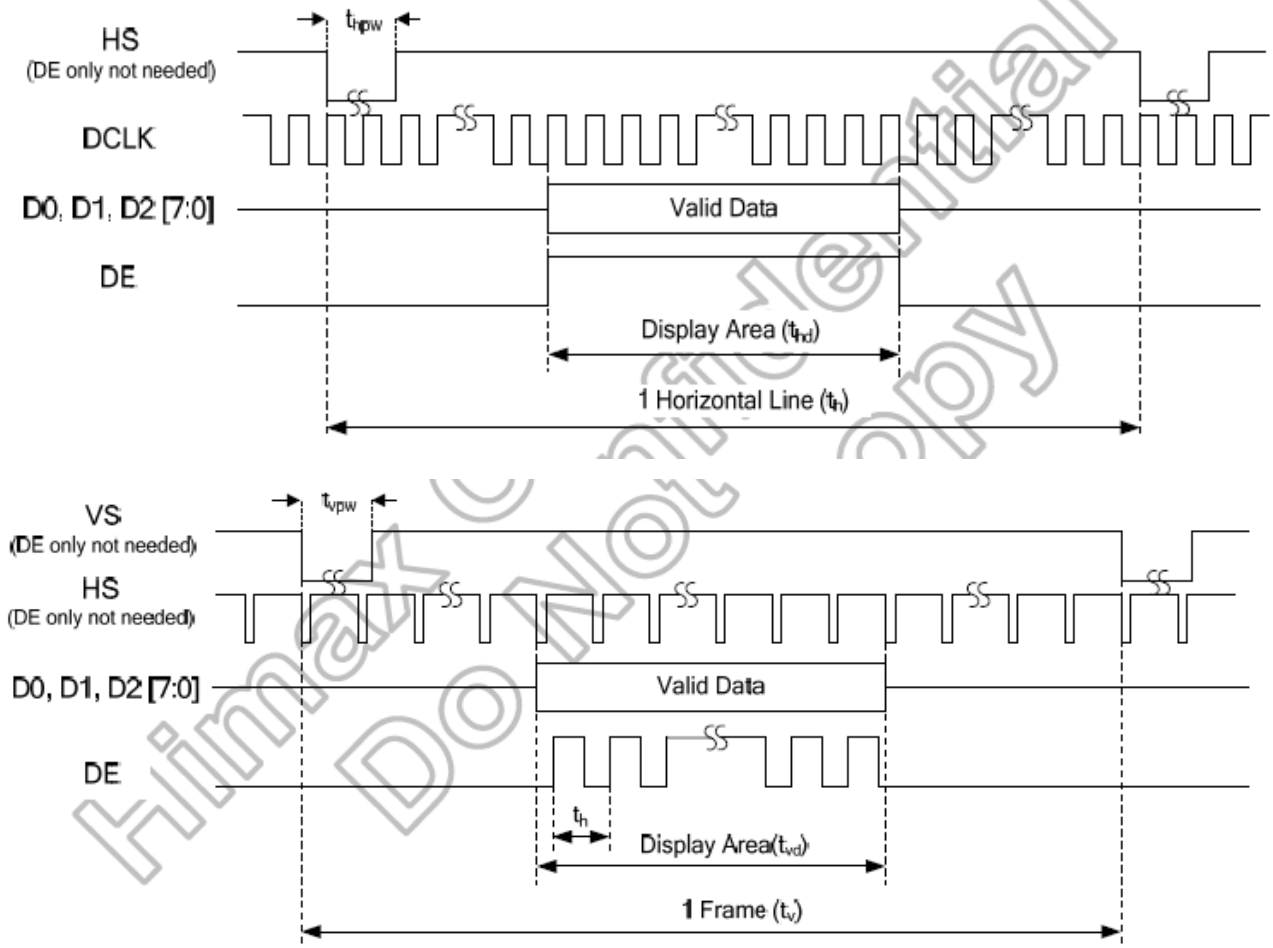


Figure 9

5.4.4 SPI interface (3 wires)

SPI interface is used to read and write the setting registers of the TFT module.

All registers setting have been OTP in driver IC.

So no need to using the SPI to initialize module, just pull high SPI pins at customer's system side.

When write register, customer should write the same data to all source driver ICs .

ID[1:0]=0, correspond to Master IC

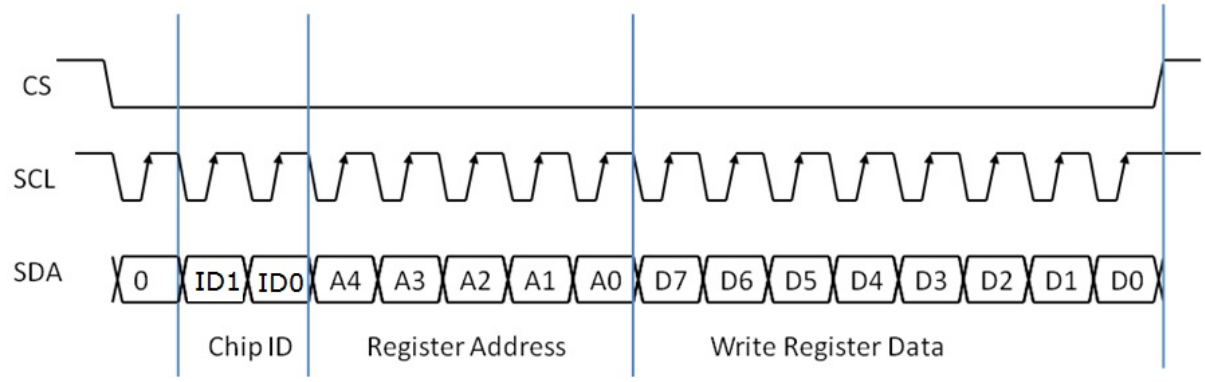


Figure 10: SPI write data format

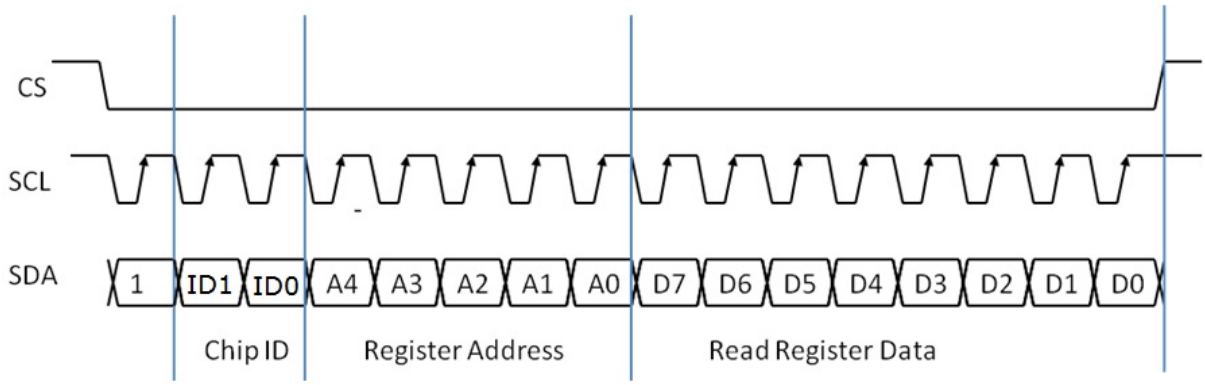


Figure 11: SPI read data format

5.4.5 SPI interface timing chart

Table 9: AC Characteristic of SPI interface

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Setup Time	tS0	CS to SCL	60	-	-	ns
	tS1	SDA to SCL	60	-	-	ns
Hold Time	tH0	CS to SCL	60	-	-	ns
	tH1	SDA to SCL	60	-	-	ns
Pulse Width	tW1L	SCL Negative cycle	75	-	-	ns
	tW1H	SCL Positive cycle	75	-	-	ns
	tW2	CS pulse width	1	-	-	us
Clock duty	-	SCL	40	50	60	%

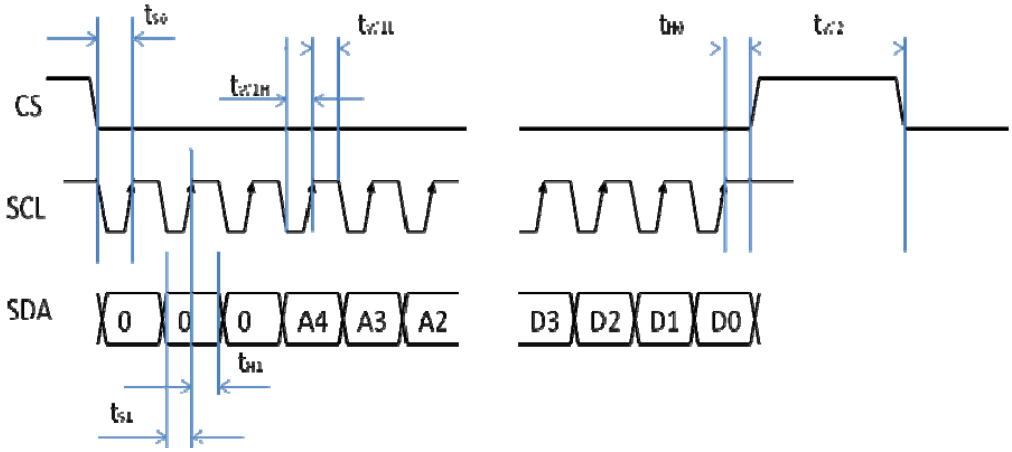


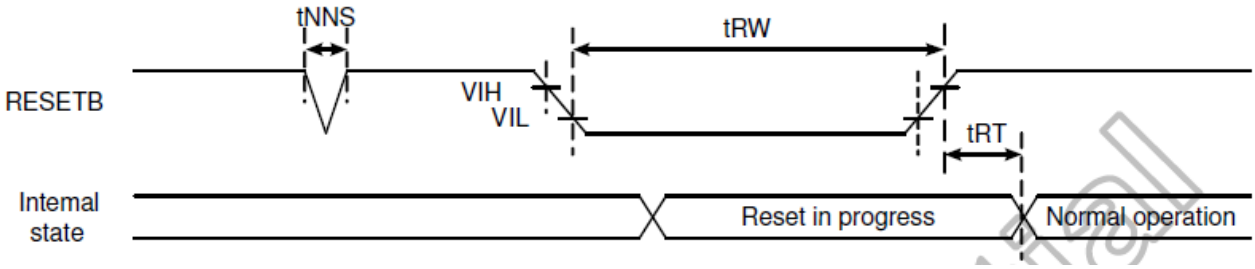
Figure 12: SPI timing

5.4.6 Reset Timing

Table 10

Symbol	Parameter	Min.	Typ.	Max.	Unit
tRW	Reset pulse width	10(note1)	-	-	us
tRT	Reset complete time	-	-	5	us
tNNS	Negative spike noise width	-	-	100	ns

Note1: There is a RC filter on STB and RESET signal line. R=10K ohm , C=1uF.



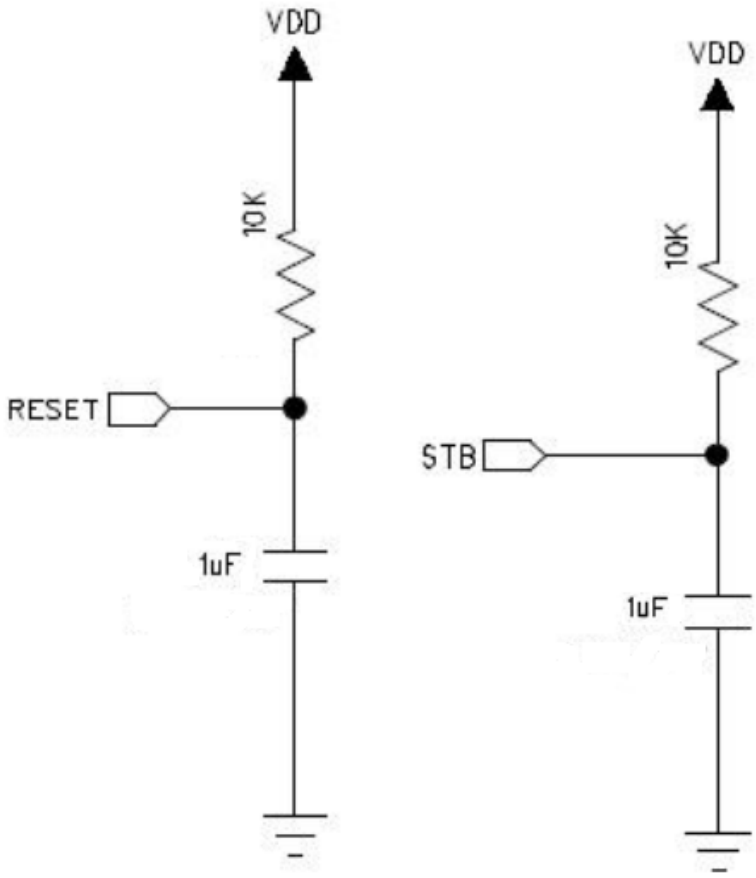


Figure 13

5.4.7 Power On/ Off Sequence

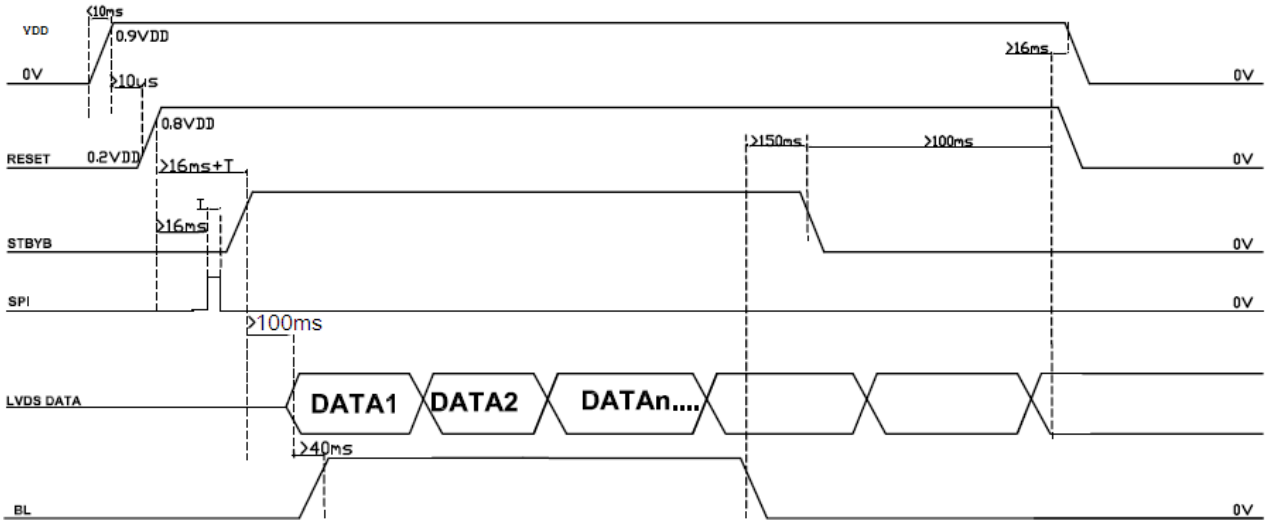
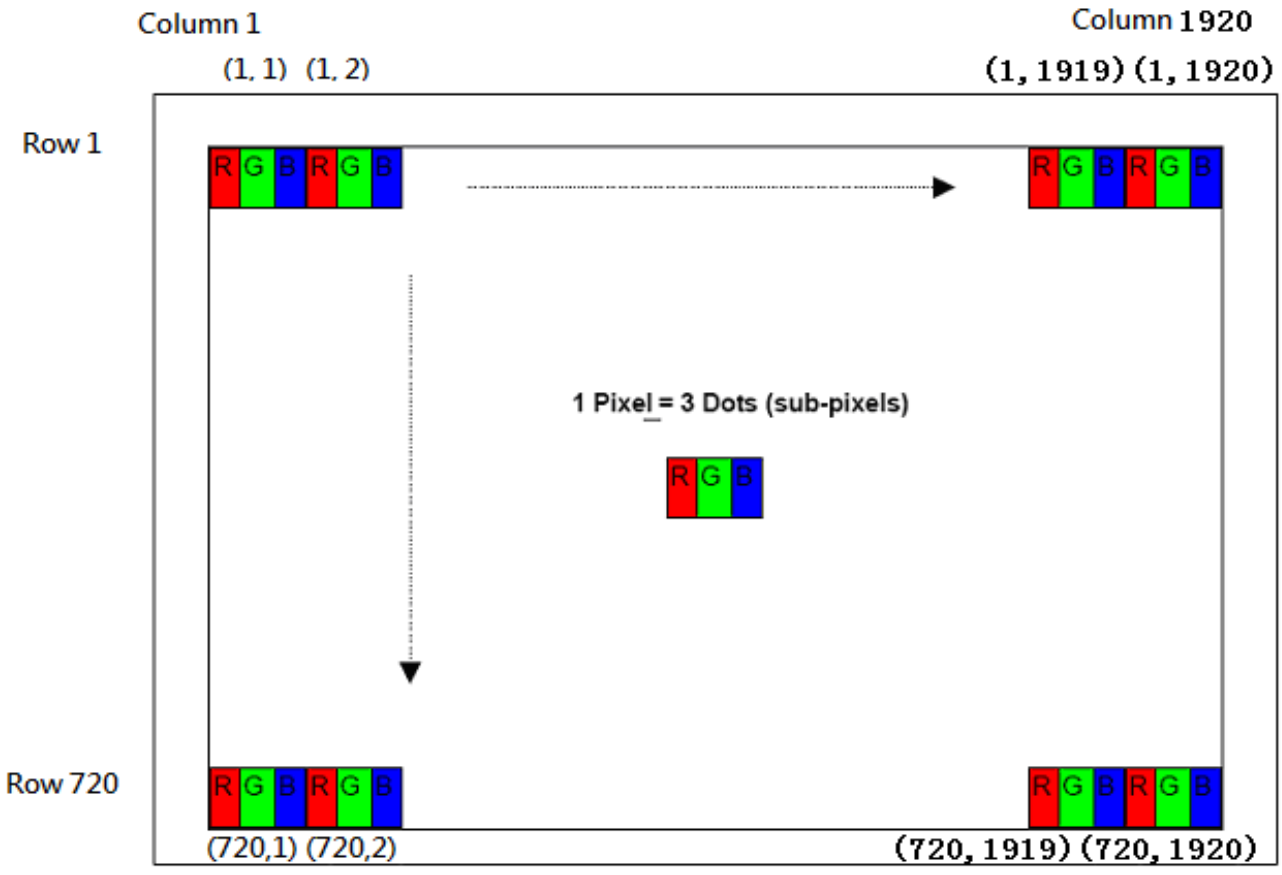


Figure 14: Power on/off sequence

5.4.8 Pixel Arrangement



5.5 Thermistors Resistance

Table 11: Thermistors Resistance

NCP18XH103F0SRB	
TEMP. (deg. C)	**RESISTANCE (k ohm)**
-40	195.6520
-35	148.1710
-30	113.3471
-25	87.5588
-20	68.2367
-15	53.6496
-10	42.5062
-5	33.8922
0	27.2186
+5	22.0211
+10	17.9255
+15	14.6735
+20	12.0805
+25	10.0000
+30	8.3145
+35	6.9479
+40	5.8336
+45	4.9169
+50	4.1609
+55	3.535
+60	3.0143
+65	2.5861
+70	2.2275
+75	1.9245
+80	1.6685
+85	1.4521
+90	1.268
+95	1.110
+100	0.974
+105	0.858
+110	0.758
+115	0.672
+120	0.596
+125	0.531

6. Optical Characteristics

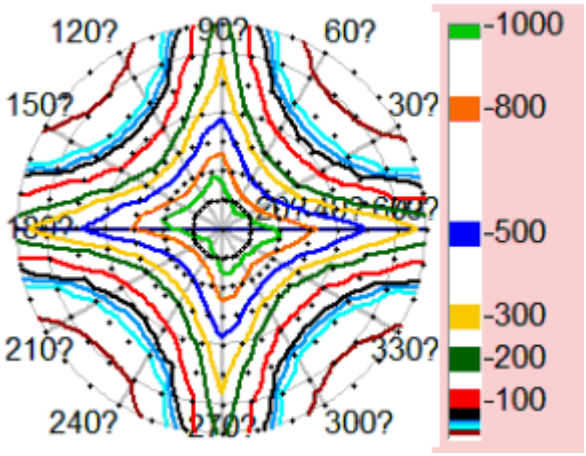
Conditions unless specified otherwise:

- Ta = 25°C, dark room
- TFT-LCD supply voltage = 3.3 volts
- Elapsed time from switch on is greater than 30 minutes
- RGB, white and black test patterns only
- Factory settings
- Luminance = 100% unless specified
- Measurements are conducted at ambient temperature and perpendicular unless specified

Table 12: Optical characteristics

Parameter		Symbol	Condition		Min.	Typ.	Max	Unit	Remark
Viewing Angle	12’	2	Ta=25°C CR > 10		-	85	-	deg.	Note 1
	6’	1			-	85	-		
	9’				-	85	-		
	3’	1			-	85	-		
Contrast ratio		CR	Ta=25°C		900	1100	-	-	Note 2
Luminance of complete module		I_{Module}	Ta=25°C		600	800	-	cd/m2	-
Chromaticity Color coordinates	White	x_{White}	Ta=25°C		0.271	0.301	0.331	-	Note 3
		y_{White}			0.309	0.339	0.369	-	
	Red	x_{Red}			0.643	0.673	0.703	-	
		y_{Red}			0.280	0.310	0.340	-	
	Green	x_{Green}			0.260	0.290	0.320	-	
		y_{Green}			0.639	0.669	0.699	-	
	Blue	x_{Blue}			0.120	0.150	0.180	-	
		y_{Blue}			0.026	0.056	0.086	-	
Response Time		Tr+Tf	Ta=25°C	Viewing normal angle =Θ=0°	-	-	30	ms	Note 4
			Ta=-20°C		-	-	200	ms	
			Ta=-30°C		-	-	500	ms	
NTSC Ratio		-	Ta=25°C		-	86	-	%	
Uniformity(White)					75			%	
Uniformity(Black)					50			%	
Gamma					1.9	2.2	2.5		
Image Sticking		LEVEL					2		Note 5

ISO:



Note 1: The definitions of viewing angle

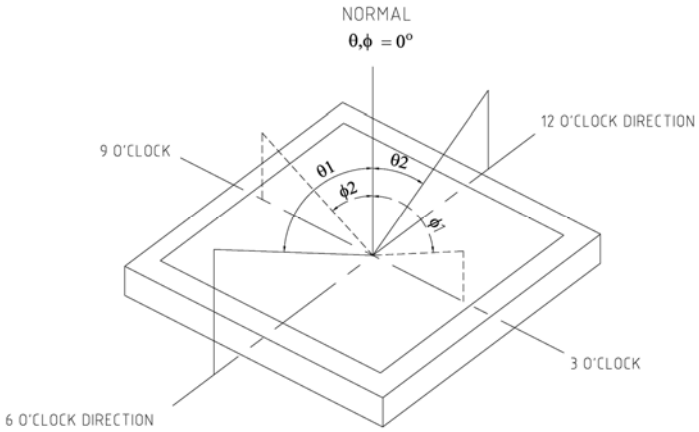


Figure 15: Viewing angle

Note 2: Contrast measurements shall be made at viewing angle of $\theta=0^{o}$ and at the center of the LCD surface by using DMS. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See Figure 15)
Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

Note 3: The color chromaticity coordinates specified in table 12 is the simulation result from the TFT-LCD and the backlight spectrum. These shall be updated from the spectral data measured with all pixels first in white, red, green, blue and black. Measurements shall be made at the center of the display.

Note 4: The electro-optical response time measurements shall be made as Figure 16 by switching the“data” input signal OFF and ON. The times needed for the luminance to change from 10% to 90% s Tr, and 90% to 10% is Tf.

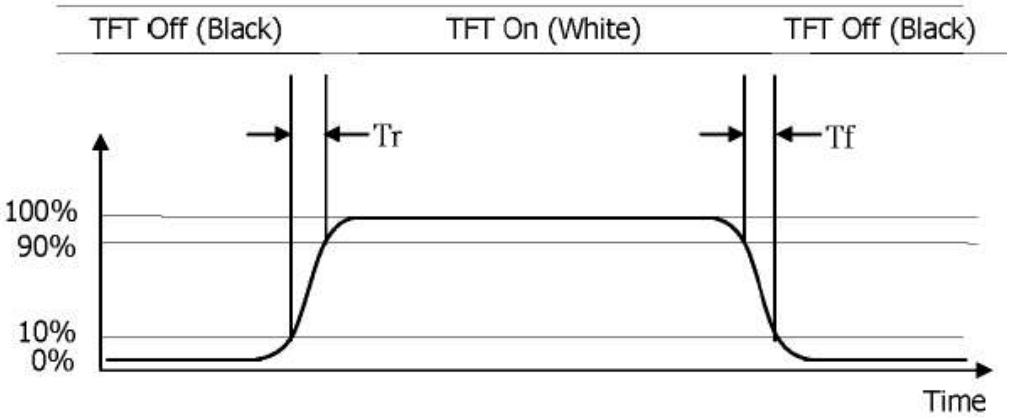


Figure 16: Response Time Testing

Note 5: Image Sticking

Test condition: Chess pattern; 50% grey scale; 65degC, 1hr, < Level2. (FIG.17)

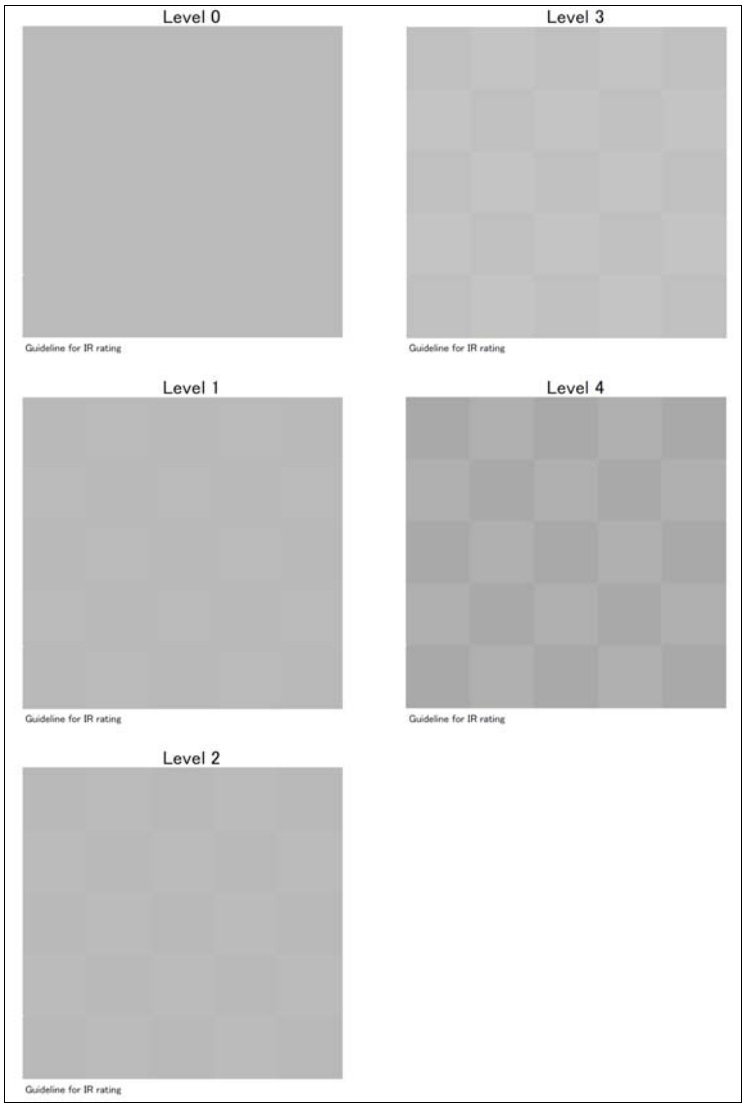


Figure 17: Image Sticking

7. Reliability Tests / Environmental

7.1 Reliability Test Conditions

Table 13: List of reliability tests

Test		Symbol	Condition	Reference	Quantity
1	High Temperature Storage	HST	+95°C / 500 hrs	IEC 60068-2-2 Bb	4pcs
2	Low Temperature Storage	LST	-40°C / 500 hrs	IEC 60068-2-1 Ab	4pcs
3	High Temperature Operating (Note 1)	HOT	+85°C / 500 hrs	IEC 60068-2-2 Bb	4pcs
4	Low Temperature Operating	LOT	-30°C / 500 hrs	IEC 60068-2-1 Ab	4pcs
5	Accelerated Humidity Test Operating	AHTO	+60°C / 90% RH / 500 hrs	IEC60068-2-78 Cab	4pcs
6	Temperature Shock Test	TST	-30°C <> +85°C, 30min/5min/30min,100cycles Non-Operating	IEC 60068-2-14Na	4pcs
7	UV exposure resistance	UV	1KW Xenon/ 100 hrs Power off.	IEC 60068-2-5 Sa	2pcs
8	Mechanical Shock (Note 2)	-	3 directions: X,Y,Z axes Repeats:6 Peak acc.:100 G Pulse duration: 6 ms (half sine wave) Non-Operating	IEC 60068-2-27Ea	2pcs
9	Mechanical Vibration (Note 2)	-	3 directions: X,Y,Z axes Sweep time:10 (1Oct/ min) Frequency:10 -> 150->10 Hz 10-58 Hz: constant amplitude 0.75mm peak. 58-150Hz: constant acceleration 10g peak Sinusoidal, Non-Operating	IEC 60068-2-6Fc	1box

Note 1: LCD panel surface temperature should not exceed 90°C.

Note 2: No optical performance guarantee below -30°C.

Note 3: For module internal structure robustness test purpose only. Customer application design should take care of overall mounting robustness with module.

7.2 Electrostatic Discharge (ESD)

Table 14: ESD test conditions

Test	Condition	Method	Remark	Quantity
Human body model	R = 330Ω, C = 150pF, • Air discharge: ±15 KV to display surface • Contact discharge: ±8 KV to metal frame	IEC61000-4-2	Not operating	2pcs
Machine model	R = 0Ω, C = 200pF, ±200V to I/O pins	MIL-STD-883, method 3015	Not operating	2pcs

Note 1: The TFT-LCD panel and IC on module are sensitive to electrostatic discharge. Please make sure equipment and operators are properly ground before during handling.

Note 2: As different customer application have different interfacing designs and assembly processes, the display module has no ESD protection circuitry. Customer is required to take special care on ESD level control in the assembly and test processes.

8. Inspection Specification

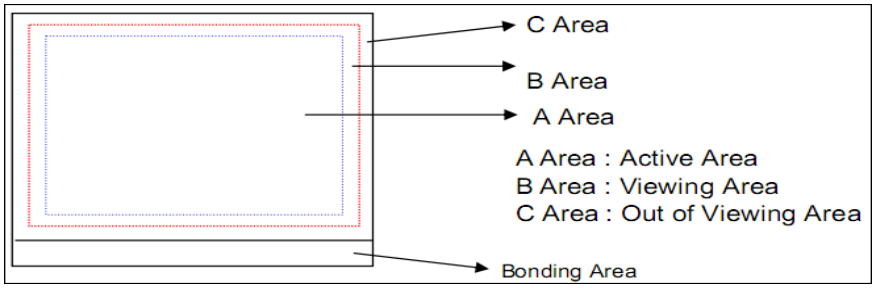
8.1 Inspection Conditions 检查条件

Items 项目	Condition 条件	
Ambient lighting 环境亮度	Non-operating inspection 800~2000 Lux. Operating inspection < 100 Lux. 非操作檢查 800~2000 Lux. 操作檢查< 100 Lux	
Temperature /Humidity 温度/湿度	21 ± 4°C with 35～80%	
Driving condition 驱动条件	Equipment 设备	Product specific test tool 产品规格书说明的测试工具
	Test pattern 测试画面	Black, White, Red,Green,Blue,etc 黑, 白, 紅, 綠, 藍,etc
	Supply voltage 电源	Typical voltages as given in the specification 规格书提供的典型电压
Inspection method 检查方法	Time 时间	≤ 20 seconds ≤ 20 seconds
	Distance 距离	35 cm ± 5 cm from display 距显示屏 35 cm ± 5 cm
	Viewing angle 视角	Standard viewing angle of inspection shall be perpendicular to the display. Inspection at other viewing angles shall not exceed 30° of perpendicular viewing angle. 视角检查的标准应垂直显示屏。其他视角检查范围应不超过垂直视角的 30°。

8.2 Visual Inspection Criteria

Items 项目	Details 详细检查点		Inspection Criteria 检验标准
Sub Pixel Defects 子像素缺陷	Bright Sub Pixel Defect 亮子像素缺陷		N =0
	Dark Sub Pixel Defect 暗子像素缺陷		N ≤4, DS>10
	Joint Sub Pixel Defect（dark dot） 子像素相连缺陷(暗点)		N=1
	Bright + Dark Sub Pixel Defect 亮+暗子像素点缺陷		N ≤4, DS>10
Line Defects 线缺陷	Bright Line, Dark Line 亮线,暗线		N =0
Displayed Screen 显示区屏幕	Foreign material Black/Bright Spot 异物黑/亮点 (Hair, Lint, etc) (头发，棉绒等)	Circular Type 圆型	D<0.2,ignore
			0.2mm≤D≤0.4mm, N≤4, DS>10
			D>0.4mm, N=0
		Linear Type 线型	W<0.05mm, Ignore 忽略
			0.05mm≤W≤0.1mm, L ≤5.0mm, N≤3, DS>10
			W>0.05mm, L>5.0mm, N=0
	Polarizer dent or bubble 偏光片凹痕、气泡	Circular Type 圆型	D<0.2,ignore
			0.2mm≤D≤0.4mm, N≤4, DS>10
			D>0.4mm, N=0
	Scratch 划痕	Linear Type 线型	W<0.05mm, Ignore 忽略
			0.05mm≤W≤0.1mm, L ≤5.0mm, N≤3, DS>10
			W>0.05mm, L>5.0mm, N=0
	Abnormal display 异常显示	All white 全白	Not allowed 不允许
		All black 全黑	Not allowed 不允许
		Gray scale 灰阶	Not allowed 不允许
		Abnormal display 异常显示	Not allowed 不允许
	Mura, 不均匀. (Pure black/with pattern check 纯,黑/白画面检查)		Refer to Domestic brands limit sample or 5%ND Filter 参考极限样品或者在 5% ND 滤片下检查，检查时间<3s。

Note 1) Definition of the Area 区域定义



Active Area:有效区域

Viewing Area:可视区域

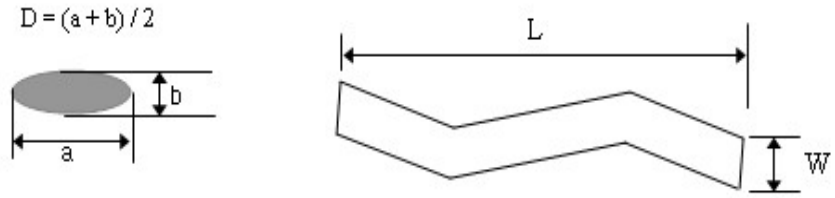
Out of Viewing Area: 可视区之外

Bonding Area: 邦定区域

Note 2) D = Diameter (直径), L = Length(长度), W = Width (宽度), N = Number (数量), DS = Distance(距离)

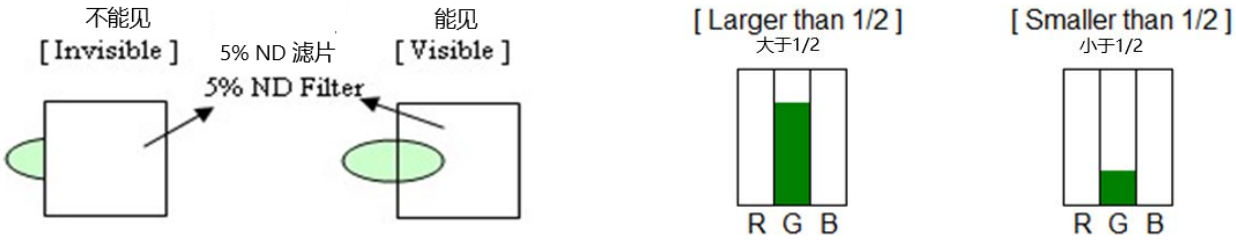
Not included area: Glass edge to within 2mm area

不包含区域：玻璃边缘向内 2mm 的范围



Note 3) Dot smaller than 1/2 of sub-pixel size will not counted as "1 dot" defect.

小于 1/2 子像素大小的点不计算为“1 点”缺陷.



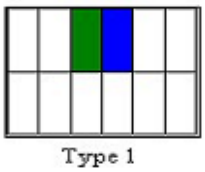
"No dot defect"
“没有不良点”
(=ignored/not counted)
不计算

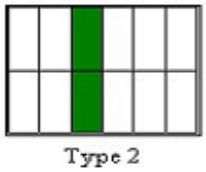
"1 dot defect"
“1 个不良点”
(=counted)
计算

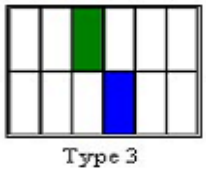
"1 dot defect"
“1 个不良点”
(=counted)
计算

" No dot defect "
“没有不良点”
(=ignored/not counted)
不计算

[2 adjacent dots defect]
两个相邻亮子像素缺陷

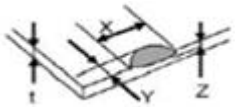
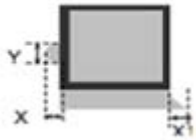






8.3 Appearance Inspection Criteria

8.3.1 TFT Panel defects

Defects 缺陷		Criteria 标准	Type 类型
Crack 裂纹		Not Allowed 不允许	Major 重要
CF Side Chipping CF 边崩裂		Y≤1/2 BM X Ignore 忽略 Z≤t	Minor 次要
TFT Side Chipping TFT 边崩裂		Y≤1mm X Ignore 忽略 Z≤t	Minor 次要
Corner Chipping 边角崩裂		X+Y≤4mm Z≤t	Minor 次要
Burr 毛刺		X+X1≤0.2mm 不影响功能、画面及组装	Minor 次要

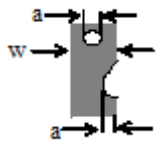
Remark:

1. 以上均不得影响线路功能及组装
2. 表面脏污及黏着可擦拭为 OK

8.3.2 Light leakage 漏光

Items 项目	Criteria of acceptance 验收模式	Inspection pattern 检查模式
Residual shadow 拖影残留	Less than 3 seconds 持续少于3秒	All patterns 所有检测画面
Light leakage 漏光	Not visible in 30° viewing cone 30° 视锥内检查不出来	Pure white/Pure black 纯白/纯黑

8.3.3 FPC defects , FPC 缺陷

Items 项目	Size (mm) 尺寸	Acceptance criteria 验收标准
FPC track defect FPC 线路缺陷 	Dent, Pinhole a ≤ w/3 缺损，针孔	No count 不计数
	Open circuit 开路	0
	Golden finger Oxidation, inerasable contamination 金手指氧化、擦不掉的玷污、	0

8.4 Malfunctioning

Not allowed are:

- Malfunctioning display: no picture, distinct block or line failure
- Malfunctioning backlight
- Excessive start up time > 3 seconds

8.5 Appearance

Not allowed are:

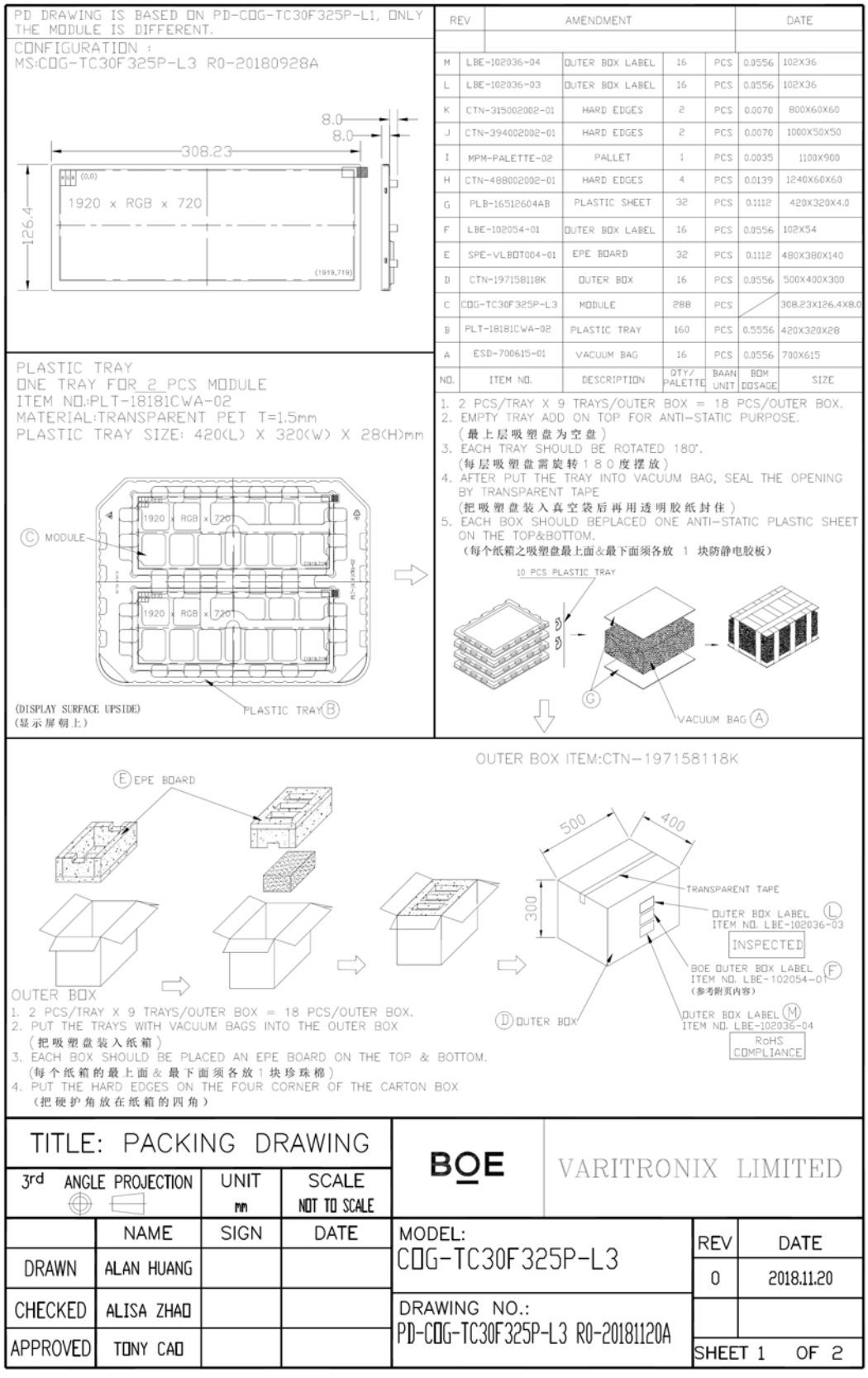
- Type and/or serial number (if any) wrong, missing or not legible
- Offensive surface damage
- Connectors damaged
- Stains within active area, such as fingerprints or adhesive residuals
- Dirty appearance (cannot be removed with a dry cloth)

8.6 Packing

Not allowed are:

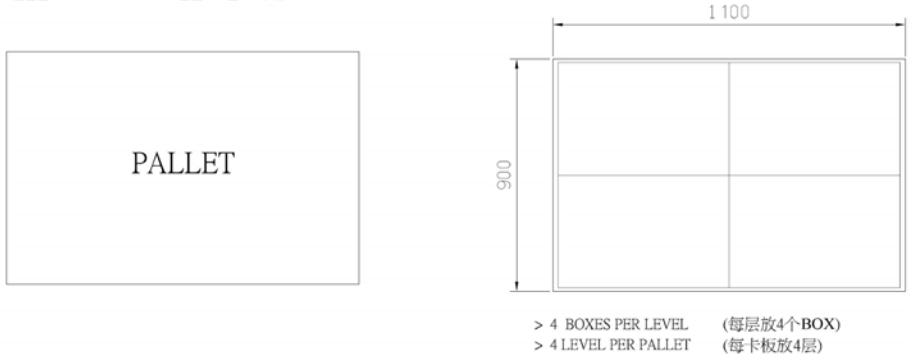
- Box damaged wet, badly taped or stapled causing the product not arriving in good condition at the customer
- Type or model number wrong (if any), missing or not legible

9. Packing Specification



REV	AMENDMENT					DATE
M	LBE-102036-04	OUTER BOX LABEL	16	PCS	0.0556	102X36
L	LBE-102036-03	OUTER BOX LABEL	16	PCS	0.0556	102X36
K	CTN-315002002-01	HARD EDGES	2	PCS	0.0070	800X60X60
J	CTN-394002002-01	HARD EDGES	2	PCS	0.0070	1000X50X50
I	MPM-PALETTE-02	PALLET	1	PCS	0.0035	1100X900
H	CTN-488002002-01	HARD EDGES	4	PCS	0.0139	1240X60X60
G	PLB-16512604AB	PLASTIC SHEET	32	PCS	0.1112	420X320X4.0
F	LBE-102054-01	OUTER BOX LABEL	16	PCS	0.0556	102X54
E	SPE-VLB0T004-01	EPE BOARD	32	PCS	0.1112	480X380X140
D	CTN-197158118K	OUTER BOX	16	PCS	0.0556	500X400X300
C	COG-TC30F325P-L3	MODULE	288	PCS		308.23X126.4X8.0
B	PLT-18181CWA-02	PLASTIC TRAY	160	PCS	0.5556	420X320X28
A	ESD-700615-01	VACUUM BAG	16	PCS	0.0556	700X615
NO.	ITEM NO.	DESCRIPTION	QTY/ PALETTE	BAAN UNIT	BOM DOSAGE	SIZE

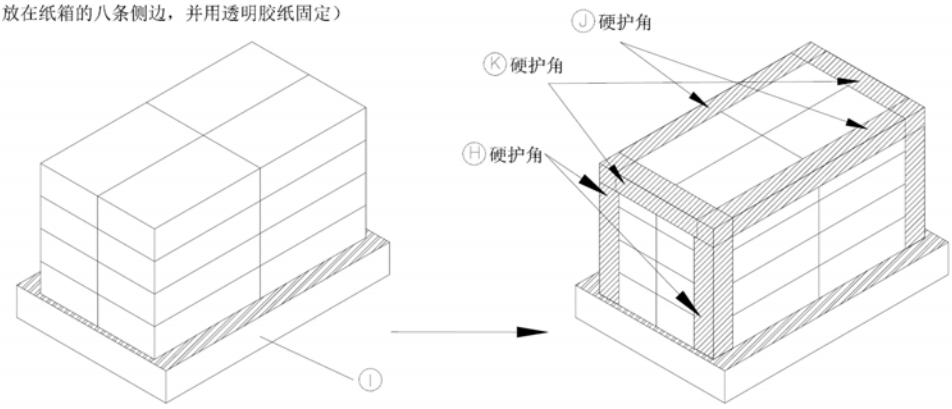
PALLET: MPM-PALETTE-02



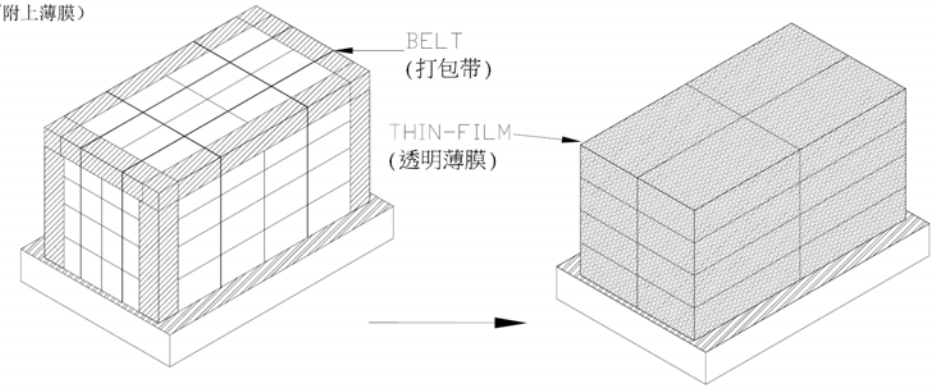
> 4 BOXES PER LEVEL (每层放4个BOX)
> 4 LEVEL PER PALLET (每卡板放4层)

2 PCS/TRAY X9 TRAYS/OUTER BOX X4 OUTER BOX/LEVEL X 4 LEVEL/PALLET = 288 PCS/PALLET.

1.STACK THE CARTON BOXES ON THE PALLET.
(把纸箱放在卡板上)
2.PUT THE HARD EDGES ON THE EIGHT SIDES, USE TRANSPARENT TAPE TO FIX.
(把纸护角放在纸箱的八条侧边，并用透明胶纸固定)



3. WRAP THE CARTONS BOXES WITH BELTS ON THE PALLET.
(用打包带将纸箱及卡板包扎好)
4.USE THE THIN FILM TO WRAP ALL THE CARTON BOXES.
(纸箱外面附上薄膜)

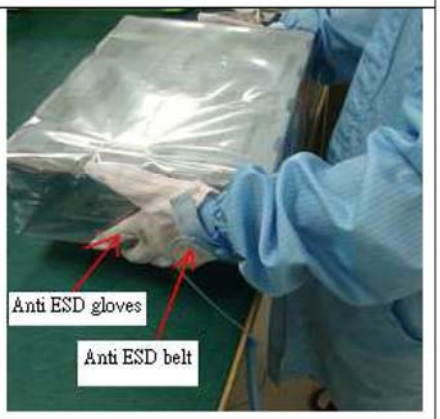


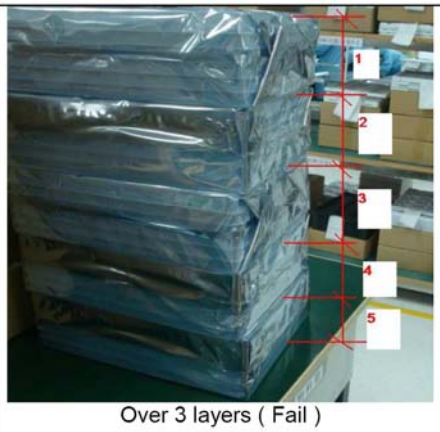
TITLE: PACKING DRAWING				BOE	VARITRONIX LIMITED	
3rd ANGLE PROJECTION		UNIT: mm	SCALE: NOT TO SCALE			
	NAME	SIGN	DATE	MODEL: COG-TC30F325P-L3	REV	DATE
DRAWN	ALAN HUANG				0	2018.11.20
CHECKED	ALISA ZHAO			DRAWING NO.: PD-COG-TC30F325P-L3 R0-20181120A		
APPROVED	TONY CAO				SHEET 2 OF 2	

10. Handling Cautions

10.1 Packing removal and handling requirement

<table>
<tr><th>Requirement</th><th>Wrong</th><th>Correct</th></tr>
<tr><td>Get one package each times & hold the package by both hands with proper ESD shielding</td><td> 

Hold the modules by one hand and without proper ESD shielding (Fail)</td><td> 

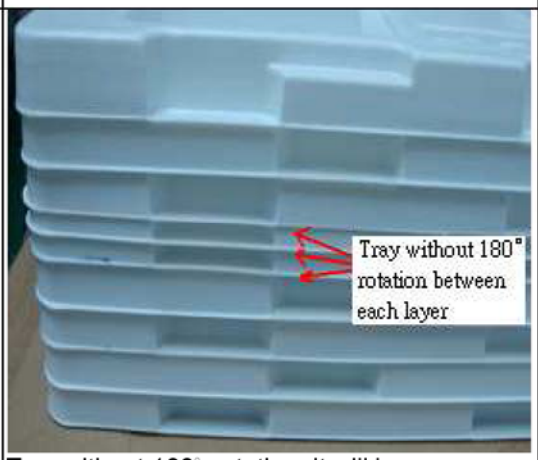
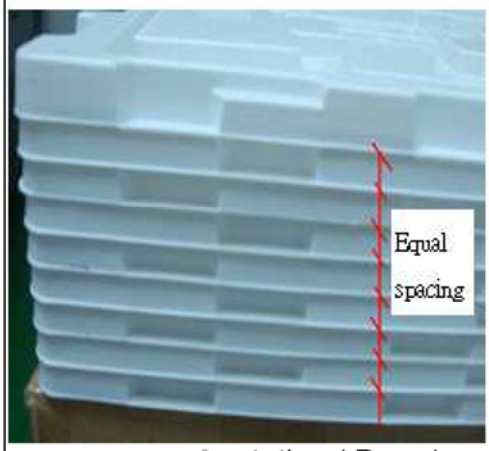
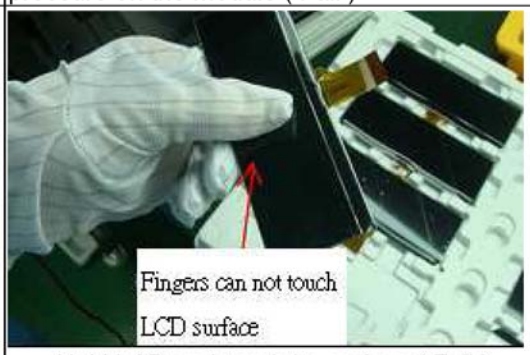
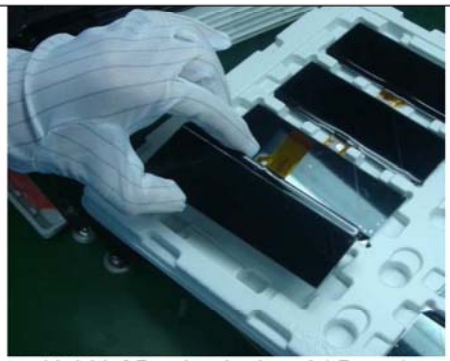
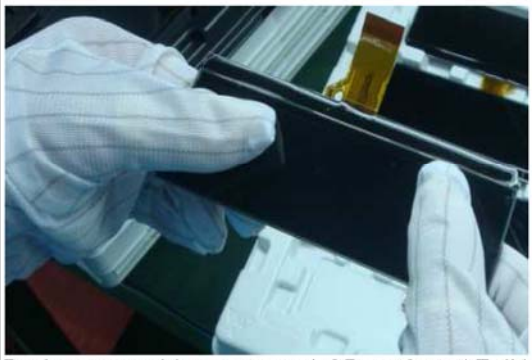
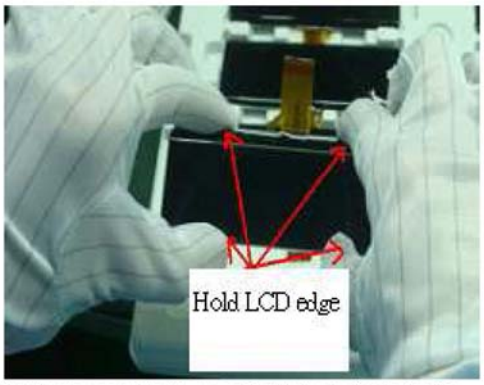
Hold the modules by both hands (Pass)</td></tr>
<tr><td>Prohibit to stack inner package over 3 layers</td><td> 

Over 3 layers (Fail)</td><td> 

Not exceed 3 layers (Pass)</td></tr>
<tr><td>Total packing tray height must within 40 cm</td><td> 

Over 40 cm (Fail)</td><td> 

Lower than 40 cm (Pass)</td></tr>
</table>

Requirement	Wrong	Correct
Packing tray must rotate 180° in each layer when stack together	 Tray without 180° rotation, It will have pressure on the module (Fail)	 Tray with 180° rotation (Pass)
Prohibit to touch LCD surface by fingers	 Hold LCD and touch its surface (Fail)	 Hold LCD edge by hand (Pass)
During assembly, prohibit to press on LCD surface by fingers, Must hold the LCD edges by both hands	 During assembly, press on LCD surface (Fail)	 During assembly, use both hands to hold LCD edge only (Pass)

10.2 Mounting of module

- Please power off the display module before it is disconnected or connected to the application.
- If the connection to the application is not good, following problems may result.
  1. Significant noise on signals between display module and application
  2. Unstable display performance
  3. Parts on the module will be heat up or damaged
- The LCD module must be handled with care.
- Protective film (Laminator) is applied on surface for protection against scratches and dirts. Please avoid electrostatic charge build-up when peeling off the laminator.

10.3 Precautions in Mounting

- When metal part of the LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth.
- Wipe off water drops or finger grease immediately when found. Prolonged contact with water may cause discoloration or spots.
- The LCD module contains glass which breaks or cracks easily if dropped or bumped on hard surface. Please handle with care.
- The display and IC on module are sensitive to electrostatic discharge; please make sure equipments and operators are properly ground before and during handling.

10.4 Adjusting module

- Adjusting volumes on the rear face of the module have been set to its optimal before shipment. Therefore, do not change any adjusted values. If adjusted values are changed, the display may not perform to specification.

10.5 Others

- Do not expose the module to direct sunlight or intensive ultraviolet rays for prolonged hours
- Store the module at room temperature condition.
- If LCD panel breaks, liquid crystal may escape from the panel. Avoid bringing it to eyes or mouth contact. When liquid crystal sticks on hands, clothes or feet, wash it out immediately with soap.
- Observe all other precautionary requirements as in handling general electronic components.
- Please adjust the voltage of common electrode as materials of attachment by 1 module.
- Do not expose the display module to harmful gases such as acid and alkali gasses, which will corrode electronic components.
- Do not disassemble the display module because it can cause permanent damage and will void the warranty agreement.

11. Definitions

Data sheet status	
Objective Specification	This data sheet contains target or goal specifications for product development.
Preliminary Specification	This data sheet contains preliminary data; supplementary data may be published later.
Product Specification	This data sheet contains final product specification.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating. Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operating of the device at these or any other conditions above those given in the Characteristics sections of the specification is not implied. Expose to limiting values for extended periods may affect device reliability. Device is functional within the limiting conditions doesn't imply the same performance over the covered conditions, customer is required to decide the best range for the final applications.	

12. Life Support Applications

These products are not designed for use in life saving appliances, devices or systems where malfunctioning of these products can reasonably be expected to result in personal injury. Customers using or selling these products for use in such applications do so at their own risk and agree full non liability of Varitronix Limited for any damages or losses resulting from such improper use or sale.