Specification

BT48141

BTHQ21605VSS-EMN-12-LED-WHITE 1DIE

Doc. No.: BTHQ 21605VSS-34

Version: March 2011

DOCUMENT REVISION HISTORY 1:

DOCUMENT REVISION FROM TO		DATE	DESCRIPTION	CHANGED BY	CHECKED BY
	A	2011.02.10	First Release. Based on Test Specification: a.) VL-TS- BTHQ 21605VSS -XX REV.T, 2011.02.10. b.) VL-QUA-012B, REV.Y, 2008.12.10. (According to VL-QUA-012B, LCD size is small because Unit Per Laminate=35 which is more than 15pcs/Laminate.)	LI WEI	CHEN JIN JUN
A	B	2011.03.28	Items 1 to 3 were updated: 1.) (Whole document) The numbers of whole pages & points were updated. 2.) (Page 13) LED Specifications was added. 3.) (Page 15) Packing removal and handling requirement was added.	LI WEI	NANCLE PAN

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CONTENTS

Specification
of
LCD Module Type
Item No.: BTHQ 21605VSS-34

1. General Description

- 16 characters (5x8 dots) x 2 lines STN Negative Blue Transmissive Dot Matrix LCD module.
- Viewing Angle: 12 O'clock direction.
- Driving scheme: 1/16 Duty, 1/5 bias.
- 'SITRONIX' ST7066U-0A-B (Die form) LCD Controller & Driver or equivalent.
- 'SITRONIX' ST7065C (Die form) LCD Segment Drivers or equivalent.
- White LED05 backlight.
- "RoHS" compliance.

2. Mechanical Specifications

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

Table 1

| Parameter	Specifications	Unit
Outline dimensions	84.0(W) x 44.0(H) x 14.0 MAX.(D)	mm
Viewing area	61.0(W) x 15.8(H)	mm
Active area	56.20(W) x 11.50(H)	mm
Display format	16 characters x 2 lines	-
Character size	2.95(W) x 5.55(H) (5 x 8 dots)	mm
Character spacing	0.60(W) x 0.40(H)	mm
Character pitch	3.55(W) x 5.95(H)	mm
Dot size	0.578(W) x 0.681(H)	mm
Dot spacing	0.015(W) x 0.015(H)	mm
Dot pitch	0.593(W) x 0.696(H)	mm
Weight	Approx. 45	grams

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Figure 1: Outline Drawing
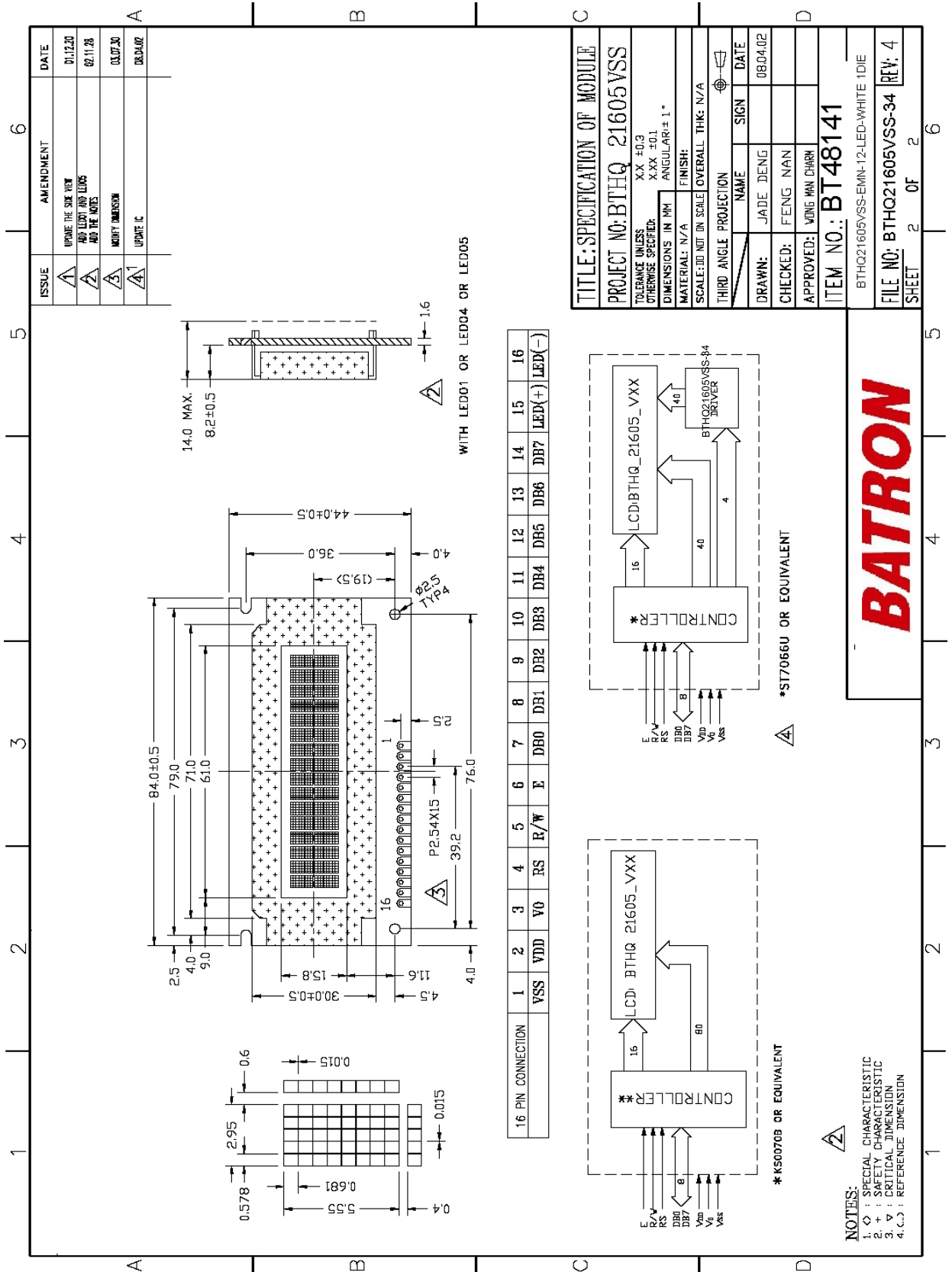
3.   Interface signals

Table 2

Pin No.	Symbol	Description
1	VSS	Ground (0V).
2	VDD	Power supply for logic (+5V)
3	V0	Power supply for LCD driver
4	RS	Register Select Input: "High" for Data register (for read and write) "Low" for Instruction register (for write), Busy flag, address counter (for read)
5	R/W	Read/Write signal: "High" for Read mode. "Low" for Write mode.
6	E	Enable. Start signal for data read /write.
7	DB0	Four low order bi-directional tristate data bus pins. Used for data transfer and receive between the MPU and the ST7066U. These pins are not used during 4-bit operation.
8	DB1	
9	DB2	
10	DB3	
11	DB4	Four high order bi-directional tristate data bus pins. Used for data transfer and receive between the MPU and the ST7066U. DB7 can be used as a busy flag.
12	DB5	
13	DB6	
14	DB7	
15	LED(+)	Anode of LED backlight
16	LED(-)	Cathode of LED backlight

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4. Absolute Maximum Ratings

4.1 Electrical Maximum Ratings – for IC Only

Table 3

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage (Logic)	VDD - VSS	-0.3	+7.0	V
Power Supply voltage (LCD drive)	VLCD=VDD – V0	-0.3	+10.0	V
Input voltage	Vin	-0.3	VDD +0.3	V

Note:

The modules may be destroyed if they are used beyond the absolute maximum ratings.

All voltage values are referenced to VSS = 0V.

4.2 Environmental Condition

Table 4

Item	Operating Temperature (Topr)		Storage Temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient Temperature	-20°C	+70°C	-30	+80	Dry
Humidity (Note 1)	90% max. RH for Ta ≤ 40°C <50%RH for 40°C <Ta≤ Maximum operating temperature				no condensation
Vibration (IEC 68-2-6) cells must be mounted on a suitable connector	Frequency: 10 ~ 55 Hz Amplitude: 0.75 mm Duration: 20 cycles in each direction.				3 directions
Shock (IEC 68-2-27) Half-sine pulse shape	Pulse duration: 11 ms Peak acceleration: 981 m/s^2 = 100g Number of shocks: 3 shocks in 3 mutually perpendicular axes.				3 directions

Note 1: Product cannot sustain at extreme storage conditions for long time.

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5. Electrical Specifications

5.1 Typical Electrical Characteristics

At Ta = 25 °C, VDD = 5V±5%, VSS=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	VDD-VSS		4.75	5.0	5.25	V
Supply voltage (LCD)	VLCD =VDD-V0	Ta=-20°C, Character mode,VDD =5.0V, Note 1	-	4.9	-	V
		Ta=+25°C, Character mode,VDD=5.0V, Note 1	4.6	4.9	5.0	V
		Ta=+70°C,Character mode, VDD =5.0V, Note 1	-	4.5	-	V
Input signal voltage for E,DB0-DB7,R/W,RS.	V_{IH}	"H" level	0.7 VDD	-	VDD	V
	V_{IL}	" L" level	-0.3	-	0.6	V
Supply Current (Logic & LCD)	IDD	Character mode, Note 1	-	1.0	1.5	mA
		Checkerboard mode, Note 1	-	1.1	1.6	mA
Supply Current (LCD)	I0	Character mode, Note 1	-	0.2	0.3	mA
		Checkerboard mode, Note 1	-	0.2	0.3	mA
Supply voltage of white LED05 backlight	VLED	Forward current =15 mA Number of LED dies =1.	3.1	3.3	3.5	V

Note 1:   There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

Note 2:   Do not display a fixed pattern for more than 30 min. because it may cause image sticking due to LCD characteristics. It is recommended to change display pattern frequently. If customer must fix display pattern on the screen, please consider to activate screen saver.

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5.2 Timing Specifications

At Ta = -20 °C To +70 °C, VDD = +5V±5%, VSS = 0V.

Table 6

Symbol	Characteristics	Test Condition	Min.	Typ.	Max.	Unit
Write Mode (Writing data from MPU to ST7066U)						
T_C	Enable Cycle Time	Pin E	1200	-	-	ns
T_{PW}	Enable Pulse Width	Pin E	140	-	-	ns
T_R, T_F	Enable Rise/Fall Time	Pin E	-	-	25	ns
T_{AS}	Address Setup Time	Pins: RS,RW,E	0	-	-	ns
T_{AH}	Address Hold Time	Pins: RS,RW,E	10	-	-	ns
T_{DSW}	Data Setup Time	Pins: DB0 - DB7	40	-	-	ns
T_H	Data Hold Time	Pins: DB0 - DB7	10	-	-	ns
Read Mode (Reading Data from ST7066U to MPU)						
T_C	Enable Cycle Time	Pin E	1200	-	-	ns
T_{PW}	Enable Pulse Width	Pin E	140	-	-	ns
T_R, T_F	Enable Rise/Fall Time	Pin E	-	-	25	ns
T_{AS}	Address Setup Time	Pins: RS,RW,E	0	-	-	ns
T_{AH}	Address Hold Time	Pins: RS,RW,E	10	-	-	ns
T_{DDR}	Data Setup Time	Pins: DB0 - DB7	-	-	100	ns
T_H	Data Hold Time	Pins: DB0 - DB7	10	-	-	ns

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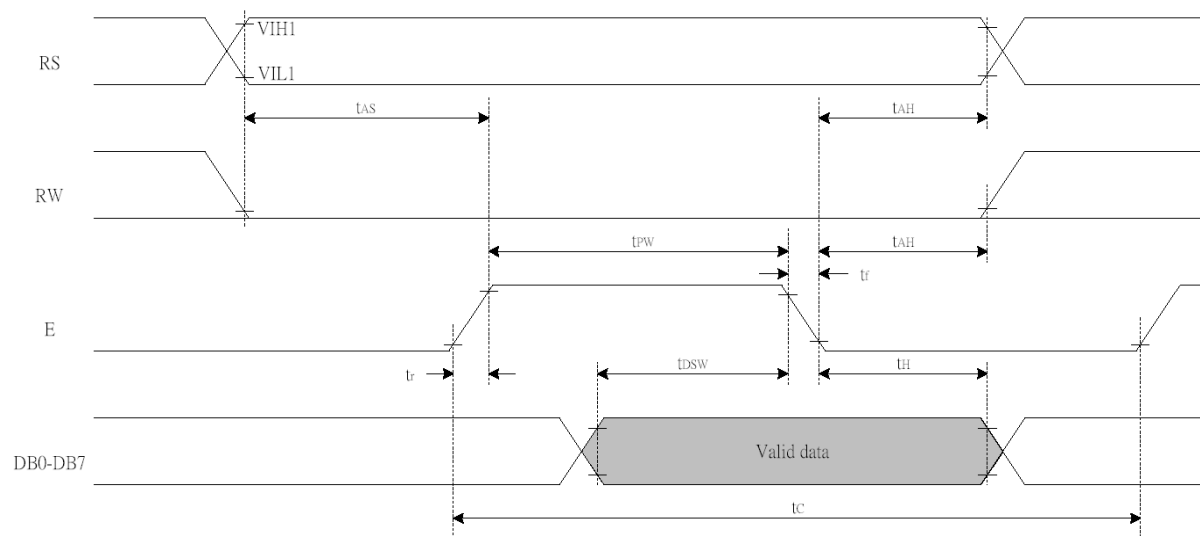
Figure 2: Writing data from MPU to ST7066U
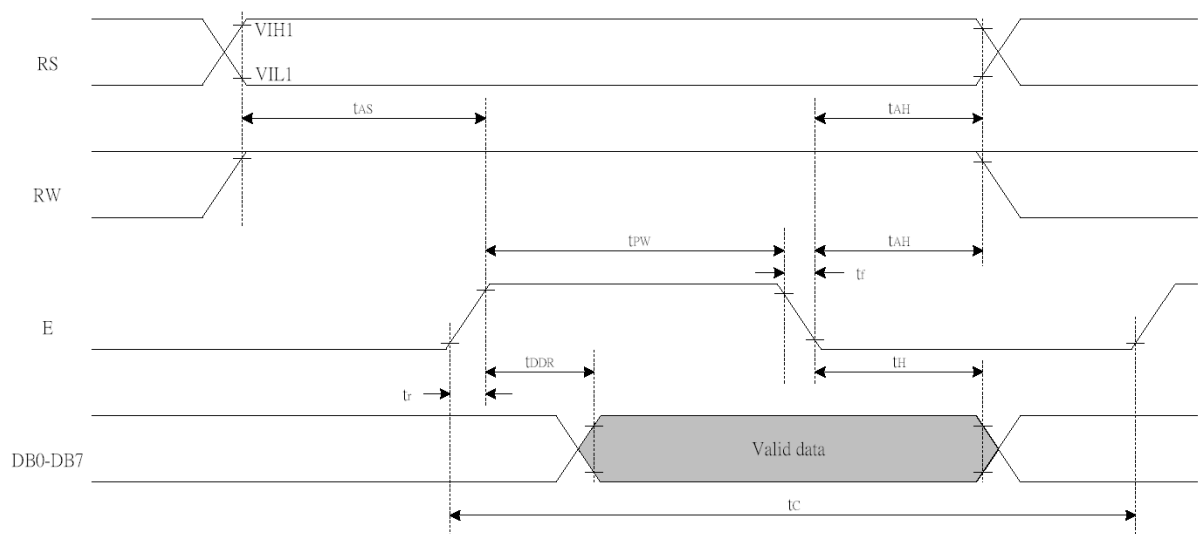
Figure 3: Reading data from ST7066U to MPU

5.3 Timing Diagram of VDD against V0.

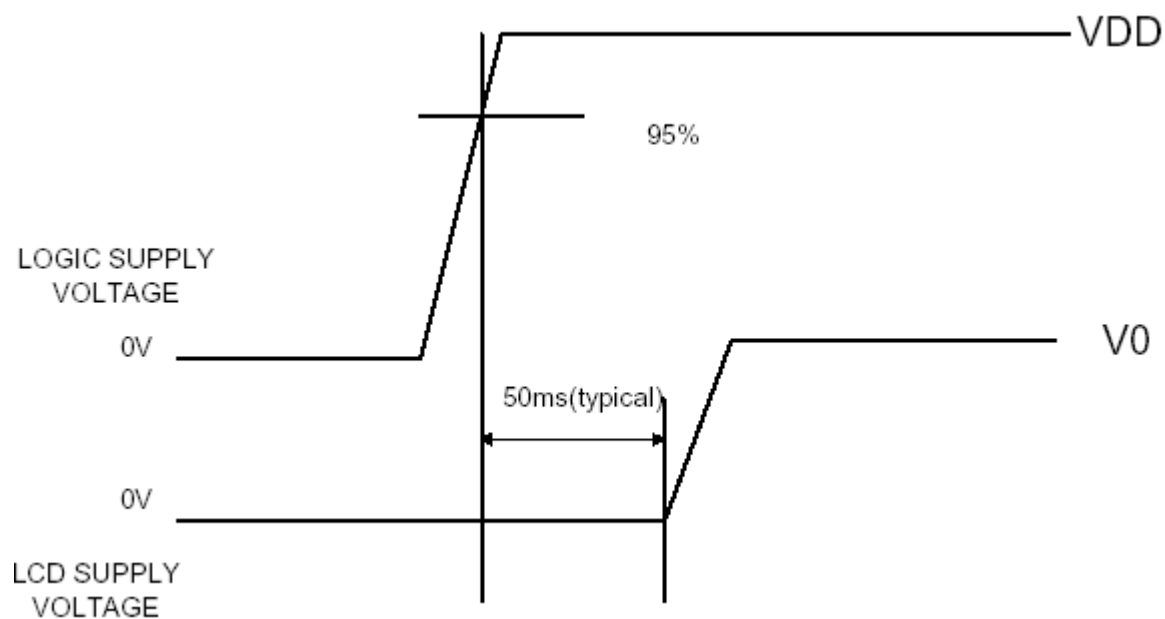Power on sequence shall meet the requirement of Figure 4, the timing diagram of VDD against V0.

Figure 4: Timing diagram of VDD against V0.

6. CGROM Character Code Table (ST7066U-0A)

NO.7066-0A

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7. Backlight Specifications

7.1 . 电路图 CIRCUIT DIAGRAM (LED   1X1=1   dies)

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    o A
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    ▼
    o K
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NOTE:
1.*:Important di
2.():Referenced
3.All parts are RoHS compliant.

7.2 . 保存和焊接条件 STORAGE & SOLDERING CONDITIONS:

- Store with care. Storing the units in bad condition will cause the reflector sheet and decrease it's adhesive power. Storage the products under the condition: temperature(25°C±10°C) and humidity(65%RH±20%RH) our recommendation.
- The soldering temperature is 260±5°C and soldering time should be less than 3 sec, and soldering iron power should be less than 30W.
- The soldering point should be far than 1.6mm from body.

- 注意保存.保存条件不好时,会降低反光膜 (扩散膜)与导光片(反射壳)的粘附力. 推荐保存条件为：温度25°C±10°C 湿度65%RH±20%RH
- 焊接温度260°C±5°C,焊接时间小于3秒, 烙铁功率小于30W.
- 焊接点应离产品实体大于1.6mm.

7.3 极限参数 ABSOLUTE MAXIMUM RATINGS

(除非特别说明,环境温度 Ta=25°C. Unless specified,The Ambient temperature Ta=25°C)

项目 Item	符号 Symbol	条件 Conditions	值 Rating	单位 Unit
* 极限直流正向电流 Absolute maximum forward current	Ifm		25	mA
* 脉冲驱动时极限正向电流 Peak forward current	Ifp	1 msec 脉冲,1/10占空比 1 msec Plus 10% Duty Cycle	60	mA
反向电压 Reverse Voltage	Vr		5	V
* 极限功耗 Power dissipation	Pd		75	mW

* 当工作温度高于25°C 时,Ifm,Ifp 和Pd 必须降低;电流降低率是 -0.36 mA/°c(直流驱动),或 -0.86 mA/°c(脉冲驱动),功耗降低率是 -0.75 mW/°C.产品的工作电流不能大于对应工作温度条件 Ifm 或Ifp 的 70 %.
For operation above 25°C,The Ifm Ifp & Pd must be derated,the Curent derating is -0.36 mA/°c for DC drive and -0.86 mA/°c for Pulse drive,the Power dissipation is -0.75 mW/°c. The product working current must not more than the 70 % of the Ifm or Ifp according to the working temperature.

7.4 电.光特性 ELECTRICAL-OPTICAL CHARACTERISTICS

(除非特别说明,环境温度 Ta=25°C. Unless specified,The Ambient temperature Ta=25°C)

项目 Item	符号 Symbol	最小值 min.	典型值 typ.	最大值 max.	单位 Unit	测定条件 Condition
正向电压 Forward Voltage	Vf	3.1	3.3	3.5	V	If= 15 mA
反向电流 Reverse Current	Ir			50	μA	Vr= 5.0 V
主波长 Peak wave length	λP				nm	If= 15 mA
频谱半宽度 Spectral Line Half width	△λ				nm	If= 15 mA
* 亮度 Luminance	Lv	270	360		cd/m²	If= 15 mA

* 反向电流的测定为测试反向静电保护二极管是否导通 而不是测发光LED的反向漏电流

* 亮度值是 个测量点的平均值,亮度最大值比最小值一般小于1.25(最大1.33).使用BM-7亮度色度仪测量,测量光圈 ø 5 mm.
The luminance is the average value of points, and the Lvmax./Lvmin. is less than 1.25 typical (max 1.33).The measurement instrument is BM-7 luminance colorimeter. The aperture is ø 5 mm.
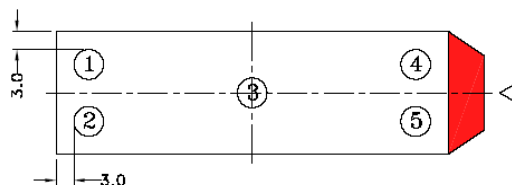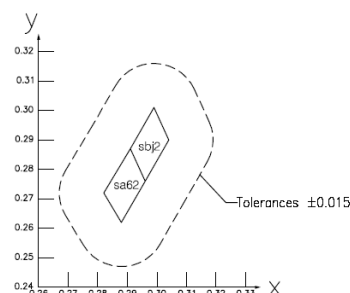
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|	Rank	sa62/sbj2	Limiting	Region
X	0.288	0.282	0.299	0.304
Y	0.262	0.272	0.301	0.290

注: 色度坐标值公差±0.015

7.5 STATIC ELECTRICITY AND SURGE

* Static electricity and surge will damage the LEDs.   It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.
* All devices, equipment and machinery must be properly grounded.
* When inspecting own final products on which LEDs were mounted, it is recommended to check also whether the mounted LEDs are damaged by static electricity or not. It is easy to find static-dimaged LEDs by light emission test at lower current (below 1mA is recommended). Damaged LEDs will show some unusual characteristics such as leak current remarkably increases, starting forward voltage becomes lower, or the LEDs get unlighted at the low current.

7.6 LED ELECTRICAL CHARACTERISTICS

(1) 正向电流–周围温度
Forward Current VS. Ambient Temperrature
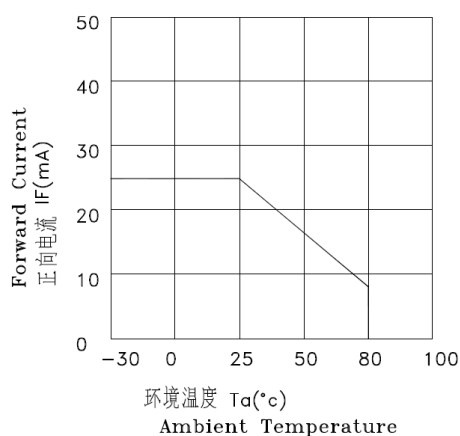
(2) 正向电流–正向电压特性
Forward Current VS. Forward Voltage
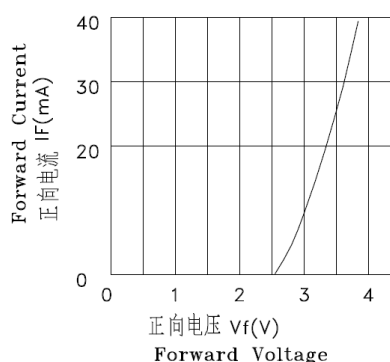
8. Packing removal and handling requirement

Requirement	Wrong	Correct
Get one package each times & hold the package by both hands with proper ESD shielding		Hold the modules by both hands (Pass)
Prohibit to stack inner package over 3 layers	Over 3 layers (Fail)	Not exceed 3 layers (Pass)
Total packing tray height must within 40 cm	Over 40 cm (Fail)	Lower than 40 cm (Pass)

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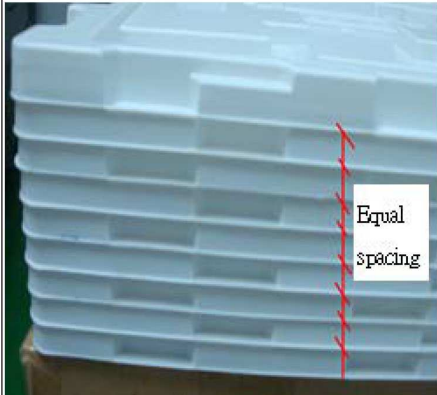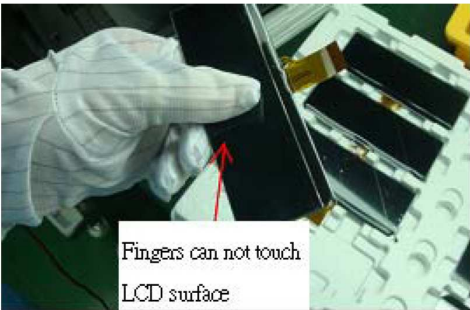Midas Components Limited, Electra House, 32 Southtown Road, Great Yarmouth, Norfolk, NR31 0DU
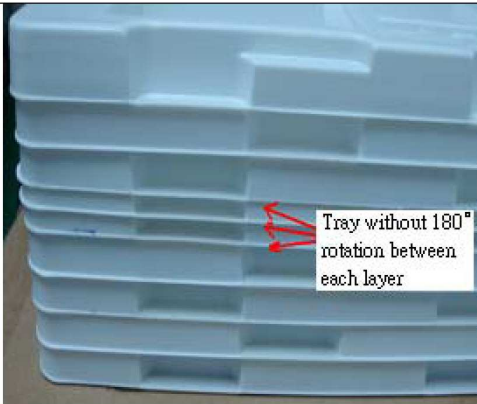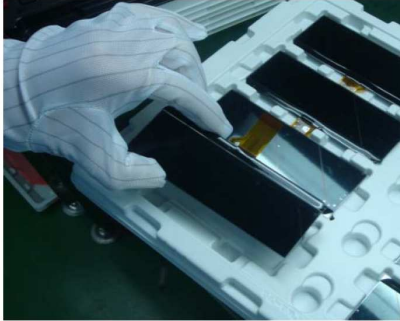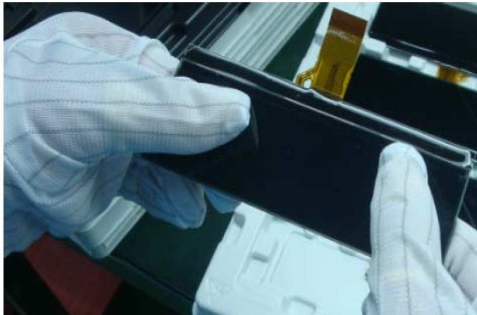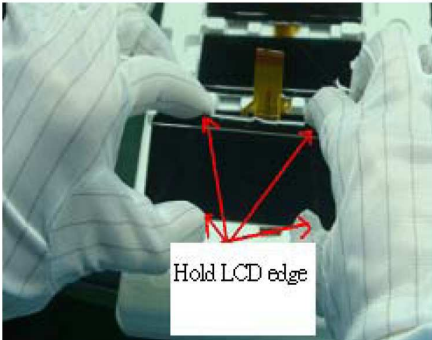
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Requirement	Wrong	Correct
Packing tray must rotate 180° in each layer when stack together	Tray without 180° rotation, It will have pressure on the module (Fail)	Tray with 180° rotation (Pass)
Prohibit to touch LCD surface by fingers	Hold LCD and touch 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)

Remark: For all ISTN display, it is extremely sensitive to external pressure, beside above handling requirement, special care to avoid pressure application on LCD surface is necessary.

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