



Chip LED 1608

Bluish White LED

ETG-L0603JOBWT-4T

1. FEATURES

- **Package:** SMD PCB type
- **Size:** small package outline(L*W*H) of 1.6*0.8*0.4 mm
- **Feature of the device:** extremely wide viewing angle; ideal for backlighting and coupling in light guides
- **Wavelength:** X=0.20, Y=0.14 (IF=20mA)
- **Technology:** InGaN dice with Color Diffusion
- **ESD:** up to 150V acc. to EOS/ESD-5.1-1993
- **Viewing angle:** lambertian emitter(130°)
- **Grouping parameter:** luminous intensity, wavelength
- **Assembly methods:** suitable for all SMT assembly methods
- **Soldering methods:** IR reflow soldering
- **Preconditioning:** acc. to JEDEC level 2
- **Taping:** 8mm tape with 4000/reel, ϕ 180mm

2. APPLICATIONS

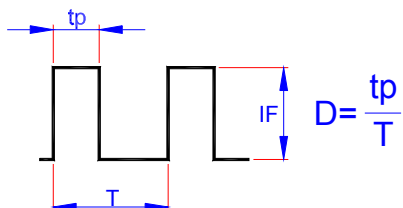
- flat backlighting(LCD, cellular phones, switches, displays)
- toys

3. SPECIFICATIONS

(1) Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Value	Unit
DC Forward Current	I_F	30	mA
Peak pulse current ($t_p \leq 0.1\mu s$, Duty cycle=0.1)*1	I_{pulse}	100	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_d	78	mW
LED junction Temperature	T_j	100	°C
Operating Temperature	T_{op}	-30 ~ +80	°C
Storage Temperature	T_{stg}	-40 ~ +85	°C

*1 Duty cycle:



(2) Characteristics (Ta=25°C)

Luminous Intensity Ranks

Intensity Group	Color of Emission	Luminous Intensity(mcd) @I _F =5mA
1	Bluish White	45.0 ~ 72.0
2	Bluish White	72.0 ~ 115.0

Dominant Wavelength Ranks

Wavelength Group	Color of Emission	Dominant Wavelength(nm) @I _F =5mA
W	Bluish White	X:0.19 ~ 0.22, Y:0.13 ~ 0.15
X	Bluish White	X:0.22 ~ 0.25, Y:0.13 ~ 0.15

Forward Voltage Ranks

Voltage Group	Forward Voltage(V) @5mA
V01	2.6 ~ 2.7
V02	2.7 ~ 2.8
V03	2.8 ~ 2.9
V04	2.9 ~ 3.0
V05	3.0 ~ 3.1

Note

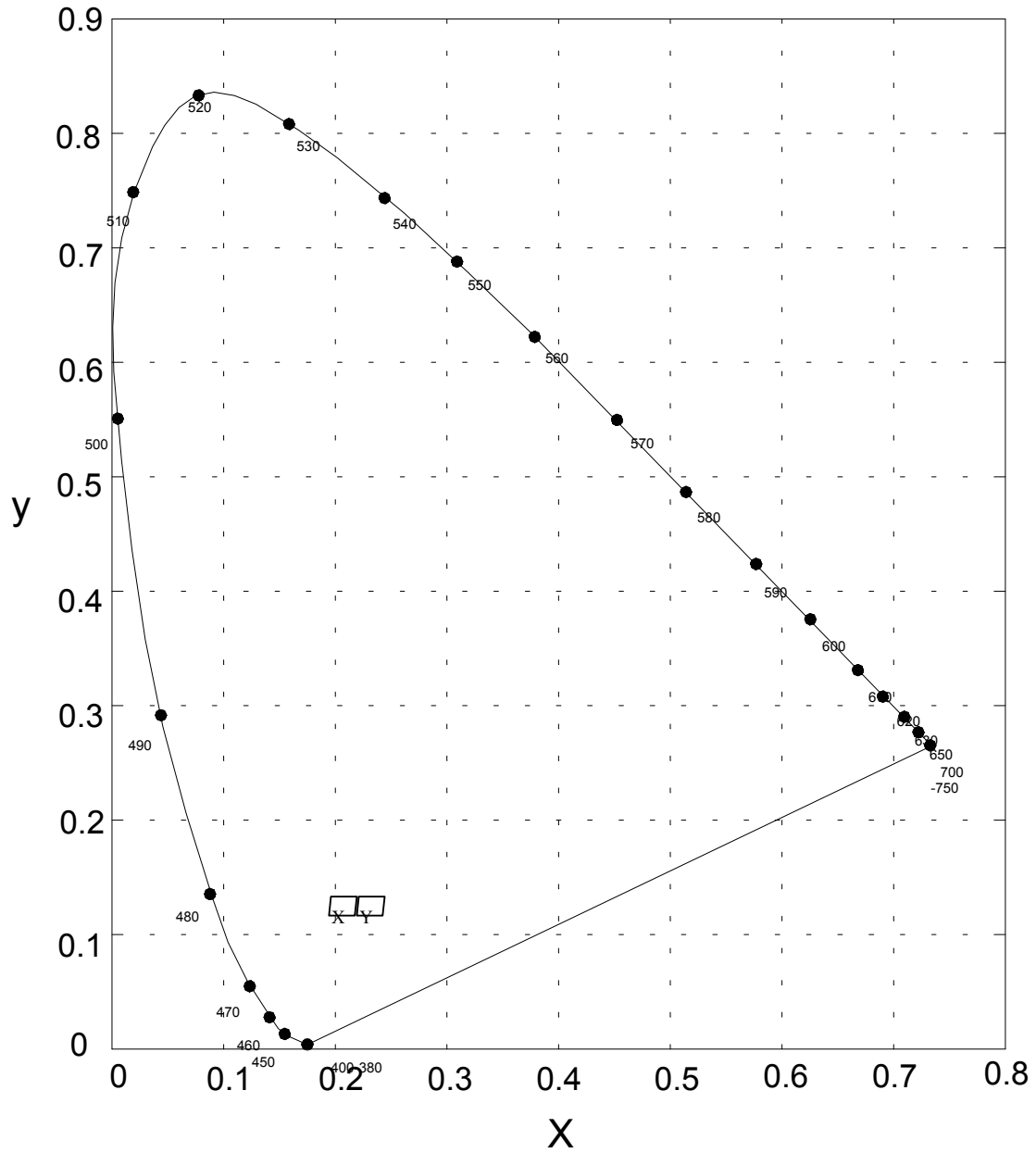
- A. Luminous Intensity is measured with an accuracy of ±11%.



- B. Color selection acc. to chromaticity coordinates groups and an accuracy of ± 0.01 .
- C. Forward Voltage is measured with an accuracy of $\pm 0.1V$.
- D. The standard shipping format for serial types all groups. Individual groups are not available.
- E. No packing unit 1 tape ever contains more than one group.



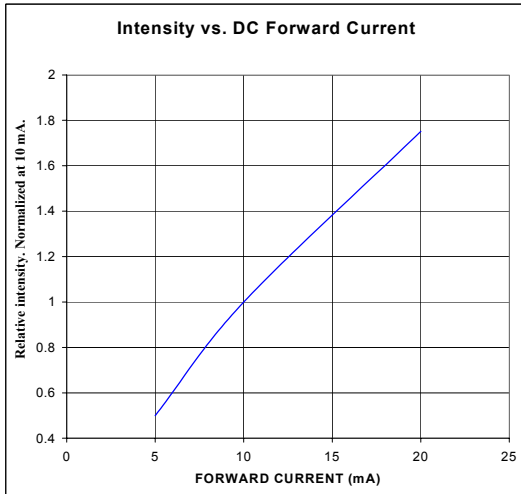
CIE Chromaticity Diagram



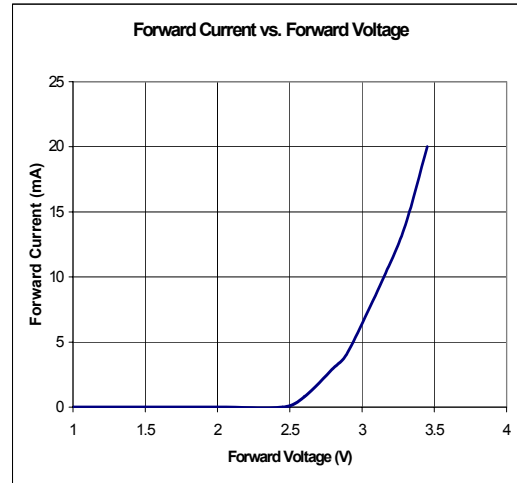
* The C.I.E. 1931 chromaticity diagram

4. TYPICAL INITIAL OPTICAL/ELECTRICAL CHARACTERISTICS

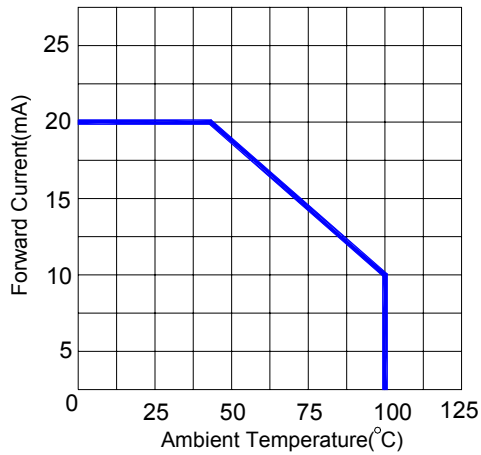
Relative Luminous Intensity
vs. Forward Current



Forward Current
vs. Forward Voltage



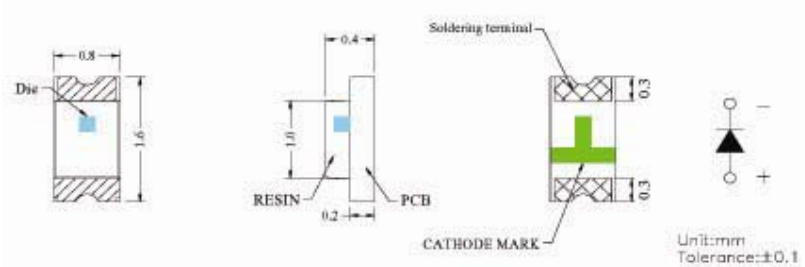
Max Forward Current
vs. Operating Temperature





5. OUTLINE DIMENSIONS AND MATERIALS

Package Outline



Dimensions are specified in mm unit and an accuracy of ± 0.1 mm

Material as follows

- Package : BT Resin
- Encapsulating Resin : Epoxy Resin
- Electrodes : Au Plating



7. RELIABILITY

Product Reliability Qualification Plan

All units are to be pre-conditioned before proceeding to the respective test.

	Conditions
<ul style="list-style-type: none">• Pre-conditioning as per JEDEC L• 2A requirement (JESD22-A113-B)• IR re-flow soldering on FR4 board.	<ul style="list-style-type: none">- Bake @ 125(C, 24 hrs.- Storage @ 60(C/60% RH, 120 hrs.- 3xIR re-flow soldering at 235(C/10 sec. min.(Jedec)

Failure criteria

- Electrical Failures:
 - VF shift $\geq 10\%$
 - VR $> 5V@10uA$
- Light Output Degradation:
 - % IV shift $\leq -50\%$ max
 $\leq -35\%$ average
- Visual Failures:
 - Broken or damaged package or lead
 - Solder ability $< 95\%$ wetting
 - Dimension out of tolerance



Reliability Test Items and Results

IR/Convective Reflow Process at Peak Temperature 235°C±5°C for 10-20 sec
 Pre-conditioning @ 60°C/60%RH for 120 hours

No	Test Item	Stress Condition	Sample Size	Test Point	Test Result
1	Ambient life test (ALT)	a) Pre-conditioning b) IR re-flow soldering - $T_a = 25^\circ\text{C}$, $I_F = 10 \text{ mA}$	100	0 hrs 168 hrs 504 hrs 1000 hrs	100/100 pass
2	High temperature humidity elevated life test(ELT)	a) Pre-conditioning b) IR re-flow soldering - $T_a = 85^\circ\text{C}$, 85% RH, $I_F = 10 \text{ mA}$	100	0 hrs 168 hrs 504 hrs 1000 hrs	100/100 pass
3	Pulse mode life test	a) Pre-conditioning b) IR re-flow soldering - $T_a = 25^\circ\text{C}$ $I_F = 100 \text{ mA}$, $t_p=1\text{ms}$, $D=0.1$	100	0 hrs 168 hrs 504 hrs 1000 hrs	100/100 pass
4	Thermal shock (TSK)	a) Pre-conditioning b) IR re-flow soldering c) Liquid-to-liquid, -55°C to 100°C, 15 min dwell, < 10 sec transfer	100	0x, 50x, 100x, 500x	100/100 pass
5	High temperature storage(HTS)	100°C	100	0 hrs 168 hrs 504 hrs 1000 hrs	100/100 pass
6	Low temperature storage(LTS)	-40°C	100	0 hrs 168 hrs 504 hrs 1000 hrs	100/100 pass



8. CAUTIONS

Storage

- (1) Calculated shelf life in sealed bag: 12 months at $<40^{\circ}\text{C}$ and $<90\%$ relative humidity (RH)
- (2) Peak package body temperature: 240°C
- (3) After bag is opened, devices that will be subjected to reflow solder or other high temperature process must.
 - A. Mounted within: 672 hours of factory conditions $\leq 30^{\circ}\text{C}/60\%$
 - B. Stored at $< 10\%$ RH
- (4) Devices require bake, before mounting, if:
 - A. Humidity Indicator Card is $> 10\%$ when read at $23\pm 5^{\circ}\text{C}$
 - B. 3A or 3B not met.
- (5) If baking is required, devices may be baked for 20 hours at $60\pm 5^{\circ}\text{C}$

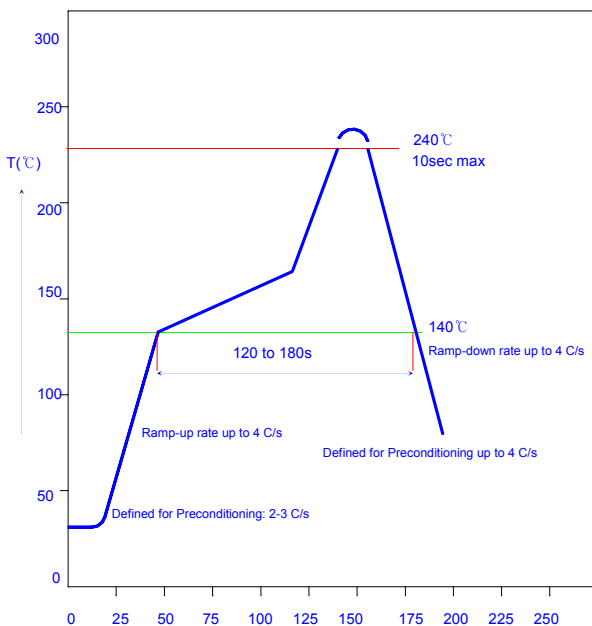
Note

If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure.

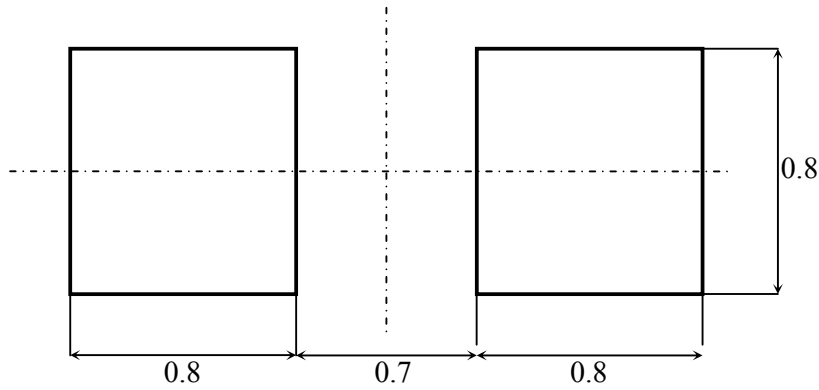
Level and body temperature defined by IPC/JEDEC J-STD-020

Soldering

IR Reflow Soldering profile



Recommended Solder Pad



9. REVISION HISTORY

Version	Page	Subjects (major modified since last revision)	Date
1.0		New part number	2003-04-16
1.1		Fixed specification	2003-07-10

10. NOTE

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