Customer : ZTE

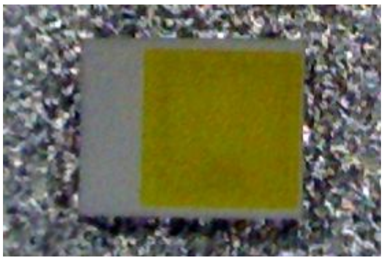
PRELIMINARY SPECIFICATION [DD412BZ-A]

Seoul semiconductor			Customer
Drawn by	Checked by	Approved by	Approved by

Enabling mobile flash with high flux

DD412BZ-A

Flash LED



RoHS HF

Product Brief

Description

- 1-chip in one package
- SMT solderability
- Own patent reserved
- RoHS Compliant
- Low Thermal Resistance
- Pb-free Reflow Soldering application

Features and Benefits

- 2.04mm x 1.64mm x 0.71mm
- White colored SMT package

Key Applications

- Camera cell phones
- PDA’s
- Digital still cameras

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Performance Characteristics

Table 1. Absolute Maximum Ratings (T_a = 25ºC)

Parameter	Symbol	Value	Unit
Power Dissipation	P_d *1	1050	mW
DC Forward Current	I_F	300	mA
Peak Forward Current	I_{FM} *2*3	1000	mA
Operating Temperature	T_{opr}	-40 ~ +85	ºC
Storage Temperature	T_{stg}	-40 ~ +100	ºC
Junction Temperature	Tj max	135ºC / 150 Pulse	ºC
ESD Sensitivity (HBM)	-	8	KV
MSL Level	-	2a	-

Notes :

(1) Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
(2) 1/10 Duty Cycle @ 300ms
(3) Maximum drive current depends on junction temperature.

Table 2. Electro Optical Characteristics (T_a = 25ºC)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage*1	V_F	I_F =300mA	2.70	-	3.50	V
		I_F =1000mA	3.40	-	4.00	
Turn on Voltage	V_{TO}	I_F =1μA	1.7	-	2.9	
Luminous Flux*2	Φ_v	I_F =1000mA	280	-	320	lm
Color Temperature	CCT	I_F =300mA	5000	-	6000	K
Viewing Angle	$2\theta_{½}$ *3	Cx		120		deg.
		Cy		120		deg.
Thermal Resistance		I_F =300mA		13		K/W

Notes :

(1) Forward voltage measurement allowance is ±0.1V
(2) Φv is total luminous flux output as measured with an integrating sphere.
Tolerance : Φv ±10 %, VF ±0.1 V, Color Coordinate ±0.01
Pulse condition: t = 20ms
(3) 2θ1/2 is the off-axis where the luminous intensity is 1/2 of the peak intensity.

Characteristic Diagram

Fig 1. Color Spectrum, T_a = 25℃, I_F = 1000mA, RH30%

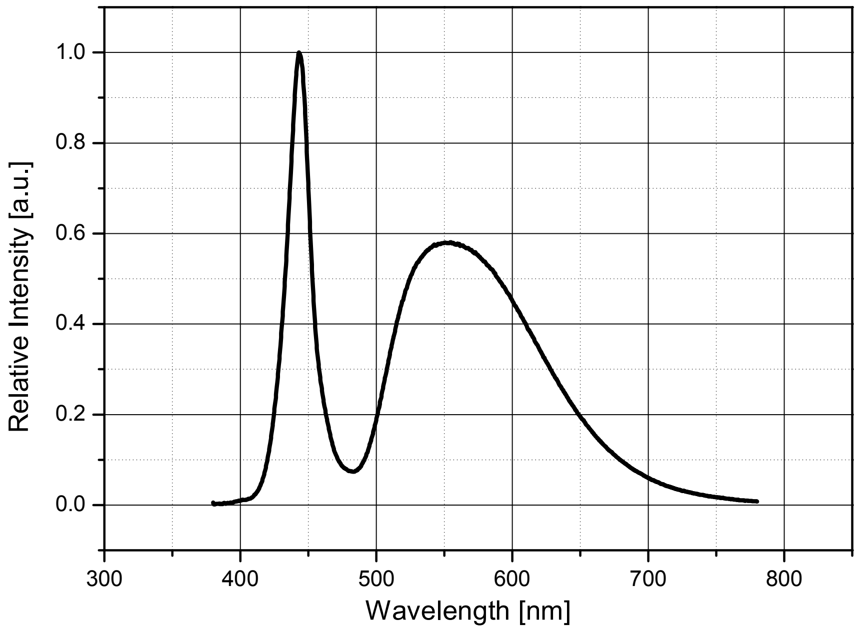
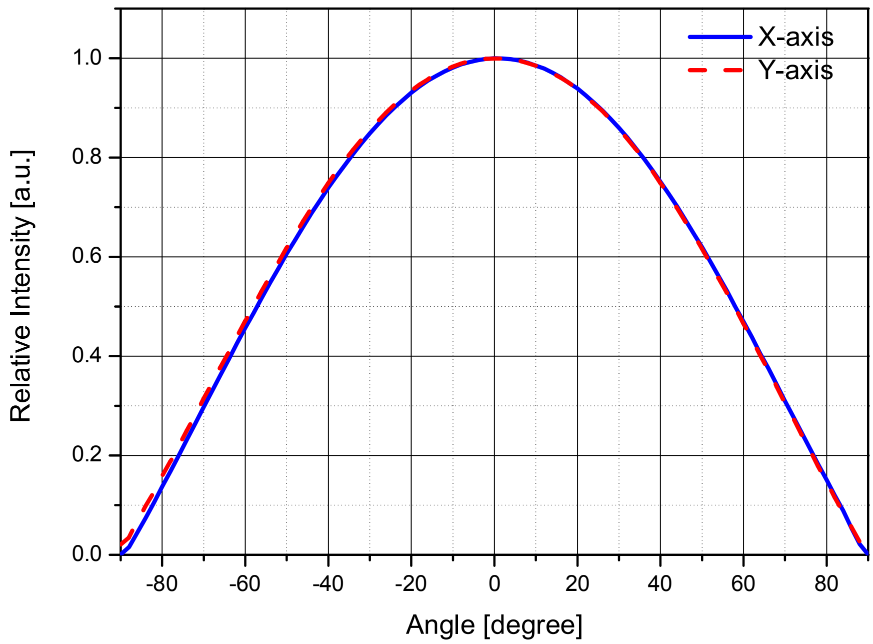


Fig 2. Radiant pattern, T_a = 25℃, I_F = 1000mA



Characteristic Diagram

Fig 3. Forward Voltage vs. Forward Current , T_a = 25℃

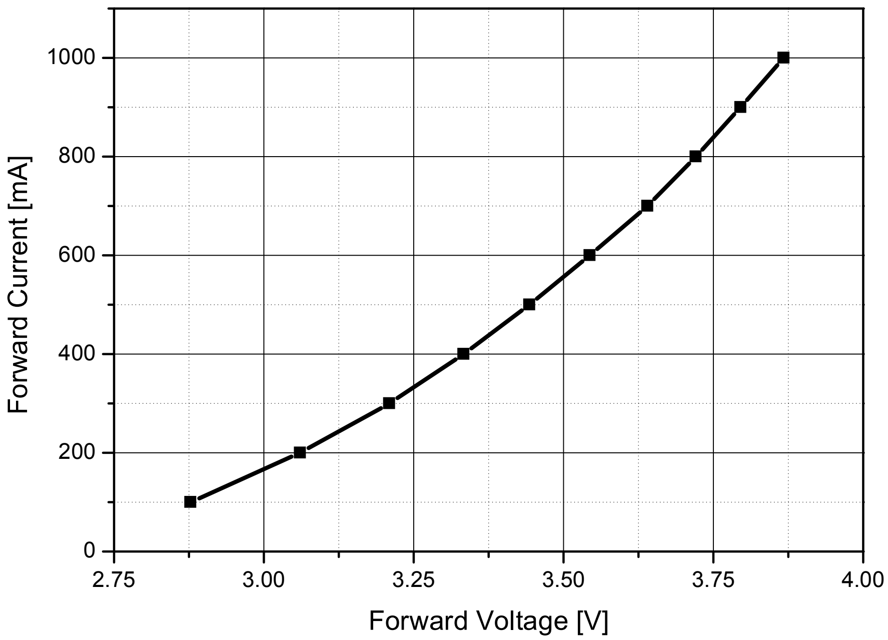
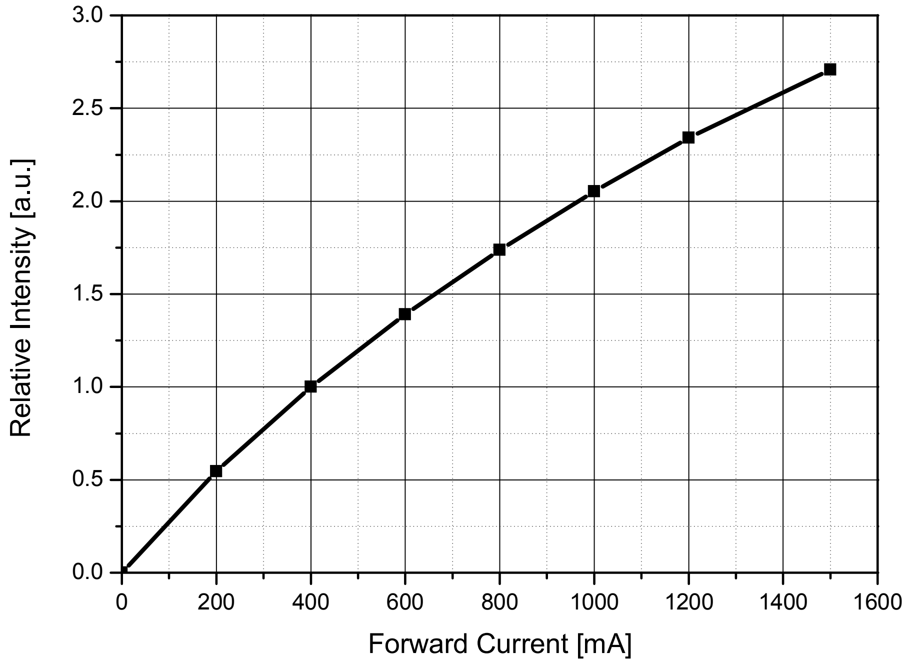


Fig 4. Forward Current vs. Relative Luminous Intensity, T_a = 25℃



Characteristic Diagram

Fig 5. Forward Current vs. CIE X, Y Shift, T_a = 25℃

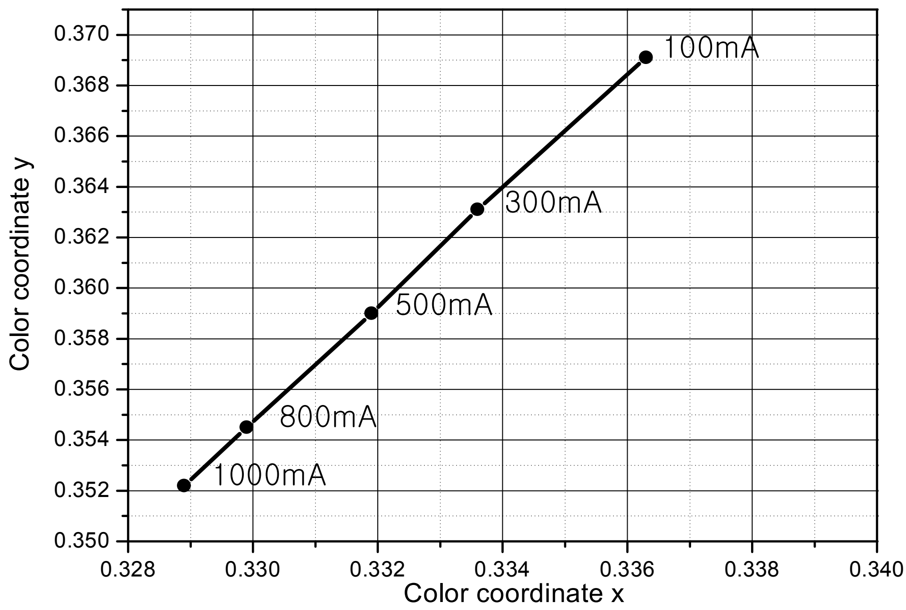
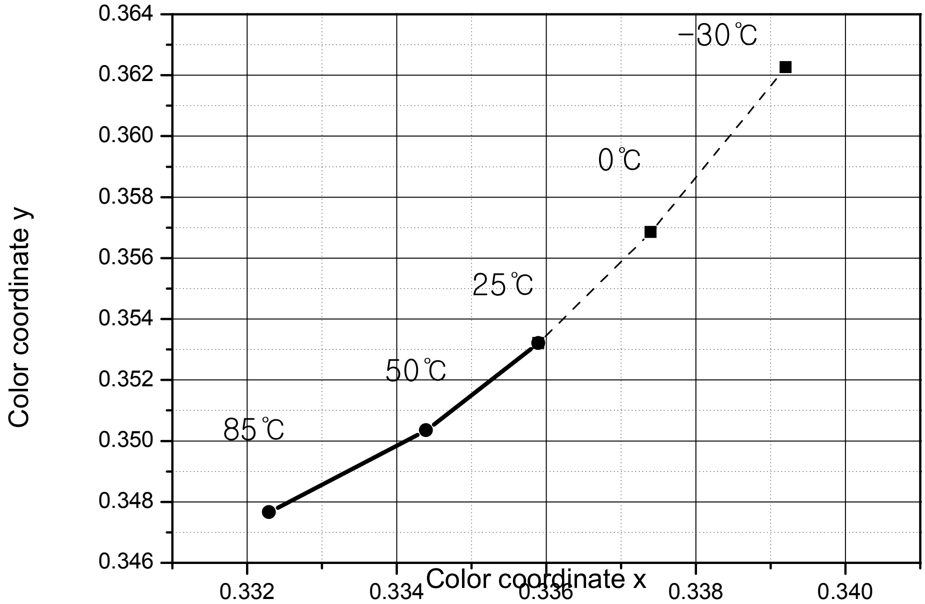


Fig 6. Color Coordinate vs. Ambient Temperature, I_F =300mA



Characteristic Diagram

Fig 7. Forward Voltage vs. Ambient Temperature, I_F =1000mA

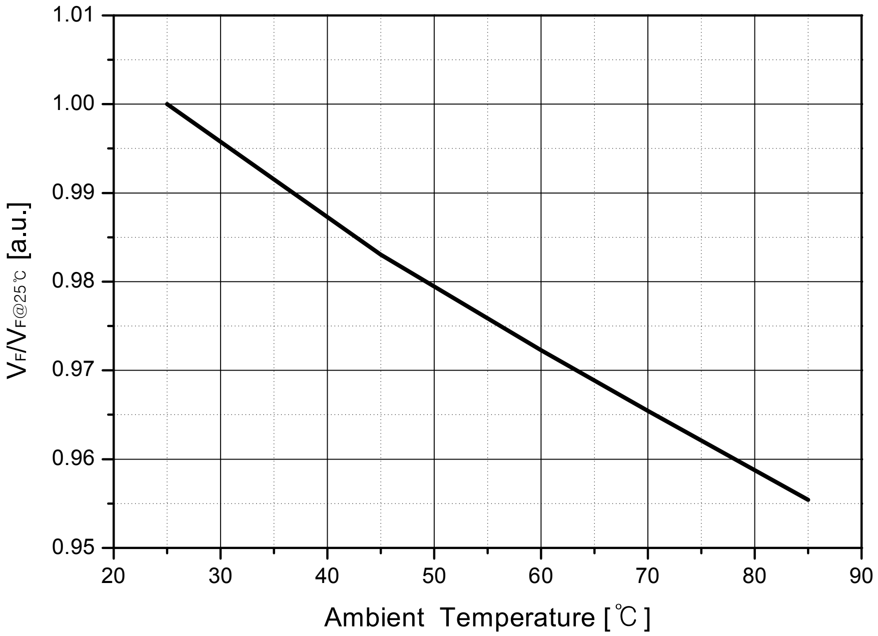
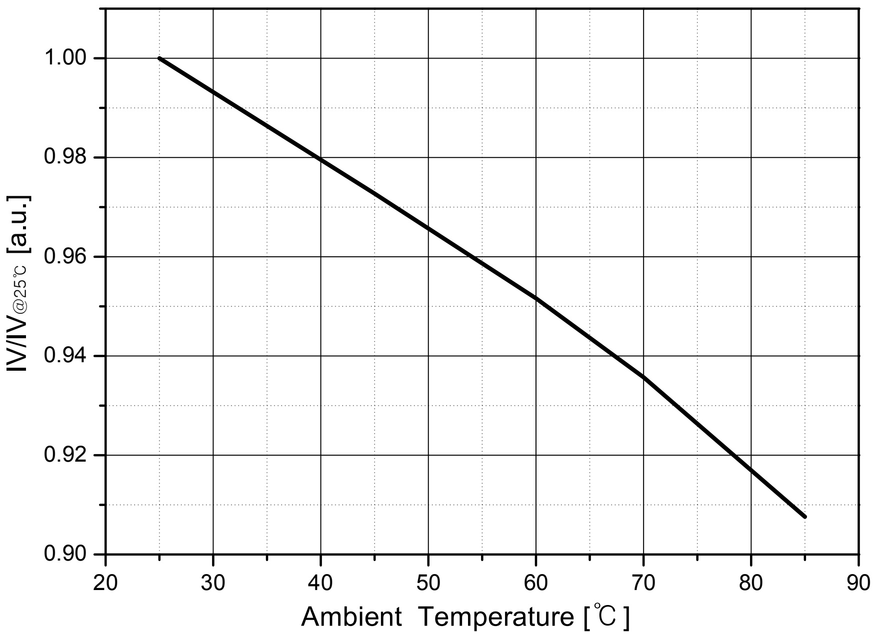


Fig 8. Relative Luminosity vs. Ambient Temperature, I_F =1000mA



Characteristic Diagram

Fig 9. Allowable Forward Current vs. Ambient Temperature

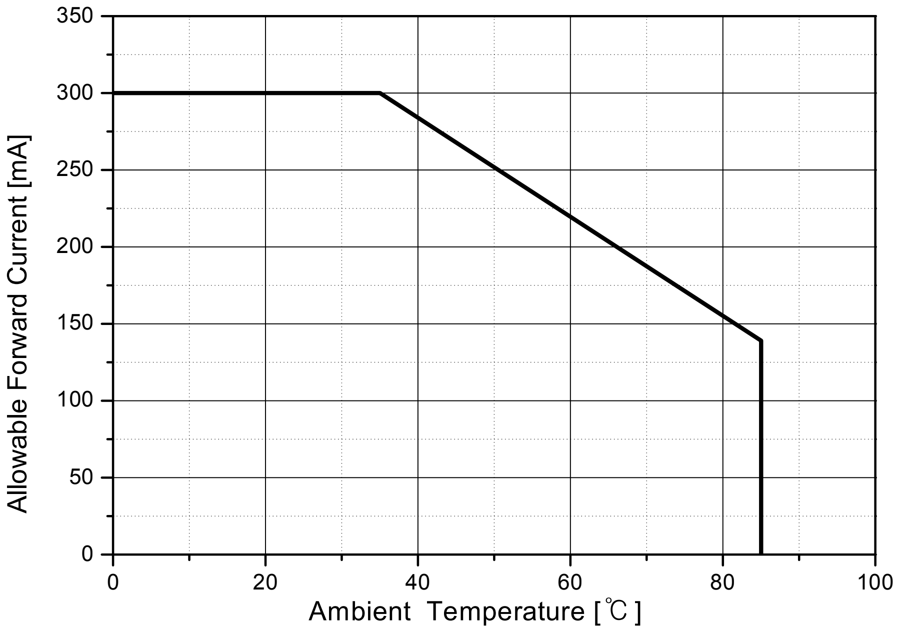
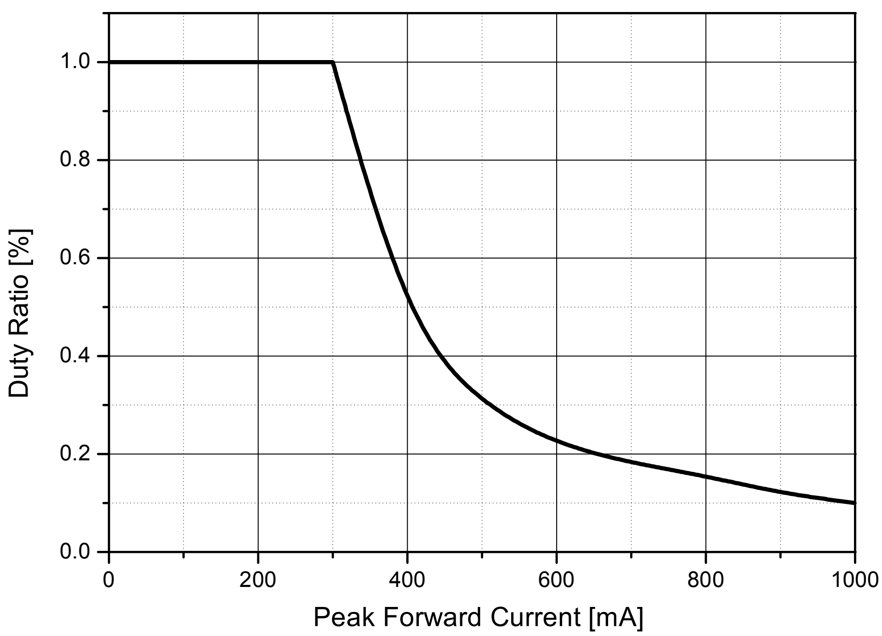


Fig 10. Allowable Forward Current vs. Duty Ratio, T_a = 25℃, Tw=0.3s



Reliability Test

Table 3. TEST ITEMS AND RESULTS

Item	Reference	Test Condition	Duration / Cycle	Number of Damage
High Temperature Life Test	-	T_a = 85℃, RH = 85%, I_F = 300mA	168 Hours	0/12
High Temperature Life	-	T_a = 85℃, I_F = 300mA	1,000 Hours	0/12
High Humidity Heat Life Test	-	T_a = 85℃, RH = 85%, I_F = 1000mA 300ms,1/10 duty	30,000 cycle	0/12
Thermal Shock	-	T_a = -40℃ (30MIN) ~ 85℃ (30MIN)	100 Cycle	0/40
Temperature Cycle	JEITA ED-4701 100 105	-40℃ ~ 25℃ ~ 100℃ ~ 25℃ (30min) (5min) (30min) (5min)	100 cycle	0/12

Table 4. Criteria for Judging the Damage

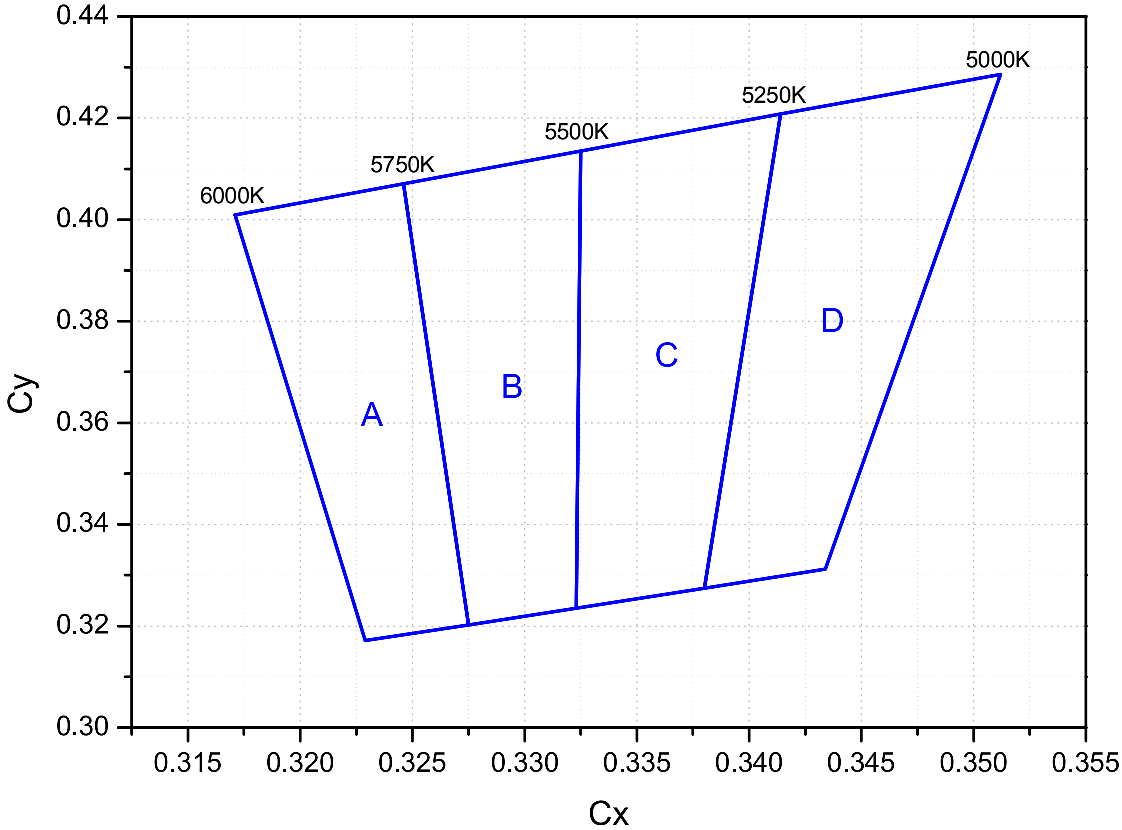
Item	Symbol	Condition	Criteria for Judgment	
			MIN	MAX
Forward Voltage	V_F	I_F =150mA	I.V. *1 - 0.2	I.V. *1 + 0.2
		I_F =1uA	1.7	-
Luminous Intensity	I_V	I_F =150mA	I.V. × 0.7	-

Notes :

*(1) I.V. : Initial Value

Color Bin Structure

CIE Chromaticity Diagram



RANK	x1 / x3	y1 / y3	x2 / x4	y2 / y4
A	0.3171	0.4009	0.3246	0.4071
	0.3275	0.3202	0.3229	0.3171
B	0.3246	0.4071	0.3325	0.4135
	0.3323	0.3235	0.3275	0.3202
C	0.3325	0.4135	0.3414	0.4208
	0.3380	0.3274	0.3323	0.3235
D	0.3414	0.4208	0.3512	0.4286
	0.3434	0.3312	0.3380	0.3274

* Measurement Uncertainty of the Color Coordinates is ±0.01

Color Bin Structure

Table 5. Bin Code description

Part Number : DD412BZ-A

Bin Code		
Luminous Flux	CIE	Forward Voltage
A	A	A

Luminous Intensity (lm) @ I_F = 1000mA		
Bin Code	Min.	Max.
D	280	320

Color Rank @ I_F = 300mA
-
A
B
C
D

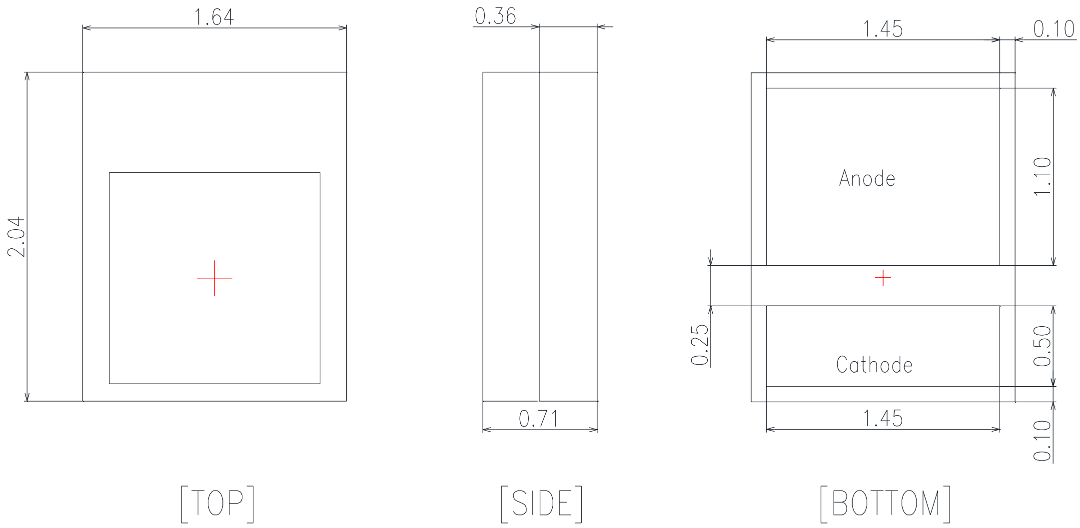
Forward Voltage (V) @ I_F = 300mA		
Bin Code	Min.	Max.
A	2.70	3.50

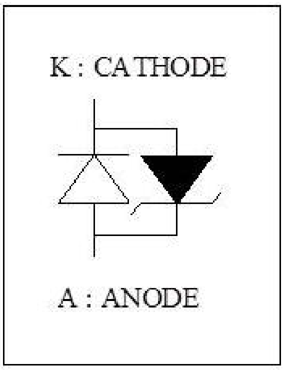
Available Ranks

Mechanical Dimensions

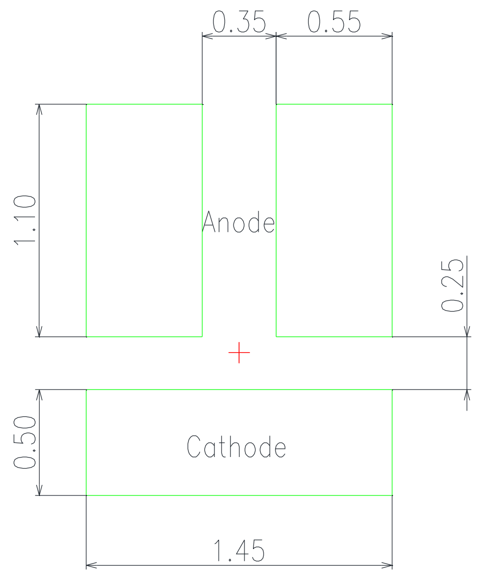
(Tolerance: ±0.1, Unit: mm)

PKG Outline dimension



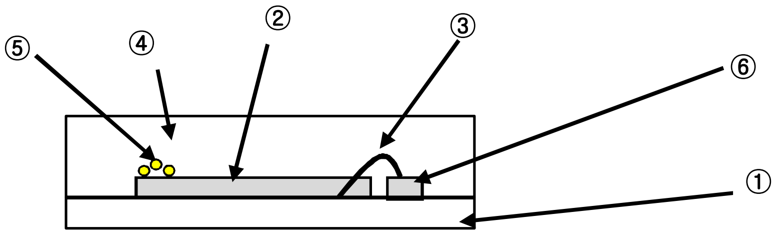


[INNER CIRCUIT]



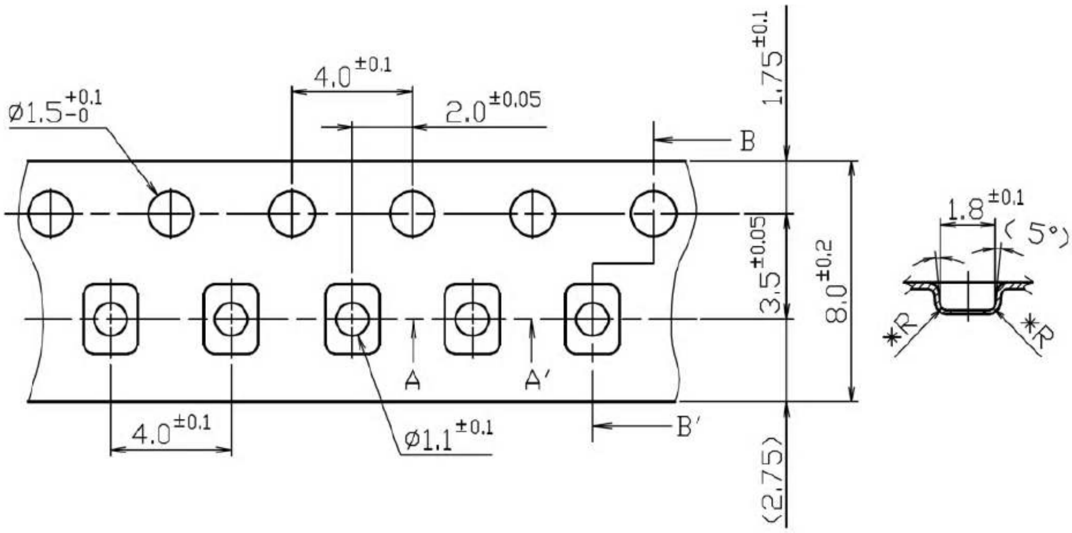
[Recommend solder pad pattern]

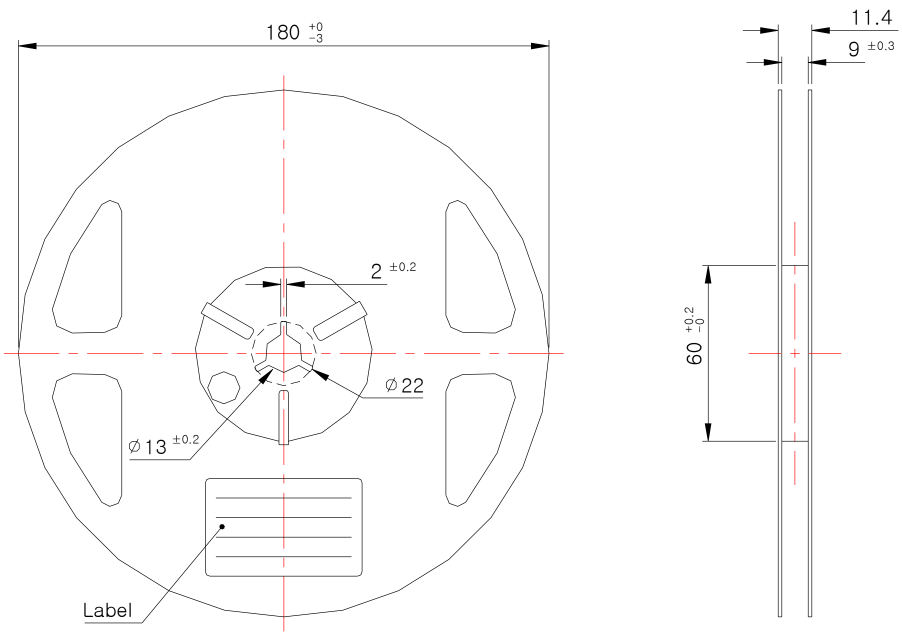
Material Structure



No.	LIST	MATERIAL
①	FRAME	Ceramic
②	LED CHIP	GaN On SAPPHIRE
③	WIRE	GOLD WIRE
④	ENCAPSULATION	SILICONE
⑤	PHOSPHOR	YAG
⑥	ZENER DIODE	Si

Packaging & Label Information





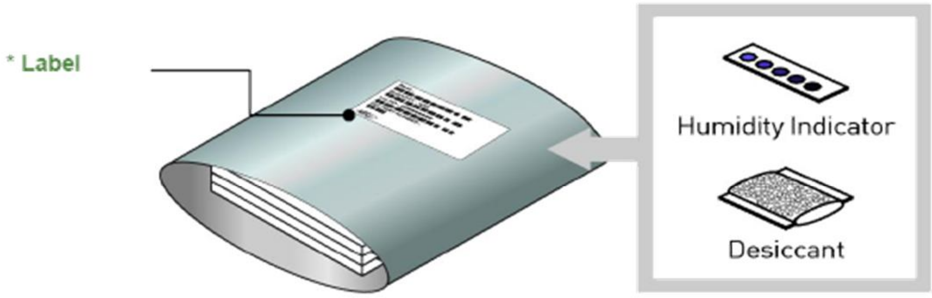
(Tolerance: ±0.2, Unit: mm)

(1) Quantity : 2000pcs/Reel
(2) Cumulative Tolerance : Cumulative Tolerance/10 pitches to be ±0.2mm
(3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at the angle of 10º to the carrier tape
(4) Package : P/N, Manufacturing data Code No. and quantity to be indicated on a damp proof Package

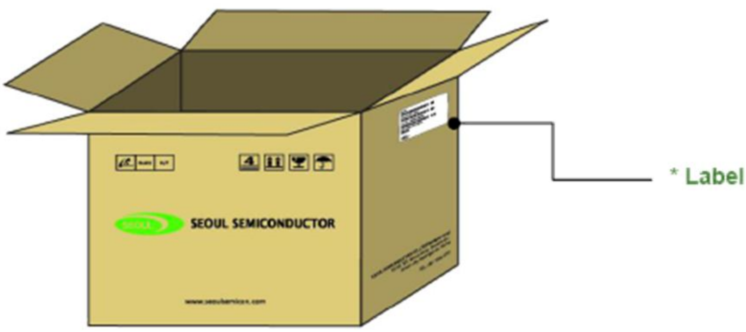
Emitter Tape & Reel Packaging

Reel

Aluminum Bag



Outer Box



Product Nomenclature

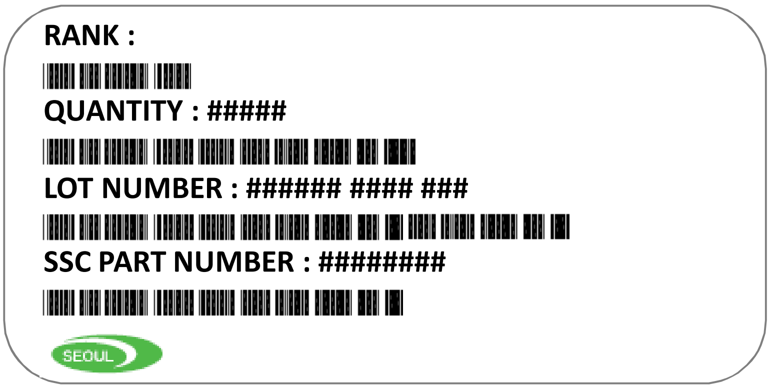


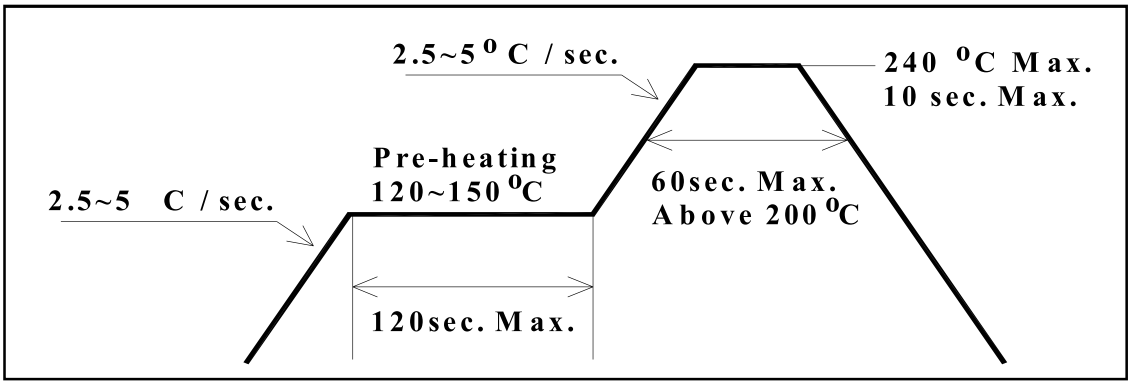
Table 4. Part Numbering System : $X_1X_2X_3$ - X_4X_5 - X_6X_7 - X_8X_9

The lot number is composed of the following characters aaaaabbbbb-ccc-ccc-ddddddd

Symbol	Meaning	Example
aaaaa	THE DATE	09A23 (Year : 09, A : Month, 23 : day)
bbbbb	SSC's Number	Ex) S0017 0001~9999 allowance
ccc-ccc	Order of Taping	014-001
ddddddd	SSC's Number	720xxxx(Automatic)

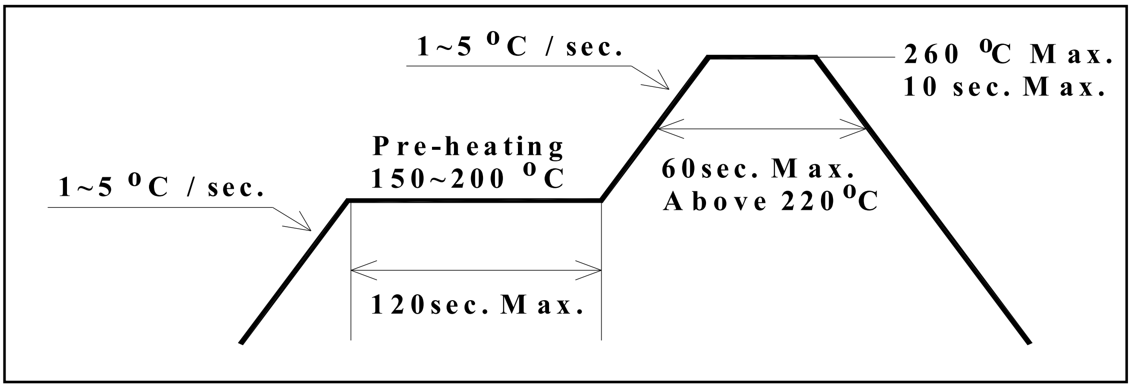
Reflow Soldering Characteristics

(1) Lead Solder



Lead Free Solder	
Pre-heat	120~150℃
Pre-heat time	120 sec. Max.
Peak-Temperature	240℃ Max.
Soldering time Condition	10 sec. Max.

(2) Lead-Free Solder



Lead Free Solder	
Pre-heat	150~200℃
Pre-heat time	120 sec. Max.
Peak-Temperature	260℃ Max.
Soldering time Condition	10 sec. Max.

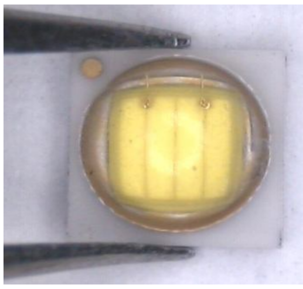
(3) Hand Soldering conditions

Not more than 3 seconds @MAX 350°C, under Soldering iron.

In case that the soldered products are reused in soldering process, we don't guarantee the products.

Handling of Silicone Resin for LEDs

(1) During processing, mechanical stress on the surface should be minimized as much as possible. Sharp objects of all types should not be used to pierce the sealing compound.



(2) In general, LEDs should only be handled from the side. By the way, this also applies to LEDs without a silicone sealant, since the surface can also become scratched.

(3) When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented. This is assured by choosing a pick and place nozzle which is larger than the LED's reflector area.

(4) Silicone differs from materials conventionally used for the manufacturing of LEDs. These conditions must be considered during the handling of such devices. Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust. As mentioned previously, the increased sensitivity to dust requires special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components.

(5) Seoul Semiconductor suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin. Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

(6) Please do not mold this product into another resin (epoxy, urethane, etc) and do not handle this product with acid or sulfur material in sealed space.

(7) Avoid leaving fingerprints on silicone resin parts.

Precaution for Use

(1) Storage conditions

Keep the product in a dry box or a desiccator with a desiccant in order to prevent moisture absorption.

a. Keep it at a temperature in the range from 5°C to 30°C and at a humidity of less than 50% RH. The product should be kept within a year.

(2) After opening the package .

When soldering, this could result in a decrease of the photoelectric effect or light intensity.

a. Soldering should be done right after mounting the product.
b. Keep the temperature in the range from 5°C to 30°C and the humidity at less than 60%.

Soldering should be done within 28 days after opening the desiccant package.
If the product has been exposed for more than 28 days after opening the package or the indicating color of the desiccator changes, the product must be baked at a temperature between 65 ± 5°C for less than 24 hours.
An unused and unsealed product should be repacked in a desiccant package and kept sealed in a dry atmosphere.
Stored at a humidity of less than 10% RH.

(3) Precautions for use

Any external mechanical force or excessive vibration should not be applied to the product during cooling after soldering, and it is preferable to avoid rapid cooling.
The product should not be mounted on a distorted part of PCB.
Gloves or wrist bands for ESD(Electric Static Discharge) should be wore in order to prevent ESD and surge damage, and all devices and equipments must be grounded to the earth.

(4) Miscellaneous

Radiation resistance is not considered.
When cleaning the product, any kind of fluid such as water, oil and organic solvent must not be used and IPA(Isopropyl Alcohol) must be used.
When using the product, operating current should be settled in consideration of the maximum ambient temperature.
Its appearance or specification for improvement is subject to change without notice.

Precaution for Use

(5) LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).
Below is a list of suggestions that Seoul Semiconductor purposes to minimize these effects.

a. ESD (Electro Static Discharge)

Electrostatic discharge (ESD) is the defined as the release of static electricity when two objects come into contact. While most ESD events are considered harmless, it can be an expensive problem in many industrial environments during production and storage. The damage from ESD to an LEDs may cause the product to demonstrate unusual characteristics such as:

- Increase in reverse leakage current lowered turn-on voltage
- Abnormal emissions from the LED at low current

The following recommendations are suggested to help minimize the potential for an ESD event.
One or more recommended work area suggestions:

- Ionizing fan setup
- ESD table/shelf mat made of conductive materials
- ESD safe storage containers

One or more personnel suggestion options:
- Antistatic wrist-strap
- Antistatic material shoes
- Antistatic clothes

Environmental controls:
- Humidity control (ESD gets worse in a dry environment)

Precaution for Use

b. EOS (Electrical Over Stress)

Electrical Over-Stress (EOS) is defined as damage that may occur when an electronic device is subjected to a current or voltage that is beyond the maximum specification limits of the device. The effects from an EOS event can be noticed through product performance like:

- Changes to the performance of the LED package
  (If the damage is around the bond pad area and since the package is completely encapsulated the package may turn on but flicker show severe performance degradation.)
- Changes to the light output of the luminaire from component failure
- Components on the board not operating at determined drive power

Failure of performance from entire fixture due to changes in circuit voltage and current across total circuit causing trickle down failures. It is impossible to predict the failure mode of every LED exposed to electrical overstress as the failure modes have been investigated to vary, but there are some common signs that will indicate an EOS event has occurred:

- Damaged may be noticed to the bond wires (appearing similar to a blown fuse)
- Damage to the bond pads located on the emission surface of the LED package
  (shadowing can be noticed around the bond pads while viewing through a microscope)
- Anomalies noticed in the encapsulation and phosphor around the bond wires.
- This damage usually appears due to the thermal stress produced during the EOS event.

c. To help minimize the damage from an EOS event Seoul Semiconductor recommends utilizing:

- A surge protection circuit
- An appropriately rated over voltage protection device
- A current limiting device

Company Information

Published by

Company Information

Seoul Semiconductor (www.SeoulSemicon.com) manufacturers and packages a wide selection of light emitting diodes (LEDs) for the automotive, general illumination/lighting, Home appliance, signage and back lighting markets. The company is the world's fifth largest LED supplier, holding more than 10,000 patents globally, while offering a wide range of LED technology and production capacity in areas such as “nPola”, "Acrich", the world's first commercially produced AC LED, and "Acrich MJT - Multi-Junction Technology" a proprietary family of high-voltage LEDs.

The company's broad product portfolio includes a wide array of package and device choices such as Acrich and Acirch2, high-brightness LEDs, mid-power LEDs, side-view LEDs, and through-hole type LEDs as well as custom modules, displays, and sensors.

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