Technical Data Sheet

SEOUL SEMICONDUCTOR

Specification
SZR05A0A
(Z5 red)

SSC		Customer
Drawn	Approval	Approval

Rev.03
November 2012.
www.seoulsemicon.com
서식번호 : SSC-QP-7-07-24 (Rev.00)

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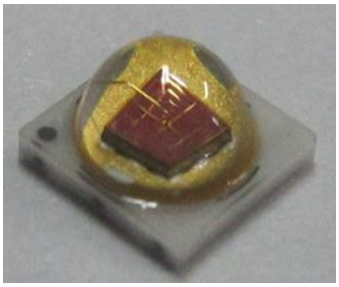
1. Description



The Z-Power series is designed for High current operation and high flux output applications. It incorporates state of the art SMD design and low thermal resistant material.
The Z Power LED is ideal light sources for general illumination applications, custom designed solutions, automotive applications.

Features

- Package :
  SMD Ceramic
  Red Color
- View Angle : 120°
- Technology : AlInGaP
- MSL : 2
- Reflow : Pb-free Reflow
- ESD : min 2kV
- RoHS : Compliant

Applications

- Automotive Exterior Lighting
- General lighting
- Indoor and outdoor Displays
- Electronic Signs and Signals

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2. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power Dissipation (T_a=25℃)	P_d	1.75	W
Forward Current (T_a=25℃)	I_F	700	mA
Peak Forward Current *1	I_{FM}	2000	mA
Reverse Voltage (I_r=10㎂, T_a=25℃)	V_R	5	V
Operating Temperature	T_{opr}	-40 ~ +100	℃
Storage Temperature	T_{stg}	-40 ~ +100	℃
Junction Temperature	T_j	125	℃
Soldering Temperature	T_{sld}	Reflow Soldering : 260 ℃ for 10sec. Hand Soldering : 315 ℃ for 4sec.	
ESD (R=1.5kΩ, C= 100pF)		Min 2	kV

*1. I_{FM} was measured at Tw≤1㎲ of pulse width and D≤1/10 of duty ratio at Ta=25℃.

3. Electro-Optical characteristics

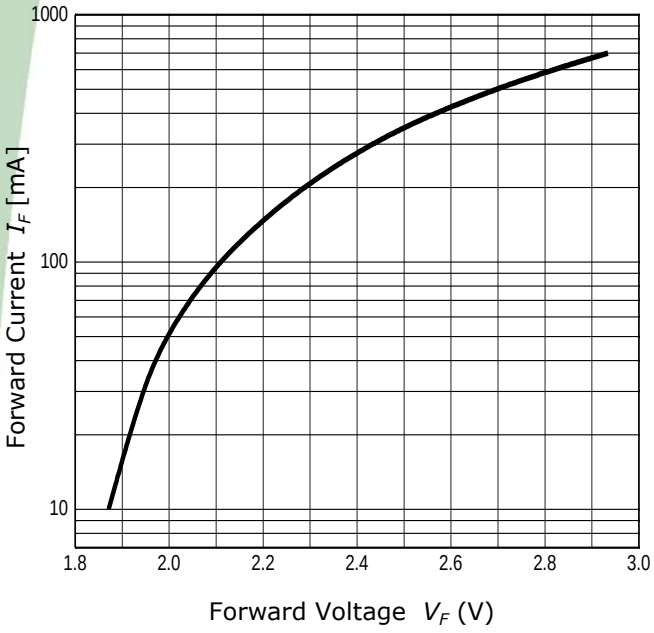
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage*1*2	V_F	I_F=350 mA	2.0	2.25	2.5	V
Luminous Flux *3	Φ_V	I_F=350 mA	32.0	51.0	70.0	lm
Peak Wavelength	λ_P	I_F=350 mA	-	632	-	nm
Dominant Wavelength	λ_d	I_F=350 mA	618	625	632	nm
Viewing Angle *4	$2\theta_{1/2}$	I_F=350 mA	-	120	-	deg.
Spectral Bandwidth 50%	$\Delta\lambda$	I_F=350 mA	-	15	-	nm
Optical Efficiency	η_{op}	I_F=350 mA		58.29		lm/W
Thermal resistance *5	*Rth JS*	I_F=350 mA		7.0		℃ / W
Temperature coefficient of V_F -10℃ ≤ T ≤ 100 ℃	TC_v	I_F=350 mA		-1.91		mV/℃
Temperature coefficient of Wd -10℃ ≤ T ≤ 100 ℃	TC_{Wd}	I_F=350 mA		0.09		nm/℃
Luminous Intensity Phi V / IV	∂_Ω	I_F=350 mA	3.0		3.1	lm/cd

*1. A tolerance of ±0.05V on forward voltage measurements
*2. 99% yield of forward voltage is 2.05 ~ 2.6V
*3. The luminous flux was measured at the peak of the spatial pattern which may not be aligned with the mechanical axis of the LED package. Luminous Flux Measurement allowance is ±10%
*4. 2θ½ is the off-axis where the luminous intensity is 1/2 of the peak intensity.
*5. Thermal resistance = Rth JS : Junction/solder point

4. Characteristic Graph

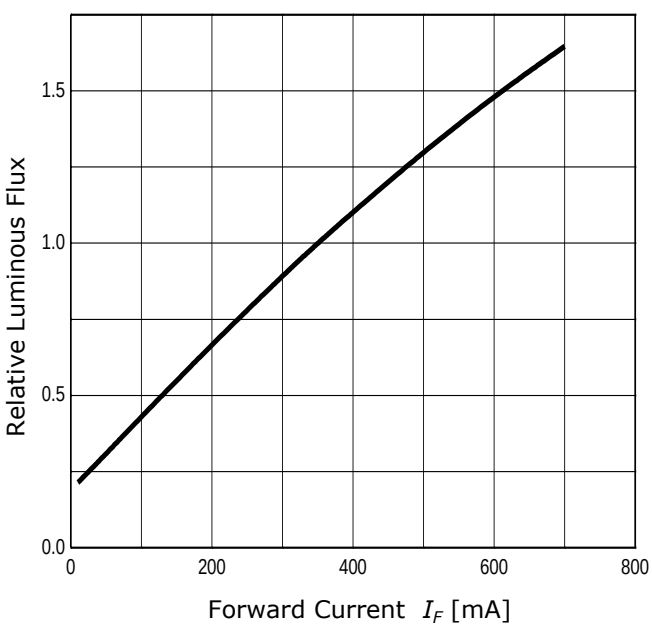
Forward Current vs. Forward Voltage

(T_a=25℃)

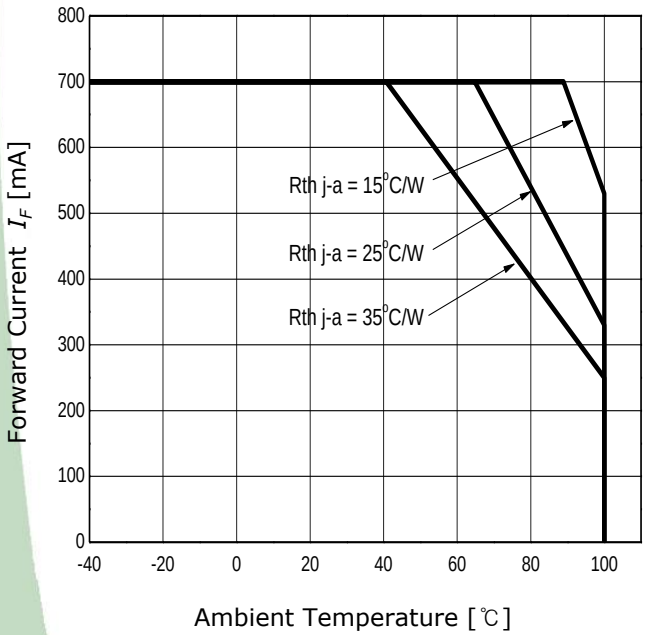


Relative Luminous Flux vs. Forward Current

(T_a=25℃)

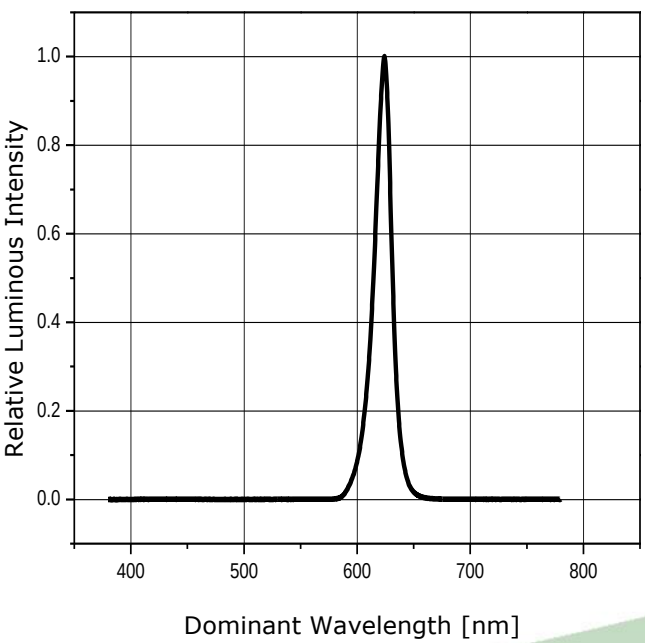


Forward Current vs. Temperature



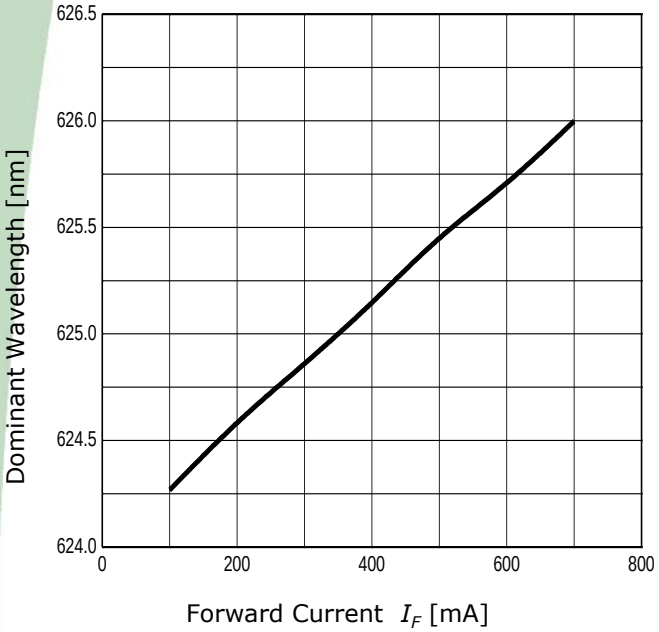
Spectral distribution

(T_a=25℃, I_F=350mA)



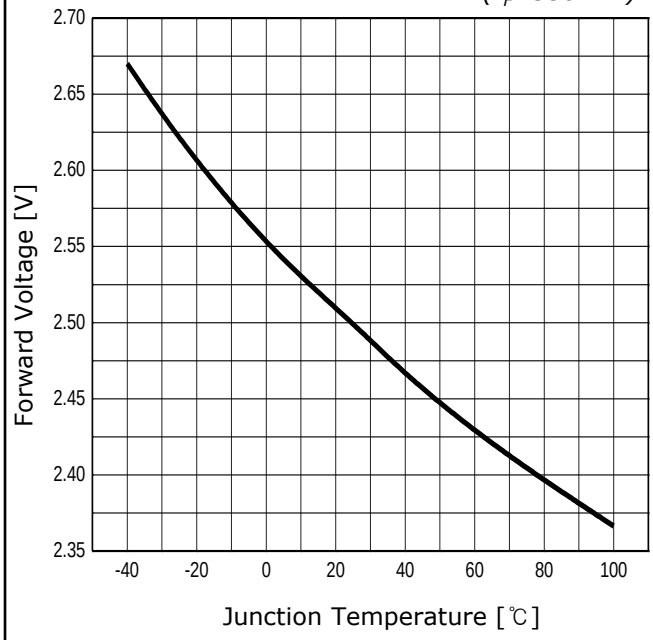
Dominant Wavelength vs. Forward Current

(T_a=25℃)



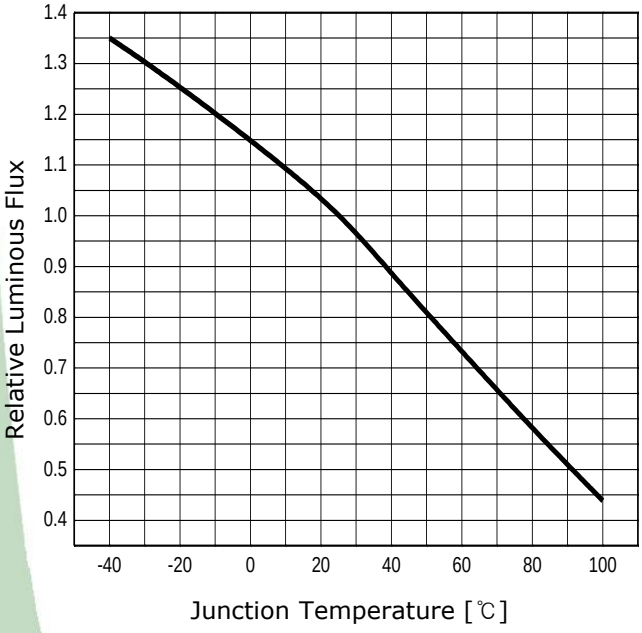
Forward Voltage vs. Junction Temperature

(I_F=350mA)



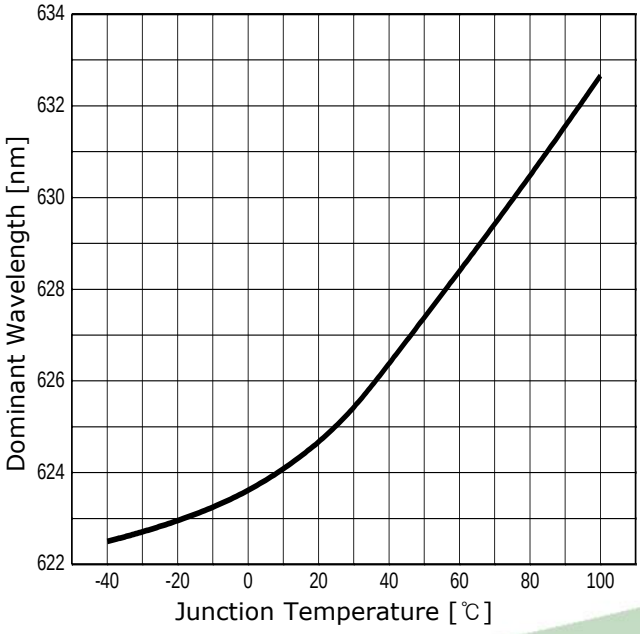
Relative Luminous Flux vs. Junction Temperature

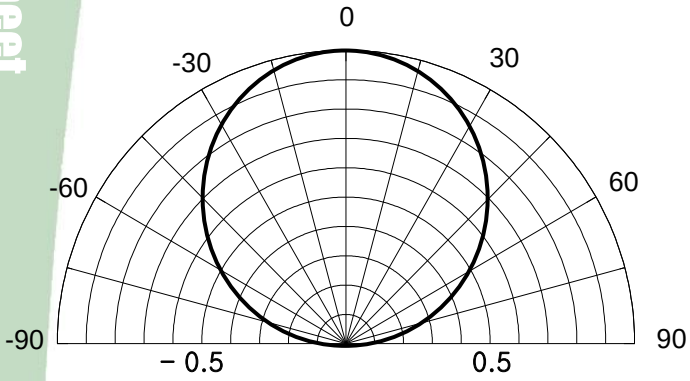
(I_F=350mA)



Dominant Wavelength vs. Junction Temperature

(I_F=350mA)



Radiation Diagram	
(T_a=25℃ ,I_F=350mA) 	

5 Reliability

(1) Test items and results

Test Item	Standard Test Method	Test Condition	Duration / Cycle	Number of Damage
Resistance to Soldering Heat (Reflow soldering)	JEITA ED-4701 300 301	Tsld=260℃, 10sec. (Pre treatment 30℃,70%,168hrs.)	2 times	0/30
Solderability (Reflow Soldering)	JEITA ED-4701 300 303	Tsld=215±5℃, 3sec. (using flux, Lead Solder)	1 time Over 95%	0/30
Thermal Shock	JEITA ED-4701 300 307	-40℃ ~ 100℃ 20min. (10sec.) 20min.	1000 hrs.	0/77
Temperature Cycle	JEITA ED-4701 100 105	-40℃ ~ 25℃ ~ 100℃ ~ 25℃ 25min. 5min. 25min. 5min	1000 hrs.	0/77
High Temperature Storage	JEITA ED-4701 200 201	T_a =100℃	1000 hrs.	0/77
Low Temperature Storage	JEITA ED-4701 200 202	T_a =-40℃	1000 hrs.	0/77
Room temperature Operating Life	Internal Reference	T_a =25℃, I_F =350mA	1000 hrs.	0/77
Steady State Operating Life of High Temperature	Internal Reference	T_a =100℃, I_F =350mA	1000 hrs.	0/77
Steady State Operating Life of High Humidity Heat	Internal Reference	85℃, RH=85%, I_F =350mA	1000 hrs.	0/77
Steady State Operating Life of Low Temperature	Internal Reference	T_a =-40℃, I_F =350mA	1000 hrs.	0/77
Power and Temperature Cycle	JESD22 A-105	T_a=-40℃(20min) ~ 85℃(20min) (Transfer time:20min,1Cycle=1hr) I_F =350mA , 2 min. on/off	1000 hrs.	0/77
Vibration	JEITA ED-4701 400 403	200m/s^2, 100~2000Hz (Sweep 4min.) 48min., 3 directions	4 times	0/30
Electrostatic Discharge	JEITA ED-4701 300 304	R=1.5kΩ, C= 100pF Test Voltage = 2kV	3 Times Negative /Positive	0/30

(2) Criteria for Judging the Damage

Item	Symbol	Condition	Criteria for Judgment	
			MIN	MAX
Forward Voltage	V_F	I_F =350mA	-	Initial × 1.2
Luminous Intensity	I_V	I_F =350mA	Initial × 0.8	-

6. Rank of STR05A0A

1) Bin Code Description

[Ta = 25℃, IF = 350mA]

Bin Code		
Luminous Flux	Dominant Wavelength	Forward Voltage
Q	RR1	D

Luminous Flux (lm) @ I_F = 350mA		
Bin Code	Min.	Max.
Q	32.0	41.5
R	41.5	54.0
S	54.0	70.0

Dominant Wavelength (nm) @ I_F = 350mA		
Bin Code	Min.	Max.
RR1	618	625
RR2	625	632

Forward Voltage (V) @ I_F = 350mA		
Bin Code	Min.	Max.
D	2.00	2.25
E	2.25	2.50
F	2.50	2.75
G	2.75	3.00

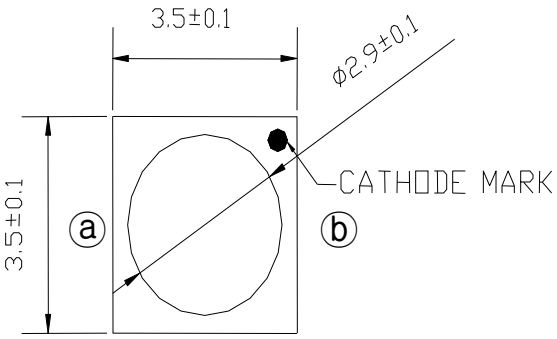
☐ Available ranks

[Note] All measurements were made under the standardized environment of SSC.

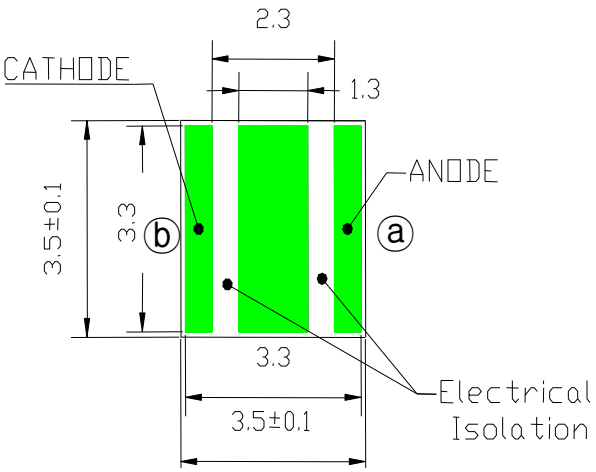
7. Package dimension

Package Dimension

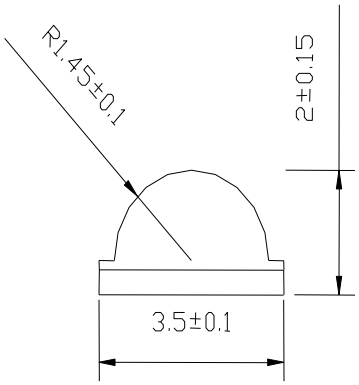
Top View



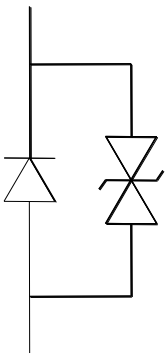
Bottom View



Side View



Circuit



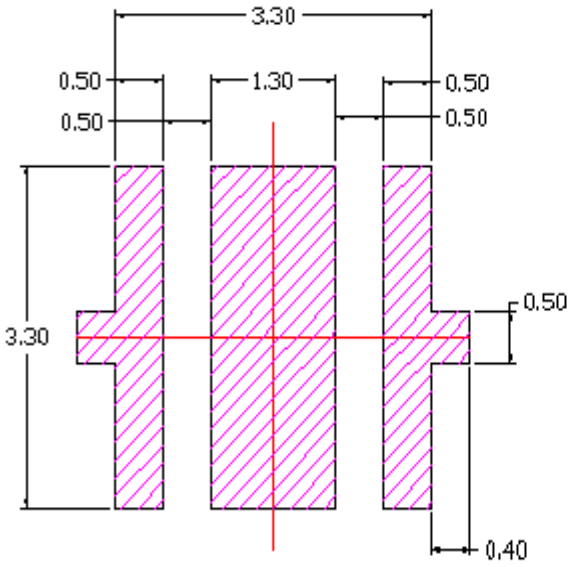
※ Au plating is applied to SZR05A0A

Notes :

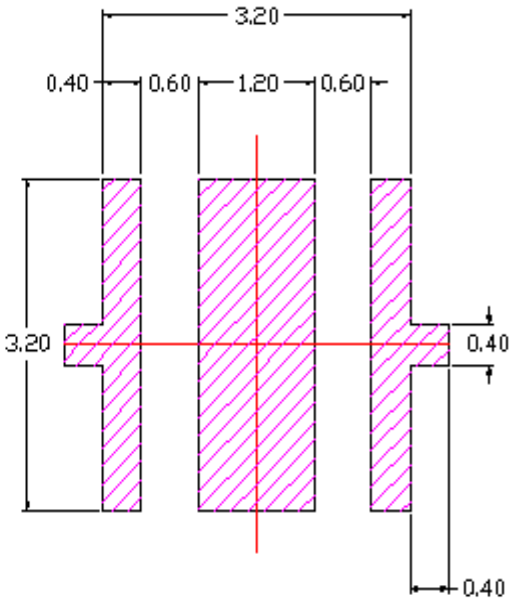
[1] All dimensions are in millimeters.
[2] Scale : none
[3] Undefined tolerance is ±0.1mm

7. Package dimension

Recommended solder pad



Recommended PCB Solder Pad

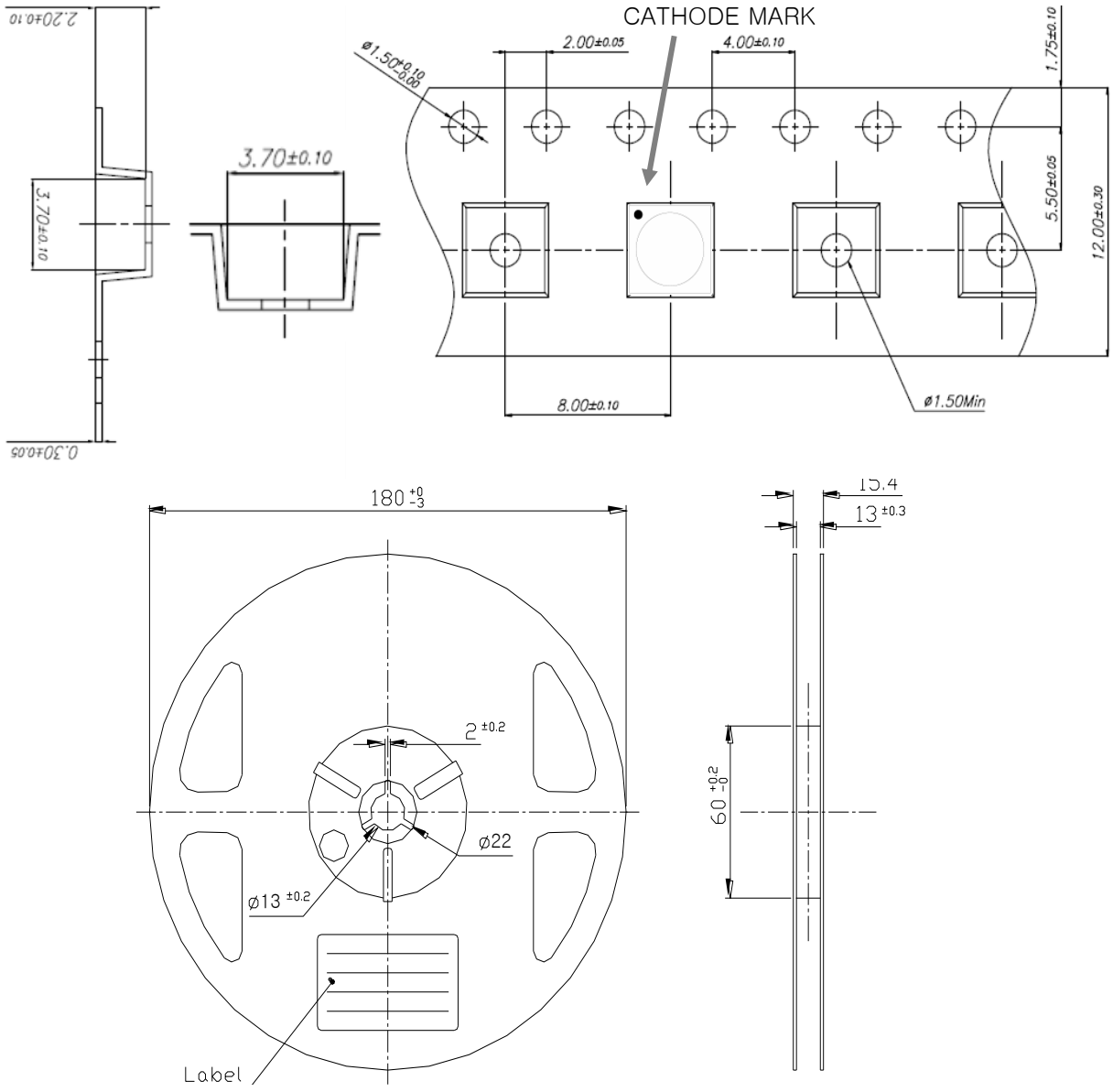


Recommended Stencil Pattern

Notes :

[1] All dimensions are in millimeters.
[2] Scale : none
[3] This drawing without tolerances are for reference only

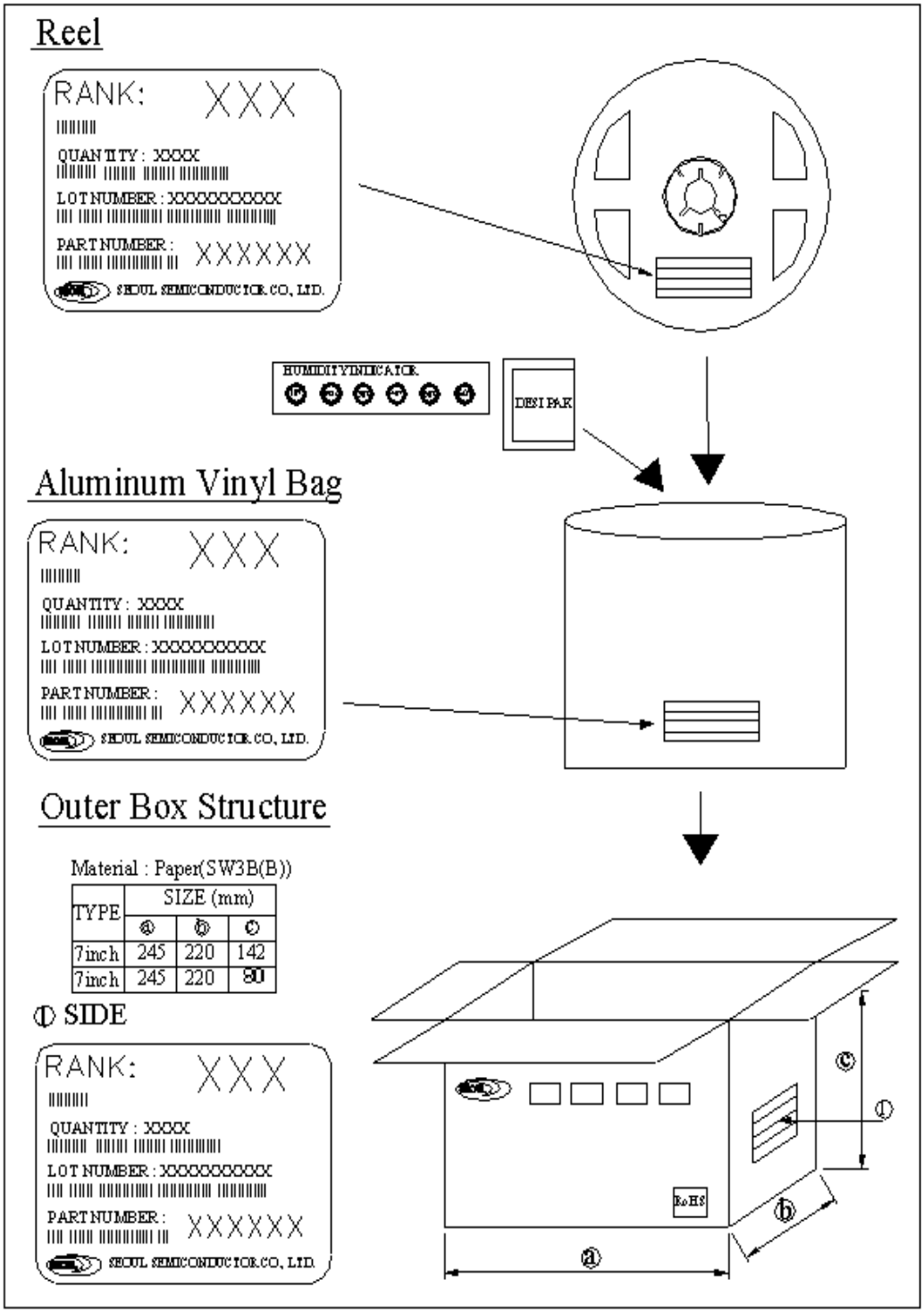
8. Reel Structure



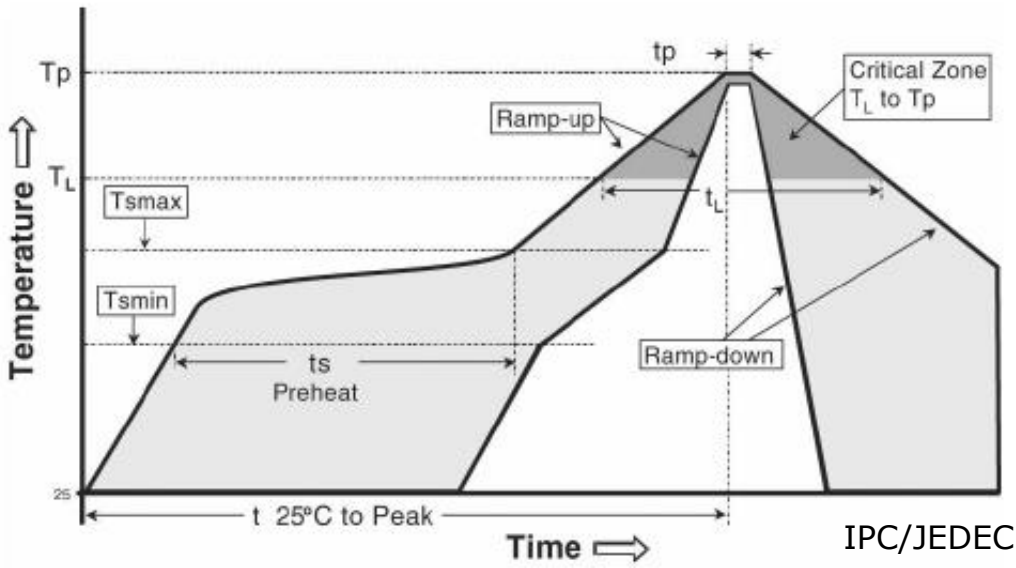
NOTES:

1. 10 sprocket hole pitch cumulative tolerance ±0.20
2. Camber not to exceed 1mm in 250mm
3. Material: Black conductive Polystyrene
4. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.
7. Pocket center and pocket hole center must be same position.

9. Packing


Reel
RANK: XXX
QUANTITY : XXXX
LOT NUMBER : XXXXXXXXXX
PART NUMBER : XXXXXX
SEOUL SEMICONDUCTOR CO., LTD.
HUMIDITY INDICATOR
DESI PAK
Aluminum Vinyl Bag
RANK: XXX
QUANTITY : XXXX
LOT NUMBER : XXXXXXXXXX
PART NUMBER : XXXXXX
SEOUL SEMICONDUCTOR CO., LTD.
Outer Box Structure
Material : Paper(SW3B(B))
TYPE
SIZE (mm)
ⓐ
ⓑ
ⓒ
7inch 245 220 142
7inch 245 220 80
① SIDE
RANK: XXX
QUANTITY : XXXX
LOT NUMBER : XXXXXXXXXX
PART NUMBER : XXXXXX
SEOUL SEMICONDUCTOR CO., LTD.
RoHS
ⓒ
①
ⓑ
ⓐ

10. Soldering



IPC/JEDEC J-STD-020

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3° C/second max.	3° C/second max.
Preheat - Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (Tsmin to Tsmax) (ts)	 100 °C 150 °C 60-120 seconds	 150 °C 200 °C 60-180 seconds
Time maintained above: - Temperature (TL) - Time (tL)	 183 °C 60-150 seconds	 217 °C 60-150 seconds
Peak Temperature (Tp)	215℃	260℃
Time within 5°C of actual Peak Temperature (tp)2	10-30 seconds	20-40 seconds
Ramp-down Rate	6 °C/second max.	6 °C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

* Caution

1. Reflow soldering is recommended not to be done more than two times. In the case of more than 24 hours passed soldering after first, LEDs will be damaged.
2. Repairs should not be done after the LEDs have been soldered. When repair is unavoidable, suitable tools must be used.
3. Die slug is to be soldered.
4. When soldering, do not put stress on the LEDs during heating.
5. After soldering, do not warp the circuit board.

11. Precaution for use

(1) Storage

In order to avoid the absorption of moisture, it is recommended to store in a dry box with a desiccant. Otherwise, to store them in the following environment is recommended.
Temperature : 5℃ ~30℃ Humidity : maximum 70%RH

(2) Attention after open.

LED is correspond to SMD, when LED be soldered dip, interfacial separation may affect the light transmission efficiency, causing the light intensity to drop. Attention in followed; Keeping of a fraction
Temperature : less than 30℃ Humidity : less than 60%

(3) In the case of more than 1 year passed after opening or change color of indicator on desiccant, components shall be dried 10-12hr. at 60±5℃.

(4) Any mechanical force or any excess vibration shall not be accepted to apply during cooling process to normal temperature after soldering.

(5) Quick cooling shall be avoided.

(6) Components shall not be mounted on warped direction of PCB.

(7) Anti radioactive ray design is not considered for the products.

(8) This device should not be used in any type of fluid such as water, oil, organic solvent etc. When washing is required, IPA should be used.

(9) When the LEDs are illuminating, operating current should be decided after considering the ambient maximum temperature.

(10) The LEDs must be soldered within 1 year after opening the moisture-proof packing.

(11) Repack unused products with anti-moisture packing, fold to close any opening and then store in a dry place.

(12) The appearance and specifications of the product may be modified for improvement without notice.

(13) Au plating becomes tarnished when being exposed to an environment which contains corrosive gases any product with tarnished leads may lead to poor solderability and deterioration of optical characteristics . Please do not expose the product to corrosive atmosphere during storage

12. Handling of Silicone Resin LEDs

The Z-Power LED is encapsulated with a silicone resin for the highest flux efficiency.
Notes for handling:

- Avoid touching silicone resin parts especially with sharp tools such as Pincette (Tweezers)
- Avoid leaving fingerprints on silicone resin parts.
- Silicone resin will attract dust so use covered containers for storage.
- When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that excessive mechanical pressure on the surface of the resin must be prevented.
- It is not recommend to cover the silicone resin of the LEDs with other resin (epoxy, urethane, etc)