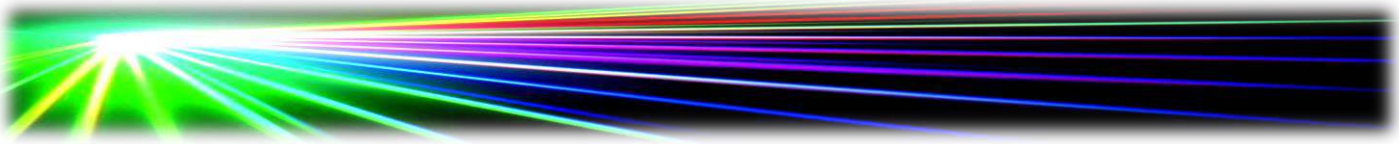
Harvatek Surface Mount CHIP LEDs Data Sheet
B3DQ3BRG-05C0001L3U1930

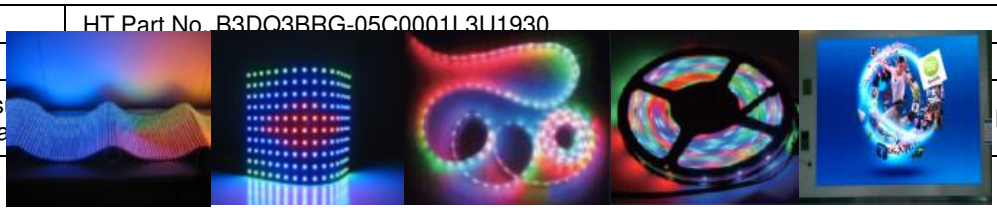
Features

- Support control circuit to be integrated with RGB chips into a single package
- Support signal reshaping to pass control waveforms to next adjacent driver
- Cascading port transmission by a single data line
- Support bi-directional data transfer protocol to feedback LED strip information, including quantity of the cascaded LDE devices and the maximal sink current capability of driver chip (patented)
- Support parallel-connected multi-strip control mechanism (patented)
- Support sleep mode for power saving (patented)
- Optional maximal driving current: 5mA
- 256-step gray-scale output to allow 16,777,216-color display
- Support 20Khz (maximum) PWM refresh rate
- Support 32-level dimming control for R/G/B channel.
- Built-in oscillator with 20MHz frequency
- LED driver port maximum withstand Voltage 6.5V
- Built-in power-on-reset
- Built-in Brown-out reset
- Operating voltage 3.3~5.5V

Applications

- Decorative LED lighting
- LED video display





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HARVATEK's products are not authorized for use as critical components in life support devices or systems without the express written approval of the President of HARVATEK or HARVATEK INTERNATIONAL. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Product Specifications

Item	Specification	Material	Quantity
Luminous Intensity(Iv)	Red : 40~120 mcd Green : 60~180 mcd Blue : 15~60 mcd IC@5V, R/G/B@5mA Ts= 25^{O} C; Tolerance ±10%		
Wavelength	Red : 618~630 nm Green : 518~535 nm Blue : 460~474 nm IC@5V, R/G/B@5mA Ts= 25^{O} C; Tolerance ±10%		
Applied voltage	5V_DC		
View angle	120^{o}		
Resin	Clear	Epoxy	
Carrier tape		Conductive black tape	3000 ea/reel
Reel		Conductive black	
Label	HT standard	Paper	
Packing bag	250x230mm	Aluminum laminated bag/ no-zipper	One reel per bag
Carton	HT standard	Paper	Non-specified

Others:

Each immediate box consists of 5 reels. The 5 reels may not necessarily have the same lot number or the same bin combinations of Iv, λ_D and Vf. Each reel has a label identifying its specification; the immediate box consists of a product label as well.

Note :This is shipped test conditions

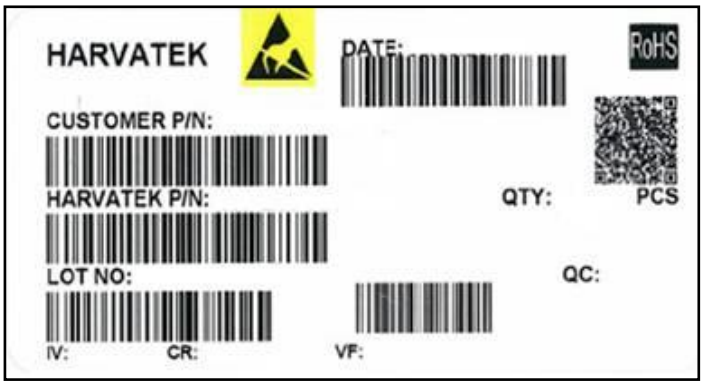
※Remarks: This product should be operated in forward bias. If a reverse voltage is continuously applied to the product, such operation can cause migration resulting in LED damage.

ATTENTION: Electrostatic Discharge (ESD) protection

The symbol to the left denotes that ESD precaution is needed. ESD protection for GaP and AlGaAs based chips is necessary even though they are relatively safe in the presence of low static-electric discharge. Parts built with AlGaInP, GaN, or/and InGaN based chips are **STATIC SENSITIVE devices**. ESD precaution must be taken during design and assembly.

If manual work or processing is needed, please ensure the device is adequately protected from ESD during the process.

Label Specifications



■Harvatek P/N:

B 3DQ 3 BRG- 05C 0001 L3

Product	Package	Dice Qty	Color	Current	Series Number	Taping
PCB	3.2(L)x1.5(W)x1.0(H) mm	3:Tri	BRG(Full Color)	5mA	X001~XZZZ	1.Taping style 2. Qty

■ Lot No.:

1	2	3	4	5	6	7	8	9	10
E	1	A	1	A	2	2	L	1	2
Code 1 2		Code 3	Code 4	Code 5	Code 6	Code 7	Code 8	Code 9	Code 10
		Mfg. Year	Mfg. Month	Mfg. Date	Consecutive number		Special code		
Internal Tracing Code		2020-L 2021-M 2022-P 2023-Q … 2026-T 2027-V … 2030-Y 2031-Z …	1:Jan. 2:Feb. … A:Oct. B:Nov. C:Dec.	1:A 2:B 3:C … 26:Z 27:7 28:8 29:9 30:3 31:4	01~ZZ		000~ZZZ		

Specifications Range

■Luminous Intensity (Iv) :

Color	Spec. Range
R	40-120 mcd
G	60-180 mcd
B	15-60 mcd

Note: It maintains a tolerance of ±10% on luminous intensity

■Wavelength :

Color	Spec. Range
R	618-630 nm
G	518-535 nm
B	460-474 nm

Note: It maintains a tolerance of ± 0.5nm on Wavelength Bin

Product Features

Electro-Optical Characteristics

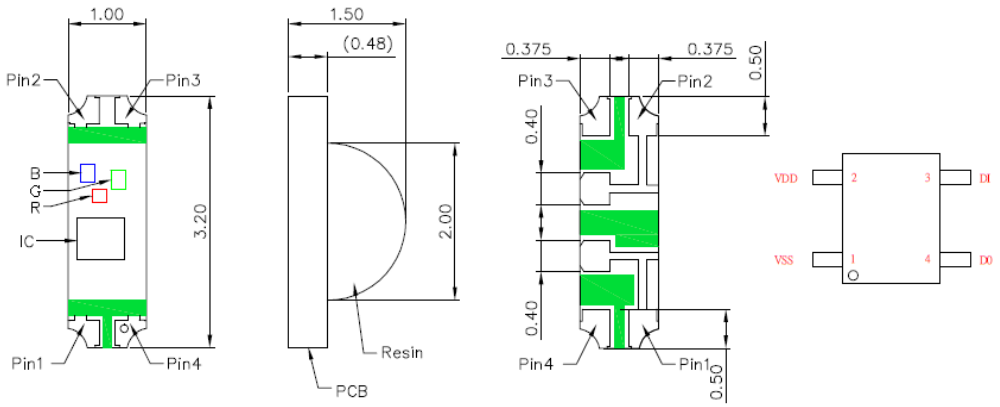
($T_{Soldering}$, 25 °C)

Series	Emitting Color	Material	Wavelength λ(nm)			I_V(mcd)	Viewing Angle $2\theta\frac{1}{2}$
			λ_D	λ_P	△λ	Typical	
B3DQ3BRG	R	AlInGaP	624	630	18	65	120
	G	InGaN	523	518	35	85	120
	B	InGaN	468	465	25	20	120

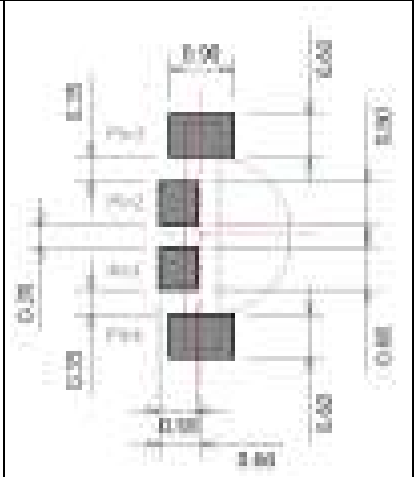
Package Outline Dimension and Recommended Soldering Pattern for Reflow Soldering

(Unit:mm Tolerance: +/-0.1)

Outline Dim.



Soldering Pattern



Soldering terminals may shift in the x, y direction.

Absolute Maximum Ratings (unless otherwise specified, Temperature=25°C)

($T_{Soldering}$ 25 ℃)

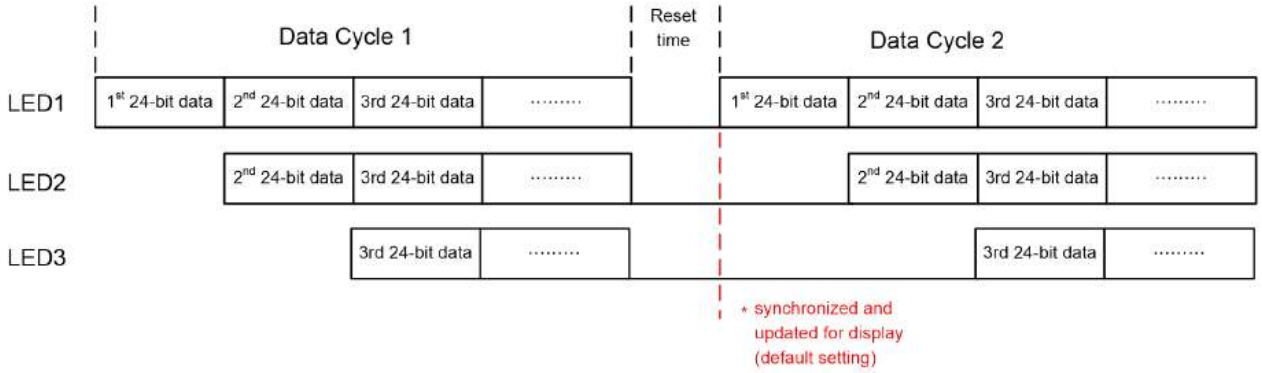
Characteristic	Symbol	Rating	Unit
Supply Voltage	VDD	6.5	V
Power Dissipation	PD	<300	mW
Maximum Output Current	ILEDOUT	25	mA
Welding Temperature	TM	300(8S)	°C
Operating Temperature Range	TOPR	-25~85	°C
Storage Temperature Range	TSTO	-65~120	°C

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Supply Voltage	VDD	3.3	5	5.5	V	
Sleep Current	I_{sleep}		5		uA	
Operation Current	I_{DD}		1.0	1.5	mA	R, G, B no load
Input High “H” of DI	V_{IH}	2.7		VDD	V	
Input Low “L” of DI	V_{IL}	0		1.0	V	
Pull Down Resistance	R_{PD}		500K		Ω	R_{IN} , R_{out}
Output High “H” of DO	V_{OH}	4.5			V	I_{OH}=4mA
Output Low “L” of DO	V_{OL}			0.4	V	I_{OL}=4mA
R, G, B Sink Current	I_{SINK}	4.75	5	5.25	mA	VDD-Vf_{LED}≥1.2V
Input leakage	I_{leak}			1	uA	D_{IN}=0V
R, G, B off leakage current	I_{off}			1	uA	PWM=0(off), @R, G, B =5V

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Propagation delay time	tPLZ			80	ns	D_{IN} → D_{OUT}, CL=30pF
	tPZL			80	ns	
Rising time	tTHL		15		ns	
Falling time	tTLH		15		ns	
Rising time	tR		50		ns	R, G, B=12mA, CL=30pF
Falling time	tF		50		ns	
Data rate	F_{data}		800		Khz	

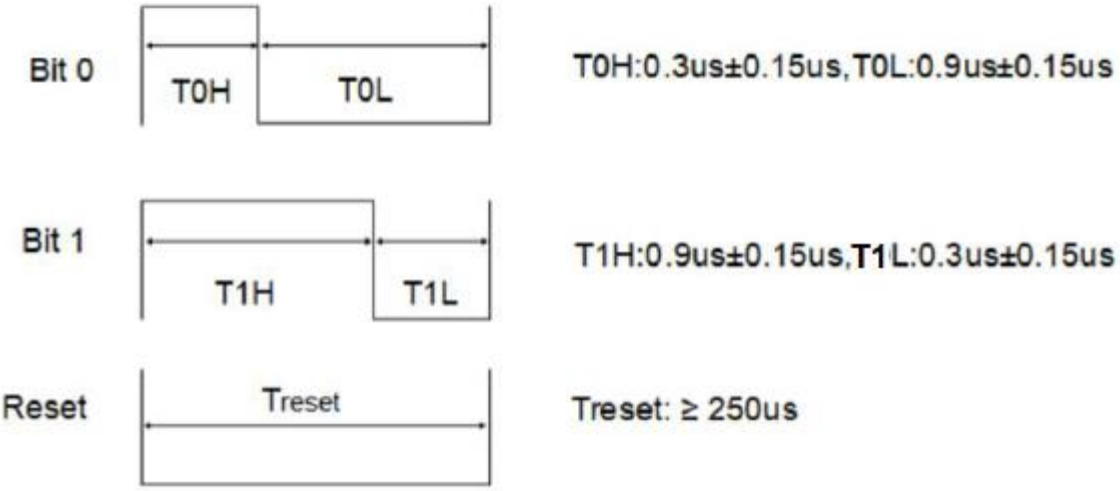
Data Transfer Protocol



The single wire data transfer protocol supports 24-bit data for each LED RGB display data refresh. The IC receives 24-bit data and passes the remaining data to next LED. The 24-bit data consist of red, green and blue data, each with 8-bit width, and are transferred with MSB first.

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0

The transferred data are recognized based on the pulse widths received by the IC. A low bit 0 is represented by a 0.3us high pulse followed by a 0.9us low pulse. A high bit 1 is represented by a 0.9us high pulse followed by a 0.3us low pulse. A low pulse ≧ 200us is used to issue a reset command to the IC to start a new cycle of serial commands.

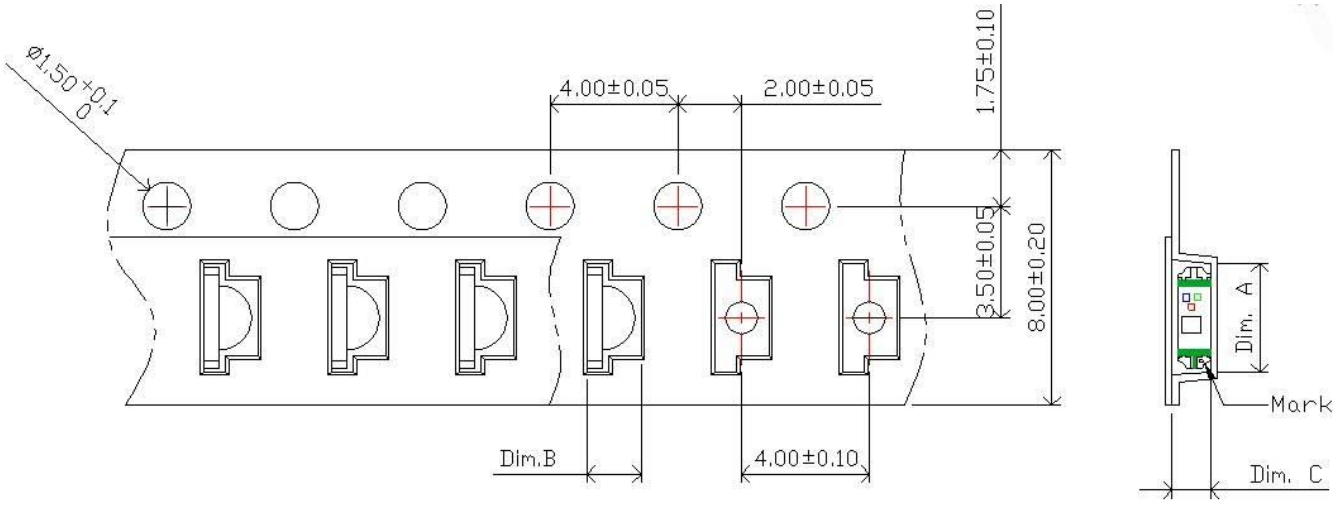


Precaution for Use

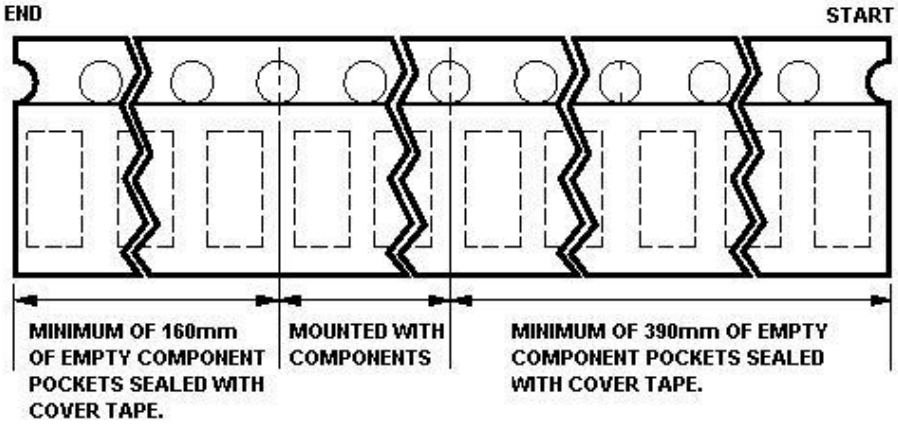
1. The chips should not be used directly in any type of fluid such as water, oil, organic solvent, etc.
2. When the LEDs are illuminating, the maximum ambient temperature should be first considered before operation.
3. LEDs must be stored in a clean environment. A sealed container with a nitrogen atmosphere is necessary if the storage period is over 3 month after shipping.
4. The LEDs must be used within 168 hours after unpacked. Unused products must be repacked in an anti-electrostatic package, folded to close any opening and then stored in a dry and cool space.
5. The appearance and specifications of the products may be modified for improvement without further notice.
6. The LEDs are sensitive to the static electricity and surge. It is strongly recommended to use a grounded wrist band and anti-electrostatic glove when handling the LEDs. If a voltage over the absolute maximum rating is applied to LEDs, it will damage LEDs. Damaged LEDs will show some abnormal characteristics such as remarkable increase of leak current, lower turn-on voltage and getting unlit at low current.

Packaging

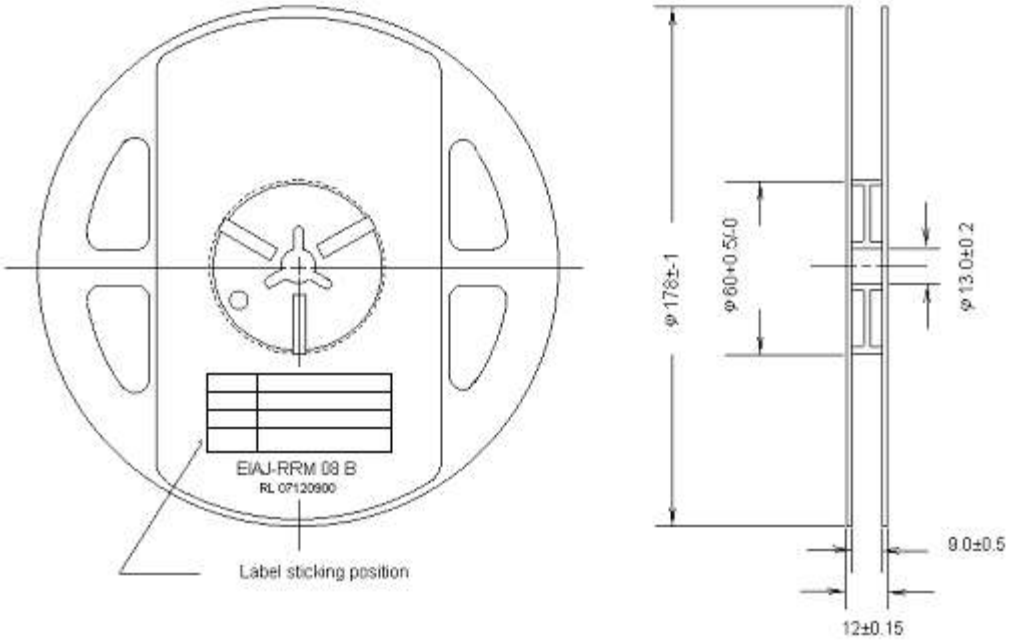
Tape Dimension



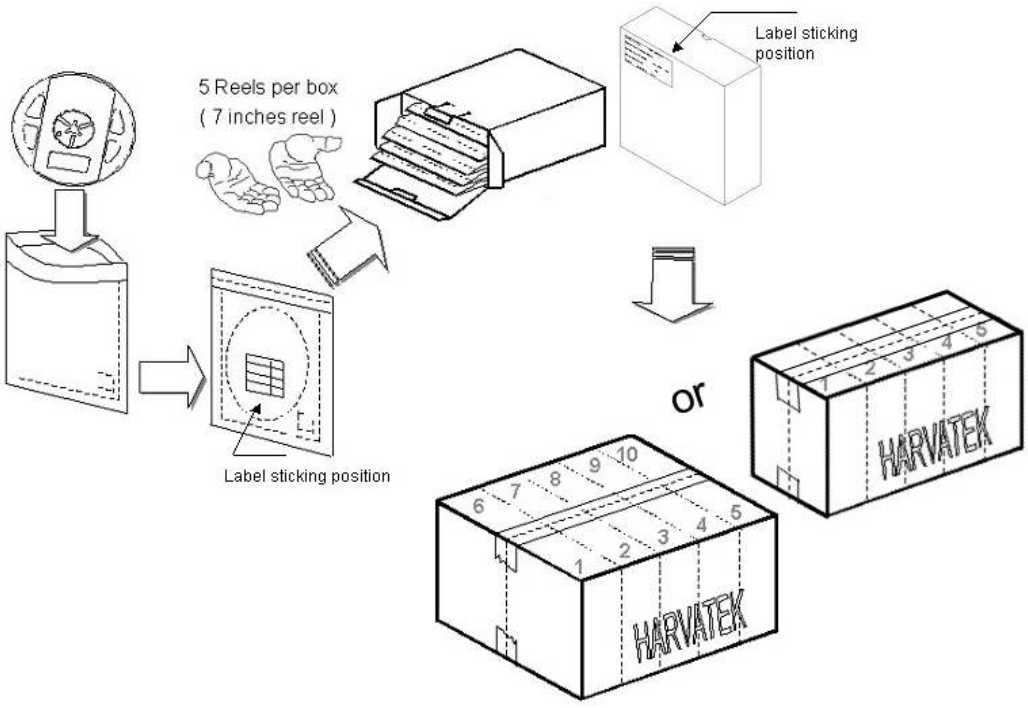
Dim. A	Dim. B	Dim. C	Qty/Reel
3.40±0.10	1.70±0.10	1.20±0.10	3K



Reel Dimension



Packing



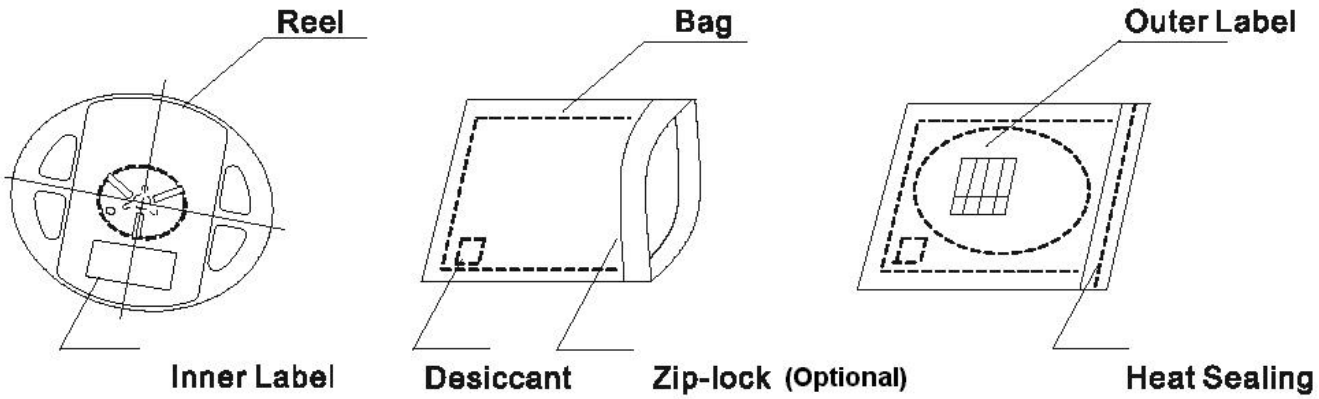
5 or 10 boxes per carton is available depending on shipment quantity.

Dry Pack

All SMD optical devices are **MOISTURE SENSITIVE**. Avoid exposure to moisture at all times during transportation or storage. Every reel is packaged in a moisture protected anti-static bag. Each bag is properly sealed prior to shipment.

A humidity indicator will be included in the moisture protected anti-static bag prior to shipment.

The packaging sequence is as follows:



Baking

Baking before soldering is recommended when the package has been unsealed for 168 hours. The conditions are as followings:

1. 60±3℃×(12~24hrs)and<5%RH, taped reel type.
2. 100±3℃×(45min~1hr), bulk type.
3. 130±3℃×(15min~30min), bulk type.

Precautions

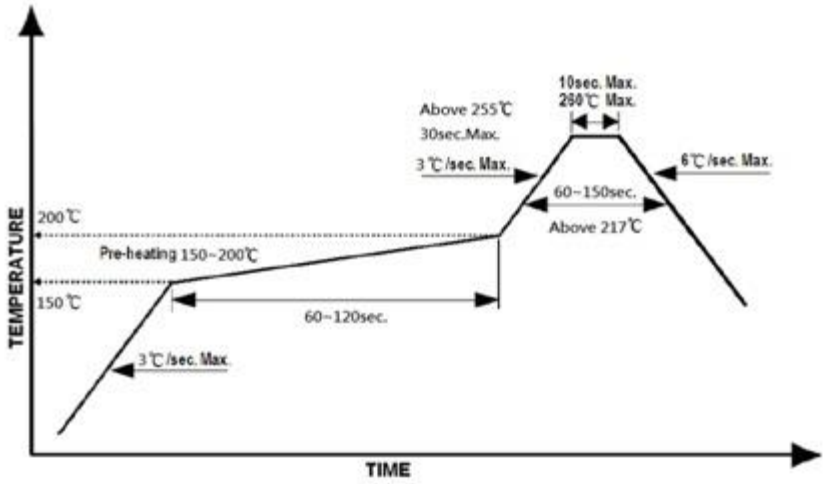
1. Avoid exposure to moisture at all times during transportation or storage.
2. Anti-Static precaution must be taken when handling GaN, InGaN, and AlGaInP products.
3. It is suggested to connect the unit with a current limiting resistor of the proper size. Avoid applying a reverse voltage beyond the specified limit.
4. Avoid operation beyond the limits as specified by the absolute maximum ratings.
5. Avoid direct contact with the surface through which the LED emits light.
6. If possible, assemble the unit in a clean room or dust-free environment.

Reflow Soldering

Recommend soldering paste specifications:

1. Operating temp.: Above 217℃ ,60 ~150sec.
2. Peak temp.:260 ℃Max.,10sec Max.
3. Reflow soldering should not be done more than two times.
4. Never attempt next process until the component is cooled down to room temperature after reflow.
5. The recommended reflow soldering profile (measured on the surface of the LED terminal) is as following:

Lead-free Solder Profile



Reworking

- Rework should be completed within 5 seconds under 260 ℃.
- The iron tip must not come in contact with the copper foil.
- Twin-head type is preferred.

Cleaning

Following are cleaning procedures after soldering:

- An alcohol-based solvent such as isopropyl alcohol (IPA) is recommended.
- Temperature x Time should be 50℃ x 30sec. or <30℃ x 3min
- Ultrasonic cleaning: < 15W/ bath; bath volume ≤ 1liter
- Curing: 100 ℃ max, <3min

Cautions of Pick and Place

- Avoid stress on the resin at elevated temperature.
- Avoid rubbing or scraping the resin by any object.
- Electric-static may cause damage to the component. Please ensure that the equipment is properly grounded. Use of an ionizer fan is recommended.

Revise History

Rev.	Descriptions	Date	Page
1.0	-	04/27/2022	-