Harvatek Surface Mount CHIP LEDs Data Sheet
B3WD3RGB-05C0802I4U1930

(Preliminary)

Features

- Support signal reshaping to pass control waveforms to next adjacent driver
- Cascading port transmission by a single data line
- Built-in current regulator, three-way drive.
- R/G/B LED sink current：5mA
- 256-step gray-scale output to allow 16,777,216 color display
- Data transmission rate : 800 Kbps
- Operating voltage 3.5~5.5V
- Built-in power-on-reset (1.7V) (@VDD=5V)
- Built-in brown-out reset (1.8V) (@VDD=5V)

Applications

- Decorative LED lighting
- LED video display
- Electronic device, computer peripheral device and wearable devices indicator lighting.

DISCLAIMER

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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 : 45 – 180 mcd Green :180 – 450 mcd Blue : 28 – 72 mcd IC@5V, R/G/B@5mA Ts= 25^{O} C; Tolerance ±10%		
Wavelength	Red : 615 – 630 nm Green : 520 – 535 nm Blue : 465 – 480 nm IC@5V, R/G/B@5mA Ts= 25^{O} C; Tolerance ±0.5nm		
Applied voltage	5V_DC		
View angle	120^{o}		
Resin	Clear	Epoxy	
Carrier tape		Conductive black tape	4000 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

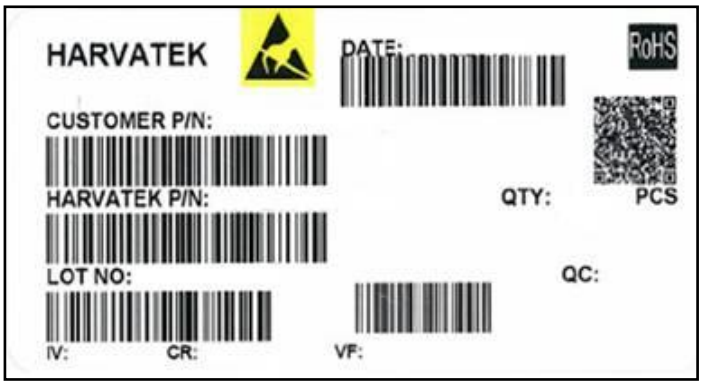
※Remarks: This product should be operated in forward bias. If a reverse voltage is continuously applied to the product, such operation can cause migration resulting in LED damage.

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 3WD 3 RGB- 05C- 0802 I4

Product	Package	Dice Q'ty	Color	Current	Series Number	Taping
PCB	1.0(L)x1.0(W)x0.30(H) mm	3:Tri	RGB(Full Color)	R/G/B:5mA	X001~XZZZ	1.Taping style 2. Q'ty

■ 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	71.5 –180 mcd
G	112.5 –285 mcd
B	28 –71.5 mcd

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

■Wavelength:

Color	Spec. Range
R	615 –630 nm
G	520 –535 nm
B	465 – 480 nm

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

Product Features

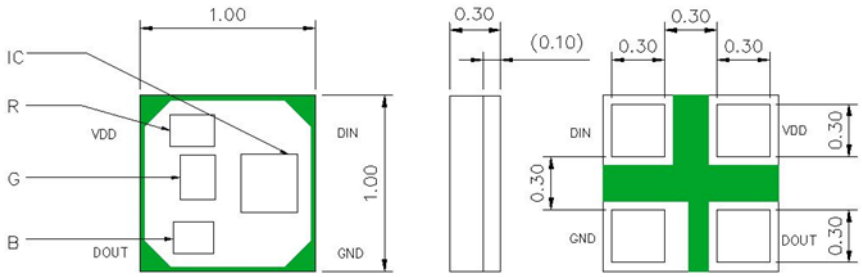
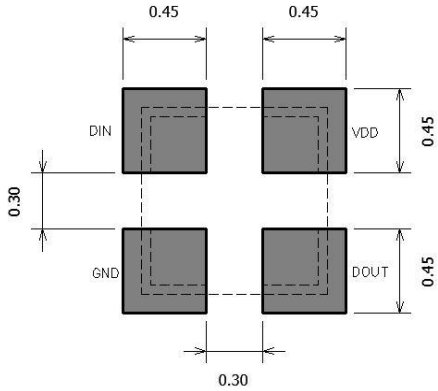
Electro-Optical Characteristics

($T_{Soldering}$, 25 °C)

Series	Emitting Color	Material	Wavelength λ(nm)	I_V(mcd)	Test	Viewing Angle
			Typical	Typical	Condition 8bits	$2\theta\frac{1}{2}$
B3WD3	R	AlGaInP	623	105	R：[11111111]	120
	G	InGaN	528	210	G：[11111111]	120
	B	InGaN	473	42	B：[11111111]	120

Package Outline Dimension and Recommended Soldering Pattern for Reflow Soldering

(Unit:mm Tolerance: ± 0.1)

Outline Dim.	Suggest Soldering Pattern
	

Soldering terminals may shift in the x, y direction.

Absolute Maximum Ratings

($T_{Soldering}$ 25 ℃)

Characteristic	Symbol	Rating	Unit
Supply Voltage	V_{DD}	5.5	V
Total DC current	I_F	16.5	mA
Operating Temperature Range	T_{OPR}	-40~85	℃
Storage Temperature Range	T_{STO}	-40~85	℃
ESD Voltage	V_{ESD}	2	KV

Electrical Characteristics

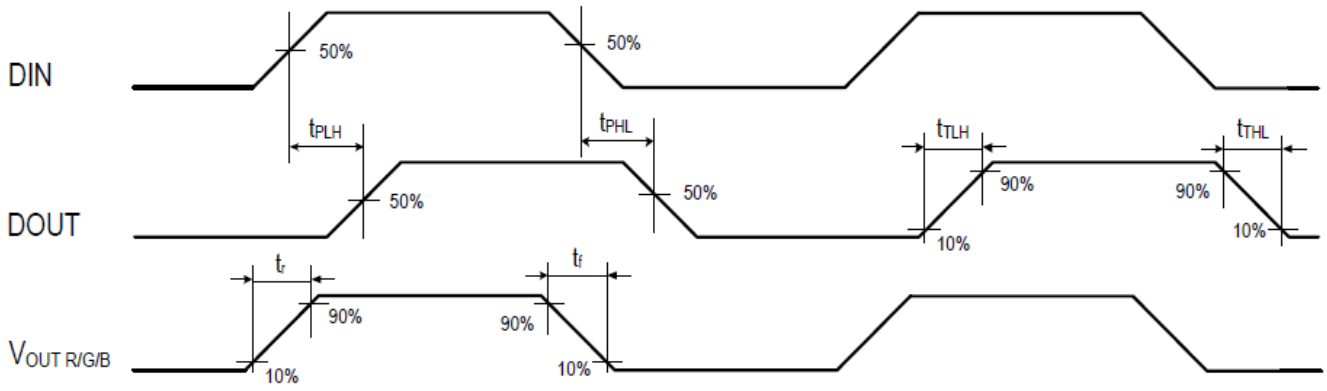
(V_{DD} =5V，Temperature=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Supply Voltage	V_{DD}	3.5		5.5	V	
Operation Current	I_{DD}		0.45		mA	V_{DD}=5V, LED OFF
Input High “H” of DI	V_{IH}	V_{DD}*0.7			V	
Input Low “L” of DI	V_{IL}			V_{DD}*0.3	V	
Output High “H” of DO	VOH	VDD-0.5			V	
Output Low “L” of DO	VOL			0.4	V	
R, G, B Sink Current	ISINK	4.75	5	5.25	mA	
Input leakage	Ileak			1	uA	DI=0V
R, G, B off leakage current	Ioff			1	uA	PWM=0 (off), @R, G, B =5V

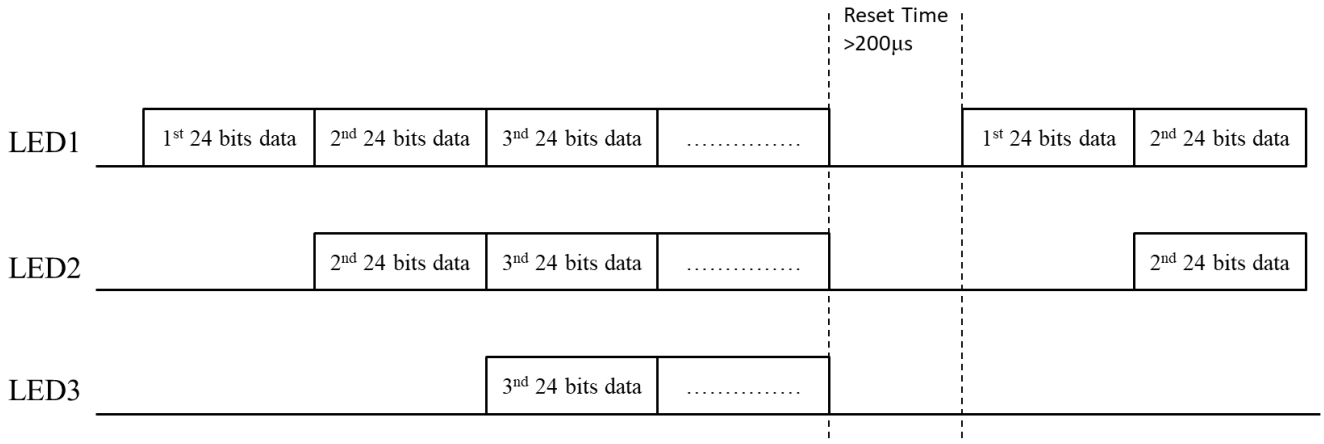
Dynamic characteristics

(VDD =5V，Temperature=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Propagation delay time	tPLH		80		ns	
	tPHL		80		ns	
Transition time	tTLH		12		ns	
Transition time	tTHL		10		ns	
Transition time	tr		500		ns	
Transition time	tf		500		ns	
RGB port output frequency	F_{PWM}		4.5		KHz	



Data Transfer Protocol

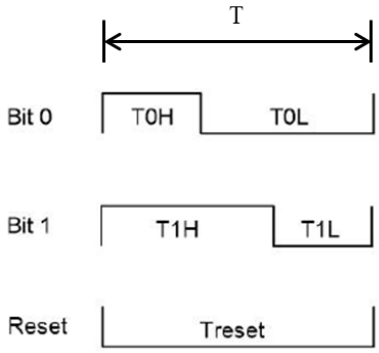


The single wire data transfer protocol supports 24-bit data for each device display data refresh. The drive receives 24-bit data and passes the remaining data to next device. The 24-bit data consist of red ,green and blue data, each with 8-bit width, and are transferred with MSB first.

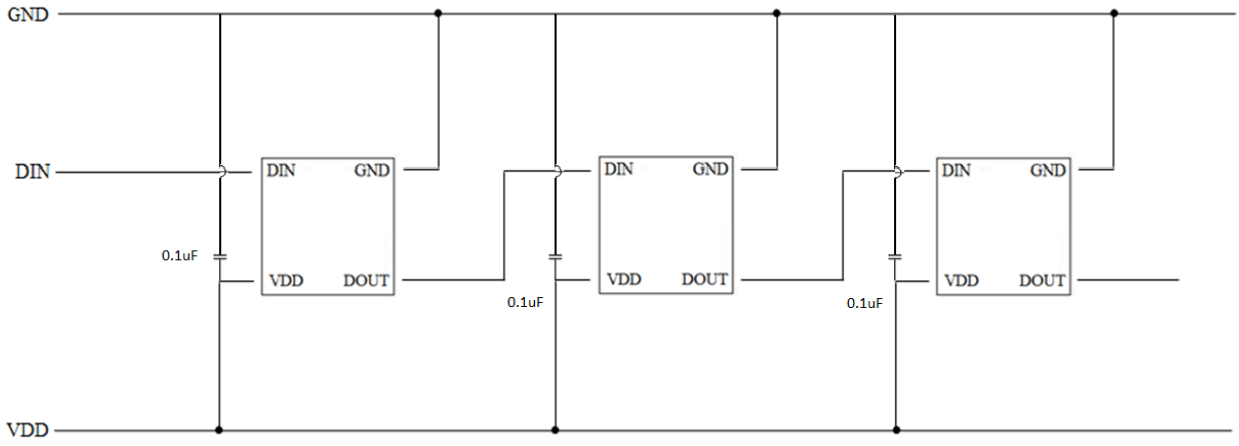
R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0

The drive determines the received bit string based on the input pulse width on DI port. A low bit 0 is represented by a 0.30us 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 longer than 200us is recognized as a reset command to drive to synchronize and update the data for all devices to display simultaneously, and it also means to start a new cycle of serial commands.

	Min	Typ.	Max	Unit:
T	---	1.20	---	μs
T0H	0.25	0.30	0.35	
T0L	0.85	0.90	0.95	
T1H	0.85	0.90	0.95	
T1L	0.25	0.30	0.35	
Reset	200	>200	---	



Typical Application Circuit

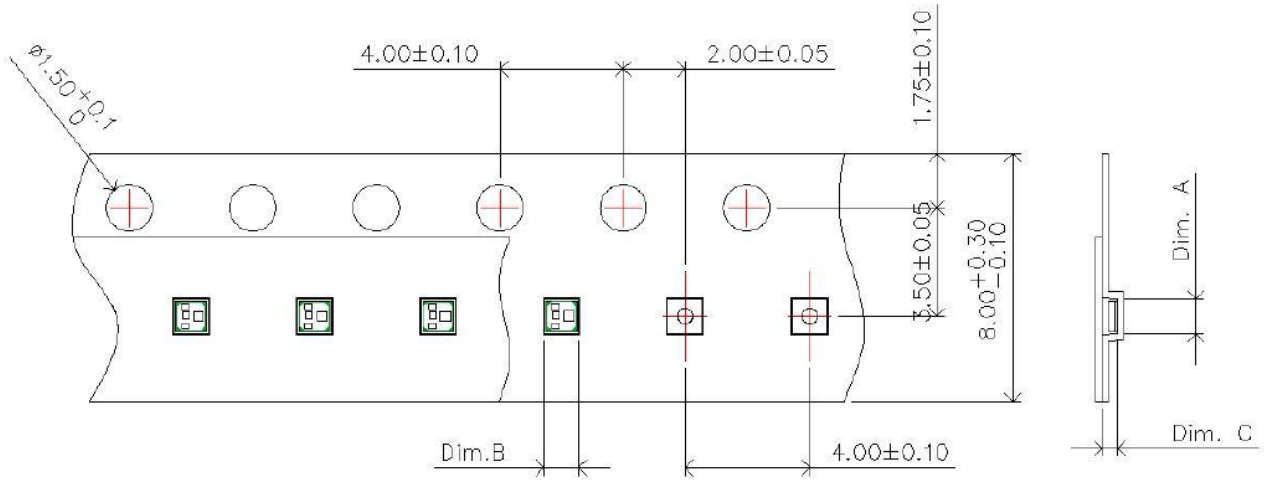


Precaution for Use

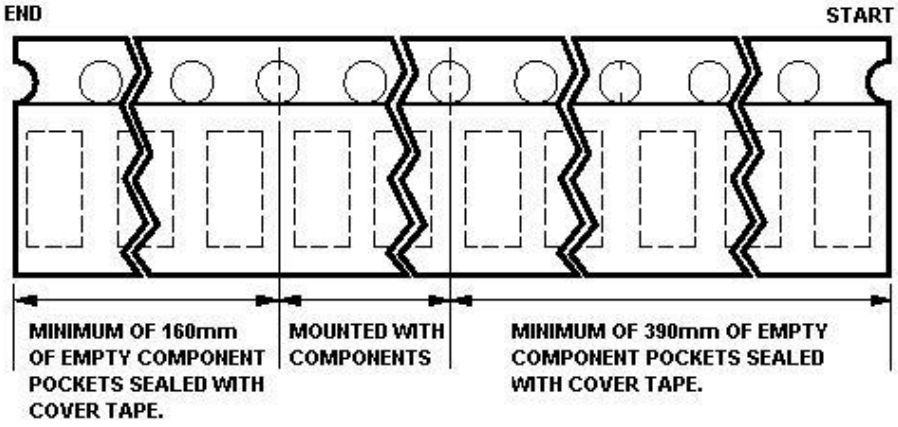
1. The chips should not be used directly in any type of fluid such as water, oil, organic solvent, etc.
2. When the LEDs are illuminating, the maximum ambient temperature should be first considered before operation.
3. LEDs must be stored in a clean environment. A sealed container with a nitrogen atmosphere is necessary if the storage period is over 3 months after shipping.
4. The LEDs must be used within 72 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

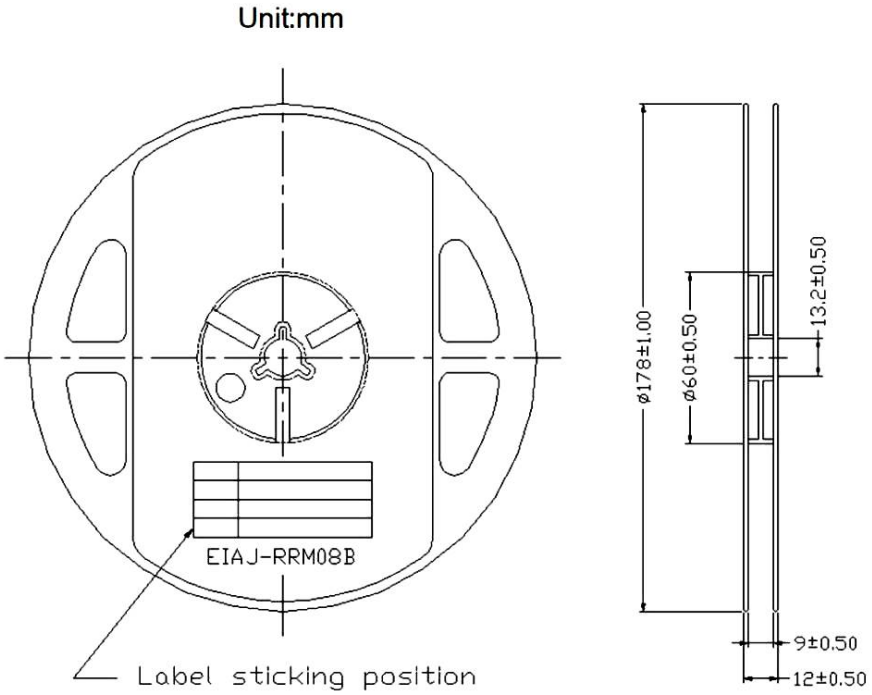
Tape Dimension



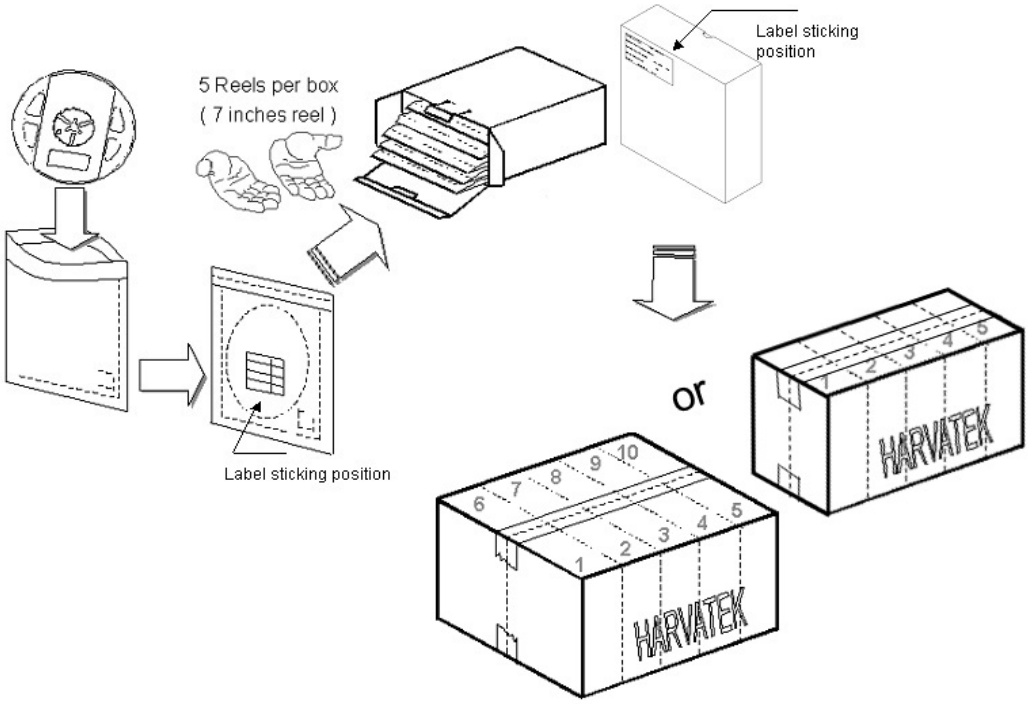
Dim. A	Dim. B	Dim. C	Q'ty/Reel
1.13±0.03	1.13±0.03	0.49±0.03	4K



Reel Dimension



Packing



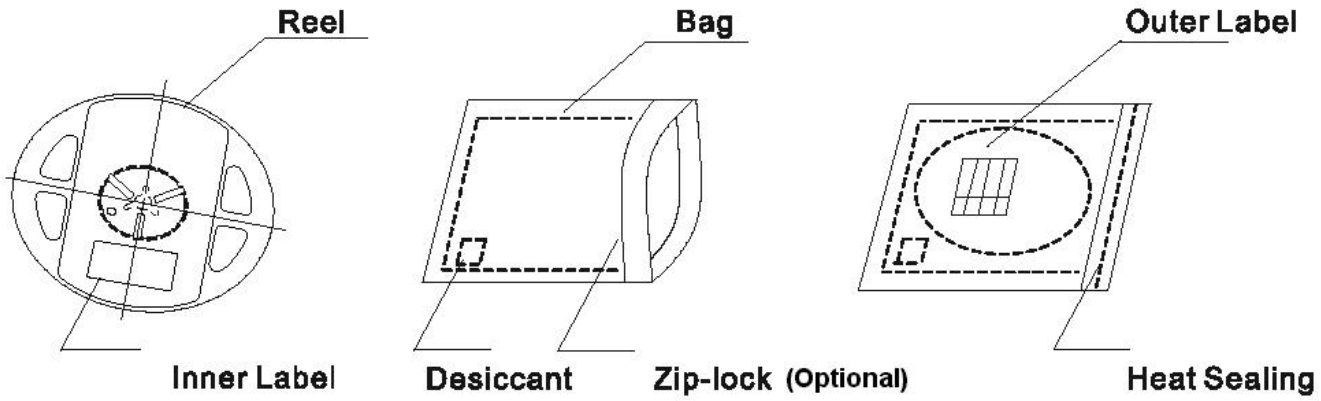
5 or 10 boxes per carton is available depending on shipment quantity.

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

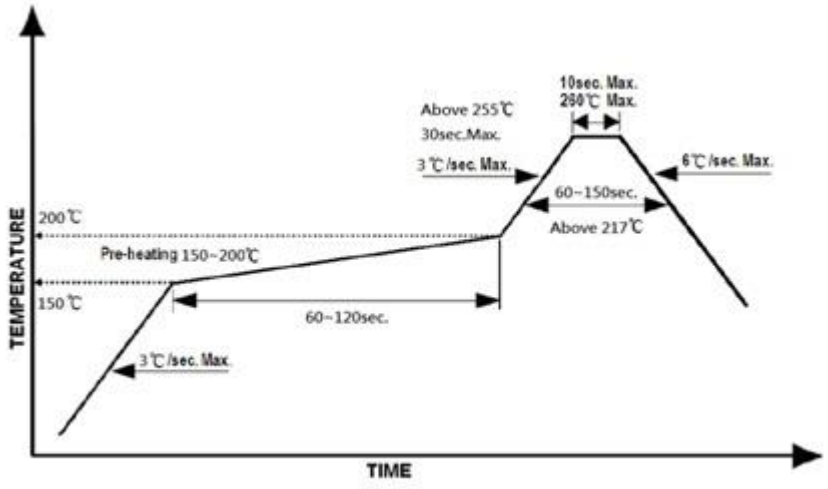
1. Avoid exposure to moisture at all times during transportation or storage.
2. Anti-Static precaution must be taken when handling GaN, InGaN, and AlGaInP products.
3. It is suggested to connect the unit with a current limiting resistor of the proper size. Avoid applying a reverse voltage beyond the 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℃, 60~150 sec.
2. Peak temp.:260 ℃Max. , 10 sec 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
-	-	06/26/2025	-