

Harvatek Surface Mount CHIP LEDs Data Sheet
E3M23RGB-02C0002H4C0028

Official Product	HT Part No. E3M23RGB-02C0002H4C0028	Customer Part No.		Data Sheet No.
Tentative Product	*****	*****		
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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.

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Product Specifications

Item	Specification	Material	Quantity
Luminous Intensity(Iv)	112.5-360.0 mcd R/G/B@2/2/2mA/ Ts= 25°C;Tolerance ±10%		
Chromaticity Coordinate	As page 7 & 8 R/G/B@2/2/2mA / Ts= 25°C; Tolerance:±0.007		
Vf	Red :1.6- 2.4 V Green : 2.4-3.3 V Blue : 2.4-3.3 V R/G/B@2/2/2mA / Ts= 25°C;Tolerance ± 0.05V		
Ir	< 1 µA @ VR = 5V		
ESD(HBM)	>2KV		
Resin	clear	Epoxy	
Carrier tape	EIA 481-1A specs	Conductive black tape	4000ea/reel
Reel	EIA 481-1A specs	Conductive black	
Label	HT standard	Paper	
Packing bag	250x230mm	Aluminum laminated bag/ 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.

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Label Specifications



Harvatek P/N:

E 3M2 3 RGB- 02C- 0002 H4

Product	Package	Dice Q'ty	Color	Current	Series Number	Taping
PCB +Zener	1.6(L)x1.6(W)x0.5(H) mm	3:Tri	RGB:Full Color	RGB:2mA	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		1:A	01~ZZ		000~ZZZ		
		2021-M		2:B					
		2022-P	1:Jan.	3:C					
		2023-Q	2:Feb.	...					
		...	...	26:Z					
		2026-T	A:Oct.	27:7					
		2027-V	B:Nov.	28:8					
		...	C:Dec.	29:9					
		2030-Y		30:3					
		2031-Z		31:4					
		...							

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Specifications Range

Electro-Optical Characteristics (Ta=25°C):

	Color	MIN	Typ.	MAX	IF (mA)
Luminous Intensity (IV/mcd)	R	18	-	71.5	7
	G	71.5	-	285	7
	B	11.25	-	45	5
Dominant Wavelength (WD/nm)	R	616	-	632	7
	G	515	-	535	7
	B	455	-	475	5
Peak Wavelength (λP)	R	-	629	-	7
	G	-	530	-	7
	B	-	460	-	5

*Just for reference.

■ Luminous Intensity (Iv)

Color	Bin Code	Spec. Range
RBG	R	112.5-180.0 mcd
	S	180.0-285.0 mcd
	T	285.0-360.0 mcd

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

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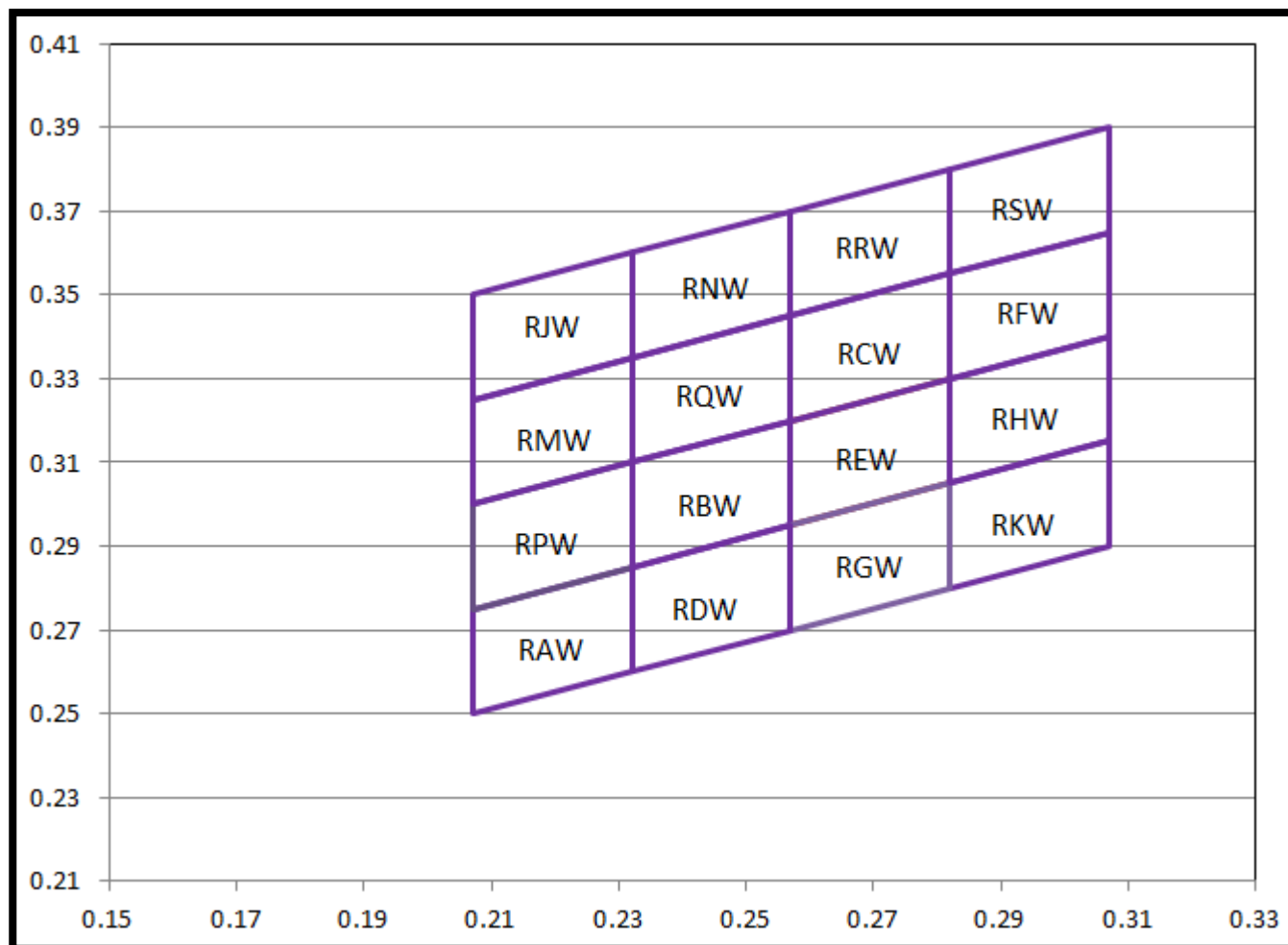
Color Bin :

Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y
RAW	0.207	0.25	RBW	0.232	0.285	RCW	0.257	0.32	RDW	0.232	0.26
	0.207	0.275		0.232	0.31		0.257	0.345		0.232	0.285
	0.232	0.285		0.257	0.32		0.282	0.355		0.257	0.295
	0.232	0.26		0.257	0.295		0.282	0.33		0.257	0.27
Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y
REW	0.257	0.295	RFW	0.282	0.33	RGW	0.257	0.27	RHW	0.282	0.305
	0.257	0.32		0.282	0.355		0.257	0.295		0.282	0.33
	0.282	0.33		0.307	0.365		0.282	0.305		0.307	0.34
	0.282	0.305		0.307	0.34		0.282	0.28		0.307	0.315
Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y
RJW	0.207	0.325	RKW	0.282	0.28	RMW	0.207	0.3	RNW	0.232	0.335
	0.207	0.35		0.282	0.305		0.207	0.325		0.232	0.36
	0.232	0.36		0.307	0.315		0.232	0.335		0.257	0.37
	0.232	0.335		0.307	0.29		0.232	0.31		0.257	0.345
Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y	Bin code	CIE_x	CIE_y
RPW	0.207	0.275	RQW	0.232	0.31	RRW	0.257	0.345	RSW	0.282	0.355
	0.207	0.3		0.232	0.335		0.257	0.37		0.282	0.38
	0.232	0.310		0.257	0.345		0.282	0.38		0.307	0.39
	0.232	0.285		0.257	0.32		0.282	0.355		0.307	0.365

Note: It maintains a tolerance of x,y ± 0.007

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Chromaticity Coordinate



Forward Voltage (Vf) Bin:

Color	Bin Code	Spec. Range
R	E18	1.6-2.4 V
B	F3B	2.2-3.3 V
G	F3B	2.2-3.3 V

Note: It maintains a tolerance of $\pm 0.05V$ on forward voltage measurements

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Product Features

Electro-Optical Characteristics

(T_{Soldering} 25 °C)

Part number	Emitting Color	Forward Voltage(VF)		Wavelength(nm)			I _v (mcd)	Viewing
		typ.	max.	λ _d	λ _p	Δλ	typ.	Angle 2θ1/2
E3M23RGB-02	Red	1.9	2.4	625	630	14.4	40	120
	Green	2.5	3.3	530	525	30.3	150	120
	Blue	2.7	3.3	468	466	15.7	20	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°C)

Series	P _D (mW)	I _F (mA)	I _{FP} (mA)*	T _{OP} (°C)	T _{ST} (°C)
Color	Power Dissipation	Forward Current	Pulse Forward Current	Operating Temperature	Storage Temperature
R	48	20	100	-40~+85	-40~+100
G	66	20	80	-40~+85	-40~+100
B	66	20	80	-40~+85	-40~+100

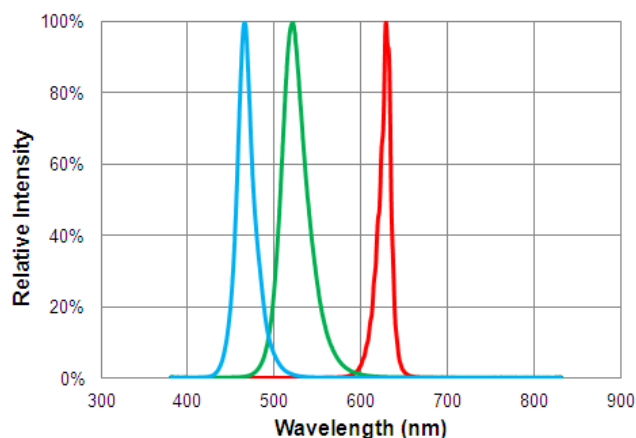
* Condition for I_{FP} is pulse of 1/10 duty and 0.1msec width

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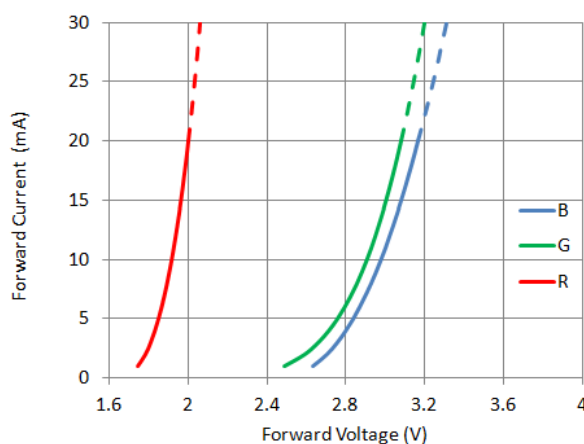
(T_{Soldering} 25 °C)

Characteristics of E3M23RGB

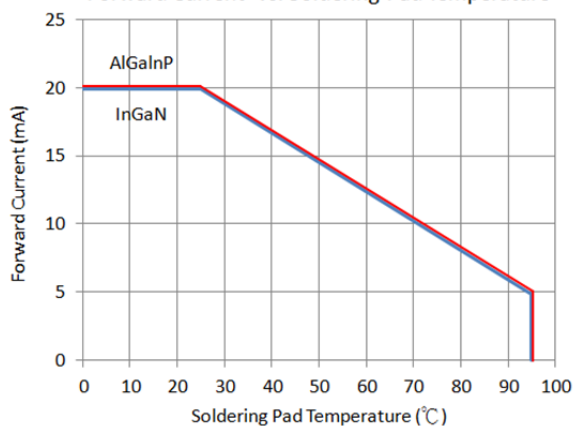
Relative Intensity vs. Wavelength



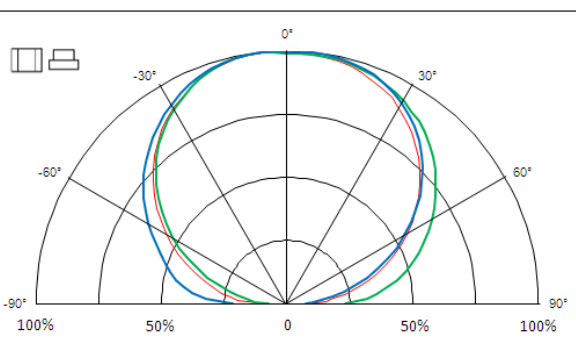
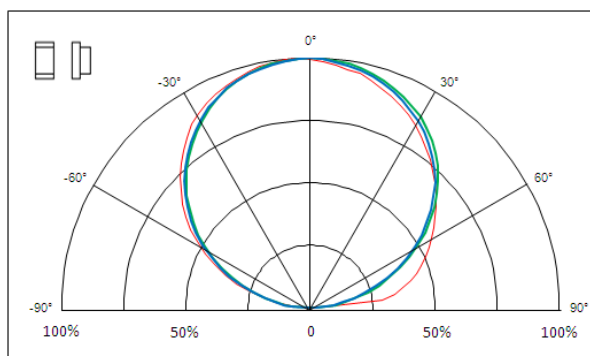
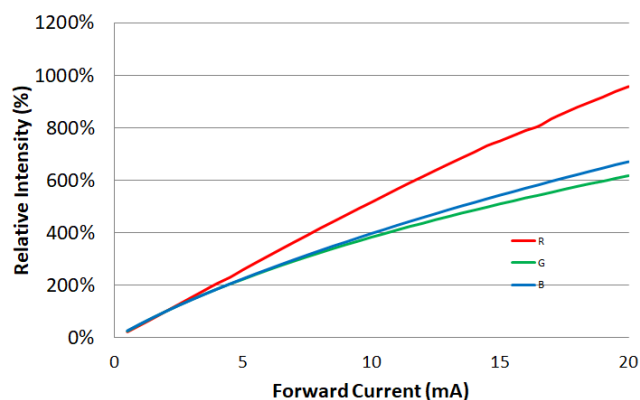
Forward Voltage vs. Forward Current



Forward Current vs. Soldering Pad Temperature



Relative Intensity vs. Forward Current



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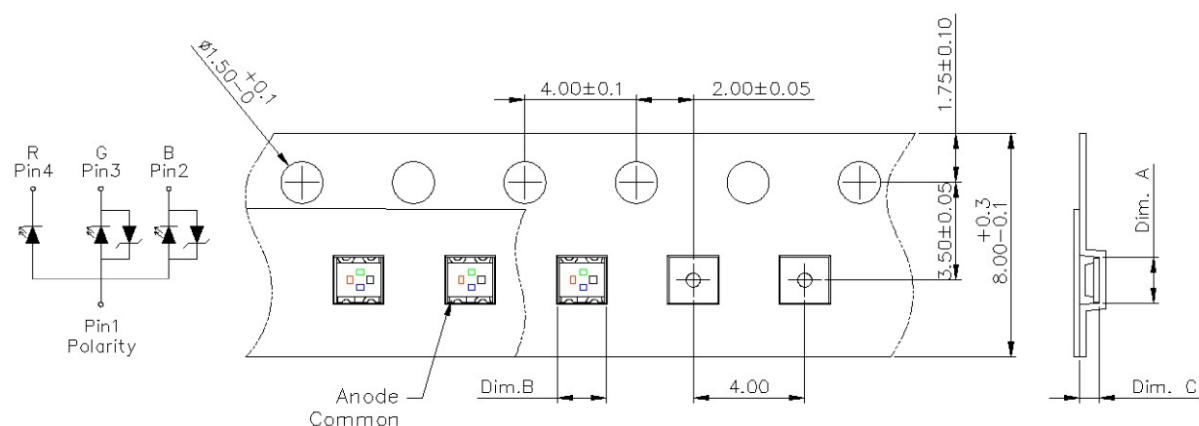
Precaution for Use

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.

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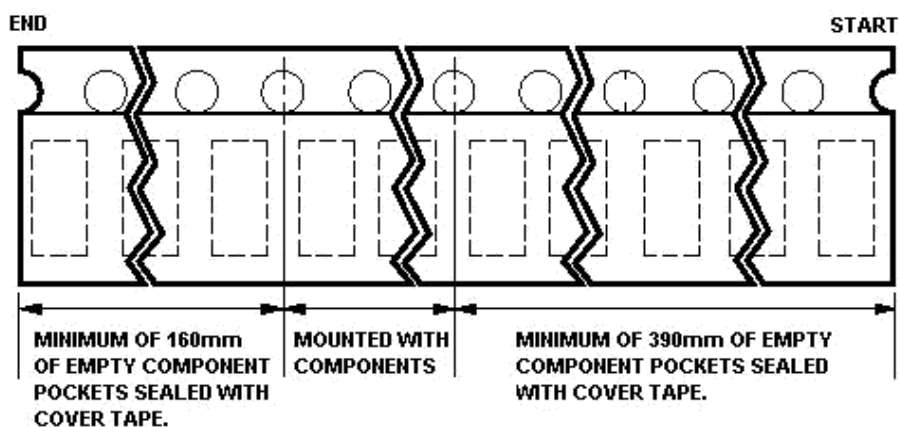
Packaging

Tape Dimension



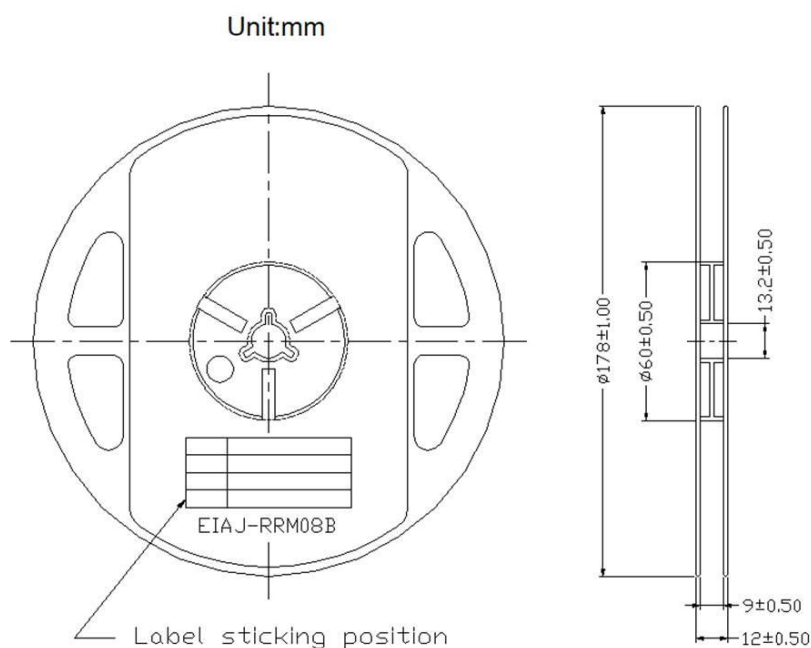
Dim. A	Dim. B	Dim. C	Q'ty/Reel
1.65±0.05	1.75±0.05	0.70±0.05	4K

unit: mm

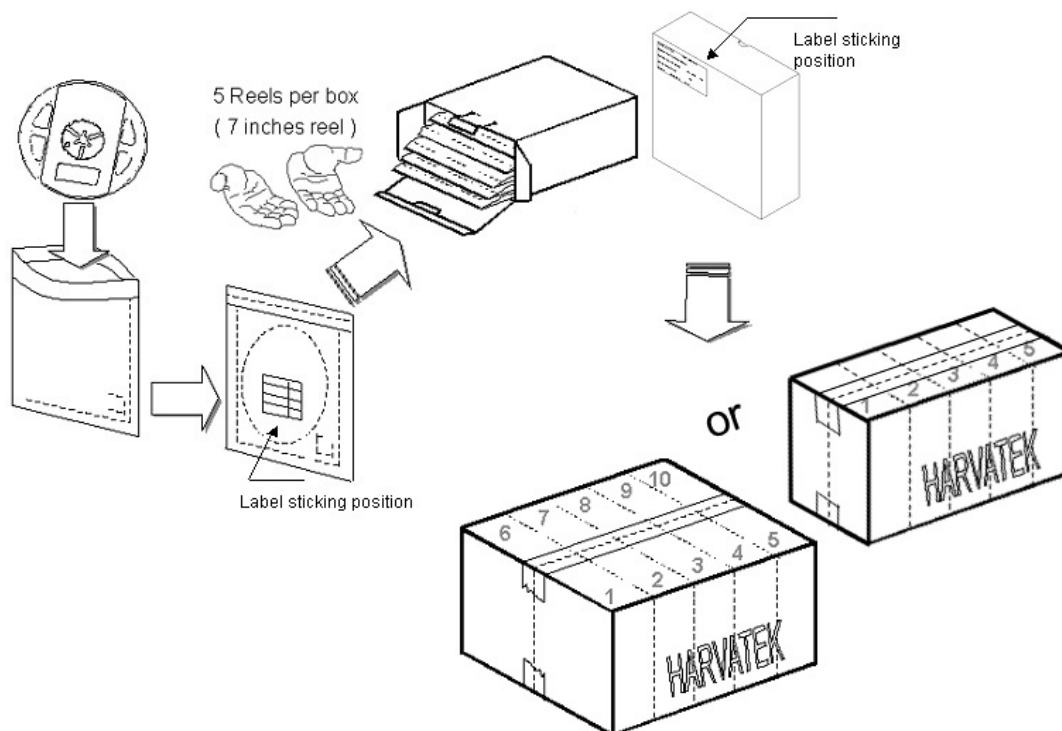


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Reel Dimension



Packing



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

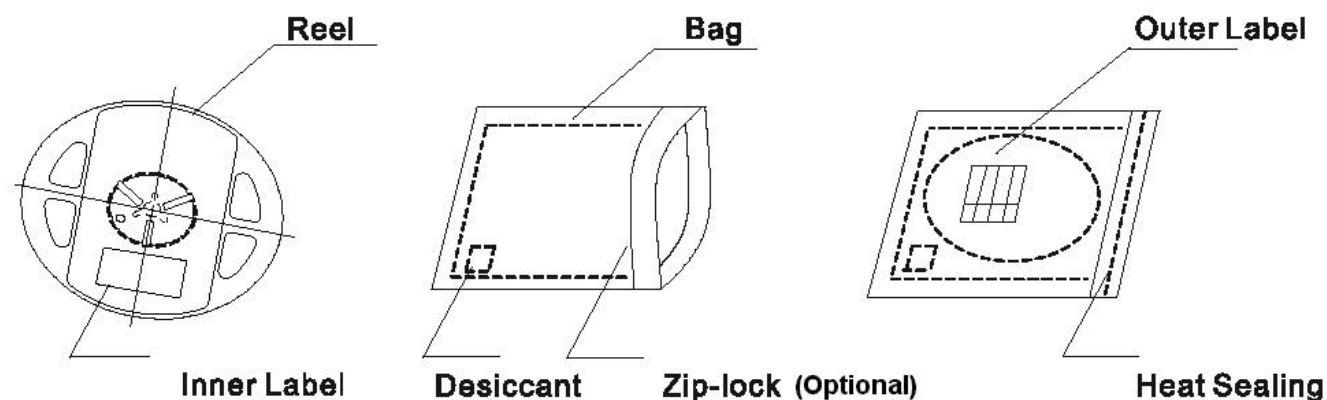
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Dry Pack

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 72 hours.

The conditions are as followings:

1. $60\pm3^{\circ}\text{C} \times (12\sim 24\text{hrs})$ and $<5\%\text{RH}$, taped reel type.
2. $100\pm3^{\circ}\text{C} \times (45\text{min}\sim 1\text{hr})$, bulk type.
3. $130\pm3^{\circ}\text{C} \times (15\text{min}\sim 30\text{min})$, 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.

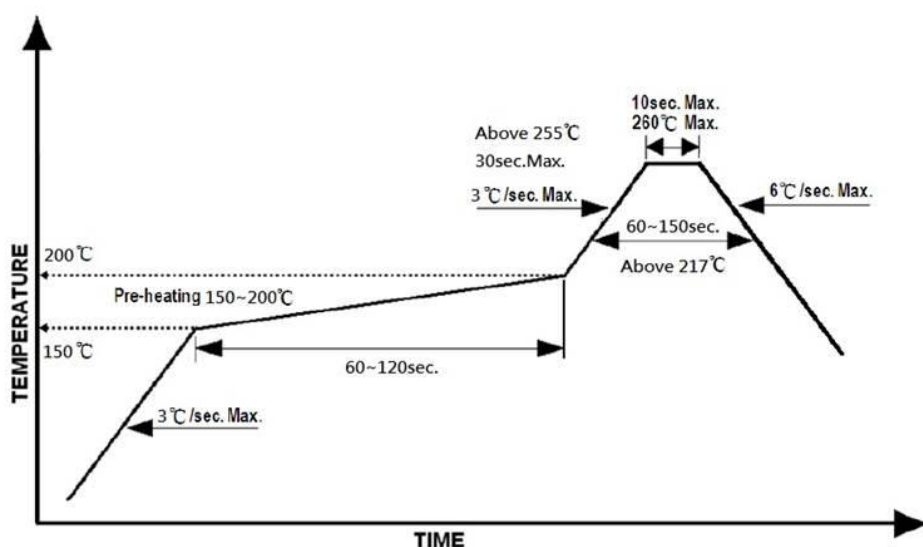
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Reflow Soldering

Recommend soldering paste specifications:

1. Operating temp.: Above 217 °C ,60~150 sec.
2. Peak temp.:260 °CMax.,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 °C .
- 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°C x 30sec. or <30°C x 3min
- Ultrasonic cleaning: < 15W/ bath; bath volume ≤ 1liter
- Curing: 100 °C max, <3min

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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	Official Version	11/20/2023	All

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