

Harvatek Surface Mount PLCC IC+RGB LEDs Data Sheet T4203GRB-12C61013TU1930

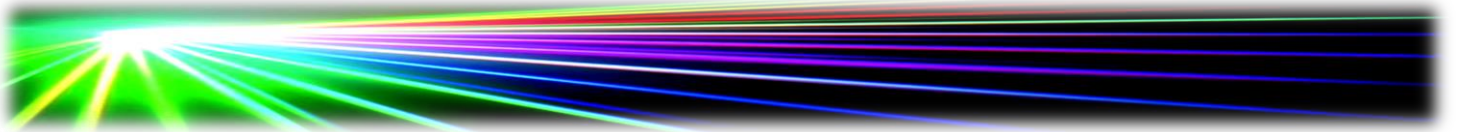
(Preliminary)

Feature Description:

- Top SMD integrates high-quality external control single-wire serial cascade constant current IC.
- The control circuit and chip are integrated in the SMD 4020 components, forming a complete external control pixel, with uniform color temperature effect and high consistency.
- Built-in data shaping circuit, any pixel receives the signal after waveform shaping and then outputs it to ensure that the line waveform distortion will not accumulate.
- Built-in power-on reset and power-off reset circuit, no light when power on.
- Grayscale adjustment circuit (256-level grayscale adjustable).
- Special treatment for red light drive, more balanced color matching,
- Single-line data transmission, infinite cascade.
- Shaping forwarding enhancement technology, the transmission distance between two points exceeds 10M.
- The data transmission frequency can reach 800Kbps, when the refresh rate is 30 frames/second, the number of cascades is not less than 1024 points.

Applications

- LED full-color light-emitting character string, LED full-color module, LED magic soft and hard light strip, LED guardrail tube, LED appearance/scenario lighting.
- LED point light source, LED pixel screen, LED special-shaped screen, various electronic products, electrical equipment marquee.



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DISCLAIMER

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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)	Red : 300~500 mcd Green : 700~1500 mcd Blue : 200~3000 mcd IC@5V, R/G/B@12mA Ts= 25 ^o C; Tolerance ±10%		
Wavelength	Red : 620.0~630.0 nm Green : 515.0~530.0 nm Blue : 460.0~475.0 nm IC@5V, R/G/B@12mA Ts= 25 ^o C; Tolerance ±10%		
Applied voltage	5V_DC		
View angle	120o		
Resin	Clear	Epoxy	
Carrier tape	EIA 481-1A specs	Conductive black tape	3000 ea/reel
Reel	EIA 481-1A specs	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, λD 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

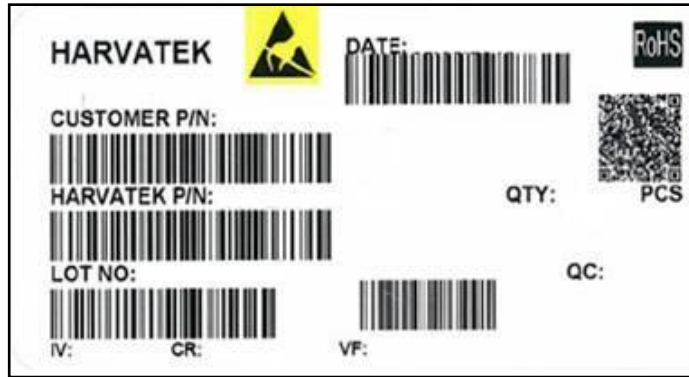


The symbol to the left denotes that ESD precaution is needed. ESD protection for GaP and AlGaAs based chips is necessary even though they are relatively safe in the presence of low static-electric discharge. Parts built with AlInGaP, GaN, or/and InGaN based chips are **STATIC SENSITIVE devices**. ESD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

T 420 3 GRB- 12C 61 01 3T

Product	Package	Dice Q'ty	Color	Current	System	Series Number	Taping
L/F	4.0(L)x2.0(W)x1.6(H) mm	3:Tri	GRB (Full Color)	12mA	00~ZZ	X001~XZZZ	1.Taping style 2. Q'ty

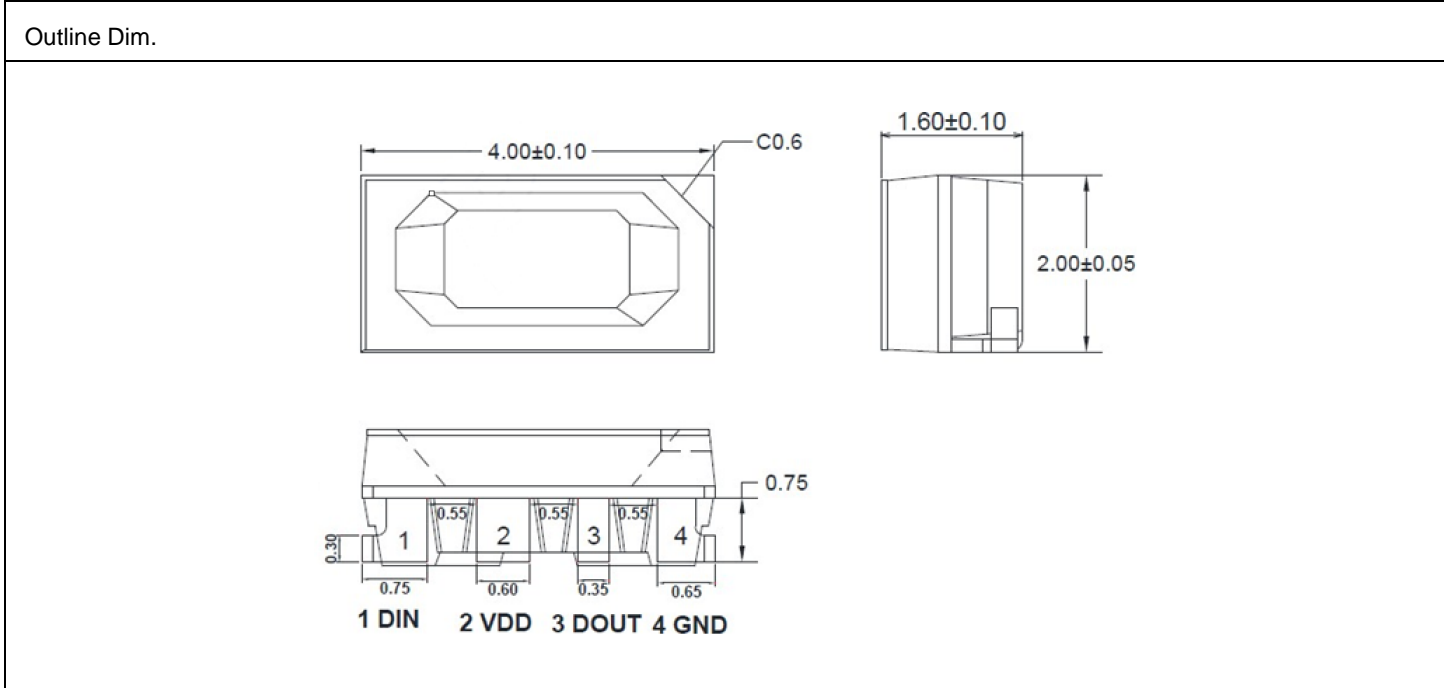
Lot No.

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		

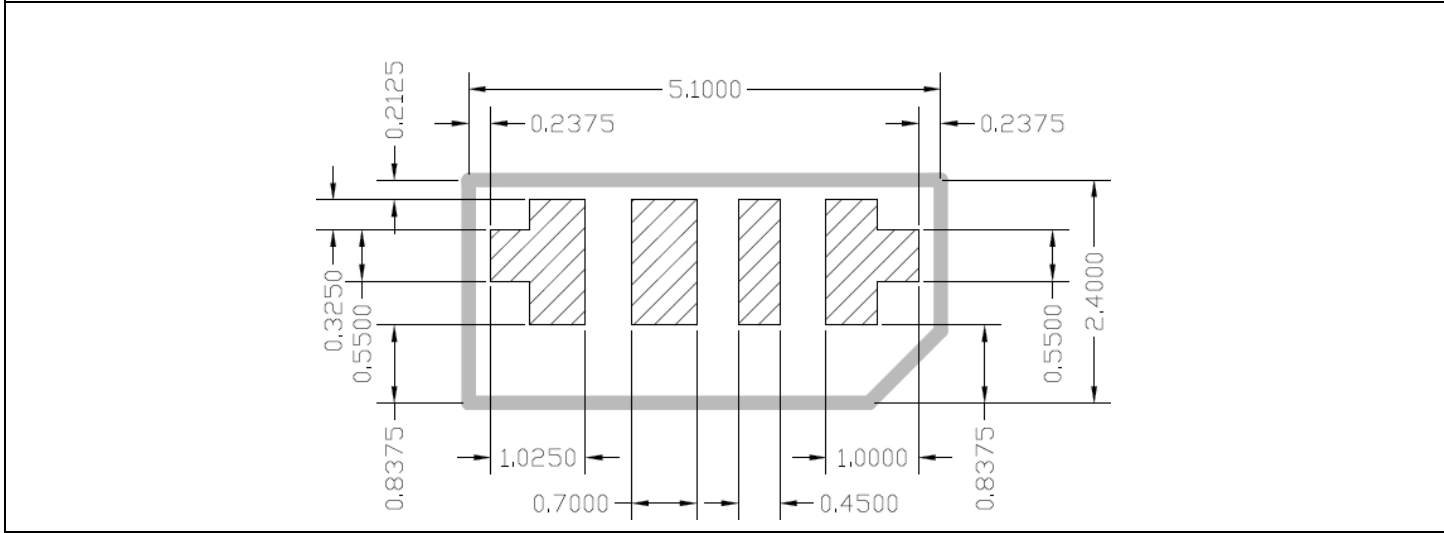
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Package Outline Dimension and Recommended Soldering Pattern for Reflow Soldering

(Unit:mm Tolerance: +/-0.1)



Soldering Pattern



Soldering terminals may shift in the Wd direction.

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Absolute Maximum Rating

(Max., TA=25°C, VSS=0V)

Symbol	Parameter	Range	Units
V _{DD}	Power Supply Voltage	+3.7~+5.5	V
V _{IN}	Logic Input Voltage	-0.5~V _{DD} +0.5	V
T _{opt}	Operating temperature	-40°C to +85°C	°C
T _{stg}	Storage Temperature	-40°C to +85°C	°C
V _{ESD}	ESD Voltage	2	kV

Electro-Optical Characteristics

Series	Emitting Color	Forward Current(mA)	Material	Dominant Wavelength (nm)	I _v (mcd)	Viewing Angle 2θ _{1/2}
T4203GRB	R	12	AllnGaP	620-630	300-500	120
	G	12	InGaN	515-530	700-1500	120
	B	12	InGaN	460-475	200-300	120

Electrical characteristics

(TA=-20~+70°C, VDD=4.5~5.5V, VSS=0V)

Symbol	Parameter	Min.	Typ.	Max.	Units	Note
V _{DD}	Supply Voltage	-	5.2	-	V	-
V _{DS.MAX}	R/G/B port pressure	-	-	26	V	-
I _{out}	R/G/B Driving Current	-	12	-	mA	V _{DS-R/G/B} =1V
I _{DOH}	DOUT Drive Capability		49		mA	-
I _{DOL}			-50		mA	-
V _{IH}	Input High "H" of DI	0.7*VDD	-	-	V	VDD=5V
V _{IL}	Input Low "L" of DI	-	-	0.3*VDD	V	

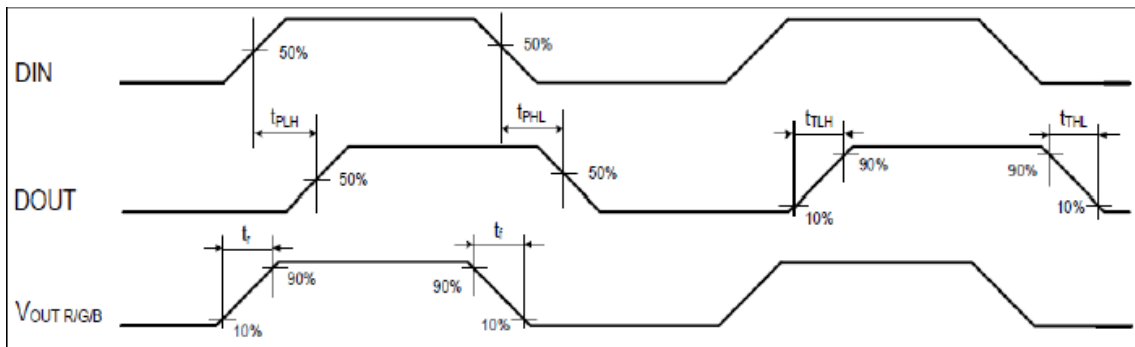
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FPWM	The Frequency of PWM	-	1.2	-	KHz	-
I _{DD}	Static Power Consumption		1.0		mA	VDD=4.5V, OUT R/G/B

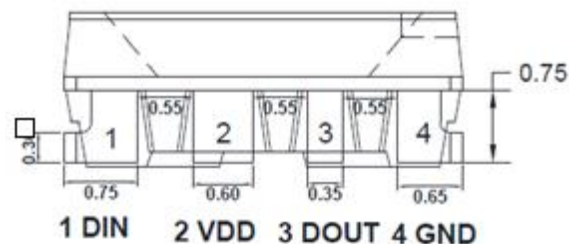
Dynamic characteristics

(TA=25°C)

Symbol	Parameter	Condition	Min	Typ.	Max	Units
f _{DIN}	Data Transfer Rate	Duty Ratio (67%)	-	800	-	kHZ
T _{PLH}	DOUT Propagation Delay	DIN→DOUT	-	-	500	ns
T _{PLH}			-	-	500	ns
T _r	IOUT Rise Rate	V _{DS} =1.5V I _{OUT} 12mA	-	100	-	ns
T _f			-	100	-	ns



Application circuit



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No.	Symbol	Pin	Function
1	DIN	Data Input	Control Data Signal Input
2	VDD	Power	Power
3	DOUT	Data Output	Control Data Signal Output
4	GND	Ground	Ground

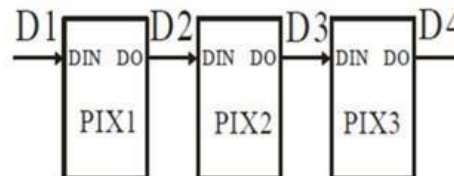
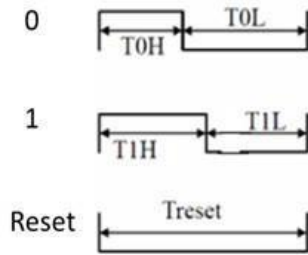
■ Cascading data structure

($T_H+T_L=1.25\mu s\pm 600ns$)

Item	Description	Min.	Typical	Max.	Allowance
T_{OH}	0 code, high voltage time	200 ns	320 ns	400 ns	± 150 ns
T_{1H}	1 code, high voltage time	800 ns	-	-	± 150 ns
T_{OL}	0 code, low voltage time	580 ns	640 ns	1000 ns	± 150 ns
T_{1L}	1 code, low voltage time	200 ns	-	-	± 150 ns
RES	reset time	$>80\mu s$	-	-	-

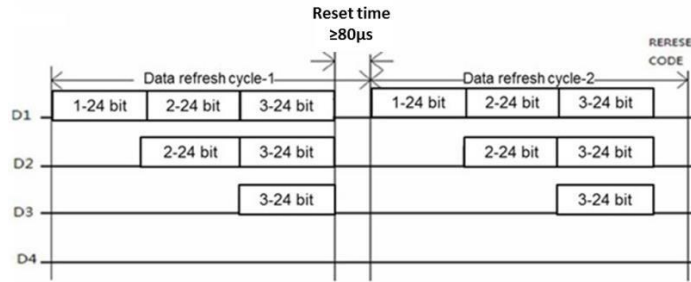
Timing waveform ($T_a=25^\circ C$) :

Connection method

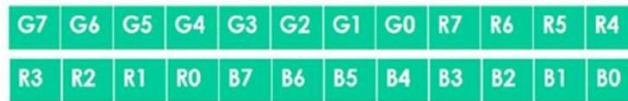


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Data transmission method(TA=25°C)



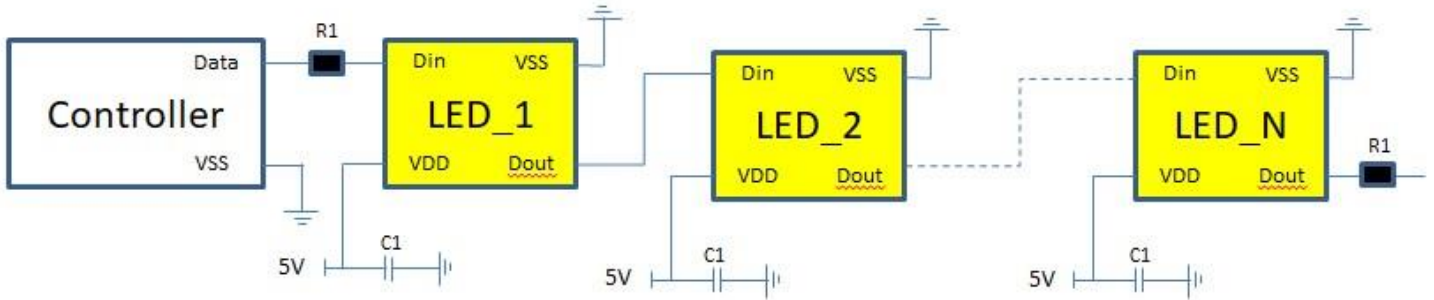
24 bit Data Structure



RGB (G7 →G6 →.....B0)

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▪ LED Application Circuit



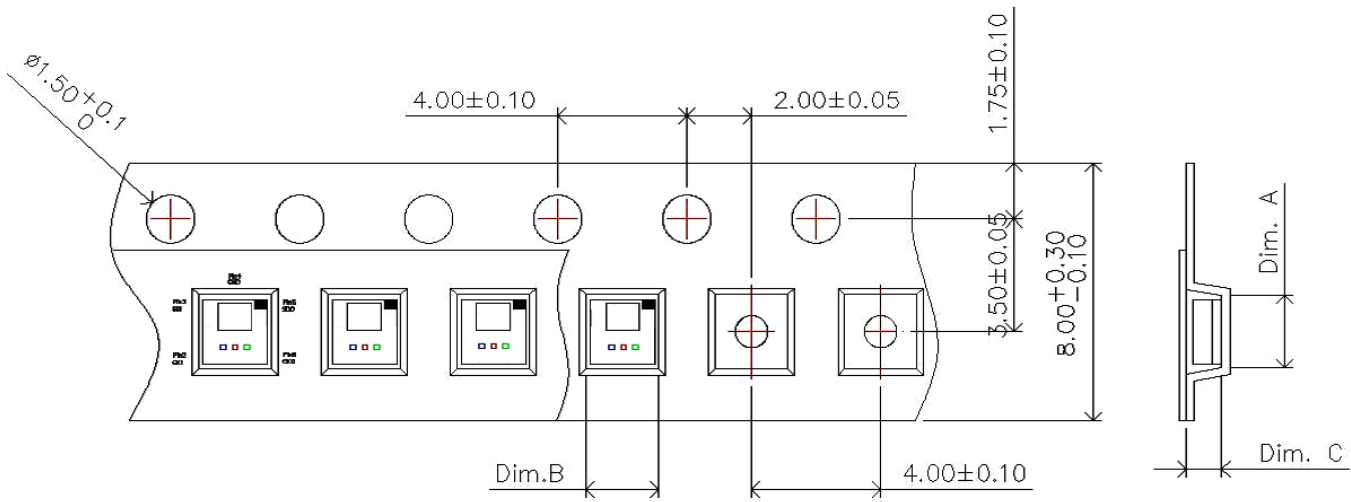
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Precaution for Use

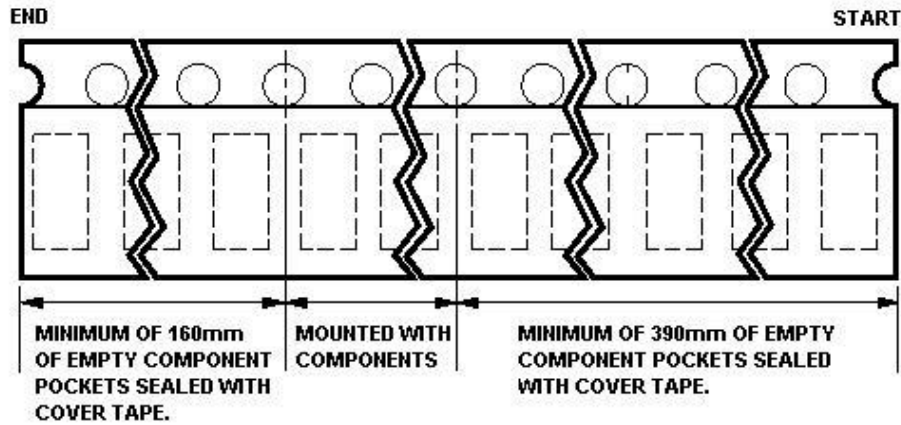
1. The chips should not be used directly in any type of fluid such as water, oil, organic solvent, etc.
2. When the LEDs are illuminating, the maximum ambient temperature should be first considered before operation.
3. LEDs must be stored in a clean environment. A sealed container with a nitrogen atmosphere is necessary if the storage period is over 3 months after shipping.
4. The LEDs must be used within 48 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



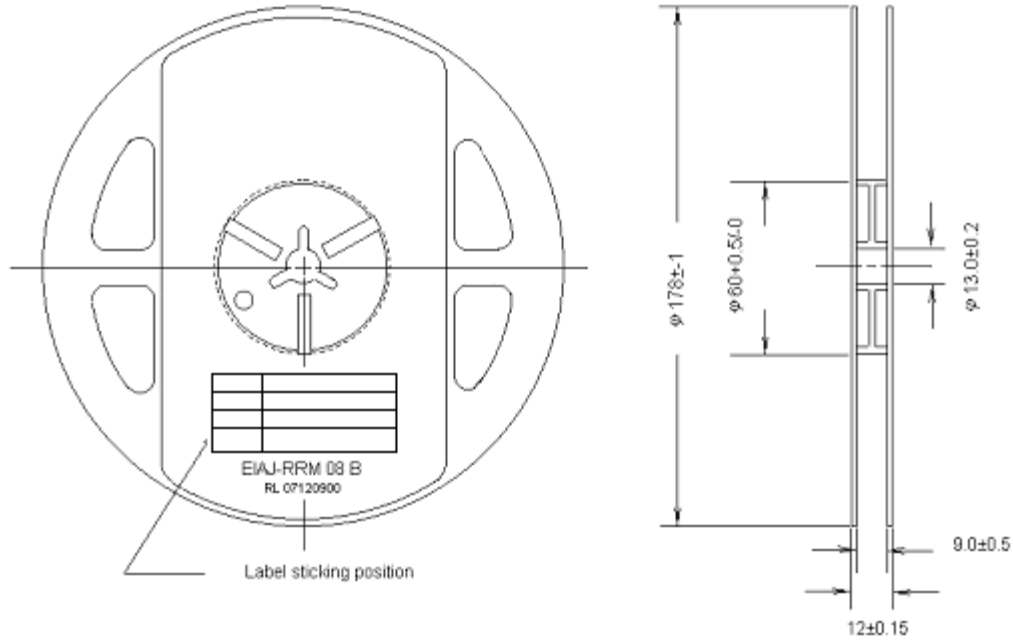
Dim. A	Dim. B	Dim. C	Q'ty/Reel
2.15±0.10	2.15±0.10	1.05±0.10	3K



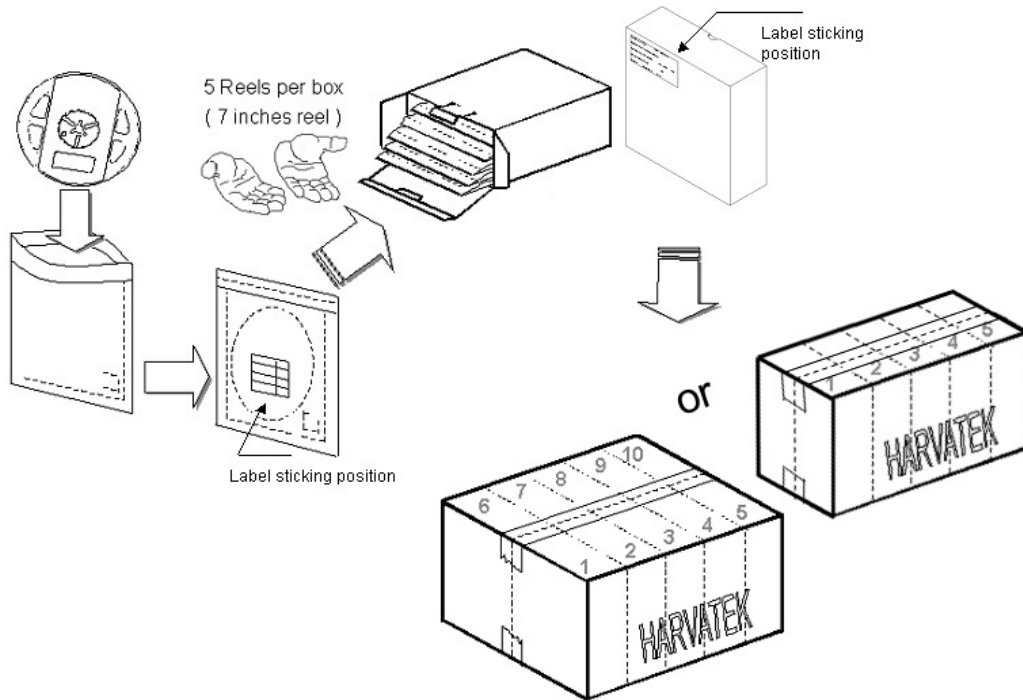
Reel

Dimension

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Packing



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

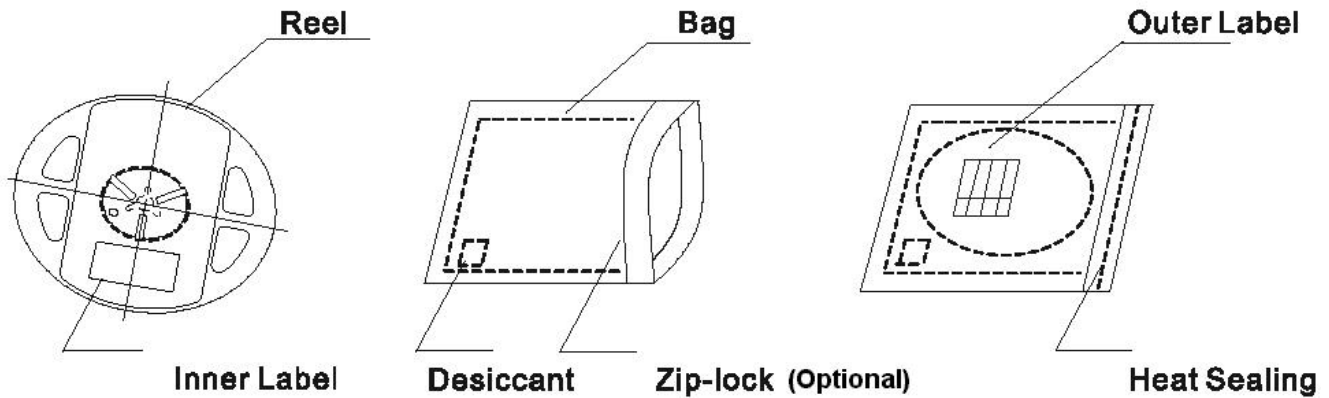
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Dry Pack

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 48 hours.

The conditions are as followings:

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

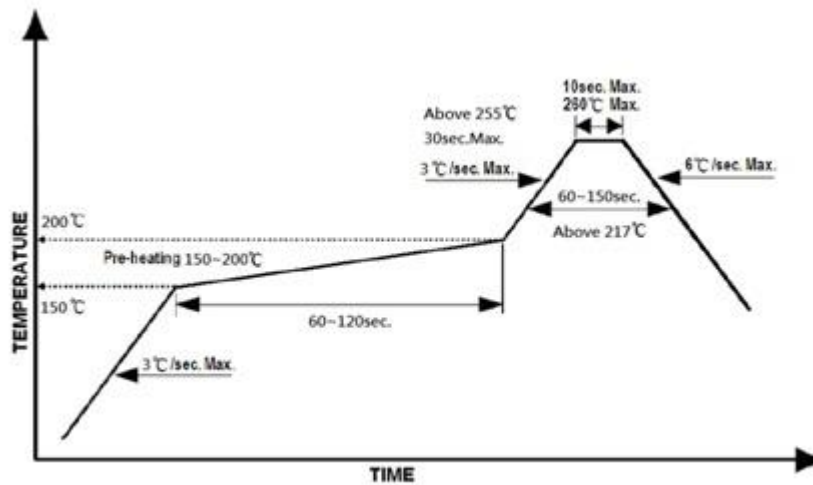
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Reflow Soldering

Recommend soldering paste specifications:

1. Operating temp.: Above 217°C ,60~150 sec.
2. Peak temp.:260 °C 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 °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
-	-	03/29/2023	-