

## Primax

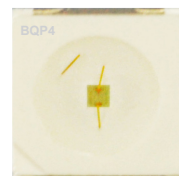
Synonymous with function and performance, enter the Primax, the new era of high intensity illumination in LED. With its high flux output and high luminous intensity, Primax transcends today LED lightings technology and how we perceive it. The small package outline and high intensity make it an ideal choice for backlighting, signage, exterior automotive lighting and decorative lighting.

## Features:

- > Super high brightness surface mount LED
- > 120° viewing angle.
- > Compact package outline (LxW) of 3.7 x 3.5 mm.
- > Ultra low height profile - 0.8mm.
- > Low thermal resistance.
- > Compatible to IR reflow soldering.
- > Superior corrosion resistant.
- > Environmental friendly; RoHS compliance.
- > Compliance to automotive standard; AEC-Q102.

## Applications:

- > Lighting: Garden light, architecture lighting, signage, etc.
- > Automotive: Interior application, eg: Ambient lighting.
- > Automotive: Exterior application, eg: Welcome lighting.



## Optical Characteristics at Tj=25°C

| Part Number          | Color             | Viewing Angle° | Luminous Flux @ 150mA (lm) <i>Appx. 1.2</i> |      |      |
|----------------------|-------------------|----------------|---------------------------------------------|------|------|
|                      |                   |                | Min.                                        | Typ. | Max. |
| ● MAT-EZHG-QR2-1     | True Green, 525nm | 120            | 30.6                                        | 39.8 | 45.2 |
| ● Not for new design |                   |                |                                             |      |      |

## Electrical Characteristics at Tj=25°C

| Part Number | Vf @ If = 150 mA <i>Appx. 3.1</i> |          |          |
|-------------|-----------------------------------|----------|----------|
|             | Min. (V)                          | Typ. (V) | Max. (V) |
| MAT-EZHG    | 2.90                              | 3.30     | 3.60     |

## Absolute Maximum Ratings

|                                                                        | Maximum Value                 | Unit |
|------------------------------------------------------------------------|-------------------------------|------|
| DC forward current                                                     | 200                           | mA   |
| Peak pulse current (T <sub>s</sub> =55°C, tp<=100µs , Duty cycle=0.03) | 300                           | mA   |
| Reverse Voltage                                                        | Not designed for reverse bias | V    |
| ESD threshold (HBM)                                                    | 8                             | kV   |
| LED junction temperature                                               | 150                           | °C   |
| Operating temperature                                                  | -40 ... +125                  | °C   |
| Storage temperature                                                    | -40 ... +125                  | °C   |
| Thermal resistance (Rated current = 150mA, Ts = 25 °C)                 |                               |      |
| - Real Thermal Resistance                                              |                               |      |
| Junction / solder point, R <sub>th JS real</sub> (Typ = 36K/W)         | 46                            | K/W  |
| - Electrical Thermal Resistance                                        |                               |      |
| Junction / solder point, R <sub>th JS el</sub> (Typ = 29K/W)           | 37                            | K/W  |

### Wavelength Grouping at Tj=25°C

| Color           | Group | Wavelength distribution (nm) <i>Appx. 2.2</i> |
|-----------------|-------|-----------------------------------------------|
| MAT; True Green | Full  | 520 - 535                                     |
|                 | A     | 520 - 525                                     |
|                 | B     | 525 - 530                                     |
|                 | C     | 530 - 535                                     |

### Luminous Flux at Tj=25°C

| Brightness Group | Luminous Flux @ If=150mA (lm) <i>Appx. 1.2</i> |
|------------------|------------------------------------------------|
| Q2               | 30.6 ... 34.8                                  |
| Q3               | 34.8 ... 39.8                                  |
| R2               | 39.8 ... 45.2                                  |

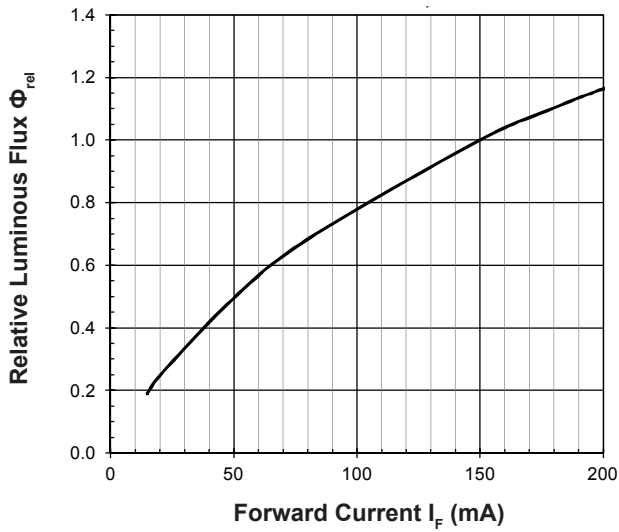
### Vf Binning (Optional)

| Vf Bin @ 150mA | Forward Voltage (V) <i>Appx. 3.1</i> |
|----------------|--------------------------------------|
| VR7            | 2.80 ... 3.10                        |
| VR8            | 3.10 ... 3.40                        |
| VR9            | 3.40 ... 3.70                        |

Please consult sales and marketing for special part number to incorporate Vf binning.

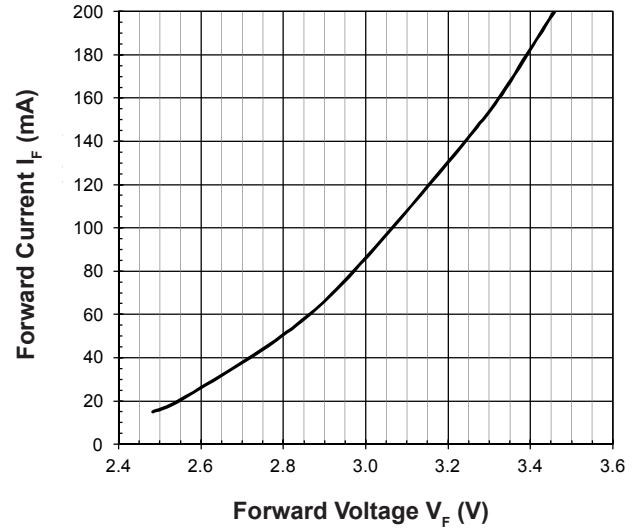
**Relative Luminous Flux Vs Forward Current**

$$\Phi_V/\Phi_V(150\text{mA}) = f(I_F); T_j = 25^\circ\text{C}$$



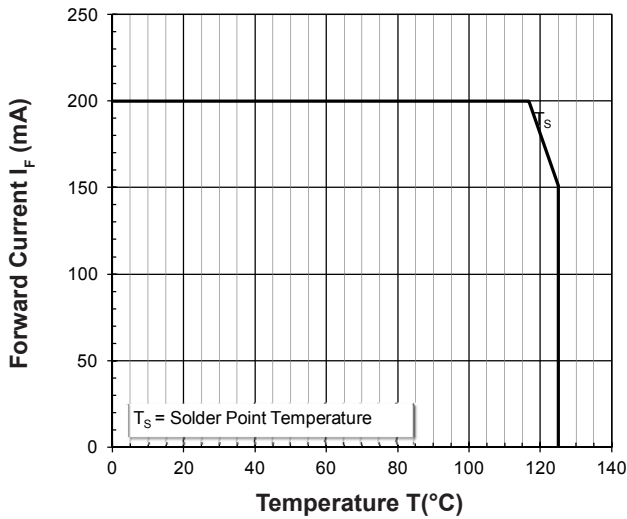
**Forward Current Vs Forward Voltage**

$$I_F = f(V_F); T_j = 25^\circ\text{C}$$



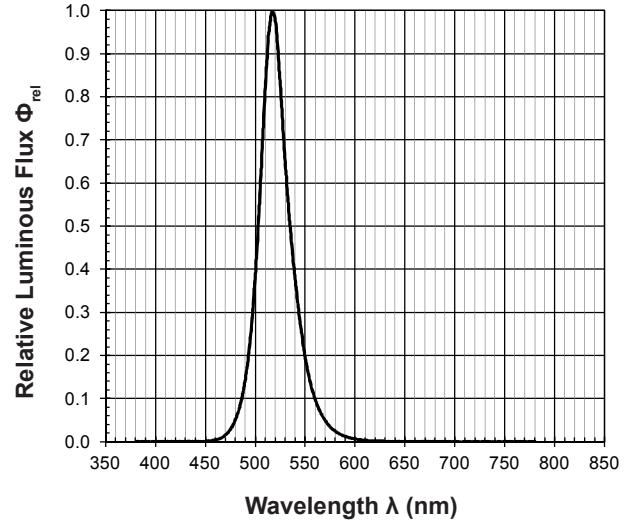
**Maximum Current Vs Temperature**

$$I_F = f(T)$$



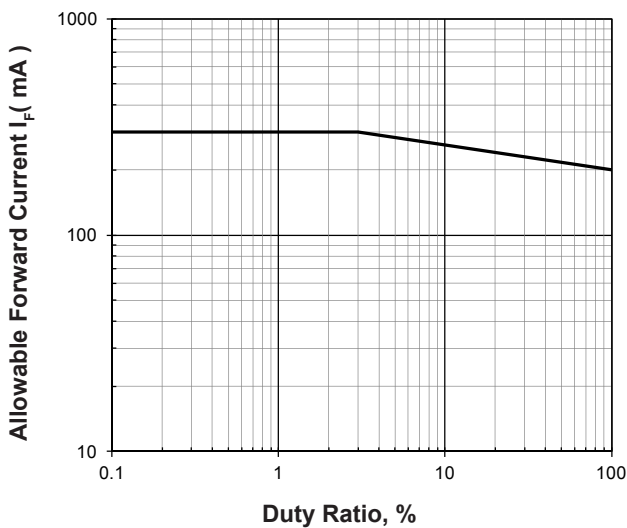
**Relative Spectral Emission**

$$\Phi_{rel} = f(\lambda); T_j = 25^\circ\text{C}; I_F = 150\text{mA}$$

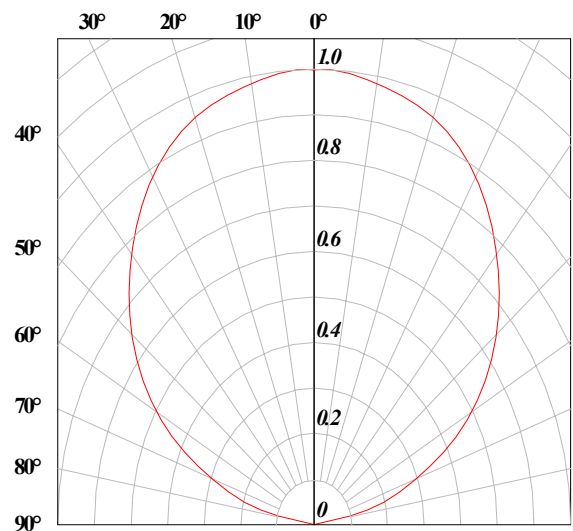


**Allowable Forward Current Vs Duty Ratio**

$$(T_s = 55^\circ\text{C}; t_p = 100\mu\text{s})$$

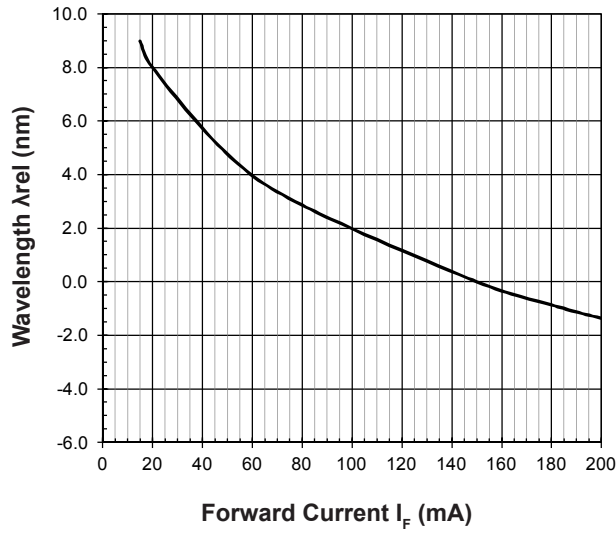


**Radiation Pattern**



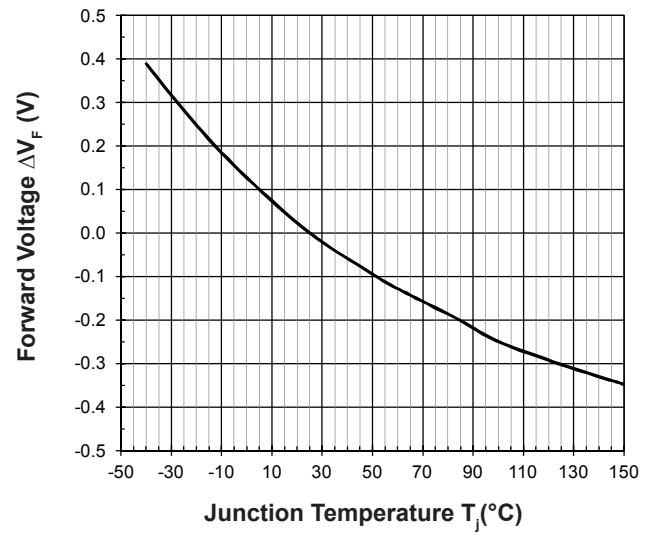
**Wavelength Shift Vs Forward Current**

$$\lambda_{\text{dom}} = f(I_F); T_j = 25^\circ\text{C}$$



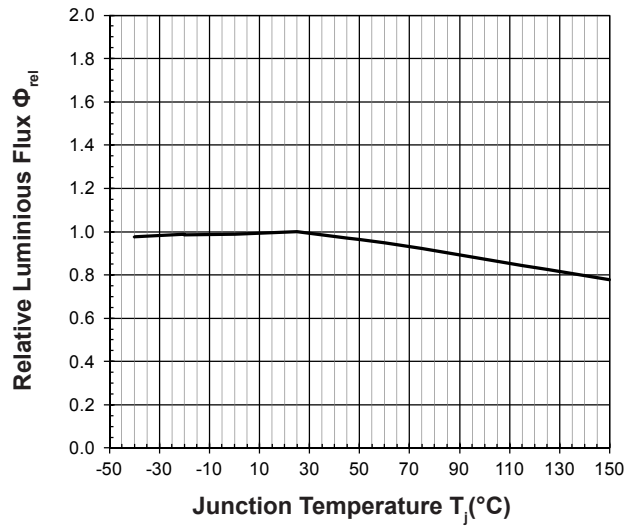
**Forward Voltage Vs Junction Temperature**

$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 150\text{mA}$$



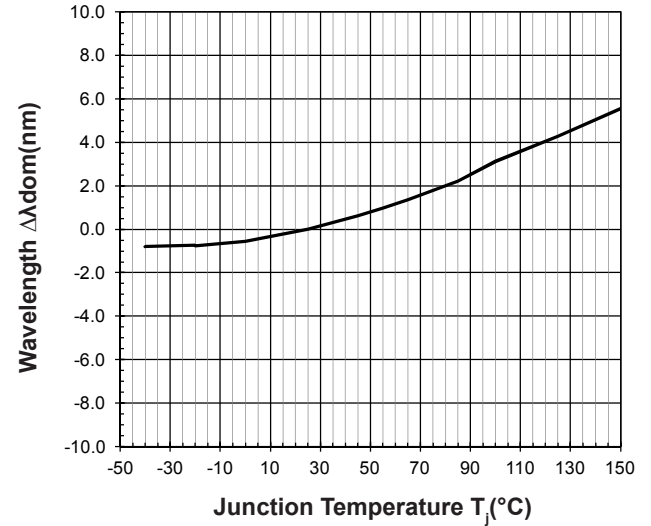
**Relative Luminous Flux Vs Junction Temperature**

$$\Phi_V/\Phi_V(25^\circ\text{C}) = f(T_j); I_F = 150\text{mA}$$

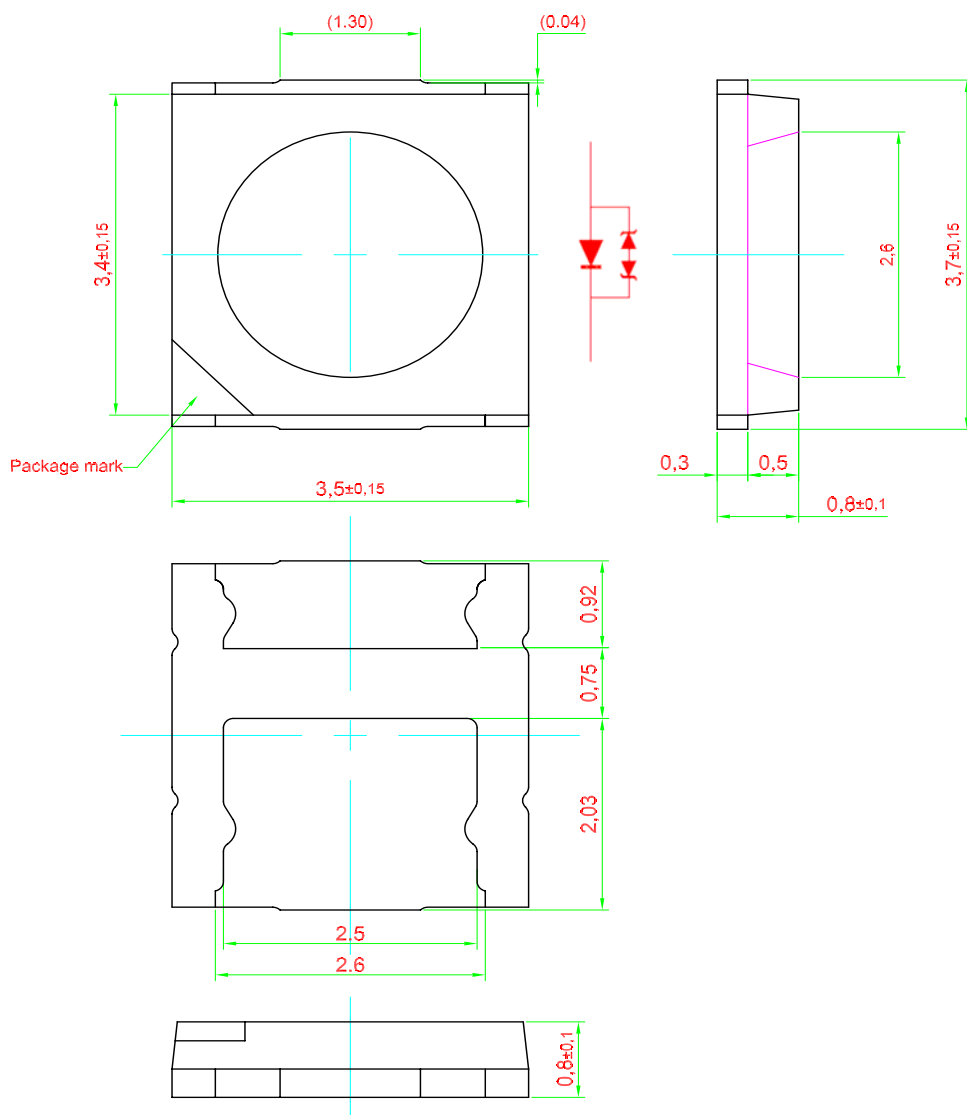


**Wavelength Vs Junction Temperature**

$$\Delta \lambda_{\text{dom}} = \lambda_{\text{dom}} - \lambda_{\text{dom}}(25^\circ\text{C}) = f(T_j); I_F = 150\text{mA}$$



## PrimaxPlus • InGaN: MAT-EZHG Package Outlines

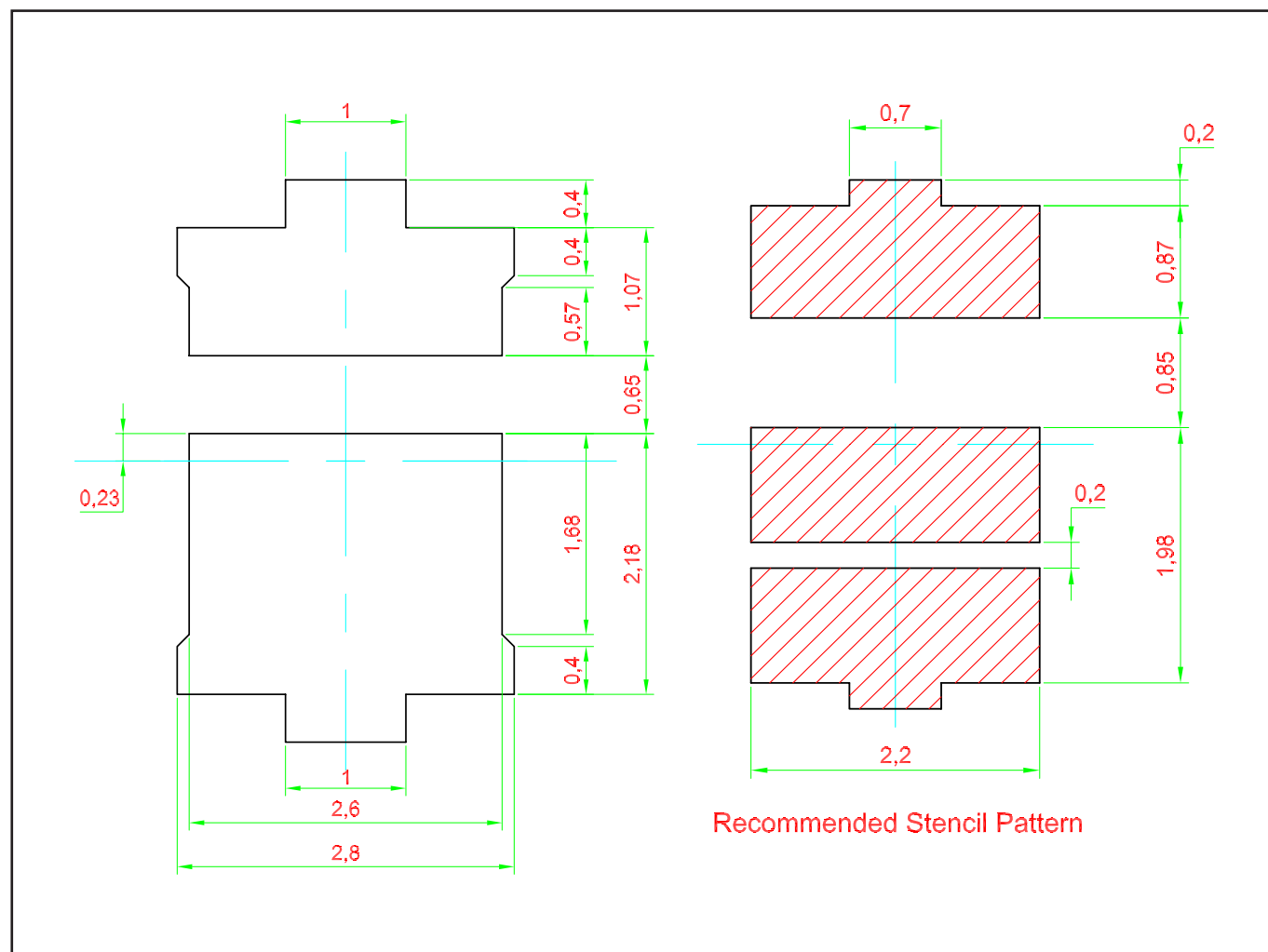


**Notes:**  
 Primary thermal path is through Cathode lead of LED package.  
 General tolerance: +/- 0.1mm.

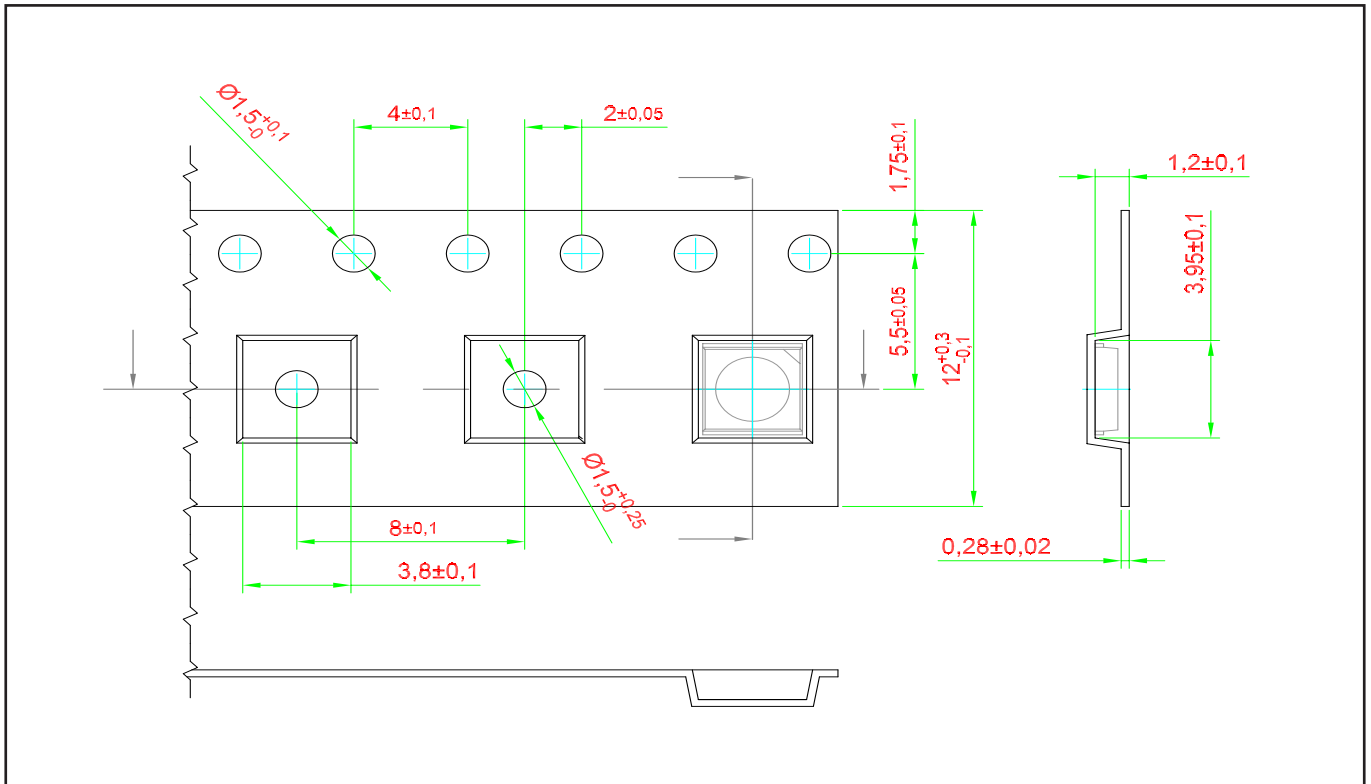
## Material

| Material        |                                    |
|-----------------|------------------------------------|
| Lead-frame      | Cu Alloy With Au Plating           |
| Package         | High Temperature Resistant Plastic |
| Encapsulant     | Silicone Resin                     |
| Soldering Leads | Au Plating                         |

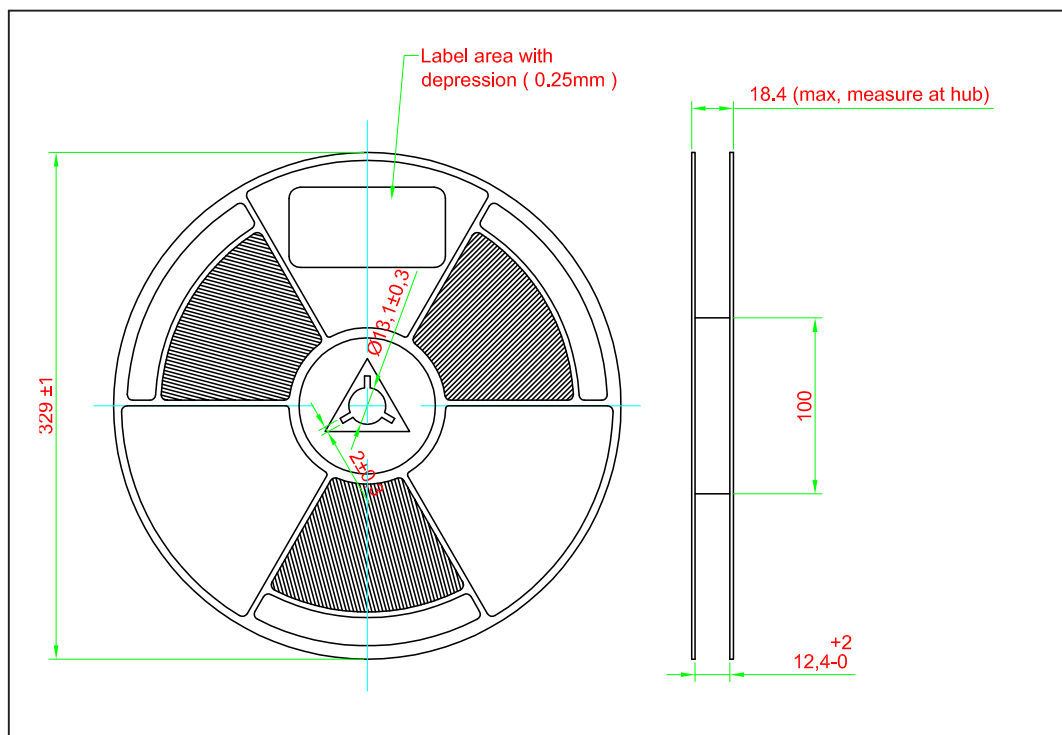
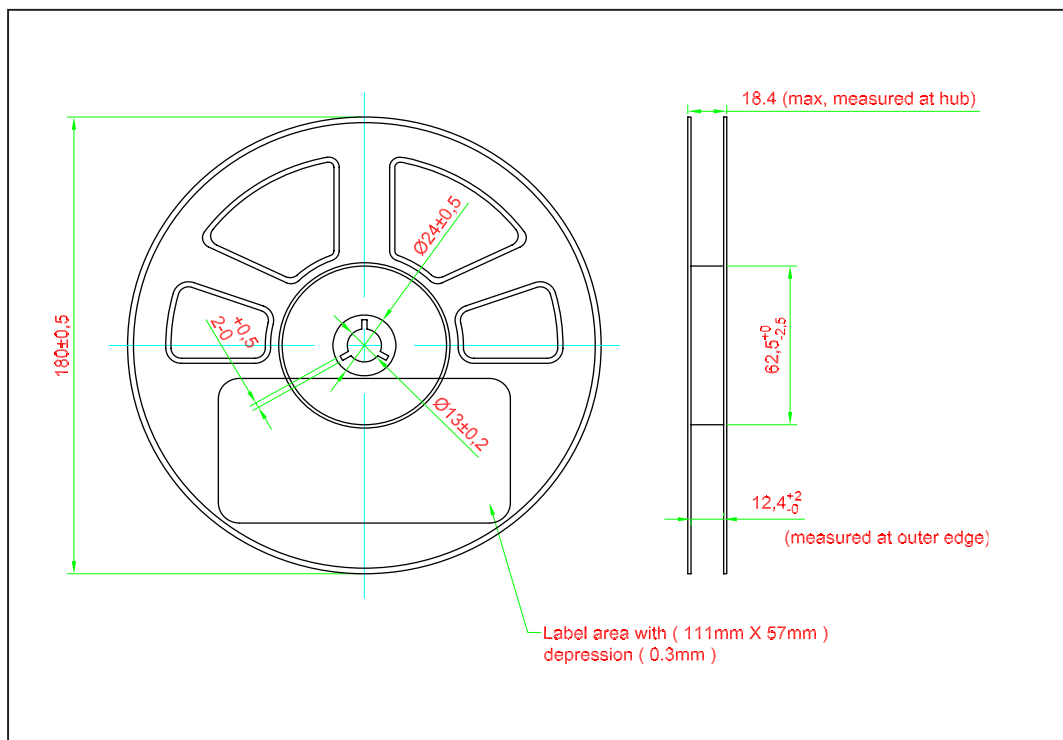
## Recommended Solder Pad



## Taping and orientation



## Packaging Specification

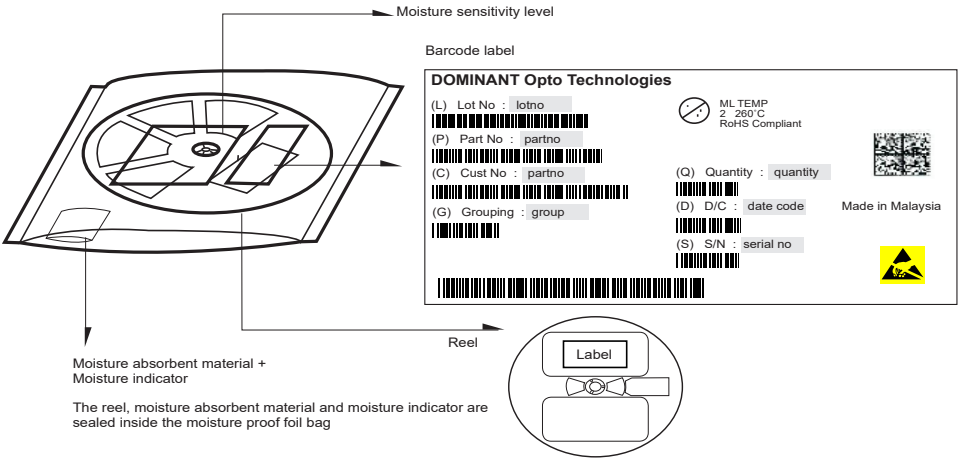


|                  | Reel Diameter (mm) | Quantity (pcs) | *Ordering Number |
|------------------|--------------------|----------------|------------------|
| Standard Packing | 180                | 1500           | MAT-EZHG-xxx-x   |
| Optional Packing | 329                | 5000           | MAT-EZHG-xxx-x-5 |

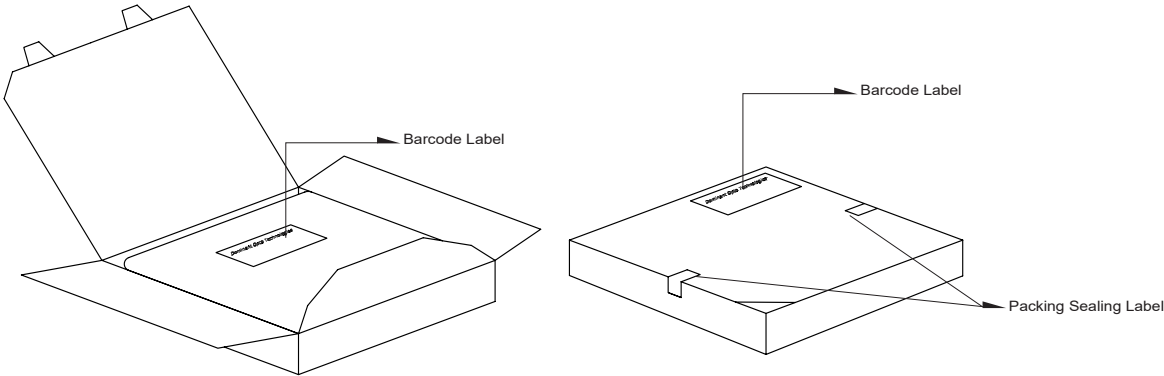
Notes:

\* For ordering purpose only. Please consult sales and marketing for details.

Packaging Specification



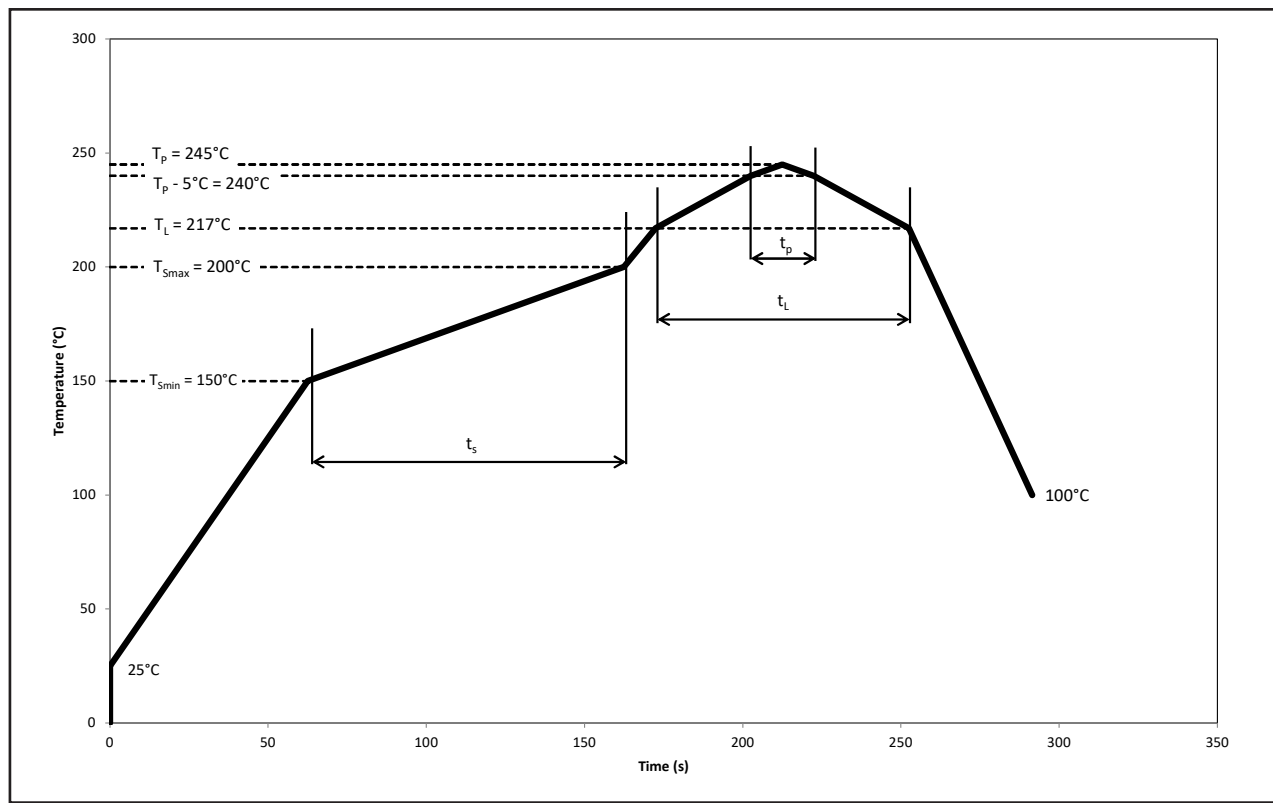
| Quantity per bag (pcs) | Average 1pc PrimaxPlus (g) | 1 completed bag (g) |
|------------------------|----------------------------|---------------------|
| 1500                   | 0.034                      | 245 ± 10            |
| 5000                   | 0.034                      | 1150 ± 10           |



| Reel Diameter (mm) | Packing Box Dimensions (mm) |
|--------------------|-----------------------------|
| 180                | 210 x 210 x 20              |
| 329                | 345 x 345 x 20              |

## Recommended Pb-free Soldering Profile

Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



| Profile Feature                                                                | Symbol | Min. | Pb-Free Assembly |      | Unit |
|--------------------------------------------------------------------------------|--------|------|------------------|------|------|
|                                                                                |        |      | Recommended      | Max. |      |
| Ramp-up rate to preheat<br>25°C to $T_{smin}$                                  | -      | -    | 2                | 3    | °C/s |
| Time $t_s$<br>$T_{smin}$ to $T_{smax}$                                         | $t_s$  | 60   | 100              | 120  | s    |
| Ramp-up rate to peak<br>$T_L$ to $T_p$                                         | -      | -    | 2                | 3    | °C/s |
| Liquidous temperature                                                          | $T_L$  | -    | 217              | -    | °C   |
| Time above liquidous<br>temperature                                            | $t_L$  | 60   | 80               | 150  | s    |
| Peak temperature                                                               | $T_p$  | -    | 245              | 260  | °C   |
| Time within 5°C of the specified<br>peak temperature $T_p - 5^{\circ}\text{C}$ | $t_p$  | 10   | 20               | 30   | s    |
| Ramp-down rate $T_p$ to 100°C                                                  | -      | -    | 3                | 6    | °C/s |
| Time 25°C to $T_p$                                                             | -      | -    | -                | 480  | s    |

## Appendix

### 1) **Brightness:**

- 1.1 Luminous intensity is measured at current pulse 25 ms(typ) with an internal reproducibility of  $\pm 8 \%$  and an expanded uncertainty of  $\pm 11 \%$  (according to GUM with a coverage factor of  $k=3$ ).
- 1.2 Luminous flux is measured at current pulse 25 ms(typ) with an internal reproducibility of  $\pm 8 \%$  and an expanded uncertainty of  $\pm 11 \%$  (according to GUM with a coverage factor of  $k=3$ ).
- 1.3 Radiant intensity is measured at current pulse 25 ms(typ) with an internal reproducibility of  $\pm 8 \%$  and an expanded uncertainty of  $\pm 11 \%$  (according to GUM with a coverage factor of  $k=3$ ).
- 1.4 Radiant flux is measured at current pulse 25 ms(typ) with an internal reproducibility of  $\pm 8 \%$  and an expanded uncertainty of  $\pm 11 \%$  (according to GUM with a coverage factor of  $k=3$ ).

### 2) **Color:**

- 2.1 Chromaticity coordinate groups are measured at current pulse 25 ms(typ) with an internal reproducibility of  $\pm 0.005$  and an expanded uncertainty of  $\pm 0.01$  (accordingly to GUM with a coverage factor of  $k=3$ ).
- 2.2 Dominant wavelength is measured at current pulse 25 ms(typ) with an internal reproducibility of  $\pm 0.5\text{nm}$  and an expanded uncertainty of  $\pm 1\text{nm}$  (accordingly to GUM with a coverage factor of  $k=3$ ).

### 3) **Voltage:**

- 3.1 Forward Voltage,  $V_f$  is measured when a current pulse of 8 ms(typ) with an internal reproducibility of  $\pm 0.05\text{V}$  and an expanded uncertainty of  $\pm 0.1\text{V}$  (accordingly to GUM with a coverage factor of  $k=3$ ).

### 4) **Typical Values:**

- 4.1 At special conditions of LED manufacturing processes, typical data or calculated correlations of technical parameters only reflect the statistical figures. But not necessarily correspond to the actual parameters of each single product, which could differ from the typical data or calculated correlations or the typical characteristic line. These typical data may change whenever technical improvements happen.

### 5) **Tolerance of Measure**

- 5.1 Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimension are specific in mm.

## Revision History

| Page      | Subjects                                                                       | Date of Modification |
|-----------|--------------------------------------------------------------------------------|----------------------|
| -         | Initial Release                                                                | 05 Apr 2019          |
| 9, 10, 11 | Update Packaging Specification<br>Update Recommended Pb-free Soldering Profile | 21 Mar 2022          |
| 2         | Not for New Design: MAT-EZHG-QR2-1                                             | 03 Apr 2023          |
| 9, 10     | Update Quantity per Reel: 1000pcs to 1500pcs                                   | 26 Oct 2023          |
|           |                                                                                |                      |
|           |                                                                                |                      |
|           |                                                                                |                      |
|           |                                                                                |                      |
|           |                                                                                |                      |
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|           |                                                                                |                      |

### NOTE

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