



# BRIGHTTEK

BRIGHTTEK (EUROPE) LIMITED

*Brighten up The World With LED!*



ISO/TS 16949:2009



BS EN ISO 14001:2004



IEC 60060 IECQ HSP01

## PRODUCT DATASHEET

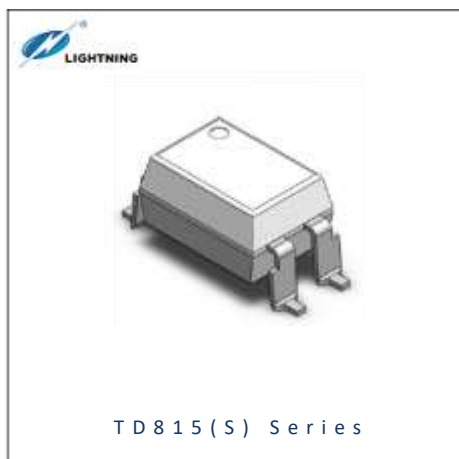


- ▶ DC Input Photo Coupler
- ▶ SMD4
- ▶ Darlington Transistor

# TD815(S)(T1)-GV



Release Date: 07 July 2025 Version: A00



## TD815(S) Series

### DESCRIPTION:

The TD815(S) series combines an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar Darlington phototransistor detector in a plastic DIP4 package with SMD4 lead forming option.

With the robust coplanar double mold structure, TD815(S) series provide the most stable isolation feature.

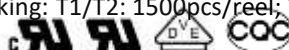


### FEATURES:

#### APPLICATIONS:

- Sequence controller
- Telephone/FAX
- System appliances, measuring instrument
- Programmable logic controller

- High isolation 5000Vrms
- DC input with transistor output
- Operating temperature range -55°C to +110°C
- REACH & RoHS compliance; Halogen free
- MSL class 1
- Regulatory Approvals:
  - UL - UL1577
  - VDE - EN60747-5-5 (VDE0884-5)
  - CQC - GB4943.1, GB8898
  - cUL - CSA Component Acceptance Service Notice 5A
- Packing: T1/T2: 1500pcs/reel; T3/T4: 1000pcs/reel



Partner with: LIGHTNING

## NAMING & ORDERING INFORMATION:

Naming Information:

|                             |                                                        |
|-----------------------------|--------------------------------------------------------|
| <b>TD815 (S) (T1) - G V</b> |                                                        |
| <b>TD815</b>                | Part Number                                            |
| <b>S</b>                    | Lead Form Option: SMD4                                 |
| <b>T1</b>                   | Selection: Tape and Reel Option (T1(default)/T2/T3/T4) |
| <b>G</b>                    | Green Option                                           |
| <b>V</b>                    | VDE Option                                             |

Ordering Information:

|                        |
|------------------------|
| <b>TD815(S)(T1)-GV</b> |
|------------------------|

| Version No. | Original Release Date |
|-------------|-----------------------|
| Rev: A00    | 12/08/2024            |

## SCHEMATIC DIAGRAM & MARKING:

Schematic Diagram:

| PIN Definition |           |
|----------------|-----------|
| 1              | Anode     |
| 2              | Cathode   |
| 3              | Emitter   |
| 4              | Collector |

Marking Information:

| Marking Definition |                    |
|--------------------|--------------------|
| TD                 | Manufacturer Code  |
| 815                | Part Number        |
| V                  | VDE Applicable     |
| Y                  | Fiscal Year        |
| A                  | Manufacturing Code |
| WW                 | Work Week          |

Labelling Information:

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|  <b>BRIGHTTEK</b><br>BRIGHTTEK (EUROPE) LIMITED  LIGHTNING<br>Part No.: XXXXXXXXXXXX      Bin Code: X<br><br>Lot No.: XXXXXXXX<br>Date Code: XXXX<br>QTY: XXX PCS<br><br>MSL: 1<br>Made in Quanzhou Fujian<br>       | <p>This product is manufactured by</p>                                                                                            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  LIGHTNING<br>for Brighttek (Europe) Limited |

## ABSOLUTE CHARACTERISTICS:

### Absolute Maximum Ratings:

| Parameter                 | Symbol    | Ratings             | Unit |
|---------------------------|-----------|---------------------|------|
| INPUT                     |           |                     |      |
| Forward Current           | $I_F$     | 60                  | mA   |
| Peak Forward Current      | $I_{FP}$  | 1 * <sup>1</sup>    | A    |
| Reverse Voltage           | $V_R$     | 6                   | V    |
| Input Power Dissipation   | $P_I$     | 100                 | mW   |
| OUTPUT                    |           |                     |      |
| Collector-Emitter Voltage | $V_{CEO}$ | 40                  | V    |
| Emitter-Collector Voltage | $V_{ECO}$ | 6                   | V    |
| Collector Current         | $I_C$     | 80                  | mA   |
| Output Power Dissipation  | $P_O$     | 150                 | mW   |
| COMMON                    |           |                     |      |
| Total Power Dissipation   | $P_{tot}$ | 200                 | mW   |
| Isolation Voltage         | $V_{iso}$ | 5000 * <sup>2</sup> | Vrms |
| Operating Temperature     | $T_{opr}$ | -55~+110            | °C   |
| Storage Temperature       | $T_{stg}$ | -55~+125            | °C   |
| Soldering Temperature     | $T_{sol}$ | 260 * <sup>3</sup>  | °C   |

\*1. 100μs pulse, 100Hz frequency

\*2. AC for 1 minute, R.H.=40~60%.

\*3. For 10 seconds max.

## ELECTRICAL CHARACTERISTICS:

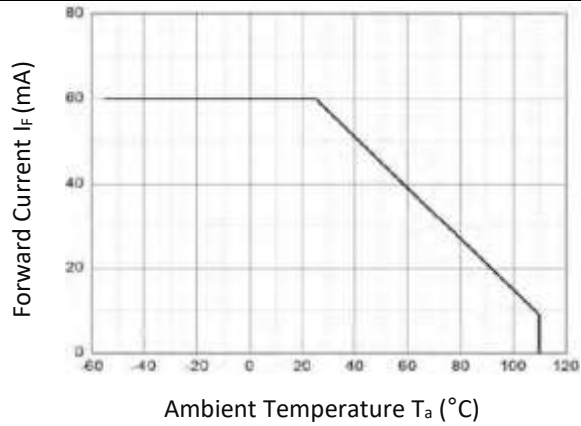
Electrical Optical Characteristics at  $T_a=25^{\circ}\text{C}$ :

| Parameter                            | Symbol               | Values           |                  |      | Unit | Test Condition                                                          |
|--------------------------------------|----------------------|------------------|------------------|------|------|-------------------------------------------------------------------------|
|                                      |                      | Min.             | Typ.             | Max. |      |                                                                         |
| INPUT                                |                      |                  |                  |      |      |                                                                         |
| Forward Voltage                      | V <sub>F</sub>       | ---              | 1.24             | 1.4  | V    | I <sub>F</sub> =10mA                                                    |
| Reverse Current                      | I <sub>R</sub>       | ---              | ---              | 10   | μA   | V <sub>R</sub> =6V                                                      |
| Input Capacitance                    | C <sub>IN</sub>      | ---              | 10               | ---  | pF   | V=0, f=1kHz                                                             |
| OUTPUT                               |                      |                  |                  |      |      |                                                                         |
| Collector Dark Current               | I <sub>CEO</sub>     | ---              | ---              | 100  | nA   | V <sub>CE</sub> =10V, I <sub>F</sub> =0                                 |
| Collector-Emitter Breakdown Voltage  | BV <sub>CEO</sub>    | 40               | ---              | ---  | V    | I <sub>C</sub> =0.1mA, I <sub>F</sub> =0                                |
| Emitter-Collector Breakdown Voltage  | BV <sub>ECO</sub>    | 6                | ---              | ---  | V    | I <sub>E</sub> =0.1mA, I <sub>F</sub> =0                                |
| TRANSFER CHARACTERISTICS             |                      |                  |                  |      |      |                                                                         |
| Current Transfer Ratio               | CTR                  | 600              | ---              | 7500 | %    | I <sub>F</sub> =1mA, V <sub>CE</sub> =2V                                |
| Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | ---              | 0.8              | 1.0  | V    | I <sub>F</sub> =20mA<br>I <sub>C</sub> =5mA                             |
| Isolation Resistance                 | R <sub>ISO</sub>     | 10 <sup>12</sup> | 10 <sup>14</sup> | ---  | Ω    | DC=500V,<br>40~60% R.H.                                                 |
| Floating Capacitance                 | C <sub>IO</sub>      | ---              | 0.4              | 1    | pF   | V=0, f=1MHz                                                             |
| Response Time (Rise)                 | t <sub>r</sub>       | ---              | 95               | 300  | μs   | I <sub>C</sub> =10mA, V <sub>CE</sub> =2V<br>R <sub>L</sub> =100Ω       |
| Response Time (Fall)                 | t <sub>f</sub>       | ---              | 84               | 250  | μs   | I <sub>C</sub> =10mA, V <sub>CE</sub> =2V<br>R <sub>L</sub> =100Ω       |
| Cutt-off Frequency                   | f <sub>c</sub>       | ---              | 1                | ---  | kHz  | I <sub>C</sub> =10mA, V <sub>CE</sub> =2V<br>R <sub>L</sub> =100Ω, -3dB |

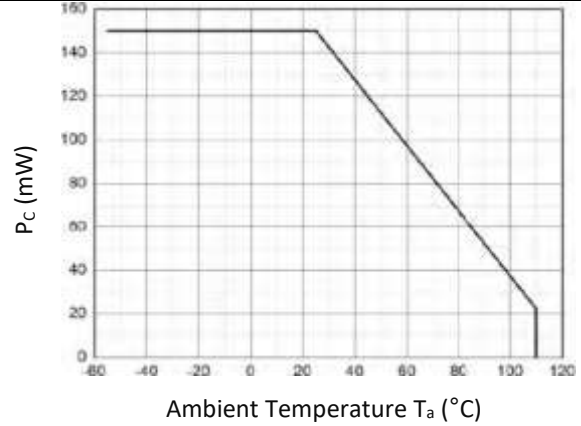
\*1. Test voltage must be applied within  $dV/dt$  rating.

## CHARACTERISTIC CURVES:

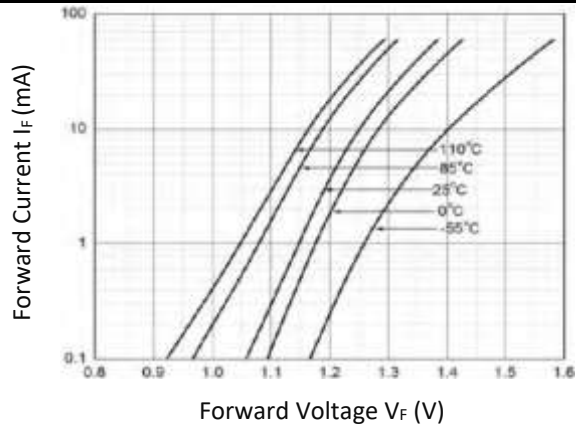
Forward Current v.s. Ambient Temperature



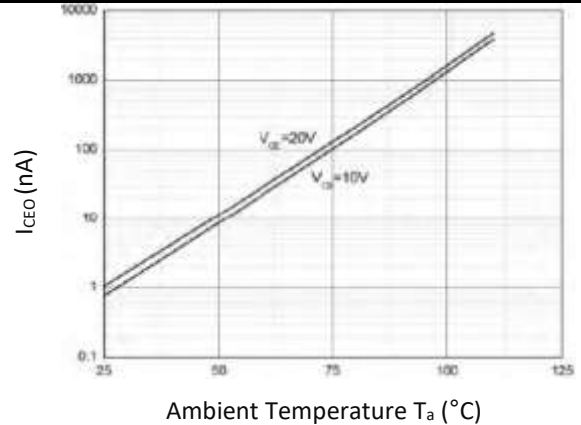
Collector Power Dissipation v.s. Ambient Temperature



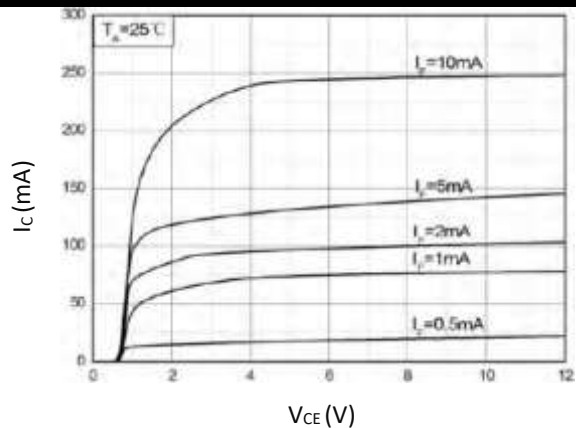
Forward Current v.s. Forward Voltage



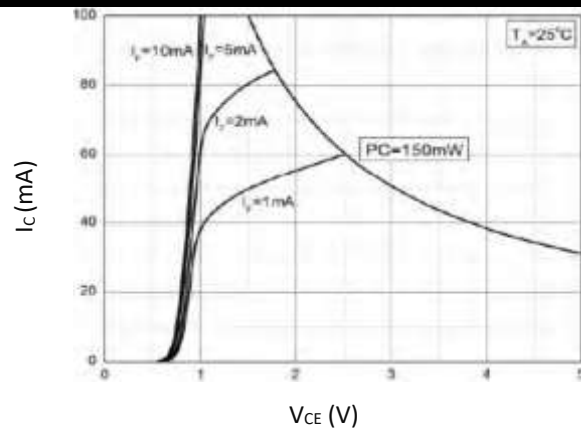
Collector Dark Current v.s. Ambient Temperature



Collect Current v.s. Collector-Emitter Voltage

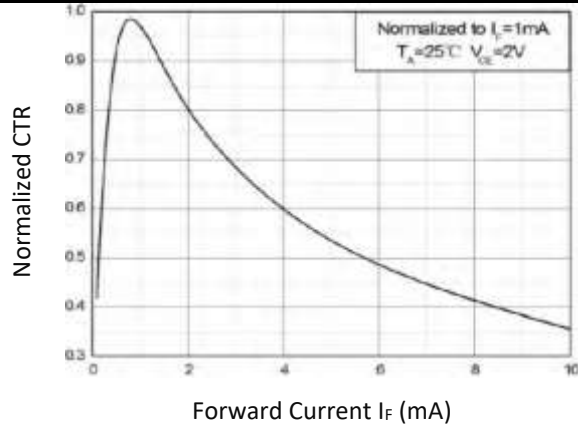


Collector Current v.s. Collector-Emitter Voltage

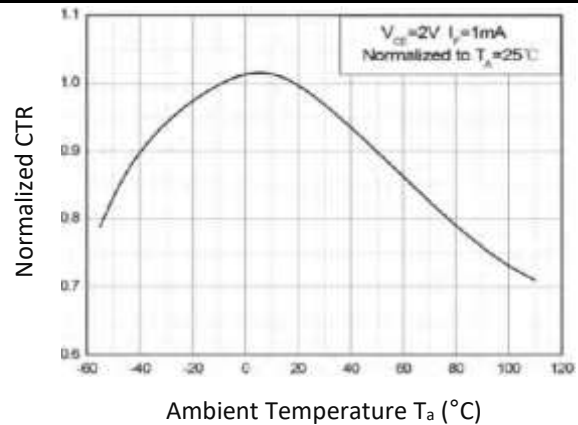


## CHARACTERISTIC CURVES:

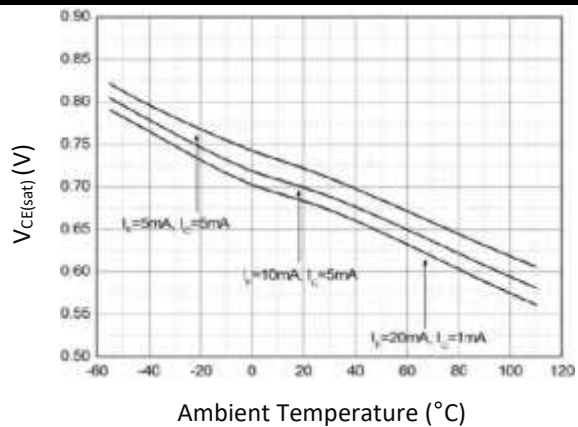
Normalized Current Transfer Ratio v.s. Forward Current



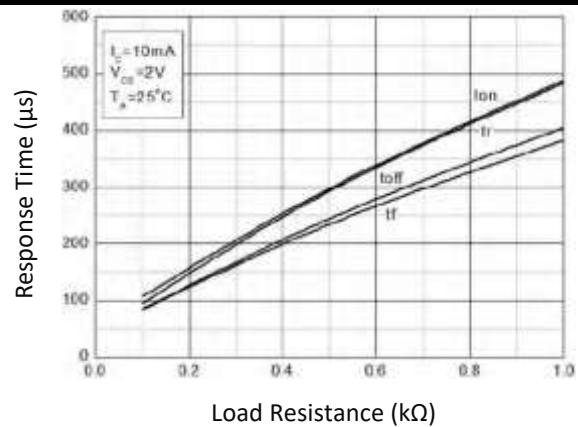
Normalized Current Transfer Ratio v.s. Ambient Temperature



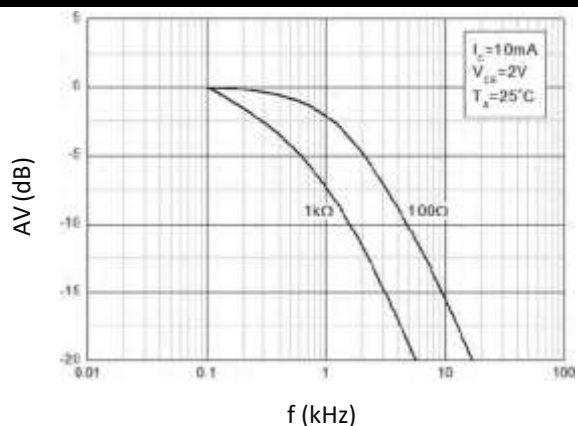
Collector-Emitter Saturation Voltage v.s. Ambient Temperature



Switching Time v.s. Load Resistance

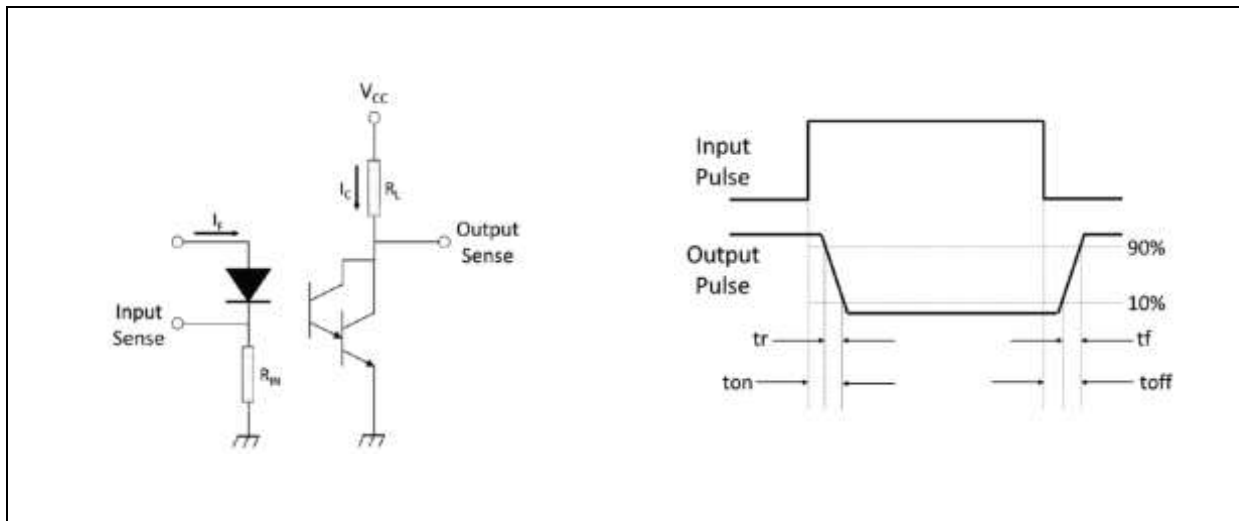


Frequency Response

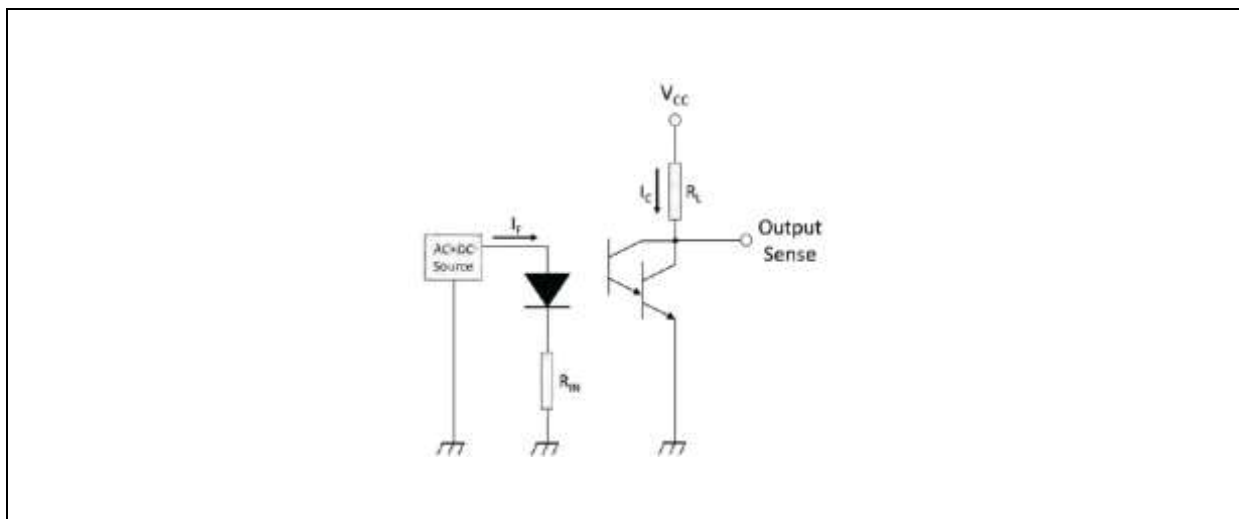


## TEST CIRCUIT:

Test Circuit and Waveforms of Response Time:

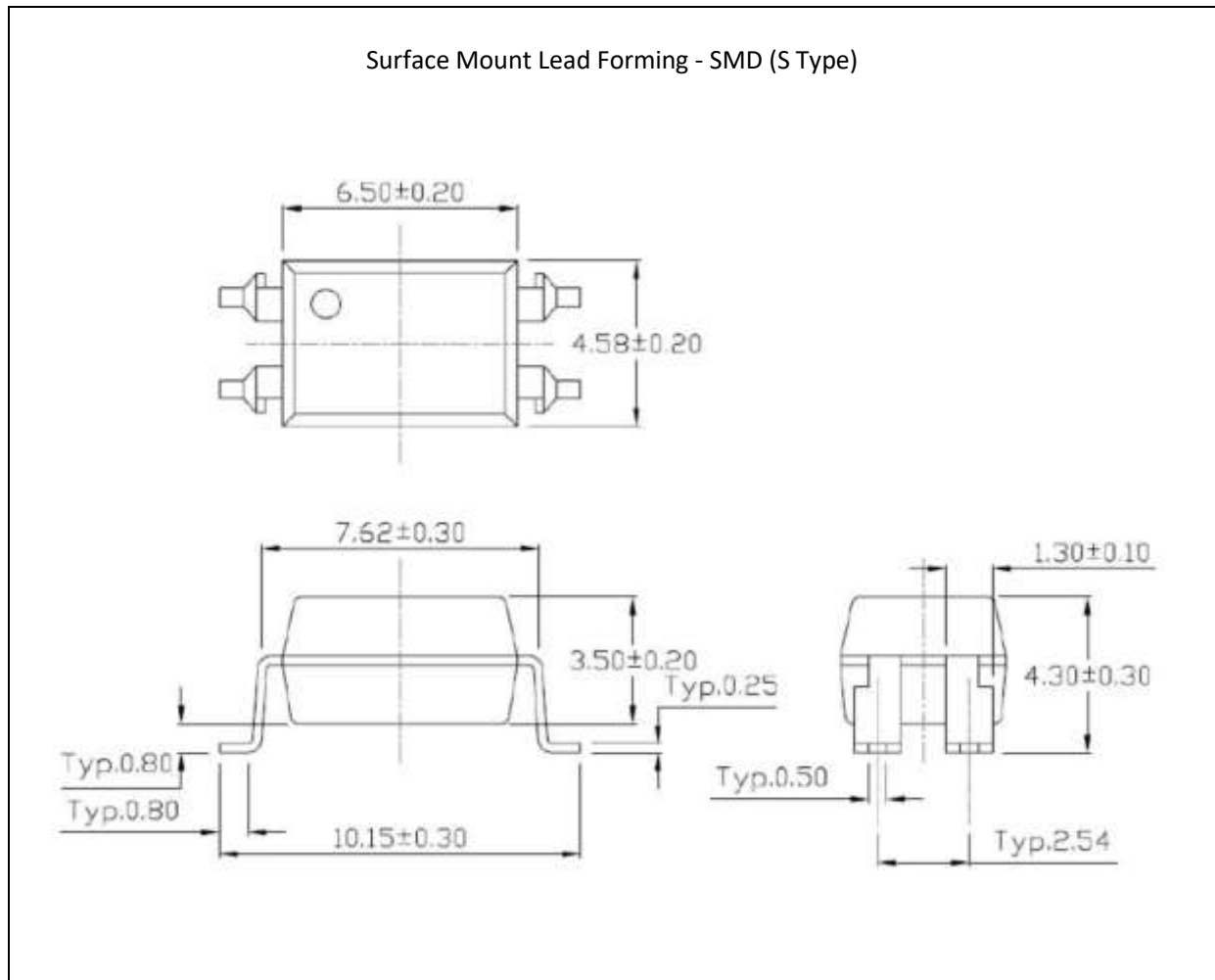


Test Circuit of Frequency Response:



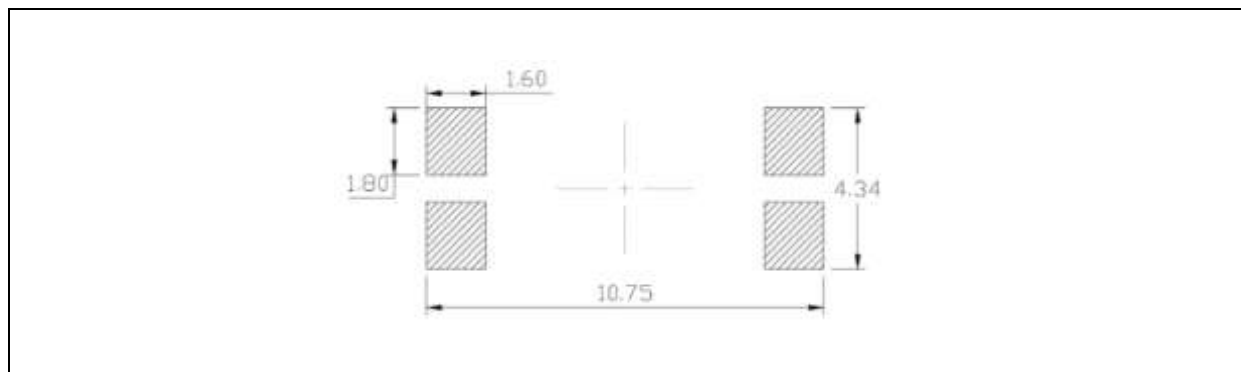
## OUTLINE DIMENSION:

Package Dimension:



1. All dimensions are in millimetre (mm).

Recommended Soldering Mask:



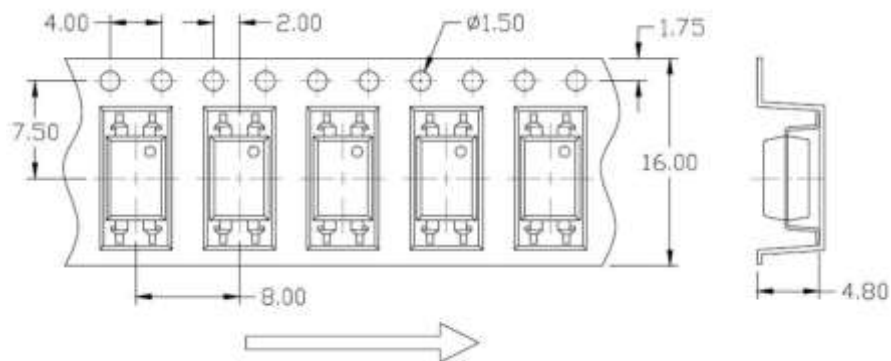
1. Dimensions are in millimetre (mm).

## PACKING SPECIFICATION:

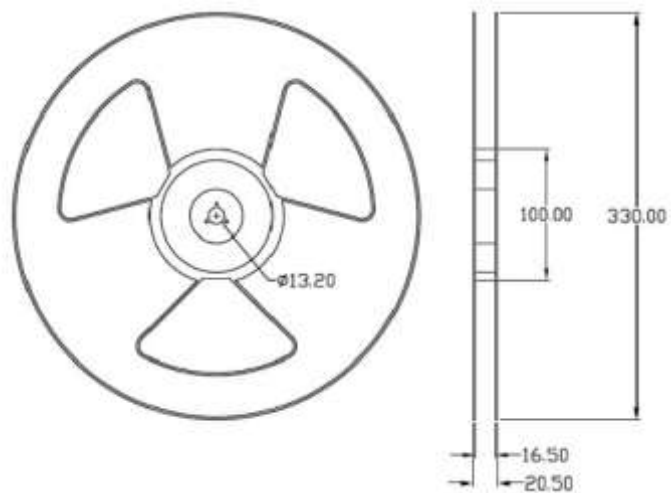
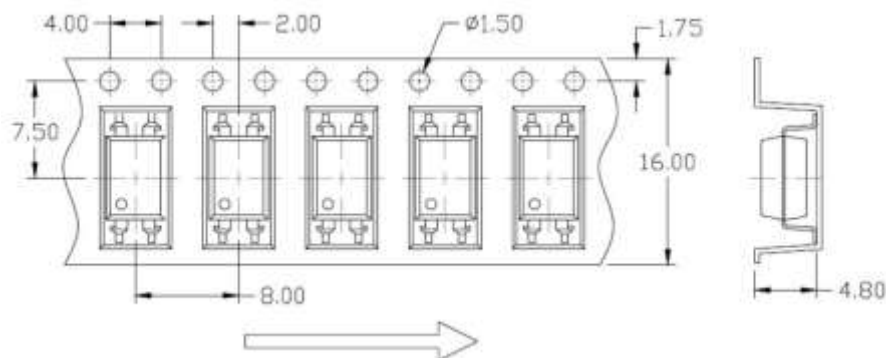
Reel Dimension:

T1(default)/T2: 1500pcs/reel

Reel Option: T1(default)

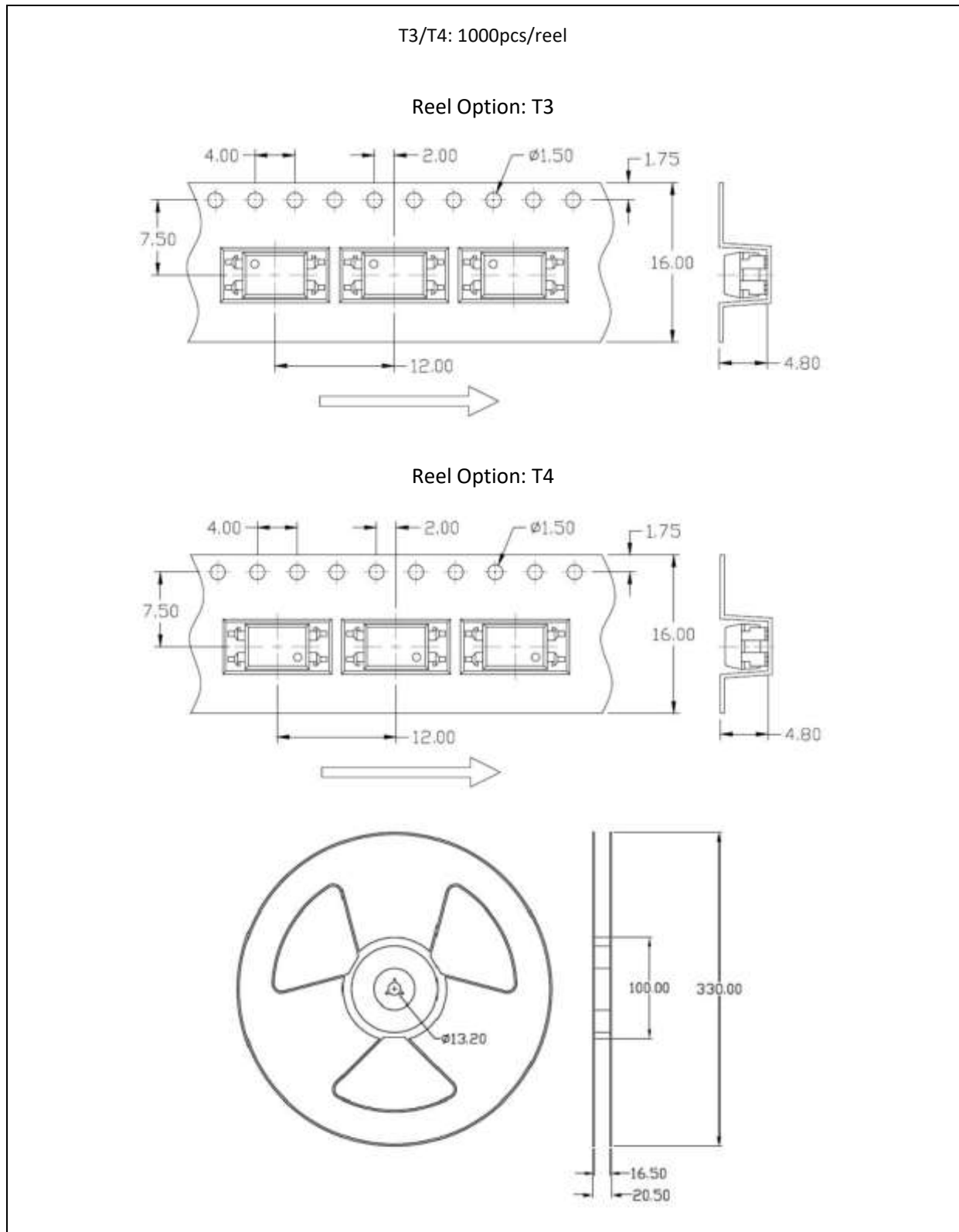


Reel Option: T2



## PACKING SPECIFICATION:

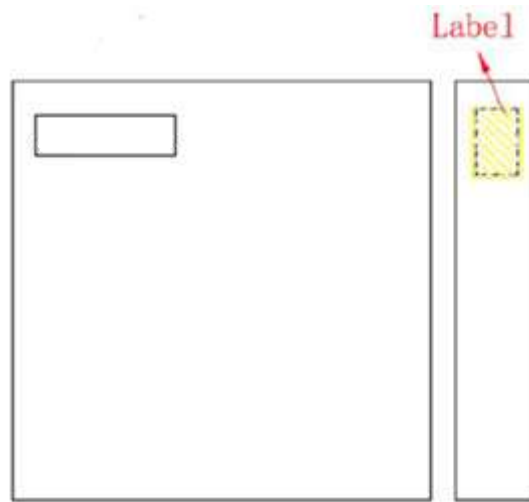
Reel Dimension:



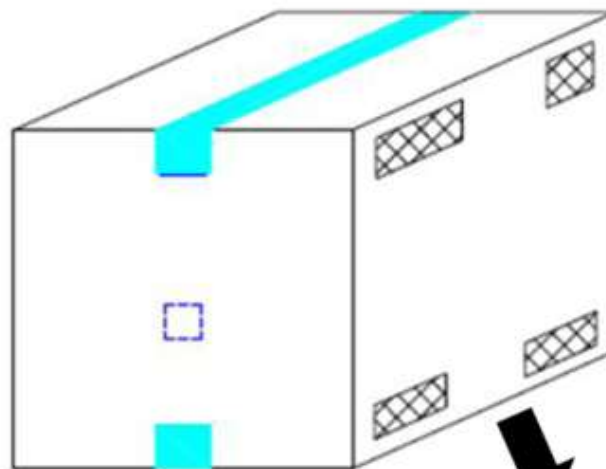
## PACKING SPECIFICATION:

### Box Dimension:

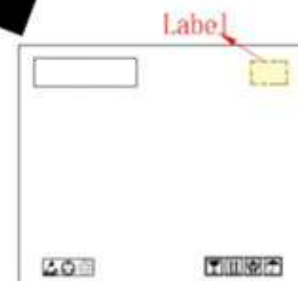
T1/T2: 3 reels (4.5Kpcs)/inner box, 5 inner boxes (22.5Kpcs)/carton  
 T3/T4: 3 reels (3Kpcs)/inner box, 5 inner boxes (15Kpcs)/carton



● L x W x H = 36cm x 36cm x 6.9cm

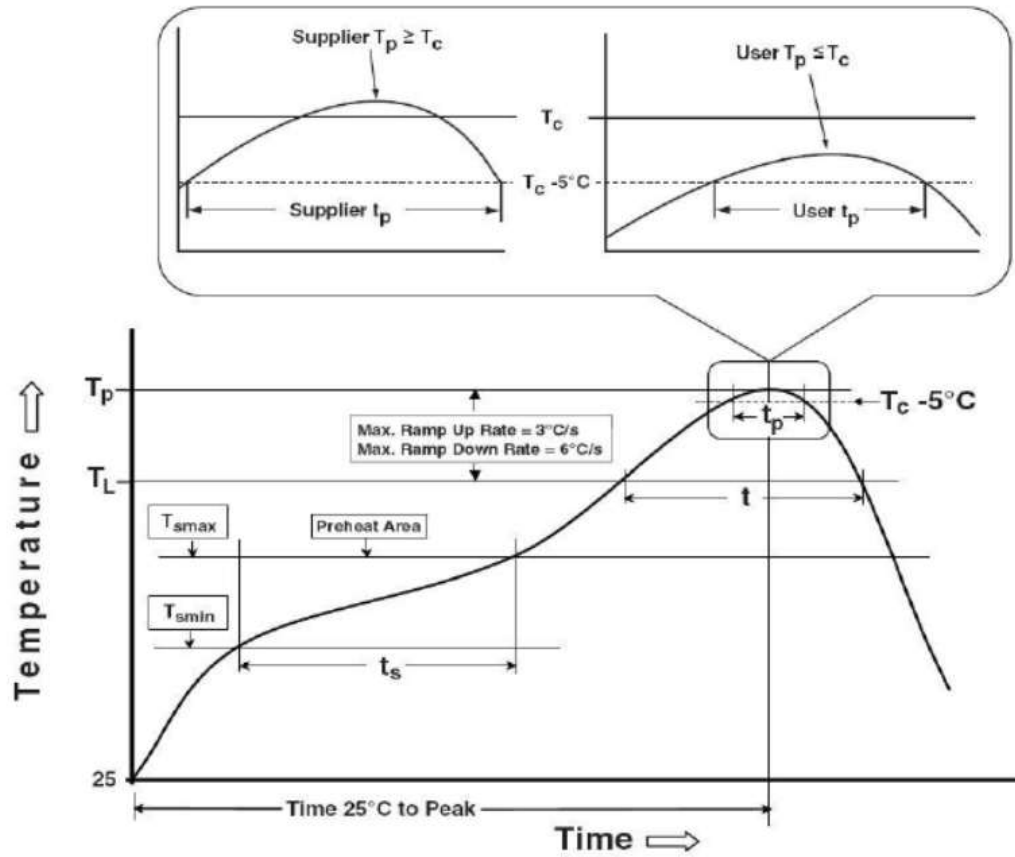


● L x W x H = 45cm x 38cm x 38cm



## RECOMMENDED SOLDERING PROFILE:

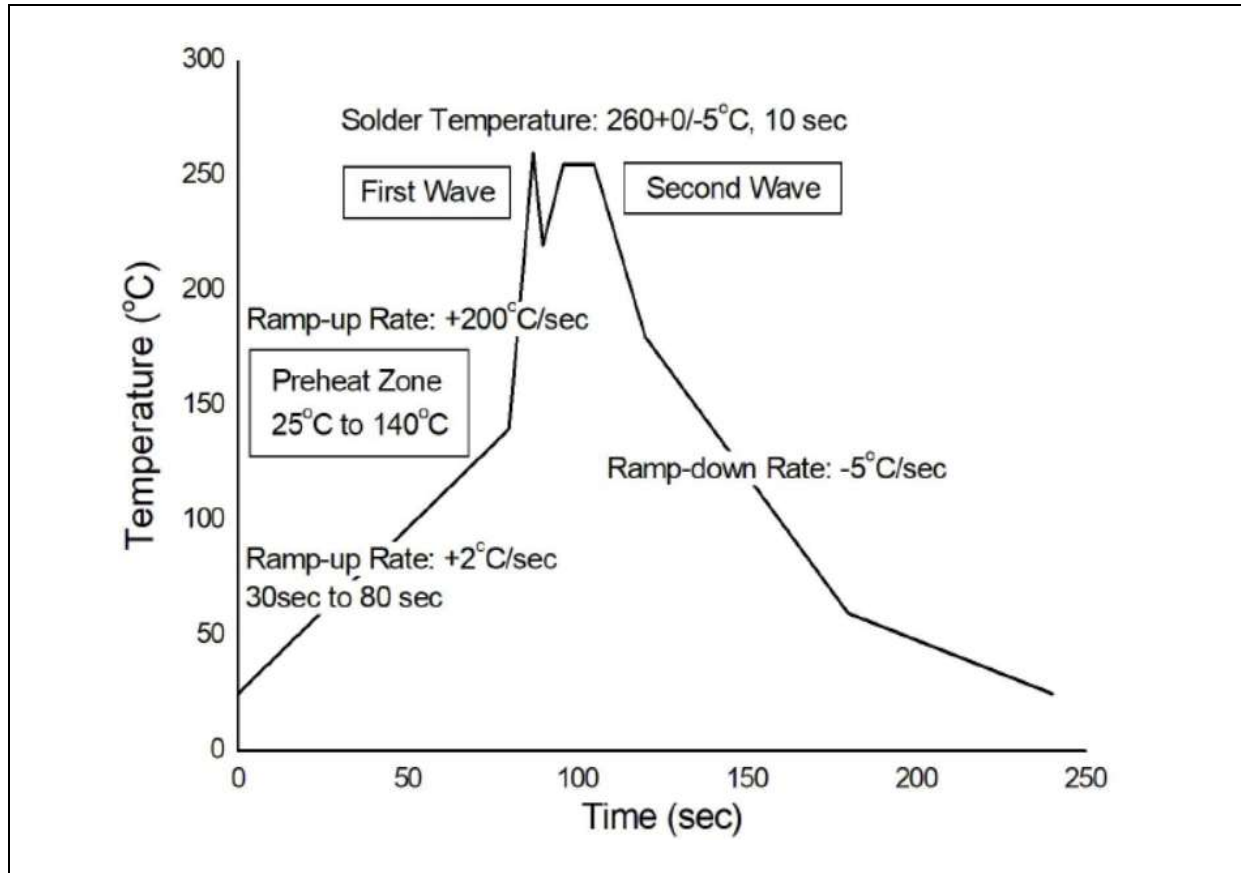
Reflow Information:



| Profile Feature                                  | Sn-Pb Assembly Profile | Pb-Free Assembly Profile |
|--------------------------------------------------|------------------------|--------------------------|
| Temperature Min. ( $T_{smin}$ )                  | 100°C                  | 150°C                    |
| Temperature Max. ( $T_{smax}$ )                  | 150°C                  | 200°C                    |
| Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ ) | 60-120 seconds         | 60-120 seconds           |
| Ramp-up Rate ( $t_L$ to $t_P$ )                  | 3°C/second max.        | 3°C/second max.          |
| Liquidous Temperature ( $T_L$ )                  | 183°C                  | 217°C                    |
| Time ( $t_L$ ) Maintained Above ( $T_L$ )        | 60-150 seconds         | 60-150 seconds           |
| Peak Body Package Temperature                    | 235°C +0°C / -5°C      | 260°C +0°C / -5°C        |
| Time ( $t_P$ ) within 5°C of 260°C               | 20 seconds             | 30 seconds               |
| Ramp-down Rate ( $T_P$ to $T_L$ )                | 6°C/second max.        | 6°C/second max.          |
| Time 25°C to Peak Temperature                    | 6 minutes max.         | 8 minutes max.           |

## RECOMMENDED SOLDERING PROFILE:

Wave Soldering (JESD22-A111 Compliant):



Hand Soldering:

|                       |            |
|-----------------------|------------|
| Soldering Temperature | 380±5°C    |
| Soldering Time        | 3 sec max. |

Note:

- One time soldering is recommended for all soldering methods.
- Do not solder more than three times for IR reflow soldering.