



# BRIGHTTEK

BRIGHTTEK (EUROPE) LIMITED

*Brighten up The World With LED!*



ISO/TS 16949:2009



BS EN ISO 14001:2004



QC 080000 IECQ HSPM

## PRODUCT DATASHEET



- ▶ DC Input Photo Coupler
- ▶ SMD8 Gullwing
- ▶ High Speed Logic Gate 10Mbit/s

# 6N137(SLM)(T1)-GV



Release Date: 07 June 2025 Version: A00



6N137(SLM) Series

## 6N137(SLM) Series

### DESCRIPTION:



The 6N137(SLM) series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon high speed integrated photo-detector logic gate with a strobable output in a plastic DIP8 package with SMD8 Gullwing lead forming option.

### FEATURES:

- High isolation 5000Vrms
- DC input with logic gate output
- Operating temperature range -55°C to +100°C
- REACH & RoHS compliance
- 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: 1000pcs/reel

### APPLICATIONS:

- Ground loop elimination
- LSTTL to TTL, LSTTL, or CMOS
- Line receiver, data transmission
- Data multiplexing
- Switching power supply
- Pulse transformer replacement
- Computer-peripheral interface



Partner with: 



## NAMING & ORDERING INFORMATION:

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### Naming Information:

|                               |                                                  |
|-------------------------------|--------------------------------------------------|
| <b>6N137 (SLM) (T1) - G V</b> |                                                  |
| <b>6N137</b>                  | Part Number                                      |
| <b>SLM</b>                    | Lead Form Option: SMD8 Gullwing                  |
| <b>T1</b>                     | Selection: Tape and Reel Option (T1(default)/T2) |
| <b>G</b>                      | Green Option                                     |
| <b>V</b>                      | VDE Option                                       |

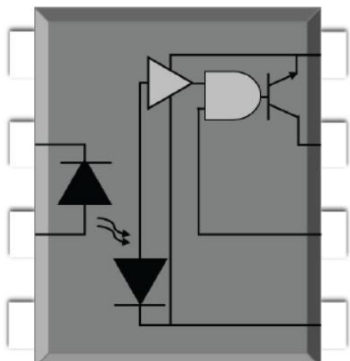
### Ordering Information:

|                          |
|--------------------------|
| <b>6N137(SLM)(T1)-GV</b> |
|--------------------------|

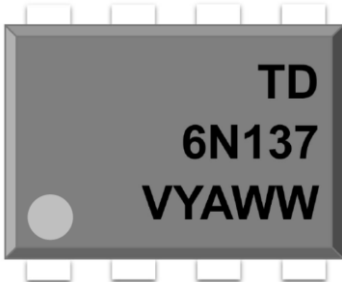
| Version No. | Original Release Date |
|-------------|-----------------------|
| Rev: A00    | 22/06/2021            |

## SCHEMATIC DIAGRAM & MARKING:

Schematic Diagram:

|  | PIN Definition |         |
|-----------------------------------------------------------------------------------|----------------|---------|
|                                                                                   | 1              | NC      |
|                                                                                   | 2              | Anode   |
|                                                                                   | 3              | Cathode |
|                                                                                   | 4              | NC      |
|                                                                                   | 5              | GND     |
|                                                                                   | 6              | VO      |
|                                                                                   | 7              | VE      |
|                                                                                   | 8              | VCC     |

Marking Information:

|  | Marking Definition |                    |
|-------------------------------------------------------------------------------------|--------------------|--------------------|
|                                                                                     | TD                 | Manufacturer Code  |
|                                                                                     | 6N137              | Part Number        |
|                                                                                     | V                  | VDE Applicable     |
|                                                                                     | Y                  | Fiscal Year        |
|                                                                                     | A                  | Manufacturing Code |
|                                                                                     | WW                 | Work Week          |

Labelling Information:

|                                                                                                                                    |                                                                                               |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                            |                                                                                     |                                                                                                                                                  |                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
|  <b>BRIGHTTEK</b><br>BRIGHTTEK (EUROPE) LIMITED |  LIGHTNING | 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> |  | This product is manufactured, tested, and packed by<br><br> | for more details, please visit <a href="http://www.tdled.com">www.tdled.com</a> |
|                                                                                                                                    |                                                                                               |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                            |                                                                                     |                                                                                                                                                  |                                                                                 |

## ABSOLUTE CHARACTERISTICS:

### Absolute Maximum Ratings:

| Parameter                | Symbol         | Ratings             | Unit             |
|--------------------------|----------------|---------------------|------------------|
| INPUT                    |                |                     |                  |
| Forward Current          | $I_F$          | 25                  | mA               |
| Peak Forward Current     | $I_{FP}$       | 50 * <sup>1</sup>   | mA               |
| Peak Transient Current   | $I_{F(trans)}$ | 1 * <sup>2</sup>    | A                |
| Reverse Voltage          | $V_R$          | 5                   | V                |
| Enable Voltage           | $V_E$          | $V_{CC}+0.5$        | V                |
| Input Power Dissipation  | $P_I$          | 100                 | mW               |
| OUTPUT                   |                |                     |                  |
| Supply Voltage           | $V_{CC}$       | 7                   | V                |
| Output Voltage           | $V_O$          | 7                   | V                |
| Output Current           | $I_O$          | 50                  | mA               |
| Output Power Dissipation | $P_O$          | 85                  | mW               |
| COMMON                   |                |                     |                  |
| Total Power Dissipation  | $P_{tot}$      | 200                 | mW               |
| Isolation Voltage        | $V_{iso}$      | 5000 * <sup>3</sup> | V <sub>rms</sub> |
| Operating Temperature    | $T_{opr}$      | -55~+100            | °C               |
| Storage Temperature      | $T_{stg}$      | -55~+125            | °C               |
| Soldering Temperature    | $T_{sol}$      | 260 * <sup>4</sup>  | °C               |

\*1. 50% duty, 1ms P.W.

\*2. ≤1Ms P.W, 300pps.

\*3. AC FOR 1 MINUTE, r.h.=40~60%.

\*4. For 10 seconds.

## ELECTRICAL CHARACTERISTICS:

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Recommended Operation Conditions:

| Parameter                               | Symbol   | Ratings |      |          | Unit      |
|-----------------------------------------|----------|---------|------|----------|-----------|
|                                         |          | Min.    | Typ. | Max.     |           |
| Operating Temperature                   | $T_a$    | -40     | ---  | 100      | mA        |
| Supply Voltage                          | $V_{CC}$ | 2.7     | ---  | 3.6      | V         |
|                                         |          | 4.5     |      | 5.5      |           |
| Low Level Input Current                 | $I_{FL}$ | 0       | ---  | 250      | $\mu A$   |
| High Level Input Current                | $I_{FH}$ | 5       | ---  | 15       | mA        |
| Low Level Enable Voltage                | $V_{EL}$ | 0       | ---  | 0.8      | V         |
| High Level Enable Voltage               | $V_{EH}$ | 2       | ---  | $V_{CC}$ | V         |
| Output Pull-up Resistor                 | $R_L$    | 330     | ---  | 4k       | $\Omega$  |
| Fan Out (At $R_L=1k\Omega$ per channel) | N        | ---     | ---  | 5        | TTL Loads |

## ELECTRICAL CHARACTERISTICS ( $V_{CC}=3.3V$ ):

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

| Parameter                                                                     | Symbol           | Values |       |      | Unit | Test Condition                                                                           |
|-------------------------------------------------------------------------------|------------------|--------|-------|------|------|------------------------------------------------------------------------------------------|
|                                                                               |                  | Min.   | Typ.  | Max. |      |                                                                                          |
| INPUT                                                                         |                  |        |       |      |      |                                                                                          |
| Forward Voltage                                                               | V <sub>F</sub>   | ---    | 1.38  | 1.8  | V    | I <sub>F</sub> =10mA                                                                     |
| Reverse Current                                                               | I <sub>R</sub>   | ---    | ---   | 10   | μA   | V <sub>R</sub> =5V                                                                       |
| Input Capacitance                                                             | C <sub>IN</sub>  | ---    | 13    | ---  | pF   | V=0, f=1MHz                                                                              |
| OUTPUT (V <sub>CC</sub> =3.3V)                                                |                  |        |       |      |      |                                                                                          |
| High Level Supply Current                                                     | I <sub>CCH</sub> | ---    | 4.3   | 10   | mA   | I <sub>F</sub> =0mA, V <sub>E</sub> =0.5V<br>V <sub>CC</sub> =3.3V                       |
| Low Level Supply Current                                                      | I <sub>CCL</sub> | ---    | 6.4   | 13   | mA   | I <sub>F</sub> =10mA<br>V <sub>CC</sub> =3.3V                                            |
| High Level Enable Current                                                     | I <sub>EH</sub>  | ---    | -0.21 | -1.6 | mA   | V <sub>E</sub> =2.0V<br>V <sub>CC</sub> =3.3V                                            |
| Low Level Enable Current                                                      | I <sub>EL</sub>  | ---    | -0.42 | -1.6 | mA   | V <sub>E</sub> =0.5V<br>V <sub>CC</sub> =3.3V                                            |
| High Level Enable Voltage                                                     | V <sub>EH</sub>  | 2.0    | ---   | ---  | V    | I <sub>F</sub> =10mA<br>V <sub>CC</sub> =3.3V                                            |
| Low Level Enable Voltage                                                      | V <sub>EL</sub>  | ---    | ---   | 0.8  | V    | I <sub>F</sub> =10mA<br>V <sub>CC</sub> =3.3V                                            |
| TRANSFER CHARACTERISTICS (V <sub>CC</sub> =3.3V, T <sub>a</sub> =-40 to 85°C) |                  |        |       |      |      |                                                                                          |
| High Level Output Current                                                     | I <sub>OH</sub>  | ---    | 4.1   | 100  | μA   | V <sub>CC</sub> =V <sub>O</sub> =3.3V<br>I <sub>F</sub> =250μA, V <sub>E</sub> =2.0V     |
| Low Level Output Voltage                                                      | V <sub>OL</sub>  | ---    | 0.29  | 0.6  | V    | V <sub>CC</sub> =3.3V, I <sub>F</sub> =5mA<br>V <sub>E</sub> =2V, I <sub>CL</sub> =13mA  |
| Input Threshold Current                                                       | I <sub>FT</sub>  | ---    | 2.2   | 5    | mA   | V <sub>CC</sub> =3.3V, V <sub>O</sub> =0.6V<br>V <sub>E</sub> =2V, I <sub>OL</sub> =13mA |
| Isolation Resistance                                                          | R <sub>iso</sub> | 10^12  | 10^14 | ---  | Ω    | DC500V<br>40~60% R.H.                                                                    |
| Floating Capacitance                                                          | C <sub>IO</sub>  | ---    | 1.0   | ---  | pF   | V=0, f=1MHz                                                                              |

## ELECTRICAL CHARACTERISTICS ( $V_{CC}=3.3V$ ):

Electrical Optical Characteristics:

| Parameter                                                                                                                        | Symbol                | Values |      |      | Unit | Test Condition                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------|------|------|------|--------------------------------------------------------------------------------------------|
|                                                                                                                                  |                       | Min.   | Typ. | Max. |      |                                                                                            |
| SWITCHING CHARACTERISTICS (T <sub>a</sub> =-40 to 85°C, V <sub>CC</sub> =3.3V, I <sub>F</sub> =7.5mA unless specified otherwise) |                       |        |      |      |      |                                                                                            |
| Propagation Delay Time to Output Low Level                                                                                       | T <sub>PHL</sub>      | ---    | 35   | 75   | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω<br>T <sub>a</sub> =25°C                         |
| Propagation Delay Time to Output High Level                                                                                      | T <sub>PLH</sub>      | ---    | 40   | 75   | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω<br>T <sub>a</sub> =25°C                         |
| Pulse Width Distortion                                                                                                           | T <sub>PHL</sub> -PLH | ---    | 12   | 35   | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω                                                 |
| Rise Time                                                                                                                        | t <sub>r</sub>        | ---    | 30   | ---  | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω                                                 |
| Fall Time                                                                                                                        | t <sub>f</sub>        | ---    | 8.5  | ---  | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω                                                 |
| Enable Propagation Delay Time to Output Low Level                                                                                | T <sub>EHL</sub>      | ---    | 15   | ---  | ns   | I <sub>F</sub> =7.5mA, V <sub>EH</sub> =3.3V<br>C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω |
| Enable Propagation Delay Time to Output High Level                                                                               | T <sub>ELH</sub>      | ---    | 15   | ---  | ns   | I <sub>F</sub> =7.5mA, V <sub>EH</sub> =3.3V<br>C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω |

## ELECTRICAL CHARACTERISTICS ( $V_{CC}=5.5V$ ):

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

| Parameter                                                                     | Symbol            | Values |       |      | Unit | Test Condition                                                                           |
|-------------------------------------------------------------------------------|-------------------|--------|-------|------|------|------------------------------------------------------------------------------------------|
|                                                                               |                   | Min.   | Typ.  | Max. |      |                                                                                          |
| INPUT                                                                         |                   |        |       |      |      |                                                                                          |
| Forward Voltage                                                               | V <sub>F</sub>    | ---    | 1.38  | 1.8  | V    | I <sub>F</sub> =10mA                                                                     |
| Reverse Current                                                               | I <sub>R</sub>    | ---    | ---   | 10   | μA   | V <sub>R</sub> =5V                                                                       |
| Input Capacitance                                                             | C <sub>IN</sub>   | ---    | 13    | ---  | pF   | V=0, f=1MHz                                                                              |
| OUTPUT (V <sub>CC</sub> =5.5V)                                                |                   |        |       |      |      |                                                                                          |
| High Level Supply Current                                                     | I <sub>CC</sub> H | ---    | 6.3   | 10   | mA   | I <sub>F</sub> =0mA, V <sub>E</sub> =0.5V<br>V <sub>CC</sub> =5.5V                       |
| Low Level Supply Current                                                      | I <sub>CC</sub> L | ---    | 8.3   | 13   | mA   | I <sub>F</sub> =10mA,<br>V <sub>CC</sub> =5.5V                                           |
| High Level Enable Current                                                     | I <sub>EH</sub>   | ---    | -0.52 | -1.6 | mA   | V <sub>E</sub> =2.0V<br>V <sub>CC</sub> =5.5V                                            |
| Low Level Enable Current                                                      | I <sub>EL</sub>   | ---    | -0.75 | -1.6 | mA   | V <sub>E</sub> =0.5V<br>V <sub>CC</sub> =5.5V                                            |
| High Level Enable Voltage                                                     | V <sub>EH</sub>   | 2.0    | ---   | ---  | V    | I <sub>F</sub> =10mA<br>V <sub>CC</sub> =5.5V                                            |
| Low Level Enable Voltage                                                      | V <sub>EL</sub>   | ---    | ---   | 0.8  | V    | I <sub>F</sub> =10mA<br>V <sub>CC</sub> =5.5V                                            |
| TRANSFER CHARACTERISTICS (V <sub>CC</sub> =5.5V, T <sub>a</sub> =-40 to 85°C) |                   |        |       |      |      |                                                                                          |
| High Level Output Current                                                     | I <sub>OH</sub>   | ---    | 0.73  | 100  | μA   | V <sub>CC</sub> =V <sub>O</sub> =5.5V<br>I <sub>F</sub> =250μA, V <sub>E</sub> =2.0V     |
| Low Level Output Voltage                                                      | V <sub>OL</sub>   | ---    | 0.28  | 0.6  | V    | V <sub>CC</sub> =5.5V, I <sub>F</sub> =5mA<br>V <sub>E</sub> =2V, I <sub>CL</sub> =13mA  |
| Input Threshold Current                                                       | I <sub>FT</sub>   | ---    | 2.5   | 5    | mA   | V <sub>CC</sub> =5.5V, V <sub>O</sub> =0.6V<br>V <sub>E</sub> =2V, I <sub>OL</sub> =13mA |
| Isolation Resistance                                                          | R <sub>iso</sub>  | 10^12  | 10^14 | ---  | Ω    | DC500V<br>40~60% R.H.                                                                    |
| Floating Capacitance                                                          | C <sub>IO</sub>   | ---    | 1.0   | ---  | pF   | V=0, f=1MHz                                                                              |



## ELECTRICAL CHARACTERISTICS ( $V_{CC}=5.5V$ ):

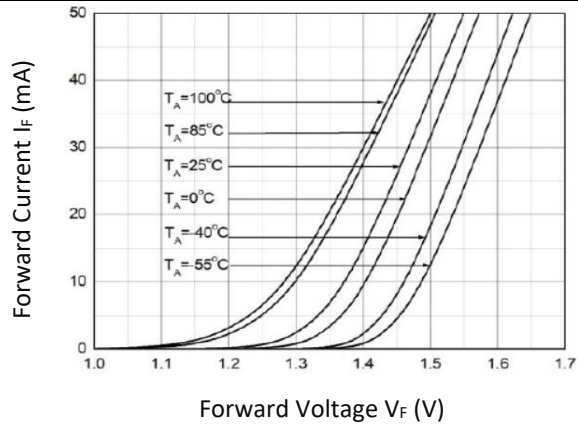
Electrical Optical Characteristics:

| Parameter                                                                                                                      | Symbol                | Values |      |      | Unit | Test Condition                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------|------|------|------|--------------------------------------------------------------------------------------------|
|                                                                                                                                |                       | Min.   | Typ. | Max. |      |                                                                                            |
| SWITCHING CHARACTERISTICS (T <sub>a</sub> =-40 to 85°C, V <sub>CC</sub> =5V, I <sub>F</sub> =7.5mA unless specified otherwise) |                       |        |      |      |      |                                                                                            |
| Propagation Delay Time to Output Low Level                                                                                     | T <sub>PHL</sub>      | ---    | 35   | 75   | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω<br>T <sub>a</sub> =25°C                         |
| Propagation Delay Time to Output High Level                                                                                    | T <sub>PLH</sub>      | ---    | 40   | 75   | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω<br>T <sub>a</sub> =25°C                         |
| Pulse Width Distortion                                                                                                         | T <sub>PHL</sub> -PLH | ---    | 5    | 35   | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω                                                 |
| Rise Time                                                                                                                      | t <sub>r</sub>        | ---    | 27   | ---  | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω                                                 |
| Fall Time                                                                                                                      | t <sub>f</sub>        | ---    | 7    | ---  | ns   | C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω                                                 |
| Enable Propagation Delay Time to Output Low Level                                                                              | T <sub>EHL</sub>      | ---    | 15   | ---  | ns   | I <sub>F</sub> =7.5mA, V <sub>EH</sub> =3.5V<br>C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω |
| Enable Propagation Delay Time to Output High Level                                                                             | T <sub>ELH</sub>      | ---    | 15   | ---  | ns   | I <sub>F</sub> =7.5mA, V <sub>EH</sub> =3.5V<br>C <sub>L</sub> =15pF, R <sub>L</sub> =350Ω |

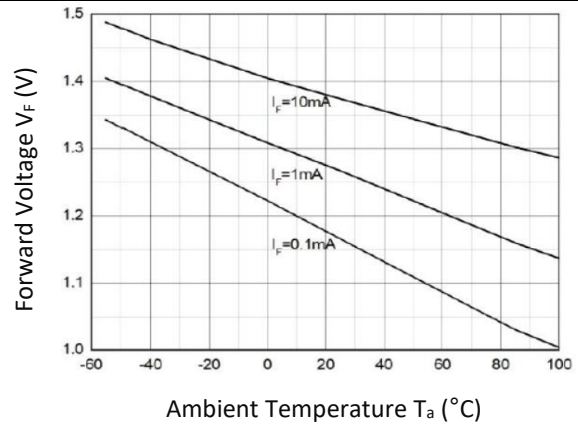


## CHARACTERISTIC CURVES:

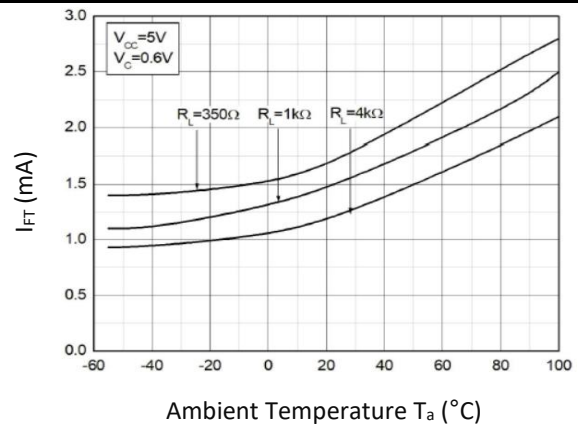
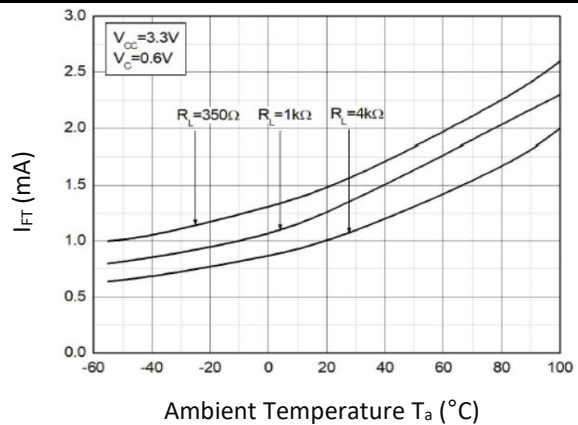
Forward Current v.s. Forward Voltage



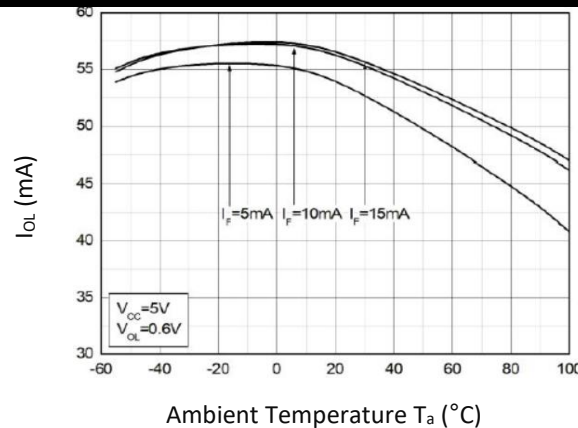
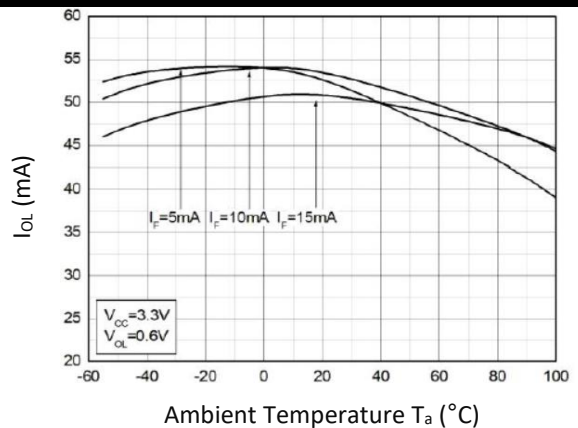
Forward Voltage v.s. Ambient Temperature



Input Threshold Current v.s. Ambient Temperature



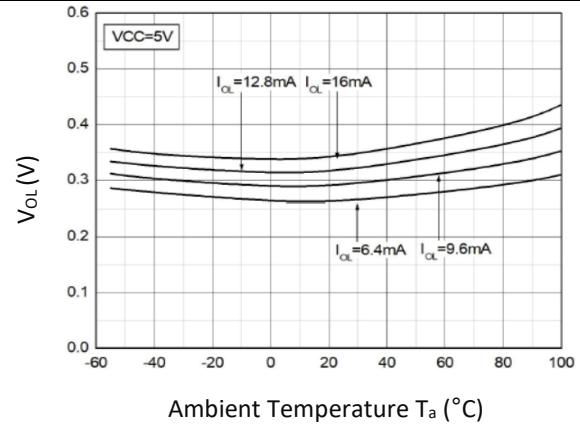
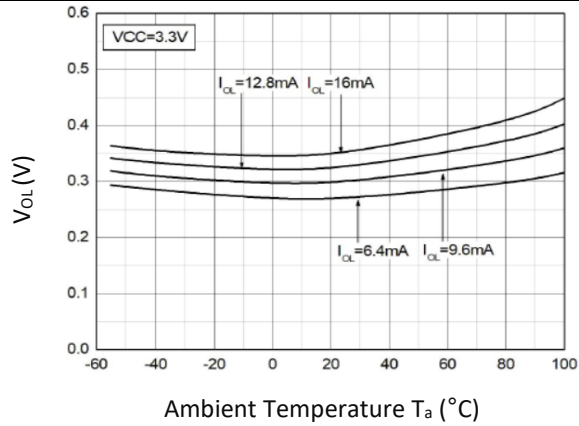
Low Level Output Current v.s. Ambient Temperature



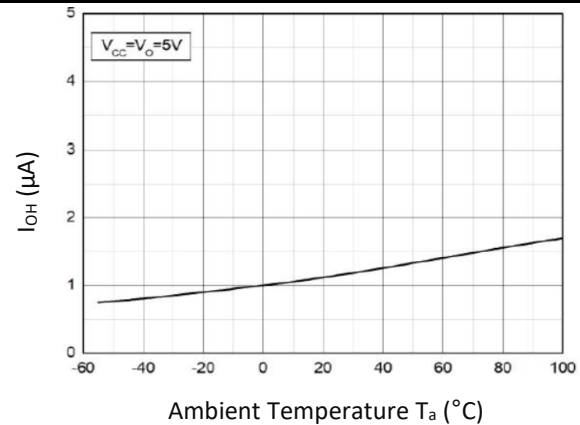
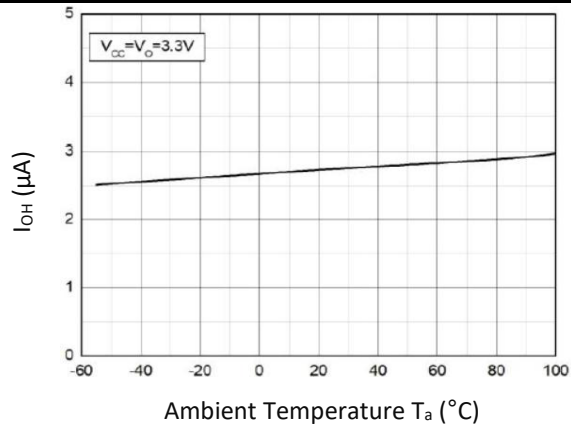


## CHARACTERISTIC CURVES:

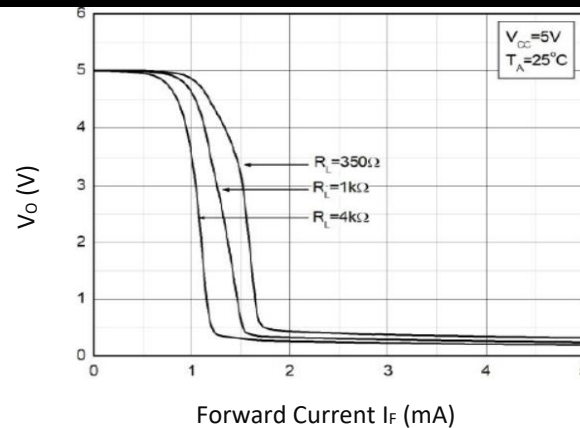
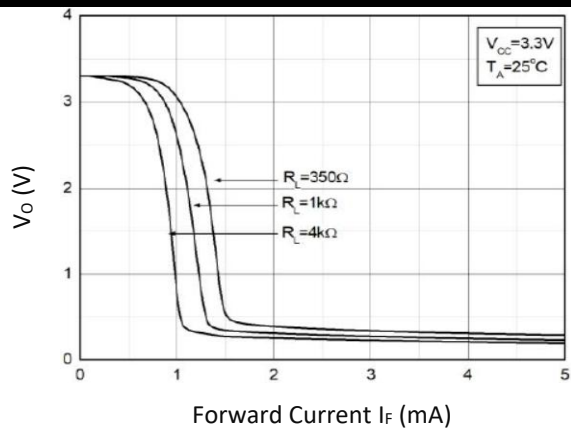
### Low Level Output Voltage v.s. Ambient Temperature



### High Level Output Current v.s. Ambient Temperature



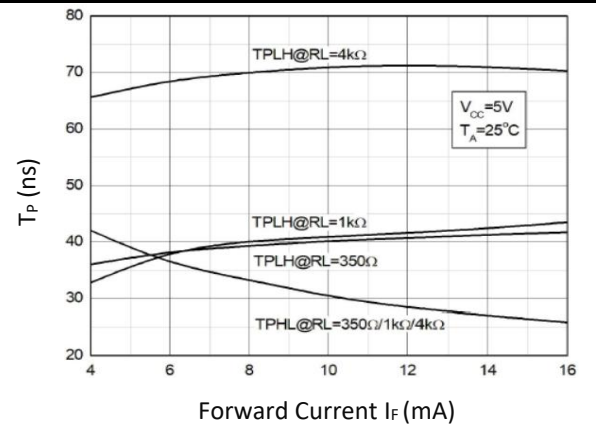
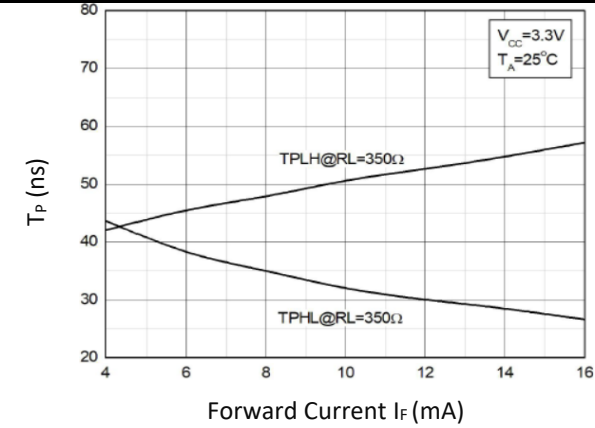
### Output Voltage v.s. Forward Current



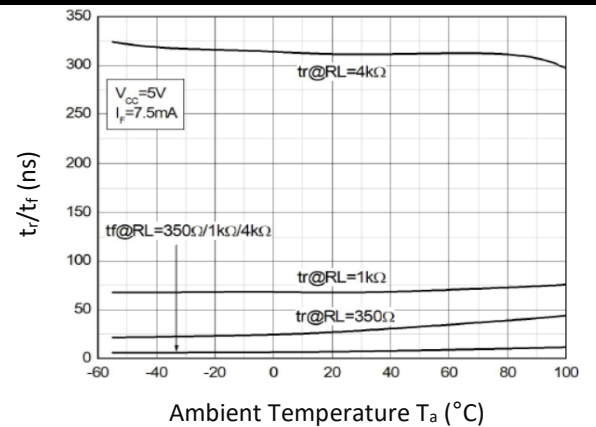
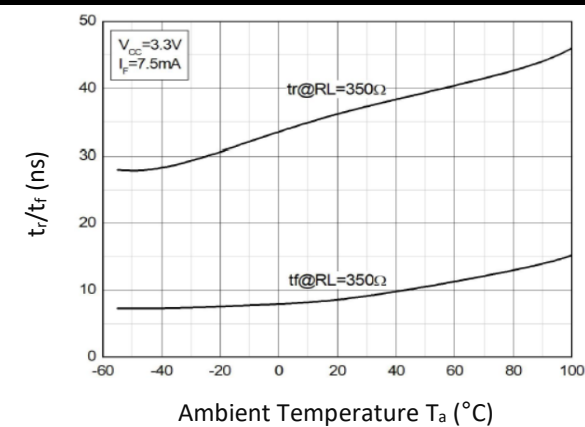


## CHARACTERISTIC CURVES:

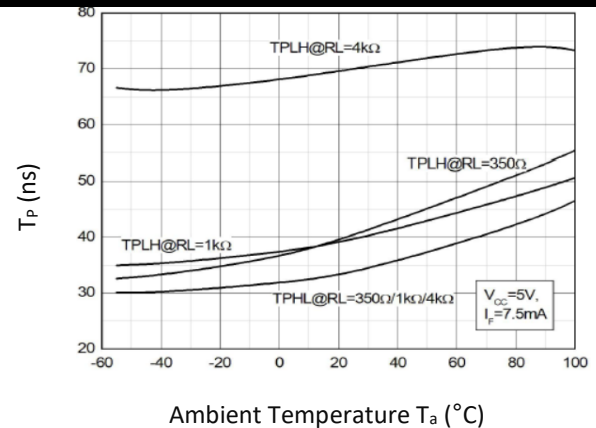
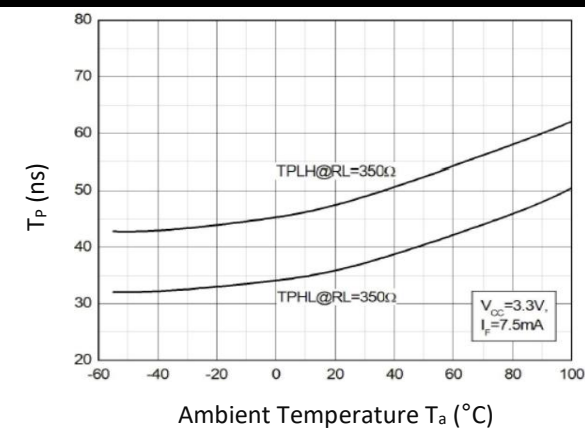
### Propagation Delay v.s. Forward Current



### Rise and Fall Time v.s. Ambient Temperature

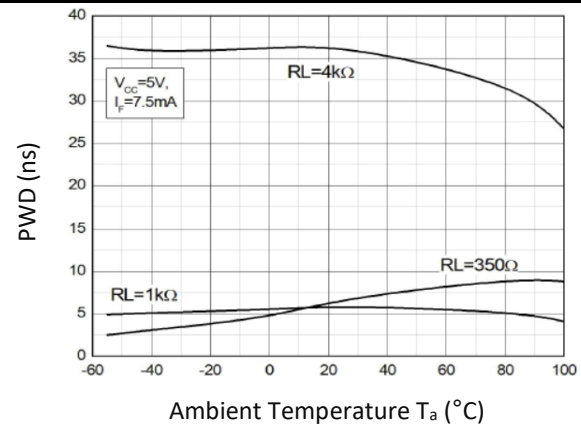
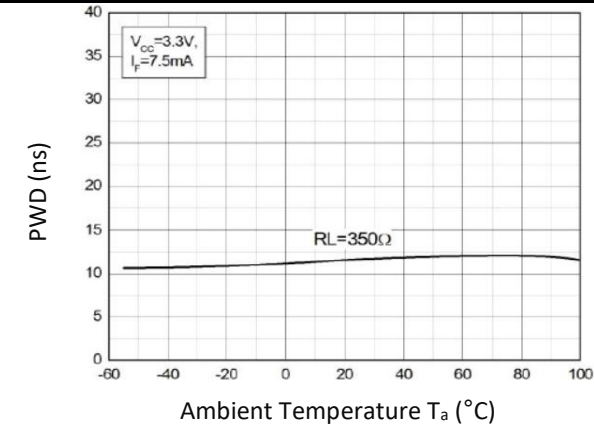


### Propagation Delay v.s. Ambient Temperature

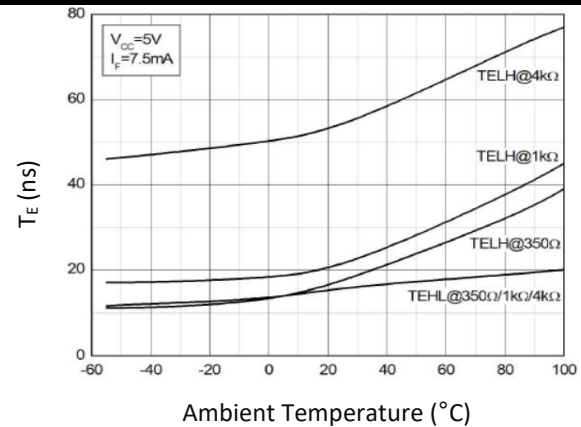
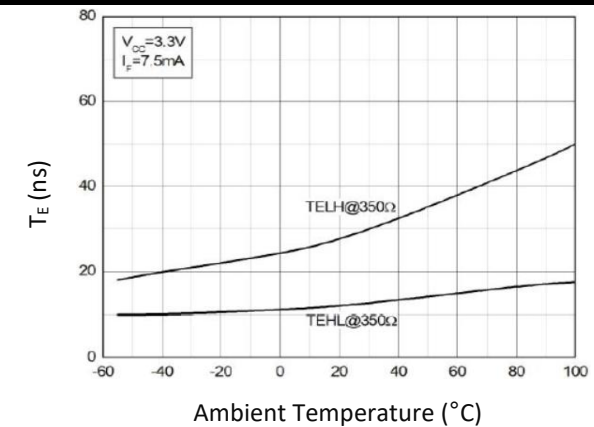


## CHARACTERISTIC CURVES:

### Pulse Width Distortion v.s. Ambient Temperature

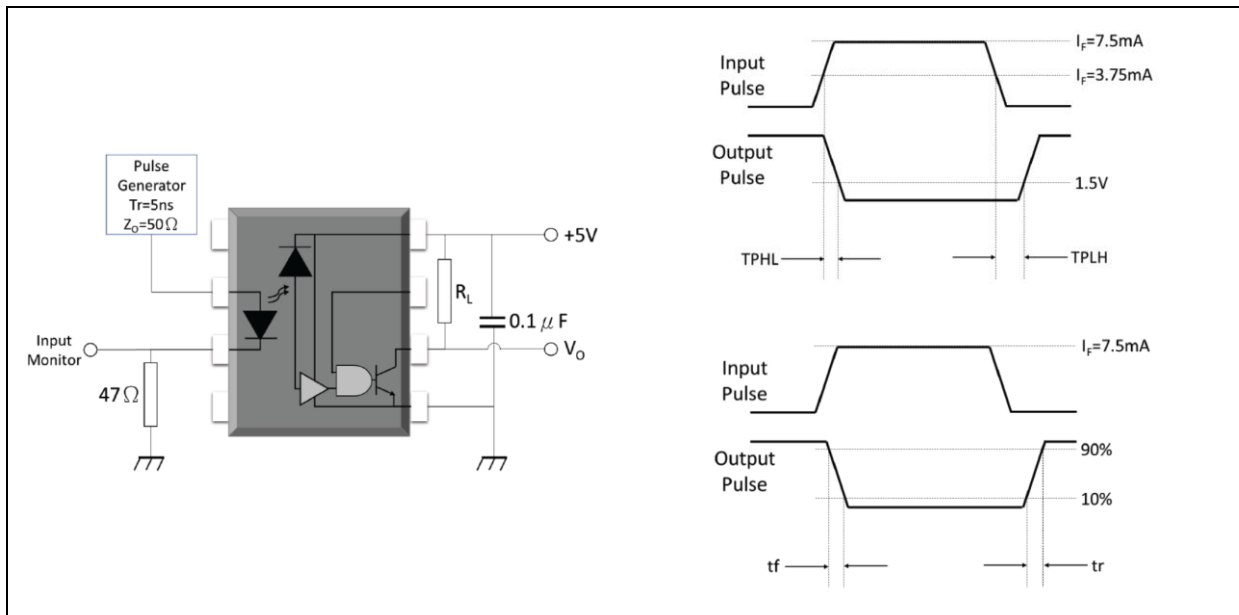


### Enable Propagation Delay v.s. Ambient Temperature

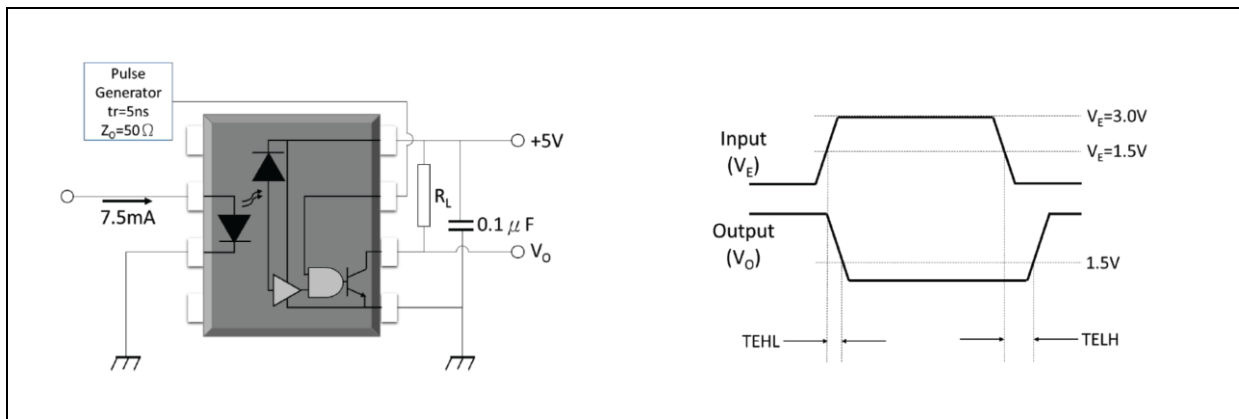


## TEST CIRCUIT:

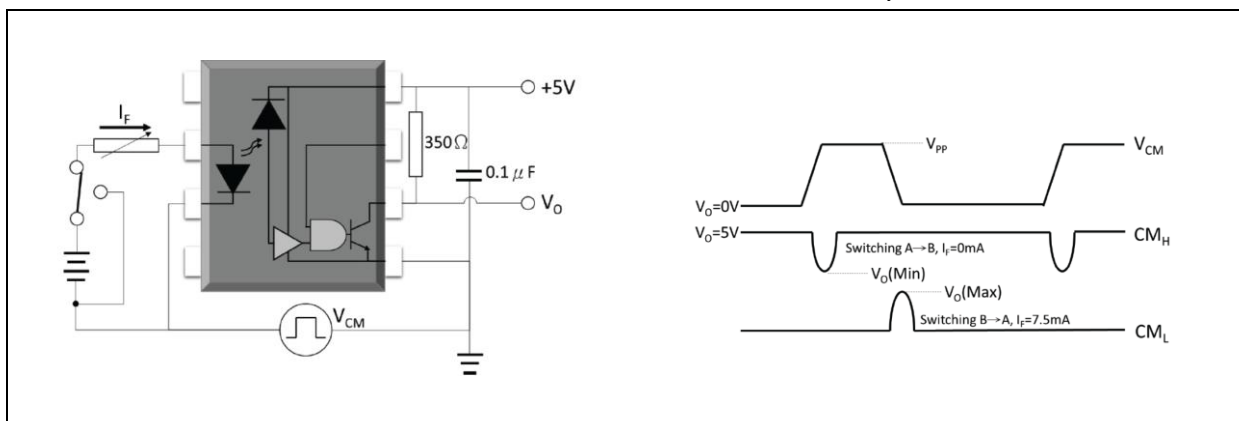
Test Circuit and Waveforms for TPHL, TPLH, tr, tf:



Test Circuit and Waveforms for TEHL, TELH:

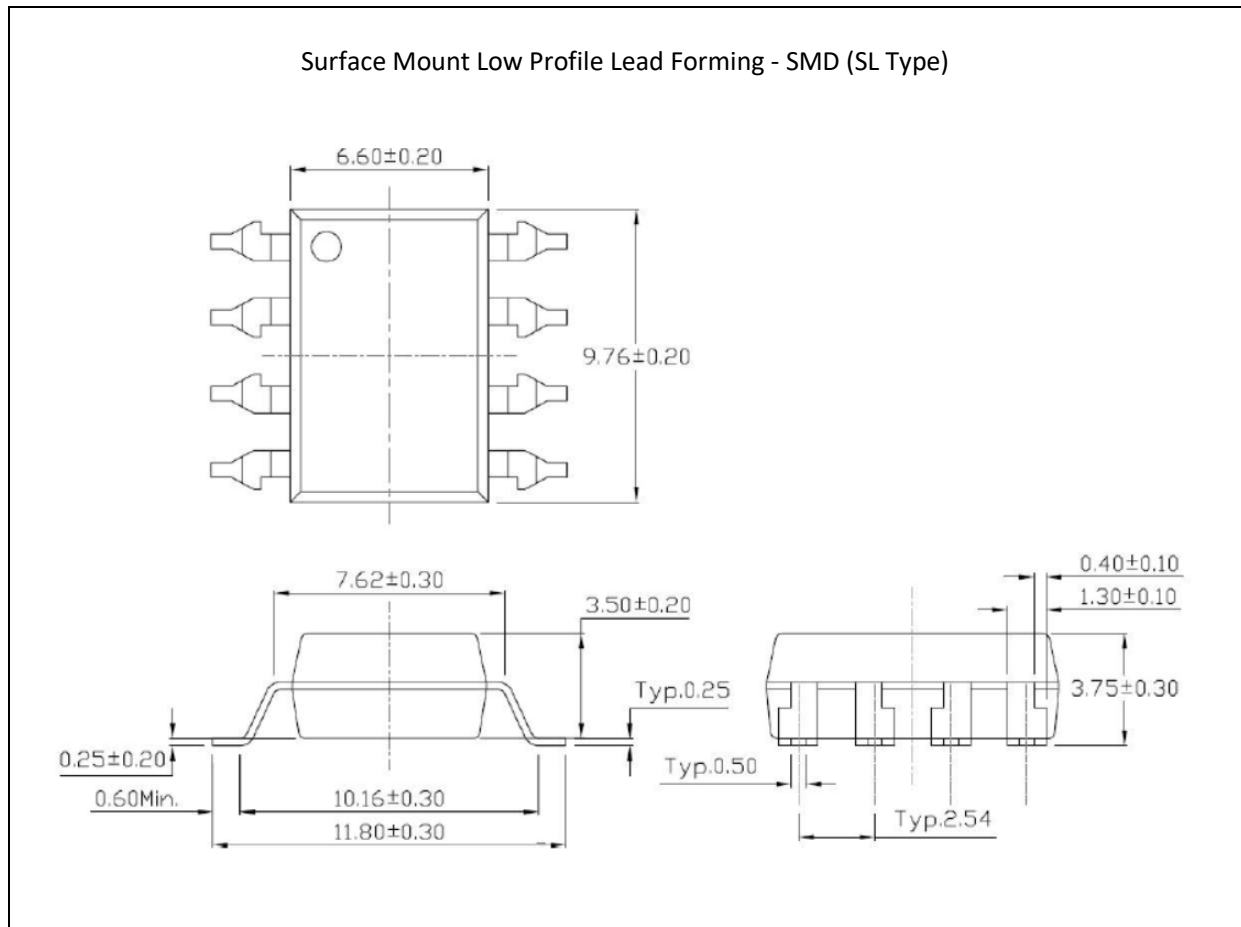


Test Circuit and Waveforms for Common Mode Transient Immunity:



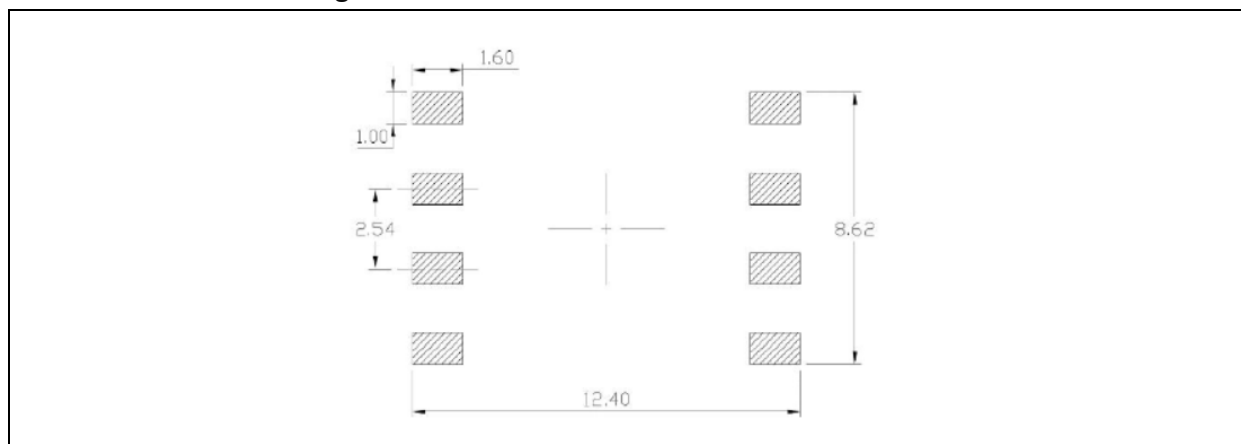
## OUTLINE DIMENSION:

Package Dimension:



1. All dimensions are in millimetre (mm).

Recommended Soldering Mask:

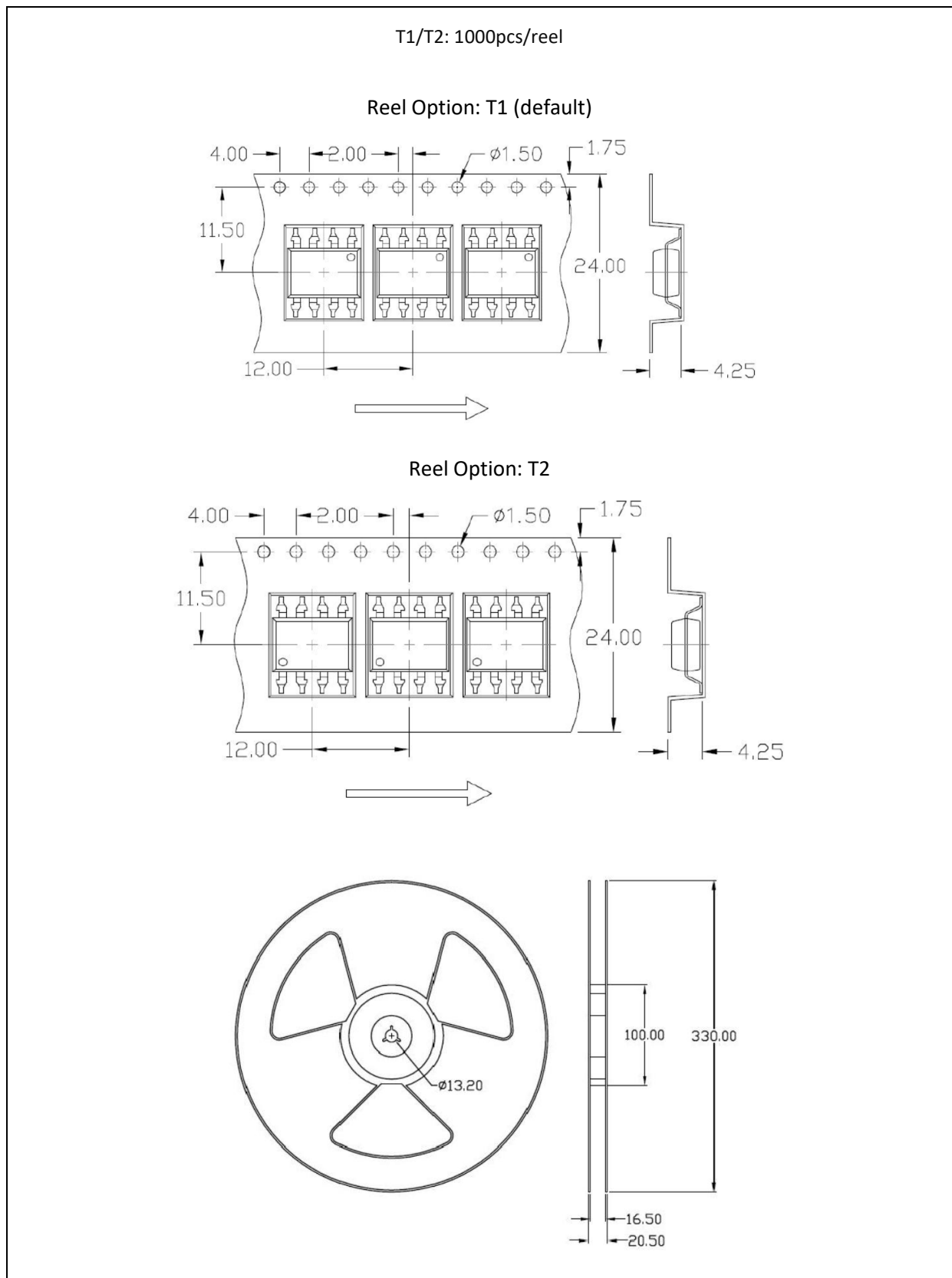


1. Dimensions are in millimetre (mm).



## PACKING SPECIFICATION:

Reel Dimension:

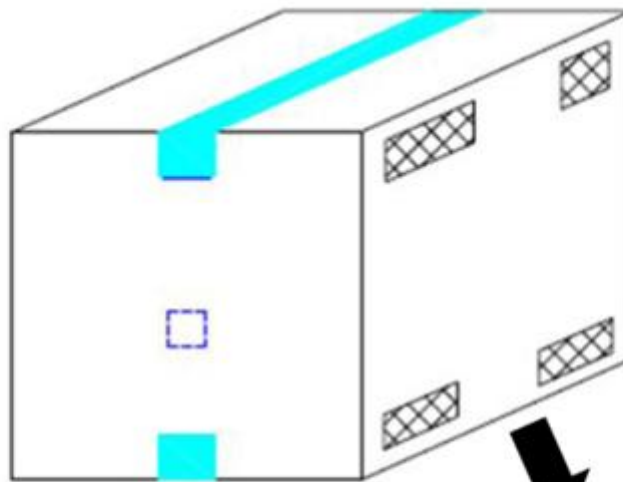


# Box Dimension:

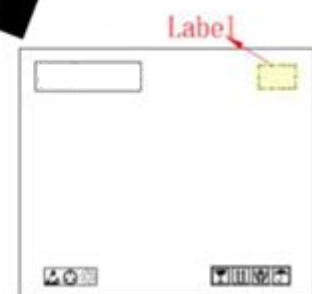
T1/T2: 3 reels (3Kpcs)/inner box, 5 inner boxes (15Kpcs)/carton



- L x W x H = 36cm x 36cm x 6.9cm



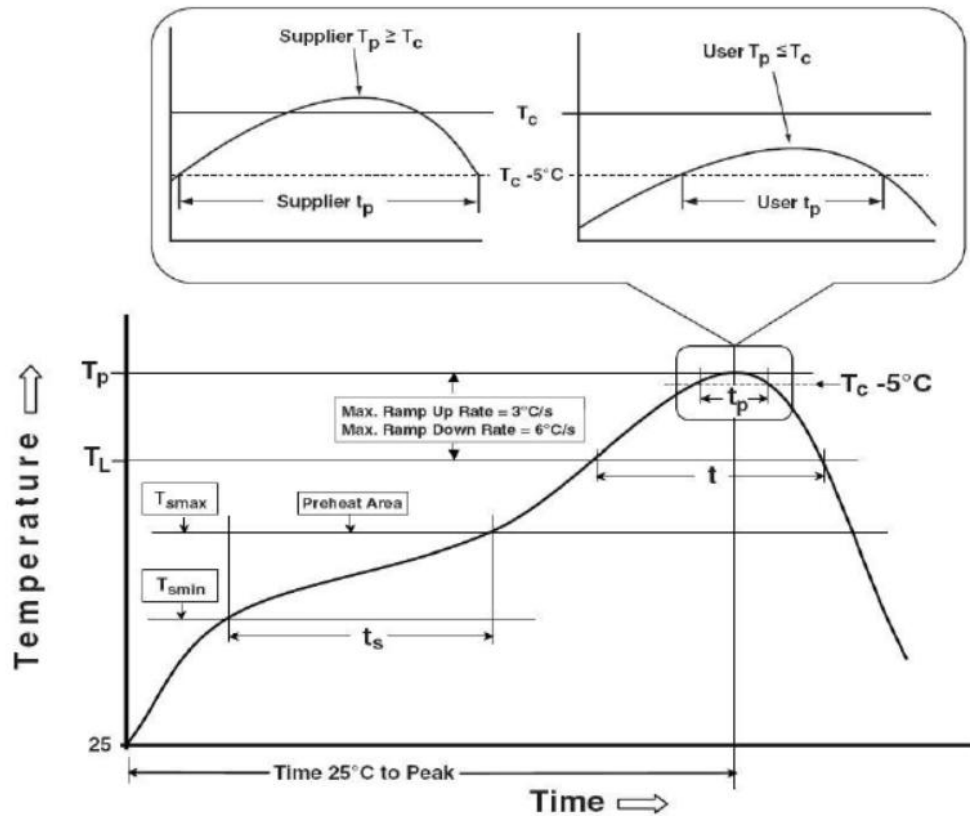
- L x W x H = 45cm x 38cm x 38cm





## 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.           |