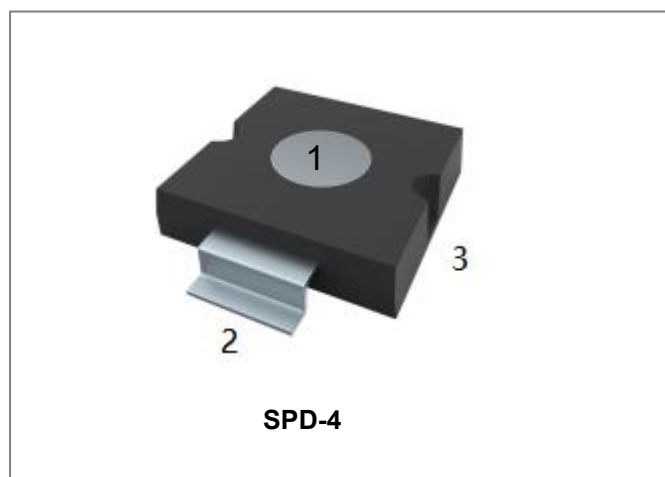


## TPK15KPXX TVS Rectifier



### Features

- Low profile surface mount
- Unidirectional and Bidirectional
- Fast response
- Suppresses transients up to 15kW @ 10/1000 $\mu$ s
- This is a Pb – Free Device
- Open top for heat dissipation and different connection options
- Base plate: Pure Sn plated; Terminals: Pure Sn plated
- Base plate is cathode, Terminal is anode
- "A" Suffix designates unidirectional,
- "CA" Suffix designates bidirectional
- All SMC parts are traceable to the wafer lot
- All part are 100% tested: electrical, 1x surge test, visual inspection
- Additional testing can be offered upon request

### Applications

- Protection from switching transients and induced RF

### Maximum Ratings@T<sub>A</sub>=25°C unless otherwise specified

| Characteristic                                                                            | Symbol                            | Value                       | Unit |
|-------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------|------|
| Junction and Storage Temperature Range                                                    | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150                 | °C   |
| Thermal Resistance Junction to Ambient (Note 1)                                           | R <sub>θJA</sub>                  | 50                          | °C/W |
| Thermal Resistance Junction to Case                                                       | R <sub>θJC</sub>                  | 0.7                         | °C/W |
| Peak Pulse Power (with 10/1000 $\mu$ s waveform) (Note 2)                                 | P <sub>PPM</sub>                  | 15000                       | W    |
| Steady-State Power dissipation (Note 5) @T <sub>A</sub> = 25°C<br>@T <sub>C</sub> = 100°C | P <sub>D</sub>                    | 2.5 (Note 1)<br>71 (Note 4) | W    |
| Peak Forward Surge Current(JEDEC Method)(Note 3)                                          | I <sub>FSM</sub>                  | 1500                        | A    |

Note: 1. When mounted on FR4 board with recommended mounting pad(see pad layout).

2. With impulse repetition rate (duty factor) of 0.05% or less.

3. At 8.3ms Single half sine-wave (unidirectional devices only)

4. Case temperature controlled heat sink as specified.

5. Derating when P<sub>PP</sub> also applying steady-state power.

**Electrical Characteristics@T<sub>A</sub>=25°C unless otherwise specified**

| Part Number<br>(Unidirectional) | Part Number<br>(Bidirectional) | Stand-off<br>Voltage<br>V <sub>WM</sub><br>(Note 1)<br>(V) | Breakdown<br>Voltage<br>V <sub>BR</sub><br>@ I <sub>BR</sub> (mA)<br>(V) |      | Test<br>Current<br>I <sub>BR</sub> (mA) | Clamping<br>Voltage<br>V <sub>C</sub> (10*1000)<br>@ I <sub>PP</sub><br>(V)<br>Max | Stand By<br>Current<br>I <sub>R</sub><br>@ V <sub>WM</sub><br>(μA)<br>Max | Peak Pulse<br>Current<br>I <sub>PP</sub><br>(A)<br>Max | Temperatur<br>e<br>Coefficient<br>Of V <sub>BR</sub><br>mV/°C<br>Max |
|---------------------------------|--------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------|------|-----------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------|
|                                 |                                |                                                            | Min                                                                      | Max  |                                         |                                                                                    |                                                                           |                                                        |                                                                      |
| TPK15KP7.0A                     | TPK15KP7.0CA                   | 7                                                          | 7.78                                                                     | 8.60 | 150                                     | 12                                                                                 | 3000                                                                      | 1251*                                                  | 5.0                                                                  |
| TPK15KP7.5A                     | TPK15KP7.5CA                   | 7.5                                                        | 8.33                                                                     | 9.21 | 5                                       | 12.9                                                                               | 750                                                                       | 1164*                                                  | 6.0                                                                  |
| TPK15KP8.0A                     | TPK15KP8.0CA                   | 8                                                          | 8.89                                                                     | 9.83 | 5                                       | 13.6                                                                               | 450                                                                       | 1101*                                                  | 6.0                                                                  |
| TPK15KP8.5A                     | TPK15KP8.5CA                   | 8.5                                                        | 9.44                                                                     | 10.4 | 5                                       | 14.4                                                                               | 150                                                                       | 1141*                                                  | 7.0                                                                  |
| TPK15KP9.0A                     | TPK15KP9.0CA                   | 9                                                          | 10                                                                       | 11.1 | 5                                       | 15.4                                                                               | 60                                                                        | 975                                                    | 8.0                                                                  |
| TPK15KP10A                      | TPK15KP10CA                    | 10                                                         | 11.1                                                                     | 12.3 | 5                                       | 17                                                                                 | 45                                                                        | 882                                                    | 9.0                                                                  |
| TPK15KP11A                      | TPK15KP11CA                    | 11                                                         | 12.2                                                                     | 13.5 | 5                                       | 18.2                                                                               | 10                                                                        | 822                                                    | 10                                                                   |
| TPK15KP12A                      | TPK15KP12CA                    | 12                                                         | 13.3                                                                     | 14.7 | 5                                       | 19.9                                                                               | 10                                                                        | 753                                                    | 11                                                                   |
| TPK15KP13A                      | TPK15KP13CA                    | 13                                                         | 14.4                                                                     | 15.9 | 5                                       | 21.5                                                                               | 10                                                                        | 696                                                    | 12                                                                   |
| TPK15KP14A                      | TPK15KP14CA                    | 14                                                         | 15.6                                                                     | 17.2 | 5                                       | 23.2                                                                               | 10                                                                        | 645                                                    | 13                                                                   |
| TPK15KP15A                      | TPK15KP15CA                    | 15                                                         | 16.7                                                                     | 18.5 | 5                                       | 24.4                                                                               | 10                                                                        | 618                                                    | 15                                                                   |
| TPK15KP16A                      | TPK15KP16CA                    | 16                                                         | 17.8                                                                     | 19.7 | 5                                       | 26                                                                                 | 10                                                                        | 576                                                    | 16                                                                   |
| TPK15KP17A                      | TPK15KP17CA                    | 17                                                         | 18.9                                                                     | 20.9 | 5                                       | 27.6                                                                               | 10                                                                        | 543                                                    | 18                                                                   |
| TPK15KP18A                      | TPK15KP18CA                    | 18                                                         | 20                                                                       | 22.1 | 5                                       | 29.2                                                                               | 10                                                                        | 516                                                    | 19                                                                   |
| TPK15KP20A                      | TPK15KP20CA                    | 20                                                         | 22.2                                                                     | 24.5 | 5                                       | 32.4                                                                               | 10                                                                        | 462                                                    | 22                                                                   |
| TPK15KP22A                      | TPK15KP22CA                    | 22                                                         | 24.4                                                                     | 26.9 | 5                                       | 35.5                                                                               | 10                                                                        | 423                                                    | 24                                                                   |
| TPK15KP24A                      | TPK15KP24CA                    | 24                                                         | 26.7                                                                     | 29.5 | 5                                       | 38.9                                                                               | 10                                                                        | 384                                                    | 27                                                                   |
| TPK15KP26A                      | TPK15KP26CA                    | 26                                                         | 28.9                                                                     | 31.9 | 5                                       | 42.1                                                                               | 10                                                                        | 357                                                    | 29                                                                   |
| TPK15KP28A                      | TPK15KP28CA                    | 28                                                         | 31.1                                                                     | 34.4 | 5                                       | 45.5                                                                               | 10                                                                        | 330                                                    | 30                                                                   |
| TPK15KP30A                      | TPK15KP30CA                    | 30                                                         | 33.3                                                                     | 36.8 | 5                                       | 48.4                                                                               | 10                                                                        | 309                                                    | 35                                                                   |
| TPK15KP33A                      | TPK15KP33CA                    | 33                                                         | 36.7                                                                     | 40.6 | 5                                       | 53.3                                                                               | 10                                                                        | 282                                                    | 38                                                                   |
| TPK15KP36A                      | TPK15KP36CA                    | 36                                                         | 40                                                                       | 44.2 | 5                                       | 58.1                                                                               | 10                                                                        | 258                                                    | 40                                                                   |
| TPK15KP40A                      | TPK15KP40CA                    | 40                                                         | 44.4                                                                     | 49.1 | 5                                       | 64.5                                                                               | 10                                                                        | 234                                                    | 45                                                                   |
| TPK15KP43A                      | TPK15KP43CA                    | 43                                                         | 47.8                                                                     | 52.8 | 5                                       | 69.4                                                                               | 10                                                                        | 216                                                    | 49                                                                   |
| TPK15KP45A                      | TPK15KP45CA                    | 45                                                         | 50                                                                       | 55.3 | 5                                       | 72.7                                                                               | 10                                                                        | 207                                                    | 51                                                                   |
| TPK15KP48A                      | TPK15KP48CA                    | 48                                                         | 53.3                                                                     | 58.9 | 5                                       | 77.4                                                                               | 10                                                                        | 195                                                    | 55                                                                   |
| TPK15KP51A                      | TPK15KP51CA                    | 51                                                         | 56.7                                                                     | 62.7 | 5                                       | 82.4                                                                               | 10                                                                        | 183                                                    | 60                                                                   |
| TPK15KP54A                      | TPK15KP54CA                    | 54                                                         | 60                                                                       | 66.3 | 5                                       | 87.1                                                                               | 10                                                                        | 171                                                    | 64                                                                   |
| TPK15KP58A                      | TPK15KP58CA                    | 58                                                         | 64.4                                                                     | 71.2 | 5                                       | 93.6                                                                               | 10                                                                        | 159                                                    | 69                                                                   |
| TPK15KP60A                      | TPK15KP60CA                    | 60                                                         | 66.7                                                                     | 73.7 | 5                                       | 96.8                                                                               | 10                                                                        | 156                                                    | 70                                                                   |
| TPK15KP64A                      | TPK15KP64CA                    | 64                                                         | 71.1                                                                     | 78.6 | 5                                       | 103                                                                                | 10                                                                        | 147                                                    | 75                                                                   |

**Electrical Characteristics @  $T_A = 25^\circ\text{C}$  unless otherwise specified**

| Part Number<br>(Unidirectional) | Part Number<br>(Bidirectional) | Stand-off<br>Voltage<br>$V_{WM}$<br>(Note 1)<br>(V) | Breakdown<br>Voltage<br>$V_{BR}$<br>@ $I_{BR}$ (mA)<br>(V) |      | Test<br>Current<br>$I_{BR}$ (mA) | Clamping<br>Voltage<br>$V_C$ ( $10 \times 1000$ )<br>@ $I_{PP}$<br>(V)<br>Max | Stand By<br>Current<br>$I_R$<br>@ $V_{WM}$<br>( $\mu\text{A}$ )<br>Max | Peak Pulse<br>Current<br>$I_{PP}$<br>(A)<br>Max | Temperature<br>Coefficient<br>Of $V_{BR}$<br>$\text{mV}/^\circ\text{C}$<br>Max |
|---------------------------------|--------------------------------|-----------------------------------------------------|------------------------------------------------------------|------|----------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------|
|                                 |                                |                                                     | Min                                                        | Max  |                                  |                                                                               |                                                                        |                                                 |                                                                                |
| TPK15KP70A                      | TPK15KP70CA                    | 70                                                  | 77.8                                                       | 86   | 5                                | 113                                                                           | 10                                                                     | 132                                             | 84                                                                             |
| TPK15KP75A                      | TPK15KP75CA                    | 75                                                  | 83.3                                                       | 92.1 | 5                                | 121                                                                           | 10                                                                     | 123                                             | 90                                                                             |
| TPK15KP78A                      | TPK15KP78CA                    | 78                                                  | 86.7                                                       | 95.8 | 5                                | 126                                                                           | 10                                                                     | 120                                             | 94                                                                             |
| TPK15KP85A                      | TPK15KP85CA                    | 85                                                  | 94.4                                                       | 104  | 5                                | 137                                                                           | 10                                                                     | 108                                             | 102                                                                            |
| TPK15KP90A                      | TPK15KP90CA                    | 90                                                  | 100                                                        | 111  | 5                                | 146                                                                           | 10                                                                     | 402                                             | 109                                                                            |
| TPK15KP100A                     | TPK15KP100CA                   | 100                                                 | 111                                                        | 123  | 5                                | 162                                                                           | 10                                                                     | 93                                              | 122                                                                            |
| TPK15KP110A                     | TPK15KP110CA                   | 110                                                 | 122                                                        | 135  | 5                                | 177                                                                           | 10                                                                     | 84                                              | 132                                                                            |
| TPK15KP120A                     | TPK15KP120CA                   | 120                                                 | 133                                                        | 147  | 5                                | 193                                                                           | 10                                                                     | 78                                              | 145                                                                            |
| TPK15KP130A                     | TPK15KP130CA                   | 130                                                 | 144                                                        | 159  | 5                                | 209                                                                           | 10                                                                     | 71                                              | 157                                                                            |
| TPK15KP150A                     | TPK15KP150CA                   | 150                                                 | 167                                                        | 185  | 5                                | 243                                                                           | 10                                                                     | 62                                              | 183                                                                            |
| TPK15KP160A                     | TPK15KP160CA                   | 160                                                 | 178                                                        | 197  | 5                                | 259                                                                           | 10                                                                     | 58                                              | 195                                                                            |
| TPK15KP170A                     | TPK15KP170CA                   | 170                                                 | 189                                                        | 209  | 5                                | 275                                                                           | 10                                                                     | 55                                              | 207                                                                            |
| TPK15KP180A                     | TPK15KP180CA                   | 180                                                 | 200                                                        | 221  | 5                                | 291                                                                           | 10                                                                     | 52                                              | 219                                                                            |
| TPK15KP200A                     | TPK15KP200CA                   | 200                                                 | 222                                                        | 245  | 5                                | 322                                                                           | 10                                                                     | 47                                              | 243                                                                            |

**Note:** 1. Transient Voltage Suppressors are normally selected with reverse standoff voltage  $V_{WM}$ , which should be equal to or greater than the peak operating voltage.  
2. TPK15KPXXXXA, "A" Suffix Designates Unidirectional Devices; TPK15KPXXXXCA, "CA" Suffix Designates Bidirectional Devices.  
\* Surge Testing is performed to 1000Amps due to Equipment limitations.

| SYMBOLS & DEFINITIONS |                                |            |                                  |
|-----------------------|--------------------------------|------------|----------------------------------|
| Symbol                | Definition                     | Symbol     | Definition                       |
| $V_{WM}$              | Working Peak(Standoff) Voltage | $I_{PP}$   | Peak Pulse Current               |
| $V_{(BR)}$            | Breakdown Voltage              | $V_C$      | Clamping Voltage                 |
| $I_R$                 | Standby Current                | $I_{(BR)}$ | Breakdown Current for $V_{(BR)}$ |

## Ratings and Characteristics Curves

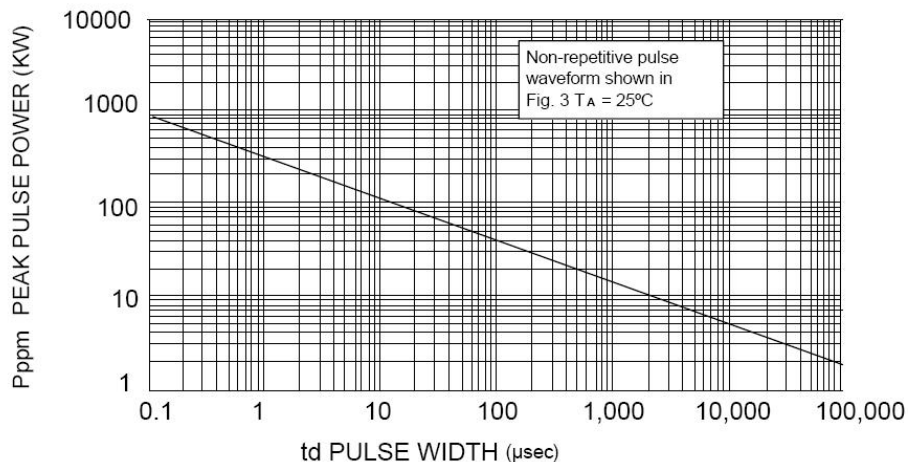


FIG. 1 PEAK PULSE POWER RATING

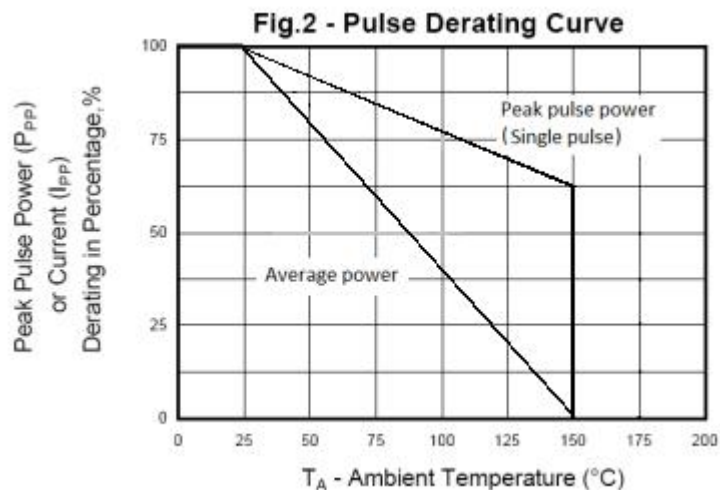
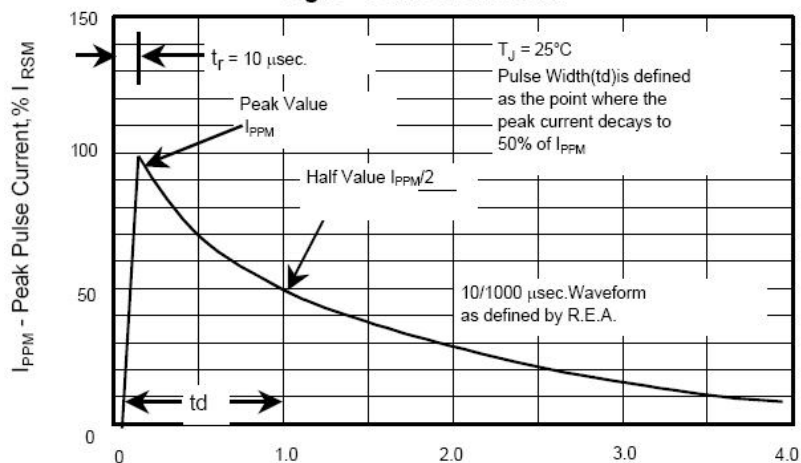
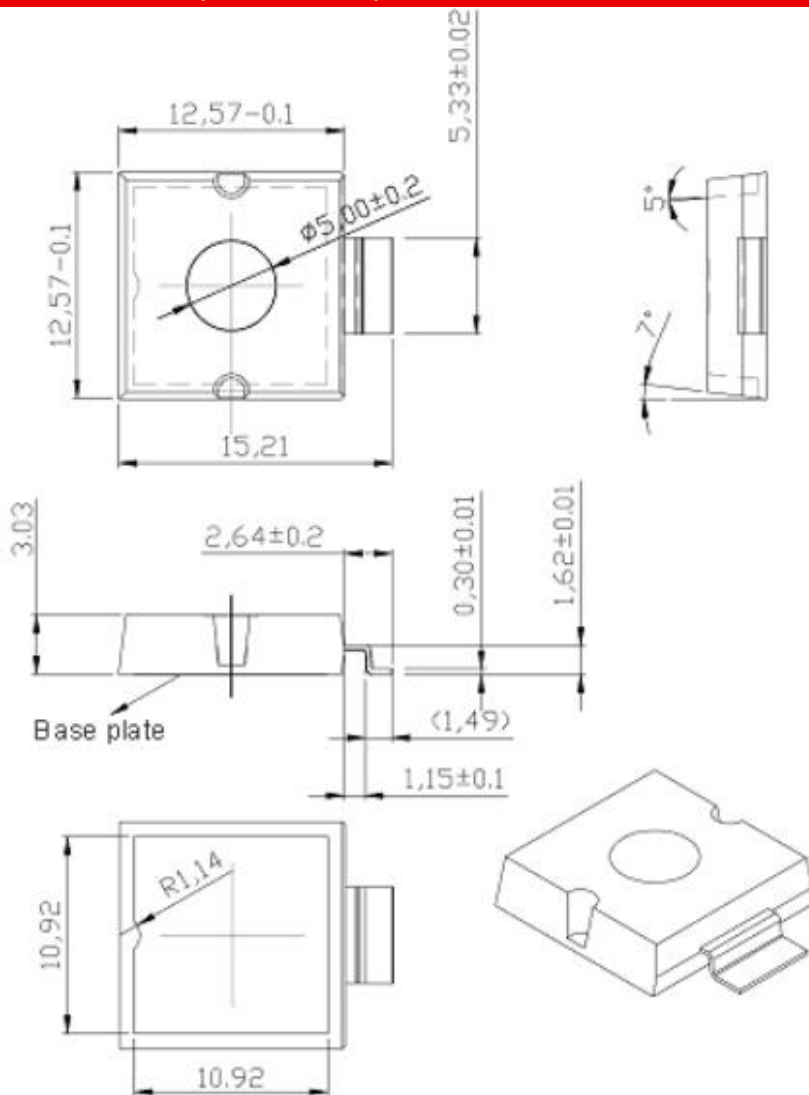


Fig.3 - Pulse Waveform



### Mechanical Dimensions SPD-4(Millimeters)

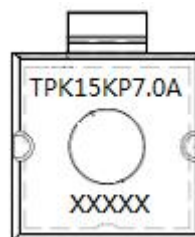


## Ordering Information

| Device      | Package        | Shipping     |
|-------------|----------------|--------------|
| TPK15KPXX   | SPD-4(Pb-Free) | 64pcs/ bag   |
| TPK15KPXXTR | SPD-4(Pb-Free) | 500pcs/ reel |

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our tape and reel packaging specification.

## Marking Diagram



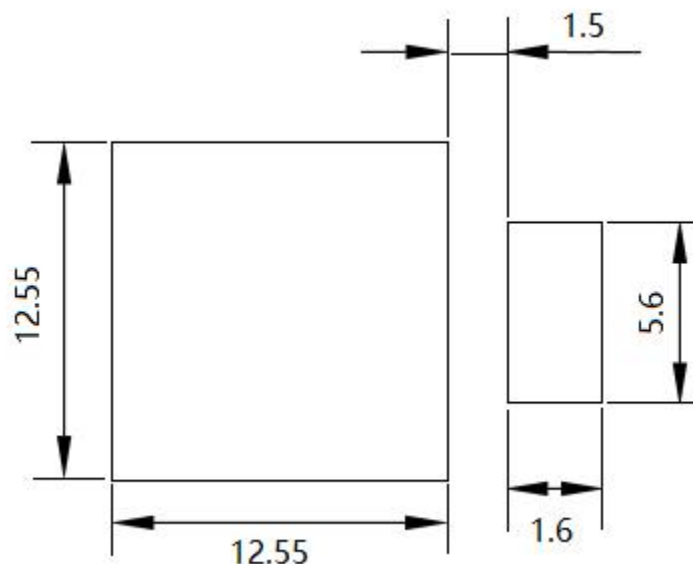
Where XXXXX is YYWWL  
Part number's example like this

TPK15KP7.0A = Part Number  
YY = Year  
WW = Week  
L = Lot Number

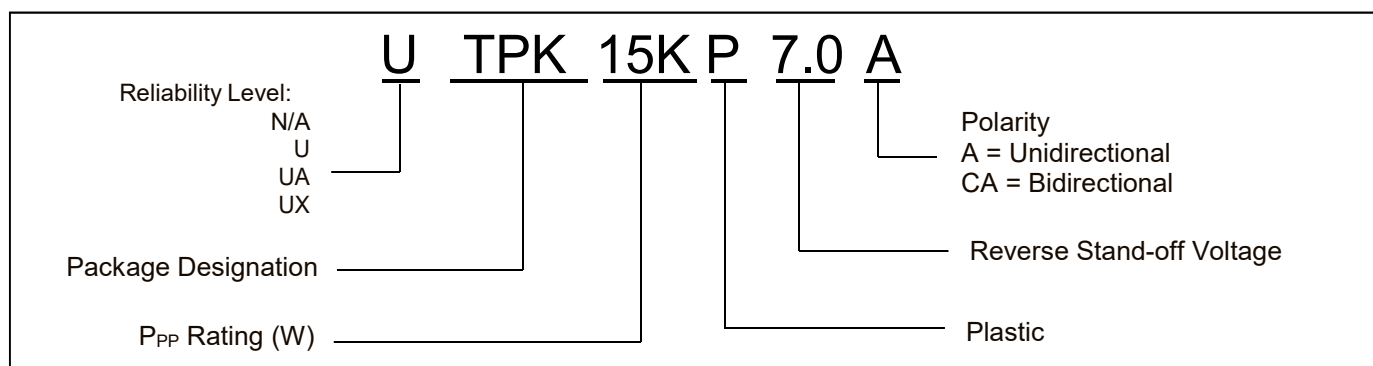
Notes: Reliability Level will Marking.

Date code "XXXXX" was added in marking from April 1, 2019.

**PAD Layout Recommend Size(Millimeters)**



**Part Number Naming Rule**



| SMC TVS Screening Options         |                   |              |           |           |
|-----------------------------------|-------------------|--------------|-----------|-----------|
|                                   |                   |              |           |           |
| Screen or Test Description        | Screening Options |              |           |           |
| Prefix                            | 1)                | U            | UA        | UX        |
| 100% Wafer Probe                  | R                 | R            | R         | R         |
| 3-Sigma lot norm determination 2) |                   | R            | R         | R         |
| Surge Test                        | 1x                | 1x           | 1x        | 1x        |
| 100% DC Electrical Test Go-No-Go  |                   | R            | R         | R         |
| Temperature Cycling               |                   | 10 Cycles 3) | 10 Cycles | 20 Cycles |
| Post TC Surge Test                |                   | 1x 3)        | 3x        | 10x       |
| 100% Thermal Impedance 4)         |                   | R            | R         | R         |
| 100% DC Electrical Test           |                   |              | go-no-go  | R         |
| HTRB                              |                   |              | 24 hrs 5) | 96 hrs 6) |
| 100% DC Electrical Test           | go-no-go          | go-no-go     | go-no-go  | R         |
| Delta Calculation                 |                   |              |           | R         |
| PDA Calculation                   |                   |              |           | R         |
| 100% Visual Inspection            | R                 | R            | R         | R         |
| Certificate of Conformance        | R                 | R            | R         | R         |
| Group A Inspection                |                   |              |           | O         |
| Group B Inspection                |                   |              |           | O         |
| Group C Inspection                |                   |              |           | O         |

**Notes:**

R = to be performed. Electrical testing per datasheet limits

O = optional

1) Commercial flow

2) 3-Sigma lot norm to remove atypical devices. For detailed requirements see below.

3) Test to be performed on TPK & STPK Series only. The condition is below:

High temp. side: 150 °C; Low temp. side: -55 °C; Duration time: HT 15min, LT 15 min

4) To be performed any time before completion of screening for unidirectional devices only.

5) 24 hours for unidirectional, 24 hours each side for bidirectional

6) 96 hours for unidirectional, 48 hours each side for bidirectional

**Test Procedure to remove Atypical Devices**

This procedure will be used in the production testing and applied for each assembly lot when required by the screening option.

- read and record VBR and IR of 200 random samples of a particular assembly lot.
- calculate the average ( $\mu$ ) and standard deviation ( $\sigma$ ) for each parameter.
- the testing limit will then be as follows:
  - $VBR\ min = \mu(VBR) - 3 \cdot \sigma(VBR)$
  - $VBR\ max = \mu(VBR) + 3 \cdot \sigma(VBR)$
  - $IR\ max = \mu(IR) + 3 \cdot \sigma(IR)$

Once the testing limit is established for this assembly lot, the 100% production testing will be done based on the tighter limit for the parts of the same assembly lot.

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[10TQ045STR](#) [11DQ03TR](#) [11DQ04TR](#) [11DQ05TA](#) [11DQ06TA](#) [11DQ09TA](#) [11DQ10TA](#) [120SPC045A](#) [120SPC060A](#) [121SPC045A](#)  
[121SPC060A](#) [122SPC030A](#) [123SPC080A](#) [123SPC100A](#) [12CTQ030](#) [12CTQ035](#) [12CTQ040](#) [12CTQ045](#) [12TQ045](#) [12TQ100](#) [12TQ150](#)  
[15KPA200ATR](#) [15MQ040NTR](#) [15MQ060N](#) [15MQ060NTR](#) [15SQ045](#) [183NQ080-1](#) [19TQ015CJ](#) [1N4001GTA](#) [1N4002GTA](#)