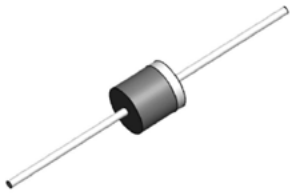
# 15KPE

## 15000 W Transient voltage suppressor



### Applications

- Consumer electronics
- Telecommunications
- Computing and servers
- Appliances
- Industrial automation
- Mobile and wearables

### Product features

- Low incremental surge resistance
- Excellent clamping capability
- 15,000 W peak pulse power capability at 10/1000 µs waveform
- Typical $I_R$ less than 2 µA above 30 V
- Fast response time: typically less than 1.0 ps from 0 V to $V_{BR}$ minimum
- High temperature reflow and wave soldering
- Plastic package meets UL 94 V-0 flammability rating
- Terminal: Solder plated leads, solderable per J-STD-02
- UL 497B recognized. File No. : E198449 Guide QVGQ2

### Environmental compliance and general specifications

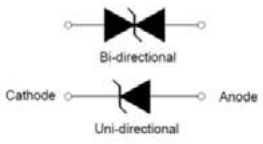
Pb HALOGEN HF FREE RoHS

### Ordering part number

**15KPE 280 C A**

- Family name
- $V_R$ voltage
- Bi-/Uni-Directional (Blank=Uni, C=Bi)
- Voltage tolerance

### PIN configuration




Symbol

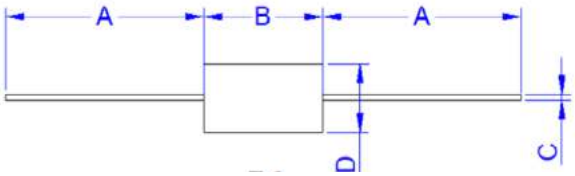
Powering Business Worldwide

## Absolute maximum ratings

(+25 °C, RH=45%-75%, unless otherwise noted)

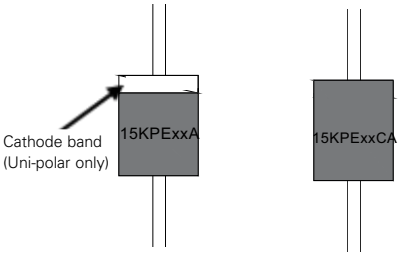
| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Storage operating junction temperature range | $T_{STG}$/ $T_J$ | -55 to +175 | °C |
| Steady state power dissipation at $T_L$= +75 °C | $P_{M(AV)}$ | 8.0 | W |
| Peak pulse power dissipation on 10/1000 µs waveform | $P_{PP}$ | 15,000 | W |
| Peak forward surge current, 8.3 ms single half sine-wave for unidirectional only | $I_{FSM}$ | 400 | A |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 8.0 | °C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 40 | °C/W |

## Mechanical parameters- mm



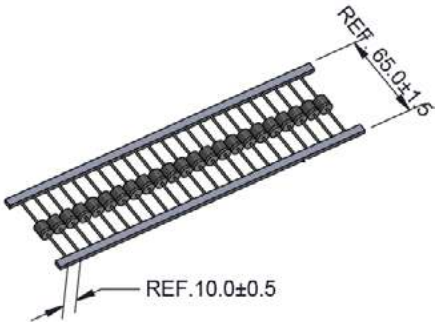

| | Millimeters | | Inches | |
|---|---|---|---|---|
| Dimension | Minimum | Maximum | Minimum | |
| A | 25.40 | | 1.000 | |
| B | 8.60 | 9.40 | 0.339 | 0.370 |
| C | 1.20 | 1.40 | 0.047 | 0.055 |
| D | 8.60 | 9.10 | 0.339 | 0.358 |

## Part marking




## Packaging information (mm)

300 parts per box.

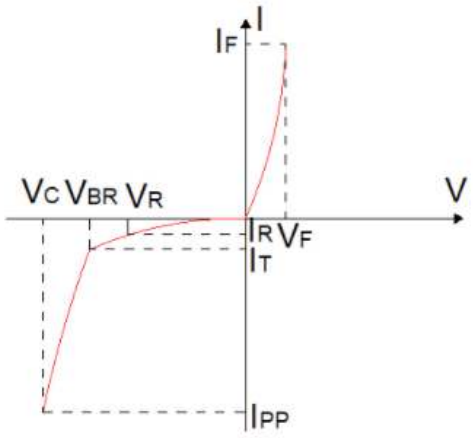


**Electrical characteristics** (+25 °C)

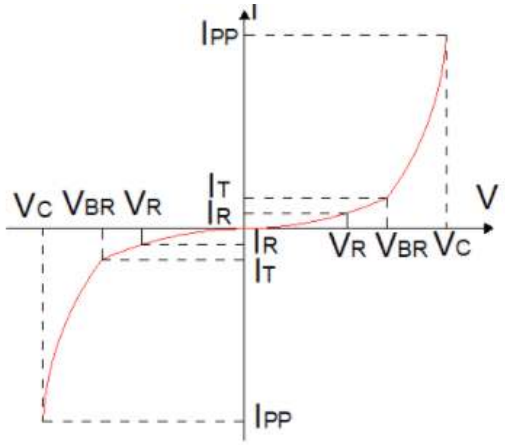
| Part number Uni-polar | Bi-polar | $V_R$ (V) | $I_R$ @ $V_R$ (µA) | $V_{BR}$ @ $I_T$ min (V) | max (V) | $I_T$ (mA) | $V_C$ @ $I_{PP}$ max (V) | $I_{PP}$ (A) |
|---|---|---|---|---|---|---|---|---|
| 15KPE17A | 15KPE17CA | 17 | 5000 | 18.9 | 20.9 | 50 | 29.3 | 515.4 |
| 15KPE18A | 15KPE18CA | 18 | 5000 | 20 | 22.1 | 50 | 30.9 | 488.7 |
| 15KPE20A | 15KPE20CA | 20 | 1500 | 22.2 | 24.5 | 20 | 34.3 | 440.2 |
| 15KPE22A | 15KPE22CA | 22 | 500 | 24.4 | 26.9 | 10 | 37.1 | 407 |
| 15KPE24A | 15KPE24CA | 24 | 150 | 26.7 | 29.5 | 5 | 40.7 | 371 |
| 15KPE26A | 15KPE26CA | 26 | 50 | 28.9 | 31.9 | 5 | 44 | 343.2 |
| 15KPE28A | 15KPE28CA | 28 | 25 | 31.1 | 34.4 | 5 | 47.5 | 317.9 |
| 15KPE30A | 15KPE30CA | 30 | 15 | 33.3 | 36.8 | 5 | 50.7 | 297.8 |
| 15KPE33A | 15KPE33CA | 33 | 2 | 36.7 | 40.6 | 5 | 54.7 | 276.1 |
| 15KPE36A | 15KPE36CA | 36 | 2 | 40 | 44.2 | 5 | 59.8 | 252.5 |
| 15KPE40A | 15KPE40CA | 40 | 2 | 44.4 | 49.1 | 5 | 65.8 | 229.5 |
| 15KPE43A | 15KPE43CA | 43 | 2 | 47.8 | 52.8 | 5 | 69.8 | 216.3 |
| 15KPE45A | 15KPE45CA | 45 | 2 | 50 | 55.3 | 5 | 72.8 | 207.4 |
| 15KPE48A | 15KPE48CA | 48 | 2 | 53.3 | 58.9 | 5 | 77.7 | 194.3 |
| 15KPE51A | 15KPE51CA | 51 | 2 | 56.7 | 62.7 | 5 | 82.9 | 182.1 |
| 15KPE54A | 15KPE54CA | 54 | 2 | 60 | 66.3 | 5 | 87.7 | 172.2 |
| 15KPE58A | 15KPE58CA | 58 | 2 | 64.4 | 71.2 | 5 | 93.8 | 161 |
| 15KPE60A | 15KPE60CA | 60 | 2 | 66.7 | 73.7 | 5 | 97.4 | 155 |
| 15KPE64A | 15KPE64CA | 64 | 2 | 71.1 | 78.6 | 5 | 104.2 | 144.9 |
| 15KPE70A | 15KPE70CA | 70 | 2 | 77.8 | 86 | 5 | 113.6 | 132.9 |
| 15KPE75A | 15KPE75CA | 75 | 2 | 83.3 | 92.1 | 5 | 122 | 123.8 |
| 15KPE78A | 15KPE78CA | 78 | 2 | 86.7 | 95.8 | 5 | 126.1 | 119.7 |
| 15KPE85A | 15KPE85CA | 85 | 2 | 94.4 | 104 | 5 | 137.6 | 109.7 |
| 15KPE90A | 15KPE90CA | 90 | 2 | 100 | 111 | 5 | 145.6 | 103.7 |
| 15KPE100A | 15KPE100CA | 100 | 2 | 111 | 123 | 5 | 161.3 | 93.6 |
| 15KPE110A | 15KPE110CA | 110 | 2 | 122 | 135 | 5 | 178.6 | 84.5 |
| 15KPE120A | 15KPE120CA | 120 | 2 | 133 | 147 | 5 | 192.3 | 78.5 |
| 15KPE130A | 15KPE130CA | 130 | 2 | 144 | 159 | 5 | 208.3 | 72.5 |
| 15KPE150A | 15KPE150CA | 150 | 2 | 167 | 185 | 5 | 241.9 | 62.4 |
| 15KPE160A | 15KPE160CA | 160 | 2 | 178 | 197 | 5 | 258.6 | 58.4 |
| 15KPE170A | 15KPE170CA | 170 | 2 | 189 | 209 | 5 | 272.7 | 55.4 |
| 15KPE180A | 15KPE180CA | 180 | 2 | 201 | 222 | 5 | 288.5 | 52.3 |
| 15KPE200A | 15KPE200CA | 200 | 2 | 224 | 247 | 5 | 319.1 | 47.3 |
| 15KPE220A | 15KPE220CA | 220 | 2 | 246 | 272 | 5 | 352.5 | 42.8 |
| 15KPE240A | 15KPE240CA | 240 | 2 | 268 | 292 | 5 | 384.6 | 39.3 |
| 15KPE260A | 15KPE260CA | 260 | 2 | 289 | 317 | 5 | 416.7 | 36.2 |
| 15KPE280A | 15KPE280CA | 280 | 2 | 311 | 341 | 5 | 454.5 | 33.2 |

**Ratings and V-I characteristic curves** (+25 °C unless otherwise noted)

**V- I curve characteristics (Uni-directional)**




**V- I curve characteristics (Bi-directional)**




Surge waveform: 10/1000 µs

$V_R$: Stand-off voltage – Maximum voltage that can be applied

$V_{BR}$: Breakdown voltage

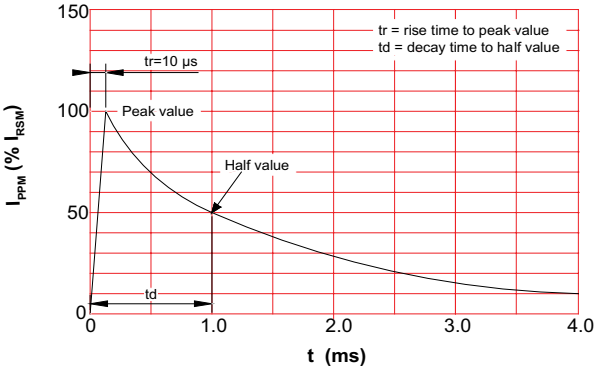
$V_C$: Clamping voltage – Peak voltage measured across the suppressor at a specified $I_{PP}$

$I_R$: Reverse leakage current

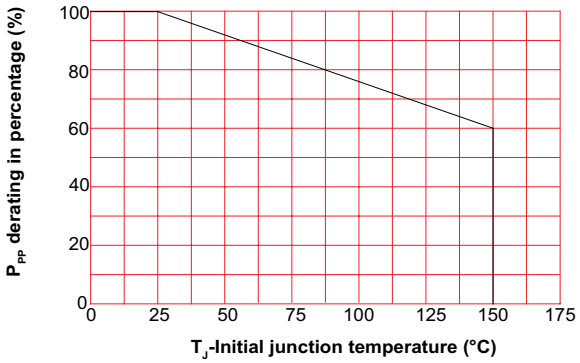
$I_T$: Test current

$V_F$: Forward voltage drop for Uni-directional TVS diode

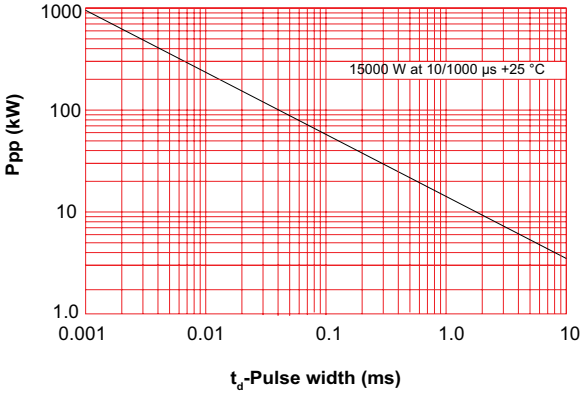
**Pulse waveform**




**Pulse derating curve**




**Peak pulse power dissipation vs. pulse width**



## Solder reflow profile

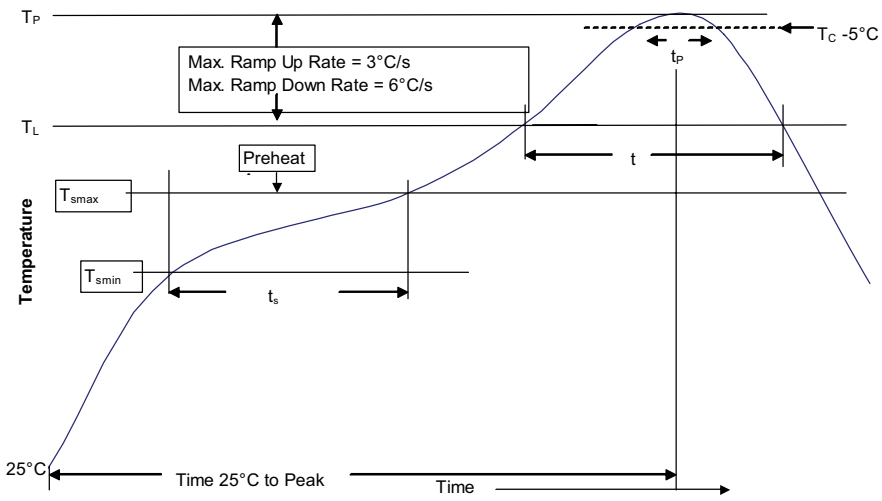



**Table 1 - Standard SnPb solder ($T_C$)**

| Package thickness | Volume mm3 <350 | Volume mm3 ≥350 |
|---|---|---|
| <2.5 mm | 235 °C | 220 °C |
| ≥2.5 mm | 220 °C | 220 °C |

**Table 2 - Lead (Pb) free solder ($T_C$)**

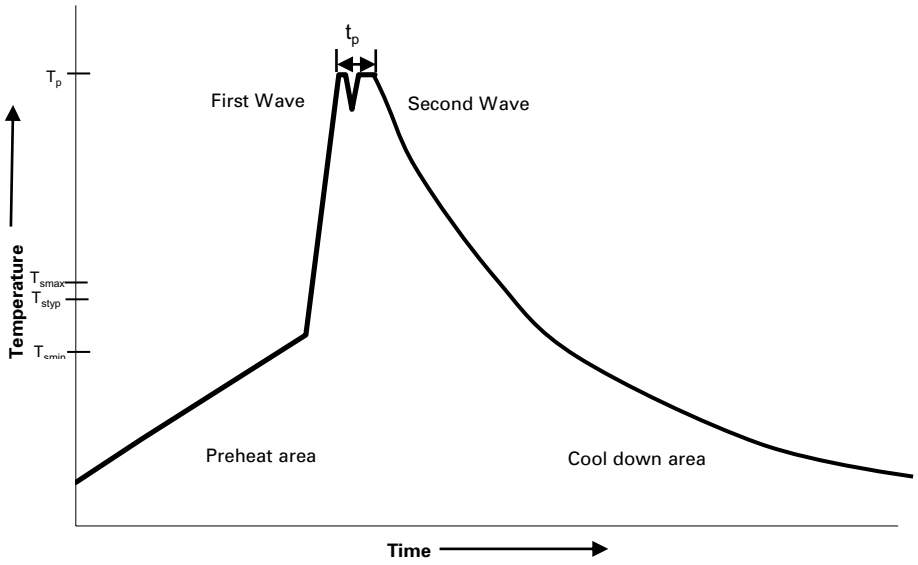
| Package thickness | Volume mm³ <350 | Volume mm³ 350 - 2000 | Volume mm³ >2000 |
|---|---|---|---|
| <1.6 mm | 260 °C | 260 °C | 260 °C |
| 1.6 – 2.5 mm | 260 °C | 250 °C | 245 °C |
| >2.5 mm | 250 °C | 245 °C | 245 °C |

## Reference J-STD-020

| Profile feature | | Standard SnPb solder | Lead (Pb) free solder |
|---|---|---|---|
| Preheat and soak | • Temperature min. ($T_{smin}$) | 100 °C | 150 °C |
| | • Temperature max. ($T_{smax}$) | 150 °C | 200 °C |
| | • Time ($T_{smin}$ to $T_{smax}$) ($t_S$) | 60-120 seconds | 60-180 seconds |
| Ramp up rate $T_L$ to $T_p$ | | 3 °C/ second max. | 3 °C/ second max. |
| Liquidous temperature ($T_L$)<br>Time ($t_L$) maintained above $T_L$ | | 183 °C<br>60-150 seconds | 217 °C<br>60-150 seconds |
| Peak package body temperature ($T_P$)* | | Table 1 | Table 2 |
| Time ($t_p$)* within 5 °C of the specified classification temperature ($T_C$) | | 20 seconds* | 40 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. |

* Tolerance for peak profile temperature ($T_p$) is defined as a supplier minimum and a user maximum.

## Wave solder profile




## Reference EN 61760-1:2006

| Profile feature | | Standard SnPb solder | Lead (Pb) free solder |
|---|---|---|---|
| Preheat | • Temperature min. ($T_{smin}$) | 100 °C | 100 °C |
| | • Temperature typ. ($T_{styp}$) | 120 °C | 120 °C |
| | • Temperature max. ($T_{smax}$) | 130 °C | 130 °C |
| | • Time ($T_{smin}$ to $T_{smax}$) ($t_s$) | 70 seconds | 70 seconds |
| $\Delta$ preheat to max Temperature | | 150 °C max. | 150 °C max. |
| Peak temperature ($T_p$)* | | 235 °C – 260 °C | 250 °C – 265 °C |
| Time at peak temperature ($t_p$) | | 10 seconds max<br>5 seconds max each wave | 10 seconds max<br>5 seconds max each wave |
| Ramp-down rate | | ~ 2 K/s min<br>~3.5 K/s typ<br>~5 K/s max | ~ 2 K/s min<br>~3.5 K/s typ<br>~5 K/s max |
| Time 25 °C to 25 °C | | 4 minutes | 4 minutes |

## Manual solder

+350 °C (4-5 seconds by soldering iron), generally manual/hand soldering is not recommended.



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