# P6KE SERIES

## List

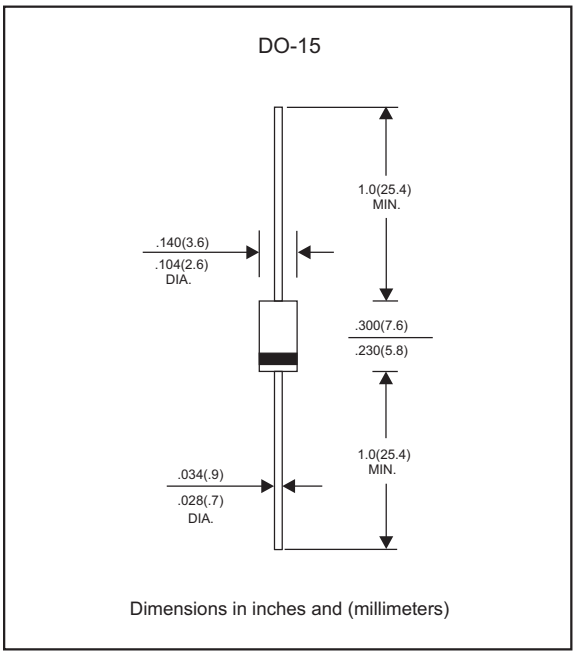
# P6KE SERIES

## 600W Axial Lead Transient Voltage Suppressors - 6.8V-600V

## Features

- Axial lead type devices for through hole design.
- 600W peak pulse power capability with a 10/1000us waveform, repetition rate (duty cycle): 0.01%.
- Excellent clamping capability.
- Low incremental surge resistance.
- Fast response time from 0V to $V_{BR}$, typically less than 1 pS for uni-directional & 5 nS for bi-directional types.
- Ultra high-speed switching.
- Glass passivated chip junction.
- Lead-free parts meet environmental standards of MIL-STD-19500 /228
- Suffix "-H" indicates Halogen free parts, ex. P6KE6.8A-H

## Package outline




## Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, DO-15
- Lead : Axial leads, solderable per MIL-STD-202, Method 208 guaranteed
- Polarity: Color band denotes cathode end
- Mounting Position : Any
- Weight : Approximated 0.40 gram

## Maximum ratings (AT $T_A$=25°C unless otherwise noted)

| PARAMETER | CONDITIONS | Symbol | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Peak power dissipation | with a 10/1000 us waveform, Note 1 & Fig. 1 | $P_{PPM}$ | | | 600 | W |
| Peak pulse current | with a 10/1000 us waveform | $I_{PPM}$ | See table 1 | | | A |
| Steady state power dissipation | at $T_L$=75°C lead length 0.375" (9.5 mm) | $P_{M(AV)}$ | | | 5.0 | W |
| Peak forward surge current | 8.3ms single half sine-wave (JEDEC Method), note 2 | $I_{FSM}$ | | | 100 | A |
| Maximum instantaneours forward voltage | for uni-directional types only, at 50A, see note 3 | $V_F$ | | | 3.5/5.0 | V |
| Operating junction temperature range | | $T_J$ | -55 | | +150 | °C |
| Storage temperature range | | $T_{STG}$ | -55 | | +150 | °C |

Note 1. Non-repetitive current pulse, per Fig. 3 and derated above $T_A$=25°C per Fig. 2
2. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum
3. $V_F$<3.5V. for devices of $V_{BR}$<200V, and $V_F$<5.0V . for devices of $V_{BR}$>201V

## Electrical characteristics (at $T_A$=25°C unless otherwise noted) Table 1

| Part No. (Uni) | Part No. (Bi) | Reverse Stand-off Voltage | Breakdown Voltage @$I_T$ | | Test Current | Maximum Clamping Voltage @$I_{PP}$ | | Maximum Reverse Leakage Current | Marking Code | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_{RWM}$ | $V_{BR\ Min}$ | $V_{BR\ Max}$ | $I_T$ | $V_C$@$I_{PP}$ | | $I_R$@$V_{RWM}$ | Uni | Bi |
| | | Volts | Volts | Volts | mA | Volts | $I_{PP}$(A) | $I_R$(uA) | | |
| P6KE6.8A | P6KE6.8CA | 5.80 | 6.45 | 7.14 | 10 | 10.5 | 57.0 | 1000 | P6KE6.8A | P6KE6.8CA |
| P6KE7.5A | P6KE7.5CA | 6.40 | 7.13 | 7.88 | 10 | 11.3 | 53.0 | 500 | P6KE7.5A | P6KE7.5CA |
| P6KE8.2A | P6KE8.2CA | 7.02 | 7.79 | 8.61 | 10 | 12.1 | 50.0 | 200 | P6KE8.2A | P6KE8.2CA |
| P6KE9.1A | P6KE9.1CA | 7.78 | 8.65 | 9.55 | 1.0 | 13.4 | 45.0 | 50 | P6KE9.1A | P6KE9.1CA |
| P6KE10A | P6KE10CA | 8.55 | 9.50 | 10.5 | 1.0 | 14.5 | 41.0 | 10 | P6KE10A | P6KE10CA |
| P6KE11A | P6KE11CA | 9.40 | 10.5 | 11.6 | 1.0 | 15.6 | 38.0 | 5 | P6KE11A | P6KE11CA |
| P6KE12A | P6KE12CA | 10.2 | 11.4 | 12.6 | 1.0 | 16.7 | 36.0 | 5 | P6KE12A | P6KE12CA |
| P6KE13A | P6KE13CA | 11.1 | 12.4 | 13.7 | 1.0 | 18.2 | 33.0 | 5 | P6KE13A | P6KE13CA |
| P6KE15A | P6KE15CA | 12.8 | 14.3 | 15.8 | 1.0 | 21.2 | 28.0 | 5 | P6KE15A | P6KE15CA |
| P6KE16A | P6KE16CA | 13.6 | 15.2 | 16.8 | 1.0 | 22.5 | 27.0 | 5 | P6KE16A | P6KE16CA |
| P6KE18A | P6KE18CA | 15.3 | 17.1 | 18.9 | 1.0 | 25.5 | 24.0 | 5 | P6KE18A | P6KE18CA |
| P6KE20A | P6KE20CA | 17.1 | 19.0 | 21.0 | 1.0 | 27.7 | 22.0 | 5 | P6KE20A | P6KE20CA |
| P6KE22A | P6KE22CA | 18.8 | 20.9 | 23.1 | 1.0 | 30.6 | 20.0 | 5 | P6KE22A | P6KE22CA |
| P6KE24A | P6KE24CA | 20.5 | 22.8 | 25.2 | 1.0 | 33.2 | 18.0 | 5 | P6KE24A | P6KE24CA |
| P6KE27A | P6KE27CA | 23.1 | 25.7 | 28.4 | 1.0 | 37.5 | 16.0 | 5 | P6KE27A | P6KE27CA |
| P6KE30A | P6KE30CA | 25.6 | 28.5 | 31.5 | 1.0 | 41.4 | 14.4 | 5 | P6KE30A | P6KE30CA |
| P6KE33A | P6KE33CA | 28.2 | 31.4 | 34.7 | 1.0 | 45.7 | 13.2 | 5 | P6KE33A | P6KE33CA |
| P6KE36A | P6KE36CA | 30.8 | 34.2 | 37.8 | 1.0 | 49.9 | 12.0 | 5 | P6KE36A | P6KE36CA |
| P6KE39A | P6KE39CA | 33.3 | 37.1 | 41.0 | 1.0 | 53.9 | 11.2 | 5 | P6KE39A | P6KE39CA |
| P6KE43A | P6KE43CA | 36.8 | 40.9 | 45.2 | 1.0 | 59.3 | 10.1 | 5 | P6KE43A | P6KE43CA |
| P6KE47A | P6KE47CA | 40.2 | 44.7 | 49.4 | 1.0 | 64.8 | 9.3 | 5 | P6KE47A | P6KE47CA |
| P6KE51A | P6KE51CA | 43.6 | 48.5 | 53.6 | 1.0 | 70.1 | 8.6 | 5 | P6KE51A | P6KE51CA |
| P6KE56A | P6KE56CA | 47.8 | 53.2 | 58.8 | 1.0 | 77.0 | 7.8 | 5 | P6KE56A | P6KE56CA |
| P6KE62A | P6KE62CA | 53.0 | 58.9 | 65.1 | 1.0 | 85.0 | 7.1 | 5 | P6KE62A | P6KE62CA |
| P6KE68A | P6KE68CA | 58.1 | 64.6 | 71.4 | 1.0 | 92.0 | 6.5 | 5 | P6KE68A | P6KE68CA |
| P6KE75A | P6KE75CA | 64.1 | 71.3 | 78.8 | 1.0 | 103.0 | 5.8 | 5 | P6KE75A | P6KE75CA |
| P6KE82A | P6KE82CA | 70.1 | 77.9 | 86.1 | 1.0 | 113.0 | 5.3 | 5 | P6KE82A | P6KE82CA |
| P6KE91A | P6KE91CA | 77.8 | 86.5 | 95.5 | 1.0 | 125.0 | 4.8 | 5 | P6KE91A | P6KE91CA |
| P6KE100A | P6KE100CA | 85.5 | 95.0 | 105.0 | 1.0 | 137.0 | 4.4 | 5 | P6KE100A | P6KE100CA |
| P6KE110A | P6KE110CA | 94.0 | 105.0 | 116.0 | 1.0 | 152.0 | 4.0 | 5 | P6KE110A | P6KE110CA |
| P6KE120A | P6KE120CA | 102.0 | 114.0 | 126.0 | 1.0 | 165.0 | 3.6 | 5 | P6KE120A | P6KE120CA |
| P6KE130A | P6KE130CA | 111.0 | 124.0 | 137.0 | 1.0 | 179.0 | 3.3 | 5 | P6KE130A | P6KE130CA |
| P6KE150A | P6KE150CA | 128.0 | 143.0 | 158.0 | 1.0 | 207.0 | 2.9 | 5 | P6KE150A | P6KE150CA |
| P6KE160A | P6KE160CA | 136.0 | 152.0 | 168.0 | 1.0 | 219.0 | 2.7 | 5 | P6KE160A | P6KE160CA |
| P6KE170A | P6KE170CA | 145.0 | 162.0 | 179.0 | 1.0 | 234.0 | 2.6 | 5 | P6KE170A | P6KE170CA |
| P6KE180A | P6KE180CA | 154.0 | 171.0 | 189.0 | 1.0 | 246.0 | 2.4 | 5 | P6KE180A | P6KE180CA |
| P6KE200A | P6KE200CA | 171.0 | 190.0 | 210.0 | 1.0 | 274.0 | 2.2 | 5 | P6KE200A | P6KE200CA |
| P6KE220A | P6KE220CA | 185.0 | 209.0 | 231.0 | 1.0 | 328.0 | 1.83 | 5 | P6KE220A | P6KE220CA |
| P6KE250A | P6KE250CA | 214.0 | 237.0 | 263.0 | 1.0 | 344.0 | 1.75 | 5 | P6KE250A | P6KE250CA |
| P6KE300A | P6KE300CA | 256.0 | 285.0 | 315.0 | 1.0 | 414.0 | 1.45 | 5 | P6KE300A | P6KE300CA |
| P6KE350A | P6KE350CA | 300.0 | 332.0 | 368.0 | 1.0 | 482.0 | 1.25 | 5 | P6KE350A | P6KE350CA |
| P6KE400A | P6KE400CA | 342.0 | 380.0 | 420.0 | 1.0 | 548.0 | 1.10 | 5 | P6KE400A | P6KE400CA |
| P6KE440A | P6KE440CA | 376.0 | 418.0 | 462.0 | 1.0 | 602.0 | 1.00 | 5 | P6KE440A | P6KE440CA |
| P6KE480A | P6KE480CA | 408.0 | 456.0 | 504.0 | 1.0 | 658.0 | 0.90 | 5 | P6KE480A | P6KE480CA |
| P6KE510A | P6KE510CA | 434.0 | 485.0 | 536.0 | 1.0 | 698.0 | 0.85 | 5 | P6KE510A | P6KE510CA |
| P6KE520A | P6KE520CA | 442.0 | 494.0 | 546.0 | 1.0 | 718.0 | 0.83 | 5 | P6KE520A | P6KE520CA |
| P6KE530A | P6KE530CA | 451.0 | 503.5 | 556.5 | 1.0 | 725.0 | 0.82 | 5 | P6KE530A | P6KE530CA |
| P6KE540A | P6KE540CA | 459.0 | 513.0 | 567.0 | 1.0 | 740.0 | 0.81 | 5 | P6KE540A | P6KE540CA |
| P6KE550A | P6KE550CA | 495.0 | 522.5 | 577.5 | 1.0 | 760.0 | 0.78 | 5 | P6KE550A | P6KE550CA |
| P6KE600A | P6KE600CA | 510.0 | 570.0 | 630.0 | 1.0 | 828.0 | 0.72 | 5 | P6KE600A | P6KE600CA |

Note 1. $V_{BR}$ measured after $I_T$ applied for 300us, $I_T$=square wave pulse or equivalent
2. Surge current waveform per Fig. 3 and derated per Fig. 2
3. For bi-directional types having $V_{RWM}$ of 10 volts and less, the $I_R$ limit is doubled
4. Suffix 'C' denotes bi-directional devices. Suffix 'A' denotes 5% tolerance devices, no suffix denotes 10% tolerance devices.
5. All terms and symbols are consistent with ANS/IEEE C62.35

# Rating and characteristic curves (P6KE SERIES)

Fig.1 - PEALK PULSE POWER RATING CURVE

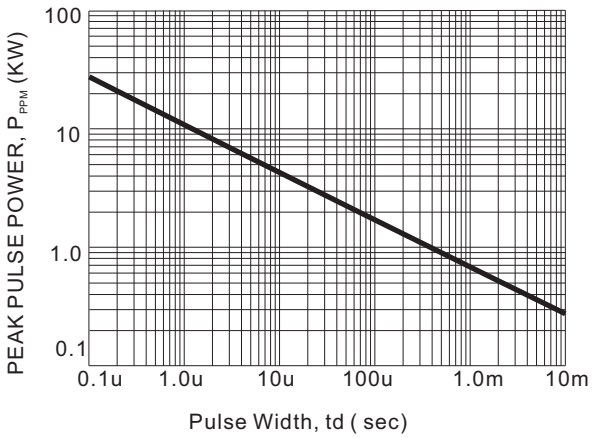



Fig.2 - PULSE DERATING CURVE

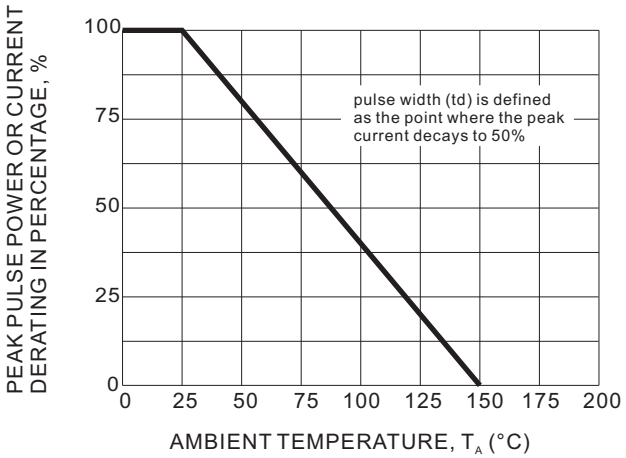



Fig.3 - PULSE WAVEFORM

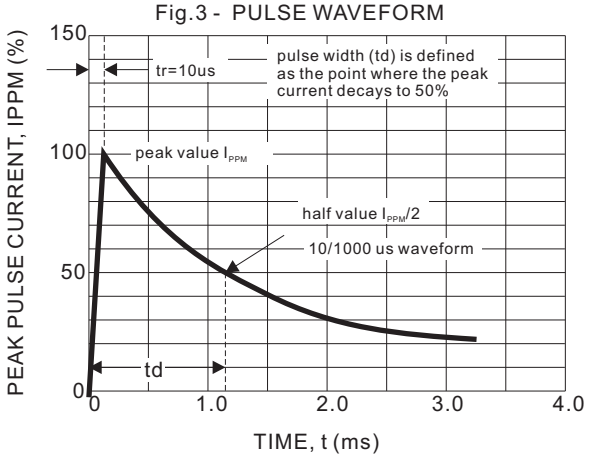



Fig.4 - TYPICAL JUNCTION CAPACITANCE

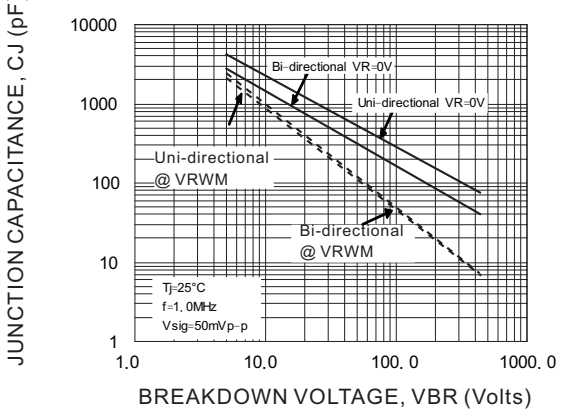



Fig.5 - STEADY STATE POWER DERATING CURVE

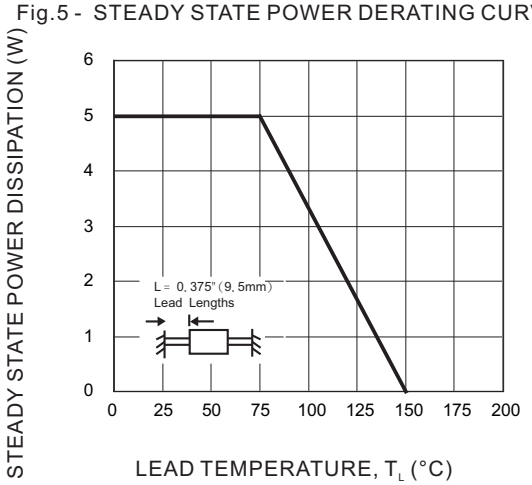
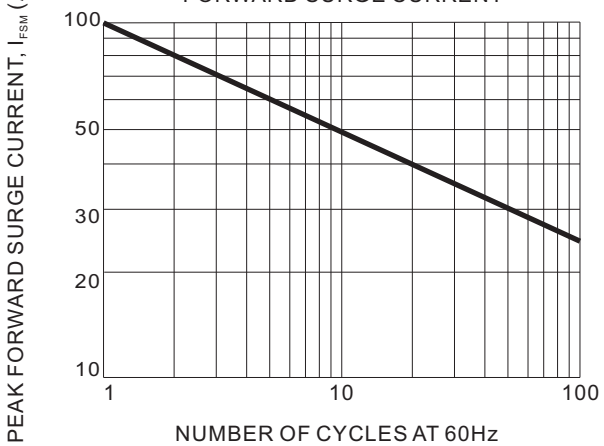
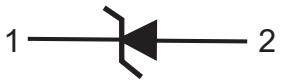



Fig.6 - MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

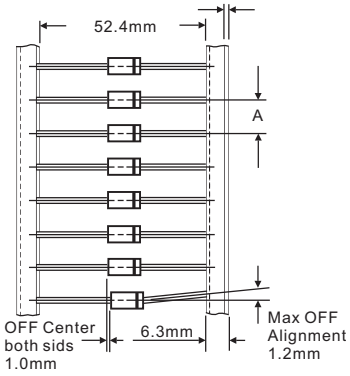


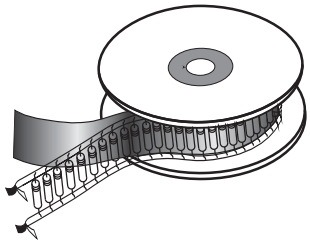
# P6KE SERIES

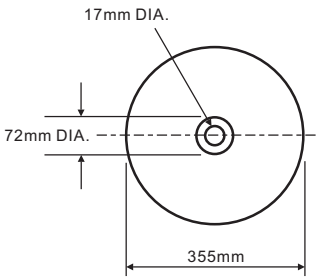
## Pinning information

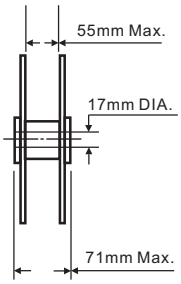
| Pin | Simplified outline | Symbol |
|---|---|---|
| Uni-Directional<br>Pin1 cathode<br>Pin2 anode |  |  |
| Bi-Directional |  |  |

## Taping & bulk specifications for AXIAL devices






REEL PACKING

| DEVICE CASE TYPE | Q'TY 1 (PCS / REEL) | COMPONENT SPACING "A" in FIG. A | CARTON SIZE (m/m) | Q'TY 2 (PCS / CARTON) | APPROX. CROSS WEIGHT(kg) |
|---|---|---|---|---|---|
| DO-15 | 4,000 | 5 mm | 360 * 340 * 370 | 16,000 | 9.9 |

AMMO PACKING

| DEVICE CASE TYPE | Q'TY 1 (PCS / BOX) | INNER BOX SIZE (m/m) | CARTON SIZE (m/m) | Q'TY 2 (PCS / CARTON) | APPROX. CROSS WEIGHT(kg) |
|---|---|---|---|---|---|
| DO-15 | 2,000<br>3,000 | 260 * 83 * 160<br>260 * 83 * 160 | 440 * 270 * 340<br>440 * 270 * 340 | 20,000<br>30,000 | 11.0<br>14.3 |

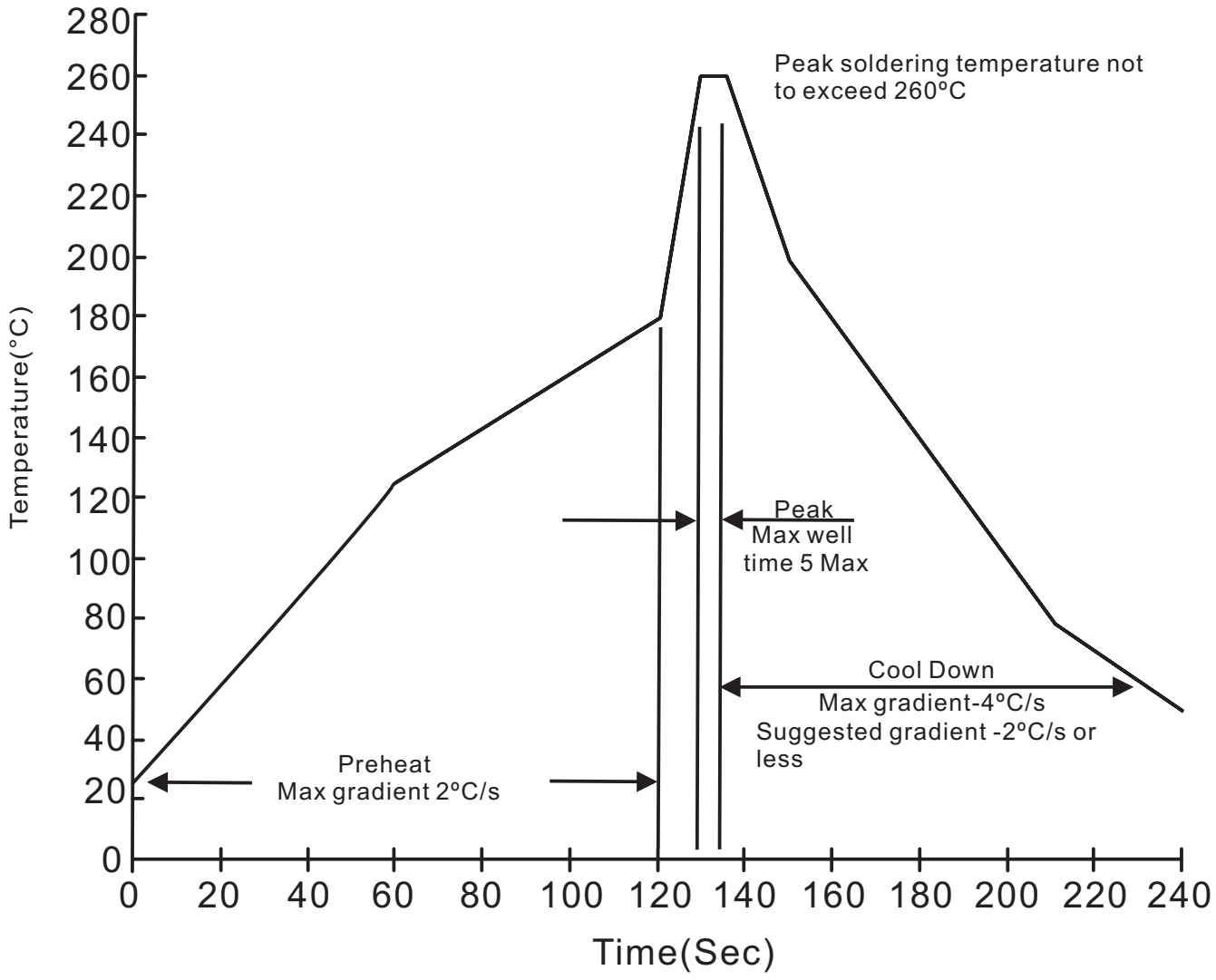
# P6KE SERIES

BULK PACKING

| DEVICE CASE TYPE | Q'TY 1 (PCS / BOX) | INNER BOX SIZE (m/m) | CARTON SIZE (m/m) | Q'TY 2 (PCS / CARTON) | APPROX. CROSS WEIGHT(kg) |
|---|---|---|---|---|---|
| DO-15 | 500 | 194 * 84 * 20 | 465 * 220 * 260 | 25,000 | 12.9 |

**Suggested thermal profiles for soldering processes**

1.Lead free temperature profile wave-soldering



# P6KE SERIES

## High reliability test capabilities

| Item Test | Conditions | Reference |
|---|---|---|
| 1. Solder Resistance | at 260±5°C for 10±2sec.<br>immerse body into solder 1/16"±1/32" | MIL-STD-750D<br>METHOD-2031 |
| 2. Solderability | at 245±5°C for 5 sec. | MIL-STD-202F<br>METHOD-208 |
| 3. Pull Test | 1.0kg in axial lead direction for 10 sec. | MIL-STD-750D<br>METHOD-2036 |
| 4. Bend Lead | 1.0kg weight applied to each lead bending<br>arc 90°±5° for 3 times. | MIL-STD-750D<br>METHOD-2036 |
| 5. High Temperature Reverse Bias | $V_{BR}$=$V_{BR}$ $N_{OM}$* 80% at $T_J$=150°C for 168 hrs. | MIL-STD-750D<br>METHOD-1038 |
| 6. Pressure Cooker | 15$P_{SIG}$ at $T_A$=121°C for 4 hrs. | JESD22-A102 |
| 7. Temperature Cycling | -55°C to +125°C dwelled for 30 min.<br>and transferred for 5min. total 10 cycles. | MIL-STD-750D<br>METHOD-1051 |
| 8. Humidity | at $T_A$=85°C, RH=85% for 1000hrs. | MIL-STD-750D<br>METHOD-1021 |
| 9. High Temperature Storage Life | at 175°C for 1000 hrs. | MIL-STD-750D<br>METHOD-1031 |

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