

P-Channel Enhancement Mode Power MOSFET

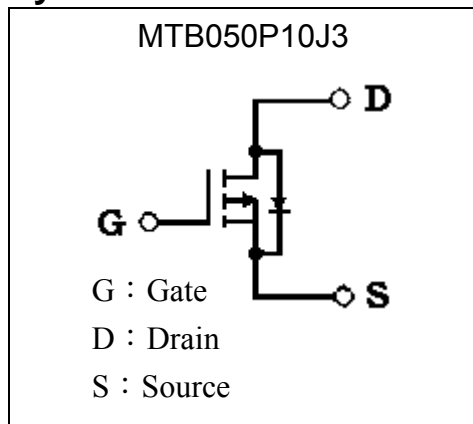
MTB050P10J3

| | |
|--|--------------------|
| BV_{DSS} | -100V |
| I_D@V_{GS}=-10V, T_C=25°C | -24A |
| I_D@V_{GS}=-10V, T_C=100°C | -17A |
| I_D@V_{GS}=-10V, T_A=25°C | -4.1A |
| I_D@V_{GS}=-10V, T_A=70°C | -3.3A |
| R_{DS(ON)}@V_{GS}=-10V, I_D=-15A | 45 mΩ (typ) |
| R_{DS(ON)}@V_{GS}=-4.5V, I_D=-12A | 51 mΩ (typ) |

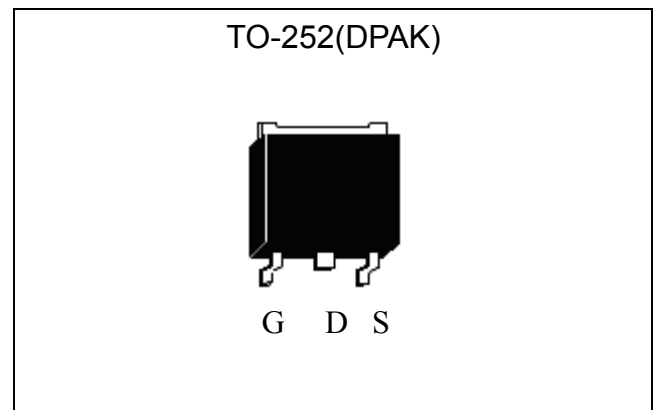
Features

- Single Drive Requirement
- Low On-resistance
- Fast switching Characteristic
- Pb-free lead plating and halogen-free package

Symbol

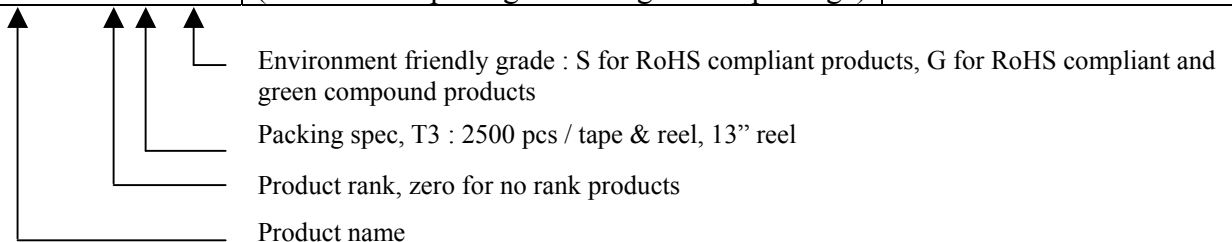


Outline



Ordering Information

| Device | Package | Shipping |
|--------------------|---|------------------------|
| MTB050P10J3-0-T3-G | TO-252 (Pb-free lead plating and halogen-free package) | 2500 pcs / Tape & Reel |



**Absolute Maximum Ratings** (Ta=25°C)

| Parameter | | Symbol | Limits | Unit |
|---|-------------------------------|-----------------------------------|----------|------|
| Drain-Source Voltage | | V _{DS} | -100 | V |
| Gate-Source Voltage | | V _{GS} | ±20 | |
| Continuous Drain Current @V _{GS} =-10V, T _C =25°C (Note1) | | I _D | -24 | A |
| Continuous Drain Current @V _{GS} =-10V, T _C =100°C (Note1) | | | -17 | |
| Continuous Drain Current @V _{GS} =-10V, T _A =25°C (Note4) | | | -4.1 | |
| Continuous Drain Current @V _{GS} =-10V, T _A =70°C (Note4) | | | -3.3 | |
| Pulsed Drain Current (Note3) | | I _{DM} | -96 | |
| Power Dissipation | T _C =25°C (Note1) | P _D | 75 | W |
| | T _C =100°C (Note1) | | 37.5 | |
| | T _A =25°C (Note2) | P _D SM | 2 | |
| | T _A =70°C (Note2) | | 1.3 | |
| Single Pulse Avalanche Energy @ L=1mH, I _{AS} =-24A, V _{DD} =-50V | | E _{AS} | 288 | mJ |
| Single Pulse Avalanche Current | | I _{AS} | -24 | A |
| Operating Junction and Storage Temperature | | T _j , T _{stg} | -55~+175 | °C |

Thermal Data

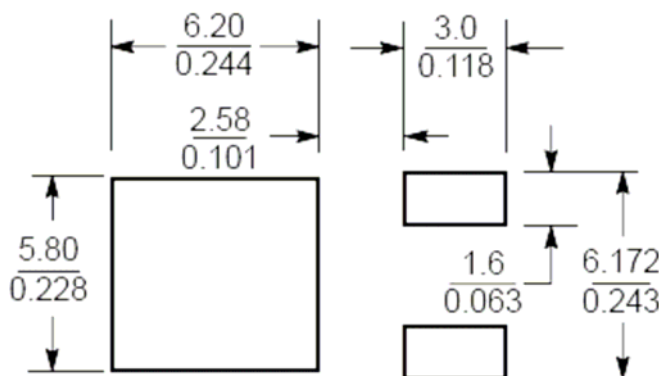
| Parameter | Symbol | Value | Unit |
|--|---------------------|-------|------|
| Thermal Resistance, Junction-to-case, max | R _{th,j-c} | 2 | °C/W |
| Thermal Resistance, Junction-to-ambient, max (Note2) | R _{th,j-a} | 62.5 | |
| Thermal Resistance, Junction-to-ambient, max (Note4) | | 90 | |

- Note : 1. The power dissipation P_D is based on T_{J(MAX)}=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
2. The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_DSM is based on R_{θJA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
3. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=175°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.
4. When mounted on the minimum pad size recommended (PCB mount), t≤10s.

Characteristics (Tj=25°C, unless otherwise specified)

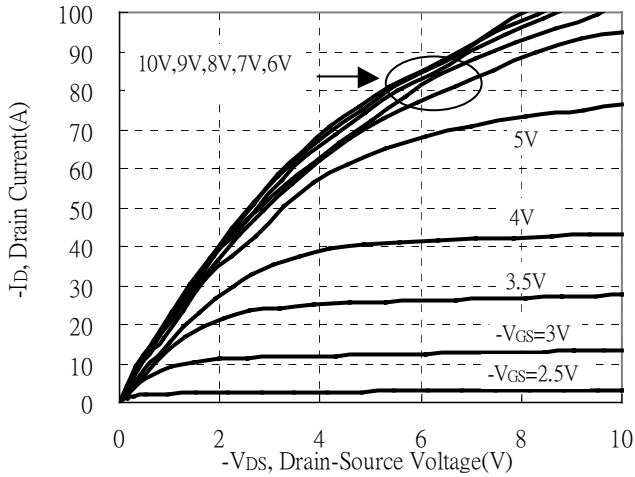
| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|-------------------------------------|------|-------|------|------|---|
| Static | | | | | |
| BV _{DSS} | -100 | - | - | V | V _{GS} =0V, I _D =-250μA |
| ΔBV _{DSS} /ΔT _j | - | -0.08 | - | V/°C | Reference to 25°C, I _D =-250μA |
| V _{GS(th)} | -1.0 | - | -2.5 | V | V _{DS} = V _{GS} , I _D =-250μA |
| G _{FS} | - | 32.8 | - | S | V _{DS} = -5V, I _D =-20A |
| I _{GSS} | - | - | ±100 | nA | V _{GS} =±20V |
| I _{DSS} | - | - | -1 | μA | V _{DS} = -80V, V _{GS} = 0V |
| I _{DSS} | - | - | -25 | | V _{DS} = -80V, V _{GS} = 0V, T _j =70°C |
| *R _{DS(ON)} | - | 45 | 60 | mΩ | V _{GS} = -10V, I _D =-15A |
| *R _{DS(ON)} | - | 51 | 72 | | V _{GS} = -4.5V, I _D =-12A |
| Dynamic | | | | | |
| *Q _g | - | 51 | - | nC | V _{DS} =-80V, I _D =-15A, V _{GS} =-10V |
| *Q _{gs} | - | 6.5 | - | | |
| *Q _{gd} | - | 14.3 | - | | |
| *t _{d(ON)} | - | 13 | - | ns | V _{DS} =-50V, I _D =-15A, V _{GS} =-10V, R _G =2.7Ω |
| *t _r | - | 21.6 | - | | |
| *t _{d(OFF)} | - | 66.2 | - | | |
| *t _f | - | 15.2 | - | | |
| C _{iss} | - | 2421 | - | pF | V _{GS} =0V, V _{DS} =-25V, f=1MHz |
| C _{oss} | - | 211 | - | | |
| C _{rss} | - | 93 | - | | |
| R _g | - | 3.6 | - | | |
| Source-Drain Diode | | | | | |
| *I _S | - | - | -24 | A | |
| *V _{SD} | - | -0.83 | -1.2 | V | I _S =-15A, V _{GS} =0V |
| *t _{rr} | - | 25 | - | ns | I _F =-15A, V _{GS} =0, dI _F /dt=-100A/μs |
| *Q _{rr} | - | 33 | - | nC | |

*Pulse Test : Pulse Width ≤300μs, Duty Cycles≤2%

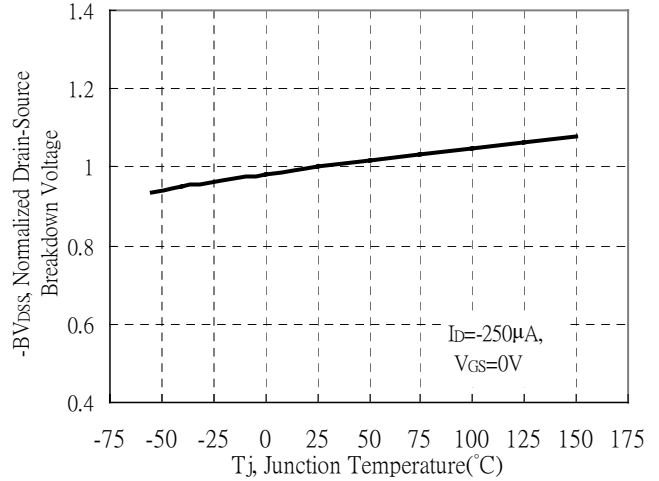
Recommended soldering footprint

 Unit ($\frac{\text{mm}}{\text{inch}}$)

Typical Characteristics

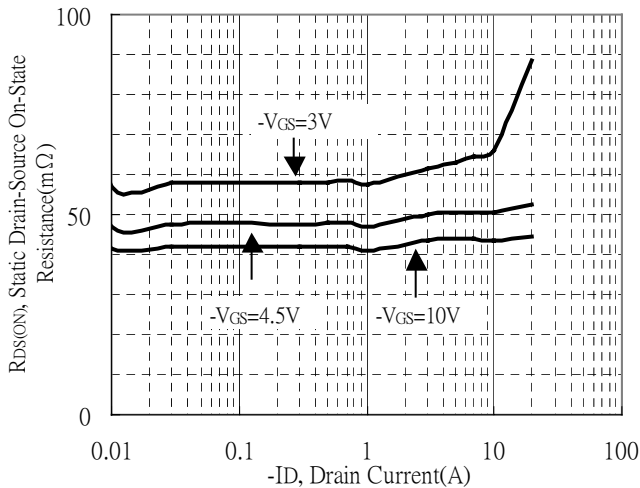
Typical Output Characteristics



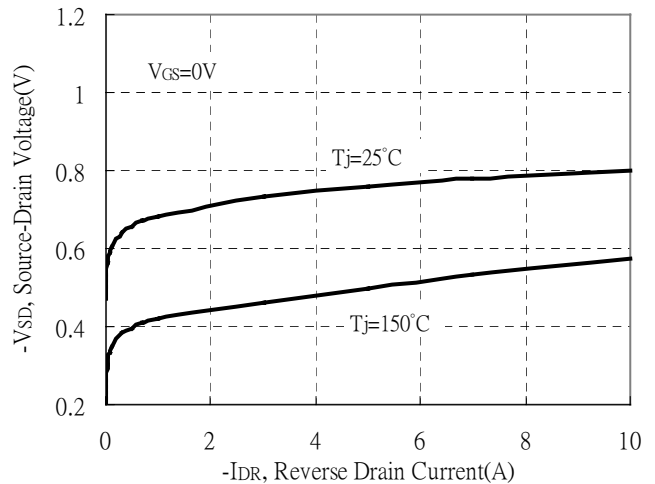
Brekdown Voltage vs Ambient Temperature



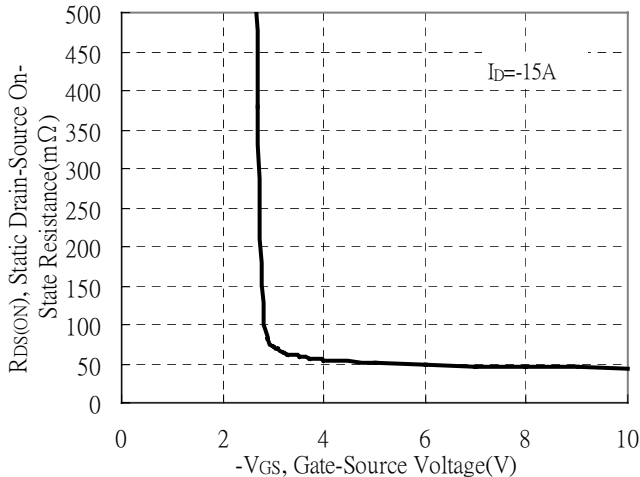
Static Drain-Source On-State resistance vs Drain Current



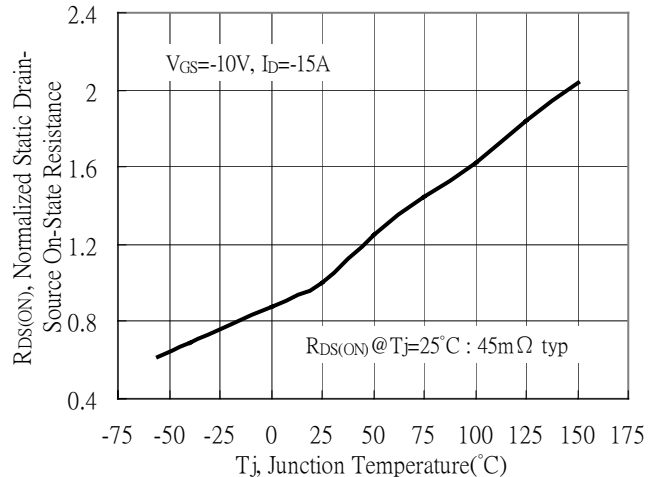
Reverse Drain Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

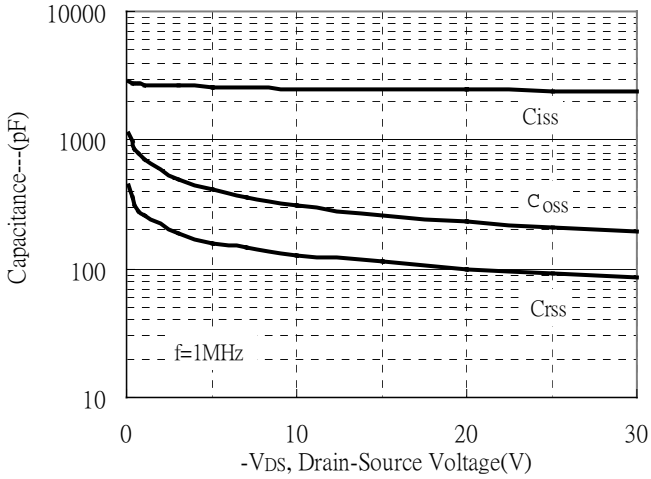


Drain-Source On-State Resistance vs Junction Temperature

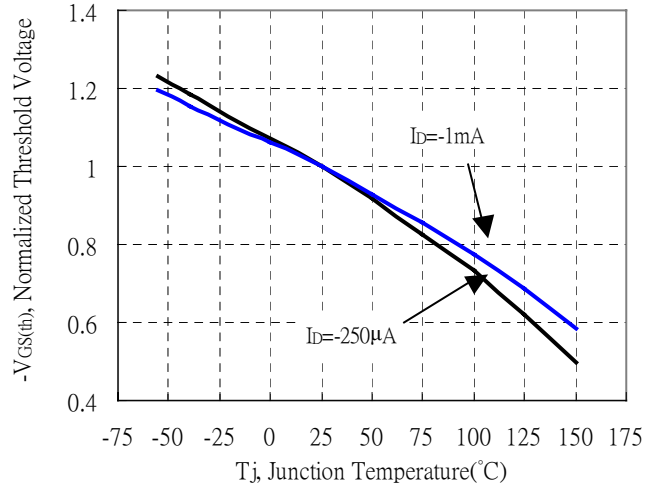


Typical Characteristics(Cont.)

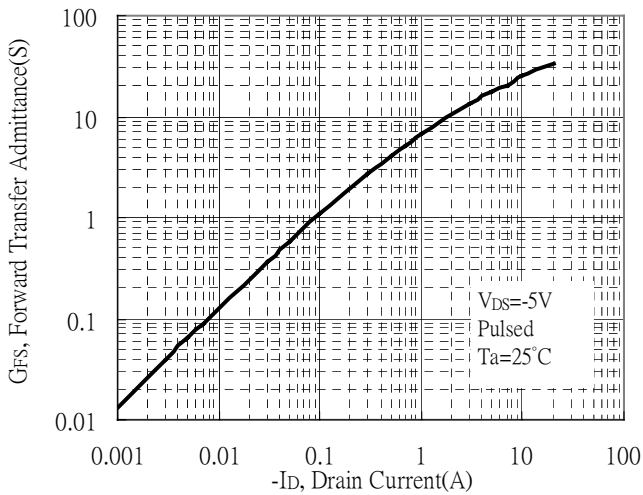
Capacitance vs Drain-to-Source Voltage



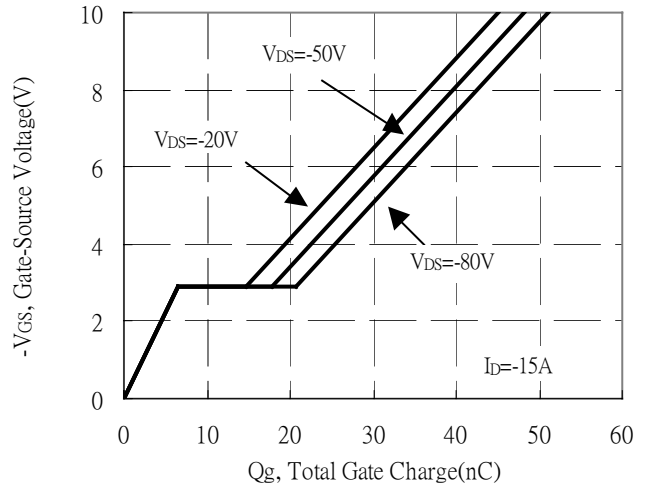
Threshold Voltage vs Junction Temperature



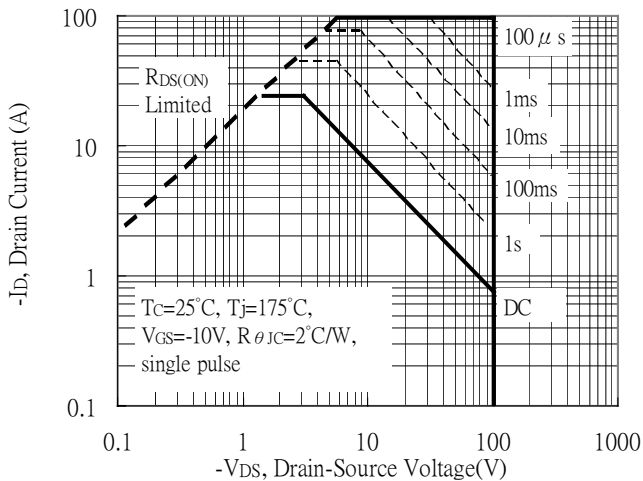
Forward Transfer Admittance vs Drain Current



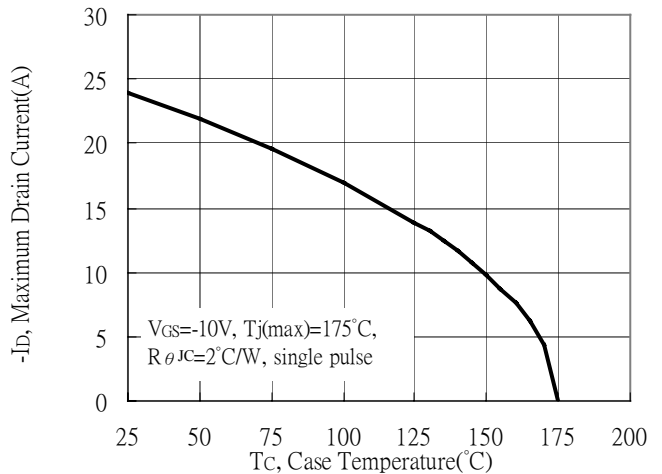
Gate Charge Characteristics



Maximum Safe Operating Area



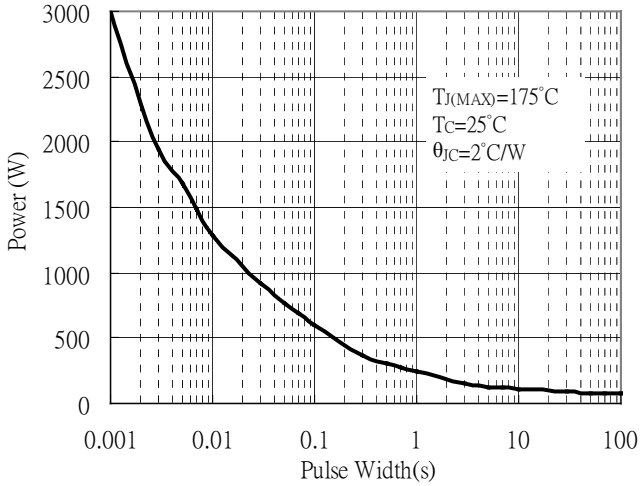
Maximum Drain Current vs Case Temperature



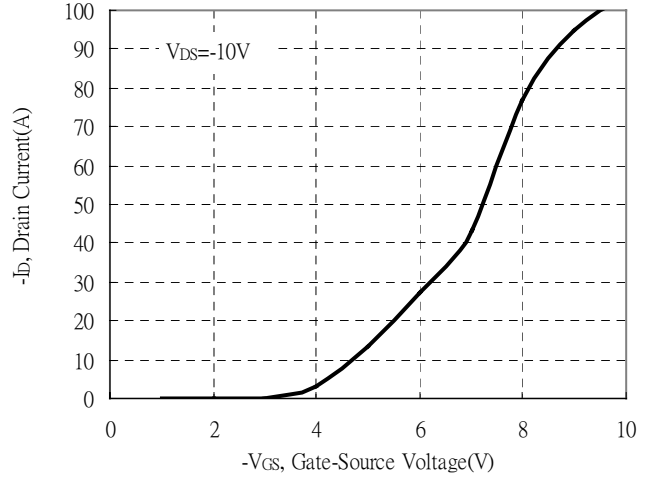


Typical Characteristics(Cont.)

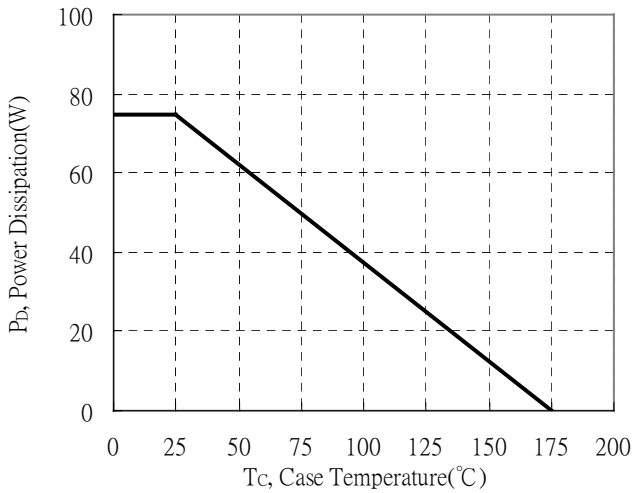
Single Pulse Power Rating, Junction to Case



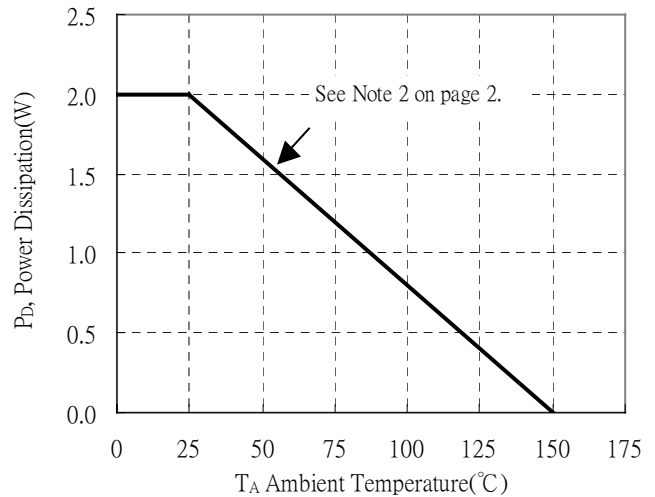
Typical Transfer Characteristics



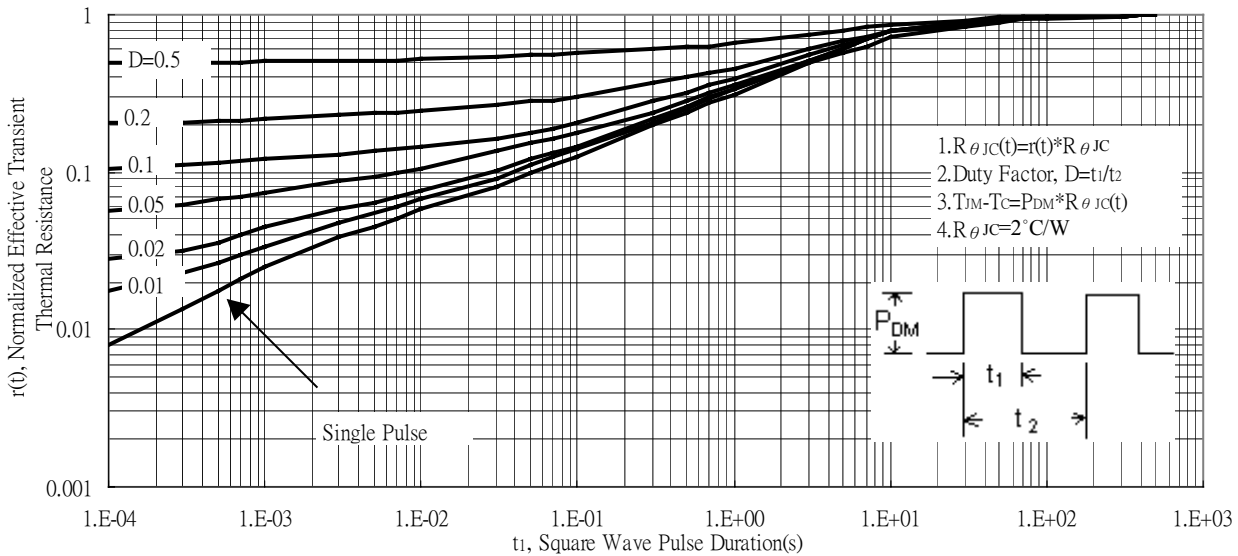
Power Derating Curve



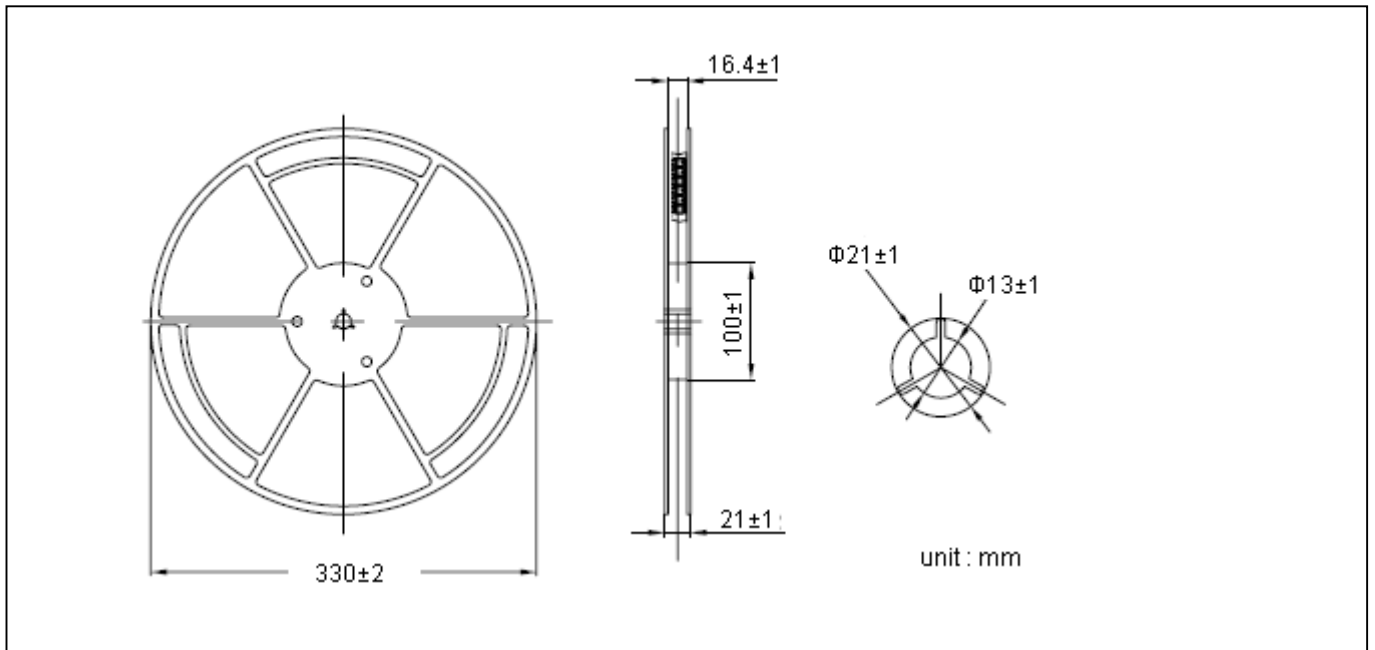
Power Derating Curve



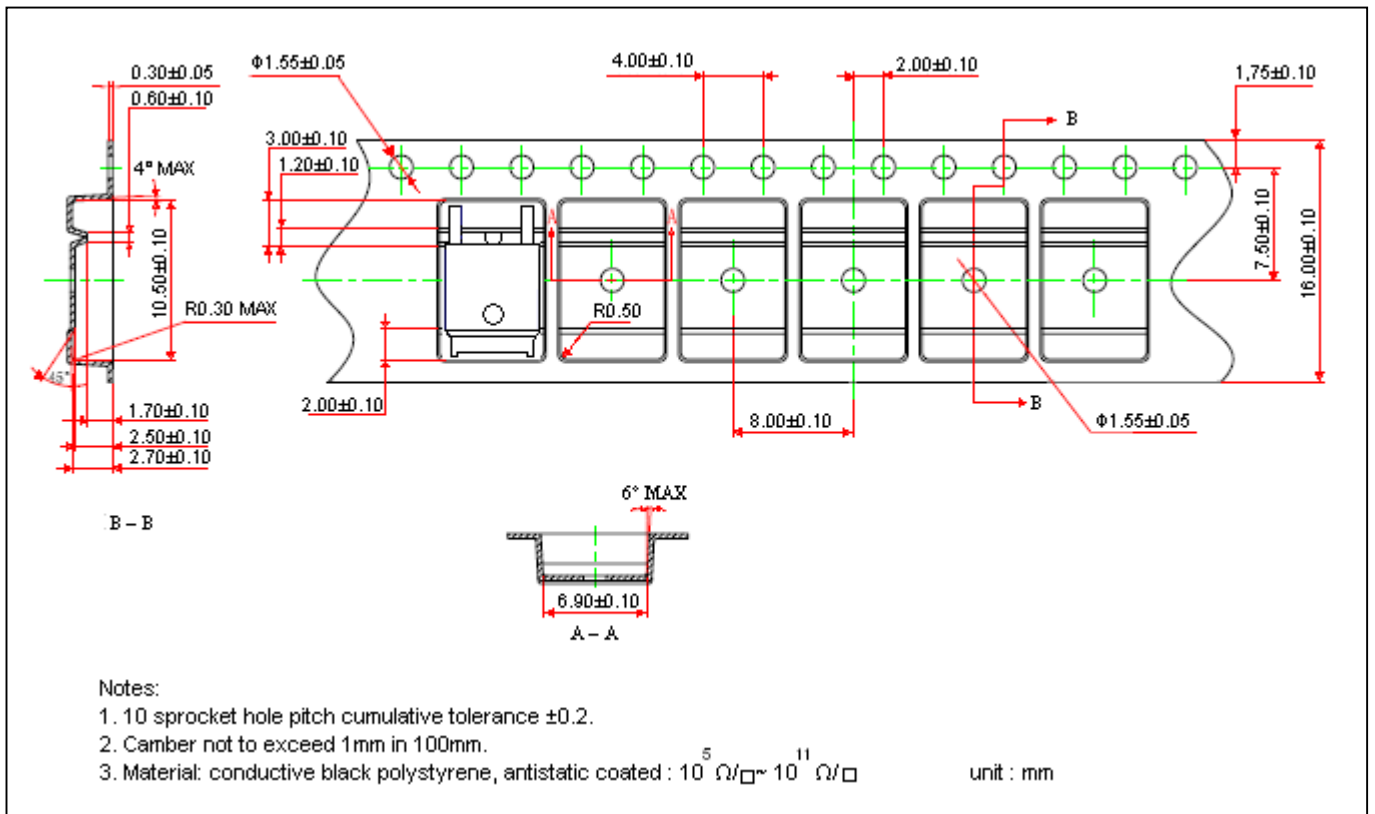
Transient Thermal Response Curves



Reel Dimension



Carrier Tape Dimension



Recommended wave soldering condition

| | | |
|-----------------|------------------|-----------------|
| Product | Peak Temperature | Soldering Time |
| Pb-free devices | 260 +0/-5 °C | 5 +1/-1 seconds |

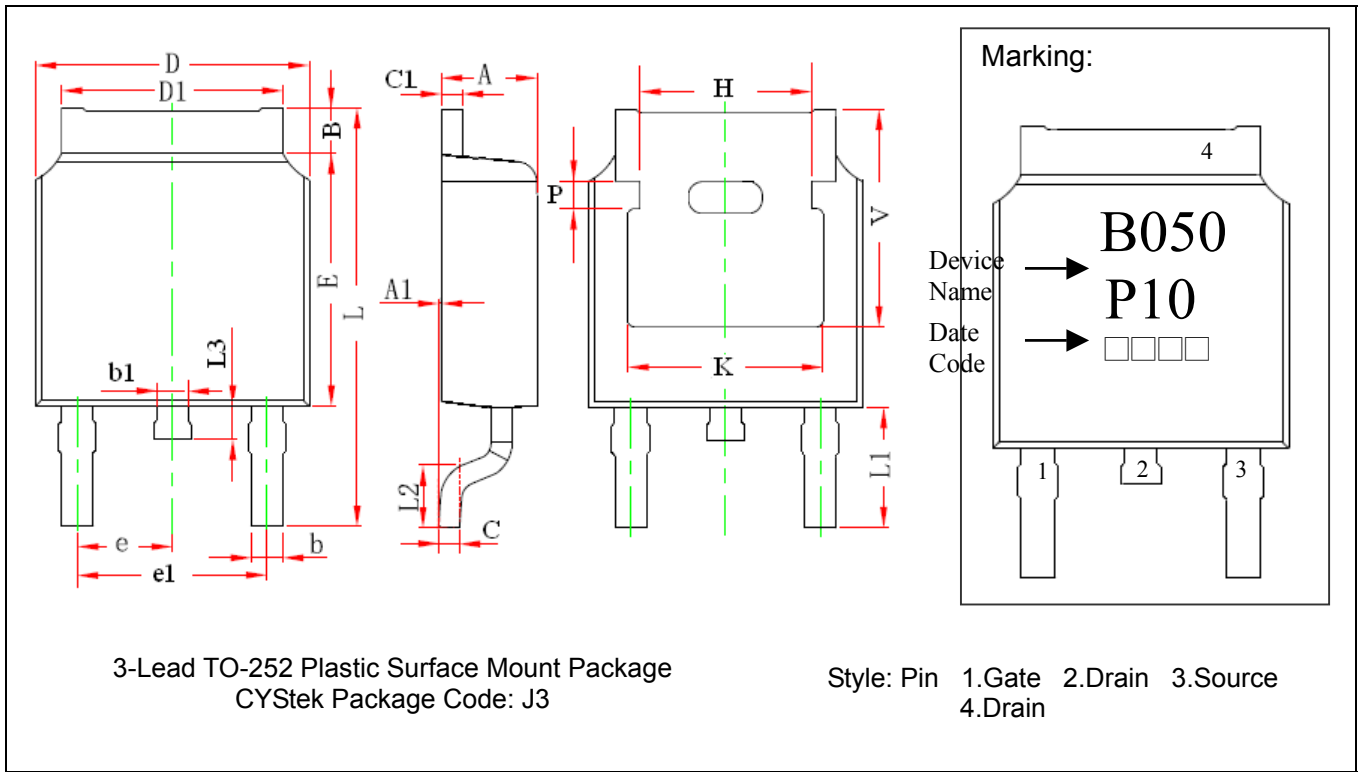
Recommended temperature profile for IR reflow



| Profile feature | Sn-Pb eutectic Assembly | Pb-free Assembly |
|---|-------------------------|------------------|
| Average ramp-up rate (T _{smax} to T _p) | 3°C/second max. | 3°C/second max. |
| Preheat | | |
| -Temperature Min(T _{s min}) | 100°C | 150°C |
| -Temperature Max(T _{s max}) | 150°C | 200°C |
| -Time(t _{s min} to t _{s max}) | 60-120 seconds | 60-180 seconds |
| Time maintained above: | | |
| -Temperature (T _L) | 183°C | 217°C |
| - Time (t _L) | 60-150 seconds | 60-150 seconds |
| Peak Temperature(T _P) | 240 +0/-5 °C | 260 +0/-5 °C |
| Time within 5°C of actual peak temperature(tp) | 10-30 seconds | 20-40 seconds |
| Ramp down rate | 6°C/second max. | 6°C/second max. |
| Time 25 °C to peak temperature | 6 minutes max. | 8 minutes max. |

Note : All temperatures refer to topside of the package, measured on the package body surface.

TO-252 Dimension



| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|-----|--------|-------|-------------|-------|-----|--------|-------|-------------|--------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.087 | 0.094 | 2.200 | 2.400 | e | 0.086 | 0.094 | 2.186 | 2.386 |
| A1 | 0.000 | 0.005 | 0.000 | 0.127 | e1 | 0.172 | 0.188 | 4.372 | 4.772 |
| B | 0.039 | 0.048 | 0.990 | 1.210 | H | 0.163 | REF | 4.140 | REF |
| b | 0.026 | 0.034 | 0.660 | 0.860 | K | 0.190 | REF | 4.830 | REF |
| b1 | 0.026 | 0.034 | 0.660 | 0.860 | L | 0.386 | 0.409 | 9.800 | 10.400 |
| C | 0.018 | 0.023 | 0.460 | 0.580 | L1 | 0.114 | REF | 2.900 | REF |
| C1 | 0.018 | 0.023 | 0.460 | 0.580 | L2 | 0.055 | 0.067 | 1.400 | 1.700 |
| D | 0.256 | 0.264 | 6.500 | 6.700 | L3 | 0.024 | 0.039 | 0.600 | 1.000 |
| D1 | 0.201 | 0.215 | 5.100 | 5.460 | P | 0.026 | REF | 0.650 | REF |
| E | 0.236 | 0.244 | 6.000 | 6.200 | V | 0.211 | REF | 5.350 | REF |

Notes: 1.Controlling dimension: millimeters.
 2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead : Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

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