

N -Channel Enhancement Mode Power MOSFET

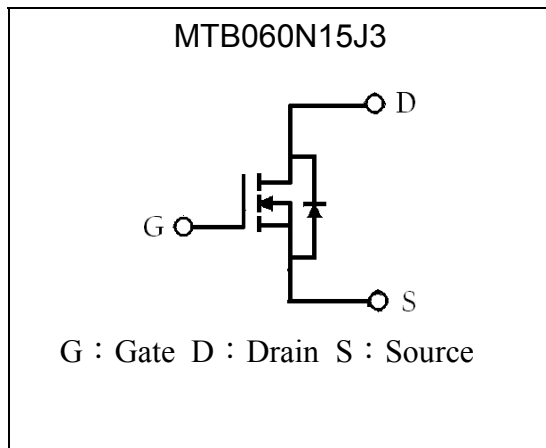
MTB060N15J3

| | |
|--|-------------------|
| BV_{DSS} | 150V |
| I_D @ V_{GS}=10V | 16A |
| R_{DS(ON)}@ V_{GS}=10V, I_D=4A | 59mΩ (typ) |
| R_{DS(ON)}@ V_{GS}=4.5V, I_D=2A | 60mΩ (typ) |

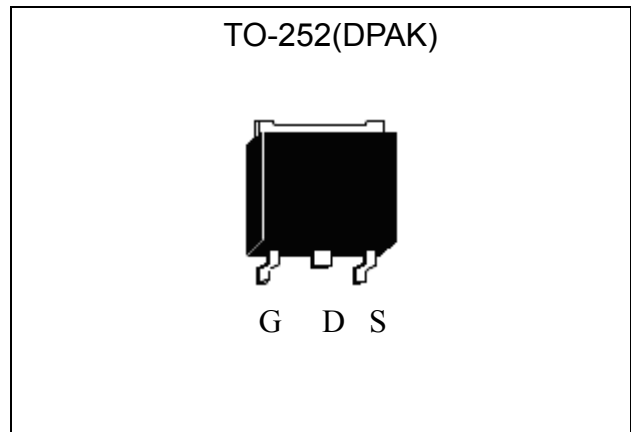
Features

- Low Gate Charge
- Simple Drive Requirement
- Pb-free lead plating and halogen-free package

Equivalent Circuit

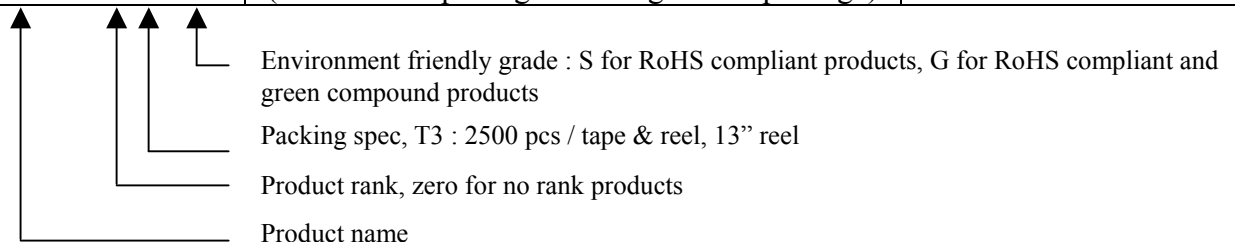


Outline



Ordering Information

| Device | Package | Shipping |
|--------------------|---|------------------------|
| MTB060N15J3-0-T3-G | TO-252 (Pb-free lead plating and halogen-free package) | 2500 pcs / Tape & Reel |





Absolute Maximum Ratings (T_C=25°C, unless otherwise noted)

| Parameter | Symbol | Limits | Unit | |
|---|-----------------------------------|----------|------|----|
| Drain-Source Voltage | V _{DS} | 150 | V | |
| Gate-Source Voltage | V _{GS} | ±20 | | |
| Continuous Drain Current @ T _C =25°C, V _{GS} =10V | I _D | 16 | A | |
| Continuous Drain Current @ T _C =100°C, V _{GS} =10V | | 11.3 | | |
| Continuous Drain Current @ T _A =25°C, V _{GS} =10V *2 | I _{DSM} | 3.8 | | |
| Continuous Drain Current @ T _A =100°C, V _{GS} =10V *2 | | 2.4 | | |
| Continuous Drain Current @ T _A =25°C, V _{GS} =10V *3 | | 3.1 | | |
| Continuous Drain Current @ T _A =100°C, V _{GS} =10V *3 | | 2.0 | | |
| Pulsed Drain Current *1 | I _{DM} | 48 | | |
| Avalanche Current | I _{AS} | 9.8 | | |
| Avalanche Energy @ L=12mH, I _D =9.8A, R _G =25 Ω | E _{AS} | 576 | mJ | |
| Total Power Dissipation @T _C =25°C | P _D | 50 | W | |
| Total Power Dissipation @T _C =100°C | | 25 | | |
| Total Power Dissipation @T _A =25°C *2 | P _D SM | 2.5 | | |
| Total Power Dissipation @T _A =100°C *2 | | 1.0 | | |
| Total Power Dissipation @T _A =25°C *3 | | 1.7 | | |
| Total Power Dissipation @T _A =100°C *3 | | 0.7 | | |
| Operating Junction and Storage Temperature Range | T _j , T _{stg} | -55~+175 | | °C |

Thermal Data

| Parameter | Symbol | Value | Unit |
|---|---------------------|-------|------|
| Thermal Resistance, Junction-to-case, max | R _{th,j-c} | 3 | °C/W |
| Thermal Resistance, Junction-to-ambient, max *2 | R _{th,j-a} | 50 | |
| Thermal Resistance, Junction-to-ambient, max *3 | | 75 | |

- Note :
- *1. Pulse width limited by maximum junction temperature
 - *2. When the device is mounted on 1 in² FR-4 board with 2 oz. copper.
 - *3. When the device is on the minimum pad size recommended.
 - *4. 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.
 - *5. 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, and the maximum temperature of 175 °C may be used if the PCB allows it.

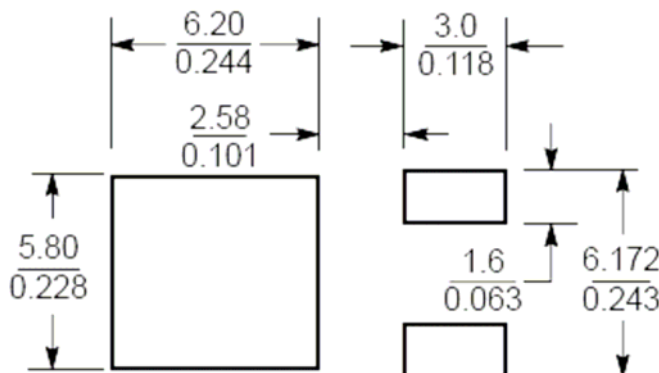
Characteristics (T_C=25°C, unless otherwise specified)

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|-------------------------------------|------|------|------|------|--|
| Static | | | | | |
| BV _{DSS} | 150 | - | - | V | V _{GS} =0V, I _D =250μA |
| ΔBV _{DSS} /ΔT _j | - | 0.15 | - | V/°C | Reference to 25°C, I _D =250μA |
| V _{GS(th)} | 1.0 | 1.4 | 2.5 | V | V _{DS} =V _{GS} , I _D =250μA |
| G _{FS} *1 | - | 21 | - | S | V _{DS} =10V, I _D =4A |
| I _{GSS} | - | - | ±100 | nA | V _{GS} =±20V, V _{DS} =0V |

| | | | | | |
|---------------------------|---|------|-----|------------------|---|
| IDSS | - | - | 1 | μA | $V_{\text{DS}}=150\text{V}, V_{\text{GS}}=0\text{V}$ |
| | - | - | 25 | | $V_{\text{DS}}=150\text{V}, V_{\text{GS}}=0, T_{\text{j}}=55^{\circ}\text{C}$ |
| RDS(ON) *1 | - | 59 | 75 | $\text{m}\Omega$ | $V_{\text{GS}}=10\text{V}, I_{\text{D}}=4\text{A}$ |
| | - | 60 | 80 | | $V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=2\text{A}$ |
| Dynamic | | | | | |
| Qg *1, 2 | - | 28 | - | nC | $I_{\text{D}}=16\text{A}, V_{\text{DS}}=120\text{V}, V_{\text{GS}}=4.5\text{V}$ |
| Qgs *1, 2 | - | 5.1 | - | | |
| Qgd *1, 2 | - | 10.7 | - | | |
| td(ON) *1, 2 | - | 12 | - | ns | $V_{\text{DS}}=75\text{V}, I_{\text{D}}=16\text{A}, V_{\text{GS}}=10\text{V}, R_{\text{G}}=6\Omega$ |
| tr *1, 2 | - | 15 | - | | |
| td(OFF) *1, 2 | - | 70 | - | | |
| tf *1, 2 | - | 100 | - | | |
| Ciss | - | 1957 | - | pF | $V_{\text{GS}}=0\text{V}, V_{\text{DS}}=30\text{V}, f=1\text{MHz}$ |
| Coss | - | 111 | - | | |
| Crss | - | 53 | - | | |
| Rg | - | 1.3 | - | Ω | $V_{\text{GS}}=15\text{mV}, V_{\text{DS}}=0, f=1\text{MHz}$ |
| Source-Drain Diode | | | | | |
| IS *1 | - | - | 16 | A | |
| ISM *3 | - | - | 48 | | |
| VSD *1 | - | 0.75 | 1.2 | V | $I_{\text{S}}=4\text{A}, V_{\text{GS}}=0\text{V}$ |
| trr | - | 61 | - | ns | $I_{\text{F}}=14\text{A}, dI_{\text{F}}/dt=100\text{A}/\mu\text{s}$ |
| Qrr | - | 150 | - | nC | |

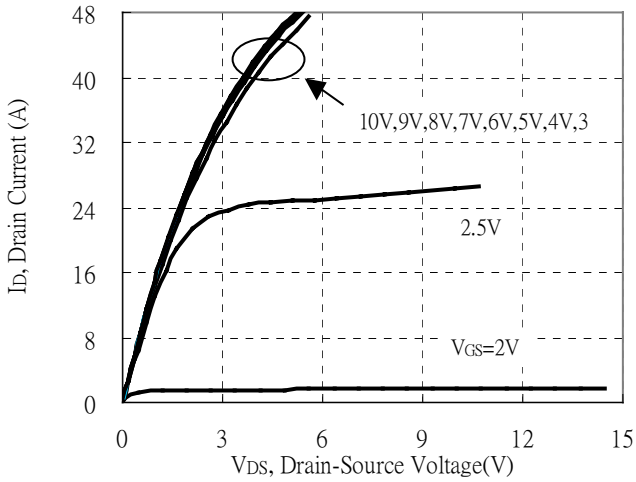
Note : *1.Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
 *2.Independent of operating temperature
 *3.Pulse width limited by maximum junction temperature.

Recommended soldering footprint

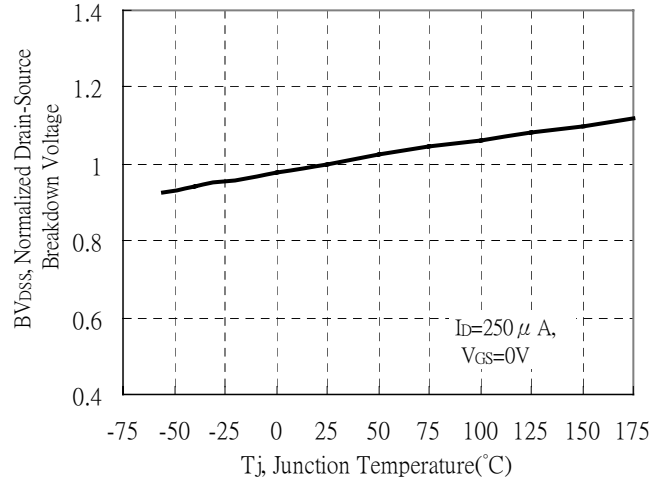

 Unit ($\frac{\text{mm}}{\text{inch}}$)

Typical Characteristics

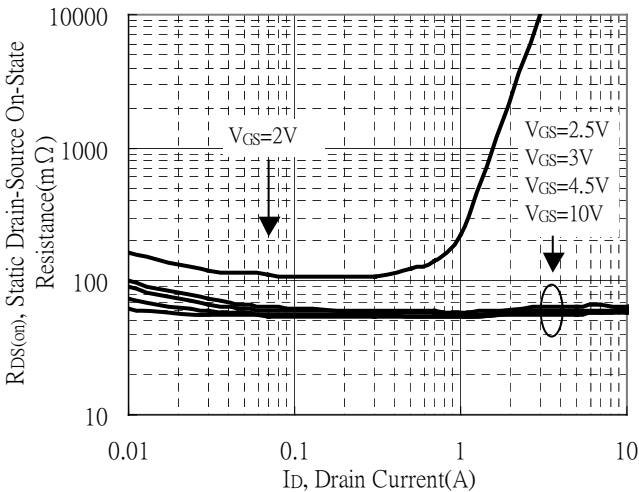
Typical Output Characteristics



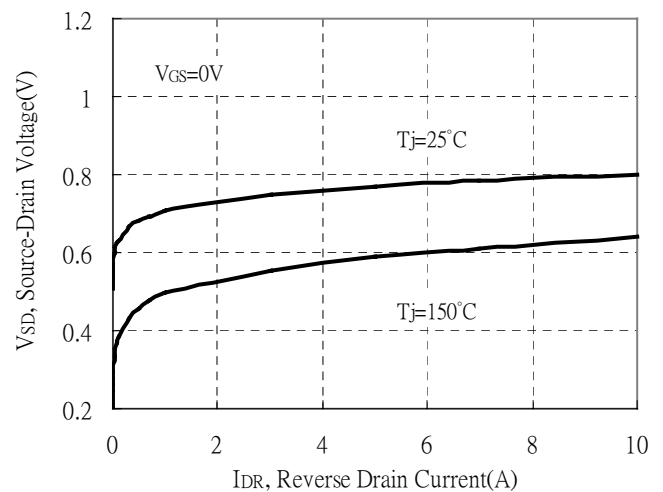
Brekdown Voltage vs Ambient Temperature



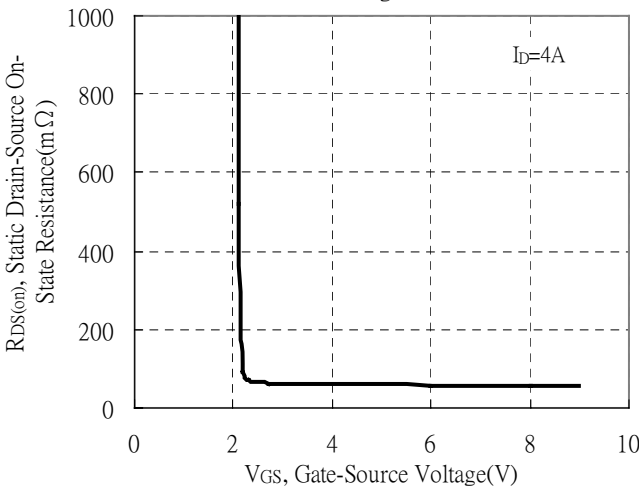
Static Drain-Source On-State resistance vs Drain Current



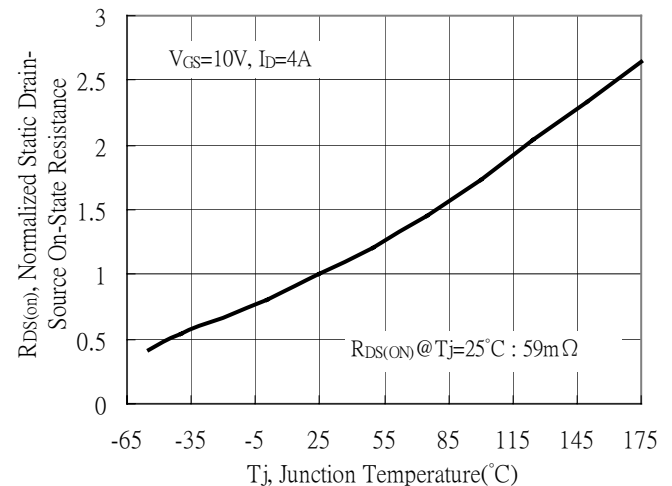
Reverse Drain Current vs Source-Drain Voltage



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

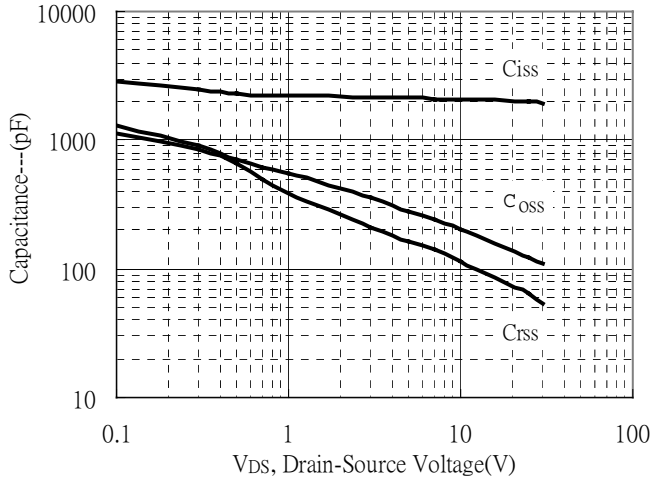


Drain-Source On-State Resistance vs Junction Temperature

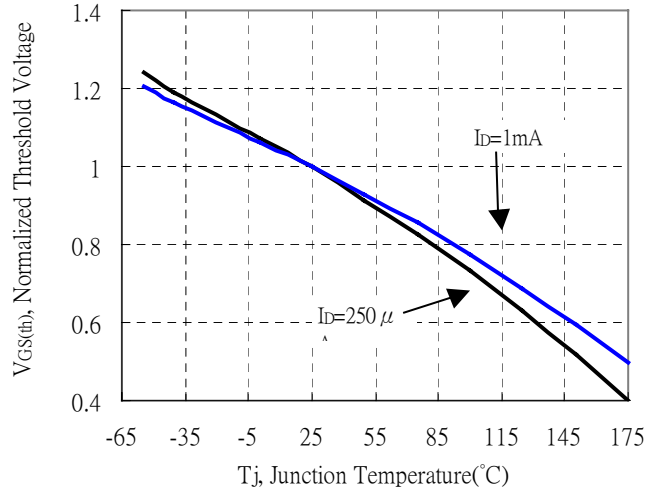


Typical Characteristics(Cont.)

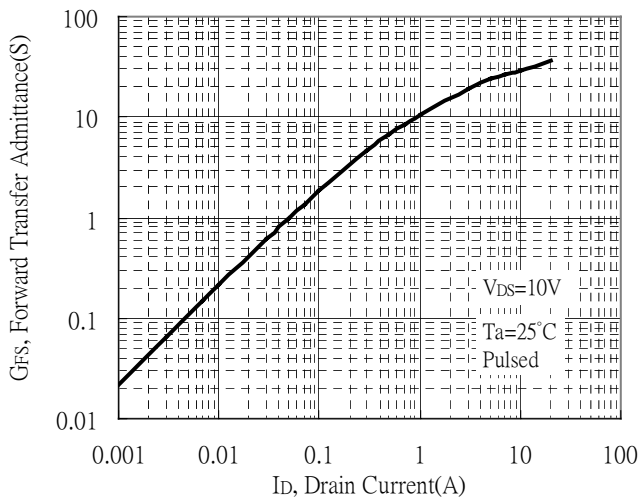
Capacitance vs Drain-to-Source Voltage



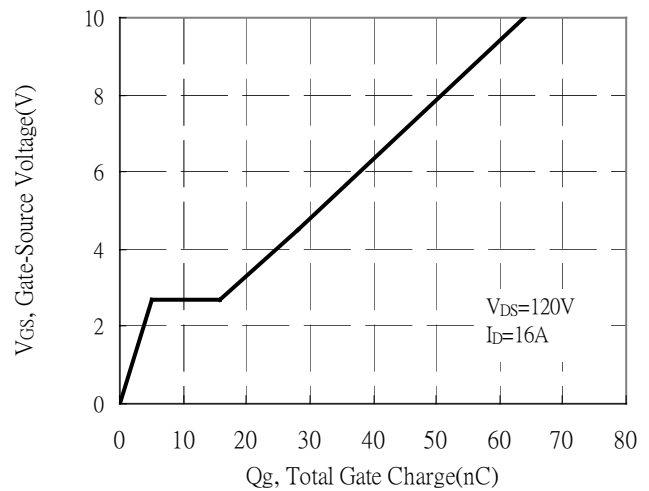
Threshold Voltage vs Junction Temperature



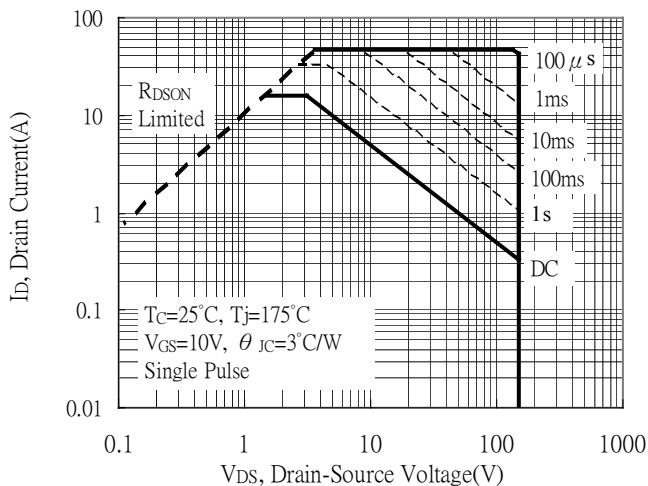
Forward Transfer Admittance vs Drain Current



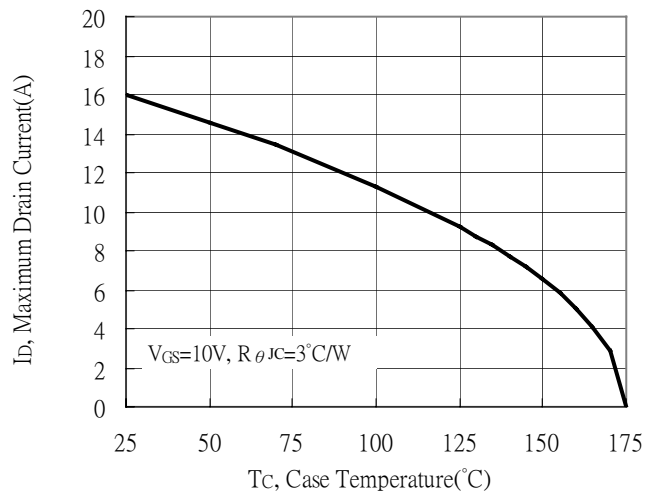
Gate Charge Characteristics



Maximum Safe Operating Area

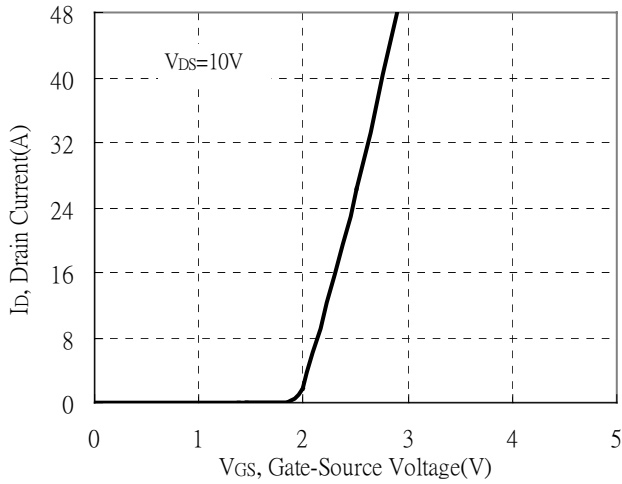


Maximum Drain Current vs Case Temperature

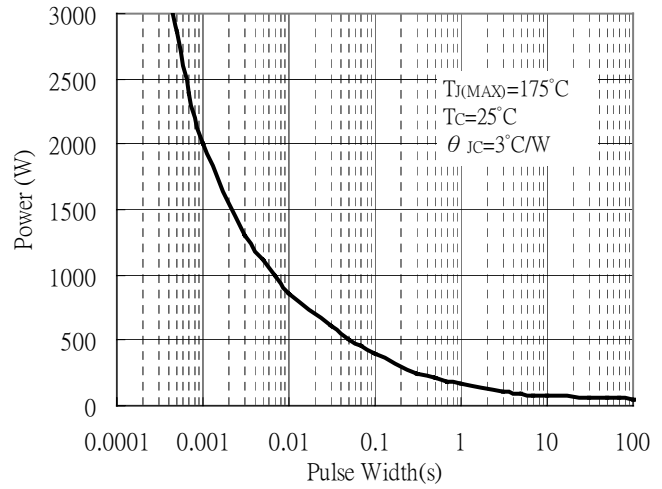


Typical Characteristics(Cont.)

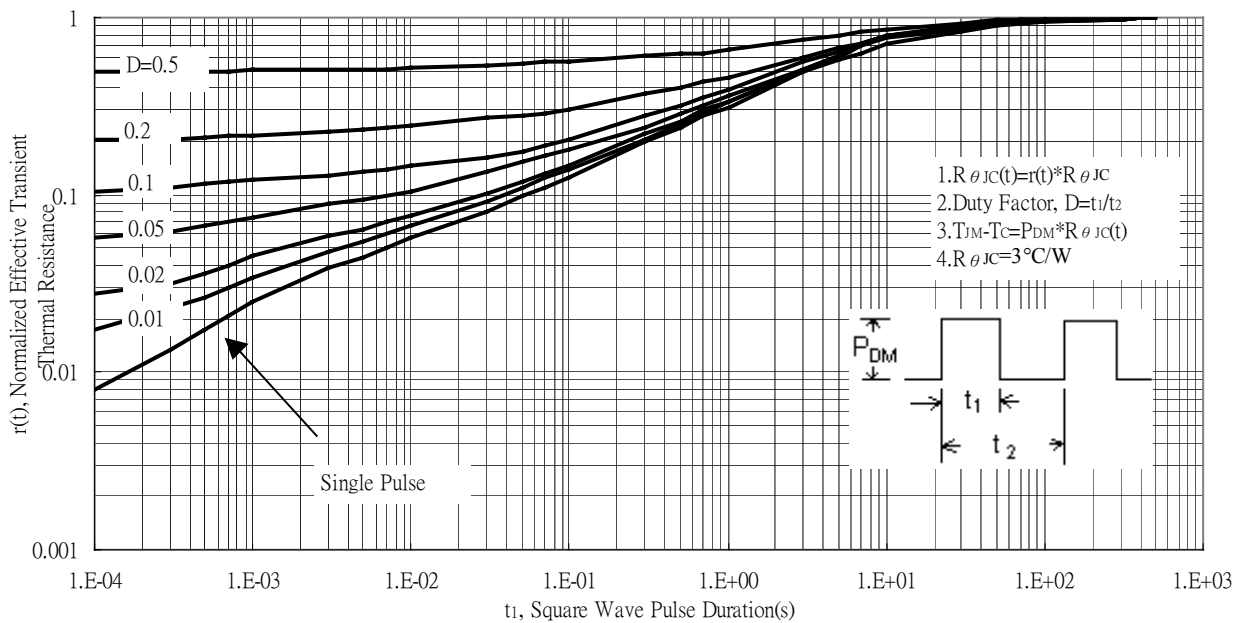
Typical Transfer Characteristics



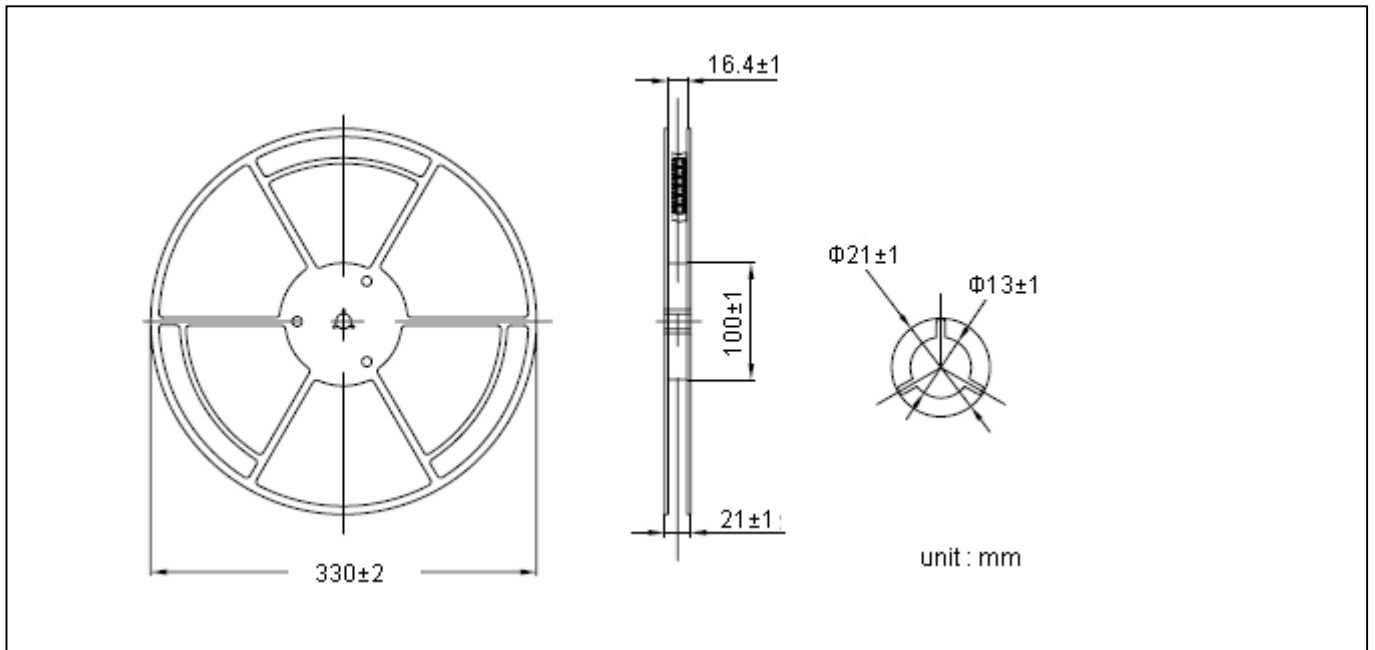
Single Pulse Power Rating, Junction to Case



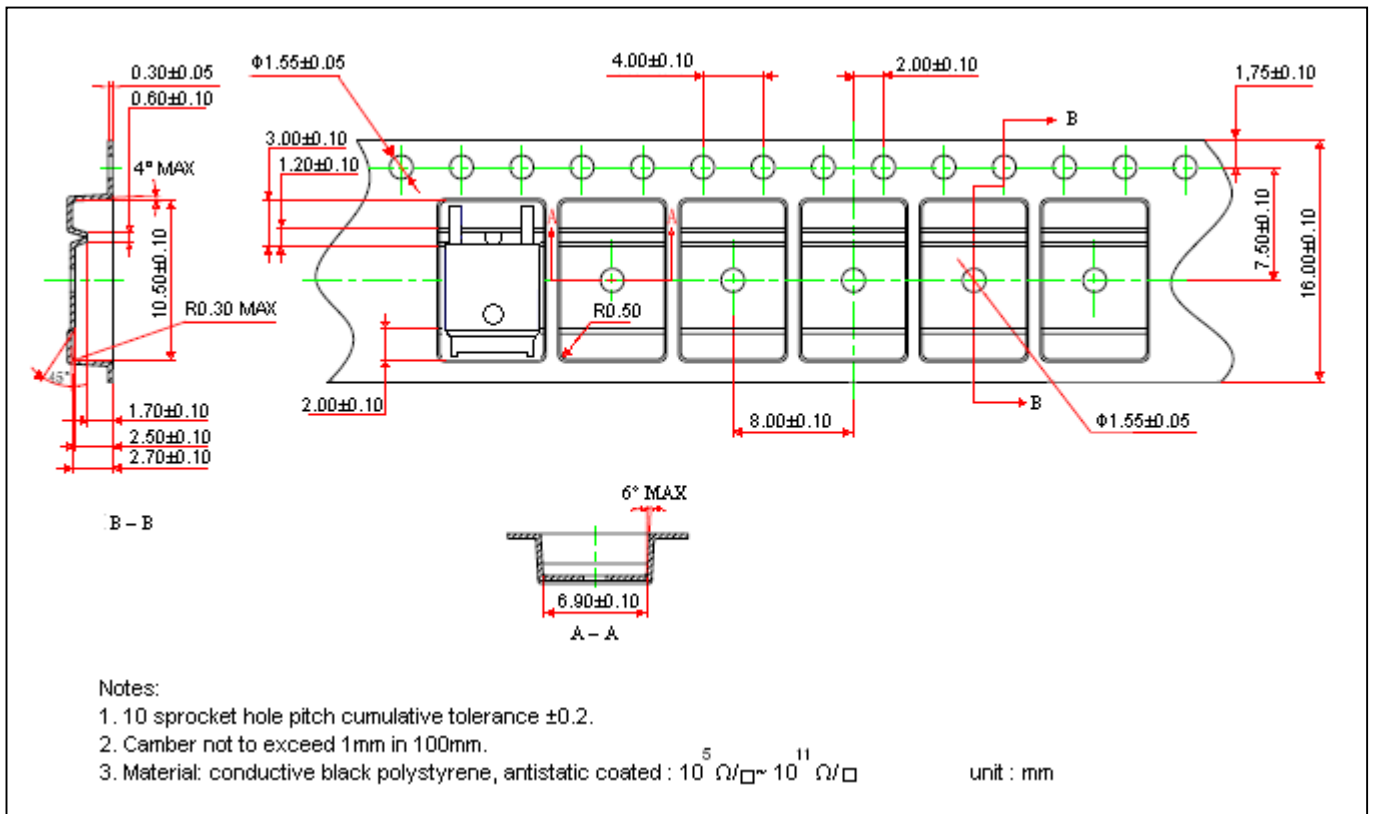
Transient Thermal Response Curves



Reel Dimension



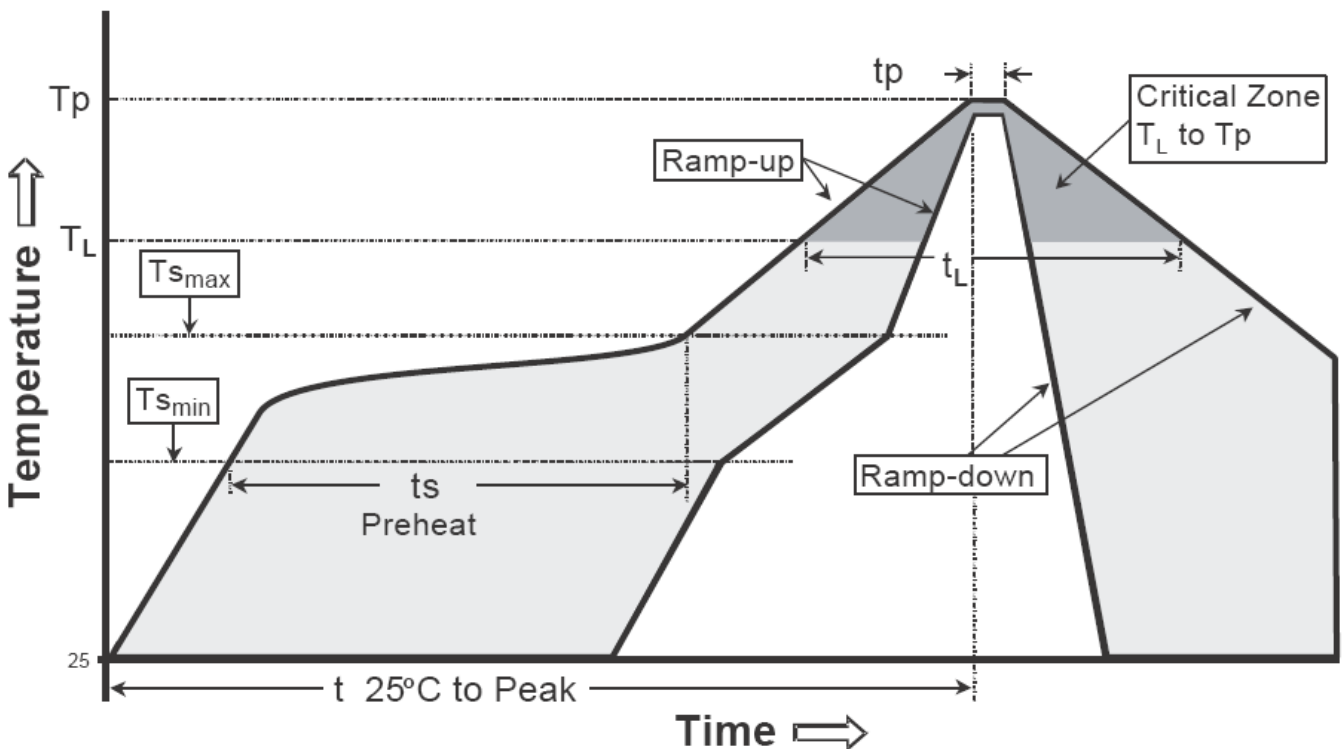
Carrier Tape Dimension



Recommended wave soldering condition

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

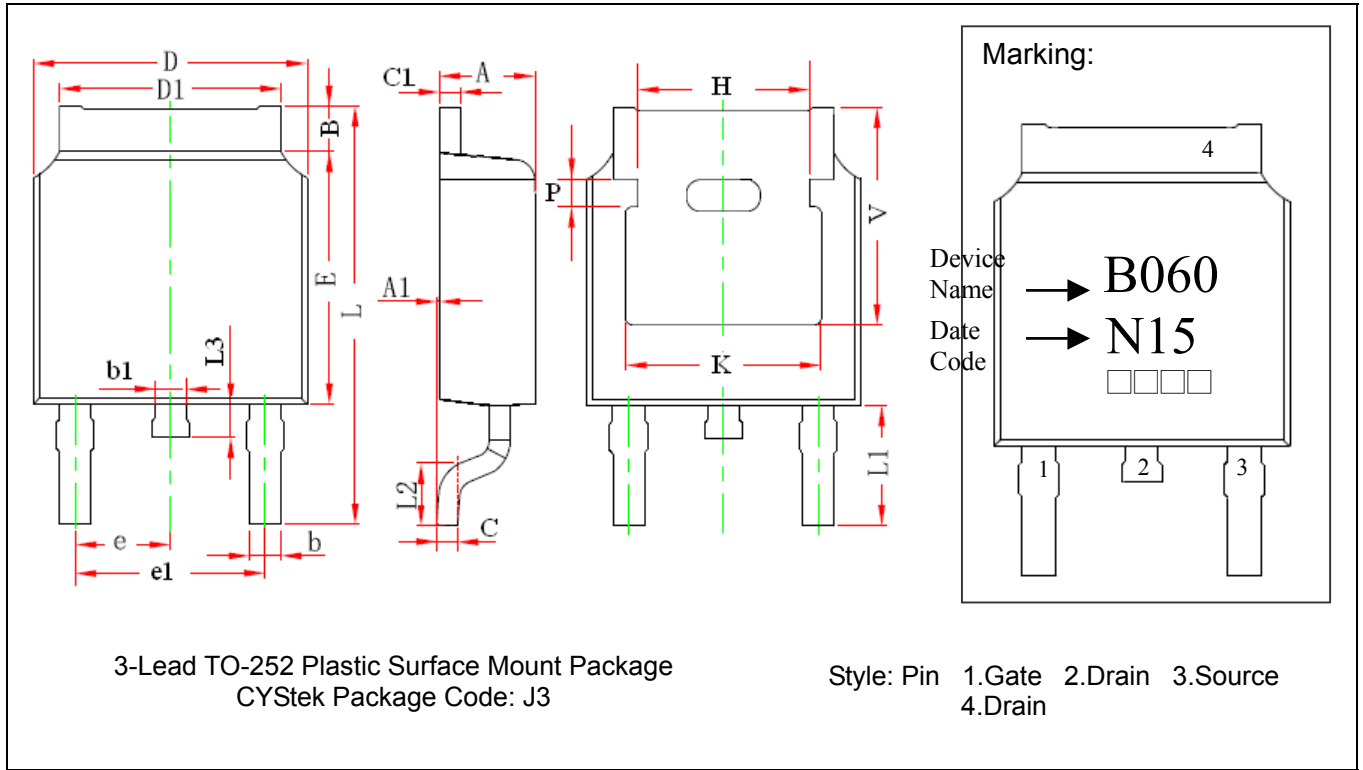
Recommended temperature profile for IR reflow



| 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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