

P-Channel Enhancement Mode Power MOSFET

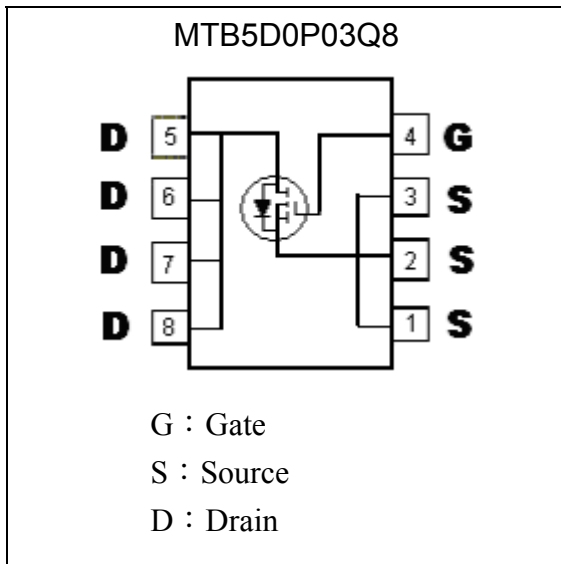
MTB5D0P03Q8

| | |
|--------------------------|-------------|
| BVDSS | -30V |
| ID@VGS=-10V, TA=25°C | -20A |
| ID@VGS=-4.5V, TA=25°C | -16A |
| ID@VGS=-10V, TC=25°C | -28A |
| ID@VGS=-4.5V, TC=25°C | -22A |
| RDSON@VGS=-10V, ID=-20A | 3.0mΩ (typ) |
| RDSON@VGS=-4.5V, ID=-17A | 4.2mΩ (typ) |

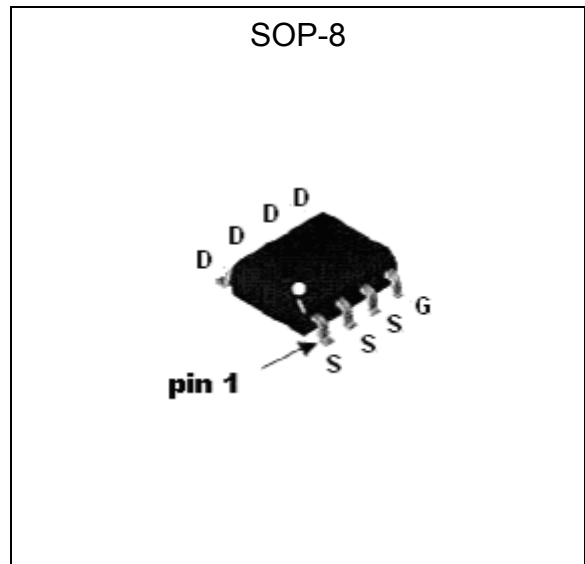
Features

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Pb-free and halogen-free package

Equivalent Circuit

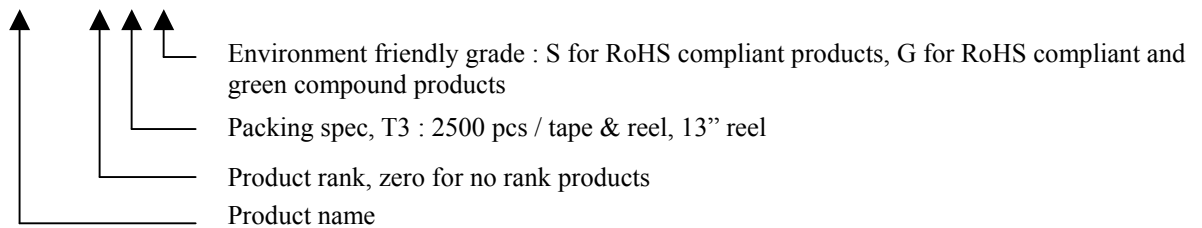


Outline



Ordering Information

| Device | Package | Shipping |
|--------------------|--|------------------------|
| MTB5D0P03Q8-0-T3-G | SOP-8 (Pb-free lead plating and halogen-free package) | 2500 pcs / tape & reel |





Absolute Maximum Ratings ($T_C=25^{\circ}C$, unless otherwise noted)

| Parameter | Symbol | Limits | Unit | |
|--|-----------------|--------------------|-------------|---|
| Drain-Source Breakdown Voltage | BV_{DSS} | -30 | V | |
| Gate-Source Voltage | V_{GS} | ± 25 | | |
| Continuous Drain Current @ $T_A=25^{\circ}C$, $V_{GS}=-10V$ | I_{DSM} | -20 | A | |
| Continuous Drain Current @ $T_A=70^{\circ}C$, $V_{GS}=-10V$ | | -16 | | |
| Continuous Drain Current @ $T_A=25^{\circ}C$, $V_{GS}=-4.5V$ | | -16 | | |
| Continuous Drain Current @ $T_A=70^{\circ}C$, $V_{GS}=-4.5V$ | | -12.8 | | |
| Continuous Drain Current @ $T_C=25^{\circ}C$, $V_{GS}=-10V$ | I_D | -28 | | |
| Continuous Drain Current @ $T_C=100^{\circ}C$, $V_{GS}=-10V$ | | -17.7 | | |
| Continuous Drain Current @ $T_C=25^{\circ}C$, $V_{GS}=-4.5V$ | | -22 | | |
| Continuous Drain Current @ $T_C=100^{\circ}C$, $V_{GS}=-4.5V$ | | -13.9 | | |
| Pulsed Drain Current (Note 1) | I_{DM} | -120 | | |
| Avalanche Current | I_{AS} | -50 | | |
| Avalanche Energy @ $L=0.1mH$, $I_D=-50A$, $V_{DD}=-25V$ | E_{AS} | 125 | mJ | |
| Power Dissipation | P_D | $T_C=25^{\circ}C$ | 6.3 | W |
| | | $T_C=100^{\circ}C$ | 2.5 | |
| Power Dissipation (Note 2) | P_{DSM} | $T_A=25^{\circ}C$ | 3.1 | |
| | | $T_A=70^{\circ}C$ | 2 | |
| Operating Junction and Storage Temperature Range | $T_j ; T_{stg}$ | -55~+150 | $^{\circ}C$ | |

Note : 1.Pulse width limited by maximum junction temperature.
 2.Surface mounted on 1 in² copper pad of FR-4 board, $t \leq 10s$.

Thermal Resistance Ratings

| Thermal Resistance | Symbol | Maximum | Unit |
|----------------------------|-----------------|---------|-----------------|
| Junction-to-Case | $R_{\theta JC}$ | 20 | $^{\circ}C / W$ |
| Junction-to-Ambient (Note) | $R_{\theta JA}$ | 40 | |

Note : When mounted on a 1 in² pad of 2 oz copper, $t \leq 10s$; $125^{\circ}C/W$ when mounted on minimum copper pad. The value in any given application depends on the user's specific board design.

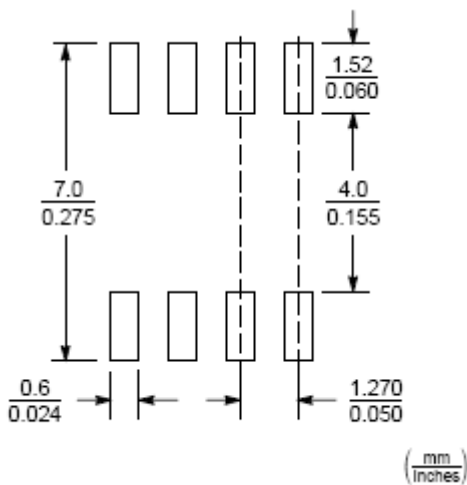
Electrical Characteristics ($T_C=25^{\circ}C$, unless otherwise noted)

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|------------------------------|------|------|-----------|-----------------|---|
| Static | | | | | |
| BV_{DSS} | -30 | - | - | V | $V_{GS}=0V$, $I_D=-250\mu A$ |
| $\Delta BV_{DSS}/\Delta T_j$ | - | -12 | - | mV/ $^{\circ}C$ | $I_D=-250\mu A$, referenced to $25^{\circ}C$ |
| $V_{GS(th)}$ | -1 | - | -2.5 | V | $V_{DS}=V_{GS}$, $I_D=-250\mu A$ |
| I_{GSS} | - | - | ± 100 | nA | $V_{GS}=\pm 25V$, $V_{DS}=0V$ |
| I_{DSS} | - | - | -1 | μA | $V_{DS}=-30V$, $V_{GS}=0V$ |
| I_{DSS} | - | - | -10 | | $V_{DS}=-24V$, $V_{GS}=0$, $T_j=125^{\circ}C$ |
| $R_{DS(ON)}$ (Note 1) | - | 3 | 4.5 | m Ω | $I_D=-20A$, $V_{GS}=-10V$ |
| | - | 4.2 | 6.5 | | $I_D=-17A$, $V_{GS}=-4.5V$ |

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|--------------------------------|------|-------|------|------|---|
| GFS (Note 1) | - | 59 | - | S | V _{DS} =-5V, I _D =-20A |
| Dynamic | | | | | |
| C _{iss} | - | 6458 | - | pF | V _{DS} =-15V, V _{GS} =0V, f=1MHz |
| C _{oss} | - | 849 | - | | |
| C _{rss} | - | 402 | - | | |
| t _{d(ON)} (Note 1&2) | - | 23.8 | - | ns | V _{DS} =-15V, I _D =-1A, V _{GS} =-10V, R _G =6Ω |
| t _r (Note 1&2) | - | 25.6 | - | | |
| t _{d(OFF)} (Note 1&2) | - | 187.2 | - | | |
| t _f (Note 1&2) | - | 69.4 | - | | |
| Q _g (Note 1&2) | - | 113 | - | nC | V _{DS} =-15V, I _D =-20A, V _{GS} =-10V |
| Q _{gs} (Note 1&2) | - | 19.6 | - | | |
| Q _{gd} (Note 1&2) | - | 19.6 | - | | |
| R _g | - | 3 | - | Ω | f=1MHz |
| Source-Drain Diode | | | | | |
| I _s | - | - | -2.1 | A | |
| I _{SM} (Note 3) | - | - | -8.4 | | |
| V _{SD} (Note 1) | - | -0.69 | -1 | V | I _s =-2.1A, V _{GS} =0V |
| t _{rr} | - | 28.4 | - | ns | I _F =-20A, dI _F /dt=100A/μs |
| Q _{rr} | - | 20.8 | - | nC | |

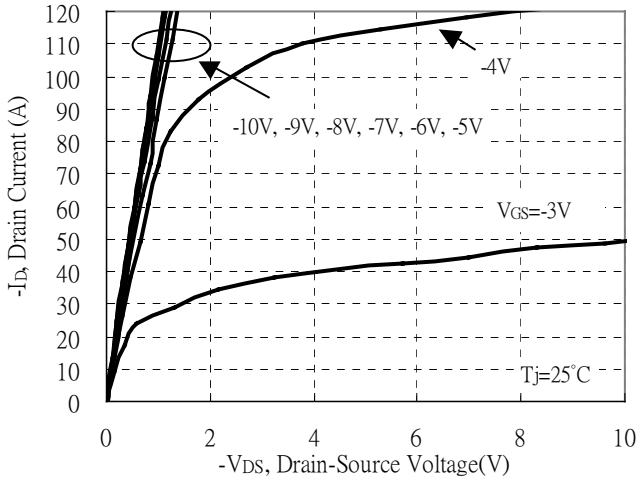
Note : 1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
 2.Independent of operating temperature
 3.Pulse width limited by maximum junction temperature

Recommended Soldering Footprint

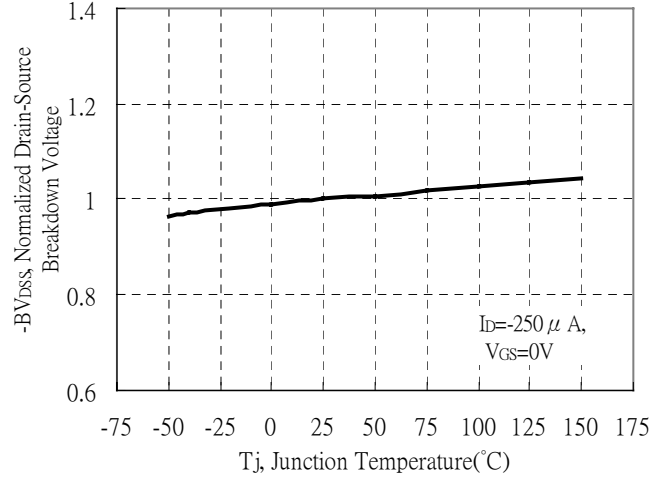


Typical Characteristics

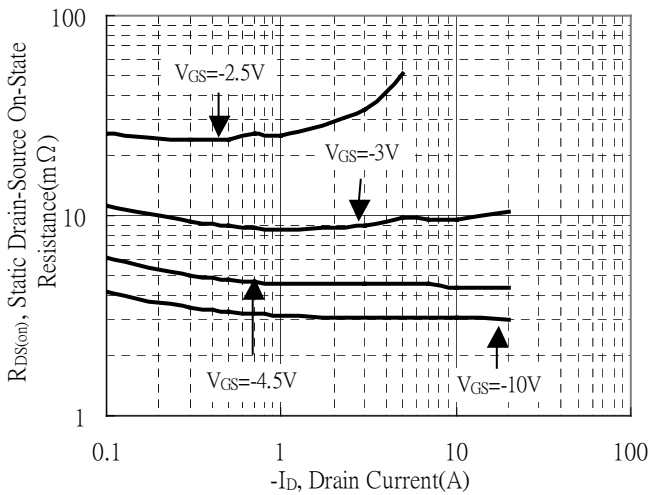
Typical Output Characteristics



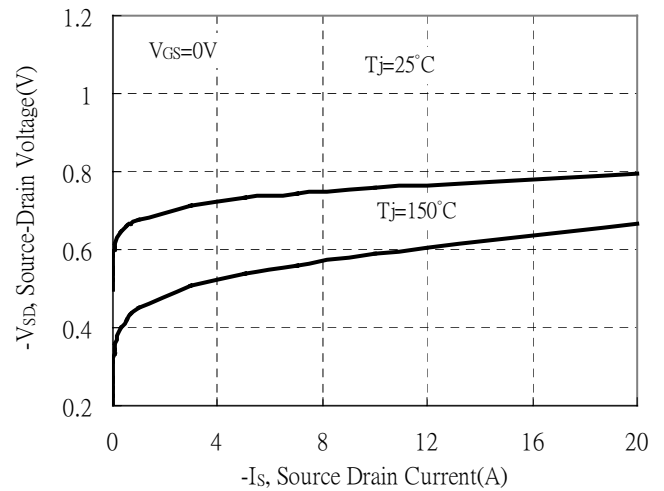
Normalized Brekdown Voltage vs Ambient Temperature



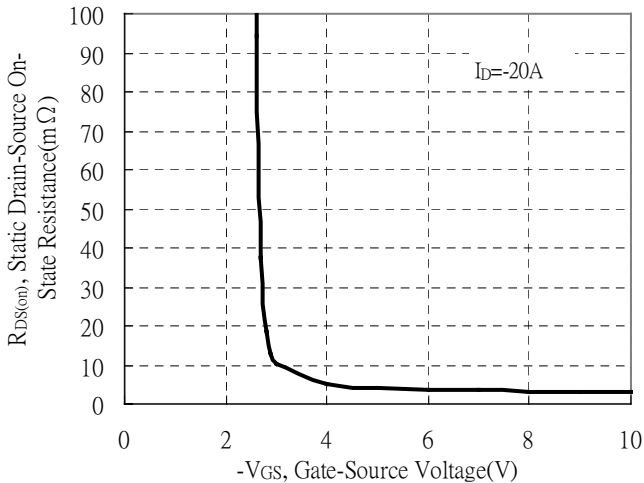
Static Drain-Source On-State resistance vs Drain Current



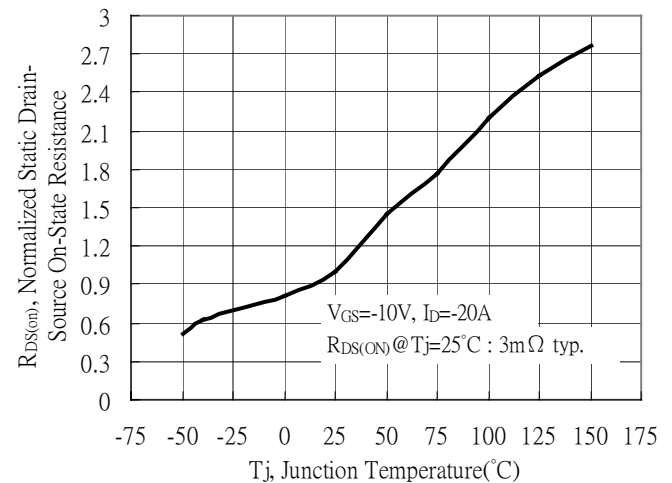
Source Drain Current vs Source-Drain Voltage



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

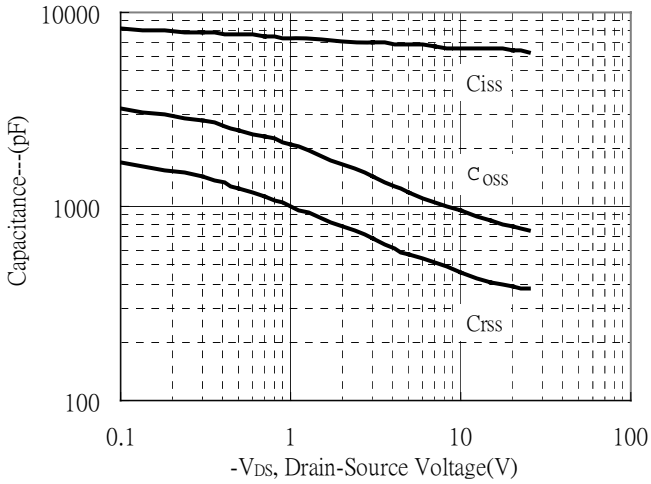


Normalized Drain-Source On-State Resistance vs Junction Temperature

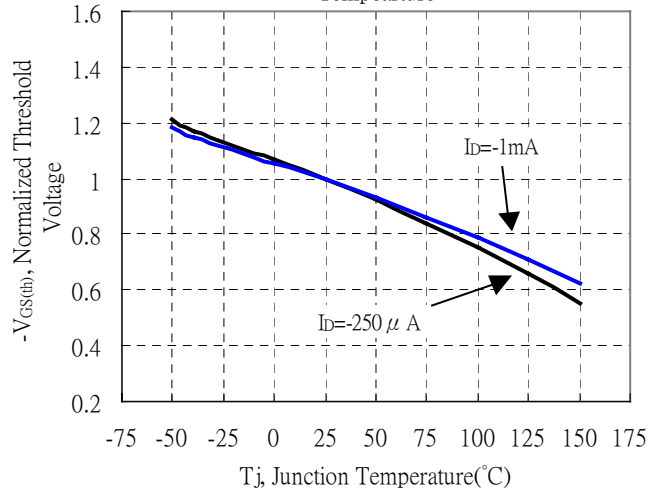


Typical Characteristics(Cont.)

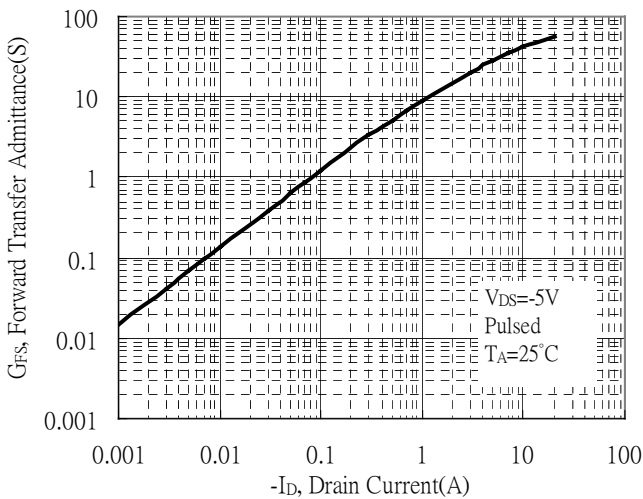
Capacitance vs Drain-to-Source Voltage



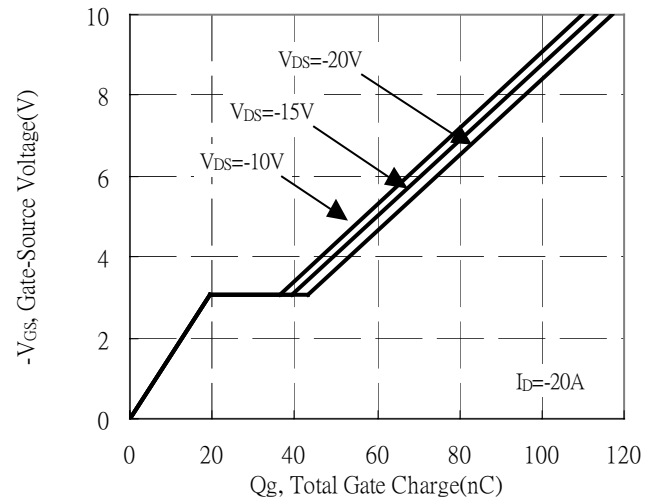
Normalized Threshold Voltage vs Junction Temperature



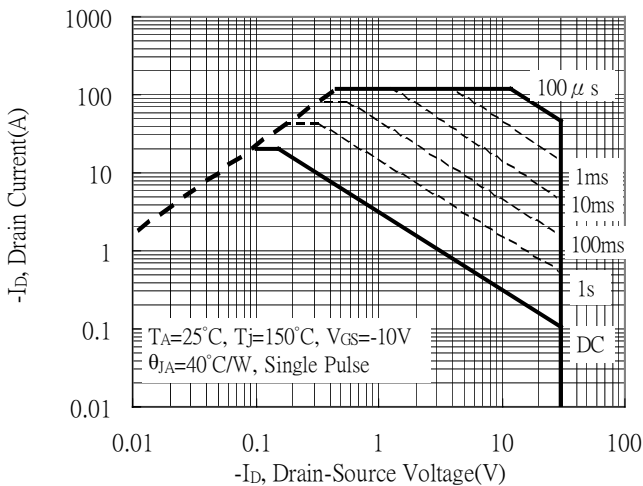
Forward Transfer Admittance vs Drain Current



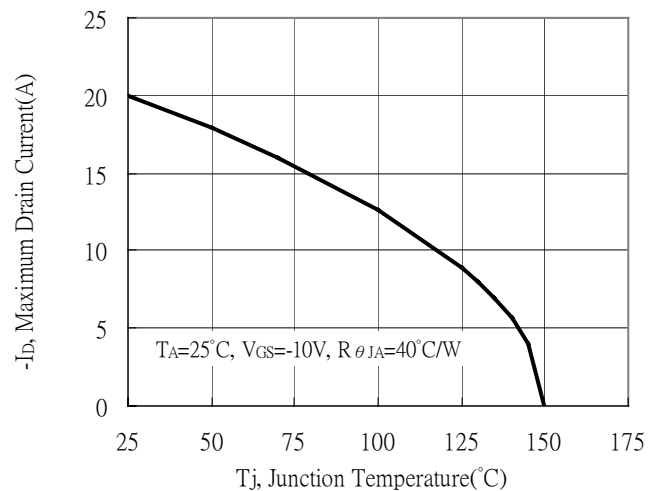
Gate Charge Characteristics



Maximum Safe Operating Area

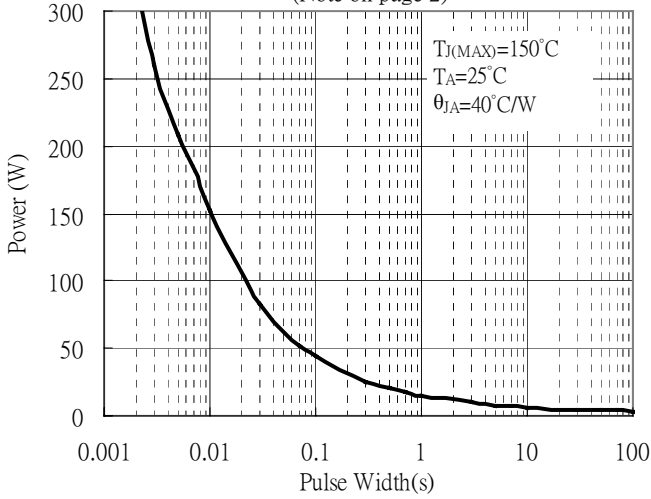


Maximum Drain Current vs Junction Temperature

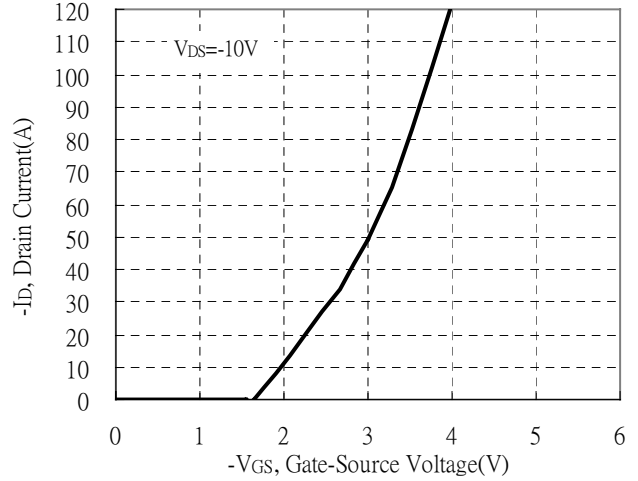


Typical Characteristics(Cont.)

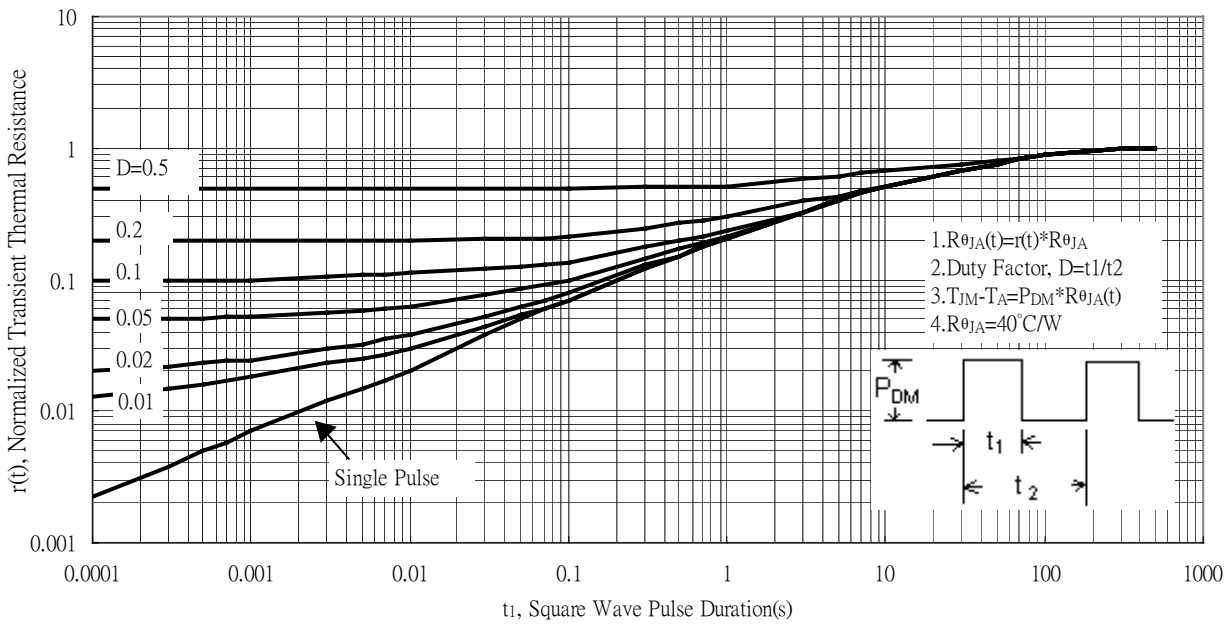
Single Pulse Power Rating, Junction to Ambient
 (Note on page 2)



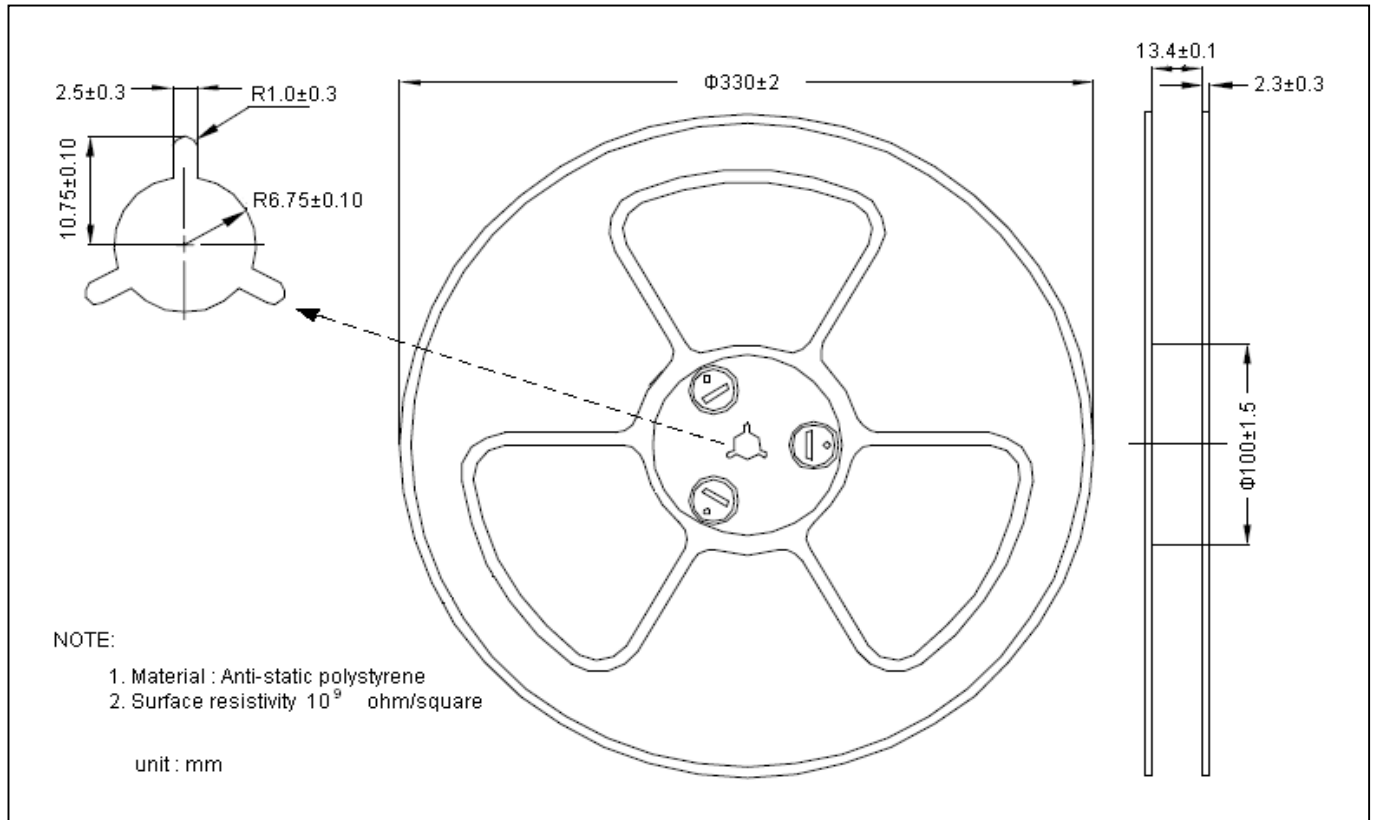
Typical Transfer Characteristics



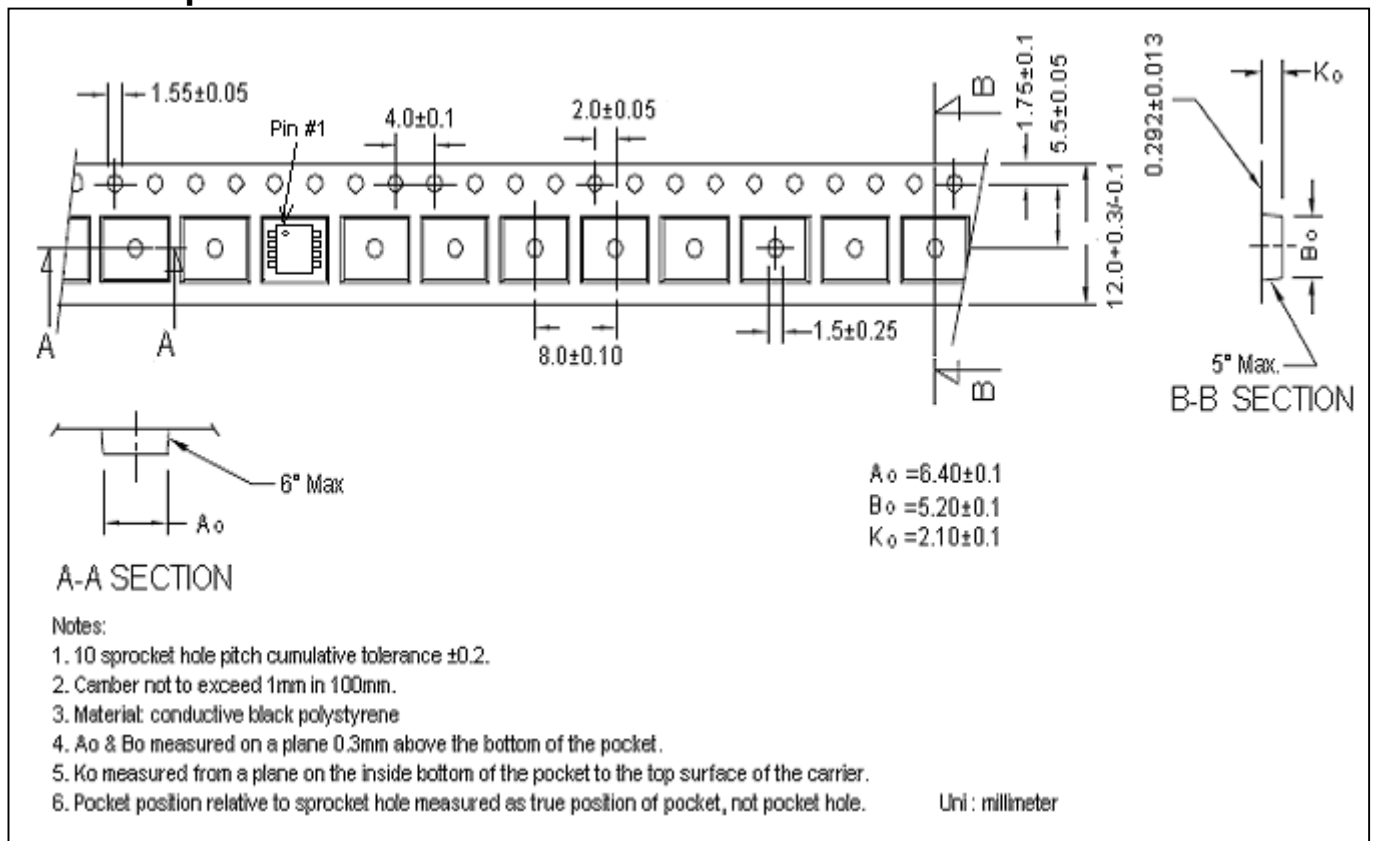
Transient Thermal Response Curves



Reel Dimension



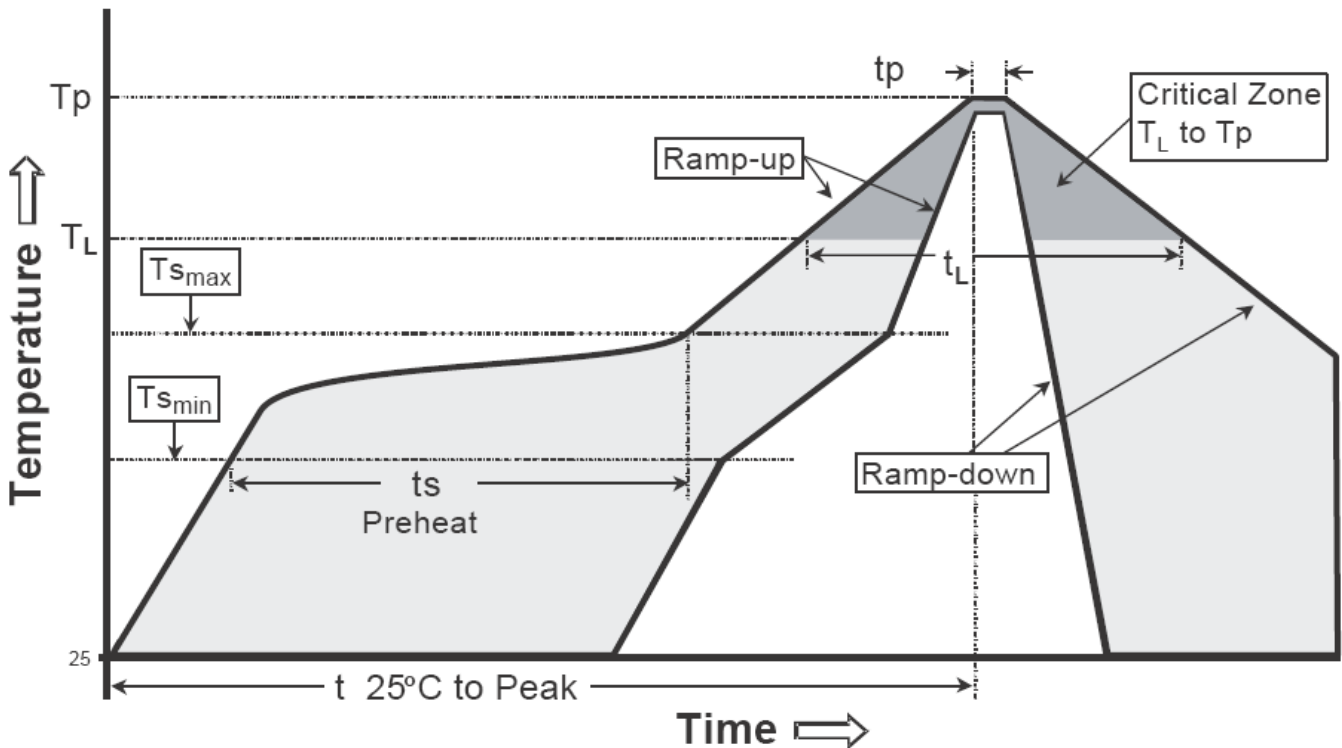
Carrier Tape Dimension



Recommended wave soldering condition

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

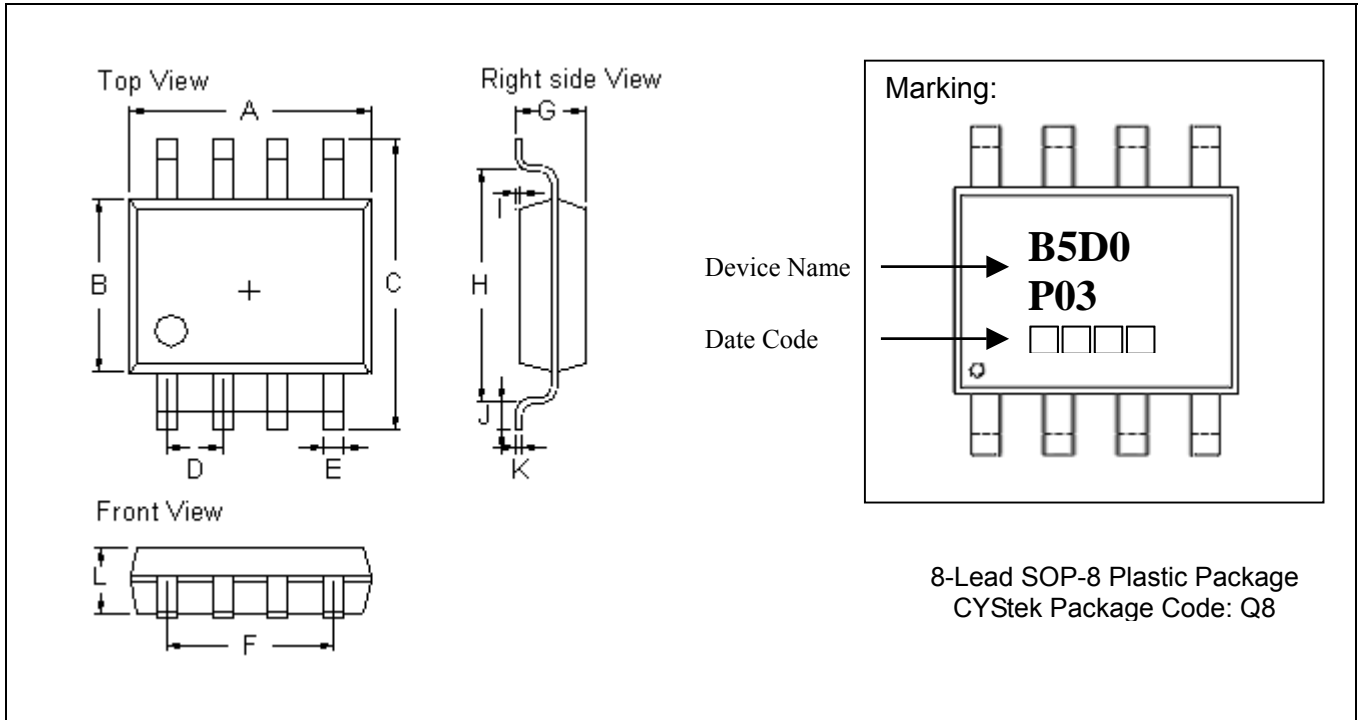
Recommended temperature profile for IR reflow



| 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.

SOP-8 Dimension



*: Typical

| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|-----|---------|--------|-------------|------|-----|--------|--------|-------------|------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.1850 | 0.2007 | 4.70 | 5.10 | G | 0.0531 | 0.0689 | 1.35 | 1.75 |
| B | 0.1496 | 0.1575 | 3.80 | 4.00 | H | 0.1889 | 0.2007 | 4.80 | 5.10 |
| C | 0.2283 | 0.2441 | 5.80 | 6.20 | I | 0.0019 | 0.0098 | 0.05 | 0.25 |
| D | 0.0500* | | 1.27 * | | J | 0.0157 | 0.0500 | 0.40 | 1.27 |
| E | 0.0130 | 0.0201 | 0.33 | 0.51 | K | 0.0067 | 0.0098 | 0.17 | 0.25 |
| F | 0.1472 | 0.1527 | 3.74 | 3.88 | L | 0.0531 | 0.0610 | 1.35 | 1.55 |

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.

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.