

P-Channel Logic Level Enhancement Mode MOSFET

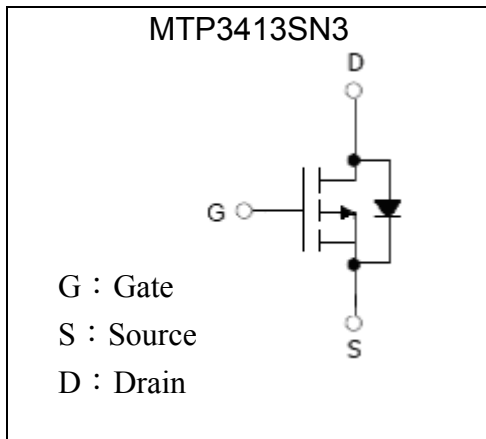
MTP3413SN3

| | | |
|--|---|-------|
| BV _{DSS} | | -20V |
| I _D @V _{GS} =-4.5V, T _A =25°C | | -4.9A |
| R _{DS(on)} (TYP) | V _{GS} =-4.5V, I _D =-4.3A | 39mΩ |
| | V _{GS} =-2.5V, I _D =-2.5A | 51mΩ |
| | V _{GS} =-1.8V, I _D =-2A | 75mΩ |

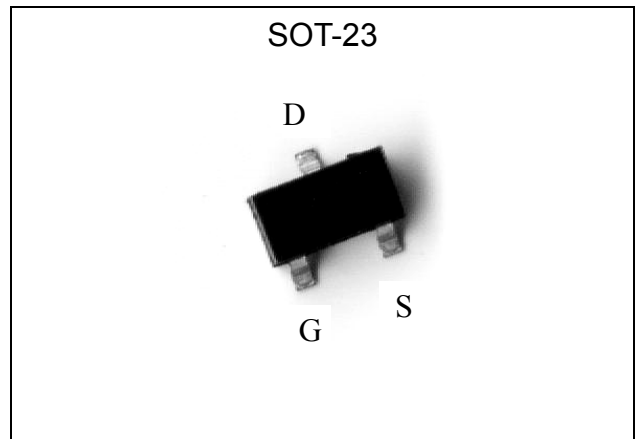
Features

- 1.8V gate rated
- Advanced trench process technology
- High density cell design for ultra low on resistance
- Pb-free lead plating and halogen-free package

Equivalent Circuit

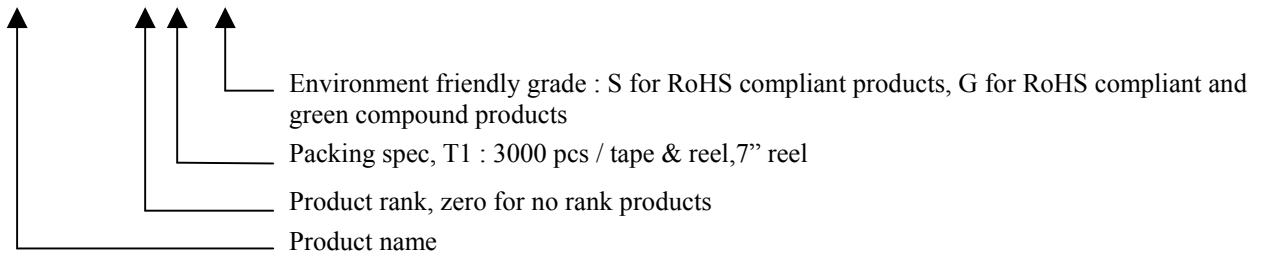


Outline



Ordering Information

| Device | Package | Shipping |
|-------------------|---|------------------------|
| MTP3413SN3-0-T1-G | SOT-23 (Pb-free lead plating and halogen-free package) | 3000 pcs / Tape & Reel |





Absolute Maximum Ratings (Ta=25°C)

| Parameter | Symbol | Limits | Unit |
|--|-----------------------------------|----------|------|
| Drain-Source Voltage | V _{DS} | -20 | V |
| Gate-Source Voltage | V _{GS} | ±12 | V |
| Continuous Drain Current @T _A =25°C, V _{GS} =-4.5V | I _D | -4.9 | A |
| Continuous Drain Current @T _A =70°C, V _{GS} =-4.5V | I _D | -3.9 | A |
| Pulsed Drain Current (Note 1&2) | I _{DM} | -35 | A |
| Maximum Power Dissipation @T _A =25°C | P _D | 1.38 | W |
| Maximum Power Dissipation @T _A =70°C | | 0.88 | |
| Operating Junction and Storage Temperature | T _j , T _{stg} | -55~+150 | °C |

Note : 1. Pulse width limited by maximum junction temperature.
 2. Pulse width ≤ 300µs, duty cycle ≤ 2%

Thermal Performance

| Parameter | Symbol | Limit | Unit |
|--|--------------------|-------|------|
| Thermal Resistance, Junction-to-Ambient (Note) | R _{th,ja} | 90 | °C/W |

Note : Surface mounted on 1 in² copper pad of FR-4 board, 270°C/W when mounted on minimum copper pad.

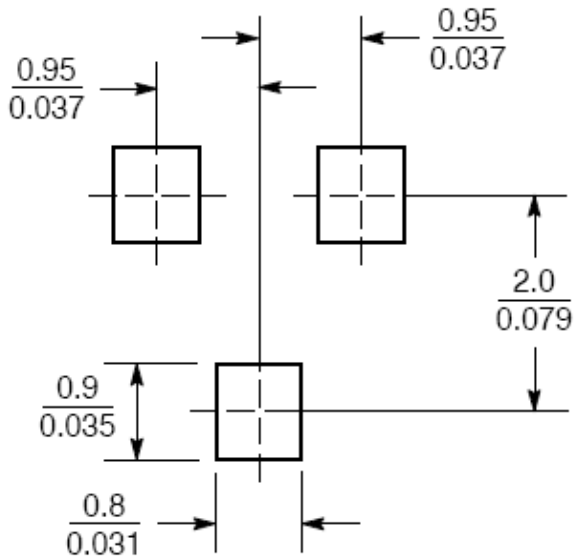
Electrical Characteristics (T_j=25°C, unless otherwise specified)

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|----------------------|------|------|------|------|---|
| Static | | | | | |
| BV _{DSS} | -20 | - | - | V | V _{GS} =0V, I _D =-250µA |
| V _{GS(th)} | -0.4 | - | -1.0 | | V _{DS} =V _{GS} , I _D =-250µA |
| I _{GSS} | - | - | ±100 | nA | V _{GS} =±12V, V _{DS} =0V |
| I _{DSS} | - | - | -1 | µA | V _{DS} =-20V, V _{GS} =0V |
| | - | - | -10 | | V _{DS} =-20V, V _{GS} =0V, T _j =55°C |
| *R _{Ds(ON)} | - | 39 | 50 | mΩ | V _{GS} =-4.5V, I _D =-4.3A |
| | - | 51 | 65 | | V _{GS} =-2.5V, I _D =-2.5A |
| | - | 75 | 100 | | V _{GS} =-1.8V, I _D =-2.0A |
| Dynamic | | | | | |
| C _{iss} | - | 1220 | - | pF | V _{DS} =-10V, V _{GS} =0V, f=1MHz |
| C _{oss} | - | 103 | - | | |
| C _{rss} | - | 92 | - | | |
| *t _{d(ON)} | - | 12.5 | - | ns | V _{DS} =-10V, I _D =-1A, V _{GS} =-4.5V, R _D =10Ω, R _G =6Ω |
| *t _r | - | 12 | - | | |
| *t _{d(OFF)} | - | 70 | - | | |
| *t _f | - | 20 | - | | |
| *Q _g | - | 10 | - | nC | V _{DS} =-10V, I _D =-4.3A, V _{GS} =-4.5V |
| *Q _{gs} | - | 1.9 | - | | |
| *Q _{gd} | - | 2.7 | - | | |

| Source-Drain Diode | | | | | |
|--------------------|---|-------|------|----|---|
| *I _{SD} | - | - | -1.3 | A | |
| *I _{SM} | - | - | -35 | | |
| *V _{SD} | - | -0.76 | -1 | V | V _{GS} =0V, I _S =-1.3A |
| *t _{rr} | - | 23 | - | ns | I _S =-1.3A, V _{GS} =0V, dI/dt=100A/μs |
| *Q _{rr} | - | 8.5 | - | nC | |

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

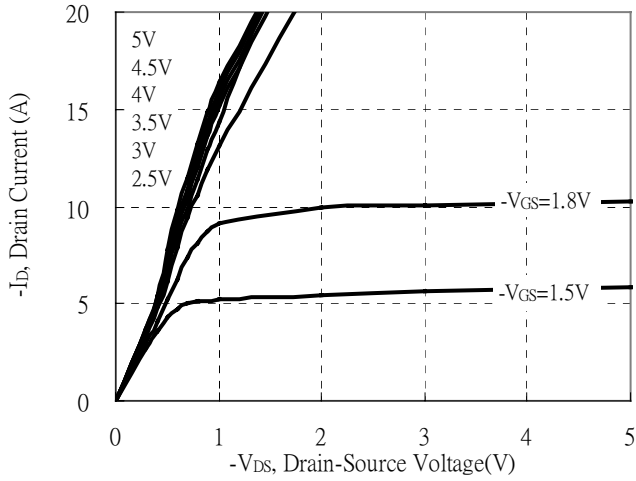
Recommended Soldering Footprint



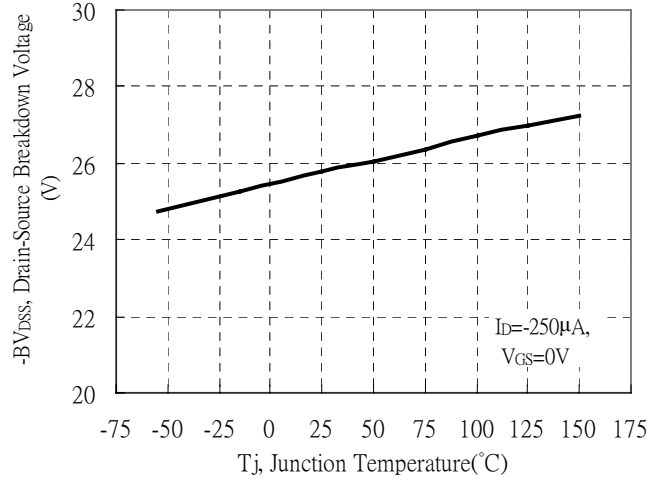
Unit : $\frac{\text{mm}}{\text{inches}}$

Typical Characteristics

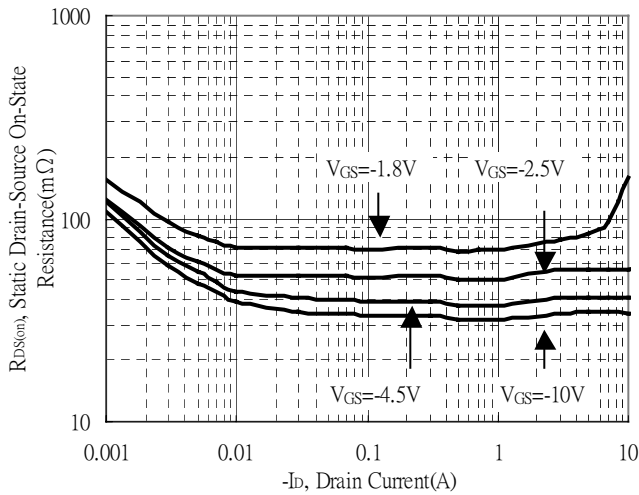
Typical Output Characteristics



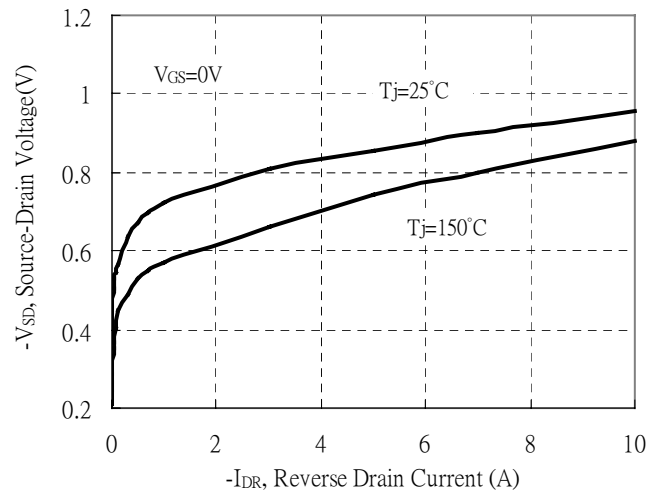
Breakdown Voltage vs Ambient Temperature



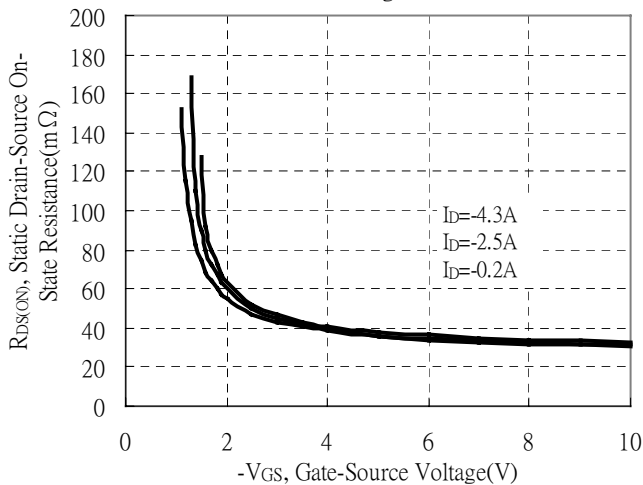
Static Drain-Source On-State resistance vs Drain Current



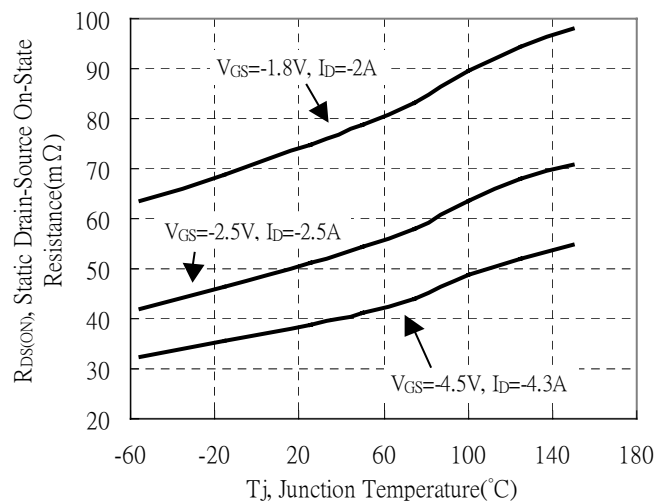
Reverse Drain Current vs Source-Drain Voltage



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

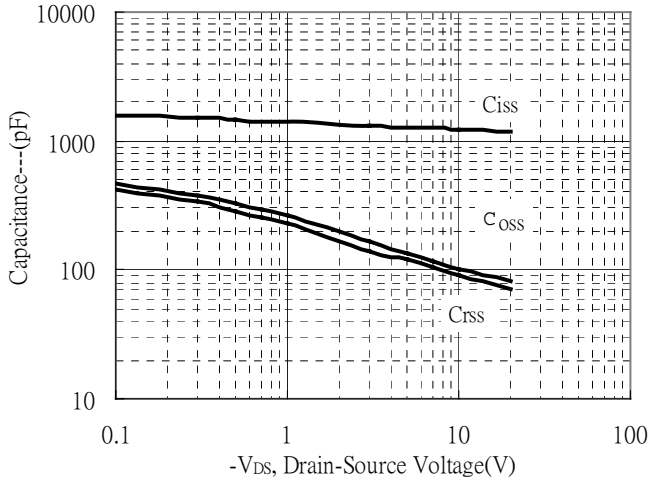


Drain-Source On-State Resistance vs Junction Temperature

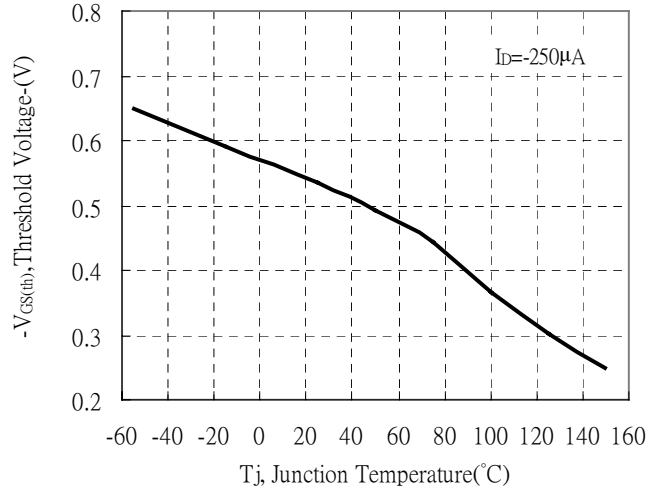


Typical Characteristics(Cont.)

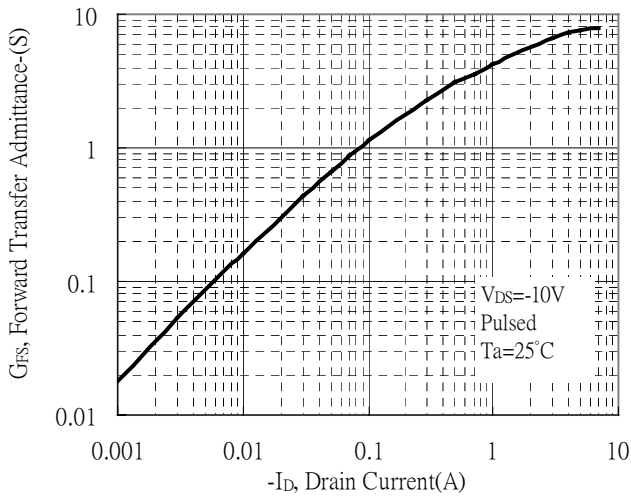
Capacitance vs Drain-to-Source Voltage



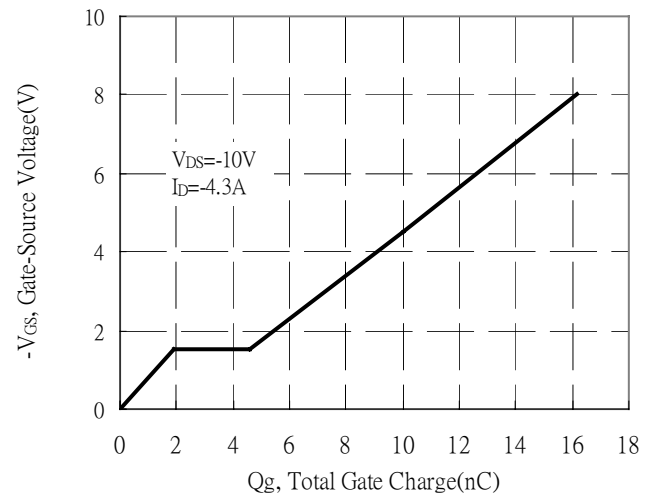
Threshold Voltage vs Junction Temperature



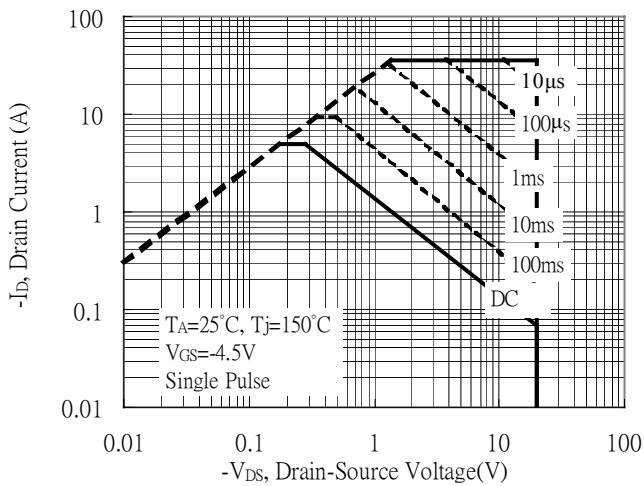
Forward Transfer Admittance vs Drain Current



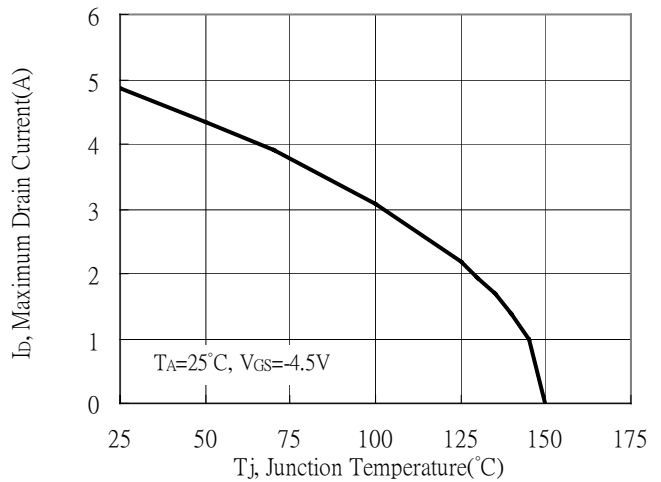
Gate Charge Characteristics



Maximum Safe Operating Area

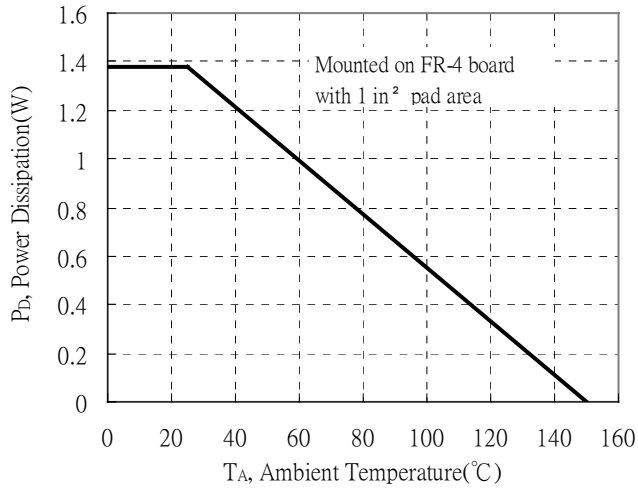


Maximum Drain Current vs Junction Temperature

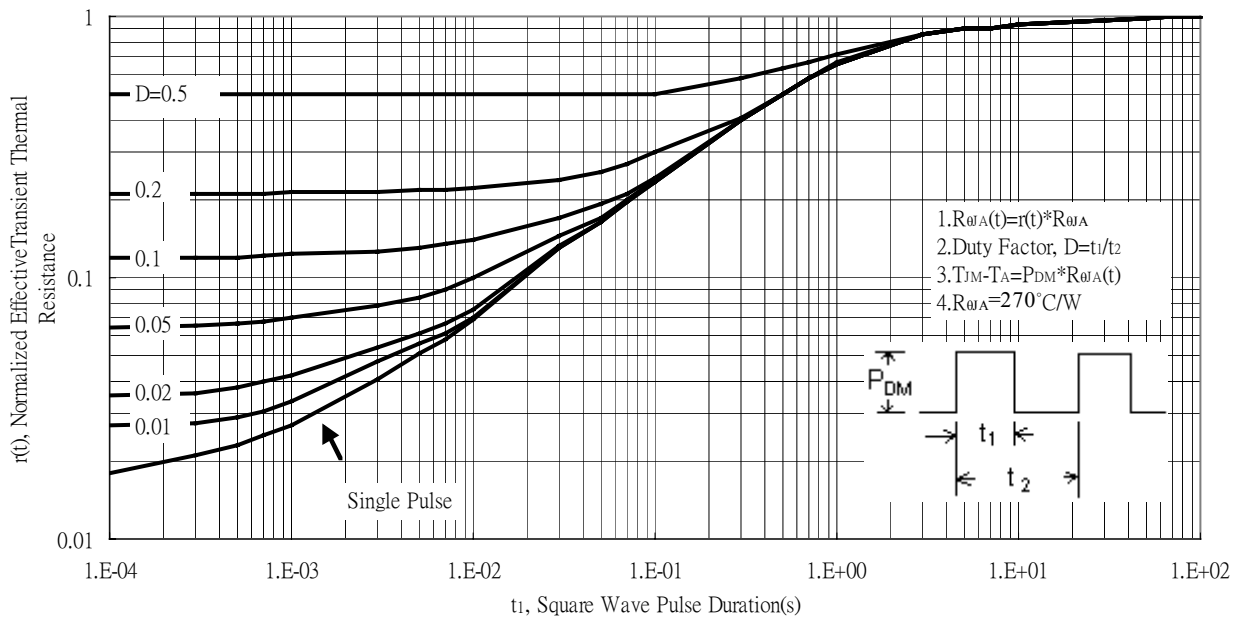


Typical Characteristics(Cont.)

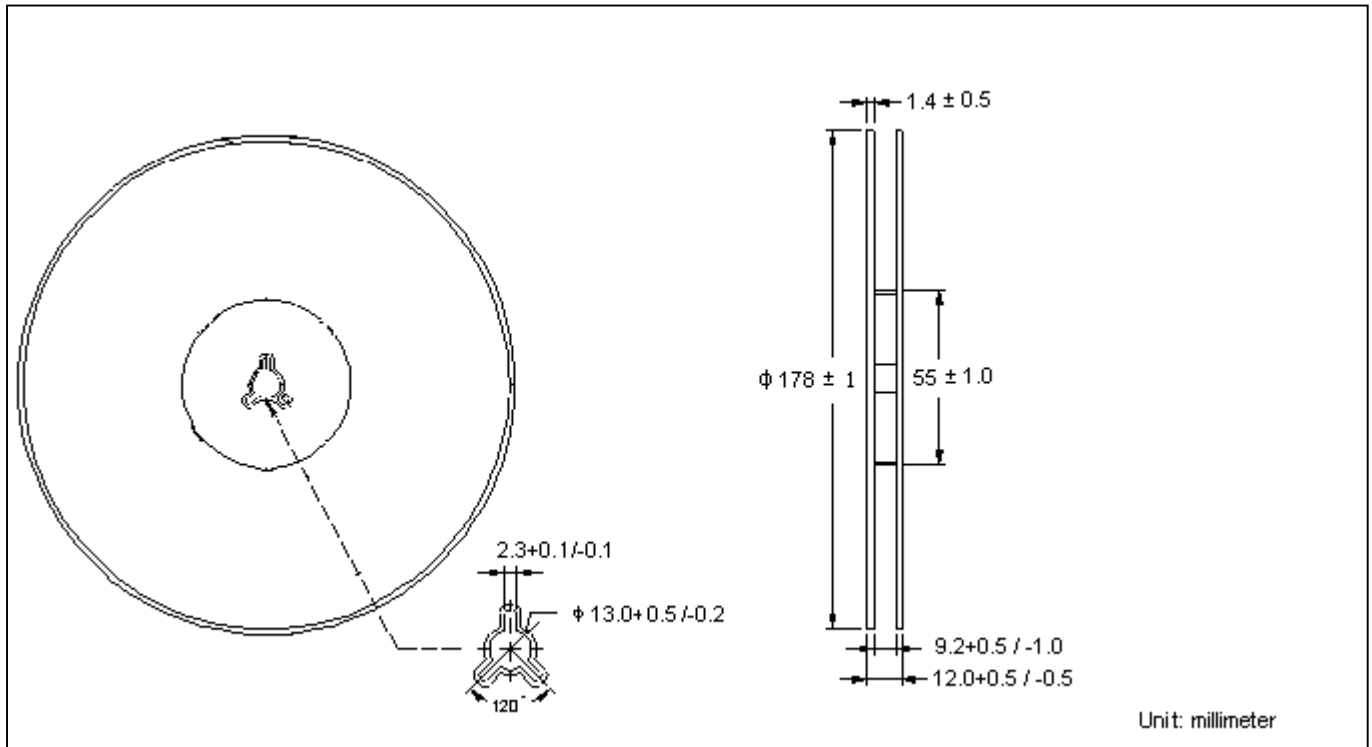
Power Derating Curve



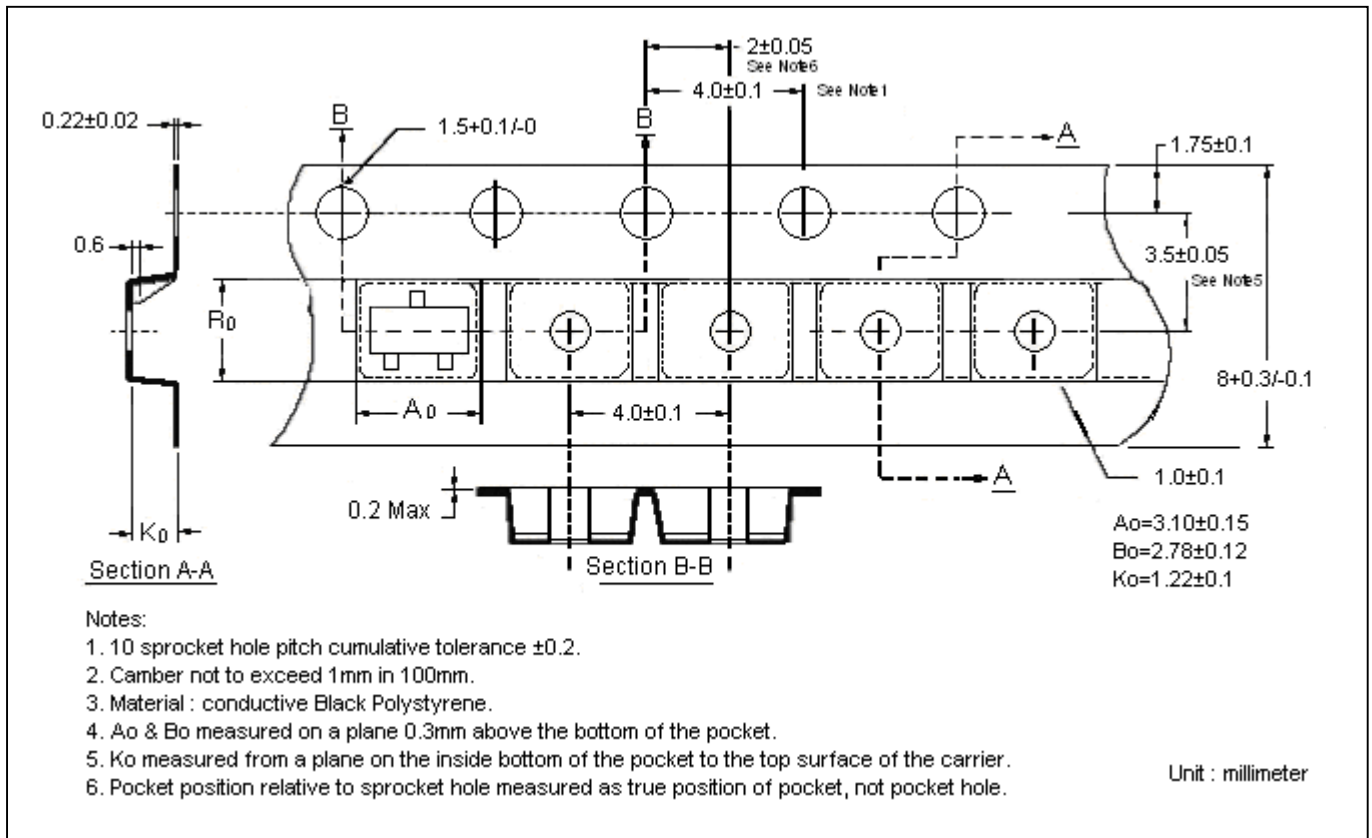
Transient Thermal Response Curves



Reel Dimension

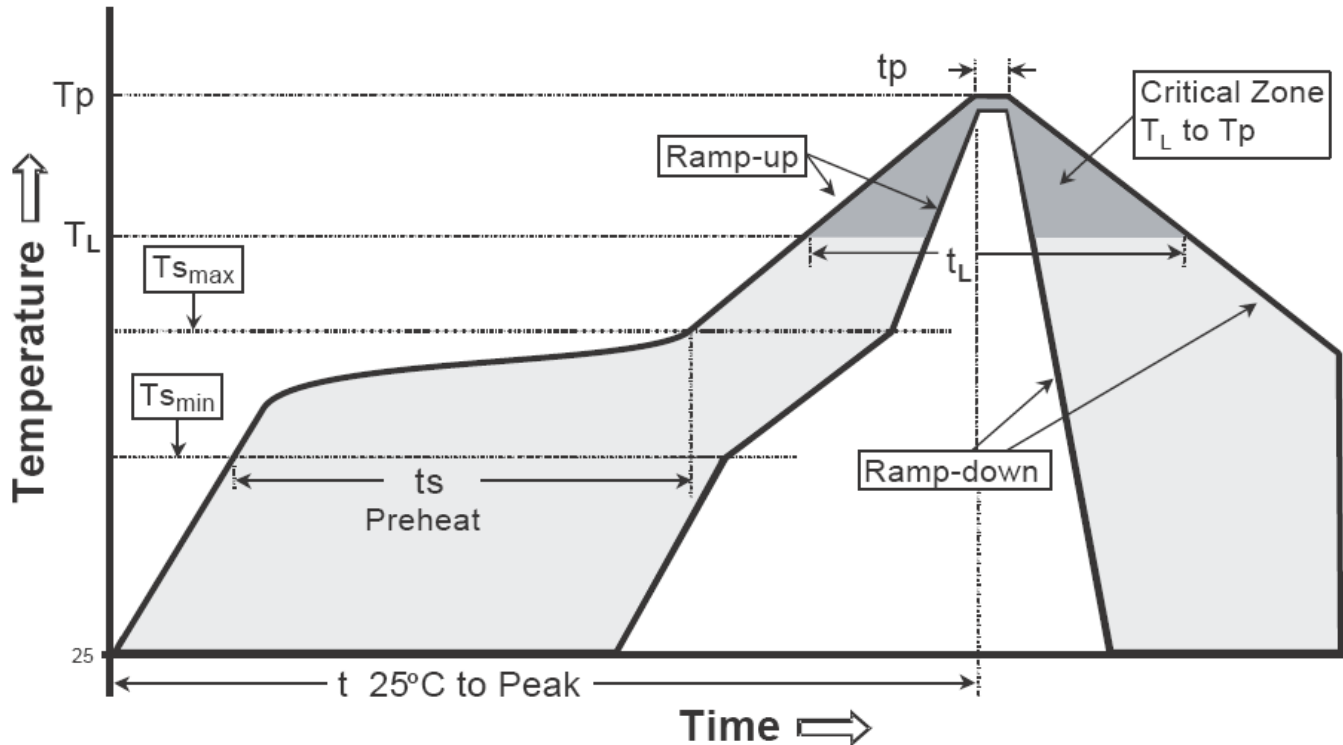


Carrier Tape Dimension



Recommended wave soldering condition

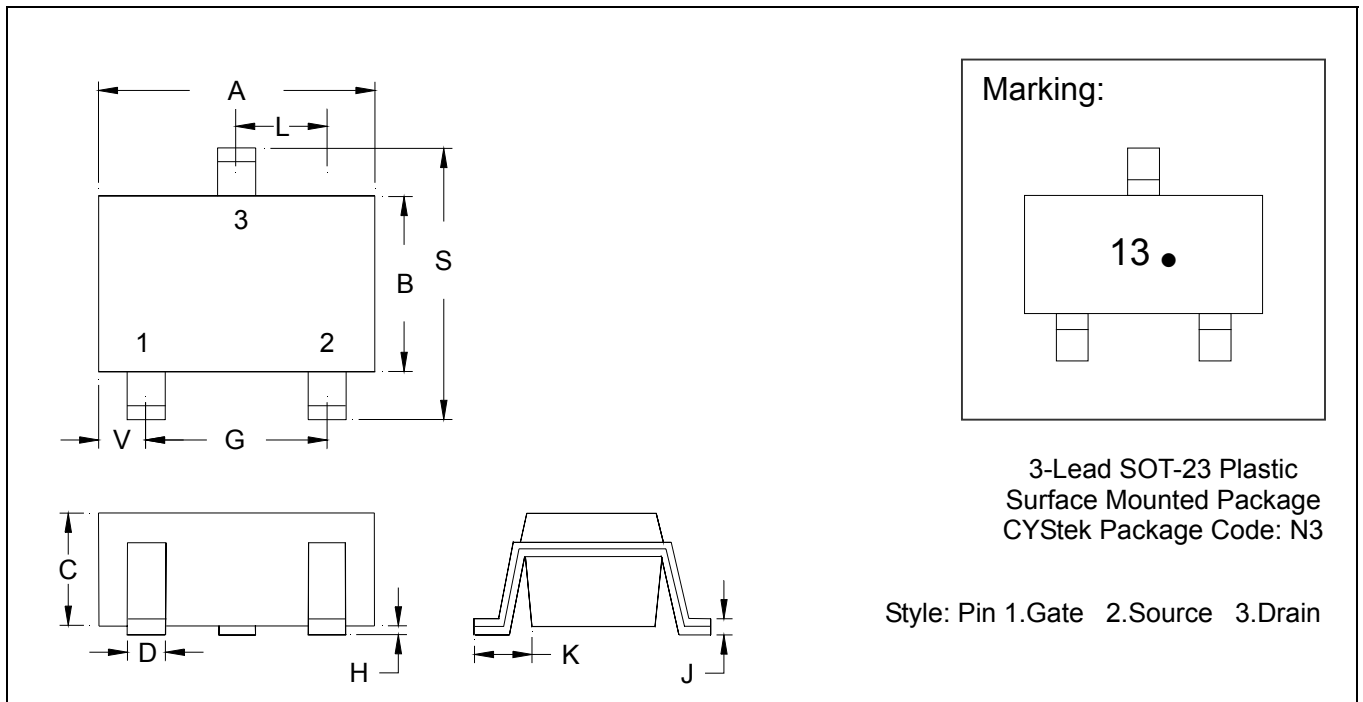
| | | |
|-----------------|------------------|-----------------|
| Product | Peak Temperature | Soldering Time |
| Pb-free devices | 260 +0/-5 °C | 5 +1/-1 seconds |

Recommended temperature profile for IR reflow


| Profile feature | Sn-Pb eutectic Assembly | Pb-free Assembly |
|--|-------------------------|------------------|
| Average ramp-up rate (Tsmax to Tp) | 3°C/second max. | 3°C/second max. |
| Preheat | | |
| -Temperature Min(Ts min) | 100°C | 150°C |
| -Temperature Max(Ts max) | 150°C | 200°C |
| -Time(ts min to ts max) | 60-120 seconds | 60-180 seconds |
| Time maintained above: | | |
| -Temperature (TL) | 183°C | 217°C |
| - Time (tL) | 60-150 seconds | 60-150 seconds |
| Peak Temperature(TP) | 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.

SOT-23 Dimension



| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|-----|--------|--------|-------------|------|-----|--------|--------|-------------|------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.1102 | 0.1204 | 2.80 | 3.04 | J | 0.0032 | 0.0079 | 0.08 | 0.20 |
| B | 0.0472 | 0.0669 | 1.20 | 1.70 | K | 0.0118 | 0.0266 | 0.30 | 0.67 |
| C | 0.0335 | 0.0512 | 0.89 | 1.30 | L | 0.0335 | 0.0453 | 0.85 | 1.15 |
| D | 0.0118 | 0.0197 | 0.30 | 0.50 | S | 0.0830 | 0.1161 | 2.10 | 2.95 |
| G | 0.0669 | 0.0910 | 1.70 | 2.30 | V | 0.0098 | 0.0256 | 0.25 | 0.65 |
| H | 0.0000 | 0.0040 | 0.00 | 0.10 | | | | | |

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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