

N-Channel Enhancement Mode MOSFET

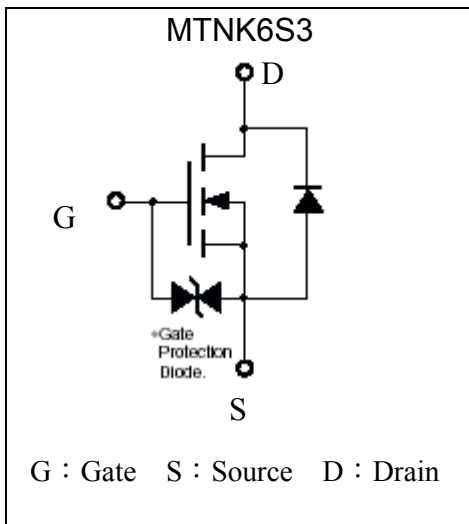
MTNK6S3

Features

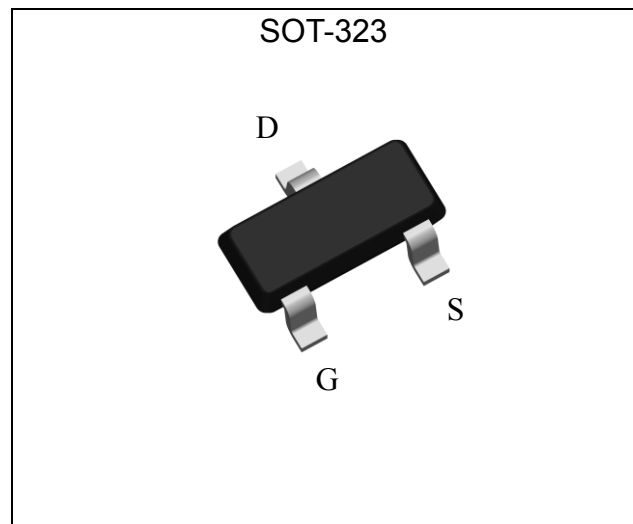
- ESD protected gate, typical 3kV (HBM)
- High speed switching
- Easily designed drive circuits
- Low-voltage drive
- Easy to use in parallel
- RoHS compliant package

| | |
|------------------------------------|--------------|
| BV_{DSS} | 60V |
| $I_D@V_{GS}=10V, T_A=25^\circ C$ | 0.2A |
| $R_{DS(ON)}@V_{GS}=10V, I_D=0.2A$ | 1.1 Ω |
| $R_{DS(ON)}@V_{GS}=4.5V, I_D=0.2A$ | 1.3 Ω |

Equivalent Circuit



Outline



Ordering Information

| Device | Package | Shipping |
|----------------|--|------------------------|
| MTNK6S3-0-T1-G | SOT-323 (Pb-free lead plating and halogen-free package) | 3000 pcs / Tape & Reel |

- ↑ Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products
- ↑ Packing spec, T1 : 3000 pcs / tape & reel, 7" reel
- ↑ Product rank, zero for no rank products
- ↑ Product name

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

| Parameter | Symbol | Limits | Unit |
|---|-----------------------------------|----------|------|
| Drain-Source Voltage | V _{DS} | 60 | V |
| Gate-Source Voltage | V _{GS} | ±20 | |
| Continuous Drain Current @ V _{GS} =10V, T _A =25°C | I _D | 0.2 | A |
| Continuous Drain Current @ V _{GS} =10V, T _A =70°C | | 0.16 | |
| Pulsed Drain Current *a | I _{DM} | 0.8 | |
| Continuous Body Diode Forward Current @ T _A =25°C | I _S | 0.16 | |
| ESD susceptibility *b | V _{ESD} | 3000 | V |
| Total Power Dissipation @ T _A =25°C | P _D | 0.2 | W |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | -55~+150 | °C |

Thermal Data

| Parameter | Symbol | Steady State | Unit |
|---|------------------|--------------|------|
| Thermal Resistance, Junction-to-ambient | R _{θJA} | 625 | °C/W |

Note:

*a. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

*b. Human body model, 1.5kΩ in series with 100pF.



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

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---------------------------|------|------|------|------|---|
| Static | | | | | |
| BV _{DSS} | 60 | - | - | V | V _{GS} =0V, I _D =250μA |
| V _{GS(th)} | 1 | - | 2.5 | | V _{DS} =V _{GS} , I _D =250μA |
| G _{FS} | - | 0.2 | - | S | V _{DS} =10V, I _D =0.2A |
| I _{GSS} | - | - | ±10 | μA | V _{GS} =±16V, V _{DS} =0V |
| I _{DSS} | - | - | 1 | | V _{DS} =48V, V _{GS} =0V |
| R _{DS(ON)} | - | 1.1 | 2.5 | Ω | V _{GS} =10V, I _D =0.2A |
| | - | 1.3 | 3 | | V _{GS} =4.5V, I _D =0.2A |
| Dynamic | | | | | |
| C _{iss} | - | 25 | - | pF | V _{DS} =30V, V _{GS} =0V, f=1MHz |
| C _{oss} | - | 9 | - | | |
| C _{rss} | - | 7 | - | | |
| Q _g *1, 2 | - | 1.7 | - | nC | V _{DS} =30V, I _D =0.2A, V _{GS} =10V |
| Q _{gs} *1, 2 | - | 0.7 | - | | |
| Q _{gd} *1, 2 | - | 0.24 | - | | |
| t _{d(ON)} *1, 2 | - | 4 | - | ns | V _{DS} =30V, I _D =0.2A, V _{GS} =10V, R _{GS} =1Ω |
| t _r *1, 2 | - | 15 | - | | |
| t _{d(OFF)} *1, 2 | - | 10 | - | | |
| t _f *1, 2 | - | 16 | - | | |
| Source-Drain Diode | | | | | |
| V _{SD} *1 | - | 0.8 | 1.2 | V | I _S =0.2A, V _{GS} =0V |
| t _{rr} | - | 9 | - | ns | I _F =0.2A, dI _F /dt=100A/μs |
| Q _{rr} | - | 3 | - | nC | |

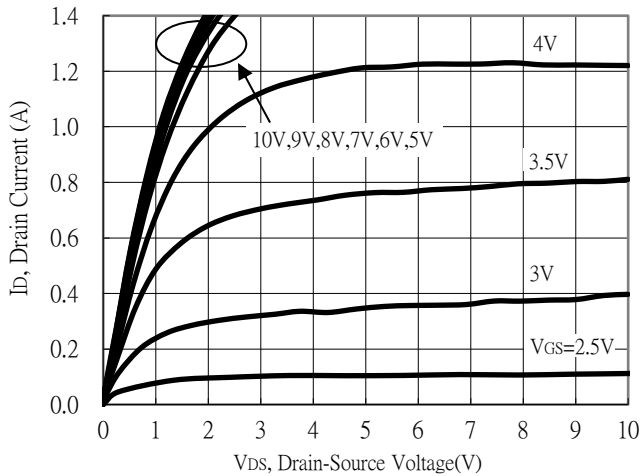
Note:

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

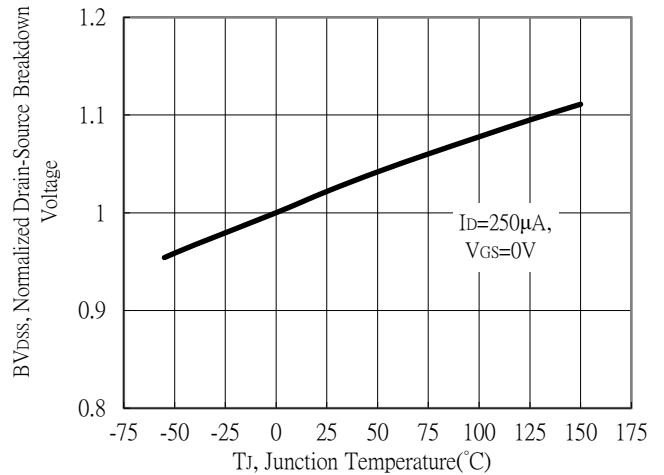
*2. Independent of operating temperature

Typical Characteristics

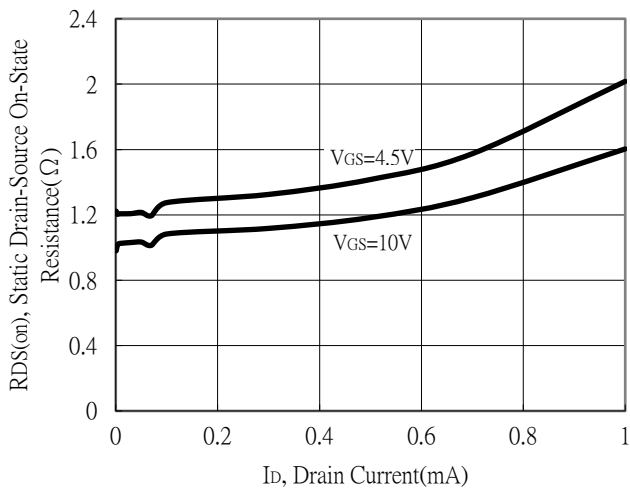
Typical Output Characteristics



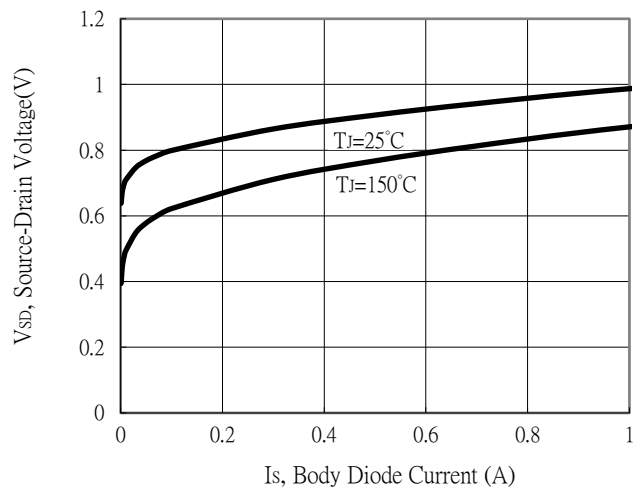
Breakdown Voltage vs Ambient Temperature



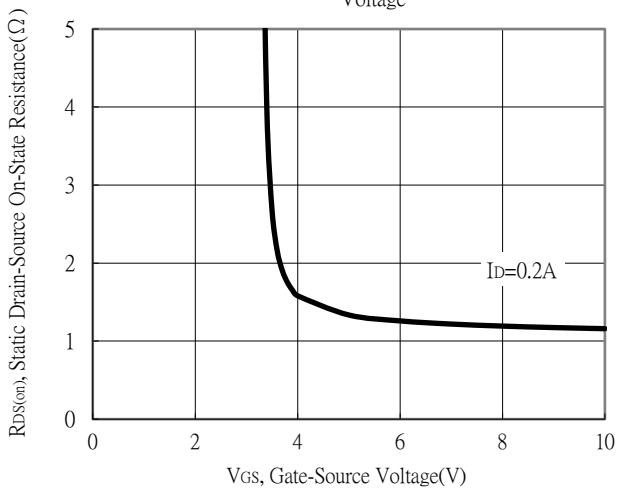
Static Drain-Source On-State resistance vs Drain Current



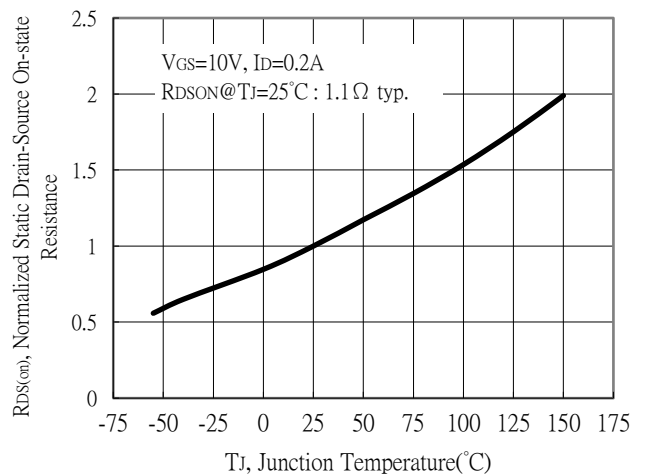
Body Diode Current vs Source-Drain Voltage



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

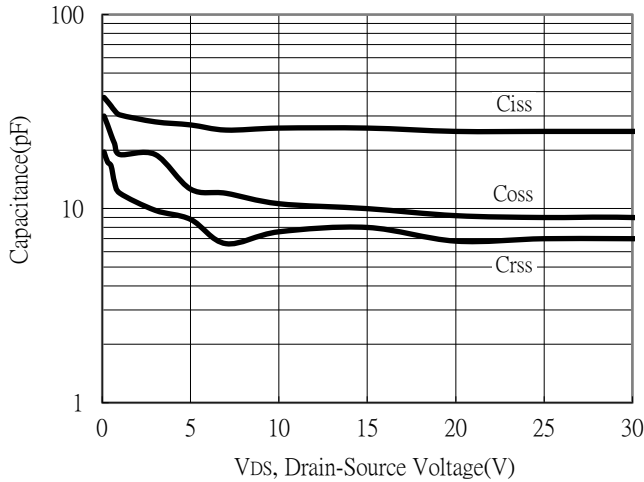


Drain-Source On-State Resistance vs Junction Temperature

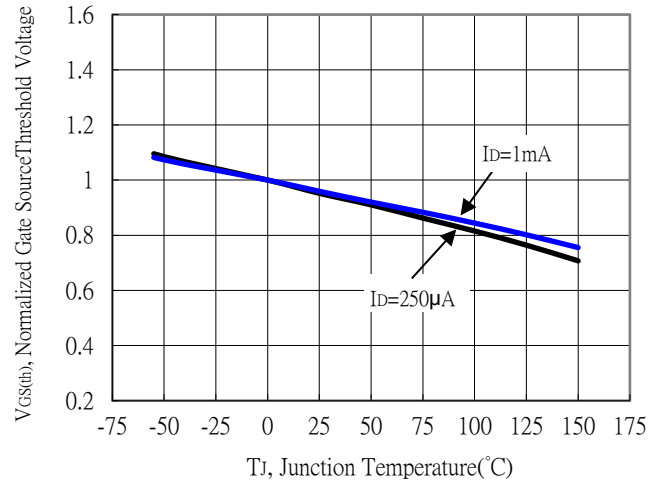


Typical Characteristics (Cont.)

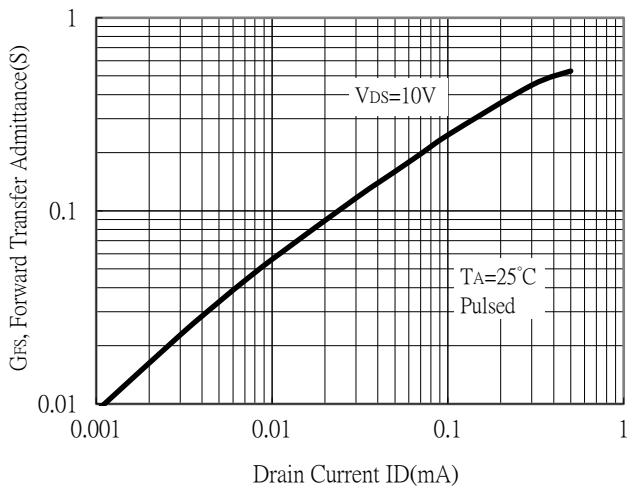
Capacitance vs Drain-to-Source Voltage



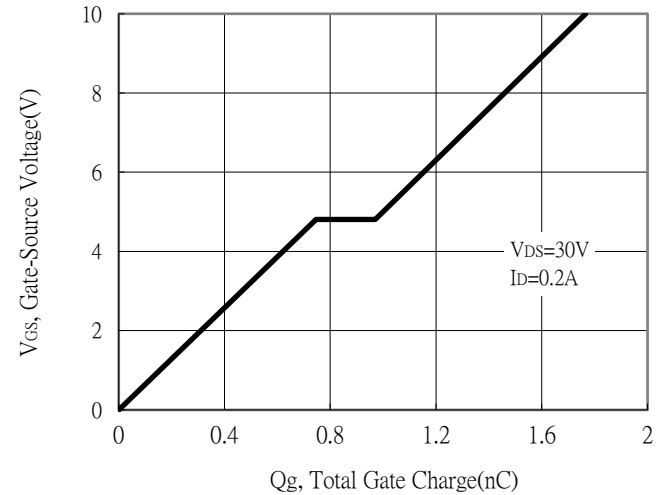
Threshold Voltage vs Junction Temperature



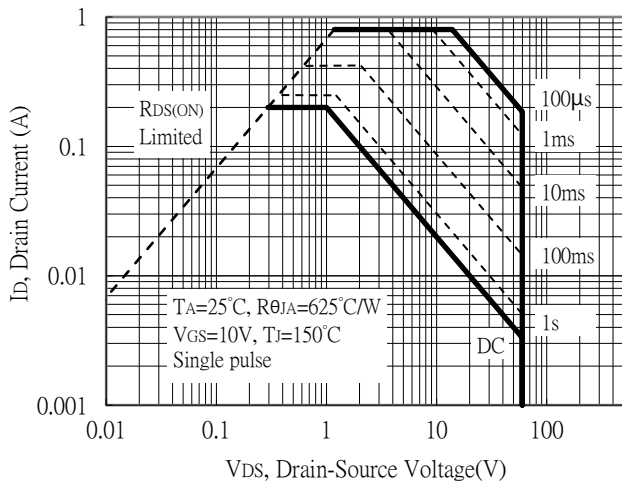
Forward Transfer Admittance vs Drain Current



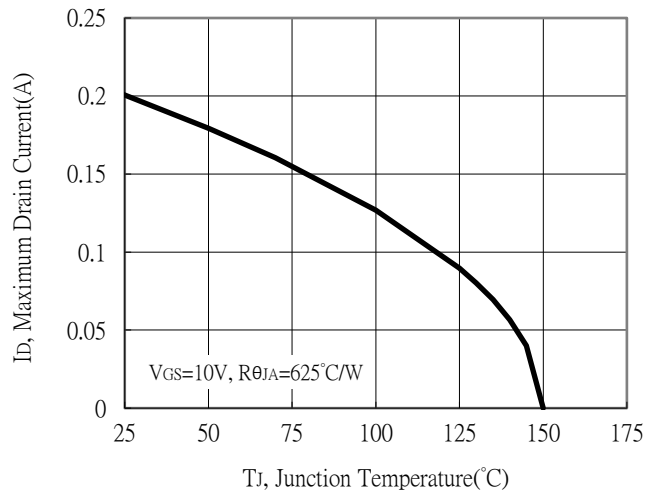
Gate Charge Characteristics



Maximum Safe Operating Area

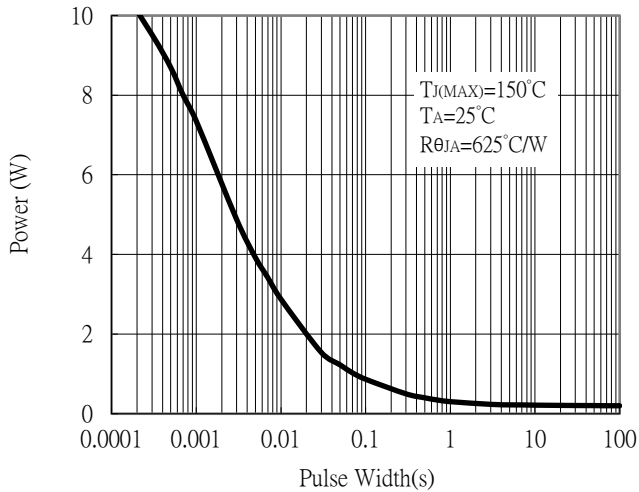


Maximum Drain Current vs Junction Temperature

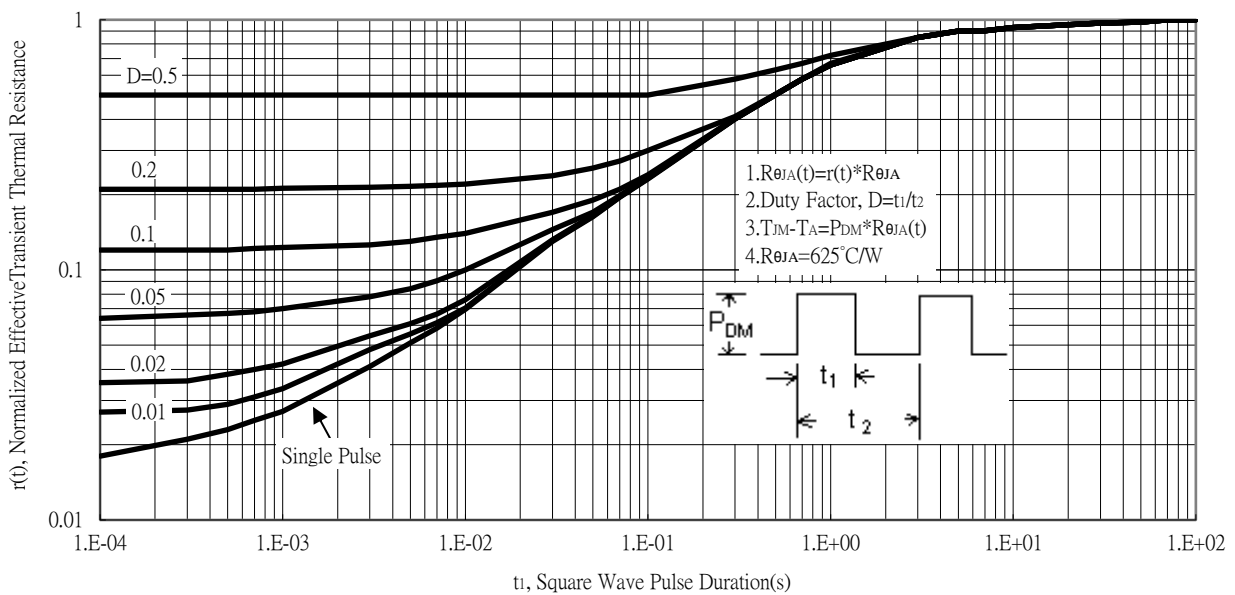


Typical Characteristics (Cont.)

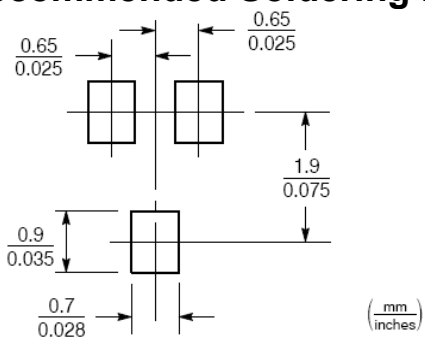
Single Pulse Power Rating, Junction to Ambient



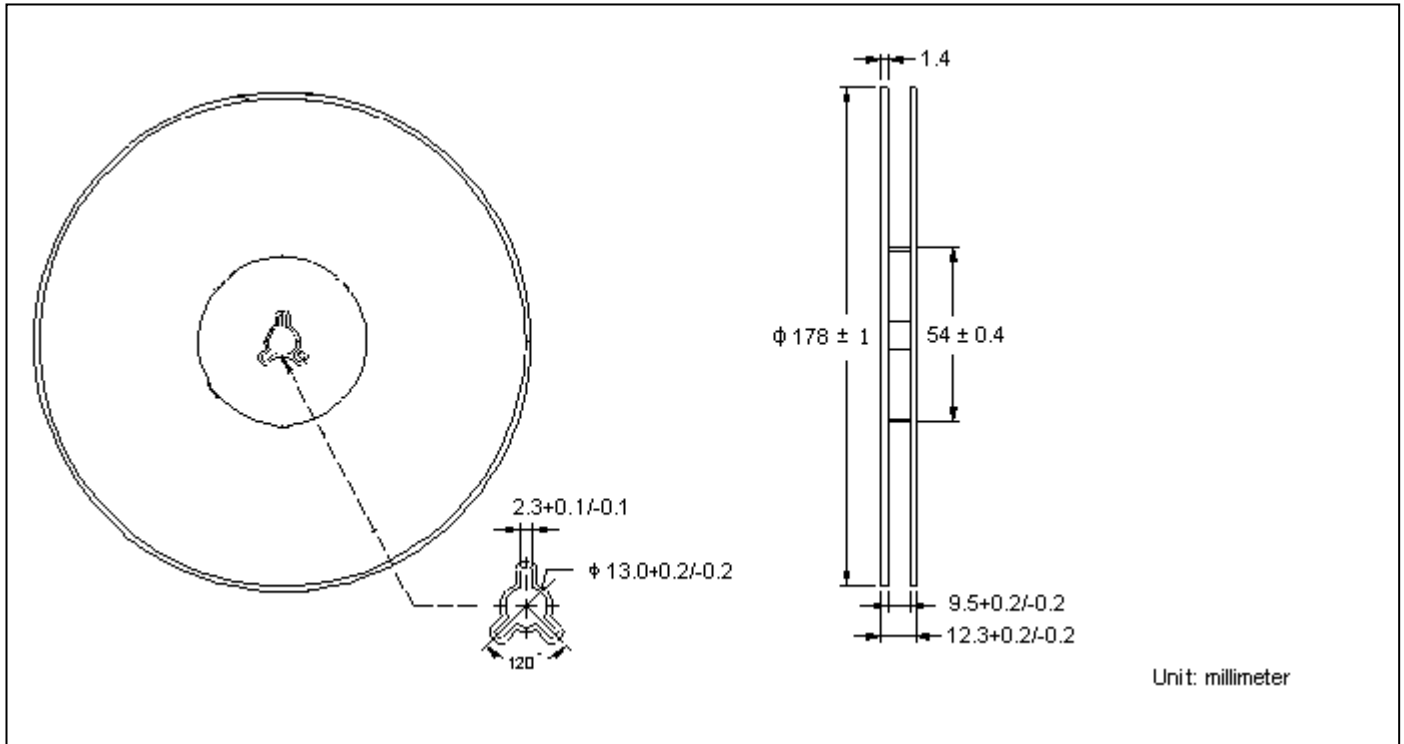
Transient Thermal Response Curves



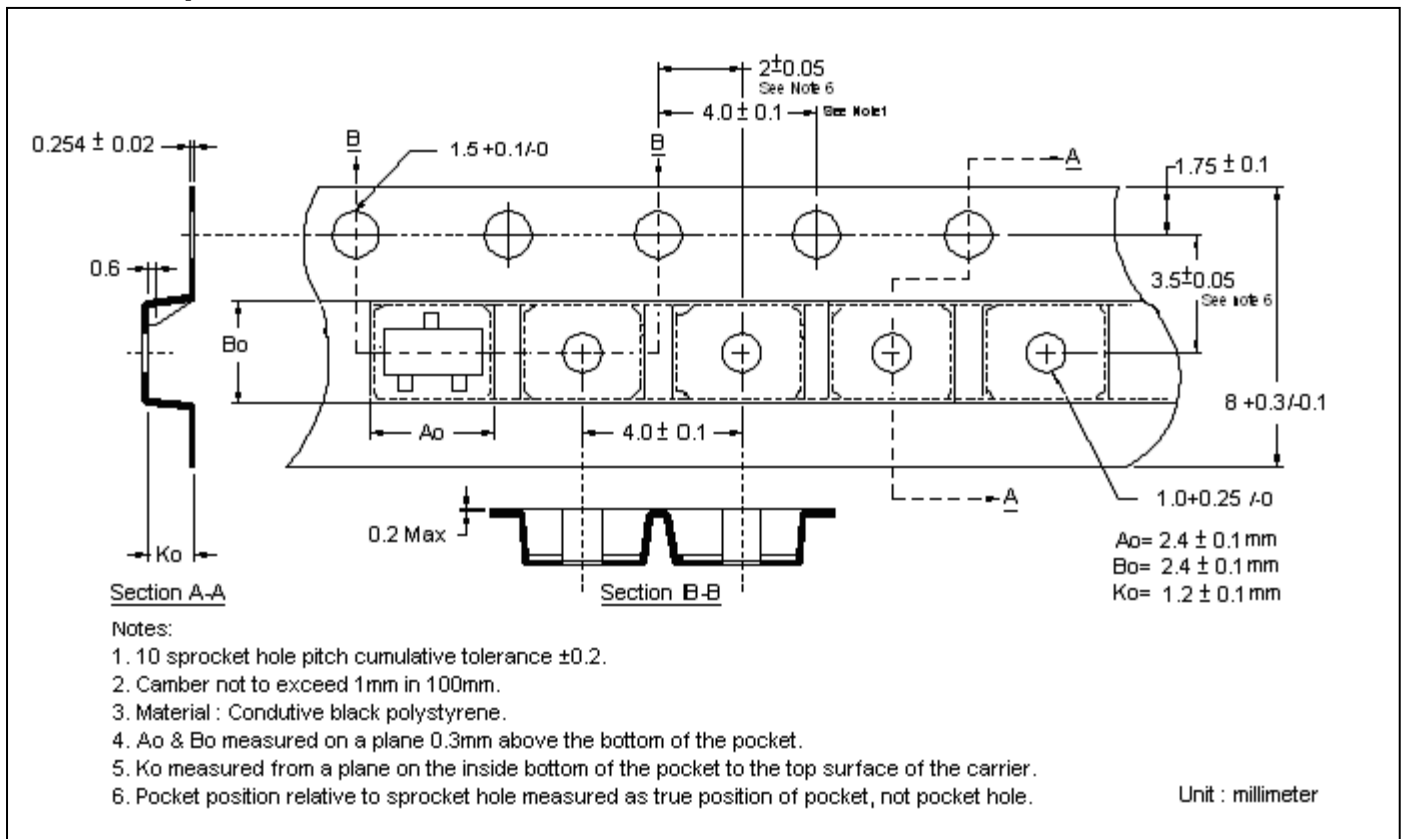
Recommended Soldering Footprint



Reel Dimension



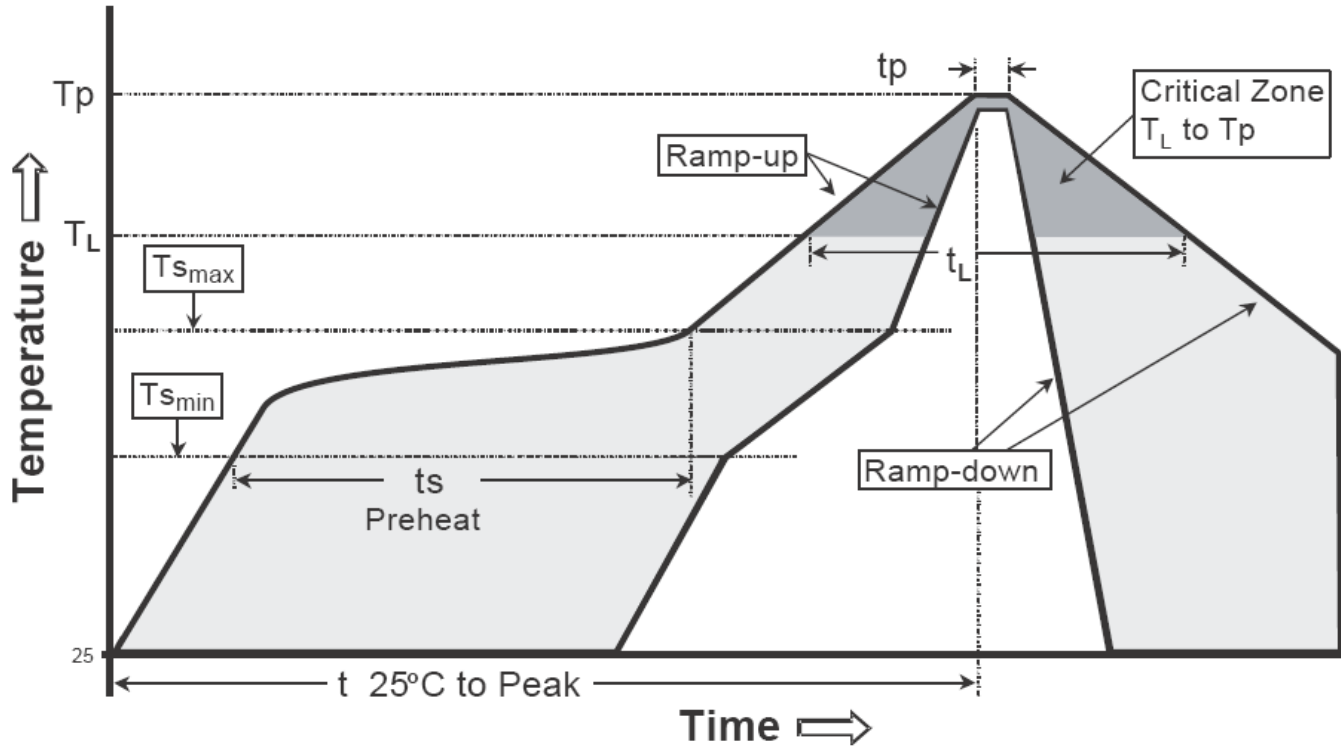
Carrier Tape Dimension



Recommended wave soldering condition

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

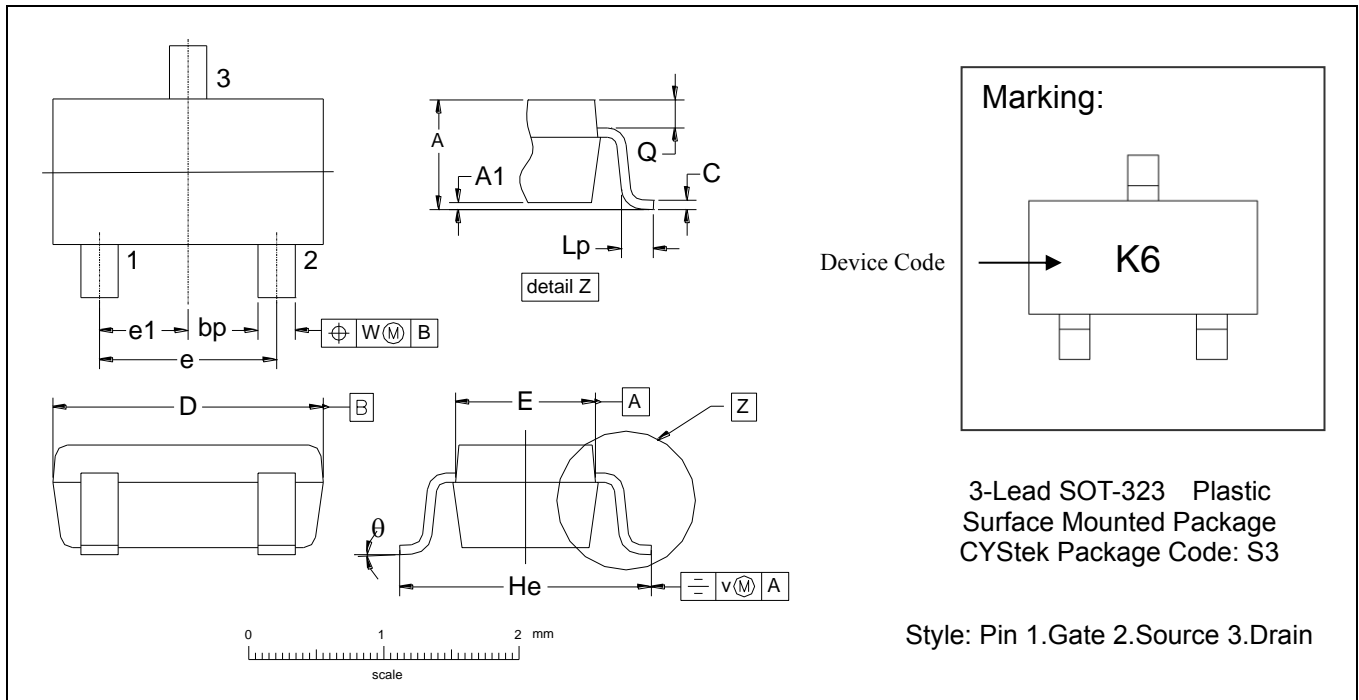
Recommended temperature profile for IR reflow



| 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-323 Dimension



| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|-----|--------|--------|-------------|------|-----|--------|--------|-------------|------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.0315 | 0.0433 | 0.80 | 1.10 | e1 | 0.0256 | - | 0.65 | - |
| A1 | 0.0000 | 0.0039 | 0.00 | 0.10 | He | 0.0787 | 0.0886 | 2.00 | 2.25 |
| bp | 0.0118 | 0.0157 | 0.30 | 0.40 | Lp | 0.0059 | 0.0177 | 0.15 | 0.45 |
| C | 0.0039 | 0.0098 | 0.10 | 0.25 | Q | 0.0051 | 0.0091 | 0.13 | 0.23 |
| D | 0.0709 | 0.0866 | 1.80 | 2.20 | v | 0.0079 | - | 0.2 | - |
| E | 0.0453 | 0.0531 | 1.15 | 1.35 | w | 0.0079 | - | 0.2 | - |
| e | 0.0512 | - | 1.3 | - | θ | - | - | 10° | 0° |

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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