

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D T _A = +25°C |
|-------------------|-------------------------------|--|
| -20V | 38mΩ @V _{GS} = -4.5V | -5.5A |
| | 52mΩ @V _{GS} = -2.5V | -5.0A |

Features and Benefits

- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DIODES™ DMP2040UVTQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and ideal for use in:

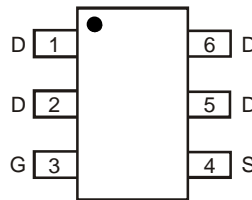
- DC-DC converters
- Motor controls
- Power management functions
- Analog switches

Mechanical Data

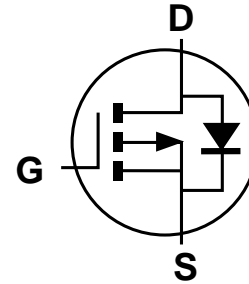
- Package: TSOT26
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.013 grams (Approximate)



Top View



Top View
Pinout



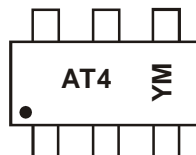
Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Package | Packing | |
|----------------|---------|---------|-------------|
| | | Qty. | Carrier |
| DMP2040UVTQ-7 | TSOT26 | 3,000 | Tape & Reel |
| DMP2040UVTQ-13 | TSOT26 | 10,000 | Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



AT4 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: J = 2022)
 M = Month (ex: 8 = August)

Date Code Key

| Year | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | H | I | J | K | L | M | N | O | P | R | S | T |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | -20 | V |
| Gate-Source Voltage | | | V _{GSS} | ±12 | V |
| Continuous Drain Current (Note 6) V _{GS} = -4.5V | Steady State | T _A = +25°C | I _D | -5.5 | A |
| | | T _A = +70°C | | -4.5 | |
| Continuous Drain Current (Note 7) V _{GS} = -4.5V | Steady State | T _C = +25°C | I _D | -13 | A |
| | | T _C = +70°C | | -10 | |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) | | | I _{DM} | -40 | A |
| Continuous Source-Drain Diode Current (Note 6) | | | I _S | -2.2 | A |
| Avalanche Current (Note 8) L = 0.1mH | | | I _{AS} | -16 | A |
| Avalanche Energy (Note 8) L = 0.1mH | | | E _{AS} | 13.5 | mJ |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|--|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | T _A = +25°C | P _D | 1.2 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | | R _{θJA} | 105 | °C/W |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 1.5 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | | R _{θJA} | 80 | °C/W |
| Thermal Resistance, Junction to Case (Note 7) | | R _{θJC} | 16 | °C/W |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|------|------|------|------|--|
| OFF CHARACTERISTICS (Note 9) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -20 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1 | μA | V _{DS} = -16V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 9) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -0.6 | — | -1.5 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 27 | 38 | mΩ | V _{GS} = -4.5V, I _D = -8.9A |
| | | — | 38 | 52 | | V _{GS} = -2.5V, I _D = -6.9A |
| Diode Forward Voltage | V _{SD} | — | -0.7 | -1.2 | V | V _{GS} = 0V, I _S = -2.9A |
| DYNAMIC CHARACTERISTICS (Note 10) | | | | | | |
| Input Capacitance | C _{ISS} | — | 834 | — | pF | V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 133 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 105 | — | | |
| Gate Resistance | R _G | — | 4.9 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 8.6 | — | nC | V _{DS} = -6V, I _D = -8.9A |
| Total Gate Charge (V _{GS} = -8V) | Q _g | — | 19 | — | | |
| Gate-Source Charge | Q _{gs} | — | 1.5 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 2.5 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.8 | — | ns | V _{DD} = -6V, R _L = 6Ω, V _{GS} = -4.5V, R _G = 6Ω, I _D = -1A |
| Turn-On Rise Time | t _R | — | 7.7 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 28.1 | — | | |
| Turn-Off Fall Time | t _F | — | 14.6 | — | | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 9.8 | — | ns | I _F = -8.9A, di/dt = -100A/μs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 2.7 | — | nC | I _F = -8.9A, di/dt = -100A/μs |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

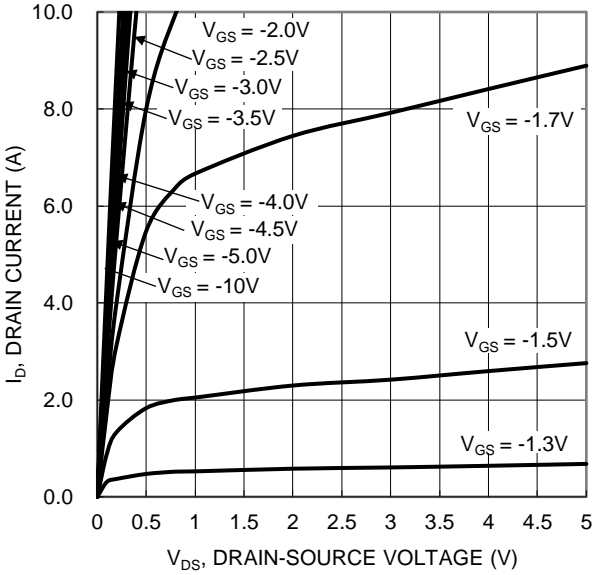


Figure 1. Typical Output Characteristic

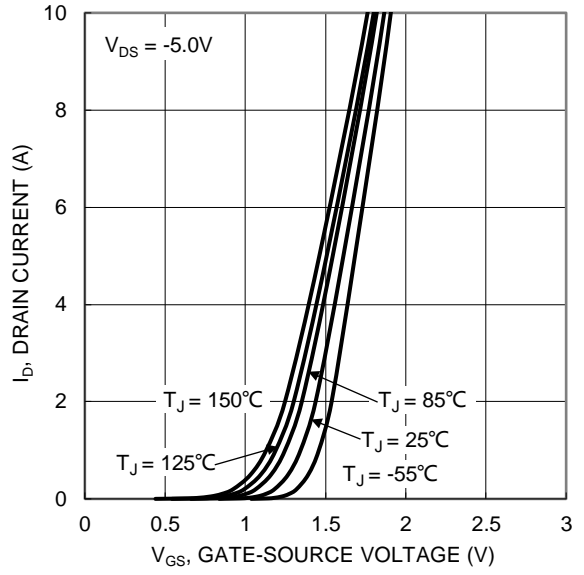


Figure 2. Typical Transfer Characteristic

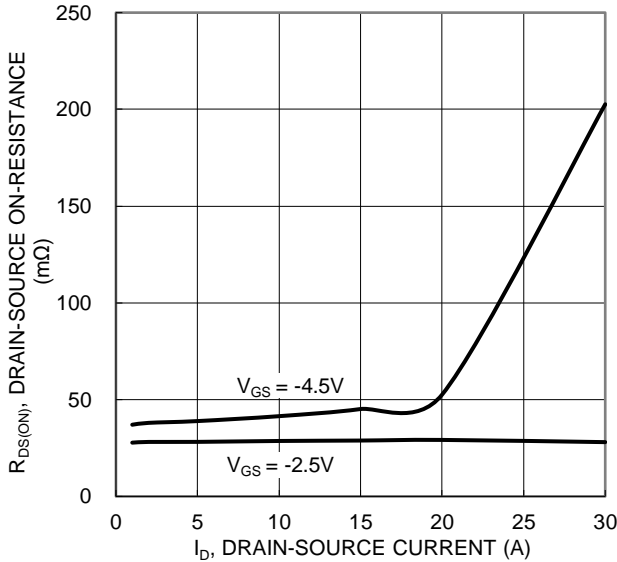


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

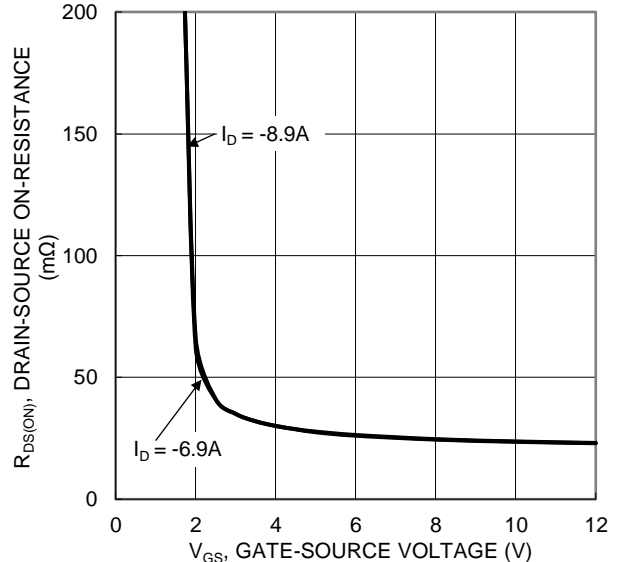


Figure 4. Typical Transfer Characteristic

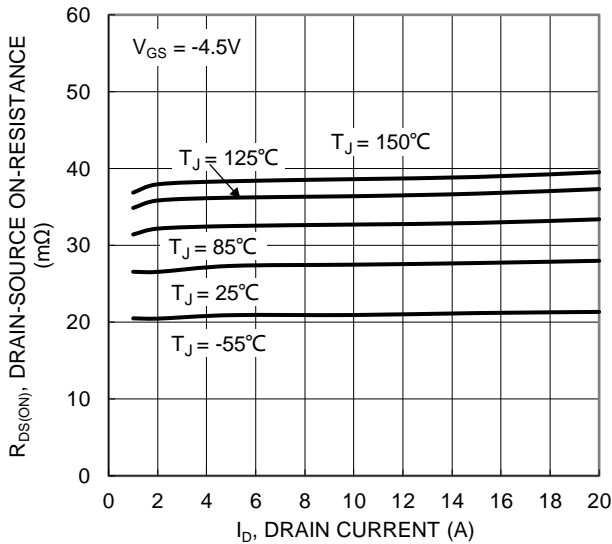


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

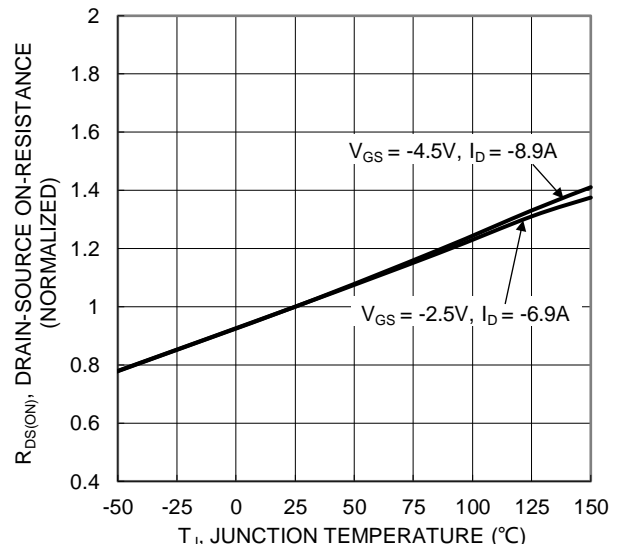


Figure 6. On-Resistance Variation with Temperature

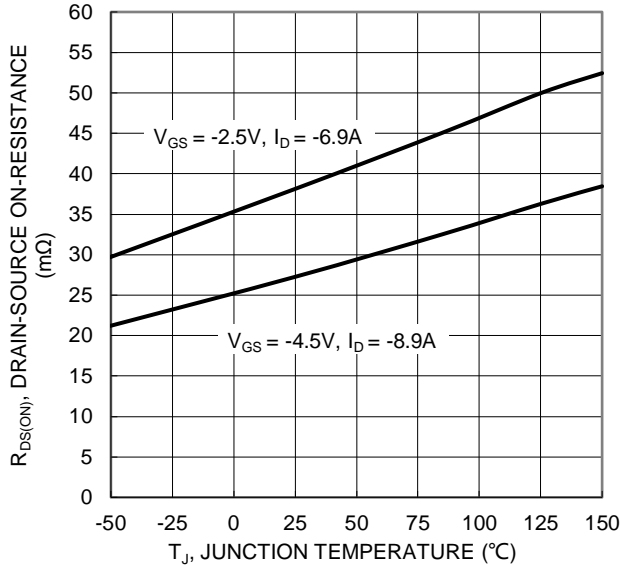


Figure 7. On-Resistance Variation with Temperature

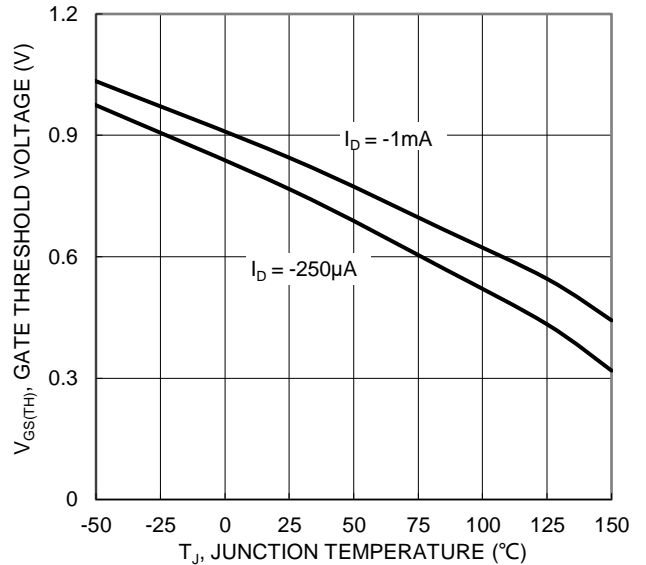


Figure 8. Gate Threshold Variation vs. Junction Temperature

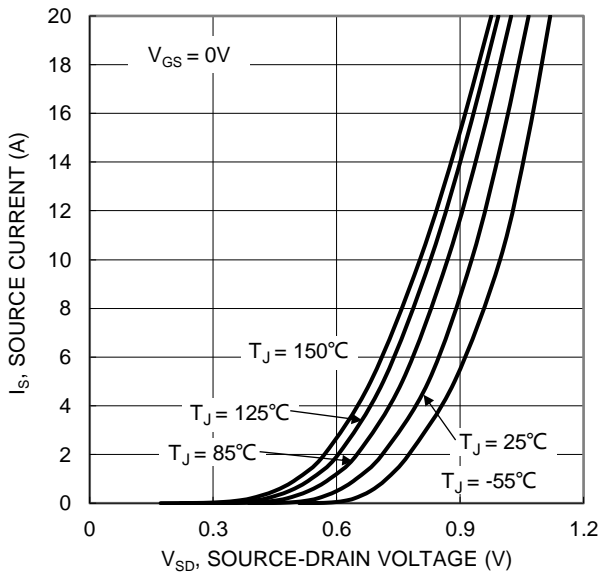


Figure 9. Diode Forward Voltage vs. Current

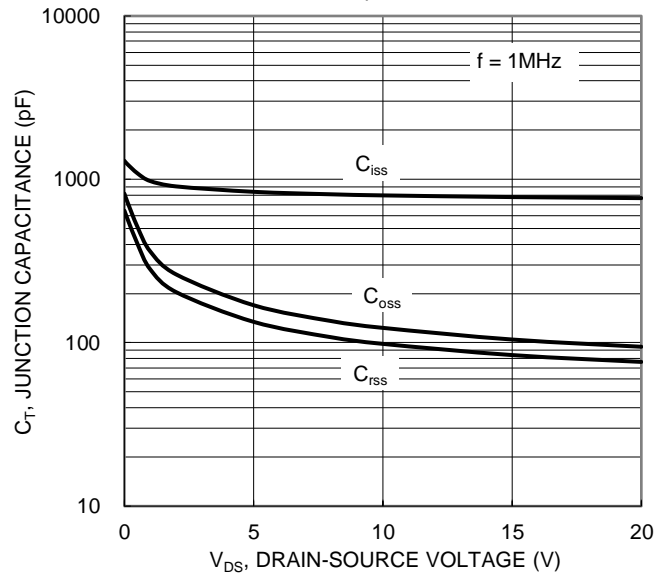


Figure 10. Typical Junction Capacitance

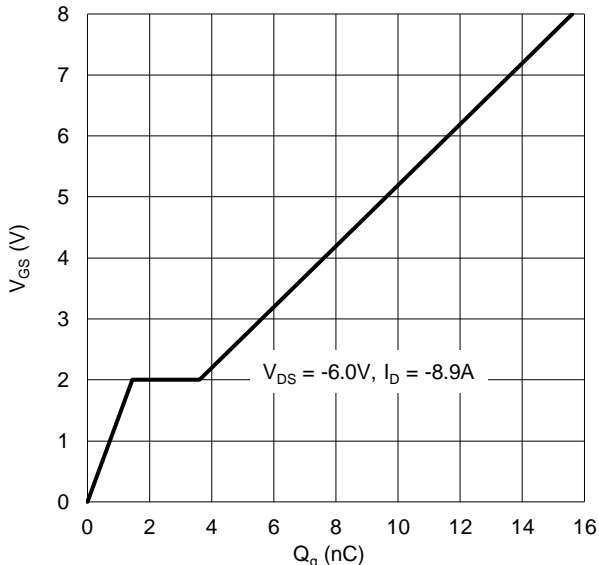


Figure 11. Gate Charge

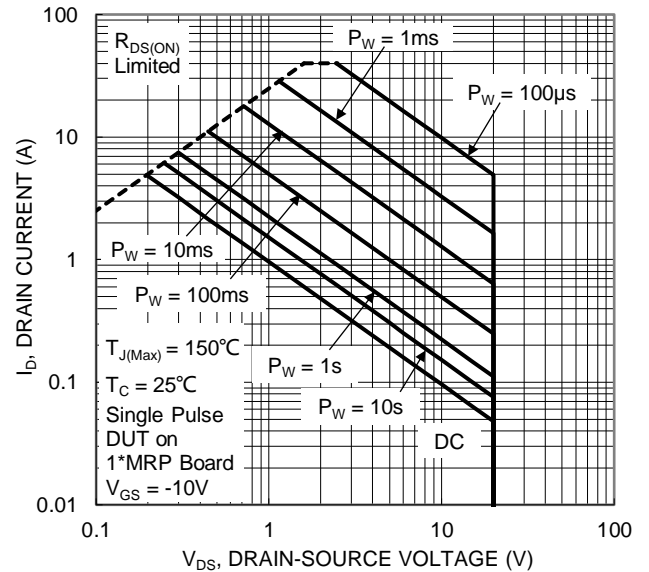


Figure 12. SOA, Safe Operation Area

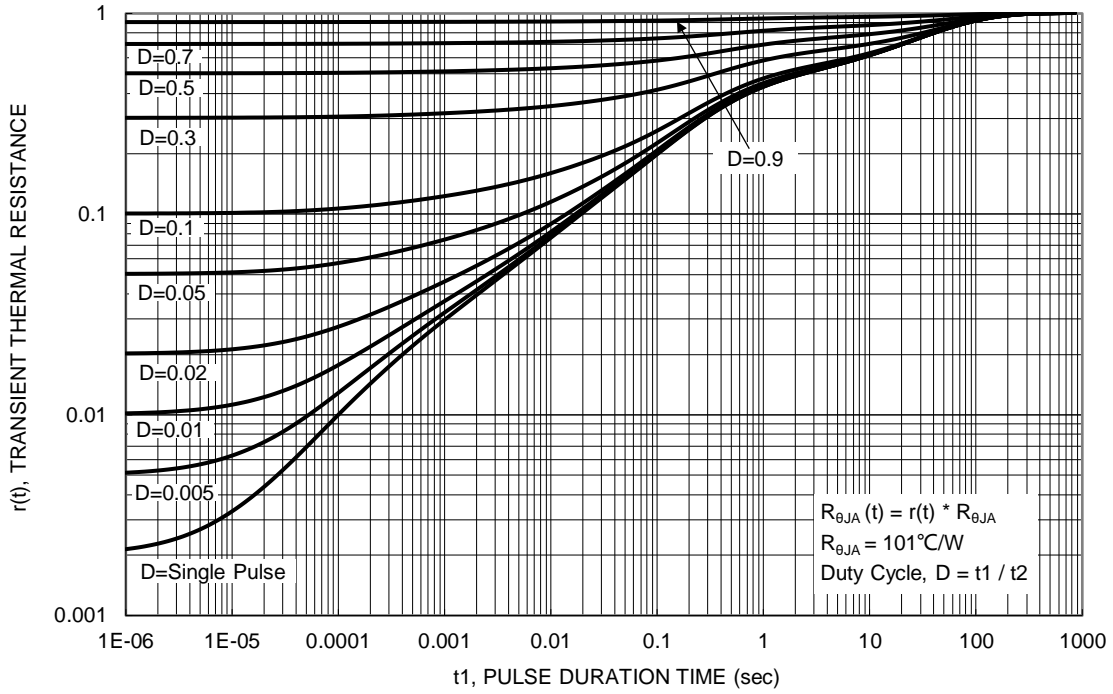
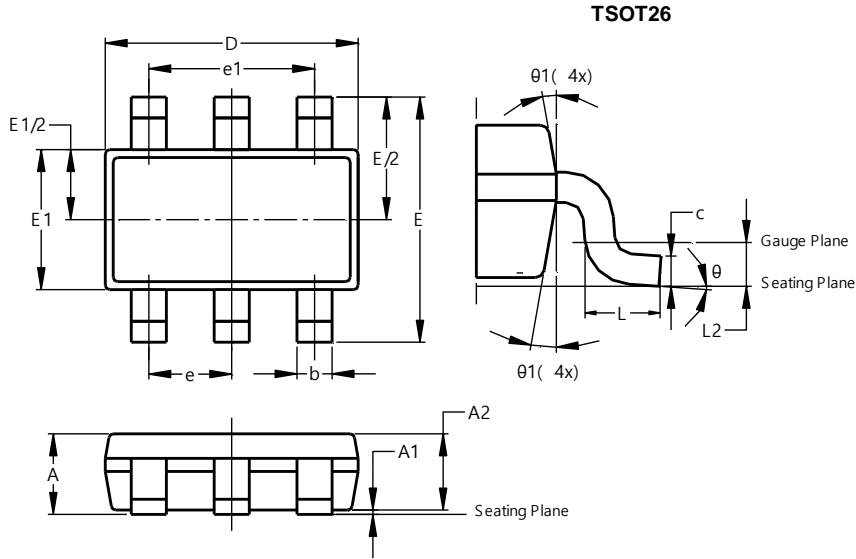


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

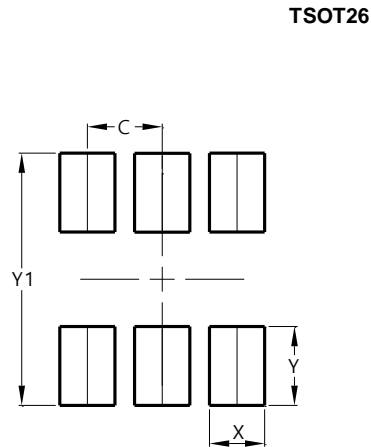
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| TSOT26 | | | |
|-----------------------------|-----------|-------|-------|
| Dim | Min | Max | Typ |
| A | – | 1.00 | – |
| A1 | 0.010 | 0.100 | – |
| A2 | 0.840 | 0.900 | – |
| D | 2.800 | 3.000 | 2.900 |
| E | 2.800 BSC | | |
| E1 | 1.500 | 1.700 | 1.600 |
| b | 0.300 | 0.450 | – |
| c | 0.120 | 0.200 | – |
| e | 0.950 BSC | | |
| e1 | 1.900 BSC | | |
| L | 0.30 | 0.50 | – |
| L2 | 0.250 BSC | | |
| θ | 0° | 8° | 4° |
| θ1 | 4° | 12° | – |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.950 |
| X | 0.700 |
| Y | 1.000 |
| Y1 | 3.200 |

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