

**COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET**
**Product Summary**

| Device | $V_{(BR)DSS}$ | $R_{DS(ON)}$                   | $I_D$<br>$T_A = +25^\circ\text{C}$ |
|--------|---------------|--------------------------------|------------------------------------|
| Q1     | 25V           | 4Ω @ $V_{GS} = 4.5\text{V}$    | 0.5A                               |
| Q2     | -12V          | 55mΩ @ $V_{GS} = -4.5\text{V}$ | -3.9A                              |
|        |               | 70mΩ @ $V_{GS} = -2.5\text{V}$ | -3.5A                              |

**Description**

This new generation MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

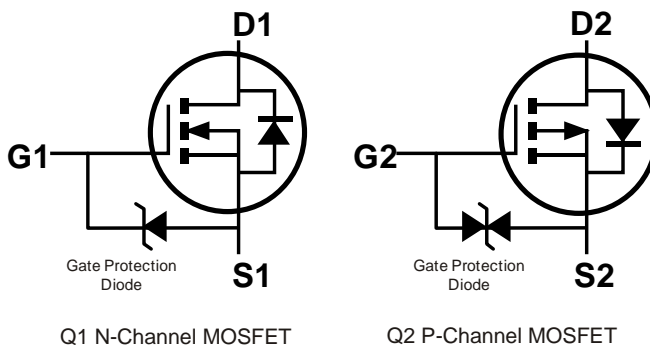
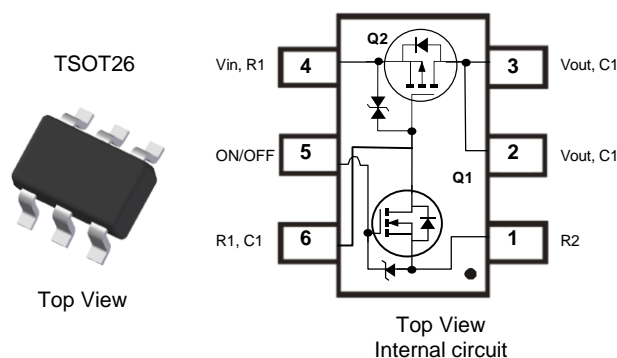
- DC-DC Converters
- Power Management Functions
- Load Switch

**Features and Benefits**

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

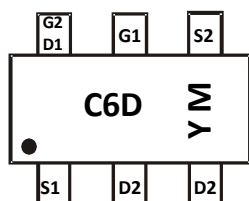
**Mechanical Data**

- Case: TSOT26
- Case 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 (e3)
- Weight: 0.013 grams (Approximate)

**NEW PRODUCT**

**Ordering Information** (Note 4)

| Part Number   | Case   | Packaging           |
|---------------|--------|---------------------|
| DMC25D1UVT-7  | TSOT26 | 3000 / Tape & Reel  |
| DMC25D1UVT-13 | TSOT26 | 10000 / Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>.

**Marking Information**


C6D = Product Type Marking Code  
 YM or YM = Date Code Marking  
 Y or Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

**Date Code Key**

| Year  | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |     |     |     |     |     |
|-------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|
| Code  | C    | D    | E    | F    | G    | H    | I    |     |     |     |     |     |
| 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 – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic   | Symbol           | Value      | Unit |
|--|------------------|------------|------|
| Drain-Source Voltage                                     | V <sub>DSS</sub> | 25         | V    |
| Gate-Source Voltage                                      | V <sub>GSS</sub> | -0.5<br>+8 | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V | I <sub>D</sub>   | 0.5        | A    |
| Maximum Continuous Body Diode Forward Current (Note 6)   | I <sub>S</sub>   | 1.2        | A    |
| Pulsed Drain Current (Note 6)                            | I <sub>DM</sub>  | 1.5        | A    |

**Maximum Ratings – Q2** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic  | Symbol           | Value        | Unit  |
|---|------------------|--------------|-------|
| Drain-Source Voltage                                      | V <sub>DSS</sub> | -12          | V     |
| Gate-Source Voltage                                       | V <sub>GSS</sub> | ±8           | V     |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V | I <sub>D</sub>   | Steady State | -3.9  |
|   |                  | Note 9       | -17.4 |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -2.5V | I <sub>D</sub>   | -2.82        | A     |
| Maximum Continuous Body Diode Forward Current (Note 6)    | I <sub>S</sub>   | -40          | A     |
| Pulsed Drain Current (Note 6)                             | I <sub>DM</sub>  | -40          | A     |

**Thermal Characteristics**

| Characteristic                                   | Symbol                            | Value        | Unit |
|--|-----------------------------------|--------------|------|
| Power Dissipation (Note 5)                       | P <sub>D</sub>                    | 1.3          | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | Steady State | 100  |
|  |                                   | Note 9       | 5    |
| Thermal Resistance, Junction to Case (Note 5)    | R <sub>θJC</sub>                  | 36           | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150  | °C   |

**Electrical Characteristics – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

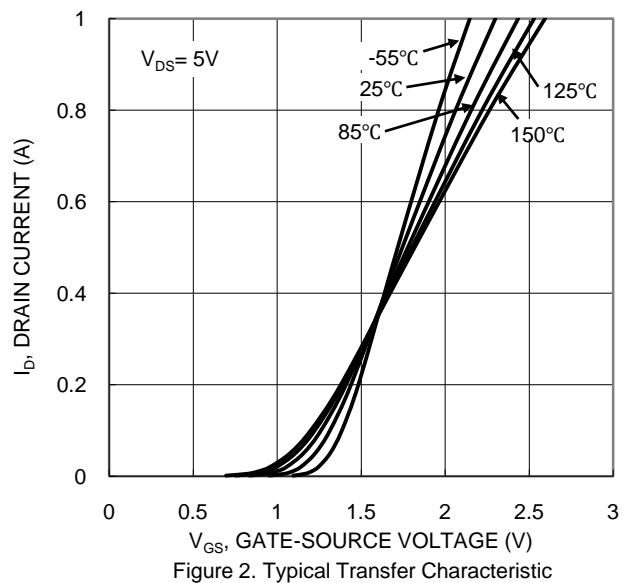
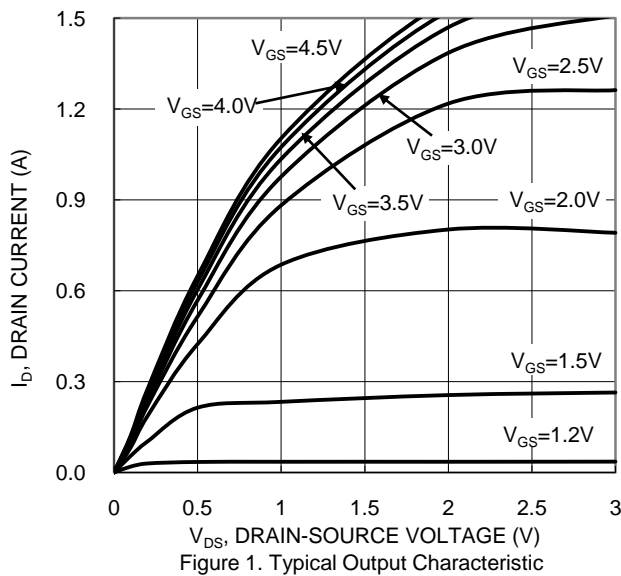
| Characteristic                             | Symbol              | Min  | Typ  | Max | Unit | Test Condition   |
|--|---------------------|------|------|-----|------|--|
| <b>OFF CHARACTERISTICS (Note 7)</b>        |                     |      |      |     |      |  |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 25   | —    | —   | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA   |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —    | —    | 1   | μA   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V  |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —    | —    | 100 | nA   | V <sub>GS</sub> = 8V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 7)</b>         |                     |      |      |     |      |  |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 0.65 | 0.85 | 1.5 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                   |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —    | 3.8  | 4   | Ω    | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 0.4A  |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —    | 0.76 | 1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 0.29A   |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>    |                     |      |      |     |      |  |
| Input Capacitance                          | C <sub>iss</sub>    | —    | 27.6 | —   | pF   | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                   |
| Output Capacitance                         | C <sub>oss</sub>    | —    | 8.5  | —   |      |  |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —    | 3.3  | —   |      |  |
| Gate Resistance                            | R <sub>g</sub>      | —    | 25   | —   | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz   |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —    | 0.4  | —   | nC   | V <sub>DS</sub> = 5V, I <sub>D</sub> = 0.2A  |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —    | 0.9  | —   |      |  |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —    | 0.1  | —   |      |  |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —    | 0.04 | —   |      |  |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —    | 2.5  | —   | ns   | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 6V,<br>R <sub>G</sub> = 50Ω, I <sub>D</sub> = 0.5A |
| Turn-On Rise Time                          | t <sub>R</sub>      | —    | 1.4  | —   |      |  |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —    | 5.7  | —   |      |  |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —    | 4.3  | —   |      |  |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1in. square copper plate.
  - Repetitive rating, pulse width limited by junction temperature.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.
  - Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%.

**Electrical Characteristics – Q2** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                              | Symbol              | Min   | Typ  | Max  | Unit | Test Condition   |
|---|---------------------|-------|------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 10)</b>        |                     |       |      |      |      |  |
| Drain-Source Breakdown Voltage              | BV <sub>DSS</sub>   | -12   | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA  |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>    | —     | —    | -1   | μA   | V <sub>DS</sub> = -6.4V, V <sub>GS</sub> = 0V  |
| Gate-Source Leakage                         | I <sub>GSS</sub>    | —     | —    | ±10  | μA   | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 10)</b>         |                     |       |      |      |      |  |
| Gate Threshold Voltage                      | V <sub>GS(TH)</sub> | -0.35 | —    | -1.5 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                    |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | —     | —    | 55   | mΩ   | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2.8A  |
|   |                     | —     | —    | 70   |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2.5A  |
|   |                     | —     | —    | 100  |      | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2.0A  |
| Diode Forward Voltage                       | V <sub>SD</sub>     | —     | —    | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -0.6A   |
| <b>DYNAMIC CHARACTERISTICS (Note 11)</b>    |                     |       |      |      |      |  |
| Input Capacitance                           | C <sub>iSS</sub>    | —     | 9.7  | —    | pF   | V <sub>DS</sub> = -6V, V <sub>GS</sub> = 0V,<br>f = 1MHz                                       |
| Output Capacitance                          | C <sub>oSS</sub>    | —     | 393  | —    |      |  |
| Reverse Transfer Capacitance                | C <sub>rSS</sub>    | —     | 1.9  | —    |      |  |
| Gate Resistance                             | R <sub>g</sub>      | —     | 1846 | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz   |
| Total Gate Charge (V <sub>GS</sub> = -4.5V) | Q <sub>g</sub>      | —     | 24.5 | —    | nC   | V <sub>DS</sub> = -6V, I <sub>D</sub> = -2.8A  |
| Gate-Source Charge                          | Q <sub>gs</sub>     | —     | 3.3  | —    |      |  |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | —     | 7.3  | —    |      |  |
| Turn-On Delay Time                          | t <sub>D(ON)</sub>  | —     | 1.2  | —    | μs   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -6V,<br>R <sub>G</sub> = 6Ω, I <sub>D</sub> = -2.8A |
| Turn-On Rise Time                           | t <sub>R</sub>      | —     | 2.7  | —    |      |  |
| Turn-Off Delay Time                         | t <sub>D(OFF)</sub> | —     | 9.8  | —    |      |  |
| Turn-Off Fall Time                          | t <sub>F</sub>      | —     | 6.5  | —    |      |  |

Notes: 10. Short duration pulse test used to minimize self-heating effect.  
11. Guaranteed by design. Not subject to production testing.

**Typical Characteristics - N-CHANNEL**


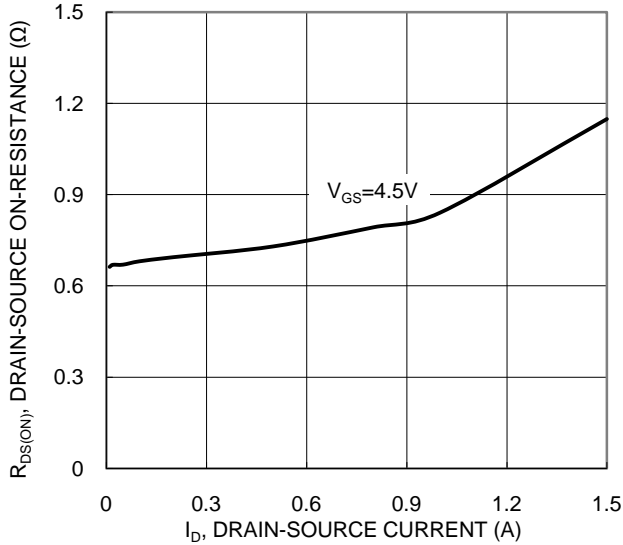


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

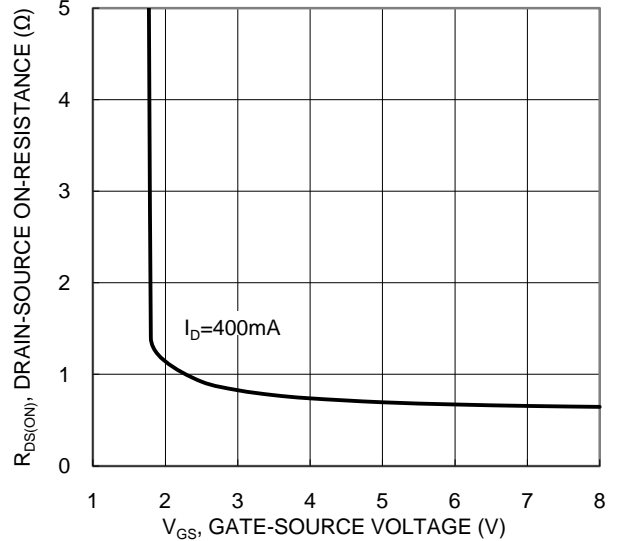


Figure 4. Typical Transfer Characteristic

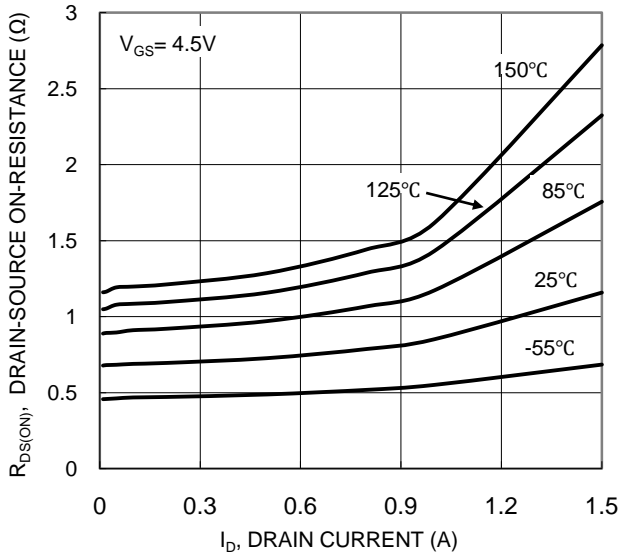


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

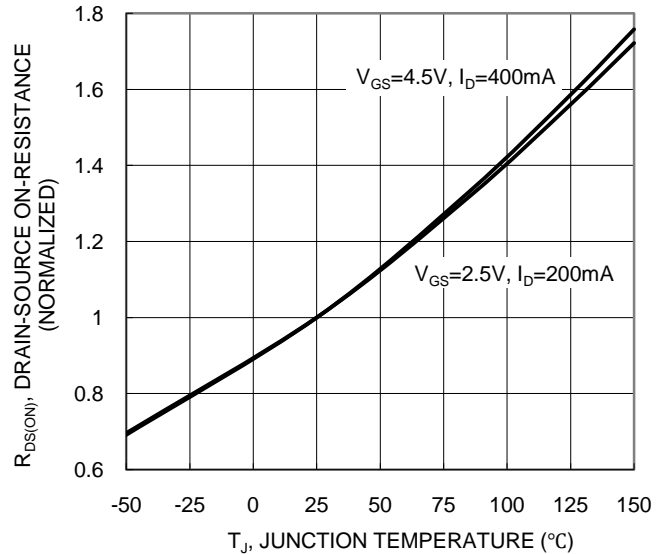


Figure 6. On-Resistance Variation with Temperature

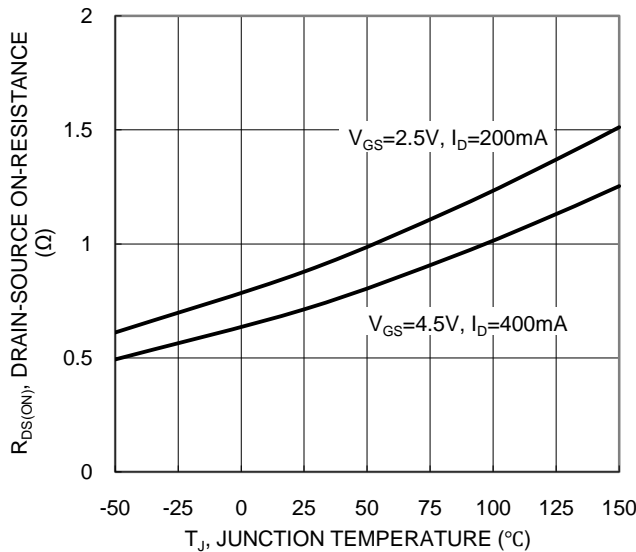


Figure 7. On-Resistance Variation with Temperature

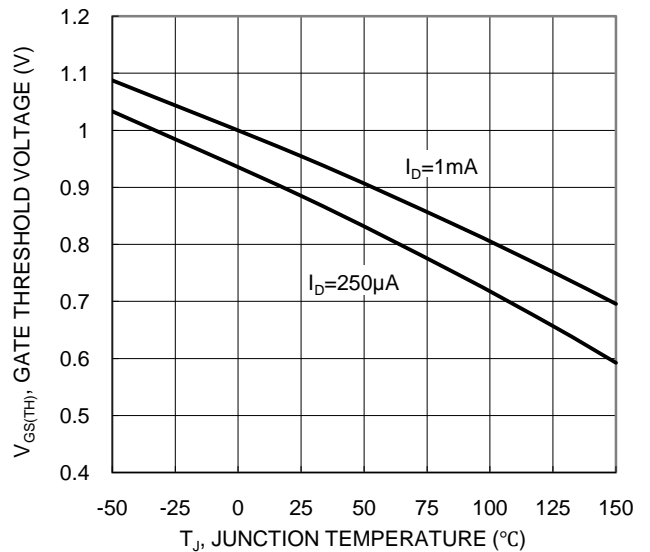


Figure 8. Gate Threshold Variation vs. Junction Temperature

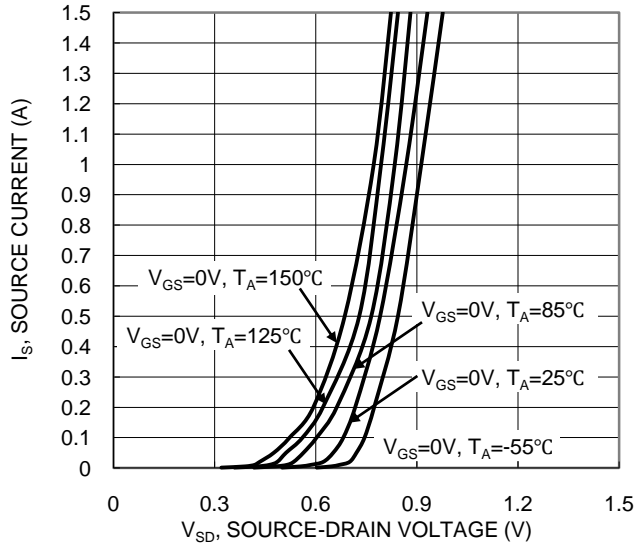


Figure 9. Diode Forward Voltage vs. Current

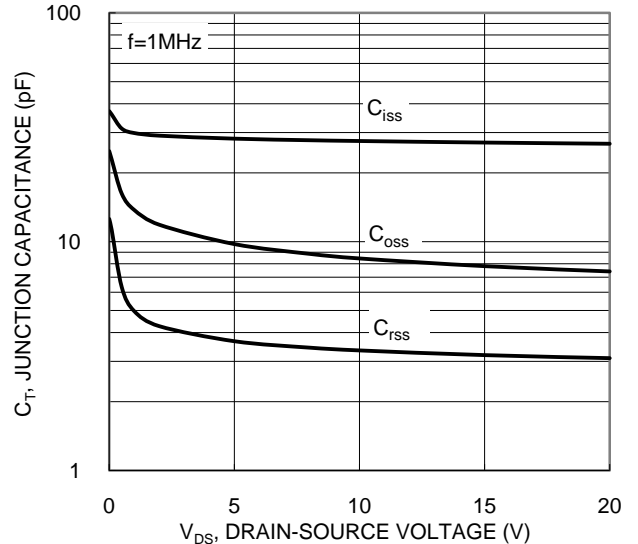


Figure 10. Typical Junction Capacitance

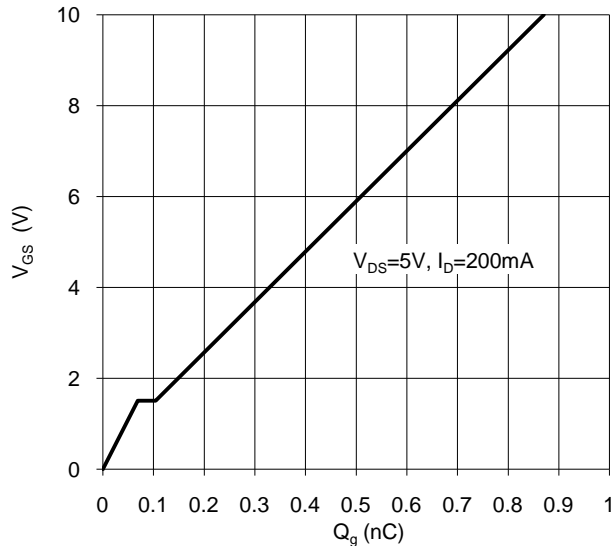


Figure 11. Gate Charge

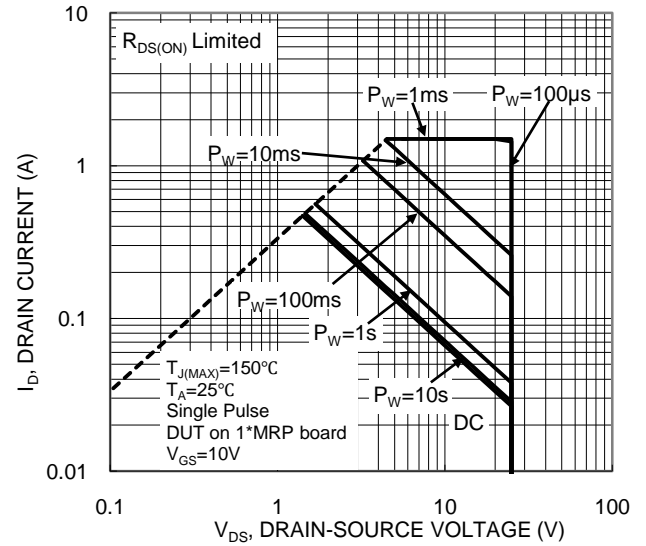


Figure 12. SOA, Safe Operation Area

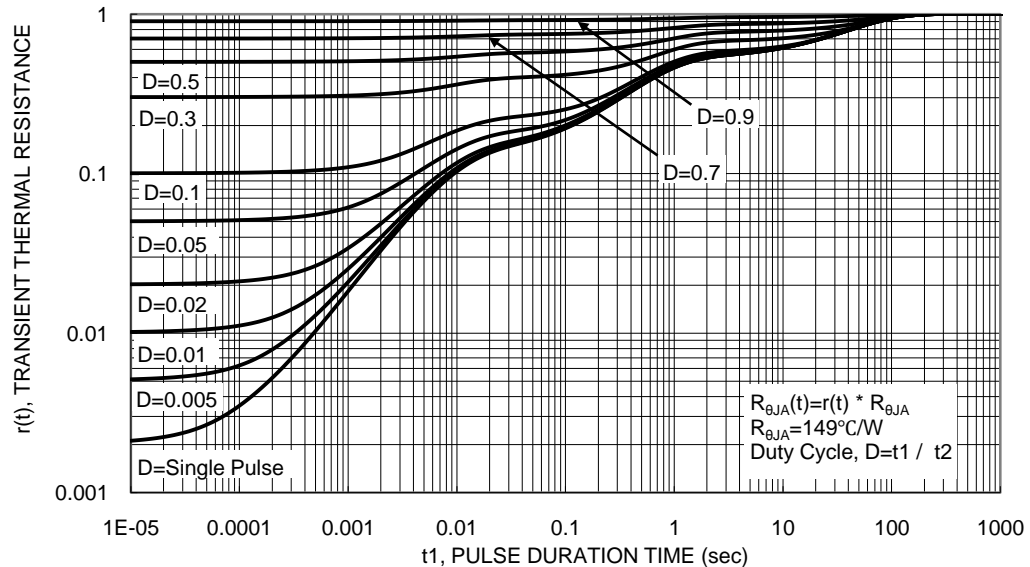


Figure 13. Transient Thermal Resistance

**Typical Characteristics - P-CHANNEL**

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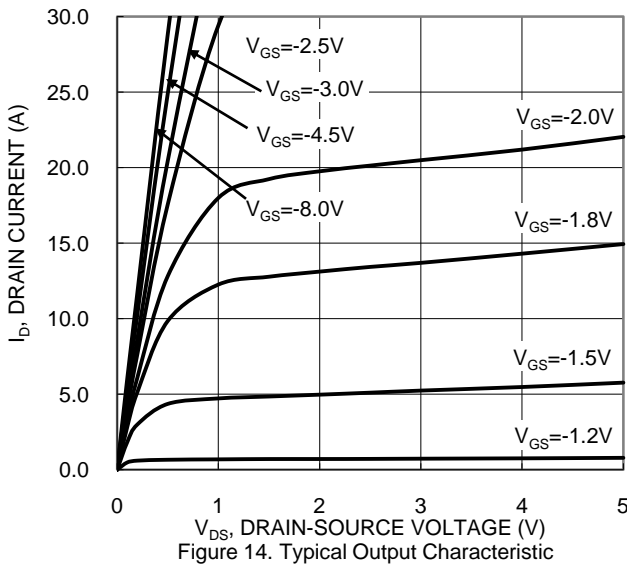


Figure 14. Typical Output Characteristic

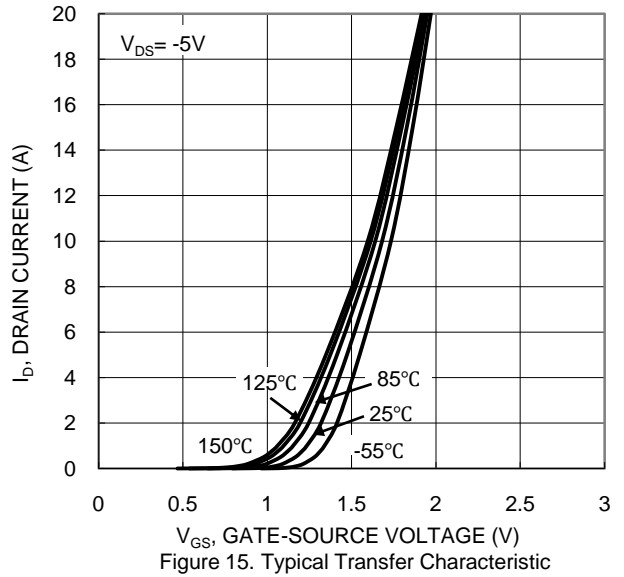


Figure 15. Typical Transfer Characteristic

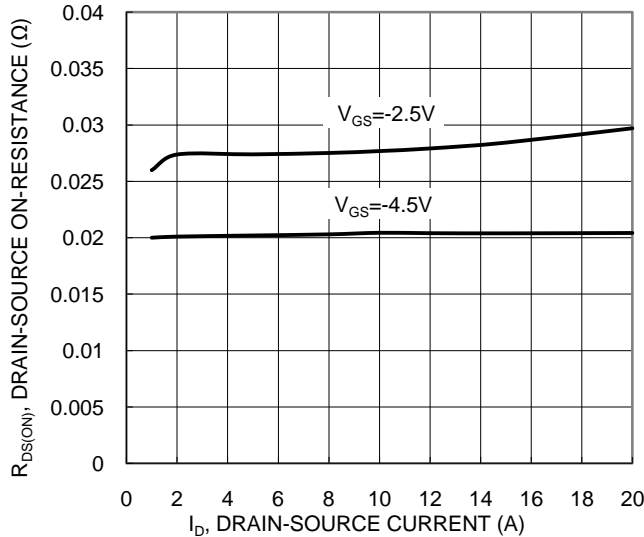


Figure 16. Typical On-Resistance vs. Drain Current and Gate Voltage

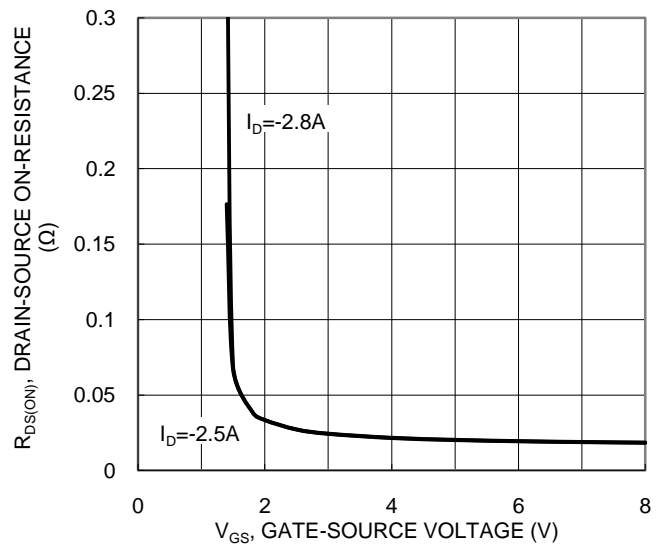


Figure 17. Typical Transfer Characteristic

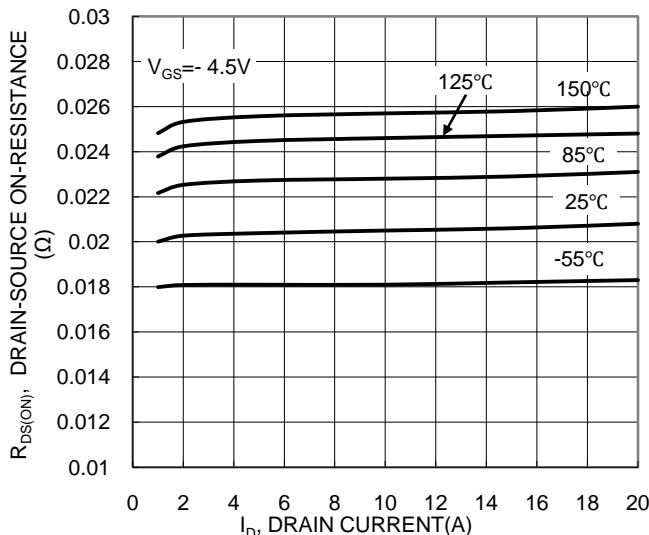


Figure 18. Typical On-Resistance vs. Drain Current and Temperature

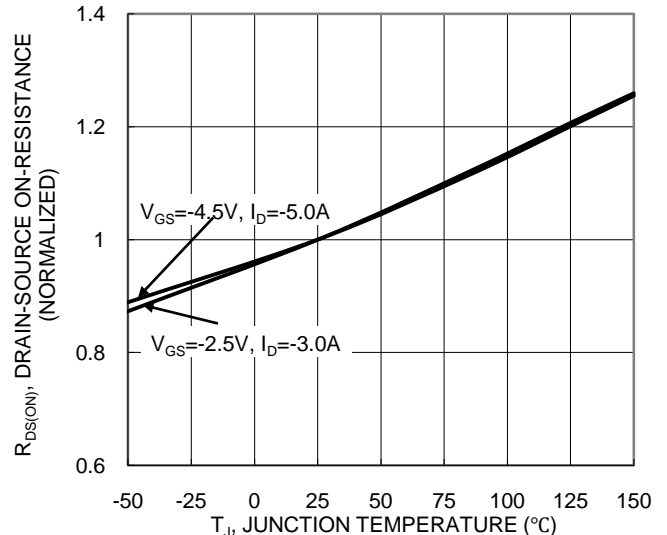


Figure 19. On-Resistance Variation with Temperature

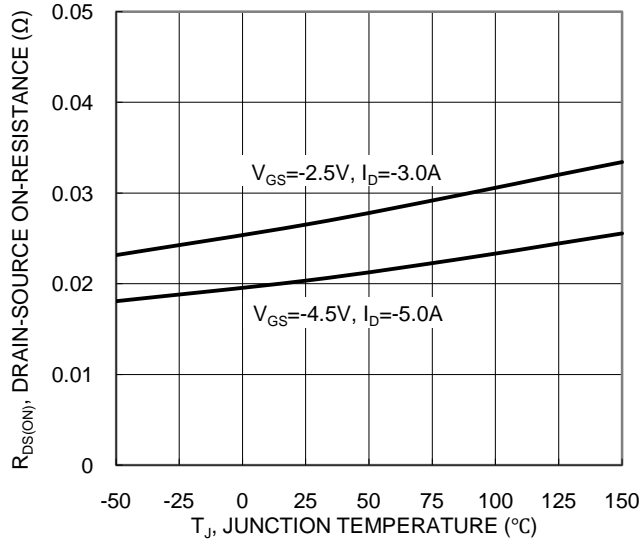


Figure 20. On-Resistance Variation with Temperature

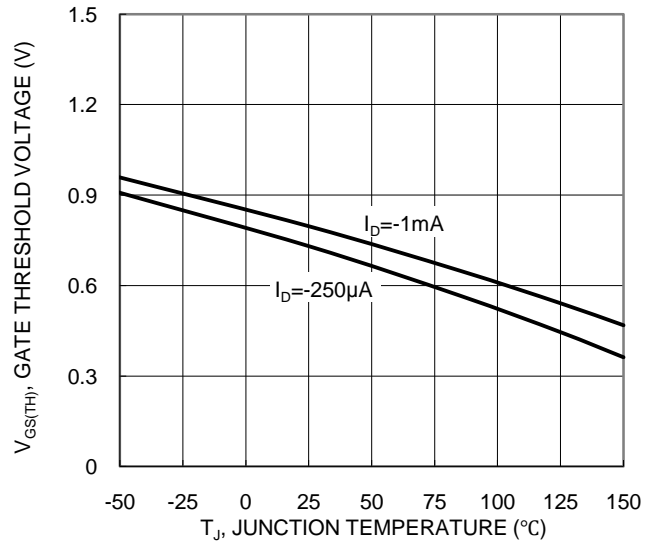


Figure 21. Gate Threshold Variation vs. Junction Temperature

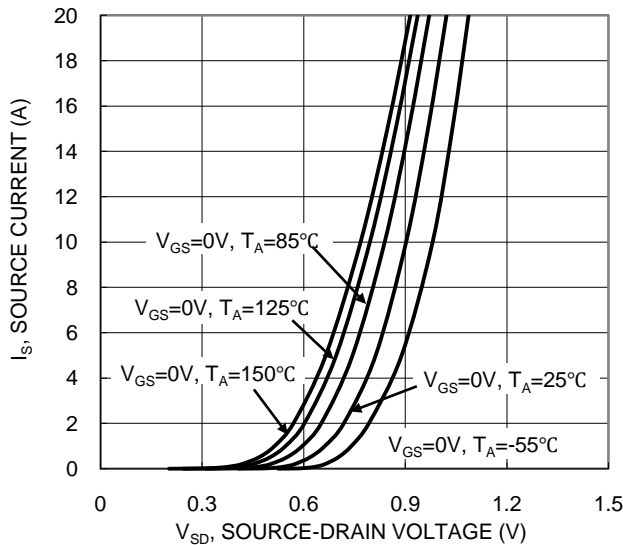


Figure 22. Diode Forward Voltage vs. Current

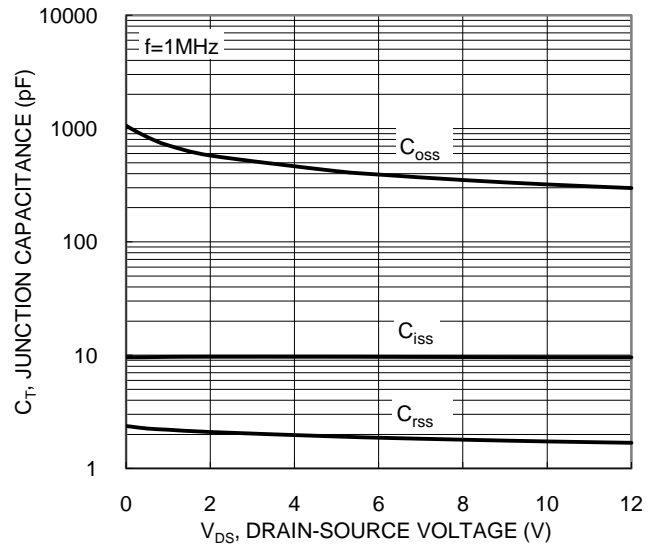


Figure 23. Typical Junction Capacitance

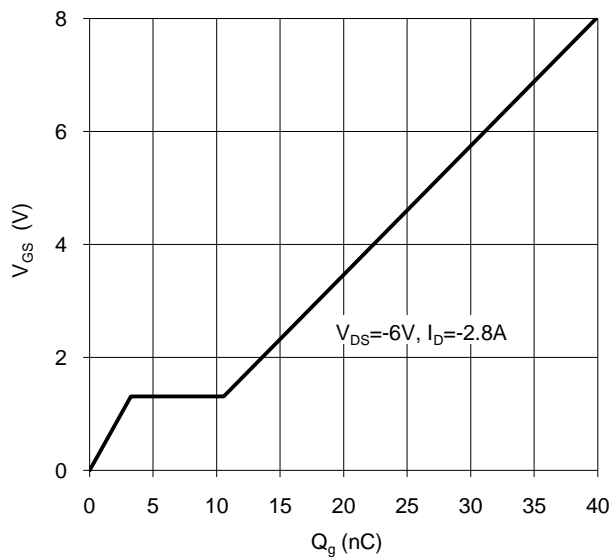


Figure 24. Gate Charge

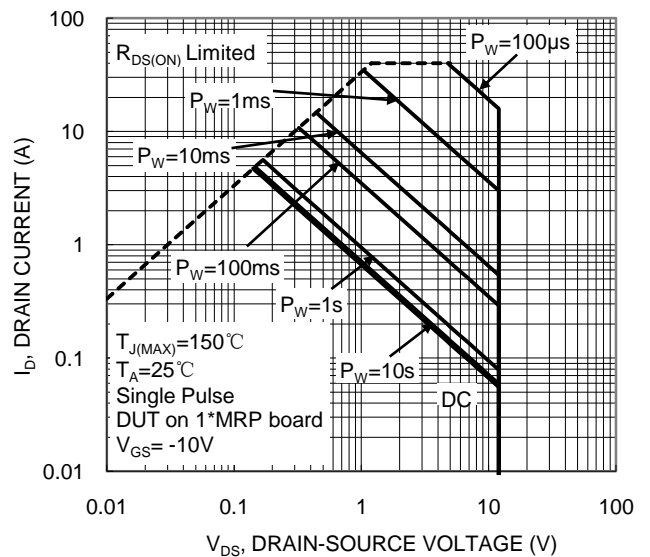
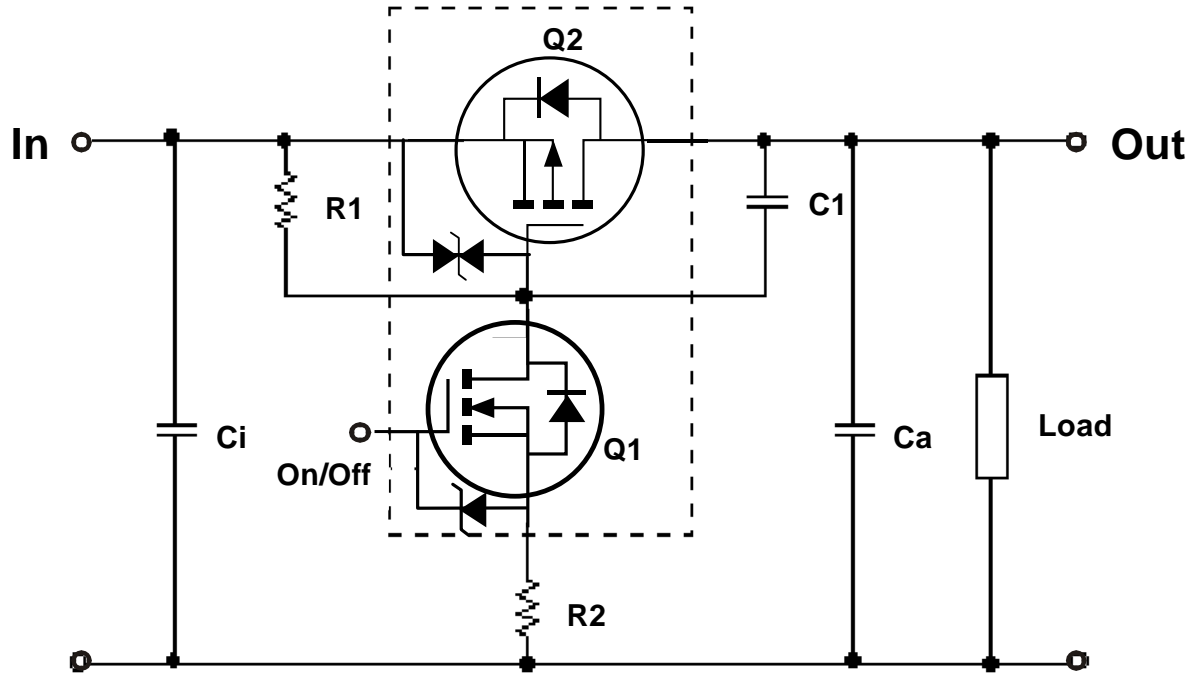


Figure 25. SOA, Safe Operation Area

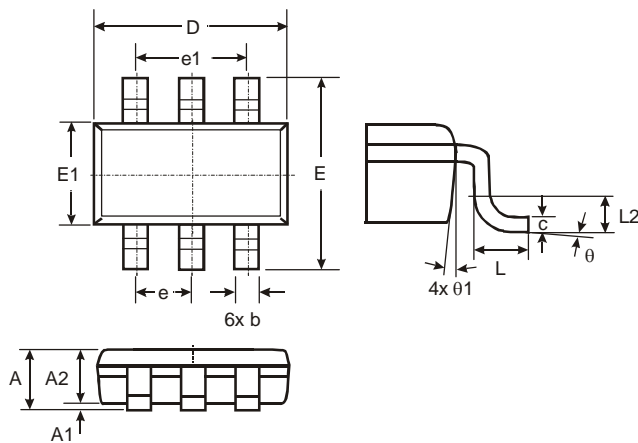
**Application Circuit**



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**Package Outline Dimensions**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

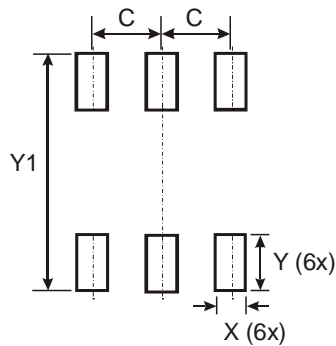


| TSOT26                      |      |      |      |
|-----------------------------|------|------|------|
| Dim                         | Min  | Max  | Typ  |
| A                           | -    | 1.00 | -    |
| A1                          | 0.01 | 0.10 | -    |
| A2                          | 0.84 | 0.90 | -    |
| D                           | -    | -    | 2.90 |
| E                           | -    | -    | 2.80 |
| E1                          | -    | -    | 1.60 |
| b                           | 0.30 | 0.45 | -    |
| c                           | 0.12 | 0.20 | -    |
| e                           | -    | -    | 0.95 |
| e1                          | -    | -    | 1.90 |
| L                           | 0.30 | 0.50 | -    |
| L2                          | -    | -    | 0.25 |
| θ                           | 0°   | 8°   | 4°   |
| θ1                          | 4°   | 12°  | -    |
| <b>All Dimensions in mm</b> |      |      |      |



## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.950         |
| X          | 0.700         |
| Y          | 1.000         |
| Y1         | 3.199         |

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

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