



**THE DATASHEET OF
DMN1017UCP3-7**



Product Summary (Typ. @ $V_{GS} = 3.3V$, $T_A = +25^\circ C$)

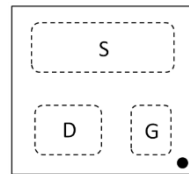
| V_{DSS} | $R_{DS(ON)}$ | Q_g | Q_{gd} | I_D |
|-----------|----------------|--------|----------|-------|
| 12V | 14.1m Ω | 10.5nC | 4.1nC | 7.5A |

Description

This new generation MOSFET is engineered to minimize on-state losses and switch ultra-fast, making it ideal for high efficiency power transfer. Using Chip-Scale Package (CSP) to increase power density by combining low thermal impedance with minimal $R_{DS(ON)}$ per footprint area.

Applications

- DC-DC Converters
- Battery Management
- Load Switch



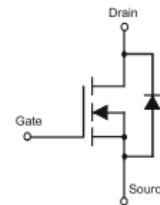
Top-View
Pin Configuration

Features

- TR-MOS Technology with the Lowest $R_{DS(ON)}$:
 $R_{DS(ON)} = 14.1m\Omega$ to Minimize On-State Losses
- CSP with Footprint 1.0mm x 1.0mm
- Height = 0.29mm for Low Profile
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative.**
<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Case: X3-DSN1010-3
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminal Finish: Matte Tin Annealed Over Copper Pillar (E3)
- Solder Cap Material: SnAg (Ag: 2.0+/-0.5%)
- Weight: 0.00062 grams (Approximate)



Equivalent Circuit

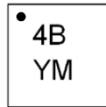
Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|--------------|------------------|
| DMN1017UCP3-7 | X3-DSN1010-3 | 3000/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 (Note 5)

Marking 1

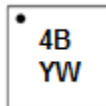


4B = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: 1 = 2021)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

| Year | 2017 | ... | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------|------|-----|------|------|------|------|------|------|------|------|------|------|
| Code | E | ... | I | J | K | L | M | N | O | P | R | S |
| 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 |

Marking 2



4B = Product Type Marking Code
 YW = Date Code Marking
 Y or \bar{Y} = Year (ex: 1 = 2021)
 W or \bar{W} = Week (ex: a = Week 27; z Represents Week 52 and 53)

Date Code Key

| Year | 2017 | ... | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|------|------|-----|------|-------|------|------|------|------|------|------|------|------|
| Code | 7 | ... | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
| Week | 1-26 | | | 27-52 | | | | 53 | | | | |
| Code | A-Z | | | a-z | | | | z | | | | |

Note: 5. The marking code changed to Marking 2 from week 6, 2021.

Maximum Ratings

| Characteristic | Symbol | Value | Unit | |
|---|-----------|---------------------|------|---|
| Drain-Source Voltage | V_{DSS} | 12 | V | |
| Gate-Source Voltage | V_{GSS} | ± 8 | V | |
| Continuous Drain Current @ $V_{GS} = 3.3V$ (Note 6) | I_D | $T_A = +25^\circ C$ | 5.4 | A |
| | | $T_A = +70^\circ C$ | 4.3 | |
| Continuous Drain Current @ $V_{GS} = 3.3V$ (Note 7) | I_D | $T_A = +25^\circ C$ | 7.5 | A |
| | | $T_A = +70^\circ C$ | 6.1 | |
| Pulsed Drain Current (Pulse Duration 10 μs , Duty Cycle $\leq 1\%$) | I_{DM} | 15 | A | |
| Continuous Source-Drain Diode Current (Note 7) | I_S | 1.47 | A | |
| Pulse Diode Forward Current (Note 7) | I_{SM} | 15 | A | |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|--------------|
| Total Power Dissipation (Note 6) | P_D | 0.74 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 167 | $^\circ C/W$ |
| Total Power Dissipation (Note 7) | P_D | 1.47 | W |
| Thermal Resistance, Junction to Ambient (Note 7) | $R_{\theta JA}$ | 85 | $^\circ C/W$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ C$ |

Electrical Characteristics (@ $T_A = +25^\circ C$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|-----|------|-----------|------------|---|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 12 | — | — | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1.0 | μA | $V_{DS} = 9.6V, V_{GS} = 0V$ |
| Gate-Body Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 8V, V_{DS} = 0V$ |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 0.4 | 0.7 | 1.0 | V | $V_{DS} = V_{GS}, I_D = 250\mu A$ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 14.1 | 17.0 | m Ω | $V_{GS} = 3.3V, I_D = 5.0A$ |
| | | — | 14.4 | 19.0 | | $V_{GS} = 3.0V, I_D = 5.0A$ |
| | | — | 15.5 | 21.0 | | $V_{GS} = 2.5V, I_D = 5.0A$ |
| | | — | 16.0 | 23.0 | | $V_{GS} = 2.3V, I_D = 5.0A$ |
| | | — | 16.8 | 24.0 | | $V_{GS} = 2.1V, I_D = 5.0A$ |
| | | — | 21.3 | 34.0 | | $V_{GS} = 2.1V, I_D = 5.0A, +125^\circ C$ (Note 9) |
| | | — | 20.0 | 30.0 | | $V_{GS} = 1.8V, I_D = 3.0A$ |
| Forward Transfer Admittance | $ Y_{fs} $ | — | 6.6 | — | S | $V_{DS} = 6V, I_S = 1.0A$ |
| Body Diode Forward Voltage | V_{SD} | — | 0.7 | 1 | V | $V_{GS} = 0V, I_S = 1.0A$ |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C_{iss} | — | 1002 | 1503 | pF | $V_{DS} = 6V, V_{GS} = 0V,$ $f = 1.0MHz$ |
| Output Capacitance | C_{oss} | — | 312 | 468 | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 259 | 389 | pF | |
| Gate Resistance | R_g | — | 2.2 | 4.4 | Ω | $V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$ |
| Total Gate Charge | Q_g | — | 10.5 | 16 | nC | $V_{GS} = 3.3V, V_{DS} = 6V,$ $I_D = 5.0A$ |
| Gate-Source Charge | Q_{gs} | — | 1.0 | 1.5 | nC | |
| Gate-Drain Charge | Q_{gd} | — | 4.1 | 6.2 | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 3.7 | 10 | ns | $V_{DD} = 6V, I_D = 5.0A$ $V_{GEN} = 4.5V, R_G = 1\Omega, R_L = 1.2\Omega$ |
| Turn-On Rise Time | t_R | — | 6.3 | 15 | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 17.9 | 35 | ns | |
| Turn-Off Fall Time | t_F | — | 7.5 | 15 | ns | |
| Reverse Recovery Charge | Q_{RR} | — | 2.7 | 5 | nC | |
| Body Diode Reverse Recovery Time | t_{RR} | — | 14.2 | 28 | ns | $I_F = 5A, di/dt = 100A/\mu s$ |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

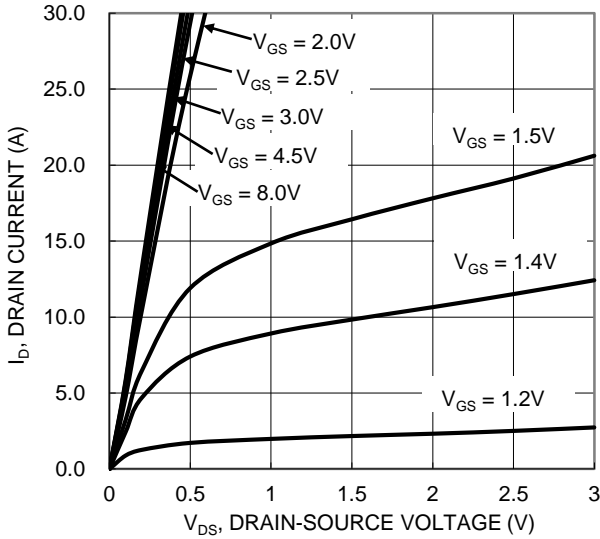


Figure 1. Typical Output Characteristic

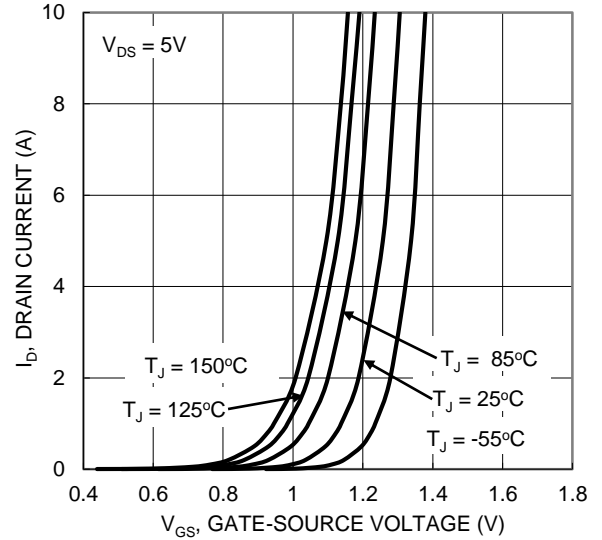


Figure 2. Typical Transfer Characteristic

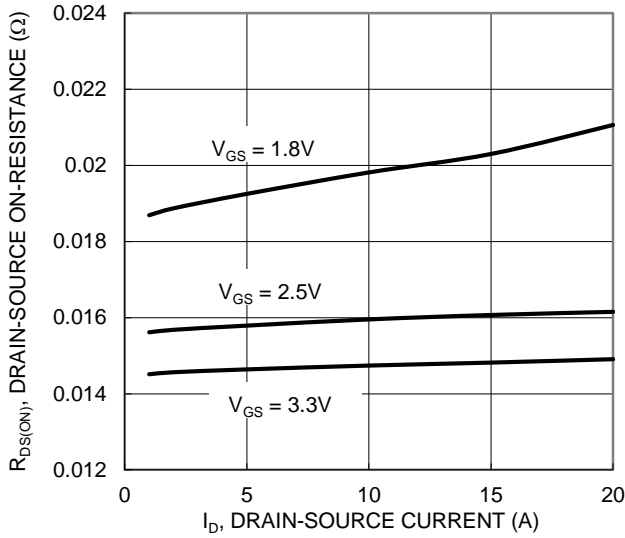


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

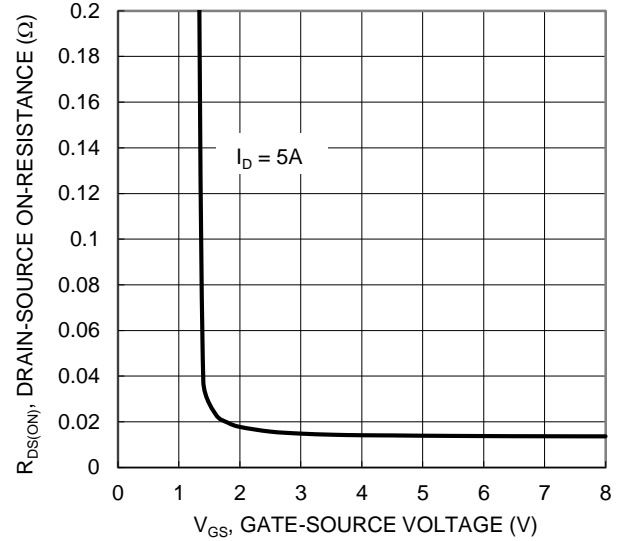


Figure 4. Typical Transfer Characteristic

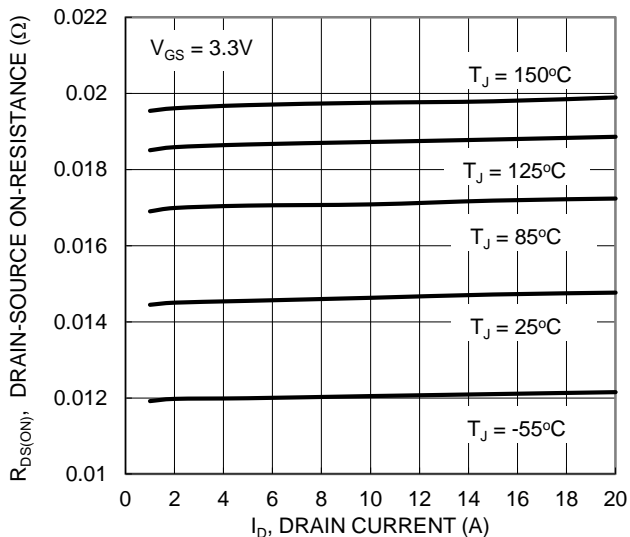


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

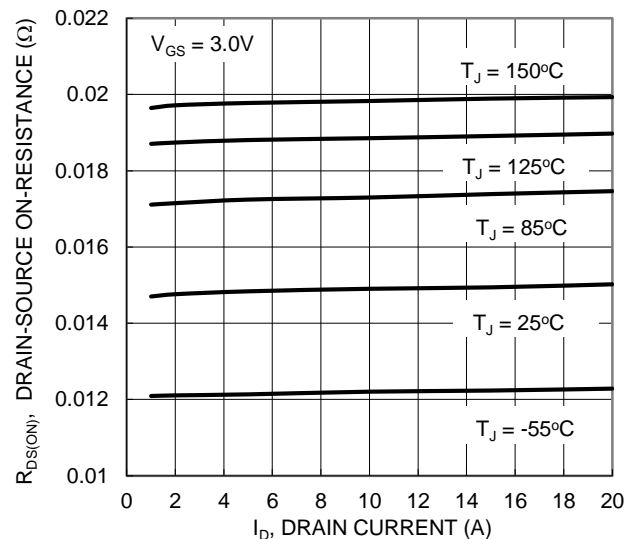


Figure 6. Typical On-Resistance vs. Drain Current and Junction Temperature

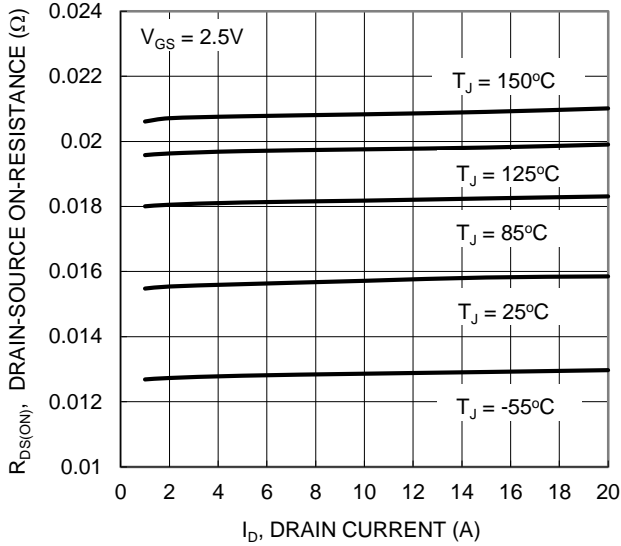


Figure 7. Typical On-Resistance vs. Drain Current and Junction Temperature

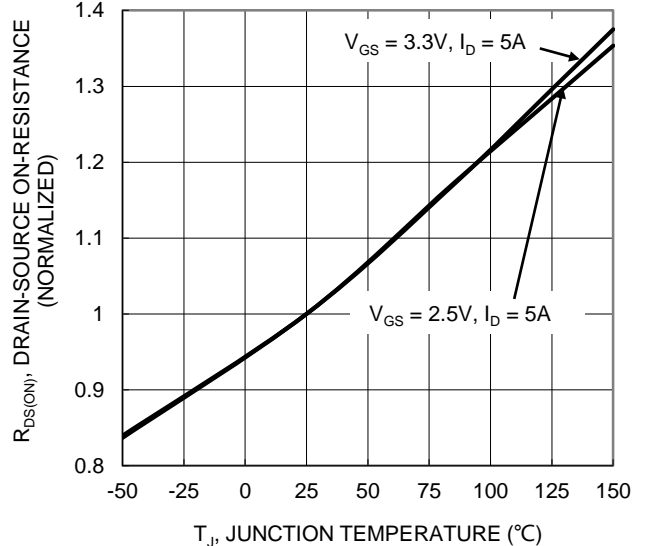


Figure 8. On-Resistance Variation with Junction Temperature

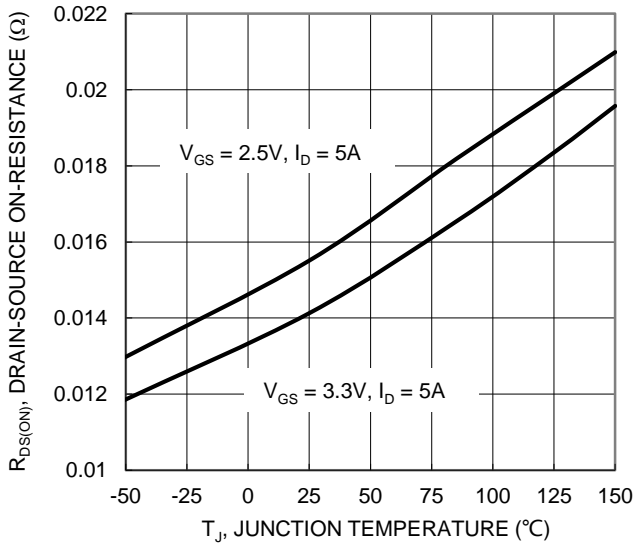


Figure 9. On-Resistance Variation with Junction Temperature

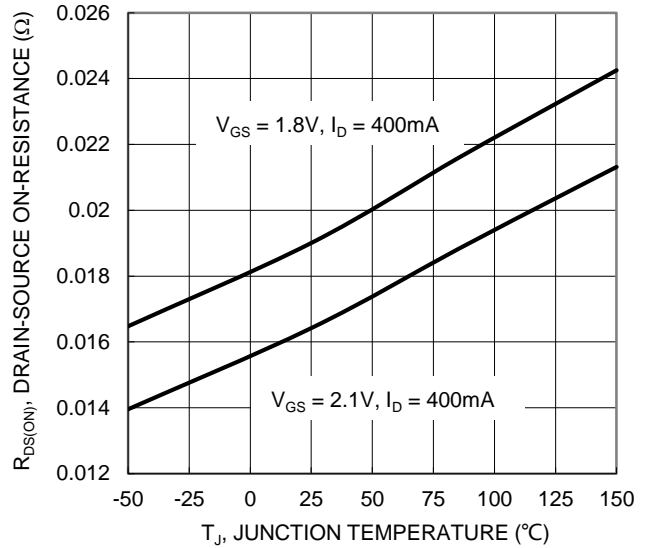


Figure 10. On-Resistance Variation with Junction Temperature

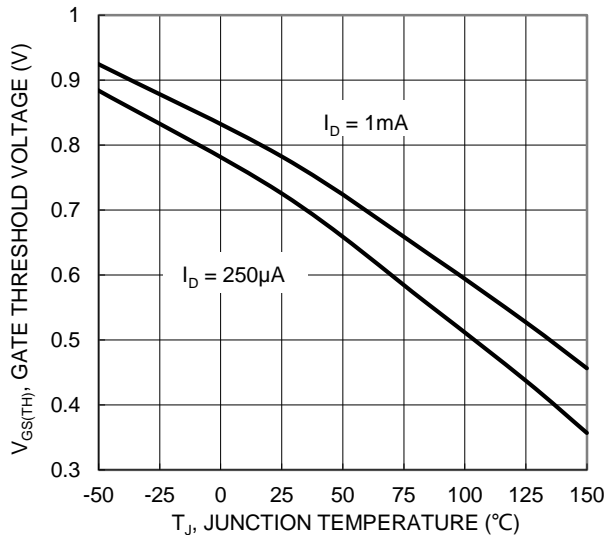


Figure 11. Gate Threshold Variation vs. Junction Temperature

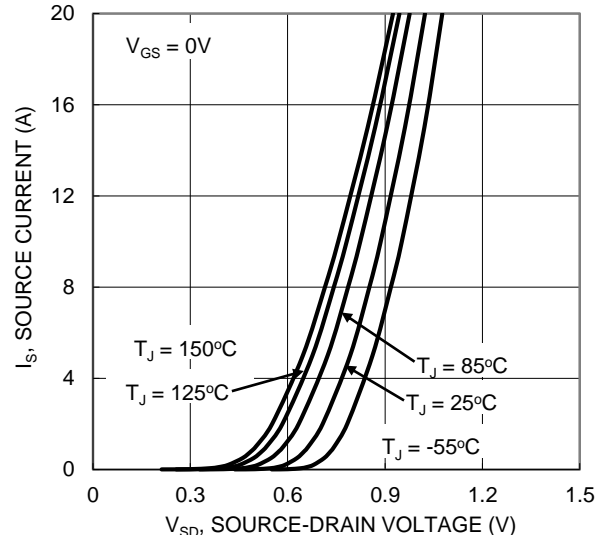


Figure 12. Diode Forward Voltage vs. Current

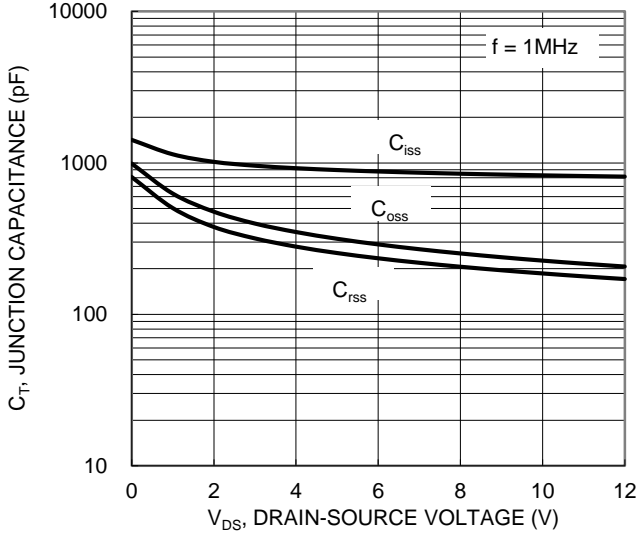


Figure 13. Typical Junction Capacitance

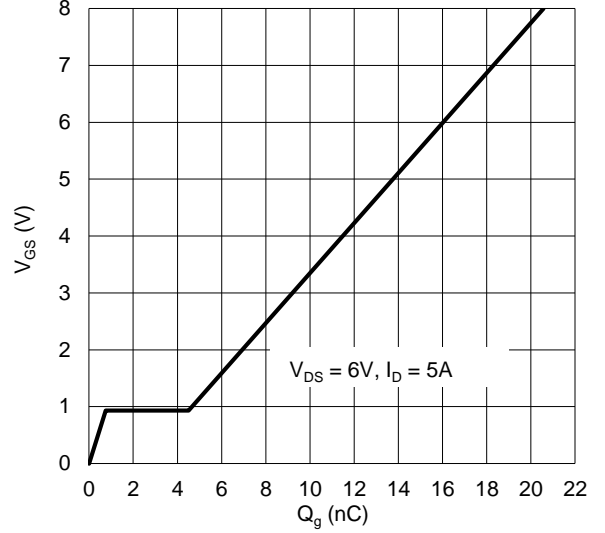


Figure 14. Gate Charge

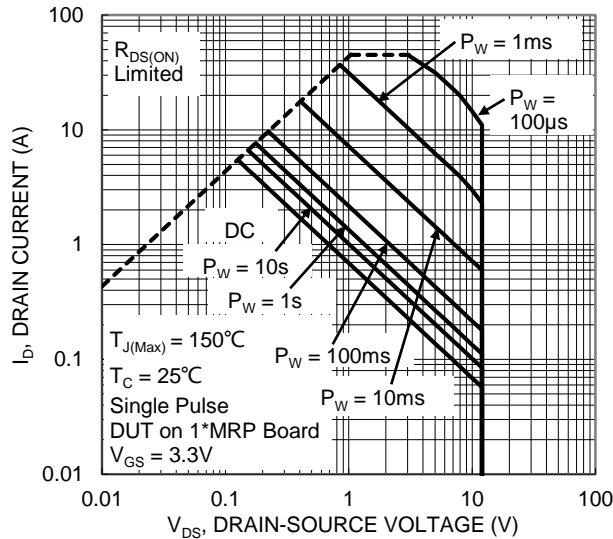


Figure 15. SOA, Safe Operation Area

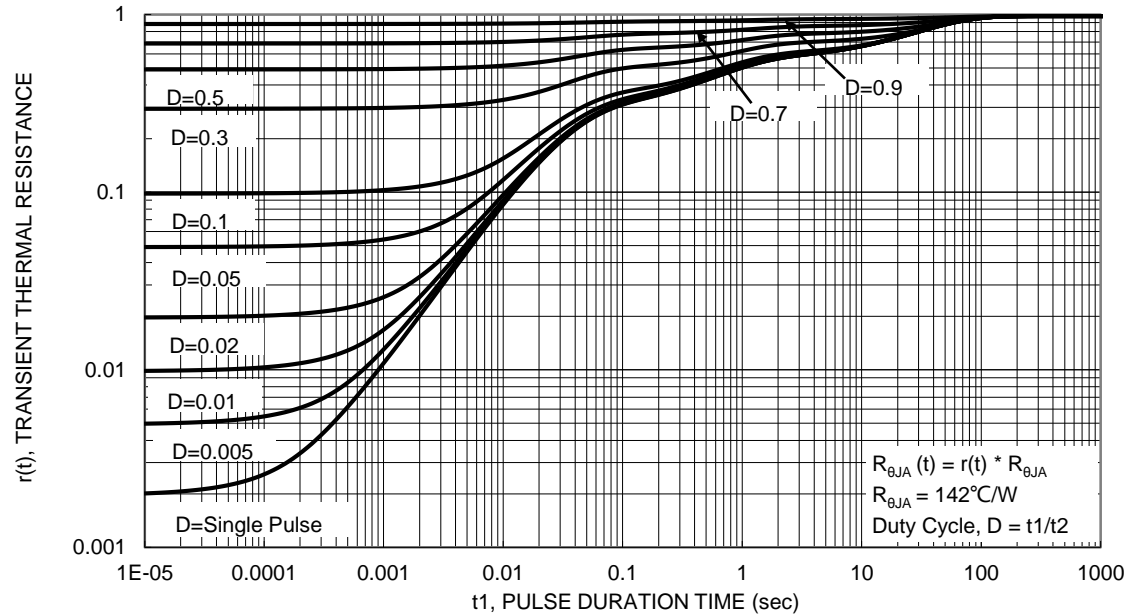
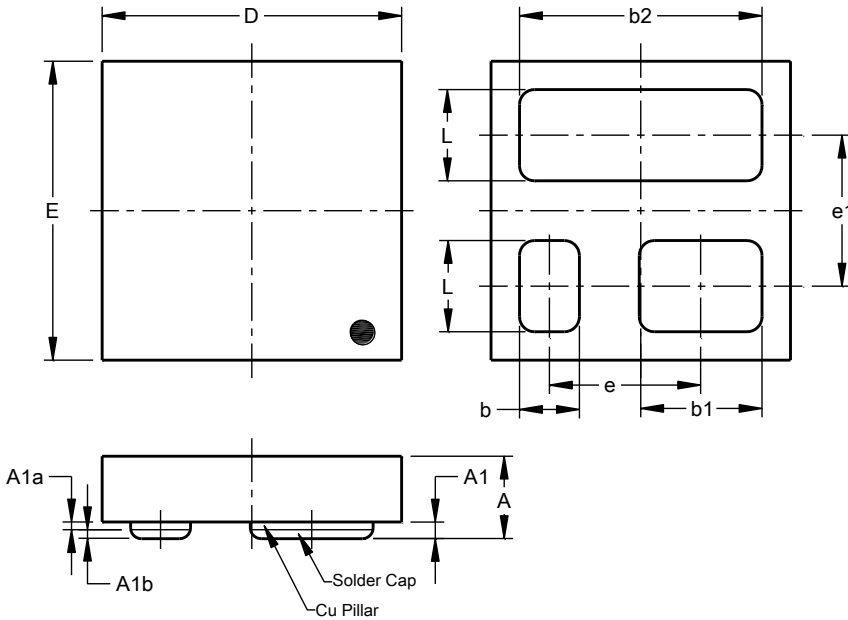


Figure 16. Transient Thermal Resistance

Package Outline Dimensions

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

X3-DSN1010-3

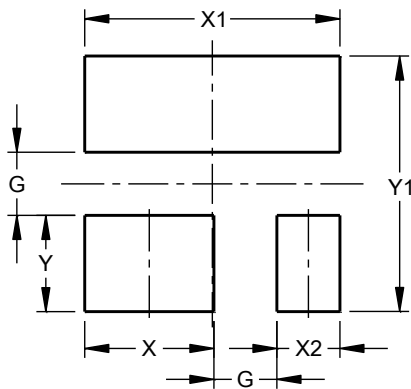


| X3-DSN1010-3 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | - | 0.29 | 0.27 |
| A1 | 0.034 | 0.046 | 0.04 |
| A1a | 0.015 | 0.025 | 0.02 |
| A1b | 0.017 | 0.023 | 0.02 |
| b | 0.18 | 0.22 | 0.20 |
| b1 | 0.39 | 0.43 | 0.41 |
| b2 | 0.79 | 0.83 | 0.81 |
| D | 0.92 | 1.00 | 0.96 |
| E | 0.92 | 1.00 | 0.96 |
| e | - | - | 0.505 |
| e1 | - | - | 0.505 |
| L | 0.285 | 0.325 | 0.305 |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

X3-DSN1010-3



| Dimensions | Value (in mm) |
|------------|---------------|
| G | 0.200 |
| X | 0.410 |
| X1 | 0.810 |
| X2 | 0.200 |
| Y | 0.305 |
| Y1 | 0.810 |

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