

Product Summary

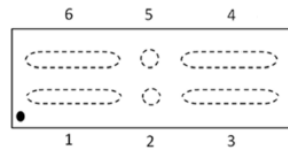
| BV _{SSS} | R _{SS(ON)} Max | I _S T _A = +25°C |
|-------------------|--------------------------------|--|
| 12V | 3.2mΩ @ V _{GS} = 4.5V | 23.6A |
| | 6.3mΩ @ V _{GS} = 2.5V | 16.8A |

Description

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

Applications

- Battery Management
- Load Switch
- Battery Protection



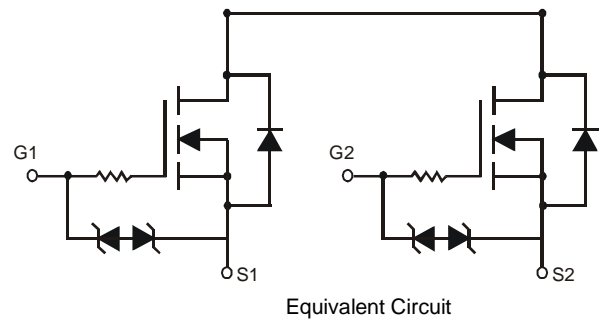
- Top View
- Source 1
 - Gate 1
 - Source 1
 - Source 2
 - Gate 2
 - Source 2

Features

- CSP with Footprint 3.54mm x 1.77mm
- Height = 0.21mm for Low Profile
- ESD Protection of Gate
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: X3-DSN3518-6
- Terminal Connections: See Diagram Below
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu. Solderable per MIL-STD-202, Method 208 (4)

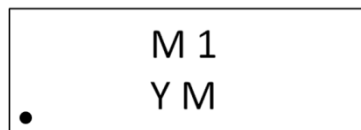


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|--------------|------------------|
| DMN1003UCA6-7 | X3-DSN3518-6 | 3000/Tape & Reel |

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

Marking Information



M1 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: F = 2018)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|------|------|------|------|------|------|------|------|------|
| Code | E | F | G | H | I | J | K | L | M |

| 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 |
|---|--------------|------------------------|------------------|-------|------|
| Source-Source Voltage | | | V _{SSS} | 12 | V |
| Gate-Source Voltage | | | V _{GSS} | ±8 | V |
| Continuous Source Current (Note 5) V _{GS} = 4.5V | Steady State | T _A = +25°C | I _S | 23.6 | A |
| | | T _A = +70°C | | 18.9 | |
| Continuous Source Current (Note 5) V _{GS} = 2.5V | Steady State | T _A = +25°C | I _S | 16.8 | A |
| | | T _A = +70°C | | 13.4 | |
| Pulsed Source Current (Note 6) | | | I _{SM} | 100 | A |

Thermal Characteristics

| Characteristic | | | Symbol | Value | Unit |
|--|--|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 7) | | | P _D | 1.05 | W |
| Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 7) | | | R _{θJA} | 120.7 | °C/W |
| Power Dissipation (Note 5) | | | P _D | 2.67 | W |
| Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 5) | | | R _{θJA} | 46.8 | °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 8) | | | | | | |
| Source-Source Breakdown Voltage | BV _{SSS} | 12 | - | - | V | V _{GS} = 0V, I _S = 1mA |
| Zero Gate Voltage Source Current T _J = +25°C | I _{SSS} | - | - | 1 | μA | V _{SS} = 10V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | - | - | ±10 | μA | V _{GS} = ±8V, V _{SS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 0.5 | - | 1.3 | V | V _{SS} = 6V, I _S = 1mA |
| Static Source-Source On-Resistance | R _{SS(ON)} | 1.6 | 2.3 | 3.2 | mΩ | V _{GS} = 4.5V, I _S = 5A |
| | | 1.7 | 2.4 | 3.2 | | V _{GS} = 4.0V, I _S = 5A |
| | | 1.8 | 2.5 | 3.2 | | V _{GS} = 3.8V, I _S = 5A |
| | | 1.9 | 2.7 | 4.4 | | V _{GS} = 3.1V, I _S = 5A |
| | | 2.1 | 3.0 | 6.3 | | V _{GS} = 2.5V, I _S = 5A |
| Diode Forward Voltage | V _{SS} | - | 0.7 | 1.2 | V | V _{GS} = 0V, I _S = 3A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iSS} | - | 3315 | - | pF | V _{SS} = 6V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oSS} | - | 850 | - | | |
| Reverse Transfer Capacitance | C _{rSS} | - | 248 | - | | |
| Total Gate Charge | Q _g | - | 56.5 | - | nC | V _{SS} = 6V, V _{GS} = 4.5V, I _S = 27A |
| Gate-Source Charge | Q _{gs} | - | 8.8 | - | | |
| Gate-Drain Charge | Q _{gd} | - | 13.3 | - | | |
| Gate Charge at V _{TH} | Q _{g(TH)} | - | 6.9 | - | | |
| Turn-On Delay Time | t _{D(ON)} | - | 603 | - | ns | V _{SS} = 6V, V _{GS} = 4.5V, I _S = 3A |
| Turn-On Rise Time | t _r | - | 1694 | - | | |
| Turn-Off Delay Time | t _{D(OFF)} | - | 4749 | - | | |
| Turn-Off Fall Time | t _f | - | 6208 | - | | |

- Notes:
- Device mounted on FR-4 material with 1-inch² (6.45-cm²), 2-oz. (0.071-mm thick) Cu.
 - Repetitive rating, pulse width limited by junction temperature.
 - Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

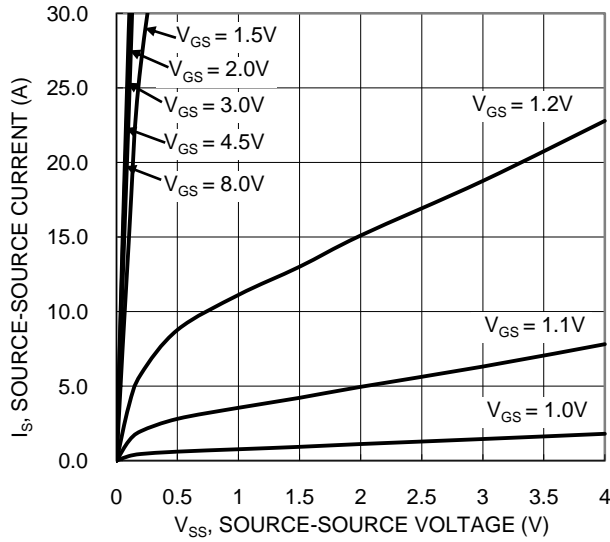


Figure 1. Typical Output Characteristic

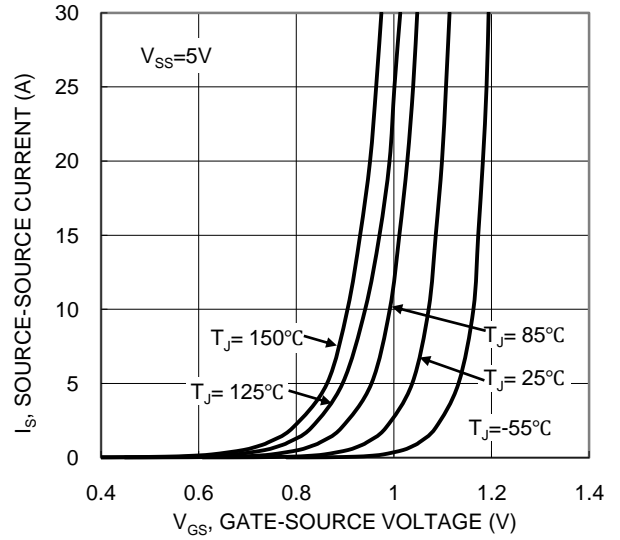


Figure 2. Typical Transfer Characteristic

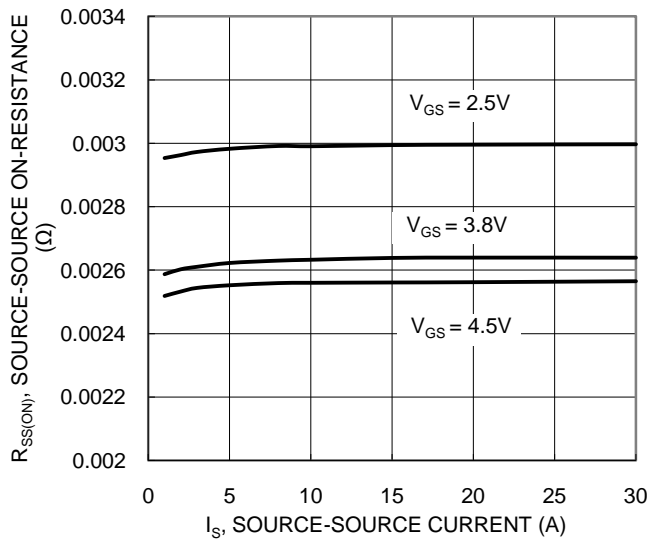


Figure 3. Typical On-Resistance vs. Source Current and Gate Voltage

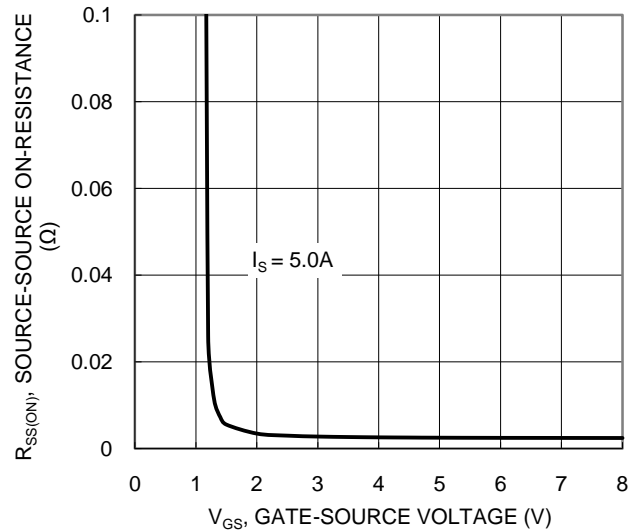


Figure 4. Typical Transfer Characteristic

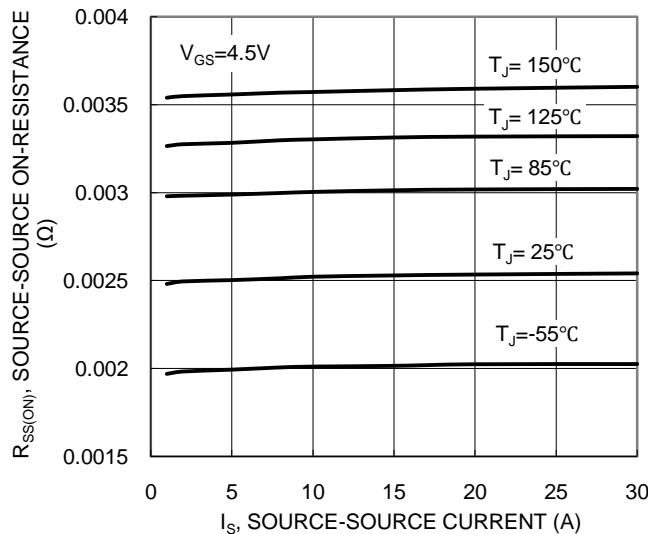


Figure 5. Typical On-Resistance vs. Source Current and Junction Temperature

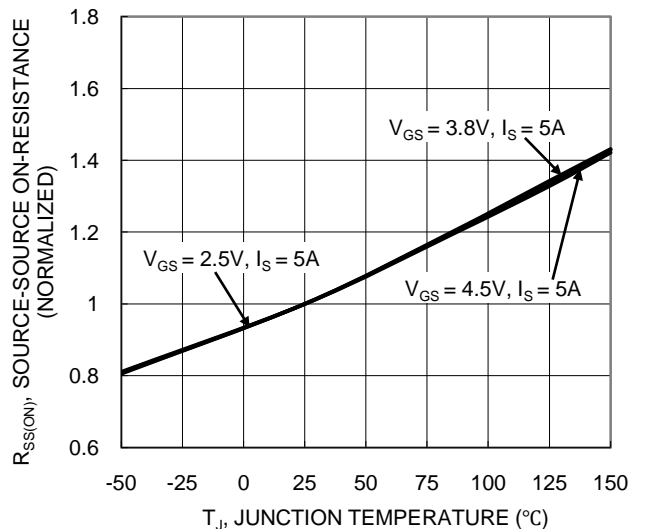
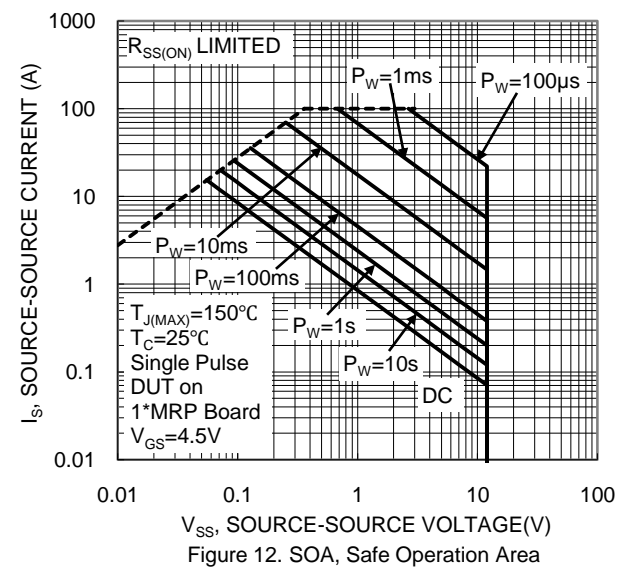
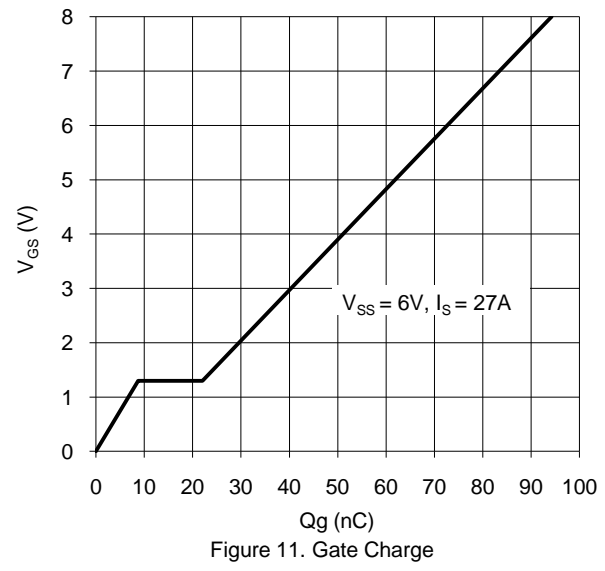
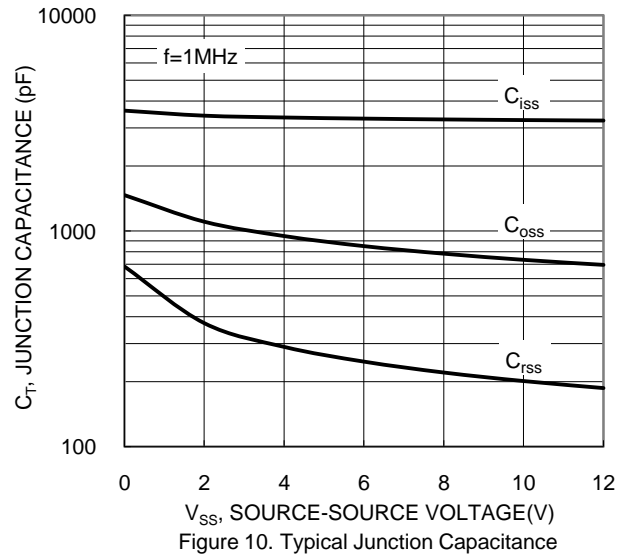
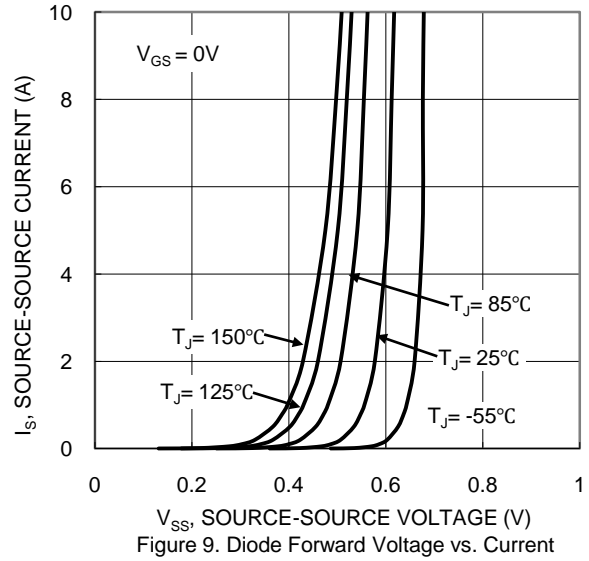
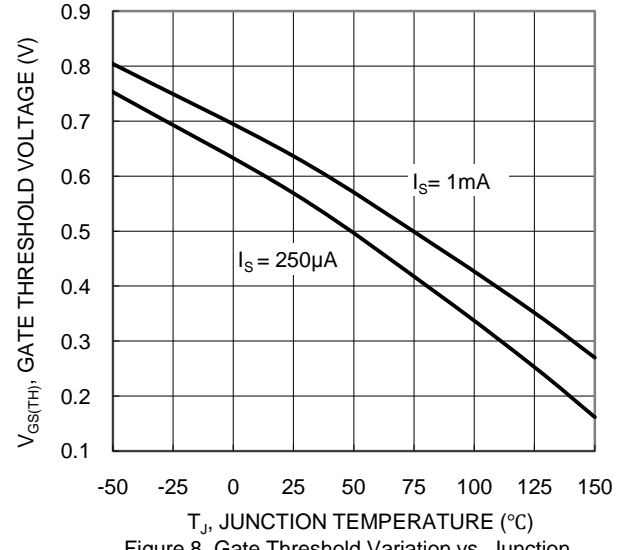
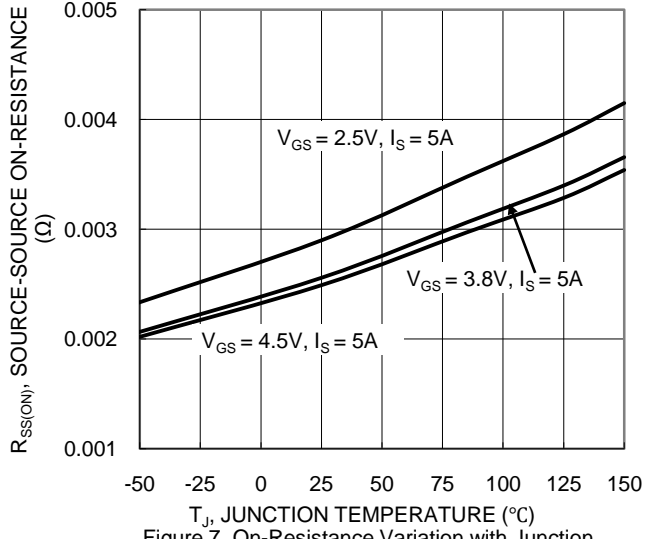


Figure 6. On-Resistance Variation with Junction Temperature



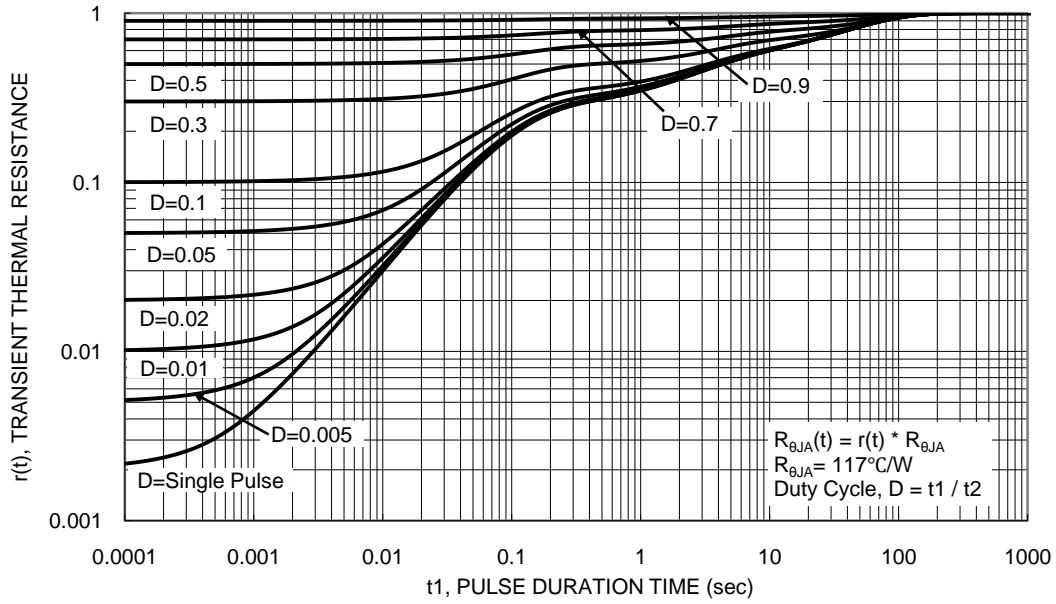
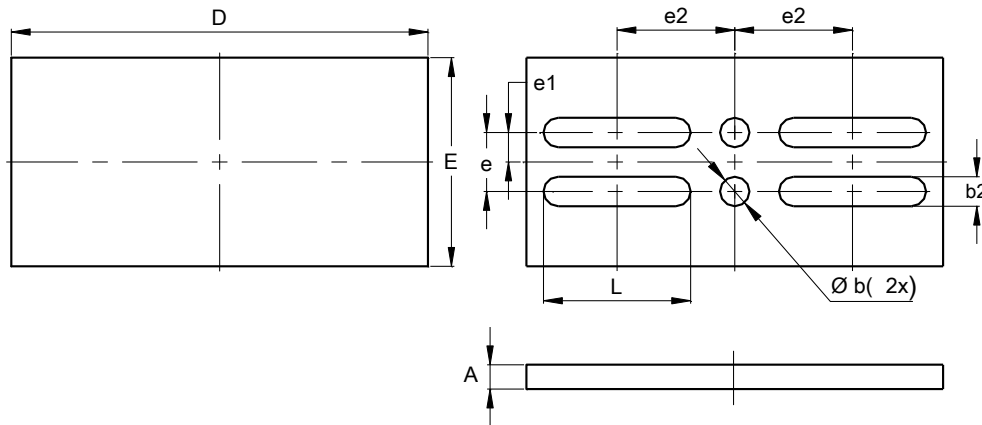


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

X3-DSN3518-6

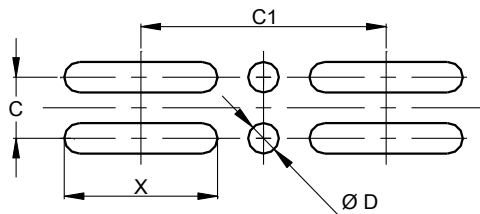


| X3-DSN3518-6 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.16 | 0.26 | 0.21 |
| b | 0.22 | 0.28 | 0.25 |
| b2 | 0.22 | 0.28 | 0.25 |
| D | 3.49 | 3.59 | 3.54 |
| E | 1.72 | 1.82 | 1.77 |
| e | 0.47 | 0.53 | 0.50 |
| e1 | 0.22 | 0.28 | 0.25 |
| e2 | 0.97 | 1.03 | 1.00 |
| L | 1.22 | 1.28 | 1.25 |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

X3-DSN3518-6



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.50 |
| C1 | 2.00 |
| D | 0.25 |
| X | 1.25 |

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