

## Product Summary

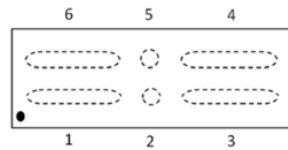
| BV <sub>SSS</sub> | R <sub>SS(ON)</sub> Max        | I <sub>S</sub><br>T <sub>A</sub> = +25°C |
|-------------------|--------------------------------|------------------------------------------|
| 12V               | 3.2mΩ @ V <sub>GS</sub> = 4.5V | 23.6A                                    |
|                   | 6.3mΩ @ V <sub>GS</sub> = 2.5V | 16.8A                                    |

## Description

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

## Applications

- Battery Management
- Load Switch
- Battery Protection



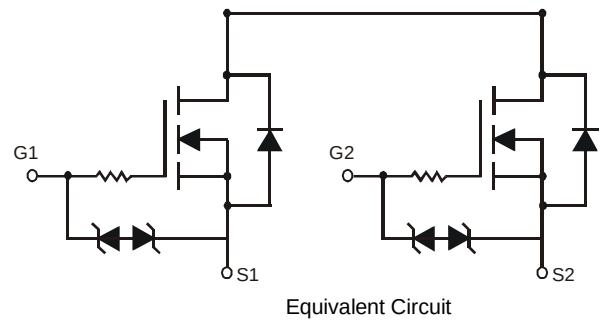
- Top View
- Source 1
  - Gate 1
  - Source 1
  - Source 2
  - Gate 2
  - Source 2

## Features

- CSP with Footprint 3.54mm × 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 

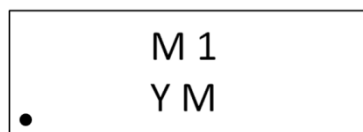


## Ordering Information (Note 4)

| 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                            |              |                        | Symbol           | Value | Unit |
|-----------------------------------------------------------|--------------|------------------------|------------------|-------|------|
| Source-Source Voltage                                     |              |                        | V <sub>SSS</sub> | 12    | V    |
| Gate-Source Voltage                                       |              |                        | V <sub>GSS</sub> | ±8    | V    |
| Continuous Source Current (Note 5) V <sub>GS</sub> = 4.5V | Steady State | T <sub>A</sub> = +25°C | I <sub>S</sub>   | 23.6  | A    |
|                                                           |              | T <sub>A</sub> = +70°C |                  | 18.9  |      |
| Continuous Source Current (Note 5) V <sub>GS</sub> = 2.5V | Steady State | T <sub>A</sub> = +25°C | I <sub>S</sub>   | 16.8  | A    |
|                                                           |              | T <sub>A</sub> = +70°C |                  | 13.4  |      |
| Pulsed Source Current (Note 6)                            |              |                        | I <sub>SM</sub>  | 100   | A    |

**Thermal Characteristics**

| Characteristic                                                           | Symbol                            | Value       | Unit |
|--------------------------------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 7)                                               | P <sub>D</sub>                    | 1.05        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 7) | R <sub>θJA</sub>                  | 120.7       | °C/W |
| Power Dissipation (Note 5)                                               | P <sub>D</sub>                    | 2.67        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5) | R <sub>θJA</sub>                  | 46.8        | °C/W |
| Operating and Storage Temperature Range                                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

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

| Characteristic                                          | Symbol              | Min | Typ  | Max | Unit | Test Condition                                                     |
|---------------------------------------------------------|---------------------|-----|------|-----|------|--------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 8)</b>                     |                     |     |      |     |      |                                                                    |
| Source-Source Breakdown Voltage                         | BV <sub>SSS</sub>   | 12  | -    | -   | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1mA                         |
| Zero Gate Voltage Source Current T <sub>J</sub> = +25°C | I <sub>SSS</sub>    | -   | -    | 1   | μA   | V <sub>SS</sub> = 10V, V <sub>GS</sub> = 0V                        |
| Gate-Source Leakage                                     | I <sub>GSS</sub>    | -   | -    | ±10 | μA   | V <sub>GS</sub> = ±8V, V <sub>SS</sub> = 0V                        |
| <b>ON CHARACTERISTICS (Note 8)</b>                      |                     |     |      |     |      |                                                                    |
| Gate Threshold Voltage                                  | V <sub>GS(TH)</sub> | 0.5 | -    | 1.3 | V    | V <sub>SS</sub> = 6V, I <sub>S</sub> = 1mA                         |
| Static Source-Source On-Resistance                      | R <sub>SS(ON)</sub> | 1.6 | 2.3  | 3.2 | mΩ   | V <sub>GS</sub> = 4.5V, I <sub>S</sub> = 5A                        |
|                                                         |                     | 1.7 | 2.4  | 3.2 |      | V <sub>GS</sub> = 4.0V, I <sub>S</sub> = 5A                        |
|                                                         |                     | 1.8 | 2.5  | 3.2 |      | V <sub>GS</sub> = 3.8V, I <sub>S</sub> = 5A                        |
|                                                         |                     | 1.9 | 2.7  | 4.4 |      | V <sub>GS</sub> = 3.1V, I <sub>S</sub> = 5A                        |
|                                                         |                     | 2.1 | 3.0  | 6.3 |      | V <sub>GS</sub> = 2.5V, I <sub>S</sub> = 5A                        |
| Diode Forward Voltage                                   | V <sub>SS</sub>     | -   | 0.7  | 1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 3A                          |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                 |                     |     |      |     |      |                                                                    |
| Input Capacitance                                       | C <sub>ISS</sub>    | -   | 3315 | -   | pF   | V <sub>SS</sub> = 6V, V <sub>GS</sub> = 0V, f = 1.0MHz             |
| Output Capacitance                                      | C <sub>OSS</sub>    | -   | 850  | -   |      |                                                                    |
| Reverse Transfer Capacitance                            | C <sub>RSS</sub>    | -   | 248  | -   |      |                                                                    |
| Total Gate Charge                                       | Q <sub>g</sub>      | -   | 56.5 | -   | nC   | V <sub>SS</sub> = 6V, V <sub>GS</sub> = 4.5V, I <sub>S</sub> = 27A |
| Gate-Source Charge                                      | Q <sub>gs</sub>     | -   | 8.8  | -   |      |                                                                    |
| Gate-Drain Charge                                       | Q <sub>gd</sub>     | -   | 13.3 | -   |      |                                                                    |
| Gate Charge at V <sub>TH</sub>                          | Q <sub>g(TH)</sub>  | -   | 6.9  | -   |      |                                                                    |
| Turn-On Delay Time                                      | t <sub>D(ON)</sub>  | -   | 603  | -   | ns   | V <sub>SS</sub> = 6V, V <sub>GS</sub> = 4.5V, I <sub>S</sub> = 3A  |
| Turn-On Rise Time                                       | t <sub>r</sub>      | -   | 1694 | -   |      |                                                                    |
| Turn-Off Delay Time                                     | t <sub>D(OFF)</sub> | -   | 4749 | -   |      |                                                                    |
| Turn-Off Fall Time                                      | t <sub>f</sub>      | -   | 6208 | -   |      |                                                                    |

- Notes:
- Device mounted on FR-4 material with 1-inch<sup>2</sup> (6.45-cm<sup>2</sup>), 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.

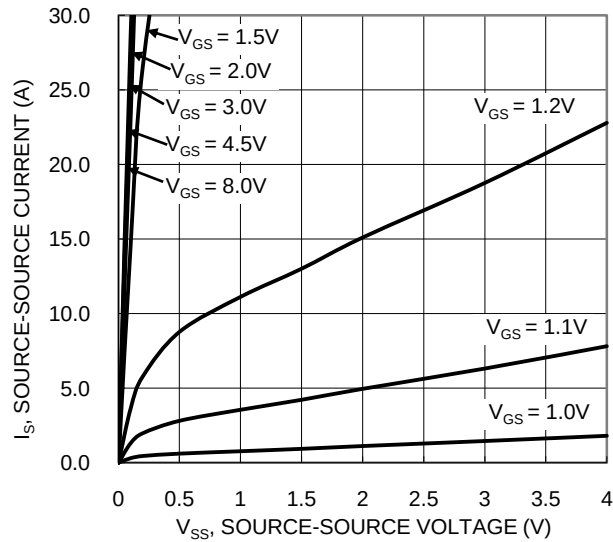


Figure 1. Typical Output Characteristic

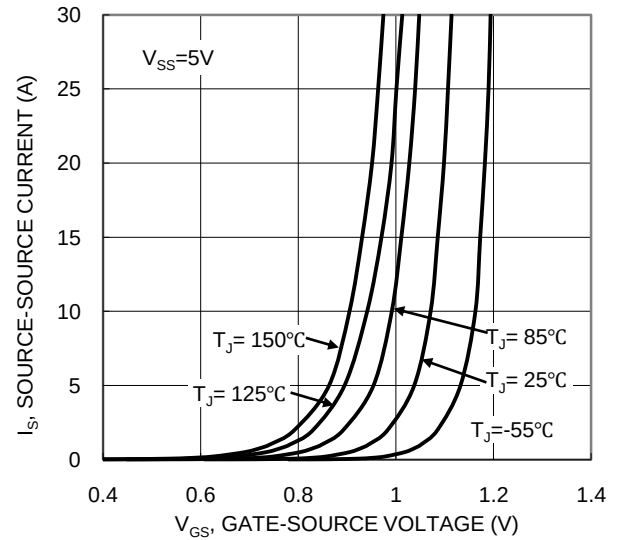


Figure 2. Typical Transfer Characteristic

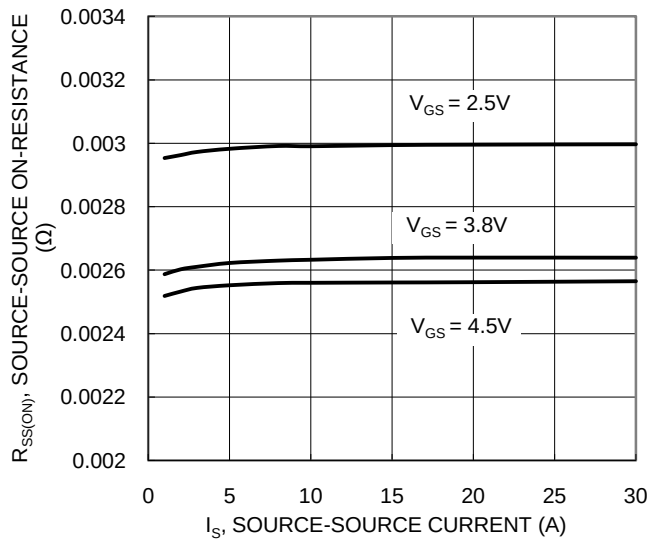


Figure 3. Typical On-Resistance vs. Source Current and Gate Voltage

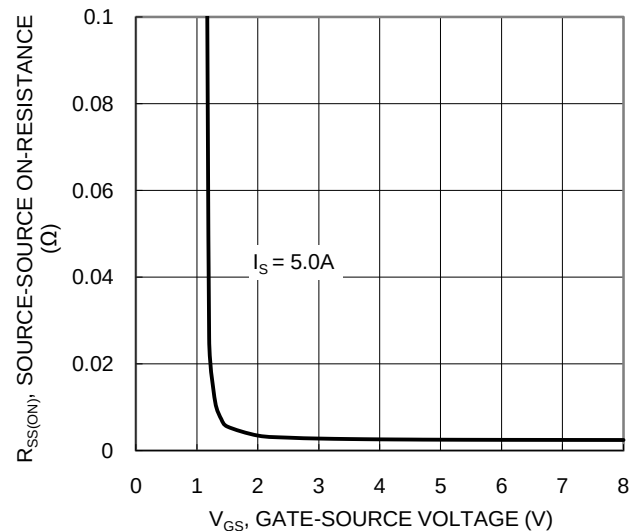


Figure 4. Typical Transfer Characteristic

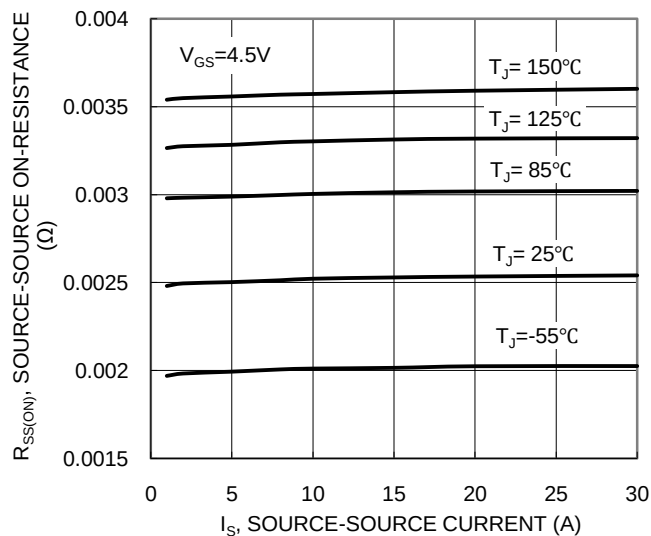


Figure 5. Typical On-Resistance vs. Source Current and Junction Temperature

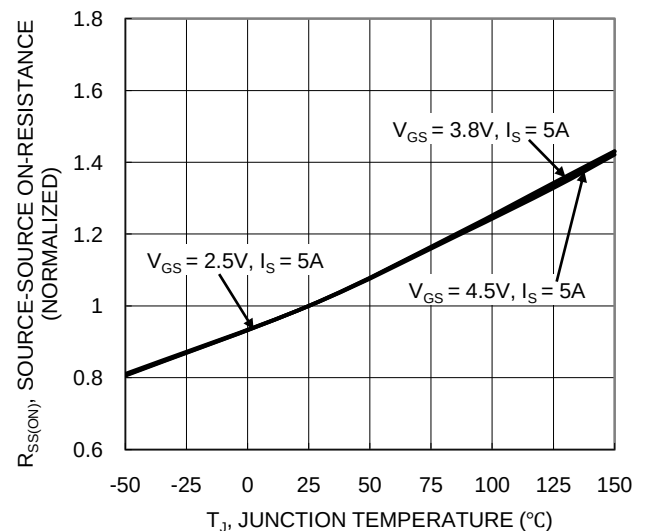
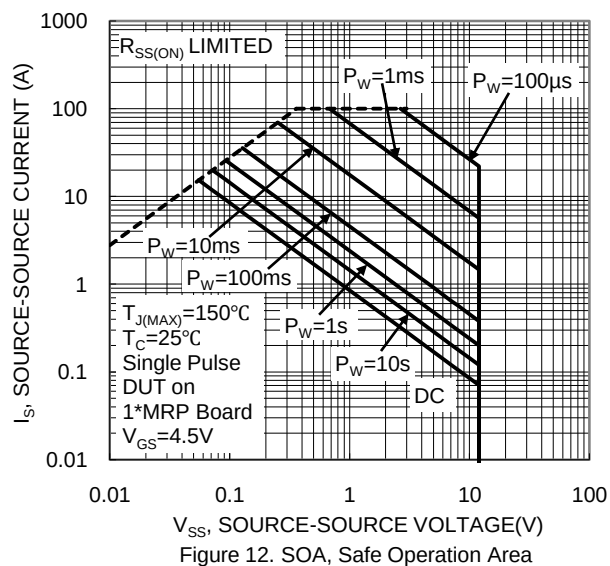
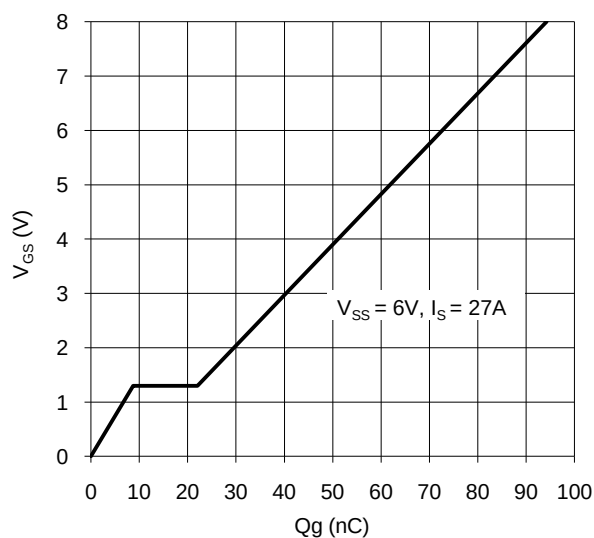
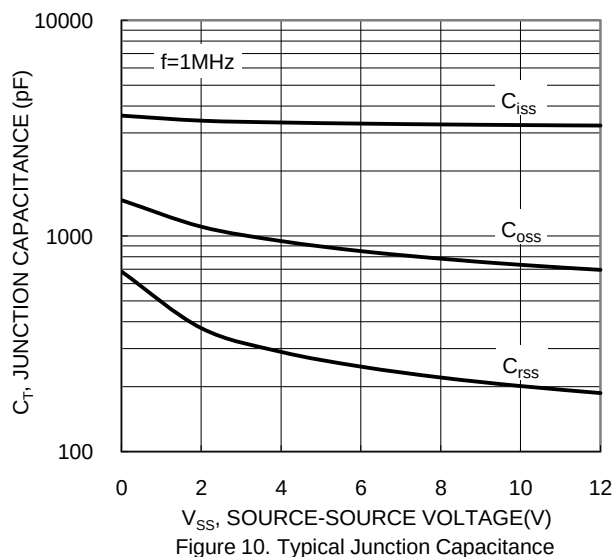
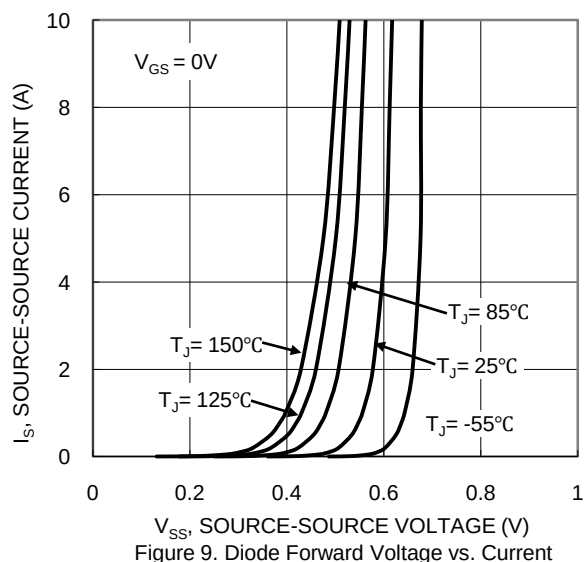
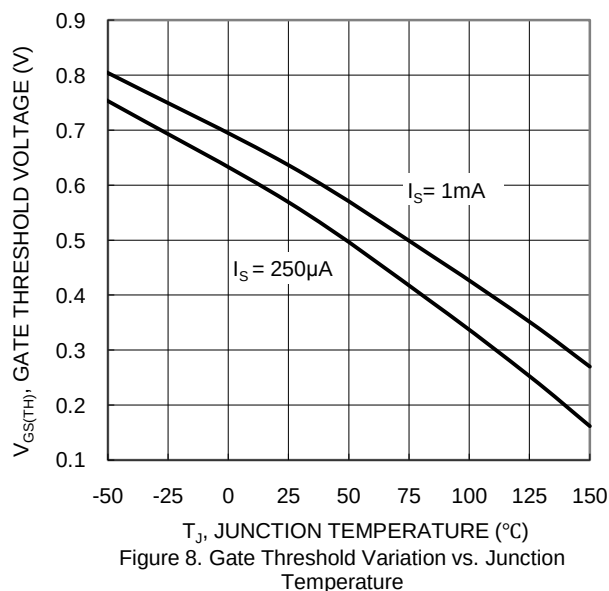
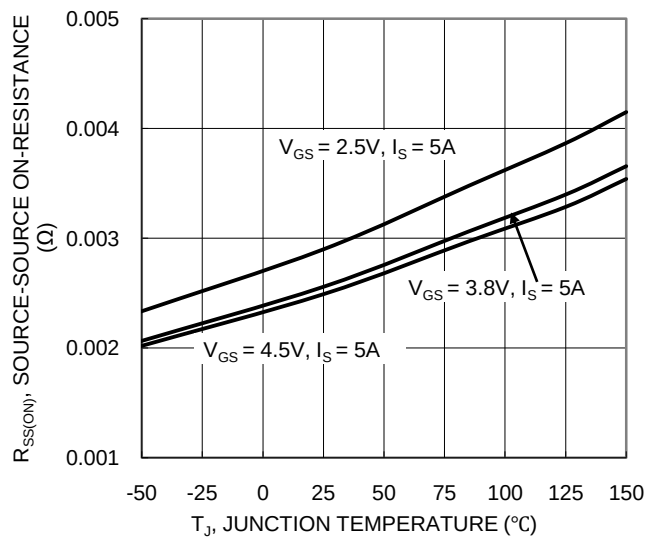


Figure 6. On-Resistance Variation with Junction Temperature



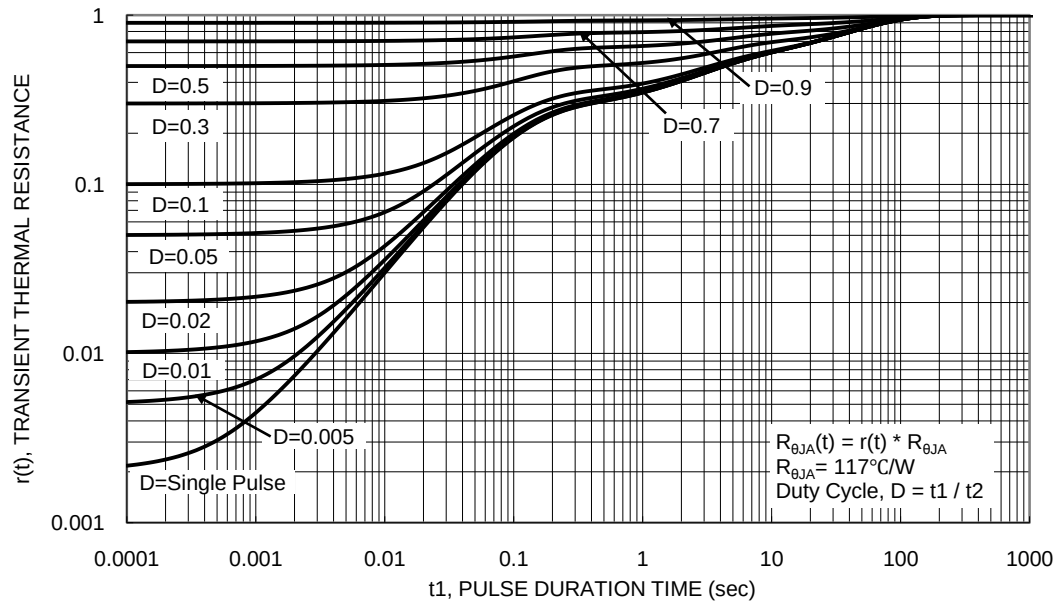
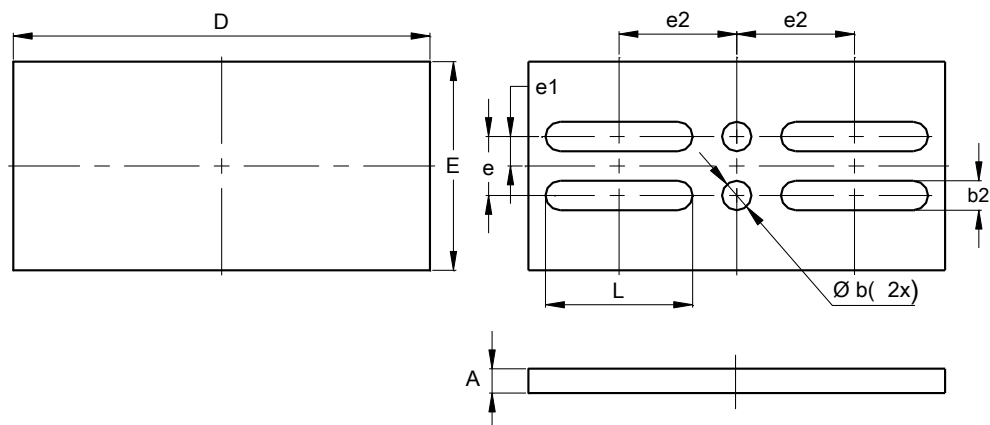


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

X3-DSN3518-6

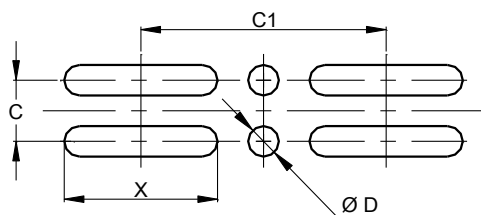


| X3-DSN3518-6         |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.16 | 0.26 | 0.21 |
| b                    | 0.22 | 0.28 | 0.25 |
| b2                   | 0.22 | 0.28 | 0.25 |
| D                    | 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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