

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max         | I <sub>D</sub><br>T <sub>A</sub> = +25°C |
|-------------------|---------------------------------|------------------------------------------|
| -20V              | 78mΩ @ V <sub>GS</sub> = -8V    | -3.4A                                    |
|                   | 100mΩ @ V <sub>GS</sub> = -4.5V | -3.0A                                    |

## Description

This new generation MOSFET is designed to minimize the footprint in handheld and mobile application. It can be used to replace many small signals MOSFET with as really small footprint.

## Applications

- Battery Management
- Load Switch
- Battery Protection
- Handheld and Mobile Application

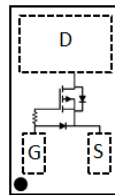
## Features and Benefits

- Low Q<sub>g</sub> & Q<sub>gd</sub>
- Small Footprint
- Low Profile 0.225mm Height
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

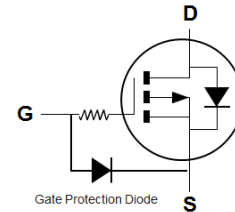
## Mechanical Data

- Case: X4-DSN1006-3
- Terminal Connections: See Diagram Below
- Moisture Sensitivity: Level 1 per J-STD-020
- Backside Lamination: A Protective Polymer Film
- Terminals: Finish — NiPdAu.or NiAu Solderable per MIL-STD-202, Method 208 (e4)

X4-DSN1006-3 (Type B)



Top View



Equivalent Circuit

## Ordering Information (Note 4)

| Part Number   | Case                  | Packaging       |
|---------------|-----------------------|-----------------|
| DMP2079LCA3-7 | X4-DSN1006-3 (Type B) | 10k/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



R = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: G = 2019)  
 M or  $\bar{M}$  = Month (ex: 9 = September)

### Date Code Key

| Year | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|------|------|------|------|------|------|------|------|------|------|
| Code | F    | G    | H    | I    | J    | K    | L    | M    | N    |

| 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 |
|-----------------------------------------------------------|--------------|------------------------|--------------------|-------|------|
| Drain-Source Voltage                                      |              |                        | V <sub>DSS</sub>   | -20   | V    |
| Gate-Source Voltage                                       |              |                        | V <sub>GSS</sub>   | -12   | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -8V   | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>     | -3.4  | A    |
|                                                           |              | T <sub>A</sub> = +70°C |                    | -2.7  |      |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>     | -3.0  | A    |
|                                                           |              | T <sub>A</sub> = +70°C |                    | -2.4  |      |
| Pulsed Drain Current (Note 6)                             |              |                        | I <sub>DM</sub>    | -13   | A    |
| Human Body Model (HBM)                                    |              |                        | V <sub>(ESD)</sub> | 4     | kV   |

**Thermal Characteristics**

| Characteristic                                                           | Symbol                            | Value       | Unit |
|--------------------------------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 7)                                               | P <sub>D</sub>                    | 0.81        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 7) | R <sub>θJA</sub>                  | 155.4       | °C/W |
| Power Dissipation (Note 5)                                               | P <sub>D</sub>                    | 1.4         | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5) | R <sub>θJA</sub>                  | 90.4        | °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>                    |                     |      |      |      |      |                                                                                              |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | -20  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                                                |
| Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | —    | —    | -100 | nA   | V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V                                                 |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | —    | —    | -50  | nA   | V <sub>GS</sub> = -12V, V <sub>DS</sub> = 0V                                                 |
| <b>ON CHARACTERISTICS (Note 8)</b>                     |                     |      |      |      |      |                                                                                              |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub> | -0.7 | -0.9 | -1.2 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                  |
| Static Drain-Source On-Resistance                      | R <sub>DS(ON)</sub> | —    | 64   | 78   | mΩ   | V <sub>GS</sub> = -8V, I <sub>D</sub> = -0.5A                                                |
|                                                        |                     | —    | 77   | 100  |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -0.5A                                              |
|                                                        |                     | —    | 113  | 165  |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -0.5A                                              |
|                                                        |                     | —    | 188  | 600  |      | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -0.1A                                              |
|                                                        |                     | —    | —    | —    |      | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -0.1A                                              |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | —    | -0.7 | -1.0 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -0.5A                                                 |
| Reverse Recovery Charge                                | Q <sub>RR</sub>     | —    | 1.3  | —    | nC   | V <sub>DD</sub> = -10V, I <sub>F</sub> = -1A,                                                |
| Reverse Recovery Time                                  | t <sub>RR</sub>     | —    | 7.7  | —    | ns   | di/dt = 100A/μs                                                                              |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                |                     |      |      |      |      |                                                                                              |
| Input Capacitance                                      | C <sub>iss</sub>    | —    | 152  | —    | pF   | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1MHz                                       |
| Output Capacitance                                     | C <sub>oss</sub>    | —    | 78   | —    |      |                                                                                              |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | —    | 4.3  | —    |      |                                                                                              |
| Series Gate Resistance                                 | R <sub>G</sub>      | —    | 21   | —    | Ω    | f = 1MHz, V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V                                         |
| Total Gate Charge                                      | Q <sub>g</sub>      | —    | 1.1  | —    | nC   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.5A                      |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | —    | 0.2  | —    |      |                                                                                              |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | —    | 0.2  | —    |      |                                                                                              |
| Gate Charge at V <sub>TH</sub>                         | Q <sub>g(th)</sub>  | —    | 3.6  | —    |      |                                                                                              |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | —    | 4.1  | —    | ns   | V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>G</sub> = 2Ω, I <sub>D</sub> = -0.5A |
| Turn-On Rise Time                                      | t <sub>R</sub>      | —    | 5.6  | —    |      |                                                                                              |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> | —    | 9.5  | —    |      |                                                                                              |
| Turn-Off Fall Time                                     | t <sub>F</sub>      | —    | 4.6  | —    |      |                                                                                              |

- 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.

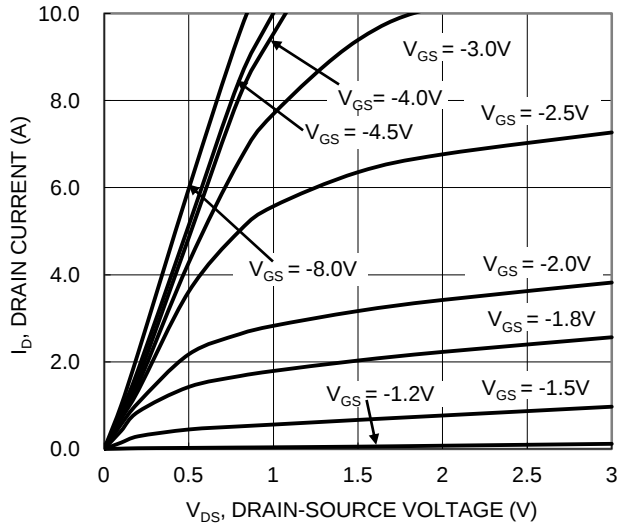


Figure 1. Typical Output Characteristic

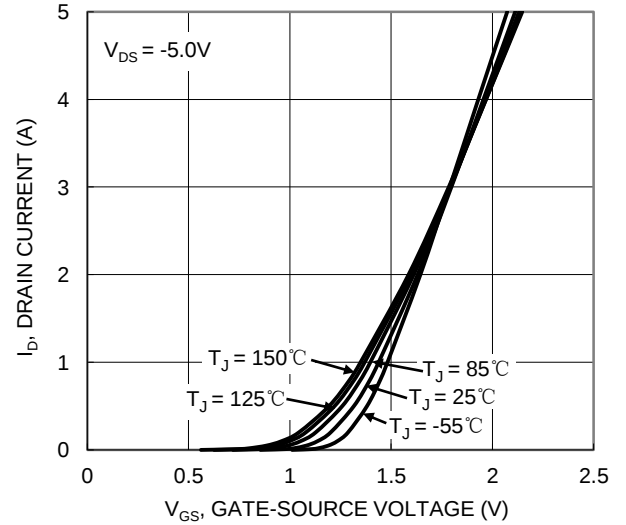


Figure 2. Typical Transfer Characteristic

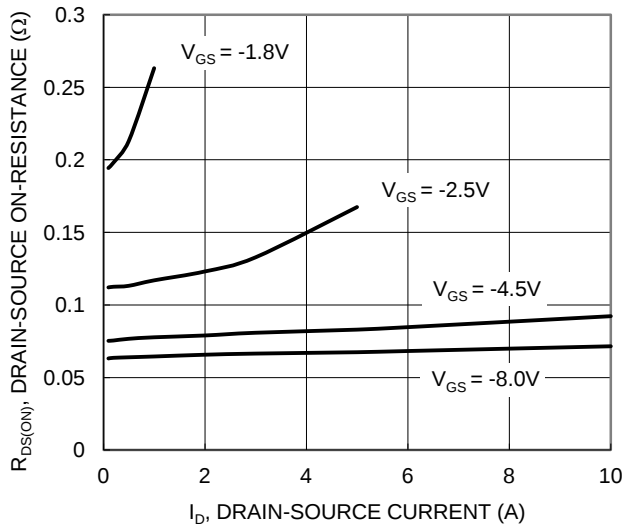


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

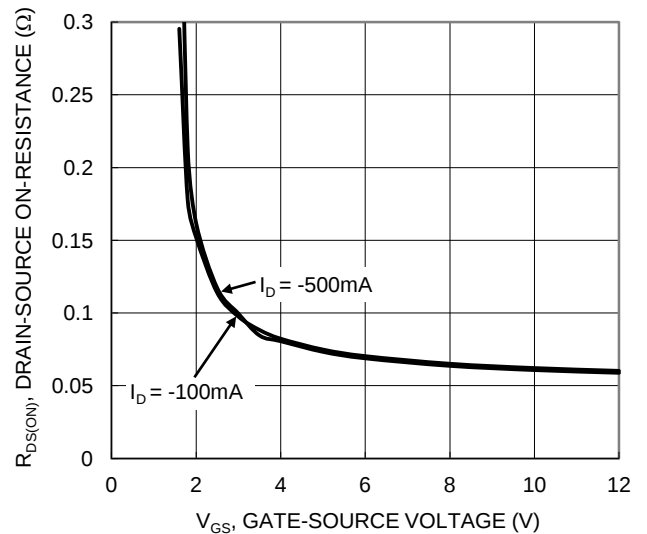


Figure 4. Typical Transfer Characteristic

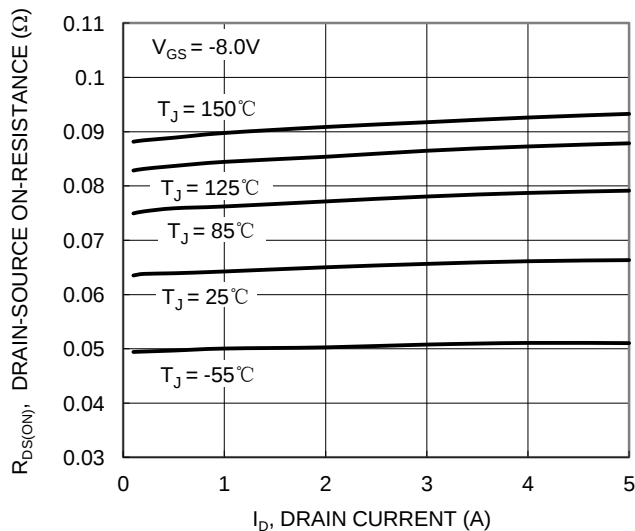


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

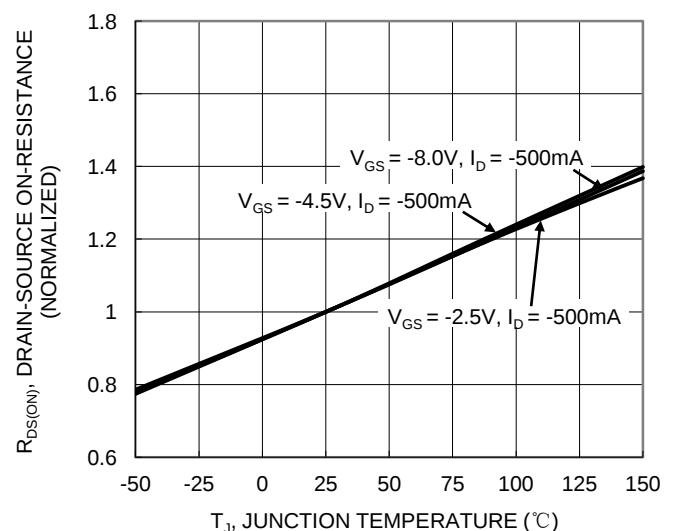
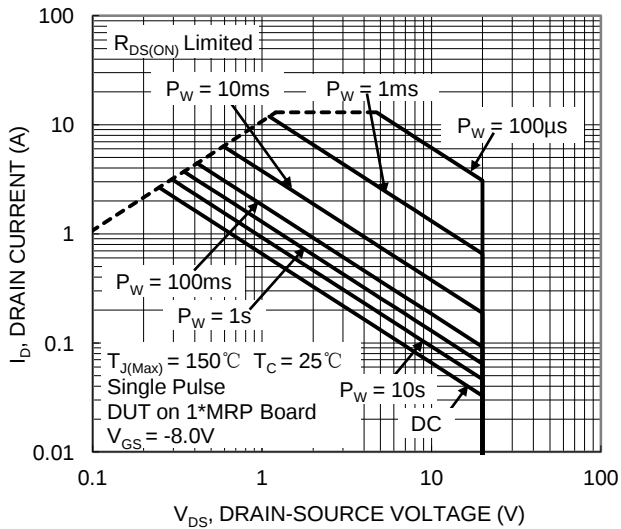
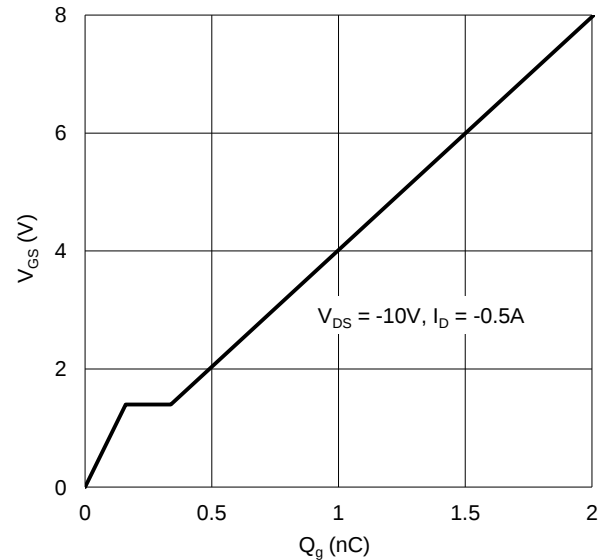
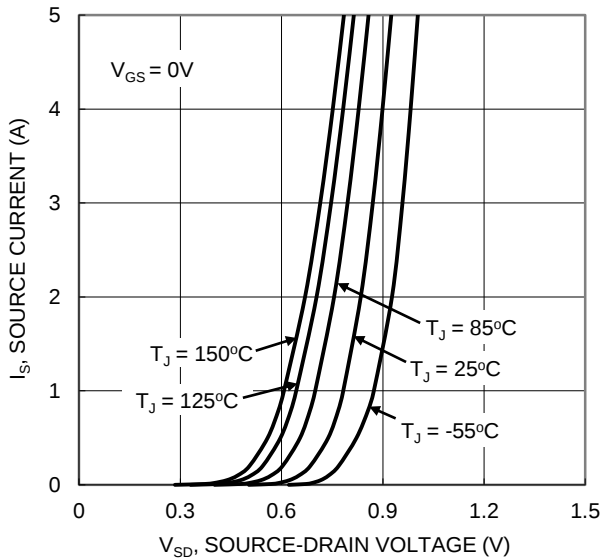
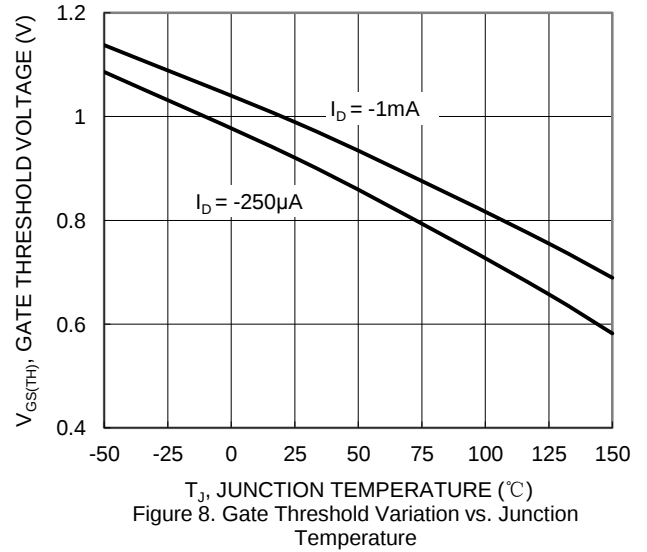
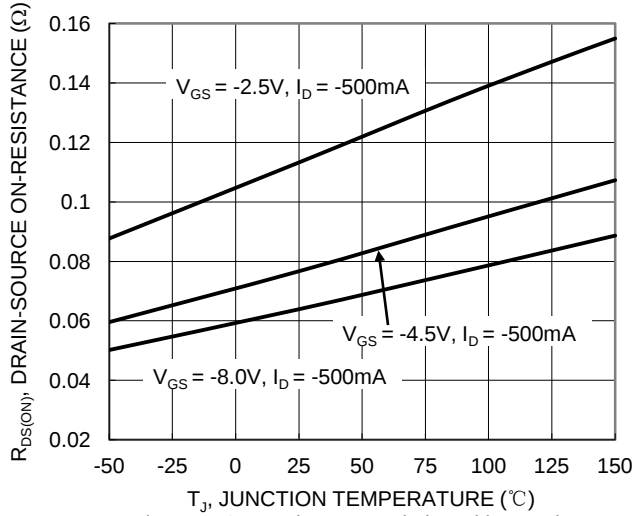


Figure 6. On-Resistance Variation with Junction Temperature



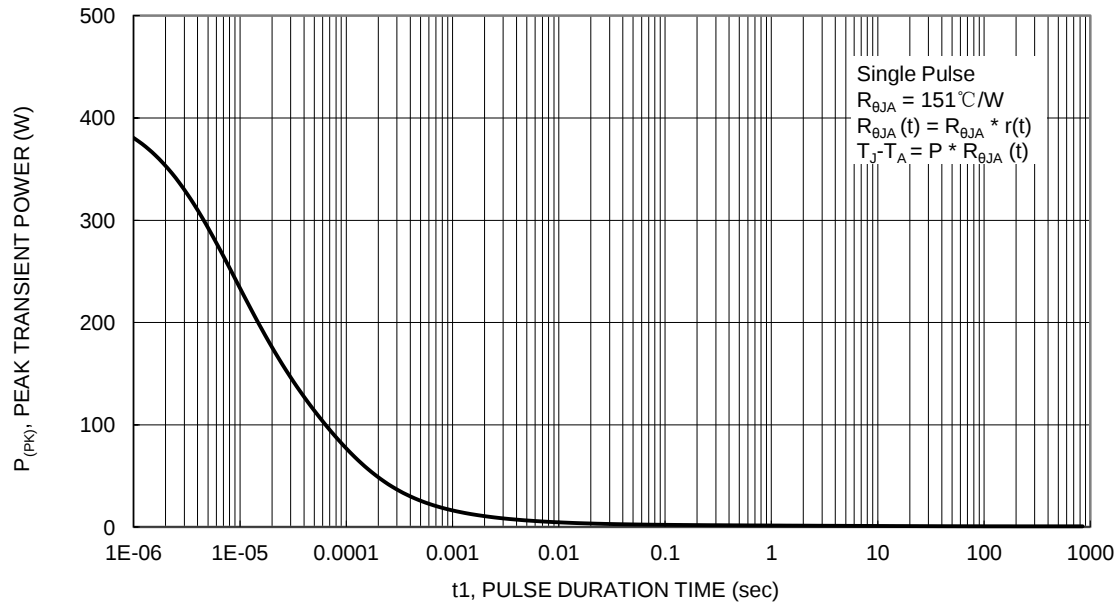


Figure 12. Single Pulse Maximum Power Dissipation

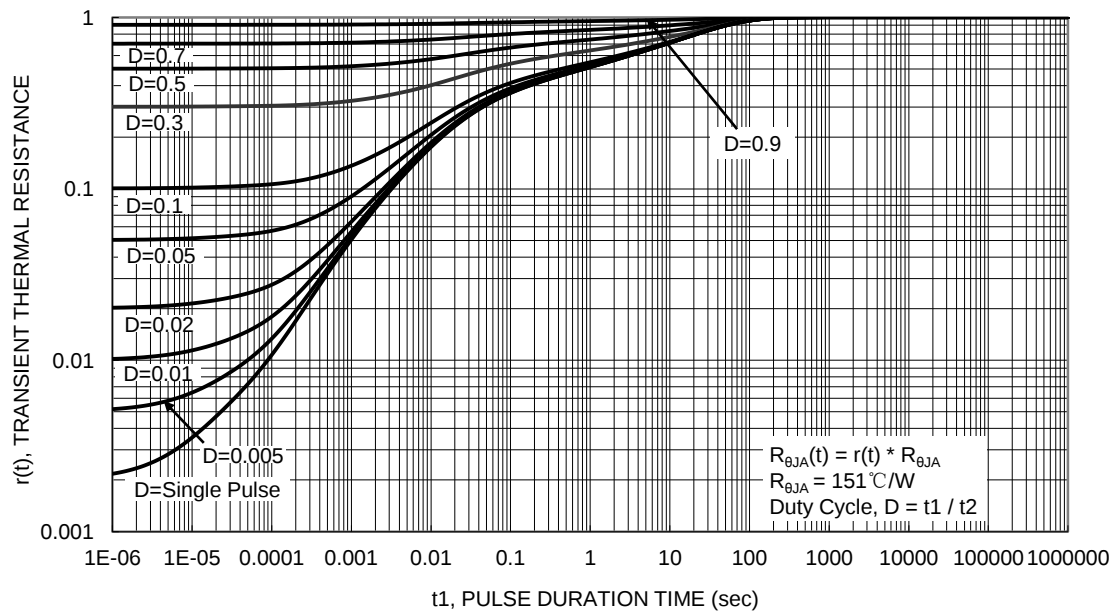
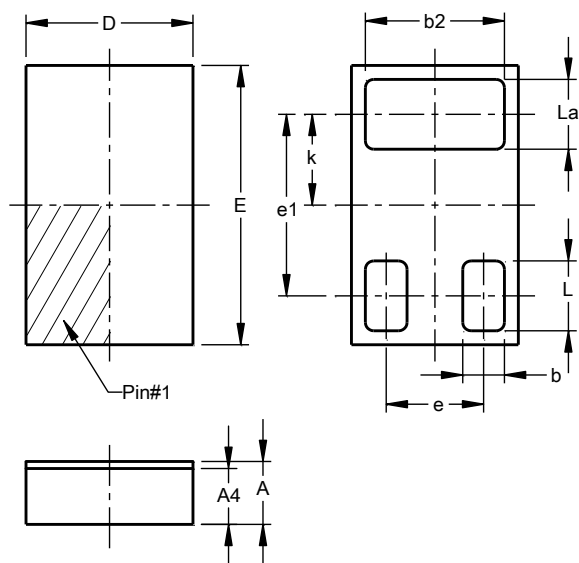


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

**X4-DSN1006-3 (Type B)**

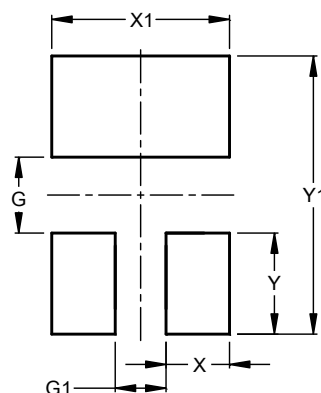


| X4-DSN1006-3<br>(Type B) |      |      |       |
|--------------------------|------|------|-------|
| Dim                      | Min  | Max  | Typ   |
| A                        | 0.20 | 0.25 | 0.225 |
| A4                       | 0.18 | 0.22 | 0.20  |
| b                        | 0.14 | 0.16 | 0.15  |
| b2                       | 0.49 | 0.51 | 0.50  |
| D                        | 0.56 | 0.64 | 0.60  |
| E                        | 0.96 | 1.04 | 1.00  |
| e                        | --   | --   | 0.35  |
| e1                       | --   | --   | 0.65  |
| k                        | --   | --   | 0.325 |
| L                        | 0.24 | 0.26 | 0.25  |
| La                       | 0.24 | 0.26 | 0.25  |
| All Dimensions in mm     |      |      |       |

## Suggested Pad Layout

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

**X4-DSN1006-3 (Type B)**



| Dimensions | Value<br>(in mm) |
|------------|------------------|
| G          | 0.40             |
| G1         | 0.20             |
| X          | 0.15             |
| X1         | 0.50             |
| Y          | 0.25             |
| Y1         | 0.90             |

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

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