

**Product Summary**

|                         |                                 |  |
|-------------------------|---------------------------------|--|
| <b>BV<sub>SSS</sub></b> | <b>R<sub>SS(ON)</sub> Typ</b>   | <b>I<sub>S</sub> Max<br/>T<sub>A</sub> = +25°C</b> |
| 12V                     | 2.3 mΩ @ V <sub>GS</sub> = 3.8V | 20.2A  |

**Description**

This new generation MOSFET is 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

**Features**

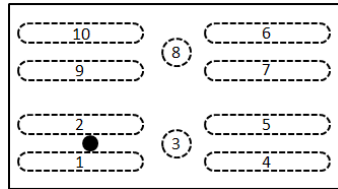
- CSP with Footprint 2.98mm × 1.49mm
- Height = 0.11mm for Low Profile
- ESD Protection of Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.**  
<https://www.diodes.com/quality/product-definitions/>

**Mechanical Data**

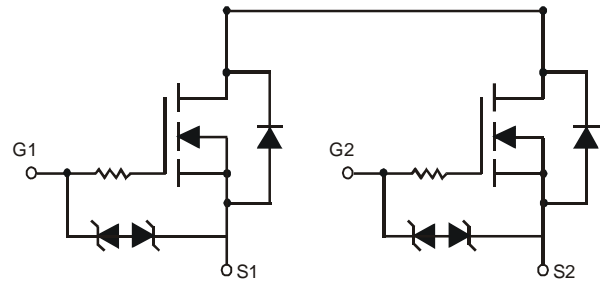
- Case: X4-DSN3015-10
- Terminal Connections: See Diagram Below
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu or NiAu. Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.0012 grams (Approximate)



X4-DSN3015-10



Source 1: 1,2,4,5    Top View  
Gate 1: 3  
Source 2: 6, 7, 9, 10  
Gate 2: 8



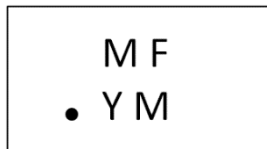
Equivalent Circuit

**Ordering Information** (Note 4)

| Part Number    | Case          | Packaging        |
|----------------|---------------|------------------|
| DMN12M7UCA10-7 | X4-DSN3015-10 | 5000/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**



MF = 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 | 2027 | 2028 | 2029 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | F    | G    | H    | I    | J    | K    | L    | M    | N    | O    | P    | R    |

| 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>   | 20.2  | A    |
|   |              | T <sub>A</sub> = +70°C |                  | 16.1  |      |
| Continuous Source Current (Note 5) V <sub>GS</sub> = 2.5V | Steady State | T <sub>A</sub> = +25°C | I <sub>S</sub>   | 13.6  | A    |
|   |              | T <sub>A</sub> = +70°C |                  | 10.8  |      |
| Pulsed Source Current (Note 6)                            |              |                        | I <sub>SM</sub>  | 80    | A    |

**Thermal Characteristics**

| Characteristic   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 7)   | P <sub>D</sub>                    | 0.74        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 7) | R <sub>θJA</sub>                  | 171.9       | °C/W |
| Power Dissipation (Note 5)   | P <sub>D</sub>                    | 1.73        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5) | R <sub>θJA</sub>                  | 74.4        | °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>                    |                     |      |      |      |      |   |
| Source-Source Breakdown Voltage                        | BV <sub>SSS</sub>   | 12   | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1mA                      |
| Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C | I <sub>SSS</sub>    | —    | —    | 1    | µA   | V <sub>SS</sub> = 9.6V, V <sub>GS</sub> = 0V                    |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | —    | —    | ±10  | µA   | V <sub>GS</sub> = ±8V, V <sub>SS</sub> = 0V                     |
|  |                     | —    | —    | ±1   | µA   | V <sub>GS</sub> = ±5V, V <sub>SS</sub> = 0V                     |
| <b>ON CHARACTERISTICS (Note 8)</b>                     |                     |      |      |      |      |   |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub> | 0.5  | 0.8  | 1.4  | V    | V <sub>SS</sub> = 10V, I <sub>S</sub> = 1.11mA                  |
| Static Source-Source On-Resistance                     | R <sub>SS(ON)</sub> | 1.55 | 2.19 | 2.75 | mΩ   | V <sub>GS</sub> = 4.5V, I <sub>S</sub> = 6A                     |
|  |                     | 1.6  | 2.30 | 2.85 |      | V <sub>GS</sub> = 3.8V, I <sub>S</sub> = 6A                     |
|  |                     | 1.65 | 2.51 | 3.95 |      | V <sub>GS</sub> = 3.1V, I <sub>S</sub> = 6A                     |
|  |                     | 1.9  | 2.93 | 6.1  |      | V <sub>GS</sub> = 2.5V, I <sub>S</sub> = 6A                     |
| Diode Forward Voltage                                  | V <sub>SS</sub>     | —    | 0.8  | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 6A                       |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                |                     |      |      |      |      |   |
| Input Capacitance                                      | C <sub>ISS</sub>    | —    | 3039 | —    | pF   | V <sub>SS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz           |
| Output Capacitance                                     | C <sub>OSS</sub>    | —    | 530  | —    |      |   |
| Reverse Transfer Capacitance                           | C <sub>RSS</sub>    | —    | 141  | —    |      |   |
| Total Gate Charge                                      | Q <sub>g</sub>      | —    | 35.7 | —    | nC   | V <sub>SS</sub> = 6V, V <sub>GS</sub> = 4V, I <sub>S</sub> = 6A |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | —    | 6.7  | —    |      |   |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | —    | 9.2  | —    |      |   |
| Gate Charge at V <sub>TH</sub>                         | Q <sub>g(th)</sub>  | —    | 3.4  | —    |      |   |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | —    | 880  | —    | ns   | V <sub>SS</sub> = 6V, V <sub>GS</sub> = 4V, I <sub>S</sub> = 6A |
| Turn-On Rise Time                                      | t <sub>r</sub>      | —    | 1468 | —    |      |   |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> | —    | 2914 | —    |      |   |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | —    | 2830 | —    |      |   |

- Notes:
- Device mounted on FR-4 material with 1inch<sup>2</sup> (6.45cm<sup>2</sup>), 2oz. (0.071mm 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.

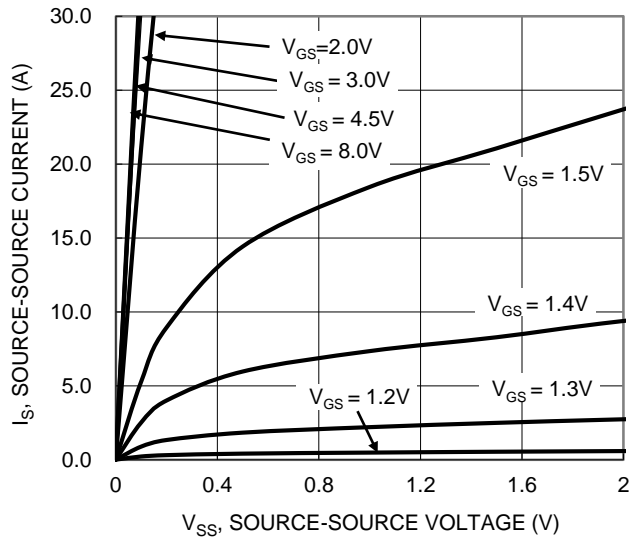


Figure 1. Typical Output Characteristic

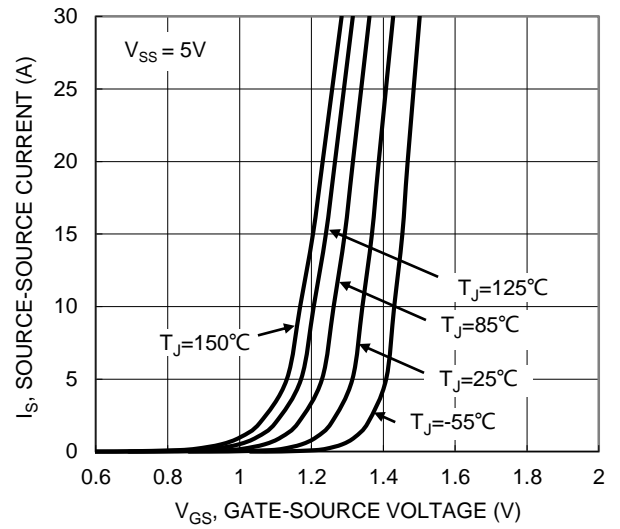


Figure 2. Typical Transfer Characteristic

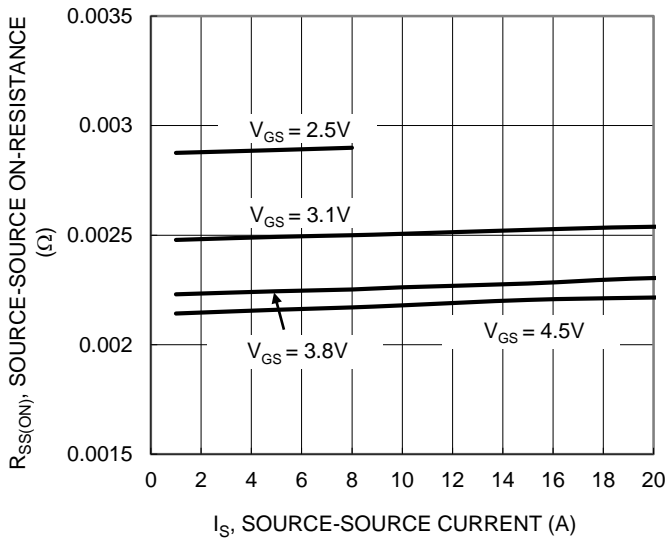


Figure 3. Typical On-Resistance vs. Source Current and Gate Voltage

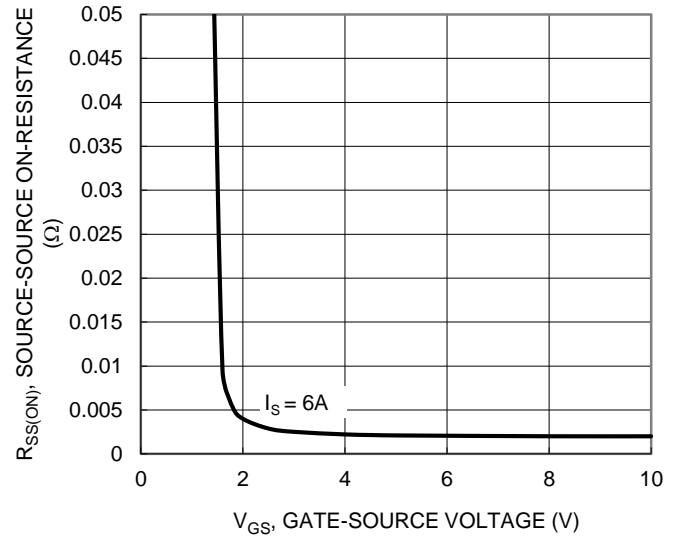


Figure 4. Typical Transfer Characteristic

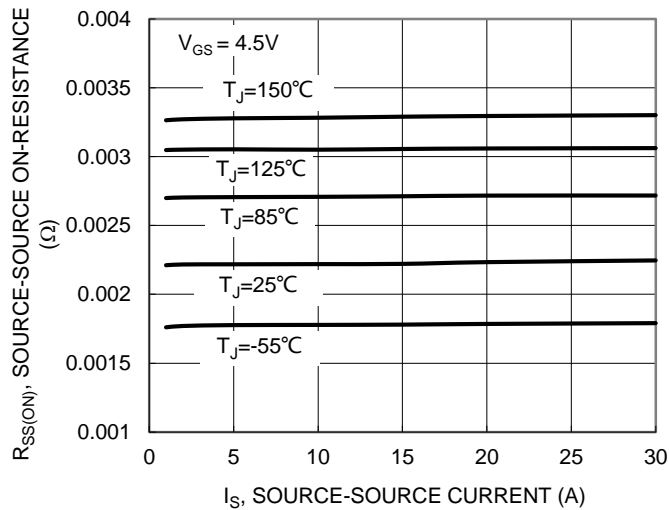


Figure 5. Typical On-Resistance vs. Source Current and Junction Temperature

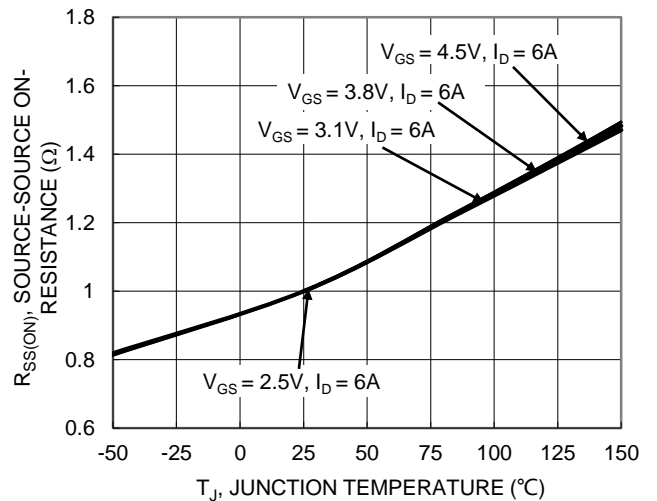
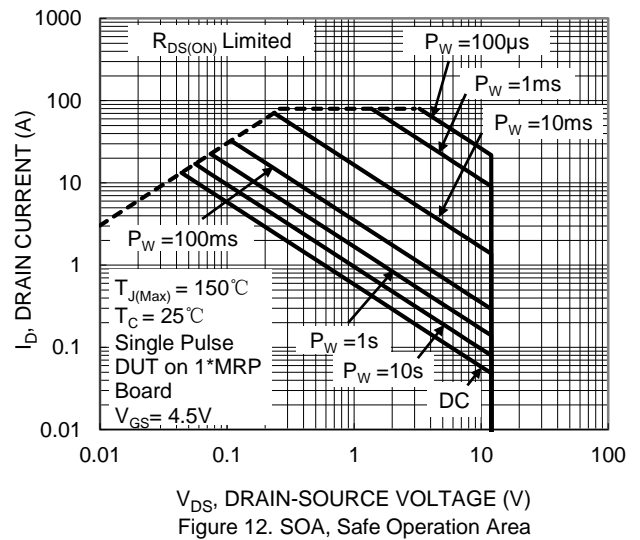
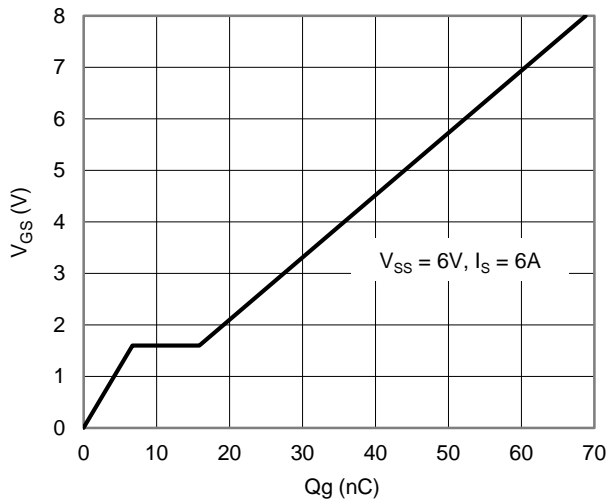
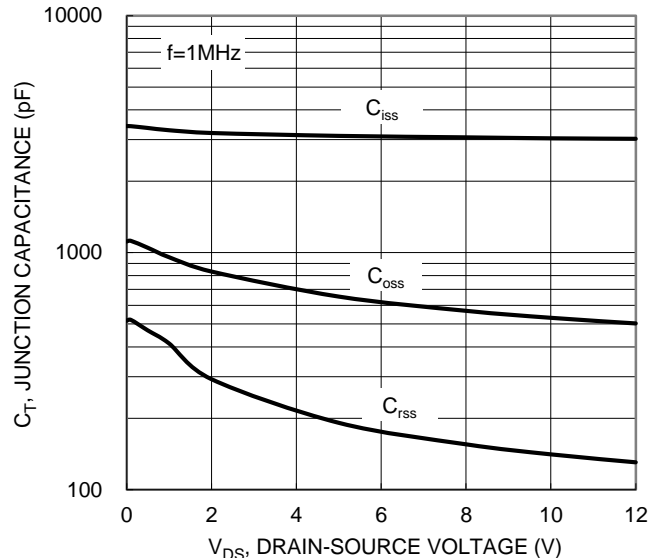
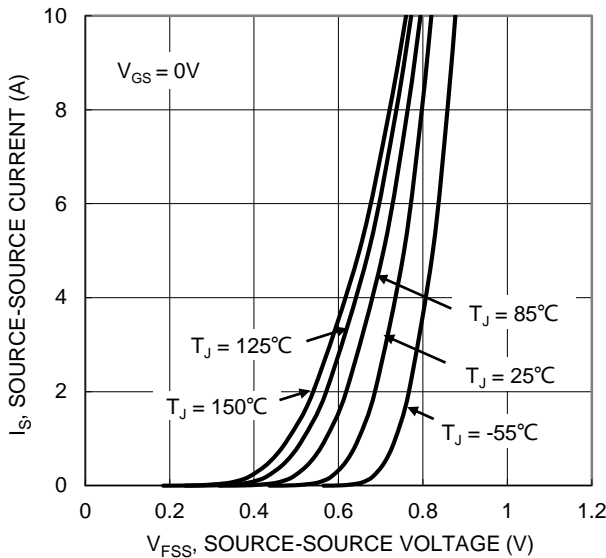
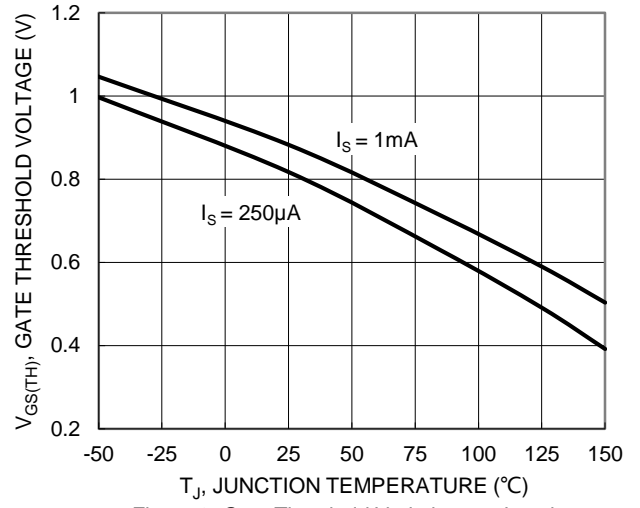
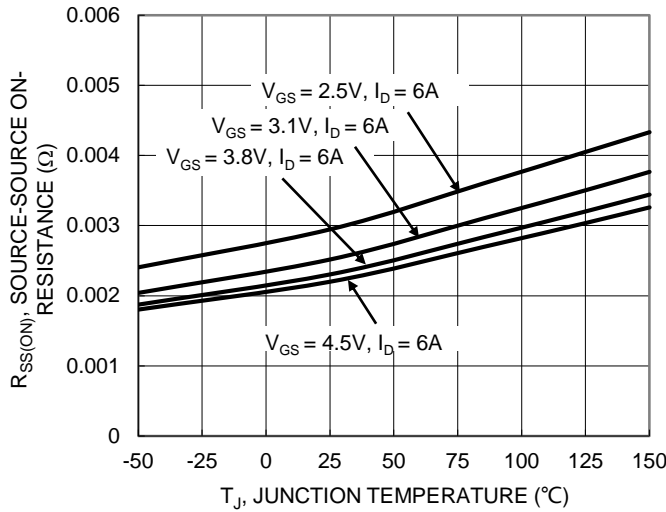


Figure 6. On-Resistance Variation with Junction Temperature



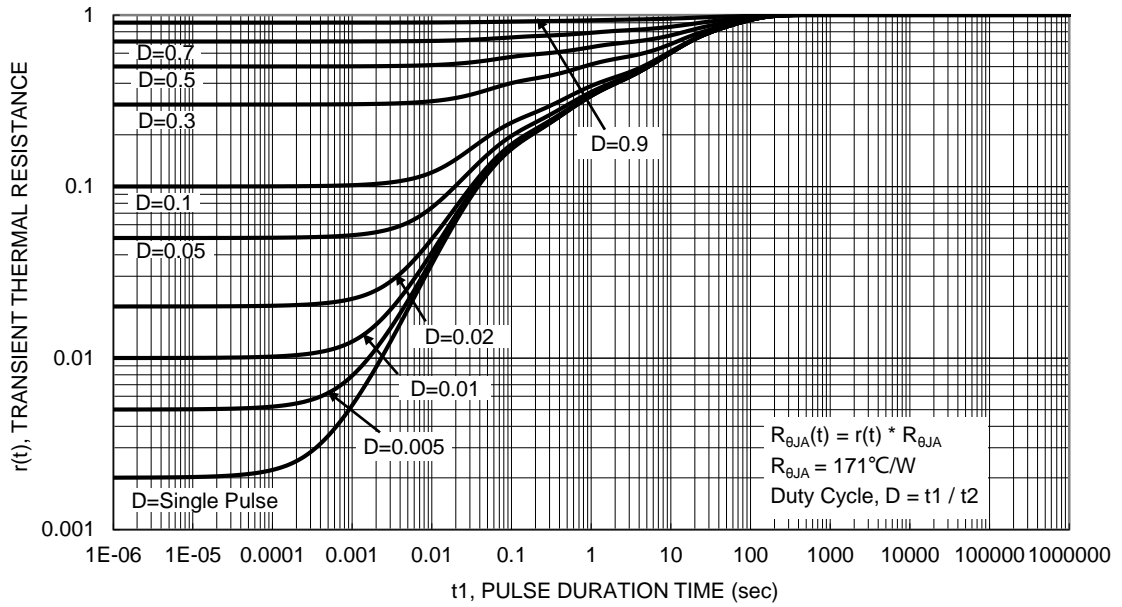
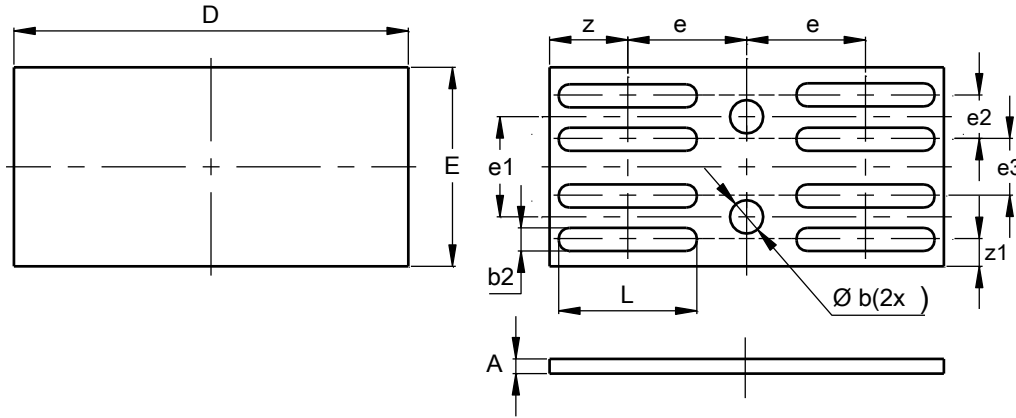


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

**X4-DSN3015-10**

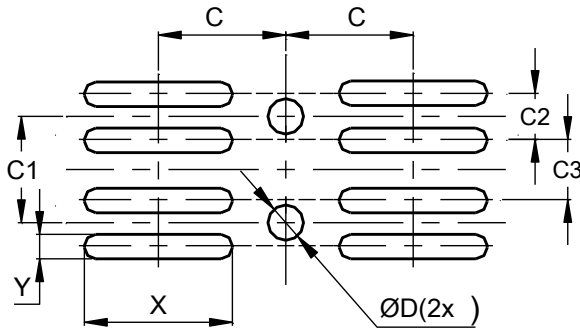


| X4-DSN3015-10        |      |      |        |
|----------------------|------|------|--------|
| Dim                  | Min  | Max  | Typ    |
| A                    | 0.09 | 0.16 | 0.11   |
| b                    | --   | --   | 0.25   |
| b2                   | --   | --   | 0.175  |
| D                    | 2.93 | 3.03 | 2.98   |
| E                    | 1.44 | 1.54 | 1.49   |
| e                    | --   | --   | 0.895  |
| e1                   | --   | --   | 0.75   |
| e2                   | --   | --   | 0.325  |
| e3                   | --   | --   | 0.425  |
| L                    | --   | --   | 1.04   |
| z                    | --   | --   | 0.595  |
| z1                   | --   | --   | 0.2075 |
| All Dimensions in mm |      |      |        |

**Suggested Pad Layout**

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

**X4-DSN3015-10**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.895         |
| C1         | 0.750         |
| C2         | 0.325         |
| C3         | 0.425         |
| D          | 0.25          |
| X          | 1.04          |
| Y          | 0.175         |

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