# DMN21D1UDA-7B Datasheet

| | |
|---|---|
| DiGi Electronics Part Number | DMN21D1UDA-7B-DG |
| Manufacturer | Diodes Incorporated |
| Manufacturer Product Number | DMN21D1UDA-7B |
| Description | MOSFET 2N-CH 20V 0.455A 6DFN |
| Detailed Description | Mosfet Array 20V 455mA (Ta) 310mW Surface Mount X2-DFN0806-6 |

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## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| DMN21D1UDA-7B | Diodes Incorporated |
| Series: | Product Status: |
| - | Active |
| Technology: | Configuration: |
| MOSFET (Metal Oxide) | 2 N-Channel (Dual) |
| FET Feature: | Drain to Source Voltage (Vdss): |
| - | 20V |
| Current - Continuous Drain (Id) @ 25°C: | Rds On (Max) @ Id, Vgs: |
| 455mA (Ta) | 990mOhm @ 100mA, 4.5V |
| Vgs(th) (Max) @ Id: | Gate Charge (Qg) (Max) @ Vgs: |
| 1V @ 250µA | 0.41nC @ 4.5V |
| Input Capacitance (Ciss) (Max) @ Vds: | Power - Max: |
| 31pF @ 15V | 310mW |
| Operating Temperature: | Mounting Type: |
| -55°C ~ 150°C (TJ) | Surface Mount |
| Package / Case: | Supplier Device Package: |
| 6-SMD, No Lead | X2-DFN0806-6 |
| Base Product Number: | |
| DMN21 | |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.21.0095 | |

Lead-free Green

**DMN21D1UDA**

**DUAL N-CHANNEL ENHANCEMENT MODE MOSFET**

## Product Summary

| Device | $BV_{DSS}$ | $R_{DS(ON)}$ max | $I_D$ max $T_A$ = +25°C |
|---|---|---|---|
| NMOS | 20V | 0.99Ω @ $V_{GS}$ = 4.5V | 455mA |
| | | 1.2Ω @ $V_{GS}$ = 2.5V | 414mA |
| | | 1.8Ω @ $V_{GS}$ = 1.8V | 338mA |
| | | 2.4Ω @ $V_{GS}$ = 1.5V | 292mA |

## Features and Benefits

- Low On-Resistance
- Very Low Gate Threshold Voltage, 1.0V max
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package 0.8mm x 0.6mm
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3 )**

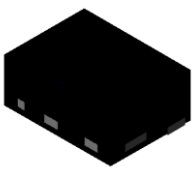
## Description and Applications

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

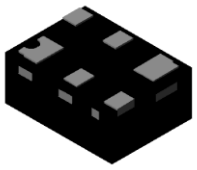
- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

## Mechanical Data

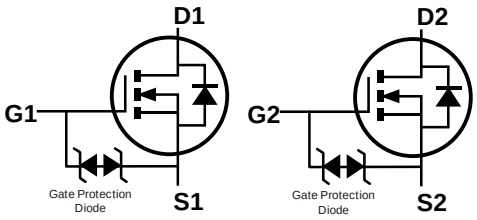
- Case: X2-DFN0806-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.001 grams (Approximate)

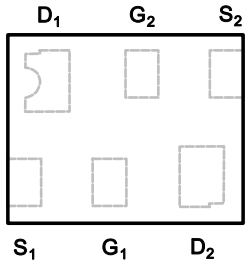
Top View



Bottom View




Device Symbol




Pin Configuration
Top View

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMN21D1UDA-7B | X2-DFN0806-6 | 10,000/Tape & Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html 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 http://www.diodes.com/products/packages.html.

## Marking Information


Top View

B2 = Product Type Marking Code

## Maximum Ratings N-CHANNEL (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 20 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±8 | V |
| Continuous Drain Current (Note 5) | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 455<br>365 | mA |
| Pulsed Drain Current (Note 6) | | | $I_{DM}$ | 1500 | mA |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | | $P_D$ | 310 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | $R_{\theta JA}$ | 405 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.

## Electrical Characteristics N-CHANNEL (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 20 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current @$T_C$ = +25°C | $I_{DSS}$ | — | — | 1 | µA | $V_{DS}$ = 16V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±10 | µA | $V_{GS}$ = ±5V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 0.4 | 0.75 | 1.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 0.5 | 0.99 | Ω | $V_{GS}$ = 4.5V, $I_D$ = 100mA |
| | | — | 0.6 | 1.2 | | $V_{GS}$ = 2.5V, $I_D$ = 50mA |
| | | — | 0.8 | 1.8 | | $V_{GS}$ = 1.8V, $I_D$ = 20mA |
| | | — | 1.0 | 2.4 | | $V_{GS}$ = 1.5V, $I_D$ = 10mA |
| | | — | 2.0 | — | | $V_{GS}$ = 1.2V, $I_D$ = 1mA |
| Diode Forward Voltage | $V_{SD}$ | — | 0.6 | 1.0 | V | $V_{GS}$ = 0V, $I_S$ = 10mA |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 31 | — | pF | $V_{DS}$ = 15V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 3.6 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 2.6 | — | pF | |
| Gate Resistance | $R_G$ | — | 113 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge | $Q_g$ | — | 0.41 | — | nC | $V_{GS}$ = 4.5V, $V_{DS}$ = 10V, $I_D$ = 250mA |
| Gate-Source Charge | $Q_{gs}$ | — | 0.06 | — | nC | |
| Gate-Drain Charge | $Q_{gd}$ | — | 0.05 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 4.5 | — | ns | $V_{DD}$ = 15V, $V_{GS}$ = 4.5V, $R_G$ = 2Ω, $I_D$ = 200mA |
| Turn-On Rise Time | $t_R$ | — | 3.4 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 24 | — | ns | |
| Turn-Off Fall Time | $t_F$ | — | 12 | — | ns | |

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

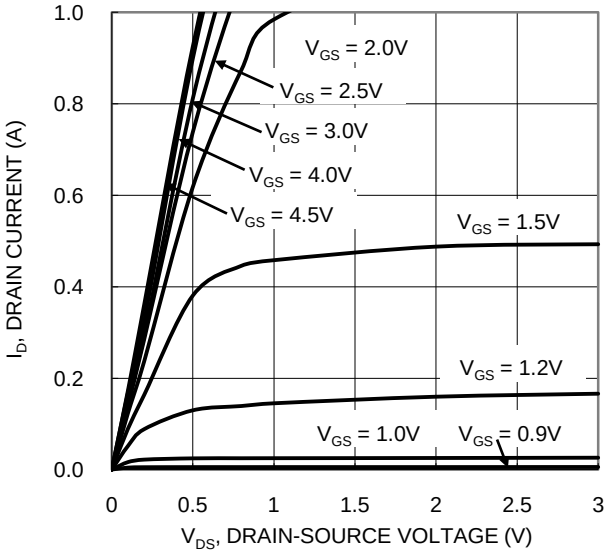



Figure 1. Typical Output Characteristic

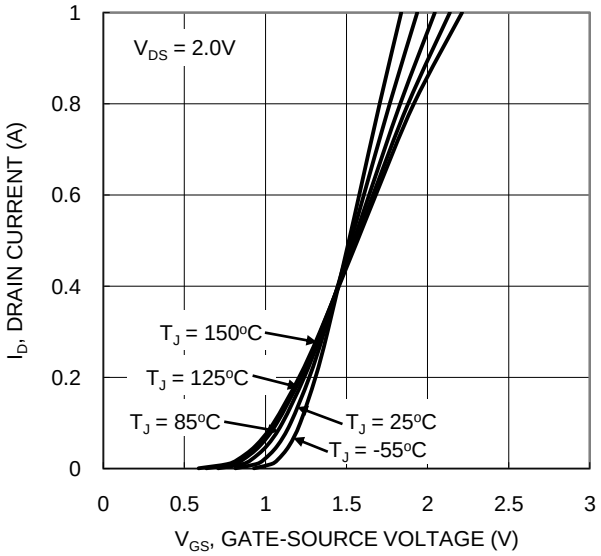



Figure 2. Typical Transfer Characteristic

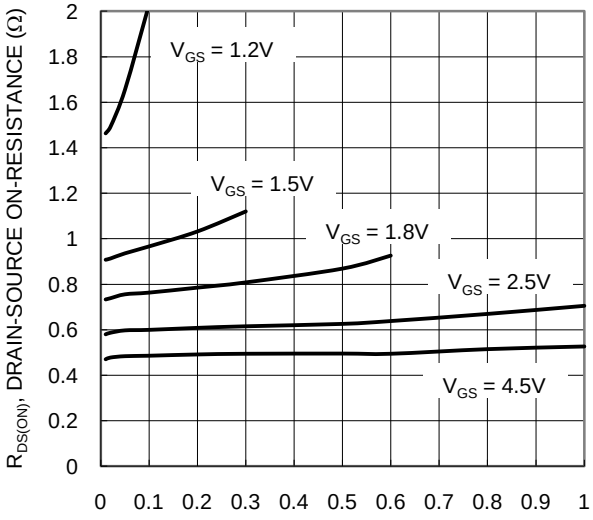



Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

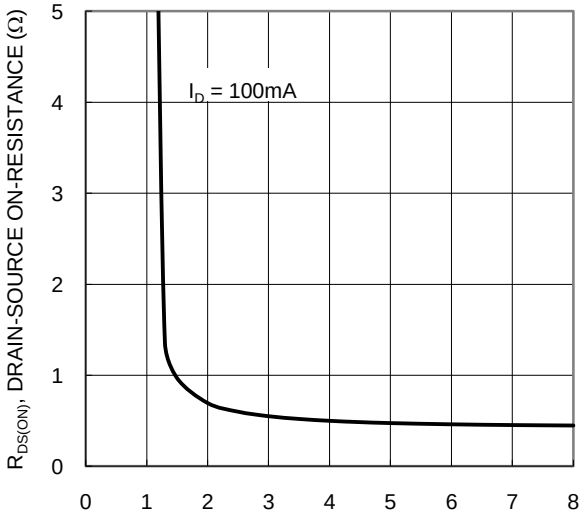



Figure 4. Typical Transfer Characteristic

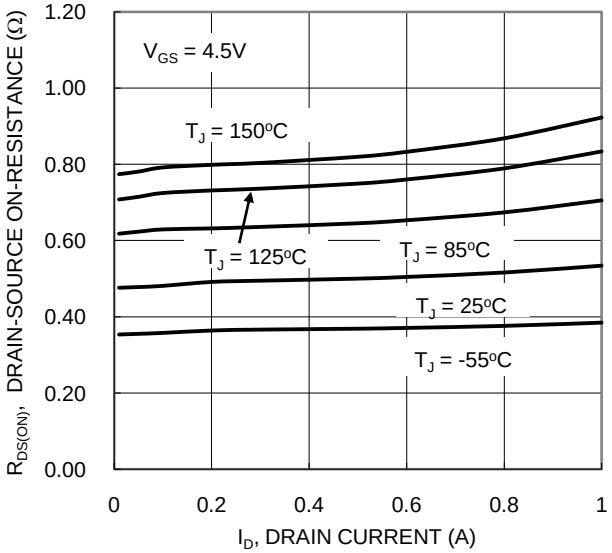



Figure 5. Typical On-Resistance vs. Drain Current and Temperature

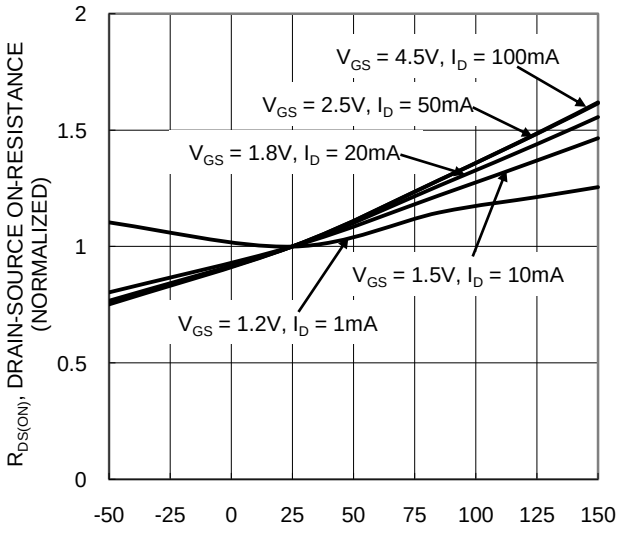



Figure 6. On-Resistance Variation with Temperature

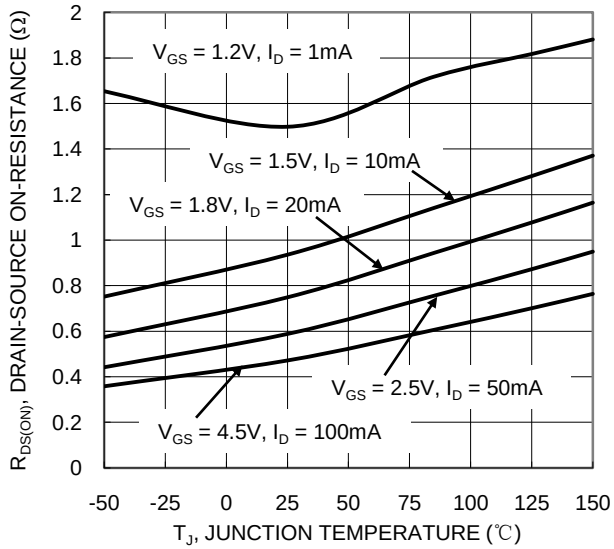



Figure 7. On-Resistance Variation with Temperature

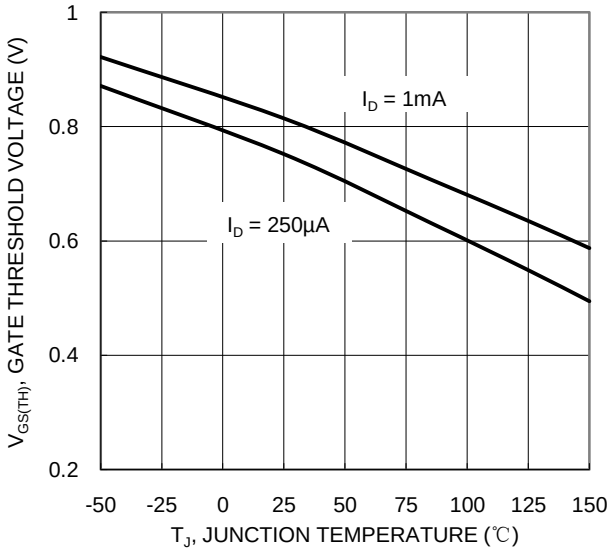



Figure 8. Gate Threshold Variation vs. Junction Temperature

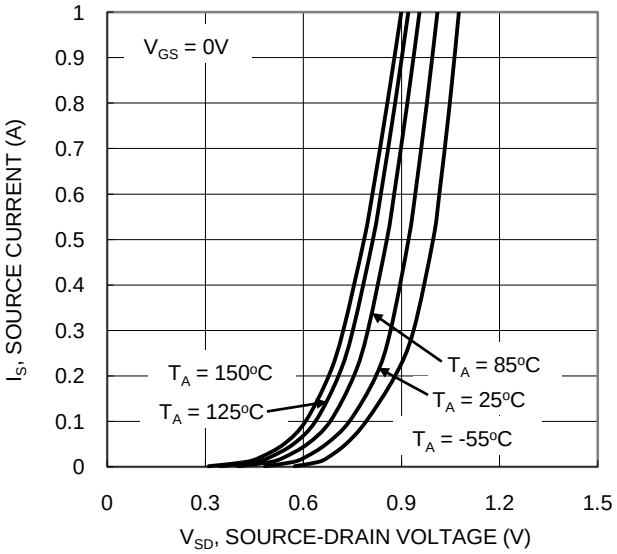



Figure 9. Diode Forward Voltage vs. Current

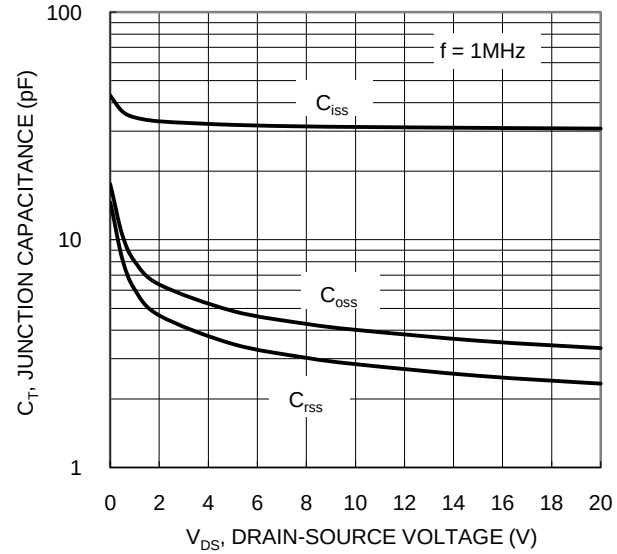



Figure 10. Typical Junction Capacitance

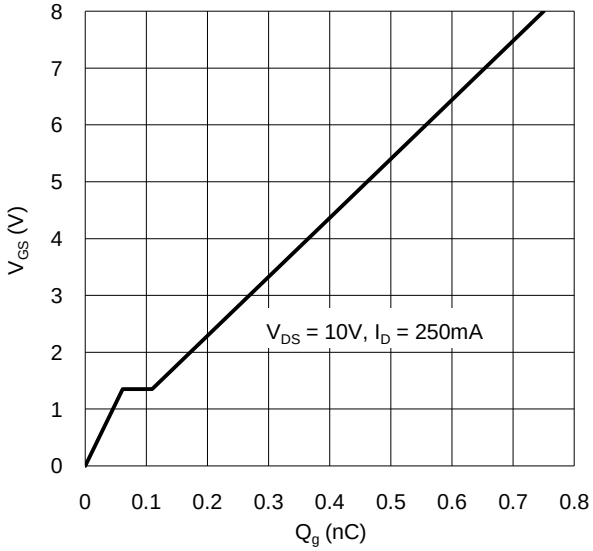



Figure 11. Gate Charge

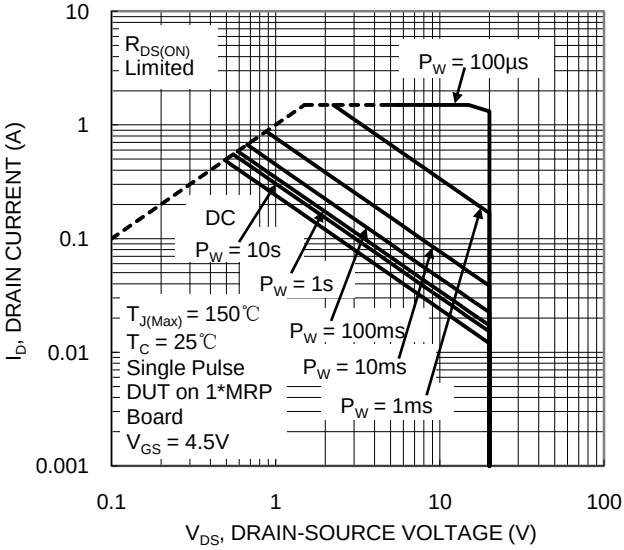



Figure 12. SOA, Safe Operation Area

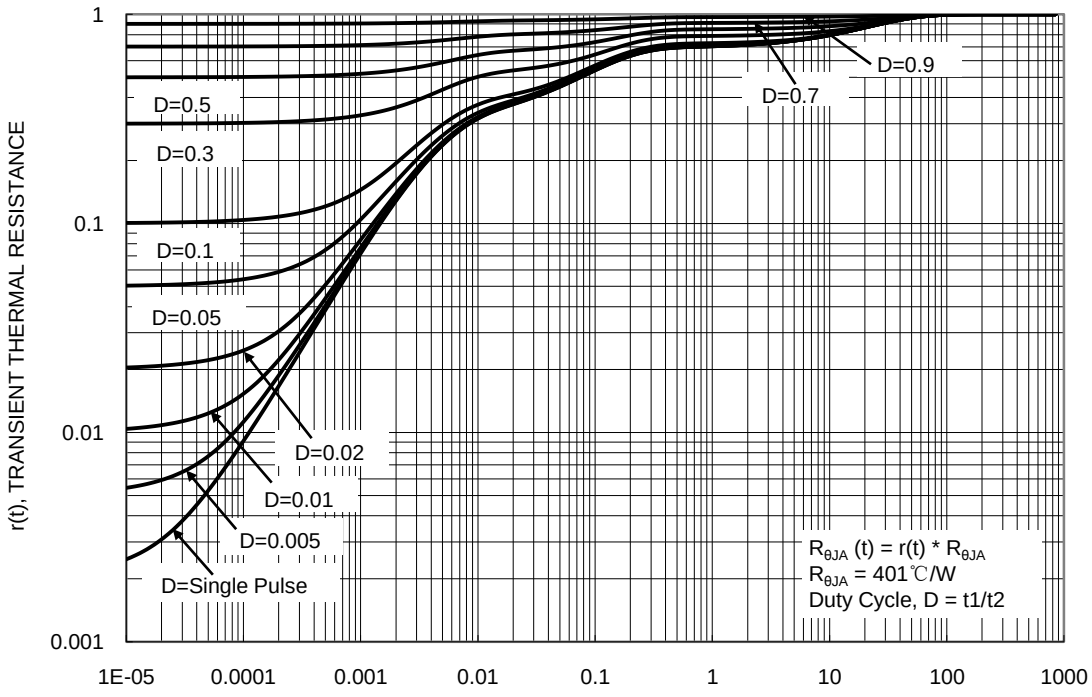
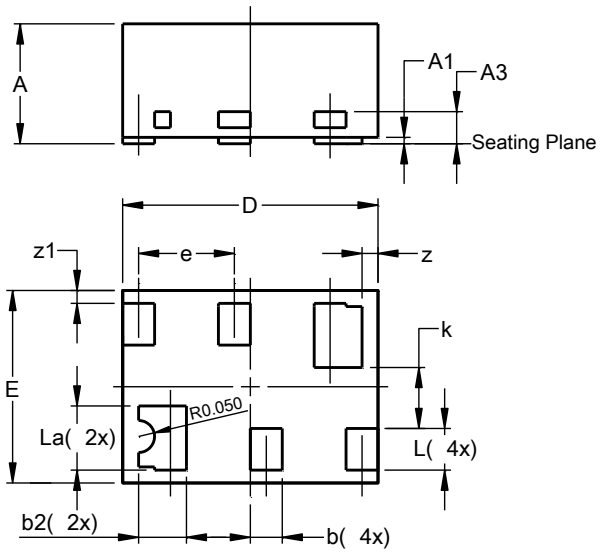



Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

**X2-DFN0806-6**

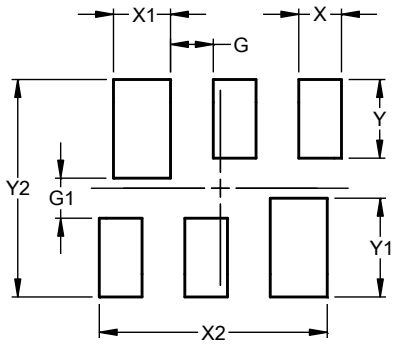



| X2-DFN0806-6 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | -- | 0.40 | 0.36 |
| **A1** | 0.00 | 0.03 | 0.02 |
| **A3** | -- | -- | 0.10 |
| **b** | 0.07 | 0.15 | 0.10 |
| **b2** | 0.10 | 0.20 | 0.15 |
| **D** | 0.75 | 0.85 | 0.80 |
| **E** | 0.55 | 0.65 | 0.60 |
| **e** | -- | -- | 0.30 |
| **k** | -- | -- | 0.19 |
| **L** | 0.10 | 0.18 | 0.13 |
| **La** | 0.17 | 0.25 | 0.20 |
| **z** | -- | -- | 0.05 |
| **z1** | -- | -- | 0.04 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**X2-DFN0806-6**




| Dimensions | Value (in mm) |
|---|---|
| **G** | 0.150 |
| **G1** | 0.140 |
| **X** | 0.150 |
| **X1** | 0.200 |
| **X2** | 0.800 |
| **Y** | 0.275 |
| **Y1** | 0.345 |
| **Y2** | 0.760 |

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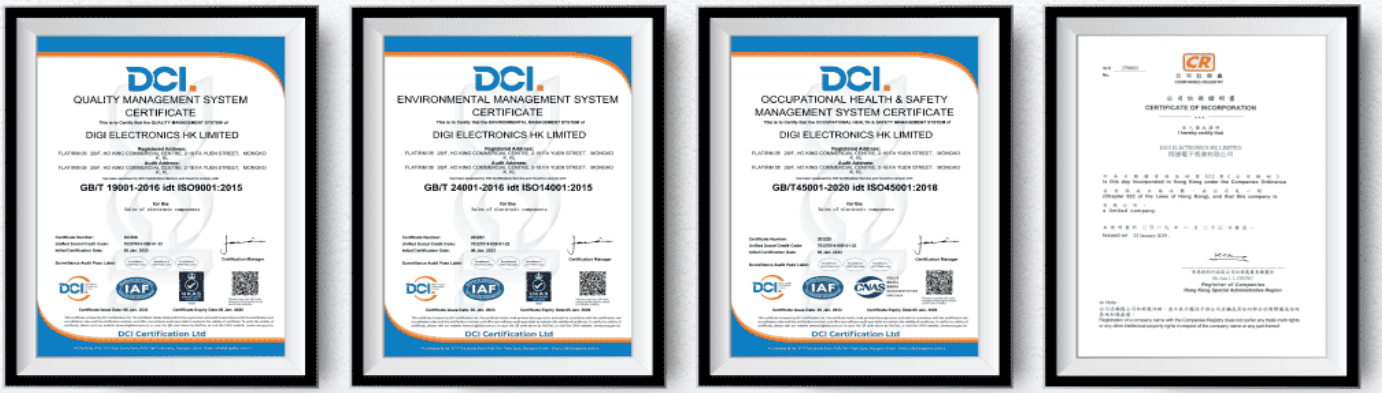



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