



**THE DATASHEET OF
DMN21D2UFB-7B**



Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ max | I_D max $T_A = 25^\circ\text{C}$ |
|---------------|--|---------------------------------------|
| 20V | 0.99 Ω @ $V_{GS} = 4.5\text{V}$ | 760mA |
| | 1.2 Ω @ $V_{GS} = 2.5\text{V}$ | 700mA |
| | 2.4 Ω @ $V_{GS} = 1.8\text{V}$ | 500mA |
| | 3.0 Ω @ $V_{GS} = 1.5\text{V}$ | 350mA |

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 1mm x 0.6mm
- Low Package Profile, 0.5mm Maximum Package height
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 standards for High Reliability**

Description and Applications

This MOSFET has been 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.

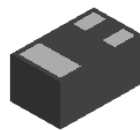
- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

Mechanical Data

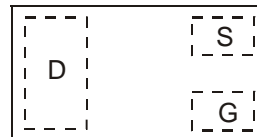
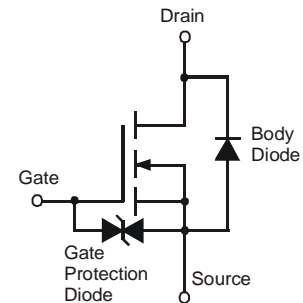
- Case: X1-DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208 $\text{\textcircled{e4}}$
- Weight: 0.001 grams (approximate)



X1-DFN1006-3



Bottom View


 Top View
Package Pin Configuration


Equivalent Circuit

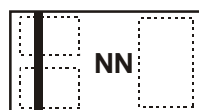
Ordering Information (Note 4)

| Part Number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|---------|--------------------|-----------------|-------------------|
| DMN21D2UFB-7B | NN | 7 | 8 | 10,000 |

- 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> 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>.

Marking Information

DMN21D2UFB-7B



NN = Product Type Marking Code

 Top View
Bar Denotes Gate and Source Side

Maximum Ratings @T_A = 25°C unless otherwise specified

| Characteristic | | | Symbol | Value | Units |
|--|--------------|--|------------------|------------|-------|
| Drain-Source Voltage | | | V _{DSS} | 20 | V |
| Gate-Source Voltage | | | V _{GSS} | ±12 | V |
| Continuous Drain Current (Note 6) V _{GS} = 4.5V | Steady State | T _A = 25°C T _A = 70°C | I _D | 760 610 | mA |
| | t < 5s | T _A = 25°C T _A = 70°C | I _D | 850 700 | mA |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | I _S | 0.8 | A |
| Pulsed Drain Current (Note 7) | | | I _{DM} | 1.0 | A |

Thermal Characteristics @T_A = 25°C unless otherwise specified

| Characteristic | | Symbol | Value | Units |
|--|-----------------------|-----------------------------------|------------|-------|
| Total Power Dissipation (Note 4) | T _A = 25°C | P _D | 0.38 | W |
| | T _A = 70°C | | 0.25 | |
| Thermal Resistance, Junction to Ambient (Note 4) | Steady State | R _{θJA} | 325 | °C/W |
| | t < 5s | | 244 | |
| Total Power Dissipation (Note 5) | T _A = 25°C | P _D | 0.9 | W |
| | T _A = 70°C | | 0.57 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R _{θJA} | 141 | °C/W |
| | t < 5s | | 106 | |
| 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) | | | | | | |
| 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} | - | - | 100 | nA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | - | - | ±1 | μA | V _{GS} = ±10V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 0.4 | - | 1.0 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(on)} | - | 0.6 | 0.99 | Ω | V _{GS} = 4.5V, I _D = 100mA |
| | | - | 0.7 | 1.2 | | V _{GS} = 2.5V, I _D = 50mA |
| | | - | 0.9 | 2.4 | | V _{GS} = 1.8V, I _D = 20mA |
| | | - | 1.2 | 3.0 | | V _{GS} = 1.5V, I _D = 10mA |
| | | - | - | - | | - |
| Forward Transfer Admittance | Y _{fs} | 180 | - | - | mS | V _{DS} = 10V, I _D = 400mA |
| Diode Forward Voltage | V _{SD} | - | 0.6 | 1.0 | V | V _{GS} = 0V, I _S = 150mA |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | - | 27.6 | - | pF | V _{DS} = 16V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | - | 4.0 | - | pF | |
| Reverse Transfer Capacitance | C _{rss} | - | 2.8 | - | pF | |
| Total Gate Charge V _{GS} = 4.5V | Q _g | - | 0.41 | - | nC | V _{DS} = 10V, I _D = 250mA |
| Total Gate Charge V _{GS} = 10V | Q _g | - | 0.93 | - | nC | |
| Gate-Source Charge | Q _{gs} | - | 0.06 | - | nC | |
| Gate-Drain Charge | Q _{gd} | - | 0.06 | - | nC | |
| Turn-On Delay Time | t _{D(on)} | - | 3.5 | - | ns | |
| Turn-On Rise Time | t _r | - | 4.2 | - | ns | V _{DD} = 10V, V _{GS} = 4.5V, R _L = 47Ω, R _G = 10Ω, I _D = 200mA |
| Turn-Off Delay Time | t _{D(off)} | - | 19.6 | - | ns | |
| Turn-Off Fall Time | t _f | - | 9.8 | - | ns | |

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate
 - Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

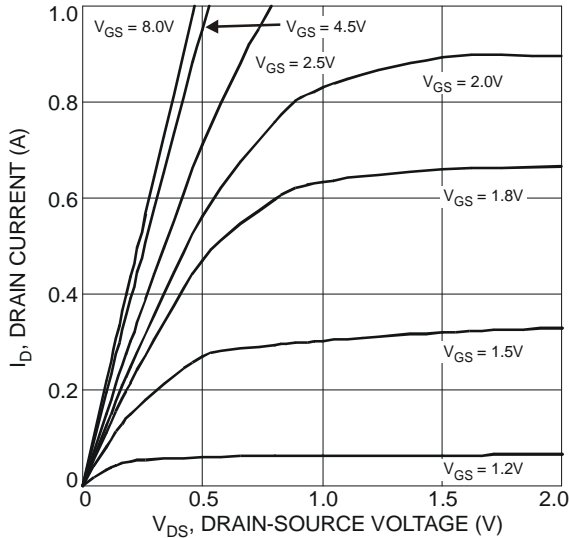


Fig. 1 Typical Output Characteristic

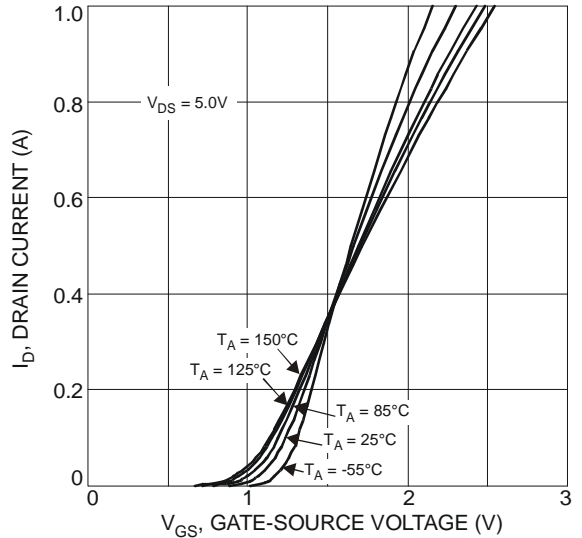


Fig. 2 Typical Transfer Characteristics

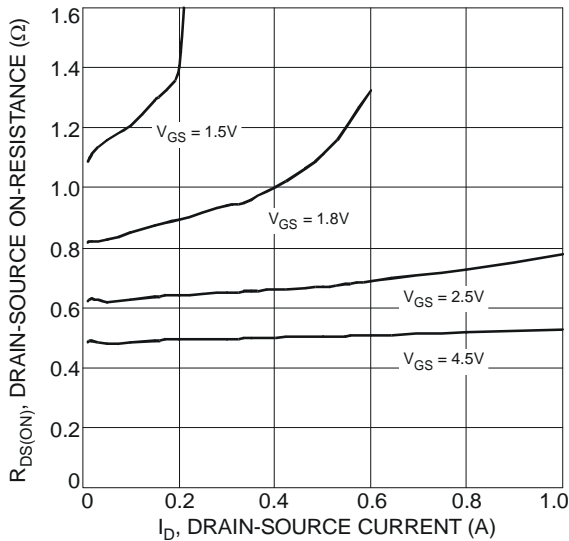


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

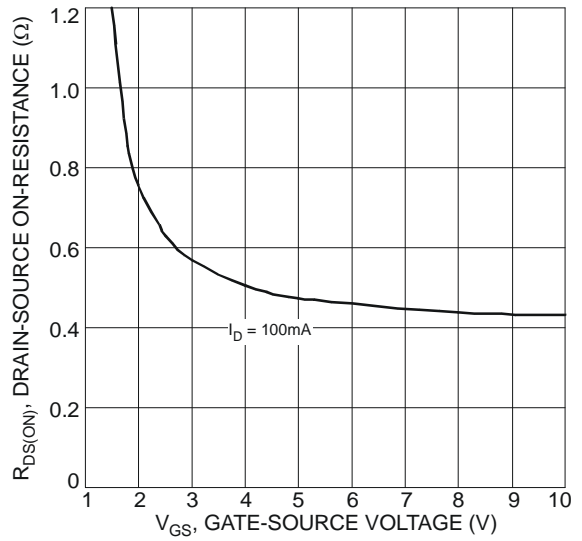


Fig. 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

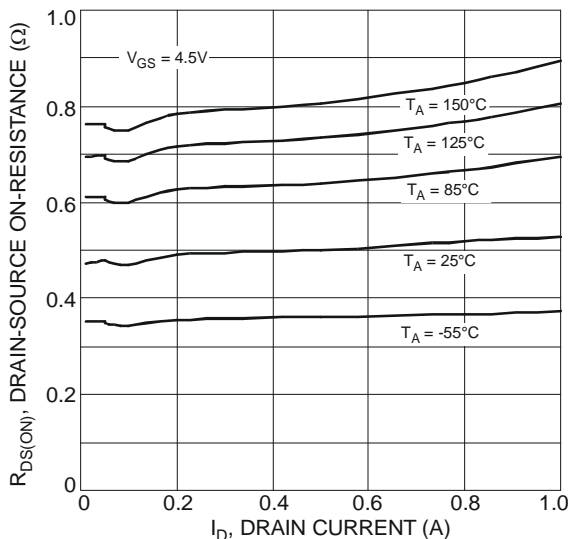


Fig. 5 Typical On-Resistance vs. Drain Current and Temperature

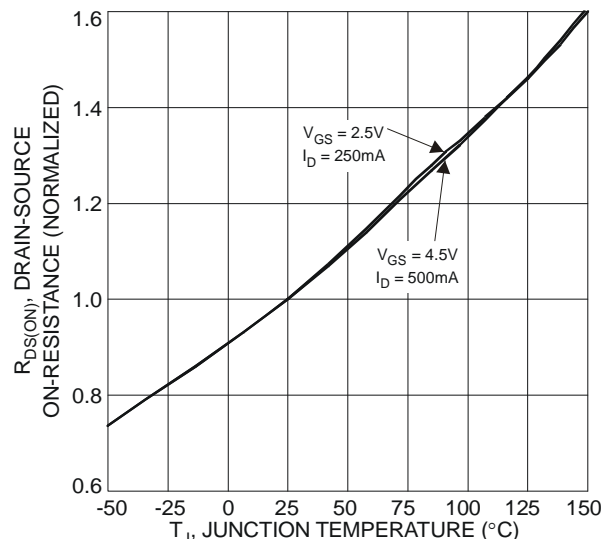


Fig. 6 On-Resistance Variation with Temperature

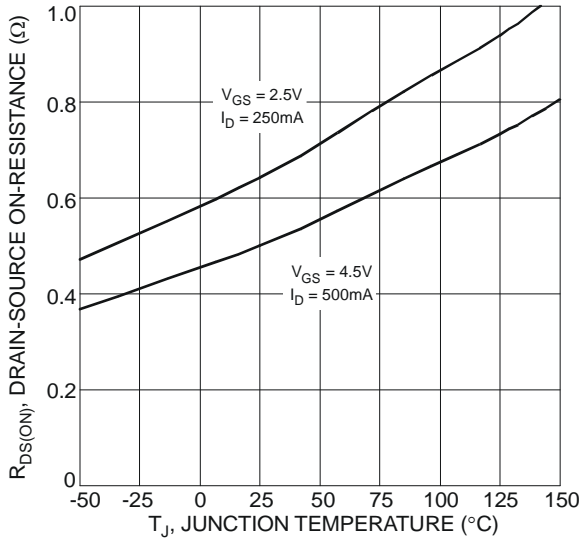


Fig. 7 On-Resistance Variation with Temperature

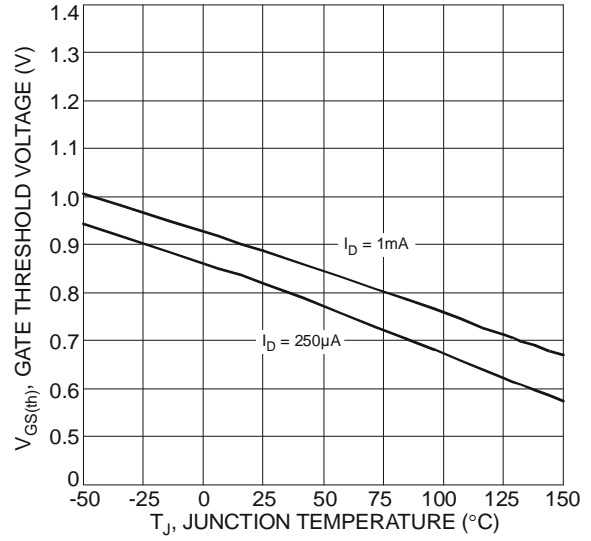


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

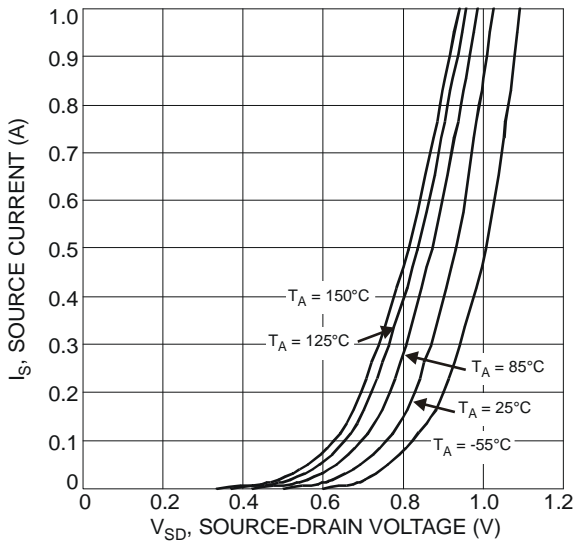


Fig. 9 Diode Forward Voltage vs. Current

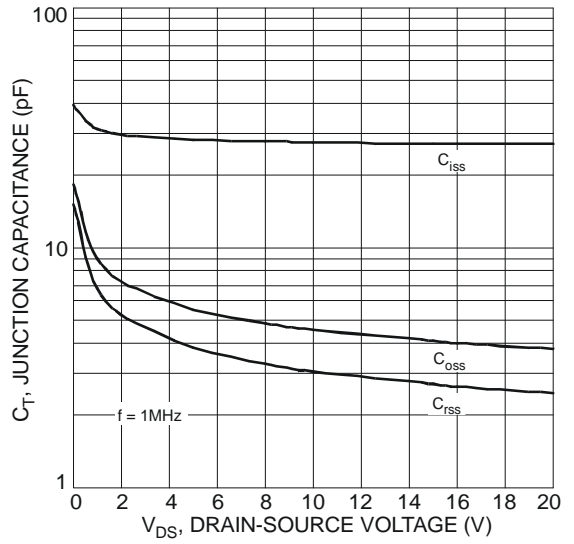


Fig. 10 Typical Junction Capacitance

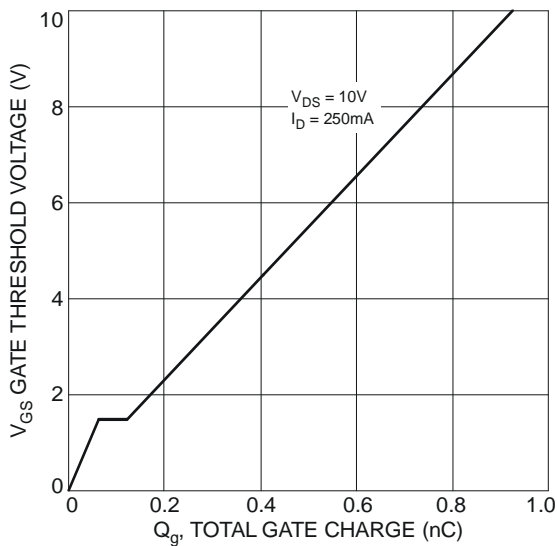


Fig. 11 Gate Charge

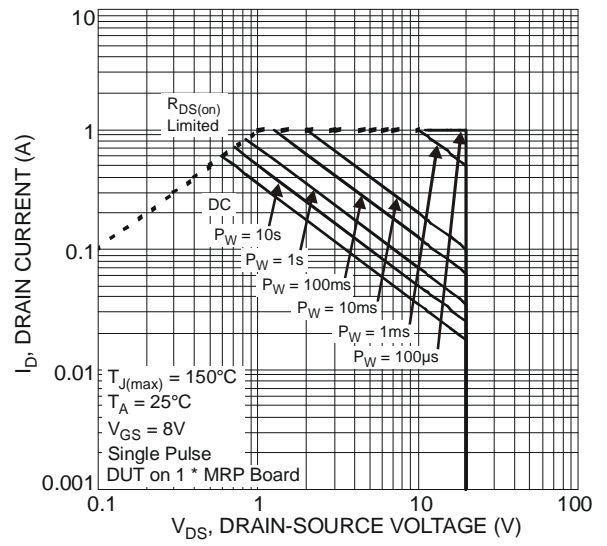


Fig. 12 SOA, Safe Operation Area

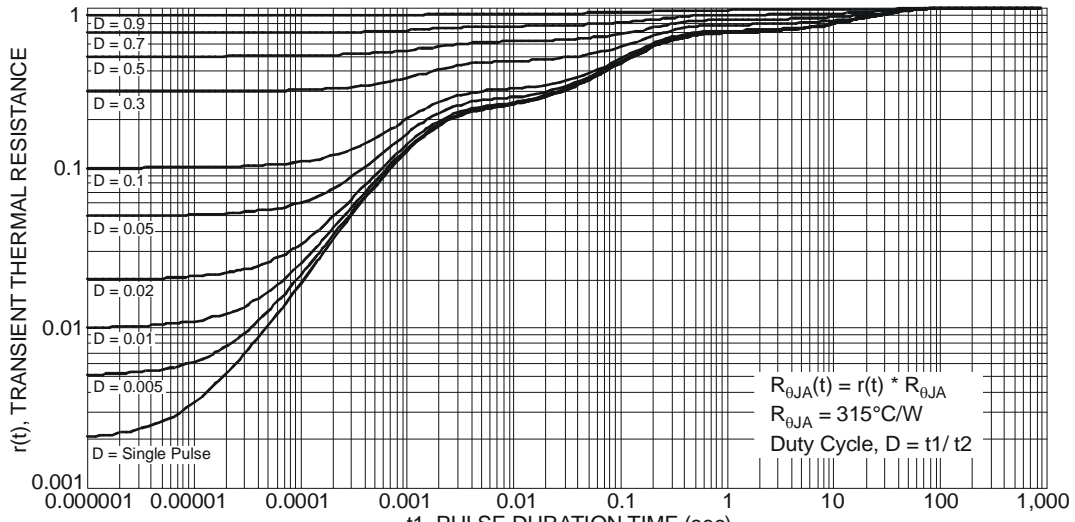
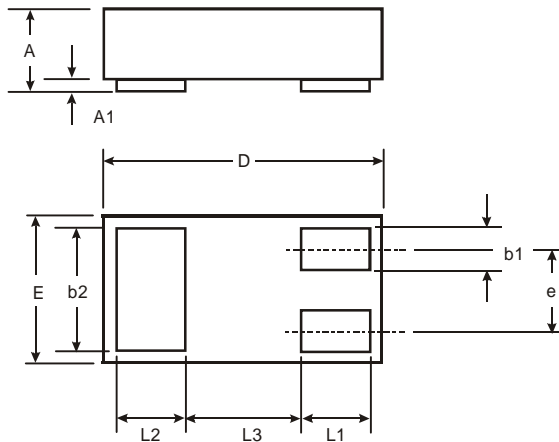


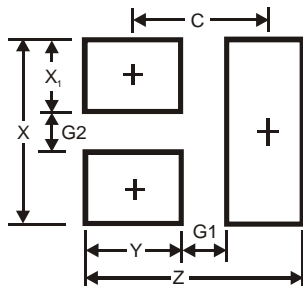
Fig. 13 Transient Thermal Resistance

Package Outline Dimensions



| X1-DFN1006-3 | | | |
|----------------------|------|-------|------|
| Dim | Min | Max | Typ |
| A | 0.47 | 0.53 | 0.50 |
| A1 | 0 | 0.05 | 0.03 |
| b1 | 0.10 | 0.20 | 0.15 |
| b2 | 0.45 | 0.55 | 0.50 |
| D | 0.95 | 1.075 | 1.00 |
| E | 0.55 | 0.675 | 0.60 |
| e | — | — | 0.35 |
| L1 | 0.20 | 0.30 | 0.25 |
| L2 | 0.20 | 0.30 | 0.25 |
| L3 | — | — | 0.40 |
| All Dimensions in mm | | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 1.1 |
| G1 | 0.3 |
| G2 | 0.2 |
| X | 0.7 |
| X1 | 0.25 |
| Y | 0.4 |
| C | 0.7 |

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