

**20V N-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

| $V_{(BR)DSS}$ | $R_{DS(on)}$                                 | $I_D$ max<br>$T_A = 25^\circ\text{C}$<br>(Note 4) |
|---------------|----------------------------------------------|---------------------------------------------------|
| 20V           | $175\text{m}\Omega$ @ $V_{GS} = 4.5\text{V}$ | 1.30A                                             |
|               | $240\text{m}\Omega$ @ $V_{GS} = 2.5\text{V}$ | 1.11A                                             |
|               | $360\text{m}\Omega$ @ $V_{GS} = 1.8\text{V}$ | 0.91A                                             |

**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.

- Load switch

**Features and Benefits**

- Footprint of just  $0.6\text{mm}^2$  – thirteen times smaller than SOT23
- 0.5mm profile – ideal for low profile applications
- On resistance  $<200\text{m}\Omega$  @  $V_{GS} = 4.5\text{V}$
- Low Gate Threshold Voltage
- Fast Switching Speed
- “Lead Free”, RoHS Compliant (Note 1)
- Halogen and Antimony Free. “Green” Device (Note 2)
- ESD Protected Gate 2KV
- Qualified to AEC-Q101 Standards for High Reliability

**Mechanical Data**

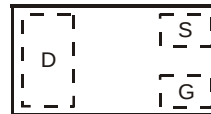
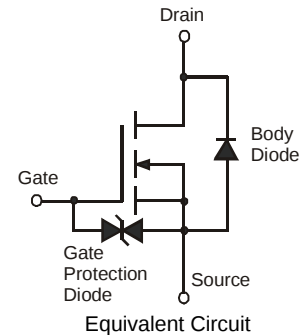
- Case: DFN1006-3
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.001 grams (approximate)



DFN1006-3



Bottom View


 Top View  
 Internal Schematic

**Ordering Information** (Note 3)

| Part Number   | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|---------|--------------------|-----------------|-------------------|
| DMN2300UFB-7  | NI      | 7                  | 8               | 3,000             |
| DMN2300UFB-7B | NI      | 7                  | 8               | 10,000            |

- Notes:
- No purposefully added lead
  - Diodes Inc's "Green" policy can be found on our website at <http://www.diodes.com>.
  - For packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**

DMN2300UFB-7


 Top View  
 Dot Denotes  
 Drain Side

DMN2300UFB-7B


 Top View  
 Bar Denotes Gate  
 and Source Side

NI = Product Type Marking Code

## 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> | ±8    | V    |
| Continuous Drain Current      | Steady State | T <sub>A</sub> = 25°C (Note 4) | I <sub>D</sub>   | 1.32  | A    |
|                               |              | T <sub>A</sub> = 85°C (Note 4) |                  | 0.94  |      |
|                               |              | T <sub>A</sub> = 25°C (Note 5) |                  | 1.78  |      |
| Pulsed Drain Current (Note 6) |              |                                | I <sub>DM</sub>  | 8     | A    |

## Thermal Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                                   | Symbol                            | Value       | Unit |
|--------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 4)                       | P <sub>D</sub>                    | 0.468       | W    |
| Power Dissipation (Note 5)                       | P <sub>D</sub>                    | 1.2         | W    |
| Thermal Resistance, Junction to Ambient (Note 4) | R <sub>θJA</sub>                  | 267         | °C/W |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 104         | °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 7)</b>                   |                     |      |       |      |      |                                                                                           |
| Drain-Source Breakdown Voltage                        | BV <sub>DSS</sub>   | 20   | -     | -    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 10μA                                               |
| Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C | I <sub>DSS</sub>    | -    | -     | 1    | μA   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V                                               |
| Gate-Source Leakage                                   | I <sub>GSS</sub>    | -    | -     | 10   | μA   | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V                                               |
| <b>ON CHARACTERISTICS (Note 7)</b>                    |                     |      |       |      |      |                                                                                           |
| Gate Threshold Voltage                                | V <sub>GS(th)</sub> | 0.45 | -     | 0.95 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                |
| Static Drain-Source On-Resistance                     | R <sub>DS(on)</sub> | -    | -     | 175  | mΩ   | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 300mA                                            |
|                                                       |                     | -    | -     | 240  |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 250mA                                            |
|                                                       |                     | -    | -     | 360  |      | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 100mA                                            |
| Forward Transfer Admittance                           | Y <sub>fs</sub>     | 40   | -     | -    | mS   | V <sub>DS</sub> = 3V, I <sub>D</sub> = 30mA                                               |
| Diode Forward Voltage                                 | V <sub>SD</sub>     | -    | 0.7   | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 300mA                                              |
| <b>DYNAMIC CHARACTERISTICS</b>                        |                     |      |       |      |      |                                                                                           |
| Input Capacitance                                     | C <sub>iss</sub>    | -    | 67.62 | -    | pF   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                |
| Output Capacitance                                    | C <sub>oss</sub>    | -    | 9.74  | -    | pF   |                                                                                           |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    | -    | 7.58  | -    | pF   |                                                                                           |
| Gate Resistance                                       | R <sub>g</sub>      | -    | 68.51 | -    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                      |
| Total Gate Charge                                     | Q <sub>g</sub>      | -    | 0.89  | -    | nC   | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V,<br>I <sub>D</sub> = 1A                     |
| Gate-Source Charge                                    | Q <sub>gs</sub>     | -    | 0.14  | -    | nC   |                                                                                           |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     | -    | 0.16  | -    | nC   |                                                                                           |
| Turn-On Delay Time                                    | t <sub>D(on)</sub>  | -    | 4.92  | -    | ns   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 1A<br>V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 6Ω |
| Turn-On Rise Time                                     | t <sub>r</sub>      | -    | 6.93  | -    | ns   |                                                                                           |
| Turn-Off Delay Time                                   | t <sub>D(off)</sub> | -    | 21.71 | -    | ns   |                                                                                           |
| Turn-Off Fall Time                                    | t <sub>f</sub>      | -    | 10.62 | -    | ns   |                                                                                           |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 25mm X 25mm 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.

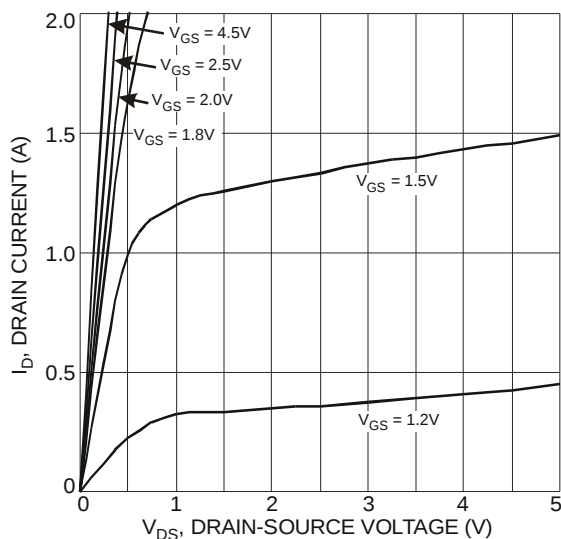


Fig. 1 Typical Output Characteristic

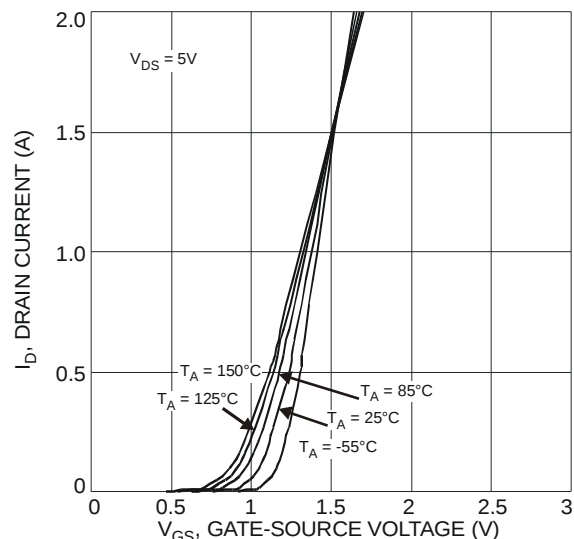


Fig. 2 Typical Transfer Characteristic

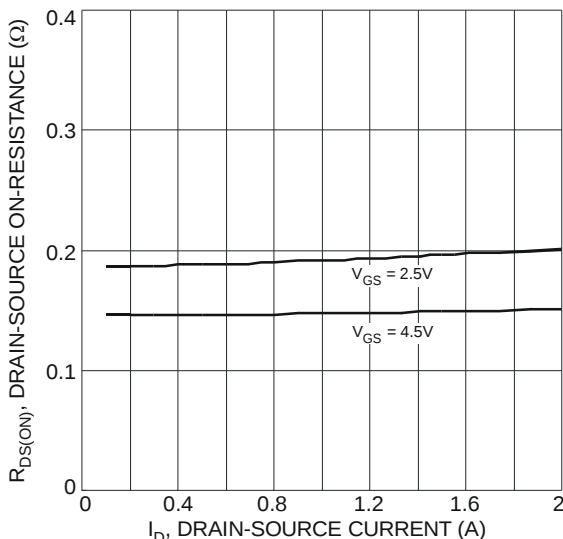


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

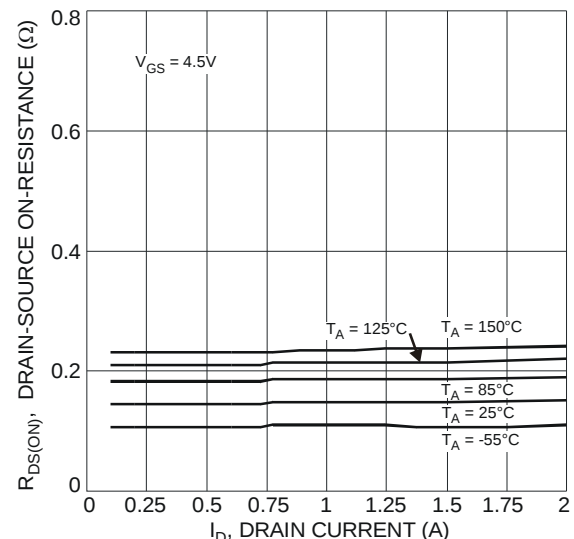


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

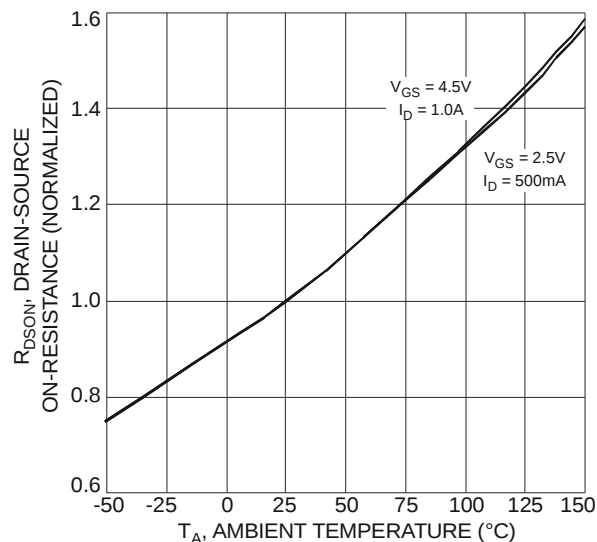


Fig. 5 On-Resistance Variation with Temperature

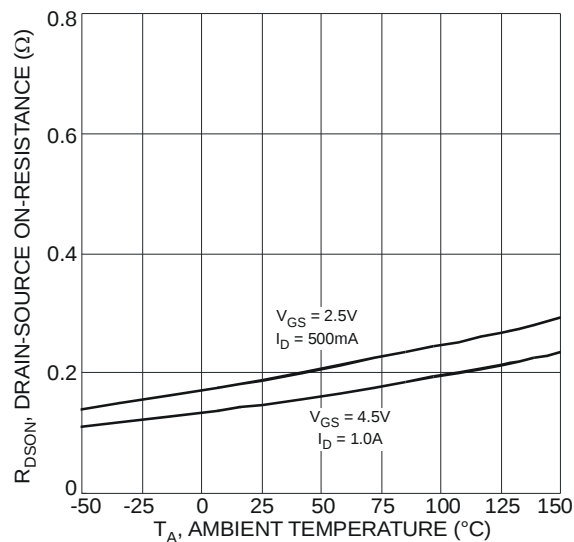


Fig. 6 On-Resistance Variation with Temperature

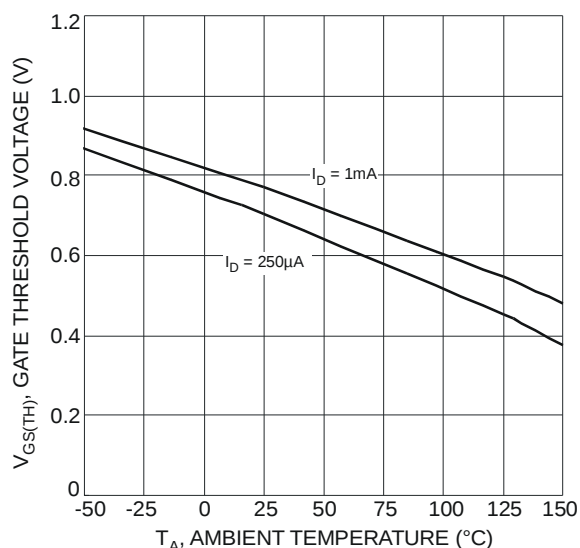


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

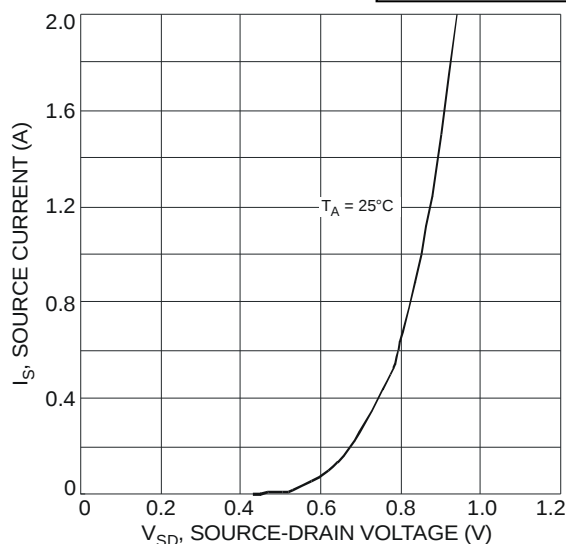


Fig. 8 Diode Forward Voltage vs. Current

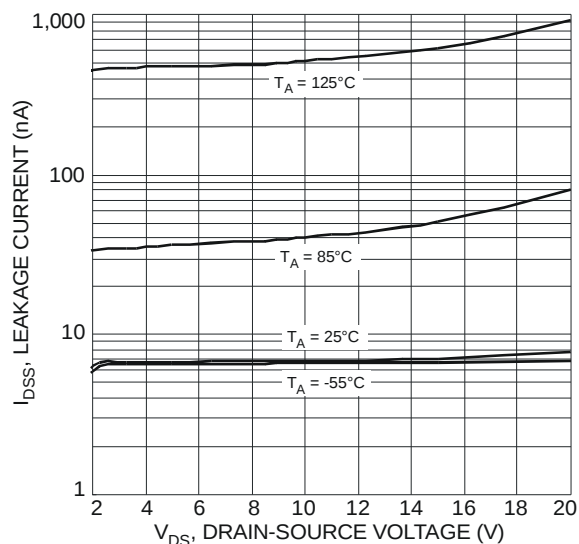


Fig. 9 Typical Leakage Current vs. Drain-Source Voltage

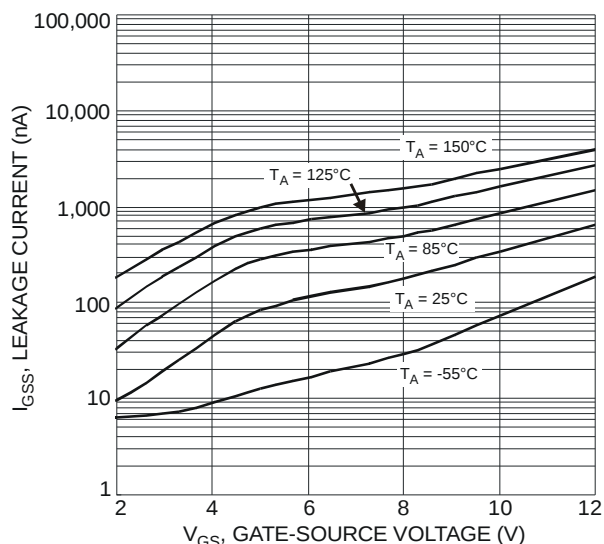


Fig. 10 Leakage Current vs. Gate-Source Voltage

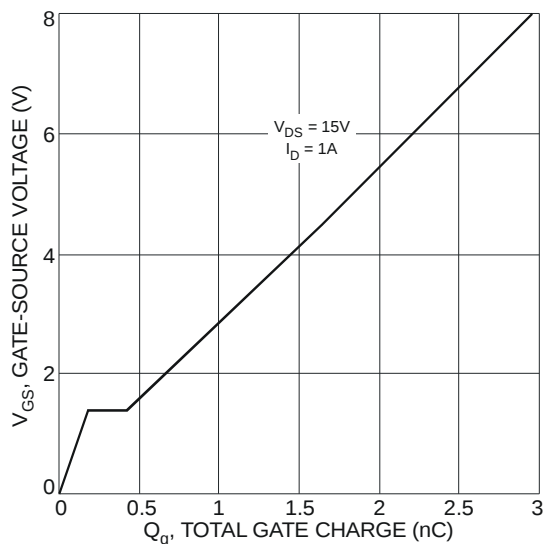


Fig. 11 Gate-Charge Characteristics

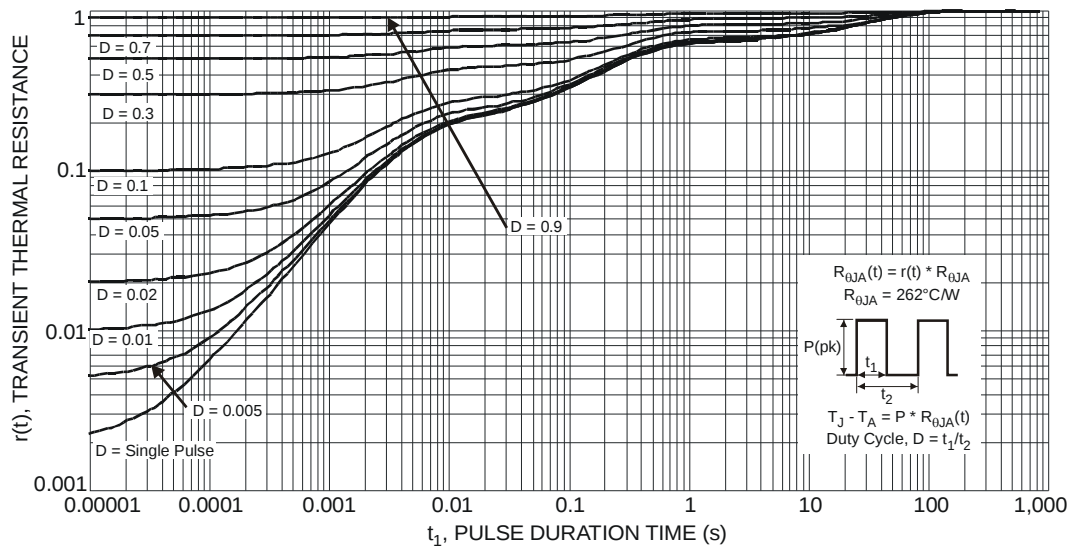
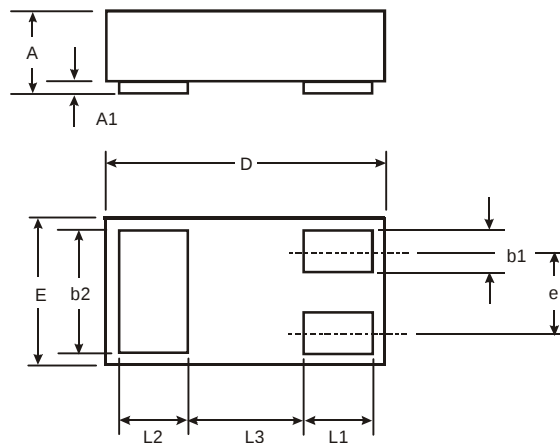


Fig. 12 Transient Thermal Response

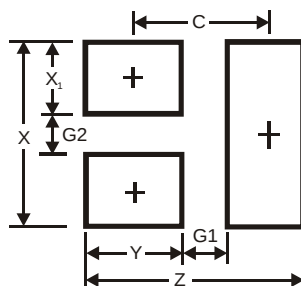
## Package Outline Dimensions



| 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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### 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:

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