# N-CHANNEL ENHANCEMENT MODE MOSFET

NEW PRODUCT

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$max | $I_D$ max $T_A$ = +25°C |
|---|---|---|
| 30V | 20mΩ @ $V_{GS}$ = 10V | 7.2A |
| | 31mΩ @ $V_{GS}$ = 4.5V | 5.8A |

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **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

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.

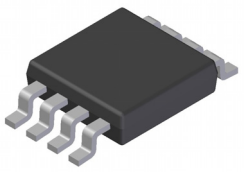
## Mechanical Data

- Case: SO-8
- 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 — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (approximate)

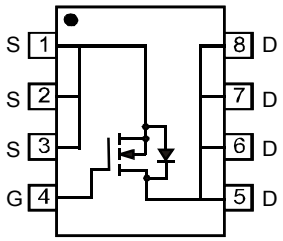
## Applications

- Backlighting
- Power Management Functions
- DC-DC Converters

SO-8



Top View



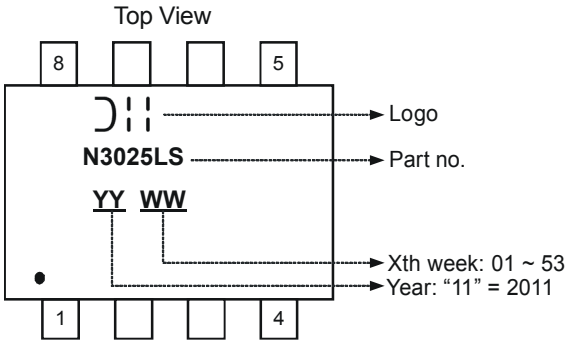

Top View
Internal Schematic

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMN3025LSS-13 | SO-8 | 2500/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 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





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

| Characteristic | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 6) $V_{GS}$ = 10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 7.2<br>5.7 | A |
| | t<10s | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 9.6<br>7.7 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | $I_S$ | 3 | A |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | | $I_{DM}$ | 40 | A |
| Avalanche Current (L = 0.1mH) | | | $I_{AS}$ | 14.5 | A |
| Repetitive Avalanche Energy (L = 0.1mH) | | | $E_{AS}$ | 10.5 | mJ |

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

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | $T_A$ = +25°C | $P_D$ | 1.4 | W |
| | $T_A$ = +70°C | | 0.9 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | $R_{\theta JA}$ | 87 | °C/W |
| | t<10s | | 44 | |
| Total Power Dissipation (Note 6) | $T_A$ = +25°C | $P_D$ | 1.7 | W |
| | $T_A$ = +70°C | | 1.1 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | $R_{\theta JA}$ | 73 | °C/W |
| | t<10s | | 37 | |
| 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 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | µA | $V_{DS}$ = 30V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±1 | µA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.8 | - | 2.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | — | 14 | 20 | mΩ | $V_{GS}$ = 10V, $I_D$ = 10A |
| | | — | 23 | 31 | | $V_{GS}$ = 4.5V, $I_D$ = 7.5A |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | — | 11 | - | S | $V_{DS}$ = 5V, $I_D$ = 10A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.70 | 1.0 | V | $V_{GS}$ = 0V, $I_S$ = 1A |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 641 | — | pF | $V_{DS}$ = 15V, $V_{GS}$ = 0V,<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 66 | — | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 50 | — | | |
| Gate resistance | $R_g$ | — | 2.2 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge ($V_{GS}$ = 4.5V) | $Q_g$ | — | 6 | — | nC | $V_{DS}$ = 15V, $I_D$ = 10A |
| Total Gate Charge ($V_{GS}$ = 10V) | $Q_g$ | — | 13.2 | — | | |
| Gate-Source Charge | $Q_{gs}$ | — | 1.7 | — | | |
| Gate-Drain Charge | $Q_{gd}$ | — | 2.2 | — | | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 3.3 | — | ns | $V_{DD}$ = 15V, $V_{GS}$ = 10V,<br>$R_G$ = 6Ω, $I_D$ = 1A |
| Turn-On Rise Time | $t_r$ | — | 4.4 | — | | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 22.3 | — | | |
| Turn-Off Fall Time | $t_f$ | — | 5.3 | — | | |

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.


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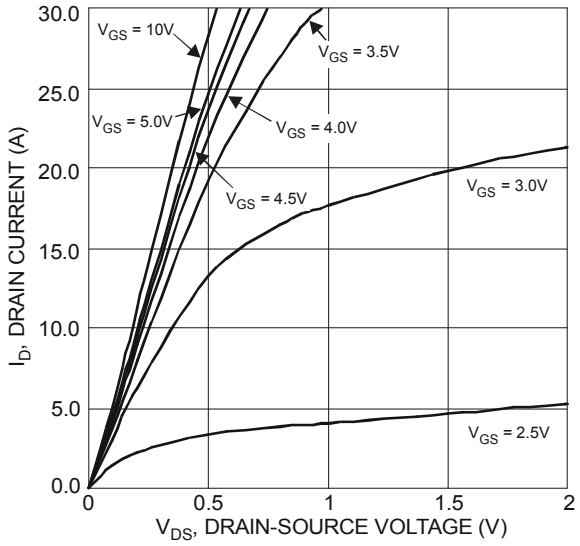


Figure 1 Typical Output Characteristic

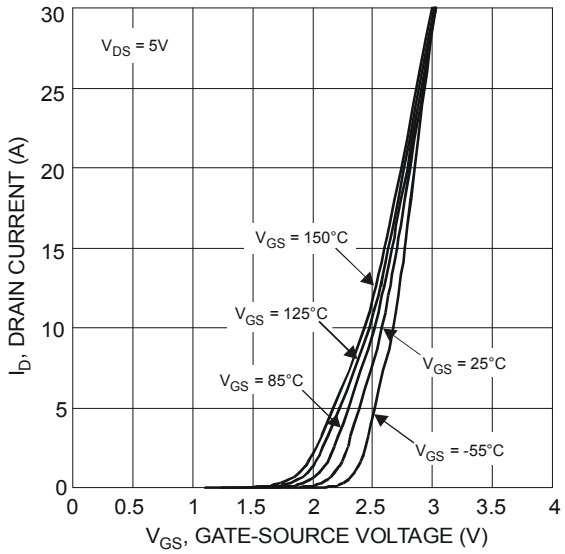


Figure 2 Typical Transfer Characteristic

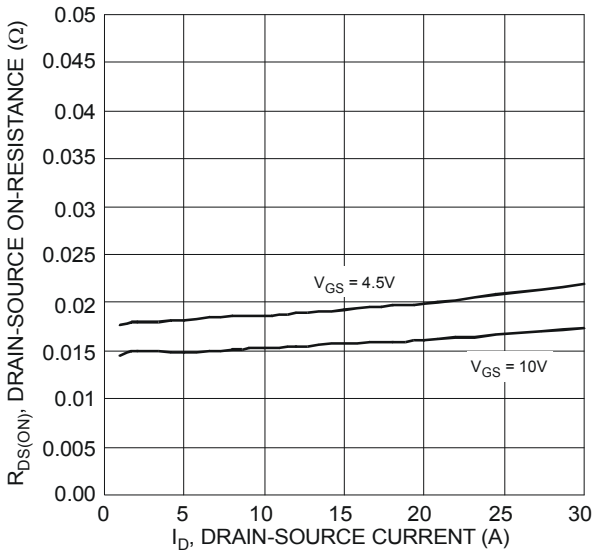


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

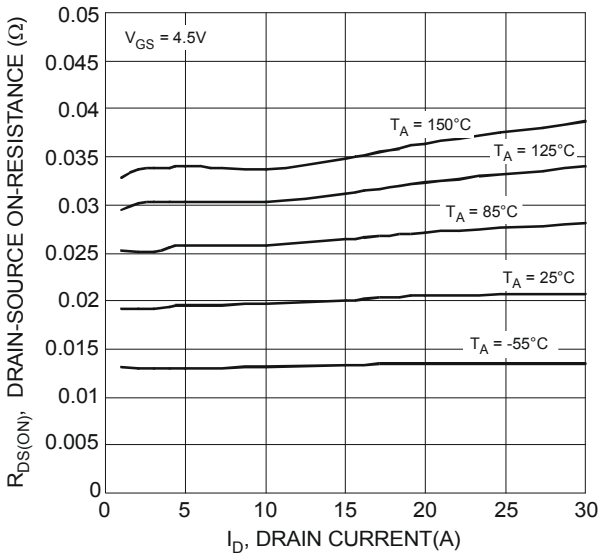


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

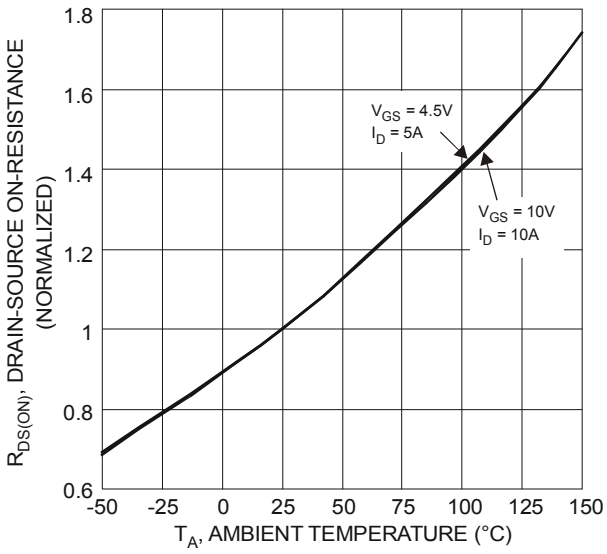


Figure 5 On-Resistance Variation with Temperature

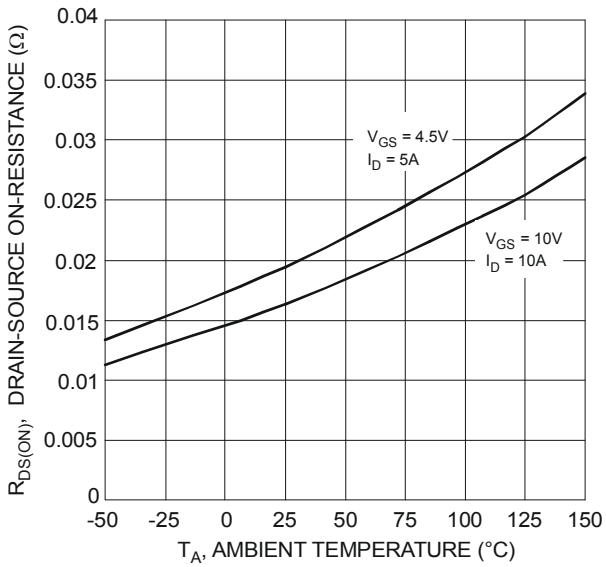


Figure 6 On-Resistance Variation with Temperature


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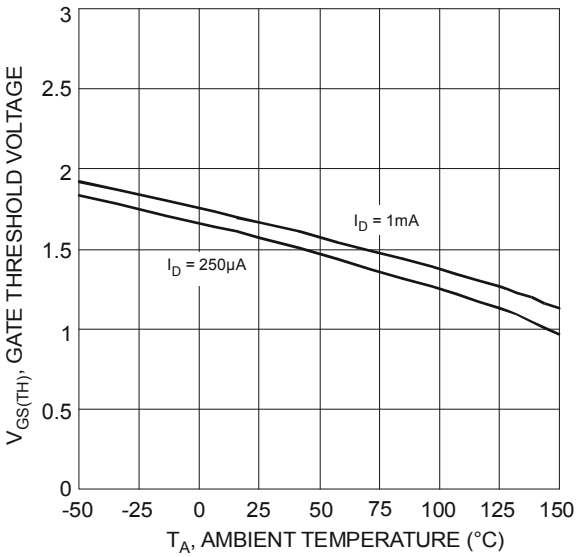


Figure 7 Gate Threshold Variation vs. Ambient Temperature

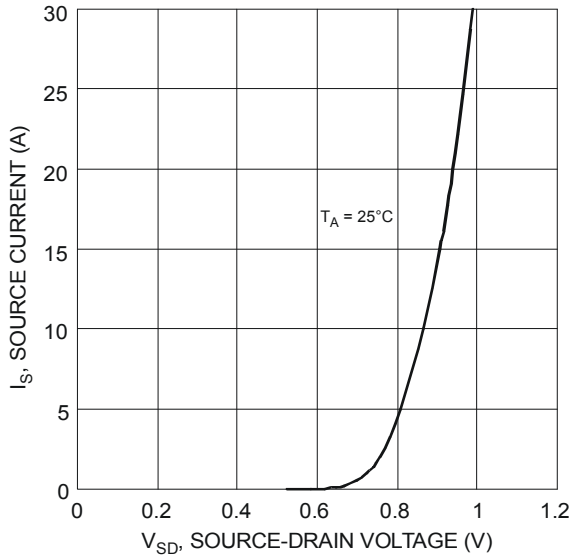


Figure 8 Diode Forward Voltage vs. Current

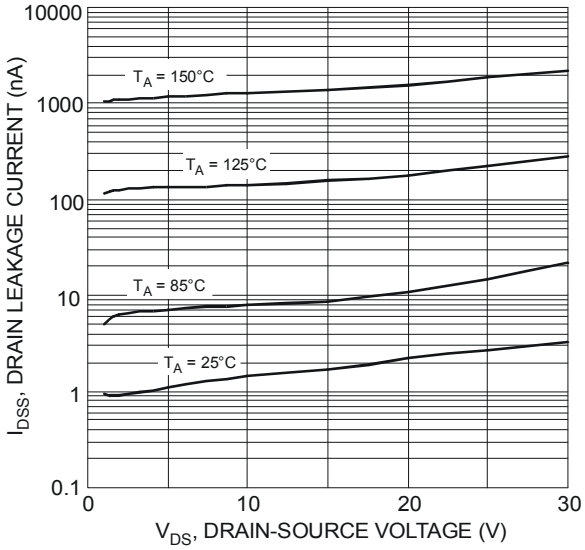


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

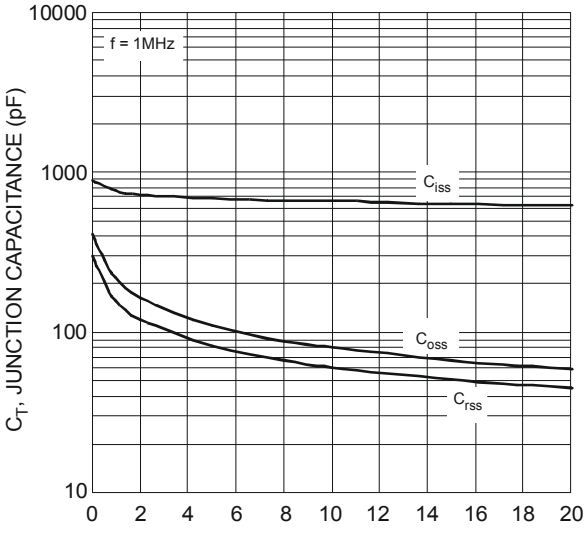


Figure 10 Typical Junction Capacitance

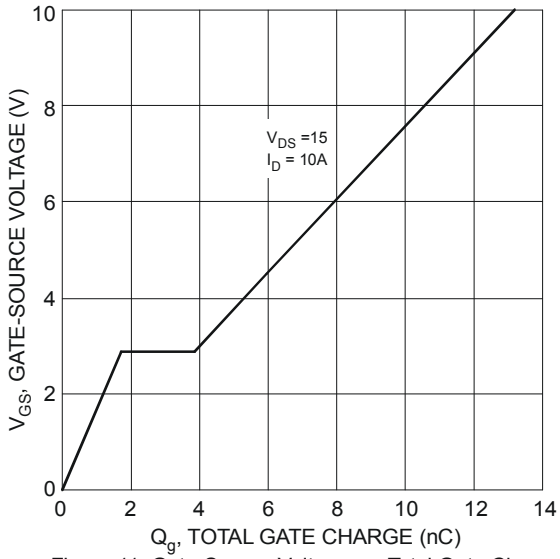


Figure 11 Gate-Source Voltage vs. Total Gate Charge


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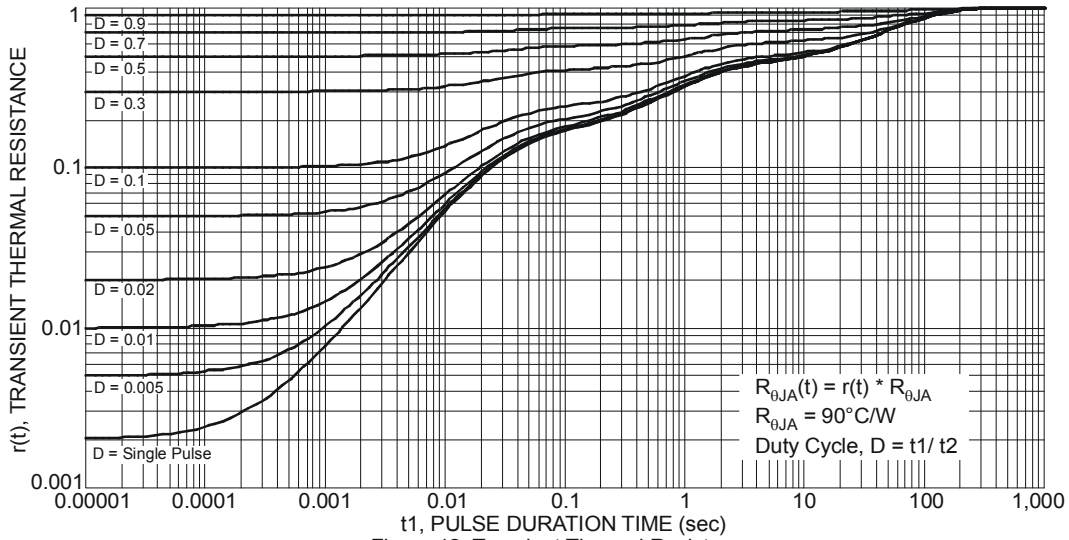
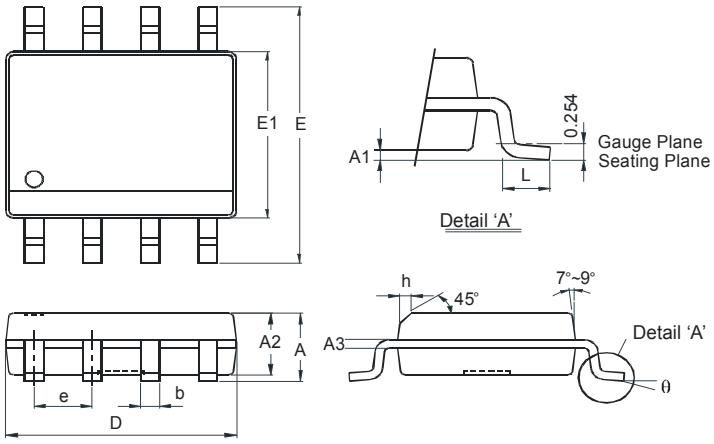


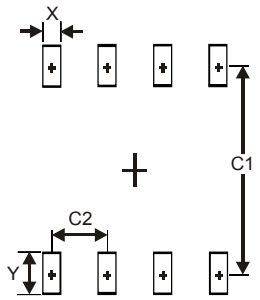

Figure 12 Transient Thermal Resistance

## Package Outline Dimensions




| SO-8 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | - | 1.75 |
| **A1** | 0.10 | 0.20 |
| **A2** | 1.30 | 1.50 |
| **A3** | 0.15 | 0.25 |
| **b** | 0.3 | 0.5 |
| **D** | 4.85 | 4.95 |
| **E** | 5.90 | 6.10 |
| **E1** | 3.85 | 3.95 |
| **e** | 1.27 Typ | |
| **h** | - | 0.35 |
| **L** | 0.62 | 0.82 |
| **θ** | 0° | 8° |
| All Dimensions in mm | | |

## Suggested Pad Layout




| Dimensions | Value (in mm) |
|---|---|
| **X** | 0.60 |
| **Y** | 1.55 |
| **C1** | 5.4 |
| **C2** | 1.27 |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