

**60V N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

| $V_{(BR)DSS}$ | $R_{DS(on)}$                   | $I_D$<br>$T_A = 25^\circ C$ |
|---------------|--------------------------------|-----------------------------|
| 60V           | 66m $\Omega$ @ $V_{GS} = 10V$  | 5.0A                        |
|               | 97m $\Omega$ @ $V_{GS} = 4.5V$ | 4.1A                        |

**Description and Applications**

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

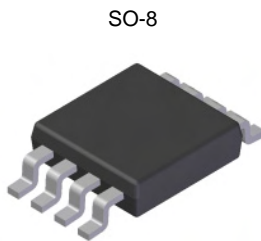
- Motor control
- Backlighting
- DC-DC Converters
- Power management functions

**Features and Benefits**

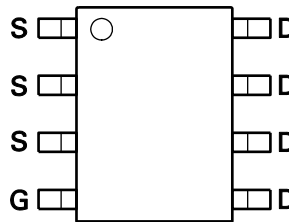
- Low on-resistance
- Fast switching speed
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

**Mechanical Data**

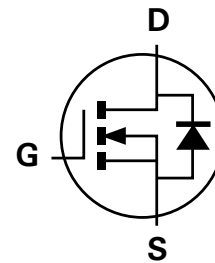
- Case: SO-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)



Top View



Top View



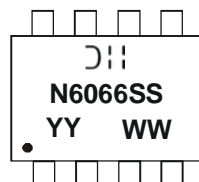
Equivalent Circuit

**Ordering Information** (Note 1)

| Product       | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|---------|--------------------|-----------------|-------------------|
| DMN6066SSS-13 | N6066SS | 13                 | 12              | 2,500             |

Note: 1. Diodes, Inc. defines “Green” products as those which are RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.’s “Green” Policy can be found on our website. For packaging details, go to our website.

**Marking Information**



$\text{D}||$  = Manufacturer's Marking  
 N6066SS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 09 = 2009)  
 WW = Week (01-53)

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

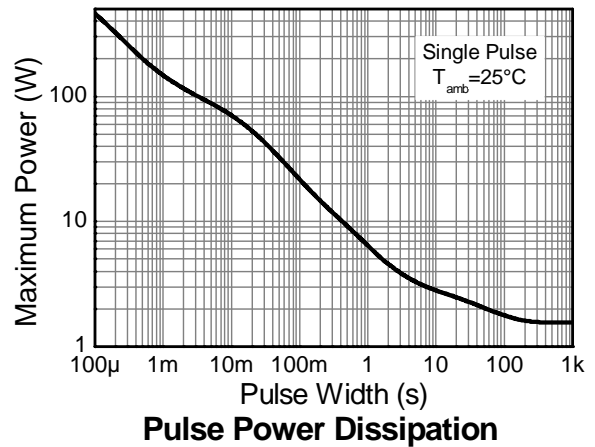
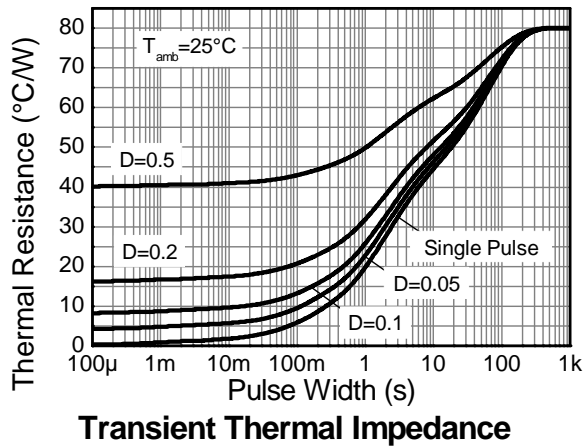
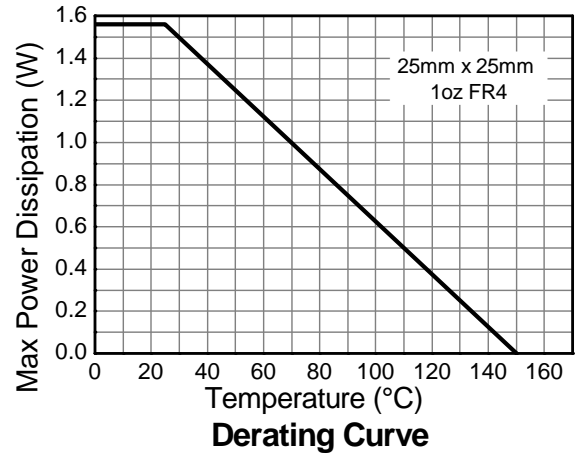
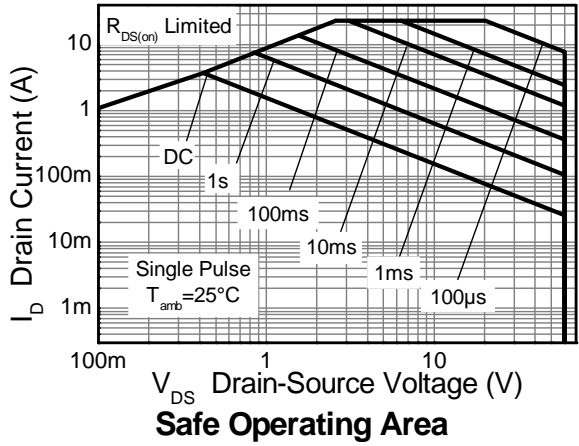
| Characteristic                         |                       | Symbol                            | Value    | Unit |   |
|--|-----------------------|-----------------------------------|----------|------|---|
| Drain-Source voltage                   |                       | $V_{DSS}$                         | 60       | V    |   |
| Gate-Source voltage                    |                       | $V_{GS}$                          | $\pm 20$ | V    |   |
| Continuous Drain current               | $V_{GS} = 10\text{V}$ | (Note 2)                          | 5.0      | A    |   |
|  |                       | (Note 4)                          | 4.0      |      |   |
|  |                       | $T_A = 70^\circ\text{C}$ (Note 4) | 3.7      |      |   |
| Pulsed Drain current                   | $V_{GS} = 10\text{V}$ | (Note 5)                          | $I_{DM}$ | 23   | A |
| Continuous Source current (Body diode) |                       | (Note 4)                          | $I_S$    | 4.0  | A |
| Pulsed Source current (Body diode)     |                       | (Note 5)                          | $I_{SM}$ | 23   | A |

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                          |          | Symbol          | Value      | Unit                       |
|---|----------|-----------------|------------|----------------------------|
| Power dissipation                       | (Note 3) | $P_D$           | 1.56       | W                          |
|   | (Note 4) |                 | 12.5       |                            |
| Linear derating factor                  | (Note 3) | $R_{\theta JA}$ | 2.81       | $\text{mW}/^\circ\text{C}$ |
|   | (Note 4) |                 | 22.5       |                            |
| Thermal Resistance, Junction to Ambient | (Note 3) | $R_{\theta JL}$ | 80.0       | $^\circ\text{C}/\text{W}$  |
|   | (Note 4) |                 | 44.5       |                            |
| Thermal Resistance, Junction to Lead    | (Note 6) | $R_{\theta JL}$ | 37.0       | $^\circ\text{C}/\text{W}$  |
| Operating and storage temperature range |          | $T_J, T_{STG}$  | -55 to 150 | $^\circ\text{C}$           |

- Notes:
- AEC-Q101  $V_{GS}$  maximum is  $\pm 16\text{V}$ .
  - For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  - Same as note (3), except the device is measured at  $t \leq 10$  sec.
  - Same as note (3), except the device is pulsed with  $D = 0.02$  and pulse width 300  $\mu\text{s}$ . The pulse current is limited by the maximum junction temperature.
  - Thermal resistance from junction to solder-point (at the end of the drain lead).

**Thermal Characteristics**

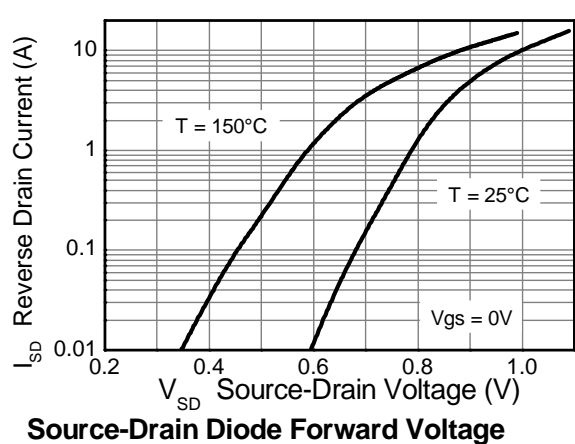
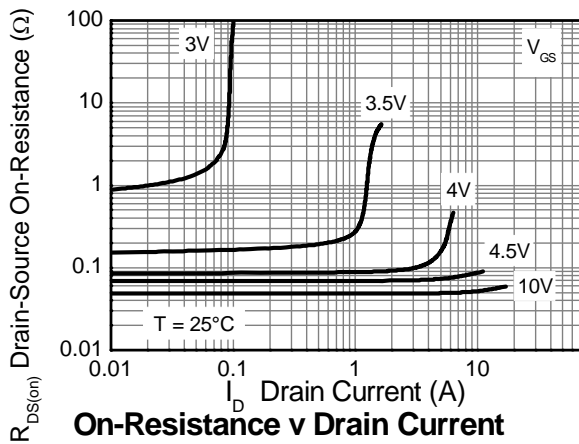
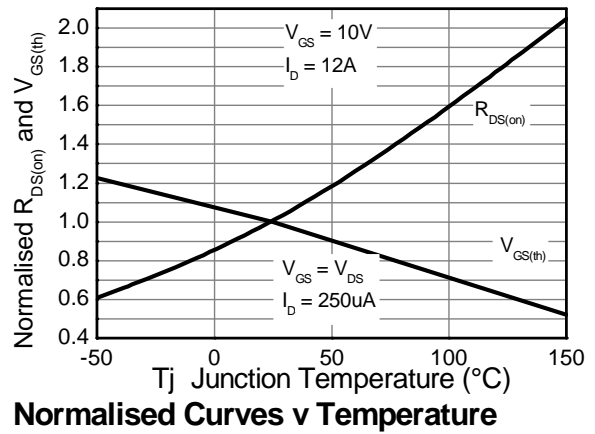
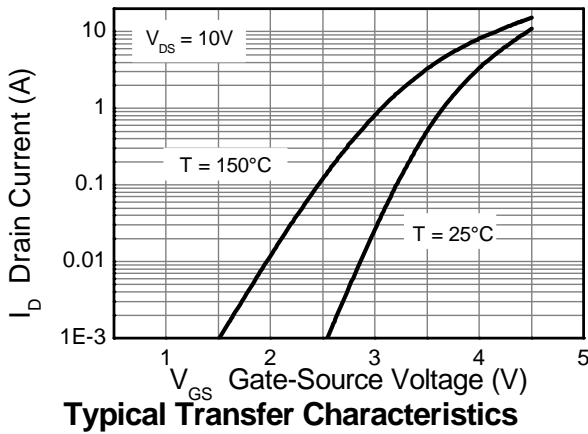
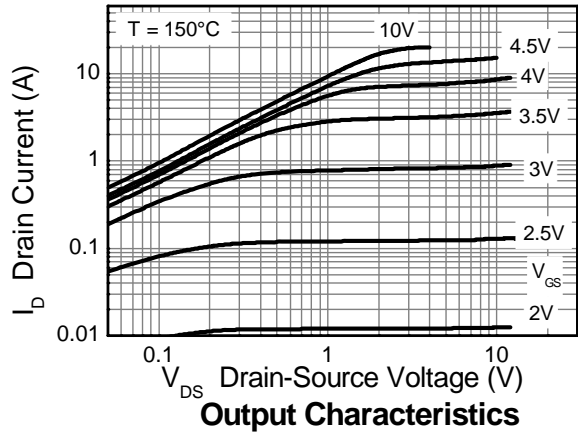
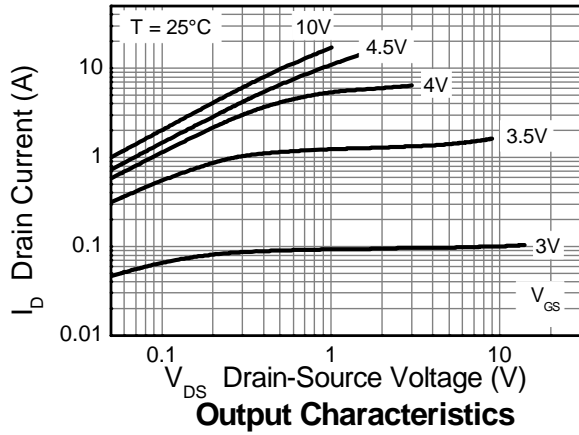


**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

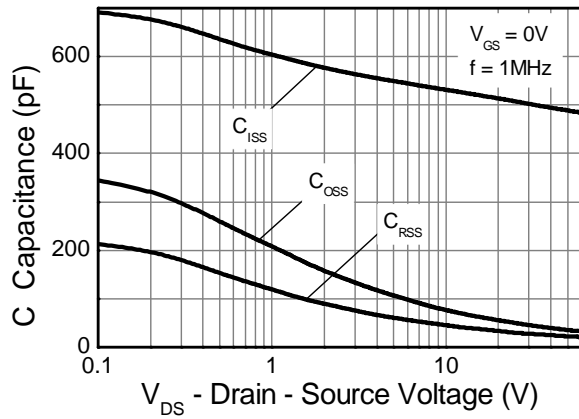
| Characteristic                             | Symbol       | Min | Typ   | Max       | Unit          | Test Condition   |
|--|--------------|-----|-------|-----------|---------------|--|
| <b>OFF CHARACTERISTICS</b>                 |              |     |       |           |               |  |
| Drain-Source Breakdown Voltage             | $BV_{DSS}$   | 60  | —     | —         | V             | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$   |
| Zero Gate Voltage Drain Current            | $I_{DSS}$    | —   | —     | 0.5       | $\mu\text{A}$ | $V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$  |
| Gate-Source Leakage                        | $I_{GSS}$    | —   | —     | $\pm 100$ | nA            | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$  |
| <b>ON CHARACTERISTICS</b>                  |              |     |       |           |               |  |
| Gate Threshold Voltage                     | $V_{GS(th)}$ | 1.0 | —     | 3.0       | V             | $I_D = 250\mu\text{A}, V_{DS} = V_{GS}$  |
| Static Drain-Source On-Resistance (Note 7) | $R_{DS(on)}$ | —   | 0.048 | 0.066     | $\Omega$      | $V_{GS} = 10\text{V}, I_D = 4.5\text{A}$   |
|  |              |     | 0.068 | 0.097     |               | $V_{GS} = 4.5\text{V}, I_D = 3.5\text{A}$  |
| Forward Transconductance (Notes 7 & 8)     | $g_{fs}$     | —   | 19.2  | —         | S             | $V_{DS} = 15\text{V}, I_D = 6\text{A}$   |
| Diode Forward Voltage (Note 7)             | $V_{SD}$     | —   | 0.89  | 1.15      | V             | $I_S = 4.5\text{A}, V_{GS} = 0\text{V}$  |
| Reverse recovery time (Note 8)             | $t_{rr}$     | —   | 23    | —         | ns            | $I_S = 2.4\text{A}, di/dt = 100\text{A}/\mu\text{s}$                                 |
| Reverse recovery charge (Note 8)           | $Q_{rr}$     | —   | 19.7  | —         | nC            |  |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>    |              |     |       |           |               |  |
| Input Capacitance                          | $C_{iss}$    | —   | 502   | —         | pF            | $V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$<br>$f = 1\text{MHz}$                       |
| Output Capacitance                         | $C_{oss}$    | —   | 45.7  | —         | pF            |  |
| Reverse Transfer Capacitance               | $C_{rss}$    | —   | 27.1  | —         | pF            |  |
| Total Gate Charge (Note 9)                 | $Q_g$        | —   | 5.4   | —         | nC            | $V_{GS} = 4.5\text{V}$   |
| Total Gate Charge (Note 9)                 | $Q_g$        | —   | 10.3  | —         | nC            | $V_{GS} = 10\text{V}$  |
| Gate-Source Charge (Note 9)                | $Q_{gs}$     | —   | 1.7   | —         | nC            |  |
| Gate-Drain Charge (Note 9)                 | $Q_{gd}$     | —   | 3.2   | —         | nC            |  |
| Turn-On Delay Time (Note 9)                | $t_{D(on)}$  | —   | 2.7   | —         | ns            | $V_{DD} = 30\text{V}, V_{GS} = 10\text{V}$<br>$I_D = 1\text{A}, R_G \cong 6.0\Omega$ |
| Turn-On Rise Time (Note 9)                 | $t_r$        | —   | 2.4   | —         | ns            |  |
| Turn-Off Delay Time (Note 9)               | $t_{D(off)}$ | —   | 14.7  | —         | ns            |  |
| Turn-Off Fall Time (Note 9)                | $t_f$        | —   | 5.4   | —         | ns            |  |

- Notes:
7. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$
  8. For design aid only, not subject to production testing.
  9. Switching characteristics are independent of operating junction temperatures.

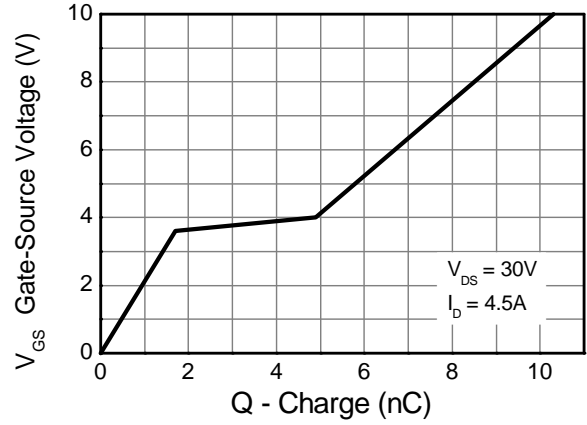
**Typical Characteristics**



**Typical Characteristics - continued**

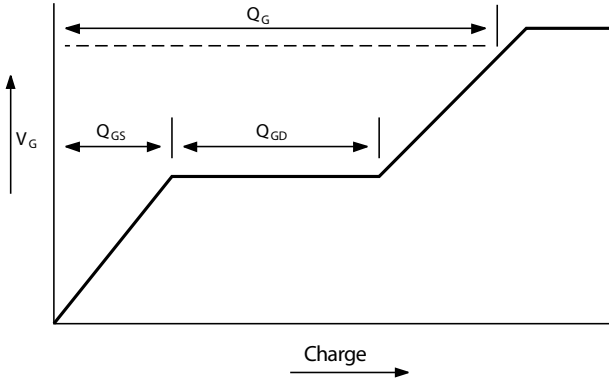


**Capacitance v Drain-Source Voltage**

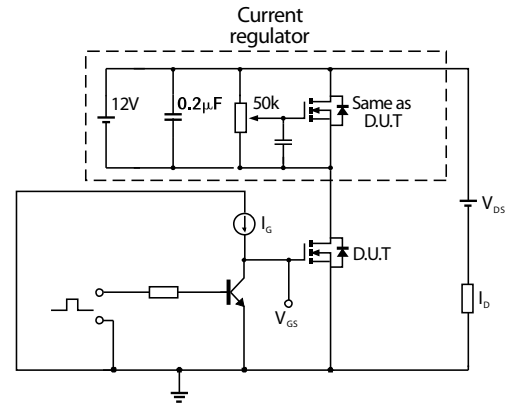


**Gate-Source Voltage v Gate Charge**

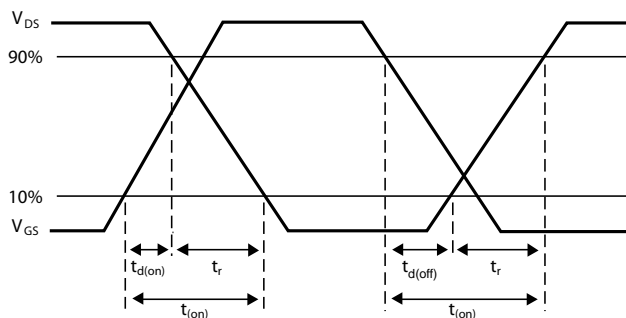
**Test Circuits**



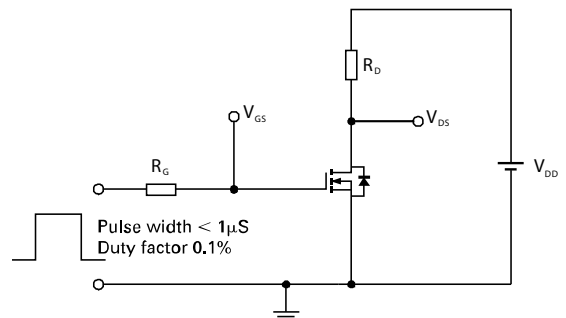
**Basic gate charge waveform**



**Gate charge test circuit**

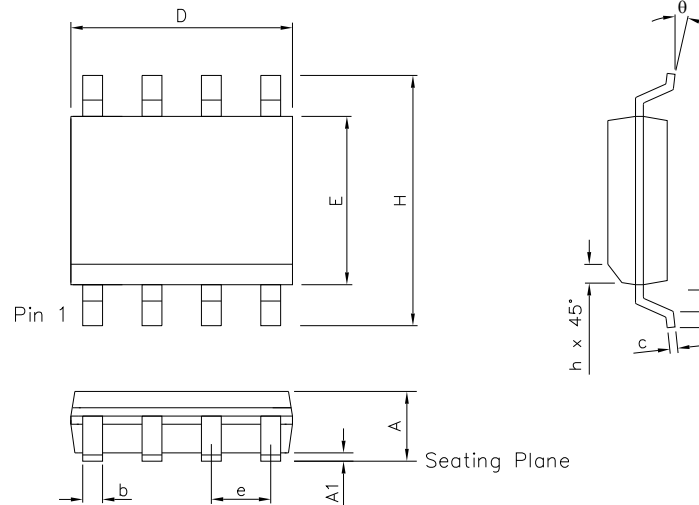


**Switching time waveforms**



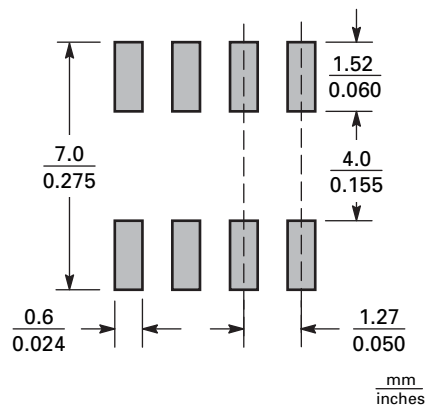
**Switching time test circuit**

**Package Outline Dimensions**



| DIM | Inches |       | Millimeters |      | DIM | Inches    |       | Millimeters |      |
|-----|--------|-------|-------------|------|-----|-----------|-------|-------------|------|
|     | Min.   | Max.  | Min.        | Max. |     | Min.      | Max.  | Min.        | Max. |
| A   | 0.053  | 0.069 | 1.35        | 1.75 | e   | 0.050 BSC |       | 1.27 BSC    |      |
| A1  | 0.004  | 0.010 | 0.10        | 0.25 | b   | 0.013     | 0.020 | 0.33        | 0.51 |
| D   | 0.189  | 0.197 | 4.80        | 5.00 | c   | 0.008     | 0.010 | 0.19        | 0.25 |
| H   | 0.228  | 0.244 | 5.80        | 6.20 | θ   | 0°        | 8°    | 0°          | 8°   |
| E   | 0.150  | 0.157 | 3.80        | 4.00 | h   | 0.010     | 0.020 | 0.25        | 0.50 |
| L   | 0.016  | 0.050 | 0.40        | 1.27 | -   | -         | -     | -           | -    |

**Suggested Pad Layout**



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