

## SI7901DN-VB Datasheet

### Dual P-Channel 30-V (D-S) MOSFET

#### PRODUCT SUMMARY

| $V_{DS}$ (V) | $R_{DS(on)}$ ( $\Omega$ )  | $I_D$ (A) |
|--------------|----------------------------|-----------|
| - 30         | 0.038 at $V_{GS} = -10$ V  | - 6.4     |
|              | 0.060 at $V_{GS} = -4.5$ V | - 5       |

#### FEATURES

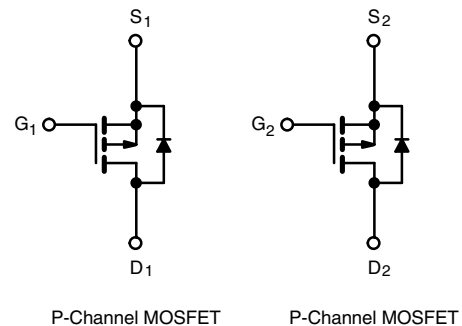
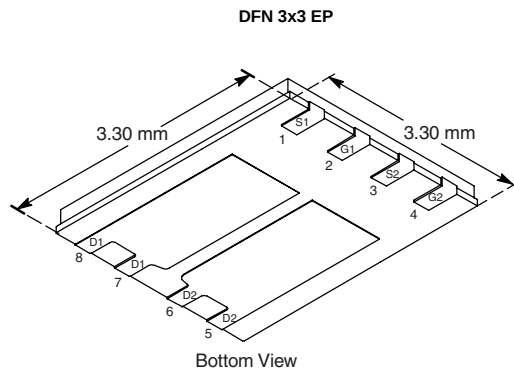
- Halogen-free According to IEC 61249-2-21 Available
- Trench Power MOSFET
- New Low Thermal Resistance Power Package



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

#### APPLICATIONS

- Portable
  - Battery Switch
  - Load Switch



#### ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ , unless otherwise noted

| Parameter                                                           | Symbol         | 10 s        | Steady State | Unit             |
|---------------------------------------------------------------------|----------------|-------------|--------------|------------------|
| Drain-Source Voltage                                                | $V_{DS}$       | - 30        |              | V                |
| Gate-Source Voltage                                                 | $V_{GS}$       | $\pm 20$    |              |                  |
| Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup> | $I_D$          | - 6.4       | - 4.3        | A                |
|                                                                     |                | - 4.6       | - 3.1        |                  |
| Pulsed Drain Current                                                | $I_{DM}$       | - 20        |              |                  |
| Continuous Source Current (Diode Conduction) <sup>a</sup>           | $I_S$          | - 2.3       | - 1.1        | W                |
| Maximum Power Dissipation <sup>a</sup>                              | $P_D$          | 2.8         | 1.3          |                  |
|                                                                     |                | 1.5         | 0.85         |                  |
| Operating Junction and Storage Temperature Range                    | $T_J, T_{stg}$ | - 55 to 150 |              | $^\circ\text{C}$ |
| Soldering Recommendations (Peak Temperature) <sup>b, c</sup>        |                | 260         |              |                  |

#### THERMAL RESISTANCE RATINGS

| Parameter                                | Symbol     | Typical | Maximum | Unit               |
|------------------------------------------|------------|---------|---------|--------------------|
| Maximum Junction-to-Ambient <sup>a</sup> | $R_{thJA}$ | 35      | 44      | $^\circ\text{C/W}$ |
|                                          |            | 75      | 94      |                    |
| Maximum Junction-to-Case (Drain)         | $R_{thJC}$ | 4       | 5       |                    |

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. The DFN3x3 package is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

| <b>SPECIFICATIONS</b> $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted |              |                                                                                                                                    |      |       |           |               |
|-----------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------|------|-------|-----------|---------------|
| Parameter                                                                         | Symbol       | Test Conditions                                                                                                                    | Min. | Typ.  | Max.      | Unit          |
| <b>Static</b>                                                                     |              |                                                                                                                                    |      |       |           |               |
| Gate Threshold Voltage                                                            | $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = -250\text{ }\mu\text{A}$                                                                                | -1.0 |       | -3.0      | V             |
| Gate-Body Leakage                                                                 | $I_{GSS}$    | $V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$                                                                                 |      |       | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current                                                   | $I_{DSS}$    | $V_{DS} = -30\text{ V}$ , $V_{GS} = 0\text{ V}$                                                                                    |      |       | -1        | $\mu\text{A}$ |
|                                                                                   |              | $V_{DS} = -30\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55\text{ }^{\circ}\text{C}$                                               |      |       | -5        |               |
| On-State Drain Current <sup>a</sup>                                               | $I_{D(on)}$  | $V_{DS} \leq -5\text{ V}$ , $V_{GS} = -10\text{ V}$                                                                                | -20  |       |           | A             |
| Drain-Source On-State Resistance <sup>a</sup>                                     | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}$ , $I_D = -6.4\text{ A}$                                                                                    |      | 0.038 |           | $\Omega$      |
|                                                                                   |              | $V_{GS} = -4.5\text{ V}$ , $I_D = -5\text{ A}$                                                                                     |      | 0.060 |           |               |
| Forward Transconductance <sup>a</sup>                                             | $g_{fs}$     | $V_{DS} = -15\text{ V}$ , $I_D = -6.4\text{ A}$                                                                                    |      | 13    |           | S             |
| Diode Forward Voltage <sup>a</sup>                                                | $V_{SD}$     | $I_S = -2.3\text{ A}$ , $V_{GS} = 0\text{ V}$                                                                                      |      | -0.8  | -1.2      | V             |
| <b>Dynamic<sup>b</sup></b>                                                        |              |                                                                                                                                    |      |       |           |               |
| Total Gate Charge                                                                 | $Q_g$        | $V_{DS} = -15\text{ V}$ , $V_{GS} = -10\text{ V}$ , $I_D = -6.4\text{ A}$                                                          |      | 14    | 21        | nC            |
| Gate-Source Charge                                                                | $Q_{gs}$     |                                                                                                                                    |      | 2.4   |           |               |
| Gate-Drain Charge                                                                 | $Q_{gd}$     |                                                                                                                                    |      | 3.8   |           |               |
| Gate Resistance                                                                   | $R_g$        |                                                                                                                                    |      | 8.5   |           | $\Omega$      |
| Turn-On Delay Time                                                                | $t_{d(on)}$  | $V_{DD} = -15\text{ V}$ , $R_L = 15\text{ }\Omega$<br>$I_D \cong -1\text{ A}$ , $V_{GEN} = -10\text{ V}$ , $R_g = 6\text{ }\Omega$ |      | 10    | 15        | ns            |
| Rise Time                                                                         | $t_r$        |                                                                                                                                    |      | 12    | 20        |               |
| Turn-Off Delay Time                                                               | $t_{d(off)}$ |                                                                                                                                    |      | 38    | 60        |               |
| Fall Time                                                                         | $t_f$        |                                                                                                                                    |      | 28    | 45        |               |
| Source-Drain Reverse Recovery Time                                                | $t_{rr}$     | $I_F = -2.3\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$                                                                         |      | 20    | 40        |               |

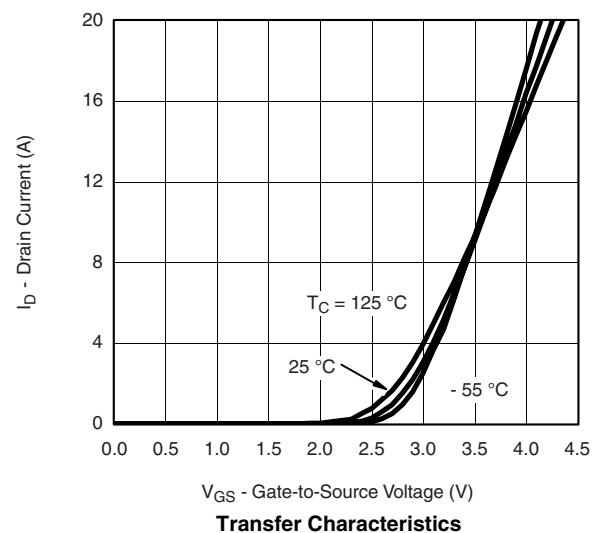
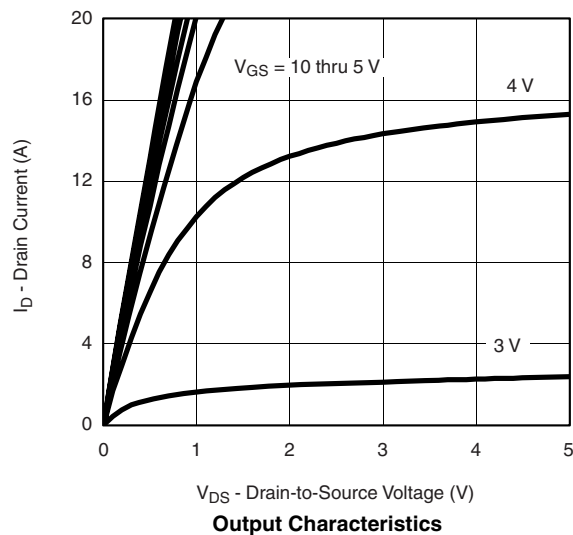
Notes:

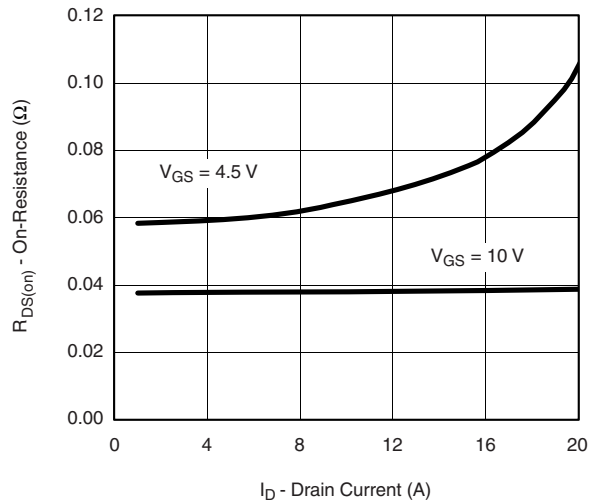
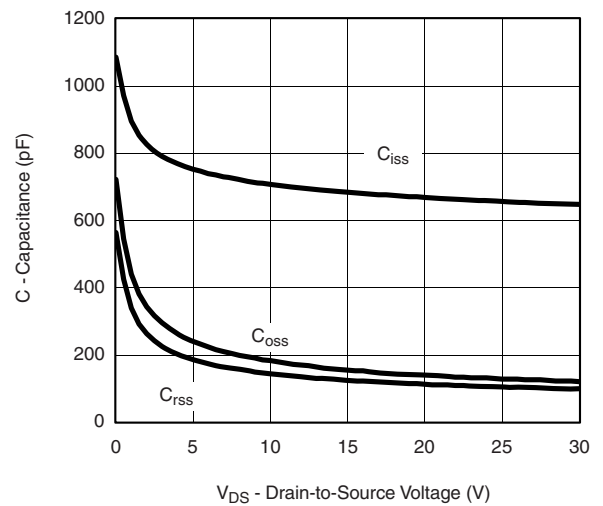
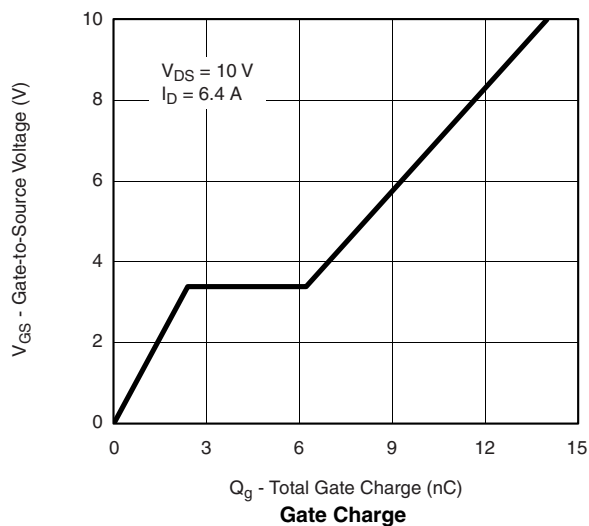
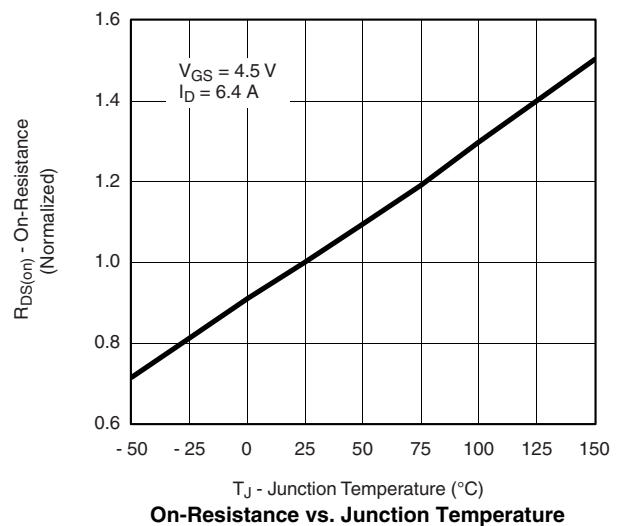
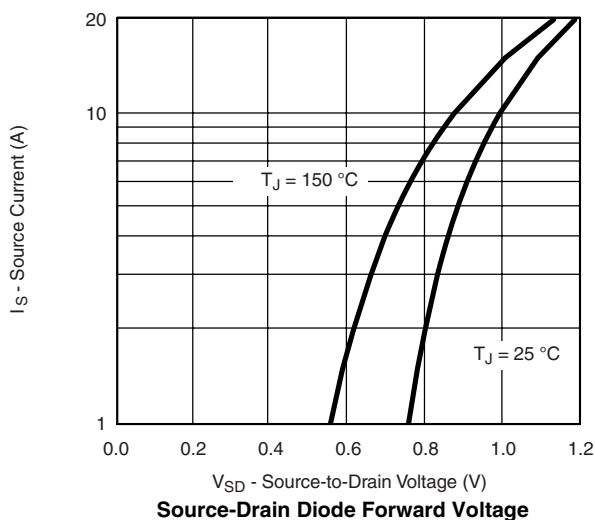
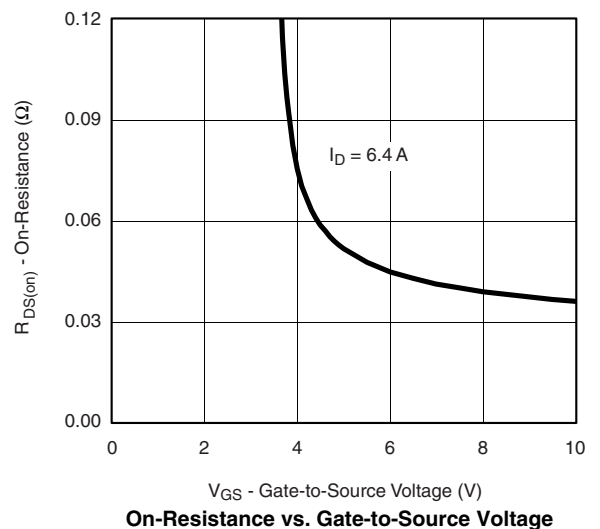
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

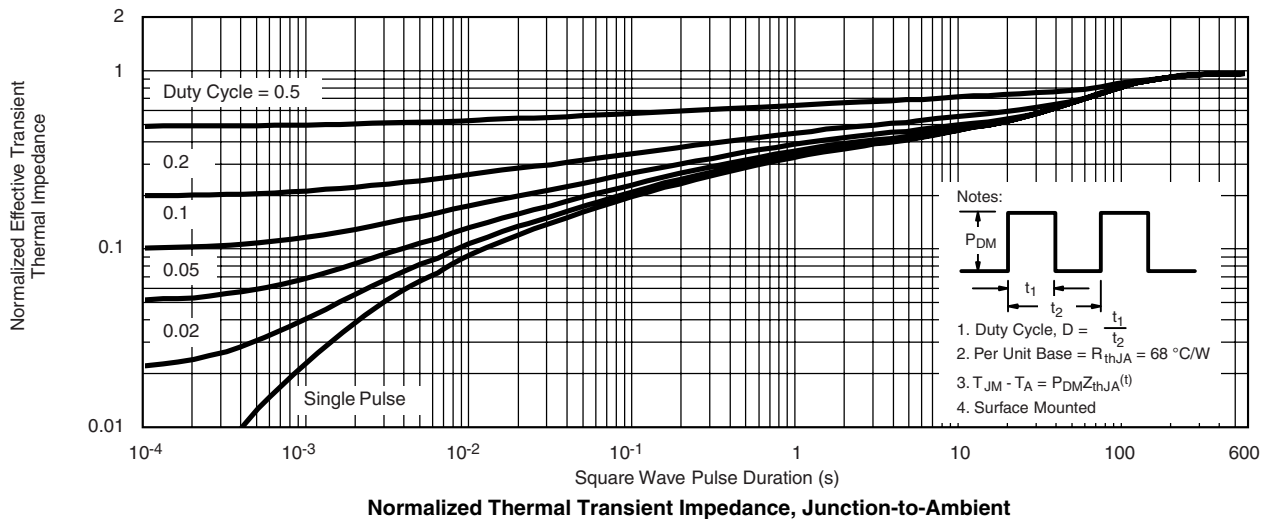
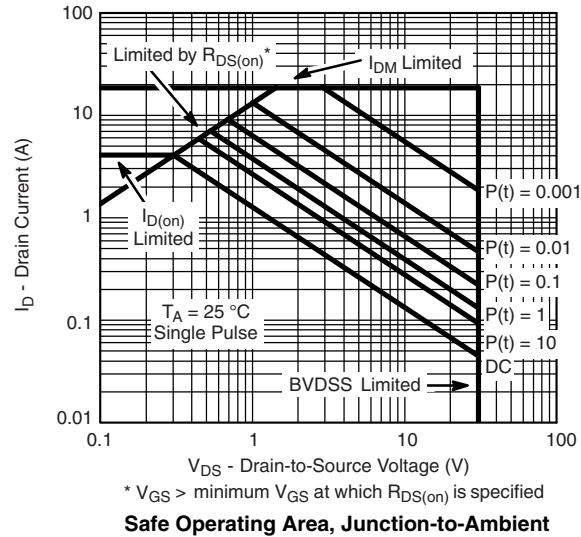
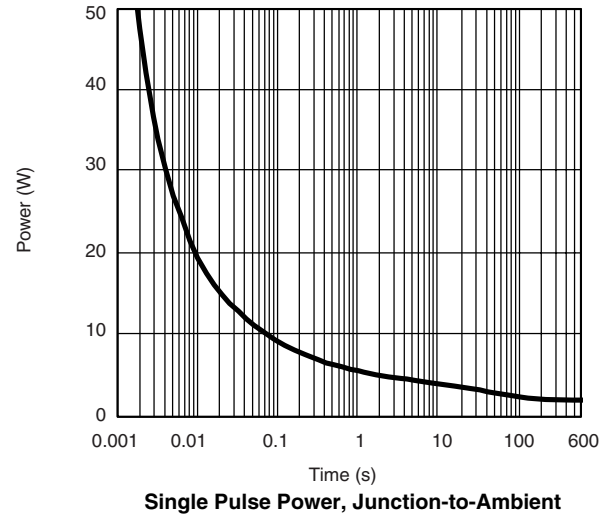
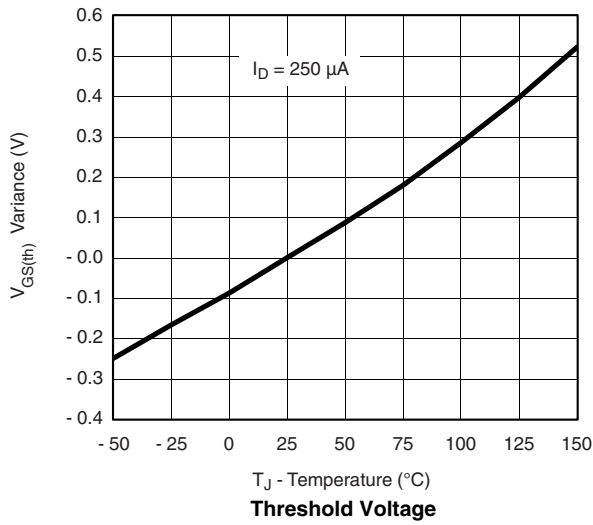
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## TYPICAL CHARACTERISTICS $25\text{ }^{\circ}\text{C}$ , unless otherwise noted

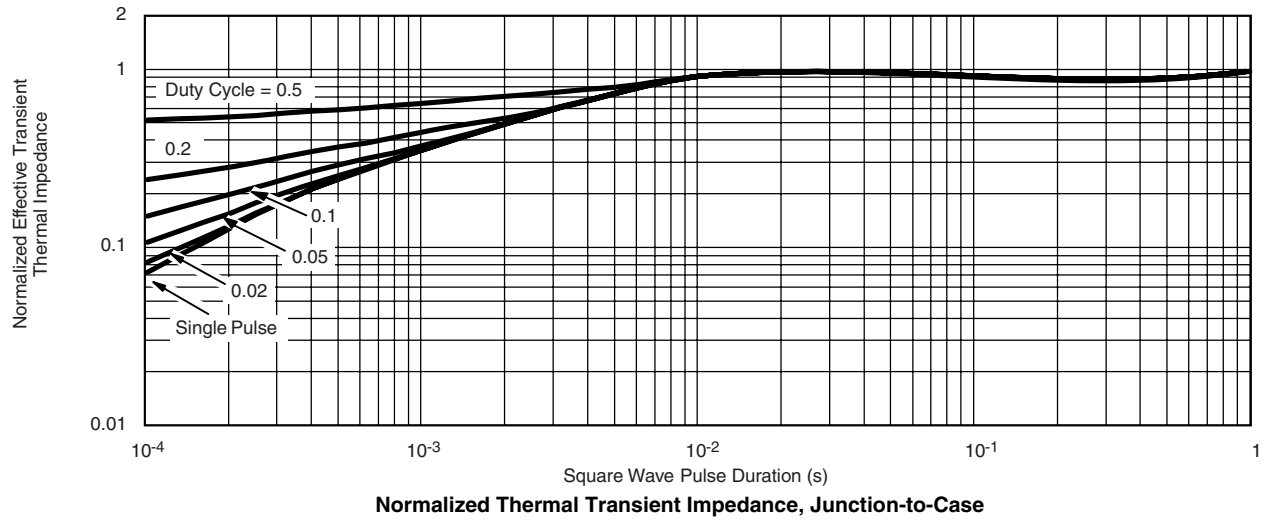


**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

**On-Resistance vs. Drain Current**

**Capacitance**

**Gate Charge**

**On-Resistance vs. Junction Temperature**

**Source-Drain Diode Forward Voltage**

**On-Resistance vs. Gate-to-Source Voltage**

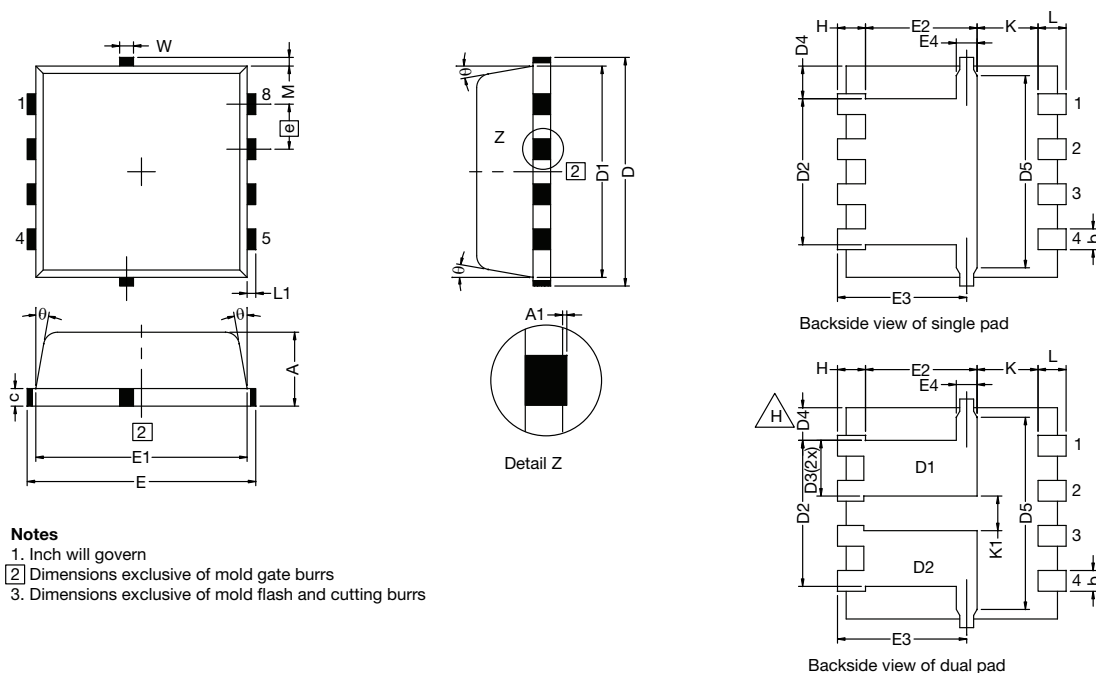
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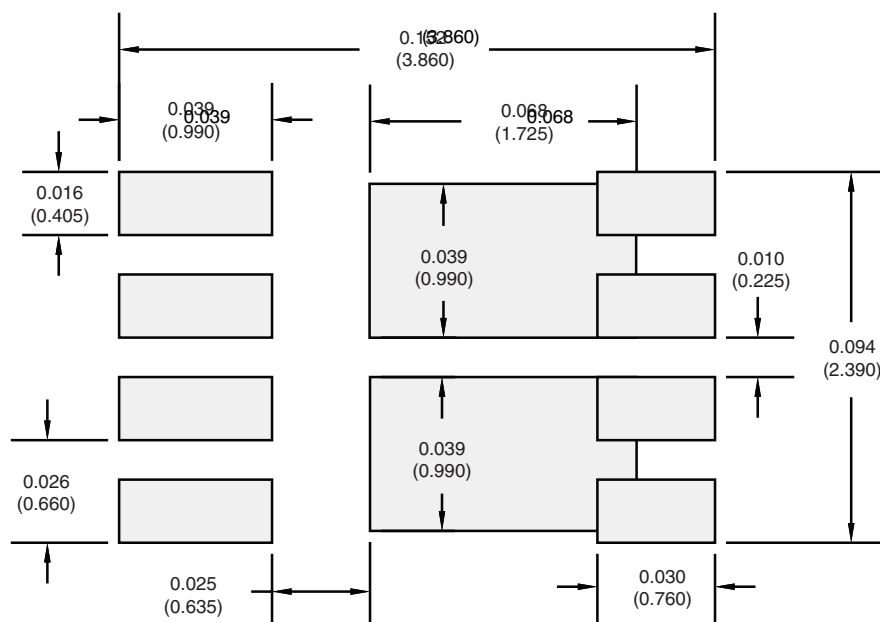


## DFN3x3, (Single / Dual)



| DIM.                            | MILLIMETERS |      |      | INCHES     |       |       |
|---------------------------------|-------------|------|------|------------|-------|-------|
|                                 | MIN.        | NOM. | MAX. | MIN.       | NOM.  | MAX.  |
| A                               | 0.97        | 1.04 | 1.12 | 0.038      | 0.041 | 0.044 |
| A1                              | 0.00        | -    | 0.05 | 0.000      | -     | 0.002 |
| b                               | 0.23        | 0.30 | 0.41 | 0.009      | 0.012 | 0.016 |
| c                               | 0.23        | 0.28 | 0.33 | 0.009      | 0.011 | 0.013 |
| D                               | 3.20        | 3.30 | 3.40 | 0.126      | 0.130 | 0.134 |
| D1                              | 2.95        | 3.05 | 3.15 | 0.116      | 0.120 | 0.124 |
| D2                              | 1.98        | 2.11 | 2.24 | 0.078      | 0.083 | 0.088 |
| D3                              | 0.48        | -    | 0.89 | 0.019      | -     | 0.035 |
| D4                              | 0.47 typ.   |      |      | 0.0185 typ |       |       |
| D5                              | 2.3 typ.    |      |      | 0.090 typ  |       |       |
| E                               | 3.20        | 3.30 | 3.40 | 0.126      | 0.130 | 0.134 |
| E1                              | 2.95        | 3.05 | 3.15 | 0.116      | 0.120 | 0.124 |
| E2                              | 1.47        | 1.60 | 1.73 | 0.058      | 0.063 | 0.068 |
| E3                              | 1.75        | 1.85 | 1.98 | 0.069      | 0.073 | 0.078 |
| E4                              | 0.034 typ.  |      |      | 0.013 typ. |       |       |
| e                               | 0.65 BSC    |      |      | 0.026 BSC  |       |       |
| K                               | 0.86 typ.   |      |      | 0.034 typ. |       |       |
| K1                              | 0.35        | -    | -    | 0.014      | -     | -     |
| H                               | 0.30        | 0.41 | 0.51 | 0.012      | 0.016 | 0.020 |
| L                               | 0.30        | 0.43 | 0.56 | 0.012      | 0.017 | 0.022 |
| L1                              | 0.06        | 0.13 | 0.20 | 0.002      | 0.005 | 0.008 |
| θ                               | 0°          | -    | 12°  | 0°         | -     | 12°   |
| W                               | 0.15        | 0.25 | 0.36 | 0.006      | 0.010 | 0.014 |
| M                               | 0.125 typ.  |      |      | 0.005 typ. |       |       |
| ECN: S16-2667-Rev. M, 09-Jan-17 |             |      |      |            |       |       |
| DWG: 5882                       |             |      |      |            |       |       |

## RECOMMENDED MINIMUM PADS FOR DFN 3x3 Dual



Recommended Minimum PADS for PowerPAK 1212-8 Dual  
Dimensions in Inches/(mm)

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