

# SIA931DJ-T1-GE3-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  | - 5.4     |
|              | 0.060 at $V_{GS} = - 4.5$ V | - 4.2     |

## FEATURES

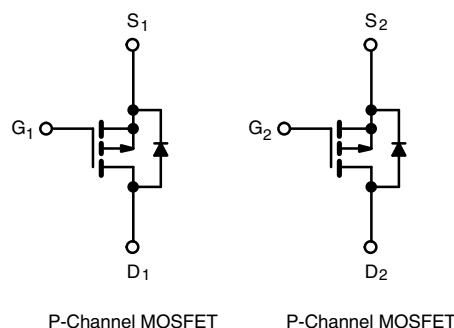
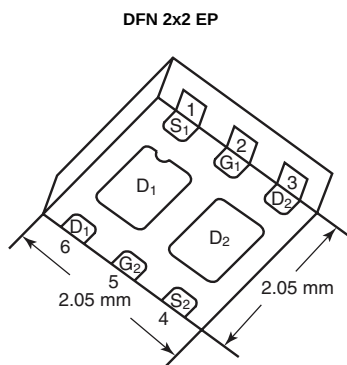
- **Halogen-free According to IEC 61249-2-21 Available**
- TrenchFET® Power MOSFET
- New Low Thermal Resistance PowerPAK® Package



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

## APPLICATIONS

- Portable
  - Battery Switch
  - Load Switch



**ABSOLUTE MAXIMUM RATINGS**  $T_A = 25\text{ }^{\circ}\text{C}$ , 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 ( $T_J = 150\text{ }^{\circ}\text{C}$ ) <sup>a</sup> | $T_A = 25\text{ }^{\circ}\text{C}$ | $I_D$          | - 5.4       | - 3.8        | A                  |
|                                                                               | $T_A = 85\text{ }^{\circ}\text{C}$ |                | - 4.2       | - 3.1        |                    |
| Pulsed Drain Current                                                          |                                    | $I_{DM}$       | - 20        |              |                    |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                     |                                    | $I_S$          | - 2.3       | - 1.1        |                    |
| Maximum Power Dissipation <sup>a</sup>                                        | $T_A = 25\text{ }^{\circ}\text{C}$ | $P_D$          | 2.8         | 1.3          | W                  |
|                                                                               | $T_A = 85\text{ }^{\circ}\text{C}$ |                | 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> | t ≤ 10 s     | R <sub>thJA</sub> | 35      | 44      | °C/W |
|                                          | Steady State |                   | 75      | 94      |      |
| Maximum Junction-to-Case (Drain)         | Steady State | R <sub>thJC</sub> | 4       | 5       |      |

Notes:

- a. Surface Mounted on 1" x 1" FR4 board.
- b. The DFN2x2 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.

**SPECIFICATIONS**  $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted

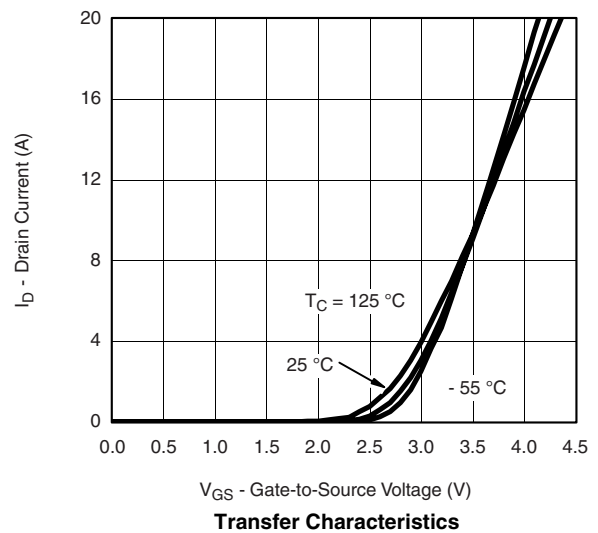
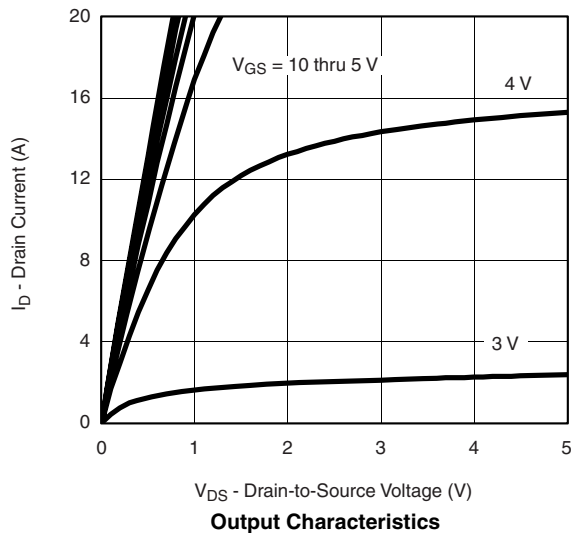
| Parameter                                     | Symbol       | Test Conditions                                                                                                                    | Min. | Typ.  | Max.      | Unit          |
|-----------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------|------|-------|-----------|---------------|
| <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> | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}$ , $I_D = -5.4\text{ A}$                                                                                    |      | 0.038 |           | $\Omega$      |
|                                               |              | $V_{GS} = -4.5\text{ V}$ , $I_D = -4.0\text{ A}$                                                                                   |      | 0.060 |           |               |
| Forward Transconductance <sup>a</sup>         | $g_{fs}$     | $V_{DS} = -15\text{ V}$ , $I_D = -5.4\text{ A}$                                                                                    |      | 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                             | $Q_g$        | $V_{DS} = -15\text{ V}$ , $V_{GS} = -10\text{ V}$ , $I_D = -5.4\text{ A}$                                                          |      | 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        |               |

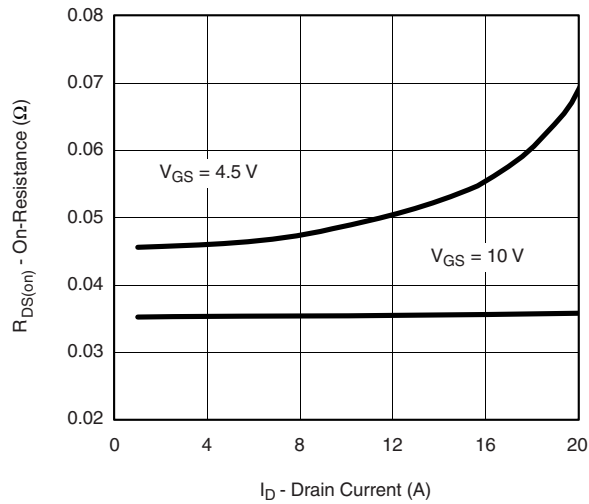
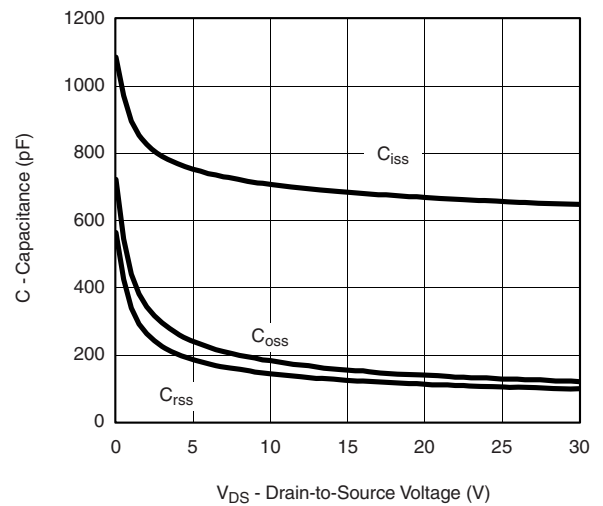
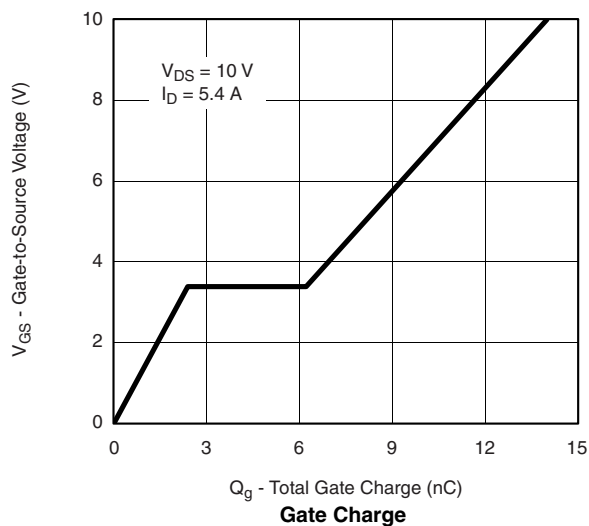
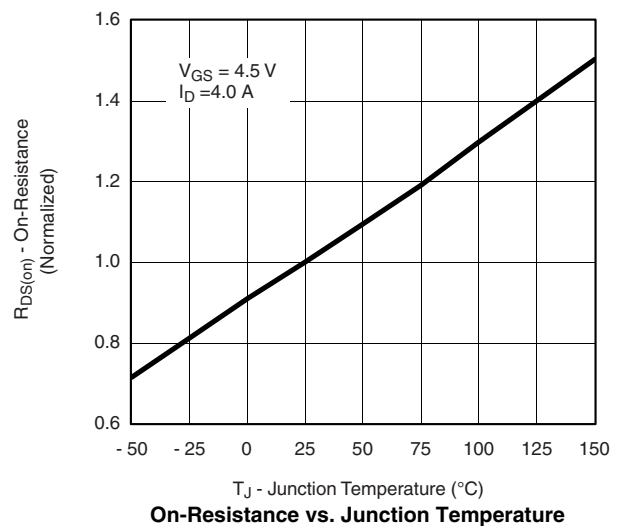
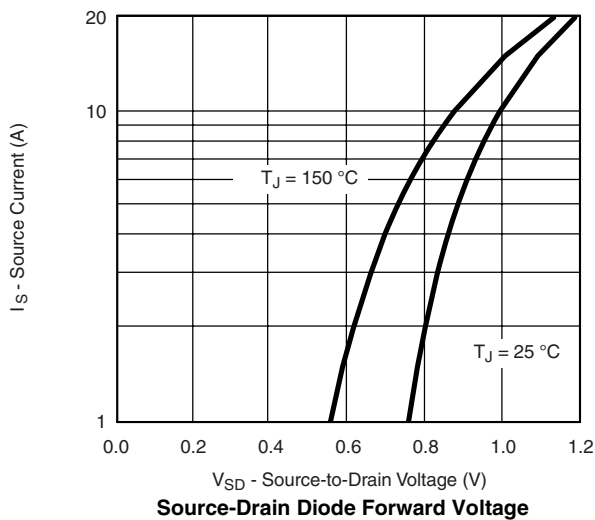
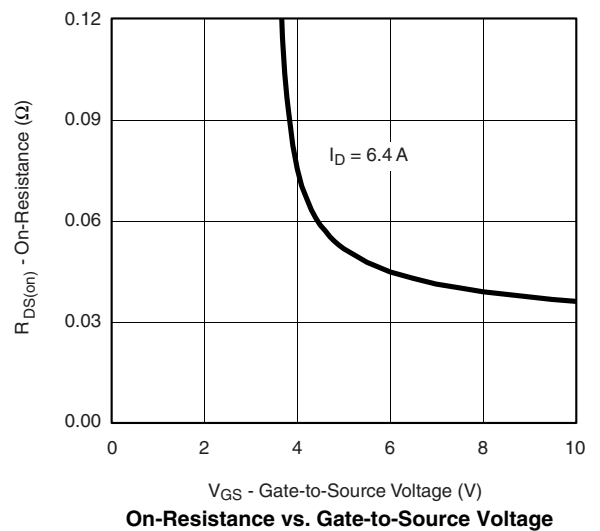
Notes:

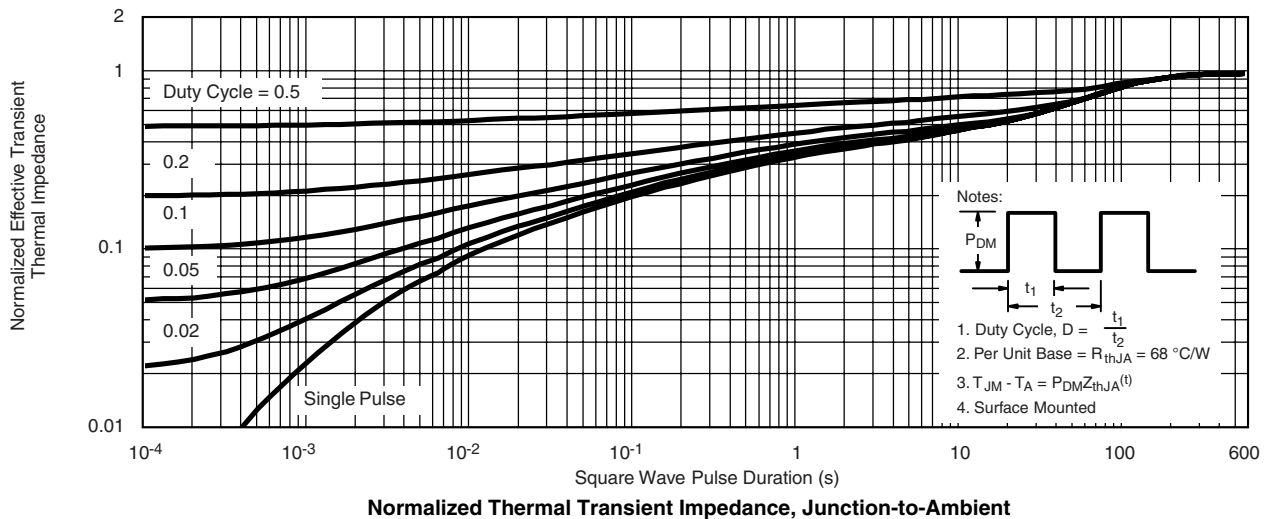
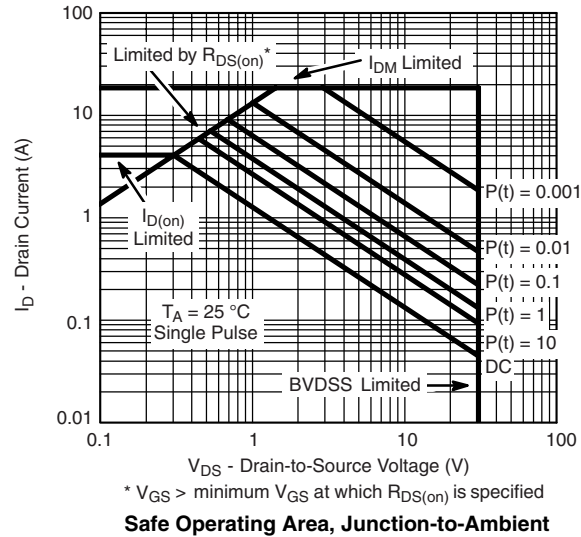
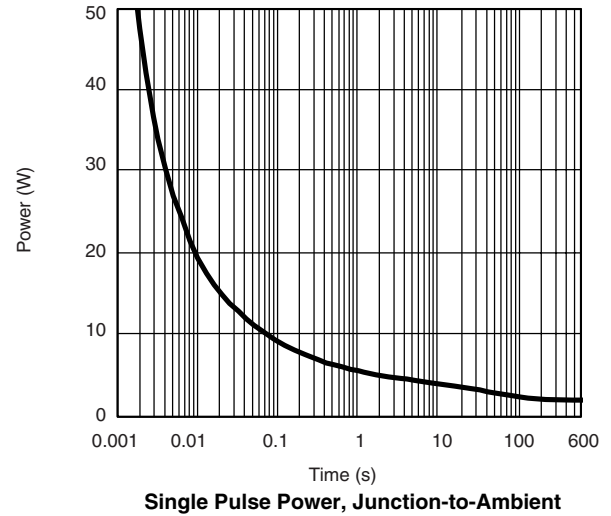
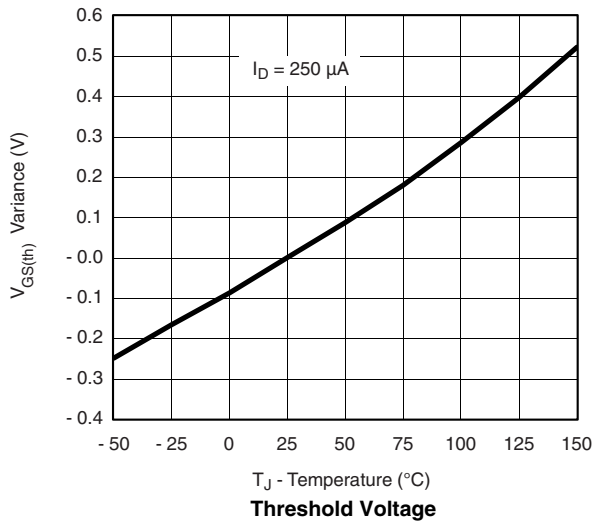
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

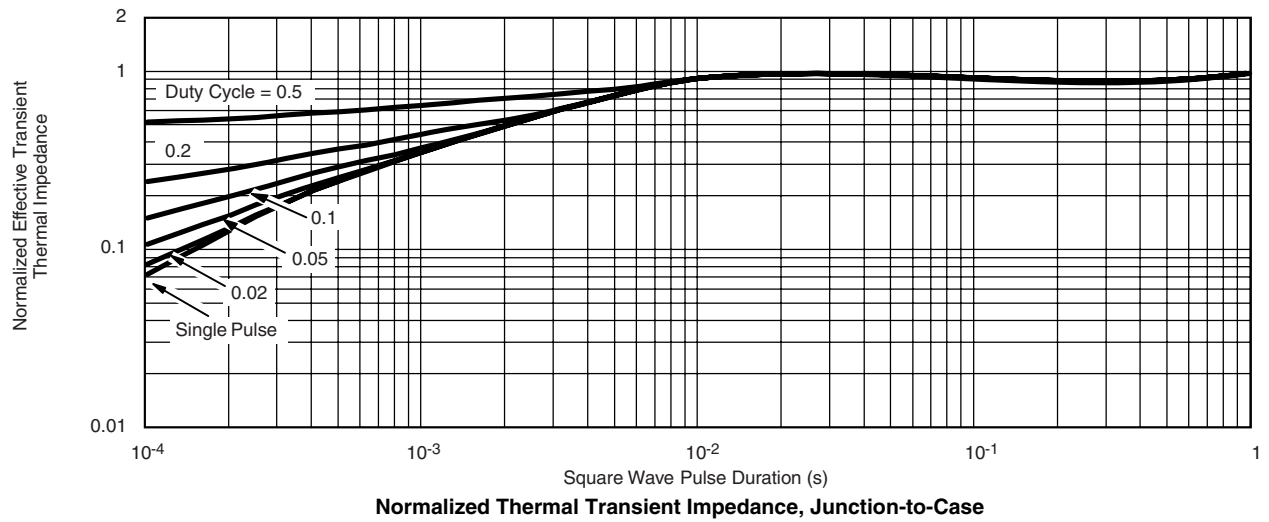
b. Guaranteed by design, not subject to production testing.

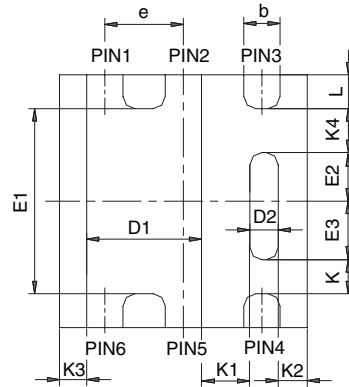
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

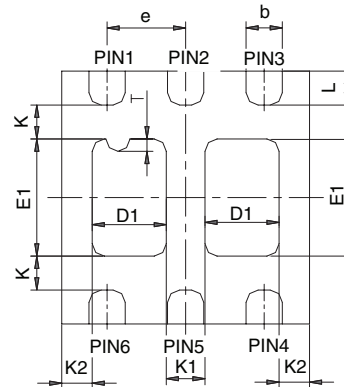
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

**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**

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


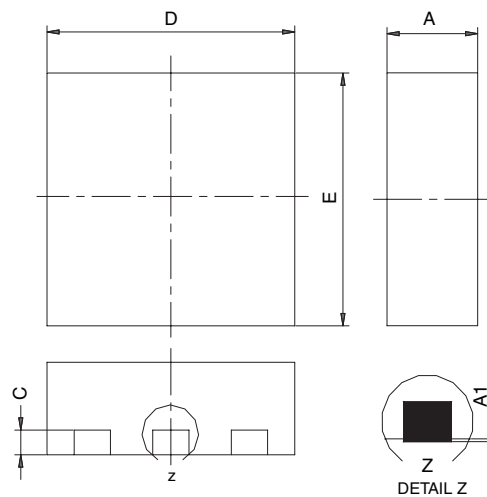
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

**DFN 2x2**

BACKSIDE VIEW OF SINGLE



BACKSIDE VIEW OF DUAL

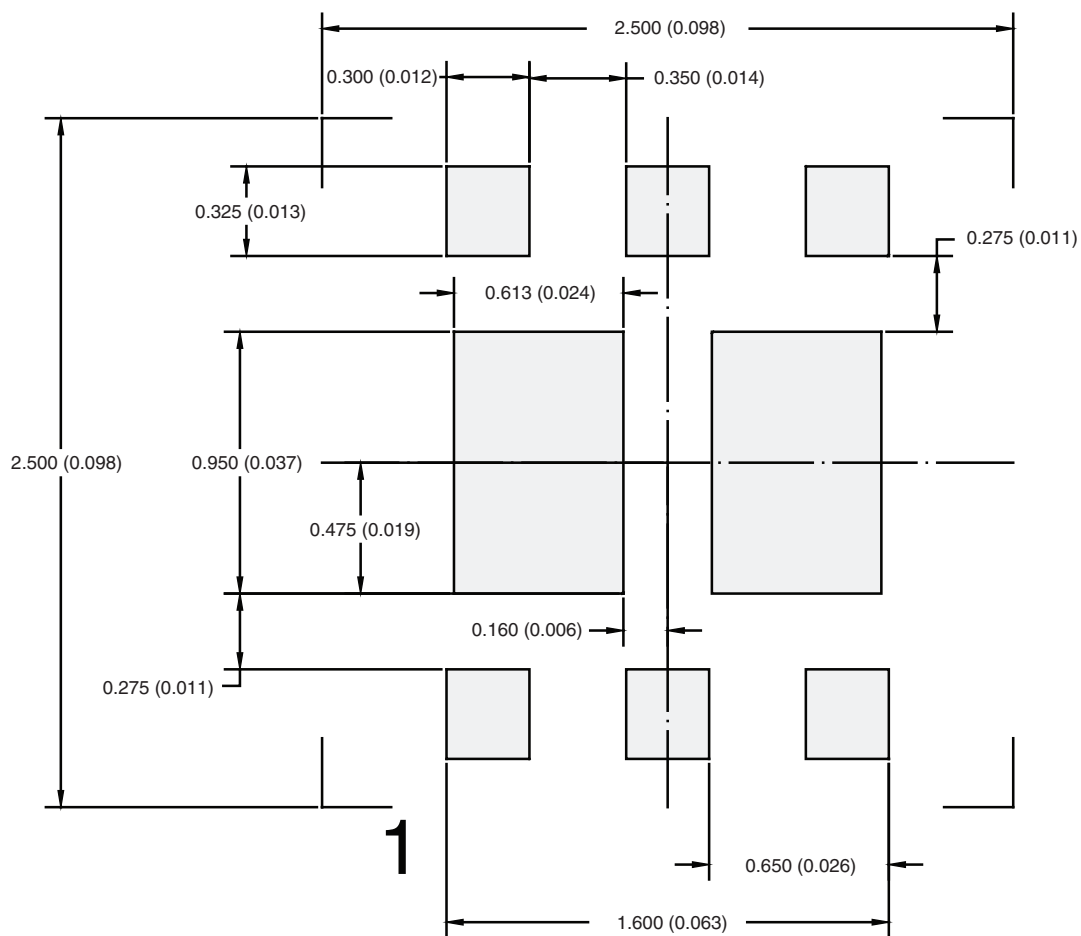
**Notes:**

1. All dimensions are in millimeters
2. Package outline exclusive of mold flash and metal burr
3. Package outline inclusive of plating

| DIM       | SINGLE PAD  |       |       |           |       |       | DUAL PAD    |       |       |           |       |       |
|-----------|-------------|-------|-------|-----------|-------|-------|-------------|-------|-------|-----------|-------|-------|
|           | MILLIMETERS |       |       | INCHES    |       |       | MILLIMETERS |       |       | INCHES    |       |       |
|           | Min         | Nom   | Max   | Min       | Nom   | Max   | Min         | Nom   | Max   | Min       | Nom   | Max   |
| <b>A</b>  | 0.675       | 0.75  | 0.80  | 0.027     | 0.030 | 0.032 | 0.675       | 0.75  | 0.80  | 0.027     | 0.030 | 0.032 |
| <b>A1</b> | 0           | -     | 0.05  | 0         | -     | 0.002 | 0           | -     | 0.05  | 0         | -     | 0.002 |
| <b>b</b>  | 0.23        | 0.30  | 0.38  | 0.009     | 0.012 | 0.015 | 0.23        | 0.30  | 0.38  | 0.009     | 0.012 | 0.015 |
| <b>C</b>  | 0.15        | 0.20  | 0.25  | 0.006     | 0.008 | 0.010 | 0.15        | 0.20  | 0.25  | 0.006     | 0.008 | 0.010 |
| <b>D</b>  | 1.98        | 2.05  | 2.15  | 0.078     | 0.081 | 0.085 | 1.98        | 2.05  | 2.15  | 0.078     | 0.081 | 0.085 |
| <b>D1</b> | 0.85        | 0.95  | 1.05  | 0.033     | 0.037 | 0.041 | 0.513       | 0.613 | 0.713 | 0.020     | 0.024 | 0.028 |
| <b>D2</b> | 0.135       | 0.235 | 0.335 | 0.005     | 0.009 | 0.013 |             |       |       |           |       |       |
| <b>E</b>  | 1.98        | 2.05  | 2.15  | 0.078     | 0.081 | 0.085 | 1.98        | 2.05  | 2.15  | 0.078     | 0.081 | 0.085 |
| <b>E1</b> | 1.40        | 1.50  | 1.60  | 0.055     | 0.059 | 0.063 | 0.85        | 0.95  | 1.05  | 0.033     | 0.037 | 0.041 |
| <b>E2</b> | 0.345       | 0.395 | 0.445 | 0.014     | 0.016 | 0.018 |             |       |       |           |       |       |
| <b>E3</b> | 0.425       | 0.475 | 0.525 | 0.017     | 0.019 | 0.021 |             |       |       |           |       |       |
| <b>e</b>  | 0.65 BSC    |       |       | 0.026 BSC |       |       | 0.65 BSC    |       |       | 0.026 BSC |       |       |
| <b>K</b>  | 0.275 TYP   |       |       | 0.011 TYP |       |       | 0.275 TYP   |       |       | 0.011 TYP |       |       |
| <b>K1</b> | 0.400 TYP   |       |       | 0.016 TYP |       |       | 0.320 TYP   |       |       | 0.013 TYP |       |       |
| <b>K2</b> | 0.240 TYP   |       |       | 0.009 TYP |       |       | 0.252 TYP   |       |       | 0.010 TYP |       |       |
| <b>K3</b> | 0.225 TYP   |       |       | 0.009 TYP |       |       |             |       |       |           |       |       |
| <b>K4</b> | 0.355 TYP   |       |       | 0.014 TYP |       |       |             |       |       |           |       |       |
| <b>L</b>  | 0.175       | 0.275 | 0.375 | 0.007     | 0.011 | 0.015 | 0.175       | 0.275 | 0.375 | 0.007     | 0.011 | 0.015 |
| <b>T</b>  |             |       |       |           |       |       | 0.05        | 0.10  | 0.15  | 0.002     | 0.004 | 0.006 |

ECN: C-07431 – Rev. C, 06-Aug-07  
 DWG: 5934

## RECOMMENDED PAD LAYOUT FOR DFN2x2



Dimensions in mm (inches)

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