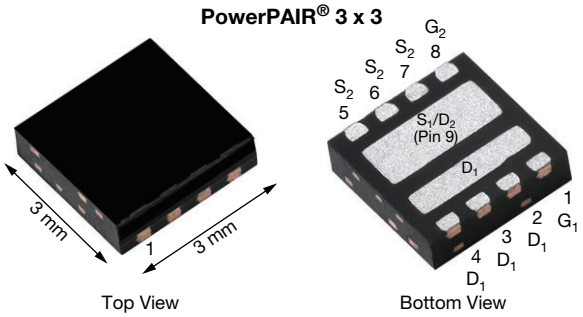
# Dual N-Channel 30 V (D-S) MOSFET




## FEATURES

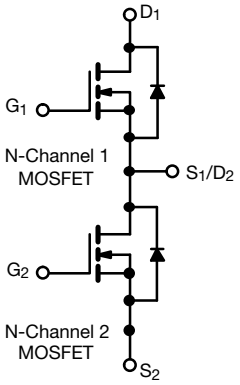
- TrenchFET® Gen IV power MOSFET
- High side and low side MOSFETs form optimized combination for 50 % duty cycle
- Optimized $R_{DS}$ - $Q_g$ and $R_{DS}$ - $Q_{gd}$ FOM elevates efficiency for high frequency switching
- 100 % $R_g$ and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE

## APPLICATIONS

- Synchronous buck
- DC/DC conversion
- Half bridge
- POL




| PRODUCT SUMMARY | |
|---|---|
| **MOSFET CHANNEL-1 AND CHANNEL-2** | |
| $V_{DS}$ (V) | 30 |
| $R_{DS(on)}$ max. (Ω) at $V_{GS}$ = 10 V | 0.0094 |
| $R_{DS(on)}$ max. (Ω) at $V_{GS}$ = 4.5 V | 0.0144 |
| $Q_g$ typ. (nC) | 3.7 |
| $I_D$ (A) | 33.4 [a] |
| Configuration | Dual |

| ORDERING INFORMATION | |
|---|---|
| Package | PowerPAIR 3 x 3 |
| Lead (Pb)-free and halogen-free | SiZ342ADT-T1-GE3 |

**ABSOLUTE MAXIMUM RATINGS** ($T_A$ = 25 °C, unless otherwise noted)

| PARAMETER | | CHANNEL-1 AND CHANNEL-2 | | |
|---|---|---|---|---|
| | | SYMBOL | LIMIT | UNIT |
| Drain-source voltage | | $V_{DS}$ | 30 | V |
| Gate-source voltage | | $V_{GS}$ | +20 / -16 | |
| Continuous drain current ($T_J$ = 150 °C) | $T_C$ = 25 °C | $I_D$ | 33.4 | A |
| | $T_C$ = 70 °C | | 26.7 | |
| | $T_A$ = 25 °C | | 15.7 [b, c] | |
| | $T_A$ = 70 °C | | 12.5 [b, c] | |
| Pulsed drain current (t = 100 µs) | | $I_{DM}$ | 100 | |
| Continuous source current (MOSFET diode conduction) | $T_C$ = 25 °C | $I_S$ | 13.9 | |
| | $T_A$ = 25 °C | | 3.1 [b, c] | |
| Single pulse avalanche current | L = 0.1 mH | $I_{AS}$ | 10 | |
| Single pulse avalanche energy | | $E_{AS}$ | 5 | mJ |
| Maximum power dissipation | $T_C$ = 25 °C | $P_D$ | 16.7 | W |
| | $T_C$ = 70 °C | | 10.7 | |
| | $T_A$ = 25 °C | | 3.7 [b, c] | |
| | $T_A$ = 70 °C | | 2.4 [b, c] | |
| Operating junction and storage temperature range | | $T_J$, $T_{stg}$ | -55 to +150 | °C |
| Soldering recommendations (peak temperature) | | | 260 | |

**Notes**

a. $T_C$ = 25 °C

b. Surface mounted on 1" x 1" FR4 board

c. t = 10 s

## THERMAL RESISTANCE RATINGS

| PARAMETER | | CHANNEL-1 AND CHANNEL-2 | | | |
|---|---|---|---|---|---|
| | | SYMBOL | TYPICAL | MAXIMUM | UNIT |
| Maximum junction-to-ambient [a, b] | t ≤ 10 s | $R_{thJA}$ | 27 | 34 | °C/W |
| Maximum junction-to-case (drain) | Steady state | $R_{thJC}$ | 6 | 7.5 | |

**Notes**

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

b. Maximum under steady state conditions is 69 °C/W

## SPECIFICATIONS ($T_J$ = 25 °C, unless otherwise noted)

| PARAMETER | CHANNEL-1 AND CHANNEL-2 | | | | | |
|---|---|---|---|---|---|---|
| | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
| **Static** | | | | | | |
| Drain-source breakdown voltage | $V_{DS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 30 | - | - | V |
| Gate-source threshold voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 1 | - | 2.4 | |
| Gate-source leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = +20 V / -16 V | - | - | ± 100 | nA |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V | - | - | 1 | µA |
| | | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, $T_J$ = 55 °C | - | - | 5 | |
| On-state drain current [a] | $I_{D(on)}$ | $V_{DS}$ ≥ 5 V, $V_{GS}$ = 10 V | 30 | - | - | A |
| Drain-source on-state resistance [a] | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 10 A | - | 0.0078 | 0.0094 | Ω |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 7 A | - | 0.0120 | 0.0144 | |
| Forward transconductance [a] | $g_{fs}$ | $V_{DS}$ = 10 V, $I_D$ = 10 A | - | 57 | - | S |
| **Dynamic [b]** | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 MHz | - | 580 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 250 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 30 | - | |
| $C_{rss}/C_{iss}$ ratio | | | - | 0.052 | 0.103 | |
| Total gate charge | $Q_g$ | $V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_D$ = 15.7 A | - | 8.1 | 12.2 | nC |
| | | $V_{DS}$ = 15 V, $V_{GS}$ = 4.5 V, $I_D$ = 15.7 A | - | 3.7 | 4.5 | |
| Gate-source charge | $Q_{gs}$ | | - | 2.4 | - | |
| Gate-drain charge | $Q_{gd}$ | | - | 0.67 | - | |
| Gate resistance | $R_g$ | f = 1 MHz | 0.24 | 1.2 | 2.4 | Ω |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$ = 15 V, $R_L$ = 1.2 Ω, $I_D$ ≅ 12.5 A, $V_{GEN}$ = 10 V, $R_g$ = 1 Ω | - | 10 | 20 | ns |
| Rise time | $t_r$ | | - | 6 | 12 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 18 | 36 | |
| Fall time | $t_f$ | | - | 8 | 16 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$ = 15 V, $R_L$ = 1.2 Ω, $I_D$ ≅ 12.5 A, $V_{GEN}$ = 4.5 V, $R_g$ = 1 Ω | - | 15 | 30 | |
| Rise time | $t_r$ | | - | 180 | 360 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 20 | 40 | |
| Fall time | $t_f$ | | - | 15 | 30 | |

| **SPECIFICATIONS** ($T_J$ = 25 °C, unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **CHANNEL-1 AND CHANNEL-2** | | | | | |
| | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **Drain-source Body Diode Characteristics** | | | | | | |
| Continuous source-drain diode current | $I_S$ | $T_C$ = 25°C | - | - | 13.9 | A |
| Pulse diode forward current | $I_{SM}$ | | - | - | 100 | |
| Body diode voltage | $V_{SD}$ | $I_S$ = 12.5 A, $V_{GS}$ = 0 V | - | 0.85 | 1.2 | V |
| Body diode reverse recovery time | $t_{rr}$ | $I_F$ = 12.5 A, di/dt = 100 A/µs, $T_J$ = 25 °C | - | 15 | 30 | ns |
| Body diode reverse recovery charge | $Q_{rr}$ | | - | 4.3 | 8.6 | nC |
| Reverse recovery fall time | $t_a$ | | - | 8 | - | ns |
| Reverse recovery rise time | $t_b$ | | - | 7 | - | |

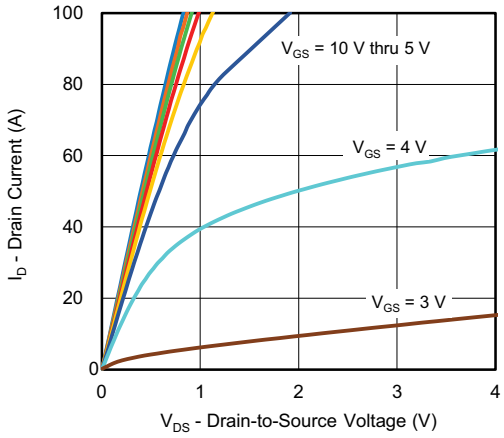
**Notes**

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

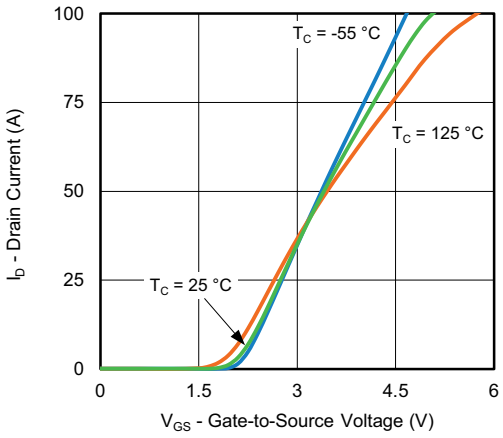
b. Guaranteed by design, not subject to production testing

*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.*

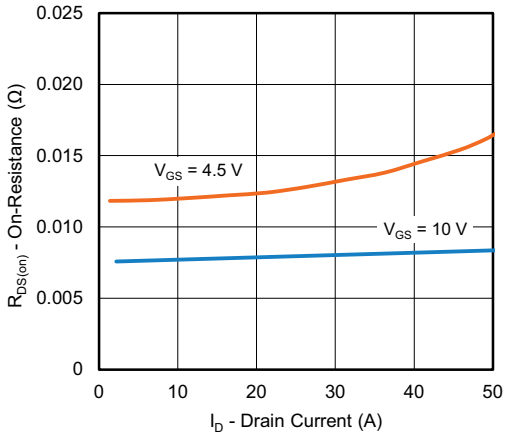
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



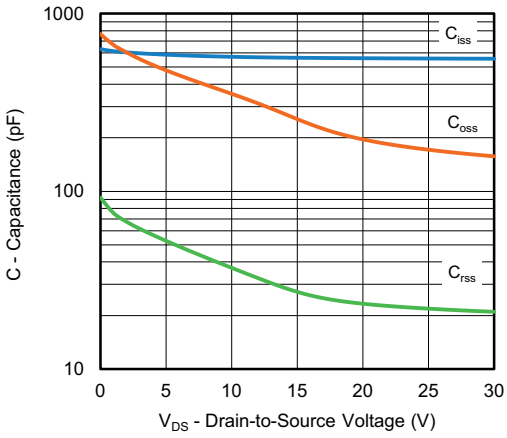

**Output Characteristics**



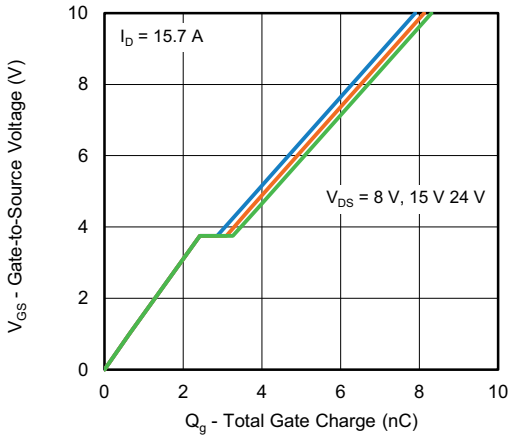

**Transfer Characteristics**



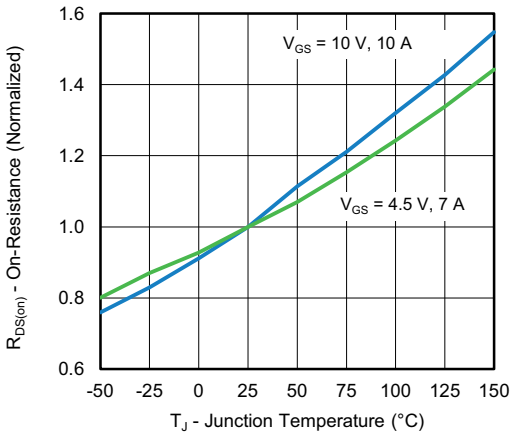

**On-Resistance vs. Drain Current and Gate**




**Capacitance**

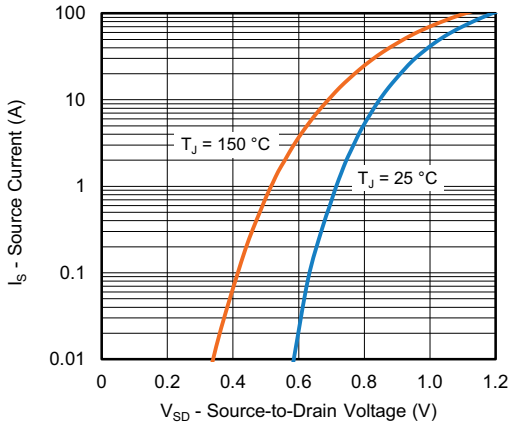



**Gate Charge**

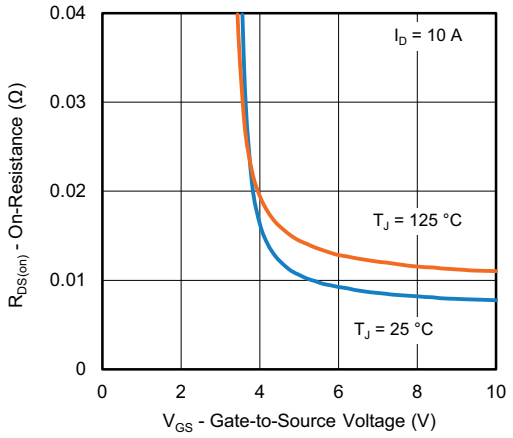



**On-Resistance vs. Junction Temperature**

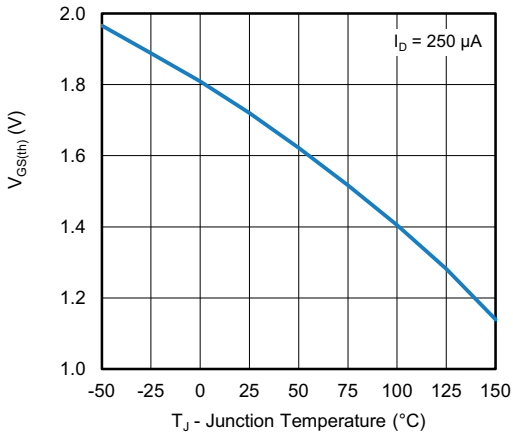
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



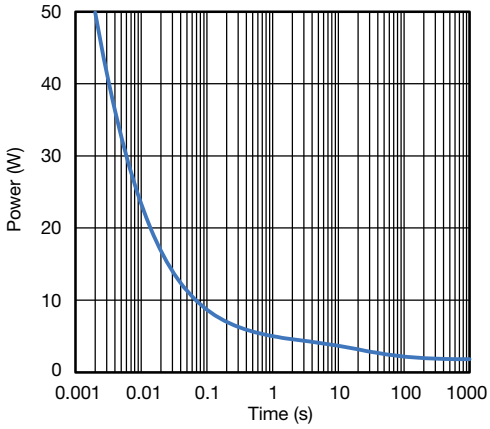

**Source-Drain Diode Forward Voltage**




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

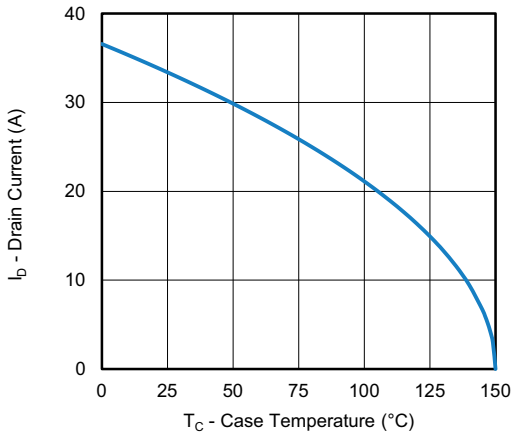



**Threshold Voltage**

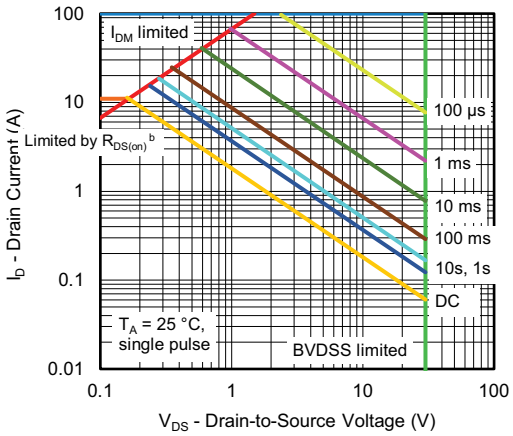



**Single Pulse Power**

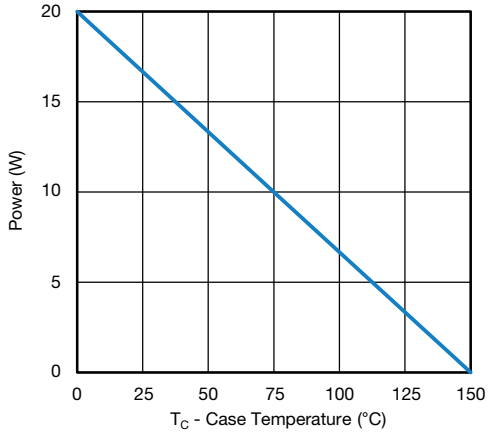
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



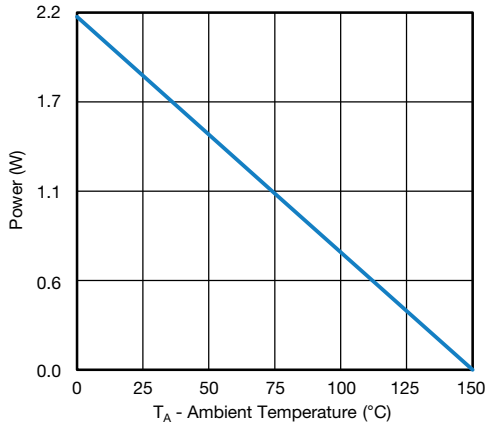

**Current Derating** [a]




**Safe Operating Area, Junction-to-Ambient**




**Power, Junction-to-Case**



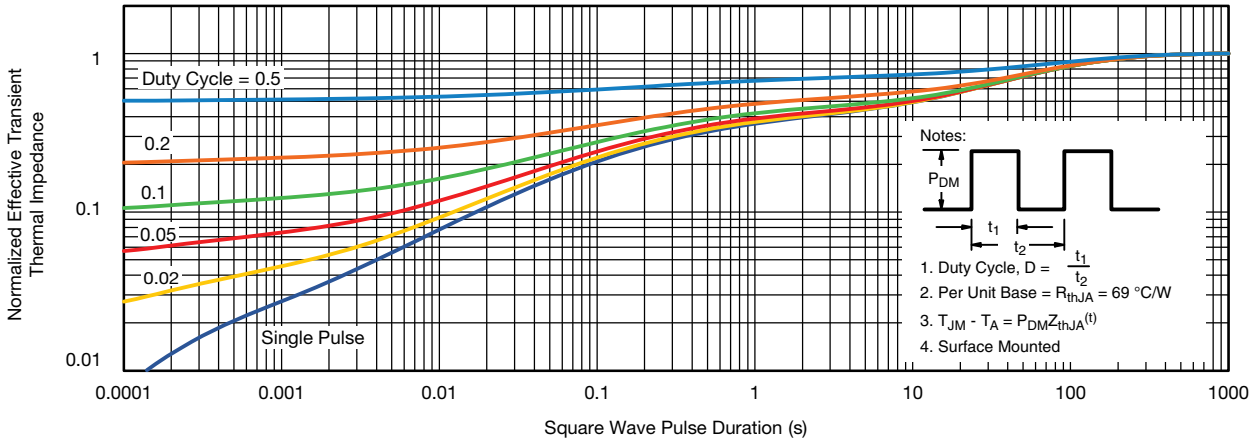

**Power, Junction-to-Ambient**

**Notes**

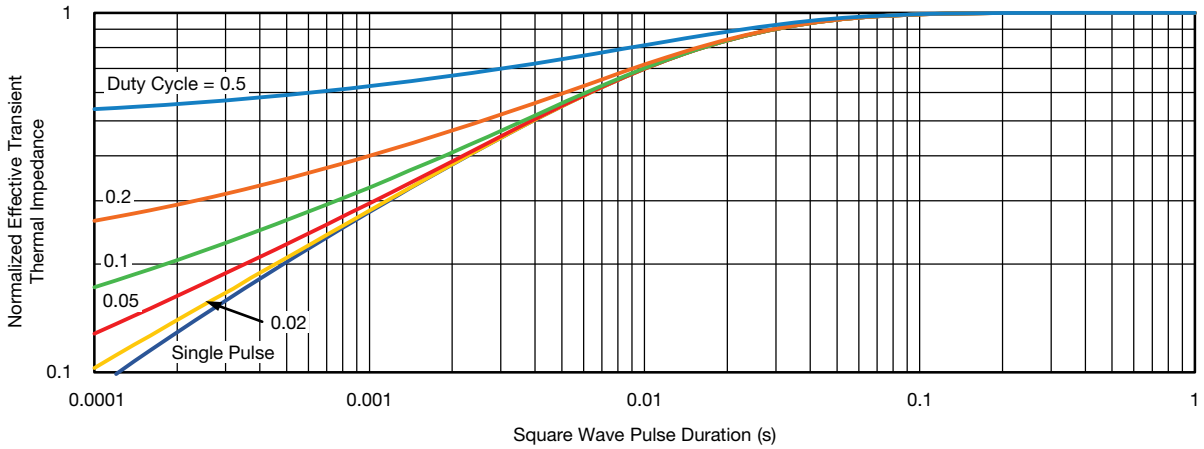
a. The power dissipation $P_D$ is based on $T_J$ max. = 150 °C, using junction-to-ambient thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit

b. $V_{GS}$ > minimum $V_{GS}$ at which $R_{DS(on)}$ is specified

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



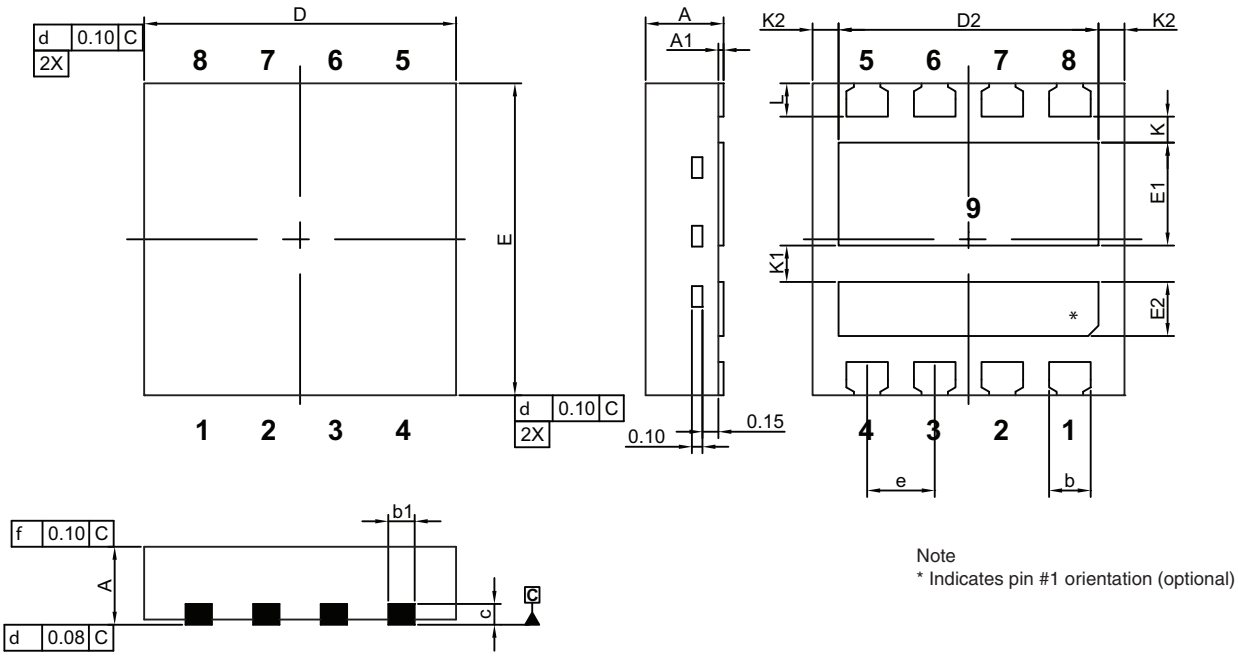

**Normalized Thermal Transient Impedance, Junction-to-Ambient**




**Normalized Thermal Transient Impedance, Junction-to-Case**

*Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg?76711.*

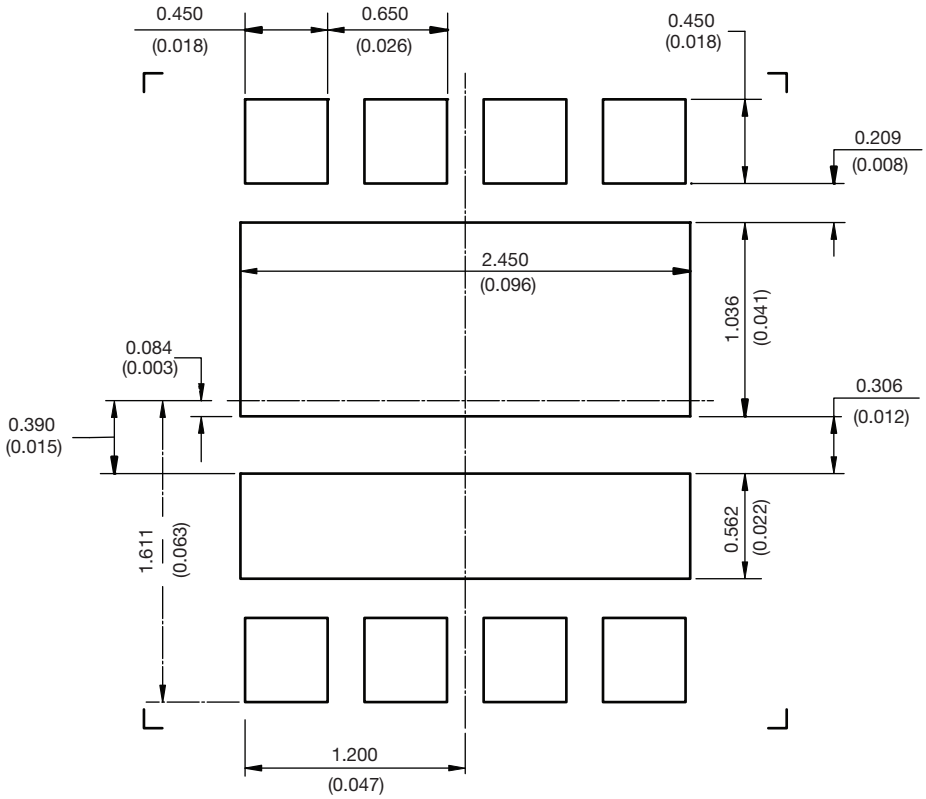
# PowerPAIR® 3 x 3 Case Outline




Note
* Indicates pin #1 orientation (optional)

| DIM. | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.70 | 0.75 | 0.80 | 0.028 | 0.030 | 0.031 |
| A1 | 0.00 | | 0.05 | 0.000 | | 0.002 |
| b | 0.35 | 0.40 | 0.45 | 0.014 | 0.016 | 0.018 |
| b1 | 0.20 | 0.25 | 0.38 | 0.008 | 0.010 | 0.015 |
| C | 0.18 | 0.20 | 0.23 | 0.007 | 0.008 | 0.009 |
| D | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| D2 | 2.35 | 2.40 | 2.45 | 0.093 | 0.094 | 0.096 |
| E | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| E1 | 0.94 | 0.99 | 1.04 | 0.037 | 0.039 | 0.041 |
| E2 | 0.47 | 0.52 | 0.57 | 0.019 | 0.020 | 0.022 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| K | 0.25 typ. | | | 0.010 typ. | | |
| K1 | 0.35 typ. | | | 0.014 typ. | | |
| K2 | 0.30 typ. | | | 0.012 typ. | | |
| L | 0.27 | 0.32 | 0.37 | 0.011 | 0.013 | 0.015 |
| ECN: T12-0347-Rev. C, 18-Jun-12<br>DWG: 5998 | | | | | | |

## RECOMMENDED MINIMUM PAD FOR PowerPAIR® 3 x 3




Recommended PAD for PowerPAIR 3 x 3

Dimensions in millimeters (inches)

Keep-Out 3.5 mm x 3.5 mm for non terminating traces

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