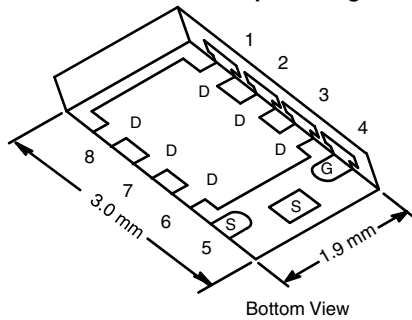


N-Channel 20 V (D-S) MOSFET

| PRODUCT SUMMARY | | | |
|---------------------|-----------------------------------|---------------------------------|-----------------------|
| V _{DS} (V) | R _{DS(on)} (Ω) Max. | I _D (A) ^a | Q _g (Typ.) |
| 20 | 0.0100 at V _{GS} = 4.5 V | 25 | 16.6 nC |
| | 0.0115 at V _{GS} = 2.5 V | 25 | |
| | 0.0135 at V _{GS} = 1.8 V | 25 | |

PowerPAK ChipFET Single



Ordering Information:
Si5442DU-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

- TrenchFET[®] Power MOSFET
- Thermally Enhanced PowerPAK[®] ChipFET[®] Package
 - Small Footprint Area
 - Low On-Resistance
 - Thin 0.8 mm Profile
- 100% R_g Tested
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

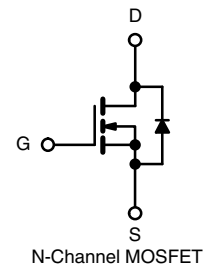
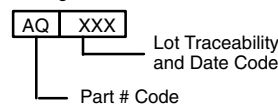


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch, PA Switch, and for Portable Applications
- Point-of-Load
- DC/DC Converters
- Power Management

Marking Code



| ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted) | | | | |
|---|-----------------------------------|------------------------|----------------------|---|
| Parameter | Symbol | Limit | Unit | |
| Drain-Source Voltage | V _{DS} | 20 | V | |
| Gate-Source Voltage | V _{GS} | ± 8 | | |
| Continuous Drain Current (T _J = 150 °C) | I _D | T _C = 25 °C | 25 ^a | A |
| | | T _C = 70 °C | 25 ^a | |
| | | T _A = 25 °C | 12.4 ^{b, c} | |
| | | T _A = 70 °C | 9.9 ^{b, c} | |
| Pulsed Drain Current (t = 300 μs) | I _{DM} | 60 | | |
| Continuous Source-Drain Diode Current | I _S | T _C = 25 °C | 25 ^a | |
| | | T _A = 25 °C | 2.6 ^{b, c} | |
| Maximum Power Dissipation | P _D | T _C = 25 °C | 31 | W |
| | | T _C = 70 °C | 20 | |
| | | T _A = 25 °C | 3.1 ^{b, c} | |
| | | T _A = 70 °C | 2 ^{b, c} | |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | - 55 to 150 | °C | |
| Soldering Recommendations (Peak Temperature) ^{d, e} | | 260 | | |

| THERMAL RESISTANCE RATINGS | | | | | |
|---|--------------|-------------------|---------|---------|------|
| Parameter | | Symbol | Typical | Maximum | Unit |
| Maximum Junction-to-Ambient ^{b, f} | t ≤ 5 s | R _{thJA} | 34 | 40 | °C/W |
| Maximum Junction-to-Case (Drain) | Steady State | R _{thJC} | 3 | 4 | |

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- See solder profile (www.vishay.com/doc?73257). The PowerPAK ChipFET 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.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is 90 °C/W.

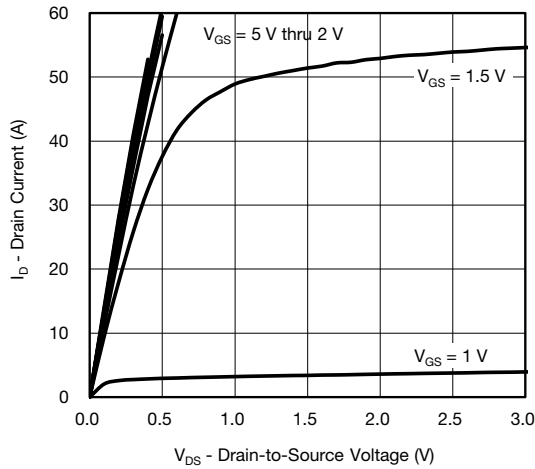
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | |
|---|-------------------------|--|--|--------|-----------|----------------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$ | 20 | | | V |
| V_{DS} Temperature Coefficient | $\Delta V_{DS}/T_J$ | $I_D = 250\text{ }\mu\text{A}$ | | 21 | | mV/ $^\circ\text{C}$ |
| $V_{GS(th)}$ Temperature Coefficient | $\Delta V_{GS(th)}/T_J$ | | | -3 | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$ | 0.4 | | 0.9 | V |
| Gate-Source Leakage | I_{GSS} | $V_{DS} = 0\text{ V}$, $V_{GS} = \pm 8\text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$ | | | 1 | μA |
| | | $V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^\circ\text{C}$ | | | 10 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 5\text{ V}$, $V_{GS} = 4.5\text{ V}$ | 20 | | | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 4.5\text{ V}$, $I_D = 8\text{ A}$ | | 0.0080 | 0.0100 | Ω |
| | | $V_{GS} = 2.5\text{ V}$, $I_D = 7\text{ A}$ | | 0.0090 | 0.0115 | |
| | | $V_{GS} = 1.8\text{ V}$, $I_D = 4\text{ A}$ | | 0.0100 | 0.0135 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 10\text{ V}$, $I_D = 8\text{ A}$ | | 65 | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$ | | 1700 | | μF |
| Output Capacitance | C_{oss} | | | 280 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 115 | | |
| Total Gate Charge | Q_g | $V_{DS} = 10\text{ V}$, $V_{GS} = 8\text{ V}$, $I_D = 15\text{ A}$ | | 29 | 45 | nC |
| | | | $V_{DS} = 10\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 15\text{ A}$ | | 16.6 | |
| Q_{gs} | | 1.9 | | | | |
| Q_{gd} | | 2 | | | | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | 0.28 | 1.4 | 2.8 | Ω |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD} = 10\text{ V}$, $R_L = 1\text{ }\Omega$ $I_D \cong 10\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$ | | 10 | 20 | ns |
| Rise Time | t_r | | | 15 | 30 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 35 | 70 | |
| Fall Time | t_f | | | 10 | 20 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 10\text{ V}$, $R_L = 1\text{ }\Omega$ $I_D \cong 10\text{ A}$, $V_{GEN} = 8\text{ V}$, $R_g = 1\text{ }\Omega$ | | 10 | 20 | |
| Rise Time | t_r | | | 10 | 20 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 30 | 60 | |
| Fall Time | t_f | | | 10 | 20 | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Continuous Source-Drain Diode Current | I_S | $T_C = 25\text{ }^\circ\text{C}$ | | | 25 | A |
| Pulse Diode Forward Current | I_{SM} | | | | 60 | |
| Body Diode Voltage | V_{SD} | $I_S = 10\text{ A}$, $V_{GS} = 0\text{ V}$ | | 0.8 | 1.2 | V |
| Body Diode Reverse Recovery Time | t_{rr} | $I_F = 10\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$ | | 20 | 40 | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | | | 10 | 20 | nC |
| Reverse Recovery Fall Time | t_a | | | 11 | | ns |
| Reverse Recovery Rise Time | t_b | | | 9 | | |

Notes:

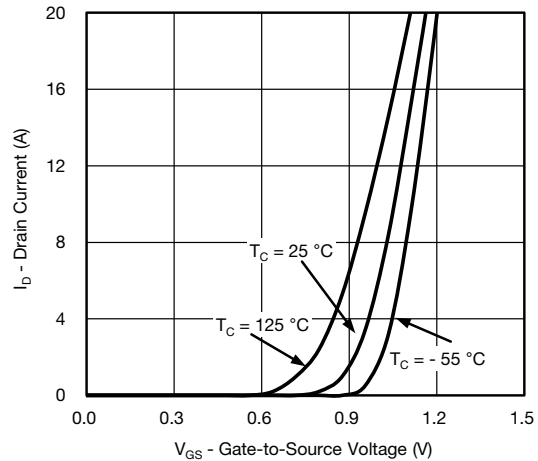
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
b. Guaranteed by design, not subject to production testing.

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.

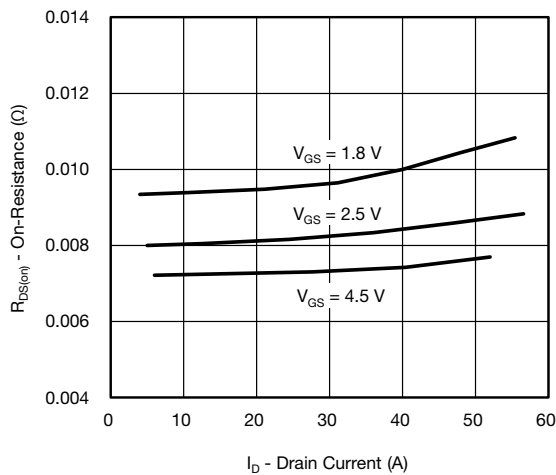
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



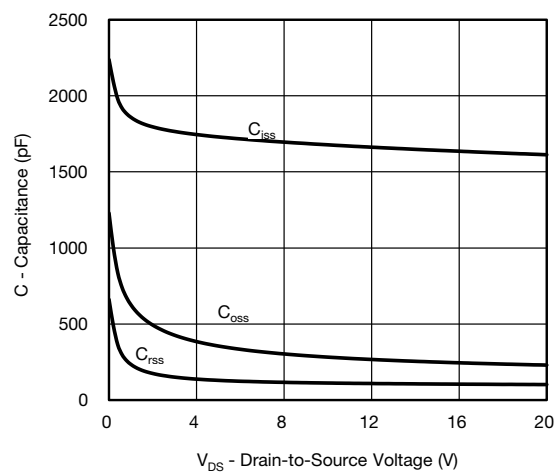
Output Characteristics



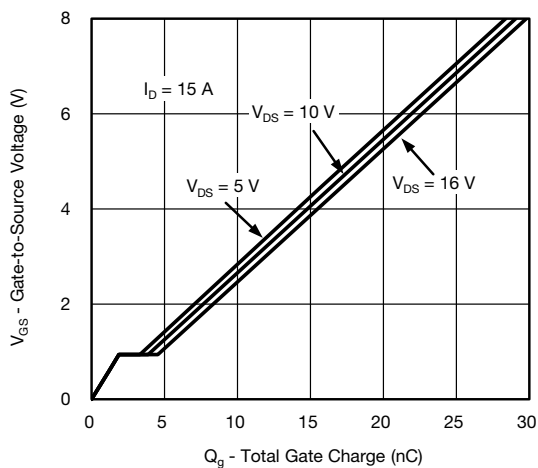
Transfer Characteristics



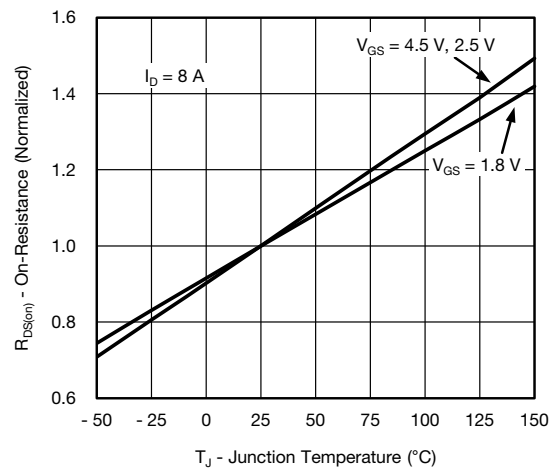
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

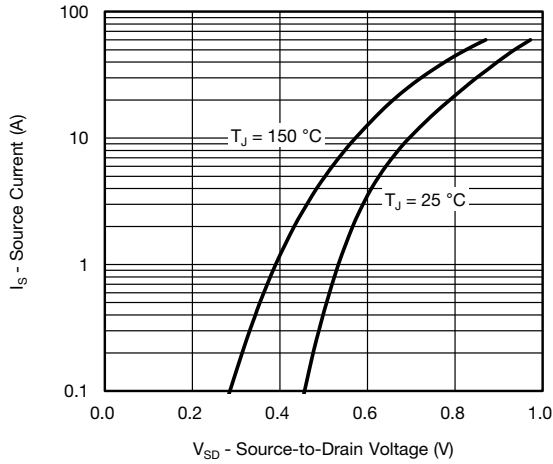


Gate Charge

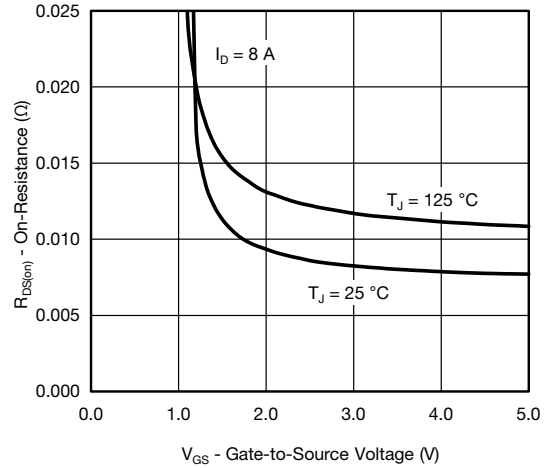


On-Resistance vs. Junction Temperature

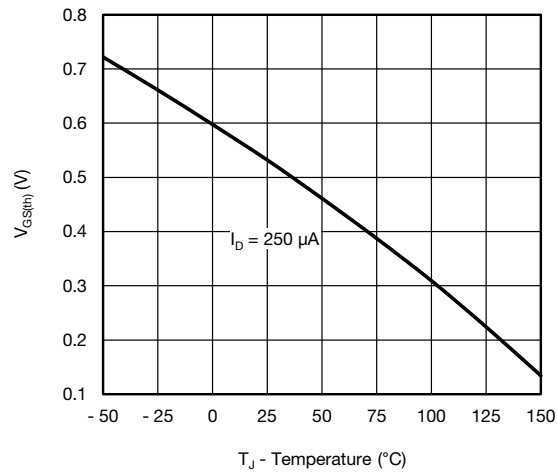
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



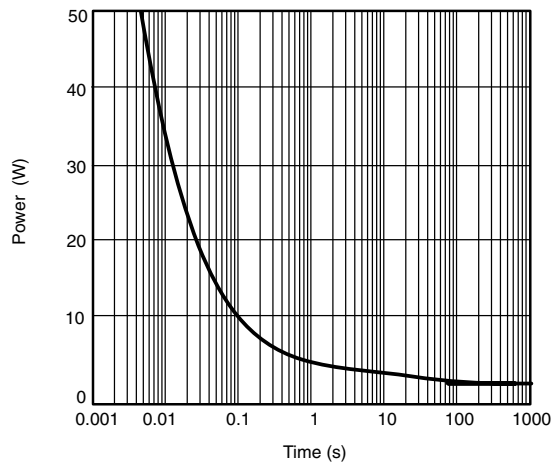
Source-Drain Diode Forward Voltage



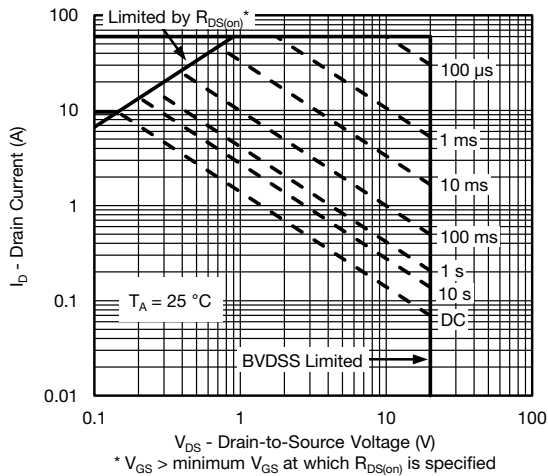
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

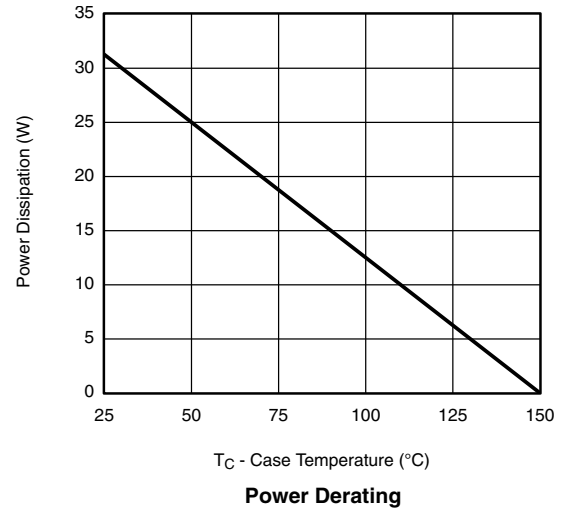
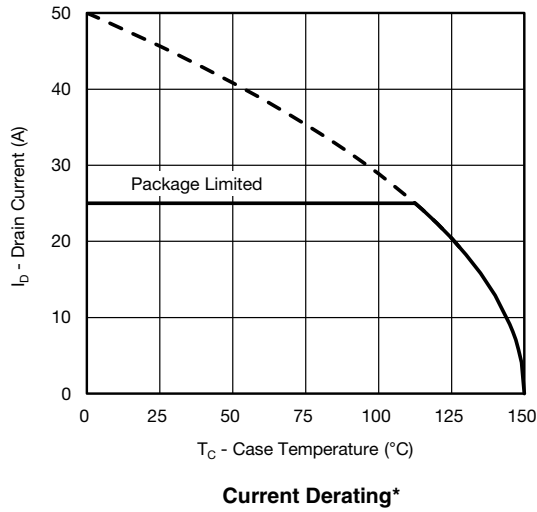


Single Pulse Power, Junction-to-Ambient



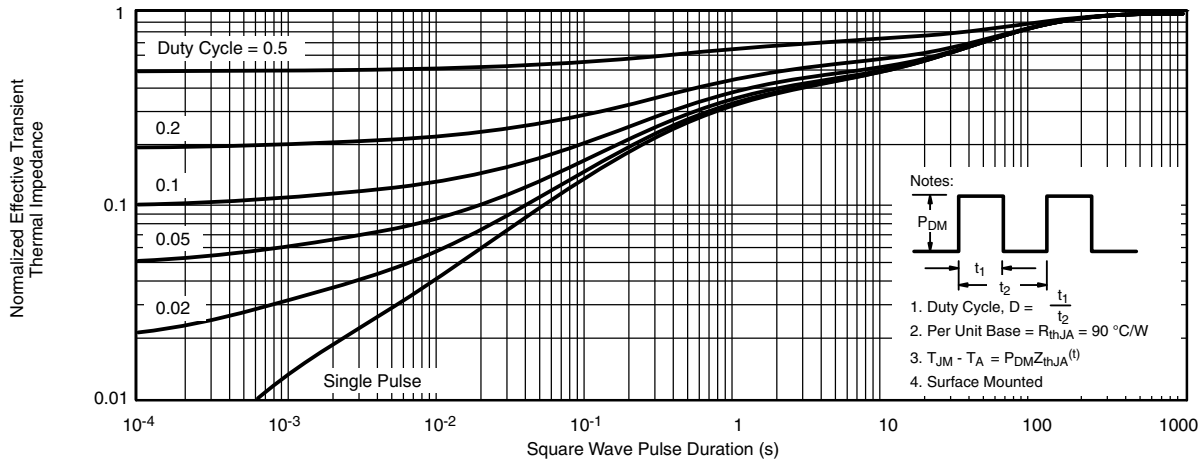
Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

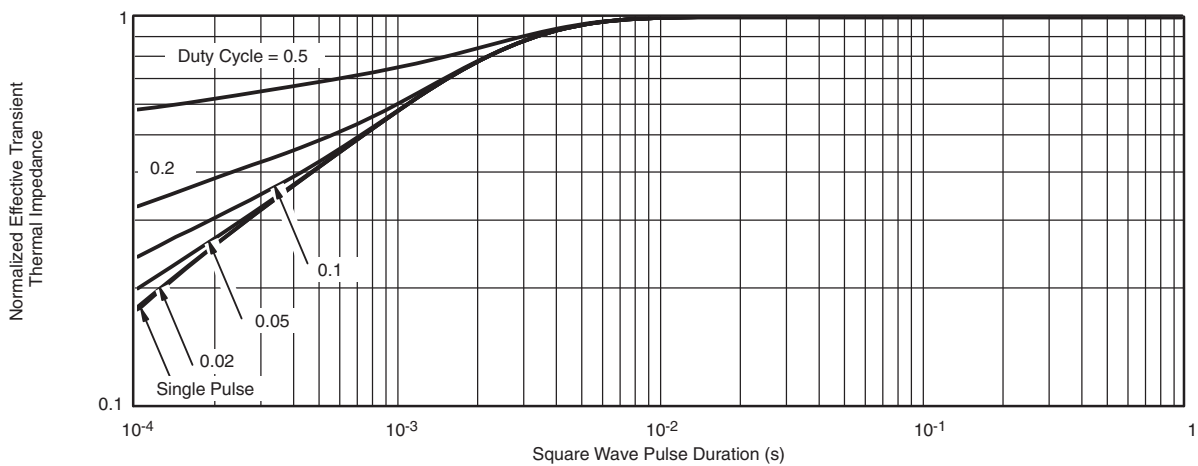


* The power dissipation P_D is based on T_{J(max.)} = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient

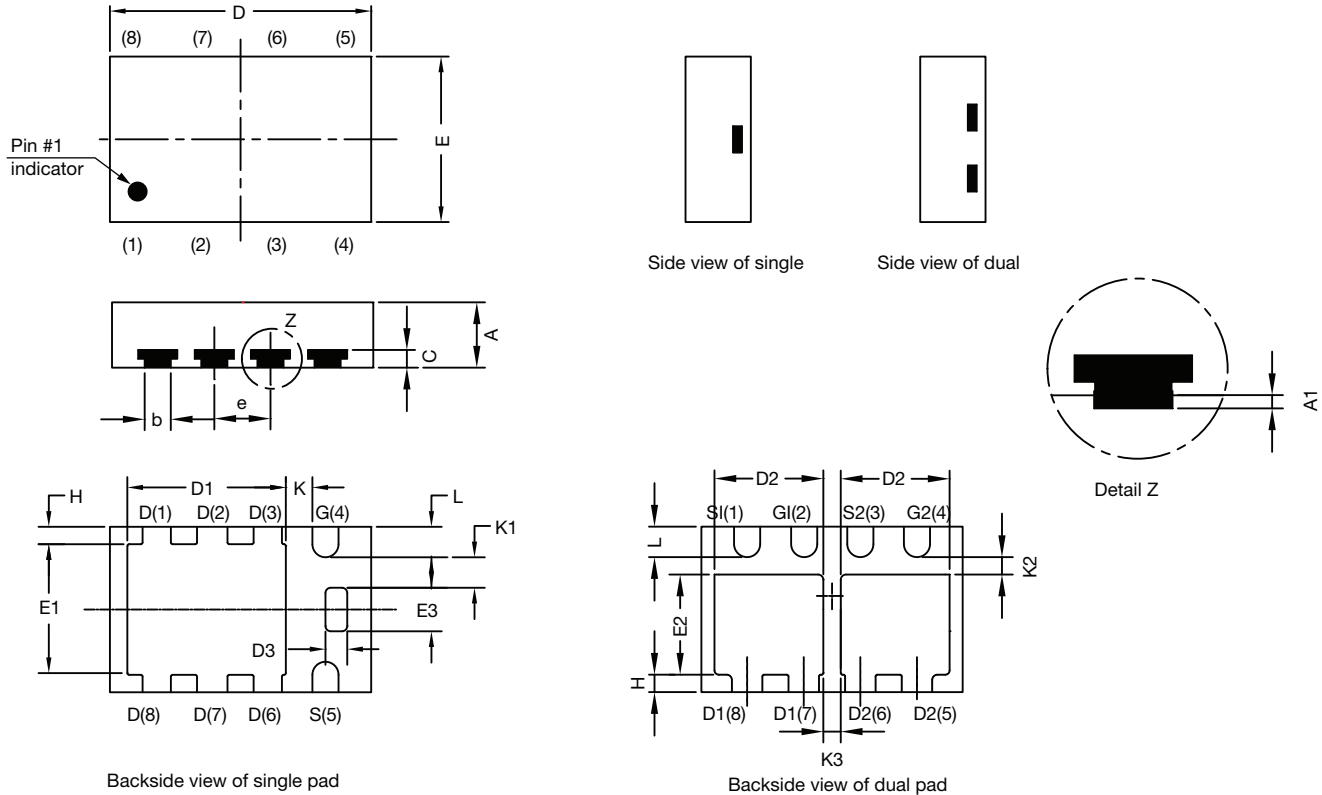


Normalized Thermal Transient Impedance, Junction-to-Case

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?63233.



PowerPAK® ChipFET® Case Outline



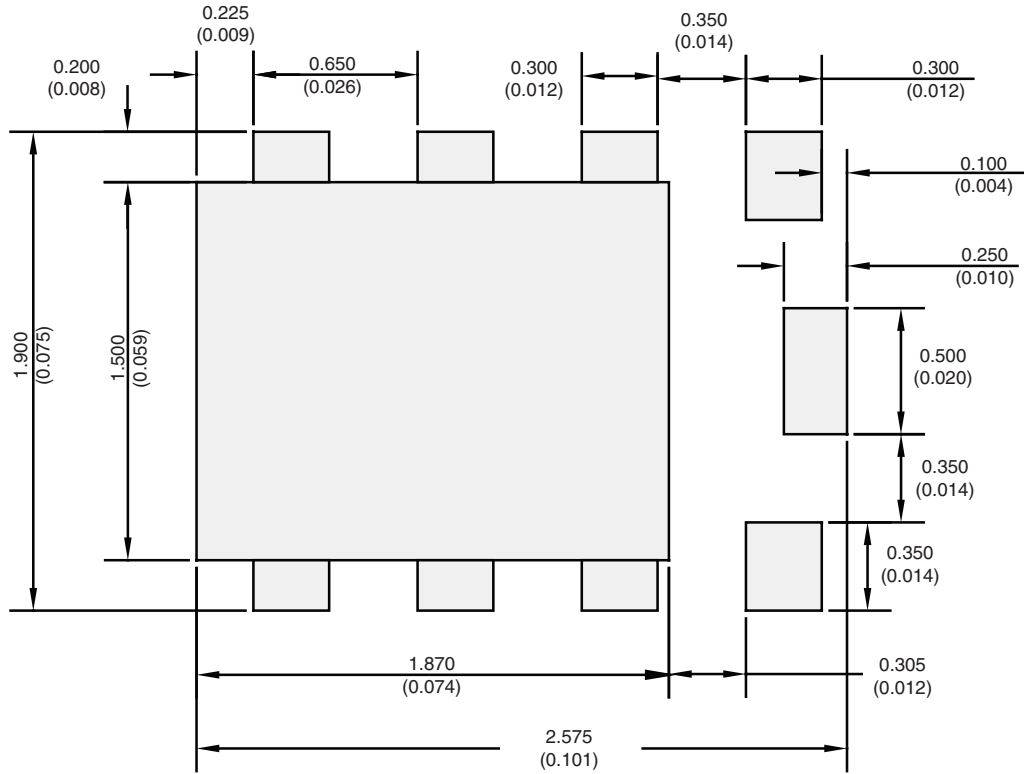
| DIM. | MILLIMETERS | | | INCHES | | |
|------|-------------|------|------|-----------|-------|-------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.70 | 0.75 | 0.85 | 0.028 | 0.030 | 0.033 |
| A1 | 0 | - | 0.05 | 0 | - | 0.002 |
| b | 0.25 | 0.30 | 0.35 | 0.010 | 0.012 | 0.014 |
| C | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| D | 2.92 | 3.00 | 3.08 | 0.115 | 0.118 | 0.121 |
| D1 | 1.75 | 1.87 | 2.00 | 0.069 | 0.074 | 0.079 |
| D2 | 1.07 | 1.20 | 1.32 | 0.042 | 0.047 | 0.052 |
| D3 | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |
| E | 1.82 | 1.90 | 1.98 | 0.072 | 0.075 | 0.078 |
| E1 | 1.38 | 1.50 | 1.63 | 0.054 | 0.059 | 0.064 |
| E2 | 0.92 | 1.05 | 1.17 | 0.036 | 0.041 | 0.046 |
| E3 | 0.45 | 0.50 | 0.55 | 0.018 | 0.020 | 0.022 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| H | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| K | 0.25 | - | - | 0.010 | - | - |
| K1 | 0.30 | - | - | 0.012 | - | - |
| K2 | 0.20 | - | - | 0.008 | - | - |
| K3 | 0.20 | - | - | 0.008 | - | - |
| L | 0.30 | 0.35 | 0.40 | 0.012 | 0.014 | 0.016 |

C14-0630-Rev. E, 21-Jul-14
DWG: 5940

Note

- Millimeters will govern

RECOMMENDED MINIMUM PADS FOR PowerPAK® ChipFET® Single



Recommended Minimum Pads
Dimensions in mm/(Inches)

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