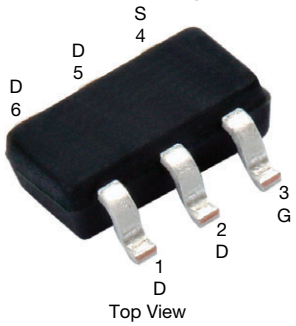
# Automotive P-Channel 60 V (D-S) 175 °C MOSFET

**TSOP-6 Single**




Top View

## FEATURES

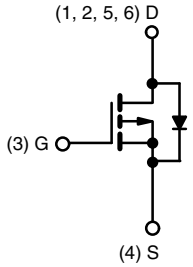
- TrenchFET® power MOSFET
- AEC-Q101 qualified [c]
- 100 % $R_g$ and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

HALOGEN FREE




P-Channel MOSFET

| PRODUCT SUMMARY | |
|---|---|
| $V_{DS}$ (V) | -60 |
| $R_{DS(on)}$ (Ω) at $V_{GS}$ = -10 V | 0.095 |
| $R_{DS(on)}$ (Ω) at $V_{GS}$ = -4.5 V | 0.135 |
| $I_D$ (A) | -5.3 |
| Configuration | Single |

**Marking Code**: 8R

| ORDERING INFORMATION | |
|---|---|
| Package | TSOP-6 |
| Lead (Pb)-free and halogen-free | SQ3427EV (for detailed order number please see www.vishay.com/doc?79771) |

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

| PARAMETER | | SYMBOL | LIMIT | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ± 20 | |
| Continuous Drain Current | $T_C$ = 25 °C | $I_D$ | -5.3 | A |
| | $T_C$ = 125 °C | | -3 | |
| Continuous Source Current (Diode Conduction) | | $I_S$ | -6.3 | |
| Pulsed Drain Current [a] | | $I_{DM}$ | -21 | |
| Single Pulse Avalanche Current | L = 0.1 mH | $I_{AS}$ | -21 | |
| Single Pulse Avalanche Energy | | $E_{AS}$ | 22 | mJ |
| Maximum Power Dissipation [a] | $T_C$ = 25 °C | $P_D$ | 5 | W |
| | $T_C$ = 125 °C | | 1.6 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 to +175 | °C |

**THERMAL RESISTANCE RATINGS**

| PARAMETER | | SYMBOL | LIMIT | UNIT |
|---|---|---|---|---|
| Junction-to-Ambient | PCB Mount [b] | $R_{thJA}$ | 110 | °C/W |
| Junction-to-Foot (Drain) | | $R_{thJF}$ | 30 | |

**Notes**

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. When mounted on 1" square PCB (FR4 material).
c. Parametric verification ongoing.

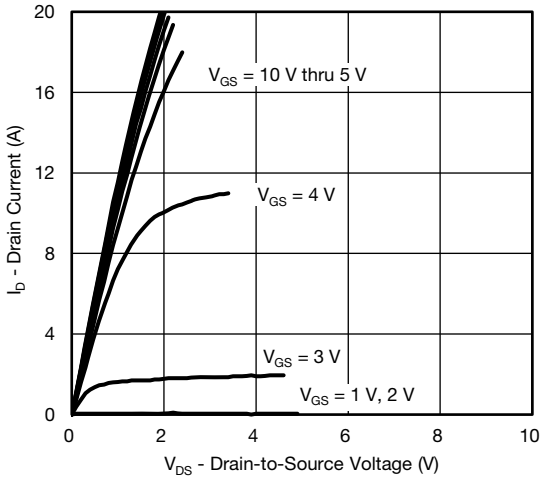
| **SPECIFICATIONS** ($T_C$ = 25 °C, unless otherwise noted) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **Static** | | | | | | | |
| Drain-Source Breakdown Voltage | $V_{DS}$ | $V_{GS}$ = 0, $I_D$ = -250 µA | | -60 | - | - | V |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = -250 µA | | -1.5 | -2 | -2.5 | |
| Gate-Source Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 20 V | | - | | ± 100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = -60 V | - | - | -1 | µA |
| | | $V_{GS}$ = 0 V | $V_{DS}$ = -60 V, $T_J$ = 125 °C | - | - | -50 | |
| | | $V_{GS}$ = 0 V | $V_{DS}$ = -60 V, $T_J$ = 175 °C | - | - | -150 | |
| On-State Drain Current [a] | $I_{D(on)}$ | $V_{GS}$ = -10 V | $V_{DS}$ ≤ -5 V | -10 | - | - | A |
| Drain-Source On-State Resistance [a] | $R_{DS(on)}$ | $V_{GS}$ = -10 V | $I_D$ = -4.5 A | - | 0.079 | 0.095 | Ω |
| | | $V_{GS}$ = -10 V | $I_D$ = -4.5 A, $T_J$ = 125 °C | - | - | 0.148 | |
| | | $V_{GS}$ = -10 V | $I_D$ = -4.5 A, $T_J$ = 175 °C | - | - | 0.178 | |
| | | $V_{GS}$ = -4.5 V | $I_D$ = -3.5 A | - | 0.112 | 0.135 | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = -15 V, $I_D$ = -4 A | | - | 9 | - | S |
| **Dynamic [b]** | | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0 V | $V_{DS}$ = -30 V, f = 1 MHz | - | 700 | 1000 | pF |
| Output Capacitance | $C_{oss}$ | | | - | 90 | 120 | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | - | 50 | 80 | |
| Total Gate Charge [c] | $Q_g$ | $V_{GS}$ = -10 V | $V_{DS}$ = -30 V, $I_D$ = -5 A | - | 15.3 | 22 | nC |
| Gate-Source Charge [c] | $Q_{gs}$ | | | - | 2.5 | - | |
| Gate-Drain Charge [c] | $Q_{gd}$ | | | - | 5.4 | - | |
| Gate Resistance | $R_g$ | f = 1 MHz | | 2.5 | 5 | 7.5 | Ω |
| Turn-On Delay Time [c] | $t_{d(on)}$ | $V_{DD}$ = -30 V, $R_L$ = 6 Ω<br>$I_D$ ≅ -5 A, $V_{GEN}$ = -10 V, $R_g$ = 1 Ω | | - | 8 | 12 | ns |
| Rise Time [c] | $t_r$ | | | - | 24 | 35 | |
| Turn-Off Delay Time [c] | $t_{d(off)}$ | | | - | 25 | 38 | |
| Fall Time [c] | $t_f$ | | | - | 33 | 50 | |
| **Source-Drain Diode Ratings and Characteristics [b]** | | | | | | | |
| Pulsed Current [a] | $I_{SM}$ | | | - | - | -21 | A |
| Forward Voltage | $V_{SD}$ | $I_F$ = -1.6 A, $V_{GS}$ = 0 V | | - | -0.8 | -1.2 | V |

**Notes**

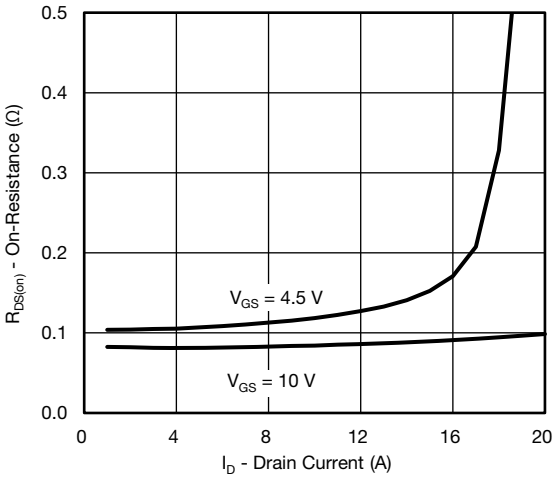
d. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
e. Guaranteed by design, not subject to production testing.
f. Independent of operating temperature.

*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.*

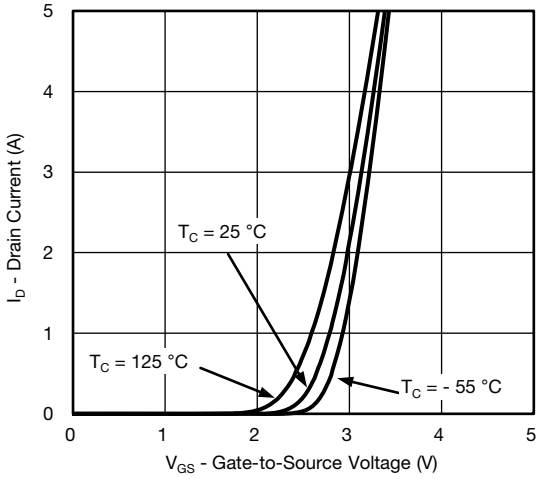
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



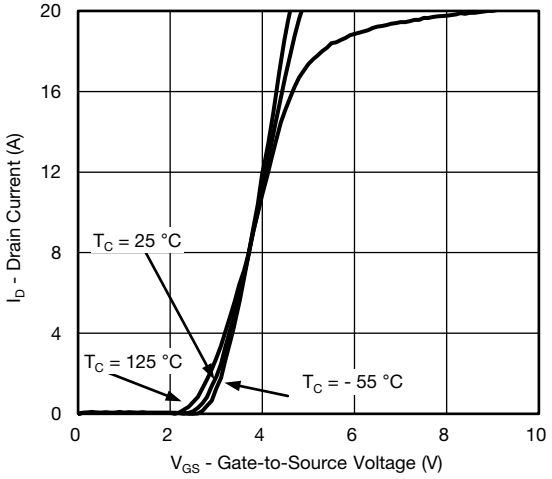

**Output Characteristics**



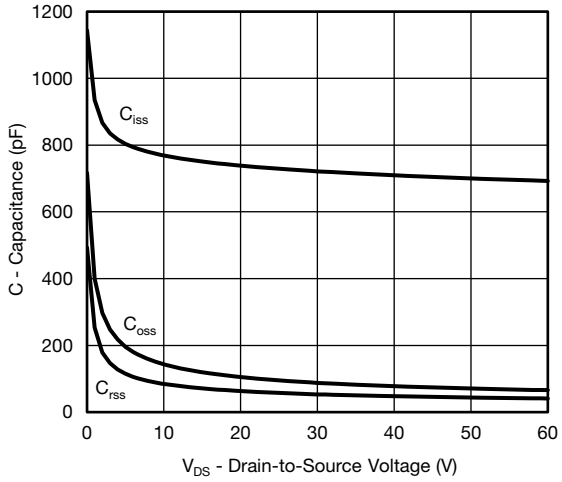

**On-Resistance vs. Drain Current and Gate Voltage**



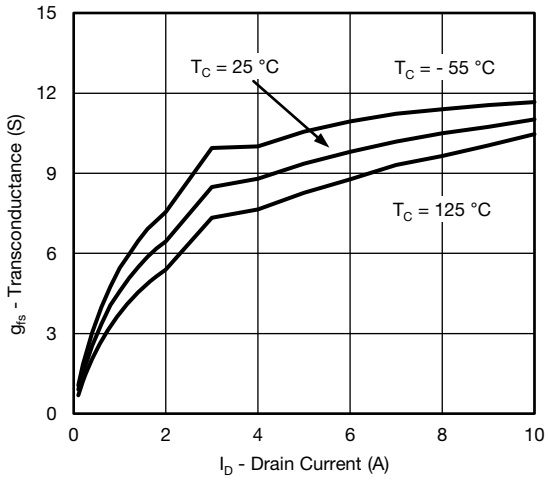

**Transfer Characteristics**




**Transfer Characteristics**

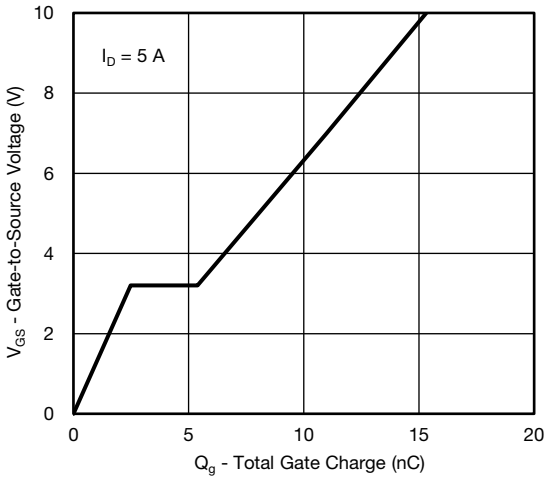



**Capacitance**

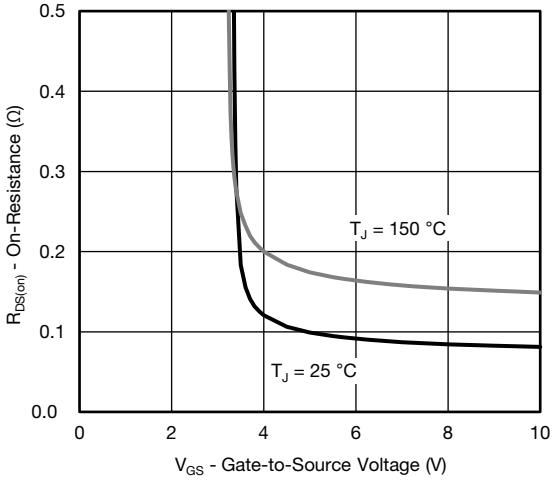



**Transconductance**

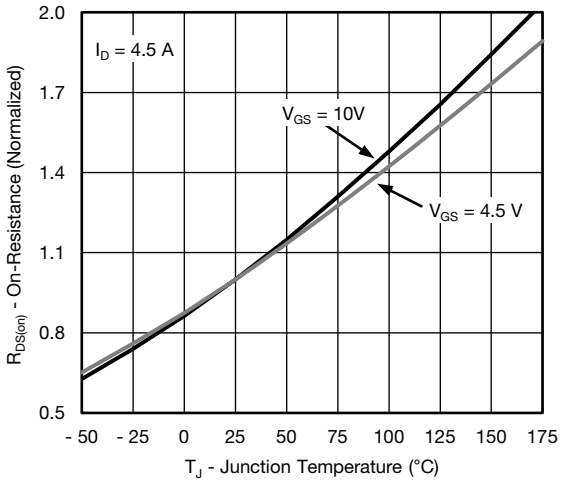
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



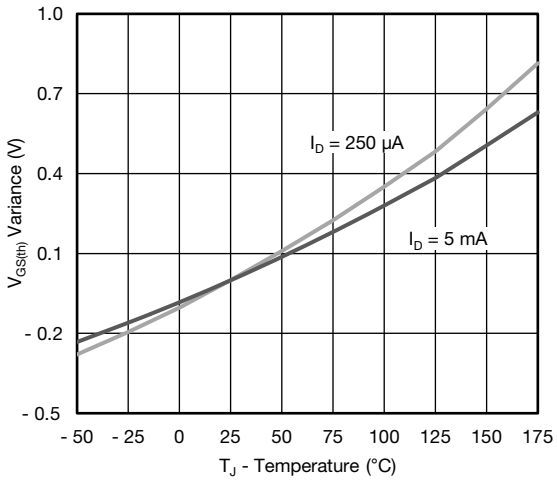

**Gate Charge**



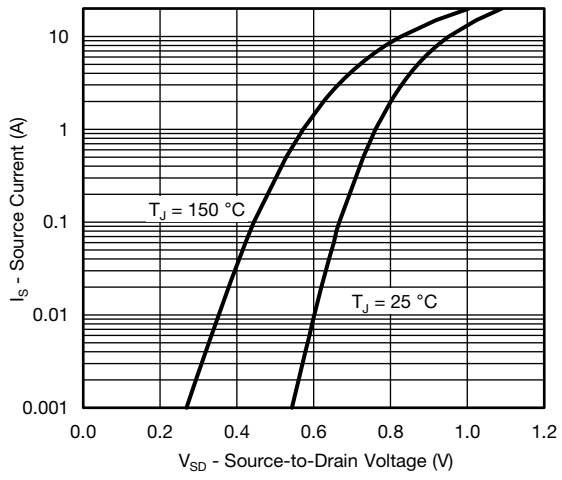

**On-Resistance vs. Gate-to-Source Voltage**



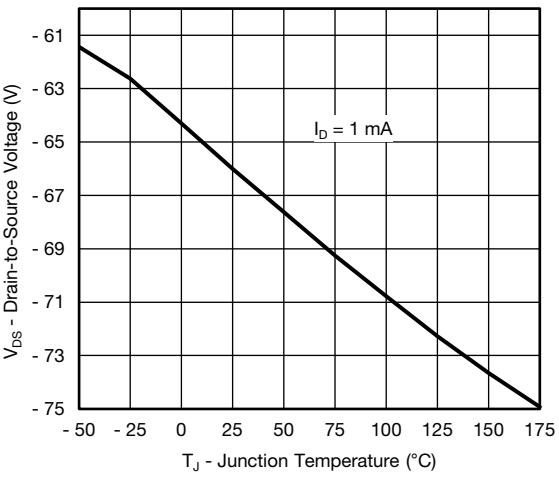

**On-Resistance vs. Junction Temperature**




**Threshold Voltage**

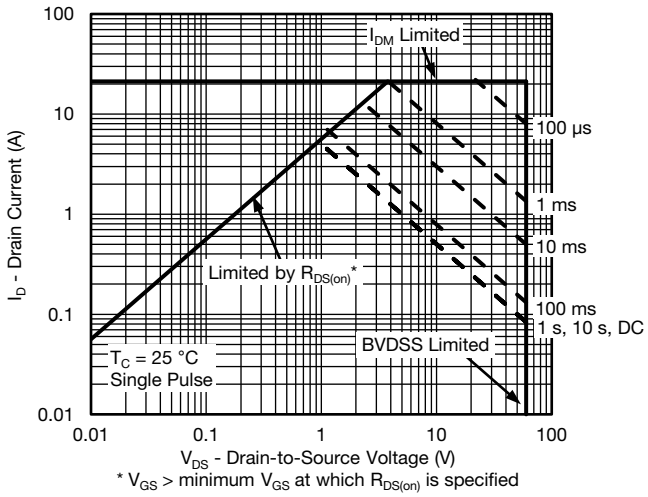



**Source-Drain Diode Forward Voltage**

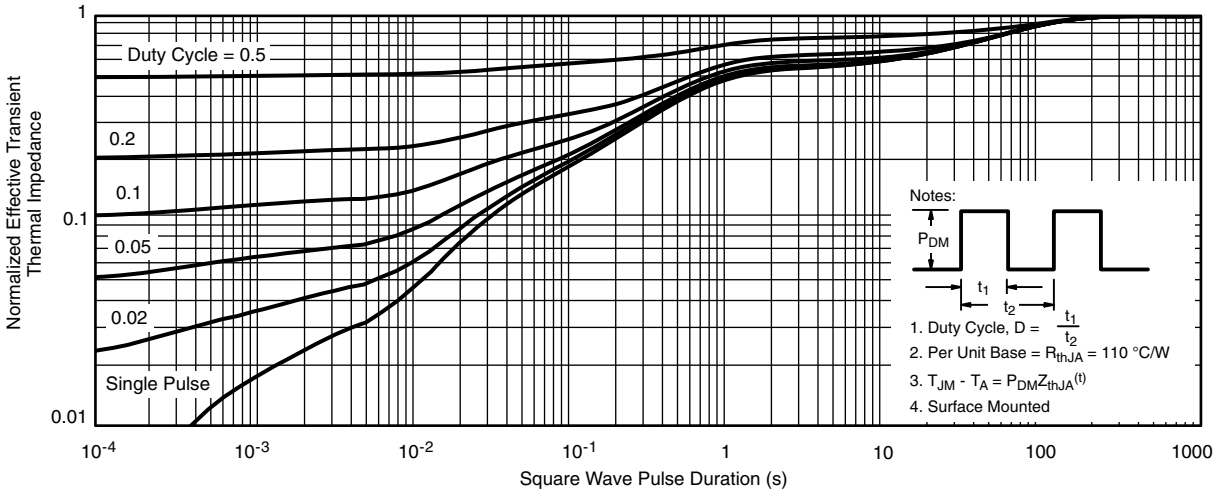



**Drain-to-Source Voltage vs. Junction Temperature**

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

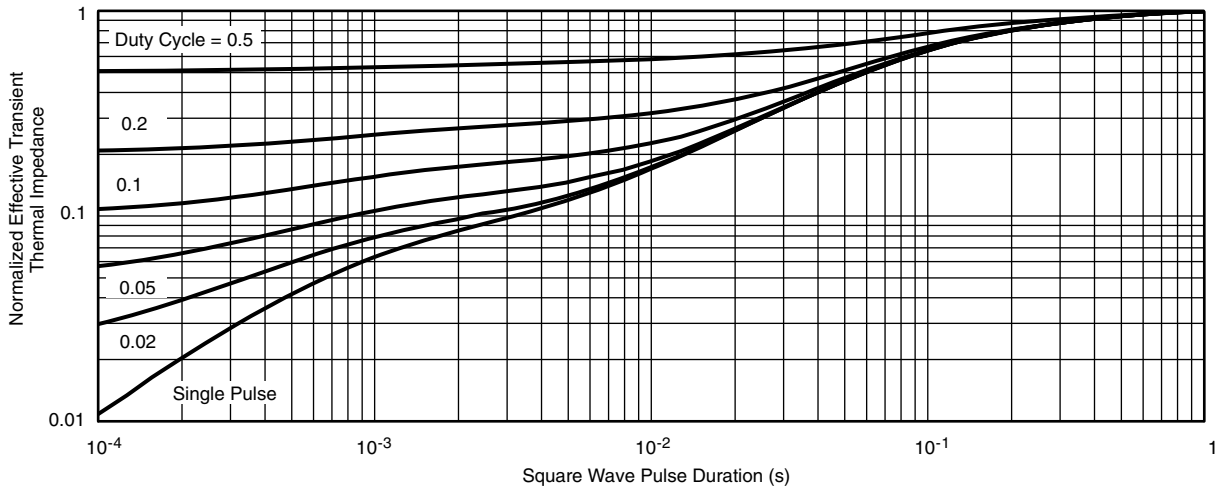



**Safe Operating Area, Junction-to-Ambient**




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

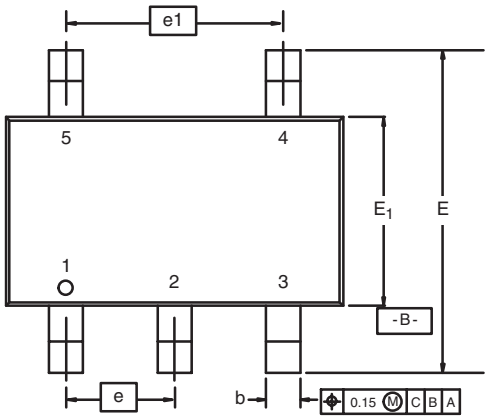
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



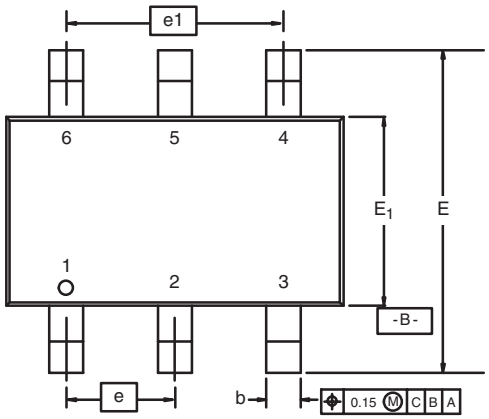

**Normalized Thermal Transient Impedance, Junction-to-Foot**

*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?67987.*

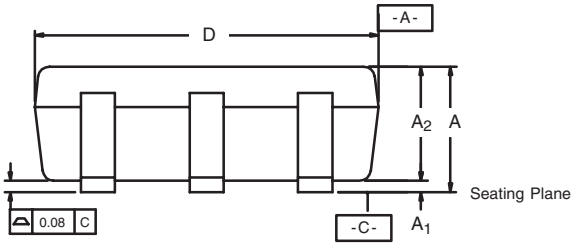
**TSOP: 5/6–LEAD**
**JEDEC Part Number: MO-193C**

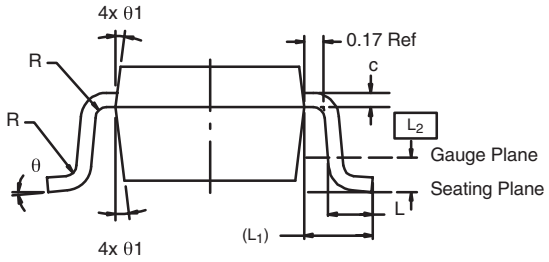



**5-LEAD TSOP**



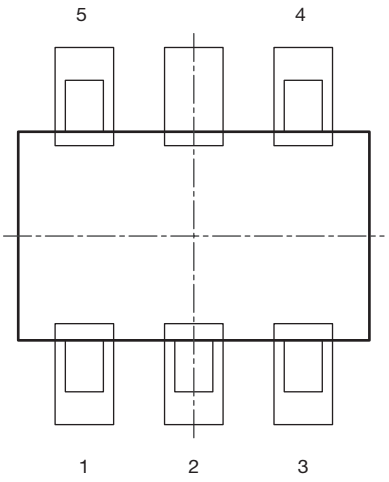

**6-LEAD TSOP**



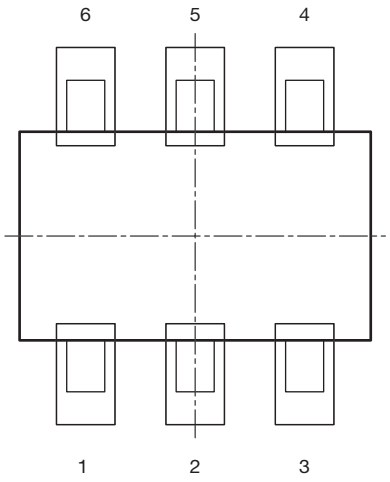




| Dim | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| | Min | Nom | Max | Min | Nom | Max |
| **A** | 0.91 | - | 1.10 | 0.036 | - | 0.043 |
| **$A_1$** | 0.01 | - | 0.10 | 0.0004 | - | 0.004 |
| **$A_2$** | 0.90 | - | 1.00 | 0.035 | 0.038 | 0.039 |
| **b** | 0.30 | 0.32 | 0.45 | 0.012 | 0.013 | 0.018 |
| **c** | 0.10 | 0.15 | 0.20 | 0.004 | 0.006 | 0.008 |
| **D** | 2.95 | 3.05 | 3.10 | 0.116 | 0.120 | 0.122 |
| **E** | 2.70 | 2.85 | 2.98 | 0.106 | 0.112 | 0.117 |
| **$E_1$** | 1.55 | 1.65 | 1.70 | 0.061 | 0.065 | 0.067 |
| **e** | 0.95 BSC | | | 0.0374 BSC | | |
| **$e_1$** | 1.80 | 1.90 | 2.00 | 0.071 | 0.075 | 0.079 |
| **L** | 0.32 | - | 0.50 | 0.012 | - | 0.020 |
| **$L_1$** | 0.60 Ref | | | 0.024 Ref | | |
| **$L_2$** | 0.25 BSC | | | 0.010 BSC | | |
| **R** | 0.10 | - | - | 0.004 | - | - |
| θ | 0° | 4° | 8° | 0° | 4° | 8° |
| $\theta_1$ | 7° Nom | | | 7° Nom | | |
| ECN: C-06593-Rev. I, 18-Dec-06<br>DWG: 5540 | | | | | | |

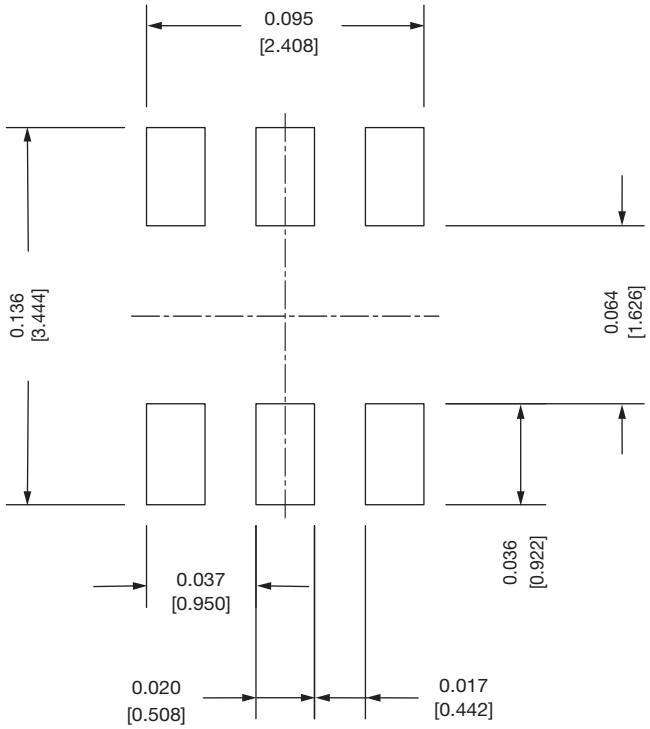
# Recommended Land Pattern For TSOP-5L / TSOP-6L




TSOP 5L




TSOP 6L




**Note**

- All dimensions are in inches (millimeter)

| |
|---|
| ECN: C22-0860-Rev. B, 24-Oct-2022<br>DWG: 3010 |

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