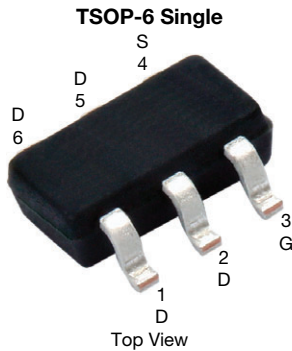


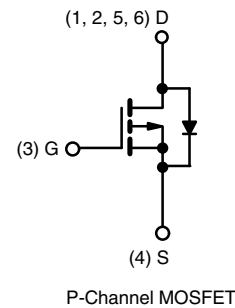
## Automotive P-Channel 60 V (D-S) 175 °C MOSFET



### FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified °
- 100 % R<sub>g</sub> and UIS tested
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE

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


| PRODUCT SUMMARY                                     |        |
|---|--------|
| V <sub>DS</sub> (V)                                 | -60    |
| R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -10 V  | 0.095  |
| R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -4.5 V | 0.135  |
| I <sub>D</sub> (A)                                  | -5.3   |
| Configuration                                       | Single |

Marking Code: 8R

| ORDERING INFORMATION            |  |
|---------------------------------|--|
| Package                         | TSOP-6   |
| Lead (Pb)-free and halogen-free | SQ3427EV<br>(for detailed order number please see <a href="http://www.vishay.com/doc?79771">www.vishay.com/doc?79771</a> ) |

| ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted) |                         |                                   |             |      |
|---|-------------------------|-----------------------------------|-------------|------|
| PARAMETER   |                         | SYMBOL                            | LIMIT       | UNIT |
| Drain-Source Voltage  |                         | V <sub>DS</sub>                   | -60         | V    |
| Gate-Source Voltage   |                         | V <sub>GS</sub>                   | ± 20        |      |
| Continuous Drain Current  | T <sub>C</sub> = 25 °C  | I <sub>D</sub>                    | -5.3        | A    |
|   | T <sub>C</sub> = 125 °C |                                   | -3          |      |
| Continuous Source Current (Diode Conduction)                              |                         | I <sub>S</sub>                    | -6.3        |      |
| Pulsed Drain Current <sup>a</sup>   |                         | I <sub>DM</sub>                   | -21         |      |
| Single Pulse Avalanche Current  | L = 0.1 mH              | I <sub>AS</sub>                   | -21         |      |
| Single Pulse Avalanche Energy   |                         | E <sub>AS</sub>                   | 22          |      |
| Maximum Power Dissipation <sup>a</sup>                                    | T <sub>C</sub> = 25 °C  | P <sub>D</sub>                    | 5           | W    |
|   | T <sub>C</sub> = 125 °C |                                   | 1.6         |      |
| Operating Junction and Storage Temperature Range                          |                         | T <sub>J</sub> , T <sub>stg</sub> | -55 to +175 | °C   |

| THERMAL RESISTANCE RATINGS |                        |                   |       |      |
|----------------------------|------------------------|-------------------|-------|------|
| PARAMETER                  |                        | SYMBOL            | LIMIT | UNIT |
| Junction-to-Ambient        | PCB Mount <sup>b</sup> | R <sub>thJA</sub> | 110   | °C/W |
| Junction-to-Foot (Drain)   |                        | R <sub>thJF</sub> | 30    |      |

### Notes

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



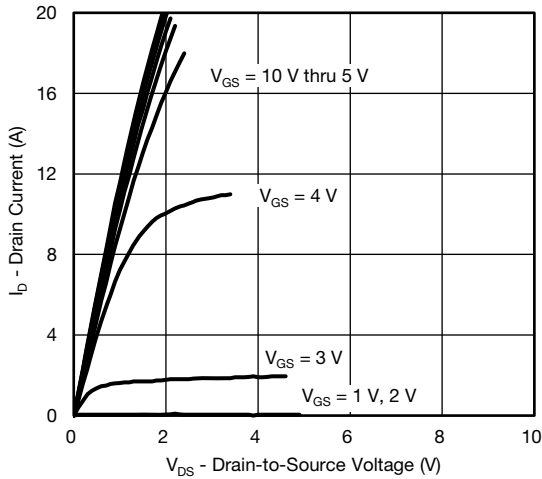
| SPECIFICATIONS ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted) |              |  |  |      |       |           |               |
|---|--------------|--|--|------|-------|-----------|---------------|
| PARAMETER   | SYMBOL       | TEST CONDITIONS  |  | MIN. | TYP.  | MAX.      | UNIT  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

**Notes**

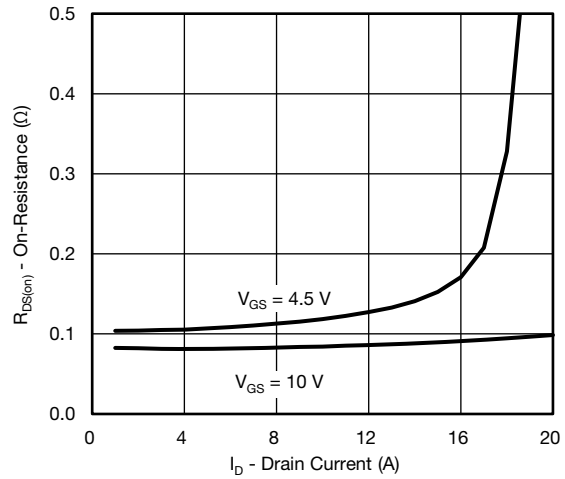
- d. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
e. Guaranteed by design, not subject to production testing.  
f. Independent of operating temperature.

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.

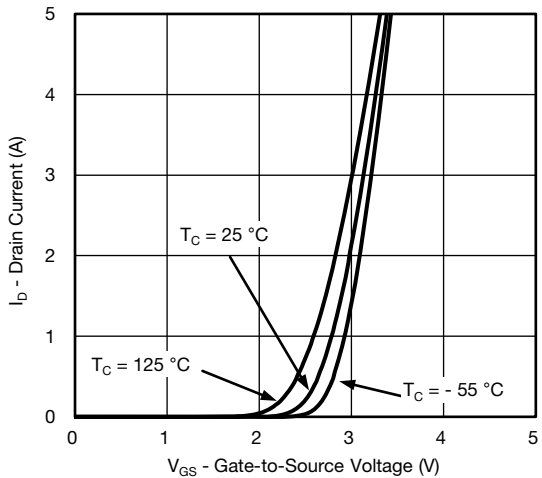
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



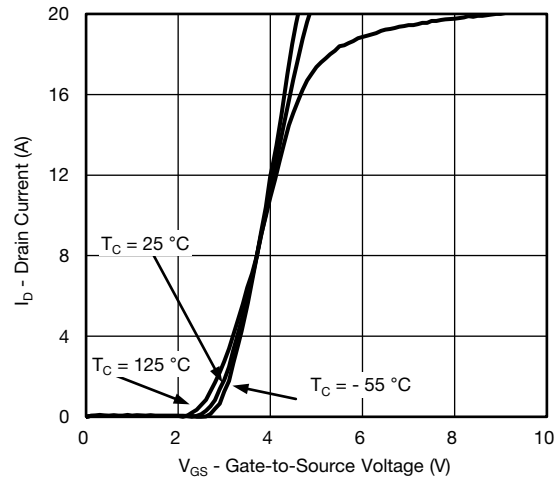
**Output Characteristics**



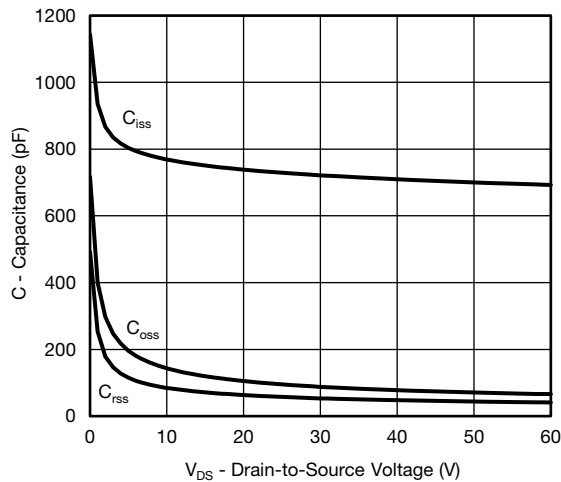
**On-Resistance vs. Drain Current and Gate Voltage**



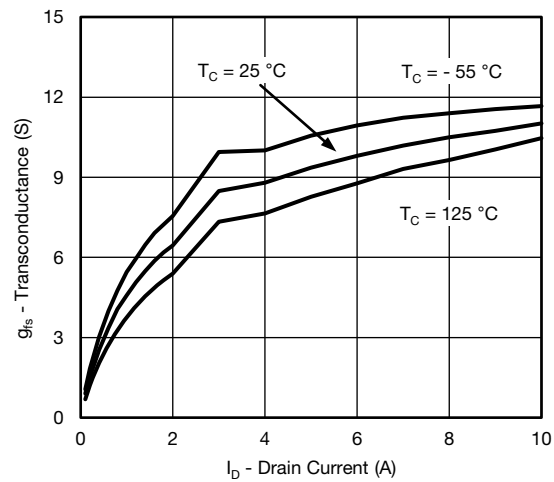
**Transfer Characteristics**



**Transfer Characteristics**

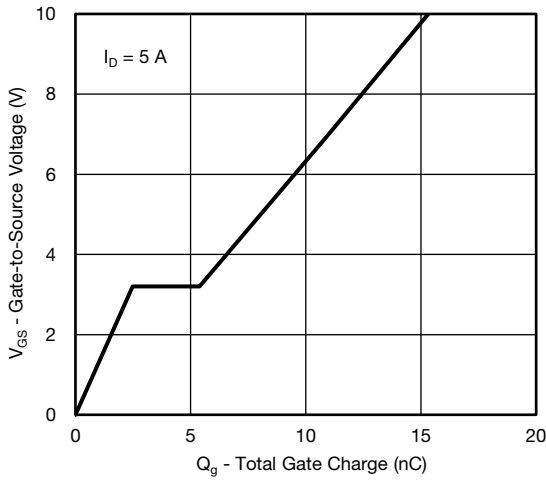


**Capacitance**

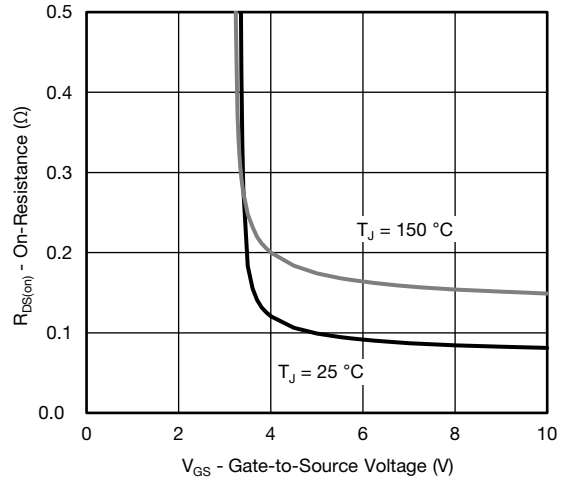


**Transconductance**

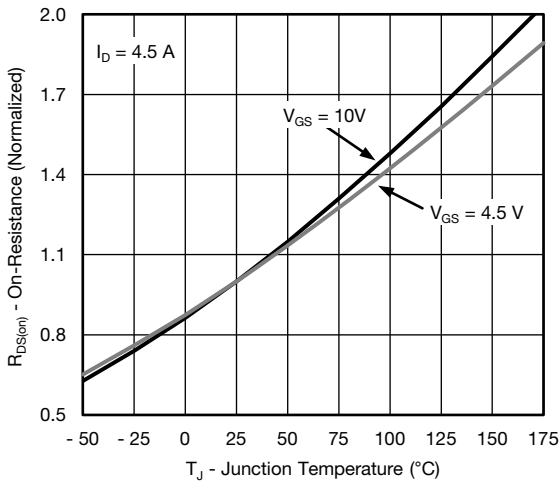
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



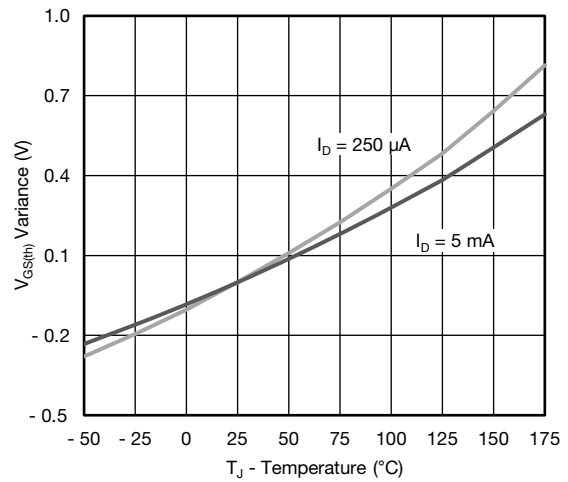
**Gate Charge**



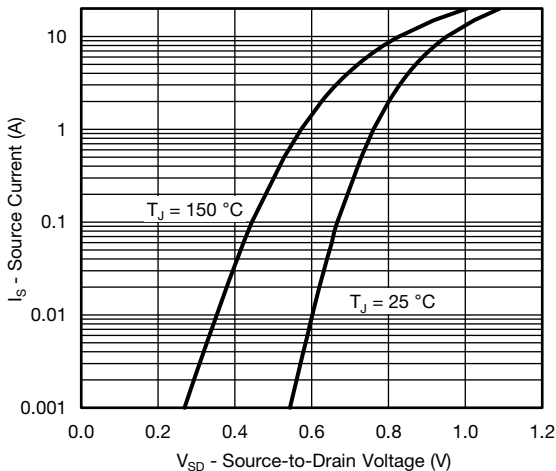
**On-Resistance vs. Gate-to-Source Voltage**



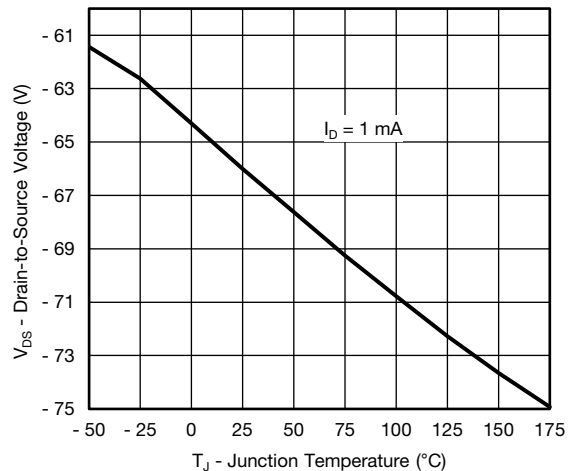
**On-Resistance vs. Junction Temperature**



**Threshold Voltage**



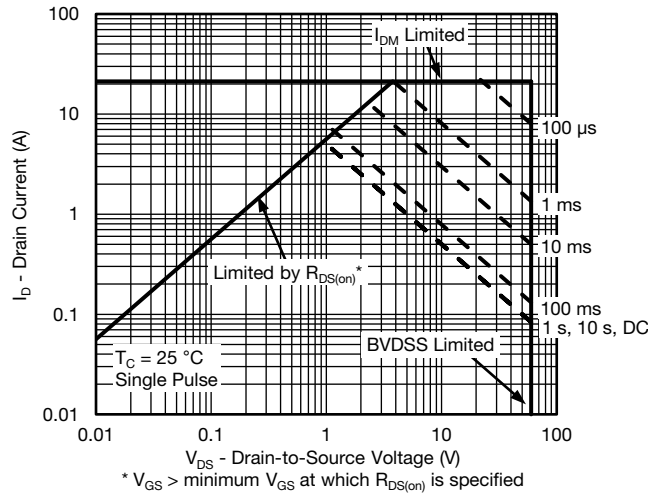
**Source-Drain Diode Forward Voltage**



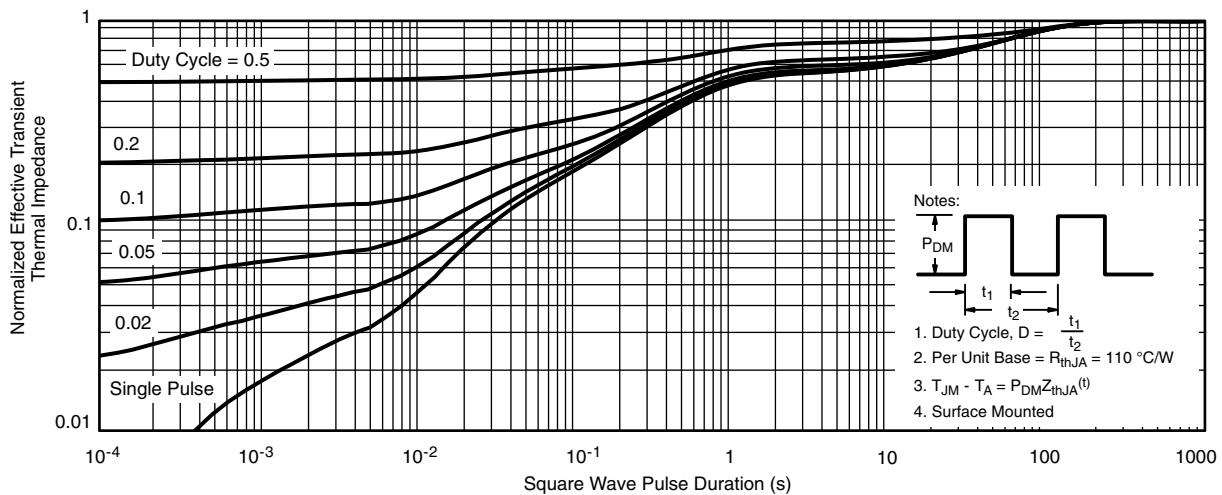
**Drain-to-Source Voltage vs. Junction Temperature**



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



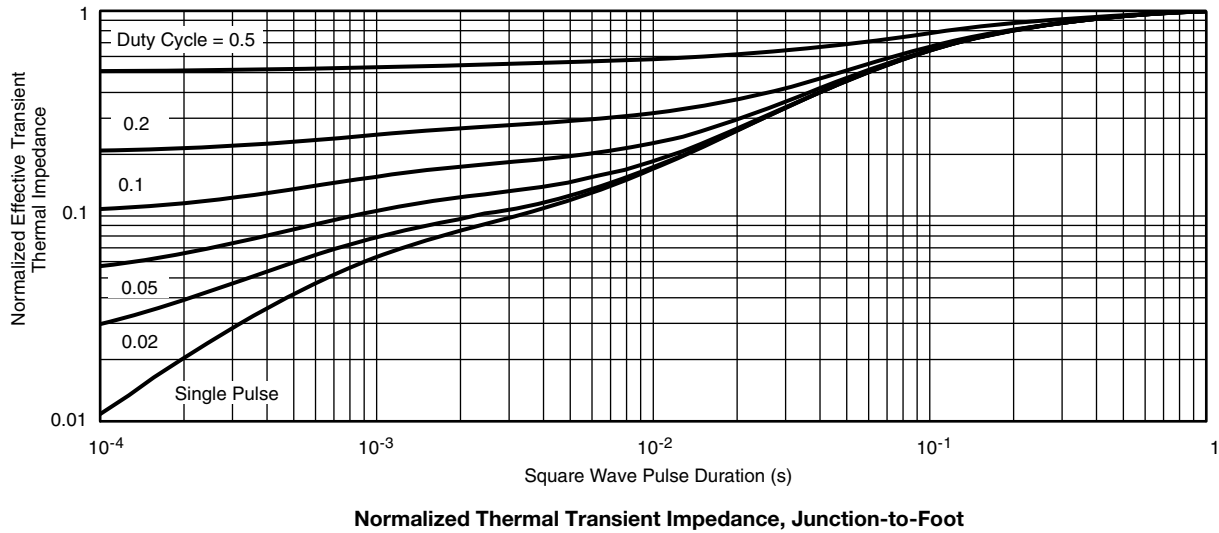
Safe Operating Area, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient



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



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## TSOP: 5/6-LEAD

JEDEC Part Number: MO-193C



5-LEAD TSOP



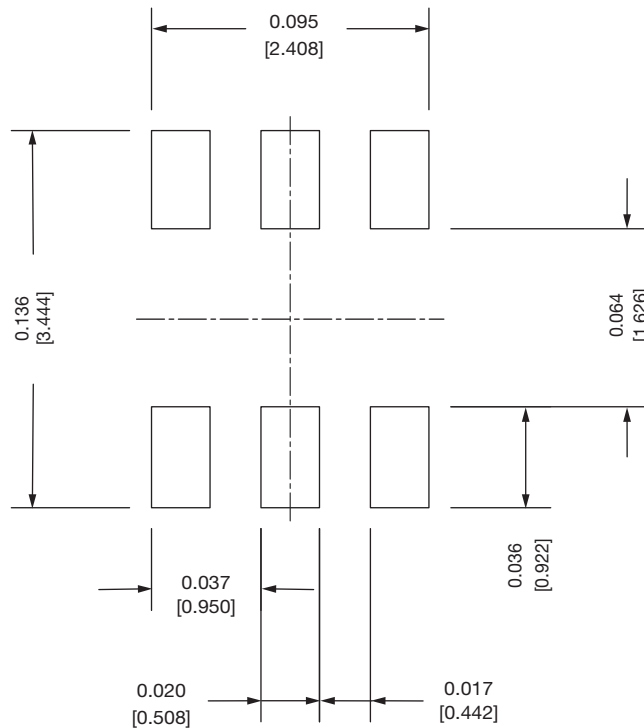
6-LEAD TSOP



| Dim                            | MILLIMETERS |      |      | INCHES     |       |       |
|--------------------------------|-------------|------|------|------------|-------|-------|
|                                | Min         | Nom  | Max  | Min        | Nom   | Max   |
| <b>A</b>                       | 0.91        | -    | 1.10 | 0.036      | -     | 0.043 |
| <b>A<sub>1</sub></b>           | 0.01        | -    | 0.10 | 0.0004     | -     | 0.004 |
| <b>A<sub>2</sub></b>           | 0.90        | -    | 1.00 | 0.035      | 0.038 | 0.039 |
| <b>b</b>                       | 0.30        | 0.32 | 0.45 | 0.012      | 0.013 | 0.018 |
| <b>c</b>                       | 0.10        | 0.15 | 0.20 | 0.004      | 0.006 | 0.008 |
| <b>D</b>                       | 2.95        | 3.05 | 3.10 | 0.116      | 0.120 | 0.122 |
| <b>E</b>                       | 2.70        | 2.85 | 2.98 | 0.106      | 0.112 | 0.117 |
| <b>E<sub>1</sub></b>           | 1.55        | 1.65 | 1.70 | 0.061      | 0.065 | 0.067 |
| <b>e</b>                       | 0.95 BSC    |      |      | 0.0374 BSC |       |       |
| <b>e<sub>1</sub></b>           | 1.80        | 1.90 | 2.00 | 0.071      | 0.075 | 0.079 |
| <b>L</b>                       | 0.32        | -    | 0.50 | 0.012      | -     | 0.020 |
| <b>L<sub>1</sub></b>           | 0.60 Ref    |      |      | 0.024 Ref  |       |       |
| <b>L<sub>2</sub></b>           | 0.25 BSC    |      |      | 0.010 BSC  |       |       |
| <b>R</b>                       | 0.10        | -    | -    | 0.004      | -     | -     |
| <b>θ</b>                       | 0°          | 4°   | 8°   | 0°         | 4°    | 8°    |
| <b>θ<sub>1</sub></b>           | 7° Nom      |      |      | 7° Nom     |       |       |
| ECN: C-06593-Rev. I, 18-Dec-06 |             |      |      |            |       |       |
| DWG: 5540                      |             |      |      |            |       |       |



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



**Note**

- All dimensions are in inches (millimeter)

ECN: C22-0860-Rev. B, 24-Oct-2022  
 DWG: 3010





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