

Dual N-Channel MOSFET

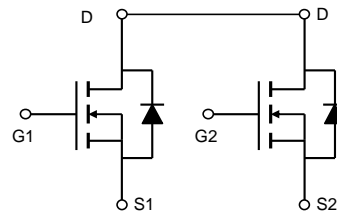
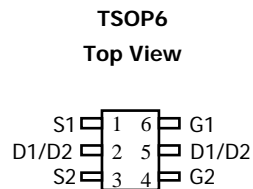
| PRODUCT SUMMARY | | |
|-----------------|---------------------------|-----------|
| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) |
| 20 | 0.018 at $V_{GS} = 4.5$ V | 5.6 |
| | 0.023 at $V_{GS} = 2.5$ V | 4.5 |

FEATURES

- Halogen-free Option Available
- TrenchFET® Power MOSFETs



RoHS*
COMPLIANT



| ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted | | | | | |
|--|----------------|---------------|--------------|------|---|
| Parameter | Symbol | 10 s | Steady State | Unit | |
| Drain-Source Voltage | V_{DS} | 20 | | V | |
| Gate-Source Voltage | V_{GS} | ± 12 | | | |
| Continuous Drain Current ($T_J = 150$ °C) ^a | I_D | $T_A = 25$ °C | 5.6 | 4.2 | A |
| | | $T_A = 70$ °C | 4.5 | 2.5 | |
| Pulsed Drain Current | I_{DM} | 30 | | | |
| Continuous Source Current (Diode Conduction) ^a | I_S | 1.5 | 1.0 | | |
| Maximum Power Dissipation ^a | P_D | $T_A = 25$ °C | 1.5 | 1.0 | W |
| | | $T_A = 70$ °C | 0.96 | 0.64 | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | - 55 to 150 | | °C | |

| THERMAL RESISTANCE RATINGS | | | | | |
|--|------------|---------------|------|------|------|
| Parameter | Symbol | Typ. | Max. | Unit | |
| Maximum Junction-to-Ambient ^a | R_{thJA} | $t \leq 10$ s | 72 | 83 | °C/W |
| | | Steady State | 100 | 120 | |
| Maximum Junction-to-Foot (Drain) | R_{thJF} | 55 | 70 | | |

Notes:

a. Surface Mounted on FR4 board, $t \leq 10$ s.

* Pb containing terminations are not RoHS compliant, exemptions may apply.

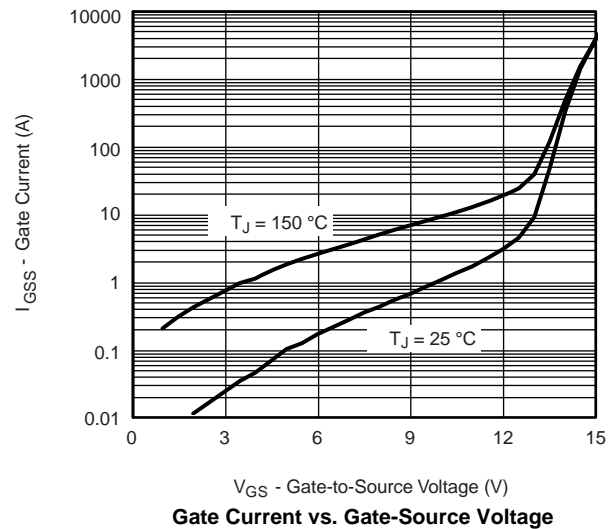
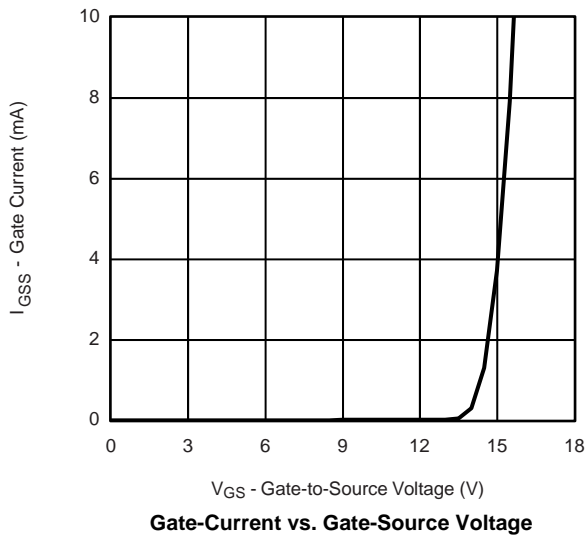
| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | |
|---|--------------|--|------|-------------------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. ^a | Max. | Unit |
| Static | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$ | 0.6 | | 1.6 | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\ \text{V}, V_{GS} = \pm 4.5\ \text{V}$ | | | ± 200 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 20\ \text{V}, V_{GS} = 0\ \text{V}$ | | | 1 | μA |
| | | $V_{DS} = 20\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70\text{ }^\circ\text{C}$ | | | 25 | |
| On-State Drain Current ^b | $I_{D(on)}$ | $V_{DS} \leq 5\ \text{V}, V_{GS} = 4.5\ \text{V}$ | 30 | | | A |
| Drain-Source On-State Resistance ^b | $R_{DS(on)}$ | $V_{GS} = 4.5\ \text{V}, I_D = 4.5\ \text{A}$ | | 0.018 | 0.022 | Ω |
| | | $V_{GS} = 2.5\ \text{V}, I_D = 3.5\ \text{A}$ | | 0.023 | 0.026 | |
| Forward Transconductance ^b | g_{fs} | $V_{DS} = 10\ \text{V}, I_D = 4.5\ \text{A}$ | | 30 | | S |
| Diode Forward Voltage ^b | V_{SD} | $I_S = 1.5\ \text{A}, V_{GS} = 0\ \text{V}$ | | 0.71 | 1.2 | V |
| Dynamic^a | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 10\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 4.5\ \text{A}$ | | 12 | 18 | nC |
| Gate-Source Charge | Q_{gs} | | | 2.2 | | |
| Gate-Drain Charge | Q_{gd} | | | 3.6 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 10\ \text{V}, R_L = 10\ \Omega$ $I_D \cong 1\ \text{A}, V_{GEN} = 4.5\ \text{V}, R_G = 6\ \Omega$ | | 245 | 365 | ns |
| Rise Time | t_r | | | 330 | 495 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 860 | 1300 | |
| Fall Time | t_f | | | 510 | 765 | |

Notes:

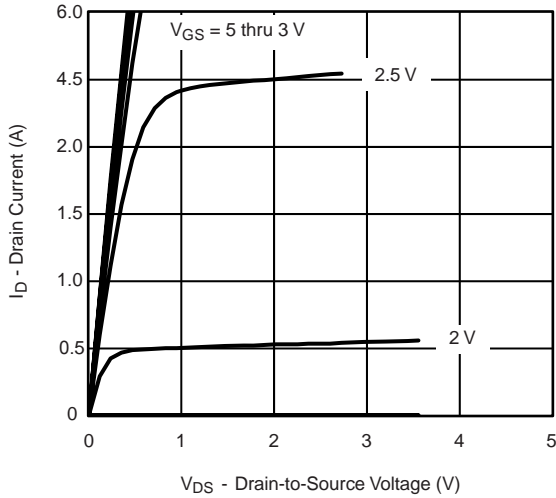
- a. For design aid only; not subject to production testing.
- b. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

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.

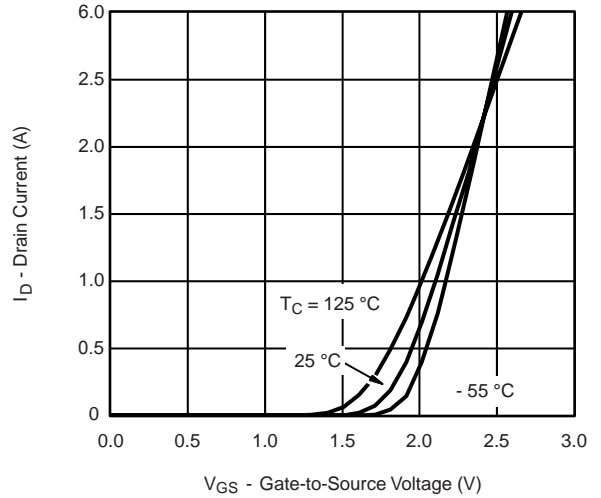
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted



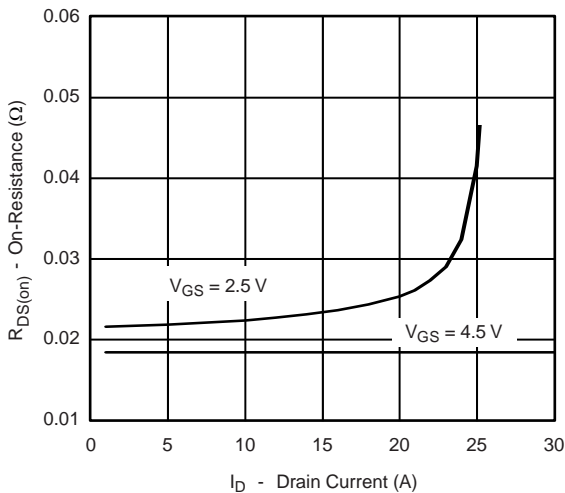
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



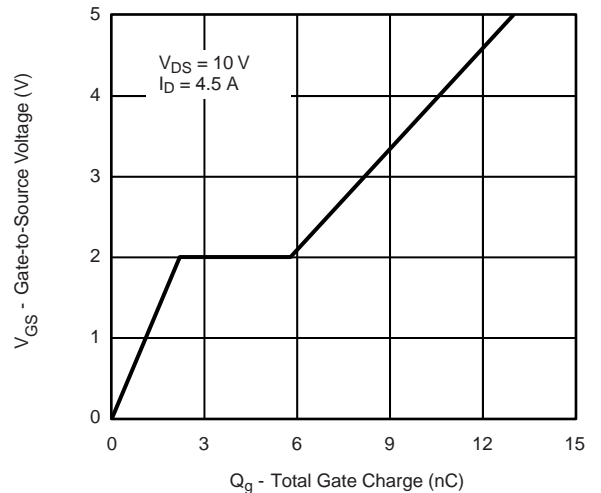
Output Characteristics



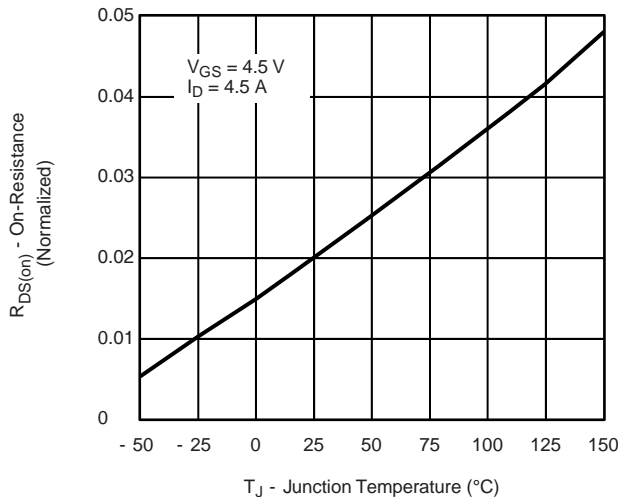
Transfer Characteristics



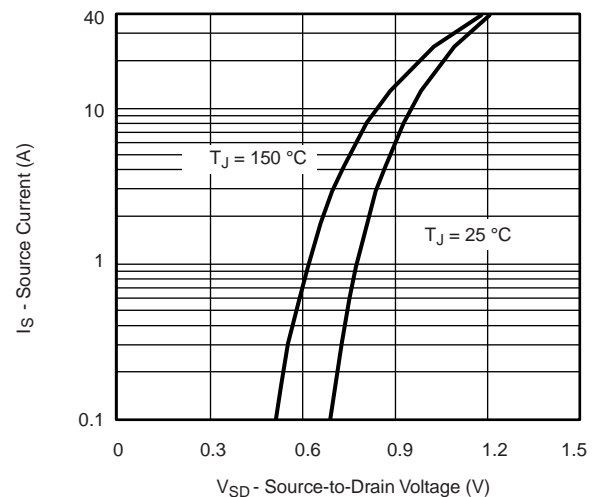
On-Resistance vs. Drain Current



Gate Charge

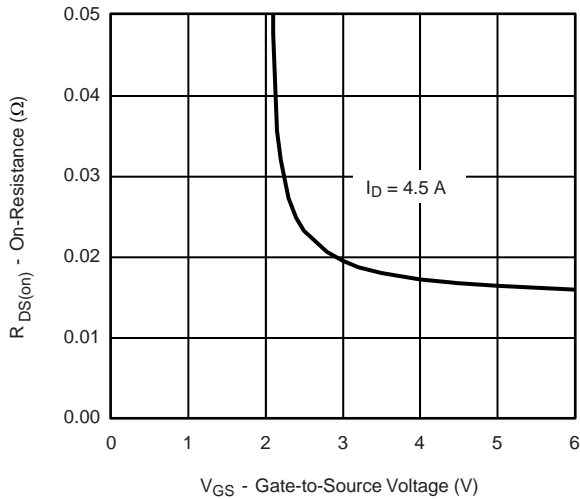


On-Resistance vs. Junction Temperature

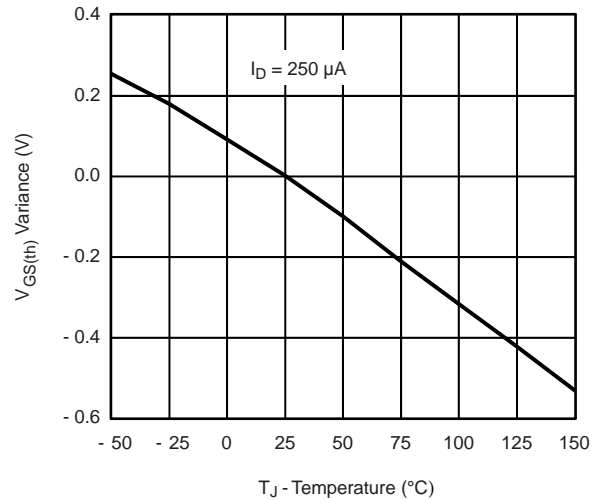


Source-Drain Diode Forward Voltage

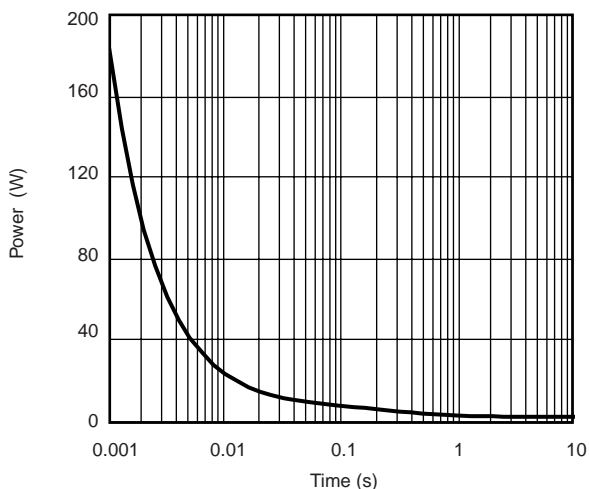
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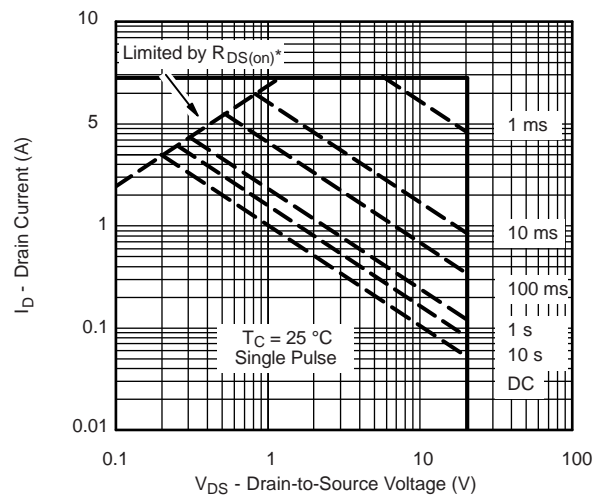
On-Resistance vs. Gate-to-Source Voltage



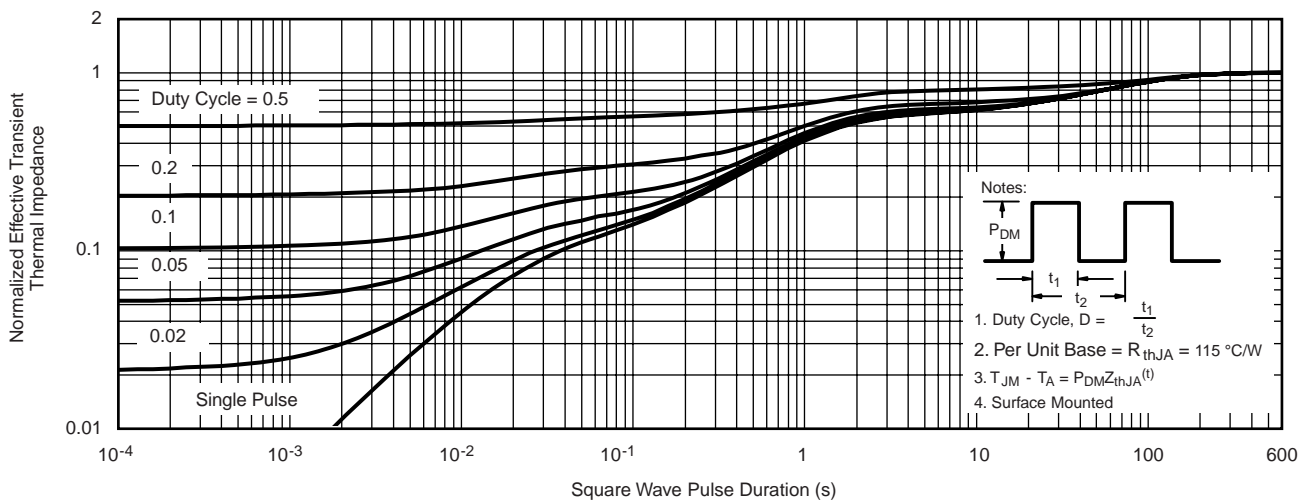
Threshold Voltage



Single Pulse Power

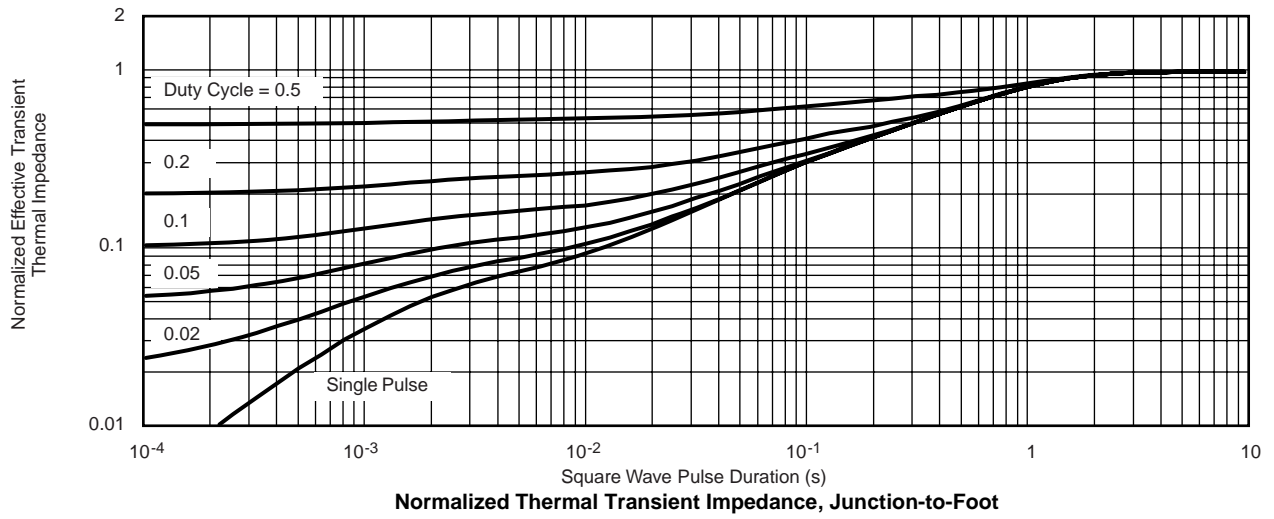


Safe Operating Area, Junction-to-Case
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

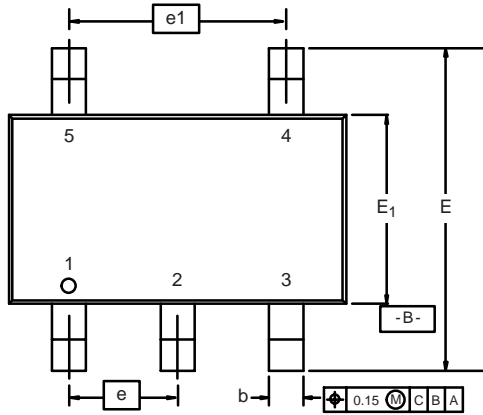


- Notes:
- Duty Cycle, $D = \frac{t_1}{t_2}$
 - Per Unit Base = $R_{thJA} = 115 \text{ } ^\circ\text{C/W}$
 - $T_{JM} - T_A = P_{DM}Z_{thJA}^{(t)}$
 - Surface Mounted

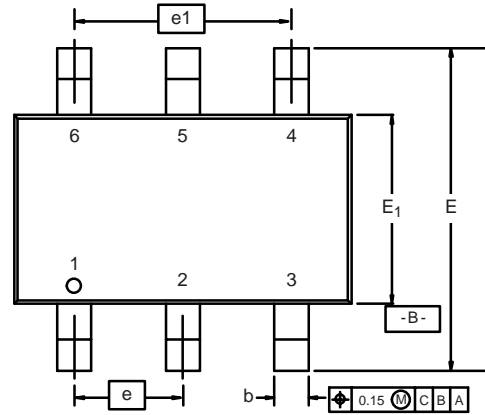
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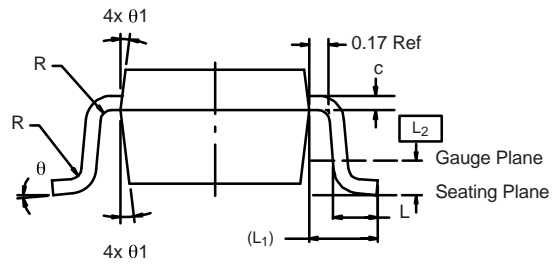
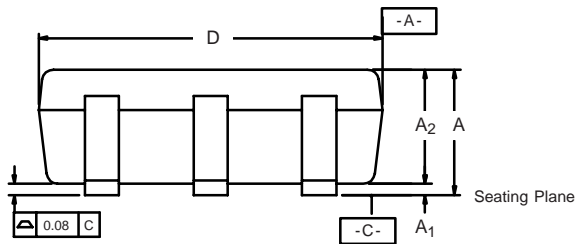
TSOP: 5/6-LEAD
JEDEC Part Number: MO-193C



5-LEAD TSOP

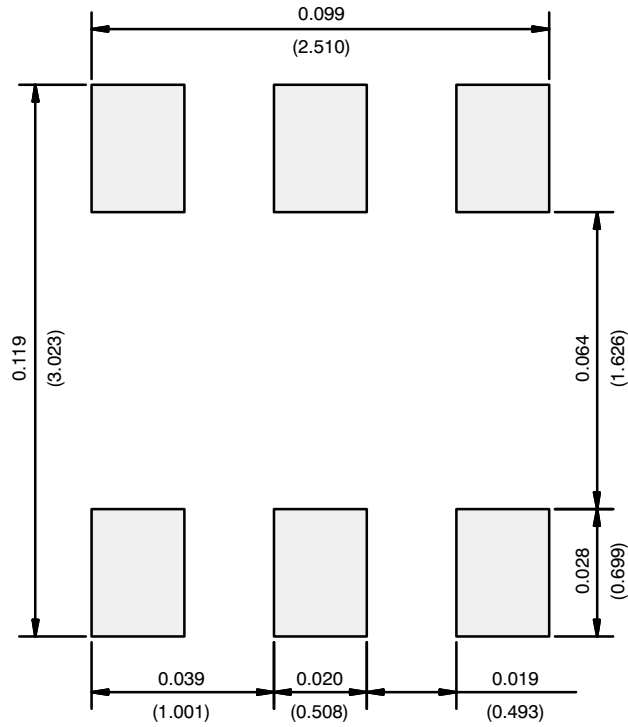


6-LEAD TSOP



| Dim | MILLIMETERS | | | INCHES | | |
|---|-------------|------|------|------------|-------|-------|
| | Min | Nom | Max | Min | Nom | Max |
| 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° |
| θ ₁ | 7° Nom | | | 7° Nom | | |
| ECN: C-06593-Rev. I, 18-Dec-06 DWG: 5540 | | | | | | |

RECOMMENDED MINIMUM PADS FOR TSOP-6



Recommended Minimum Pads
Dimensions in Inches/(mm)

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