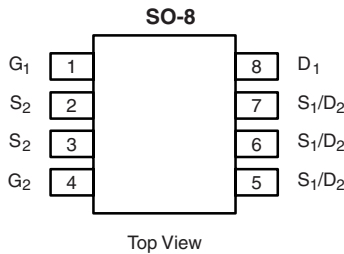


Dual N-Channel 30-V (D-S) MOSFET with Schottky Diode

| PRODUCT SUMMARY | | | | |
|-----------------|---------------------|----------------------------------|---------------------------------|-----------------------|
| | V _{DS} (V) | R _{DS(on)} (Ω) | I _D (A) ^a | Q _g (Typ.) |
| Channel-1 | 30 | 0.017 at V _{GS} = 10 V | 8.0 | 12.5 |
| | | 0.021 at V _{GS} = 4.5 V | 7.5 | |
| Channel-2 | 30 | 0.009 at V _{GS} = 10 V | 15.0 | 17 |
| | | 0.010 at V _{GS} = 4.5 V | 14.0 | |

| SCHOTTKY PRODUCT SUMMARY | | |
|--------------------------|--|---------------------------------|
| V _{DS} (V) | V _{SD} (V) Diode Forward Voltage | I _F (A) ^a |
| 30 | 0.43 V at 1.0 A | 3.8 |



FEATURES

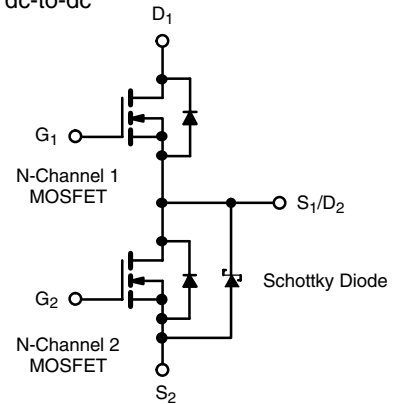
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS COMPLIANT

APPLICATIONS

- Notebook Logic dc-to-dc
- Low Current dc-to-dc



| ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted | | | | |
|---|-----------------------------------|------------------------|----------------------|----------------------|
| Parameter | Symbol | Channel-1 | Channel-2 | Unit |
| Drain-Source Voltage | V _{DS} | 30 | 30 | V |
| Gate-Source Voltage | V _{GS} | ± 16 | ± 16 | |
| Continuous Drain Current (T _J = 150 °C) | I _D | T _C = 25 °C | 8.0 | 15.0 |
| | | T _C = 70 °C | 6.4 | 12.0 |
| | | T _A = 25 °C | 6.7 ^{b, c} | 11.4 ^{b, c} |
| | | T _A = 70 °C | 5.4 ^{b, c} | 9.1 ^{b, c} |
| Pulsed Drain Current (10 μs Pulse Width) | I _{DM} | 35 | 60 | A |
| Source-Drain Current Diode Current | I _S | T _C = 25 °C | 1.8 | 3.8 |
| | | T _A = 25 °C | 1.25 ^{b, c} | 2.4 ^{b, c} |
| Pulsed Source-Drain Current | I _{SM} | 35 | 35 | |
| Single Pulse Avalanche Current | I _{AS} | 15 | 15 | |
| Single Pulse Avalanche Energy | E _{AS} | 11.2 | 11.2 | mJ |
| Maximum Power Dissipation | P _D | T _C = 25 °C | 1.98 | 4.16 |
| | | T _C = 70 °C | 1.26 | 2.66 |
| | | T _A = 25 °C | 1.38 ^{b, c} | 2.35 ^{b, c} |
| | | T _A = 70 °C | 0.88 ^{b, c} | 1.5 ^{b, c} |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | - 55 to 150 | | °C |

| THERMAL RESISTANCE RATINGS | | | | | | | |
|---|--------------|-------------------|------|-----------|------|------|------|
| Parameter | Symbol | Channel-1 | | Channel-2 | | Unit | |
| | | Typ. | Max. | Typ. | Max. | | |
| Maximum Junction-to-Ambient ^{b, d} | t ≤ 10 s | R _{thJA} | 72 | 90 | 43 | 53 | °C/W |
| Maximum Junction-to-Foot (Drain) | Steady State | R _{thJF} | 51 | 63 | 25 | 30 | |

Notes:

- Based on T_C = 25 °C.
- Surface Mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under Steady State conditions is 125 °C/W (Channel-1) and 100 °C/W (Channel-2).

| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | | |
|---|-------------------------|--|--|------|-------------------|-------|---------------|
| Parameter | Symbol | Test Conditions | | Min. | Typ. ^a | Max. | Unit |
| Static | | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$ | Ch-1 | 30 | | | V |
| | | $V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$ | Ch-2 | 30 | | | |
| V_{DS} Temperature Coefficient | $\Delta V_{DS}/T_J$ | $I_D = 250\text{ }\mu\text{A}$ | Ch-1 | | 35 | | |
| $V_{GS(th)}$ Temperature Coefficient | $\Delta V_{GS(th)}/T_J$ | $I_D = 250\text{ }\mu\text{A}$ | Ch-1 | | -6 | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 1\text{ mA}$ | Ch-1 | 1 | | 2.5 | |
| | | $V_{DS} = V_{GS}, I_D = 1\text{ mA}$ | Ch-2 | 1 | | 2.5 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 16\text{ V}$ | Ch-1 | | | 100 | μA |
| | | $V_{DS} = 0\text{ V}, V_{GS} = \pm 16\text{ V}$ | Ch-2 | | | 100 | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$ | Ch-1 | | | 0.001 | mA |
| | | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$ | Ch-2 | | 0.05 | 0.5 | |
| | | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 100\text{ }^\circ\text{C}$ | Ch-1 | | | 0.025 | |
| | | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 100\text{ }^\circ\text{C}$ | Ch-2 | | 3 | 15 | |
| On-State Drain Current ^b | $I_{D(on)}$ | $V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$ | Ch-1 | 20 | | | A |
| | | $V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$ | Ch-2 | 20 | | | |
| Drain-Source On-State Resistance ^b | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 8\text{ A}$ | Ch-1 | | 0.017 | | Ω |
| | | $V_{GS} = 10\text{ V}, I_D = 8\text{ A}$ | Ch-2 | | 0.009 | | |
| | | $V_{GS} = 4.5\text{ V}, I_D = 5\text{ A}$ | Ch-1 | | 0.021 | | |
| | | $V_{GS} = 4.5\text{ V}, I_D = 5\text{ A}$ | Ch-2 | | 0.010 | | |
| Forward Transconductance ^b | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 8\text{ A}$ | Ch-1 | | 40 | | S |
| | | $V_{DS} = 15\text{ V}, I_D = 8\text{ A}$ | Ch-2 | | 47 | | |
| Dynamic^a | | | | | | | |
| Input Capacitance | C_{iss} | Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | Ch-1 | | 1535 | | pF |
| | | | Ch-2 | | 2290 | | |
| Output Capacitance | C_{oss} | | Ch-1 | | 205 | | |
| | | | Ch-2 | | 360 | | |
| Reverse Transfer Capacitance | C_{rss} | Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | Ch-1 | | 91 | | |
| | | | Ch-2 | | 117 | | |
| Total Gate Charge | Q_g | | $V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 8\text{ A}$ | Ch-1 | | 29 | 44 |
| | | | | Ch-2 | | 39 | 59 |
| | | Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 8\text{ A}$ | Ch-1 | | 12.5 | 19 | |
| | | | Ch-2 | | 17 | 26 | |
| Gate-Source Charge | Q_{gs} | Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 8\text{ A}$ | Ch-1 | | 4.1 | | |
| Ch-2 | | | 5.6 | | | | |
| Gate-Drain Charge | Q_{gd} | Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 8\text{ A}$ | Ch-1 | | 3.4 | | |
| | | | Ch-2 | | 4 | | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | Ch-1 | | 1.8 | 3.0 | Ω |
| | | | Ch-2 | | 1.9 | 3.0 | |

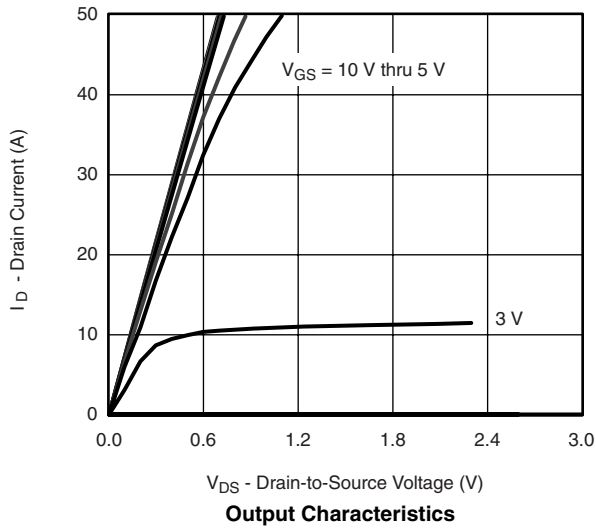
| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | | |
|---|--------------|---|------|-------------------|------|------|----|
| Parameter | Symbol | Test Conditions | Min. | Typ. ^a | Max. | Unit | |
| Dynamic^a | | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | Channel-1 $V_{DD} = 15\text{ V}, R_L = 3\ \Omega$ $I_D \cong 5\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\ \Omega$ | Ch-1 | | 8 | 15 | ns |
| | | | Ch-2 | | 9 | 16 | |
| Rise Time | t_r | | Ch-1 | | 22 | 33 | |
| | | | Ch-2 | | 24 | 36 | |
| Turn-Off Delay Time | $t_{d(off)}$ | Channel-2 $V_{DD} = 15\text{ V}, R_L = 3\ \Omega$ $I_D \cong 5\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\ \Omega$ | Ch-1 | | 20 | 30 | |
| | | | Ch-2 | | 26 | 39 | |
| Fall Time | t_f | | Ch-1 | | 8 | 15 | |
| | | | Ch-2 | | 8 | 15 | |
| Turn-On Delay Time | $t_{d(on)}$ | Channel-1 $V_{DD} = 15\text{ V}, R_L = 3\ \Omega$ $I_D \cong 5\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\ \Omega$ | Ch-1 | | 24 | 36 | |
| | | | Ch-2 | | 24 | 36 | |
| Rise Time | t_r | | Ch-1 | | 87 | 130 | |
| | | | Ch-2 | | 97 | 145 | |
| Turn-Off Delay Time | $t_{d(off)}$ | Channel-2 $V_{DD} = 15\text{ V}, R_L = 3\ \Omega$ $I_D \cong 5\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\ \Omega$ | Ch-1 | | 30 | 45 | |
| | | | Ch-2 | | 35 | 53 | |
| Fall Time | t_f | | Ch-1 | | 34 | 51 | |
| | | | Ch-2 | | 45 | 68 | |
| Drain-Source Body Diode Characteristics | | | | | | | |
| Continuous Source-Drain Diode Current | I_S | $T_C = 25\text{ }^\circ\text{C}$ | Ch-1 | | | 1.8 | A |
| | | | Ch-2 | | | 3.8 | |
| Pulse Diode Forward Current ^a | I_{SM} | | Ch-1 | | | 35 | |
| | | | Ch-2 | | | 35 | |
| Body Diode Voltage | V_{SD} | $I_S = 2\text{ A}$ $I_S = 1\text{ A}$ | Ch-1 | | 0.77 | 1.1 | V |
| | | | Ch-2 | | 0.37 | 0.43 | |
| Body Diode Reverse Recovery Time | t_{rr} | Channel-1 $I_F = 4\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$ | Ch-1 | | 22 | 33 | ns |
| | | | Ch-2 | | 26 | 39 | |
| Body Diode Reverse Recovery Charge | Q_{rr} | | Ch-1 | | 15 | 23 | nC |
| | | | Ch-2 | | 15 | 23 | |
| Reverse Recovery Fall Time | t_a | Channel-2 $I_F = 4\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$ | Ch-1 | | 13 | | ns |
| | | | Ch-2 | | 13 | | |
| Reverse Recovery Rise Time | t_b | | Ch-1 | | 9 | | |
| | | | Ch-2 | | 13 | | |

Notes:

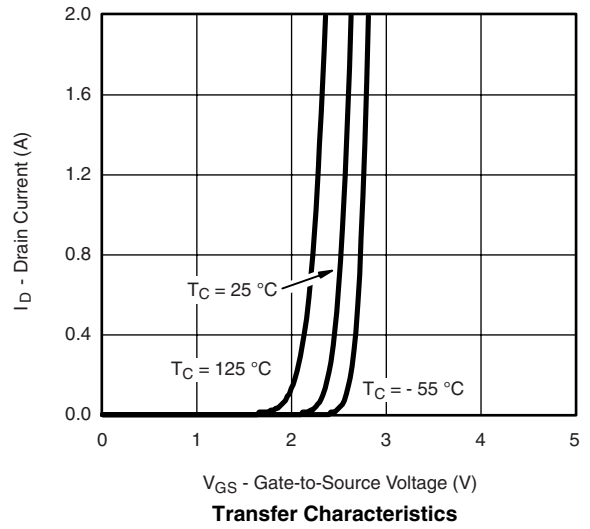
- a. Guaranteed by design, not subject to production testing.
 b. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

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.

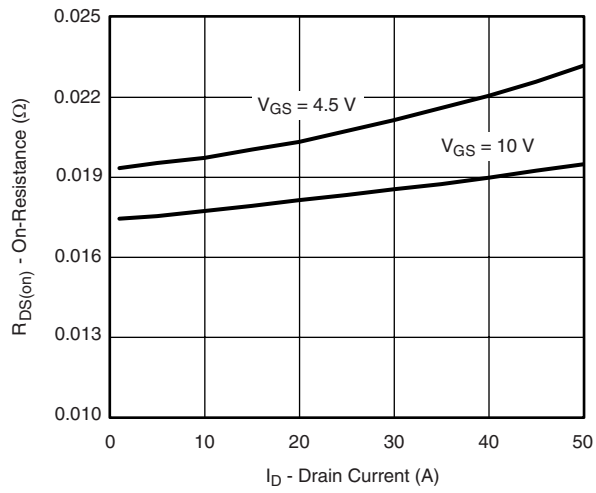
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



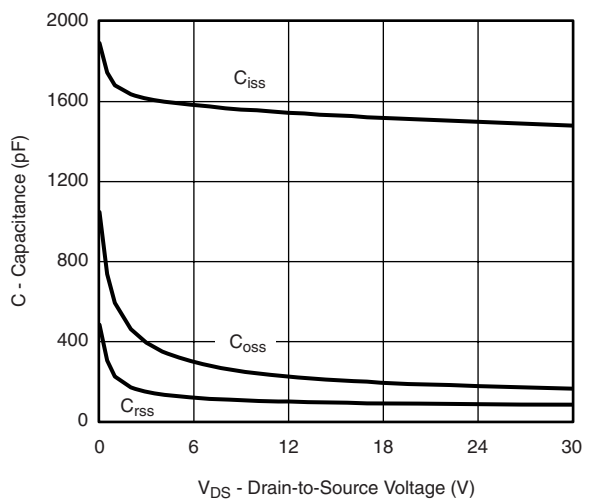
Output Characteristics



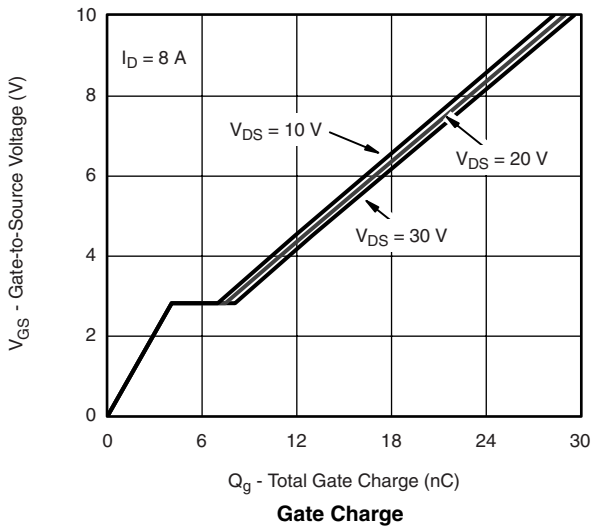
Transfer Characteristics



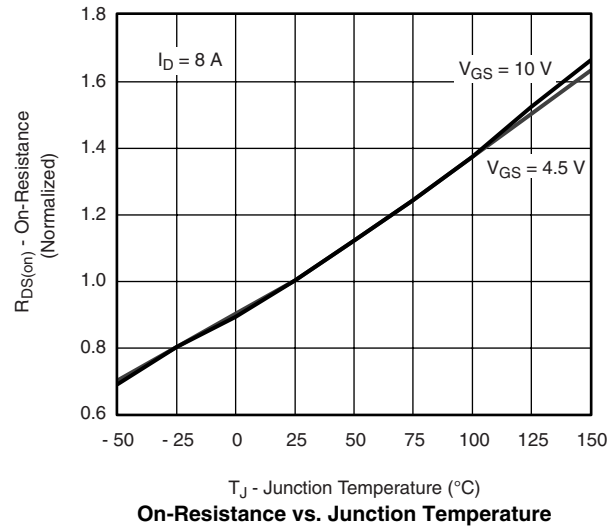
On-Resistance vs. Drain Current



Capacitance

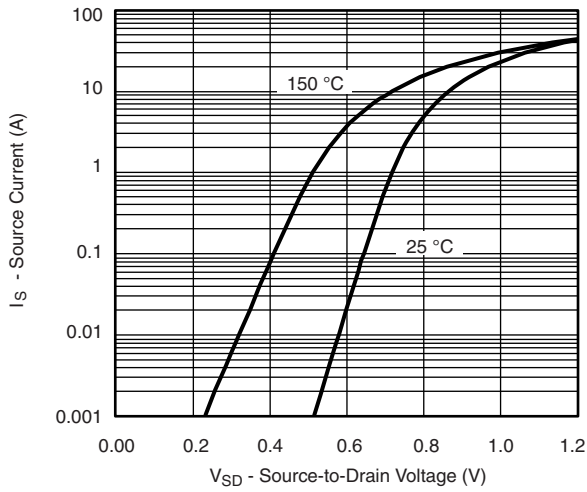


Gate Charge

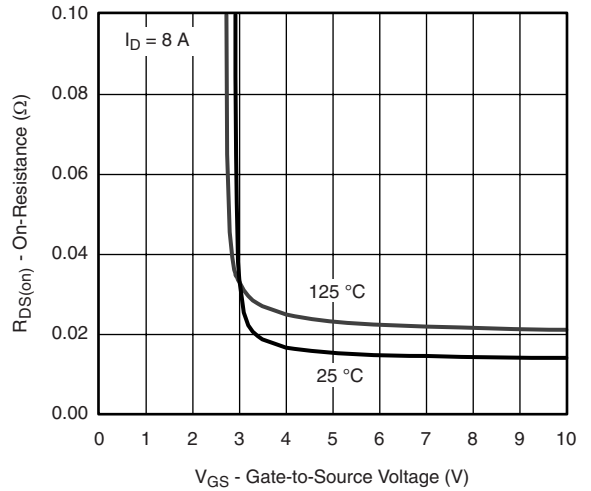


On-Resistance vs. Junction Temperature

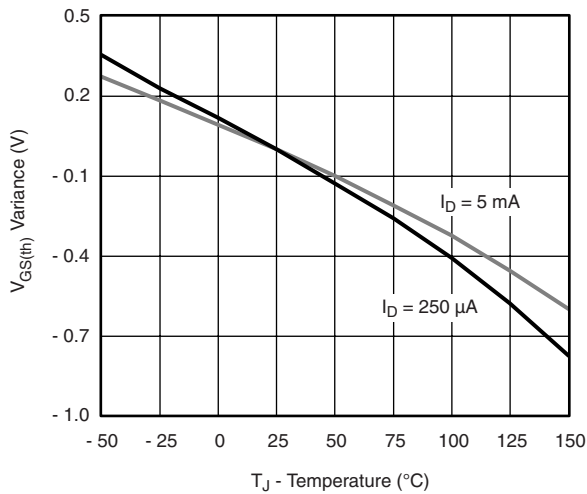
CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



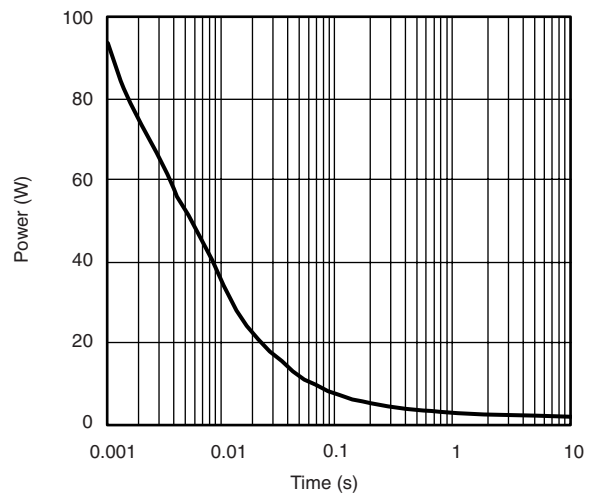
Source-Drain Diode Forward Voltage



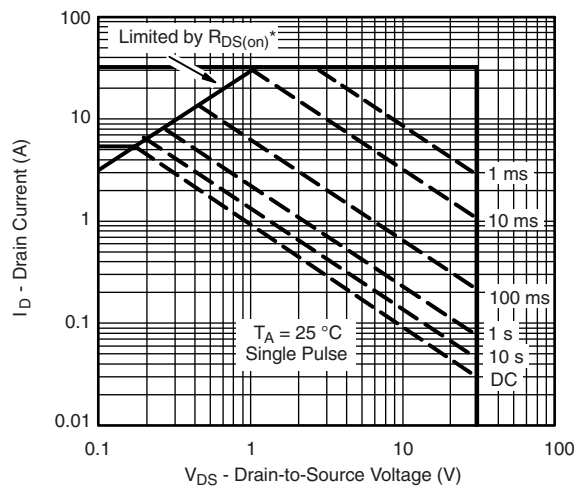
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



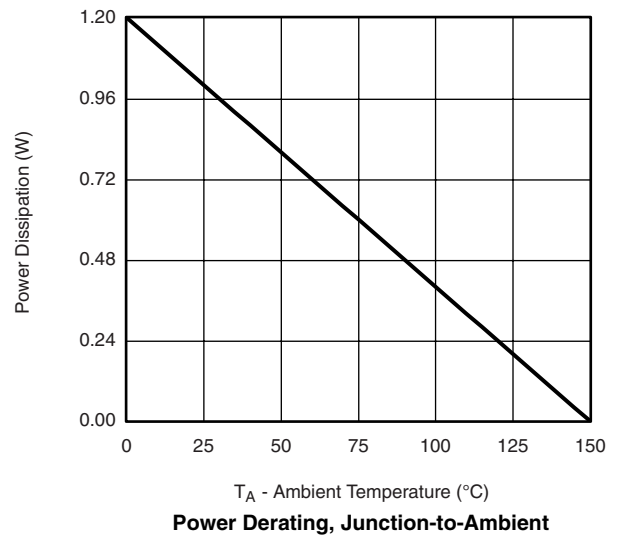
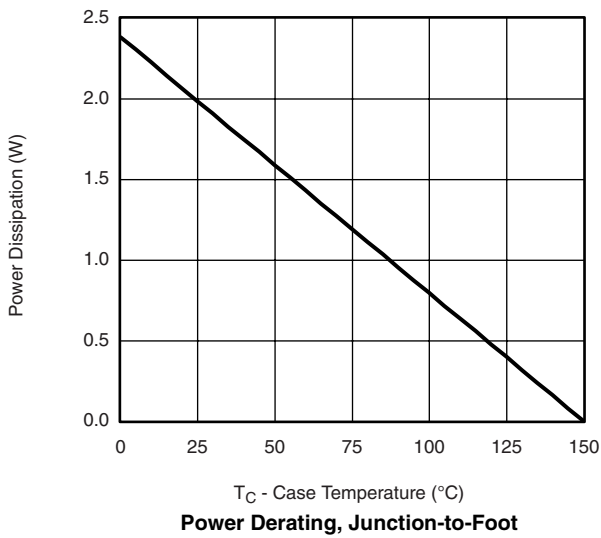
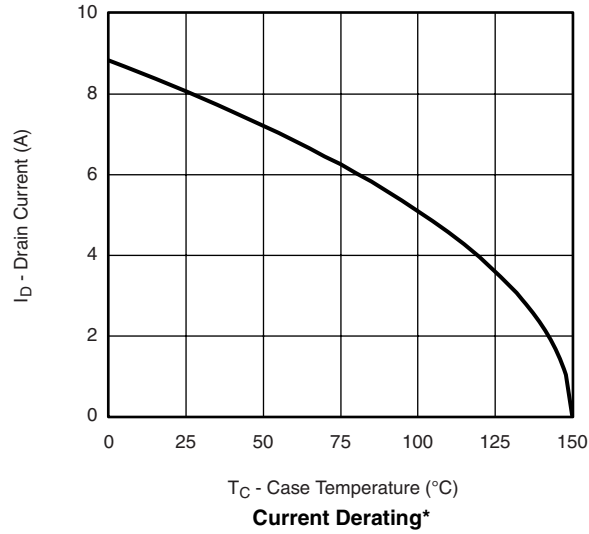
Single Pulse Power, Junction-to-Ambient



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

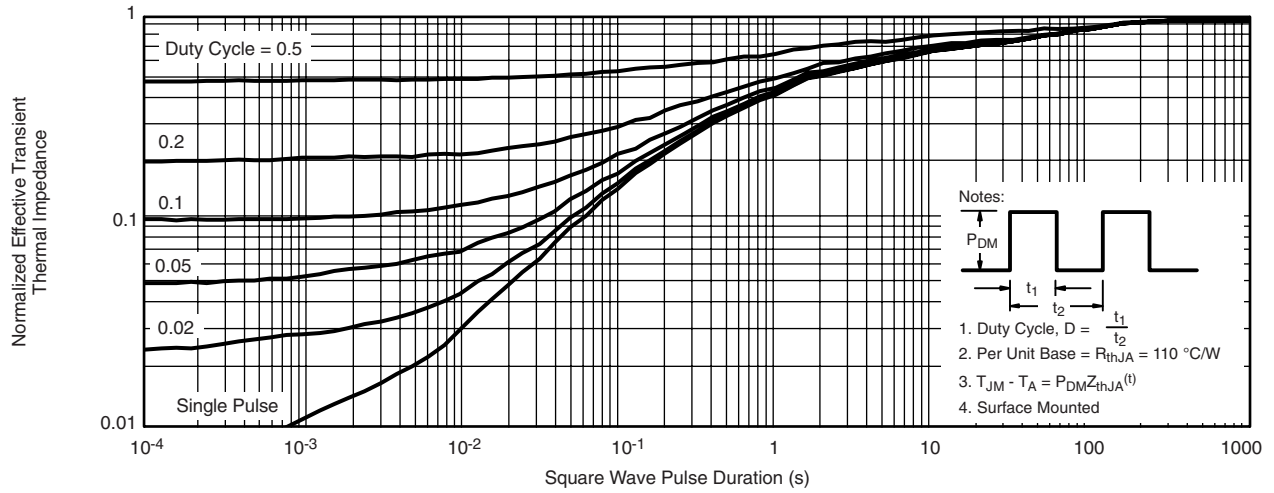
Safe Operating Area, Junction-to-Ambient

CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

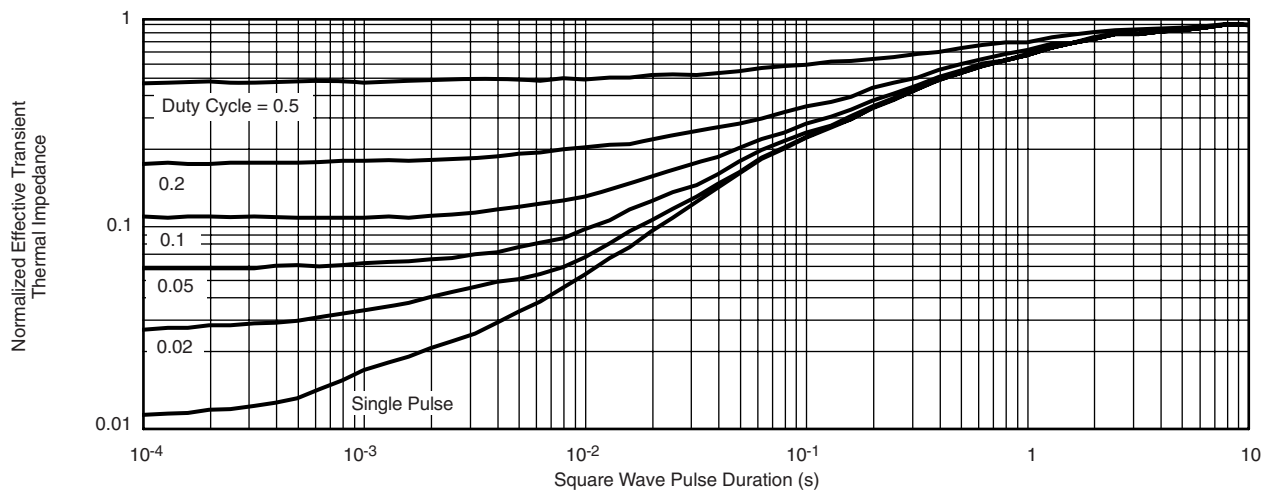


* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

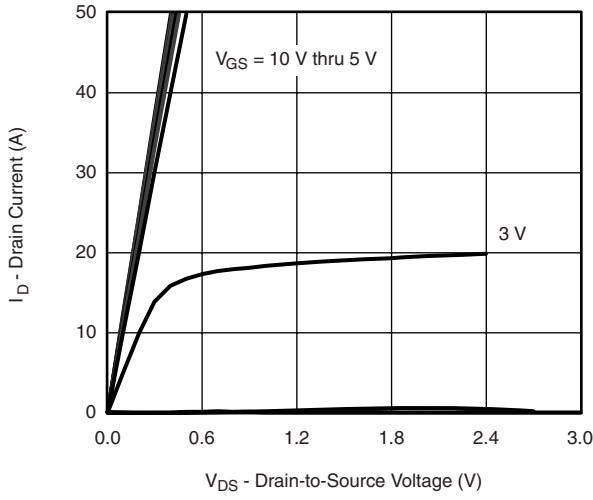


Normalized Thermal Transient Impedance, Junction-to-Ambient

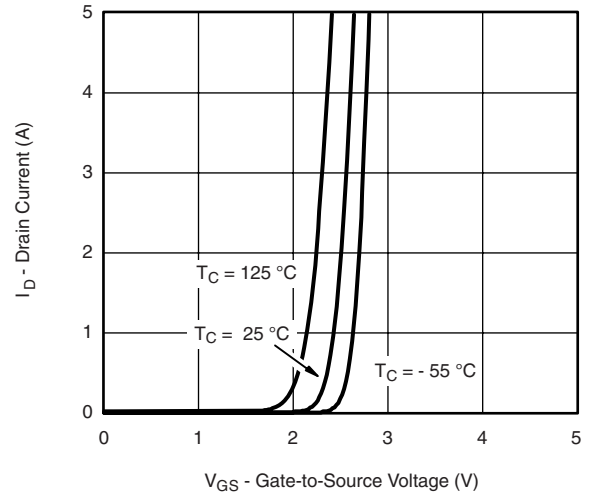


Normalized Thermal Transient Impedance, Junction-to-Foot

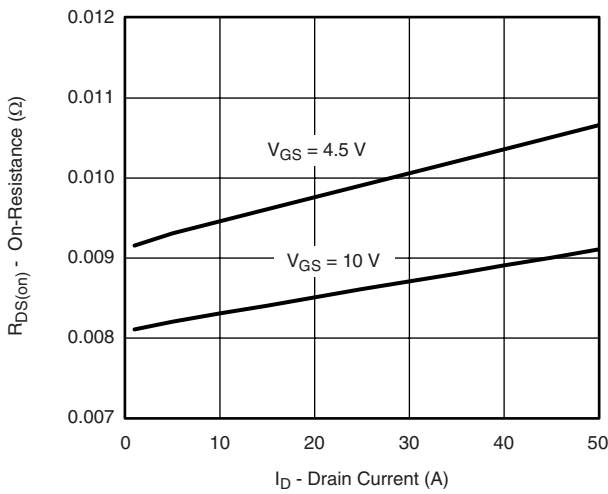
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



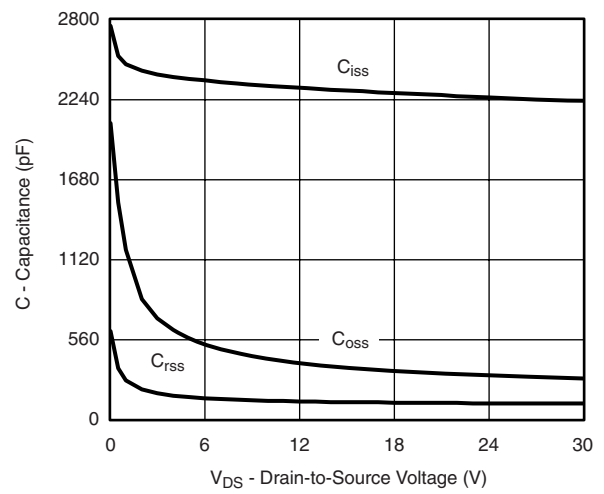
Output Characteristics



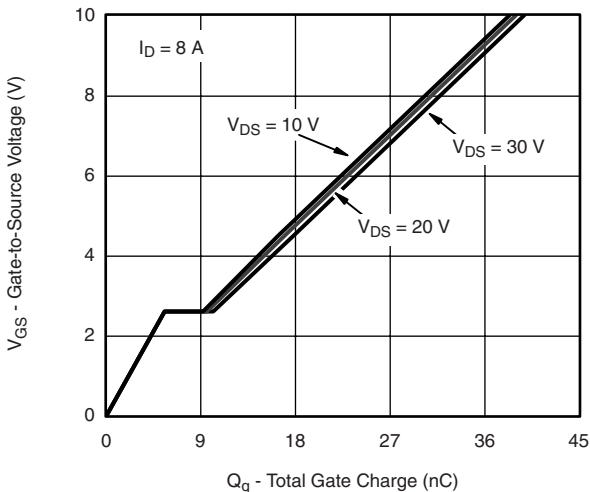
Transfer Characteristics



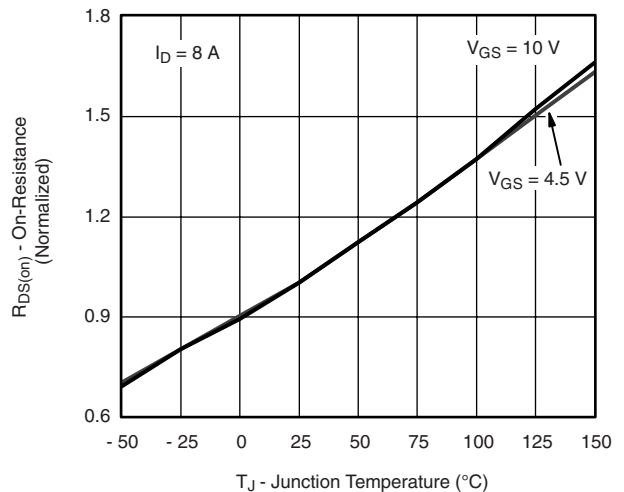
On-Resistance vs. Drain Current



Capacitance

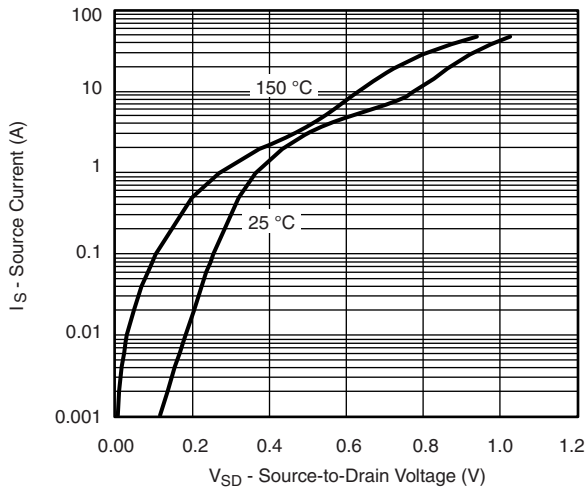


Gate Charge

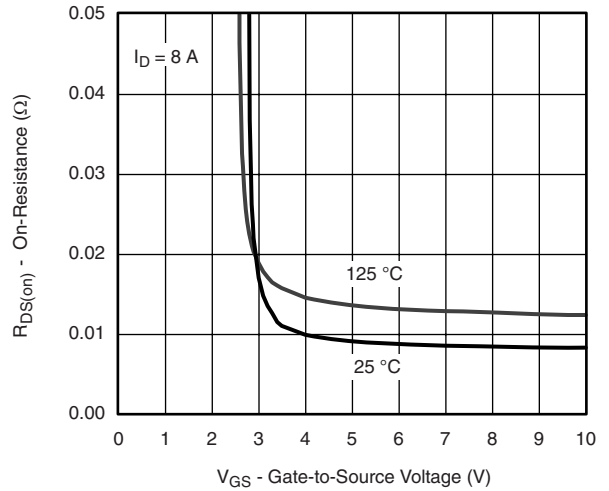


On-Resistance vs. Junction Temperature

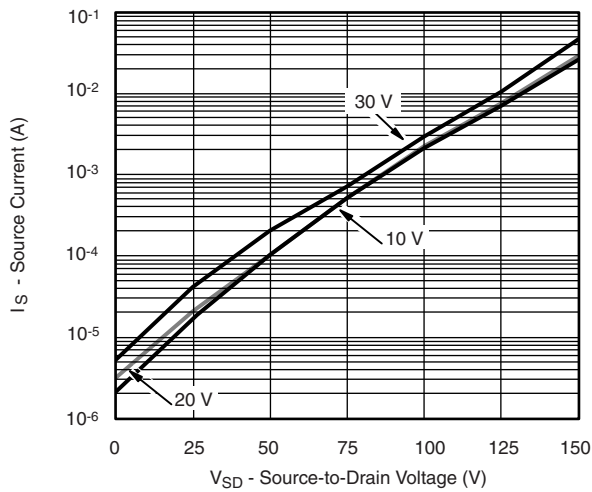
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



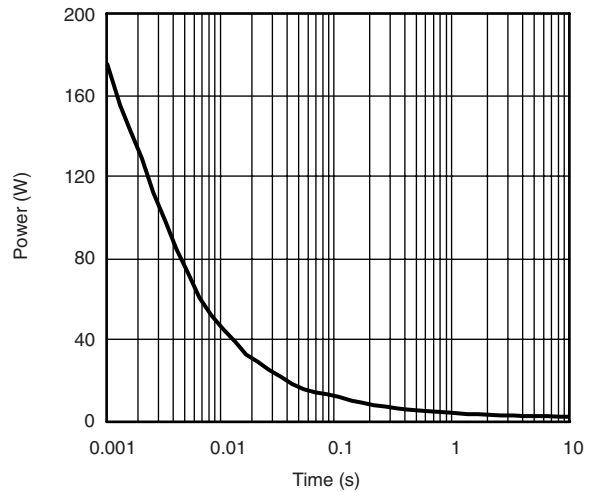
Source-Drain Diode Forward Voltage



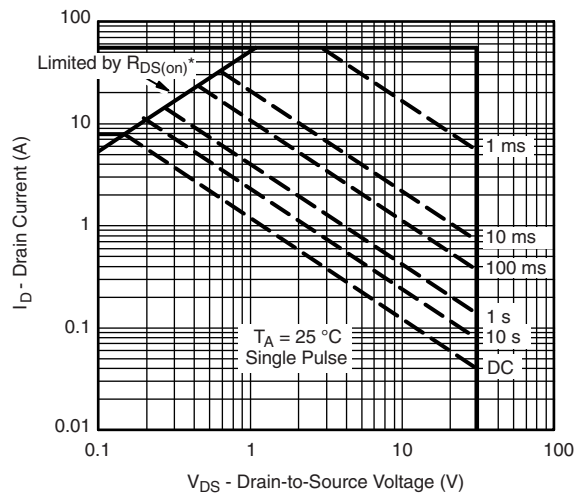
On-Resistance vs. Gate-to-Source Voltage



Reverse Current (Schottky)



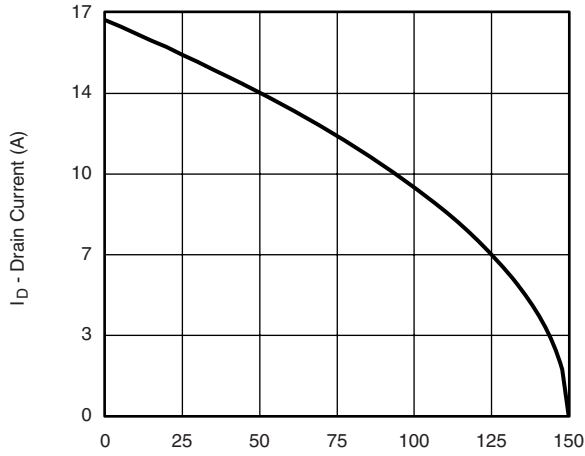
Single Pulse Power, Junction-to-Ambient



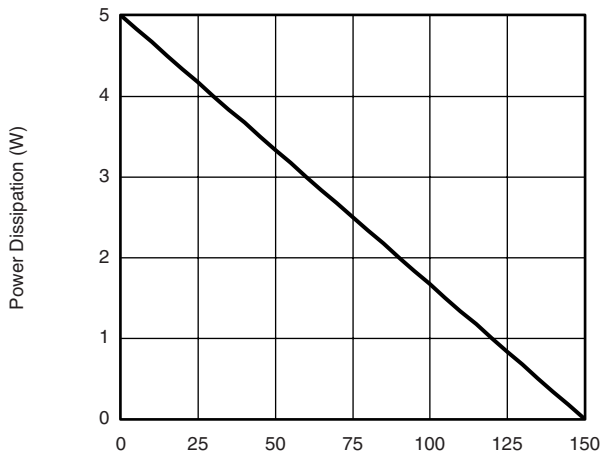
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

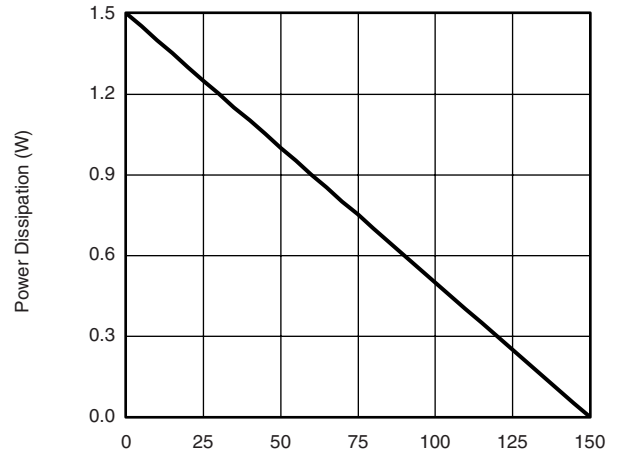
CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



T_C - Case Temperature (°C)
Current Derating*



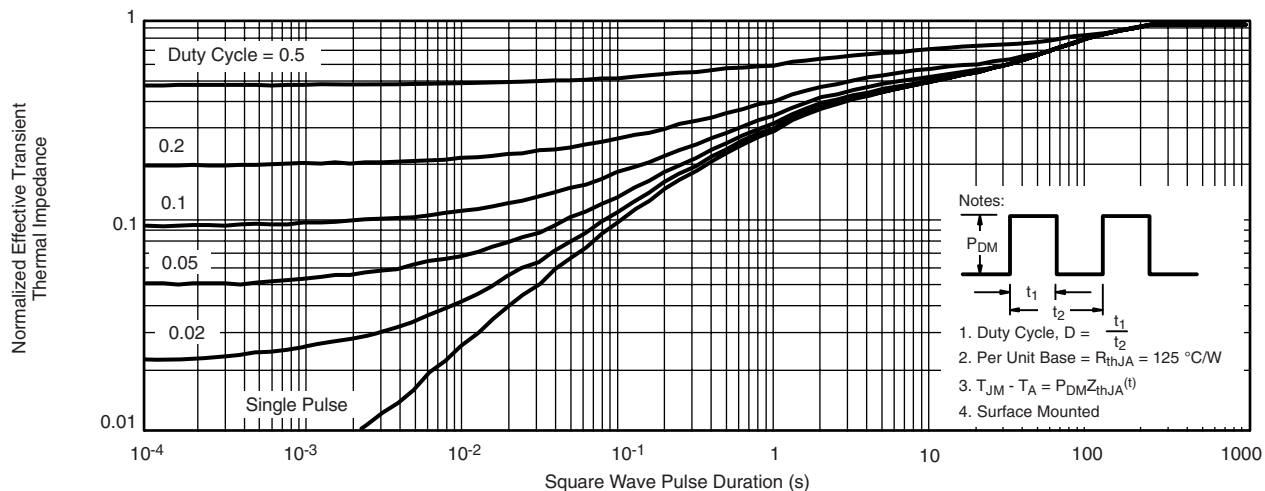
T_C - Case Temperature (°C)
Power Derating, Junction-to-Foot



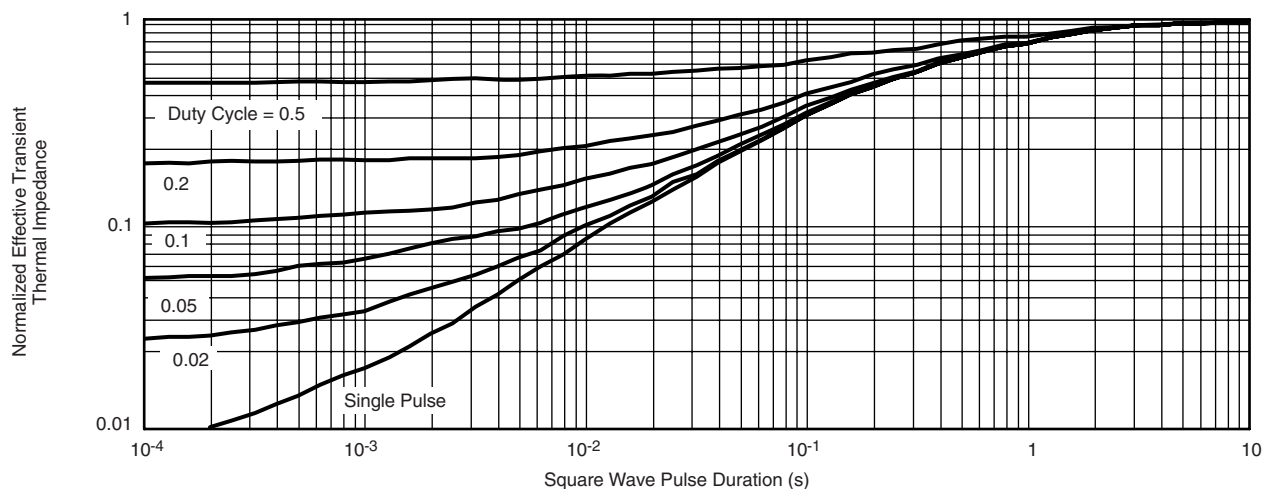
T_A - Ambient Temperature (°C)
Power Derating, Junction-to-Ambient

* 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.

CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

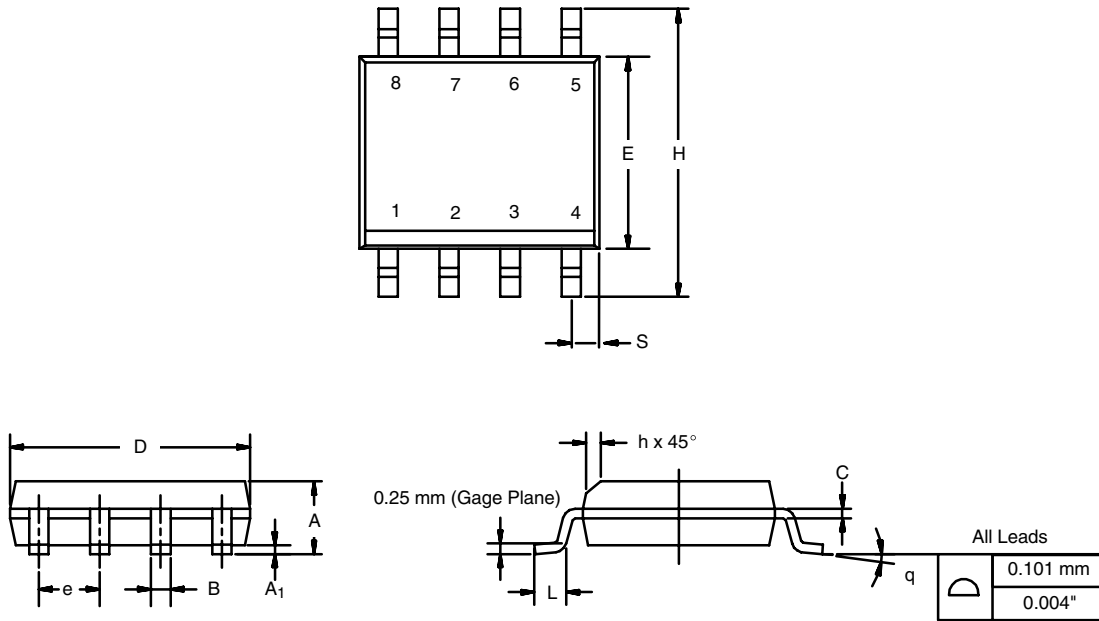


Normalized Thermal Transient Impedance, Junction-to-Ambient



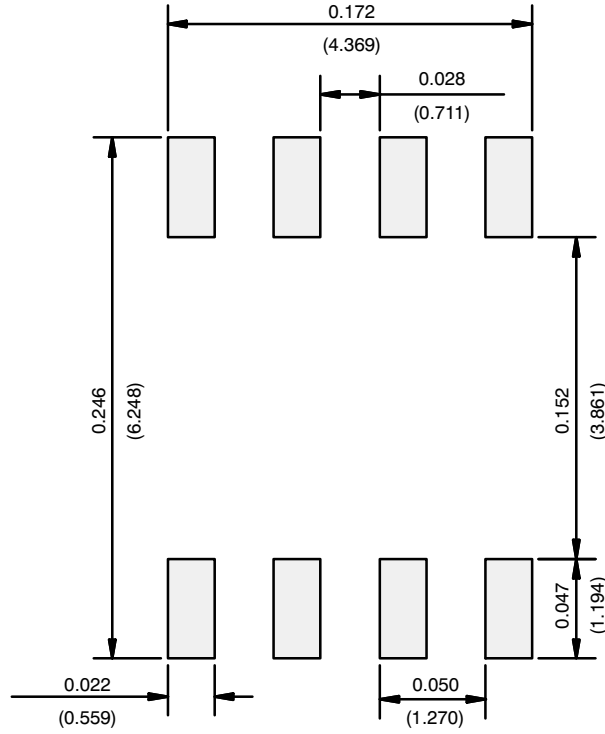
Normalized Thermal Transient Impedance, Junction-to-Foot

SOIC (NARROW): 8-LEAD
JEDEC Part Number: MS-012



| DIM | MILLIMETERS | | INCHES | |
|---|-------------|------|-----------|-------|
| | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| A ₁ | 0.10 | 0.20 | 0.004 | 0.008 |
| B | 0.35 | 0.51 | 0.014 | 0.020 |
| C | 0.19 | 0.25 | 0.0075 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.196 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 BSC | | 0.050 BSC | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| h | 0.25 | 0.50 | 0.010 | 0.020 |
| L | 0.50 | 0.93 | 0.020 | 0.037 |
| q | 0° | 8° | 0° | 8° |
| S | 0.44 | 0.64 | 0.018 | 0.026 |
| ECN: C-06527-Rev. I, 11-Sep-06 DWG: 5498 | | | | |

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

Disclaimer

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