

N-Channel Enhancement Mode MOSFET

TDM31058

DESCRIPTION

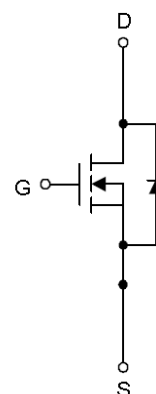
The TDM31058 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

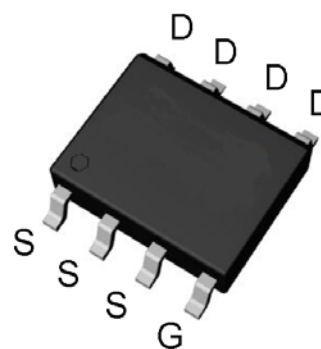
- RDS(ON) < 18.2mΩ @ VGS=4.5V
RDS(ON) < 13.5mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- SOP-8 Package

Application

- PWM applications
- Load switch
- Power management
- Hard Switched and High Frequency Circuits



N-Channel MOSFET



Top View of SOP-8

ABSOLUTE MAXIMUM RATINGS(TA=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---------------------------|------------|------|
| Drain-Source Voltage | V _{DS} | 100 | V |
| Gate-Source Voltage | V _{GS} | ±20 | V |
| Diode Continuous Forward Current | I _S (TA=25°C) | 4 | A |
| Pulsed Drain Current | I _{DM} (TA=25°C) | 32 | A |
| Drain Current @ Continuous | I _D (TA=25°C) | 8.0 | A |
| | I _D (TA=70°C) | 6.5 | A |
| Maximum Power Dissipation(t≤10s) | P _D (TA=25°C) | 3.5 | W |
| | P _D (TA=70°C) | 2.2 | W |
| Thermal Resistance,Junction-to-Ambient (Note 1) | RθJA(t≤10s) | 35 | °C/W |
| | RθJA(Steady State) | 70 | °C/W |
| Avalanche Current, Single pulse | I _{AS} (L=0.5mH) | 18 | A |
| Avalanche Energy, Single pulse | E _{AS} (L=0.5mH) | 81 | mJ |
| Maximum Operating Junction Temperature | T _J | 150 | °C |
| Storage Temperature Range | T _{STG} | -55 To 150 | °C |

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ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

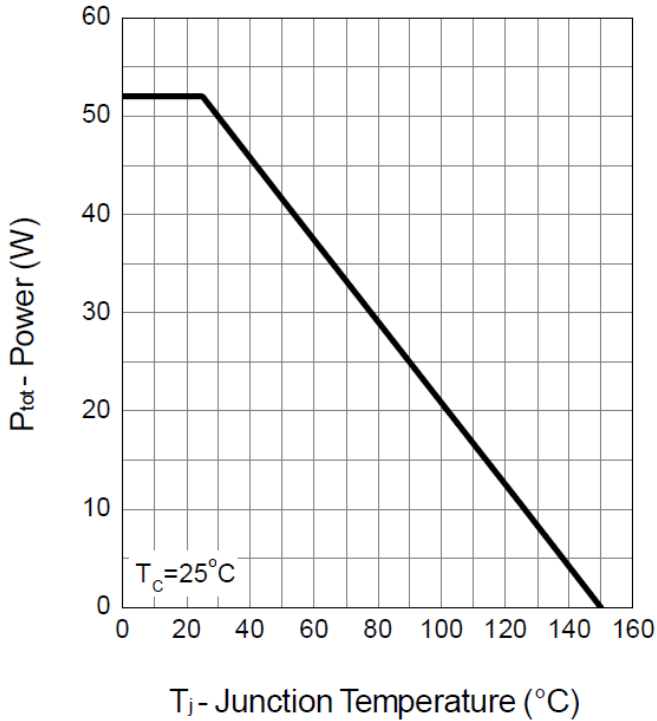
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|--|-----|------|-----------|------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 100 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=80V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| ON CHARACTERISTICS (Note 2) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1 | 2 | 3 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=15A$ | - | 14 | 18.2 | m Ω |
| | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=20A$ | - | 11.2 | 13.5 | m Ω |
| DYNAMIC CHARACTERISTICS (Note3) | | | | | | |
| Gate Resistance | R_G | $V_{DS}=0V, V_{GS}=0V, F=1.0MHz$ | - | 1.0 | - | Ω |
| Input Capacitance | C_{iss} | $V_{DS}=30V, V_{GS}=0V, F=1.0MHz$ | - | 1440 | 1880 | PF |
| Output Capacitance | C_{oss} | | - | 405 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 30 | - | PF |
| SWITCHING CHARACTERISTICS (Note 3) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}=30V, R_L=30\Omega, V_{GEN}=10V, R_G=6\Omega, I_D=1A$ | - | 16 | 29 | nS |
| Turn-on Rise Time | t_r | | - | 7 | 13 | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 38 | 69 | nS |
| Turn-Off Fall Time | t_f | | - | 41 | 74 | nS |
| Total Gate Charge | Q_g | $V_{DS}=50V, I_D=20A, V_{GS}=10V$ | - | 28 | 40 | nC |
| Gate-Source Charge | Q_{gs} | | - | 4.8 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 5.8 | - | nC |
| Body Diode Reverse Recovery Time | T_{rr} | $I_F=20A, di/dt=100A/\mu s$ | - | 45 | - | nS |
| Body Diode Reverse Recovery Charge | Q_{rr} | | - | 86 | - | nC |
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode Forward Voltage (Note 2) | V_{SD} | $V_{GS}=0V, I_S=2A$ | - | 0.8 | 1.3 | V |

NOTES:

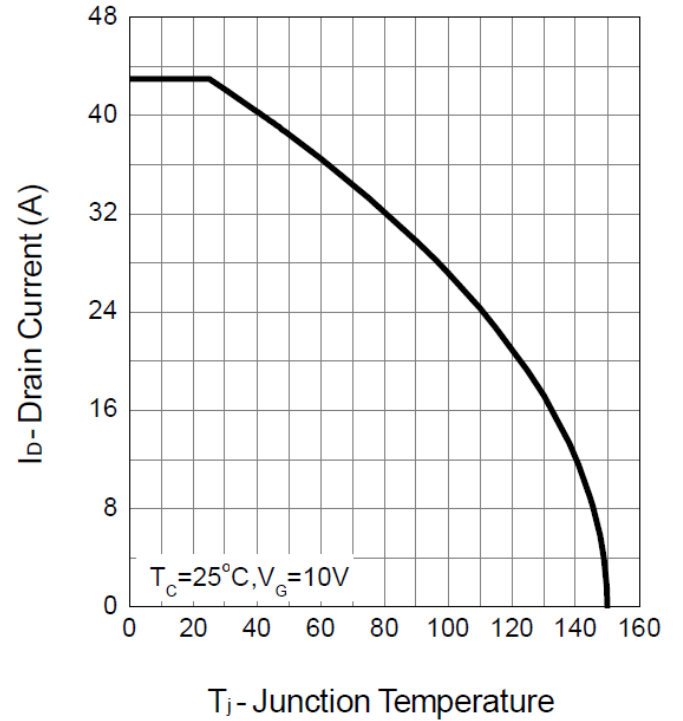
1. Pulse width limited by max. junction temperature.
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
3. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

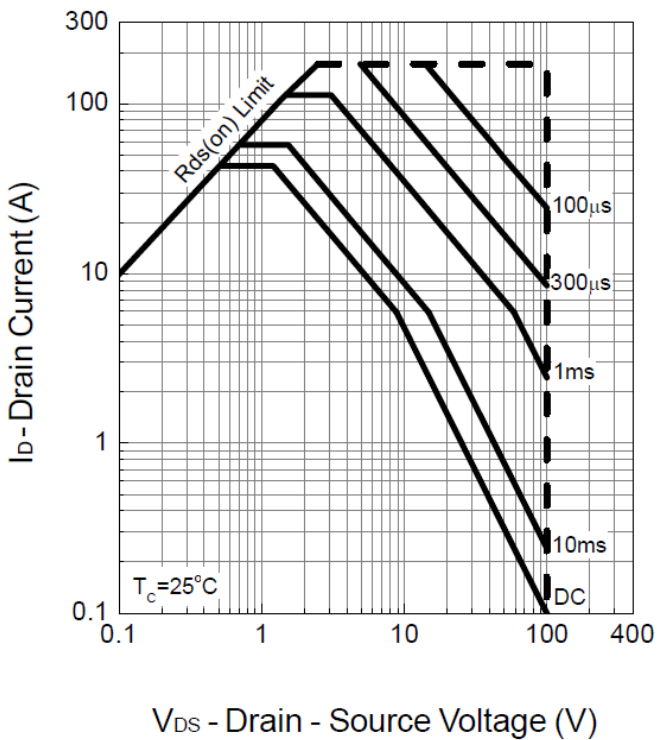
Power Dissipation



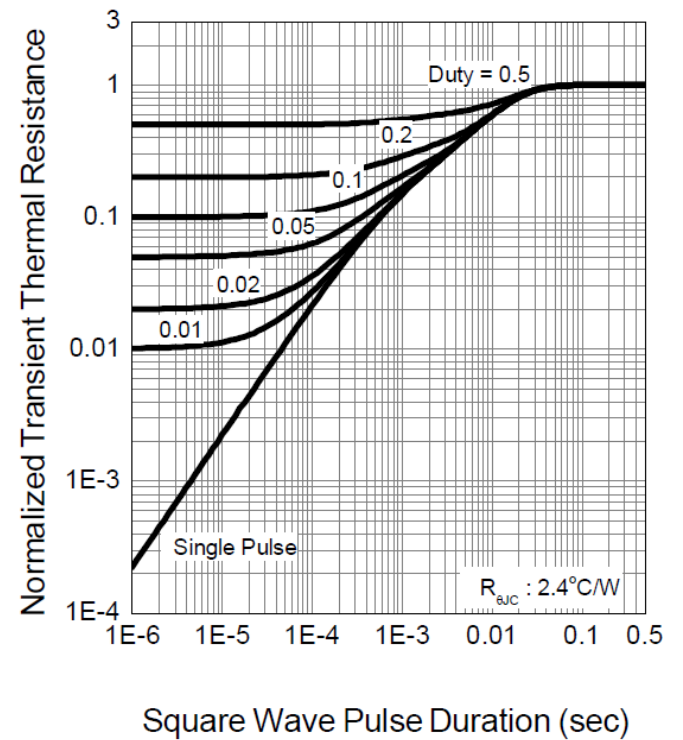
Drain Current



Safe Operation Area

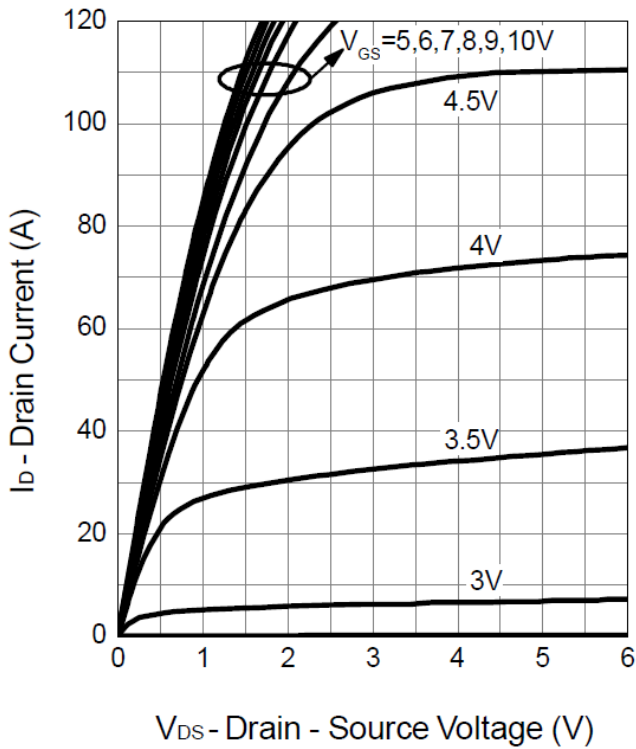


Thermal Transient Impedance

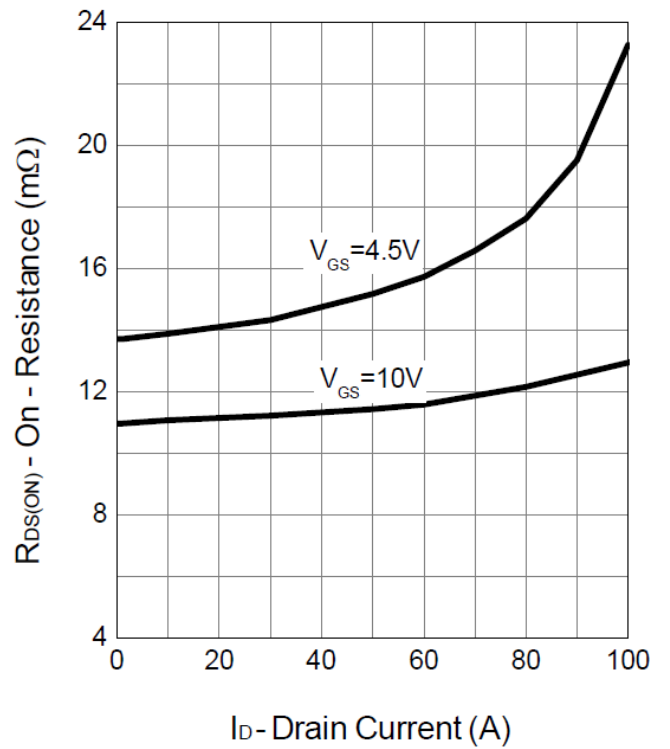


Typical Operating Characteristics (Cont.)

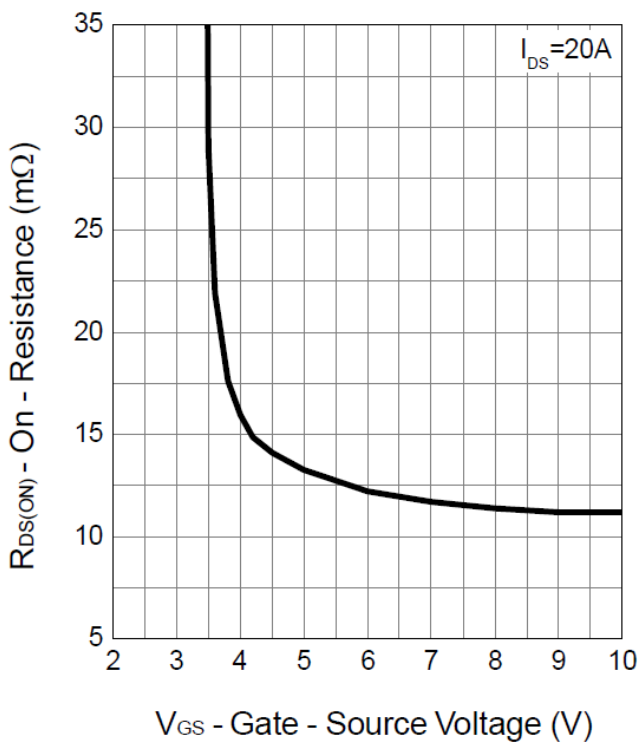
Output Characteristics



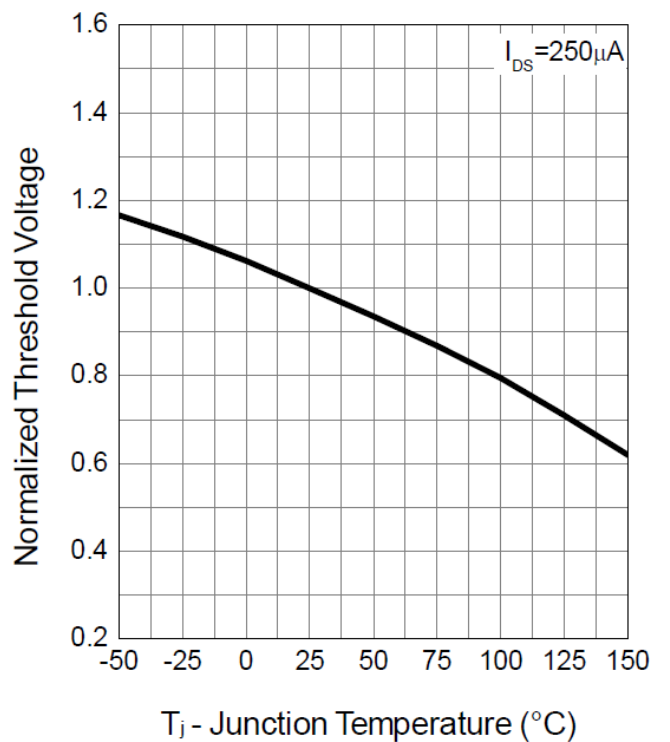
Drain-Source On Resistance



Gate-Source On Resistance

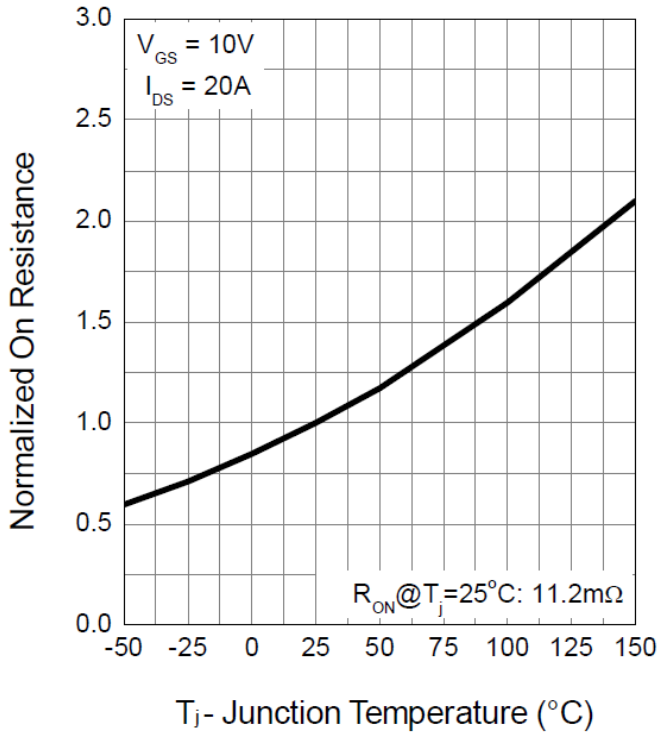


Gate Threshold Voltage

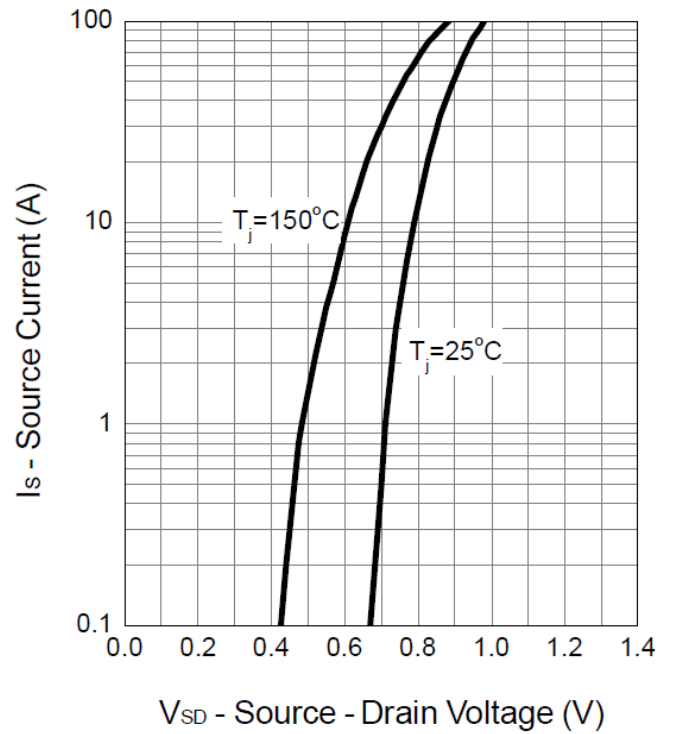


Typical Operating Characteristics (Cont.)

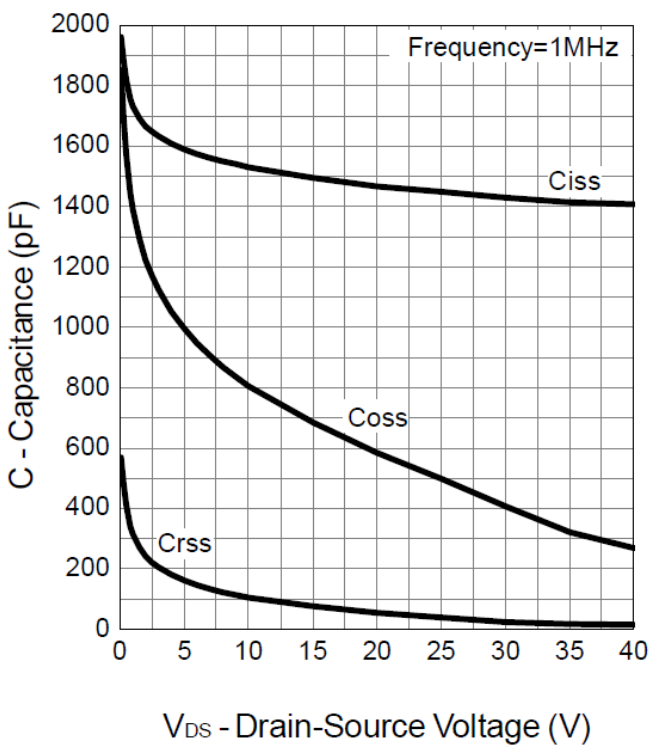
Drain-Source On Resistance



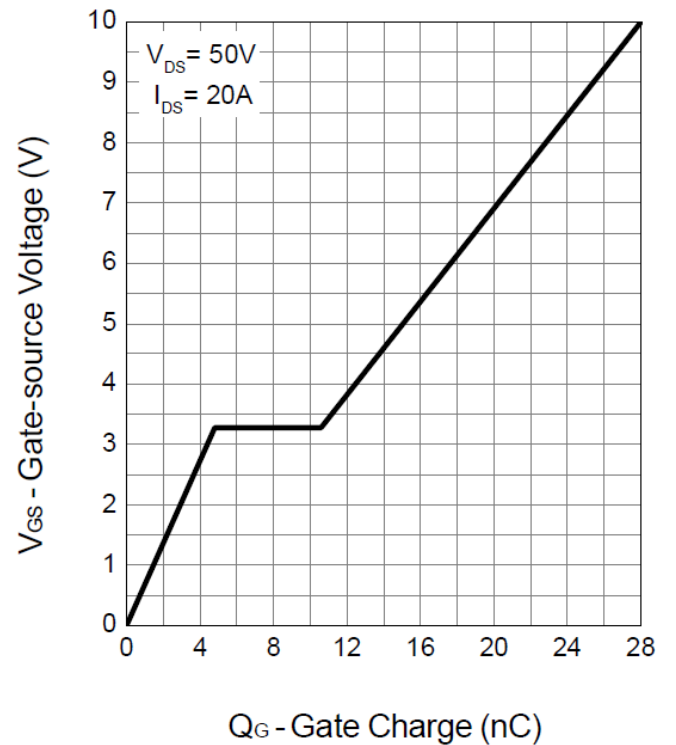
Source-Drain Diode Forward



Capacitance

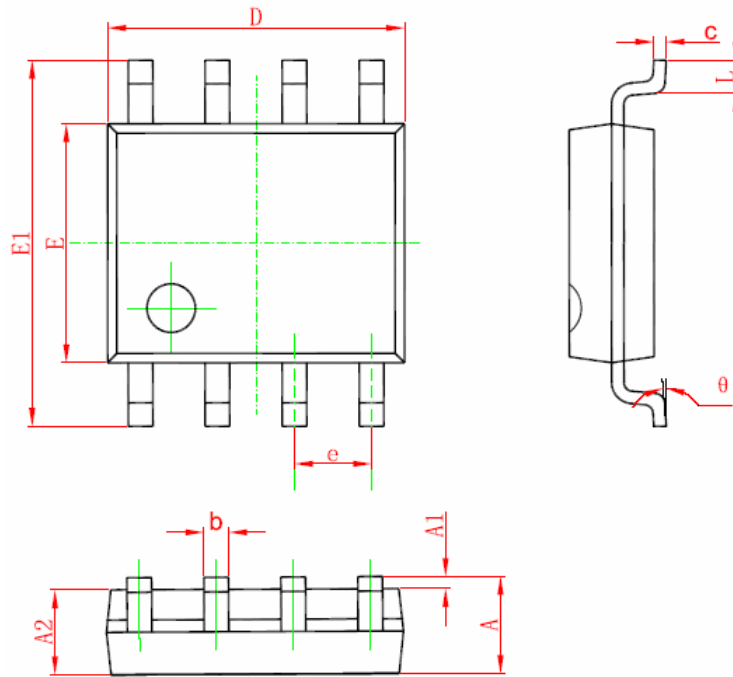


Gate Charge



Package Information

SOP-8 Package



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270 (BSC) | | 0.050 (BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

Design Notes

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