

General Description

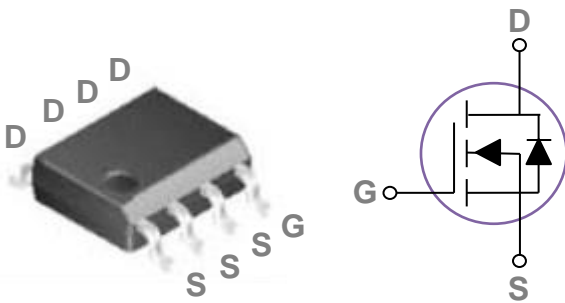
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

| | | |
|-------|-------|------|
| BVDSS | RDSON | ID |
| 60V | 26mΩ | 5.5A |

Features

- 60V,5.5A, $R_{DS(ON)}=26m\Omega@V_{GS}=10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

SOP8 Pin Configuration



Applications

- Motor Drive
- Power Tools
- LED Lighting

Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------|
| V_{DS} | Drain-Source Voltage | 60 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_A=25^\circ C$) | 5.5 | A |
| | Drain Current – Continuous ($T_A=100^\circ C$) | 4.4 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 22 | A |
| EAS | Single Pulse Avalanche Energy ² | 26.5 | mJ |
| IAS | Single Pulse Avalanche Current ² | 23 | A |
| P_D | Power Dissipation ($T_A=25^\circ C$) | 1.47 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 0.011 | W/ $^\circ C$ |
| T_{STG} | Storage Temperature Range | -50 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -50 to 150 | $^\circ C$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 85 | $^\circ C/W$ |

Electrical Characteristics (T_J=25 °C, unless otherwise noted)
Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|---|--|------|------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 60 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.06 | --- | V/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =60V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =48V, V _{GS} =0V, T _J =125°C | --- | --- | 10 | uA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |

On Characteristics

| | | | | | | |
|----------------------|---|---|-----|------|-----|-------|
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =2.5A | --- | 21 | 26 | mΩ |
| | | V _{GS} =10V, I _D =2.5A(T _J =125°C) | --- | 37.4 | --- | mΩ |
| | | V _{GS} =4.5V, I _D =2A | --- | 25 | 32 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.2 | 1.7 | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -4.6 | --- | mV/°C |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _D =1A | --- | 5 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------------------|------------------------------------|--|-----|------|------|----|
| Q _g | Total Gate Charge ^{2,3} | V _{DS} =30V, V _{GS} =10V, I _D =10A | --- | 16.4 | 32 | nC |
| Q _{gs} | Gate-Source Charge ^{2,3} | | --- | 3.1 | 6 | |
| Q _{gd} | Gate-Drain Charge ^{2,3} | | --- | 3.7 | 7 | |
| T _{d(on)} | Turn-On Delay Time ^{2,3} | V _{DD} =30V, V _{GS} =10V, R _G =6Ω I _D =1A | --- | 4.6 | 9 | ns |
| T _r | Rise Time ^{2,3} | | --- | 14.8 | 28 | |
| T _{d(off)} | Turn-Off Delay Time ^{2,3} | | --- | 27.2 | 52 | |
| T _f | Fall Time ^{2,3} | | --- | 7.8 | 15 | |
| C _{iss} | Input Capacitance | V _{DS} =30V, V _{GS} =0V, F=1MHz | --- | 1180 | 2200 | pF |
| C _{oss} | Output Capacitance | | --- | 80 | 160 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 52 | 100 | |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 1.3 | 2.6 | Ω |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--------------------------------------|---|------|------|------|------|
| I _S | Continuous Source Current | V _G =V _D =0V, Force Current | --- | --- | 5.5 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 11 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1 | V |
| t _{rr} | Reverse Recovery Time ² | V _{GS} =0V, I _S =10A, dI/dt=100A/μs T _J =25°C | --- | 25 | --- | ns |
| Q _{rr} | Reverse Recovery Charge ² | | --- | 12 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=50V, V_{GS}=10V, L=0.1mH, I_{AS}=23A., R_G=25Ω, Starting T_J=25°C
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

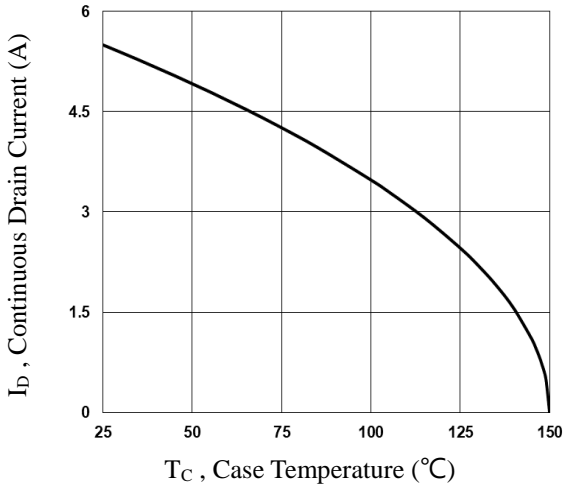


Fig.1 Continuous Drain Current vs. T_c

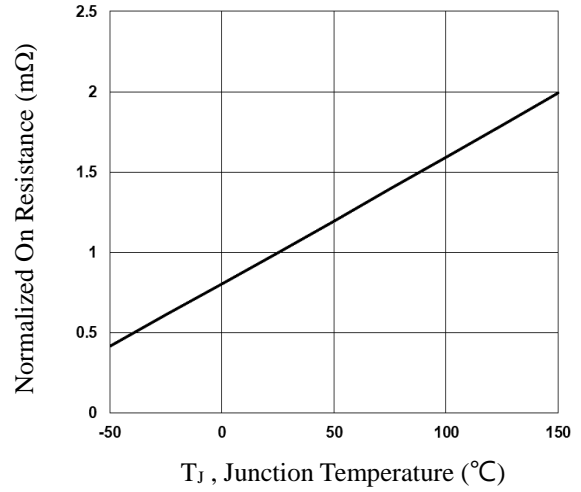


Fig.2 Normalized R_{DS(on)} vs. T_j

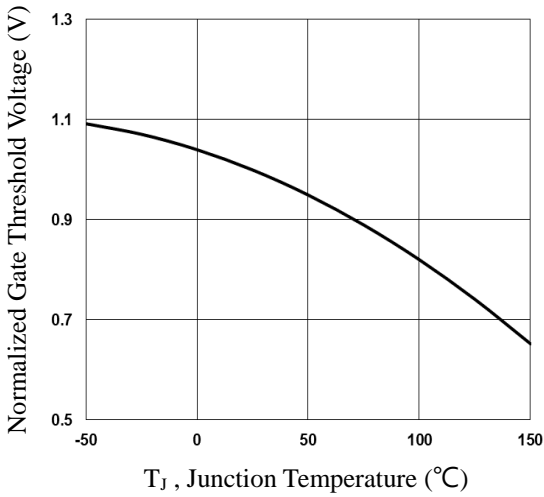


Fig.3 Normalized V_{th} vs. T_j

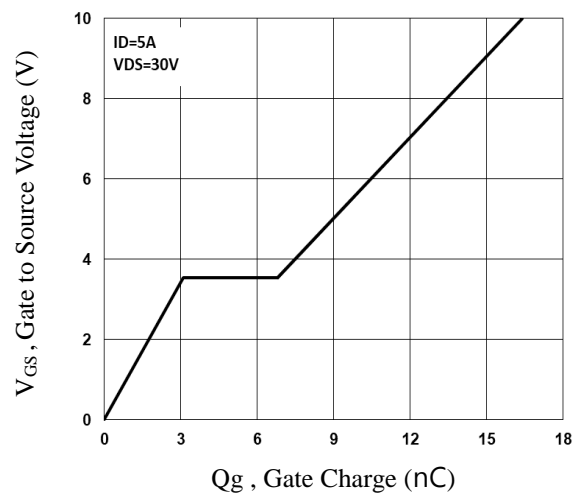


Fig.4 Gate Charge Waveform

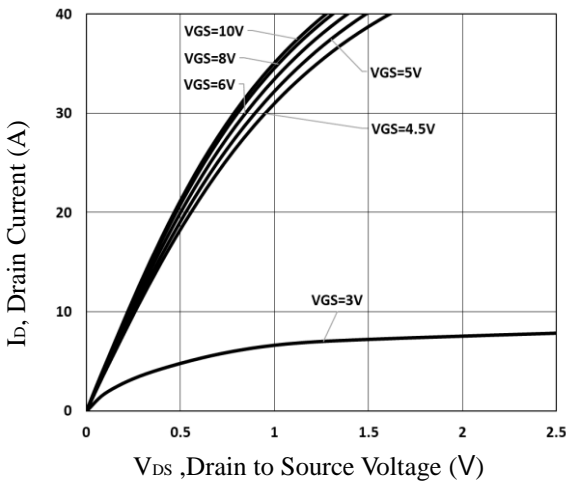


Fig.5 Typical Output Characteristics

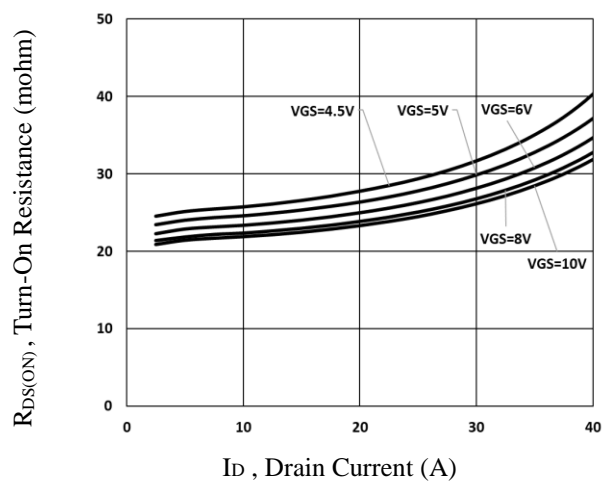


Fig.6 Turn-On Resistance vs. I_D

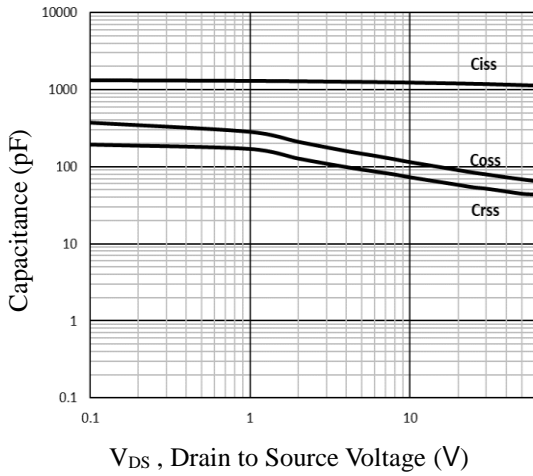


Fig.7 Capacitance Characteristics

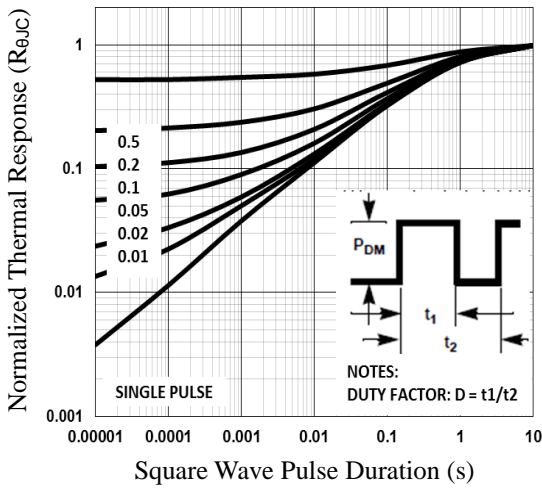


Fig.8 Normalized Transient Impedance

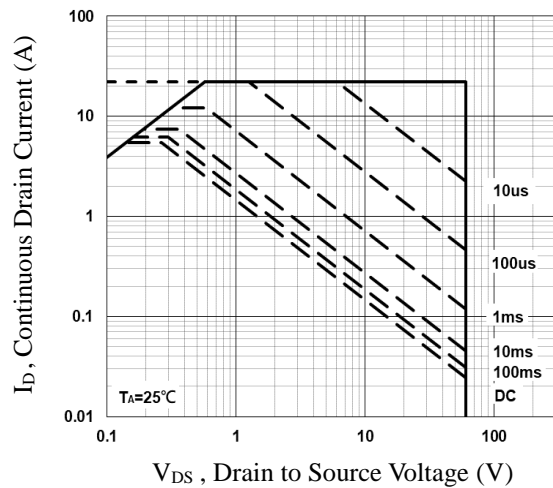


Fig.9 Maximum Safe Operation Area

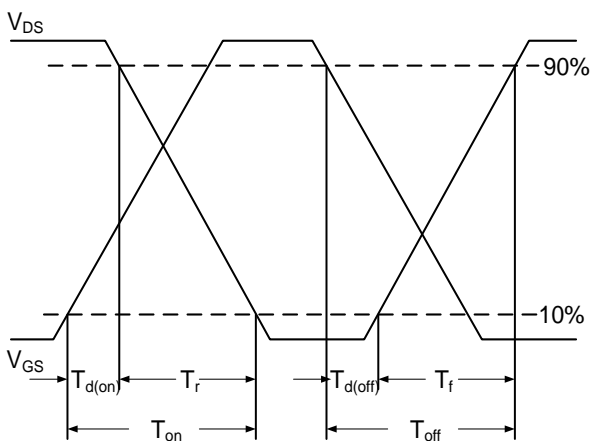


Fig.10 Switching Time Waveform

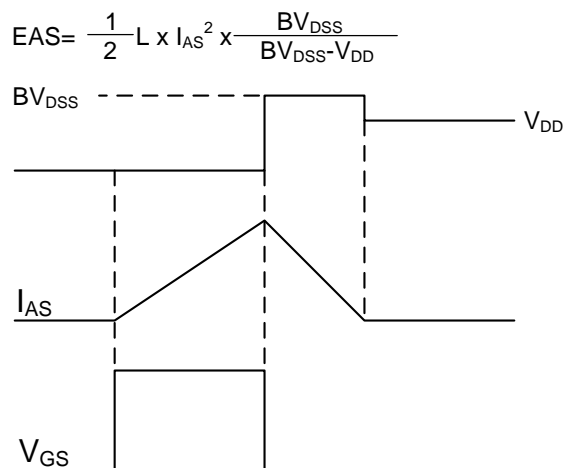
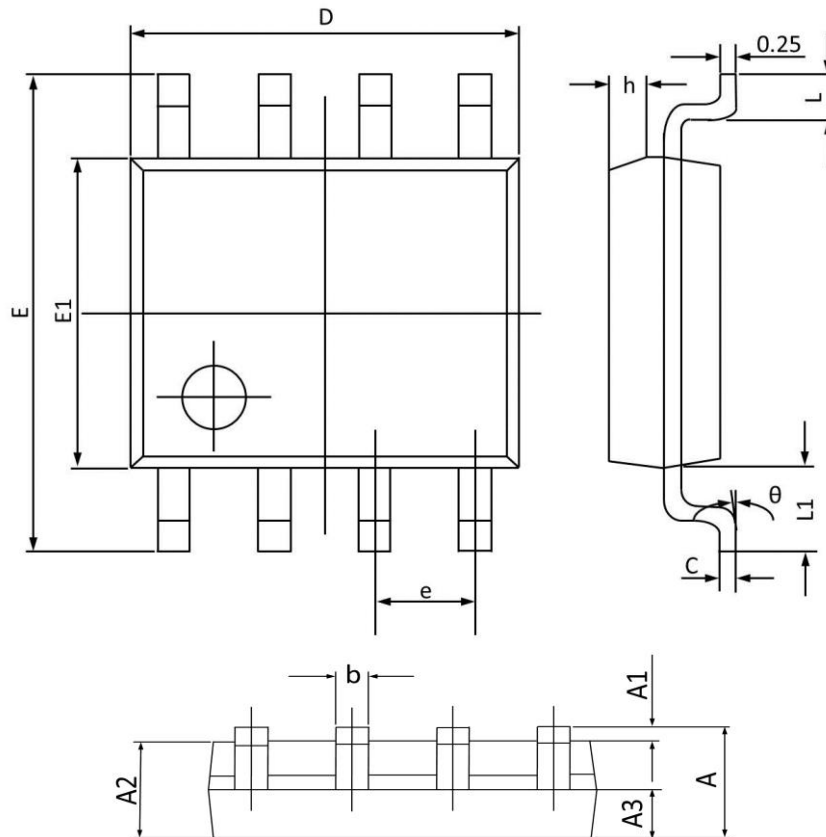


Fig.11 EAS Waveform

SOP8 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.068 |
| A1 | 0.100 | 0.250 | 0.004 | 0.009 |
| A2 | 1.300 | 1.500 | 0.052 | 0.059 |
| A3 | 0.600 | 0.700 | 0.024 | 0.027 |
| b | 0.390 | 0.480 | 0.016 | 0.018 |
| c | 0.210 | 0.260 | 0.009 | 0.010 |
| D | 4.700 | 5.100 | 0.186 | 0.200 |
| E | 5.800 | 6.200 | 0.229 | 0.244 |
| E1 | 3.700 | 4.100 | 0.146 | 0.161 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| h | 0.250 | 0.500 | 0.010 | 0.019 |
| L | 0.500 | 0.800 | 0.019 | 0.031 |
| L1 | 1.050(BSC) | | 0.041(BSC) | |
| θ | 0° | 8° | 0° | 8° |