

General Description

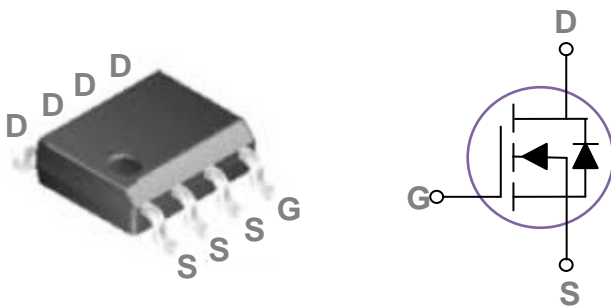
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|-----|
| BVDSS | RDSON | ID |
| 30V | 4.2mΩ | 30A |

Features

- 30V, 30A, $R_{DS(ON)} = 4.2m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

SOP8 Pin Configuration



Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|-----------|--------------------------------------------------------|------------|---------------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_C=25^\circ\text{C}$) | 30 | A |
| | Drain Current – Continuous ($T_C=100^\circ\text{C}$) | 19 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 120 | A |
| EAS | Single Pulse Avalanche Energy ² | 125 | mJ |
| IAS | Single Pulse Avalanche Current ² | 50 | A |
| P_D | Power Dissipation ($T_C=25^\circ\text{C}$) | 7 | W |
| | Power Dissipation – Derate above 25°C | 0.056 | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 175 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 175 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|----------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 18 | $^\circ\text{C/W}$ |

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)
Static State Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|------------------------------------------------|----------------------------------------------------|------|------|-----------|---------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BV_{DSS} Temperature Coefficient | Reference to 25°C , $I_D=1\text{mA}$ | --- | 0.03 | --- | $V/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=24V, V_{GS}=0V, T_J=125^\circ\text{C}$ | --- | --- | 10 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ³ | $V_{GS}=10V, I_D=12A$ | --- | 3.8 | 4.2 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=6A$ | --- | 5.2 | 6 | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.6 | 2.5 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -5 | --- | $mV/^\circ\text{C}$ |
| g_{fs} | Forward Transconductance | $V_{DS}=10V, I_D=6A$ | --- | 12 | --- | S |

Dynamic Characteristics

| | | | | | | |
|--------------|------------------------------------|------------------------------------------------------|-----|------|------|----------|
| Q_g | Total Gate Charge ^{3,4} | $V_{DS}=15V, V_{GS}=4.5V, I_D=12A$ | --- | 24 | 34 | nC |
| Q_{gs} | Gate-Source Charge ^{3,4} | | --- | 4.2 | 6 | |
| Q_{gd} | Gate-Drain Charge ^{3,4} | | --- | 13 | 18 | |
| $T_{d(on)}$ | Turn-On Delay Time ^{3,4} | $V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega$ $I_D=15A$ | --- | 12.6 | 24 | ns |
| T_r | Rise Time ^{3,4} | | --- | 19.5 | 37 | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{3,4} | | --- | 42.8 | 81 | |
| T_f | Fall Time ^{3,4} | | --- | 13.2 | 25 | |
| C_{iss} | Input Capacitance | $V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$ | --- | 2200 | 3190 | pF |
| C_{oss} | Output Capacitance | | --- | 280 | 405 | |
| C_{riss} | Reverse Transfer Capacitance | | --- | 177 | 255 | |
| R_g | Gate resistance | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | --- | 2 | 4 | Ω |

Guaranteed Avalanche Energy

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------|-------------------------------|------------------------------------------|------|------|------|------|
| EAS | Single Pulse Avalanche Energy | $V_{DD}=25V, L=0.1\text{mH}, I_{AS}=10A$ | 31 | --- | --- | mJ |

Drain-Source Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|------------------------------------|-------------------------------------------|------|------|------|------|
| I_S | Continuous Source Current | $V_G=V_D=0V$, Force Current | --- | --- | 30 | A |
| I_{SM} | Pulsed Source Current ³ | | --- | --- | 120 | A |
| V_{SD} | Diode Forward Voltage ³ | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1 | V |
| t_{rr} | Reverse Recovery Time | $V_{GS}=0V, I_S=1A, di/dt=100A/\mu s$ | --- | --- | --- | ns |
| Q_{rr} | Reverse Recovery Charge | $T_J=25^\circ\text{C}$ | --- | --- | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=50A, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.
3. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

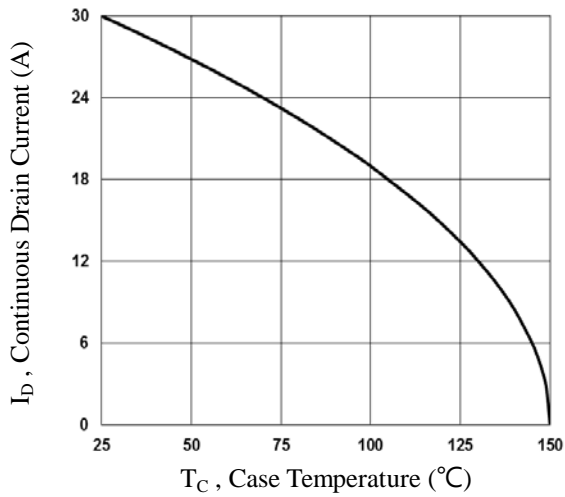


Fig.1 Continuous Drain Current vs. T_c

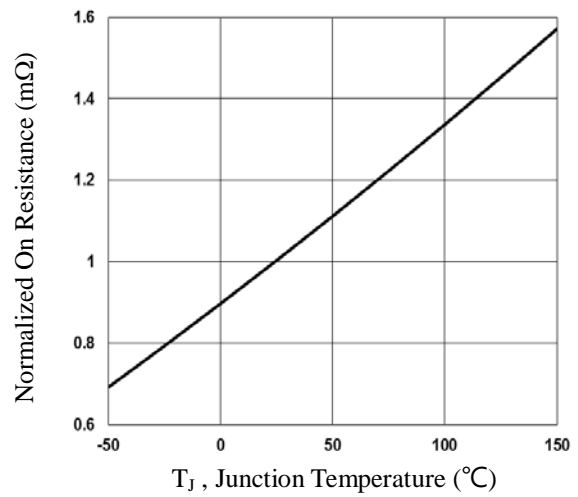


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

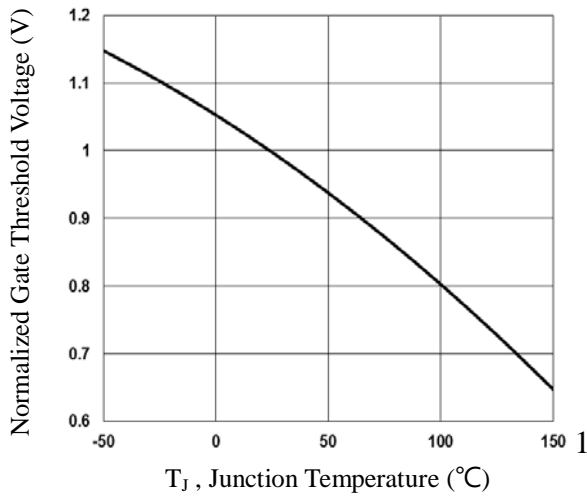


Fig.3 Normalized V_{th} vs. T_j

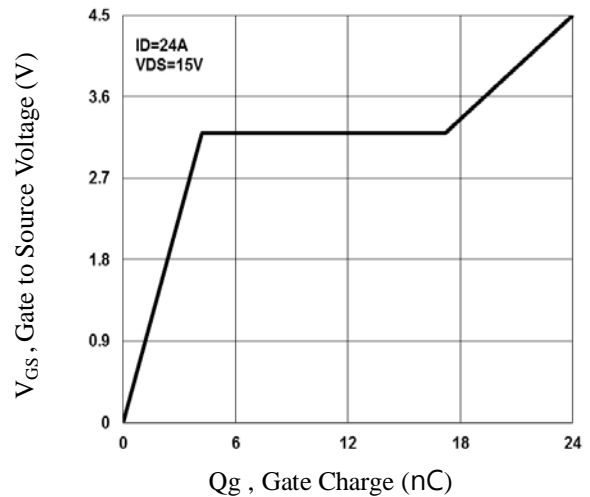


Fig.4 Gate Charge Waveform

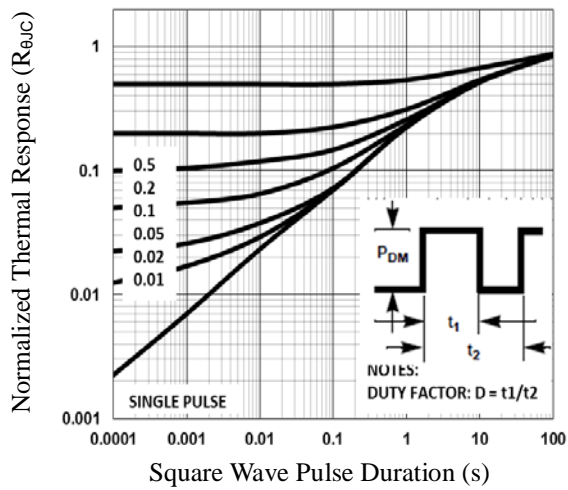


Fig.5 Normalized Transient Impedance

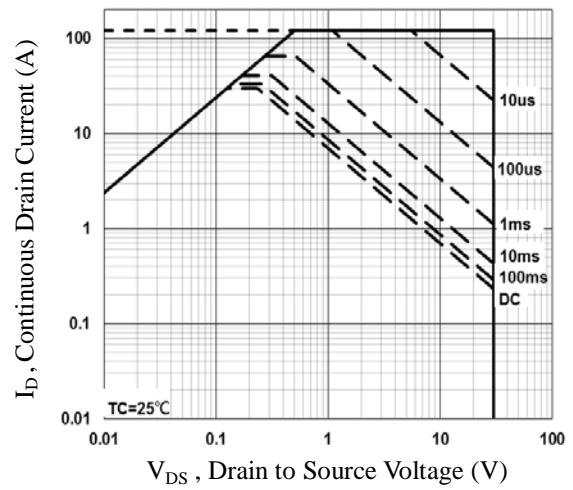


Fig.6 Maximum Safe Operation Area

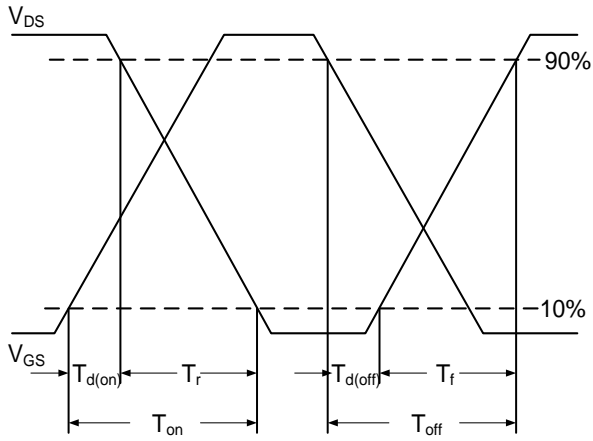


Fig.7 Switching Time Waveform

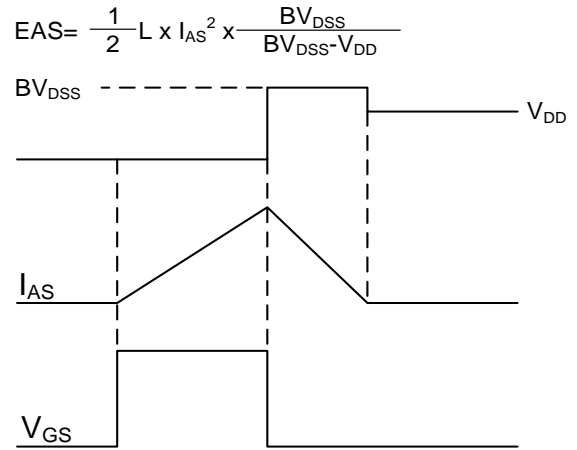
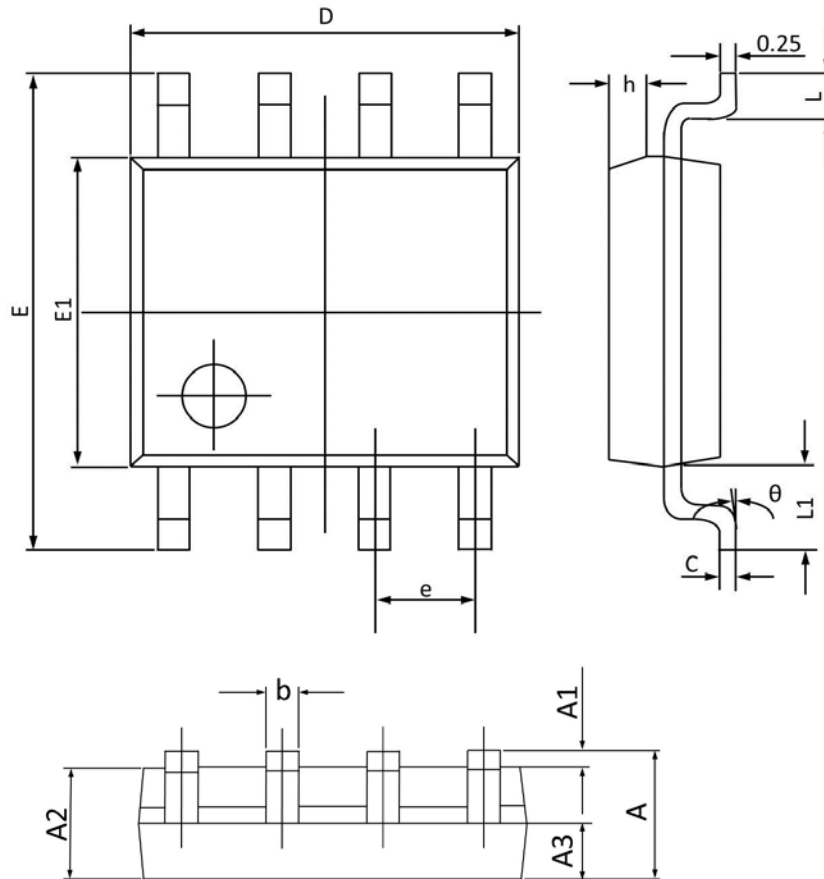


Fig.8 EAS Waveform

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° |