

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 | 15.5mΩ | 7.5A |

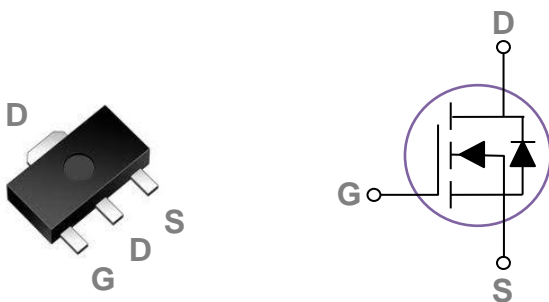
Features

- 30V, 7.5A, $R_{DS(ON)}=15.5m\Omega@V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

Applications

- Notebook
- Load Switch
- LED applications
- Hand-Held Device

SOT89 Pin Configuration



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 ($T_A=25^\circ\text{C}$) | 7.5 | A |
| | Drain Current – Continuous ($T_A=70^\circ\text{C}$) | 6 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 30 | A |
| P_D | Power Dissipation ($T_A=25^\circ\text{C}$) | 1.47 | W |
| | Power Dissipation – Derate above 25°C | 0.012 | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

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

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 | 30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.04 | --- | V/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =30V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =24V, 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 =4A | --- | 13 | 15.5 | mΩ |
| | | V _{GS} =4.5V, I _D =3A | --- | 17 | 22 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.2 | 1.6 | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -4 | --- | mV/°C |
| gfs | Forward Transconductance | V _{DS} =10V, I _D =10A | --- | 18 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------------------|-------------------------------------|--|-----|------|------|----|
| Q _g | Total Gate Charge ^{2, 3} | V _{DS} =15V, V _{GS} =10V, I _D =4A | --- | 16.7 | 32 | nC |
| Q _{gs} | Gate-Source Charge ^{2, 3} | | --- | 1.3 | 3 | |
| Q _{gd} | Gate-Drain Charge ^{2, 3} | | --- | 4.5 | 9 | |
| T _{d(on)} | Turn-On Delay Time ^{2, 3} | V _{DD} =15V, V _{GS} =10V, R _G =3.3Ω I _D =1A | --- | 4.8 | 9 | ns |
| T _r | Rise Time ^{2, 3} | | --- | 12.5 | 25 | |
| T _{d(off)} | Turn-Off Delay Time ^{2, 3} | | --- | 27.6 | 50 | |
| T _f | Fall Time ^{2, 3} | | --- | 8.2 | 16 | |
| C _{iss} | Input Capacitance | V _{DS} =25V, V _{GS} =0V, F=1MHz | --- | 750 | 1350 | pF |
| C _{oss} | Output Capacitance | | --- | 150 | 300 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 110 | 200 | |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 2.7 | 4.5 | 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 | --- | --- | 7.5 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 15 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1 | V |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

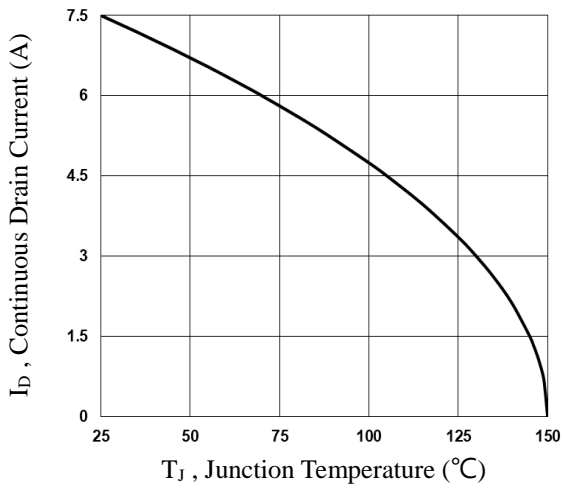


Fig.1 Continuous Drain Current vs. T_c

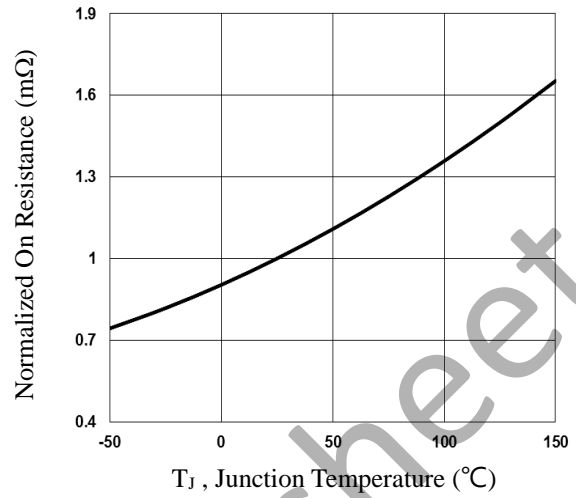


Fig.2 Normalized R_{DS(on)} vs. T_J

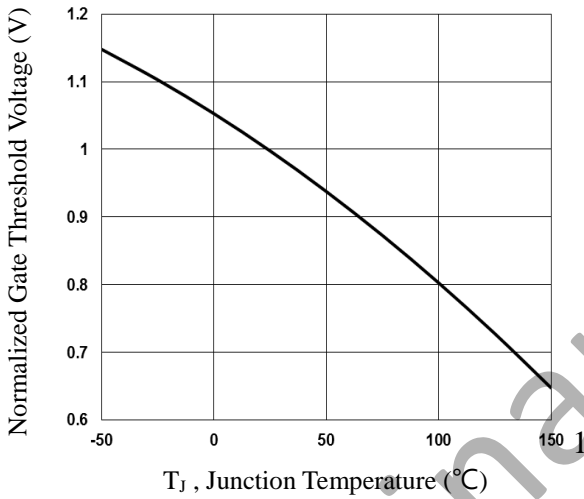


Fig.3 Normalized V_{th} vs. T_J

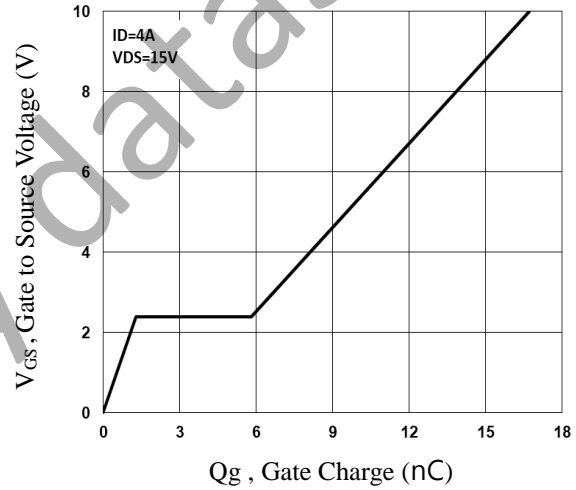


Fig.4 Gate Charge Waveform

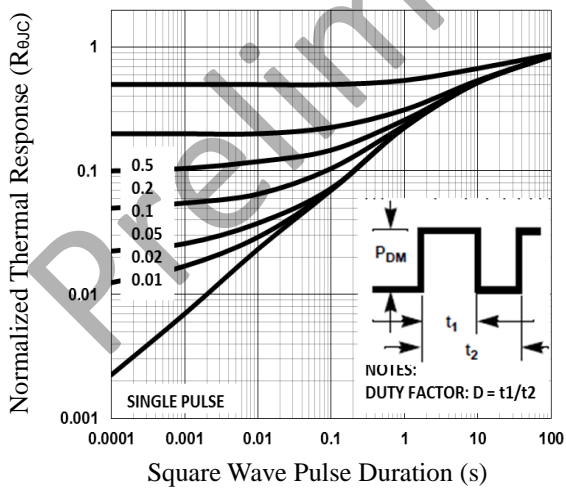


Fig.5 Normalized Transient Impedance

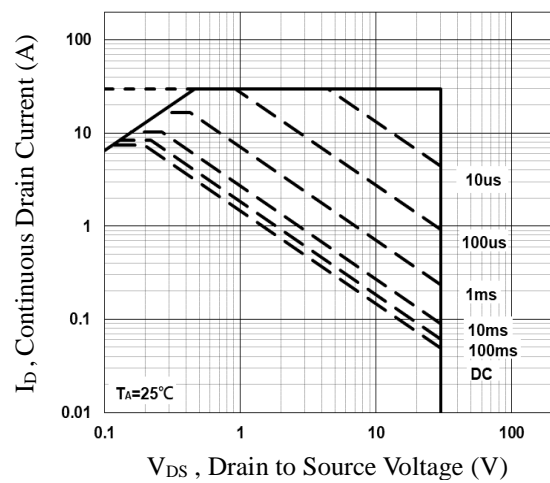


Fig.6 Maximum Safe Operation Area

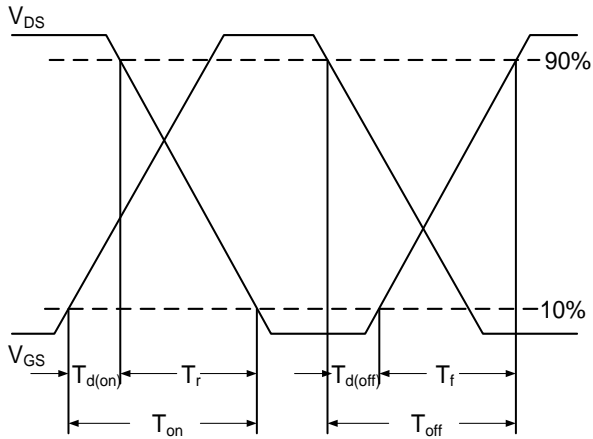


Fig.7 Switching Time Waveform

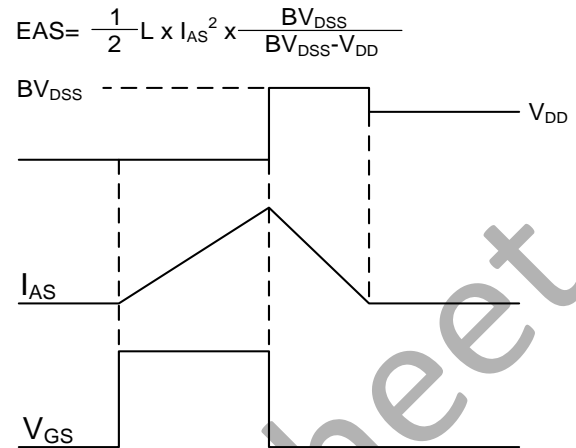
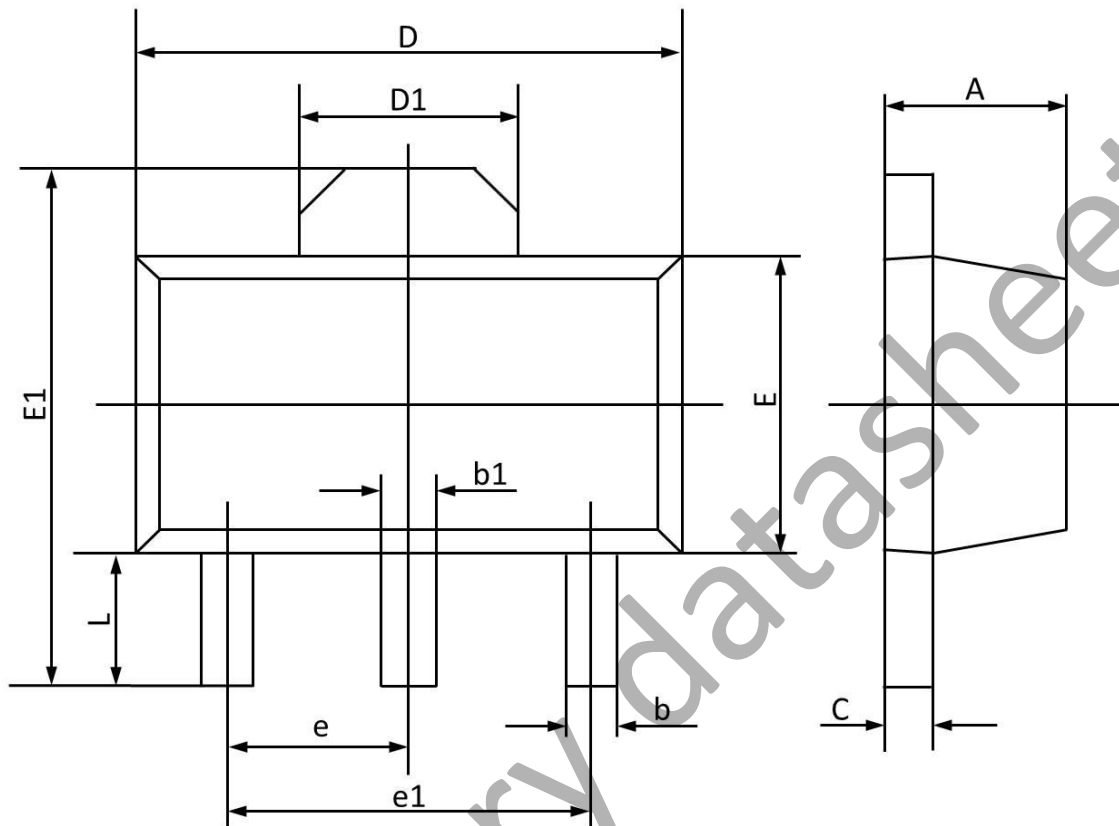


Fig.8 EAS Waveform

Preliminary datasheet

SOT89 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.400 | 1.600 | 0.055 | 0.063 |
| b | 0.320 | 0.520 | 0.013 | 0.020 |
| b1 | 0.400 | 0.580 | 0.016 | 0.023 |
| c | 0.350 | 0.440 | 0.014 | 0.017 |
| D | 4.400 | 4.600 | 0.173 | 0.181 |
| D1 | 1.550 REF | | 0.061 REF | |
| E | 2.300 | 2.600 | 0.091 | 0.102 |
| E1 | 3.940 | 4.250 | 0.155 | 0.167 |
| e | 1.500 TYP. | | 0.060 TYP. | |
| e1 | 3.000 TYP | | 0.118 TYP | |
| L | 0.900 | 1.200 | 0.035 | 0.047 |