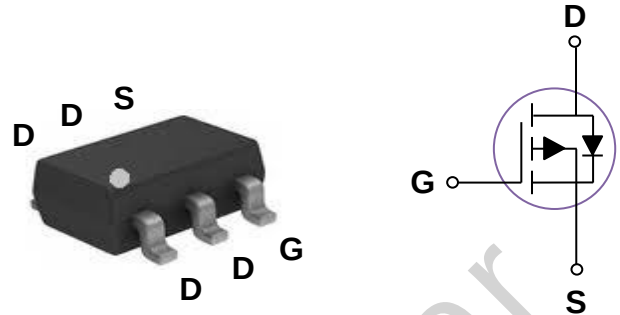


Features

- -60V, -3.3A, $R_{DS(ON)} = 96m\Omega @ V_{GS} = -10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available



General Description

These P-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.

Applications

- Motor Drive
- Power Tools
- LED Lighting

Absolute Maximum Ratings $T_c=25^\circ\text{C}$ 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 ($T_A=25^\circ\text{C}$)	-3.3	A
	Drain Current – Continuous ($T_A=70^\circ\text{C}$)	-2.6	A
I_{DM}	Drain Current – Pulsed ¹	-13.2	A
EAS	Single Pulse Avalanche Energy ²	25	mJ
IAS	Single Pulse Avalanche Current ²	-18	A
P_D	Power Dissipation ($T_A=25^\circ\text{C}$)	2	W
	Power Dissipation – Derate above 25°C	0.016	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	---	62.5	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-60	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-60V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-48V$, $V_{GS}=0V$, $T_J=125^\circ\text{C}$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10V$, $I_D=-2A$	---	80	96	$m\Omega$
		$V_{GS}=-4.5V$, $I_D=-1A$	---	100	130	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=-250\mu A$	-1.0	-1.6	-2.5	V
g_{fs}	Forward Transconductance	$V_{DS}=-10V$, $I_D=-1A$	---	3	---	S

Dynamic and switching Characteristics

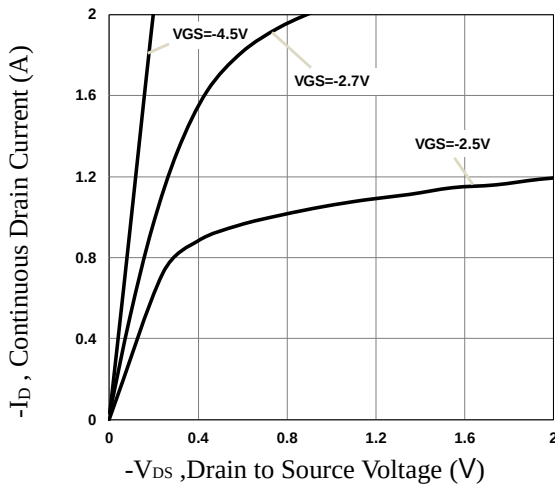
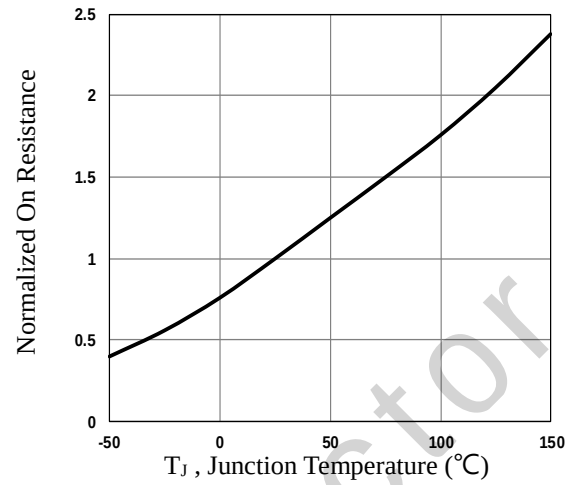
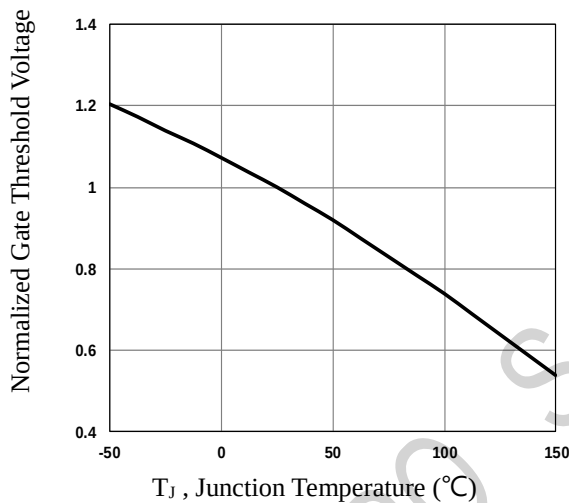
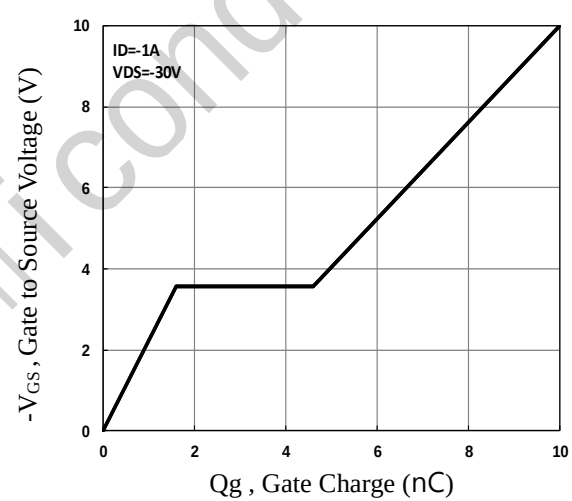
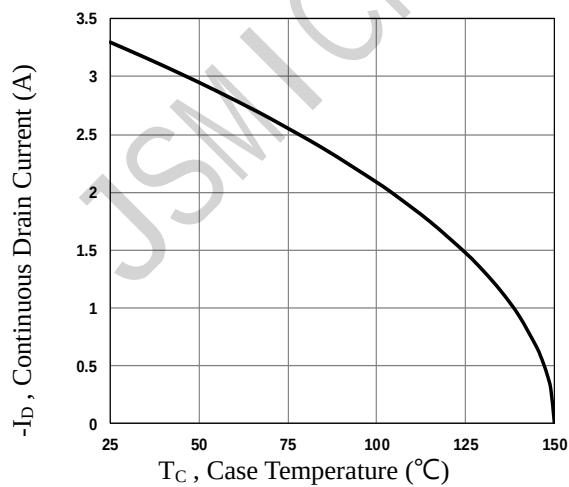
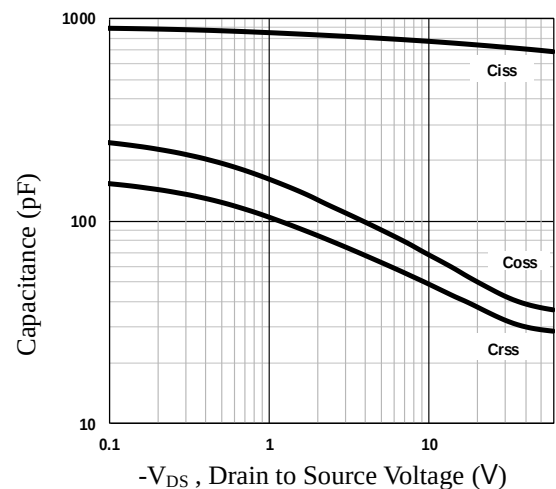
Q_g	Total Gate Charge ^{3, 4}	$V_{DS}=-30V$, $V_{GS}=-10V$, $I_D=-1A$	---	10	15	nC
Q_{gs}	Gate-Source Charge ^{3, 4}		---	1.6	3.2	
Q_{gd}	Gate-Drain Charge ^{3, 4}		---	3	6	
$T_{d(on)}$	Turn-On Delay Time ^{3, 4}	$V_{DD}=-30V$, $V_{GS}=-10V$, $R_G=6\Omega$	---	8	16	ns
T_r	Rise Time ^{3, 4}		---	15.4	30	
$T_{d(off)}$	Turn-Off Delay Time ^{3, 4}		---	42.8	80	
T_f	Fall Time ^{3, 4}		---	8.4	16	
C_{iss}	Input Capacitance	$V_{DS}=-30V$, $V_{GS}=0V$, $F=1\text{MHz}$	---	720	1080	pF
C_{oss}	Output Capacitance		---	42	63	
C_{rss}	Reverse Transfer Capacitance		---	32	48	
R_g	Gate resistance	$V_{GS}=0V$, $V_{DS}=0V$, $F=1\text{MHz}$	---	22	---	Ω

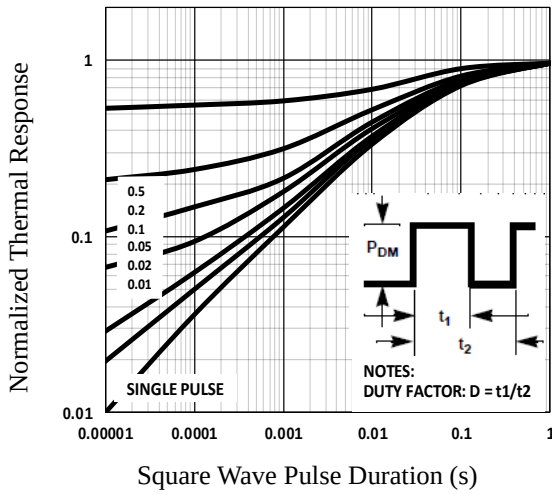
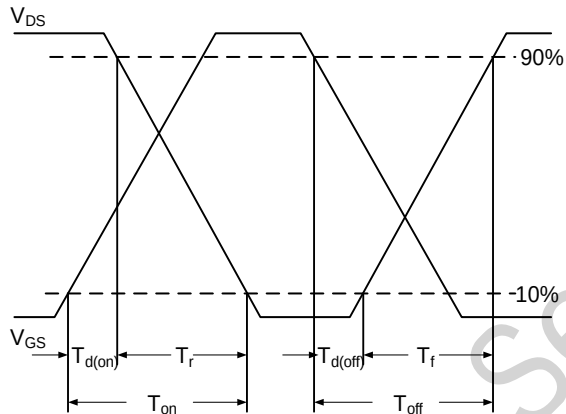
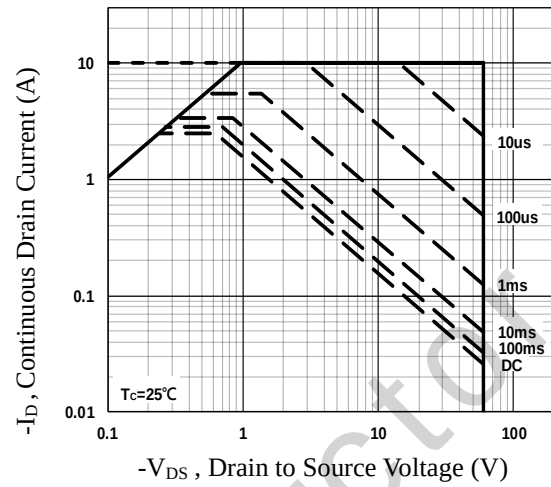
Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	-3.3	A
I_{SM}	Pulsed Source Current		---	---	-6.6	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=-1A$, $T_J=25^\circ\text{C}$	---	---	-1	V
t_{rr}	Reverse Recovery Time	$V_R=-50V$, $I_S=-1A$	---	30	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	15	---	nC

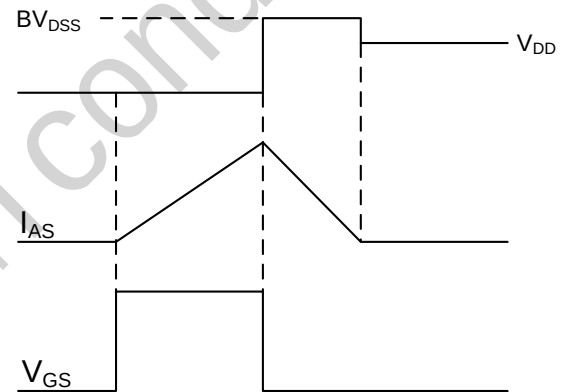
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=-25V$, $V_{GS}=-10V$, $L=0.1mH$, $I_{AS}=-18A$, $R_G=25\Omega$, 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.

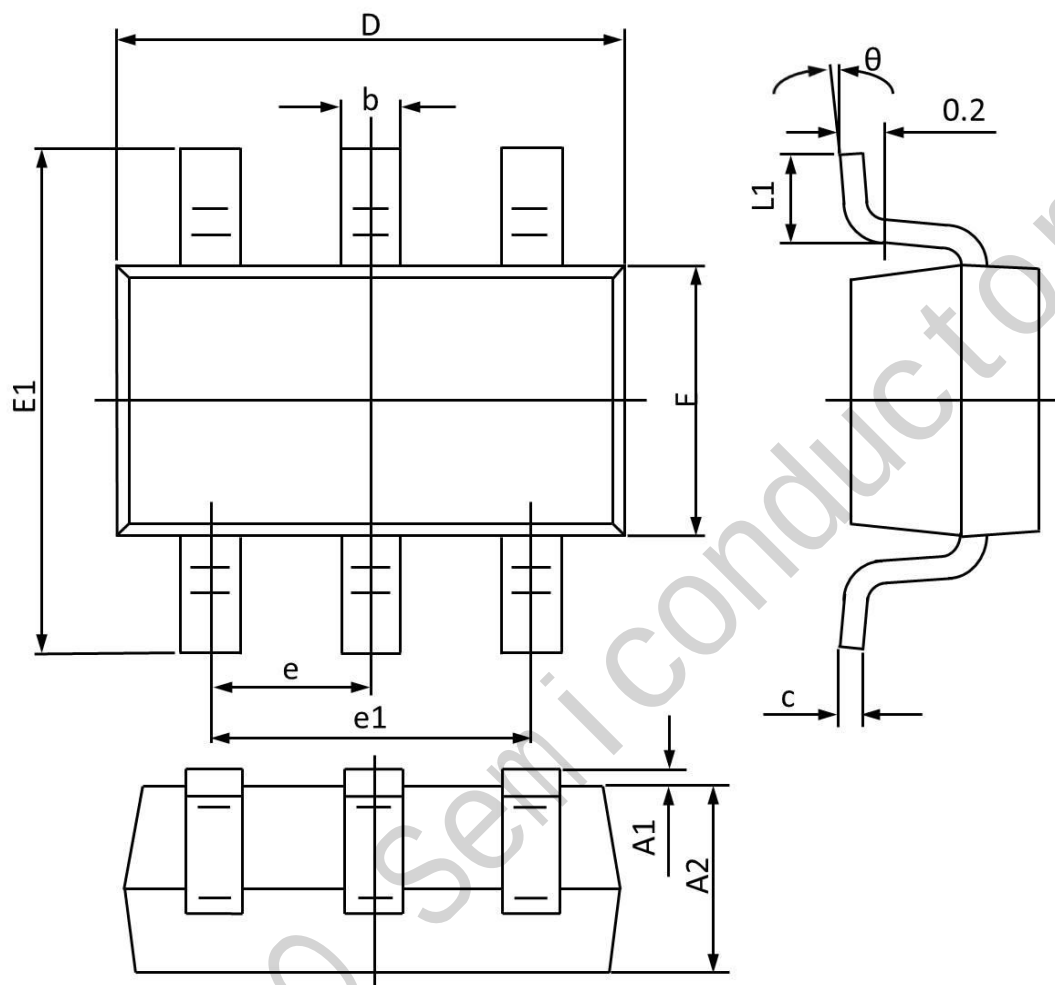

Fig.1 Typical Output Characteristics

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

Fig.3 Normalized V_{th} vs. T_J

Fig.4 Gate Charge Waveform

Fig.5 Continuous Drain Current vs. T_c

Fig.6 Capacitance Characteristics


Fig.7 Normalized Transient Impedance

Fig.9 Switching Time Waveform

Fig.8 Maximum Safe Operation Area

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$


Fig.10 EAS Waveform

SOT23-6 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A1	---	0.150	---	0.006
A2	0.900	1.300	0.035	0.051
b	0.300	0.500	0.012	0.019
c	0.100	0.200	0.004	0.008
D	2.800	3.050	0.110	0.120
E1	2.600	3.000	0.103	0.118
F	1.500	1.800	0.059	0.071
e	0.950 TYP		0.037 TYP	
e1	1.900 TYP		0.075 TYP	
L1	0.250	0.600	0.010	0.024
θ	0°	8°	0°	8°