60V N-Channel MOSFETs

BVDSS	RDSON	ID
60V	75mΩ	5A

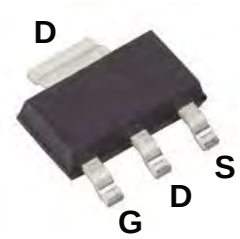
General Description

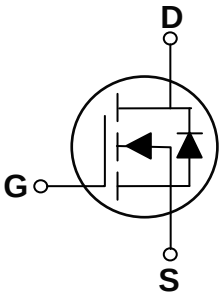
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

Features

- *60V,5A, RDS(ON) =75mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*
- *AEC-Q101 qualified*

SOT223 Pin Configuration





Applications

- *Motor Drive*
- *Power Tools*
- *LED Lighting*

Absolute Maximum Ratings **Tc=25℃ 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_C=25℃)	5	A
	Drain Current – Continuous (T_C=100℃)	3.2	A
I_{DM}	Drain Current – Pulsed[1]	20	A
EAS	Single Pulse Avalanche Energy[2]	25	mJ
IAS	Single Pulse Avalanche Current[2]	7	A
P_D	Power Dissipation (T_C=25℃)	1.79	W
	Power Dissipation – Derate above 25℃	0.014	W/℃
T_{STG}	Storage Temperature Range	-50 to 150	℃
T_J	Operating Junction Temperature Range	-50 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	70	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	30	℃/W

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Electrical Characteristics (T_J=25 ℃, 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
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.05	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=60V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=48V , V_{GS}=0V , T_J=125℃	---	---	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=5A	---	60	75	mΩ
		V_{GS}=4.5V , I_D=3A	---	70	90	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.8	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5	---	mV/℃
gfs	Forward Transconductance	V_{DS}=10V , I_D=3A	---	7	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=48V , V_{GS}=10V , I_D=5A	---	9.3	14	nC
Q_{gs}	Gate-Source Charge[2,3]		---	2.1	4	
Q_{gd}	Gate-Drain Charge[2,3]		---	1.8	4	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=30V , V_{GS}=10V , R_G=3.3Ω I_D=1A	---	2.9	6	ns
T_r	Rise Time[2,3]		---	9.5	18	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	18.4	35	
T_f	Fall Time[2,3]		---	5.3	10	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , F=1MHz	---	500	725	pF
C_{oss}	Output Capacitance		---	45	65	
C_{rss}	Reverse Transfer Capacitance		---	16	30	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	2	4	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	A
I_{SM}	Pulsed Source Current		---	---	20	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V
t_{rr}	Reverse Recovery Time[2]	V_{GS}=30V,I_S=1A , dI/dt=100A/μs	---	23.2	---	ns
Q_{rr}	Reverse Recovery Charge[2]	T_J=25℃	---	14.3	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V,V_{GS}=10V,L=1mH,I_{AS}=7A.,R_G=25Ω , Starting T_J=25℃
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

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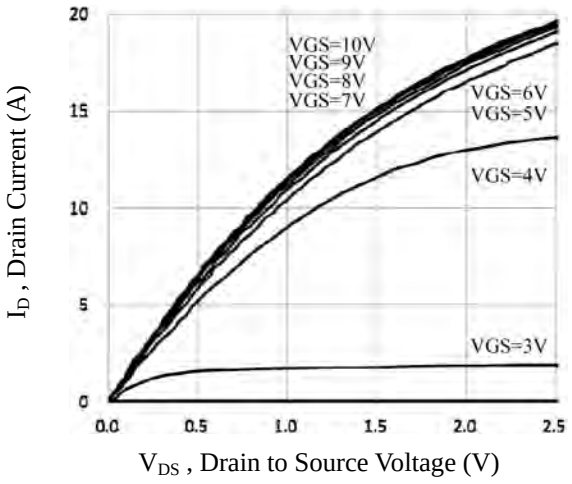

Fig.1 Typical Output Characteristics

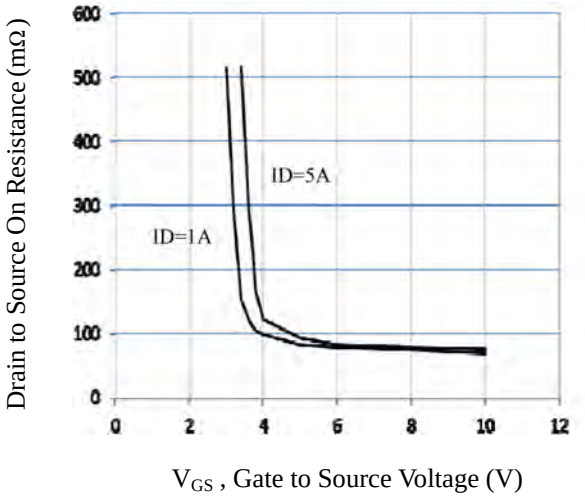

Fig.2 RDSON vs. Gate Voltage

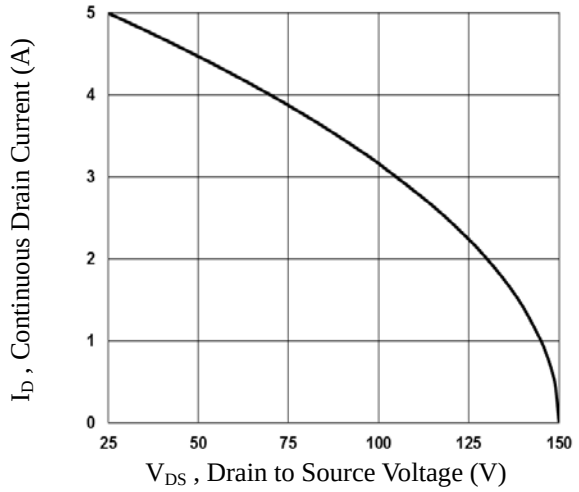

Fig.3 Output Characteristics

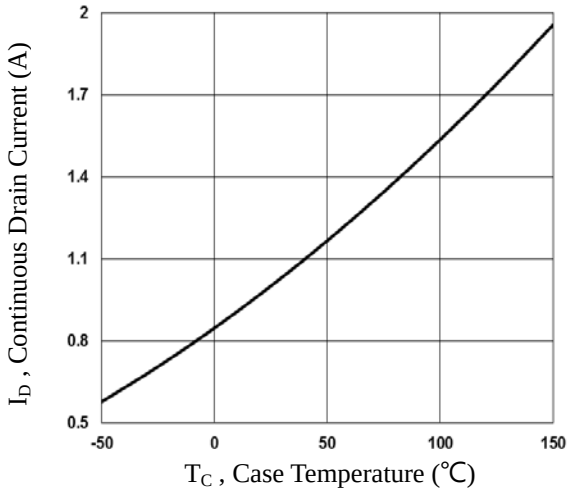

Fig.4 Continuous Drain Current vs. T_C

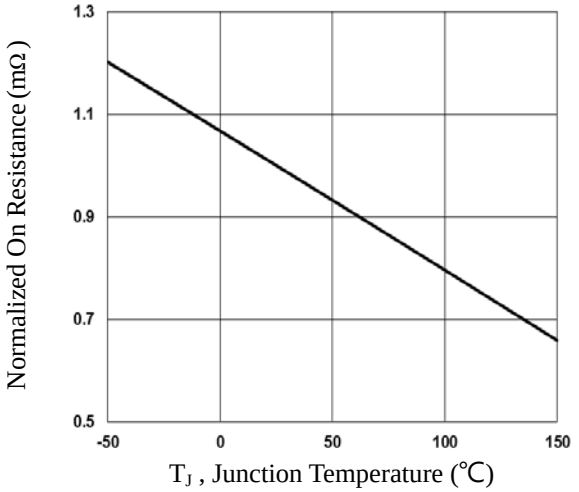

Fig.5 Normalized RDSON vs. T_J

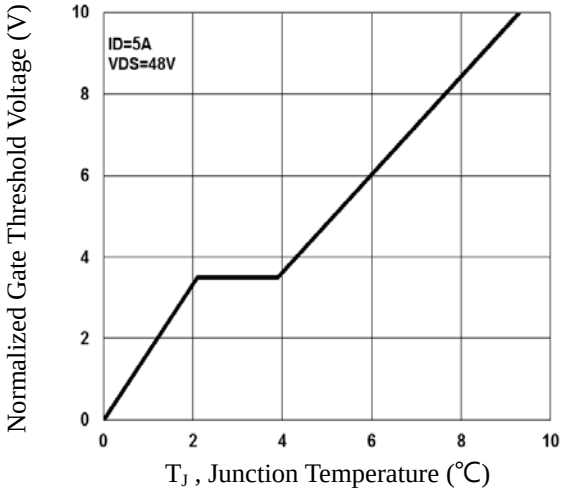

Fig.6 Normalized V_{th} vs. T_J

60V N-Channel MOSFETs

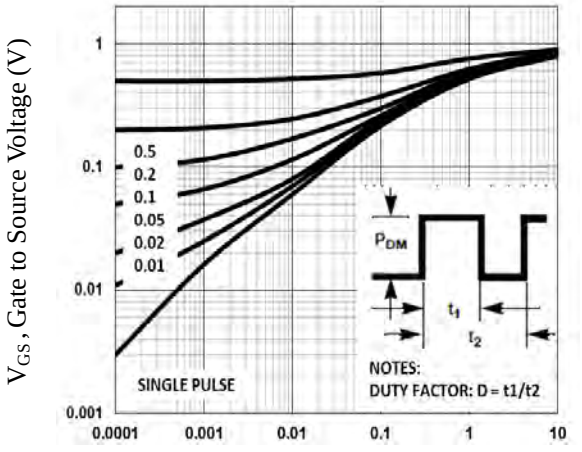

Fig.7 Gate Charge Waveform

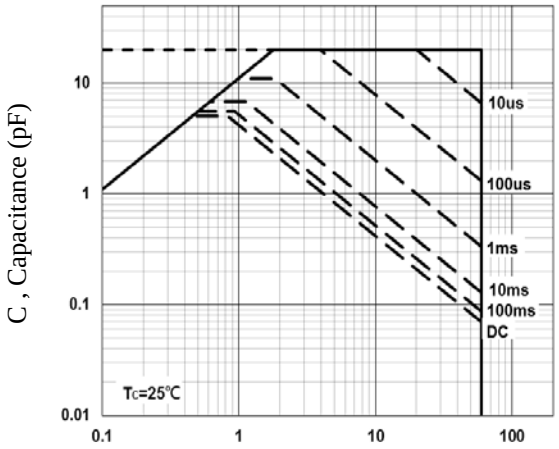

Fig.8 Capacitance Characteristics

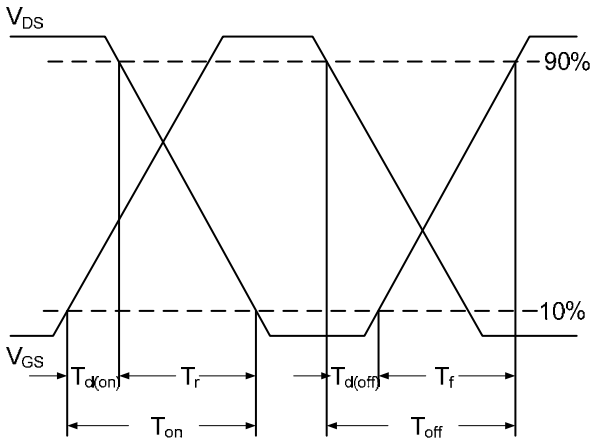

Fig.9 Switching Time Waveform

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

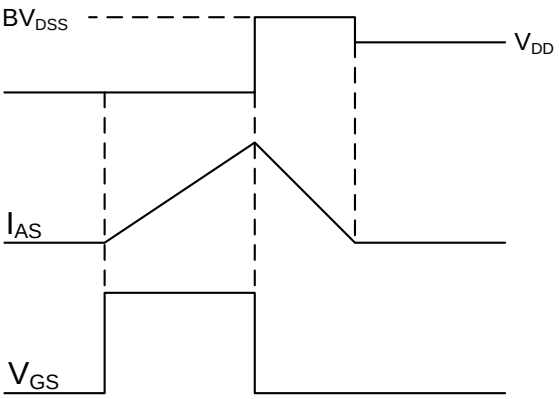

Fig.10 EAS Waveform

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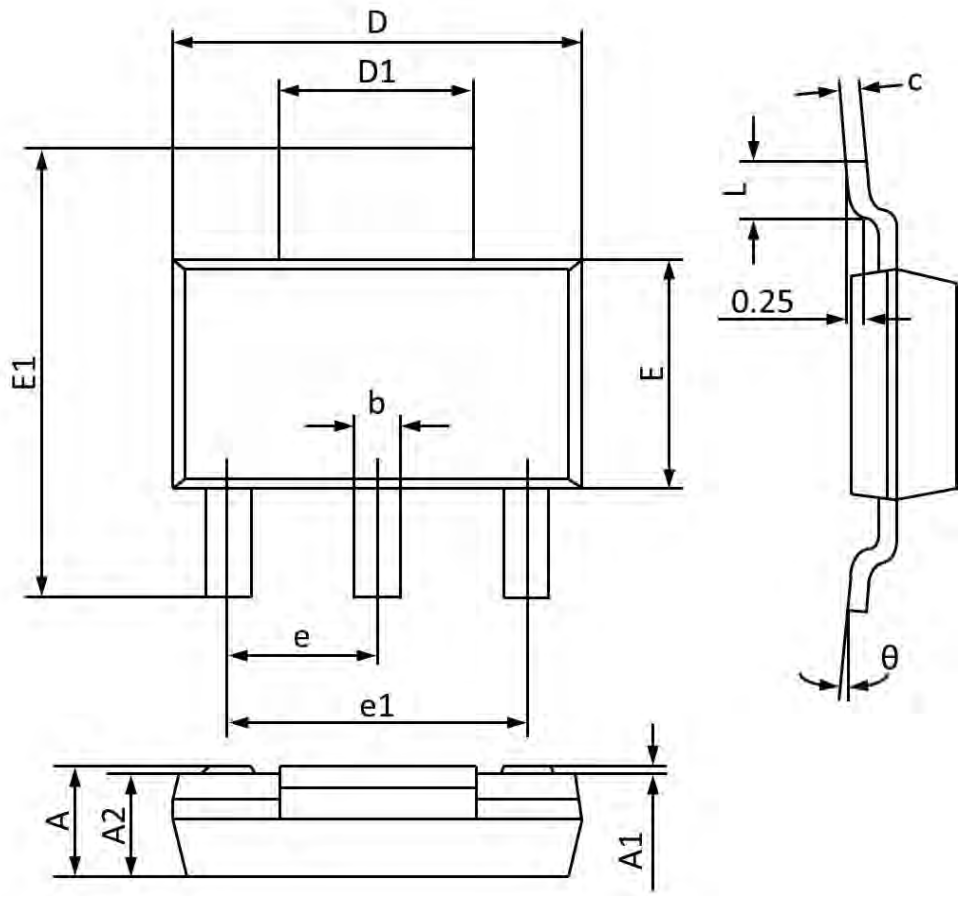
SOT223 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300 (BSC)		0.091 (BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°