

60V P-Channel MOSFETs

General Description

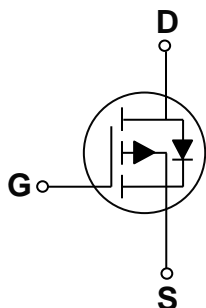
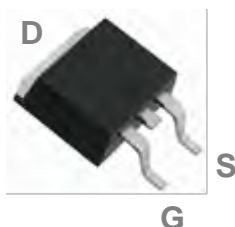
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
-60V	9.2mΩ	-70A

Features

- -60V,-70A, $R_{DS(ON)} = 9.2m\Omega @ V_{GS} = -10V$
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

TO-252 Pin Configuration



Applications

- POL Applications
- Load Switch
- LED Application

Absolute Maximum Ratings (Tc=25 °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 _C =25 °C)	-70	A
	Drain Current – Continuous (T _C =100 °C)	-44.3	A
I _{DM}	Drain Current – Pulsed ¹	-280	A
EAS	Single Pulse Avalanche Energy ²	320	mJ
IAS	Single Pulse Avalanche Current ²	80	A
P _D	Power Dissipation (T _C =25 °C)	133	W
	Power Dissipation – Derate above 25 °C	1.06	W/°C
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R _{θJC}	Thermal Resistance Junction to Case	---	0.94	°C/W
R _{θJA}	Thermal Resistance Junction to Ambient	---	62	°C/W



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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
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.036	---	V/ $^\circ\text{C}$
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	$V_{GS}=-10V, I_D=-20A$	---	7.6	9.2	m Ω
		$V_{GS}=-4.5V, I_D=-10A$	---	9.2	12	m Ω
$V_{GS(th)}$	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		---	-6.3	---	mV/ $^\circ\text{C}$
gfs	Forward Transconductance	$V_{DS}=-10V, I_D=-3A$	---	18	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{3, 4}	$V_{DS}=-48V, V_{GS}=-10V, I_D=-5A$	---	141	210	nC
Q_{gs}	Gate-Source Charge ^{3, 4}		---	17	25.5	
Q_{gd}	Gate-Drain Charge ^{3, 4}		---	28.6	43	
$T_{d(on)}$	Turn-On Delay Time ^{3, 4}	$V_{DD}=-48V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A$	---	70	140	ns
T_r	Rise Time ^{3, 4}		---	205	410	
$T_{d(off)}$	Turn-Off Delay Time ^{3, 4}		---	402	804	
T_f	Fall Time ^{3, 4}		---	197	394	
C_{iss}	Input Capacitance	$V_{DS}=-25V, V_{GS}=0V, F=1\text{MHz}$	---	8620	12930	pF
C_{oss}	Output Capacitance		---	486	730	
C_{rss}	Reverse Transfer Capacitance		---	288	430	

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	---	---	-70	A
I_{SM}	Pulsed Source Current		---	---	-140	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=50V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=80A, R_G=25\Omega$, 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.



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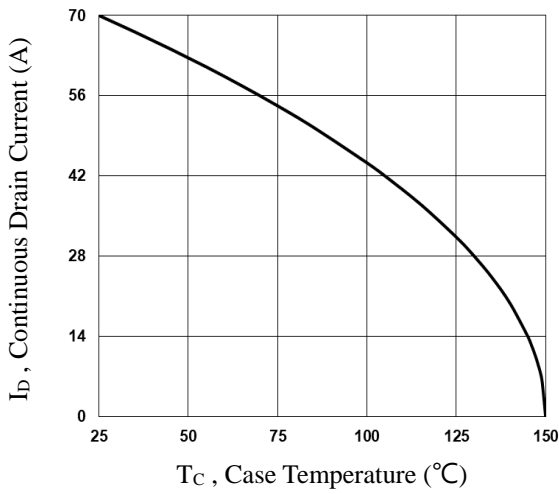


Fig.1 Continuous Drain Current vs. T_C

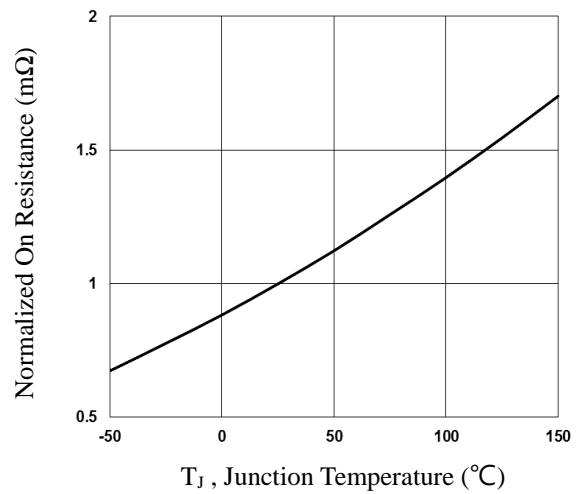


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

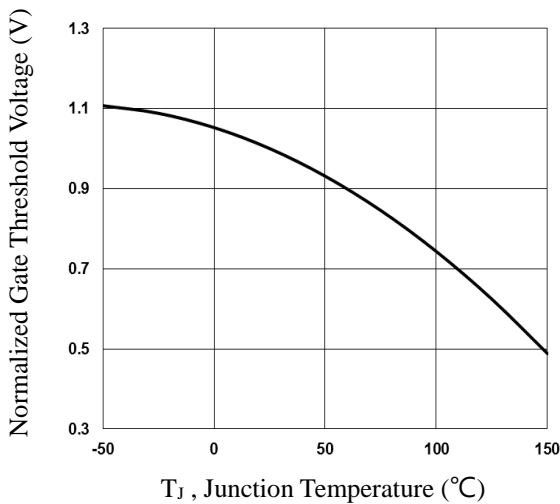


Fig.3 Normalized V_{th} vs. T_J

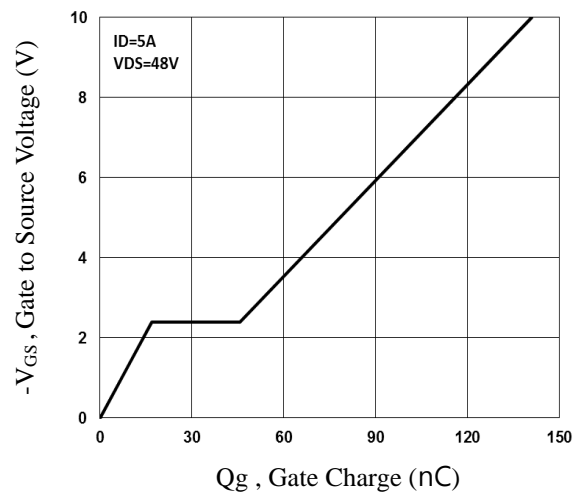


Fig.4 Gate Charge Waveform

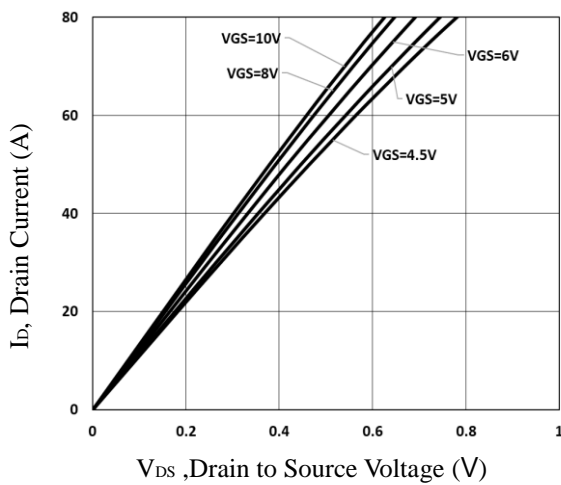


Fig.5 Typical Output Characteristics

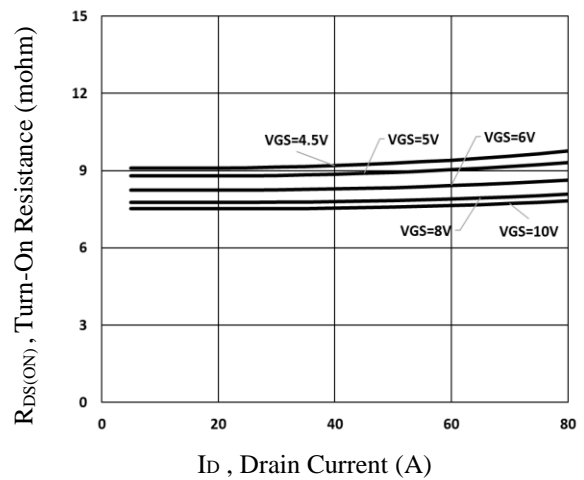


Fig.6 Turn-On Resistance vs. I_D

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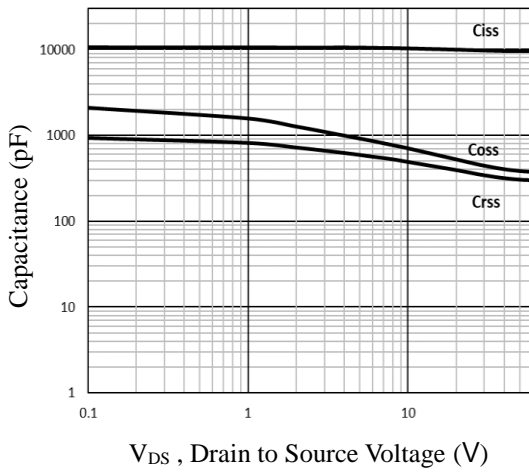


Fig.7 Capacitance Characteristics

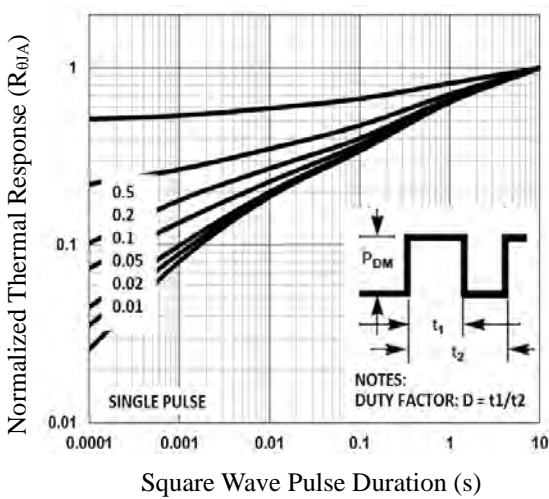


Fig.8 Normalized Transient Impedance

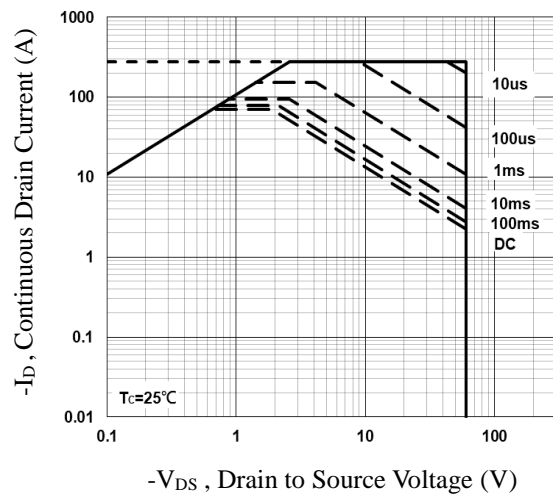


Fig.9 Maximum Safe Operation Area

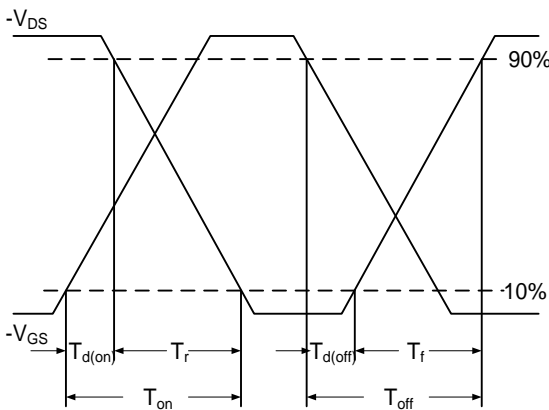


Fig.10 Switching Time Waveform

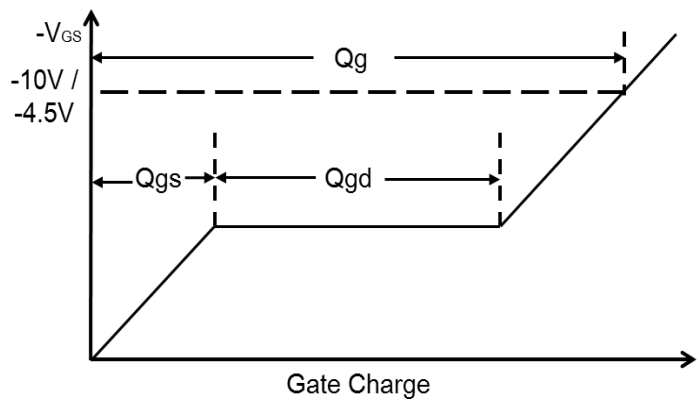
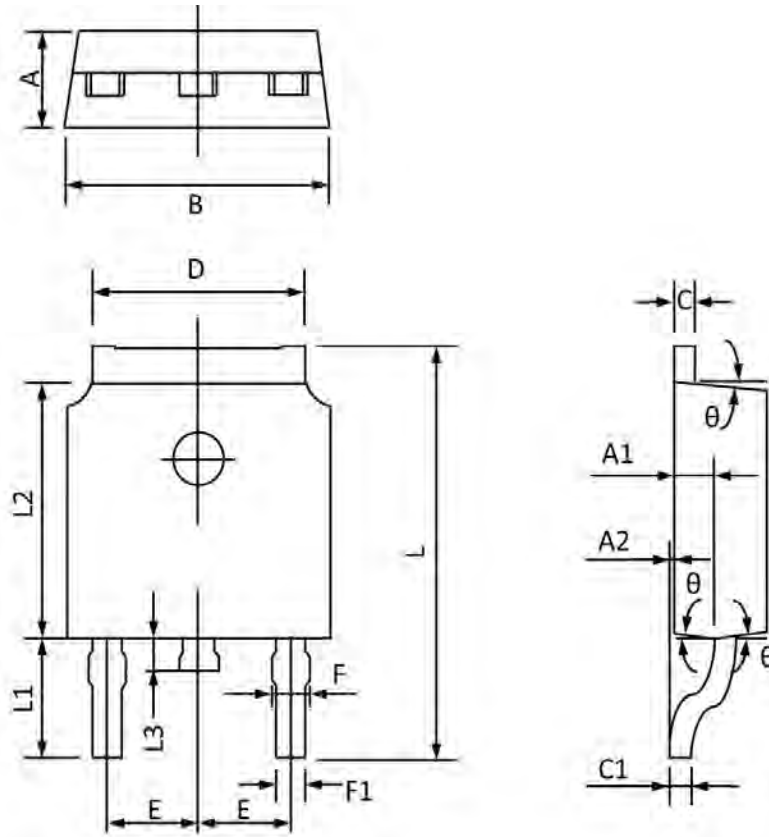


Fig.11 Gate Charge Waveform

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TO-252 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.400	2.200	0.094	0.087
A1	1.110	0.910	0.044	0.036
A2	0.150	0.000	0.006	0.000
B	6.800	6.400	0.268	0.252
C	0.580	0.450	0.023	0.018
C1	0.580	0.460	0.023	0.018
D	5.500	5.100	0.217	0.201
E	2.386	2.186	0.094	0.086
F	0.940	0.600	0.037	0.024
F1	0.860	0.500	0.034	0.020
L	10.400	9.400	0.409	0.370
L1	3.000	2.400	0.118	0.094
L2	6.200	5.400	0.244	0.213
L3	1.200	0.600	0.047	0.024
θ	9°	3°	9°	3°