

40V P-channel MOS FET

General Description

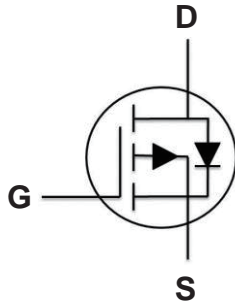
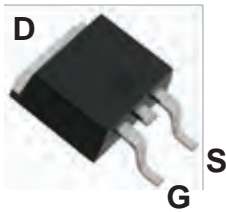
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	R _{DS(ON)}	I _D
-40V	15mΩ	-45A

Features

- -40V,-45A, R_{DS(ON)} 15mΩ@V_{GS} = -10V
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

TO-252 Pin Configuration



Applications

- MB / VGA / Vcore
- POL Applications
- Load Switch
- LED Application

Absolute Maximum Ratings (T_c=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	-40	V
V _{GS}	Gate-Source Voltage	± 20	V
I _D	Drain Current – Continuous (T _c =25°C)	-45	A
	Drain Current – Continuous (T _c =100°C)	-28	A
I _{DM}	Drain Current – Pulsed ¹	-180	A
EAS	Single Pulse Avalanche Energy ²	130	mJ
IAS	Single Pulse Avalanche Current ²	51	A
P _D	Power Dissipation (T _c =25°C)	73.5	W
	Power Dissipation – Derate above 25°C	0.59	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	---	1.7	°C/W
R _{θJA}	Thermal Resistance Junction to ambient	---	62	°C/W

Electrical Characteristics ($T_J = 25^\circ\text{C}$)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-32V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-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	$V_{GS}=-10V, I_D=-10A$	---	11.5	15	$m\Omega$
		$V_{GS}=-4.5V, I_D=-8A$	---	16	22	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
gfs	Forward Transconductance	$V_{DS}=-10V, I_D=-10A$	---	13	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{3,4}	$V_{DS}=-32V, V_{GS}=-4.5V, I_D=-10A$	---	22.2	40	nC
Q_{gs}	Gate-Source Charge ^{3,4}		---	8.2	16	
Q_{gd}	Gate-Drain Charge ^{3,4}		---	8.8	16	
$T_{d(on)}$	Turn-On Delay Time ^{3,4}	$V_{DD}=-20V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A$	---	23	40	ns
T_r	Rise Time ^{3,4}		---	10	20	
$T_{d(off)}$	Turn-Off Delay Time ^{3,4}		---	135	250	
T_f	Fall Time ^{3,4}		---	46	90	
C_{iss}	Input Capacitance	$V_{DS}=-25V, V_{GS}=0V, F=1\text{MHz}$	---	2757	4000	pF
C_{oss}	Output Capacitance		---	240	360	
C_{riss}	Reverse Transfer Capacitance		---	137	200	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	-45	A
I_{SM}	Pulsed Source Current		---	---	-90	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. $V_{DD}=-25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=51A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$.
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

ELECTRICAL CHARACTERISTICS CURVES

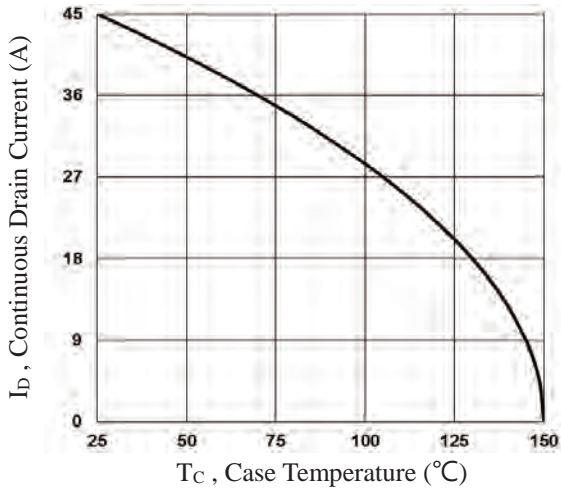


Fig.1 Continuous Drain Current vs. T_c

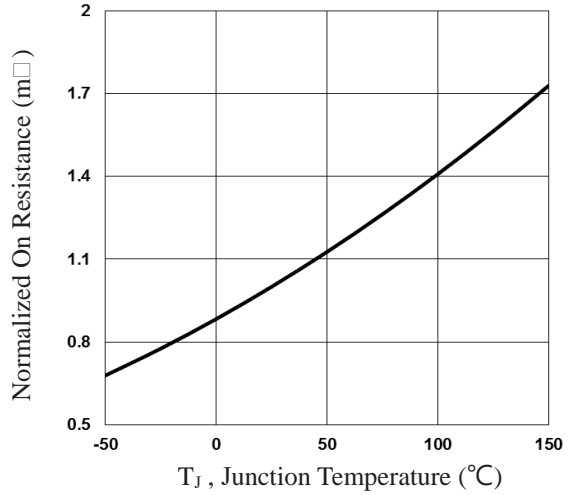


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

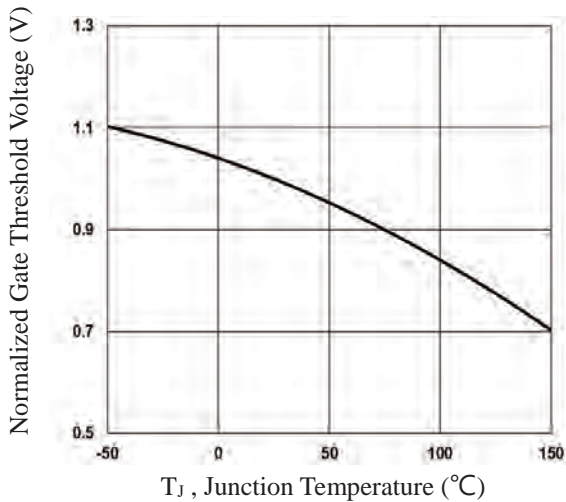


Fig.3 Normalized V_{th} vs. T_j

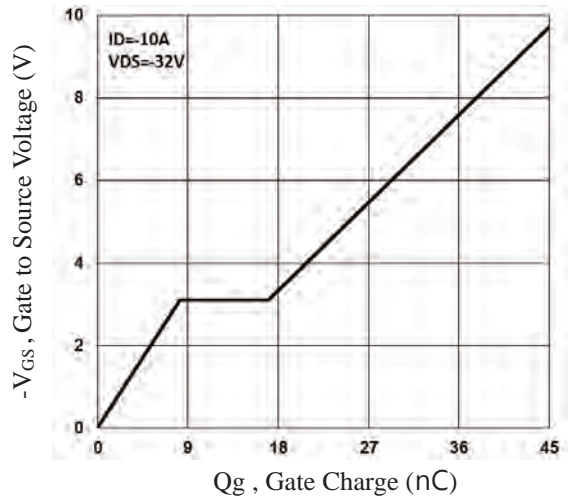


Fig.4 Gate Charge Waveform

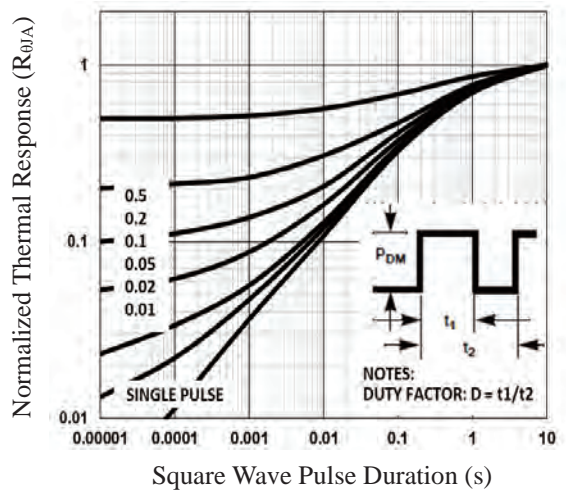


Fig.5 Normalized Transient Impedance

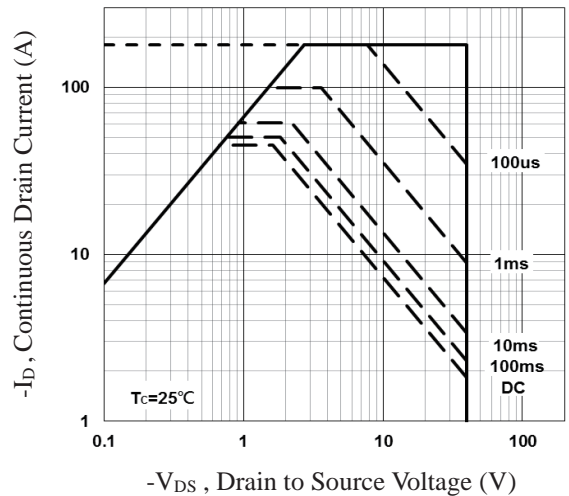


Fig.6 Maximum Safe Operation Area

ELECTRICAL CHARACTERISTICS CURVES (Con.)

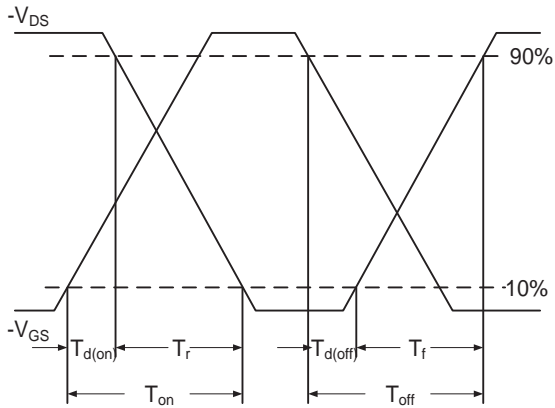


Fig.7 Switching Time Waveform

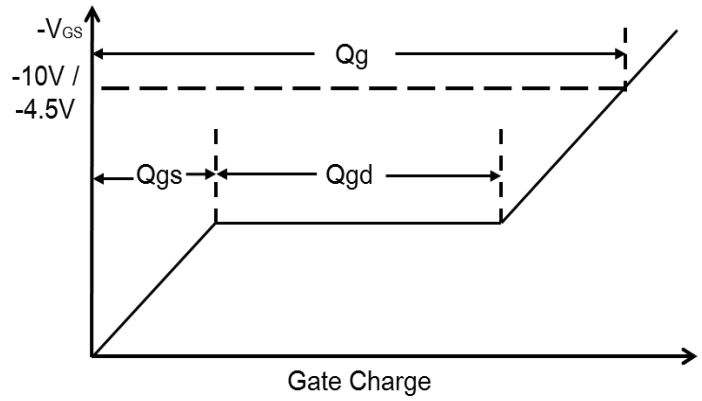
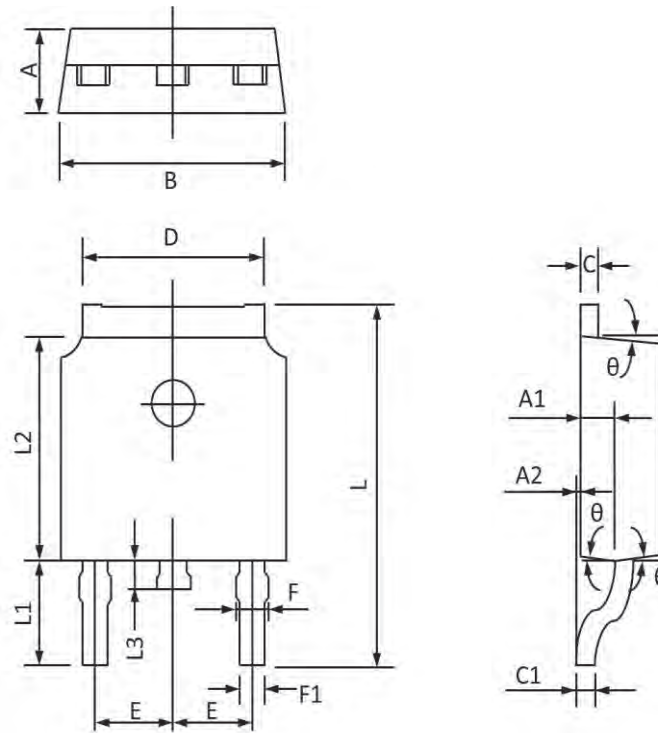


Fig.8 Gate Charge Waveform

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	1.140	0.600	0.045	0.024
F1	0.880	0.500	0.035	0.020
L	10.400	9.400	0.409	0.370
L1	3.000	2.400	0.118	0.094
L2	6.223	5.400	0.245	0.213
L3	1.200	0.600	0.047	0.024
θ	9°	3°	9°	3°