40V N-Channel MOSFETs

General Description

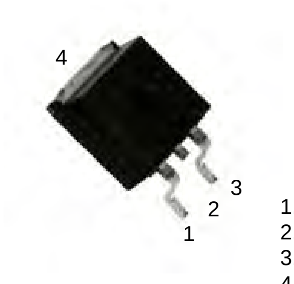
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
40V	3.8mΩ	150A

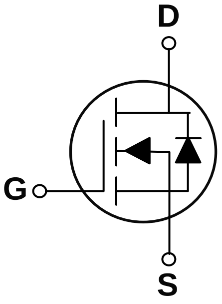
Features

- *40V, 150A, RDS(ON) =3.8mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *Green Device Available*

TO-263 Pin Configuration



1. Gate
2. Drain
3. Source
4. Drain



Applications

- *MB / VGA / Vcore*
- *POL Applications*
- *SMPS 2nd SR*

Absolute Maximum Ratings (Tc=25℃ 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℃)	150	A
	Drain Current – Continuous (T_C=100℃)	95	A
I_{DM}	Drain Current – Pulsed[1]	600	A
EAS	Single Pulse Avalanche Energy[2]	312	mJ
IAS	Single Pulse Avalanche Current[2]	79	A
P_D	Power Dissipation (T_C=25℃)	166	W
	Power Dissipation – Derate above 25℃	1.33	W/℃
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.75	℃/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	40	---	---	V
△BV_{DSS}/△T_J	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.03	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=32V , 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[3]	V_{GS}=10V , I_D=25A	---	3.1	3.8	mΩ
		V_{GS}=4.5V , I_D=12A	---	4.0	5.0	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.6	2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5	---	mV/℃
gfs	Forward Transconductance	V_{DS}=10V , I_D=2A	---	16	---	S

Dynamic Characteristics

Q_g	Total Gate Charge[3,4]	V_{DS}=20V , V_{GS}=4.5V , I_D=10A	---	44.4	80	nC
Q_{gs}	Gate-Source Charge[3,4]		---	9.6	18	
Q_{gd}	Gate-Drain Charge[3,4]		---	16	30	
$T_{d(on)}$	Turn-On Delay Time[3,4]	V_{DD}=20V , V_{GS}=10V , R_G=6Ω I_D=1A	---	28	50	ns
T_r	Rise Time[3,4]		---	3.2	6.5	
$T_{d(off)}$	Turn-Off Delay Time[3,4]		---	89	160	
T_f	Fall Time[3,4]		---	14	28	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	4940	7800	pF
C_{oss}	Output Capacitance		---	425	800	
C_{rss}	Reverse Transfer Capacitance		---	170	330	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	1.4	2.8	Ω

Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	150	A
I_{SM}	Pulsed Source Current[3]		---	---	300	A
V_{SD}	Diode Forward Voltage[3]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=79A., 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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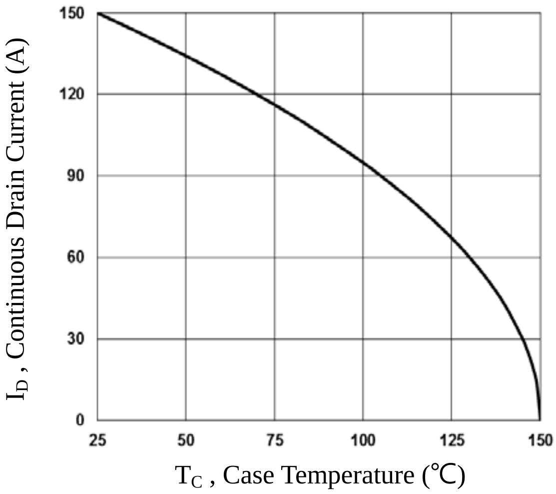

Fig.1 Continuous Drain Current vs. T_C

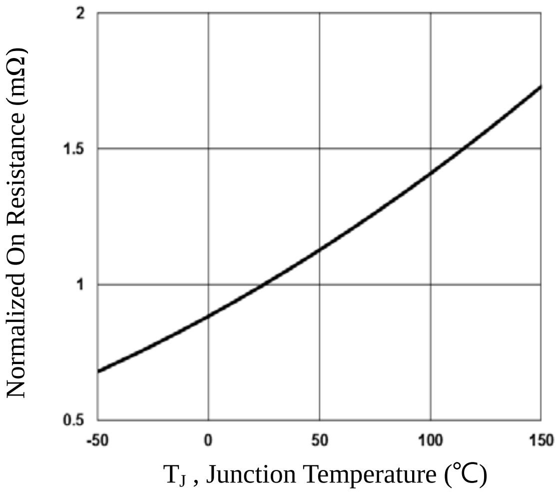

Fig.2 Normalized RDSON vs. T_J

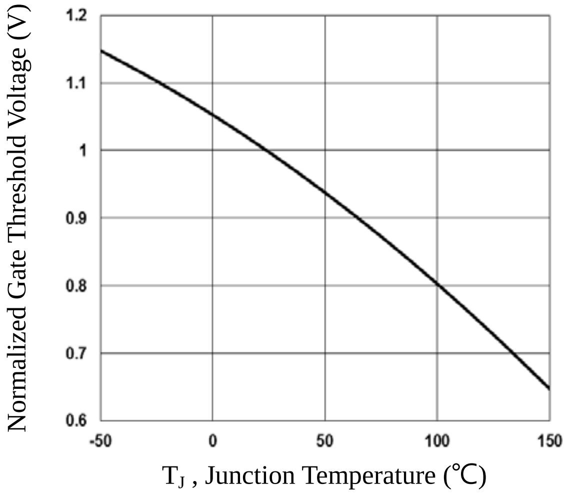

Fig.3 Normalized V_{th} vs. T_J

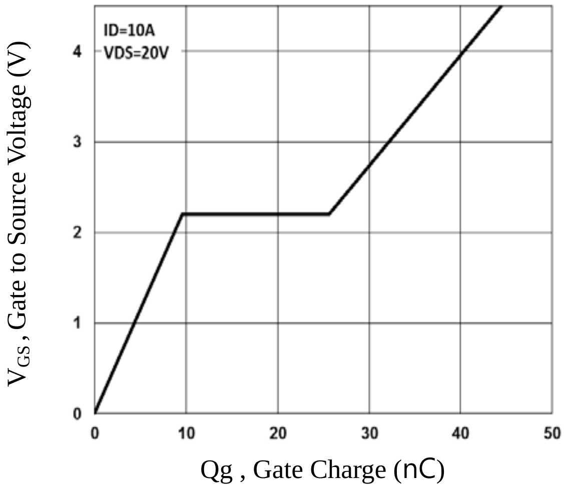

Fig.4 Gate Charge Waveform

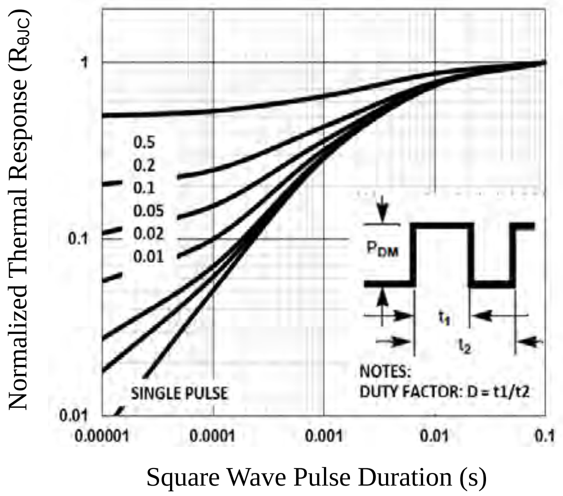

Fig.5 Normalized Transient Impedance

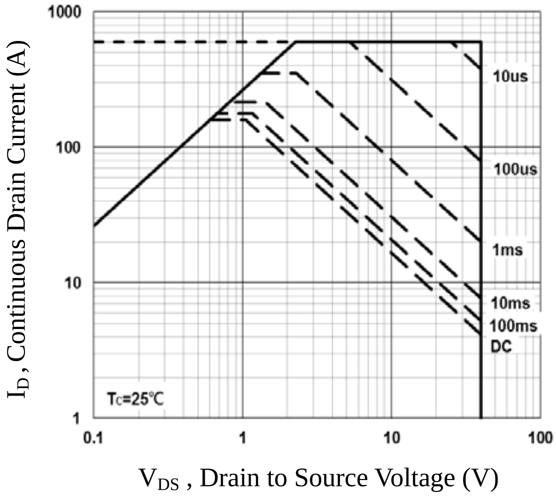

Fig.6 Maximum Safe Operation Area

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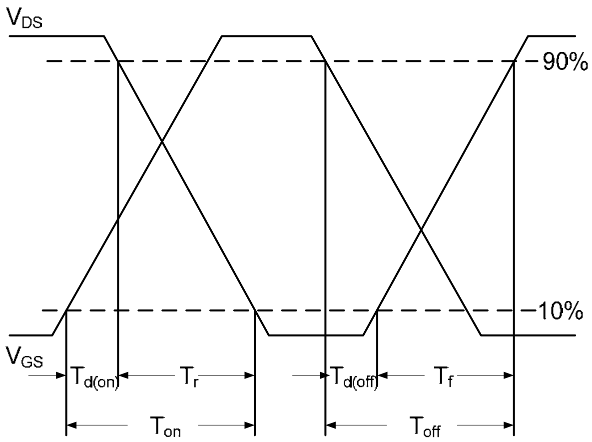
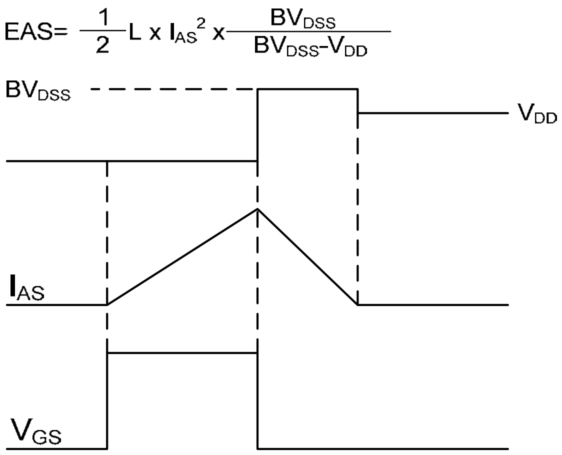


Fig.7 Switching Time Waveform



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

Fig.8 EAS Waveform

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TO-263 PACKAGE INFORMATION