30V N-Channel MOSFETs

General Description

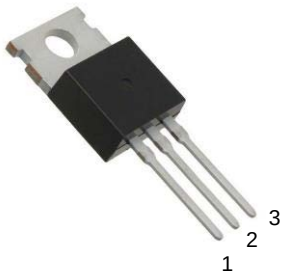
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
30V	3mΩ	176A

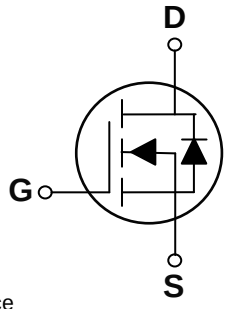
Features

- *30V, 176A, RDS(ON) =3mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

TO-220 Pin Configuration



1. Gate
2. Drain
3. Source



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	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous (T_C=25℃)	176	A
	Drain Current – Continuous (T_C=100℃)	111	A
I_{DM}	Drain Current – Pulsed[1]	704	A
EAS	Single Pulse Avalanche Energy[2]	180	mJ
IAS	Single Pulse Avalanche Current[2]	60	A
P_D	Power Dissipation (T_C=25℃)	168	W
	Power Dissipation – Derate above 25℃	1.34	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	---	0.74	℃/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	30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.03	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=30V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=24V , 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=30A	---	2.4	3	mΩ
		V_{GS}=4.5V , I_D=15A	---	3.2	4	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.6	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ 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}=15V , V_{GS}=4.5V , I_D=24A	---	40	75	nC
Q_{gs}	Gate-Source Charge[3,4]		---	6	12	
Q_{gd}	Gate-Drain Charge[3,4]		---	19	35	
$T_{d(on)}$	Turn-On Delay Time[3,4]	V_{DD}=15V , V_{GS}=10V , R_G=1Ω I_D=1A	---	20	40	ns
T_r	Rise Time[3,4]		---	32	60	
$T_{d(off)}$	Turn-Off Delay Time[3,4]		---	75	130	
T_f	Fall Time[3,4]		---	28	55	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	4800	8000	pF
C_{oss}	Output Capacitance		---	735	1300	
C_{rss}	Reverse Transfer Capacitance		---	420	800	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	1.6	3.5	Ω

Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	176	A
I_{SM}	Pulsed Source Current[3]		---	---	352	A
V_{SD}	Diode Forward Voltage[3]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V
t_{rr}	Reverse Recovery Time	V_{DS}=30V,I_S=1A , di/dt=100A/μs T_J=25℃	---	49	85	ns
Q_{rr}	Reverse Recovery Charge		---	18	35	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=60A.,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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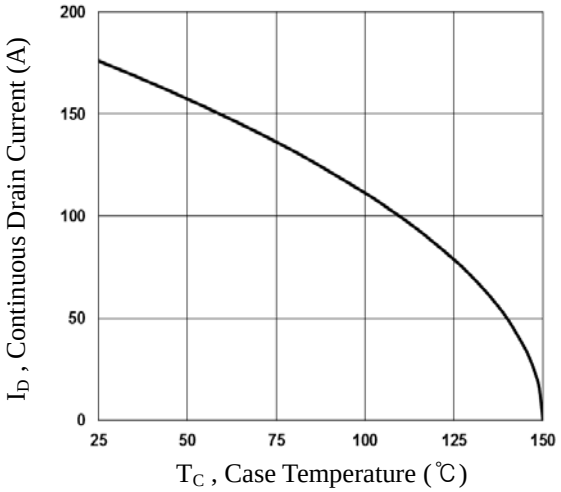


Fig.1 Continuous Drain Current vs. T_C

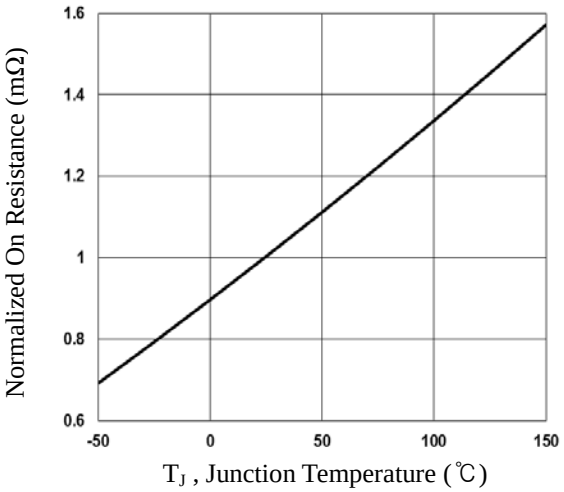


Fig.2 Normalized RDSON vs. T_J

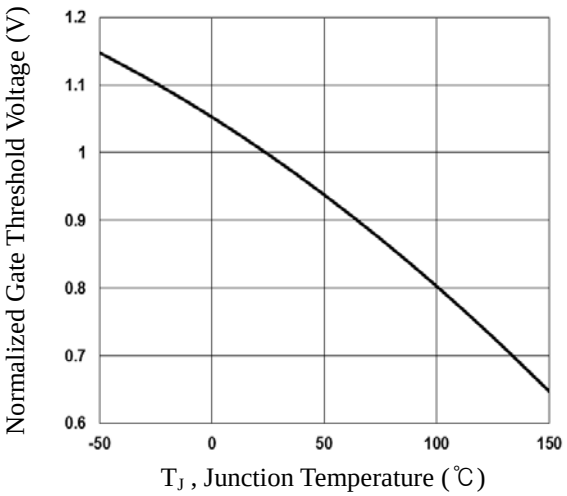


Fig.3 Normalized V_{th} vs. T_J

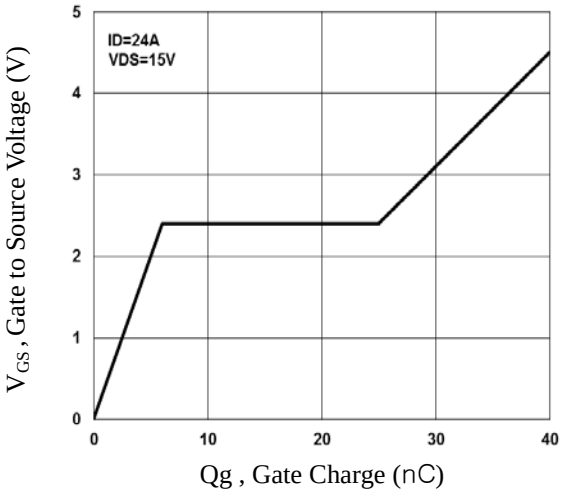


Fig.4 Gate Charge Waveform

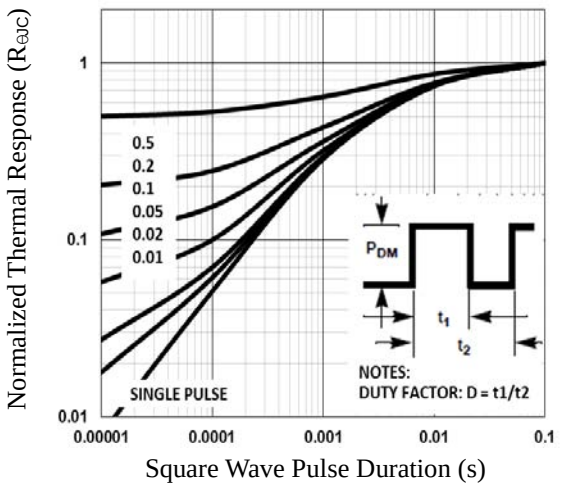


Fig.5 Normalized Transient Impedance

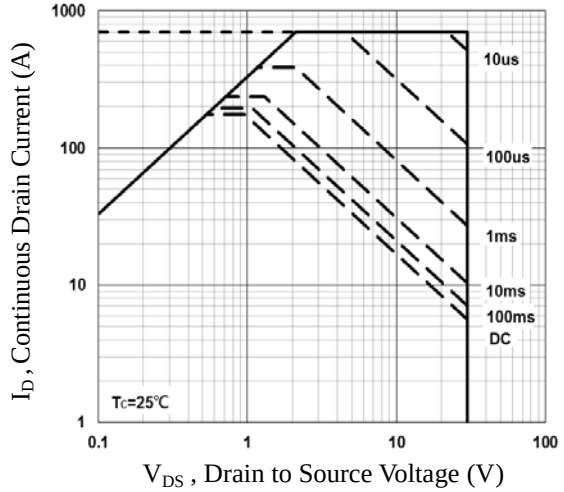


Fig.6 Maximum Safe Operation Area

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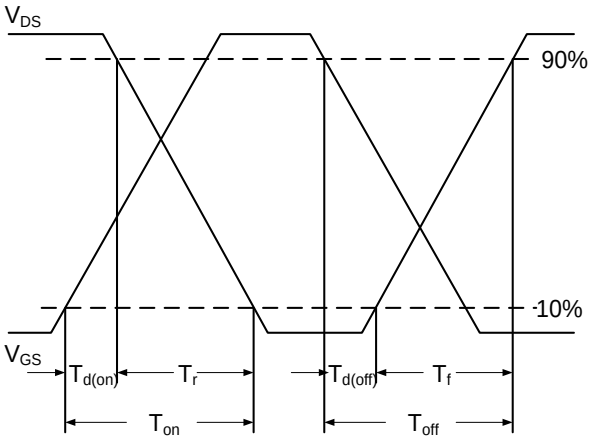


Fig.7 Switching Time Waveform

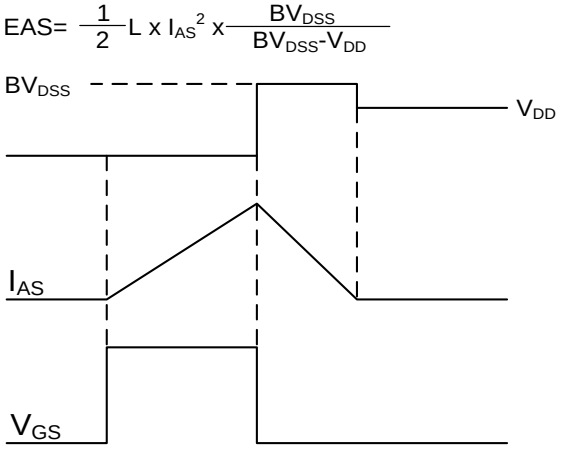
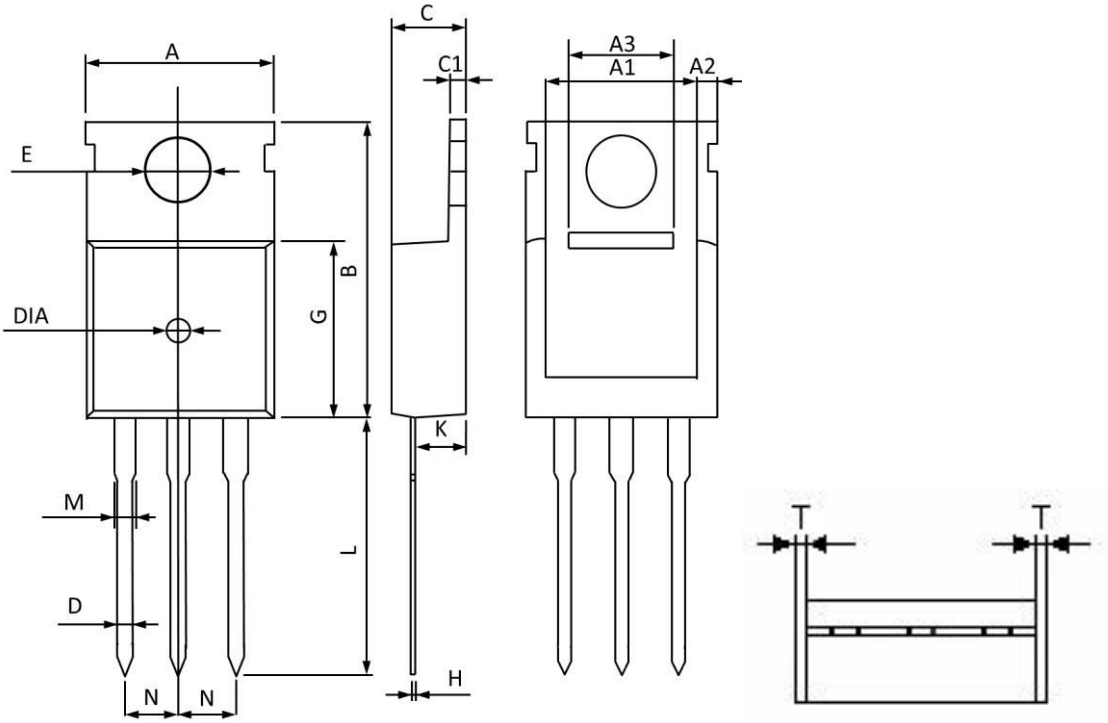


Fig.8 EAS Waveform

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TO-220 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.840	8.440	0.348	0.332
A2	1.250	1.050	0.049	0.041
A3	5.300	5.100	0.209	0.201
B	16.200	15.400	0.638	0.606
C	4.680	4.280	0.184	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	3.800	3.400	0.150	0.134
G	9.300	8.700	0.366	0.343
H	0.600	0.400	0.024	0.016
K	2.700	2.100	0.106	0.083
L	13.600	12.800	0.535	0.504
M	1.500	1.100	0.059	0.043
N	2.590	2.490	0.102	0.098
T	W0.35		W0.014	
DIA	Φ1.5 TYP.	deep0.2 TYP.	Φ0.059 TYP.	deep0.008 TYP.