

Single N-Channel MOSFETs

General Description

- Advanced Trench MOS Technology
- Low Gate Charge
- LOW $R_{DS(ON)}$
- 100% EAS Guaranteed
- Green Device Available

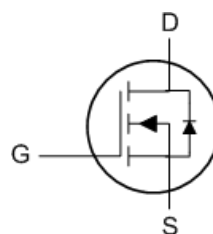
Applications

- Motor Control.
- DC/DC Converter.
- Synchronous rectifier applications.

Product Summary

BVDSS	RDSON	ID
60V	2.8mΩ	185A

TO220 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	185	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	117	A
I_{DM}	Pulsed Drain Current ²	400	A
EAS	Single Pulse Avalanche Energy ³	306	mJ
I_{AS}	Avalanche Current	35	A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ⁴	178	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	50	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.7	°C/W

Electrical Characteristics ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	60	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=20A$	---	2.4	2.8	$m\Omega$
		$V_{GS}=4.5V$, $I_D=20A$	---	3.1	4.0	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.2	---	2.3	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=48V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=48V$, $V_{GS}=0V$, $T_J=55^{\circ}\text{C}$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=5V$, $I_D=20A$	---	60	---	S
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	1.8	---	Ω
Q_g	Total Gate Charge($V_{GS}=10V$)	$V_{DS}=30V$, $V_{GS}=10V$, $I_D=20A$	---	102	---	nC
Q_g	Total Gate Charge($V_{GS}=4.5V$)		---	54.1	---	
Q_{gs}	Gate-Source Charge		---	15.7	---	
Q_{gd}	Gate-Drain Charge		---	27.9	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=30V$, $V_{GS}=10V$, $R_G=3\Omega$, $I_D=20A$	---	15	---	ns
T_r	Rise Time		---	12	---	
$T_{d(off)}$	Turn-Off Delay Time		---	60	---	
T_f	Fall Time		---	19	---	
C_{iss}	Input Capacitance	$V_{DS}=30V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	5471	---	pF
C_{oss}	Output Capacitance		---	1847	---	
C_{rss}	Reverse Transfer Capacitance		---	86	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,5,6}	$V_G=V_D=0V$, Force Current	---	---	105	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=1A$, $T_J=25^{\circ}\text{C}$	---	---	1.2	V
t_{rr}	Reverse Recovery Time	$I_F=20A$, $dI/dt=100A/\mu s$, $T_J=25^{\circ}\text{C}$	---	50	---	nS
Q_{rr}	Reverse Recovery Charge		---	72	---	nC

Note :

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- The EAS data shows Max. rating. The test condition is $V_{DD}=50V$, $V_{GS}=10V$, $L=0.5mH$, $I_{AS}=35A$
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.
- Bonding wire limitation current is 105A.

Typical Characteristics

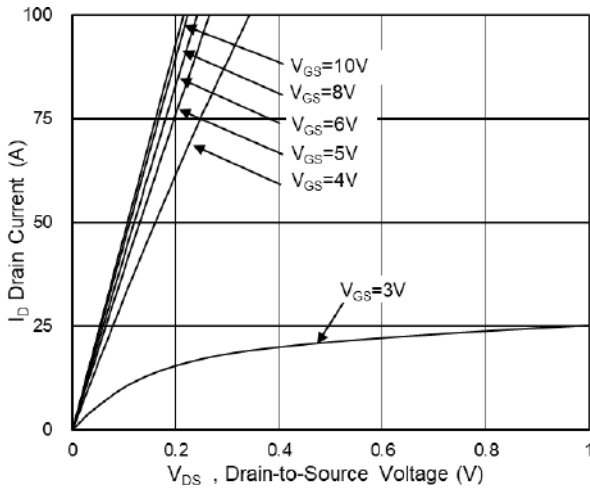


Fig.1 Typical Output Characteristics

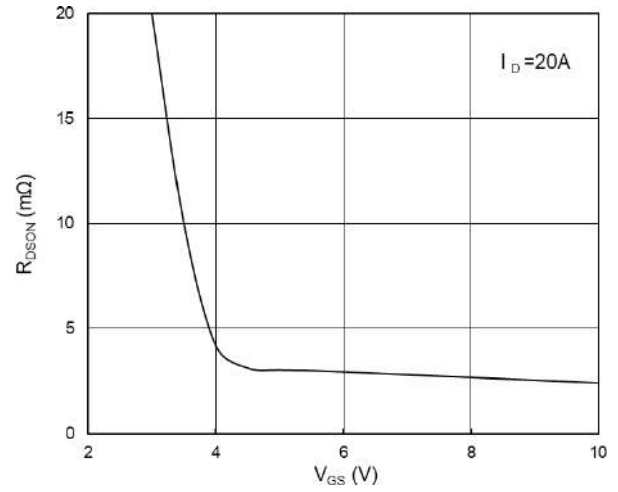


Fig.2 On-Resistance vs G-S Voltage

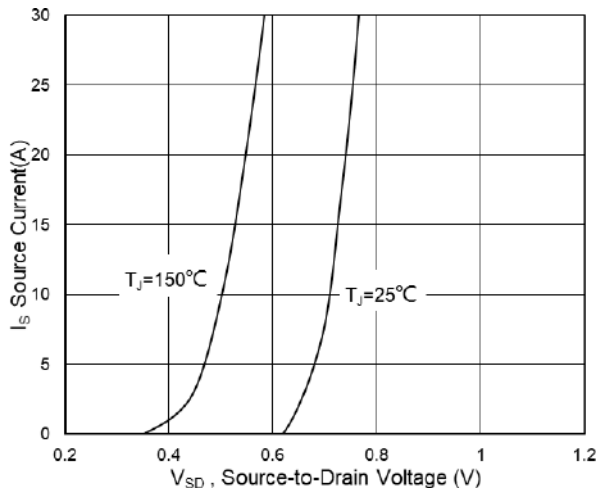


Fig.3 Source Drain Forward Characteristics

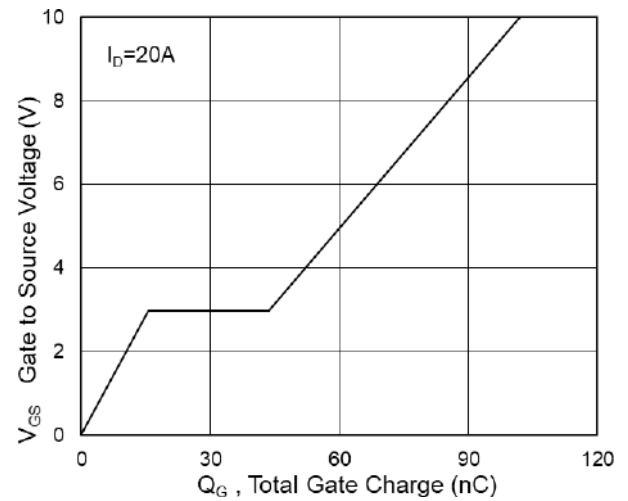


Fig.4 Gate-Charge Characteristics

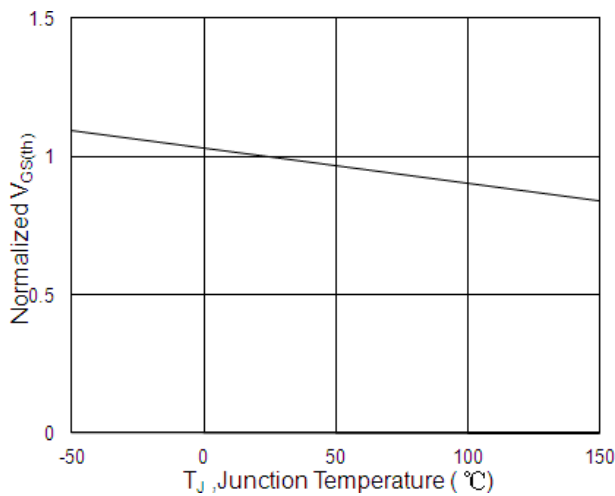


Fig.5 Normalized $V_{GS(th)}$ vs T_J

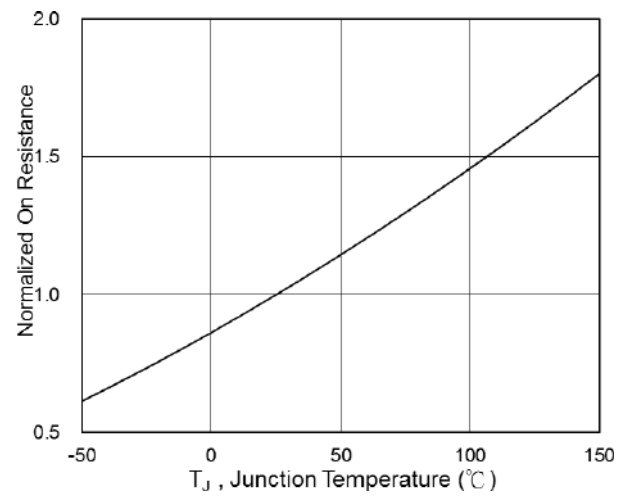


Fig.6 Normalized $R_{DS(on)}$ vs T_J

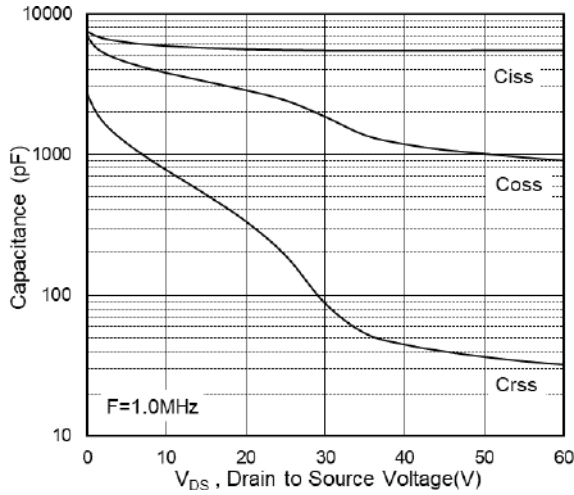


Fig.7 Capacitance

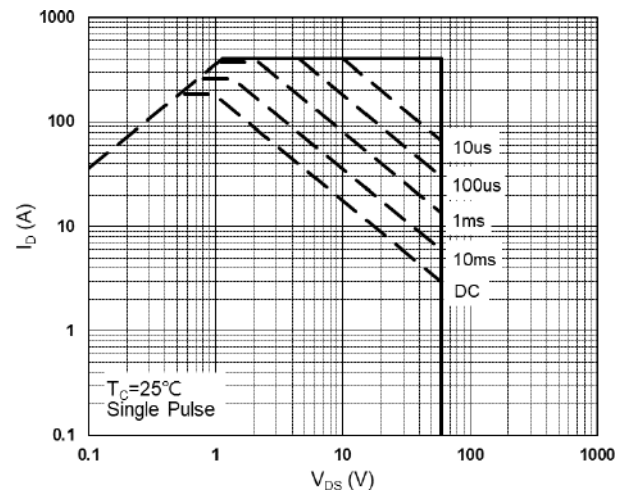


Fig.8 Safe Operating Area

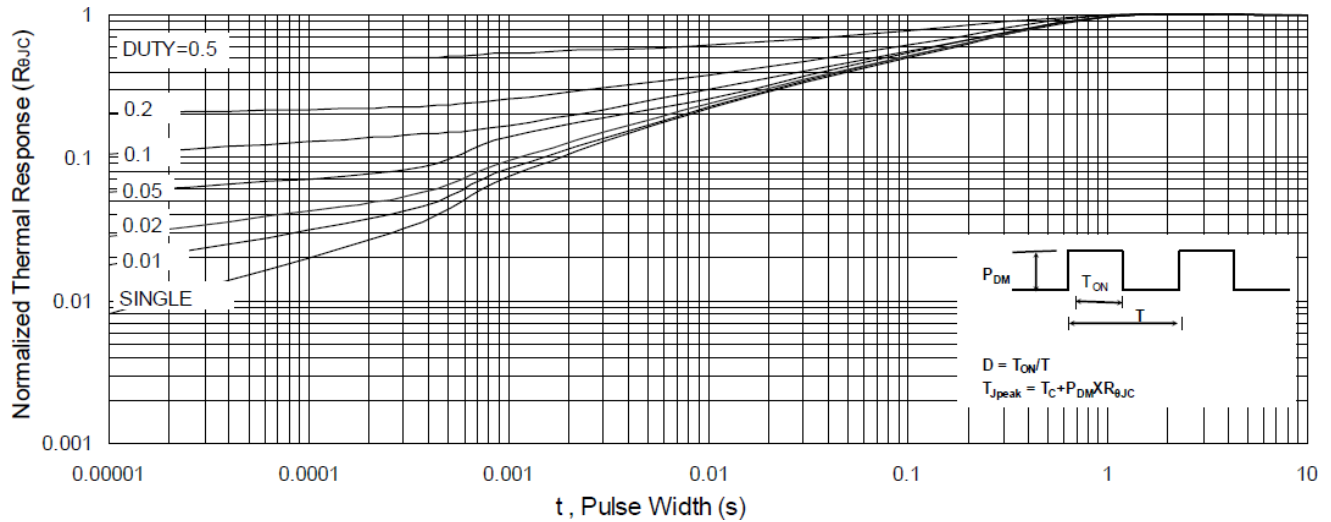


Fig.9 Normalized Maximum Transient Thermal Impedance

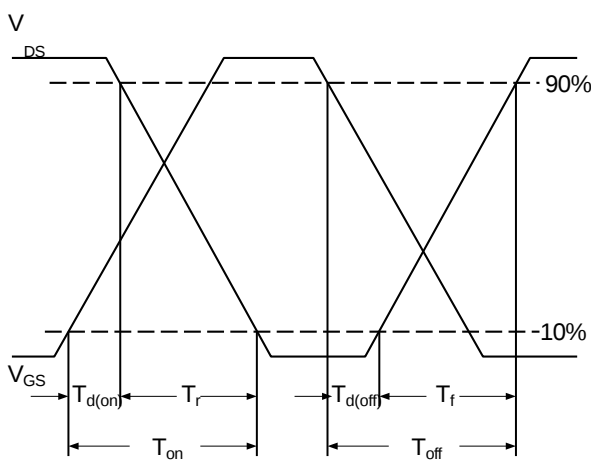


Fig.10 Switching Time Waveform

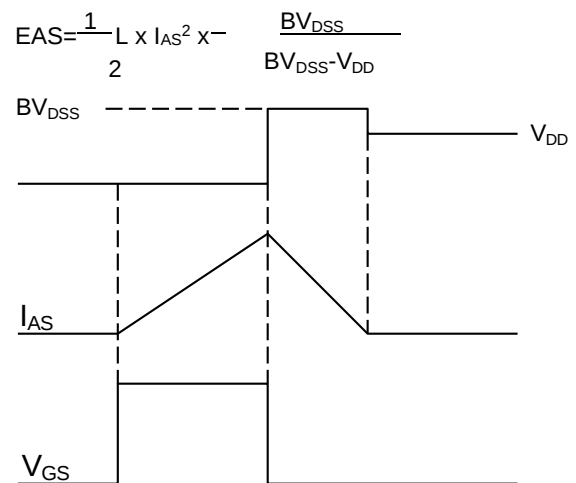


Fig.11 Unclamped Inductive Switching Waveform