

N-Ch 40V Fast Switching MOSFETs

Features

- Advanced Trench MOS Technology
- 100% EAS Guaranteed
- High Current Capability
- Green Device Available

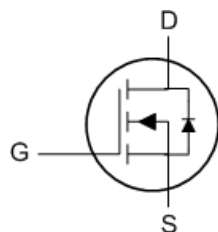
Applications

- SMPS Synchronous Rectification
- DC/DC Converters
- Or-ing

Product Summary

BVDSS	R _{DS(on)}	I _D
40V	1.9mΩ	220A

TO220 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	40	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @T _C =25°C	Continuous Drain Current, V _{GS} @ 10V ^{1,6}	220	A
I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ 10V ^{1,6}	145	A
I _{DM}	Pulsed Drain Current ²	400	A
EAS	Single Pulse Avalanche Energy ³	510	mJ
I _{AS}	Avalanche Current	101	A
P _D @T _C =25°C	Total Power Dissipation ⁴	149	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 _{θJA}	Thermal Resistance Junction-Ambient ¹	---	50	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	---	0.84	°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	$V_{GS}=0V$, $I_D=250\mu A$	40	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=20A$	---	1.6	1.9	$m\Omega$
		$V_{GS}=4.5V$, $I_D=20A$	---	2.0	2.6	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.2	1.7	2.3	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=32V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=32V$, $V_{GS}=0V$, $T_J=55^{\circ}\text{C}$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	1.3	---	Ω
Q_g	Total Gate Charge (10V)	$V_{DS}=20V$, $V_{GS}=10V$, $I_D=20A$	---	126	---	nC
Q_g	Total Gate Charge (4.5V)		---	66	---	
Q_{gs}	Gate-Source Charge		---	17	---	
Q_{gd}	Gate-Drain Charge		---	28	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=20V$, $V_{GS}=10V$, $R_G=1.5\Omega$, $I_D=20A$	---	15	---	ns
T_r	Rise Time		---	41	---	
$T_{d(off)}$	Turn-Off Delay Time		---	58	---	
T_f	Fall Time		---	30	---	
C_{iss}	Input Capacitance	$V_{DS}=20V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	6780	---	pF
C_{oss}	Output Capacitance		---	2100	---	
C_{rss}	Reverse Transfer Capacitance		---	225	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,6}	$V_G=V_D=0V$, Force Current	---	---	120	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=1A$, $T_J=25^{\circ}\text{C}$	---	---	1.2	V

Note :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating . The test condition is $V_{DD}=25V$, $V_{GS}=10V$, $L=0.1mH$, $I_{AS}=101A$
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.
6. Bonding wire limitation current is 120A.

Typical Characteristics

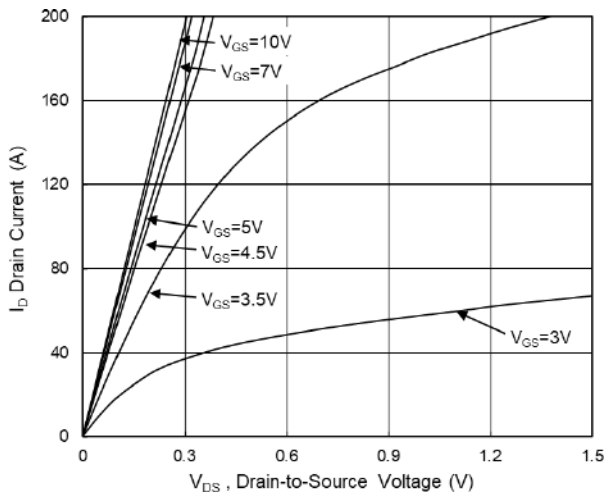


Fig.1 Typical Output Characteristics

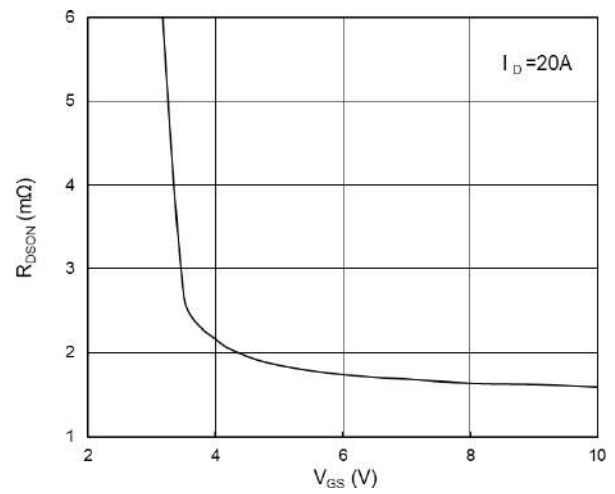


Fig.2 On-Resistance vs G-S Voltage

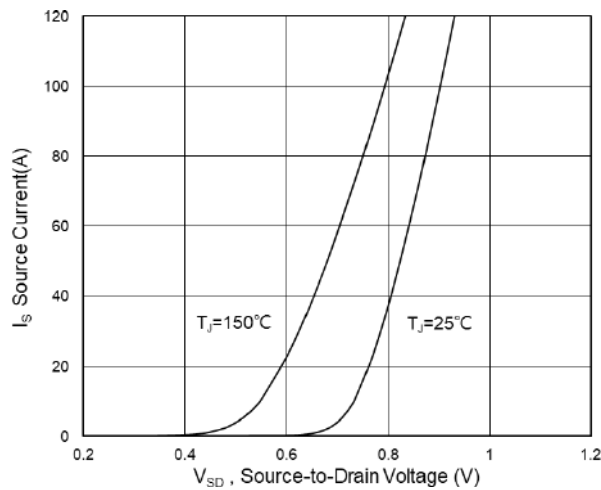


Fig.3 Source Drain Forward Characteristics

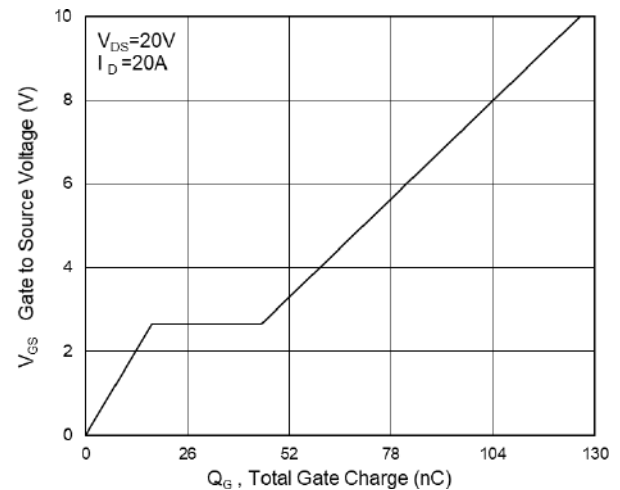


Fig.4 Gate-Charge Characteristics

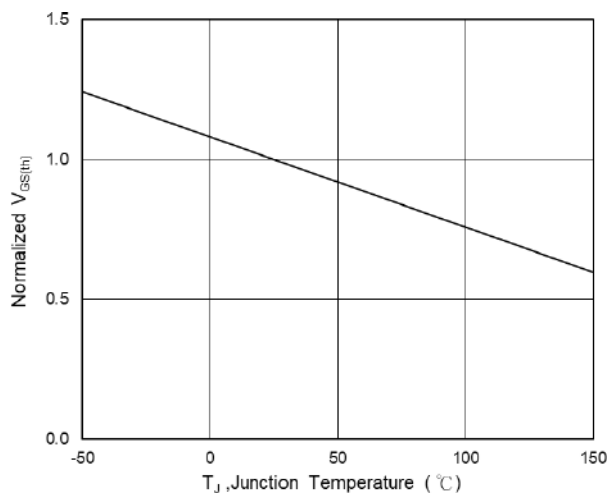


Fig.5 Normalized $V_{GS(th)}$ vs T_J

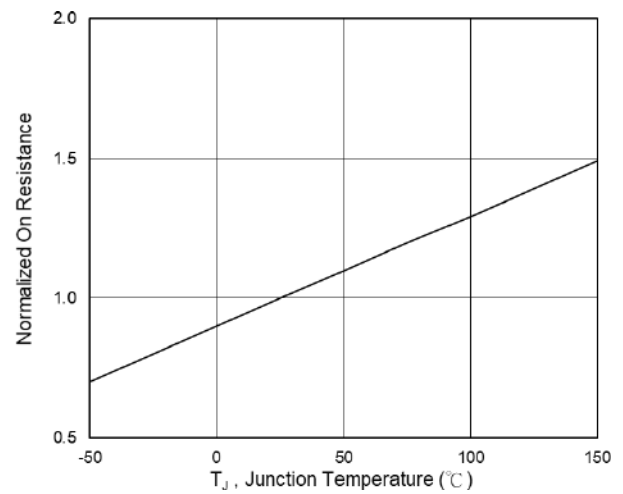


Fig.6 Normalized $R_{DS(on)}$ vs T_J

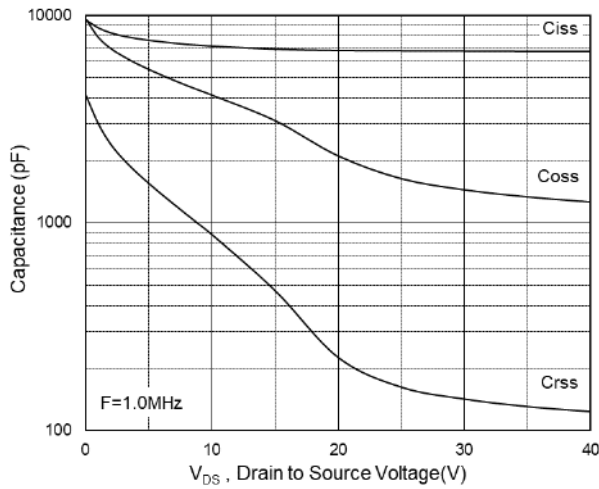


Fig.7 Capacitance

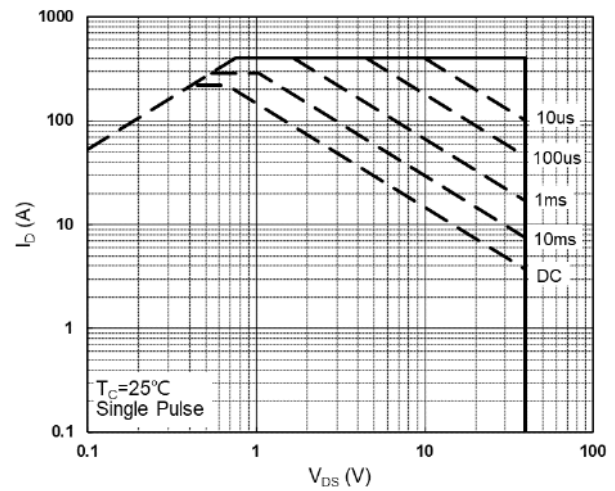


Fig.8 Safe Operating Area

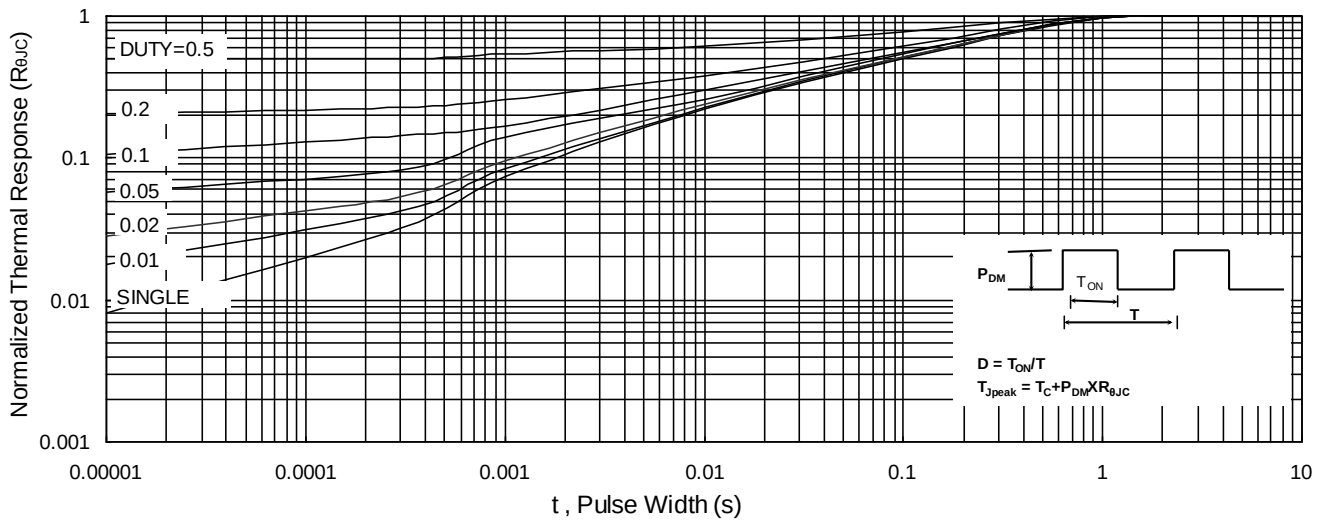


Fig.9 Normalized Maximum Transient Thermal Impedance

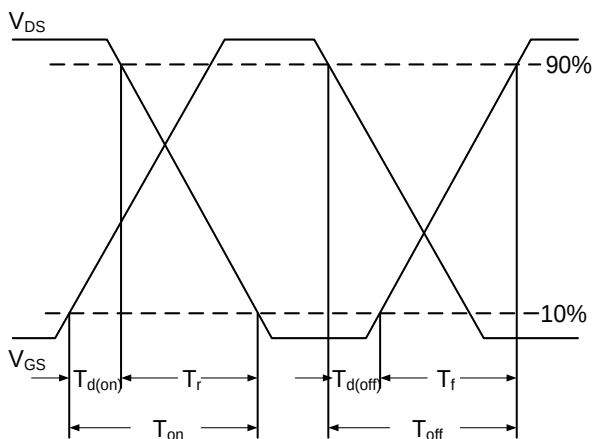


Fig.10 Switching Time Waveform

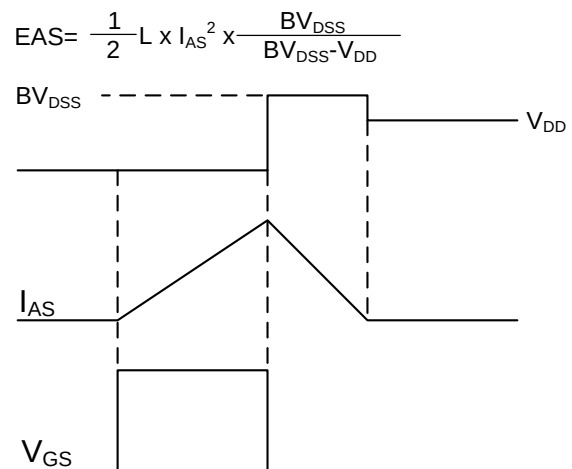


Fig.11 Unclamped Inductive Switching Waveform