

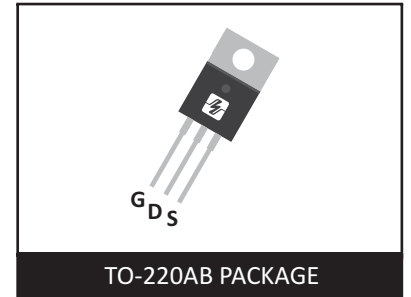
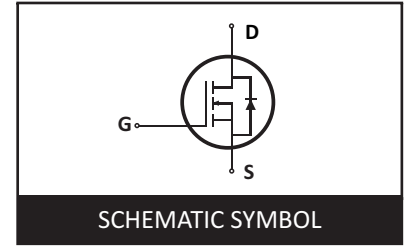
## N-CHANNEL POWER MOSFET

### DESCRIPTION

This power MOSFET is produced with advanced VDMOS technology of Semiwill. This technology enable power MOSFET to have better characteristics , such as fast switching time , low on resistance , low gate charge and especially excellent avalanche characteristics . This power MOSFET is usually used at high efficient DC to DC converter block, high efficiency switch mode power supplies, power factor correction, electronic lamp ballast based on half bridge.

### FEATURES

- High ruggedness
- $R_{DS(ON)}$ (Max.  $0.55\Omega$ )@ $V_{GS}=10V$
- Gate Charge (Typ.36nC)
- Improved dv/dt Capability
- 100% Avalanche Tested



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain to Source Voltage	400	V
$I_D$	Continuous Drain Current (@ $T_C=25\text{ }^\circ\text{C}$ )	10	A
	Continuous Drain Current (@ $T_C=100\text{ }^\circ\text{C}$ )	6.2	A
$I_{DM}$	Drain current pulsed (note 1)	40	A
$V_{GS}$	Gate to Source Voltage	$\pm 30$	V
$E_{AS}$	Single pulsed Avalanche Energy (note 2)	952	mJ
$E_{AR}$	Repetitive Avalanche Energy (note 1)	12.5	mJ
dv/dt	Peak diode Recovery dv/dt (note 3)	5.0	V/ns
$P_D$	Total power dissipation (@ $T_C=25\text{ }^\circ\text{C}$ )	125	W
	Derating Factor above $25\text{ }^\circ\text{C}$	1.0	W/ $^\circ\text{C}$
$T_{STG}, T_J$	Operating Junction Temperature & Storage Temperature	$-55 \sim +150$	$^\circ\text{C}$
$T_L$	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{thjc}$	Thermal resistance, Junction to case	1.0	$^\circ\text{C}/\text{W}$
$R_{thja}$	Thermal resistance, Junction to ambient	62.5	

**ELECTRICAL CHARACTERISTIC (  $T_C = 25^\circ\text{C}$  unless otherwise specified )**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
<b>Off characteristics</b>						
$BV_{DSS}$	Drain to source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	400	-	-	V
$I_{DSS}$	Drain to source leakage current	$V_{DS}=250V, V_{GS}=0V$	-	-	1	$\mu A$
		$V_{DS}=200V, T_C=125^\circ\text{C}$	-	-	50	$\mu A$
$I_{GSS}$	Gate to source leakage current, forward	$V_{DS}=30V, V_{GS}=0V$	-	-	100	nA
	Gate to source leakage current, reverse	$V_{DS}=-30V, V_{GS}=0V$	-	-	-100	nA
<b>On characteristics</b>						
$V_{GS(TH)}$	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
$R_{DS(ON)}$	Drain to source on state resistance	$V_{GS}=10V, I_D=5.0A$		0.46	0.55	$\Omega$
<b>Dynamic characteristics</b>						
$C_{iss}$	Input capacitance	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$	-	1450	1800	pF
$C_{oss}$	Output capacitance		-	145	200	
$C_{rss}$	Reverse transfer capacitance		-	35	45	
$t_{d(on)}$	Turn on delay time	$V_{DS}=200V, I_D=10A, R_G=25\text{ohm}$ (note 4,5)	-	30	50	ns
$t_r$	Rising time		-	60	150	
$t_{d(off)}$	Turn off delay time		-	150	300	
$t_f$	Fall time		-	60	150	
$Q_g$	Total gate charge	$V_{DS}=320V, V_{GS}=10V, I_D=10A$ (note 4,5)	-	36	60	nC
$Q_{gs}$	Gate -source charge		-	6.0	-	
$Q_{gd}$	Gate -drain charge		-	14	-	

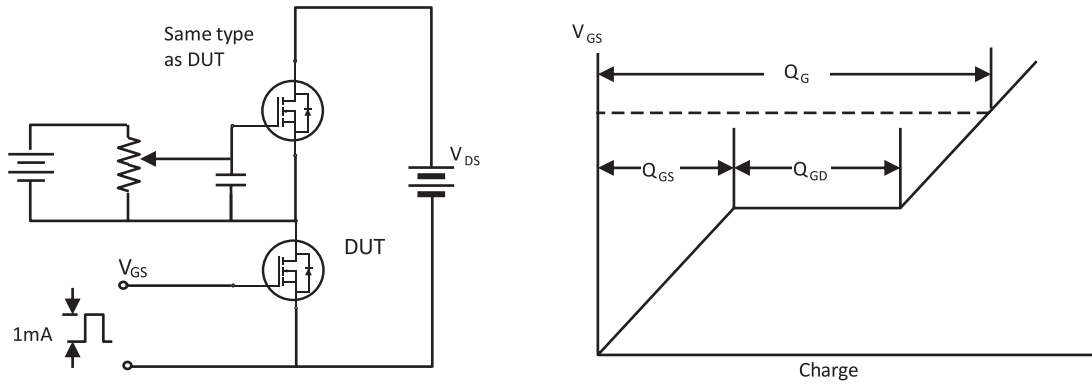
**SOURCE TO DRAIN DIODE RATINGS CHARACTERISTICS**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous source current	Integral reverse p-n Junction diode in the MOSFET	-	-	10	A
$I_{SM}$	Pulsed source current		-	-	40	A
$V_{SD}$	Diode forward voltage drop.	$I_S=10A, V_{GS}=0V$	-	-	1.2	V
$T_{rr}$	Reverse recovery time	$I_S=10A, V_{GS}=0V$ $di/dt=100A/\mu s$	-	335	-	ns
$Q_{rr}$	Breakdown voltage temperature		-	3.6	-	nC

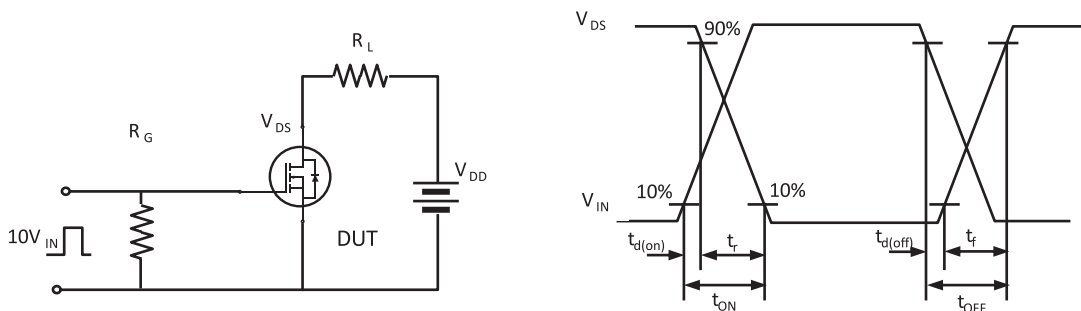
**Notes**

1. Repeattive rating : pulse width limited by junction temperature.
2.  $L = 18.5\text{mH}, I_{AS}=10A, V_{DD}=50V, R_G=50\Omega$ , Starting  $T_J=25^\circ\text{C}$
3.  $I_{SD}\leq 10A, di/dt = 300A/\mu s, V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$
4. Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature.

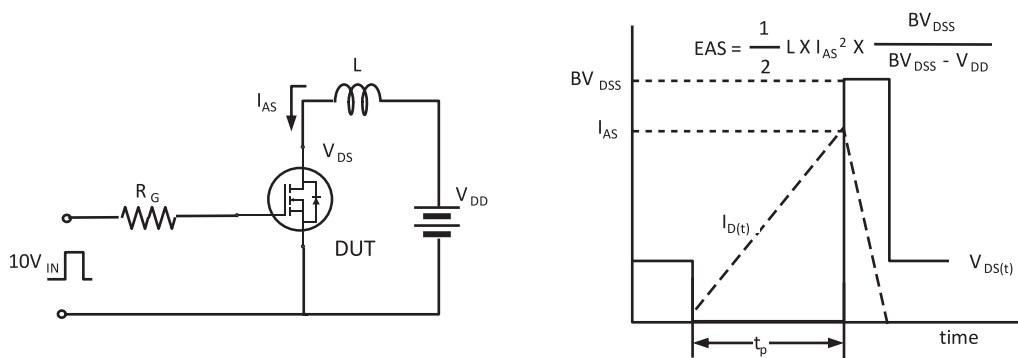
**Fig. 1. Gate charge test circuit & waveform**



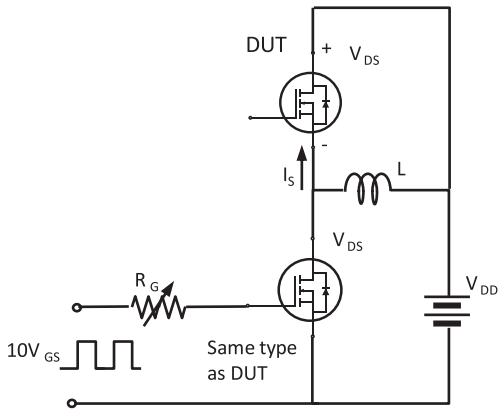
**Fig. 2. Switching time test circuit & waveform**



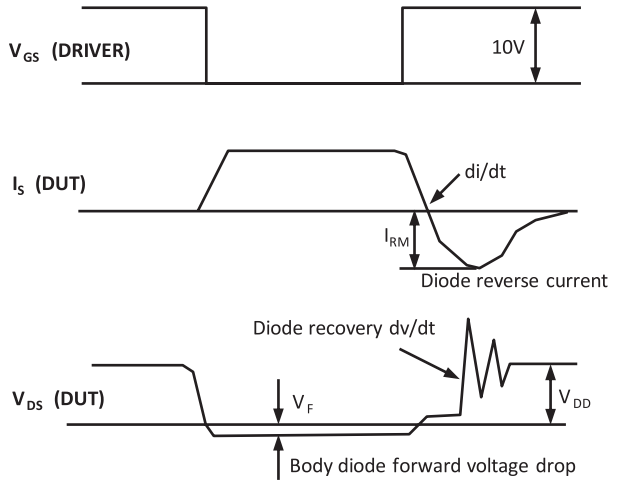
**Fig. 3. Unclamped Inductive switching test circuit & waveform**



**Fig. 4. Peak diode recovery dv/dt test circuit & waveform**



\*. dv/dt controlled by R<sub>G</sub>  
 \*. I<sub>S</sub> controlled by pulse period



**PACKAGE DIMENSIONS**

**TO-220AB**

Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	3.56	4.83	0.140	0.190
A1	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b1	1.14	1.78	0.045	0.070
C	0.51	1.40	0.020	0.055
C1	0.36	0.61	0.014	0.024
D	9.65	10.67	0.380	0.420
E	14.22	16.51	0.560	0.650
e	2.54BSC		0.10BSC	
F	2.54	3.05	0.100	0.120
G	3.53	3.90	0.139	0.154
H	12.70	14.73	0.500	0.580
L	5.84	6.86	0.230	0.270
L1	-	6.35	-	0.250

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