

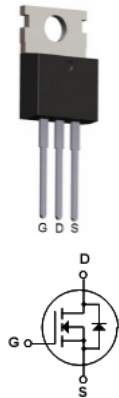
TS50N06

50A 60V N-Channel Enhancement Mode Power Mosfet

DRAWING

Features

- ◆ 50A,60V, $R_{DS(on)}=18m\Omega@V_{GS}=10V$
- ◆ Low gate charge(typical 31nc)
- ◆ Low crss (typical 65pF)
- ◆ Fast switching
- ◆ 100%avalanche tested
- ◆ Improved dv/dt capability



General Description

- ◆ Package:TO-220C
- ◆ 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 switch mode power supply.

Absolute Maximum Ratings( $T_c=25^{\circ}C$  unless otherwise noted )

Symbol	Parameter	Spec	Units
$V_{DSS}$	Drain-Source Voltage	60	V
$I_D$	Drain Current -Continuous( $T_c=25^{\circ}C$ )	50	A
	-Continuous( $T_c=100^{\circ}C$ )	35.4	A
$I_{DM}$	Drain Current -Pulsed	200	A
$V_{GSS}$	Gate-Source Voltage	$\pm 25$	V
$E_{AS}$	Single Pulsed Avalanche Energy	490	mJ
$I_{AR}$	Avalanche Current	50	A
$E_{AR}$	Repetitive Avalanche Energy	12	mJ
dv/dt	Peak Diode Recovery dv/dt	7.0	V/ns
$P_D$	Power Dissipation ( $T_A=25^{\circ}C$ )	3.75	W
	Power Dissipation ( $T_C=25^{\circ}C$ )	120	W
	-Derate above $25^{\circ}C$	0.8	W/ $^{\circ}C$
$T_j, T_{STG}$	Operating and Storage Temperature Range	-55 to +175	$^{\circ}C$
$T_L$	Maximum lead temperature for solderin purpose 1/8" from case for 5 seconds	300	$^{\circ}C$

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	1.24	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	40	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	62.5	$^{\circ}C/W$

**Electrical Characteristics**(Tc=25°C unless otherwise noted)

**Off Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	60	—	—	V
BV <sub>DSS/Tj</sub>	Breakdown Voltage Temperature Coeffocoent	ID=250uA, Referenced to 25°C	—	0.06	—	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	—	—	1	uA
		V <sub>DS</sub> =48V, Tc=125°C	—	—	10	uA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	Vgs=20V, Vds=0V	—	—	100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	Vgs=-20V, Vds=0V	—	—	-100	nA

**On Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V <sub>GSTH</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2	—	4	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =2.5A	—	18	22	mΩ
G <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =15, I <sub>D</sub> =20A	5	—	150	S

**Dynamic Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C <sub>JSS</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	—	1180	1540	pF
C <sub>oss</sub>	Output Capacitance		—	440	580	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		—	65	90	pF

**Switching Characteristics**

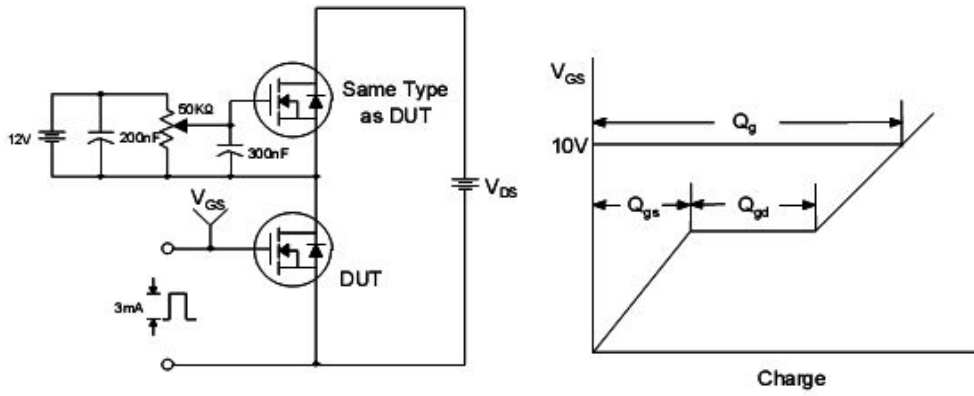
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t <sub>don</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V I <sub>D</sub> =25A R <sub>G</sub> =25Ω	—	15	40	ns
t <sub>r</sub>	Turn-On Rise Time		—	105	220	ns
t <sub>doff</sub>	Turn-Off Delay Time		—	60	130	ns
t <sub>f</sub>	Turn-Off Fall Time		—	65	140	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =48V	—	31	41	nc
Q <sub>gs</sub>	Gate-Source Charge	I <sub>D</sub> =50A	—	8	—	nc
Q <sub>gd</sub>	Gate-Drain Charge	V <sub>GS</sub> =10V	—	13	—	nc

**Drain-Source Diode Characteristics and Maximum Ratings**

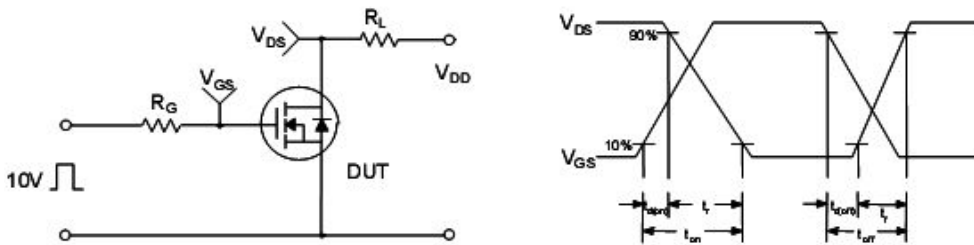
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I <sub>s</sub>	Maximum Continuous Drain-source diode forward current		—	—	50	A
I <sub>sm</sub>	Maxmum pulsed drain-source diode diode forward current		—	—	200	A
V <sub>sd</sub>	Drain-source diode forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =50A	—	—	1.5	V
T <sub>rr</sub>	Rverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =50A	—	52	—	ns
Q <sub>rr</sub>	Rverse Recovery charge	diff/dt=100A/us	—	75	—	uc

Test circuits

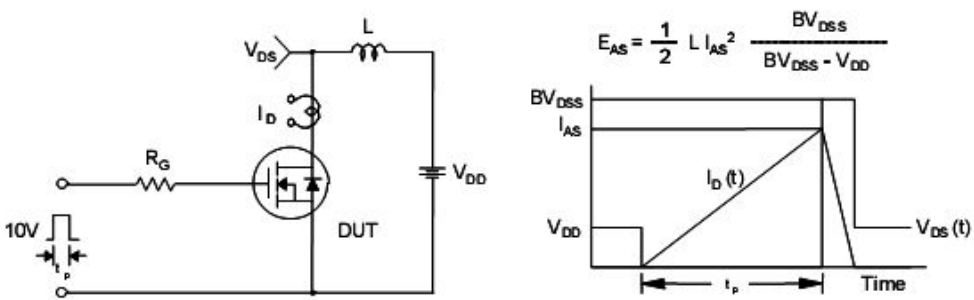
Gate Charge Test Circuit & Waveform



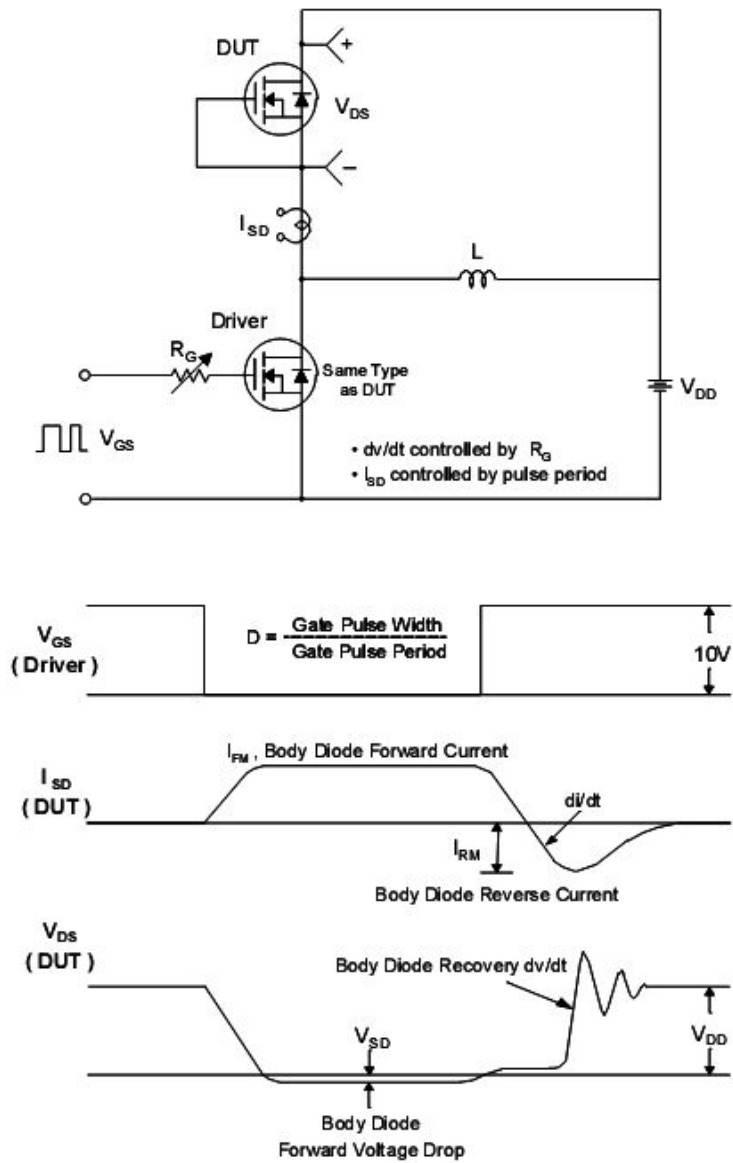
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



Typical Electrical And Thermal Characteristics(Curves)

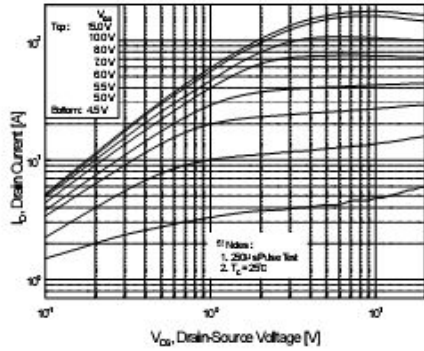


Figure 1. On-Region Characteristics

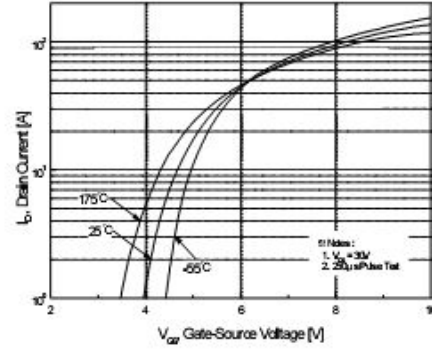


Figure 2. Transfer Characteristics

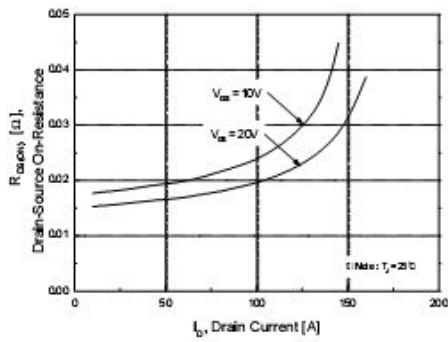


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

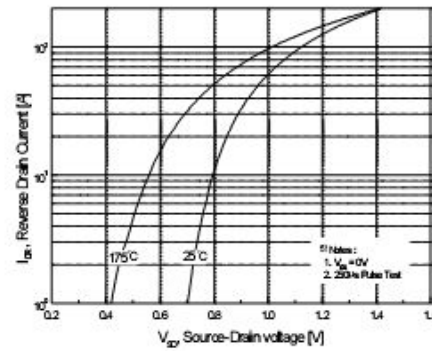


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

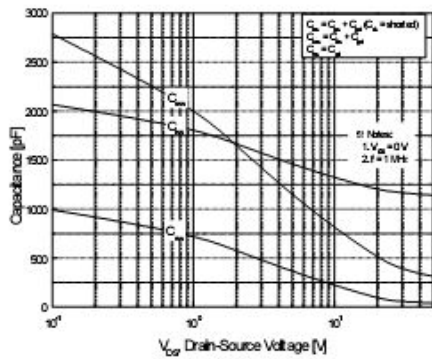


Figure 5. Capacitance Characteristics

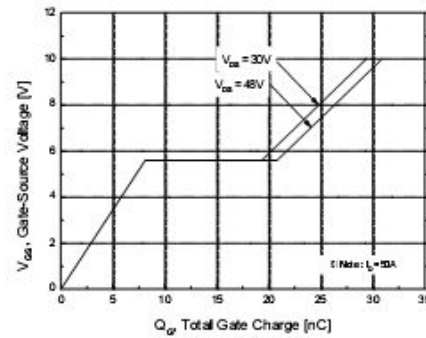


Figure 6. Gate Charge Characteristics

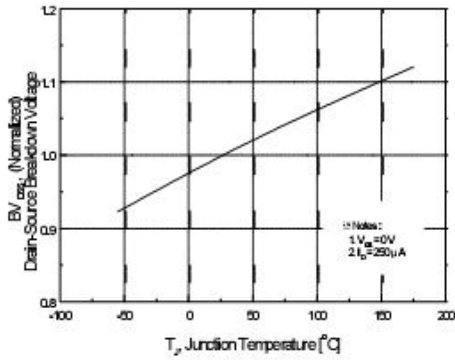


Figure 7. Breakdown Voltage Variation vs. Temperature

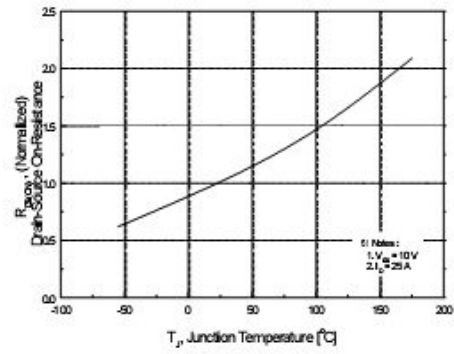


Figure 8. On-Resistance Variation vs. Temperature

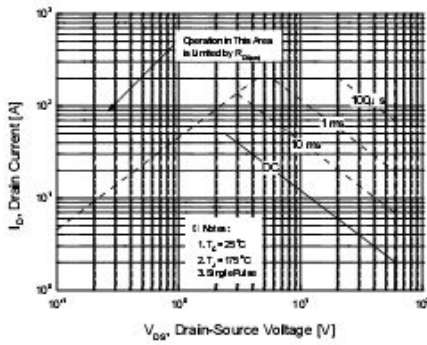


Figure 9. Maximum Safe Operating Area

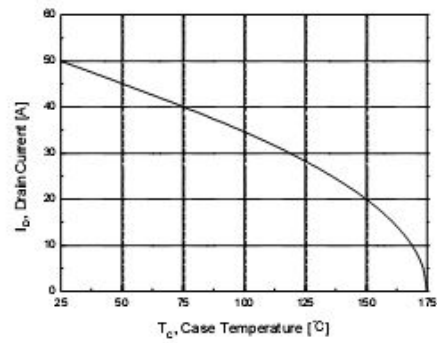


Figure 10. Maximum Drain Current vs. Case Temperature

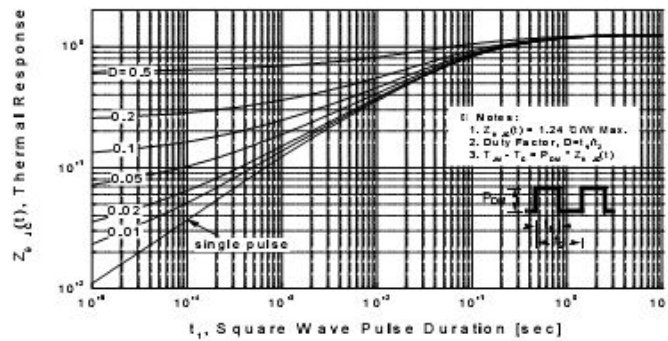


Figure 11. Transient Thermal Response Curve

Mechanical Dimensions

