

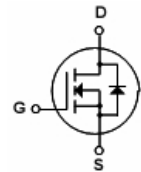
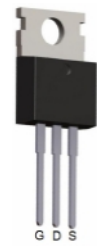
10N60A

9.5Amps, 600V N-Channel Power Mosfet

DRAWING

Features

- ◆ 9.5A,600V, $R_{DS(ON)}=1.0\Omega@V_{GS}=10V$
- ◆ Ultra low gate charge(typical 28nc )
- ◆ Low reverse transfer capacitance ( $C_{RSS}$ =typical 12.0 PF )
- ◆ Fast switching capability
- ◆ Avalanche energy specified
- ◆ Improved dv/dt capability, high ruggedness



General Description

- ◆ Package:TO-220C
- ◆ This is a high voltage and high current power MOSFET .Designed to have better characteristics, such as fast switching time , low gate charge, low on-state resistance and have a high rugged avalanche characteristics.This power MOSFET is usually used at high speed switching applications in power supplies ,PWM motor controls. High efficient DC to DC converters and bridge circuits.

Absolute Maximum Ratings

Symbol	Parameter	Spec	Units
$V_{DSS}$	Drain-Source Voltage	600	V
$I_D$	Drain Current -Continuous( $T_c=25^\circ C$ )	9.5	A
$I_{AR}$	Avalanche Current	9.5	A
$I_{DM}$	Drain Current -Pulsed	30	A
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy	230	mJ
$E_{AR}$	Repetitive Avalanche Energy	14.7	mJ
dv/dt	Peak Diode Recovery dv/dt	4.5	V/ns
$P_D$	Power Dissipation	147	W
$T_j$	Junction Temperature	+150	$^\circ C$
$T_{opr}$	Operating Temperature Range	-55 to +150	$^\circ C$
$T_{stg}$	Storage Temperature	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	0.80	$^\circ C/W$
$R_{\theta JA}$	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	600	—	—	V
BV <sub>DSS</sub> /T <sub>J</sub>	Breakdown Voltage Temperature Coefficient	ID=250uA,Referenced to 25°C	—	0.7	—	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =600V,V <sub>GS</sub> =0V	—	—	1	uA
I <sub>GSSF</sub>	Gate-Body Leakage Current,Forward	V <sub>gs</sub> =30V,V <sub>ds</sub> =0V	—	—	100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current,Reverse	V <sub>gs</sub> =-30V,V <sub>ds</sub> =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	2.0	—	4.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V,I <sub>D</sub> =5A	—	0.75	1.0	Ω

**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	—	1740	2500	pF
C <sub>OSS</sub>	Output Capacitance		—	137	185	pF
C <sub>RSS</sub>	Reverse Transfer Capacitance		—	12	16	pF

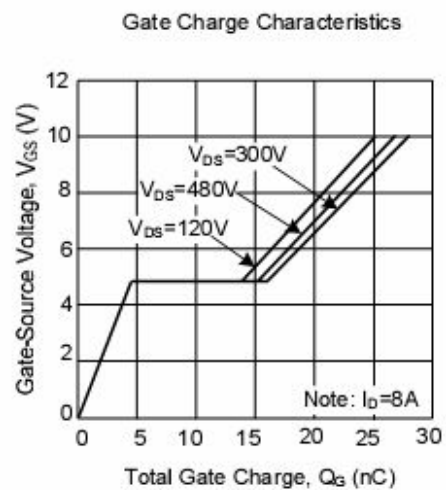
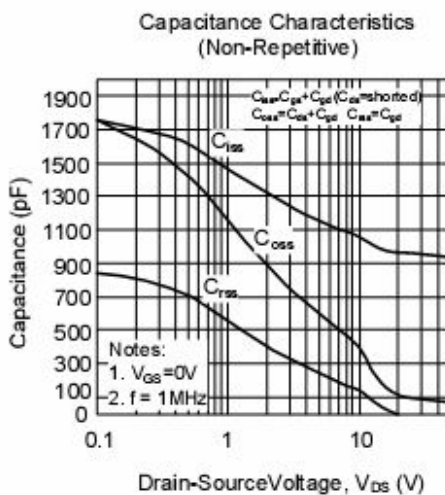
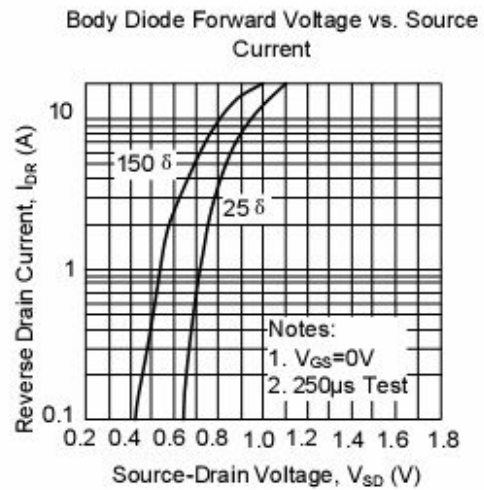
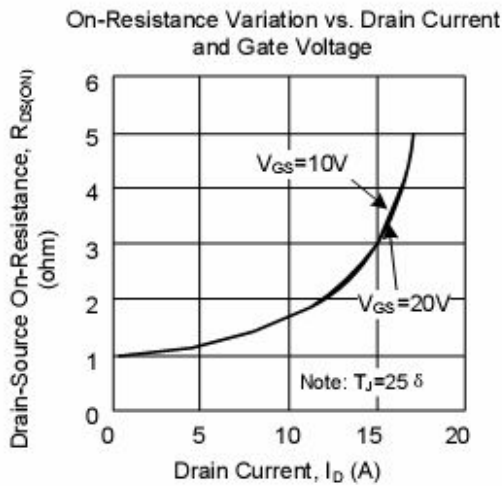
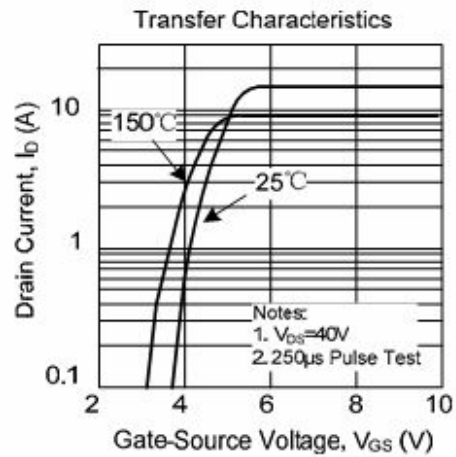
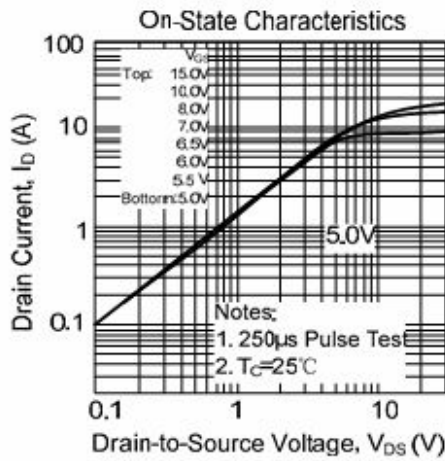
**Switching Characteristics**

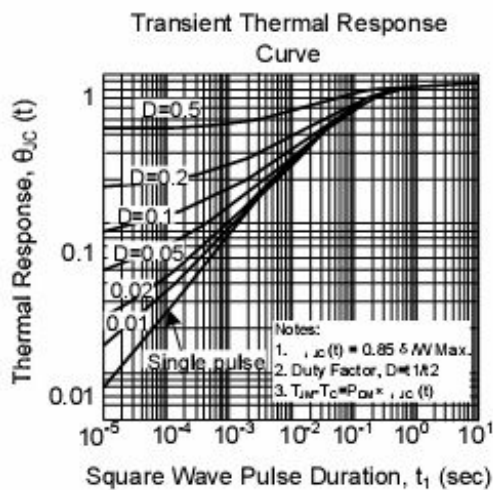
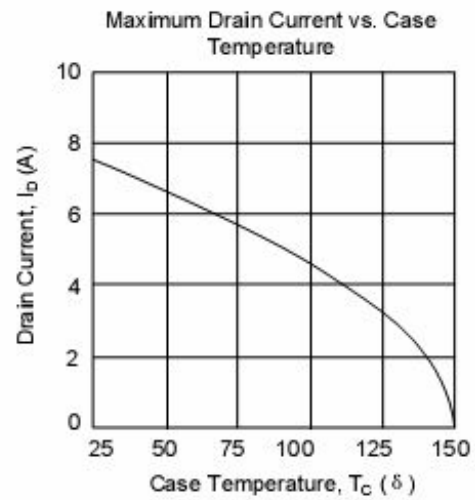
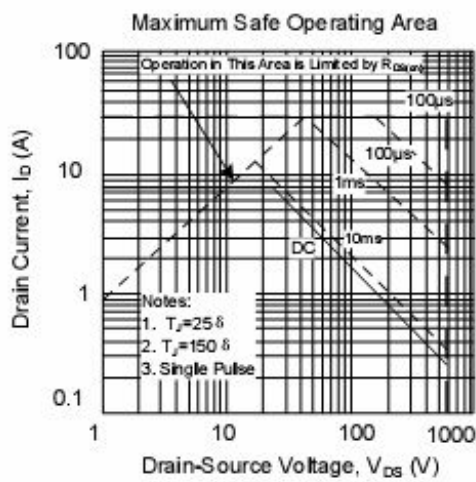
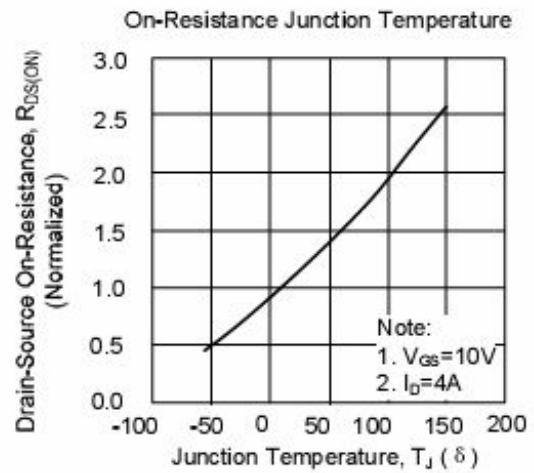
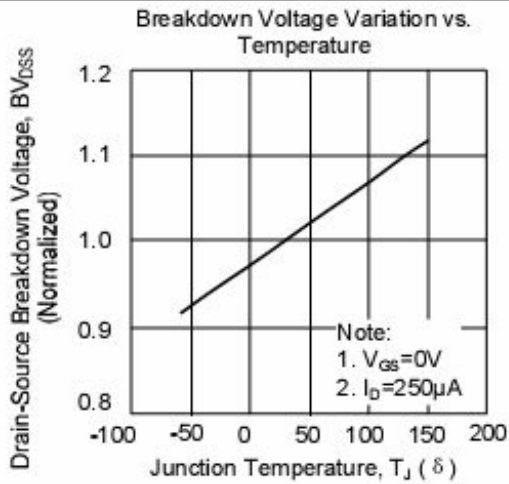
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t <sub>don</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V I <sub>D</sub> =9.5A R <sub>G</sub> =25Ω	—	16.5	45	ns
t <sub>r</sub>	Turn-On Rise Time		—	60.5	130	ns
t <sub>doff</sub>	Turn-Off Delay Time		—	81	170	ns
t <sub>f</sub>	Turn-Off Fall Time		—	64.5	140	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =480V	—	28	36	nc
Q <sub>gs</sub>	Gate-Source Charge	I <sub>D</sub> =9.5A	—	4.5	—	nc
Q <sub>gd</sub>	Gate-Drain Charge	V <sub>GS</sub> =10V	—	12	—	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		—	—	9.5	A
I <sub>sm</sub>	Maximum pulsed drain-source diode forward current		—	—	30	A
V <sub>sd</sub>	Drain-source diode forward Voltage	V <sub>GS</sub> =0V,I <sub>S</sub> =9A	—	—	1.4	V
T <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V,I <sub>S</sub> =9A	—	365	—	ns
Q <sub>rr</sub>	Reverse Recovery charge	dif/dt=100A/us	—	3.4	—	uc

Typical Characteristics





Test circuits and waveforms

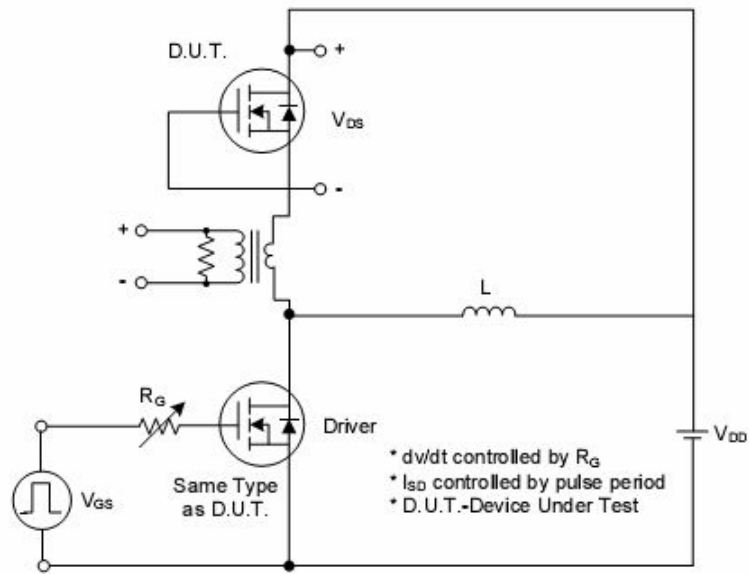


Fig. 1A Peak Diode Recovery  $dv/dt$  Test Circuit

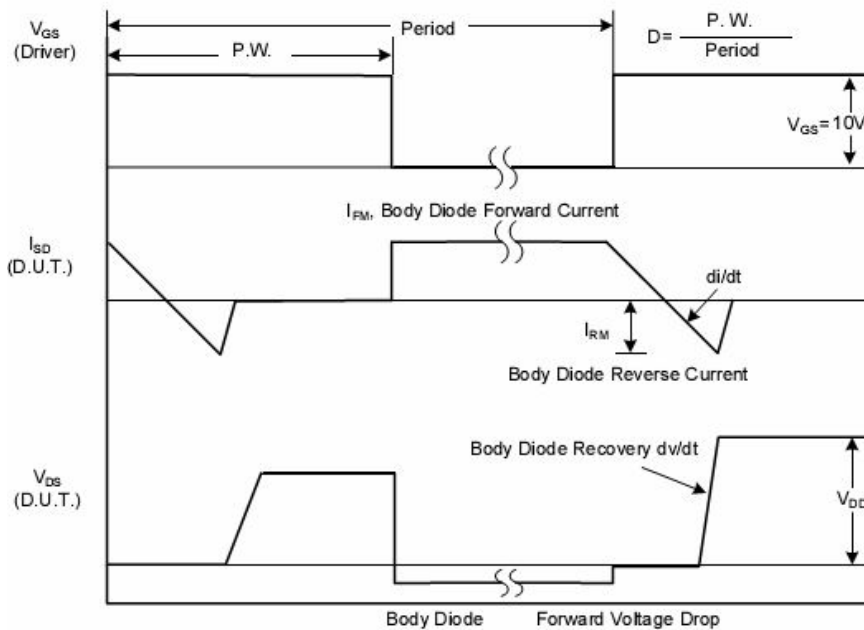


Fig. 1B Peak Diode Recovery  $dv/dt$  Waveforms

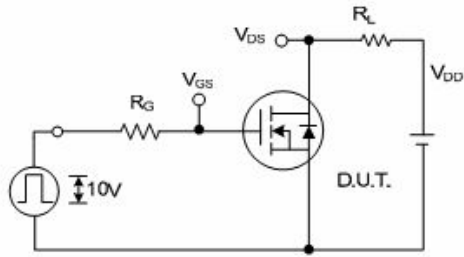


Fig. 2A Switching Test Circuit

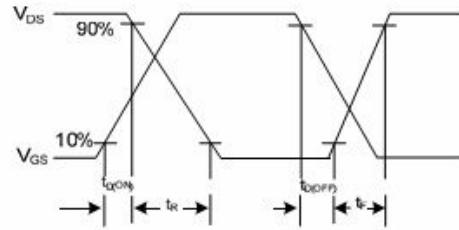


Fig. 2B Switching Waveforms

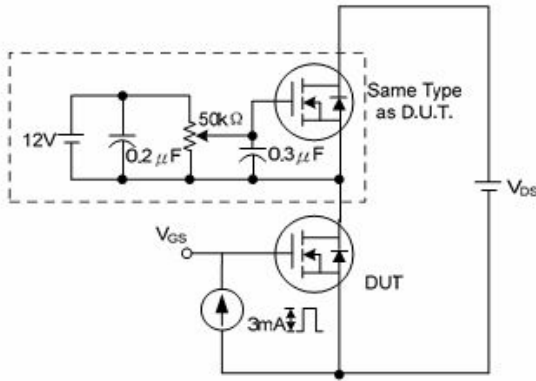


Fig. 3A Gate Charge Test Circuit

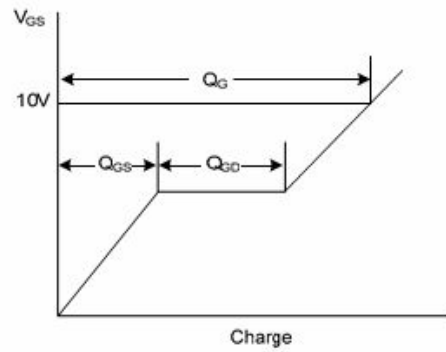


Fig. 3B Gate Charge Waveform

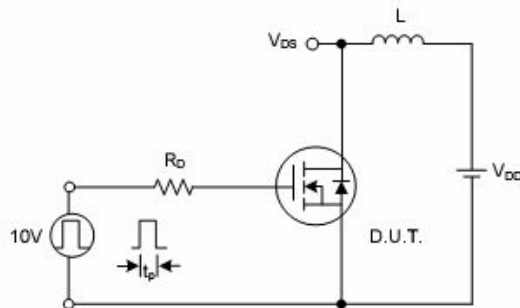


Fig. 4A Unclamped Inductive Switching Test Circuit

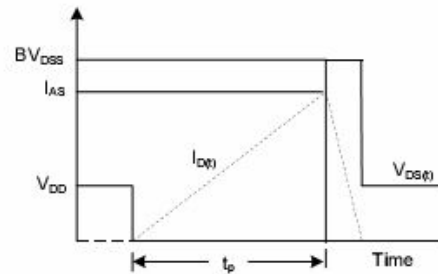


Fig. 4B Unclamped Inductive Switching Waveforms

Mechanical Dimensions

