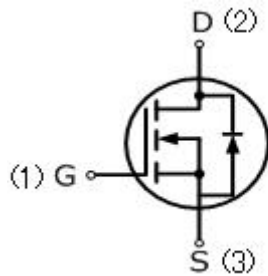


## 47N60YS

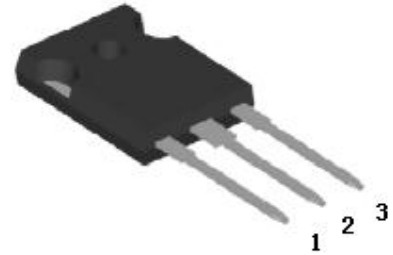
47 Amps,600 Volts N-Channel Super Junction Power MOSFET

### FEATURE

- 47A,600V, $R_{DS(ON)MAX}=90m\Omega @V_{GS}=10V/15.6A$
- Low gate charge
- Low  $C_{iss}$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



TO-247



### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	47N60YS	UNIT
Drain-Source Voltage	$V_{DSS}$	600	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	
Continuous Drain Current	$I_D$	47	A
Pulsed Drain Current(Note 1)	$I_{DM}$	132	
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	720	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	$T_L$	260	$^\circ\text{C}$
Mounting Torque	6-32 or M3 screw	10	lbf • in
		1.1	N • m

### Thermal Characteristics

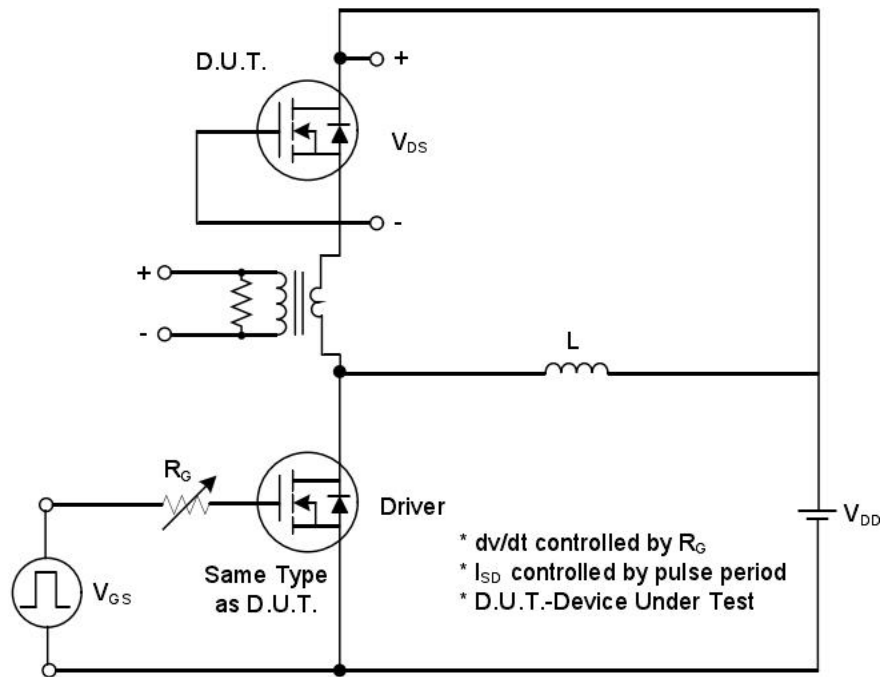
Parameter	Symbol	47N60YS	Units
Maximum Junction-to-Case	$R_{thJC}$	0.68	$^\circ\text{C}/\text{W}$
Maximum Power Dissipation	$P_D$	183	W

Electrical Characteristics (T <sub>c</sub> =25°C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA, T <sub>C</sub> =25°C	600	—	—	V
		V <sub>GS</sub> =0V, I <sub>D</sub> =250uA, T <sub>C</sub> =125°C	—	700	—	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V	—	—	1	μ A
Gate-Body Leakage Current, Forward	I <sub>GSSF</sub>	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	—	—	100	nA
Gate-Body Leakage Current, Reverse	I <sub>GSSR</sub>	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	—	—	-100	nA
<b>On Characteristics</b>						
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2	—	4	V
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =15.6A	—	68	90	m Ω
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHZ	—	3112	—	pF
Output Capacitance	C <sub>oss</sub>		—	2399	—	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		—	62	—	pF
<b>Switching Characteristics</b>						
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =20A, R <sub>G</sub> =25Ω (Note3,4)	—	45.5	—	ns
Turn-On Rise Time	t <sub>r</sub>		—	120.6	—	ns
Turn-Off Delay Time	t <sub>d(off)</sub>		—	137	—	ns
Turn-Off Fall Time	t <sub>f</sub>		—	116.2	—	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =480V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V, (Note3,4)	—	88	—	nC
Gate-Source Charge	Q <sub>gs</sub>		—	21.7	—	nC
Gate-Drain Charge	Q <sub>gd</sub>		—	41	—	nC
<b>Drain-Source Body Diode Characteristics and Maximum Ratings</b>						
Continuous Diode Forward Current	I <sub>S</sub>		—	—	47	A
Pulsed Diode Forward Current	I <sub>SM</sub>		—	—	132	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V	—	—	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =20A, dI <sub>F</sub> /dt=100A/us, (Note3)	—	947.1	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>		—	6.8	—	μ C

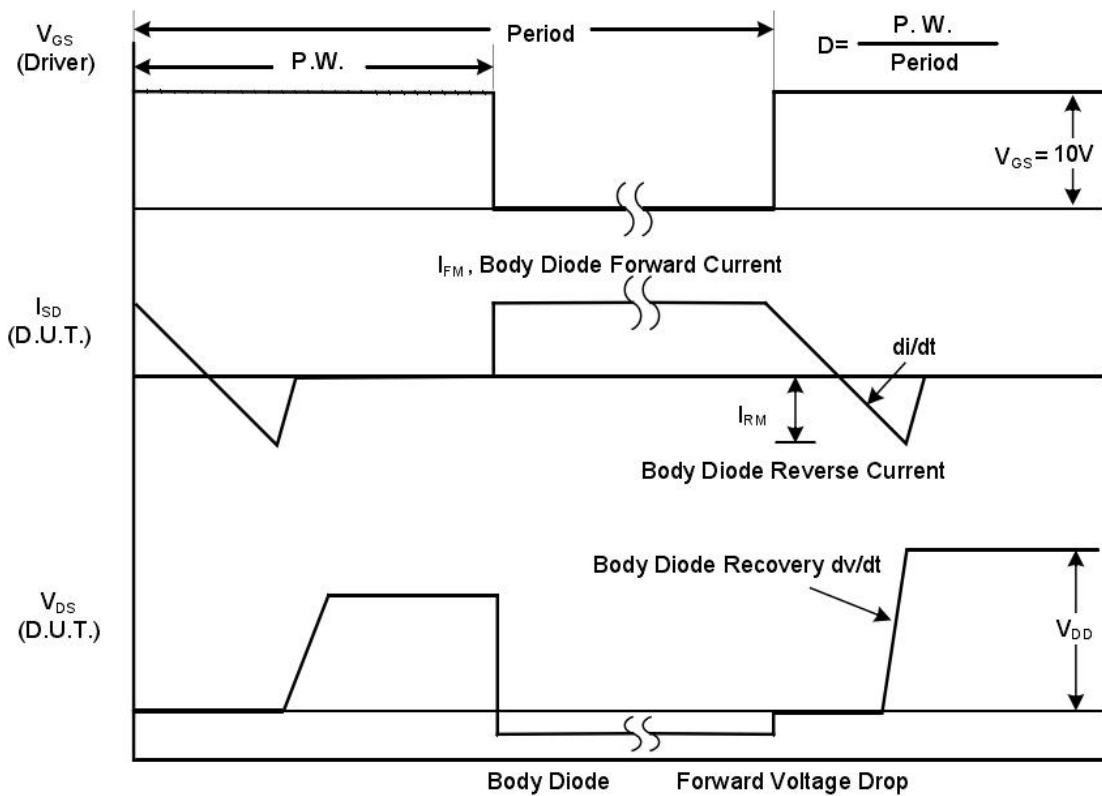
#### Notes

1. Repetitive Rating: pulse width limited by maximum junction temperature.
2. L=10mH, R<sub>g</sub>=25 Ω, I<sub>AS</sub>=12A, starting T<sub>J</sub>=25°C.
3. dI/dt=200A/us, starting T<sub>J</sub>=25°C. Pulse width ≤ 300us; duty cycle ≤ 2%.
4. Repetitive rating; pulse width limited by maximum junction temperature.

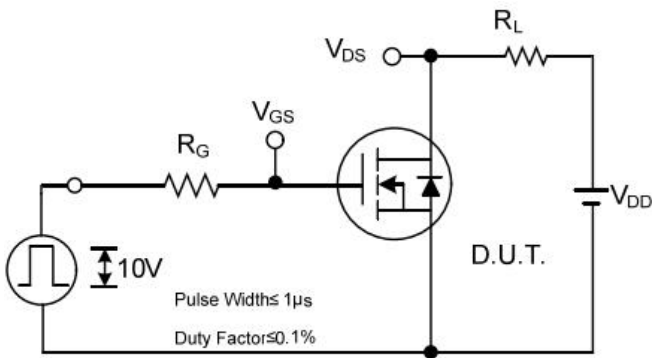
**TEST CIRCUIT AND WAVEFORM**



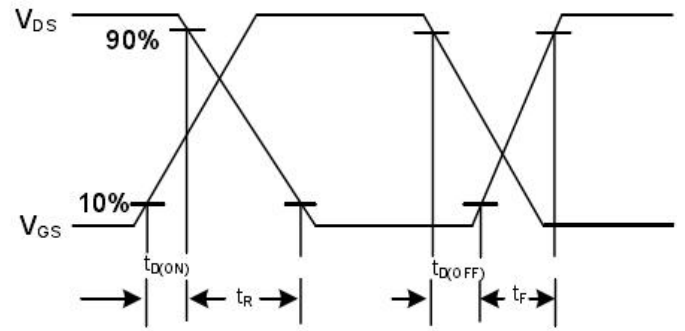
**Peak Diode Recovery  $dv/dt$  Test Circuit**



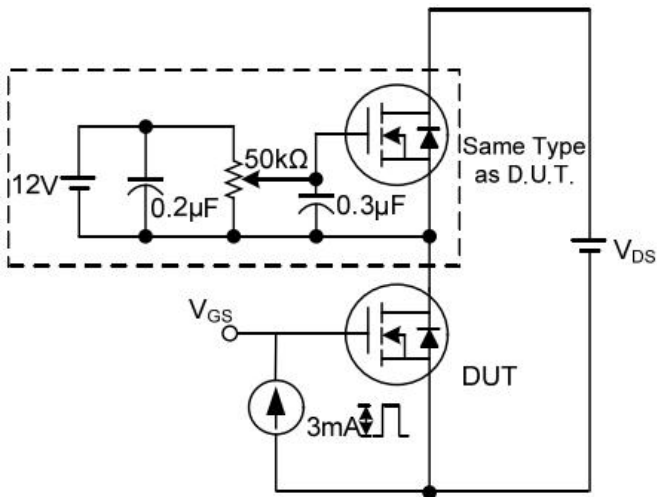
**Peak Diode Recovery  $dv/dt$  Waveforms**



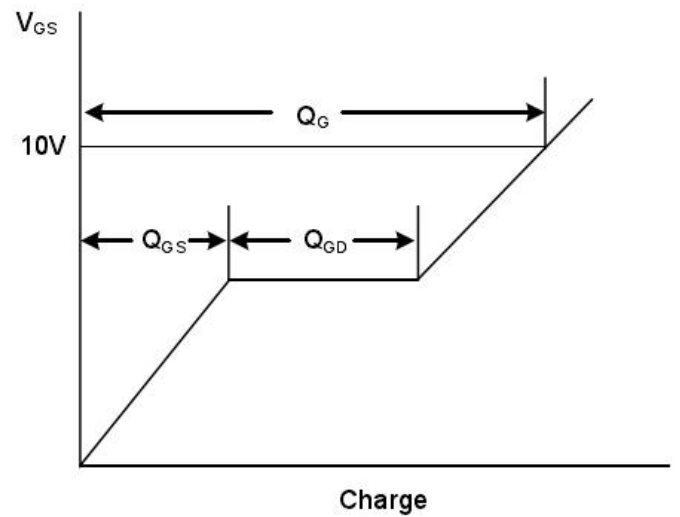
Switching Test Circuit



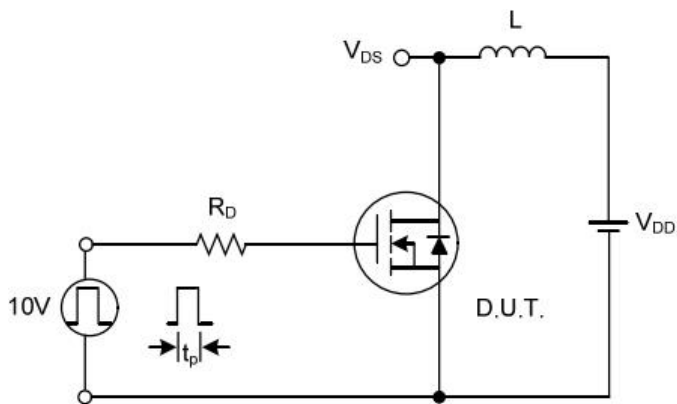
Switching Waveforms



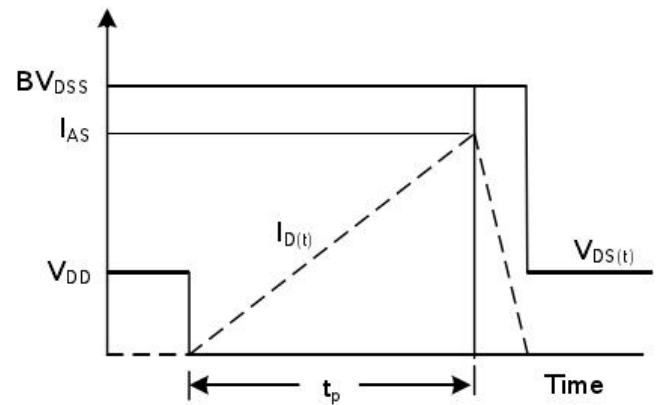
Gate Charge Test Circuit



Gate Charge Waveform

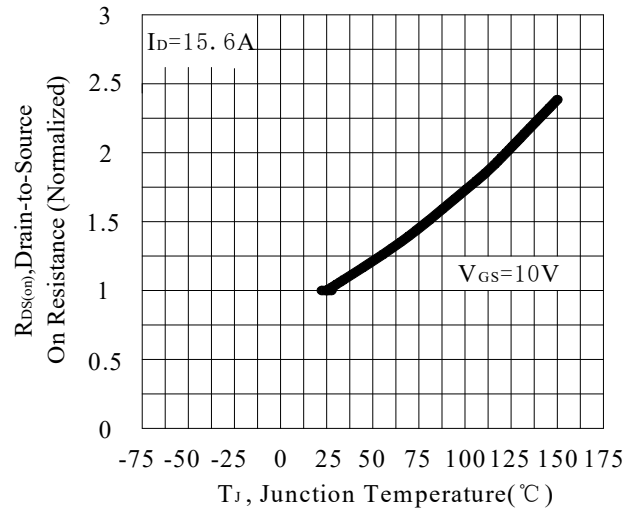
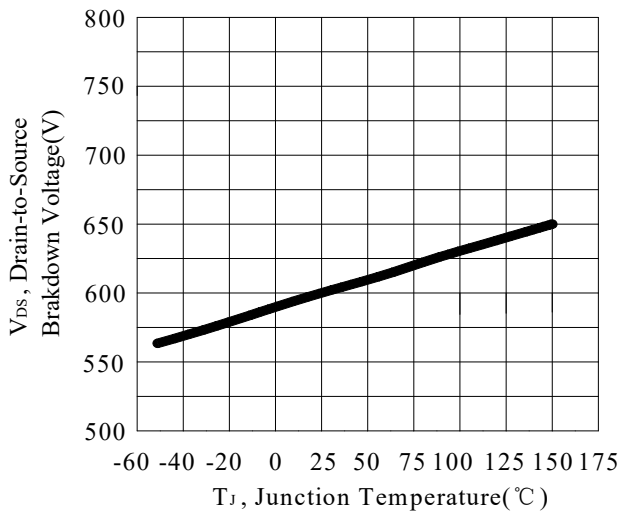
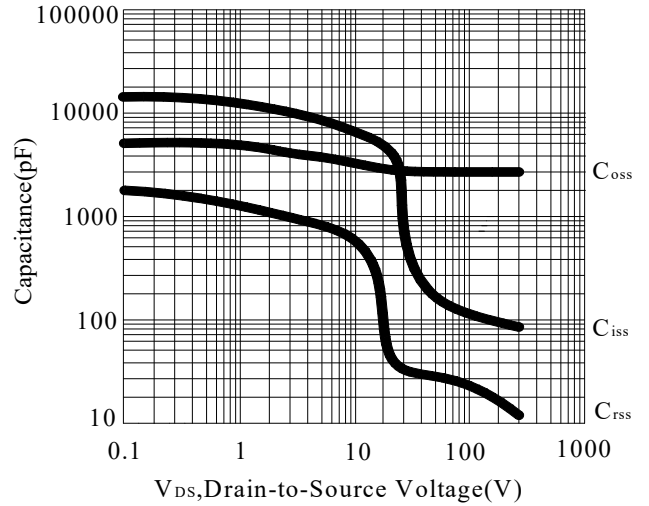
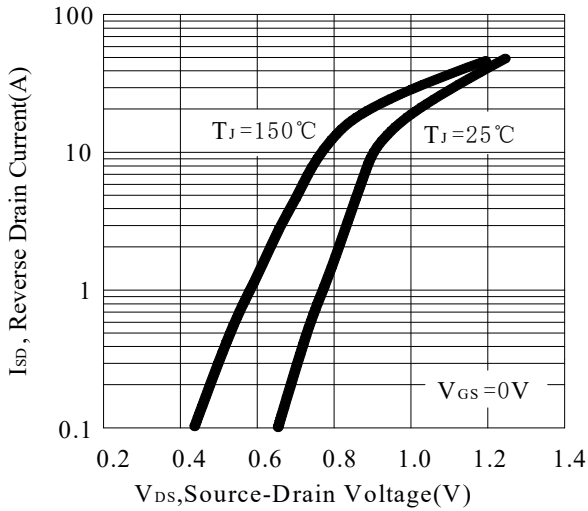
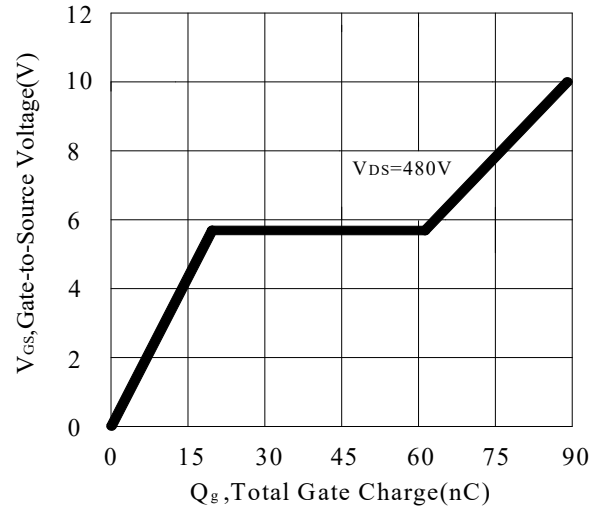
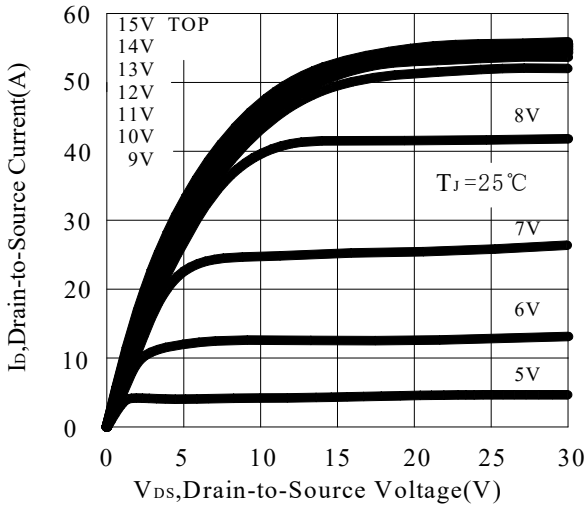


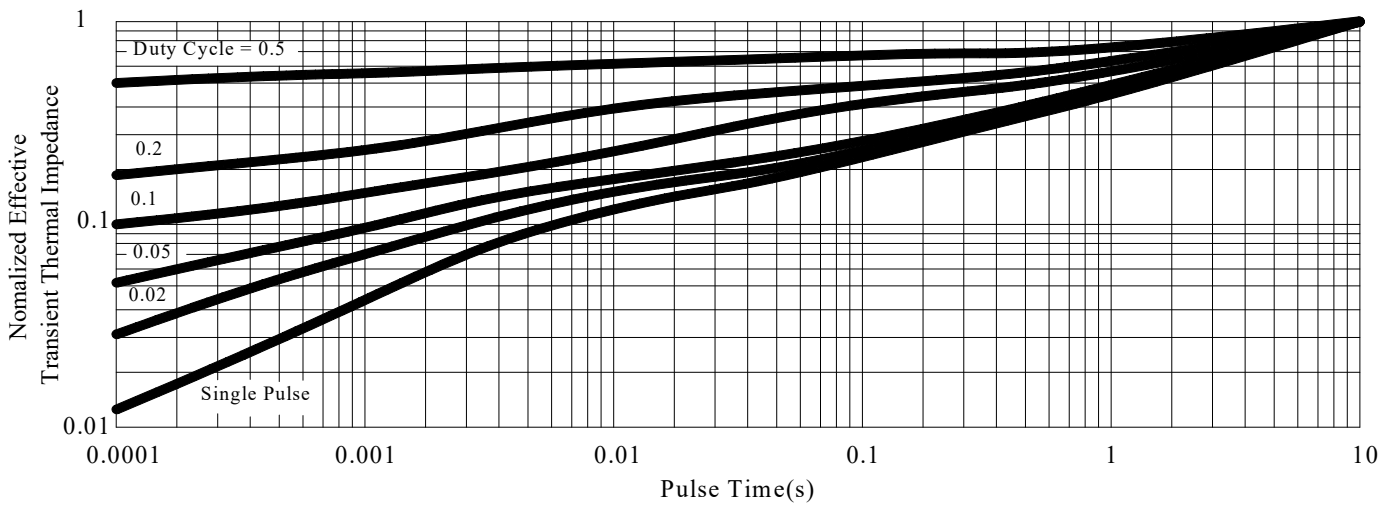
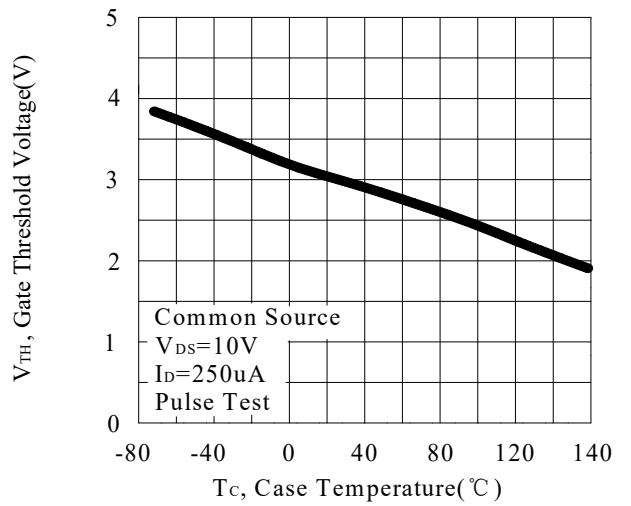
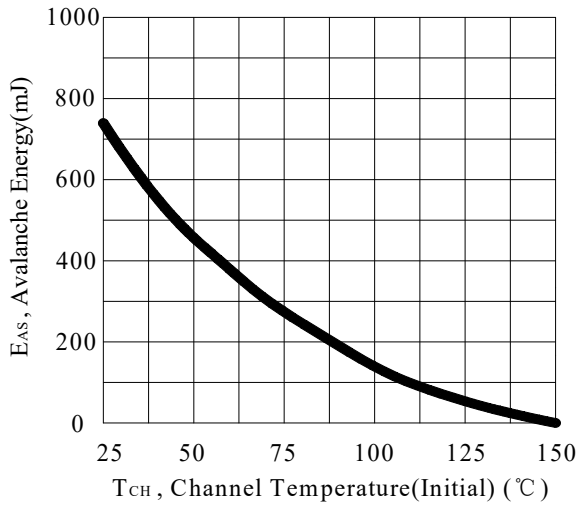
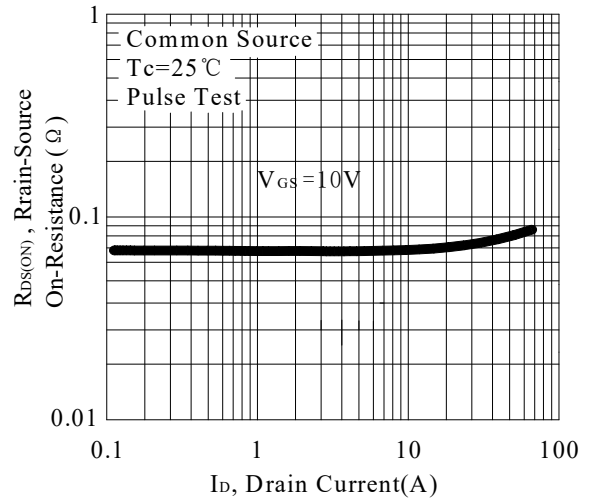
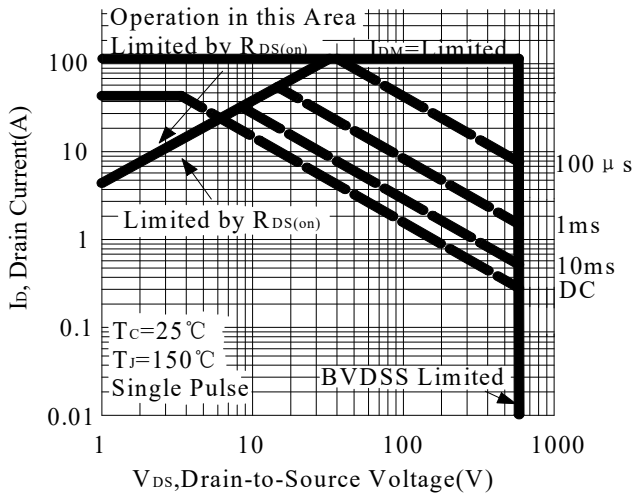
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

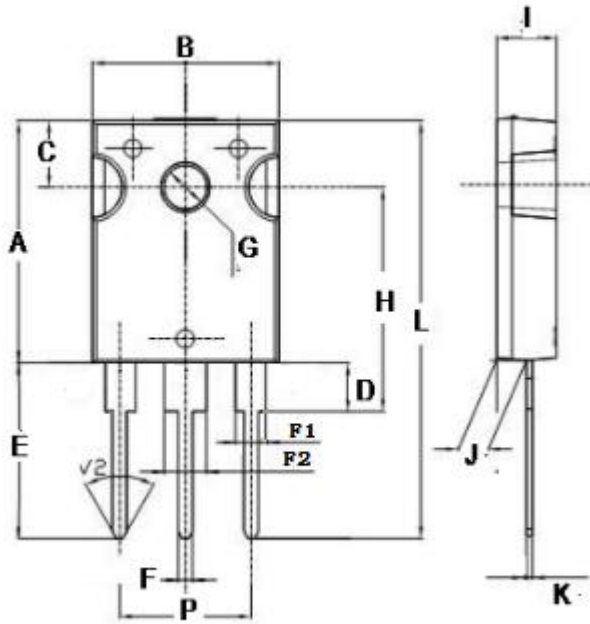
## RATING AND CHARACTERISTIC CURVES





**PACKAGE OUTLINE DIMENSIONS**

**TO-247**



Dim	Min	Max
A	20.0	22.0
B	15.5	16.0
C	5.7	6.3
D	4.0	4.4
E	19.0	21.0
F	1.1	1.3
G	3.5	3.8
H	18.3	20.2
I	4.9	5.2
J	2.3	2.5
K	0.55	0.65
L	39.0	42.0
P	10.7	10.9
F1	1.9	2.1
F2	2.9	3.1
mm		

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