

General Description

The IRFS3607TRPBF is silicon N-channel Enhanced VDMOSFETS, obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy.

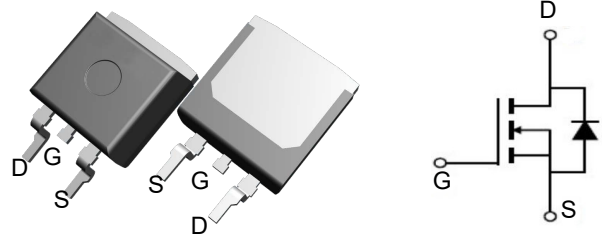


Features

V_{DS}	75	V
I_D	75	A
$R_{DS(ON)}$ (at $V_{GS} = 4.5V$)	7	m Ω
$R_{DS(ON)}$ (at $V_{GS} = 10V$)	10	m Ω

Application

- High efficiency switch mode power supplies
- Power factor correction
- Electronic lamp ballast



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
IRFS3607TRPBF	TO-263	IRFS3607TRPBF	2500

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

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	75	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current ^G	$T_C = 25^\circ\text{C}$	I_D	80	A
	$T_C = 100^\circ\text{C}$		75	
Pulsed Drain Current ^C		I_{DM}	245	
Continuous Drain Current	$T_A = 25^\circ\text{C}$	I_{DSM}	13	A
	$T_A = 70^\circ\text{C}$		10.5	
Avalanche Current ^C		I_{AS}	50	A
Avalanche energy $L = 0.1\text{mH}$ ^C		E_{AS}	125	mJ
Power Dissipation ^B	$T_C = 25^\circ\text{C}$	P_D	167	W
	$T_C = 100^\circ\text{C}$		83	
Power Dissipation ^A	$T_A = 25^\circ\text{C}$	P_{DSM}	2.1	W
	$T_A = 70^\circ\text{C}$		1.3	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Electrical Characteristics ($T_c=25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	75			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=80\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^{\circ}\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2	3	4	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	245			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		7	8	m Ω
		TO220 $T_J=125^{\circ}\text{C}$		10	12	
		$V_{GS}=6\text{V}$, $I_D=20\text{A}$ TO-220		6.1	7.9	m Ω
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		60		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.7	1	V
I_S	Maximum Body-Diode Continuous Current ^G				70	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=40\text{V}$, $f=1\text{MHz}$		3142		pF
C_{oss}	Output Capacitance			435		pF
C_{rss}	Reverse Transfer Capacitance			43		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	0.6	1.3	2.0	Ω
SWITCHING PARAMETERS						
$Q_{g(10V)}$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=40\text{V}$, $I_D=20\text{A}$		44.5	63	nC
Q_{gs}	Gate Source Charge			12		nC
Q_{gd}	Gate Drain Charge			8		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=40\text{V}$, $R_L=2\Omega$, $R_{GEN}=3\Omega$		13.5		ns
t_r	Turn-On Rise Time			11		ns
$t_{D(off)}$	Turn-Off DelayTime			32		ns
t_f	Turn-Off Fall Time			11		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$		29		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=20\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$		161		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25\text{ }^{\circ}\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of $150\text{ }^{\circ}\text{C}$. The value in any given application depends on the user's specific board design, and the maximum temperature of $175\text{ }^{\circ}\text{C}$ may be used if the PCB allows it.

B. The power dissipation P_D is based on $T_{J(MAX)}=175\text{ }^{\circ}\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=175\text{ }^{\circ}\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25\text{ }^{\circ}\text{C}$.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

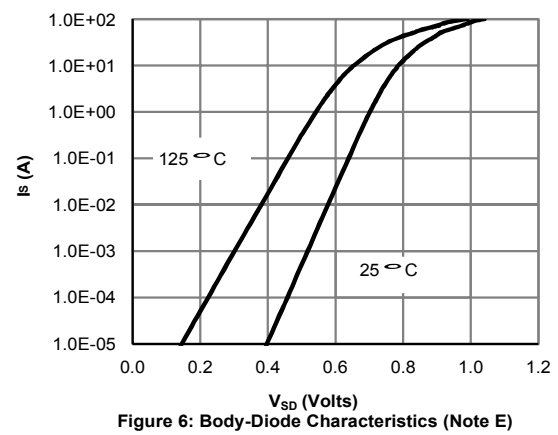
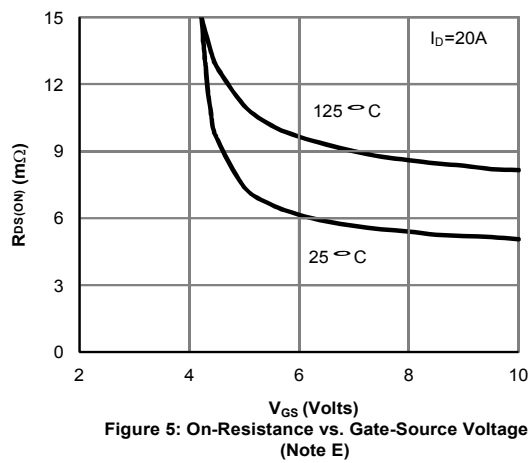
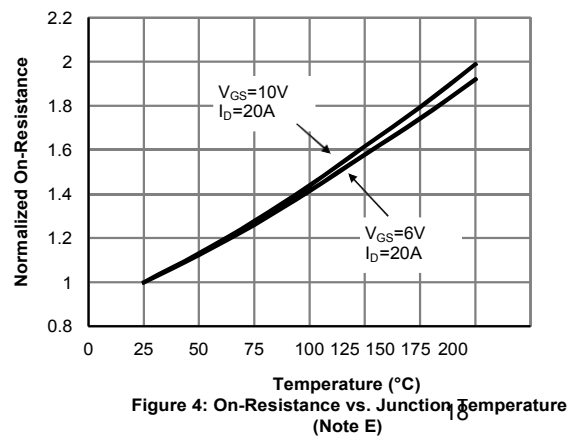
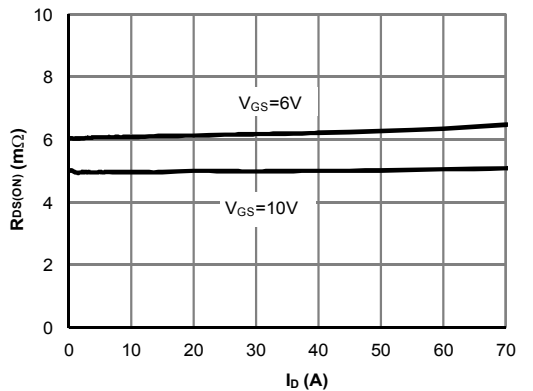
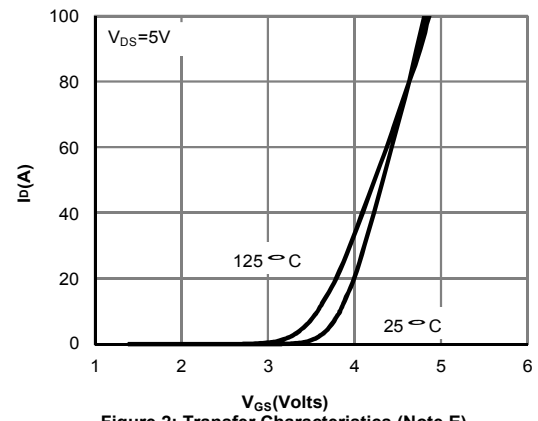
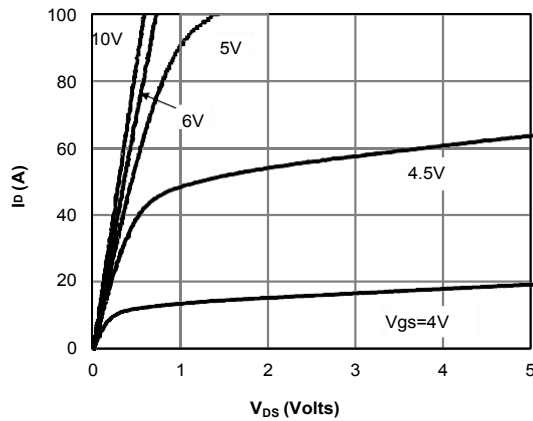
E. The static characteristics in Figures 1 to 6 are obtained using $<300\mu\text{s}$ pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=175\text{ }^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

G. The maximum current limited by package.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25\text{ }^{\circ}\text{C}$.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



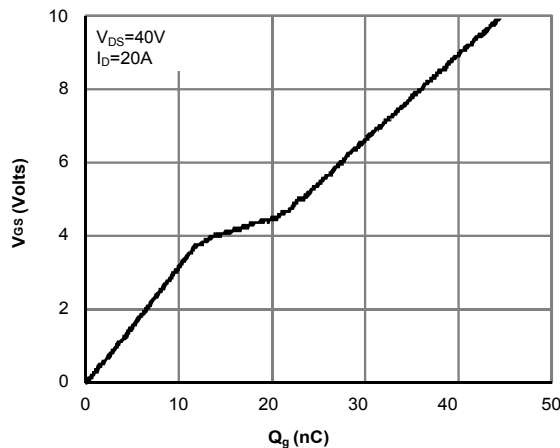


Figure 7: Gate-Charge Characteristics

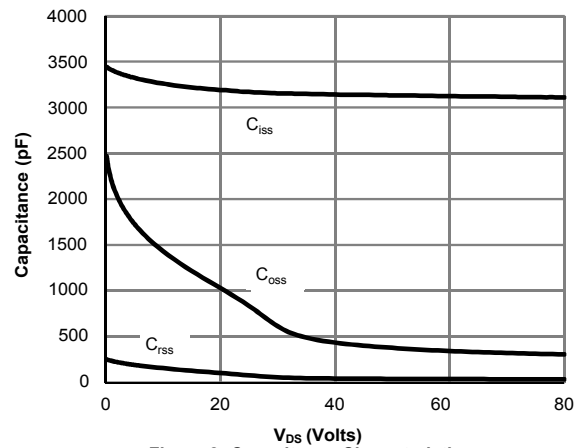


Figure 8: Capacitance Characteristics

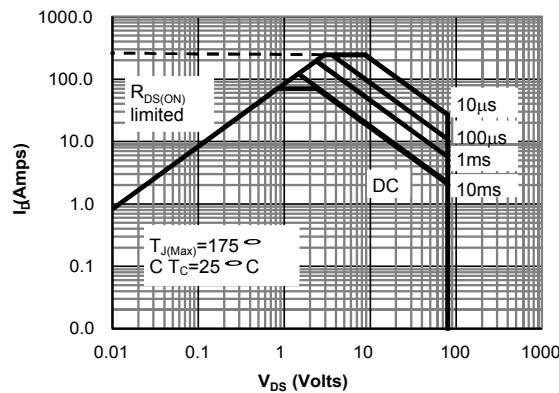


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

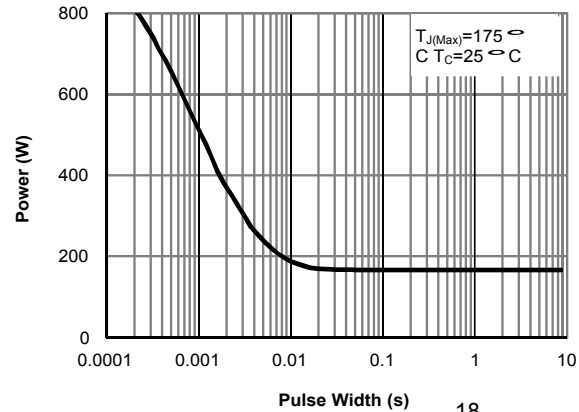


Figure 10: Single Pulse Power Rating Ju Non-to-Case (Note F)

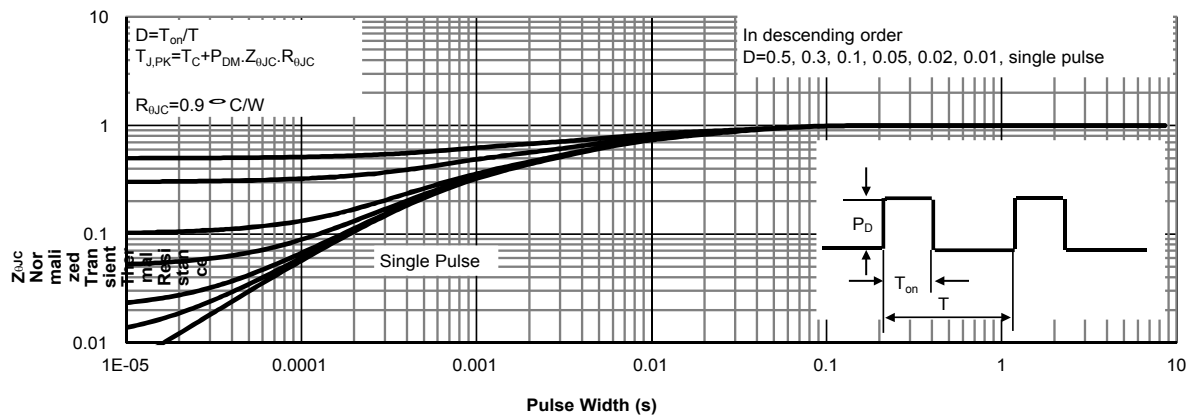


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

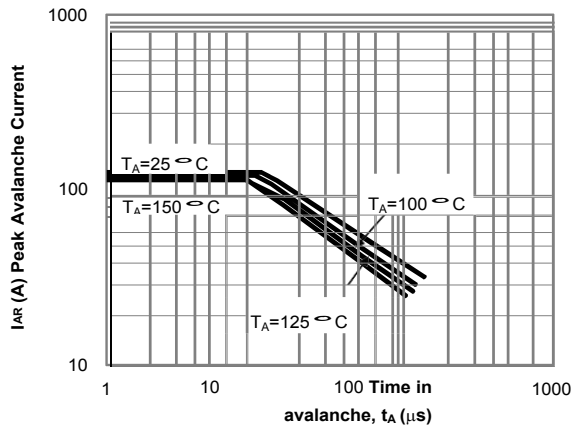


Figure 12: Single Pulse Avalanche capability (Note C)

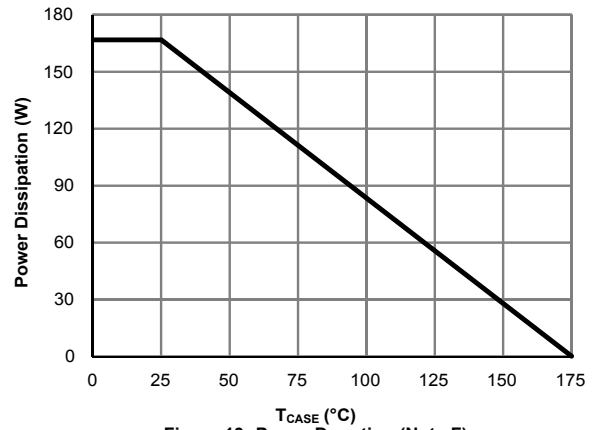


Figure 13: Power De-rating (Note F)

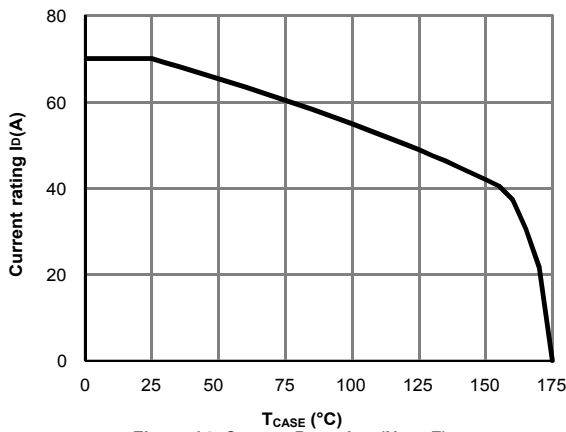


Figure 14: Current De-rating (Note F)

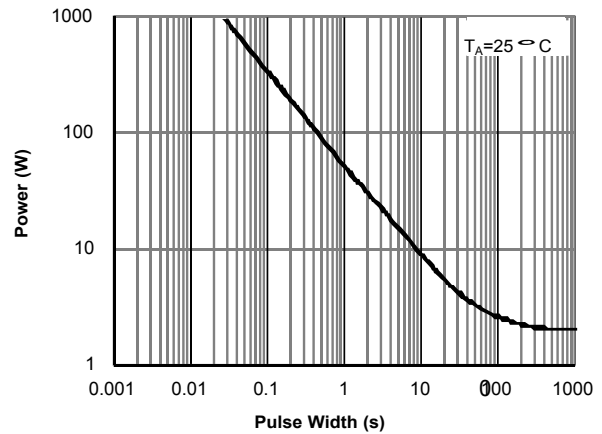


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

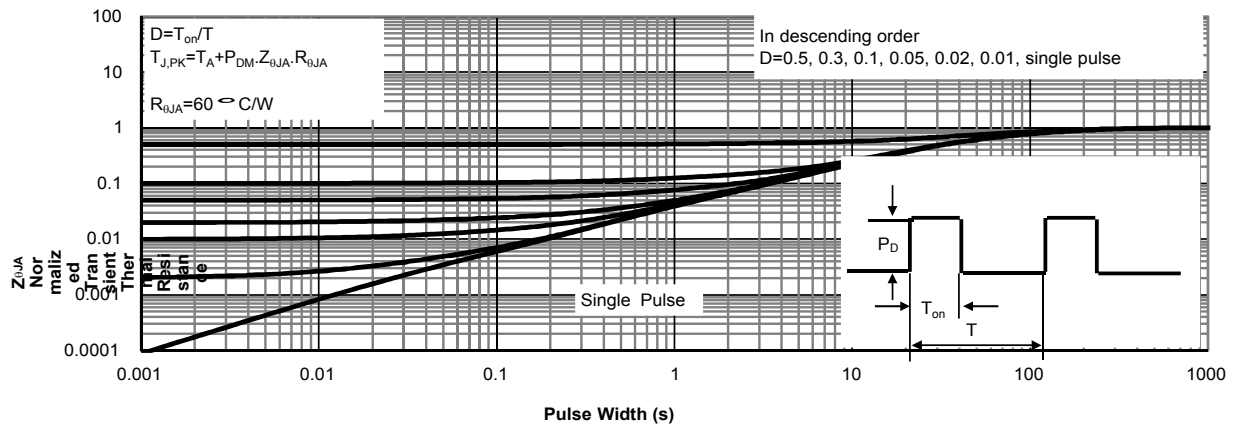
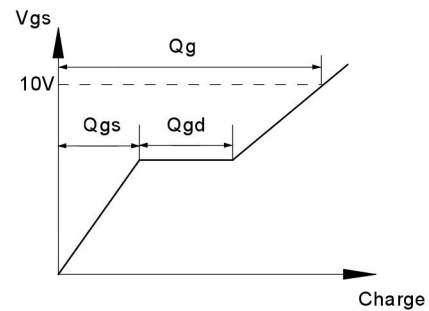
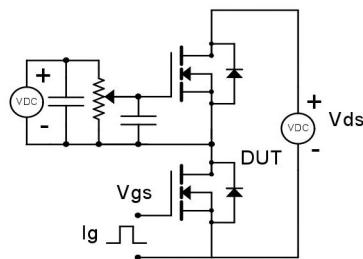
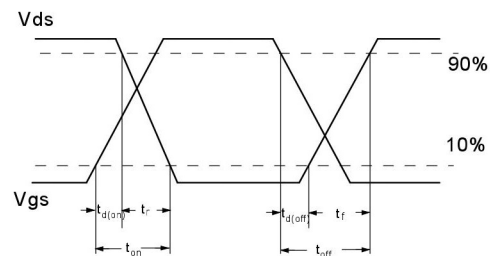
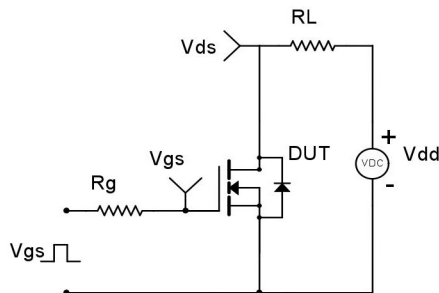


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

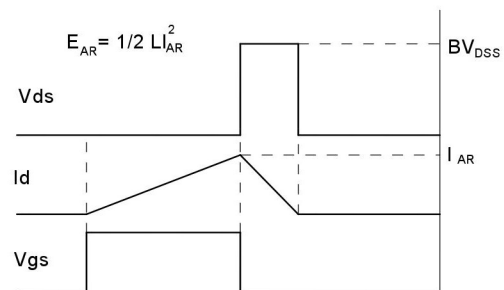
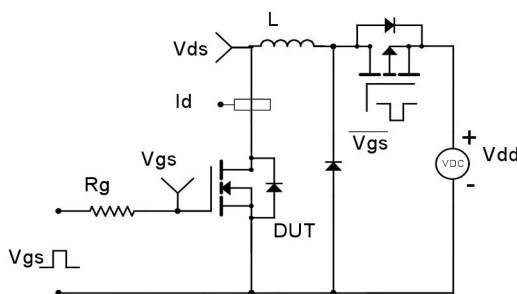
Gate Charge Test Circuit & Waveform



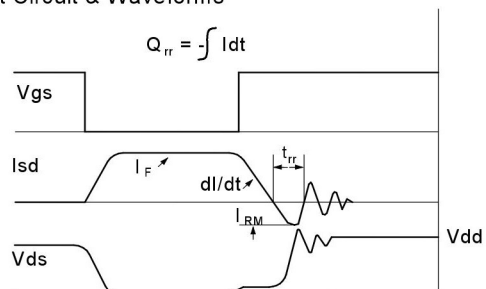
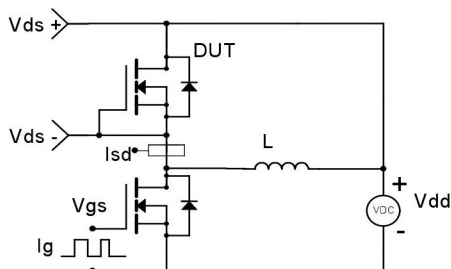
Resistive Switching Test Circuit & Waveforms



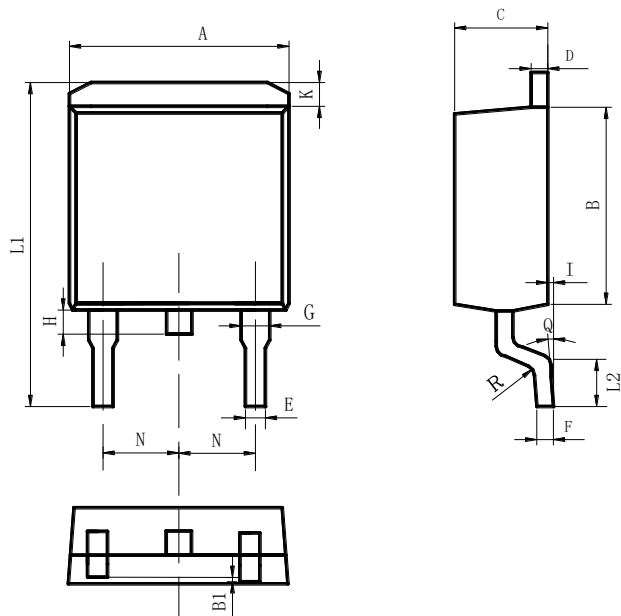
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data-TO-263 Single



Items	Values(mm)	
	MIN	MAX
A	9.80	10.40
B	8.90	9.50
B1	0	0.10
C	4.40	4.80
D	1.16	1.37
E	0.70	0.95
F	0.30	0.60
G	1.07	1.47
H	1.30	1.80
K	0.95	1.37
L1	14.50	16.50
L2	1.90	2.90
I	0	0.2
Q	0°	8°
R	0.4	
N	2.39	2.69