

ID	$R_{DS(ON)}$ (Typ)	VDSS
31A	86mΩ	600V

Applications:

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- AC-DC Switching Power Supply

Features:

- Fast switching speed
- 100% avalanche tested
- Improved dv/dt capability
- Fast Recovery Time

Ordering Information

Part Number	Package	Marking	Packing	Qty.
RSF60R099T	T0-220	RSF60R099T	Tube	50 PCS

Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise specified

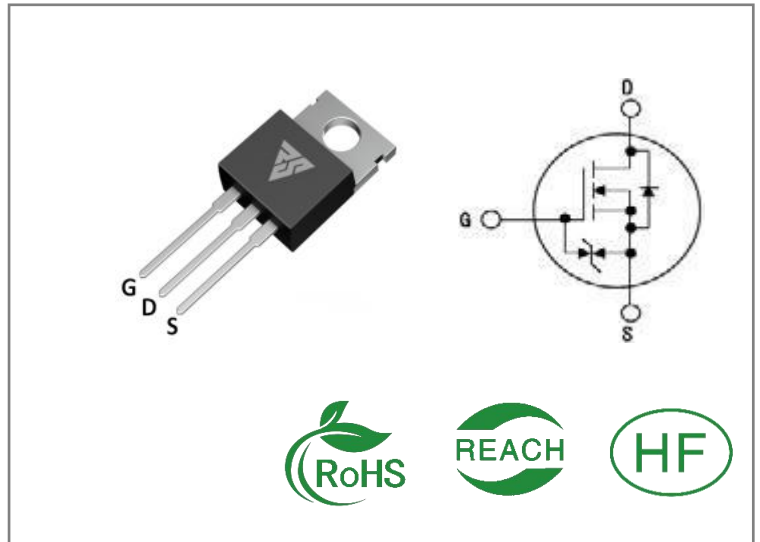
Symbol	Parameter	RSF60R099T	Units
VDSS	Drain-to-Source Voltage	600	V
ID	Continuous Drain Current $T_C = 25^\circ\text{C}$	31	A
ID	Continuous Drain Current $T_C = 100^\circ\text{C}$	19.5	
IDM	Pulsed Drain Current (Note*1)	93	
PD	Power Dissipation	205	W
VGS	Gate- to- Source Voltage	± 20	V
EAS	Single Pulse Avalanche Energy $I_{AS} = 3.5\text{A}, V_{DD} = 100\text{V}, R_G = 25\ \Omega, T_C = 25^\circ\text{C}$	588	mJ
dv/dt	MOSFET dv/ dt ruggedness $V_{DS} = 0 \dots 400\text{V}$	50	V/ns
dv/dt	Reverse diode dv/dt $V_{DS} = 0 \dots 400\text{V}, T_j = 25^\circ\text{C}, I_{SD} \leq I_D$	15	V/ns
VESD(G-S)	Gate source ESD(HBM-C=100pF, R=1.5KΩ)	2000	V
TL TPKG	Maximum Temperature for Soldering	300	$^\circ\text{C}$
	Leads at 0.063in(1.6mm)from Case for 10 seconds	260	
	Package Body for 10 seconds		
TJ and TSTG	Operating Junction and Storage Temperature Range	-55 to 150	

* Drain Current Limited by Maximum Junction Temperature

Caution: Stresses greater than those listed in the " Absolute Maximum Ratings" Table may cause permanent damage to the device.

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Thermal Resistance

Symbol	Parameter	RSF60R099T	Units	Test Conditions
R θ JC	Junction-to-Case	0.61	°C / W	Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 °C
R θ JA	Junction-to- Ambient	62.5		1 cubic foot chamber, free air.

OFF Characteristics T_J= 25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BVDSS	Drain- to- source Breakdown Voltage	600	--	--	V	V _{GS} =0V, I _D =1mA
IDSS	Drain- to- Source Leakage Current	--	--	5	μA	V _{DS} =600V, V _{GS} =0V
IGSS	Gate- to- Source Forward Leakage	--	--	1	μA	V _{GS} =20V , V _{DS} =0V
	Gate- to- Source Reverse Leakage	--	--	-1		V _{GS} =-20V , V _{DS} =0V

ON Characteristics T_J=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R _{DS(on)}	Static Drain- to- Source On-Resistance(Note*2)	--	86	99	mΩ	V _{GS} =10V, I _D =13.2A
V _{GS(TH)}	Gate Threshold Voltage	2.5	--	5	V	V _{GS} =V _{DS} , I _D =1.29mA

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t _{d(ON)}	Turn- on Delay Time	--	63	--	nS	V _{DS} =300V I _D =16.5A R _G =25Ω
t _{rise}	Rise Time	--	32	--		
t _{d(OFF)}	Turn- OFF Delay Time	--	281	--		
t _{fall}	Fall Time	--	20	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance	--	3300	--	pF	VGS=0V VDS=400V f=1.0MHz
Coss	Output Capacitance	--	70	--		
Crss	Reverse Transfer Capacitance	--	3.3	--		
Qg	Total Gate Charge	--	75	--	nC	VDS=480V ID=16.5A VGS=10V
Qgs	Gate- to- Source Charge	--	14	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	22	--		

Source- Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	31	A	Integral pn- diode in MOSFET
ISM	Maximum Pulsed Current	--	--	93	A	
VSD	Diode Forward Voltage	--	--	1.3	V	IS=16.5A,VGS=0V
trr	Reverse Recovery Time	--	160	--	nS	VR=400V IS=16.5A,di/dt=100 A/μs
Qrr	Reverse Recovery Charge	--	7.7	--	μC	

Notes:

- * 1. Repetitive rating, pulse width limited by maximum junction temperature.
- * 2. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Feature Curve

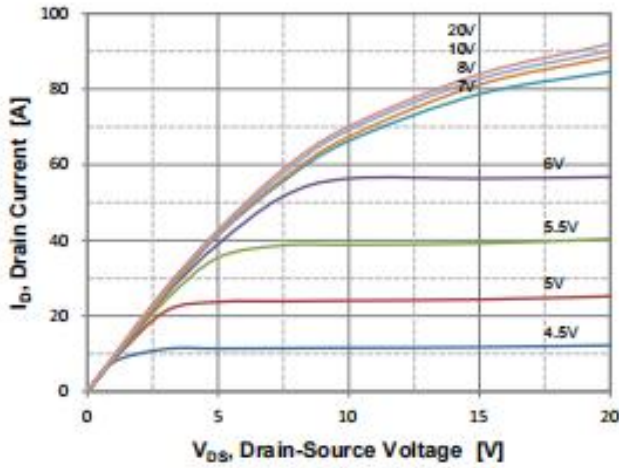


Figure 1. On Region Characteristics

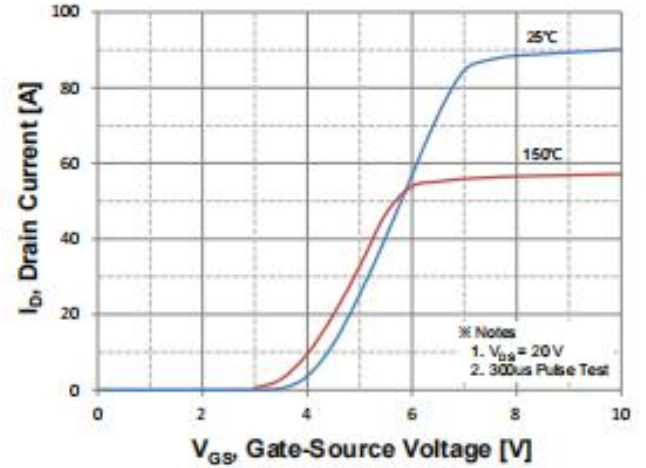


Figure 2. Transfer Characteristics

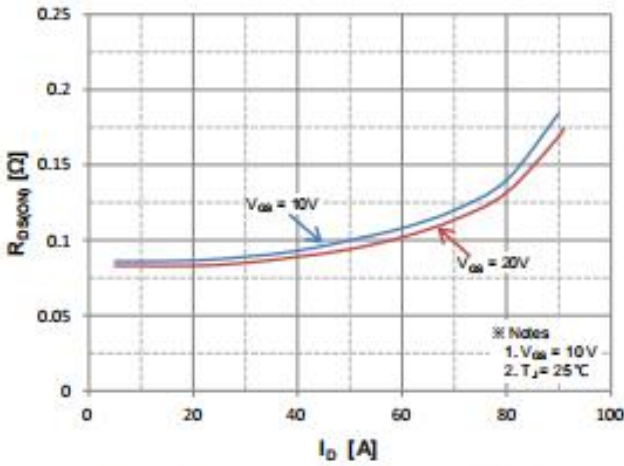


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

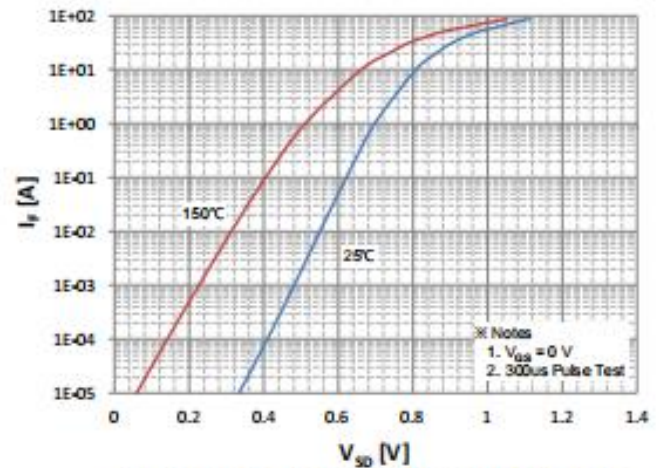


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

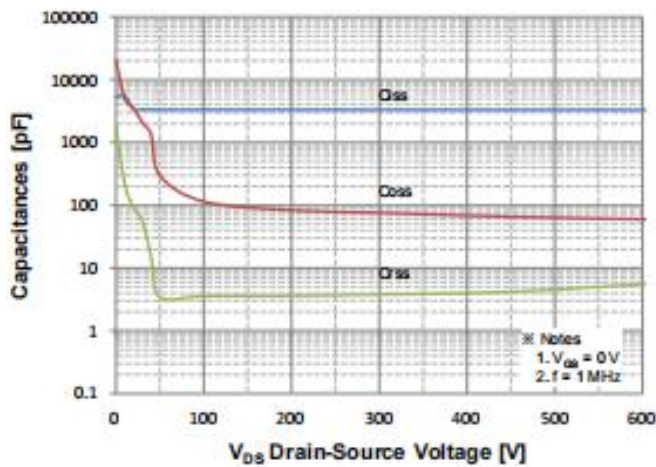


Figure 5. Capacitance Characteristics

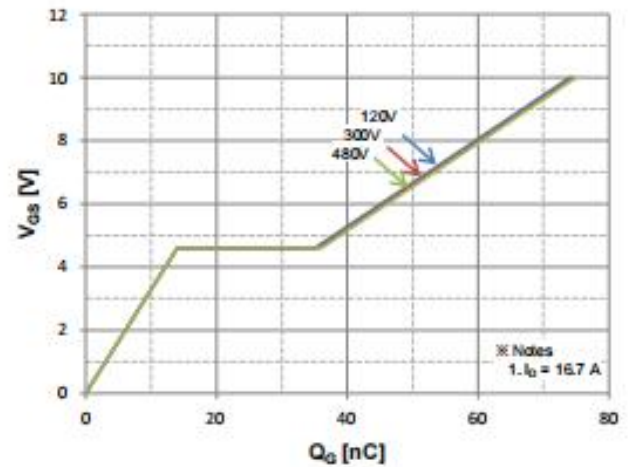


Figure 6. Gate Charge Characteristics

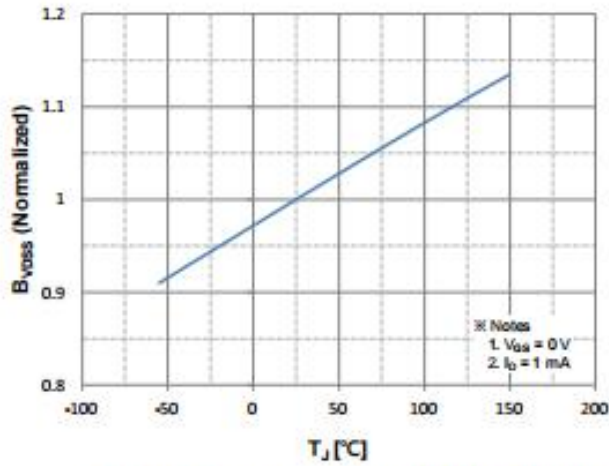


Figure 7. Breakdown Voltage Variation vs. Temperature

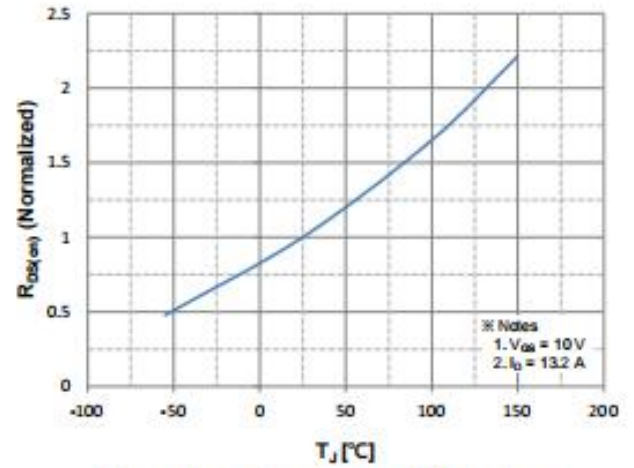


Figure 8. On-Resistance Variation vs. Temperature

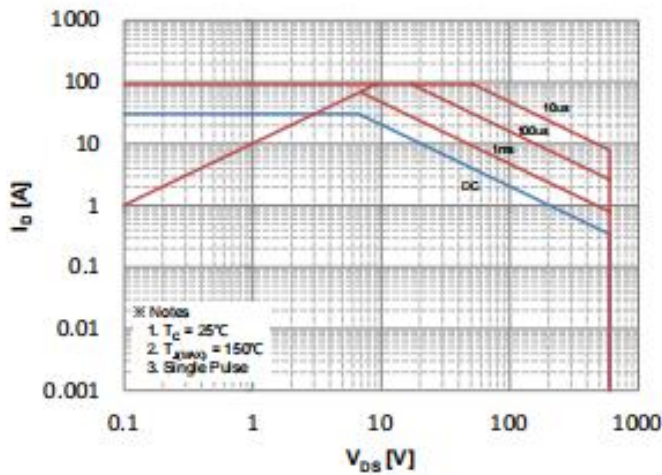


Figure 9. Maximum Safe Operating Area

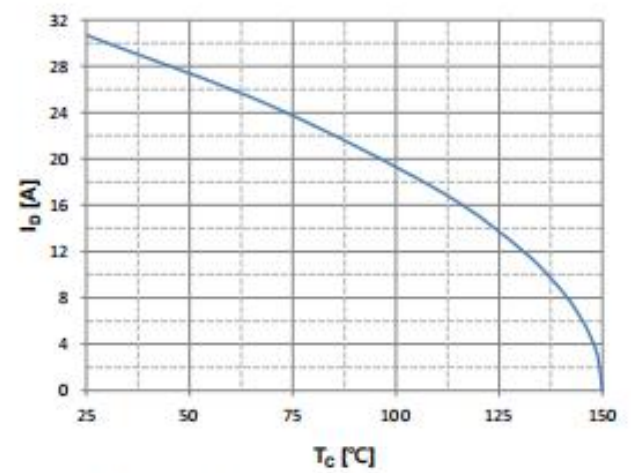


Figure 10. Maximum Drain Current vs. Case Temperature

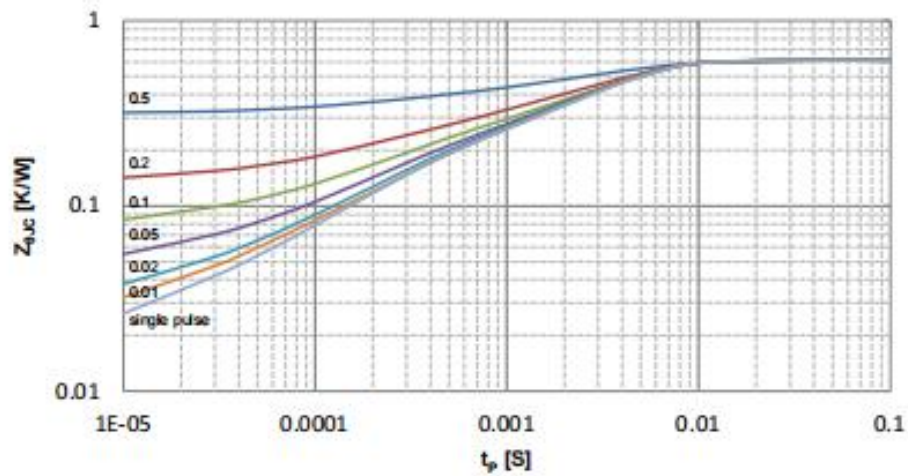


Figure 11. Transient Thermal Response Curve

Test Circuits and Waveforms

Fig 12. Gate Charge Test Circuit & Waveform

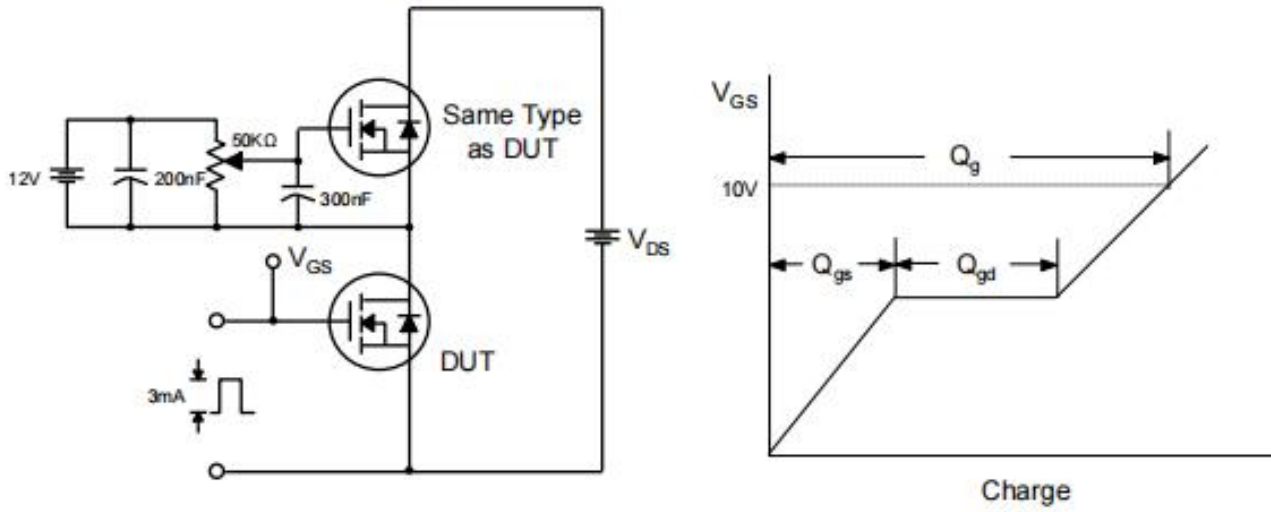


Fig 13. Resistive Switching Test Circuit & Waveforms

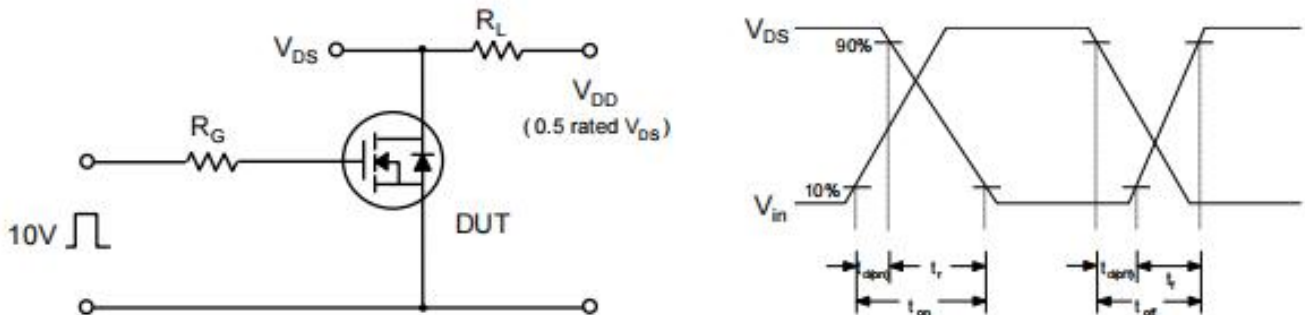
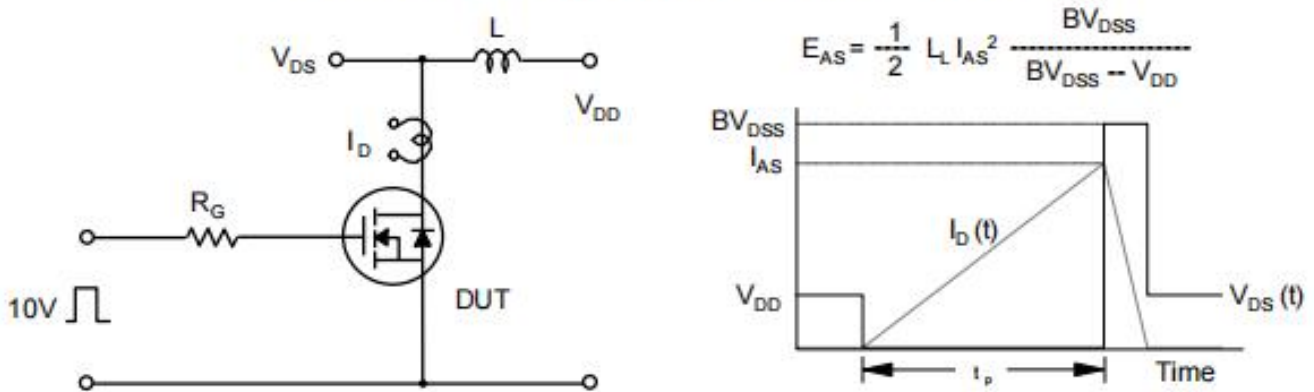
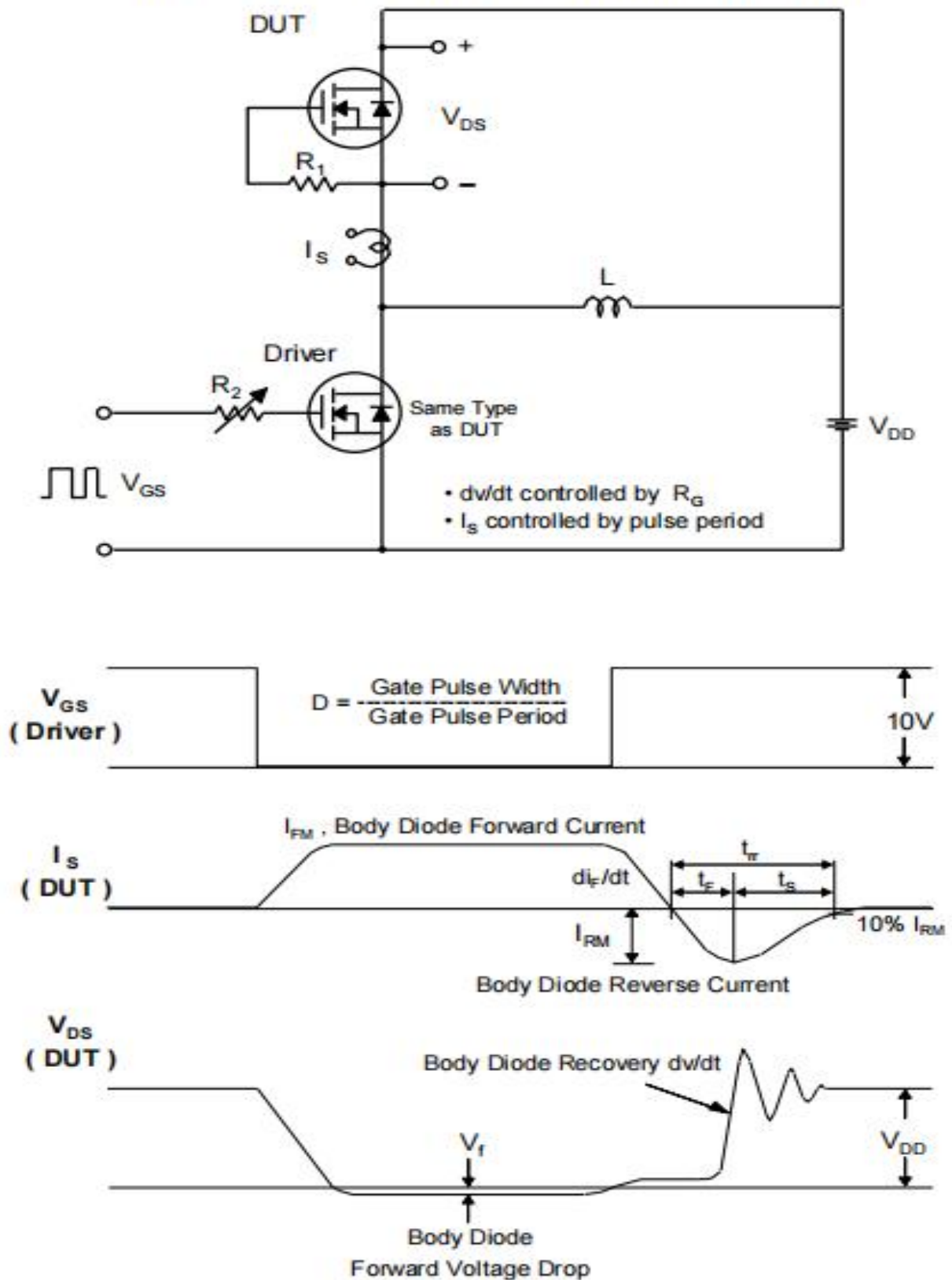


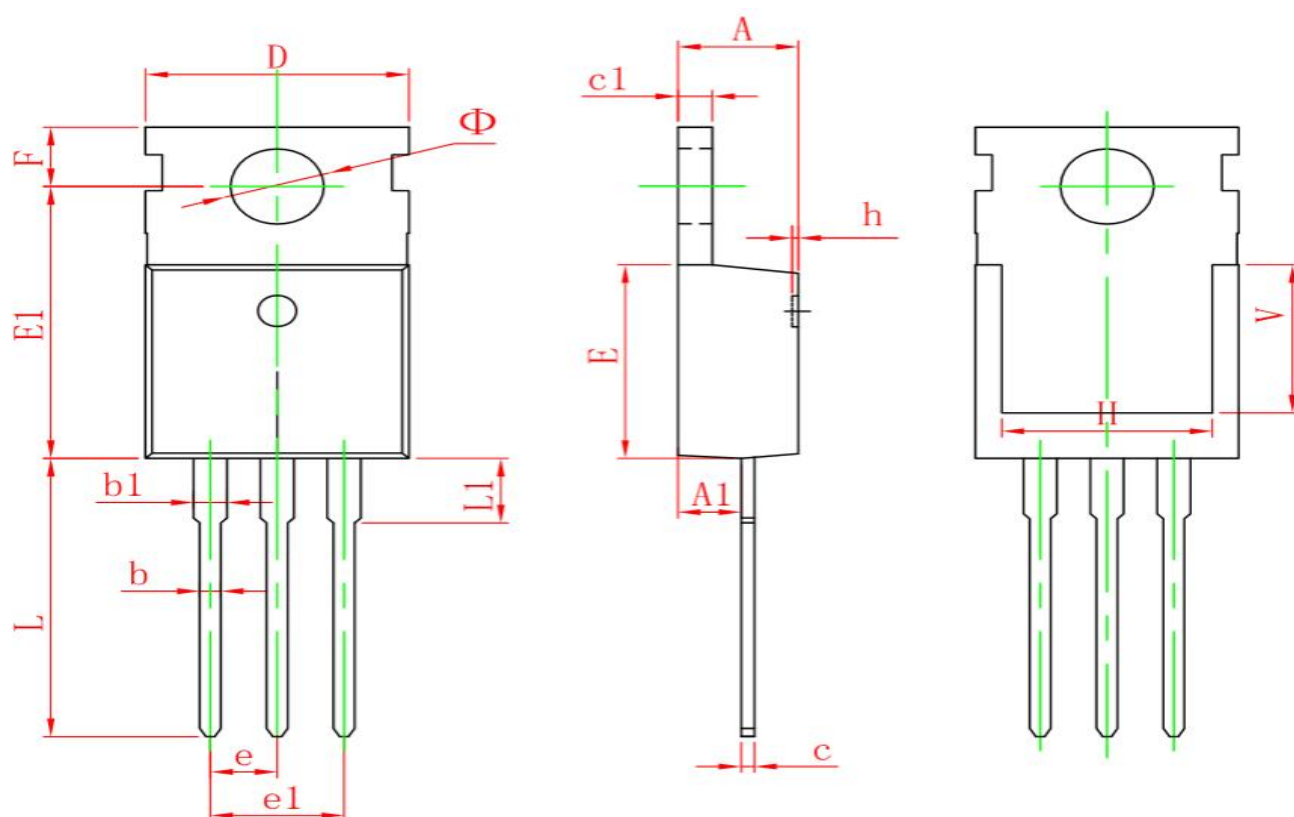
Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms



Test Circuits and Waveforms

Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package outline drawing (TO-220 Unit: mm)


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150

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