N Channel MOSFET

Lead Free Package and Finish

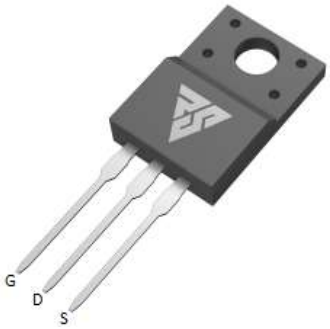
Applications:

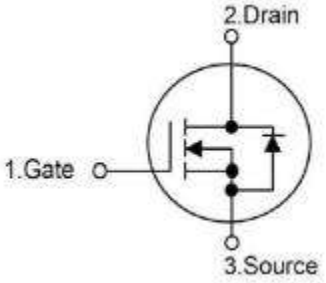
- Adapter & Charger
- SMPS Standby Power
- AC-DC Switching Power Supply
- LED driving power

I_D	$R_{DS(ON)}$(Typ.)	V_{DSS}
4A	3.2Ω	800V

Features:

- Low On Resistance
- Low Gate Charge
- Peak Current vs Pulse Width Curve
- RoHS Compliant





Not to Scale

Ordering Information

Part Number	Package	Marking
RS4N80F	TO-220F	RS4N80F

Absolute Maximun Ratings Tc=25℃ unless otherwise specified

Symbol	Parameter	RS4N80F	Units
V_{DSS}	Drain-to-Source Voltage (Note*1)	800	V
I_D	Continuous Drain Current	4.0	A
I_D@ 100 ℃	Continuous Drain Current	2.5	
I_{DM}	Pulsed Drain Current (Note*2)	15	
P_D	Power Dissipation	42	W
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Engergy L=10mH VDD=50V RG=25Ω Starting TJ=25℃ (Note*2)	80	mJ
T_L	Maximum Temperature for Soldering Leads at 0.063in(1.6mm)from Case for 10 seconds	300	℃
T_{PKG}	Package Body for 10 seconds	260	
T_J and T_{STG}	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.

Thermal Resistance

Symbol	Parameter	RS4N80F	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	3	℃/W	Drain lead soldered to water cooled heatsink,P_D adjusted for a peak junction temperature of +150℃.
$R_{\theta JA}$	Junction-to-Ambient	68		1 cubic foot chamber,free air.

Static Characteristics TJ=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-source Breakdown Voltage	800	--	--	V	V_{GS}=0V,I_D=250μA
I_{DSS}	Drain-to-Source Leakage Current	--	--	1.0	μA	V_{DS}=800V,VGS=0V
I_{GSS}	Gate-to-Source Forward Leakage	--	--	100	nA	V_{GS}=+30V V_{DS}=0V
	Gate-to-Source Reverse Leakage	--	--	-100		V_{GS}=-30V V_{DS}=0V

Static Characteristics TJ=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(on)}$	Static Drain-to-Source On-Resistance (Note*3)	--	3.2	3.8	Ω	V_{GS}=10V,I_D=2A
$V_{GS(TH)}$	Gate Threshold Voltage	2.5	--	5.0	V	V_{GS}=V_{DS},I_D=250μA

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	18	--	nS	V_{DS}=400V I_D=4A R_G=25Ω V_{GS}=10V
t_{rise}	Rise Time	--	24	--		
$t_{d(OFF)}$	Turn-OFF Delay Time	--	33	--		
t_{fall}	Fall Time	--	17	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C_{iss}	Input Capacitance	--	558	--	pF	V_{GS}=0V V_{DS}=25V f=1.0MHz
C_{oss}	Output Capacitance	--	51	--		
C_{rss}	Reverse Transfer Capacitance	--	5	--		
Q_g	Total Gate Charge	--	12.6	--	nC	V_{DS}=640V I_D=4A V_{GS}=10V (Note:3,4)
Q_{gs}	Gate-to-Source Charge	--	3.5	--		
Q_{gd}	Gate-to-Drain("Miller"）Charge	--	5.6	--		

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current	--	--	4.0	A	Integral pn-diode in MOSFET
I_{SM}	Maximum Pulsed Current	--	--	16	A	
V_{SD}	Diode Forward Voltage	--	--	1.4	V	IS=4A,VGS=0V
t_{rr}	Reverse Recovery Time	--	480		nS	VGS=0V IS=4A,di/dt=100A/μs
Q_{rr}	Reverse Recovery Charge	--	3.1		μC	

Notes:

*1.TJ=±25℃ to +150℃.
*2.Repetitive rating;pulse width limited by maximum junction temperature.
*3.Pulse width≤300μs;duty cycle ≤1%.

Typical Feature curve T_J = 25°C, unless otherwise noted

Fig1. Output characteristics

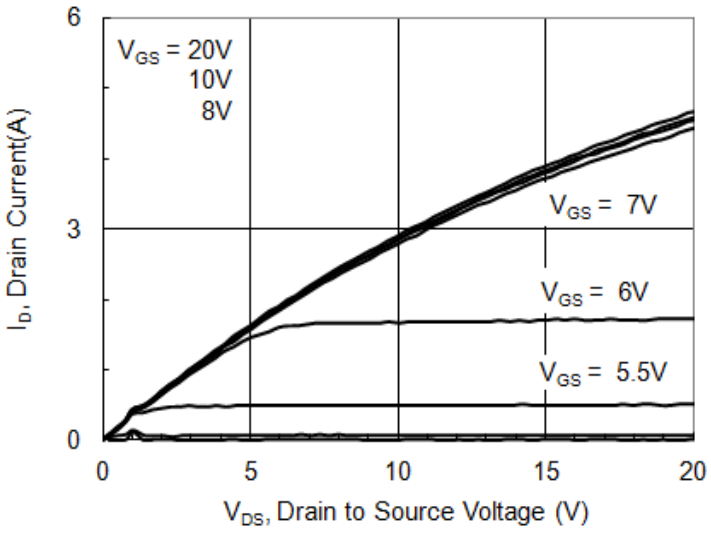


Fig2. Drain-source on-state resistance

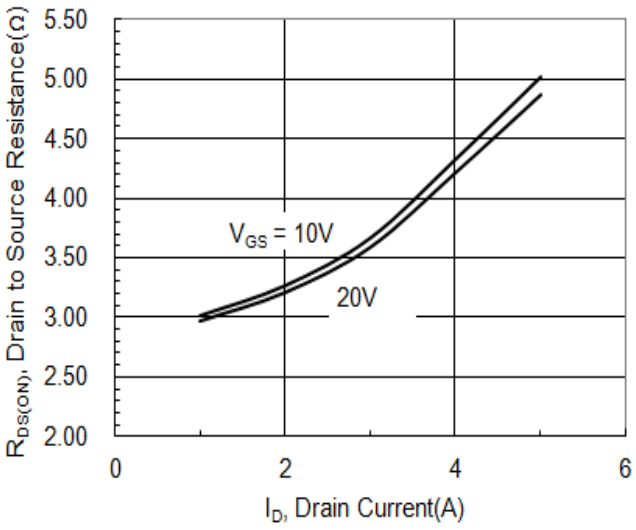


Fig3. Gate charge characteristics

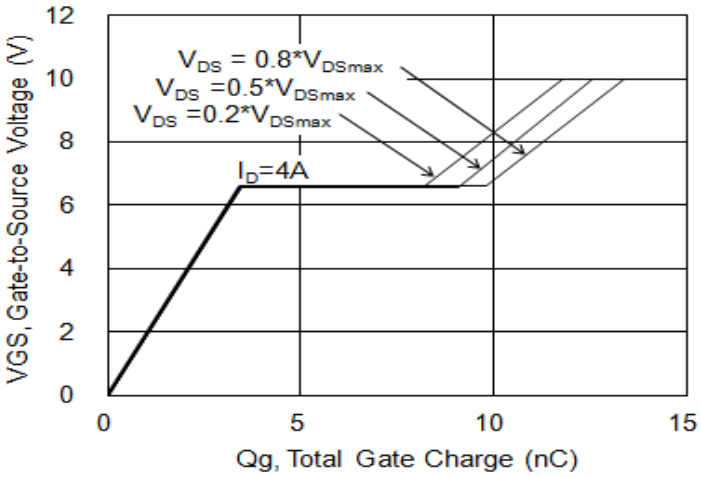


Fig4.Capacitance Characteristics

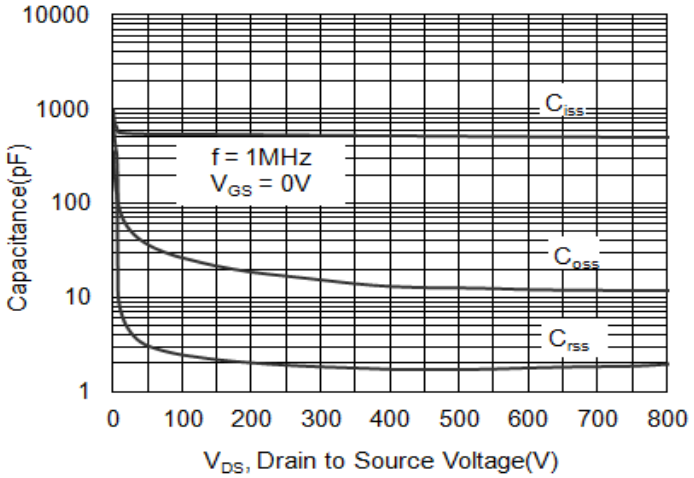


Fig5.RDS(ON)vsjunction temperature

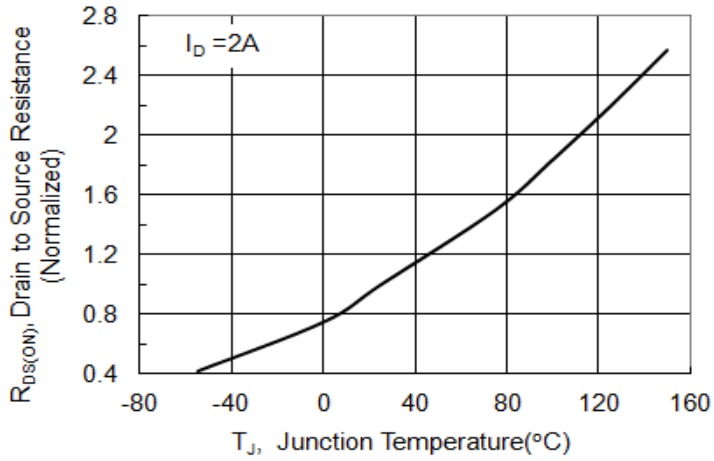


Fig6.BVDSS vsjunction temperature

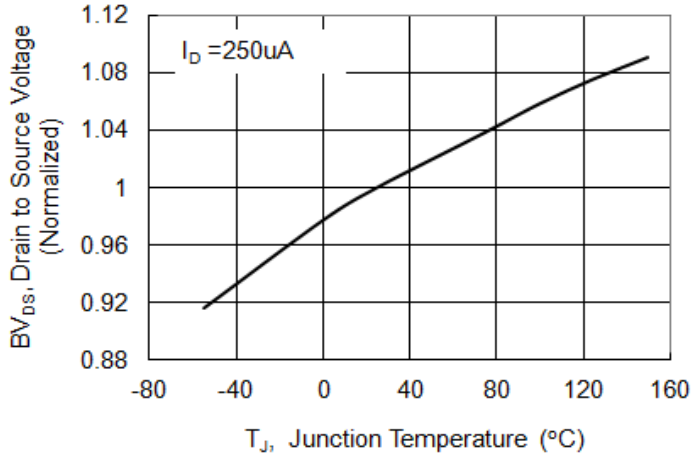


Fig 7. Forward characteristics of reverse diode

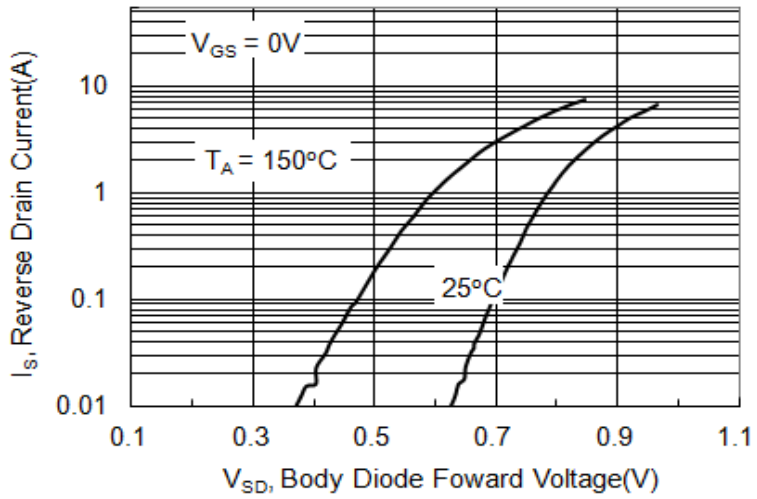


Fig 8. VGS(TH) vs junction temperature

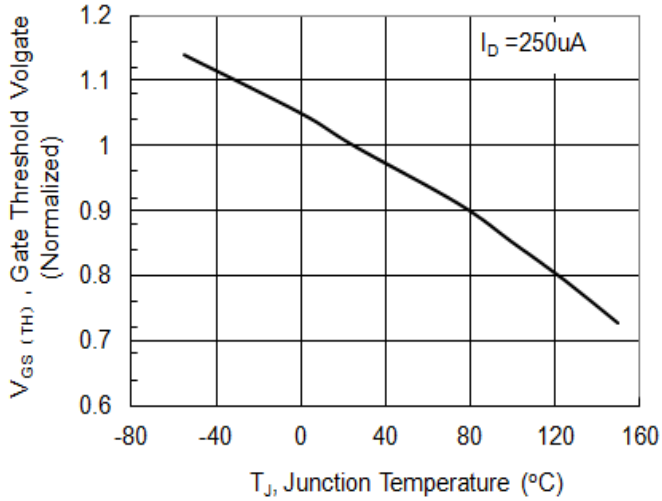


Fig9. Safe operating area

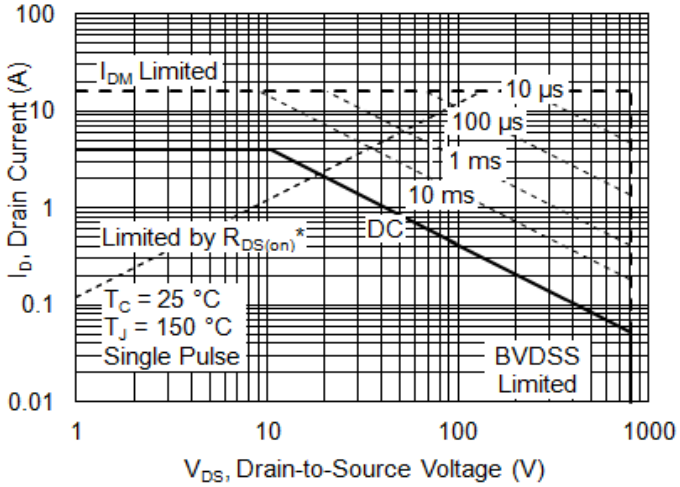


Fig 10. Transfer characteristics

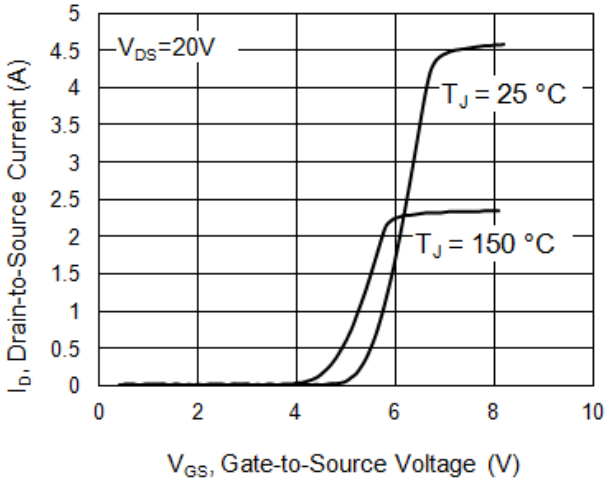
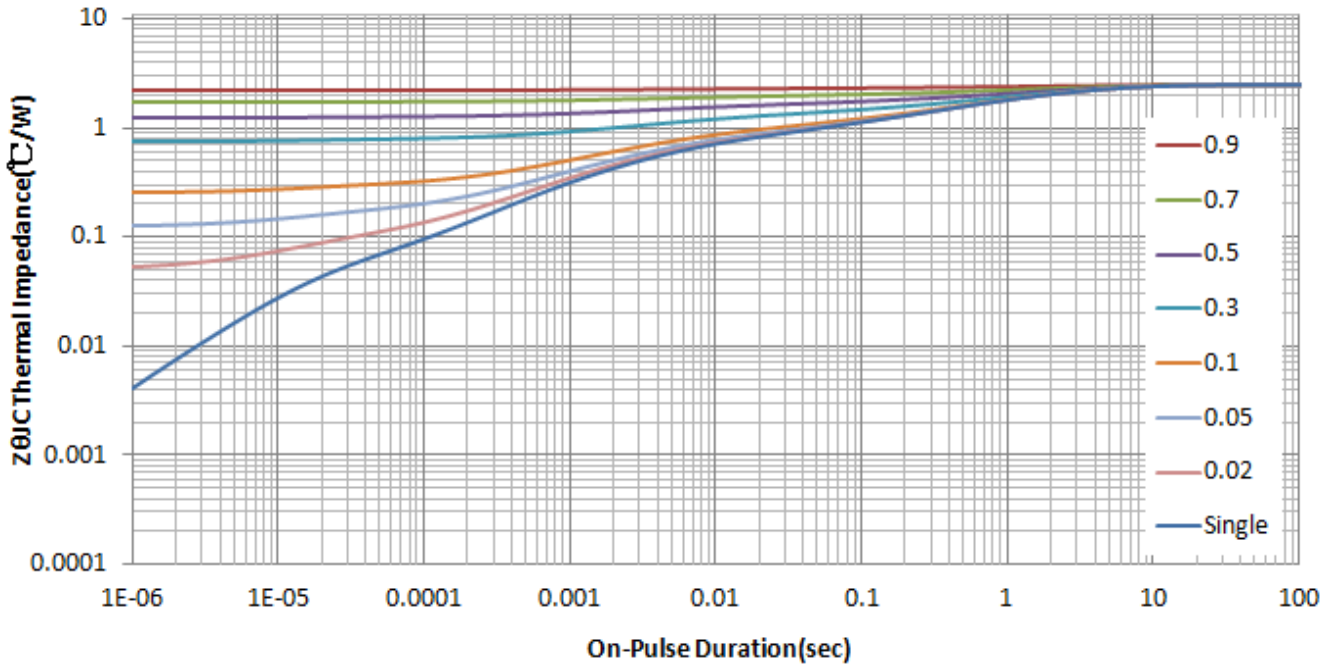


Fig11.Transient thermal impedance



Test Circuits and Waveforms

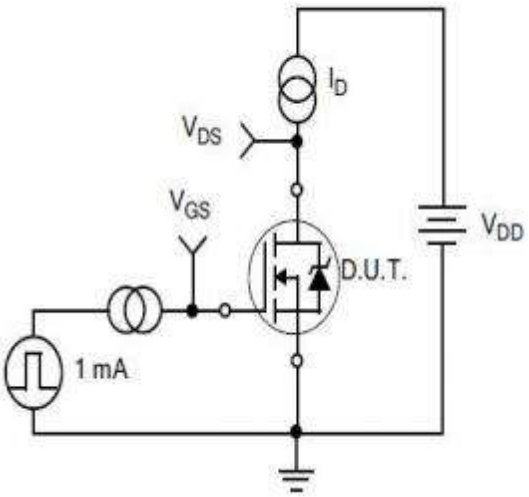


Figure12.
Gate Charge Test Circuit

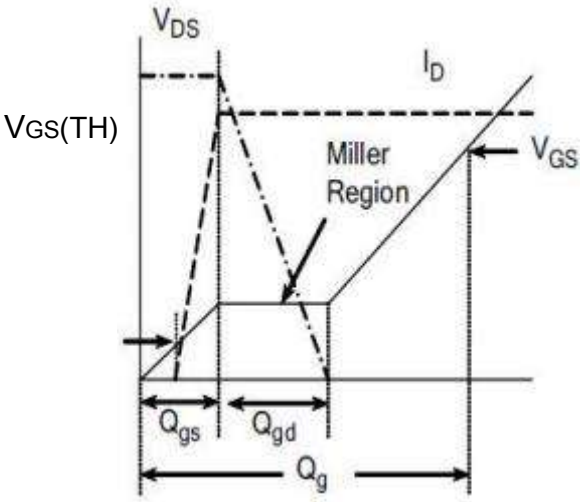


Figure13.
Gate Charge Waveform

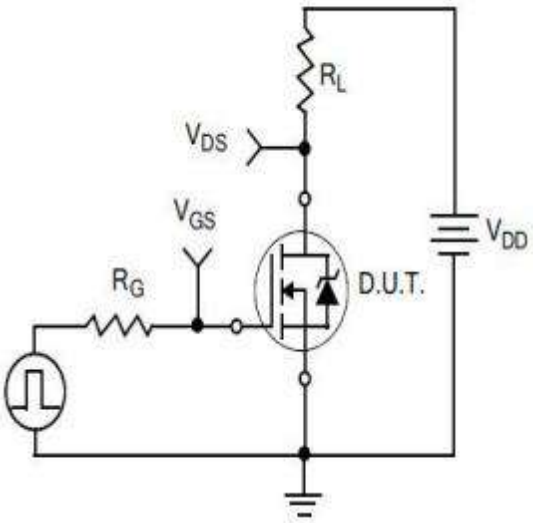


Figure14.
Resistive Switching Test Circuit

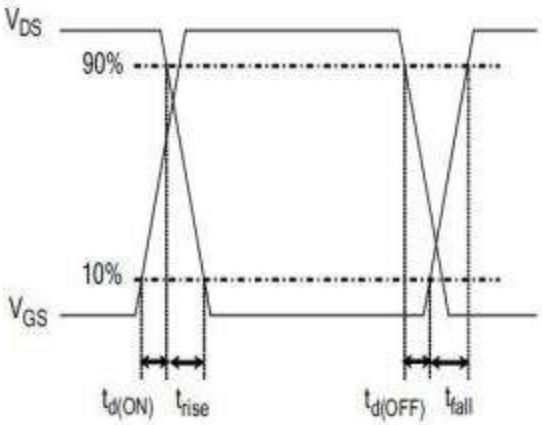


Figure15.
Resistive Switching Waveforms

Test Circuits and Waveforms

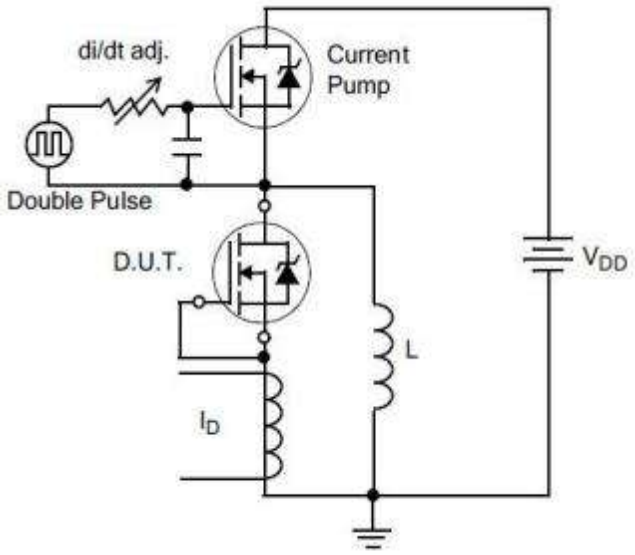


Figure16.Diode Reverse Recovery Test Circuit

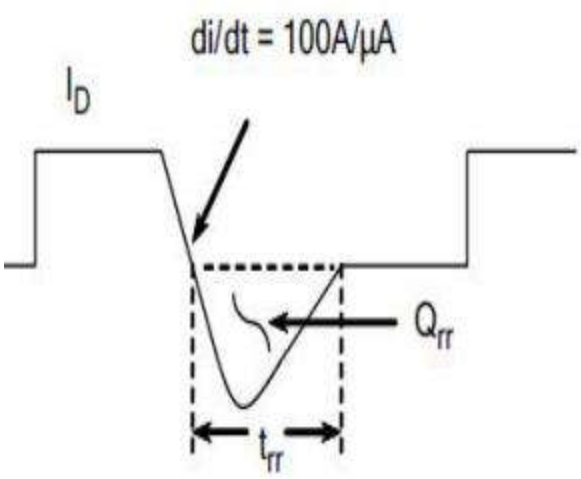


Figure17.Diode Reverse Recovery Waveform

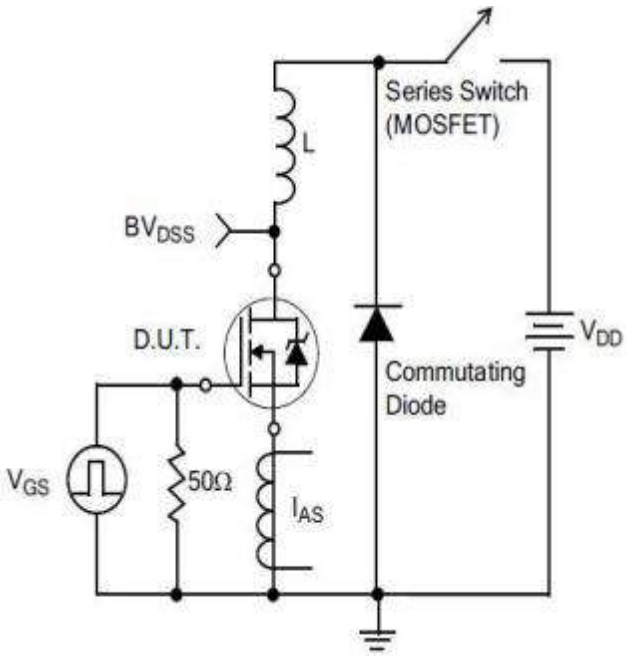
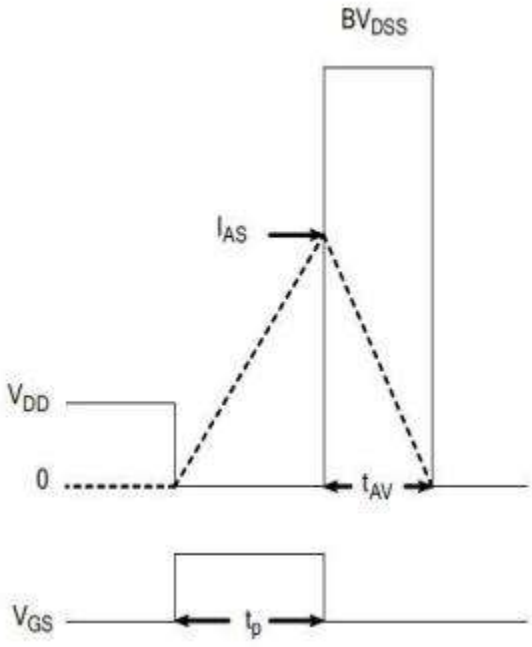


Figure18.Unclamped Inductive Switching Test Circuit



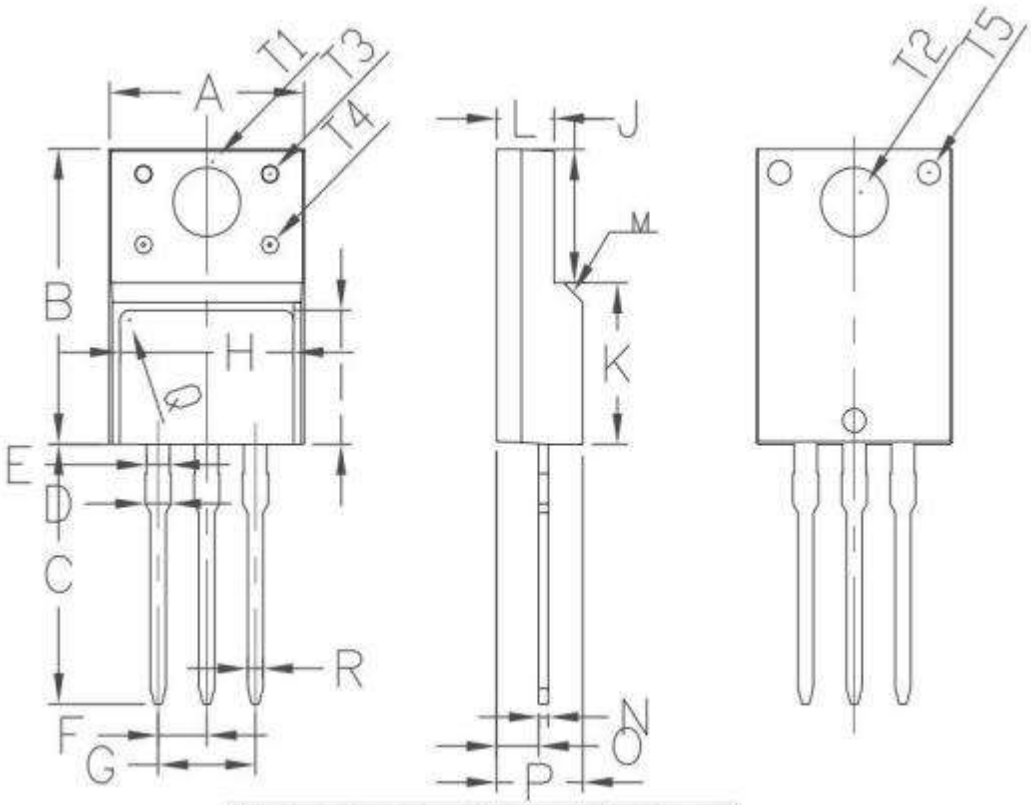
$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Figure19.Unclamped Inductive Switching Waveforms

Package outline drawing

TO-220F

Unit: mm



Symbol	Min	Non	Max
A	9.96	10.16	10.36
B	15.67	15.87	16.07
C	13.14	13.34	13.54
D	1.20	1.30	1.40
E		1.20	
F		2.54	
G		5.08	
H	7.60	7.80	8.00
I	7.10	7.30	7.50
J	6.48	6.68	6.88
K	8.99	9.19	9.39
L	2.34	2.54	2.74
M		45°	
N	0.49	0.50	0.52
O	2.15	2.35	2.55
P	4.50	4.70	4.90
Q		0.50	
S	4°	4.5°	5°
T1		3.45	
T2		3.18	
T3		1.50	
T4		1.20	
T5		1.50	
R	0.77	0.8	0.83

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