

**N Channel MOSFET**

Lead Free Package and Finish

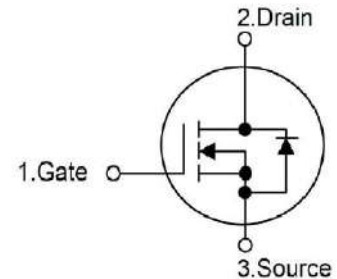
**Applications:**

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

**Features:**

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

$I_D$	$R_{DS(ON)}(Typ.)$	$V_{DSS}$
7A	1.1 $\Omega$	650V



Not to Scale

**Ordering Information**

Part Number	Package	Marking
RS7N65F	TO-220F	RS7N65F

**Absolute Maximum Ratings Tc=25°C unless otherwise specified**

Symbol	Parameter	RS7N65F	Units	
$V_{DSS}$	Drain-to-Source Voltage (Note*1)	650	V	
$I_D$	Continuous Drain Current	7.0	A	
$I_{D@ 100^\circ C}$	Continuous Drain Current	4.5		
$I_{DM}$	Pulsed Drain Current (Note*2)	28.0		
PD	Power Dissipation	97	W	
VGS	Gate-to-Source Voltage	$\pm 30$	V	
EAS	Single Pulse Avalanche Energy L=10mH VDD=50V RG=25 $\Omega$ Starting TJ=25°C	250	mJ	
TL	Maximum Temperature for Soldering	300	°C	
TPKG	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.

**Thermal Resistance**

Symbol	Parameter	RS7N65F	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	1.29	°C/W	Drain lead soldered to water cooled heatsink,PD adjusted for a peak junction temperature of +150°C.
$R_{\theta JA}$	Junction-to-Ambient	60		1 cubic foot chamber,free air.

**OFF Characteristics**  $T_J=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$	Drain-to-source Breakdown Voltage	650	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	1.0	$\mu A$	$V_{DS}=650V, V_{GS}=0V$
$I_{GSS}$	Gate-to-Source Forward Leakage	--	--	100	nA	$V_{GS}=+30V, V_{DS}=0V$
	Gate-to-Source Reverse Leakage	--	--	-100		$V_{GS}=-30V, V_{DS}=0V$

**ON Characteristics**  $T_J=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(on)}$	Static Drain-to-Source On-Resistance (Note*3)	--	1.1	1.4	$\Omega$	$V_{GS}=10V, I_D=3.5A$
$V_{GS(TH)}$	Gate Threshold Voltage	3.0	--	4.0	V	$V_{GS}=V_{DS}, I_D=250\mu A$

**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	$V_{DS}=325V$ $I_D=7A$ $R_G=25\Omega$ (Note:3,4)
$t_{rise}$	Rise Time	--	19	--		
$t_d(OFF)$	Turn-OFF Delay Time	--	82	--		
$t_{fall}$	Fall Time	--	35	--		

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$C_{iss}$	Input Capacitance	--	997	--	pF	$V_{GS}=0V$ $V_{DS}=25V$ $f=1.0MHz$
$C_{oss}$	Output Capacitance	--	97	--		
$C_{rss}$	Reverse Transfer Capacitance	--	6.9	--		
$Q_g$	Total Gate Charge	--	22	--	nC	$V_{DS}=520V$ $I_D=7A$ $V_{GS}=10V$ (Note:3,4)
$Q_{gs}$	Gate-to-Source Charge	--	4.3	--		
$Q_{gd}$	Gate-to-Drain("Miller") Charge	--	13	--		

**Source-Drain Diode Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I <sub>S</sub>	Continuous Source Current	--	--	7.0	A	Integral pn-diode in MOSFET
I <sub>SM</sub>	Maximum Pulsed Current	--	--	28.0	A	
V <sub>SD</sub>	Diode Forward Voltage	--	--	1.4	V	I <sub>S</sub> =7A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	--	300	--	nS	V <sub>GS</sub> =0V
Q <sub>rr</sub>	Reverse Recovery Charge	--	4.1	--	μC	I <sub>S</sub> =7A, di/dt=100A/μs

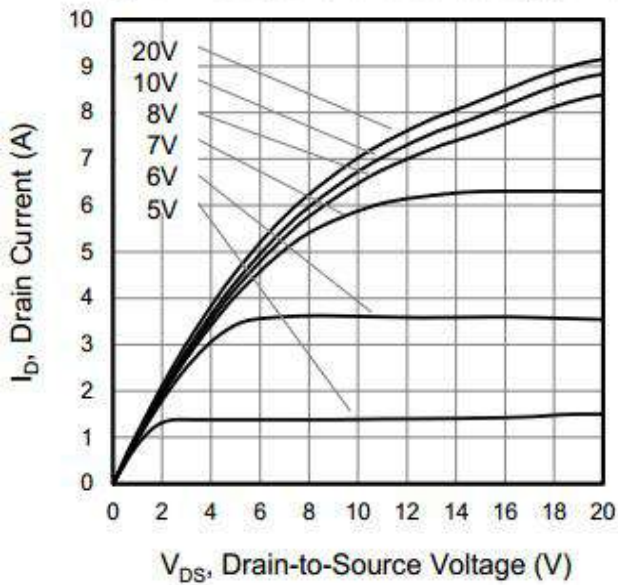
**Notes:**

- \*1. T<sub>J</sub>=±25°C to +150°C.
- \*2. Repetitive rating; pulse width limited by maximum junction temperature.
- \*3. Pulse width ≤ 300μs; duty cycle ≤ 1%.

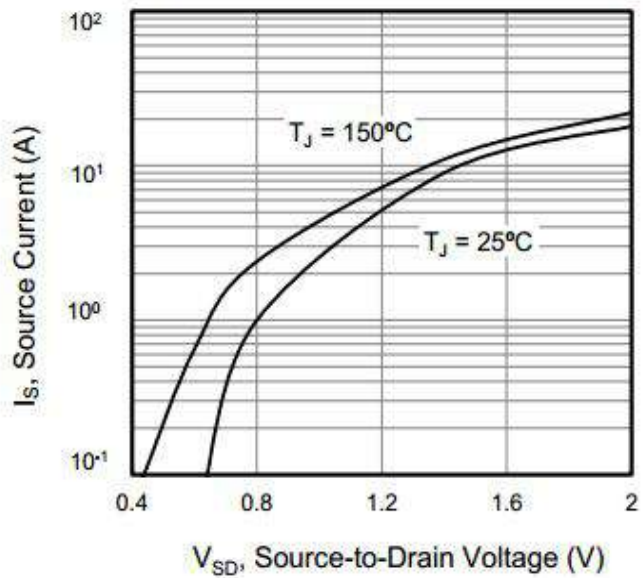
**Typical Feature curve**

T<sub>J</sub> = 25°C, unless otherwise noted

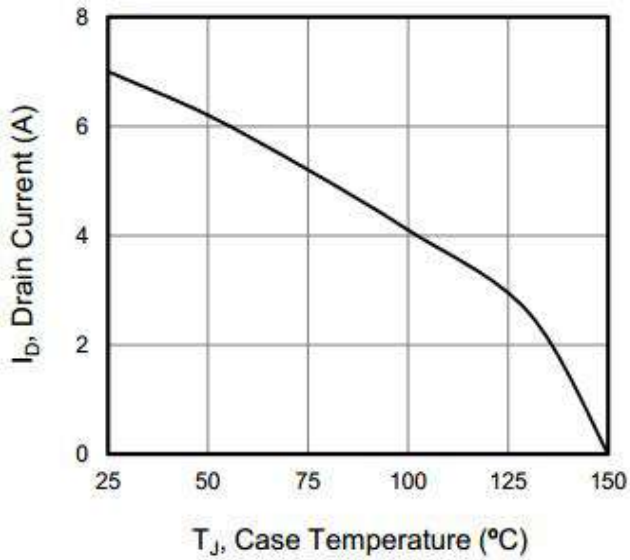
**Figure 1. Output Characteristics (T<sub>J</sub> = 25°C)**



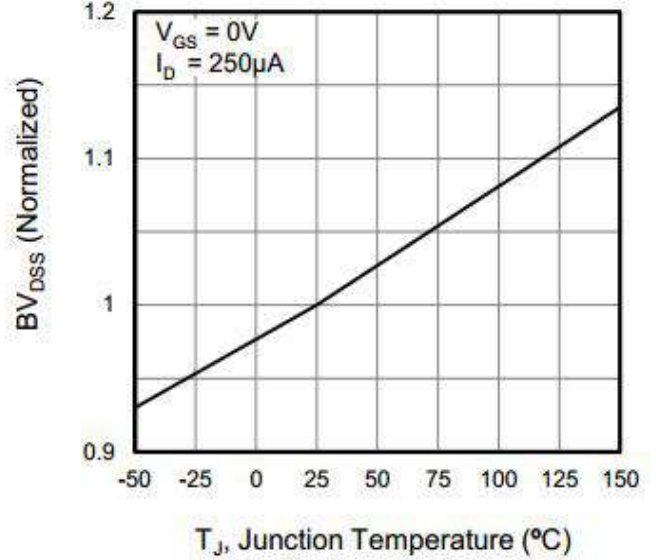
**Figure 2. Body Diode Forward Voltage**



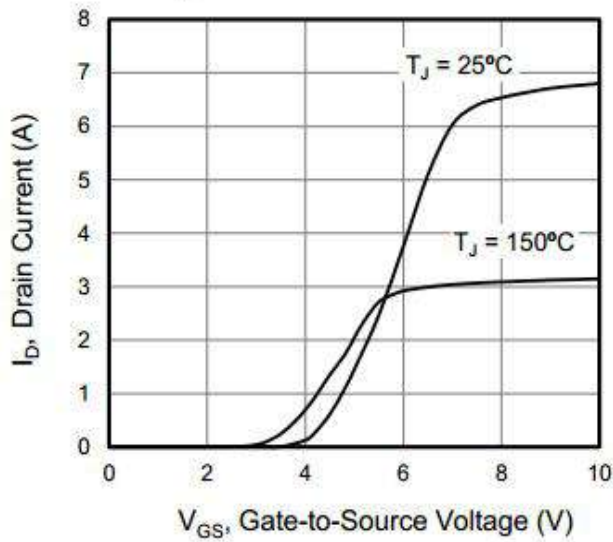
**Figure 3. Drain Current vs. Temperature**



**Figure 4.  $BV_{DSS}$  Variation vs. Temperature**



**Figure 5. Transfer Characteristics**



**Figure 6. On-Resistance vs. Temperature**

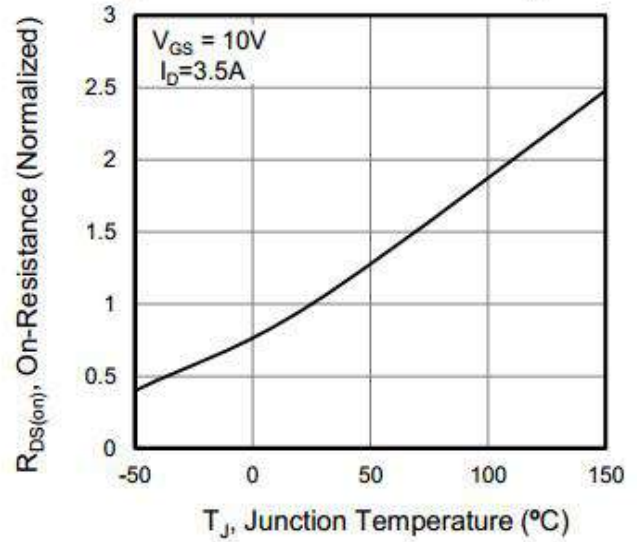


Figure 7. Capacitance

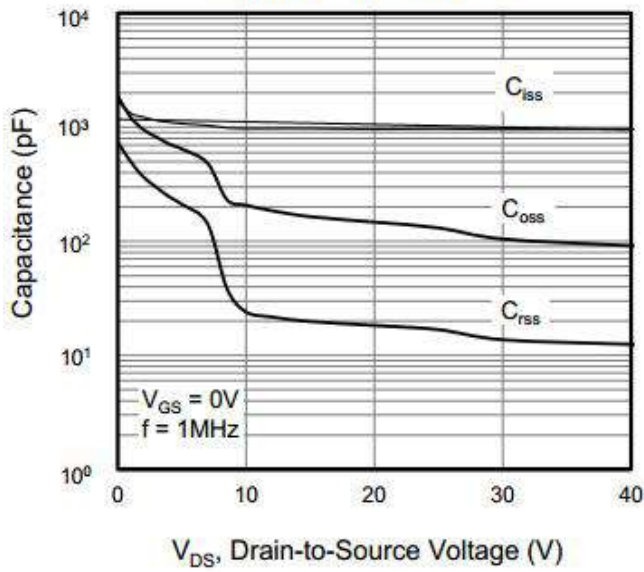


Figure 8. Gate Charge

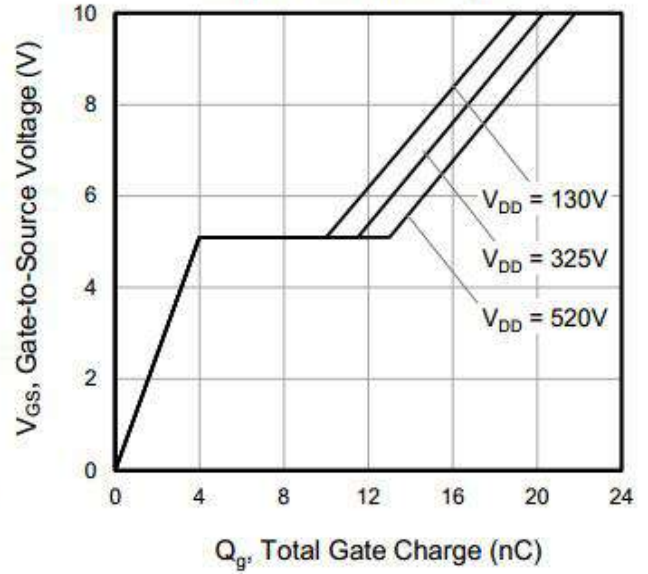
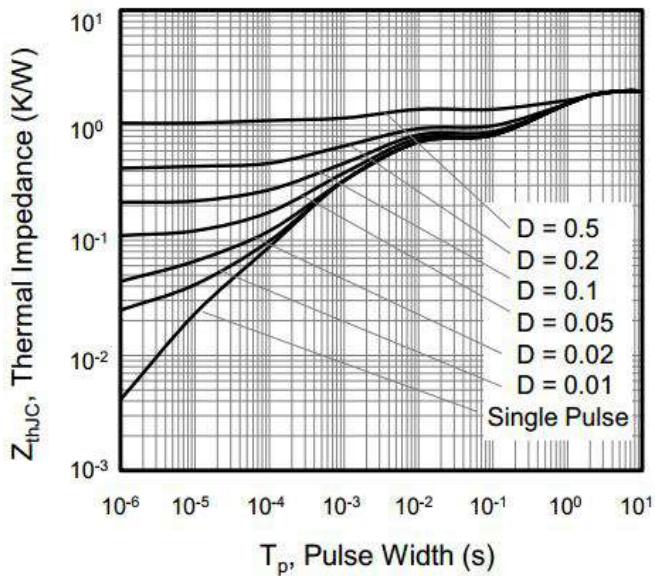


Figure 9. Transient Thermal Impedance

TO-220F



## Test Circuits and Waveforms

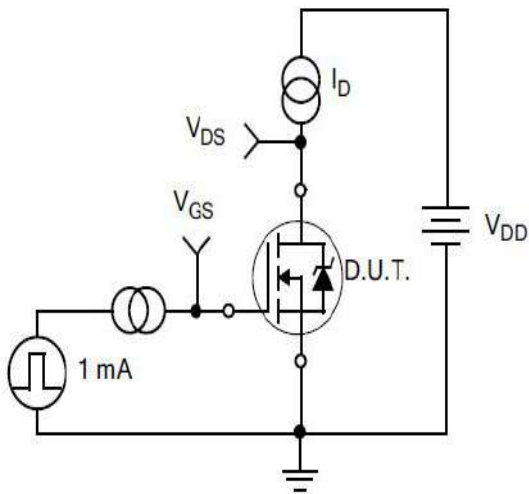


Figure 10.  
Gate Charge Test Circuit

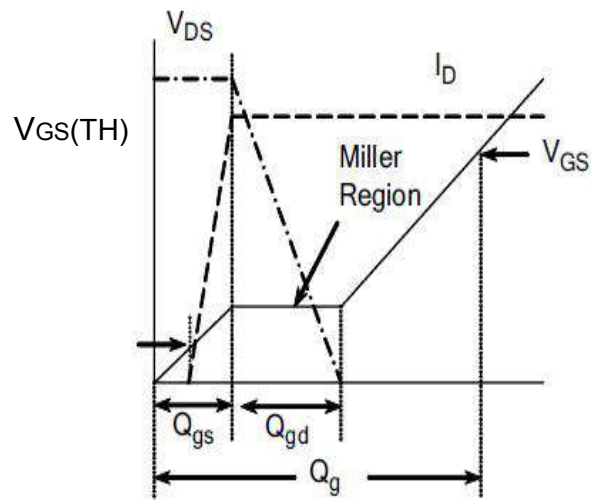


Figure 11.  
Gate Charge Waveform

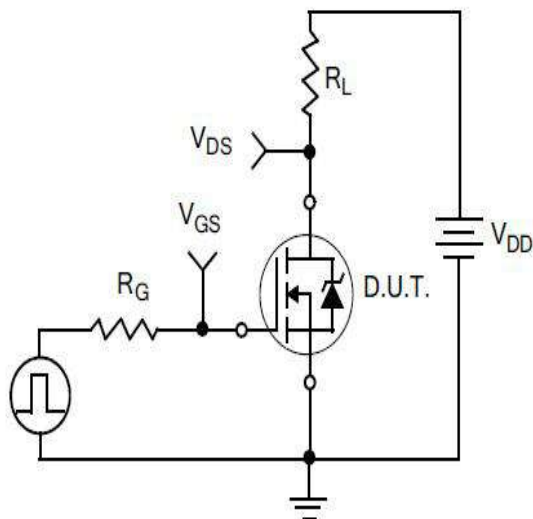


Figure 12.  
Resistive Switching Test Circuit

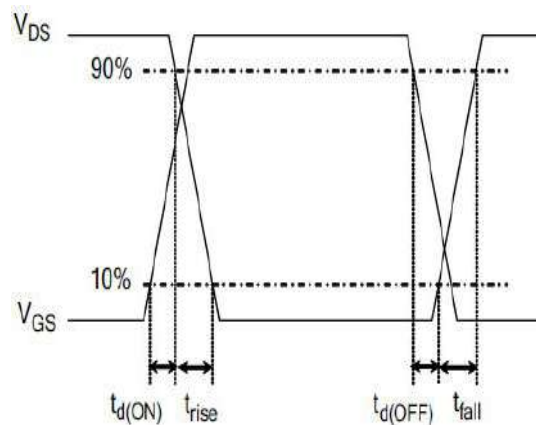


Figure 13.  
Resistive Switching Waveforms

**Test Circuits and Waveforms**

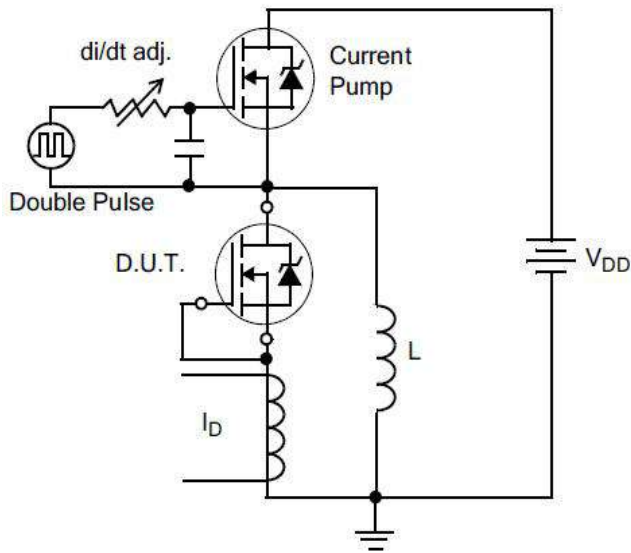


Figure14.Diode Reverse Recovery Test Circuit

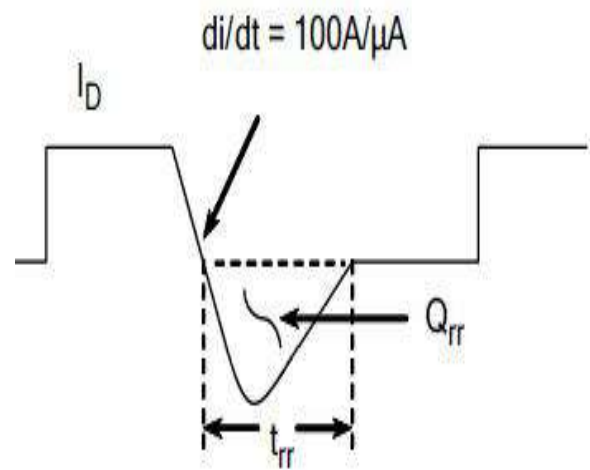


Figure15.Diode Reverse Recovery Waveform

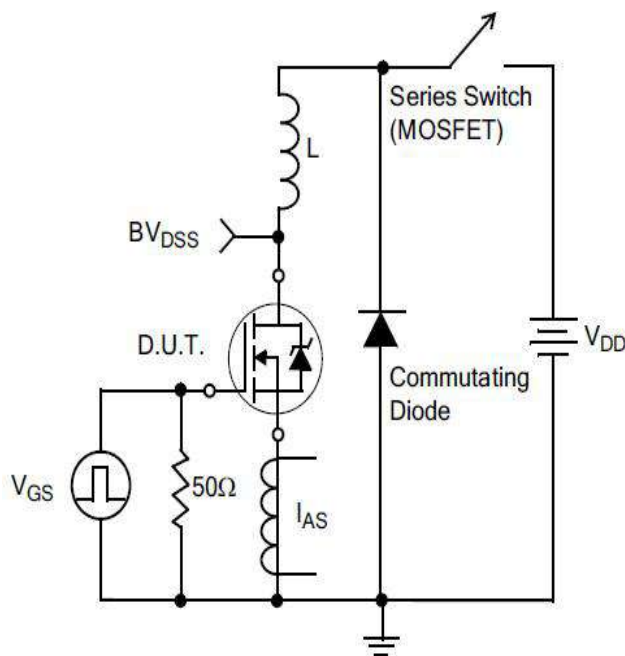
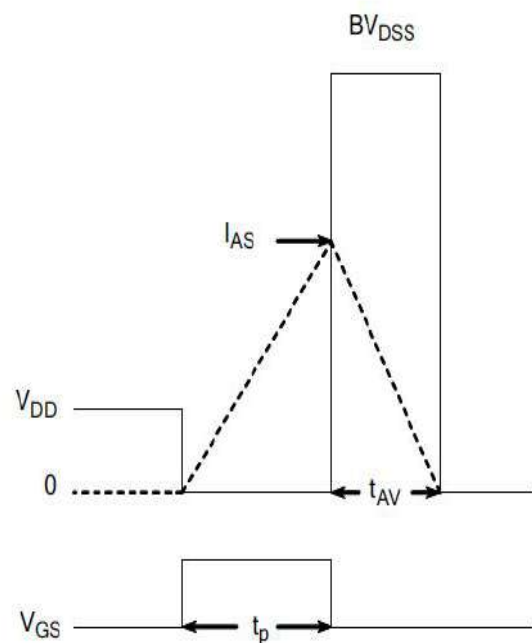


Figure16.Unclamped Inductive Switching Test Circuit



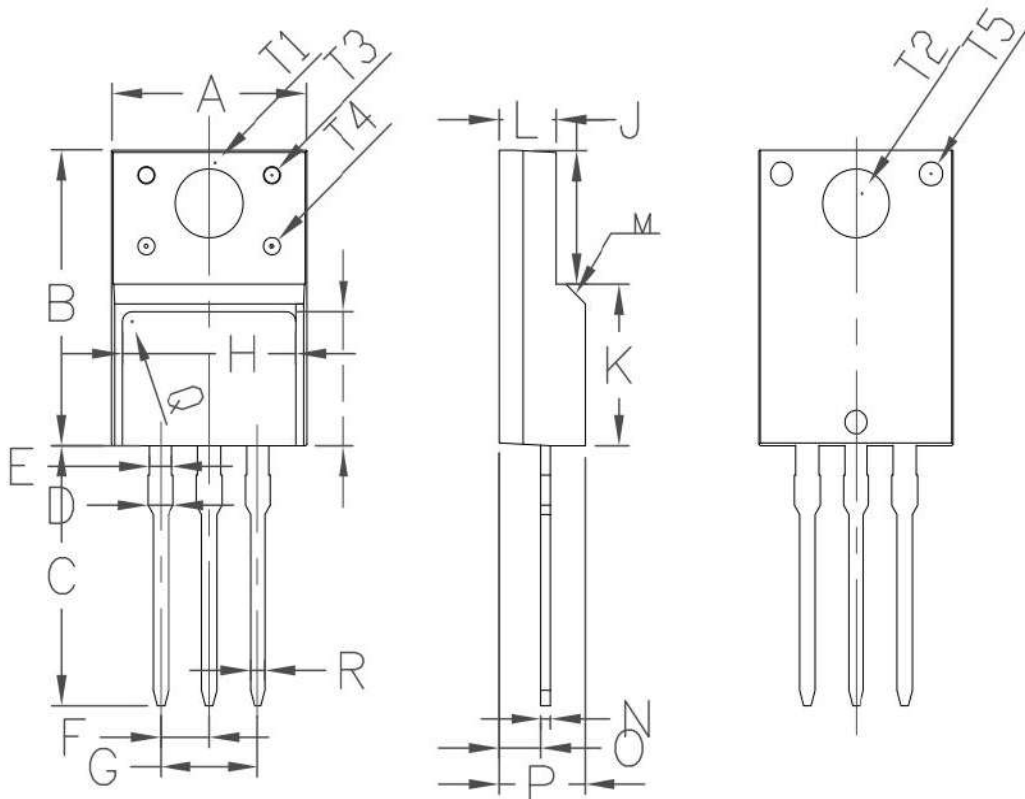
$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Figure17.Unclamped Inductive Switching Waveforms

**Package outline drawing**

Unit: mm

**TO-220F**



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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