N Channel MOSFET

Pb Lead Free Package and Finish

Applications:
- Adapter & Charger
- PC Power supply
- AC-DC Switching Power Supply
- LED driving power

ID	RDS(ON)(Typ.)	VDSS
20A	0.3Ω	600V

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

Ordering Information

2.Drain
1.Gate
3.Source

Not to Scale

Part Number	Package	Marking
RS20N60F	TO-220F	RS20N60F

Absolute Maximun Ratings Tc=25℃ unless otherwise specified

Symbol	Parameter	RS20N60F	Units
VDSS	Drain-to-Source Voltage (Note*1)	600	V
ID	Continuous Drain Current	20.0	A
ID@ 100 ℃	Continuous Drain Current	12.5	
IDM	Pulsed Drain Current (Note*2)	80.0	
PD	Power Dissipation	72	W
	Derating Factor above 25℃	0.57	W/℃
VGS	Gate-to-Source Voltage	±30	V
EAS	Single Pulse Avalanche Engergy L=10mH VDD=50V RG=25Ω TJ=25℃	1600	mJ
TL TPKG	Maximum Temperature for Soldering	300 260	℃
	Leads at 0.063in(1.6mm)from Case for 10 seconds		
	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	RS20N60F	Units	Test Conditions
RθJC	Junction-to-Case	1.62	℃/W	Drain lead soldered to water cooled heatsink,PD adjusted for a peak junction temperature of +150℃.
RθJA	Junction-to-Ambient	115		1 cubic foot chamber,free air.

OFF Characteristics   TJ=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV$_{DSS}$	Drain-to-source Breakdown Voltage	600	--	--	v	V$_{GS}$=0V,I$_D$=250μA
I$_{DSS}$	Drain-to-Source Leakage Current	--	--	1.0	μA	V$_{DS}$=600V,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   TJ=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R$_{DS(on)}$	Static Drain-to-Source On-Resistance	--	0.3	0.42	Ω	V$_{GS}$=10V,I$_D$=10A
V$_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	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	--	61	--	nS	V$_{DS}$=300V I$_D$=10A R$_G$=10Ω V$_{GS}$=10V (Note:3,4)
t$_{rise}$	Rise Time	--	132	--		
t$_{d(OFF)}$	Turn-OFF Delay Time	--	218	--		
t$_{fall}$	Fall Time	--	73	--		

Dynamic Characteristics   Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C$_{iss}$	Input Capacitance	--	2315	--	pF	V$_{GS}$=0V V$_{DS}$=25V f=1.0MHz
C$_{oss}$	Output Capacitance	--	1280	--		
C$_{rss}$	Reverse Transfer Capacitance	--	86	--		
Q$_g$	Total Gate Charge	--	51	--	nC	V$_{DS}$=480V I$_D$=20A V$_{GS}$=10V (Note:3,4)
Q$_{gs}$	Gate-to-Source Charge	--	15.0	--		
Q$_{gd}$	Gate-to-Drain("Miller"）Charge	--	22	--		

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current	--	--	20	A	Integral pn-diode
I_{SM}	Maximum Pulsed Current	--	--	80	A	in MOSFET
V_{SD}	Diode Forward Voltage	--	--	1.4	V	I_S=20A,V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	468	--	nS	V_{GS}=0V
Q_{rr}	Reverse Recovery Charge	--	5.3	--	µC	I_S=20A,di/dt=100A/µs

Notes:

*1.T_J=±25℃ to +150℃.
*2.Repetitive rating;pulse width limited by maximum junction temperature.
*3.Pulse width≤300µs;duty cycle ≤2%.
*4.Basically not affected by temperature.

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

Figure 1. Output Characteristics
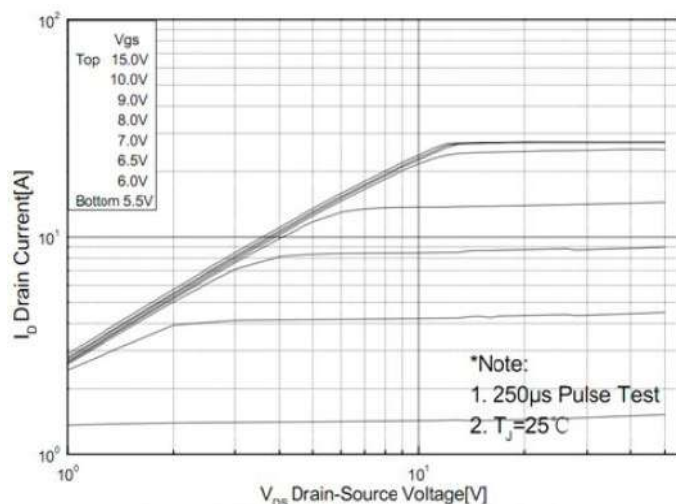
Figure 2. On-Resistance vs. Drain Current
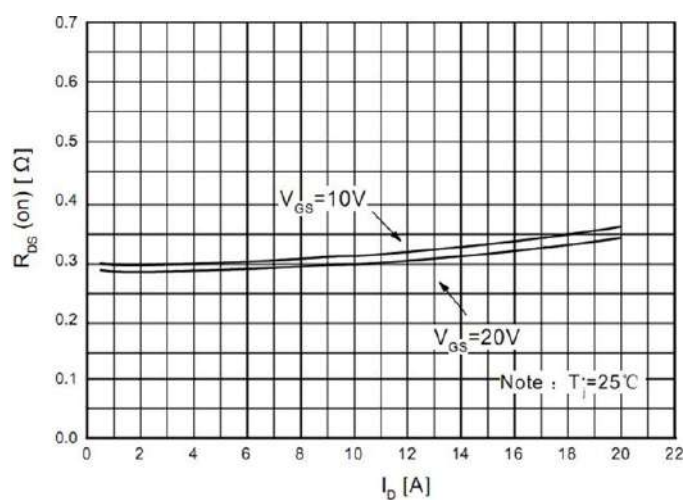
Figure 3. BVDSS vs. Temperature
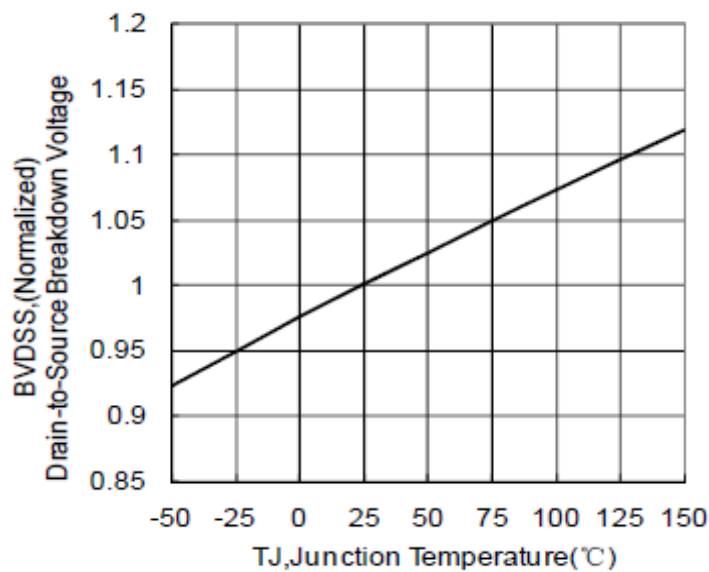
Figure 4. On-Resistance vs. Temperature
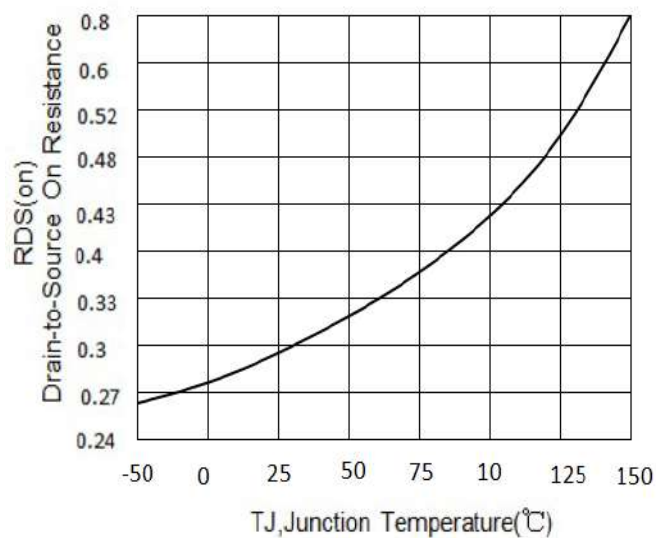
Figure 5. Gate Charge vs. Vgs
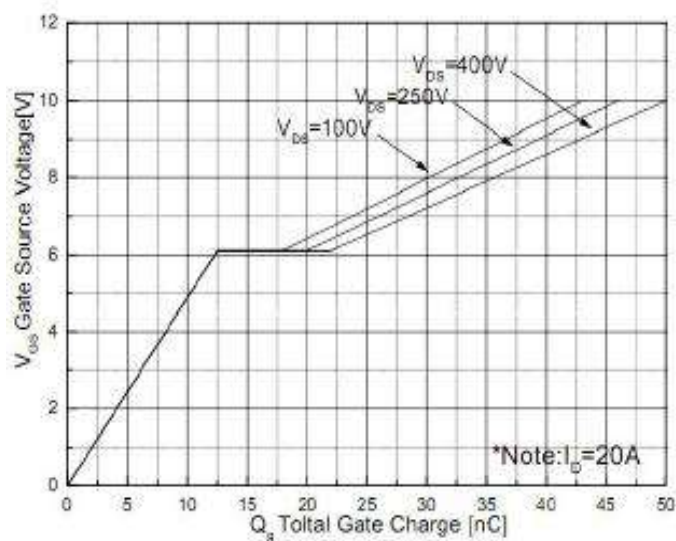
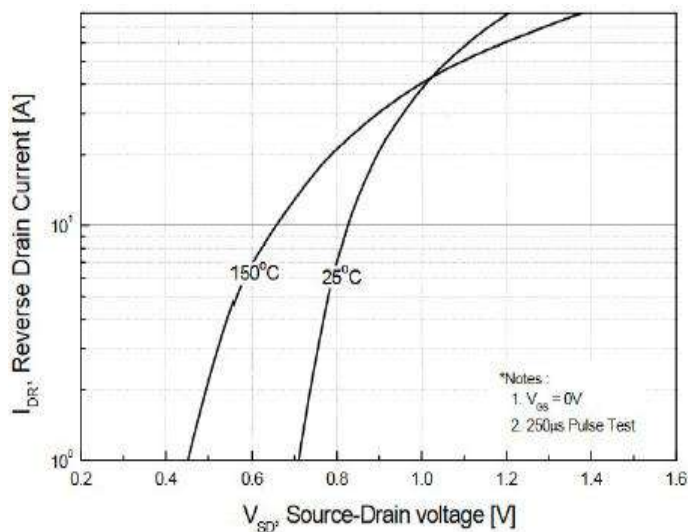Figure 6. Diode Forward Voltage vs. Current

Figure 7. Maximum Continuous Drain
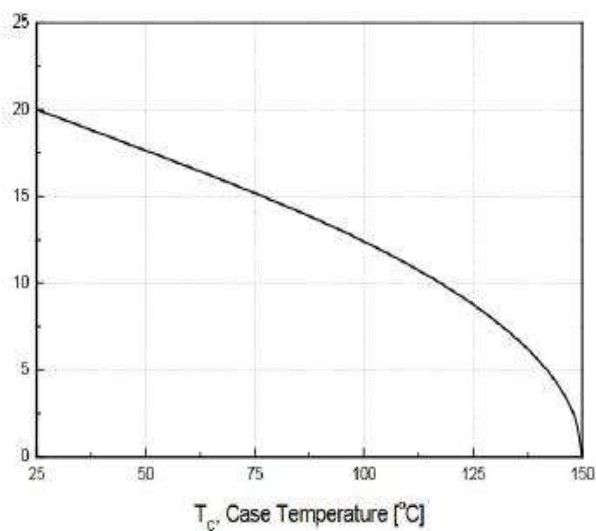Current vs Case Temperature
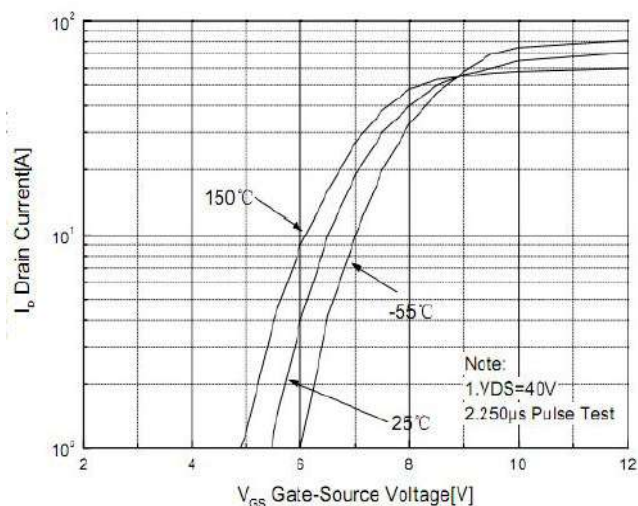
Figure 8. Typical Transfer Characteristics

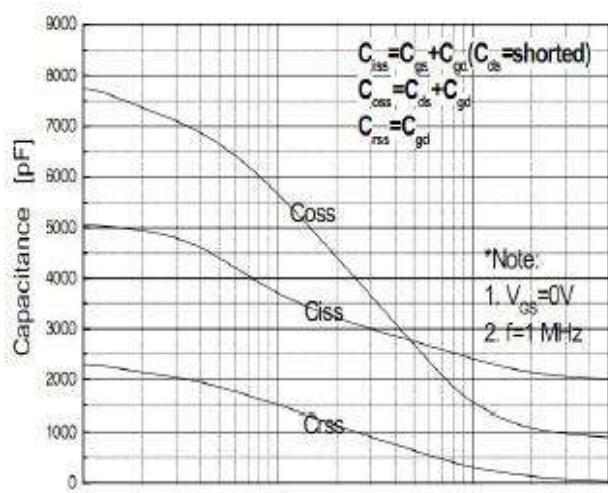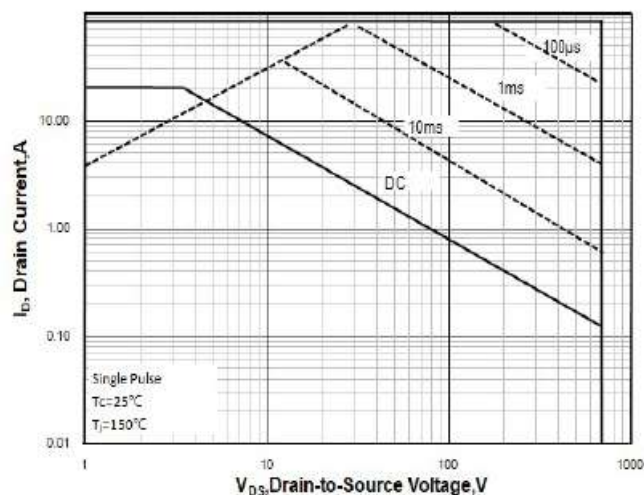Figure 9. Capacitance vs. Drian-to-source voltage

Figure 10. Maximum Safe Operating Area

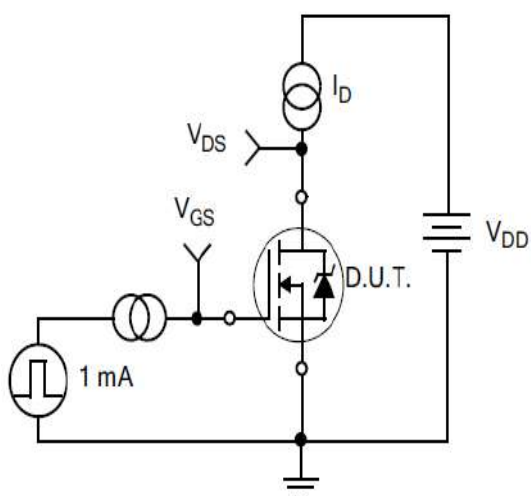**REASUNOS**

Test Circuits and Waveforms
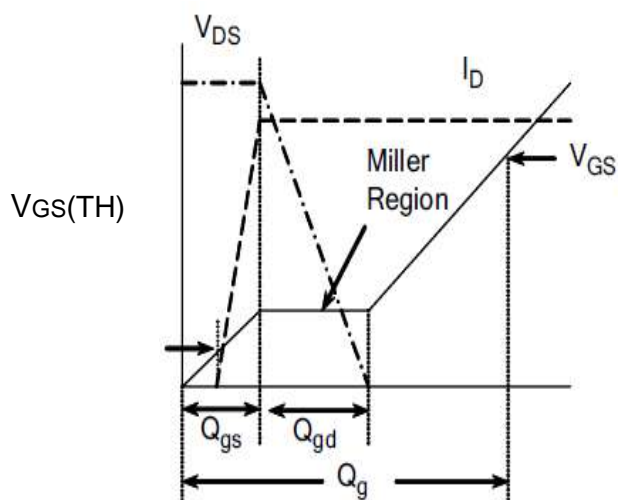

Figure11.
Gate Charge Test Circuit
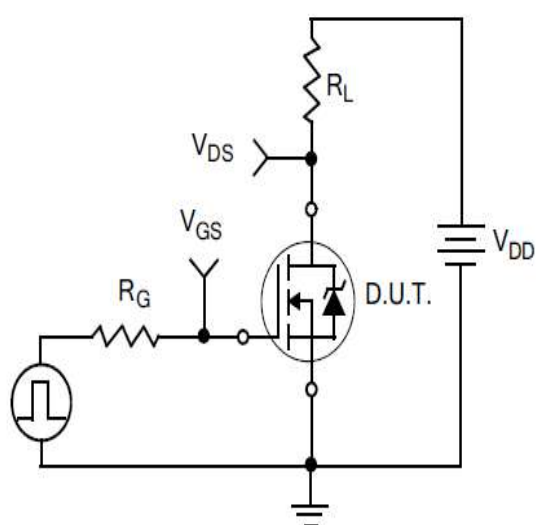

Figure12.
Gate Charge Waveform

Figure13.
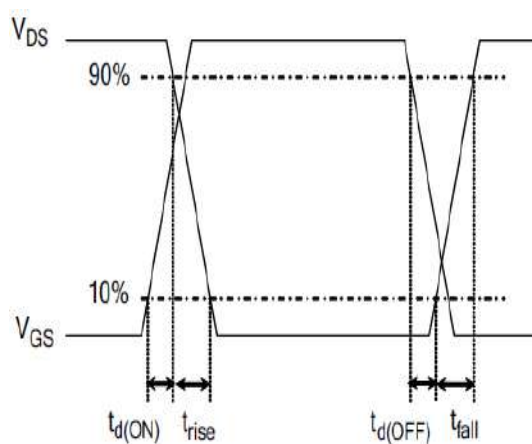Resistive Switching Test Circuit

Figure14.
Resistive Switching Waveforms
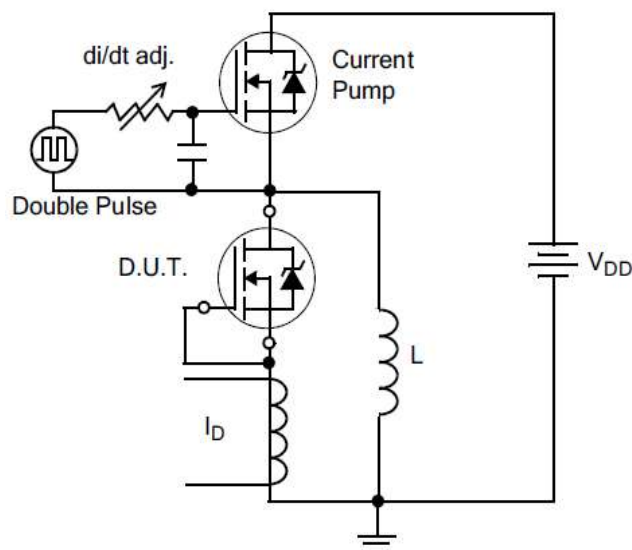
Test Circuits and Waveforms

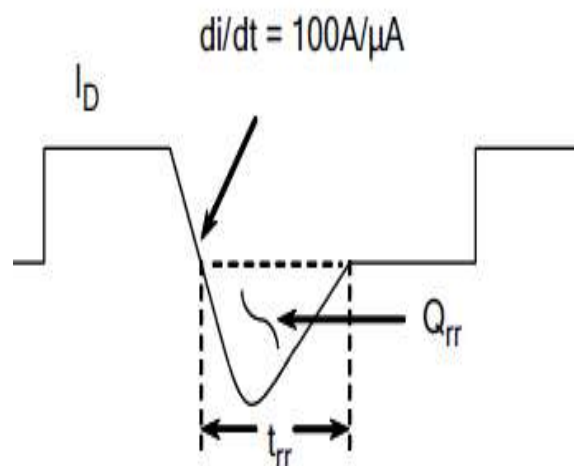Figure15.Diode Reverse Recovery
Test Circuit
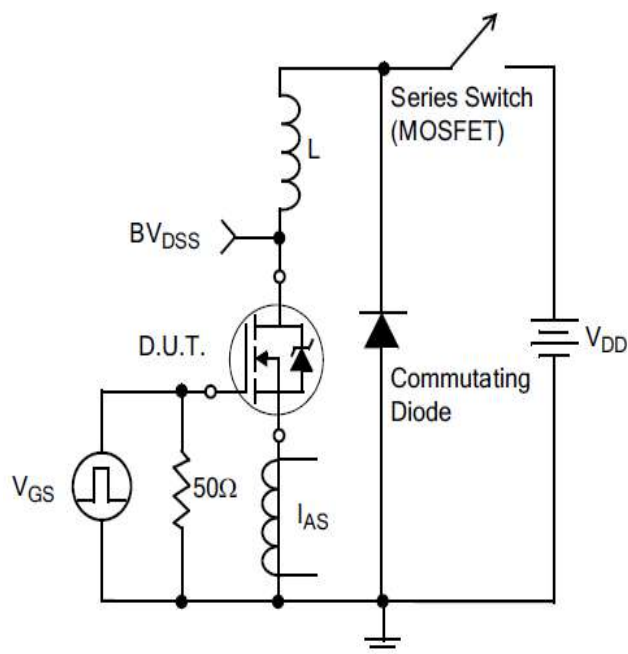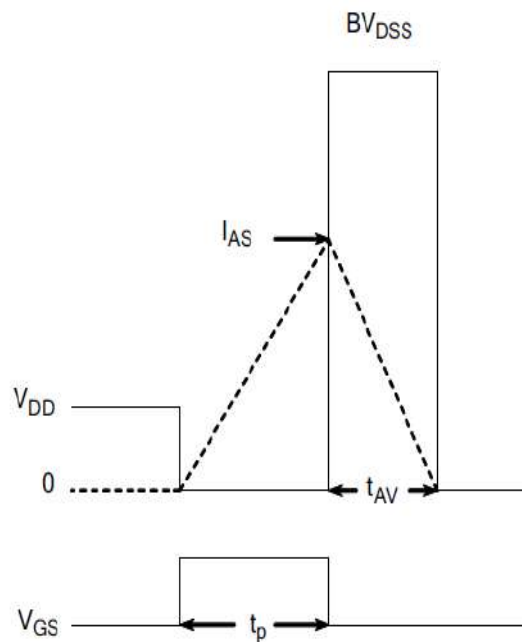

Figure16.Diode Reverse Recovery
Waveform

Figure17.Unclamped Inductive
Switching Test Circuit

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

Figure18.Unclamped Inductive
Switching Waveforms

Package outline drawing

TO-220F

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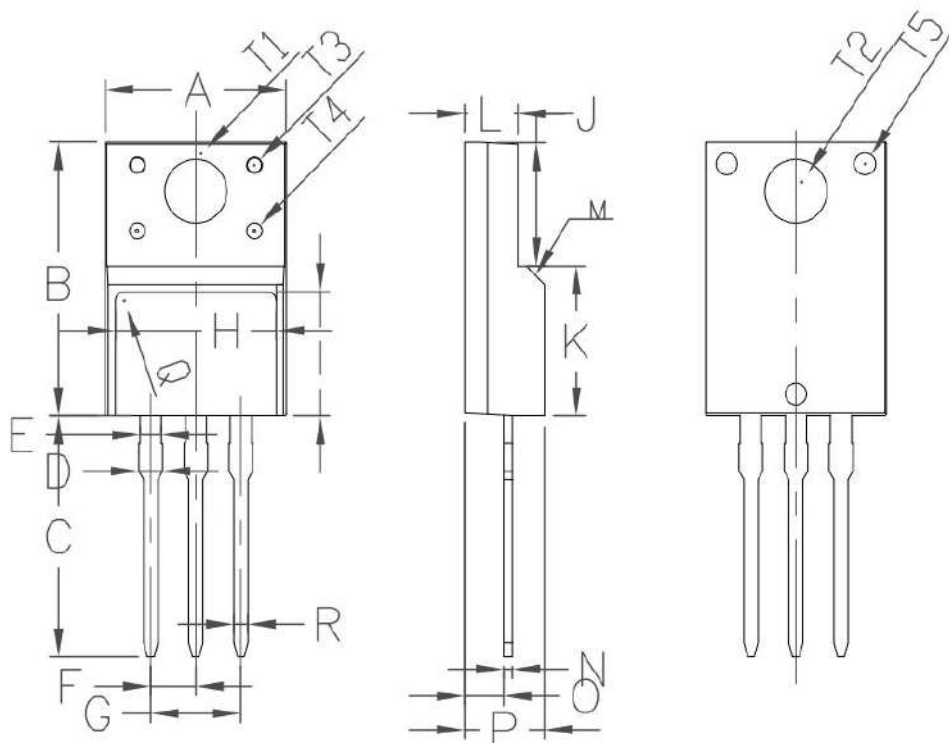
Symbol	Min	Non	Max
A	9.96	10.16	10.36
B	15.67	15.87	16.07
C	13.14	13.34	13.54
D	1.20	1.30	1.40
E		1.20	
F		2.54	
G		5.08	
H	7.60	7.80	8.00
I	7.10	7.30	7.50
J	6.48	6.68	6.88
K	8.99	9.19	9.39
L	2.34	2.54	2.74
M		45°	
N	0.49	0.50	0.52
O	2.15	2.35	2.55
P	4.50	4.70	4.90
Q		0.50	
S	4°	4.5°	5°
T1		3.45	
T2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

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       in the laeling,can be reasonably expected to result in significant injury to the user.

   2.A critical component is any component of a life support device or system whose failure to
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     support device or system,or to affect its safety or effectiveness.