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N Channel MOSFET

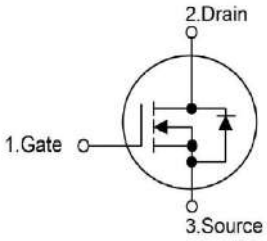
Lead Free Package and Finish

Applications:

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

I_D	$R_{DS(ON)}$(Typ.)	V_{DSS}
2.0A	3.7Ω	600V

Not to Scale



Features:

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

Ordering Information

Part Number	Package	Marking
RS2N60F	TO-220F	RS2N60F

Absolute Maximun Ratings Tc=25℃ unless otherwise specified

Symbol	Parameter	RS2N60F	Units
V_{DSS}	Drain-to-Source Voltage (Note*1)	600	V
I_D	Continuous Drain Current	2.0	A
I_D@ 100 ℃	Continuous Drain Current	1.3	
I_{DM}	Pulsed Drain Current (Note*2)	8.0	
P_D	Power Dissipation	25	W
	Derating Factor above 25℃	0.28	W/℃
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Engergy L=30mH I_{AS}=2.52A V_{DD}=145V R_G=25Ω T_J=25℃	57	mJ
T_L	Maximum Temperature for Soldering	300	℃
T_{PKG}	Leads at 0.063in(1.6mm)from Case for 10 seconds 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	RS2N60F	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	1.98	℃/W	Drain lead soldered to water cooled heatsink,P_D adjusted for a peak junction temperature of +150℃.
$R_{\theta JA}$	Junction-to-Ambient	62.5		1 cubic foot chamber,free air.

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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	--	--	10.0	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	--	3.7	4.2	Ω	V_{GS}=10V,I_D=1A
$V_{GS(TH)}$	Gate Threshold Voltage	3.0	--	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	--	7.8	--	nS	V_{DS}=250V I_D=2.0A R_G=25Ω (Note:3,4)
t_{rise}	Rise Time	--	33	--		
$t_{d(OFF)}$	Turn-OFF Delay Time	--	23	--		
t_{fall}	Fall Time	--	59	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C_{iss}	Input Capacitance	--	310	--	pF	V_{GS}=0V V_{DS}=25V f=1.0MHz
C_{oss}	Output Capacitance	--	39	--		
C_{rss}	Reverse Transfer Capacitance	--	6.1	--		
Q_g	Total Gate Charge	--	8	--	nC	V_{DS}=480V I_D=2.0A V_{GS}=10V (Note:3,4)
Q_{gs}	Gate-to-Source Charge	--	1.2	--		
Q_{gd}	Gate-to-Drain("Miller"）Charge	--	5	--		

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Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current	--	--	2	A	Integral pn-diode in MOSFET
I_{SM}	Maximum Pulsed Current	--	--	8	A	
V_{SD}	Diode Forward Voltage	--	--	1.4	V	I_S=2.0A,V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	80	--	nS	V_{GS}=0V I_S=2.0A,di/dt=100A/μs
Q_{rr}	Reverse Recovery Charge	--	1.8	--	μC	

Notes:

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

Typical Feature curve （TJ = 25° C, unless otherwise noted）

Figure 1. Output Characteristics

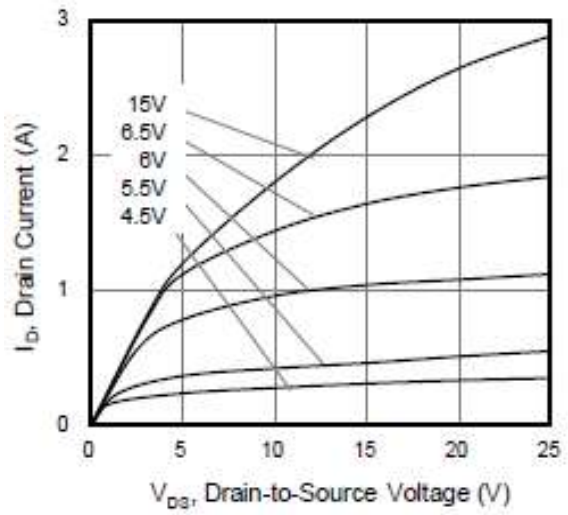

Figure 2. Drain Current vs. Temperature

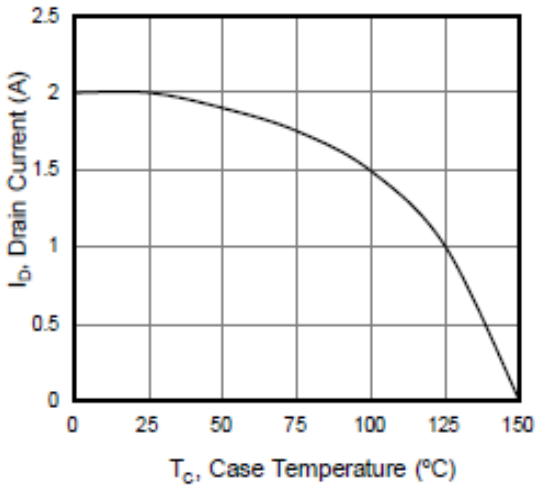

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Figure 3. Body Diode Forward Voltage

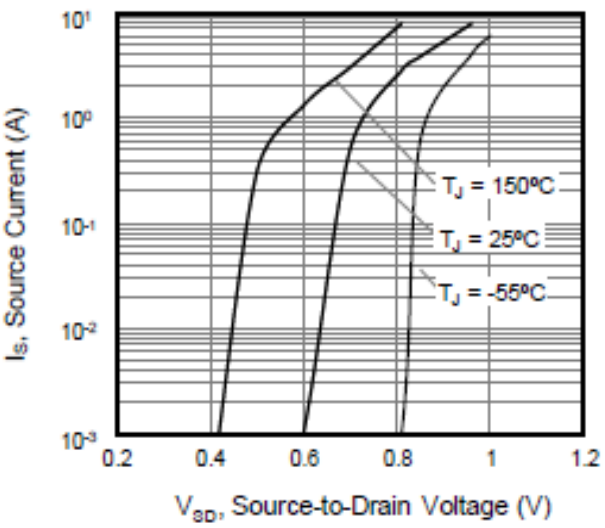

Figure 4. Power Dissipation vs. Temperature

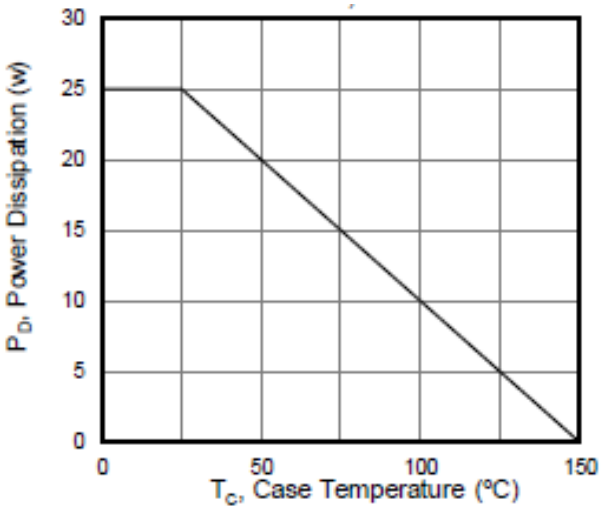

Figure 5. On-Resistance vs. Temperature

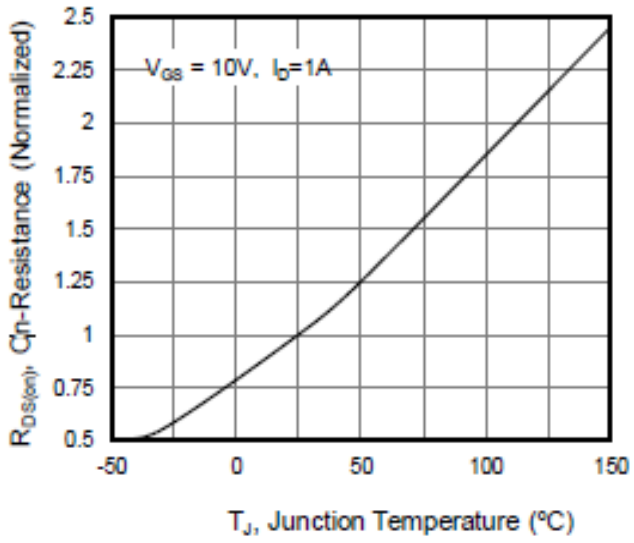

Figure 6. Transfer Characteristics

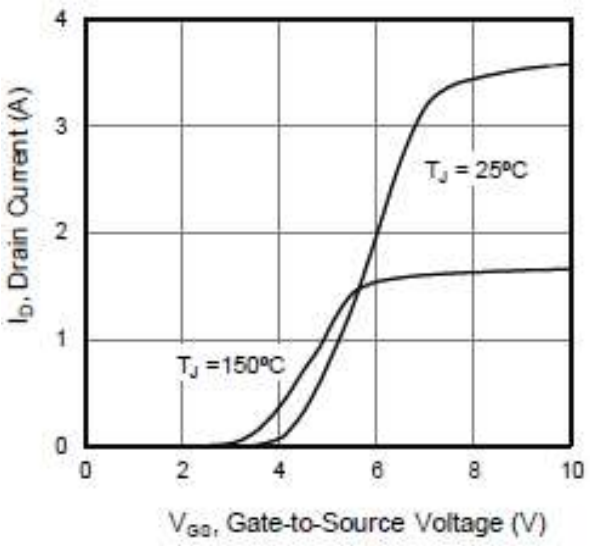

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Figure7. Capacitance

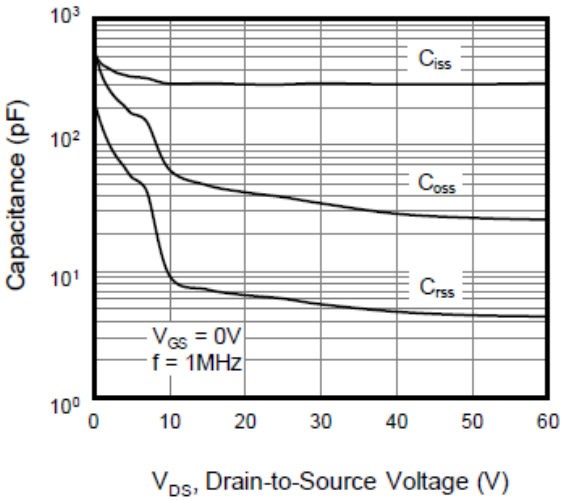


Figure8. Gate Charge

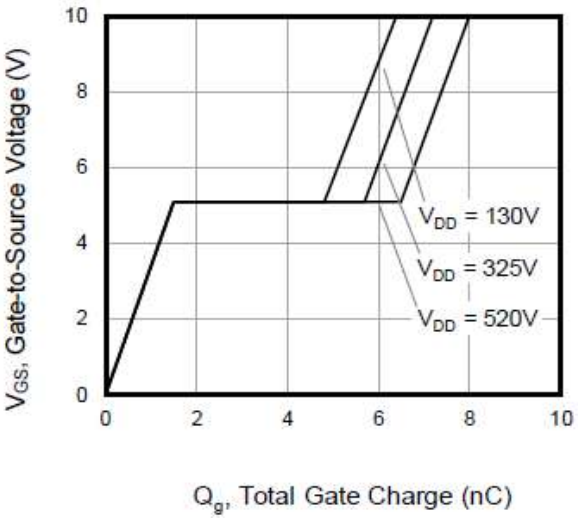
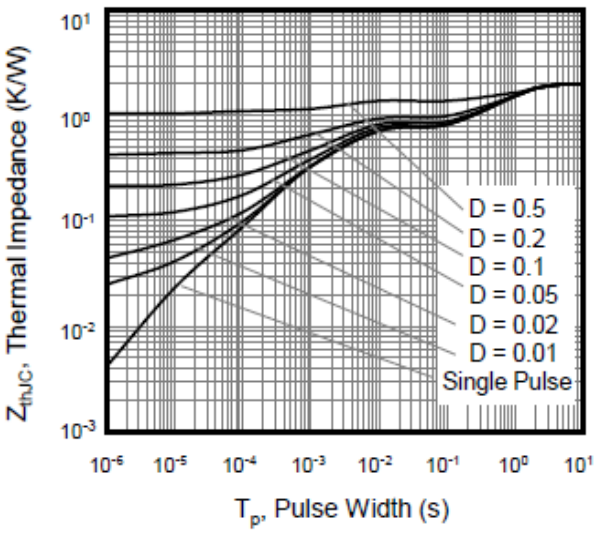


Figure 9. Transient Thermal Impedance
TO-220F



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Test Circuits and Waveforms

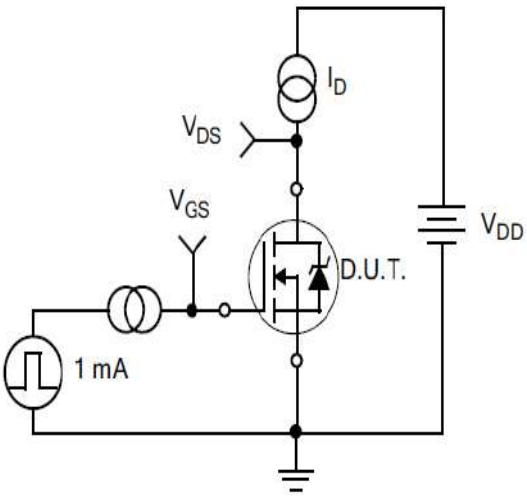

Figure10.
Gate Charge Test Circuit

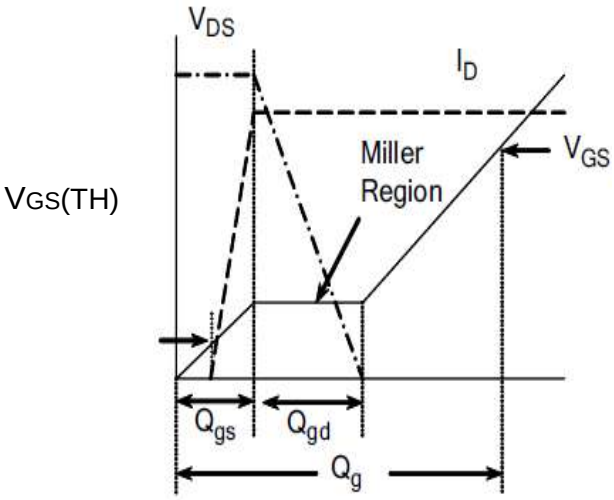

Figure11.
Gate Charge Waveform

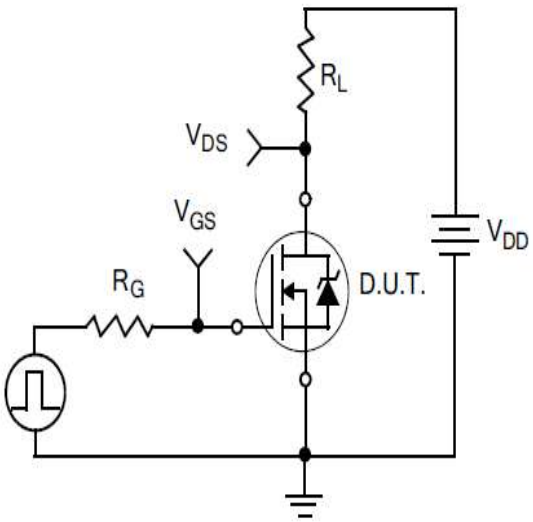

Figure12.
Resistive Switching Test Circuit

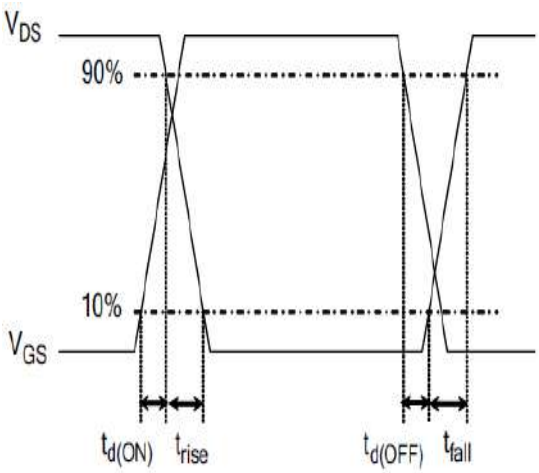

Figure13.
Resistive Switching Waveforms

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Test Circuits and Waveforms

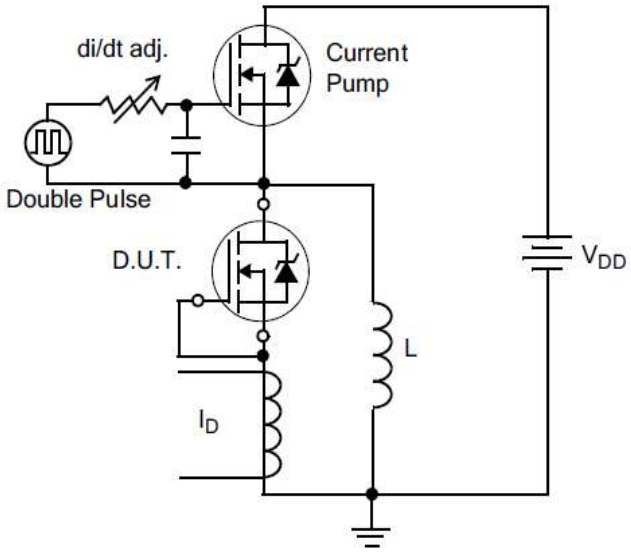


Figure14.Diode Reverse Recovery Test Circuit

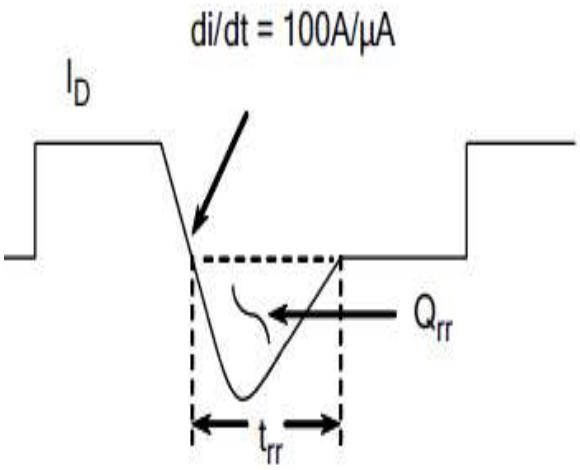


Figure15.Diode Reverse Recovery Waveform

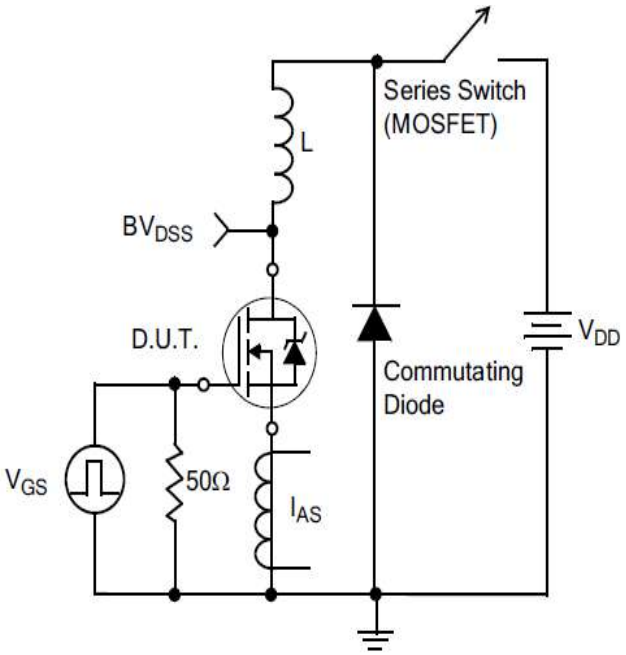
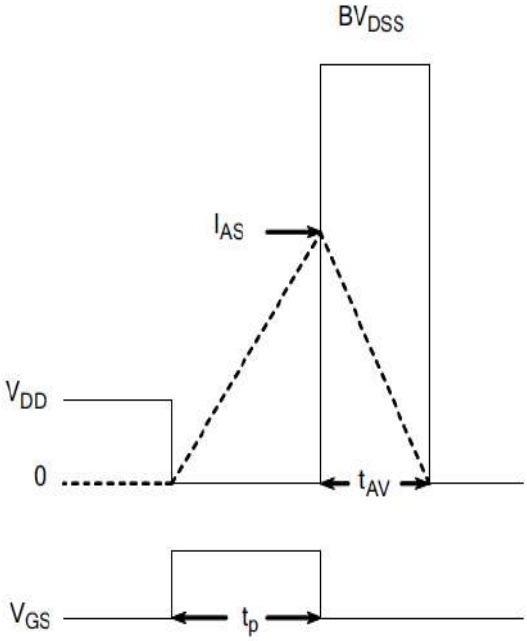


Figure16.Unclamped Inductive Switching Test Circuit



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

Figure17.Unclamped Inductive Switching Waveforms

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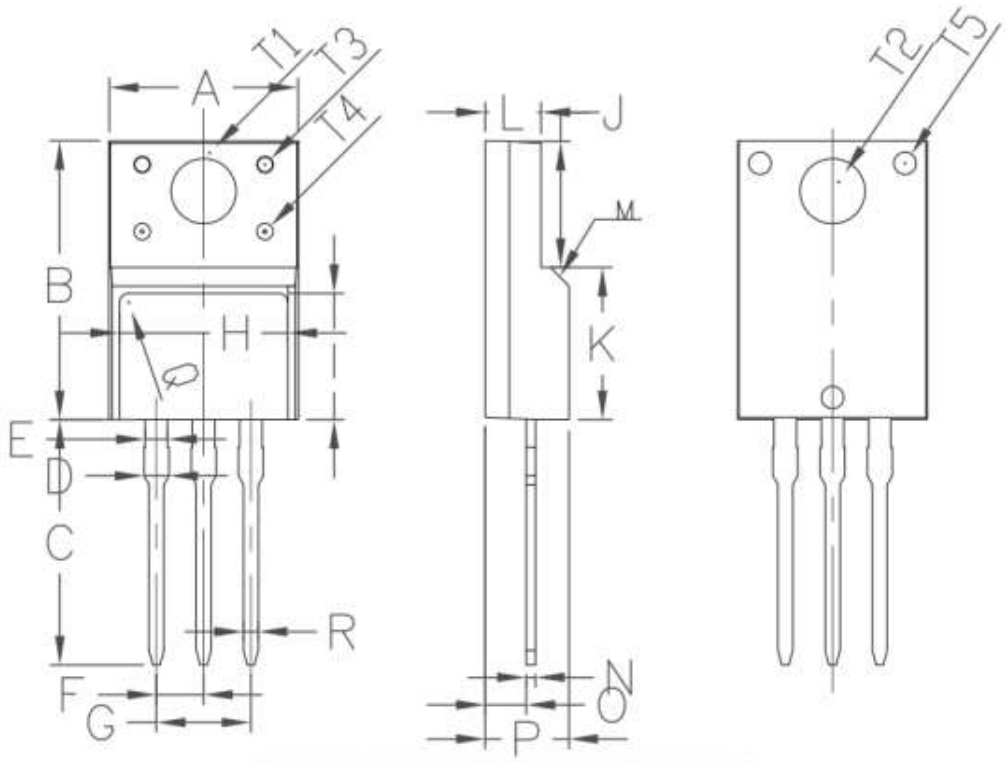
Package outline drawing

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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