

Multi-Epi Super Junction MOSFETs


Lead Free Package and Finish

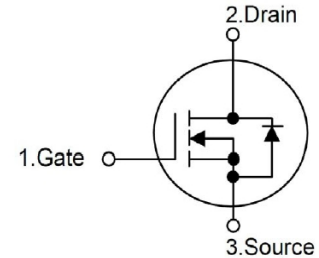
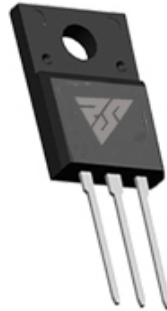
Applications:

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply(UPS)
- PFC stages for server & telecom
- Consumer

ID	R _{DS(ON)} (Max.)	V _{DSS}
12A	420mΩ	650V

Features:

- New revolutionary high voltage technology
- Better RDS(on) in TO-220F
- Ultra Low Gate Charge cause lower driving requirements
- Periodic avalanche rated
- Ultra low effective capacitances



Not to Scale

Ordering Information

Part Number	Package	Marking
RSU12N65F	TO-220F	RSU12N65F

Absolute Maximum Ratings T_c=25°C unless otherwise specified

Symbol	Parameter	RSU12N65F	Units
V _{DSS}	Drain-to-Source Voltage	650	V
I _D	Continuous Drain Current (T _C = 25°C)	12	A
	Continuous Drain Current (T _C = 100°C)	7	
I _{DM}	Pulsed Drain Current (Note*1)	44	
P _D	Power Dissipation(T _c =25°C)	31	W
V _{GS}	Gate-to-Source Voltage	±30	V
E _{AS}	Single Pulse Avalanche Energy (Note*2)	120	mJ
I _{AR}	Avalanche Current (Note*1)	1.8	A
E _{AR}	Repetitive Avalanche Energy (Note*1)	0.32	mJ
T _L TPKG	Maximum Temperature for Soldering	300 260	°C
	Leads at 0.063in(1.6mm)from Case for 10 seconds		
	Package Body for 10 seconds		
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	RSU12N65F	Units	Test Conditions
R _{θJC}	Junction-to-Case	4	°C/W	Drain lead soldered to water cooled heatsink,PD Adjusted for a peak junction temperature of +150°C.
R _{θJA}	Junction-to-Ambient	78		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
BVDSS	Drain-to-source Breakdown Voltage	650	--	--	V	VGS = 0V, ID = 250 μ A, TJ= 25 $^{\circ}$ C
		--	650	--	V	VGS = 0V, ID = 250 μ A, TJ= 150 $^{\circ}$ C
IDSS	Drain-to-Source Leakage Current	--	--	1.0	μ A	VDS=650V, VGS=0V
IGSS	Gate-to-Source Forward Leakage	--	--	100	nA	VGS=+30V VDS=0V
	Gate-to-Source Reverse Leakage	--	--	-100		VGS=-30V VDS=0V

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
RDS(on)	Static Drain-to-Source On-Resistance	--	380	420	m Ω	VGS=10V, ID=6A
VGS(TH)	Gate Threshold Voltage	3.5	4	4.5	V	VGS=VDS, ID=250 μ A
gfs	Transconductance		40		S	VDS=20V, ID=6A

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
td(ON)	Turn-on Delay Time	--	21	--	ns	VDS=400V ID=6A RG=25 Ω VGS=10V
trise	Rise Time	--	20	--		
td(OFF)	Turn-OFF Delay Time	--	51			
tfall	Fall Time	--	40			

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance	--	850	--	pF	VGS=0V VDS=100V f=1.0MHz
Coss	Output Capacitance	--	35	--		
Crss	Reverse Transfer Capacitance	--	5	--		
Qg	Total Gate Charge	--	19	--	nC	VDS=520V ID=12A VGS=10V
Qgs	Gate-to-Source Charge	--	6	--		
Qgd	Gate-to-Drain("Miller") Charge	--	6	--		

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	12	A	Integral pn-diode in MOSFET
ISM	Maximum Pulsed Current	--	--	44	A	
VSD	Diode Forward Voltage	--	0.9	1.2	V	IS=12A, VGS=0V Tj=25°C
trr	Reverse Recovery Time	--	212	--	nS	VR=400V, VGS=0V IS=12A, di/dt=100A/μs
Qrr	Reverse Recovery Charge	--	2.28	--	μC	

Notes:

- *1.Repetitive rating;pulse width limited by maximum junction temperature.
- *2. IAS = 1.8A, VDD = 50V, RG = 25Ω, Starting Tj = 25°C Pulse width tp limited by Tj,max

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

Fig 1. Output Characteristics (Tj=25°C)

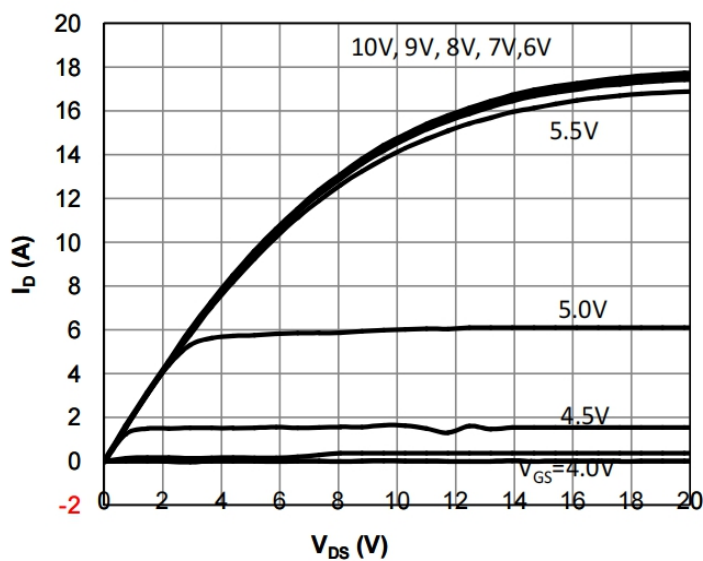


Fig 2. Output Characteristics (Tj=125°C)

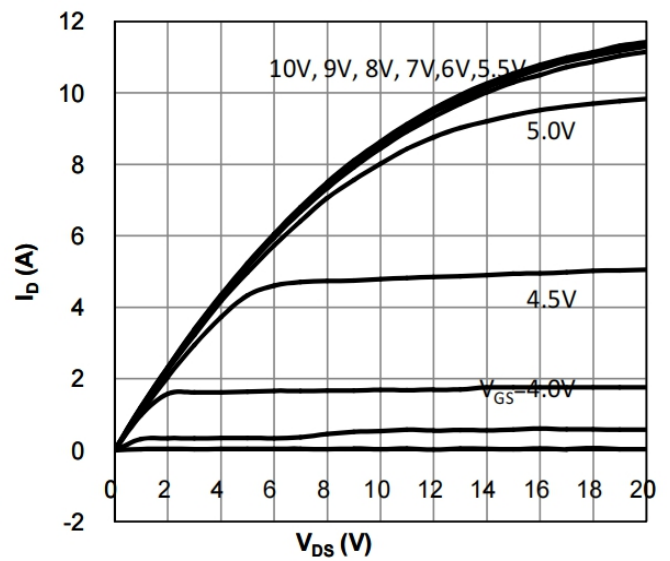


Fig 3: Transfer Characteristics

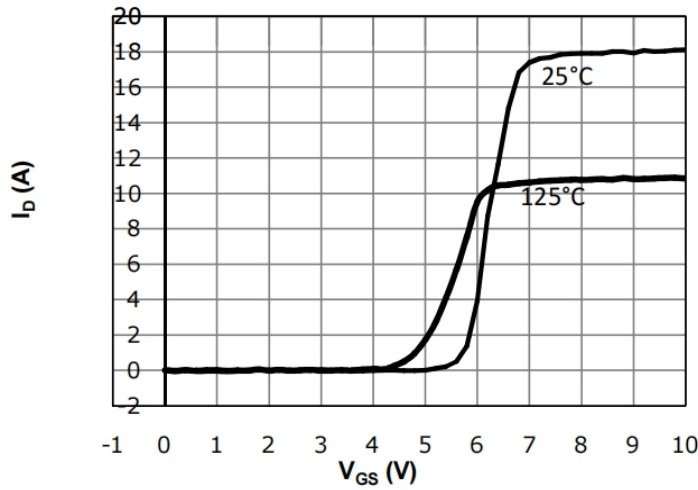


Fig 4: V_{TH} Vs T_J Temperature Characteristics

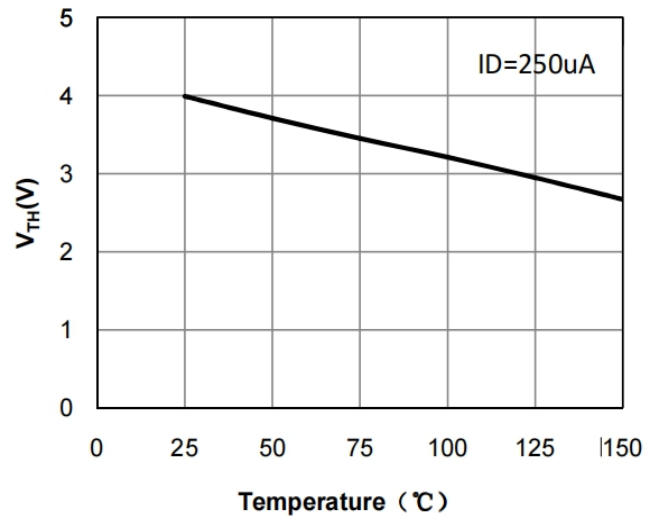


Fig 5: $R_{DS(on)}$ Vs I_{DS} Characteristics ($T_C = 25^\circ C$)

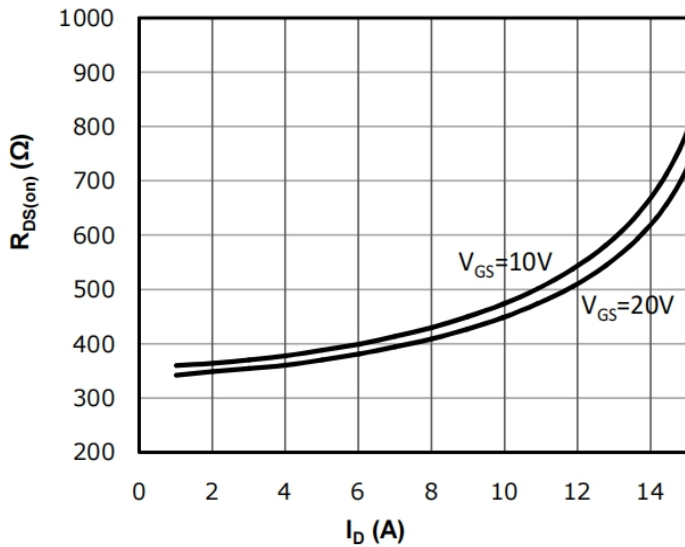


Fig 6: $R_{DS(on)}$ vs. Temperature

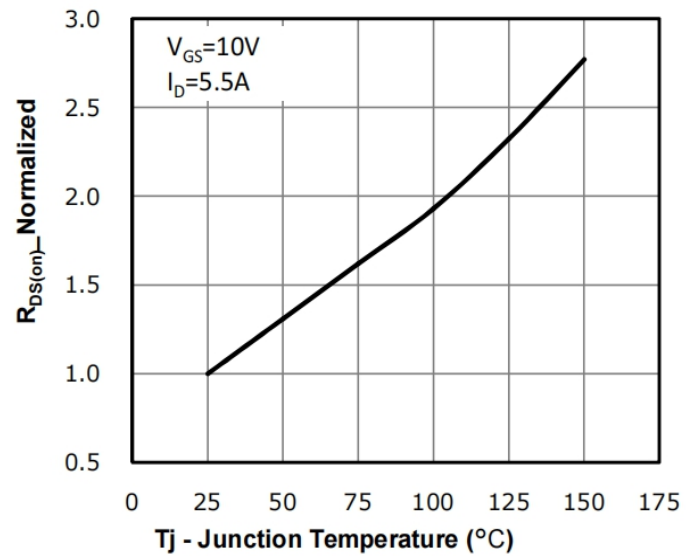


Fig 7: B_{VDS} vs. Temperature Characteristics

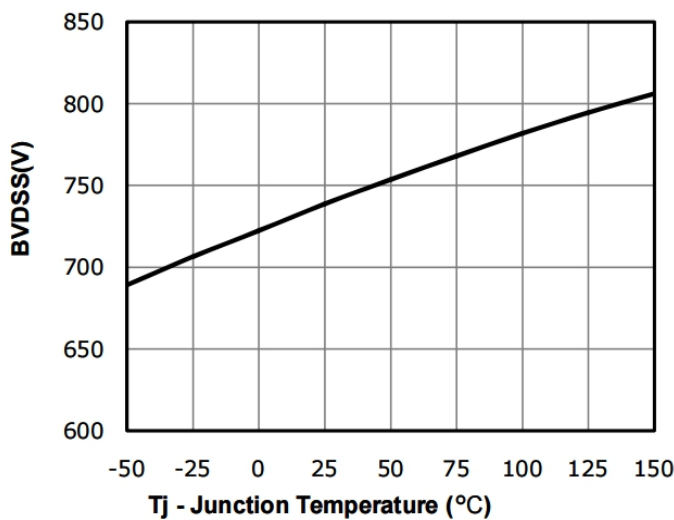


Fig 8: $R_{DS(on)}$ vs Gate Voltage

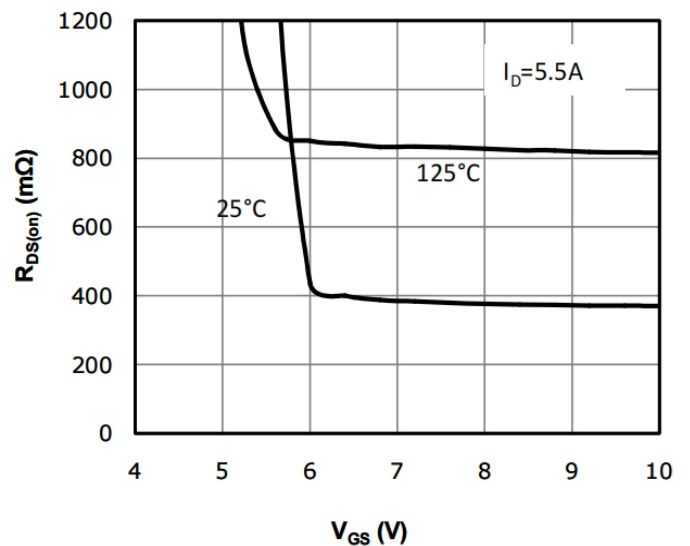


Fig 9: Body-diode Forward Characteristics

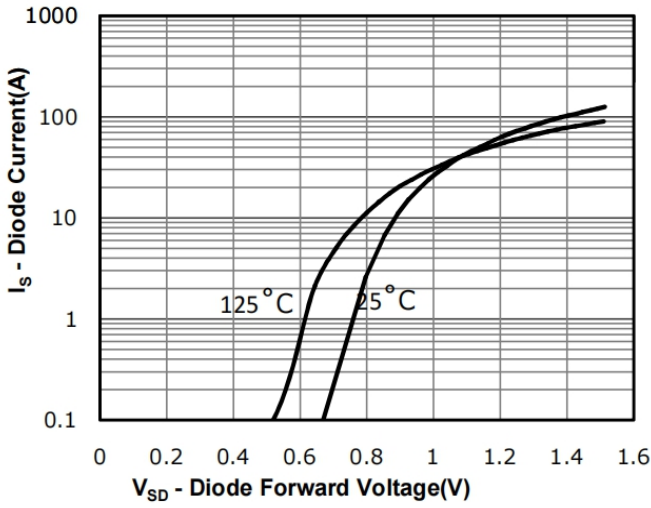


Fig 10: Gate Charge Characteristics

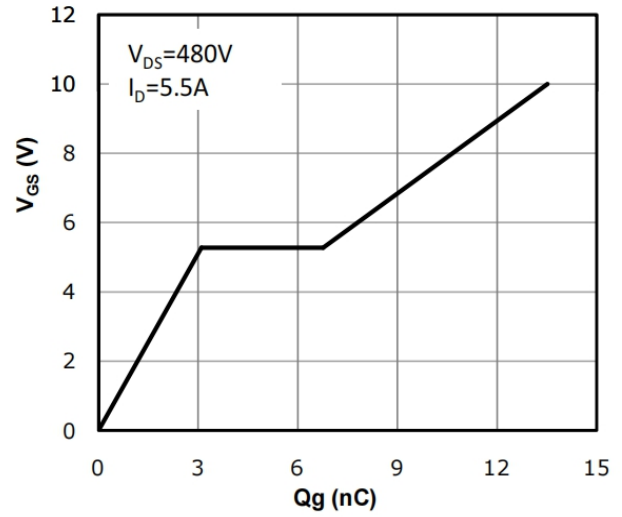


Fig 11: Capacitance Characteristics

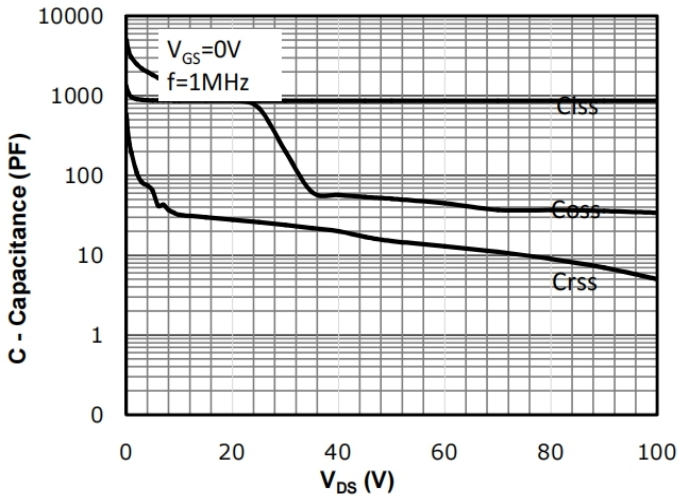
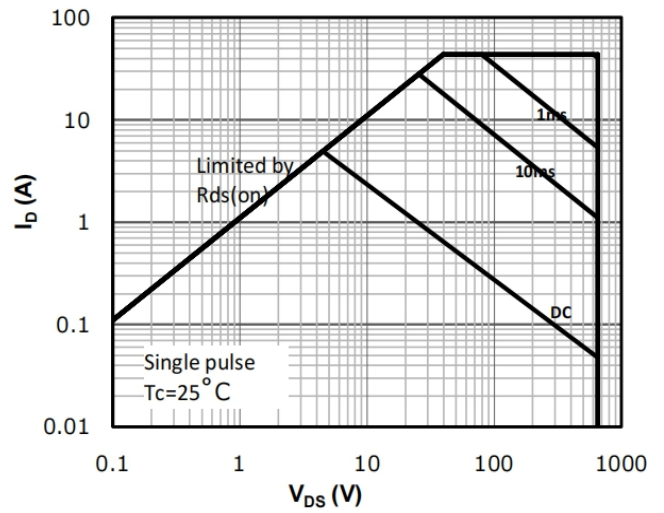


Fig 12: Safe Operating Area



Test Circuits and Waveforms

Figure A: Gate Charge Test Circuit and Waveform

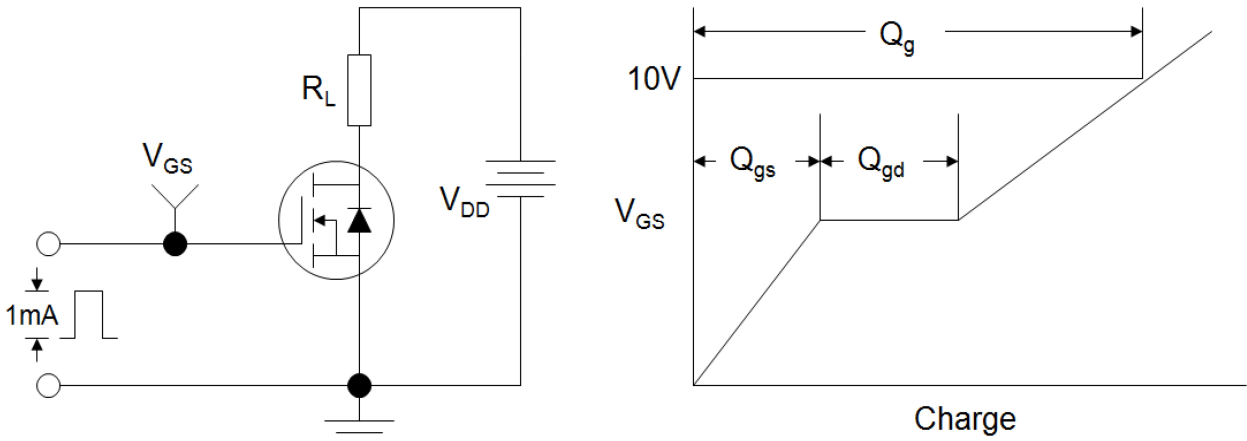


Figure B: Resistive Switching Test Circuit and Waveform

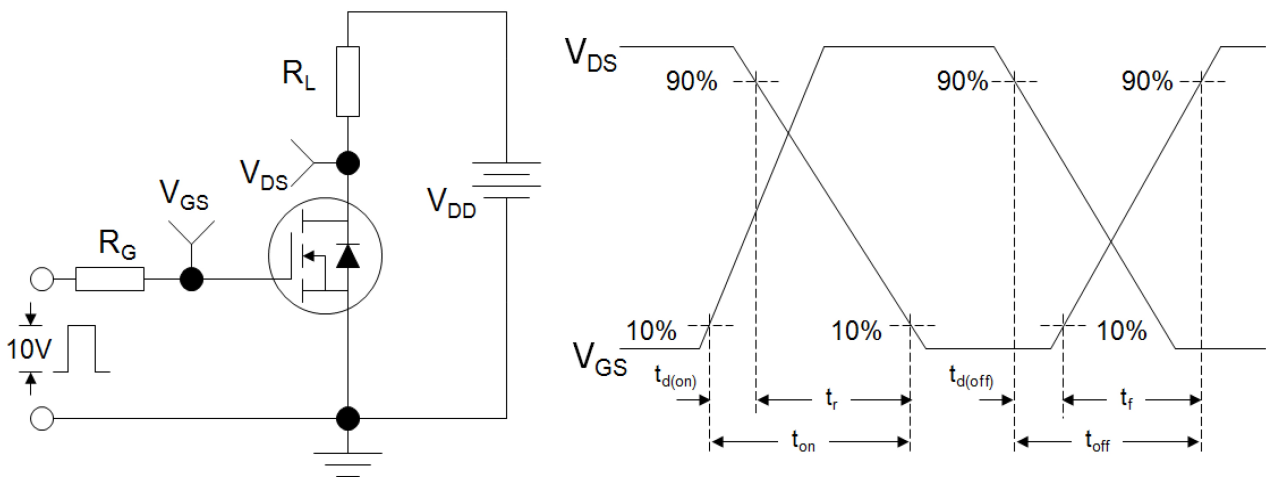
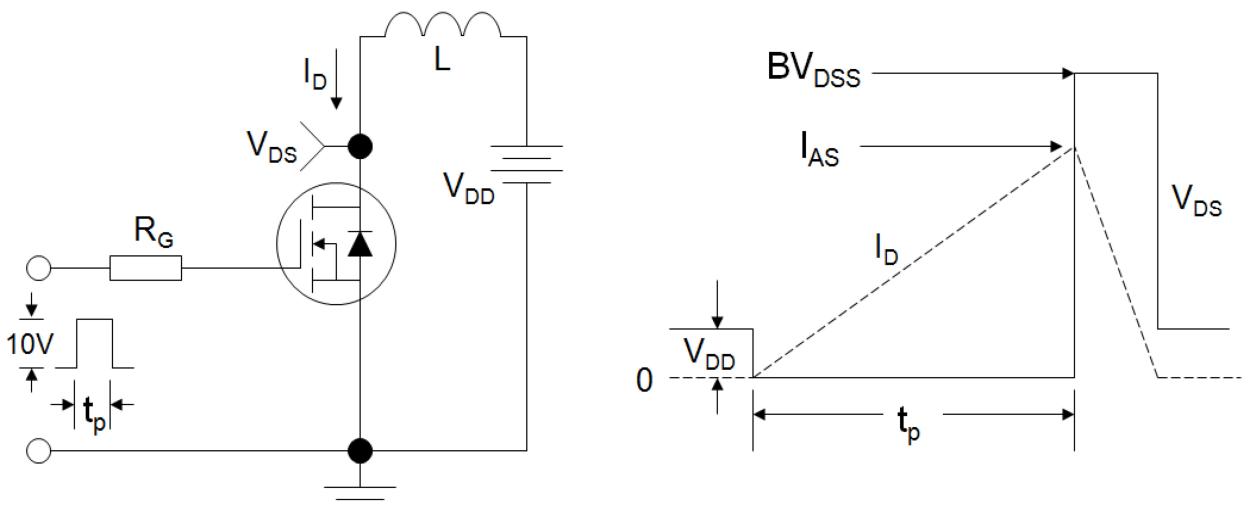
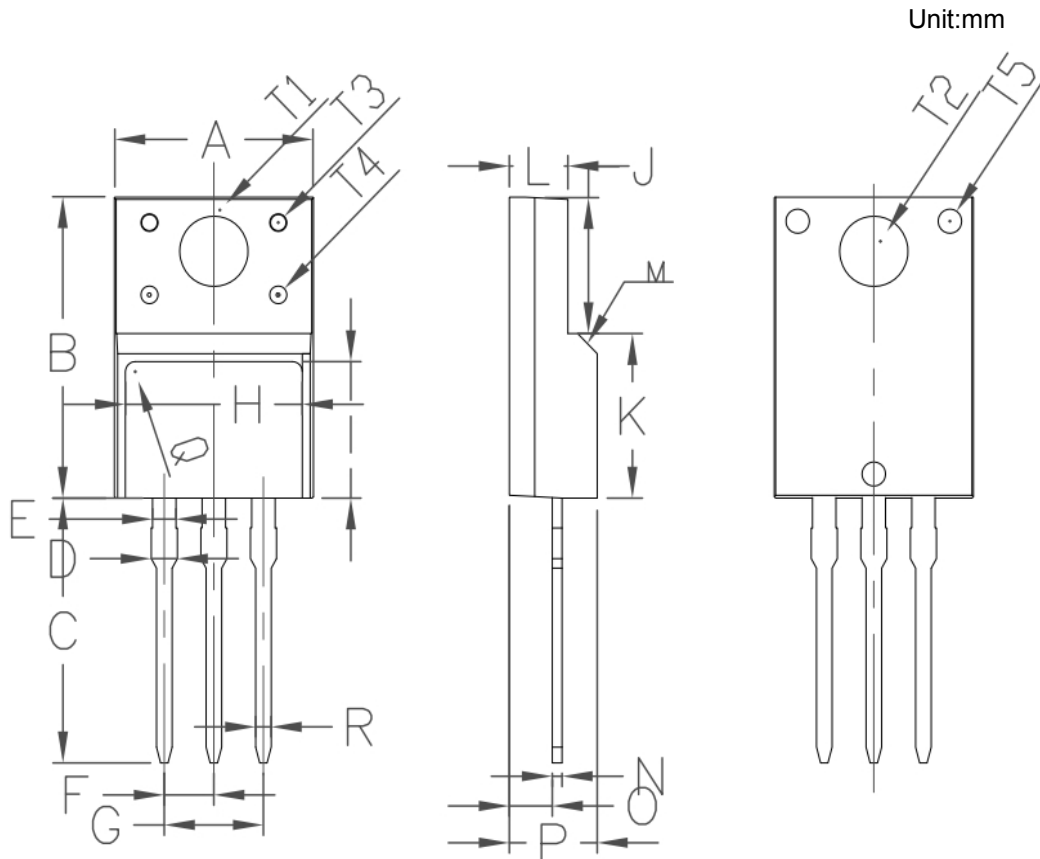


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Package outline drawing



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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