Multi-Epi Super Junction MOSFETs

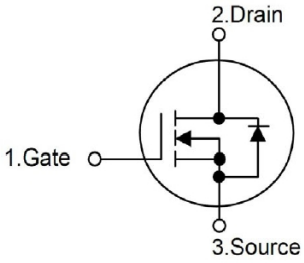
Lead Free Package and Finish

Applications:

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

I_D	$R_{DS(ON)}$(Max.)	V_{DSS}
12A	420mΩ	650V

Not to Scale



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

Ordering Information

Part Number	Package	Marking
RSU12N65F	TO-220F	RSU12N65F

Absolute Maximun Ratings Tc=25℃ unless otherwise specified

Symbol	Parameter	RSU12N65F	Units
VDSS	Drain-to-Source Voltage	650	V
ID	Continuous Drain Current (TC = 25℃)	12	A
	Continuous Drain Current (TC = 100℃)	7	
IDM	Pulsed Drain Current (Note*1)	44	
PD	Power Dissipation(Tc=25℃)	31	W
VGS	Gate-to-Source Voltage	±30	V
EAS	Single Pulse Avalanche Engergy (Note*2)	120	mJ
IAR	Avalanche Current (Note*1)	1.8	A
EAR	Repetitive Avalanche Engergy (Note*1)	0.32	mJ
TL TPKG	Maximum Temperature for Soldering Leads at 0.063in(1.6mm)from Case for 10 seconds Package Body for 10 seconds	300 260	℃
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	RSU12N65F	Units	Test Conditions
RθJC	Junction-to-Case	4	℃/W	Drain lead soldered to water cooled heatsink,PD Adjusted for a peak junction temperature of +150℃.
RθJA	Junction-to-Ambient	78		1 cubic foot chamber,free air.

OFF Characteristics TJ=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BVDSS	Drain-to-source Breakdown Voltage	650	--	--	V	VGS = 0V, ID = 250μA, TJ= 25℃
		--	650	--	V	VGS = 0V, ID = 250μA, TJ= 150℃
IDSS	Drain-to-Source Leakage Current	--	--	1.0	μA	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 TJ=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
RDS(on)	Static Drain-to-Source On-Resistance	--	380	420	mΩ	VGS=10V,ID=6A
VGS(TH)	Gate Threshold Voltage	3.5	4	4.5	V	VGS=VDS,ID=250μA
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=25Ω 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℃
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°CPulse width tp limited by Tj,max

Typical Feature curve T_J=25℃, unless otherwise noted

Fig 1. Output Characteristics (Tj=25℃)

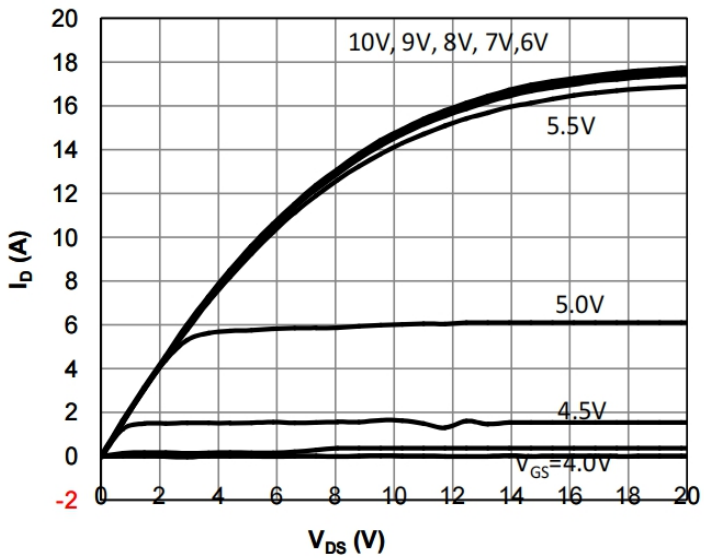


Fig 2. Output Characteristics (Tj=125℃)

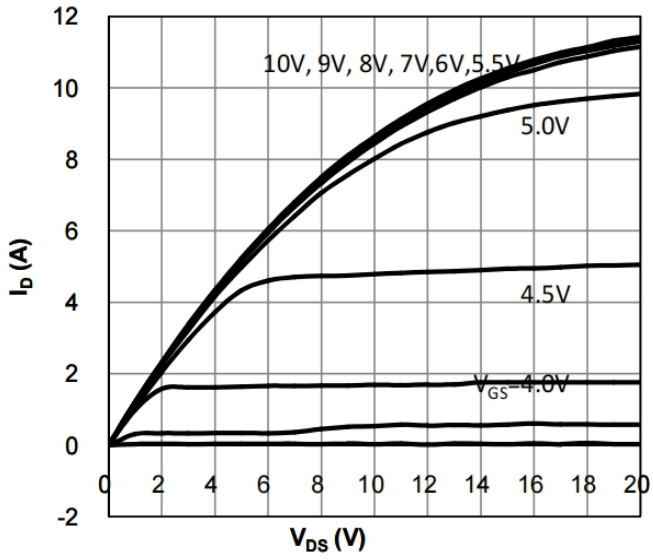


Fig 3: Transfer Characteristics

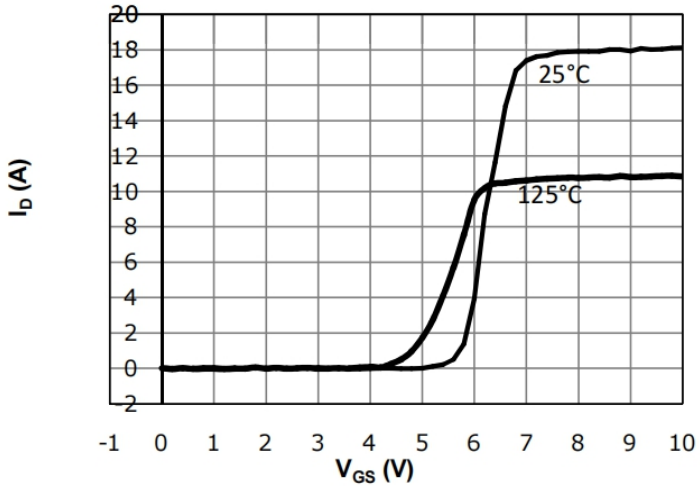


Fig 4: V_{TH} Vs Tj Temperature Characteristics

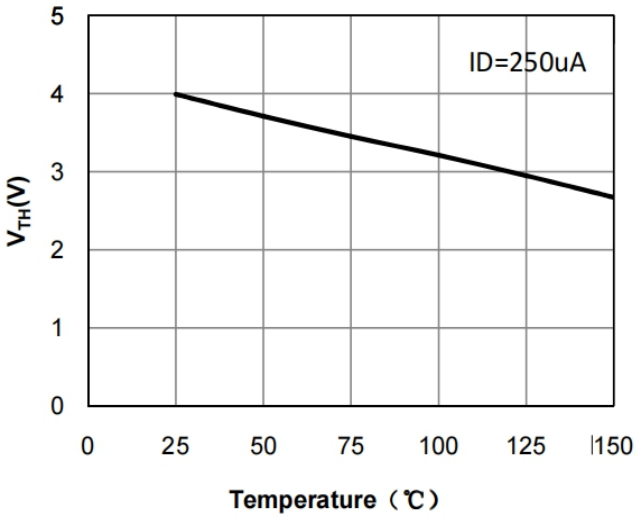


Fig 5: Rdson Vs Ids Characteristics(Tc=25℃)

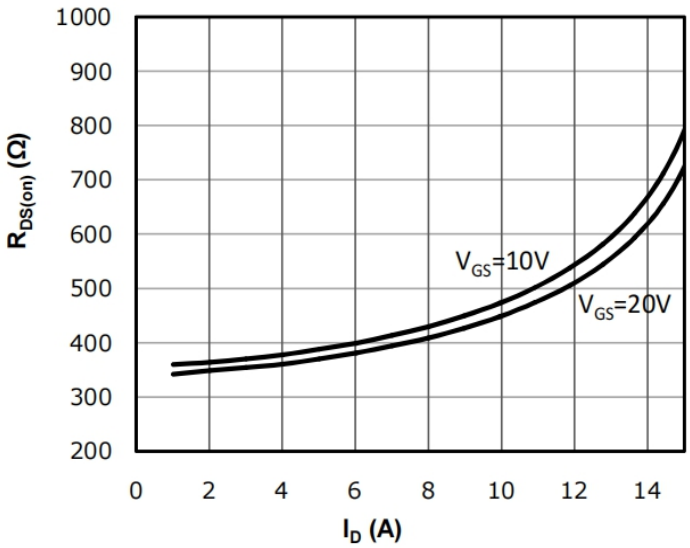


Fig 6: Rds(on) vs. Temperature

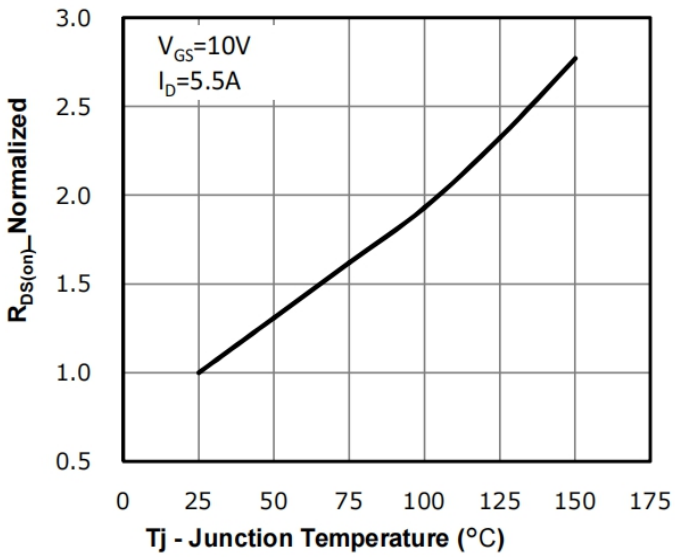


Fig 7: BVDSS vs. Temperature Characteristics

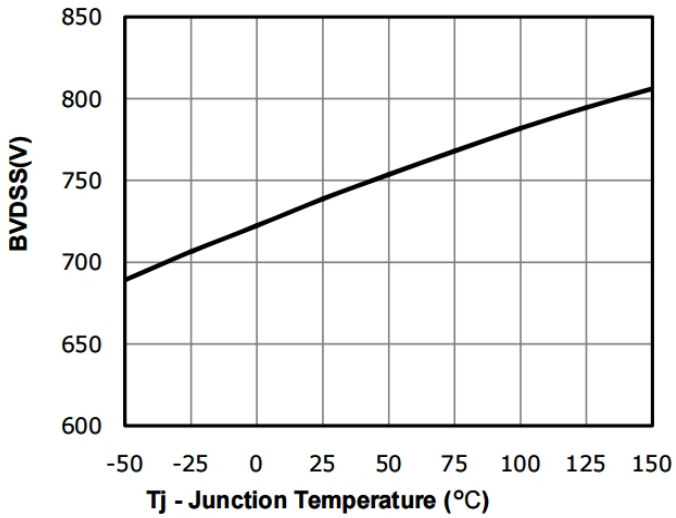


Fig 8: Rds(on) vs Gate Voltage

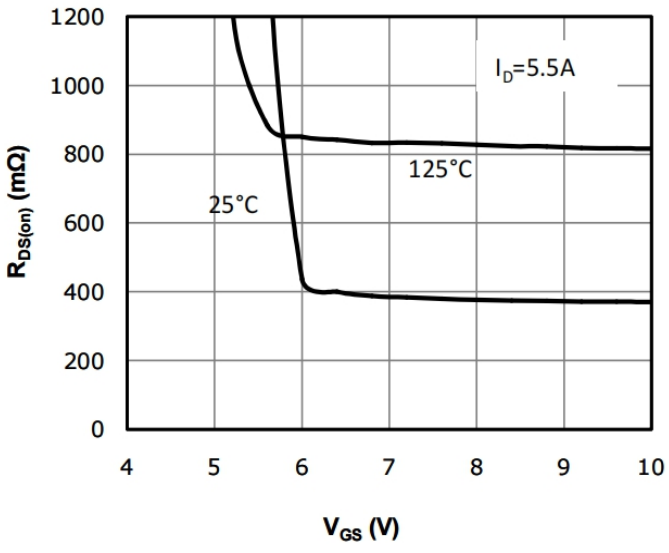


Fig 9: Body-diode Forward Characteristics

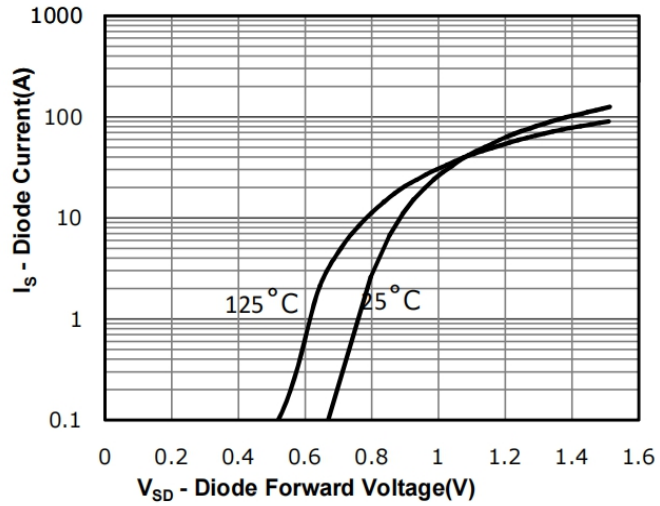


Fig 10: Gate Charge Characteristics

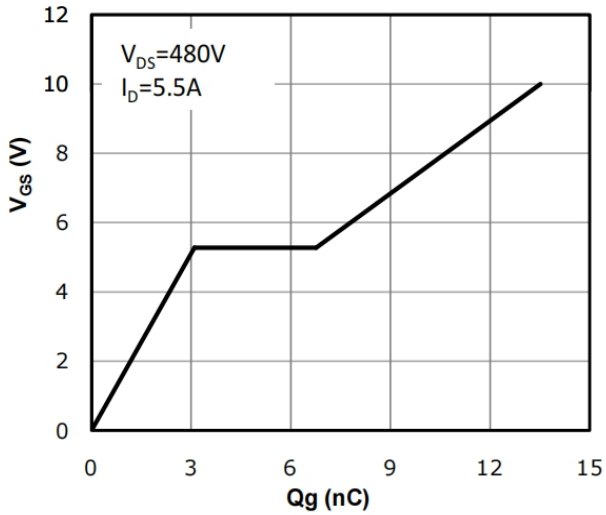


Fig 11: Capacitance Characteristics

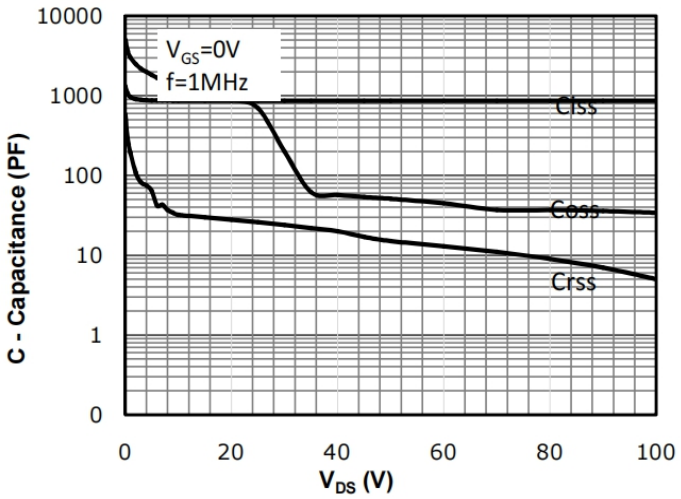
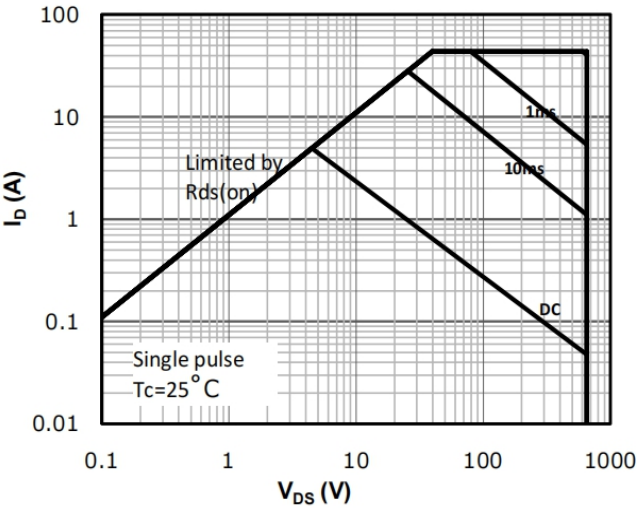


Fig 12: Safe Operating Area



Test Circuits and Waveforms

Figure A：Gate Charge Test Circuit and Waveform

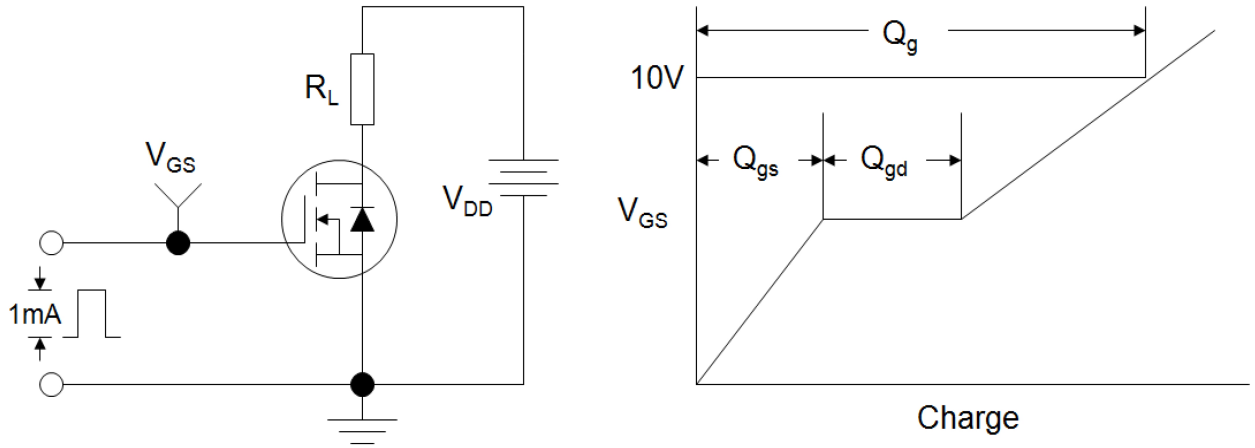


Figure B：Resistive Switching Test Circuit and Waveform

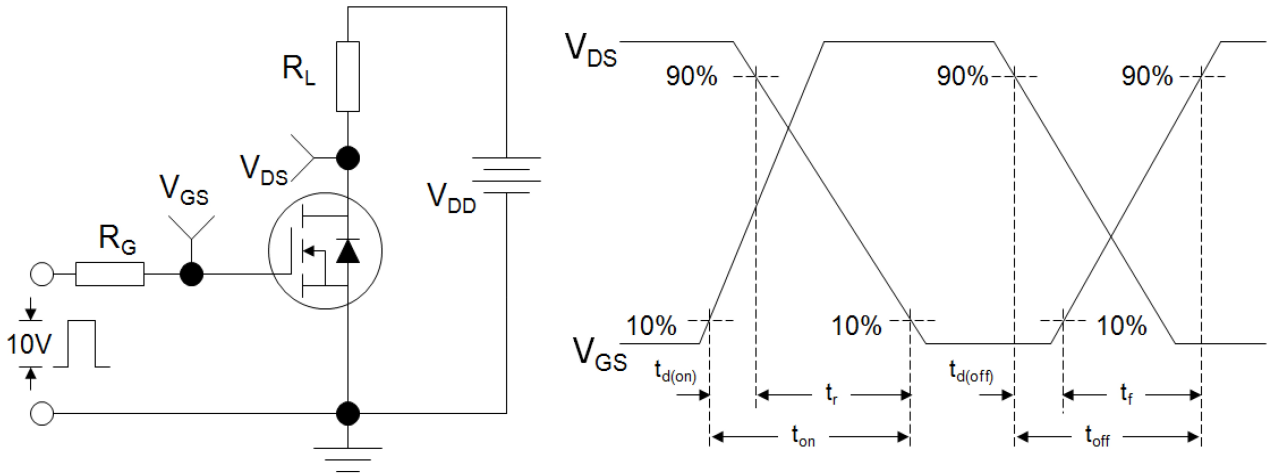
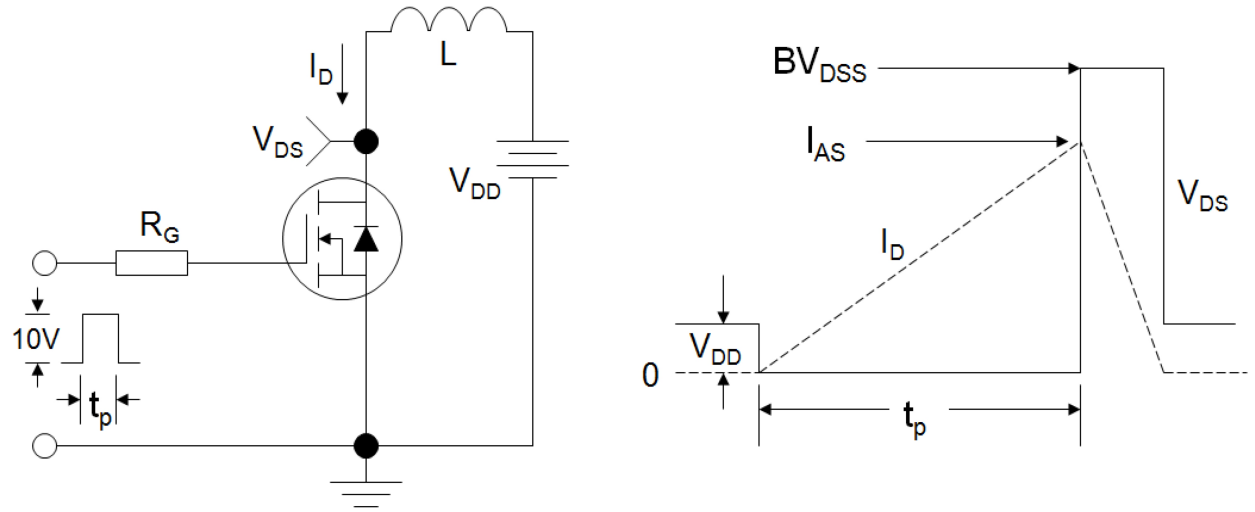
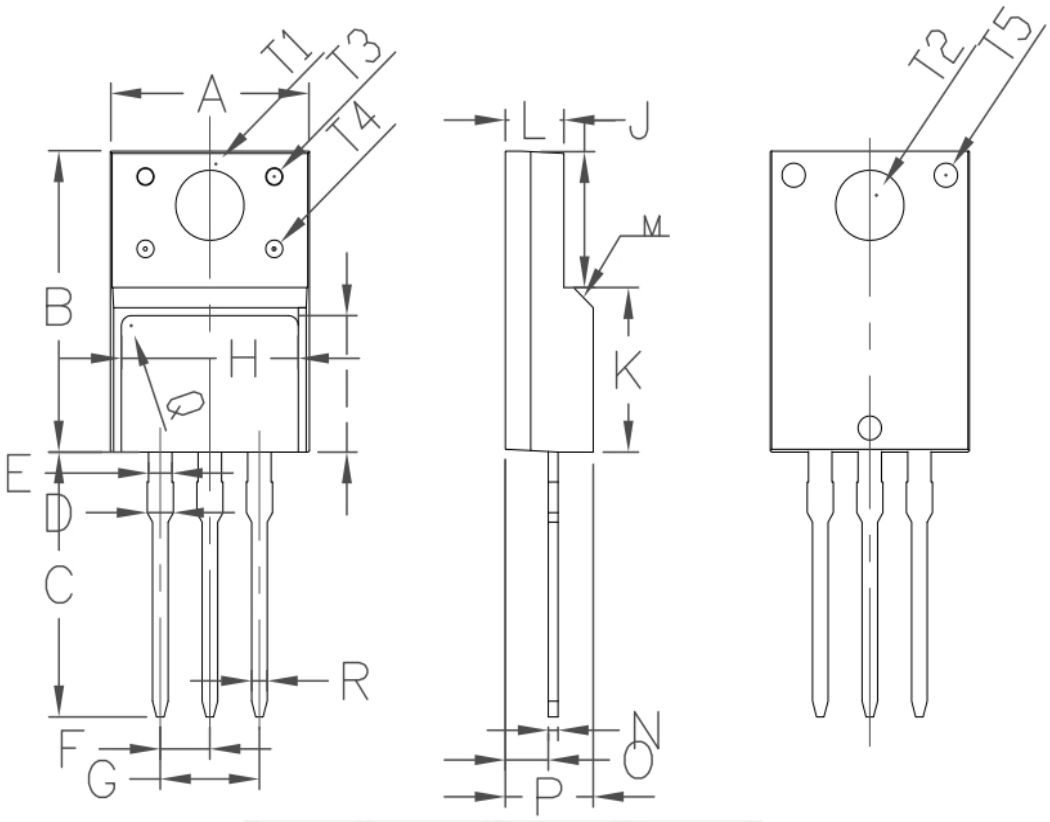


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



Package outline drawing

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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