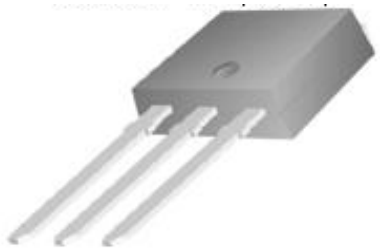
Main Product Characteristics

I_D	7A
V_{DSS}	650V
$P_D(T_C=25^oC)$	95W
$R_{DS(ON)Typ}$	1.1Ω

■ Outline

TO-251



1 2 3

1.Gate 2.Drain 3.Source

■ Features

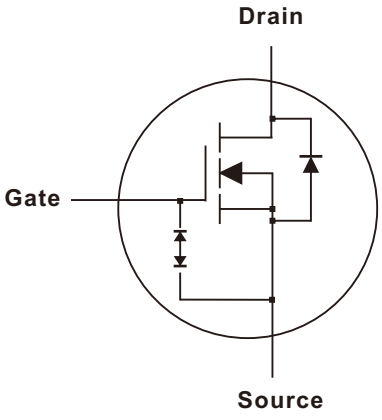
- Fast switching.
- ESD improved capability.
- Low gate charge. (Typical Data:24nC)
- Low reverse transfer capacitances.(Typical:4.5pF)
- 100% single pulse avalanche energy test.

■ Application

- Power switch circuit of adaptor and charger.

■ Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : JEDEC TO-251 molded plastic body over passivated chip
- Lead : Axial leads, solderable per MIL-STD-202, Method 208 guranteed.



Inner Equivalent principium Chart

■ Absolute(T_C = 25°C unless otherwise specified)

PARAMETER	CONDITIONS	Symbol	MHU07N65	UNIT
Drain-to-Source Voltage		V_{DSS}	650	V
Continuous Drain Current		I_D	7	A
Continuous Drain Current	T_C = 100°C		4.5	
Pulsed Drain Current(Note:1)		I_{DM}	28	
Gate-to-Source Voltage		V_{GS}	±30	V
Single Pulse Avalanche Energy(Note:2)		E_{AS}	450	mJ
Avalanche Current(Note:1)		I_{AR}	3.3	A
Avalanche Energy, Repetitive(Note:1)		E_{AR}	54	mJ
Power Dissipation	Power Dissipation	P_D	95	W
	Derating factor above 25°C		0.76	W/°C
Peak Diode Recovery dv/dt(Note:3)		dV/dt	5.0	V/ns
Gate source ESD	HBM-C = 100pF, R = 1.5kΩ	$V_{ESD(G-S)}$	3000	V
Operating Junction and Storage Temperature Range		T_J, T_{STG}	150,-55 ~ +150	°C
Maximum temperature for soldering		T_L	300	°C

NOTE : 1.Repetitive rating; pulse width limited by maximum junction temperature.
2.L=10.0mH, I_D = 6.3A, Start T_J = 25°C.
3.I_{SD} =4A,di/dt ≤100A/μs, V_{DD}≤BV_{DS}, Start T_J = 25°C.

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■ Electrical characteristics(T_C = 25°C unless otherwise specified)

■ OFF Characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Drain to Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	V_{DSS}	650			V
Bvdss Temperature Coefficient	I_D = 250μA, Reference 25°C	$\Delta BV_{DSS}/\Delta T_J$		0.67		V/°C
Drain to Source Leakage Current	V_{DS} = 650V, V_{GS} = 0V, T_a = 25°C	I_{DSS}			1	μA
	V_{DS} = 520V, V_{GS} = 0V, T_a = 125°C				100	
Gate to Source Forward Leakage	V_{GS} = +20V	$I_{GSS(F)}$			10	
Gate to Source Reverse Leakage	V_{GS} = -20V	$I_{GSS(R)}$			-10	

■ ON Characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(th)}$	2.0		4.0	V
Drain-to-Source On-Resistance	V_{GS} = 10V, I_D = 3.5A	$R_{DS(on)}$		1.1	1.4	Ω

Pulse Width tp≤300μs,δ≤2%

■ Dynamic Characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Forward Trans conductance	V_{DS} = 15V, I_D = 3.5A	g_{fs}		6.5		S
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	C_{iss}		1080		pF
Output Capacitance		C_{oss}		93		
Reverse Transfer Capacitance		C_{rss}		4.5		

■ Resistive Switching Characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Turn-on Delay Time	I_D = 7A, V_{DD} = 520V, V_{GS} = 10V, R_G = 9.1Ω	$td_{(ON)}$		11		ns
Rise Time		tr		10		
Turn-off Delay Time		$td_{(OFF)}$		36		
Fail Time		tf		18		
Total Gate Charge	I_D = 7A, V_{DD} = 520V, V_{GS} = 10V	Q_g		24		nC
Gate toSource Charge		Q_{gs}		5		
Gate to Drain (”Miller”) Charge		Q_{gd}		8		

■ Source-Drain Diode Characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Continuous Source Current	Boby Diode	I_S			7	A
Maximum Pulse Current	Boby Diode	I_{SM}			28	
Diode Forward Voltage	I_S = 7.0A, V_{GS} = 0V	V_{SD}			1.5	V
Reverse recovery time	I_S = 7A, T_J = 25°C, dI_F/dt = 100A/μs, V_{GS} = 0V	t_{rr}		280		ns
Reverse recovery charge		Q_{rr}		1200		nC

Pulse Width tp≤300μs,δ≤2%

■ Thermal characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Thermal Resistance	Junction to Case	$R_{\theta JC}$		1.32		°C/W
	Junction to Ambient	$R_{\theta JA}$		62		

■ Gate-source Zener Diode

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Gate-Source Breakdown Voltage	I_{GS} = ±1mA(open Drain)	V_{GSO}	30			V

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■ Rating and characteristic curves

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

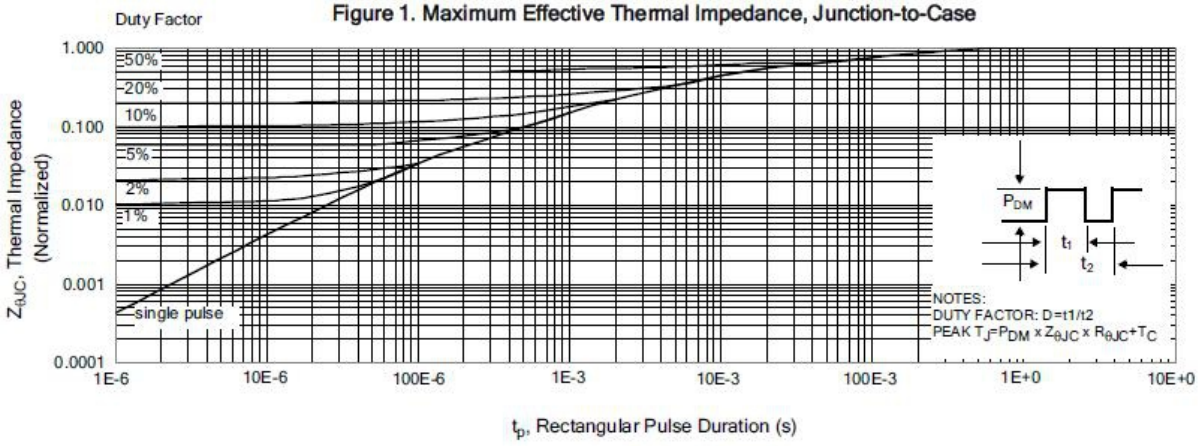


Figure 2. Maximum Power Dissipation vs Case Temperature

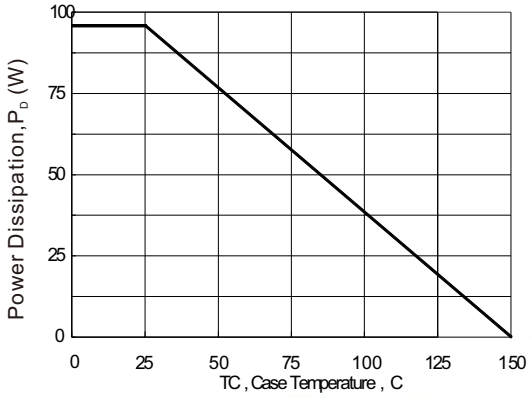


Figure 3. Maximum Continuous Drain Current vs Case Temperature

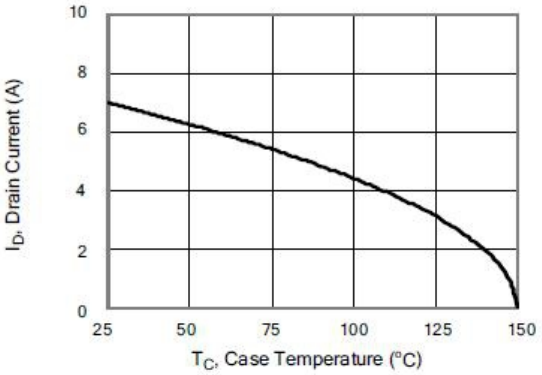


Figure 4. Typical Output Characteristics

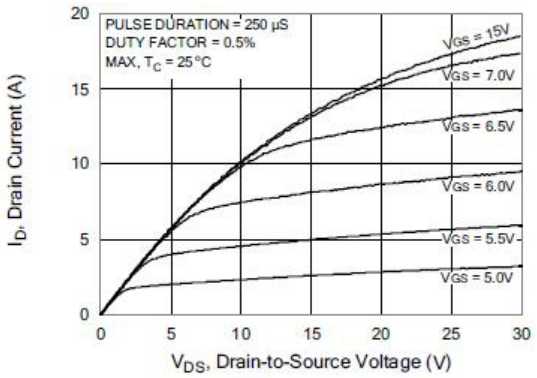
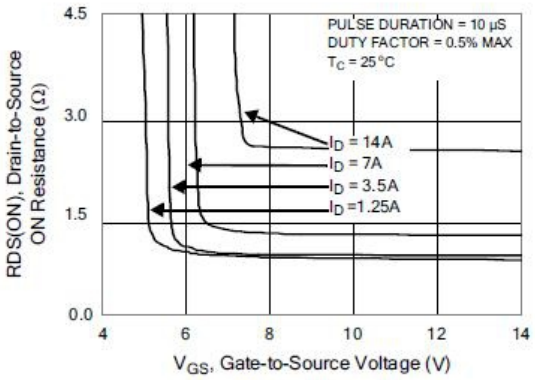


Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current



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■ Rating and characteristic curves

Figure 6. Maximum Peak Current Capability

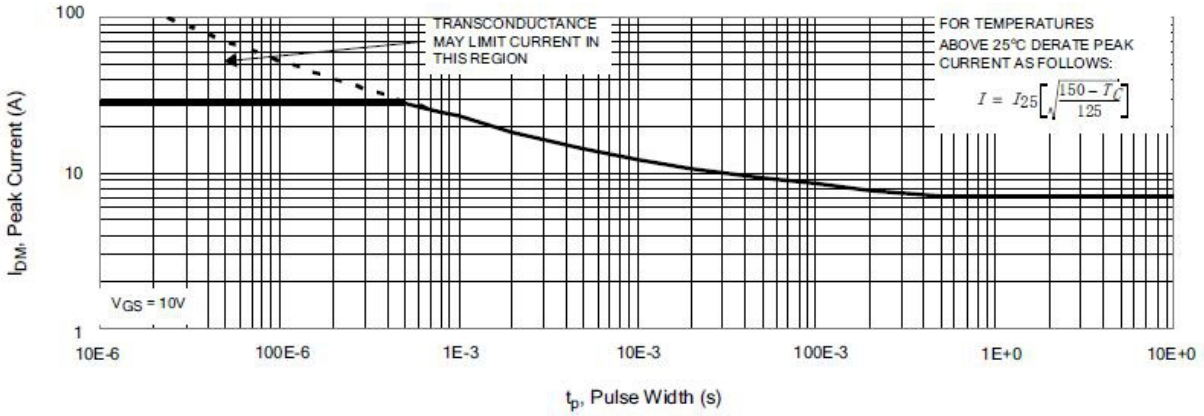


Figure 7. Typical Transfer Characteristics

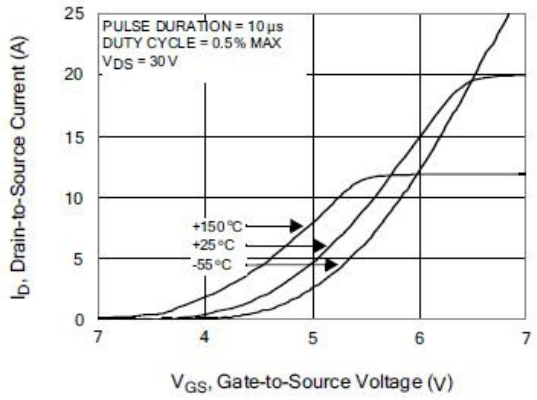


Figure 8. Unclamped Inductive Switching Capability

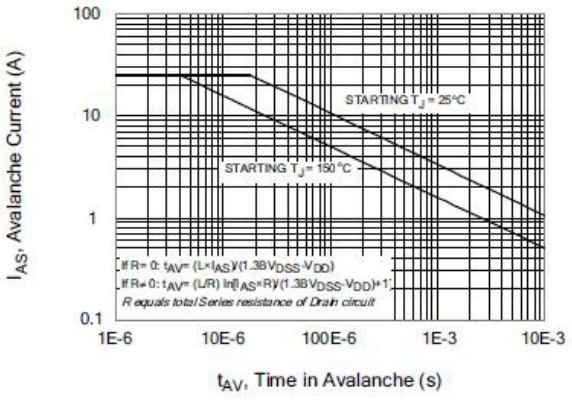


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

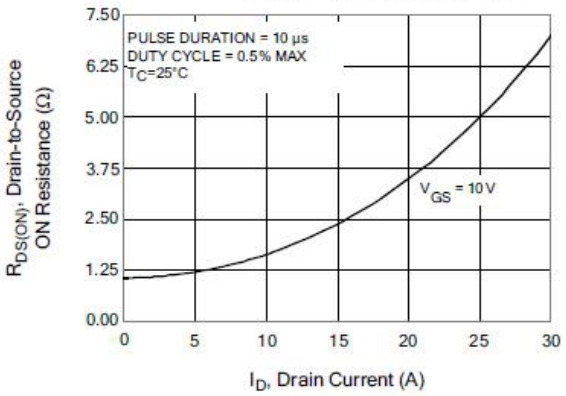
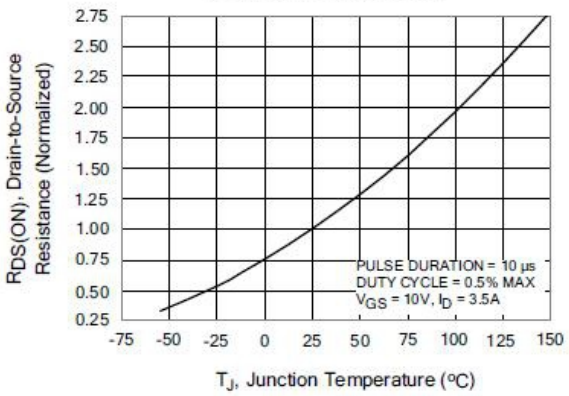


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature



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■ Rating and characteristic curves

Figure 11. Typical Breakdown Voltage vs Junction Temperature

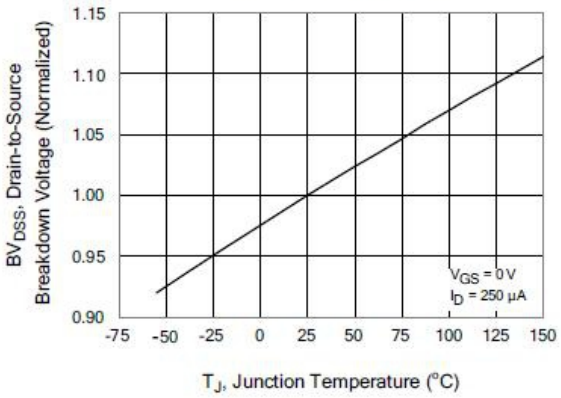


Figure 12. Typical Threshold Voltage vs Junction Temperature

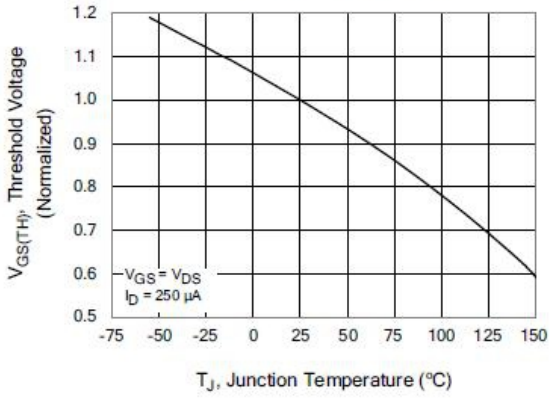


Figure 13. Maximum Forward Bias Safe Operating Area

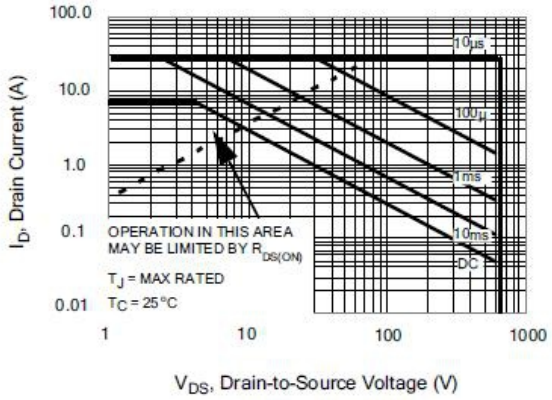


Figure 14. Typical Capacitance vs Drain-to-Source Voltage

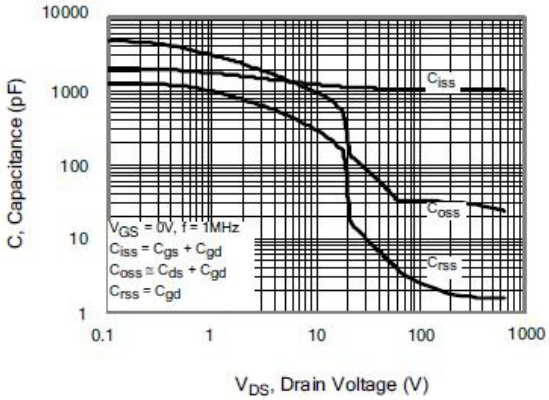


Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

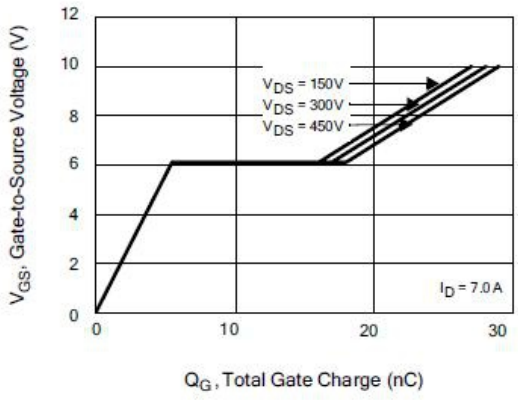
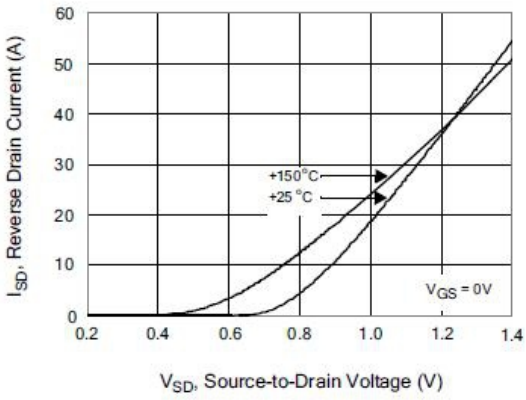


Figure 16. Typical Body Diode Transfer Characteristics



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■ Test circuit and waveform

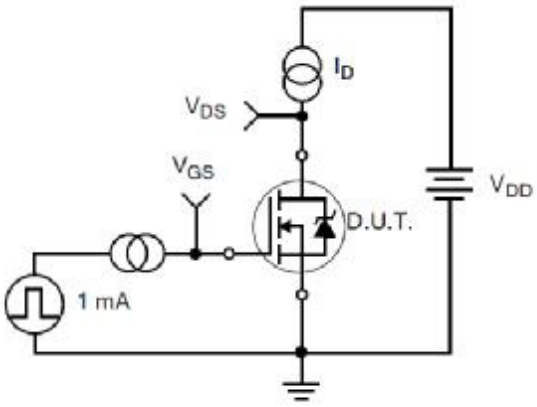

Figure 17. Gate Charge Test Circuit

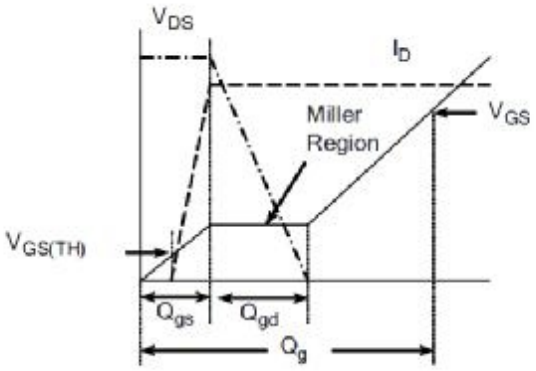

Figure 18. Gate Charge Waveform

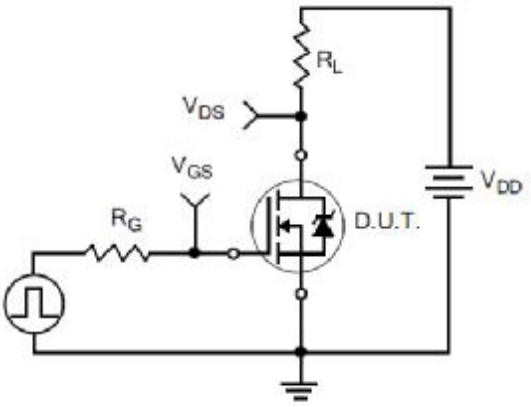

Figure 19. Resistive Switching Test Circuit

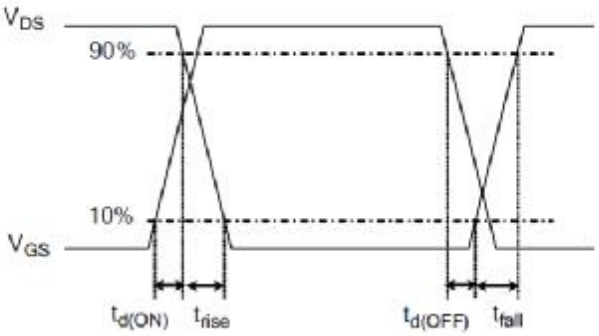

Figure 20. Resistive Switching Waveforms

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■ Test circuit and waveform

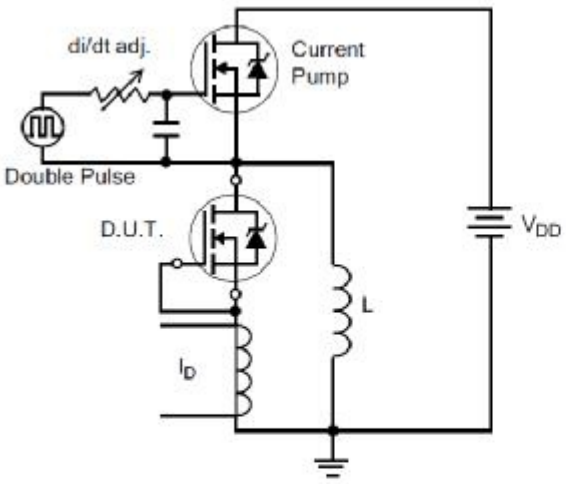


Figure 21. Diode Reverse Recovery Test Circuit

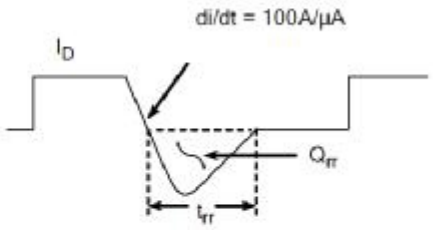


Figure 22. Diode Reverse Recovery Waveform

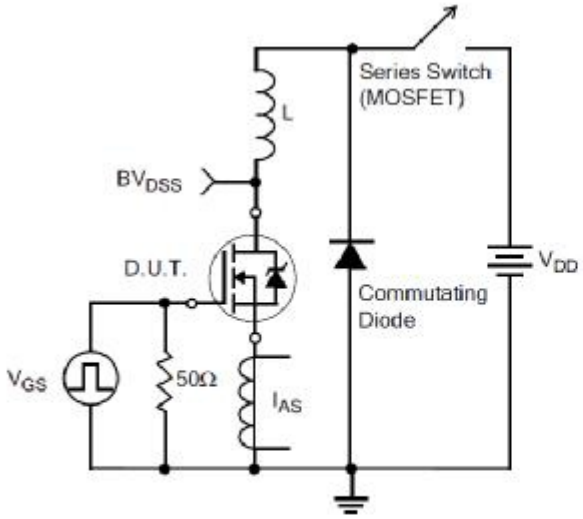
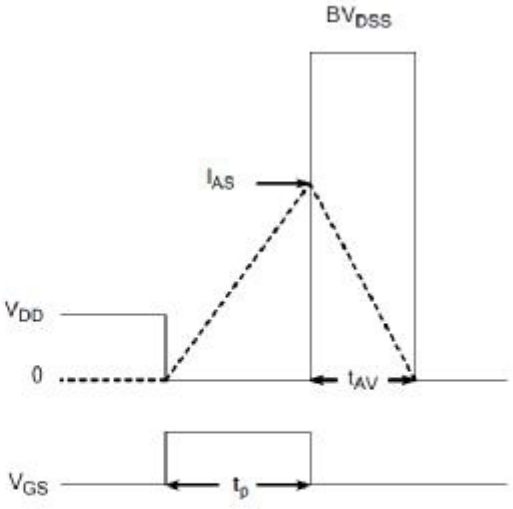


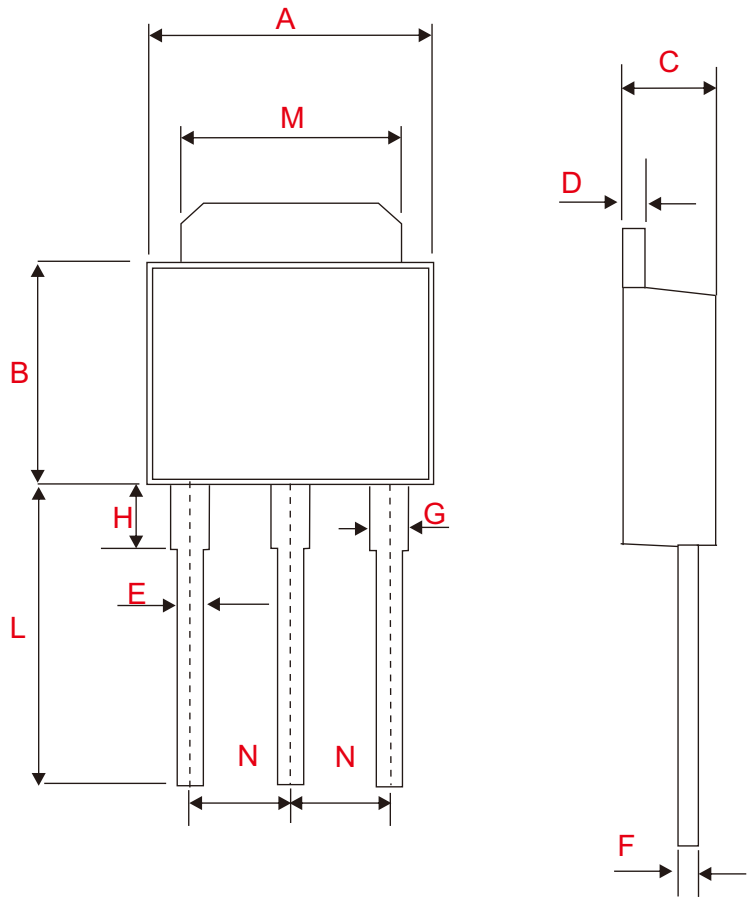
Figure 23. Unclamped Inductive Switching Test Circuit



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

Figure 24. Unclamped Inductive Switching Waveforms

■ Package Information



Item	Values (mm)	
	Min	Max
A	6.30	6.90
B	5.70	6.30
C	2.10	2.50
D	0.30	0.60
E	0.50	0.70
F	0.30	0.60
G	0.70	1.00
H	1.60	2.40
L	7.70	9.80
	6.00	6.30
	4.50	5.80
	2.10	3.70
M	5.10	5.50
N	2.09	2.49

TO-251 Package

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The name and content of poisonous and harmful material in products

Parts Name	Hazardous Substance					
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE
Limit	≤0.1%	≤0.1%	≤0.01%	≤0.1%	≤0.1%	≤0.1%
Lead Frame	○	○	○	○	○	○
Molding Compound	○	○	○	○	○	○
Chip	○	○	○	○	○	○
Wire Bonding	○	○	○	○	○	○
Solder	×	○	○	○	○	○
Note	○：means the hazardous material is under the criterion of SJ/T11363-2006. ×：means the hazardous material exceeds the criterion of SJ/T11363-2006. The plumbum element of solder exist in products presently, but within the allowed range of Eurogroup RoHS.					

Warnings

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. It is suggested to be used under 80 percent of the maximum ratings of the device.
2. When installing the heatsink, please pay attention to the torsional moment and the smoothness of the heatsink.
3. VDMOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. This publication is made by CITC and subject to regular change without notice.

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