MHF20N60CT

600V Silicon N-Channel Power MOSFET

■ Features

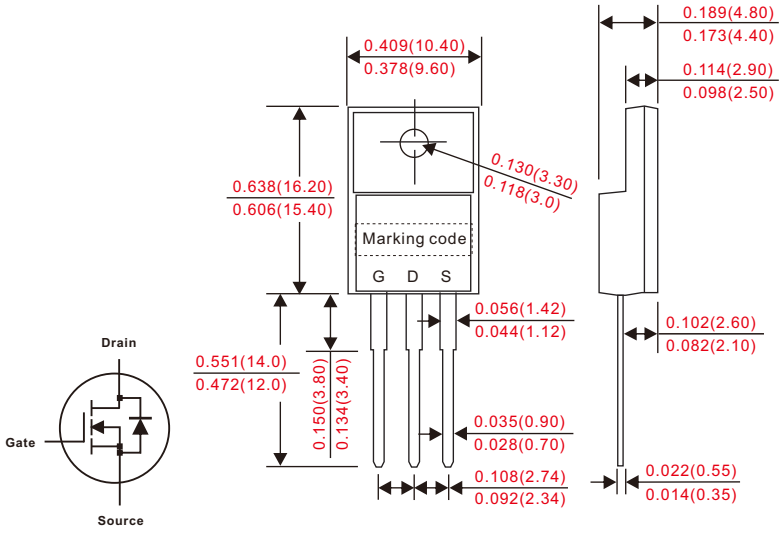
- Fast switching.
- ESD improved capability.
- Low gate charge.
- Low reverse transfer capacitances.
- 100% single pulse avalanche energy test.

■ Mechanical data

- Epoxy : UL94-V0 rated flame retardant.
- Case : JEDEC TO-220F molded plastic body.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Polarity: As marked.
- Mounting Position : Any.
- Weight : Approximated 2.25 gram.

■ Outline

TO-220F



Dimensions in inches and (millimeters)

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

PARAMETER	CONDITIONS	Symbol	MHF20N60CT	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Continuous Drain Current		I_D	20	A
Continuous Drain Current	T_C = 100°C		14	
Pulsed Drain Current(1)		I_{DM}	80	
Gate-Source Voltage		V_{GS}	±30	V
Single Pulse Avalanche Energy(2)		E_{AS}	1200	mJ
Avalanche Current(1)		I_{AR}	4.5	A
Repetitive Avalanche Energy(1)		E_{AR}	100	mJ
Power Dissipation		P_D	85	W
	Derating factor above 25°C		0.68	W/°C
Peak Diode Recovery dv/dt(3)		dV/dt	5.0	V/ns
Operating and Storage Temperature Range		T_J, T_{STG}	-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 = 15.5A, Start T_J = 25°C.
3.I_{SD} =20A,di/dt ≤100A/us, V_{DD}≤BV_{DS}, Start T_J = 25°C.

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

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	V_{DSS}	600			V
Bvdss Temperature Coefficient	I_D = 250uA, Reference 25°C	BV_{DSS} / T_J		0.65		V/°C
Drain-Source Leakage Current	V_{DS} = 600V, V_{GS} = 0V, T_a = 25°C	I_{DSS}			1	uA
	V_{DS} = 480V, V_{GS} = 0V, T_a = 125°C				100	
Gate-Source Leakage Current, Forward	V_{GS} = 30V	$I_{GSS(F)}$			100	nA
Gate-Source Leakage Current, Reverse	V_{GS} = -30V	$I_{GSS(R)}$			-100	

■ 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
Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 10A	$R_{DS(on)}$		0.36	0.45	Ω

■ Dynamic Characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Forward Transconductance	V_{DS} = 15V, I_D = 10A	g_{fs}		17		S
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	C_{iss}		2847		pF
Output Capacitance		C_{oss}		252		
Reverse Transfer Capacitance		C_{rss}		20		

■ Resistive Switching Characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Turn-on Delay Time	I_D = 20A, V_{DD} = 300V, R_G = 25Ω	$td_{(ON)}$		36		ns
Rise Time		tr		73		
Turn-off Delay Time		$td_{(OFF)}$		166		
Fail Time		tf		73		
Total Gate Charge	I_D = 20A, V_{DD} = 300V, V_{GS} = 10V	Q_g		61		nC
Gate-Source Charge		Q_{gs}		14		
Gate-Drain Charge		Q_{gd}		24		

■ Source-Drain Diode Characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Continuous Source-Drain Diode Current	Boby Diode	I_S			20	A
Pulse Diode Forward Current	Boby Diode	I_{SM}			80	
Body Diode Voltage	I_S = 20A, V_{GS} = 0V	V_{SD}			1.5	V
Reverse recovery time	I_S = 20A, T_J = 25°C, dI_F/dt = 100A/μs, V_{GS} = 0V	t_{rr}		425		ns
Reverse recovery charge		Q_{rr}		3.7		uC

■ Thermal characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Thermal Resistance	Junction to Case	$R_{\theta JC}$		1.47		°C/W
	Junction to Ambient	$R_{\theta JA}$		100		

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■ Rating and characteristic curves

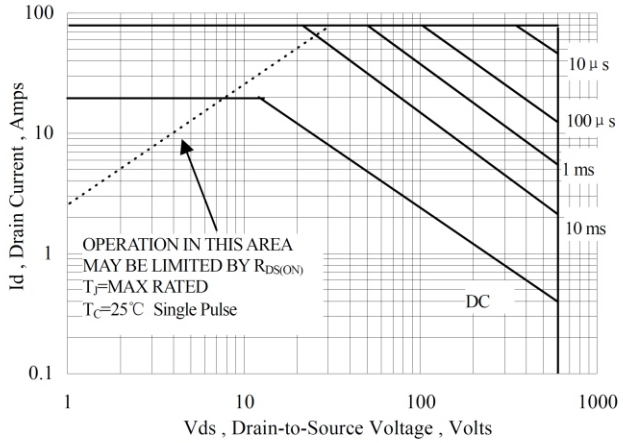

Figure 1 Maximun Forward Bias Safe Operating Area

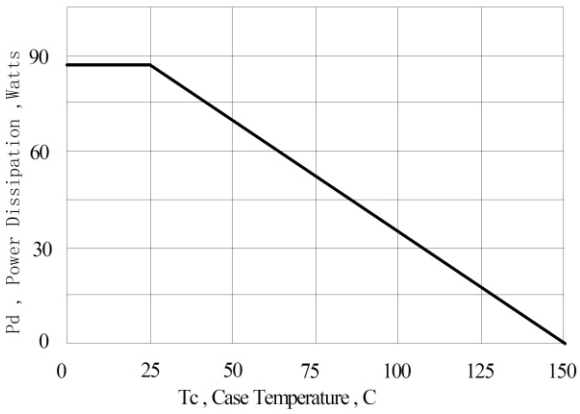

Figure 2 Maximun Power Dissipation vs Case Temperature

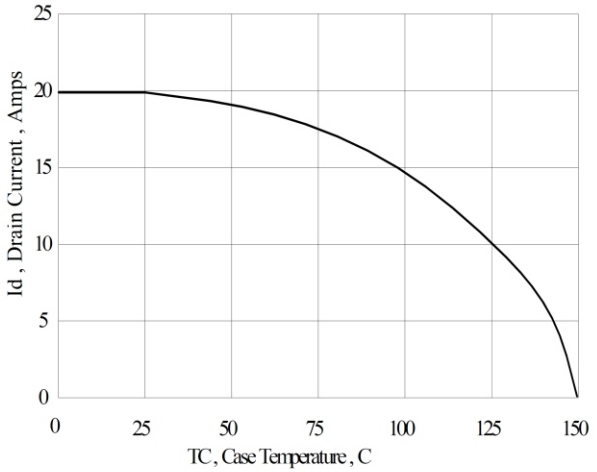

Figure 3 Maximum Continuous Drain Current vs Case Temperature

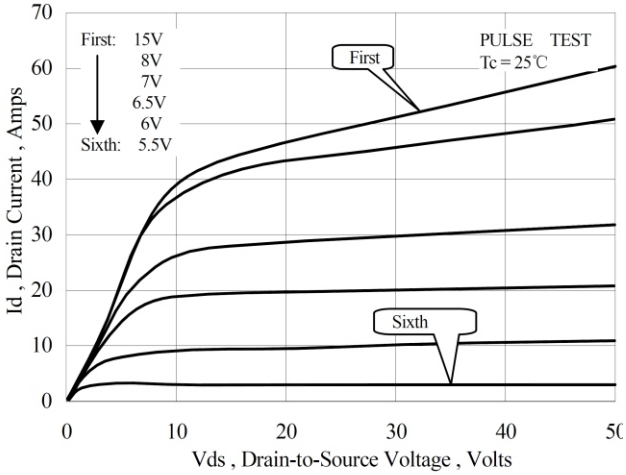

Figure 4 Typical Output Characteristics

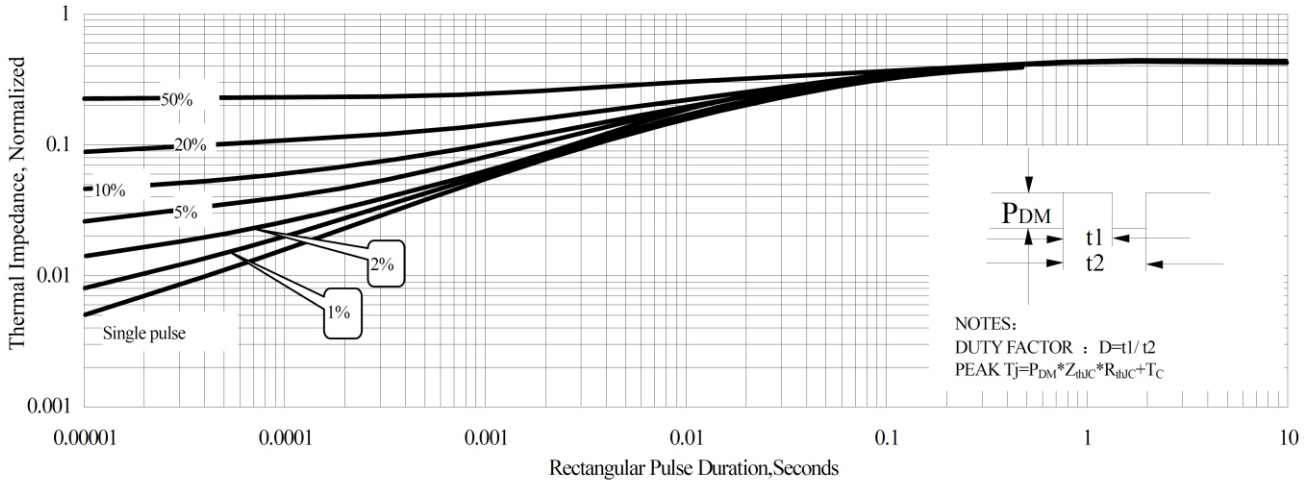

Figure 5 Maximum Effective Thermal Impendance , Junction to Case

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■ Rating and characteristic curves

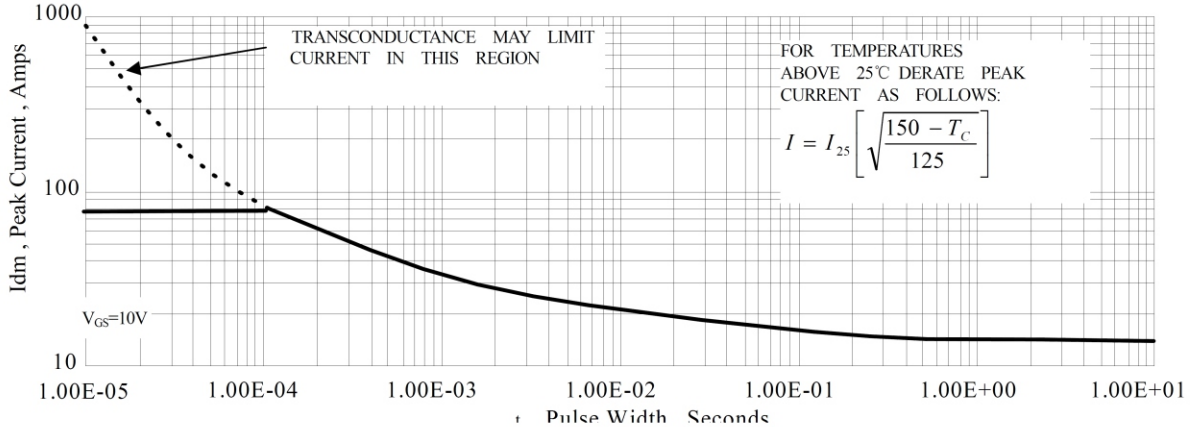

Figure 6 Maximun Peak Current Capability

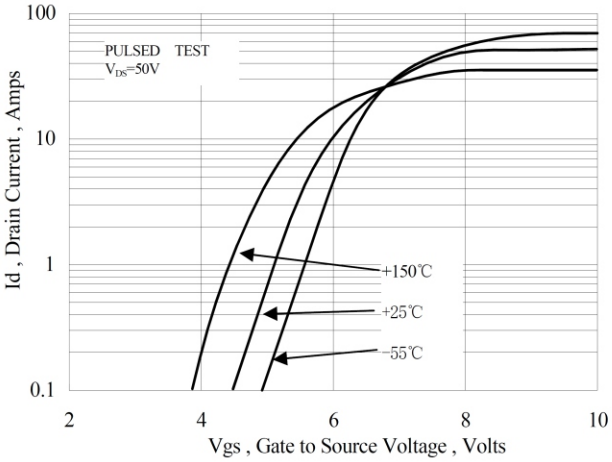

Figure 7 Typical Transfer Characteristics

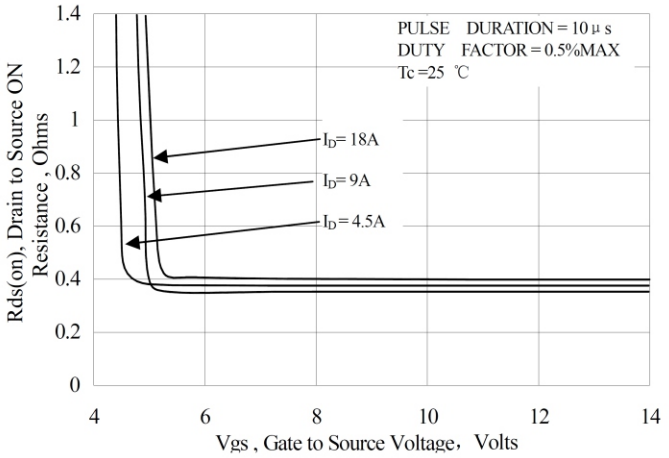

Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

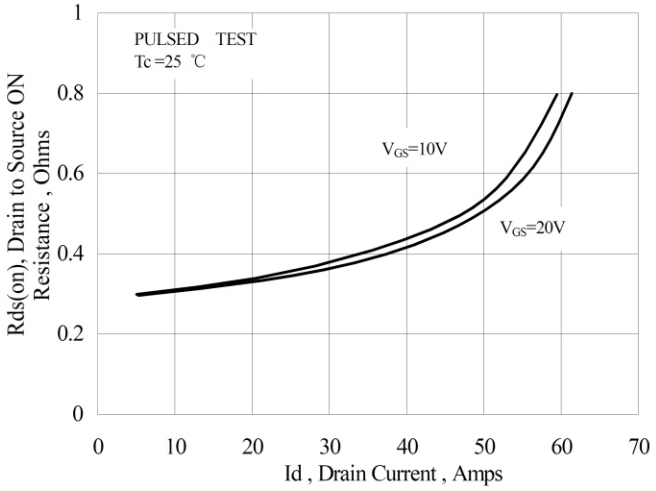

Figure 9 Typical Drain to Source ON Resistance vs Drain Current

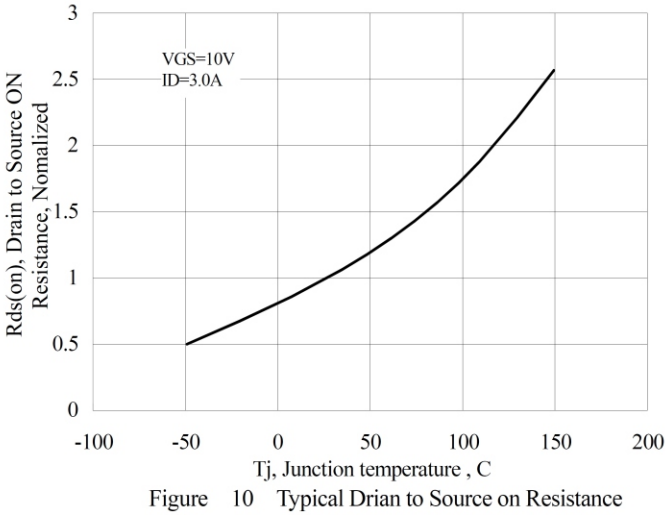

Figure 10 Typical Drian to Source on Resistance vs Junction Temperature

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■ Rating and characteristic curves

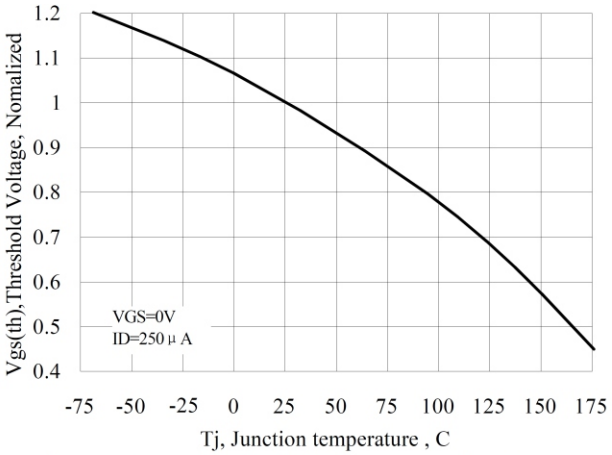

Figure 11 Typical Theshold Voltage vs Junction Temperature

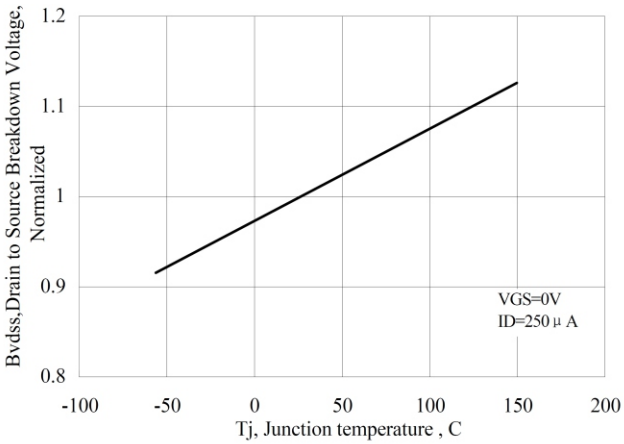

Figure 12 Typical Breakdown Voltage vs Junction Temperature

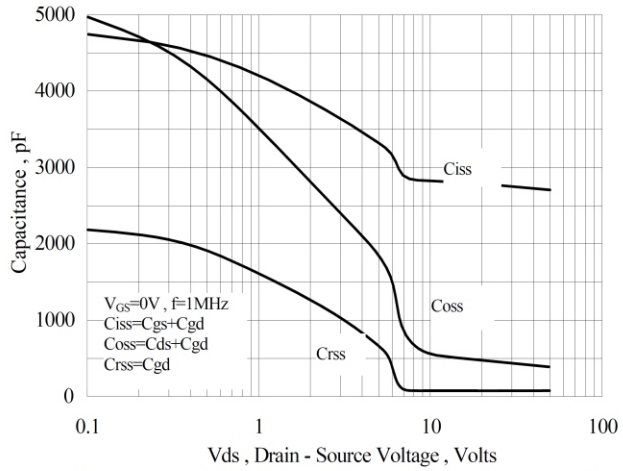

Figure 13 Typical Capacitance vs Drain to Source Voltage

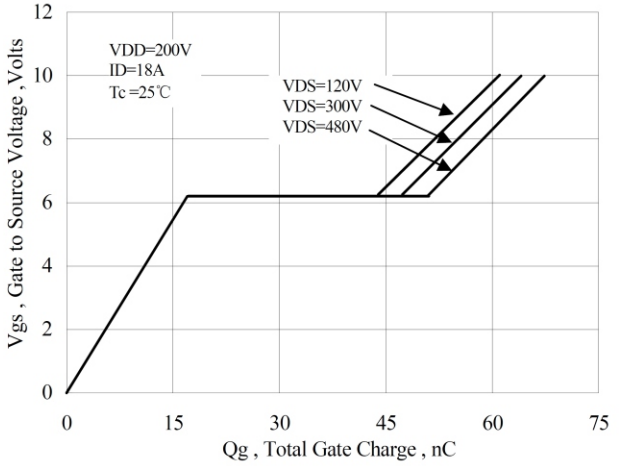

Figure 14 Typical Gate Charge vs Gate to Source Voltage

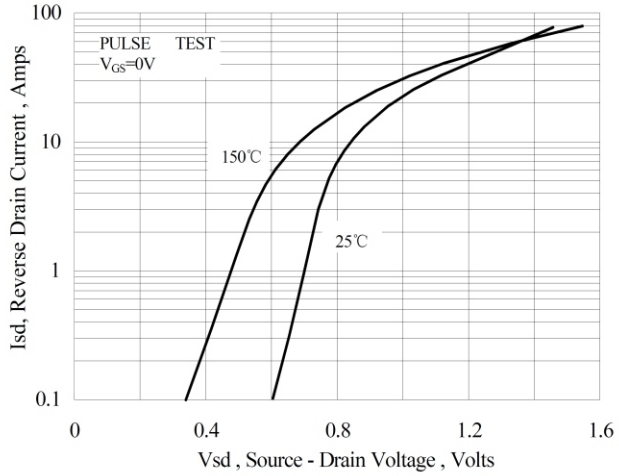

Figure 15 Typical Body Diode Transfer Characteristics

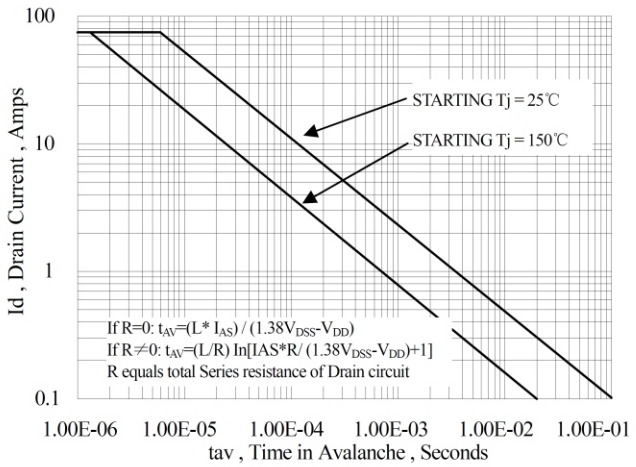

Figure 16 Unclamped Inductive Switching Capability

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■ Test circuit and waveform

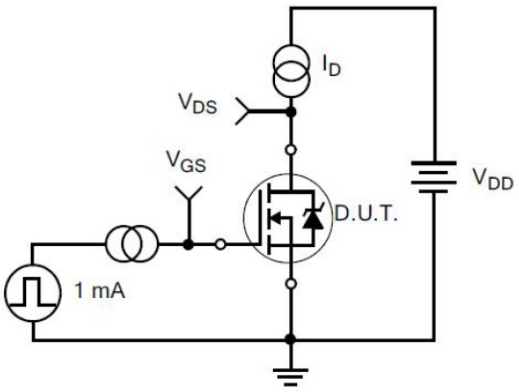

Figure 17. Gate Charge Test Circuit

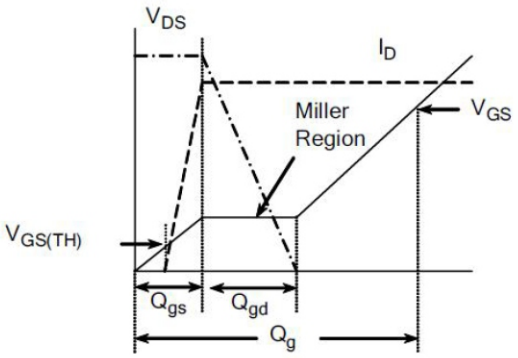

Figure 18. Gate Charge Waveform

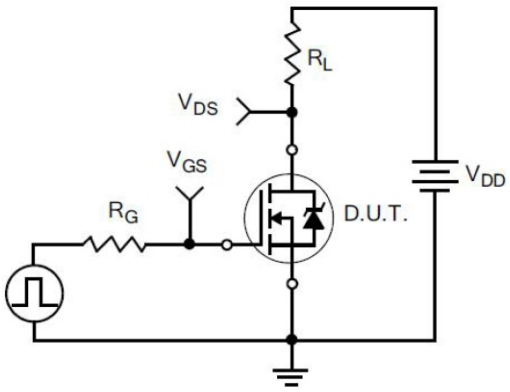

Figure 19. Resistive Switching Test Circuit

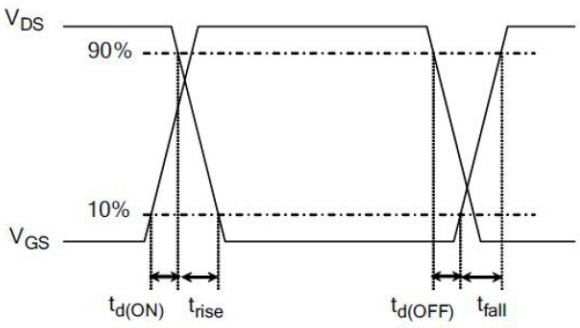

Figure 20. Resistive Switching Waveforms

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■ Test circuit and waveform

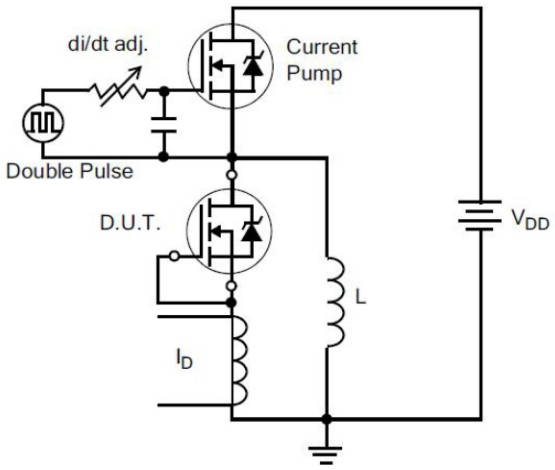

Figure 21. Diode Reverse Recovery Test Circuit

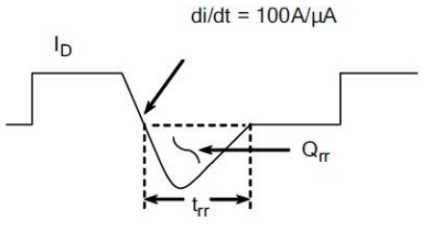

Figure 22. Diode Reverse Recovery Waveform

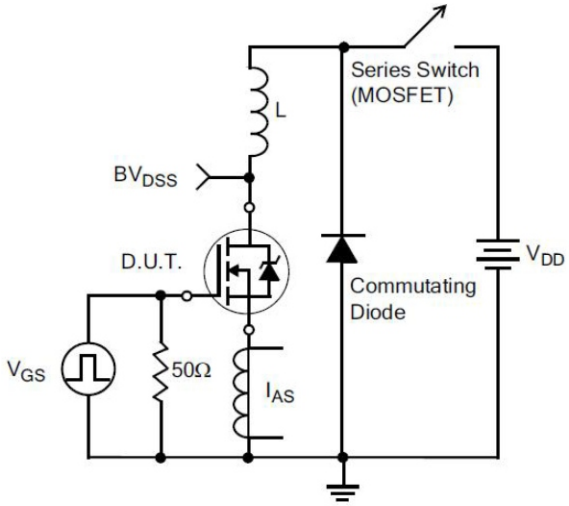

Figure 23. Unclamped Inductive Switching Test Circuit

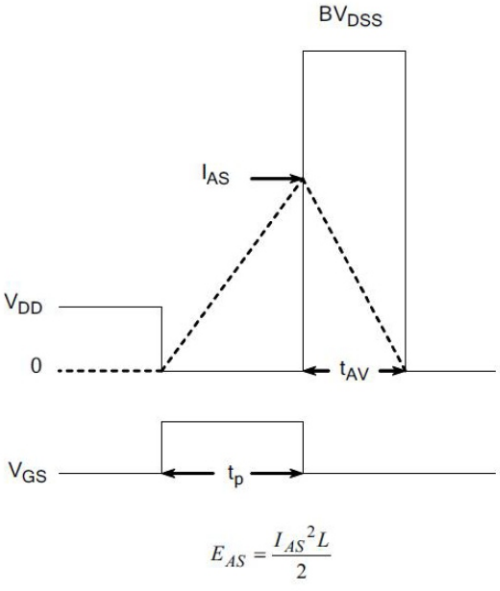

Figure 24. Unclamped Inductive Switching Waveforms

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