



700V N-ch Planar MOSFET

 Lead Free Package and Finish

General Features



- RoHS Compliant
- $R_{DS(ON),typ.}=0.80\ \Omega @ V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

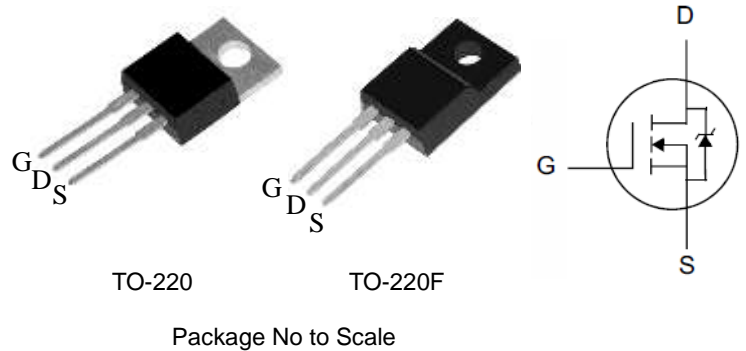
BV_{DSS}	$R_{DS(ON),typ.}$	I_D
700V	0.80 Ω	10A

Applications

- Adaptor
- Charger
- SMPS Standby Power

Ordering Information

Part Number	Package	Brand
PSP10N70	TO-220	
PSA10N70	TO-220F	



Absolute Maximum Ratings

$T_C=25^{\circ}C$ unless otherwise specified

Symbol	Parameter	PSP10N70	PSA10N70	Unit
V _{DSS}	Drain-to-Source Voltage	700		V
V _{GSS}	Gate-to-Source Voltage	±30		
I _D	Continuous Drain Current	10		A
I _{DM}	Pulsed Drain Current at V _{GS} =10V	40		
E _{AS}	Single Pulse Avalanche Energy	500		mJ
dv/dt	Peak Diode Recovery dv/dt	5.5		V/ns
P _D	Power Dissipation	218	51	W
	Derating Factor above 25°C	1.75	0.4	W/°C
T _L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300		°C
T _J & T _{STG}	Operating and Storage Temperature Range	-55 to 150		

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	PSP10N70	PSA10N70	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.57	2.45	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	100	



Electrical Characteristics

OFF Characteristics

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	700	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=700V, V_{GS}=0V$
		--	--	125		$V_{DS}=560V, V_{GS}=0V, T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	$V_{GS}=+30V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-30V, V_{DS}=0V$

ON Characteristics

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	0.80	0.90	Ω	$V_{GS}=10V, I_D=5A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
gfs	Forward Transconductance	--	10	--	S	$V_{DS}=15V, I_D=5A$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	1540	--	pF	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$
C_{rss}	Reverse Transfer Capacitance	--	16	--		
C_{oss}	Output Capacitance	--	150	--		
Q_g	Total Gate Charge	--	40	--	nC	$V_{DD}=350V, I_D=10A, V_{GS}=0 \text{ to } 10V$
Q_{gs}	Gate-to-Source Charge	--	7	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	17	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	14	--	ns	$V_{DD}=350V, I_D=10A, V_{GS}=10V, R_g=9.1 \Omega$
t_{rise}	Rise Time	--	23	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	48	--		
t_{fall}	Fall Time	--	32	--		



Source-Drain Body Diode Characteristics

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

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current ^[2]	--	--	10	A	Integral pn-diode in MOSFET
I_{SM}	Pulsed Source Current ^[2]	--	--	40		
V_{SD}	Diode Forward Voltage	--	--	1.5	V	$I_S=10\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	289	--	ns	$V_{GS}=0\text{V}$ $I_F=10\text{A}$, $di/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	--	1.9	--	μC	

Note:

[1] $T_J=+25^{\circ}\text{C}$ to $+150^{\circ}\text{C}$

[2] Pulse width $\leq 380\mu\text{s}$; duty cycle $\leq 2\%$.



Typical Characteristics

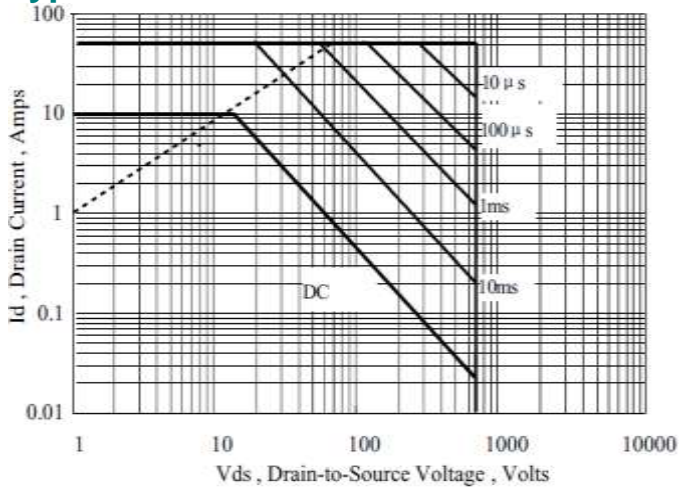


Figure 1 Maximum Forward Bias Safe Operating Area

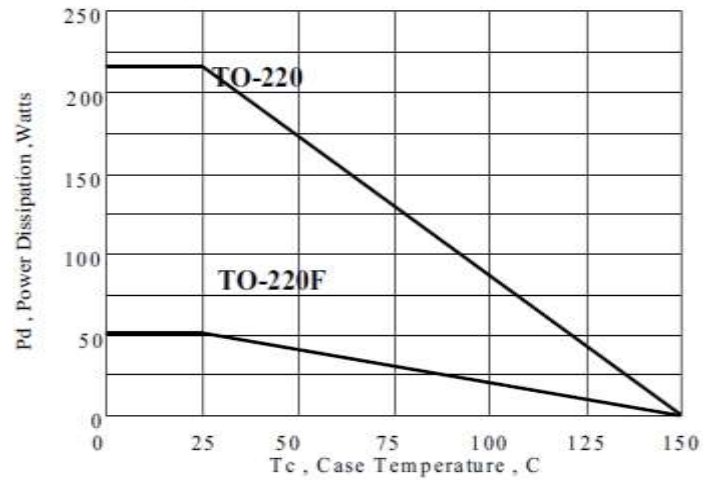


Figure 2 Maximum Power Dissipation vs Case Temperature

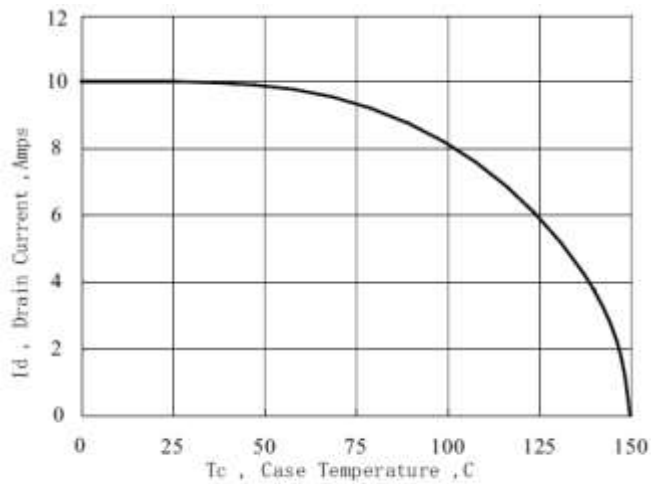


Figure 3 Maximum Continuous Drain Current vs Case Temperature

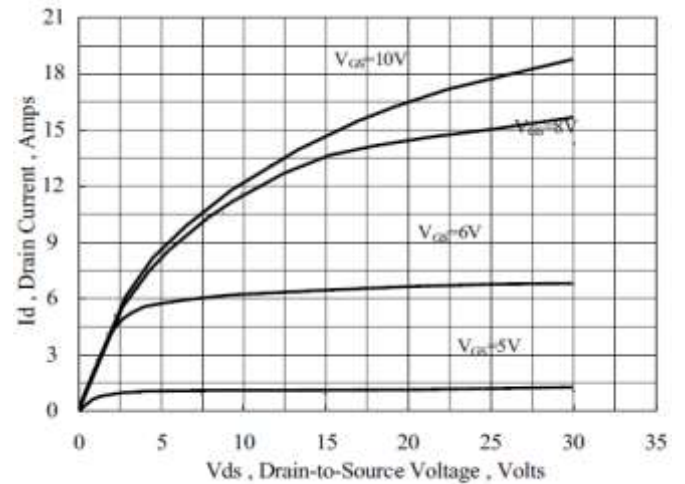


Figure 4 Typical Output Characteristics

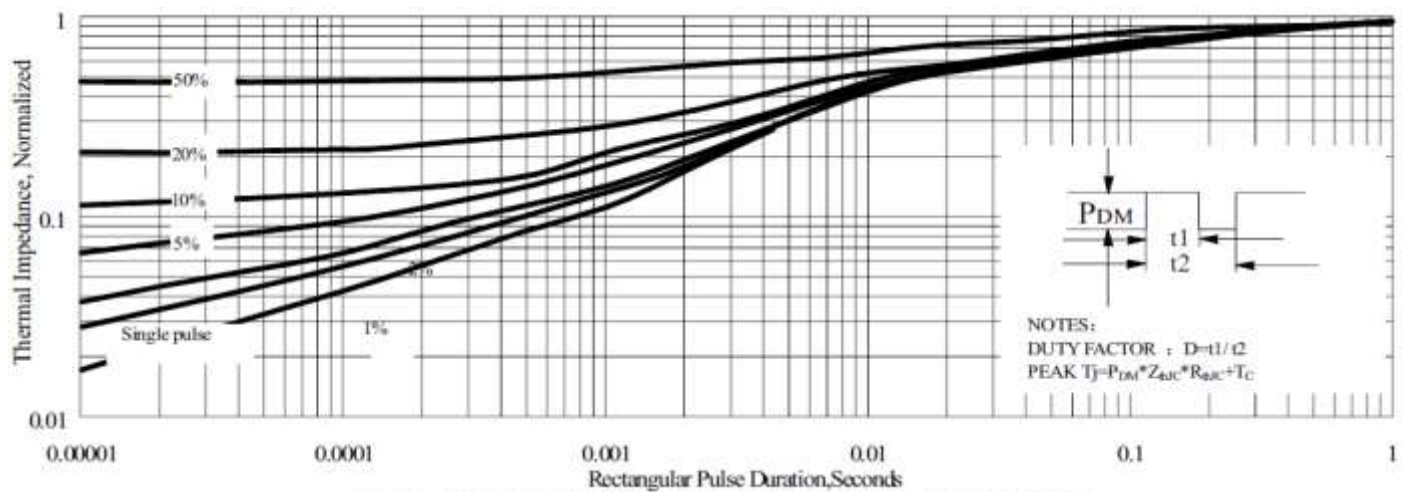


Figure 5 Maximum Effective Thermal Impedance, Junction to Case



Typical Characteristics(Cont.)

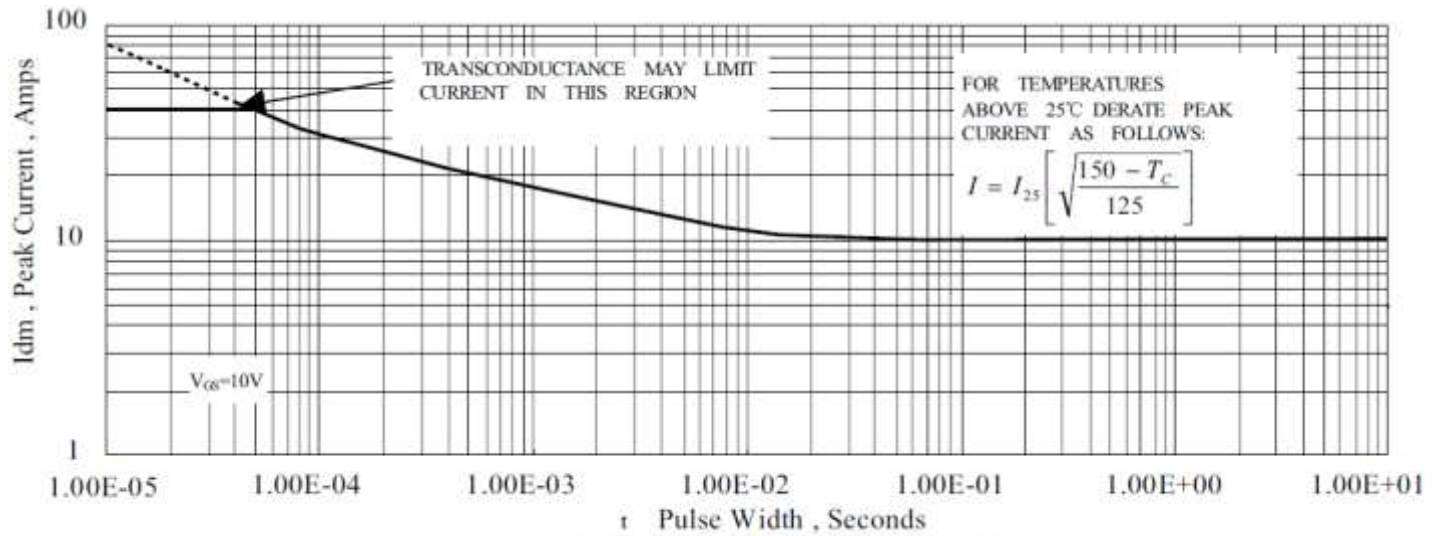


Figure 6 Maximum Peak Current Capability

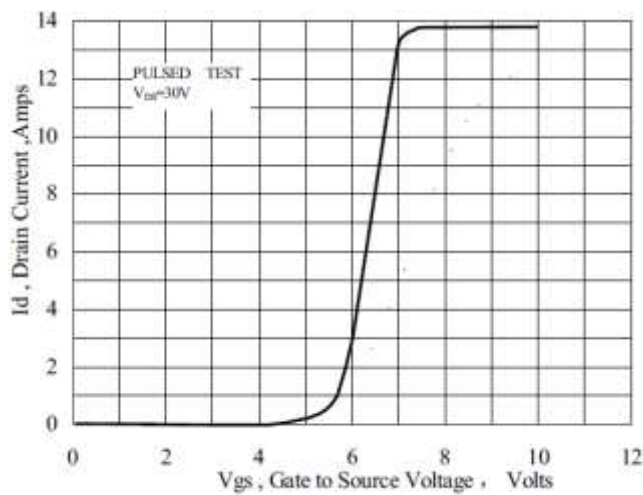


Figure 7 Typical Transfer Characteristics

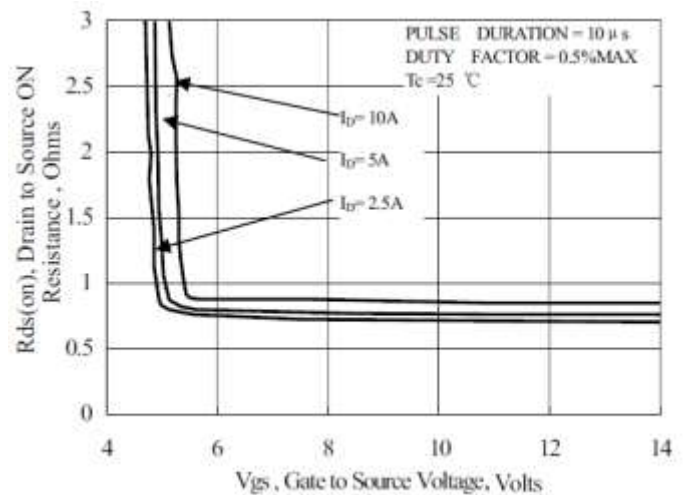


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage

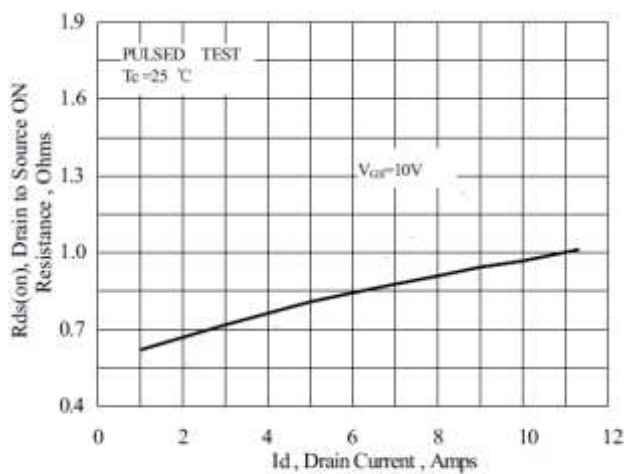


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

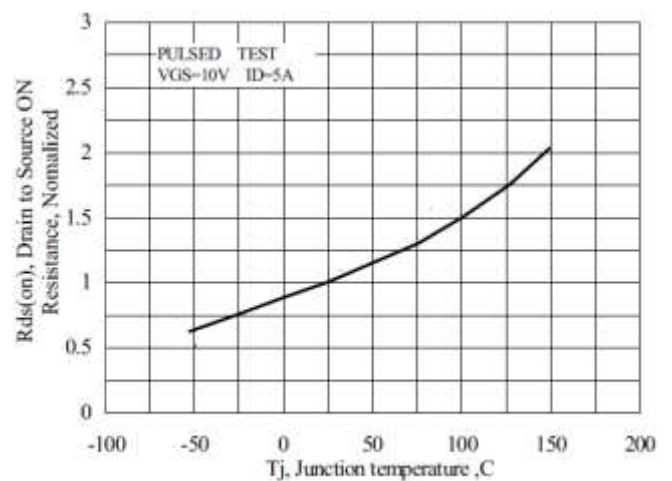


Figure 10 Typical Drain to Source on Resistance vs Junction Temperature



Typical Characteristics(Cont.)

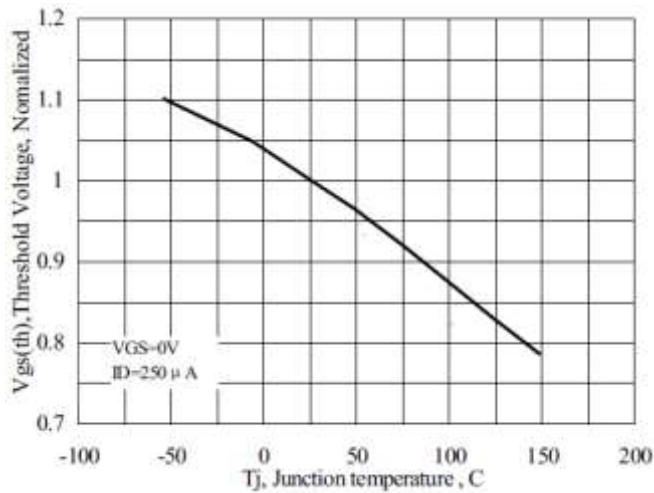


Figure 11 Typical Theshold Voltage vs Junction Temperature

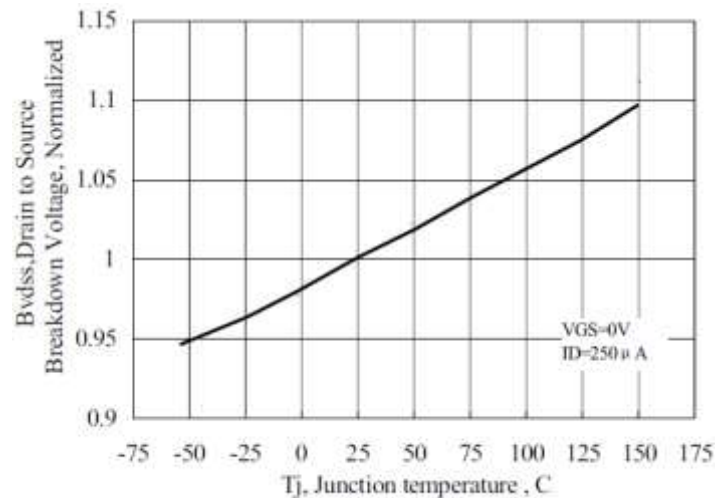


Figure 12 Typical Breakdown Voltage vs Junction Temperature

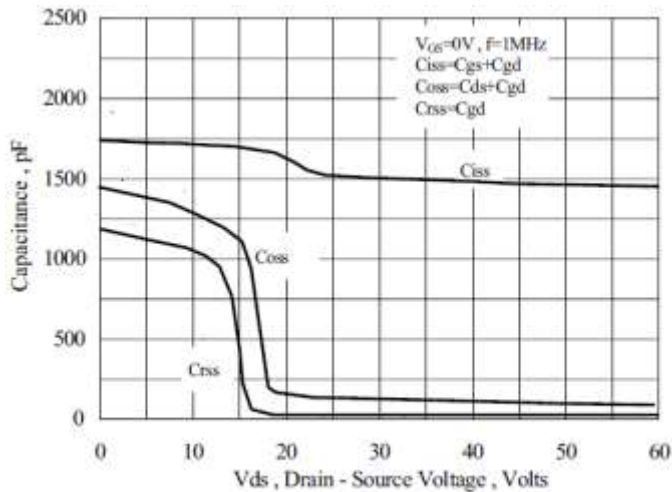


Figure 13 Typical Capacitance vs Drain to Source Voltage

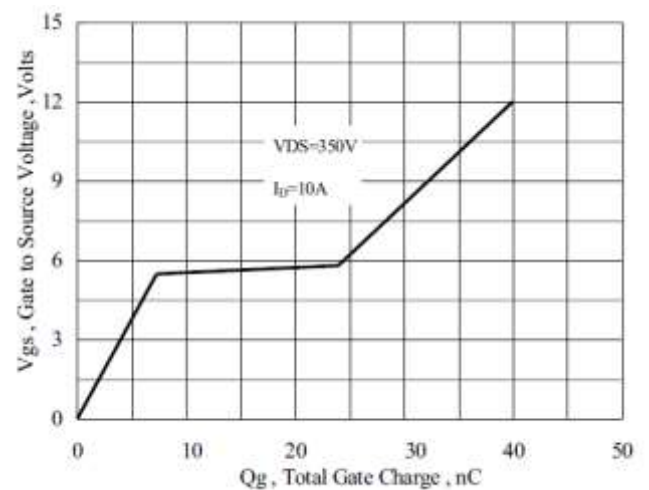


Figure 14 Typical Gate Charge vs Gate to Source Voltage

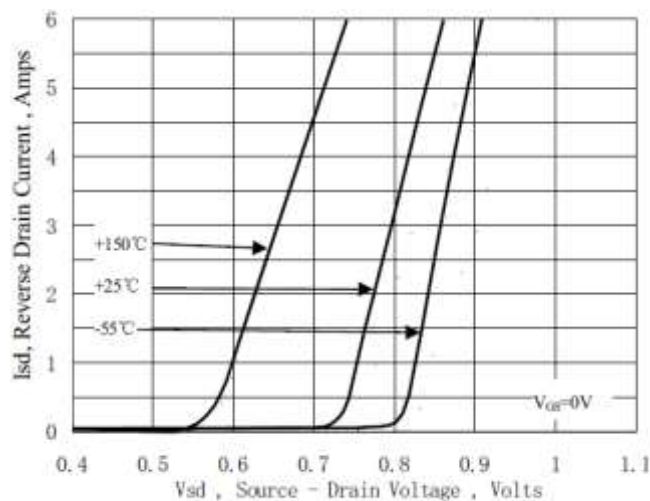


Figure 15 Typical Body Diode Transfer Characteristics

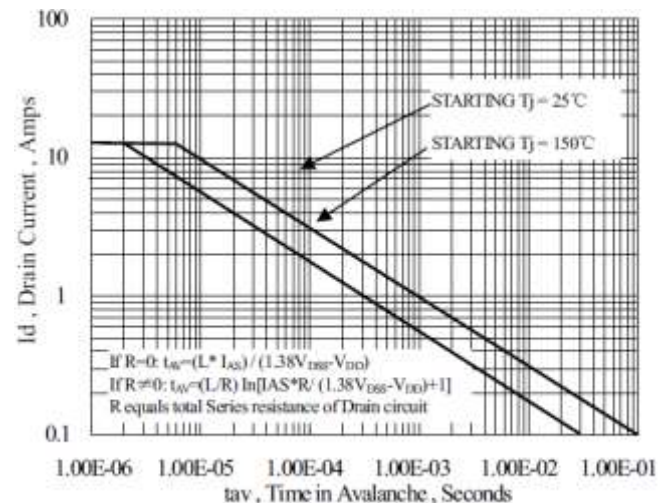


Figure 16 Unclamped Inductive Switching Capability

Test Circuits and Waveforms

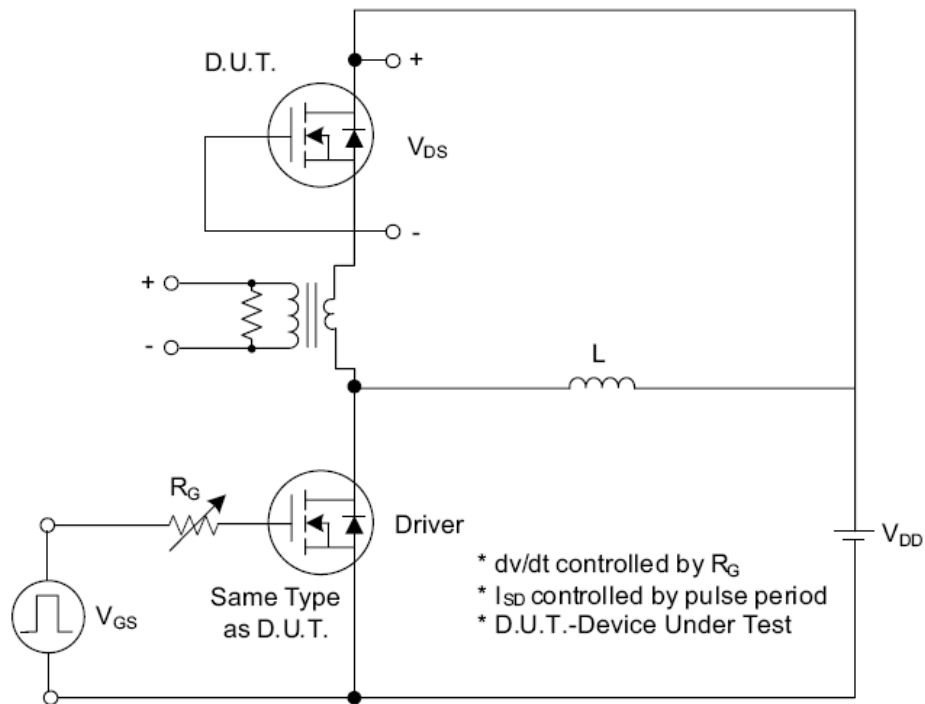


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

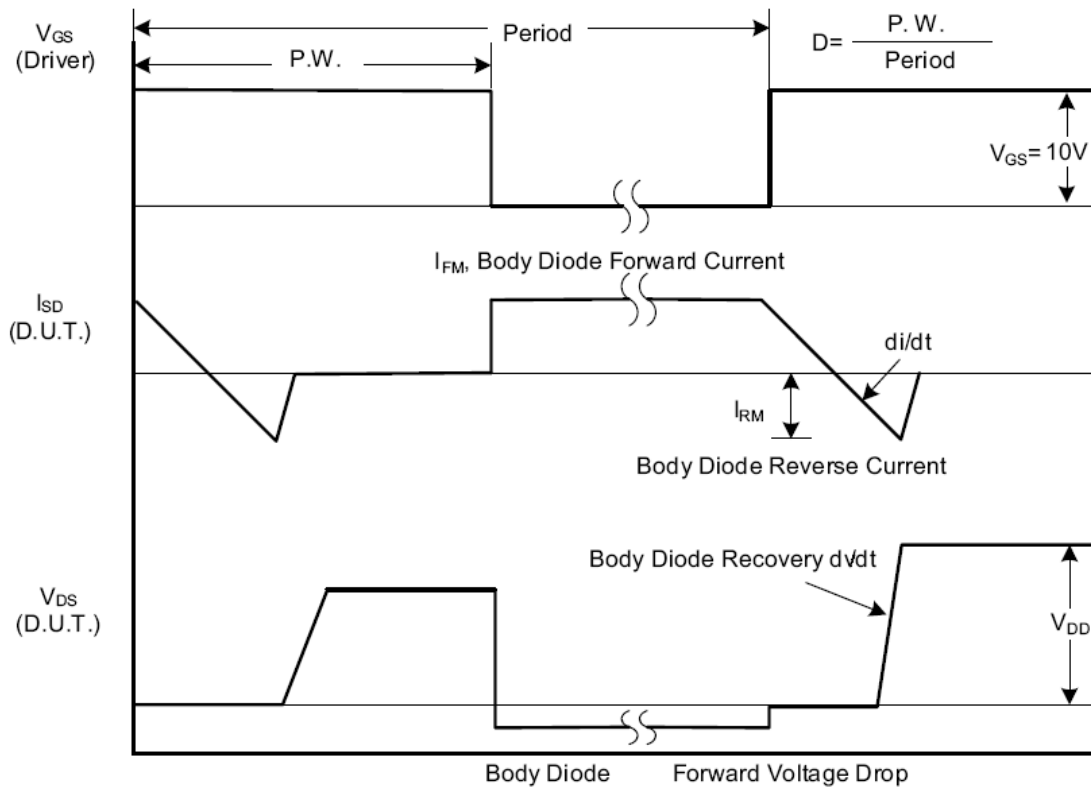


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms



Test Circuits and Waveforms (Cont.)

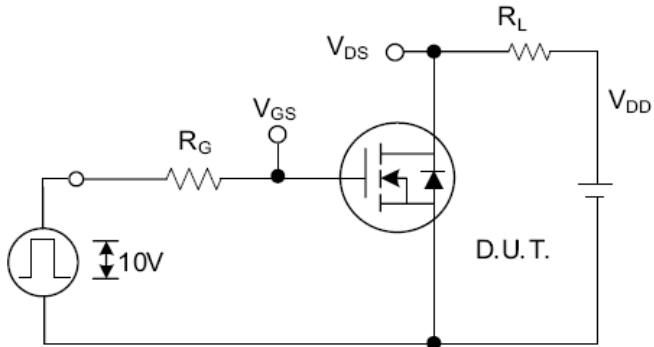


Fig. 2.1 Switching Test Circuit

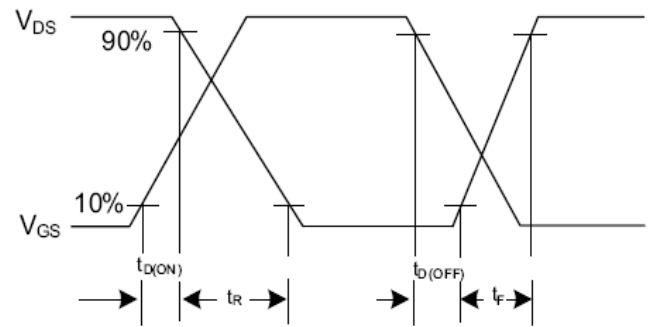


Fig. 2.2 Switching Waveforms

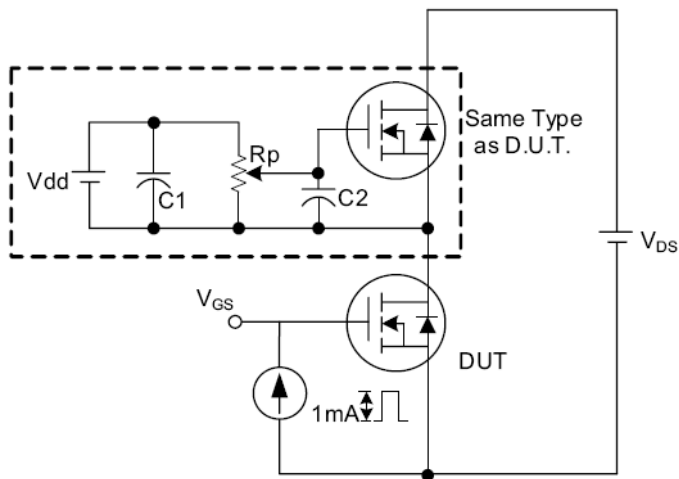


Fig. 3.1 Gate Charge Test Circuit

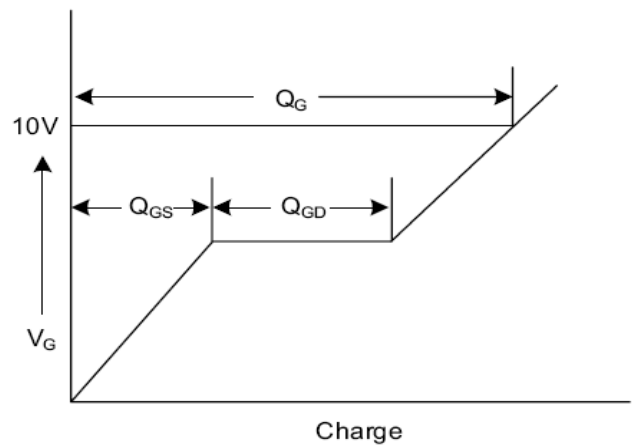


Fig. 3.2 Gate Charge Waveform

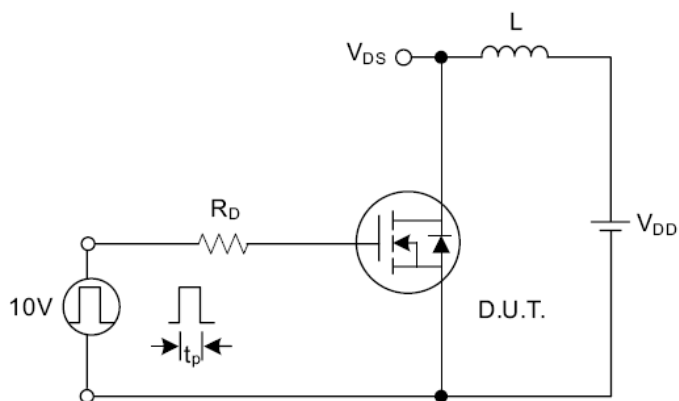


Fig. 4.1 Unclamped Inductive Switching Test Circuit

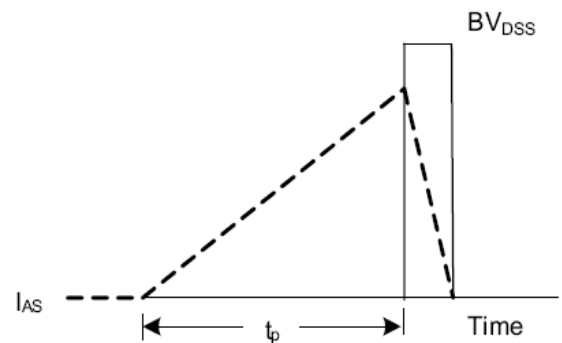


Fig. 4.2 Unclamped Inductive Switching Waveforms



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