



650V N-ch Planar MOSFET

Lead Free Package and Finish

General Features

- RoHS Compliant
- $R_{DS(ON),typ.}=0.70\ \Omega@V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

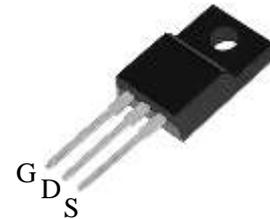
BV_{DSS}	$R_{DS(ON),typ.}$	I_D
650V	0.70 Ω	10A

Applications

- Adaptor
- Charger
- SMPS Standby Power

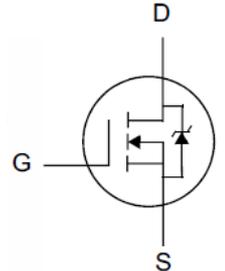
Ordering Information

Part Number	Package	Brand
PSA10N65C	TO-220F	



TO-220F

Package No to Scale



Absolute Maximum Ratings

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

Symbol	Parameter	Value	Unit
		PSA10N65C	
V_{DSS}	Drain-to-Source Voltage	650	V
V_{GSS}	Gate-to-Source Voltage	± 20	
I_D	Continuous Drain Current	10	A
I_{DM}	Pulsed Drain Current at $V_{GS}=10V$	40	
E_{AS}	Single Pulse Avalanche Energy	750	mJ
P_D	Power Dissipation	65	W
	Derating Factor above 25°C	0.52	
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300	$^\circ\text{C}$
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	Max. Value	Unit
		PSA10N65C	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.92	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	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	650	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	uA	$V_{DS}=650V, V_{GS}=0V$
		--	--	100		$V_{DS}=520V, V_{GS}=0V, T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	+0.1		$V_{GS}=+30V, V_{DS}=0V$
		--	--	-0.1		$V_{GS}=-30V, V_{DS}=0V$

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	--	0.70	0.85	Ω	$V_{GS}=10V, I_D=5.0A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
gfs	Forward Transconductance	--	13	--	S	$V_{DS}=30V, I_D=5.0A$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	1360	--	pF	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{MHz}$
C_{rss}	Reverse Transfer Capacitance	--	13	--		
C_{oss}	Output Capacitance	--	135	--		
Q_g	Total Gate Charge	--	25	--	nC	$V_{DD}=325V, I_D=10A, V_{GS}=0 \text{ to } 10V$
Q_{gs}	Gate-to-Source Charge	--	7.5	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	7.0	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	15	--	ns	$V_{DD}=325V, I_D=10A, V_{GS}=10V, R_g=9.1 \Omega$
t_{rise}	Rise Time	--	25	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	50	--		
t_{fall}	Fall Time	--	30	--		

**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	--	430	--	ns	$V_{GS}=0\text{V}$ $I_F=10\text{A}$, $di/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	--	2.2	--	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 Transient Thermal Impedance

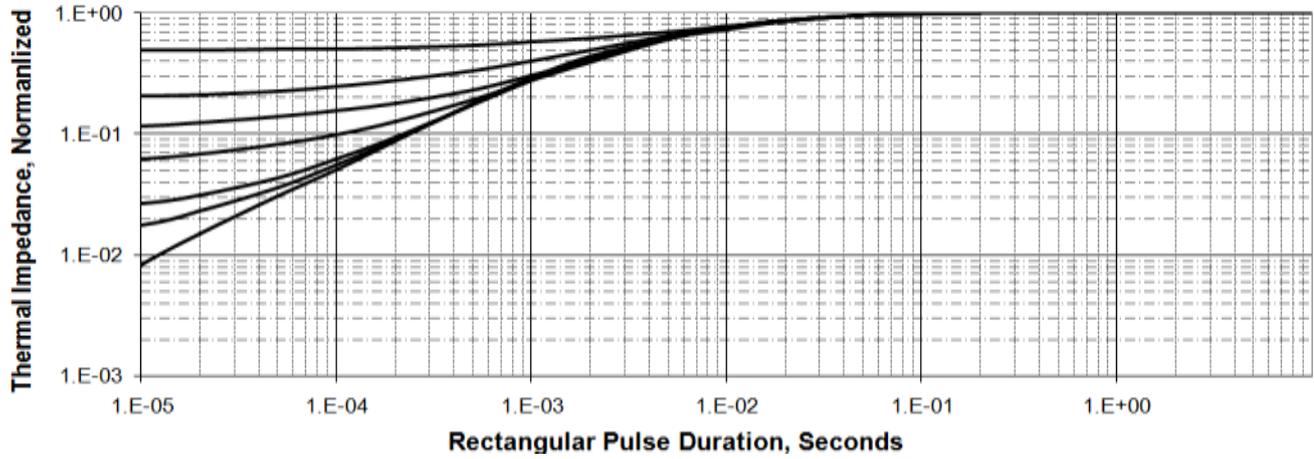


Figure 2. Max. Power Dissipation vs Case Temperature

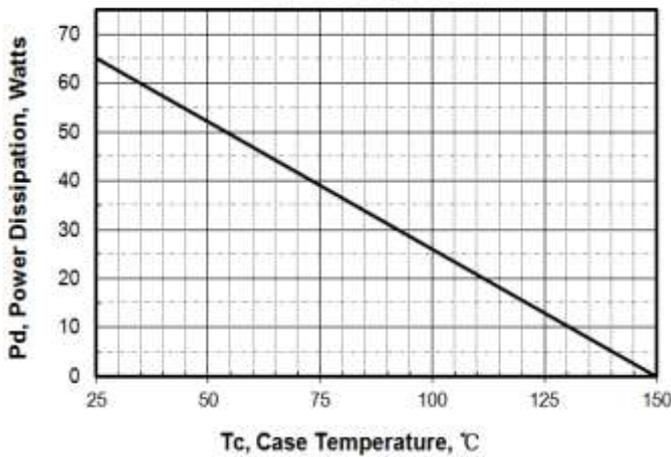


Figure 3. Maximum Continuous Drain Current vs Tc

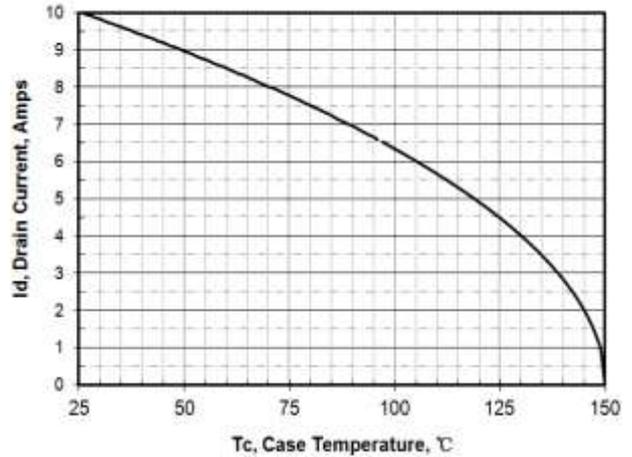


Figure 4. Output Characteristics

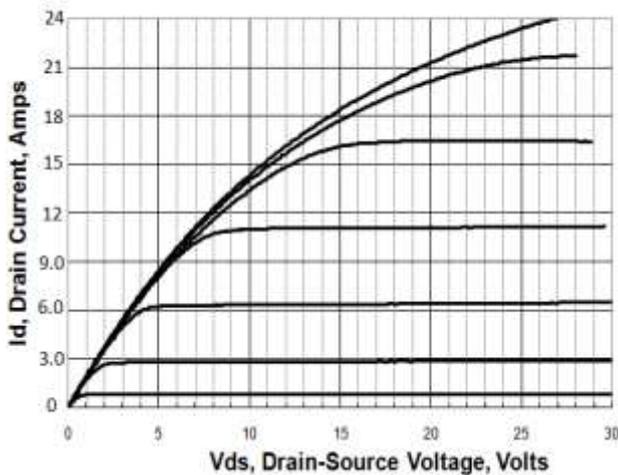
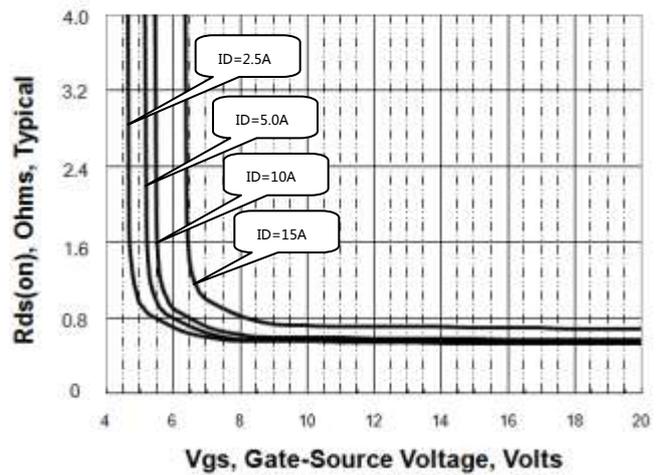


Figure 5. Rds(on) vs Gate Voltage





Typical Characteristics(Cont.)

Figure 6. Peak Current Capability

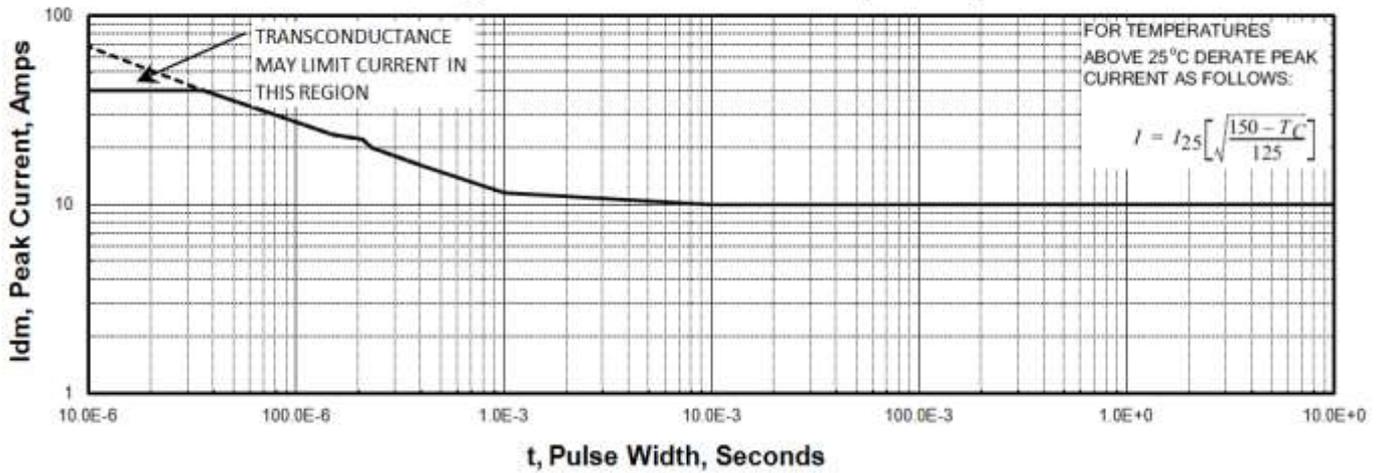


Figure 7. Transfer Characteristics

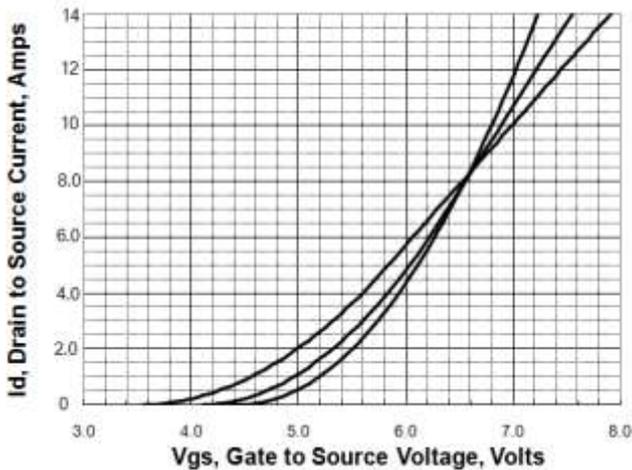


Figure 8. Unclamped Inductive Switching Capability

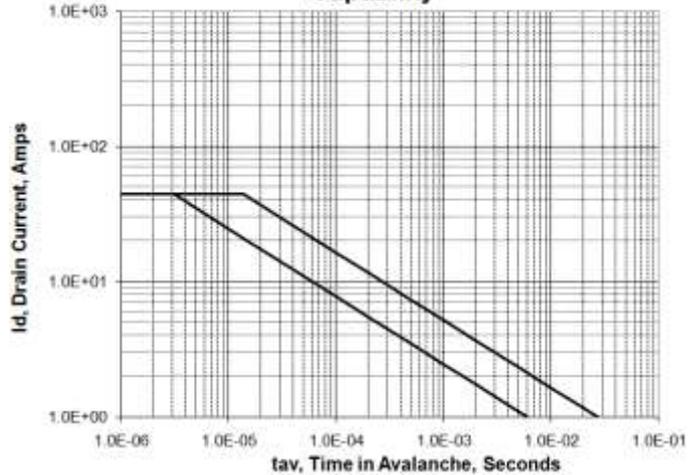


Figure 9. Drain to Source ON Resistance vs Drain Current

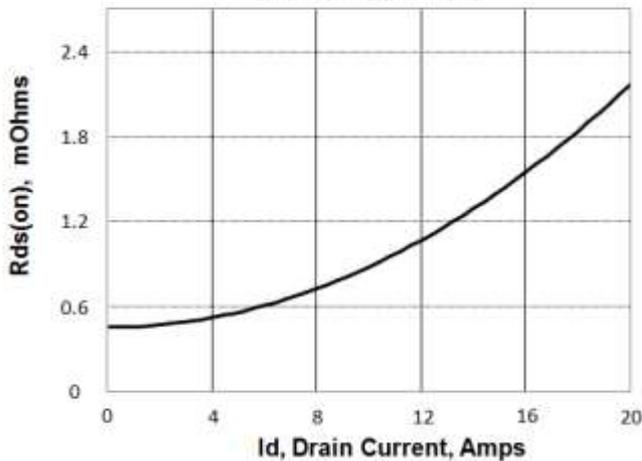
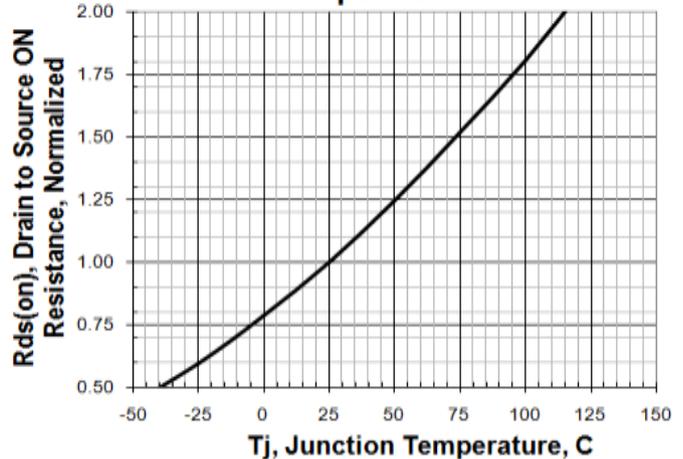


Figure 10. Rds(on) vs Junction Temperature





Typical Characteristics(Cont.)

Figure 11. Breakdown Voltage vs Temperature

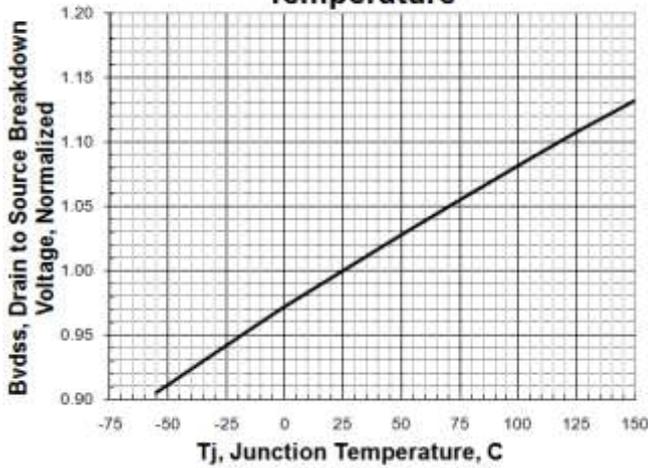


Figure 12. Threshold Voltage vs Temperature

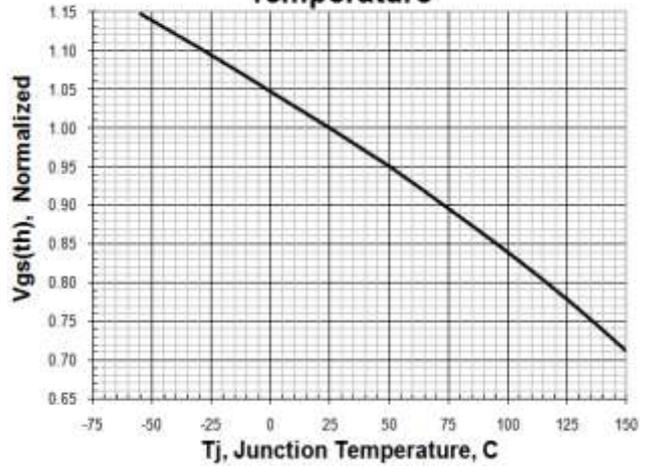


Figure 13 . Maximum Safe Operating Area

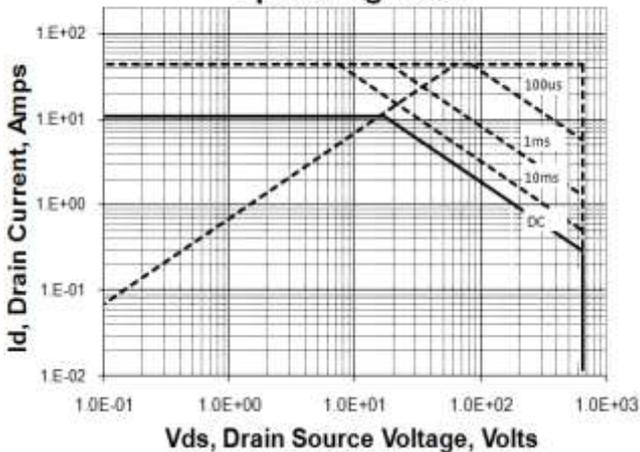


Figure 14. Capacitance vs Vds

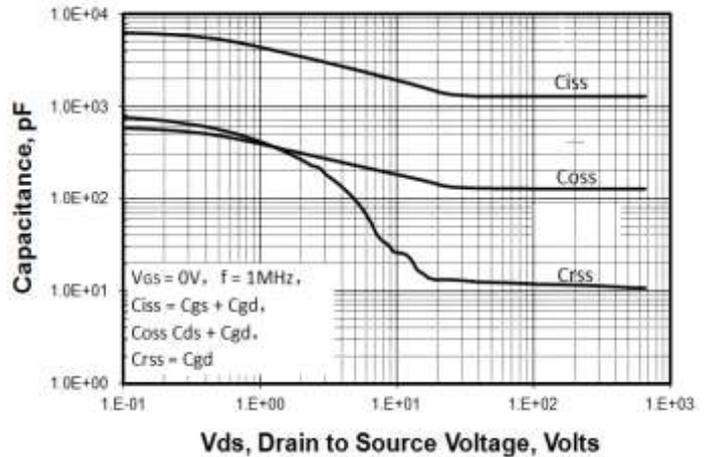


Figure 15 . Typical Gate Charge

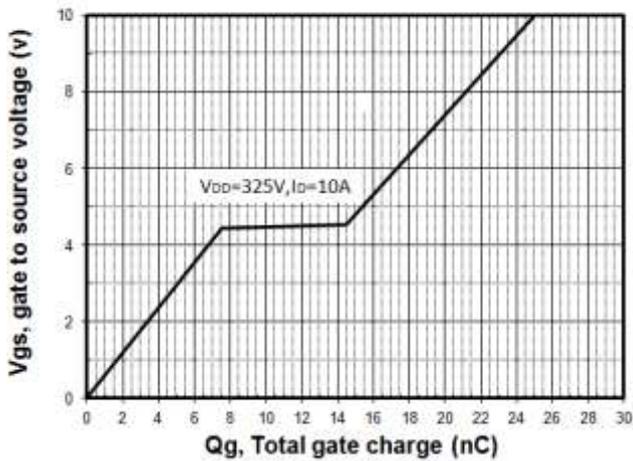
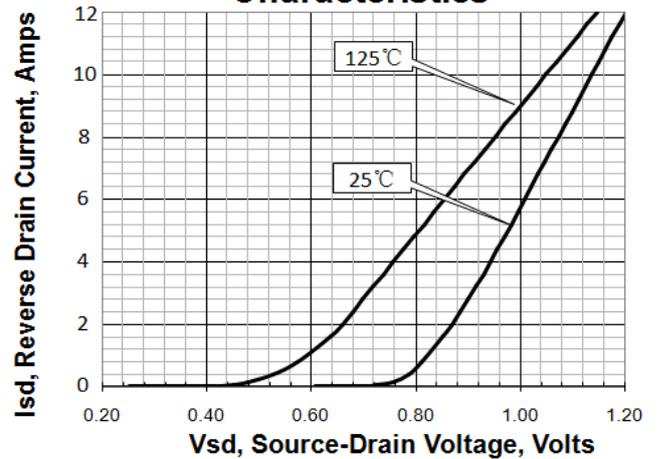


Figure 16. Body Diode Transfer Characteristics





Test Circuits and Waveforms

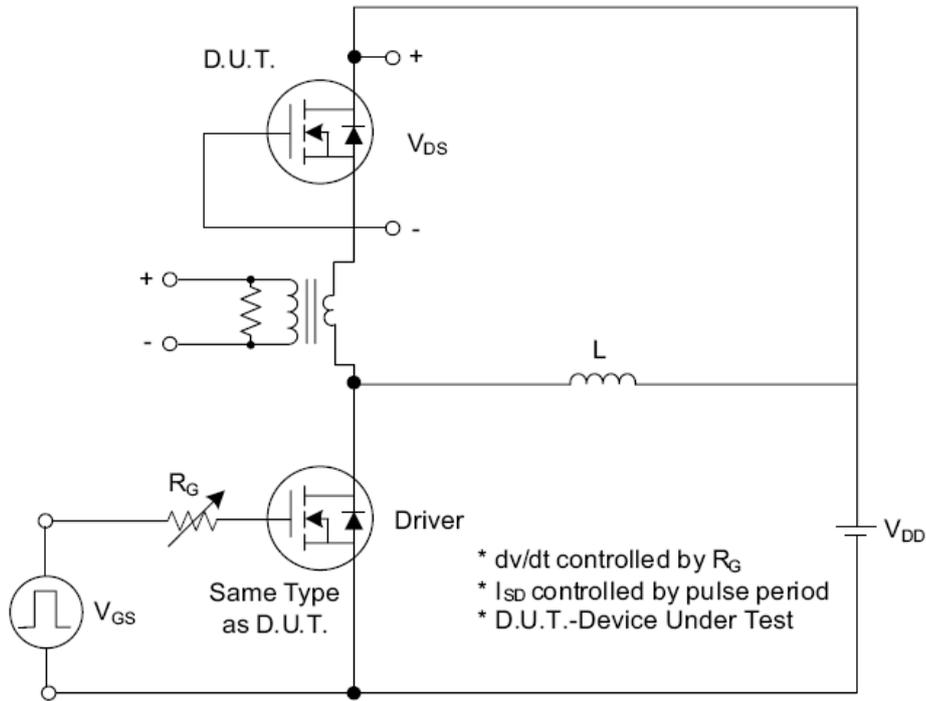


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

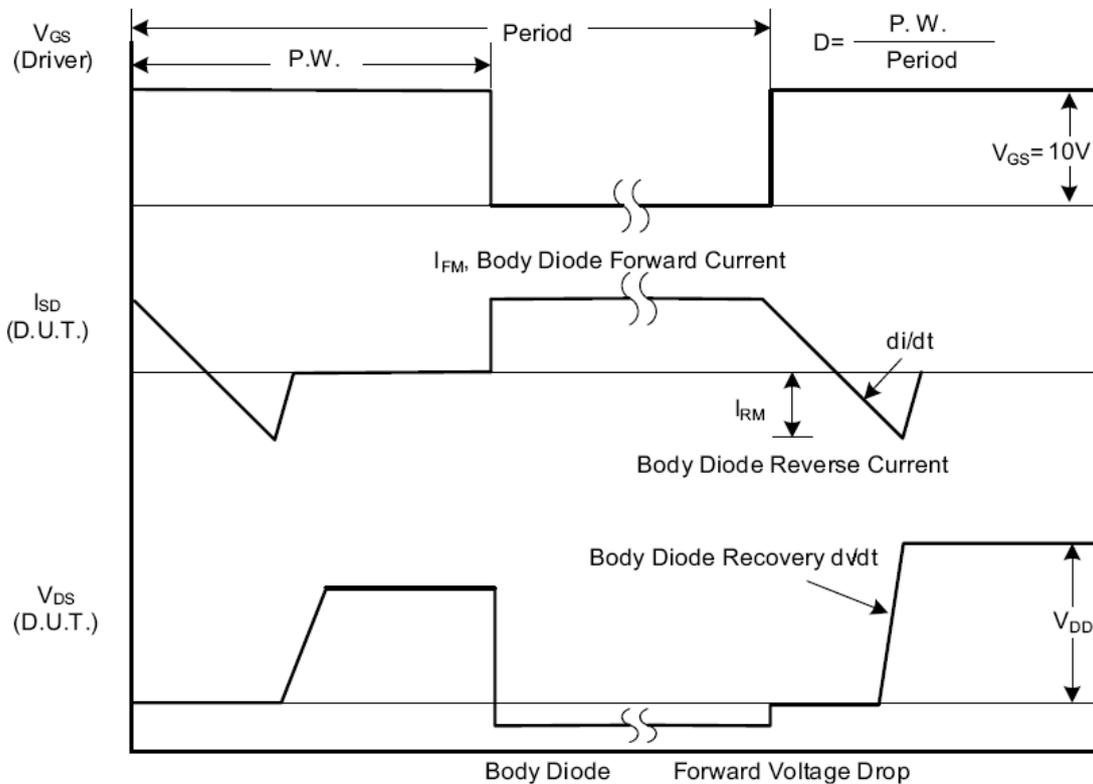


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

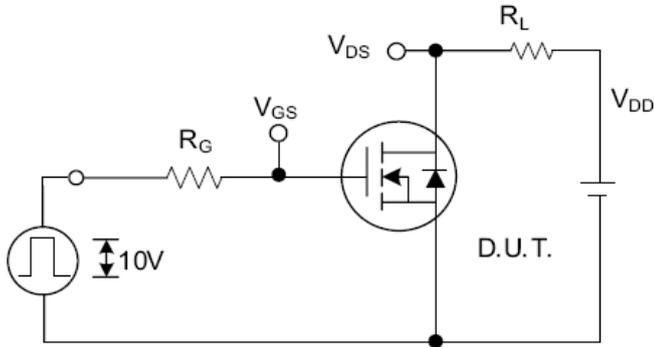


Fig. 2.1 Switching Test Circuit

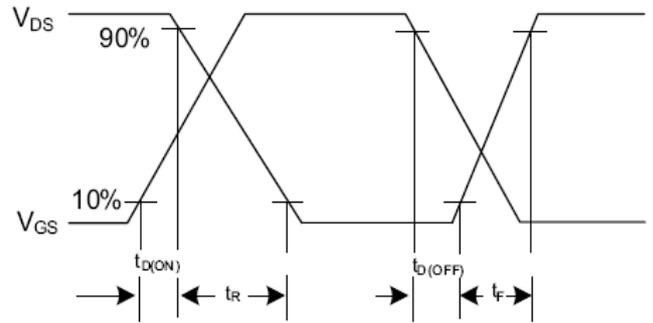


Fig. 2.2 Switching Waveforms

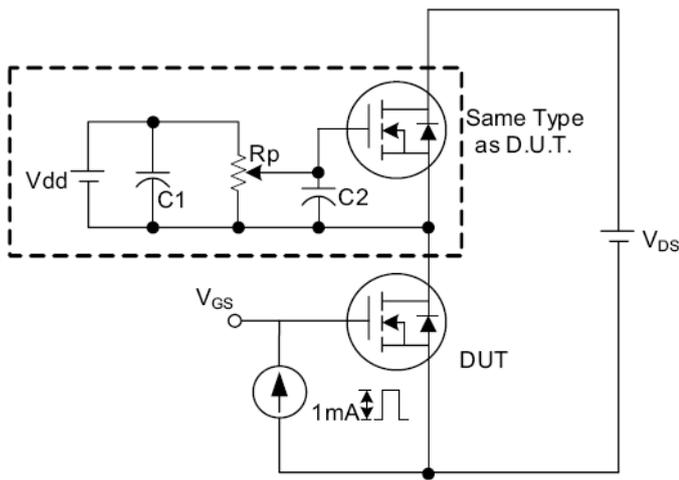


Fig. 3.1 Gate Charge Test Circuit

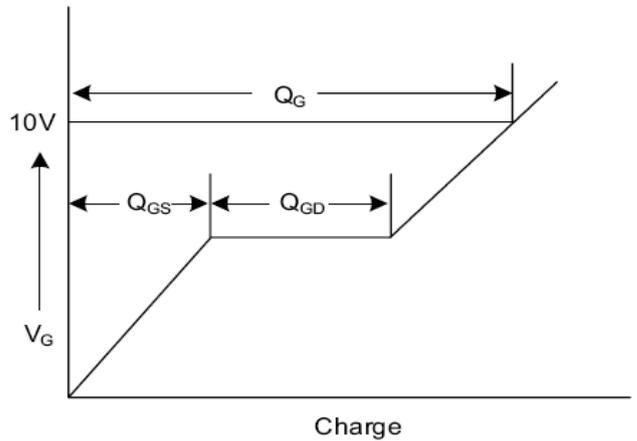


Fig. 3.2 Gate Charge Waveform

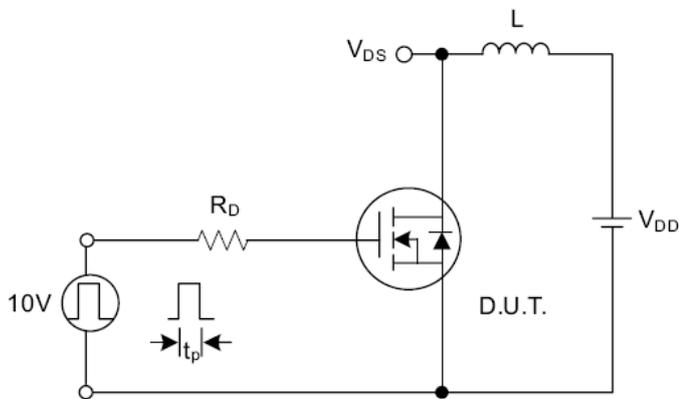


Fig. 4.1 Unclamped Inductive Switching Test Circuit

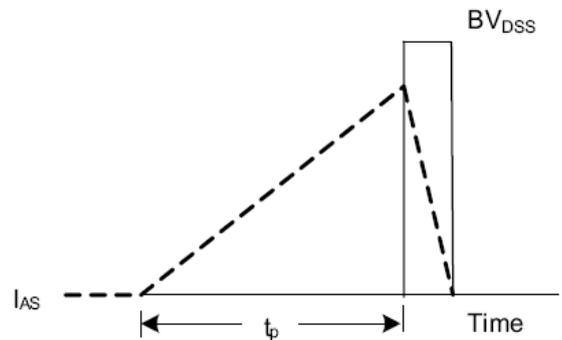


Fig. 4.2 Unclamped Inductive Switching Waveforms



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