



20V N-Channel MOSFET

Pb Lead Free Package and Finish

General Features

- Proprietary New Trench Technology
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

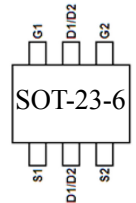
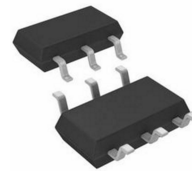
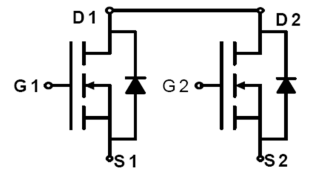
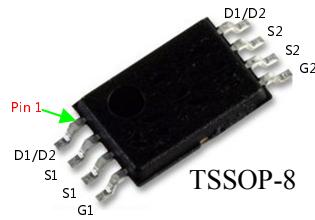
BV _{DSS}	R _{DS(ON),max.mΩ}	R _{DS(ON),typ.mΩ}	Test Conditions	I _D
20V	20	16	V _{GS} =10V, I _D =5.0A	7A
	22	18	V _{GS} =4.5V, I _D =4.5A	
	28	22	V _{GS} =2.5V, I _D =3.0A	

Applications

- High efficiency DC/DC Converters
- Motor Bridge Switch
- Oring FET/Load Switching

Ordering Information

Part Number	Package	Marking	Brand
PIP8205-S8	TSSOP-8	8205	
PIP8205-Z6	SOT-23-6	8205	



TSSOP-8 & SOT-23-6 Definition and Inner Circuit

Absolute Maximum Ratings T_C=25°C unless otherwise specified

Symbol	Parameter	8205	Unit
V _{DSS}	Drain-to-Source Voltage ^[1]	20	V
V _{GSS}	Gate-to-Source Voltage	±12	
I _D	Continuous Drain Current T _A =25°C	7.0	A
I _{DM}	Pulsed Drain Current at V _{GS} =10V	28	
P _d	Power Dissipation T _A =25°C	1.5	W
T _L T _{PAK}	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds	300 260	°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	8205	Unit
R _{θJA}	Thermal Resistance, Junction-to-Ambient	110	°C/W



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	20	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=20V, V_{GS}=0V$
		--	--	100		$V_{DS}=16V, V_{GS}=0V, T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	$V_{GS}=+12V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-12V, V_{DS}=0V$

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	--	16	20	$m\Omega$	$V_{GS}=10V, I_D=5.0A$
		--	18	22		$V_{GS}=4.5V, I_D=4.5A$
		--	22	28		$V_{GS}=2.5V, I_D=3.0A$
$V_{GS(TH)}$	Gate Threshold Voltage	0.5	--	1.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	900	--	pF	$V_{GS}=0V, V_{DS}=10V, f=1.0MHz$
C_{rss}	Reverse Transfer Capacitance	--	100	--		
C_{oss}	Output Capacitance	--	220	--		
Q_g	Total Gate Charge	--	12	--	nC	$V_{DD}=10V, I_D=6A, V_{GS}=4.5V$
Q_{gs}	Gate-to-Source Charge	--	2.3	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	1	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	10	--	nS	$V_{DD}=10V, V_{GS}=4.5V, I_D=6A, R_G=6.0\Omega$
t_{rise}	Rise Time	--	11	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	35	--		
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	--	--	7	A	Integral PN-diode in MOSFET
I_{SM}	Pulsed Source Current	--	--	28		
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_S=6\text{A}$, $V_{GS}=0\text{V}$

Note:

- [1] $T_J=+25^{\circ}\text{C}$ to $+150^{\circ}\text{C}$.
- [2] Silicon limited current only.
- [3] Package limited current.
- [4] Repetitive rating; pulse width limited by maximum junction temperature.
- [5] Pulse width $\leq 380\mu\text{s}$; duty cycle $\leq 2\%$.



Typical Characteristics

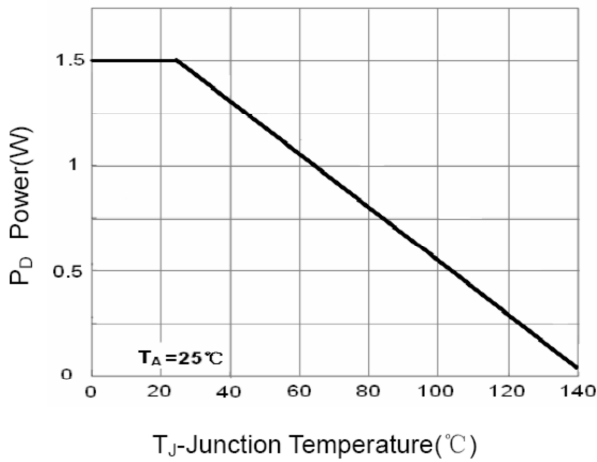


Figure 1 Power Dissipation

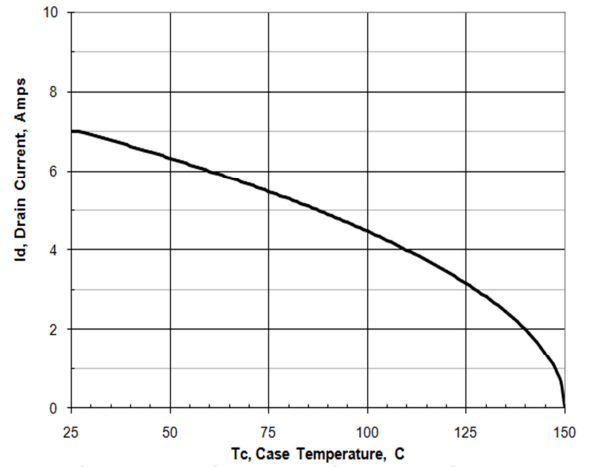


Figure 2 .Maximum Continuous Drain Current vs Case Temperature

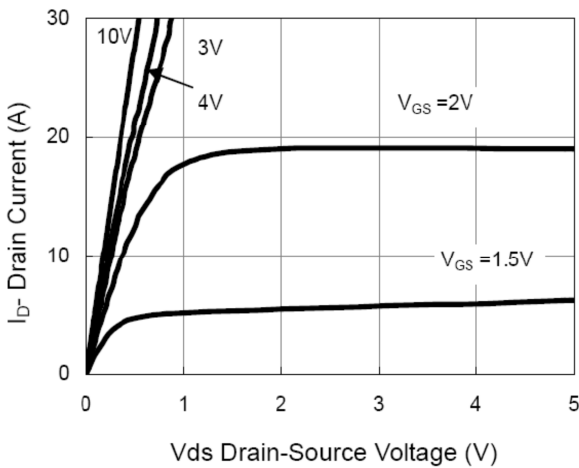


Figure 3 Output Characteristics

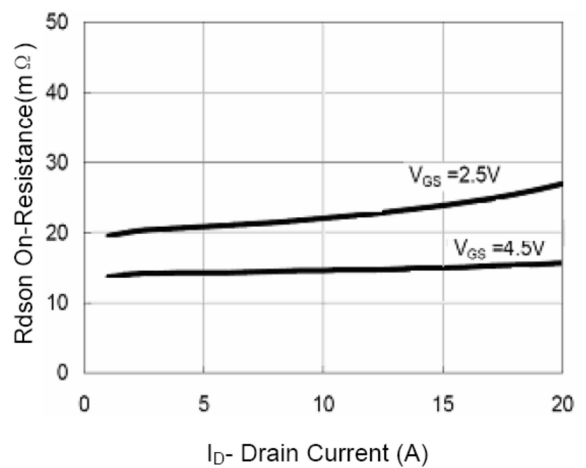


Figure 4 Drain-Source On-Resistance

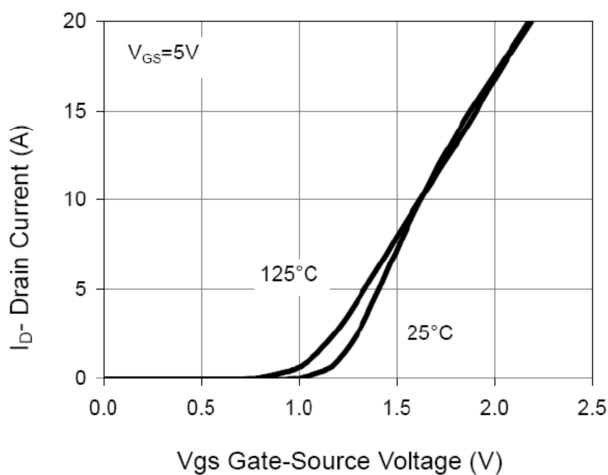


Figure 5 Transfer Characteristics

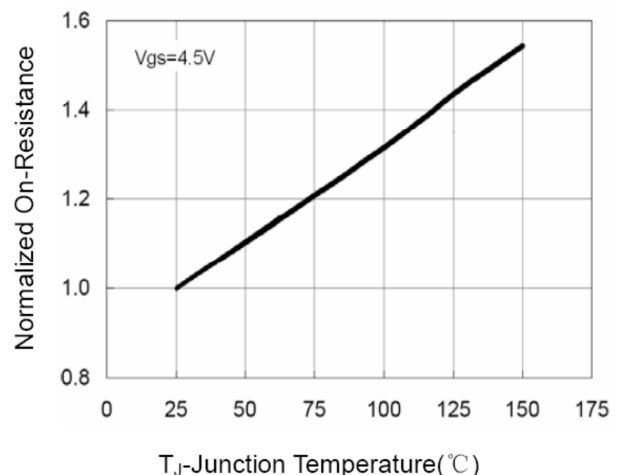
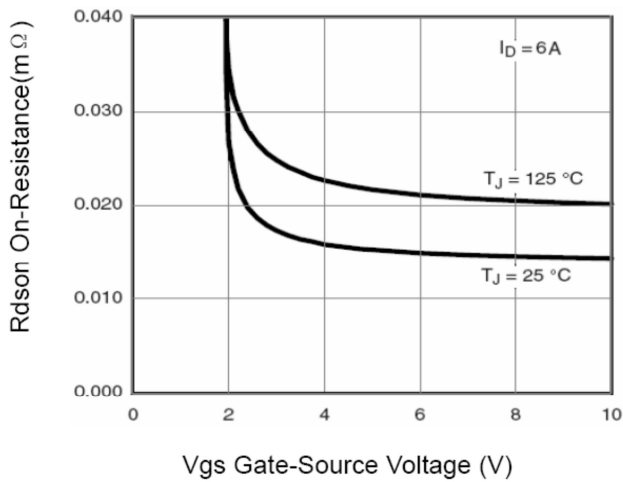


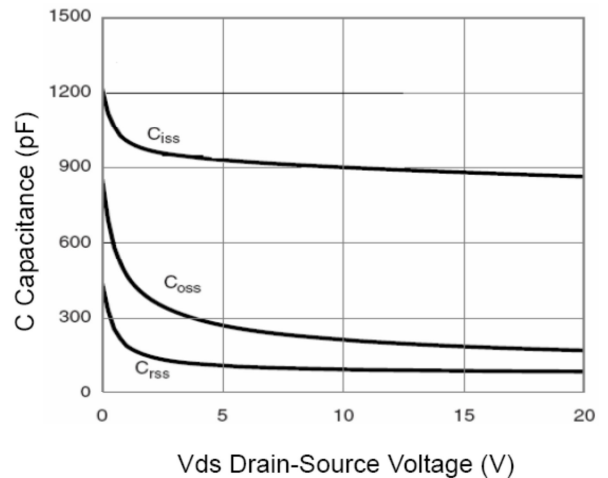
Figure 6 Drain-Source On-Resistance



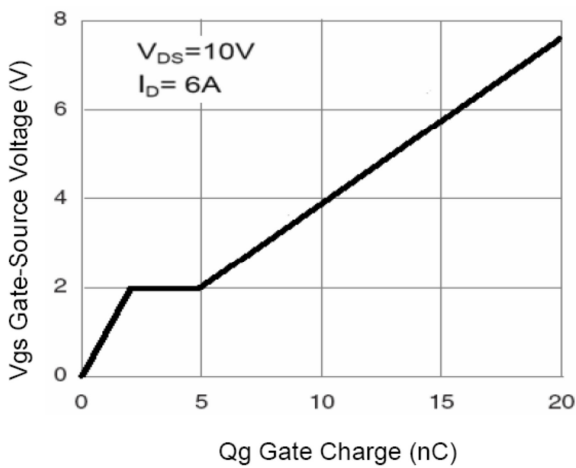
Typical Characteristics



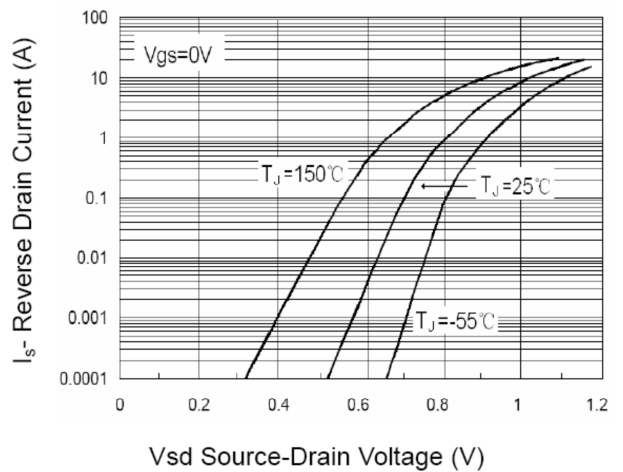
Vgs Gate-Source Voltage (V)
Figure 7 Rds(on) vs Vgs



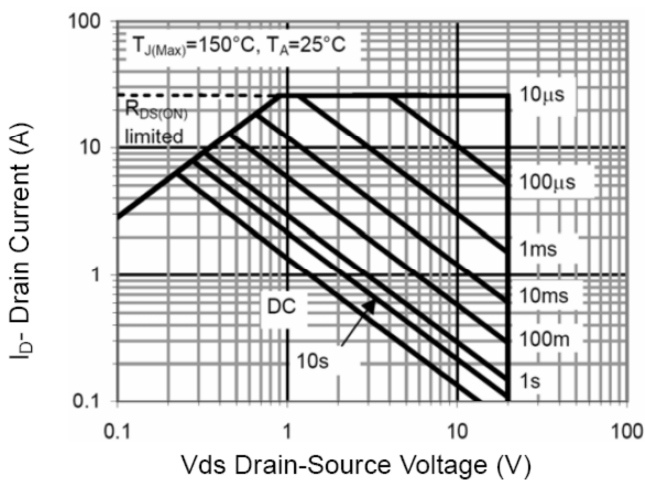
Vds Drain-Source Voltage (V)
Figure 8 Capacitance vs Vds



Qg Gate Charge (nC)
Figure 9 Gate Charge



Vsd Source-Drain Voltage (V)
Figure 10 Source-Drain Diode Forward



Vds Drain-Source Voltage (V)
Figure 11 Safe Operation Area



Typical Characteristics

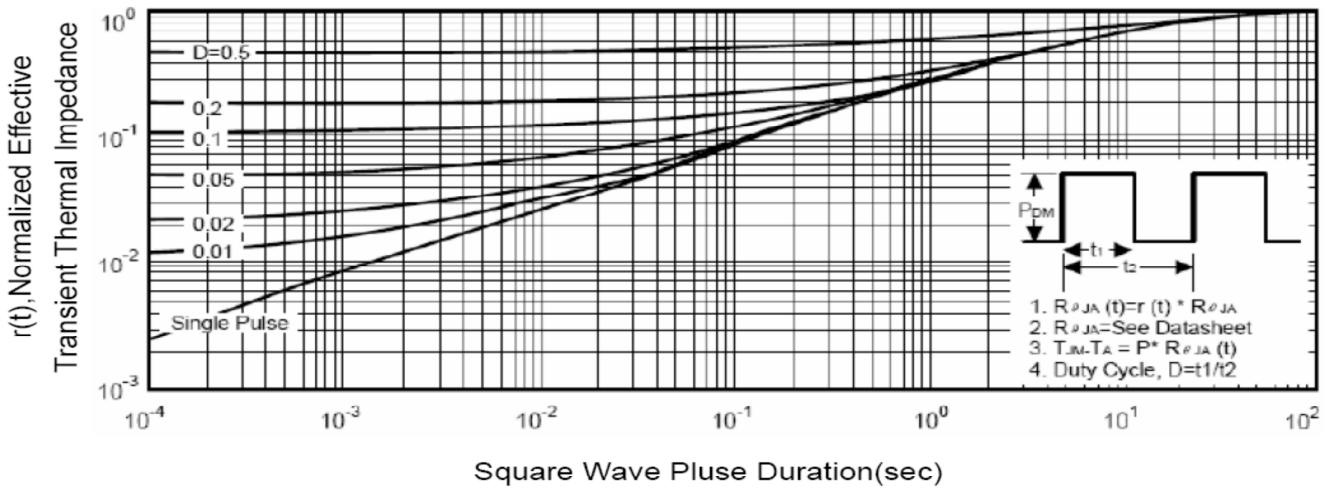


Figure 12 Normalized Maximum Transient Thermal Impedance

Test Circuits and Waveforms

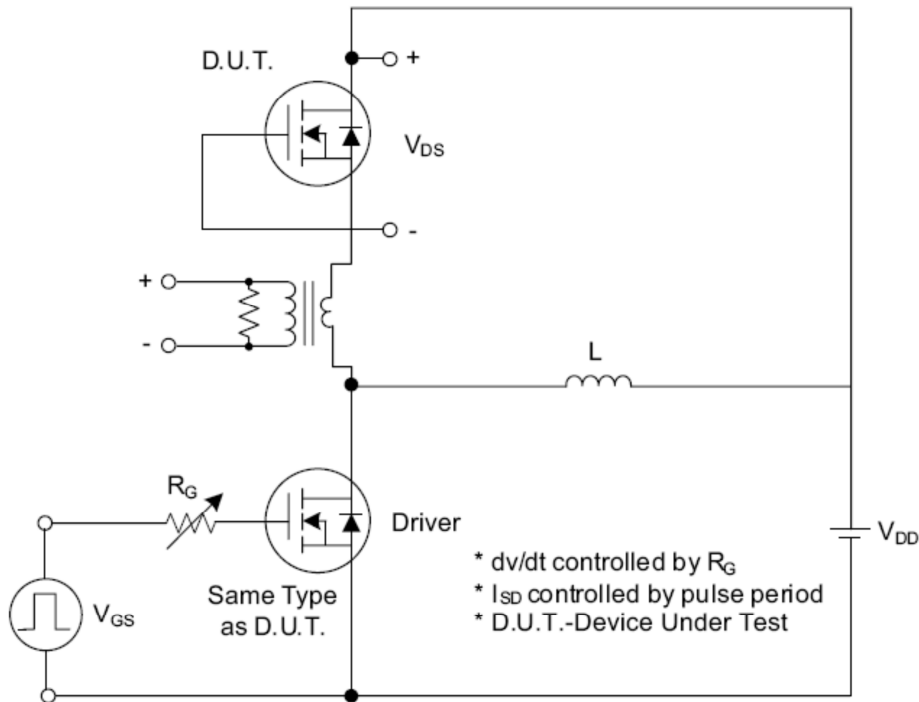


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

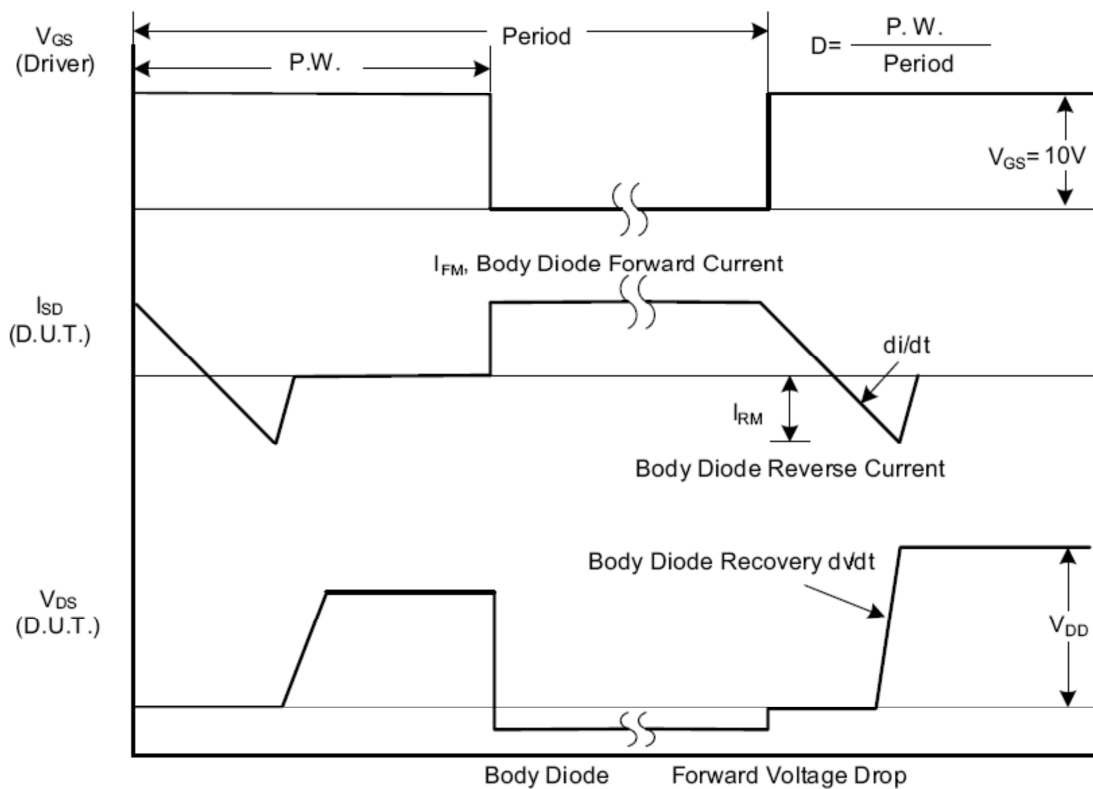


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

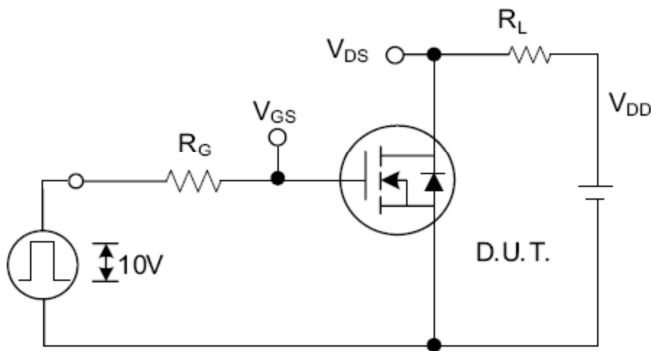
Test Circuits and Waveforms (Cont.)


Fig. 2.1 Switching Test Circuit

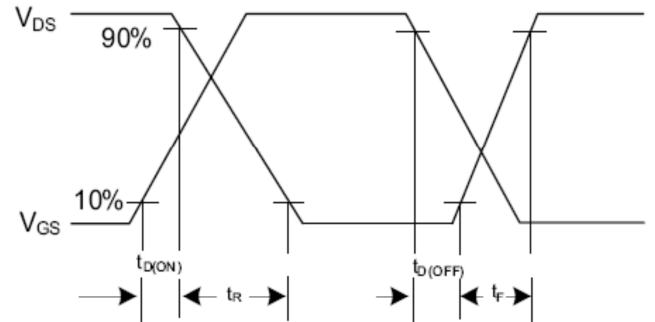


Fig. 2.2 Switching Waveforms

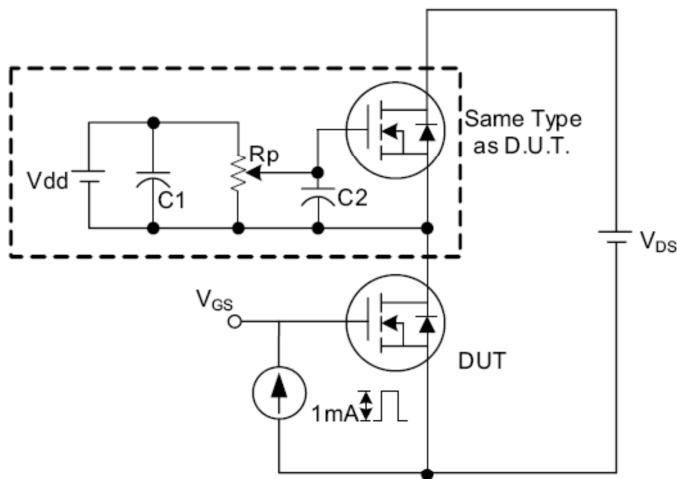


Fig. 3.1 Gate Charge Test Circuit

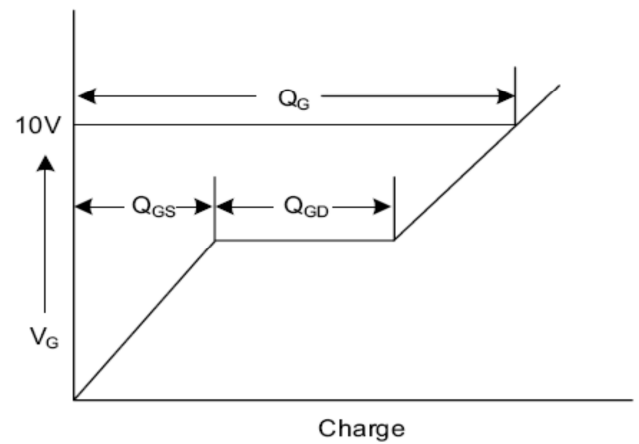


Fig. 3.2 Gate Charge Waveform

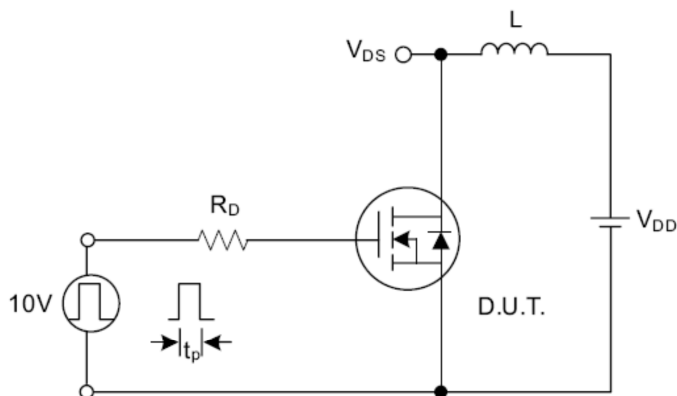


Fig. 4.1 Unclamped Inductive Switching Test Circuit

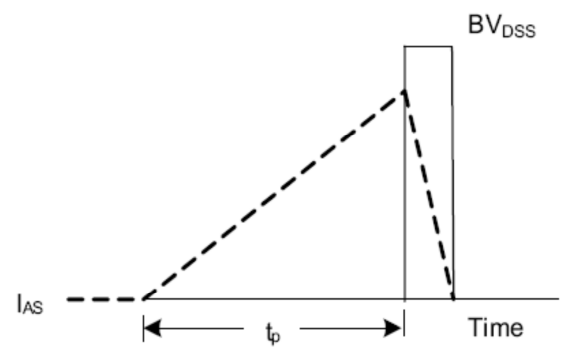


Fig. 4.2 Unclamped Inductive Switching Waveforms



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