



80V N-Channel MOSFET

Lead Free Package

General Features

- Proprietary New Trench Technology
- $R_{DS(ON),typ.}=4.8\text{ m}\Omega@V_{GS}=10\text{V}$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

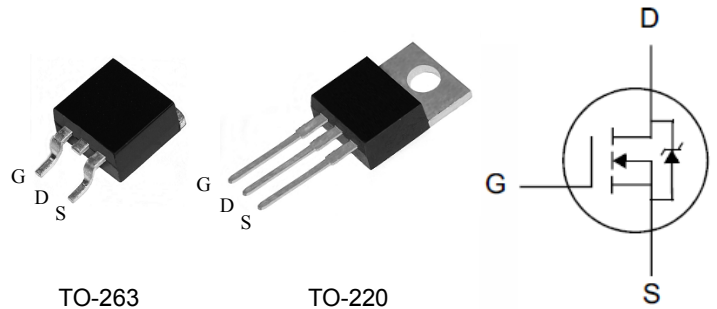
BV_{DSS}	$R_{DS(ON),typ.}$	$I_D^{[2]}$
80V	4.8m Ω	145A

Applications

- High efficiency DC/DC Converters
- Synchronous Rectification
- UPS Inverter

Ordering Information

Part Number	Package	Brand
PTP14508E	TO-220	
PTB14508E	TO-263	



TO-263

TO-220

Package Not to Scale

Absolute Maximum Ratings

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

Symbol	Parameter	PTB14508E	PTP14508E	Unit
V_{DSS}	Drain-to-Source Voltage ^[1]	80		V
V_{GSS}	Gate-to-Source Voltage	± 20		
I_D	Continuous Drain Current ^[2]	145		A
$I_D @ T_C=100^\circ\text{C}$	Continuous Drain Current @ $T_C=100^\circ\text{C}$ ^[2]	100		
I_{DM}	Pulsed Drain Current at $V_{GS}=10\text{V}$ ^[2,4]	580		
E_{AS}	Single Pulse Avalanche Energy	1200		mJ
dv/dt	Peak Diode Recovery dv/dt ^[3]	5.0		V/ns
P_D	Power Dissipation	273		W
	Derating Factor above 25°C	1.82		W/ $^\circ\text{C}$
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		$^\circ\text{C}$
T_J & T_{STG}	Operating and Storage Temperature Range	-55 to 175		

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

Thermal Characteristics

Symbol	Parameter	PTB14508E	PTP14508E	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.55		$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62		



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	80	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=80V, V_{GS}=0V$
		--	--	100		$V_{DS}=64V, V_{GS}=0V,$ $T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	$V_{GS}=+20V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-20V, V_{DS}=0V$

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	--	4.8	5.8	$m\Omega$	$V_{GS}=10V, I_D=24A$ [5]
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	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	--	8.2	--	nF	$V_{GS}=0V,$ $V_{DS}=25V,$ $f=1.0MHz$
C_{rSS}	Reverse Transfer Capacitance	--	0.30	--		
C_{oss}	Output Capacitance	--	0.42	--		
R_G	Gate Series Resistance	--	1.2	--	Ω	$f=1.0MHz$
Q_g	Total Gate Charge	--	160	--	nC	$V_{DD}=40V,$ $I_D=20A, V_{GS}=0$ to 10V
Q_{gs}	Gate-to-Source Charge	--	30	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	35	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	25	--	nS	$V_{DD}=40V,$ $I_D=20A,$ $V_{GS}=10V$ $R_G=2.5\Omega$
t_{rise}	Rise Time	--	45	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	80	--		
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]	--	--	145	A	Integral PN-diode in MOSFET
I_{SM}	Pulsed Source Current ^[2]	--	--	580		
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_S=20\text{A}$, $V_{GS}=0\text{V}$
trr	Reverse recovery time	--	50	--	ns	$V_{GS}=0\text{V}$, $I_F=20\text{A}$, $di_F/dt=100\text{A}/\mu\text{s}$
Qrr	Reverse recovery charge	--	100	--	nC	

Note:

- [1] $T_J=+25^{\circ}\text{C}$ to $+175^{\circ}\text{C}$
- [2] Silicon limited current only.
- [3].Package limited current 80A
- [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. Output Characteristics

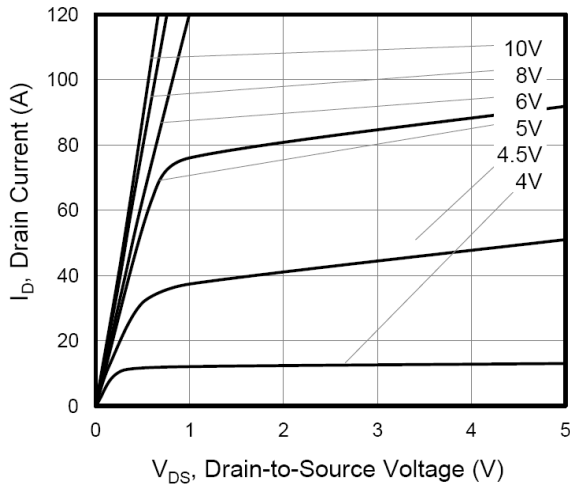


Figure 3. On-Resistance vs. Drain Current

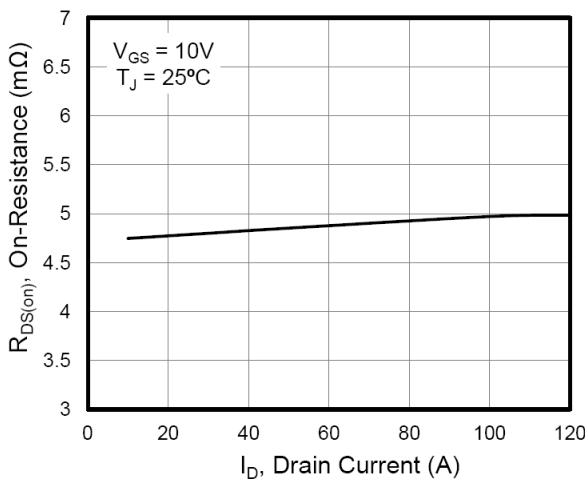


Figure 5. Gate Charge

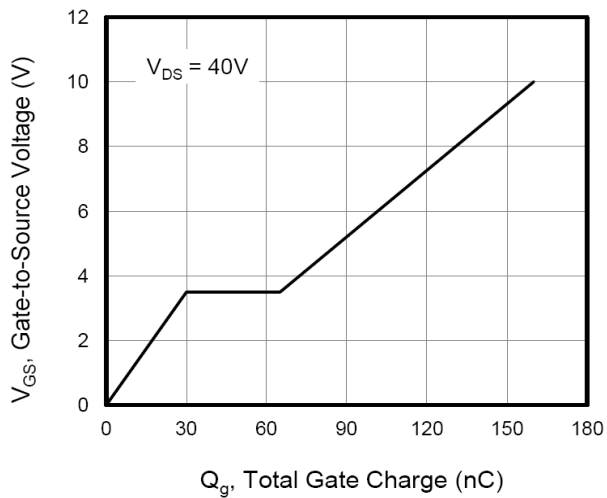


Figure 2. Transfer Characteristics

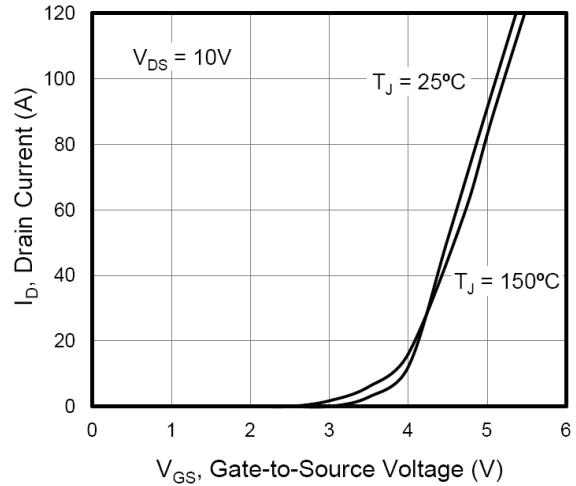


Figure 4. Capacitance

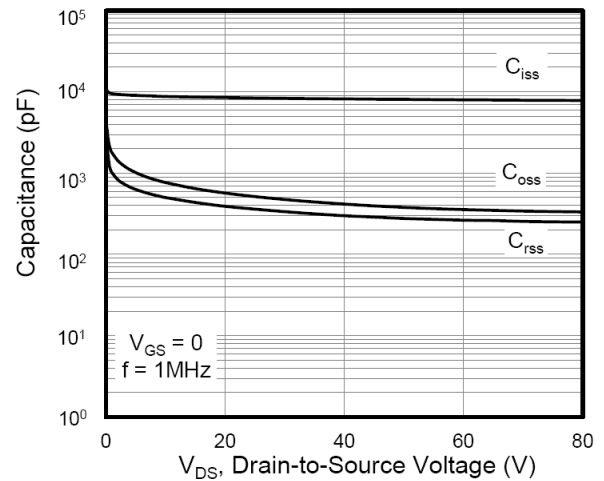
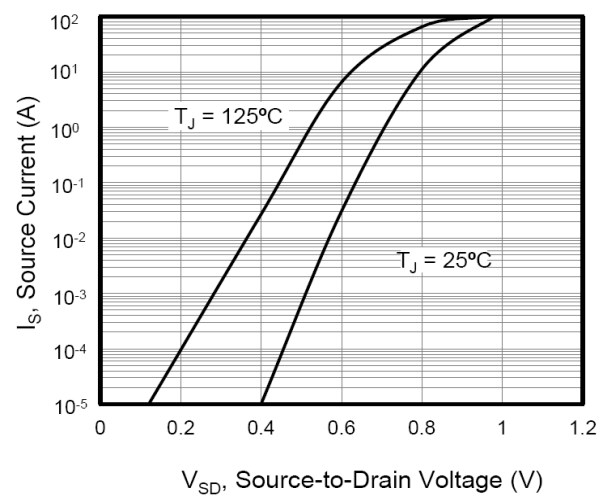


Figure 6. Body Diode Forward Voltage





Typical Characteristics(Cont.)

Figure 7. On-Resistance vs. Temperature

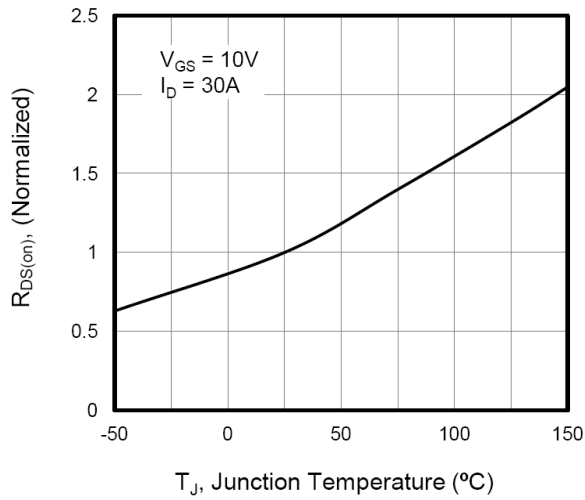


Figure 8. Threshold Voltage vs. Temperature

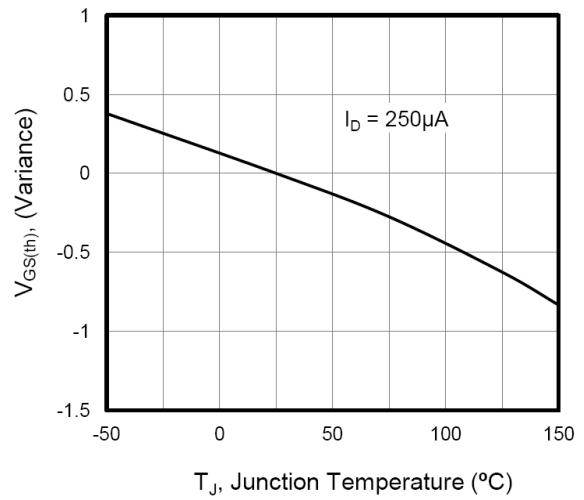


Figure 9. Breakdown voltage vs. Junction Temperature

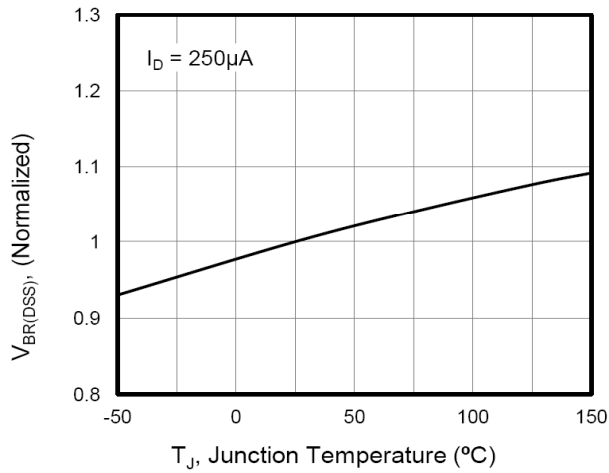


Figure 10. Transient Thermal Impedance

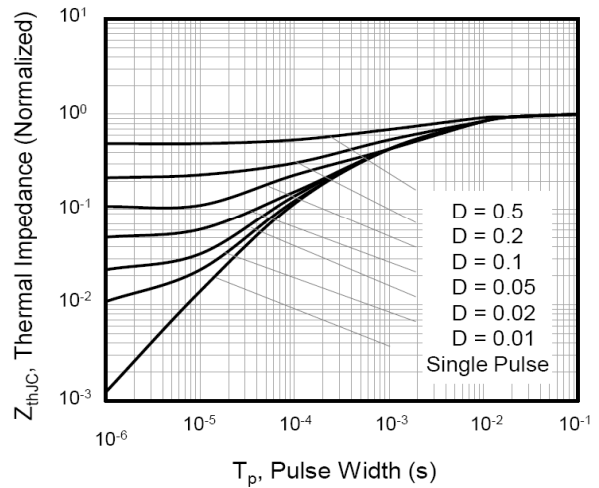
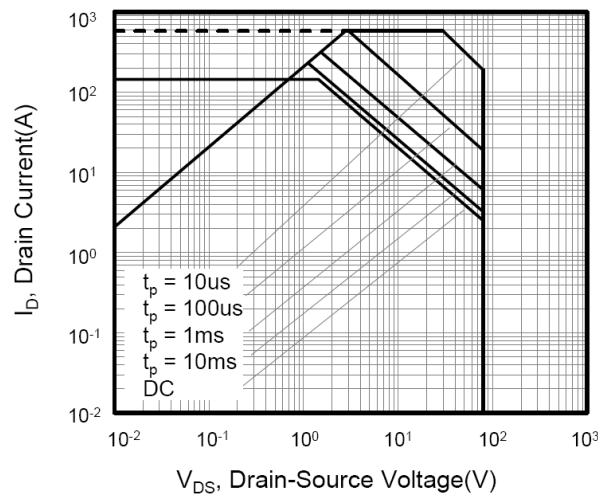


Figure 11. Safe operation area for



Test Circuits and Waveforms

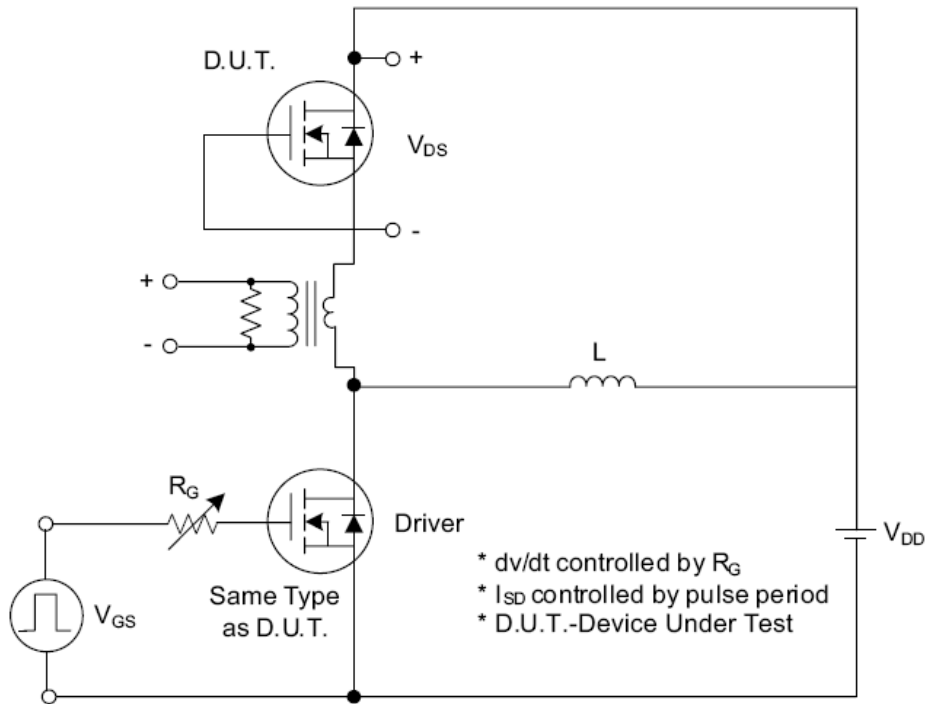


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

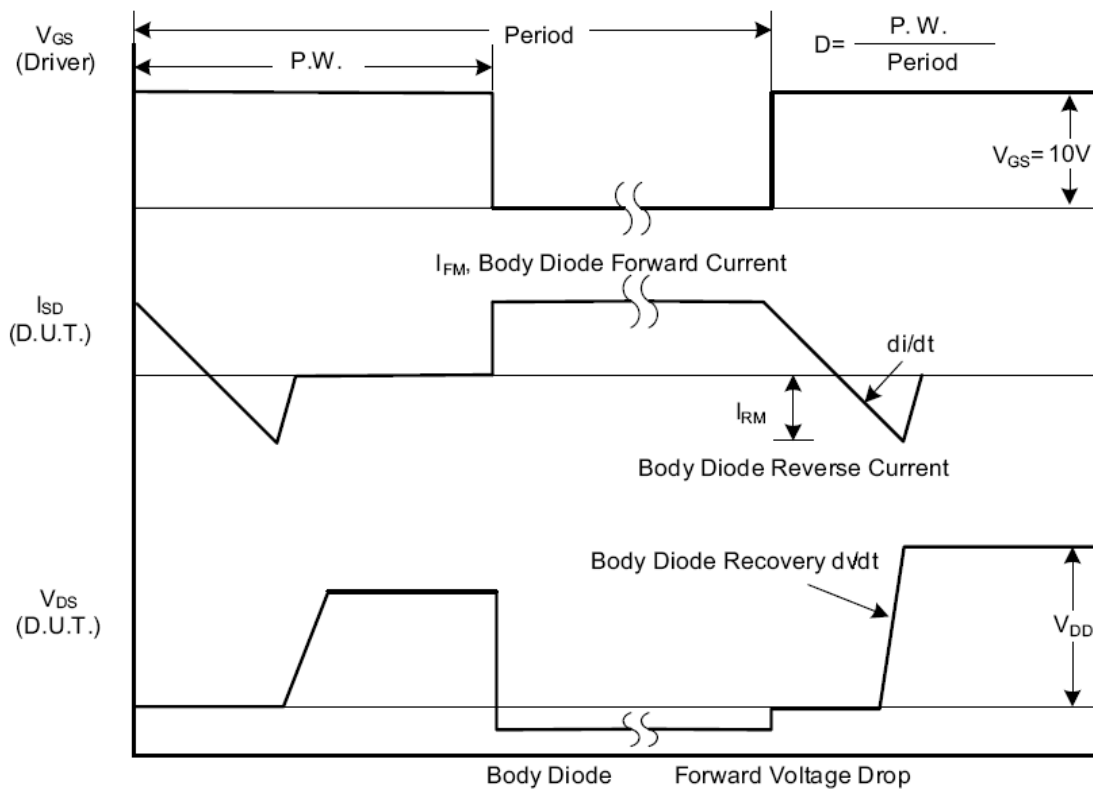


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

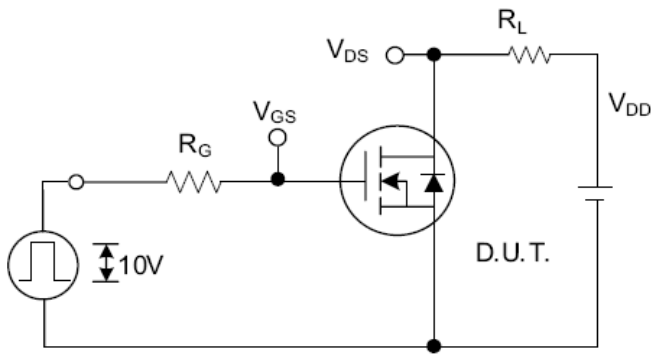


Fig. 2.1 Switching Test Circuit

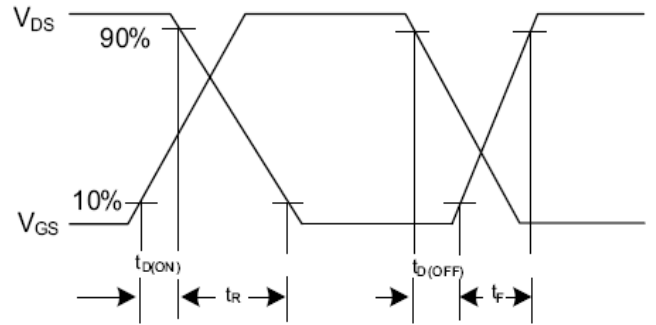


Fig. 2.2 Switching Waveforms

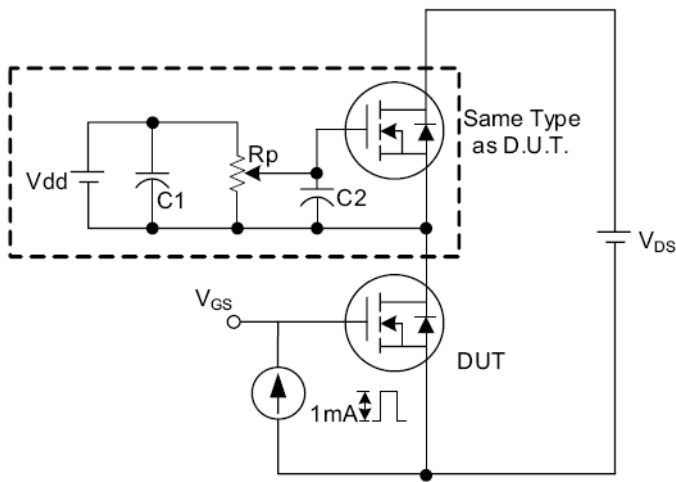


Fig. 3.1 Gate Charge Test Circuit

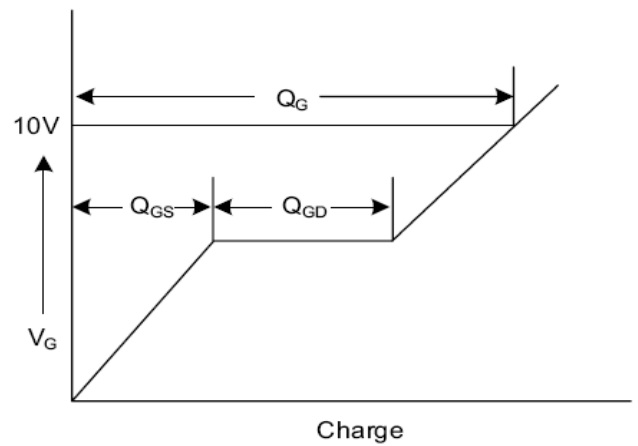


Fig. 3.2 Gate Charge Waveform

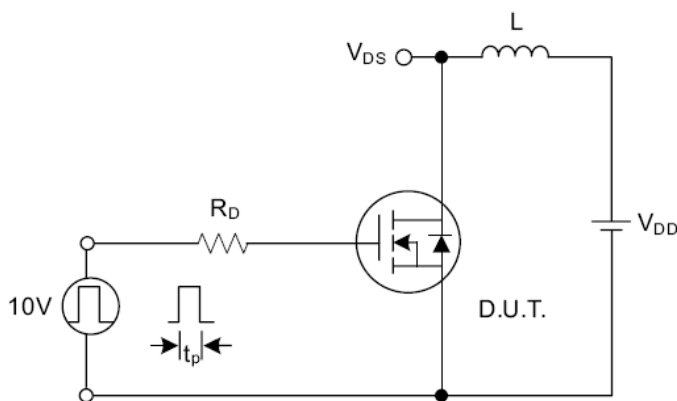


Fig. 4.1 Unclamped Inductive Switching Test Circuit

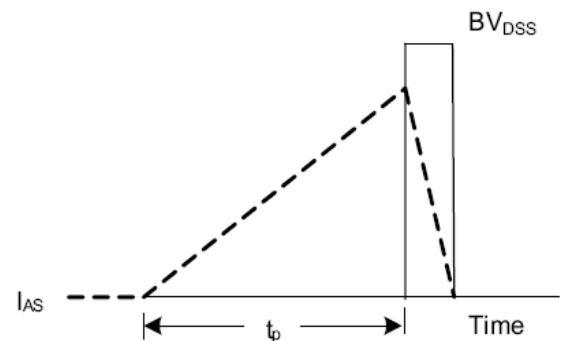


Fig. 4.2 Unclamped Inductive Switching Waveforms



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