

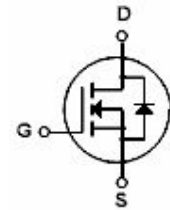
TS10N80

800V N-Channel MOSFET

DRAWING

Features

- ◆ Originative New Design
- ◆ Superior Avalanche Rugged Technology
- ◆ Robust Gate Oxide Technology
- ◆ Very Low Intrinsic Capacitances
- ◆ Excellent Switching Characteristics
- ◆ Unrivalled Gate Charge : 58 nC (Typ.)
- ◆ Extended Safe Operating Area
- ◆ Lower  $R_{DS(ON)}$  : 0.85Ω(Typ.) @ $V_{GS}=10V$
- ◆ 100% Avalanche Tested



G D S

Absolute Maximum Ratings

Symbol	Parameter	Spec	Units
$V_{DSS}$	Drain-Source Voltage	800	V
$I_D$	Drain Current -Continuous( $T_c=25^\circ C$ )	9.4*	A
	Drain Current -Continuous( $T_c=100^\circ C$ )	5.9*	
$I_{DM}$	Drain Current -Pulsed (Note 1)	36.0*	A
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	920	mJ
$I_{AR}$	Avalanche Current (Note 1)	9.4	A
$E_{AR}$	Repetitive Avalanche Energy (Note 1)	6.5	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ (Note 3)	4.5	V/ns
$P_D$	Power Dissipation ( $T_c=25^\circ C$ )	65	W
	--Derate above $25^\circ C$	0.25	
$T_J, Topr$	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
$T_L$	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ C$

\* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Junction-to-Case	—	1.93	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	—	62.5	$^\circ C/W$

**Electrical Characteristics**( $T_c=25^{\circ}\text{C}$  unless otherwise noted)

**On Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{Gsth}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.5	—	4.5	V
$R_{DSON}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=4.7\text{A}$	—	0.85	0.98	$\Omega$

**Off Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	800	—	—	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu\text{A}$ , Referenced to $25^{\circ}\text{C}$	—	0.99	—	$\text{V}/^{\circ}\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=800\text{V}, V_{GS}=0\text{V}$	—	—	1	$\mu\text{A}$
		$V_{DS}=640\text{V}, T_c=125^{\circ}\text{C}$	—	—	100	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS}=30\text{V}, V_{DS}=0\text{V}$	—	—	100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS}=-30\text{V}, V_{DS}=0\text{V}$	—	—	-100	nA

**Dynamic Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$C_{jss}$	Input Capacitance	$V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1.0\text{MHz}$	—	2800	3600	pF
$C_{oss}$	Output Capacitance		—	230	300	pF
$C_{rss}$	Reverse Transfer Capacitance		—	20	25	pF

**Switching Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{don}$	Turn-On Delay Time	$V_{DD}=400\text{V}$ $I_D=9.4\text{A}$ $R_G=25\Omega$ (Note 4、5)	—	60	120	ns
$t_r$	Turn-On Rise Time		—	150	300	ns
$t_{doff}$	Turn-Off Delay Time		—	120	240	ns
$t_f$	Turn-Off Fall Time		—	120	240	ns
$Q_g$	Total Gate Charge		$V_{DS}=640\text{V}$	—	58	75
$Q_{gs}$	Gate-Source Charge	$I_D=9.4\text{A}$	—	17.5	—	nc
$Q_{gd}$	Gate-Drain Charge	$V_{GS}=10\text{V}$ (Note 4、5)	—	22	—	nc

**Drain-Source Diode Characteristics and Maximum Ratings**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$I_S$	Maximum Continuous Drain-source diode forward current		—	—	9.4	A
$I_{sm}$	Maximum pulsed drain-source diode diode forward current		—	—	36.0	A
$V_{sd}$	Drain-source diode forward Voltage	$V_{GS}=0\text{V}, I_S=9.4\text{A}$	—	—	1.5	V
$T_{rr}$	Reverse Recovery Time	$V_{GS}=0\text{V}, I_S=9.4\text{A}$	—	420	—	ns
$Q_{rr}$	Reverse Recovery charge	$dif/dt=100\text{A}/\mu\text{s}$ (Note 4)	—	4.2	—	$\mu\text{C}$

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2.  $L=17.3\text{mH}$ ,  $I_{AS}=10.0\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^{\circ}\text{C}$
3.  $I_{SD} \leq 9.4\text{A}$ ,  $dif/dt \leq 300\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^{\circ}\text{C}$
4. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
5. Essentially Independent of Operating Temperature.

Typical Characteristics

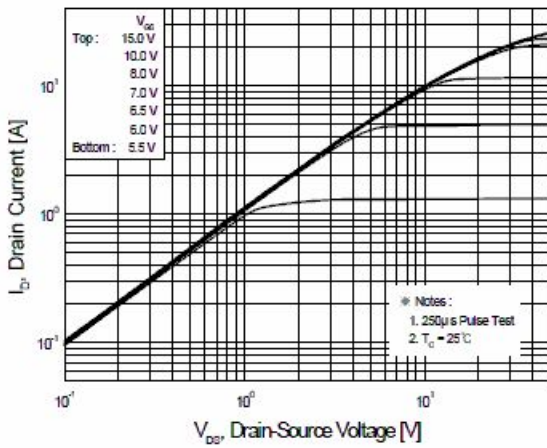


Figure 1. On Region Characteristics

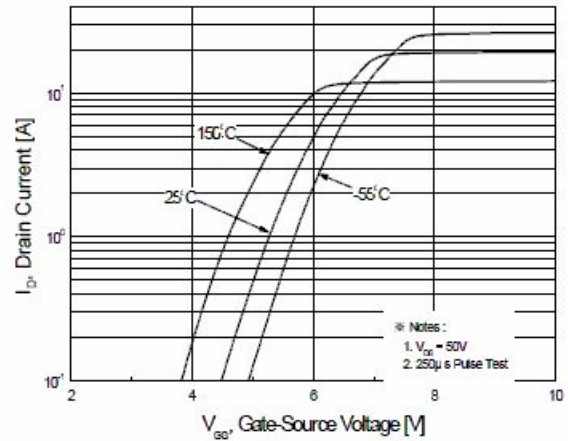


Figure 2. Transfer Characteristics

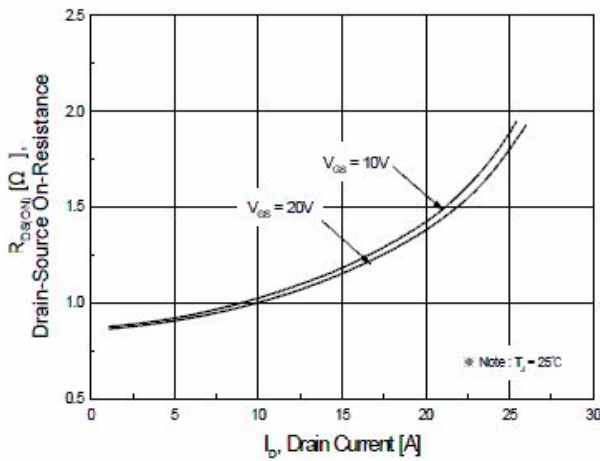


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

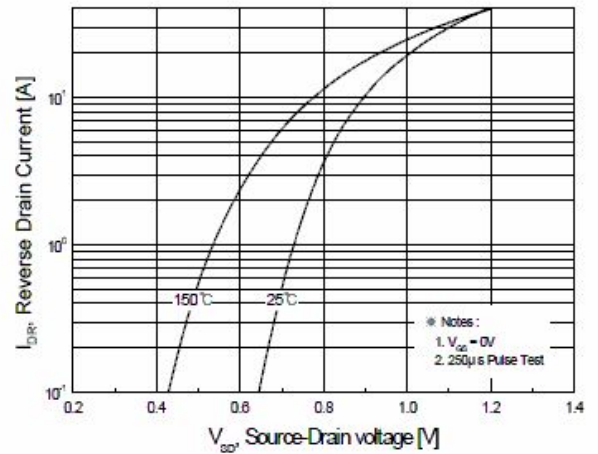


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

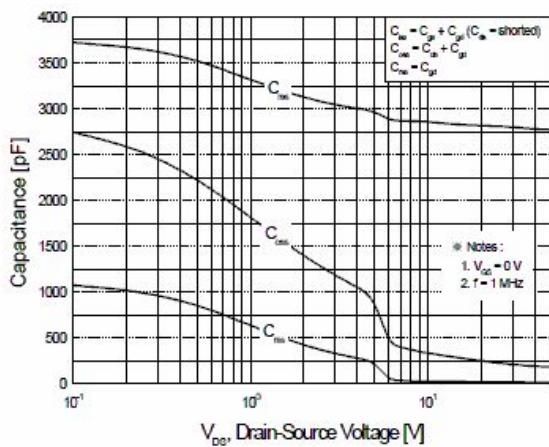


Figure 5. Capacitance Characteristics

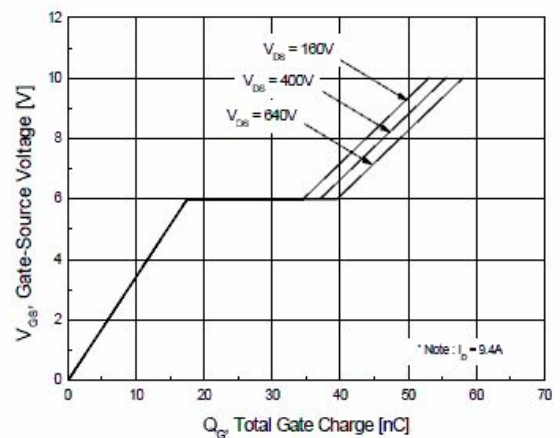


Figure 6. Gate Charge Characteristics

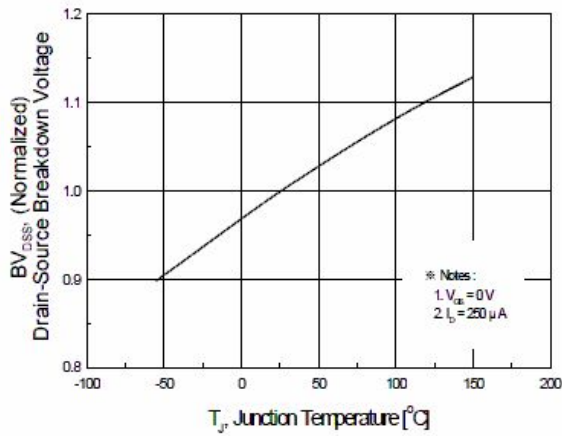


Figure 7. Breakdown Voltage Variation vs Temperature

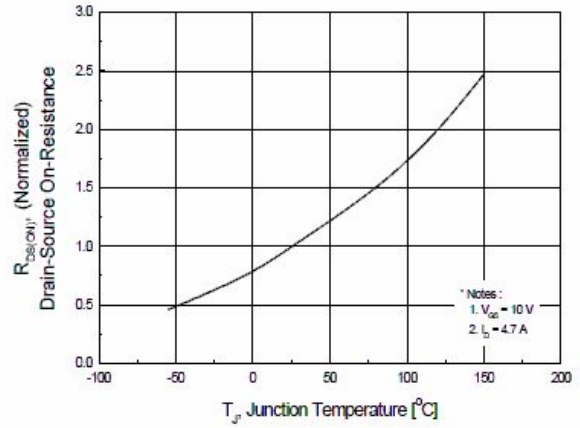


Figure 8. On-Resistance Variation vs Temperature

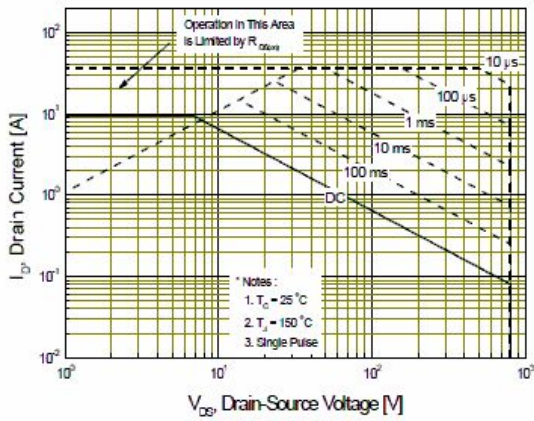


Figure 9. Maximum Safe Operating Area

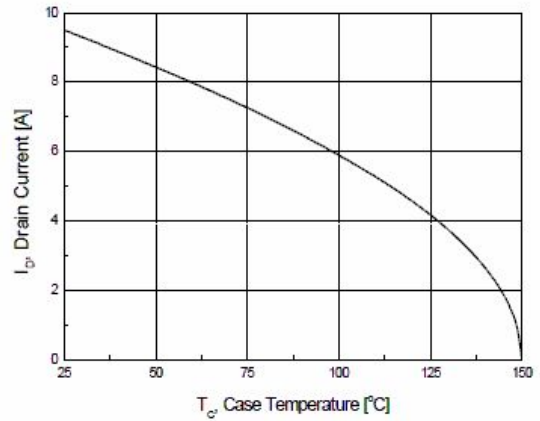


Figure 10. Maximum Drain Current vs Case Temperature

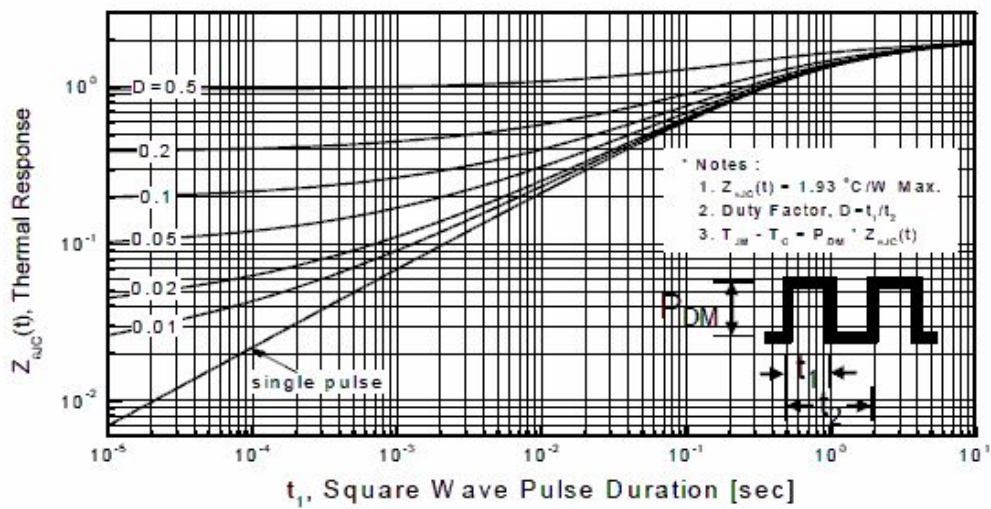


Figure 11. Transient Thermal Response Curve

Test circuits and waveforms

Fig 12. Gate Charge Test Circuit & Waveform

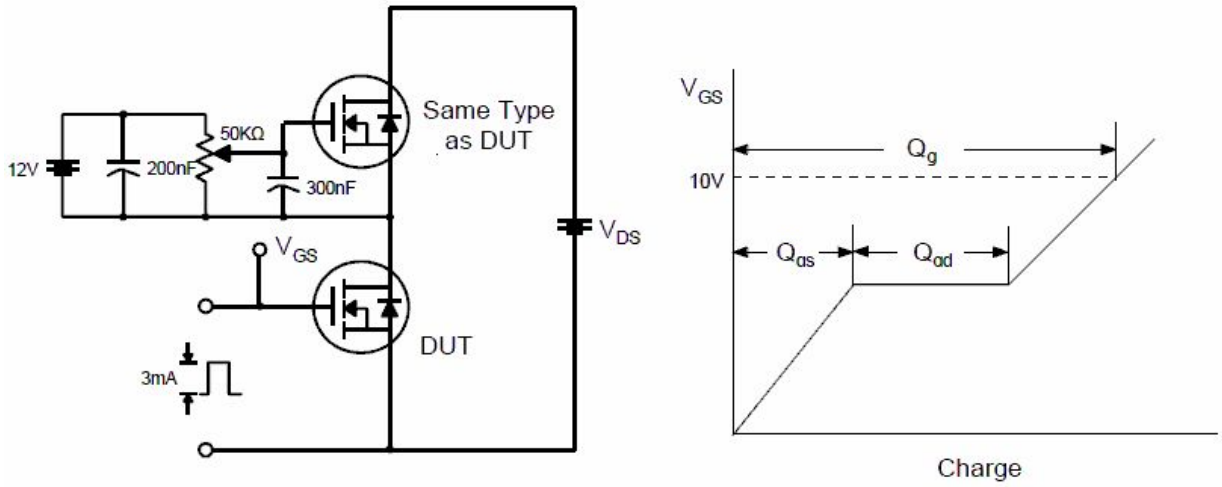


Fig 13. Resistive Switching Test Circuit & Waveforms

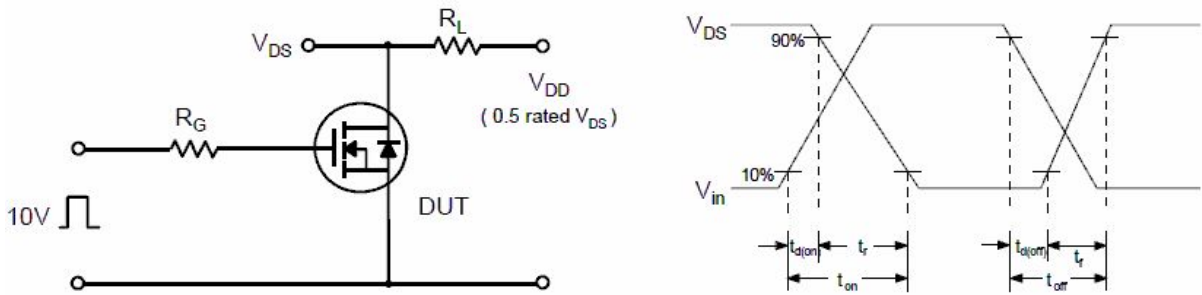


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

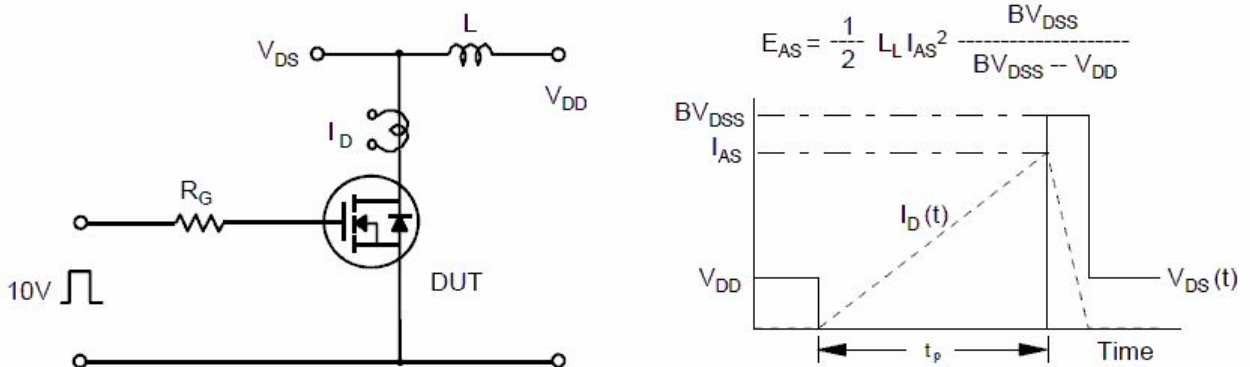
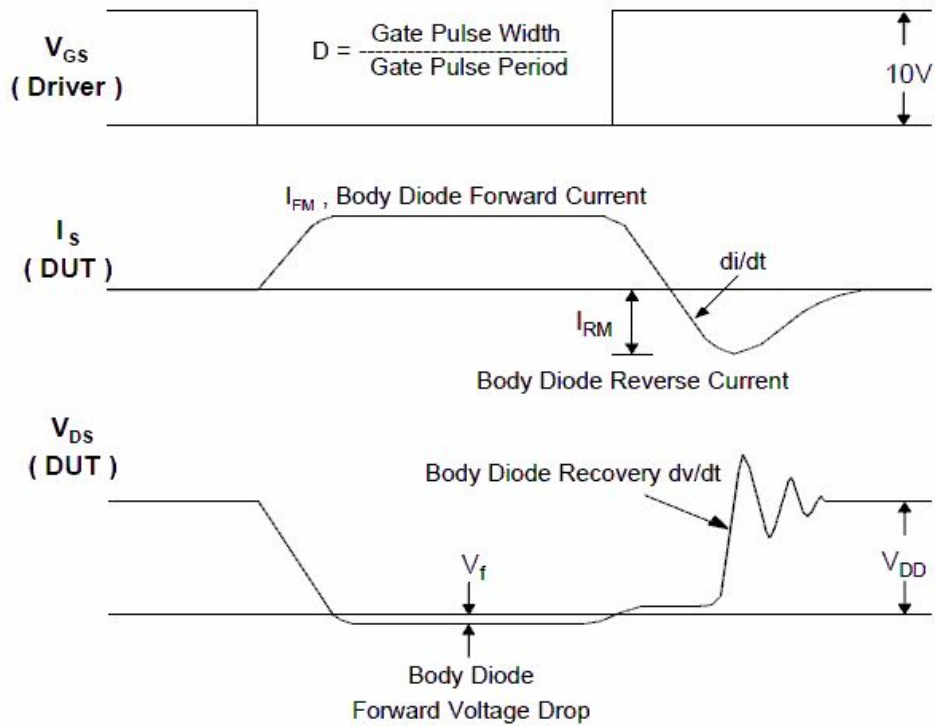
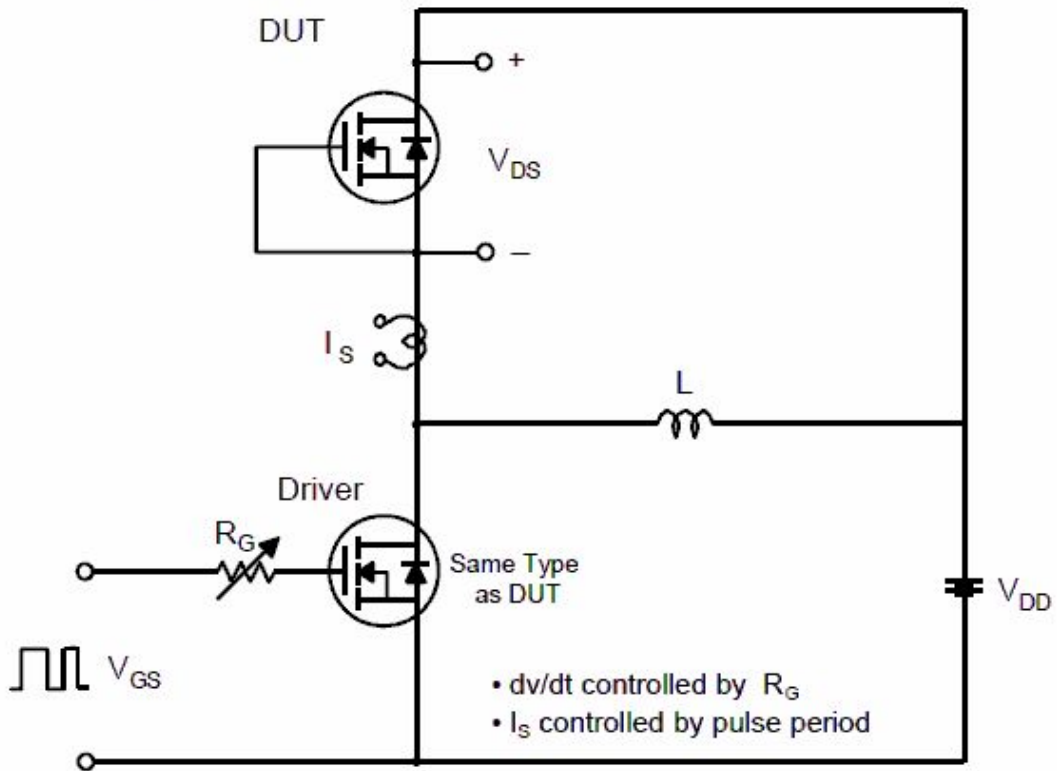


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

