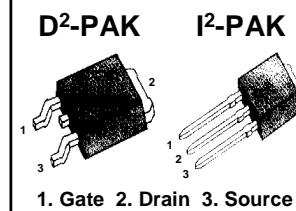


FEATURES

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- 175°C Operating Temperature
- Lower Leakage Current : 10 µA (Max.) @ $V_{DS} = -60V$
- Low $R_{DS(ON)}$: 0.206 Ω (Typ.)

$BV_{DSS} = -60 V$
 $R_{DS(on)} = 0.28 \Omega$
 $I_D = -9.7 A$



Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	-60	V
I_D	Continuous Drain Current ($T_C=25^\circ C$)	-9.7	A
	Continuous Drain Current ($T_C=100^\circ C$)	-6.8	
I_{DM}	Drain Current-Pulsed	① -40	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy	② 161	mJ
I_{AR}	Avalanche Current	① -9.7	A
E_{AR}	Repetitive Avalanche Energy	① 4.9	mJ
dv/dt	Peak Diode Recovery dv/dt	③ -5.5	V/ns
P_D	Total Power Dissipation ($T_A=25^\circ C$) *	3.8	W
	Total Power Dissipation ($T_C=25^\circ C$)	49	W
	Linear Derating Factor	0.33	$W^\circ C$
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to +175	$^\circ C$
T_L	Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5-seconds	300	

Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	3.06	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient *	--	40	
$R_{\theta JA}$	Junction-to-Ambient	--	62.5	

* When mounted on the minimum pad size recommended (PCB Mount).

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	-60	--	--	V	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=-250\mu\text{A}$
$\Delta \text{BV}/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	-0.04	--	V°C	$\text{I}_D=-250\mu\text{A}$ See Fig 7
$\text{V}_{\text{GS(th)}}$	Gate Threshold Voltage	-2.0	--	-4.0	V	$\text{V}_{\text{DS}}=-5\text{V}, \text{I}_D=-250\mu\text{A}$
I_{GSS}	Gate-Source Leakage , Forward	--	--	-100	nA	$\text{V}_{\text{GS}}=-20\text{V}$
	Gate-Source Leakage , Reverse	--	--	100		$\text{V}_{\text{GS}}=20\text{V}$
I_{DSS}	Drain-to-Source Leakage Current	--	--	-10	μA	$\text{V}_{\text{DS}}=-60\text{V}$
		--	--	-100		$\text{V}_{\text{DS}}=-48\text{V}, \text{T}_C=150^\circ\text{C}$
$\text{R}_{\text{DS(on)}}$	Static Drain-Source On-State Resistance	--	--	0.28	Ω	$\text{V}_{\text{GS}}=-10\text{V}, \text{I}_D=-4.9\text{A}$ ④
g_{fs}	Forward Transconductance	--	4.1	--	S	$\text{V}_{\text{DS}}=-30\text{V}, \text{I}_D=-4.9\text{A}$ ④
C_{iss}	Input Capacitance	--	465	600	pF	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=-25\text{V}, f=1\text{MHz}$ See Fig 5
C_{oss}	Output Capacitance	--	140	215		
C_{rss}	Reverse Transfer Capacitance	--	40	60		
$t_{\text{d(on)}}$	Turn-On Delay Time	--	11	30	ns	$\text{V}_{\text{DD}}=-30\text{V}, \text{I}_D=-9.7\text{A},$ $\text{R}_G=18\Omega$ See Fig 13 ④⑤
t_r	Rise Time	--	21	50		
$t_{\text{d(off)}}$	Turn-Off Delay Time	--	29	65		
t_f	Fall Time	--	20	50		
Q_g	Total Gate Charge	--	15	19	nC	$\text{V}_{\text{DS}}=-48\text{V}, \text{V}_{\text{GS}}=-10\text{V},$ $\text{I}_D=-9.7\text{A}$ See Fig 6 & Fig 12 ④⑤
Q_{gs}	Gate-Source Charge	--	2.9	--		
Q_{gd}	Gate-Drain("Miller") Charge	--	6.0	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	-9.7	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current ①	--	--	-40		
V_{SD}	Diode Forward Voltage ④	--	--	-3.8	V	$\text{T}_J=25^\circ\text{C}, \text{I}_S=-9.7\text{A}, \text{V}_{\text{GS}}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	80	--	ns	$\text{T}_J=25^\circ\text{C}, \text{I}_F=-9.7\text{A}$ $d\text{I}/dt=100\text{A}/\mu\text{s}$ ④
Q_{rr}	Reverse Recovery Charge	--	0.22	--		

Notes :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=2.0\text{mH}, \text{I}_{\text{AS}}=-9.7\text{A}, \text{V}_{\text{DD}}=-25\text{V}, \text{R}_G=27\Omega^*$, Starting $\text{T}_J=25^\circ\text{C}$
- ③ $\text{I}_{\text{SD}} \leq -9.7\text{A}, d\text{I}/dt \leq 250\text{A}/\mu\text{s}, \text{V}_{\text{DD}} \leq \text{BV}_{\text{DSS}}$, Starting $\text{T}_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width = $250\mu\text{s}$, Duty Cycle $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

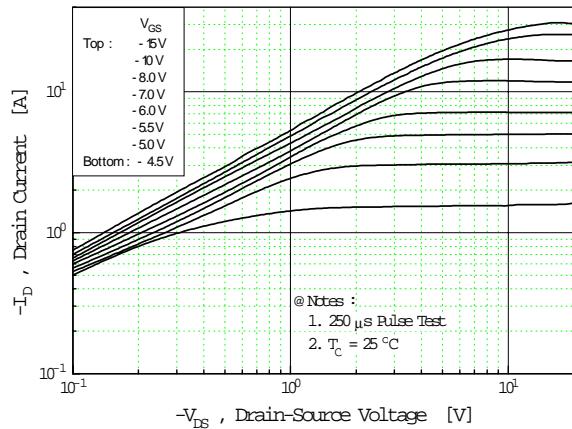


Fig 2. Transfer Characteristics

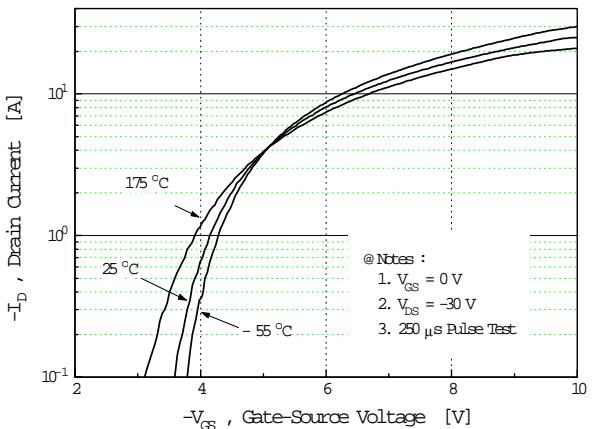


Fig 3. On-Resistance vs. Drain Current

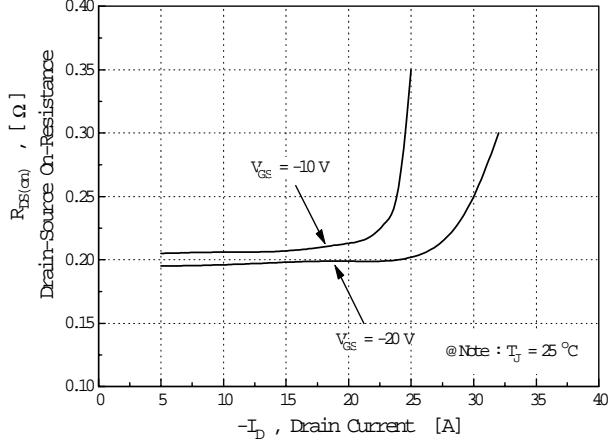


Fig 4. Source-Drain Diode Forward Voltage

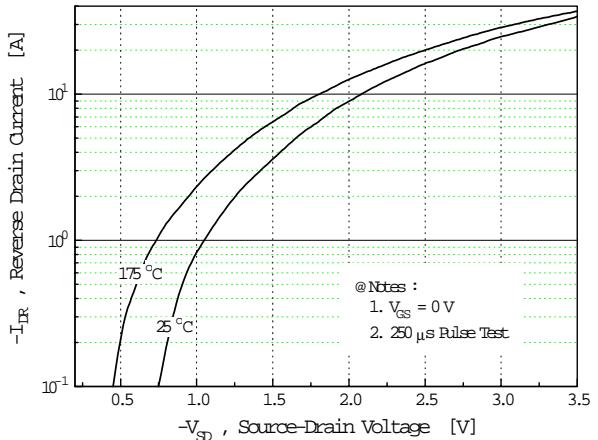


Fig 5. Capacitance vs. Drain-Source Voltage

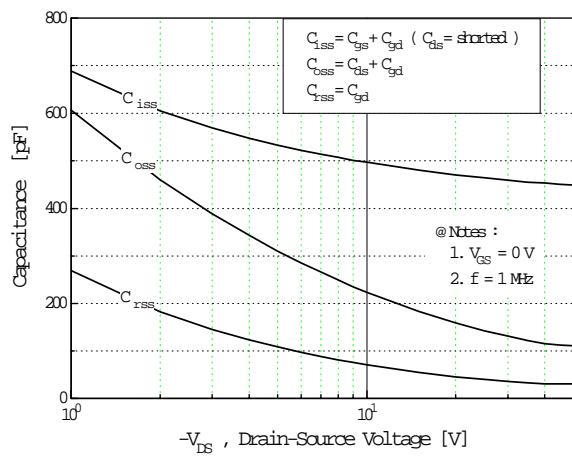


Fig 6. Gate Charge vs. Gate-Source Voltage

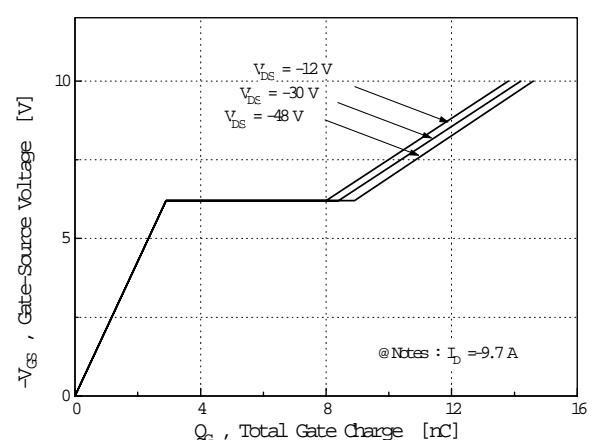


Fig 7. Breakdown Voltage vs. Temperature

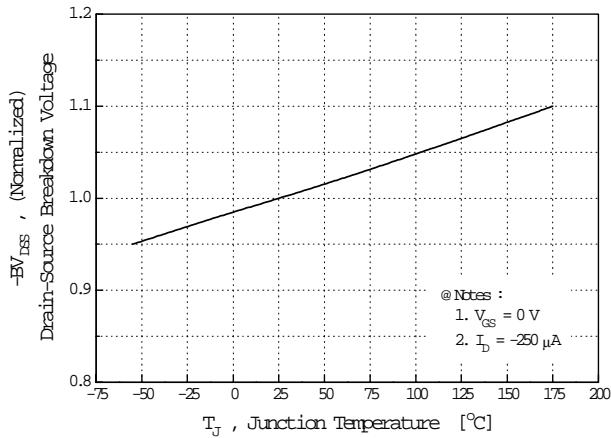


Fig 8. On-Resistance vs. Temperature

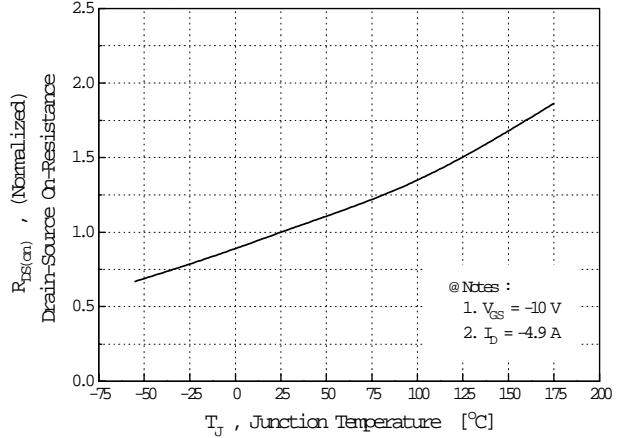


Fig 9. Max. Safe Operating Area

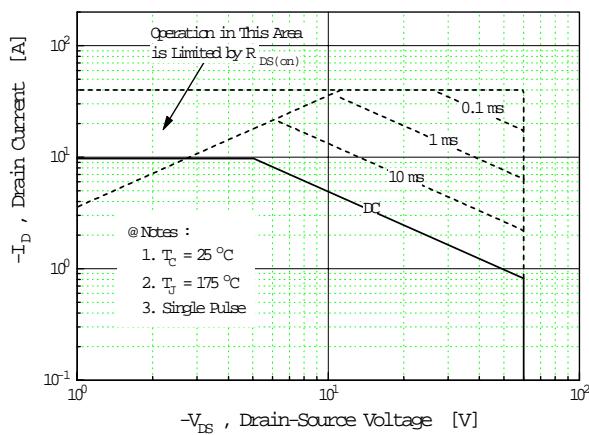


Fig 10. Max. Drain Current vs. Case Temperature

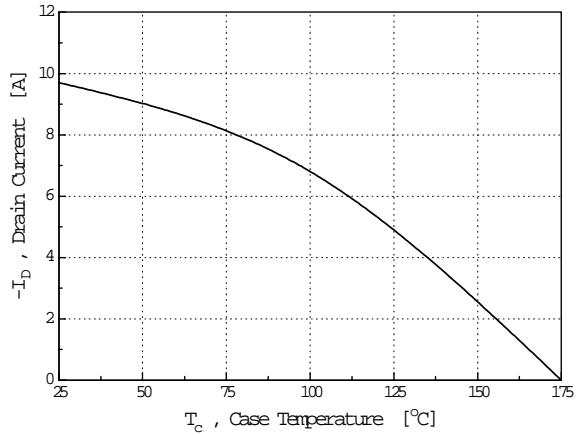


Fig 11. Thermal Response

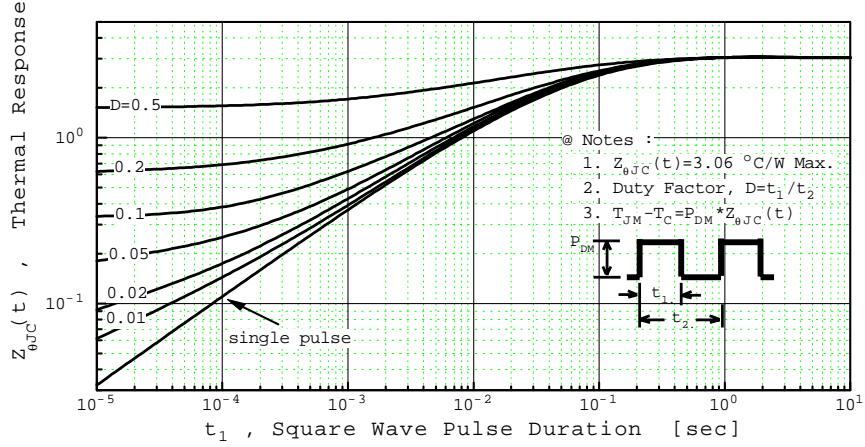


Fig 12. Gate Charge Test Circuit & Waveform

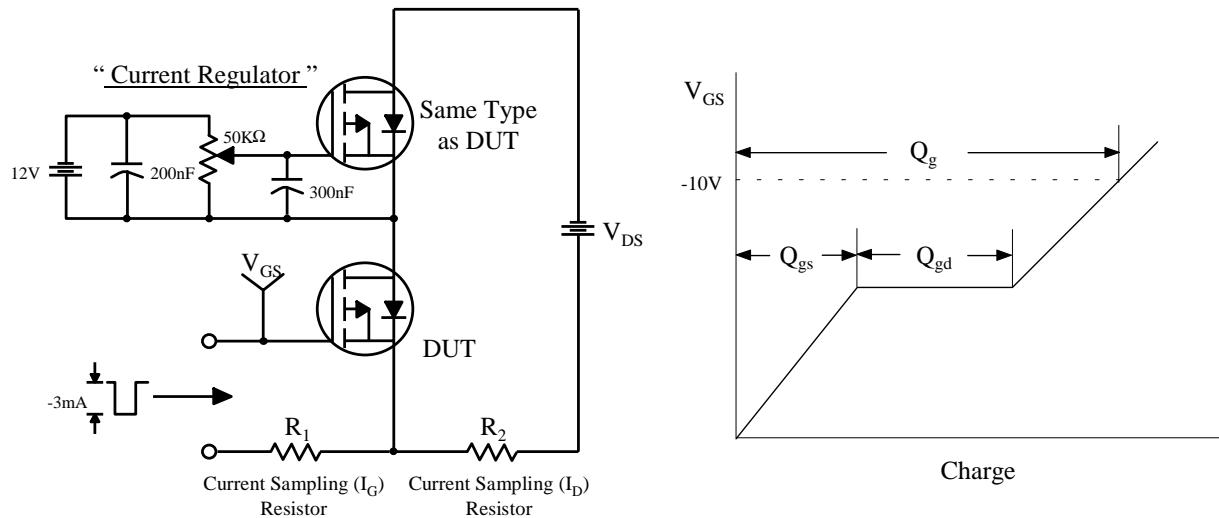


Fig 13. Resistive Switching Test Circuit & Waveforms

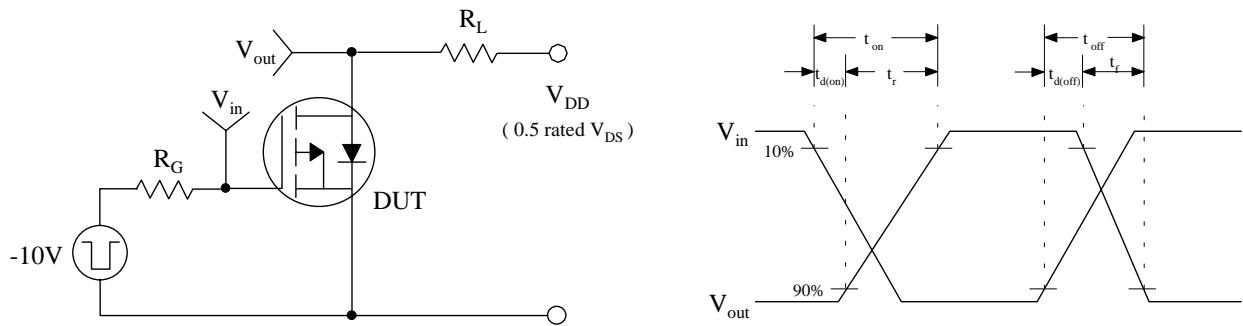


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

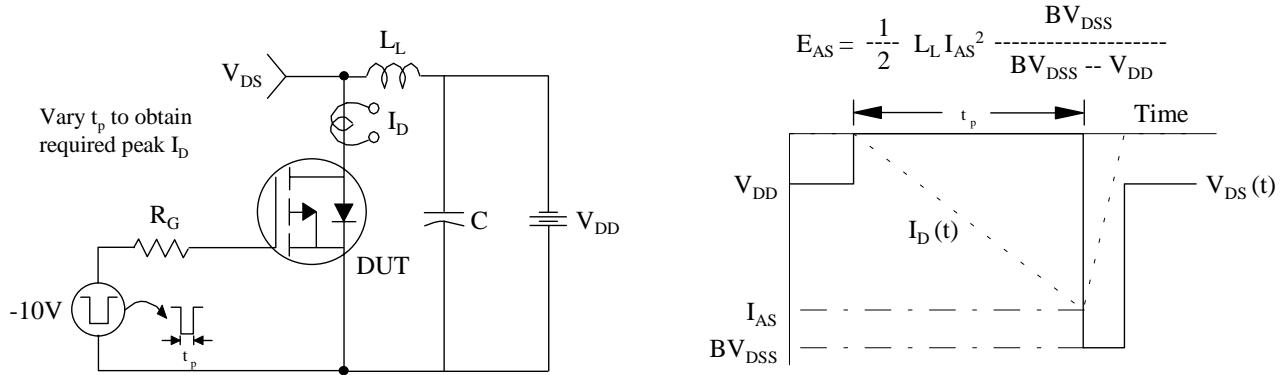
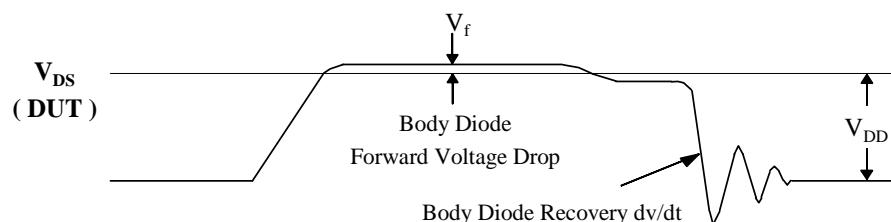
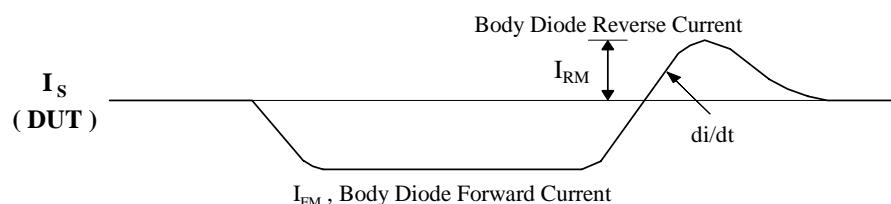
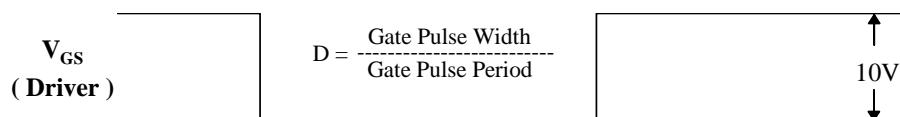
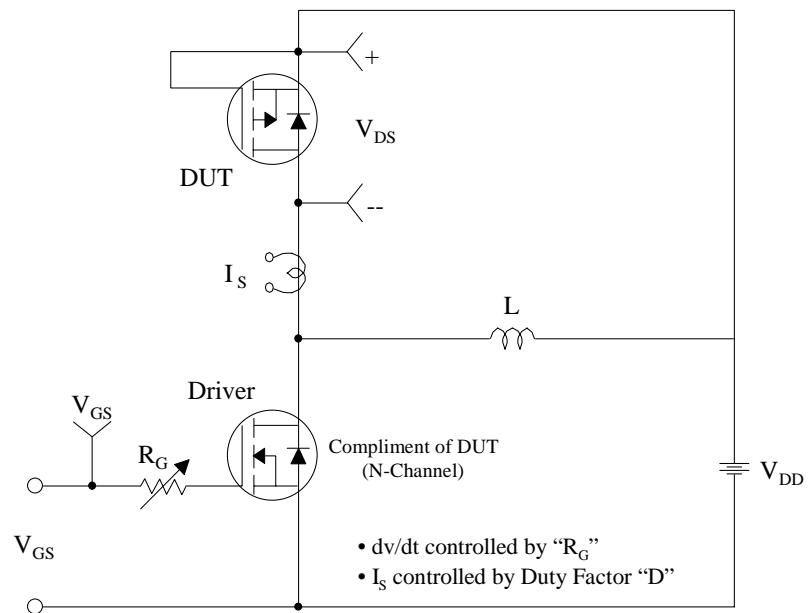


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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