

TSD630M

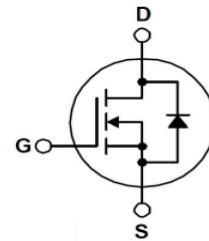
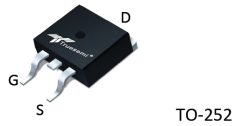
200V N-Channel MOSFET

General Description

This Power MOSFET is produced using Truesemi's advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

Features

- 9.0A, 200V, Max. $R_{DS(on)} = 0.4\Omega$
@ $V_{GS} = 10V$
- 100% avalanche tested
- RoHS compliant device and Halogen-free device



Absolute Maximum Ratings T_C=25°C unless otherwise specified

Symbol	Parameter		Value	Units
V_{DSS}	Drain-Source Voltage		200	V
V_{GS}	Gate-Source Voltage		± 30	V
I_D	Drain Current ^(Note 1)	$T_C = 25^\circ C$	9	A
		$T_C = 100^\circ C$	6	A
I_{DM}	Pulsed Drain Current	(Note 1)	38	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	210	mJ
E_{AR}	Repetitive Avalanche Energy	(Note 1)	7.2	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	5.5	V/ns
P_D	Power Dissipation ($T_C = 25^\circ C$)		72	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	°C

Thermal Resistance Characteristics

Symbol	Parameter	TSD630M	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.74	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

Electrical Characteristics $T_c=25\text{ }^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	--	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 4.75\text{ A}$	--	0.34	0.40	Ω

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	200	--	--	V
I_{DSS}	Drain-source cut-off current	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
I_{GSSF}	Gate-Body Leakage Current,Forward	$V_{DS}=0\text{ V}, V_{GS}=30\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current,Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	500	--	pF
C_{oss}	Output Capacitance		--	100	--	pF
C_{rss}	Reverse Transfer Capacitance		--	40	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Time	$V_{DS}=100\text{ V}, I_D = 9.5\text{ A},$ $R_G=25\Omega$ (Note 4.5)	--	10	--	ns
t_r	Turn-On Rise Time		--	90	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	70	--	ns
t_f	Turn-Off Fall Time		--	70	--	ns
Q_g	Total Gate Charge	$V_{DS}=160\text{ V}, I_D = 9.5\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 4.5)	--	20	--	nC
Q_{gs}	Gate-Source Charge		--	3	--	nC
Q_{gd}	Gate-Drain Charge		--	10	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

I _S	Continuous Source-Drain Diode Forward Current		--	--	9.5	A
I _{SM}	Pulsed Source-Drain Diode Forward Current		--	--	39	
V _{SD}	Source-Drain Diode Forward Voltage	I _S =9.5A, V _{GS} = 0 V	--	--	1.5	V
t _{rr}	Reverse Recovery Time	I _S =9.5A, V _{GS} = 0 V di _p /dt = 100 A/μs (Note 4)	--	160	--	ns
Q _{rr}	Reverse Recovery Charge		--	1	--	uC

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=3.5\text{ mH}, I_{AS}=9.5\text{ A}, V_{DD}=50\text{ V}, R_G=25\text{ }\Omega$, Starting $T_J=25\text{ }^{\circ}\text{C}$
3. $I_{SD}\leq 9.5\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25\text{ }^{\circ}\text{C}$
4. Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Characteristics

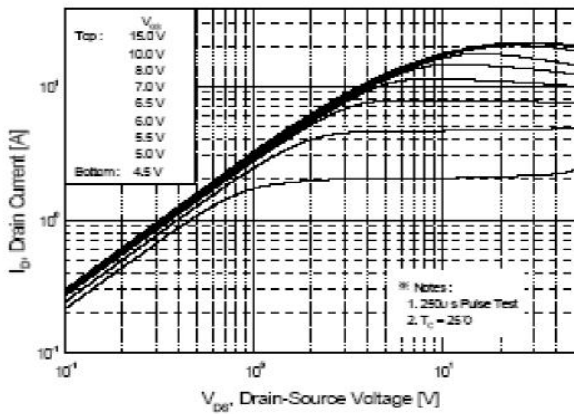


Figure 1. On-Region Characteristics

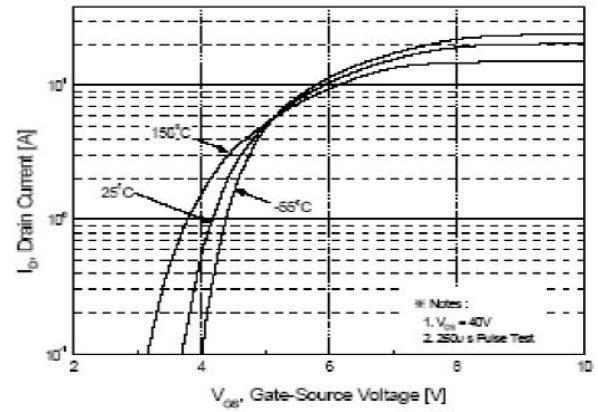


Figure 2. Transfer Characteristics

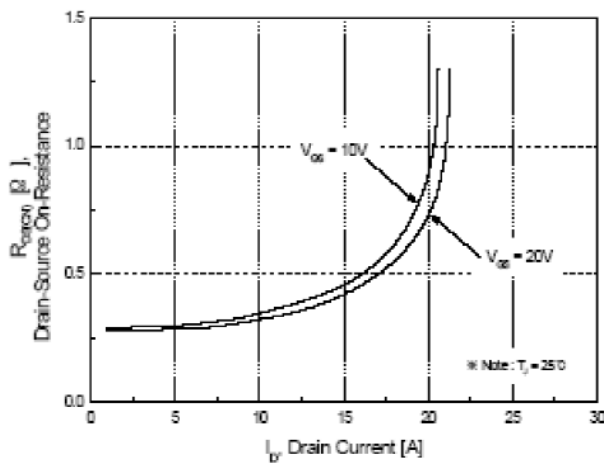


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

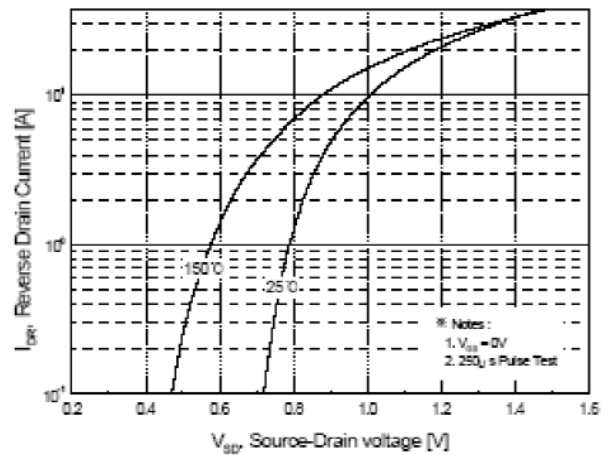


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

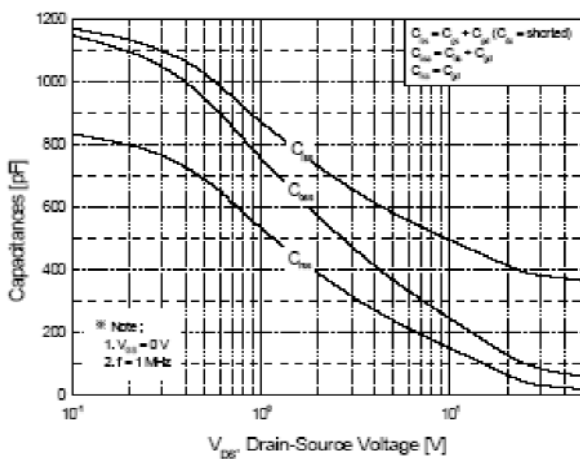


Figure 5. Capacitance Characteristics

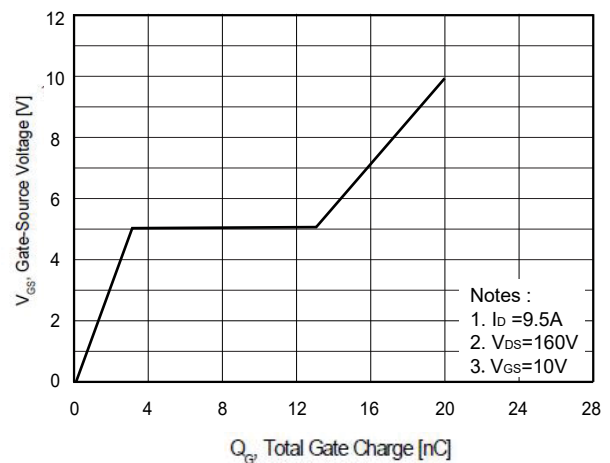


Figure 6. Gate Charge Characteristics

Typical Characteristics Curve (Continue)

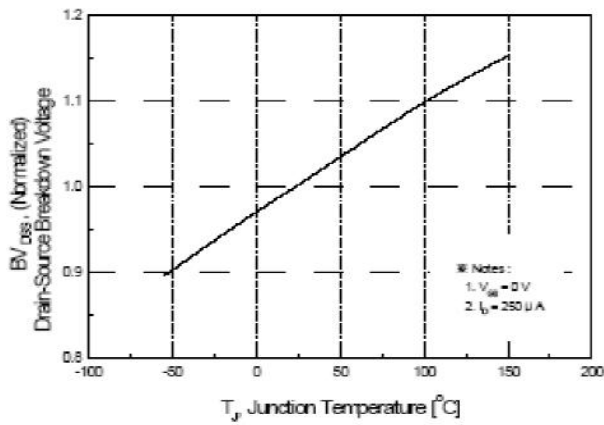


Figure 7. Breakdown Voltage Variation vs Temperature

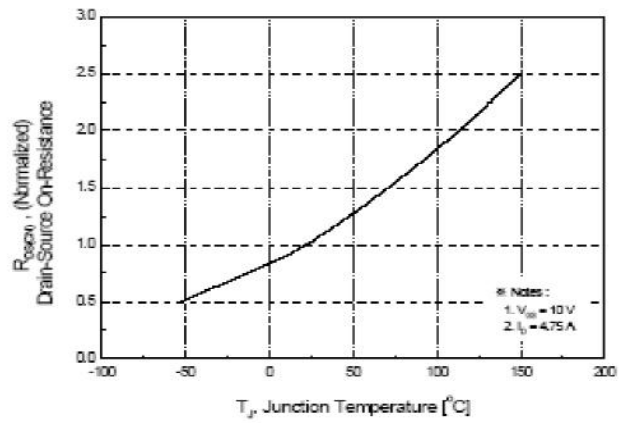


Figure 8. On-Resistance Variation vs Temperature

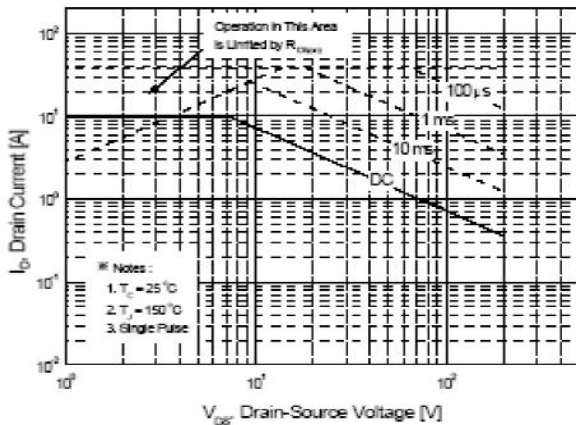


Figure 9-1. Maximum Safe Operating Area for TSD630M

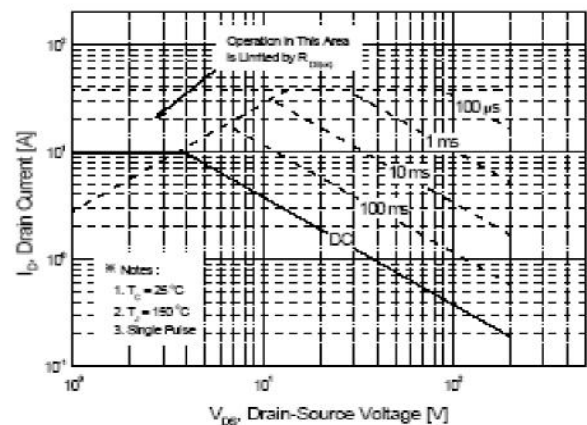


Figure 9-2. Maximum Safe Operating Area for TSD630M

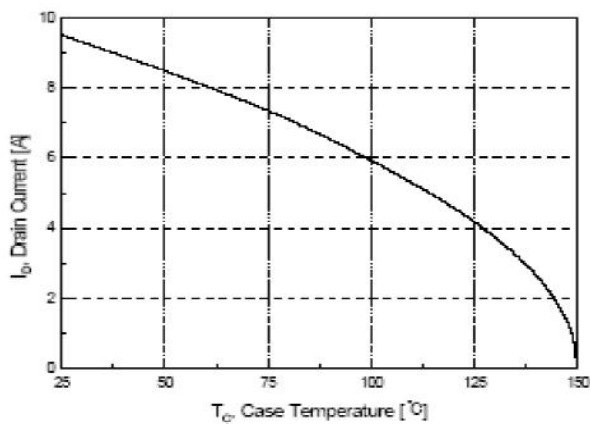


Figure 10. Maximum Drain Current vs Case Temperature

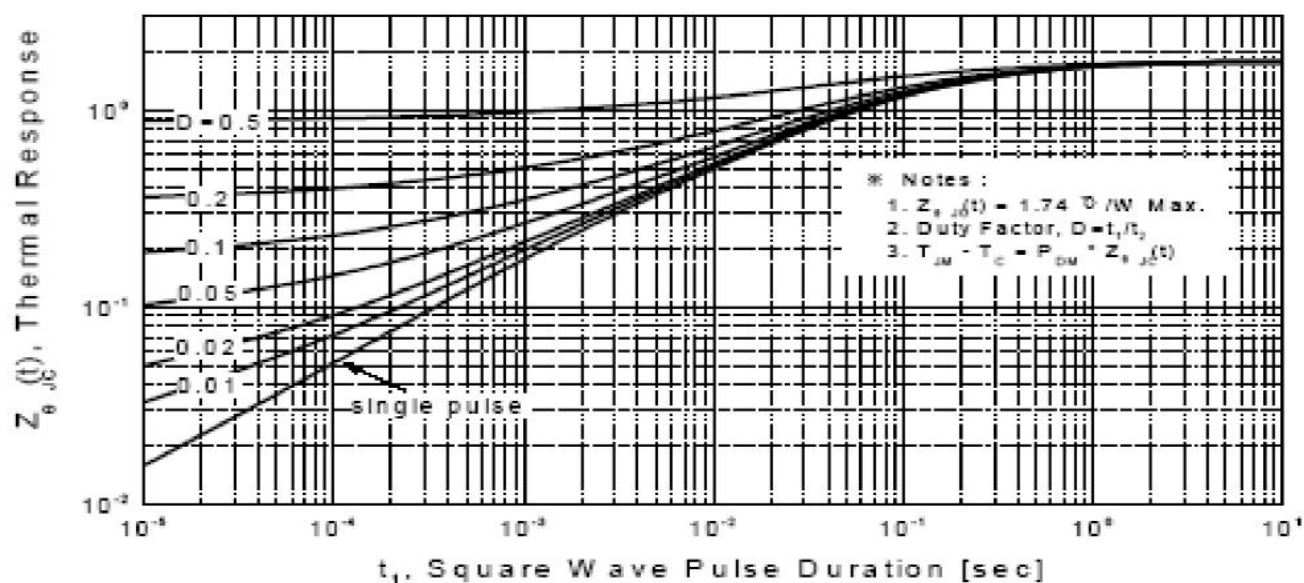


Figure 11-1. Transient Thermal Response Curve
for TSD630M

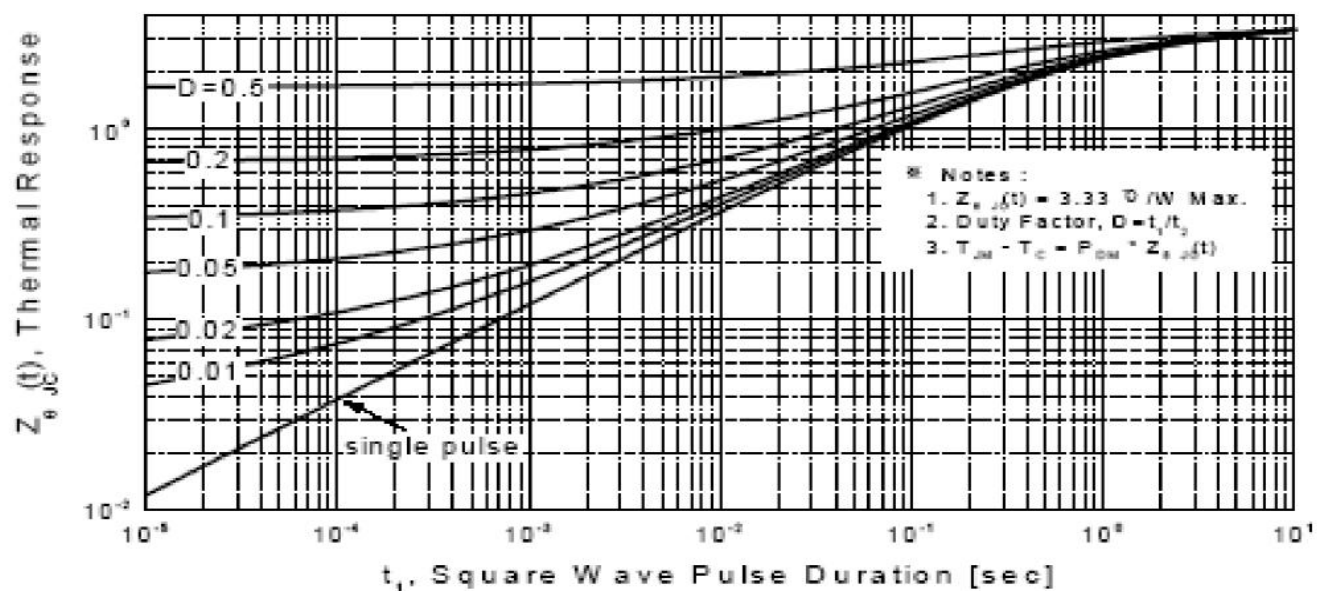


Figure 11-2. Transient Thermal Response Curve
for TSD630M

Fig 12. Gate Charge Test Circuit & Waveform

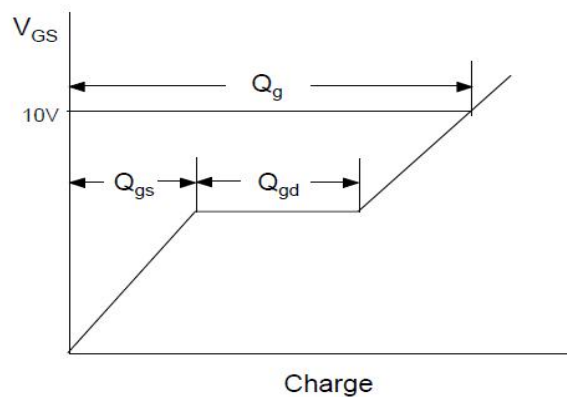
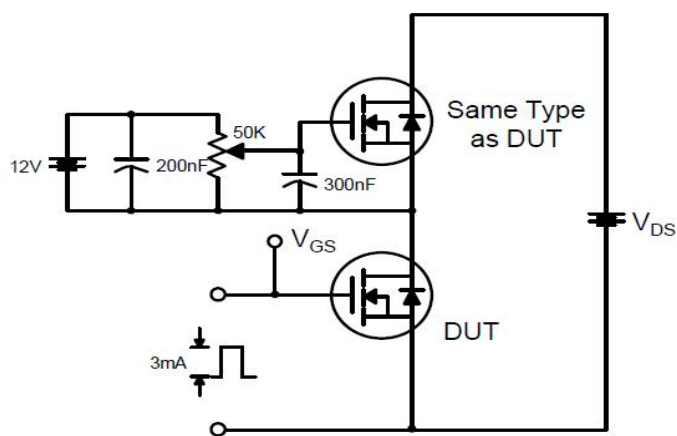


Fig 13. Resistive Switching Test Circuit & Waveforms

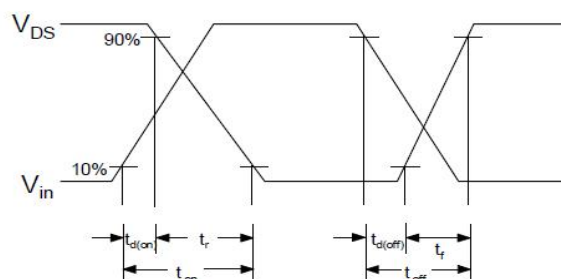
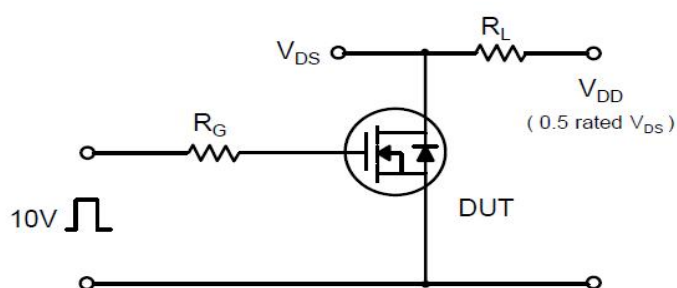


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

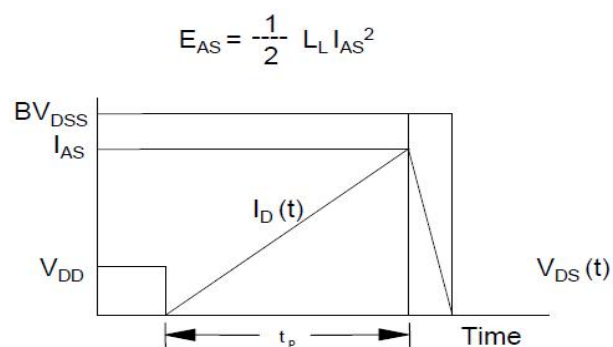
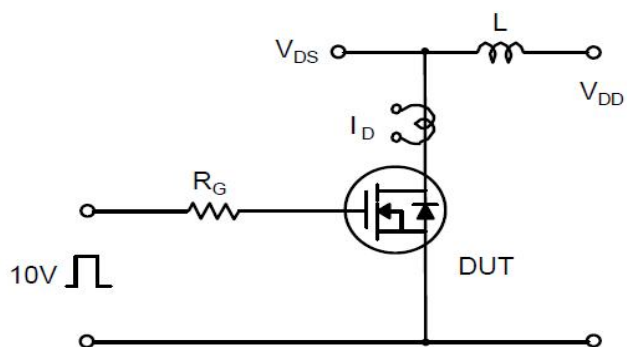


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

