

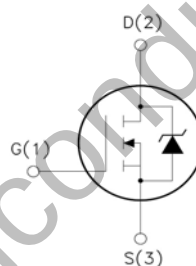
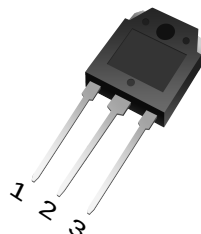


WGA90N30

Features:

- ☐ Low Intrinsic Capacitances.
- ☐ Excellent Switching Characteristics.
- ☐ Extended Safe Operating Area.
- ☐ Unrivalled Gate Charge: $Q_g = 136.2\text{nC}$ (Typ.).
- ☐ $V_{DS} = 300\text{V}$, $I_D = 90\text{A}$
- ☐ $R_{DS(on)} : 38\text{m}\Omega$ (Typ) @ $V_G = 10\text{V}$
- ☐ 100% Avalanche Tested

TO-3P



- 1. Gate (G)
- 2. Drain (D)
- 3. Source (S)

Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-to-Source Voltage	300	V
I_D	Continuous Drain Current $T_C = 25^\circ\text{C}$	90	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	42	A
I_{DM}^{a1}	Pulsed Drain Current	280	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	3450	mJ
dv/dt^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation $T_C = 25^\circ\text{C}$	250	W
	Derating Factor above 25°C	2	W/°C
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T_L	Maximum Temperature for Soldering	300	°C

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

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	300	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Bvdss Temperature Coefficient	$I_D=250\mu A, \text{Reference } 25^\circ\text{C}$	--	0.30	--	V/ $^\circ\text{C}$
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=300V, V_{GS}=0V, T_J=25^\circ\text{C}$	--	--	1	μA
		$V_{DS}=240V, V_{GS}=0V, T_J=125^\circ\text{C}$	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{DS}=0V, V_{GS}=30V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{DS}=0V, V_{GS}=-30V$	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=35A$	--	38	42	m Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	V
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Trans conductance	$V_{DS}=15V, I_D=40A$	--	9.0	--	S
R_g	Gate resistance	$f=1.0\text{MHz}$	--	3.2	--	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{MHz}$	--	8280	--	pF
C_{oss}	Output Capacitance		--	900	--	
C_{rss}	Reverse Transfer Capacitance		--	107	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=80A, V_{DD}=150V, R_G=25\Omega$	--	82.4	--	ns
t_r	Rise Time		--	301.6	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	196	--	
t_f	Fall Time		--	135	--	
Q_g	Total Gate Charge	$I_D=80A, V_{DD}=240V, V_{GS}=10V$	--	136.2	--	nC
Q_{gs}	Gate to Source Charge		--	42.8	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	47.5	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I _S	Continuous Source Current (Body Diode)		--	--	70	A
I _{SM}	Maximum Pulsed Current (Body Diode)		--	--	280	A
V _{SD}	Diode Forward Voltage	I _S =80A,V _{GS} =0V	--	--	1.5	V
t _{rr}	Reverse Recovery Time	I _S =80A,T _j = 25° C dI _F /dt=100A/us, V _{GS} =0V	--	336	--	ns
Q _{rr}	Reverse Recovery Charge		--	3460	--	nC
I _{RRM}	Reverse Recovery Current		--	20.6	--	A
Pulse width tp≤300μs, δ ≤2%						

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Junction-to-Case	0.5	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	40	$^\circ C/W$

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

^{a2}: $L=10.0mH, I_D=26.3A, \text{Start } T_J=25^\circ C$

^{a3}: $I_{SD}=80A, di/dt \leq 300A/us, V_{DD} \leq BV_{DS}, \text{Start } T_J=25^\circ C$

Typical Characteristics

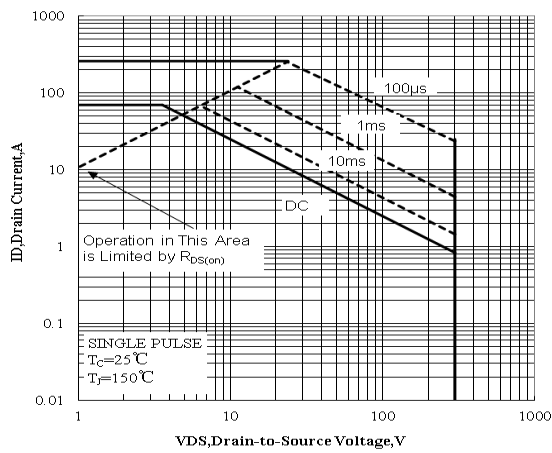


Figure 1 Maximum Forward Bias Safe Operating Area

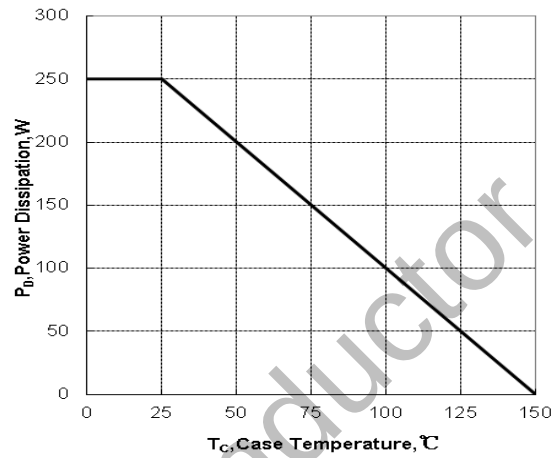


Figure 2 Maximum Power dissipation vs Case Temperature

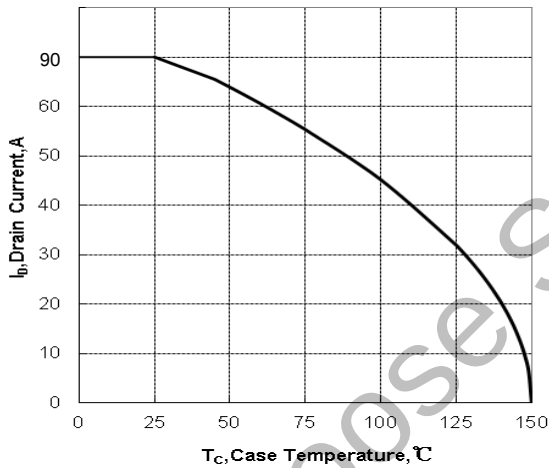


Figure 3 Maximum Continuous Drain Current vs Case Temperature

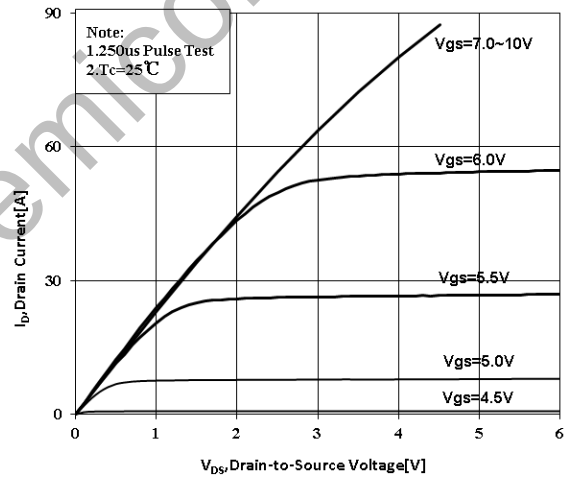


Figure 4 Typical Output Characteristics

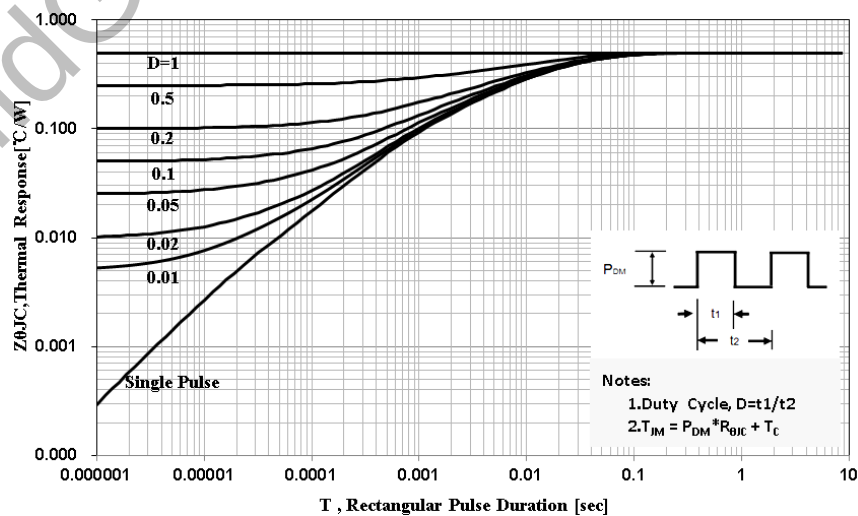


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

Typical Characteristics (Continued)

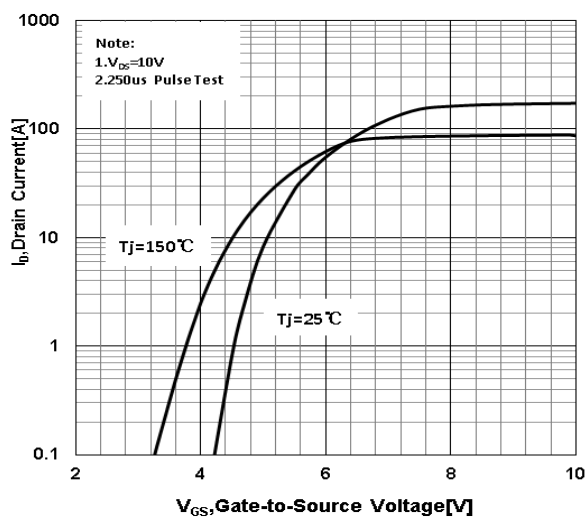


Figure 6 Typical Transfer Characteristics

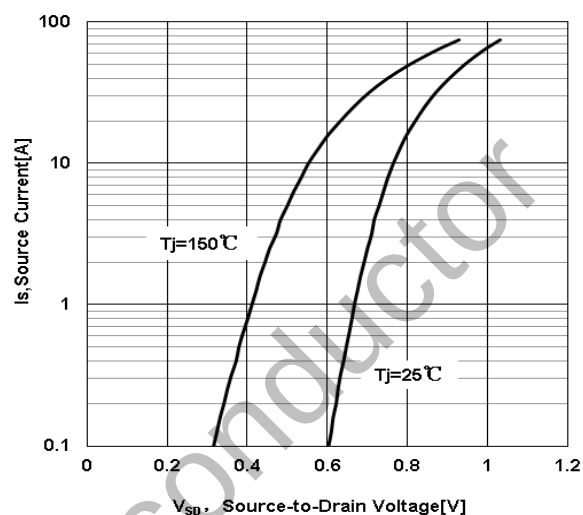


Figure 7 Typical Body Diode Transfer Characteristics

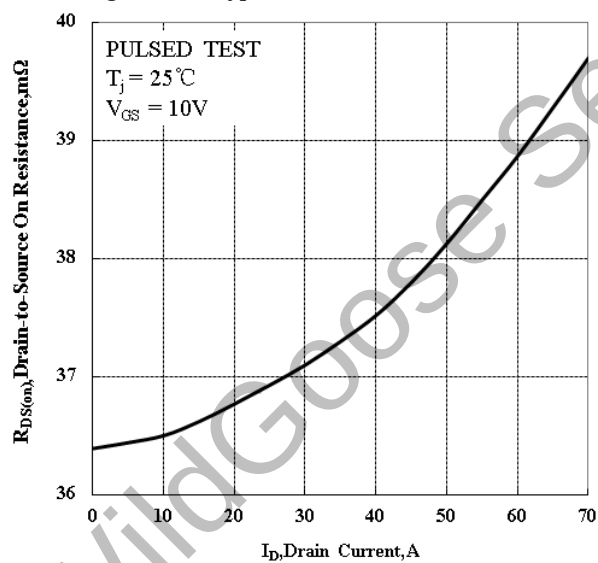


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

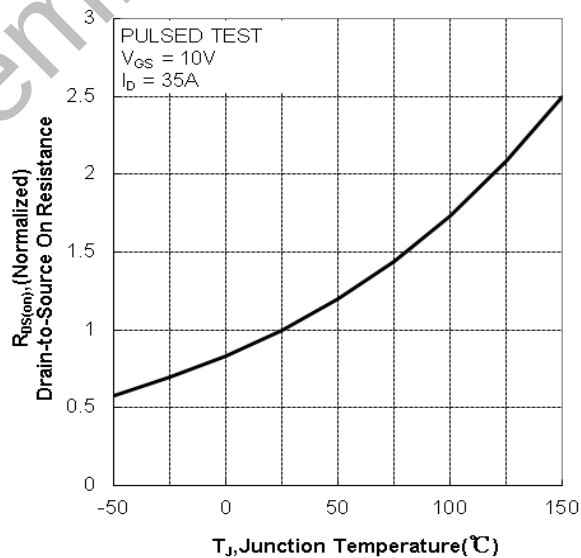


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

Typical Characteristics (Continued)

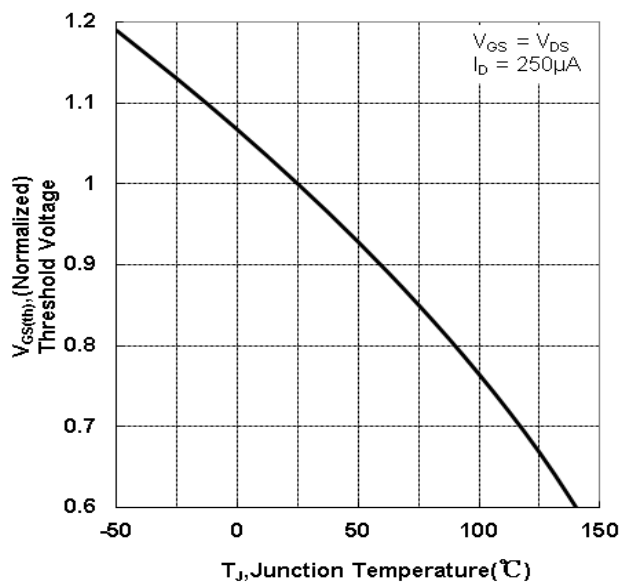


Figure 10 Typical Theshold Voltage vs Junction Temperature

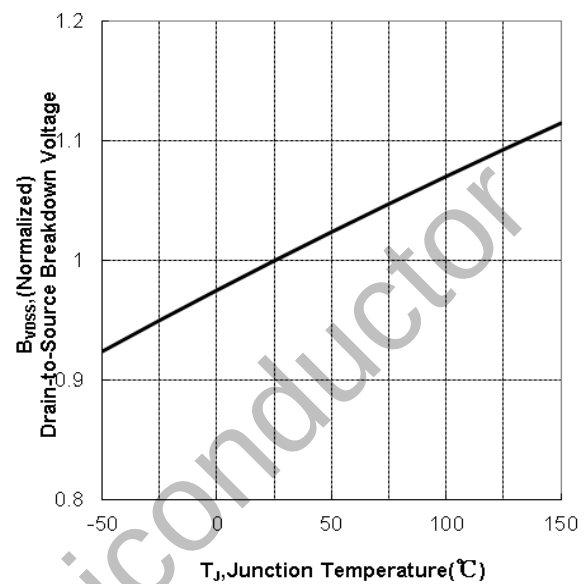


Figure 11 Typical Breakdown Voltage vs Junction Temperature

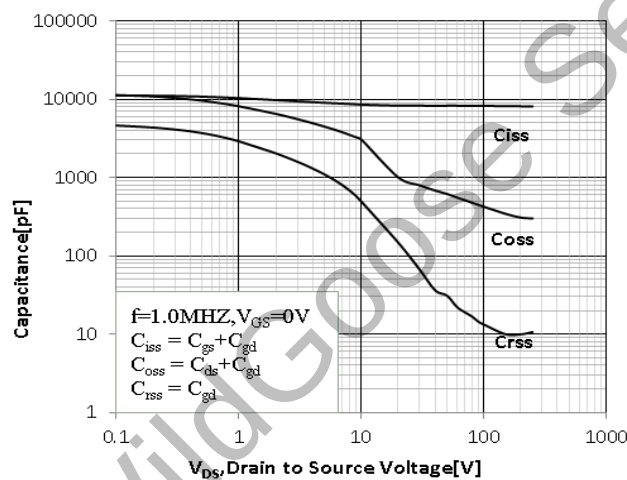


Figure 12 Typical Capacitance vs Drain to Source Voltage

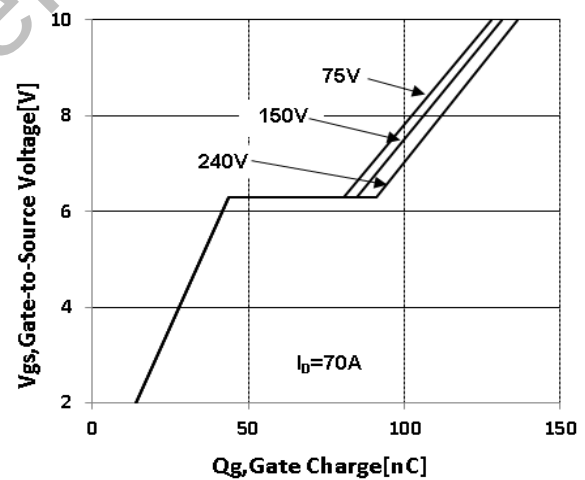


Figure 13 Typical Gate Charge vs Gate to Source Voltage

Test Circuit and Waveform

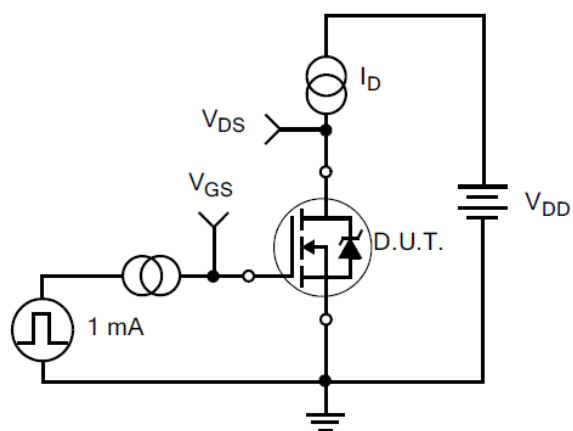


Figure 14. Gate Charge Test Circuit

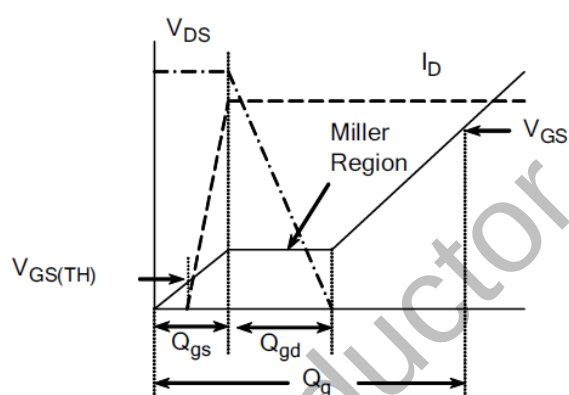


Figure 15. Gate Charge Waveforms

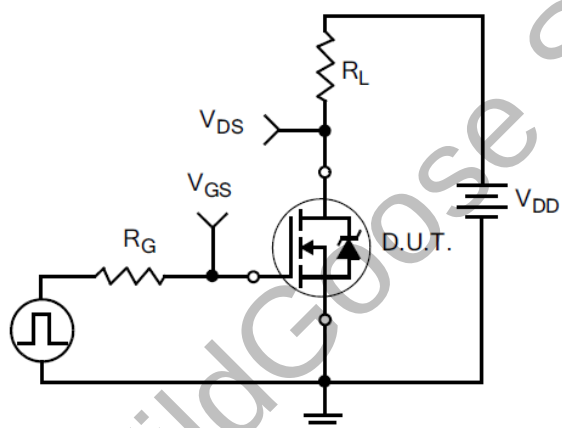


Figure 16. Resistive Switching Test Circuit

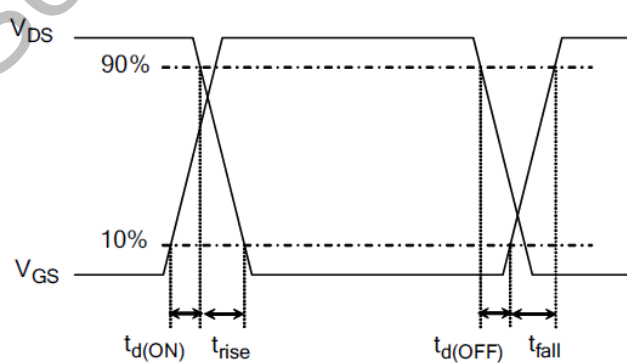


Figure 17. Resistive Switching Waveforms

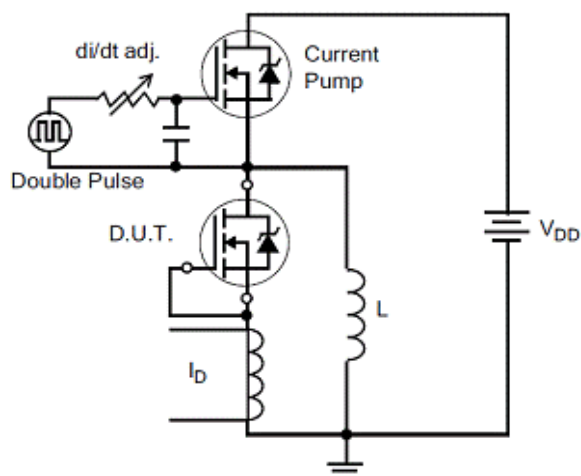


Figure 18. Diode Reverse Recovery Test Circuit

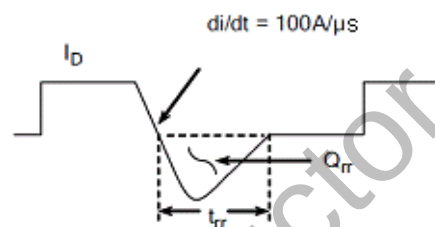


Figure 19. Diode Reverse Recovery Waveform

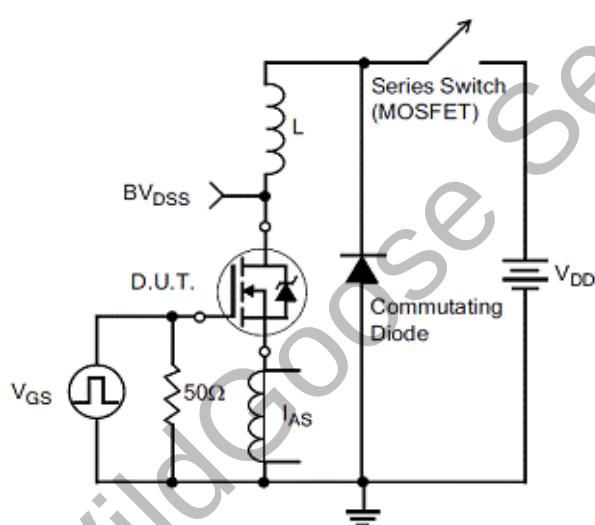


Figure20.Unclamped Inductive Switching Test Circuit

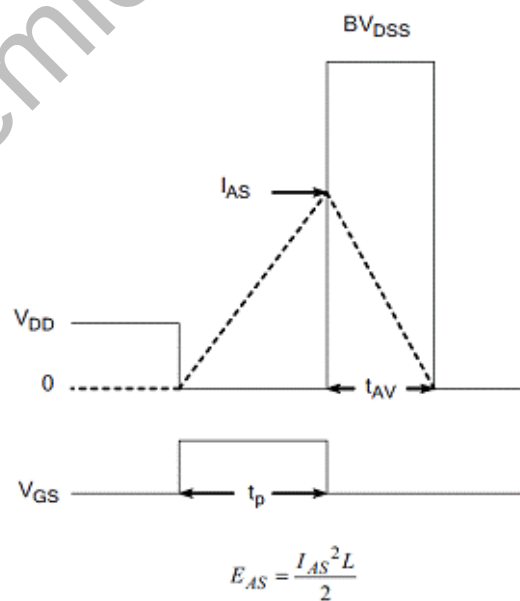


Figure21.Unclamped Inductive Switching Waveform

Package Dimension

TO-3P

Unit:mm

