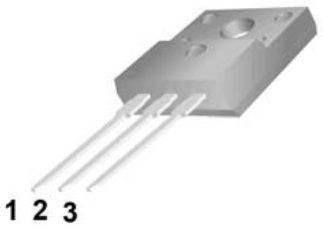
WGF4N80S

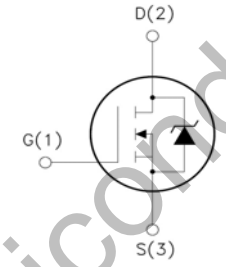
Features:

- ☐ Low Intrinsic Capacitances.
- ☐ Excellent Switching Characteristics.
- ☐ Extended Safe Operating Area.
- ☐ Unrivalled Gate Charge :Qg=6.5nC (Typ.).
- ☐ BVDSS=800V,I_D=4 A
- ☐ R_{DS}(on) :2.2 Ω (Max) @V_G=10V
- ☐ 100% Avalanche Tested

TO-220F

RoHS COMPLIANT





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

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	800	V
I_D	Drain Current -Continuous (TC = 25℃) -Continuous (TC = 100℃)	4 2.5	A
I_{DM}	Drain Current - Pulsed (Note 1)	16	A
V_{GSS}	Gate-Source voltage	±30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	230	mJ
I_{AR}	Avalanche Current (Note 1)	1	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	0.2	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.0	V/ns
dVds/dt	Drain Source voltage slope (Vds=640V)	50	V/ns
P_D	Power Dissipation (TC = 25℃)	35	W
T_J, T_{STG}	Operating and Storage Temperature Range	150,-55 to +150	℃
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300	℃

* Drain current limited by maximum junction temperature. Maximum duty cycle D=0.75.

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.57	℃/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	℃/W

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA, T_J = 25℃	800	-	-	V
		V_{GS} = 0V, I_D = 250μA, T_J = 25 ℃	-	850	-	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25℃		0.9		V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800V, V_{GS} = 0V -T_J = 25 ℃	-	-	25 -	μA μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20V	-	-	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = 20V	-	-	-100	nA
On Characteristics						
$V_{GSS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.0		4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 2A		2.2	2.8	
g_{FS}	Forward Transconductance	V_{DS} = 40V, I_D = 4A	-	4	-	S
Rg	Gate resistance	f=1 MHz, open drain	-	1.5	-	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 100kHz	-	86.5	-	pF
C_{oss}	Output Capacitance		-	82	-	pF
C_{rss}	Reverse Transfer Capacitance			7.5	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400V, I_D =4A, R_G = 10Ω(Note 4)	-	18	-	ns
t_r	Turn-On Rise Time		-	16	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	45	-	ns
t_f	Turn-Off Fall Time		-	14	-	ns
Q_g	Total Gate Charge	V_{DS} = 640V, I_D = 4A, V_{GS} = 10V (Note 4)	-	25		nc
Q_{gs}	Gate-Source Charge		-	4		nc
Q_{gd}	Gate-Drain Charge		-	11.5		nc
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		-	-	4	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	16	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 4A	-	-	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_S = 4A, dI_F/dt =100A/μs	-	274	-	ns
Q_{rr}	Reverse Recovery Charge		-	1150	-	nc

NOTES:

1.Repetitive rating; pulse width limited by maximum junction temperature
2.L=10mH, I_D=6.8A, Start T_J=25℃
3.I_{SD} =4A,di/dt ≤100A/us,V_{DD}≤$BV_{DS,}$ Start T_J=25℃

Typical Characteristics

Characteristics Curve:

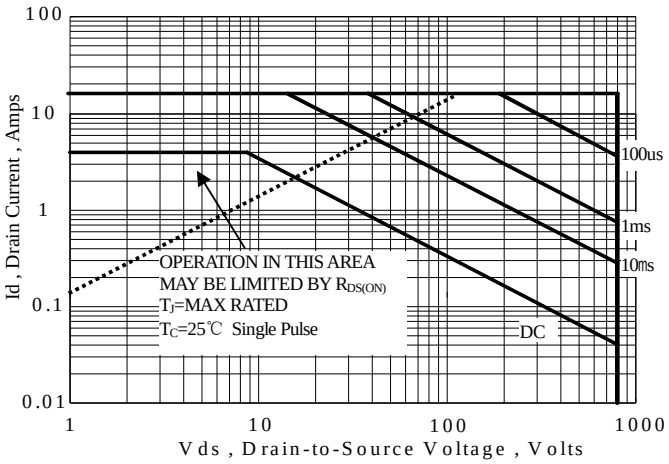


Figure 1 Maximum Forward Bias Safe Operating Area

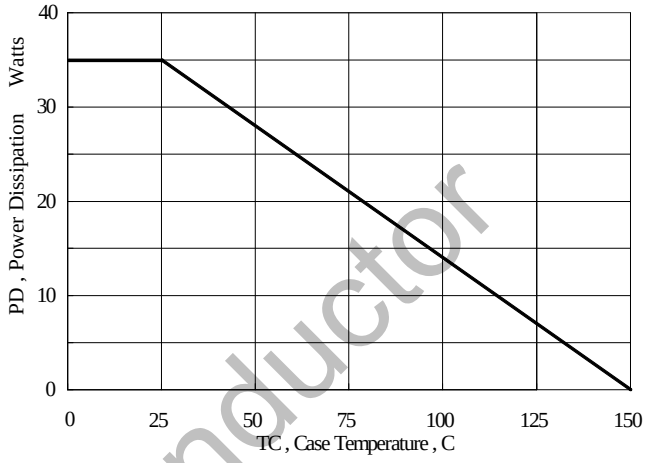


Figure 2 Maximum Power Dissipation vs Case Temperature

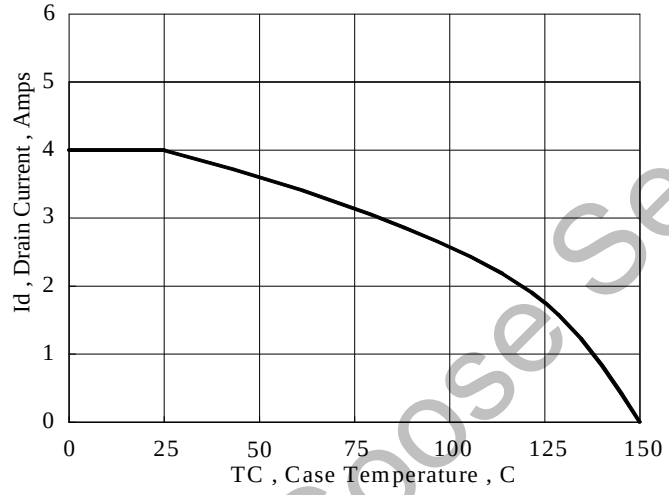


Figure 3 Maximum Continuous Drain Current vs Case Temperature

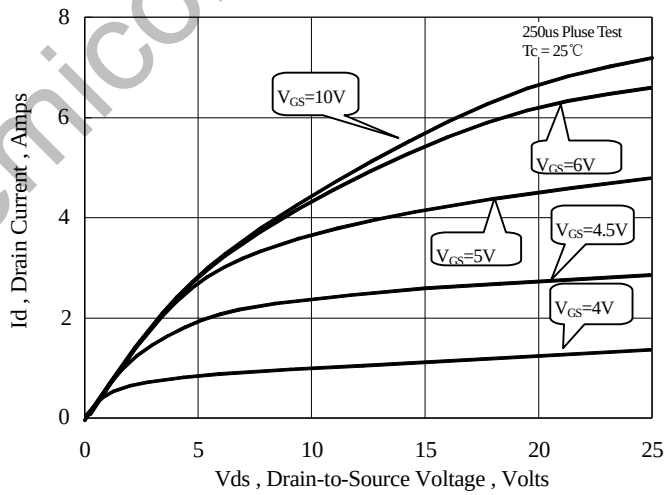
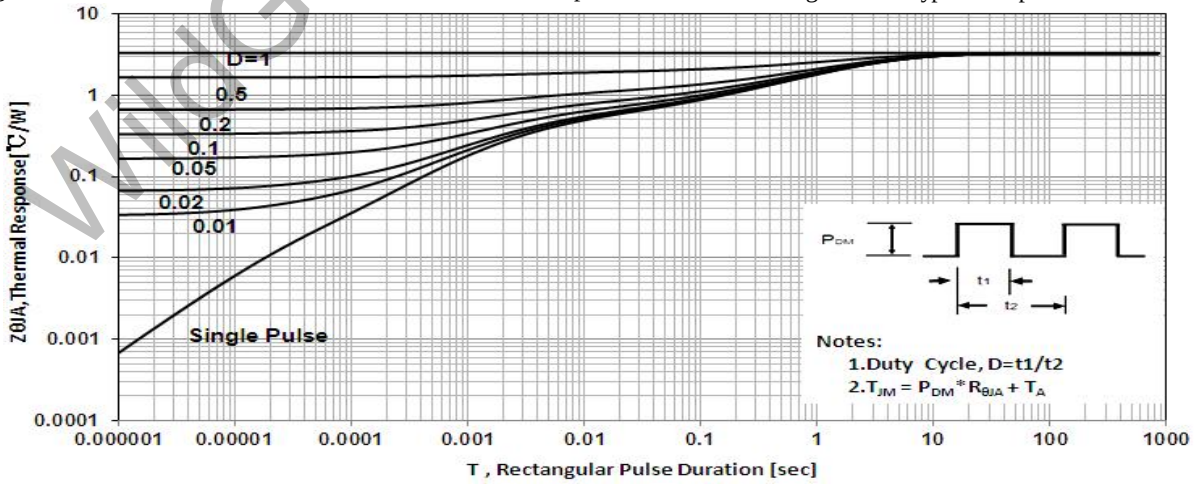


Figure 4 Typical Output Characteristics



Fi ure 5 Maximum Effective Thermal Im edance , Junction to Case

Typical Characteristics (Continued)

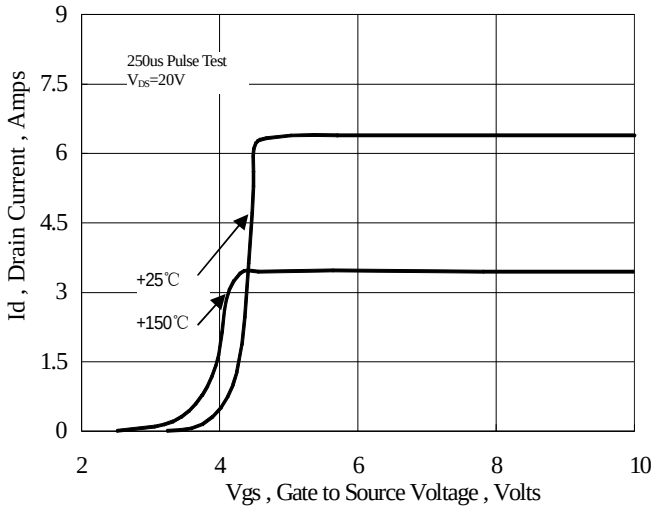


Figure 6 Typical Transfer Characteristics

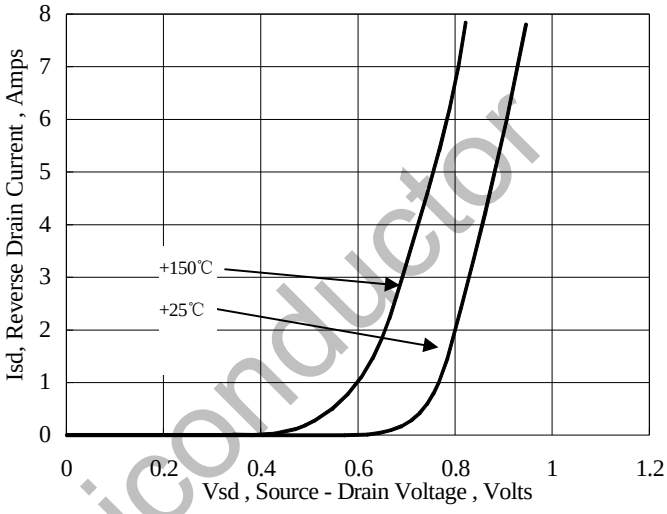


Figure 7 Typical Body Diode Transfer Characteristics

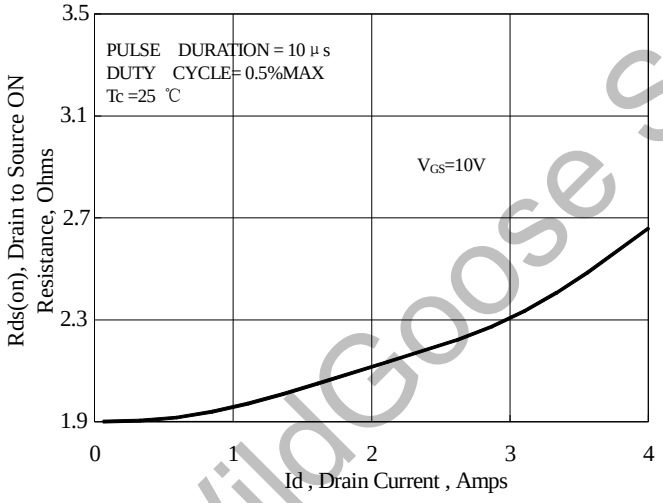


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

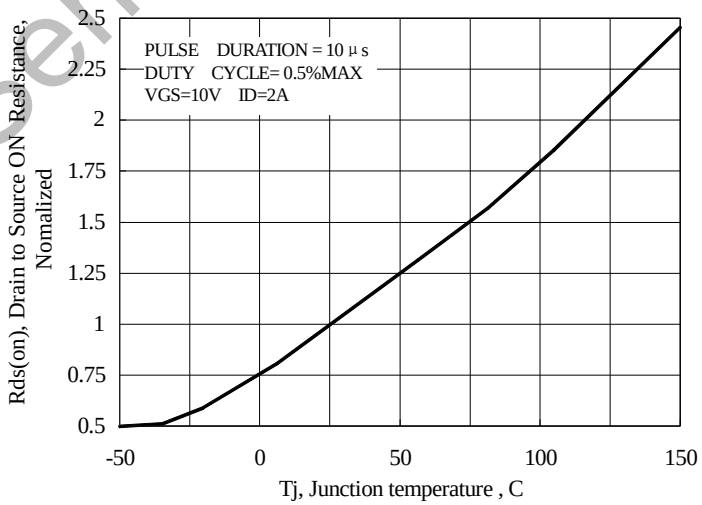


Figure 9 Typical Drian to Source on Resistance vs Junction Temperature

Typical Characteristics (Continued)

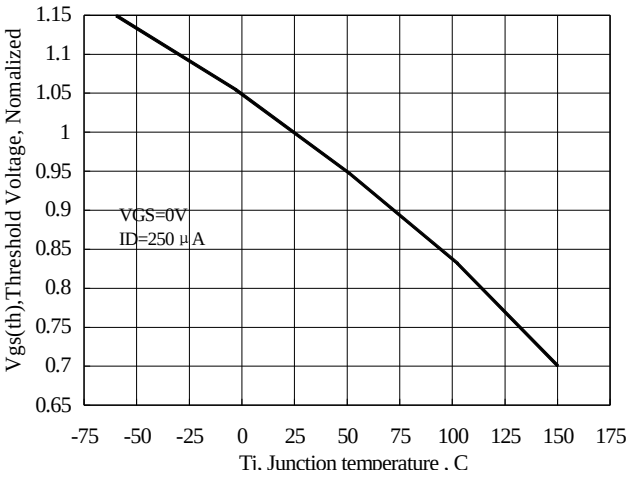


Figure 10 Typical Theshold Voltage vs Junction Temperature

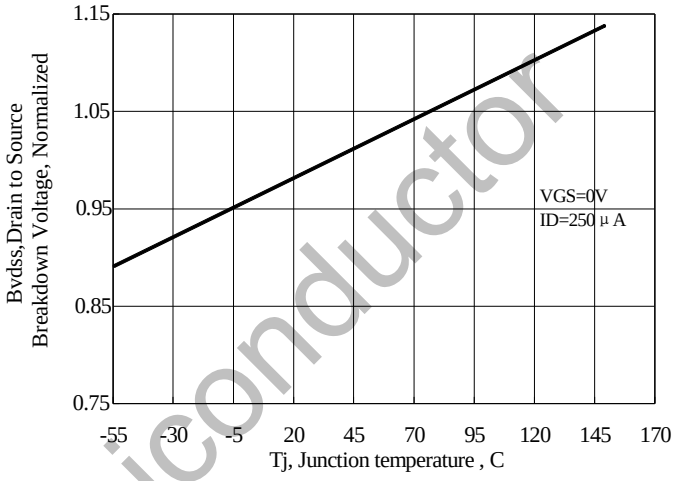


Figure 11 Typical Breakdown Voltage vs Junction Temperature

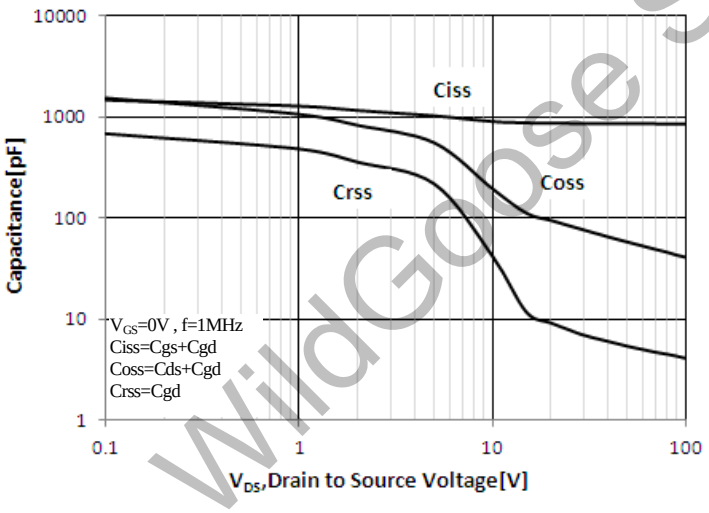


Figure 12 Typical Capacitance vs Drain to Source Voltage

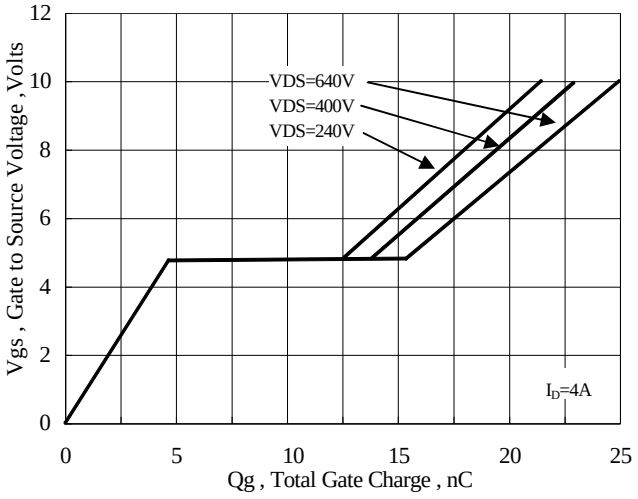


Figure 13 Typical Gate Charge vs Gate to Source Voltage

Test Circuit and Waveform

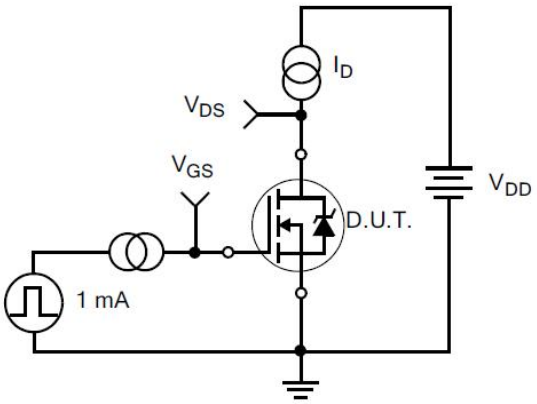


Figure 17. Gate Charge Test Circuit

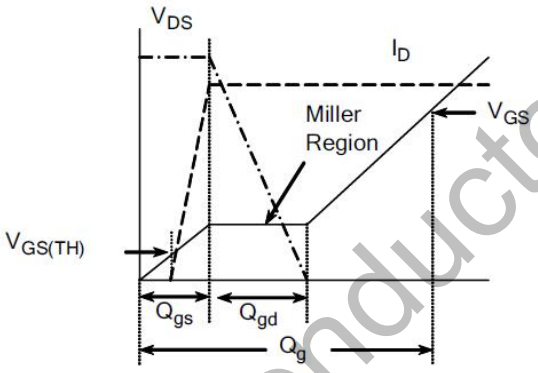


Figure 18. Gate Charge Waveform

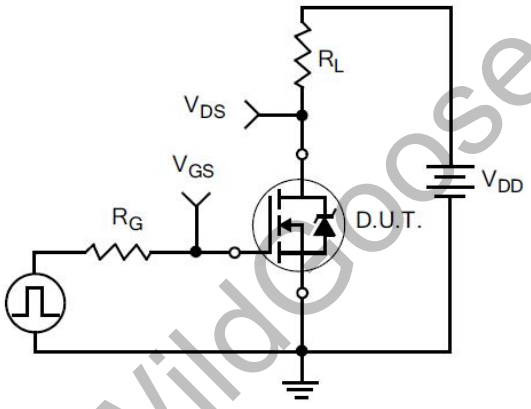


Figure 19. Resistive Switching Test Circuit

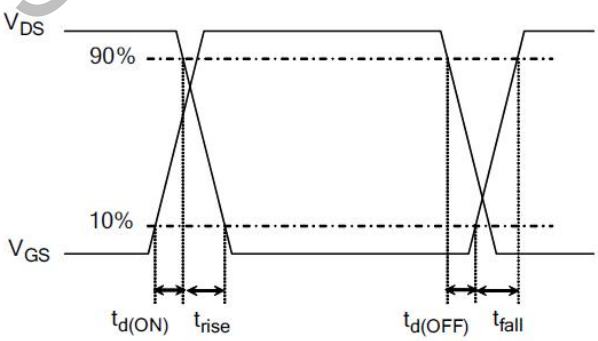


Figure 20. Resistive Switching Waveforms

Test circuit and waveform for diode characteristics

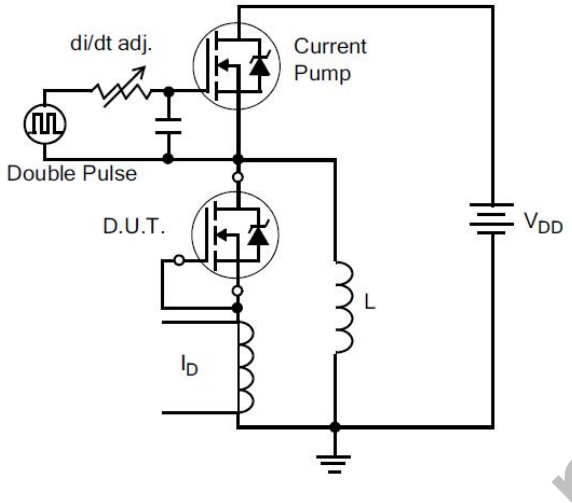


Figure 21. Diode Reverse Recovery Test Circuit

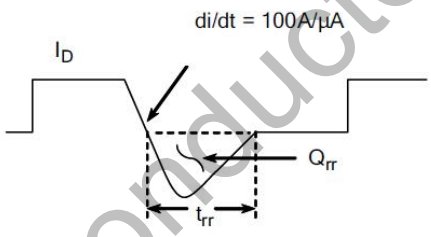


Figure 22. Diode Reverse Recovery Waveform

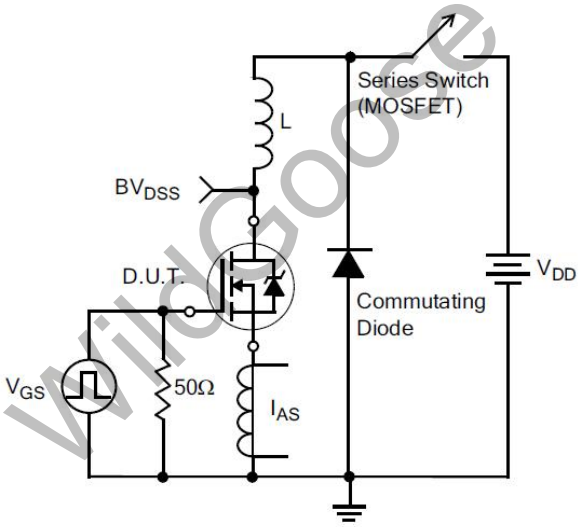
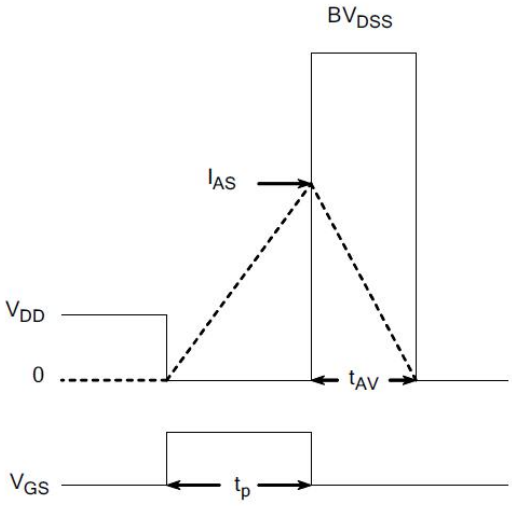


Figure 23. Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Figure 24. Unclamped Inductive Switching Waveforms

Package Dimension

TO-220F

Unit: mm