



V_{DSS}	600	V
I_D	2	A
P_D ($T_C=25^{\circ}C$)	35	W
$R_{DS(ON)}$	3.74	Ω

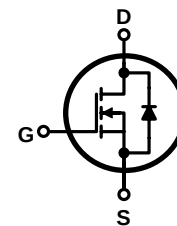
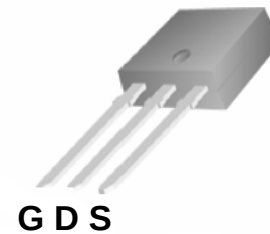
Features

- Fast Switching
- Low ON Resistance($R_{ds(on)} \leq 4.0 \Omega$)
- Low Gate Charge (Typical Data:8nC)
- Low Reverse transfer capacitances(Typical:3.8pF)
- 100% Single Pulse avalanche energy Test

Applications

Power switch circuit of adaptor and charger.

PIN Connection TO-251



Marking Diagram



Y = Year
A = Assembly Location
WW = Work Week
FIR2N60BTP= Specific Device Code

Absolute (Tc= 25°C unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current	2.0	A
	Continuous Drain Current $T_C = 100^{\circ}C$	1.26	A
I_{DM}^{a1}	Pulsed Drain Current	8.0	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	100	mJ
E_{AR}^{a1}	Avalanche Energy ,Repetitive	6.4	mJ
I_{AR}^{a1}	Avalanche Current	3.6	A
dv/dt^{a3}	Peak Diode Recovery dv/dt	5	V/ns
P_D	Power Dissipation	35	W
	Derating Factor above 25°C	0.28	W/°C
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T_L	MaximumTemperature for Soldering	300	°C

Electrical Characteristics (Tc= 25°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 =250μA	600	--	--	V
Δ BV _{DSS} / Δ T _J	Bvdss Temperature Coefficient	I _D =250uA, Reference 25°C	--	0.7	--	V/°C
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 600V, V _{GS} = 0V, T _a = 25°C	--	--	25	μA
		V _{DS} =480V, V _{GS} = 0V, T _a = 125°C			250	
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 _{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 =1.0A	--	4.0	4.5	Ω
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.0	3.0	4.0	V
Pulse width tp ≤ 380μs, δ ≤ 2%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g _{fs}	Forward Transconductance	V _{DS} =15V, I _D =1.0A	2.0	--	--	S
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1.0MHz	--	280		pF
C _{oss}	Output Capacitance		--	30		
C _{rss}	Reverse Transfer Capacitance		--	3.8		

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =2.0A V _{DD} = 300V V _{GS} = 10V R _G = 18Ω	--	7.8	--	ns
t _r	Rise Time		--	5.5	--	
t _{d(OFF)}	Turn-Off Delay Time		--	33	--	
t _f	Fall Time		--	16	--	
Q _g	Total Gate Charge	I _D =2.0A V _{DD} =480V V _{GS} = 10V	--	8.5	9.0	nC
Q _{gs}	Gate to Source Charge		--	1.5		
Q _{gd}	Gate to Drain ("Miller") Charge		--	4.0		

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I _S	Continuous Source Current (Body Diode)		--	--	2	A
I _{SM}	Maximum Pulsed Current (Body Diode)		--	--	8	A
V _{SD}	Diode Forward Voltage	I _S =2.0A,V _{GS} =0V	--	--	1.5	V
t _{rr}	Reverse Recovery Time	I _S =2.0A,T _j = 25° C dI _F /dt=100A/us, V _{GS} =0V	--	285	--	ns
Q _{rr}	Reverse Recovery Charge		--	750	--	nC
I _{RRM}	Reverse Recovery Current		--	5.2	--	A
Pulse width tp≤380μs, δ ≤2%						

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	3.57	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	100	$^\circ C/W$

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

^{a2}: $L=10.0mH, I_D=2A, \text{ Start } T_j=25^\circ C$

^{a3}: $I_{SD}=2A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, \text{ Start } T_j=25^\circ C$

Characteristic Curves

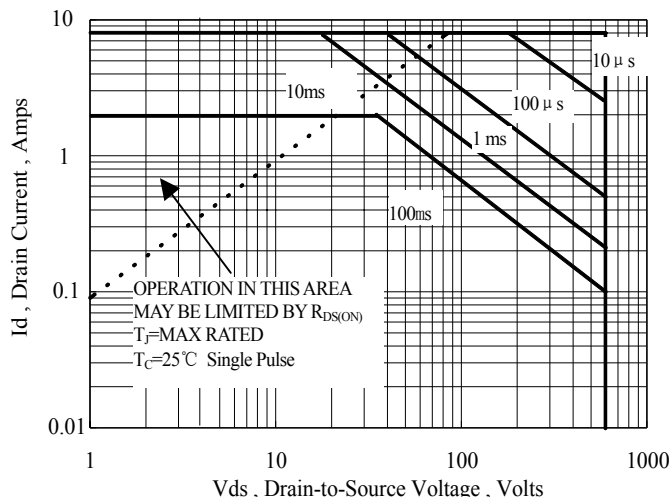


Figure 1 Maximum Forward Bias Safe Operating Area

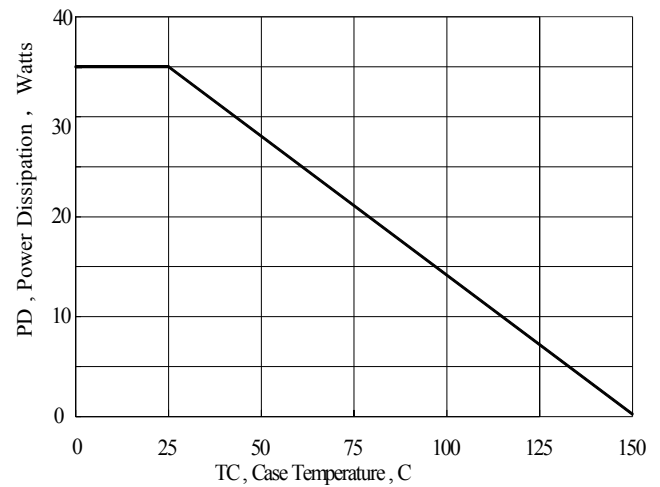


Figure 2 Maximum Power Dissipation vs Case Temperature

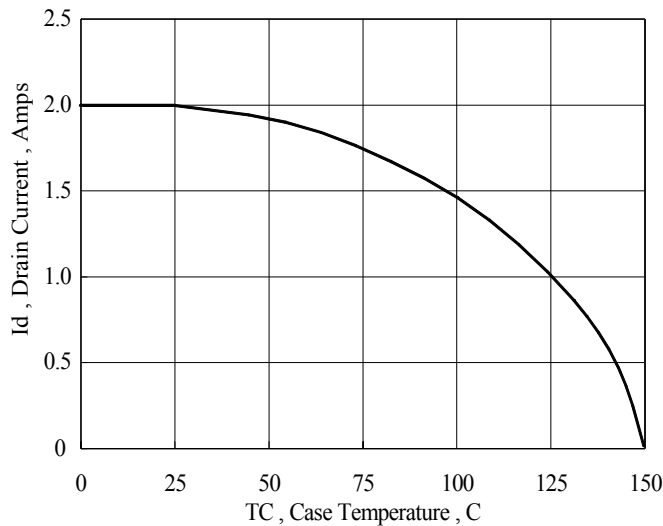


Figure 3 Maximum Continuous Drain Current vs Case Temperature

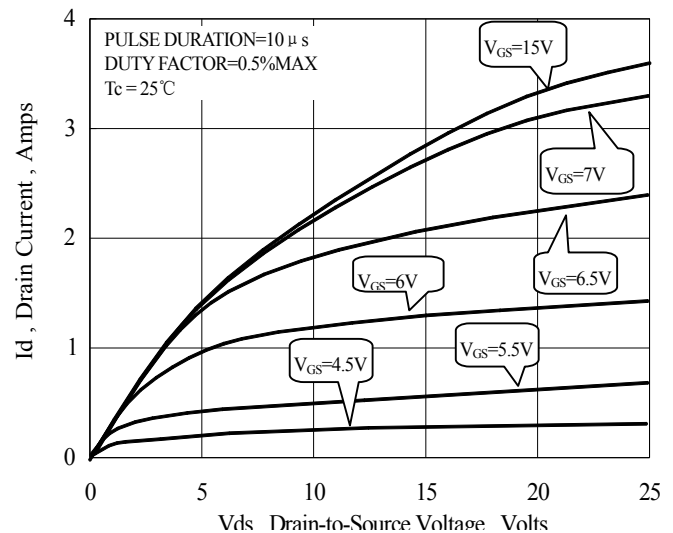


Figure 4 Typical Output Characteristics

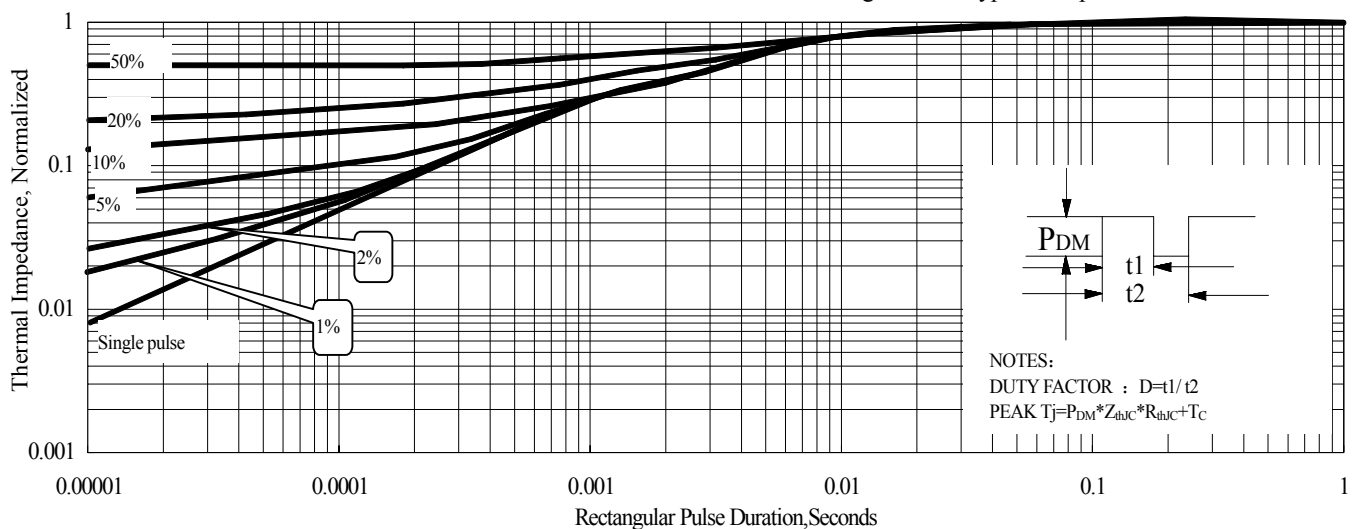


Figure 5 Maximum Effective Thermal Impedance, Junction to Case

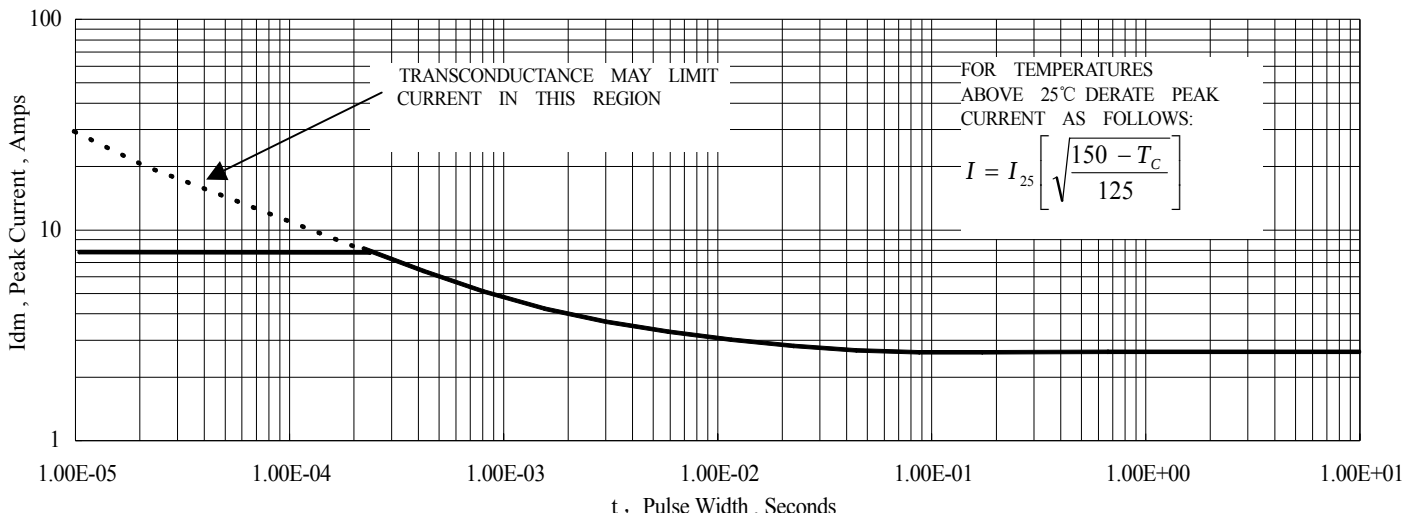


Figure 6 Maximum Peak Current Capability

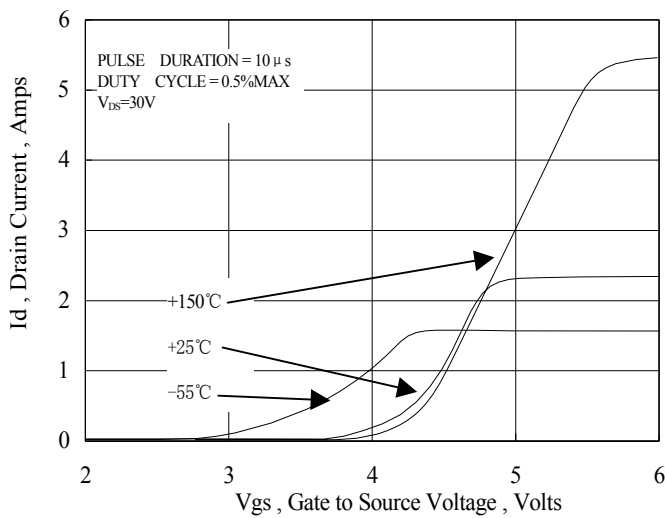


Figure 7 Typical Transfer Characteristics

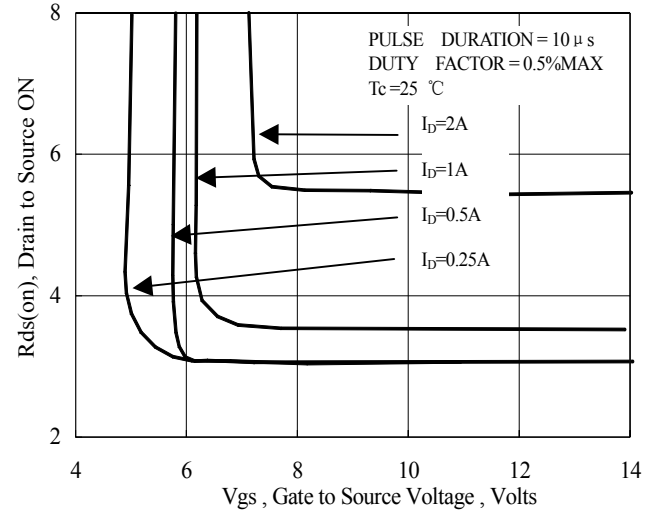


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

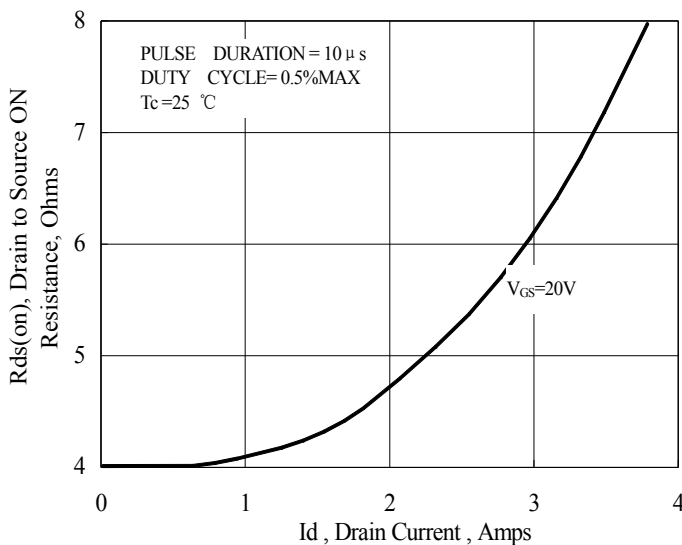


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

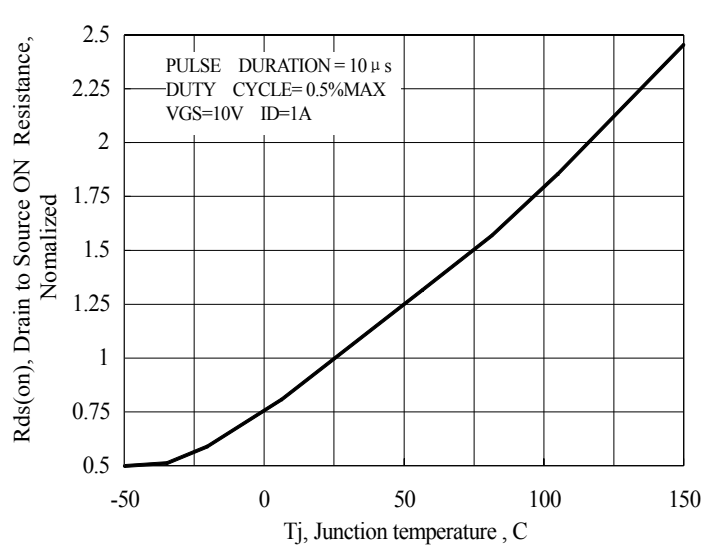


Figure 10 Typical Drain to Source on Resistance vs Junction Temperature

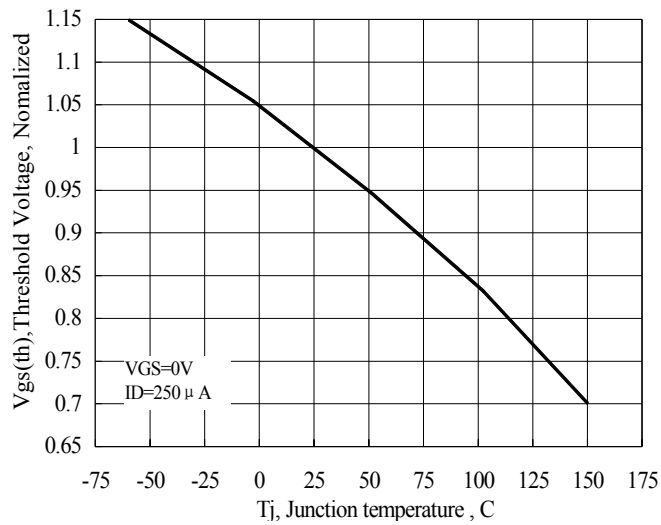


Figure 11 Typical Threshold Voltage vs Junction Temperature

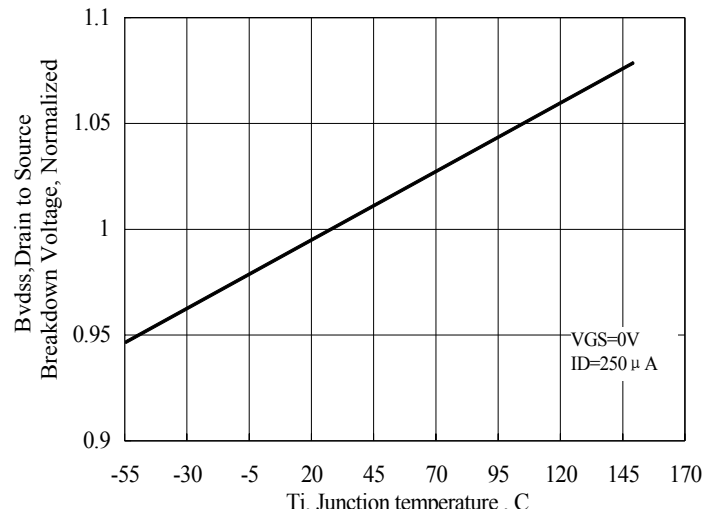


Figure 12 Typical Breakdown Voltage vs Junction Temperature

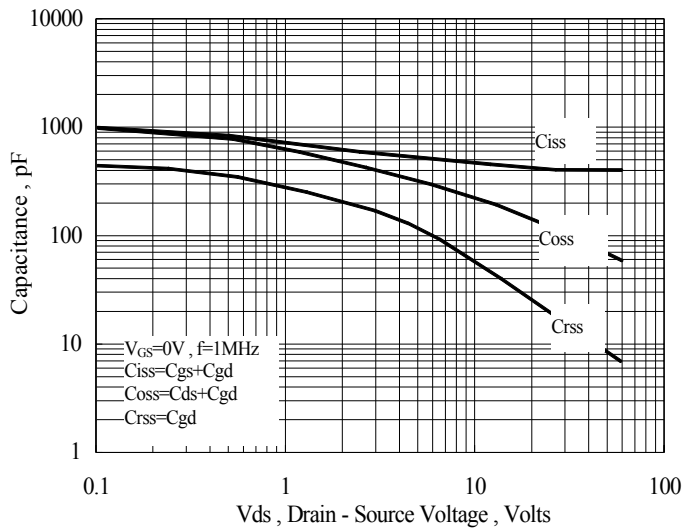


Figure 13 Typical Capacitance vs Drain to Source Voltage

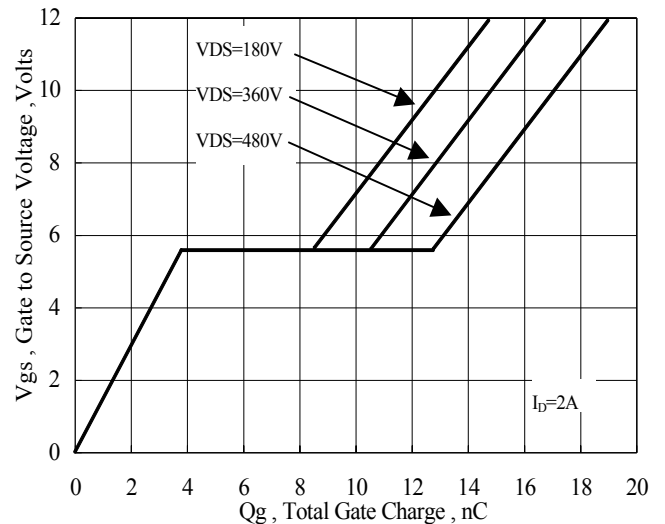


Figure 14 Typical Gate Charge vs Gate to Source Voltage

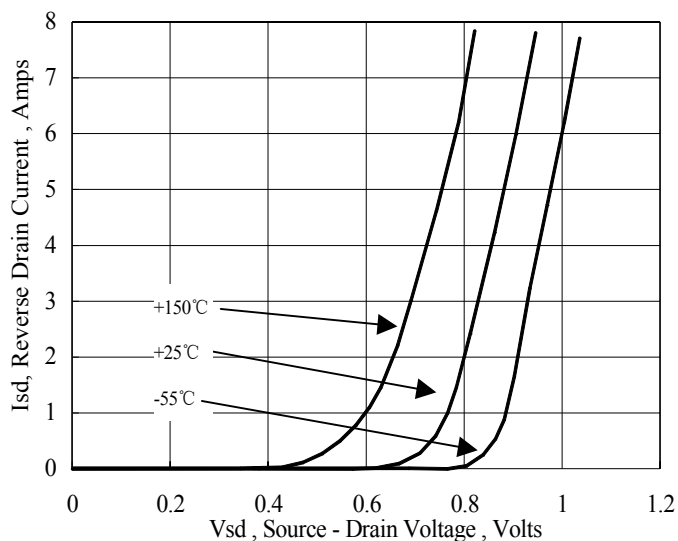


Figure 15 Typical Body Diode Transfer Characteristics

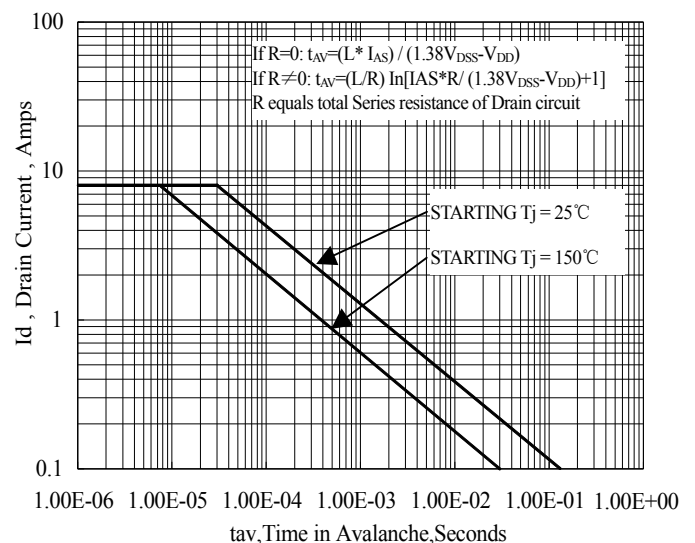
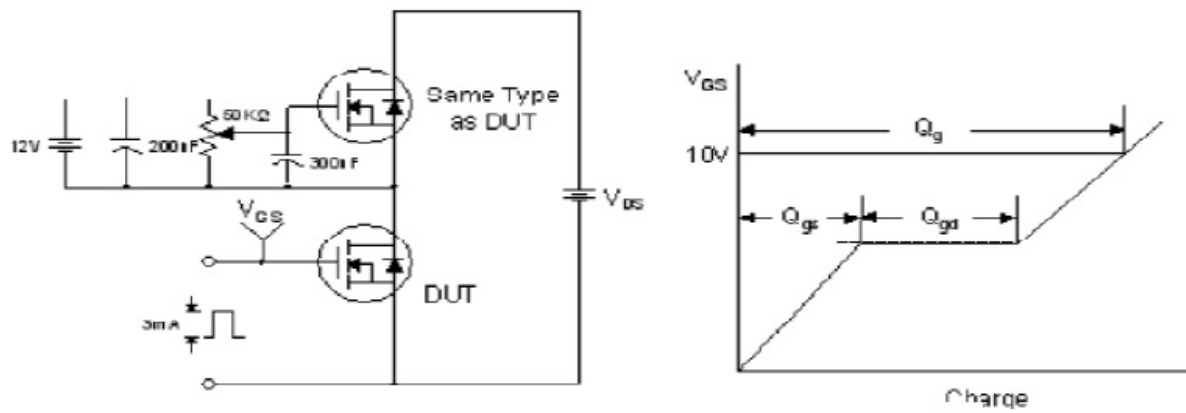
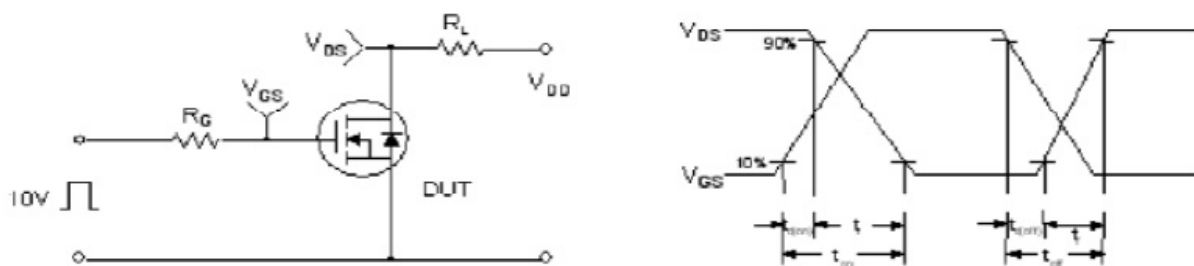


Figure 16 Unclamped Inductive Switching Capability

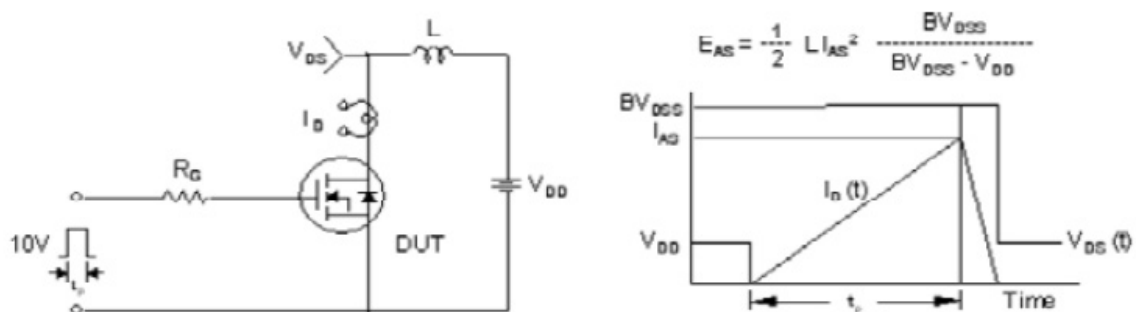
Test Circuit and Waveform



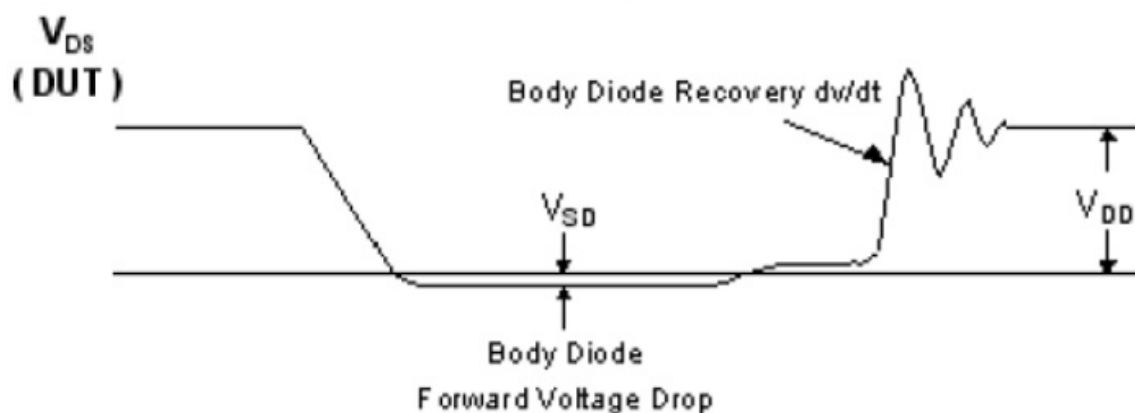
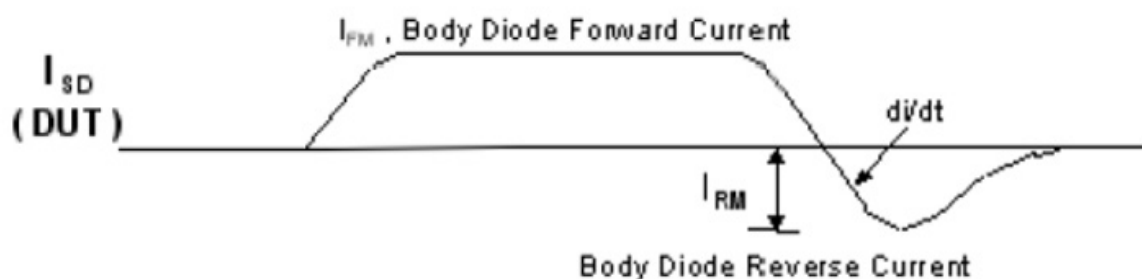
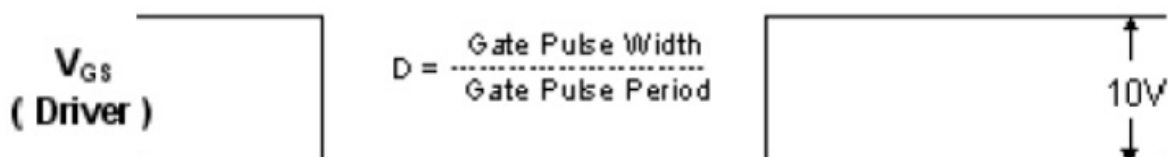
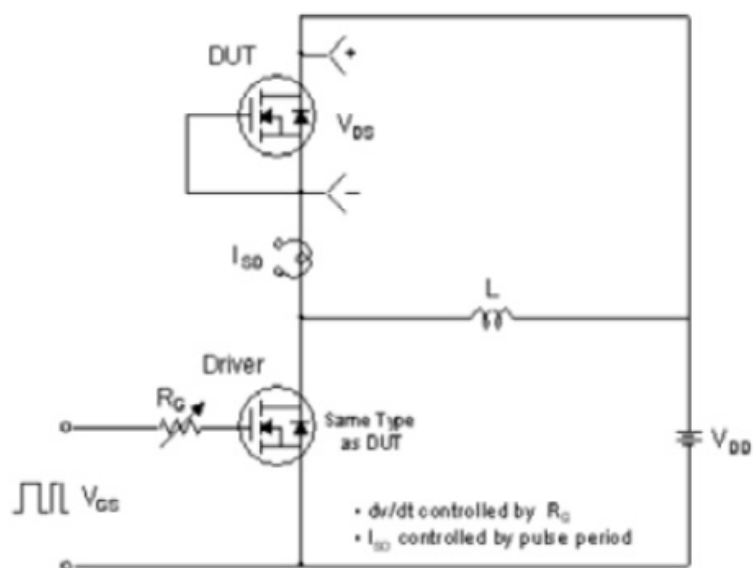
Gate Charge Test Circuit and Waveform



Resistive Switching Test Circuit and Waveform



Unclamped Inductive Switching Test Circuit and Waveform



Diode Reverse Recovery Test Circuit and Waveform

Package Information

TO-251 Package

