

General Description:

FTW20N50A, the silicon N-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-3P(N), which accords with the RoHS standard..

V_{DSS}	500	V
I_D	20	A
$P_D (T_C=25^\circ C)$	230	W
$R_{DS(ON)}$	0.26	Ω

Features:

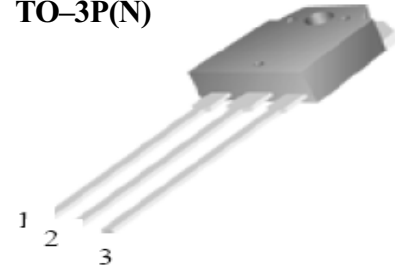
- **Fast Switching**
- **Low ON Resistance**($R_{dson} \leq 0.3 \Omega$)
- **Low Gate Charge** (Typical Data:130nC)
- **Low Reverse transfer capacitances**(Typical:65pF)
- **100% Single Pulse avalanche energy Test**

Applications:

Power switch circuit of electron ballast and adaptor.

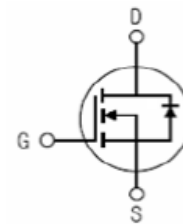
Absolute ($T_c = 25^\circ C$ unless otherwise specified):

TO-3P(N)



1.Gate 2.Drain 3.Source

Inner Equivalent Principium Chart



Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	500	V
I_D	Continuous Drain Current	20	A
	Continuous Drain Current $T_C = 100^\circ C$	12	A
I_{DM}^{a1}	Pulsed Drain Current	80	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	950	mJ
E_{AR}^{a1}	Avalanche Energy ,Repetitive	90	mJ
I_{AR}^{a1}	Avalanche Current	14	A
dv/dt^{a3}	Peak Diode Recovery dv/dt	4.0	V/ns
P_D	Power Dissipation	230	W
	Derating Factor above $25^\circ C$	1.85	W/ $^\circ C$
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ C$
T_L	Maximum Temperature for Soldering	300	$^\circ C$

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	500	--	--	V
Δ BV _{DSS} / Δ T _J	Bvdss Temperature Coefficient	I _D =250uA, Reference 25°C	--	0.55	--	V/°C
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 500V, V _{GS} = 0V, T _a = 25°C	--	--	10	μA
		V _{DS} = 400V, V _{GS} = 0V, T _a = 125°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 =10A	--	0.26	0.3	Ω
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.0	--	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 =10A	13	17	--	S
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1.0MHz	--	4500	6000	pF
C _{oss}	Output Capacitance		--	350	460	
C _{rss}	Reverse Transfer Capacitance		--	65	80	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D = 20A V _{DD} = 250V R _G = 25Ω	--	55	120	ns
t _r	Rise Time		--	145	310	
t _{d(OFF)}	Turn-Off Delay Time		--	280	770	
t _f	Fall Time		--	135	370	
Q _g	Total Gate Charge	I _D = 20A V _{DD} = 400V V _{GS} = 10V	--	130	170	nC
Q _{gs}	Gate to Source Charge		--	20		
Q _{gd}	Gate to Drain ("Miller") Charge		--	45		

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I _S	Continuous Source Current (Body Diode)		--	--	20	A
I _{SM}	Maximum Pulsed Current (Body Diode)		--	--	80	A
V _{SD}	Diode Forward Voltage	I _S =20A, V _{GS} =0V	--	--	1.5	V
t _{rr}	Reverse Recovery Time	I _S =20A, T _j = 25° C	--	480	--	ns
Q _{rr}	Reverse Recovery Charge	dI _F /dt=100A/us, V _{GS} =0V	--	7.7	--	nC
Pulse width tp ≤ 380μs, δ ≤ 2%						

Symbol	Parameter	Max.	Units
R _{θJC}	Junction-to-Case	0.54	°C/W
R _{θJA}	Junction-to-Ambient	40	°C/W

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

^{a2}: L=10.0mH, I_D=20A, Start T_J=25°C

^{a3}: I_{SD} =20A, di/dt ≤ 300A/us, V_{DD} ≤ BV_{DS}, Start T_J=25°C

Characteristics Curve:

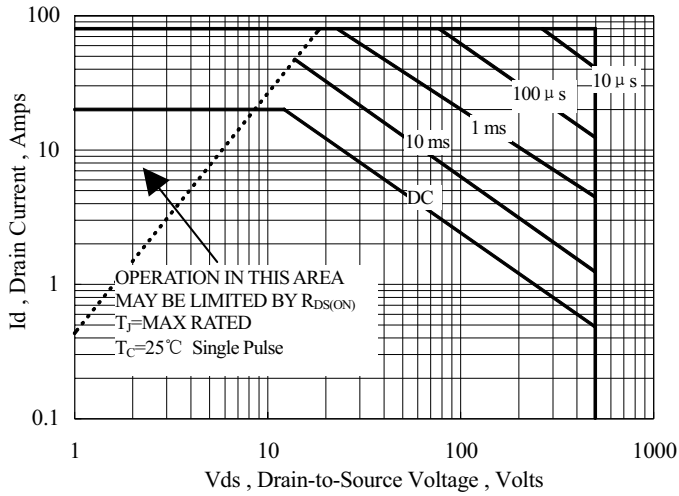


Figure 1 Maximum Forward Bias Safe Operating Area

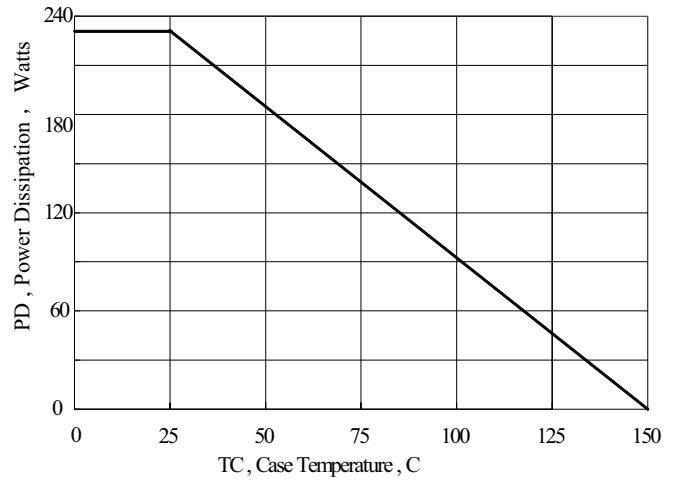


Figure 2 Maximum Power Dissipation vs Case Temperature

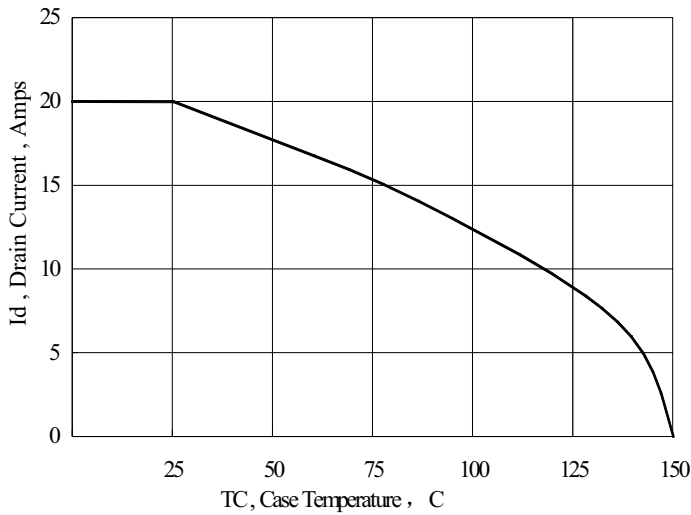


Figure 3 Maximum Continuous Drain Current vs Case Temperature

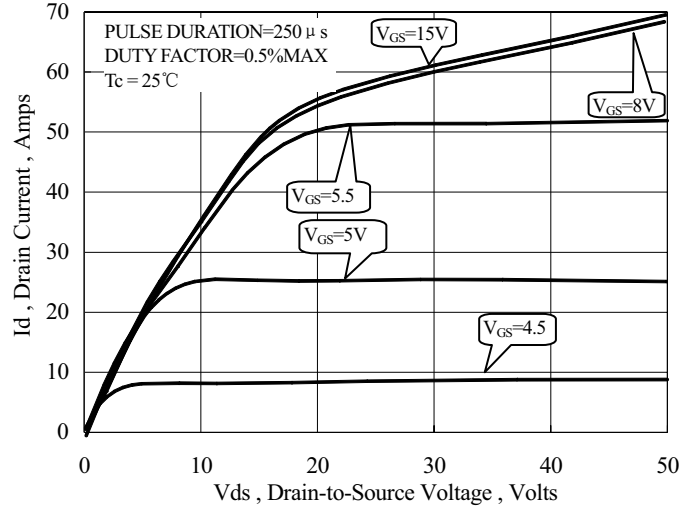


Figure 4 Typical Output Characteristics

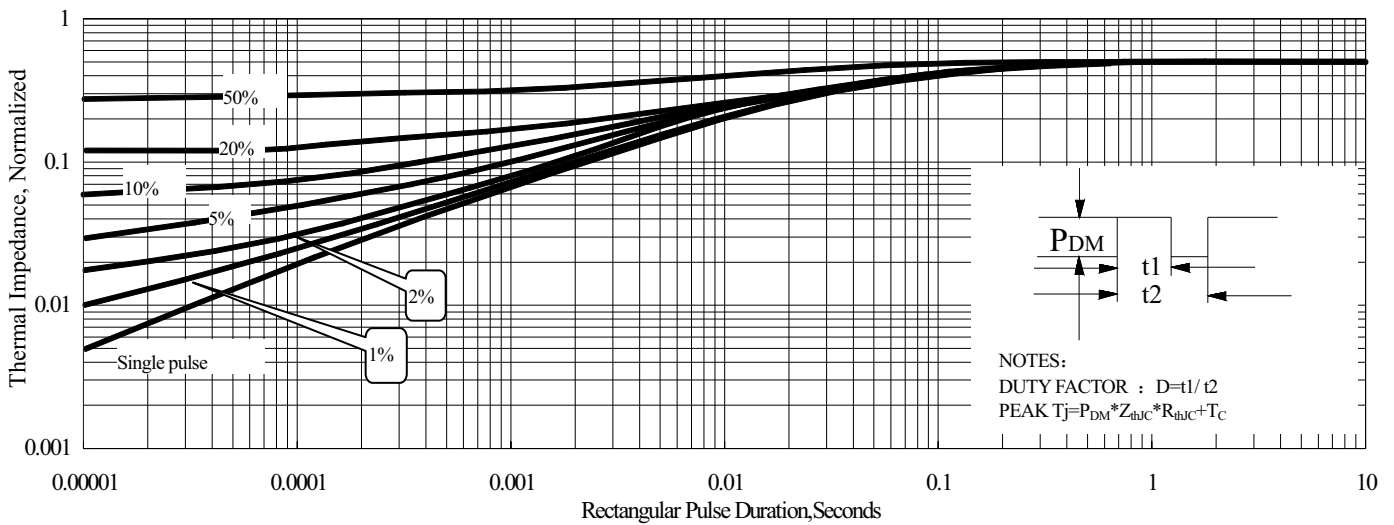


Figure 5 Maximum Effective Thermal Impedance, Junction to Case

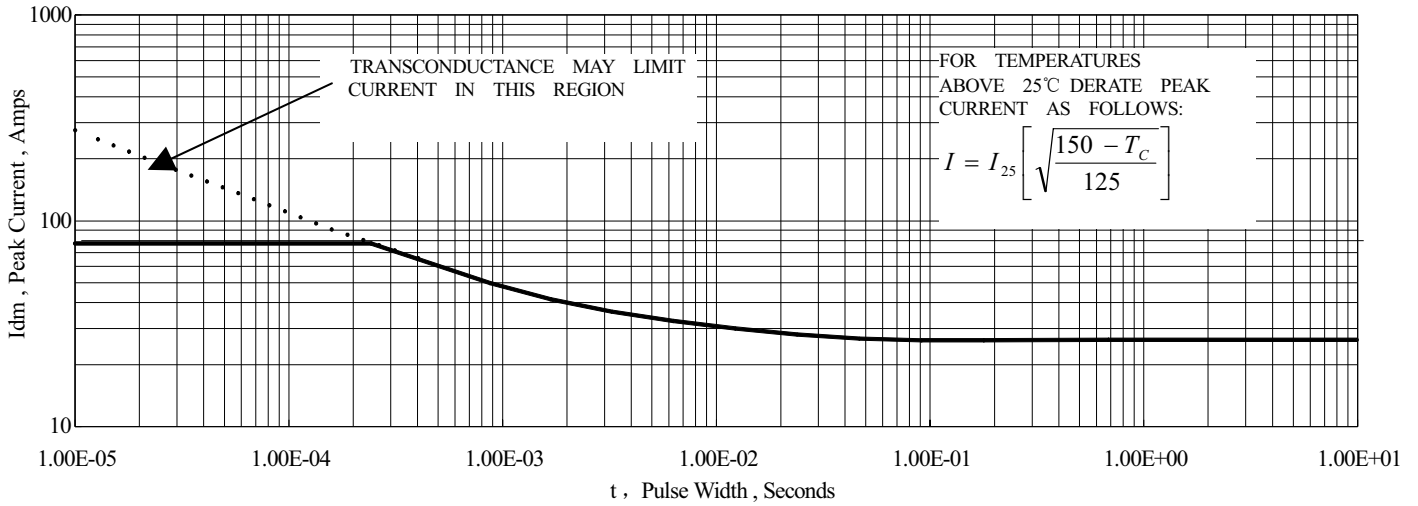


Figure 6 Maximum Peak Current Capability

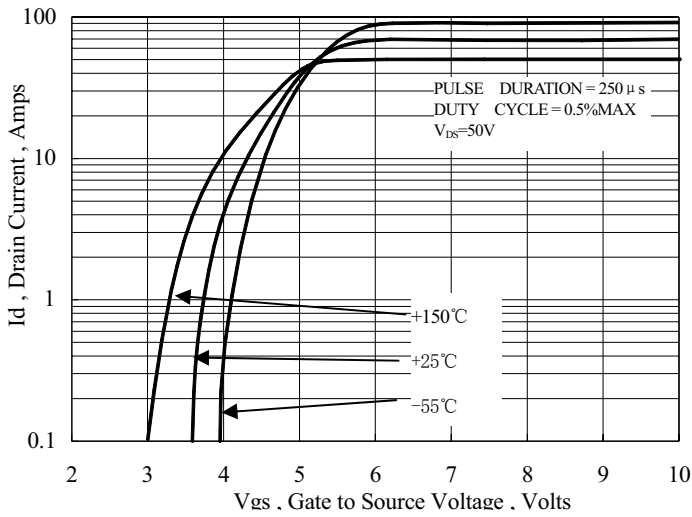


Figure 7 Typical Transfer Characteristics

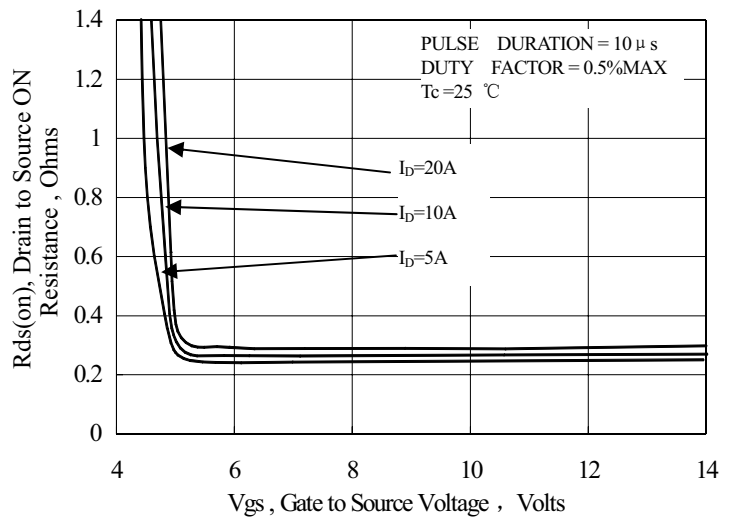


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

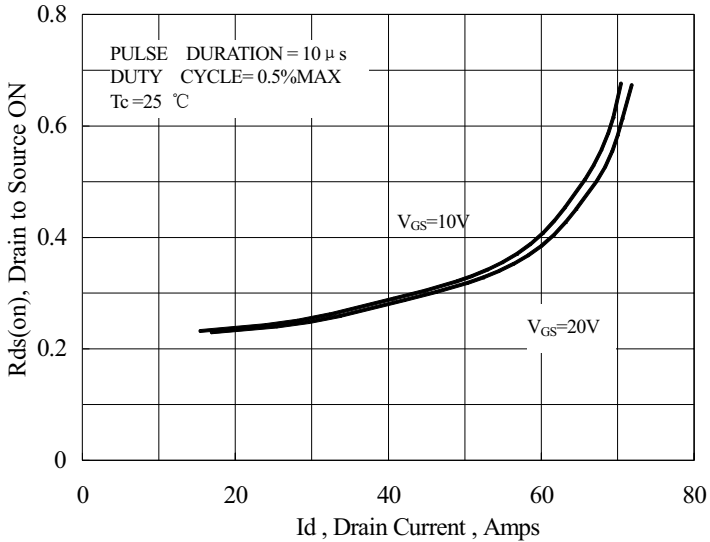


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

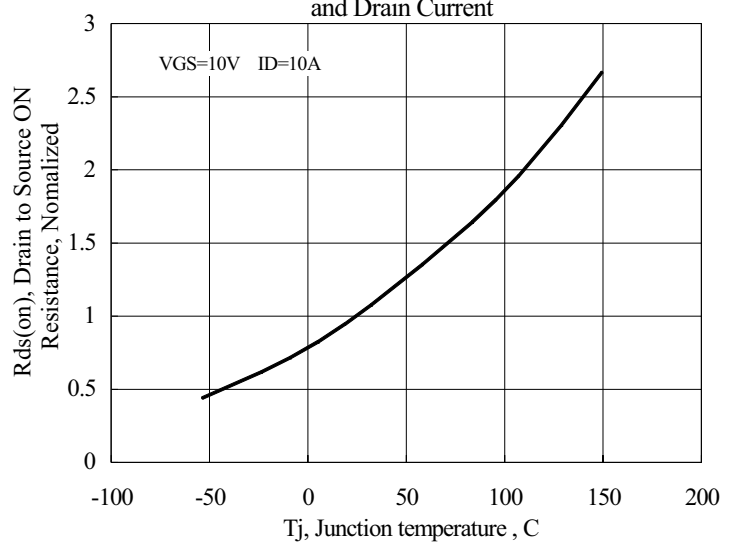


Figure 10 Typical Drain to Source on Resistance vs Junction Temperature

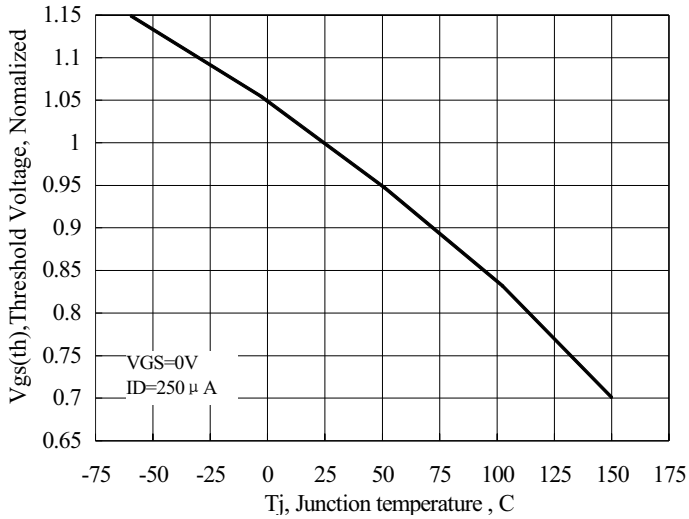


Figure 11 Typical Threshold Voltage vs Junction Temperature

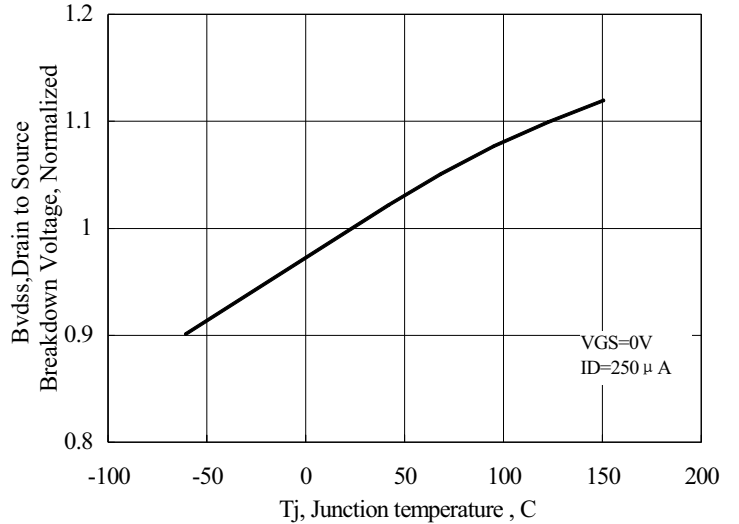


Figure 12 Typical Breakdown Voltage vs Junction Temperature

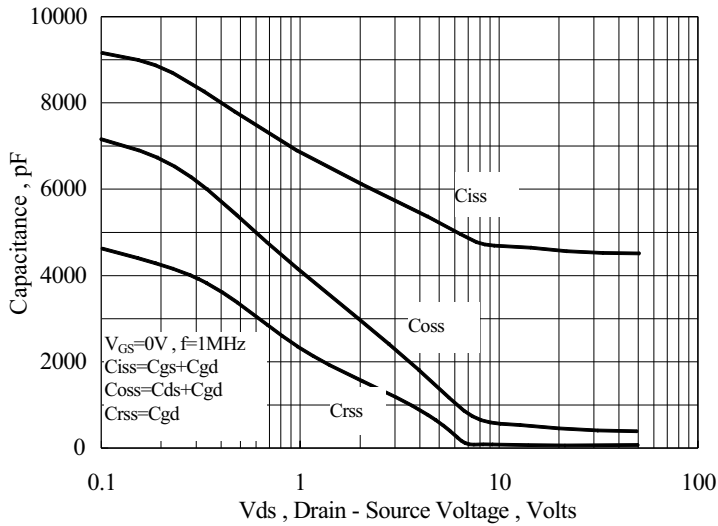


Figure 13 Typical Capacitance vs Drain to Source Voltage

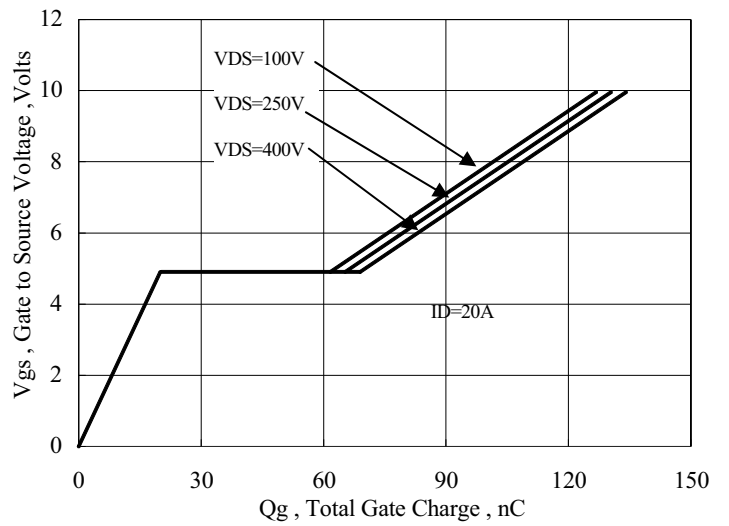


Figure 14 Typical Gate Charge vs Gate to Source Voltage

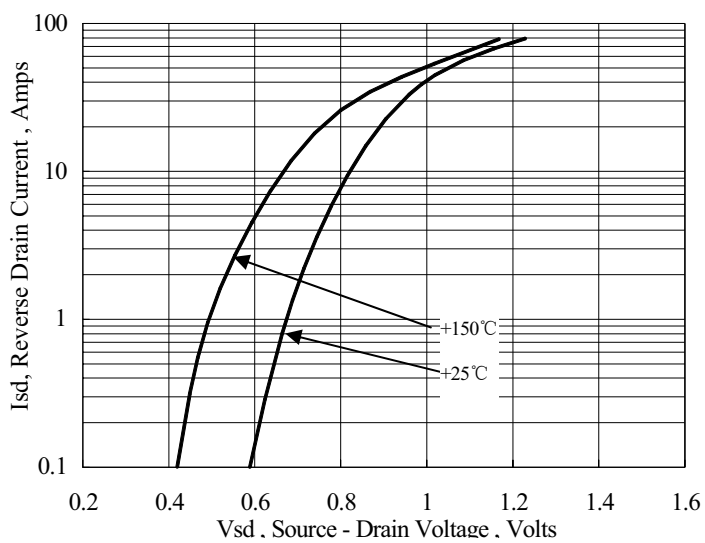


Figure 15 Typical Body Diode Transfer Characteristics

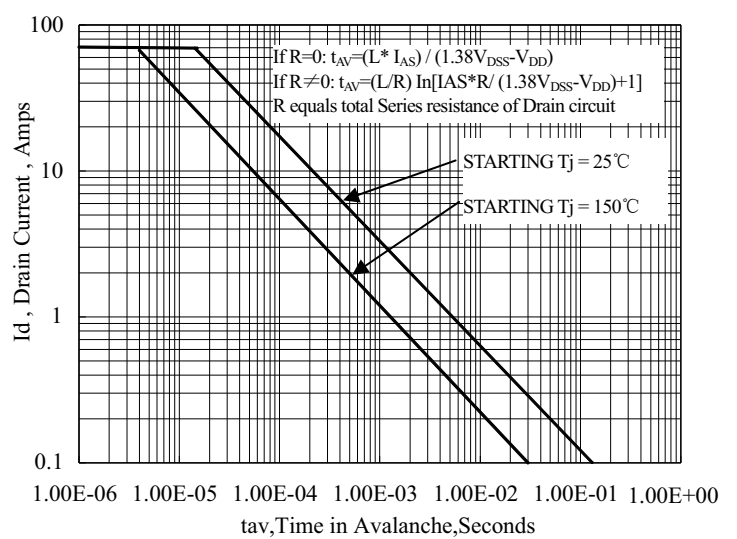
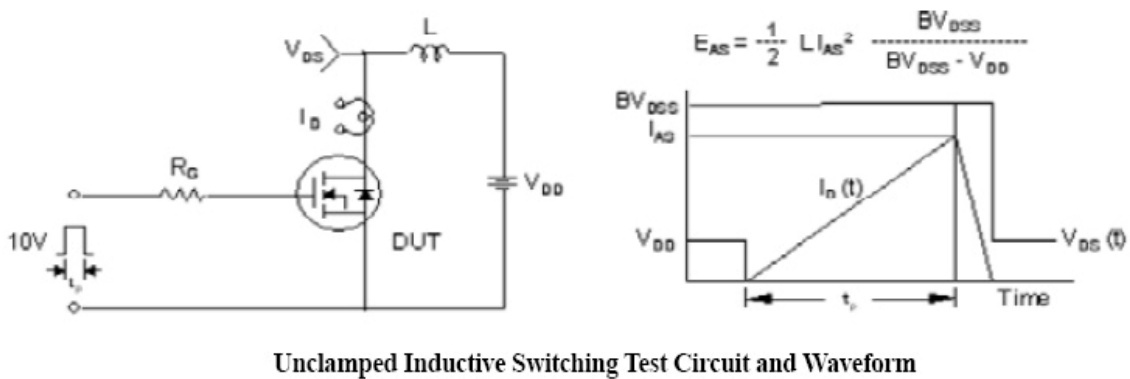
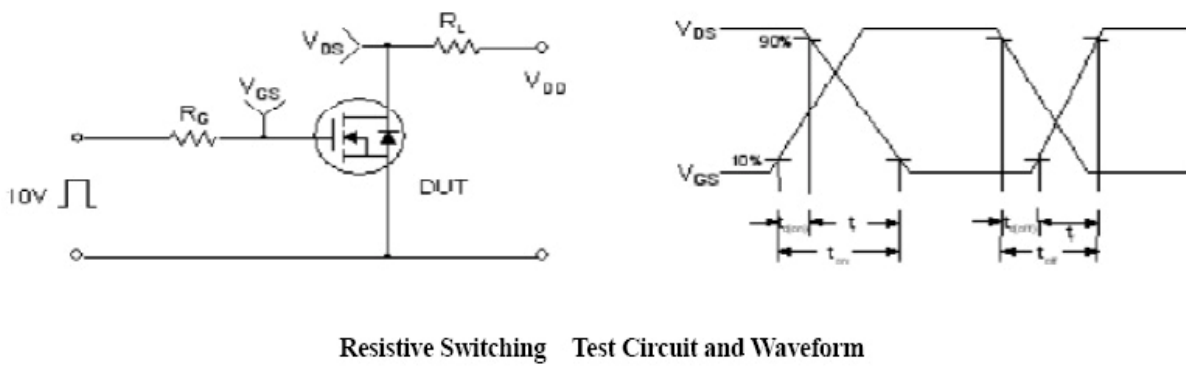
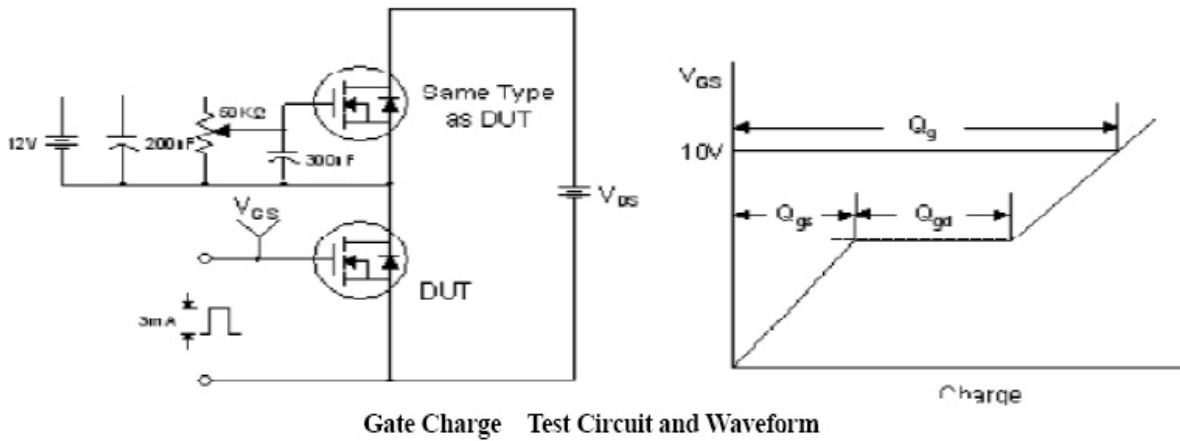
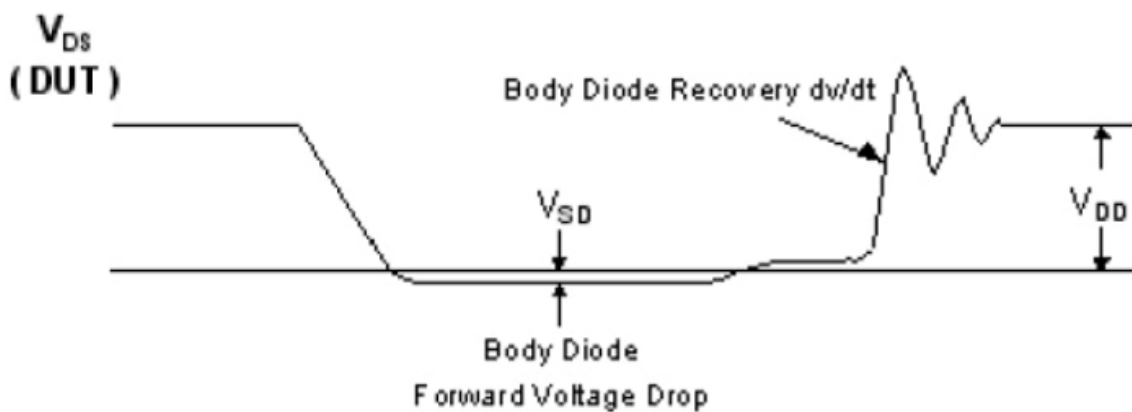
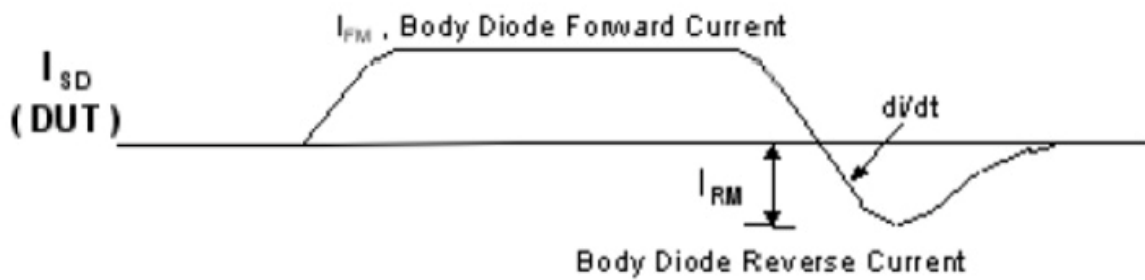
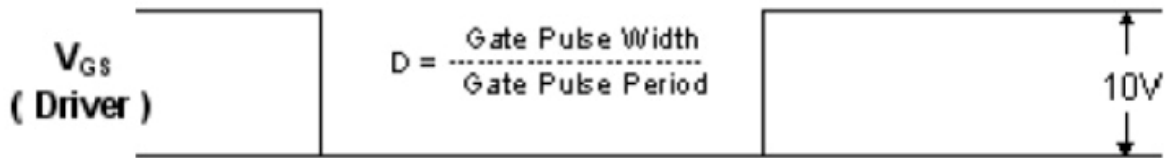
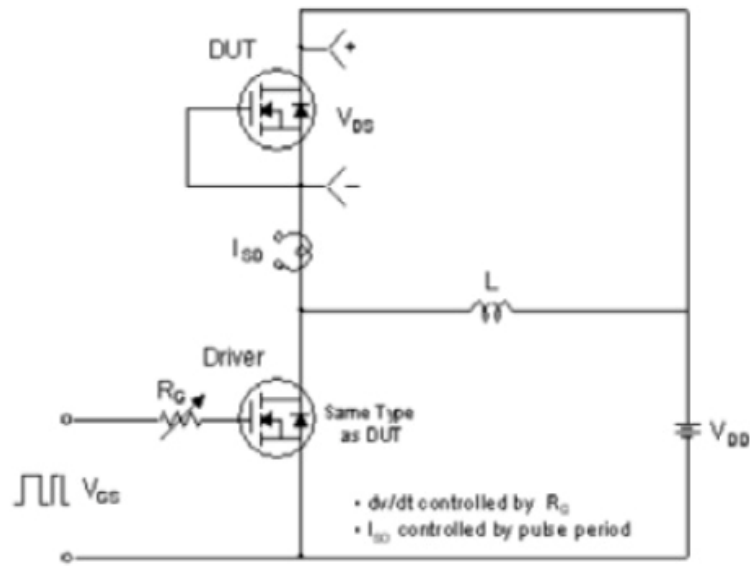


Figure 16 Unclamped Inductive Switching Capability

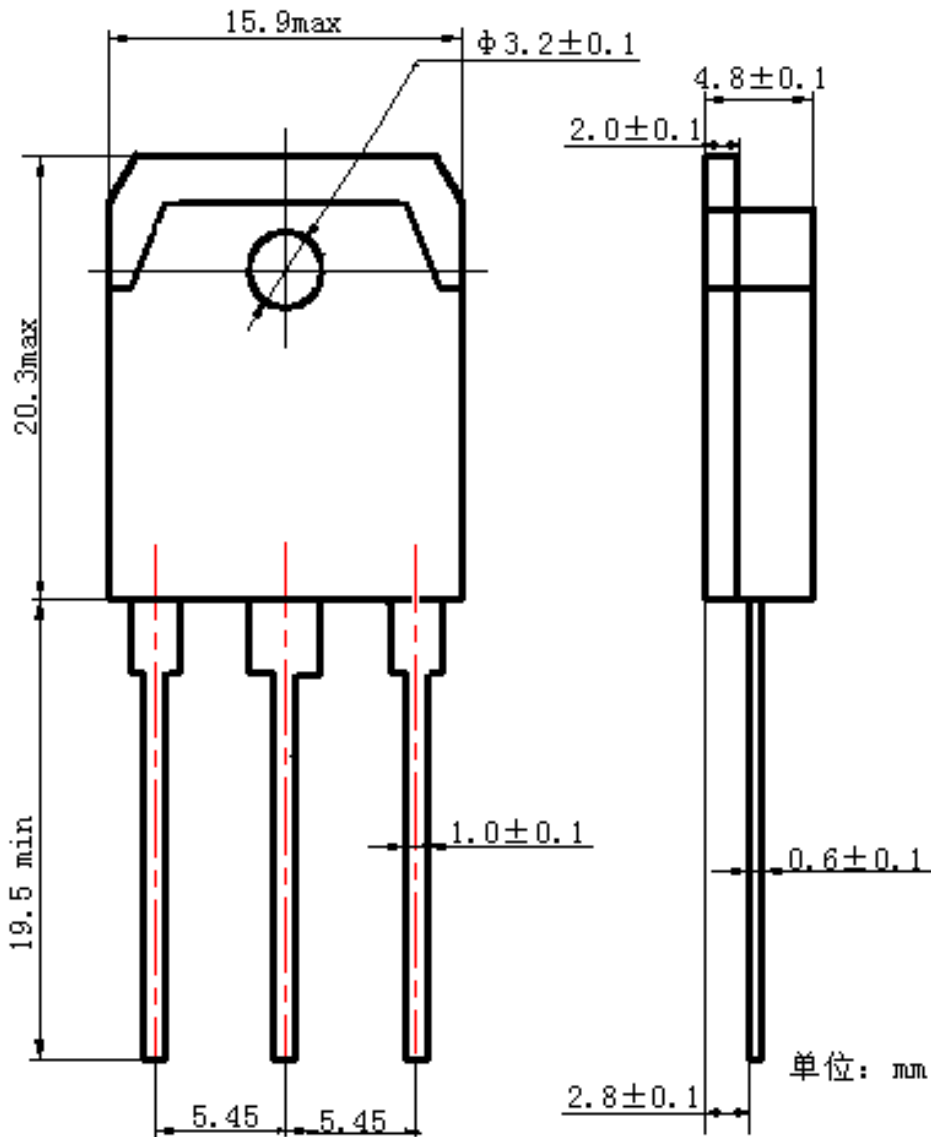
TestCircuitandWaveform





Diode Reverse Recovery Test Circuit and Waveform

Package Information:



TO-3P(N) Package

The name and content of poisonous and harmful material in products

Part's Name	Hazardous Substance					
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE
Limit	≤0.1%	≤0.1%	≤0.01%	≤0.1%	≤0.1%	≤0.1%
Lead Frame	○	○	○	○	○	○
Molding Compound	○	○	○	○	○	○
Chip	○	○	○	○	○	○
Wire Bonding	○	○	○	○	○	○
Solder	○	○	○	○	○	○
Note	○: means the hazardous material is under the criterion of SJ/T11363-2006. ×: means the hazardous material exceeds the criterion of SJ/T11363-2006.					

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 - b. support or sustain life,
 - c. whose failure to perform when properly used in accordance with instructions for used provided in the labeling, can be reasonably expected to result in significant injury to the user.
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