

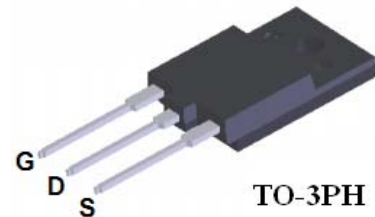
1500V N-Channel MOSFET

General Description

This Power MOSFET is produced using advanced self-aligned planar 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. These devices can be used in various power switching circuit for system miniaturization and higher efficiency.

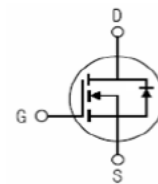
Features

3A, 1500V, $R_{DS(on)}$ typ. = 5Ω @ $V_{GS} = 10V$ $I_D = 1.5A$
 Low gate charge (typical 37nC)
 Low reverse transfer capacitance (typical 2.8pF)
 Fast switching
 100% avalanche tested



TO-3PH

Inner Equivalent Principium Chart



Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	JFQM3N150C	Units
V_{DS}	Drain – Source Voltage	1500	V
I_D	Drain Current	Continuous ($T_c = 25^\circ\text{C}$)	3
		Continuous ($T_c = 100^\circ\text{C}$)	1.8
I_{DM}	Drain Current - Pulsed (Note 1)	12	A
V_{GS}	Gate – Source Voltage	± 30	V
EAS	Single Pulsed Avalanche Energy (Note 2)	225	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5	V/ns
P_D	Power Dissipation ($T_c = 25^\circ\text{C}$)	32	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes 1/8" from case for 5 seconds	300	$^\circ\text{C}$

*Drain current limited by maximum junction temperature.

Thermal characteristics

Symbol	Parameter	JFQM3N150C	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.8	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^\circ\text{C}/\text{W}$

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain – Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 uA	1500	--	--	V
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 uA, Referenced to 25 °C	--	1.5	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 1500 V, V _{GS} = 0 V	--	--	25	uA
		V _{DS} = 1200 V, T _c = 125 °C	--	--	500	uA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage (Note 4)	V _{DS} = V _{GS} , I _D = 250 uA	3.0	--	5.0	V
R _{DS(on)}	Static Drain-Source on-Resistance (Note 4)	V _{GS} = 10 V, I _D = 1.5A	--	5	8	Ω
g _{FS}	Forward Transconductance (Note 4)	V _{DS} = 30 V, I _D = 1.5 A	--	4.5	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	1938	--	pF
C _{oss}	Output Capacitance		--	104	--	pF
C _{rss}	Reverse Transfer Capacitance		--	2.8	--	pF
R _g	Gate resistance	F= 1.0 MHz		4.0		Ω
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} = 750 V, I _D = 3.0 A , R _G = 10Ω , V _{GS} = 10 V (Note 4,5)	--	35	--	ns
t _r	Turn-On Rise Time		--	19	--	ns
t _{d(off)}	Turn-Off Delay Time		--	56	--	ns
t _f	Turn-Off Fall Time		--	30	--	ns
Q _g	Total Gate Charge	V _{DS} = 750 V, I _D = 3.0 A V _{GS} = 10 V (Note 4,5)	--	37	--	nC
Q _{gs}	Gate-Source Charge		--	10	--	nC
Q _{gd}	Gate-Drain Charge		--	14	--	nC
Drain – Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	3	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	12	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 3.0 A	--	--	1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 3.0 A	--	880	--	ns
Q _{rr}	Reverse Recovery Charge	di _r /dt = 100 A/us (Note 4)	--	6.5	--	uC

Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature
2. $L = 10.0\text{ mH}$, $I_{AS} = 6.7\text{ A}$, $R_G = 25\Omega$, Starting $T_J = 25\text{ }^{\circ}\text{C}$
3. $I_{SD} \leq 3.0\text{ A}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25\text{ }^{\circ}\text{C}$
4. Pulsed Test : Pulsed width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Characteristics Curve

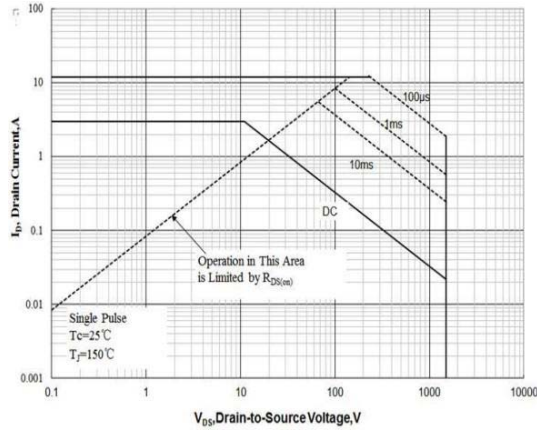


Figure 1 Maximum Forward Bias Safe Operating Area

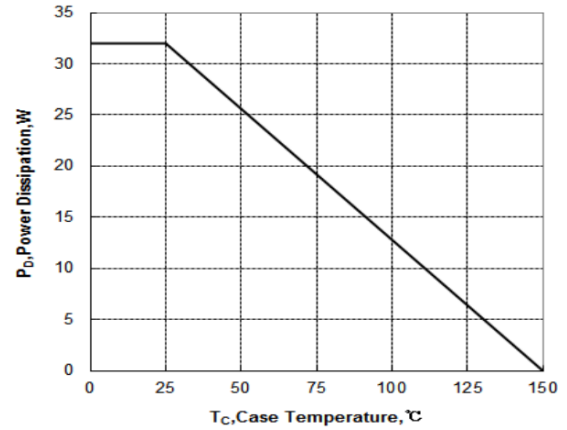


Figure 2 Maximum Power dissipation vs Case Temperature

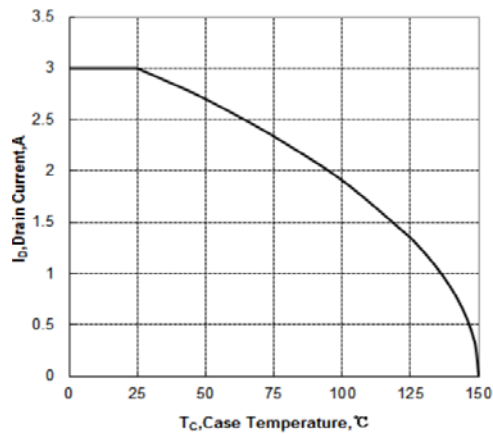


Figure 3 Maximum Continuous Drain Current vs Case Temperature

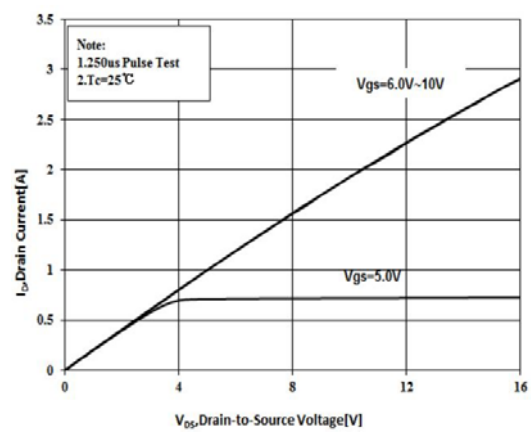


Figure 4 Typical Output Characteristics

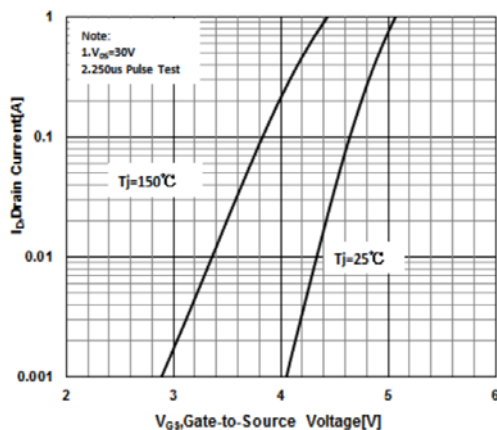


Figure 5 Typical Transfer Characteristics

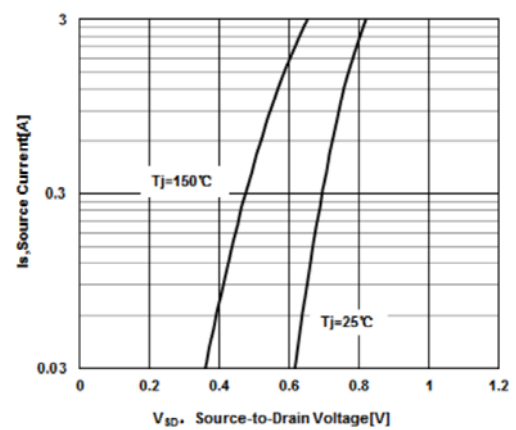


Figure 6 Typical Body Diode Transfer Characteristics

Characteristics Curve

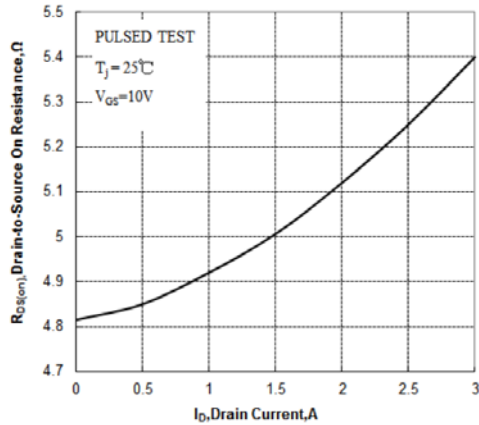


Figure 7 Typical Drain to Source ON Resistance vs Drain Current

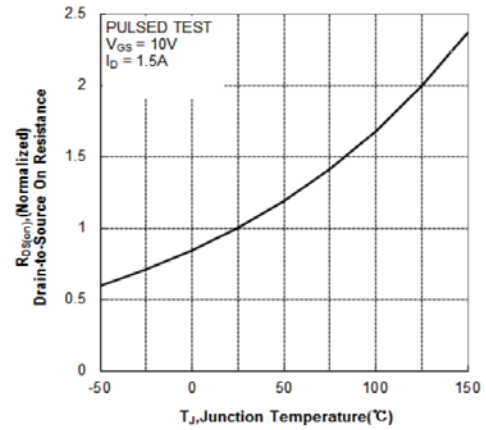


Figure 8 Typical Drain to Source on Resistance vs Junction Temperature

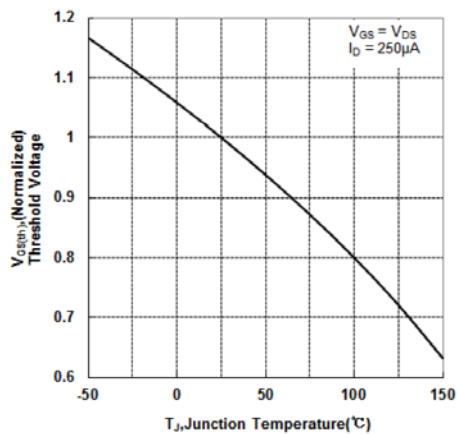


Figure 9 Typical Threshold Voltage vs Junction Temperature

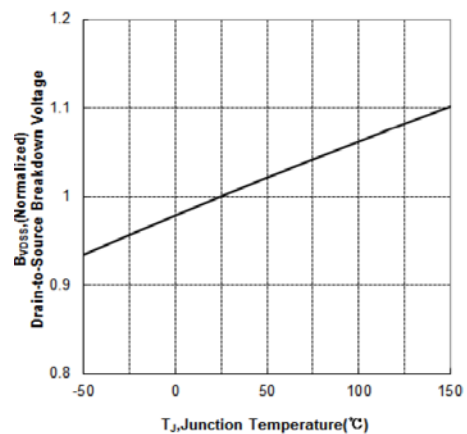


Figure 10 Typical Breakdown Voltage vs Junction Temperature

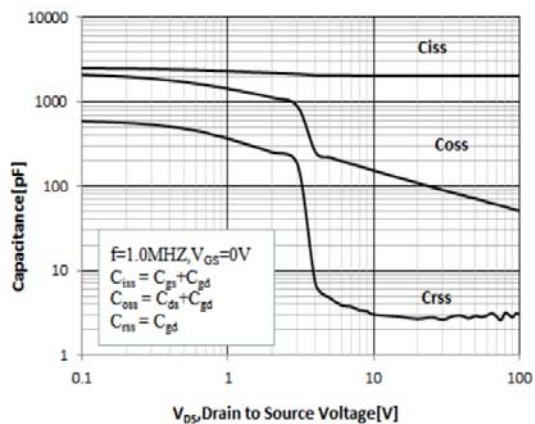


Figure 11 Typical Capacitance vs Drain to Source Voltage

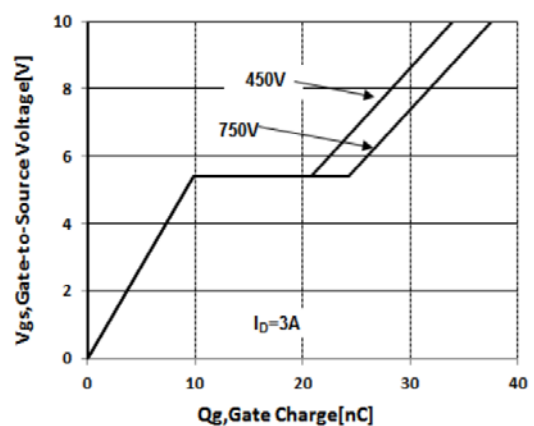


Figure 12 Typical Gate Charge vs Gate to Source Voltage

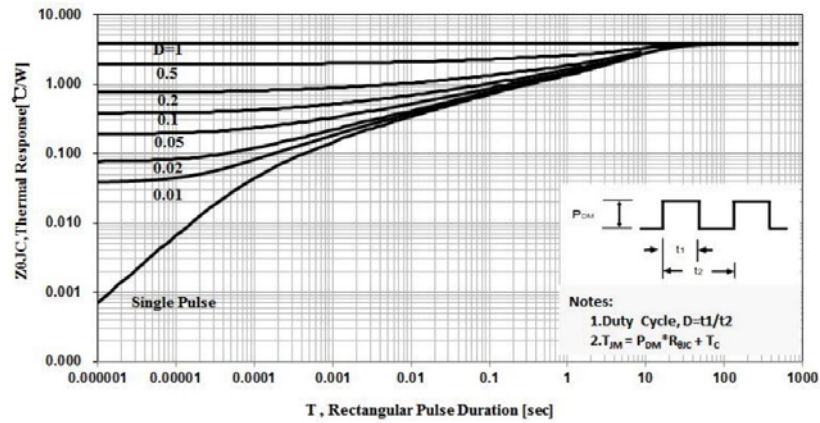
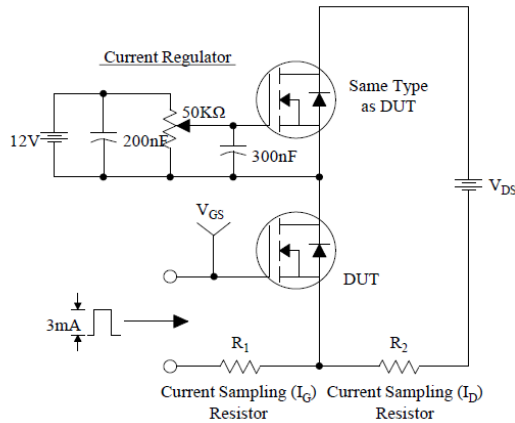
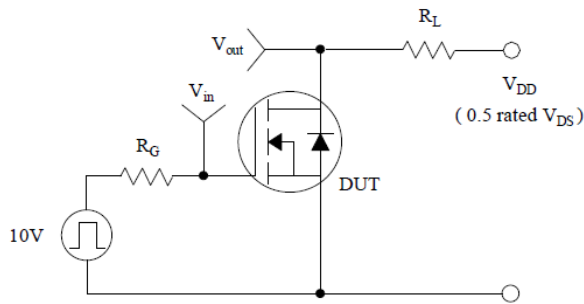
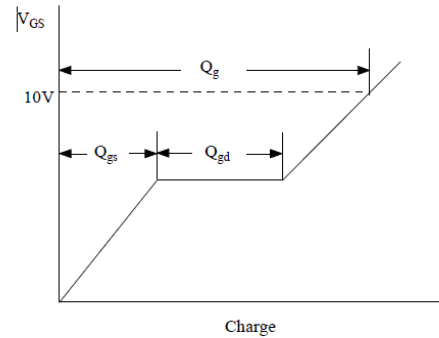


Figure 13 Maximum Effective Thermal Impedance , Junction to Case

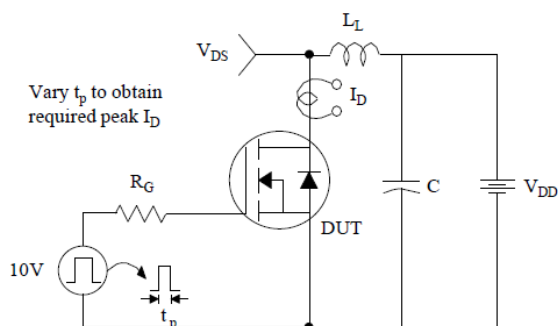
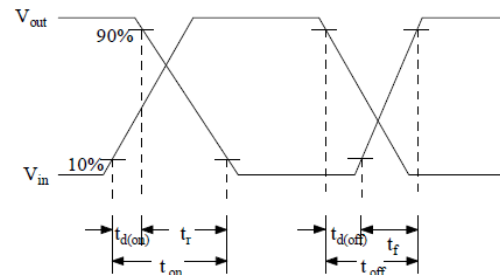
Test Circuit & Waveform



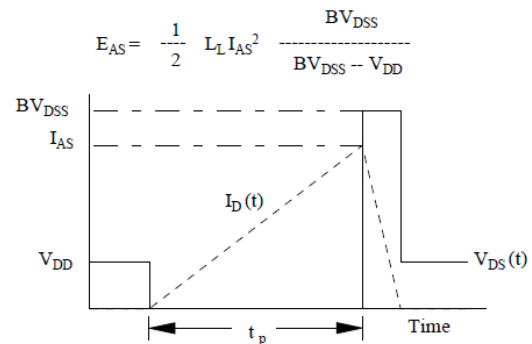
Gate Charge Test Circuit & Waveform



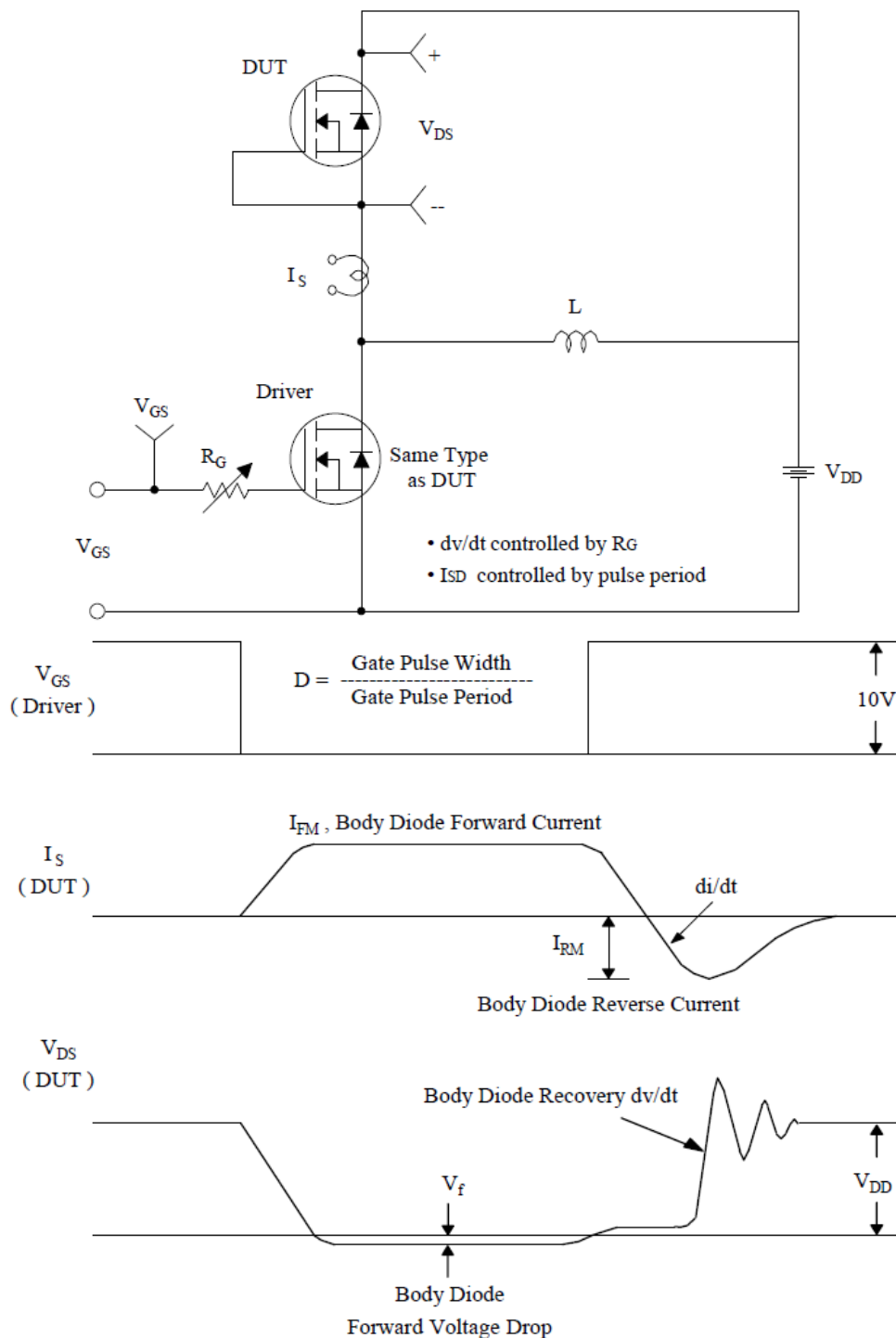
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

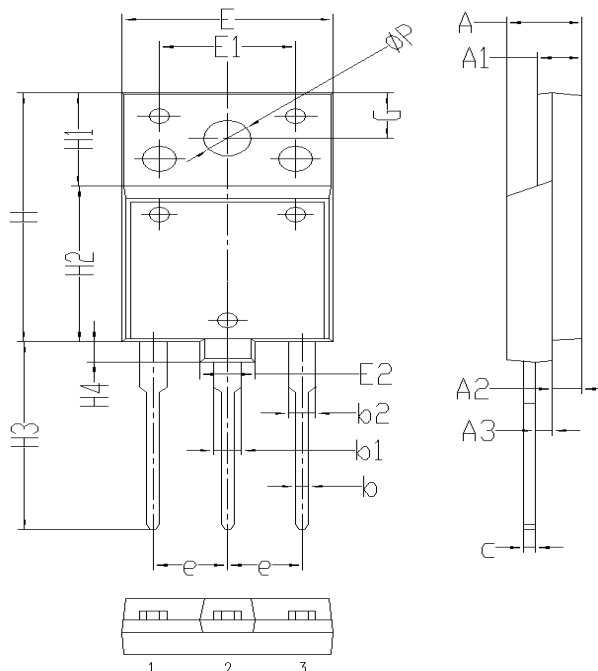


Test Circuit & Waveform



Peak Diode Recovery dv/dt Test Circuit & Waveforms

Package Information



Symbol	单位 mm		
	Min	Nom	Max
A	5.35	5.55	5.75
A1	2.80	3.00	3.20
A2	1.90	2.10	2.30
A3	1.10	1.30	1.50
b	0.65	0.75	0.85
b1	1.80	2.00	2.20
b2	1.80	2.00	2.20
c	0.70	0.90	1.10
e	5.25	5.45	5.65
E	15.3	15.5	15.7
E1	9.80	10.0	10.2
E2	3.80	4.00	4.20
H	24.3	24.5	24.7
H1	9.00	9.20	9.40
H2	15.1	15.3	15.5
H3	18.5	19.0	19.5
H4	1.80	2.00	2.20
H5	4.80	5.00	5.20
G	4.3	4.5	4.7
ΦP	3.40	3.60	3.80