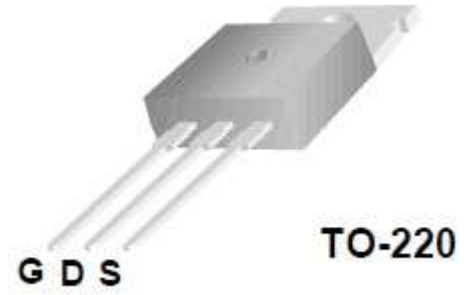
SMP730

400V N-Channel Power MOSFET

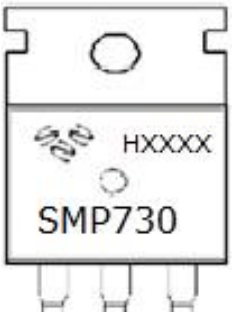
Features

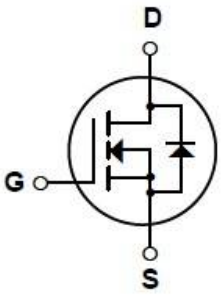
- 6A,400V, $R_{DS(on)}$ =1.0 Ω@V_{GS}=10V
- Low gate charge (typical 13 nC)
- Low Crss (typical 7pF)
- 100% avalanche tested
- Fast switching
- Improved dv/dt capability



Application

- Electronic Ballast
- Active power factor correction
- Switching mode power supply





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

Symbol	Parameters		Value	Unit
VDSS	Drain-source Voltage		400	V
VGS	Gate-source Voltage		±30	V
ID	Continuous Drain Current	--TC=25°C	6	A
		--TC=100°C	3.6	A
IDM	Drain Current-Pulsed ①		24	A
P_D	Power Dissipation	--(TC = 25°C)	75	W
		-- Derate above 25°C	0.6	W/°C
T_j	Junction Temperature		150	°C
T_{STG}	Storage Temperature		-55-150	°C
E_{AS}	Single Pulse Avalanche Energy②		280	mJ
I_{AR}	Avalanche Current①		7.5	A

Thermal Characteristics

Symbol	Parameters	Min	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance Junction-case			1.05	°C /W
$R_{\theta JA}$	Thermal Resistance Junction-ambient			62.5	°C /W

Electronic Characteristics(Tc=25°C unless otherwise noted)

Symbol	Characteristics	Test condition	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-source Breakdown Voltage	V_{GS}=0V ,I_D=250μA	400			V
$\triangle BV_{DSS}/\triangle T_j$	Breakdown Voltage Temperature Coefficien ③	I_D=250μA (Referenced to 25℃)		0.55		V/℃
I_{DSS}	Drain-source Leakage Current	V_{DS}=400V,V_{GS}=0V			1	μA
		V_{DS}=320V,T_j=125℃			10	μA
IGSSF	Gate-body Leakage Current	V_{GS}=+30V			100	nA
IGSSR		V_{GS}=-30V			100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	VGS=VDS,ID=250μA	2.0		4.0	V
$R_{DS(on)}$	Static Drain-source On Resistance	VGS=10V,ID=3A		0.8	1.0	Ω
g_{FS}	Forward Transconductance	VDS=15V,ID=3A		4.5		S
Dynamic and Switching Characteristics						
Ciss	Input Capacitance	V_{GS}=0V,V_{DS}=25V,f=1.0MHZ		550		pF
Coss	Output Capacitance			72		pF
Crss	Reverse Transfer Capacitance			7		pF
$t_{d(on)}$	Turn-On Delay Time	V_{DD} =300 V, I_D = 6 A, R_G = 25 Ω③		14		ns
t_r	Turn-On Rise Time			67		ns
$t_{d(off)}$	Turn-Off Delay Time			21		ns
t_f	Turn-Off Fall Time			35		ns
Q_g	Total Gate Charge	V_{DS} = 300 V, I_D =6 A, V_{GS} = 10 V③		13		nC
Q_{gs}	Gate-Source Charge			3.5		nC
Q_{gd}	Gate-Drain Charge			5.5		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-source Diode Forward Current				6	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				24	A
V_{SD}	Drain-source Forward Voltage	Tj=25℃,I_S=6A,V_{GS} =0V			1.5	V

Notes :

①Repetitive Rating:Pulse width limited by maximum junction temperature

②EAS Test condition

L = 10mH, I_{AS} =7.5 A, V_{DD} = 50V, RG = 25 Ω, Starting TJ = 25°C

③ Pulse Test : Pulse width ≤300 μ s, Duty cycle≤2%

Typical Characteristics

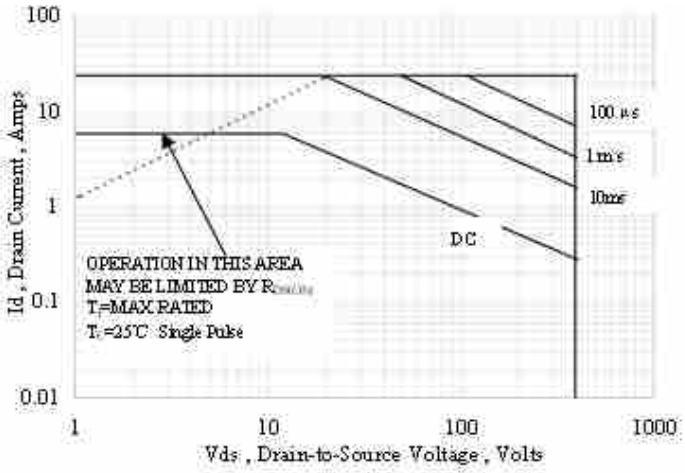


Figure 1 Maximun Forward Bias Safe Operating Area

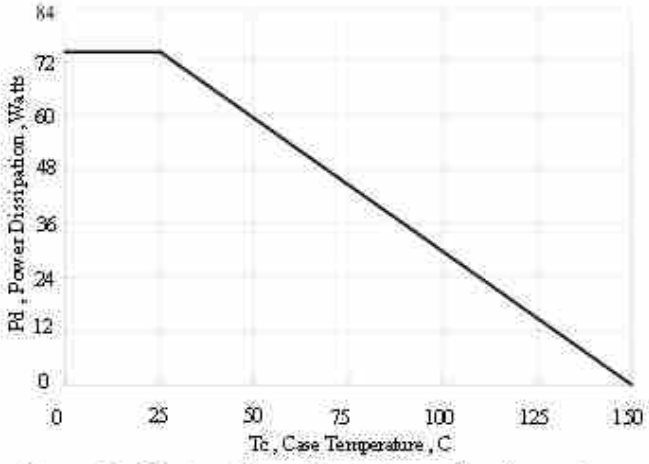


Figure 2 Maximun Power Dissipation vs Case Temperature

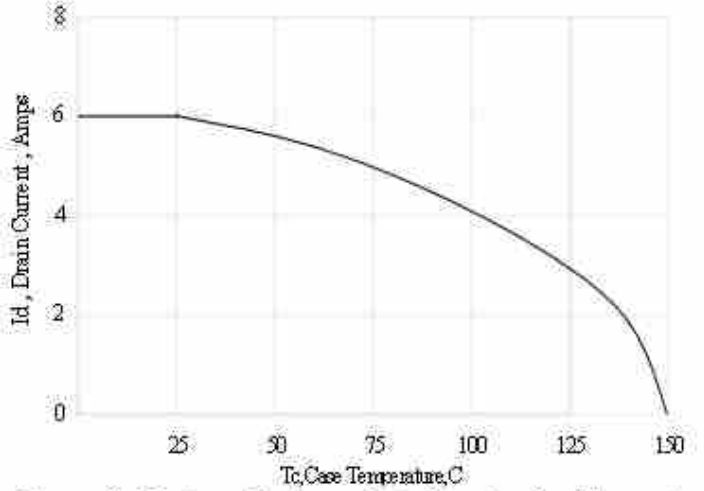


Figure 3 Maximum Continuous Drain Current vs Case Temperature

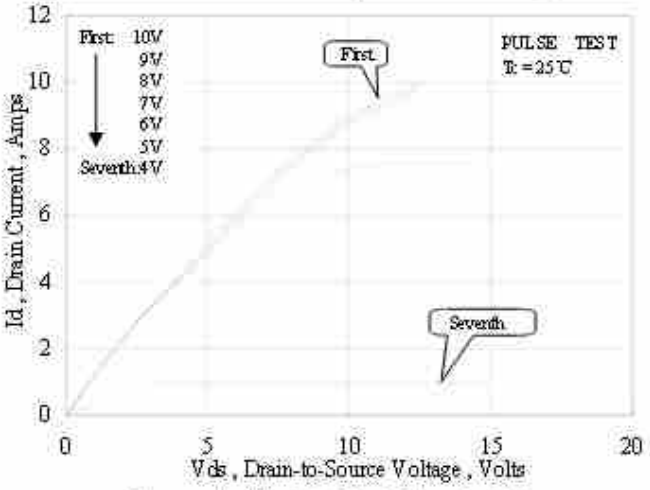


Figure 4 Typical Output Characteristics

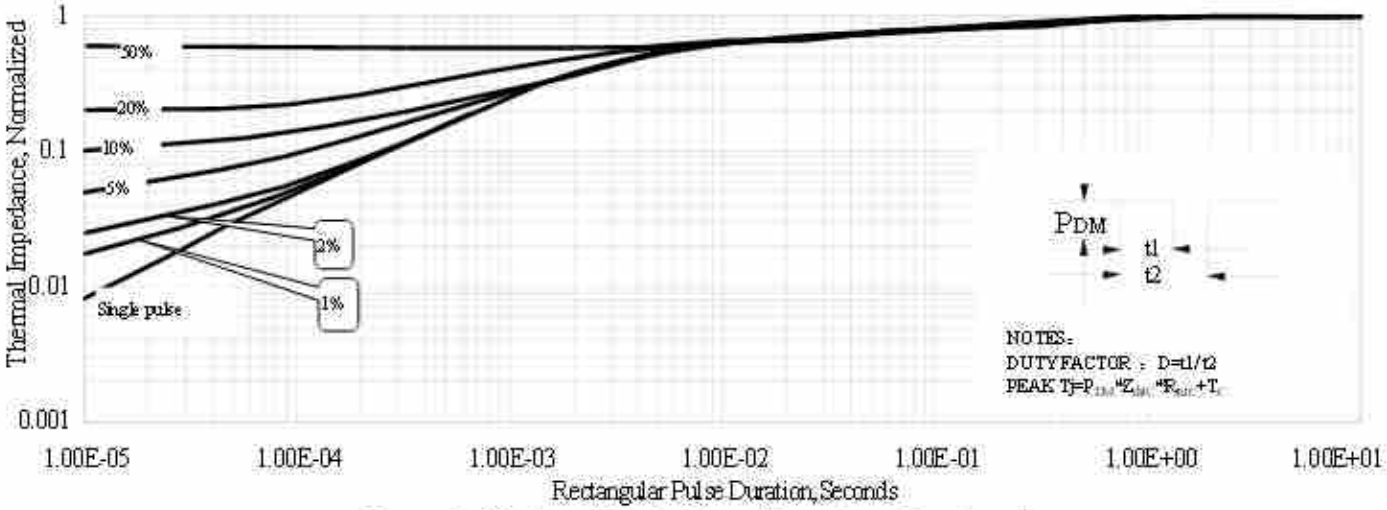


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

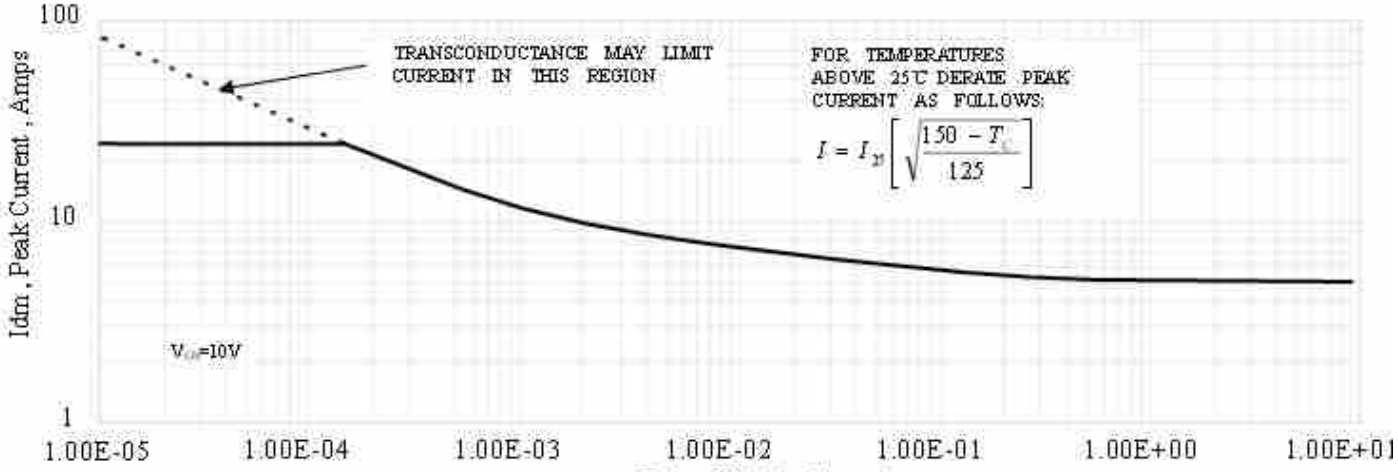


Figure 6 Maximun Peak Current Capability

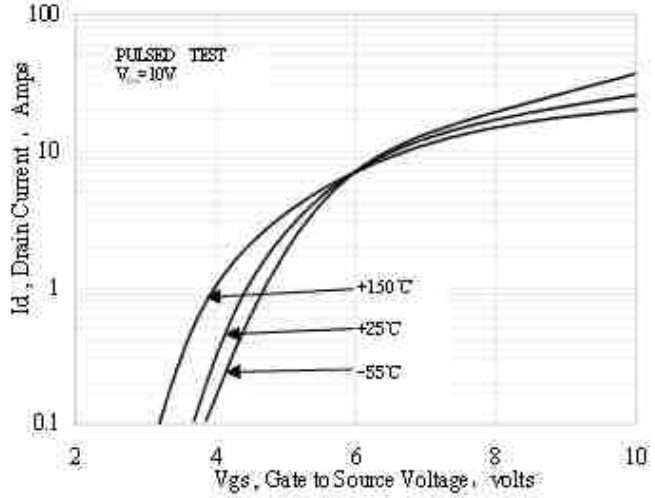


Figure 7 Typical Transfer Characteristics

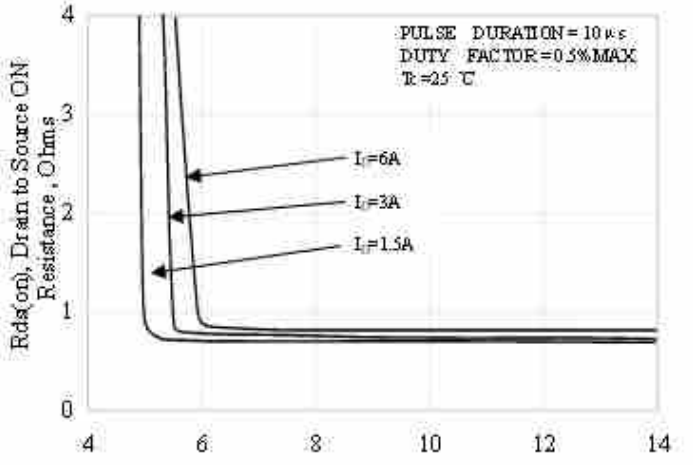


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

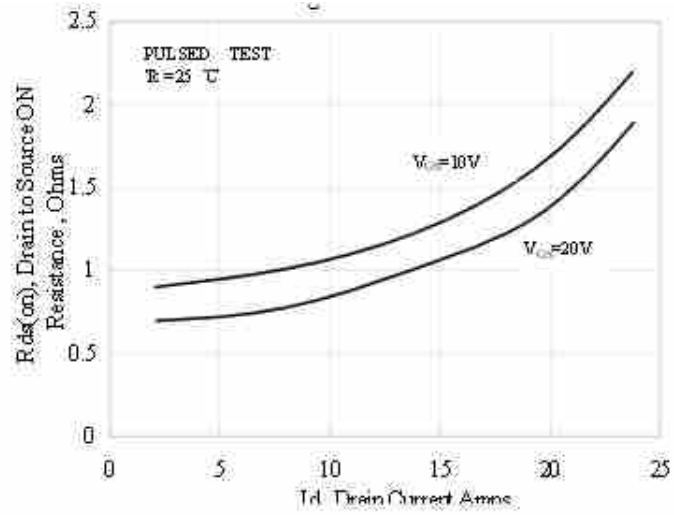


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

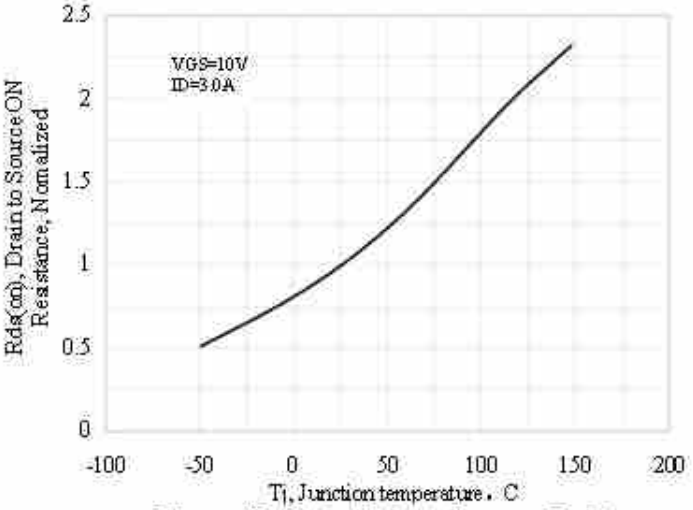


Figure 10 Typical Drian to Source on Resistance vs Junction Temperature

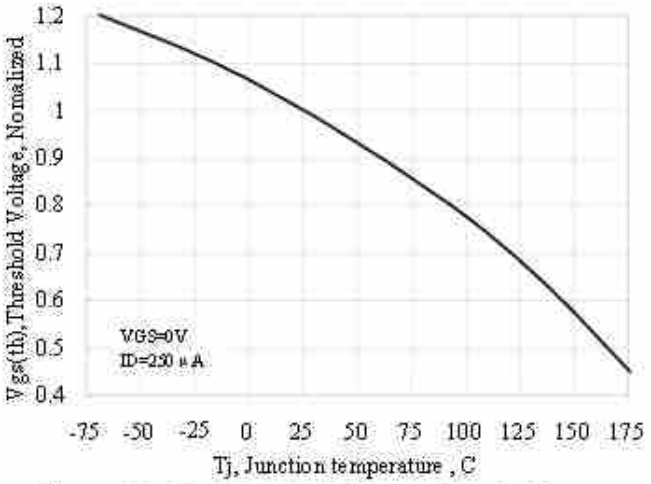


Figure 11 Typical Theshold Voltage vs Junction Temperature

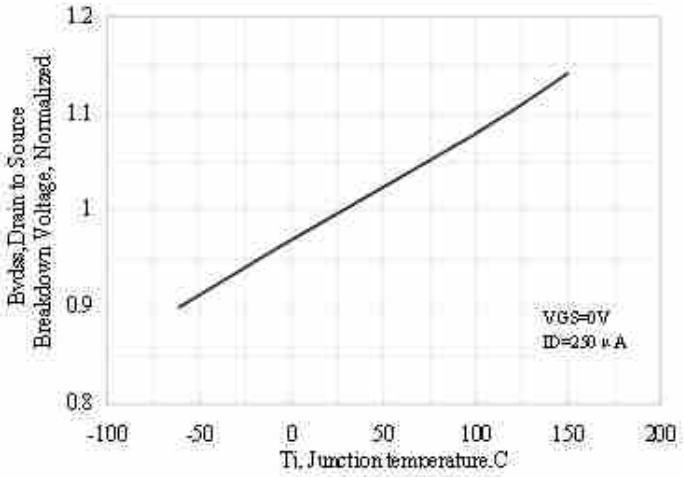


Figure 12 Typical Breakdown Voltage vs Junction Temperature

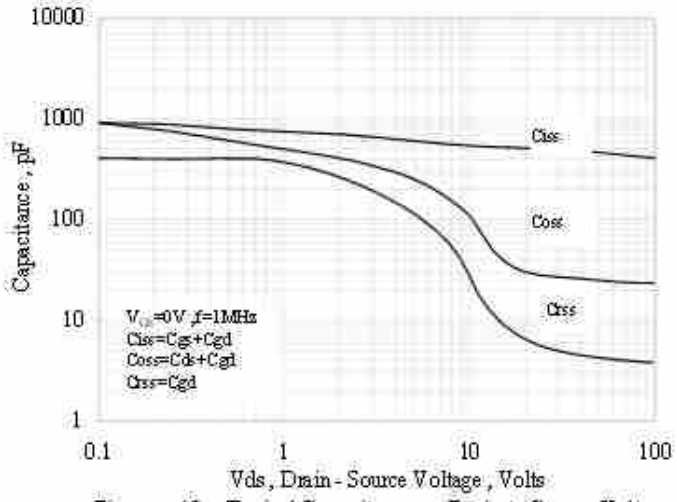


Figure 13 Typical Capacitance vs Drain to Source Voltage

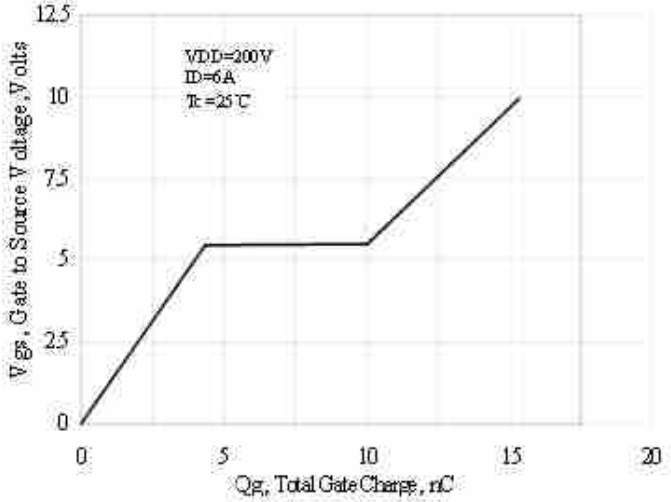


Figure 14 Typical Gate Charge vs Gate to Source Voltage

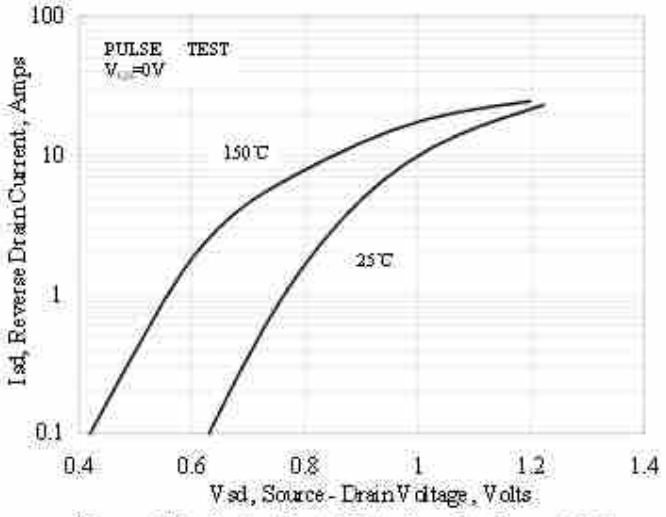


Figure 15 Typical Body Diode Transfer Characteristics

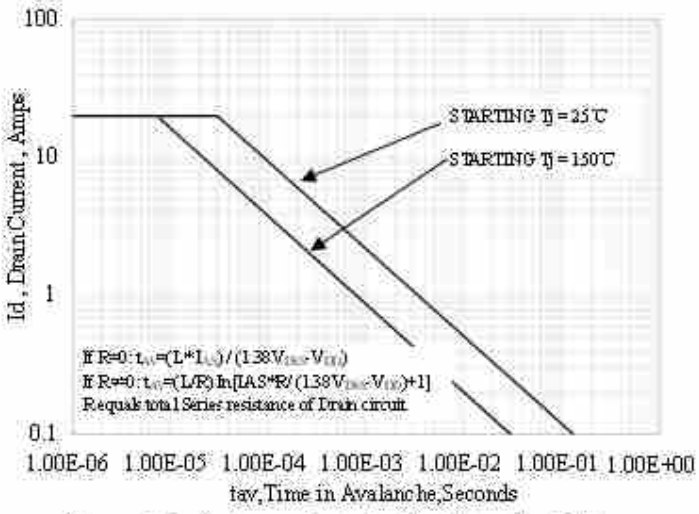
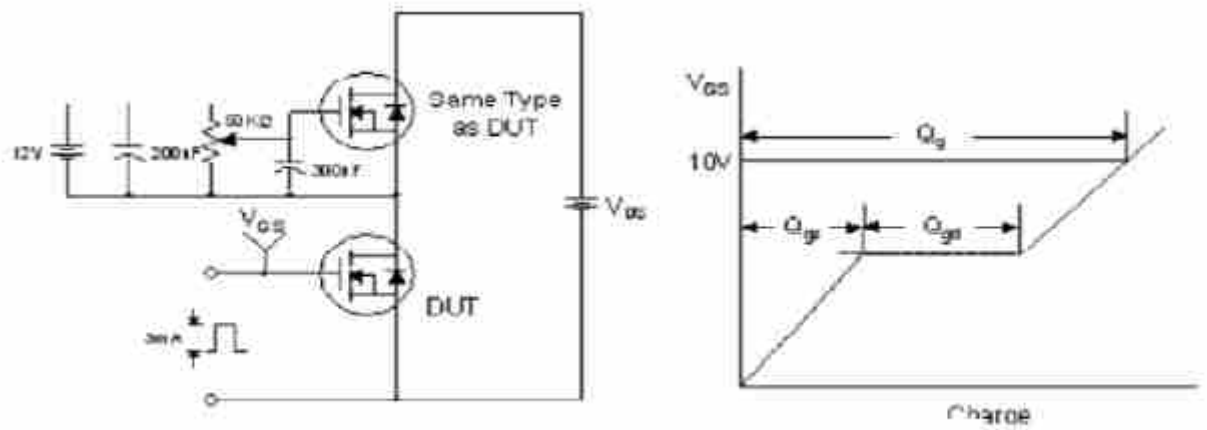
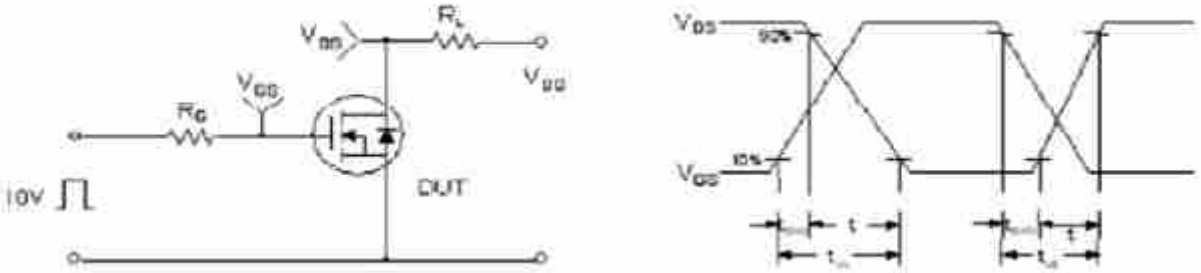


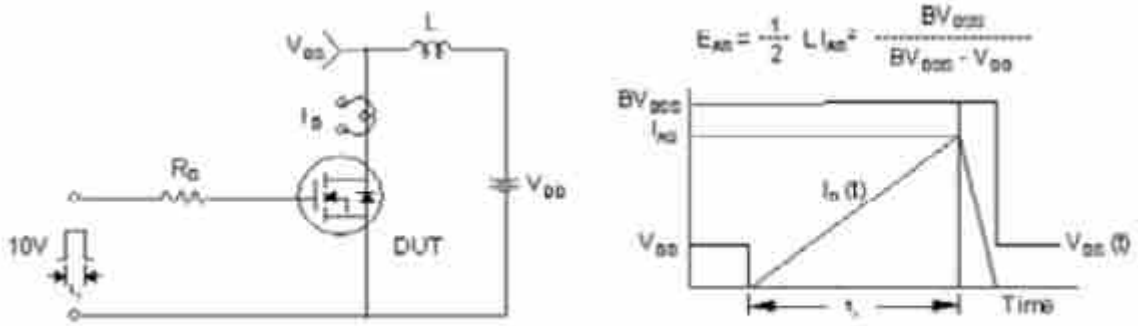
Figure 16 Unclamped Inductive Switching Capability



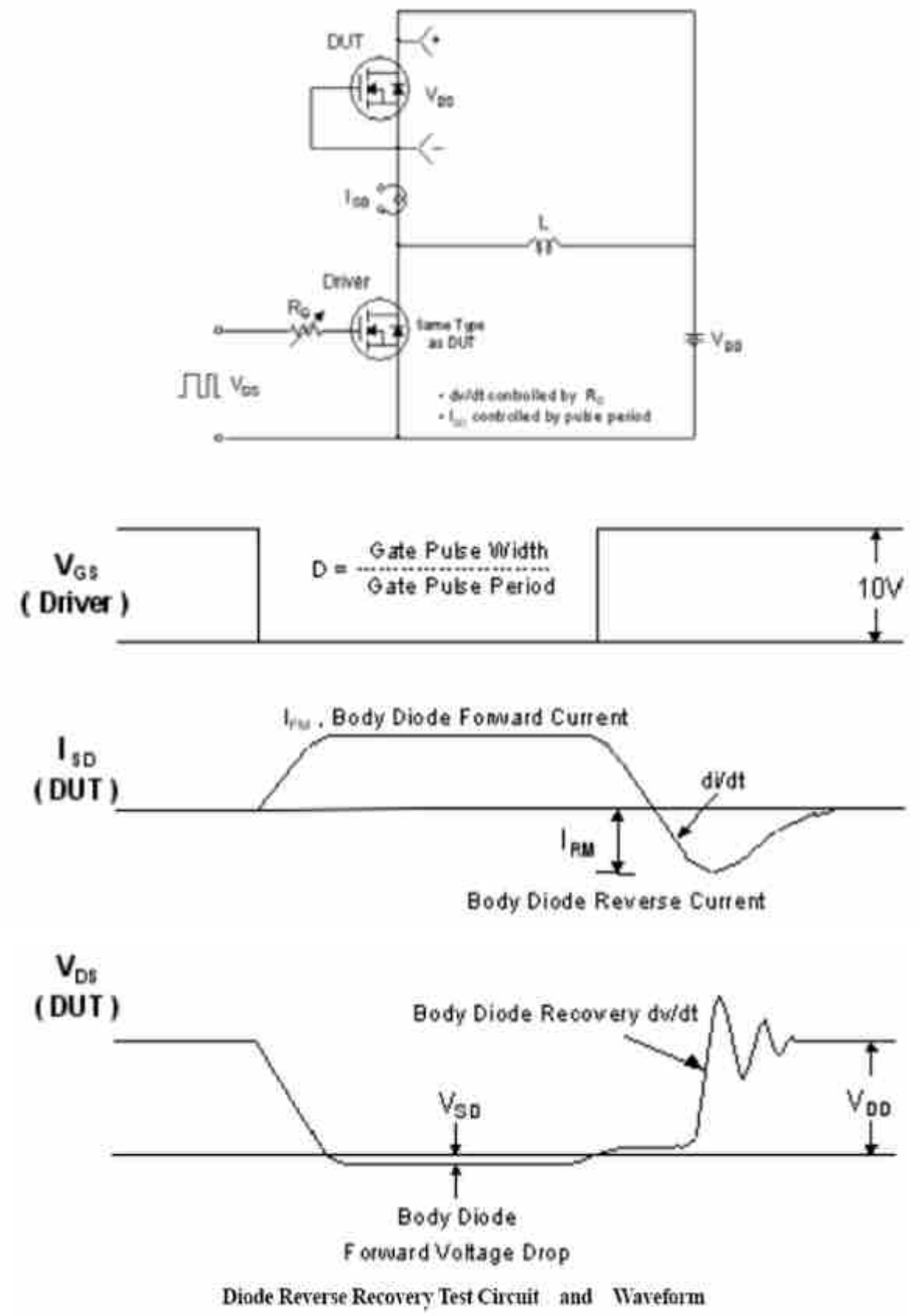
Gate Charge Test Circuit and Waveform



Resistive Switching Test Circuit and Waveform

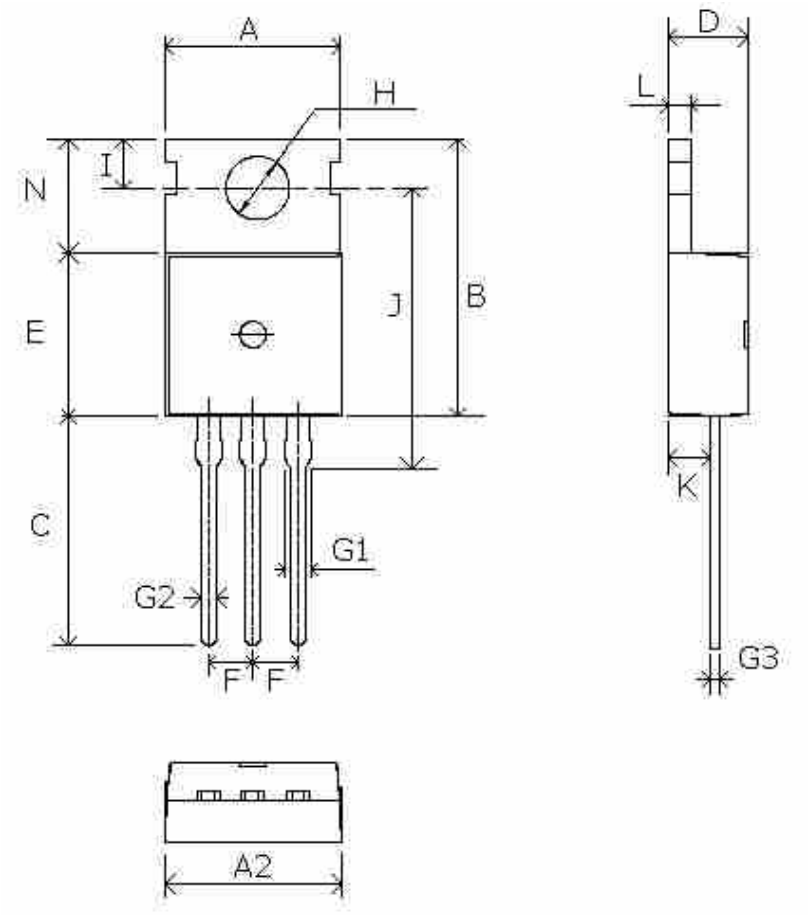


Unclamped Inductive Switching Test Circuit and Waveform



Diode Reverse Recovery Test Circuit and Waveform

TO-220Package Dimensions



Unit:mm

Symbol	Min	Max	Symbol	Min	Max
A	9.6	10.4	G2	0.7	0.95
A2	9.8	10.2	G3	0.36	0.39
B	15.5	15.7	H(Φ)	3.7	4
C	12.7	14.3	I	2.7	2.9
D	4.3	4.7	J	15.9	16.4
E	8.85	9.25	K	2.2	2.6
F	2.54		L	1.25	1.4
G1	1.26	1.5	N	6.4	6.8