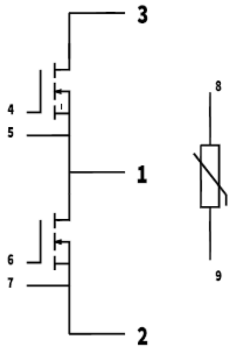
RSC120HF120T2LH

Preliminary Data

SiC MOSFET Module

Features：

- Ultra Low Loss
- High-Frequency Operation
- Zero Reverse Recovery Current from Diode
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-safe Device Operation
- Easy of Paralleling
- Copper Baseplate and Aluminum Nitride Insulator



Applications：

- Induction Heating
- DC/DC Converters
- Solar and Wind Inverters
- Line Regen Drives
- Battery Chrage

Absolute Maximum Ratings (T_C=25℃unless otherwise specified)

Symbol	Description		Value	Units
V_{DSmax}	Drain-Source Voltage		1200	V
V_{GSmax}	Gate-Source Voltage	Absolute Maximum values	-10/+25	V
V_{GSop}	Gate-Source Voltage	Recommended Operational Values	-5/20	V
I_D	Continuous Drain Current	V_{GS}=20V,T_C=25℃	193	A
		V_{GS}=20V,T_C=90℃	138	A
$I_{D(pluse)}$	Pulsed Drain Current	Pulse width t_p limited by T_{jmax}	480	A
P_D	Power Dissipation	T_c=25℃，T_j=150℃	925	W

Electrical Characteristics of MOSFET (T_C=25℃unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain - Source Breakdown Voltage	V_{GS}=0V,I_D=300uA	1.2			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = 10 V, I_D =6 mA	1.8	2.6		V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 1.2 kV, V_{GS} = 0V		80	300	μA
		V_{DS} = 1.2 kV, V_{GS} = 0V, T_J = 150 ˚C		400	1500	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS} = 20 V, V_{DS} = 0V		1	100	nA
$R_{DS(on)}$	On State Resistance	V_{GS} = 20 V, I_{DS} = 120 A		13	16	mΩ
		V_{GS} = 20 V, I_{DS} = 120 A, T_J = 150 ˚C		23	30	
g_{fs}	Transconductance	V_{DS}= 20 V, I_{DS} = 120 A		53.8		S
		V_{DS}= 20 V, I_{DS} = 120 A, Tj=150℃		48.5		
C_{iss}	Input Capacitance	V_{DS} = 1KV, f = 200 kHz, V_{AC} = 25 mV		6.3		nF
C_{OSS}	Output Capacitance			0.88		
C_{rss}	Reverse Transfer Capacitance			0.037		
E_{on}	Turn-On Switching Energy	V_{DD} = 600 V, V_{GS} = -5V/+20V I_D = 120 A, $R_{G(ext)}$ = 2.5 Ω		1.7		mJ
E_{off}	Turn-Off Switching Energy			0.4		
$R_{G(int)}$	Internal Gate Resistance	f = 200 kHz, V_{AC} = 25 mV		1.8		Ω
Q_{GS}	Gate-Source Charge	V_{DD}= 800 V, V_{GS} = -5V/+20V, I_D= 120 A,		97		nC
Q_{GD}	Gate-Drain Chrage			118		
Q_G	Total Gate Chrage			378		
$t_{d(on)}$	Turn-off delay time	V_{DD} = 600V, V_{GS} = -5/+20V, I_D = 120 A, $R_{G(ext)}$ = 2.5 Ω,		38		ns
t_r	Rise Time			34		
$t_{d(off)}$	Turn-off delay time			70		
t_f	Fall Time			22		
$R_{\theta JCM}$	MOSFET Thermal Resistance: Junction-To-Case			0.125	0.135	℃/W

Electrical Characteristics of Body Diode (T_C=25℃unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{SD}	Diode Forward Voltage	I_F = 120 A, V_{GS} = 0		1.5	1.8	V
		I_F = 120 A, V_{GS} = 0 T_j=150℃		1.9	2.4	
Q_C	Total Capacitive Charge	I_{SD} = 120A, V_{DS} = 600 V, T_J = 25°C, di_{SD}/d_t = 3 kA/μs, V_{GS} = -5 V		1.1		μC
$R_{θJCD}$	Diode Thermal Resistance: Junction-To-Case			0.108	0.115	℃/W
I_F	Continuous Diode Forward Current	V_{GS}= -5V，T_C=25℃			305	A
		V_{GS}= 5V，T_C=25℃			195	A

NTC-Thermistor Characteristic Values

R_{25}	T_C =25℃	5		kΩ
△R/R	T_C =100℃，R_{100} =481Ω		±5	%
P_{25}	T_C =25℃	50		mW
$B_{25/50}$	R_2=R_{25} exp[$B_{25/50}$(1/T_2-1/(298.15K))]	3380		K
$B_{25/80}$	R_2=R_{25} exp[$B_{25/80}$(1/T_2-1/(298.15K))]	3440		K

Module

Symbol	Description		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1minute	2500			V
T_J	Maximum Junction Temperature				150	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		150	℃
T_{stg}	Storage Temperature		-40		125	℃
CTI	Comparative Tracking Index		200			V
$R_{θCS}$	Case-To-Sink Thermally (Conductive Grease Applied)			0.03		℃/W
M	Power Terminals Screw:M5		2.0		3.5	N·m
M	Mounting Screw:M6		3.0		5.0	N·m
G	Weight			290		g

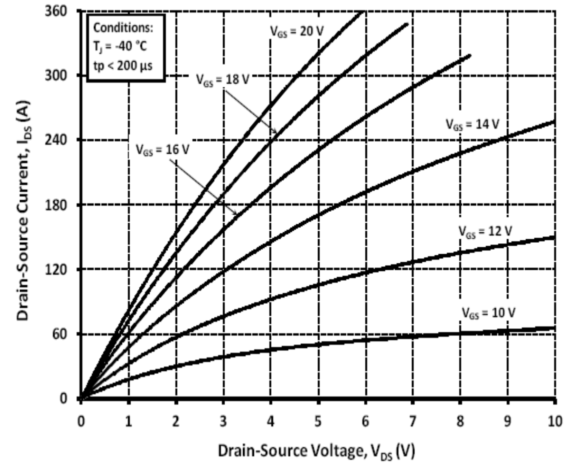


Fig.1 Output Characteristic Tj=-40℃

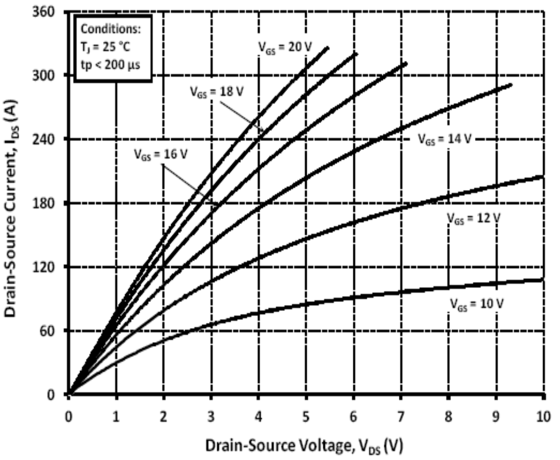


Fig.2 Output Characteristics Tj=25℃

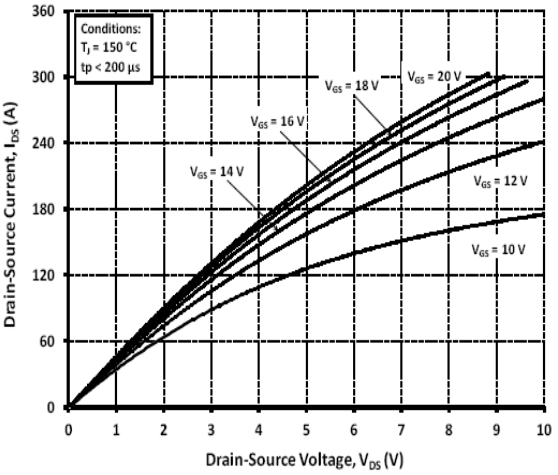


Fig.3 Output Characteristic Tj=150℃

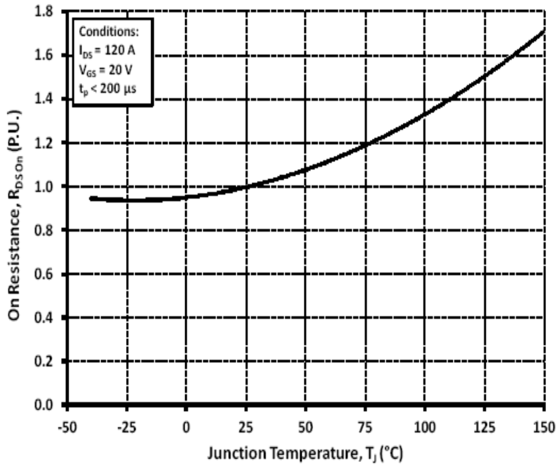


Fig.4 Normalized On-Resistant VS Temperature

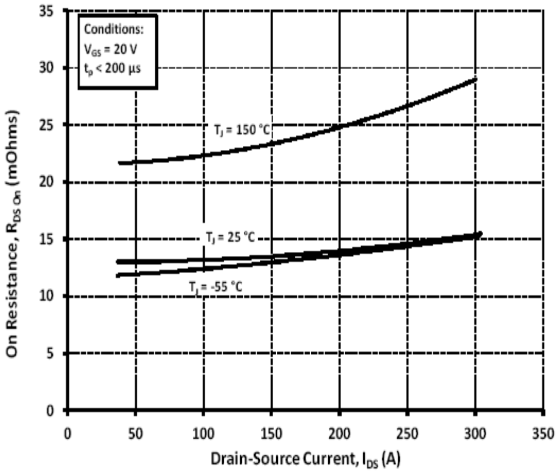


Fig.5 On-Resistant VS Drain Current For Various Temperatures

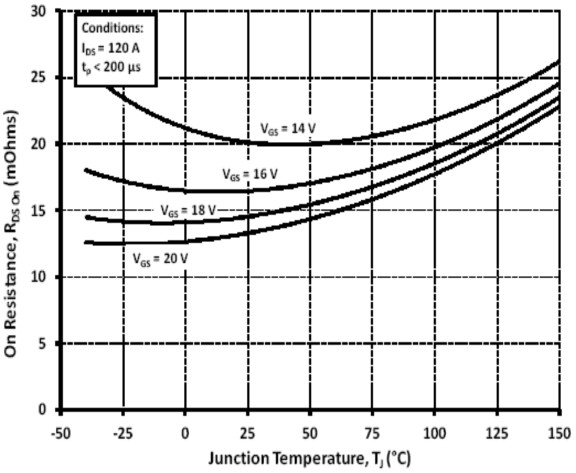


Fig.6 On-Resistant vs Temperatures For Various Gate-Source voltage

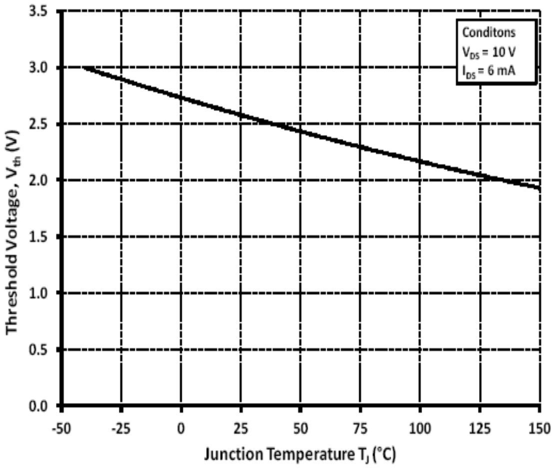


Fig.7 Threshold Voltage VS Temperature

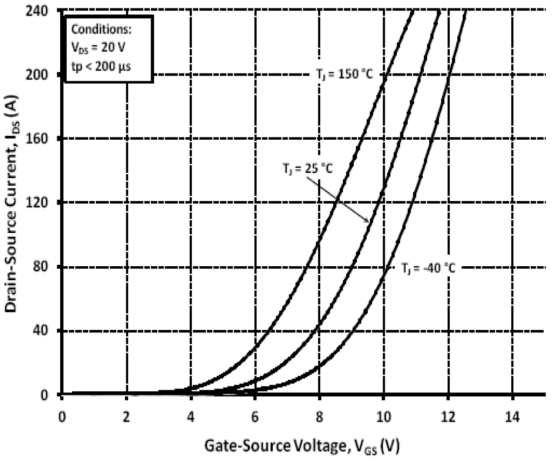


Fig.8 Transfer Characteristic for Various Junction Temperature

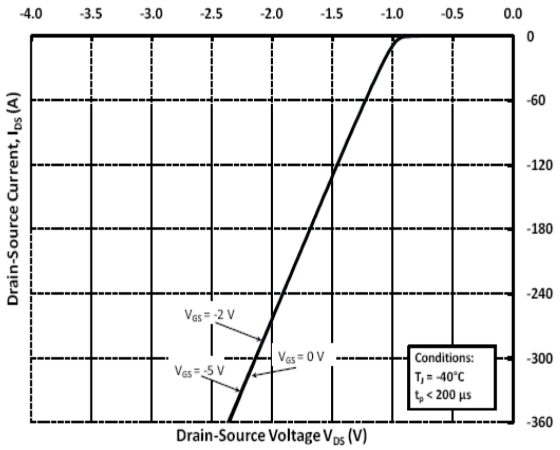


Fig.9 Diode Characteristic at -40℃

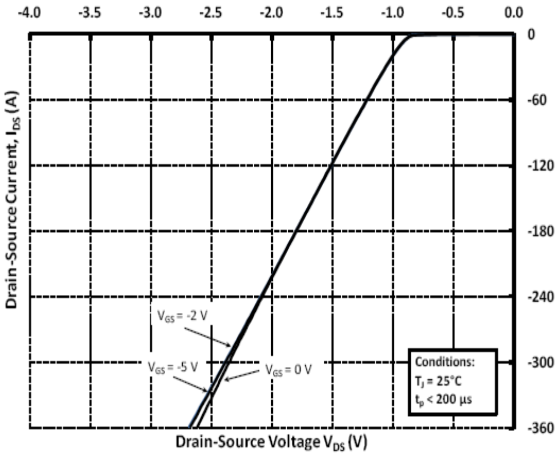


Fig.10 Diode Characteristic at 25℃

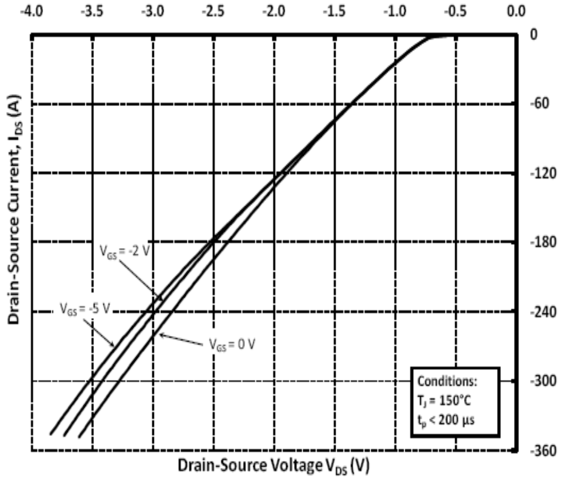


Fig.11 Diode Characteristic at 150℃

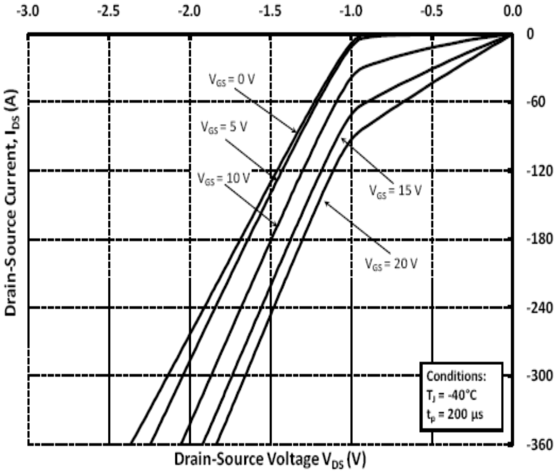


Fig.12 3rd Quadrant Characteristic at -40℃

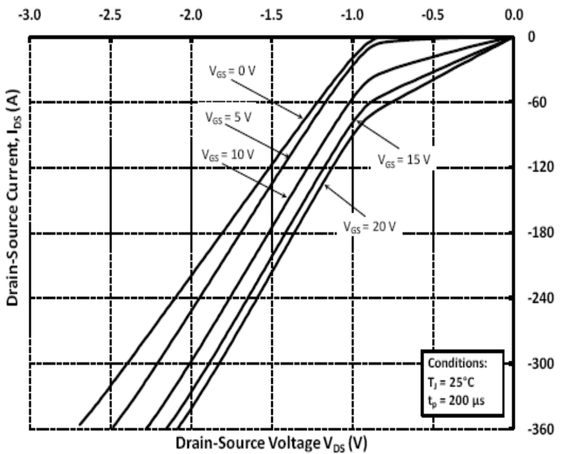


Fig.13 3rd Quadrant Characteristic at 25℃

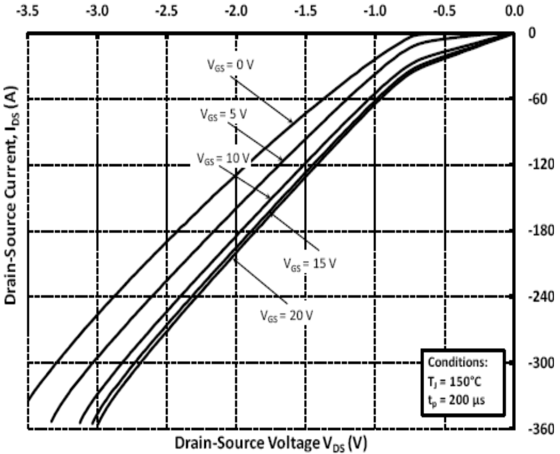


Fig.14 3rd Quadrant Characteristic at 150℃

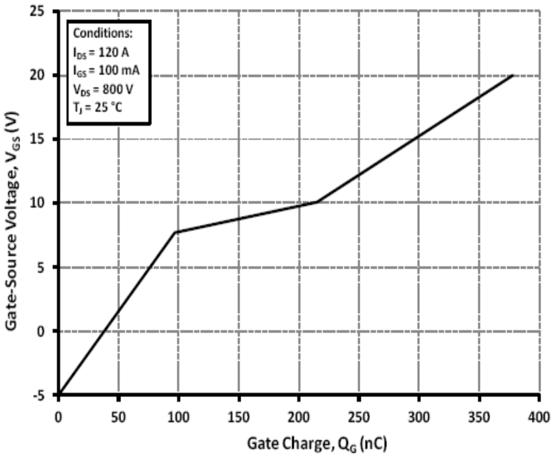


Fig.15 Typical Gate Charge Characteristic

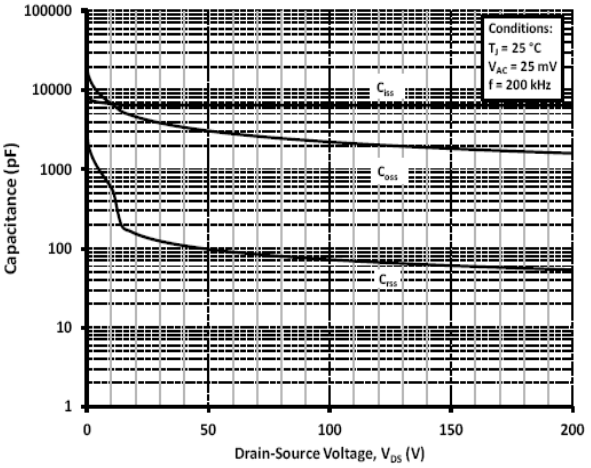


Fig.16 Capacitances VS Drain-Source Voltage (0-200V)

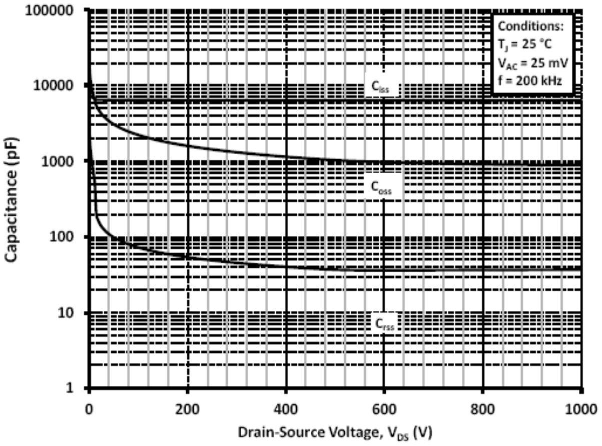


Fig.17 Typical Capacitances VS Drain-Source

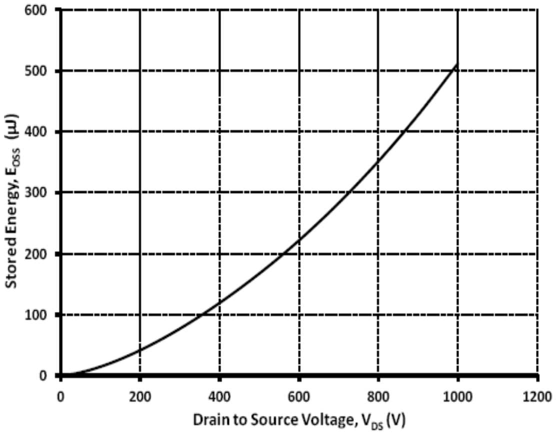


Fig.18 Typical Output Capacitor Stored Energy

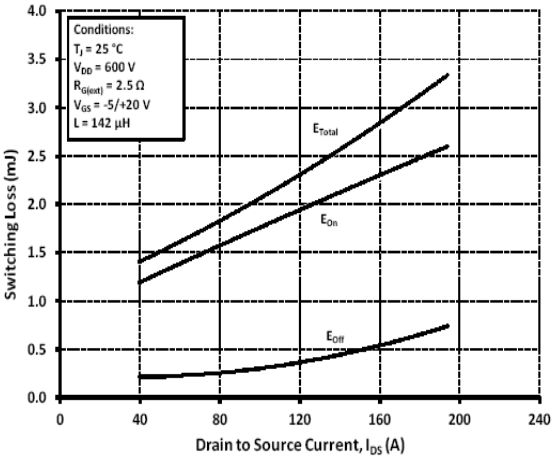


Fig.19 Inductive Switching Energy VS Drain Current For V_{DS}=600A,R_G=2.5Ω

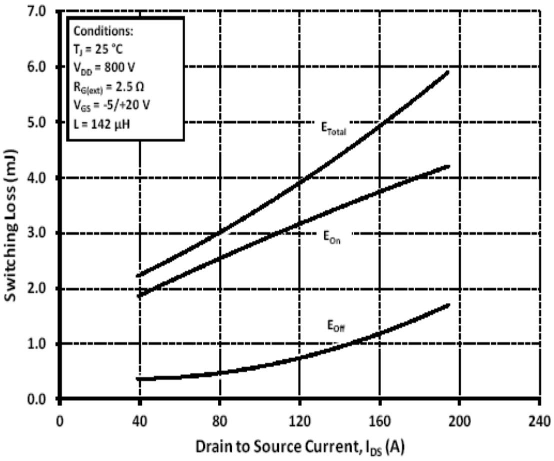


Fig.20 Inductive Switching Energy VS Drain Current For V_{DS}=800A,R_G=2.5Ω

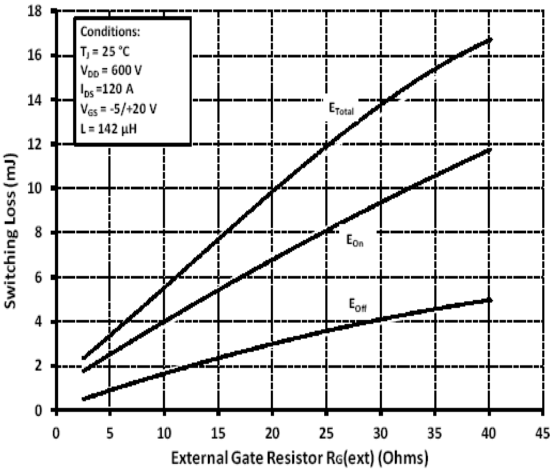


Fig.21 Inductive Switching Energy VS $R_{G(ext)}$

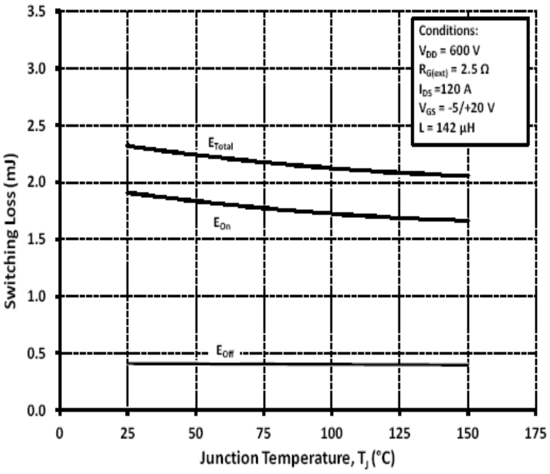


Fig.22 Inductive Switching Energy VS Temperature

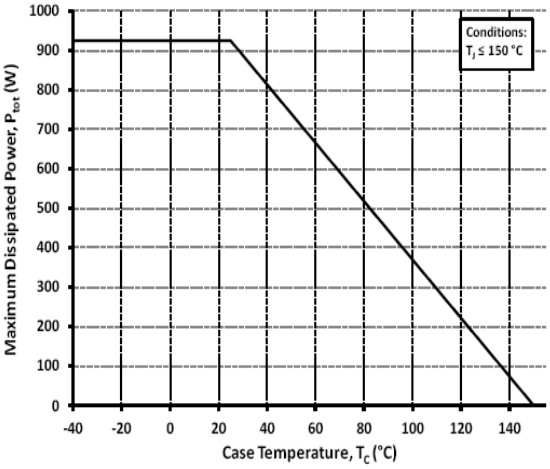


Fig.23 Maximum Power Dissipation (MOSFET) Derating VS Case Temperature

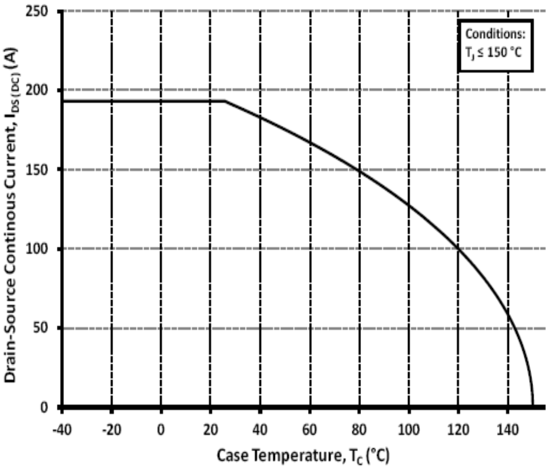


Fig.24 Continous Drain Current Derating VS Case Temperature

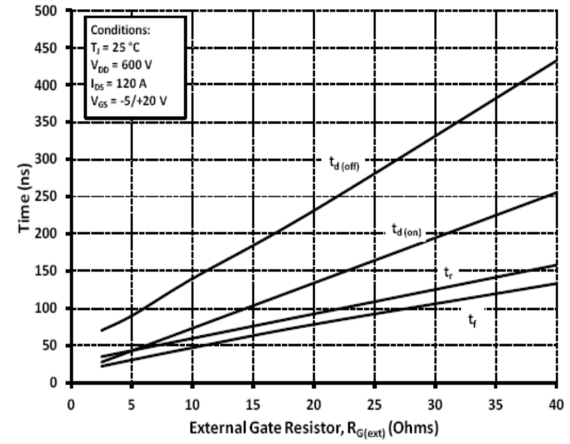


Fig.25 Timing VS $R_{G(ext)}$

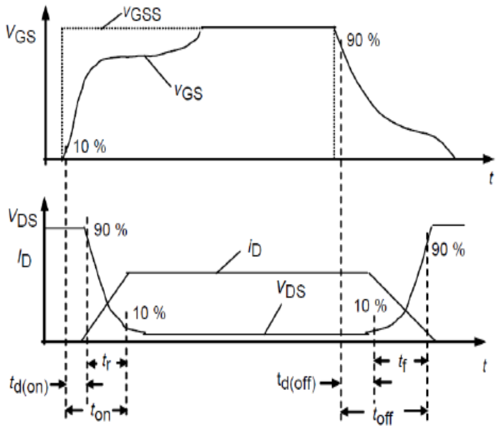


Fig.26 Resistive Switching Time Description

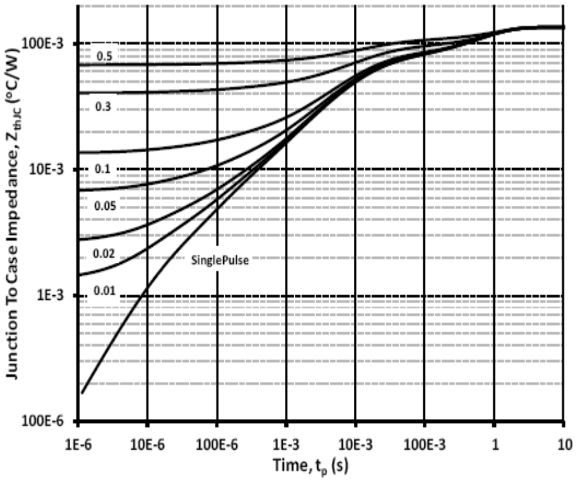


Fig.27 MOSFET Junction Case Thermal Impedance

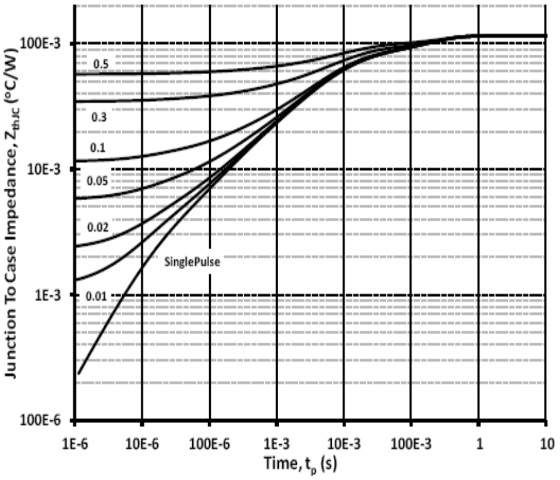


Fig.28 Diode Junction to Case Thermal Impendence

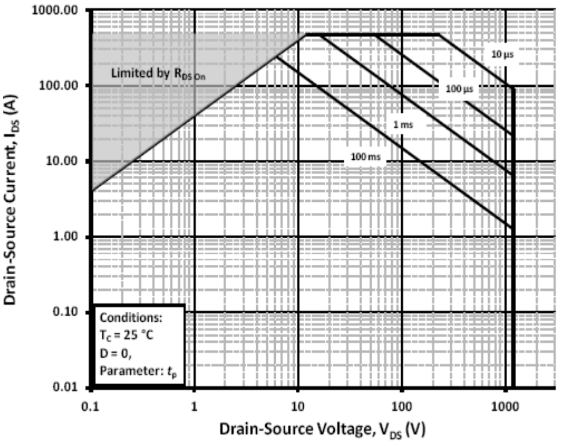


Fig.29 Maximum Power Dissipation (MOSFET) Derating

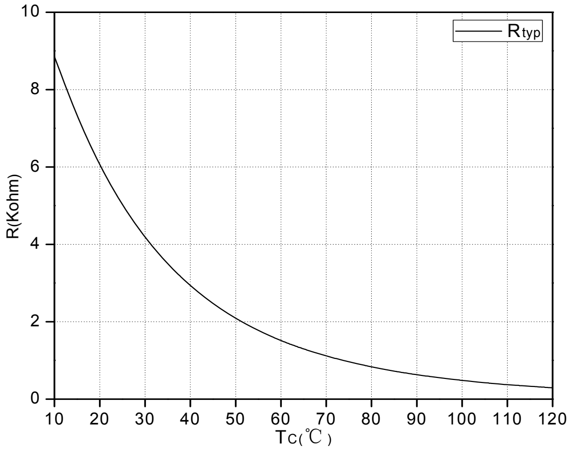
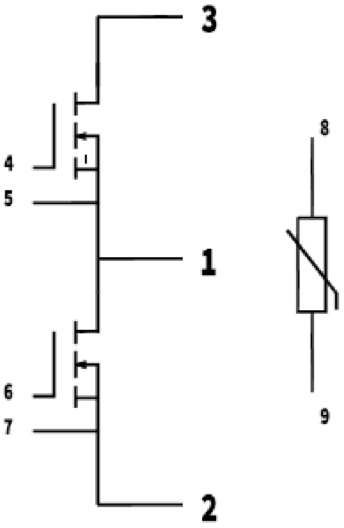


Fig.30 NTC Temperature Characteristics

Internal Circuit:



Package Outline (Unit: mm):