IV1B12013HA1L – 1200V 13mohm SiC MODULE

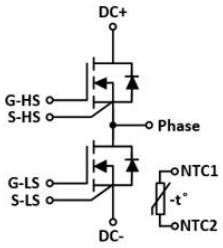
Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Very fast and robust intrinsic body diode

Applications

- Solar applications
- UPS system
- Motor drivers
- High voltage DC/DC converters

Package



Marking Diagram

IV1B12013HA1L	Specific Device Code	
YYWWZ-XXXXX	YY	Year
	WW	Work Week
	Z	Assembly Location
	XXXXX	Lot Traceability

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DS}	Drain-Source voltage	1200	V		
V_{GSmax} (DC)	Maximum DC voltage	-5 to 22	V	Static (DC)	
V_{GSmax} (Spike)	Maximum spike voltage	-10 to 25	V	<1% duty cycle, and pulse width<200ns	
V_{GSon}	Recommended turn-on voltage	20±0.5	V		
V_{GSoff}	Recommended turn-off voltage	-3.5 to -2	V		
I_D	Drain current (continuous)	96	A	V_{GS}=20V, T_h=50°C, T_{vj}≤150℃	
		102	A	V_{GS}=20V, T_h=50°C, T_{vj}≤175℃	
I_{DM}	Drain current (pulsed)	204	A	Pulse width limited by SOA	Fig.26
P_{TOT}	Total power dissipation	210	W	T_{vj}≤150℃	Fig.24
T_{stg}	Storage temperature range	-40 to 150	°C		
T_J	Maximum virtual junction temperature under switching conditions	-40 to 150	°C	Operation	
		-55 to 175	°C	Intermittent with reduced life	

Thermal Data

Symbol	Parameter	Value	Unit	Note
$R_{\theta(J-H)}$	Thermal Resistance from Junction to Heatsink	0.596	°C/W	Fig.25

Electrical Characteristics (T_C=25°C unless otherwise specified)

Symbol	Parameter	Value			Unit	Test Conditions	Note
		Min.	Typ.	Max.			
I_{DSS}	Zero gate voltage drain current		10	200	μA	V_{DS}=1200V, V_{GS}=0V	
I_{GSS}	Gate leakage current			±200	nA	V_{DS}=0V, V_{GS}=-5~20V	
V_{TH}	Gate threshold voltage	1.8	3.2	5	V	V_{GS}=V_{DS}, I_D=24mA	Fig.9
			2.3			V_{GS}=V_{DS}, I_D=24mA @ T_C=150°C	
R_{ON}	Static drain-source on-resistance		12.5	16.3	mΩ	V_{GS}=20V, I_D=80A @T_J=25°C	Fig.4-7
			18		mΩ	V_{GS}=20V, I_D=80A @T_J=150°C	
C_{iss}	Input capacitance		11		nF	V_{DS}=800V, V_{GS}=0V, f=100kHz, V_{AC}=25mV	Fig.16
C_{oss}	Output capacitance		507		pF		
C_{rss}	Reverse transfer capacitance		31		pF		
E_{oss}	C_{oss} stored energy		203		μJ		Fig.17
Q_g	Total gate charge		480		nC	V_{DS}=800V, I_D=80A, V_{GS}=-5 to 20V	Fig.18
Q_{gs}	Gate-source charge		100		nC		
Q_{gd}	Gate-drain charge		192		nC		
R_g	Gate input resistance		1.0		Ω	f=100kHz	
E_{ON}	Turn-on switching energy		783		μJ	V_{DS}=600V, I_D=60A, V_{GS}=-5 to 20V, $R_{G(ext)on}$/ $R_{G(ext)off}$ =2.5Ω/1.43Ω, L=120μH	Fig.19-22
E_{OFF}	Turn-off switching energy		182		μJ		
$t_{d(on)}$	Turn-on delay time		30		ns		
t_r	Rise time		5.9				
$t_{d(off)}$	Turn-off delay time		37				
t_f	Fall time		21				
L_{sCE}	Stray inductance		7.6		nH		

Reverse Diode Characteristics (T_C=25°C unless otherwise specified)

Symbol	Parameter	Value			Unit	Test Conditions	Note
		Min.	Typ.	Max.			
V_{SD}	Diode forward voltage		4.9		V	I_{SD}=80A, V_{GS}=0V	Fig.10-12
			4.5		V	I_{SD}=80A, V_{GS}=0V, T_J=150°C	
t_{rr}	Reverse recovery time		17.4		ns	V_{GS}=-5V/+20V, I_{SD}=60A, V_R=600V, di/dt=13.28A/ns, $R_{G(ext)}$=2.5Ω,L=120μH	
Q_{rr}	Reverse recovery charge		1095		nC		
I_{RRM}	Peak reverse recovery current		114		A		

NTC Thermistor Characteristics

Symbol	Parameter	Value			Unit	Test Conditions	Note
		Min.	Typ.	Max.			
R_{NTC}	Rated Resistance		5		kΩ	T_{NTC}=25℃	Fig.27
ΔR/R	Resistance Tolerance at 25℃	-5		5	%		
$\beta_{25/50}$	Beta Value		3380		K	±1%	
P_{max}	Power Dissipation		5		mW		

Typical Performance (curves)

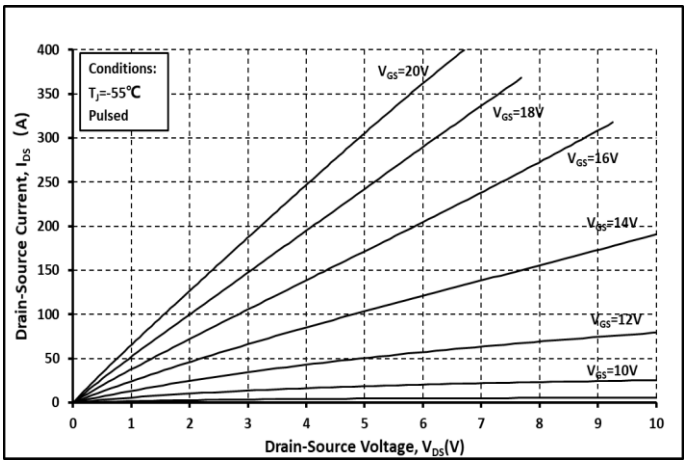


Fig. 1 Output Curve @ Tj=-55℃

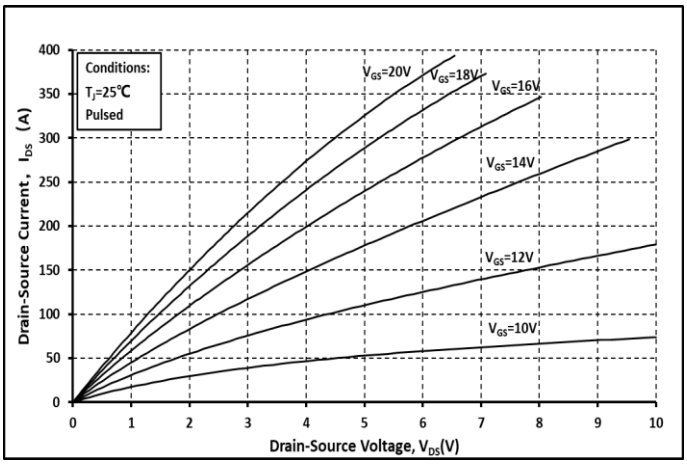


Fig. 2 Output Curve @ Tj=25℃

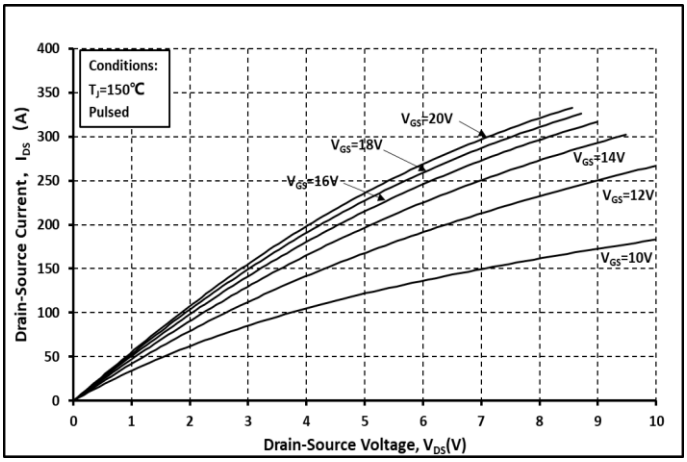


Fig. 3 Output Curve @ Tj=150℃

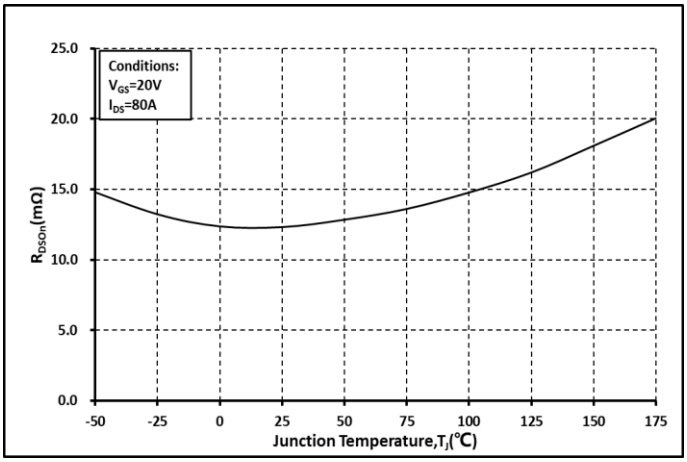


Fig. 4 Ron vs. Temperature

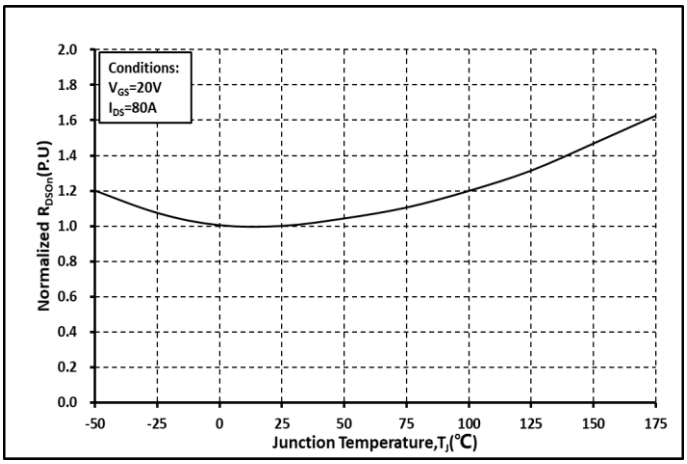


Fig. 5 Normalized Ron vs. Temperature

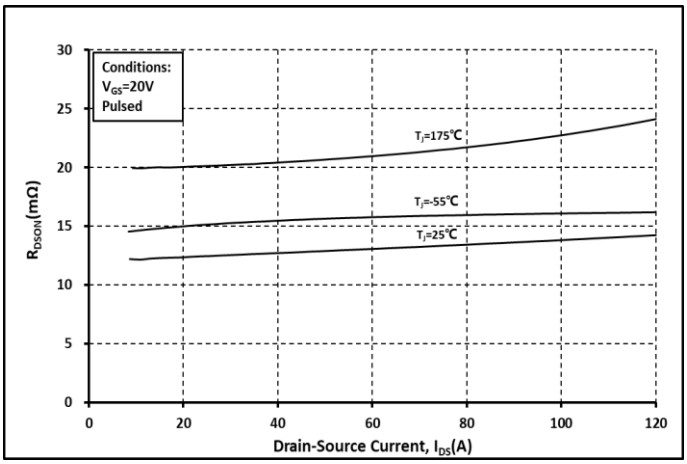


Fig. 6 Ron vs. I_{DS} @ Various Temperature

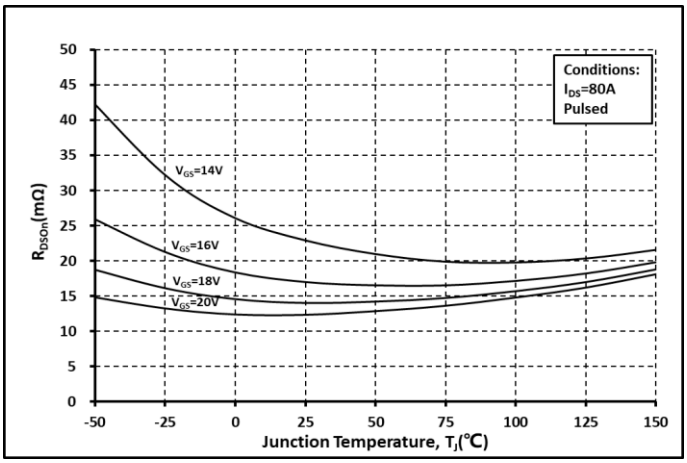


Fig. 7 Ron vs. Temperature @ Various V_{GS}

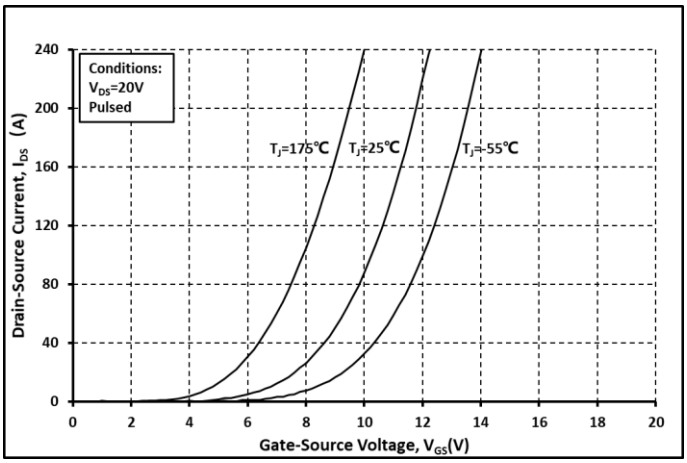


Fig. 8 Transfer Curves @ Various Temperature

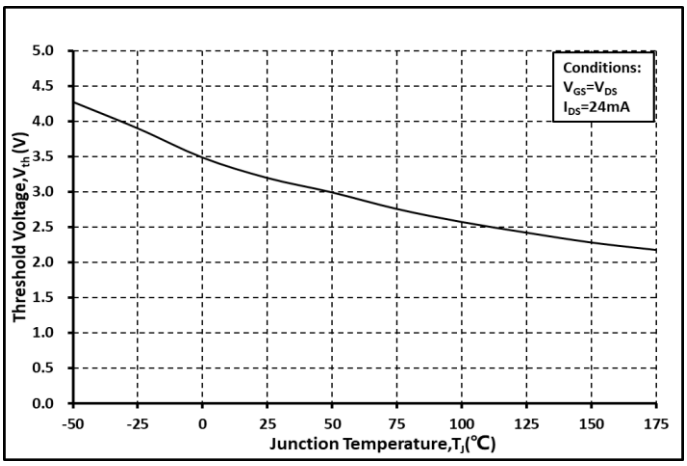


Fig. 9 Threshold Voltage vs. Temperature

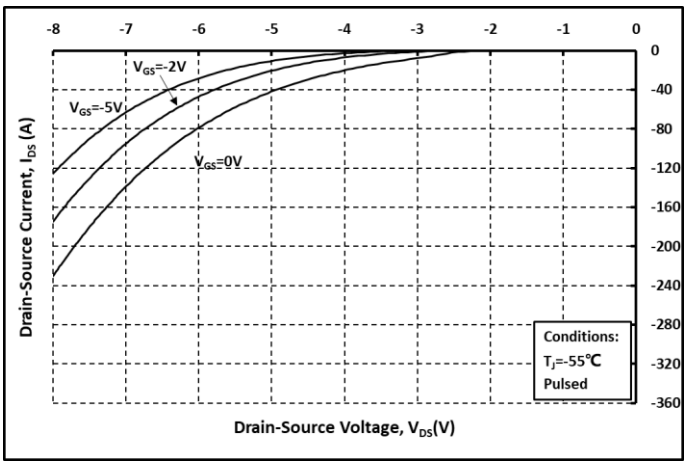


Fig. 10 Body Diode Curves @ T_J=-55°C

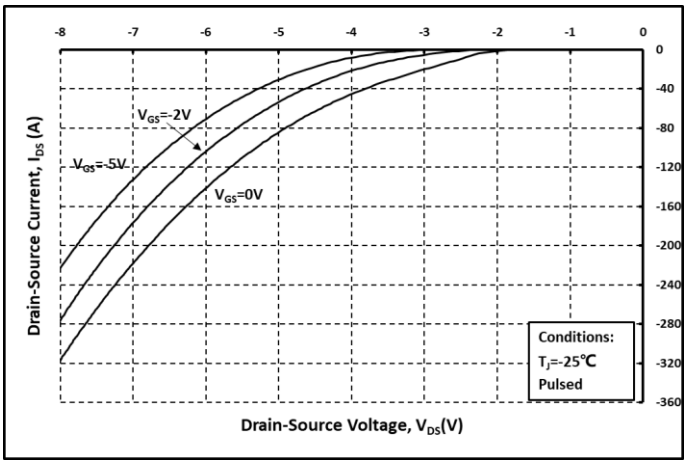


Fig. 11 Body Diode Curves @ T_J=25°C

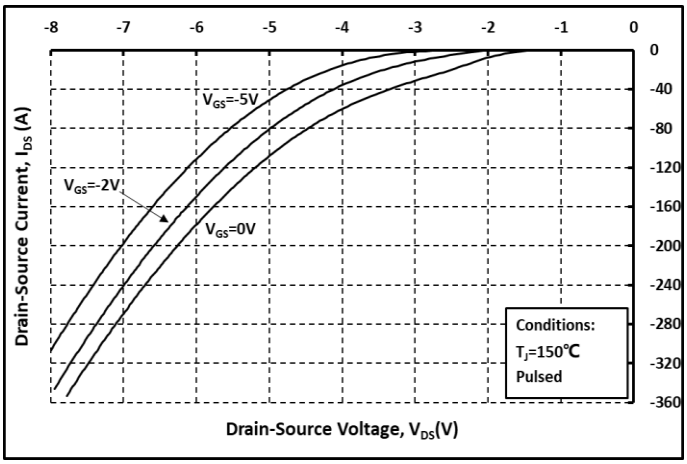


Fig. 12 Body Diode Curves @ T_J=150°C

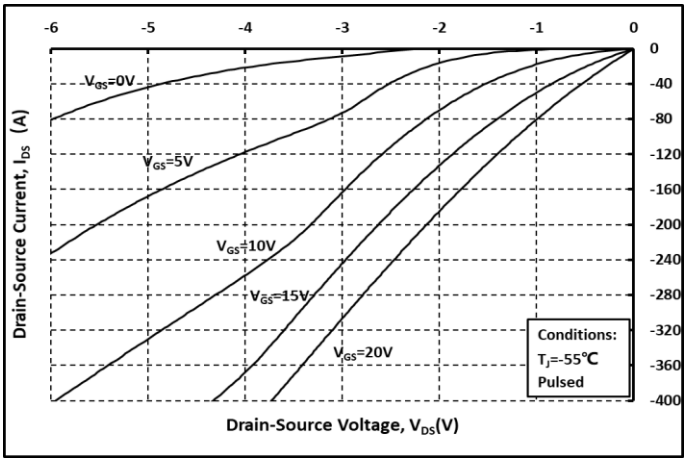


Fig. 13 3rd Quadrant Curves @ T_J=-55°C

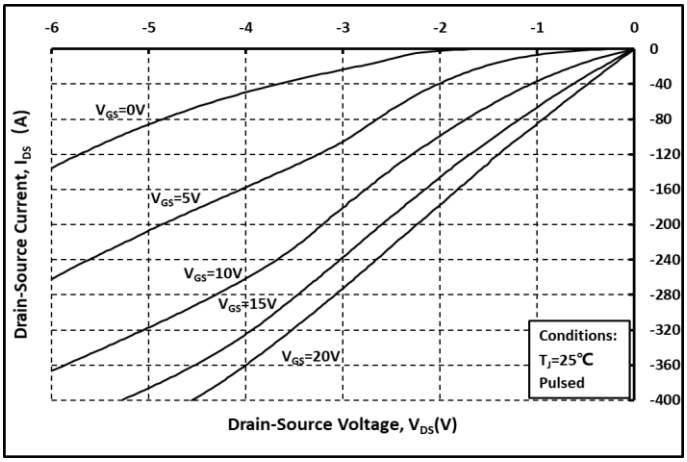


Fig. 14 3rd Quadrant Curves @ T_J=25°C

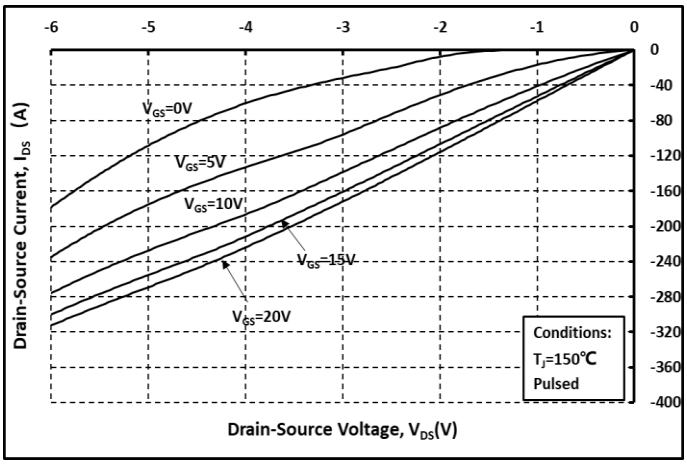


Fig. 15 3rd Quadrant Curves @ T_J=150°C

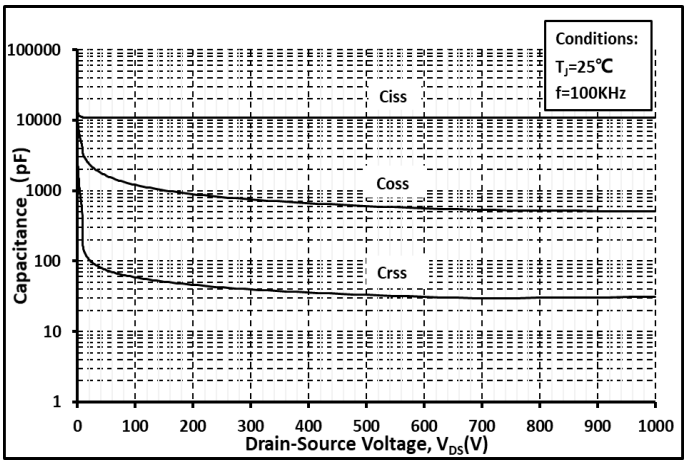


Fig. 16 Capacitance vs. V_{DS}

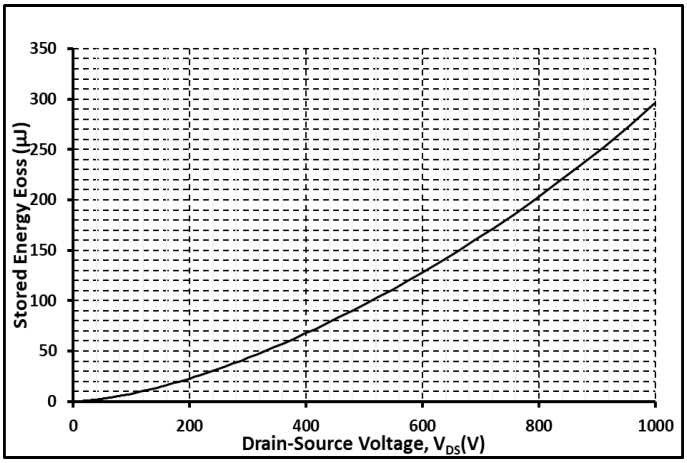


Fig. 17 Output Capacitor Stored Energy

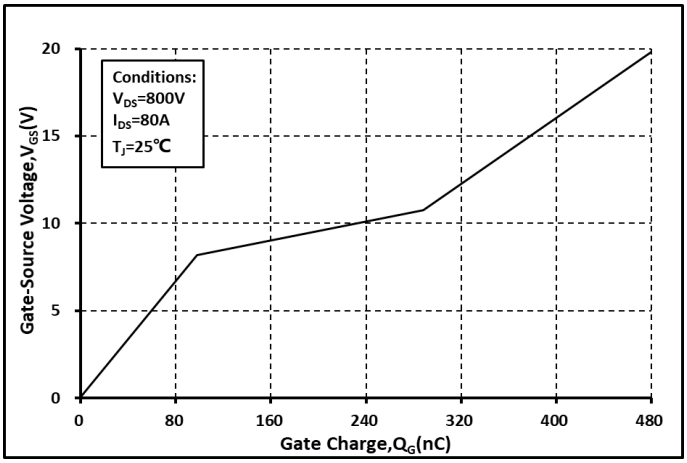


Fig. 18 Gate Charge Characteristics

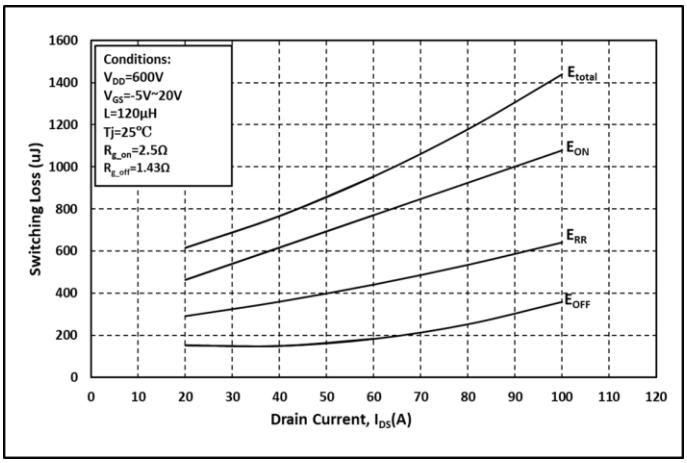


Fig. 19 Switching Energy vs. Drain Current

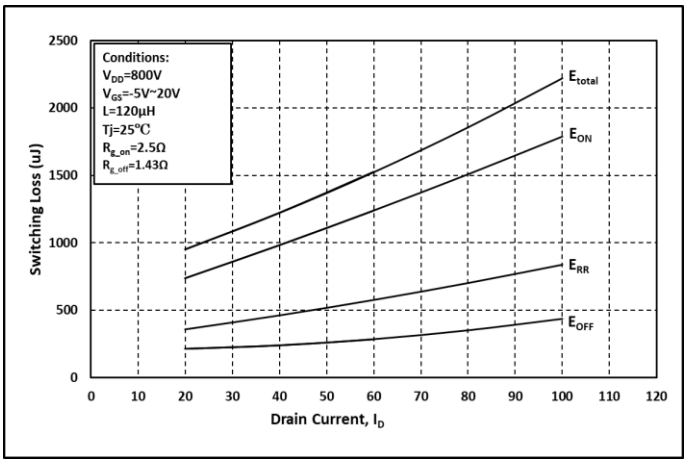


Fig. 20 Switching Energy vs. Drain Current

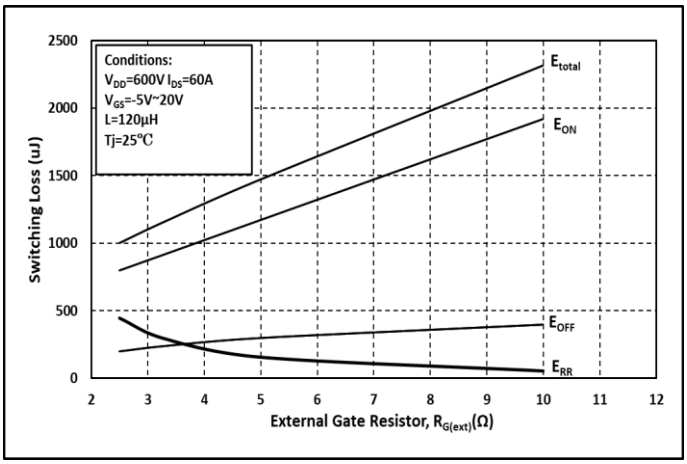


Fig. 21 Switching Energy vs. $R_{G(ext)}$

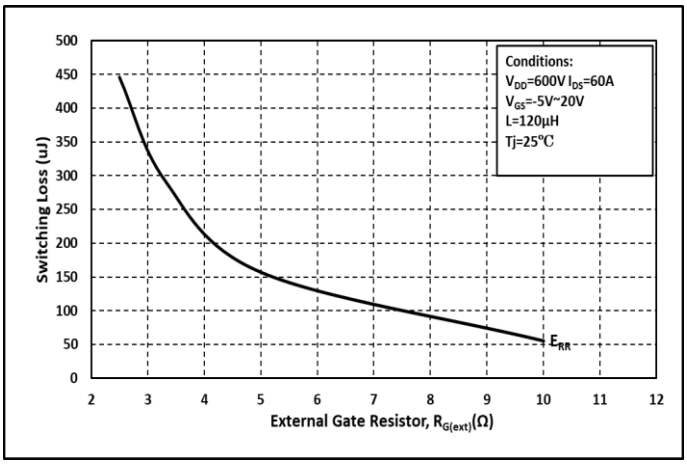


Fig. 22 Reverse Recovery Energy vs. $R_{G(ext)}$

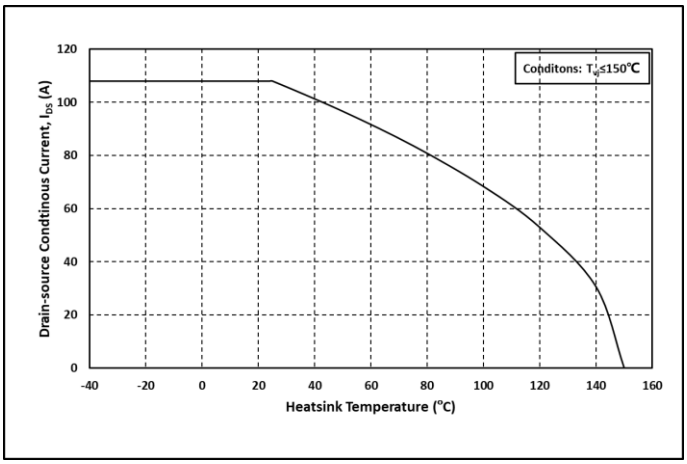


Fig. 23 Continuous Drain Current vs. Heatsink Temperature

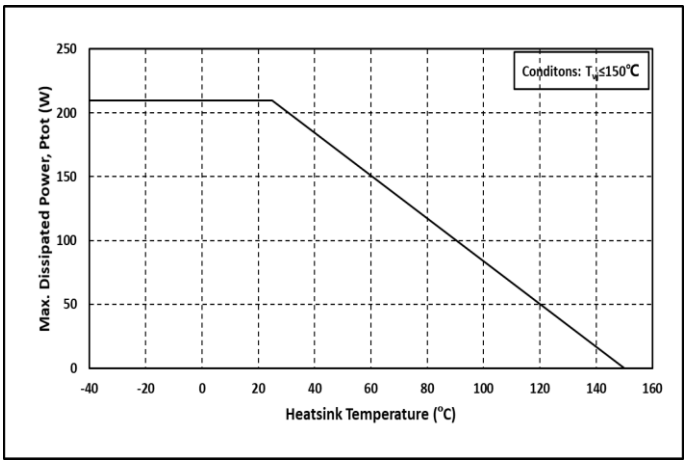


Fig. 24 Max. Power Dissipation Derating vs. Heatsink Temperature

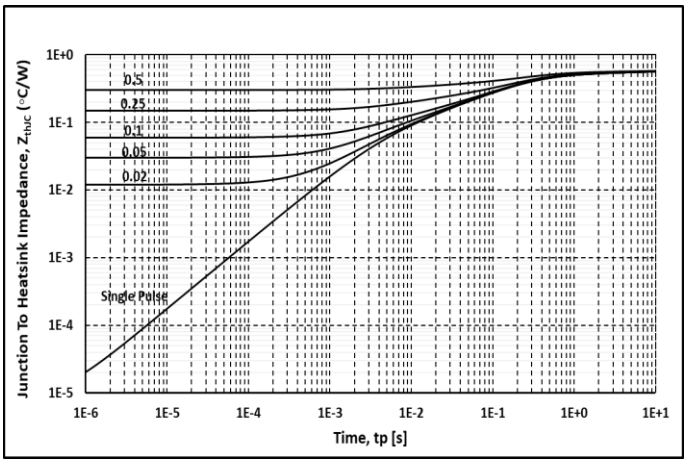


Fig. 25 Thermal Impedance

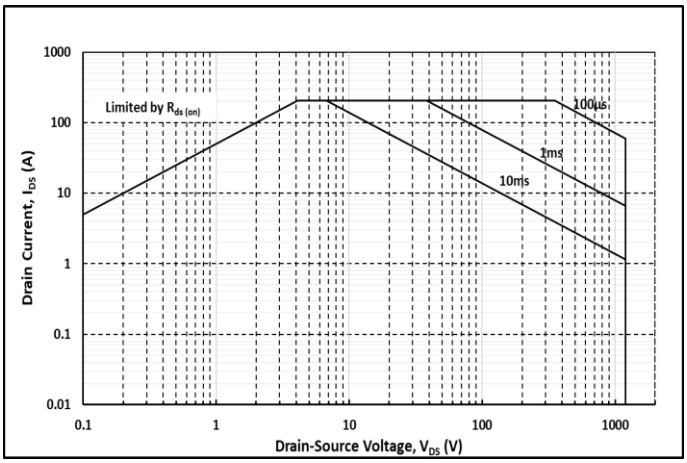


Fig. 26 Safe Operating Area

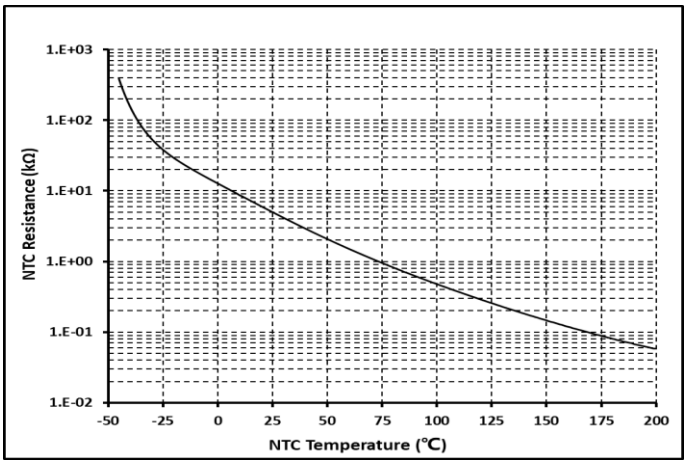
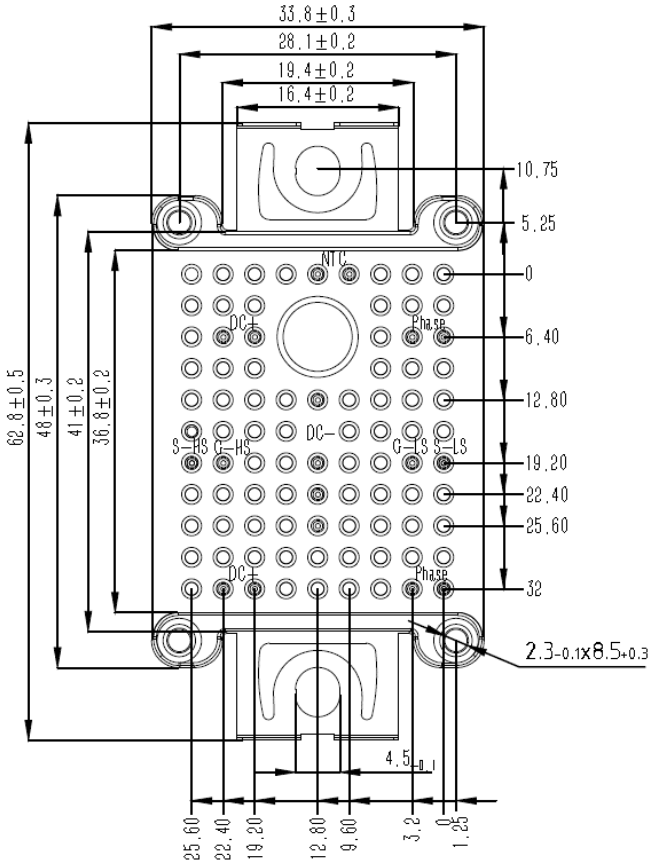
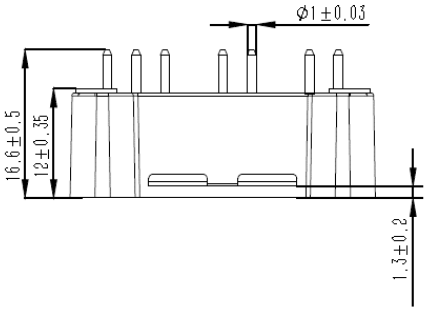


Fig. 27 NTC Resistance vs. Temperature

Package Dimensions (mm)





Notes

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