IV1B12025HC1L – 1200V 25mohm SiC MODULE

Features:

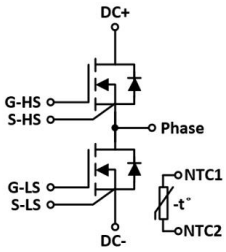
- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Very fast and robust intrinsic body diode

Applications:

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

Package:





Part Number	Package
IV1B12025HC1L	1B

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_{GS}=0V, I_D=200μA	
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)	74	A	V_{GS}=20V, T_C=25°C	
		50	A	V_{GS}=20V, T_C=94°C	
I_{DM}	Drain current (pulsed)	185	A	Pulse width limited by SOA	Fig.26
P_{TOT}	Total power dissipation	250	W	T_C=25°C	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
$R_{\theta(J-C)}$	Thermal Resistance from Junction to Case	0.5	°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		2	±200	nA	V_{DS}=0V, V_{GS}=-5~20V	
V_{TH}	Gate threshold voltage		3.2		V	V_{GS}=V_{DS}, I_D=12mA	Fig.9
			2.3			V_{GS}=V_{DS}, I_D=12mA @ T_C=150°C	
R_{ON}	Static drain-source on-resistance		25	33	mΩ	V_{GS}=20V, I_D=40A @T_J=25°C	Fig.4-7
			36		mΩ	V_{GS}=20V, I_D=40A @T_J=150°C	
C_{iss}	Input capacitance		5.5		nF	V_{DS}=800V, V_{GS}=0V, f=100kHz, V_{AC}=25mV	Fig.16
C_{oss}	Output capacitance		285		pF		
C_{rss}	Reverse transfer capacitance		20		pF		
E_{oss}	C_{oss} stored energy		105		μJ		Fig.17
Q_g	Total gate charge		240		nC	V_{DS}=800V, I_D=40A, V_{GS}=-5 to 20V	Fig.18
Q_{gs}	Gate-source charge		50		nC		
Q_{gd}	Gate-drain charge		96		nC		
R_g	Gate input resistance		3.0		Ω	f=100kHz	
E_{ON}	Turn-on switching energy		795		μJ	V_{DS}=600V, I_D=50A, 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		135		μJ		
$t_{d(on)}$	Turn-on delay time		15		ns		
t_r	Rise time		4.1				
$t_{d(off)}$	Turn-off delay time		24				
t_f	Fall time		17				
L_{sCE}	Stray inductance		8.8		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}=40A, V_{GS}=0V	Fig.10-12
			4.5		V	I_{SD}=40A, V_{GS}=0V, T_J=150°C	
t_{rr}	Reverse recovery time		18		ns	V_{GS}=-5V/+20V, I_{SD}=50A, V_R=600V, di/dt=14.29A/ns, $R_{G(ext)}$=2.5Ω,L=120μH	
Q_{rr}	Reverse recovery charge		1068		nC		
I_{RRM}	Peak reverse recovery current		96.3		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)

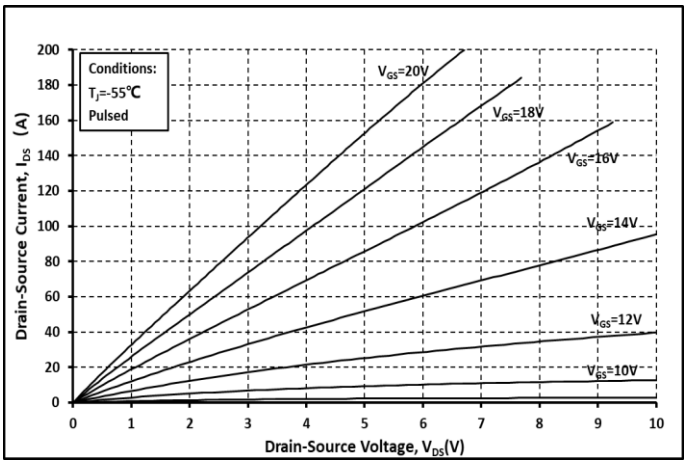


Fig. 1 Output Curve @ Tj=-55℃

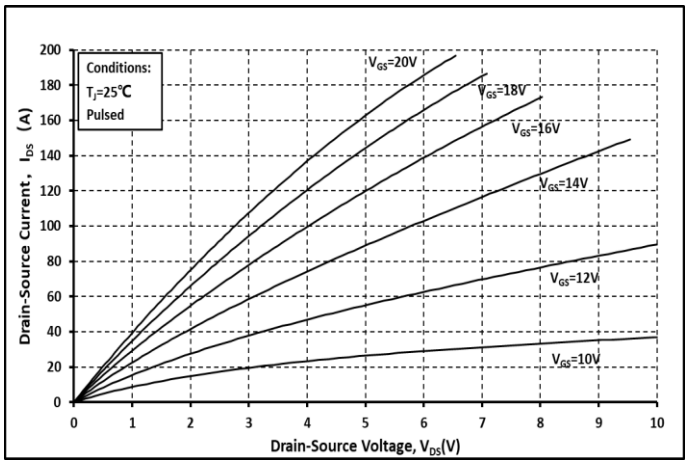


Fig. 2 Output Curve @ Tj=25℃

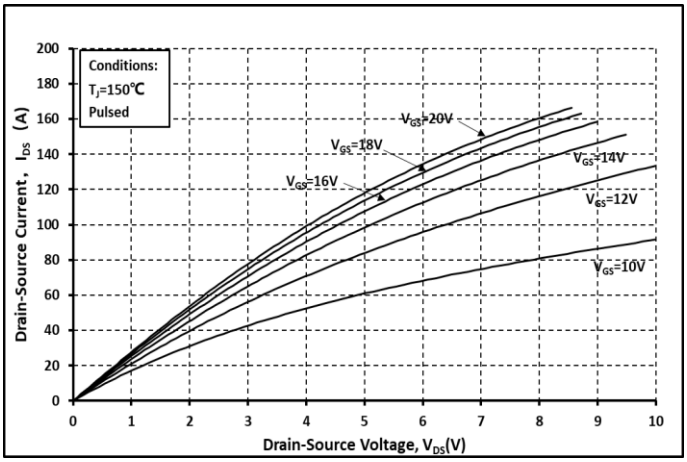


Fig. 3 Output Curve @ Tj=150℃

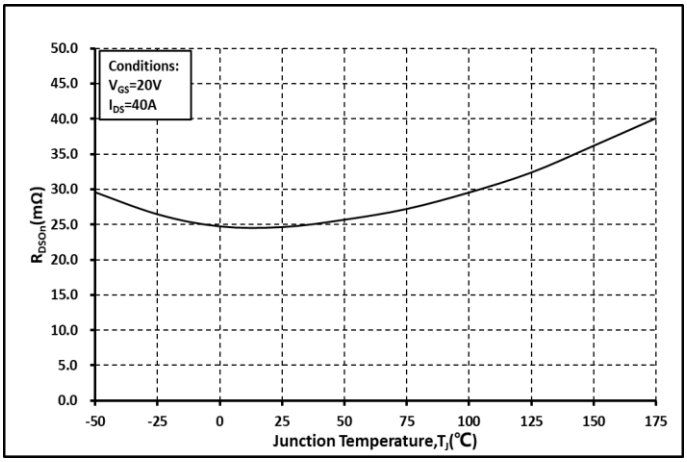


Fig. 4 Ron vs. Temperature

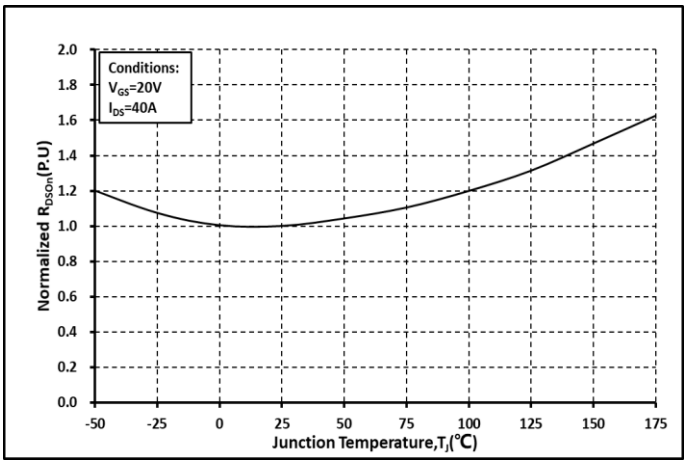


Fig. 5 Normalized Ron vs. Temperature

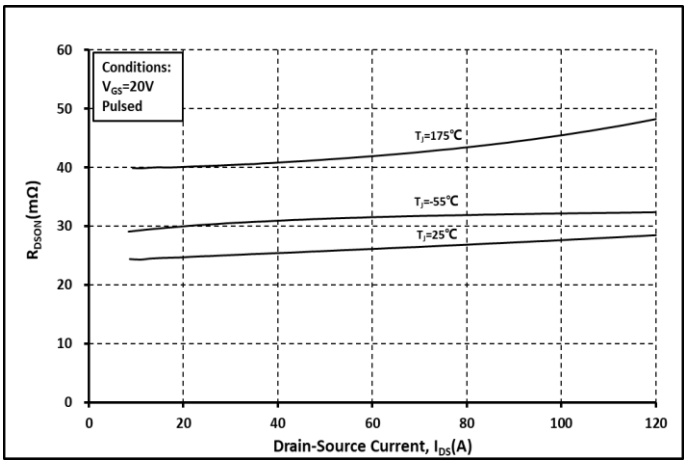


Fig. 6 Ron vs. I_{DS} @ Various Temperature

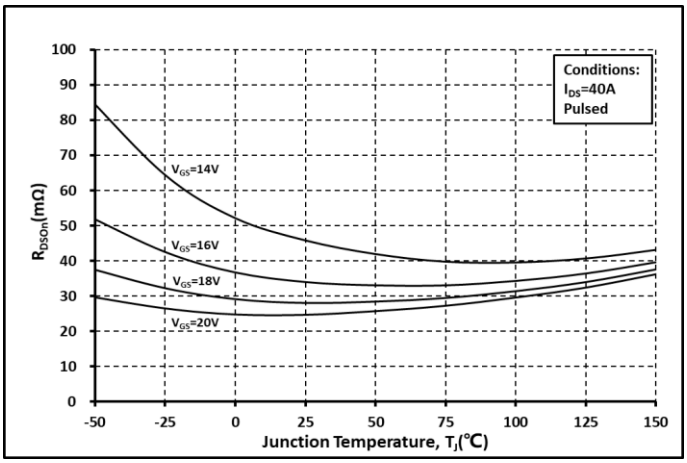


Fig. 7 Ron vs. Temperature @ Various V_{GS}

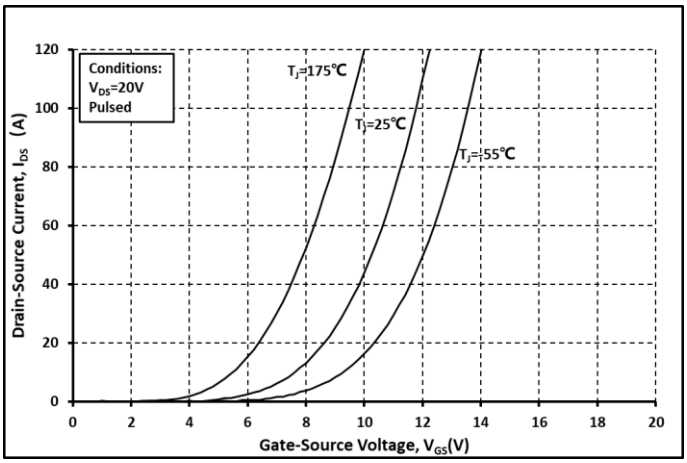


Fig. 8 Transfer Curves @ Various Temperature

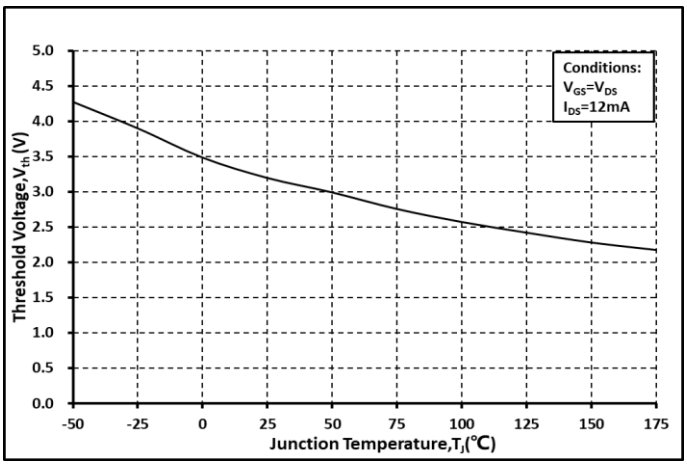


Fig. 9 Threshold Voltage vs. Temperature

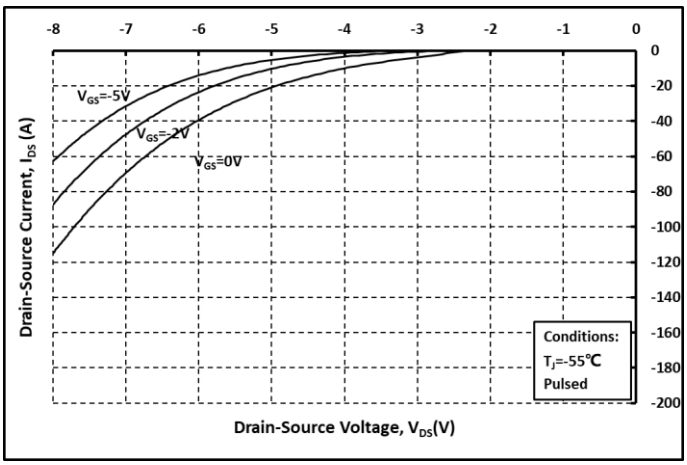


Fig. 10 Body Diode Curves @ T_J=-55°C

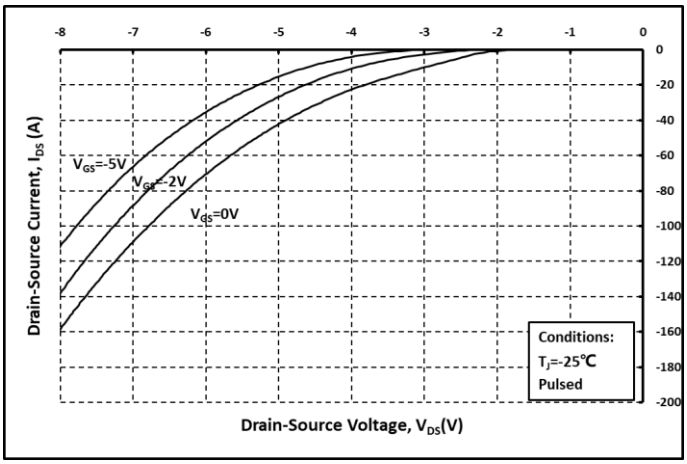


Fig. 11 Body Diode Curves @ T_J=25°C

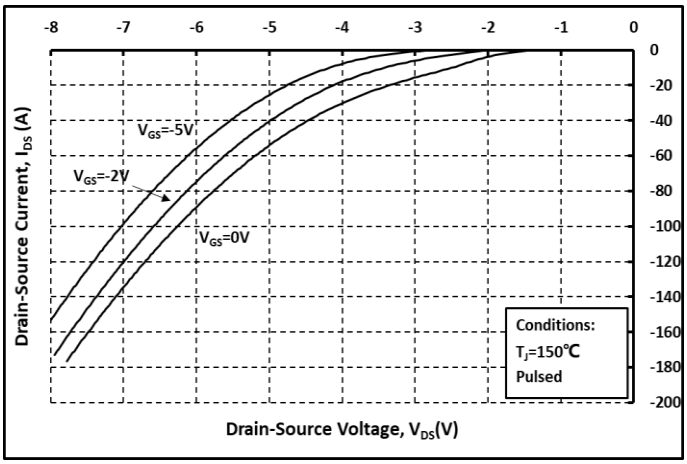


Fig. 12 Body Diode Curves @ T_J=150°C

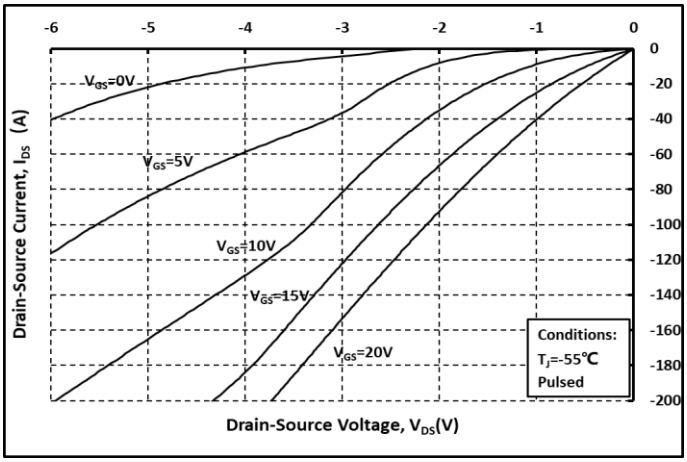


Fig. 13 3rd Quadrant Curves @ T_J=-55°C

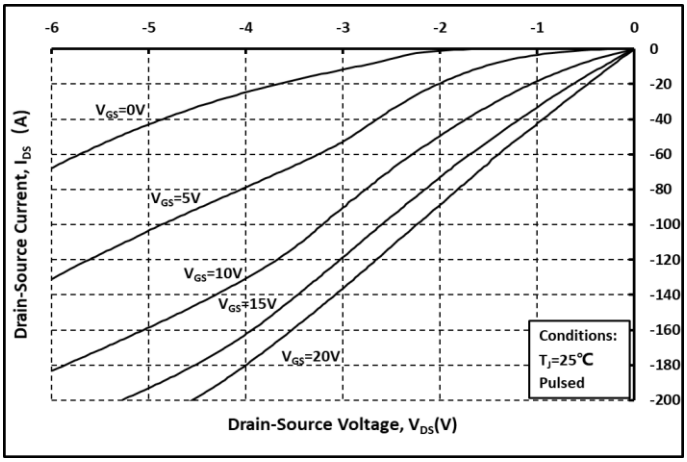


Fig. 14 3rd Quadrant Curves @ T_J=25°C

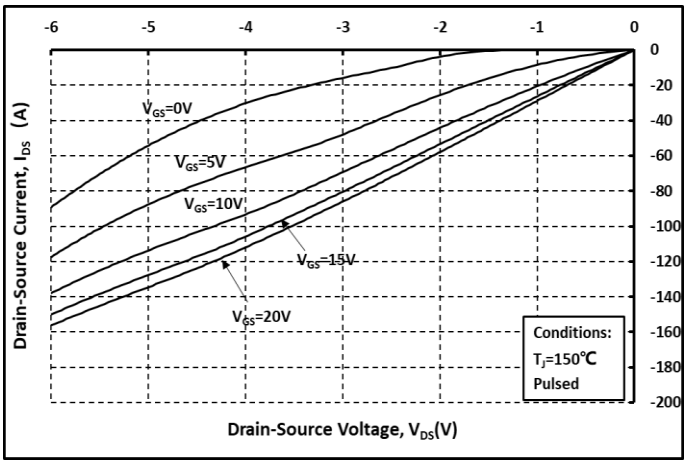


Fig. 15 3rd Quadrant Curves @ T_J=175°C

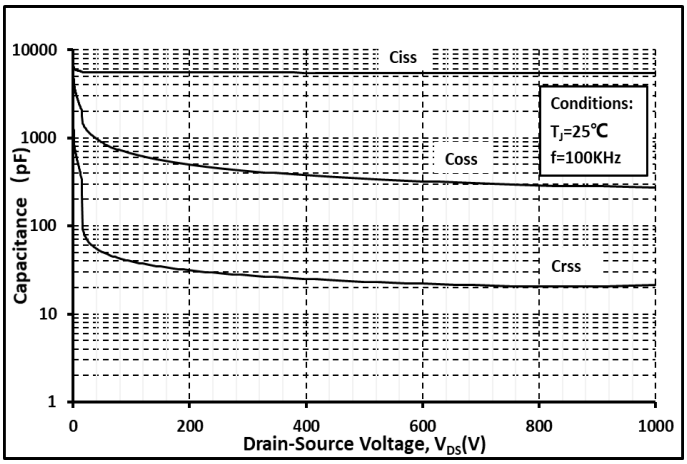


Fig. 16 Capacitance vs. V_{DS}

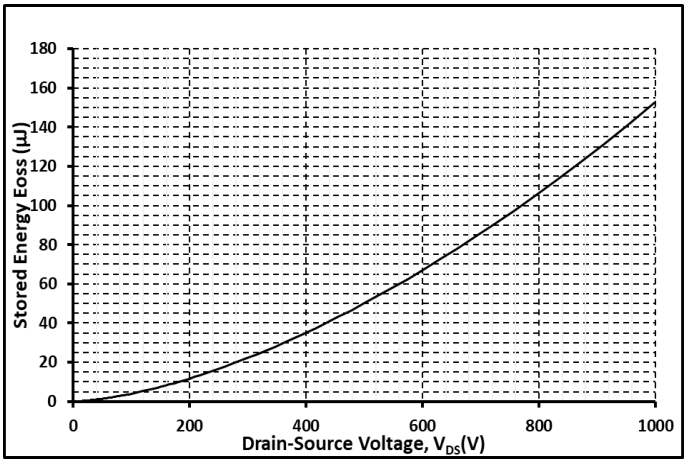


Fig. 17 Output Capacitor Stored Energy

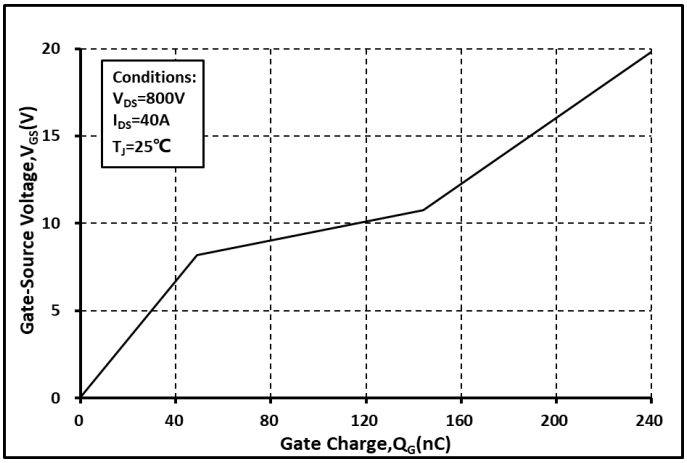


Fig. 18 Gate Charge Characteristics

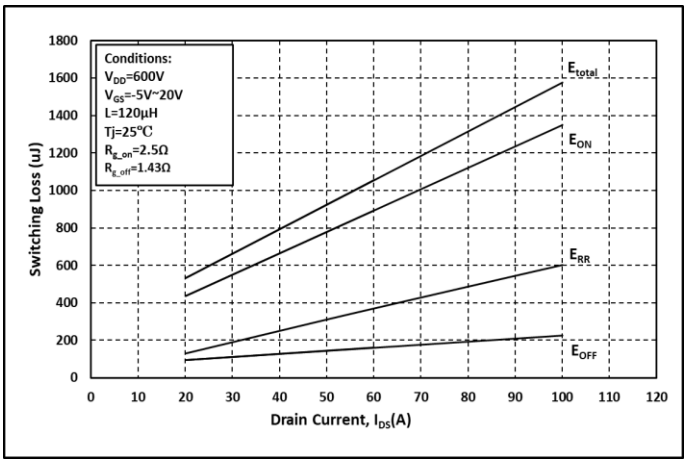


Fig. 19 Switching Energy vs. Drain Current

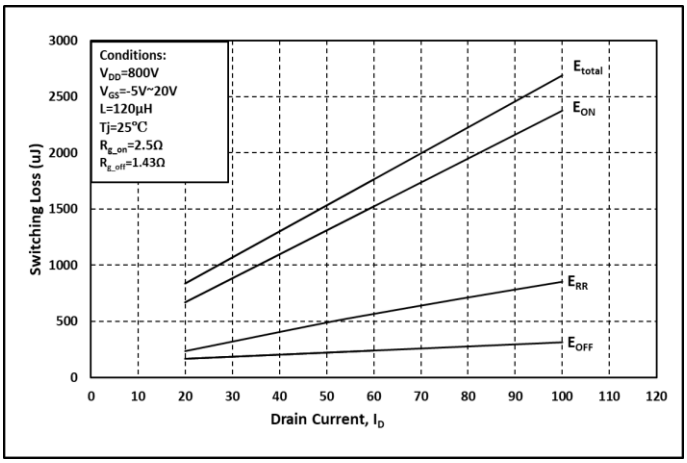


Fig. 20 Switching Energy vs. Drain Current

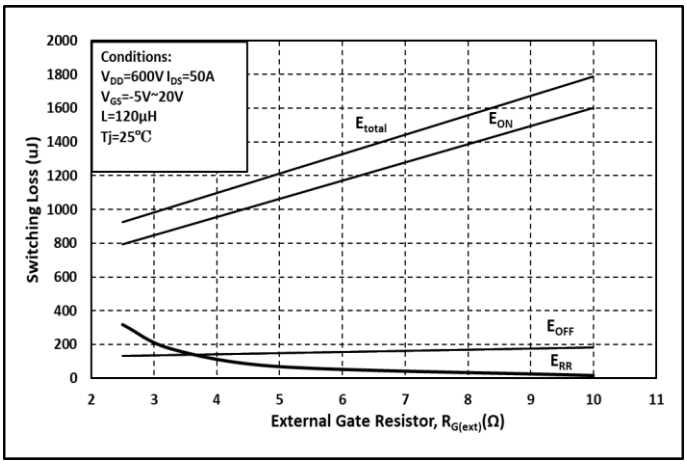


Fig. 21 Switching Energy vs. $R_{G(ext)}$

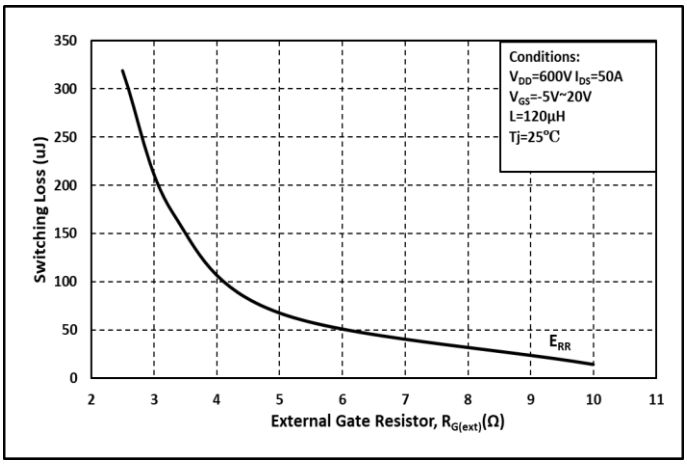


Fig. 22 Reverse Recovery Energy vs. $R_{G(ext)}$

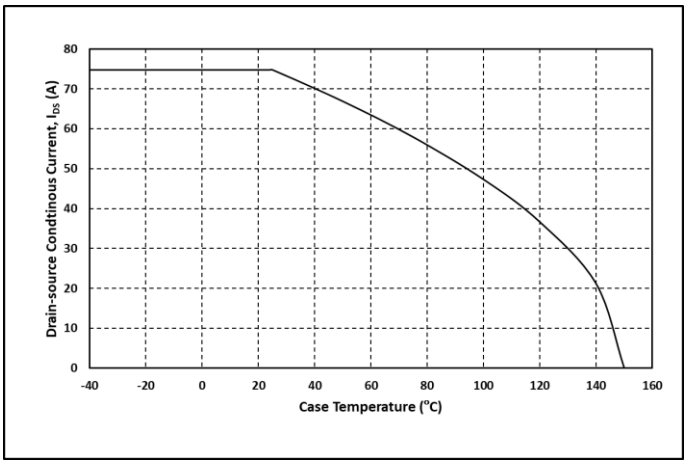


Fig. 23 Continuous Drain Current vs. Case Temperature

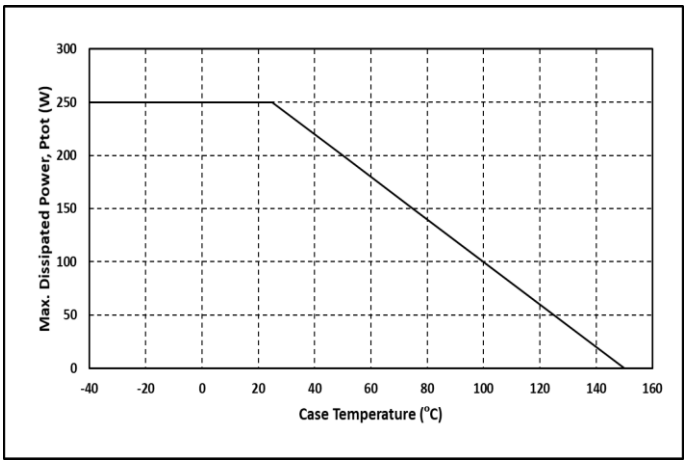


Fig. 24 Max. Power Dissipation Derating vs. Case Temperature

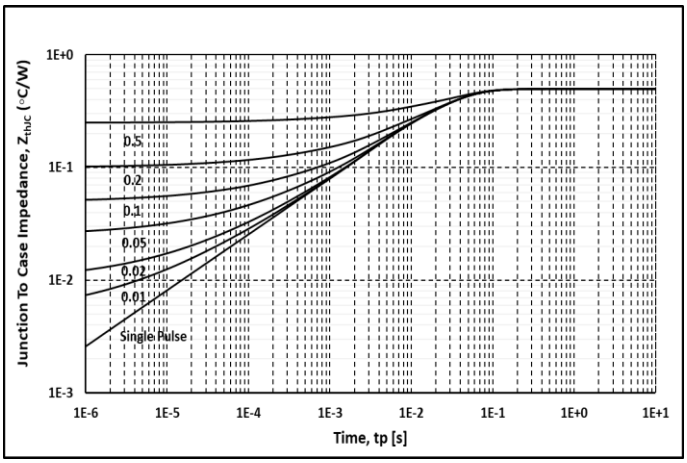


Fig. 25 Thermal Impedance

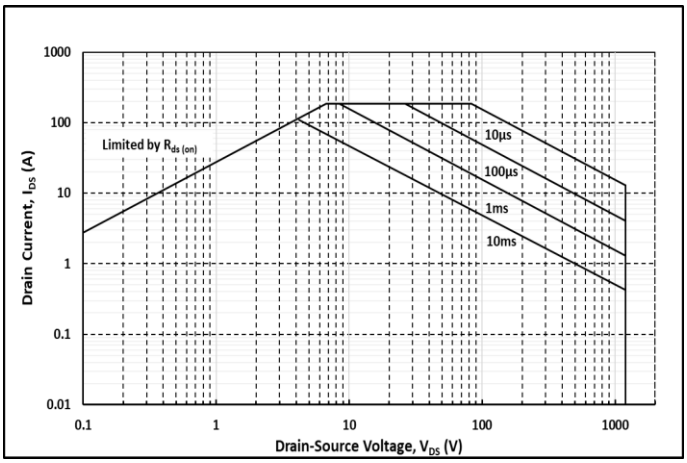


Fig. 26 Safe Operating Area

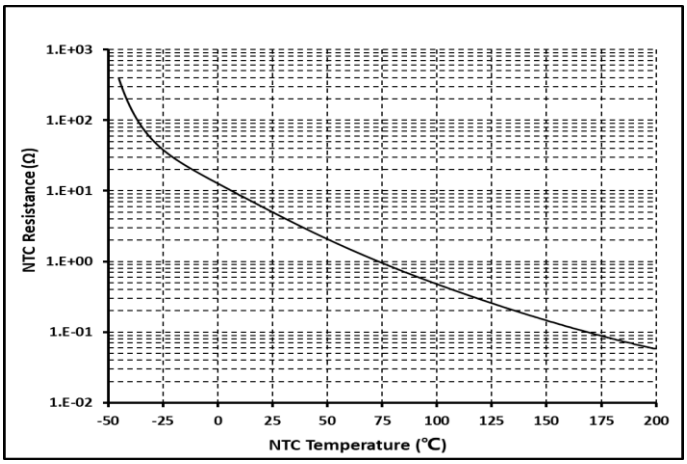
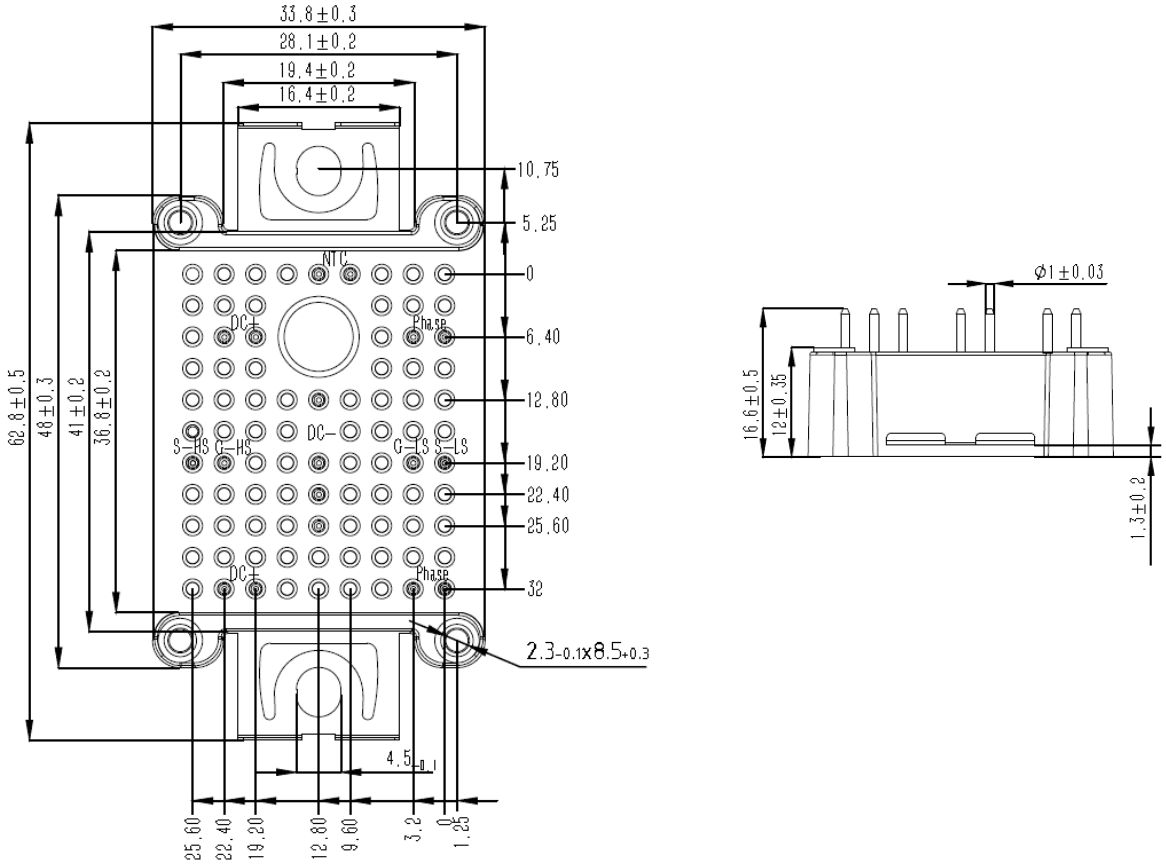


Fig. 27 NTC Resistance vs. Temperature

Package Dimensions (mm)



Notes

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