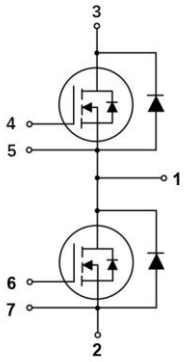
IV6212004HB2 – 1200V 4mΩ SiC MODULE

Features:

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- High frequency operation

Package:



Applications:

- Solar applications
- UPS system
- Motor drive
- Induction heating

Part Number	Package
IV6212004HB2	62mm

Absolute Maximum Ratings (Per MOSFET, 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=100μA	
V_{GSmax} (DC)	Maximum DC voltage	-5 to 20	V	Static (DC)	
V_{GSmax} (Spike)	Maximum spike voltage	-10 to 23	V	Duty cycle<1%, and pulse width<200ns	
V_{GSon}	Recommended turn-on voltage	18±0.5	V		
V_{GSoff}	Recommended turn-off voltage	-3.5 to -2	V		
I_D	Drain current (continuous)	416	A	V_{GS}=18V, T_C=25°C, T_J≤150°C	Fig.21
		315	A	V_{GS}=18V, T_C=78°C, T_J≤150°C	
I_{DM}	Drain current (pulsed)	787	A	Pulse width limited by SOA	Fig.25
P_{TOT}	Total power dissipation	1336	W	T_C=25°C, T_J≤150°C	Fig.22
T_J	Maximum virtual junction temperature	-40 to 150	°C	Operation	
		-55 to 175	°C	Intermittent with reduced life	

Thermal Data

Symbol	Parameter	Value			Unit	Note
		Min.	Typ.	Max.		
$R_{\theta(J-C)}$, per MOSFET	Thermal Resistance from Junction to Case		0.0935		°C/W	Fig.23
$R_{\theta(J-C)}$, per SBD	Thermal Resistance from Junction to Case		0.0677		°C/W	Fig.24

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

Symbol	Parameter	Value			Unit	Test Conditions	Note
		Min.	Typ.	Max.			
I_{DSS}	Zero gate voltage drain current		20	400	μA	V_{DS}=1200V, V_{GS}=0V	
I_{GSS}	Gate leakage current			±400	nA	V_{DS}=0V, V_{GS}=-5~20V	
V_{TH}	Gate threshold voltage	1.8	2.8	4.5	V	V_{GS}=V_{DS}, I_D=80mA	Fig.4
			2.2		V	V_{GS}=V_{DS}, I_D=80mA @ T_J=150°C	
R_{ON}	Static drain-source on-resistance		4.75		mΩ	V_{GS}=18V, I_D=240A @T_J=25°C	Fig.5, 6, 7
			7.72		mΩ	V_{GS}=18V, I_D=240A @T_J=150°C	
C_{iss}	Input capacitance		19.4		nF	V_{DS}=800V, V_{GS}=0V, f=100kHz, V_{AC}=25mV	Fig.13
C_{oss}	Output capacitance		2.0		nF		
C_{rss}	Reverse transfer capacitance		77.6		pF		
E_{oss}	C_{oss} stored energy		820.2		μJ		Fig.14
Q_g	Total gate charge		863		nC	V_{DS}=800V, I_D=240A, V_{GS}=-3 to 18V	Fig.12
Q_{gs}	Gate-source charge		249		nC		
Q_{gd}	Gate-drain charge		350		nC		
R_g	Gate input resistance		2.44		Ω	f=100kHz	
E_{ON}	Turn-on switching energy T_J=25℃		8.04		mJ	V_{DS}=600V, I_D=300A, V_{GS}=-3 to 18V, $R_{G(ext)}$=2Ω, L=10μH	Fig.15, 17, 18
	Turn-on switching energy T_J=150℃		5.5		mJ		
E_{OFF}	Turn-off switching energy T_J=25℃		5.8		mJ		
	Turn-off switching energy T_J=150℃		6.5		mJ		
$t_{d(on)}$	Turn-on delay time, T_J=25℃		34.2		ns		Fig.16
t_r	Rise time, T_J=25℃		86.2		ns		
$t_{d(off)}$	Turn-off delay time, T_J=25℃		142.9		ns		
t_f	Fall time, T_J=25℃		46.8		ns		
L_{sCE}	Stray inductance		11		nH		

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

Symbol	Parameter	Value			Unit	Test Conditions	Note
		Min.	Typ.	Max.			
V_{SD}	Diode forward voltage		1.5		V	I_{SD}=300A, V_{GS}=0V	
			2.3		V	I_{SD}=300A, V_{GS}=0V, T_J=175°C	
t_{rr}	Reverse recovery time		57.7		ns	V_{DS}=600V, I_D=300A, V_{GS}=-3 to 18V, $R_{G(ext)}$=2Ω, L=10 μH	
Q_{rr}	Reverse recovery charge		5.7		μC		
I_{RRM}	Peak reverse recovery current		176		A		

Typical Performance (curves)

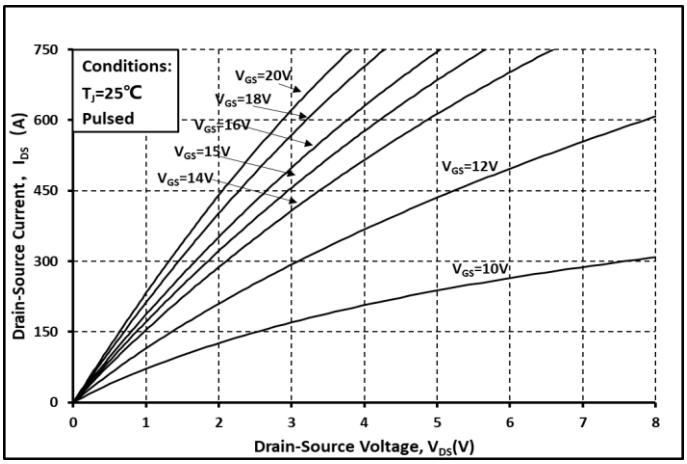


Fig. 1 Output Curve @ Tj=25℃

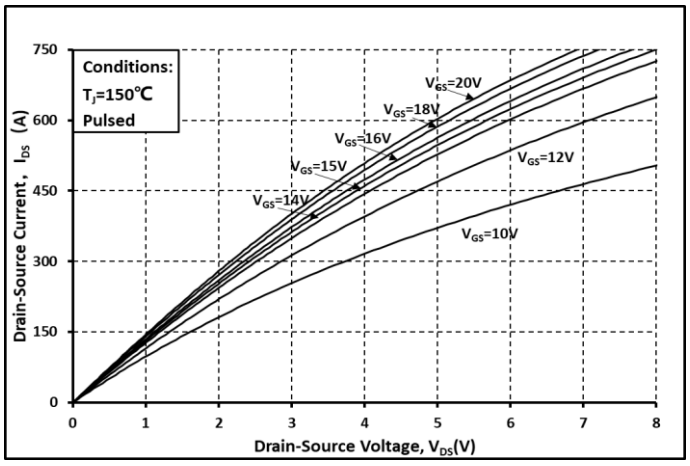


Fig. 2 Output Curve @ Tj=150℃

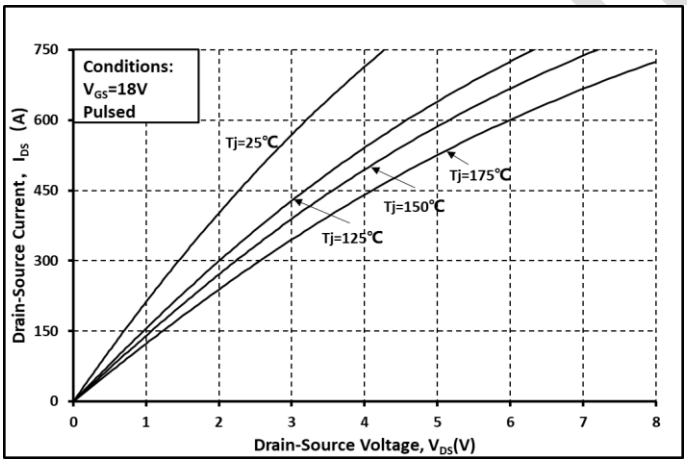


Fig. 3 Output Curve @ V_{GS}=18V

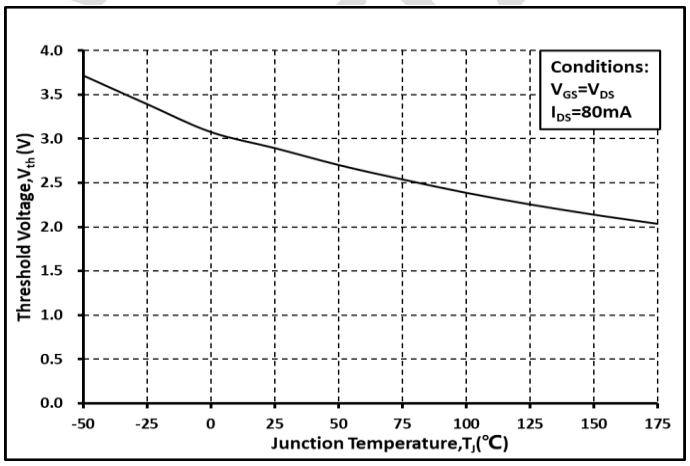


Fig. 4 Threshold Voltage vs. Temperature

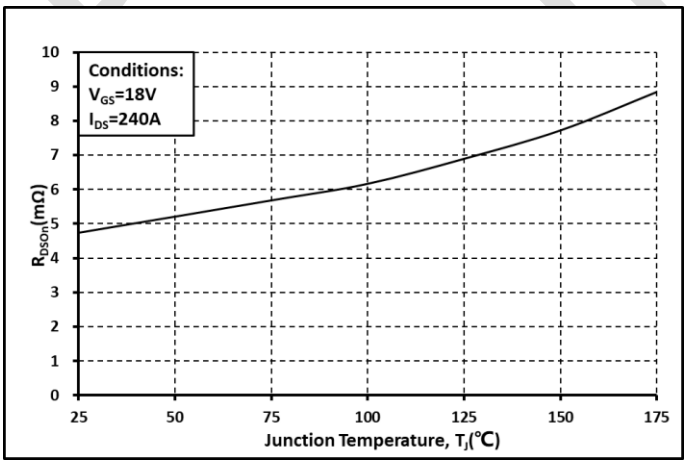


Fig. 5 Ron vs. Temperature

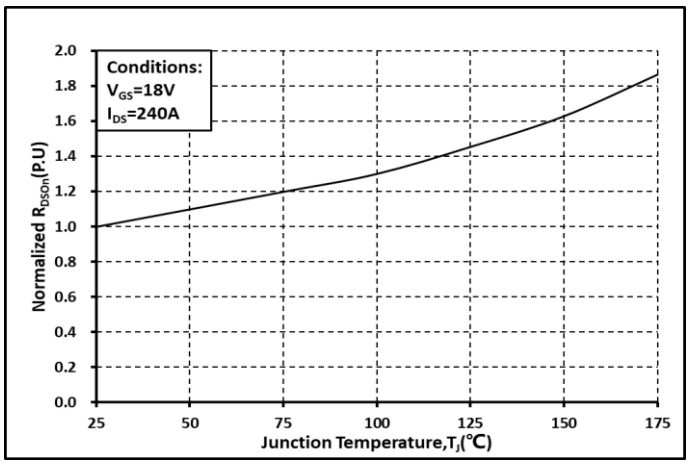


Fig. 6 Normalized Ron vs. Temperature

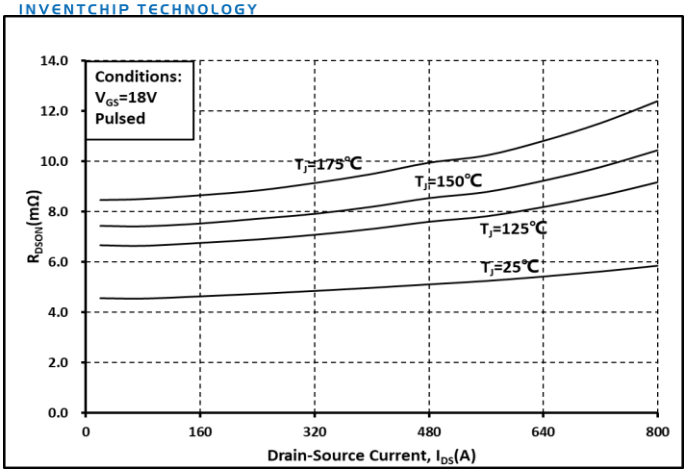


Fig. 7 Ron vs. I_{DS} @ Various Temperature

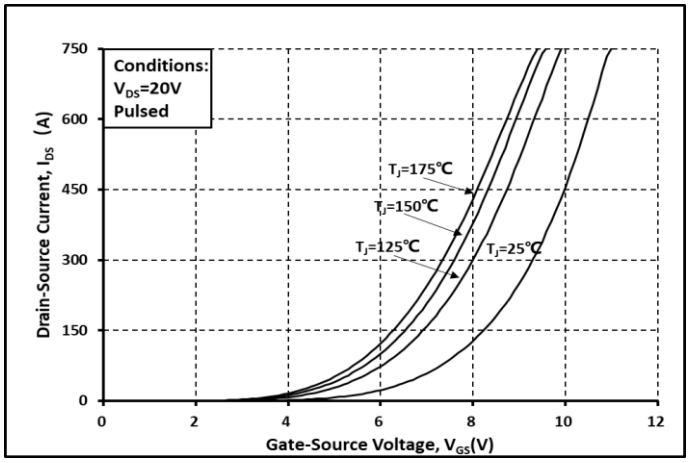


Fig. 8 Transfer Curves @ Various Temperature

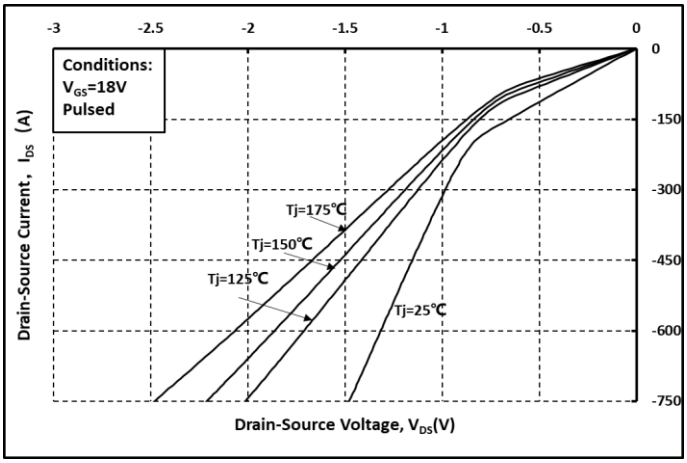


Fig. 9 3rd Quadrant Curves @ V_{GS}=18V

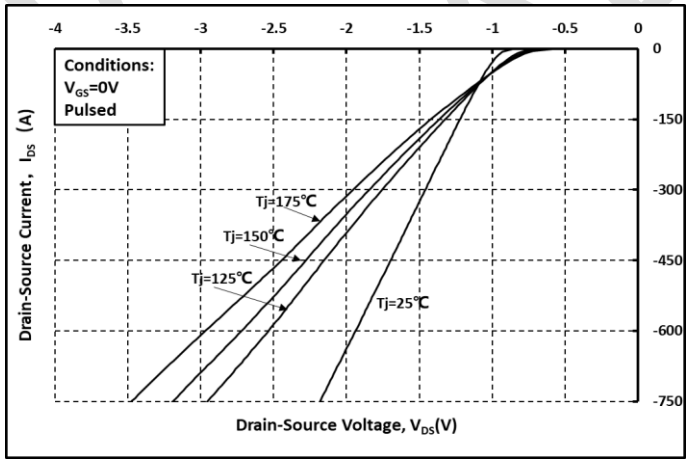


Fig. 10 3rd Quadrant Curves @ V_{GS}=0V (Diode)

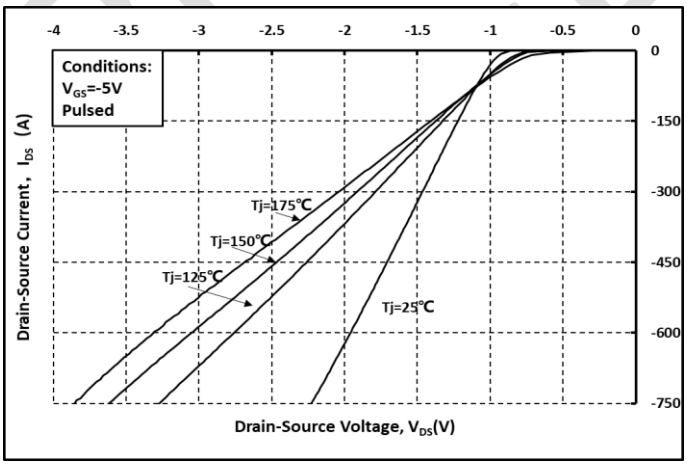


Fig. 11 3rd Quadrant curves @ V_{GS}=-5V (Diode)

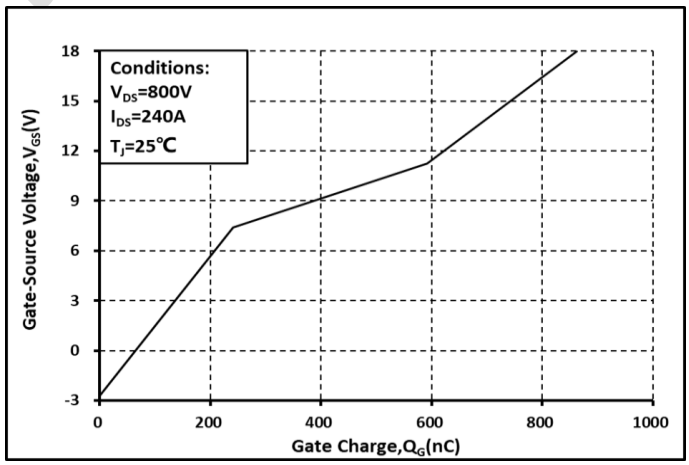


Fig. 12 Gate Charge Characteristics

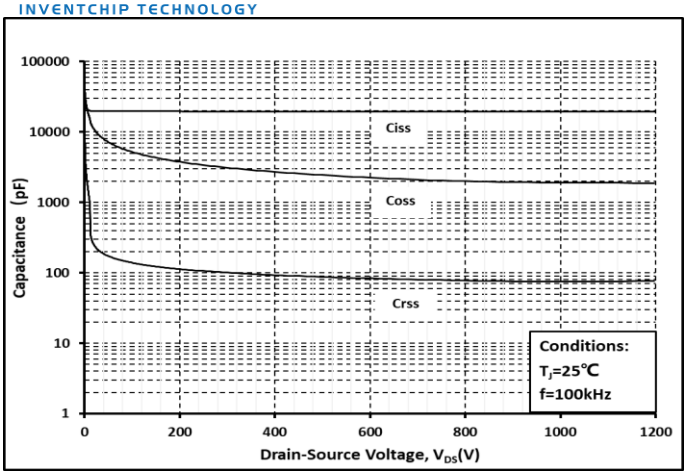


Fig. 13 Capacitance vs. V_{DS}

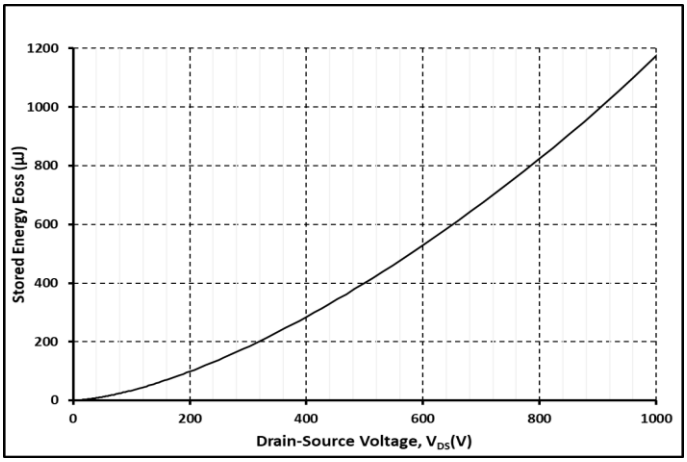


Fig. 14 Output Capacitor Stored Energy

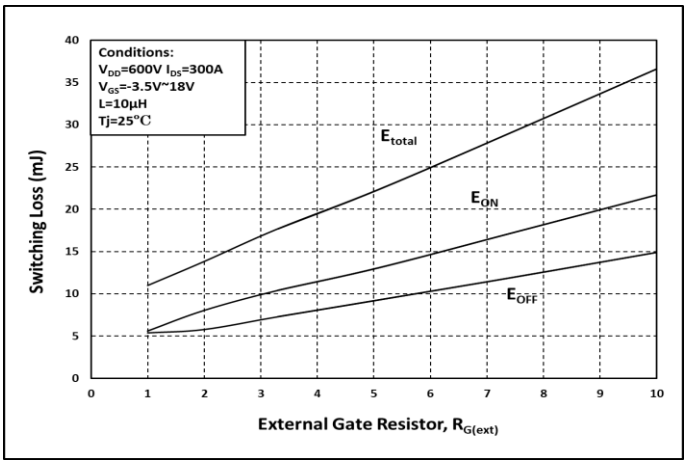


Fig. 15 Switching Energy vs. $R_{G(ext)}$

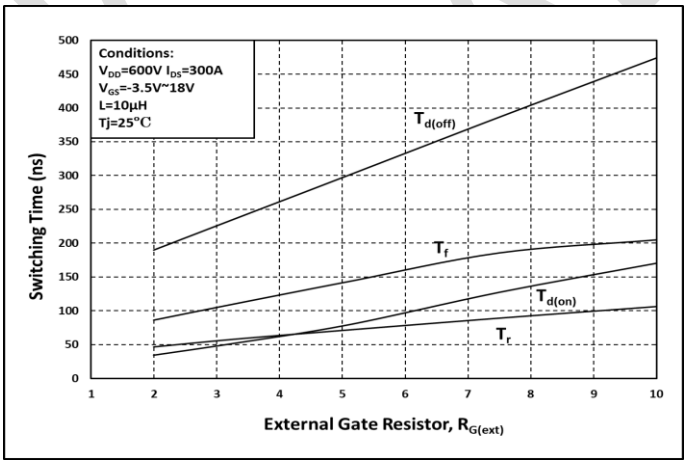


Fig. 16 Switching Times vs. $R_{G(ext)}$

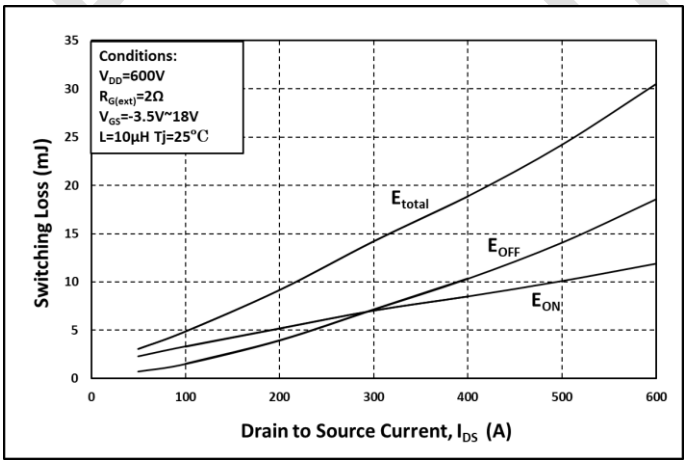


Fig. 17 Switching Energy vs. I_{DS}

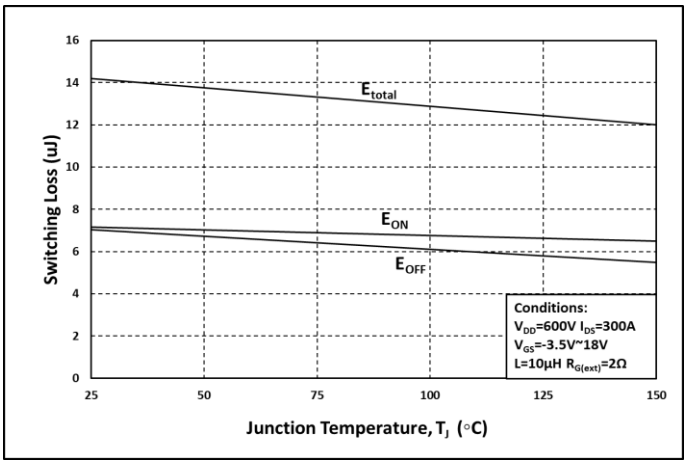


Fig. 18 Switching Energy vs. Temperature

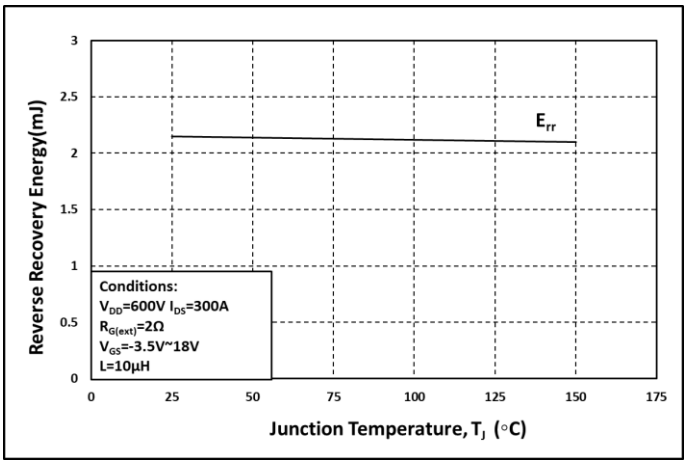


Fig. 19 Reverse Recovery Energy vs. Junction Temperature

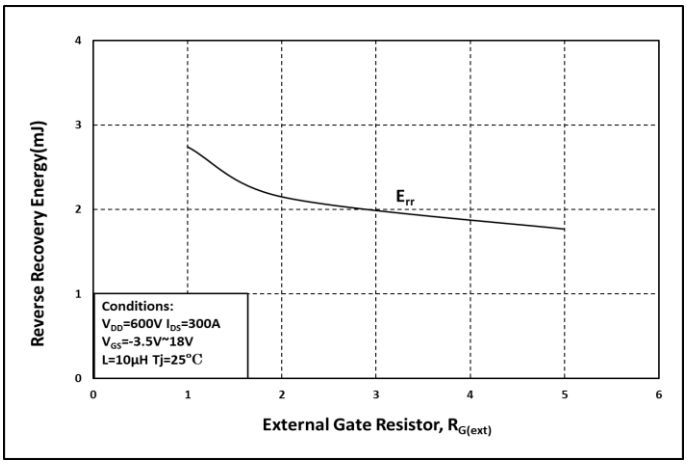


Fig. 20 Reverse Recovery Energy vs. $R_{G(ext)}$

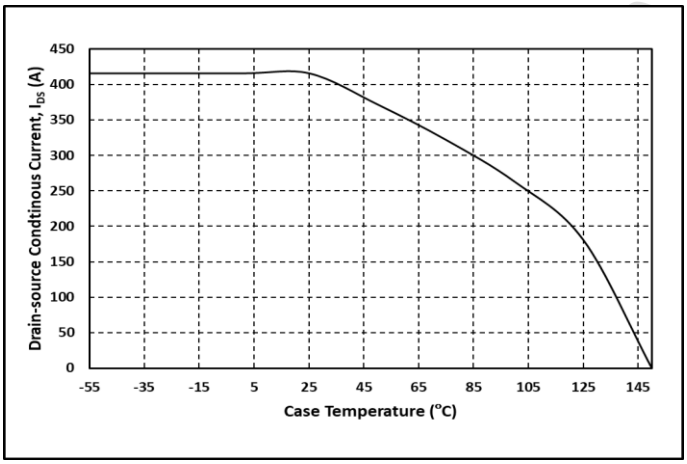


Fig. 21 Continuous Drain Current vs. Case Temperature

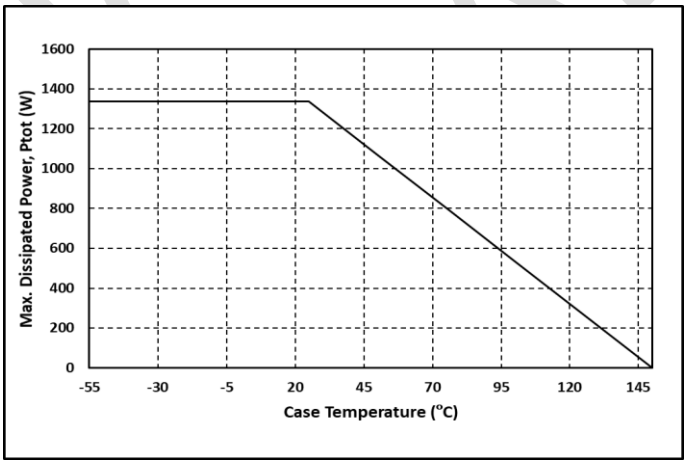


Fig. 22 Max. Power Dissipation Derating vs. Case Temperature

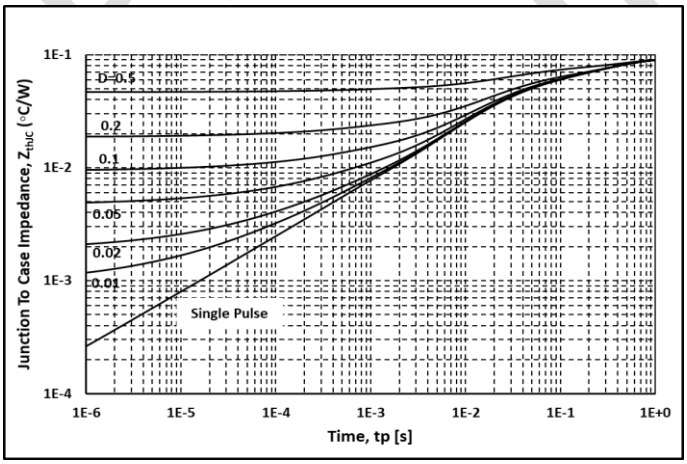


Fig. 23 Thermal Impedance (MOSFET)

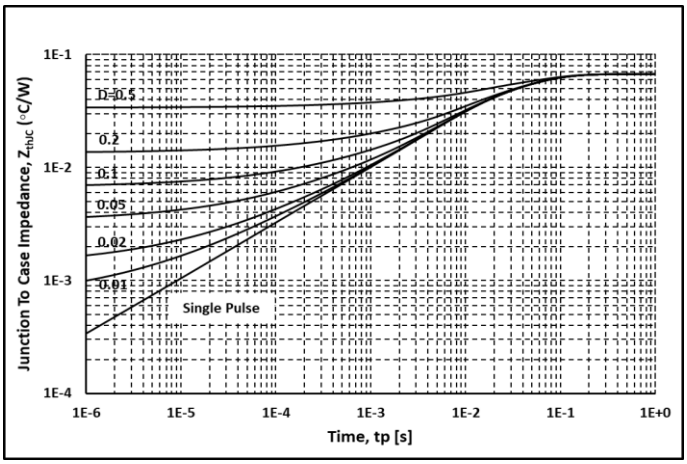


Fig. 24 Thermal Impedance (DIODE)

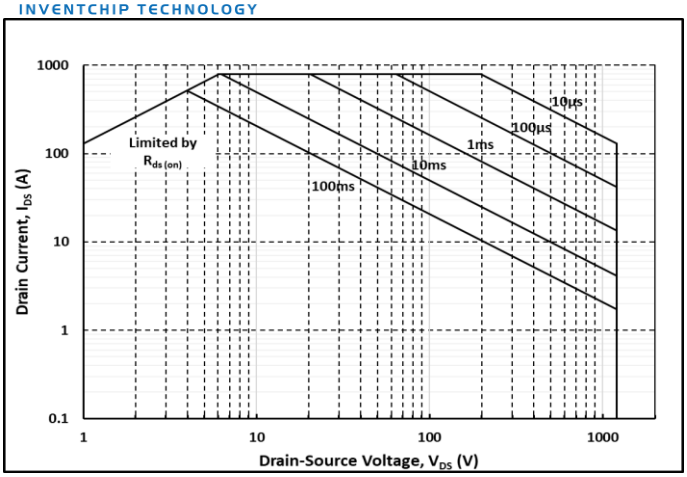
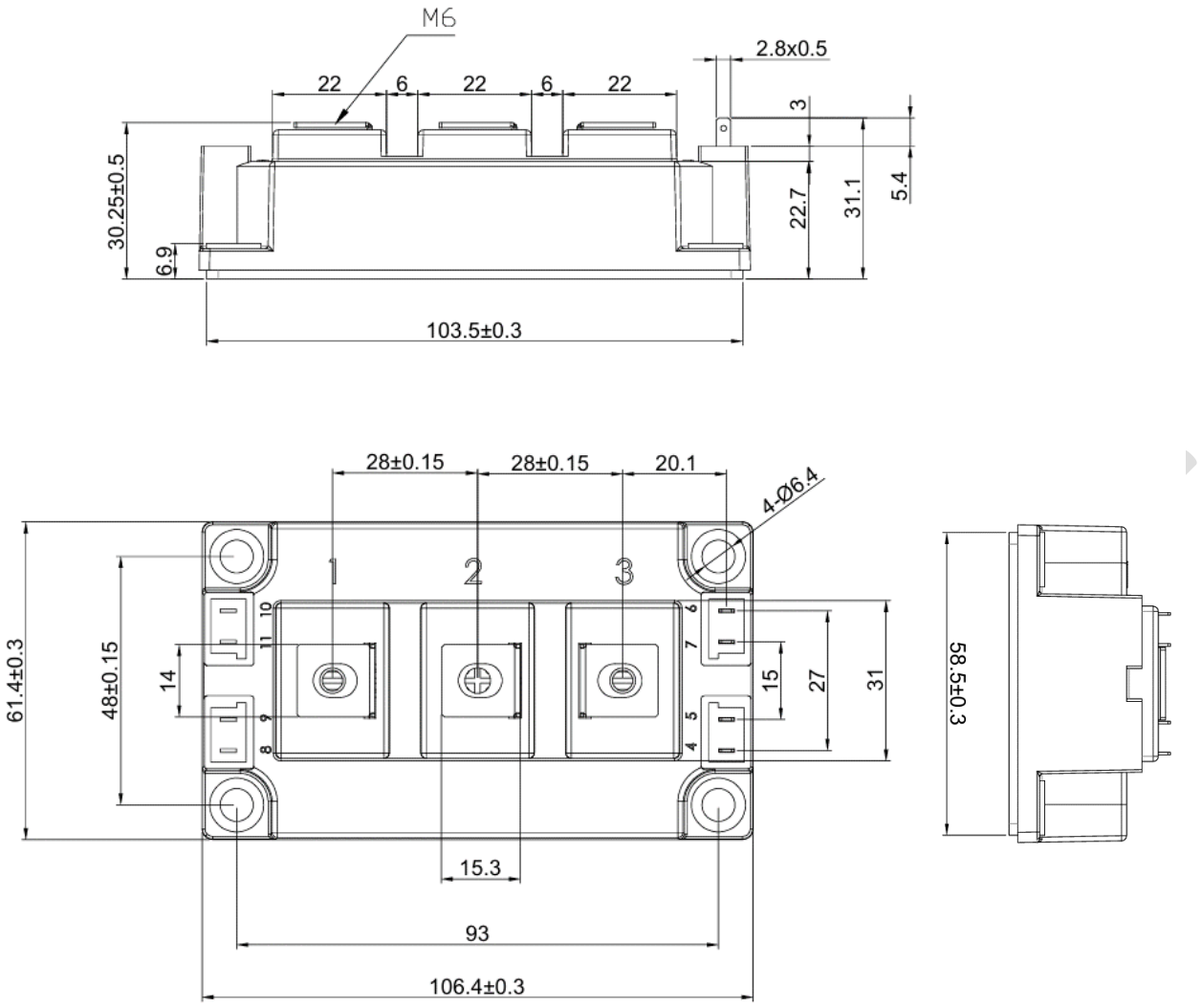


Fig. 25 Safe Operating Area

Package Dimensions (mm)



Notes

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