



GHXS400A120S7D5

VDC	1200 V
I _F	400 A
T _{j,max}	150 °C

1200V SiC Power Module Half Bridge

Features

- SiC Schottky Diode
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature independent switching behavior
 - Positive Temperature coefficient on V_F
- Low stray inductance
- High junction temperature operation
- All parts tested to greater than 1,400V

Benefits

- Outstanding performance at high frequency operation
- Low loss and low EMI noise
- Very rugged and easy mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- RoHS compliant

Package



Half Bridge

Part #	Package	Marking
GHXS400A120S7D5	S7	GHXS400A120S7D5

Applications

- Switched-mode power supplies
- Induction heater
- Welding equipment
- Charging station



Maximum Ratings, at T_j=25 °C, unless otherwise specified (per leg)

Characteristics	Symbol	Conditions	Values	Unit
Continuous forward current	I _F *	T _C =25 °C, T _J =150 °C	623	A
		T _C =93 °C, T _J =150 °C	400	
		T _C =125 °C, T _J =150 °C	224	
Repetitive peak reverse voltage	V _{RRM}	T _J =25 °C	1200	V
Diode dv/dt ruggedness	dv/dt	Turn-on slew rate, repetitive	200	V/ns
Power dissipation	P _{tot**}	T _C =25 °C	1689	W
Operating junction temperature	T _J		-40...150	°C
Storage temperature	T _{storage}		-40...150	°C

Notes:

* Typical R_{thjC} used

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Electrical Characteristics, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
DC blocking voltage	V_{DC}	$I_R=800\mu\text{A}$, $T_j=25\text{ }^\circ\text{C}$	1200	-	-	V
Diode forward voltage	V_F^{**}	$I_F=400\text{A}$, $T_j=25\text{ }^\circ\text{C}$	-	1.67	1.90	V
		$I_F=400\text{A}$, $T_j=125\text{ }^\circ\text{C}$	-	2.04	-	
		$I_F=400\text{A}$, $T_j=150\text{ }^\circ\text{C}$	-	2.17	2.70	
Reverse current	I_R	$V_R=1,200\text{V}$, $T_j=25\text{ }^\circ\text{C}$	-	42	800	μA
		$V_R=1,400\text{V}$, $T_j=25\text{ }^\circ\text{C}$	-	254	-	
		$V_R=1,200\text{V}$, $T_j=125\text{ }^\circ\text{C}$	-	339	-	
		$V_R=1,200\text{V}$, $T_j=150\text{ }^\circ\text{C}$	-	652	6000	
Total capacitive charge	Q_C	$V_R=800\text{V}$, $T_j=25\text{ }^\circ\text{C}$	-	2450	-	nC
Total capacitance	C	$V_R=1\text{V}$, $f=1\text{ MHz}$	-	33.8	-	nF
		$V_R=400\text{V}$, $f=1\text{ MHz}$	-	2.4	-	
		$V_R=800\text{V}$, $f=1\text{ MHz}$	-	1.7	-	

Thermal and Package Characteristics, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction-case	R_{thJC}	Per leg	-	0.07	0.09	$^\circ\text{C/W}$
Mounting torque	M_d		-	-	5.0	N-m
Terminal connection torque	M_{dt}		-	-	5.0	N-m
Package weight	W_t		-	250	-	g
Isolation voltage	V_{ISOL}	$I_{ISOL} < 1\text{mA}$, 50/60 Hz, 1 min	2500	-	-	V

NTC Characteristics, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Rated resistance	R_{NTC}	$T_{NTC} = 25\text{ }^\circ\text{C}$	-	5.0	-	k Ω
Resistance tolerance	$\Delta R/R$		-5	-	5	%
Beta Value ($T_2 = 50\text{ }^\circ\text{C}$)	$\beta_{25/50}$		-	3380	-	k
Beta Value ($T_2 = 80\text{ }^\circ\text{C}$)	$\beta_{25/80}$		-	3440	-	k
Power dissipation	P_{MAX}	$T_{NTC} = 25\text{ }^\circ\text{C}$	-	-	50	mW

**Diode forward voltage measured at module terminals

Typical Performance

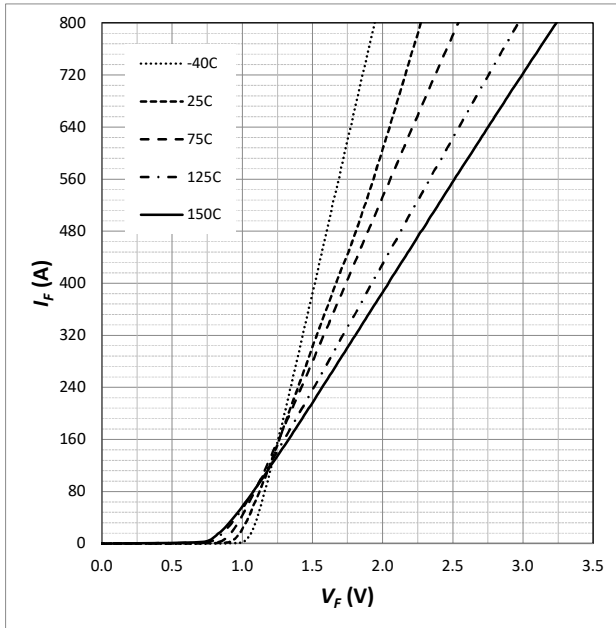


Fig. 1 Forward Characteristics (parameterized on T_j)

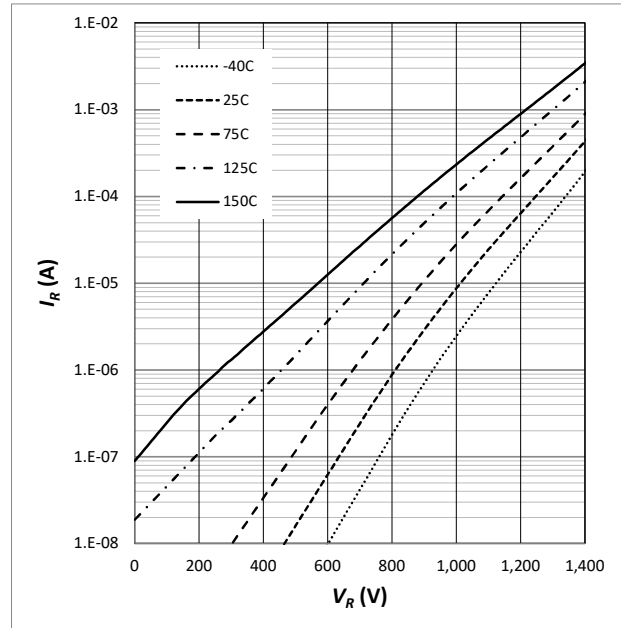


Fig. 2 Reverse Characteristics (parameterized on T_j)

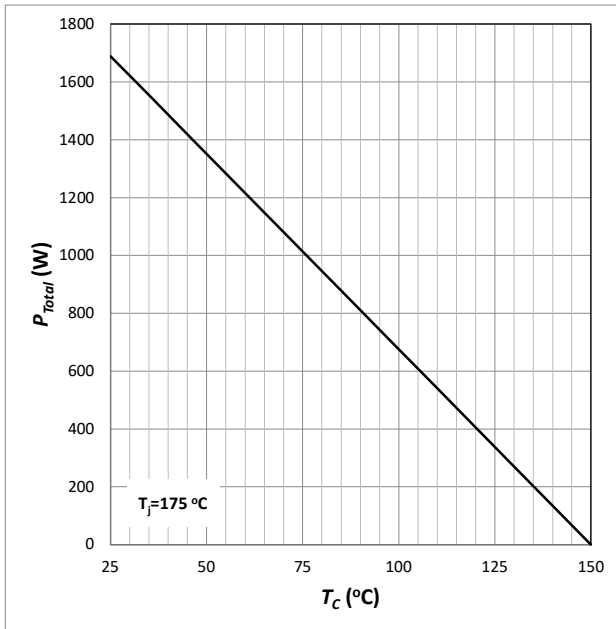


Fig. 3 Power Derating

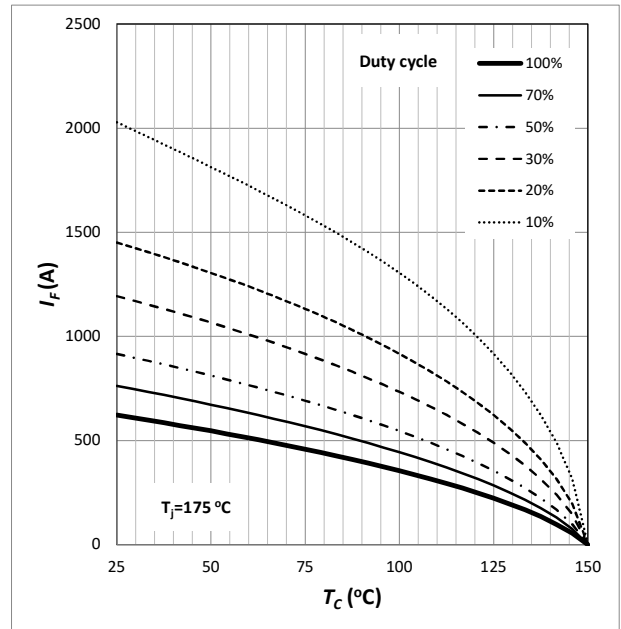


Fig. 4 Current Derating

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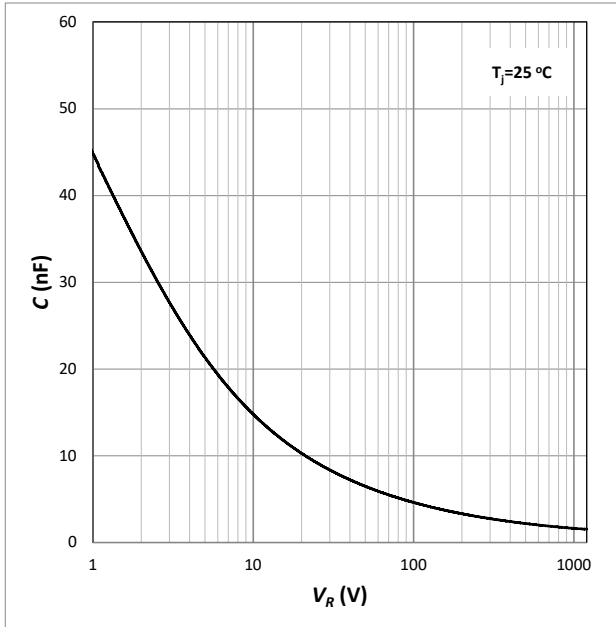


Fig. 5 Capacitance

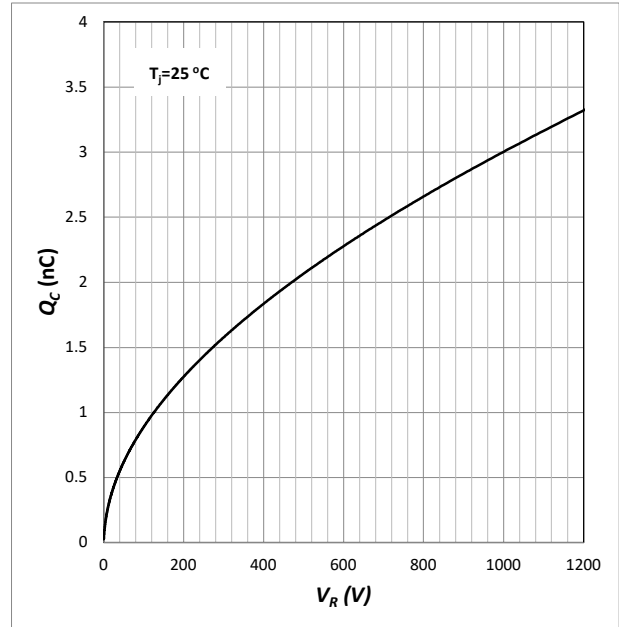


Fig. 6 Capacitive Charge

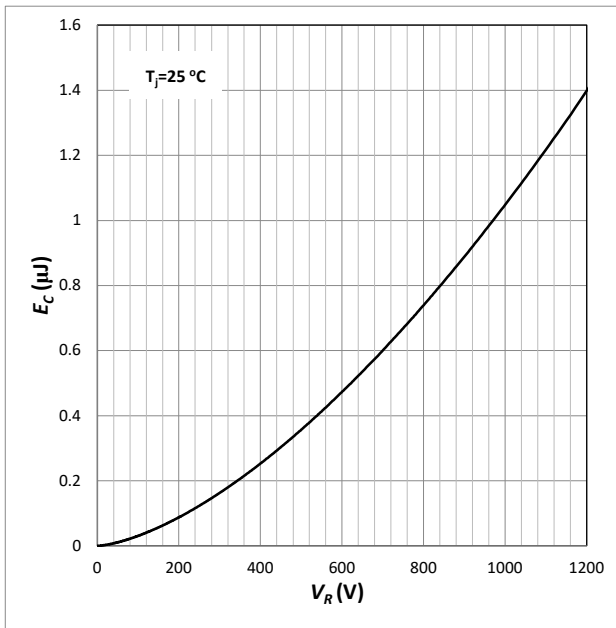


Fig. 7 Typical Capacitance Stored Energy

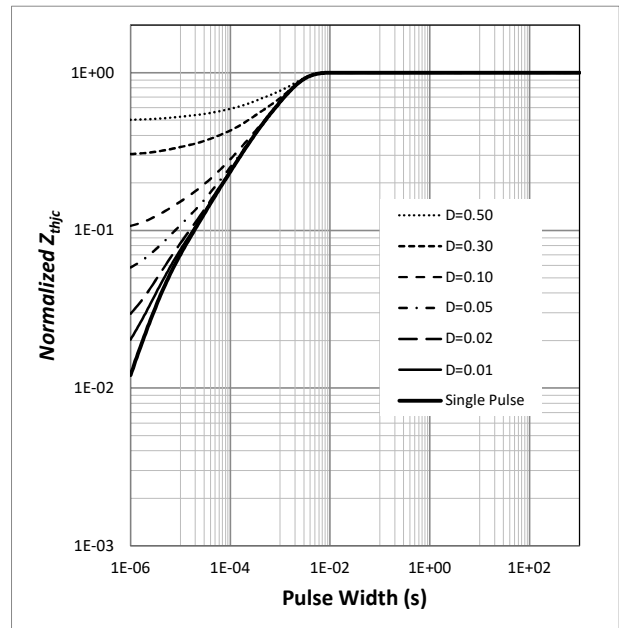


Fig. 8 Transient Thermal Impedance

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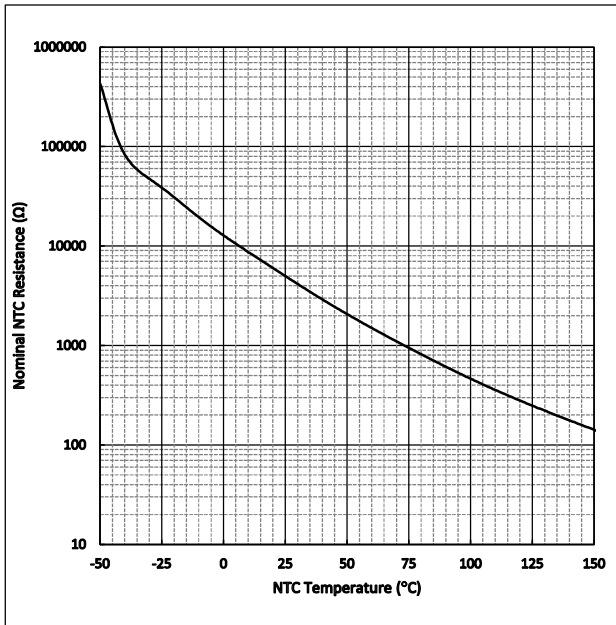
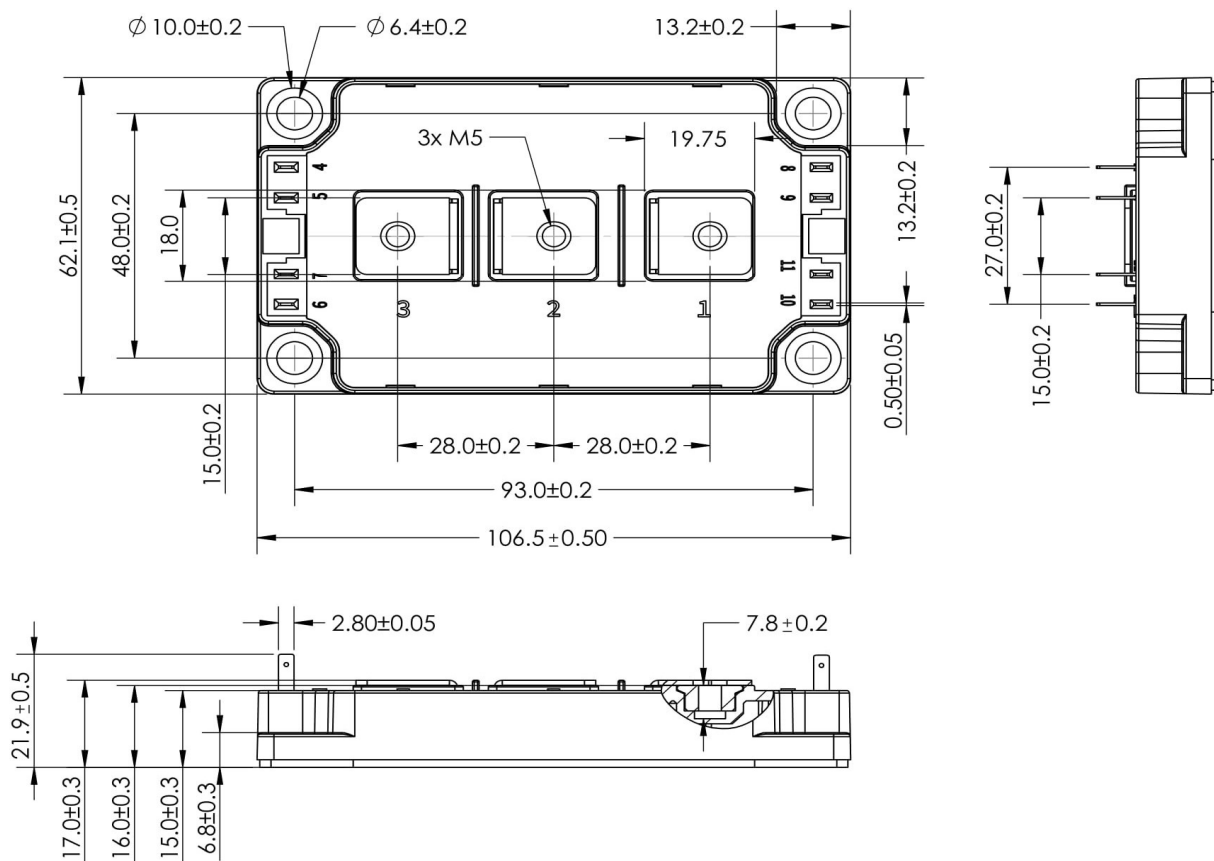


Fig. 9 Nominal NTC Resistance vs. Temperature

Package Dimensions S7



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Revision History

Date	Revision	Notes
8/20/2020	0.1	Initial release of preliminary datasheet
9/17/2021	0.2	Update specs
11/24/2021	0.3	Updated package image
4/11/2022	1.0	Initial production release

Notes

RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.SemiQ.com.

REACH Compliance

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