

BS450HF120B2SDX

IGBT Module

1200V , 450A Half Bridge Module

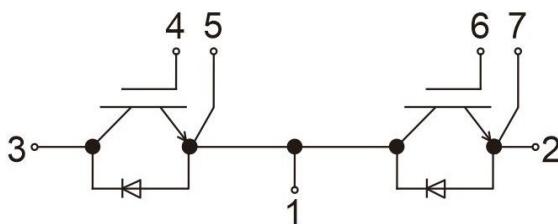


概述

Bestirpower的 IGBT 提供超快的开关速度适用于焊接、感应加热、UPS 和其他高频应用。

General Description

Bestirpower's IGBTs offer ultrafast switching speed for application such as welding, inductive heating, UPS and other high frequency applications.



特点

- 正温度系数的VCE(sat)
- 1200V450A,VCE(sat)(typ.)=1.6V
- 低开关损耗
- 大电流能力
- 出色的短路耐受性

Features

- VCE(sat) with positive temperature coefficient
- 1200V450A,VCE(sat)(typ.)=1.6V
- Low switching losses
- High current capability
- Excellent short circuit ruggedness

最大额定绝对值/ Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter		Value	Unit	Note
V_{CES}	集电极-发射极电压	Collector-Emitter voltage	1200	V	
V_{GES}	栅极-发射极电压	Continuous Gate to Emitter Voltage	± 20	V	
I_c	连续集电极直流电流	Continuous Collector Current ($T_C=25^{\circ}\text{C}$)	700	A	Fig.1,2
	连续集电极直流电流	Continuous Collector Current ($T_C=100^{\circ}\text{C}$)	450		
P_D	最大功耗 ($T_C=25^{\circ}\text{C}$)	Maximum Power Dissipation ($T_C=25^{\circ}\text{C}$)	2307	W	
	最大功耗 ($T_J=175^{\circ}\text{C}$)	Maximum Power Dissipation ($T_J=175^{\circ}\text{C}$)			
t_{sc}	短路耐受时间	Short Circuit Withstand Time	10	μs	
T_J	IGBT最大结温	Maximum IGBT Junction Temperature	175	$^{\circ}\text{C}$	
T_{JOP}	最大工作结温范围	Maximum Operating Junction Temperature Range	-40 to +150	$^{\circ}\text{C}$	
T_{stg}	保存温度	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$	
V_{RRM}	二极管重复峰值反向电压初步数据 Repetitive Peak Reverse Voltage Preliminary Data		1200	V	
I_F	二极管连续正向电流	Diode Continuous Forward Current	450	A	Fig.8
I_{FM}	二极管最大正向电流	Diode Maximun Forward Current	900	A	

IGBT电气特性/ Electrical Characteristics of IGBT $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units	Note
BV _{CES}	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 1mA		1200	-	-	V	
I _{CES}	集电极-发射极漏电流 Collector-Emitter Leakage Current	V _{CE} = 1200V , V _{GE} = 0V		-	-	1	mA	
I _{GES}	栅极-发射极正向漏电流 Gate to Emitter Leakage Current	V _{GE} = 20V, V _{CE} =0V		-	-	±400	nA	
V _{GE(th)}	阈值电压 Gate Threshold Voltage	V _{GE} =V _{CE} , I _C =8mA		5.0	5.8	6.6	V	Fig.1
V _{CE(sat)}	集电极-发射极饱和电压 Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C =450A, T _J = 25°C		-	1.60	2.0	V	
		V _{GE} =15V, I _C =450A, T _J = 150°C		-	2.00	-		
t _{d(on)}	开通延迟时间 Turn-on Delay time	V _{CC} = 600V, I _C = 450A V _{GE} = +15/-15V R _{Gon} = 1 Ω R _{Goff} = 1 Ω	T _J = 25°C	-	0.12	-	ns	
	T _J = 150°C		-	0.13	-			
t _r	开通上升时间 Turn-on Rise Time		T _J = 25°C	-	0.05	-	us	
			T _J = 150°C	-	0.05	-		
t _{d(off)}	关断延迟时间 Turn-off Delay time		T _J = 25°C	-	0.41	-	us	
			T _J = 150°C	-	0.46	-		
t _f	关断下降时间 Turn-off Fall Time		T _J = 25°C	-	0.14	-	us	
			T _J = 150°C	-	0.23	-		
E _{on}	开通损耗 Turn-on Switching Loss		T _J = 25°C	-	10.9	-	mJ	Fig.4,5
			T _J = 150°C	-	19.1	-		
E _{off}	关断损耗 Turn-off Switching Loss		T _J = 25°C	-	41.5	-	mJ	
			T _J = 125°C	-	51.8	-		
Q _g	栅极电荷 Total Gate Charge	V _{CC} = 600V, I _C = 450A V _{GE} = +15/-15V	T _J = 25°C	-	3800	-	nC	
C _{ies}	输入电容 Input Capacitance	V _{CE} =25V V _{GE} =0V f=100kHz		-	75	-	nF	
C _{res}	反向传输电容 Reverse Transfer Capacitance	T _J = 25°C		-	1.3	-		
R _{Gint}	栅极电阻 Integrated gate resistor	f=1MHz		-	1.0	-	Ω	
R _{thJC}	IGBT的芯片与外壳间的热阻 Thermal Resistance, Junction-to-Case (IGBT)	Per IGBT		-	-	0.065	°C/W	
R _{thCH}	Thermal resistance, case to heatsink	Per IGBT, λ _{grease} = 1 W/(m·K)		-	0.03	-	°C/W	

二极管电气特性/ Electrical Characteristics of Diode $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units	Note
V _F	二极管导通电压 Diode Forward Voltage	I _F = 450A	T _J = 25°C	-	2.05	2.4	V	Fig.8
			T _J = 150°C	-	1.95	-		
I _{rr}	二极管反向恢复峰值电流 Diode peak Reverse Recovery Current	I _F =450A V _R = 600V V _{GE} =-15V R _{Gon} =1Ω	T _J = 25°C	-	494	-	A	
			T _J = 150°C		536			
Q _{rr}	二极管反向恢复电荷 Diode Reverse Recovery Charge		T _J = 25°C	-	43	-	uC	
			T _J = 150°C	-	73	-		
E _{rr}	二极管反向恢复能量 Diode Reverse Recovery Energy		T _J = 25°C	-	23.3	-	mJ	
			T _J = 150°C	-	33.2	-		
R _{thJC}	二极管的芯片与外壳间的热阻 Thermal Resistance, Junction-to-Case (Diode)	Per Diode		-	-	0.11	°C/W	
R _{thCH}	Thermal resistance, case to heatsink	Per Diode, λ _{grease} = 1 W/(m·K)		-	0.06	-	°C/W	

模块特性/ Module Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISOL}	隔离电压 Isolation Voltage (All Terminals Shorted), $f = 50\text{Hz}$, 1minute	4000	-	-	V
R_{eCS}	外壳与散热器凹槽间热阻（涂有导电油脂情况下） Case-To-Sink(Conductive Grease Applied)	-	0.1	-	$^{\circ}\text{C}/\text{W}$
M	电源端子螺钉：M6 Power Terminals Screw: M6	2.5	-	5.0	N·m
M	安 装 螺 钉：M6 Mounting Screw: M6	3.0	-	6.0	N·m
G	重量 Weight	-	310	-	g

图1.IGBT输出特性

Fig 1, Output Characteristics IGBT, Inverter (typical)
 $I_C = f(V_{CE})$ $T_J = 25^\circ\text{C}$

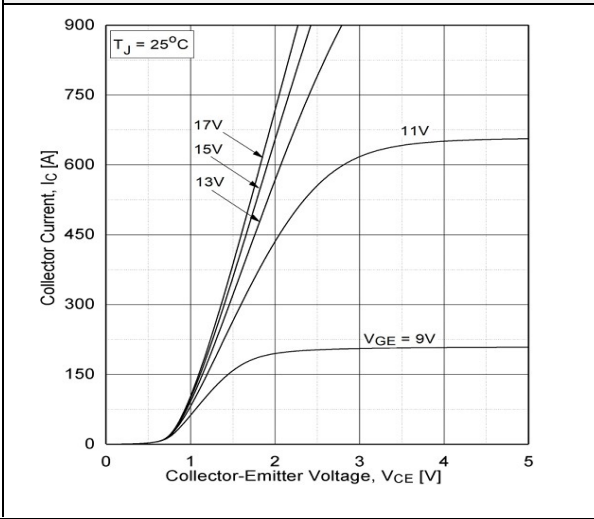


图2.IGBT输出特性

Fig 2, Output Characteristics IGBT, Inverter (typical)
 $I_C = f(V_{CE})$ $T_J = 150^\circ\text{C}$

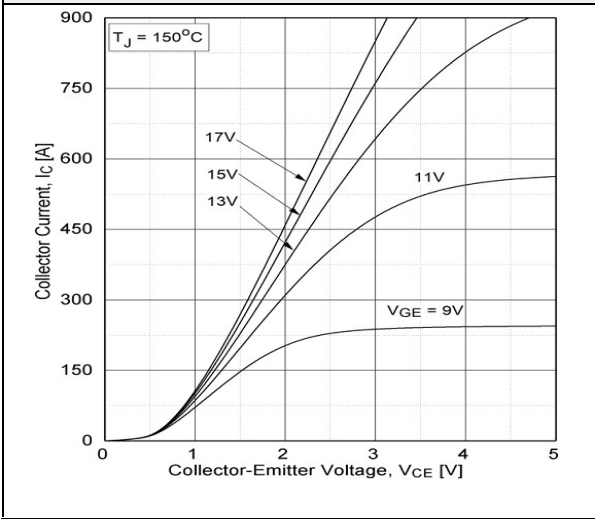


图3. IGBT传输特性

Fig 3, Transfer Characteristics IGBT, Inverter (typical)
 $I_C = f(V_{GE})$ $V_{CE} = 20\text{ V}$

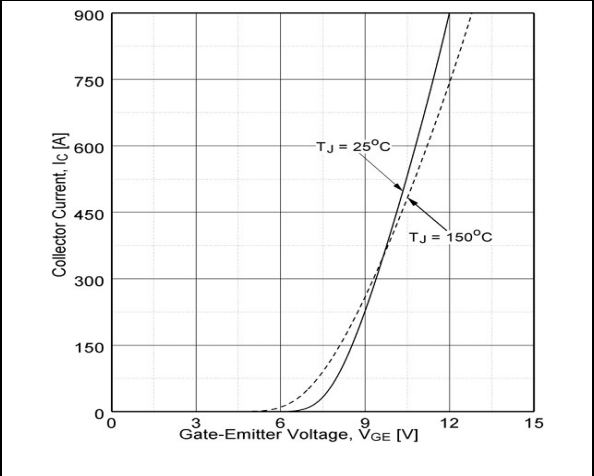


图4. IGBT开关损耗逆变器

Fig 4, Switching Losses IGBT, Inverter (typical), $V_{CE} = 600\text{ V}$
 $E_{on} = f(I_C)$, $E_{off} = f(I_C)$ $V_{GE} = +15/-15\text{ V}$, $R_{Gon} = 1\ \Omega$, $R_{Goff} = 1\ \Omega$

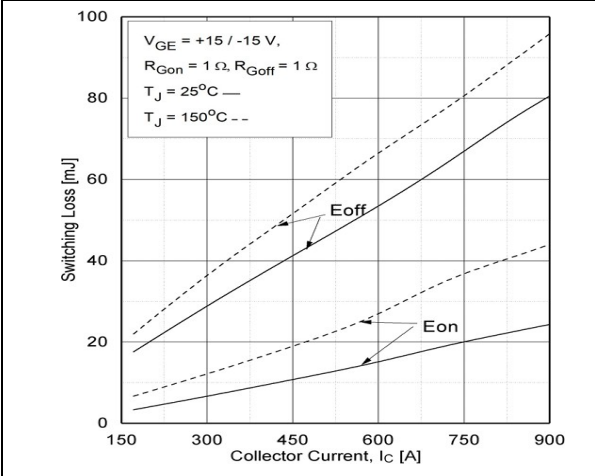


图5. IGBT开关损耗逆变器

Fig 5, Switching Losses IGBT, Inverter (typical) $E_{on} = f(R_G)$,
 $E_{off} = f(R_G)$ $V_{GE} = +15/-15\text{ V}$, $I_C = 450\text{ A}$, $V_{CE} = 600\text{ V}$

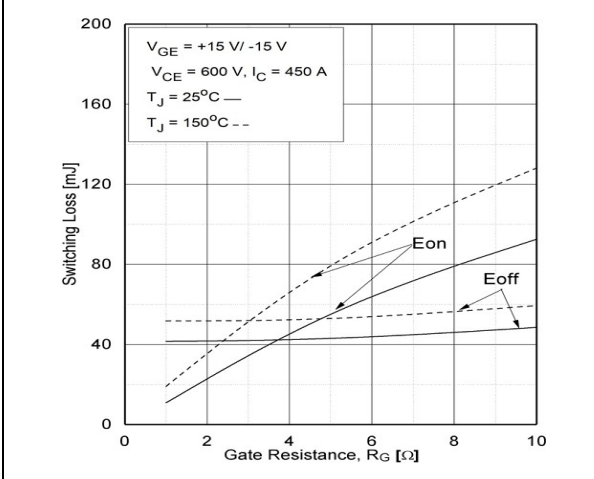


图6. IGBT瞬态热阻特性

Fig 6, Transient Thermal Impedance IGBT, Inverter $Z_{thJC} = f(t)$

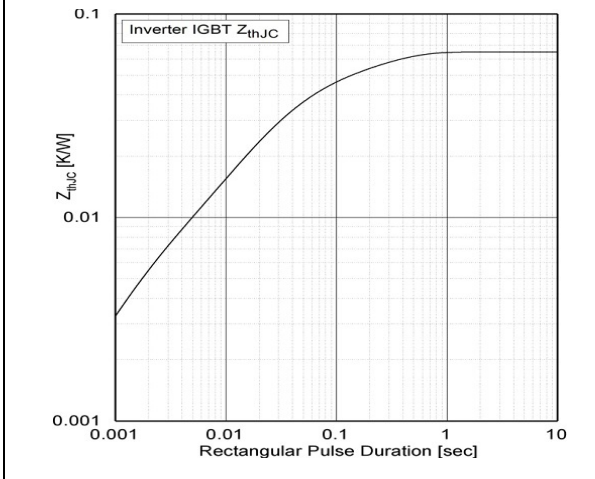


图7. IGBT反向偏置安全工作区

Fig 7, Reverse Bias safe operating area IGBT, Inverter (RBSOA)
 $I_C = f(V_{CE})$ $V_{GE} = +15/-15\text{ V}$, $R_{Goff} = 1\ \Omega$, $T_J = 150^\circ\text{C}$

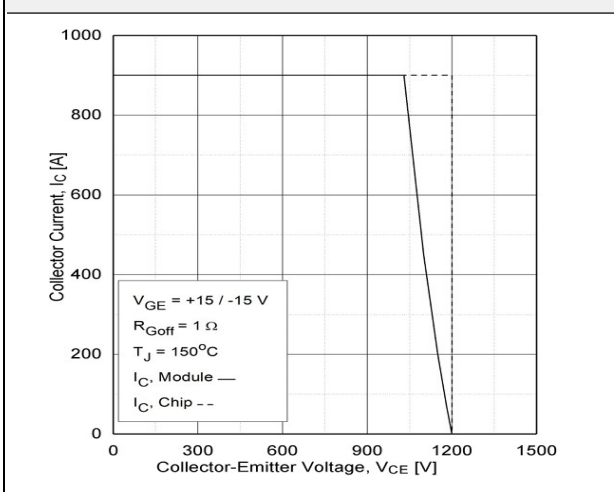


图8. 二极管正向特性

Fig 8, Forward Characteristics of Diode, Inverter (typical) $I_F = f(V_F)$

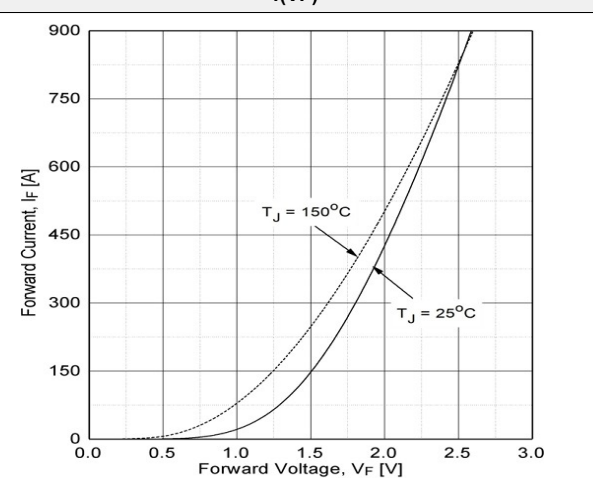


图9. 开关损耗二极管

Fig 9, Switching Losses Diode, Inverter (typical)
 $E_{rec} = f(I_F)$ $E_{rr} = f(I_F)$, $R_{Gon} = 1\ \Omega$, $V_{CE} = 600\text{V}$

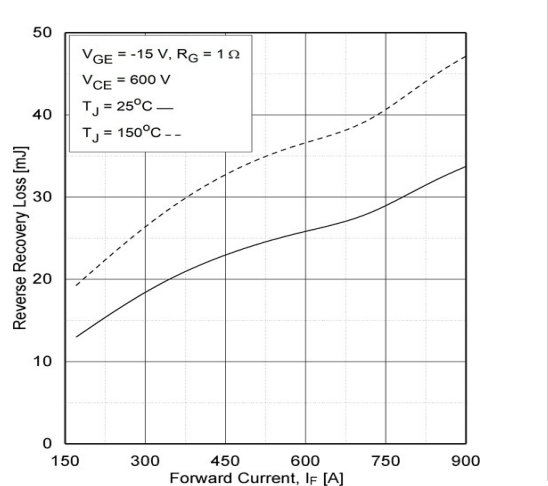


图10. 开关损耗二极管

Fig 10, Switching Losses Diode, Inverter (typical) $E_{rec} = f(R_G)$ $I_F = 450\text{A}$, $V_{CE} = 600\text{V}$

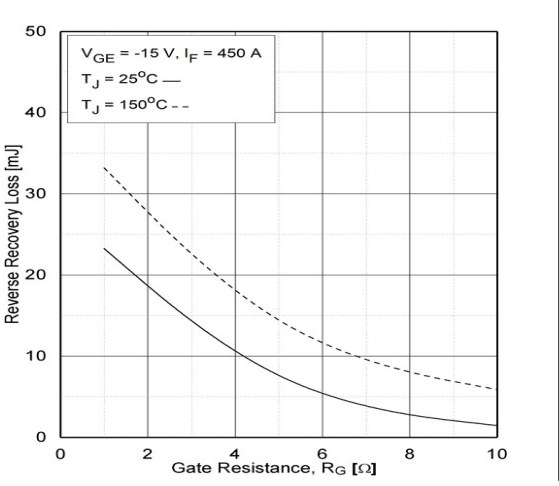
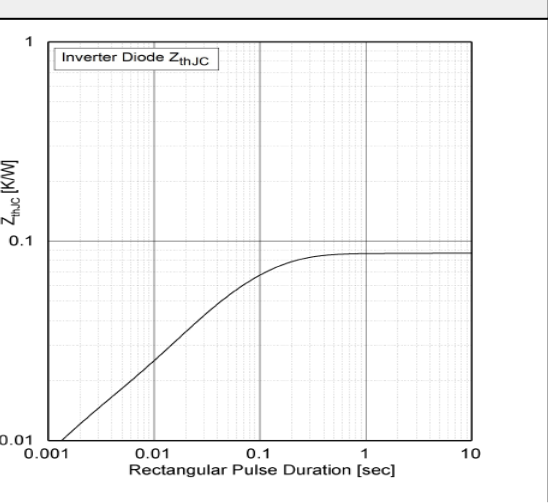
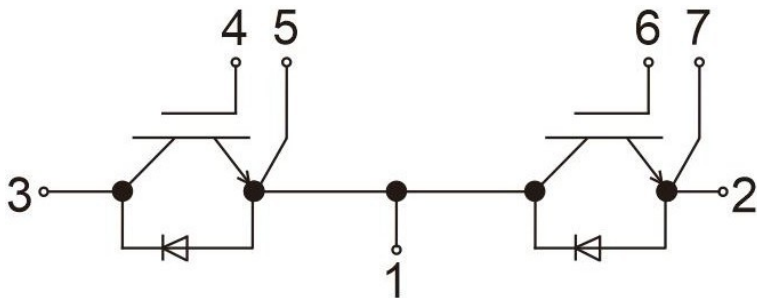


图11. 二极管瞬态热阻抗

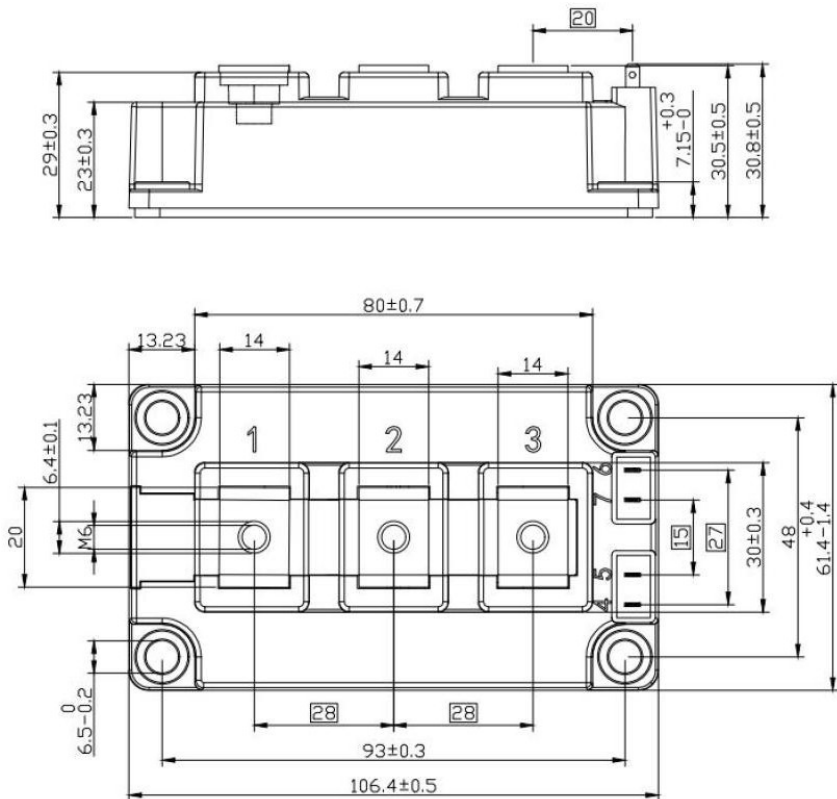
Fig 11, Transient Thermal Impedance Diode, Inverter $Z_{thJC} = f(t)$



接线图 / Circuit diagram headline



封装尺寸 / Package outlines



免责声明

Bestirpower 保留随时对Bestirpower 产品和/或本文件进行更改、更正、润色、修改和改进的权利，恕不另行通知。

本文件中提供的信息在任何情况下均不应视为条件或特性的保证，Bestirpower 不对因使用本文件中描述的产品或技术信息而侵犯第三方专利、版权或其他知识产权承担任何责任。

本文件归 Bestirpower Co.,LTD. 所有，未经授权不得复制或转换为其他格式。

© 2025 Bestirpower – 保留所有权利

Disclaimer

Bestirpower reserve the right to make changes, corrections, enhancements, modifications, and improvements to Bestirpower products and/or to this document at any time without notice.

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. Bestirpower does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Products or technical information described in this document.

This document is the property of Bestirpower Co., LTD., and not allowed to copy or transformed to other format if not under the authority approval.

© 2025 Bestirpower – All rights reserved