



Hua | 芯華睿
Semiconductor

Data Sheet

HB820SS08XFESH

HybridPACK Drive Module



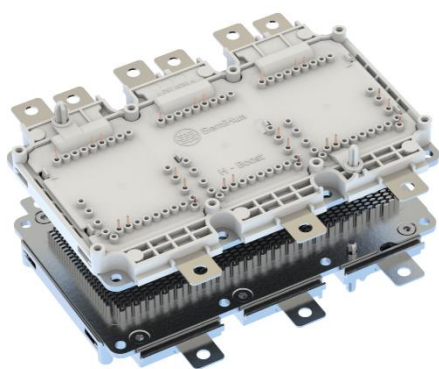
上海芯华睿半导体科技有限公司
2022-2

Description 产品描述

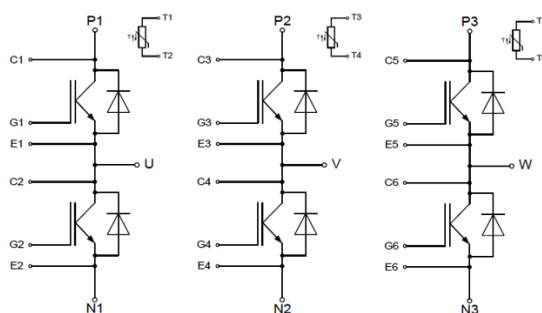
This H-BOOST driver module is a very compact three phases fully controlled bridge Standard package module (750V/820A) optimized for hybrid and electric vehicles. The chipset has benchmark current density combined with short circuit ruggedness and increased blocking voltage for reliable inverter operation under harsh environmental conditions with better light load power losses, which helps to improve system efficiency in a real driving cycle.

这款 H-BOOST 驱动器模块是一块专为混合动力和电动汽车设计，布局非常紧凑的三相全控桥式标准封装 (750V/820A)。该芯片组在保证电流能力输出的同时还有一定的短路能力和更高的阻断电压，可在恶劣的逆变器环境下可靠运行，并具有更低的轻负载损耗，这有助于实际循环中的系统效率。

Outline 产品外观



Topology 产品拓扑



$$V_{CES} = 750V \quad I_{C\ nom} = 820A \quad / \quad I_{CRM} = 1640A$$

Main Characteristics 主要特征

- Three-phase fully controlled bridge module for HEV/EV
- 适用于混动/电动的三相全控桥模块
- Blocking voltage 750V
- 最高耐压 750V
- Continuous DC collector current 510A
- 最大持续电流 510A
- Low Vcesat, Vcesat=1.2V(Type@450A)
- 低导通压降，典型值为 1.2V
- Low Switching Losses
- 低开关损耗
- Low Qg and Crss
- 低开关电荷量和反转电容
- Low Inductive Design
- 低杂感设计
- RoHS Compliant
- 符合 RoHS
- Tvj op=150 °C

Typical Applications 典型应用

- Hybrid Electrical Vehicles (H)EV
- 混动/纯电动驱动系统
- Automotive Applications
- 各种车规应用
- Motor Drives
- 电机驱动应用

Good Design 优秀的设计

- 4.2kV DC 1sec Insulation for safety
- 直流 4.2kV 1 秒安全绝缘能力
- Compact design
- 紧凑设计，节省空间
- Integrated NTC temperature sensor
- 内置温度监测传感器
- Direct Cooled PinFin Base Plate
- 可直接水冷的一体化 PinFin 散热底板
- Guiding elements for PCB and cooler assembly
- PCB 和冷却器组件的装配导向设计
- Soldering FIT connection Technology
- 焊接连结针技术

Part Number 产品名	Packing 包装	Quantity 数量
HB820SS08XFESH	Box 盒装	4

1 IGBT, Inverter

1.1 Maximum Rated Values 极限参数

Symbol 符号	Parameter 项目	Conditions 条件	T _{vj} (°C)	Value 值			Unit 单位
				Min.	Typ.	Max.	
V _{CES}	Collector-emitter Breakdown Voltage 集电极-发射极击穿电压		25	750			V
I _{CN}	Implemented collector current 最大集电极电流		25			820	A
I _{C nom} *1	Continuous DC collector current 集电极连续直流电流	T _F = 80°C	175			510	A
I _{CRM}	Repetitive peak collector current 集电极可重复峰值电流	t _p = 1 ms				1640	A
P _{tot} *1	Total power dissipation 总功耗功率	T _F = 75°C	175			714	W
V _{GES}	Gate-Emitter peak voltage 栅极-发射极峰值电压			-20		20	V
T _{vj}	Junction temperature 芯片结温			-40~175			°C
T _{stg}	Storage temperature 存储温度			-40~125			°C

1.2 Characteristic Values 产品典型值

Symbol 符号	Parameter 项目	Conditions 条件	T _{vj} (°C)	Value 值			Unit 单位
				Min.	Typ.	Max.	
V _{GE(th)}	Gate Threshold Voltage 栅极-发射极阈值电压	I _C = 9.60 mA, V _{CE} = V _{GE}	25	4.9	5.9	6.9	V
			175		4.2		
V _{CE sat}	Collector-emitter saturation voltage 集电极-发射极饱和电压	I _C = 450 A, V _{GE} = 15 V	25		1.2	1.55	V
			175		1.3		
		I _C = 820 A, V _{GE} = 15 V	25		1.48	2.0	
			175		1.76		
I _{CSE}	Collector cut-off current 集电极截止电流	V _{GE} = 0V, V _{CE} = 750 V	25			1	mA
			150		3.0		mA
			175		8.0		mA
I _{GES}	Gate leakage current 栅极漏电流	V _{GE} = ±20 V, V _{CE} = 0 V	25			500	nA
R _{Gint}	Internal gate resistor 栅极内阻		25		1.2		Ω
C _{ies}	Input Capacitance 输入电容	V _{CE} = 50 V, V _{GE} = 0 V, f = 1 MHz	25		74		nF
C _{oes}	Output Capacitance 输出电容		25		1.67		nF
C _{res}	Reverse Transfer Capacitance 反向传输电容--米勒电容		25		0.23		nF
Q _g	Total Gate Charge 栅极电荷		V _{CE} = 400 V, I _C = 450 A, V _{GE} = -8 to 15 V	25		3.62	

Symbol 符号	Parameter 项目	Conditions 条件	T _{vj} (°C)	Value 值			Unit 单位
				Min.	Typ.	Max.	
t _{d(on)}	Turn-On Delay Time 开通延迟时间	I _C = 450 A, V _{CE} = 400 V V _{GE} = -8 V / +15 V R _{gon} = 2.4Ω di/dt=7500A/μs-Tvj 25°C R _{goff} =5.1Ω dv/dt=5300V/μs-Tvj 25°C	25		0.21		μS
			150		0.20		
t _r	Turn-On Rise Time 开通上升时间		25		0.06		μS
			150		0.07		
t _{d(off)}	Turn-Off Delay Time 关断延迟时间		25		0.80		μS
			150		0.94		
t _f	Turn-Off Fall Time 关断下降时间		25		0.05		μS
			150		0.07		
E _{on}	Turn-on energy loss per pulse 开通能量损失/单次脉冲		25		14.6		mJ
			150		22.4		
E _{off}	Turn-off energy loss per pulse 关断能量损失/单次脉冲	25		19		mJ	
		150		25.6			
I _{SC}	Short circuit capability 短路电流能力	V _{CC} =400V, V _{GE} =15V T _p ≤ 6 μs	25		4000		A
R _{thJF} *2	Thermal resistance, junction to cooling fluid 热阻, 芯片至冷却液	per IGBT; ΔV/Δt=10dm ³ /min, T _F =75°C			0.11		K/W

2 Diode, Inverter

2.1 Maximum Rated Values 极限参数

Symbol 符号	Parameter 项目	Conditions 条件	T _{vj} (°C)	Value 值			Unit 单位
				Min.	Typ.	Max.	
V _{RRM}	Repetitive peak reverse voltage 反向重复峰值电压		25	750			V
I _{FN}	Implemented forward current 最大正向电流		25			820	A
I _F *1	Continuous DC forward current 正向连续直流电流	T _F = 75°C	175			450	A
I _{FRM}	Repetitive peak forward current 正向重复脉冲电流	t _p = 1 ms				1640	A
I ² t	I ² t	V _R = 0 V, t _p = 10 ms	175			16000	A ² s
T _{vj}	Junction temperature 芯片结温				-40~175		°C
T _{stg}	Storage temperature 存储温度				-40~125		°C

*1. Verified by characterization / design not by test.

2.2 Characteristic Values 产品典型值

Symbol 符号	Parameter 项目	Conditions 条件	T _{vj} (°C)	Value 值			Unit 单位
				Min.	Typ.	Max.	
V _F	Forward voltage 正向压降	I _F = 450 A, V _{GE} = 0 V	25		1.5	1.7	V
			150		1.41		
		I _F = 820 A, V _{GE} = 0 V	25		1.79		
			150		1.78		
I _{RM}	Peak reverse recovery current 反向恢复最大电流	I _F = 450 A, V _R = 400 V V _{GE} = -8 V di/dt=-7400A/μs- Tvj 25°C	25		320		A
			150		390		
Q _R	Recovered charge 反向恢复电荷		25		39.1		μC
			150		60		
E _{REC}	Reverse recovery energy 反向恢复能量	25		7.9		mJ	
		150		15.6			
R _{thJF} *1	Thermal resistance, junction to cooling fluid 热阻, 芯片至冷却液	pre Diode;ΔV/Δt = 10 dm ³ /min,T _F =75°C			0.16		K/W

3 NTC-Thermistor

Symbol 符号	Parameter 项目	Conditions 条件	T _{vj} (°C)	Value 值			Unit 单位
				Min.	Typ.	Max.	
R ₂₅	Rated resistance 额定阻值		25		5.00		kΩ
ΔR/R	Deviation of R ₁₀₀ 100°C时温度差		100	-5		5	%
B _{25/50}	B-value B 值	R ₂ = R ₂₅ exp [B _{25/50} (1/T ₂ - 1/(298,15 K))]	50		3375		K
B _{25/80}		R ₂ = R ₂₅ exp [B _{25/80} (1/T ₂ - 1/(298,16 K))]	80		3411		
B _{25/100}		R ₂ = R ₂₅ exp [B _{25/100} (1/T ₂ - 1/(298,17 K))]	100		3433		
P ₂₅	Power dissipation 额定功耗		25			20	mW

*1. Cooling fluid 50% water / 50% ethylenglycol.

4 Module 模块

Symbol 符号	Parameter 项目	Conditions 条件	T _{vj} (°C)	Value 值			Unit 单位
				Min.	Typ.	Max.	
V _{ISOL}	Isolation test voltage 绝缘测试电压	RMS, f = 0 Hz, t = 1 sec	25	4.2	-	-	kV
I _{IRMS} *1	Maximum RMS module terminal current 模块端子最大电流	T _F = 75°C, T _{Ct} = 105°C		-	-	500	A
	Material of module baseplate 模块底板材料			Cu+Ni*2			
	Internal isolation 内部绝缘材料	basic insulation (class 1, IEC 61140)		Al ₂ O ₃ (ZTA)			
d _{Creep}	Creepage distance 爬电距离	terminal to heatsink		-	9.0	-	mm
		terminal to terminal		-	9.0	-	
d _{Clear}	Clearance 电气间隙	terminal to heatsink		-	4.5	-	mm
		terminal to terminal		-	4.5	-	
CTI	Comperative tracking index 相对电痕指数			200	-	-	
Δp	Pressure drop in cooling circuit 冷却系统的压差	ΔV/Δt = 10.0 dm ³ /min; T _F = 75°C		-	64.0	-	mbar
P	Maximum pressure in cooling circuit 冷却系统的最大压强	T _{baseplate} < 40°C -relative pressure		-	-	2.5	bar
		T _{baseplate} > 40°C -relative pressure		-	-	2.0	
L _s	Stray inductance module 模块杂散电感			-	8.0	-	nH
R _{CC'+EE'}	Module lead resistance, terminals - chip 模块引脚阻抗, 端子 - 芯片	per switch	25	-	0.75	-	mΩ
T _{stg}	Storage temperature 存储温度			-40	-	125	°C
M *3	Mounting torque 安装力矩	Screw M4 baseplate to heatsink	25	1.80	2.00	2.20	Nm
		Screw EJOT Delta PCB to frame	25	0.45	0.50	0.55 *3	
G	Weight 重量		25	-	730	-	g

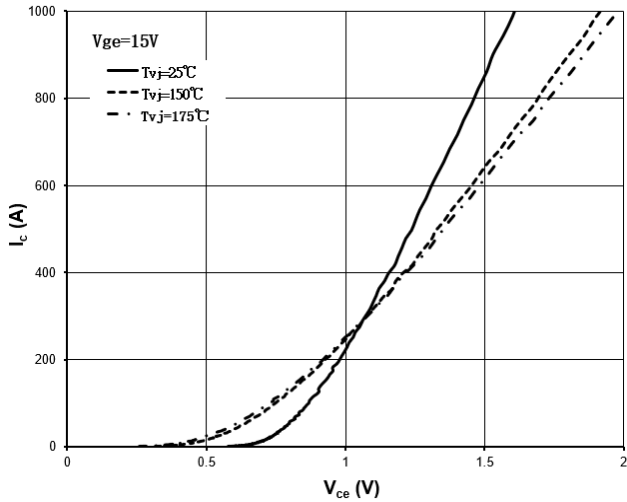
*1. Verified by characterization / design not by test.

*2. Ni plated Cu baseplate.

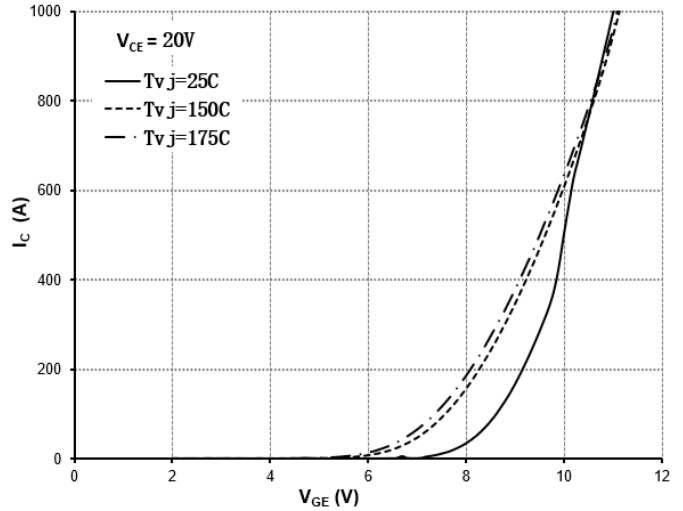
*3. EJOT Delta PT WN 5451 30x10.

5 Typical Performance Characteristics 典型性能特征

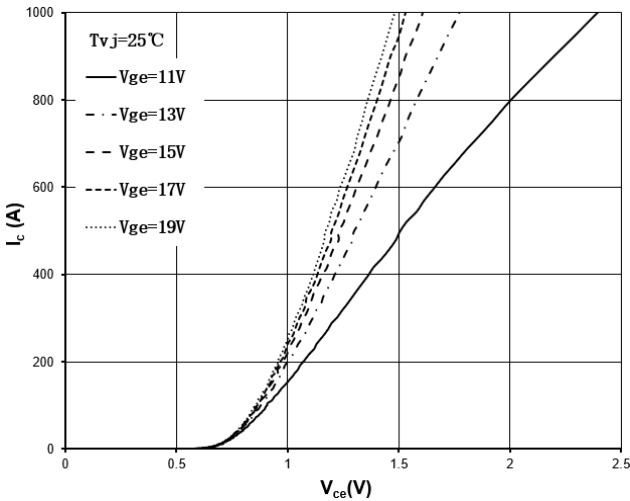
1. Output Characteristic IGBT, Inverter



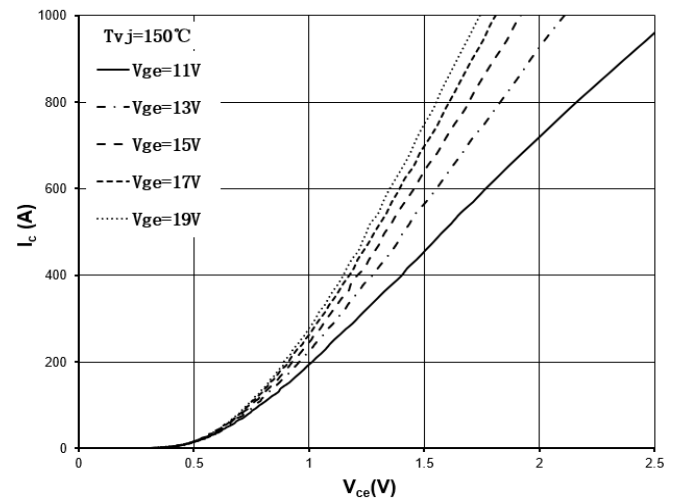
2. Transfer Characteristic IGBT, Inverter



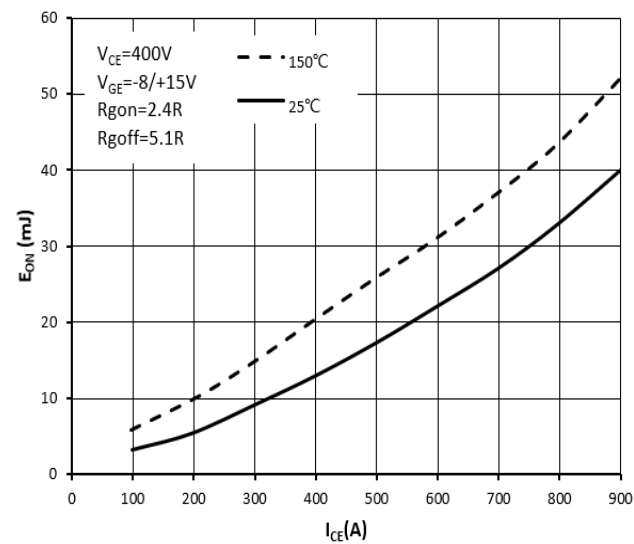
3. Output Characteristic IGBT, Inverte



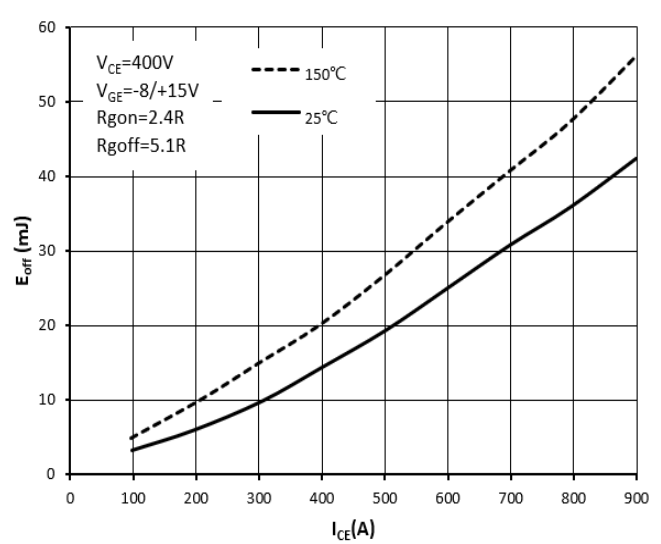
4. Output Characteristic IGBT, Inverter



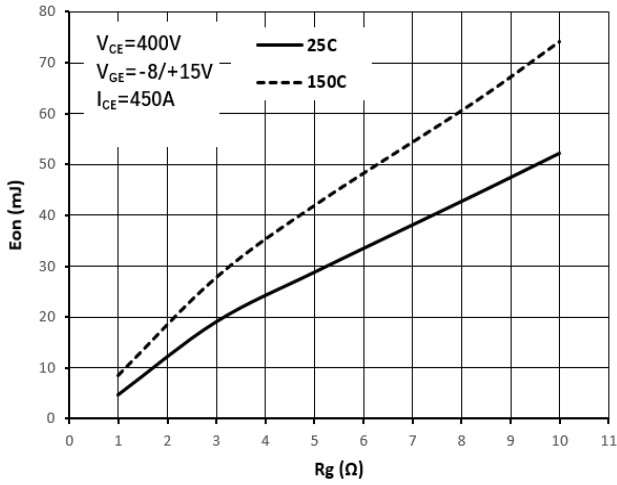
5. Switching Losses IGBT, Inverter



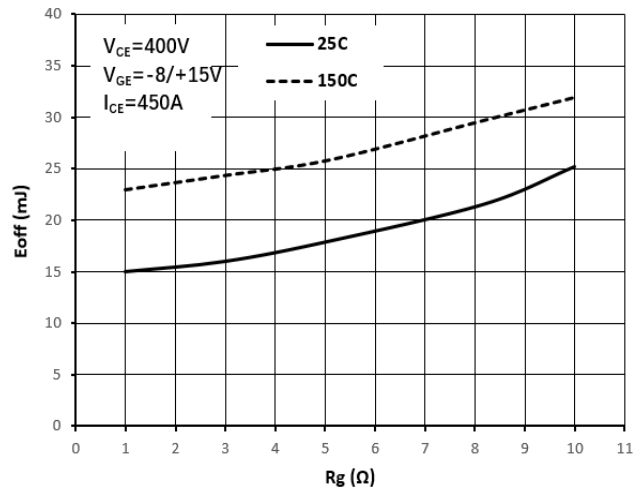
6. Switching Losses IGBT, Inverter



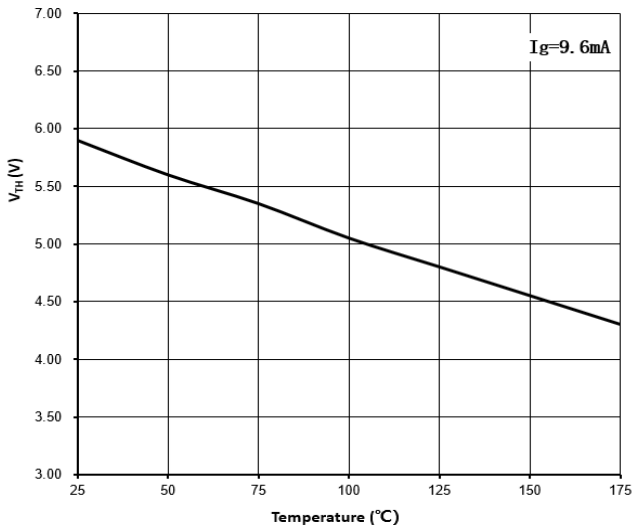
7. Switching Losses IGBT, Inverter



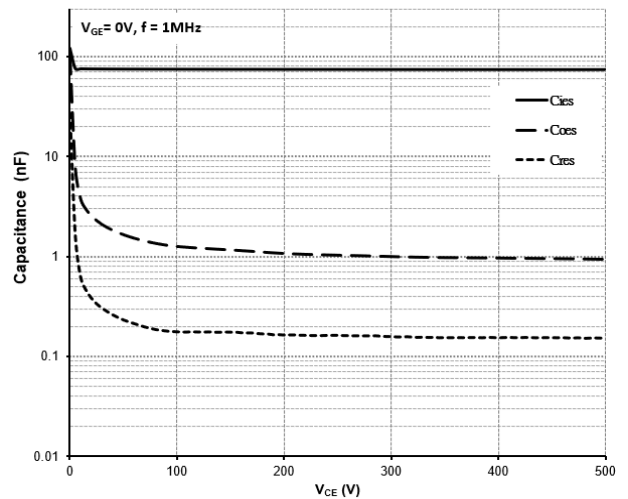
8. Switching Losses IGBT, Inverter



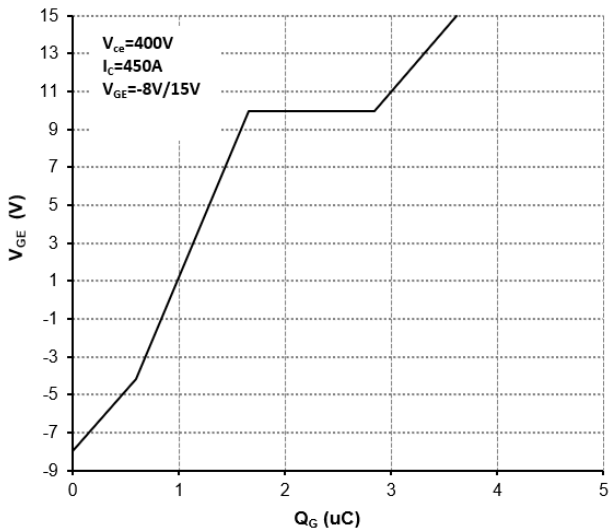
9. Threshold voltage characteristic IGBT, Inverter



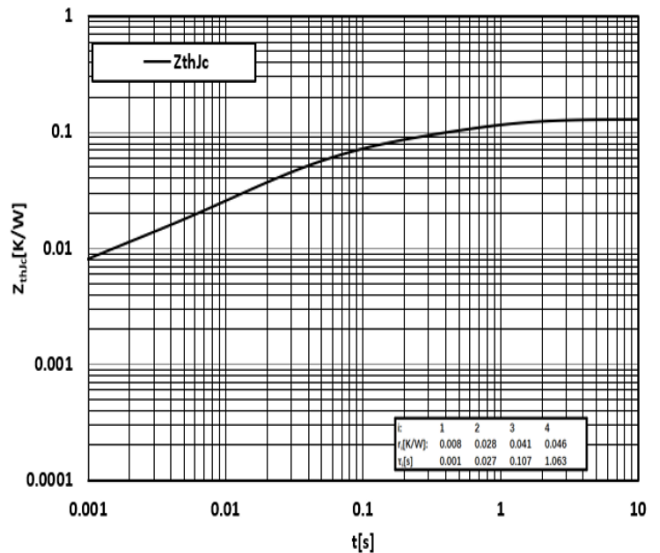
10. Capacity characteristic IGBT, Inverter



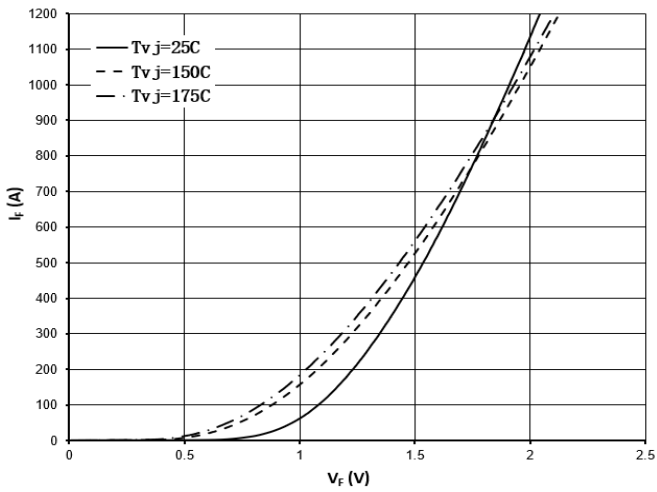
11. Gate charge characteristic IGBT, Inverter



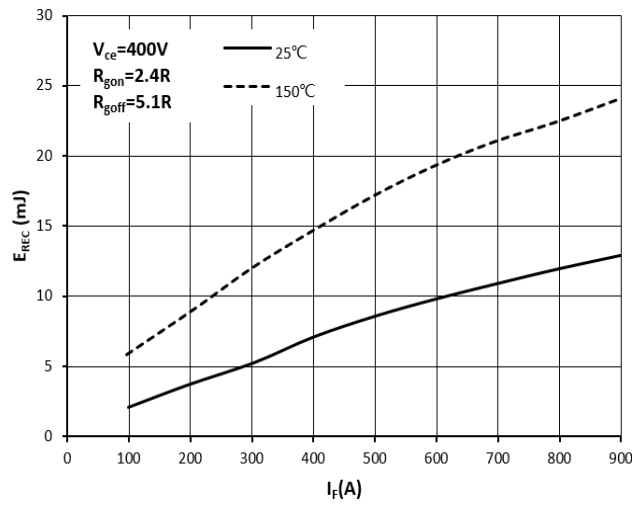
12. Transient thermal impedance IGBT, Inverter



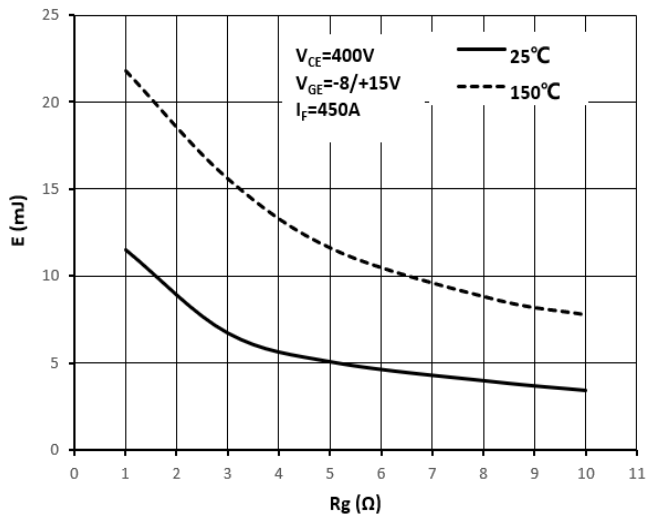
13. Forward characteristic of Diode, Inverter



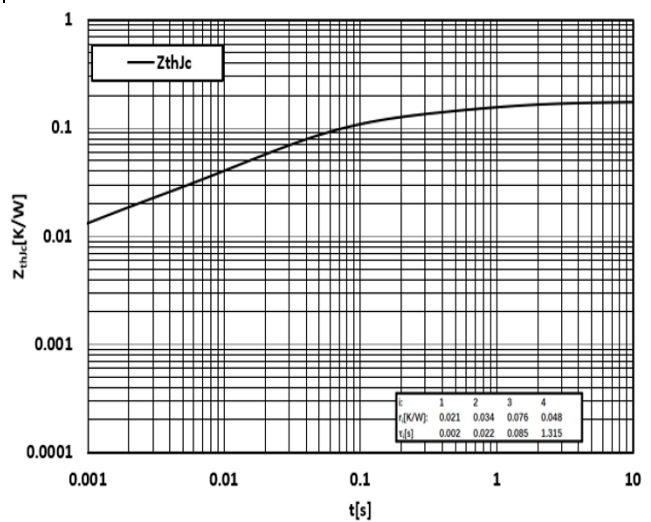
14. Switching Losses Diode, Inverter



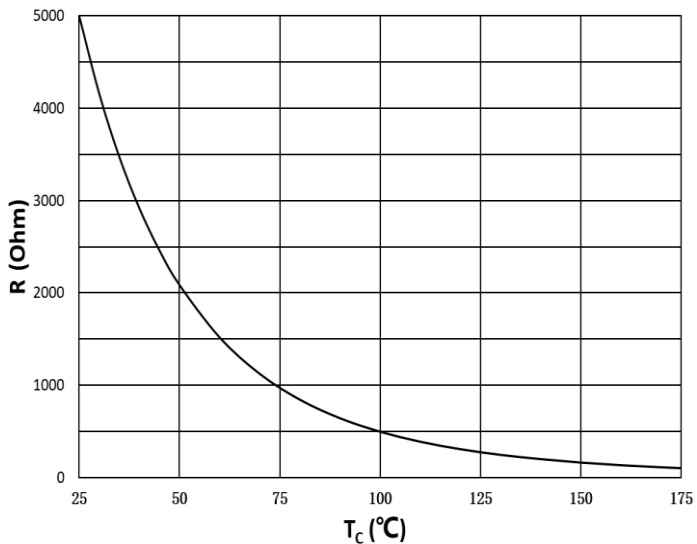
15. Switching Losses Diode, Inverter



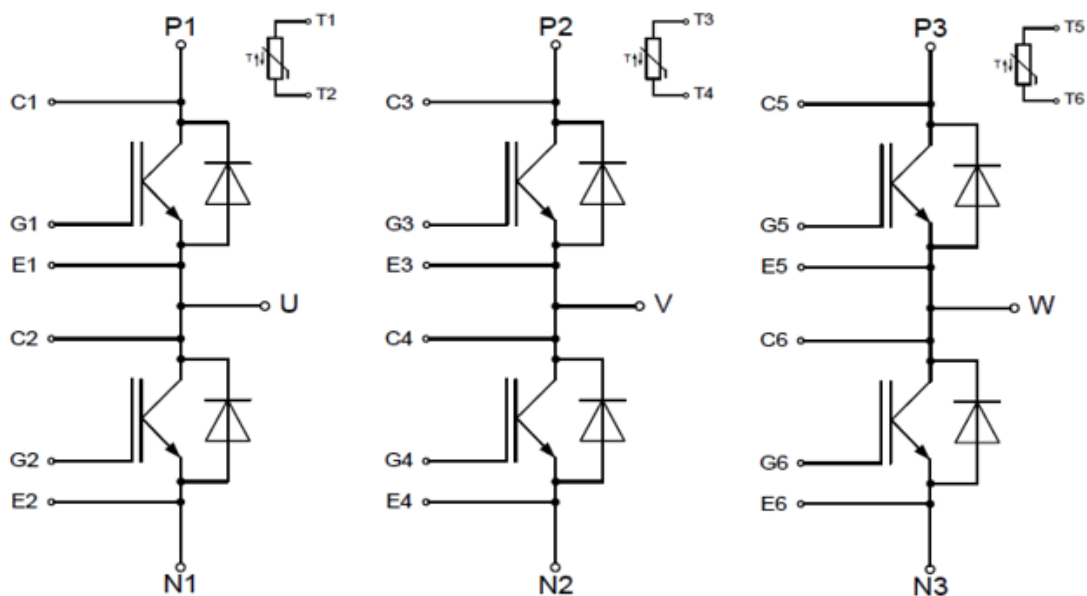
16. Transient thermal impedance Diode, Inverter



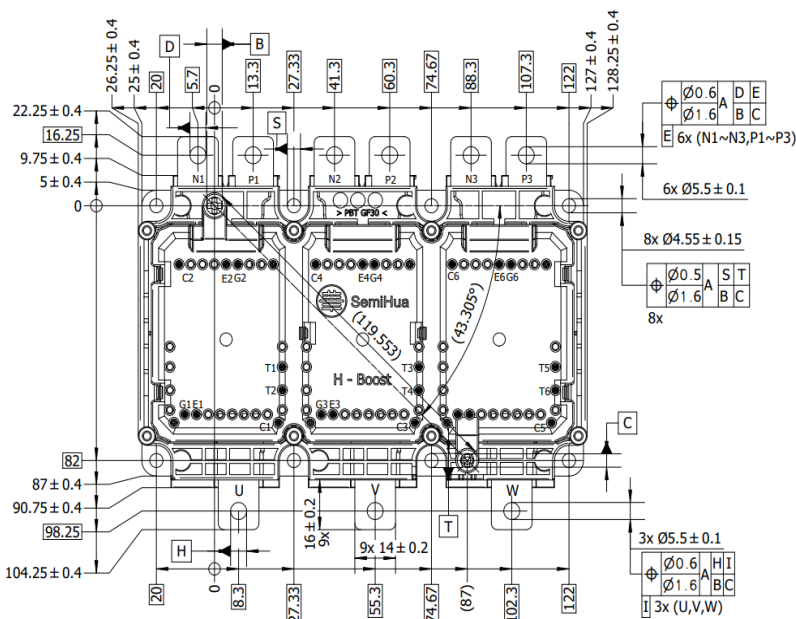
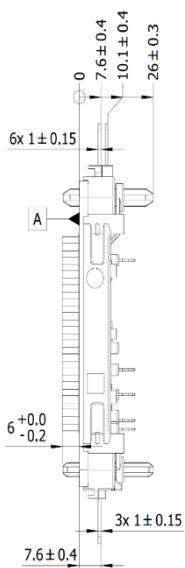
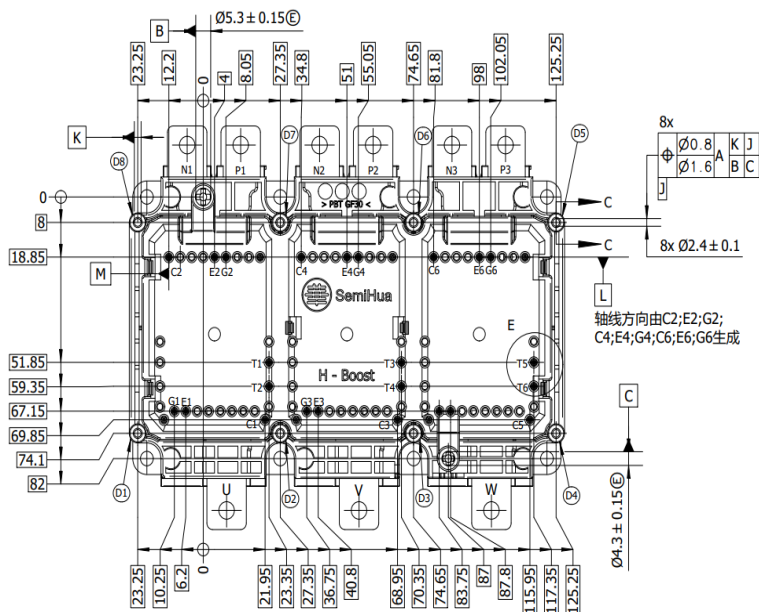
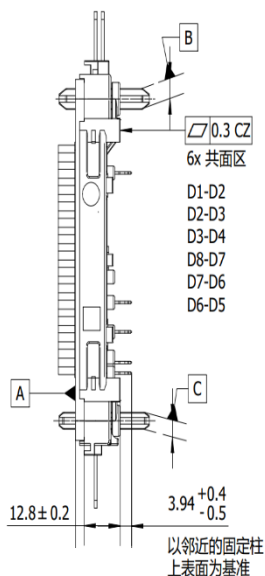
17. Thermistor-temperature (NTC) characteristic



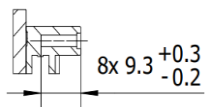
6 Circuit diagram 线路图



7 Package outlines 封装尺寸



C-C
1:1




产品几何图形参考标准

GB/T 19096-2003	1. GB/T 14486-2008 MT5	GB/T 131-2006
	2. BG/T 1804-2000 m	

对象	Semi Hua H-BOOST
版本	Rv1.0
日期	2024.02
模块重量	730 克 (730g)
默认单位	毫米 (mm)

8 Label Codes 二维码标签

Code Format 代码格式	Data Matrix 数据矩阵	
Encoding 编码	ASCII Text ASCII 文本	
Symbol Size 符号规格	16x16	
Standard 执行标准	IEC24720 and IEC16022	
Code Content 编码内容	<p>Content: 内容</p> <p>Semihua product Number 芯华睿产品料号</p> <p>Datecode (Production Year) 日期码 (制造年份)</p> <p>Datecode (Production Day) 日期码 (制造天数)</p> <p>Production Serial Number 生产流水号</p>	<p>Digit Example (below) 位数说明 (以下内容)</p> <p>1 – 7 A1017S4</p> <p>8 – 9 24 (Year 2024)</p> <p>10 – 12 020(020th day)</p> <p>13 – 16 0001</p>
Example 示例	 A1017S4240200001	