Silicon Carbide (SiC)
3300V 20mohm
H-Bridge MOSFET Module
Easy2B

HCS100FF330E2B2



The HCS100FF330E2B2 is a power module containing 20mΩ/ 3300V SiC MOSFET H-bridge and a thermistor with Si_3N_4 AMB in a Easy2B package.

Features

- 20mΩ / 3300V SiC MOSFET H−Bridge
- Si_3N_4 AMB
- Fully SiC MOSFET-based for Ultra-Low Loss
- High-Ampacity Press-Fit Pins (50 A per pin)
- Optional Pre-Applied Thermal Interface Material
- Sinter Die Attach & Epoxy Encapsulation for Enhanced Power Cycle Life

Typical Applications

- Solid State Transformers
- Energy Storage Systems
- High-Efficiency Converters / Inverters
- Renewable Energy
- DC Fast Chargers

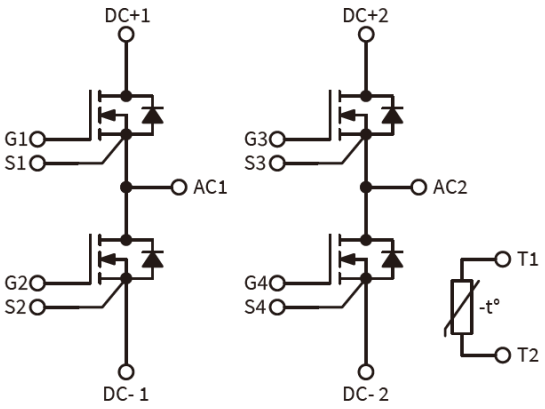
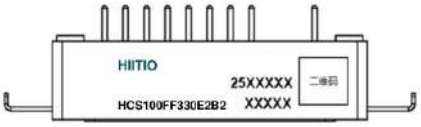


Figure 1. Schematic

MARKING DIAGRAM



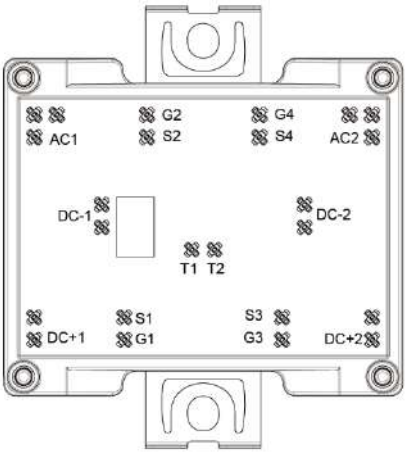
HCS100FF330E2B2= Device Code

XXXXXXX = Year, week and batch Code
XXXXX = Flow code

ORDERING INFORMATION

Device	Package
HCS100FF330E2B2	Easy2B

PIN ASSIGNMENTS



ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Parameter		Symbol	Maximum Ratings	Unit
Drain-source voltage		V_{DS}	3300	V
Gate-source voltage, maximum value	Transient	$V_{GS(max)}$	-10/23	V
Gate-source voltage, recommended	Static	$V_{GS(op)}$	-5/+18	V
DC continuous drain current	V_{GS} = 18 V; T_{HS} = 75 °C; $T_{VJ} \leq$ 175 °C	I_D	95	A
DC source-drain current (body diode)	V_{GS} = -5 V; T_{HS} = 75 °C; $T_{VJ} \leq$ 175 °C	$I_{SD(BD)}$	99	A
Pulsed drain-source current	V_{GS} = 18 V; T_{HS} = 25 °C; $t_{p,max}$ limited by $T_{VJ(max)}$	I_{DM}	380	A
Power dissipation	T_{HS} = 75 °C; $T_{VJ} \leq$ 175 °C	P_D	580	W
Virtual junction temperature	Operation	$T_{VJ(op)}$	-40/175	°C

SiC MOSFET ELECTRICAL CHARACTERISTICS

Characteristic	Test Conditions		Symbol	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	V_{GS} = 0 V; T_{VJ} = -40 °C		$V_{(BR)DSS}$	3300	—	—	V
Gate threshold voltage	V_{DS} = V_{GS}; I_D = 49 mA	T_{VJ} = 25 °C	$V_{GS(th)}$	—	3	—	V
Zero gate voltage drain current	V_{GS} = 0 V; V_{DS} = 3300 V		I_{DSS}	—	3	150	μA
Gate-source leakage current	V_{GS} = 18 V; V_{DS} = 0 V		I_{GSS}	—	30	750	nA
Drain-source on-state resistance	V_{GS} = 18 V; I_D = 80 A	T_{VJ} = 25 °C	$R_{DS(on)}$	—	20.0	25.0	mΩ
		T_{VJ} = 150 °C		—	57.5	—	
		T_{VJ} = 175 °C		—	65.0	—	
Transconductance	V_{DS} = 20 V; I_{DS} = 80 A	T_{VJ} = 25 °C	g_{fs}	—	67	—	S
		T_{VJ} = 175 °C		—	89	—	
Turn-on switching energy	V_{DS} = 1800 V; I_D = 80 A; V_{GS} = -5/+18 V; $R_{G(OFF)}$ = 0 Ω; $R_{G(ON)}$ = 0 Ω; L_σ = 32 nH	T_{VJ} = 25 °C	E_{ON}	—	1.3	—	mJ
		T_{VJ} = 125 °C		—	1.2	—	
		T_{VJ} = 175 °C		—	1.3	—	
Turn-off switching energy	V_{DS} = 1800 V; I_D = 80 A; V_{GS} = -5/+18 V; $R_{G(OFF)}$ = 0 Ω; $R_{G(ON)}$ = 0 Ω; L_σ = 32 nH	T_{VJ} = 25 °C	E_{OFF}	—	0.8	—	mJ
		T_{VJ} = 125 °C		—	0.8	—	
		T_{VJ} = 175 °C		—	0.8	—	
Internal gate resistance	f = 100 kHz		$R_{G(int)}$	—	1	—	Ω
Input capacitance	V_{GS} = 0 V; V_{DS} = 3000 V; V_{AC} = 25 mV; f = 100 kHz		C_{iss}	—	16	—	nF
Output capacitance	V_{GS} = 0 V; V_{DS} = 3000 V; V_{AC} = 25 mV; f = 100 kHz		C_{oss}	—	0.21	—	nF
Reverse transfer capacitance	V_{GS} = 0 V; V_{DS} = 3000 V; V_{AC} = 25 mV; f = 100 kHz		C_{rss}	—	15.2	—	pF
FET thermal resistance, junction to heatsink	Per switch position		$R_{th\ JHS}$	—	0.171	—	°C/W

Body Diode ELECTRICAL CHARACTERISTICS

Characteristic	Test Conditions		Symbol	Min.	Typ.	Max.	Unit
Body diode forward voltage	V_{GS} = -5 V; I_{SD} = 80 A	T_{VJ} = 25 °C	V_{SD}	—	6.0	—	V
		T_{VJ} = 175 °C		—	5.4	—	
Reverse recovery time	V_{GS} = -5 V; I_{SD} = 80 A; V_R = 1800 V; di/dt = 20.8 A/ns	T_{VJ} = 175 °C	t_{RR}	—	34.2	—	ns
Reverse recovery charge	V_{GS} = -5 V; I_{SD} = 80 A; V_R = 1800 V; di/dt = 20.8 A/ns	T_{VJ} = 175 °C	Q_{RR}	—	3.1	—	µC
Peak reverse recovery current	V_{GS} = -5 V; I_{SD} = 80 A; V_R = 1800 V; di/dt = 20.8 A/ns	T_{VJ} = 175 °C	I_{RRM}	—	175	—	A
Reverse recovery energy	V_{DS} = 1800 V; I_D = 80 A; V_{GS} = -5/+18 V; $R_{G(ON)}$ = 0 Ω; L_σ = 32 nH	T_{VJ} = 25 °C	E_{RR}	—	1.6	—	mJ
		T_{VJ} = 125 °C		—	3.4	—	
		T_{VJ} = 175 °C		—	6.9	—	

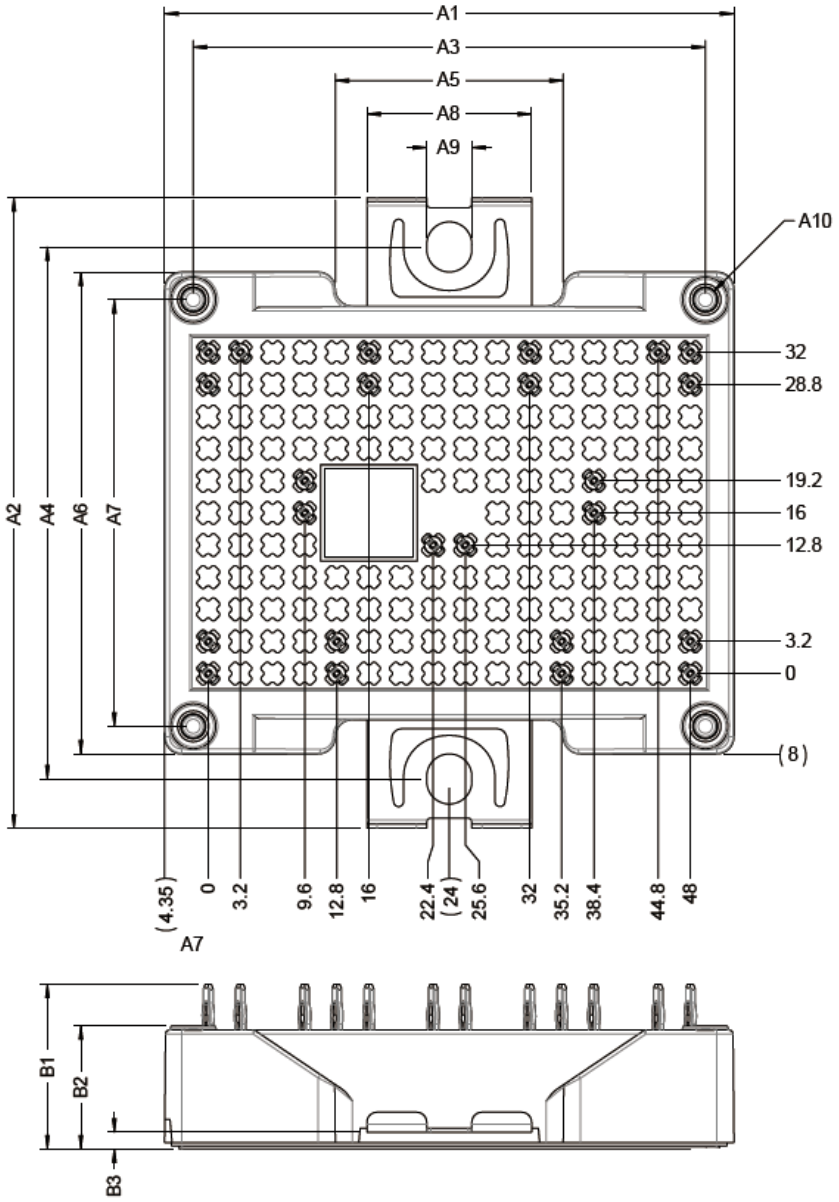
Package Characteristics

Characteristic		Symbol	Min.	Typ.	Max.	Unit
Package resistance, M1 and M3 (high-side)	T_C = 125 °C	R_{pkg1}	—	0.87	—	mΩ
Package resistance, M2 and M4 (low-side)	T_C = 125 °C	R_{pkg2}	—	0.68	—	mΩ
Module stray inductance	Between DC+ and DC-; f = 10 MHz	L_{Stray}	—	14	—	nH
Operating case temperature		T_C	-40	—	125	°C
Package weight		W	—	44	—	g
Mounting torque	M4 bolts	M_S	—	2.0	2.3	N-m
RMS isolation voltage, terminal-to-case	AC, 50 Hz, 1 min	V_{isol}	6	—	—	kV
Comparative tracking index		CTI	600	—	—	—
Clearance distance, terminal-to-terminal		d_{clear}	—	12.5	—	mm
Clearance distance, terminal-to-heatsink		d_{clear}	—	10.0	—	mm
Creepage distance, terminal-to-terminal		d_{creep}	—	12.5	—	mm
Creepage distance, terminal-to-heatsink		d_{creep}	—	11.5	—	mm

Temperature Sensor (NTC) Characteristics

Characteristic	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Rated resistance	T_{NTC} = 25 °C	R_{NTC}	—	5.0	—	kΩ
Resistance tolerance at 25 °C		ΔR/R	-5	—	5	%
Beta value (T_2 = 50 °C)		$\beta_{25/50}$	—	3380	—	K
Beta value (T_2 = 80 °C)		$\beta_{25/80}$	—	3468	—	K
Beta value (T_2 = 100 °C)		$\beta_{25/100}$	—	3523	—	K
Power dissipation	T_{NTC} = 25 °C	P_{Max}	—	—	10	mW

Package Outline



DIMENSION TABLE		
SYMBOL	DIMENSION	TOLERANCE
A1	56.7	±0.30
A2	62.8	±0.50
A3	51	±0.15
A4	(53)	REF.
A5	22.7	±0.30
A6	48	±0.30
A7	42.5	±0.15
A8	16.4	±0.20
A9	4.5	±0.10
A10	22.7	ϕ: $^{+0}_{-0.10}$ $\overline{\downarrow}$: ±0.30
B1	16.4	±0.50
B2	12.25	±0.35
B3	1.65	±0.20
ALL PIN LOCATIONS		±0.40