Target specification

5SFG 1000X330100

LinPak SiC MOSFET phase-leg module

- V_{DSS} = 3300 V
- I_D = 2 x 1000 A
- Ultra-low inductance phase-leg module
- Compact design with very high current density
- Paralleling without derating
- AlSiC baseplate for high power cycling capability
- AlN substrate for low thermal resistance
- Ultra fast low loss SiC MOSFET

Maximum rated values [1]

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}	V_{GE} = 0 V, $T_{vj} \geq 25$ °C		3300	V
DC drain current	I_D	T_C = 25 °C T_C = 100 °C, $T_{vj,\,max}$ = 175 °C		1000 tbd	A
Pulsed drain current	I_{DP}	t_p = 10 µs limited by T_{vj}		2000	A
Gate-source voltage	V_{GSS}		-6	22	V
Total power dissipation	P_{tot}	T_C = 25 °C, $T_{vj,}$ = 175 °C		tbd	W
DC source current (body diode)	I_S	$T_{vj,}$ = 25 °C, limited by T_{vj}		1000	A
Peak source current (body diode)	I_{SP}	t_p = 10 µs limited by T_{vj}		2000	A
Surge source current				tbd	A
Isolation voltage	V_{isol}	1 min, f = 50 Hz		6000	V
Junction temperature	T_{vj}			175	°C
Junction operating temperature	$T_{vj(op)}$		-40	175	°C
Case temperature	T_C		-50	150	°C
Storage temperature	T_{stg}		-40	125	°C
Mounting torques[2]	M_s	Base-heatsink, M6 screws	4	6	Nm
	M_{t1}	Main terminals, M8 screws	8	10	
	M_{t2}	Auxiliary terminals, M3 screws	0.6	0.8	

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[1] Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747

[2] For detailed mounting instructions refer to ABB Document No. 5SYA2039

MOSFET characteristic values [3]

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 10 mA, T_{vj} = 25 °C		3300			V
Static drain-source on-state resistance [4]	$R_{DS(on)}$	I_D = 600 A, V_{GS} = 18 V	T_{vj} = 25 °C		3.8		mΩ
			T_{vj} = 125 °C		7.0		mΩ
Drain leakage current	I_{DSS}	V_{DS} = 3300 V, V_{GS} = 0 V	T_{vj} = 25 °C		2		µA
Gate leakage current	I_{GSS}	V_{CE} = 0 V, V_{GS} = +20 V / -5V			30		nA
Gate threshold voltage	$V_{GS(th)}$	I_D = 165 mA, V_{DS} = V_{GS}, T_{vj} = 25 °C			2.8		V
Gate charge	Q_{GS}	I_D = 600 A, V_{DS} = 1800 V, V_{GS} = 0 V … +18 V			tbd		µC
Turn-on switching energy	E_{on}	V_{DD} = 1800 V, I_D = 600 A, R_G = 1.5 Ω, V_{GS} = -4 / +15 V, L_σ = 25 nH, inductive load	T_{vj} = 25 °C		170		mJ
			T_{vj} = 125 °C		160		mJ
Turn-off switching energy	E_{off}	V_{DD} = 1800 V, I_D = 600 A, R_G = 1.5 Ω, V_{GS} = -4 / +15 V, L_σ = 25 nH, inductive load	T_{vj} = 25 °C		105		mJ
			T_{vj} = 125 °C		112		mJ

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[3] Characteristic values according to IEC 60747 – 8

[4] R_{DSon} is given at chip level

Body diode characteristic values [5]

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Forward voltage	V_{sd}	I_S = 600 A, V_{GS} = -5 V	T_{vj} = 25 °C		5.4		V
Reverse recovery energy	$E_{rec, 100\%}$	V_{DD} = 1800 V, I_D = 600 A, R_G = 1.5 Ω, V_{GS} = -4 / +15 V, L_σ = 25 nH, inductive load	T_{vj} = 125 °C		12		mJ

[5] Characteristic values according to IEC 60747 – 2

NTC Thermistor

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Rated resistance	V_{sd}	Tc = 25 °C		4.7		kΩ
B-value	$B_{25/85}$	R2 = R25 exp [B25/50(1/T2 – 1/(298.15K))]		3435		K

Package properties [6]

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance junction to case	$R_{th(j-c)}$			0.04		K/W
Thermal resistance case to heatsink	$R_{th(c-s)}$	IGBT per switch, λ grease = 1W/m x K		0.04		K/W
Comparative tracking index	CTI			> 400		
Module stay inductance	$L_{\sigma\ CE}$			10		nH
Resistance, terminal-chip	$R_{CC'+EE}$	per switch Tc = 25°C		0.2		mΩ

[6] For detailed mounting instructions refer to ABB Document No. 5SYA2039

Mechanical properties [7]

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Dimensions	L x W x H	Typical			140 x 100 x 38		mm
Clearance distance in air	d_a	According to IEC 60664-1 and EN 50124-1	Term. to base:	20			mm
			Term. to term:	7			mm
Surface creepage distance	d_s	According to IEC 60664-1 and EN 50124-1	Term. to base:	34			mm
			Term. to term:	34			mm
Mass	m				450		g

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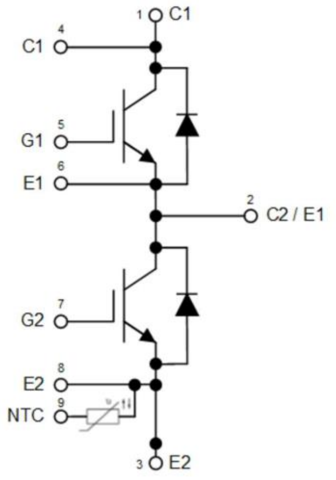
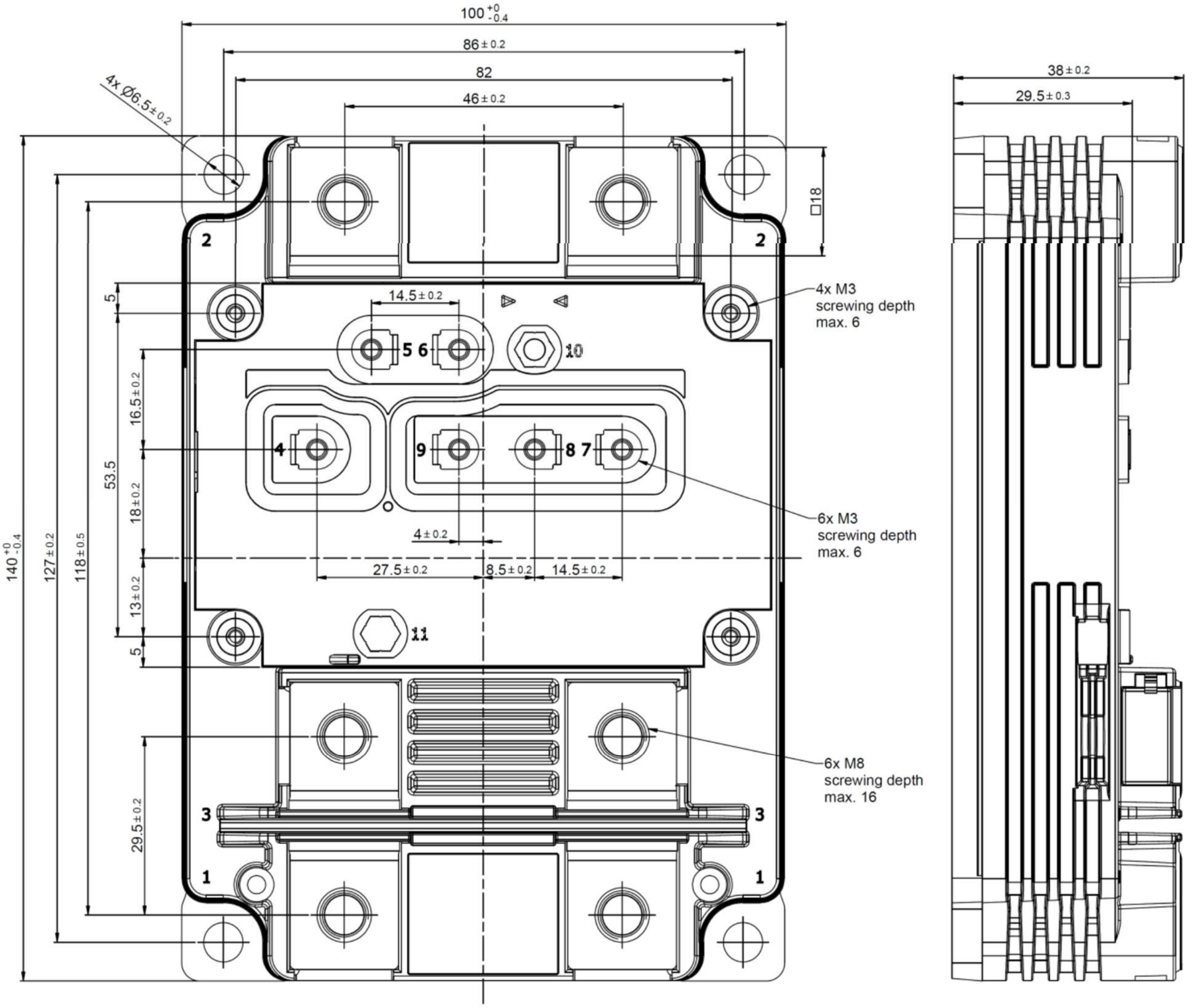
[7] Package and mechanical properties according to IEC 60747 – 15

Electrical configuration



Outline drawing (mm)
For detailed mounting instructions refer to ABB Document No. 5SYA2039



This is an electrostatic sensitive device, please observe the international standard IEC 60747-1, chap. VIII.
The intention of this product is Industrial Level usage.

Related documents:

- 5SYA 2039 Mounting Instructions for HiPak modules
- 5SYA 2042 Failure rates of HiPak modules due to cosmic rays
- 5SYA 2043 Load – cycle capability of HiPaks
- 5SYA 2045 Thermal runaway during blocking
- 5SYA 2053 Applying IGBT
- 5SYA 2058 Surge currents for IGBT diodes
- 5SYA 2093 Thermal design of IGBT modules
- 5SYA 2098 Paralleling of IGBT modules

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