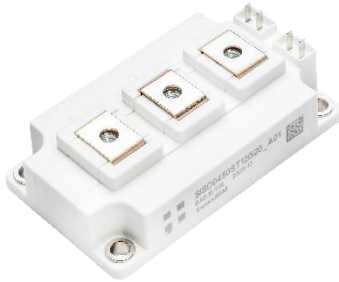


TARGET DATASHEET

SCSD0022ST120m23

ST-Type phase leg SiC module



$V_{CE} = 1200\text{ V}$

$R_{DSon} = 2.2\text{ m}\Omega$

- m23 generation SiC MOSFET chips
- Ultra-low R_{DSon}
- Baseplate isolation with efficient Al_2O_3 ceramic
- Cu baseplate for low thermal resistance
- Industry standard package

Maximum ratings¹

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNIT
Drain – source voltage	V_{DS}	$V_{GS} \leq 0\text{ V}$, $T_{vj} = 25\text{ °C}$		1200	V
Continuous drain and source current	I_D , I_S	$T_c = 100\text{ °C}$, $V_{GS} = 18\text{ V}$, $T_{vj} = 175\text{ °C}$		450	A
Peak drain and source current	I_{DM} , I_{SM}	$t_p = 1\text{ ms}$, limited by T_{vjmax}		1200	A
Gate-source voltage (DC)	V_{GS}		-8	22	V
Gate-source surge voltage	$V_{GS\text{ surge}}$	$t_{surge} < 300\text{ ns}$	-10	25	V
Recommended gate voltage	V_{GS}		-5	18	V
Surge current				TBD	A
MOSFET SCSOA	t_{psc}	$V_{DS} = 800\text{ V}$, $V_{GSon} = 18\text{ V}$, $T_{vj} < 175\text{ °C}$		1.5	μs
Isolation voltage	V_{isol}	RMS, 1 s, $f = 50\text{ Hz}$		4000	V
Junction operating temperature	$T_{vj(op)}$		-40	175	$^{\circ}\text{C}$
Storage temperature	T_{stg}		-40	125	$^{\circ}\text{C}$
Mounting torques ²	M	Base-heatsink, M6 screws	3	6	Nm

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

² For details, please refer to the mounting instructions.



MOSFET³

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} ≤/ = 0 V, I _D = 1.5 mA, T _{vj} = -40 .. 25°C		1200			V
Static drain-source on-state resistance ⁴	R _{DS(on)}	I _D = 600 A, V _{GS} = 18 V	T _{vj} = 25 °C		2.2	2.7	mΩ
			T _{vj} = 175 °C		4		mΩ
Zero gate voltage drain current	I _{DSS}	V _{DS} = 1200 V, V _{GS} = 0 V	T _{vj} = 25 °C		6	60	μA
			T _{vj} = 175 °C		60		μA
Gate leakage current	I _{GSS}	V _{GS} = +22 / -10 V		-300		300	nA
Gate-emitter threshold voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 30 mA	T _{vj} = 25°C	2.25	2.75	3.5	V
			T _{vj} = 175°C		2		V
Gate charge	Q _G	I _D = 600 A, V _{DS} = 800 V, V _{GS} = -5 V ... 18 V			1.2		μC
Input capacitance	C _{iss}	V _{DS} = 800 V, V _{GS} = 0 V, f = 100 kHz, T _{vj} = 25 °C			35.6		nF
Output capacitance	C _{OSS}				2.4		nF
Reverse tansfer capacitance	C _{rss}				0.18		nF
Internal gate resistor	R _{Gint}	Per switch			0.4		Ω
Turn-on delay time	t _{d(on)}	V _{CC} = 800 V, I _D = 600 A, R _G = 4 Ω, V _{GS} = -5 / +18 V, L _s =30 nH, inductive load	T _{vj} = 25 °C		100		ns
			T _{vj} = 125 °C		90		ns
			T _{vj} = 175 °C		90		ns
Rise time	t _r		T _{vj} = 25 °C		70		ns
			T _{vj} = 125 °C		60		ns
			T _{vj} = 175 °C		60		ns
Turn-off delay time	t _{d(off)}	V _{CC} = 800 V, I _D = 600 A, R _G = 2 Ω, V _{GS} = -5 / +18 V, L _s =30 nH, inductive load	T _{vj} = 25 °C		170		ns
			T _{vj} = 125 °C		180		ns
			T _{vj} = 175 °C		190		ns
Fall time	t _f		T _{vj} = 25 °C		60		ns
			T _{vj} = 125 °C		60		ns
			T _{vj} = 175 °C		60		ns
Turn-on switching energy	E _{on}	V _{CC} = 800 V, I _D = 600 A, R _G = 4 Ω, V _{GS} = -5 / +18 V, dI/dt = 8 kA/ μs (175°C) L _s = 30 nH, inductive load	T _{vj} = 25 °C		10.7		mJ
			T _{vj} = 125 °C		8.2		mJ
			T _{vj} = 175 °C		7.4		mJ
Turn-off switching energy	E _{off}	V _{CC} = 800 V, I _D = 600 A, R _G = 2 Ω, V _{GS} = -5 / +18 V, dV/dt = 14 kV/ μs (175°C) L _s = 30 nH, inductive load	T _{vj} = 25 °C		11.2		mJ
			T _{vj} = 125 °C		11.5		mJ
			T _{vj} = 175 °C		12.0		mJ
Short circuit current	I _{SC}	t _{pcs} ≤ 1.5 μs, V _{GE} = 18 V, T _{vj} = 175 °C, V _{CC} = 800 V, V _{DSM} Chip ≤ 1200 V			6		kA

³ Characteristic values according to IEC 60747-9

⁴ Given at chip level



Body Diode (MOSFET)⁵

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Drain-source reverse voltage ⁶	V _{SD}	I _D = -600 A, V _{GS} = 18 V	T _{Vj} = 25 °C		5.4		V
			T _{Vj} = 175 °C		4.8		V
MOSFET peak forward recovery current	I _{frm}	V _R = 600 V, I _{SD} = 600 A, di/dt = 11.5 kA/μs, R _G = 4 Ω, V _{GS} = -5 / +18 V, L _s =30 nH, inductive load	T _{Vj} = 25 °C		160		A
			T _{Vj} = 125 °C		230		A
			T _{Vj} = 175 °C		307		A
MOSFET forward recovery charge	Q _f		T _{Vj} = 25 °C		11		μC
			T _{Vj} = 125 °C		15		μC
			T _{Vj} = 175 °C		20		μC
MOSFET forward recovery time	t _{fr}		T _{Vj} = 25 °C		50		ns
			T _{Vj} = 125 °C		80		ns
			T _{Vj} = 175 °C		90		ns
MOSFET forward recovery energy	E _{fr}		T _{Vj} = 25 °C		6.8		mJ
			T _{Vj} = 125 °C		9.4		mJ
			T _{Vj} = 175 °C		13.6		mJ

Package properties ⁷

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Thermal resistance junction to case	$R_{th(j-c)}$	Per switch		0.125		K/W
Comparative tracking index	CTI		400			
Module stray inductance	$L_{s\text{ CE}}$	Per switch		TBD		nH
Resistance, terminal chip	$R_{CC'+EE'}$	Per switch	$T_{vj} = 25\text{ °C}$	TBD		m Ω
			$T_{vj} = 125\text{ °C}$			m Ω
			$T_{vj} = 175\text{ °C}$			m Ω
Material of module baseplate		Ni + Cu Nickel plated Cu baseplate				
Internal isolation		Al_2O_3				

⁵ Characteristic values according to IEC 60747-2

⁶ Given at chip level

⁷ Package and mechanical properties according to IEC 60747-15

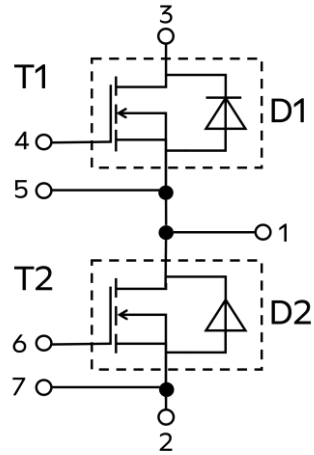


Mechanical properties ⁸

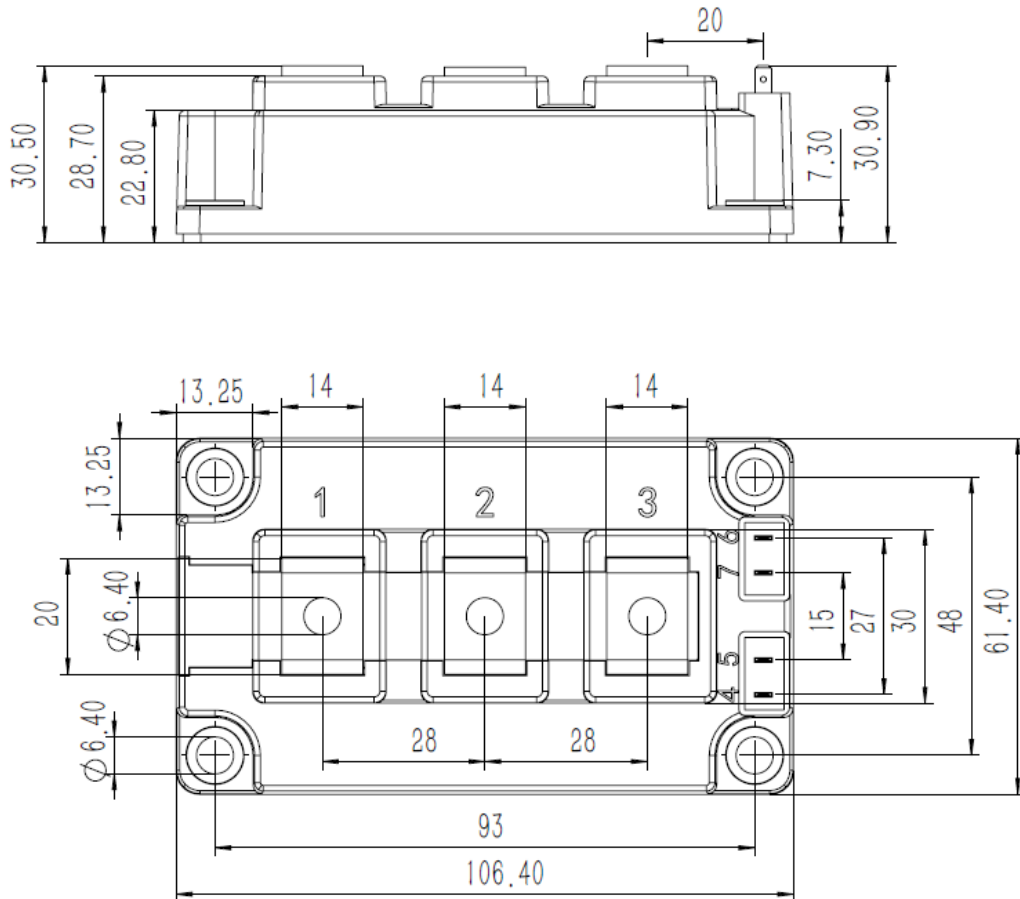
PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Dimensions	L x W x H	Typical		106 x 62 x 30.9			mm ³
Clearance distance in air	da	According to IEC 60664-1 and EN 50124-1	Terminal to base:		23		mm
			Terminal to terminal:		11		
Surface creepage distance	ds		Terminal to base:		29		mm
			Terminal to terminal:		23		
Mass	m				310		g

⁸ Package and mechanical properties according to IEC 60747-15

Electrical configuration



Outline drawing



This is an electrostatic sensitive device, please observe the international standard.
This product has been designed and qualified for Industrial Level.