

# Target Data Sheet

5SNG 0900R120500

1200V, 900A LoPak1 Phase Leg IGBT Module

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

$I_C = 900\text{ A X 2}$

Press-fit pins for reliable auxiliary contacts  
Ultra low-loss rugged Trench IGBT chipset  
NTC thermistor for temperature sensing  
Cu baseplate for low thermal resistance  
Industry standard package



## Maximum rated values

Parameter	Symbol	Conditions	min	max	units
Collector-emitter voltage	$V_{ces}$	$V_{GE} = 0\text{ V}, T_{vj} \geq 25\text{ }^\circ\text{C}$		1200	V
DC collector current	$I_C$	$T_C = 125\text{ }^\circ\text{C}, T_{vj} = 150\text{ }^\circ\text{C}$		900	A
Peak collector current	$I_{cm}$	$t_p = 1\text{ ms}$		1800	A
Gate-emitter voltage	$V_{ges}$		-20	20	V
DC forward current	$I_f$			900	A
Peak forward current	$I_{frm}$	$t_p = 1\text{ ms}$		1800	A
Surge current	$I_{fsm}$			2400	A
IGBT short circuit SOA	$t_{psc}$	$t_p \leq 8\text{ }\mu\text{s}, V_{GE} \leq 15\text{ V}, V_{CC} = 900\text{ V}$ $V_{CE,max} \leq 1200\text{ V}, T_{vj} = 150\text{ }^\circ\text{C}$		8	us
Isolation voltage	$V_{isol}$	1 min, $f = 50\text{ Hz}$		4000	V
Max Junction temperature	$T_{vj}$		-40	175	C
Junction operating temperature	$T_{vj(op)}$		-40	150	C
Case temperature	$T_c$		-40	125/150	C
Storage temperature	$T_{stg}$		-40	125	C
Mounting torques	$M_s, M_{t1}$	Base-heatsink, M5 screws or Main terminals, M6 screws	3	6	Nm

**IGBT characteristic values**

Parameter	Symbol	Conditions	min	typ	max	units
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}, I_C = 10 \text{ mA}, T_{vj} = 25 \text{ }^\circ\text{C}$	1200			V
Collector-emitter saturation voltage	$V_{CE\text{sat}}$	$I_C = 900\text{A}, V_{GE} = 15 \text{ V}$	$T_{vj}=25\text{C}$	1.6		V
			$T_{vj}=125\text{C}$	1.75		V
			$T_{vj}=150\text{C}$	1.9		V
Collector cut-off current	$I_{CES}$	$V_{CE} = 1200 \text{ V}, V_{GE} = -15 \text{ V}$	$T_{vj}=25\text{C}$		0.1	mA
			$T_{vj}=125\text{C}$	4.5		mA
			$T_{vj}=150\text{C}$	6		mA
Gate leakage current	$I_{GES}$	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			100	nA
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C = 36 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25 \text{ }^\circ\text{C}$		5		V
Gate charge	$Q_G$			TBD		$\mu\text{C}$
Input capacitance	$C_{ies}$			TBD		nF
Internal gate resistance	$R_{g,int}$			1.3		Ohms
Turn-on delay time	$t_{d(on)}$	$I_C = 900\text{A}, V_{CE} = 600\text{V}, V_{GE} = \pm 15 \text{ V},$ $R_{G,on} = \text{TBD}$	$T_{vj}=25\text{C}$	300		ns
			$T_{vj}=125\text{C}$	350		ns
			$T_{vj}=150\text{C}$	350		ns
Rise time	$t_r$		$T_{vj}=25\text{C}$	70	200	ns
			$T_{vj}=125\text{C}$	90	275	ns
			$T_{vj}=150\text{C}$	100	300	ns
Turn-off delay time	$t_{d(off)}$	$I_C = 900\text{A}, V_{CE} = 600\text{V}, V_{GE} = \pm 15 \text{ V},$ $R_{G,off} = \text{TBD}$	$T_{vj}=25\text{C}$	400		ns
			$T_{vj}=125\text{C}$	475		ns
			$T_{vj}=150\text{C}$	500		ns
Fall time	$t_f$		$T_{vj}=25\text{C}$	190		ns
			$T_{vj}=125\text{C}$	200		ns
			$T_{vj}=150\text{C}$	200		ns
Turn-on switching energy	$E_{on}$	$I_C = 900\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = \pm 15 \text{ V},$ $L_s = 25 \text{ nH}, R_{G,on} = \text{TBD}$	$T_{vj}=25\text{C}$	105		mJ
			$T_{vj}=125\text{C}$	150		mJ
			$T_{vj}=150\text{C}$	168	240	mJ
Turn-off switching energy	$E_{off}$	$I_C = 900\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = \pm 15 \text{ V}, L_s = 25 \text{ nH}$	$T_{vj}=25\text{C}$	132		mJ
			$T_{vj}=125\text{C}$	170		mJ
			$T_{vj}=150\text{C}$	192		mJ
Short circuit current	$I_{SC}$	$t_{psc} \leq 8 \text{ } \mu\text{s}, V_{GE} = 15 \text{ V},$ $V_{CC} = 900 \text{ V},$ $V_{CEM\text{CHIP}} \leq 1200 \text{ V}$	$T_{vj}=150\text{C}$	4500		A

## Diode characteristic values

Parameter	Symbol	Conditions	min	typ	max	units	
Forward voltage	$V_f$	$I_F = 900\text{ A}$	$T_{vj}=25\text{C}$		1.6		V
			$T_{vj}=125\text{C}$				V
			$T_{vj}=150\text{C}$		1.7		V
Peak reverse recovery current	$I_{rm}$	$I_F = 900\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = \pm 15\text{ V},$ $L_s = 25\text{ nH}, R_{g,on} = \text{TBD Ohm}$	$T_{vj}=25\text{C}$		966		A
			$T_{vj}=125\text{C}$				A
			$T_{vj}=150\text{C}$		1041		A
Recovered charge	$Q_r$	$I_F = 900\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = \pm 15\text{ V},$ $L_s = 25\text{ nH}, R_{g,on} = \text{TBD Ohm}$	$T_{vj}=25\text{C}$		104		$\mu\text{C}$
			$T_{vj}=125\text{C}$				$\mu\text{C}$
			$T_{vj}=150\text{C}$		180		$\mu\text{C}$
Reverse recovery time	trr	$I_F = 900\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = \pm 15\text{ V},$ $L_s = 25\text{ nH}, R_{g,on} = \text{TBD Ohm}$	$T_{vj}=25\text{C}$				ns
			$T_{vj}=125\text{C}$				ns
			$T_{vj}=150\text{C}$			800	ns
Reverse recovery energy	$E_{rec}$	$I_F = 900\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = \pm 15\text{ V},$ $L_s = 25\text{ nH}, R_{g,on} = \text{TBD Ohm}$	$T_{vj}=25\text{C}$		54		mJ
			$T_{vj}=125\text{C}$				mJ
			$T_{vj}=150\text{C}$		84		mJ

## NTC Thermistor

Parameter	Symbol	Conditions	min	typ	max	units
Rated resistance	$R_{25}$	$T_c=25\text{C}$		5		K-ohms
R100	$R_{100}$	$T_c=100\text{C}$	468		517	ohms
B-value	$B_{25/50}$	$R_{25} = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$		3375		K
B-value	$B_{25/100}$	$R_{25} = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298.15\text{K}))]$		3433		K

## Package properties

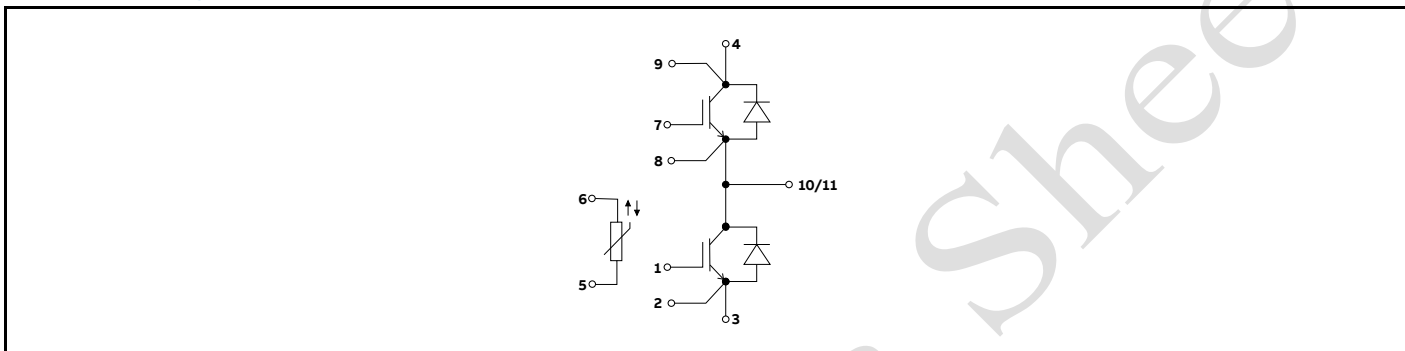
Parameter	Symbol	Conditions	min	typ	max	units
IGBT thermal resistance junction to case	$R_{th(j-c)} \text{ IGBT}$	per switch			0.048	K/W
Diode thermal resistance junction to case	$R_{th(j-c)} \text{ DIODE}$	per switch			0.087	K/W
IGBT thermal resistance case to heatsink	$R_{th(c-s)} \text{ IGBT}$	IGBT per switch, $\lambda$ grease = $1\text{W/m} \times \text{K}$		0.029		K/W
Diode thermal resistance case to heatsink	$R_{th(c-s)} \text{ DIODE}$	Diode per switch, $\lambda$ grease = $1\text{W/m} \times \text{K}$		0.048		K/W
Comparative tracking index	CTI					
Module stray inductance	$L_{\sigma CE}$	per switch		20		nH
Resistance, terminal-chip	$R_{CC'+EE'}$	per switch	$T_{vj}=25\text{C}$	0.95		m-ohms
			$T_{vj}=125\text{C}$	1.35		
			$T_{vj}=175\text{C}$	1.55		

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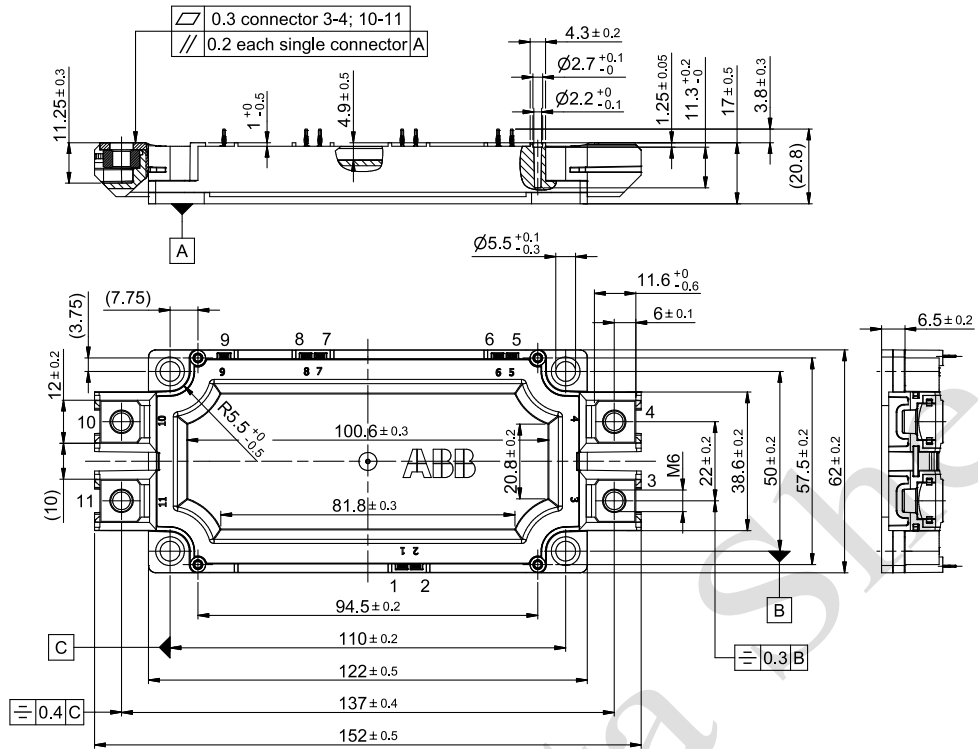
### Mechanical properties

Parameter	Symbol	Conditions		min	typ	max	units
Dimensions	L x W x H	Typical		152 x 62 x 17			mm
Clearance distance in air	$d_a$	according to IEC 60664-1 and EN 50124-1	Term. to base:	12.5			
Surface creepage distance	$d_s$		Term. to term:	10			
			Term. to base:	14.5			
			Term. to term:	13			
Mass	m				350		g

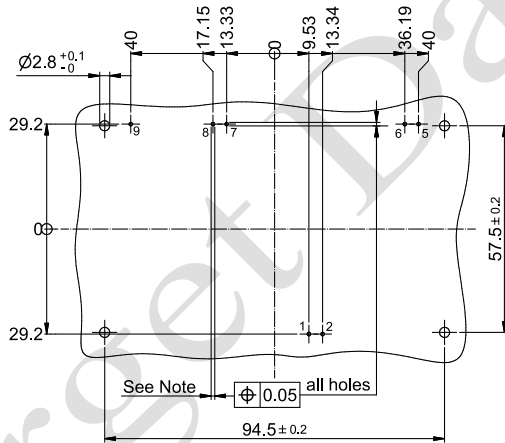
### Electrical configuration



Outline drawing <sup>3)</sup>



PCB drill hole pattern for press-fit



Note:

- Ø1<sup>+0.09</sup><sub>-0.06</sub> Diameter of finished plated through-hole
- Ø1.15 Diameter of drilled hole

Note: all dimensions are shown in millimeters

<sup>3)</sup> For detailed mounting instructions refer to ABB Document No. 5SYA 2113

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