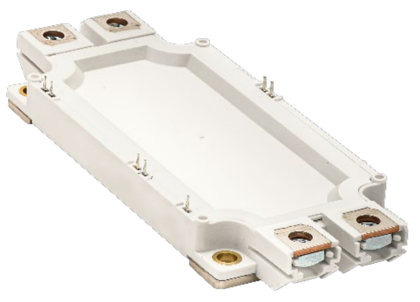
Preliminary data sheet

5SNG 0900R120590

LoPak phase leg IGBT module



- V_{CE} = 1200 V
- I_C = 900 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
- Pre-Applied Thermal Interface Material (TIM) to improve thermal conductivity between module and heat sink
- Industry standard package

Maximum rated values

Parameter	Symbol	Conditions	Min.	Max.	Unit
Collector-emitter voltage	V_{ces}	V_{GE} = 0 V, T_{vj} ≥ 25 °C		1200	V
DC collector current	I_c	T_C = 125 °C, Tvj = 175 °C		900	A
Peak collector current	I_{cm}	t_p = 1 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 ms		1800	A
Surge current	I_{fsm}			TBD	A
IGBT short circuit SOA	t_{psc}	V_{GE} ≤ 15 V, V_{CC} = 900 V $V_{CE,max}$ ≤ 1200 V, T_{vj} = 175°C		8	us
Isolation voltage	V_{isol}	1 min, f = 50 Hz		4000	V
Max Junction temperature	T_{vj}		-40	175	C
Junction operating temperature	$T_{vj(op)}$		-40	175	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

All data are preliminary and subject to change without prior notice.

IGBT characteristic values

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE} = 0 V, I_C = 5 mA	T_{vj}=25 °C	1200			V
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C = 900 A, V_{GE} = 15 V	T_{vj}=25 °C		1.55		V
			T_{vj}=125 °C		1.7		V
			T_{vj}=175 °C		1.8		V
Collector cut-off current	I_{CES}	V_{CE} = 1200 V, V_{GE} = -15 V	T_{vj}=25 °C			0.1	mA
			T_{vj}=125 °C		2.5		mA
			T_{vj}=175 °C		13		mA
Gate leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V		-150		150	nA
Gate-emitter threshold voltage	$V_{GE(th)}$	I_c = 36 mA, V_{CE} = V_{GE}	T_{vj}=25 °C		5.5		V
Gate charge	Q_G					TBD	uC
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 A, V_{CE} = 600 V, V_{GE} = ±15 V, $R_{G,on}$ = 0.51 Ω	T_{vj}=25 °C		475		ns
			T_{vj}=125 °C		500		ns
			T_{vj}=175 °C		550		ns
Rise time	t_r		T_{vj}=25 °C		140		ns
			T_{vj}=125 °C		175		ns
			T_{vj}=175 °C		200		ns
Turn-off delay time	$t_{d(off)}$	I_C = 900 A, V_{CE} = 600 V, V_{GE} = ±15 V, $R_{G,off}$ = 0.51 Ω	T_{vj}=25 °C		525		ns
			T_{vj}=125 °C		615		ns
			T_{vj}=175 °C		650		ns
Fall time	t_f		T_{vj}=25 °C		140		ns
			T_{vj}=125 °C		170		ns
			T_{vj}=175 °C		180		ns
Turn-on switching energy	E_{on}	I_C = 900A, V_{CE} = 600V, V_{GE} = ±15 V, L_s = 25 nH, $R_{g,on}$ = 0.51 Ω	T_{vj}=25 °C		152		mJ
			T_{vj}=125 °C		235		mJ
			T_{vj}=175 °C		273		mJ
Turn-off switching energy	E_{off}	I_C = 900 A, V_{CE} = 600 V, V_{GE} = ±15 V, L_s = 25 nH	T_{vj}=25 °C		132		mJ
			T_{vj}=125 °C		165		mJ
			T_{vj}=175 °C		186		mJ
Short circuit current	I_{SC}	V_{GE} = 15 V, V_{CC} = 900 V, $V_{CEM\ CHIP}$ ≤ 1200 V	T_{vj}=175 °C		3500		A

Diode characteristic values

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Forward voltage	V_F	I_F = 900 A	T_{vj} = 25 °C		1.65		V
			T_{vj} = 125 °C		1.7		V
			T_{vj} = 175 °C		1.8		V
Peak reverse recovery current	I_{rm}	I_F = 900 A V_{CE} = 600 V V_{GE} = ±15 V L_s = 25 nH $R_{g,on}$ = 0.51 Ω dI/dt = 3.9 kA / µs	T_{vj} = 25 °C		493		A
			T_{vj} = 125 °C		535		A
			T_{vj} = 175 °C		550		A
Recovered charge	Q_{rr}		T_{vj} = 25 °C		76		uC
			T_{vj} = 125 °C		135		uC
			T_{vj} = 175 °C		190		uC
Reverse recovery time	t_{rr}		T_{vj} = 25 °C		297		ns
			T_{vj} = 125 °C		553		ns
			T_{vj} = 175 °C		680		ns
Reverse recovery energy	E_{rec}		T_{vj} = 25 °C		21		mJ
			T_{vj} = 125 °C		47		mJ
			T_{vj} = 175 °C		55		mJ

NTC Thermistor

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Rated resistance	R_{25}	T_c=25 °C		5		K-ohms
R100	R_{100}	T_c=100 °C	468		517	ohms
B-value	$B_{25/50}$	$R_{25} = R_{25}$ exp $[B_{25/50}(1/T_2 – 1/(298.15K))]$		3375		K
B-value	$B_{25/100}$	$R_{25} = R_{25}$ exp $[B_{25}/100(1/T_2 – 1/(298.15K))]$		3433		K

Package properties

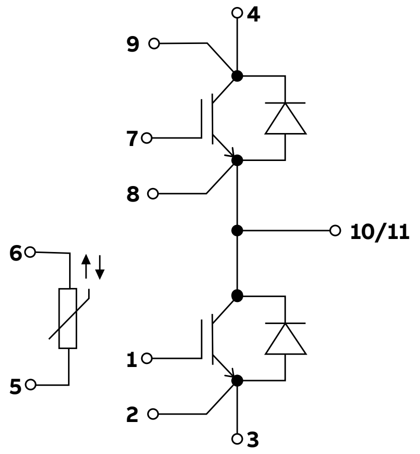
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
IGBT thermal resistance junction to case	$R_{th(j-c)}$IGBT	per switch			0.043	K/W
Diode thermal resistance junction to case	$R_{th(j-c)}$ DIODE	per switch			0.095	K/W
IGBT thermal resistance case to heatsink	$R_{th(c-s)}$ IGBT	IGBT per switch, I TIM = 5 W/m x K		0.03		K/W
Diode thermal resistance case to heatsink	$R_{th(c-s)}$ DIODE	Diode per switch, I TIM = 5 W/m x K		0.04		K/W
Comparative tracking index	CTI					
Module stray inductance	Lσ CE	per switch		20		nH
Resistance, terminal-chip	RCC'+EE'	per switch	T_{vj} = 25 °C	0.95		m-ohms
			T_{vj} = 125 °C	1.35		
			T_{vj} = 175 °C	1.55		K/W

Mechanical properties

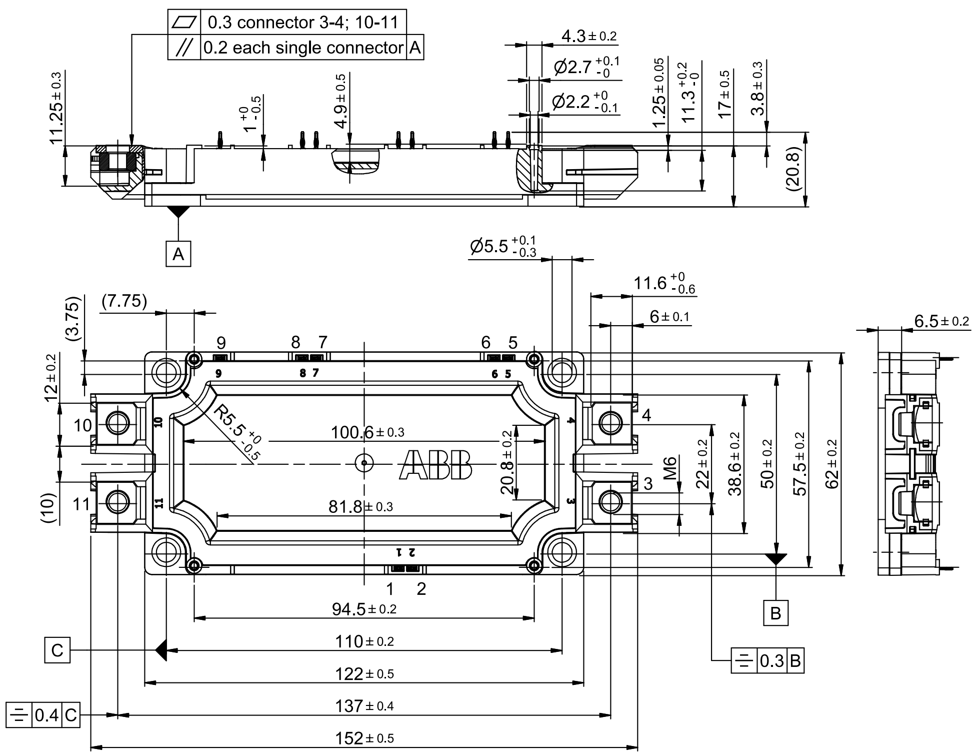
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Dimensions	L x W x H	Typical		152 x 62 x 17			
Clearance distance in air	d_a	According to IEC 60664-1 and EN 50124-1	Term. to base:	12.5			mm
			Term. to base:	10			
Surface creepage distance	d_s		Term. to base:	14.5			
			Term. to base:	13			
Mass	m				350		g

All data are preliminary and subject to change without prior notice.

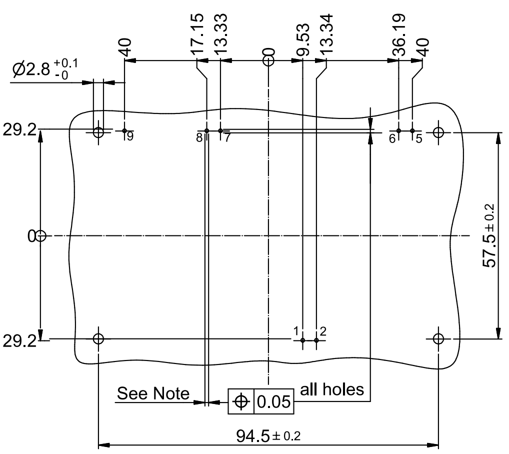
Electrical configuration



Outline drawing (mm)



PCB drill hole pattern for press-fit



Note:

ø1 $^{+0.09}_{-0.06}$ Diameter of finished plated through-hole

ø1.15 Diameter of drilled hole

Note: For detailed mounting instructions refer to ABB Document No. 5SYA 2113.

All data are preliminary and subject to change without prior notice.

Fig. 1 Typical on-state characteristics, chip level

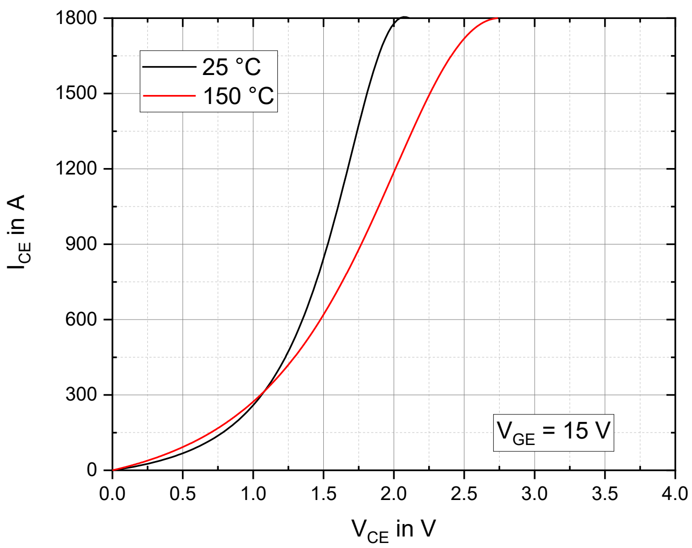


Fig. 2 Typical transfer characteristics, chip level

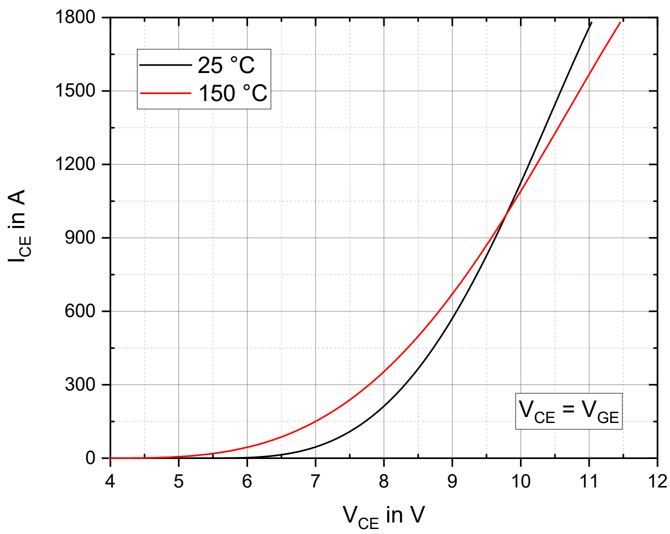


Fig. 3 Typical switching energies per pulse, vs. switched current

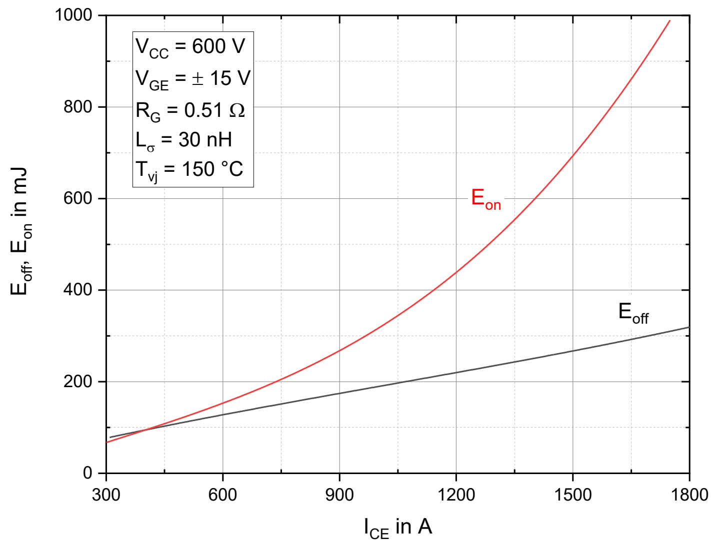


Fig. 4 Typical switching energies per pulse vs. gate resistor

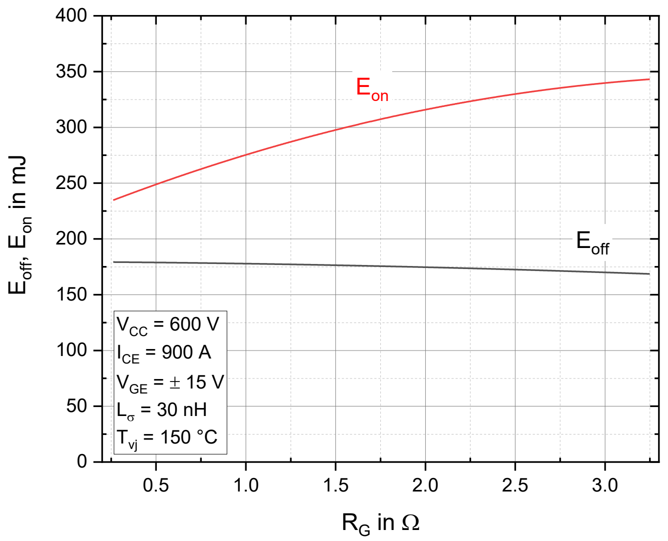


Fig. 5 Turn-off safe operating area (RBSOA)

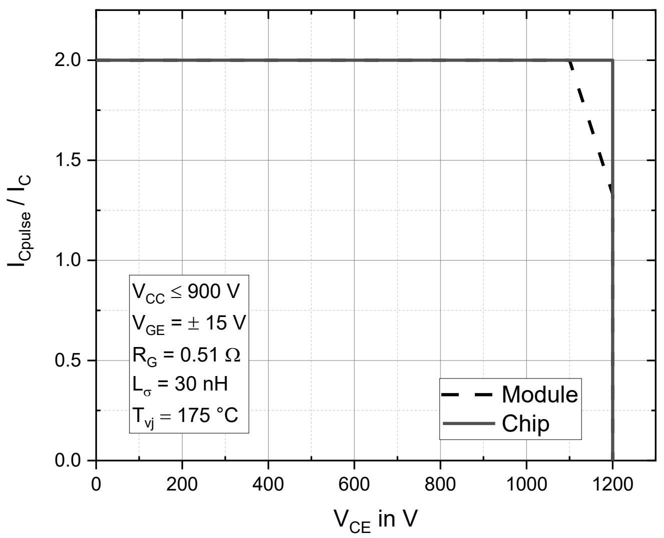
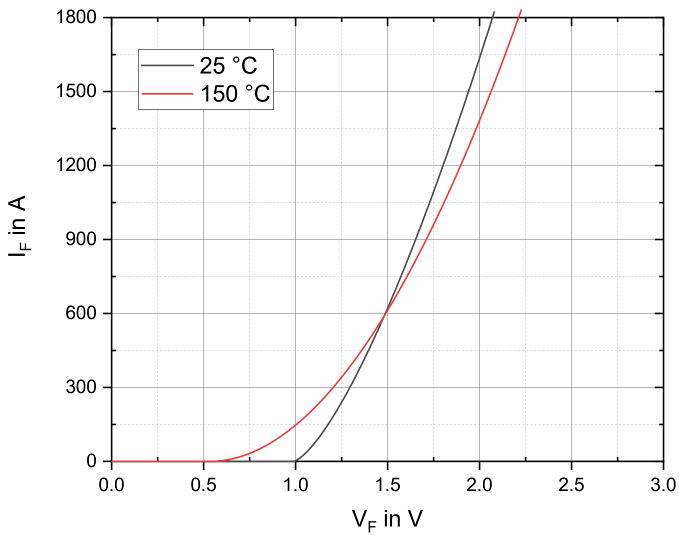


Fig. 6 Typical diode forward characteristics, chip level



All data are preliminary and subject to change without prior notice.

Fig. 7 Typical recovery characteristics, vs. switched current

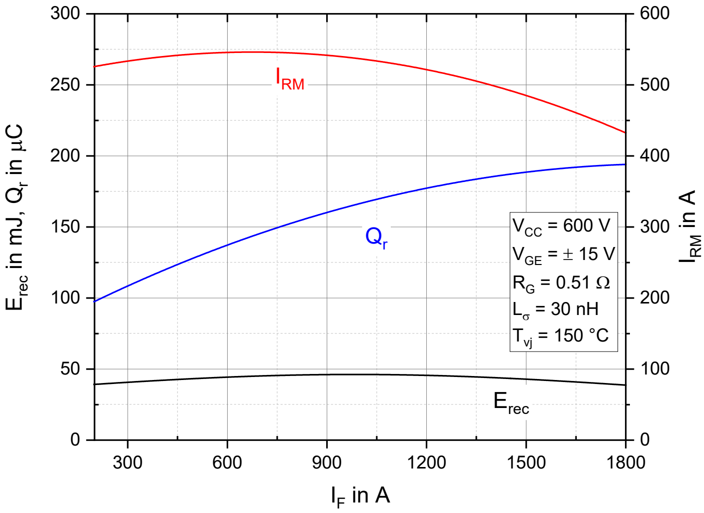


Fig. 8 Typical recovery characteristics vs. dI / dt

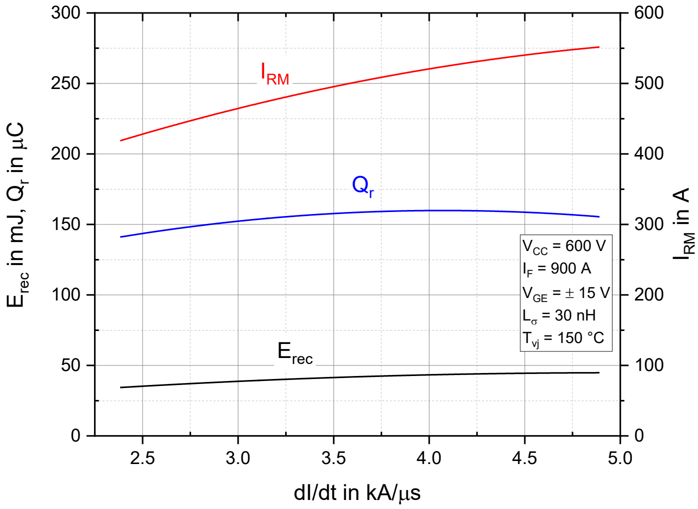


ABB Power Grids Switzerland Ltd.
Hitachi ABB Join Venture
Fabrikstrasse 3
5600 Lenzburg, Switzerland
abbsem@hitachi-powergrids.com

hitachiabb-powergrids.com/semiconductors