

Target Specification

5SNG 0600R120590

1200V 600A LoPak Phase Leg IGBT Module

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

$I_C = 600\text{ A X 2}$

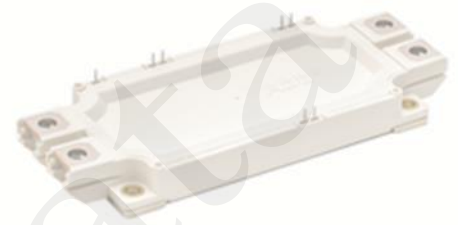
Press-fit pins for reliable auxiliary contacts

Ultra low-loss rugged Trench IGBT chipset

NTC thermistor for temperature sensing

Cu baseplate for low thermal resistance

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	units
Collector-emitter voltage	V_{ces}	$V_{GE} = 0\text{ V}, T_{vj} \geq 25\text{ °C}$		1200	V
DC collector current	I_c	$T_c = 115\text{ °C}, T_{vj} = 150\text{ °C}$		600	A
Peak collector current	I_{cm}	$t_p = 1\text{ ms}$		1200	A
Gate-emitter voltage	V_{ges}		-20	20	V
DC forward current	I_f			600	A
Peak forward current	I_{frm}	$t_p = 1\text{ ms}$		1200	A
Surge current	I_{fsm}			1600	A
IGBT short circuit SOA	t_{psc}	$t_p \leq 8\text{ }\mu\text{s}, V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $V_{CE,max} = V_{CES} - L_{s,CE} \cdot di/dt, T_{vj} = 150\text{ °C}$		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 V, I _C = 10 mA, T _{vj} = 25 °C		1300			V
Collector-emitter saturation voltage	V _{CEsat}	I _C = 600A, V _{GE} = 15 V	T _{vj} =25C		1.6		V
			T _{vj} =125C		1.75		V
			T _{vj} =150C		1.9		V
Collector cut-off current	I _{CES}	V _{CE} = 1200 V, V _{GE} = -15 V	T _{vj} =25C			0.1	mA
			T _{vj} =125C		3		mA
			T _{vj} =150C		4		mA
Gate leakage current	I _{GES}	V _{CE} = 0 V, V _{GE} = ±20 V				60	nA
Gate-emitter threshold voltage	V _{GE(th)}	I _C = 12 mA, V _{CE} = V _{GE} , T _{vj} = 25 °C			5		V
Gate charge	Q _G				TBD		uC
Input capacitance	C _{ies}				TBD		nF
Internal gate resistance	R _{Gint}				0.67		Ohms
Turn-on delay time	t _{d(on)}	I _C = 600A, V _{CE} = 600V, V _{GE} = ±15 V, R _{G,on} = TBD	T _{vj} =25C		300		ns
			T _{vj} =125C		350		ns
			T _{vj} =150C		350		ns
Rise time	t _r		T _{vj} =25C	70		200	ns
			T _{vj} =125C	90		275	ns
			T _{vj} =150C	100		300	ns
Turn-off delay time	t _{d(off)}		T _{vj} =25C		400		ns
			T _{vj} =125C		475		ns
			T _{vj} =150C		500		ns
Fall time	t _f		T _{vj} =25C		190		ns
			T _{vj} =125C		200		ns
			T _{vj} =150C		200		ns
Turn-on switching energy	E _{on}	I _C = 600A, V _{CE} = 600V, V _{GE} = ±15 V, L _s = 35 nH, R _{G,on} = TBD	T _{vj} =25C	70			mJ
			T _{vj} =125C	100			mJ
			T _{vj} =150C	112		160	mJ
Turn-off switching energy	E _{off}	I _C = 600A, V _{CE} = 600V, V _{GE} = ±15 V, L _s = 35 nH	T _{vj} =25C		88		mJ
			T _{vj} =125C		112		mJ
			T _{vj} =150C		128		mJ
Short circuit current	I _{SC}	t _{pSC} ≤ 8 μs, V _{GE} = 15 V, V _{CC} = 800 V, V _{CEM CHIP} ≤ 1200 V	T _{vj} =150C		3000		A

Diode characteristic values

Parameter	Symbol	Conditions	min	typ	max	units
Forward voltage	V_f	$I_F = 600 \text{ A}$	$T_{vj}=25^\circ\text{C}$	1.6		V
			$T_{vj}=125^\circ\text{C}$			V
			$T_{vj}=150^\circ\text{C}$	1.7		V
Peak reverse recovery current	I_{rm}	$I_F = 600 \text{ A}, V_{CE} = 600 \text{ V},$ $V_{GE} = \pm 15 \text{ V},$ $L_S = 35 \text{ nH}, R_{g,on} = \text{TBD}$	$T_{vj}=25^\circ\text{C}$	644		A
			$T_{vj}=125^\circ\text{C}$			A
			$T_{vj}=150^\circ\text{C}$	694		A
Recovered charge	Q_r	$I_F = 600 \text{ A}, V_{CE} = 600 \text{ V},$ $V_{GE} = \pm 15 \text{ V},$ $L_S = 35 \text{ nH}, R_{g,on} = \text{TBD}$	$T_{vj}=25^\circ\text{C}$	70		μC
			$T_{vj}=125^\circ\text{C}$			μC
			$T_{vj}=150^\circ\text{C}$	120		μC
Reverse recovery time	t_{rr}	$I_F = 600 \text{ A}, V_{CE} = 600 \text{ V},$ $V_{GE} = \pm 15 \text{ V},$ $L_S = 35 \text{ nH}, R_{g,on} = \text{TBD}$	$T_{vj}=25^\circ\text{C}$			ns
			$T_{vj}=125^\circ\text{C}$			ns
			$T_{vj}=150^\circ\text{C}$		800	ns
Reverse recovery energy	E_{rec}	$I_F = 600 \text{ A}, V_{CE} = 600 \text{ V},$ $V_{GE} = \pm 15 \text{ V},$ $L_S = 35 \text{ nH}, R_{g,on} = \text{TBD}$	$T_{vj}=25^\circ\text{C}$	36		mJ
			$T_{vj}=125^\circ\text{C}$			mJ
			$T_{vj}=150^\circ\text{C}$	56		mJ

NTC Thermistor

Parameter	Symbol	Conditions	min	typ	max	units
Rated resistance	R_{25}	$T_c=25^\circ\text{C}$		5		K-ohms
R100	R_{100}	$T_c=100^\circ\text{C}$	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

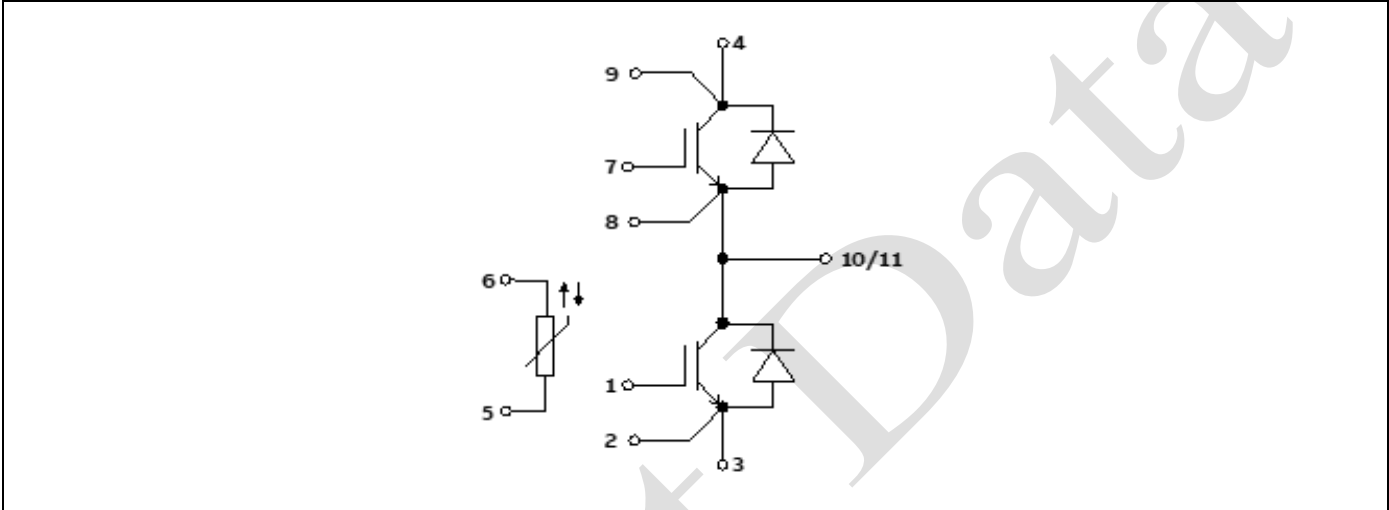
Package properties

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, $\lambda \text{ TIM} = 5 \text{ W/m} \times \text{K}$		0.025		K/W
Diode thermal resistance case to heatsink	$R_{th(c-s)} \text{ DIODE}$	Diode per switch, $\lambda \text{ TIM} = 5 \text{ W/m} \times \text{K}$		0.044		K/W
Comparative tracking index	CTI					
Module stray inductance	$L_{\sigma \text{ CE}}$	per switch		20		nH
Resistance, terminal-chip	$R_{CC'+EE'}$	per switch	$T_{vj}=25^\circ\text{C}$	0.95		m-ohms
			$T_{vj}=125^\circ\text{C}$	1.35		
			$T_{vj}=150^\circ\text{C}$	1.55		

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			
			Term. to term:	10			
Surface creepage distance	d _s		Term. to base:	14.5			
			Term. to term:	13			
Mass	m				350		g

Electrical configuration



Outline drawing ³⁾

Note: all dimensions are shown in millimeters

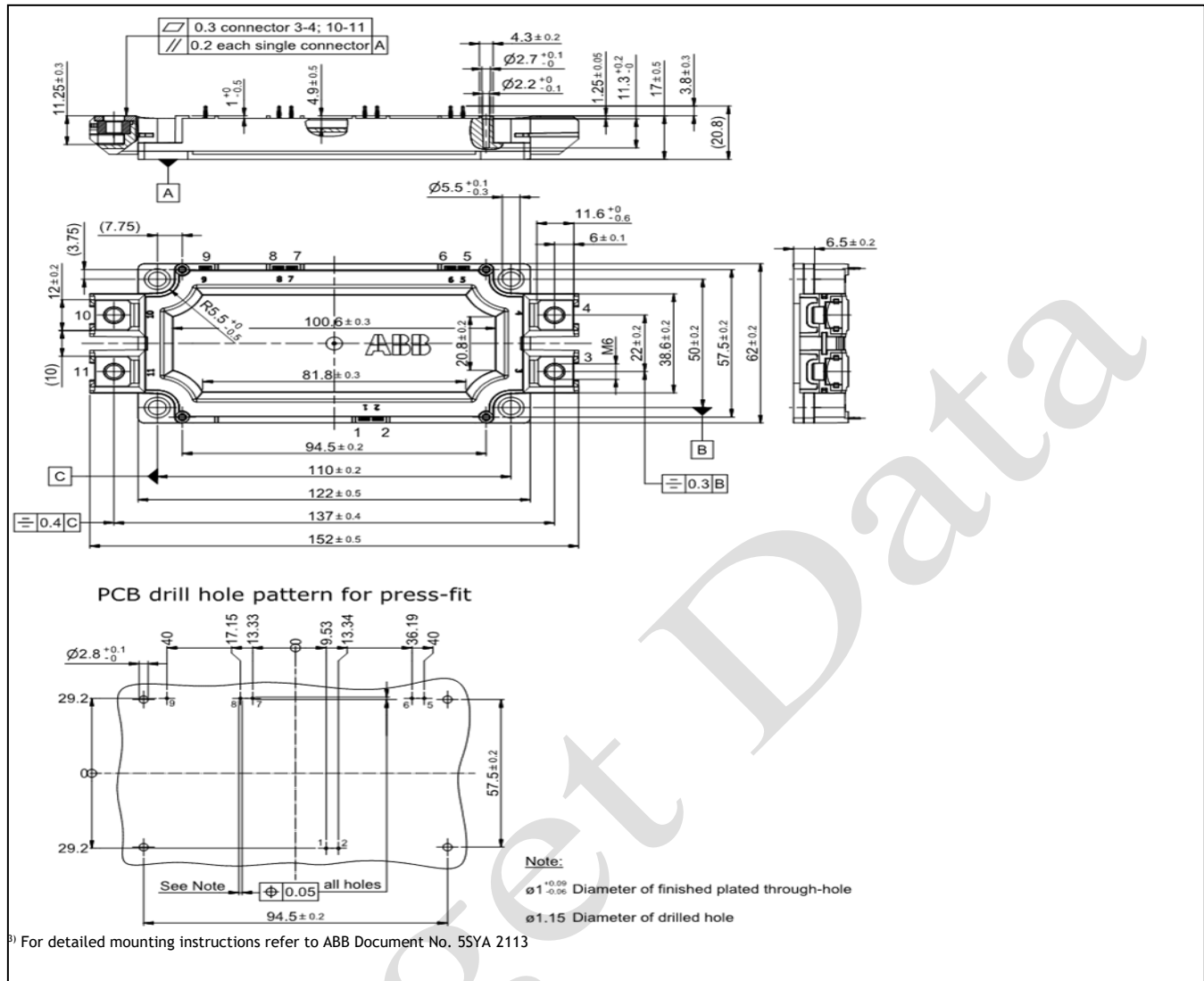


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