

Target Data Sheet

5SNG 0600R120500

1200V, 600A LoPak1 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

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	$T_c = 125\text{ }^\circ\text{C}, T_{vj} = 150\text{ }^\circ\text{C}$		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}	$t_p \leq 8\text{ }\mu\text{s}, V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $V_{CE,max} \leq 1200\text{ V}, T_{vj} = 150\text{ }^\circ\text{C}$		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	$V_{(BR)CES}$	$V_{GE} = 0\text{ V}, I_C = 6\text{ mA}, T_{vj} = 25\text{ °C}$	1200			V
Collector-emitter saturation voltage	V_{CESat}	$I_C = 600\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj}=25\text{C}$	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
			$T_{vj}=125\text{C}$		3	mA
			$T_{vj}=150\text{C}$		4	mA
Gate leakage current	I_{GES}	$V_{CE} = 0\text{ V}, V_{GE} = \pm 20\text{ V}$			60	nA
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C = 24\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25\text{ °C}$		5		V
Gate charge	Q_G			TBD		uC
Input capacitance	C_{ies}			TBD		nF
Internal gate resistance	R_{Gint}			2		Ohms
Turn-on delay time	$t_{d(on)}$	$I_C = 600\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{G,on} = \text{TBD}$	$T_{vj}=25\text{C}$	300		ns
			$T_{vj}=125\text{C}$	350		ns
			$T_{vj}=150\text{C}$	350		ns
Rise time	t_r	$I_C = 600\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{G,on} = \text{TBD}$	$T_{vj}=25\text{C}$	70	200	ns
			$T_{vj}=125\text{C}$	90	275	ns
			$T_{vj}=150\text{C}$	100	300	ns
Turn-off delay time	$t_{d(off)}$	$I_C = 600\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{G,off} = \text{TBD}$	$T_{vj}=25\text{C}$	400		ns
			$T_{vj}=125\text{C}$	475		ns
			$T_{vj}=150\text{C}$	500		ns
Fall time	t_f	$I_C = 600\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{G,off} = \text{TBD}$	$T_{vj}=25\text{C}$	190		ns
			$T_{vj}=125\text{C}$	200		ns
			$T_{vj}=150\text{C}$	200		ns
Turn-on switching energy	E_{on}	$I_C = 600\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, L_s = 35\text{ nH}, R_{g,on} = \text{TBD}$	$T_{vj}=25\text{C}$	70		mJ
			$T_{vj}=125\text{C}$	100		mJ
			$T_{vj}=150\text{C}$	112	160	mJ
Turn-off switching energy	E_{off}	$I_C = 600\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, L_s = 35\text{ nH}$	$T_{vj}=25\text{C}$	88		mJ
			$T_{vj}=125\text{C}$	112		mJ
			$T_{vj}=150\text{C}$	128		mJ
Short circuit current	I_{SC}	$t_{psc} \leq 8\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, V_{CC} = 800\text{ V}, V_{CEM\text{ CHIP}} \leq 1200\text{ V}$	$T_{vj}=150\text{C}$	3000		A

Diode characteristic values

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

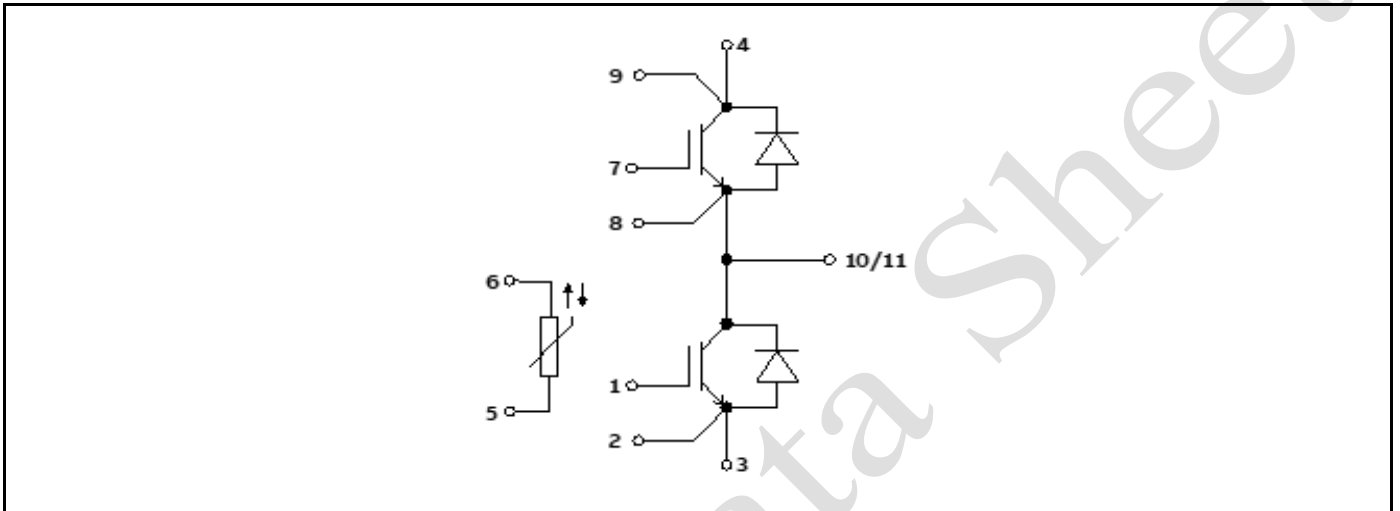
Package properties

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, λ 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, λ 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		
			$T_{vj}=150\text{C}$		1.55		

Mechanical properties

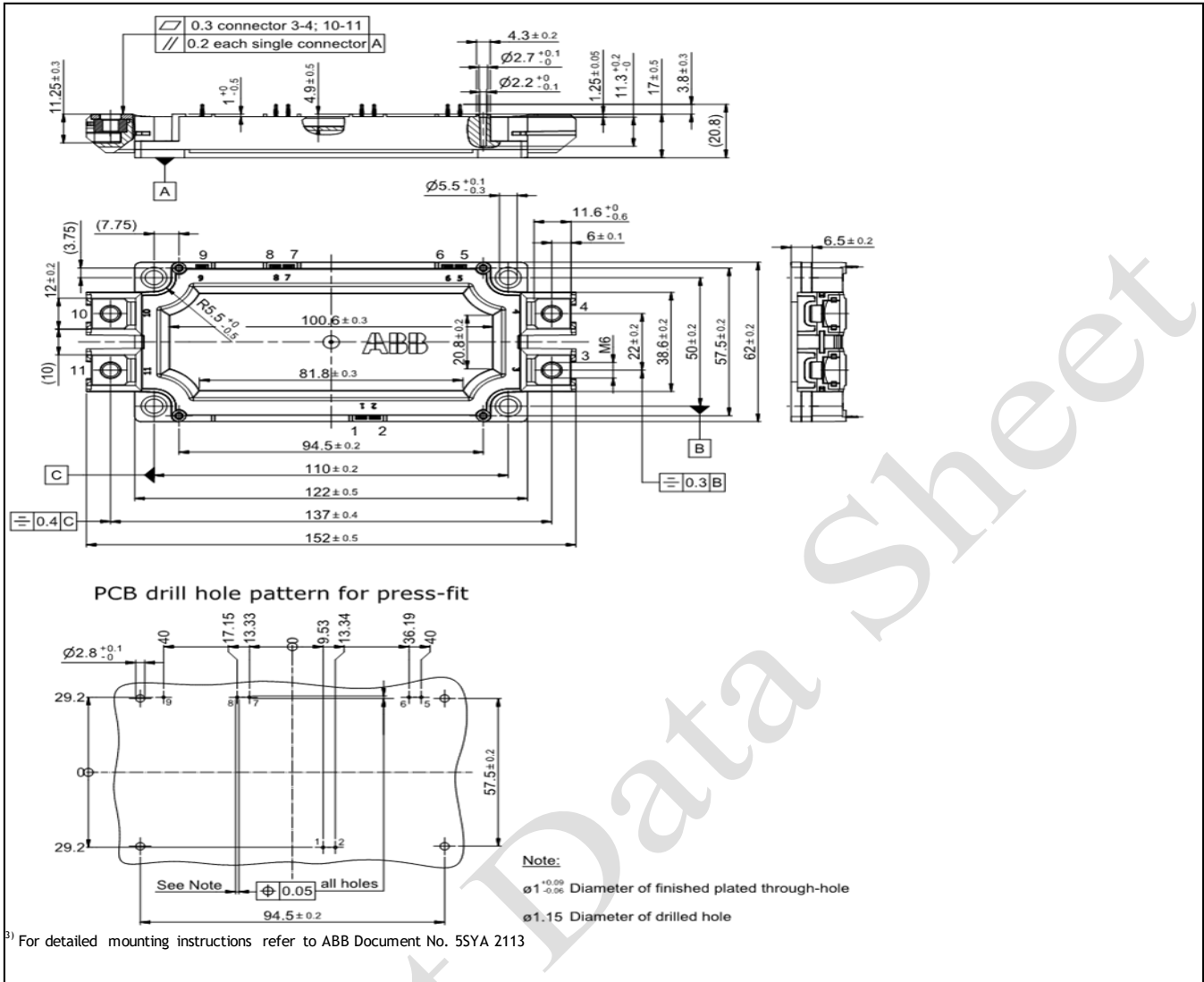
Parameter	Symbol	Conditions		min	typ	max	units	
Dimensions	L x W x H	Typical		152 x 62 x 17			mm	
Clearance distance in air	d_a	according to IEC 60664-1 and EN 50124-1		Term. to base:	12.5			
				Term. to term:	10			
Surface creepage distance	d_s			Term. to base:	14.5			
				Term. to term:	13			
Mass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

Electrical configuration



Outline drawing ³⁾

Note: all dimensions are shown in millimeters



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