

$V_{CE} = 2500 \text{ V}$

$I_C = 2000 \text{ A}$

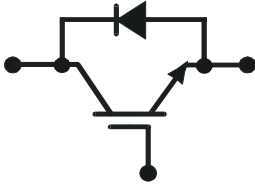


ABB StakPak™ H Series Press-pack IGBT

5SNR 20H2501 PRELIMINARY

Doc. No. 5SYA1582-03 May. 07

- High SOA
- Fails into stable shorted state
- High tolerance to uneven mounting pressure
- Designed for series connection
- Explosion resistant package
- Modular design concept, available for a wide range of current ratings
- SPT chip set



Maximum Rated Values¹⁾

Parameter ²⁾	Symbol	Conditions	min	max	Unit
Collector-emitter voltage	V_{CES}			2500	V
DC collector current	I_C	$T_c = 75 \text{ }^\circ\text{C}$		2000	A
Repetitive peak collector current	I_{CM}			4000	A
Gate-emitter voltage	V_{GES}			± 20	V
Total power dissipation	P_{tot}	$T_c = 25 \text{ }^\circ\text{C}$, (IGBT)		18000	W
DC forward current	I_F	$T_c = 75 \text{ }^\circ\text{C}$		2000	A
Repetitive peak forward current	I_{FM}			4000	A
Surge current	I_{FSM}	$V_R = 0 \text{ V}$, $t_p = 10 \text{ ms}$, $T_{vj} = 125 \text{ }^\circ\text{C}$, half-sinewave		23	kA
IGBT short circuit SOA	t_{psc}	$V_{CC} = 1500 \text{ V}$, $V_{CEM} \leq 2500 \text{ V}$, $V_{GE} \leq 15 \text{ V}$		10	μs
Junction temperature	T_{vj}		5	125	$^\circ\text{C}$
Storage temperature	T_{stg}		-40	70	$^\circ\text{C}$
Mounting force ²⁾	F_M		65	95	kN

¹⁾Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747-9

²⁾For detailed mounting instructions refer to ABB document no. 5SYA 2037-02

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IGBT Characteristic Values³⁾

Parameter	Symbol	Conditions	min	typ	max	Unit	
Collector-emitter saturation voltage	V_{CEsat}	$I_C = 2000 \text{ A}$, $V_{GE} = 15 \text{ V}$	$T_{vj} = 25^\circ\text{C}$	2.20	2.60	V	
			$T_{vj} = 125^\circ\text{C}$	2.70	3.00	V	
Collector cut-off current	I_{CES}	$V_{CE} = 2500 \text{ V}$, $V_{GE} = 0 \text{ V}$,	$T_{vj} = 125^\circ\text{C}$	35	100	mA	
Gate leakage current	I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$,	$T_{vj} = 125^\circ\text{C}$		± 500	nA	
Gate-emitter threshold voltage	$V_{GE(TO)}$	$I_C = 360 \text{ mA}$, $V_{CE} = V_{GE}$,	$T_{vj} = 25^\circ\text{C}$	5	7	8.5	V
Turn-on energy	E_{on}	$V_{CC} = 1250 \text{ V}$, $I_C = 2000 \text{ A}$, $R_G = 3.9 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_\sigma = 200 \text{ nH}$ inductive load	$T_{vj} = 25^\circ\text{C}$	3.0		J	
			$T_{vj} = 125^\circ\text{C}$	4.0		J	
Turn-off energy	E_{off}	$V_{CC} = 1250 \text{ V}$, $I_C = 2000 \text{ A}$, $R_G = 3.3 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_\sigma = 200 \text{ nH}$ inductive load	$T_{vj} = 25^\circ\text{C}$	3.0		J	
			$T_{vj} = 125^\circ\text{C}$	3.6		J	

³⁾Characteristic values according to IEC 60747-9Diode Characteristic Values⁴⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Forward voltage	V_F	$I_F = 2000 \text{ A}$	$T_{vj} = 25^\circ\text{C}$	1.95	2.20	V
			$T_{vj} = 125^\circ\text{C}$	1.90	2.20	V
Reverse recovery current	I_{rr}	$V_{CC} = 1250 \text{ V}$, $I_F = 2000 \text{ A}$, $R_G = 3.9 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_\sigma = 200 \text{ nH}$ inductive load	$T_{vj} = 25^\circ\text{C}$	1100		A
			$T_{vj} = 125^\circ\text{C}$	1600		A
Reverse recovery charge	Q_{rr}	$V_{CC} = 1250 \text{ V}$, $I_F = 2000 \text{ A}$, $R_G = 3.9 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_\sigma = 200 \text{ nH}$ inductive load	$T_{vj} = 25^\circ\text{C}$	1000		μC
			$T_{vj} = 125^\circ\text{C}$	1900		μC
Reverse recovery time	t_{rr}	$V_{CC} = 1250 \text{ V}$, $I_F = 2000 \text{ A}$, $R_G = 3.9 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_\sigma = 200 \text{ nH}$ inductive load	$T_{vj} = 25^\circ\text{C}$	1.7		μs
			$T_{vj} = 125^\circ\text{C}$	1.8		μs
Reverse recovery energy	E_{rec}	$V_{CC} = 1250 \text{ V}$, $I_F = 2000 \text{ A}$, $R_G = 3.9 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_\sigma = 200 \text{ nH}$ inductive load	$T_{vj} = 25^\circ\text{C}$	0.9		J
			$T_{vj} = 125^\circ\text{C}$	1.7		J

⁴⁾Characteristic values according to IEC 60747-2

Thermal Properties

Parameter	Symbol	Conditions	min	typ	max	Unit
IGBT thermal resistance junction to case	$R_{th(j-c)}$ IGBT				5.5	K/kW
Diode thermal resistance junction to case	$R_{th(j-c)}$ Diode				11	K/kW
IGBT thermal resistance case to heatsink	$R_{th(c-h)}$ IGBT	Heatsink flatness : Complete module area < 100 μm			1	K/kW
Diode thermal resistance case to heatsink	$R_{th(c-h)}$ Diode	Each submodule area < 50 μm Roughness : < 6.3 μm			2	K/kW
Operating junction temperature	T_{vjop}		5		125	$^\circ\text{C}$

Mechanical Properties

Parameter	Symbol	Conditions	min	typ	max	Unit
Dimensions	L* W* H	Typical , see outline drawing	236*150*26			mm
Clearance distance	D _C	acc. IEC 60664-1 and EN50124-1	10			mm
Surface creepage distance	D _{SC}	acc. IEC 60664-1 and EN50124-1	23			mm
Weight				2.2		kg

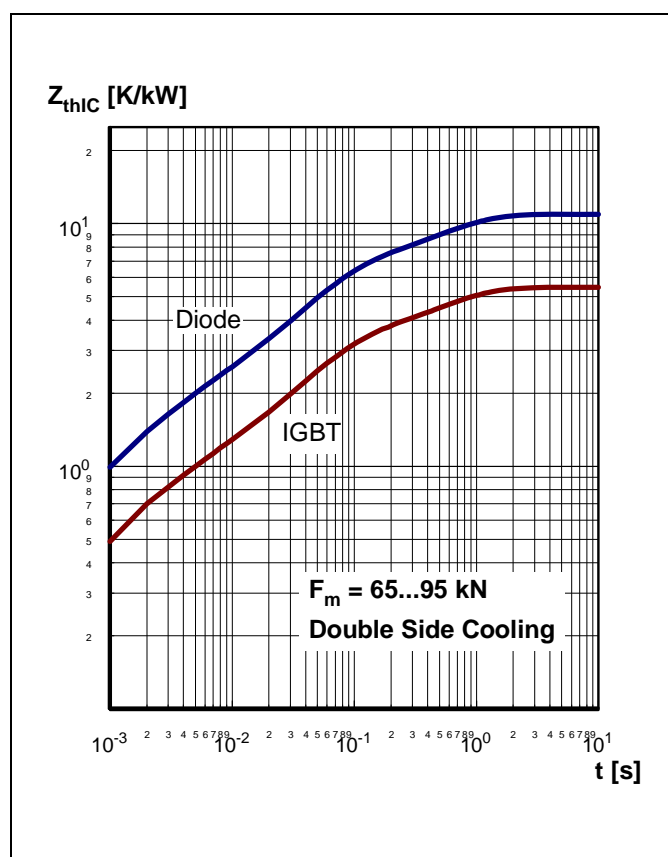


Fig.15 Maximum thermal impedance of IGBT and diode versus time

Analytical function for transient thermal impedance:

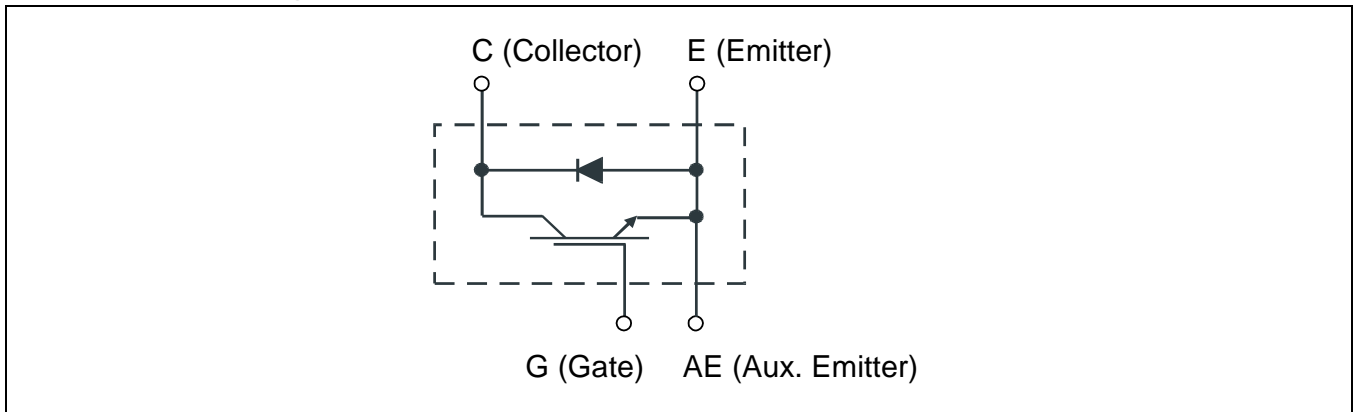
$$Z_{th(j-c)}(t) = \sum_{i=1}^n R_i(1 - e^{-t/\tau_i})$$

	i	1	2	3	4
IGBT	R _i (K/kW)	2.284	2.306	0.472	0.402
	τ _i (ms)	580.8	53.11	3.286	0.609
DIODE	R _i (K/kW)	4.569	4.611	0.945	0.804
	τ _i (ms)	580.8	53.11	3.286	0.609

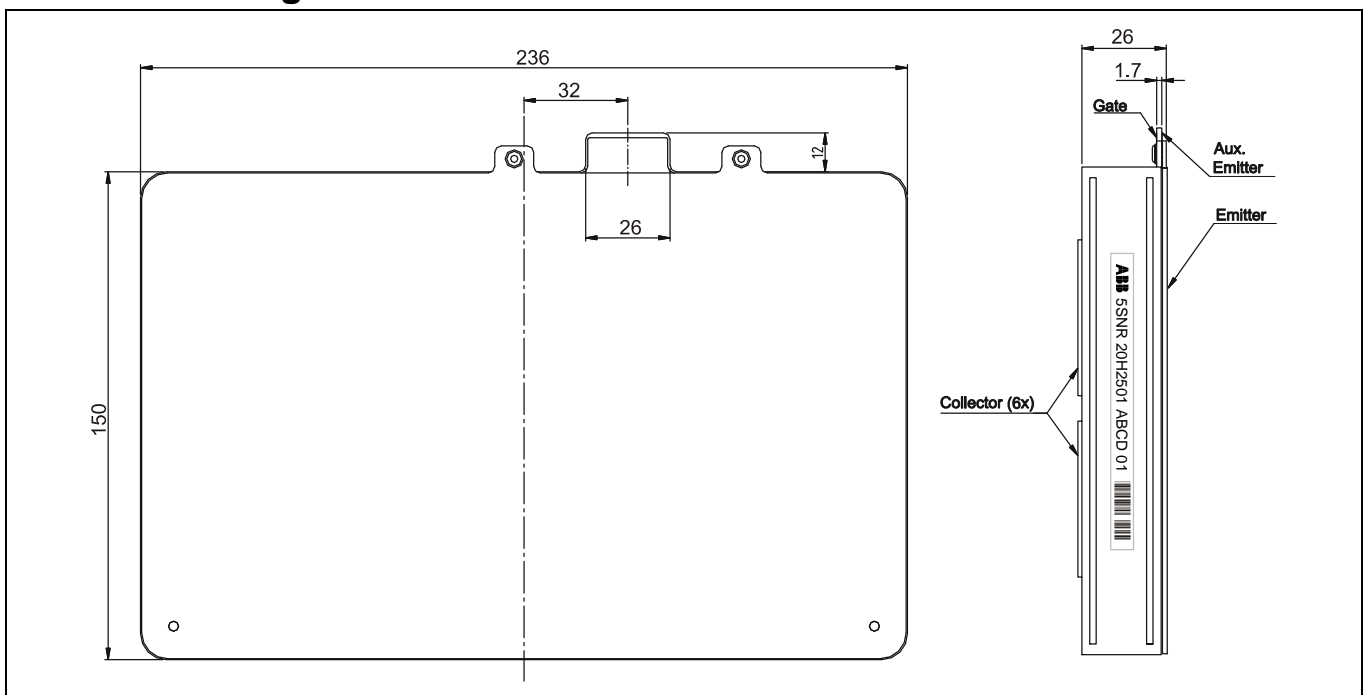
Environmental class according to IEC 60721

Mode	Class	Document - no.
Storage	IE 11	5 SZK 9101-01
Transportation	IE 23	5 SZK 9102-01
Operation	IE 33	5 SZK 9103-01

Electrical configuration



Outline drawing



StakPak H6

This is an electrostatic sensitive device.
Please observe the international standard IEC 60747-1, chapter IX.
This product has been designed and qualified for Industrial Level

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