

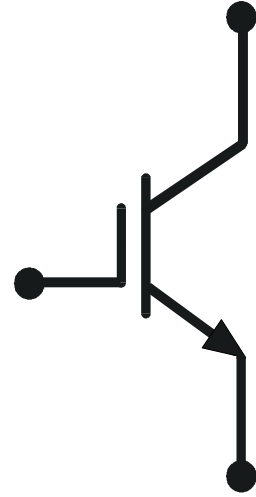
5SMY 12J1722

IGBT-Die

$V_{CE} = 1700 \text{ V}$

$I_C = 75 \text{ A}$

Ultra low loss thin IGBT die
Highly rugged SPT+ design
Large bondable emitter area
Passivation: alpha-Si and Silicon Nitride plus
Polyimide



Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	max	Unit
Collector-emitter voltage	V_{CES}	$V_{GE} = 0 \text{ V}, T_{vj} \geq 25 \text{ °C}$		1700	V
DC collector current	I_C			75	A
Peak collector current	I_{CM}			150	A
Gate-emitter voltage	V_{GES}		-20	20	V
IGBT short circuit SOA	t_{psc}	$V_{CC} = 1300 \text{ V}, V_{CEM \text{ CHIP}} \leq 1700 \text{ V}$ $V_{GE} \leq 15 \text{ V}, T_{vj} \leq 150 \text{ °C}$		10	μs
Junction temperature	T_{vj}			175	$^{\circ}\text{C}$
	$T_{vj(op)}$		-40	150	

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

IGBT characteristic values ²⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Collector (-emitter) breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0\text{ V}$, $I_C = 1\text{ mA}$, $T_{vj} = 25\text{ °C}$ adequate environment	1700			V
Collector-emitter saturation voltage	$V_{CE\text{ sat}}$	$I_C = 75\text{ A}$, $V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$	2.5	2.75	V
			$T_{vj} = 125\text{ °C}$	3.0		V
			$T_{vj} = 150\text{ °C}$	3.1		V
Collector cut-off current	I_{CES}	$V_{CE} = 1700\text{ V}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		0.1	mA
			$T_{vj} = 125\text{ °C}$	0.375		mA
			$T_{vj} = 150\text{ °C}$	1.875		mA
Gate leakage current	I_{GES}	$V_{CE} = 0\text{ V}$, $V_{GE} = \pm 20\text{ V}$, $T_{vj} = 125\text{ °C}$	-500		500	nA
Gate-emitter threshold voltage	$V_{GE(TO)}$	$I_C = 6\text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25\text{ °C}$	5.4		7.4	V
Gate charge	Q_{ge}	$I_C = 75\text{ A}$, $V_{CE} = 900\text{ V}$, $V_{GE} = 15\text{ V} \dots 15\text{ V}$		0.61		μC
Input capacitance	C_{ies}	$V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$, $T_{vj} = 25\text{ °C}$		5.1		nF
Output capacitance	C_{oes}			0.27		nF
Reverse transfer capacitance	C_{res}			0.18		nF
Internal gate resistance	R_{Gint}			7.8		Ω
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 900\text{ V}$, $I_C = 75\text{ A}$, $R_G = 15\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$, $L_\sigma = 400\text{ nH}$, inductive load	$T_{vj} = 25\text{ °C}$	235		ns
			$T_{vj} = 125\text{ °C}$	250		ns
			$T_{vj} = 150\text{ °C}$	254		ns
Rise time	t_r	$V_{CC} = 900\text{ V}$, $I_C = 75\text{ A}$, $R_G = 15\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$, $L_\sigma = 400\text{ nH}$, inductive load	$T_{vj} = 25\text{ °C}$	110		ns
			$T_{vj} = 125\text{ °C}$	120		ns
			$T_{vj} = 150\text{ °C}$	125		ns
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 900\text{ V}$, $I_C = 75\text{ A}$, $R_G = 15\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$, $L_\sigma = 400\text{ nH}$, inductive load	$T_{vj} = 25\text{ °C}$	390		ns
			$T_{vj} = 125\text{ °C}$	475		ns
			$T_{vj} = 150\text{ °C}$	500		ns
Fall time	t_f	$V_{CC} = 900\text{ V}$, $I_C = 75\text{ A}$, $R_G = 15\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$, $L_\sigma = 400\text{ nH}$, inductive load	$T_{vj} = 25\text{ °C}$	145		ns
			$T_{vj} = 125\text{ °C}$	155		ns
			$T_{vj} = 150\text{ °C}$	160		ns
Turn-on switching energy	E_{on}	$V_{CC} = 900\text{ V}$, $I_C = 75\text{ A}$, $V_{GE} = \pm 15\text{ V}$, $R_G = 15\text{ }\Omega$, $L_\sigma = 400\text{ nH}$, inductive load	$T_{vj} = 25\text{ °C}$	20.25		mJ
			$T_{vj} = 125\text{ °C}$	26.25		mJ
			$T_{vj} = 150\text{ °C}$	28.25		mJ
Turn-off switching energy	E_{off}	$V_{CC} = 900\text{ V}$, $I_C = 75\text{ A}$, $V_{GE} = \pm 15\text{ V}$, $R_G = 15\text{ }\Omega$, $L_\sigma = 400\text{ nH}$, inductive load	$T_{vj} = 25\text{ °C}$	14.25		mJ
			$T_{vj} = 125\text{ °C}$	21.75		mJ
			$T_{vj} = 150\text{ °C}$	24		mJ
Short circuit current	ISC	$t_{psc} \leq 10\text{ }\mu\text{s}$, $V_{GE} = 15\text{ V}$, $T_{vj} = 150\text{ °C}$, $V_{CC} = 1300\text{ V}$, $V_{CEM\text{ CHIP}} \leq 1700\text{ V}$	$T_{vj} = 150\text{ °C}$	250		A

²⁾ Characteristic values according to IEC 60747 - 9

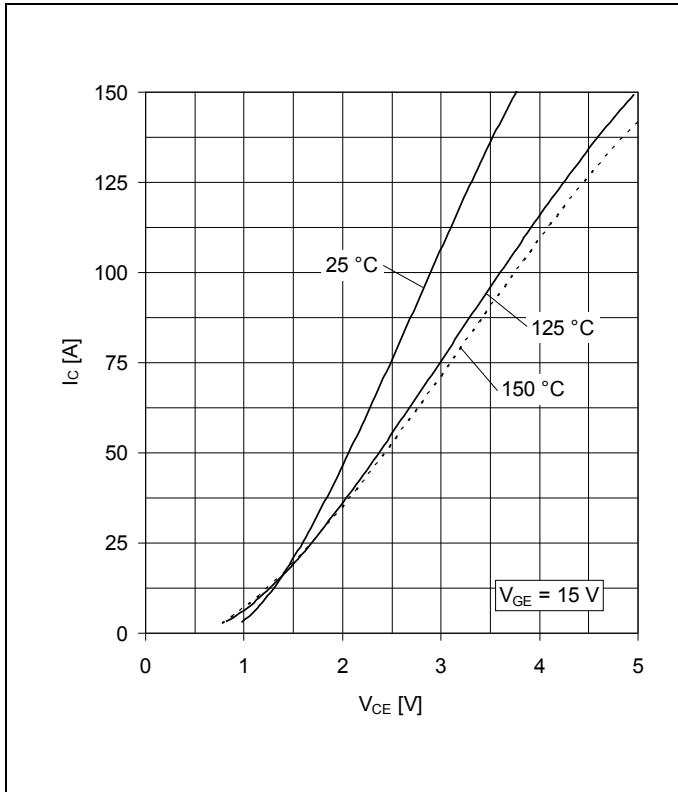


Fig. 1 Typical on-state characteristics, chip level

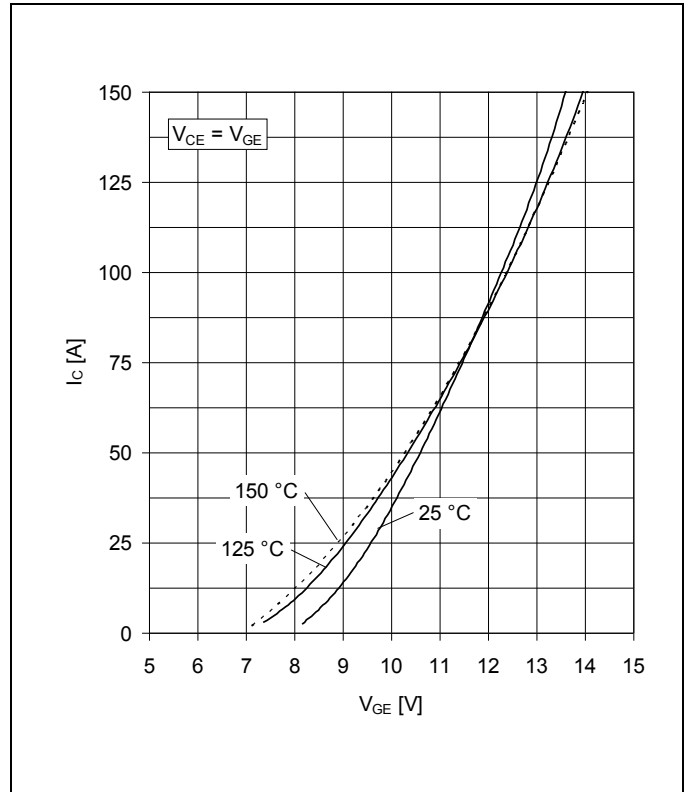


Fig. 2 Typical transfer characteristics, chip level

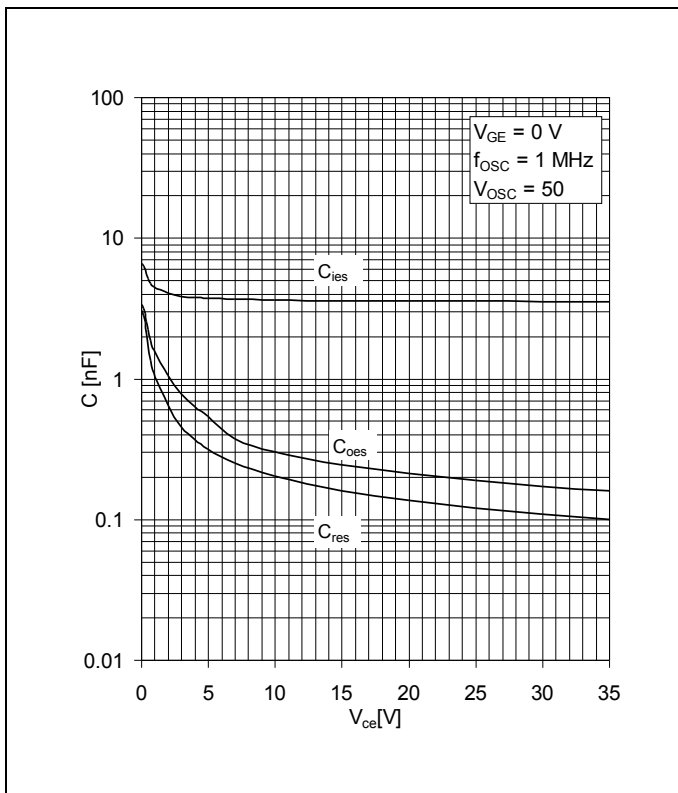


Fig. 3 Typical capacitances vs collector-emitter voltage

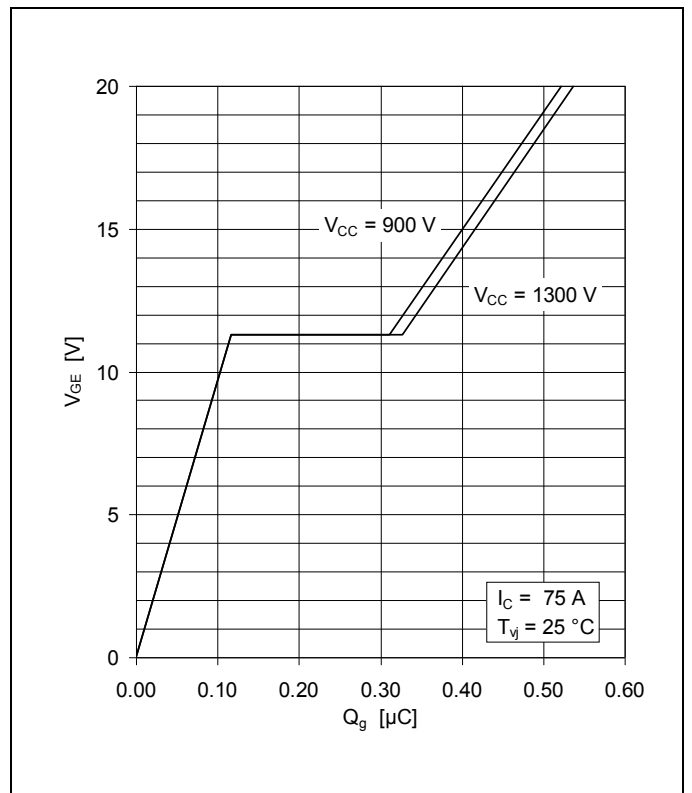


Fig. 4 Typical gate charge characteristics

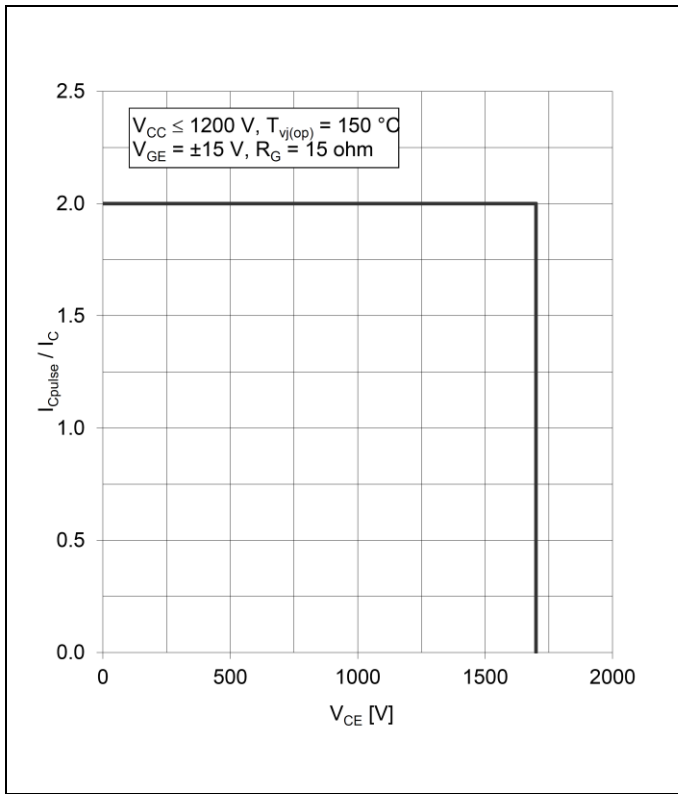


Fig. 5 Safe operation area (RBSOA)

Mechanical properties ³⁾

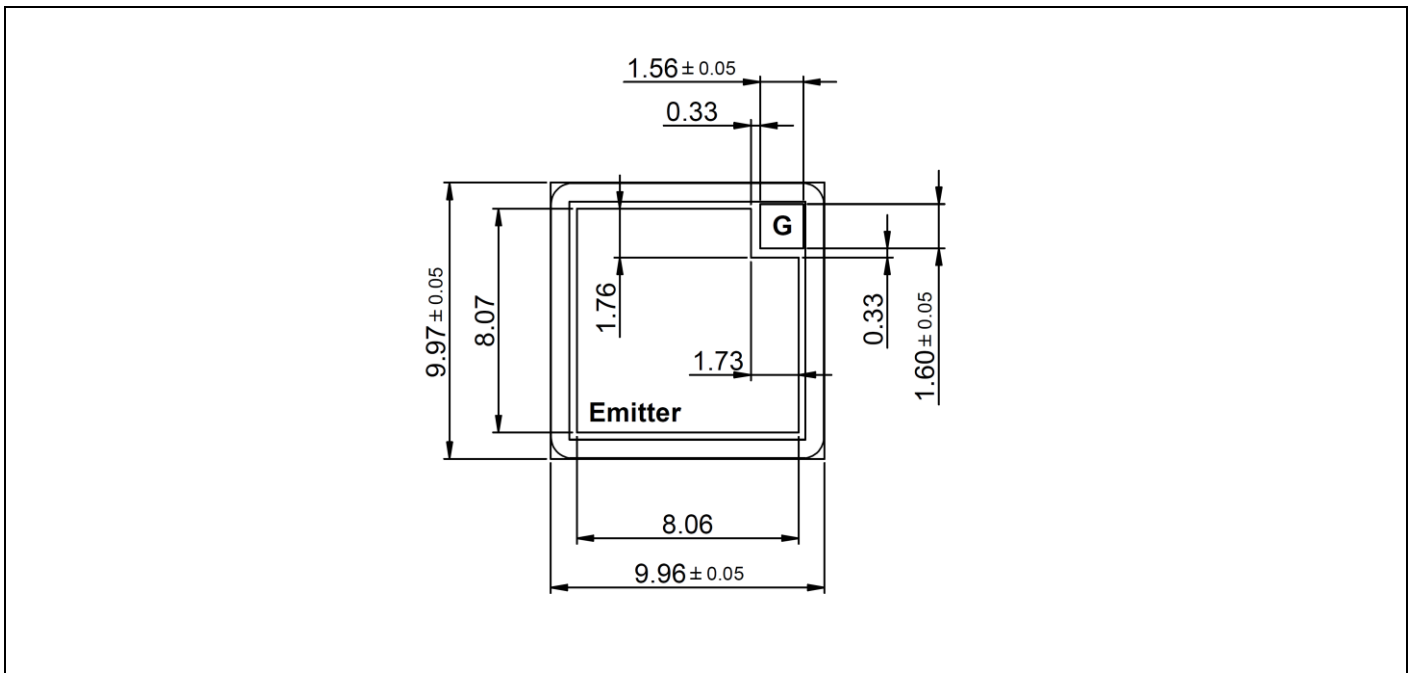
Parameter	Symbol	Conditions	min	Unit
Dimensions	Overall die	L x W	9.96 x 9.97	mm
	exposed front metal	L x W (except gate pad)	8.06 x 8.07	mm
	gate pad	L x W	1.73 x 1.76	mm
	thickness		210 ± 15	µm
Metallization ³⁾	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.6	µm

³⁾ Package and mechanical properties according to IEC 60747 - 15

Form of delivery

Description	Part number
Picked wafer die (waffle pack)	5SMY 12J1722
Sawn 6" wafer die (on blue tape)	5SMY 86J1722

Outline drawing ⁴⁾



Note: all dimensions are shown in millimeters

⁴⁾ For detailed mounting instructions refer to ABB Document No. 5SYA2039

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

Related documents:

- 5SYA 2042 Failure rates of HiPak modules due to cosmic rays
- 5SYA 2045 Thermal runaway during blocking
- 5SYA 2053 Applying IGBT

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