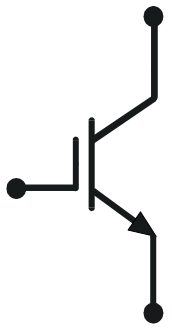
Data Sheet, Doc. No. 5SYA 1705-00 08-2017

5SMY 12K1732
IGBT-Die

V_{CE} =1700 V
I_C =100 A

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



Maximum rated values [1)]

Parameter	Symbol	Conditions	min	max	Unit
Collector-emitter voltage	V_{CES}	V_{GE} = 0 V, T_{vj} ≥ 25 °C		1700	V
DC collector current	I_C			100	A
Peak collector current	I_{CM}			200	A
Gate-emitter voltage	V_{GES}		-20	20	V
IGBT short circuit SOA	t_{psc}	V_{CC} = 1300 V, $V_{CEM\ CHIP}$ ≤ 1700 V V_{GE} ≤ 15 V, T_{vj} ≤ 175 °C		10	µs
Junction temperature	T_{vj}			175	°C
	$T_{vj(op)}$		-40	175	

[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	VGE = 0 V, IC = 1 mA, Tvj = 25 °C adequate environment		1700			V
Collector-emitter [3)] saturation voltage	VCE sat	IC = 100 A, VGE = 15 V	Tvj =25 °C		2.25	2.6	V
			Tvj = 125 °C		2.55		V
			Tvj = 175 °C		2.75		V
Collector cut-off current	ICES	VCE = 1700 V, VGE = 0 V	Tvj =25 °C			0.1	mA
			Tvj = 125 °C		0.2		mA
			Tvj = 175 °C		4		mA
Gate leakage current	IGES	VCE = 0 V, VGE = ±20 V, Tvj = 125 °C		-500		500	nA
Gate-emitter threshold voltage	VGE(TO)	IC = 6 mA, VCE = VGE, Tvj = 25 °C		4.5		6.5	V
Gate charge	Qge	IC = 100 A, VCE = 900 V, VGE = 15 V ..15 V			0.7		µC
Input capacitance	Cies	VCE = 25 V, VGE = 0 V, f = 1 MHz, Tvj = 25 °C			6.1		nF
Output capacitance	Coes				0.35		nF
Reverse transfer capacitance	Cres				0.24		nF
Internal gate resistance	RGint				5.9		Ω
Internal gate resistance	td(on)	VCC = 900 V, IC = 100 A, RG = 4.4 Ω, VGE = ±15 V, Lσ = 120 nH, inductive load	Tvj =25 °C		195		ns
			Tvj = 125 °C		205		ns
			Tvj = 175 °C		210		ns
Rise time	tr		Tvj =25 °C		70		ns
			Tvj = 125 °C		75		ns
			Tvj = 175 °C		80		ns
Turn-off delay time	td(off)	VCC = 900 V, IC = 100 A, RG = 4.4 Ω, VGE = ±15 V, Lσ = 120 nH, inductive load	Tvj =25 °C		250		ns
			Tvj = 125 °C		380		ns
			Tvj = 175 °C		320		ns
Fall time	tf		Tvj =25 °C		160		ns
			Tvj = 125 °C		175		ns
			Tvj = 175 °C		200		ns
Turn-on switching energy	Eon	VCC = 900 V, IC = 100 A, VGE = ±15 V, RG = 4.4 Ω, Lσ = 120 nH, inductive load	Tvj =25 °C		23		mJ
			Tvj = 125 °C		30		mJ
			Tvj = 175 °C		38		mJ
Turn-off switching energy	Eoff	VCC = 900 V, IC = 100 A, VGE = ±15 V, RG = 4.4 Ω, Lσ = 120 nH, inductive load	Tvj =25 °C		15		mJ
			Tvj = 125 °C		25		mJ
			Tvj = 175 °C		33		mJ
Short circuit current	ISC	tpsc ≤ 10 µs, VGE = 15 V, Tvj = 175 °C, VCC = 1300 V, VCEM CHIP ≤ 1700 V	Tvj =175 °C		310		A

[2)] Characteristic values according to IEC 60747 - 9
[3)] Collector-emitter saturation voltage is given at chip level

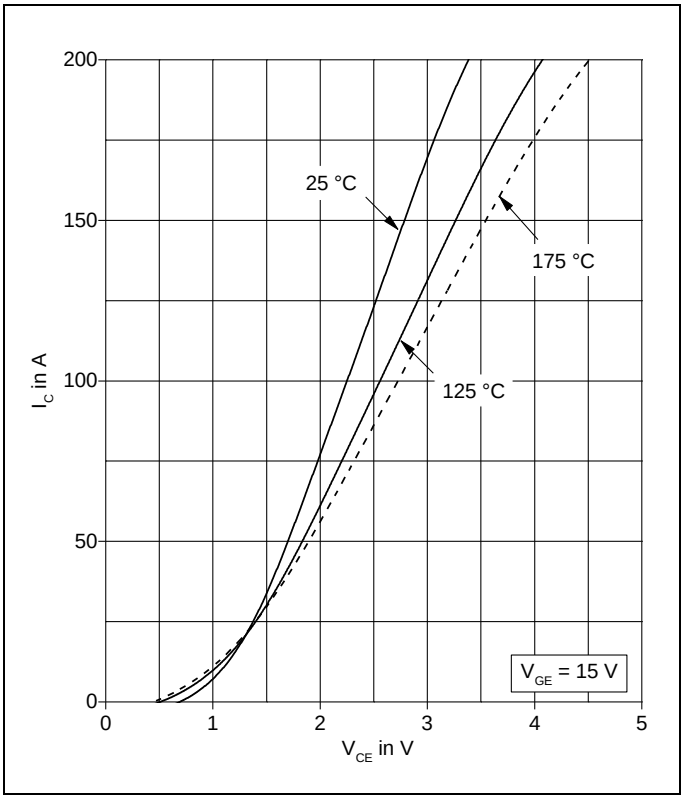


Fig. 1 Typical on-state characteristics, chip level

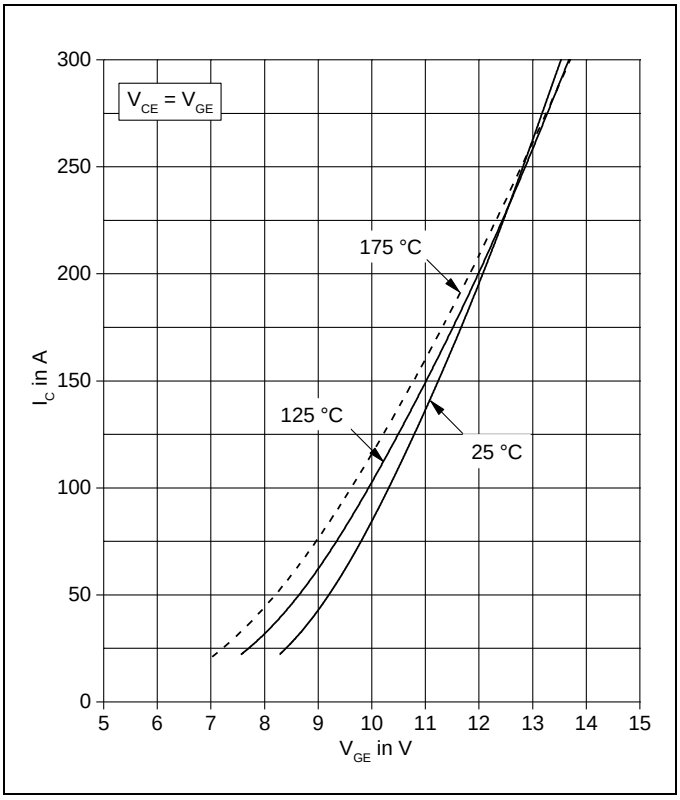


Fig. 2 Typical transfer characteristics, chip level

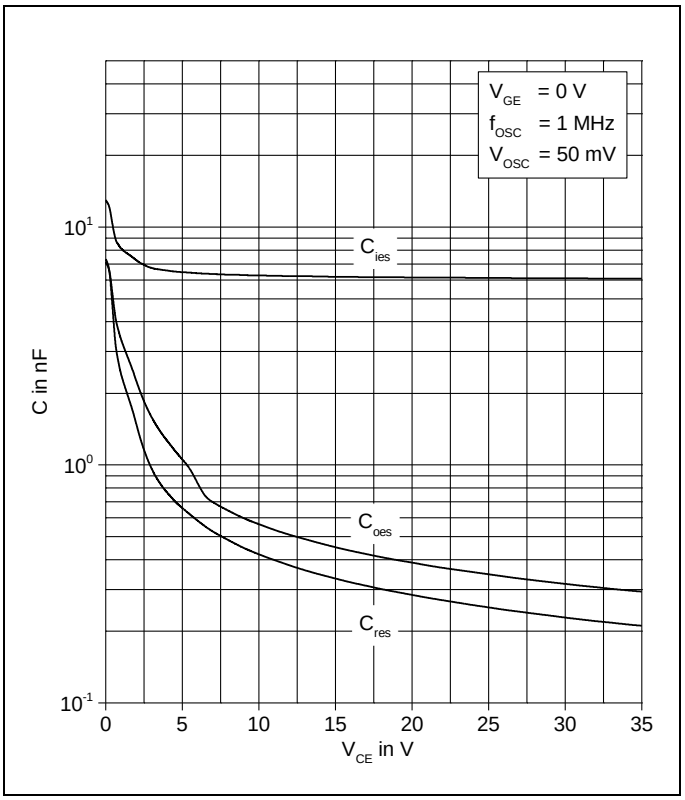


Fig. 3 Typical capacitances vs collector-emitter voltage

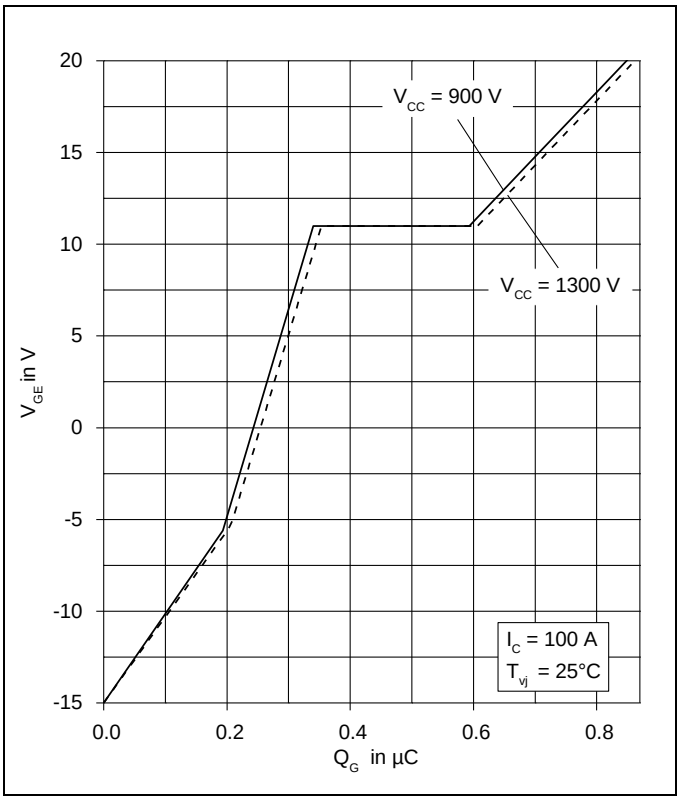


Fig. 4 Typical gate charge characteristics

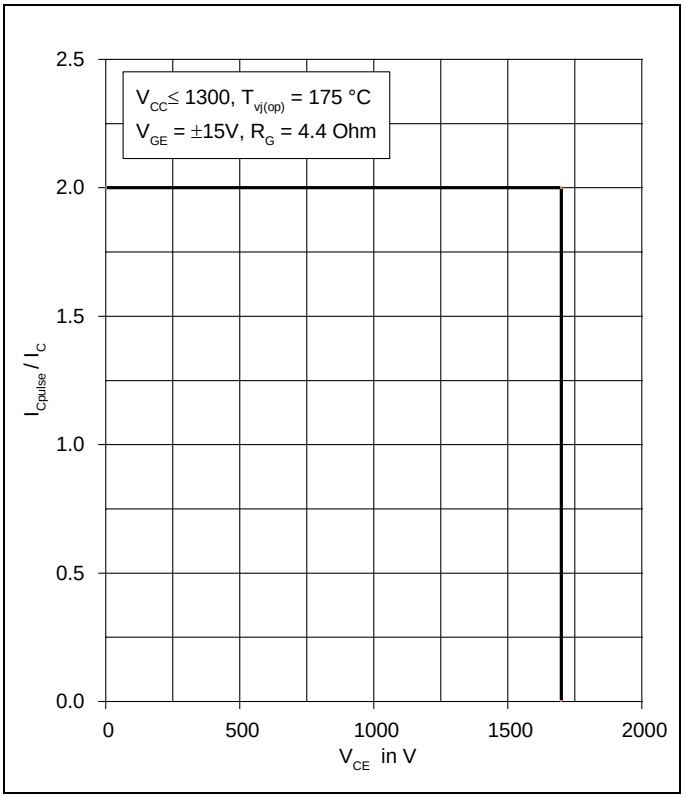


Fig. 5 Safe operating area (RBSOA)

Mechanical properties [6)]

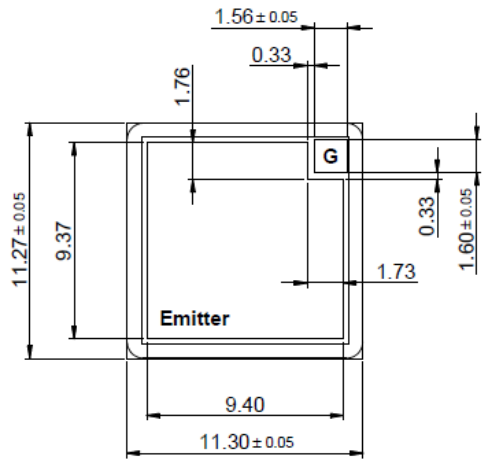
Parameter	Symbol	Conditions	min	Unit
Dimensions	Overall die	L x W	11.30 x 11.27	mm
	exposed front metal	L x W (except gate pad)	9.40 x 9.37	mm
	gate pad	L x W	1.76 x 1.73	mm
	thickness		190 ± 15	µm
Metallization [3)]	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.6	µm

[6)] Package and mechanical properties according to IEC 60747 - 15

Form of delivery

Description	Part number
Unsawn 6" wafer die	5SMY 76K1732
Sawn 6" wafer die (on blue tape)	5SMY 86K1732

Outline drawing [7)]



Note: all dimensions are shown in millimeters
[7)] 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 2043 Load - cycle capability of HiPaks
5SYA 2045 Thermal runaway during blocking
5SYA 2053 Applying IGBT
5SYA 2058 Surge currents for IGBT diodes
5SZK 9120 Specification of environmental class for HiPak

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