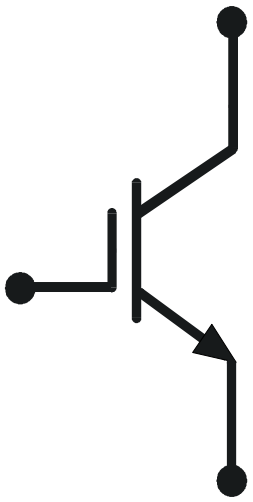
Data Sheet, Doc. No.5SYA 1704-00 08-2017

5SMY 12K1722
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} ≤150 °C		10	µs
Junction temperature	T_{vj}			175	
	$T_{vj(op)}$		-40	150	°C

[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		2.5	2.75	V
			Tvj = 125 °C		3.0		V
			Tvj = 150 °C		3.1		V
Collector cut-off current	ICES	VCE = 1700 V, VGE = 0 V	Tvj =25 °C			0.1	mA
			Tvj = 125 °C		0.5		mA
			Tvj = 150 °C		2.5		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		5.4		7.4	V
Gate charge	Qge	IC =100 A, VCE =900 V, VGE =15 V ..15 V			0.77		µC
Input capacitance	Cies	VCE = 25 V, VGE = 0 V, f = 1 MHz, Tvj =25 °C			6.75		nF
Output capacitance	Coes				0.34		nF
Reverse transfer capacitance	Cres				0.23		nF
Internal gate resistance	RGint				6.6		Ω
Turn-on delay time	td(on)	VCC =900 V, IC =100 A, RG =12 Ω, VGE = ±15 V, Lσ =266 nH, inductive load	Tvj =25 °C		235		ns
			Tvj = 125 °C		250		ns
			Tvj = 150 °C		254		ns
Rise time	tr		Tvj =25 °C		110		ns
			Tvj = 125 °C		120		ns
			Tvj = 150 °C		125		ns
Turn-off delay time	td(off)	VCC =900 V, IC =100 A, RG =12 Ω, VGE = ±15 V, Lσ =266 nH, inductive load	Tvj =25 °C		390		ns
			Tvj = 125 °C		475		ns
			Tvj = 150 °C		500		ns
Fall time	tf		Tvj =25 °C		145		ns
			Tvj = 125 °C		155		ns
			Tvj = 150 °C		160		ns
Turn-on switching energy	Eon	VCC =900 V, IC =100 A, VGE = ±15 V, RG =12 Ω, Lσ =266 nH, inductive load	Tvj =25 °C		27		mJ
			Tvj = 125 °C		35		mJ
			Tvj = 150 °C		39		mJ
Turn-off switching energy	Eoff	VCC =900 V, IC =100 A, VGE = ±15 V, RG =12 Ω, Lσ =266 nH, inductive load	Tvj =25 °C		19		mJ
			Tvj = 125 °C		29		mJ
			Tvj = 150 °C		32		mJ
Short circuit current	ISC	tpsc ≤10 µs, VGE = 15 V, Tvj =150 °C, VCC =1300 V, VCEM CHIP ≤1700 V	Tvj =150 °C		310		A

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

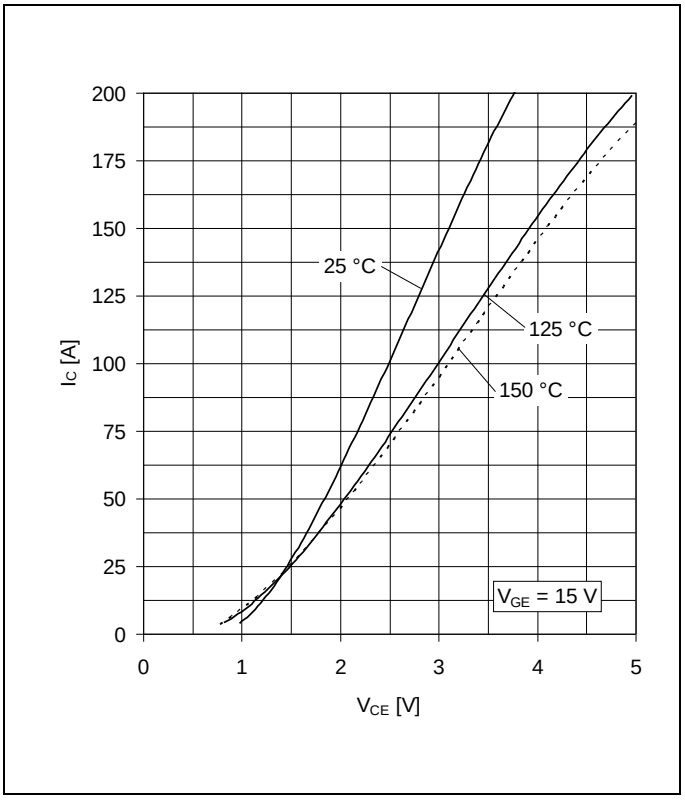


Fig. 1 Typical on-state characteristics, chip level

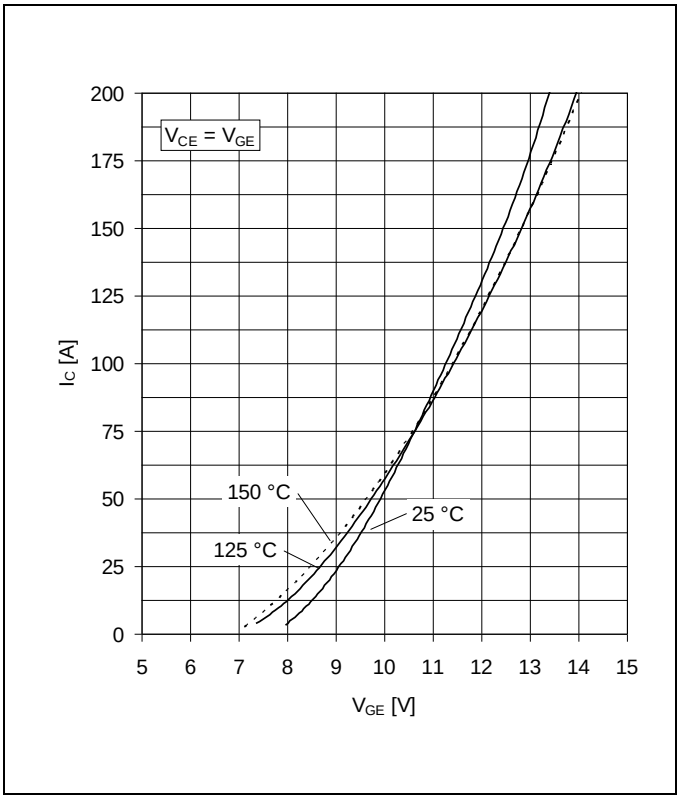


Fig. 2 Typical transfer characteristics, chip level

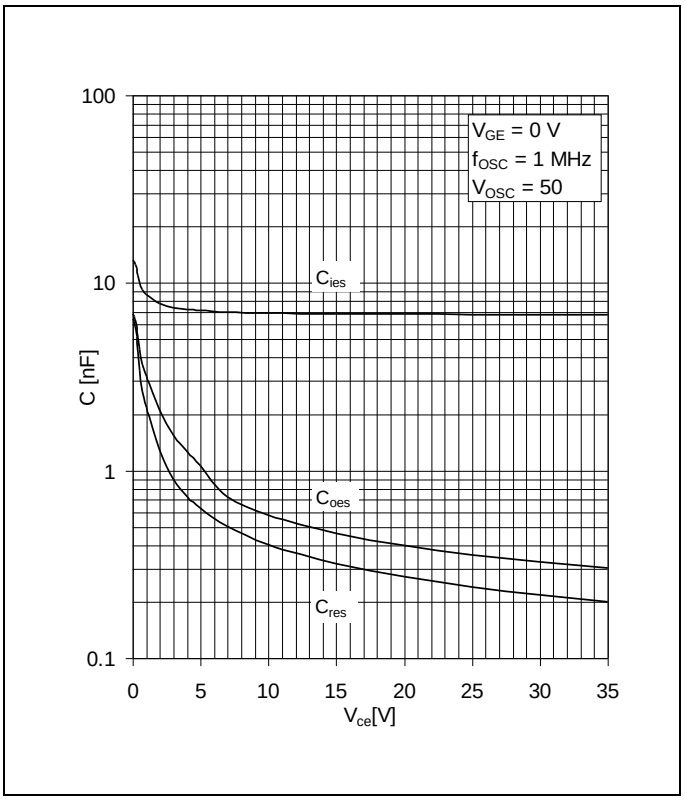


Fig. 3 Typical capacitances vs collector-emitter voltage

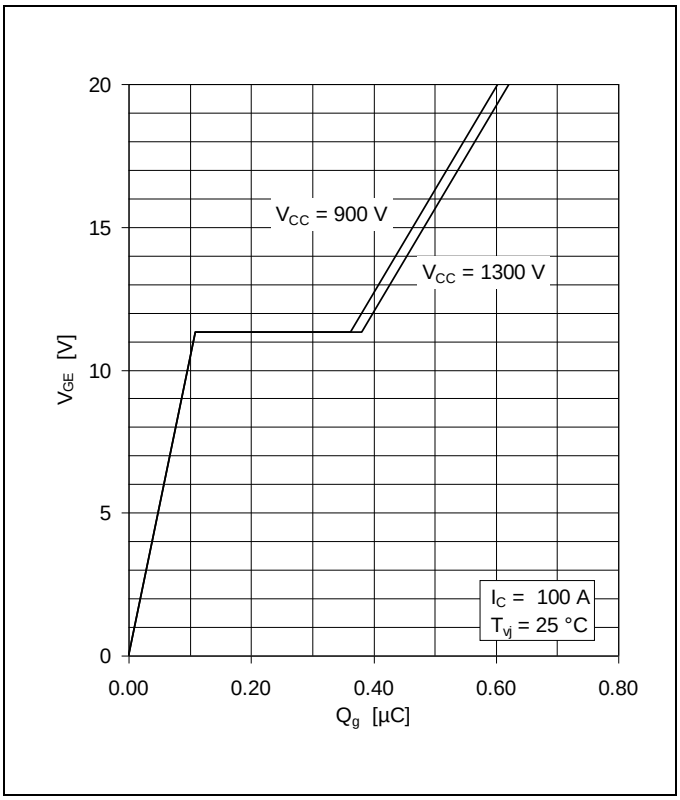


Fig. 4 Typical gate charge characteristics

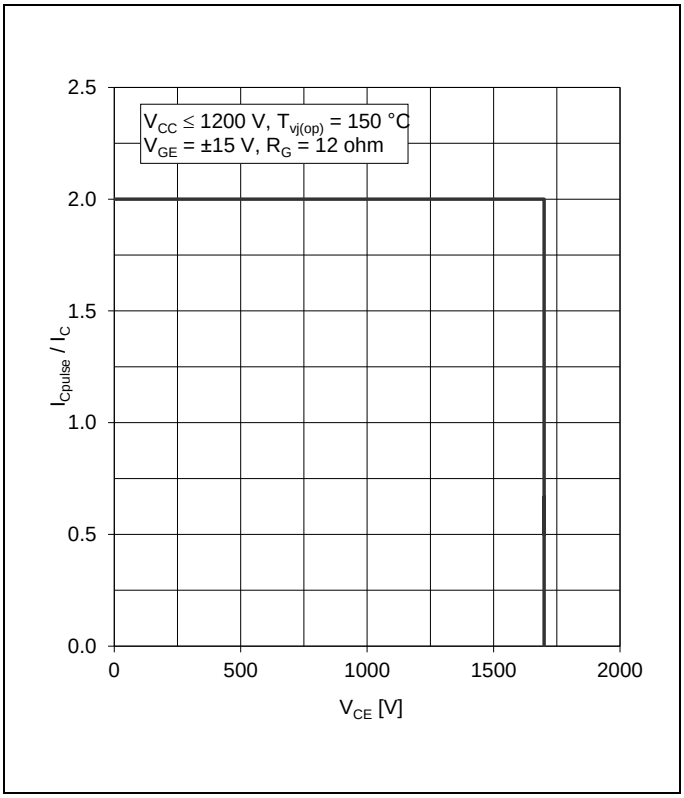


Fig. 5 Safe operating area (RBSOA)

Mechanical properties [6)]

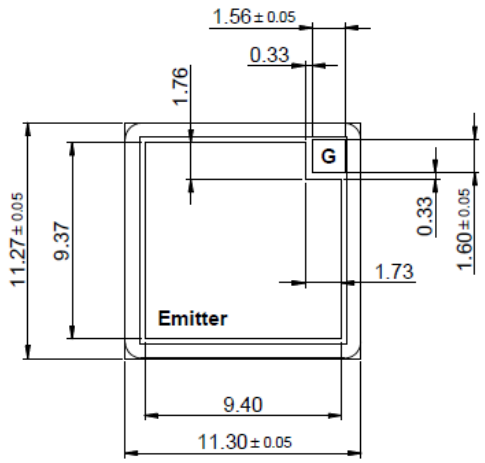
Parameter	Symbol	Conditions	min	Unit
Dimensions	Overall die	L x W	11.30 x 11.27	mm
	exposed front metal	L x W (except gate pad)	9.40 x 9.37	mm
	gate pad	L x W	1.73 x 1.76	mm
	thickness		205 ± 15	µm
Metallization [3)]	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.6	µm

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

Form of delivery

Description	Part number
Unsawn 6" wafer die	5SMY 76K1722
Sawn 6" wafer die (on blue tape)	5SMY 86K1722

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

ABB Switzerland Ltd.
Semiconductors
Fabrikstrasse 3
CH-5600 Lenzburg
Switzerland

Phone: +41 58 586 1419
Fax: +41 58 586 1306
E-Mail: abbsem@ch.abb.com

www.abb.com/semiconductors