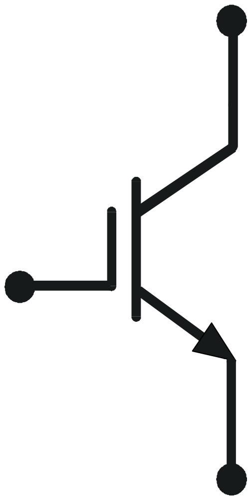
Data Sheet, Doc. No. 5SYA 1703-01 05 15

5SMY 12L1731
IGBT-Die

V_{CE} = 1700 V
I_C = 120 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, $T_{vj} \geq 25$ °C		1700	V
DC collector current	I_C			120	A
Peak collector current	I_{CM}			240	A
Gate-emitter voltage	V_{GES}		- 20	20	V
IGBT short circuit SOA	t_{psc}	V_{CC} = 1300 V, $V_{CEM\ CHIP} \leq 1700$ V $V_{GE} \leq 15$ V, $T_{vj} \leq 175$ °C		10	µs
Junction temperature	T_{vj}		-40	175	°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	$V_{(BR)CES}$	V_{GE} = 0 V, I_C = 1 mA, T_{vj} = 25 °C adequate environment		1700			V
Collector-emitter [3)] saturation voltage	$V_{CE\ sat}$	I_C = 120 A, V_{GE} = 15 V	T_{vj} = 25 °C		2.35		V
			T_{vj} = 125 °C		2.70		V
			T_{vj} = 175 °C		2.90		V
Collector cut-off current	I_{CES}	V_{CE} = 1700 V, V_{GE} = 0 V	T_{vj} = 25 °C			0.1	mA
			T_{vj} = 125 °C		0.1		mA
			T_{vj} = 175 °C		5		mA
Gate leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = ± 20 V, T_{vj} = 125 °C		- 500		500	nA
Gate-emitter threshold voltage	$V_{GE(TO)}$	I_C = 4.8 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		4.5		6.5	V
Gate charge	Q_{ge}	I_C = 120 A, V_{CE} = 900 V, V_{GE} = -15 V .. 15 V			0.82		µC
Input capacitance	C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz, T_{vj} = 25 °C			7.0		nF
Output capacitance	C_{oes}				0.40		nF
Reverse transfer capacitance	C_{res}				0.28		nF
Internal gate resistance	R_{Gint}				16		Ω
Turn-on delay time	$t_{d(on)}$	V_{CC} = 900 V, I_C = 120 A, R_G = 0.2 Ω, V_{GE} = ± 15 V, L_σ = 267 nH, inductive load Aux: 5SLZ 12J1700	T_{vj} = 25 °C		315		ns
			T_{vj} = 125 °C		335		ns
			T_{vj} = 175 °C		345		ns
Rise time	t_r		T_{vj} = 25 °C		140		ns
			T_{vj} = 125 °C		135		ns
			T_{vj} = 175 °C		140		ns
Turn-off delay time	$t_{d(off)}$	V_{CC} = 900 V, I_C = 120 A, R_G = 0.2 Ω, V_{GE} = ± 15 V, L_σ = 267 nH, inductive load Aux: 5SLZ 12J1700	T_{vj} = 25 °C		445		ns
			T_{vj} = 125 °C		550		ns
			T_{vj} = 175 °C		600		ns
Fall time	t_f		T_{vj} = 25 °C		150		ns
			T_{vj} = 125 °C		150		ns
			T_{vj} = 175 °C		160		ns
Turn-on switching energy	E_{on}	V_{CC} = 900 V, I_C = 120 A, V_{GE} = ± 15 V, R_G = 0.2 Ω, L_σ = 267 nH, inductive load	T_{vj} = 25 °C		54		mJ
			T_{vj} = 125 °C		63		mJ
			T_{vj} = 175 °C		75		mJ
Turn-off switching energy	E_{off}	V_{CC} = 900 V, I_C = 120 A, V_{GE} = ± 15 V, R_G = 0.2 Ω, L_σ = 267 nH, inductive load	T_{vj} = 25 °C		24		mJ
			T_{vj} = 125 °C		35		mJ
			T_{vj} = 175 °C		42		mJ
Short circuit current	I_{SC}	t_{psc} ≤ 10 µs, V_{GE} = 15 V, T_{vj} = 125 °C, V_{CC} = 1300 V, $V_{CEM\ CHIP}$ ≤ 1700 V	T_{vj} = 125 °C		345		A

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

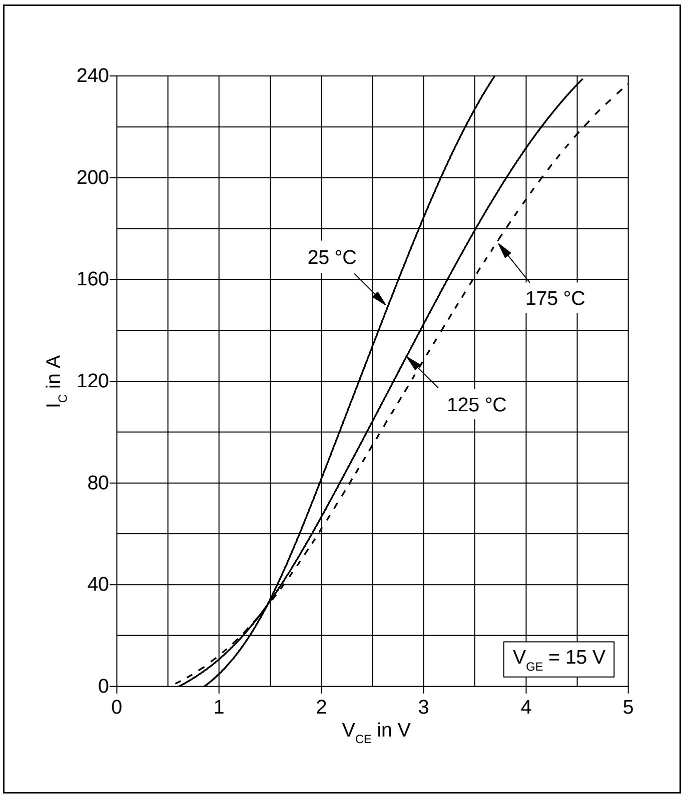


Fig. 1 Typical on-state characteristics, chip level

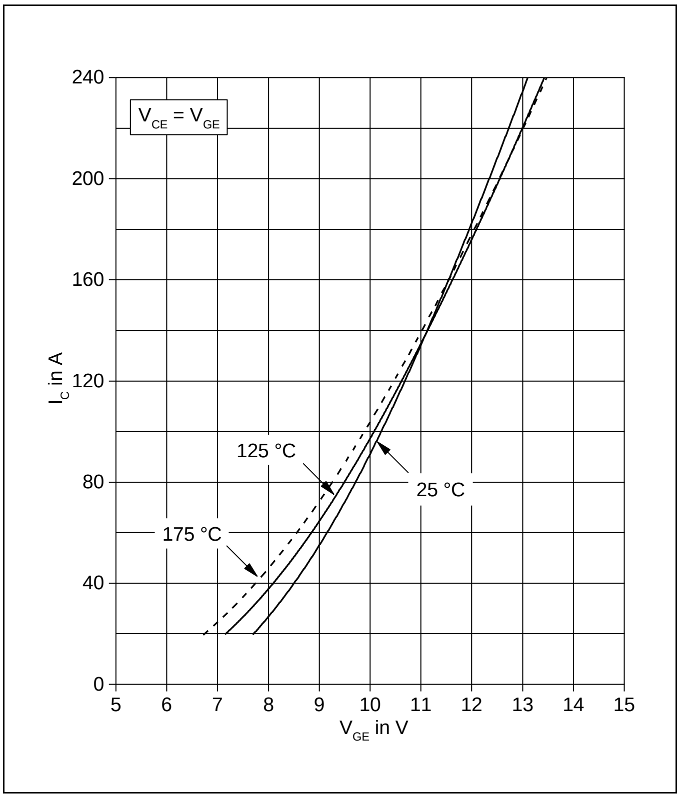


Fig. 2 Typical transfer characteristics, chip level

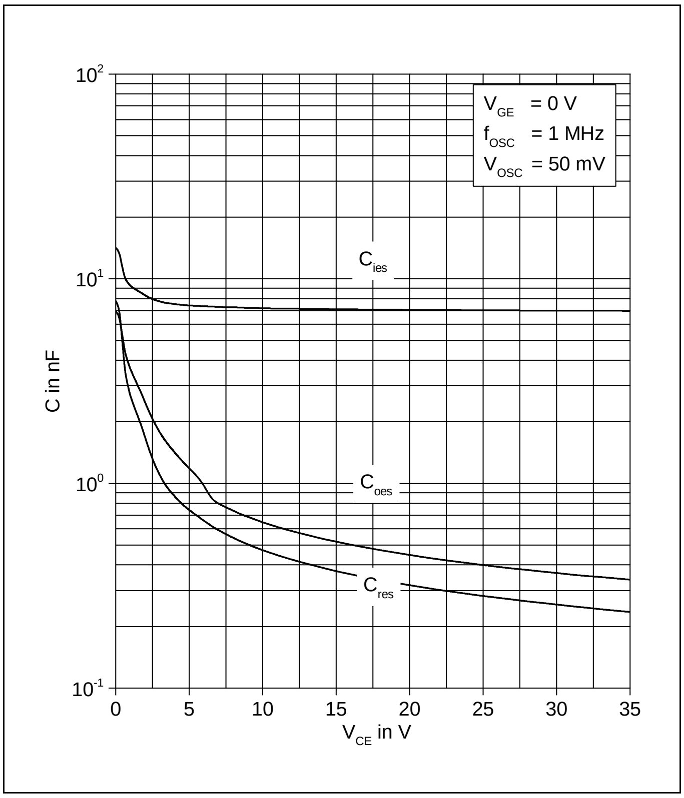


Fig. 5 Typical capacitances vs collector-emitter voltage

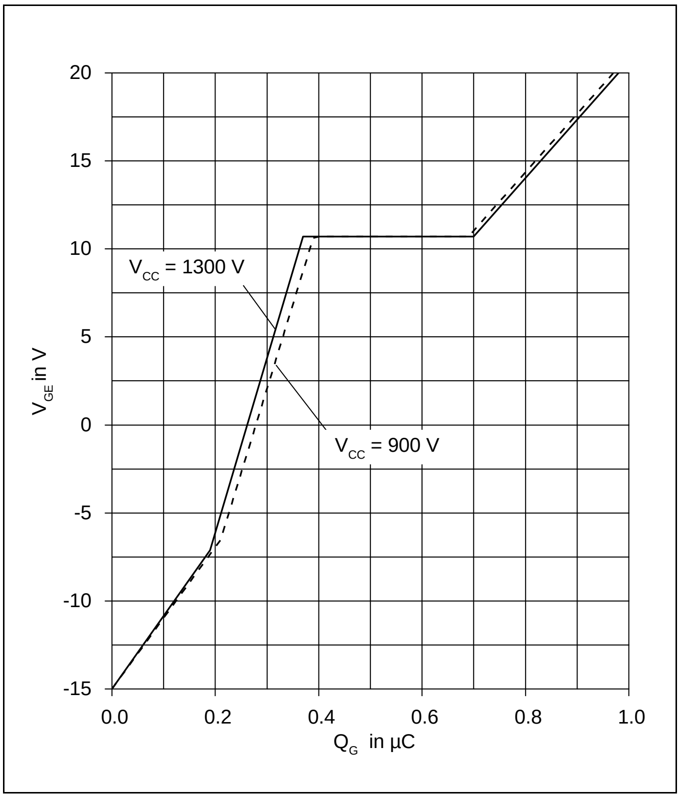


Fig. 6 Typical gate charge characteristics

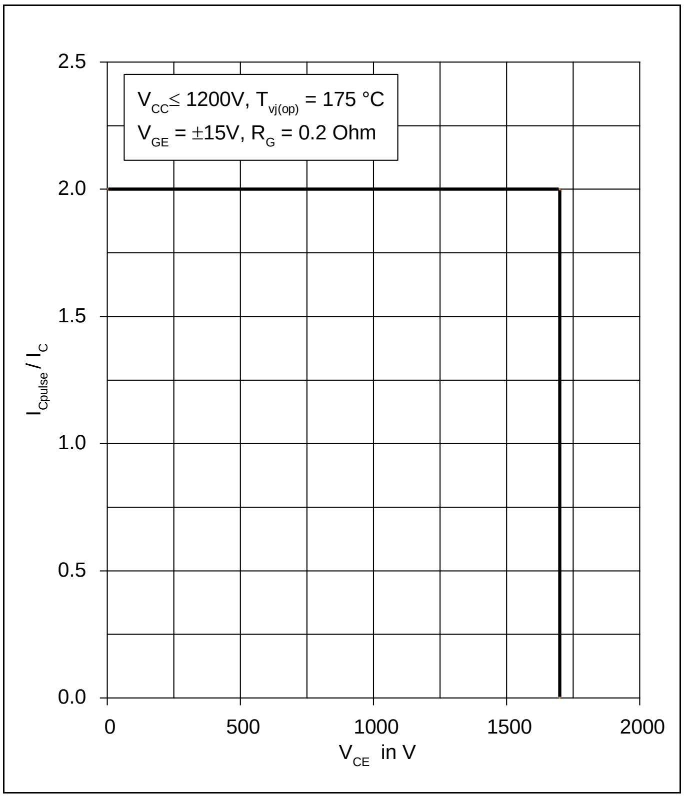


Fig. 5 Safe operating area diode (SOA)

Mechanical properties 6)

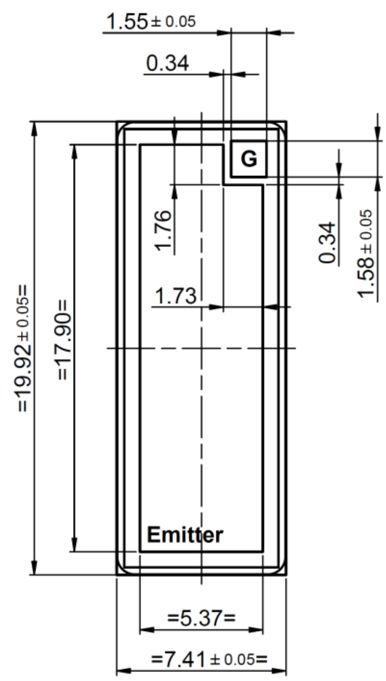
Parameter	Symbol	Conditions	min	Unit
Dimensions	Overall die	L x W	7.41 x 19.92	mm
	exposed front metal	L x W (except gate pad)	5.37 x 17.90	mm
	gate pad	L x W	1.73 x 1.76	mm
	thickness		190 ± 15	µm
Metallization 3)	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.6	µm

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

Form of delivery

Description	Part number
Sawn 6" wafer die (on blue tape)	5SMY 86L1731

Outline drawing 7)



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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. IX.
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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