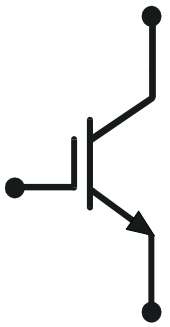
Data Sheet, Doc. No. 5SYA 1326-04 12 14

5SMY 12M1721
IGBT-Die

V_{CE} = 1700 V
I_C = 150 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			150	A
Peak collector current	I_{CM}			300	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} ≤ 125 °C		10	µs
Junction temperature	T_{vj}			175	°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 V, I_C = 1 mA, T_{vj} = 25 °C adequate environment		1700			V
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C = 150 A, V_{GE} = 15 V	T_{vj} = 25 °C		2.5	2.75	V
			T_{vj} = 125 °C		3.0		V
			T_{vj} = 150 °C		3.1		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		0.5		mA
			T_{vj} = 150 °C		2.5		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 = 6 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		5.4		7.4	V
Gate charge	Q_{ge}	I_C = 150 A, V_{CE} = 900 V, V_{GE} = 15 V .. 15 V			0.9		µC
Input capacitance	C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz, T_{vj} = 25 °C			10.0		nF
Output capacitance	C_{oes}				0.52		nF
Reverse transfer capacitance	C_{res}				0.36		nF
Turn-on delay time	$t_{d(on)}$	V_{CC} = 900 V, I_C = 150 A, R_G = 8.2 Ω, V_{GE} = ± 15 V, L_σ = 200 nH, inductive load	T_{vj} = 25 °C		235		ns
			T_{vj} = 125 °C		250		ns
			T_{vj} = 150 °C		254		ns
Rise time	t_r		T_{vj} = 25 °C		110		ns
			T_{vj} = 125 °C		120		ns
			T_{vj} = 150 °C		125		ns
Turn-off delay time	$t_{d(off)}$	V_{CC} = 900 V, I_C = 150 A, R_G = 8.2 Ω, V_{GE} = ± 15 V, L_σ = 200 nH, inductive load	T_{vj} = 25 °C		390		ns
			T_{vj} = 125 °C		475		ns
			T_{vj} = 150 °C		500		ns
Fall time	t_f		T_{vj} = 25 °C		145		ns
			T_{vj} = 125 °C		155		ns
			T_{vj} = 150 °C		160		ns
Turn-on switching energy	E_{on}	V_{CC} = 900 V, I_C = 150 A, V_{GE} = ± 15 V, R_G = 8.2 Ω, L_σ = 200 nH, inductive load	T_{vj} = 25 °C		41		mJ
			T_{vj} = 125 °C		53		mJ
			T_{vj} = 150 °C		59		mJ
Turn-off switching energy	E_{off}	V_{CC} = 900 V, I_C = 150 A, V_{GE} = ± 15 V, R_G = 8.2 Ω, L_σ = 200 nH, inductive load	T_{vj} = 25 °C		29		mJ
			T_{vj} = 125 °C		44		mJ
			T_{vj} = 150 °C		48		mJ
Short circuit current	I_{SC}	t_{psc} ≤ 10 µs, V_{GE} = 15 V, T_{vj} = 150 °C, V_{CC} = 1300 V, $V_{CEM\ CHIP}$ ≤ 1700 V	T_{vj} = 150 °C		480		A

[2)] Characteristic values according to IEC 60747 - 9

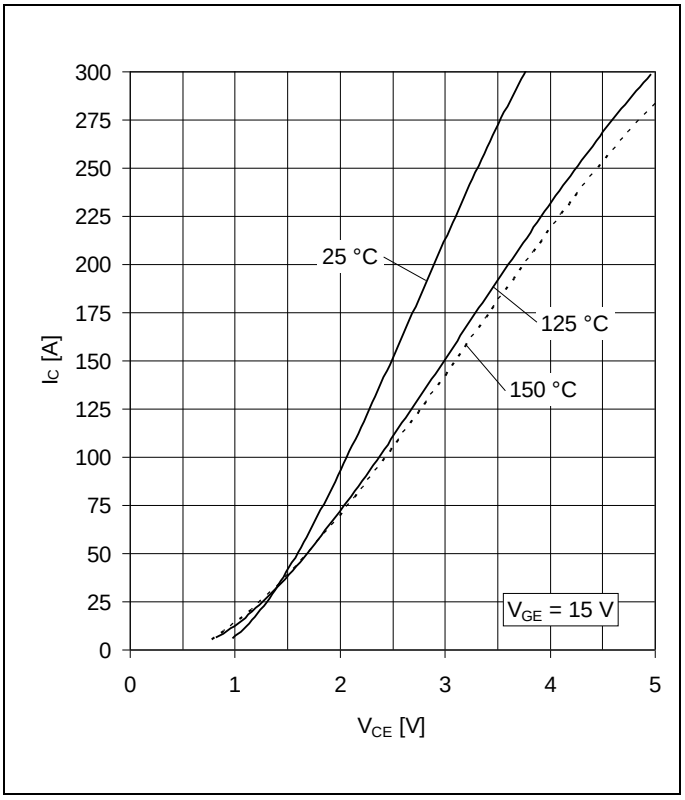


Fig. 1 Typical on-state characteristics, chip level

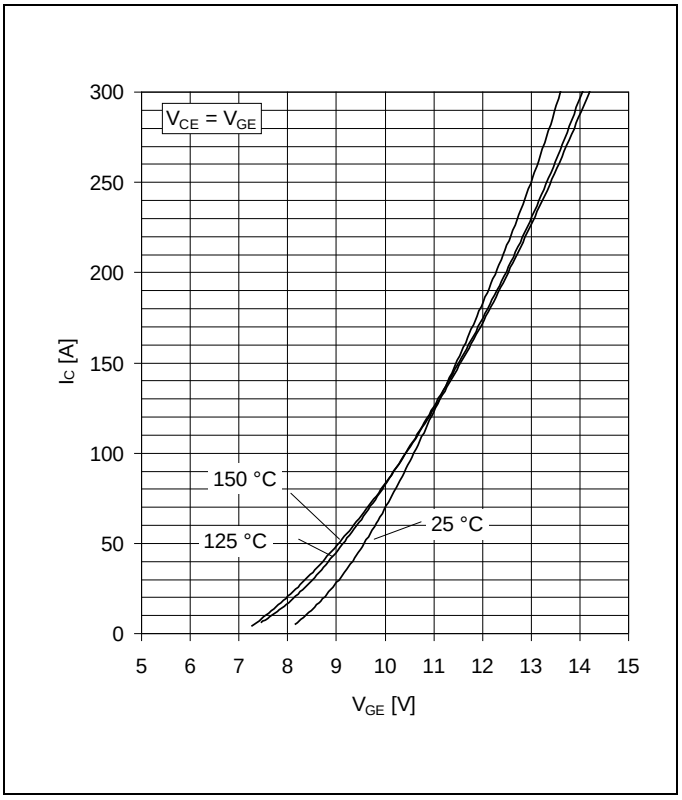


Fig. 2 Typical transfer characteristics, chip level

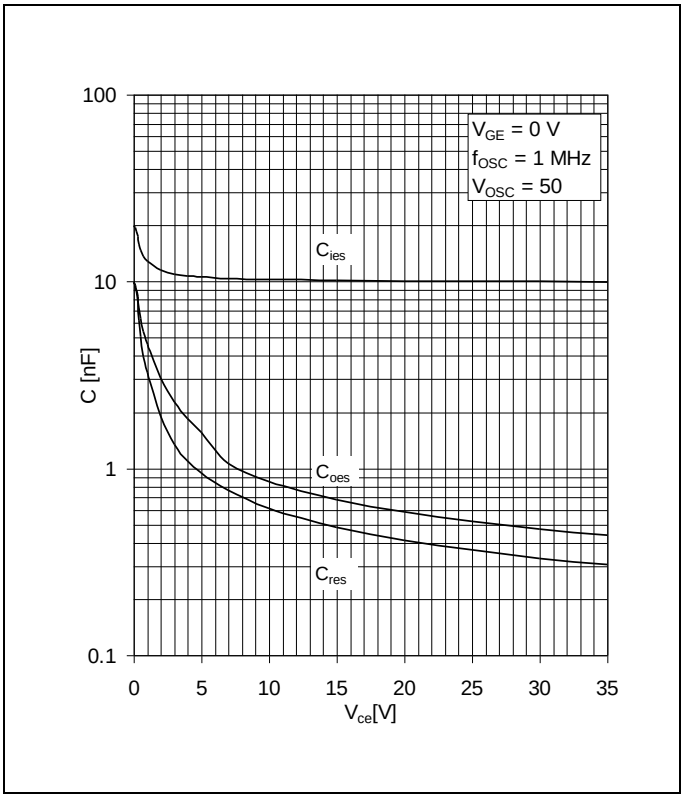


Fig. 3 Typical capacitances vs collector-emitter voltage

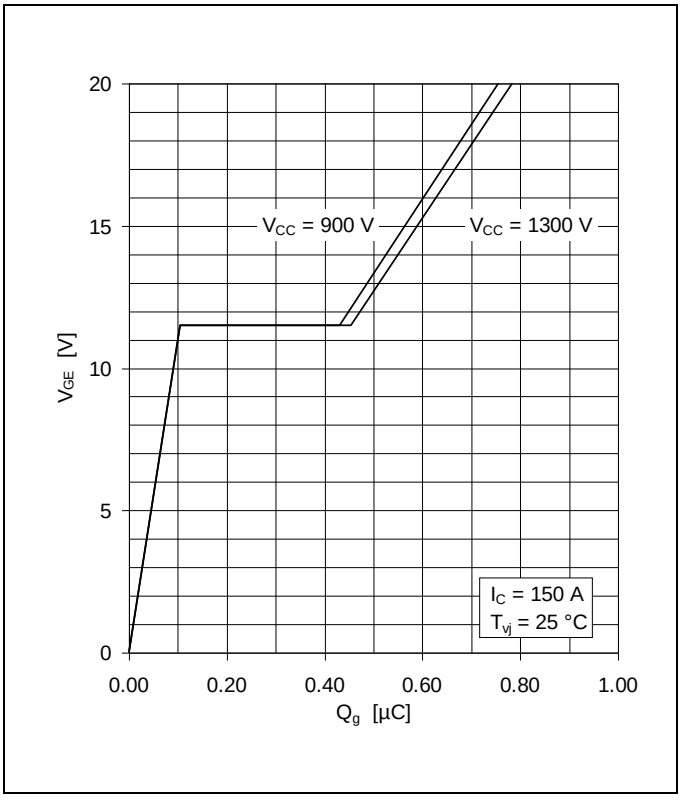


Fig. 4 Typical gate charge characteristics

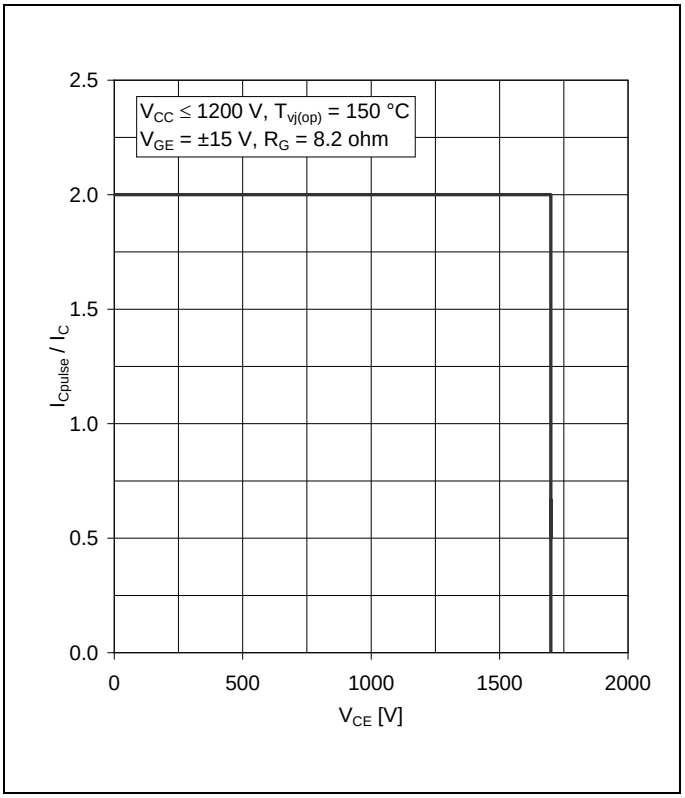


Fig. 5 Safe operating area diode (SOA)

Mechanical properties [3)]

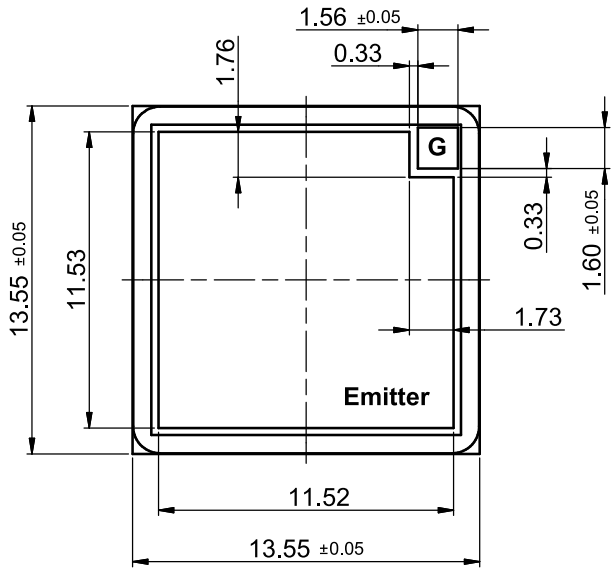
Parameter	Symbol	Conditions	min	Unit
Dimensions	Overall die	L x W	13.55 x 13.55	mm
	exposed front metal	L x W (except gate pad)	11.52 x 11.53	mm
	gate pad	L x W	1.73 x 1.76	mm
	thickness		209 ± 15	µm
Metallization [3)]	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.6	µm

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

Form of delivery

Description	Part number
Picked wafer die (waffle pack)	5SMY 12M1721
Sawn 6" wafer die (on blue tape)	5SMY 86M1721

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. IX.
This product has been designed and qualified for Industrial Level.

Related documents:

5SYA 2045 Thermal runaway during blocking
5SYA 2059 Applying IGBT and Diode dies
5SYA 2093-00 Thermal design of IGBT Modules

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