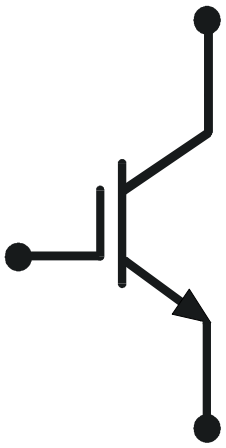
Data Sheet, Doc. No. 5SYA 1332-00 2017-05

5SMY 12P1730
IGBT-Die

V_{CE} = 1700 V
I_C = 225 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			225	A
Peak collector current	I_{CM}			450	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, $T_{vj\ start} \leq$ 150 °C		10	µs
Junction temperature	$T_{vj(op)}$		-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 [3)]	$V_{(BR)CES}$	V_{GE} = 0 V, I_C = 1 mA, T_{vj} = 25 °C		1700			V
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C = 150 A, V_{GE} = 15 V	T_{vj} = 25 °C		2.25	2.6	V
			T_{vj} = 125 °C		2.55		V
			T_{vj} = 175 °C		2.75		V
Collector cut-off current	I_{CES}	V_{CE} = 1700 V, V_{GE} = 0 V	T_{vj} = 25 °C			0.5	mA
			T_{vj} = 125 °C		0.5		mA
			T_{vj} = 175 °C		15		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		4.5		6.5	V
Gate charge	Q_{GE}	I_C = 225 A, V_{CE} = 900 V, V_{GE} = 15 V .. 15 V			1.6		µC
Input capacitance	C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz, T_{vj} = 25 °C			14.4		nF
Output capacitance	C_{oes}				1.3		nF
Reverse transfer capacitance	C_{res}				1.2		nF
Internal gate resistance	R_{Gint}				2		Ω
Turn-on delay time	$t_{d(on)}$	V_{CC} = 900 V, I_C = 225 A, R_G = 1 Ω, V_{GE} = ± 15 V, L_σ = 80 nH, inductive load Aux: 5SLZ 12L1700	T_{vj} = 25 °C		245		ns
			T_{vj} = 125 °C		260		ns
			T_{vj} = 175 °C		270		ns
Rise time	t_r		T_{vj} = 25 °C		70		ns
			T_{vj} = 125 °C		90		ns
			T_{vj} = 175 °C		95		ns
Turn-off delay time	$t_{d(off)}$	V_{CC} = 900 V, I_C = 225 A, R_G = 1 Ω, V_{GE} = ± 15 V, L_σ = 80 nH, inductive load Aux: 5SLZ 12L1700	T_{vj} = 25 °C		440		ns
			T_{vj} = 125 °C		540		ns
			T_{vj} = 175 °C		600		ns
Fall time	t_f		T_{vj} = 25 °C		110		ns
			T_{vj} = 125 °C		160		ns
			T_{vj} = 175 °C		165		ns
Turn-on switching energy	E_{on}	V_{CC} = 900 V, I_C = 225 A, V_{GE} = ± 15 V, R_G = 1 Ω, L_σ = 80 nH, inductive load Aux: 5SLZ 12L1700	T_{vj} = 25 °C		50		mJ
			T_{vj} = 125 °C		75		mJ
			T_{vj} = 175 °C		95		mJ
Turn-off switching energy	E_{off}	V_{CC} = 900 V, I_C = 225 A, V_{GE} = ± 15 V, R_G = 1 Ω, L_σ = 80 nH, inductive load	T_{vj} = 25 °C		45		mJ
			T_{vj} = 125 °C		70		mJ
			T_{vj} = 175 °C		85		mJ
Short circuit current	I_{SC}	V_{GE} = 15 V, V_{CC} = 1300 V	T_{vj} = 150 °C		750		A

[2)] Characteristic values according to IEC 60747 - 9
[3)] Please refer to Application Note 5SYA 2059: Applying IGBT and diode dies

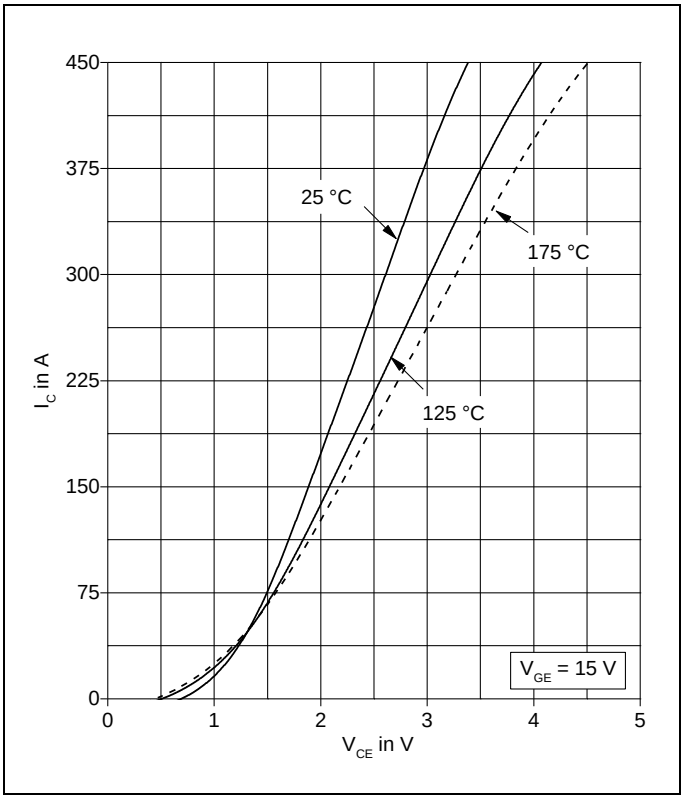


Fig. 1 Typical on-state characteristics

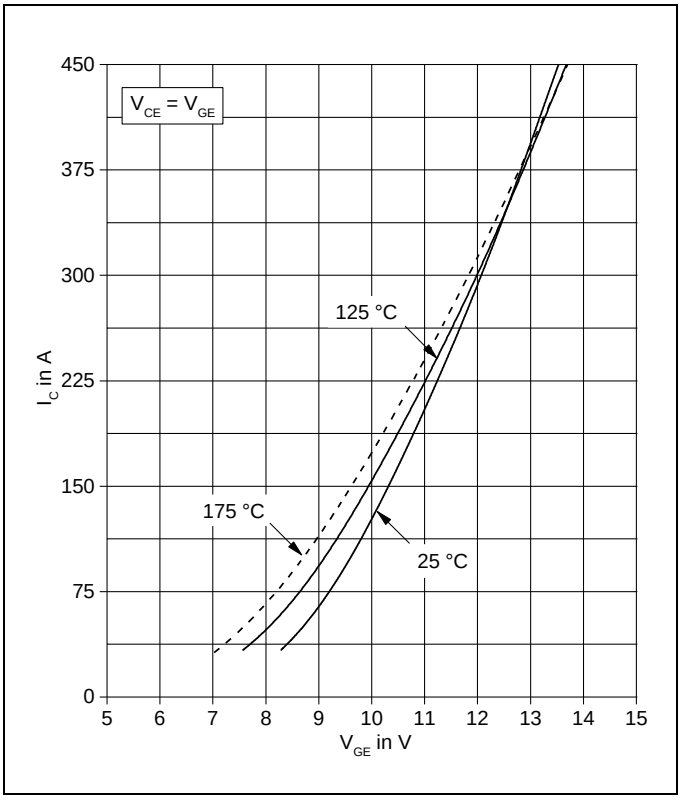


Fig. 2 Typical transfer characteristics

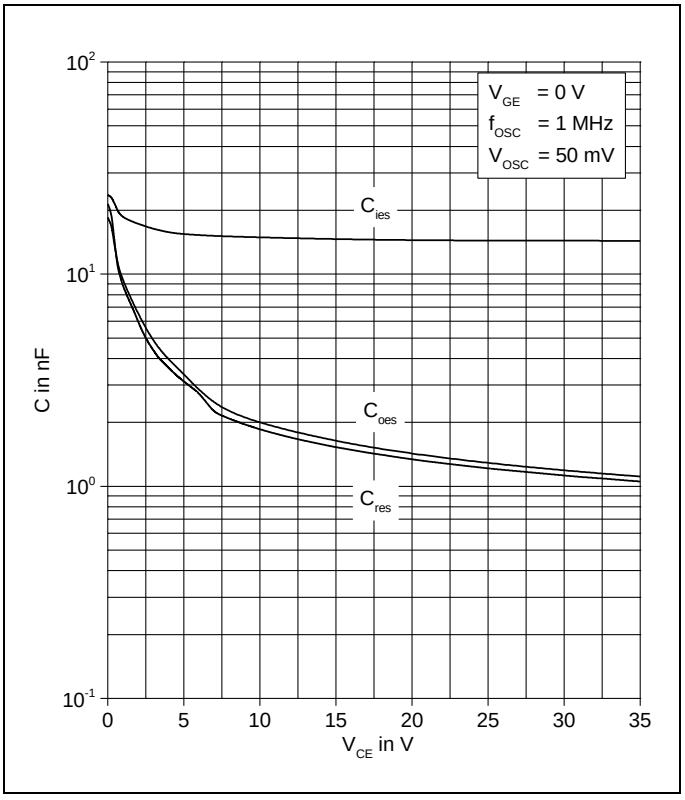


Fig. 3 Typical capacitances vs collector-emitter voltage

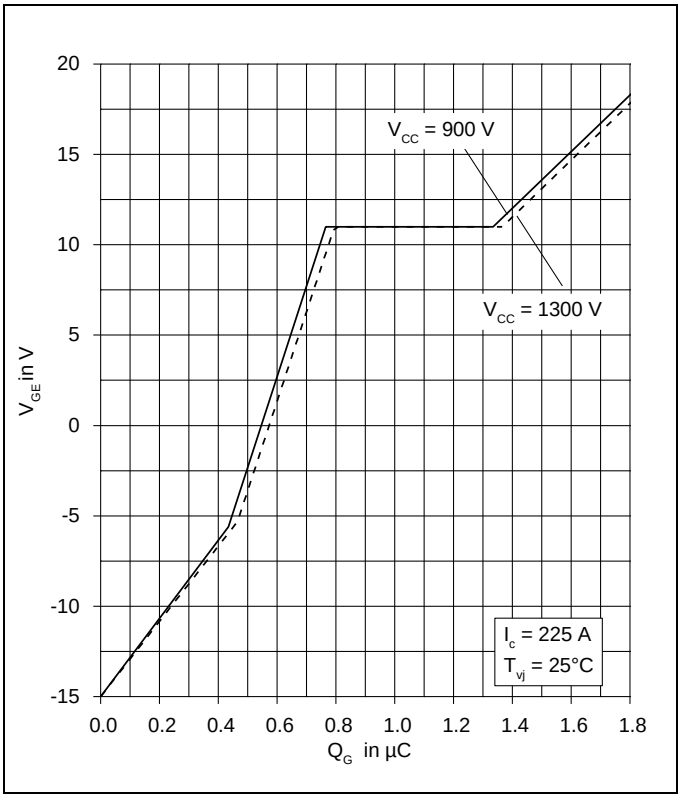


Fig. 4 Typical gate charge characteristics

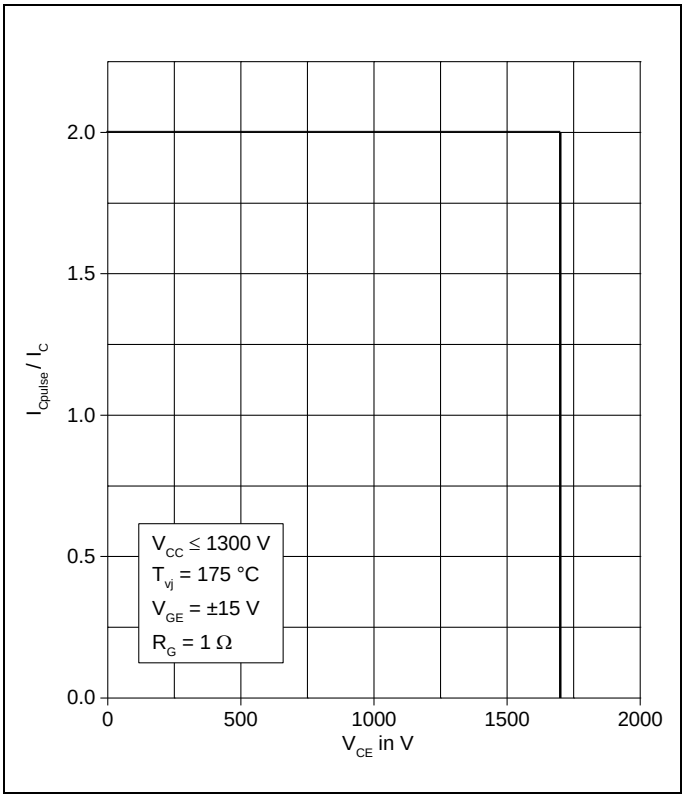


Fig. 5 Turn-off safe operating area (RBSOA)

Mechanical properties [3)]

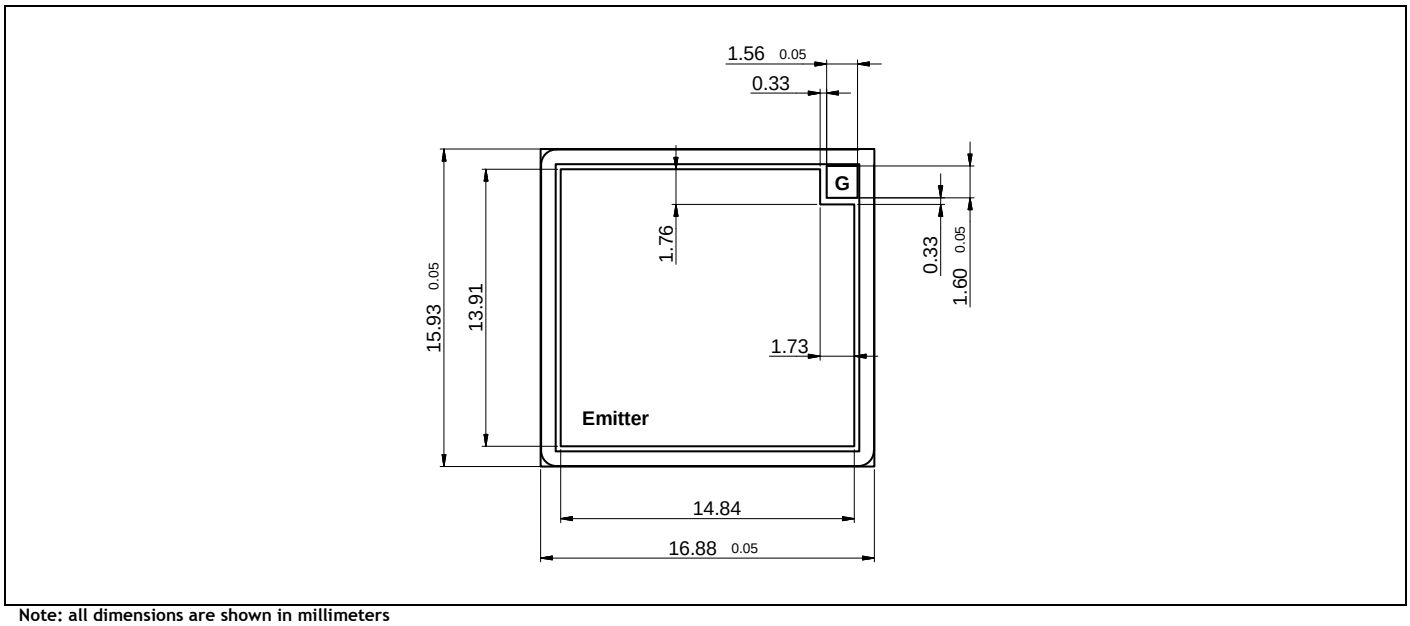
Parameter	Symbol	Conditions	min	Unit
Dimensions	Overall die	L x W	16.88 x 15.93	mm
	exposed front metal	L x W (except gate pad)	14.84 x 13.91	mm
	gate pad	L x W	1.76 x 1.73	mm
	thickness		190 ± 15	µm
Metallization [3)]	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.6	µm

[3)] Please refer to Application Note 5SYA 2059: Applying IGBT and diode dies

Form of delivery

Description	Part number
Unsawn 6" wafer die (on blue tape)	5SMY 76P1730
Sawn 6" wafer die (on blue tape)	5SMY 86P1730

Outline drawing



Note: all dimensions are shown in millimeters

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 2045 Thermal runaway during blocking
5SYA 2059 Applying IGBT & Diode Dies
5SZK 9114 Handling, packing and storage conditions for sawn wafer dies and bare die

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