V_{CE} = 1200 V
I_C = 150 A

IGBT-Die

5SMY 12M1280

Die size: 13.5 x 13.5 mm

Doc. No. 5SYA 1322-04 12 14

- **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		1200	V
DC collector current	I_C			150	A
Peak collector current	I_{CM}	Limited by T_{vjmax}		300	A
Gate-emitter voltage	V_{GES}		-20	20	V
IGBT short circuit SOA	t_{psc}	V_{CC} = 900 V, $V_{CEM} \leq$ 1200 V $V_{GE} \leq$ 15 V, $T_{vj} \leq$ 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 - 9

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		1200			V
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C = 150 A, V_{GE} = 15 V	T_{vj} = 25 °C		2.0	2.3	V
			T_{vj} = 125 °C		2.2		V
Collector cut-off current	I_{CES}	V_{CE} = 1200 V, V_{GE} = 0 V	T_{vj} = 25 °C			100	µA
			T_{vj} = 125 °C		150		µA
Gate leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V, T_{vj} = 125 °C		-200		200	nA
Gate-emitter threshold voltage	$V_{GE(TO)}$	I_C = 6 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		5		7	V
Gate charge	Q_{ge}	I_C = 150 A, V_{CE} = 600 V, V_{GE} = -15 ..15 V			1530		nC
Input capacitance	C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz, T_{vj} = 25 °C			10.6		nF
Output capacitance	C_{oes}				0.71		
Reverse transfer capacitance	C_{res}				0.47		
Internal gate resistance	R_{Gint}				2		Ω
Turn-on delay time	$t_{d(on)}$	V_{CC} = 600 V, I_C = 150 A, R_G = 6.8 Ω, V_{GE} = ±15 V, L_σ = 60 nH, inductive load	T_{vj} = 25 °C		200		ns
			T_{vj} = 125 °C		230		
Rise time	t_r		T_{vj} = 25 °C		70		ns
			T_{vj} = 125 °C		70		
Turn-off delay time	$t_{d(off)}$	V_{CC} = 600 V, I_C = 150 A, R_G = 6.8 Ω, V_{GE} = ±15 V, L_σ = 60 nH, inductive load	T_{vj} = 25 °C		460		ns
			T_{vj} = 125 °C		525		
Fall time	t_f		T_{vj} = 25 °C		50		ns
			T_{vj} = 125 °C		75		
Turn-on switching energy	E_{on}	V_{CC} = 600 V, I_C = 150 A, V_{GE} = ±15 V, R_G = 6.8 Ω, L_σ = 60 nH, inductive load, FWD: 5SLY 12M1200	T_{vj} = 25 °C		16		mJ
			T_{vj} = 125 °C		22		
Turn-off switching energy	E_{off}	V_{CC} = 600 V, I_C = 150 A, V_{GE} = ±15 V, R_G = 6.8 Ω, L_σ = 60 nH, inductive load	T_{vj} = 25 °C		9.4		mJ
			T_{vj} = 125 °C		15		
Short circuit current	I_{SC}	t_{psc} ≤ 10 µs, V_{GE} = 15 V, T_{vj} = 125 °C, V_{CC} = 900 V, V_{CEM} ≤ 1200 V			650		A

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

Mechanical properties

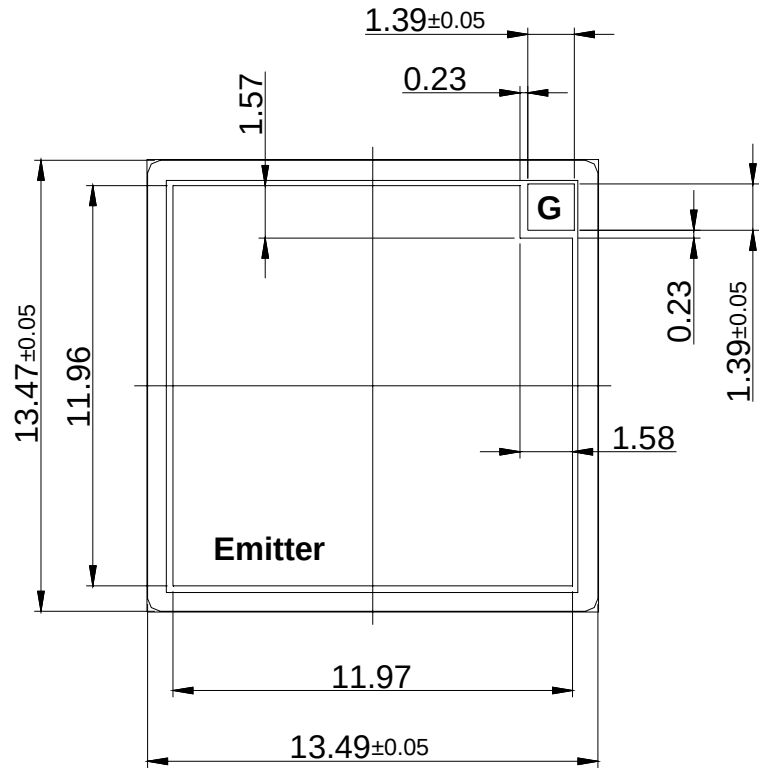
Parameter				Unit
Dimensions	Overall die	L x W	13.5 x 13.5	mm
	exposed front metal	L x W (except gate pad)	12.0 x 12.0	mm
	gate pad	L x W	1.39 x 1.39	mm
	thickness		140 ± 20	µm
Metallization [3)]	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.2	µm

[3)] For assembly instructions refer to : IGBT and Diode chips from ABB Switzerland Ltd, Semiconductors, Doc. No. 5SYA 2033.

Form of delivery

Description	Part number
Unsawn 6" wafer die	5SMY 76M1280
Sawn 6" wafer die (on blue tape)	5SMY 86M1280

Outline drawing



Note: all dimensions are shown in mm

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.

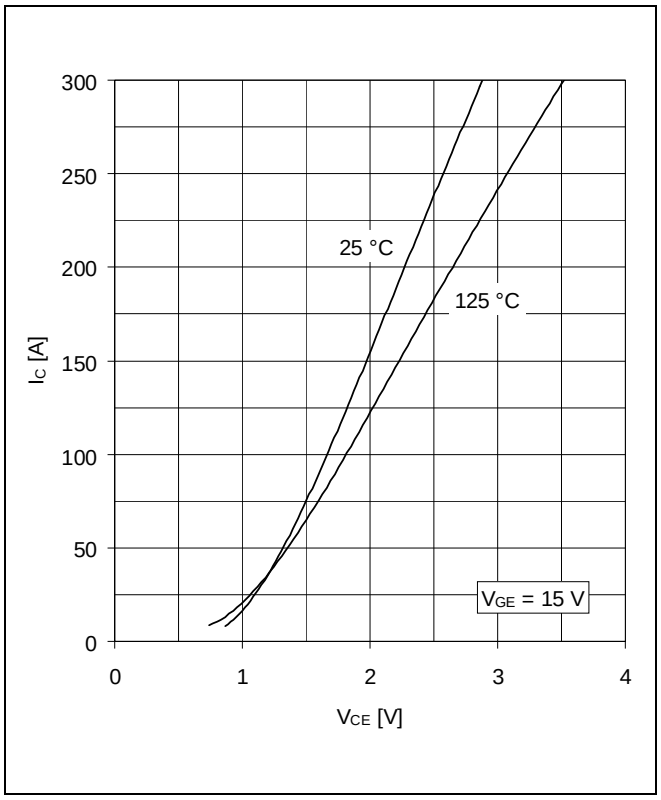


Fig. 1 Typical on-state characteristics

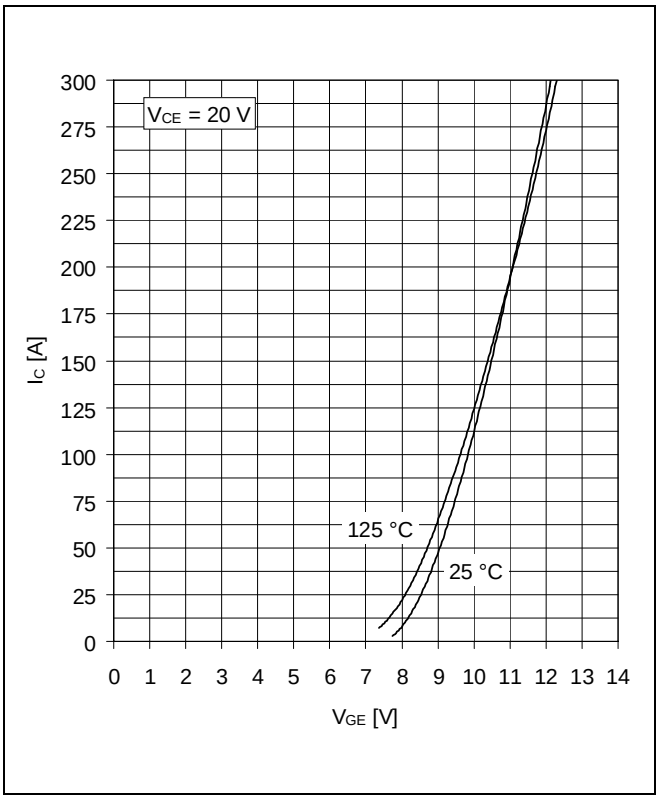


Fig. 2 Typical transfer characteristics

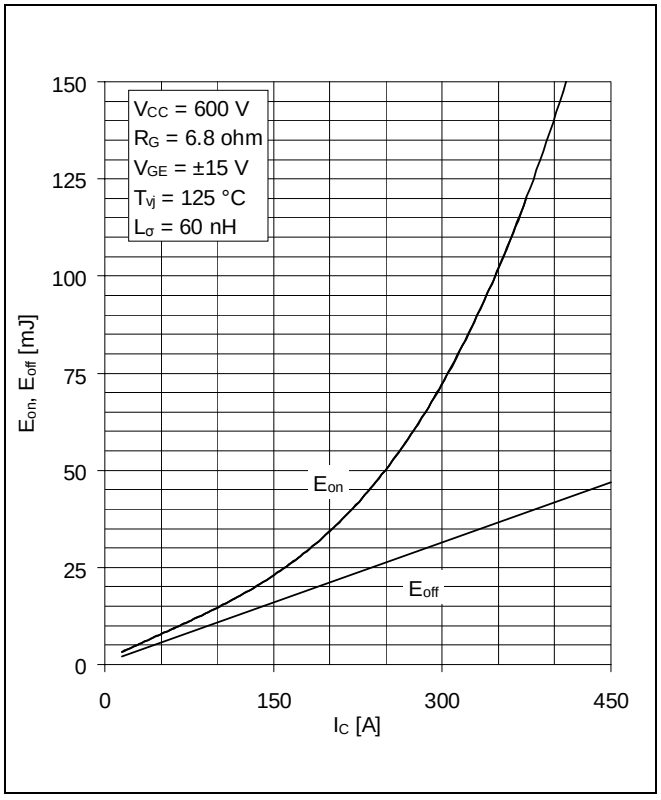


Fig. 3 Typical switching characteristics vs collector current

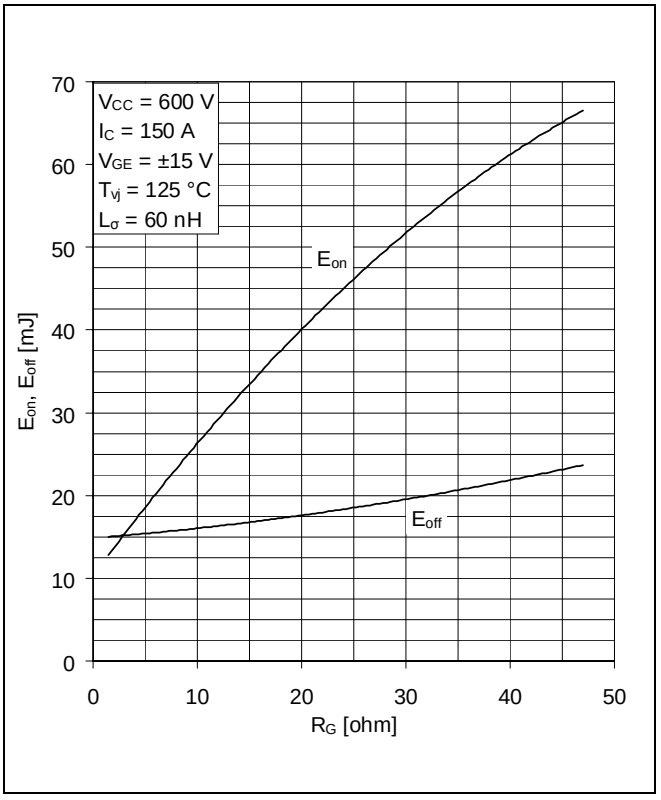


Fig. 4 Typical switching characteristics vs gate resistor

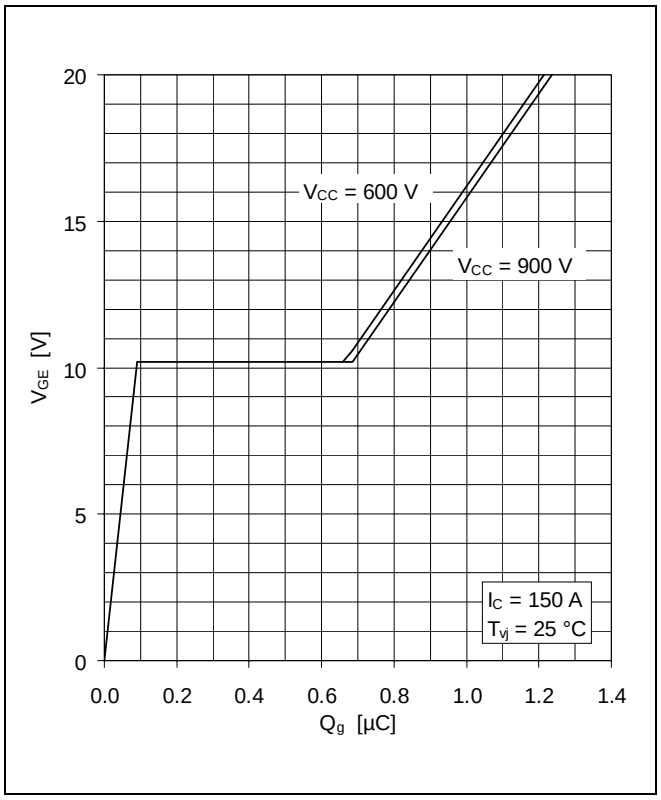


Fig. 5 Typical gate charge characteristics

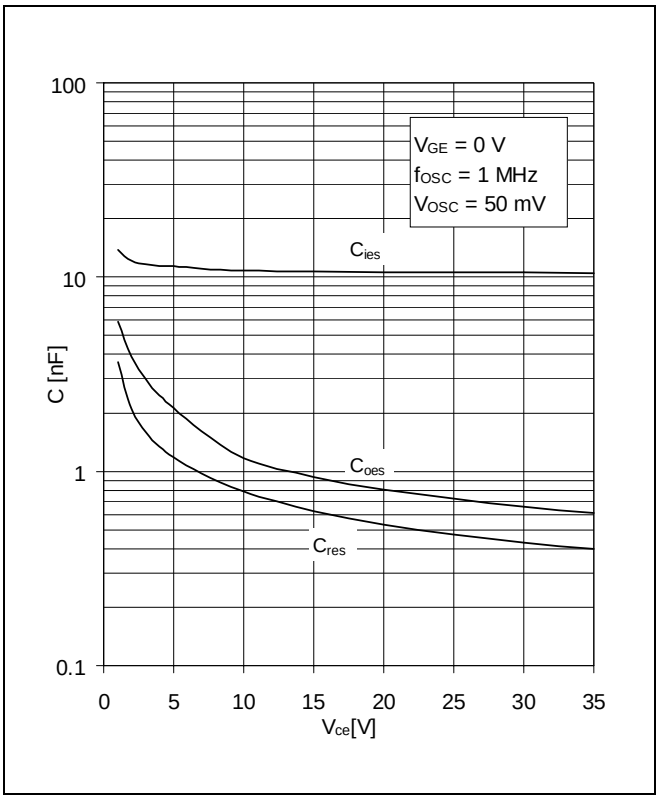


Fig. 6 Typical capacitances vs collector-emitter voltage

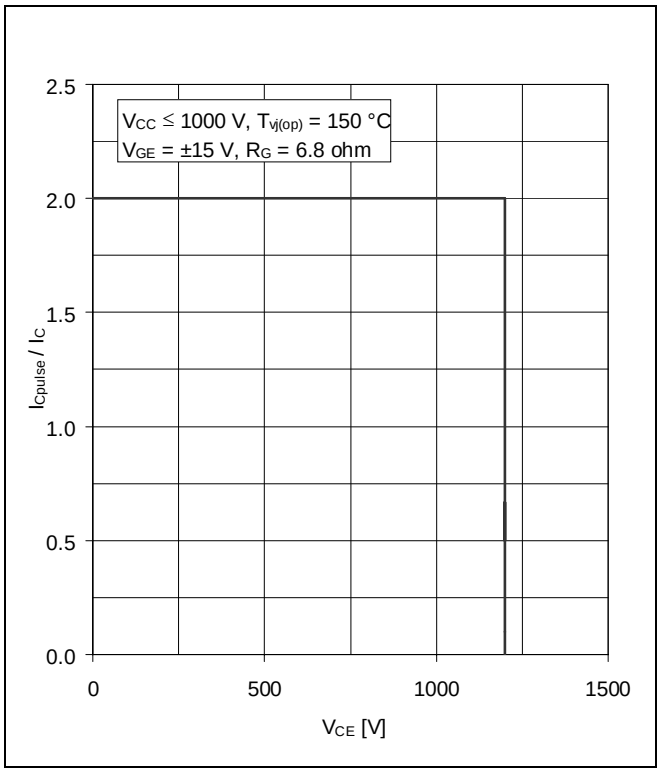


Fig. 7 Safe operating area (RBSOA)

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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