

$V_{CE} = 1200\text{ V}$

$I_C = 100\text{ A}$

**IGBT-Die**

**5SMY 12K1280**



**Die size: 11.9 x 11.2 mm**

Doc. No. 5SYA 1319-04 12 14

- Ultra low loss thin IGBT die
- Highly rugged SPT<sup>+</sup> design
- Large bondable emitter area
- Passivation : Silicon Nitride plus Polyimide

#### Maximum rated values <sup>1)</sup>

Parameter	Symbol	Conditions	min	max	Unit
Collector-emitter voltage	$V_{CES}$	$V_{GE} = 0\text{ V}, T_{vj} \geq 25\text{ °C}$		1200	V
DC collector current	$I_C$			100	A
Peak collector current	$I_{CM}$	Limited by $T_{vjmax}$		200	A
Gate-emitter voltage	$V_{GES}$		-20	20	V
IGBT short circuit SOA	$t_{psc}$	$V_{CC} = 900\text{ V}, V_{CEM} \leq 1200\text{ V}$ $V_{GE} \leq 15\text{ V}, T_{vj} \leq 125\text{ °C}$		10	$\mu\text{s}$
Junction temperature	$T_{vj}$			175	°C
	$T_{vj(op)}$		-40	150	

<sup>1)</sup> Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747 - 9

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IGBT characteristic values <sup>2)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Collector (-emitter) breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}$ , $I_C = 1 \text{ mA}$ , $T_{vj} = 25 \text{ °C}$	1200			V
Collector-emitter saturation voltage	$V_{CE \text{ sat}}$	$I_C = 100 \text{ A}$ , $V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.9	2.2	V
			$T_{vj} = 125 \text{ °C}$	2.1		V
Collector cut-off current	$I_{CES}$	$V_{CE} = 1200 \text{ V}$ , $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$		100	$\mu\text{A}$
			$T_{vj} = 125 \text{ °C}$	110		$\mu\text{A}$
Gate leakage current	$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$ , $T_{vj} = 125 \text{ °C}$	-200		200	nA
Gate-emitter threshold voltage	$V_{GE(TO)}$	$I_C = 4 \text{ mA}$ , $V_{CE} = V_{GE}$ , $T_{vj} = 25 \text{ °C}$	5		7	V
Gate charge	$Q_{ge}$	$I_C = 100 \text{ A}$ , $V_{CE} = 600 \text{ V}$ , $V_{GE} = -15 \dots 15 \text{ V}$		1120		nC
Input capacitance	$C_{ies}$	$V_{CE} = 25 \text{ V}$ , $V_{GE} = 0 \text{ V}$ , $f = 1 \text{ MHz}$ , $T_{vj} = 25 \text{ °C}$		7.43		nF
Output capacitance	$C_{oes}$			0.52		
Reverse transfer capacitance	$C_{res}$			0.34		
Internal gate resistance	$R_{Gint}$			2		$\Omega$
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600 \text{ V}$ , $I_C = 100 \text{ A}$ , $V_{GE} = \pm 15 \text{ V}$ , $R_G = 10 \Omega$ ,	$T_{vj} = 25 \text{ °C}$	135		ns
			$T_{vj} = 125 \text{ °C}$	150		
Rise time	$t_r$	$L_\sigma = 60 \text{ nH}$ , inductive load	$T_{vj} = 25 \text{ °C}$	65		ns
			$T_{vj} = 125 \text{ °C}$	65		
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 600 \text{ V}$ , $I_C = 100 \text{ A}$ , $V_{GE} = \pm 15 \text{ V}$ , $R_G = 10 \Omega$ ,	$T_{vj} = 25 \text{ °C}$	420		ns
			$T_{vj} = 125 \text{ °C}$	490		
Fall time	$t_f$	$L_\sigma = 60 \text{ nH}$ , inductive load	$T_{vj} = 25 \text{ °C}$	55		ns
			$T_{vj} = 125 \text{ °C}$	75		
Turn-on switching energy	$E_{on}$	$V_{CC} = 600 \text{ V}$ , $I_C = 100 \text{ A}$ , $V_{GE} = \pm 15 \text{ V}$ , $R_G = 10 \Omega$ , $L_\sigma = 60 \text{ nH}$ , inductive load FWD: 5SLY 12G1200	$T_{vj} = 25 \text{ °C}$	10.5		mJ
			$T_{vj} = 125 \text{ °C}$	14.4		
Turn-off switching energy	$E_{off}$	$V_{CC} = 600 \text{ V}$ , $I_C = 100 \text{ A}$ , $V_{GE} = \pm 15 \text{ V}$ , $R_G = 10 \Omega$ , $L_\sigma = 60 \text{ nH}$ , inductive load	$T_{vj} = 25 \text{ °C}$	6.3		mJ
			$T_{vj} = 125 \text{ °C}$	10.5		
Short circuit current	$I_{SC}$	$t_{psc} \leq 10 \mu\text{s}$ , $V_{GE} = 15 \text{ V}$ , $T_{vj} = 125 \text{ °C}$ , $V_{CC} = 900 \text{ V}$ , $V_{CEM} \leq 1200 \text{ V}$		470		A

<sup>2)</sup> Characteristic values according to IEC 60747 - 9

## Mechanical properties

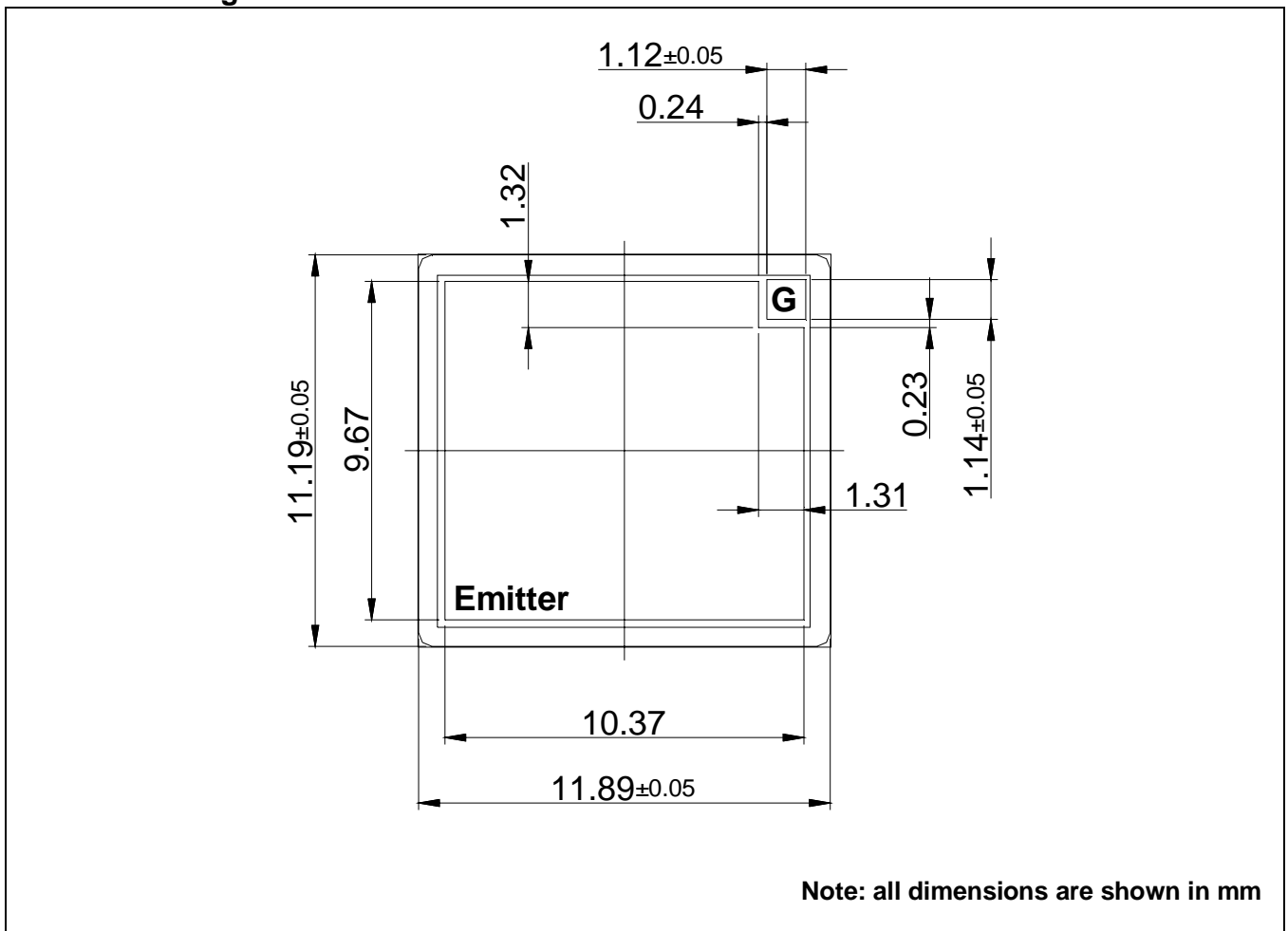
Parameter				Unit
Dimensions	Overall die	L x W	11.9 x 11.2	mm
	exposed front metal	L x W (except gate pad)	10.4 x 9.7	mm
	gate pad	L x W	1.12 x 1.14	mm
	thickness		140 ± 20	µm
Metallization <sup>3)</sup>	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.2	µm

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

## Form of delivery

Description	Part number
Unsaun 6" wafer die	5SMY 76K1280
Sawn 6" wafer die (on blue tape)	5SMY 86K1280

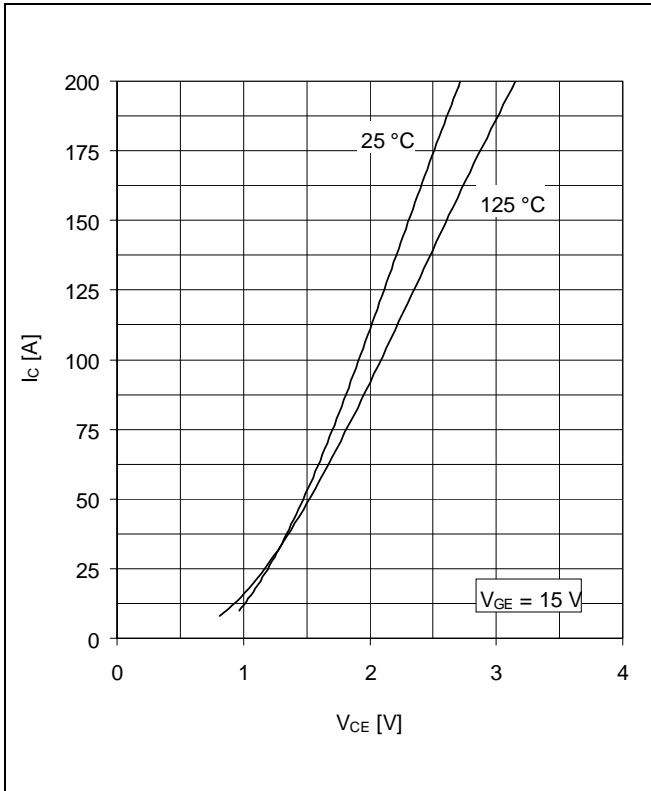
## Outline drawing



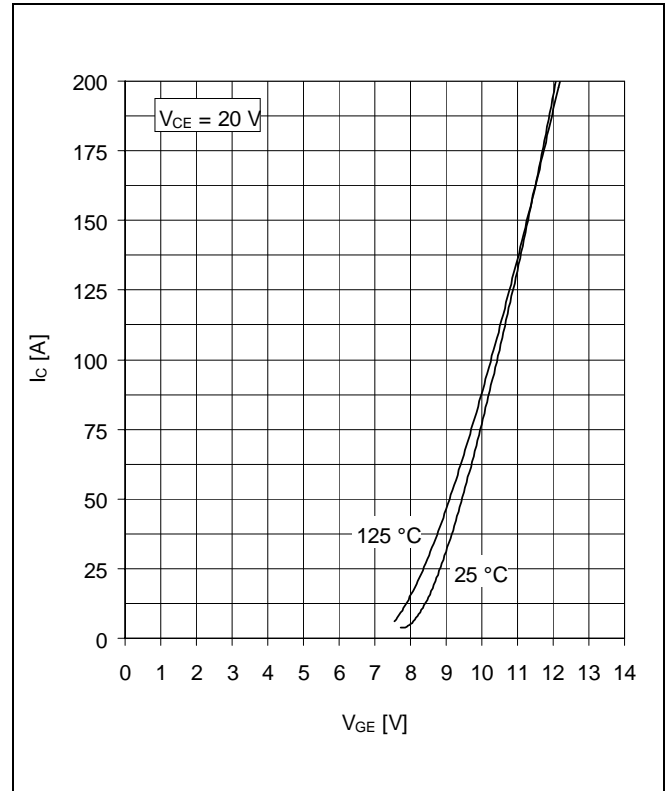
This is an electrostatic sensitive device, please observe the international standard IEC 60747-1, Chap. IX.

This product has been designed and qualified for Industrial Level.

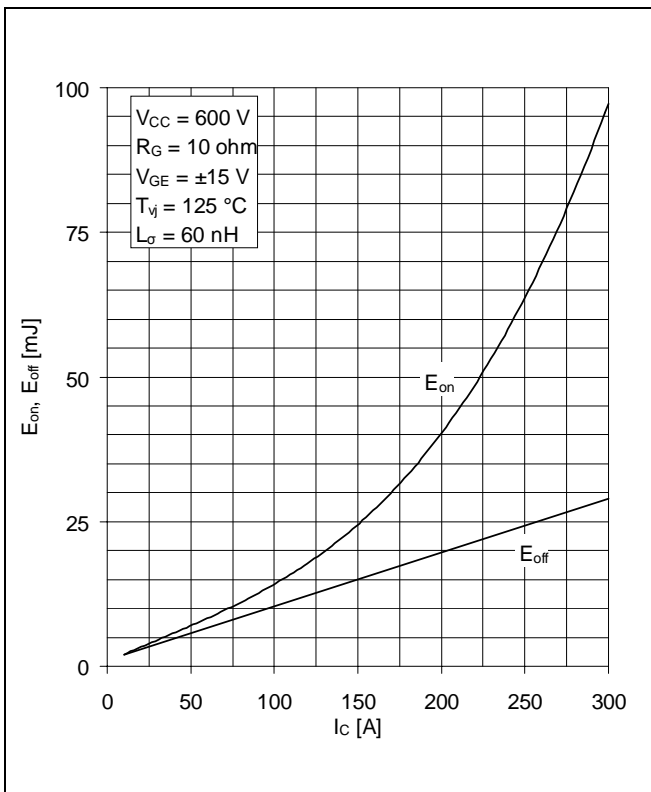
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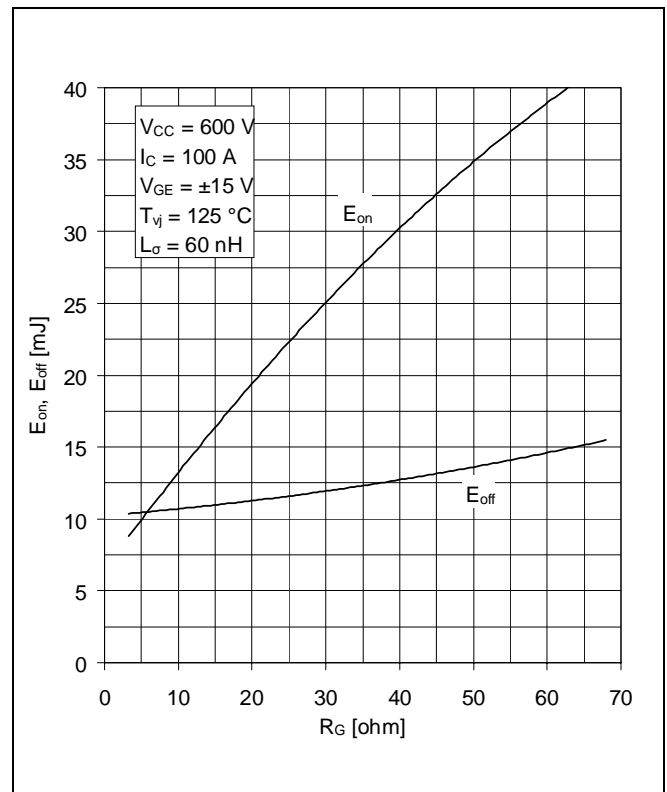
**Fig. 1** Typical on-state characteristics



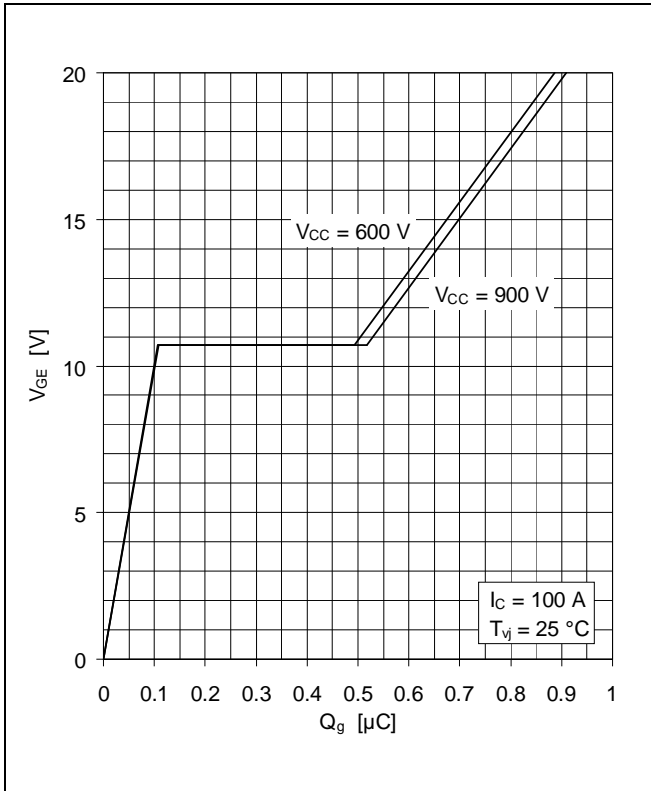
**Fig. 2** Typical transfer characteristics



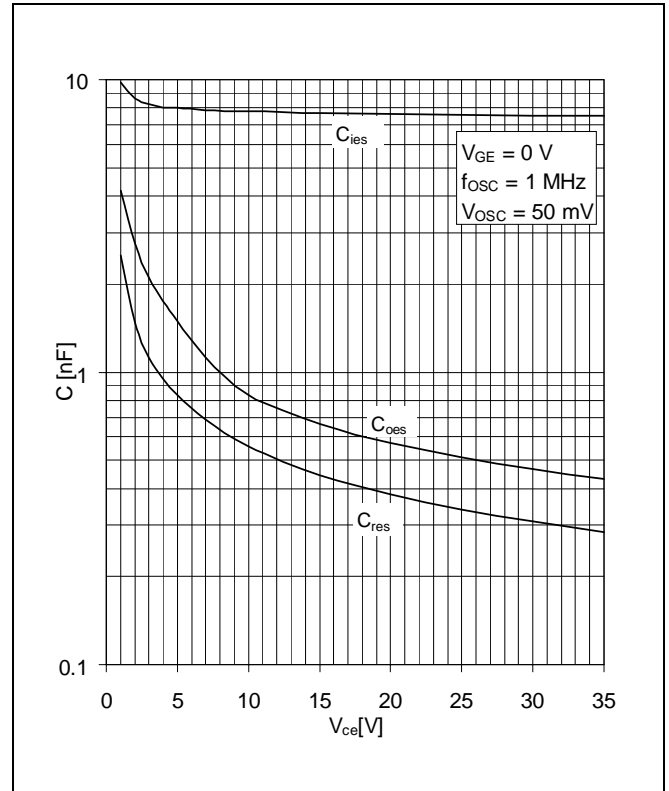
**Fig. 3** Typical switching characteristics vs collector current



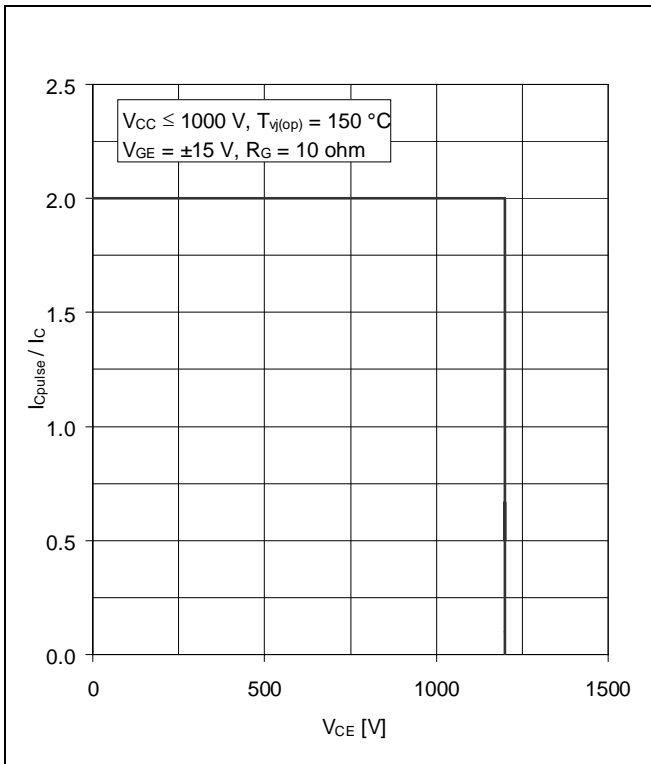
**Fig. 4** Typical switching characteristics vs gate resistor



**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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