

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

$I_C = 57\text{ A}$

IGBT-Die

5SMY 12H1280



Die size: 9.1 x 9.1 mm

Doc. No. 5SYA 1320-04 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}	$V_{GE} = 0\text{ V}, T_{vj} \geq 25\text{ °C}$		1200	V
DC collector current	I_C			57	A
Peak collector current	I_{CM}	Limited by T_{vjmax}		114	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	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

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IGBT characteristic values ²⁾

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	$V_{CE \text{ sat}}$	$I_C = 57 \text{ A}$, $V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$	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	μA
			$T_{vj} = 125 \text{ °C}$	50		μA
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	$V_{GE(TO)}$	$I_C = 2 \text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25 \text{ °C}$	5		7	V
Gate charge	Q_{ge}	$I_C = 57 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = -15 \dots 15 \text{ V}$		611		nC
Input capacitance	C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$, $T_{vj} = 25 \text{ °C}$		4.29		nF
Output capacitance	C_{oes}			0.30		
Reverse transfer capacitance	C_{res}			0.20		
Internal gate resistance	R_{Gint}			10		Ω
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600 \text{ V}$, $I_C = 57 \text{ A}$, $R_G = 18 \Omega$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$	320		ns
			$T_{vj} = 125 \text{ °C}$	345		
Rise time	t_r	$L_\sigma = 60 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	70		ns
			$T_{vj} = 125 \text{ °C}$	70		
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 600 \text{ V}$, $I_C = 57 \text{ A}$, $R_G = 18 \Omega$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$	485		ns
			$T_{vj} = 125 \text{ °C}$	560		
Fall time	t_f	$L_\sigma = 60 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	55		ns
			$T_{vj} = 125 \text{ °C}$	70		
Turn-on switching energy	E_{on}	$V_{CC} = 600 \text{ V}$, $I_C = 57 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 18 \Omega$, $L_\sigma = 60 \text{ nH}$, inductive load, FWD: 5SLY 12E1200	$T_{vj} = 25 \text{ °C}$	7.7		mJ
			$T_{vj} = 125 \text{ °C}$	10.1		
Turn-off switching energy	E_{off}	$V_{CC} = 600 \text{ V}$, $I_C = 57 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 18 \Omega$, $L_\sigma = 60 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	3.5		mJ
			$T_{vj} = 125 \text{ °C}$	5.8		
Short circuit current	I_{SC}	$t_{psc} \leq 10 \mu\text{s}$, $V_{GE} = 15 \text{ V}$, $T_{vj} = 125 \text{ °C}$, $V_{CC} = 900 \text{ V}$, $V_{CEM} \leq 1200 \text{ V}$		270		A

²⁾ Characteristic values according to IEC 60747 - 9

Mechanical properties

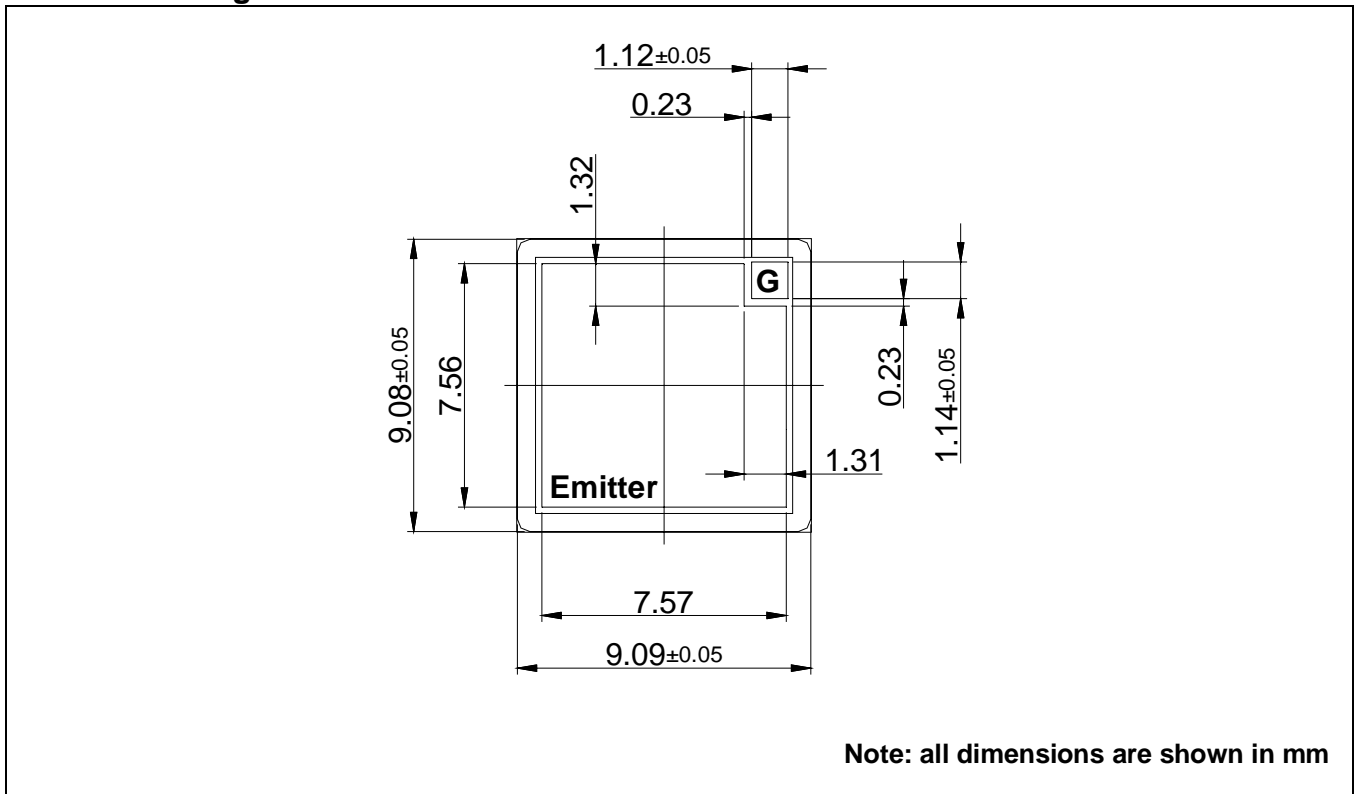
Parameter				Unit
Dimensions	Overall die	L x W	9.1 x 9.1	mm
	exposed front metal	L x W (except gate pad)	7.57 x 7.56	mm
	gate pad	L x W	1.12 x 1.14	mm
	thickness		140 ± 20	µm
Metallization ³⁾	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.2	µm

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
Unsaun 6" wafer die	5SMY 76H1280
Sawn 6" wafer die (on blue tape)	5SMY 86H1280

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.

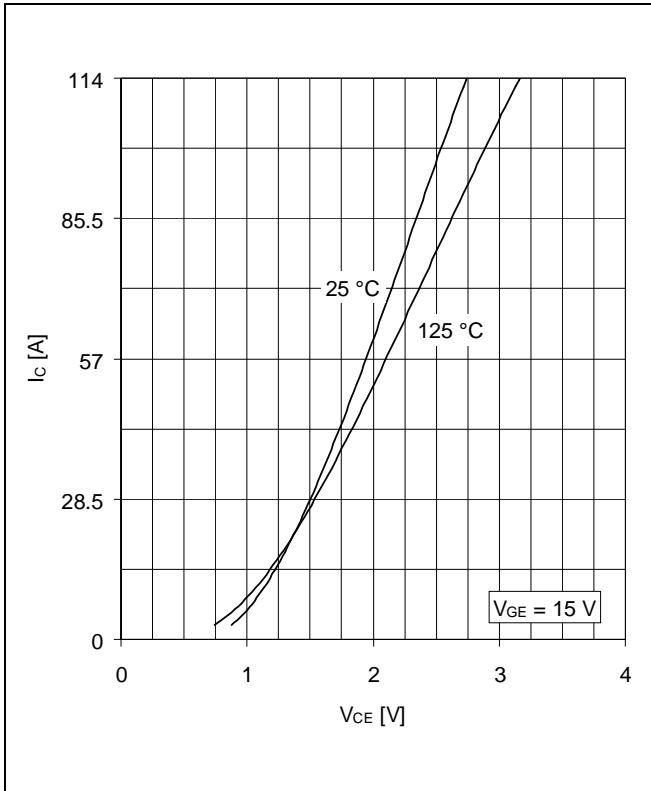


Fig. 1 Typical on-state characteristics

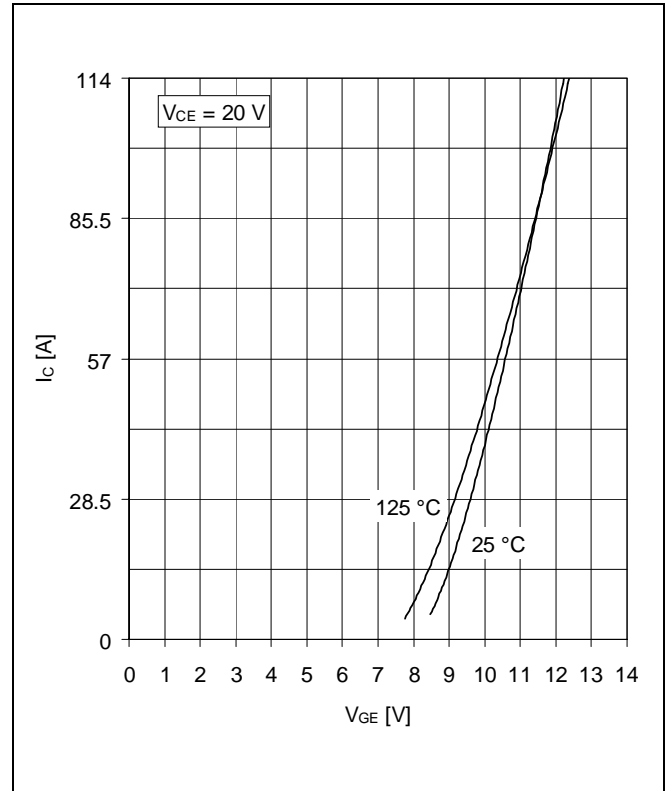


Fig. 2 Typical transfer characteristics

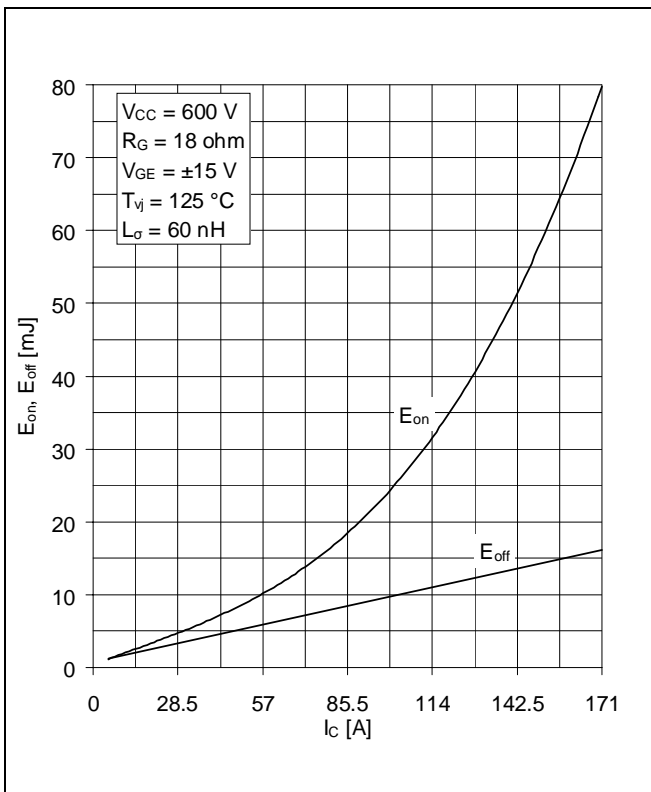


Fig. 3 Typical switching characteristics vs collector current

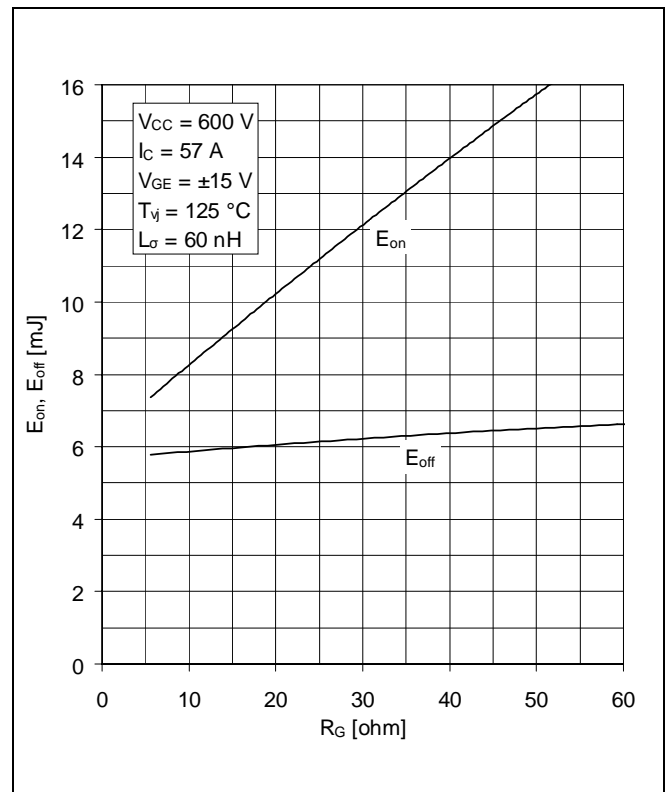


Fig. 4 Typical switching characteristics vs gate resistor

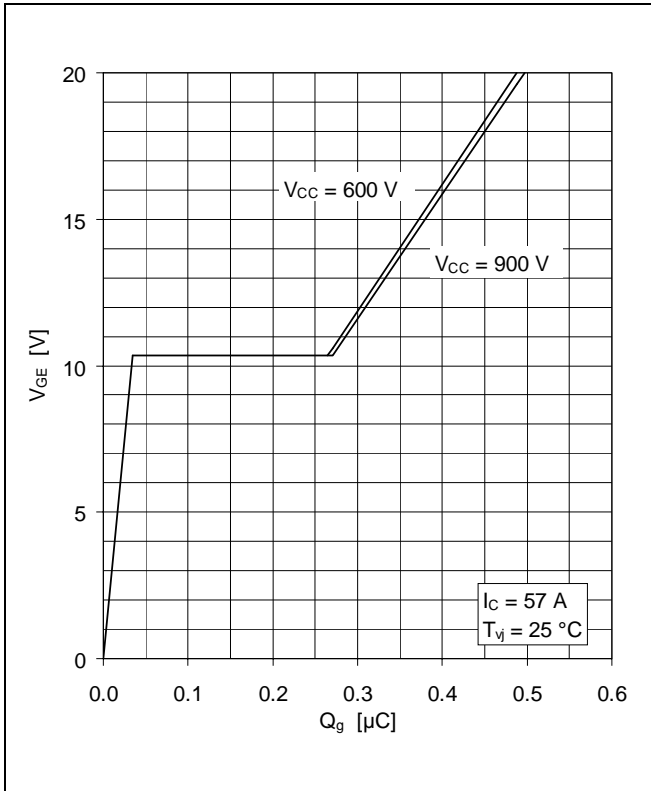


Fig. 5 Typical gate charge characteristics

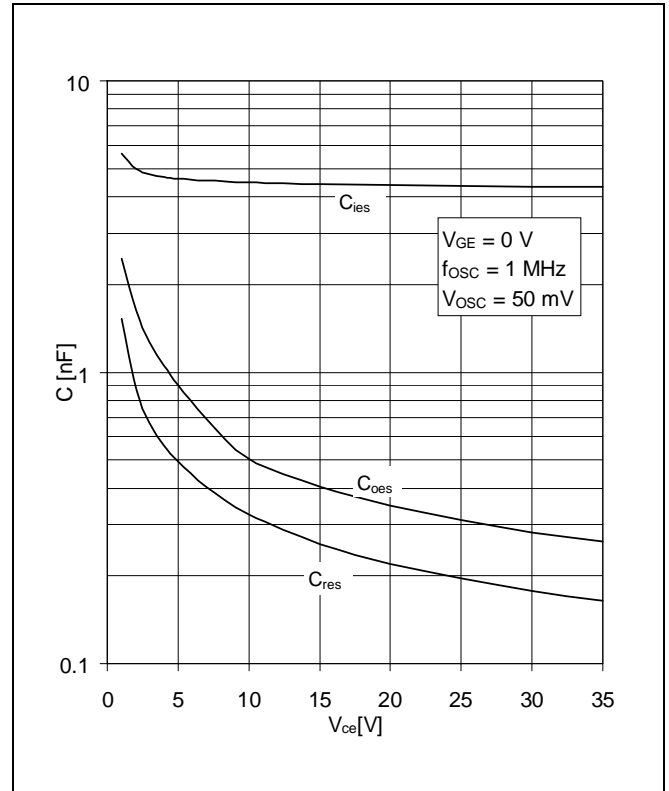


Fig. 6 Typical capacitances vs collector-emitter voltage

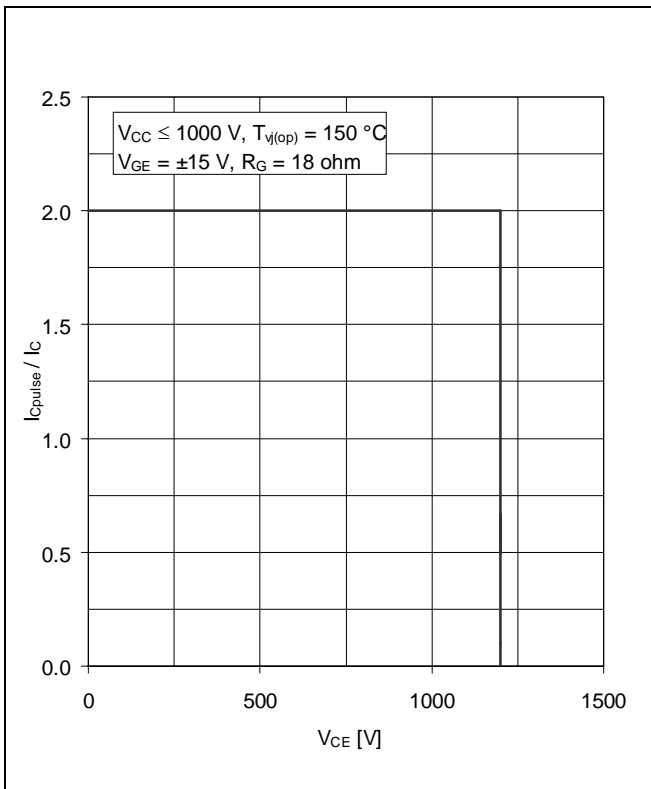


Fig. 7 Safe operating area (RBSOA)

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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