

$V_{CE} = 1200\text{ V}$
 $I_C = 75\text{ A}$

IGBT-Die

5SMY 12J1200



Die size: 10.2 x 10.2 mm

Doc. No. 5SYA1636-01 Sep 06

- Ultra low loss thin IGBT die
- Highly rugged SPT⁺ design
- Large bondable emitter area

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			75	A
Peak collector current	I_{CM}	Limited by T_{vjmax}		150	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}		-40	150	$^{\circ}\text{C}$

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	$V_{CE \text{ sat}}$	$I_C = 75 \text{ A}$, $V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.8		V
			$T_{vj} = 125 \text{ °C}$	2.0		V
Collector cut-off current	I_{CES}	$V_{CE} = 1200 \text{ V}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$		100	μA
			$T_{vj} = 125 \text{ °C}$	300		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	$V_{GE(TO)}$	$I_C = 3 \text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25 \text{ °C}$	5	6.2	7	V
Gate charge	Q_{ge}	$I_C = 75 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = -15 \dots 15 \text{ V}$		780		nC
Input capacitance	C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$, $T_{vj} = 25 \text{ °C}$		5.52		nF
Output capacitance	C_{oes}			0.40		
Reverse transfer capacitance	C_{res}			0.26		
Internal gate resistance	R_{Gint}			3		Ω
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600 \text{ V}$, $I_C = 75 \text{ A}$, $R_G = 15 \text{ }\Omega$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$	150		ns
			$T_{vj} = 125 \text{ °C}$	160		
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	$t_{d(off)}$	$V_{CC} = 600 \text{ V}$, $I_C = 75 \text{ A}$, $R_G = 15 \text{ }\Omega$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$	440		ns
			$T_{vj} = 125 \text{ °C}$	500		
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}	$V_{CC} = 600 \text{ V}$, $I_C = 75 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 15 \text{ }\Omega$, $L_\sigma = 60 \text{ nH}$, inductive load, FWD: 5SLX 12F1200	$T_{vj} = 25 \text{ °C}$	7.45		mJ
			$T_{vj} = 125 \text{ °C}$	10.3		
Turn-off switching energy	E_{off}	$V_{CC} = 600 \text{ V}$, $I_C = 75 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 15 \text{ }\Omega$, $L_\sigma = 60 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	4.9		mJ
			$T_{vj} = 125 \text{ °C}$	7.8		
Short circuit current	I_{SC}	$t_{psc} \leq 10 \text{ }\mu\text{s}$, $V_{GE} = 15 \text{ V}$, $T_{vj} = 125 \text{ °C}$, $V_{CC} = 900 \text{ V}$, $V_{CEM} \leq 1200 \text{ V}$		420		A

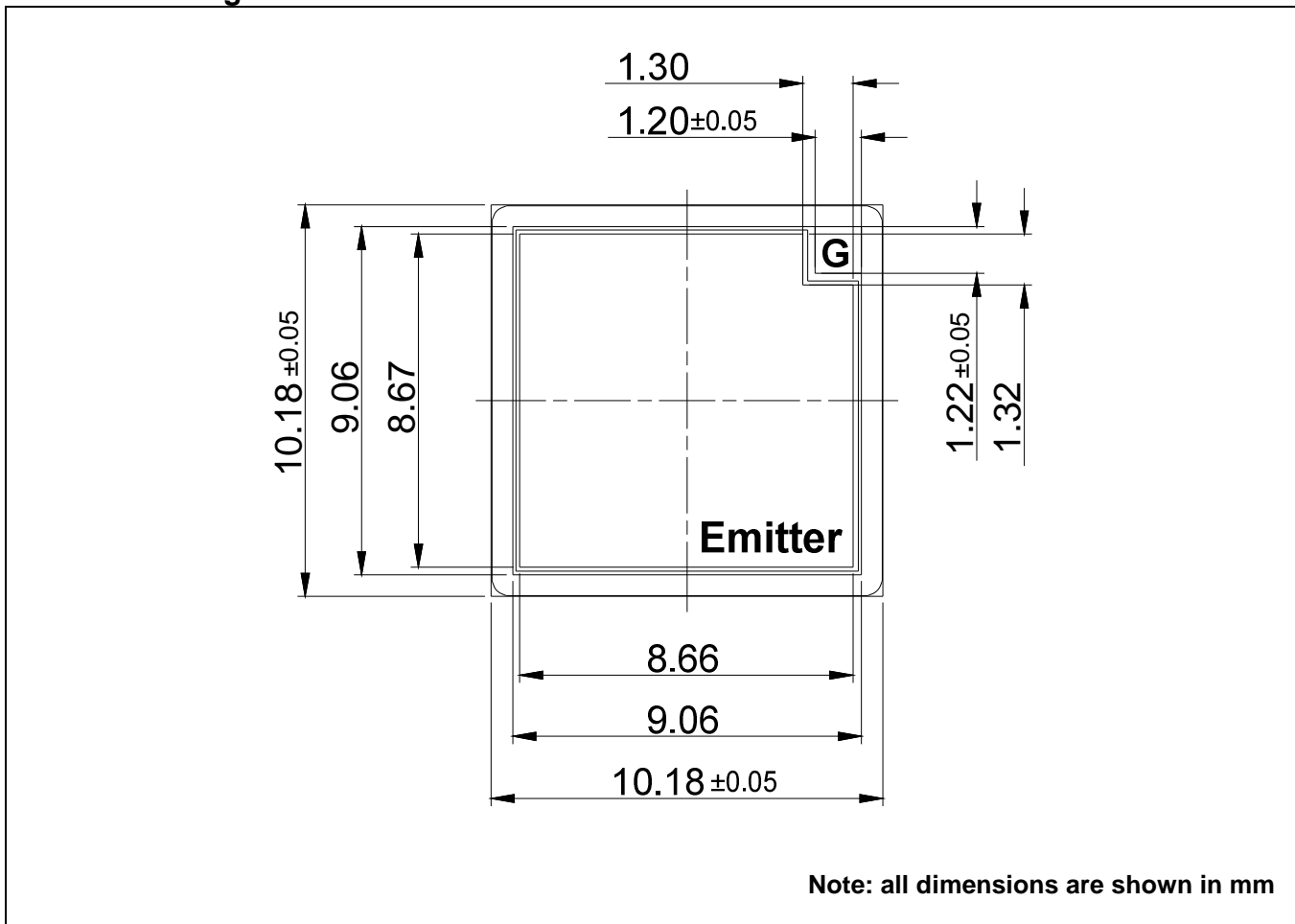
²⁾ Characteristic values according to IEC 60747 - 9

Mechanical properties

Parameter				Unit
Dimensions	Overall die	L x W	10.2 x 10.2	mm
	exposed front metal	L x W (except gate pad)	8.7 x 8.7	mm
	gate pad	L x W	1.2 x 1.22	mm
	thickness		130 ± 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.

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.

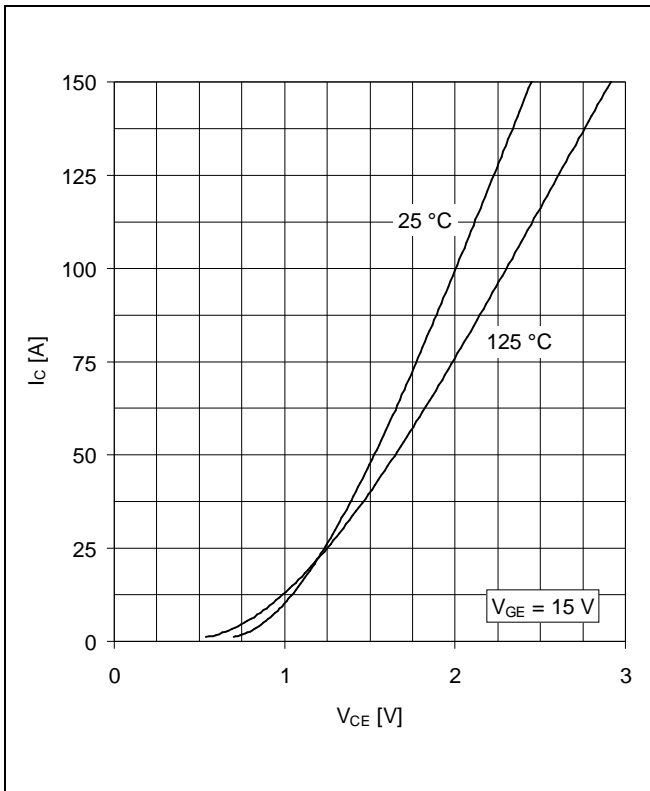


Fig. 1 Typical on-state characteristics

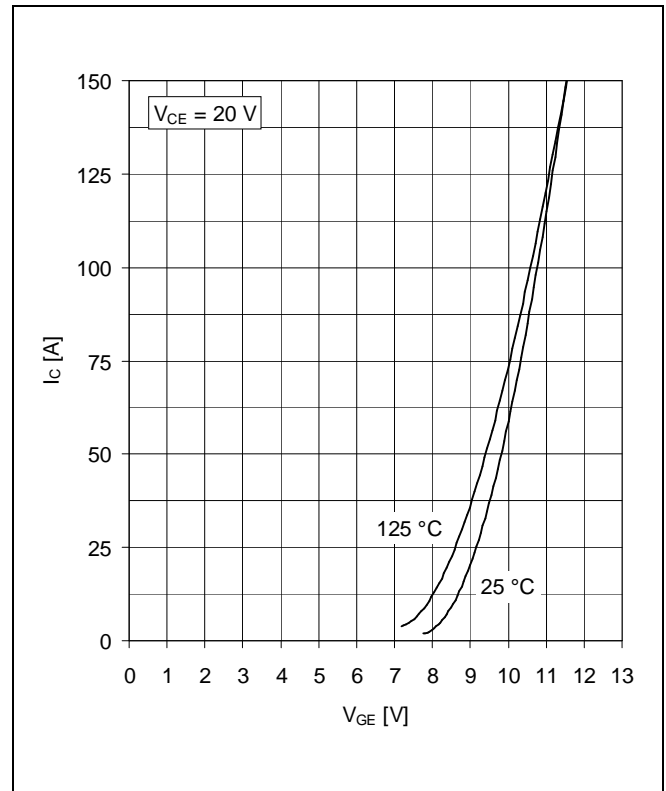


Fig. 2 Typical transfer characteristics

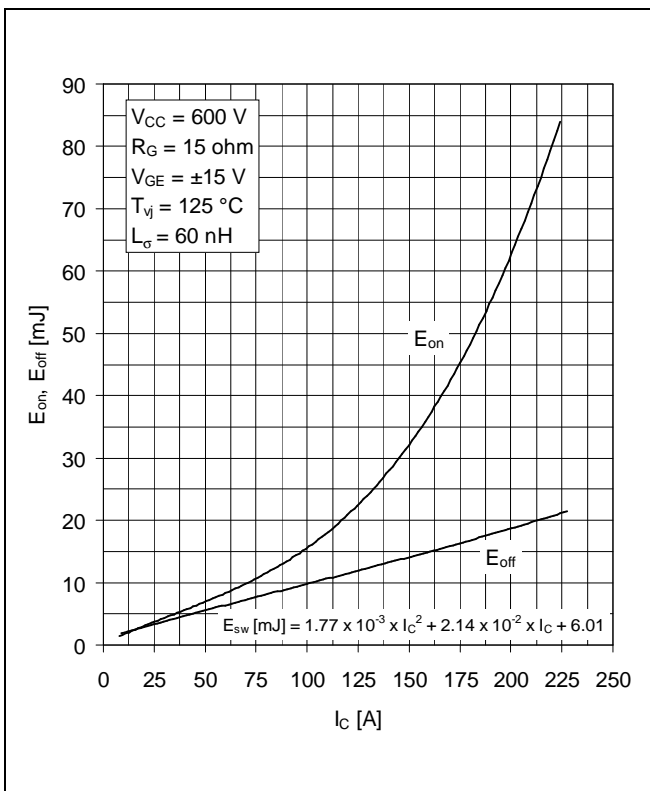


Fig. 3 Typical switching characteristics vs collector current

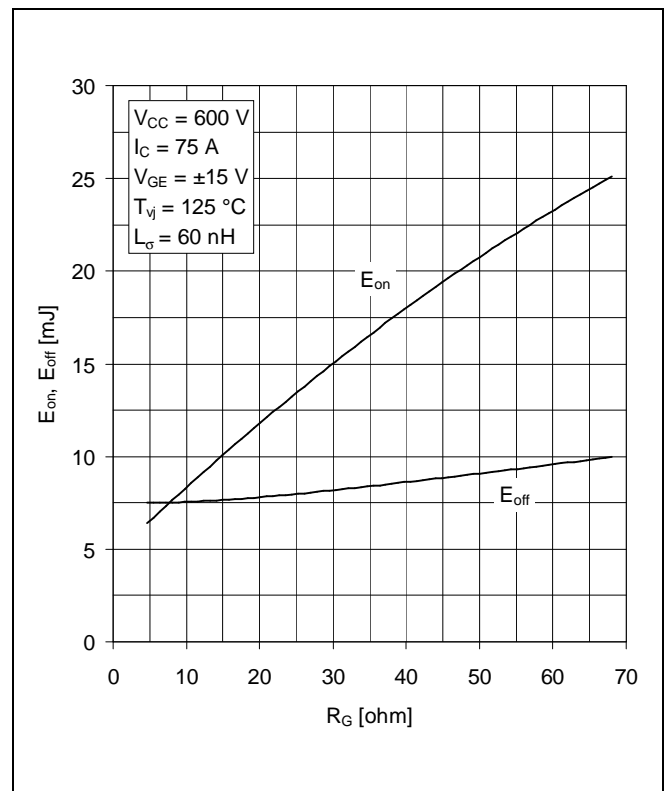


Fig. 4 Typical switching characteristics vs gate resistor

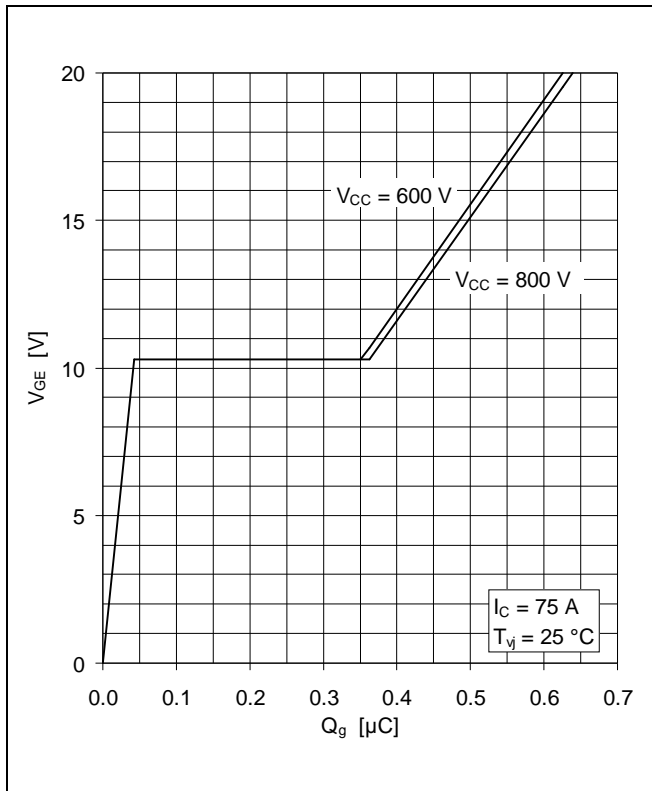


Fig. 5 Typical gate charge characteristics

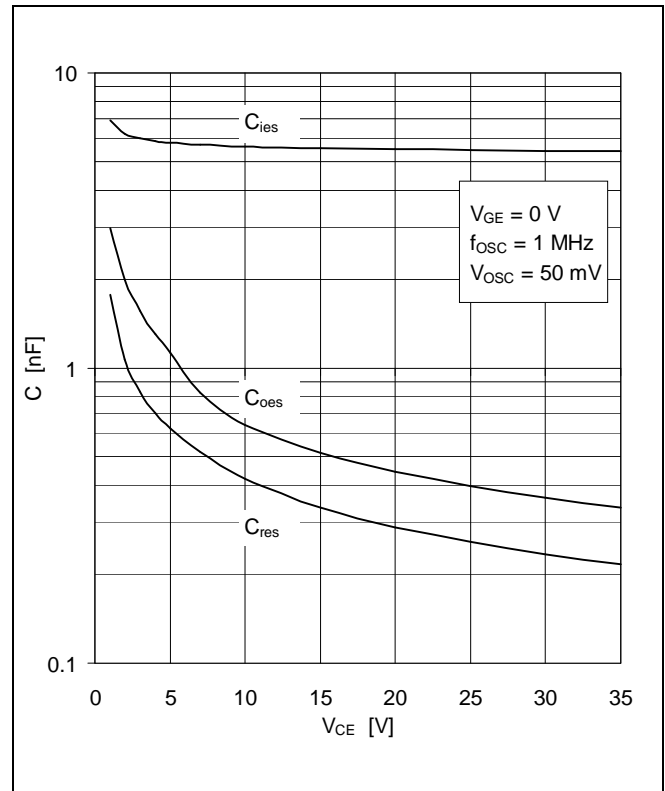


Fig. 6 Typical capacitances vs collector-emitter voltage

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