

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

# IGBT-Die

## 5SMX 12K1274



Die size: 11.0 x 11.0 mm

Doc. No. 5SYA 1303-00 Dec 07

- Low loss, rugged SPT technology
- Smooth switching for good EMC
- Minimized gate charge, short delay times
- Optimized for paralleling
- Large bondable emitter area

### 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	$I_C$			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	$\mu\text{s}$
Junction temperature	$T_{vj}$		-40	150	°C

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

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	$V_{CE \text{ sat}}$	$I_C = 75 \text{ A}$ , $V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.7	1.9	2.3	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	$\mu\text{A}$
			$T_{vj} = 125 \text{ °C}$		225		$\mu\text{A}$
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	$V_{GE(TO)}$	$I_C = 3 \text{ mA}$ , $V_{CE} = V_{GE}$ , $T_{vj} = 25 \text{ °C}$	4.5		6.5	V	
Gate charge	$Q_{ge}$	$I_C = 75 \text{ A}$ , $V_{CE} = 600 \text{ V}$ , $V_{GE} = -15 \dots 15 \text{ V}$		710		nC	
Input capacitance	$C_{ies}$	$V_{CE} = 25 \text{ V}$ , $V_{GE} = 0 \text{ V}$ , $f = 1 \text{ MHz}$ , $T_{vj} = 25 \text{ °C}$		6.92		nF	
Output capacitance	$C_{oes}$			0.46			
Reverse transfer capacitance	$C_{res}$			0.29			
Internal gate resistance	$R_{Gint}$			5		$\Omega$	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600 \text{ V}$ , $I_C = 75 \text{ A}$ , $R_G = 10 \text{ }\Omega$ , $V_{GE} = \pm 15 \text{ V}$ ,	$T_{vj} = 25 \text{ °C}$		170	ns	
			$T_{vj} = 125 \text{ °C}$		195		
Rise time	$t_r$	$L_\sigma = 60 \text{ nH}$ , inductive load	$T_{vj} = 25 \text{ °C}$		60	ns	
			$T_{vj} = 125 \text{ °C}$		65		
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 600 \text{ V}$ , $I_C = 75 \text{ A}$ , $R_G = 15 \text{ }\Omega$ , $V_{GE} = \pm 15 \text{ V}$ ,	$T_{vj} = 25 \text{ °C}$		415	ns	
			$T_{vj} = 125 \text{ °C}$		470		
Fall time	$t_f$	$L_\sigma = 60 \text{ nH}$ , inductive load	$T_{vj} = 25 \text{ °C}$		45	ns	
			$T_{vj} = 125 \text{ °C}$		70		
Turn-on switching energy	$E_{on}$	$V_{CC} = 600 \text{ V}$ , $I_C = 75 \text{ A}$ , $V_{GE} = \pm 15 \text{ V}$ , $R_G = 10 \text{ }\Omega$ , $L_\sigma = 60 \text{ nH}$ , inductive load, FWD: 5SLX12F1200	$T_{vj} = 25 \text{ °C}$		6.3	mJ	
			$T_{vj} = 125 \text{ °C}$		9.2		
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	

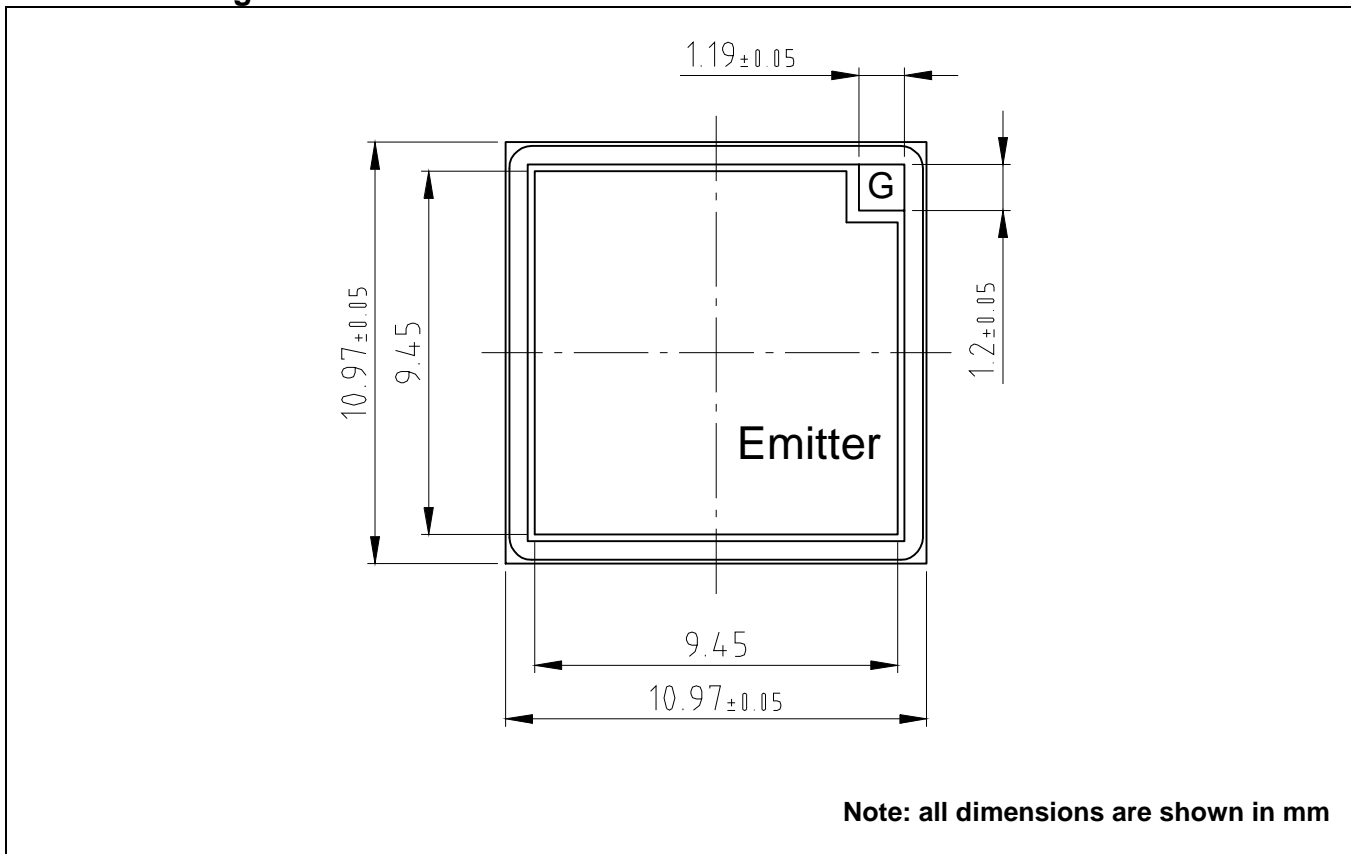
<sup>2)</sup> Characteristic values according to IEC 60747 - 9

## Mechanical properties

Parameter				Unit
Dimensions	Overall die	L x W	11.0 x 11.0	mm
	exposed front metal	L x W (except gate pad)	9.5 x 9.5	mm
	gate pad	L x W	1.2 x 1.2	mm
	thickness		130 ± 20	µm
Metallization <sup>3)</sup>	front (E)	AlSi1	4	µm
	back (C)	Al / Ti / Ni / Ag	1.8	µm

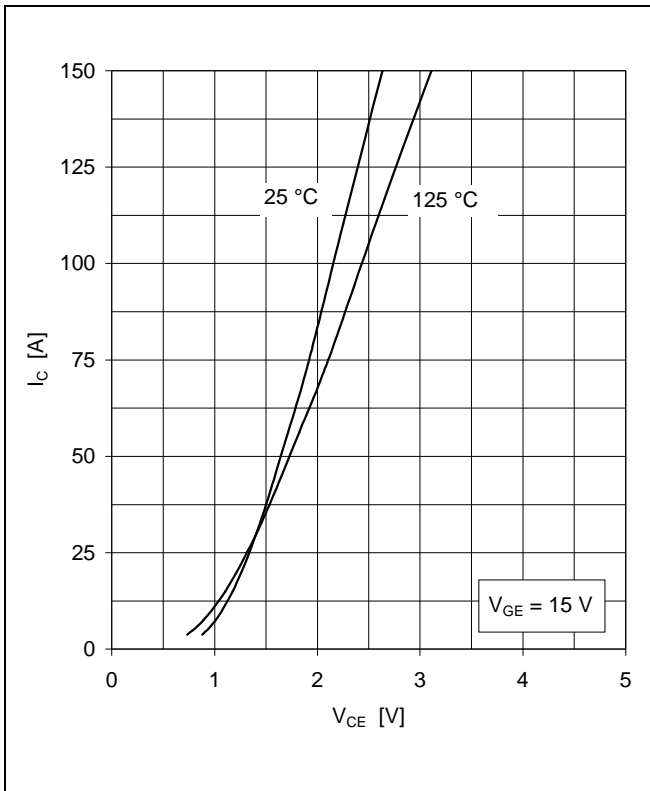
<sup>3)</sup> For assembly instructions refer to : IGBT and Diode chips from ABB Switzerland Ltd, Semiconductors, Doc. No. 5SYA 2033.

## Outline drawing

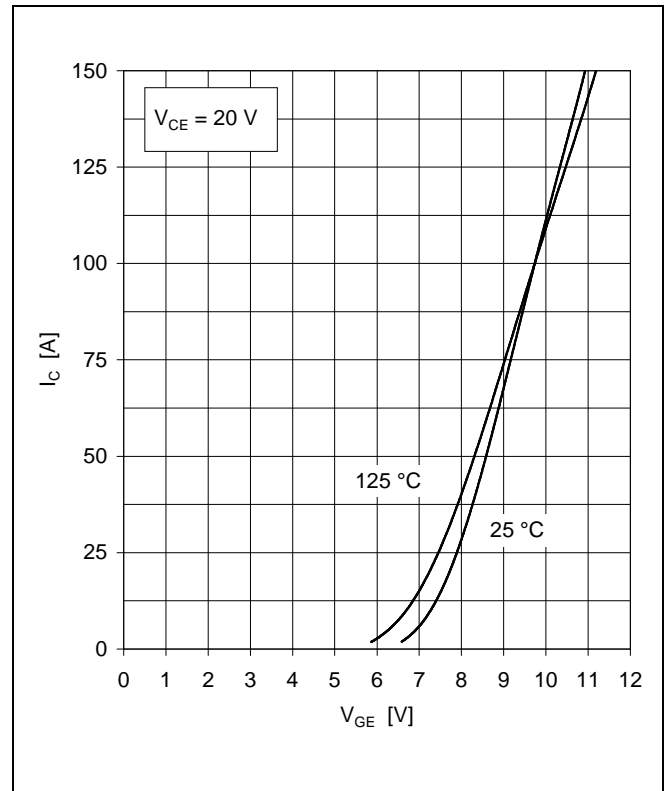


This is an electrostatic sensitive device, please observe the international standard IEC 60747-1, Chap. IX.

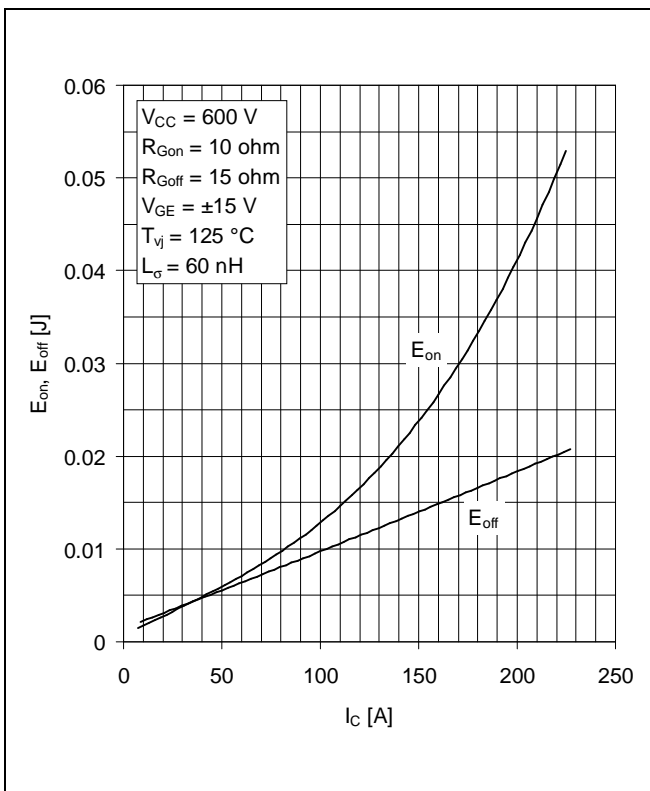
This product has been designed and qualified for Industrial Level.



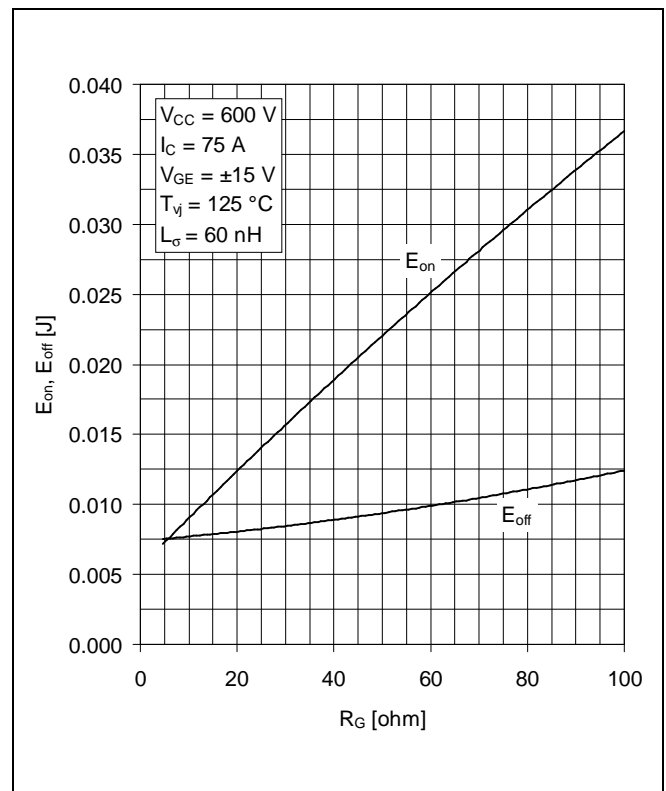
**Fig. 1** Typical on-state characteristics



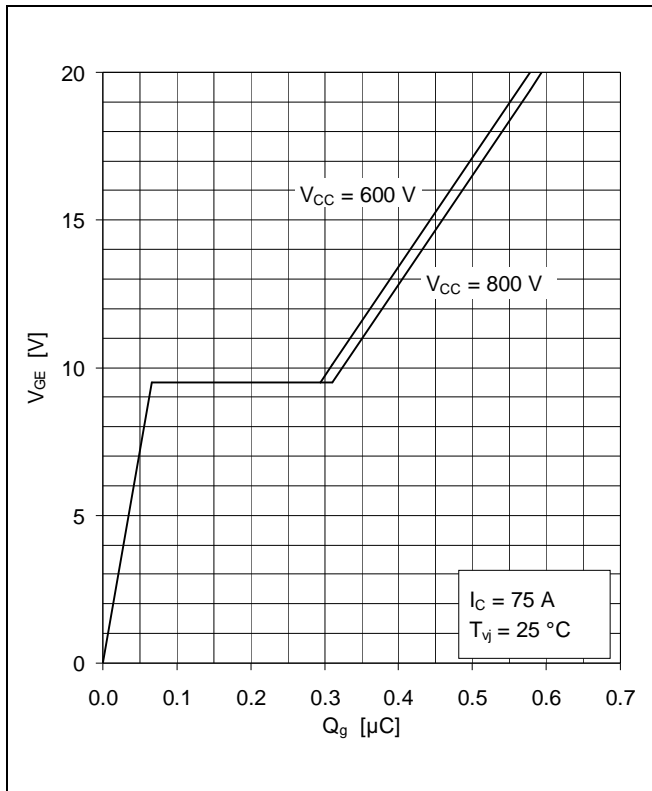
**Fig. 2** Typical transfer characteristics



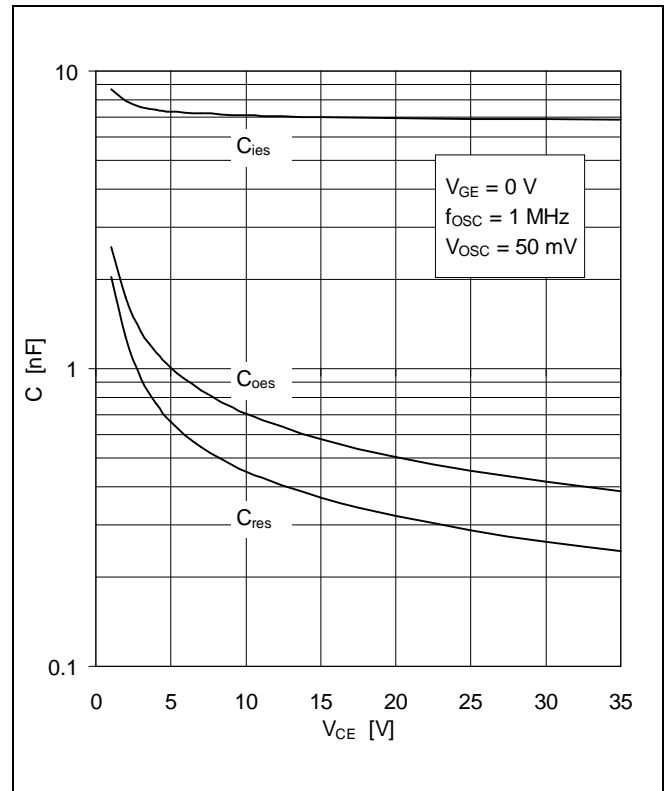
**Fig. 3** Typical switching characteristics vs collector current



**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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