

$V_{CE} = 1700\text{ V}$
 $I_C = 75\text{ A}$

IGBT-Die

5SMX 12K1701



Die size: 11.9 x 11.9 mm

Doc. No. 5SYA1619-01 July 03

- Low loss thin IGBT die
- Highly rugged SPT design
- Large front bondable area

Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	max	Unit
Collector-emitter voltage	V_{CES}	$V_{GE} = 0\text{ V}, T_{vj} \geq 25\text{ °C}$		1700	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}	$V_{CC} = 1300\text{ V}, V_{CEM} \leq 1700\text{ V}$ $V_{GE} \leq 15\text{ V}, T_{vj} \leq 125\text{ °C}$		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

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IGBT characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit	
Collector (-emitter) breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}$, $I_C = 1 \text{ mA}$, $T_{vj} = 25 \text{ °C}$	1700			V	
Collector-emitter saturation voltage	$V_{CE \text{ sat}}$	$I_C = 75 \text{ A}$, $V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$	2.1	2.3	2.7	V
			$T_{vj} = 125 \text{ °C}$		2.6		V
Collector cut-off current	I_{CES}	$V_{CE} = 1700 \text{ V}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$			100	μA
			$T_{vj} = 125 \text{ °C}$		800		μA
Gate leakage current	I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$, $T_{vj} = 125 \text{ °C}$	-500		500	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}	$I_C = 75 \text{ A}$, $V_{CE} = 900 \text{ V}$, $V_{GE} = -15 \dots 15 \text{ V}$		630		nC	
Input capacitance	C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$, $T_{vj} = 25 \text{ °C}$		6.9		nF	
Output capacitance	C_{oes}			0.48			
Reverse transfer capacitance	C_{res}			0.29			
Internal gate resistance	R_{Gint}			5		Ω	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 900 \text{ V}$, $I_C = 75 \text{ A}$, $R_G = 15 \text{ }\Omega$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$		170	ns	
			$T_{vj} = 125 \text{ °C}$		180		
Rise time	t_r	$L_\sigma = 160 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$		100	ns	
			$T_{vj} = 125 \text{ °C}$		110		
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 900 \text{ V}$, $I_C = 75 \text{ A}$, $R_G = 15 \text{ }\Omega$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$		420	ns	
			$T_{vj} = 125 \text{ °C}$		500		
Fall time	t_f	$L_\sigma = 160 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$		90	ns	
			$T_{vj} = 125 \text{ °C}$		110		
Turn-on switching energy	E_{on}	$V_{CC} = 900 \text{ V}$, $I_C = 75 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 15 \text{ }\Omega$, $L_\sigma = 160 \text{ nH}$, inductive load, FWD: 5SLX12G1700	$T_{vj} = 25 \text{ °C}$		18	mJ	
			$T_{vj} = 125 \text{ °C}$		25		
Turn-off switching energy	E_{off}	$V_{CC} = 900 \text{ V}$, $I_C = 75 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 15 \text{ }\Omega$, $L_\sigma = 160 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$		12	mJ	
			$T_{vj} = 125 \text{ °C}$		19		
Short circuit current	I_{SC}	$t_{psc} \leq 10 \text{ }\mu\text{s}$, $V_{GE} = 15 \text{ V}$, $T_{vj} = 125 \text{ °C}$, $V_{CC} = 1300 \text{ V}$, $V_{CEM} \leq 1700 \text{ V}$		350		A	

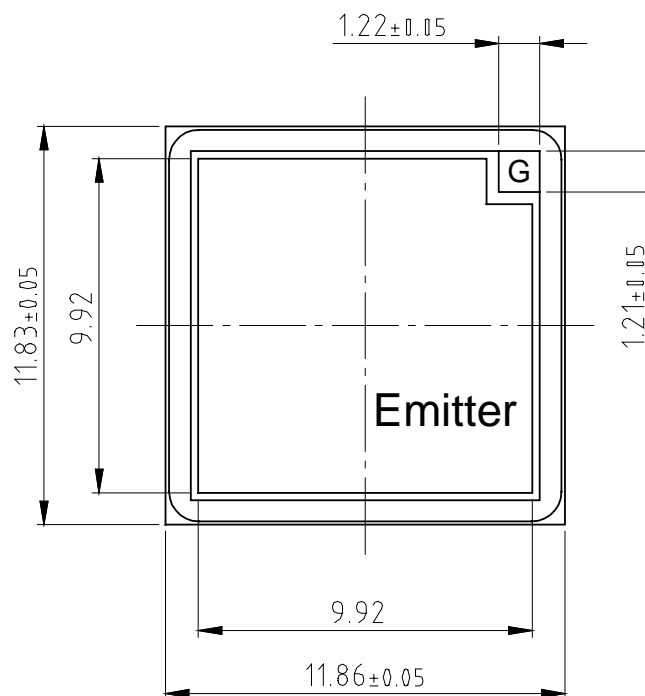
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Mechanical properties

Parameter				Unit
Dimensions	Overall die	L x W	11.9 x 11.9	mm
	exposed front metal	L x W (except gate pad)	9.9 x 9.9	mm
	gate pad	L x W	1.2 x 1.2	mm
	thickness		210 ± 15	µm
Metallization ¹⁾	front	AlSi1	4	µm
	back	Al / Ti / Ni / Ag	1.2	µm

1) For assembly instructions refer to : IGBT and Diode chips from ABB Switzerland Ltd, Semiconductors, Doc. No. 5SYA2033-01 April 02.

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.

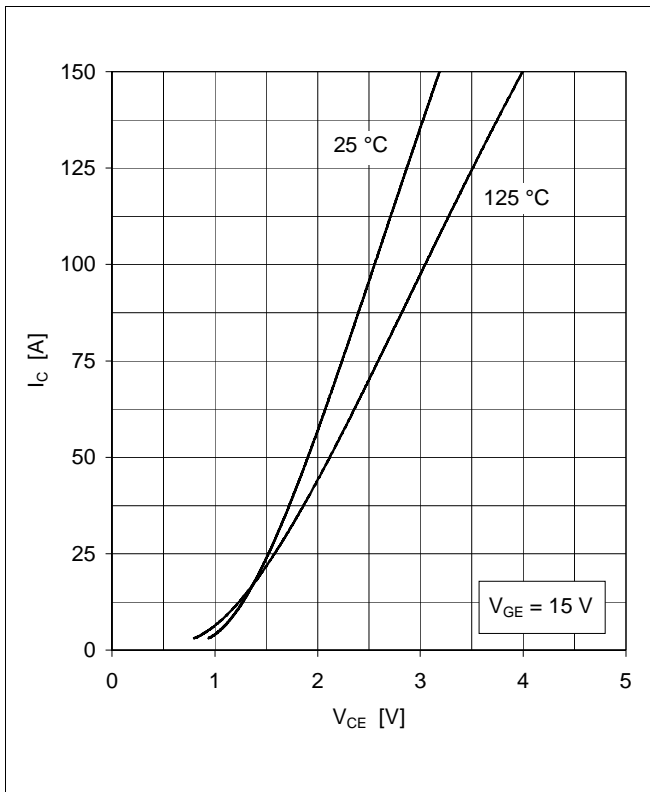


Fig. 1 Typical onstate characteristics

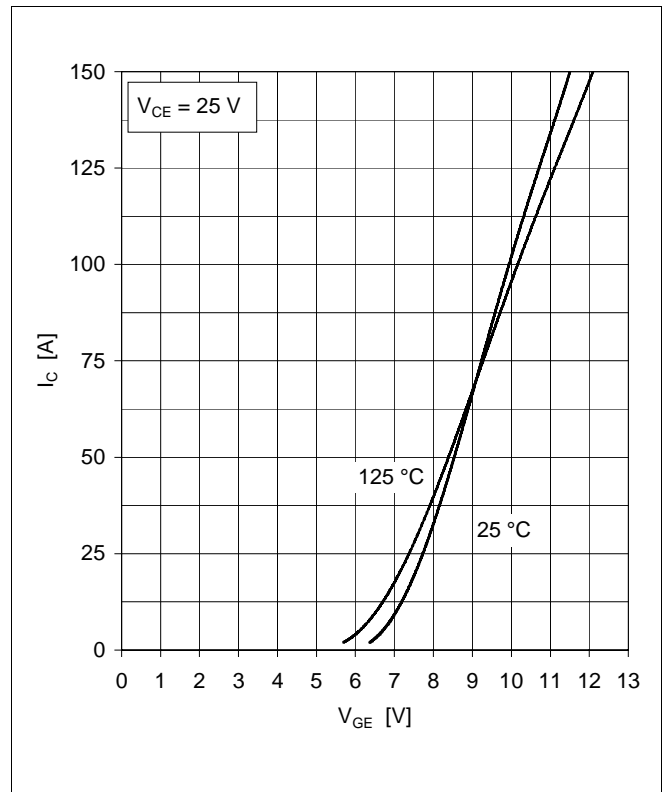


Fig. 2 Typical transfer characteristics

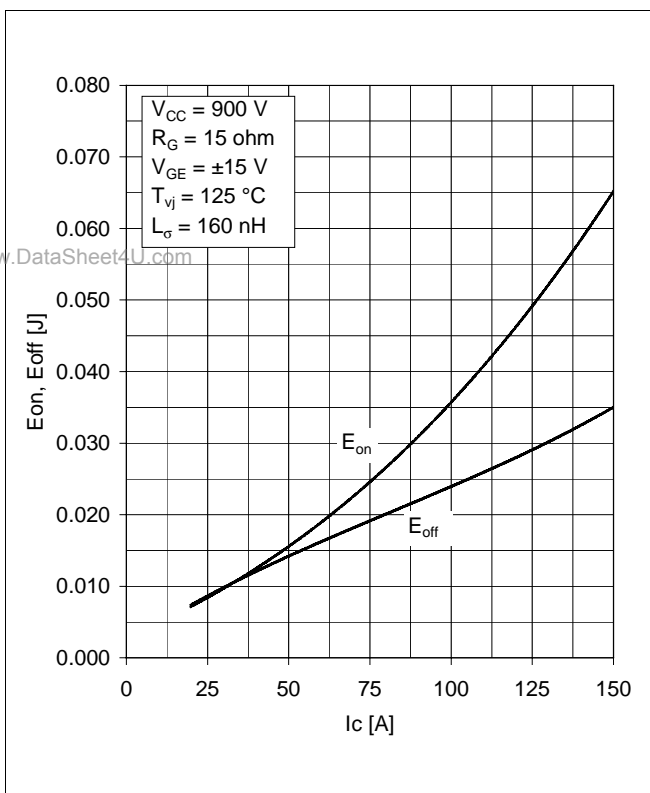


Fig. 3 Typical switching characteristics vs collector current

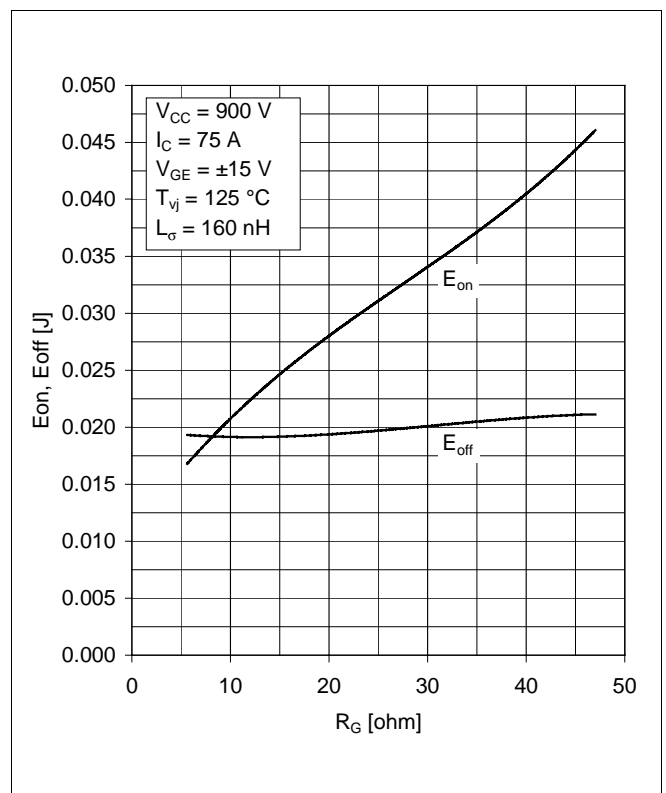


Fig. 4 Typical switching characteristics vs gate resistor

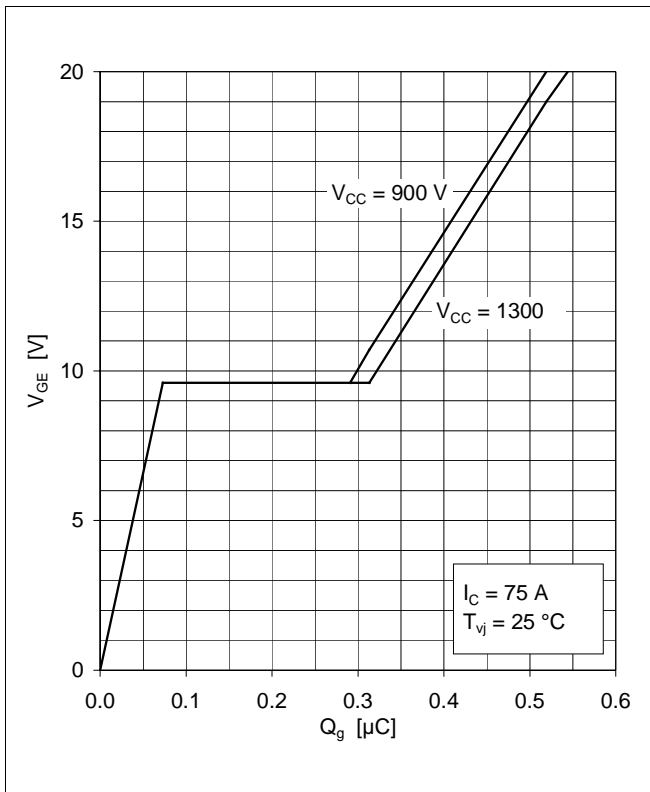


Fig. 5 Typical gate charge characteristics

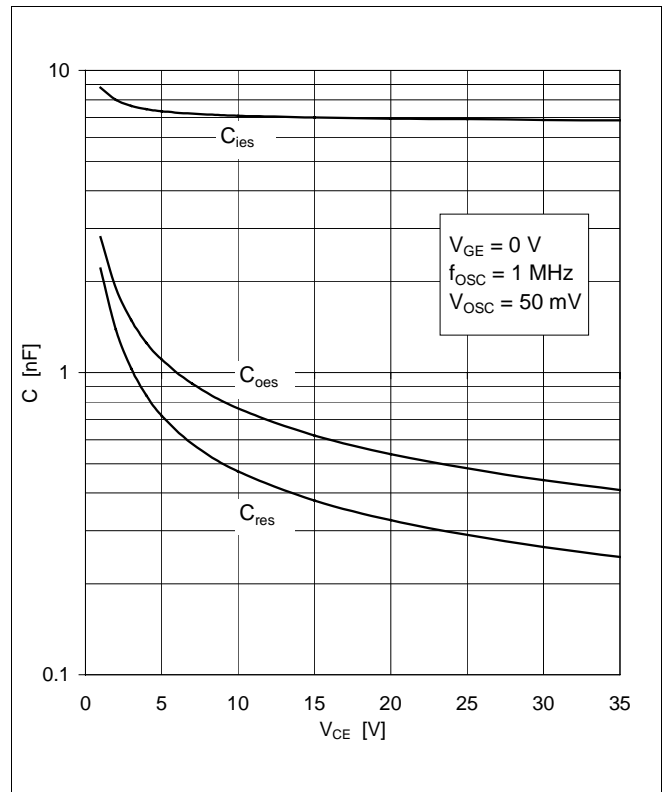


Fig. 6 Typical capacitances vs collector-emitter voltage

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