

$V_{CE} = 3300 \text{ V}$

$I_C = 50 \text{ A}$

IGBT-Die

5SMX 12M3300



Die size: 13.6 x 13.6 mm

Doc. No. 5SYA1621-02 Sep 05

- Low loss, rugged SPT technology
- Smooth switching for good EMC
- Large bondable emitter area
- Passivation: SIPOS and Silicon Nitride plus Polyimide

Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	max	Unit
Collector-emitter voltage	V_{CES}	$V_{GE} = 0 \text{ V}$		3300	V
DC collector current	I_C			50	A
Peak collector current	I_{CM}	Limited by T_{vjmax}		100	A
Gate-emitter voltage	V_{GES}		-20	20	V
IGBT short circuit SOA	t_{psc}	$V_{CC} = 2500 \text{ V}, V_{CEM} \leq 3300 \text{ V}$ $V_{GE} \leq 15 \text{ V}, T_{vj} \leq 125 \text{ °C}$		10	μs
Junction temperature	T_{vj}		-40	125	°C

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

IGBT characteristic values ²⁾

Parameter	Symbol	Conditions	min	typ	max	Unit	
Collector-emitter saturation voltage	$V_{CE\ sat}$	$I_C = 50\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$	2.6	3.1	3.5	V
			$T_{vj} = 125\ ^\circ C$		3.8		V
Collector cut-off current	I_{CES}	$V_{CE} = 3300\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			100	μA
			$T_{vj} = 125\ ^\circ C$		1000		μA
Gate leakage current	I_{GES}	$V_{CE} = 0\ V, V_{GE} = \pm 20\ V, T_{vj} = 125\ ^\circ C$	-500		500	nA	
Gate-emitter threshold voltage	$V_{GE(TO)}$	$I_C = 10\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$	5.5		7.5	V	
Gate charge	Q_{ge}	$I_C = 50\ A, V_{CE} = 1800\ V, V_{GE} = -15 \dots 15\ V$		500		nC	
Input capacitance	C_{ies}	$V_{CE} = 25\ V, V_{GE} = 0\ V, f = 1\ MHz, T_{vj} = 25\ ^\circ C$		7.8		nF	
Output capacitance	C_{oes}			0.35			
Reverse transfer capacitance	C_{res}			0.09			
Internal gate resistance	R_{Gint}			5		Ω	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 1800\ V, I_C = 50\ A, R_G = 33\ \Omega, V_{GE} = \pm 15\ V, L_\sigma = 2400\ nH,$ inductive load	$T_{vj} = 25\ ^\circ C$	350		ns	
			$T_{vj} = 125\ ^\circ C$	330			
Rise time	t_r	$L_\sigma = 2400\ nH,$ inductive load	$T_{vj} = 25\ ^\circ C$	190		ns	
			$T_{vj} = 125\ ^\circ C$	200			
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 1800\ V, I_C = 50\ A, R_G = 33\ \Omega, V_{GE} = \pm 15\ V, L_\sigma = 2400\ nH,$ inductive load	$T_{vj} = 25\ ^\circ C$	1140		ns	
			$T_{vj} = 125\ ^\circ C$	1250			
Fall time	t_f	$L_\sigma = 2400\ nH,$ inductive load	$T_{vj} = 25\ ^\circ C$	750		ns	
			$T_{vj} = 125\ ^\circ C$	770			
Turn-on switching energy	E_{on}	$V_{CC} = 1800\ V, I_C = 50\ A, V_{GE} = \pm 15\ V, R_G = 33\ \Omega, L_\sigma = 2400\ nH,$ inductive load, FWD: $\frac{1}{2}$ 5SLX12M3301	$T_{vj} = 25\ ^\circ C$	50		mJ	
			$T_{vj} = 125\ ^\circ C$	72			
Turn-off switching energy	E_{off}	$V_{CC} = 1800\ V, I_C = 50\ A, V_{GE} = \pm 15\ V, R_G = 33\ \Omega, L_\sigma = 2400\ nH,$ inductive load	$T_{vj} = 25\ ^\circ C$	67		mJ	
			$T_{vj} = 125\ ^\circ C$	84			
Short circuit current	I_{SC}	$t_{psc} \leq 10\ \mu s, V_{GE} = 15\ V, T_{vj} = 125\ ^\circ C,$ $V_{CC} = 2500\ V, V_{CEM} \leq 3300\ V$		190		A	

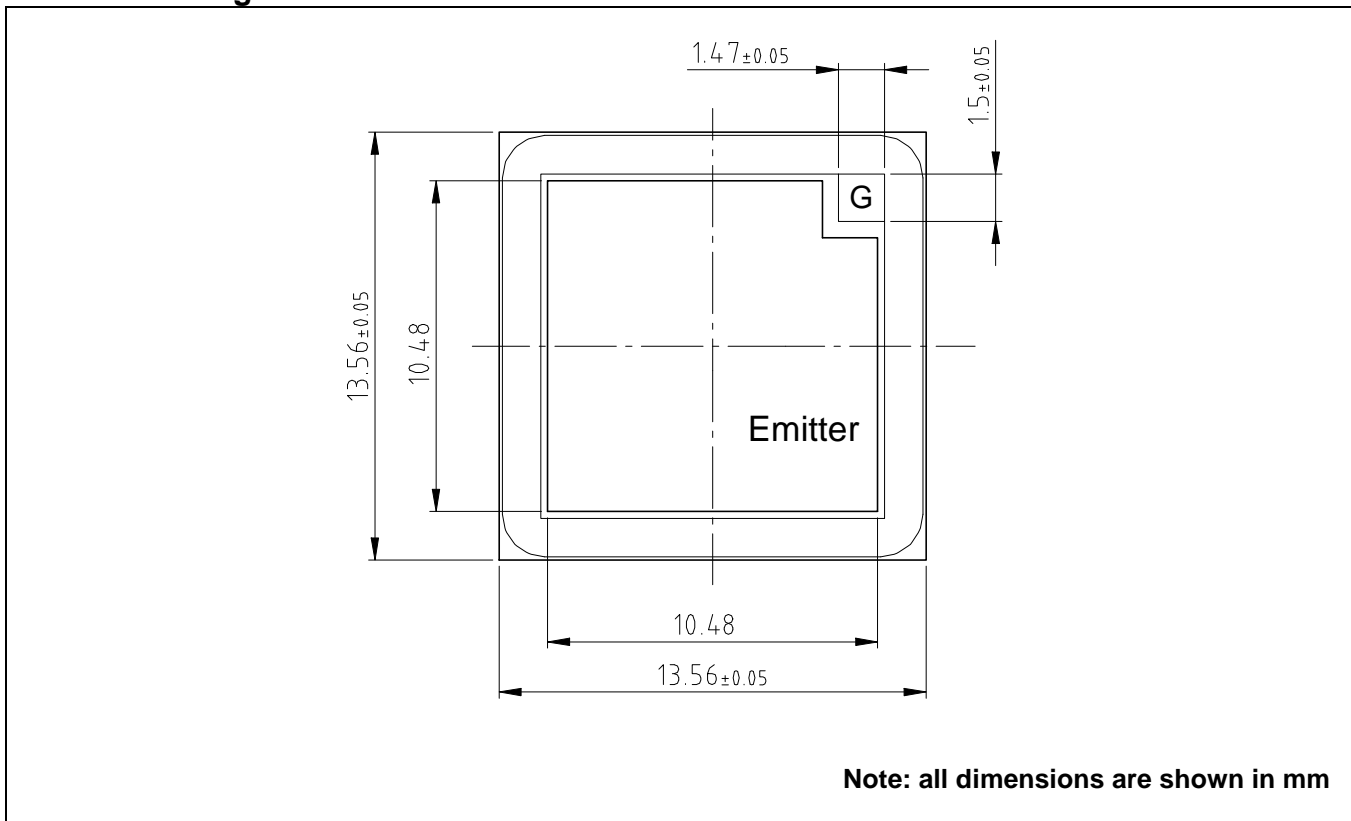
²⁾ Characteristic values according to IEC 60747 - 9

Mechanical properties

Parameter				Unit
Dimensions	Overall die	L x W	13.6 x 13.6	mm
	exposed front metal	L x W (except gate pad)	10.48 x 10.48	mm
	gate pad	L x W	1.5 x 1.47	mm
	thickness		385 ± 20	µm
Metallization ³⁾	front (E)	AlSi1	4	µm
	back (C)	AlSi1 + TiNiAg	1.8 + 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.

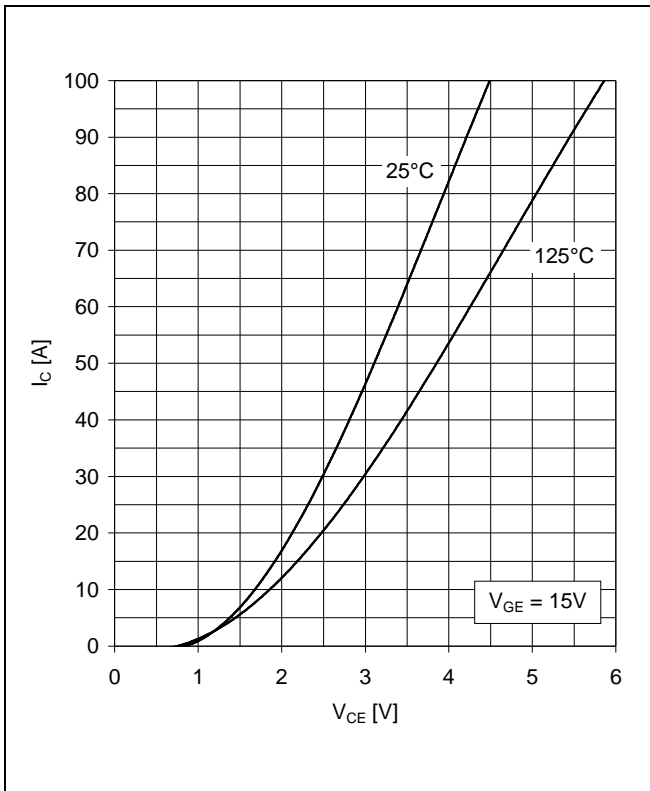


Fig. 1 Typical on-state characteristics

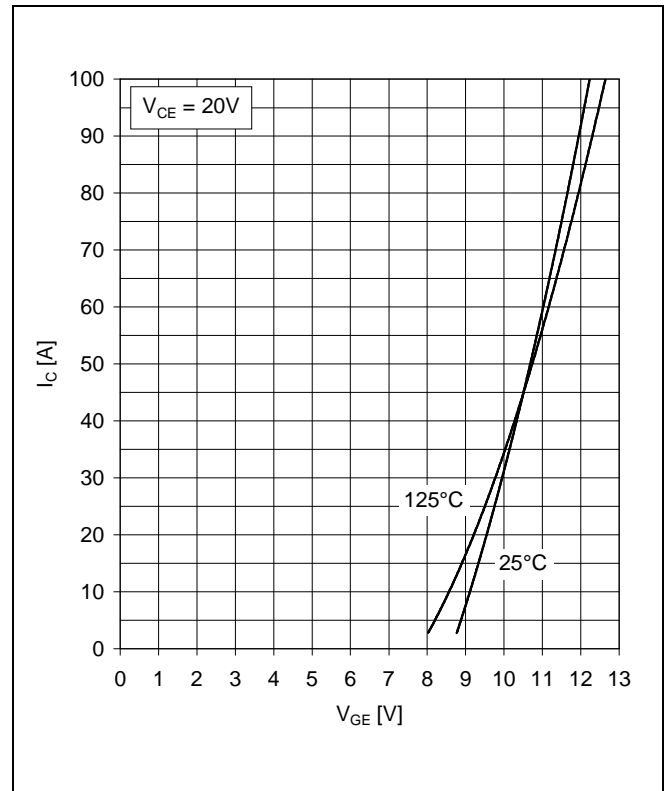


Fig. 2 Typical transfer characteristics

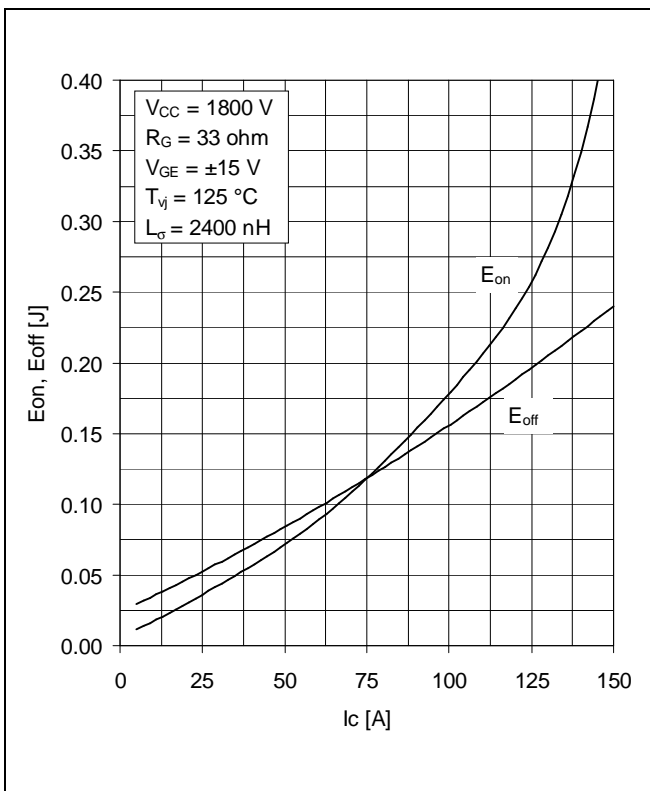


Fig. 3 Typical switching characteristics vs collector current

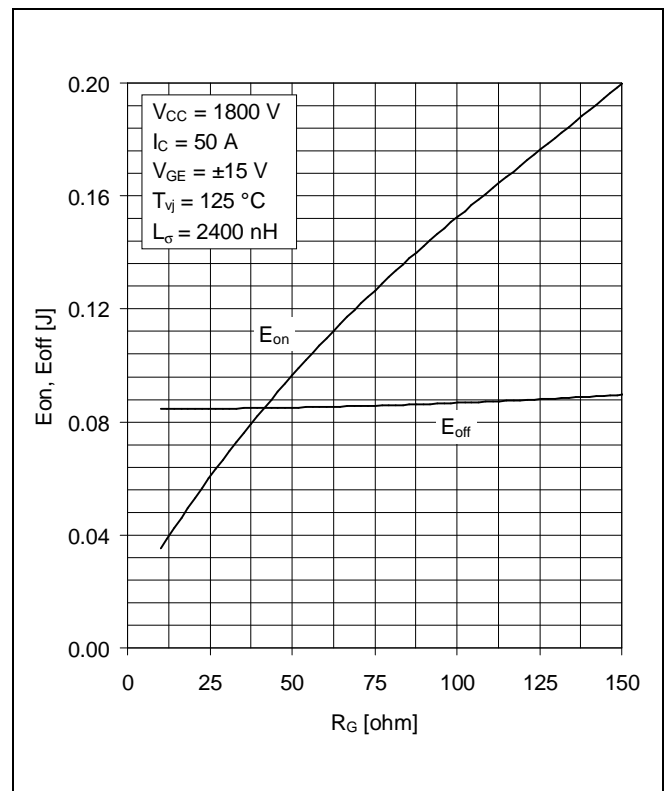


Fig. 4 Typical switching characteristics vs gate resistor

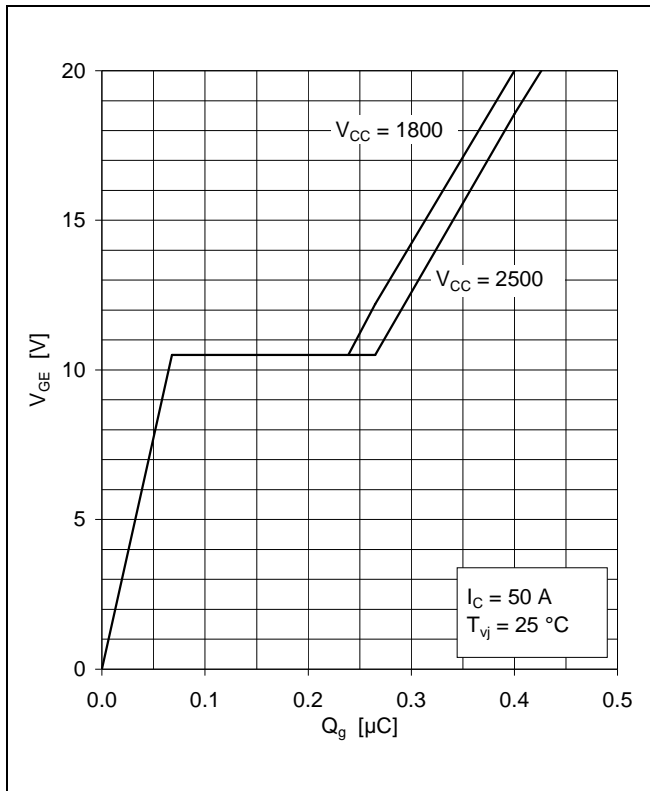


Fig. 5 Typical gate charge characteristics

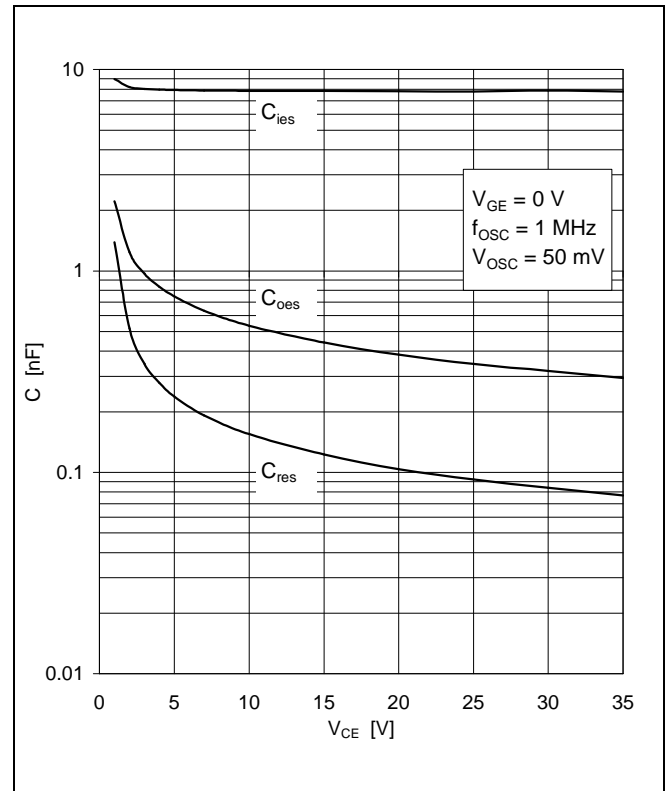


Fig. 6 Typical capacitances vs collector-emitter voltage

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