

$V_{CE} = 6500 \text{ V}$

$I_C = 25 \text{ A}$

IGBT-Die

5SMX 12M6500

PRELIMINARY



Die size: 13.6 x 13.6 mm

Doc. No. 5SYA1627-01 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}	$V_{GE} = 0 \text{ V}, T_{vj} \geq 25 \text{ °C}$		6500	V
DC collector current	I_C			25	A
Peak collector current	I_{CM}	Limited by T_{vjmax}		50	A
Gate-emitter voltage	V_{GES}		-20	20	V
IGBT short circuit SOA	t_{psc}	$V_{CC} = 4400 \text{ V}, V_{CEM} \leq 6500 \text{ V}$ $V_{GE} \leq 15 \text{ V}, T_{vj} \leq 125 \text{ °C}$		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

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IGBT characteristic values ²⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Collector (-emitter) breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}$, $I_C = 1 \text{ mA}$, $T_{vj} = 25 \text{ °C}$	6500			V
Collector-emitter saturation voltage	$V_{CE \text{ sat}}$	$I_C = 25 \text{ A}$, $V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$	4.2		V
			$T_{vj} = 125 \text{ °C}$	5.4		V
Collector cut-off current	I_{CES}	$V_{CE} = 6500 \text{ V}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	10		μA
			$T_{vj} = 125 \text{ °C}$		4000	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	$V_{GE(TO)}$	$I_C = 10 \text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25 \text{ °C}$	6		8	V
Gate charge	Q_{ge}	$I_C = 25 \text{ A}$, $V_{CE} = 3600 \text{ V}$, $V_{GE} = -15 \dots 15 \text{ V}$		400		nC
Input capacitance	C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$, $T_{vj} = 25 \text{ °C}$		6.28		nF
Output capacitance	C_{oes}			0.38		
Reverse transfer capacitance	C_{res}			0.06		
Internal gate resistance	R_{Gint}			5		Ω
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 3600 \text{ V}$, $I_C = 25 \text{ A}$, $R_G = 82 \text{ }\Omega$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$	690		ns
			$T_{vj} = 125 \text{ °C}$	550		
Rise time	t_r	$L_\sigma = 6800 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	340		ns
			$T_{vj} = 125 \text{ °C}$	270		
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 3600 \text{ V}$, $I_C = 25 \text{ A}$, $R_G = 56 \text{ }\Omega$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$	1430		ns
			$T_{vj} = 125 \text{ °C}$	1450		
Fall time	t_f	$L_\sigma = 6800 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	540		ns
			$T_{vj} = 125 \text{ °C}$	690		
Turn-on switching energy	E_{on}	$V_{CC} = 3600 \text{ V}$, $I_C = 25 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 82 \text{ }\Omega$, $L_\sigma = 6800 \text{ nH}$, inductive load, FWD: $\frac{1}{2}$ 5SLX12M6500	$T_{vj} = 25 \text{ °C}$	180		mJ
			$T_{vj} = 125 \text{ °C}$	200		
Turn-off switching energy	E_{off}	$V_{CC} = 3600 \text{ V}$, $I_C = 25 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 56 \text{ }\Omega$, $L_\sigma = 6800 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	85		mJ
			$T_{vj} = 125 \text{ °C}$	130		
Short circuit current	I_{SC}	$t_{psc} \leq 10 \text{ }\mu\text{s}$, $V_{GE} = 15 \text{ V}$, $T_{vj} = 125 \text{ °C}$, $V_{CC} = 4400 \text{ V}$, $V_{CEM} \leq 6500 \text{ V}$		110		A

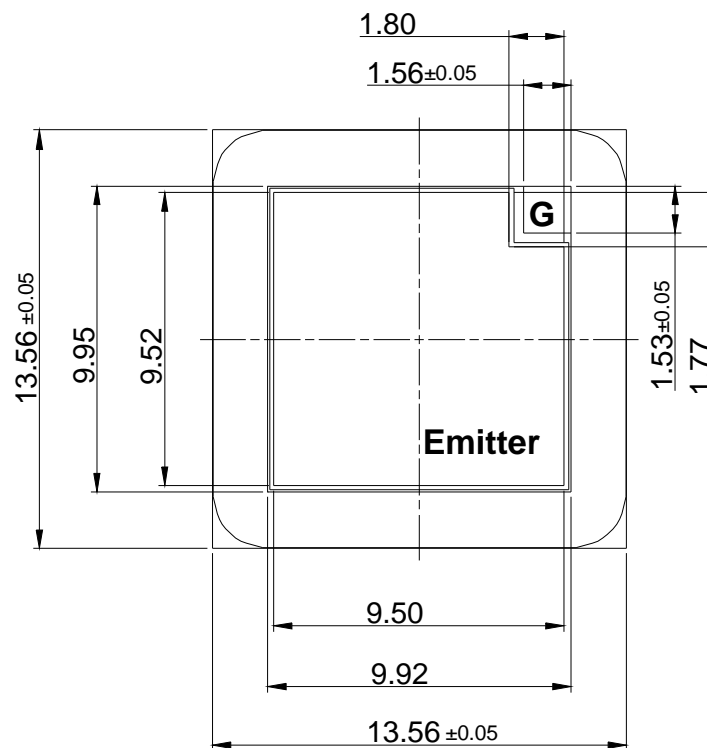
²⁾ Characteristic values according to IEC 60747 - 9

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)	9.52 x 9.5	mm
	gate pad	L x W	1.56 x 1.53	mm
	thickness		670 ± 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



Note: all dimensions are shown in mm

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.

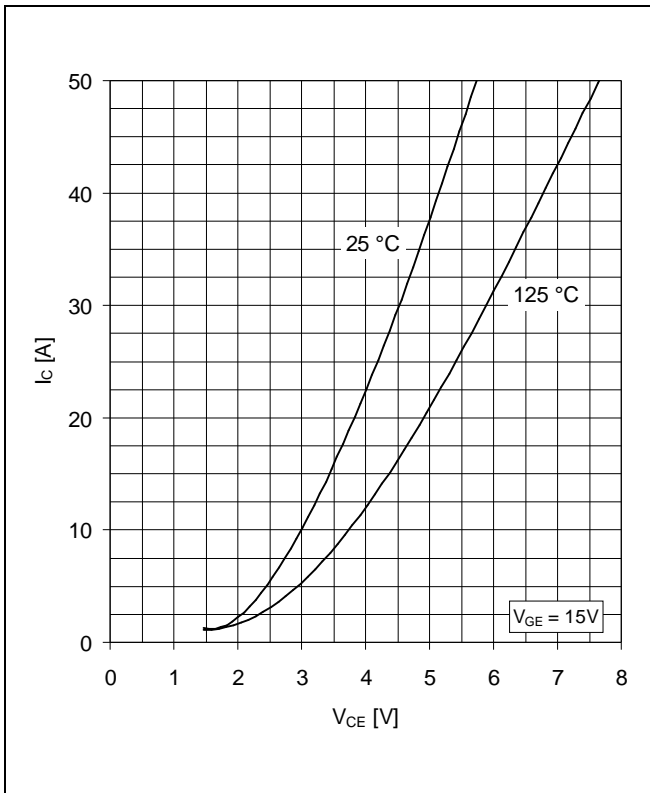


Fig. 1 Typical on-state characteristics

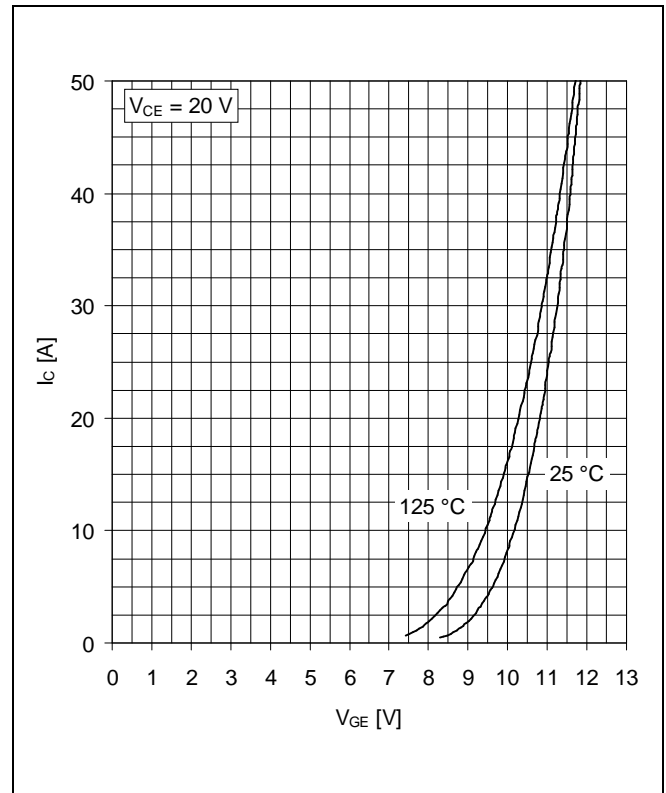


Fig. 2 Typical transfer characteristics

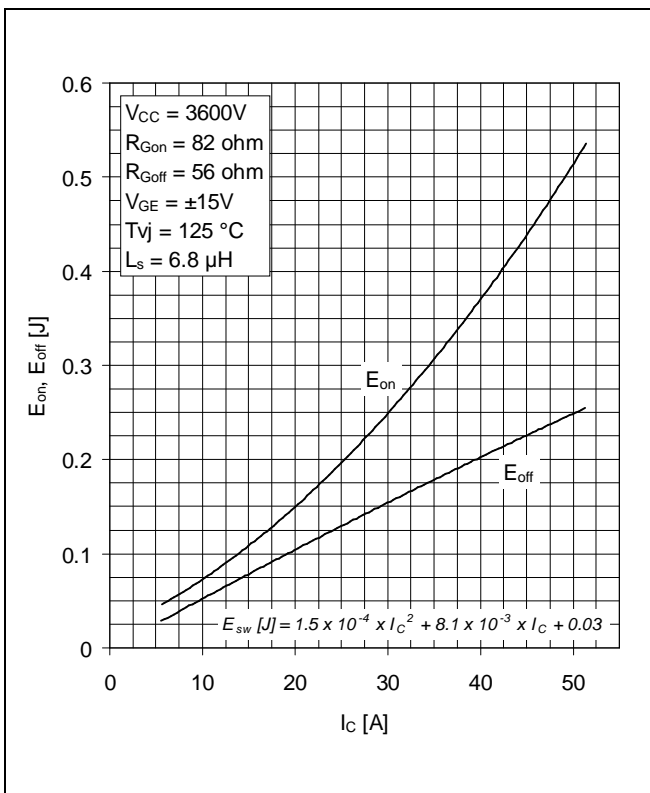


Fig. 3 Typical switching characteristics vs collector current

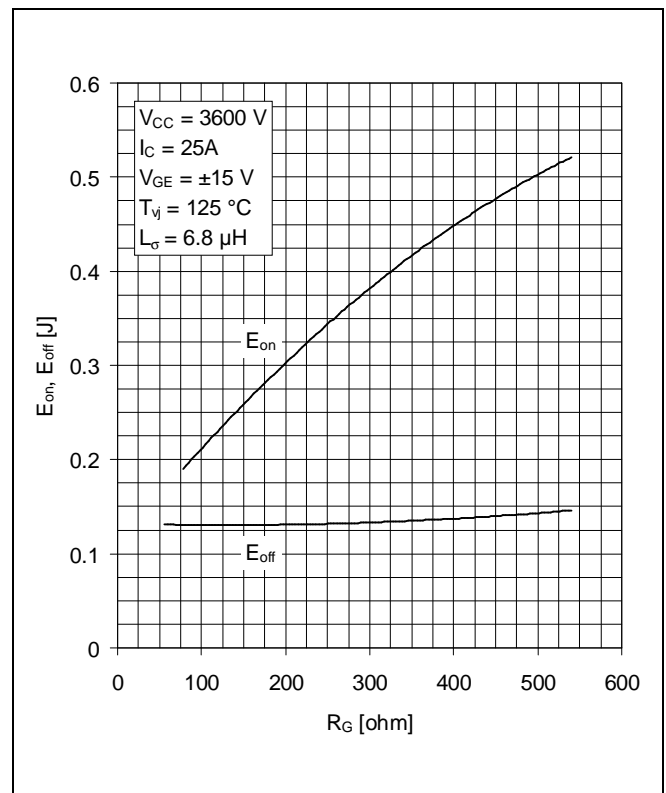


Fig. 4 Typical switching characteristics vs gate resistor

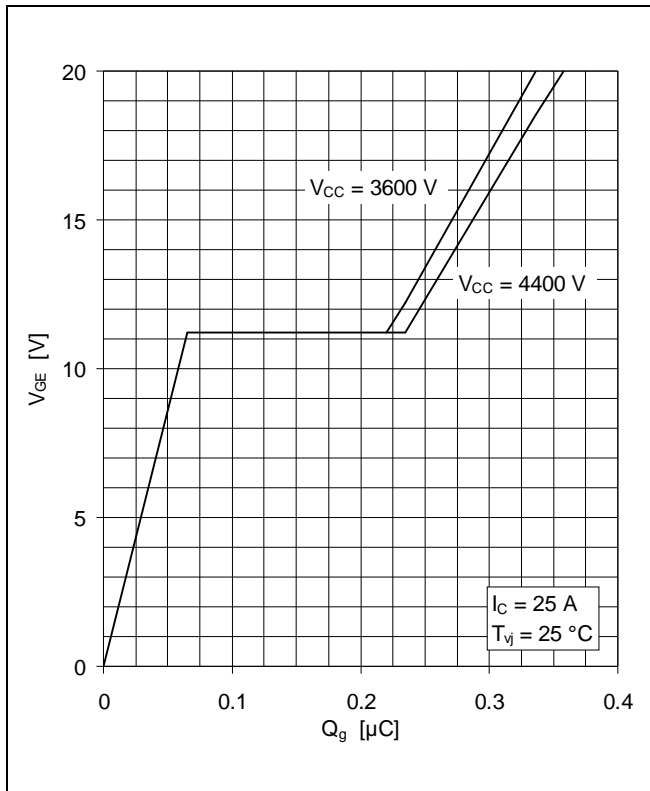


Fig. 5 Typical gate charge characteristics

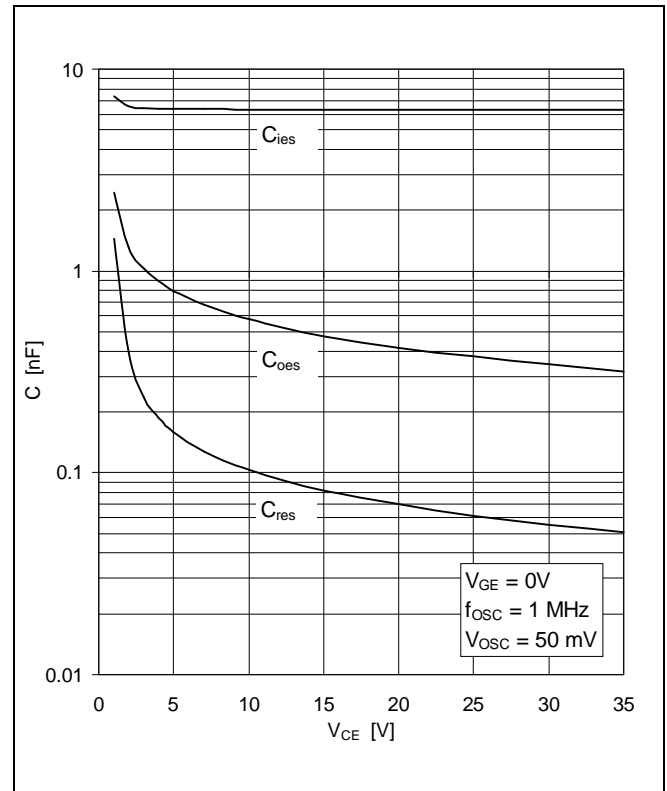


Fig. 6 Typical capacitances vs collector-emitter voltage

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