

$V_{CE} = 4500 \text{ V}$

$I_C = 55 \text{ A}$

IGBT-Die

5SMY 12N4501



Die size: 14.3 x 14.3 mm

Doc. No. 5SYA 1646-01 11 11

- Ultra low loss thin IGBT die
- Highly rugged SPT⁺ design
- Emitter metallisation optimized for press-pack packaging
- Passivation: SIPOS and Silicon Nitride

Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	max	Unit
Collector-emitter voltage	V_{CES}	$V_{GE} = 0 \text{ V}$		4500	V
DC collector current	I_C			55	A
Peak collector current	I_{CM}	Limited by T_{vjmax}		110	A
Gate-emitter voltage	V_{GES}		-20	20	V
IGBT short circuit SOA	t_{psc}	$V_{CC} = 3400 \text{ V}, V_{CEM} \leq 4500 \text{ V}$ $V_{GE} \leq 15 \text{ V}, T_{vj} \leq 125 \text{ °C}$		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) breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}$, $I_C = 1 \text{ mA}$, $T_{vj} = 25 \text{ °C}$	4500			V
Collector-emitter saturation voltage	$V_{CE \text{ sat}}$	$I_C = 55 \text{ A}$, $V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$	2.8		V
			$T_{vj} = 125 \text{ °C}$	3.5		V
Collector cut-off current	I_{CES}	$V_{CE} = 4500 \text{ V}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$		100	μA
			$T_{vj} = 125 \text{ °C}$	1700		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	$V_{GE(TO)}$	$I_C = 10 \text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25 \text{ °C}$	5.5	6.3	7	V
Gate charge	Q_{ge}	$I_C = 55 \text{ A}$, $V_{CE} = 2800 \text{ V}$, $V_{GE} = -15 \dots 15 \text{ V}$		500		nC
Input capacitance	C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$, $T_{vj} = 25 \text{ °C}$		5.94		nF
Output capacitance	C_{oes}			0.27		
Reverse transfer capacitance	C_{res}			0.11		
Internal gate resistance	R_{Gint}			5		Ω
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 2800 \text{ V}$, $I_C = 55 \text{ A}$, $R_G = 47 \text{ }\Omega$, $C_{GE} = 6.8 \text{ nF}$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$	620		ns
			$T_{vj} = 125 \text{ °C}$	550		
Rise time	t_r	$L_\sigma = 6000 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	330		ns
			$T_{vj} = 125 \text{ °C}$	350		
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 2800 \text{ V}$, $I_C = 55 \text{ A}$, $R_G = 47 \text{ }\Omega$, $C_{GE} = 6.8 \text{ nF}$, $V_{GE} = \pm 15 \text{ V}$,	$T_{vj} = 25 \text{ °C}$	1550		ns
			$T_{vj} = 125 \text{ °C}$	1750		
Fall time	t_f	$L_\sigma = 6000 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	640		ns
			$T_{vj} = 125 \text{ °C}$	710		
Turn-on switching energy	E_{on}	$V_{CC} = 2800 \text{ V}$, $I_C = 55 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 47 \text{ }\Omega$, $C_{GE} = 6.8 \text{ nF}$, $L_\sigma = 6000 \text{ nH}$, inductive load, FWD: $\frac{1}{2}$ 5SLX12N4500	$T_{vj} = 25 \text{ °C}$	155		mJ
			$T_{vj} = 125 \text{ °C}$	200		
Turn-off switching energy	E_{off}	$V_{CC} = 2800 \text{ V}$, $I_C = 55 \text{ A}$, $V_{GE} = \pm 15 \text{ V}$, $R_G = 47 \text{ }\Omega$, $C_{GE} = 6.8 \text{ nF}$, $L_\sigma = 6000 \text{ nH}$, inductive load	$T_{vj} = 25 \text{ °C}$	190		mJ
			$T_{vj} = 125 \text{ °C}$	260		
Short circuit current	I_{SC}	$t_{psc} \leq 10 \text{ }\mu\text{s}$, $V_{GE} = 15 \text{ V}$, $T_{vj} = 125 \text{ °C}$, $V_{CC} = 3400 \text{ V}$, $V_{CEM} \leq 4500 \text{ V}$		160		A

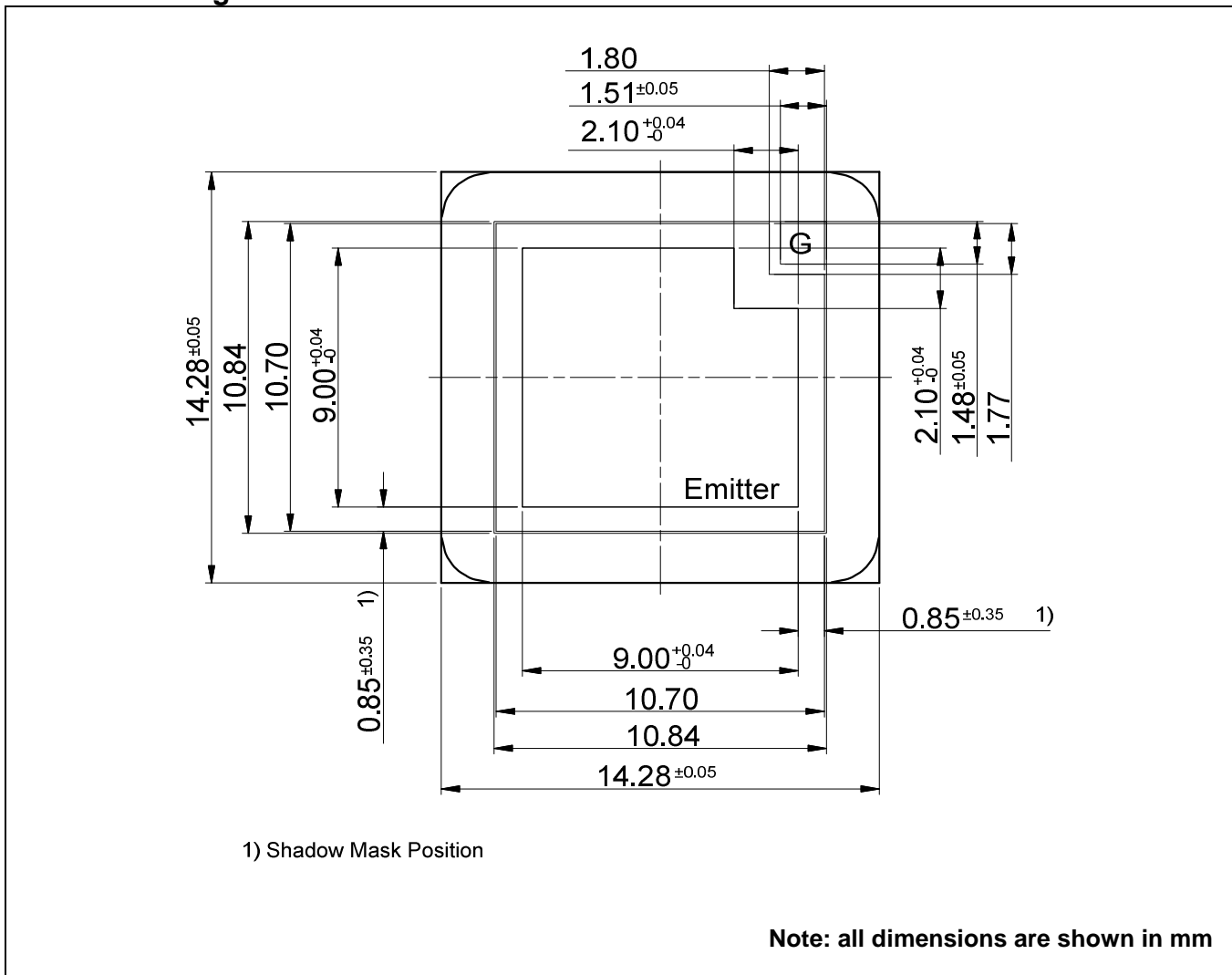
²⁾ Characteristic values according to IEC 60747 - 9

Mechanical properties

Parameter				Unit
Dimensions	Overall die	L x W	14.3 x 14.3	mm
	exposed front metal	L x W (except gate pad)	9.0 x 9.0	mm
	gate pad	L x W	1.51 x 1.48	mm
	thickness		530 ± 20	µm
Metallization ³⁾	front (E)	AlSi1 + Al	4 + 8	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.

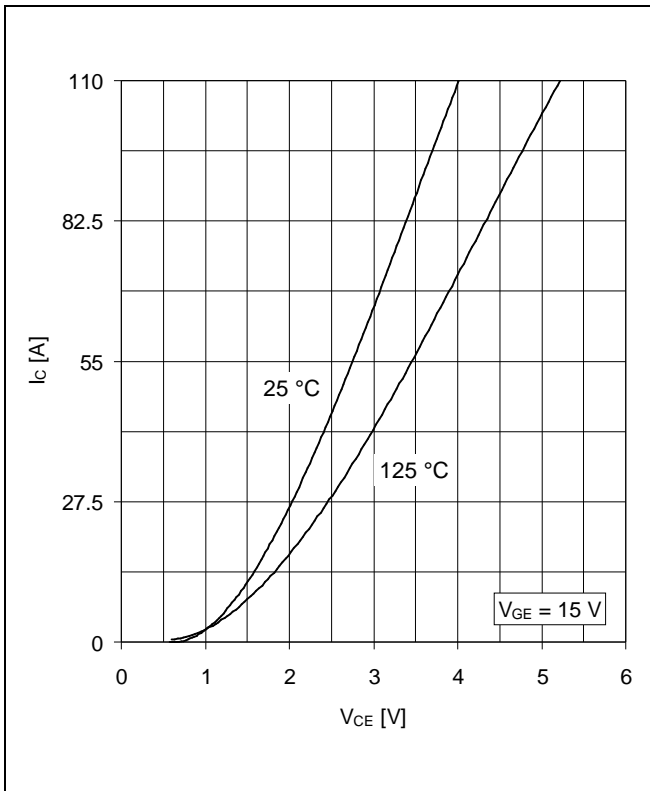


Fig. 1 Typical onstate characteristics

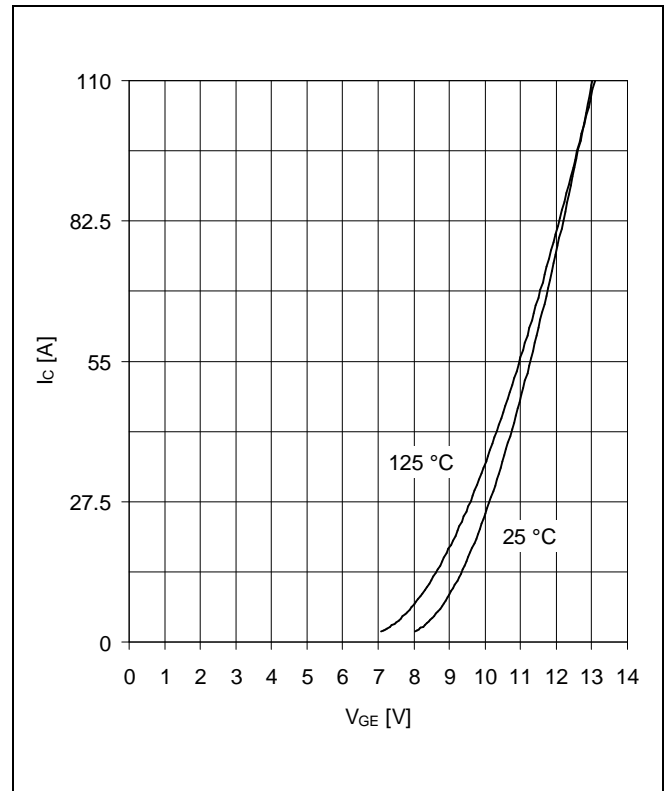


Fig. 2 Typical transfer characteristics

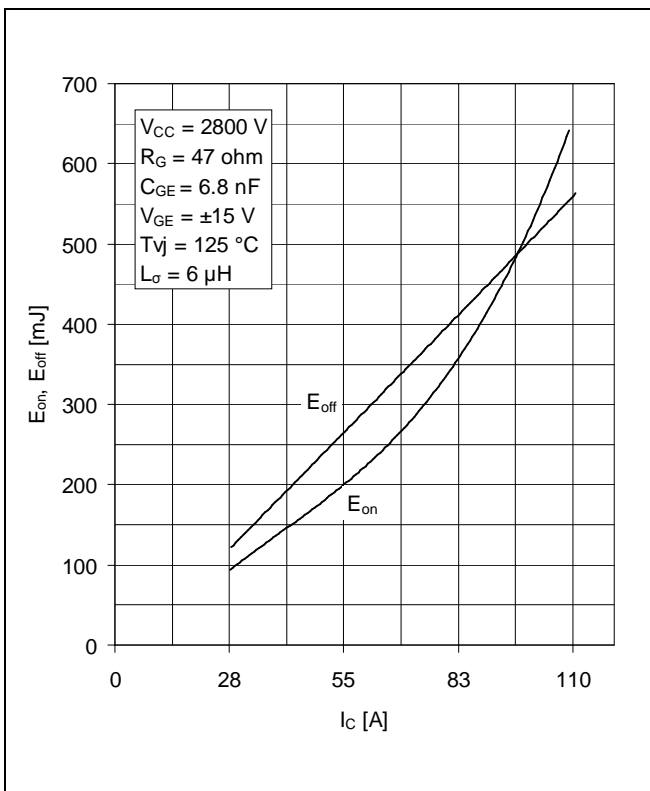


Fig. 3 Typical switching characteristics vs collector current

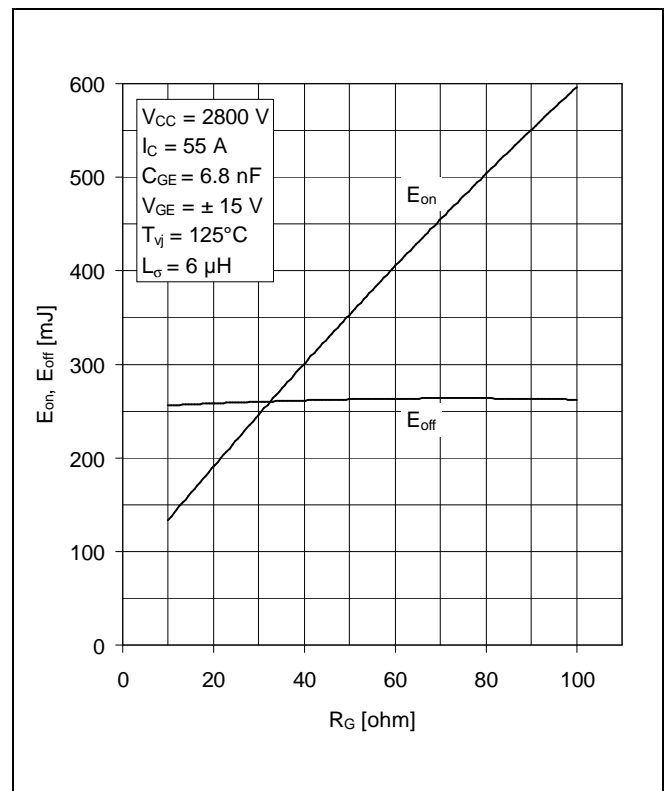


Fig. 4 Typical switching characteristics vs gate resistor

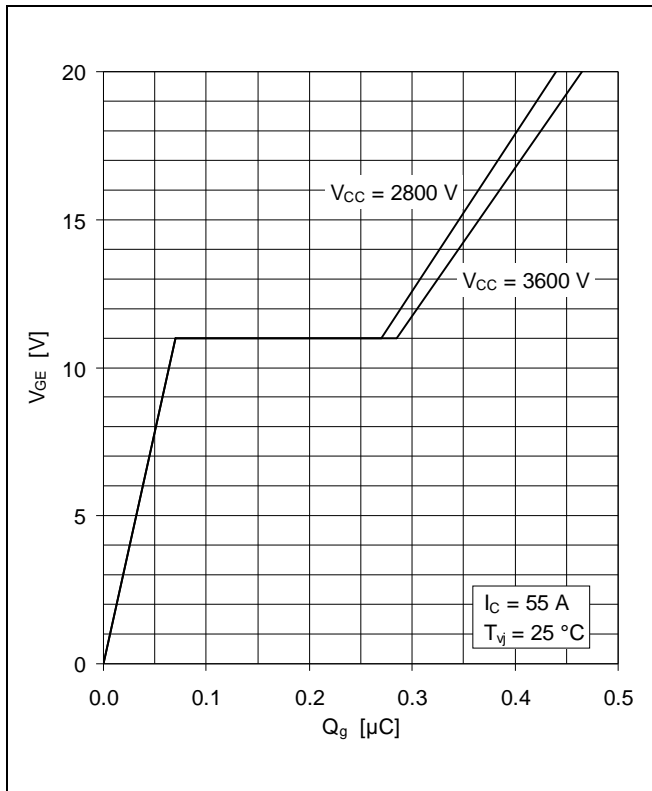


Fig. 5 Typical gate charge characteristics

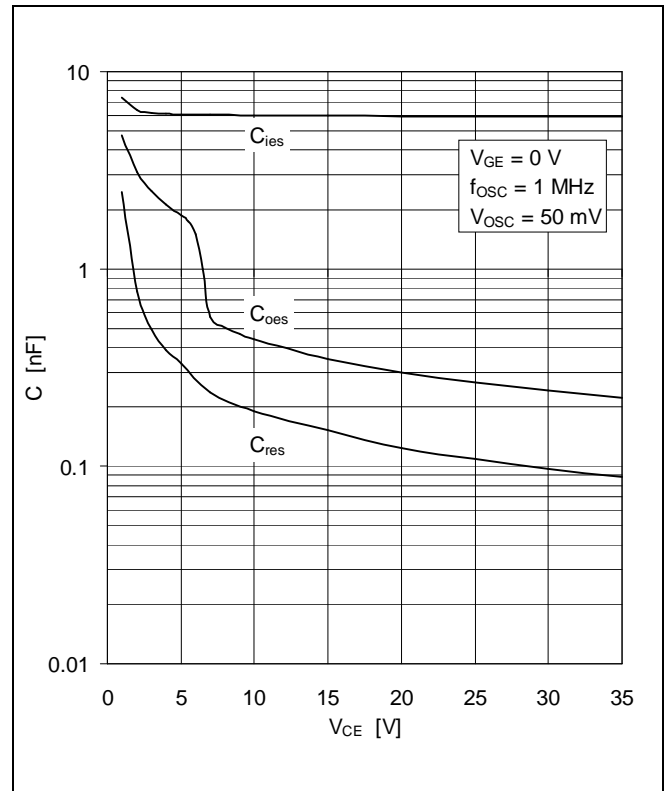


Fig. 6 Typical capacitances vs collector-emitter voltage

ABB Switzerland Ltd, Semiconductors reserves the right to change specifications without notice.



ABB Switzerland Ltd
Semiconductors
 Fabrikstrasse 3
 CH-5600 Lenzburg, Switzerland

Telephone +41 (0)58 586 1419
 Fax +41 (0)58 586 1306
 Email abbsem@ch.abb.com
 Internet www.abb.com/semiconductors