

$V_{CE} = 2500 \text{ V}$
 $I_C = 50 \text{ A}$

IGBT-Die

5SMX 12L2510



Die size: 12.4 x 12.4 mm

Doc. No. 5SYA 1622-03 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}	$V_{GE} = 0 \text{ V}$		2500	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}	$V_{CC} = 2000 \text{ V}, V_{CEM} \leq 2500 \text{ V}$ $V_{GE} \leq 15 \text{ V}, T_{vj} \leq 125 \text{ °C}$		10	μs
Junction temperature	T_{vj}		-40	125	$^{\circ}\text{C}$

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	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}, I_C = 1 \text{ mA}, T_{vj} = 25 \text{ }^\circ\text{C}$	2500			V	
Collector-emitter saturation voltage	$V_{CE \text{ sat}}$	$I_C = 50 \text{ A}, V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	2.0	2.5	2.9	V
			$T_{vj} = 125 \text{ }^\circ\text{C}$		3.1		V
Collector cut-off current	I_{CES}	$V_{CE} = 2500 \text{ V}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$			100	μA
			$T_{vj} = 125 \text{ }^\circ\text{C}$		1000		μA
Gate leakage current	I_{GES}	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}, T_{vj} = 125 \text{ }^\circ\text{C}$	-500		500	nA	
Gate-emitter threshold voltage	$V_{GE(TO)}$	$I_C = 10 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25 \text{ }^\circ\text{C}$	5		7.5	V	
Gate charge	Q_{ge}	$I_C = 50 \text{ A}, V_{CE} = 1250 \text{ V}, V_{GE} = -15 \dots 15 \text{ V}$		510		nC	
Input capacitance	C_{ies}	$V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}, f = 1 \text{ MHz}, T_{vj} = 25 \text{ }^\circ\text{C}$		7.8		nF	
Output capacitance	C_{oes}			0.4			
Reverse transfer capacitance	C_{res}			0.13			
Internal gate resistance	R_{Gint}			5		Ω	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 1250 \text{ V}, I_C = 50 \text{ A}, R_G = 33 \text{ } \Omega, V_{GE} = \pm 15 \text{ V},$	$T_{vj} = 25 \text{ }^\circ\text{C}$		380	ns	
			$T_{vj} = 125 \text{ }^\circ\text{C}$		390		
Rise time	t_r	$L_\sigma = 2400 \text{ nH},$ inductive load	$T_{vj} = 25 \text{ }^\circ\text{C}$		255	ns	
			$T_{vj} = 125 \text{ }^\circ\text{C}$		265		
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 1250 \text{ V}, I_C = 50 \text{ A}, R_G = 33 \text{ } \Omega, V_{GE} = \pm 15 \text{ V},$	$T_{vj} = 25 \text{ }^\circ\text{C}$		690	ns	
			$T_{vj} = 125 \text{ }^\circ\text{C}$		790		
Fall time	t_f	$L_\sigma = 2400 \text{ nH},$ inductive load	$T_{vj} = 25 \text{ }^\circ\text{C}$		320	ns	
			$T_{vj} = 125 \text{ }^\circ\text{C}$		350		
Turn-on switching energy	E_{on}	$V_{CC} = 1250 \text{ V}, I_C = 50 \text{ A}, V_{GE} = \pm 15 \text{ V}, R_G = 33 \text{ } \Omega, L_\sigma = 2400 \text{ nH},$ inductive load, FWD: $\frac{1}{2}$ 5SLX12L2510	$T_{vj} = 25 \text{ }^\circ\text{C}$		28	mJ	
			$T_{vj} = 125 \text{ }^\circ\text{C}$		42		
Turn-off switching energy	E_{off}	$V_{CC} = 1250 \text{ V}, I_C = 50 \text{ A}, V_{GE} = \pm 15 \text{ V}, R_G = 33 \text{ } \Omega, L_\sigma = 2400 \text{ nH},$ inductive load	$T_{vj} = 25 \text{ }^\circ\text{C}$		40	mJ	
			$T_{vj} = 125 \text{ }^\circ\text{C}$		50		
Short circuit current	I_{SC}	$t_{psc} \leq 10 \text{ } \mu\text{s}, V_{GE} = 15 \text{ V}, T_{vj} = 125 \text{ }^\circ\text{C}, V_{CC} = 2000 \text{ V}, V_{CEM} \leq 2500 \text{ V}$		250		A	

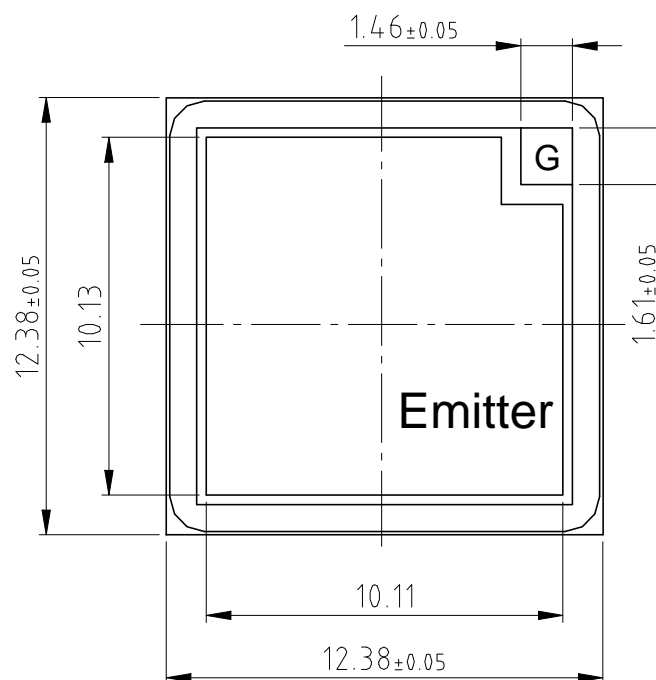
²⁾ Characteristic values according to IEC 60747 - 9

Mechanical properties

Parameter				Unit
Dimensions	Overall die	L x W	12.4 x 12.4	mm
	exposed front metal	L x W (except gate pad)	10.11 x 10.13	mm
	gate pad	L x W	1.46 x 1.61	mm
	thickness		305 ± 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.

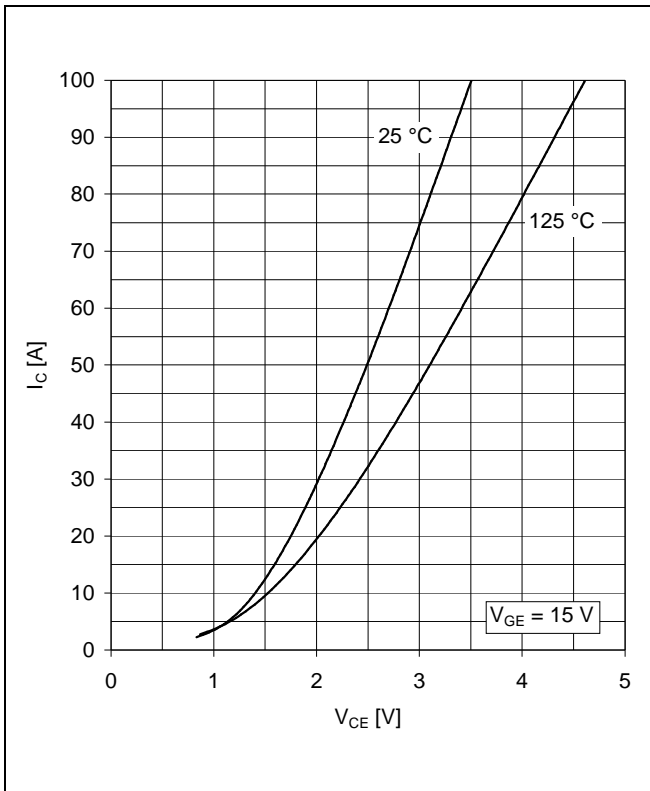


Fig. 1 Typical on-state characteristics

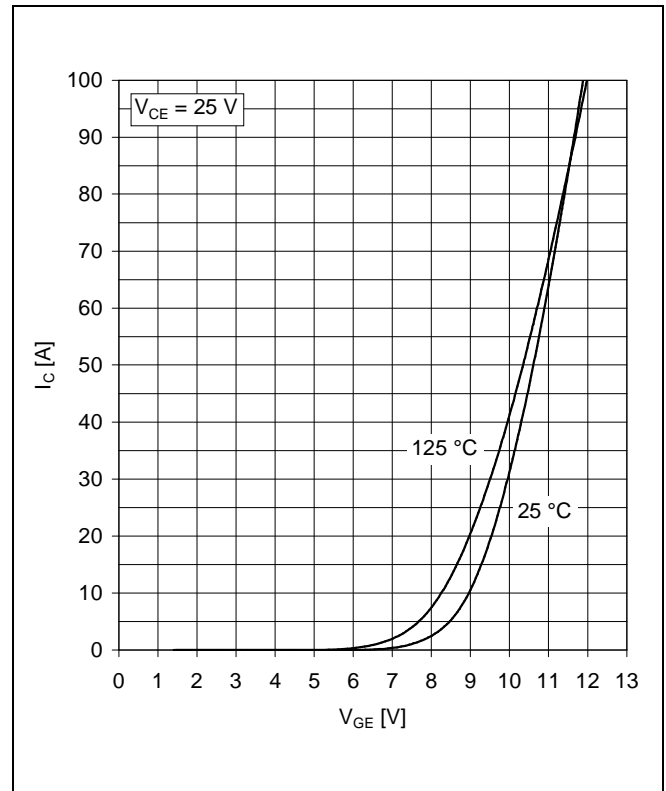


Fig. 2 Typical transfer characteristics

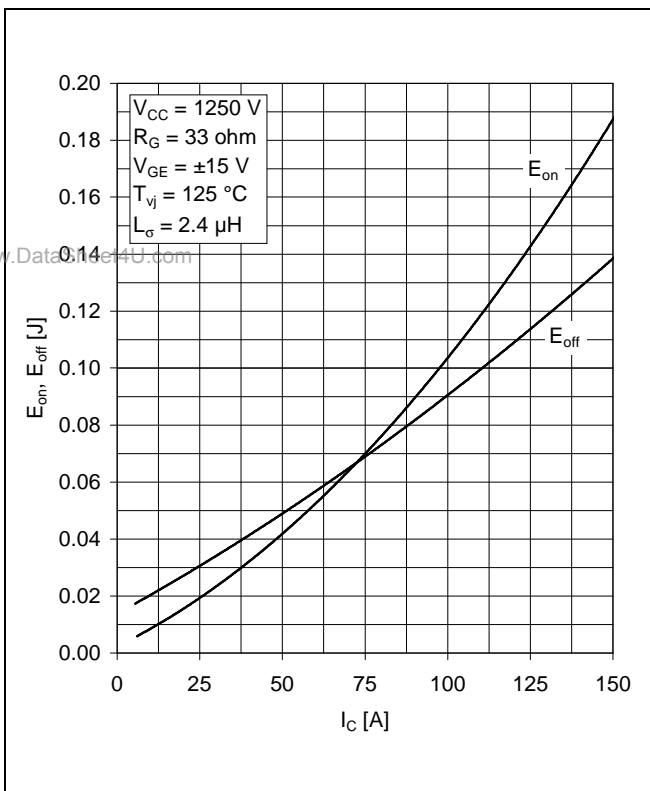


Fig. 3 Typical switching characteristics vs collector current

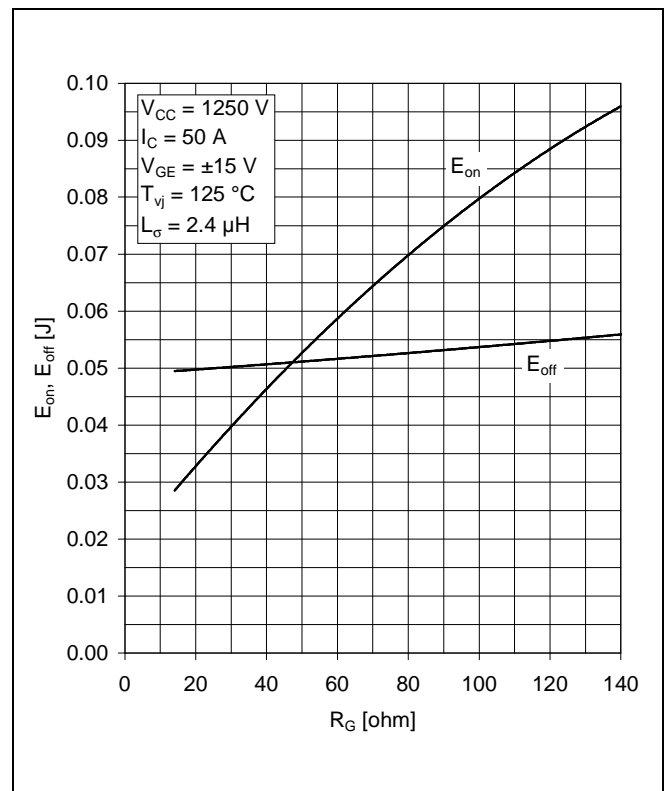


Fig. 4 Typical switching characteristics vs gate resistor

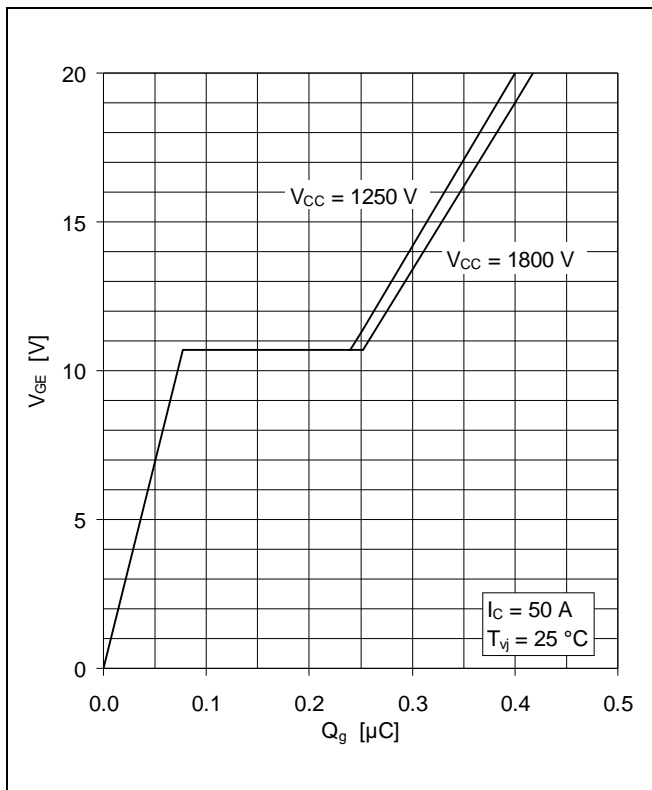


Fig. 5 Typical gate charge characteristics

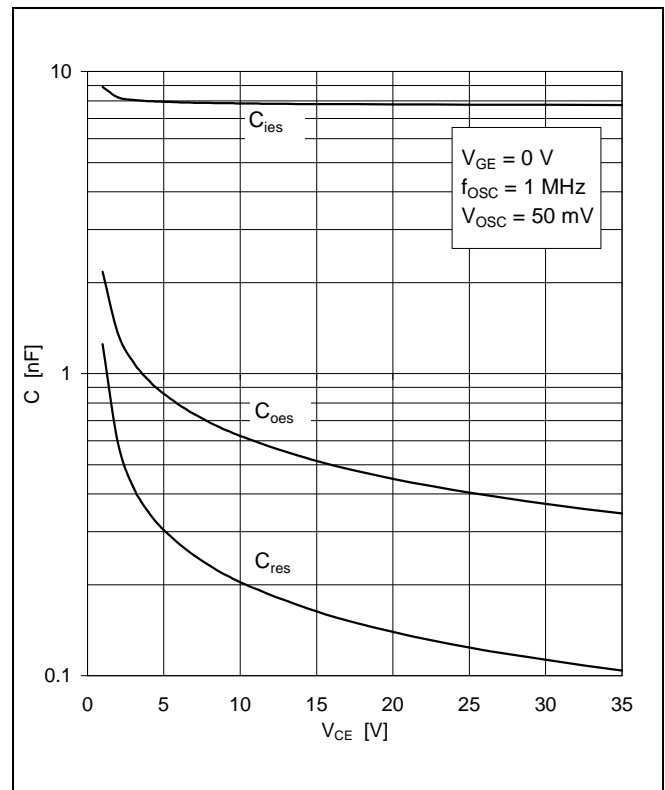


Fig. 6 Typical capacitances vs collector-emitter voltage

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