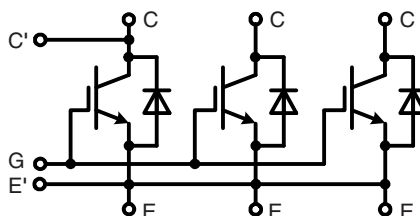


IGBT Module

Single switch

Short Circuit SOA Capability
Square RBSOA

$$\begin{aligned} I_{C80} &= 2400 \text{ A} \\ V_{CES} &= 1700 \text{ V} \\ V_{CE(sat) \text{ typ.}} &= 2.3 \text{ V} \end{aligned}$$



IGBT			
Symbol	Conditions	Maximum Ratings	
V_{CES}	$V_{GE} = 0 \text{ V}$	1700	V
V_{GES}		± 20	V
I_{C80}	$T_C = 80^\circ\text{C}$	2400	A
I_{CM}	$t_p = 1 \text{ ms}; T_C = 80^\circ\text{C}$	4800	A
t_{SC}	$V_{CC} = 1000 \text{ V}; V_{CEM \text{ CHIP}} \leq 1700 \text{ V};$ $V_{GE} \leq 15 \text{ V}; T_{VJ} \leq 125^\circ\text{C}$	10	μs

Features

- NPT³ IGBT
 - Low-loss
 - Smooth switching waveforms for good EMC
- Industry standard package
 - High power density
 - AISiC base-plate for high power cycling capacity
 - AlN substrate for low thermal resistance

Typical Applications

- AC power converters for
 - industrial drives
 - windmills
 - traction
- LASER pulse generator

Symbol	Conditions	Characteristic Values ($T_{VJ} = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)} \star$	$I_C = 2400 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		2.3 2.6	2.6 V 2.9 V
$V_{GE(th)}$	$I_C = 240 \text{ mA}; V_{CE} = V_{GE}$	4.5		6.5 V
I_{CES}	$V_{CE} = 1700 \text{ V}; V_{GE} = 0 \text{ V}; T_{VJ} = 125^\circ\text{C}$			120 mA
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}; T_{VJ} = 125^\circ\text{C}$			500 nA
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	Inductive load; $T_{VJ} = 125^\circ\text{C};$ $V_{GE} = \pm 15 \text{ V}; V_{CC} = 900 \text{ V};$ $I_C = 2400 \text{ A}; R_G = 0.56 \Omega;$ $L_\sigma = 60 \text{ nH}$		340 260 1050 270 600 980	ns ns ns ns mJ mJ
C_{ies} C_{oes} C_{res}			230 22 10	nF nF nF
Q_{ge}	$I_C = 2400 \text{ A}; V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}$		22	μC
R_{thJC}				0.007 K/W

★ Collector emitter saturation voltage is given at chip level

IXYS reserves the right to change limits, test conditions and dimensions.

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Diode

Symbol	Conditions	Maximum Ratings	
I_{F80}	$T_C = 80^\circ\text{C}$	2400	A
I_{FSM}	$V_R = 0\text{ V}; T_{VJ} = 125^\circ\text{C}; t_p = 10\text{ ms}; \text{half-sinewave}$	22000	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$V_F *$	$I_F = 2400\text{ A}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	1.65 1.70		2.0 V V
I_{RM} t_{rr} Q_{RR} E_{rec}	$V_{CC} = 900\text{ V}; I_C = 2400\text{ A};$ $V_{GE} = \pm 15\text{ V}; R_G = 0.56\Omega; T_{VJ} = 125^\circ\text{C}$ Inductive load; $L_\sigma = 60\text{ nH}$	1880 890 1025 720		A ns μC mJ
R_{thJC}				0.012 K/W

* Forward voltage is given at chip level

Module

Symbol	Conditions	Maximum Ratings	
T_{JM}	max junction temperature	+150	$^\circ\text{C}$
T_{VJ}	Operating temperature	-40...+125	$^\circ\text{C}$
T_{stg}	Storage temperature	-40...+125	$^\circ\text{C}$
V_{ISOL}	50 Hz	4000	V~
M_d	Mounting torque	Base-heatsink, M6 screws Main terminals, M8 screws	4 - 6 Nm 8 - 10 Nm

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
d_A	Clearance distance	terminal to base terminal to terminal	23 19	mm mm
d_s	Surface creepage distance	terminal to base terminal to terminal	33 33	mm mm
L_σ	Module stray inductance, C to E terminal		10	nH
$R_{term-chip}^{*)}$	Resistance terminal to chip		0.085	m Ω
R_{thCH}	per module; λ grease = 1 W/m $\cdot$ K		0.006	K/W
Weight			1500	g

*) $V = V_{CE(sat)} + R_{term-chip} \cdot I_C$ resp. $V = V_F + R_{term-chip} \cdot I_F$

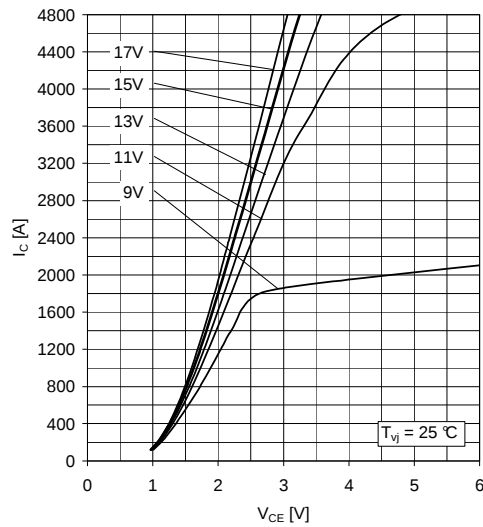


Fig. 1 Typical output characteristics, chip level

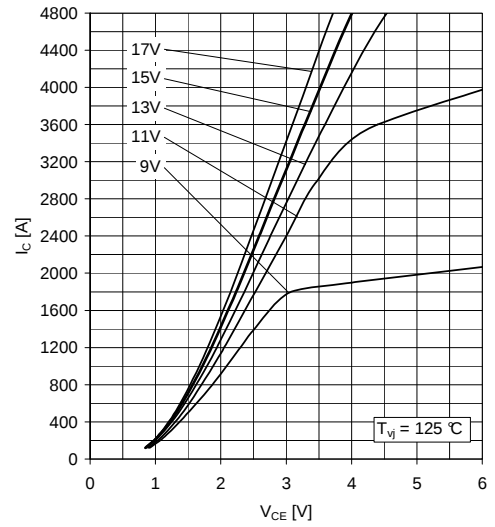


Fig. 2 Typical output characteristics, chip level

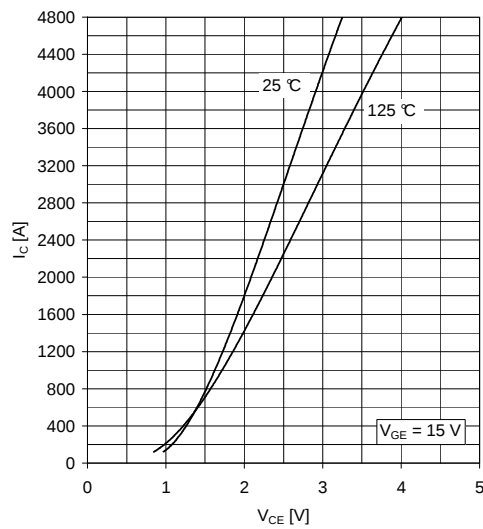


Fig. 3 Typical onstate characteristics, chip level

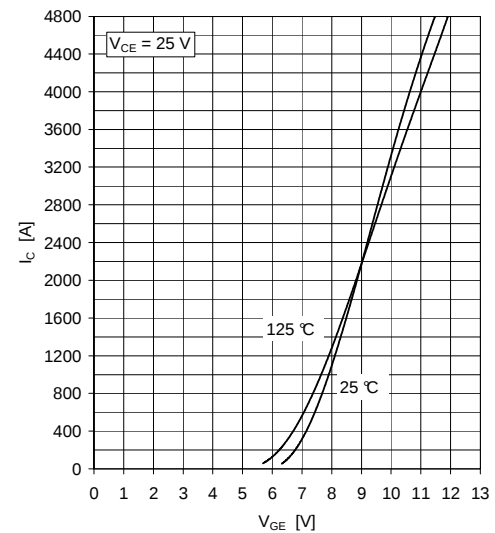


Fig. 4 Typical transfer characteristics, chip level

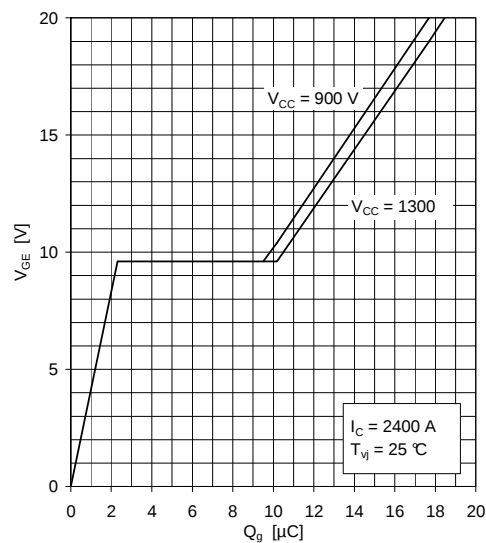


Fig. 5 Typical gate charge characteristics

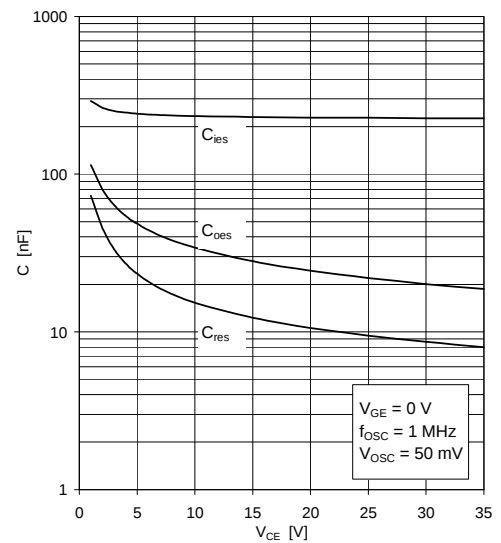


Fig. 6 Typical capacitances vs collector-emitter voltage

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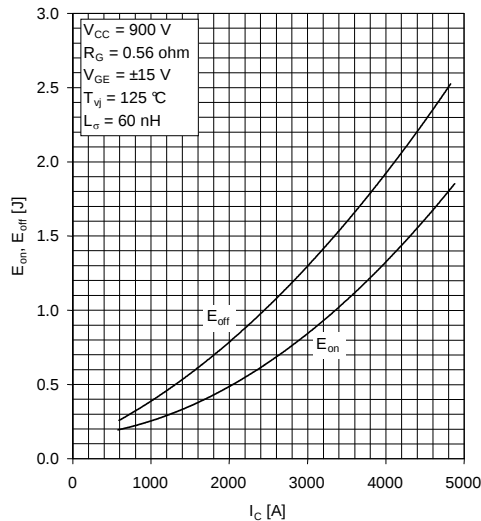


Fig. 7 Typical switching energies per pulse vs collector current

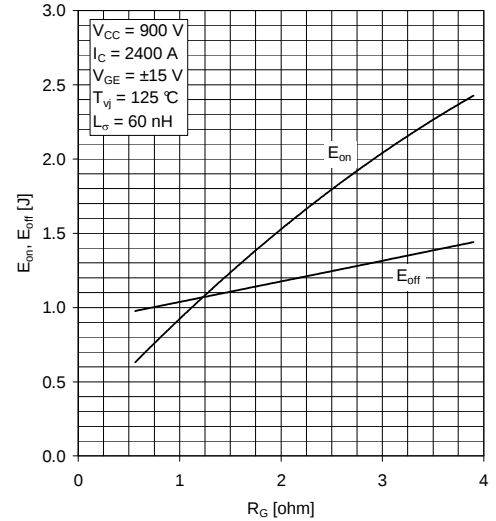


Fig. 8 Typical switching energies per pulse vs gate resistor

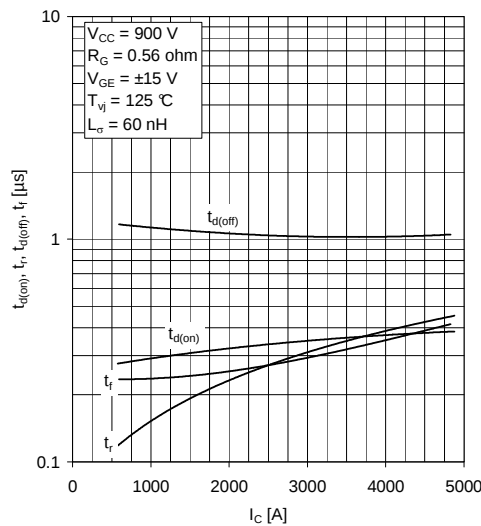


Fig. 9 Typical switching times vs collector current

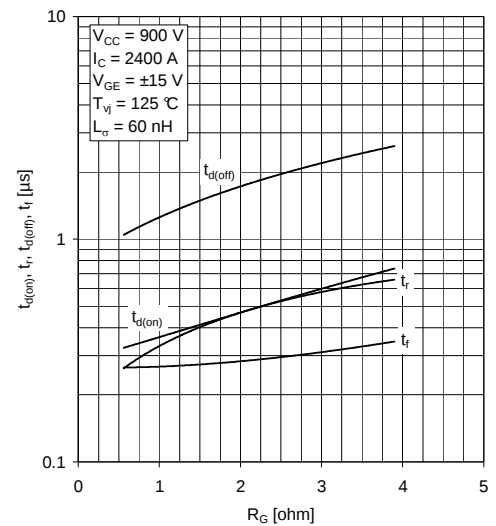


Fig. 10 Typical switching times vs gate resistor

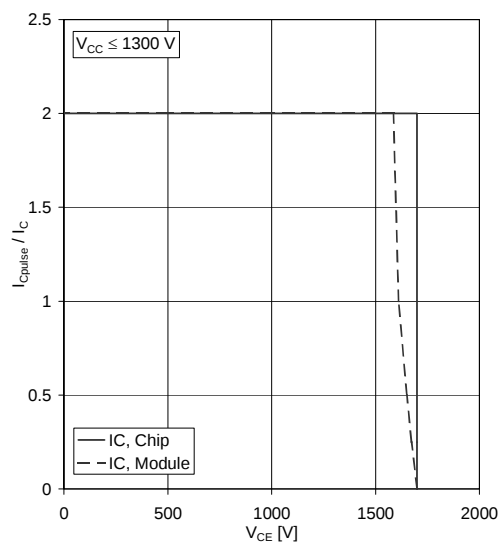


Fig. 11 Turn-off safe operating area (RBSOA)

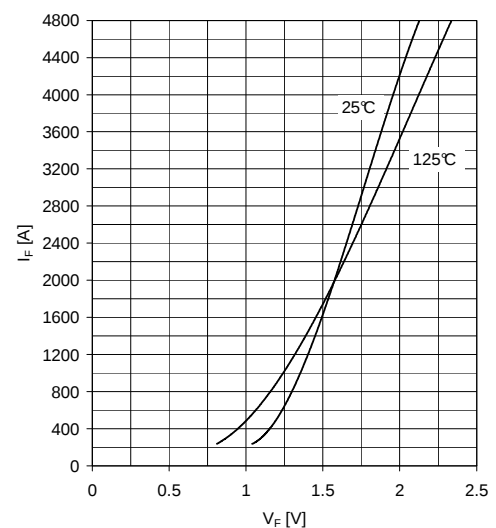


Fig. 12 Typical diode forward characteristics, chip level

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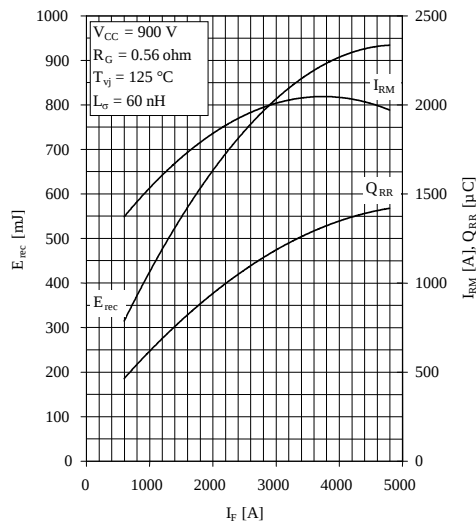


Fig. 13 Typical reverse recovery characteristics vs forward current

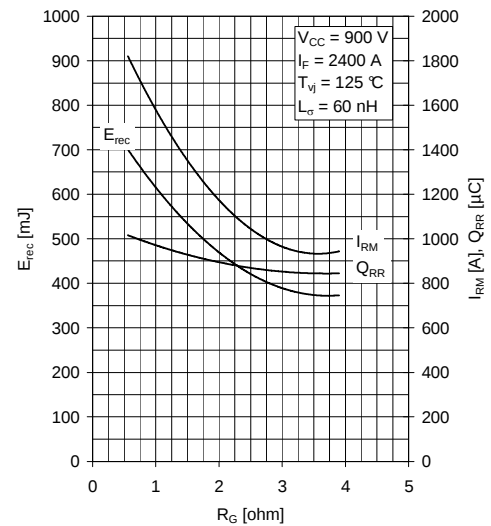


Fig. 14 Typical reverse recovery characteristics vs gate resistor

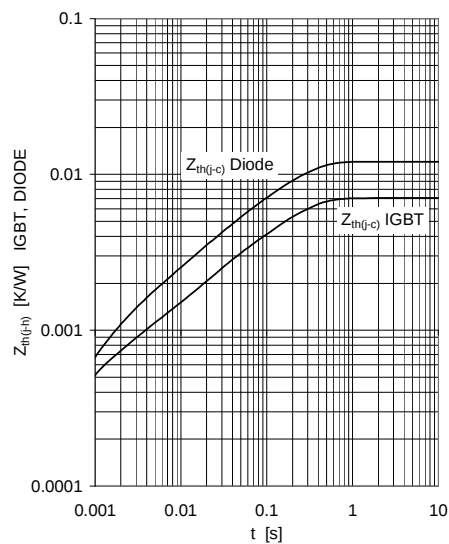


Fig. 15 Thermal impedance vs time

$$Z_{th(j-c)}(t) = \sum_{i=1}^n R_i (1 - e^{-t/\tau_i})$$

	i	1	2	3	4
IGBT	Ri(K/kW)	4.91	1.35	0.444	0.331
	τ_i (ms)	189	22	2.4	0.54
DIODE	Ri(K/kW)	8.17	2.16	0.862	0.885
	τ_i (ms)	196	31	7.4	1.4

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