

IGBT Module

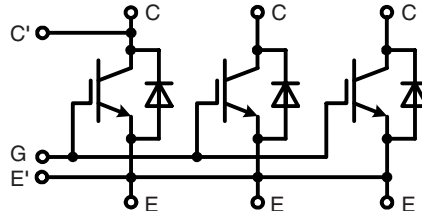
Single switch

Short Circuit SOA Capability
Square RBSOA

$$I_{C80} = 1200 \text{ A}$$

$$V_{CES} = 2500 \text{ V}$$

$$V_{CE(sat) \text{ typ.}} = 2.5 \text{ V}$$



IGBT			
Symbol	Conditions	Maximum Ratings	
V_{CES}	$V_{GE} = 0 \text{ V}$	2500	V
V_{GES}		± 20	V
I_{C80}	$T_C = 80^\circ\text{C}$	1200	A
I_{CM}	$t_p = 1 \text{ ms}; T_C = 80^\circ\text{C}$	2400	A
t_{SC}	$V_{CC} = 1800 \text{ V}; V_{CEM \text{ CHIP}} \leq 2500 \text{ V};$ $V_{GE} \leq 15 \text{ V}; T_{VJ} \leq 125^\circ\text{C}$	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.	
$V_{CE(sat)} \text{ ①}$	$I_C = 1200 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		2.5 3.1	V V	
$V_{GE(th)}$	$I_C = 240 \text{ mA}; V_{CE} = V_{GE}$	6		7.5 V	
I_{CES}	$V_{CE} = 2500 \text{ V}; V_{GE} = 0 \text{ V}; T_{VJ} = 125^\circ\text{C}$			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; $T_{VJ} = 125^\circ\text{C}; V_{GE} = \pm 15 \text{ V};$ $V_{CC} = 1250\text{V}; I_C = 1200\text{A}; R_G = 1.5\Omega; L_\sigma = 100\text{nH}$		365 250 980 345	ns ns ns ns	
			1150 1250	mJ mJ	
C_{ies} C_{oes} C_{res}		$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$		186 13.7 3.0	nF nF nF
Q_{ge}			$I_C = 1200 \text{ A}; V_{CE} = 1250 \text{ V}; V_{GE} = \pm 15 \text{ V}$	12.2	μC
R_{thJC}					0.009 K/W

① Collector emitter saturation voltage is given at chip level

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

Diode

Symbol	Conditions	Maximum Ratings	
I_{F80}	$T_C = 80^\circ\text{C}$	1200	A
I_{FSM}	$V_R = 0\text{ V}; T_{VJ} = 125^\circ\text{C}; t_p = 10\text{ ms};$ half-sinewave	11000	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V_F ②	$I_F = 1200\text{ A}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	1.75		V
		1.8		V
I_{RM} t_{rr} Q_{RR} E_{rec}	$V_{CC} = 1250\text{ V}; I_C = 1200\text{ A};$ $V_{GE} = \pm 15\text{ V}; R_G = 1.5\ \Omega; T_{VJ} = 125^\circ\text{C}$ Inductive load; $L_\sigma = 100\text{ nH}$	1180		A
		970		ns
		1150		μC
		990		mJ
R_{thJC}				0.017 K/W

② 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	5000	V~
M_d	Mounting torque	Base-heatsink, M6 screws	4 - 6 Nm
		Main terminals, M8 screws	8 - 10 Nm

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
d_A	Clearance distance	terminal to base	23	mm
		terminal to terminal	19	mm
d_S	Surface creepage distance	terminal to base	33	mm
		terminal to terminal	33	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. $V = V_F + R_{term-chip} \cdot I_F$

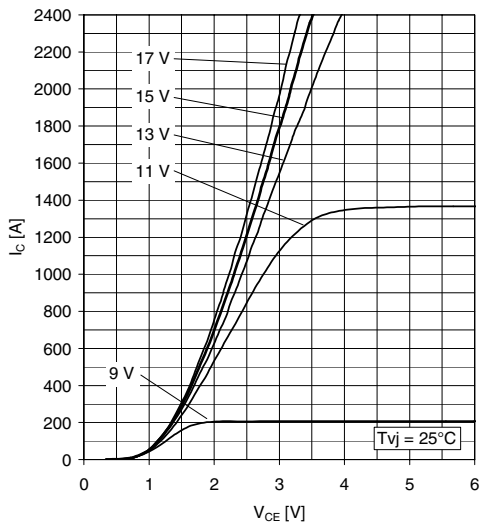


Fig. 1 Typical output characteristics, chip level

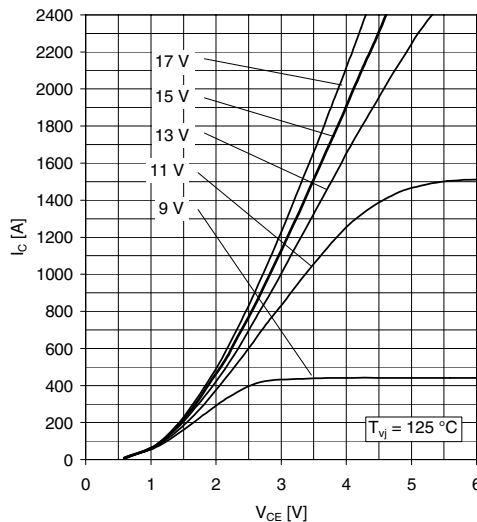


Fig. 2 Typical output characteristics, chip level

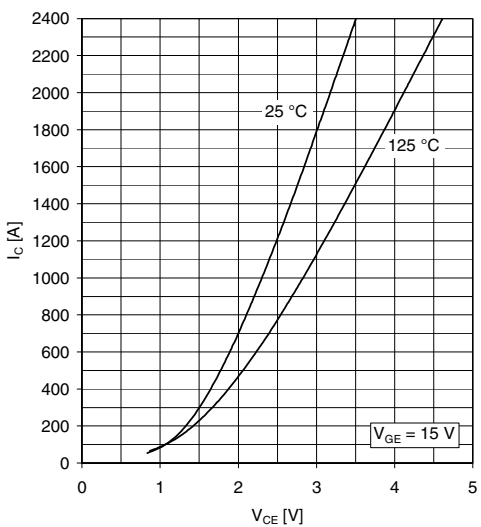


Fig. 3 Typical onstate characteristics, chip level

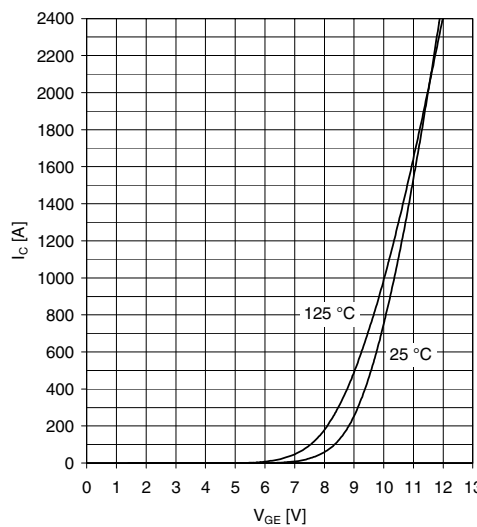


Fig. 4 Typical transfer characteristics, chip level

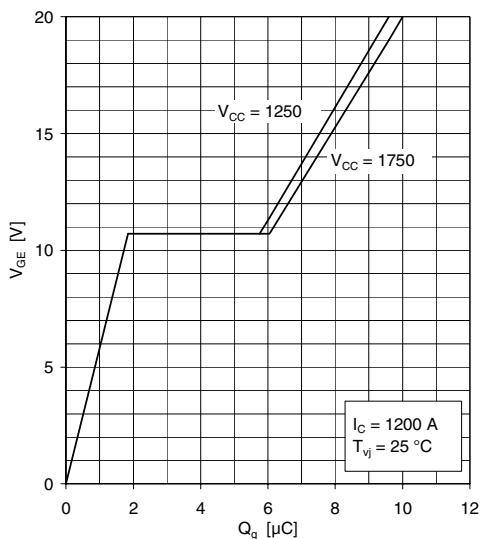


Fig. 5 Typical gate charge characteristics

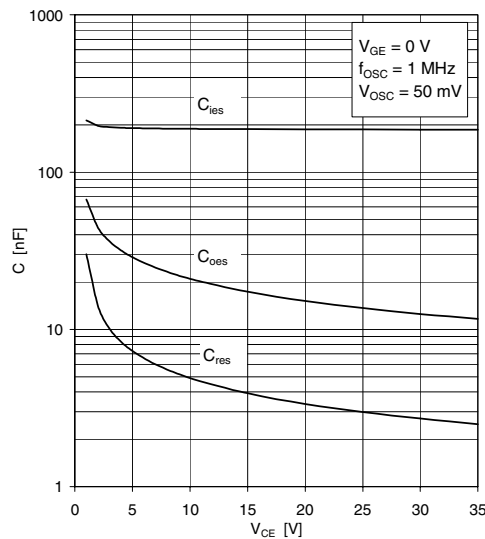


Fig. 6 Typical capacitances vs collector-emitter voltage

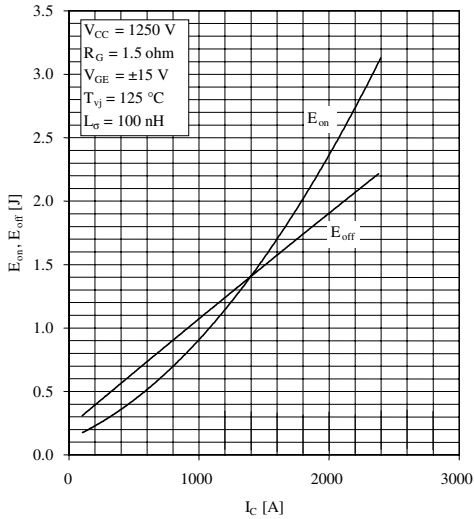


Fig. 7 Typical switching energies per pulse vs collector current

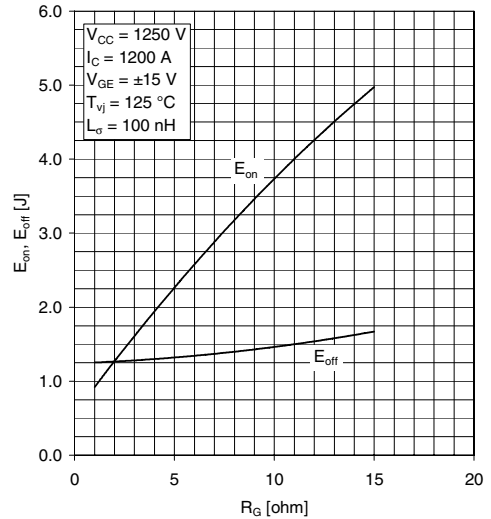


Fig. 8 Typical switching energies per pulse vs gate resistor

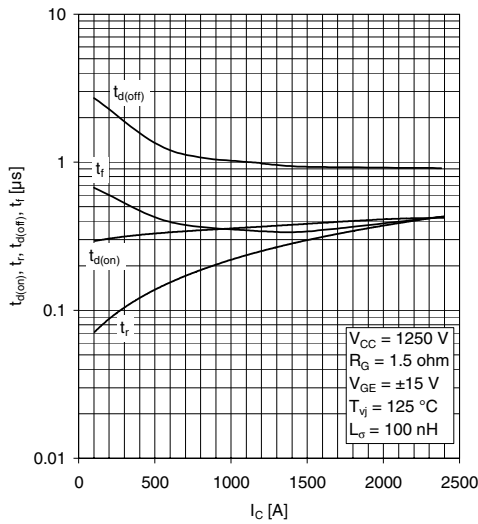


Fig. 9 Typical switching times vs collector current

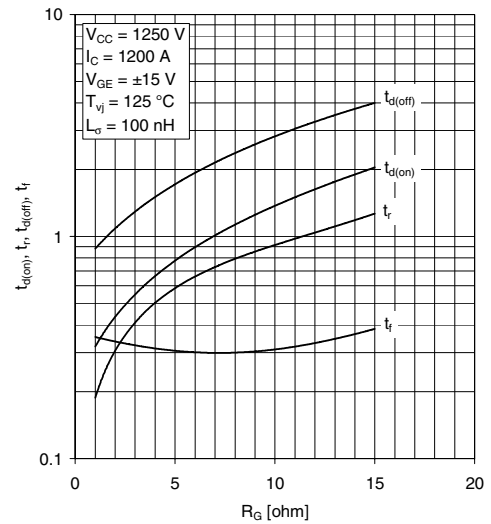


Fig. 10 Typical switching times vs gate resistor

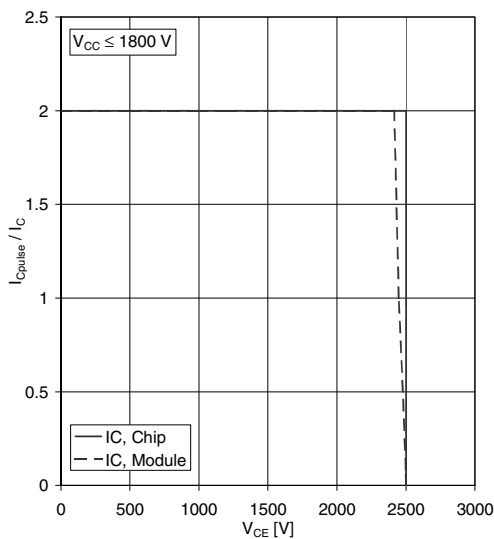


Fig. 11 Turn-off safe operating area (RBSOA)

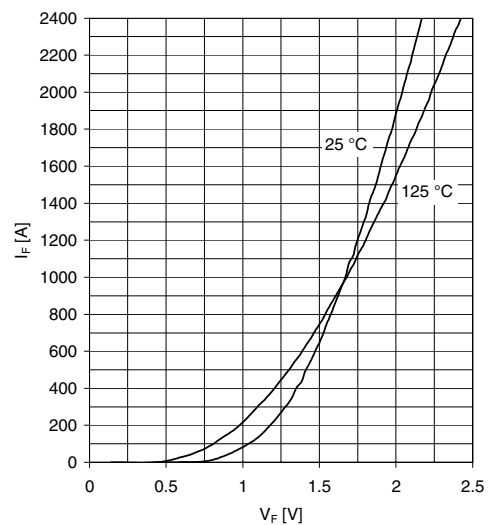


Fig. 12 Typical diode forward characteristics, chip level

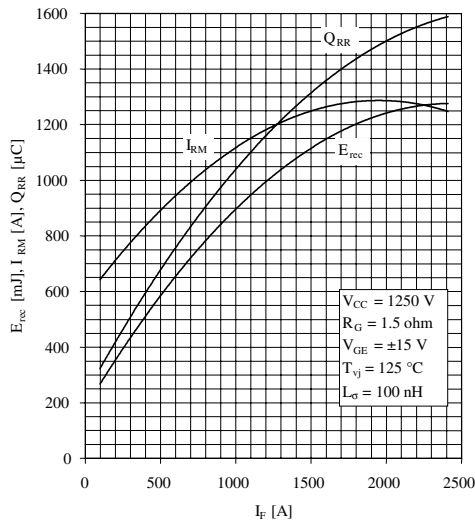


Fig. 13 Typical reverse recovery characteristics vs forward current

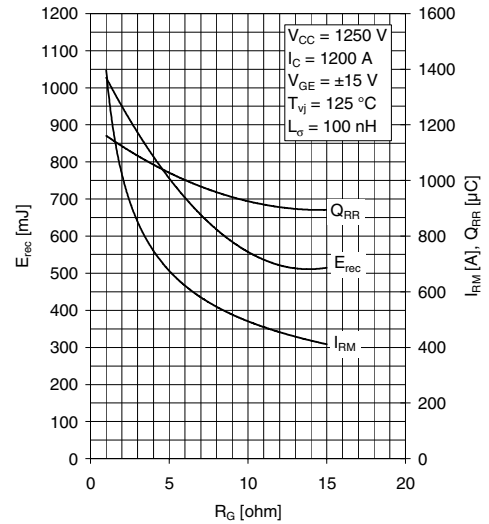


Fig. 14 Typical reverse recovery characteristics vs gate resistor

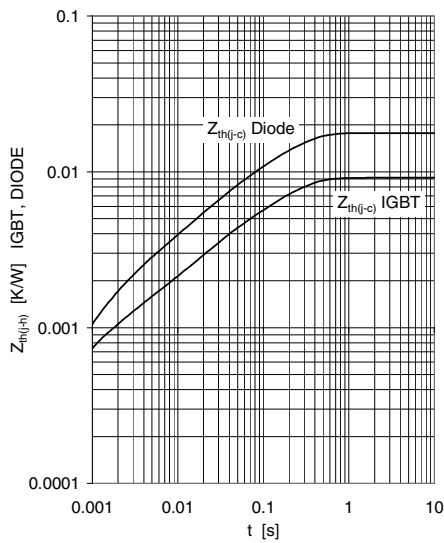
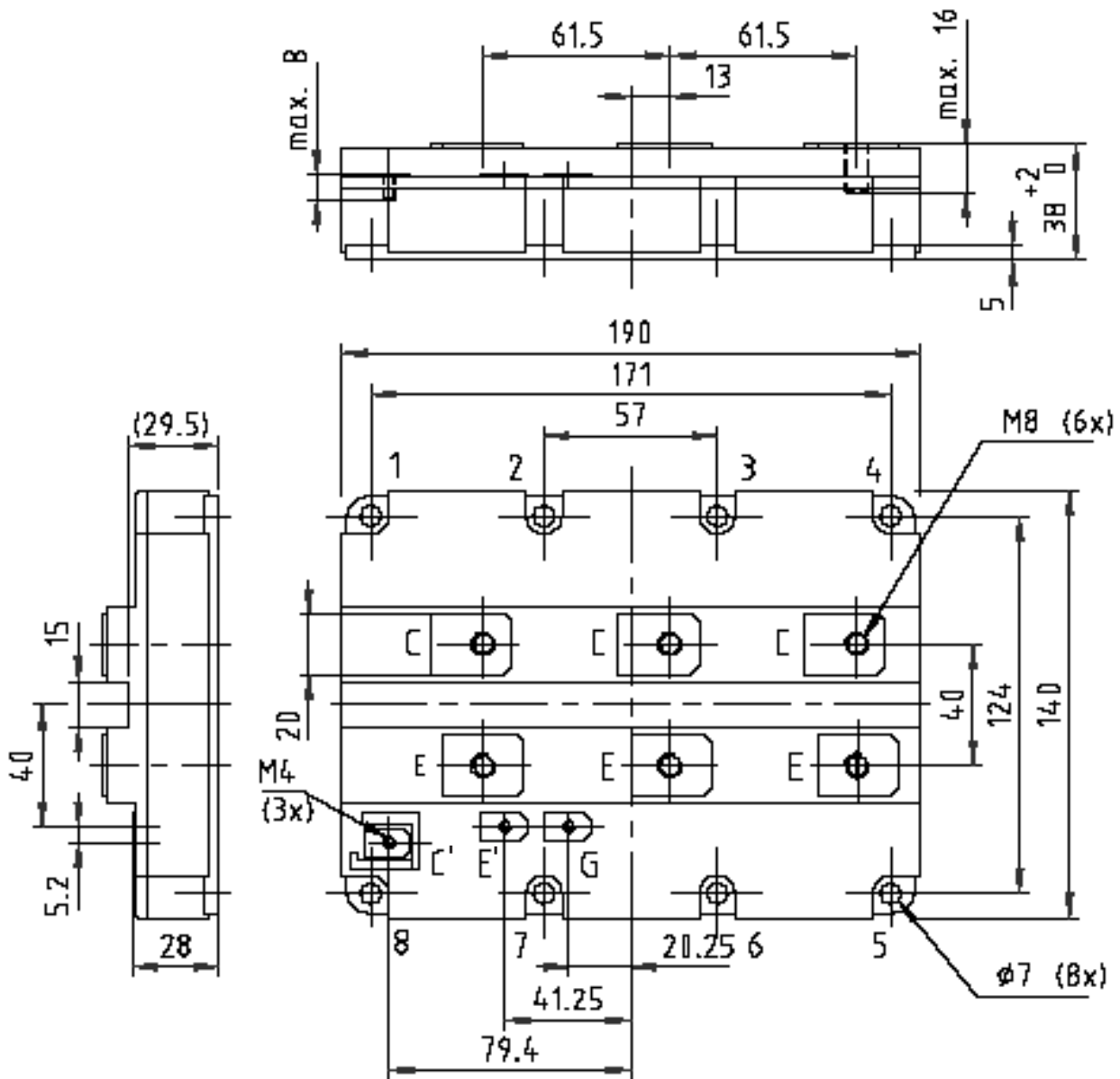


Fig. 15 Thermal impedance vs time

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

	i	1	2	3	4
IGBT	R _i (K/kW)	5.97	1.99	0.619	0.465
	τ _i (ms)	179	22	2.4	0.54
DIODE	R _i (K/kW)	11.1	3.36	1.27	1.34
	τ _i (ms)	189	30	7.4	1.4

Outline drawing



Note: all dimensions are shown in mm