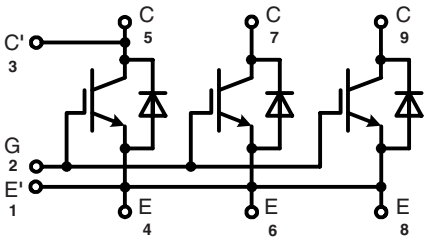
IGBT Module
Single switch

I_{C80} = 600 A
V_{CES} = 6500 V
$V_{CE(sat)\ typ}$ = 4.2 V

Short Circuit SOA Capability
Square RBSOA



IGBT

Symbol	Conditions	Maximum Ratings	
V_{CES}	V_{GE} = 0 V	6500	V
V_{GES}		± 20	V
I_{C85}	T_C = 85°C	600	A
I_{CM}	t_p = 1 ms; T_C = 85°C	1200	A
t_{SC}	V_{CC} = 4400 V; $V_{CEM\ CHIP}$ = ≤ 6500 V; V_{GE} ≤ 15 V; T_{VJ} ≤ 125°C	10	µs

Symbol	Conditions		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{CE(sat)}$ ①	I_C = 600 A; V_{GE} = 15 V;	T_{VJ} = 25°C		4.2		V
		T_{VJ} = 125°C		5.4		V
$V_{GE(th)}$	I_C = 240 mA; V_{CE} = V_{GE}		6		8	V
I_{CES}	V_{CE} = 6500 V; V_{GE} = 0 V; T_{VJ} = 125°C				120	mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V; T_{VJ} = 125°C				500	nA
$t_{d(on)}$	Inductive load; T_{VJ} = 125°C; V_{GE} = ±15 V; V_{CC} = 3600 V; I_C = 600 A; L_σ = 280 nH	R_G = 3.9 Ω		620		ns
t_r		R_G = 3.9 Ω		270		ns
$t_{d(off)}$		R_G = 2.7 Ω		1500		ns
t_f		R_G = 2.7 Ω		930		ns
E_{on}		R_G = 3.9 Ω		4250		mJ
E_{off}		R_G = 2.7 Ω		3250		mJ
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			150		nF
C_{oes}				7.57		nF
C_{res}				1.46		nF
Q_{ge}	I_C = 600 A; V_{CE} = 3600 V; V_{GE} = ± 15 V			9.65		µC
R_{thJC}					0.011	K/W

① Collector emitter saturation voltage is given at chip level

Features

- NPT³ IGBT
  - Low-loss
  - Smooth switching waveforms for good EMC
- Industry standard package
  - High power density
  - AlSiC 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

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

0547

Diode

Symbol	Conditions	Maximum Ratings	
I_{F80}	T_C = 80°C	600	A
I_{FSM}	V_R = 0 V; T_{VJ} = 125°C; t_p = 10 ms; half-sinewave	6000	A

Symbol	Conditions	Characteristic Values min.	typ.	max.	
V_F ②	I_F = 600 A; T_{VJ} = 25°C		3.2		V
	T_{VJ} = 125°C		3.4		V
I_{RM}	V_{CC} = 3600 V; I_C = 600 A;		930		A
t_{rr}	V_{GE} = ±15 V; R_G = 3.9 Ω; T_{VJ} = 125°C		2200		ns
Q_{RR}	Inductive load; L_σ = 280 nH		1150		µC
E_{rec}			2100		mJ
R_{thJC}				0.021	K/W

② Forward voltage is given at chip level

Symbol	Conditions	Maximum Ratings	
T_{JM}	max junction temperature	+125	°C
T_{VJ}	Operatingtemperature	-40...+125	°C
T_{stg}	Storage temperature	-40...+125	°C
V_{ISOL}	50 Hz, 1 min	10200	V~
M_d	Mounting torque Base-heatsink, M6 screws	4 - 6	Nm
	Main terminals, M8 screws	8 - 10	Nm
	Auxiliary terminals, M4 screws	2 - 3	Nm

Symbol	Conditions	Characteristic Values min.	typ.	max.	
d_A	Clearance distance terminal to base	40			mm
	IEC 60664-1 / EN 50124-1 terminal to terminal	26			mm
d_S	Surface creepage dist. terminal to base	64			mm
	IEC 60664-1 / EN 50124-1 terminal to terminal	56			mm
V_E	Partial discharge extinction voltage f = 50 Hz, $Q_{PD} \leq$ 10pC (IEC 61287)	5100			V
CTI	Comperative tracking index	600			
L_σ	Module stray inductance, C to E terminal		18		nH
$R_{term-chip}$ *	Resistance terminal to chip		0.12		mΩ
R_{thCH}	per module; λ grease = 1 W/m•K		0.006		K/W
Weight			1760		g

0547

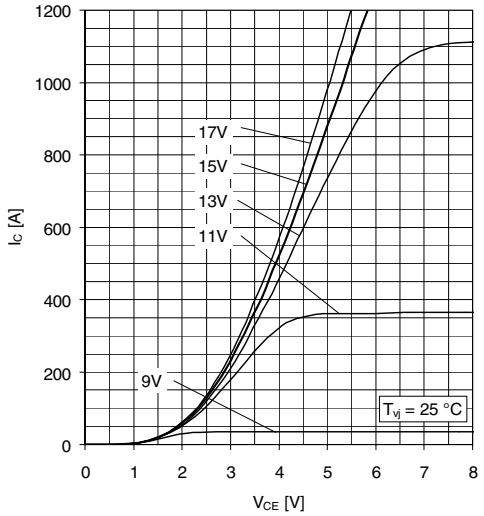


Fig. 1 Typical output characteristics, chip level

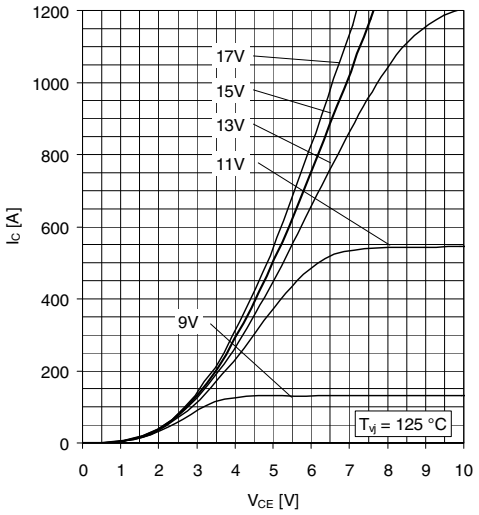


Fig. 2 Typical output characteristics, chip level

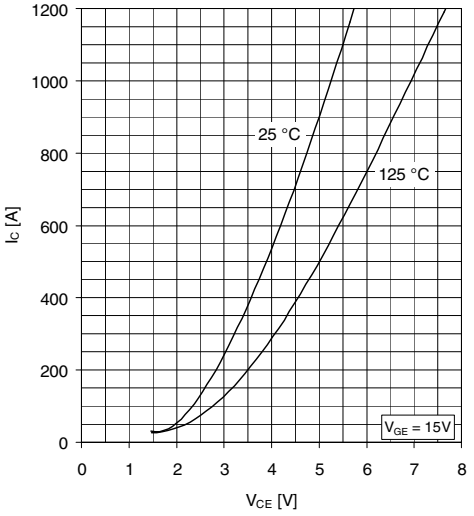


Fig. 3 Typical on-state characteristics, chip level

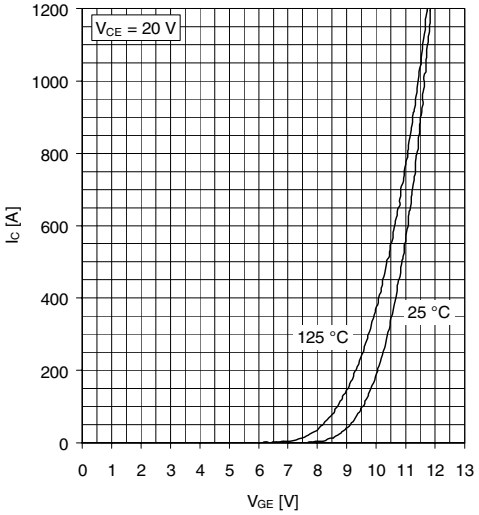


Fig. 4 Typical transfer characteristics, chip level

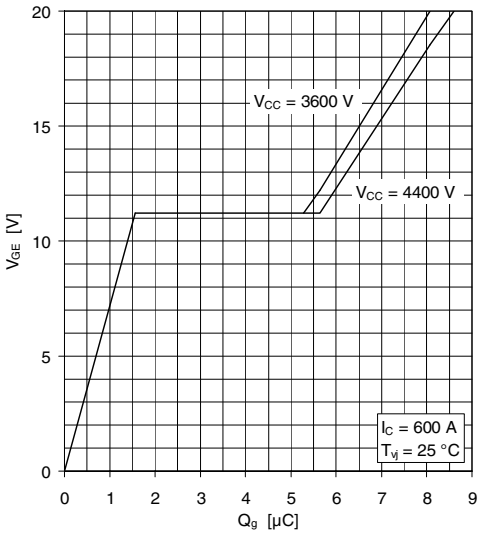


Fig. 5 Typical gate charge characteristics

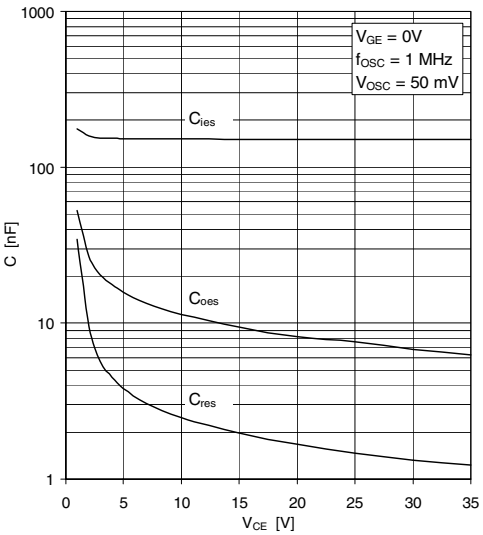


Fig. 6 Typical capacitances vs collector-emitter voltage

0547

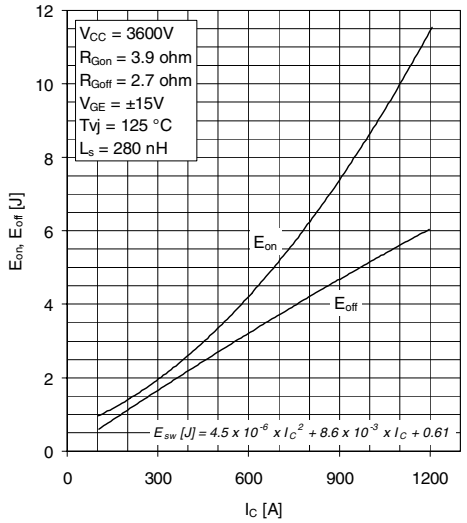


Fig. 7 Typical switching energies per pulse versus collector current

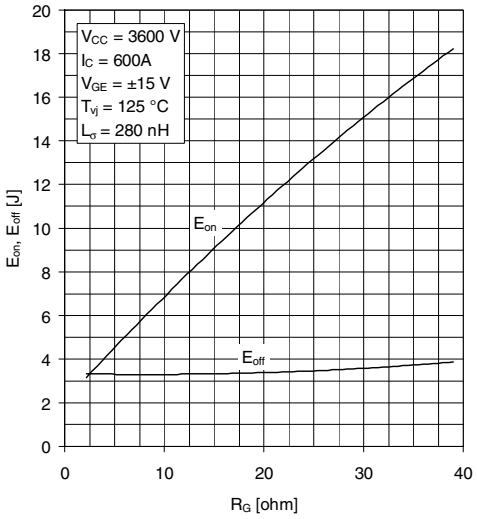


Fig. 8 Typical switching energies per pulse versus gate resistor

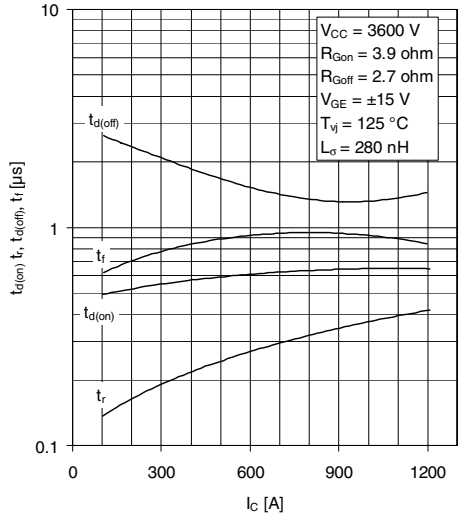


Fig. 9 Typical switching times vs. collector current

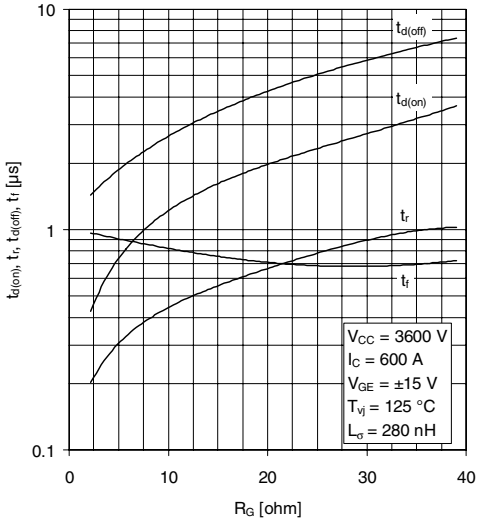


Fig. 10 Typical switching times vs. gate resistor

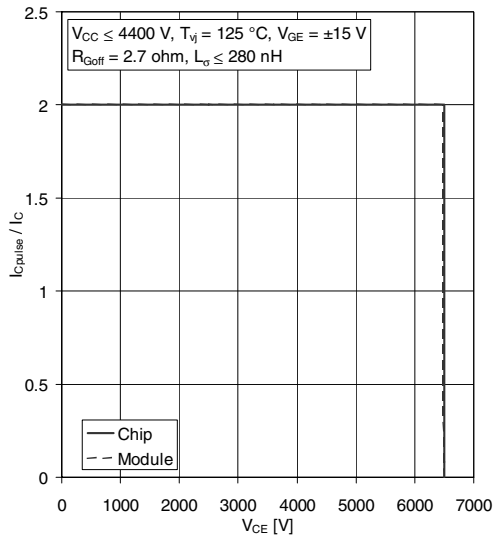


Fig. 11 Turn-off safe operating area (RBSOA)

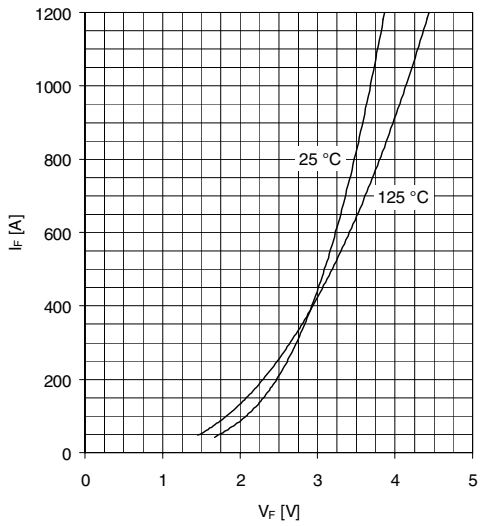


Fig. 12 Typ. diode forward characteristics, chip level

0547

Fig. 14 Typical diode forward characteristics, chip level

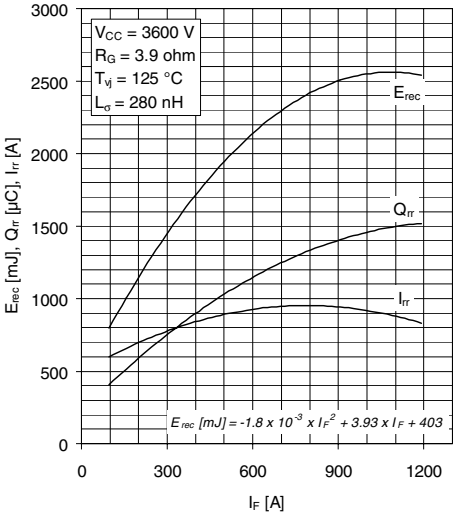


Fig. 13 Typ. reverse recovery characteristics versus forward current

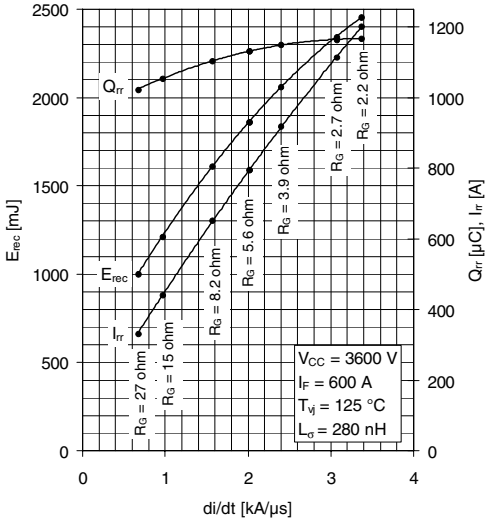


Fig. 14 Typ. reverse recovery characteristics versus di/dt

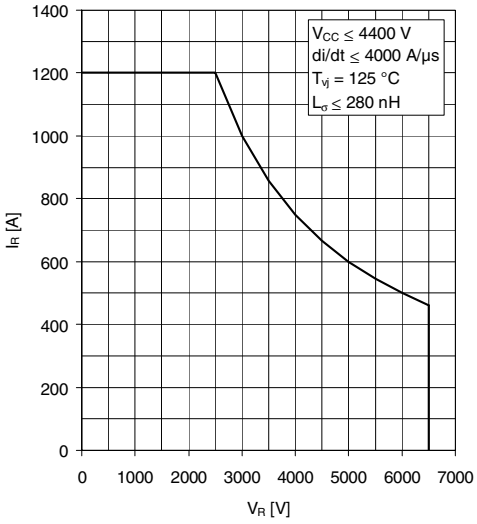


Fig. 15 Safe operating area diode (SOA)

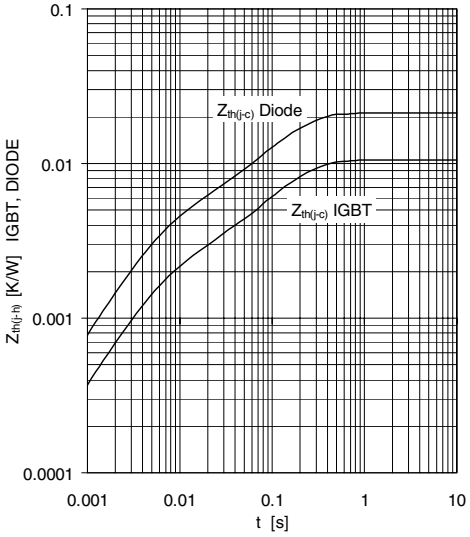
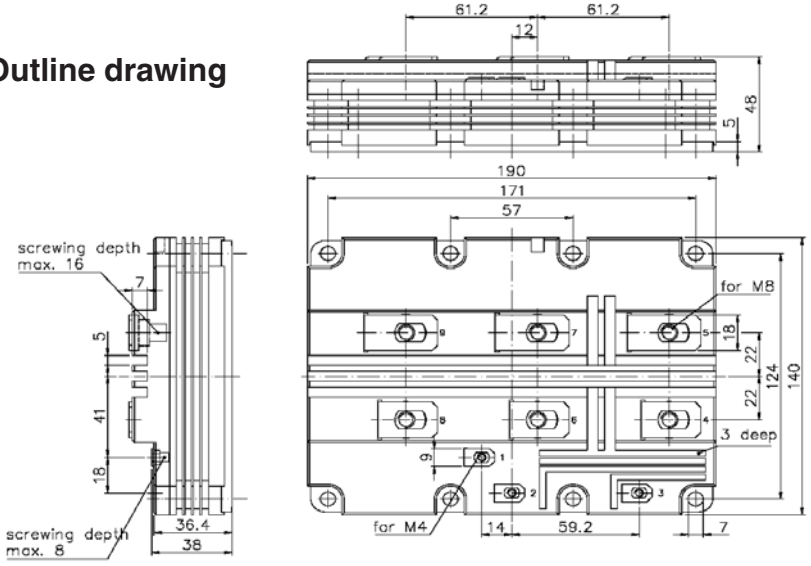


Fig. 16 Thermal impedance vs. time

Outline drawing



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

	i	1	2
IGBT	R_i [K/kW]	8.5	2
	t_i [ms]	151	5.84
DIODE	R_i [K/kW]	17	4.2
	t_i [ms]	144	5.83

0547