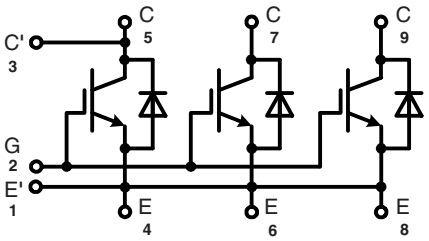
IGBT Module
Single switch

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.	
$V_{CE(sat)}$ ✶	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

✶ 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

PHASE-OUT

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

© 2011 IXYS All rights reserved

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 ✷	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

✷ 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

PLEASE, OUT

© 2011 IXYS All rights reserved

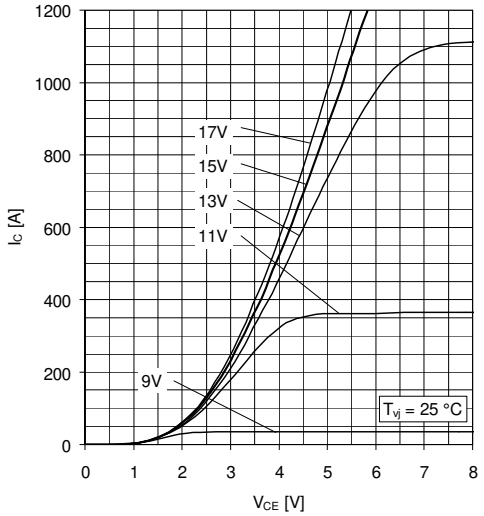


Fig. 1 Typical output characteristics, chip level

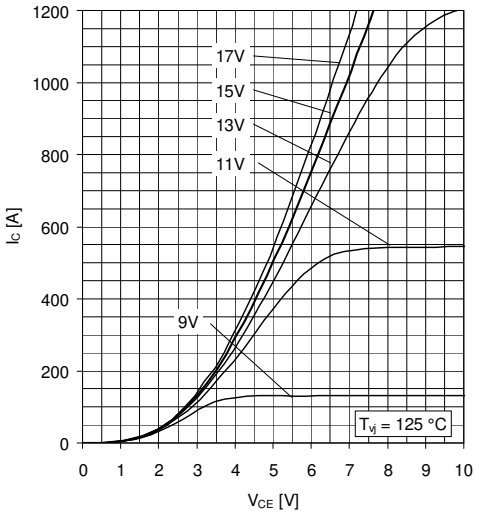


Fig. 2 Typical output characteristics, chip level

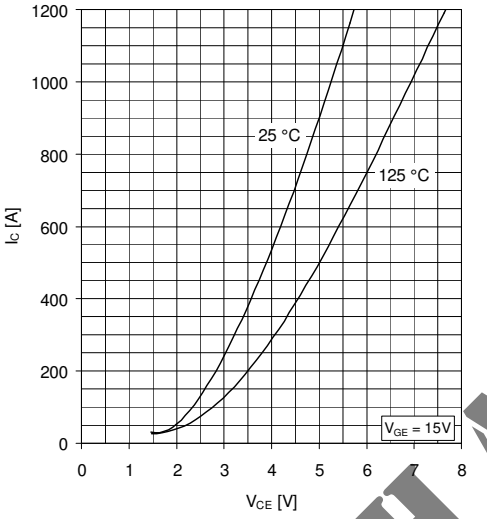


Fig. 3 Typical on-state characteristics, chip level

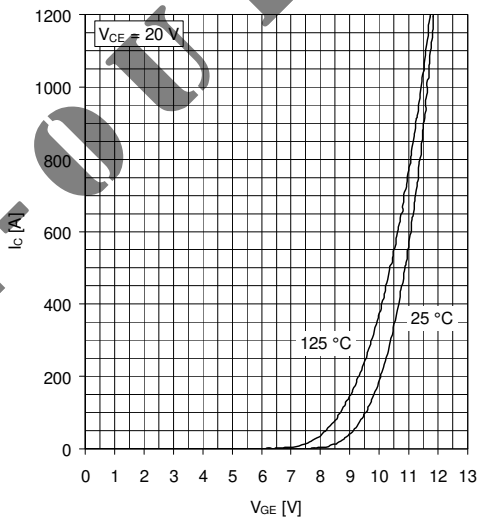


Fig. 4 Typical transfer characteristics, chip level

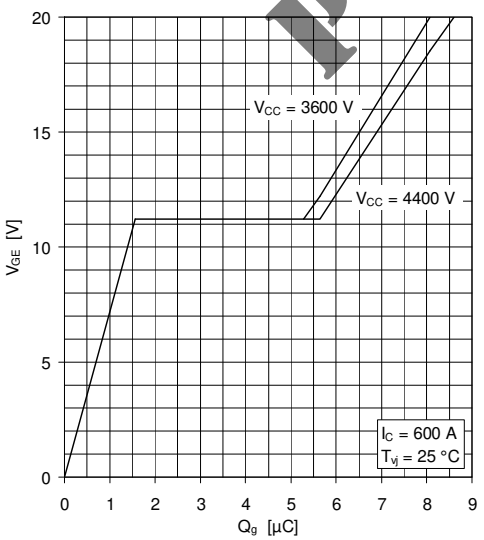


Fig. 5 Typical gate charge characteristics

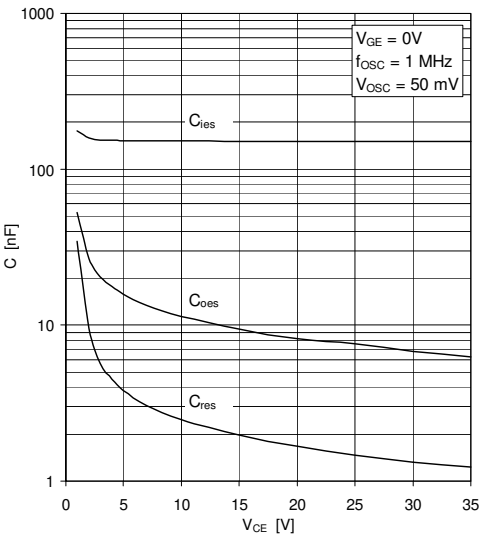


Fig. 6 Typical capacitances vs collector-emitter voltage

20110119a

PHASE-OUT

© 2011 IXYS All rights reserved

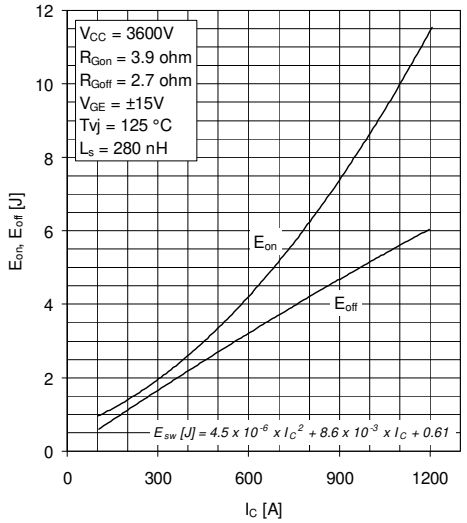


Fig. 7 Typical switching energies per pulse versus collector current

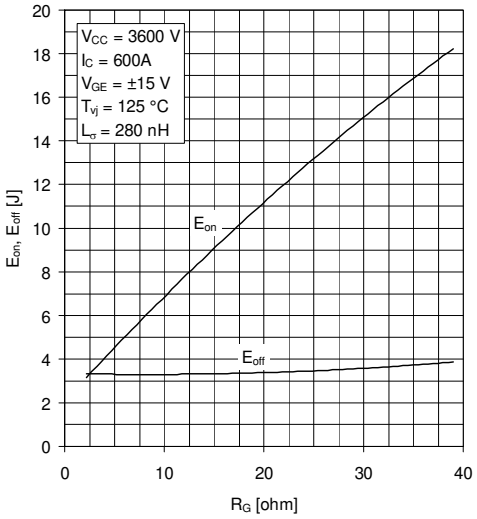


Fig. 8 Typical switching energies per pulse versus gate resistor

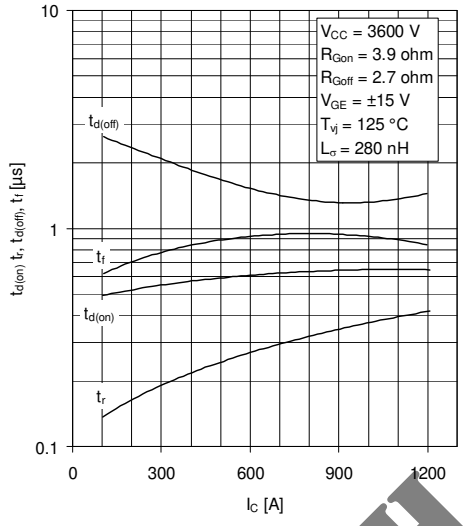


Fig. 9 Typical switching times vs. collector current

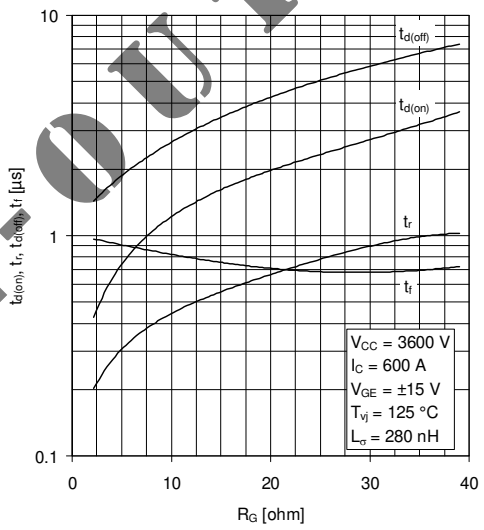


Fig. 10 Typical switching times vs. gate resistor

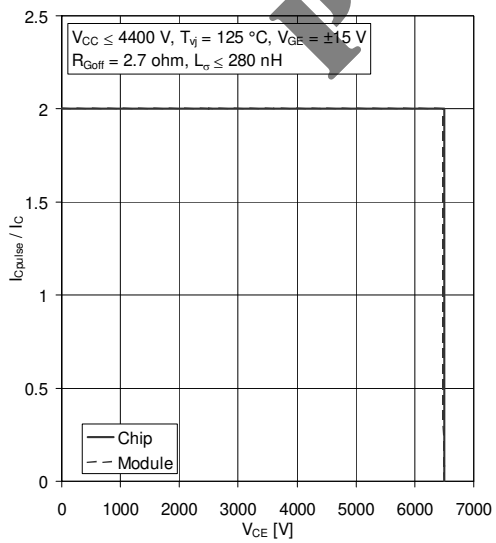


Fig. 11 Turn-off safe operating area (RBSOA)

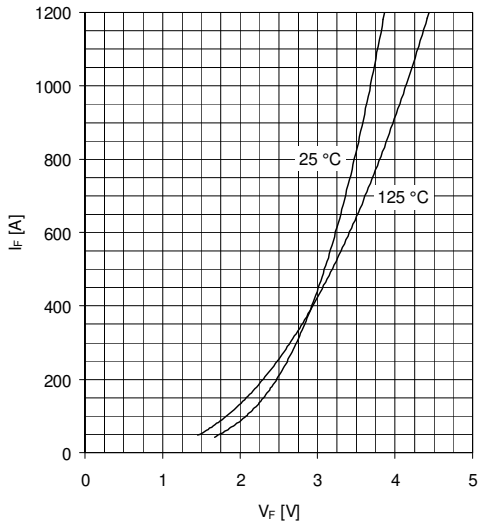


Fig. 12 Typ. diode forward characteristics, chip level

20110119a

PHASE OUT

© 2011 IXYS All rights reserved

Fig. 14 Typical diode forward characteristics, chip level

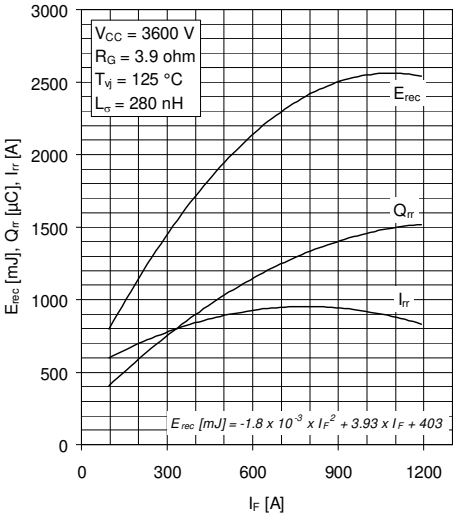


Fig. 13 Typ. reverse recovery characteristics versus forward current

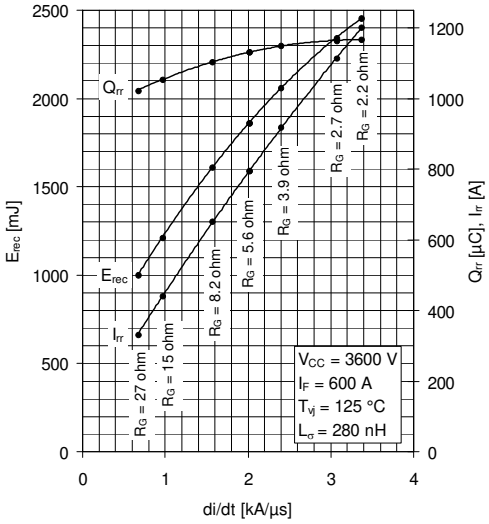


Fig. 14 Typ. reverse recovery characteristics versus di/dt

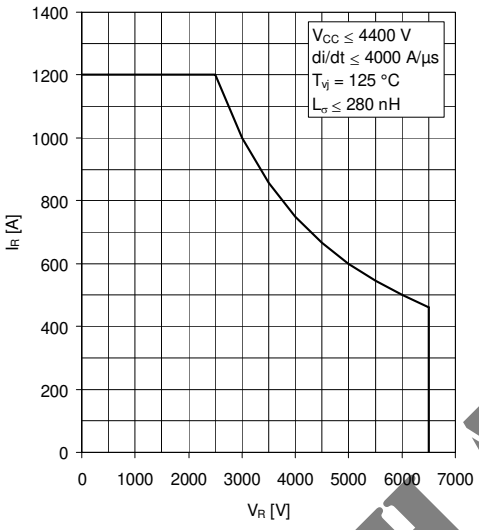


Fig. 15 Safe operating area diode (SOA)

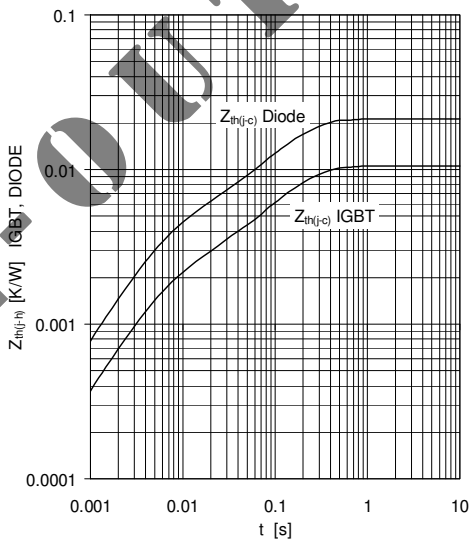
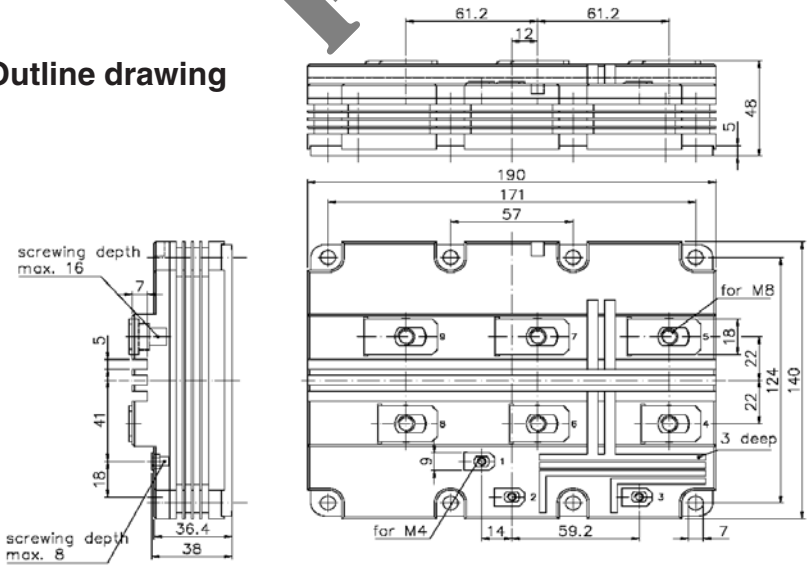


Fig. 16 Thermal impedance vs. time

PHASE OUT

Outline drawing



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

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

20110119a

© 2011 IXYS All rights reserved