XPT IGBT

|		
V_{CES}	=	1200 V
I_{C25}	=	58 A
$V_{CE(sat)}$	=	1.8 V

Copack

Part number

IXA33IF1200HB
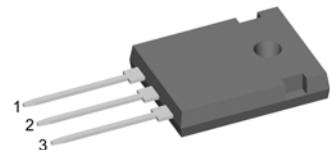
Backside: collector

2 (C)

(G) 1

3 (E)
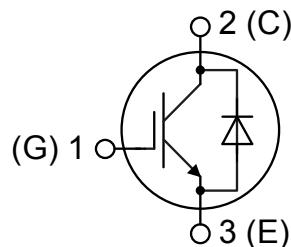
Features / Advantages:

● Easy paralleling due to the positive temperature coefficient of the on-state voltage
● Rugged XPT design (Xtreme light Punch Through) results in:
  - short circuit rated for 10 μsec.
  - very low gate charge
  - low EMI
  - square RBSOA @ 3x Ic
● Thin wafer technology combined with the XPT design results in a competitive low VCE(sat)
● SONIC™ diode
  - fast and soft reverse recovery
  - low operating forward voltage

Applications:

● AC motor drives
● Solar inverter
● Medical equipment
● Uninterruptible power supply
● Air-conditioning systems
● Welding equipment
● Switched-mode and resonant-mode power supplies
● Inductive heating, cookers
● Pumps, Fans

Package: TO-247

● Industry standard outline
● RoHS compliant
● Epoxy meets UL 94V-0

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

Data according to IEC 60747and per semiconductor unless otherwise specified

20100702b

IGBT | | | | **Ratings** | |

Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	collector emitter voltage		$T_{VJ} = 25°C$			1200	V
V_{GES}	max. DC gate voltage					±20	V
V_{GEM}	max. transient gate emitter voltage					±30	V
I_{C25}	collector current		$T_C = 25°C$			58	A
I_{C80}			$T_C = 80°C$			34	A
P_{tot}	total power dissipation		$T_C = 25°C$			250	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 25A$; $V_{GE} = 15$ V	$T_{VJ} = 25°C$		1.8	2.1	V
			$T_{VJ} = 125°C$		2.1		V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 1mA$; $V_{GE} = V_{CE}$	$T_{VJ} = 25°C$	5.4	5.9	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}$; $V_{GE} = 0$ V	$T_{VJ} = 25°C$			0.1	mA
			$T_{VJ} = 125°C$		0.1		mA
I_{GES}	gate emitter leakage current	$V_{GE} = ±20$ V				500	nA
$Q_{G(on)}$	total gate charge	$V_{CE} = 600$ V; $V_{GE} = 15$ V; $I_C = 25$ A			76		nC
$t_{d(on)}$	turn-on delay time				70		ns
t_r	current rise time				40		ns
$t_{d(off)}$	turn-off delay time	inductive load	$T_{VJ} = 125°C$		250		ns
t_f	current fall time	$V_{CE} = 600V$; $I_C = 25A$			100		ns
E_{on}	turn-on energy per pulse	$V_{GE} = ±15$ V; $R_G = 39$ Ω			2.5		mJ
E_{off}	turn-off energy per pulse				3		mJ
RBSOA	reverse bias safe operating area	$V_{GE} = ±15$ V; $R_G = 39$ Ω	$T_{VJ} = 125°C$				
I_{CM}		$V_{CEmax} = 1200V$				75	A
SCSOA	short circuit safe operating area	$V_{CEmax} = 900$ V					
t_{SC}	short circuit duration	$V_{CE} = 900$ V; $V_{GE} = ±15$ V	$T_{VJ} = 125°C$			10	μs
I_{SC}	short circuit current	$R_G = 39$ Ω; non-repetitive			100		A
R_{thJC}	thermal resistance junction to case					0.5	K/W
R_{thCH}	thermal resistance case to heatsink				0.25		K/W

Diode | | | | | |

Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RRM}	max. repetitive reverse voltage		$T_{VJ} = 25°C$			1200	V
I_{F25}	forward current		$T_C = 25°C$			60	A
I_{F80}			$T_C = 80°C$			33	A
V_F	forward voltage	$I_F = 30A$	$T_{VJ} = 25°C$			2.20	V
			$T_{VJ} = 125°C$		1.95		V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25°C$			*	mA
	* not applicable, see Ices value above		$T_{VJ} = 125°C$		*		mA
Q_{rr}	reverse recovery charge	$V_R = 600$ V			3.5		μC
I_{RM}	max. reverse recovery current	-di$_F$/dt = -600 A/μs	$T_{VJ} = 125°C$		30		A
t_{rr}	reverse recovery time				350		ns
E_{rec}	reverse recovery energy	$I_F = 30A$; $V_{GE} = 0$ V			0.9		mJ
R_{thJC}	thermal resistance junction to case					0.7	K/W
R_{thCH}	thermal resistance case to heatsink				0.25		K/W

Package   TO-247

Symbol	Definition	Conditions	min.	typ.	max.	Unit
I$_{RMS}$	RMS current	per terminal			70	A
T$_{VJ}$	virtual junction temperature		-40		150	°C
T$_{op}$	operation temperature		-40		125	°C
T$_{stg}$	storage temperature		-40		150	°C
Weight				6		g
M$_D$	mounting torque		0.8		1.2	Nm
F$_C$	mounting force with clip		20		120	N

Product Marking

Logo → IXYS
Part No. → XXXXXXXXX
Assembly Line → Zyyww
Assembly Code → abcd
Date Code
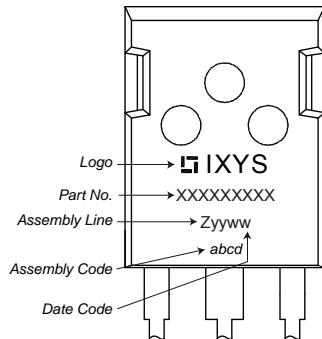
Part number

I = IGBT
X = XPT IGBT
A = Gen 1 / std
33 = Current Rating [A]
IF = Copack
1200 = Reverse Voltage [V]
HB = TO-247AD (3)

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	IXA33IF1200HB	IXA33IF1200HB	Tube	30	508562

Equivalent Circuits for Simulation   *on die level*   T$_{VJ}$ = 150 °C
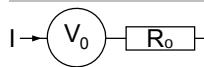
			IGBT	Diode	
V$_{0\,max}$	threshold voltage		1.1	1.25	V
R$_{0\,max}$	slope resistance *		55	28.3	mΩ

Outlines   TO-247
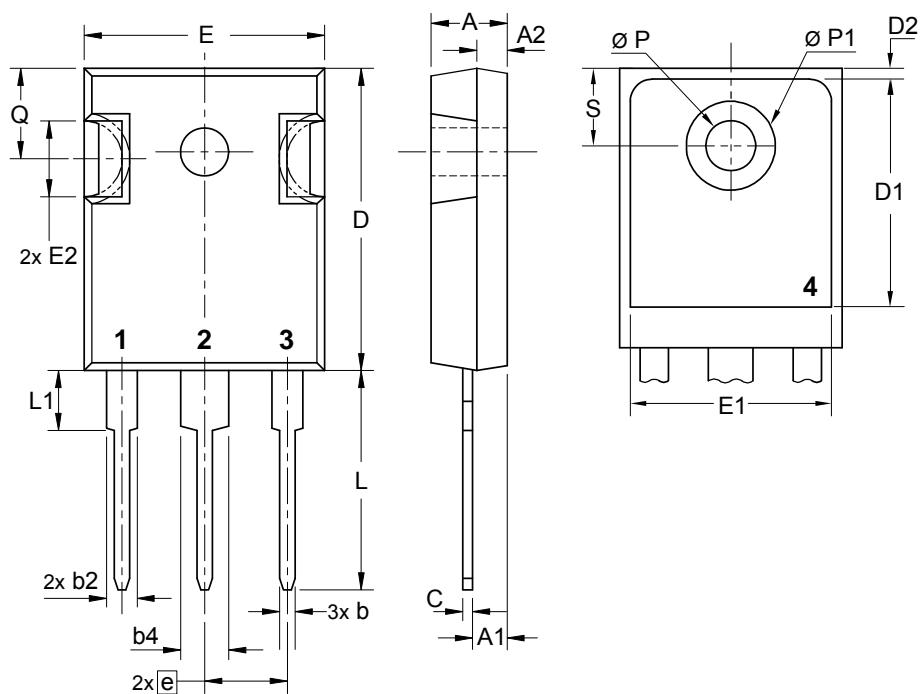
Sym.	Inches		Millimeter	
	min.	max.	min.	max.
A	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
e	0.215 BSC		5.46 BSC	
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
Ø P	0.140	0.144	3.55	3.65
Q	0.212	0.244	5.38	6.19
S	0.242 BSC		6.14 BSC	
b	0.039	0.055	0.99	1.40
b2	0.065	0.094	1.65	2.39
b4	0.102	0.135	2.59	3.43
c	0.015	0.035	0.38	0.89
D1	0.515	-	13.07	-
D2	0.020	0.053	0.51	1.35
E1	0.530	-	13.45	-
Ø P1	-	0.29	-	7.39

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20100702b
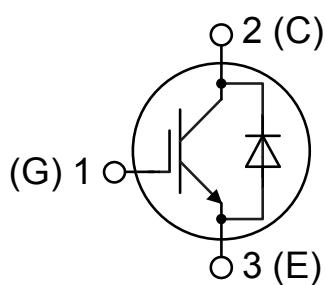
IGBT
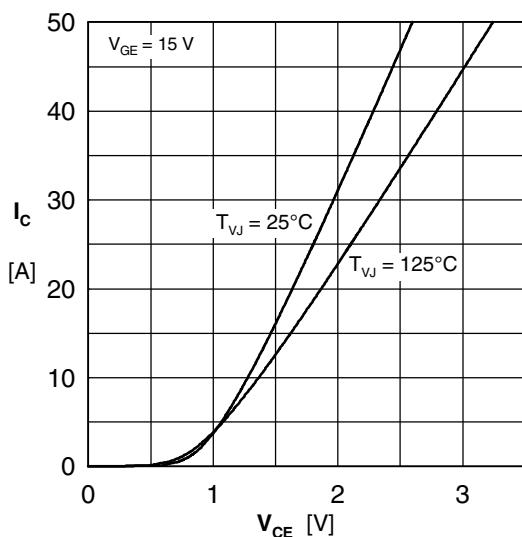
Fig. 1 Typ. output characteristics
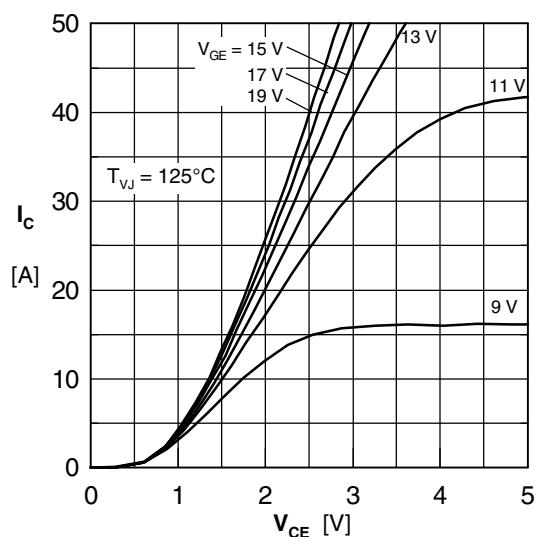

Fig. 2 Typ. output characteristics
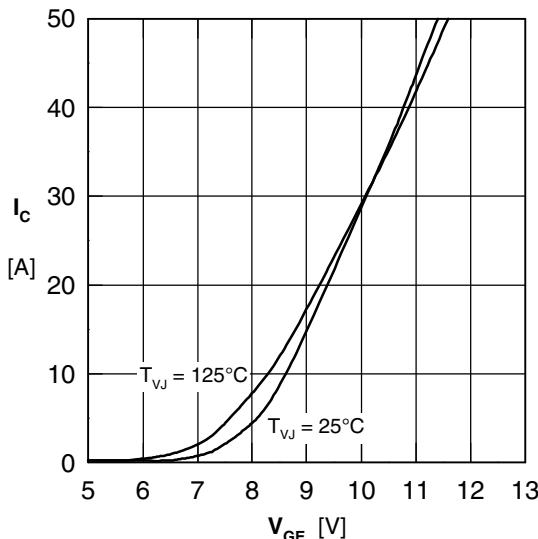

Fig. 3 Typ. tranfer characteristics
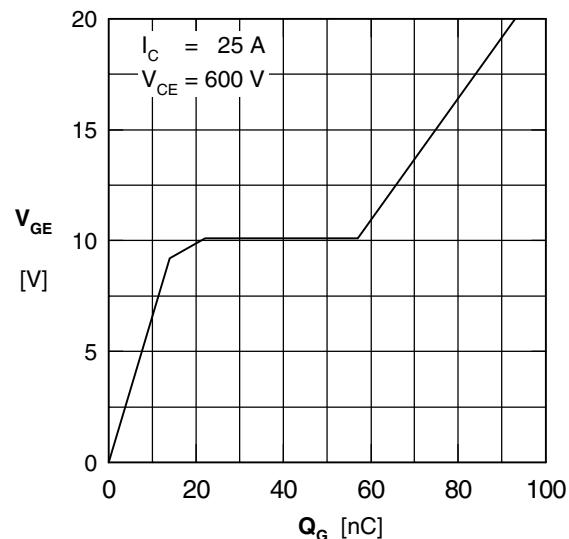
Fig. 4 Typ. turn-on gate charge
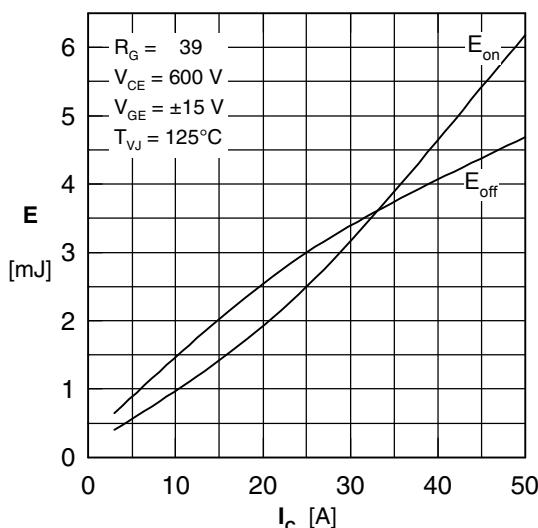
Fig. 5 Typ. switching energy vs. collector current
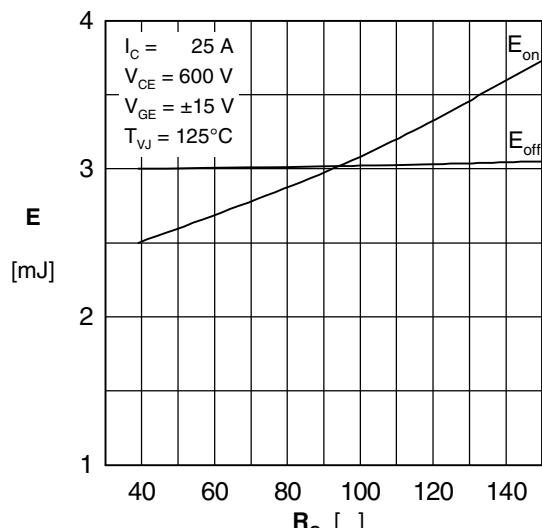
Fig. 6 Typ. switching energy vs. gate resistance

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20100702b

Diode
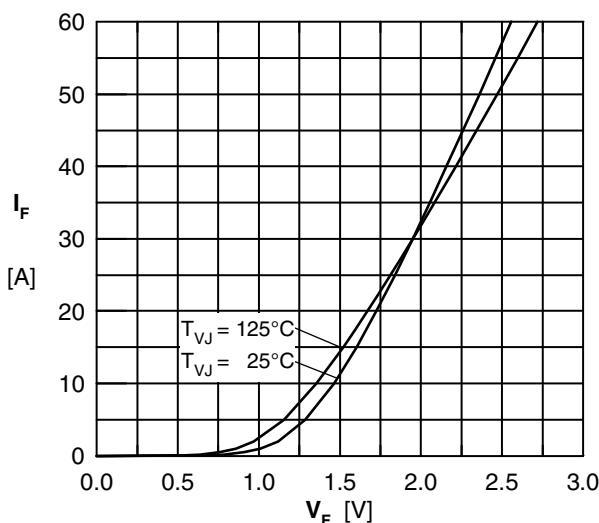

Fig. 7 Typ. Forward current versus V_F
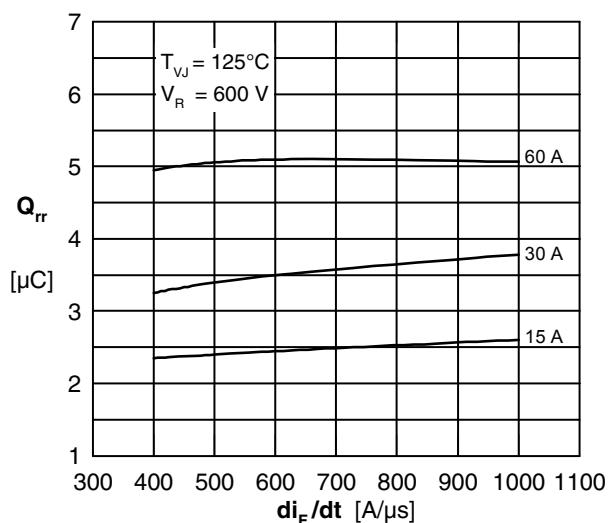
Fig. 8 Typ. reverse recov.charge Q_{rr} vs. di/dt
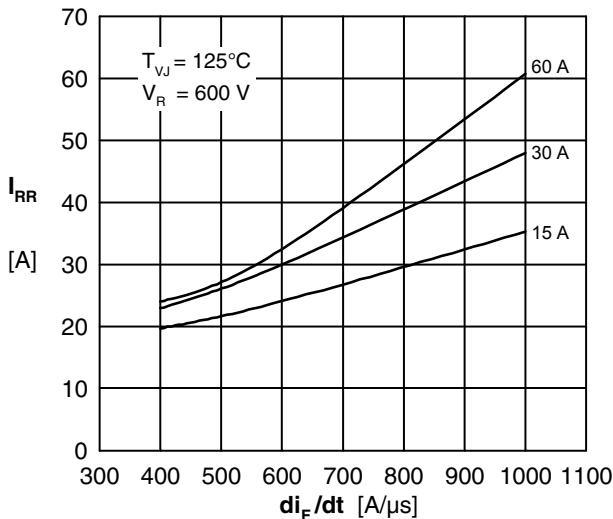

Fig. 9 Typ. peak reverse current I_{RM} vs. di/dt
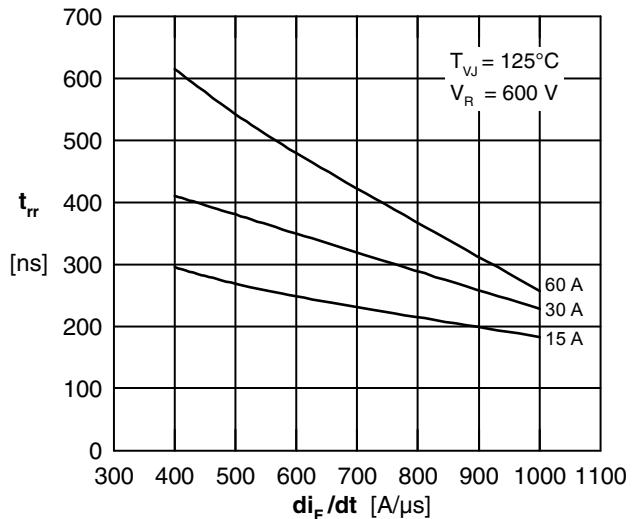
Fig. 10 Typ. recovery time t_{rr} versus di/dt
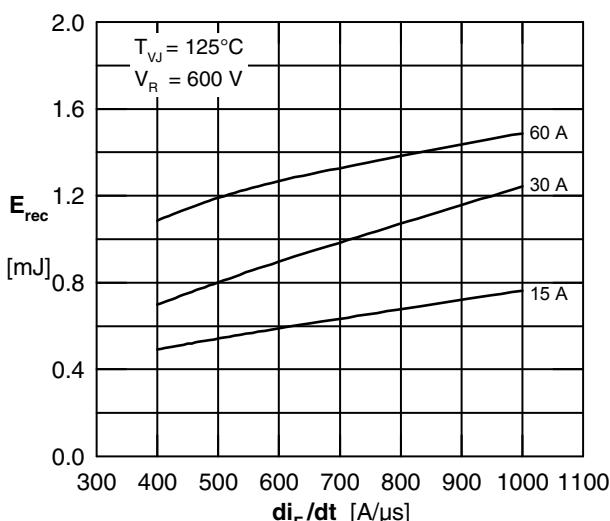
Fig.11 Typ. recovery energy E_{rec} versus di/dt

|	Inverter-IGBT		Inverter-FRD	
	R_i	t_i	R_i	t_i
1	0.116	0.0006	0.16	0.0005
2	0.1	0.2	0.12	0.004
3	0.112	0.006	0.15	0.02
4	0.172	0.05	0.27	0.15
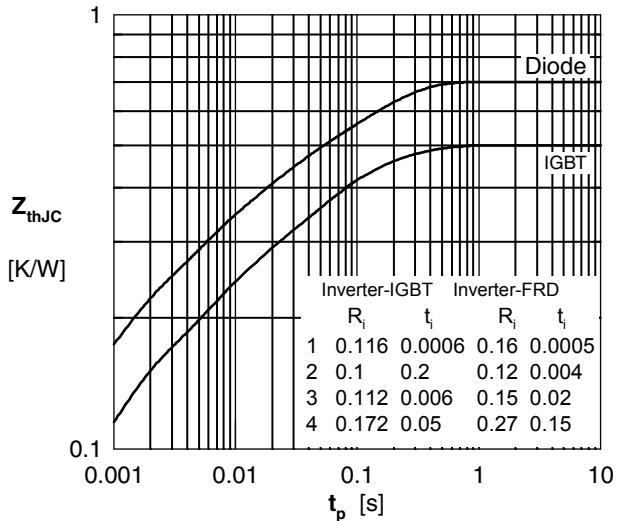
Fig. 12 Typ. transient thermal impedance

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20100702b