XPT IGBT
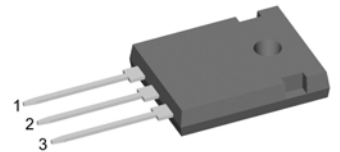
preliminary

V_{CES} = 1200 V
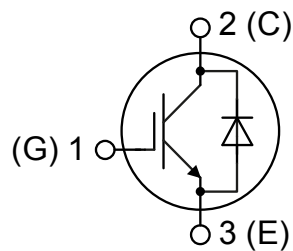I_{C25} = 20 A
$V_{CE(sat)}$ = 1.8 V

Copack

Part number

IXA12IF1200HB

1
2
3

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
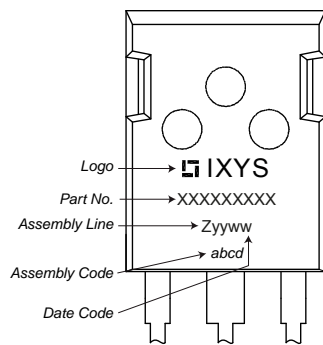● Inductive heating, cookers
● Pumps, Fans

Package: TO-247

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

IXYS

IGBT

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		$T_C = 25°C$			20	A
I_{C100}			$T_C = 100°C$			13	A
P_{tot}	total power dissipation		$T_C = 25°C$			85	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 10A$; $V_{GE} = 15 V$	$T_{VJ} = 25°C$		1.8	2.1	V
			$T_{VJ} = 125°C$		2.1		V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.3mA$; $V_{GE} = V_{CE}$	$T_{VJ} = 25°C$	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	$V_{CE} = 600 V$; $V_{GE} = 15 V$; $I_C = 10 A$			27		nC
$t_{d(on)}$	turn-on delay time	inductive load $T_{VJ} = 125°C$ $V_{CE} = 600V$; $I_C = 10A$ $V_{GE} = ±15 V$; $R_G = 100 Ω$			70		ns
t_r	current rise time				40		ns
$t_{d(off)}$	turn-off delay time				250		ns
t_f	current fall time				100		ns
E_{on}	turn-on energy per pulse				1.1		mJ
E_{off}	turn-off energy per pulse				1.1		mJ
RBSOA	reverse bias safe operating area	$V_{GE} = ±15 V$; $R_G = 100 Ω$ $T_{VJ} = 125°C$					A
I_{CM}		$V_{CEmax} = 1200V$				30	
SCSOA	short circuit safe operating area	$V_{CEmax} = 900 V$					μs
t_{SC}	short circuit duration	$V_{CE} = 900 V$; $V_{GE} = ±15 V$ $T_{VJ} = 125°C$				10	
I_{SC}	short circuit current	$R_G = 100 Ω$; non-repetitive			40		A
R_{thJC}	thermal resistance junction to case					1.5	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		$T_C = 25°C$			22	A
I_{F100}			$T_C = 100°C$			14	A
V_F	forward voltage	$I_F = 10A$	$T_{VJ} = 25°C$			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	$V_R = 600 V$ -$di_F/dt = -250 A/μs$ $T_{VJ} = 125°C$ $I_F = 10A$; $V_{GE} = 0 V$			1.3		μC
I_{RM}	max. reverse recovery current				10.5		A
t_{rr}	reverse recovery time				350		ns
E_{rec}	reverse recovery energy				0.35		mJ
R_{thJC}	thermal resistance junction to case					1.8	K/W
R_{thCH}	thermal resistance case to heatsink				0.25		K/W

Data according to IEC 60747and per semiconductor unless otherwise specified   20110330a

IXYS

IXA12IF1200HB

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

Ratings

Product Marking

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

Part number

```
  I  =  IGBT
  X  =  XPT IGBT
  A  =  Gen 1 / std
 12  =  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	IXA12IF1200HB	IXA12IF1200HB	Tube	30	508453

Similar Part	Package	Voltage class
IXA12IF1200PB	TO-220AB (3)	1200
IXA12IF1200TC	TO-268AA (D3Pak) (2)	1200

Equivalent Circuits for Simulation

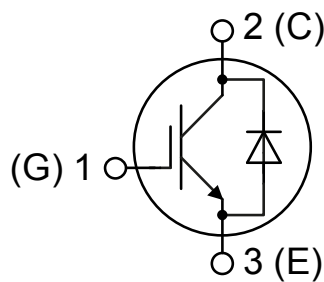*on die level* $T_{VJ} = 150\,°C$
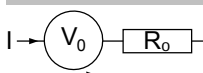
		IGBT	Diode	
$V_{0\,max}$	threshold voltage	1.1	1.25	V
$R_{0\,max}$	slope resistance *	153	85	mΩ

IXYS

Outlines   TO-247
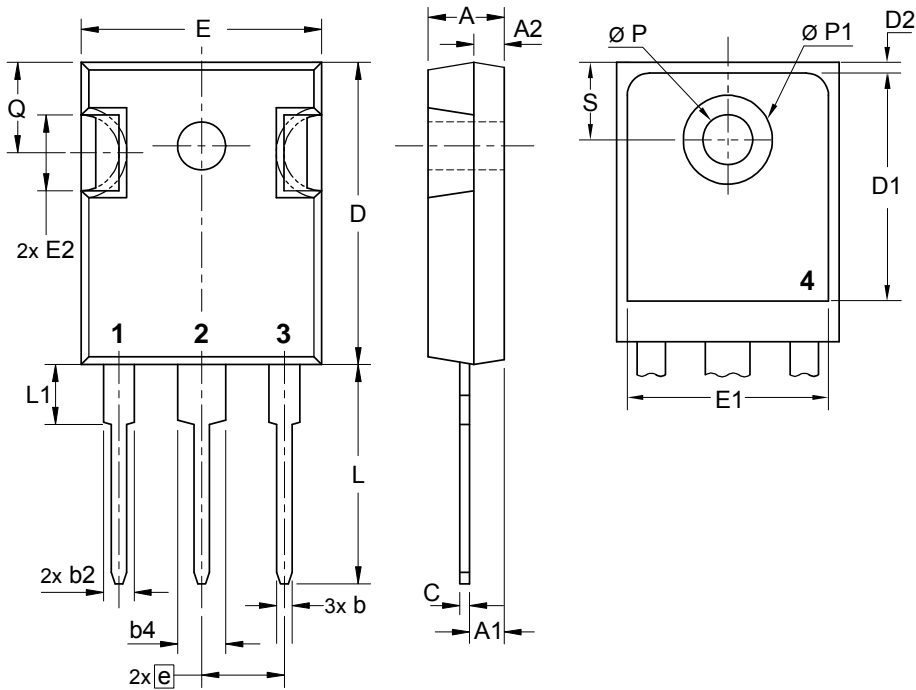
Sym.	Inches		Millimeter	
	min.	max.	min.	max.
A	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
e	0.215 BSC		5.46 BSC	
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
Ø P	0.140	0.144	3.55	3.65
Q	0.212	0.244	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

2 (C)

(G) 1

3 (E)

Data according to IEC 60747and per semiconductor unless otherwise specified   20110330a

IGBT
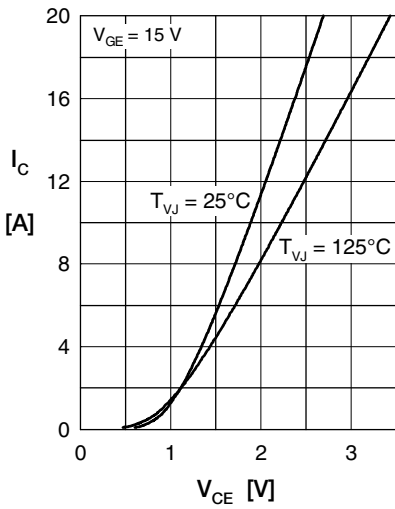
Fig. 1 Typ. output characteristics
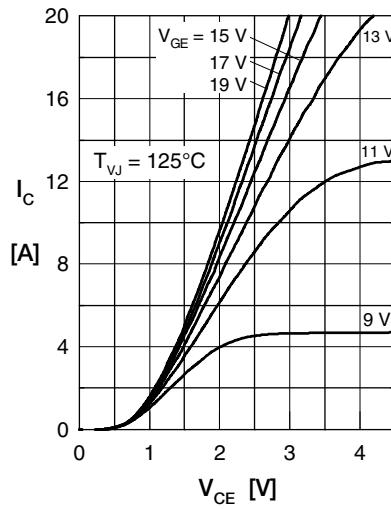
Fig. 2 Typ. output characteristics
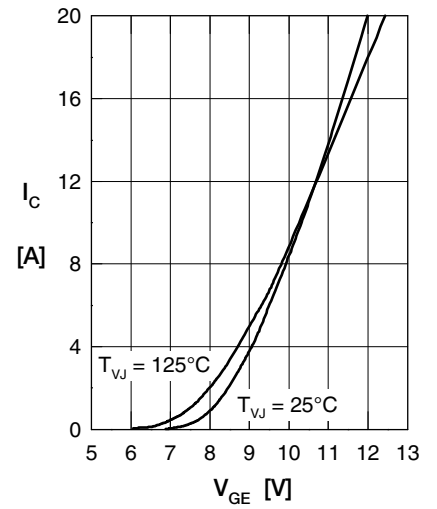
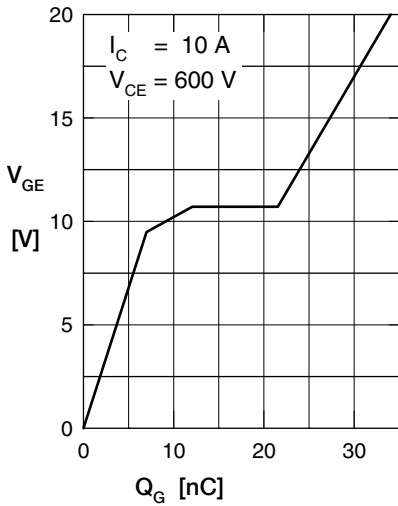Fig. 3 Typ. tranfer characteristics
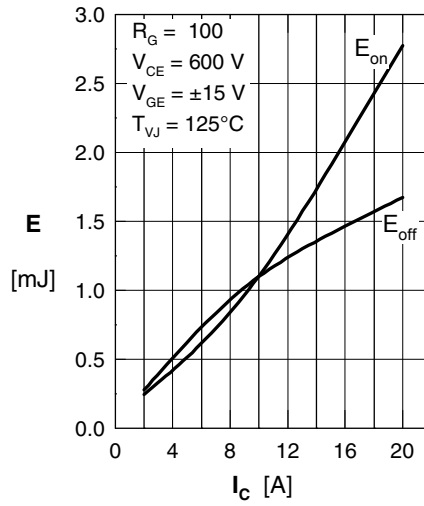

Fig. 4 Typ. turn-on gate charge
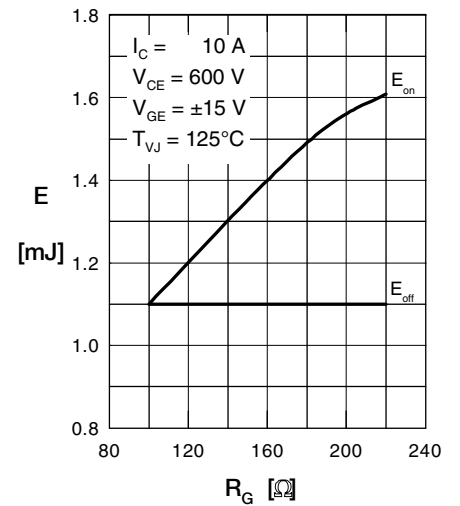

Fig. 5 Typ. switching energy
vs. collector current

Fig. 6 Typ. switching energy
vs. gate resistance

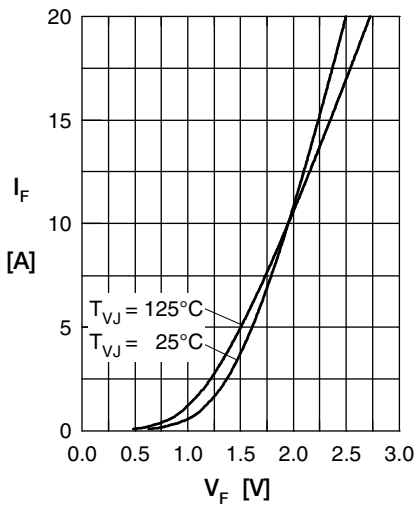Fig. 7 Typ. transient thermal impedance junction to case

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20110330a

preliminary

Diode

Fig. 1 Typ. forward current versus V_F
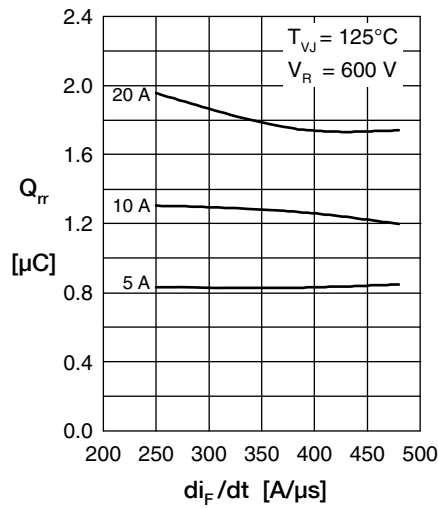
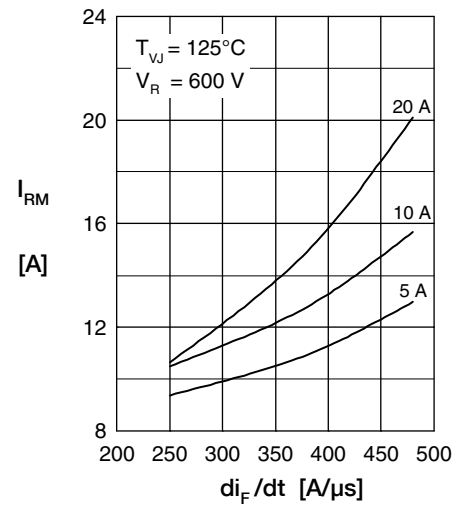Fig. 2 Typical reverse recov. charge Q_{rr} versus. di_F/dt

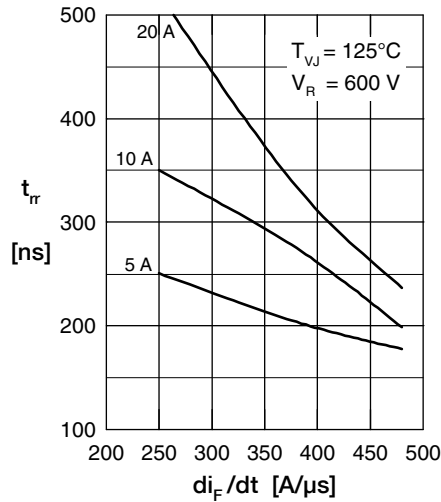Fig.3 Typ: peak reverse current I_{RR} versus di_F/dt

Fig. 4 Dynamic parameters Q_{rr}, I_{RM} versus T_{VJ}
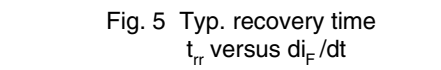

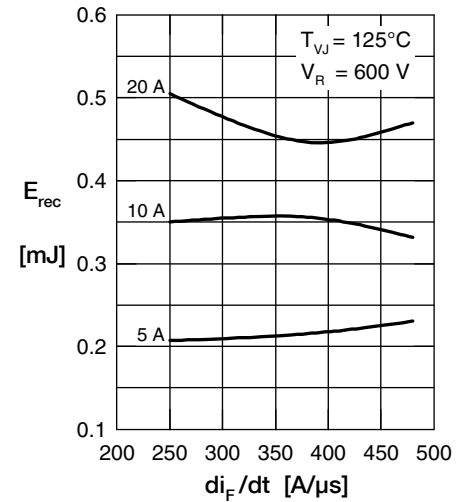Fig. 5 Typ. recovery time t_{rr} versus di_F/dt

Fig. 6 Typ. recovery energy E_{rec} vs. di_F/dt

Fig. 7 Typ. transient thermal impedance junction to case

Data according to IEC 60747and per semiconductor unless otherwise specified

20110330a