

XPT IGBT

preliminary

$$V_{CES} = 1200V$$

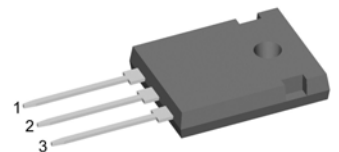
$$I_{C25} = 20A$$

$$V_{CE(sat)} = 1.8V$$

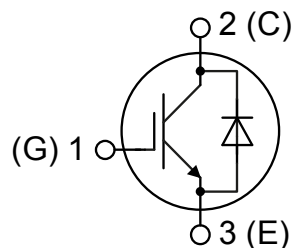
Copack

Part number

IXA12IF1200HB



Backside: collector



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 μ sec.
 - very low gate charge
 - low EMI
 - square RBSOA @ 3x I_C
- Thin wafer technology combined with the XPT design results in a competitive low $V_{CE(sat)}$
- 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

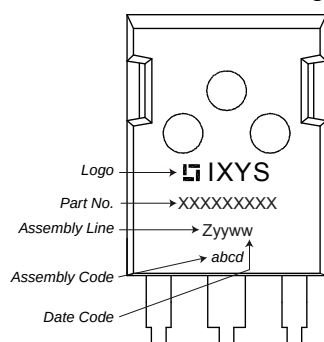
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

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				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 V _{CE} = 600V; I _C = 10A V _{GE} = ±15 V; R _G =100 Ω	T _{VJ} = 125°C		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				
I _{CM}		V _{CEmax} = 1200V				30	A
SCSOA	short circuit safe operating area	V _{CEmax} = 900 V	T _{VJ} = 125°C				
t _{sc}	short circuit duration	V _{CE} = 900 V; V _{GE} = ±15 V				10	μs
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							
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 I _F = 10A; V _{GE} = 0 V	T _{VJ} = 125°C		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

preliminary

Package TO-247			Ratings			
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



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)

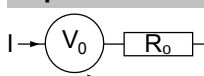
Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	IXA12IF1200HB	IXA12IF1200HB	Tube	30	508453

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

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150\text{ °C}$



$V_{0\max}$ threshold voltage

$R_{0\max}$ slope resistance *

IGBT

1.1

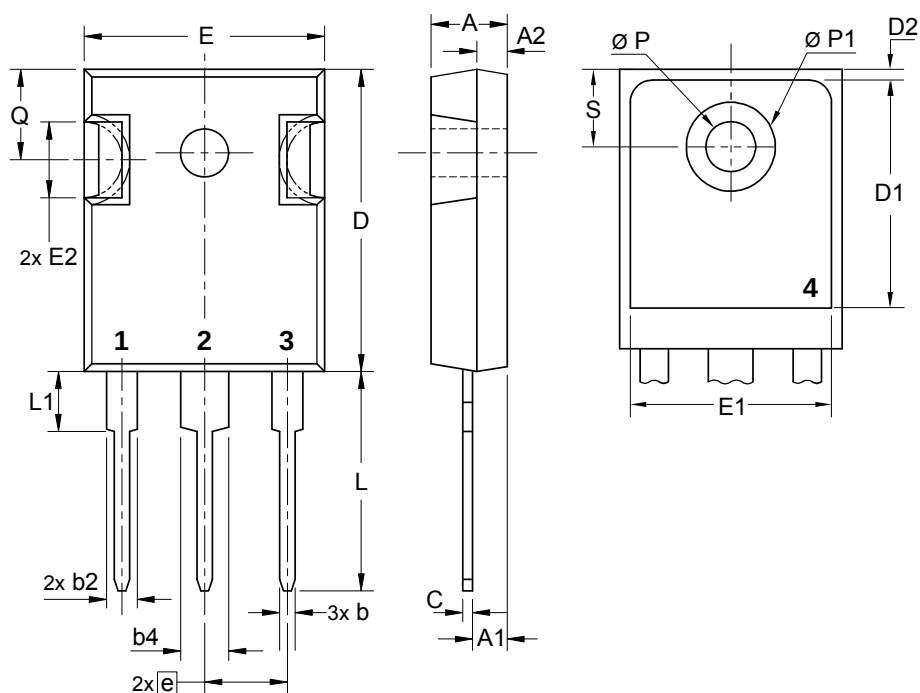
153

Diode

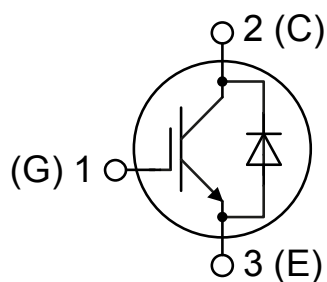
1.25

85 mΩ

V

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



IGBT

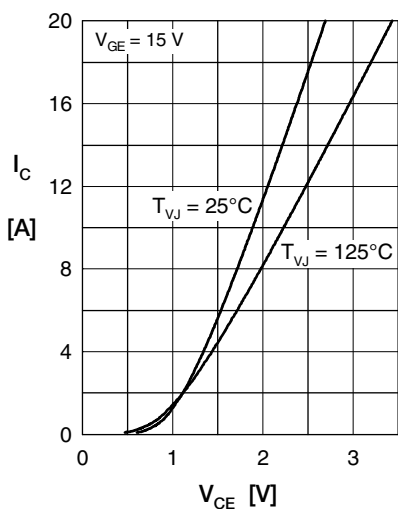


Fig. 1 Typ. output characteristics

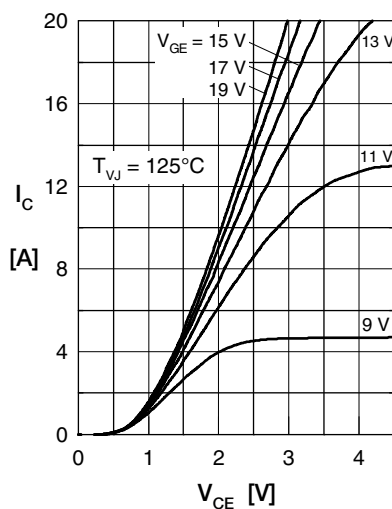


Fig. 2 Typ. output characteristics

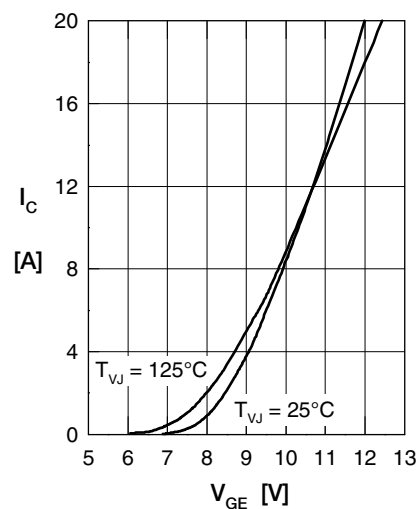


Fig. 3 Typ. transfer characteristics

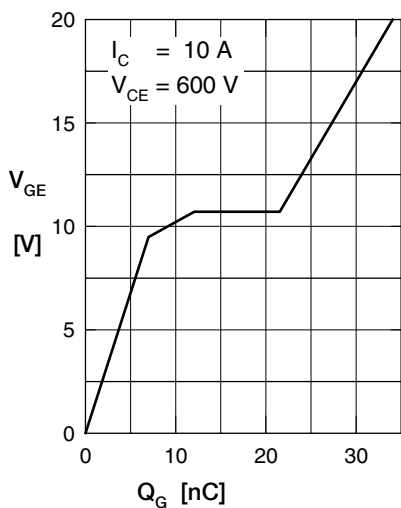


Fig. 4 Typ. turn-on gate charge

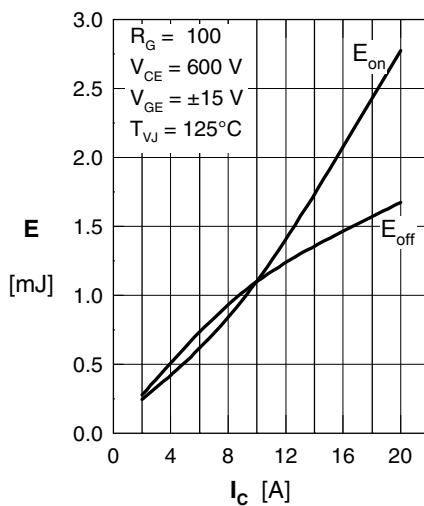


Fig. 5 Typ. switching energy vs. collector current

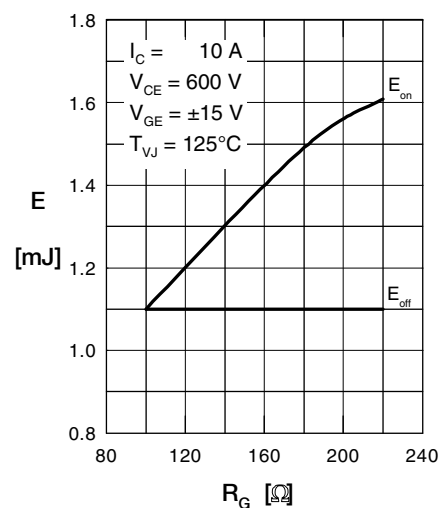


Fig. 6 Typ. switching energy vs. gate resistance

Fig. 7 Typ. transient thermal impedance junction to case

Diode

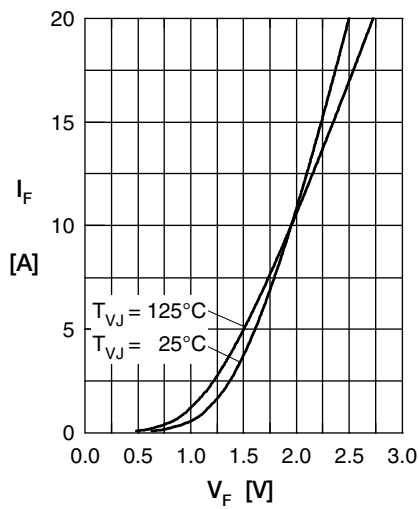


Fig. 1 Typ. forward current versus V_F

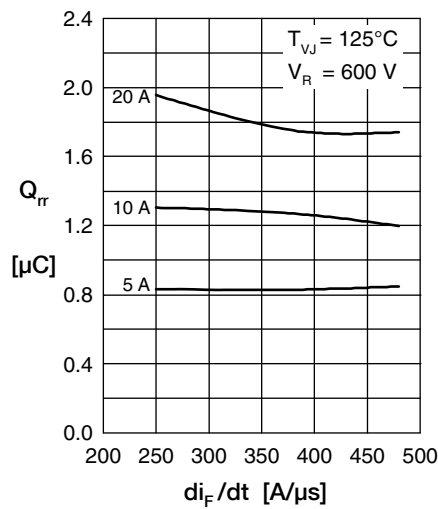


Fig. 2 Typical reverse recov. charge Q_{rr} versus di_F/dt

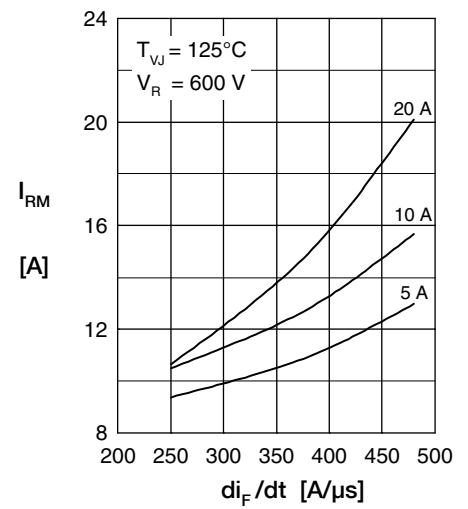


Fig. 3 Typ: peak reverse current I_{RM} versus di_F/dt

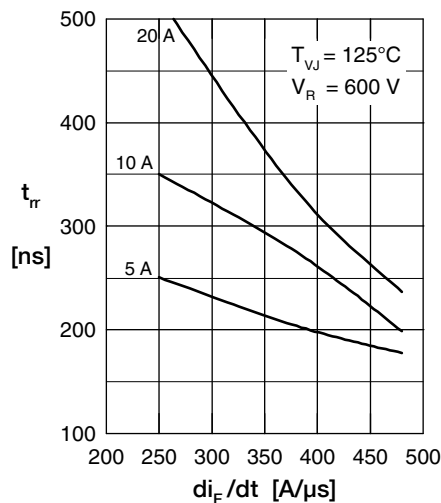


Fig. 4 Dynamic parameters Q_{rr} , I_{RM} versus T_{VJ}

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

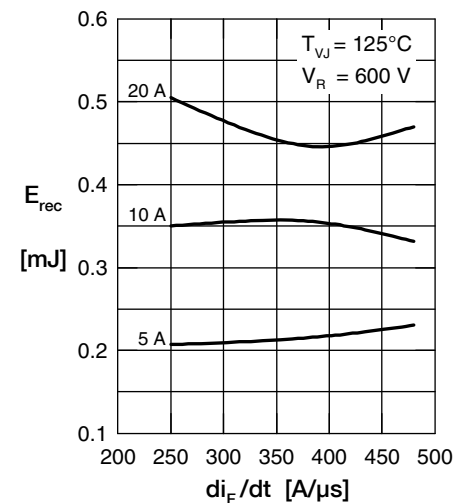


Fig. 6 Typ. recovery energy E_{rec} vs. di_F/dt

Fig. 7 Typ. transient thermal impedance junction to case



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