preliminary

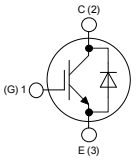
XPT IGBT

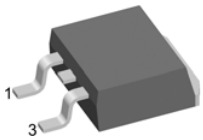
Copack

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

Part number

IXA12IF1200PC





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

Package:

- Housing: TO-263 (D2Pak)
- Industry standard outline
- Epoxy meets UL 94V-0
- RoHS compliant

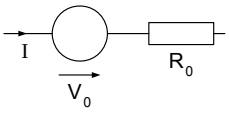
IGBT

				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
V_{CES}	*Collector emitter voltage*	V_{GE} = 0 V	T_{VJ} = 25°C			1200	V
V_{GES}	*Maximum DC gate voltage*		T_{VJ} = 25°C			±20	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_{VJ} = 25°C			85	W
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_{CE} = 0 V; V_{GE} = ±20 V				500	nA
$V_{CE(sat)}$	*Collector emitter saturation voltage*	I_C = 9 A; 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 = 0.3 mA; V_{GE} = V_{CE}		5.4	6	6.5	V
$_{Gon}$	*Total gate charge*	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 10 A			27		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			250		ns
t_f	*Current fall time*	V_{CE} = 600 V; I_C = 10 A			100		ns
E_{on}	*Turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 100 Ω	T_{VJ} = 125°C		1.1		mJ
E_{off}	*Turn-off energy per pulse*				1.1		mJ
RBSOA	*Reverse bias safe operation area*	V_{GE} = 15 V; R_G = 100 Ω V_{CEK} = 1200 V	T_{VJ} = 125°C			30	A
SCSOA	*Short circuit safe operation area*						
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 = 100 Ω; non-repetitive				40	A
R_{thJC}	*Thermal resistance juntion to case*					1.5	K/W

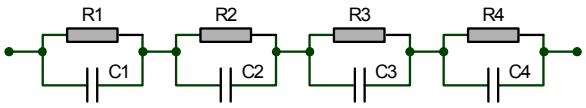
Diode

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
I_{F25}	*Forward current*	T_C = 25°C				22	A
I_{F100}		T_C = 100 °C				14	A
V_F	*Forward voltage*	I_F = 10 A	T_{VJ} = 25°C		1.95	2.2	V
			T_{VJ} = 125 °C		1.95		V
Q_{rr}	*Reverse recovery charge*	V_R = 600 V di_F/dt = - 250 A/µs; I_F = 10 A	T_{VJ} = 125 °C		1.3		µC
I_{RM}	*Maximum reverse recovery current*				10.5		A
t_{rr}	*Reverse recovery time*				350		ns
$E_{rec(off)}$	*Reverse recovery losses at turn-off*				0.35		mJ
R_{thJC}	*Thermal resistance junction to case*					1.8	K/W

Equivalent Circuits for Simulation



Symbol	Definition	Conditions	Ratings min.	typ.	max.	Unit
V_0	*IGBT*	T_{VJ} = 150 °C			1.1	V
R_0					153	mΩ
V_0	*Diode*	T_{VJ} = 150 °C			1.25	V
R_0					85	mΩ



$$Zth(t) = \sum_{i=1}^{n} \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i} \right) \right) \right]$$

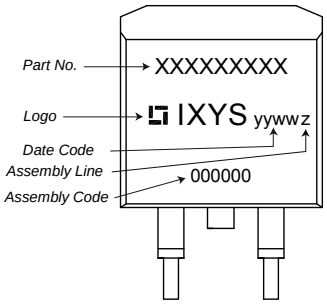
$$\tau_i = R_i \cdot C_i$$

	IGBT	Diode
R_1	tbd	tbd
R_2	tbd	tbd
R_3	tbd	tbd
R_4	tbd	tbd
τ_1	tbd	tbd
τ_2	tbd	tbd
τ_3	tbd	tbd
τ_4	tbd	tbd

Package TO-263 (D2Pak)

Symbol	Definition	Conditions	Ratings min.	typ.	max.	Unit
T_{VJ}	*Virtual junction temperature*		-55		150	°C
T_{stg}	*Storage temperature*		-55		150	°C
R_{thCH}	*Thermal resistance case to heatsink*			0.25		K/W
Weight				2		g
F_C	*Mounting force with clip*		20		60	N

Product Marking

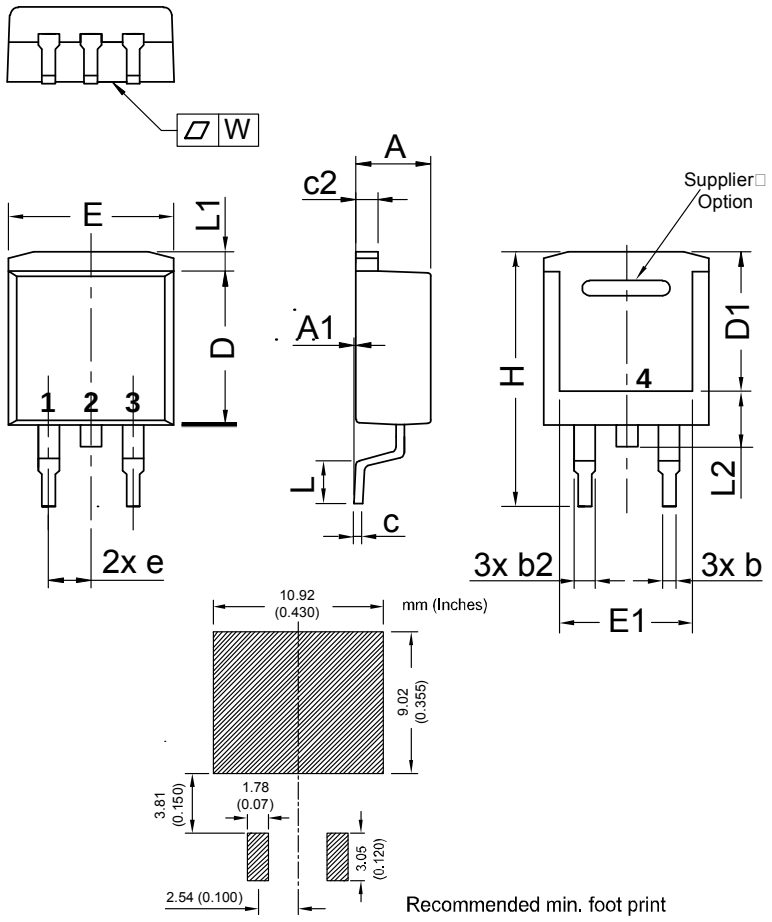


Part number

I = IGBT
X = XPT IGBT
A = Gen 1 / std
12 = Current Rating [A]
IF = Copack
1200 = Reverse Voltage [V]
PC = TO-263AB (D2Pak) (2)

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	IXA 12 IF 1200 PC	IXA12IF1200PC			

Similar Part	Package	Voltage class
IXA12IF1200PB	TO-220AB (3)	1200
IXA12IF1200HB	TO-247AD (3)	1200
IXA12IF1200TC	TO-268AA (D3Pak)	1200



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.06	4.83	0.160	0.190
A1	typ. 0.10		typ. 0.004	
b	0.51	0.99	0.020	0.039
b2	1.14	1.40	0.045	0.055
c	0.40	0.74	0.016	0.029
c2	1.14	1.40	0.045	0.029
D	8.38	9.40	0.330	0.370
D1	8.00	8.89	0.315	0.350
E	9.65	10.41	0.380	0.410
E1	6.22	8.20	0.245	0.323
e	2,54 BSC		0,100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	1.02	1.68	0.040	0.066
L2	1.02	1.52	0.040	0.060
W	typ. 0.02	0.040	typ. 0.0008	0.0016

All dimensions conform with and/or are within JEDEC standard.

Recommended min. foot print

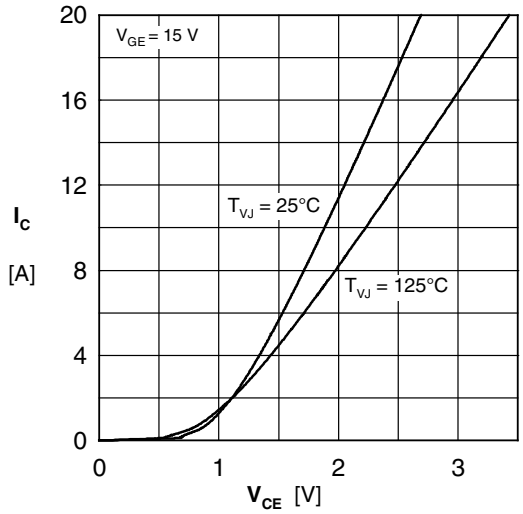


Fig. 1 Typ. output characteristics

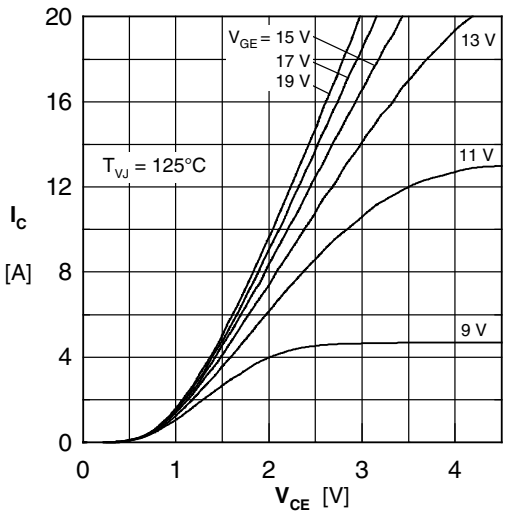


Fig. 2 Typ. output characteristics

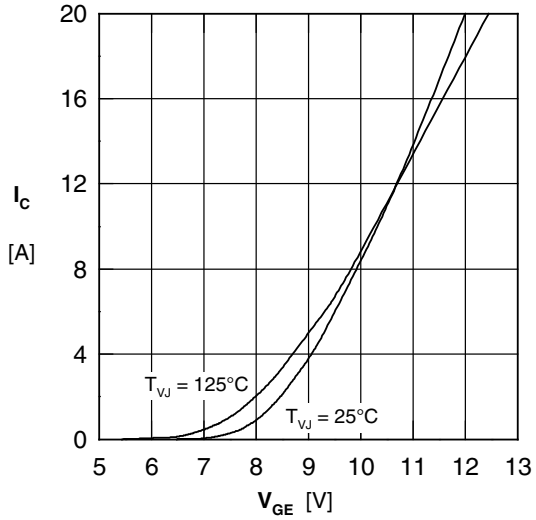


Fig. 3 Typ. tranfer characteristics

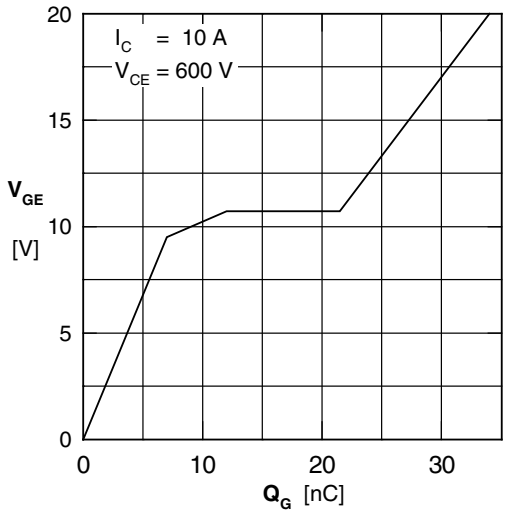


Fig. 4 Typ. turn-on gate charge

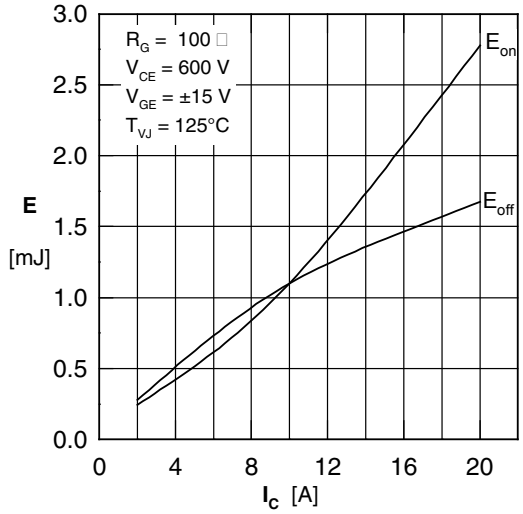


Fig. 5 Typ. switching energy vs. collector current

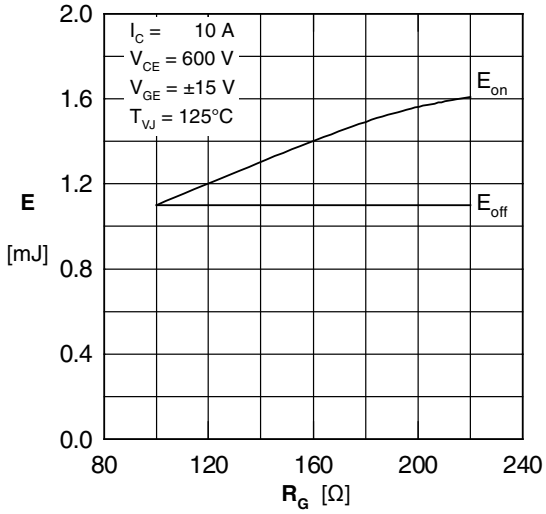


Fig. 6 Typ. switching energy vs. gate resistance

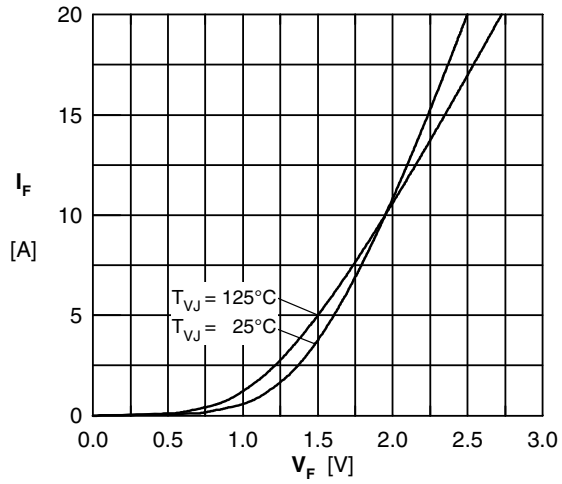


Fig. 7 Typ. forward characteristics

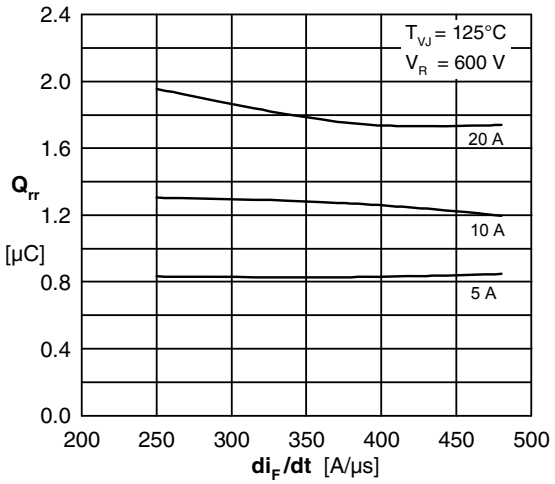


Fig. 8 Typical reverse recovery charge Q_{rr} versus. di_F/dt (125°C)

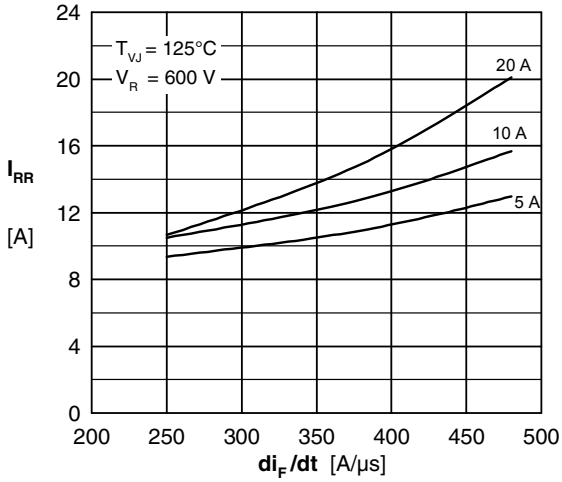


Fig. 9 Typical peak reverse current I_{RR} versus di_F/dt (125°C)

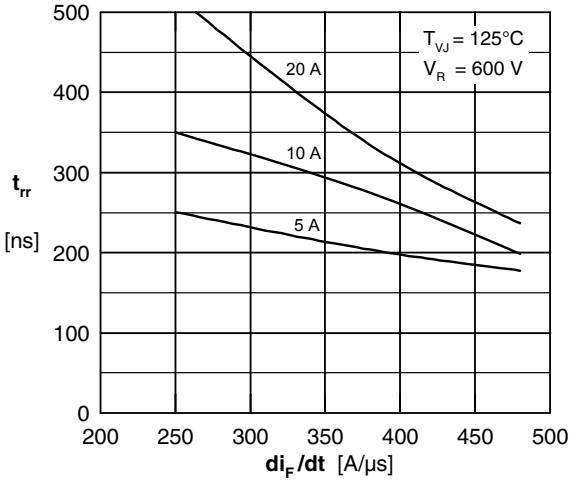


Fig. 10 Typ. recovery time t_{rr} vs. di/dt (125°C)

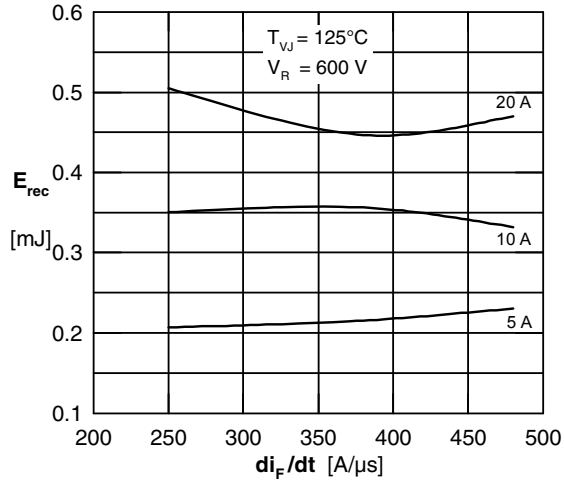


Fig. 11 Typ. recovery energy E_{rec} vs. di_F/dt (125°C)