preliminary

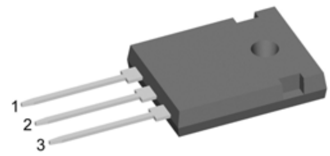
XPT IGBT

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

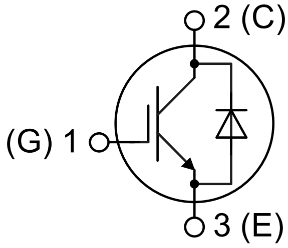
Copack

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 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

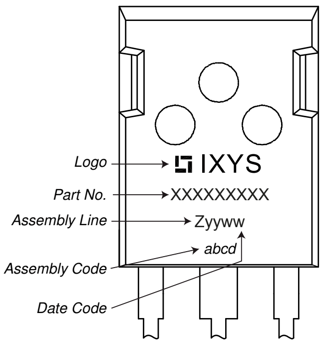
preliminary

Symbol	Definition	Conditions		min.	typ.	max.	Unit
IGBT							
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		70		ns
t_r	*current rise time*	V_{CE} = 600V; I_C = 10A			40		ns
$t_{d(off)}$	*turn-off delay time*	V_{GE} = ±15 V; R_G = 100 Ω			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} = 900V					
t_{SC}	*short circuit duration*	V_{CE} = 900V; 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 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			1.3		µC
I_{RM}	*max. reverse recovery current*	$-di_F/dt$ = -250 A/µs	T_{VJ} = 125°C		10.5		A
t_{rr}	*reverse recovery time*	I_F = 10A; V_{GE} = 0 V			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

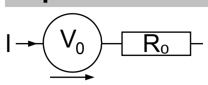
I = IGBT
X = XPT IGBT
A = Gen 1 / std
12 = Current Rating [A]
IF = Copack
1200 = Reverse Voltage [V]
HB = TO-247AD (3)

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

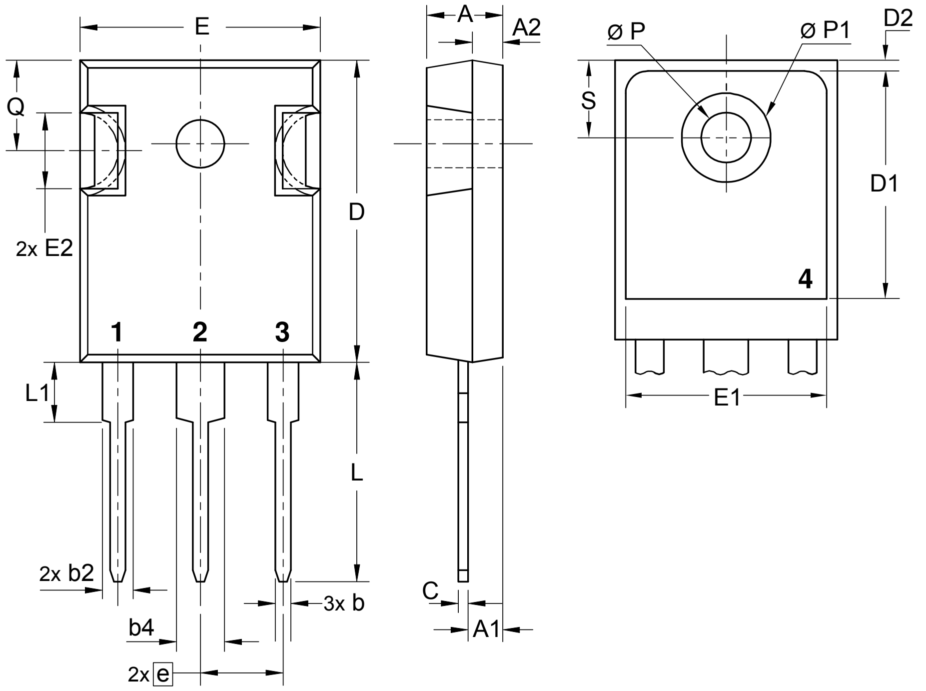
Equivalent Circuits for Simulation

** on die level* T_{VJ} = 150 °C

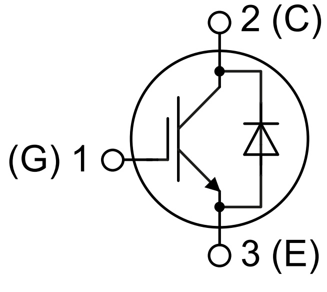


		IGBT	Diode	
$V_{0\,max}$	*threshold voltage*	1.1	1.25	V
$R_{0\,max}$	*slope resistance **	153	85	mΩ

Outlines TO-247



Sym.	Inches min.	Inches max.	Millimeter min.	Millimeter 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

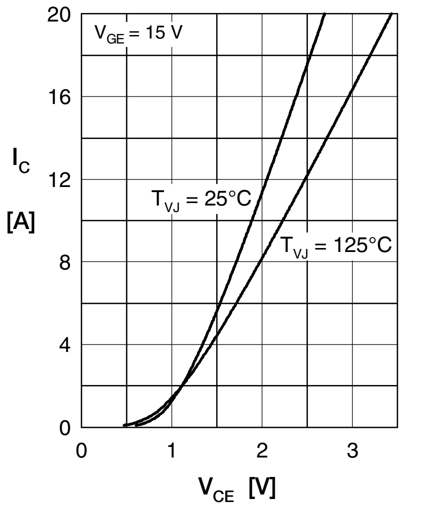


Fig. 1 Typ. output characteristics

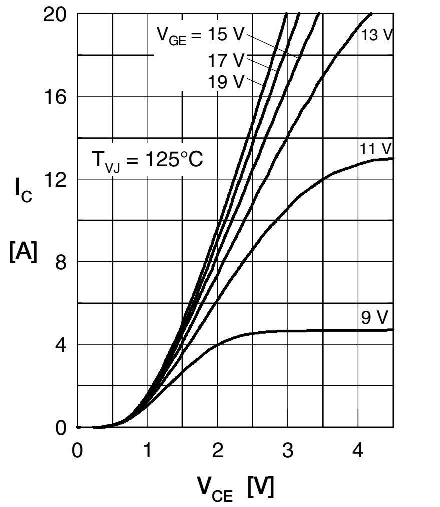


Fig. 2 Typ. output characteristics

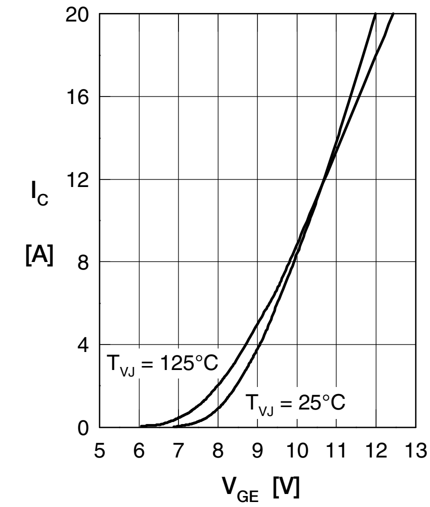


Fig. 3 Typ. tranfer characteristics

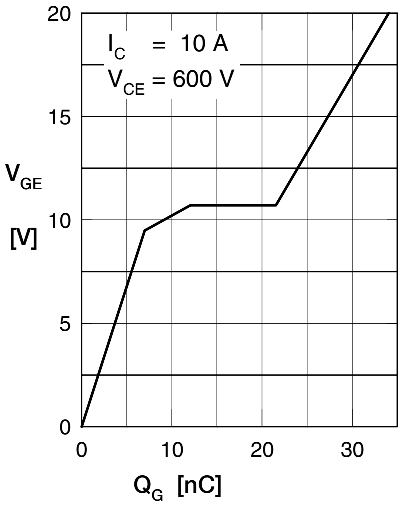


Fig. 4 Typ. turn-on gate charge

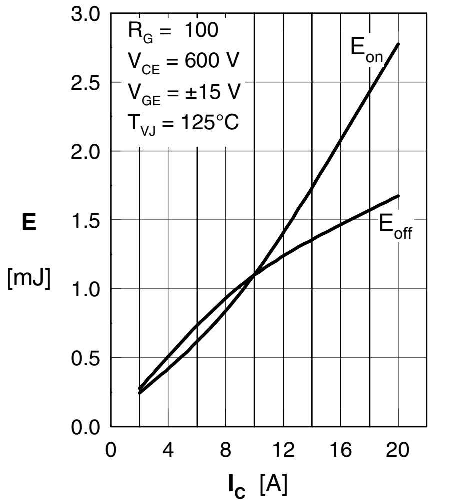


Fig. 5 Typ. switching energy vs. collector current

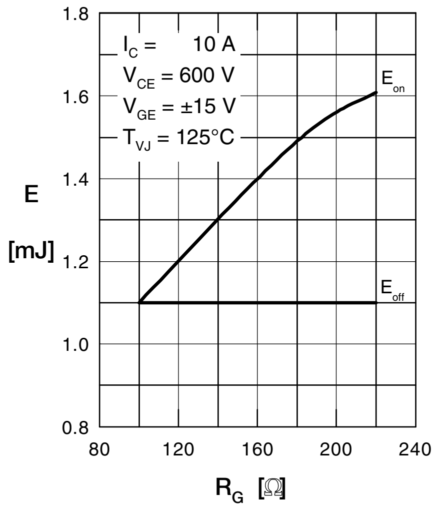


Fig. 6 Typ. switching energy vs. gate resistance

Fig. 7 Typ. transient thermal impedance junction to case

Diode

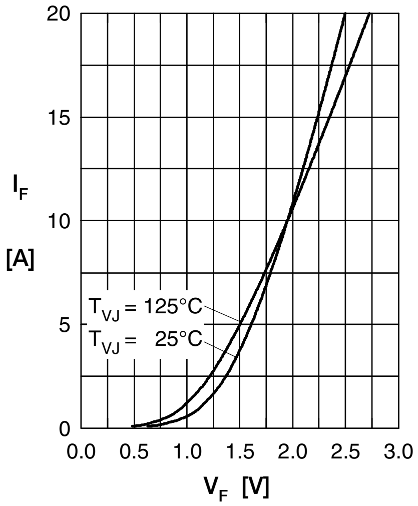


Fig. 1 Typ. forward current versus V_F

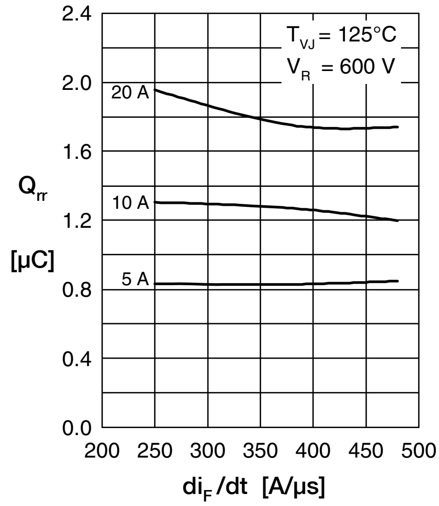


Fig. 2 Typical reverse recov. charge Q_{rr} versus. di_F/dt

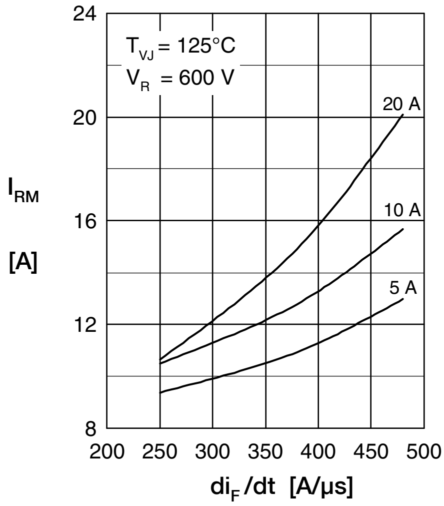


Fig.3 Typ: peak reverse current I_{RR} versus di_F/dt

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

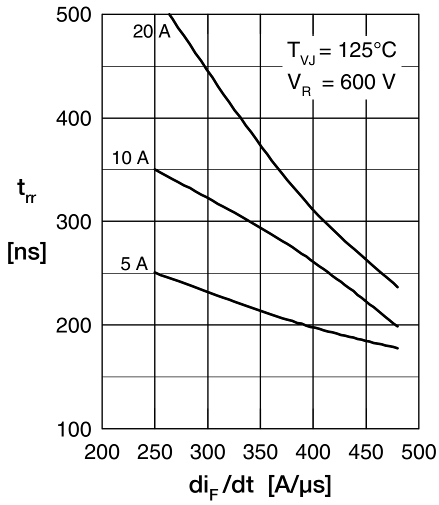


Fig. 5 Typ. recovery time t_{rr} versus di_F/dt

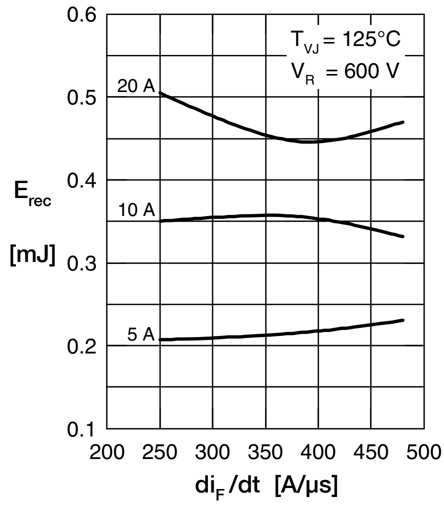


Fig. 6 Typ. recovery energy E_{rec} vs. di_F/dt

Fig. 7 Typ. transient thermal impedance junction to case