preliminary

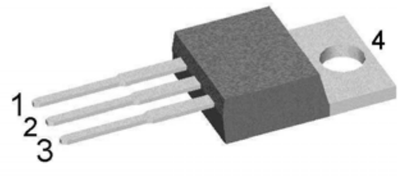
XPT IGBT

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

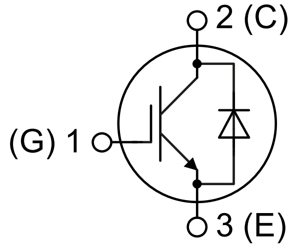
Copack

Part number

IXA12IF1200PB



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-220

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

preliminary

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 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} = 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				0.50		K/W

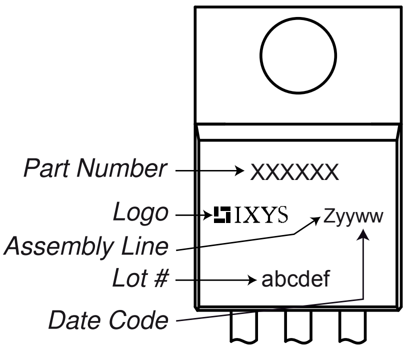
Diode

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 = 600V $-di_F/dt$ = -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				0.50		K/W

preliminary

Package TO-220			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal			35	A
T_{VJ}	*virtual junction temperature*		-40		150	°C
T_{op}	*operation temperature*		-40		125	°C
T_{stg}	*storage temperature*		-40		150	°C
Weight				2		g
M_D	*mounting torque*		0.4		0.6	Nm
F_C	*mounting force with clip*		20		60	N

Product Marking



Part number

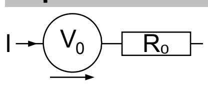
I = IGBT
X = XPT IGBT
A = Gen 1 / std
12 = Current Rating [A]
IF = Copack
1200 = Reverse Voltage [V]
PB = TO-220AB (3)

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	IXA12IF1200PB	IXA12IF1200PB	Tube	50	507428

Similar Part	Package	Voltage class
IXA12IF1200HB	TO-247AD (3)	1200
IXA12IF1200TC	TO-268AA (D3Pak) (2)	1200

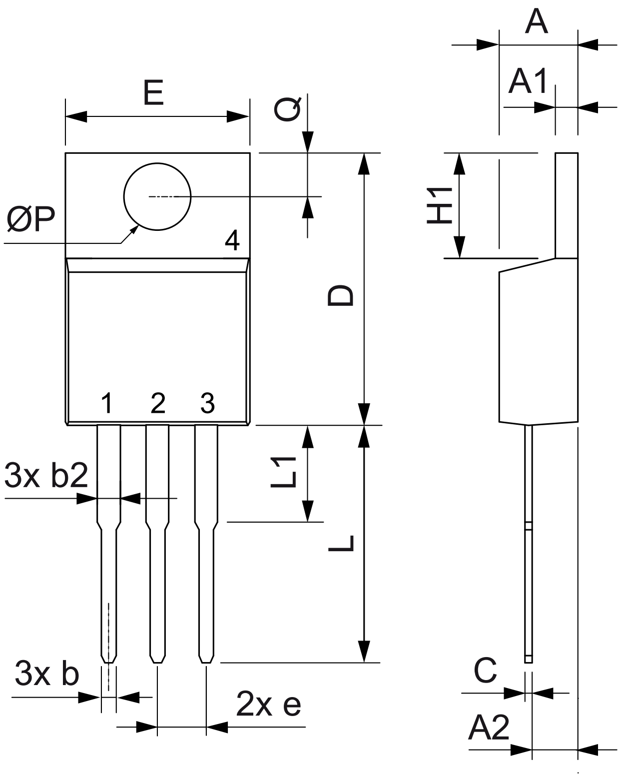
Equivalent Circuits for Simulation

** on die level* $T_{VJ} = 150\,°C$

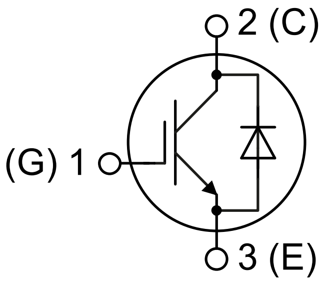


		IGBT	Diode	
$V_{0\,max}$	*threshold voltage*	1.1	1.25	V
$R_{0\,max}$	*slope resistance **	153	85	mΩ

Outlines TO-220



Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.32	4.82	0.170	0.190
A1	1.14	1.39	0.045	0.055
A2	2.29	2.79	0.090	0.110
b	0.64	1.01	0.025	0.040
b2	1.15	1.65	0.045	0.065
C	0.35	0.56	0.014	0.022
D	14.73	16.00	0.580	0.630
E	9.91	10.66	0.390	0.420
e	2.54	BSC	0.100	BSC
H1	5.85	6.85	0.230	0.270
L	12.70	13.97	0.500	0.550
L1	2.79	5.84	0.110	0.230
ØP	3.54	4.08	0.139	0.161
Q	2.54	3.18	0.100	0.125



IGBT

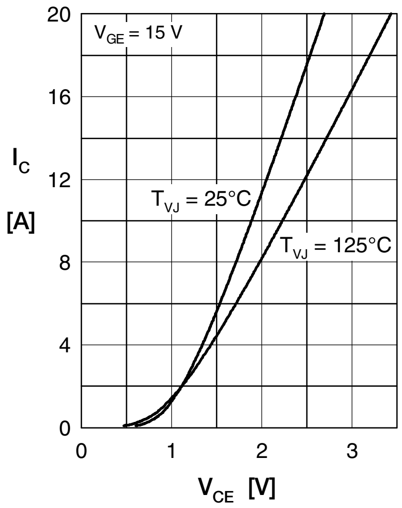


Fig. 1 Typ. output characteristics

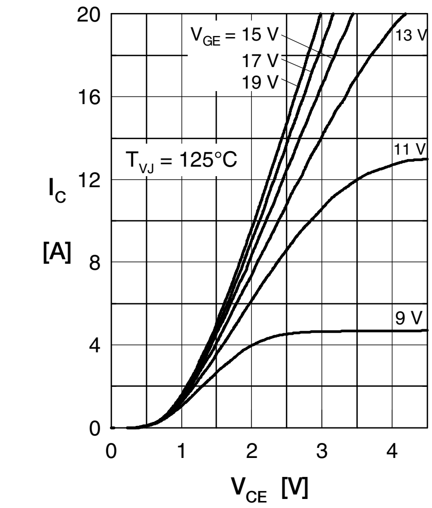


Fig. 2 Typ. output characteristics

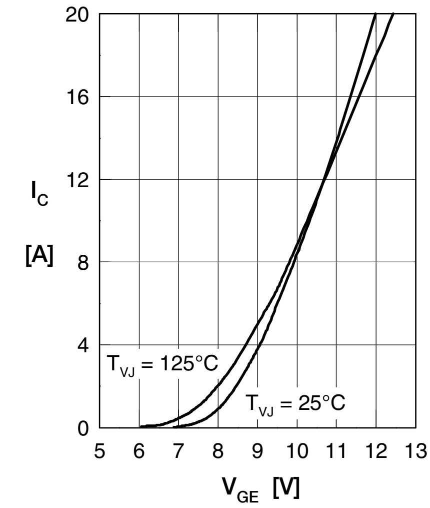


Fig. 3 Typ. tranfer characteristics

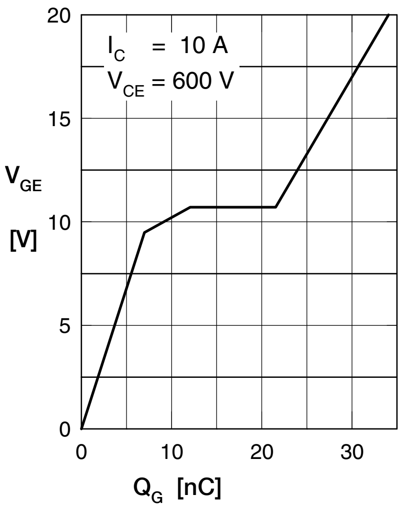


Fig. 4 Typ. turn-on gate charge

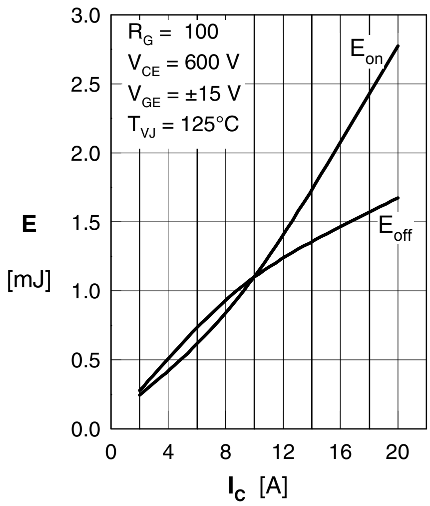


Fig. 5 Typ. switching energy vs. collector current

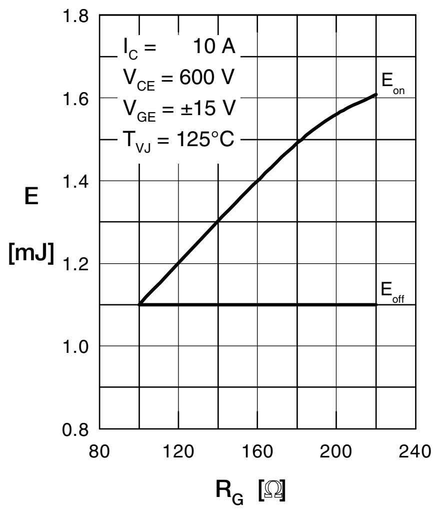


Fig. 6 Typ. switching energy vs. gate resistance

Fig. 7 Typ. transient thermal impedance junction to case

Diode

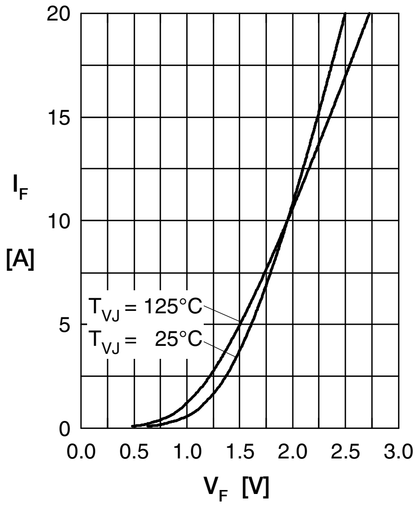


Fig. 1 Typ. forward current versus V_F

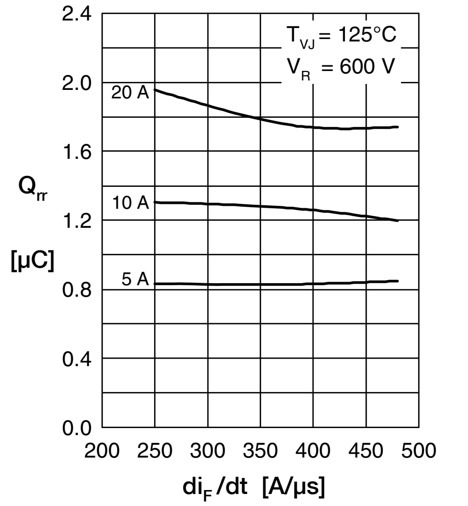


Fig. 2 Typical reverse recov. charge Q_{rr} versus. di_F/dt

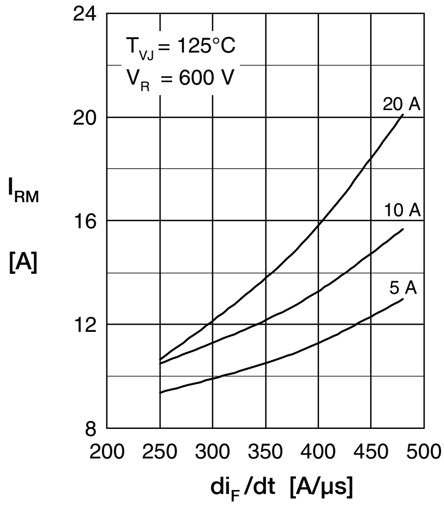


Fig.3 Typ: peak reverse current I_{RR} versus di_F/dt

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

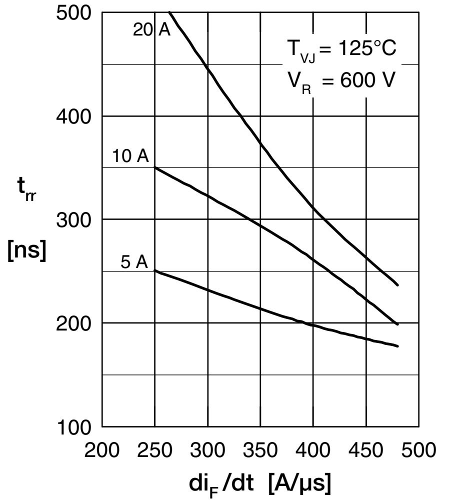


Fig. 5 Typ. recovery time t_{rr} versus di_F/dt

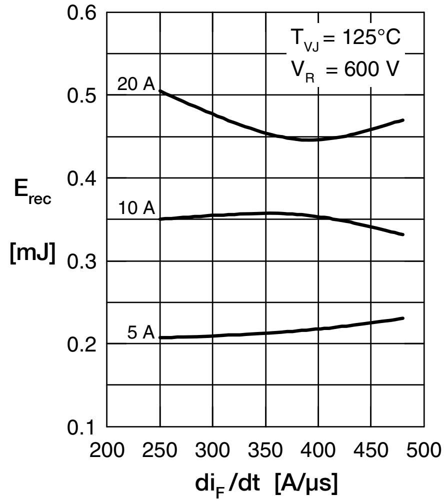


Fig. 6 Typ. recovery energy E_{rec} vs. di_F/dt

Fig. 7 Typ. transient thermal impedance junction to case