

# XPT IGBT

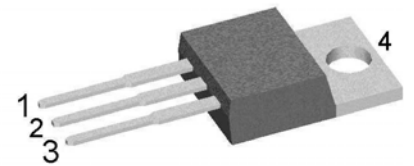
preliminary

$$V_{CES} = 1200V$$

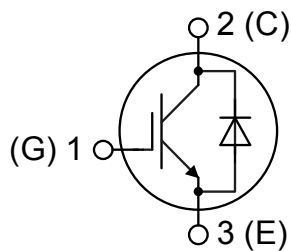
$$I_{C25} = 20A$$

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

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  $\mu$ sec.
  - 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

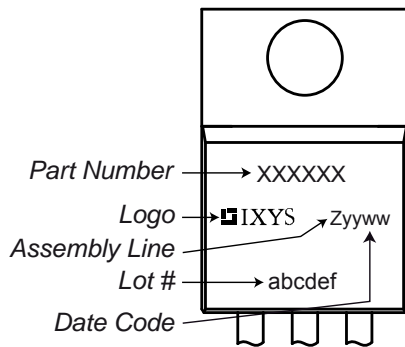
**Package: TO-220**

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

IGBT				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{CES}$	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
$V_{GES}$	max. DC gate voltage				$\pm 20$	V	
$V_{GEM}$	max. transient gate emitter voltage				$\pm 30$	V	
$I_{C25}$	collector current	$T_C = 25^{\circ}\text{C}$			20	A	
$I_{C100}$		$T_C = 100^{\circ}\text{C}$			13	A	
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}\text{C}$			85	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 10\text{A}; V_{GE} = 15\text{V}$		1.8	2.1	V	
				2.1		V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.3\text{mA}; V_{GE} = V_{CE}$	5.4	5.9	6.5	V	
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{V}$			0.1	mA	
				0.1		mA	
$I_{GES}$	gate emitter leakage current	$V_{GE} = \pm 20\text{V}$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{V}; V_{GE} = 15\text{V}; I_C = 10\text{A}$		27		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{V}; I_C = 10\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 100\Omega$		70		ns	
$t_r$	current rise time		$T_{VJ} = 125^{\circ}\text{C}$		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
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15\text{V}; R_G = 100\Omega$					
$I_{CM}$		$V_{CEmax} = 1200\text{V}$			30	A	
<b>SCSOA</b>	short circuit safe operating area	$V_{CEmax} = 900\text{V}$					
$t_{sc}$	short circuit duration	$V_{CE} = 900\text{V}; V_{GE} = \pm 15\text{V}$			10	$\mu\text{s}$	
$I_{sc}$	short circuit current	$R_G = 100\Omega; \text{non-repetitive}$		40		A	
$R_{thJC}$	thermal resistance junction to case				1.5	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.50		K/W	
<b>Diode</b>							
$V_{RRM}$	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
$I_{F25}$	forward current	$T_C = 25^{\circ}\text{C}$			22	A	
$I_{F100}$		$T_C = 100^{\circ}\text{C}$			14	A	
$V_F$	forward voltage	$I_F = 10\text{A}$			2.20	V	
				1.95		V	
$I_R$	reverse current	$V_R = V_{RRM}$			*	mA	
	* not applicable, see Ices value above				*	mA	
$Q_{rr}$	reverse recovery charge	$V_R = 600\text{V}$ $-di_F/dt = -250\text{A}/\mu\text{s}$ $I_F = 10\text{A}; V_{GE} = 0\text{V}$		1.3		$\mu\text{C}$	
$I_{RM}$	max. reverse recovery current		$T_{VJ} = 125^{\circ}\text{C}$		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
<b>Weight</b>				2		g
$M_D$	mounting torque		0.4		0.6	Nm
$F_C$	mounting force with clip		20		60	N

**Product Marking**

**Part number**

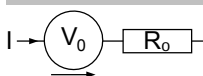
I = IGBT  
 X = XPT IGBT  
 A = Gen 1 / std  
 12 = Current Rating [A]  
 IF = Copack  
 1200 = Reverse Voltage [V]  
 PB = TO-220AB (3)

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

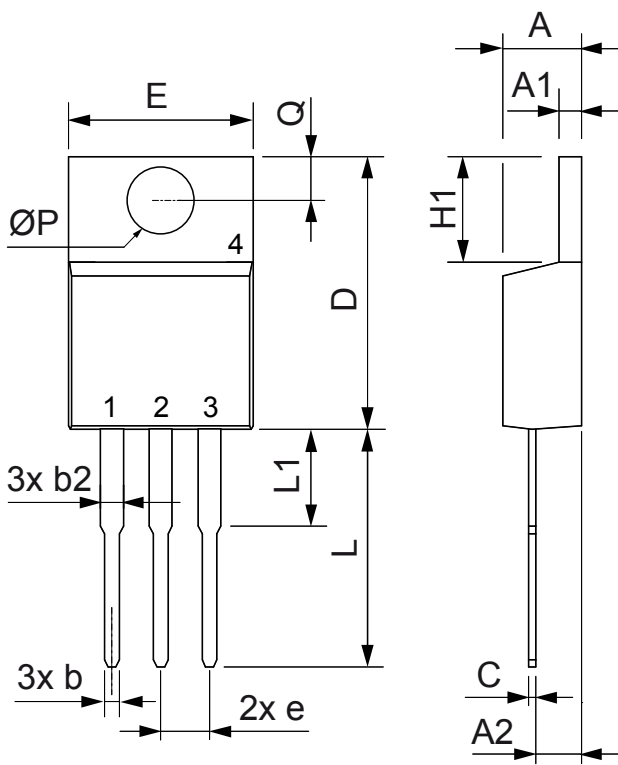
**Equivalent Circuits for Simulation**

\* on die level

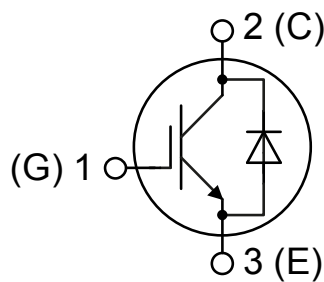
 $T_{VJ} = 150\text{ }^{\circ}\text{C}$ 


	IGBT	Diode	
$V_{0\text{ max}}$	1.1	1.25	V
$R_{0\text{ max}}$	153	85	mΩ

Outlines TO-220



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	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

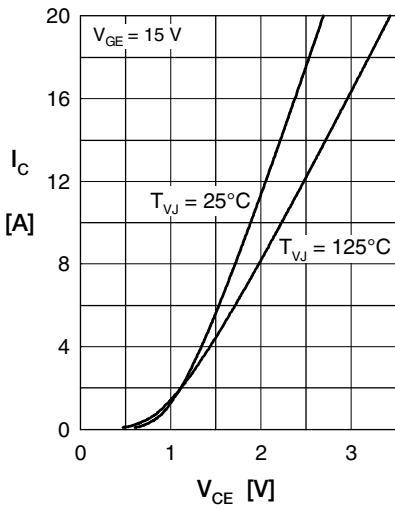


Fig. 1 Typ. output characteristics

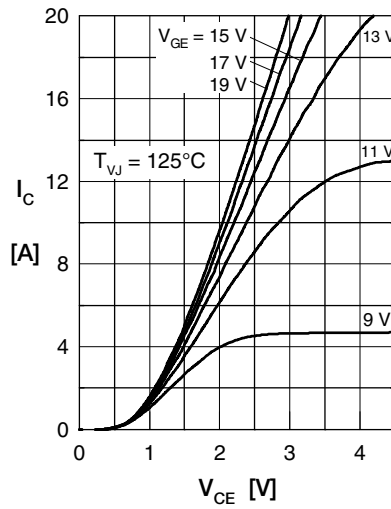


Fig. 2 Typ. output characteristics

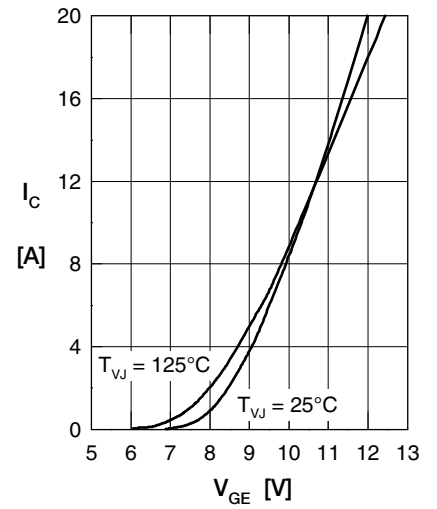


Fig. 3 Typ. transfer characteristics

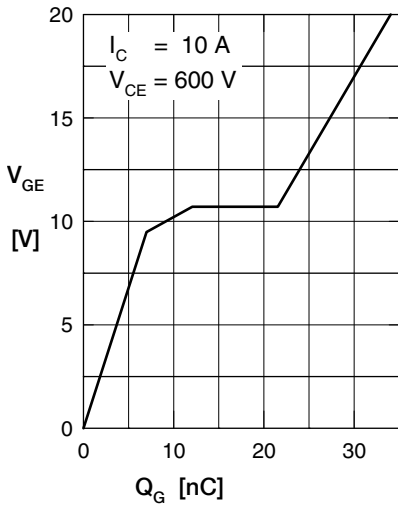


Fig. 4 Typ. turn-on gate charge

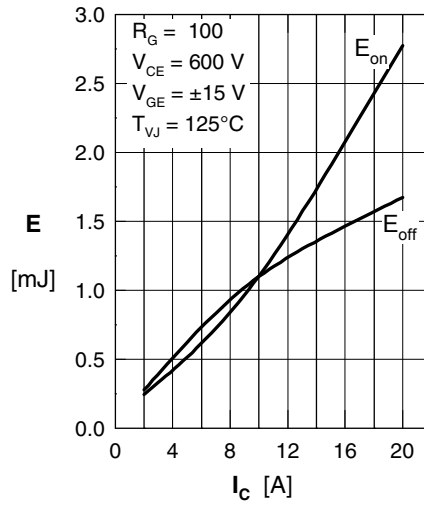


Fig. 5 Typ. switching energy vs. collector current

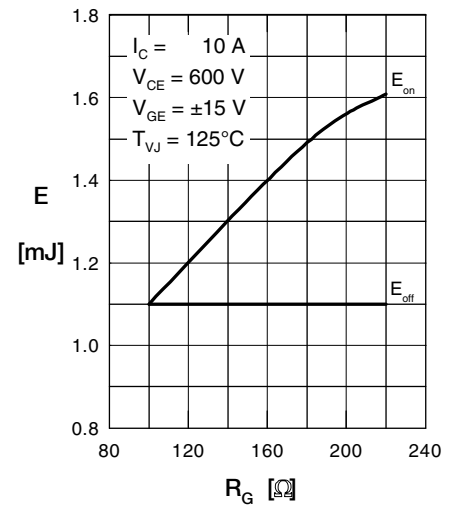


Fig. 6 Typ. switching energy vs. gate resistance

Fig. 7 Typ. transient thermal impedance junction to case

## Diode

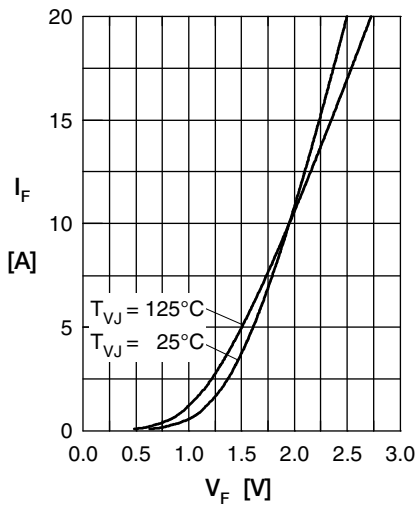


Fig. 1 Typ. forward current versus  $V_F$

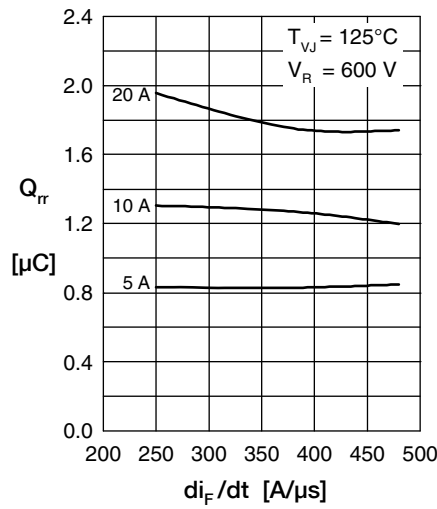


Fig. 2 Typical reverse recov. charge  $Q_{rr}$  versus  $di_F/dt$

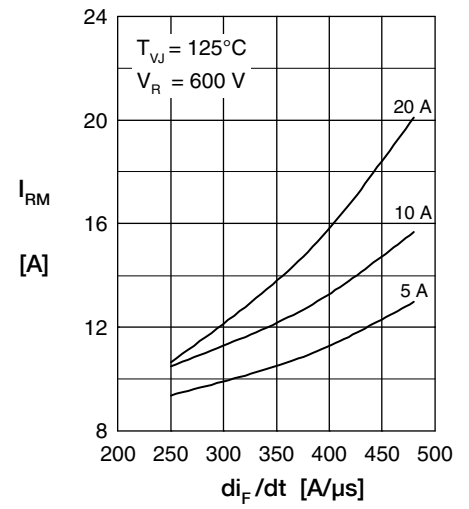


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $di_F/dt$

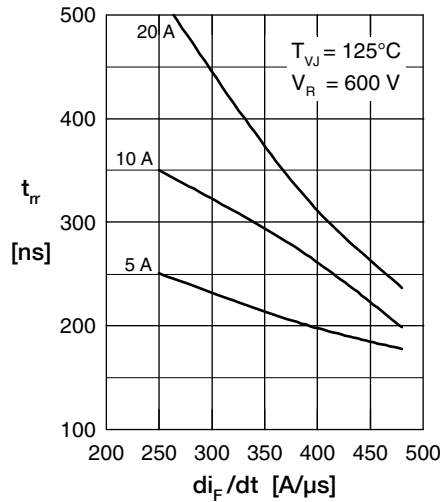


Fig. 4 Dynamic parameters  $Q_{rr}$ ,  $I_{RM}$  versus  $T_{VJ}$

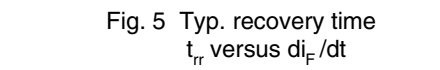


Fig. 5 Typ. recovery time  $t_{rr}$  versus  $di_F/dt$

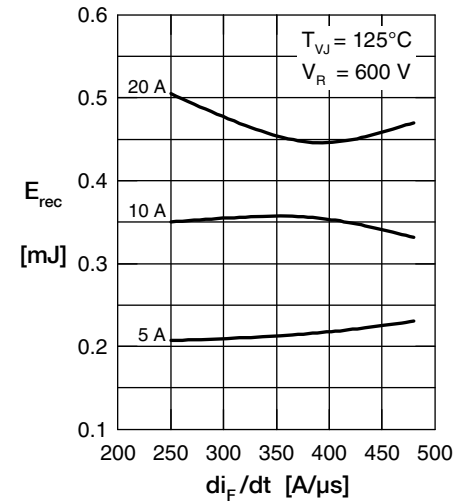


Fig. 6 Typ. recovery energy  $E_{rec}$  vs.  $di_F/dt$

Fig. 7 Typ. transient thermal impedance junction to case



---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).