

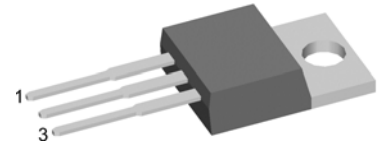
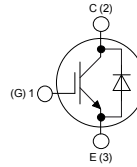
# XPT IGBT

Copack

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

Part number

**IXA12IF1200PB**



### 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  $\mu\text{sec}$ .
  - 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

### Package:

- Housing: TO-220
- Industry standard outline
- Epoxy meets UL 94V-0
- RoHS compliant

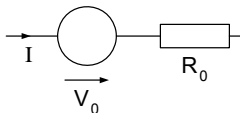
## IGBT

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
$V_{CES}$	Collector emitter voltage	$V_{GE} = 0 \text{ V}$			1200	V
$V_{GES}$	Maximum DC gate voltage				$\pm 20$	V
$I_{C25}$	Collector current				20	A
$I_{C90}$					13	A
$P_{tot}$	Total power dissipation				85	W
$I_{CES}$	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	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			500	nA
$V_{CE(sat)}$	Collector emitter saturation voltage	$I_C = 9 \text{ A}; V_{GE} = 15 \text{ V}$		1.8	2.1	V
				2.1		V
$V_{GE(th)}$	Gate emitter threshold voltage	$I_C = 0.3 \text{ mA}; V_{GE} = V_{CE}$	5.5	6	6.5	V
$Q_{Gon}$	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			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	$V_{CE} = 600 \text{ V}; I_C = 10 \text{ A}$		100		ns
$E_{on}$	Turn-on energy per pulse	$V_{GE} = \pm 15 \text{ V}; R_G = 100 \Omega$	$T_{VJ} = 125^\circ\text{C}$	1.1		mJ
$E_{off}$	Turn-off energy per pulse			1.1		mJ
<b>RBSOA</b>	Reverse bias safe operation area	$V_{GE} = 15 \text{ V}; R_G = 100 \Omega$ $V_{CEK} = 1200 \text{ V}$	$T_{VJ} = 125^\circ\text{C}$		30	A
<b>SCSOA</b>	Short circuit safe operation area					
$t_{sc}$	Short circuit duration	$V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}$	$T_{VJ} = 125^\circ\text{C}$		10	$\mu\text{s}$
$I_{sc}$	Short circuit current	$R_G = 100 \Omega$ ; non-repetitive			40	A
$R_{thJC}$	Thermal resistance junction to case				1.5	K/W

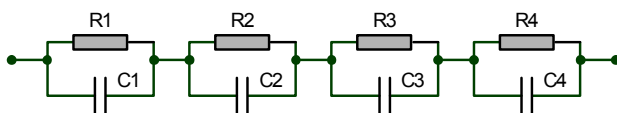
## Diode

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
$I_{F25}$	Forward current	$T_C = 25^\circ\text{C}$			22	A
$I_{F90}$		$T_C = 90^\circ\text{C}$			14	A
$V_F$	Forward voltage	$I_F = 10\text{ A}$	$T_{VJ} = 25^\circ\text{C}$	1.95	2.2	V
			$T_{VJ} = 125^\circ\text{C}$	1.85		V
$Q_{rr}$	Reverse recovery charge	$V_R = 600\text{V};$		tbd		$\mu\text{C}$
$I_{RM}$	Maximum reverse recovery current	$di_F/dt = -$	$T_{VJ} = 125^\circ\text{C}$	tbd		A
$t_{rr}$	Reverse recovery time	$A/\mu\text{s};$		tbd		ns
$E_{rec(off)}$	Reverse recovery losses at turn-off	$I_F = 10\text{ A}$		tbd		mJ
$R_{thJC}$	Thermal resistance junction to case				1.8	K/W

## Equivalent Circuits for Simulation



Symbol	Definition		Ratings			Unit
			min.	typ.	max.	
$V_0$	IGBT	$T_{VJ} = 150^\circ\text{C}$			1.1	V
$R_0$					153	m $\Omega$
$V_0$	Diode	$T_{VJ} = 150^\circ\text{C}$			1.1	V
$R_0$					90	m $\Omega$



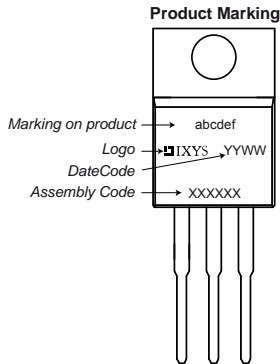
$$Z_{th}(t) = \sum_{i=1}^n \left[ R_i \cdot \left( 1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

	IGBT	Diode
$R_1$	tbd	tbd
$R_2$	tbd	tbd
$R_3$	tbd	tbd
$R_4$	tbd	tbd
$\tau_1$	tbd	tbd
$\tau_2$	tbd	tbd
$\tau_3$	tbd	tbd
$\tau_4$	tbd	tbd

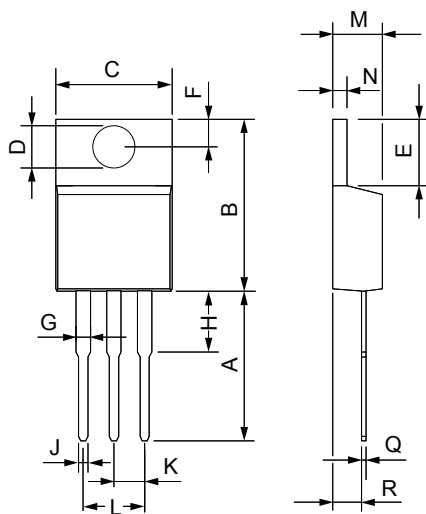
**Package TO-220**

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
$T_{vj}$	Virtual junction temperature		-55		150	°C
$T_{stg}$	Storage temperature		-55		150	°C
$R_{thCH}$	Thermal resistance case to heatsink			0.50		K/W
<b>Weight</b>				2		g
$M_D$	Mounting torque		0.4		0.6	Nm
$F_c$	Mounting force with clip		20		60	N

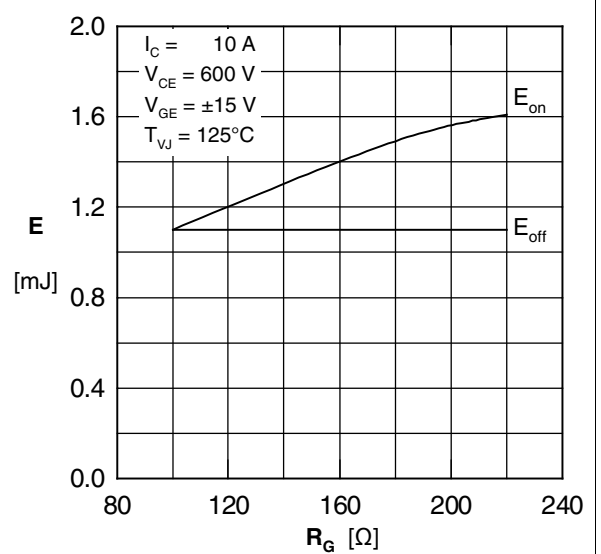
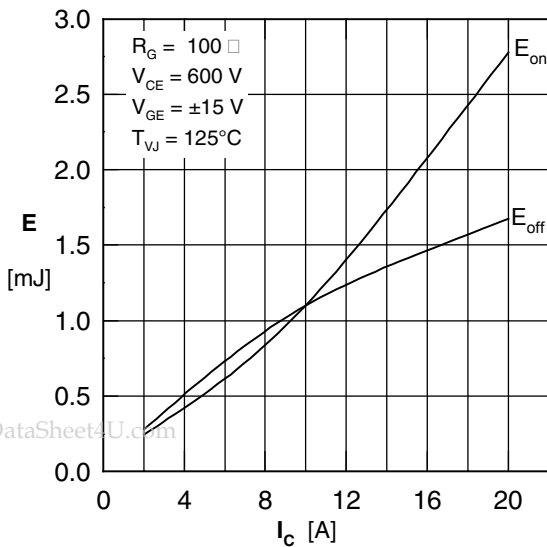
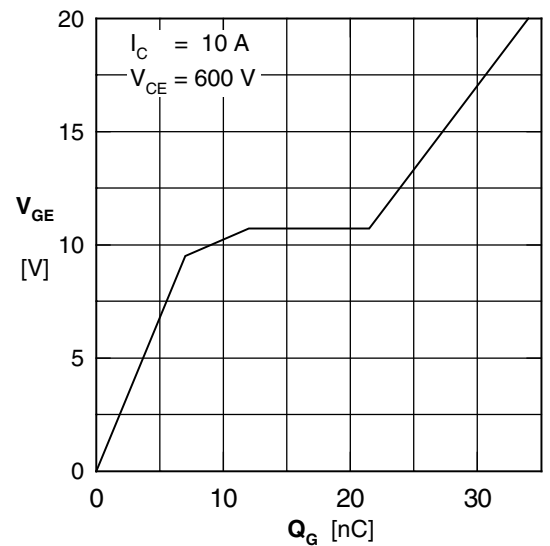
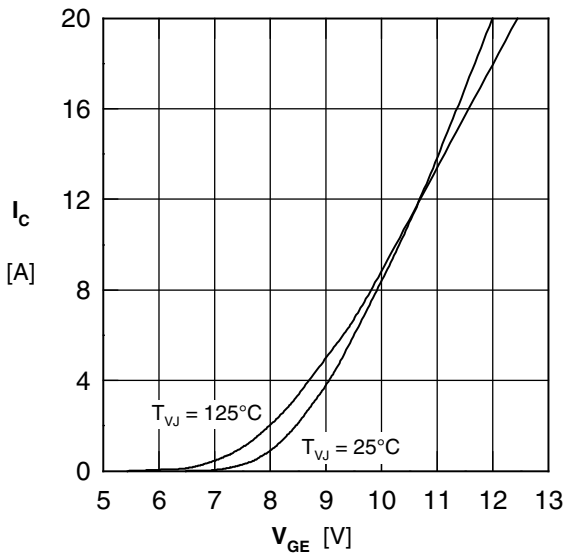
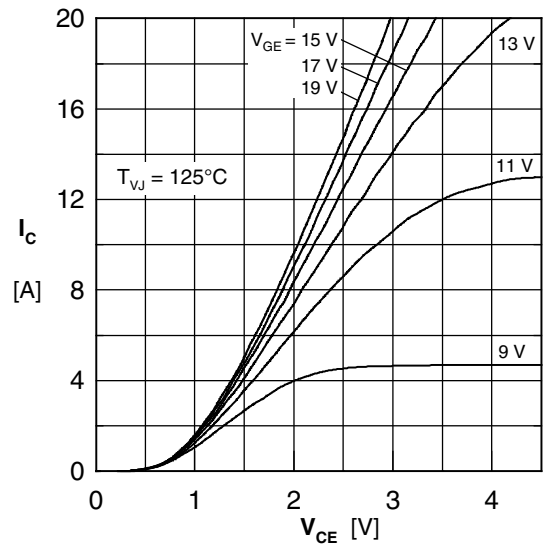
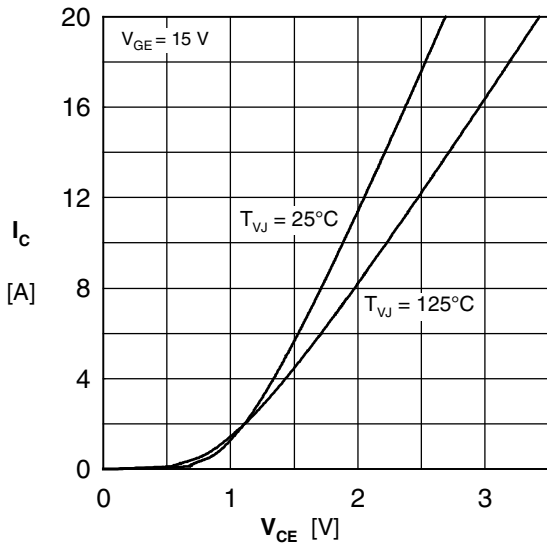

**Part number**

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 Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	IXA 12 IF 1200 PB	IXA12IF1200PB			



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	12.70	13.97	0.500	0.550
B	14.73	16.00	0.580	0.630
C	9.91	10.66	0.390	0.420
D	3.54	4.08	0.139	0.161
E	5.85	6.85	0.230	0.270
F	2.54	3.18	0.100	0.125
G	1.15	1.65	0.045	0.065
H	2.79	5.84	0.110	0.230
J	0.64	1.01	0.025	0.040
K	2.54	BSC	0.100	BSC
M	4.32	4.82	0.170	0.190
N	1.14	1.39	0.045	0.055
Q	0.35	0.56	0.014	0.022
R	2.29	2.79	0.090	0.110



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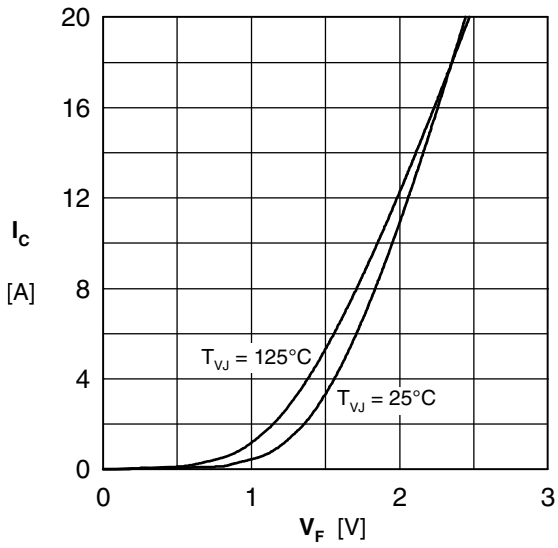


Fig. 7 Typ. forward characteristic