

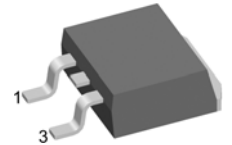
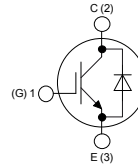
# XPT IGBT

Copack

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

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  $\mu\text{sec}$ .
  - 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-263 (D2Pak)
- Industry standard outline
- Epoxy meets UL 94V-0
- RoHS compliant

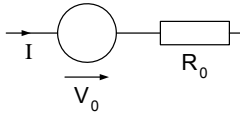
## IGBT

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
$I_{C100}$					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	$I_C = 0.3 \text{ mA}; V_{GE} = V_{CE}$	5.4	6	6.5	V
$Q_{on}$	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			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

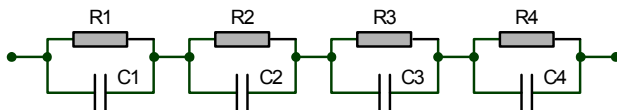
## Diode

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
$I_{F25}$	Forward current	$T_C = 25^\circ\text{C}$			22	A
$I_{F100}$		$T_C = 100^\circ\text{C}$			14	A
$V_F$	Forward voltage	$I_F = 10\text{ A}$	$T_{VJ} = 25^\circ\text{C}$	1.95	2.2	V
			$T_{VJ} = 125^\circ\text{C}$	1.95		V
$Q_{rr}$	Reverse recovery charge	$V_R = 600\text{ V}$		1.3		$\mu\text{C}$
$I_{RM}$	Maximum reverse recovery current	$di_F/dt = - 250\text{ A}/\mu\text{s};$	$T_{VJ} = 125^\circ\text{C}$	10.5		A
$t_{rr}$	Reverse recovery time	$I_F = 10\text{ A}$		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			Unit
			min.	typ.	max.	
$V_0$	IGBT	$T_{VJ} = 150^\circ\text{C}$			1.1	V
$R_0$					153	m $\Omega$
$V_0$	Diode	$T_{VJ} = 150^\circ\text{C}$			1.25	V
$R_0$					85	m $\Omega$



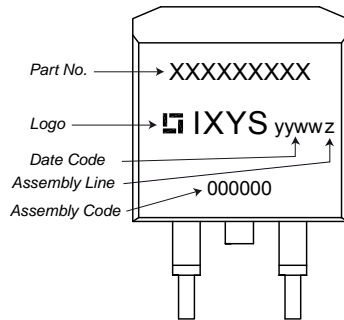
$$Z_{th}(t) = \sum_{i=1}^n \left[ R_i \cdot \left( 1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

	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-263 (D2Pak)**

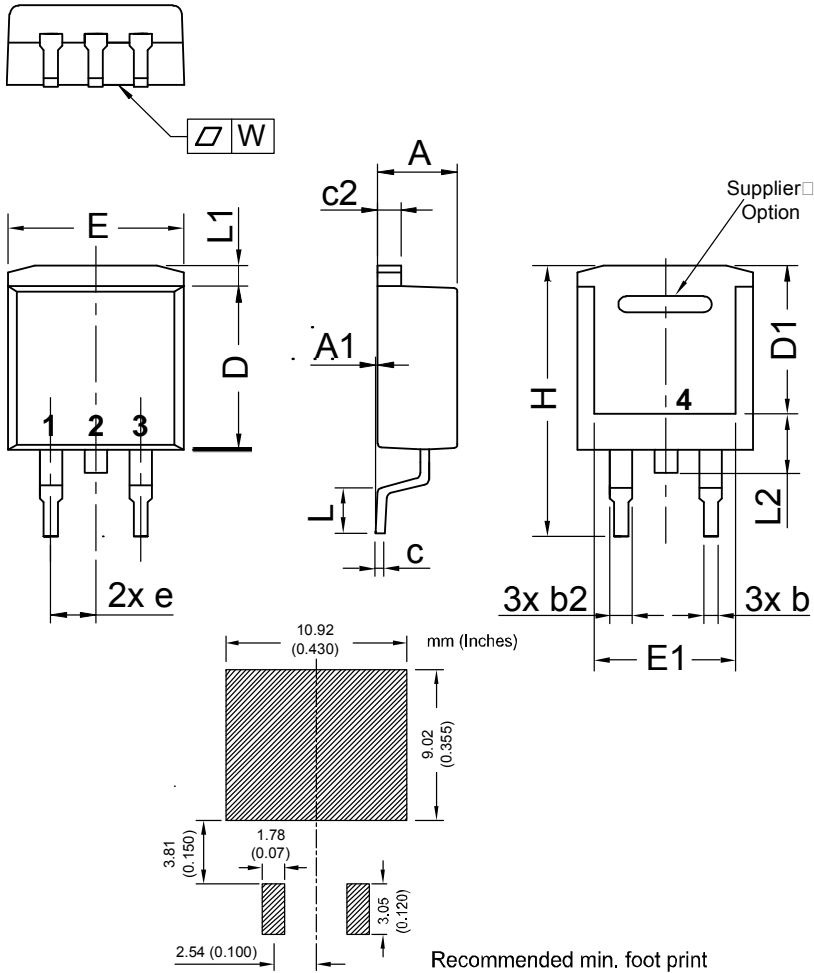
Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
$T_{vj}$	Virtual junction temperature		-55		150	°C
$T_{stg}$	Storage temperature		-55		150	°C
$R_{thCH}$	Thermal resistance case to heatsink			0.25		K/W
<b>Weight</b>				2		g
$F_C$	Mounting force with clip		20		60	N

**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.

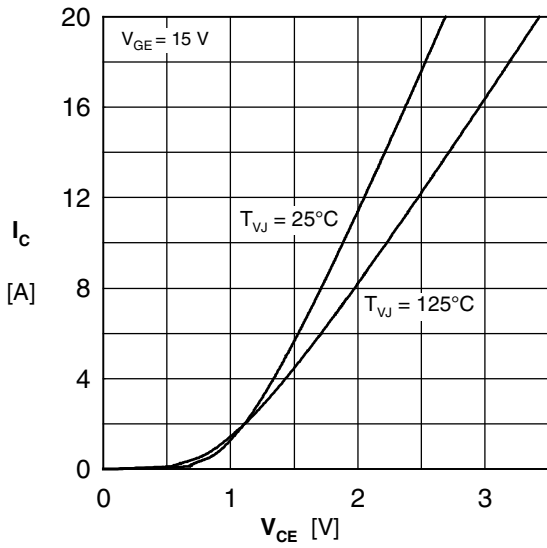


Fig. 1 Typ. output characteristics

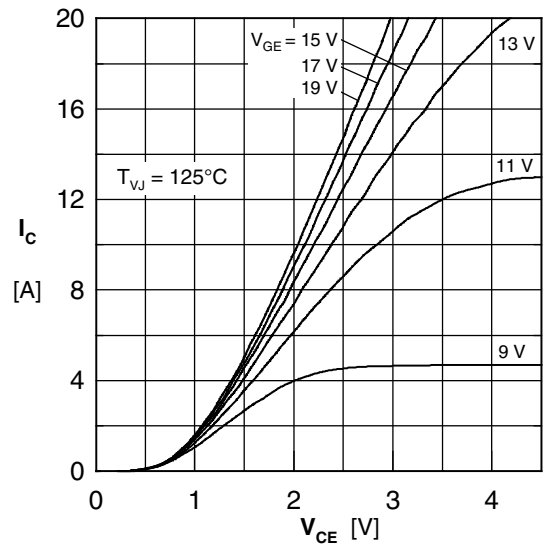


Fig. 2 Typ. output characteristics

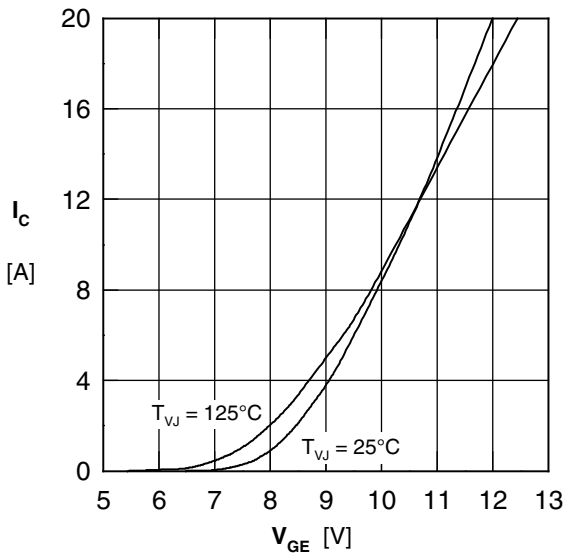


Fig. 3 Typ. transfer characteristics

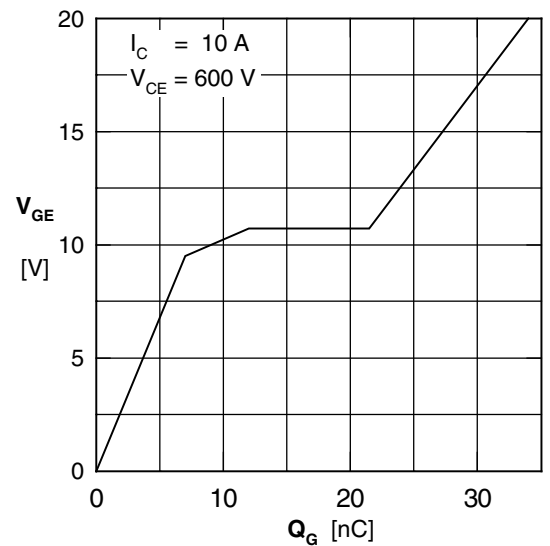


Fig. 4 Typ. turn-on gate charge

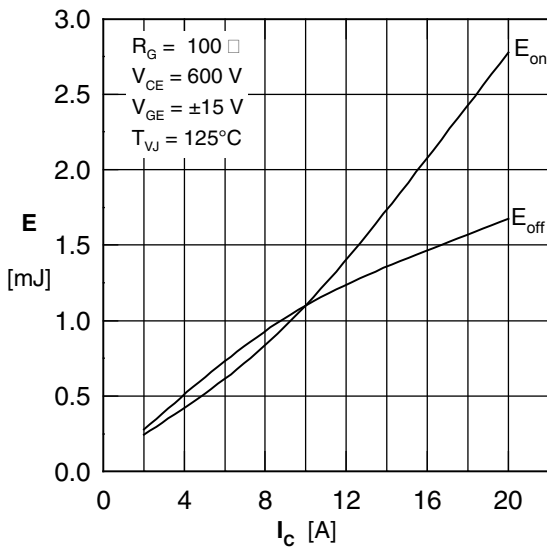


Fig. 5 Typ. switching energy vs. collector current

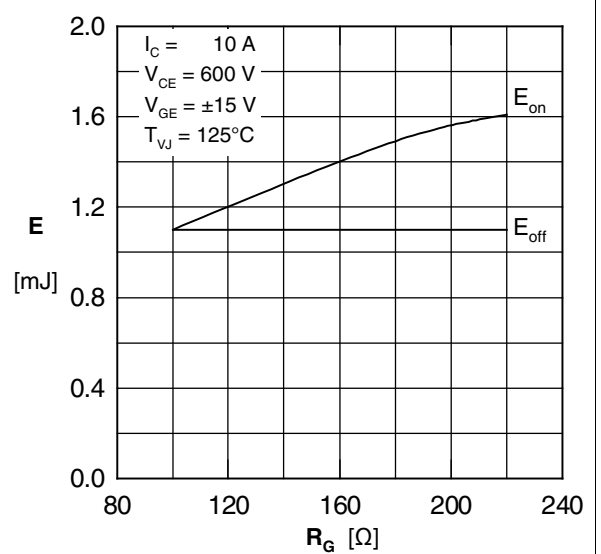


Fig. 6 Typ. switching energy vs. gate resistance

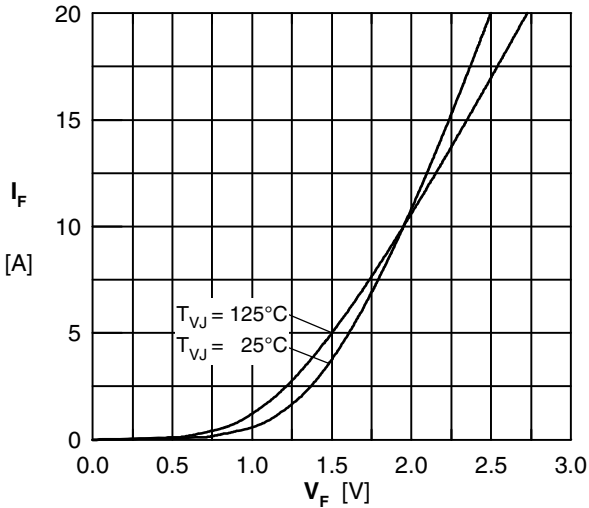


Fig. 7 Typ. forward characteristics

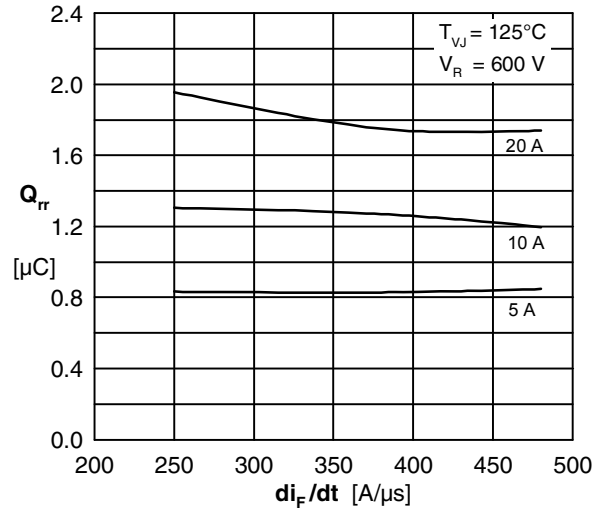


Fig. 8 Typical reverse recovery charge  $Q_{rr}$  versus  $di_F/dt$  (125°C)

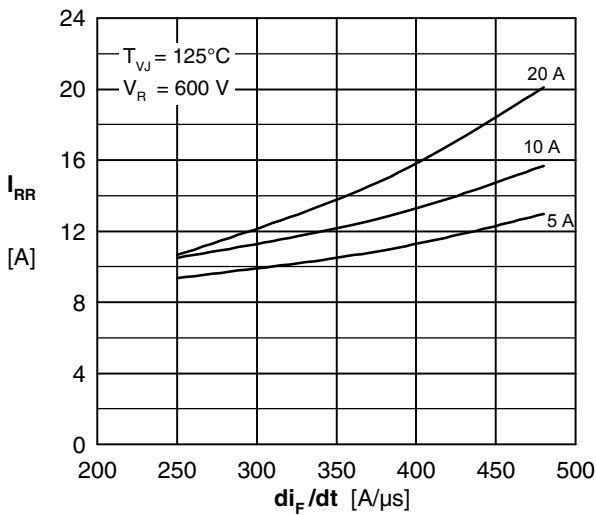


Fig. 9 Typical peak reverse current  $I_{RR}$  versus  $di_F/dt$  (125°C)

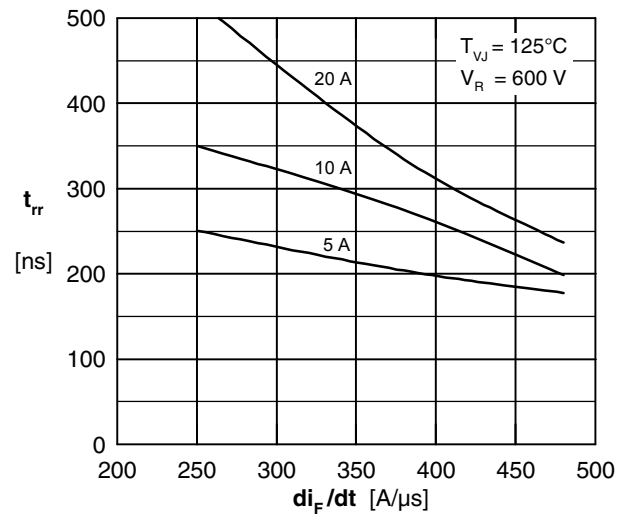


Fig. 10 Typ. recovery time  $t_{rr}$  vs.  $di/dt$  (125°C)

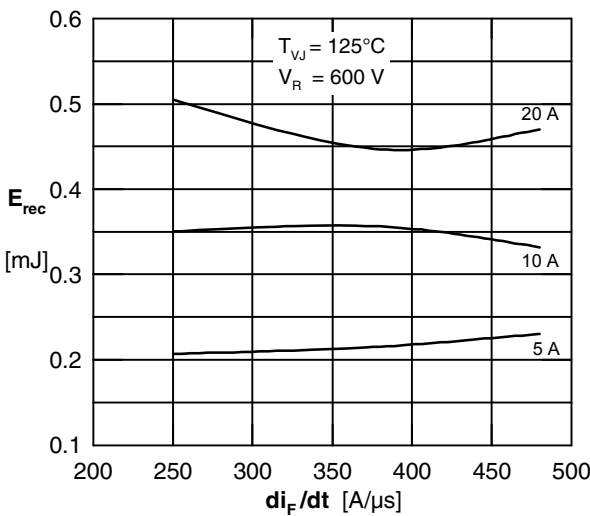


Fig. 11 Typ. recovery energy  $E_{rec}$  vs.  $di_F/dt$  (125°C)