

XPT IGBT

Copack

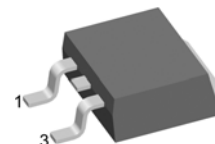
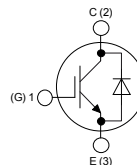
$$I_{C25} = 20 \text{ A}$$

$$V_{CES} = 1200 \text{ V}$$

$$V_{CE(sat)typ} = 1.8 \text{ V}$$

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 μ 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

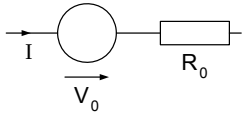
Ratings

Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	Collector emitter voltage	$V_{GE} = 0 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$			1200	V
V_{GES}	Maximum DC gate voltage		$T_{VJ} = 25^\circ\text{C}$			± 20	V
I_{C25}	Collector current		$T_C = 25^\circ\text{C}$			20	A
I_{C90}			$T_C = 90^\circ\text{C}$			13	A
P_{tot}	Total power dissipation		$T_{VJ} = 25^\circ\text{C}$			85	W
I_{CES}	Collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$			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	$I_C = 9 \text{ A}; V_{GE} = 15 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		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
RBSOA	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
SCSOA	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	μ 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

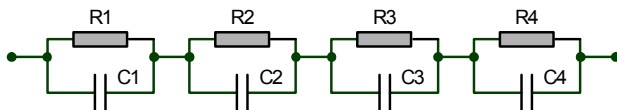
Diode

Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	Unit
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	$I_F = 10\text{ A}$		1.95	2.2	V
				1.85		V
Q_{rr}	Reverse recovery charge	$V_R = 600\text{V};$		tbd		μC
I_{RM}	Maximum reverse recovery current	$di_F/dt = -\quad\quad\quad\text{A}/\mu\text{s};$		tbd		A
t_{rr}	Reverse recovery time	$I_F = 10\text{ A}$		tbd		ns
$E_{rec(off)}$	Reverse recovery losses at turn-off			tbd		mJ
R_{thJC}	Thermal resistance junction to case				1.8	K/W

Equivalent Circuits for Simulation



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



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

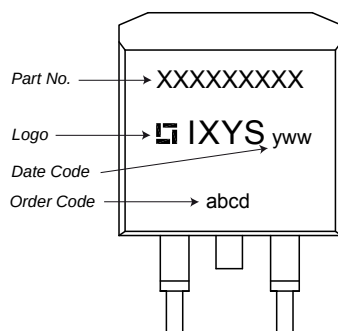
$$\tau_i = R_i \cdot C_i$$

	IGBT	Diode
R_1	tbd	tbd
R_2	tbd	tbd
R_3	tbd	tbd
R_4	tbd	tbd
τ_1	tbd	tbd
τ_2	tbd	tbd
τ_3	tbd	tbd
τ_4	tbd	tbd

Package TO-263 (D2Pak)

Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	Unit
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
Weight				2		g
F_c	Mounting force with clip		20		60	N

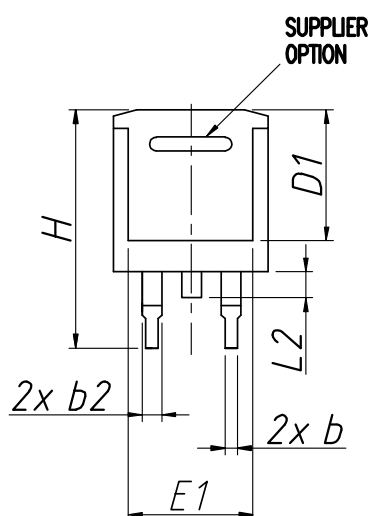
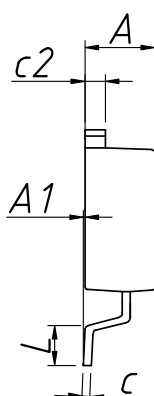
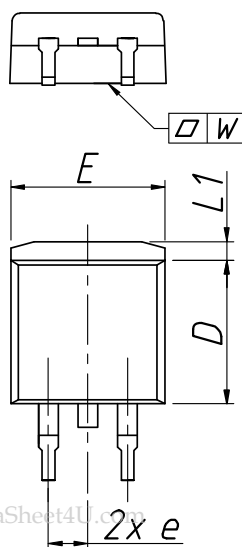
Product Marking



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			



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.

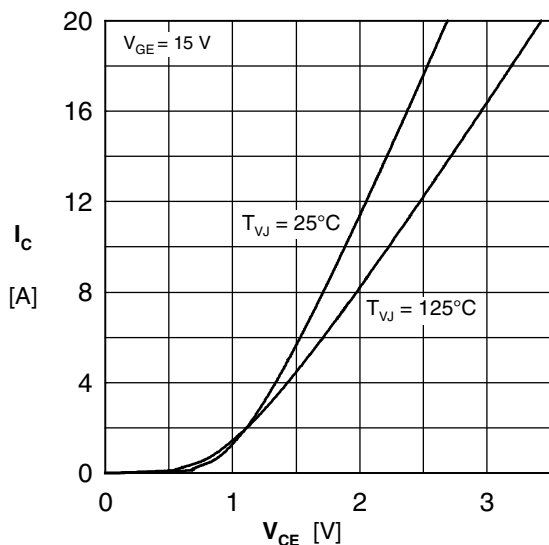


Fig. 1 Typ. output characteristics

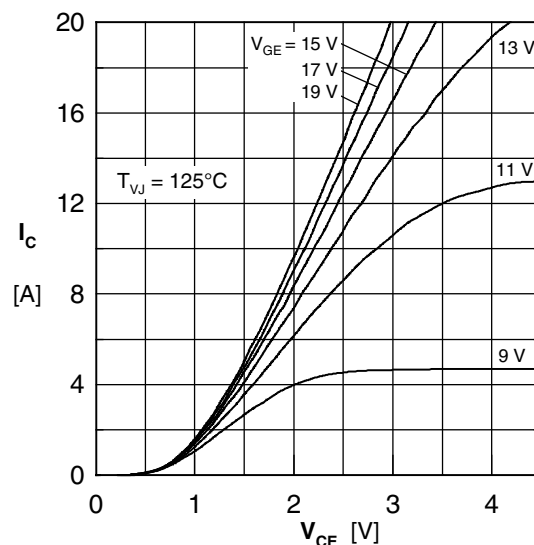


Fig. 2 Typ. output characteristics

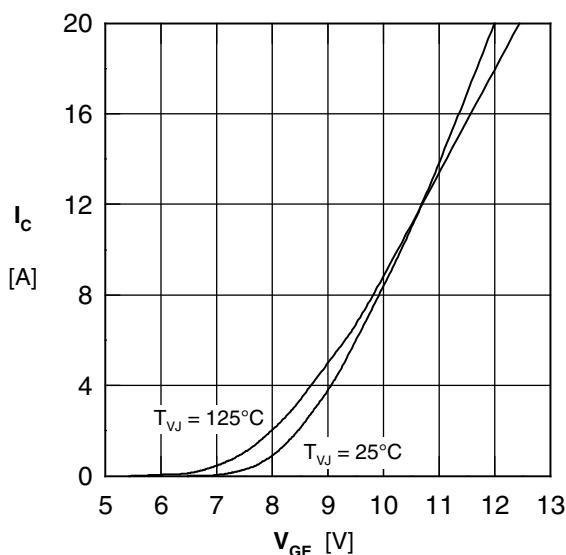


Fig. 3 Typ. transfer characteristics

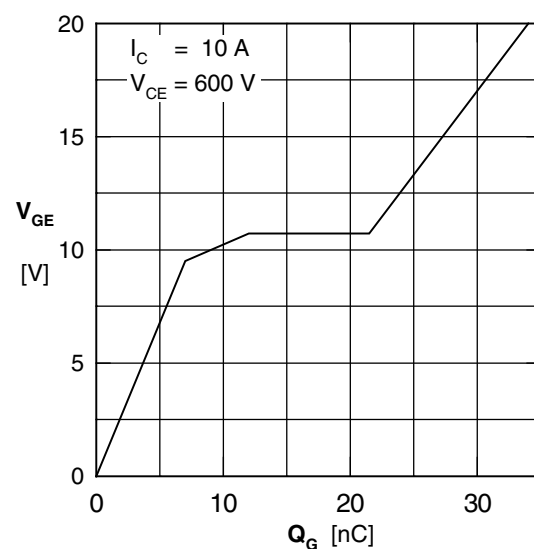


Fig. 4 Typ. turn-on gate charge

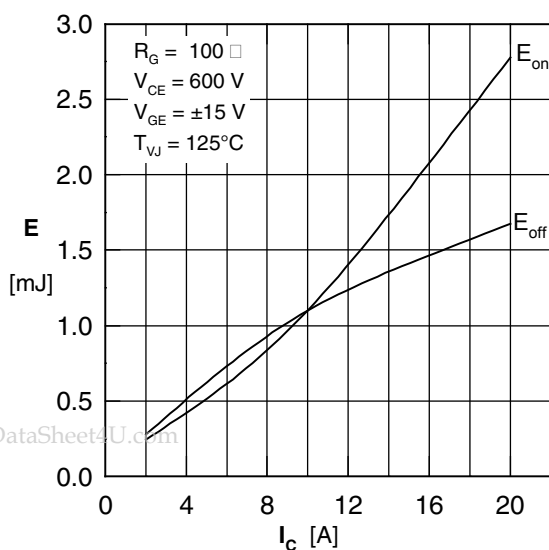


Fig. 5 Typ. switching energy vs. collector current

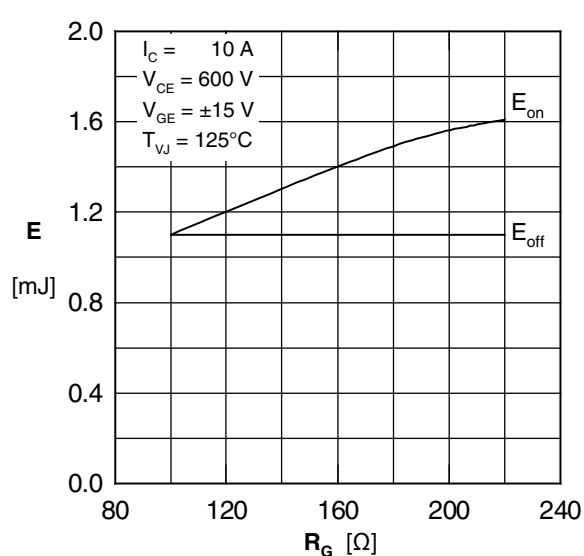


Fig. 6 Typ. switching energy vs. gate resistance

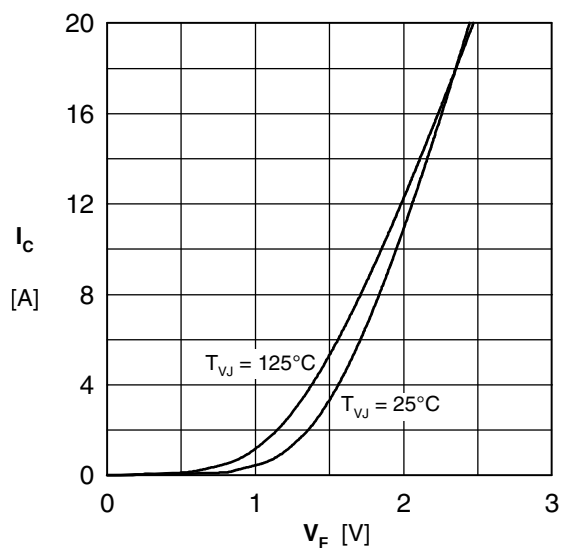


Fig. 7 Typ. forward characteristic