

XPT IGBT

preliminary

$$V_{CES} = 1200V$$

$$I_{C25} = 20A$$

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

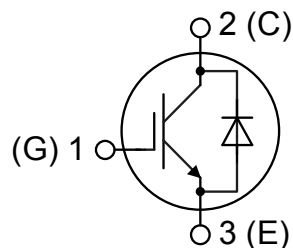
Copack

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 μ 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				± 20	V	
V_{GEM}	max. transient gate emitter voltage				± 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
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{V}; R_G = 100\Omega$					
I_{CM}		$V_{CEmax} = 1200\text{V}$			30	A	
SCSOA	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	μs	
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	
Diode							
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		μC	
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
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

 $T_{VJ} = 150\text{ °C}$

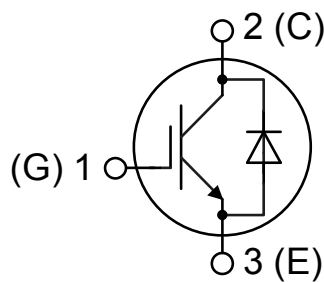

$V_{0\ max}$ threshold voltage
 $R_{0\ max}$ slope resistance *

	IGBT	Diode	
	1.1	1.25	V
	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

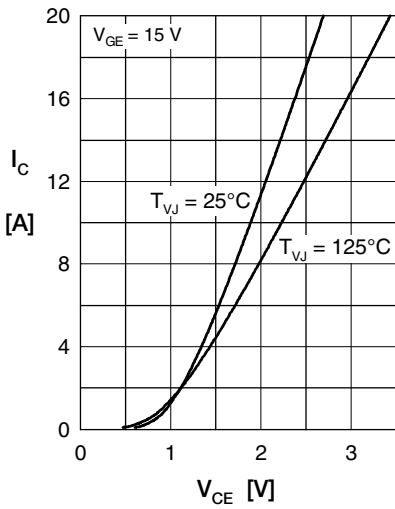


Fig. 1 Typ. output characteristics

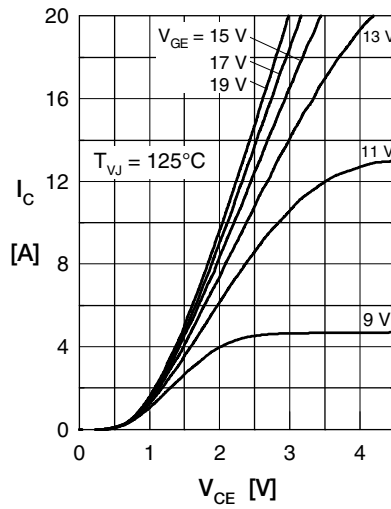


Fig. 2 Typ. output characteristics

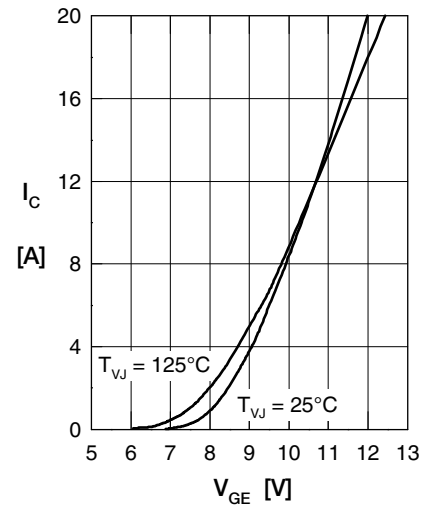


Fig. 3 Typ. transfer characteristics



Fig. 4 Typ. turn-on gate charge



Fig. 5 Typ. switching energy vs. collector current

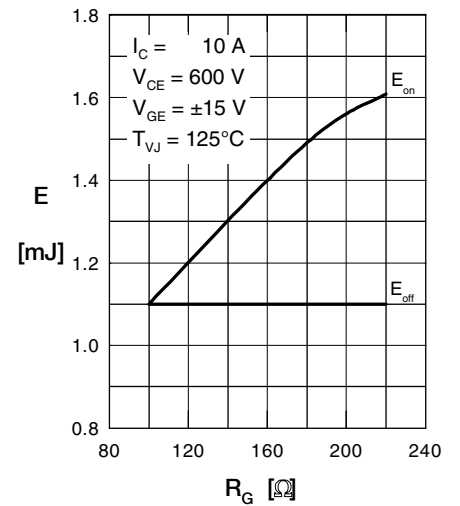


Fig. 6 Typ. switching energy vs. gate resistance

Fig. 7 Typ. transient thermal impedance junction to case

Diode

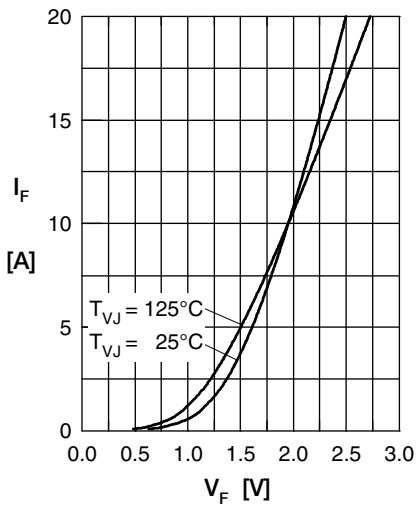


Fig. 1 Typ. forward current versus V_F

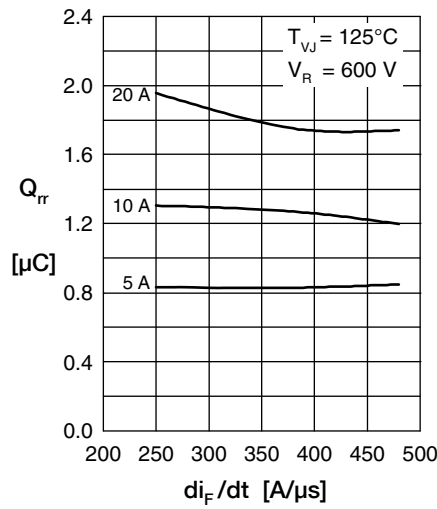


Fig. 2 Typical reverse recov. charge Q_{rr} versus di_F/dt

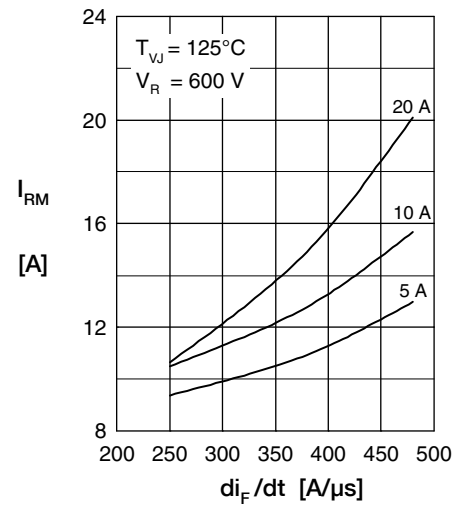


Fig. 3 Typ. peak reverse current I_{RM} versus di_F/dt

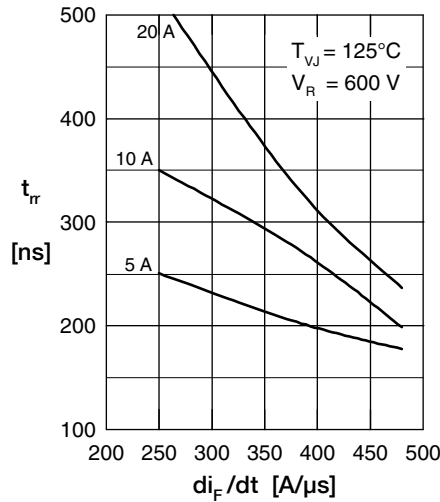


Fig. 4 Dynamic parameters Q_{rr} , I_{RM} versus T_{VJ}

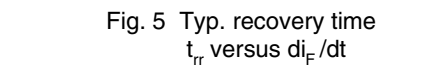


Fig. 5 Typ. recovery time t_{rr} versus di_F/dt

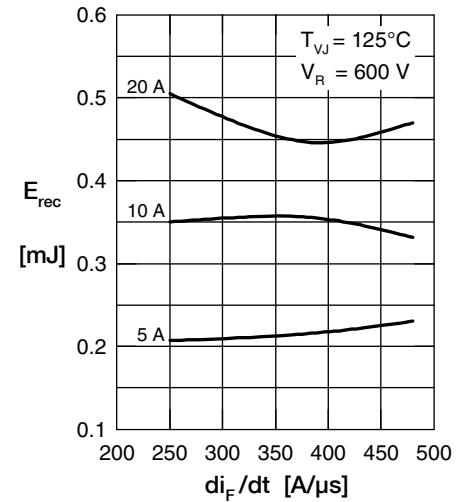


Fig. 6 Typ. recovery energy E_{rec} vs. di_F/dt

Fig. 7 Typ. transient thermal impedance junction to case



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