preliminary

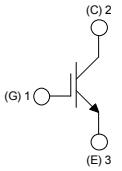
XPT IGBT

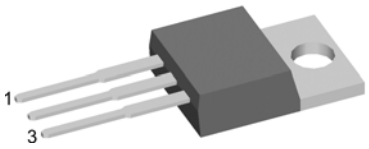
Single IGBT

I_{C25} = 33 A
V_{CES} = 1200 V
$V_{CE(sat)typ}$ = 1.8 V

Part number

IXA20I1200PB





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 µsec.
  - 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)

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

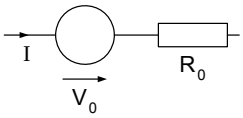
IGBT

				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
V_{CES}	*Collector emitter voltage*	V_{GE} = 0 V	T_{VJ} = 25°C			1200	V
V_{GES}	*Maximum DC gate voltage*		T_{VJ} = 25°C			±20	V
I_{C25}	*Collector current*		T_C = 25°C			33	A
I_{C90}			T_C = 90°C			22	A
P_{tot}	*Total power dissipation*		T_{VJ} = 25°C			130	W
I_{CES}	*Collector emitter leakage current*	$V_{CE} = V_{CES}$; V_{GE} = 0 V	T_{VJ} = 25°C			0.1	mA
			T_{VJ} = 125 °C		0.1		mA
I_{GES}	*Gate emitter leakage current*	V_{CE} = 0 V; V_{GE} = ±20 V				500	nA
$V_{CE(sat)}$	*Collector emitter saturation voltage*	I_C = 16 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.8	2.1	V
			T_{VJ} = 125 °C		2.1		V
$V_{GE(th)}$	*Gate emitter threshold voltage*	I_C = 0.6 mA; V_{GE} = V_{CE}		5.5	6	6.5	V
Q_{Gon}	*Total gate charge*	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 15 A			47		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 V; I_C = 15 A			100		ns
E_{on}	*Turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 56 Ω	T_{VJ} = 125 °C		1.55		mJ
E_{off}	*Turn-off energy per pulse*				1.7		mJ
RBSOA	*Reverse bias safe operation area*	V_{GE} = 15 V; R_G = 56 Ω V_{CEK} = 1200 V	T_{VJ} = 125°C			45	A
SCSOA	*Short circuit safe operation area*						
t_{SC}	*Short circuit duration*	V_{CE} = 900 V; V_{GE} = ±15 V	T_{VJ} = 125°C			10	µs
I_{SC}	*Short circuit current*	R_G = 56 Ω; non-repetitive				60	A
R_{thJC}	*Thermal resistance juntion to case*					0.95	K/W

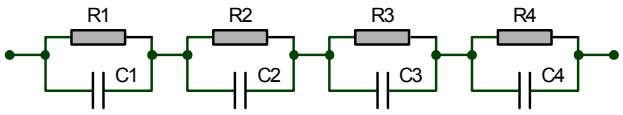
Diode

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
I_{F25}	*Forward current*	T_C = 25°C				n/a	A
I_{F90}		T_C = 90°C				n/a	A
V_F	*Forward voltage*	I_F = A	T_{VJ} = 25°C			n/a	V
			T_{VJ} = 125 °C		n/a		V
Q_{rr}	*Reverse recovery charge*	V_R = 600V;			n/a		µC
I_{RM}	*Maximum reverse recovery current*	di_F/dt = - A/µs;	T_{VJ} = 125 °C		n/a		A
t_{rr}	*Reverse recovery time*	I_F = A			n/a		ns
$E_{rec(off)}$	*Reverse recovery losses at turn-off*				n/a		mJ
R_{thJC}	*Thermal resistance juntion to case*					n/a	K/W

Equivalent Circuits for Simmulation



Symbol	Definition	Conditions	Ratings min.	typ.	max.	Unit
V_0	*IGBT*	T_{VJ} = 150 °C			1.1	V
R_0					86	mΩ
V_0	*Diode*	T_{VJ} = 150 °C			n/a	V
R_0					n/a	mΩ



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

$$\tau_i = R_i \cdot C_i$$

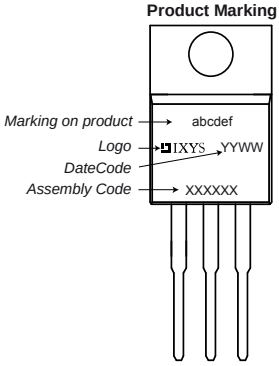
	IGBT	Diode
R_1	tbd	n/a
R_2	tbd	n/a
R_3	tbd	n/a
R_4	tbd	n/a
τ_1	tbd	n/a
τ_2	tbd	n/a
τ_3	tbd	n/a
τ_4	tbd	n/a

preliminary

Package TO-220

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*			0.50		K/W
Weight				2		g
M_D	*Mounting torque*		0.4		0.6	Nm
F_C	*Mounting force with clip*		20		60	N

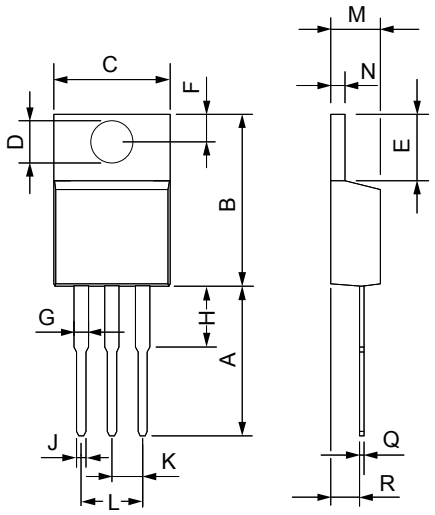
Product Marking



Part number

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

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	IXA 20 I 1200 PB	IXA20I1200PB			



Dim.	Millimeter Min.	Max.	Inches 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

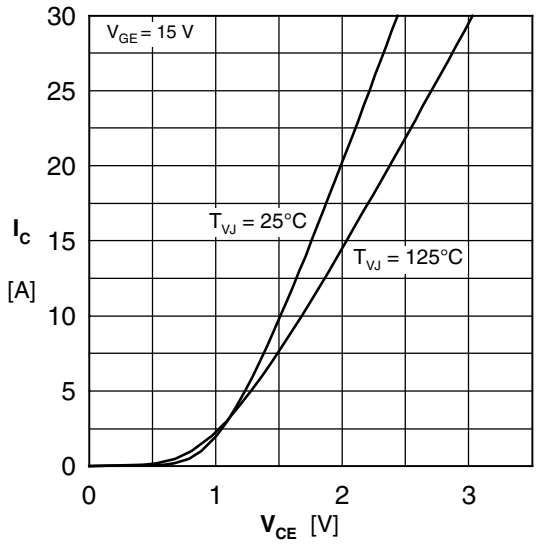


Fig. 1 Typ. output characteristics

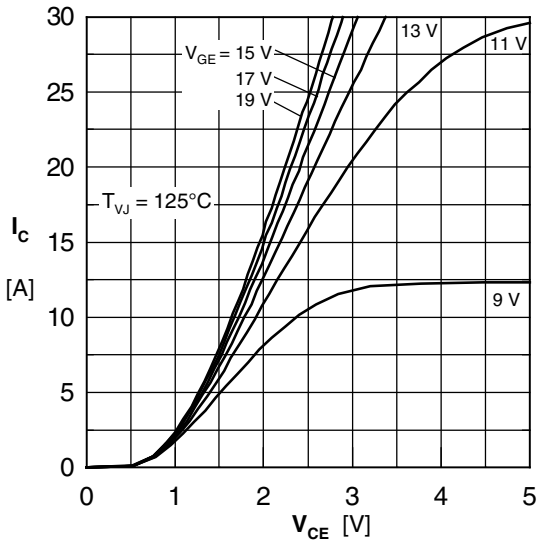


Fig. 2 Typ. output characteristics

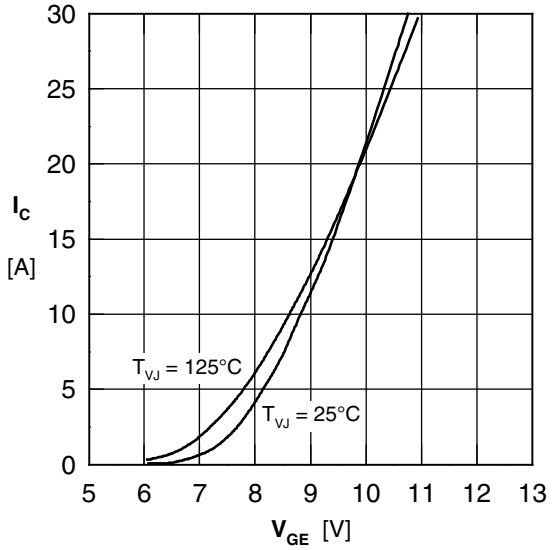


Fig. 3 Typ. tranfer characteristics

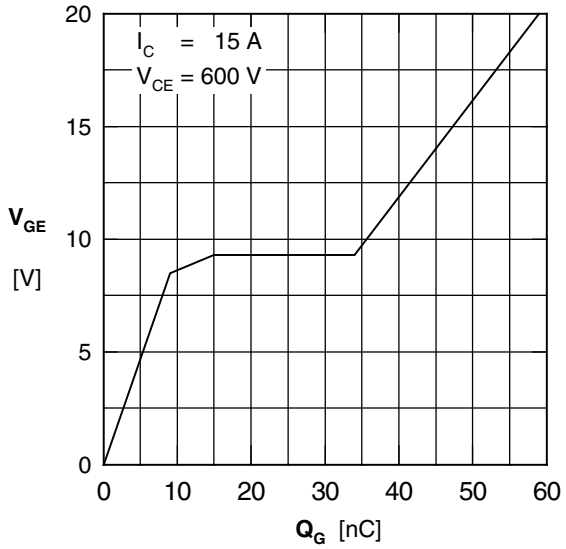


Fig. 4 Typ. turn-on gate charge

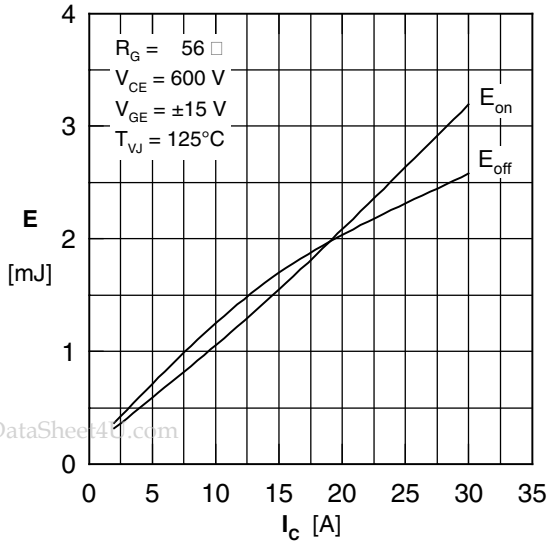


Fig. 5 Typ. switching energy vs. collector current

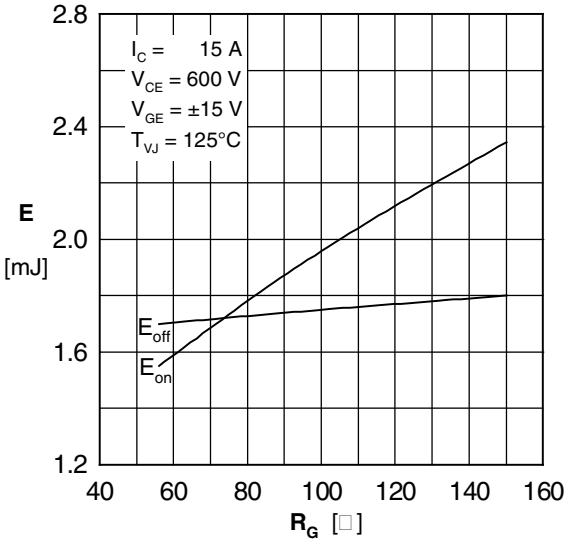


Fig. 6 Typ. switching energy vs. gate resistance