

XPT IGBT

Copack

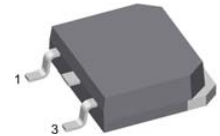
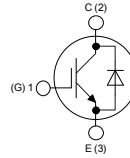
$$I_{C25} = 20 \text{ A}$$

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

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

Part number

IXA12IF1200TC



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-268AA (D3Pak)
- Industry standard outline
- Epoxy meets UL 94V-0
- RoHS compliant

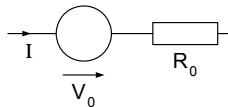
IGBT

Ratings

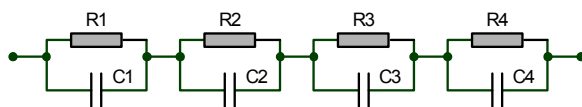
Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
V_{CES}	Collector emitter voltage	$V_{GE} = 0 \text{ V}$			1200	V
V_{GES}	Maximum DC gate voltage				± 20	V
I_{C25}	Collector current				20	A
I_{C100}					13	A
P_{tot}	Total power dissipation				85	W
I_{CES}	Collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}$			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
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			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		μC
I_{RM}	Maximum reverse recovery current				$di_F/dt = -250\text{ A}/\mu\text{s}$	$T_{VJ} = 125^\circ\text{C}$	10.5
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		Ratings			Unit
			min.	typ.	max.	
V_0	IGBT	$T_{VJ} = 150^\circ\text{C}$			1.1	V
R_0					153	$\text{m}\Omega$
V_0	Diode	$T_{VJ} = 150^\circ\text{C}$			1.25	V
R_0					85	$\text{m}\Omega$



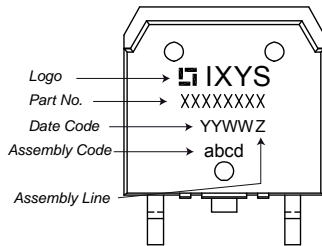
$$Z_{th}(t) = \sum_{i=1}^n \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

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

Package TO-268AA (D3Pak)

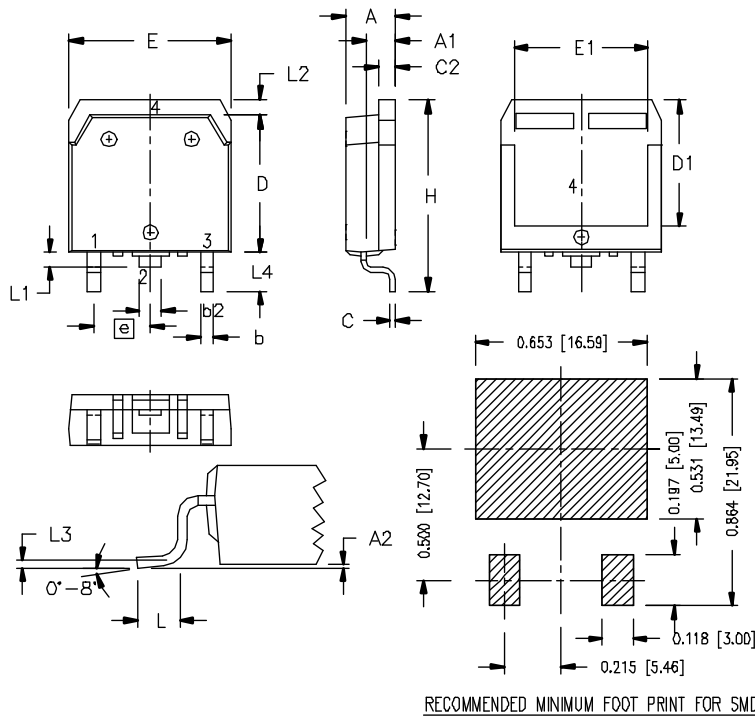
Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
T_{vj}	Virtual junction temperature		-55		150	°C
T_{stg}	Storage temperature		-55		150	°C
R_{thCH}	Thermal resistance case to heatsink			0.15		K/W
Weight				5		g
F_c	Mounting force with clip		20		120	N

Product Marking

Part number

I = IGBT
 X = XPT IGBT
 A = Gen 1 / std
 12 = Current Rating [A]
 IF = Copack
 1200 = Reverse Voltage [V]
 TC = TO-268AA (D3Pak) (2)

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	IXA 12 IF 1200 TC	IXA12IF1200TC			

Similar Part	Package	Voltage class
IXA12IF1200HB	TO-247AD (3)	1200
IXA12IF1200PB	TO-220AB (3)	1200
IXA12IF1200PC	TO-263AB (D2Pak)	1200



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

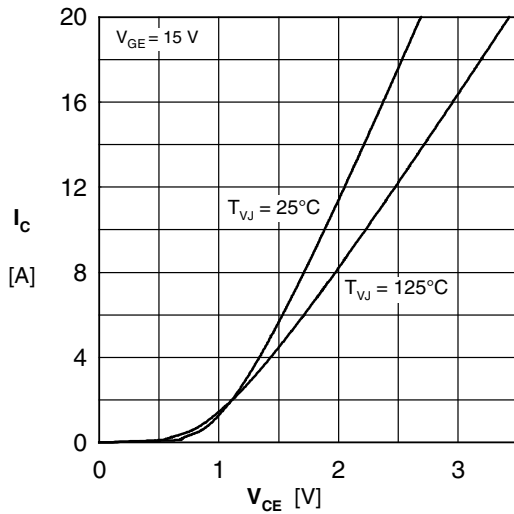


Fig. 1 Typ. output characteristics

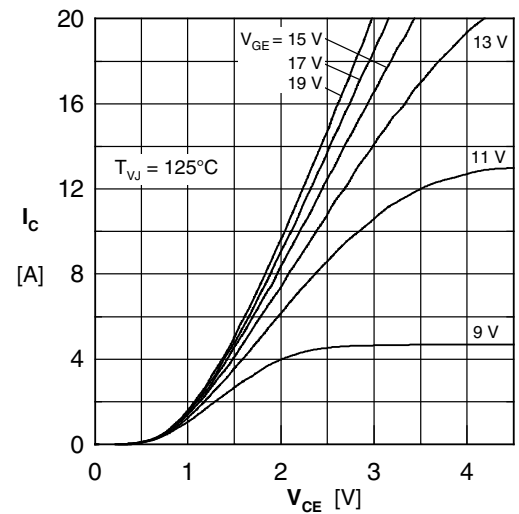


Fig. 2 Typ. output characteristics

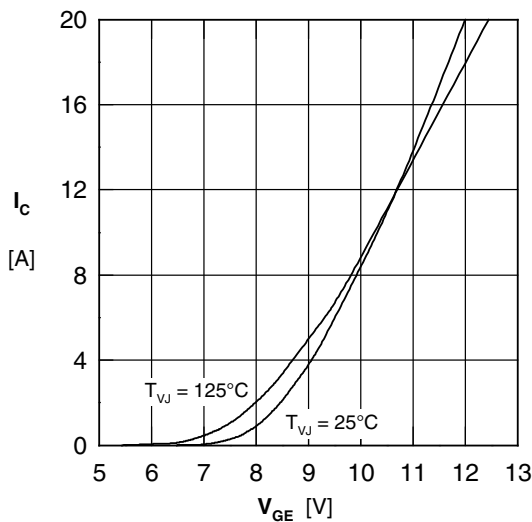


Fig. 3 Typ. transfer characteristics

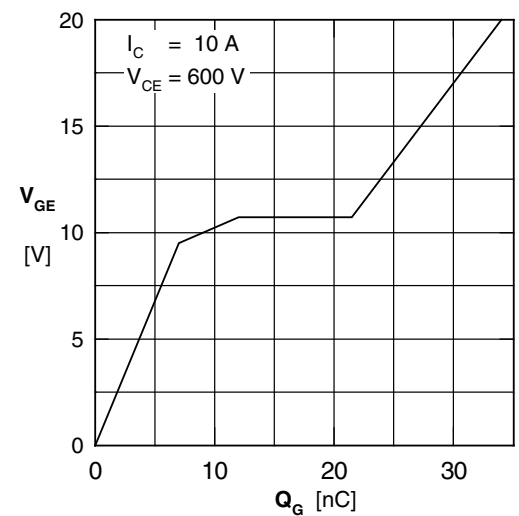


Fig. 4 Typ. turn-on gate charge

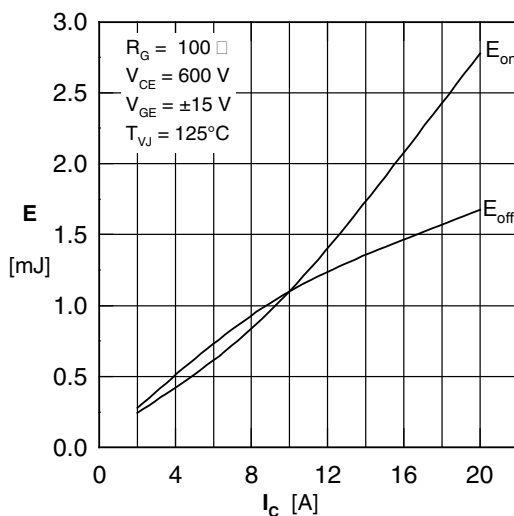


Fig. 5 Typ. switching energy vs. collector current

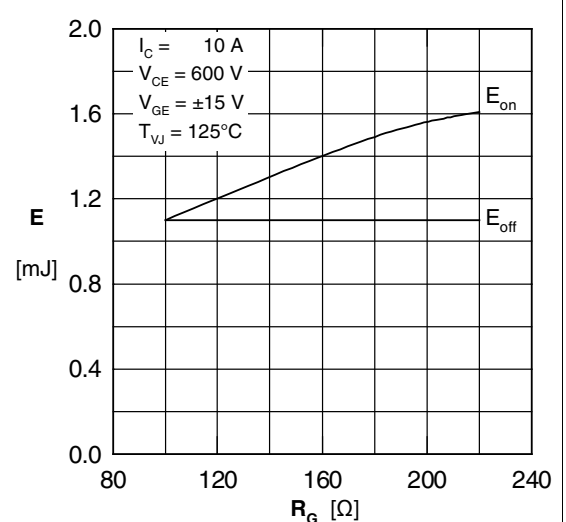


Fig. 6 Typ. switching energy vs. gate resistance

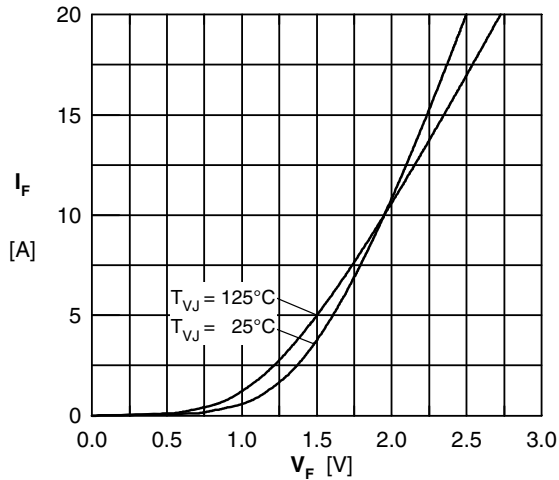


Fig. 7 Typ. forward characteristics

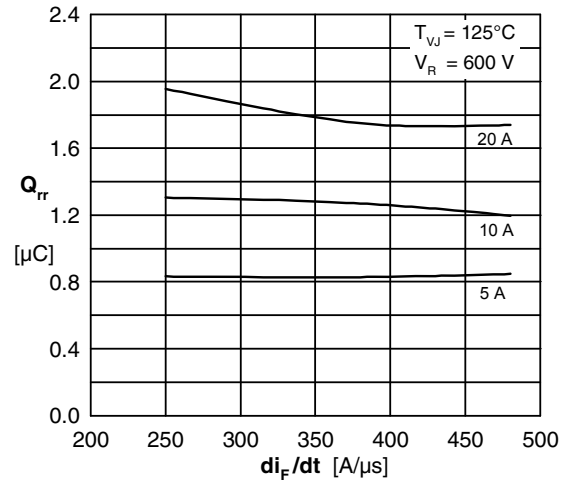


Fig. 8 Typical reverse recovery charge Q_{rr} versus di_F/dt (125°C)

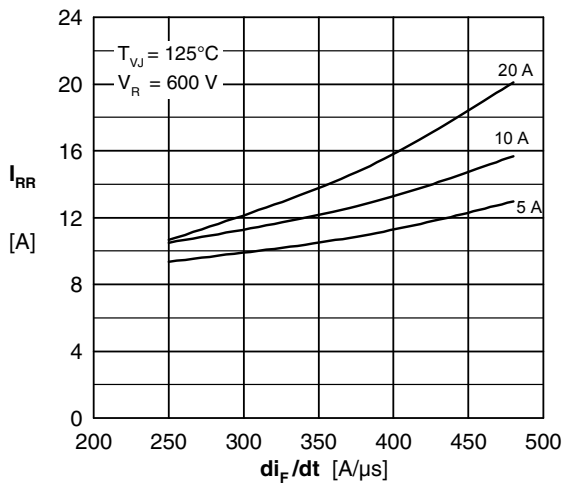


Fig. 9 Typical peak reverse current I_{RR} versus di_F/dt (125°C)

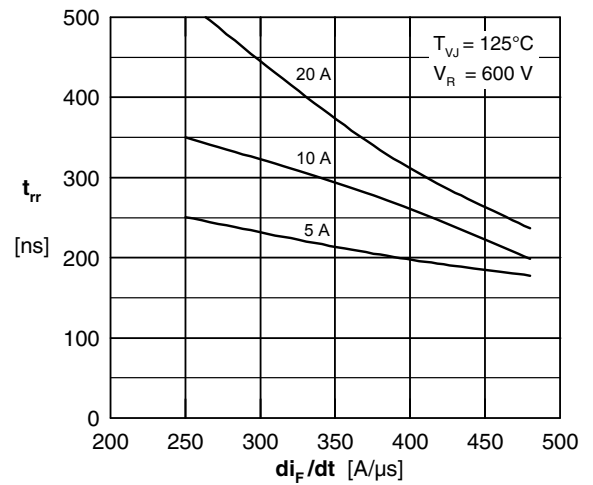


Fig. 10 Typ. recovery time t_{rr} vs. di/dt (125°C)

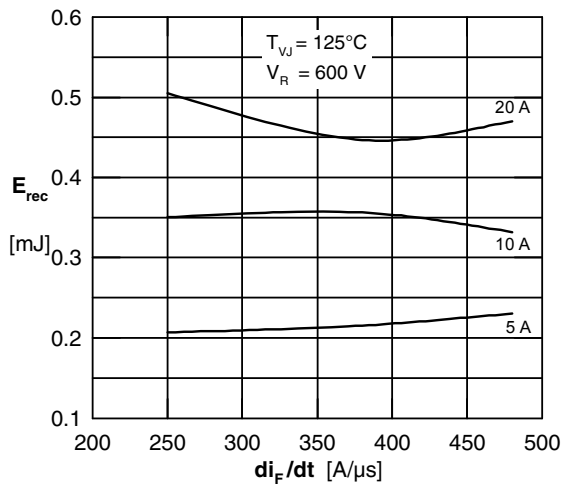


Fig. 11 Typ. recovery energy E_{rec} vs. di_F/dt (125°C)