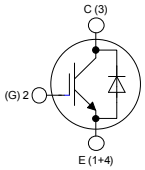
XPT IGBT

Copack

I_{C25} = 88 A
V_{CES} = 1200 V
$V_{CE(sat)typ}$ = 1.8 V

Part number

IXA60IF1200NA



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)
- 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: E72873

- Housing: SOT-227B (minibloc)
- Industry standard outline
- Cu base plate internal DCB isolated
- Isolation Voltage 3000 V
- Epoxy meets UL 94V-0
- RoHS compliant

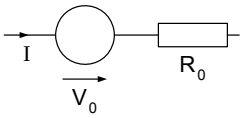
IGBT

				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			88	A
I_{C90}			T_C = 90°C			56	A
P_{tot}	*Total power dissipation*		T_{VJ} = 25°C			290	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 = 55 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 = 2 mA; V_{GE} = V_{CE}		5.4	6	6.5	V
Q_{Gon}	*Total gate charge*	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 50 A			190		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 = 50 A			100		ns
E_{on}	*Turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 15 Ω	T_{VJ} = 125 °C		4.5		mJ
E_{off}	*Turn-off energy per pulse*				5.5		mJ
RBSOA	*Reverse bias safe operation area*	V_{GE} = 15 V; R_G = 15 Ω V_{CEK} = 1200 V	T_{VJ} = 125°C			150	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 = 15 Ω; non-repetitive				200	A
R_{thJC}	*Thermal resistance juntion to case*					0.43	K/W

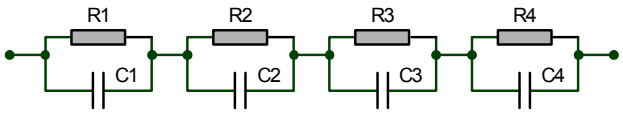
Diode

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
I_{F25}	*Forward current*	T_C = 25°C				85	A
I_{F90}		T_C = 90°C				51	A
V_F	*Forward voltage*	I_F = 60 A	T_{VJ} = 25°C		1.95	2.2	V
			T_{VJ} = 125 °C		1.95		V
Q_{rr}	*Reverse recovery charge*	V_R = 600 V			8		µC
I_{RM}	*Maximum reverse recovery current*	di_F/dt = -1200 A/µs;	T_{VJ} = 125 °C		60		A
t_{rr}	*Reverse recovery time*	I_F = 60 A			350		ns
$E_{rec(off)}$	*Reverse recovery losses at turn-off*				2.5		mJ
R_{thJC}	*Thermal resistance juntion to case*					0.6	K/W

Equivalent Circuits for Simulation



Symbol	Definition	Conditions	Ratings min.	typ.	max.	Unit
V_0	*IGBT*	T_{VJ} = 150 °C			1.1	V
R_0					28	mΩ
V_0	*Diode*	T_{VJ} = 150 °C			1.25	V
R_0					14.2	mΩ



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

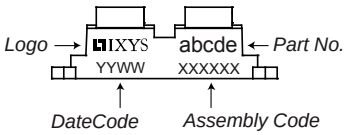
$$\tau_i = R_i \cdot C_i$$

	IGBT	Diode
R_1	0.1	0.137
R_2	0.05	0.1
R_3	0.21	0.233
R_4	0.07	0.13
τ_1	0.0025	0.0025
τ_2	0.03	0.03
τ_3	0.03	0.03
τ_4	0.08	0.08

Package SOT-227B (minibloc)

Symbol	Definition	Conditions	Ratings min.	typ.	max.	Unit
T_{VJ}	*Virtual junction temperature*		-55		150	°C
T_{stg}	*Storage temperature*		-40		150	°C
R_{thCH}	*Thermal resistance case to heatsink*			0.10		K/W
Weight				30		g
M_D	*Mounting torque*		1.1		1.5	Nm
M_T	*Terminal torque*		1.1		1.5	Nm
V_{ISOL}	*Isolation voltage*	t = 1 second	3000			V
		t = 1 minute	2500			V
d_S	*Creapage distance on surface*		8			mm
d_A	*Striking distance through air*		4			mm

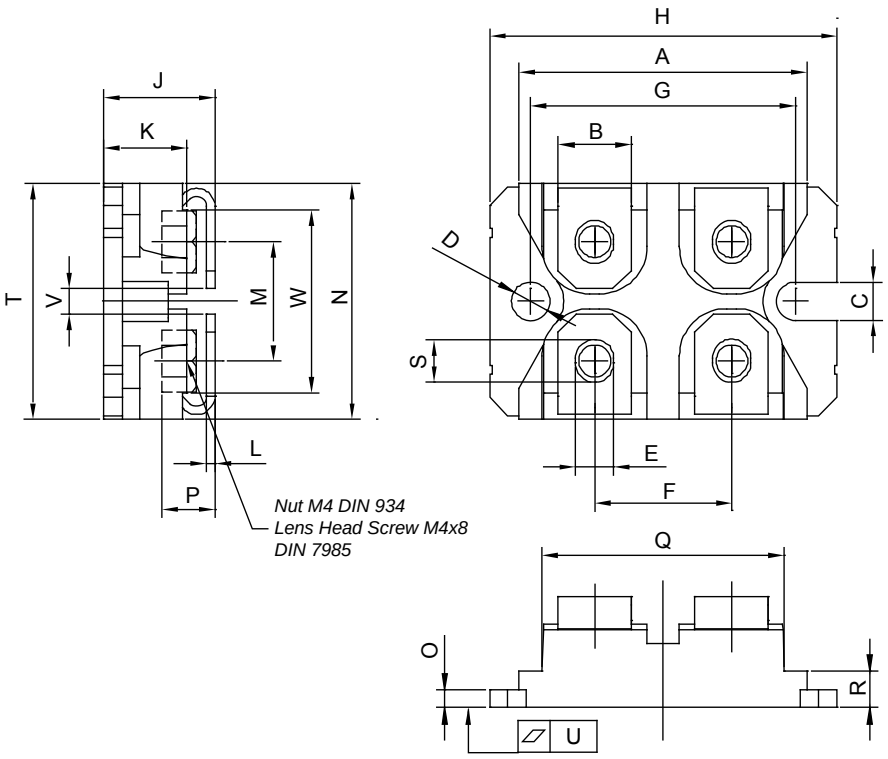
Product Marking



Part number

I = IGBT
X = XPT IGBT
A = Gen 1 / std
60 = Current Rating [A]
IF = Copack
1200 = Reverse Voltage [V]
NA = SOT-227B (minibloc)

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	IXA 60 IF 1200 NA	IXA60IF1200NA	Tube	10	508765



SYM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	31.50	31.88	1.240	1.255
B	7.80	8.20	.307	.323
C	4.09	4.29	.161	.169
D	4.09	4.29	.161	.169
E	4.09	4.29	.161	.169
F	14.91	15.11	.587	.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.489	1.505
J	11.68	12.22	.460	.481
K	8.92	9.60	.351	.378
L	0.76	0.84	.030	.033
M	12.60	12.85	.496	.506
N	25.15	25.42	.990	1.001
O	1.98	2.13	.078	.084
P	4.95	5.97	.195	.235
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	.155	.174
S	4.72	4.85	.186	.191
T	24.59	25.07	.968	.987
U	-.05	.10	-.002	.004
V	3.30	4.57	.130	.180
W	19.81	21.08	.780	.830

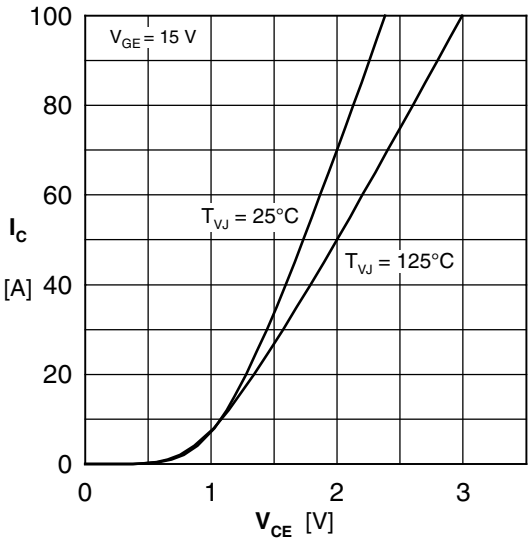


Fig. 1 Typ. output characteristics

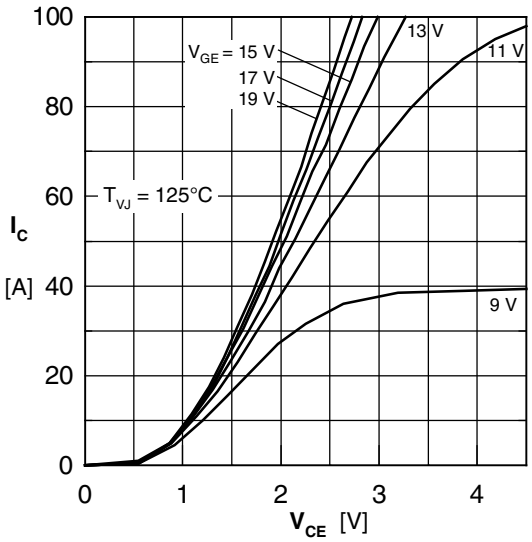


Fig. 2 Typ. output characteristics

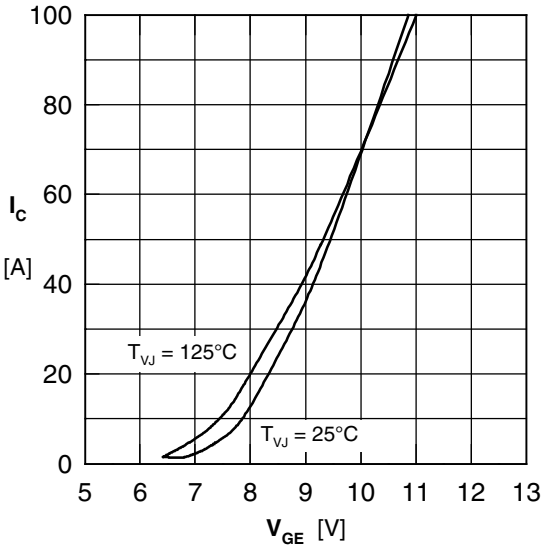


Fig. 3 Typ. tranfer characteristics

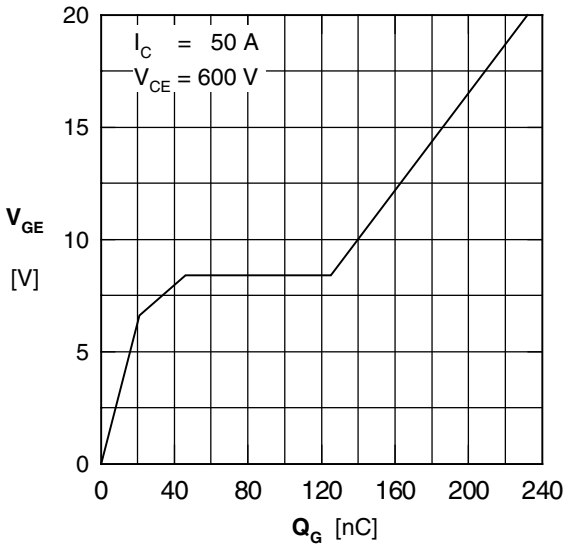


Fig. 4 Typ. turn-on gate charge

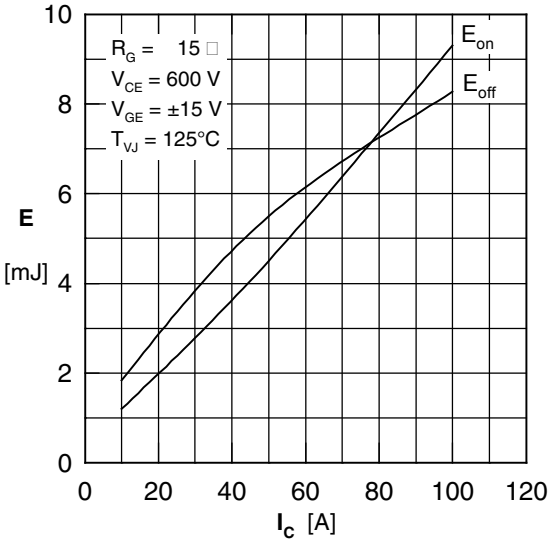


Fig. 5 Typ. switching energy vs. collector current

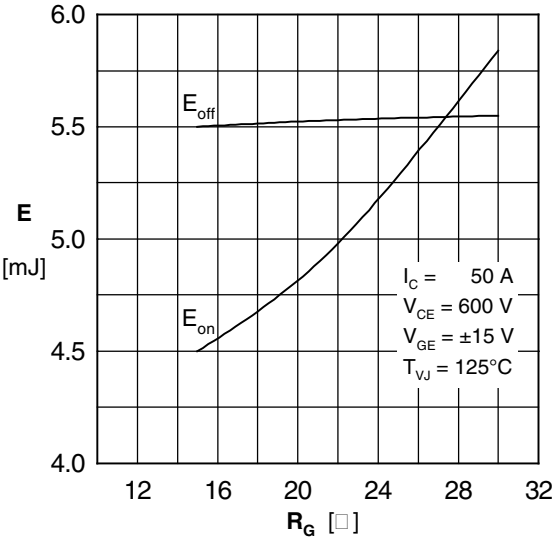


Fig. 6 Typ. switching energy vs. gate resistance

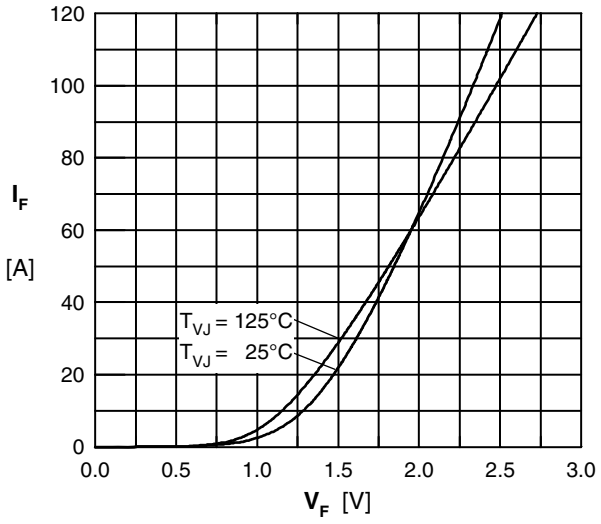


Fig. 7 Typ. Forward current versus V_F

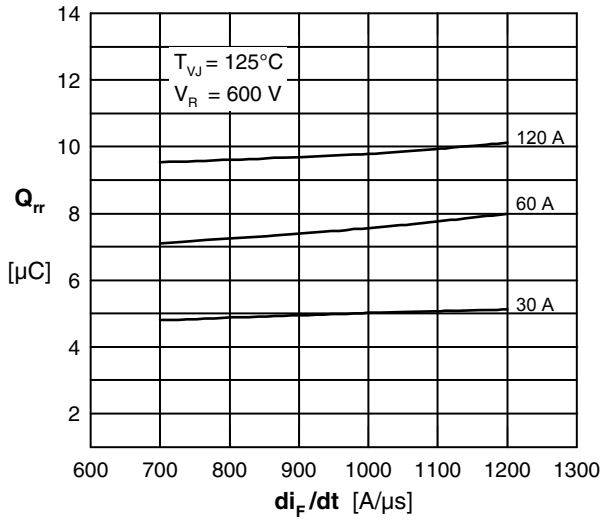


Fig. 8 Typ. reverse recov.charge Q_{rr} vs. di/dt

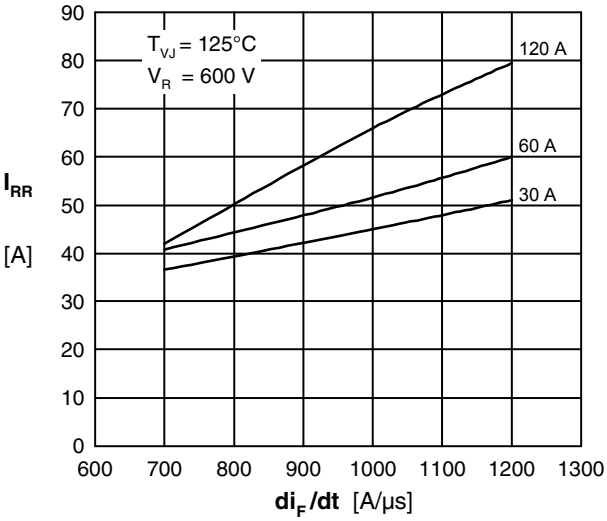


Fig. 9 Typ. peak reverse current I_{RM} vs. di/dt

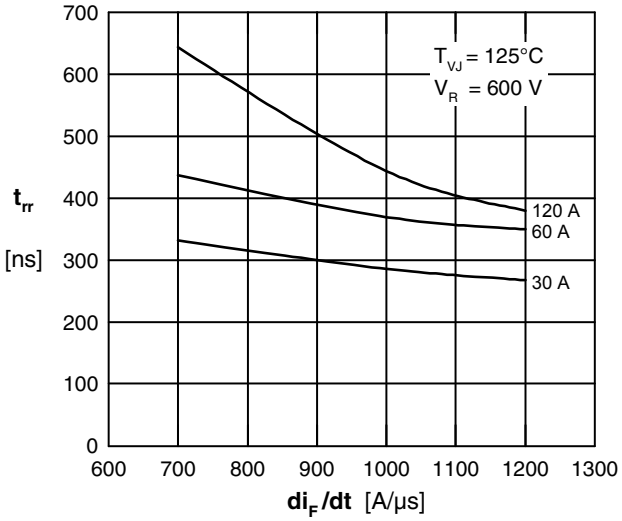


Fig. 10 Typ. recovery time t_{rr} versus di/dt

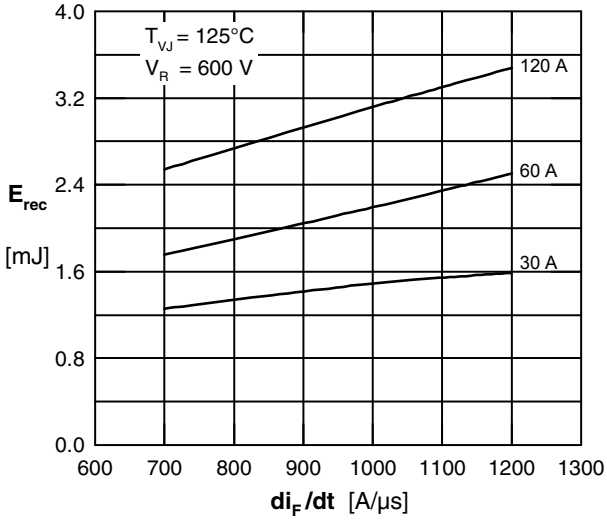


Fig. 11 Typ. recovery energy E_{rec} versus di/dt

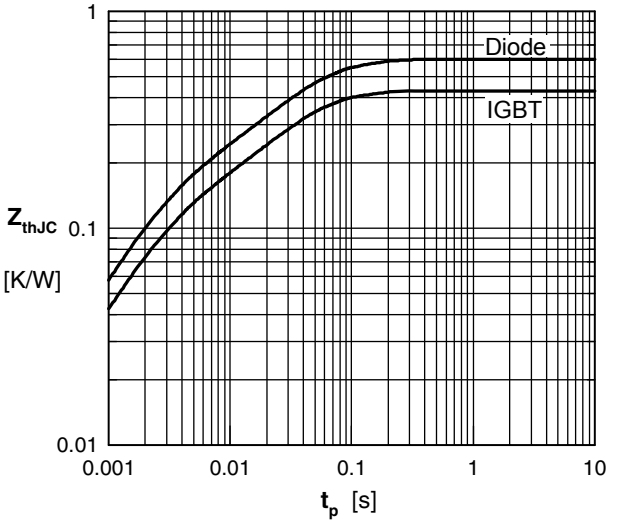


Fig. 12 Typ. transient thermal impedance