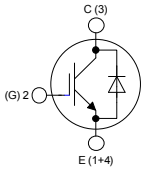
XPT IGBT

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

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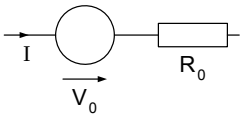
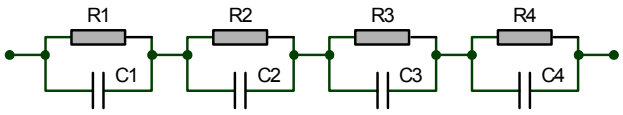
Diode

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

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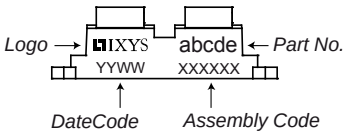
Package SOT-227B (minibloc)

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

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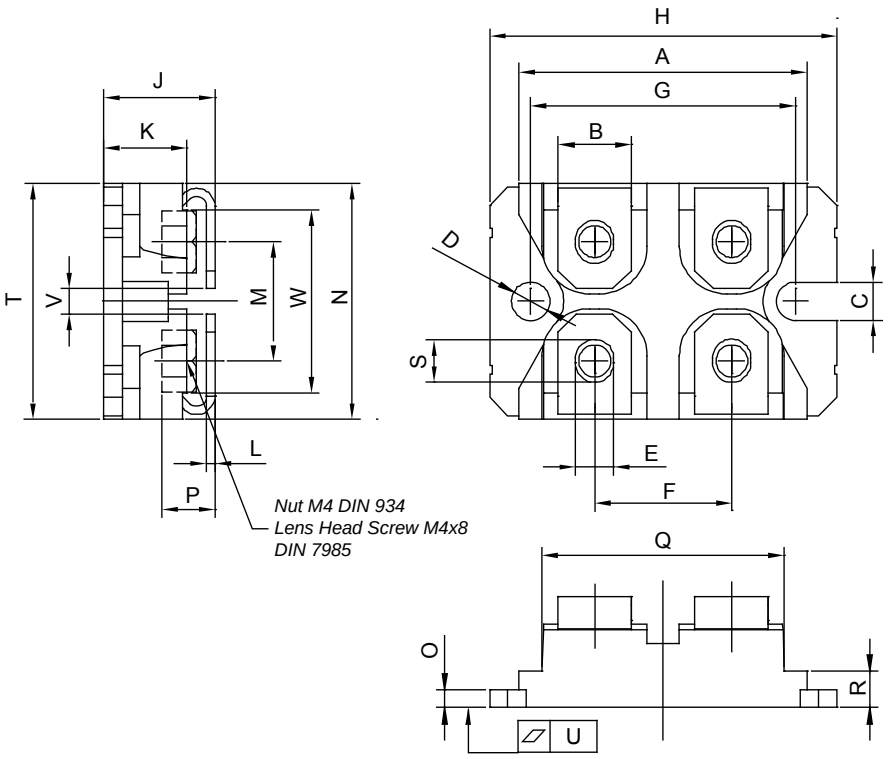

SYM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	31.50	31.88	1.240	1.255
B	7.80	8.20	.307	.323
C	4.09	4.29	.161	.169
D	4.09	4.29	.161	.169
E	4.09	4.29	.161	.169
F	14.91	15.11	.587	.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.489	1.505
J	11.68	12.22	.460	.481
K	8.92	9.60	.351	.378
L	0.76	0.84	.030	.033
M	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

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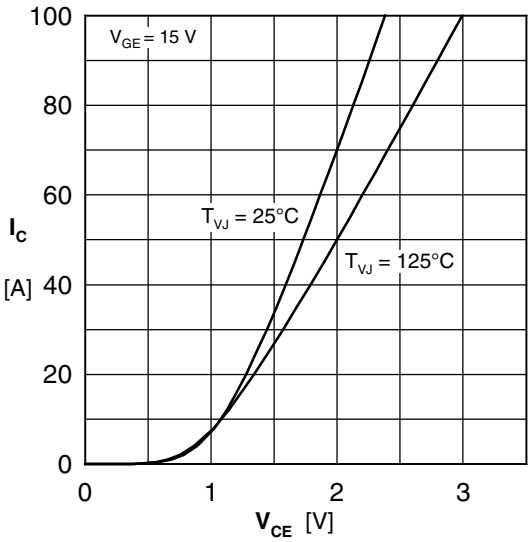

Fig. 1 Typ. output characteristics

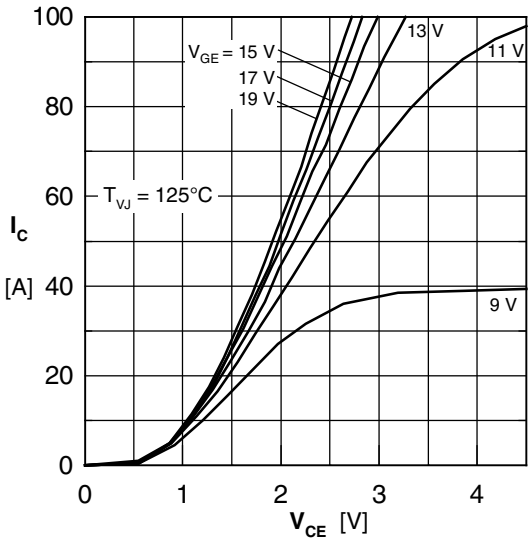

Fig. 2 Typ. output characteristics

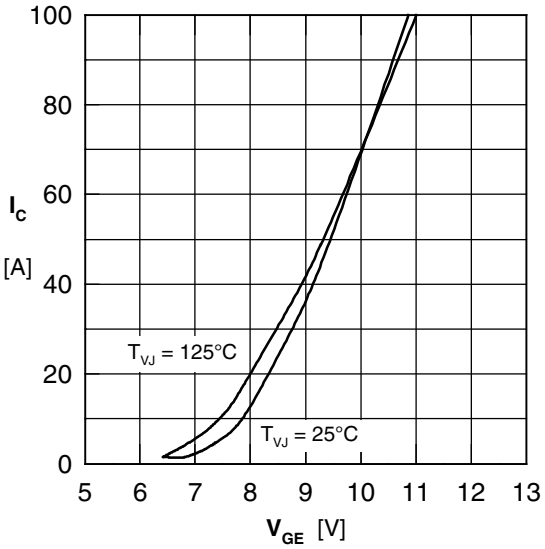

Fig. 3 Typ. tranfer characteristics

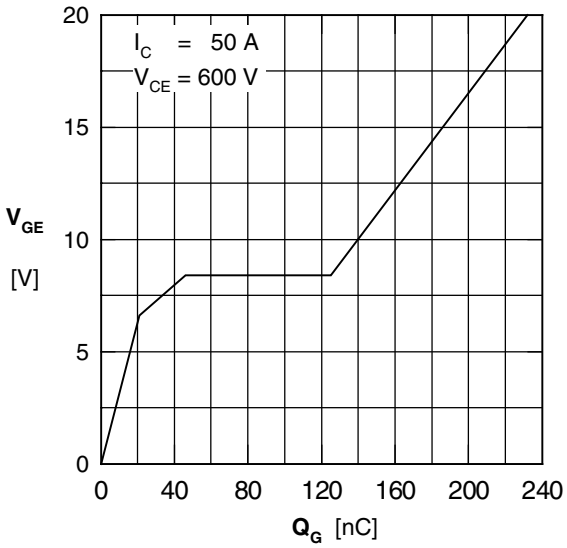

Fig. 4 Typ. turn-on gate charge

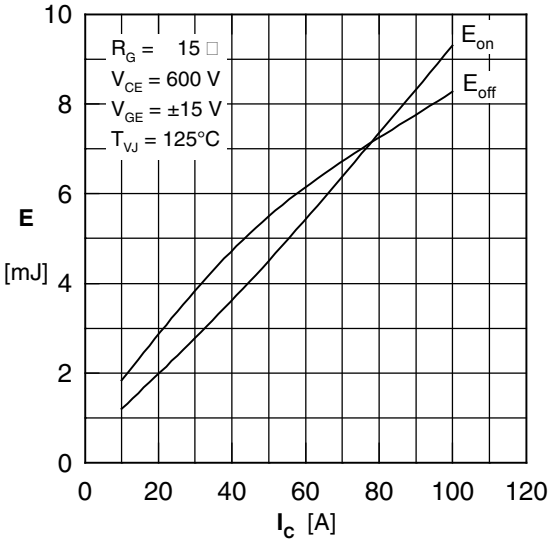

Fig. 5 Typ. switching energy vs. collector current

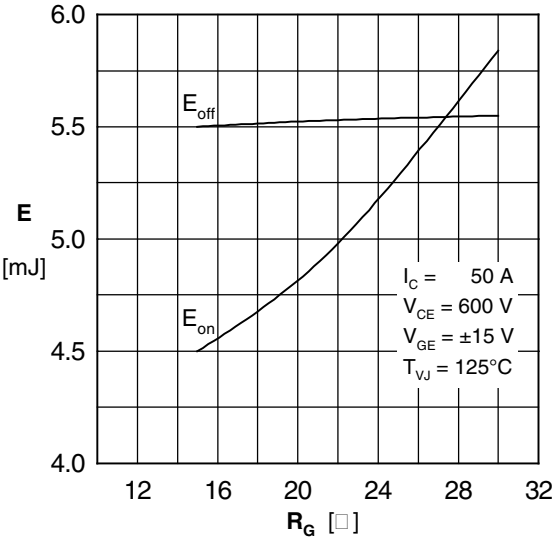

Fig. 6 Typ. switching energy vs. gate resistance

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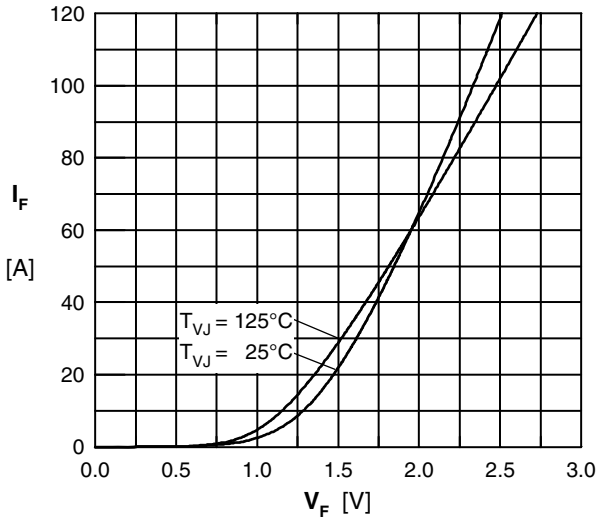

Fig. 7 Typ. Forward current versus V_F

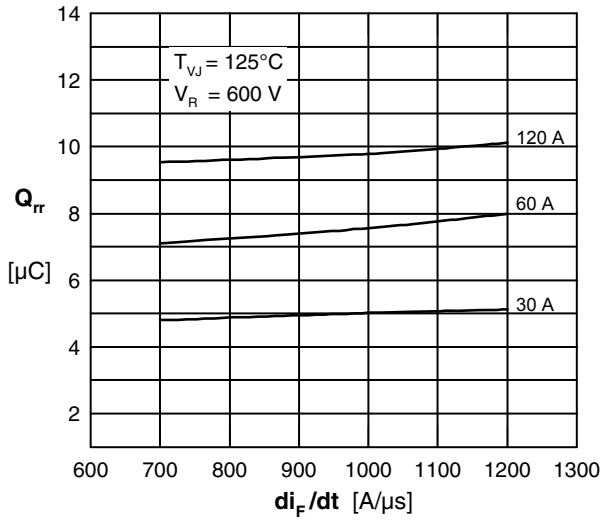

Fig. 8 Typ. reverse recov.charge Q_{rr} vs. di/dt

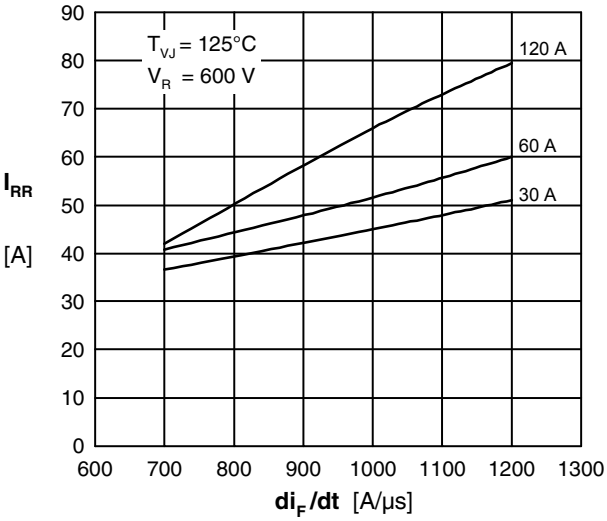

Fig. 9 Typ. peak reverse current I_{RM} vs. di/dt

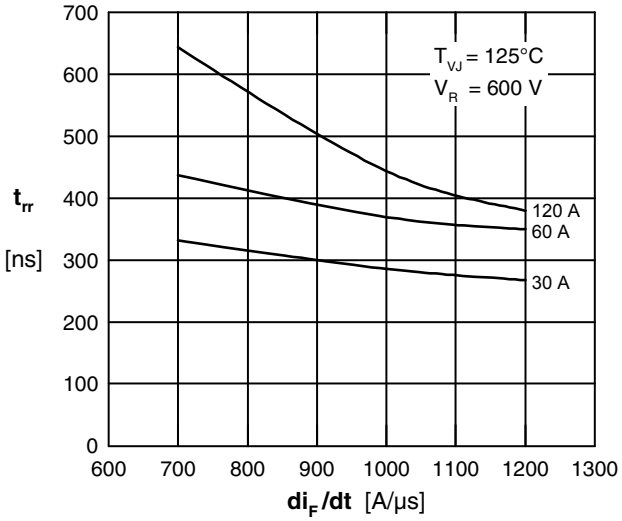

Fig. 10 Typ. recovery time t_{rr} versus di/dt

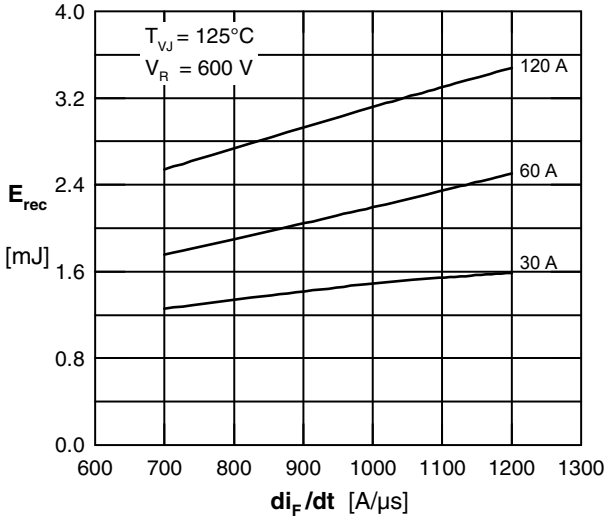

Fig. 11 Typ. recovery energy E_{rec} versus di/dt

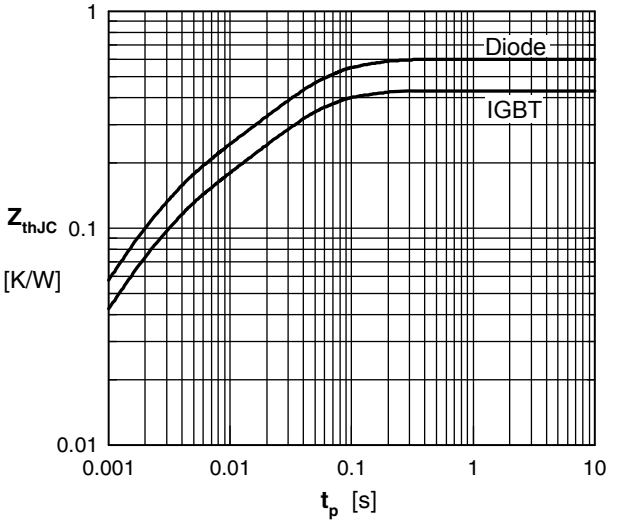

Fig. 12 Typ. transient thermal impedance

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