

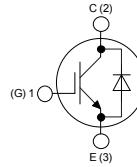
XPT IGBT

Copack

$I_{C25} = 84 \text{ A}$
 $V_{CES} = 1200 \text{ V}$
 $V_{CE(sat)typ} = 1.8 \text{ V}$

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

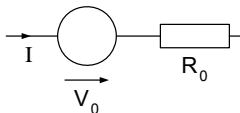
IGBT

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				84	A
I_{C90}					54	A
P_{tot}	Total power dissipation				290	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	$I_C = 55 \text{ A}; V_{GE} = 15 \text{ V}$		1.8	2.1	V
				2.1		V
$V_{GE(th)}$	Gate emitter threshold voltage	$I_C = 2 \text{ mA}; V_{GE} = V_{CE}$	5.5	6	6.5	V
Q_{Gon}	Total gate charge	$V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 50 \text{ A}$		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	$V_{CE} = 600 \text{ V}; I_C = 50 \text{ A}$		100		ns
E_{on}	Turn-on energy per pulse	$V_{GE} = \pm 15 \text{ V}; R_G = 15 \Omega$	$T_{VJ} = 125^\circ\text{C}$	4.5		mJ
E_{off}	Turn-off energy per pulse			5.5		mJ
RBSOA	Reverse bias safe operation area	$V_{GE} = 15 \text{ V}; R_G = 15 \Omega$ $V_{CEK} = 1200 \text{ V}$	$T_{VJ} = 125^\circ\text{C}$		150	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	μs
I_{sc}	Short circuit current	$R_G = 15 \Omega$; non-repetitive			200	A
R_{thJC}	Thermal resistance junction to case				0.43	K/W

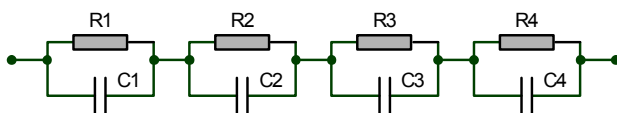
Diode

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
I_{F25}	Forward current	$T_C = 25^\circ\text{C}$			88	A
I_{F90}		$T_C = 90^\circ\text{C}$			53	A
V_F	Forward voltage	$I_F = 60\text{ A}$	$T_{VJ} = 25^\circ\text{C}$	1.95	1.95	V
			$T_{VJ} = 125^\circ\text{C}$	1.85		V
Q_{rr}	Reverse recovery charge	$V_R = 600\text{V};$ $di_F/dt = -\quad\quad\quad\text{A}/\mu\text{s};$ $I_F = 60\text{ A}$		tbd		μC
I_{RM}	Maximum reverse recovery current			tbd		A
t_{rr}	Reverse recovery time			tbd		ns
$E_{rec(off)}$	Reverse recovery losses at turn-off			tbd		mJ
R_{thJC}	Thermal resistance junction to case				0.6	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					28	m Ω
V_0	Diode	$T_{VJ} = 150^\circ\text{C}$			1.2	V
R_0					13	m Ω



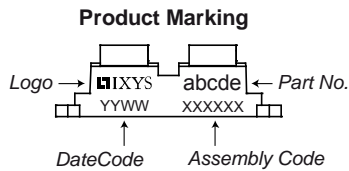
$$Z_{th}(t) = \sum_{i=1}^n \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

	IGBT	Diode
R_1	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)

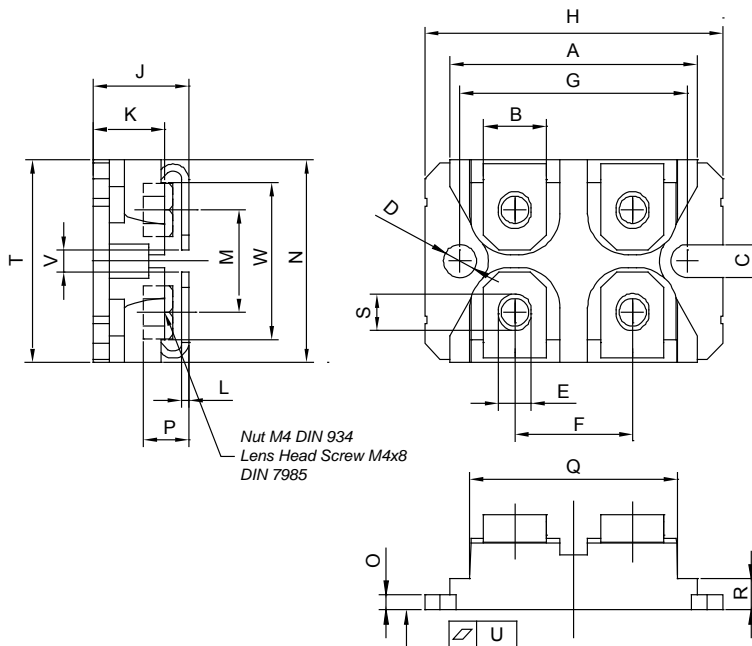
Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
T_{vj}	Virtual junction temperature		-55		150	°C
T_{stg}	Storage temperature		-40		150	°C
R_{thCH}	Thermal resistance case to heatsink			0.10		K/W
Weight				30		g
M_D	Mounting torque		1.1		1.5	Nm
M_T	Terminal torque		1.1		1.5	Nm
V_{ISOL}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



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			



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

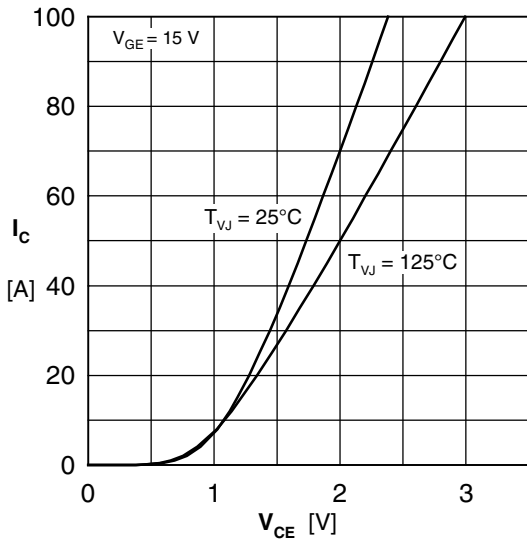


Fig. 1 Typ. output characteristics

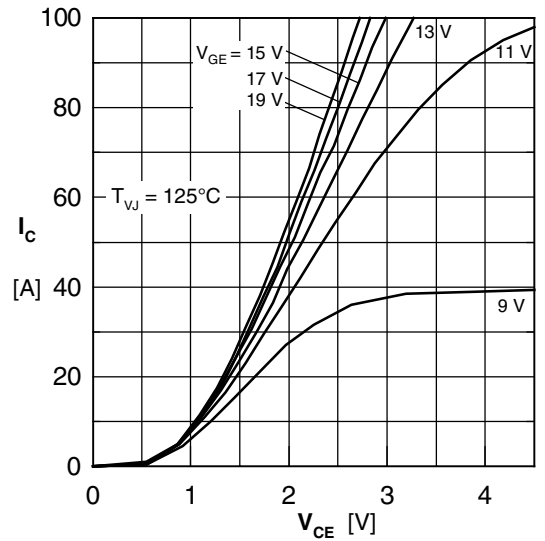


Fig. 2 Typ. output characteristics

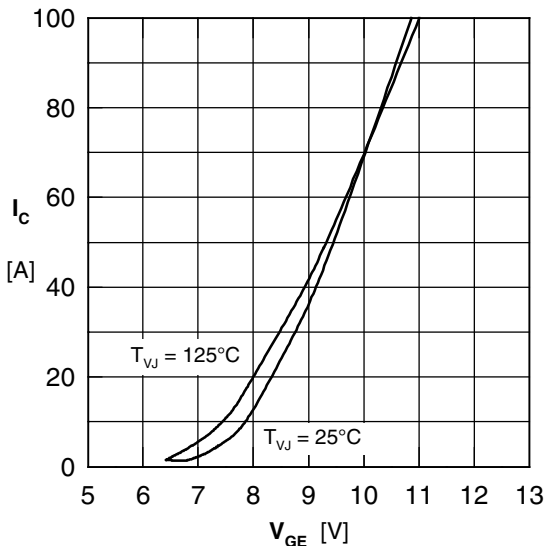


Fig. 3 Typ. transfer characteristics

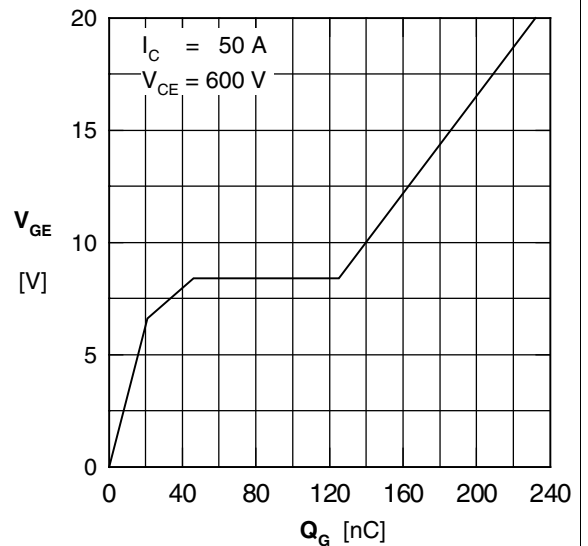


Fig. 4 Typ. turn-on gate charge

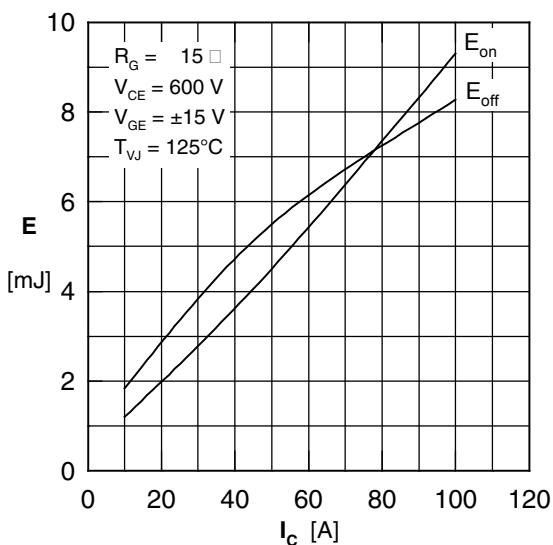


Fig. 5 Typ. switching energy vs. collector current

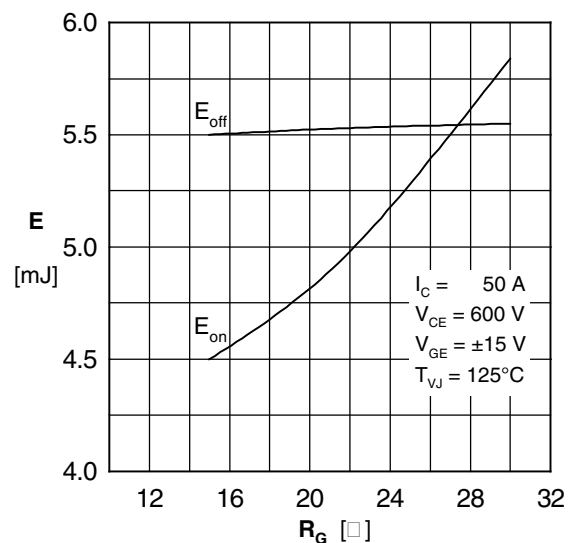


Fig. 6 Typ. switching energy vs. gate resistance

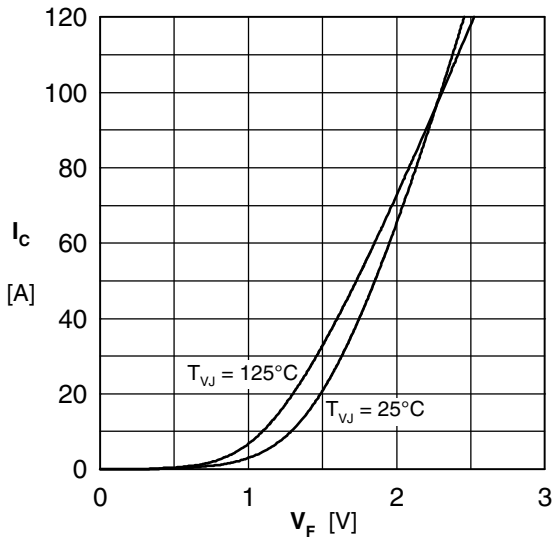


Fig. 7 Typ. forward characteristic

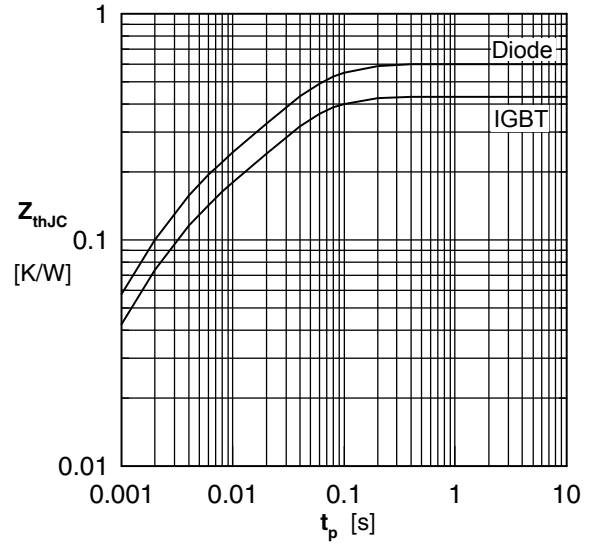


Fig. 8 Typ. transient thermal impedance