

# XPT IGBT

$$V_{CES} = 1200V$$

$$I_{C25} = 88A$$

$$V_{CE(sat)} = 1.8V$$

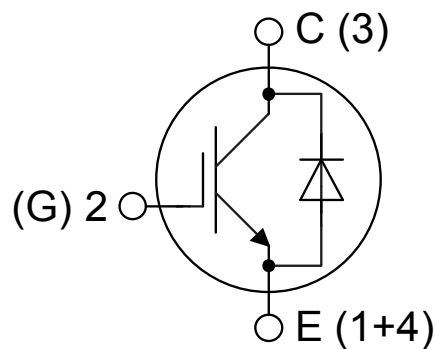
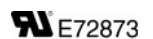
Copack

Part number

**IXA60IF1200NA**



Backside: isolated



### 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  $\mu$ 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
- Pumps, Fans

### Package: SOT-227B (minibloc)

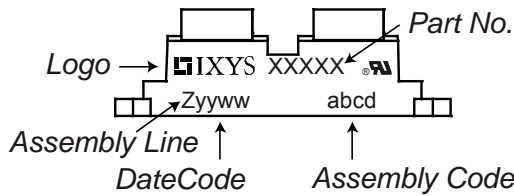
- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Either emitter terminal can be used as main or Kelvin emitter

IGBT				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{CES}$	collector emitter voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$V_{GES}$	max. DC gate voltage				$\pm 20$	V	
$V_{GEM}$	max. transient gate emitter voltage				$\pm 30$	V	
$I_{C25}$	collector current	$T_C = 25^{\circ}C$			88	A	
$I_{C80}$		$T_C = 80^{\circ}C$			56	A	
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}C$			290	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 50A; V_{GE} = 15V$		1.8	2.1	V	
				2.1		V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 2mA; V_{CE} = V_{CE}$	5.4	5.9	6.5	V	
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0V$			0.1	mA	
				0.1		mA	
$I_{GES}$	gate emitter leakage current	$V_{GE} = \pm 20V$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600V; V_{GE} = 15V; I_C = 50A$		190		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600V; I_C = 50A$ $V_{GE} = \pm 15V; R_G = 15\Omega$		70		ns	
$t_r$	current rise time		$T_{VJ} = 125^{\circ}C$	40		ns	
$t_{d(off)}$	turn-off delay time		250		ns		
$t_f$	current fall time		100		ns		
$E_{on}$	turn-on energy per pulse		4.5		mJ		
$E_{off}$	turn-off energy per pulse		5.5		mJ		
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15V; R_G = 15\Omega$					
$I_{CM}$		$V_{CEmax} = 1200V$			150	A	
<b>SCSOA</b>	short circuit safe operating area	$V_{CEmax} = 1200V$					
$t_{sc}$	short circuit duration	$V_{CE} = 900V; V_{GE} = \pm 15V$			10	$\mu s$	
$I_{sc}$	short circuit current	$R_G = 15\Omega; \text{non-repetitive}$		200		A	
$R_{thJC}$	thermal resistance junction to case				0.43	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.10		K/W	
<b>Diode</b>							
$V_{RRM}$	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$I_{F25}$	forward current	$T_C = 25^{\circ}C$			85	A	
$I_{F80}$		$T_C = 80^{\circ}C$			51	A	
$V_F$	forward voltage	$I_F = 60A$			2.20	V	
				1.95		V	
$I_R$	reverse current	$V_R = V_{RRM}$			*	mA	
	* not applicable, see Ices at IGBT				*	mA	
$Q_{rr}$	reverse recovery charge	$V_R = 600V$ $-di_F/dt = E+03 A/\mu s$ $I_F = 60A; V_{GE} = 0V$		8		$\mu C$	
$I_{RM}$	max. reverse recovery current		$T_{VJ} = 125^{\circ}C$	60		A	
$t_{rr}$	reverse recovery time		350		ns		
$E_{rec}$	reverse recovery energy		2.5		mJ		
$R_{thJC}$	thermal resistance junction to case				0.6	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.10		K/W	

Package SOT-227B (minibloc)		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal <sup>1)</sup>			150	A
$T_{VJ}$	virtual junction temperature		-40		150	°C
$T_{op}$	operation temperature		-40		125	°C
$T_{stg}$	storage temperature		-40		150	°C
<b>Weight</b>				30		g
$M_D$	mounting torque		1.1		1.5	Nm
$M_T$	terminal torque		1.1		1.5	Nm
$d_{Spp/App}$	creepage distance on surface   striking distance through air	terminal to terminal	10.5	3.2		mm
$d_{Spb/Apb}$		terminal to backside	8.6	6.8		mm
$V_{ISOL}$	isolation voltage	t = 1 second			3000	V
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		2500	V

<sup>1)</sup>  $I_{RMS}$  is typically limited by the pin-to-chip resistance (1); or by the current capability of the chip (2). In case of (1) and a product with multiple pins for one chip-potential, the current capability can be increased by connecting the pins as one contact.

### Product Marking



### Part description

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

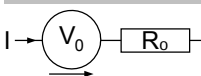
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	IXA60IF1200NA	IXA60IF1200NA	Tube	10	508765

Similar Part	Package	Voltage class
IXA70I1200NA	SOT-227B (minibloc)	1200

### Equivalent Circuits for Simulation

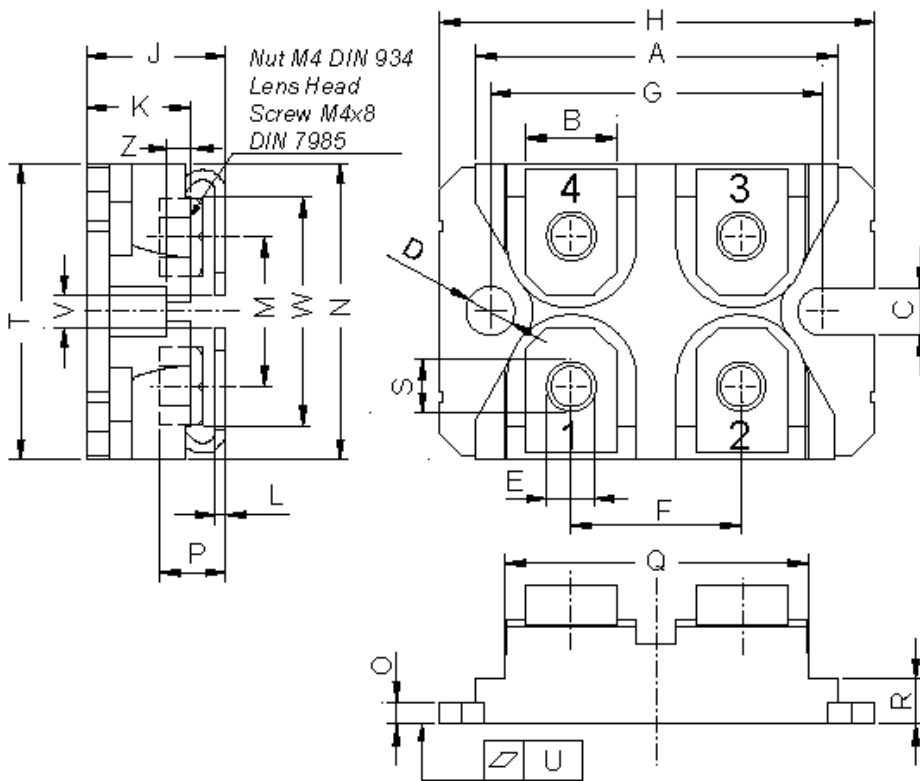
\* on die level

$T_{VJ} = 150$  °C

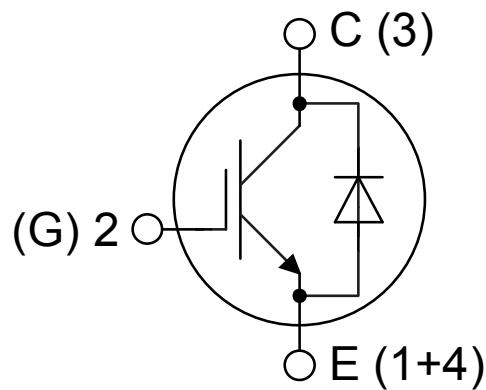


	IGBT	Diode	
$V_{0\ max}$	1.1	1.25	V
$R_{0\ max}$	28	14.2	mΩ

## Outlines SOT-227B (minibloc)



Dim.	Millimeter		Inches	
	min	max	min	max
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.488	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.74	0.84	0.029	0.033
M	12.50	13.10	0.492	0.516
N	25.15	25.42	0.990	1.001
O	1.95	2.13	0.077	0.084
P	4.95	6.20	0.195	0.244
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.167
S	4.55	4.85	0.179	0.191
T	24.59	25.25	0.968	0.994
U	-0.05	0.10	-0.002	0.004
V	3.20	5.50	0.126	0.217
W	19.81	21.08	0.780	0.830
Z	2.50	2.70	0.098	0.106



## IGBT

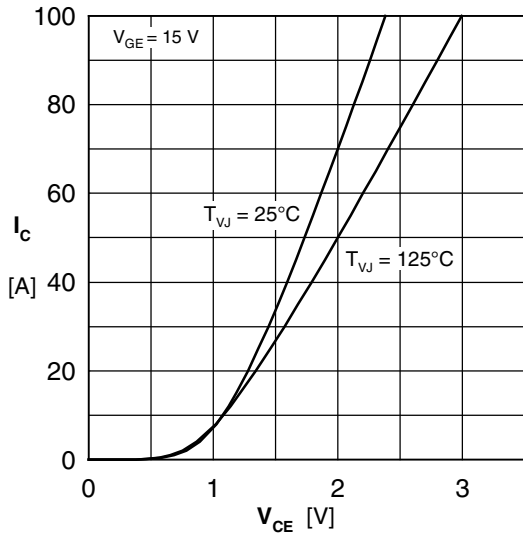


Fig. 1 Typ. output characteristics

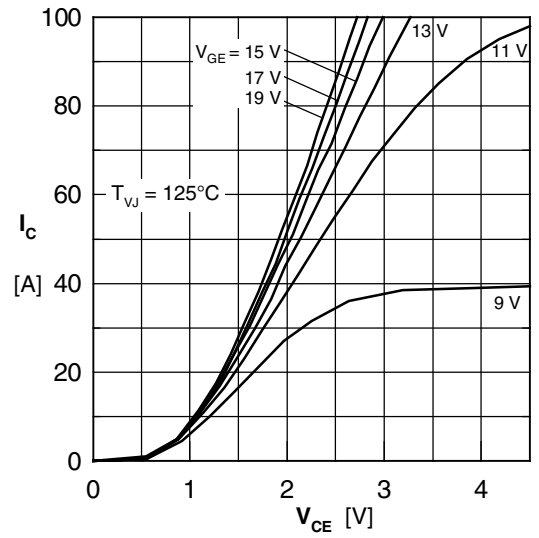


Fig. 2 Typ. output characteristics

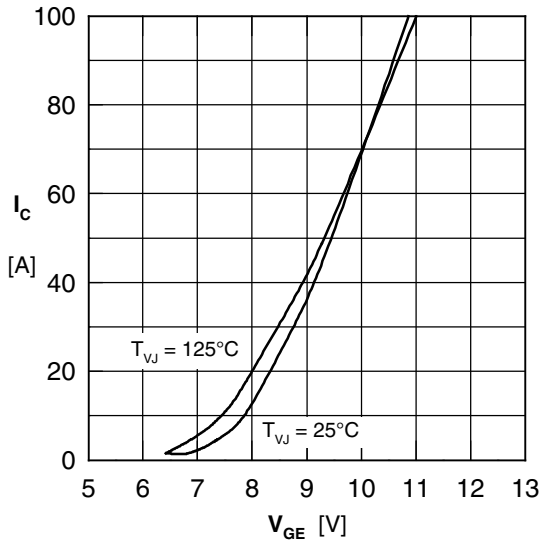


Fig. 3 Typ. transfer characteristics

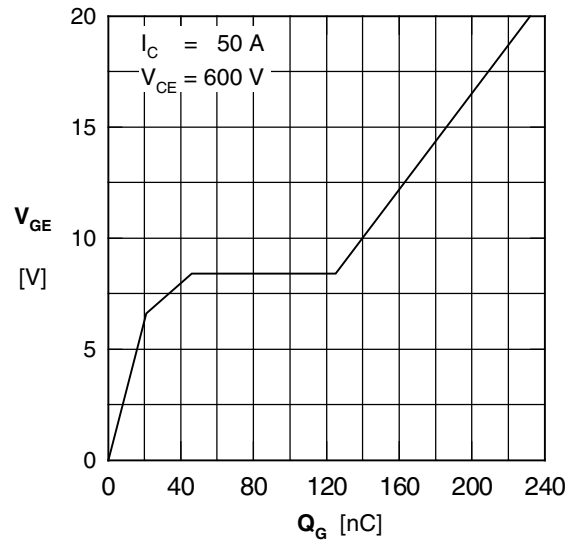


Fig. 4 Typ. turn-on gate charge

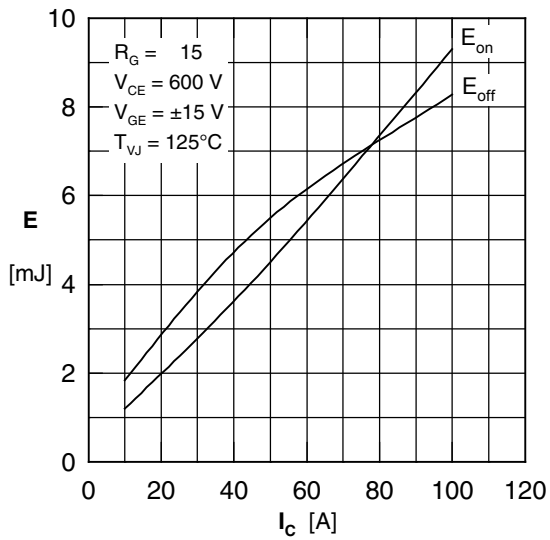


Fig. 5 Typ. switching energy vs. collector current

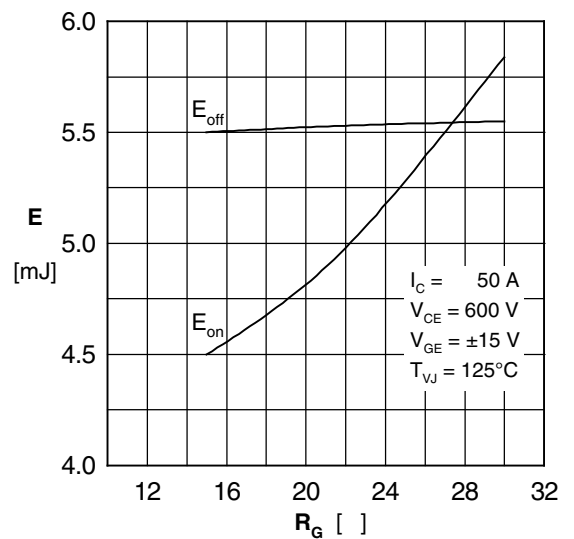


Fig. 6 Typ. switching energy vs. gate resistance

## Diode

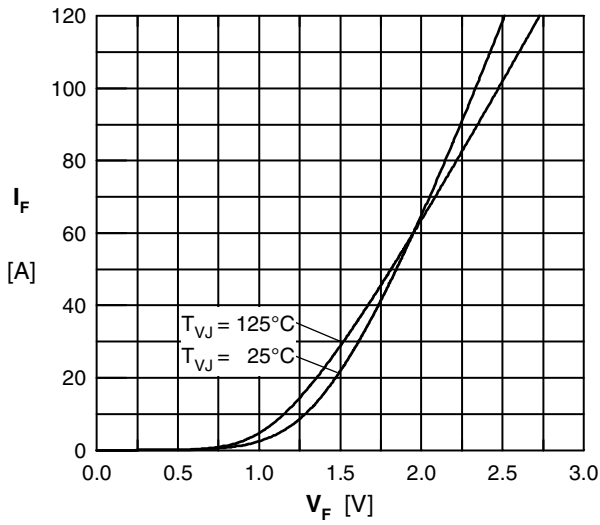


Fig. 7 Typ. Forward current versus  $V_F$

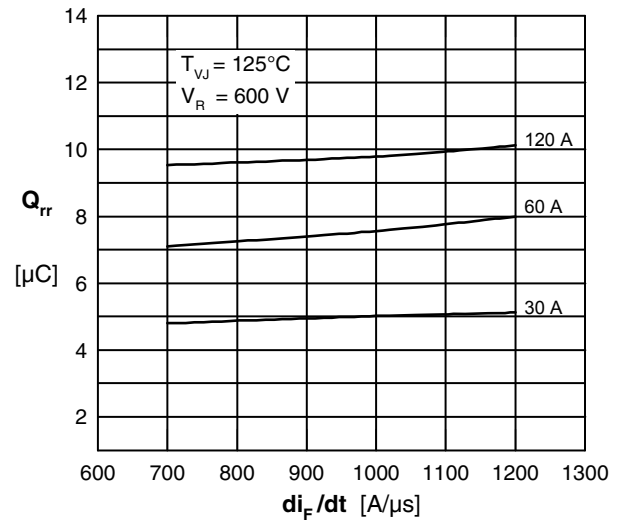


Fig. 8 Typ. reverse recov.charge  $Q_{rr}$  vs.  $di/dt$

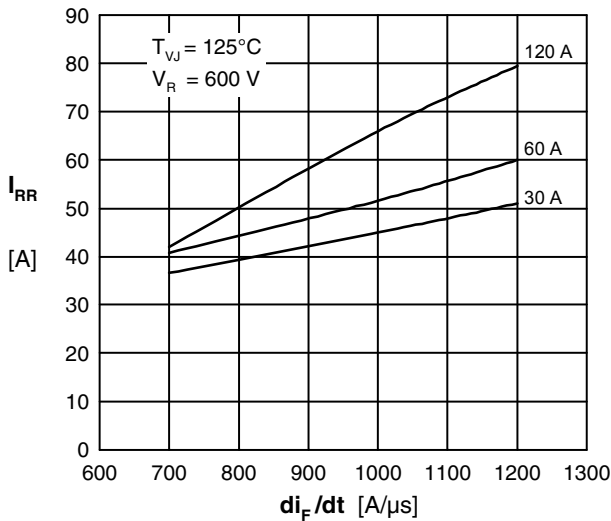


Fig. 9 Typ. peak reverse current  $I_{RM}$  vs.  $di/dt$

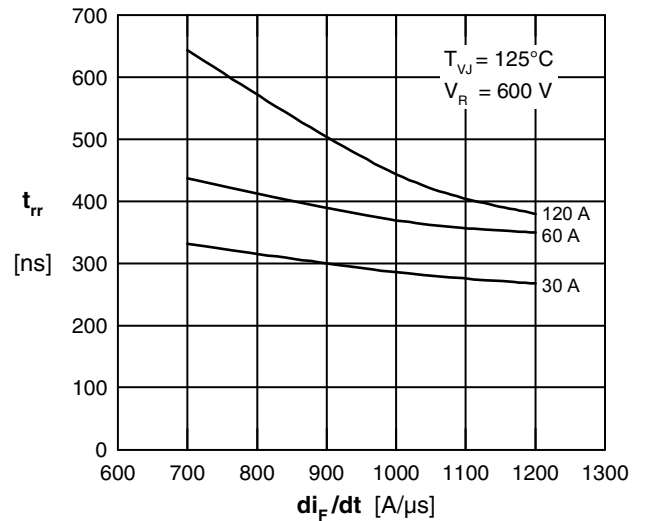


Fig. 10 Typ. recovery time  $t_{rr}$  versus  $di/dt$

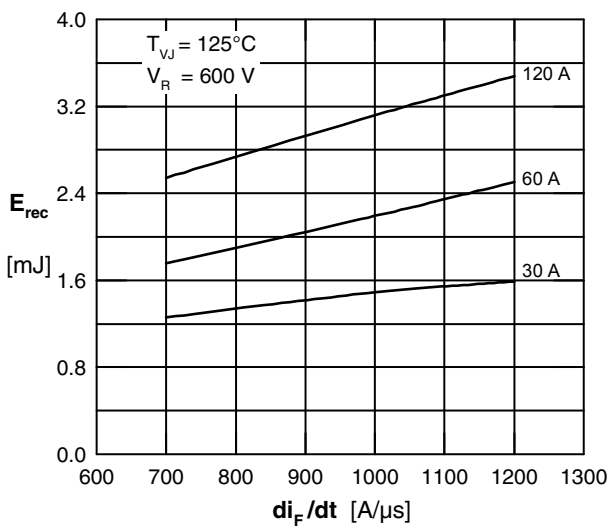


Fig. 11 Typ. recovery energy  $E_{rec}$  versus  $di/dt$

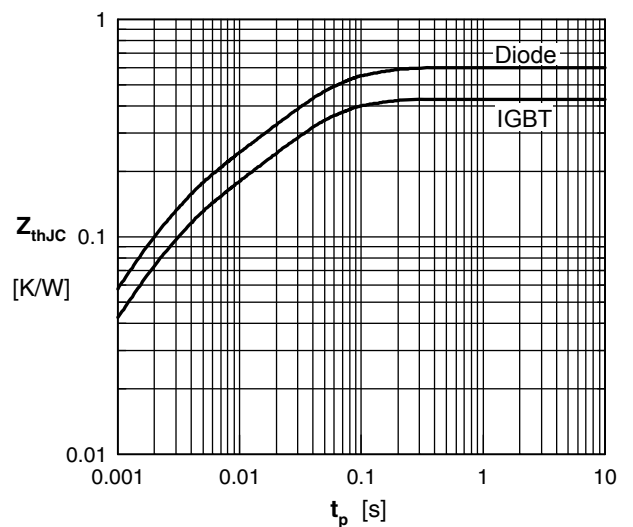


Fig. 12 Typ. transient thermal impedance



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