

**XPT IGBT**

$V_{CES} = 1200V$

$I_{C25} = 58A$

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

Copack

Part number

IXA33IF1200HB



Backside: collector

**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

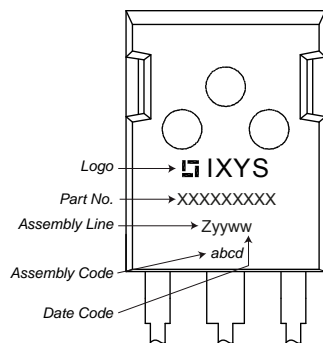
**Package: TO-247**

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

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	$T_C = 25^{\circ}C$			58	A	
$I_{C80}$		$T_C = 80^{\circ}C$			34	A	
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}C$			250	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 25A; V_{GE} = 15V$		1.8	2.1	V	
				2.1		V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 1mA; V_{CE} = V_{CE}$	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	$V_{CE} = 600V; V_{GE} = 15V; I_C = 25A$		76		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600V; I_C = 25A$ $V_{GE} = \pm 15V; R_G = 39\Omega$	$T_{VJ} = 125^{\circ}C$	70		ns	
$t_r$	current rise time			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			2.5		mJ	
$E_{off}$	turn-off energy per pulse			3		mJ	
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15V; R_G = 39\Omega$	$T_{VJ} = 125^{\circ}C$				
$I_{CM}$		$V_{CEmax} = 1200V$			75	A	
<b>SCSOA</b>	short circuit safe operating area	$V_{CEmax} = 900V$	$T_{VJ} = 125^{\circ}C$				
$t_{sc}$	short circuit duration	$V_{CE} = 900V; V_{GE} = \pm 15V$			10	$\mu s$	
$I_{sc}$	short circuit current	$R_G = 39\Omega; \text{non-repetitive}$		100		A	
$R_{thJC}$	thermal resistance junction to case				0.5	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.25		K/W	
<b>Diode</b>							
$V_{RRM}$	max. repetitive reverse voltage		$T_{VJ} = 25^{\circ}C$		1200	V	
$I_{F25}$	forward current		$T_C = 25^{\circ}C$		60	A	
$I_{F80}$			$T_C = 80^{\circ}C$		33	A	
$V_F$	forward voltage	$I_F = 30A$	$T_{VJ} = 25^{\circ}C$		2.20	V	
			$T_{VJ} = 125^{\circ}C$	1.95		V	
$I_R$	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}C$		*	mA	
	* not applicable, see Ices value above		$T_{VJ} = 125^{\circ}C$	*		mA	
$Q_{rr}$	reverse recovery charge	$V_R = 600V$ $-di_F/dt = -600A/\mu s$ $I_F = 30A; V_{GE} = 0V$	$T_{VJ} = 125^{\circ}C$	3.5		$\mu C$	
$I_{RM}$	max. reverse recovery current			30		A	
$t_{rr}$	reverse recovery time			350		ns	
$E_{rec}$	reverse recovery energy			0.9		mJ	
$R_{thJC}$	thermal resistance junction to case				0.7	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.25		K/W	

Package TO-247			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			70	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>				6		g
$M_D$	mounting torque		0.8		1.2	Nm
$F_C$	mounting force with clip		20		120	N

### Product Marking



### Part number

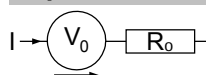
I = IGBT  
 X = XPT IGBT  
 A = Gen 1 / std  
 33 = Current Rating [A]  
 IF = Copack  
 1200 = Reverse Voltage [V]  
 HB = TO-247AD (3)

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	IXA33IF1200HB	IXA33IF1200HB	Tube	30	508562

### Equivalent Circuits for Simulation

\* on die level

$T_{VJ} = 150\text{ °C}$



$V_{0\max}$  threshold voltage

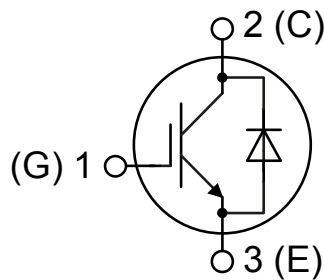
$R_{0\max}$  slope resistance \*

	IGBT	Diode	
$V_{0\max}$	1.1	1.25	V
$R_{0\max}$	55	28.3	mΩ

## Outlines TO-247



Sym.	Inches		Millimeter	
	min.	max.	min.	max.
A	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
e	0.215 BSC		5.46 BSC	
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
Ø P	0.140	0.144	3.55	3.65
Q	0.212	0.244	5.38	6.19
S	0.242 BSC		6.14 BSC	
b	0.039	0.055	0.99	1.40
b2	0.065	0.094	1.65	2.39
b4	0.102	0.135	2.59	3.43
c	0.015	0.035	0.38	0.89
D1	0.515	-	13.07	-
D2	0.020	0.053	0.51	1.35
E1	0.530	-	13.45	-
Ø P1	-	0.29	-	7.39



## IGBT

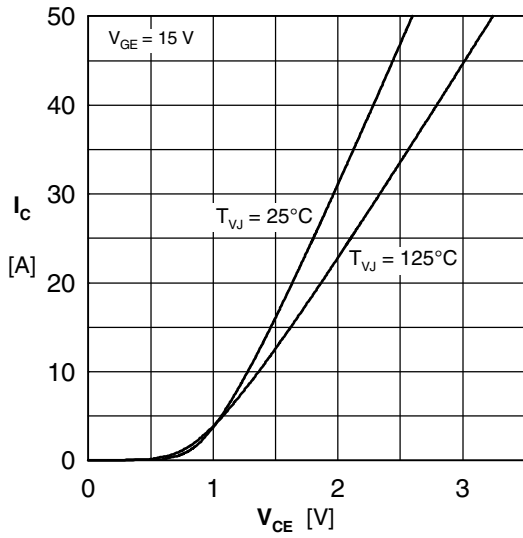


Fig. 1 Typ. output characteristics

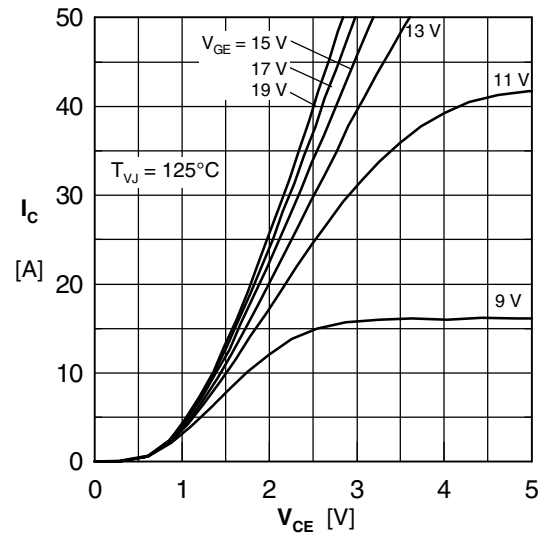


Fig. 2 Typ. output characteristics

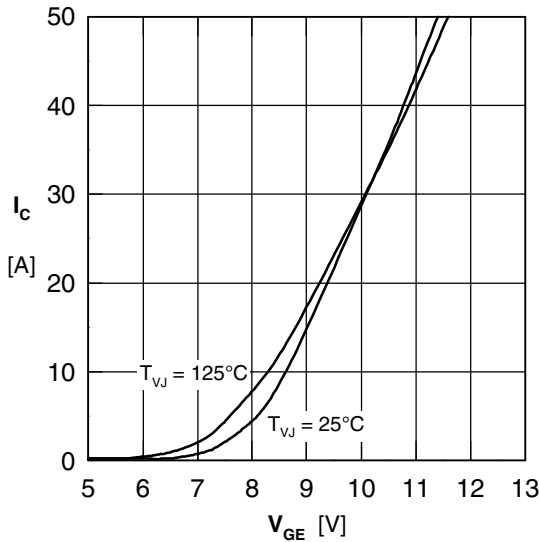


Fig. 3 Typ. transfer characteristics

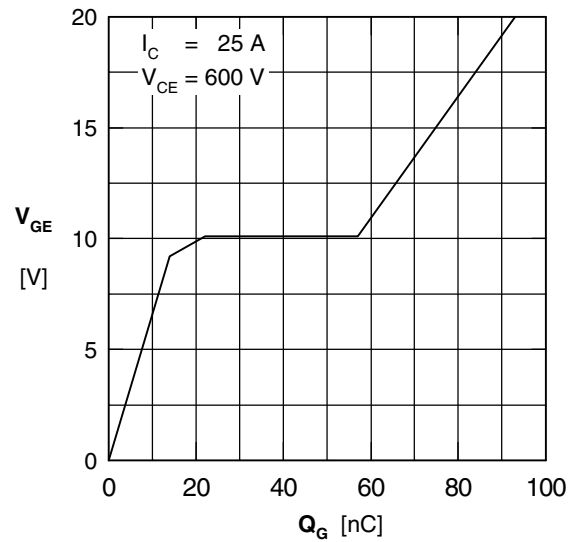


Fig. 4 Typ. turn-on gate charge

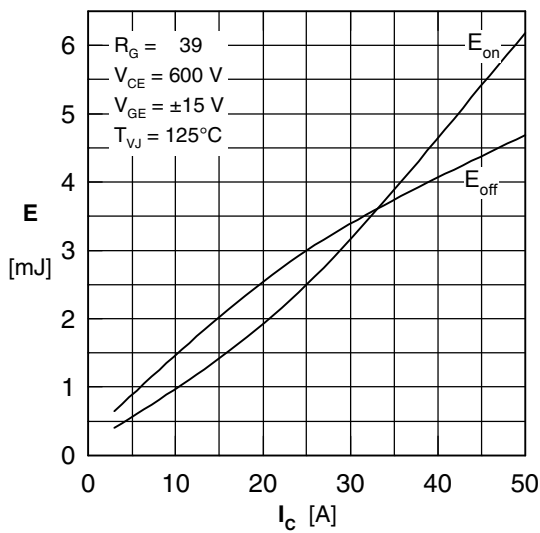


Fig. 5 Typ. switching energy vs. collector current

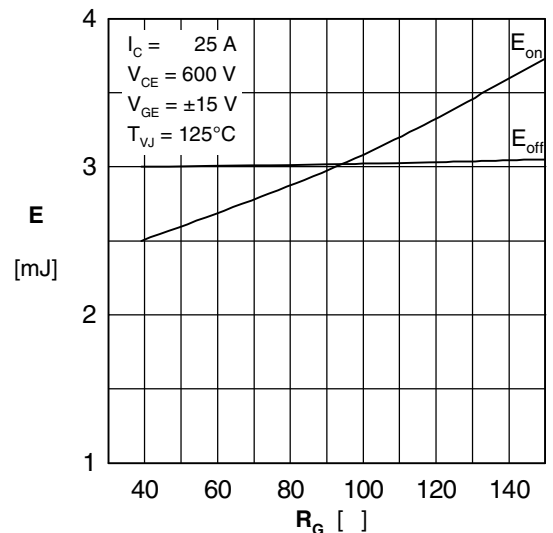


Fig. 6 Typ. switching energy vs. gate resistance

## Diode

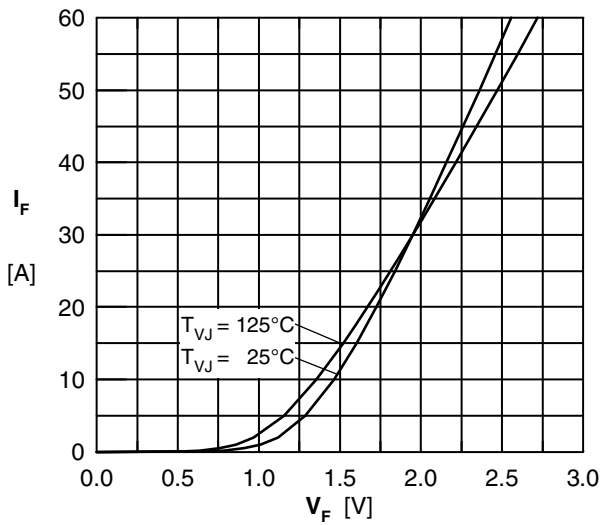


Fig. 7 Typ. Forward current versus  $V_F$

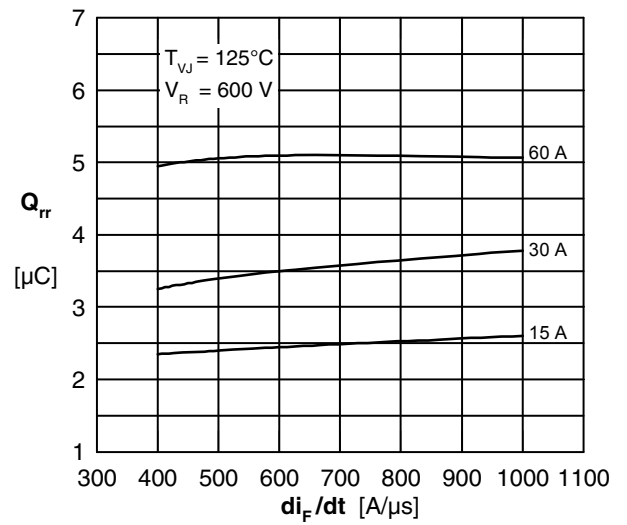


Fig. 8 Typ. reverse recov. charge  $Q_{rr}$  vs.  $di/dt$

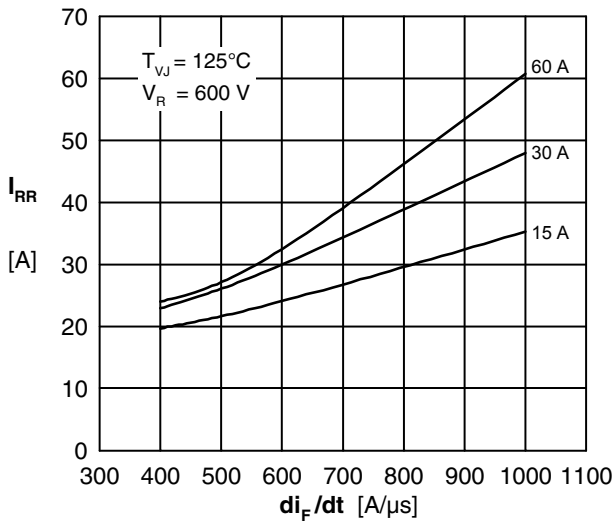


Fig. 9 Typ. peak reverse current  $I_{RM}$  vs.  $di/dt$

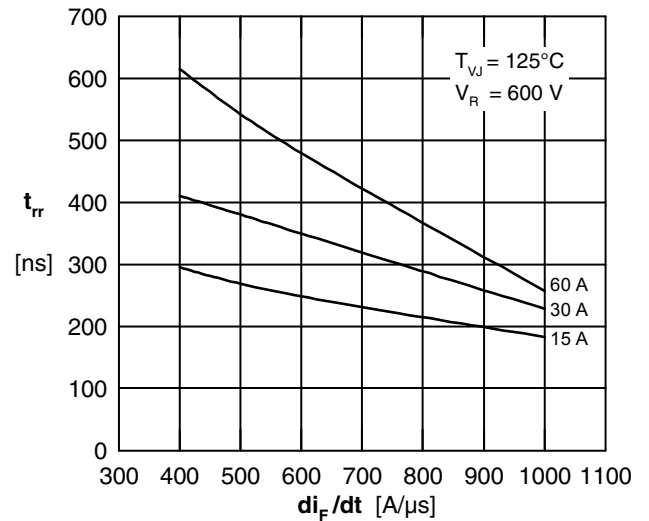


Fig. 10 Typ. recovery time  $t_{rr}$  versus  $di/dt$

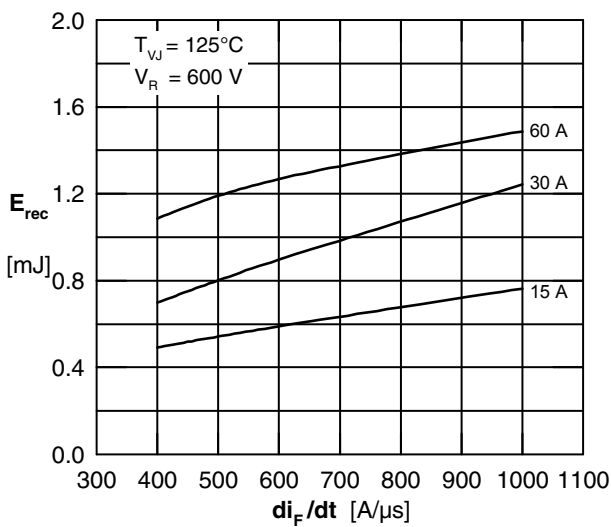


Fig. 11 Typ. recovery energy  $E_{rec}$  versus  $di/dt$

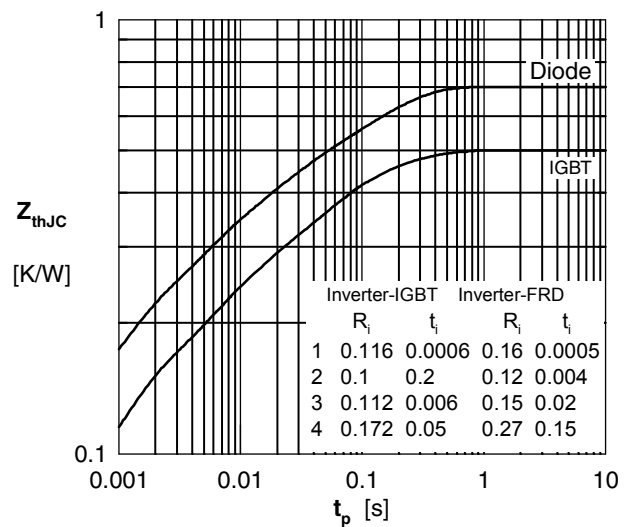


Fig. 12 Typ. transient thermal impedance



---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).