

XPT IGBT

Copack

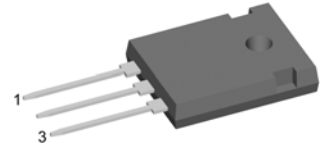
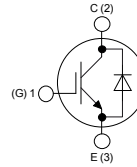
$$I_{C25} = 58 \text{ A}$$

$$V_{CES} = 1200 \text{ V}$$

$$V_{CE(sat)typ} = 1.8 \text{ V}$$

Part number

IXA33IF1200HB



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 μ 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

Package:

- Housing: TO-247
- Industry standard outline
- Epoxy meets UL 94V-0
- RoHS compliant

IGBT

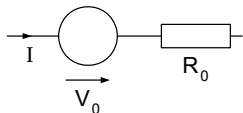
Ratings

Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	Collector emitter voltage	$V_{GE} = 0 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$			1200	V
V_{GES}	Maximum DC gate voltage		$T_{VJ} = 25^\circ\text{C}$			± 20	V
I_{C25}	Collector current		$T_C = 25^\circ\text{C}$			58	A
I_{C100}			$T_C = 100^\circ\text{C}$			34	A
P_{tot}	Total power dissipation		$T_{VJ} = 25^\circ\text{C}$			250	W
I_{CES}	Collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$			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	$I_C = 25 \text{ A}; V_{GE} = 15 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		1.8	2.1	V
					2.1		V
$V_{GE(th)}$	Gate emitter threshold voltage	$I_C = 1 \text{ mA}; V_{GE} = V_{CE}$		5.4	6	6.5	V
Q_{Gon}	Total gate charge	$V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 25 \text{ A}$			76		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	$V_{CE} = 600 \text{ V}; I_C = 25 \text{ A}$			100		ns
E_{on}	Turn-on energy per pulse	$V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega$	$T_{VJ} = 125^\circ\text{C}$		2.5		mJ
E_{off}	Turn-off energy per pulse				3.0		mJ
RBSOA	Reverse bias safe operation area	$V_{GE} = 15 \text{ V}; R_G = 39 \Omega$ $V_{CEK} = 1200 \text{ V}$	$T_{VJ} = 125^\circ\text{C}$			75	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	μ s
I_{sc}	Short circuit current	$R_G = 39 \Omega$; non-repetitive				100	A
R_{thJC}	Thermal resistance junction to case					0.5	K/W

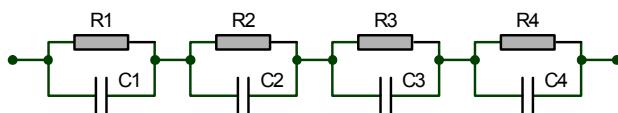
Diode

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
I_{F25}	Forward current	$T_C = 25^\circ\text{C}$			60	A
I_{F100}		$T_C = 100^\circ\text{C}$			33	A
V_F	Forward voltage	$I_F = 30\text{ A}$		$T_{VJ} = 25^\circ\text{C}$	2.2	V
				$T_{VJ} = 125^\circ\text{C}$	1.95	V
Q_{rr}	Reverse recovery charge	$V_R = 600\text{ V}$		3.5		μC
I_{RM}	Maximum reverse recovery current	$di_F/dt = -600\text{ A}/\mu\text{s}$		30		A
t_{rr}	Reverse recovery time	$I_F = 30\text{ A}$		350		ns
$E_{rec(off)}$	Reverse recovery losses at turn-off			0.9		mJ
R_{thJC}	Thermal resistance junction to case				0.7	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					55	m Ω
V_0	Diode	$T_{VJ} = 150^\circ\text{C}$			1.25	V
R_0					28.3	m Ω



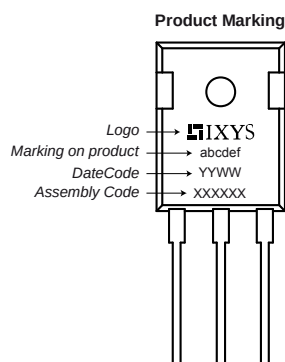
$$Z_{th}(t) = \sum_{i=1}^n \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

	IGBT	Diode
R_1	0.116	0.16
R_2	0.1	0.12
R_3	0.112	0.15
R_4	0.172	0.27
τ_1	0.0006	0.0005
τ_2	0.2	0.004
τ_3	0.006	0.02
τ_4	0.05	0.15

Package TO-247

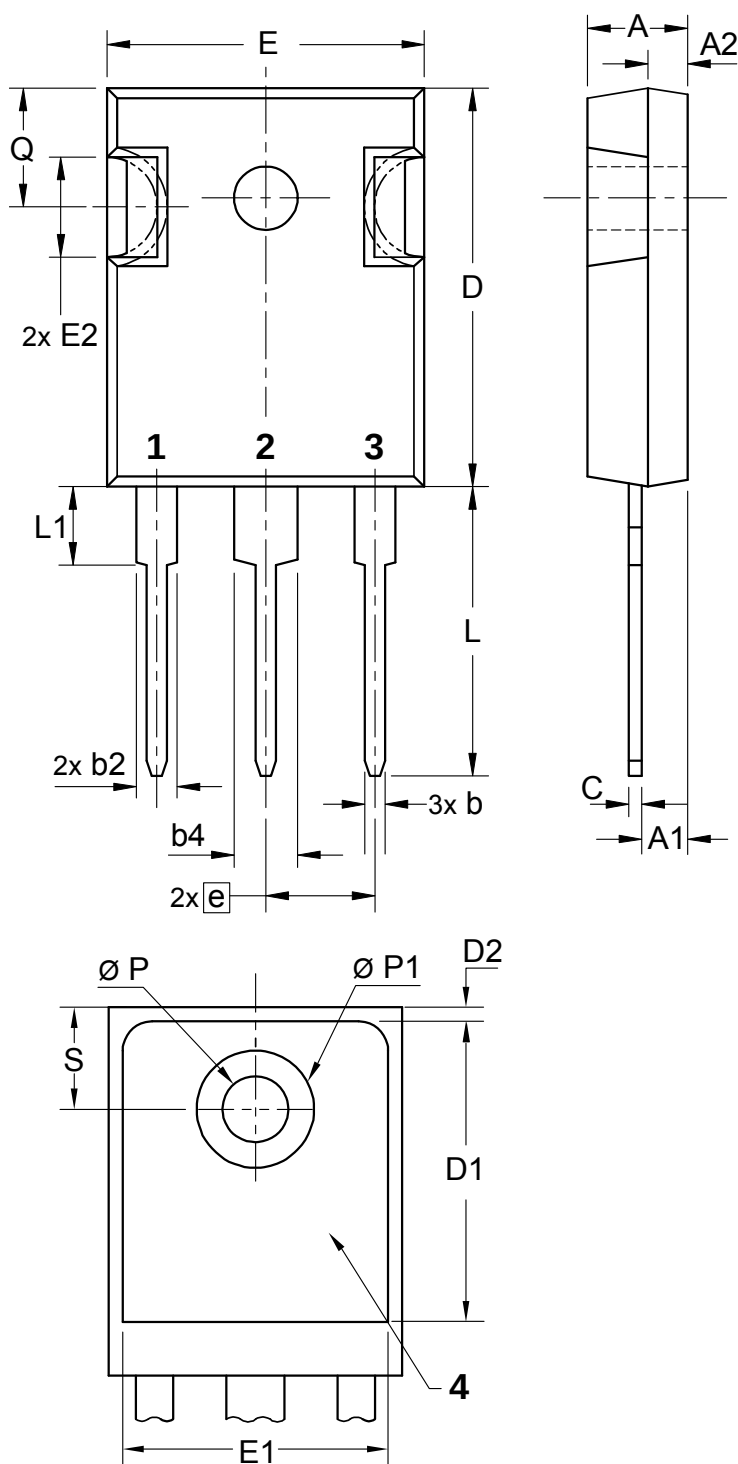
Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	Unit
T_{vj}	Virtual junction temperature		-55		150	°C
T_{stg}	Storage temperature		-55		150	°C
R_{thCH}	Thermal resistance case to heatsink			0.25		K/W
Weight				6		g
M_D	Mounting torque		0.8		1.2	Nm
F_c	Mounting force with clip		20		120	N



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 Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	IXA 33 IF 1200 HB	IXA33IF1200HB			



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

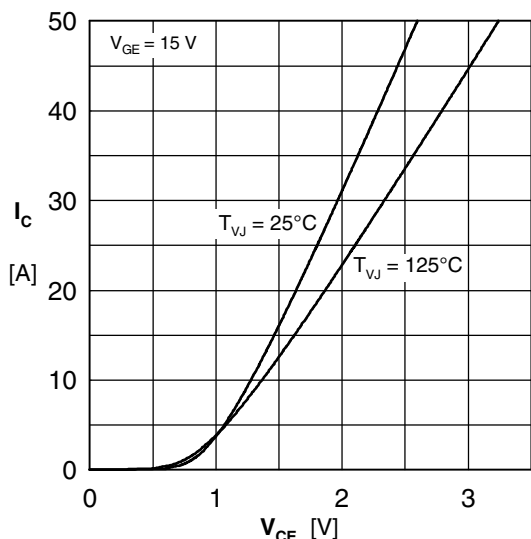


Fig. 1 Typ. output characteristics

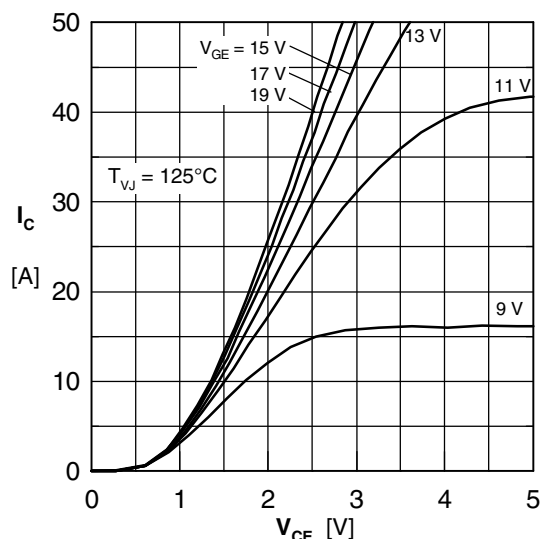


Fig. 2 Typ. output characteristics

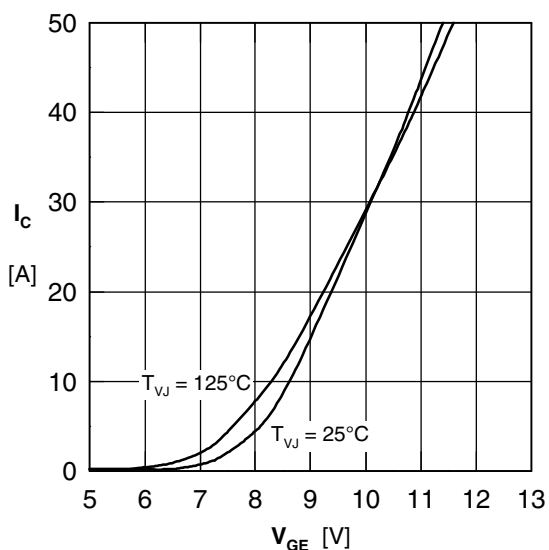


Fig. 3 Typ. transfer characteristics

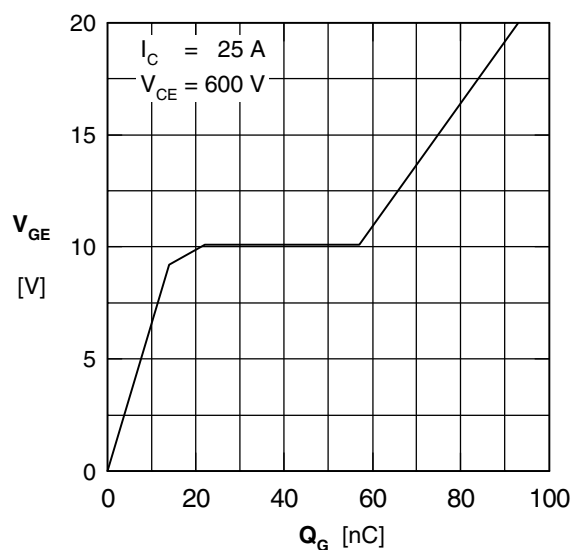


Fig. 4 Typ. turn-on gate charge

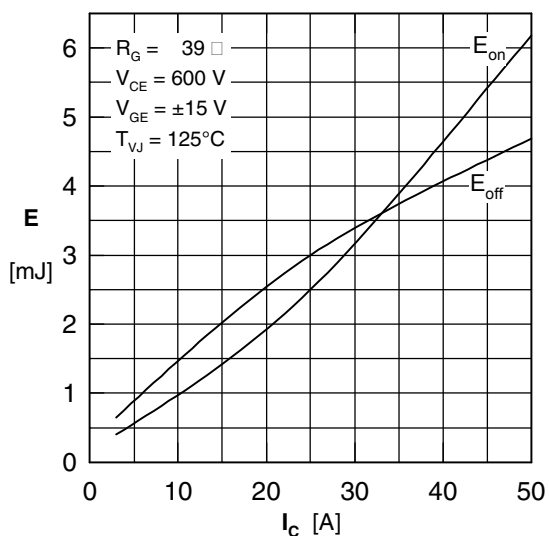


Fig. 5 Typ. switching energy vs. collector current

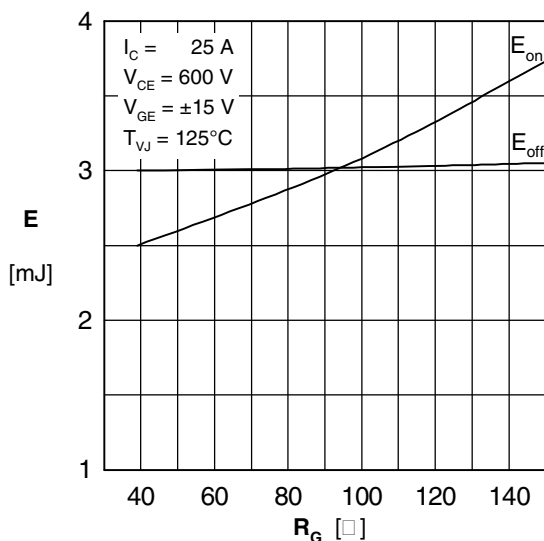


Fig. 6 Typ. switching energy vs. gate resistance

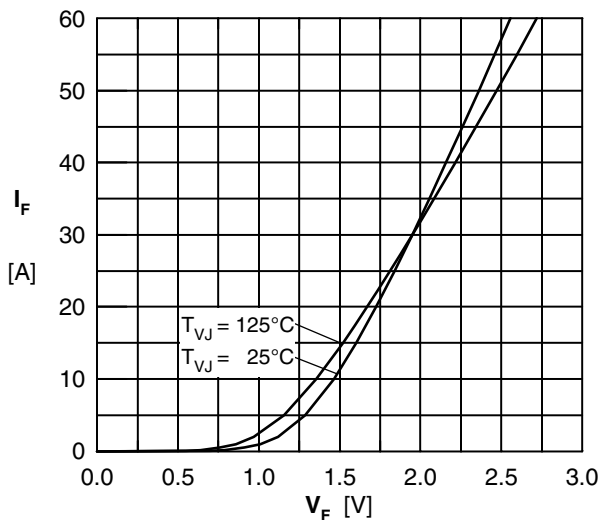


Fig. 7 Typ. Forward current versus V_F

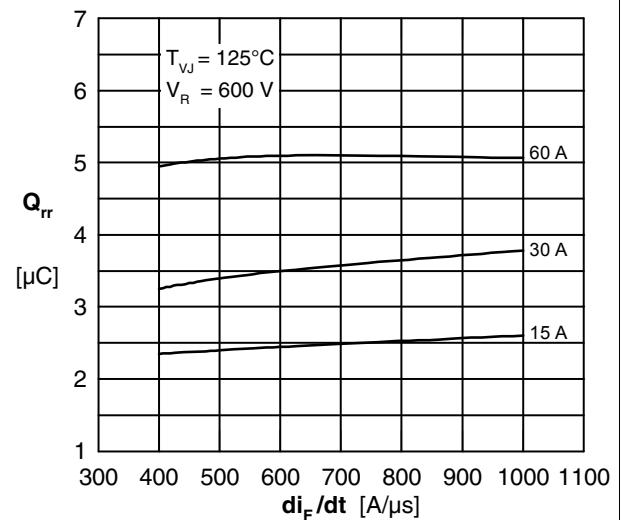


Fig. 8 Typ. reverse recov.charge Q_{rr} vs. di/dt

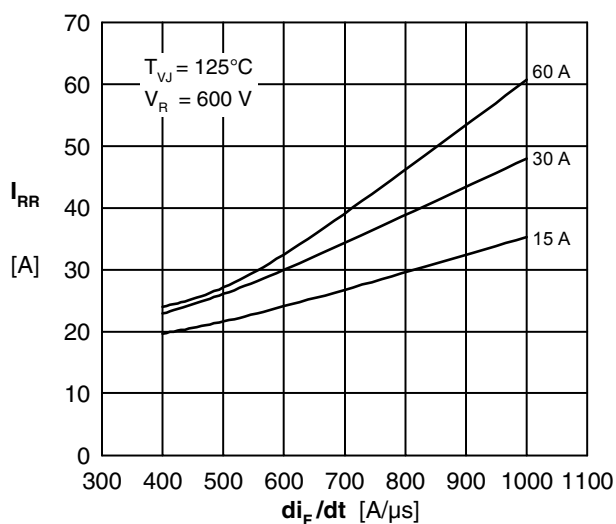


Fig. 9 Typ. peak reverse current I_{RM} vs. di/dt

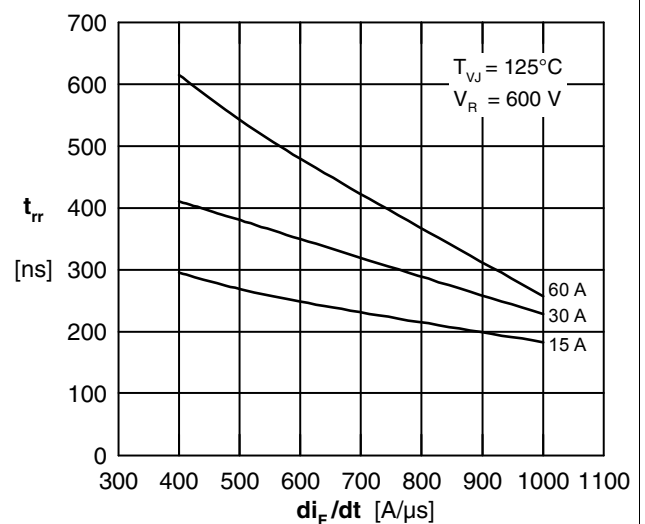


Fig. 10 Typ. recovery time t_{rr} versus di/dt

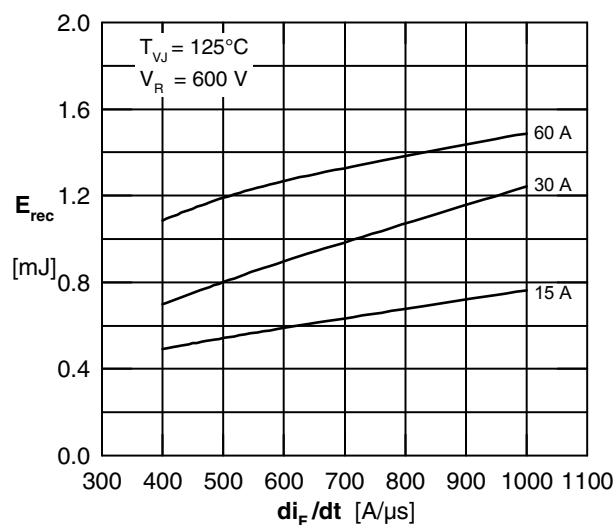


Fig. 11 Typ. recovery energy E_{rec} versus di/dt

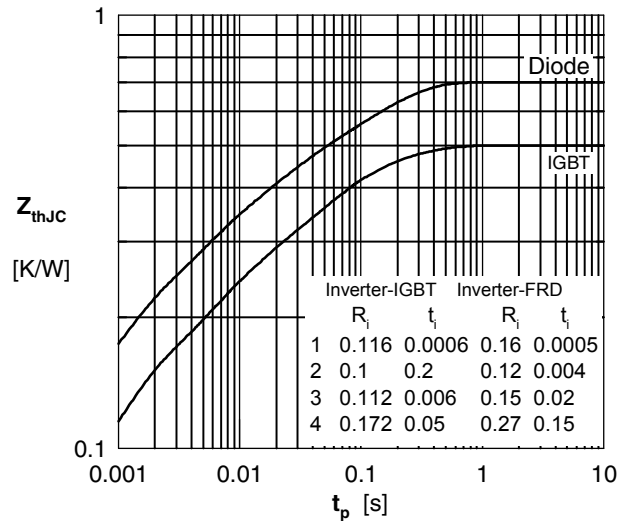


Fig. 12 Typ. transient thermal impedance