IXYS

IXA20IF1200HB

XPT IGBT

Copack

I_{C25}	=	38 A
V_{CES}	=	1200 V
$V_{CE(sat)typ}$	=	1.8 V

Part number

IXA20IF1200HB

C (2)

(G) 1

E (3)

1

3
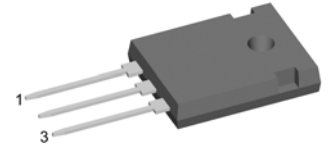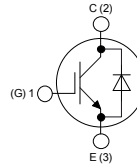
Features / Advantages:
- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Rugged XPT design (Xtreme light Punch Through) results in:
  - short circuit rated for 10 µsec.
  - very low gate charge
  - low EMI
  - square RBSOA @ 3x Ic
- Thin wafer technology combined 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:
- Housing: TO-247
- Industry standard outline
- Epoxy meets UL 94V-0
- RoHS compliant

IGBT

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				38	A
I_{C100}			T_C = 100°C				22	A
P_{tot}	Total power dissipation		T_{VJ} = 25°C				165	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 = 16 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 = 0.6 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 = 15 A				47		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 = 15 A				100		ns
E_{on}	Turn-on energy per pulse	V_{GE} = ±15 V; R_G = 56 Ω	T_{VJ} = 125°C			1.55		mJ
E_{off}	Turn-off energy per pulse					1.7		mJ
RBSOA	Reverse bias safe operation area	V_{GE} = 15 V; R_G = 56 Ω	T_{VJ} = 125°C				45	A
		V_{CEK} = 1200 V						
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 = 56 Ω; non-repetitive					60	A
R_{thJC}	Thermal resistance juntion to case						0.76	K/W

Data according to IEC 60747and per diode unless otherwise specified

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Diode

Symbol	Definition	Conditions		min.	typ.	max.	Unit
						Ratings	
I_{F25}	Forward current	$T_C = 25°C$				45	A
I_{F100}		$T_C = 100°C$				24	A
V_F	Forward voltage	$I_F = 20$ 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				3	µC
I_{RM}	Maximum reverse recovery current	$di_F/dt = -400$ A/µs;	$T_{VJ} = 125°C$			20	A
t_{rr}	Reverse recovery time	$I_F = 20$ A				350	ns
$E_{rec(off)}$	Reverse recovery losses at turn-off					0.7	mJ
R_{thJC}	Thermal resistance juntion to case					0.9	K/W

Equivalent Circuits for Simulation
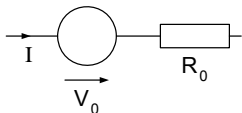
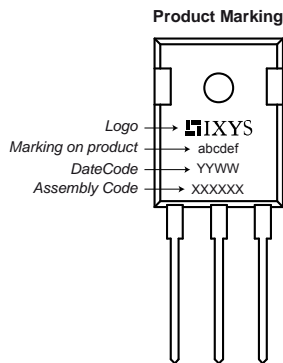| Symbol	Definition		min.	typ.	max.	Unit
					Ratings	
V_0	IGBT	$T_{VJ} = 150°C$			1.1	V
R_0					86	mΩ
V_0	Diode	$T_{VJ} = 150°C$			1.25	V
R_0					42.5	mΩ
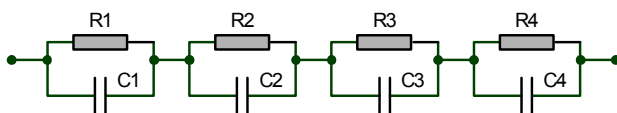
$$Zth(t) = \sum_{i=1}^{n} \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

	IGBT	Diode
R_1	0.15	0.231
R_2	0.28	0.212
R_3	0.16	0.19
R_4	0.17	0.267
τ_1	0.0006	0.0005
τ_2	0.2	0.004
τ_3	0.006	0.02
τ_4	0.05	0.15

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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

Product Marking

Logo → IXYS
Marking on product → abcdef
DateCode → YYWW
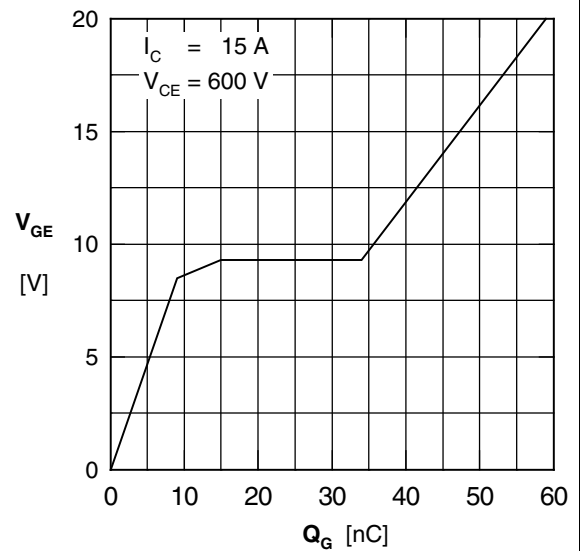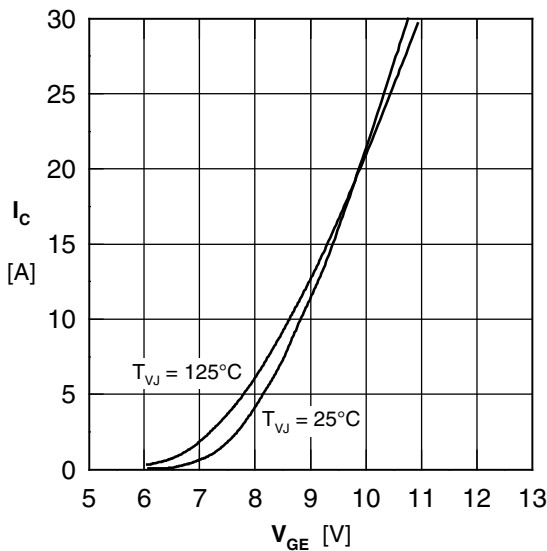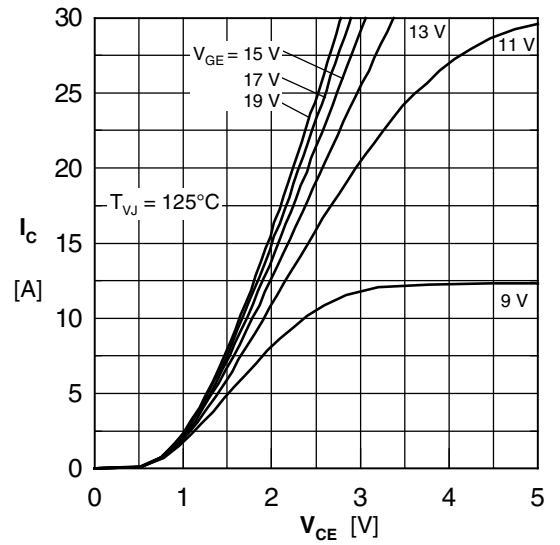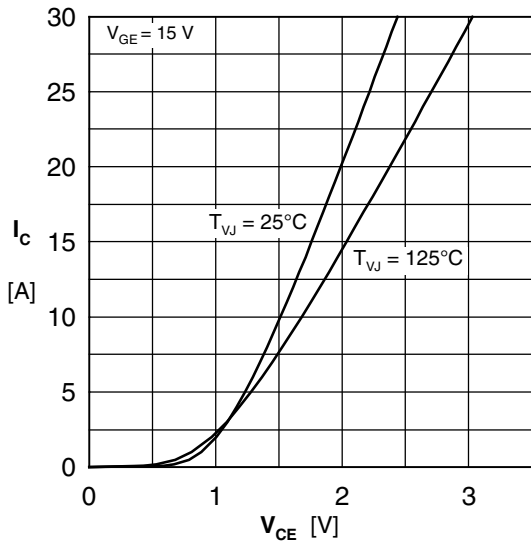Assembly Code → XXXXXX

Part number

I = IGBT
X = XPT IGBT
A = Gen 1 / std
20 = 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 20 IF 1200 HB	IXA20IF1200HB	Tube	30	508460

Similar Part	Package	Voltage class
IXA20I1200PB	TO-220AB (3)	1200

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per diode unless otherwise specified   20100102a
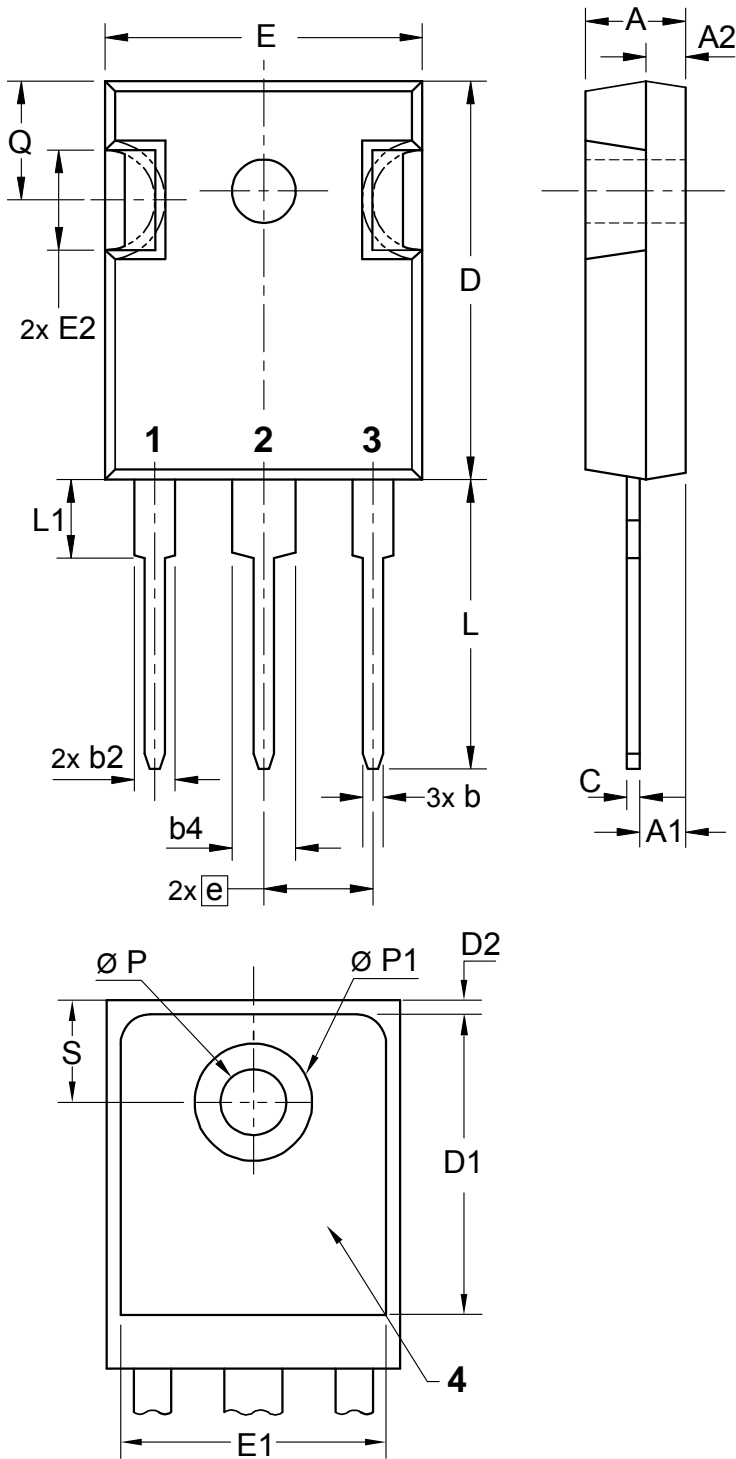
Sym.	Inches		Millimeter	
	min.	max.	min.	max.
A	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
e	0.215 BSC		5.46 BSC	
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
Ø P	0.140	0.144	3.55	3.65
Q	0.212	0.244	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. 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
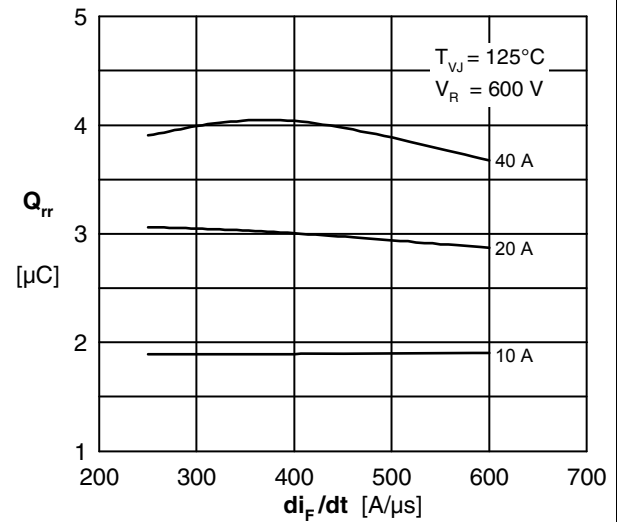
Fig. 8 Typ. reverse recov.charge Q_{rr} vs. di/dt
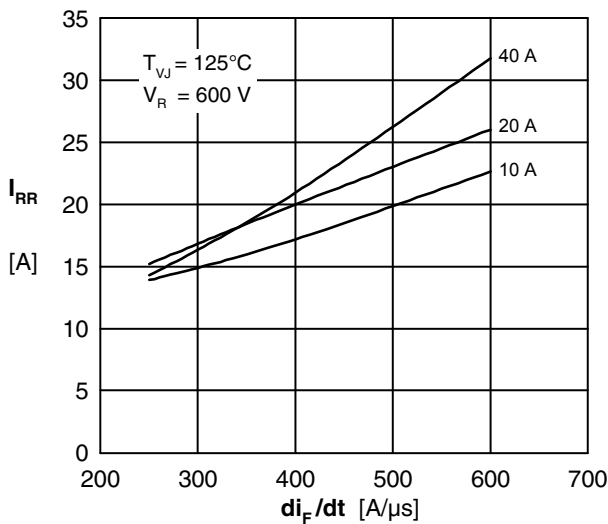

Fig. 9 Typ. peak reverse current I_{RM} vs. di/dt
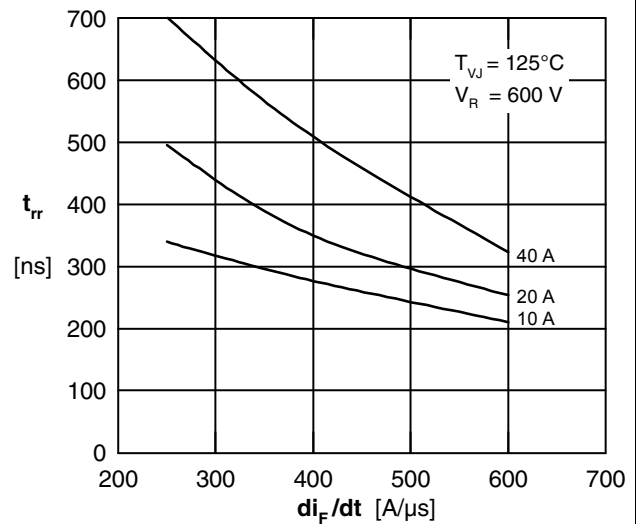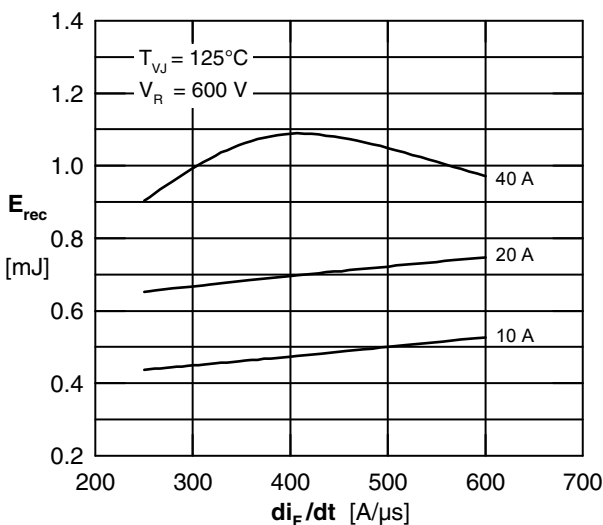

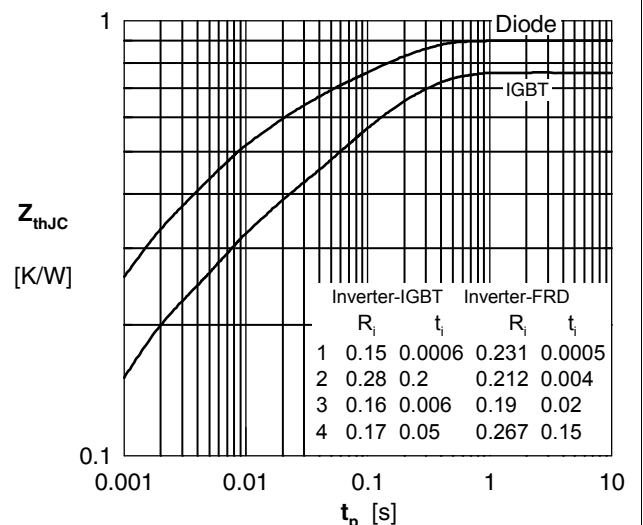Fig. 10 Typ. recovery time t_{rr} versus di/dt

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

Fig. 12 Typ. transient thermal impedance

	Inverter-IGBT		Inverter-FRD	
	R_i	t_i	R_i	t_i
1	0.15	0.0006	0.231	0.0005
2	0.28	0.2	0.212	0.004
3	0.16	0.006	0.19	0.02
4	0.17	0.05	0.267	0.15

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