IXYS

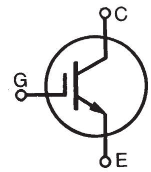
IGBT

Optimized for switching up to 5KHz

IXGA 12N120A2
IXGP 12N120A2

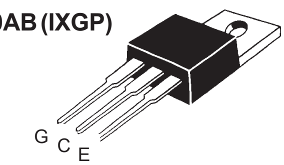
V_{CES} = 1200 V
I_{C25} = 24 A
$V_{CE(sat)}$ = 3.0 V

Preliminary data sheet

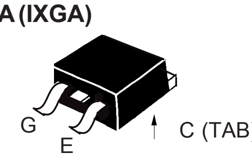


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	24	A
I_{C90}	T_C = 90°C	12	A
I_{CM}	T_C = 25°C, 1 ms	48	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 100 Ω Clamped inductive load	I_{CM} = 24 @ 0.8 V_{CES}	A
P_C	T_C = 25°C	75	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
M_d	Mounting torque with screw M3	0.45/4	Nm/lb.in.
	Mounting torque with screw M3.5	0.55/5	Nm/lb.in.
Weight	TO-220	4	g
	TO-263	2	g

TO-220AB (IXGP)



TO-263 AA (IXGA)



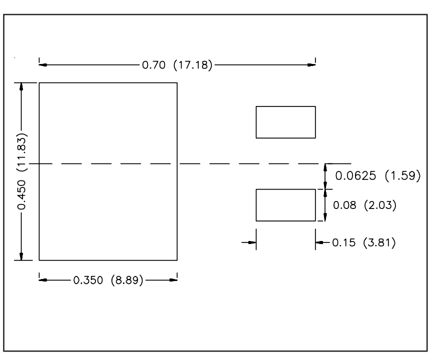
Features
- International standard packages JEDEC TO-220AB and TO-263AA
- Low $V_{CE(sat)}$
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity

Applications
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies
- Capacitor discharge

Advantages
- Easy to mount with one screw
- Reduces assembly time and cost
- High power density

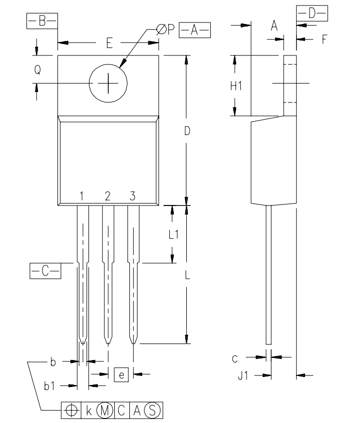
Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250 µA, V_{GE} = 0 V		1200			V
$V_{GE(th)}$	I_C = 250 µA, V_{CE} = V_{GE}		2.5		5.0	V
I_{CES}	V_{CE} = V_{CES}	T_J = 25°C			25	µA
	V_{GE} = 0 V	T_J = 125°C			250	µA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15V			2.4	3.0	V

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Min.	Typ.	Max.	Unit
g_{fs}	I_C = I_{C90} V_{CE} = 10 V; Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	4.0	7.8		S
$I_{C(on)}$	V_{GE} = 10 V, V_{CE} = 10V		35		A
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		530		pF
C_{oes}			30		pF
C_{res}			4		pF
Q_g	I_C = I_{C90}, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		24		nC
Q_{ge}			5.5		nC
Q_{gc}			8.8		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		15		ns
t_{ri}	I_C = I_{C90}, V_{GE} = 15 V		30		ns
$t_{d(off)}$	V_{CE} = 960 V, R_G = R_{off} = 100 Ω		680	1000	ns
t_{fi}	Remarks: Switching times may		650	1000	ns
E_{off}	increase for V_{CE} (Clamp) > 0.8 V_{CES}, higher T_J or increased R_G		5.4	9.0	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		15		ns
t_{ri}	I_C = I_{C90}, V_{GE} = 15 V		30		ns
E_{on}	V_{CE} = 960 V, R_G = R_{off} = 100 Ω		0.5		mJ
$t_{d(off)}$	Remarks: Switching times may		700		ns
t_{fi}	increase for V_{CE} (Clamp) > 0.8 V_{CES},		1050		ns
E_{off}	higher T_J or increased R_G		7.7		mJ
R_{thJC}				1.66	K/W
R_{thCK}	TO-220		0.5		K/W



Min. Recommended Footprint
(Dimensions in inches and mm)

TO-220 AB Dimensions

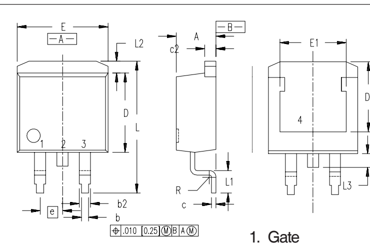


Pins: 1 - Gate, 2 - Collector, 3 - Emitter, 4 - Collector Bottom Side

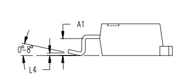
SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70	13.97
L1	.110	.230	2.79	5.84
ØP	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-220 AB.

TO-263 AA Outline



1. Gate
2. Collector
3. Emitter
4. Collector Bottom Side



Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.06	4.83	.160	.190
A1	2.03	2.79	.080	.110
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.46	0.74	.018	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	7.11	8.13	.280	.320
E	9.65	10.29	.380	.405
E1	6.86	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.38	0	.015
R	0.46	0.74	.018	.029

IXYS reserves the right to change limits, test conditions, and dimensions.

Fig. 1. Output Characteristics @ 25 ºC

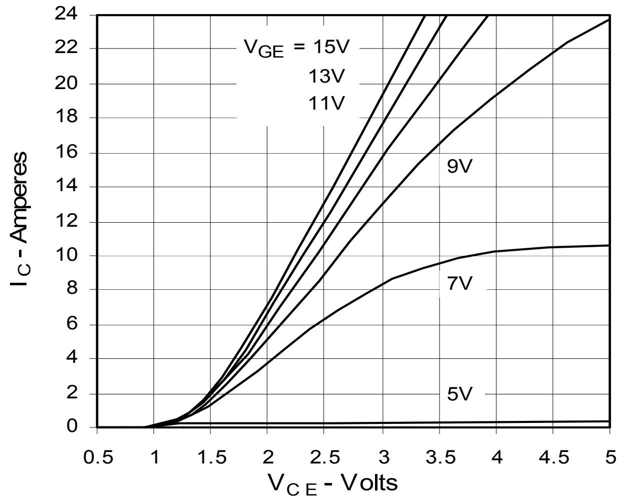


Fig. 2. Extended Output Characteristics @ 25 ºC

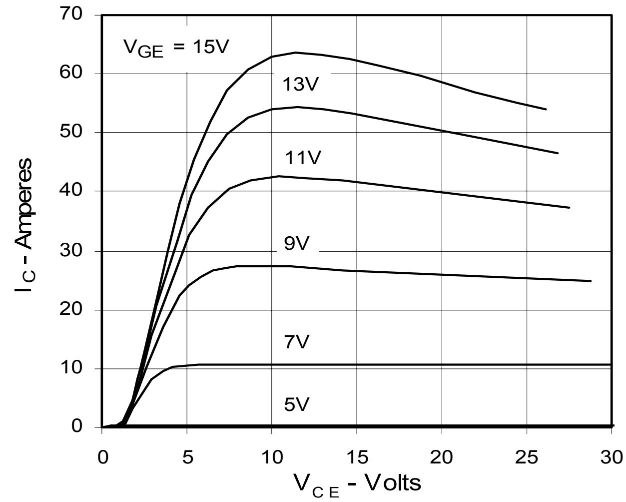


Fig. 3. Output Characteristics @ 125 ºC

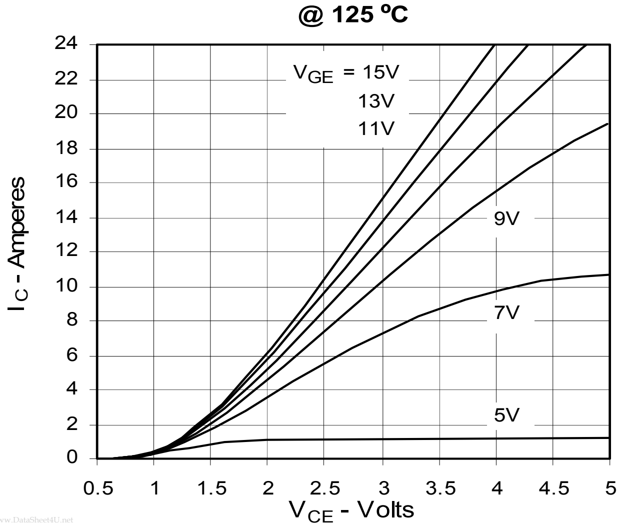


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

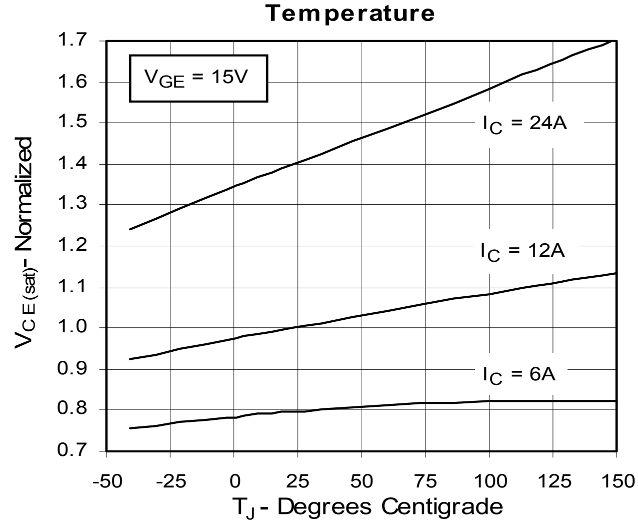


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

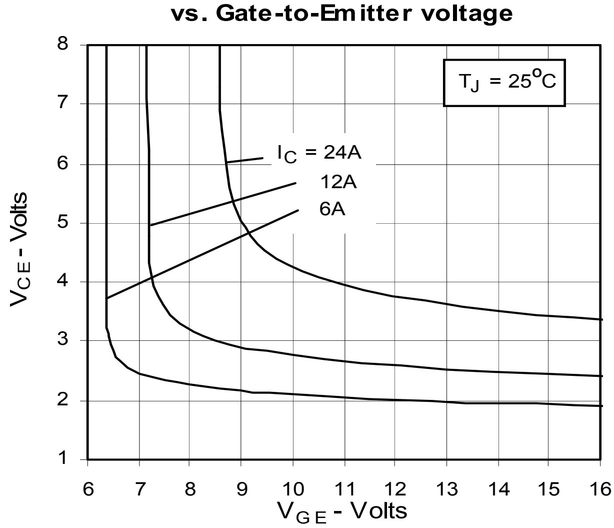


Fig. 6. Input Admittance

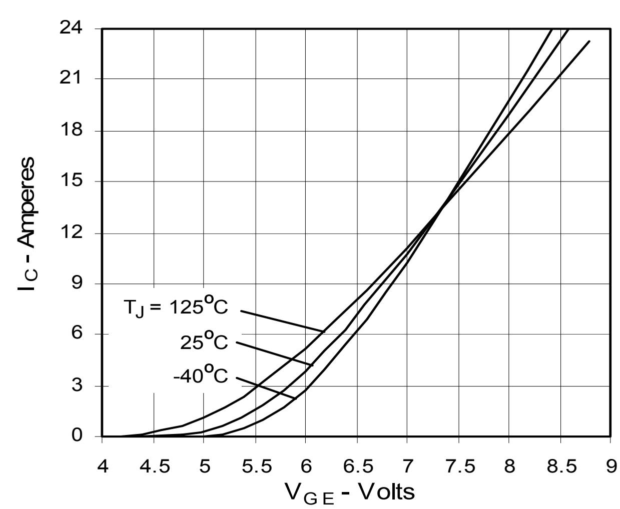


Fig. 7. Transconductance

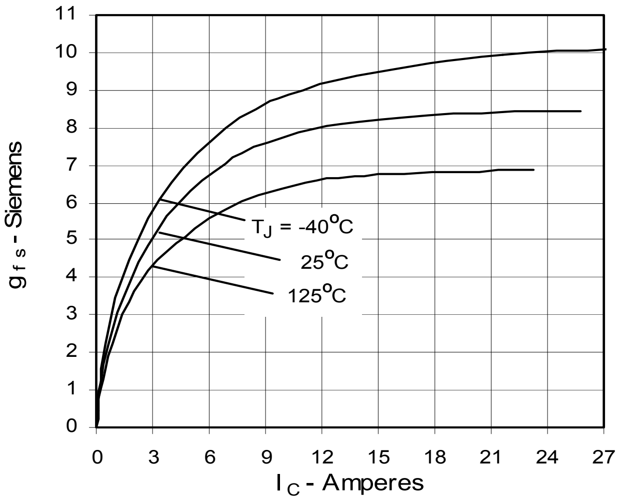


Fig. 8. Dependence of Turn-off Energy Loss on R_G

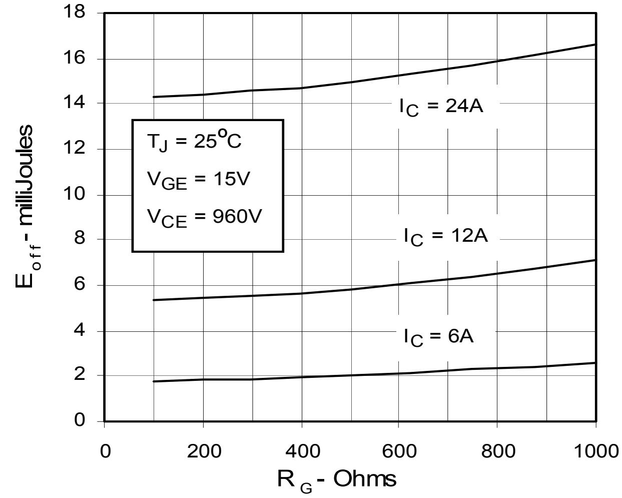


Fig. 9. Dependence of Turn-Off Energy Loss on I_C

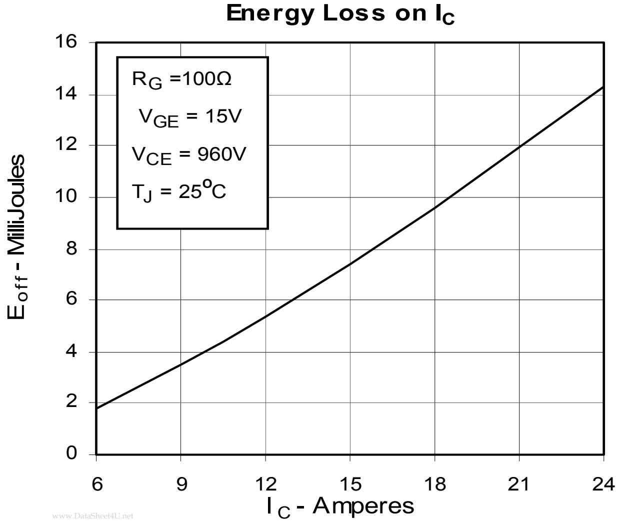


Fig. 10. Dependence of Turn-off Delay Time on R_G

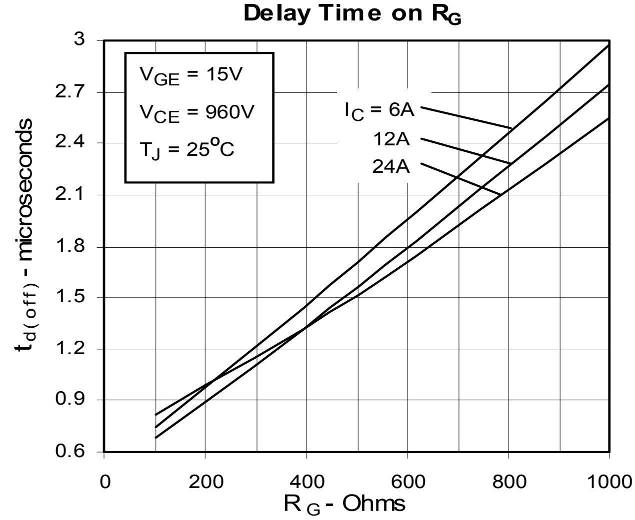


Fig. 11. Dependence of Turn-off Current Fall Time on R_G

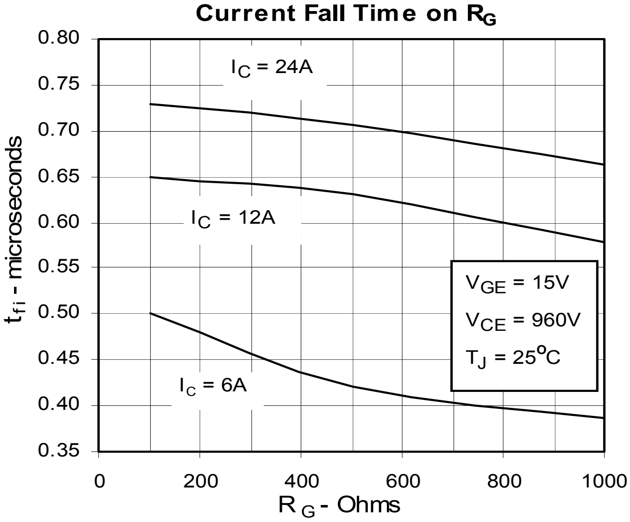


Fig. 12. Dependence of Turn-off Switching Time on I_C

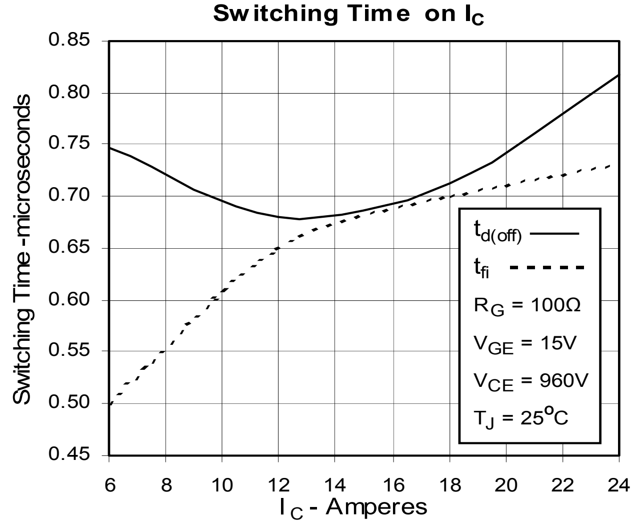


Fig. 13. Gate Charge

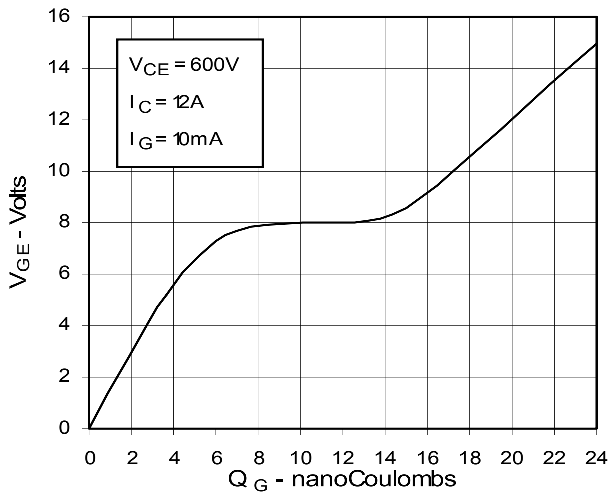


Fig. 14. Reverse-Bias Safe Operating Area

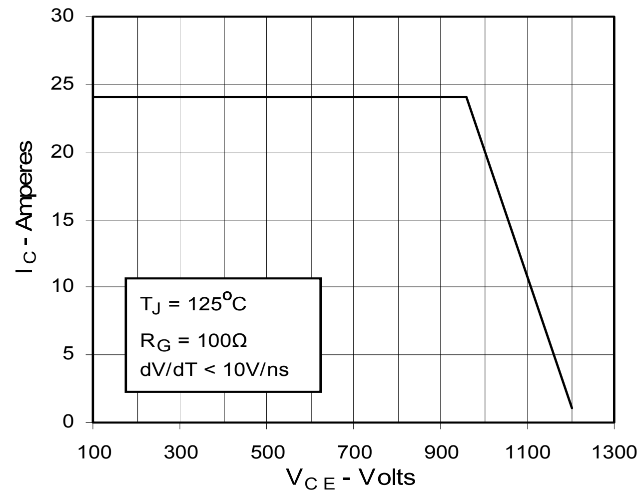


Fig. 15. Capacitance

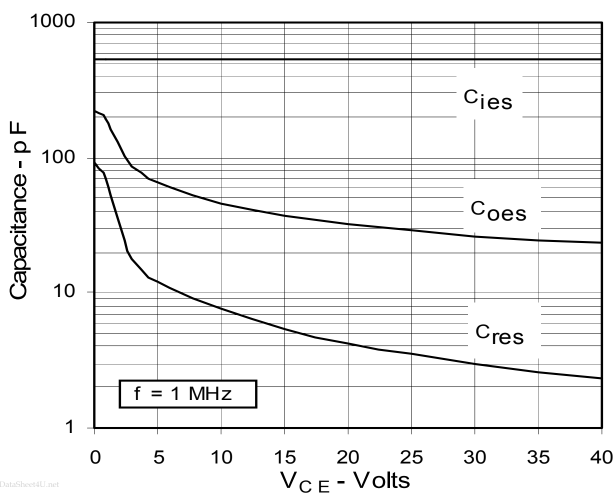


Fig. 17. Maximum Transient Thermal Resistance