IXYS

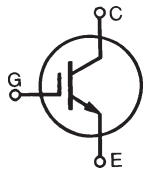
IGBT

Optimized for switching up to 5KHz

IXGA 12N120A2
IXGP 12N120A2

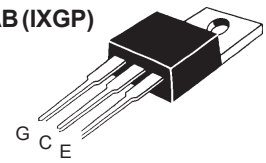
V_{CES} = 1200 V
I_{C25} = 24 A
$V_{CE(sat)}$ = 3.0 V

Preliminary data sheet

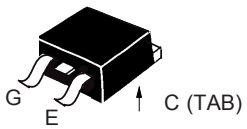


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	24	A
I_{C90}	T_C = 90°C	12	A
I_{CM}	T_C = 25°C, 1 ms	48	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 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 Mounting torque with screw M3.5	0.45/4 0.55/5	Nm/lb.in. Nm/lb.in.
Weight	TO-220 TO-263	4 2	g g

TO-220AB (IXGP)



TO-263 AA (IXGA)



Symbol (T_J = 25°C, unless otherwise specified)	Test Conditions		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

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

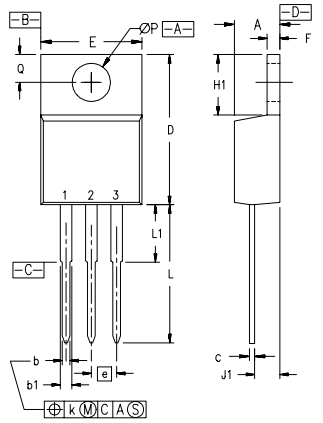
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies
- Capacitor discharge

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.	
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

TO-220 AB Dimensions

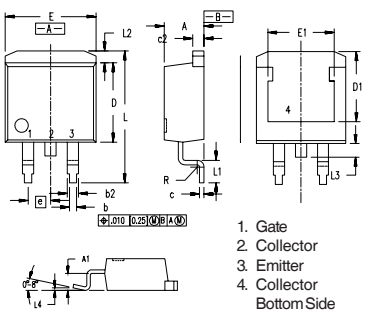


Pins: 1 - Gate 2 - Collector
3 - Emitter 4 - Collector
Bottom Side

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

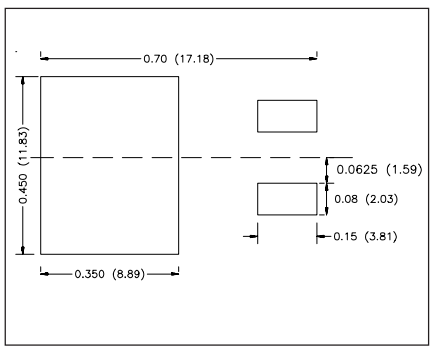
NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-220 AB.

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



Min. Recommended Footprint
(Dimensions in inches and mm)

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

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:
4,835,592 4,850,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123B1 6,306,728 B1 6,404,065B1 6,534,343 6,583,505 6,683,344 6,710,405B2 6,710,463 6,727,585 6,759,692

Fig. 1. Output Characteristics @ 25 ºC

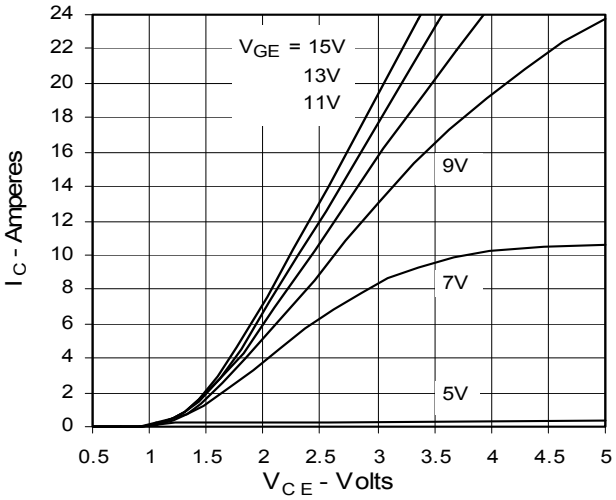


Fig. 2. Extended Output Characteristics @ 25 ºC

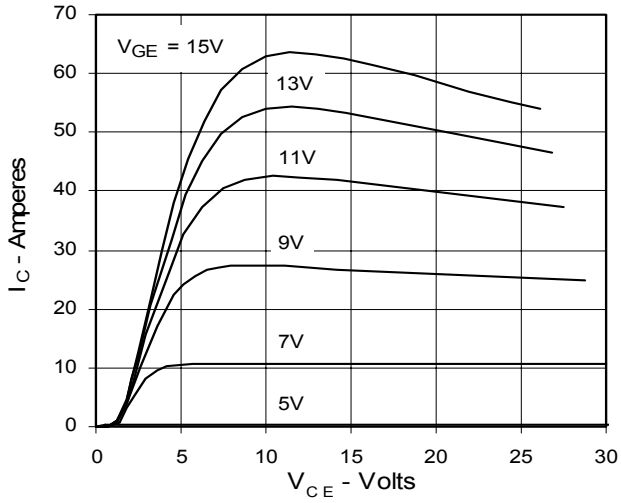


Fig. 3. Output Characteristics @ 125 ºC

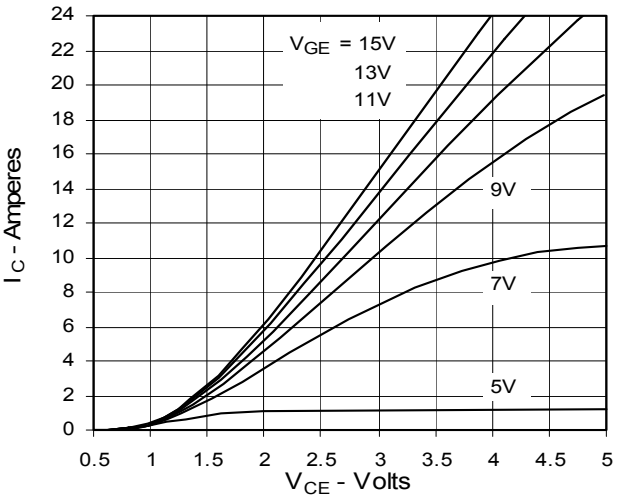


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

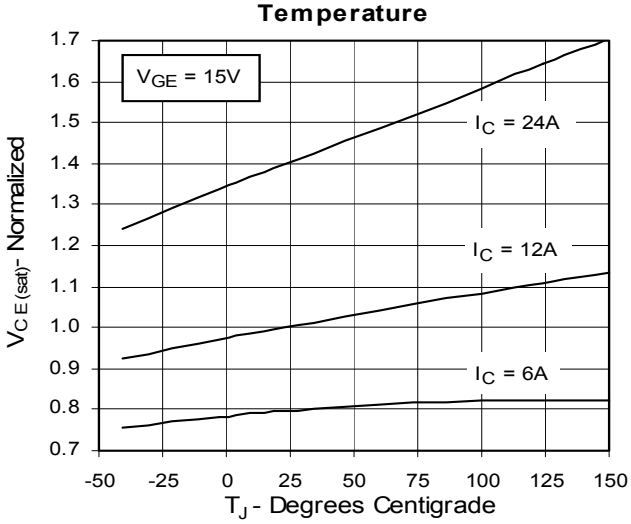


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

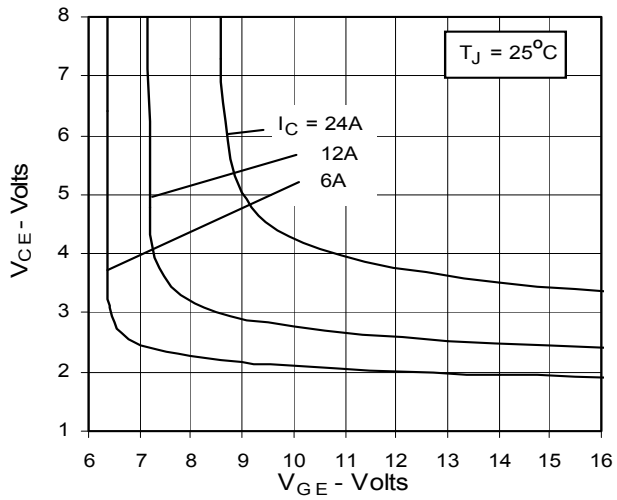


Fig. 6. Input Admittance

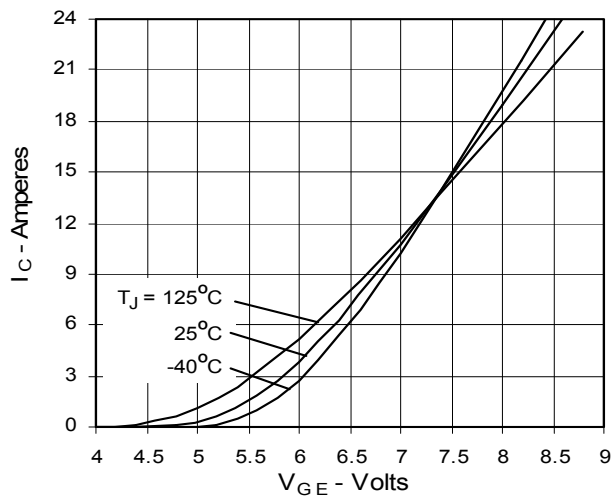


Fig. 7. Transconductance

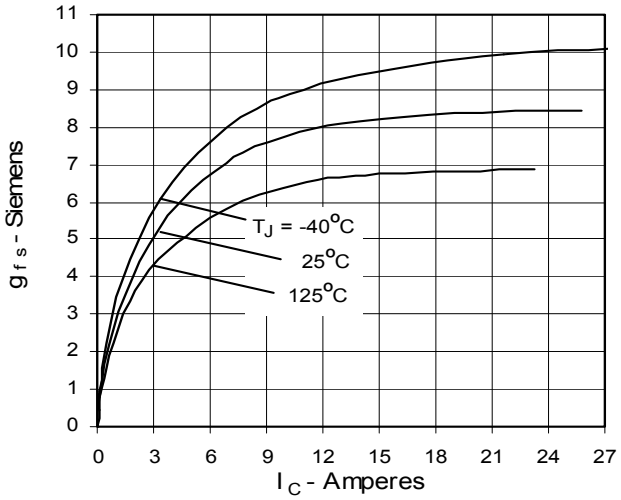


Fig. 8. Dependence of Turn-off Energy Loss on R_G

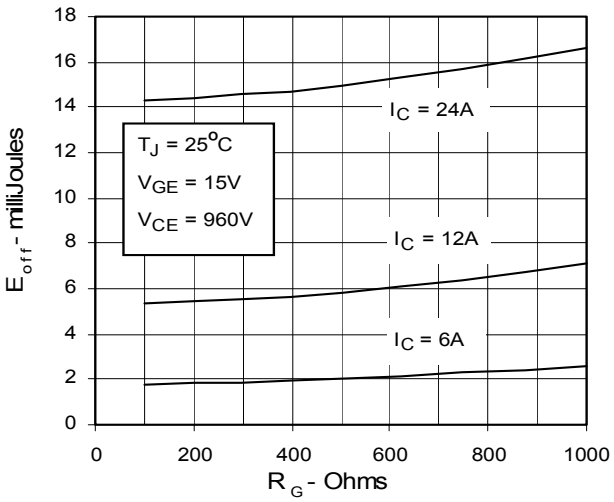


Fig. 9. Dependence of Turn-Off Energy Loss on I_C

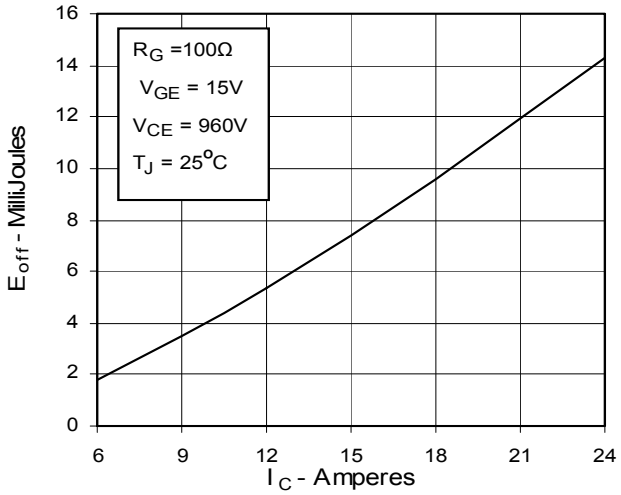


Fig. 10. Dependence of Turn-off Delay Time on R_G

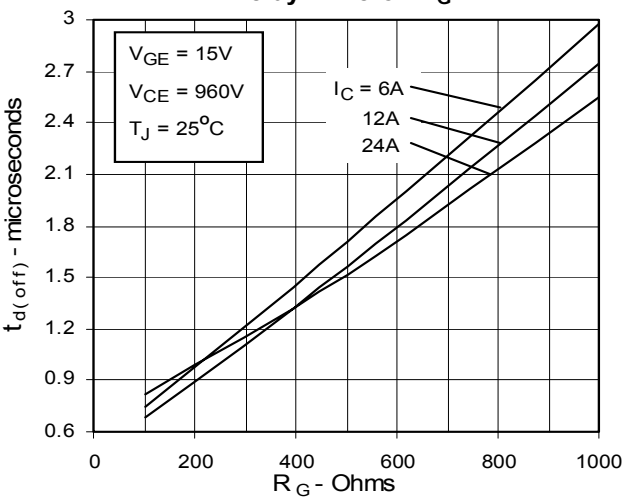


Fig. 11. Dependence of Turn-off Current Fall Time on R_G

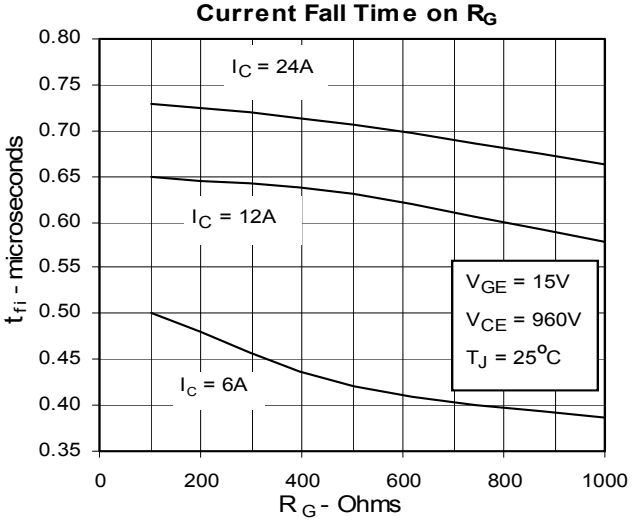


Fig. 12. Dependence of Turn-off Switching Time on I_C

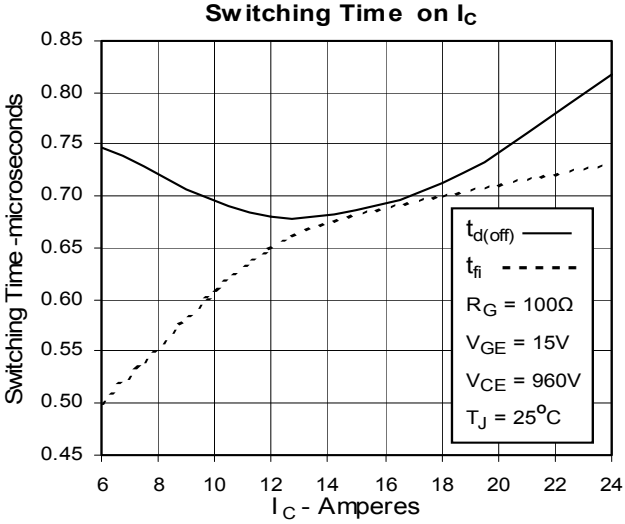


Fig. 13. Gate Charge

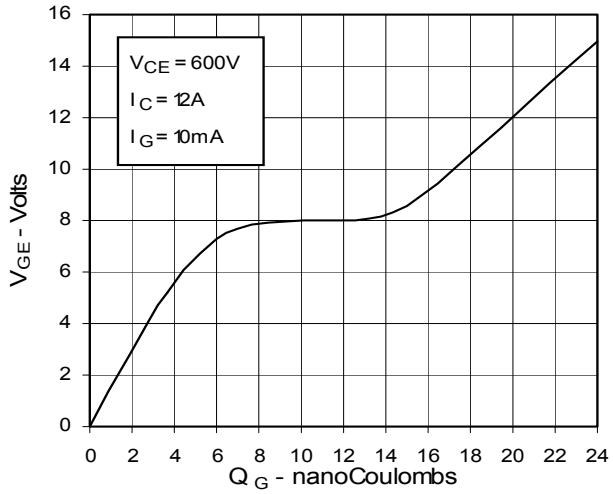


Fig. 14. Reverse-Bias Safe Operating Area

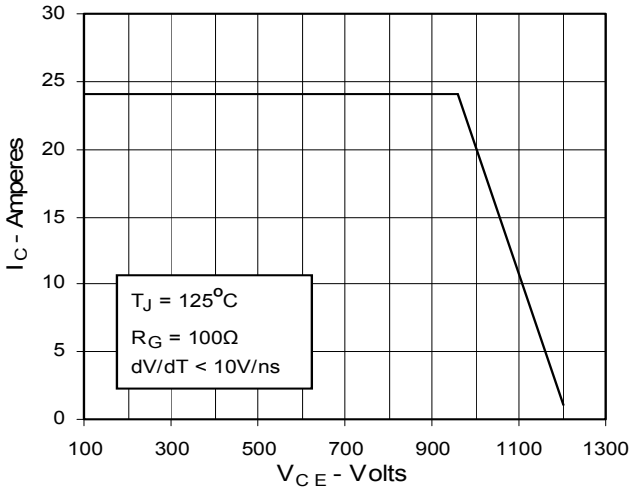


Fig. 15. Capacitance

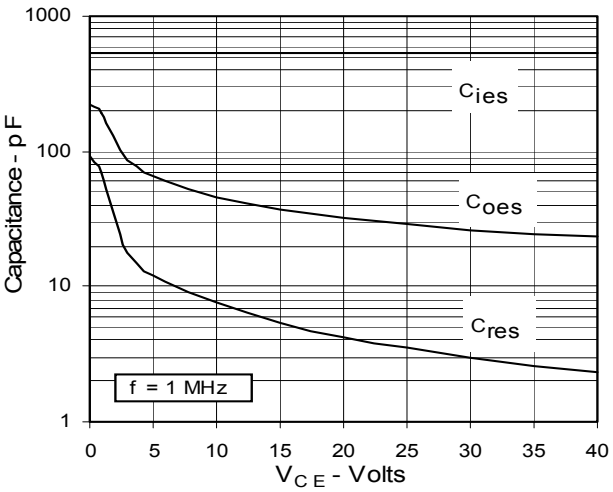


Fig. 17. Maximum Transient Thermal Resistance