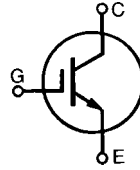


# IGBT

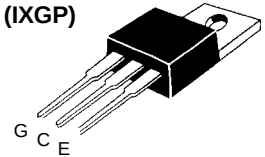
**IXGA 20N120**  
**IXGP 20N120**

$V_{CES} = 1200 \text{ V}$   
 $I_{C25} = 40 \text{ A}$   
 $V_{CE(sat)} = 2.5 \text{ V}$   
 $t_{fi(typ)} = 380 \text{ ns}$

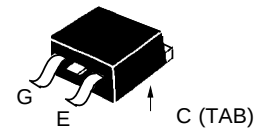


| Symbol                                                                          | Test Conditions                                                                                | Maximum Ratings                      |                  |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------|------------------|
| $V_{CES}$                                                                       | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                                                 | 1200                                 | V                |
| $V_{CGR}$                                                                       | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$                     | 1200                                 | V                |
| $V_{GES}$                                                                       | Continuous                                                                                     | $\pm 20$                             | V                |
| $V_{GEM}$                                                                       | Transient                                                                                      | $\pm 30$                             | V                |
| $I_{C25}$                                                                       | $T_C = 25^\circ\text{C}$                                                                       | 40                                   | A                |
| $I_{C90}$                                                                       | $T_C = 90^\circ\text{C}$                                                                       | 20                                   | A                |
| $I_{CM}$                                                                        | $T_C = 25^\circ\text{C}, 1 \text{ ms}$                                                         | 80                                   | A                |
| <b>SSOA</b><br><b>(RBSOA)</b>                                                   | $V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 47 \Omega$<br>Clamped inductive load | $I_{CM} = 40$<br>@ $0.8 V_{CES}$     | A                |
| $P_C$                                                                           | $T_C = 25^\circ\text{C}$                                                                       | 150                                  | W                |
| $T_J$                                                                           |                                                                                                | -55 ... +150                         | $^\circ\text{C}$ |
| $T_{JM}$                                                                        |                                                                                                | 150                                  | $^\circ\text{C}$ |
| $T_{stg}$                                                                       |                                                                                                | -55 ... +150                         | $^\circ\text{C}$ |
| Maximum lead temperature for soldering<br>1.6 mm (0.062 in.) from case for 10 s |                                                                                                | 300                                  | $^\circ\text{C}$ |
| Maximum tab temperature for soldering                                           |                                                                                                | 260                                  | $^\circ\text{C}$ |
| $M_d$                                                                           | Mounting torque with screw M3<br>Mounting torque with screw M3.5                               | 0.45/4 Nm/lb.in.<br>0.55/5 Nm/lb.in. |                  |
| <b>Weight</b>                                                                   | TO-220<br>TO-263                                                                               | 4<br>2                               | g<br>g           |

**TO-220AB (IXGP)**



**TO-263 AA (IXGA)**



## Features

- International standard packages  
JEDEC TO-220AB and TO-263AA
- High current handling capability
- 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

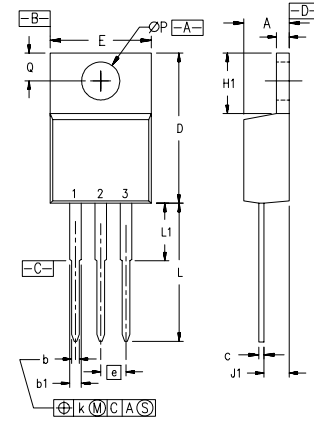
## Advantages

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

| Symbol        | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                   | Characteristic Values |      |                           |
|---------------|-----------------------------------------------------------------------------------------------|-----------------------|------|---------------------------|
|               |                                                                                               | Min.                  | Typ. | Max.                      |
| $BV_{CES}$    | $I_C = 1 \text{ mA}, V_{GE} = 0 \text{ V}$                                                    | 1200                  |      | V                         |
| $V_{GE(th)}$  | $I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$                                                      | 2.5                   |      | 5.0 V                     |
| $I_{CES}$     | $V_{CE} = V_{CES}, T_J = 25^\circ\text{C}$<br>$V_{GE} = 0 \text{ V}, T_J = 125^\circ\text{C}$ |                       |      | 250 $\mu\text{A}$<br>1 mA |
| $I_{GES}$     | $V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$                                             |                       |      | $\pm 100 \text{ nA}$      |
| $V_{CE(sat)}$ | $I_C = I_{C90}, V_{GE} = 15 \text{ V}$                                                        |                       | 2.0  | 2.5 V                     |

| Symbol       | Test Conditions                                                                                                                                                                                                                                        | Characteristic Values |      |          |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|----------|
|              |                                                                                                                                                                                                                                                        | Min.                  | Typ. | Max.     |
| $g_{fs}$     | $I_C = I_{C90}; V_{CE} = 10 V$<br>Pulse test, $t \leq 300 \mu s$ , duty cycle $\leq 2\%$                                                                                                                                                               | 12                    | 16   | S        |
| $C_{ies}$    | $V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz$                                                                                                                                                                                                               |                       | 1750 | pF       |
| $C_{oes}$    |                                                                                                                                                                                                                                                        |                       | 90   | pF       |
| $C_{res}$    |                                                                                                                                                                                                                                                        |                       | 31   | pF       |
| $I_{C(ON)}$  | $V_{GE} = 10 V, V_{CE} = 10 V$                                                                                                                                                                                                                         |                       | 90   | A        |
| $Q_g$        | $I_C = I_{C90}, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}$                                                                                                                                                                                                   |                       | 63   | nC       |
| $Q_{ge}$     |                                                                                                                                                                                                                                                        |                       | 13   | nC       |
| $Q_{gc}$     |                                                                                                                                                                                                                                                        |                       | 26   | nC       |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ C</math></b><br>$I_C = I_{C90}, V_{GE} = 15 V$<br>$V_{CE} = 800 V, R_G = R_{off} = 47 \Omega$<br>Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$  |                       | 28   | ns       |
| $t_{ri}$     |                                                                                                                                                                                                                                                        |                       | 20   | ns       |
| $t_{d(off)}$ |                                                                                                                                                                                                                                                        |                       | 400  | 800 ns   |
| $t_{fi}$     |                                                                                                                                                                                                                                                        |                       | 380  | 700 ns   |
| $E_{off}$    |                                                                                                                                                                                                                                                        |                       | 6.5  | 10.5 mJ  |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ C</math></b><br>$I_C = I_{C90}, V_{GE} = 15 V$<br>$V_{CE} = 800 V, R_G = R_{off} = 47 \Omega$<br>Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$ |                       | 30   | ns       |
| $t_{ri}$     |                                                                                                                                                                                                                                                        |                       | 27   | ns       |
| $E_{on}$     |                                                                                                                                                                                                                                                        |                       | 0.90 | mJ       |
| $t_{d(off)}$ |                                                                                                                                                                                                                                                        |                       | 700  | ns       |
| $t_{fi}$     |                                                                                                                                                                                                                                                        |                       | 550  | ns       |
| $E_{off}$    |                                                                                                                                                                                                                                                        |                       | 9.5  | mJ       |
| $R_{thJC}$   |                                                                                                                                                                                                                                                        |                       |      | 0.83 K/W |
| $R_{thCK}$   | TO-220                                                                                                                                                                                                                                                 |                       | 0.5  | K/W      |

### TO-220 AB Dimensions

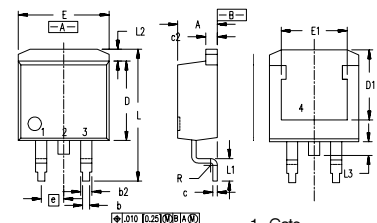


Pins: 1 - Gate  
2 - Collector  
3 - Emitter  
4 - Collector  
Bottom Side

| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | 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  |

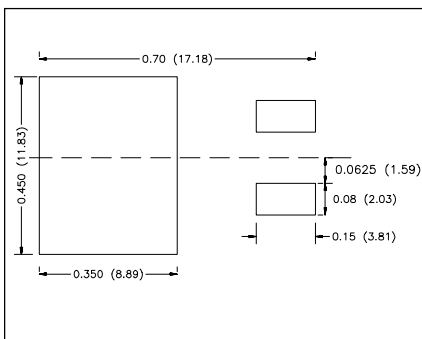
NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-220 AB.

### TO-263 AA Outline



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

| Dim. | Millimeter |       | Inches |      |
|------|------------|-------|--------|------|
|      | Min.       | Max.  | Min.   | 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 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 | 6,306,728B1 |
|                                                                                  | 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 |             |

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