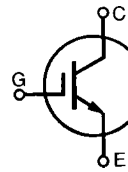
IXYS Advance Technical Information

# HIGH Voltage IGBT

"S" Series - Improved SCSOA Capability

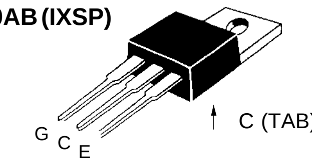
## IXSA 15N120B
## IXSP 15N120B

$V_{CES}$ = 1200 V
$I_{C25}$ = 30 A
$V_{CE(sat)}$ = 3.4 V

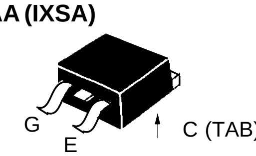



| Symbol | Test Conditions | | Maximum Ratings | |
|---|---|---|---|---|
| $V_{CES}$ | $T_J$ = 25°C to 150°C | | 1200 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C; $R_{GE}$ = 1 MΩ | | 1200 | V |
| $V_{GES}$ | Continuous | | ±20 | V |
| $V_{GEM}$ | Transient | | ±30 | V |
| $I_{C25}$ | $T_C$ = 25°C | | 30 | A |
| $I_{C90}$ | $T_C$ = 90°C | | 15 | A |
| $I_{CM}$ | $T_C$ = 25°C, 1 ms | | 60 | A |
| **SSOA (RBSOA)** | $V_{GE}$= 15 V, $T_J$ = 125°C, $R_G$ = 10 Ω Clamped inductive load | | $I_{CM}$ = 40 @ 0.8 $V_{CES}$ | A |
| $t_{SC}$ | $T_J$ = 125°C, $V_{GE}$ = 720 V; $V_{GE}$ = 15 V, $R_G$ = 10 Ω Non repetitive | | 10 | µs |
| $P_C$ | $T_C$ = 25°C | | 150 | W |
| $T_J$ | | | -55 ... +150 | °C |
| $T_{JM}$ | | | 150 | °C |
| $T_{stg}$ | | | -55 ... +150 | °C |
| $M_d$ | Mounting torque | (TO-247) | 1.13/10 | Nm/lb.in. |
| Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s | | | 300 | °C |
| Maximum tab temperature for soldering | | (TO-263) | 260 | °C |
| **Weight** | | TO-220 | 4 | g |
| | | TO-263 | 2 | g |

**TO-220AB (IXSP)**




**TO-263 AA (IXSA)**




| 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, $V_{CE}$ = $V_{GE}$ | | 3 | | 6 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$ | $T_J$ = 25°C | | | 50 | µA |
| | $V_{GE}$ = 0 V | $T_J$ = 125°C | | | 2.5 | mA |
| $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = ±20 V | | | | ±100 | nA |
| $V_{CE(sat)}$ | $I_C$ = $I_{CE90}$, $V_{GE}$ = 15 | | | 3.0 | 3.4 | V |
| | | $T_J$ = 125°C | | 2.8 | | V |

### Features

- International standard packages JEDEC TO-220AB and TO-263AA
- Low switching losses, low $V_{(sat)}$
- MOS Gate turn-on
  - drive simplicity

### Applications

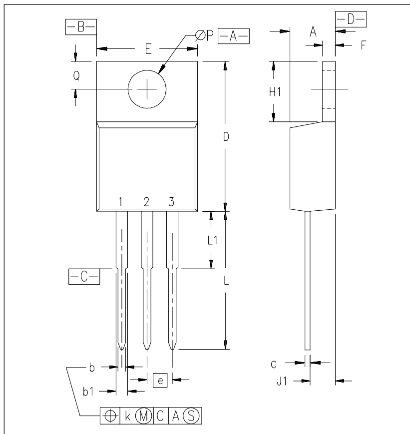
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

### 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, Note2 | 7 | 9.5 | | S |
| $C_{ies}$ | $V_{CE}$ = 25 V, $V_{GE}$ = 0 V, f = 1 MHz | | 1400 | | pF |
| $C_{oes}$ | | | 98 | | pF |
| $C_{res}$ | | | 37 | | pF |
| $Q_g$ | $I_C = I_{C90}$, $V_{GE}$ = 15 V, $V_{CE} = 0.5\ V_{CES}$ | | 57 | | nC |
| $Q_{ge}$ | | | 14 | | nC |
| $Q_{gc}$ | | | 25 | | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 25°C** $I_C = I_{C90}$, $V_{GE}$ = 15 V $V_{CE}$ = 960 V, $R_G = R_{off}$ = 10 Ω Note3 | | 30 | | ns |
| $t_{ri}$ | | | 25 | | ns |
| $t_{d(off)}$ | | | 148 | 280 | ns |
| $t_{fi}$ | | | 160 | 320 | ns |
| $E_{off}$ | | | 1.75 | 3.0 | mJ |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** $I_C = I_{C90}$, $V_{GE}$ = 15 V $V_{CE}$ = 960 V, $R_G = R_{off}$ = 10 Ω Note3 | | 30 | | ns |
| $t_{ri}$ | | | 25 | | ns |
| $E_{on}$ | | | 1.1 | | mJ |
| $t_{d(off)}$ | | | 265 | | ns |
| $t_{fi}$ | | | 298 | | ns |
| $E_{off}$ | | | 3.1 | | mJ |
| $R_{thJC}$ | | | | 0.83 | K/W |
| $R_{thCK}$ | TO-220 | | 0.5 | | K/W |

## TO-220 AB Dimensions

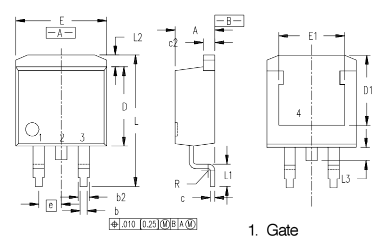


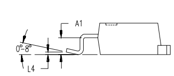

Pins: 1 - Gate, 2 - Collector, 3 - Emitter, 4 - Collector Bottom Side

| SYM | INCHES 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



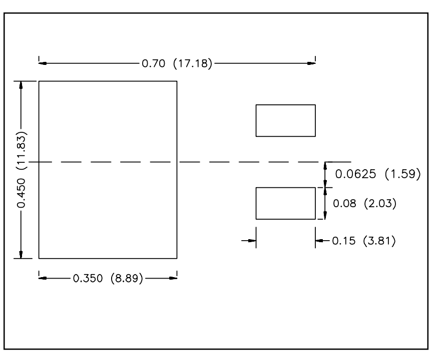

1. Gate
2. Collector
3. Emitter
4. Collector Bottom Side

| 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 |

Notes: 1. Device must be heatsunk for high temperature leakage current measurements to avoid thermal runaway.

2. Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %

3. Switching times may increase for $V_{CE}$ (Clamp) > 0.8 $V_{CES}$, higher $T_J$ or increased $R_G$.




**Min. Recommended Footprint**
(Dimensions in inches and mm)