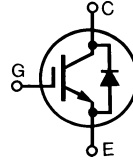


High Voltage IGBT with Diode

IXSK 35N120BD1
IXSX 35N120BD1

$V_{CES} = 1200\text{ V}$
 $I_{C25} = 70\text{ A}$
 $V_{CE(SAT)} = 3.6\text{ V}$

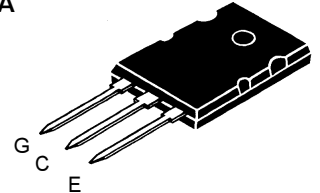
Short Circuit SOA Capability



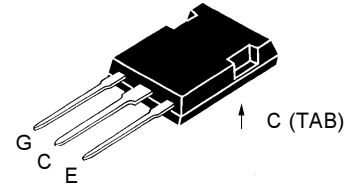
Preliminary data sheet

| 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 | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ\text{C}$ | 70 | A |
| I_{C90} | $T_C = 90^\circ\text{C}$ | 35 | A |
| I_{CM} | $T_C = 25^\circ\text{C}, 1\text{ ms}$ | 140 | A |
| SSOA (RBSOA) | $V_{GE} = 15\text{ V}, T_J = 125^\circ\text{C}, R_G = 5\ \Omega$ Clamped inductive load | $I_{CM} = 90$ @ $0.8 V_{CES}$ | A |
| t_{SC} (SCSOA) | $V_{GE} = 15\text{ V}, V_{CE} = 720\text{ V}, T_J = 125^\circ\text{C}$ $R_G = 5\ \Omega$, non repetitive | 10 | μs |
| P_C | $T_C = 25^\circ\text{C}$ | IGBT | 300 W |
| | | Diode | 190 W |
| T_J | | -55 ... +150 | $^\circ\text{C}$ |
| T_{JM} | | 150 | $^\circ\text{C}$ |
| T_{stg} | | -55 ... +150 | $^\circ\text{C}$ |
| T_L | 1.6 mm (0.063 in) from case for 10 s | 300 | $^\circ\text{C}$ |
| Weight | TO-264 | 10 | g |
| | PLUS247 | 6 | g |

TO-264 AA (IXSK)



PLUS TO-247™ (IXSX)



G = Gate,
E = Emitter,

C = Collector,
TAB = Collector

Features

- Hole-less TO-247 package for clip mounting
- High frequency IGBT and anti-parallel FRED in one package
- Low $V_{CE(sat)}$
 - for minimum on-state conduction losses
- MOS Gate turn-on
 - drive simplicity
- Fast Recovery Epitaxial Diode (FRED)
 - soft recovery with low I_{RM}

Applications

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

Advantages

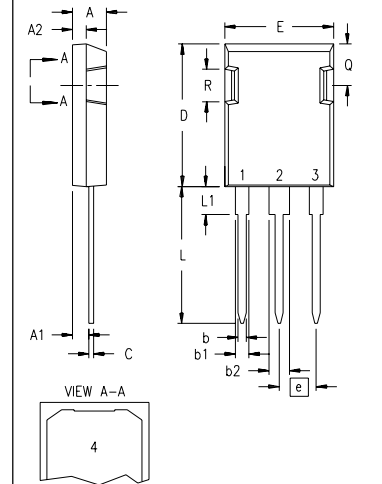
- Space savings (two devices in one package)
- Reduces assembly time and cost
- High power density

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|---------------|--|---|------|---------------------|
| | | min. | typ. | max. |
| BV_{CES} | $I_C = 3\text{ mA}, V_{GE} = 0\text{ V}$ | 1200 | | V |
| $V_{GE(th)}$ | $I_C = 250\ \mu\text{A}, V_{CE} = V_{GE}$ | 3 | | V |
| I_{CES} ① | $V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{ V}$ $T_J = 125^\circ\text{C}$ | | | 1 mA 3 mA |
| I_{GES} | $V_{CE} = 0\text{ V}, V_{GE} = \pm 20\text{ V}$ | | | $\pm 100\text{ nA}$ |
| $V_{CE(sat)}$ | $I_C = I_{C90}, V_{GE} = 15\text{ V}$ | | | 3.6 V |

① Device must be heatsunk for high temperature measurements to avoid thermal runaway.
IXYS reserves the right to change limits, test conditions and dimensions

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | | |
|--------------|--|---|------|------|----|
| | | min. | typ. | max. | |
| g_{fs} | $I_C = I_{C90}$; $V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$ | 16 | 23 | S | |
| C_{ies} | $V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$ | | 3600 | pF | |
| C_{oes} | | | 315 | pF | |
| C_{res} | | | 75 | pF | |
| Q_g | $I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $V_{CE} = 0.5 V_{CES}$ | | 120 | nC | |
| Q_{ge} | | | 33 | nC | |
| Q_{gc} | | | 49 | nC | |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $V_{CE} = 0.8 V_{CES}$, $R_G = 5.0\ \Omega$ Switching times may increase for V_{CE} (Clamp) $> 0.8 \cdot V_{CES}$, higher T_J or increased R_G | | 36 | ns | |
| t_{ri} | | | 27 | ns | |
| $t_{d(off)}$ | | | 160 | 300 | ns |
| t_{fi} | | | 180 | 300 | ns |
| E_{off} | | | 5 | 9 | mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $V_{CE} = 0.8 V_{CES}$, $R_G = 5.0\ \Omega$ Switching times may increase for V_{CE} (Clamp) $> 0.8 \cdot V_{CES}$, higher T_J or increased R_G | | 38 | ns | |
| t_{ri} | | | 29 | ns | |
| E_{on} | | | 6 | mJ | |
| $t_{d(off)}$ | | | 240 | ns | |
| t_{fi} | | | 340 | ns | |
| E_{off} | | 9 | mJ | | |
| R_{thJC} | | | 0.42 | KW | |
| R_{thCK} | | 0.15 | | KW | |

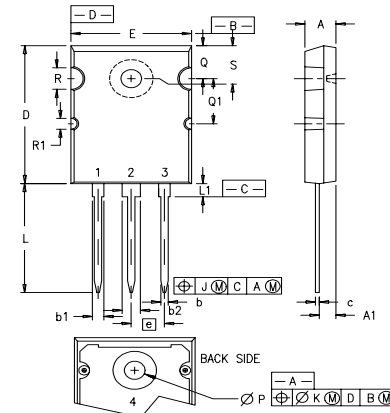
TO-247 HOLE-LESS Outline



| SYM | INCHES | | MILLIMETERS | |
|-----|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .190 | .205 | 4.83 | 5.21 |
| A1 | .090 | .100 | 2.29 | 2.54 |
| A2 | .075 | .085 | 1.91 | 2.16 |
| b | .045 | .055 | 1.14 | 1.40 |
| b1 | .075 | .084 | 1.91 | 2.13 |
| b2 | .115 | .123 | 2.92 | 3.12 |
| C | .024 | .031 | 0.61 | 0.80 |
| D | .819 | .840 | 20.80 | 21.34 |
| E | .620 | .635 | 15.75 | 16.13 |
| e | .215 BSC | | 5.45 BSC | |
| L | .780 | .800 | 19.81 | 20.32 |
| L1 | .150 | .170 | 3.81 | 4.32 |
| Q | .220 | .244 | 5.59 | 6.20 |
| R | .170 | .190 | 4.32 | 4.83 |

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - DRAIN (COLLECTOR)

TO-264 AA Outline



| SYM | INCHES | | MILLIMETERS | |
|-----|----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .185 | .209 | 4.70 | 5.31 |
| A1 | .102 | .118 | 2.59 | 3.00 |
| b | .037 | .055 | 0.94 | 1.40 |
| b1 | .087 | .102 | 2.21 | 2.59 |
| b2 | .110 | .126 | 2.79 | 3.20 |
| c | .017 | .029 | 0.43 | 0.74 |
| D | 1.007 | 1.047 | 25.58 | 26.59 |
| E | .760 | .799 | 19.30 | 20.29 |
| e | .215 BSC | | 5.46 BSC | |
| J | .000 | .010 | 0.00 | 0.25 |
| K | .000 | .010 | 0.00 | 0.25 |
| L | .779 | .842 | 19.79 | 21.39 |
| L1 | .087 | .102 | 2.21 | 2.59 |
| ØP | .122 | .138 | 3.10 | 3.51 |
| Q | .240 | .256 | 6.10 | 6.50 |
| Q1 | .330 | .346 | 8.38 | 8.79 |
| ØR | .155 | .187 | 3.94 | 4.75 |
| ØR1 | .085 | .093 | 2.16 | 2.36 |
| S | .243 | .253 | 6.17 | 6.43 |

- 1 - GATE
- 2, 4 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|------------|--|---|------|------------------|
| | | min. | typ. | max. |
| V_F | $I_F = 130\text{ A}$, $V_{GE} = 0\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$, $T_J = 125^\circ\text{C}$ | | | 2.75 V 1.85 V |
| I_{RM} | $I_F = 130\text{ A}$, $V_{GE} = 0\text{ V}$, $-di_F/dt = 100\text{ A}/\mu\text{s}$, $T_J = 100^\circ\text{C}$ $V_R = 100\text{ V}$ $I_F = 1\text{ A}$; $-di/dt = 200\text{ A}/\mu\text{s}$; $V_R = 30\text{ V}$ | | 7 | 14.3 A |
| t_{rr} | | | 40 | ns |
| R_{thJC} | | | | 0.65 KW |

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