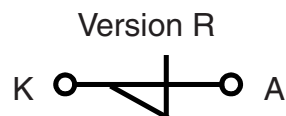


Breakover Diode Modules (BOD1)

 $V_{BO} = 1200 - 4200 \text{ V}$
 $I_{AVM} = 0.2 - 1.25 \text{ A}$

| Number of BODs | Types |
|----------------|---------------------------------|
| 2 | IXBOD1-12R(D) ... IXBOD1-19R(D) |
| 3 | IXBOD1-20R(D) ... IXBOD1-32R(D) |
| 4 | IXBOD1-34R ... IXBOD1-42R |



Features / Advantages:

- Fast turn on
- Low temperature dependence
- Low leakage current

Applications:

- High voltage circuit protection
- Transient voltage protection
- Trigger device
- Power pulse generators
- Lightning and arcing protection
- Energy discharge circuits
- Battery overvoltage protection
- Solar array protection

Package: BOD-Package

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Reduced weight

Disclaimer Notice

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| IXBOD1 several values | | | | Ratings | | | |
|-----------------------|--|--|------|---------|-------------------|------------------|--|
| Symbol | Definitions | Conditions | min. | typ. | max. | | |
| I_D | drain current | $V_D = 0.8 \cdot V_{BO}$ $T_{VJ} = 125^\circ\text{C}$ | | | 100 | μA | |
| I_{BO} | breakover current | $T_{VJ} = 25^\circ\text{C}$ | | | 15 | mA | |
| I_H | holding current | $T_{VJ} = 25^\circ\text{C}$ | | | 30 | mA | |
| V_H | holding voltage | $T_{VJ} = 25^\circ\text{C}$ | 4 | | 8 | V | |
| $(di/dt)_C$ | maximum pulsed source current | $V_D = V_{BO}; I_T = 80 \text{ A}; f = 50 \text{ Hz}$ $T_{VJ} = 125^\circ\text{C}$ | | | 200 | A/ μs | |
| t_q | turn-off time | $V_D = 0.67 \cdot V_{BO}; V_R = 0 \text{ V}; I_T = 80 \text{ A}$ $T_{VJ} = 125^\circ\text{C}$ $dv/dt_{(lin.)} = 200 \text{ V}/\mu\text{s}; di/dt = -10 \text{ A}/\mu\text{s}$ | | 150 | | μs | |
| K_T | temperature coefficient of V_{BO} | | | | $2 \cdot 10^{-3}$ | K^{-1} | |
| K_P | coefficient for energy per pulse E_P | (material constant) | | | 700 | K/Ws | |

| IXBOD1 - 12R... - 19R (2 Elements) | | | | Ratings | | | |
|------------------------------------|---------------------------------|---|--|--|--|--------------------------------------|--|
| Symbol | Definitions | Conditions | min. | typ. | max. | | |
| V_{BO} | breakover voltage | $V_{BO}(T_{VJ}) = V_{BO, 25^\circ\text{C}} [1 + K_T (T_{VJ} - 25^\circ\text{C})]$ IXBOD 1 -12R IXBOD 1 -13R IXBOD 1 -14R IXBOD 1 -15R IXBOD 1 -16R IXBOD 1 -17R IXBOD 1 -18R IXBOD 1 -19R | 1150 1250 1350 1450 1550 1650 1750 1850 | 1200 1300 1400 1500 1600 1700 1800 1900 | 1250 1350 1450 1550 1650 1750 1850 1950 | V V V V V V V V | |
| I_{RMS} | RMS current | $f = 50 \text{ Hz}$ $T_{amb} = 50^\circ\text{C}$ pins soldered to printed circuit (conductor 0.035x2mm) | | | 2.0 | A | |
| I_{FAVM} | maximum average forward current | | | | 1.25 | A | |
| I_{SM} | maximum pulsed source current | $t_p = 0.1 \text{ ms};$ non repetitive $T_{amb} = 50^\circ\text{C}$ | | | 200 | A | |
| I^2t | I^2t value for fusing | $t_p = 0.1 \text{ ms}$ $T_{amb} = 50^\circ\text{C}$ | | | 2 | A^2s | |
| V_T | forward voltage drop | $I_T = 5 \text{ A}$ $T_{VJ} = 125^\circ\text{C}$ | | | 3.4 | V | |
| V_{T0} | threshold voltage | for power-loss calculation only | | | 2.2 | V | |
| r_T | slope resistance | | | | 0.24 | Ω | |

| IXBOD1 - 12RD... - 19RD (2 Elements) | | | | Ratings | | | |
|--------------------------------------|--|---|------|---------|-------|---|------------------|
| Symbol | Definitions | Conditions | min. | typ. | max. | | |
| V_{BO} | <i>breakover voltage</i> | $V_{BO}(T_{VJ}) = V_{BO, 25^{\circ}C} [1 + K_T (T_{VJ} - 25^{\circ}C)]$ IXBOD 1 -12RD IXBOD 1 -13RD IXBOD 1 -14RD IXBOD 1 -15RD IXBOD 1 -16RD IXBOD 1 -17RD IXBOD 1 -18RD IXBOD 1 -19RD | | | | | |
| | | | 1150 | 1200 | 1250 | V | |
| | | | 1250 | 1300 | 1350 | V | |
| | | | 1350 | 1400 | 1450 | V | |
| | | | 1450 | 1500 | 1550 | V | |
| | | | 1550 | 1600 | 1650 | V | |
| | | | 1650 | 1700 | 1750 | V | |
| | | | 1750 | 1800 | 1850 | V | |
| | | 1850 | 1900 | 1950 | V | | |
| I_{RMS} | <i>RMS current</i> | f = 50 Hz pins soldered to printed circuit (conductor 0.035x2mm) | | | 0.3 | | A |
| I_{FAVM} | <i>maximum average forward current</i> | | | | 0.2 | | A |
| I_{SM} | <i>maximum pulsed source current</i> | $t_p = 0.1$ ms; non repetitive | | | 50 | | A |
| I^2t | <i>I²t value for fusing</i> | $t_p = 0.1$ ms | | | 0.125 | | A ² s |
| V_T | <i>forward voltage drop</i> | $I_T = 5$ A | | | 27 | | V |
| V_{TO} | <i>threshold voltage</i> | for power-loss calculation only | | | 17.5 | | V |
| r_T | <i>slope resistance</i> | | | | 3 | | Ω |

| IXBOD1 - 20R... - 32R (3 Elements) | | | | Ratings | | | |
|------------------------------------|--|---|------|---------|------|---|------------------|
| Symbol | Definitions | Conditions | min. | typ. | max. | | |
| V_{BO} | <i>breakover voltage</i> | $V_{BO}(T_{VJ}) = V_{BO, 25^{\circ}C} [1 + K_T (T_{VJ} - 25^{\circ}C)]$ IXBOD 1 -20R IXBOD 1 -21R IXBOD 1 -22R IXBOD 1 -23R IXBOD 1 -24R IXBOD 1 -25R IXBOD 1 -26R IXBOD 1 -28R IXBOD 1 -30R IXBOD 1 -32R | | | | | |
| | | | 1950 | 2000 | 2050 | V | |
| | | | 2050 | 2100 | 2150 | V | |
| | | | 2150 | 2200 | 2250 | V | |
| | | | 2250 | 2300 | 2350 | V | |
| | | | 2350 | 2400 | 2450 | V | |
| | | | 2450 | 2500 | 2550 | V | |
| | | | 2500 | 2600 | 2700 | V | |
| | | | 2700 | 2800 | 2900 | V | |
| | | | 2900 | 3000 | 3100 | V | |
| | | 3100 | 3200 | 3300 | V | | |
| I_{RMS} | <i>RMS current</i> | f = 50 Hz pins soldered to printed circuit (conductor 0.035x2mm) | | | 1.4 | | A |
| I_{FAVM} | <i>maximum average forward current</i> | | | | 0.9 | | A |
| I_{SM} | <i>maximum pulsed source current</i> | $t_p = 0.1$ ms; non repetitive | | | 200 | | A |
| I^2t | <i>I²t value for fusing</i> | $t_p = 0.1$ ms | | | 2 | | A ² s |
| V_T | <i>forward voltage drop</i> | $I_T = 5$ A | | | 5.1 | | V |
| V_{TO} | <i>threshold voltage</i> | for power-loss calculation only | | | 3.3 | | V |
| r_T | <i>slope resistance</i> | | | | 0.36 | | Ω |

| IXBOD1 - 20RD... - 32RD (3 Elements) | | | Ratings | | | |
|--------------------------------------|--|---|---------|------|-------|------------------|
| Symbol | Definitions | Conditions | min. | typ. | max. | |
| V_{BO} | <i>breakover voltage</i> | $V_{BO}(T_{VJ}) = V_{BO, 25^{\circ}C} [1 + K_T (T_{VJ} - 25^{\circ}C)]$ IXBOD 1 -20RD IXBOD 1 -21RD IXBOD 1 -22RD IXBOD 1 -23RD IXBOD 1 -24RD IXBOD 1 -25RD IXBOD 1 -26RD IXBOD 1 -28RD IXBOD 1 -30RD IXBOD 1 -32RD | | | | |
| | | | 1950 | 2000 | 2050 | V |
| | | | 2050 | 2100 | 2150 | V |
| | | | 2150 | 2200 | 2250 | V |
| | | | 2250 | 2300 | 2350 | V |
| | | | 2350 | 2400 | 2450 | V |
| | | | 2450 | 2500 | 2550 | V |
| | | | 2500 | 2600 | 2700 | V |
| | | | 2700 | 2800 | 2900 | V |
| | | | 2900 | 3000 | 3100 | V |
| 3100 | 3200 | 3300 | V | | | |
| I_{RMS} | <i>RMS current</i> | f = 50 Hz pins soldered to printed circuit (conductor 0.035x2mm) | | | 0.3 | A |
| I_{FAVM} | <i>maximum average forward current</i> | | | | 0.2 | A |
| I_{SM} | <i>maximum pulsed source current</i> | $t_p = 0.1$ ms; non repetitive | | | 50 | A |
| I^2t | <i>I²t value for fusing</i> | $t_p = 0.1$ ms | | | 0.125 | A ² s |
| V_T | <i>forward voltage drop</i> | $I_T = 5$ A | | | 27 | V |
| V_{T0} | <i>threshold voltage</i> | for power-loss calculation only | | | 17.5 | V |
| r_T | <i>slope resistance</i> | | | | 3 | Ω |

| IXBOD1 - 34... - 42R (4 Elements) | | | Ratings | | | |
|-----------------------------------|--|---|---------|------|------|------------------|
| Symbol | Definitions | Conditions | min. | typ. | max. | |
| V_{BO} | <i>breakover voltage</i> | $V_{BO}(T_{VJ}) = V_{BO, 25^{\circ}C} [1 + K_T (T_{VJ} - 25^{\circ}C)]$ IXBOD 1 -34R IXBOD 1 -36R IXBOD 1 -38R IXBOD 1 -40R IXBOD 1 -42R | | | | |
| | | | 3300 | 3400 | 3500 | V |
| | | | 3500 | 3600 | 3700 | V |
| | | | 3700 | 3800 | 4000 | V |
| | | | 3900 | 4000 | 4100 | V |
| | | | 4100 | 4200 | 4300 | V |
| I_{RMS} | <i>RMS current</i> | f = 50 Hz pins soldered to printed circuit (conductor 0.035x2mm) | | | 1.1 | A |
| I_{FAVM} | <i>maximum average forward current</i> | | | | 0.7 | A |
| I_{SM} | <i>maximum pulsed source current</i> | $t_p = 0.1$ ms; non repetitive | | | 200 | A |
| I^2t | <i>I²t value for fusing</i> | $t_p = 0.1$ ms | | | 2 | A ² s |
| V_T | <i>forward voltage drop</i> | $I_T = 5$ A | | | 6.8 | V |
| V_{T0} | <i>threshold voltage</i> | for power-loss calculation only | | | 4.4 | V |
| r_T | <i>slope resistance</i> | | | | 0.48 | Ω |

| Package FP-Case | | | | Ratings | | |
|-----------------|--|----------------------|------|---------|------|-----|
| Symbol | Definitions | Conditions | min. | typ. | max. | |
| T_{amb} | ambient temperature (cooling medium) | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 125 | °C |
| T_{vJM} | maximum virtual junction temperature | | -40 | | 125 | °C |
| R_{thJA} | thermal resistance junction to ambient | natural convection | | | 20 | K/W |
| | | with air speed 2 m/s | | | 16 | K/W |
| Weight | | | | 14 | | g |



Outlines FP-case



Dimensions in mm (1 mm = 0.0394")



| Ordering | Part Name | Marking on Product | Delivering Mode | Base Qty | Ordering Code |
|----------|---------------|--------------------|-----------------|----------|---------------|
| Standard | IXBOD 1 -12R | IXBOD 1 -12R | Box | 20 | 468649 |
| Standard | IXBOD 1 -12RD | IXBOD 1 -12RD | Box | 20 | 472948 |
| Standard | IXBOD 1 -13R | IXBOD 1 -13R | Box | 20 | 468657 |
| Standard | IXBOD 1 -13RD | IXBOD 1 -13RD | Box | 20 | 472956 |
| Standard | IXBOD 1 -14R | IXBOD 1 -14R | Box | 20 | 468665 |
| Standard | IXBOD 1 -14RD | IXBOD 1 -14RD | Box | 20 | 472964 |
| Standard | IXBOD 1 -15R | IXBOD 1 -15R | Box | 20 | 468673 |
| Standard | IXBOD 1 -15RD | IXBOD 1 -15RD | Box | 20 | 472972 |
| Standard | IXBOD 1 -16R | IXBOD 1 -16R | Box | 20 | 468681 |
| Standard | IXBOD 1 -16RD | IXBOD 1 -16RD | Box | 20 | 472794 |
| Standard | IXBOD 1 -17R | IXBOD 1 -17R | Box | 20 | 468703 |
| Standard | IXBOD 1 -17RD | IXBOD 1 -17RD | Box | 20 | 472980 |
| Standard | IXBOD 1 -18R | IXBOD 1 -18R | Box | 20 | 468711 |
| Standard | IXBOD 1 -18RD | IXBOD 1 -18RD | Box | 20 | 472999 |
| Standard | IXBOD 1 -19R | IXBOD 1 -19R | Box | 20 | 468738 |
| Standard | IXBOD 1 -19RD | IXBOD 1 -19RD | Box | 20 | 473006 |
| Standard | IXBOD 1 -20R | IXBOD 1 -20R | Box | 20 | 468746 |
| Standard | IXBOD 1 -20RD | IXBOD 1 -20RD | Box | 20 | 473014 |
| Standard | IXBOD 1 -21R | IXBOD 1 -21R | Box | 20 | 468754 |
| Standard | IXBOD 1 -21RD | IXBOD 1 -21RD | Box | 20 | 473022 |
| Standard | IXBOD 1 -22R | IXBOD 1 -22R | Box | 20 | 468762 |
| Standard | IXBOD 1 -22RD | IXBOD 1 -22RD | Box | 20 | 473030 |
| Standard | IXBOD 1 -23R | IXBOD 1 -23R | Box | 20 | 468770 |
| Standard | IXBOD 1 -23RD | IXBOD 1 -23RD | Box | 20 | 472786 |
| Standard | IXBOD 1 -24R | IXBOD 1 -24R | Box | 20 | 468789 |
| Standard | IXBOD 1 -24RD | IXBOD 1 -24RD | Box | 20 | 473049 |
| Standard | IXBOD 1 -25R | IXBOD 1 -25R | Box | 20 | 468797 |
| Standard | IXBOD 1 -25RD | IXBOD 1 -25RD | Box | 20 | 473057 |
| Standard | IXBOD 1 -26R | IXBOD 1 -26R | Box | 20 | 468800 |
| Standard | IXBOD 1 -26RD | IXBOD 1 -26RD | Box | 20 | 473065 |
| Standard | IXBOD 1 -28R | IXBOD 1 -28R | Box | 20 | 468819 |
| Standard | IXBOD 1 -28RD | IXBOD 1 -28RD | Box | 20 | 473073 |
| Standard | IXBOD 1 -30R | IXBOD 1 -30R | Box | 20 | 468827 |
| Standard | IXBOD 1 -30RD | IXBOD 1 -30RD | Box | 20 | 473081 |
| Standard | IXBOD 1 -32R | IXBOD 1 -32R | Box | 20 | 468835 |
| Standard | IXBOD 1 -32RD | IXBOD 1 -32RD | Box | 20 | 473103 |
| Standard | IXBOD 1 -34R | IXBOD 1 -34R | Box | 20 | 468843 |
| Standard | IXBOD 1 -36R | IXBOD 1 -36R | Box | 20 | 468851 |
| Standard | IXBOD 1 -38R | IXBOD 1 -38R | Box | 20 | 468878 |
| Standard | IXBOD 1 -40R | IXBOD 1 -40R | Box | 20 | 468886 |
| Standard | IXBOD 1 -42R | IXBOD 1 -42R | Box | 20 | 468894 |

Curves



Fig. 1 Energy per pulse for single BOD element for trapezoidal wave current. E_p must be multiplied by number of elements for total energy

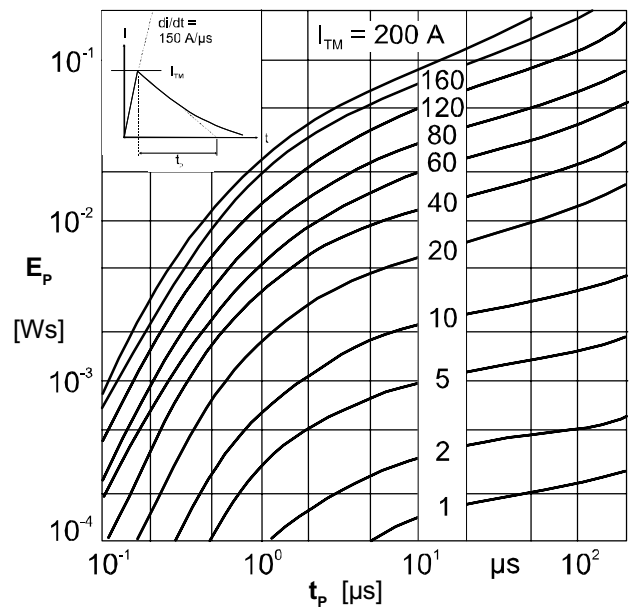


Fig. 2 Energy per pulse for single BOD element for exponentially decaying current pulse. E_p must be multiplied by number of elements for total energy



Fig. 3 On-state voltage at $T_{vj} = 125^\circ\text{C}$



Fig. 4 Transient thermal resistance