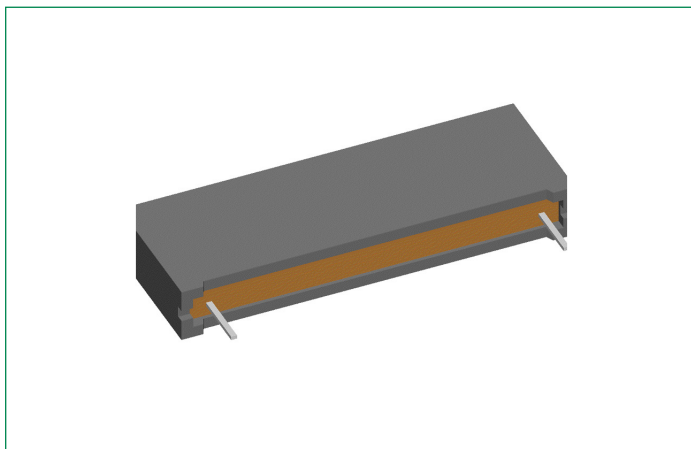


# IXBOD2-XXR/ IXBOD2-XXRD

## Breakover Diode Module

RoHS



### Features

- Extra fast turn-on
- Very low temperature dependence
- Very low leakage current

### Applications

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

### Package

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Reduced weight
- Soldering pins for PCB mounting
- Base plate: Plastic overmolded tab

### Product Summary

Number of BODs	IXBOD-XXR	IXBOD-XXRD
1-2	IXBOD2-12R - IXBOD2-20R	IXBOD2-11RD - IXBOD2-20RD
3	IXBOD2-21R - IXBOD2-32R	IXBOD2-21RD - IXBOD2-36RD
4	IXBOD2-33R - IXBOD2-42R	-

### Pinout Diagram



**A:** Anode; **K:** Cathode

## IXBOD2 Electrical Characteristics

Symbol	Characteristics	Conditions		Value			Units
				Min.	Typ.	Max.	
$I_D$	Off-state Current	$V_D = 0.8 \cdot V_{BO}$	$T_{vj} = 125\text{ °C}$	–	–	200	$\mu\text{A}$
$K_T$	Temperature Coefficient of $V_{BO}$	–		–	–	$1 \cdot 10^{-3}$	$\text{K}^{-1}$
$I_{BO}$	Breakover Current	$T_{vj} = 25\text{ °C}$		–	–	20	$\text{mA}$
$I_H$	Holding Current	$T_{vj} = 25\text{ °C}$		–	–	40	$\text{mA}$
		$T_{vj} = 125\text{ °C}$		–	–	20	$\text{mA}$
$dv/dt_{(cr)}$	Critical Rate of Rise of Off-state Voltage	$V_D = 0.9 \cdot V_{BO}$	$T_{vj} = 25\text{ °C}$	–	–	3000	$\text{V}/\mu\text{s}$
$di/dt_{(cr)}$	Critical Rate of Rise of On-state Current	$I_T = 80\text{ A}; V_D = V_{BO}; f = 50\text{ Hz}$	$T_{vj} = 125\text{ °C}$	–	–	150	$\text{A}/\mu\text{s}$
$t_q$	Turn-off Time	$V_D = 0.75 \cdot V_{BO}; V_R = 0\text{ V}; I_T = 100\text{ A}; T_{vj} = 125\text{ °C}$		–	200	–	$\mu\text{s}$

## IXBOD2-12R...20R

Symbol	Characteristics	Conditions	IXBOD2 Variant	Value			Units
				Min.	Typ.	Max.	
$V_{BO}$	Breakover Voltage	$V_{BO}(T_{vj}) = V_{BO}, 25\text{ °C} \cdot [1 + K_T (T_{vj} - 25\text{ °C})]$	IXBOD2-12R	1150	1200	1250	V
			IXBOD2-14R	1350	1400	1450	
			IXBOD2-15R	1450	1500	1550	
			IXBOD2-16R	1550	1600	1650	
			IXBOD2-17R	1650	1700	1750	
			IXBOD2-18R	1750	1800	1850	
			IXBOD2-19R	1850	1900	1950	
			IXBOD2-20R	1950	2000	2050	
$I_{RMS}$	RMS On-state Current	$f = 50\text{ Hz}; T_{amb} = 50\text{ °C}$ pins soldered to printed circuit (conductor 0.035 x 2mm)		–	–	2	A
$I_{T(AVM)}$	Maximum Average Forward	–		–	–	1.25	A
$I_{FSM}$	Non-repetitive Peak Forward Surge Current	$t_p = 0.1\text{ ms}$ ; rectangular, non repetitive, $T_{vj} = 50\text{ °C}$		–	–	200	A
$I^2t$	$I^2t$ Value	$t_p = 0.1\text{ ms}; T_{vj} = 50\text{ °C}$		–	–	4	$\text{A}^2\text{s}$
$V_T$	On-state Voltage	$T_{vj} = 125\text{ °C}$	$I_T = 5\text{ A}$	–	–	3.4	V
$V_{TO}$	Threshold Voltage	for power-loss calculation only		–	–	2.2	V
$r_T$	Slope Resistance			–	–	0.24	$\Omega$

**Note:**  $I_{FSM}$  replaces the previously used symbol  $I_{SM}$ ; ratings and test conditions are unchanged.

**IXBOD2-21R...32R**

Symbol	Characteristics	Conditions	IXBOD2 Variant	Value			Units
				Min.	Typ.	Max.	
V <sub>BO</sub>	Breakover Voltage	V <sub>BO</sub> (T <sub>vj</sub> ) = V <sub>BO</sub> , 25°C · [1 + K <sub>T</sub> (T <sub>vj</sub> - 25 °C)]	IXBOD2-21R	2050	2100	2150	V
			IXBOD2-22R	2150	2200	2250	
			IXBOD2-23R	2250	2300	2350	
			IXBOD2-24R	2350	2400	2450	
			IXBOD2-25R	2450	2500	2550	
			IXBOD2-26R	2500	2600	2700	
			IXBOD2-28R	2700	2800	2900	
			IXBOD2-30R	2900	3000	3100	
IXBOD2-32R	3100	3200	3300				
I <sub>RMS</sub>	RMS On-state Current	f = 50 Hz T <sub>amb</sub> = 50 °C		–	–	1.4	A
I <sub>T(AVM)</sub>	Maximum Average Forward	–		–	–	0.9	A
I <sub>FSM</sub>	Non-repetitive Peak Forward Surge Current	t <sub>p</sub> = 0.1 ms; rectangular, non repetitive, T <sub>vj</sub> = 50 °C		–	–	200	A
I <sup>2</sup> t	I <sup>2</sup> t Value	t <sub>p</sub> = 0.1 ms; T <sub>vj</sub> = 50 °C		–	–	4	A <sup>2</sup> s
V <sub>T</sub>	On-state voltage	T <sub>vj</sub> = 125 °C	I <sub>T</sub> = 5 A	–	–	5.1	V
V <sub>TO</sub>	Threshold Voltage	for power-loss calculation only		–	–	3.3	V
r <sub>T</sub>	Slope Resistance			–	–	0.36	Ω

**Note:** I<sub>FSM</sub> replaces the previously used symbol I<sub>SM</sub>; ratings and test conditions are unchanged.

**IXBOD2-33R...42R**

Symbol	Characteristics	Conditions	IXBOD2 Variant	Value			Units
				Min.	Typ.	Max.	
V <sub>BO</sub>	Breakover Voltage	V <sub>BO</sub> (T <sub>vj</sub> ) = V <sub>BO</sub> , 25°C · [1 + K <sub>T</sub> (T <sub>vj</sub> - 25 °C)]	IXBOD2-33R	3200	3300	3400	V
			IXBOD2-34R	3300	3400	3500	
			IXBOD2-36R	3500	3600	3700	
			IXBOD2-38R	3700	3800	4000	
			IXBOD2-40R	3900	4000	4100	
			IXBOD2-42R	4100	4200	4300	
I <sub>RMS</sub>	RMS On-state Current	f = 50 Hz T <sub>amb</sub> = 50 °C		–	–	1.1	A
I <sub>T(AVM)</sub>	Maximum Average Forward	–		–	–	0.7	A
I <sub>FSM</sub>	Non-repetitive Peak Forward Surge Current	t <sub>p</sub> = 0.1 ms; rectangular, non repetitive, T <sub>vj</sub> = 50 °C		–	–	200	A
I <sup>2</sup> t	I <sup>2</sup> t Value	t <sub>p</sub> = 0.1 ms; T <sub>vj</sub> = 50 °C		–	–	4	A <sup>2</sup> s
V <sub>T</sub>	On-state voltage	T <sub>vj</sub> = 125 °C	I <sub>T</sub> = 5 A	–	–	6.8	V
V <sub>TO</sub>	Threshold Voltage	for power-loss calculation only		–	–	4.4	V
r <sub>T</sub>	Slope Resistance			–	–	0.48	Ω

**Note:** I<sub>FSM</sub> replaces the previously used symbol I<sub>SM</sub>; ratings and test conditions are unchanged.

## IXBOD2-11RD...20RD

Symbol	Characteristics	Conditions	IXBOD2 Variant	Value			Units
				Min.	Typ.	Max.	
V <sub>BO</sub>	Breakover Voltage	$V_{BO}(T_{vj}) = V_{BO, 25\text{ °C}} \cdot [1 + K_T (T_{vj} - 25\text{ °C})]$	IXBOD2-11RD	1050	1100	1150	V
			IXBOD2-12RD	1150	1200	1250	
			IXBOD2-14RD	1350	1400	1450	
			IXBOD2-15RD	1450	1500	1550	
			IXBOD2-16RD	1550	1600	1650	
			IXBOD2-17RD	1650	1700	1750	
			IXBOD2-18RD	1750	1800	1850	
			IXBOD2-19RD	1850	1900	1950	
			IXBOD2-20RD	1950	2000	2050	
V <sub>RRM</sub>	Repetitive Peak Reverse Voltage (internal diode)	T <sub>vj</sub> = 125 °C		–	–	6000	V
I <sub>RMS</sub>	RMS On-state Current	f = 50 Hz T <sub>amb</sub> = 50 °C		–	–	0.3	A
I <sub>T(AVM)</sub>	Maximum Average Forward	–		–	–	0.2	A
I <sub>FSM</sub>	Non-repetitive Peak Forward Surge Current	t <sub>p</sub> = 0.1 ms; rectangular, non repetitive, T <sub>vj</sub> = 50 °C		–	–	50	A
I <sup>2</sup> t	I <sup>2</sup> t Value	t <sub>p</sub> = 0.1 ms; T <sub>vj</sub> = 50 °C		–	–	0.125	A <sup>2</sup> s
V <sub>T</sub>	On-state voltage	T <sub>vj</sub> = 125 °C	I <sub>T</sub> = 5 A	–	–	27	V
V <sub>TO</sub>	Threshold Voltage	for power-loss calculation only		–	–	17.5	V
r <sub>T</sub>	Slope Resistance			–	–	3	Ω

**Note:** I<sub>FSM</sub> replaces the previously used symbol I<sub>SM</sub>; ratings and test conditions are unchanged.

IXBOD2-21RD...36RD

Symbol	Characteristics	Conditions	IXBOD2 Variant	Value			Units
				Min.	Typ.	Max.	
V <sub>BO</sub>	Breakover Voltage	$V_{BO}(T_{vj}) = V_{BO} \cdot 25\text{ °C} \cdot [1 + K_T (T_{vj} - 25\text{ °C})]$	IXBOD2-21RD	2050	2100	2150	V
			IXBOD2-22RD	2150	2200	2250	
			IXBOD2-23RD	2250	2300	2350	
			IXBOD2-24RD	2350	2400	2450	
			IXBOD2-25RD	2450	2500	2550	
			IXBOD2-26RD	2500	2600	2700	
			IXBOD2-28RD	2700	2800	2900	
			IXBOD2-30RD	2900	3000	3100	
			IXBOD2-32RD	3100	3200	3300	
IXBOD2-36RD	3500	3600	3700				
V <sub>RRM</sub>	Repetitive Peak Reverse Voltage (internal diode)	T <sub>vj</sub> = 125 °C		–	–	6000	V
I <sub>RMS</sub>	RMS On-state Current	f = 50 Hz T <sub>amb</sub> = 50 °C		–	–	0.3	A
I <sub>T(AVM)</sub>	Maximum Average Forward	–		–	–	0.2	A
I <sub>FSM</sub>	Non-repetitive Peak Forward Surge Current	t <sub>p</sub> = 0.1 ms; rectangular, non repetitive, T <sub>vj</sub> = 50 °C		–	–	50	A
I <sup>2</sup> t	I <sup>2</sup> t Value	t <sub>p</sub> = 0.1 ms; T <sub>vj</sub> = 50 °C		–	–	0.125	A <sup>2</sup> s
V <sub>T</sub>	On-state voltage	T <sub>vj</sub> = 125 °C	I <sub>T</sub> = 5 A	–	–	27	V
V <sub>TO</sub>	Threshold Voltage	for power-loss calculation only		–	–	17.5	V
r <sub>T</sub>	Slope Resistance			–	–	3	Ω

**Note:** I<sub>FSM</sub> replaces the previously used symbol I<sub>SM</sub>; ratings and test conditions are unchanged.

Thermal Specifications and Package

Symbol	Characteristics		Value			Unit
			Min.	Typ.	Max.	
R <sub>th(j-a)</sub>	Thermal Resistance, Junction to Ambient	natural convection	–	–	20	K/W
		with air speed 2 m/s	–	–	16	K/W
T <sub>stg</sub>	Storage Temperature Range	–	–40 to +125			°C
T <sub>amb</sub>	Ambient Temperature (cooling medium)	–	–40 to +125			°C
T <sub>vj</sub>	Virtual Junction Temperature Range	–	–40 to +125			°C
G	Weight	–	–	14	–	g

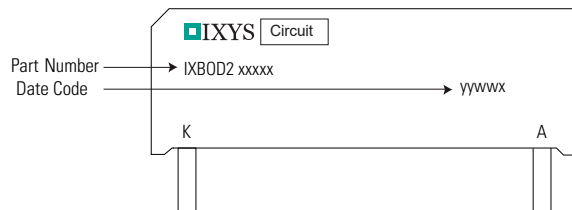
## Packing Options

Part Number	Marking	Packing Mode	MOQ
IXBOD2-12R	IXBOD2-12R	Box	20
IXBOD2-14R	IXBOD2-14R	Box	20
IXBOD2-15R	IXBOD2-15R	Box	20
IXBOD2-16R	IXBOD2-16R	Box	20
IXBOD2-17R	IXBOD2-17R	Box	20
IXBOD2-18R	IXBOD2-18R	Box	20
IXBOD2-19R	IXBOD2-19R	Box	20
IXBOD2-20R	IXBOD2-20R	Box	20
IXBOD2-21R	IXBOD2-21R	Box	20
IXBOD2-22R	IXBOD2-22R	Box	20
IXBOD2-23R	IXBOD2-23R	Box	20
IXBOD2-24R	IXBOD2-24R	Box	20
IXBOD2-25R	IXBOD2-25R	Box	20
IXBOD2-26R	IXBOD2-26R	Box	20
IXBOD2-28R	IXBOD2-28R	Box	20
IXBOD2-30R	IXBOD2-30R	Box	20
IXBOD2-32R	IXBOD2-32R	Box	20
IXBOD2-33R	IXBOD2-33R	Box	20
IXBOD2-34R	IXBOD2-34R	Box	20
IXBOD2-36R	IXBOD2-36R	Box	20
IXBOD2-38R	IXBOD2-38R	Box	20
IXBOD2-40R	IXBOD2-40R	Box	20
IXBOD2-42R	IXBOD2-42R	Box	20
IXBOD2-11RD	IXBOD2-11RD	Box	20
IXBOD2-12RD	IXBOD2-12RD	Box	20
IXBOD2-14RD	IXBOD2-14RD	Box	20
IXBOD2-15RD	IXBOD2-15RD	Box	20
IXBOD2-16RD	IXBOD2-16RD	Box	20
IXBOD2-17RD	IXBOD2-17RD	Box	20
IXBOD2-18RD	IXBOD2-18RD	Box	20
IXBOD2-19RD	IXBOD2-19RD	Box	20
IXBOD2-20RD	IXBOD2-20RD	Box	20
IXBOD2-21RD	IXBOD2-21RD	Box	20
IXBOD2-22RD	IXBOD2-22RD	Box	20
IXBOD2-23RD	IXBOD2-23RD	Box	20
IXBOD2-24RD	IXBOD2-24RD	Box	20
IXBOD2-25RD	IXBOD2-25RD	Box	20

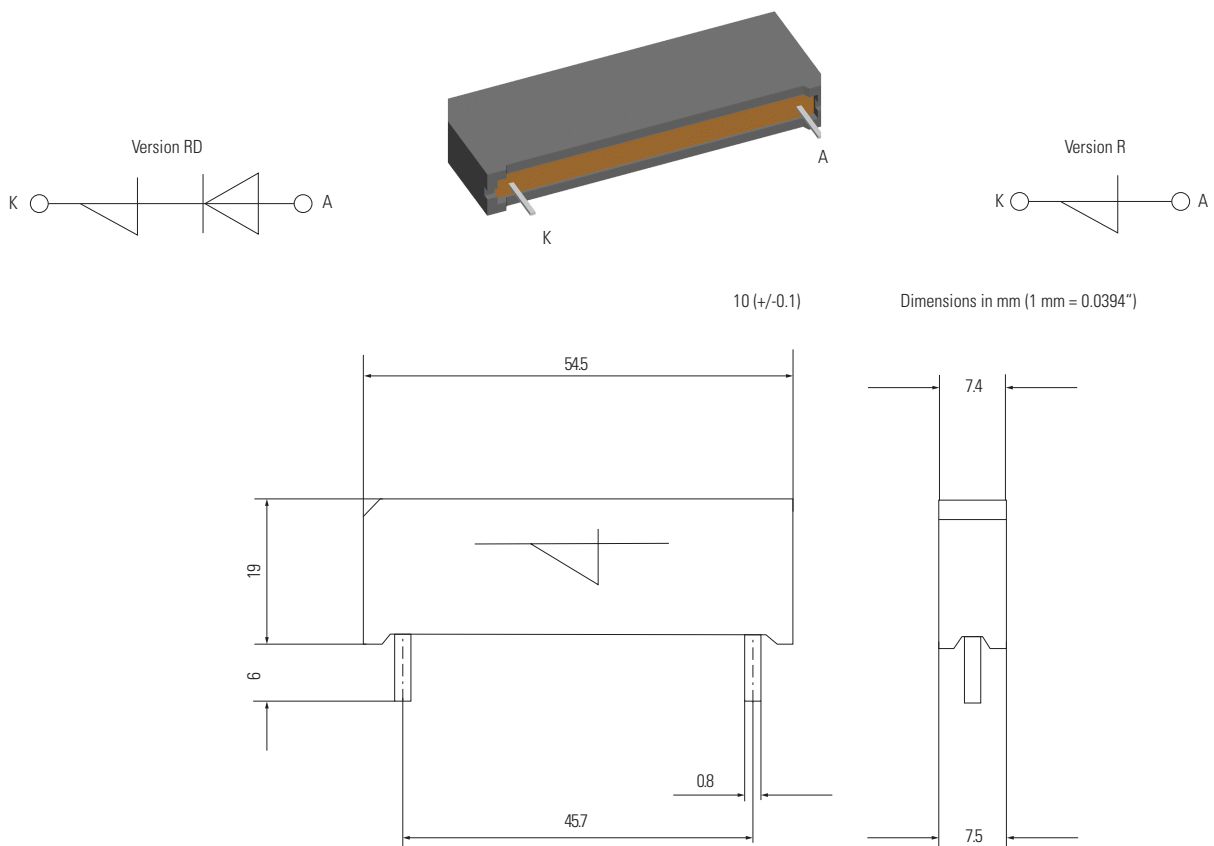
### Packing Options

Part Number	Marking	Packing Mode	MOQ
IXBOD2-26RD	IXBOD2-26RD	Box	20
IXBOD2-28RD	IXBOD2-28RD	Box	20
IXBOD2-30RD	IXBOD2-30RD	Box	20
IXBOD2-32RD	IXBOD2-32RD	Box	20
IXBOD2-36RD	IXBOD2-36RD	Box	20

### Part Marking



### Package Dimensions



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Part of:



Characteristic Curves

Fig. 1. Energy per pulse for trapezoidal current waveforms (see waveform definition)

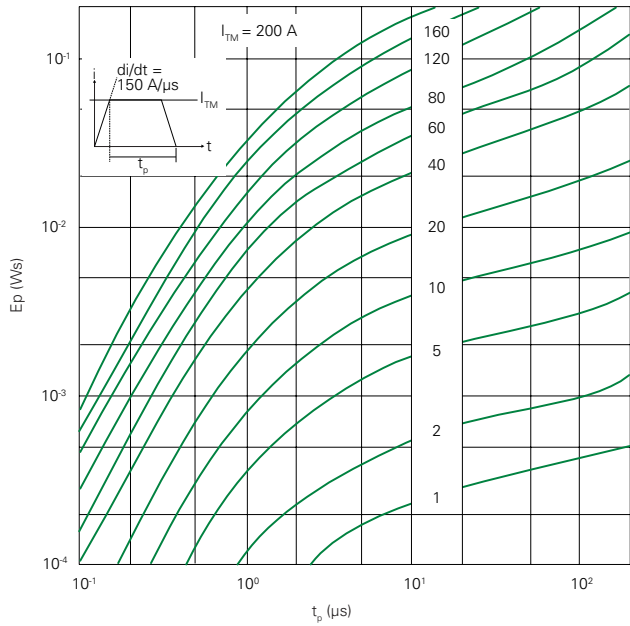


Fig. 2. Energy per pulse for exponentially decaying current pulse (see waveform definition)

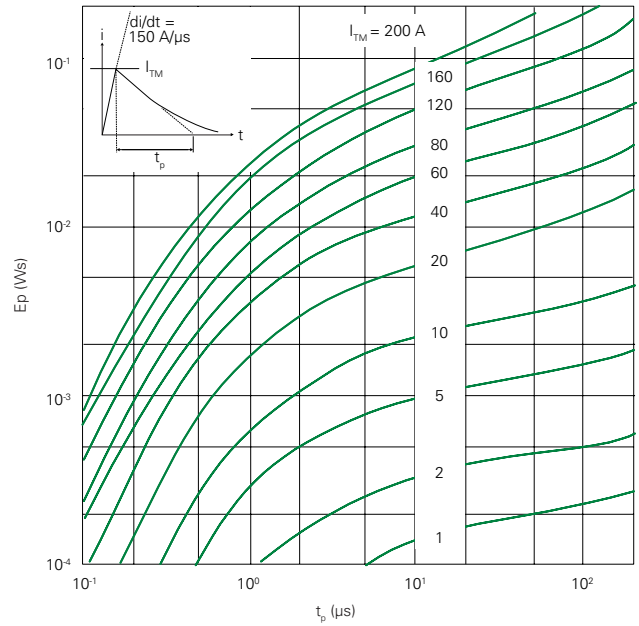


Fig. 3. On-state voltage

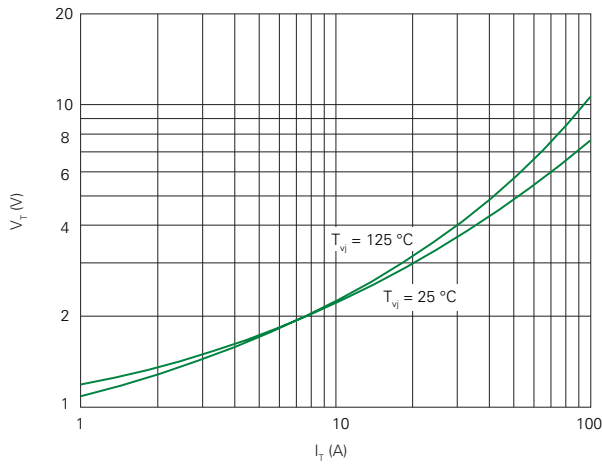
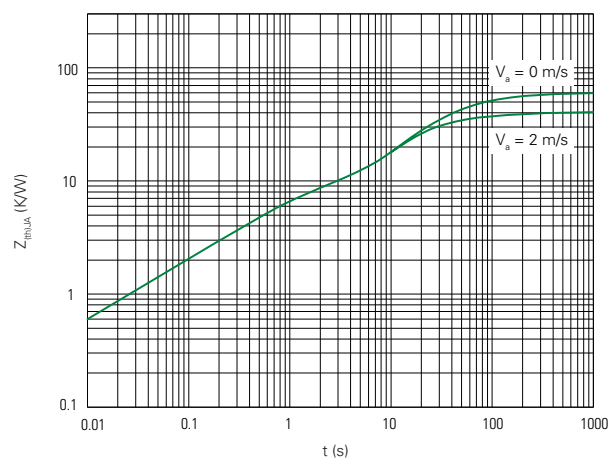


Fig. 4. Transient thermal resistance



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