

# Thermal Sensors MOXIE<sup>®</sup> (NTC)

## FEATURES

- high sensitivity
- quick reaction
- hysteresis approx. 3–6 °C
- excellent reliability
- long service life
- no selecting, no adjusting
- no corrosion of contact surface as semi-conductor
- no +/- polarity
- can be used as logical control element
- isolated casing
- easy installation
- can be delivered in chip form

TS3  
TS3 B3  
TS3 C3

## CONSTRUCTION

Moxies are a family of variable resistance thermal sensors having a highly specific "transition region". Within this transition region the devices typically exhibit a negative temperature coefficient ranging from 40 % per °C to 300 % per °C. Below the transition region they exhibit a linear "thermistor" characteristic of  $-2$  to  $-4\%/^{\circ}\text{C}$ .

Moxies are available in a TO – 18 transistor package (code TS 3) with two lead-wires, or as individual, trimmed clips.

The Moxie is a solid state component produced by thin film technology. A sapphire die is mounted on a gold plated header and connected to the terminals by gold-wire bonding.

## APPLICATIONS

Sensors for temperature protection, control and limiting.

Voltage, current and frequency limiters in electronics.

Examples:

Overtemperature protector for power semi-conductors, such as transistors, power output stages, amplifiers.

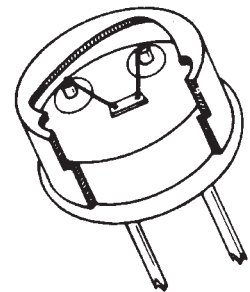
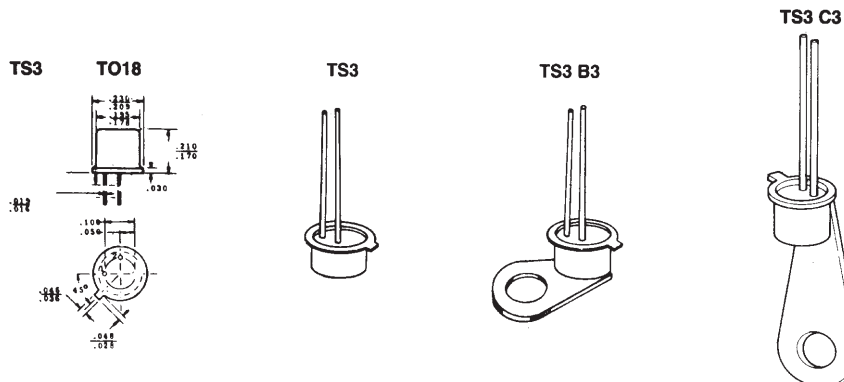
Temperature control of electronic appliances and electric equipment.

Temperature sensor for signalling systems and fire detectors .

Control of componentry in industrial and entertainment electronics.

Protection of electronic circuits, such as computers or battery chargers.

## DIMENSIONS



TS3

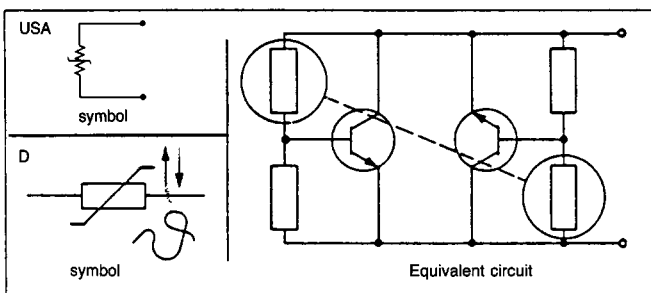
# SPECIFICATIONS

Type	Parameter	Temp. (°C)	Condition	Min.	Typ.	Max.	Units
TS3-57	Resistance	35	Heating	35	85	230	k Ω
	Resistance	57	Heating		1.0		k Ω
	Resistance	75	Heating	15	45	100	Ω
	Sensitivity (1)	57	Heating	40	100		%/°C
	Latching Current (2)	–	D.C. Volts	0.6	1.8	3.2	mA
TS3-60	Resistance	35	Heating	50	130	350	k Ω
	Resistance	60	Heating		5		k Ω
	Resistance	75	Heating	20	75	250	Ω
	Sensitivity (1)	60	Heating	40	100		%/°C
	Latching Current (2)	–	D.C. Volts	0.6	1.6	2.8	mA
TS3-65	Resistance	40	Heating	120	620	1700	k Ω
	Resistance	65	Heating		5.0		k Ω
	Resistance	80	Heating	10	50	100	Ω
	Sensitivity (1)	65	Heating	80	200		%/°C
	Latching Current (2)	–	D.C. Volts	0.14	0.33	0.52	mA
TS3-75	Resistance	55	Heating	40	80	300	k Ω
	Resistance	75	Heating		3.0		k Ω
	Resistance	95	Heating	20	115	200	Ω
	Sensitivity (1)	75	Heating	50	70		%/°C
	Latching Current (2)	–	D.C. Volts	0.7	1.9	3.1	mA
TS3-85	Resistance	65	Heating	25	45	90	k Ω
	Resistance	85	Heating		1.5		k Ω
	Resistance	100	Heating	75	150	330	Ω
	Sensitivity (1)	85	Heating	30	40		%/°C
	Latching Current (2)	–	D.C. Volts	1.4	2.0	2.6	mA

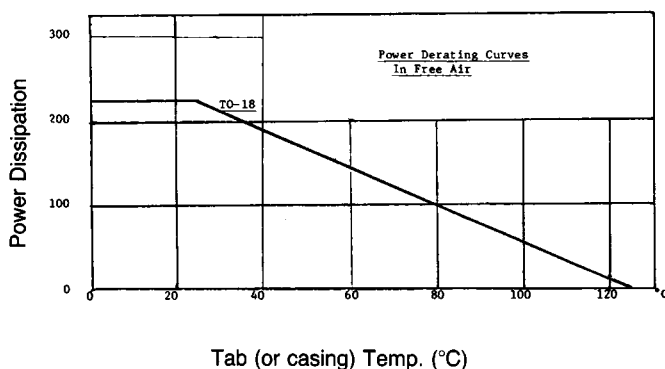
Notes: (1) Sensitivity is defined as the percentage of resistance change per variation of 1 °C in temperature.

(2) Latching current is the smallest current that will cause the device to make changes in resistance while it's cooling from transition to a lower temperature.

## EQUIVALENT CIRCUIT



## POWER DERATING CURVES IN FREE AIR



## TYPICAL CHARACTERISTICS

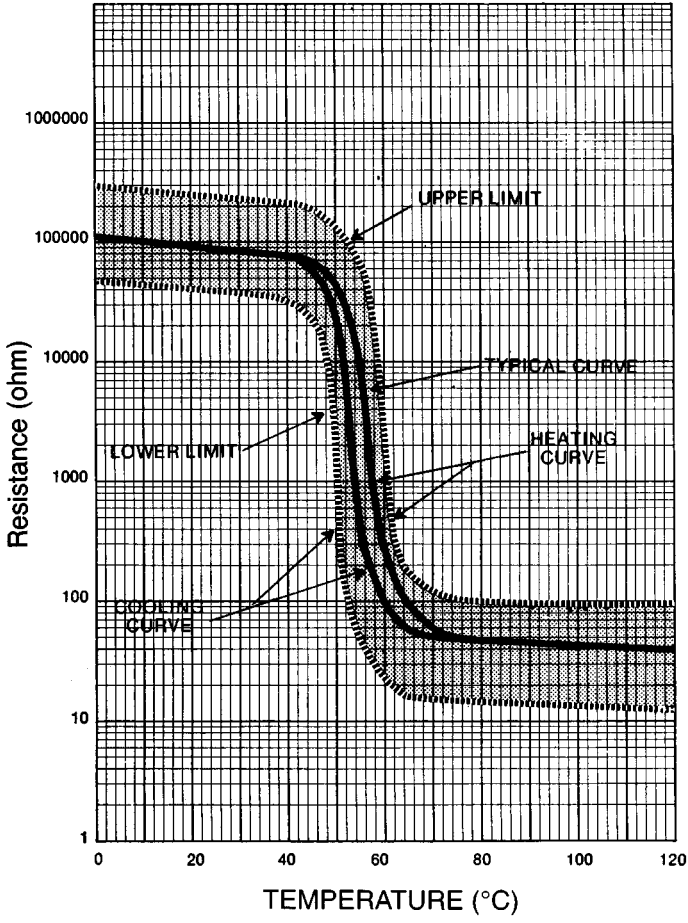
	TS3-XX	TS3-XXB3
Thermal Resistance (°C/W)		
– Die to tab (or casing)	250	300
– Tab (or case) to air	200	200
Time Constant (sec)		
– Air to tab (or casing)	60	60
– Tab (or case) to die	2.0	2.5
Shunt Capacitance (pF)		
– Lead to lead	0.5	0.5
– Lead to tab (or casing)	0.2	0.2
Dielectric Withstanding (V dc)		
– Lead to tab (or casing)	600	600
Storage Temp. (°C)	120	120
Solder Temp. (1/16" from case, 10 sec)	260	260

## TYPICAL RESPONSE CHARACTERISTICS

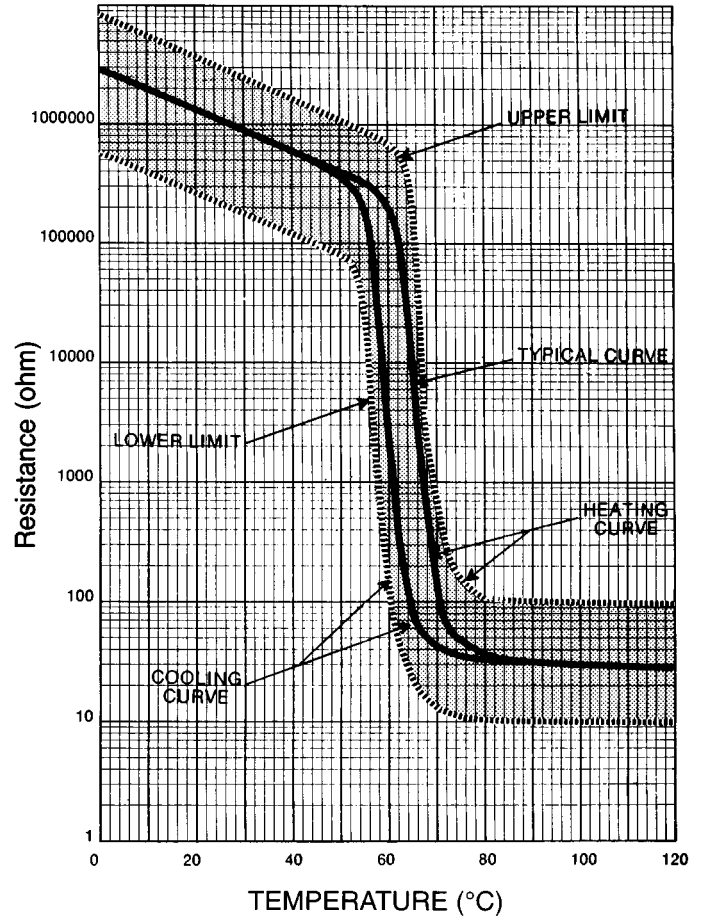
	TS3-57	TS3-60	TS3-65	TS3-75	TS3-85
Temp. Coefficient (%/°C)					
Pre-Transition	-2.0	-2.5	-4.0	-3.5	-3.0
Transition	-100	-100	-200	-70	-40
Post-Transition	-0.25	-0.25	-0.5	-1.0	-1.5

RESPONSE CHARACTERISTICS

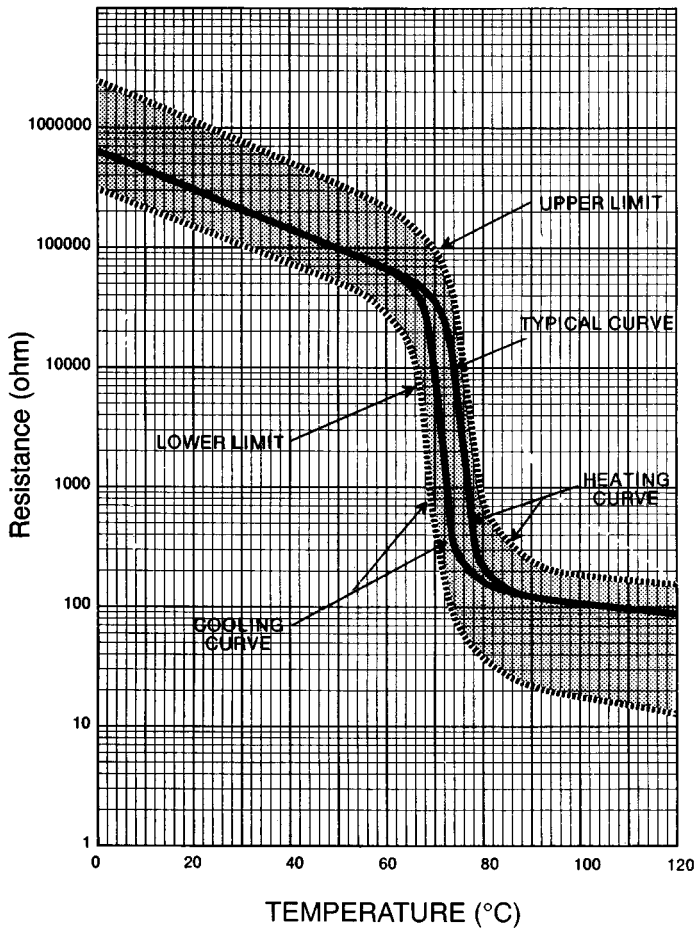
TS 3-57, TS 3-60



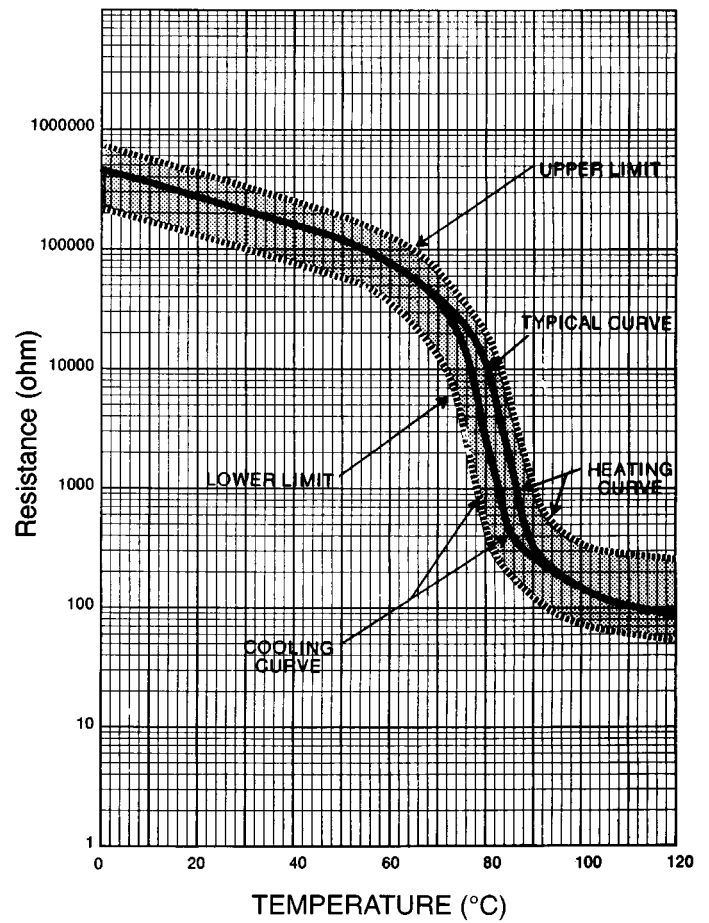
TS 3-65



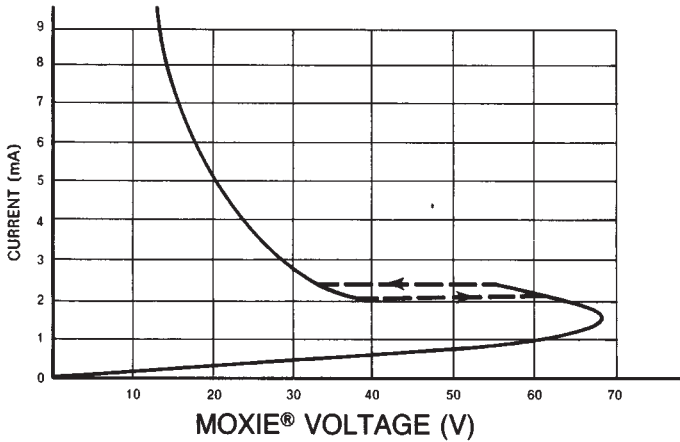
TS 3-75



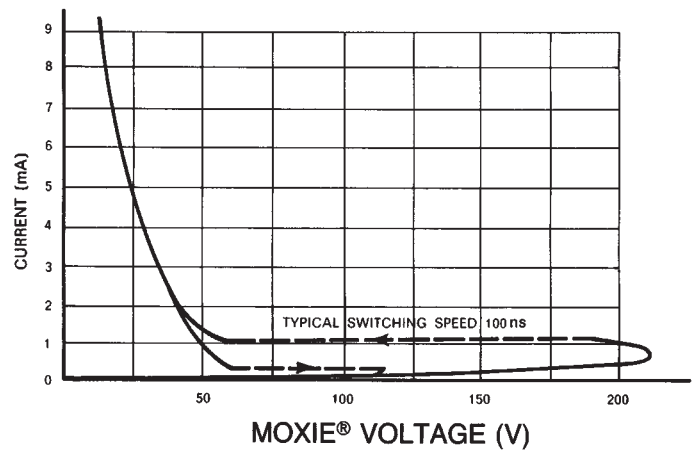
TS 3-85



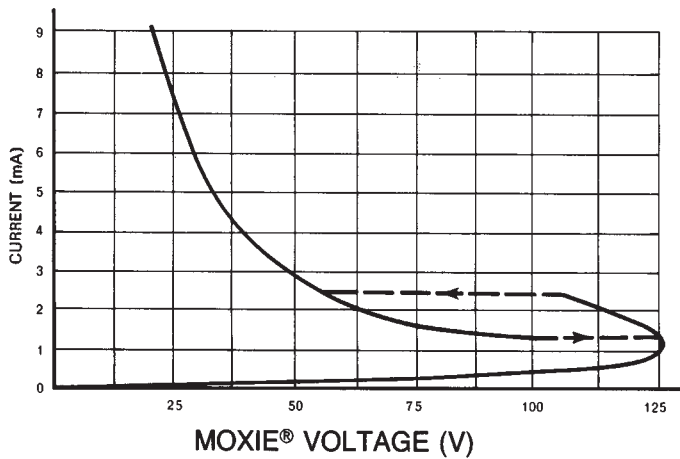
**TS3-57/TS3-60**



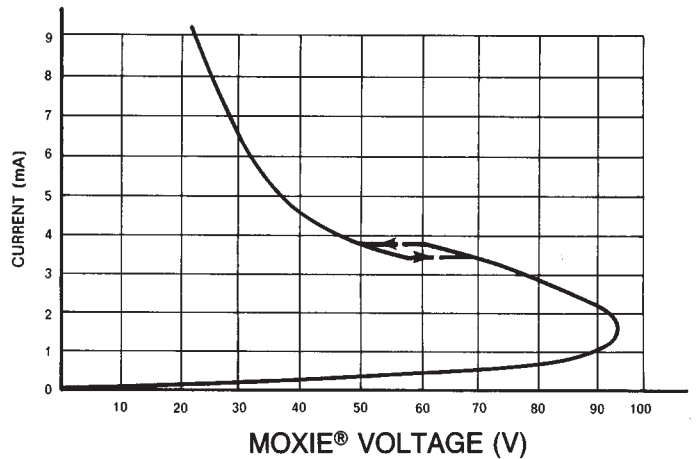
**TS3-65**



**TS3-75**



**TS3-85**



**MOUNTING AND INSTALLATION**

Because of its construction good heat transfer can be achieved between the application and the Moxie. For easy mounting, the Moxie can be supplied with a mounting tab (code TS3- XX-B3 or TS3-XX-C3).

**QUALITY**

Individual testing according to manufacturer's standard.

All data given are average values.

**TEMPERATURES**

°C	Type	°C	Type
57	TS3-57	75	TS3-75
60	TS3-60	85	TS3-85
65	TS3-65		

**EXAMPLE FOR ORDERING**

Quantity	Temperature	Fixture	Type
500	85 deg c	B3	TS 3 - 85

Technical data and availability are subject to change without notice.

**Company Address:**  
 Microtherm GmbH  
 Täschenwaldstraße 3  
 D-75181 Pforzheim

**Postal address:**  
 Microtherm GmbH  
 P.O. Box 1208  
 D-75112 Pforzheim

**Phone** +49 (0) 72 31 787-0  
**Fax** +49 (0) 72 31 787-155  
**Internet:** <http://www.microtherm.de>  
**eMail:** mic-pforzheim@microtherm.de