

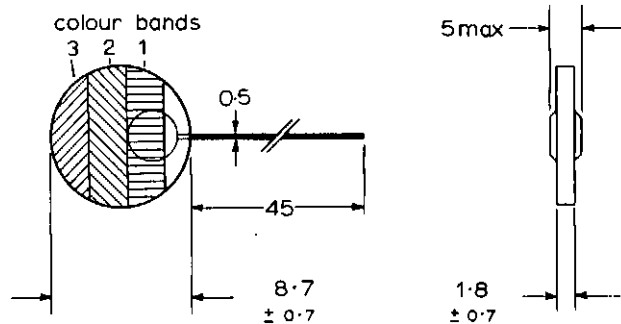
Plate type thermistor for use in transistor and similar circuits for temperature compensation.

This data should be read in conjunction with Introductory Notes - Thermistors

ELECTRICAL DATA (at  $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$8.0 \pm 1.6$	$\Omega$
B factor	$2800 \pm 5\%$	$^{\circ}\text{K}$
Maximum dissipation	1.0	W
Resistance at maximum dissipation (approx)	0.65	$\Omega$
Current at maximum dissipation (approx)	1.25	A
Temperature at maximum dissipation (approx)	120	$^{\circ}\text{C}$
Dissipation constant	10	$\text{mW}/^{\circ}\text{C}$
Recovery Time	70	s.

MECHANICAL DATA



All dimensions in mm

B 2681

For a plate type without leads see type VA1054

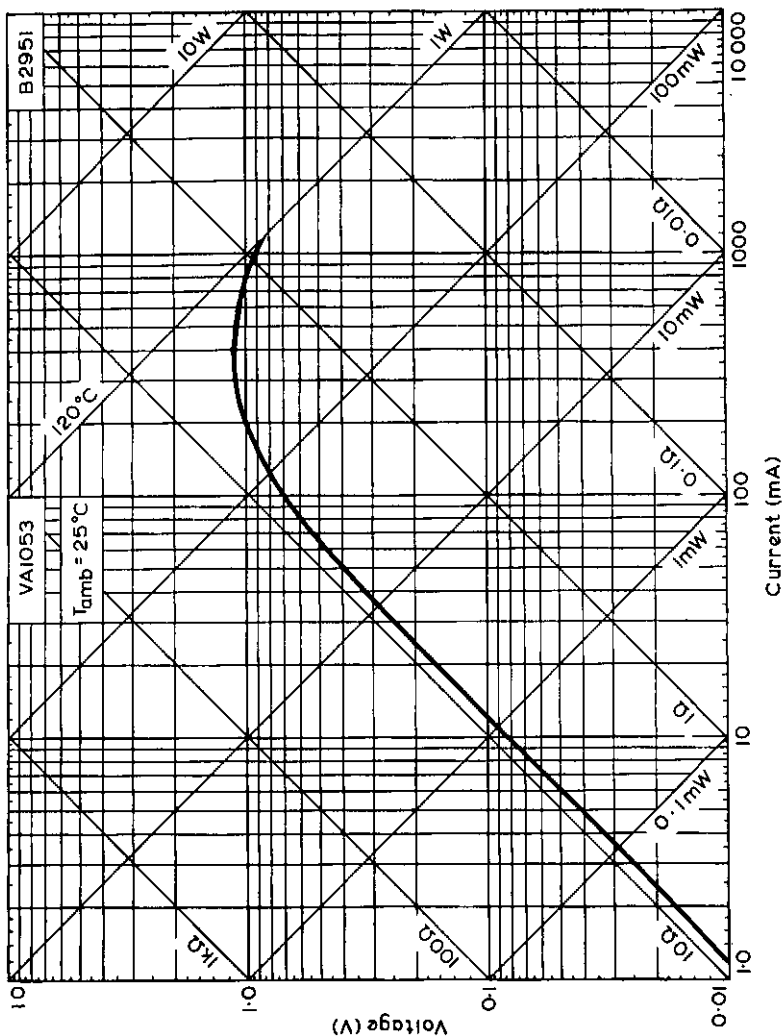
MARKING

The VA1053 is distinguished from other types in this range by the following colour bands:

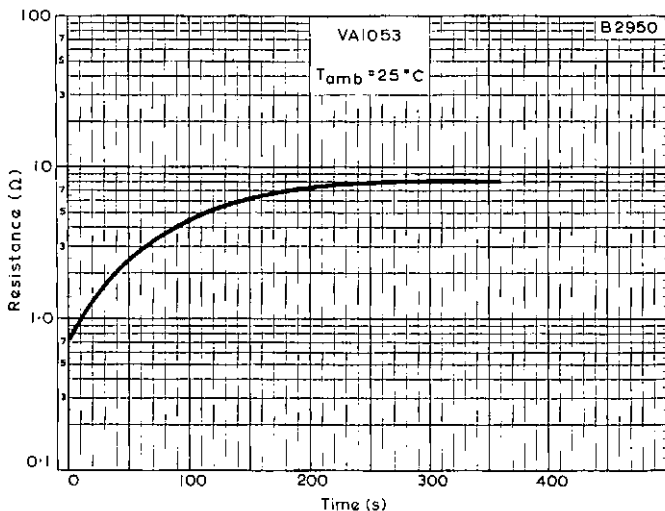
- Band 1. Grey
- Band 2. Black
- Band 3. Gold

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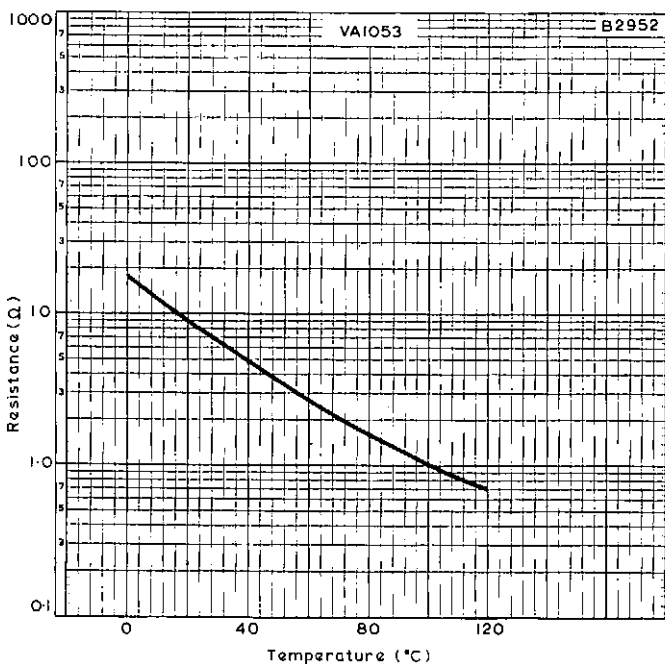




VOLTAGE/CURRENT CHARACTERISTIC AT  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER  
 NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

Electrojumble.org.uk



Rod type thermistor for use in transistor and similar circuits for temperature compensation.

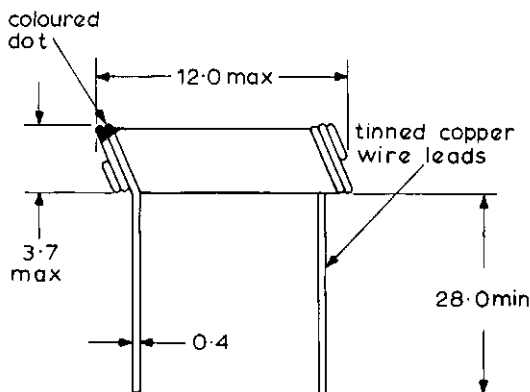
This data should be read in conjunction with Introductory Notes - Thermistors

ELECTRICAL DATA (at  $T_{amb} = 25^{\circ}\text{C}$ )

Resistance(at $25^{\circ}\text{C}$ )	$15 \pm 3.0$	$\text{k}\Omega$
B factor	3550	$^{\circ}\text{K}$
Maximum dissipation	600	mW
Resistance at maximum dissipation (approx)	0.5	$\text{k}\Omega$
Current at maximum dissipation (approx)	35	mA
Temperature at maximum dissipation (approx)	150	$^{\circ}\text{C}$
Dissipation constant	4.5	$\text{mW}/^{\circ}\text{C}$
Recovery Time	30	s

MECHANICAL DATA

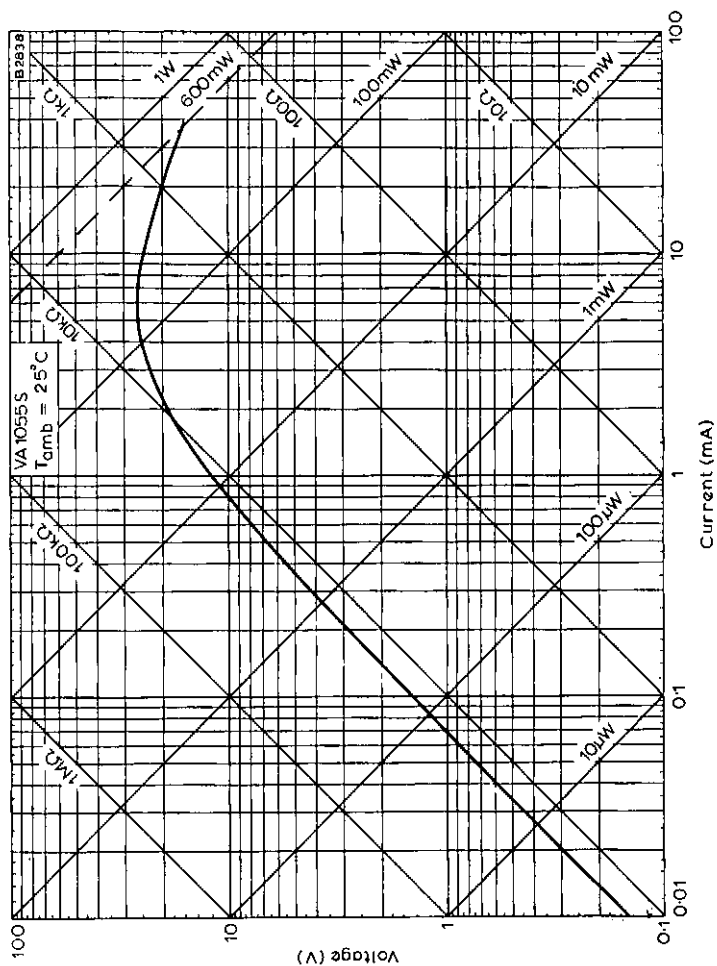
B 26 B 2



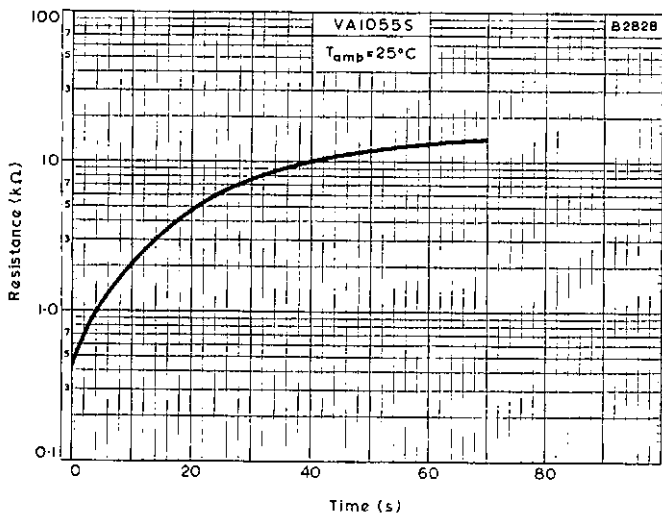
All dimensions in mm

MARKING

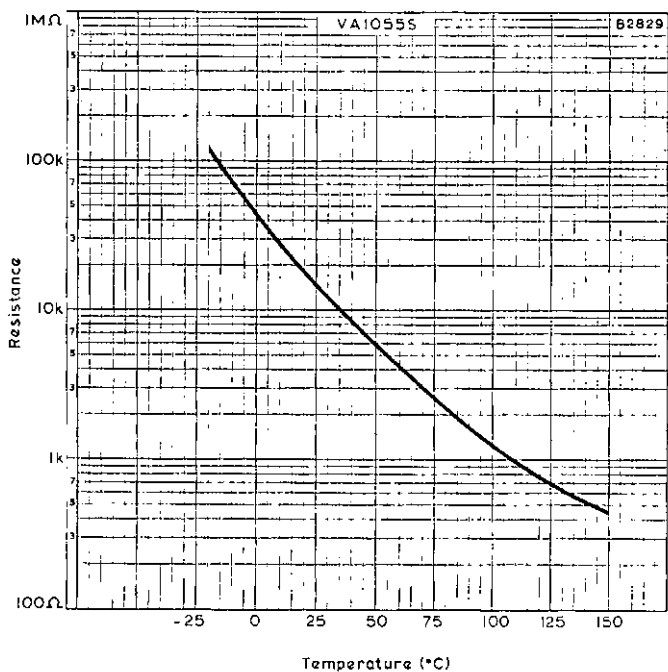
The VA1055S is distinguished from other types in this range by a green dot.



VOLTAGE/CURRENT CHARACTERISTIC at  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

Electrojumble.org.uk



Rod type thermistor for use in transistor and similar circuits for temperature compensation.

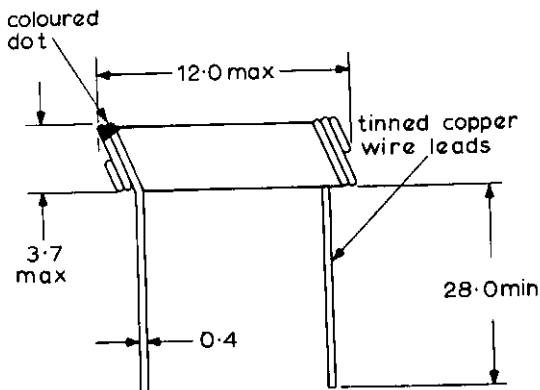
This data should be read in conjunction with Introductory Notes - Thermistors

ELECTRICAL DATA (at  $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$47 \pm 9.4$	$\text{k}\Omega$
B factor	3925	$^{\circ}\text{K}$
Maximum dissipation	600	$\text{mW}$
Resistance at maximum dissipation (approx)	1.0	$\text{k}\Omega$
Current at maximum dissipation (approx)	24	$\text{mA}$
Temperature at maximum dissipation (approx)	150	$^{\circ}\text{C}$
Dissipation constant	4.5	$\text{mW}/^{\circ}\text{C}$
Recovery Time	40	$\text{s}$

MECHANICAL DATA

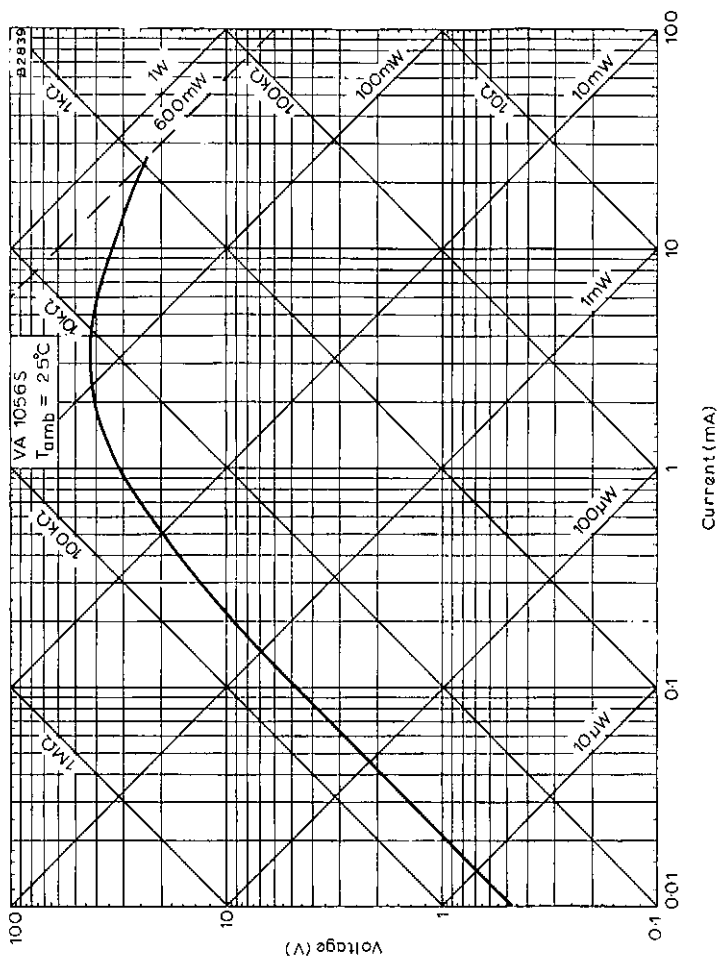
**B 26 82**



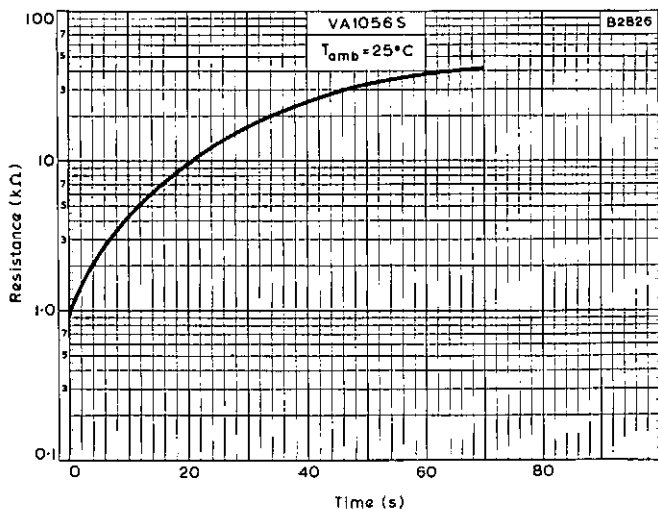
All dimensions in mm

MARKING

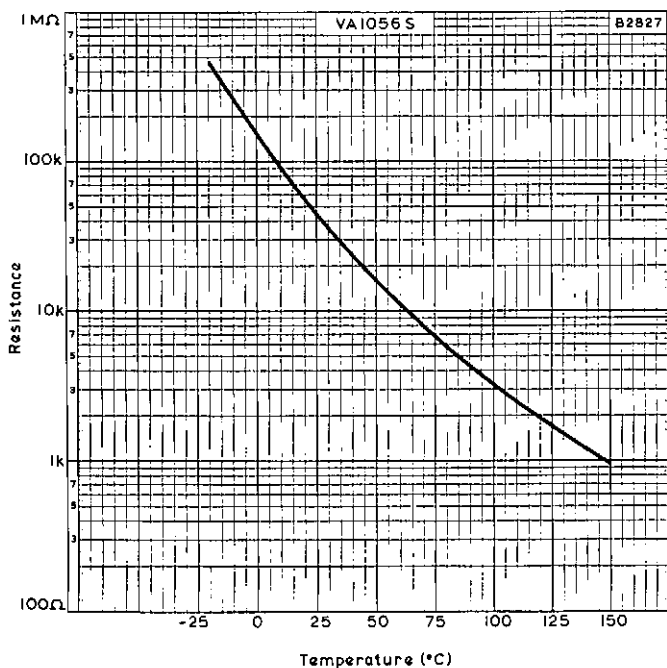
The VA1056S is distinguished from other types in this range by a blue dot.


 VOLTAGE/CURRENT CHARACTERISTIC at  $T_{amb} = 25^{\circ}\text{C}$





VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

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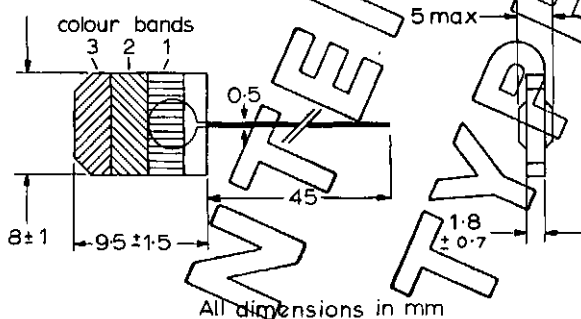
Plate type thermistor for use in transistor and similar circuits for temperature compensation.

This data should be read in conjunction with Introductory Notes - Thermistors

ELECTRICAL DATA (at  $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$2.20 \pm 0.44$	$\Omega$
B factor	$2650 \pm 5\%$	$^{\circ}\text{K}$
Maximum dissipation	1.0	W
Resistance at maximum dissipation (approx)	0.25	$\Omega$
Current at maximum dissipation (approx)	2	A
Temperature at maximum dissipation (approx)	120	$^{\circ}\text{C}$
Dissipation constant	10	$\text{mW}/^{\circ}\text{C}$
Recovery Time	60	s

MECHANICAL DATA



All dimensions in mm

B2680

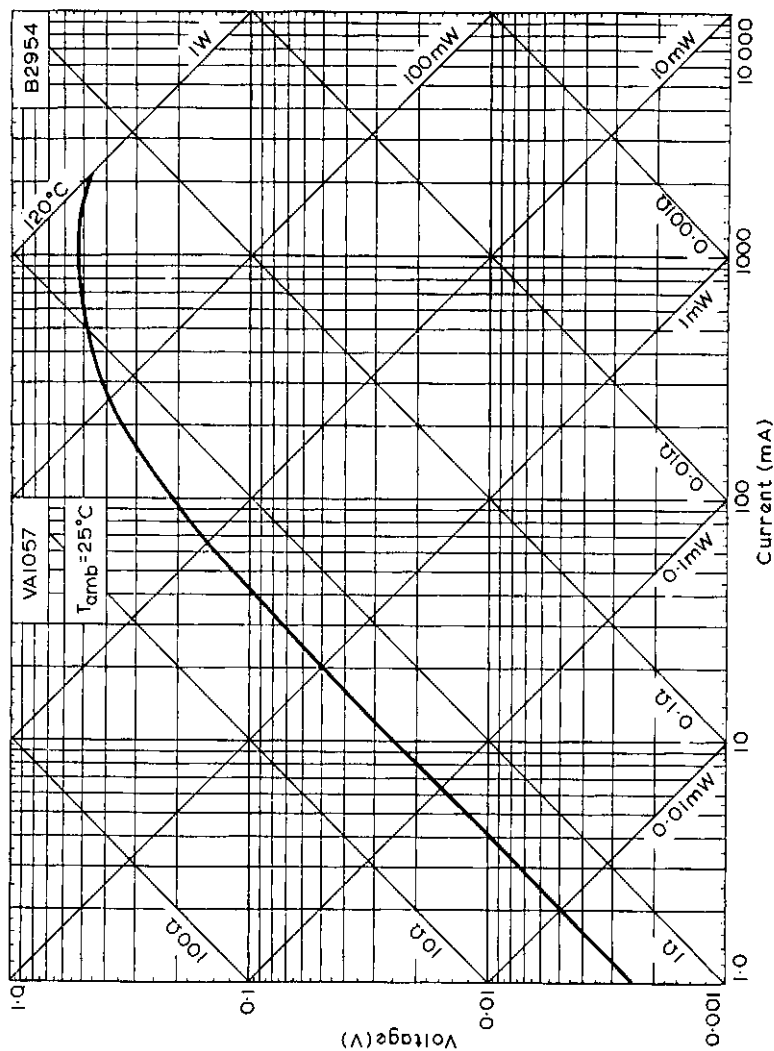
MARKING

The VA1057 is distinguished from other types in this range by the following colour bands:

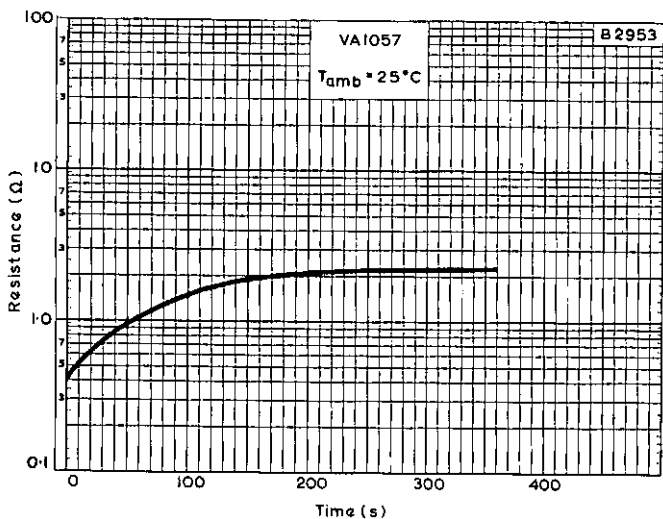
- Band 1. Red
- Band 2. Red
- Band 3. Gold

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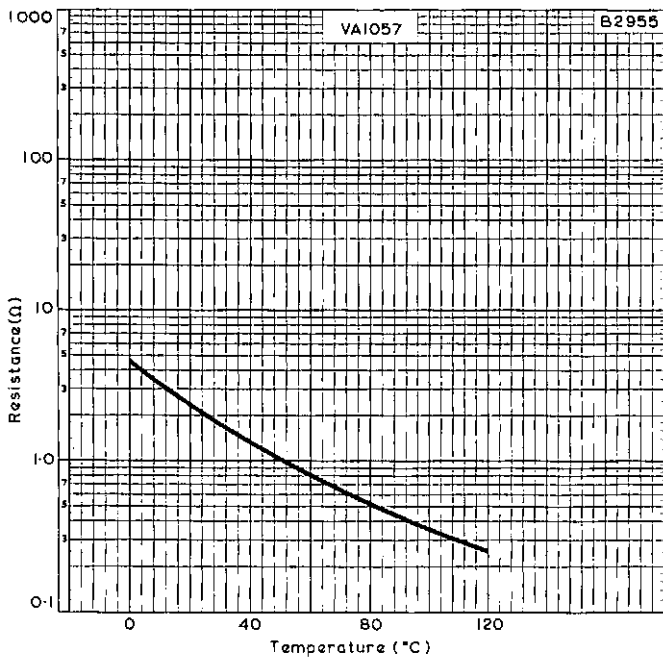




VOLTAGE/CURRENT CHARACTERISTIC AT  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER  
 NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

Electrojumble.org.uk



Rod type thermistor for use in transistor and similar circuits for temperature compensation.

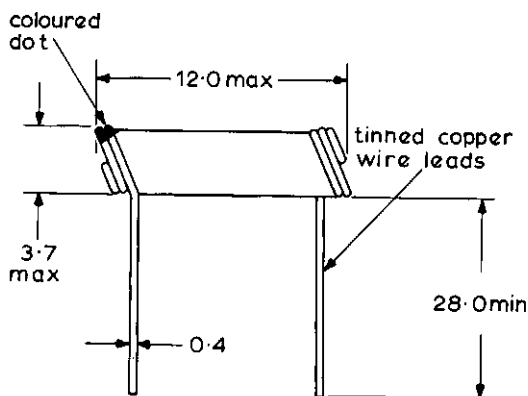
This data should be read in conjunction with Introductory Notes - Thermistors

ELECTRICAL DATA (at  $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$4.7 \pm 0.94$	$\text{k}\Omega$
B factor	3250	$^{\circ}\text{K}$
Maximum dissipation	600	mW
Resistance at maximum dissipation (approx)	0.2	$\text{k}\Omega$
Current at maximum dissipation (approx)	54	mA
Temperature at maximum dissipation (approx)	150	$^{\circ}\text{C}$
Dissipation constant	4.5	$\text{mW}/^{\circ}\text{C}$
Recovery Time	30	s

MECHANICAL DATA

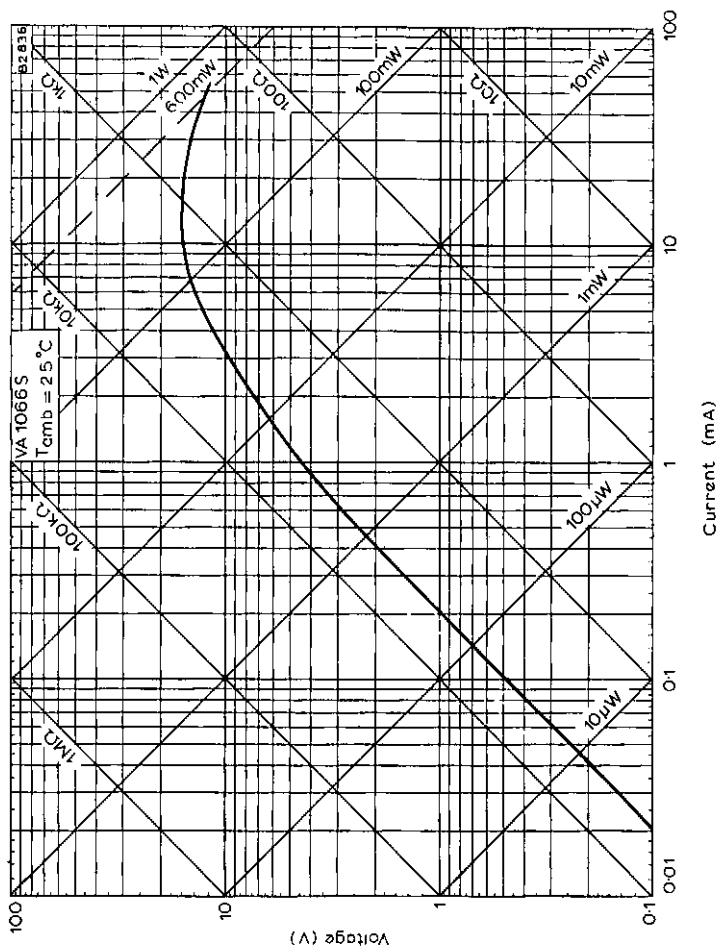
8 26 8 2



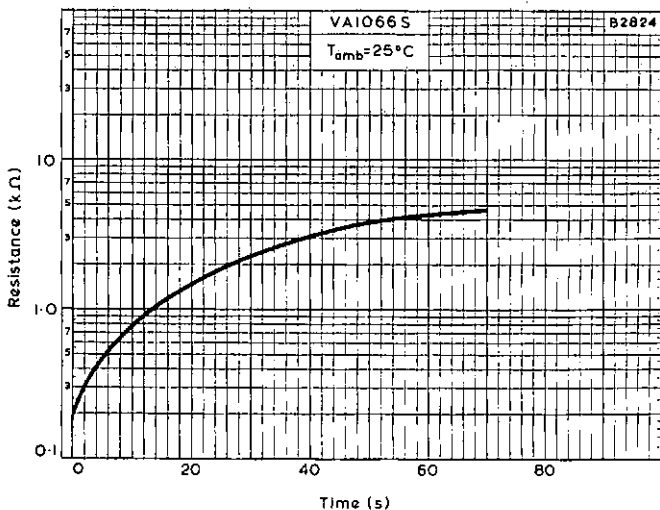
All dimensions in mm

MARKING

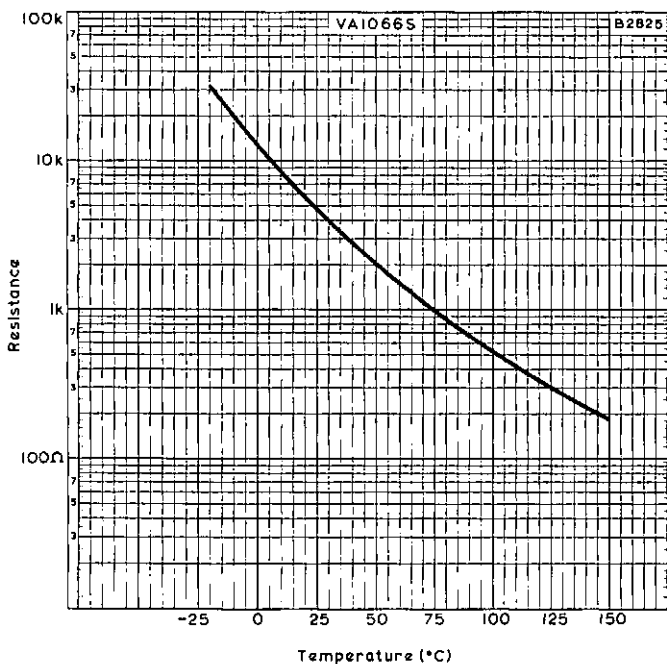
The VA1066S is distinguished from other types in this range by an orange dot.



VOLTAGE/CURRENT CHARACTERISTIC at  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

Electrojumble.org.uk



Rod type thermistor for use in transistor and similar circuits for temperature compensation.

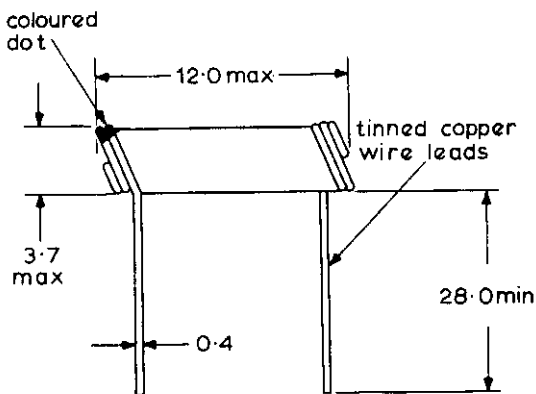
This data should be read in conjunction with Introductory Notes - Thermistors

ELECTRICAL DATA (at  $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$150 \pm 30$	$\text{k}\Omega$
B factor	4075	$^{\circ}\text{K}$
Maximum dissipation	600	$\text{mW} \leftarrow$
Resistance at maximum dissipation (approx)	3.0	$\text{k}\Omega$
Current at maximum dissipation (approx)	14	$\text{mA}$
Temperature at maximum dissipation (approx)	150	$^{\circ}\text{C}$
Dissipation constant	4.5	$\text{mW}/^{\circ}\text{C}$
Recovery Time	40	s

MECHANICAL DATA

**B 2682**

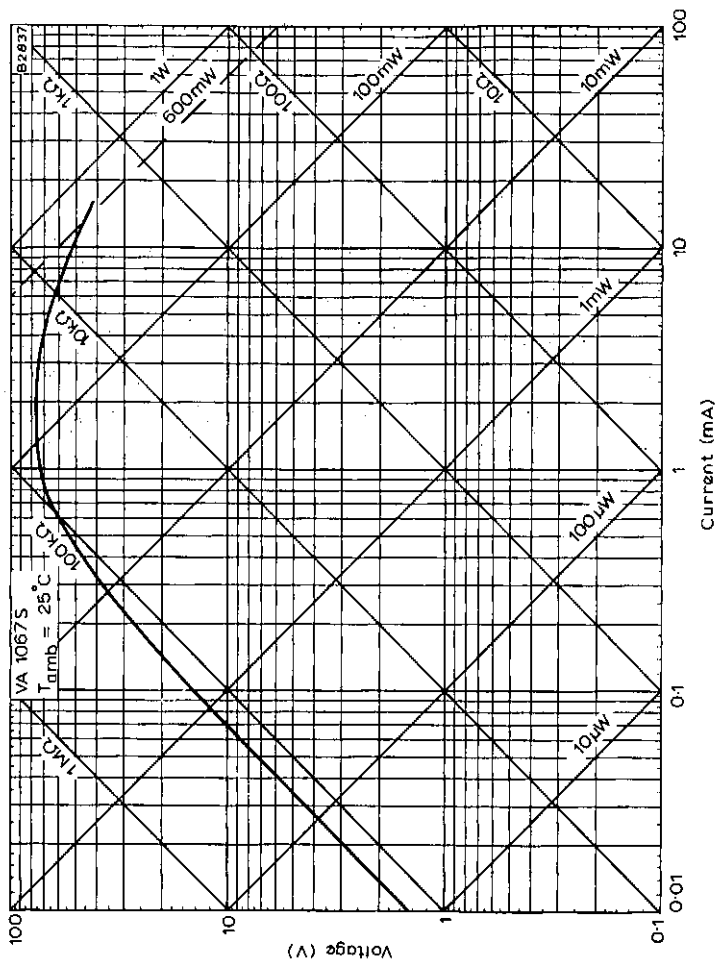


All dimensions in mm

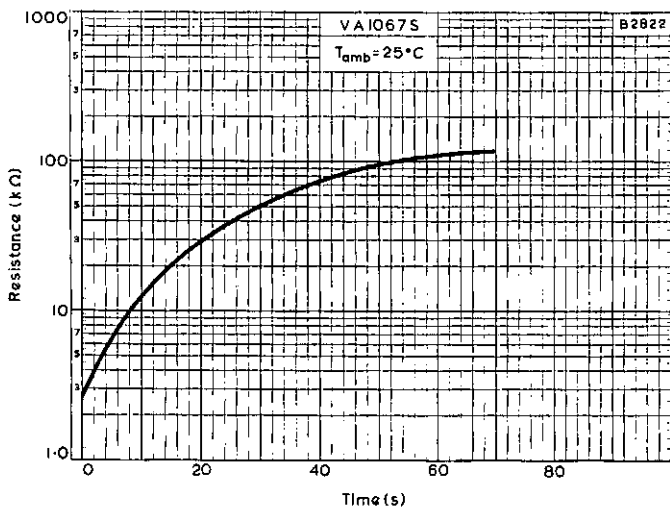
MARKING

The VA1067S is distinguished from other types in this range by a white dot.

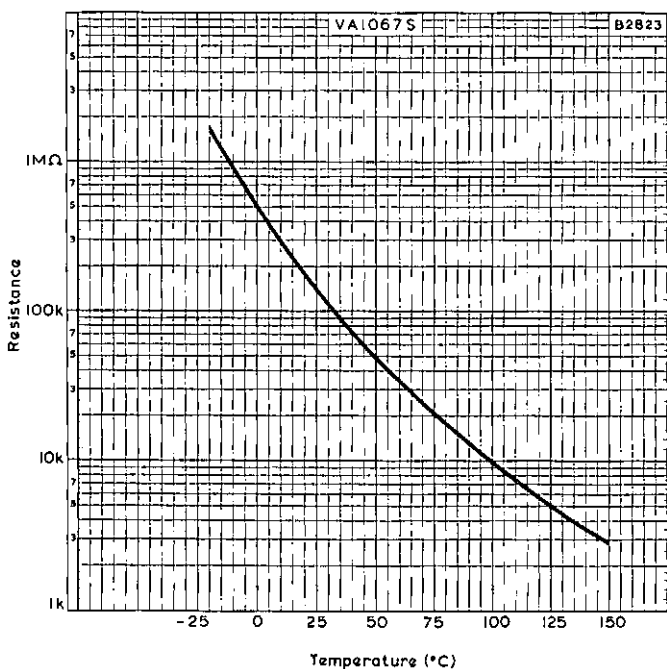




VOLTAGE/CURRENT CHARACTERISTIC at  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

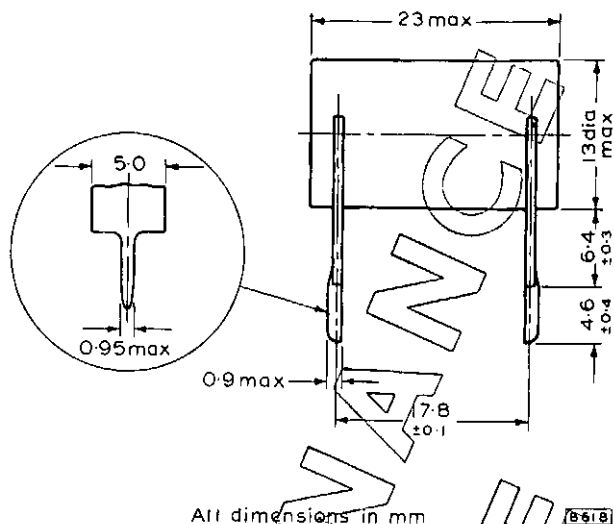
Electrojumble.org.uk



# VARITE THERMISTOR

# VA1070

Surge limiting thermistor for use in television receivers employing a 300mA series heater chain and printed circuit boards.



## GENERAL

Varite thermistors are thermally sensitive semiconductors. They are characterised by a large negative temperature coefficient of resistance. The variation of resistance of a thermistor may be caused by self heating due to power dissipated in the device, by a change in ambient temperature, or by a combination of these factors.

## ELECTRICAL DATA

Resistance (at 25°C)	400 ± 100	Ω
B factor (Note 1)	3700 ± 10%	°K
Maximum dissipation	2.5	W
Resistance at maximum dissipation	25 to 32	Ω
Current at maximum dissipation	300	mA
Temperature at maximum dissipation (T <sub>ambient</sub> = 25°C)	150	°C
Dissipation constant (Note 2)	30	mW/°C
Recovery time (Note 3)	350	s

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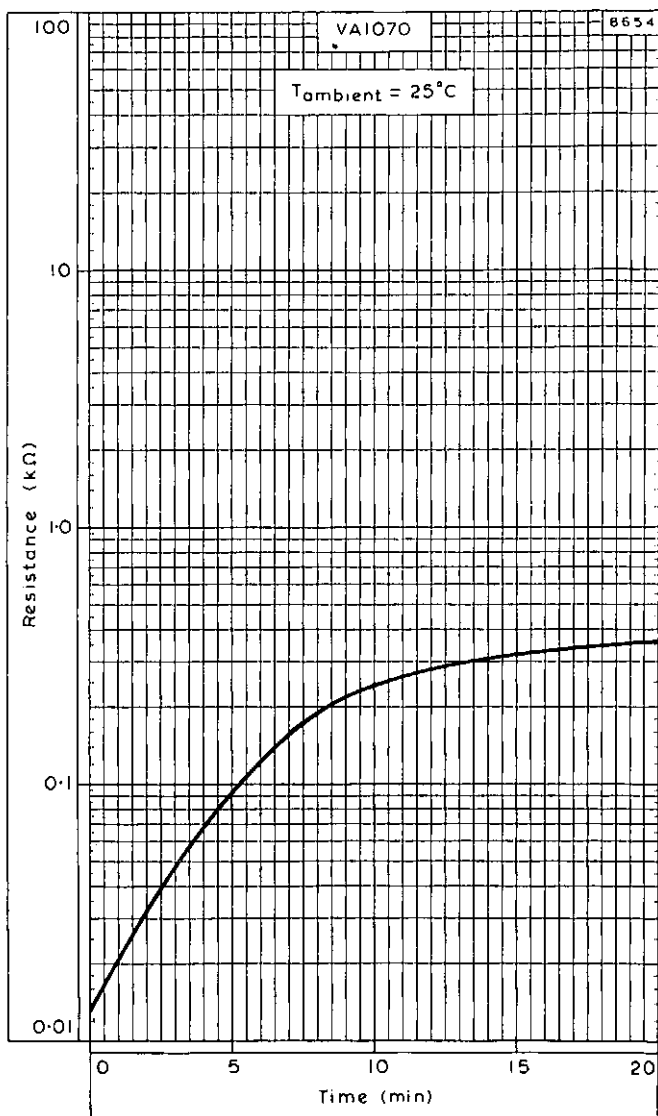
### NOTES

1. The B factor is used to determine the resistance at any temperature from the formula:

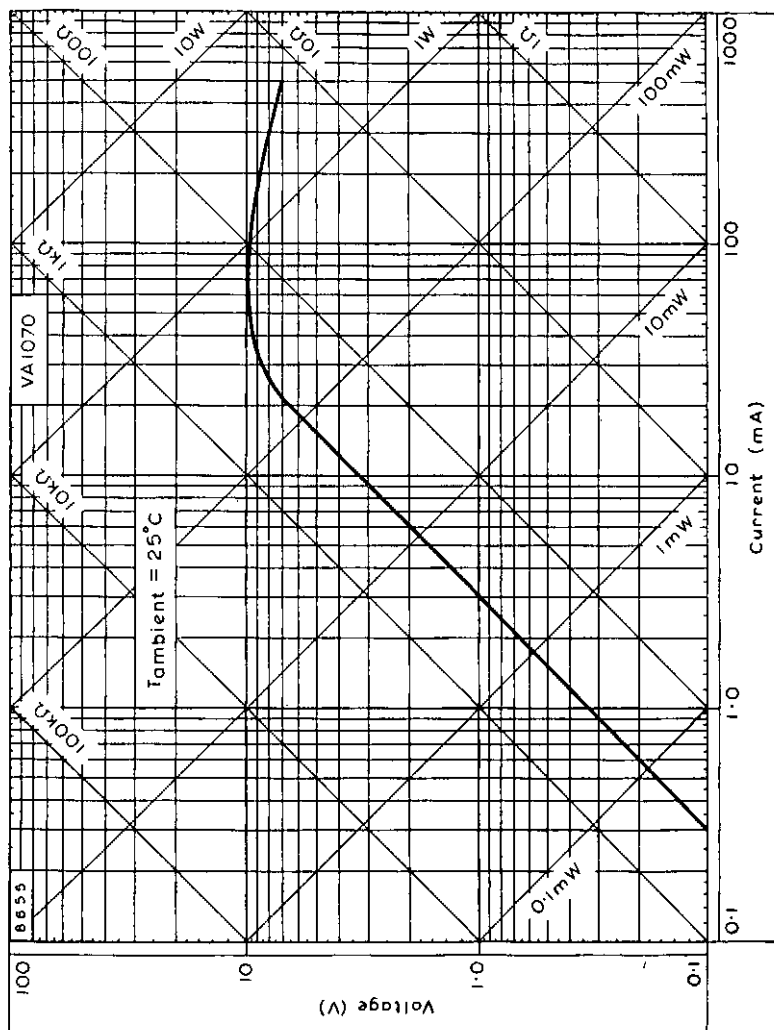
$$\log_{10}R_1 = \log_{10}R_2 + \frac{B}{2.303} \left( \frac{T_2 - T_1}{T_2 T_1} \right)$$

where  $R_1$  is the resistance at a temperature of  $T_1(^{\circ}\text{K})$  and  
 $R_2$  is the resistance at a temperature of  $T_2(^{\circ}\text{K})$

2. The dissipation constant is the power required to raise the temperature by  $1^{\circ}\text{C}$ . It can be used to estimate the rise in temperature of a thermistor for a given dissipation.
3. The recovery time is the time taken by a thermistor to reach half its resistance value at  $25^{\circ}\text{C}$  after it has been operating at maximum dissipation for some time and is allowed to cool in still air at  $25^{\circ}\text{C}$ .



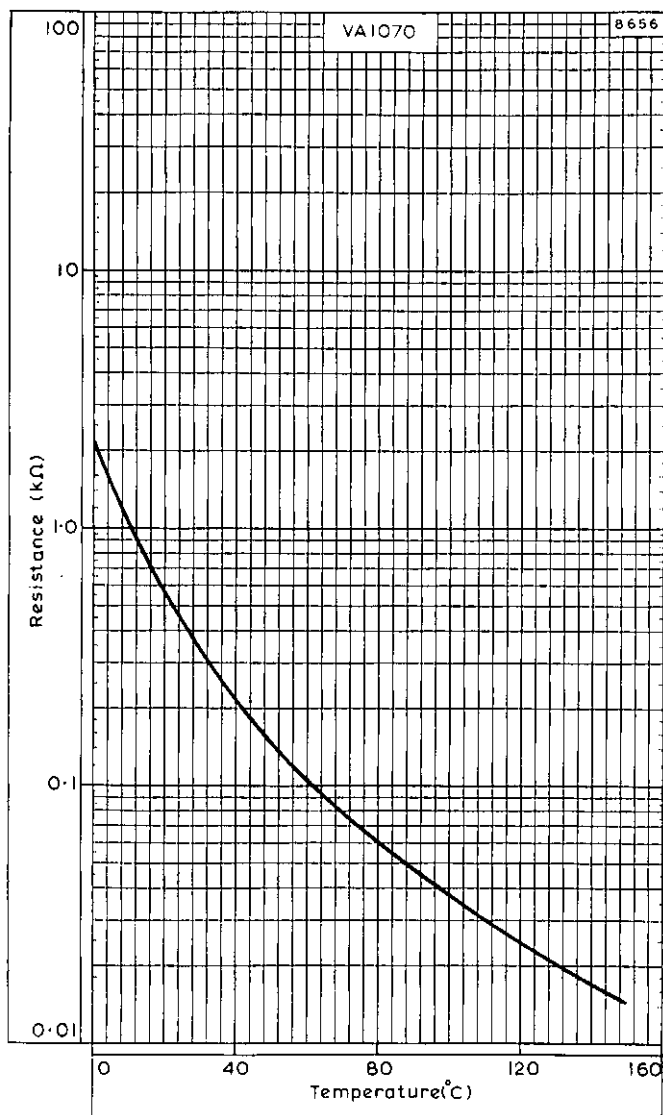
VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS  
Electrojumble.org.uk



VOLTAGE/CURRENT CHARACTERISTIC

Electrojumble.org.uk





RESISTANCE/TEMPERATURE CHARACTERISTIC

[Electrojumble.org.uk](http://Electrojumble.org.uk)

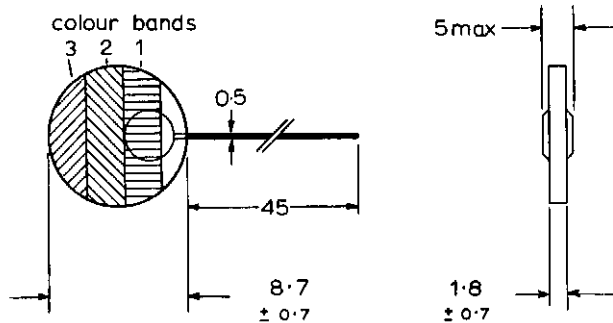
Plate type thermistor for use in transistor and similar circuits for temperature compensation.

This data should be read in conjunction with Introductory Notes - Thermistors

**ELECTRICAL DATA** (at  $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$6.0 \pm 1.2$	$\Omega \leftarrow$
B factor	$2800 \pm 5\%$	$^{\circ}\text{K}$
Maximum dissipation	1.0	W
Resistance at maximum dissipation (approx)	0.6	$\Omega$
Current at maximum dissipation (approx)	1.3	A
Temperature at maximum dissipation (approx)	120	$^{\circ}\text{C}$
Dissipation constant	10	$\text{mW}/^{\circ}\text{C}$
Recovery Time	100	s

**MECHANICAL DATA**



All dimensions in mm

B 2681

The type number for plate type without leads is VA1078.

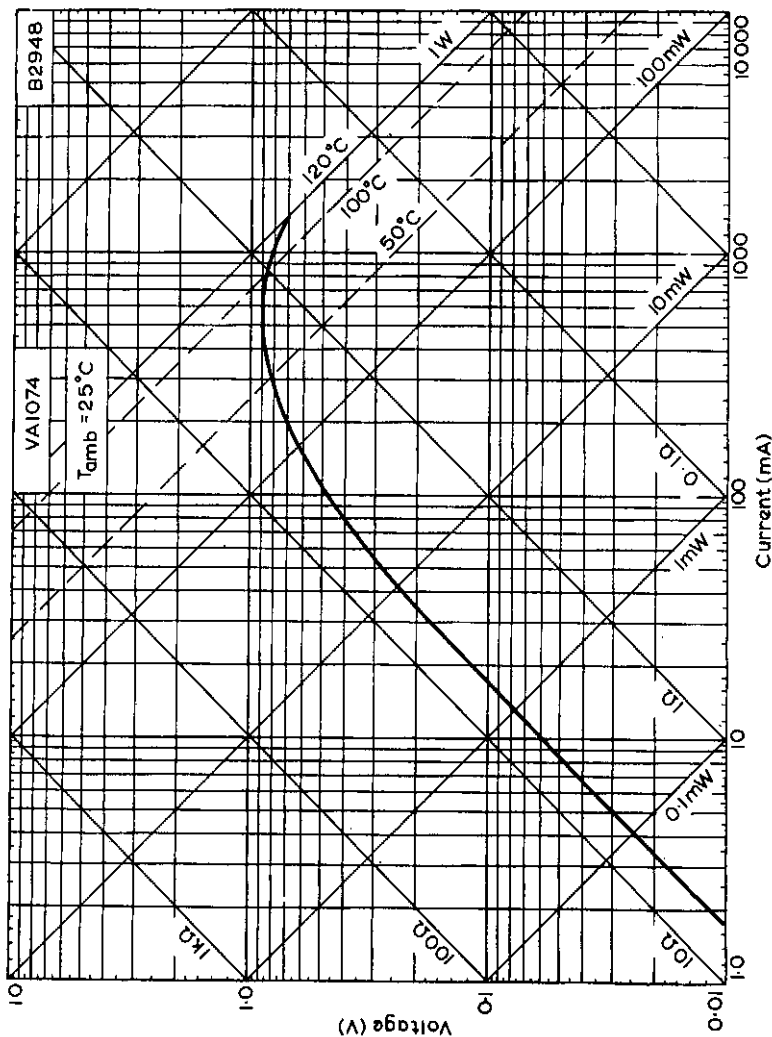
**MARKING**

The VA1074 is distinguished from other types in this range by the following colour bands:

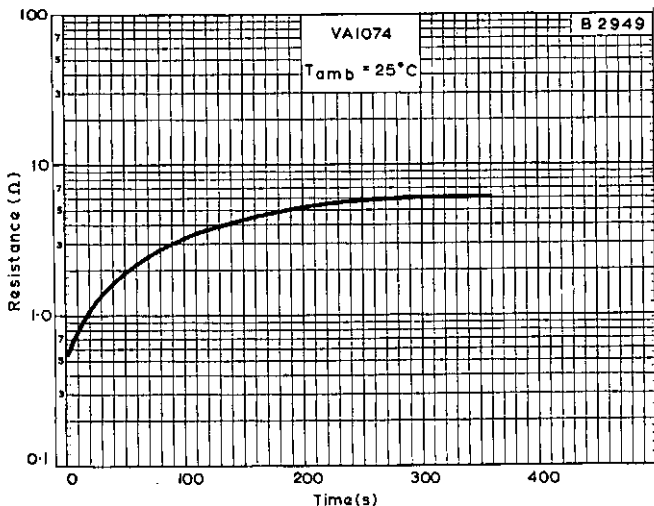
- Band 1. Blue
- Band 2. Black
- Band 3. Gold

Electrojumble.org.uk

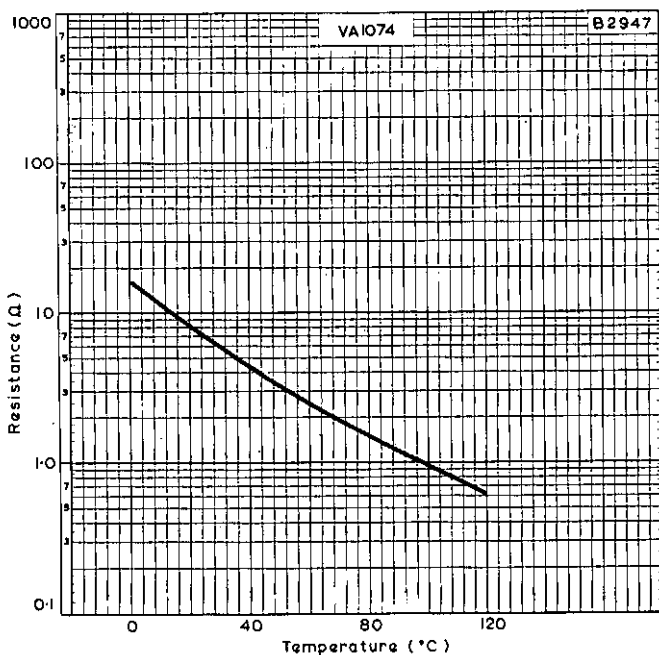




VOLTAGE/CURRENT CHARACTERISTIC AT  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER  
NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

Electrojumble.org.uk



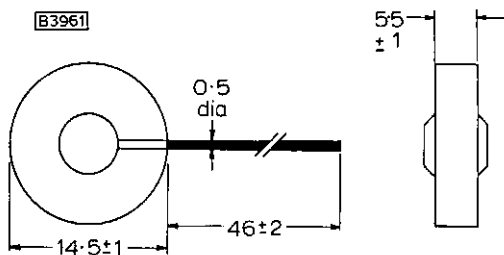
Disc type thermistor for protection of silicon rectifier and heater chain in television and similar circuits.

This data should be read in conjunction with Introductory Notes - Thermistors

## ELECTRICAL DATA (at $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$125 \pm 25$	$\Omega$
B factor (approx.)	4300	$^{\circ}\text{K}$
Maximum dissipation	2.0	W
Resistance at 800mA	2.0 to 4.0	$\Omega$
Temperature at maximum dissipation (approx.)	150	$^{\circ}\text{C}$
Dissipation constant (approx.)	20	mW/deg C

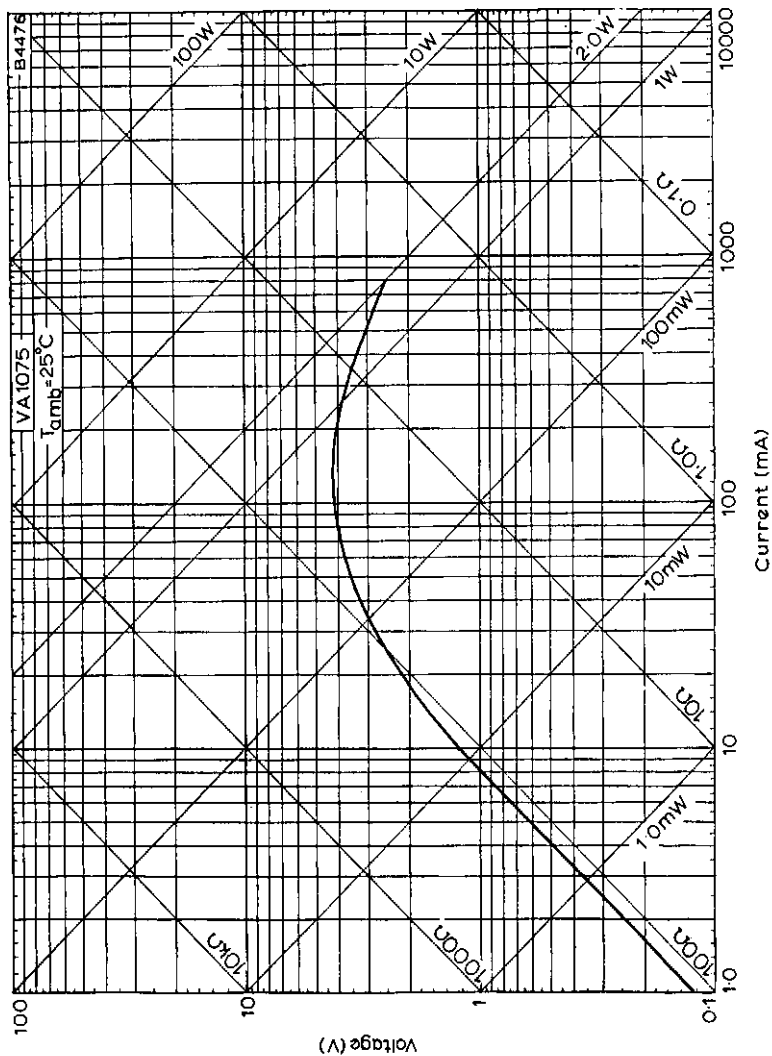
## MECHANICAL DATA



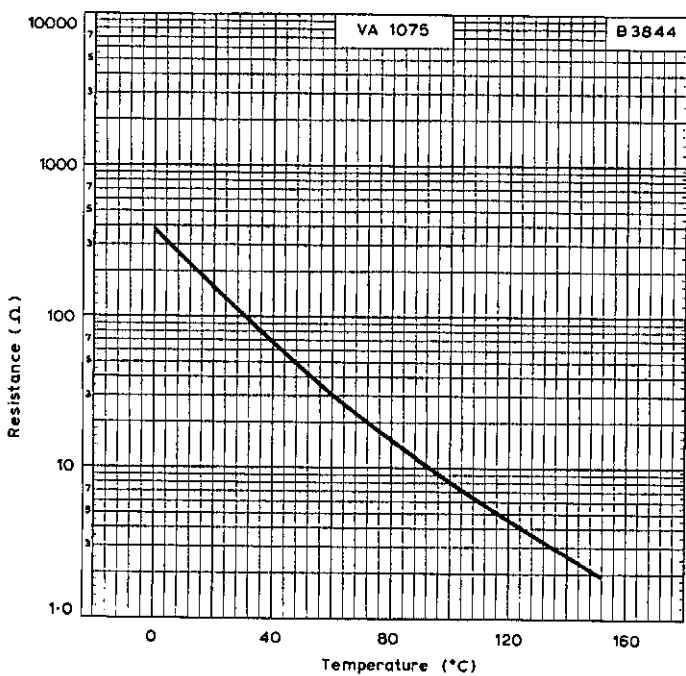
All dimensions in mm

## MARKING

The VA1075 is not colour coded but is distinguishable from other types in this range by its dimensions.



VOLTAGE/CURRENT CHARACTERISTIC AT  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TEMPERATURE

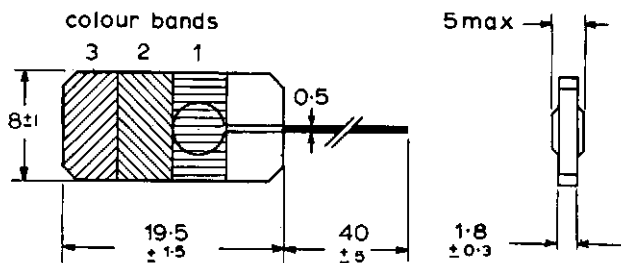
Plate type thermistor for use in transistor and similar circuits for temperature compensation.

This data should be read in conjunction with Introductory Notes - Thermistors

### ELECTRICAL DATA (at $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$32 \begin{smallmatrix} +9.6 \\ -6.4 \end{smallmatrix}$	$\Omega$
B factor	$4200 \pm 5\%$	$^{\circ}\text{K}$
Maximum dissipation	1.0	W
Resistance at maximum dissipation (approx)	0.64	$\Omega$
Current at maximum dissipation (approx)	1.25	A
Temperature at maximum dissipation (approx)	120	$^{\circ}\text{C}$
Dissipation constant	14	mW/degC

### MECHANICAL DATA



All dimensions in mm

B2679

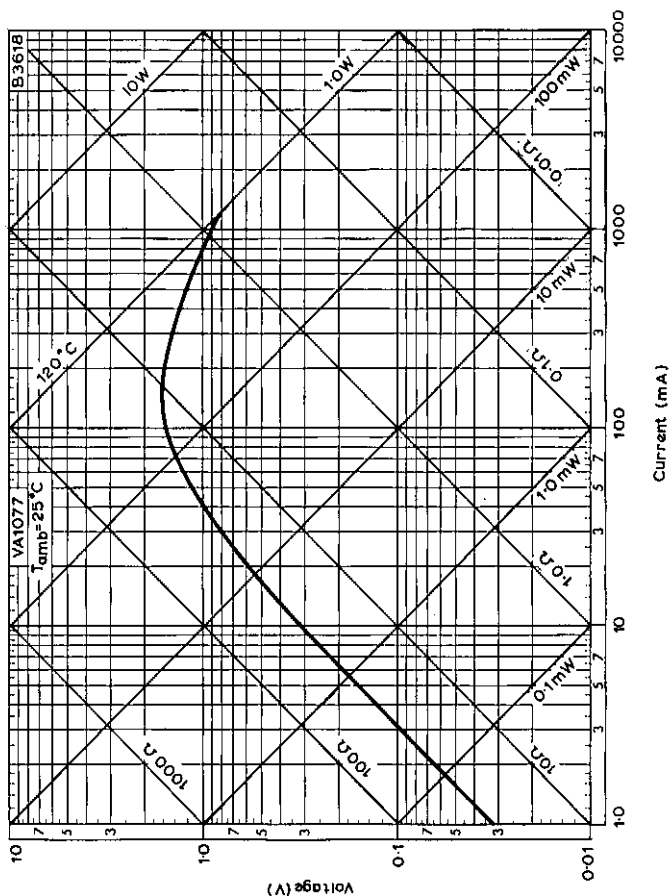
### MARKING

The VA1077 is distinguished from other types in this range by the following colour bands:

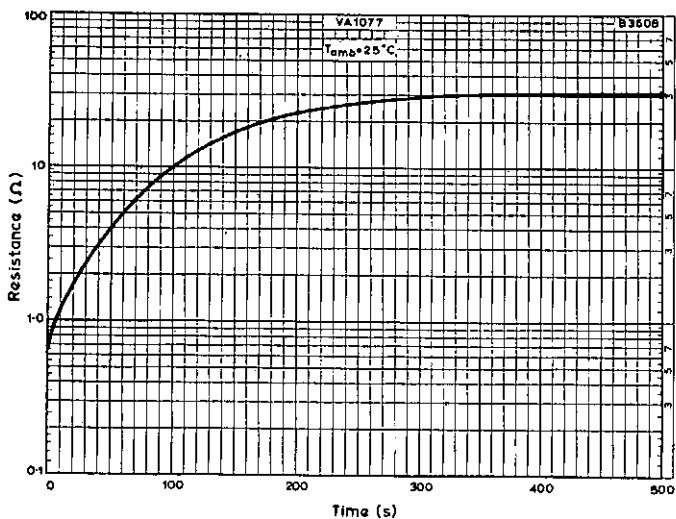
- Band 1. Orange
- Band 2. Red
- Band 3. Black

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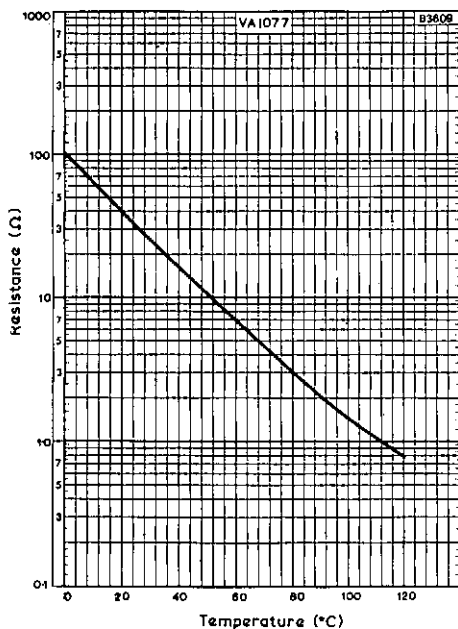




VOLTAGE/CURRENT CHARACTERISTIC AT  $T_{amb} = 25^\circ\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

Electrojumble.org.uk





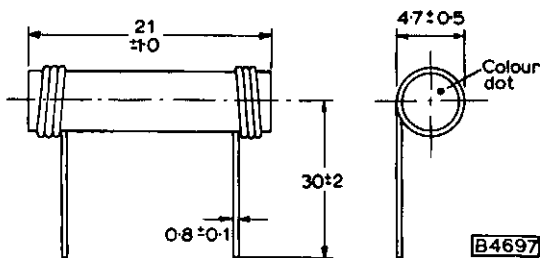
Rod type thermistor for use in transistor and similar circuits for compensation purposes

This data sheet should be read in conjunction with Introductory Notes - Thermistors

### ELECTRICAL DATA (at $T_{amb} = 25^{\circ}\text{C}$ )

Resistance (at $25^{\circ}\text{C}$ )	$150 \pm 20\%$	$\text{k}\Omega$
B factor	$4150 \pm 5\%$	$^{\circ}\text{K}$
Maximum dissipation	1.5	W
Resistance at maximum dissipation (approx)	2.1	$\text{k}\Omega$
Current at maximum dissipation (approx)	27	mA
Temperature at maximum dissipation (approx)	150	$^{\circ}\text{C}$
Dissipation constant	12	mW/deg C

### MECHANICAL DATA



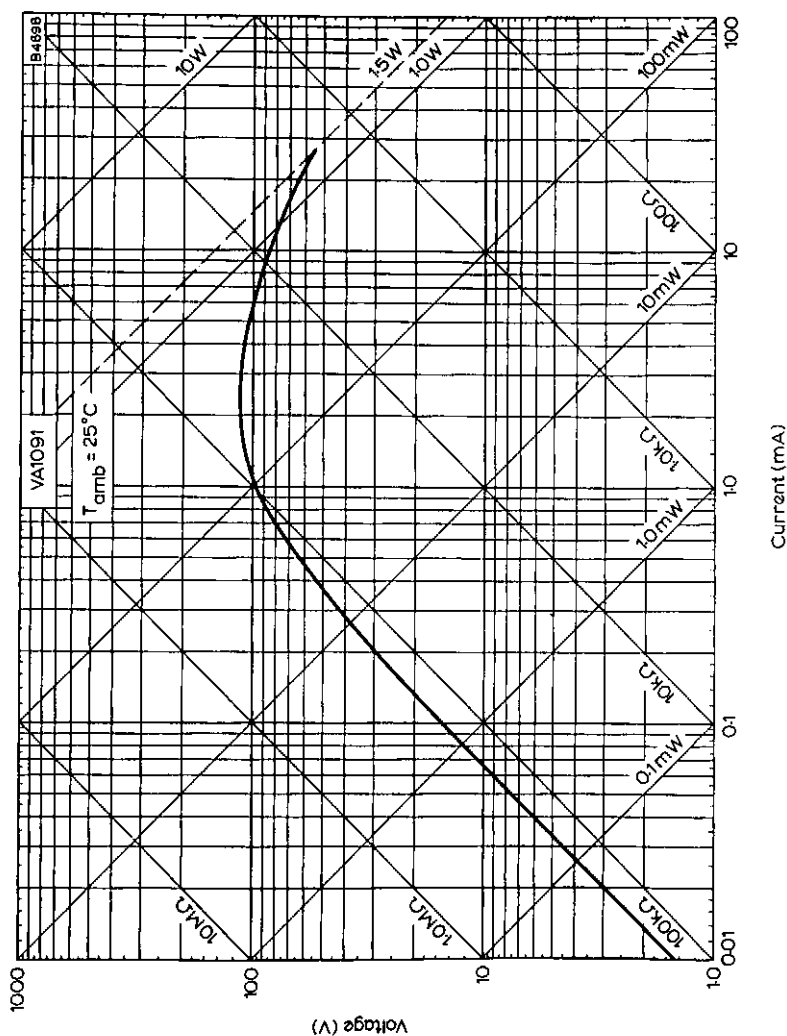
All dimensions in mm

### MARKING

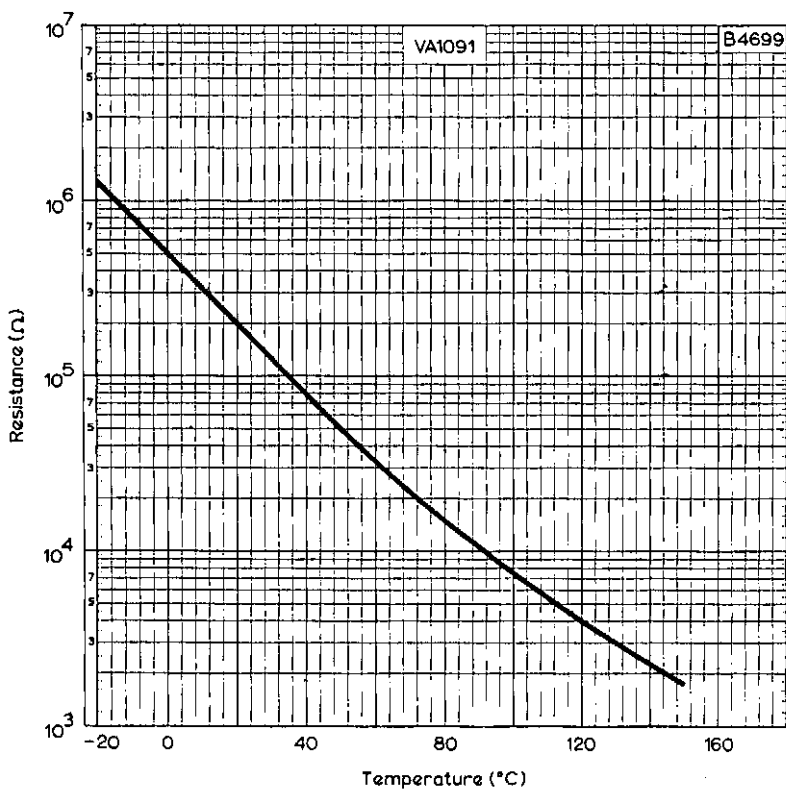
The VA1091 is distinguished from other types in this range by a white dot.

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VOLTAGE/CURRENT CHARACTERISTIC at  $T_{amb} = 25^{\circ}C$



VARIATION OF RESISTANCE WITH TEMPERATURE

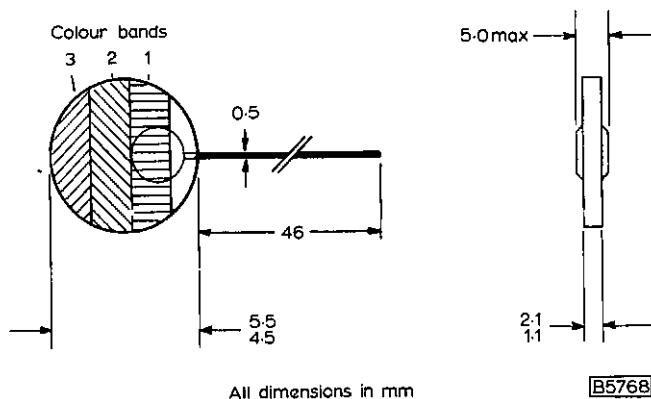
Negative temperature coefficient thermistor  
for compensation and control purposes.

This data should be read in conjunction with I nformational Notes - Negative Temperature Coefficient Thermistors.

## ELECTRICAL DATA (at $T_{amb} = 25^{\circ}C$ )

$R_{25}$	$150 \pm 30$	$\Omega$
B factor	$3150 \pm 5\%$	$^{\circ}K$
Maximum dissipation	0.6	W
Resistance at maximum dissipation (approx.)	11	$\Omega$
Current at maximum dissipation (max.)	235	mA
Temperature at maximum dissipation (approx.)	125	$^{\circ}C$
Dissipation constant	6.2	mW/degC
Recovery Time	50	s

## MECHANICAL DATA



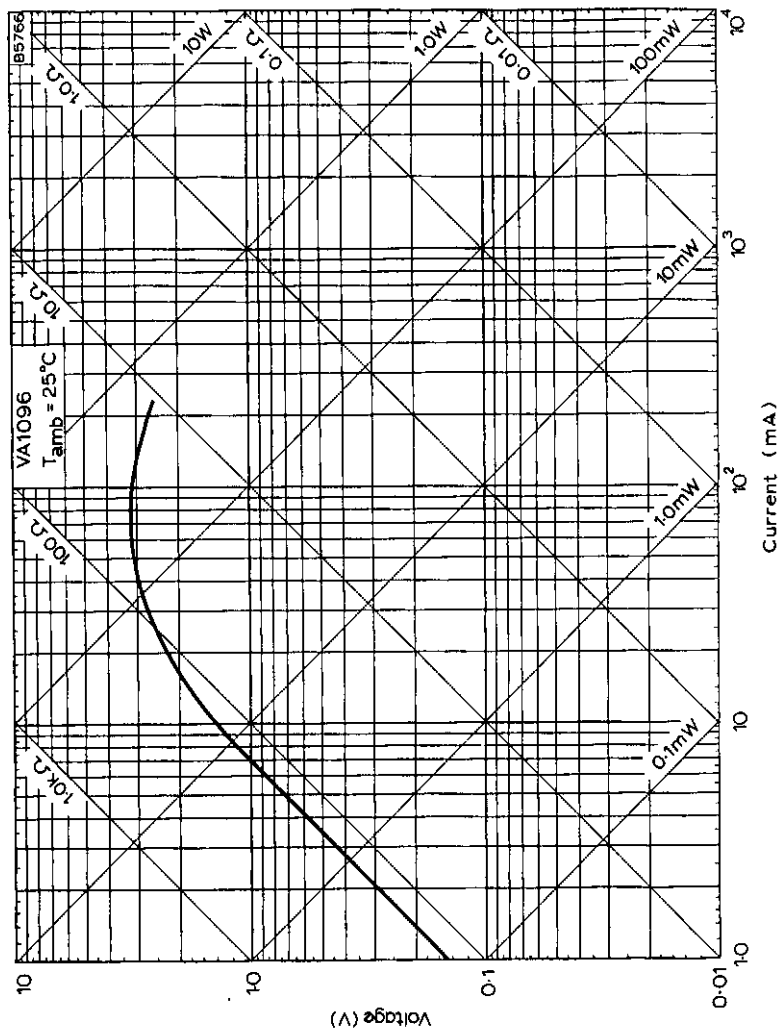
## MARKING

The VA1096 is distinguished from other types in this range by the following colour bands:

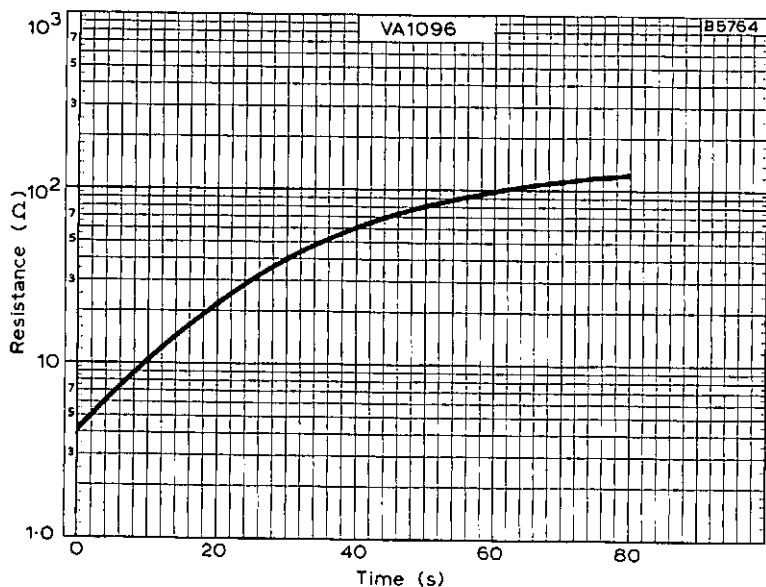
Band 1.	Brown
Band 2.	Green
Band 3.	Brown

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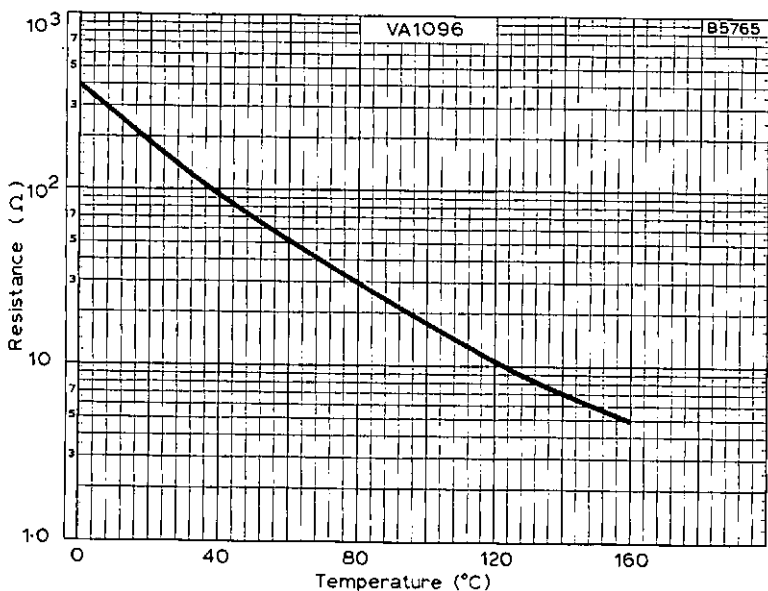




VOLTAGE/CURRENT CHARACTERISTIC AT  $T_{amb} = 25^{\circ}C$



VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

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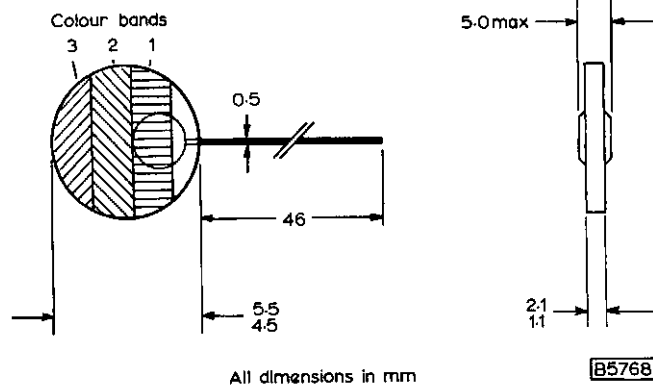
Negative temperature coefficient thermistor  
for compensation and control purposes.

This data should be read in conjunction with Introductory Notes - Negative Temperature Coefficient Thermistors

### ELECTRICAL DATA (at $T_{amb} = 25^{\circ}C$ )

$R_{25}$	$470 \pm 94$	$\Omega$
B factor	$3450 \pm 5\%$	$^{\circ}K$
Maximum dissipation	0.6	W
Resistance at maximum dissipation (approx.)	25	$\Omega$
Current at maximum dissipation (max.)	155	mA
Temperature at maximum dissipation (approx.)	125	$^{\circ}C$
Dissipation constant	6.2	mW/degC
Recovery time (approx.)	50	s

### MECHANICAL DATA



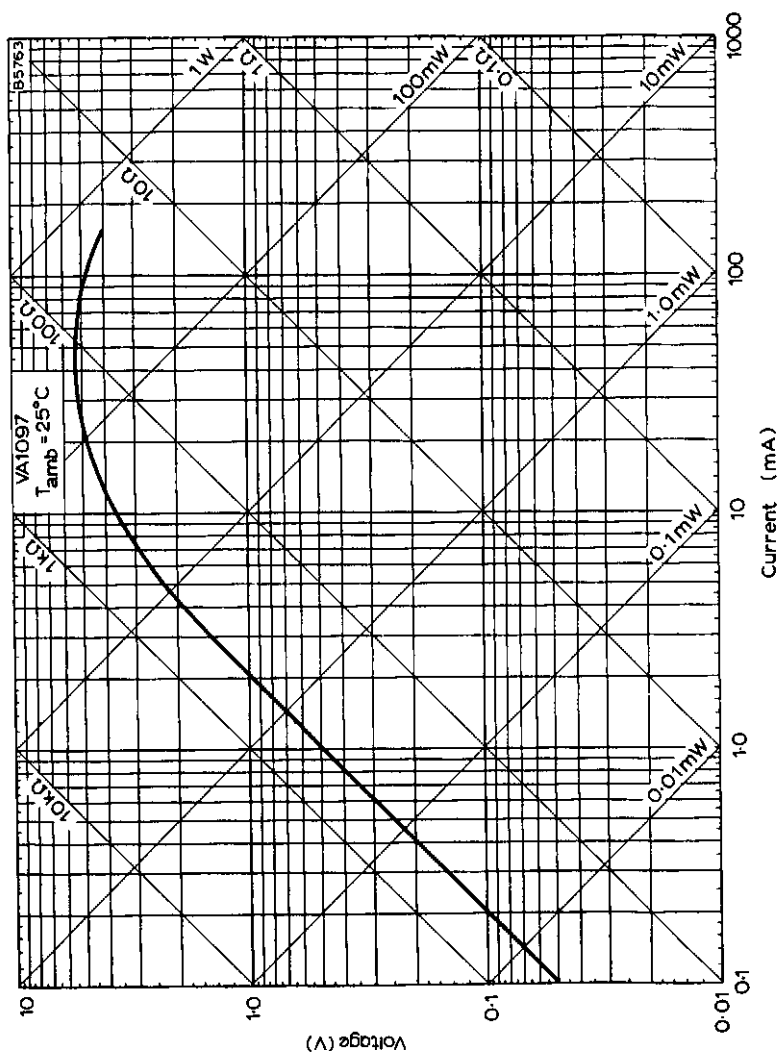
### MARKING

The VA1097 is distinguished from other types in this range by the following colour bands:

- Band 1. Yellow
- Band 2. Violet
- Band 3. Brown

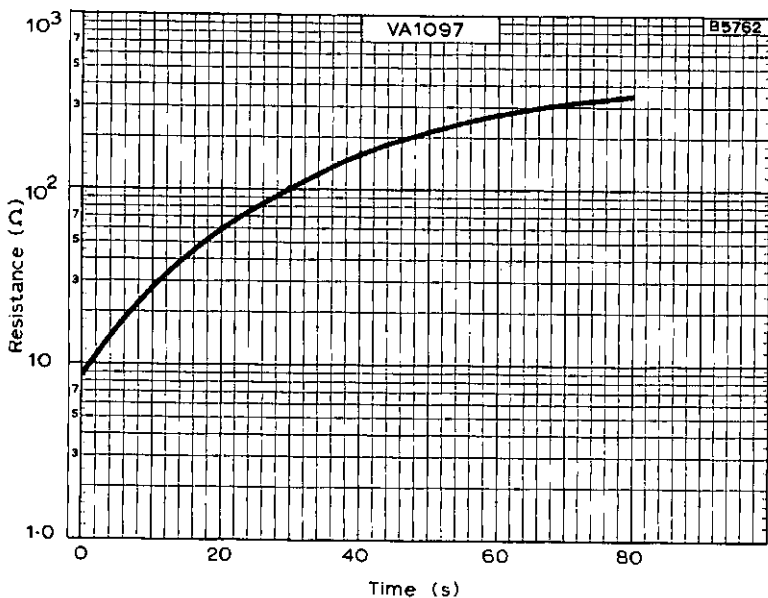
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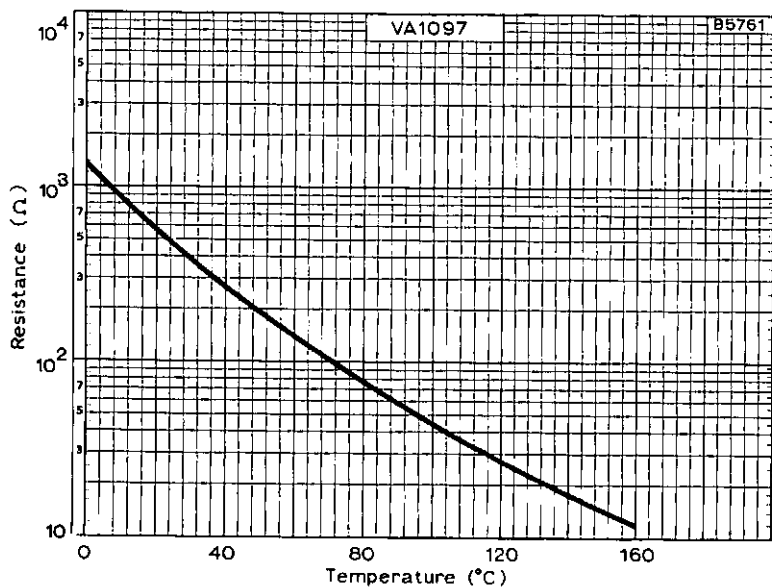


VOLTAGE/CURRENT CHARACTERISTIC AT T<sub>amb</sub> = 25°C





VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

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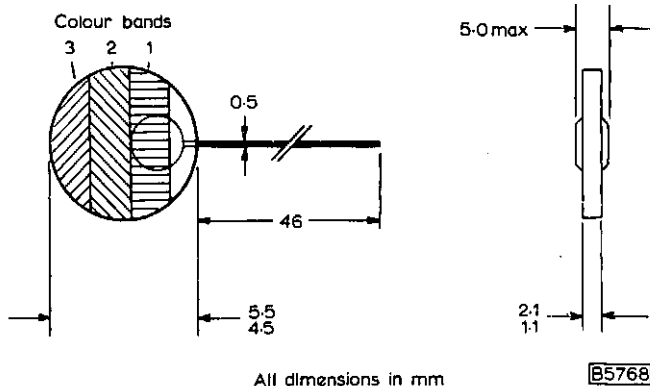
Negative temperature coefficient thermistor  
for compensation and control purposes.

This data should be read in conjunction with Introductory Notes - Negative Temperature Coefficient Thermistors.

### ELECTRICAL DATA (at $T_{amb} = 25^{\circ}C$ )

$R_{25}$	$1.5 \pm 0.3$	$k\Omega$
B factor	$3725 \pm 5\%$	$^{\circ}K$
Maximum dissipation	0.6	W
Resistance at maximum dissipation (approx.)	78.5	$\Omega$
Current at maximum dissipation (max.)	87.5	mA
Temperature at maximum dissipation (approx.)	125	$^{\circ}C$
Dissipation constant	6.2	mW/degC
Recovery time (approx.)	50	s

### MECHANICAL DATA

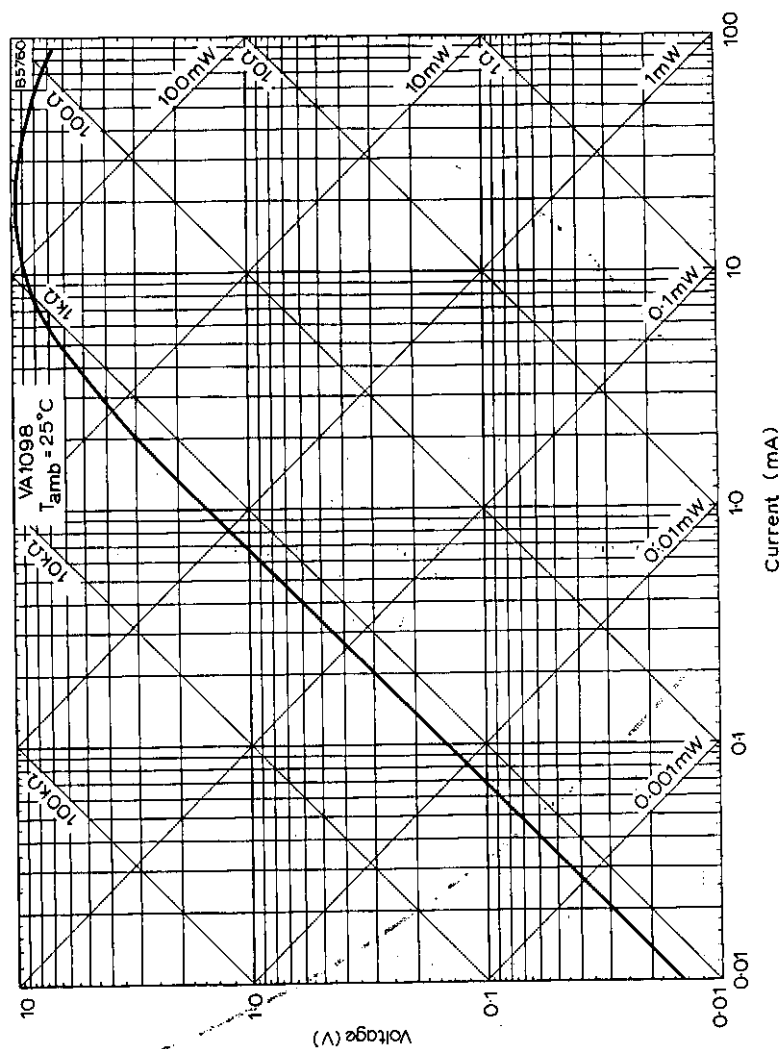


### MARKING

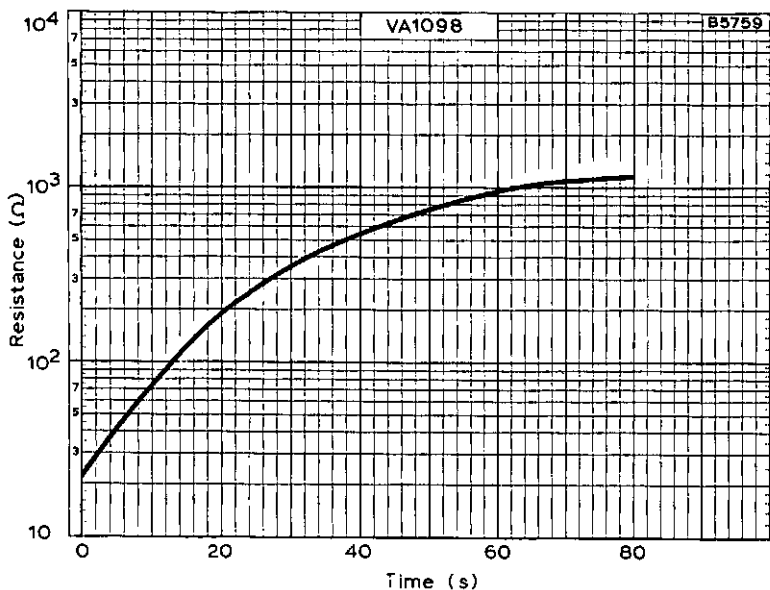
The VA1098 is distinguished from other types in this range by the following colour bands:

Band 1.	Brown
Band 2.	Green
Band 3.	Red

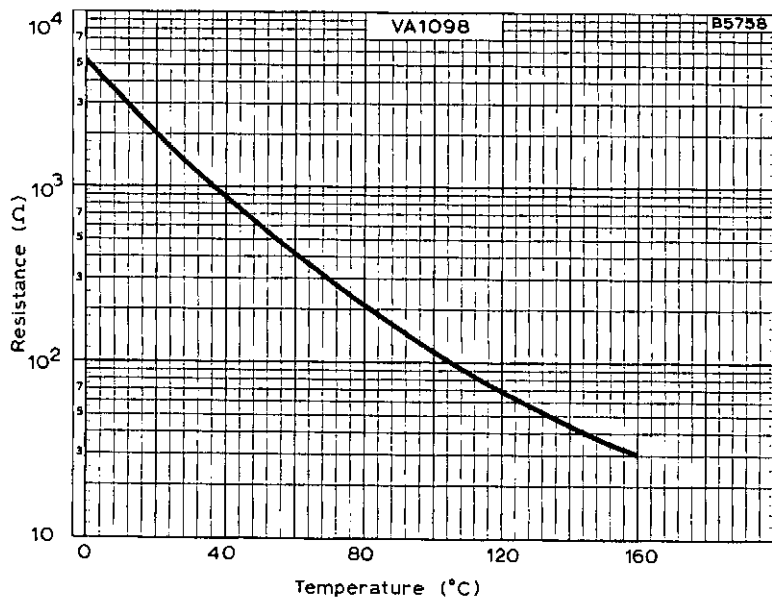
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VOLTAGE/CURRENT CHARACTERISTIC AT  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE  
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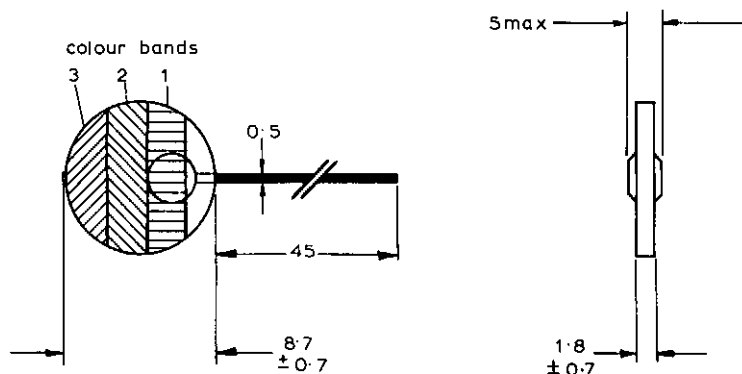
Negative temperature coefficient thermistor  
for compensation and control purposes.

This data sheet should be read in conjunction with Introductory Notes -  
Negative Temperature Coefficient Thermistors.

### ELECTRICAL DATA (at $T_{amb} = 25^{\circ}C$ )

$R_{25}$	$15 \pm 3$	$\Omega$
B factor	$3000 \pm 5\%$	$^{\circ}K$
Maximum dissipation	1.0	W
Resistance at maximum dissipation (approx.)	1.2	$\Omega$
Current at maximum dissipation (max.)	800	mA
Temperature at maximum dissipation (approx.)	120	$^{\circ}C$
Dissipation constant	10	mW/degC
Recovery time (approx.)	60	s

### MECHANICAL DATA



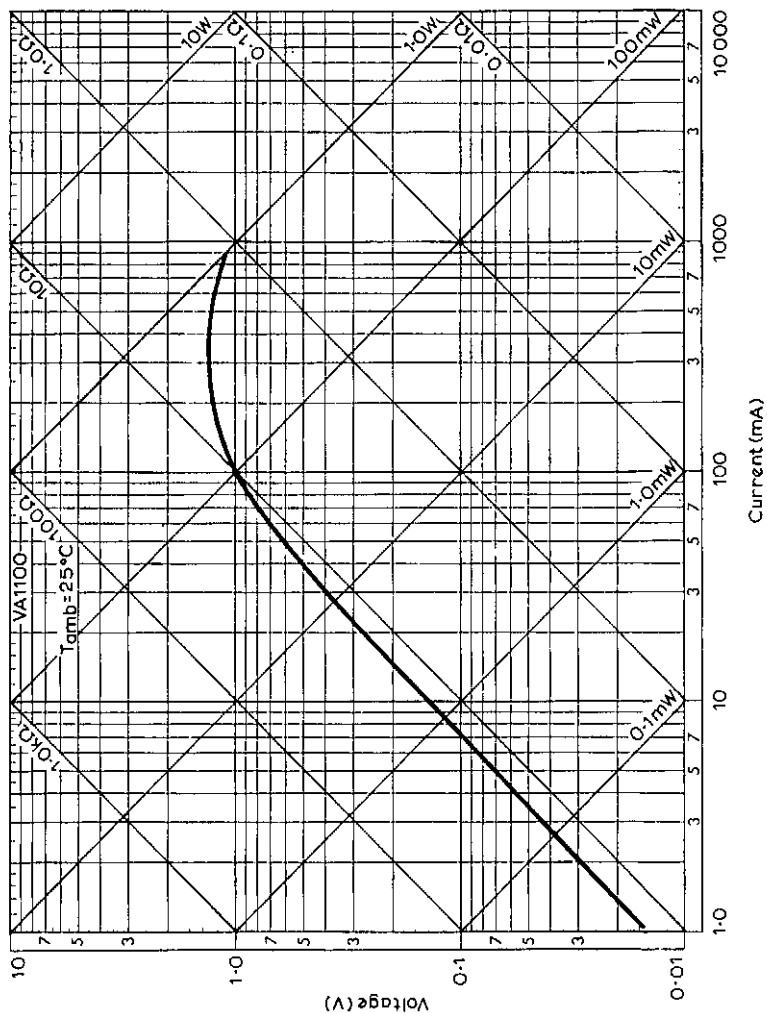
All dimensions in mm.

**B6946**

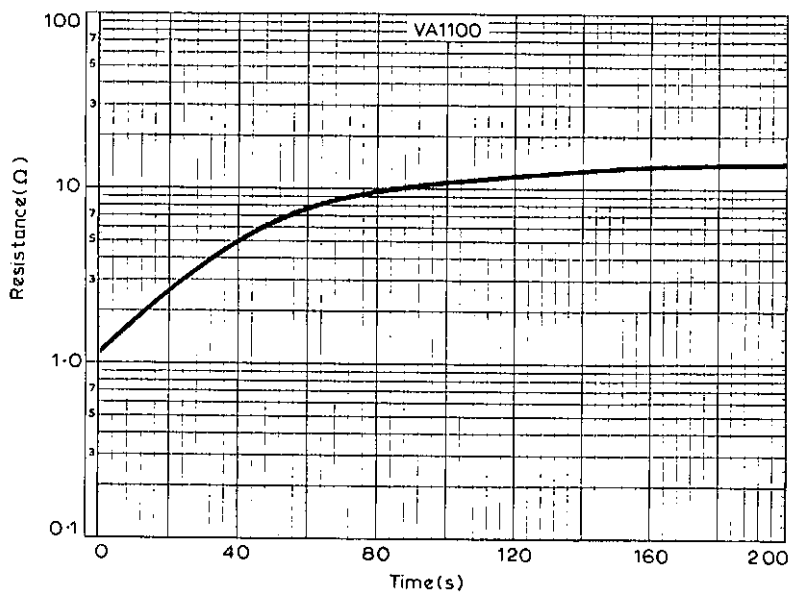
### MARKING

The VA1100 is distinguished from other types in this range by the following colour bands:

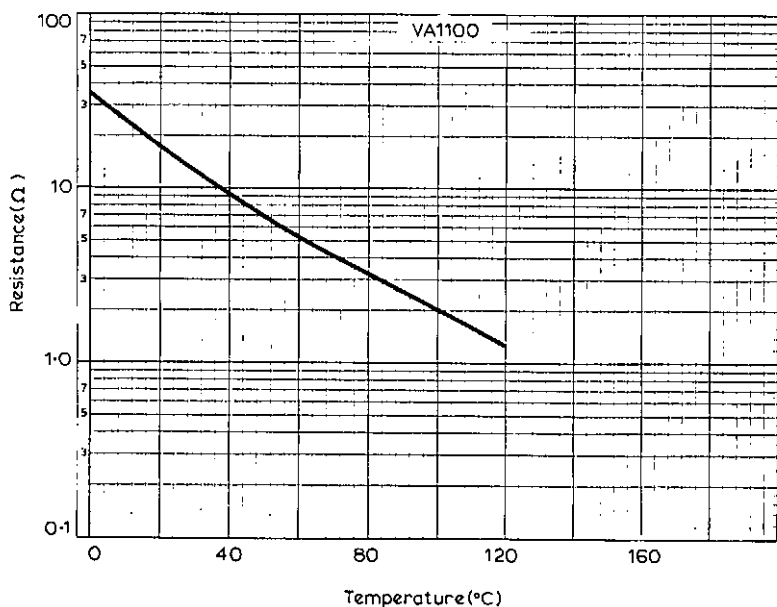
- Band 1. Brown
- Band 2. Green
- Band 3. Black



VOLTAGE/CURRENT CHARACTERISTIC AT  $T_{amb} = 25^{\circ}\text{C}$



VARIATION OF RESISTANCE WITH TIME UNDER  
NORMAL COOLING CONDITIONS



VARIATION OF RESISTANCE WITH TEMPERATURE

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## QUICK REFERENCE DATA

Miniature bead thermistors in four forms. As a naked bead or in three different types of glass encapsulation.

$R_{25}$ values	1 to 680	k $\Omega$
B factor at 25 <sup>o</sup> C	2350 to 4225	<sup>o</sup> K
W max. at T ambient 25 <sup>o</sup> C	60	mW

The VA3000 range of thermistors offers a choice of four forms of bead thermistor, each using the same basic bead.

The four types are:

- 1) The naked bead, VA3100 series - which is the basic bead with leads attached, unmounted.
- 2) The double ended glass type, VA3200 series - consisting of the bead mounted in a gas filled, glass encapsulation.
- 3) The glass dipped type, VA3400 series - which is the basic bead protected by a glass coating.
- 4) The thermometer type, VA3700 series - where the bead is mounted very close to the tip in a glass encapsulation, similar to a clinical thermometer.

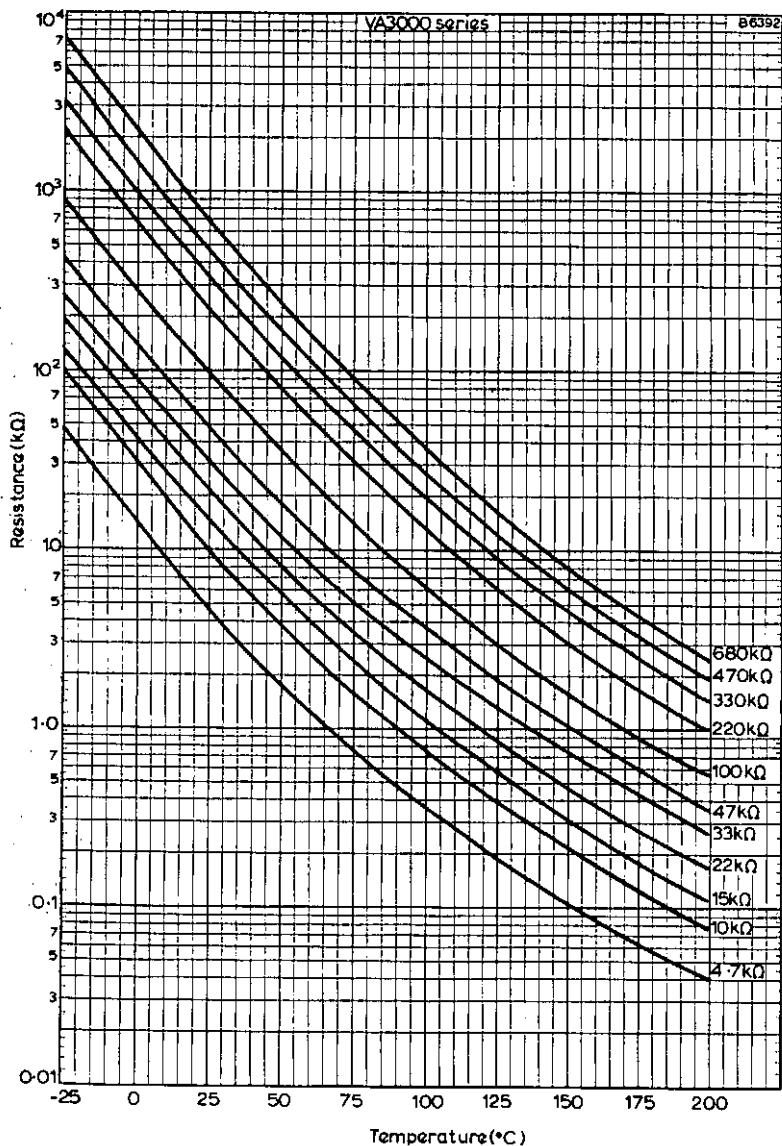
The thermistors are offered in a preferred range of resistance at 25<sup>o</sup>C ( $R_{25}$ ). The tables on individual data pages give the values and corresponding numbers.

Note: The dissipation constant is the power needed to raise the bead through one degree centigrade (measured in still air).

The thermal time constant is the time required for the thermistor to change 63.2% of the total difference between its initial and final body temperature, when subjected to a step function change in temperature under zero power conditions (measured in still air).

Both constants are largely dependent on the method of mounting.

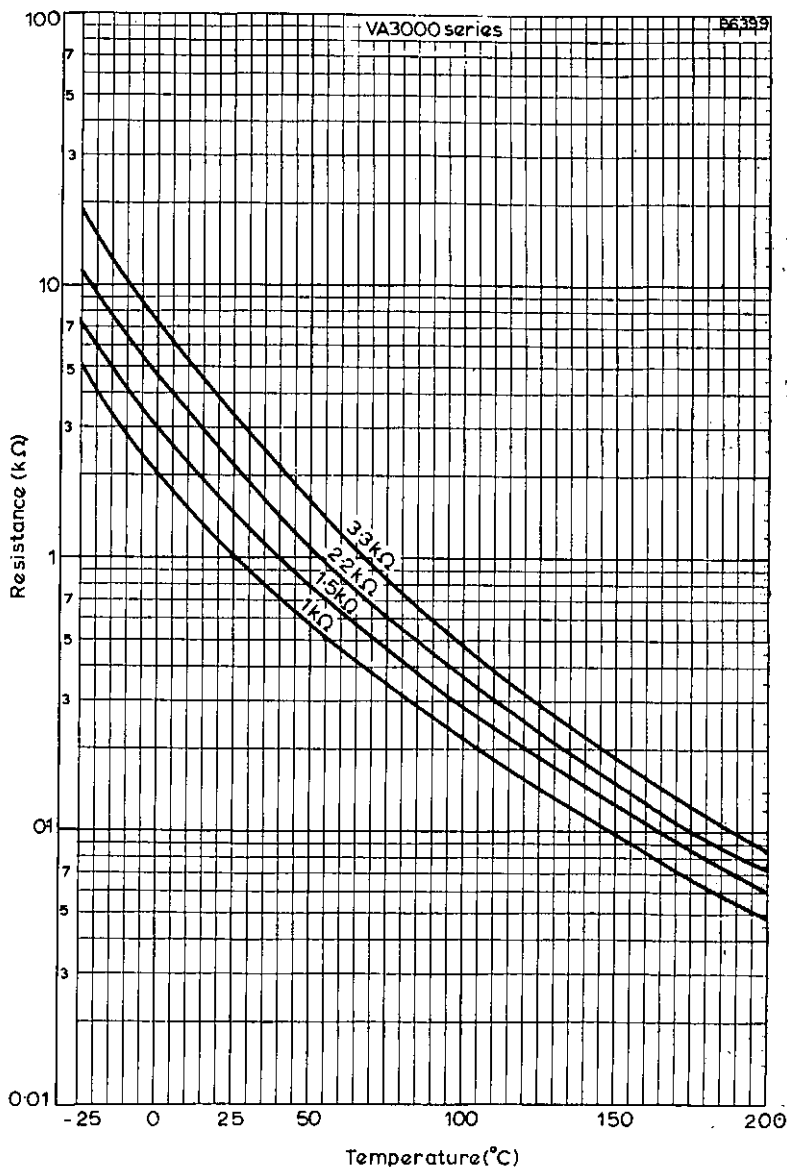




RESISTANCE/TEMPERATURE CHARACTERISTICS

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RESISTANCE/TEMPERATURE CHARACTERISTICS

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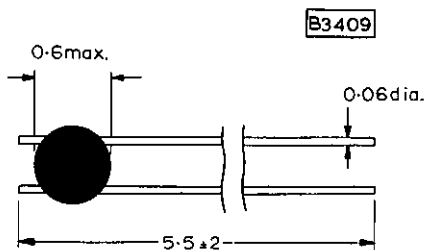


# MINIATURE BEAD N.T.C. THERMISTORS

# VA3000 Series

VA3100 to VA3116

Naked bead type for use where very small size and high thermal sensitivity are desired.



All dimensions in mm

## ELECTRICAL DATA

Maximum dissipation	60	mW
T max.	200	°C
Dissipation constant (approx.)	0.1 mW/degC	
Stability after 1000 hours at T max., $\Delta R_{25}$	< 1.0	%

Resistance at 25°C ( $R_{25}$ ) ( $\Omega$ ) $\pm 20\%$	B value at 25°C (°K) $\pm 5\%$	Type Number
1000	2350	VA3100
2200	2600	VA3102
4700	3650	VA3104
10000	3800	VA3106
22000	3800	VA3108
47000	3800	VA3110
100000	3900	VA3112
220000	4075	VA3114
470000	4225	VA3116

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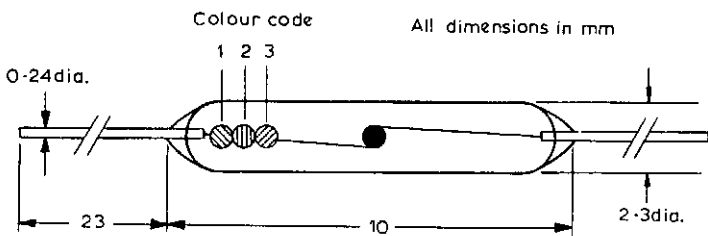
# MINIATURE BEAD N.T.C. THERMISTORS

# VA3000 Series

VA3200 to VA3216

Double ended glass type used to compensate for small power changes in electronic circuitry.

**B3410**



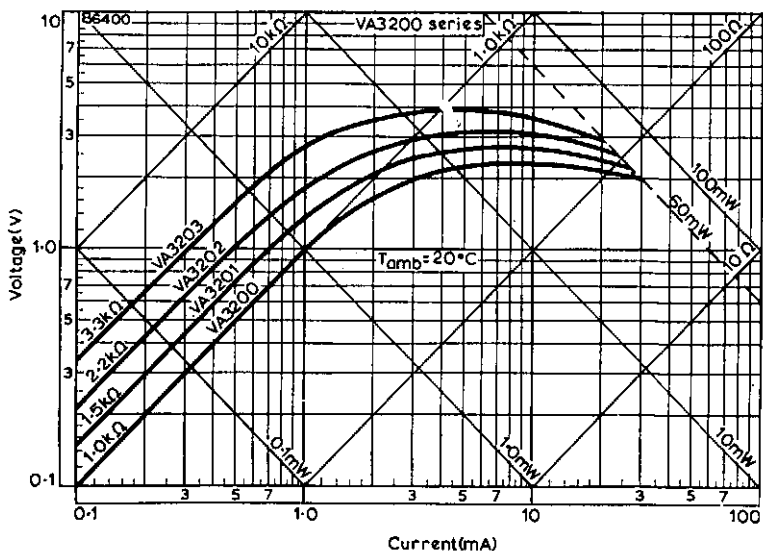
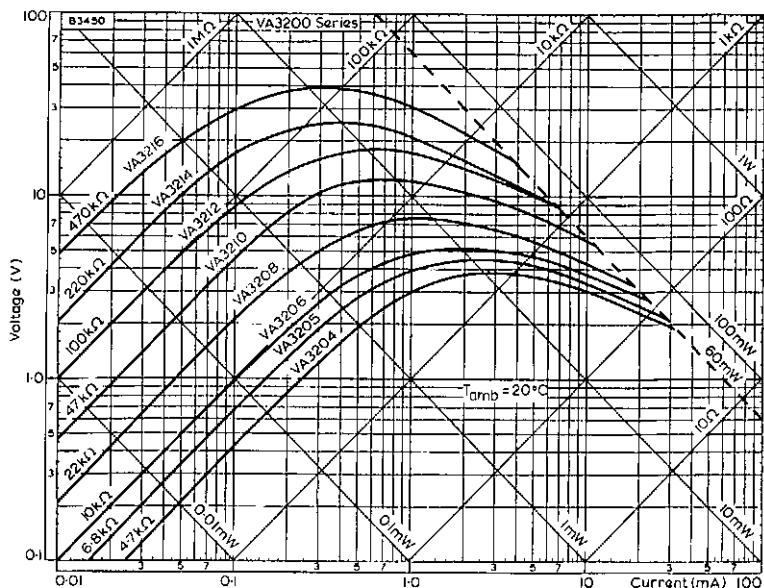
## ELECTRICAL DATA

Maximum dissipation	60	mW
T max.	200	°C
Dissipation constant (approx.)	0.4	mW/degC
Thermal time constant	10 to 15	s
Stability after 1000 hours at T max., $\Delta R_{25}$	< 1.0	%

Resistance at 25°C ( $R_{25}$ ) ( $\Omega$ ) $\pm 20\%$	B value at 25°C (°K) $\pm 5\%$	Colour code			Type Number
		1	2	3	
1000	2350	Brown	Black	Red	VA3200
1500	2450	Brown	Green	Red	VA3201
2200	2600	Red	Red	Red	VA3202
3300	2775	Orange	Orange	Red	VA3203
4700	3650	Yellow	Violet	Red	VA3204
10000	3800	Brown	Black	Orange	VA3206
15000	3750	Brown	Green	Orange	VA3207
22000	3800	Red	Red	Orange	VA3208
33000	3750	Orange	Orange	Orange	VA3209
47000	3800	Yellow	Violet	Orange	VA3210
100000	3900	Brown	Black	Yellow	VA3212
<b>220000</b>	4075	Red	Red	Yellow	VA3214
470000	4225	Yellow	Violet	Yellow	VA3216

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VOLTAGE/CURRENT CHARACTERISTICS

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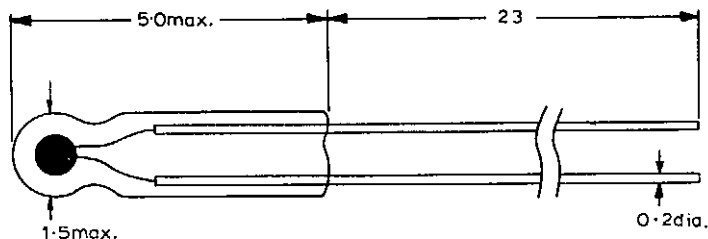


# MINIATURE BEAD N.T.C. THERMISTORS

# VA3000 Series

VA3400 to VA3417

Glass dipped bead type for use where small size is desired in temperature measurement and control applications.



All dimensions in mm

**B 3411**

## ELECTRICAL DATA

Maximum dissipation	60	mW
T max.	200	°C
Dissipation constant (approx.)	0.75	mW/degC
Thermal time constant	12	s
Stability after 1000 hours at T max., $\Delta R_{25}$	< 1.0	%

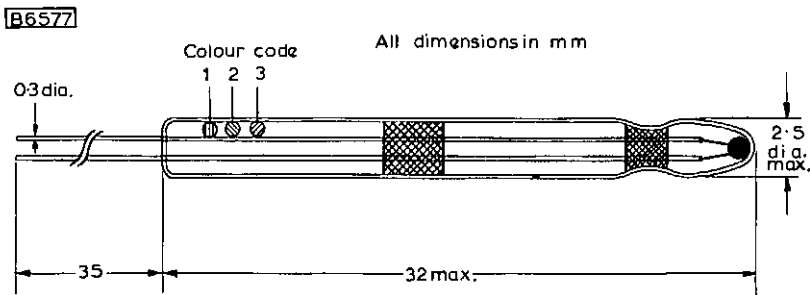
Resistance at 25°C ( $R_{25}$ ) ( $\Omega$ ) $\pm 20\%$	B value at 25°C (°K) $\pm 5\%$	Type Number
1000	2350	VA3400
2200	2600	VA3402
3300	2775	VA3403
4700	3650	VA3404
6800	3725	VA3405
10000	3800	VA3406
47000	3800	VA3410
220000	4075	VA3414
680000	4300	VA3417

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## VA3700 to VA3716

Thermometer type for use in the measurement and control of temperature.

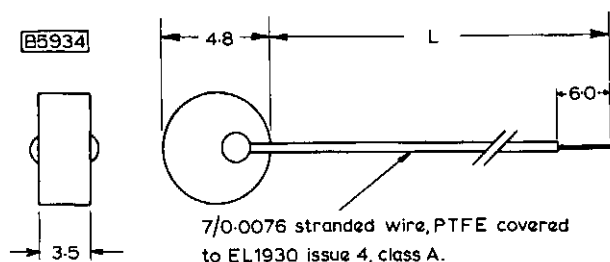


### ELECTRICAL DATA

Maximum dissipation	60	mW
T max.	200	°C
Dissipation constant (approx.)	0.7	mW/degC
Thermal time constant	14	s
Stability after 1000 hours at T max., $\Delta R_{25}$	< 1.0	%

Resistance at 25°C ( $R_{25}$ ) ( $\Omega \pm 20\%$ )	B value at 25°C (°K) $\pm 5\%$	Colour Code			Type Number
		1	2	3	
1000	2350	Brown	Black	Red	VA3700
2200	2600	Red	Red	Red	VA3702
4700	3650	Yellow	Violet	Red	VA3704
6800	3725	Blue	Grey	Red	VA3705
10000	3800	Brown	Black	Orange	VA3706
22000	3800	Red	Red	Orange	VA3708
47000	3800	Yellow	Violet	Orange	VA3710
100000	3900	Brown	Black	Yellow	VA3712
220000	4075	Red	Red	Yellow	VA3714
330000	4175	Orange	Orange	Yellow	VA3715
470000	4225	Yellow	Violet	Yellow	VA3716

For use in motor protection



All dimensions in mm

### GENERAL DESCRIPTION

Electric motors and other electrical machinery commonly employ insulating materials which have maximum continuous operating temperature ratings of 120 and 130°C as specified in B.S. 2757 for classes E and B respectively. Positive temperature coefficient thermistors provide a convenient and reliable method of protecting such machines from the dangers of thermal overload. A p.t.c. thermistor can be buried in the windings and the sharp rise in the resistance value as the temperature increases gives an accurate and rapid indication of the temperature of the winding.

In the VA8600 series, types are available which provide for protection at the rated temperatures 120 and 130°C and also for early warning at 110 and 120°C respectively. The same design of sensing circuit can be used with each of these thermistors since each type is designed to have a nominal resistance at the critical temperature of 1000ohms and a temperature coefficient at that point greater than 15% per degree C.



## APPLICATIONS INFORMATION

Three p.t.c. thermistors can be wired in series and connected to one sensing circuit. The three thermistors can be, for example, embedded in each of the stator windings of a three phase machine.

In such applications it is recommended that the sensing circuit be designed to operate when the combined resistance of the thermistor chain is about 3000ohms but satisfactory operation will be possible over the range 2000 to 4000ohms. The applied voltage across the thermistor chain should be kept as low as possible to avoid the effects of self heating and voltage dependency. A maximum of 5 volts is recommended.

### Example

Consider three thermistors type VA8602 embedded in the stator windings of a motor and connected in series to the sensing circuit.

If the motor heats up uniformly then:-

- a) At temperatures below  $100^{\circ}\text{C}$  the combined resistance will be less than  $750\Omega$ . (typically  $240\Omega$  at  $25^{\circ}\text{C}$ )
- b) At  $115^{\circ}\text{C}$  the combined resistance will be less than  $2000\Omega$ .
- c) At  $122^{\circ}\text{C}$  the combined resistance will be at least  $3000\Omega$ .
- d) At  $124^{\circ}\text{C}$  the combined resistance will be at least  $4000\Omega$ .

Hence for any sensing circuit operating in the range 2000 to 4000ohms, the motor will not switch off at temperatures below  $115^{\circ}\text{C}$  but will certainly be switched off if the temperature reaches  $124^{\circ}\text{C}$ .

In the case where only one thermistor is heated, the other two remaining cold, then:-

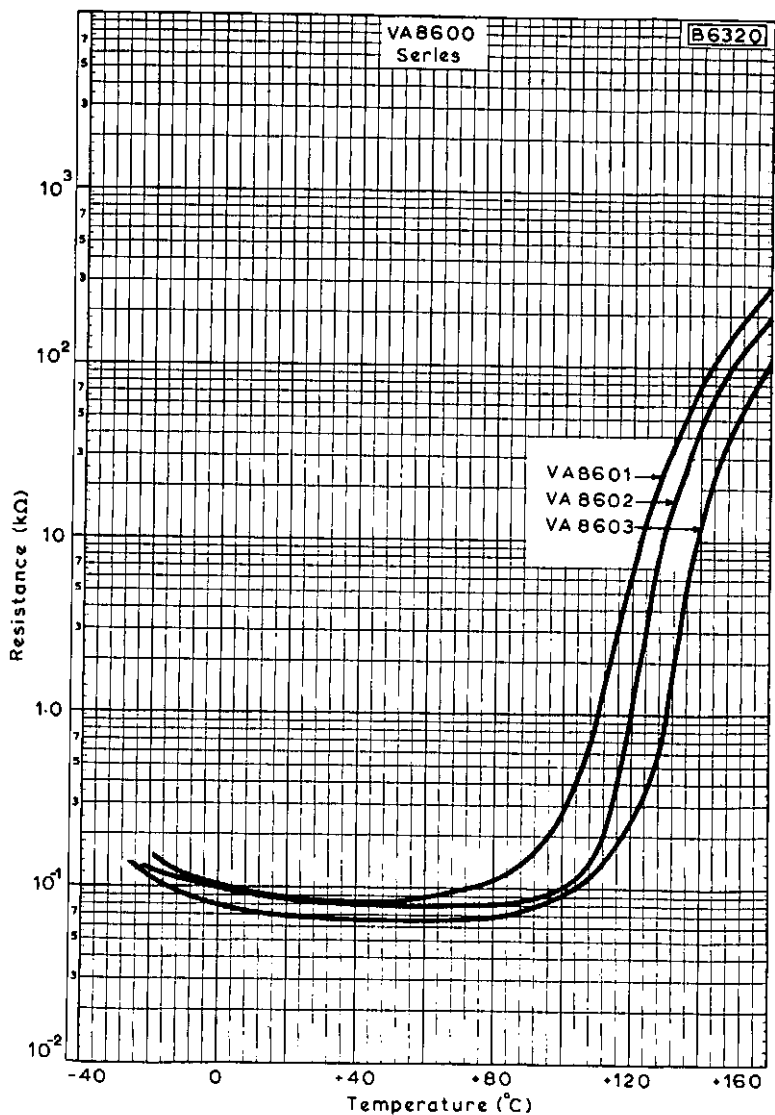
- e) At  $127^{\circ}\text{C}$  the combined resistance will be at least  $2000\Omega$ .
- f) At  $130^{\circ}\text{C}$  the combined resistance will be at least  $4000\Omega$ .

Therefore, for a sensing circuit below 4000ohms, the motor will be switched off if any part of the winding where a thermistor is mounted rises to  $130^{\circ}\text{C}$ .

In the above example, a temperature coefficient of 15% per degree Centigrade has been assumed, together with a sensing circuit operating at the worst limit of the 2000 to 4000ohm range. In practice, the temperature coefficient is appreciably higher than the minimum and this will reduce the range of temperature over which switching may occur. A reduction in the tolerance of the sensing circuit would further reduce the temperature range.

## CHARACTERISTICS

Lead length (L) cm	Type number			
	VA8601	VA8602	VA8603	
20	VA8601	VA8602	VA8603	
50	VA8611	VA8612	VA8613	
75	VA8607	VA8605	VA8606	
Nominal temperature for R=1000Ω	110	120	130	°C
Temperature range for R ≤ 250Ω	-20 to +90	-20 to +100	-20 to +110	°C
Minimum temperature for R=670Ω	105	115	125	°C
Temperature range for R=1000Ω	108 to 112	118 to 122	128 to 132	°C
Maximum temperature for R=4000Ω	120	130	140	°C
Minimum temperature coefficient over range R=670 to 4000Ω	15	15	15	%per degC
Dissipation constant in free air at 25°C	10	10	10	mW/degC
<p>Note These p.t.c. thermistors are also voltage sensitive. The above characteristics are obtained with a measuring voltage less than 2.5V. Operation with an applied voltage greater than 5.0V is not recommended.</p>				
Operating temperature range		-20 to +155		°C
Storage temperature range		-40 to +155		°C
Maximum temperature during impregnation for not more than 12 hours			+180	°C



TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTICS

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