

EPCOS Product Brief 2018

# SIOV Metal Oxide Varistors

NT Series of ThermoFuse Varistors

## Applications

- Home appliances
- Power supplies
- Inverters
- Photovoltaic inverters
- Drives
- Lighting applications
- Communication and data systems
- Smart meters

## Features

- Compact size
- Highly reliable fuse design
- Fuse prevents reconnection for high safety
- According to UL 1449
- Also available with third lead for status display
- High surge current capability ( $I_{max}$  10 kA,  $I_n$  up to 5 kA)



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## NT Series of ThermoFuse Varistors

### Introduction

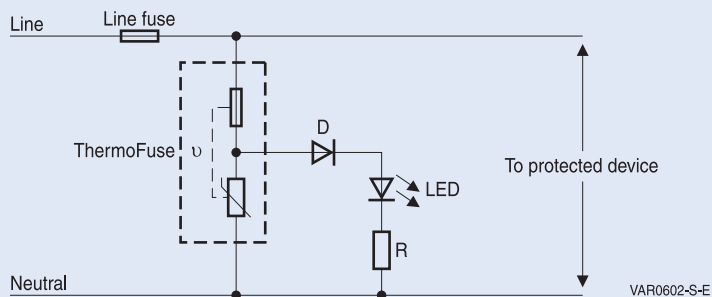
The new NT series of ThermoFuse™ varistors consists of a disk varistor connected in series with an integrated thermally coupled fuse designed to trip in the event of overheating due to the excessive overvoltage. In this event, the fuse trips and disconnects the overheated varistor from the power circuit and thus prevents flames from developing. This increases the reliability of the equipment to be protected. Thanks to their thermal resistance and flame-retardant design, ThermoFuse™ varistors meet UL 94 V-0 requirements, and are also listed as Type 4CA in UL 1449, 4<sup>th</sup> edition.

In addition to the two varistor terminal wires, the NT series features a monitor output lead that may be used to send a status signal, for example, to an LED to indicate that the fuse has been activated.

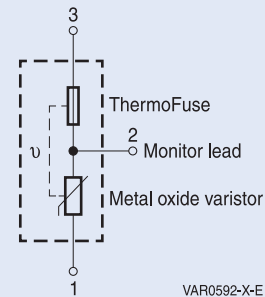
The product range comprises types with 14 mm and 20 mm diameter disks. The ThermoFuse™ varistors in the NT series are designed to absorb maximum surge currents with an 8/20  $\mu$ s pulse of between 6 kA and 10 kA at rated voltages of between 130  $V_{RMS}$  and 750  $V_{RMS}$ . They have a surge current capability of 10.000 A and a maximum energy absorption capacity of 480 J for 2 ms.

NT types are designed for use in a wide range of applications, which include home appliances, power supplies, inverters for solar installations, drives and smart meters. They can also be used for the general protection of electrical wiring and installations.

### Typical applications



### Lead configuration



### Symbols and terms

Symbol	Term
$C_{typ}$	Typical capacitance
$i_c$	Current at which $v_{c,max}$ is measured
$i_{max}$	Maximum surge current (also termed peak current)
$I_n$	Nominal discharge current to UL 1449
$v_{c,max}$	Maximum clamping voltage at specified current $i_c$
$V_{DC}$	DC operating voltage
$V_{RMS}$	AC operating voltage, root-mean-square value
$V_V$	Varistor voltage
$W_{max}$	Maximum energy absorption

# NT14 Series, 2 Leads



## Electrical specifications and ordering codes

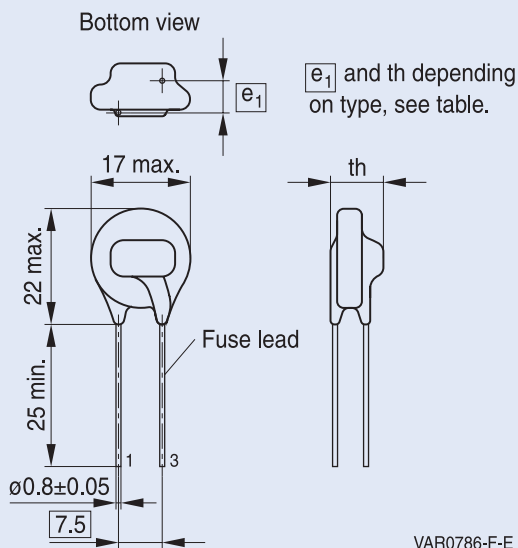
Maximum ratings (T <sub>A</sub> = 85 °C)							Characteristics (T <sub>A</sub> = 25 °C)			Dimensions	
Ordering code <sup>1)</sup>	Type <sup>1)</sup> (untaped) SIOV-	V <sub>RMS</sub>	V <sub>DC</sub>	i <sub>max</sub> (8/20 μs) 1 time A	I <sub>n</sub> <sup>2)</sup> (8/20 μs) 15 times A	W <sub>max</sub> (2 ms) J	V <sub>v</sub> (1 mA) V	V <sub>c,max</sub> (i <sub>c</sub> @ 50 A) (8/20 μs) V	C <sub>typ</sub> (1 kHz) pF	th max. mm	e <sub>1</sub> ±1 mm
B72214R2131K101	NT14K130E2K4	130	170	6000	3000	50	205 ±10%	340	880	9.0	2.6
B72214R2141K101	NT14K140E2K4	140	180	6000	3000	55	220 ±10%	360	820	9.0	2.7
B72214R2151K101	NT14K150E2K4	150	200	6000	3000	60	240 ±10%	395	750	9.0	2.8
B72214R2171K101	NT14K175E2K4	175	225	6000	3000	70	270 ±10%	455	670	9.0	2.8
B72214R2211K101	NT14K210E2K4	210	270	6000	3000	80	330 ±10%	545	580	9.5	2.9
B72214R2251K101	NT14K250E2K4	250	320	6000	3000	100	390 ±10%	650	490	9.5	3.1
B72214R2271K101	NT14K275E2K4	275	350	6000	3000	110	430 ±10%	710	440	9.5	3.2
B72214R2301K101	NT14K300E2K4	300	385	6000	3000	125	470 ±10%	775	400	11.0	3.3
B72214R2321K101	NT14K320E2K4	320	420	6000	3000	136	510 ±10%	840	370	11.0	3.5
B72214R2351K101	NT14K350E2K4	350	460	6000	3000	110	560 ±10%	910	340	11.0	3.7
B72214R2381K101	NT14K385E2K4	385	505	6000	3000	136	620 ±10%	1025	315	11.0	4.0
B72214R2421K101	NT14K420E2K4	420	560	6000	3000	136	680 ±10%	1120	290	11.0	4.2
B72214R2461K101	NT14K460E2K4	460	615	6000	3000	150	750 ±10%	1240	260	11.0	4.4
B72214R2511K101	NT14K510E2K4	510	670	6000	3000	165	820 ±10%	1355	240	12.0	4.5
B72214R2551K101	NT14K550E2K4	550	745	6000	3000	180	910 ±10%	1500	215	12.0	4.7
B72214R2621K101	NT14K625E2K4	625	825	6000	3000	200	1000 ±10%	1650	200	13.0	5.0
B72214R2681K101	NT14K680E2K4	680	895	6000	3000	220	1100 ±10%	1815	180	13.0	5.5

<sup>1)</sup> The ordering codes listed (B72214R\*\*\*\*K101) are for straight versions (standard); Kinked versions are available upon request under ordering codes B72214R\*\*\*\*K501. The type designations for straight versions are NT14K\*\*\*E2K4 and for kinked versions NT14K\*\*\*E2S5K4.

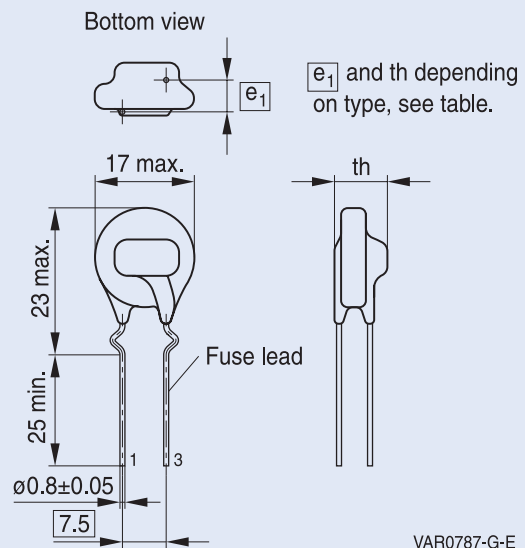
<sup>2)</sup> Nominal discharge current I<sub>n</sub> according to UL 1449, 4<sup>th</sup> edition.

## Dimensional drawings for NT14 series, 2 leads

### Straight version



### Kinked version



# NT14 Series, 3 Leads



## Electrical specifications and ordering codes

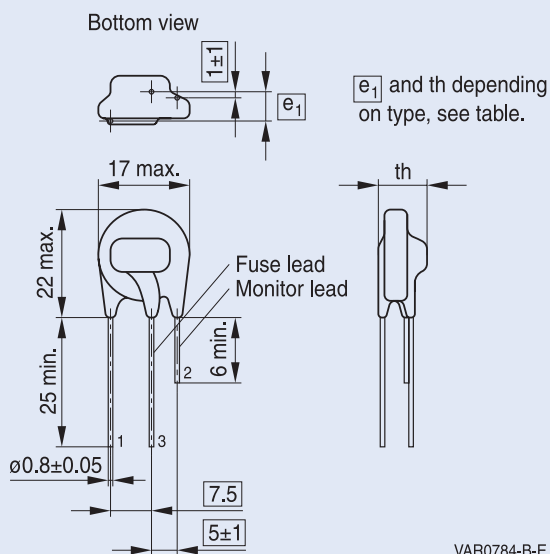
Maximum ratings (T <sub>A</sub> = 85 °C)							Characteristics (T <sub>A</sub> = 25 °C)			Dimensions	
Ordering code <sup>1)</sup>	Type <sup>1)</sup> (untaped) SIOV-	V <sub>RMS</sub>	V <sub>DC</sub>	i <sub>max</sub> (8/20 μs) 1 time	I <sub>n</sub> <sup>2)</sup> (8/20 μs) 15 times	W <sub>max</sub> (2 ms)	V <sub>V</sub> (1 mA)	V <sub>c,max</sub> (i <sub>c</sub> @ 50 A) (8/20 μs)	C <sub>typ</sub> (1 kHz)	th max.	e <sub>1</sub> ±1
		V	V	A	A	J	V	V	pF	mm	mm
B72214W2131K101	NT14K130E2	130	170	6000	3000	50	205 ±10%	340	880	9.0	2.6
B72214W2141K101	NT14K140E2	140	180	6000	3000	55	220 ±10%	360	820	9.0	2.7
B72214W2151K101	NT14K150E2	150	200	6000	3000	60	240 ±10%	395	750	9.0	2.8
B72214W2171K101	NT14K175E2	175	225	6000	3000	70	270 ±10%	455	670	9.0	2.8
B72214W2211K101	NT14K210E2	210	270	6000	3000	80	330 ±10%	545	580	9.5	2.9
B72214W2251K101	NT14K250E2	250	320	6000	3000	100	390 ±10%	650	490	9.5	3.1
B72214W2271K101	NT14K275E2	275	350	6000	3000	110	430 ±10%	710	440	9.5	3.2
B72214W2301K101	NT14K300E2	300	385	6000	3000	125	470 ±10%	775	400	11.0	3.3
B72214W2321K101	NT14K320E2	320	420	6000	3000	136	510 ±10%	840	370	11.0	3.5
B72214W2351K101	NT14K350E2	350	460	6000	3000	110	560 ±10%	910	340	11.0	3.7
B72214W2381K101	NT14K385E2	385	505	6000	3000	136	620 ±10%	1025	315	11.0	4.0
B72214W2421K101	NT14K420E2	420	560	6000	3000	136	680 ±10%	1120	290	11.0	4.2
B72214W2461K101	NT14K460E2	460	615	6000	3000	150	750 ±10%	1240	260	11.0	4.4
B72214W2511K101	NT14K510E2	510	670	6000	3000	165	820 ±10%	1355	240	12.0	4.5
B72214W2551K101	NT14K550E2	550	745	6000	3000	180	910 ±10%	1500	215	12.0	4.7
B72214W2621K101	NT14K625E2	625	825	6000	3000	200	1000 ±10%	1650	200	13.0	5.0
B72214W2681K101	NT14K680E2	680	895	6000	3000	220	1100 ±10%	1815	180	13.0	5.5

<sup>1)</sup> The ordering codes listed (B72214W\*\*\*\*K101) are for straight versions (standard); Kinked versions are available upon request under ordering codes B72214W\*\*\*\*K501. The type designations for straight versions are NT14K\*\*\*E2 and for kinked versions NT14K\*\*\*E2S5.

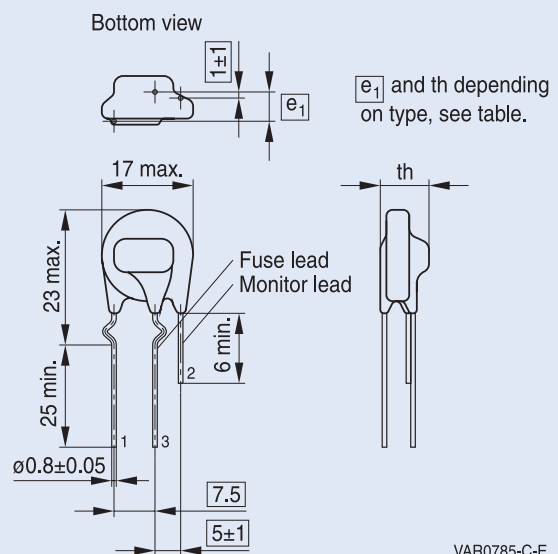
<sup>2)</sup> Nominal discharge current I<sub>n</sub> according to UL 1449, 4<sup>th</sup> edition.

## Dimensional drawings for NT14 series, 3 leads

### Straight version



### Kinked version



# NT20 Series, 2 Leads



## Electrical specifications and ordering codes

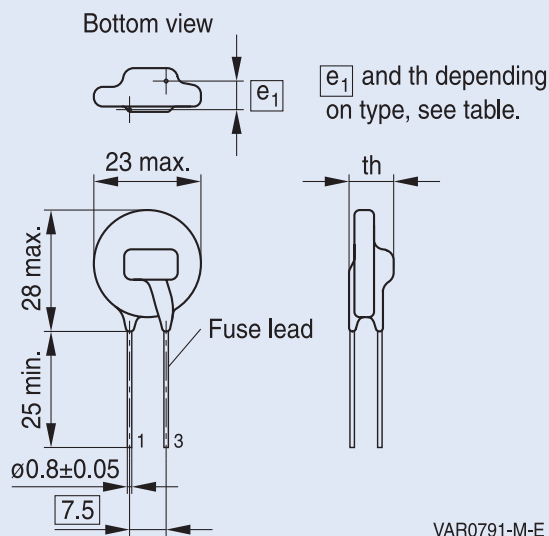
Maximum ratings (T <sub>A</sub> = 85 °C)							Characteristics (T <sub>A</sub> = 25 °C)			Dimensions	
Ordering code <sup>1)</sup>	Type <sup>1)</sup> (untaped) SIOV-	V <sub>RMS</sub>	V <sub>DC</sub>	i <sub>max</sub> (8/20 μs) 1 time	I <sub>n</sub> <sup>2)</sup> (8/20 μs) 15 times	W <sub>max</sub> (2 ms)	V <sub>V</sub> (1 mA)	V <sub>c,max</sub> (i <sub>c</sub> @ 100 A) (8/20 μs)	C <sub>typ</sub> (1 kHz)	th max.	e <sub>1</sub> ±1
		V	V	A	A	J	V	V	pF	mm	mm
B72220R2131K101	NT20K130E2K4	130	170	10000	5000	100	205 ±10%	340	1850	9.0	2.6
B72220R2141K101	NT20K140E2K4	140	180	10000	5000	110	220 ±10%	360	1700	9.0	2.7
B72220R2151K101	NT20K150E2K4	150	200	10000	5000	120	240 ±10%	395	1550	9.0	2.8
B72220R2171K101	NT20K175E2K4	175	225	10000	5000	135	270 ±10%	455	1350	9.0	2.8
B72220R2211K101	NT20K210E2K4	210	270	10000	5000	160	330 ±10%	545	1100	9.5	2.9
B72220R2251K101	NT20K250E2K4	250	320	10000	5000	195	390 ±10%	650	940	9.5	3.1
B72220R2271K101	NT20K275E2K4	275	350	10000	5000	215	430 ±10%	710	850	9.5	3.2
B72220R2301K101	NT20K300E2K4	300	385	10000	5000	250	470 ±10%	775	780	11.0	3.3
B72220R2321K101	NT20K320E2K4	320	420	10000	5000	273	510 ±10%	840	720	11.0	3.5
B72220R2351K101	NT20K350E2K4	350	460	10000	5000	200	560 ±10%	910	660	11.0	3.7
B72220R2381K101	NT20K385E2K4	385	505	10000	5000	273	620 ±10%	1025	600	11.0	4.0
B72220R2421K101	NT20K420E2K4	420	560	10000	5000	273	680 ±10%	1120	550	11.0	4.2
B72220R2461K101	NT20K460E2K4	460	615	10000	5000	300	750 ±10%	1240	500	11.0	4.4
B72220R2511K101	NT20K510E2K4	510	670	10000	5000	325	820 ±10%	1355	460	12.0	4.5
B72220R2551K101	NT20K550E2K4	550	745	10000	5000	360	910 ±10%	1500	410	12.0	4.7
B72220R2621K101	NT20K625E2K4	625	825	10000	5000	400	1000 ±10%	1650	380	13.0	5.0
B72220R2681K101	NT20K680E2K4	680	895	10000	5000	440	1100 ±10%	1815	340	13.0	5.5
B72220R2751K101	NT20K750E2K4	750	1060	10000	3000	480	1200 ±10%	2000	250	13.0	6.0

<sup>1)</sup> The ordering codes listed (B72220R\*\*\*\*K**101**) are for straight versions (standard); Kinked versions are available upon request under ordering codes B72220R\*\*\*\*K**501**. The type designations for straight versions are NT20K\*\*\*E2K4 and for kinked versions NT20K\*\*\*E2**S5**K4.

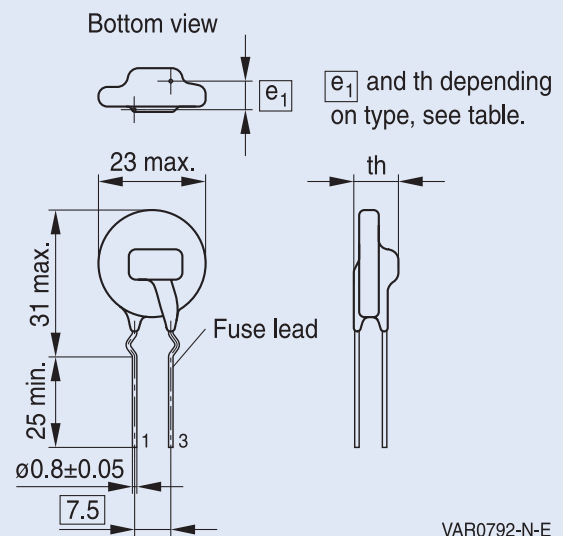
<sup>2)</sup> Nominal discharge current I<sub>n</sub> according to UL 1449, 4<sup>th</sup> edition.

## Dimensional drawings for NT20 series, 2 leads

### Straight version



### Kinked version



# NT20 Series, 3 Leads



## Electrical specifications and ordering codes

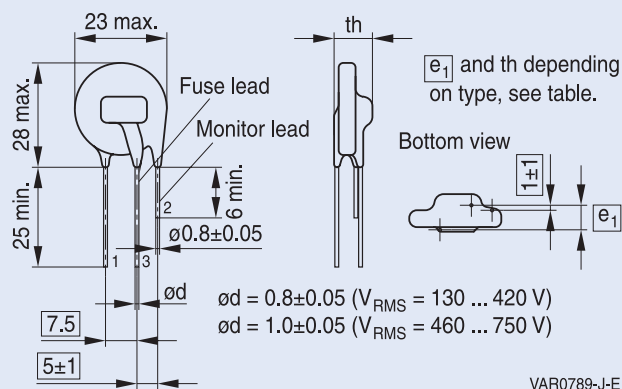
Maximum ratings (T <sub>A</sub> = 85 °C)							Characteristics (T <sub>A</sub> = 25 °C)			Dimensions	
Ordering code <sup>1)</sup>	Type <sup>1)</sup> (untaped) SIOV-	V <sub>RMS</sub>	V <sub>DC</sub>	i <sub>max</sub> (8/20 μs) 1 time	I <sub>n</sub> <sup>2)</sup> (8/20 μs) 15 times	W <sub>max</sub> (2 ms)	V <sub>v</sub> (1 mA)	V <sub>c,max</sub> (i <sub>c</sub> @ 100 A) (8/20 μs)	C <sub>typ</sub> (1 kHz)	th max.	e <sub>1</sub> ±1
		V	V	A	A	J	V	V	pF	mm	mm
B72220W2131K101	NT20K130E2	130	170	10000	5000	100	205 ±10%	340	1850	9.0	2.6
B72220W2141K101	NT20K140E2	140	180	10000	5000	110	220 ±10%	360	1700	9.0	2.7
B72220W2151K101	NT20K150E2	150	200	10000	5000	120	240 ±10%	395	1550	9.0	2.8
B72220W2171K101	NT20K175E2	175	225	10000	5000	135	270 ±10%	455	1350	9.0	2.8
B72220W2211K101	NT20K210E2	210	270	10000	5000	160	330 ±10%	545	1100	9.5	2.9
B72220W2251K101	NT20K250E2	250	320	10000	5000	195	390 ±10%	650	940	9.5	3.1
B72220W2271K101	NT20K275E2	275	350	10000	5000	215	430 ±10%	710	850	9.5	3.2
B72220W2301K101	NT20K300E2	300	385	10000	5000	250	470 ±10%	775	780	11.0	3.3
B72220W2321K101	NT20K320E2	320	420	10000	5000	273	510 ±10%	840	720	11.0	3.5
B72220W2351K101	NT20K350E2	350	460	10000	5000	200	560 ±10%	910	660	11.0	3.7
B72220W2381K101	NT20K385E2	385	505	10000	5000	273	620 ±10%	1025	600	11.0	4.0
B72220W2421K101	NT20K420E2	420	560	10000	5000	273	680 ±10%	1120	550	11.0	4.2
B72220W2461K101	NT20K460E2	460	615	10000	5000	300	750 ±10%	1240	500	11.0	4.4
B72220W2511K101	NT20K510E2	510	670	10000	5000	325	820 ±10%	1355	460	12.0	4.5
B72220W2551K101	NT20K550E2	550	745	10000	5000	360	910 ±10%	1500	410	12.0	4.7
B72220W2621K101	NT20K625E2	625	825	10000	5000	400	1000 ±10%	1650	380	13.0	5.0
B72220W2681K101	NT20K680E2	680	895	10000	5000	440	1100 ±10%	1815	340	13.0	5.5
B72220W2751K101	NT20K750E2	750	1060	10000	3000	480	1200 ±10%	2000	250	13.0	6.0

<sup>1)</sup> The ordering codes listed (B72220W\*\*\*\*K101) are for straight versions (standard); Kinked versions are available upon request under ordering codes B72220W\*\*\*\*K501. The type designations for straight versions are NT20K\*\*\*E2 and for kinked versions NT20K\*\*\*E2S5.

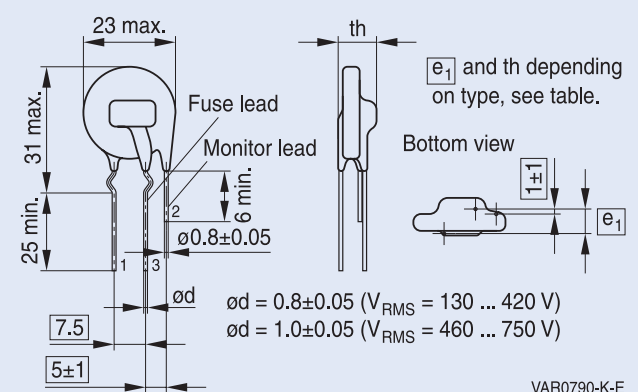
<sup>2)</sup> Nominal discharge current I<sub>n</sub> according to UL 1449, 4<sup>th</sup> edition.

## Dimensional drawings for NT20 series, 3 leads

### Straight version



### Kinked version



**Structure of ordering codes:** The ordering code for one and the same product can be represented differently in data sheets, data books, other publications and the website of EPCOS, or in order-related documents such as shipping notes, order confirmations and product labels. **The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products.** Detailed information can be found on the Internet under [www.epcos.com/orderingcodes](http://www.epcos.com/orderingcodes).

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