

EPCOS Sample Kit 2016

SMD NTC Thermistors

Temperature Measurement and Compensation for General-Use



Temperature measurement and compensation

NTC (negative temperature coefficient) thermistors are thermally sensitive semiconductor resistors which show a decrease in resistance as temperature increases. At -2%/K to -6%/K, the negative temperature coefficients of resistance are about ten times greater than those of metals and about five times greater than those of silicon temperature sensors. NTC thermistors are simple yet very sensitive and accurate sensing elements for measuring and control circuits.

Features

- Superior performance in high-stability applications
- Accurate temperature sensing up to +125 °C
- Excellent long-term aging stability in high temperature environment
- Short response time
- All SMD NTC thermistors are listed under UL (file number E69802)
- Alternative ratings available on request, e.g. resistance and B value

Applications

- Displays
- Smartphones and wearable devices
- Heating and air-conditioning, radiator cooling fan control units, thermostats
- Household electronics, e.g. refrigerators, washing machines, water boilers
- Battery management systems
- Healthcare
- Smart metering
- Electronic control unit
- Industrial automation
- Security and safety
- Lighting, e.g. LED lighting modules, LED retrofit bulbs and tubes

A short presentation with more details and applications examples can be found under: www.epcos.com/smdntc_gu

Important information: Some parts of this publication contain statements about the suitability of our products for certain areas of application. These statements are based on our knowledge of typical requirements that are often placed on our products. We expressly point out that these statements cannot be regarded as binding statements about the suitability of our products for a particular customer application. It is incumbent on the customer to check and decide whether a product is suitable for use in a particular application. The publication is only a brief product survey which may be changed from time to time. Our products are described in detail in our data sheets. The *Important notes* (www.epcos.com /ImportantNotes) and the product-specific *Cautions and warnings* must be observed. All relevant information is available through our sales offices.

Components

B57230 V2103F260	B57221 V2103J060	B57261 V2223J060	B57221 V2473J060	B57250 V2473F560	B57250 V2104F360	

B57330 V2103F260	B57321 V2103J060	B57371 V2223J060	B57371 V2473J060	B57357 V2473F560	B57374 V2104J060	B57350 V2104F460	B57371 V2474J060	

		B57421 V2102J062	B57401 V2103J062	B57421 V2103J062	B57471 V2103J062	B57471 V2223J062	B57471 V2473J062	B57471 V2104J062	B57471 V2474J062	
--	--	---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	--

1			

Product range



Electrical	Electrical specifications and ordering codes							
R ₂₅	$\Delta R_{R}/R_{R}$	B _{25/50}	B _{25/85}	B _{25/100}	Ordering code			
[kΩ]	%	[K]	[K]	[K]				
EIA case si	ze 0402	·	- -	-				
10	±1, ±5	3380	3435	3455 ±1%	B57230V2103+260			
10	±5	3940	3980	4000 ±3%	B57221V2103J060			
22	±5	4473	4548	4575 ±3%	B57261V2223J060			
47	±5	3940	3980	4000 ±3%	B57221V2473J060			
47	±1, ±3, ±5	4050	4108	4131 ±1%	B57250V2473+560 NEW			
100	±1, ±3, ±5	4250	4311	4334 ±1%	B57250V2104+360 NEW			
EIA case si	ze 0603							
10	±1, ±5	3380	3435	3455 ±1%	B57330V2103+260			
10	±3, ±5	3940	3980	4000 ±3%	B57321V2103+060			
22	±3, ±5	4386	4455	4480 ±3%	B57371V2223+060			
47	±3, ±5	4386	4455	4480 ±3%	B57371V2473+060			
47	±1, ±3, ±5	4050	4108	4131 ±1.5%	B57357V2473+560 NEW			
47	±3, ±5	4050	4108	4131 ±2%	B57358V2473+560 NEW			
100	±3, ±5	4386	4455	4480 ±1%	B57374V2104+060			
100	±1, ±3, ±5	4200	4260	4282 ±1%	B57350V2104+460 NEW			
100	±3, ±5	4250	4311	4334 ±2%	B57358V2104+360 NEW			
470	±3, ±5	4386	4455	4480 ±3%	B57371V2474+060			
EIA case size 0805								
1	±3, ±5	3940	3980	4000 ±3%	B57421V2102+062			
10	±3, ±5	3590	3635	3650 ±3%	B57401V2103+062			
10	±3, ±5	3940	3980	4000 ±3%	B57421V2103+062			
10	±3, ±5	4386	4455	4480 ±3%	B57471V2103+062			
22	±3, ±5	4386	4455	4480 ±3%	B57471V2223+062			
47	±3, ±5	4386	4455	4480 ±3%	B57471V2473+062			
100	±3, ±5	4386	4455	4480 ±3%	B57471V2104+062			
470	±3, ±5	4386	4455	4480 ±3%	B57471V2474+062			

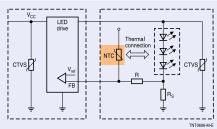
+ = Resistance tolerance: $F = \pm 1\%$ $H = \pm 3\%$

 $J = \pm 5\%$

Application examples for SMD NTC thermistors

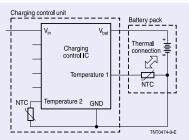


LEDs



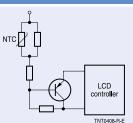
Thermal connection with a NTC on LED

Battery packs



Charging control unit of a battery pack using NTC thermistors as temperature sensor

LCD displays



LCD using a NTC thermistor as temperature sensor

- No discoloration
- No reduction in lumens
- Extension of life time
- Performance efficiency optimization
- Optimum design (reduction in number of LEDs)

- Detects temperature rises of the battery cell during charging
- Detects the ambient temperature for optimized charging
- Detects heat generation of a battery cell caused by abnormal current
- Performs temperature compensation for voltage measurement for display of the remaining amount of energy
- LCDs are sensitive to temperature and have a limited operating temperature range
- LCD contrast increases with temperature, wasting power at high temperatures
- Low temperatures lead to low contrast
- LCD modules often use temperature compensation circuits with NTC thermistors and resistors