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# NON-LINEAR RESISTORS

## Resistive Products

### NTC Thermistors Sensors | NTC RT Calculator Tool

	Product Family	Size and Encapsulant	Lead Wire or Termination Characteristics	Res. Range $R_{25}$ ( $\Omega$ )	Tol. $\pm$ % or $\pm$ K @ 25°C	$B_{25/85}$ (K)	$B_{25/85}$ Tol. ( $\pm$ %)	Temp. Range (°C)	AEC-Q200 Compliant	HALOGEN FREE	RoHS Pb-free available	SPICE model	3D Models	FAVUS	
SMD	<b>NTCS</b>	<a href="#">0805 (2012 metric)</a>	Ni barrier + tinned on T&R, glass protected	1 k to 680 k	1 to 5	3370 to 4125	1 to 3	-40 to +150	x	x		x	x	x	
		<a href="#">0603 (1608 metric)</a>		1 k to 100 k		3170 to 4100			x	x		x	x	x	
		<a href="#">0402 (1005 metric)</a>	4.7 k to 100 k	3490 to 4075		x			x		x	x	x		
	<b>NTCS...SMT</b>	<a href="#">0402, 0603, 0805</a>	+ enhanced stability	100 k to 210 k	1	3590	1			x		x	x		
SMD	<b>NTHS</b>	1206 (3216 metric)	Ni barrier + tinned on T&R, glass protected	6 k to 330 k	3 to 10 ( $\pm$ 1 to $\pm$ 10 Curve1)	Curve 2: 3486	3	-40 to +125		x					
		0805 (2012 metric)		4.7 k to 350 k		Curve 11: 3715				x					
		0603 (1608 metric)		6.8 k to 350 k		Curve 1-5: 3974				x					
		0402 (1005 metric)		10 k to 350 k		Curve 17: 4073				x					
SMD	<b>NTCC200/300</b> <b>NTCCC200E4C90008</b>	2 mm x 2 mm x 0.7 mm	Ag / Au metallized bondable die	4.7 k to 20 k	1 to 5	3435 to 3865	1	-55 to +175	x	x	x	x	x		
		2 mm x 2 mm x 0.7 mm	Ag metallized bondable die	5063	$\pm$ 2 K	3435	1	-55 to +175	x	x	x	x	x		
	<b>NTCSMELF</b>	SOD80 glass	Tinned dummet on T&R	10 k to 100 k	5	3977	1.3	-40 to +150		x					
Leaded (Through Hole)	<b>NTCLE100</b>	3.8 mm epoxy (5 mm)	Tinned Cu 0.6 mm ...B0: Bulk 1E pitch ...T1: T&R 1E pitch ...T2: T&R 2E pitch	3.3 to 2 k	2 to 5	2880 to 3560	0.5 to 3	-40 to +125			x	x	x	x	
				2.2 k to 10 k		3977	0.75				x	x	x	x	
				10 k to 470 k		3740 to 4570	1.5				x	x	x	x	
	<b>NTCLE203</b>	3.4 mm epoxy	Tinned Ni 0.4 mm	2 k to 470 k	1 to 5	3528 to 4570	0.5 to 2	-40 to +125			x	x	x	x	
				<b>NTCLE203..SB0</b>	4 mm epoxy	Tinned Ni 0.5 mm (T&R available)	2060 to 2800	0.5 K	3528 to 4090	0.5 to 0.75	-55 to +150	x			
	3 k to 10 k	3984	0.5												
	30 k	3935	0.75												
	<b>NTCLE213</b>	2.5 mm epoxy	Tinned Ni 0.4 mm (T&R long leads available)	2.1 k	1 to 5	3511	0.5	-55 to +150	x						x
				10 k		3435 to 3984	0.5 to 1.0								
12 k to 100 k	3740 to 4190	0.75 to 1.5													
<b>NTCLE300...SB(A)</b>	2.4 mm epoxy	ETFE AWG30 tinned Ni	3.0 to 10 k	$\pm$ 0.5 K	3977	0.75	-40 to +125	x		x					
<b>NTCLE301</b>	2.40 mm epoxy	PEEK AWG30 SP Ni	2.1 k to 10 k	1 to 5	3435 to 3984	0.5 to 1.0	-55 to 150	x							
<b>NTCLE305</b>	1.60 mm epoxy	ETFE AWG32 SP Ni	2060 to 10 k	0.5 K	3511 to 3984	0.5 to 1	-40 to 125	x		x					



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Leaded (Through Hole)	<a href="#">NTCLE317E4</a> <span style="background-color: green; color: white; border-radius: 50%; padding: 2px;">NEW</span>	1.6 mm epoxy	PEEK AWG32 SP NiFe	10 k	0.5 K	3984	0.5	-55 to +150	x		x	x	x		
	<a href="#">NTCLE350E4</a> <span style="background-color: green; color: white; border-radius: 50%; padding: 2px;">NEW</span>	2.4 mm epoxy	PEEK AWG32 SP NiFe	2.1 k to 30 k	1 to 5	3435 to 3984	0.5 to 1.0	-55 to +185	x	x		x	x		
	<a href="#">NTCLG100E2</a>	SOD27 glass	Tinned CCSW 0.56 mm bulk / T&R	10 k to 220 k	5	3797 to 3977	1.3 to 3	-40 to +200		x					
	<a href="#">NTCLE400</a>	6 mm epoxy	UL-2468 PVC AWG24	2.2 k to 100 k	3	3977 to 4190	0.75 to 1.5	-40 to +85			x				
Sensor Assemblies	<a href="#">NTCLE413</a>	3 mm epoxy	UL-2651 PVC AWG30	4.7 k to 100 k	1 to 5	3435 to 4190	0.5 to 1.5	-40 to +105			x				
	<a href="#">NTCLE428</a>		UL-1061 PVC AWG30								x				
	<a href="#">NTCLP100</a>	Brass pipe 6 mm	UL-2468 PVC AWG24	2.2 k to 100 k	3	3977 to 4190	0.75 to 1.5	-40 to +85			x		x		
	<a href="#">NTCLP4 11/12/13</a>	Pipe 6 mm	UL-2651 PVC AWG26/24/22	4.7 k to 100 k	1 to 5	3435 to 4190	0.5 to 1.5	-40 to +105							
	<a href="#">NTCLP450</a>	Pipe 3.2 mm	UL-2651 PVC AWG30	100 k	3	4190	1.5						x		
	<a href="#">NTCALUG01A</a>	Stud #3, #4, #5, #6, screw M3, M3.5	PTFE AWG24 TP Cu	4.7 k to 100 k	1 to 5	3435 to 4190	0.5 to 1.5	-40 to +150	x		x	x	x	x	
	<a href="#">NTCALUG02A</a>		PEEK AWG30 SP Ni		1 to 3			-55 to +125							
	<a href="#">NTCALUG03A/39A</a>	Stud #1, #2, #3, #4, screw M2, M3	ETFE AWG32 SP Ni	2 to 5	3435 to 3984	-40 to +125									
	<a href="#">NTCALUG91A</a>	Stud #8, screw M4	PTFE AWG24 SP Cu	10 k	2 to 3	3435 to 3984	0.5 to 1	-40 to +150	x		x	x	x	x	
	<a href="#">NTCALUG54A</a>	Stud #10, screw M5	PTFE AWG24 SP Cu	10 k	2 to 3	3435 to 3984	0.5 to 1	-40 to +150	x		x	x	x	x	
	<a href="#">NTCALUG85A</a>	Stud #1/4, screw M6	PTFE AWG24 SP Cu	10 k	2	3435 to 3984	0.5 to 1	-40 to +150	x		x	x	x	x	
	<a href="#">NTCALUG01T</a>	Stud #3, #4, #5, #6, screw M3, M3.5	ETFE AWG26 SP Cu	10 k	2	3984	0.5	-40 to +150	x		x	x	x	x	
	<a href="#">NTCASCW</a>	Anodized alu, screw M4	Tinned Cu 0.6 mm, tinned Ni 0.5 mm	1 k to 470 k	1 to 5	3528 to 4570	0.5 to 2.5	-40 to +100					x	x	
<a href="#">NTCACAP</a>	ABS cap diameter 7 mm to 9 mm	Tinned, AWG22 to AWG30, single or double insulated	2.7 k to 10 k	1, 2	3984	0.5	-55 to +60					x	x		
<a href="#">NTCAIMME3</a>	SS304 or SS316, pipe 2.5 to 3.9 mm (brass collar)	UL-2651 PVC AWG30	10 k	3	3984	1.0	-25 to +105					x			






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### PTC Power Thermistors

	Product Family	Size and Encapsulant	Lead Wire or Termination Characteristics	Res. Range $R_{25}$ ( $\Omega$ )	Tol. ( $\pm$ %) @ 25°C	Max. Voltage ( $V_{RMS}$ ) ( $V_{DC}$ )	$I_{hold} - I_{max}$ ( $A_{RMS}$ ) ( $E_m$ (J))	Temp. Range (°C)	AEC-Q200 Compliant	HALOGEN FREE	SPICE model available	3D Models	FAUS
SMD	 <a href="#">PTCTZ, PTCCZ, SMD Lead-frame</a>	D6.4, D7.2, D7.8 mm, 10 mm pitch silicone	Tin-plated P-bronze leadframe, T&R	2 to 500	$\pm 10$ to $\pm 20$	16 to 600	$I_h$ 0.05 - 0.5 $I_m$ 0.7 - 10	-40 to +85	x				
Leaded (Through Hole)	 <a href="#">PTCCL...D/E Overload 30 / 60 V</a> <a href="#">PTCCL...F Overload 145 V</a> <a href="#">PTCCL...H Overload 265 V</a>	D5 to D21 mm, silicone coated	Tinned CCSW 0.6 mm / 0.5 mm bulk 2E pitch / T&R	0.3 to 50	$\pm 20$	30, 60	$I_h$ 0.09 - 2.0 $I_m$ 0.8 - 23	-40 to +85					x
				1.3 to 50		145	$I_h$ 0.05 - 1.0 $I_m$ 0.2 - 13		0 to +70			x	
				2.1 to 5 k		265	$I_h$ 0.01 - 0.8 $I_m$ 0.08 - 5.5				x		
Leaded (Through Hole)	 <a href="#">PTCCL...S/T/V Overload <math>\geq 600</math> V</a>  <a href="#">PTCEL, Inrush-Current Limiting</a>	PTCCL...H..SBE series	Tinned CCSW/Cu 0.6 mm / 0.5 mm bulk 2E pitch / T&R	400 to 5 k	$\pm 20$ to $\pm 25$	600 to 1000	$I_h$ 0.01 - 0.03 $I_m$ 0.1 - 0.5	-10 to +55			x	x	x
		PTCEL13 series, D13 mm, silicone coated	Tinned CCSW 0.6 mm bulk 2E pitch / T&R	60 to 1 k	$\pm 30$	350 to 600 500 to 850	$I_h$ 0.03 - 0.12 $E_m$ 150	-40 to +105	x		x	x	x
		PTCEL17 series, D17 mm, silicone coated	Tinned CCSW 0.8 mm bulk 2E, 3E, 4E pitch	60 to 500		460 700 to 1000	$I_h$ 0.050 - 0.14 $E_m$ 240		x		x	x	x



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### RTD and PTC Thermistor Sensors

	Product Family	Size and Encapsulant	Lead Wire or Termination Characteristics	Res. Range R at T <sub>ref</sub> (Ω)	T <sub>n</sub> (°C)	Tol. (% or K)	TCR (ppm/°C)	Temp. Range (°C)	AEC-Q200 Compliant	HALOGEN FREE	RoHS Pb-free available	SPICE model available	3D Models	RoHS	
SMD	 <a href="#">PTS, Platinum Thin Film</a>	0603 (1608 metric)	Ni barrier + tinned in box / T&R, protective coating	100	0	± 0.3 K, ± 0.6 K	3850	-55 to +155	x	x	x	x	x	x	
		0805 (2012 metric)		100, 500											
		1206 (3216 metric)		100, 500, 1 k											
	 <a href="#">PTS AT</a>	0603 (1608 metric)	Ni barrier + tinned on T&R, protective coating	100	0	± 0.3 K, ± 0.6 K	3850	-55 to +175	x	x	x	x	x	x	x
		0805 (2012 metric)		100, 500											
		1206 (3216 metric)		100, 500, 1 k											
 <a href="#">TFPT, Nickel Thin Film</a>	0603 (1608 metric)	Ni barrier + tinned in T&R	100 to 1 k	25	± 0.5 to ± 5	4110	-55 to +150	x	x	x	x	x	x	x	
	0805 (2012 metric)		100 to 5 k												
	1206 (3216 metric)		100 to 10 k												
Leaded (Through Hole)	 <a href="#">PTCSL03, Ceramic</a>	3.5 mm silicone coating	Tinned CCSW 0.5 mm 1E / 2E pitch bulk / T&R	550 to 1330	80 to 150	± 5 K	> 100 000	-40 to T <sub>n</sub> +15	x			x		x	
		 <a href="#">TFPTL, Nickel Thin Film</a>	TL10 3.6 mm epoxy	Tinned CCSW 0.5 mm 1E / 2E pitch	100 to 1 k	25	± 1, ± 5	4110	-55 to +150	x					x
TL15 4.0 mm epoxy	100 to 5 k		x										x		

### Varistors

	Product Family	Reference Size and Encapsulant	Lead Wire or Termination Characteristics	Voltage Range (V <sub>RMS</sub> )	V <sub>bd</sub> (V <sub>DC</sub> at 1 mA) ± 10 %	Max. I <sub>surge</sub> (A <sub>peak</sub> ) 8/20 μs	Max. Energy (J) 10/1000 μs	Temp. Range (°C)	AEC-Q200 Compliant	HALOGEN FREE	SPICE model available	3D Models	RoHS	
Leaded (Through Hole)	 <a href="#">VDRS05/07/10/14/20 Standard Surge</a>	5 mm, 7 mm, 10 mm, 14 mm, 20 mm epoxy coated	Tinned CCSW 0.6 mm, 0.8 mm tinned Cu 1.0 mm straight, kinked, flanged leads, bulk / T&R	14 to 680	22 to 1100	100 to 6500	0.5 to 496	-40 to +85		x	x	x	x	
		 <a href="#">VDRH05/07/10/14/20 High Surge</a>	5 mm, 7 mm, 10 mm, 14 mm, 20 mm epoxy coated	Tinned CCSW 0.6 mm, 0.8 mm tinned Cu 1.0 mm straight, kinked leads, bulk / T&R	11 to 680	18 to 1100	250 to 10 000	0.7 to 620	-40 to +125		x	x	x	x
			 <a href="#">VDRUS07/10/14/20 Ultra Surge</a>	7 mm, 10 mm, 14 mm, 20 mm silicone coated	Tinned CCSW 0.6 mm, 0.8 mm Cu 1.0 mm in straight, kinked leads, bulk / T&R	115 to 680	180 to 1100	1800 to 13 000	19 to 720	-40 to +125		x	x	
SMD	 <b>MLV Series</b>	<a href="#">0402</a> , <a href="#">0603</a> , <a href="#">0805</a>	Ni barrier + tinned and glass protected in T&R	4 to 25	8 to 46	20 to 40	0.05 to 0.1	-40 to +125		x	x			
		<a href="#">1206</a> , <a href="#">1210</a> , <a href="#">1812</a> , <a href="#">2220</a>		4 to 95	8 to 150	100 to 1200	0.5 to 12	-40 to +85						