

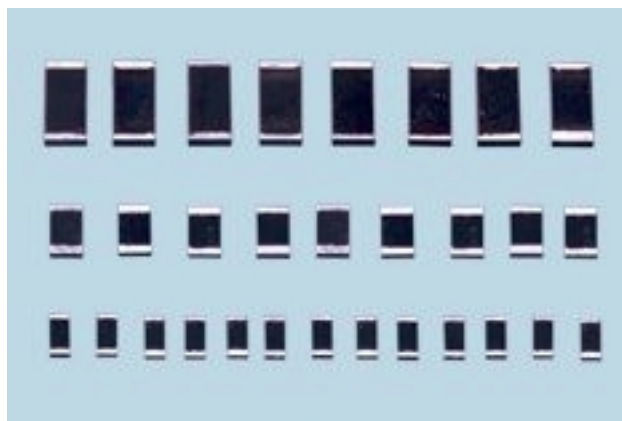
Precision Chip Resistors

Type: **CMF**

Sizes: **RR0603, RR0805, RR1206, RR1210, RR2010, RR2512**

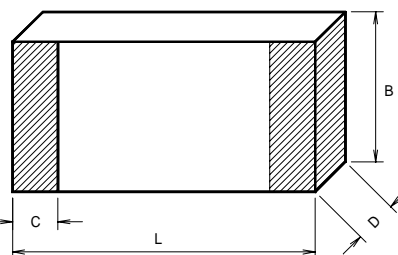
Features:

- Chip Resistors in Thinfilm
- Contact areas tinned - resistant to leaching
- Close tolerances (0,05%)
- Low TCR (5 ppm/K)
- extreme low noise



Dimensions:

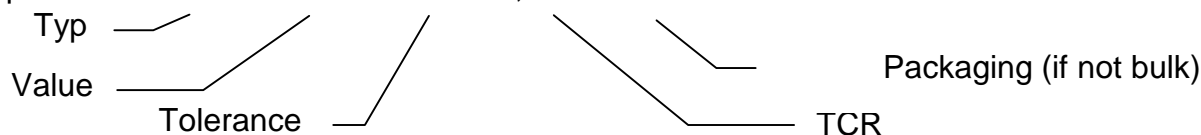
Size	metric	L	B	D	C
RR0603	RR1608M	1,6 ^{±0,1}	0,8 ^{±0,1}	0,45 ^{±0,1}	0,3 ^{±0,2}
RR0805	RR2012M	2,0 ^{±0,1}	1,25 ^{±0,1}	0,55 ^{±0,1}	0,4 ^{±0,2}
RR1206	RR3216M	3,2 ^{±0,2}	1,6 ^{±0,15}	0,55 ^{±0,1}	0,5 ^{±0,2}
RR1210	RR3225M	3,2 ^{±0,2}	2,5 ^{±0,2}	0,55 ^{±0,1}	0,5 ^{±0,2}
RR2010	RR5025M	5,0 ^{±0,2}	2,5 ^{±0,2}	0,55 ^{±0,2}	0,5 ^{±0,2}
RR2512	RR6332M	6,3 ^{±0,2}	3,2 ^{±0,2}	0,55 ^{±0,2}	0,5 ^{±0,2}



(L=Length, B=Width, D=Thickness, C=Width wrap around (in mm))

Bestellangaben:

Example.: CMF 0805 - 100K ± 0,1% - TK 15 - bulk



Packaging:

Bulk or Tape/Reel acc. to DIN IEC 60286-3

(tape-width: 8 mm, reel-diameter: 180 mm)

Minimum quantity bulk: 100 pieces per value

Minimum quantity tape: 1000 pieces per value

Technical data - depending on size:

Ranges	0603 TCR/Tolerances	0805 TCR/Tolerances	1206 TCR/Tolerances	1210 TCR/Tolerances	2010 TCR/Tolerances	2512 TCR/Tolerances
5R1-< 10R	-	-	TK 50 1%	TK 50 1%	TK 50 1%	TK 50 1%
10R-< 47R	≥TK 25 ≥0,1%	≥TK 25 ≥0,1%	≥TK 25 ≥0,1%	≥TK 25 ≥0,1%	≥TK 25 ≥0,1%	≥TK 25 ≥0,1%
47R - <100R	≥TK 10 ≥0,1%	≥TK 10 ≥0,1%	≥TK 10 ≥0,1%	≥TK 10 ≥0,1%	≥TK 10 ≥0,1%	≥TK 10 ≥0,1%
100R - 10K	≥TK 5 ≥0,1%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%
>10K - 100K	≥TK 5 ≥0,1%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%
>100K - 332K	≥TK 5 ≥0,1%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%
>332K - 511K	-	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%
>511K - 1M	-	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%	≥TK 5 ≥0,05%
>1M - 2M	-	-	≥TK 10 ≥0,1%	≥TK 10 ≥0,1%	≥TK 10 ≥0,1%	≥TK 10 ≥0,1%
>2M - 5M	-	-	-	-	≥TK 10 ≥0,25%	≥TK 10 ≥0,25%
>5M - 15M	-	-	-	-	-	≥TK 10 ≥0,25%

Noise-diagrams on request

Size	Stability class	0603	0805	1206	1210	2010	2512
Power rating P ₇₀ (mW)	0,5; 1	65	125	250	400	500	750
	0,1	32	50	100	150	250	400
Working voltage U ₋ , U _{eff} (V) ^{1*}	0,1; 0,5; 1	100	200	300	300	300	300

Technical data - general:

Temperature range	-55°C...+125°C
Climatic category acc. to DIN IEC 68	55/125/56
Solderability	235°C; 2s
Max. soldering temperature	260°C; 10s

Long term stability	47 Ω - 15 MΩ	< 47 Ω
Storage 125 °C/1000h	< 0,15 %	< 0,25 %
Storage 155 °C/1000h	< 0,35 %	< 0,5 %
Load P ₇₀ /70°C/1000h	< 0,1 %	< 0,25 %
Damp heat (56d/40°C/96%)	< 0,15 %	< 0,5 %

Data not specified:: CECC 40401-801

Stand: 02/99

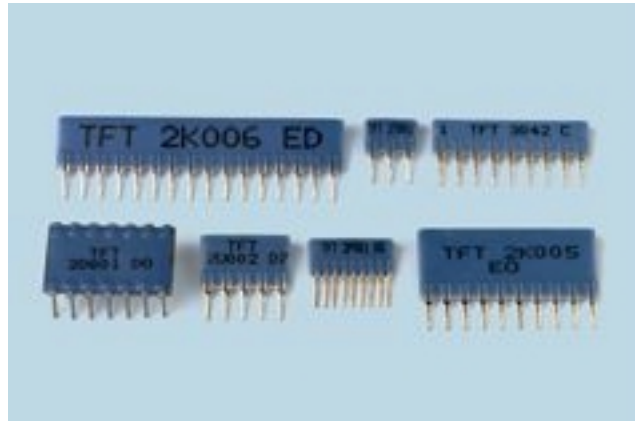
Precision-R-Networks

Typeg: **HPN**

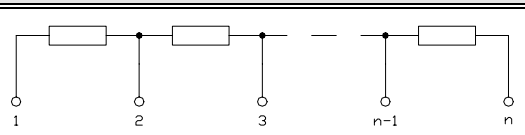
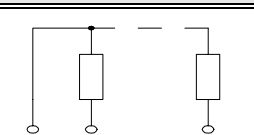
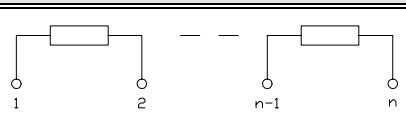
Sizes: **SIL, DIL, SMD**

Features:

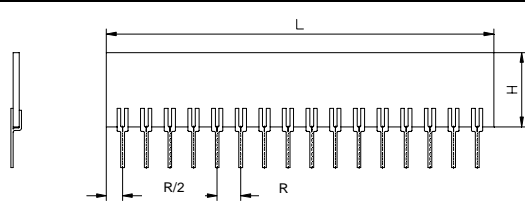
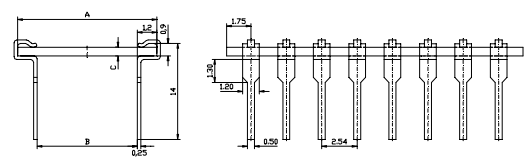
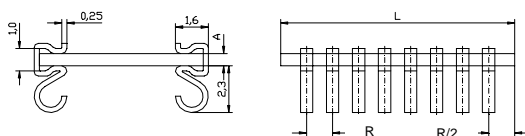
- Thinfilm (NiCr) on Alumina
- Standard types and custom networks
- Relative-data (tolerance, TCR and stability) much closer than with single resistors
- DIL available for SMT



Examples of circuits:

Resistor bridges	Current-dividers	Single resistors
		

Standard dimensions:

Size		
SIL		H = 6,0; 8,0; 11,0; 13,5 mm R = 1,27; 2,54 L = R x Number of contacts
DIL		A = 7,5 mm; 10 mm B = 5 mm; 7,5 mm C = 0,6...0,75 mm
SMD		A = 7,5 mm; 10 mm R = 1,27; 2,54 L = R x Number of contacts

Technical Data:

Power rating P ₇₀	20 mW/mm ² 10 mW/mm ² for applications of high precision
Resistance range	10 Ω...10 MΩ
Working voltage	250 V (special versions > 1 kV)
Tolerance	absolute relative ± 0,05; ± 0,1; ± 0,25; ± 0,5; ± 1% < 0,025 ¹⁾ ; < 0,05; < 0,1%
TCR	absolute relative ± 5 ¹⁾ ; ± 10; ± 25; ± 50 *10 ⁻⁶ /K 2; 5; 10 *10 ⁻⁶ /K
Operating temperature range Climatic category acc. to DIN IEC 68	-55 °C...+125 °C 25/125/56
Solderability ²⁾ Max. soldering temperature ³⁾	235 °C 2s 260 °C 10s

Long term stability		1000 h	10 000h
Storage 125 °C oder Load P70/70 °C	absolute relative	< 0,1 % < 0,02 %	< 0,3 % < 0,1 %
Overload (100%/10s)	absolute relative	< 0,05 % < 0,01 %	
Damp heat (56d/40°C/96%)	absolute relative	< 0,1 % < 0,02 %	

¹⁾ Temperature range 0...+70°C

²⁾ DIN IEC 68 T2-20, Ta Meth.1

³⁾ DIN IEC 68 T2-20, Ta Meth.1A

Other specifications on request.

Customer-specific version:

- Any circuits are possible.
- The parameters of the resistance values are specified by the customer. A customer-specific layout is planned in the company's own development department and implemented technologically.

Ordering data:

- Maximum dimensions
- Number and connection of resistors
- Resistance values
- Tolerance and TCR (absolute and relative)
- Power rating
- Temperature range
- Stability requirements

Packaging: Packed in deep-drawing foil

Stand: 11/98

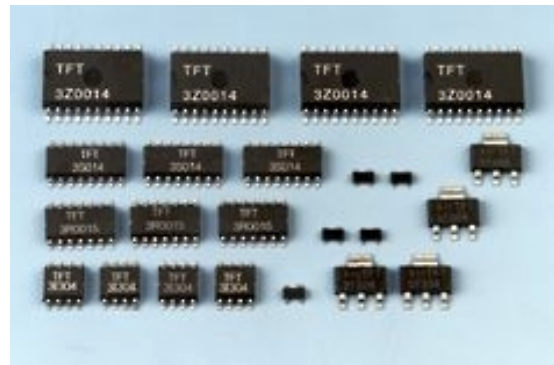
SMT-Precision-R-Networks

Type: **SCN**

Sizes: **SOT143, SOT223, SO8, SO14, SO16, SO20L**

Features:

- Thinfilm (NiCr) on passivated Si- or Alu-minia-substrate
- Standart types and custom networks
- Relative-data (tolerance, TCR and stability) much closer than with single resistors



Examples of circuits:

SO				SOT 143	SOT 223
Single resistors		Current-dividers	Resistor bridges		

Size / Dimensions:

SO8, SO14, SO16, SO20L	SOT 143	SOT 223

Case	D max	E min	E max	A max	A 1	He min	He max	L min	Lp min	bp	C
SO 8	5,08	3,8	4,2	2,0	0,2 ± 0,1	5,5	6,7	0,85	0,3	0,42 ± 0,07	0,2 ± 0,05
SO 14	8,89	3,8	4,2	2,0	0,2 ± 0,1	5,5	6,7	0,85	0,3	0,42 ± 0,07	0,2 ± 0,05
SO 16	10,16	3,8	4,2	2,0	0,2 ± 0,1	5,5	6,7	0,85	0,3	0,42 ± 0,07	0,2 ± 0,05
SO 20 L	13,0	7,4	7,6	2,65	0,2 ± 0,1	10,1	10,7	1,35	0,3	0,42 ± 0,07	0,27 + 0,05

Technical data - depending on size:

Size	SOT 143	SOT 223	SO 8	SO 14	SO 16	SO 20L
Power rating: P ₇₀ (mW) (P ₁₂₅ = 0 mW)	125	250	250	250	250	500
Resistance ranges	10R/1M	10R/5M	10R/5M	10R/10M	10R/10M	10R/10M

Technical data - general:

Working voltage	100 V on Silicon, 250 V on Alumina	
Tolerance	absolute relative	± 0,05; ± 0,1; ± 0,25; ± 0,5; ± 1% < 0,025 ¹⁾ ; < 0,05; < 0,1%
TCR	absolute relative	± 5 ¹⁾ ; ± 10; ± 25; ± 50 *10 ⁻⁶ /K 0,5 ¹⁾ ; 1; 2; 5; 10 *10 ⁻⁶ /K
Operating temperature range Climatic category acc. to DIN IEC 68	-55 °C...+125 °C 25/125/56	
Solderability ²⁾ Max. soldering temperature ³⁾	235 °C; 2s 260 °C; 10s	

Long term stability		Tol. ≤ 0,25 %		Tol. ≥ 0,25 %	
		1.000h	10.000h	1.000h	10.000h
Storage 125 °C Load P70/70 °C	absolute	< 0,02 %	< 0,06 %	< 0,05 %	< 0,1 %
	relative	< 0,005 %	< 0,02 %	< 0,01 %	< 0,05 %
Storage 155 °C	absolute	< 0,1 %	< 0,2 %	< 0,2 %	< 0,5 %
	relative	< 0,05 %	< 0,1 %	< 0,1 %	< 0,2 %
Damp heat (56d/40°C/96%)	absolute	< 0,05 %		< 0,10 %	
	relative	< 0,01 %		< 0,05 %	

¹⁾ Temperature range 0...+70°C

²⁾ DIN IEC 68 T2-20, Ta Meth.1

³⁾ DIN IEC 68 T2-20, Ta Meth.1A

Other specifications on request.

Customer-specific version:

- Any circuits are possible.
- The parameters of the resistance values are specified by the customer. A customer-specific layout is planned in the company's own development department and implemented technologically.

Ordering data:

- Size
- Number and connection of resistors
- Resistance values
- Tolerance and TCR (absolute and relative)
- Power rating
- Temperature range
- Stability requirements

Packaging: bulk, tape/reel, magazine

Stand: 02/99

Precision-R-Networks for Bonding

Type: **SRN**


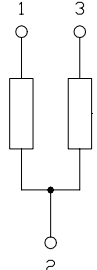
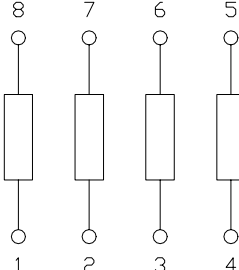
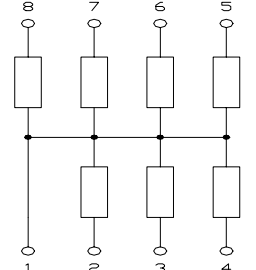
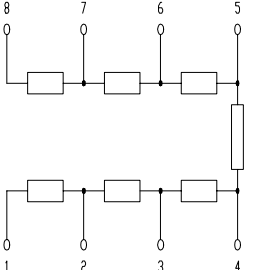
Sizes: **ab 0,50 mm x 0,50 mm bis 6 mm x 10 mm**

Features:

- Thinfilm (NiCr) on passivated Si- or Alumina-substrate
- Standart types and custom networks
- Relative-data (tolerance, TCR and stability) much closer than with single resistors
- Suited for active trimming with laser
- Packaging: Wafflepack, wafer/inked or on foil/inked



Examples of circuits:

Size: 0,5 x 0,5 mm/ 0,75 x 0,75 mm		Size: 1,6 x 2,0 mm		
Single resistor	Current-dividers/ Resistor bridges	Single resistor	Current-dividers/ Resistor bridges	Resistor bridges
				

Dimensions:

Feature	Minimal	Maximal
Chip size	0,50 x 0,50 mm ²	bis 6 x 10 mm ²
Thickness	0,260 ^{±0,025} mm	0,375 ^{±0,025} mm
Contact areas	0,15 x 0,15 mm ²	
Contact area material	Al or Au (US-/TS-bondable)	

Technical data:

Power rating P ₇₀		25 mW/mm ² 10 mW/mm ² for applications of high precision
Resistance range		10 Ω...2,5 MΩ (depending on size)
Working voltage		100 V Silicon, 250 V Alumina
Tolerance	Absolute	± 0,05; ± 0,1; ± 0,25; ± 0,5; ± 1 %
	Relative	< 0,025 ¹⁾ ; < 0,05; < 0,1 %
TCR	Absolute	± 5 ¹⁾ ; ± 10; ± 25; ± 50 *10 ⁻⁶ /K
	Relative	0,5 ¹⁾ ; 1; 2; 5; 10 *10 ⁻⁶ /K
Operating temperature range		-55 °C...+125 °C (+155 °C)
Condition for application		Hermetic sealing Polymer-Passivation

Long term stability		Tol. ≤ 0,25 %	Tol. ≥ 0,25 %
Storage 125 °C 1000h	Absolute	< 0,02 %	< 0,05 %
	Relative	< 0,005 %	< 0,01 %

¹⁾ Temperature range 0...+70 °C,

Other specifications on request.. Structural elements are to be protected from environmental influences.

Customer-specific version:

- Any circuits are possible.
- The parameters of the resistance values are specified by the customer. A customer-specific layout is planned in the company's own development department and implemented technologically.
- In the case of applications in the upper frequency range from 100 kHz the use of ceramic substrates is recommended.

Ordering data:

- Size
- Number and connection of resistors
- Resistance values
- Tolerance and TCR (absolute and relative)
- Power rating
- Temperature range
- Stability requirements



Packaging: Chip Trays, Wafer inked, Wafer foil/inked

Stand: 02/99



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