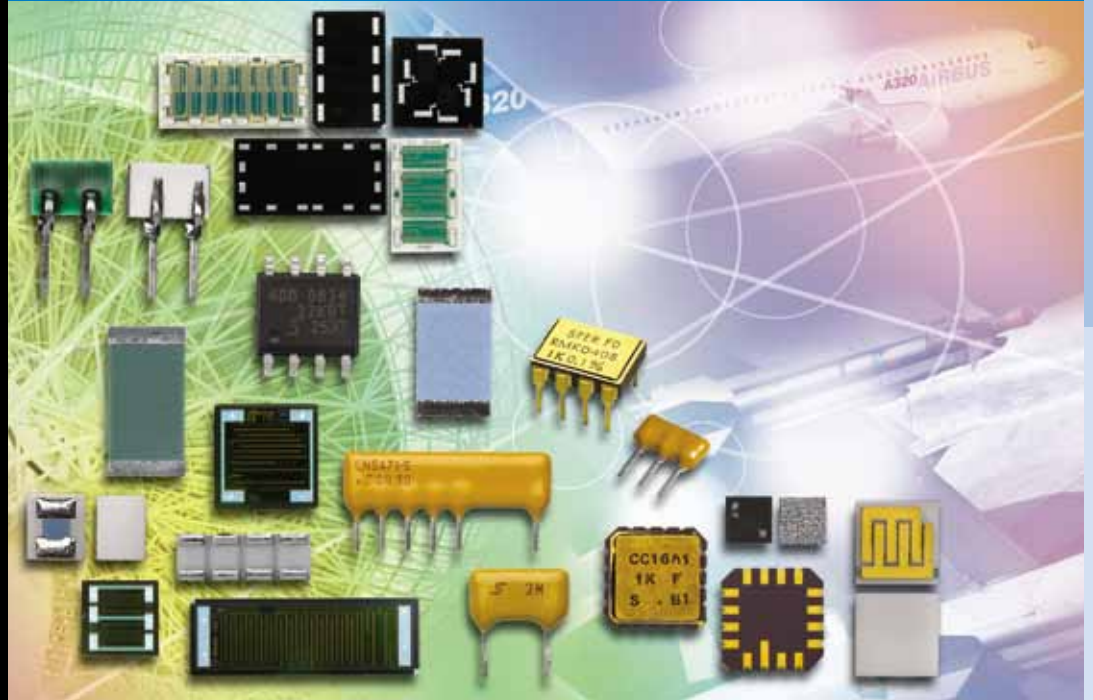




THIN FILM RESISTORS AND RESISTOR NETWORKS



Vishay Sfernice



Thin Film Resistors

- SMD chip resistors (bare chips and wraparound)
- SIL resistor
- Small size: down to 20 mils x 20 mils
- High stability: 0.05 % (1000 hours/Pn/70 °C)
- Low temperature coefficient: 5 ppm/°C (- 55 °C; + 155 °C)
- Tight tolerance: down to 0.01 %
- Wide ohmic range: 50 mΩ to 100 MΩ
- CECC qualification
- ESCC qualification
- High temperature (- 55 °C; + 215 °C)

Thin Film Networks

- SMD resistors network (bare chips, wraparound and SOIC)
- Hermetic: leadless chip carrier
- High stability: 0.02 % on the ratio (1000 hours/Pn/70 °C)
- Low temperature coefficient: 10 ppm/°C absolute, 2 ppm/°C ratio
- Tight tolerance: down to 0.01 % ratio
- 6-decade voltage divider
- ESCC qualification
- Custom designs
- High temperature (- 55 °C; + 215 °C)

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Vishay Sfernice Thin Film Resistors and Networks Summary Table

Product Name	Product Type	Custom	Bare Chip/ Network	SIL	Leadless	Through Hole	SMD	Wraparound	Hermetic	DIL	Molded
CH	Resistor						X	X			
CHP/HCHP	Resistor						X	X			
CHP HR	Resistor						X	X			
CN	Network	X	X				X				
CNHT	Network	X	X				X				
CNM	Network	X					X				X
CNP	Network	X			X	X	X		X		
CNS	Network	X		X		X					
CNS 020/ CNS 021	Resistor			X		X					
CNS 471	Network			X		X					
CNW	Network	X					X	X			
CS22	Resistor		X				X				
CS33	Network		X				X				
EPIC	Resistor	X					X	X			
L	Resistor						X	X			
LHR	Resistor						X	X			
P	Resistor						X	X			
PFRR	Resistor						X	X			
PHR	Resistor						X	X			
PHT	Resistor						X	X			
PRA	Network						X	X			
PRA HR	Network						X	X			
PZR	Resistor						X	X			
PZHR	Resistor						X	X			
RMK 33	Network		X				X				
RMK 48/408/ 508/816/914	Network		X				X				
RMK 55/515	Resistor		X				X				
RMK22	Resistor		X				X				
RMKHT	Resistor & Network		X				X				
RMKD	Network					X			X	X	
RMKMS	Network						X			X	X
RSK22	Resistor		X				X				
RSK33	Network		X				X				
RV	Resistor						X	X			
SA/SB/SV	Resistor		X				X				
SLCC	Network				X		X		X		
TA22	Resistor		X				X				
TA33	Network		X				X				
TAS	Network			X		X					
TFS-S	Resistor			X		X					
TFS-W	Resistor						X	X			

Resistors												
Model	CS22	RMK 22	RMKHT	RMK 55/515	RSK 22	TA22	S	CH	CHP/ HCHP	CHPHR	EPIC	L
Type	Bare Chip	Bare Chip	Bare Chip	Bare Chip	Bare Chip	Bare Chip	Bare chip	Wraparound	Wraparound	Wraparound	Wraparound	Wraparound
Sizes	20 mil x 20 mil	20 mil x 20 mil	20 mil x 20 mil to 213 mil x 102 mil	50 mil x 50 mil to 150 mil x 50 mil	20 mil x 20 mil	20 mil x 20 mil	1.5 x 1.5; 3 x 3; 5 x 5	02016 to 2010	0502 to 2512	0603 to 2512	0603	0603 to 2010
Resistance Range	10 K to 10 M	50 R to 300 K	10 R to 7M5	1 K to 750 K to 1 K to 2 M	10 R to 500 K	10 R to 1 M	0R05 to 1 R	10 R to 500 R	0R1 to 100 MR	1 R to 10 M	2 R to 10 R	0R1 to 9R99
Power Rating at 70 °C	50 mW	50 mW	5mW to 100 mW	125 mW to 250 mW	50 mW	50 mW	500 mW to 6 W	30 mW to 330 mW	50 mW to 2 W	100 mW to 800 mW	N/A	125 mW to 1 W
Maximum Voltage	100 V	100 V	N/A	100 V	100 V	50 V	N/A	30 V to 75 V	50 V to 250 V	50 V to 300 V	N/A	50 V
Tolerance	0.5 % to 2 %	0.01% to 1%	0.05 % to 1 %	0.01 % to 1 %	0.1 % to 1 %	0.5 % to 2 %	1 % to 5 %	1 % to 10 %	0.5 % to 5 %	1 % to 5 %	N/A	1 % to 10 %
Temperature Coefficient (ppm/°C)	100 (50 upon request)	5 Typical	25 ppm/°C	10	25	100 (50 upon request)	100	100	100 and 200	100 and 200	N/A	100 to 300
Load Life Stability (2000 h at 70 °C at Pn)	0.10 %	0.03 % Typical	0.5 % (at 200 °C)	0.03 %	0.05 % Typical	0.07 % Typical	0.10 %	N/A	< 0.25 % Typical	1 %	N/A	0.15 % Typical
Operating Temp. Range	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 215 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 125 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C
Storage Temperature Range	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 230 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C
Special Features			High temperature - backside metallized option				Current sensor	Frequency up to 50 GHz (design kits available)	HCHP: frequency up to 10 GHz	High temperature storage: 1.5 %	Electro-pyrotechnic initiator: firing energy 50 µJ / firing time 50 µs	
Qualification									ESA (see CHPHR)	ESA (ESCC 4001/026)		ESA ongoing (see LHR)




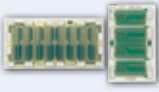



For detailed information on device performance at various ohmic values, please refer to the product datasheets.

Resistors											
Model	LHR	P	PFRR	PHR	PHT	PZR	PZHR	RV	TFS-W	CNS 020	TFS-S
Type	Wraparound	Wraparound	Wraparound	Wraparound	Wraparound	Wraparound	Wraparound	Wraparound	Wraparound	SIL	SIL
Sizes	0603 to 2010 (2512 under development)	0302 to 2010 (2512 under development)	0603 to 1206	0603 to 2010	0603 / 0805 / 1206 / 2010	02016 to 2512	0402 to 2512	0505 to 1206	0805 / 1206	.200" lead spacing	.100" lead spacing
Resistance Range	0R100 to 9R99	10 R to 50 M	100 R to 3M01	50 R to 3 M	10R - 7M6	0R (25 mΩ)	0 R (25 mΩ)	100 R to 1 M	25 R to 250 R	100 R to 10 M	25 R to 2500 R
Power Rating at 70 °C	100 mW to 500 mW	40 mW to 1 W	100 mW to 500 mW	100 mW to 500 mW	12.5 mW to 100 mW	10 mW to 1 W	40 mW to 1 W	125 mW to 330 mW	N/A	500 mW	N/A
Maximum Voltage	50 V	25 V to 300 V	50 V to 200 V	35 V to 150 V	75 V to 300 V	I max = 0.7 A to 6.3 A	I max = 1.4 A to 6.3 A	50 V to 75 V	N/A	300 V	N/A
Tolerance	1 % to 20 %	0.01 % to 2 %	0.05 % to 0.1 %	0.01 % to 0.1 %	0.05 % to 1 %	N/A	N/A	0.1 % to 5 %	1 % and 2 %	0.01 % to 1 %	1 % and 2 %
Temperature Coefficient (ppm/°C)	50 ppm/°C to 300 ppm/°C	5 to 100	10 ppm/°C and 25 ppm/°C	5 to 25	25 ppm/°C to 100 ppm/°C	N/A	N/A	10 and 25	6180	10	6180
Load Life Stability (2000 h at 70 °C at Pn)	0.5 % at 70 °C 2000h @ Pn	0.05 % Typical	0.02 % Typical	0.02 % Typical	0.5 % at 215 °C 1000h @ Pn	R max = 25 mΩ after 2000 h	R max = 25 mΩ after 2000 h	0.05 % Typical	0.20 %	0.10 %	0.20 %
Operating Temp. Range	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +215 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C
Storage Temperature Range	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +230 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C	-55 °C; +155 °C
Special Features		215 °C option	High temperature storage 0.15 %	High temperature storage: 0.15 %	High temperature				ΔCT/CT 0.2 %		ΔCT/CT 0.2 %
Qualification	ESA on going	ESA (see PHR)	ESA (ESCC 4001/023) variants 09 to 12	ESA (ESCC 4001/023) variants 01 to 08		ESA on going (see PZHR)		CECC 40401-010			

For detailed information on device performance at various ohmic values, please refer to the product datasheets.







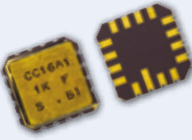


THIN FILM RESISTORS AND NETWORKS

Networks							
	<u>CNS 471</u>	<u>CS33</u>	<u>RMK 33</u>	<u>RMK 48/408/ 508/816/914</u>	<u>RMKHT</u>	<u>RSK 33</u>	<u>TA 33</u>
Model							
Type	SIL Network	Bare Network	Bare Network	Bare Network	Bare Network	Bare Network	Bare Network
Sizes	6 or 7 terminals	30 mil x 30 mil	30 mil x 30 mil	8 to 16 terminals	8 to 16 terminals	30 mil x 30 mil	30 mil x 30 mil
Resistance Range	100 R to 10 M	10 K to 10 M	1 K to 250 K	1 K to 200 K	10 R to 1 M2	10 R to 1 M	50 R to 1 M
Power Rating at 70 °C	100 mW (per resistor)	125 mW	50 mW	125 mW to 250 mW	12.5 mW to 25 mW	250 mW	125 mW
Maximum Voltage	1200 V	100 V	100 V	100 V	N/A	100 V	50 V
Absolute Tolerance	0.10 %	0.5 % to 2 %	0.1 % to 1 %	0.1 % to 1 %	0.05 % to 1 %	0.5 % to 2 %	0.5 % to 2 %
Tolerance Ratio	0.03 % to 0.1 %	0.50 %	0.01 % to 0.1 %	0.01 % to 0.05 %	0.02 % to 0.1 %	0.05 % to 0.5 %	0.1 % to 0.50 %
Absolute Temperature Coefficient (ppm/°C)	< 25	100	10	10	25	25	100
Temperature Coefficient Ratio	< 2.5	5	2	2	2	5	5
Load Life Stability (2000 h at 70 °C at Pn)	0.10 %	0.1 % Typical	0.03 % Typical	0.03 % Typical	0.5 % (at 200 °C)	0.03 % Typical	0.07 % Typical
Load Life Stability On Ratio (2000 h at 70 °C at Pn)	0.01 % Typical	N/A	N/A	N/A	0.5 % (at 200 °C)	N/A	N/A
Operating Temperature Range	0 °C; + 70 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 215 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C
Storage Temperature Range	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 230 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C
Special Features	Decade voltage divider	Unequal values upon request	Unequal values upon request		Unequal values upon request. Back side metallized option	Unequal values upon request	Unequal values upon request
Qualification							
Custom Part Number		CN	CN	CN	CNHT	CN	CN

For detailed information on device performance at various ohmic values, please refer to the product datasheets.

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Networks						
	<u>PRA</u>	<u>PRAHR</u>	<u>RMKD</u>	<u>RMKMS</u>	<u>SLCC</u>	<u>TAS</u>
Model						
Type	Wraparound Network	Wraparound Network	Hermetic Network	Molded Network	Hermetic Network	SIL Network
Sizes	100, 135, 182	100, 135, 182	8 to 16 terminals	SO8, SO14, SO16	20	2 to 9 terminals
Resistance Range	100 R to 1.6 M	100 R to 1 M	500 R to 200 K	500 R to 200 K	50 R to 100 K	100 R to 1 K
Power Rating at 70 °C	100 mW to 200 mW (per resistor)	100 mW (per resistor)	125 mW to 250 mW	50 mW (per resistor)	50 mW (per resistor)	50 mW (per resistor)
Maximum Voltage	50 V to 150 V	35 V to 100 V	100 V	50 V	100 V	100 V
Absolute Tolerance	0.01 % to 0.5 %	0.5 % to 0.1 %	0.05 % to 0.1 %	0.1 % to 1 %	0.1 % to 5 %	0.10 %
Tolerance Ratio	0.01 % to 0.1 %	0.05 % to 0.1 %	0.01 % to 0.05 %	0.05 % to 0.5 %	0.1 % to 1 %	0.01 % to 0.05 %
Absolute Temperature Coefficient (ppm/°C)	10	10	10	15	25	10
Temperature Coefficient Ratio	2	3 to 5	2	5	2	< 2
Load Life Stability (2000 h at 70 °C at Pn)	0.10 %	0.10 %	0.05 %	0.05 %	0.10 %	0.10 %
Load Life Stability On Ratio (2000 h at 70 °C at Pn)	0.02 %	0.02 %	0.03 %	0.02 %	0.05 %	0.05 %
Operating Temperature Range	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 125 °C	- 55 °C; + 155 °C	- 40 °C; + 125 °C
Storage Temperature Range	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 155 °C	- 55 °C; + 125 °C
Special Features	2 to 8 resistors; unequal values available	2 to 8 resistors; unequal values available	Unequal values upon request	Unequal values upon request	Unequal values upon request	Custom up to 10 M
Qualification	ESA (see PRAHR)	ESA (ESCC 4001/025) 				
Custom Part Number	CNW	CNWHR	CNP	CNM	CNP	CNS

For detailed information on device performance at various ohmic values, please refer to the product datasheets.

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