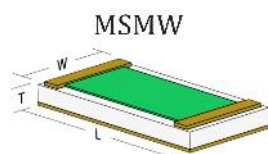


MICROWAVE CHIP RESISTORS



Wire bondable gold
OR Solderable gold with nickel barrier
OR Nickel barrier pre-soldered

Mini-Systems, Inc. **Top Contact Microwave Chip Resistor** series is designed to fit a wide variety of applications operating in the Microwave Bands. All sizes offer the **high stability, flat frequency response** and **low noise** of Mini-Systems, Inc. Thin Film materials. **Specialized LASER trim** techniques specifically designed for this series guarantee operation up to **40 GHz**. Microwave Chip Resistors can be attached to associated circuitry through ribbon or wire bonding, conductive epoxy, soldering to terminations or mounted as flip-chips.

GENERAL CHARACTERISTICS

Resistance Range	2Ω to 5kΩ		
Resistance Tolerance	±0.5% to ±10%		
Termination ¹	(G) Non-Solderable Gold, (NU) Solderable Au w/ Ni barrier, (NT) Nickel with Solder		
Backing Material	Bare Substrate (Standard), Gold (Optional)		
Operating Temperature	-55°C to +150°C		
Storage Temperature	-65°C to +150°C		
Operating Voltage	100V Max.		
VSWR ²	DC to 10GHz	10 to 20GHz	20-40GHz
	1.2:1	1.3:1	1.5:1

¹ Soldered or Solderable Gold require a Nickel Barrier

² Achieving operating characteristics is dependent on attachment methods in order to minimize parasitics

SUBSTRATE CHARACTERISTICS

SUBSTRATE	Available Thickness	Dielectric Constant @ 1MHz	Thermal Conductivity W/m• K	Current Noise	
				101Ω to 5kΩ	≤ 100Ω
99.6% Alumina	0.005" - 0.025"	9.9	28	-35dB	-30dB
Beryllium Oxide	0.010" - 0.025"	6.7	300	-35dB	-30dB
Aluminum Nitride	0.010" - 0.025"	9.0	140 - 177	-35dB	-30dB
Quartz	0.005" - 0.010"	3.75	1.3	-40dB	-30dB

RESISTOR CHARACTERISTICS

RESISTOR FILM	Passivation	Standard TCR	TCR Optional to:
Tantalum Nitride	Ta ₂ O ₅ (Self Passivating)	±150 ppm/°C	±25 ppm/°C
NiChrome	SiO ₂	±25 ppm/°C	±5 ppm/°C

PART NUMBER DESIGNATION

MSMW	110	A	N	10000	F	GGB
STYLE	TYPE	SUBSTRATE	RESISTOR FILM	OHMIC VALUE	TOLERANCE	OPTION
MSMW	SEE TABLE	A = Alumina B = BeO N = AlN Q = Quartz ³	T = Tantalum Nitride N = NiChrome	5-Digit Number: 1st 4 digits are significant with "R" as decimal point when required, 5th digit represents number of zeros.	D = ±0.5% F = ±1% G = ±2% J = ±5% K = ±10%	D = ±5ppm/°C C = ±10ppm/°C B = ±25ppm/°C A = ±50ppm/°C F = ±100ppm/°C G = Non-Solderable Gold NU = Solderable Au w/ Ni barrier NT = Nickel w/ Sn62 Solder NT3 = Nickel w/ SAC305 Solder GB = Gold Back TR = Tape & Reel

EXAMPLE: MSMW-110 - AN - 10000F - GGB

MSMW-110 Series, Alumina Substrate, NiChrome Resistor Film, 1kΩ, ±1% Tol., Non-Solderable Gold, Gold Backside

³ Quartz available as wire bondable only



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MADE IN AMERICA
SINCE 1968

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TOP CONTACT MICROWAVE CHIP RESISTORS

CASE SIZE	TYPE	DIMENSIONS			Resistance Range	Max. Operating Frequency ¹ GHz	POWER RATING ²			
		L (±0.002") [±0.051mm]	W (±0.002") [±0.051mm]	T ³ (±0.002") [±0.051mm]			Quartz	Alumina	AlN	BeO
0101	101	0.012" [0.304]	0.009" [0.229]	0.006" [0.152]	3Ω - 200Ω	40	10mW	50mW	200mW	400mW
0201	21	0.020" [0.508]	0.010" [0.254]	0.006" [0.152]	3Ω - 400Ω	40	10mW	50mW	200mW	400mW
0202	1	0.015" [0.381]	0.015" [0.381]	0.010" [0.254]	2Ω - 300Ω	40	10mW	50mW	200mW	400mW
0202	122	0.020" [0.508]	0.016" [0.406]	0.010" [0.254]	2Ω - 360Ω	40	25mW	125mW	500mW	1W
0202	7	0.020" [0.508]	0.020" [0.508]	0.010" [0.254]	2Ω - 400Ω	40	50mW	250mW	1W	2W
0302	32	0.030" [0.762]	0.020" [0.508]	0.010" [0.254]	2Ω - 500Ω	40	50mW	250mW	1W	2W
0402	110	0.037" [0.90]	0.017" [0.432]	0.010" [0.254]	2Ω - 1kΩ	40	25mW	125mW	500mW	1W
0404	2	0.035" [0.889]	0.035" [0.889]	0.010" [0.254]	2Ω - 1kΩ	26	50mW	250mW	1W	2W
0502	115	0.050" [1.270]	0.025" [0.635]	0.010" [0.254]	2Ω - 2kΩ	26	50mW	250mW	1W	2W
0505	112	0.050" [1.270]	0.050" [1.270]	0.010" [0.254]	2Ω - 2kΩ	26	100mW	500mW	2W	4W
0603	8	0.055" [1.397]	0.025" [0.635]	0.010" [0.254]	2Ω - 2kΩ	26	50mW	250mW	1W	2W
0805	3	0.075" [1.905]	0.050" [1.270]	0.010" [0.254]	2Ω - 3kΩ	26	100mW	500mW	2W	4W
1005	120	0.100" [2.540]	0.050" [1.270]	0.010" [0.254]	5Ω - 5kΩ	26	100mW	500mW	2W	4W
1010	121	0.100" [2.540]	0.100" [2.540]	0.010" [0.254]	10Ω - 5kΩ	26	150mW	750mW	3W	6W
1206	5	0.126" [3.200]	0.063" [1.600]	0.010" [0.254]	2Ω - 5kΩ	26	150mW	750mW	3W	6W

MSMW 118 will continue to be available, size and characteristics similar to MSMW122

¹ Achieving operating characteristics in this frequency range is dependent on attachment methods in order to minimize parasitics

² Power rating at 70°C derated linearly to 0% at 150°C

³ Thickness does not include solder

PERFORMANCE SPECIFICATIONS

PROPERTY	TEST CONDITION	REQUIRED LIMITS	MSI TYPICAL LIMITS
SHORT TERM OVERLOAD	2.5xWVDC(6.25xRATED POWER)MIL-PRF-55342, +25°C, 5 SEC	±0.25 MAX ΔR/R	±0.10 MAX ΔR/R
HIGH TEMP EXPOSURE	+150°C, 100HRS	±0.20 MAX ΔR/R	±0.03 MAX ΔR/R
THERMAL SHOCK	MIL-STD 202, METHOD 107	±0.25 MAX ΔR/R	±0.10 MAX ΔR/R
MOISTURE RESISTANCE	MIL-STD 202, METHOD 106	±0.40 MAX ΔR/R	±0.10 MAX ΔR/R
STABILITY	MIL-STD 202 METHOD 108, 2000 HRS, +70°C, RATED POWER	±0.50 MAX ΔR/R	±0.10 MAX ΔR/R

All MSMW Series parts are produced on the same manufacturing line using the same materials and processes as parts manufactured to MIL-PRF-55342

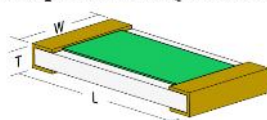


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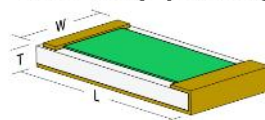
MICROWAVE CHIP RESISTORS

Wrap Around (WAMT)



Solderable gold with nickel barrier
OR Nickel barrier pre-soldered

Half Wrap (HWMT)



Solderable gold with nickel barrier
OR Nickel barrier pre-soldered
Isolated pad is wire bondable

Mini-Systems, Inc. **Surface Mount Microwave Chip Resistor** series is designed to fit a wide variety of applications operating in the Microwave Bands. All sizes are offered in wrap around and half wrap configurations and offer the **high stability, flat frequency response** and **low noise** of Mini-Systems, Inc. Thin Film materials. **Specialized LASER trim** techniques specifically designed for this series guarantee operation up to **40 GHz**. Microwave Chip Resistors can be attached to associated circuitry through ribbon or wire bonding, conductive epoxy, or soldering to terminations.

GENERAL CHARACTERISTICS

Resistance Range	2Ω to 5kΩ		
Resistance Tolerance	±0.5% to ±10%		
Termination ¹	(NU) Solderable Au w/ Ni barrier, (NT) Nickel with Solder		
Operating Temperature	-55°C to +150°C		
Storage Temperature	-65°C to +150°C		
Operating Voltage	100V Max.		
VSWR ²	DC to 10GHz	10 to 20GHz	20-40GHz
	1.2:1	1.3:1	1.5:1

¹ Soldered or Solderable Gold require a Nickel Barrier

² Achieving operating characteristics is dependent on attachment methods in order to minimize parasitics

SUBSTRATE CHARACTERISTICS

SUBSTRATE	Available Thickness	Dielectric Constant @ 1MHz	Thermal Conductivity W/m•K	Current Noise	
				101Ω to 5kΩ	≤ 100Ω
99.6% Alumina	0.005" - 0.025"	9.9	28	-35dB	-30dB
Beryllium Oxide	0.010" - 0.025"	6.7	300	-35dB	-30dB
Aluminum Nitride	0.010" - 0.025"	9.0	140 - 177	-35dB	-30dB

RESISTOR CHARACTERISTICS

RESISTOR FILM	Passivation	Standard TCR	TCR Optional to:
Tantalum Nitride	Ta ₂ O ₅ (Self Passivating)	±150 ppm/°C	±25 ppm/°C
NiChrome	SiO ₂	±25 ppm/°C	±5 ppm/°C

PART NUMBER DESIGNATION

WAMT	4	A	N	10000	F	GB
STYLE	TYPE	SUBSTRATE	RESISTOR FILM	OHMIC VALUE	TOLERANCE	OPTION
WAMT	SEE	A = Alumina	T = Tantalum Nitride	5-Digit Number:	D = ±0.5%	D = ±5ppm/°C
HWMT	TABLE	B = BeO	N = NiChrome	1st 4 digits are significant with "R" as decimal point when required, 5th digit represents number of zeros.	F = ±1%	C = ±10ppm/°C
		N = AlN			G = ±2%	B = ±25ppm/°C
					J = ±5%	A = ±50ppm/°C
					K = ±10%	F = ±100ppm/°C
						NU = Solderable Au w/ Ni barrier
						NT = Nickel w/ Sn62 Solder
						NT3 = Nickel w/ SAC305 Solder
						TR = Tape & Reel

EXAMPLE: WAMT- 4 - AN - 10000F - NT

WAMT-4 Series, Alumina Substrate, NiChrome Resistor Film, 1kΩ, ±1% Tol, Nickel w/ Sn62 Solder



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8041 Rev. A

SURFACE MOUNT MICROWAVE CHIP RESISTORS

CASE SIZE	TYPE	DIMENSIONS			Resistance Range	Max. Operating Frequency ¹ GHz	POWER RATING ²		
		L (±0.002") [±0.051mm]	W (±0.002") [±0.051mm]	T ³ (±0.002") [±0.051mm]			Alumina	AlN	BeO
0201	21	0.020" [0.508]	0.010" [0.254]	0.006" [0.152]	3Ω - 400Ω	20	50mW	200mW	400mW
0202	122	0.020" [0.508]	0.016" [0.406]	0.010" [0.254]	2Ω - 360Ω	20	125mW	500mW	1W
0202	7	0.020" [0.508]	0.020" [0.508]	0.010" [0.254]	2Ω - 400Ω	20	250mW	1W	2W
0302	32	0.030" [0.762]	0.020" [0.508]	0.010" [0.254]	2Ω - 500Ω	20	250mW	1W	2W
0402	1	0.040" [1.016]	0.020" [0.508]	0.010" [0.254]	2Ω - 1kΩ	20	250mW	1W	2W
0404	2	0.035" [0.889]	0.035" [0.889]	0.010" [0.254]	2Ω - 1kΩ	13	250mW	1W	2W
0502	115	0.050" [1.270]	0.025" [0.635]	0.010" [0.254]	2Ω - 2kΩ	13	250mW	1W	2W
0505	4	0.050" [1.270]	0.050" [1.270]	0.010" [0.254]	2Ω - 2kΩ	13	500mW	2W	4W
0603	8	0.055" [1.397]	0.025" [0.635]	0.010" [0.254]	2Ω - 2kΩ	13	250mW	1W	2W
0805	3	0.075" [1.905]	0.050" [1.270]	0.010" [0.254]	2Ω - 3kΩ	13	500mW	2W	4W
1005	6	0.100" [2.540]	0.050" [1.270]	0.010" [0.254]	5Ω - 5kΩ	13	500mW	2W	4W
1010	121	0.100" [2.540]	0.100" [2.540]	0.010" [0.254]	10Ω - 5kΩ	13	750mW	3W	6W
1206	5	0.126" [3.200]	0.063" [1.600]	0.010" [0.254]	2Ω - 5kΩ	13	750mW	3W	6W

¹ Achieving operating characteristics in this frequency range is dependent on attachment methods in order to minimize parasitics

² Power rating at 70°C derated linearly to 0% at 150°C

³ Thickness does not include solder

PERFORMANCE SPECIFICATIONS

PROPERTY	TEST CONDITION	REQUIRED LIMITS	MSI TYPICAL LIMITS
SHORT TERM OVERLOAD	2.5xWVDC(6.25xRATED POWER)MIL-PRF-55342, +25°C, 5 SEC	±0.25 MAX ΔR/R	±0.10 MAX ΔR/R
HIGH TEMP EXPOSURE	+150°C, 100HRS	±0.20 MAX ΔR/R	±0.03 MAX ΔR/R
THERMAL SHOCK	MIL-STD 202, METHOD 107	±0.25 MAX ΔR/R	±0.10 MAX ΔR/R
MOISTURE RESISTANCE	MIL-STD 202, METHOD 106	±0.40 MAX ΔR/R	±0.10 MAX ΔR/R
STABILITY	MIL-STD 202 METHOD 108, 2000 HRS, +70°C, RATED POWER	±0.50 MAX ΔR/R	±0.10 MAX ΔR/R

All WAMT, HWMT Series parts are produced on the same manufacturing line using the same materials and processes as parts manufactured to MIL-PRF-55342



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