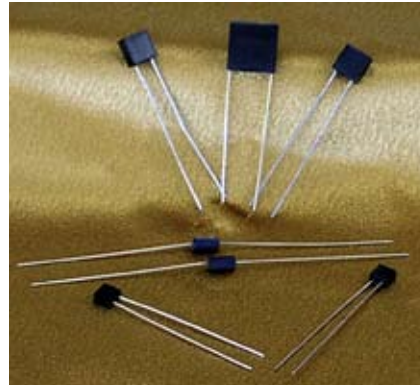


HNT

High Temperature 200°C "T" Series
Axial and Radial Leaded NPO Capacitors

Features

- Capacitance Range: 1.0pF to .15μF
- Operating Temperature: -55°C to +200°C
- Rated Voltage: 100V and 200V
- Ultra-Stable Performance
- Unique Polymer (300°C) Case
- Conformal Coated Option

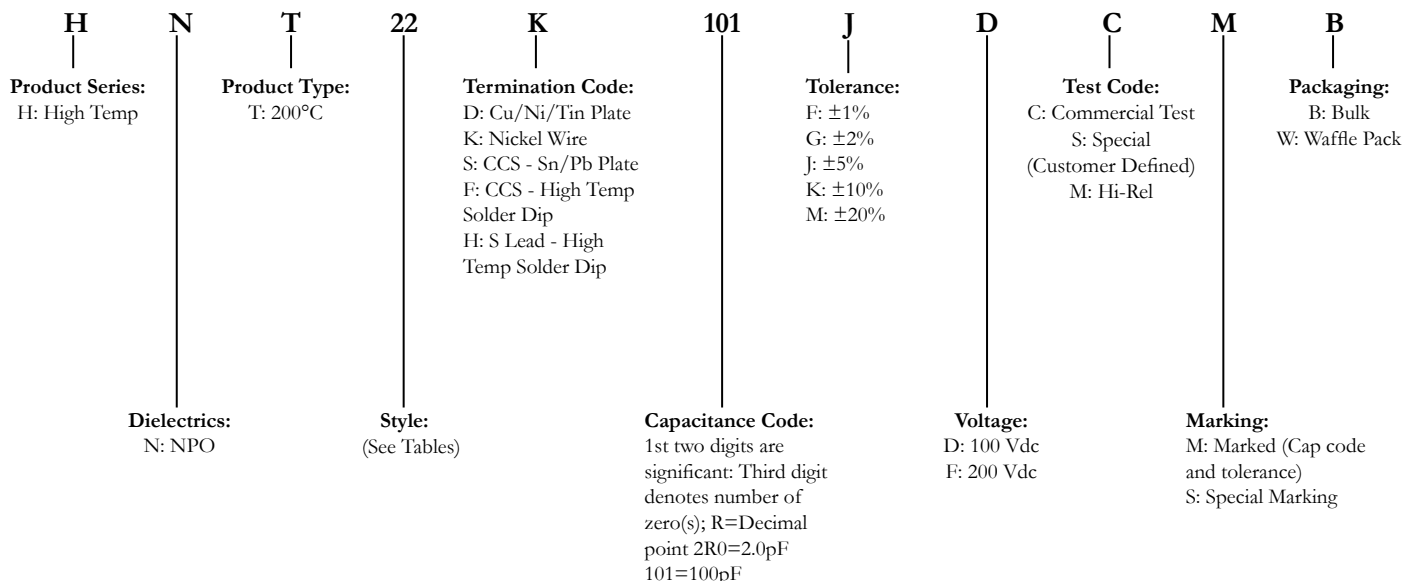


The HNT Series is designed using an ultra-stable, high insulation resistance, and low loss NPO (COG) dielectric system which exhibits little change in capacitance over the operating temperature range. These high temperature capacitors are capable of continuous operating at 200°C. Available in both axial and radial lead configurations, the HNT comes standard in 100Vdc and 200Vdc voltage ratings. Higher operating voltages, higher capacitance values and extended sizes are available upon request.

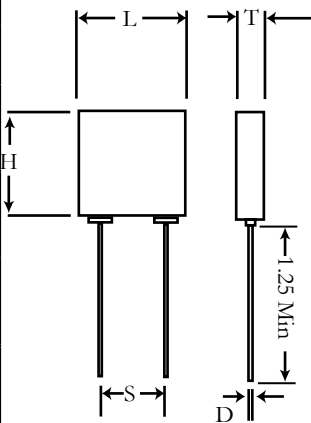
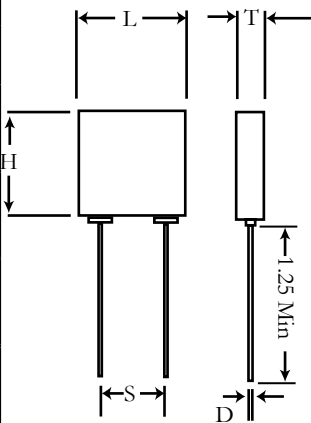
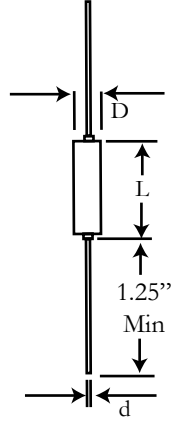
Applications

Typical Functional Applications: Bypass, Coupling, Tuning, Feedback, Impedance Matching and DC Blocking. Devices such as RF oscillators and precision timing circuits requiring a predictable temperature coefficient are examples of devices utilizing these capacitors.

AFM Part Number Code

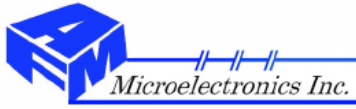


NPO Dielectric Capacitance Ranges and Size Information

	Style	Capacitance Ranges				Sizes (Max) Inches (mm)				Lead Spacing ± 0.30 (S)	
		100 Vdc		200 Vdc		Width (W)	Height (H)	Thickness (T)	Diameter (D)		
		Min	Max	Min	Max						
Radial Leaded NPO Capacitors	12	1.0pF	.010 μ F	1.0pF	8200pF	.200 (5.08)	.200 (5.08)	.100 (2.54)	.025 (.635) ± 0.002 (.051)	.200 (5.08)	
	22	100pF	.033 μ F	470pF	.027 μ F	.300 (7.62)	.300 (7.62)	.100 (2.54)	.025 (.635) ± 0.002 (.051)	.200 (5.08)	
	25	270pF	.047 μ F	560pF	.039 μ F	.300 (7.62)	.300 (7.62)	.150 (3.81)	.025 (.635) ± 0.002 (.051)	.200 (5.08)	
	38	.010 μ F	.100 μ F	.010 μ F	.100 μ F	.500 (12.70)	.500 (12.70)	.250 (6.35)	.025 (.635) ± 0.002 (.051)	.400 (10.16)	
	45	.010 μ F	.150 μ F	.010 μ F	.120 μ F	.675 (17.15)	.500 (12.70)	.250 (6.35)	.025 (.635) ± 0.002 (.051)	.400 (10.16)	
Axial Leaded NPO Capacitors						Diameter (D)	Length (L)		Lead Diameter (d)		
	10	12pF	1000pF	10pF	820pF	.100 (2.54)	.170 (4.32)		.025 (.635) ± 0.002 (.051)		
	17	16pF	.010 μ F	16pF	8200pF	.135 (3.43)	.260 (6.60)		.025 (.635) ± 0.002 (.051)		
	30	1000pF	.033 μ F	1000pF	.027 μ F	.155 (3.94)	.400 (10.16)		.025 (.635) ± 0.002 (.051)		
	40	.010 μ F	.047 μ F	.010 μ F	.039 μ F	.200 (5.08)	.500 (12.70)		.025 (.635) ± 0.002 (.051)		
49	.010 μ F	.100 μ F	.010 μ F	.082 μ F	.375 (9.52)	.750 (19.05)		.025 (.635) ± 0.002 (.051)			

Testing and Burn In

100% of AFM's high temperature capacitors undergo standard commercial testing. High reliability testing, customer SCD test protocols, and optional extended tests are also available. For more information see testing pages at the end of the catalog. AFM has the test facilities to perform electrical characterization measurements and burn in up to 300°C.



HNT

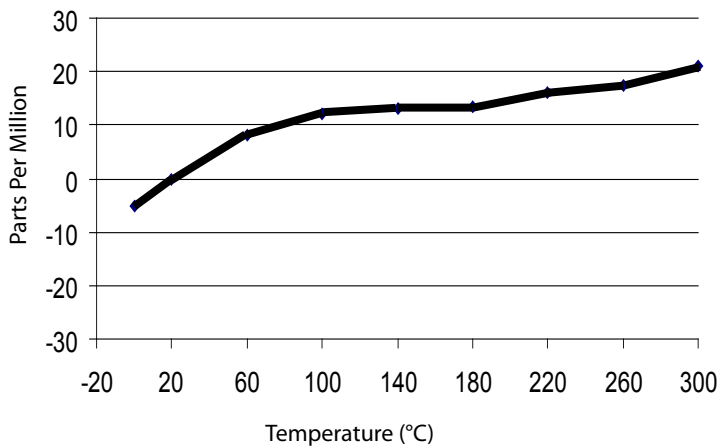
High Temperature 200°C "T" Series
Axial and Radial Leaded NPO Capacitors

Specification and Performance

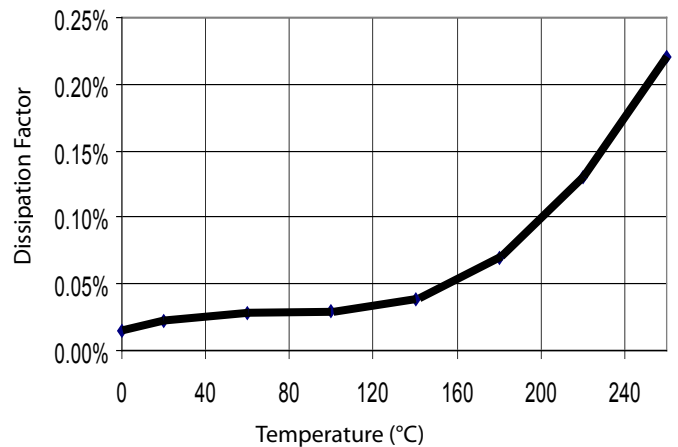
Piezoelectric and Aging Effect:	None
Temperature Range:	-55°C to +200°C
Temperature Coefficient of Capacitance:	0±30ppm/°C
Dissipation Factor:	0.15% max at 200°C
Insulation Resistance (IR, at Rated Voltage):	>10 ⁴ MΩ at 200°C or 100MΩμF Whichever is Less
Dielectric Withstand Voltage (DWV):	150% of Rated Voltage
Capacitance Drift:	±0.02% or ±0.02pF

Performance Curve

Capacitance vs. Temperature



Dissipation Factor

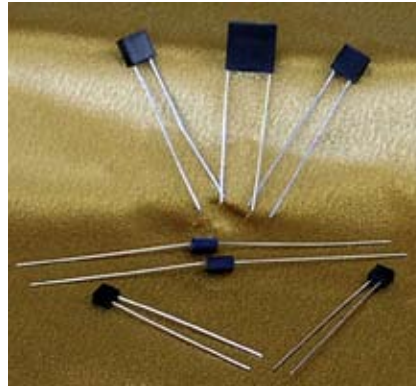


HXT

High Temperature 200°C "T" Series
Axial and Radial Leaded X7R Capacitors

Features

- Capacitance Range: 1000pF to 2.2μF
- Operating Temperature: -55°C to +200°C
- Rated Voltage: 100V and 200V
- Conformal Coated
- Unique High Temperature 300°C Polymer Case



The HXT Series is designed using a high insulation resistance, high dielectric constant barium titanate for high capacitance per unit volume. These high temperature capacitors are capable of continuous operating at 200°C. The dissipation factor of these capacitors improve five-fold at elevated temperature when compared to the dielectric loss at 25°C. The HXT comes standard with a 100Vdc and 200Vdc voltage rating. Higher voltage ratings are available upon request. See AFM's VXT line of 200°C rated 1kV to 4kV capacitors.

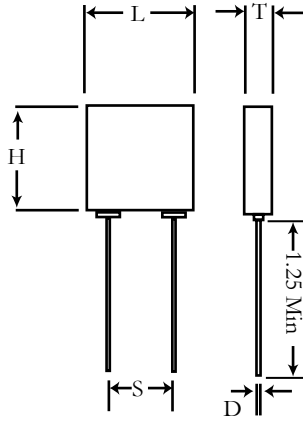
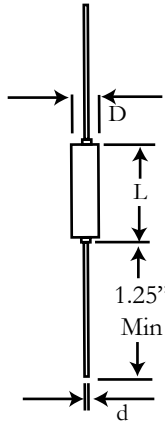
Applications

Typical Functional Applications: Bypass, Coupling, Tuning, Feedback, Impedance Matching and DC Blocking. Devices such as RF oscillators and precision timing circuits requiring a predictable temperature coefficient are examples of devices utilizing these capacitors.

AFM Part Number Code

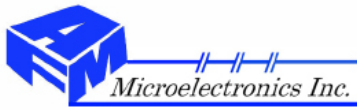
H	X	T	22	D	101	J	D	C	M	B
Product Series: H: High Temp	Product Type: T: 200°C	Termination Code: D: Cu/Ni/Tin Plate K: Nickel Wire S: CCS - Sn/Pb Plate F: CCS - High Temp Solder Dip H: S Lead - High Temp Solder Dip	Style: (See Tables)	Capacitance Code: 1st two digits are significant: Third digit denotes number of zero(s); R=Decimal point 2R0=2.0pF 101=100pF	Tolerance: J: ±5% K: ±10% M: ±20%	Voltage: D: 100V F: 200V	Test Code: C: Commercial Test S: Special (Customer Defined) M: Hi-Rel	Marking: M: Marked (Cap code and tolerance) S: Special Marking	Packaging: B: Bulk W: Waffle Pack	

X7R Dielectric Capacitance Ranges and Size Information

	Style	Capacitance Ranges				Sizes (Max) Inches (mm)				Lead Spacing ±0.30 (S)	
		100 Vdc		200 Vdc		Width (W)	Height (H)	Thickness (T)	Diameter (D)		
		Min	Max	Min	Max						
Radial Leaded X7R Capacitors	12	1000pF	.027μF	1000pF	.018μF	.200 (5.08)	.200 (5.08)	.100 (2.54)	.025 (.635) ±.002 (.051)	.200 (5.08)	
	22	1000pF	.033μF	1000pF	.120μF	.300 (7.62)	.300 (7.62)	.100 (2.54)	.025 (.635) ±.002 (.051)	.200 (5.08)	
	25	.010μF	.047μF	.010μF	.150μF	.300 (7.62)	.300 (7.62)	.150 (3.81)	.025 (.635) ±.002 (.051)	.200 (5.08)	
	38	.010μF	1.5μF	.010μF	.500μF	.500 (12.70)	.500 (12.70)	.250 (6.35)	.025 (.635) ±.002 (.051)	.400 (10.16)	
	45	.100μF	2.2μF	.100μF	1.0μF	.675 (17.15)	.500 (12.70)	.250 (6.35)	.025 (.635) ±.002 (.051)	.400 (10.16)	
Axial Leaded X7R Capacitors						Diameter (D)	Length (L)	Lead Diameter (d)			
	10	1000pF	.022μF	1000pF	.018μF	.100 (2.54)	.170 (4.32)	.025 (.635) ±.002 (.051)			
	17	1000pF	.100μF	1000pF	.027μF	.135 (3.43)	.260 (6.60)	.025 (.635) ±.002 (.051)			
	30	.010μF	.180μF	.015μF	.056μF	.155 (3.94)	.400 (10.16)	.025 (.635) ±.002 (.051)			
	40	.010μF	.560μF	.027μF	.390μF	.200 (5.08)	.500 (12.70)	.025 (.635) ±.002 (.051)			
49	.100μF	1.0μF	.100μF	.680μF	.375 (9.52)	.750 (19.05)	.025 (.635) ±.002 (.051)				

Testing and Burn In

100% of AFM's high temperature capacitors undergo standard commercial testing. High reliability testing, customer SCD test protocols, and optional extended tests are also available. For more information see testing pages at the end of the catalog. AFM has the test facilities to perform electrical characterization measurements and burn in up to 300°C.



HXT

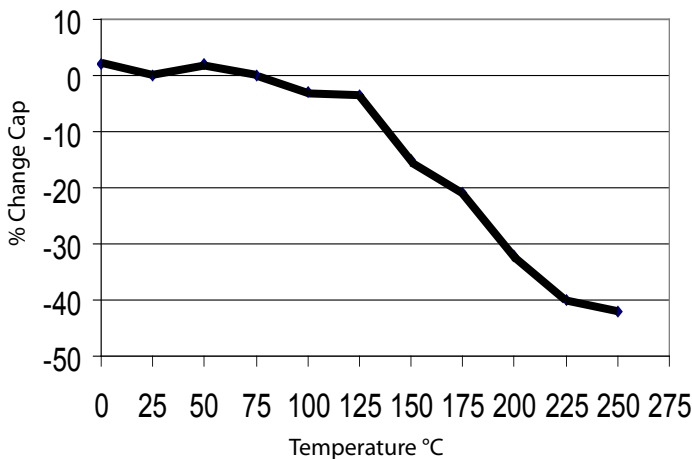
High Temperature 200°C "T" Series
Axial and Radial Leaded X7R Capacitors

Specification and Performance

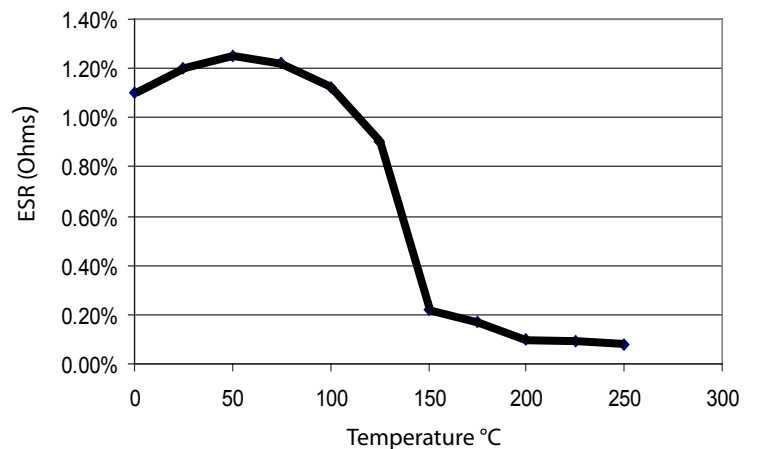
Dielectric Absorption:	<2.0% -55°C to 120°C None Exhibited Above 125°C (Paraelectric)
Temperature Range:	-55°C to +200°C
Temperature Coefficient of Capacitance:	+15% , -40%
Dissipation Factor:	1.2% at 25°C < 2.0% at 200°C
Insulation Resistance (IR, at Rated Voltage):	> 10 ⁴ MΩ at 25°C > 10 ³ MΩ at 200°C
Dielectric Withstand Voltage (DWV):	150% of Rated Voltage
Environmental and Mechanical:	Capable of Meeting MIL-PRF-39014 Requirements

Performance Curve

Temperature Coefficient of Capacitance



Dissipation Factor vs. Temperature



MNT 11

High Temperature 200°C "T" Series
COG (NPO) RF/Microwave Multilayer Capacitors

Features

- Capacitance Range: 0.1pF to 1000pF
- Operating Temperature: -55°C to +200°C
- Rated Voltage: 100V and 50V
- High Q
- Ultra-Stable Performance
- Low ESR/ESL
- High Self-Resonance

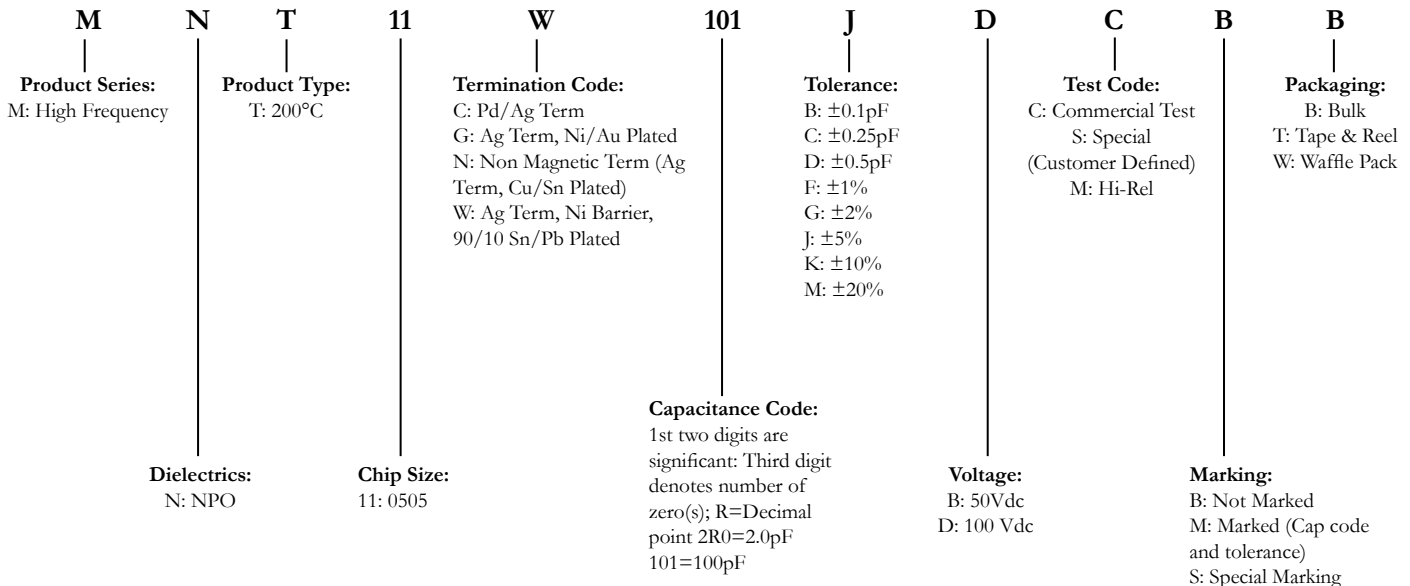


MNT11 series is high temperature RF/Microwave capacitors incorporating an ultra-stable COG (NPO) dielectric system. These capacitors are designed for continuous operating at 200°C, are low loss, high insulation resistance, and exhibit little change in capacitance over the operating temperature range. The MNT11 Series is available with 100V with a rating up to 470pF and a 50V rating up to 1000pF. This Series can be supplied compliant to the EU's **RoHS** standard.

Applications

Typical Functional Applications: Bypass, Coupling, Tuning, Feedback, Impedance Matching and DC Blocking. Devices such as RF oscillators and precision timing circuits requiring a predictable temperature coefficient are examples of devices utilizing these capacitors.

AFM Part Number Code

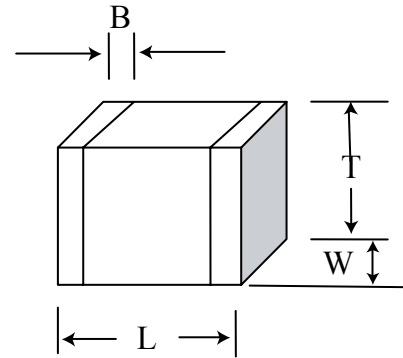


MNT 11

High Temperature 200°C "T" Series
COG (NPO) RF/Microwave Multilayer Capacitors

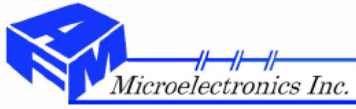
Chip Dimensions

Length	.057in (1.5mm)
Width	.055in (1.4mm)
Thickness	.055in (1.4mm)
Band	.015in (0.38mm)



Standard Capacitance Values

CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc
0R1	0.1	B	100	2R4	2.4	B, C, D	100	200	20	F, G, J, K, M	100	151	150	F, G, J, K, M	100
0R2	0.2			2R7	2.7			220	22			161	160		
0R3	0.3			B, C	3R0			3.0	240			24	181		
0R4	0.4	3R3			3.3			270	27			201	200		
0R5	0.5	B, C, D		3R6	3.6			300	30			221	220		
0R6	0.6			3R9	3.9			330	33			241	240		
0R7	0.7			4R3	4.3			360	36			271	270		
0R8	0.8			4R7	4.7			390	39			301	300		
0R9	0.9			5R1	5.1			430	43			331	330		
1R0	1.0			5R6	5.6			470	47			361	360		
1R1	1.1		B, C, D	6R2	6.2	510	51	391	390						
1R2	1.2			6R8	6.8	560	56	431	430						
1R3	1.3			7R5	7.5	620	62	471	470						
1R4	1.4			8R2	8.2	680	68	511	510						
1R5	1.5	9R1		9.1	750	75	561	560							
1R6	1.6	100		10	820	82	621	620							
1R7	1.7	B, C, D		110	11	910	91	681	680						
1R8	1.8			120	12	101	100	751	750						
1R9	1.9			130	13	111	110	821	820						
2R0	2.0			150	15	121	120	911	910						
2R1	2.1		160	16	131	130	102	1000							
2R2	2.2		180	18											



MNT 11

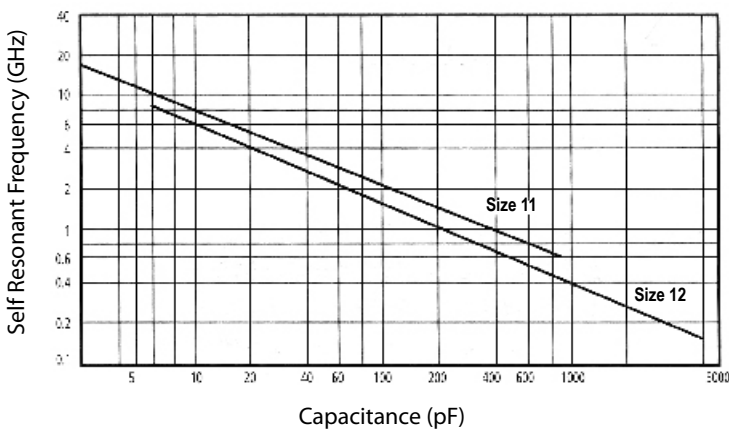
High Temperature 200°C "T" Series
COG (NPO) RF/Microwave Multilayer Capacitors

Specification and Performance

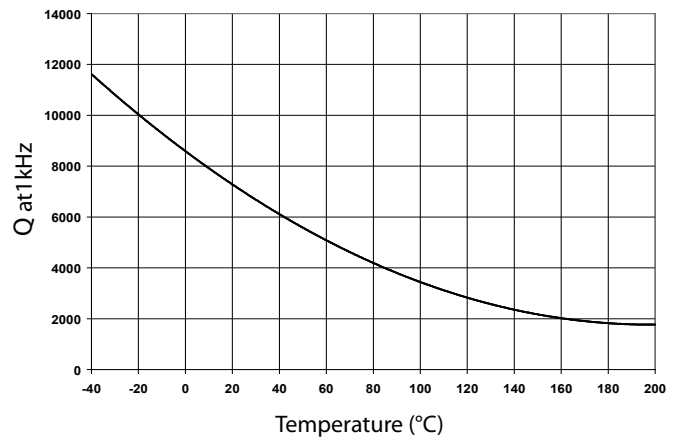
Piezoelectric and Aging Effects:	None
Temperature Range:	-55°C to +200°C
Temperature Coefficient of Capacitance:	0±30ppm/°C
Quality Factor (Q):	≤100pF at 1MHz >10k >100pF at 1MHz >2k
Insulation Resistance (IR, at Rated Voltage):	>10 ⁵ MΩ at 25°C >10 ⁴ MΩ at 200°C
Dielectric Withstand Voltage (DWV):	250% of Rated Voltage
Capacitance Drift:	±0.02% or 0.02 pF

Performance Curve

Self Resonant Frequency vs. Capacitance



Q vs. Temperature



MNT 12

High Temperature 200°C "T" Series
COG (NPO) RF/Microwave Multilayer Capacitors

Features

- Capacitance Range: 0.1pF to 5100pF
- Operating Temperature: -55°C to 200°C
- Rated Voltage: 50V, 150V and 250V
- High Q
- Ultra-Stable Performance
- Low ESR/ESL
- High Self-Resonance
- Encapsulation Option for Leadless MNT 12 Series
- Lead Options (See Page 42)

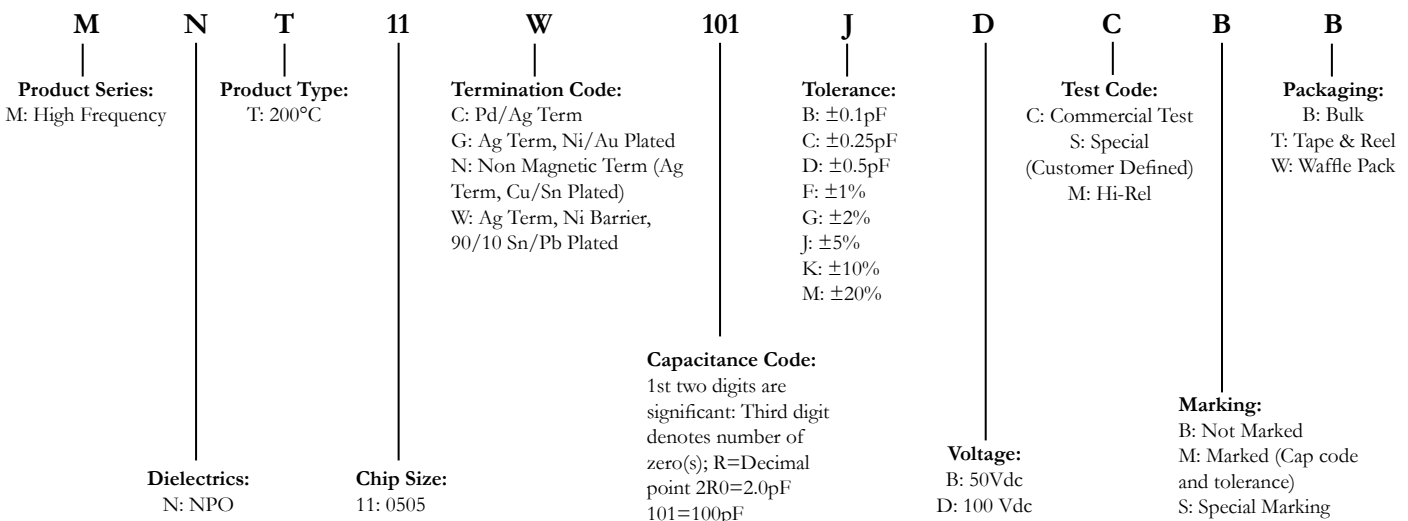


MNT12 series is high temperature RF/Microwave capacitors incorporating an ultra-stable COG (NPO) dielectric system. These capacitors are designed for continuous operating at 200°C, are low loss, high insulation resistance, and exhibit little change in capacitance over the operating temperature range. The MNT12 Series is available in voltages from 50 to 250 volts. High-reliability and burn-in testing is available as options. This Series can be supplied compliant to the EU's **RoHS** standard.

Applications

Typical Functional Applications: Bypass, Coupling, Tuning, Feedback, Impedance Matching and DC Blocking. Devices such as RF oscillators and precision timing circuits requiring a predictable temperature coefficient are examples of devices utilizing these capacitors.

AFM Part Number Code

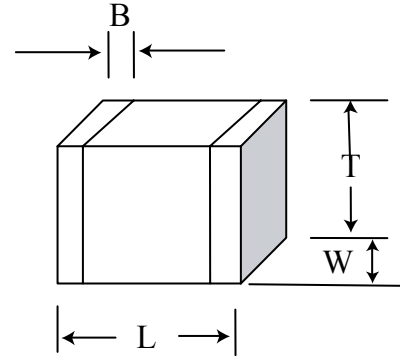


MNT 12

High Temperature 200°C "T" Series
COG (NPO) RF/Microwave Multilayer Capacitors

Chip Dimensions

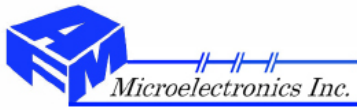
Length	.110in (2.79mm)
Width	.110in (2.79mm)
Thickness	.102in (2.59mm)
Band	.015in (0.38mm)



Standard Capacitance Values

*STD.: Standard Voltage; EXT.: Extended Voltage

CAP CODE	CAP (pF)	TOL	RATED WVdc		CAP CODE	CAP (pF)	TOL	RATED WVdc		CAP CODE	CAP (pF)	TOL	RATED WVdc		CAP CODE	CAP (pF)	TOL	RATED WVdc				
			STD.*	EXT.*				STD.	EXT.				STD.	EXT.				STD.	EXT.			
0R1	0.1	B	500	1500	3R3	3.3	B, C, D	500	1500	360	36	F, G, J, K, M	500	1500	391	390	F, G, J, K, M	50	N/A			
0R2	0.2				3R6	3.6				390	39				431	430				200		
0R3	0.3	B, C			3R9	3.9				430	43				511	510				100		
0R4	0.4				4R3	4.3				470	47										561	560
0R5	0.5	B, C, D			4R7	4.7				510	51				500	1000				50		
0R6	0.6				5R1	5.1				560	56										621	620
0R7	0.7				5R6	5.6				620	62										681	680
0R8	0.8				6R2	6.2				680	68										751	750
0R9	0.9				6R8	6.8				750	75										821	820
1R0	1.0				7R5	7.5				820	82										911	910
1R1	1.1				8R2	8.2				910	91										102	1000
1R2	1.2				9R1	9.1				101	100										112	1100
1R3	1.3				100	10				111	110										122	1200
1R4	1.4				110	11				121	120										152	1500
1R5	1.5	120			12	131				130	182				1800							
1R6	1.6	130			13	151				150	222				2200							
1R7	1.7	150			15	161				160	272				2700							
1R8	1.8	160			16	181				180	302				3000							
1R9	1.9	180			18	201				200	332				3300							
2R0	2.0	200			20	221				220	392				3900							
2R1	2.1	220	22	241	240	472	4700															
2R2	2.2	240	24	271	270	512	5100															
2R4	2.4	270	27	301	300																	
2R7	2.7	300	30	331	330																	
3R0	3.0	330	33	361	360																	



MNT 12

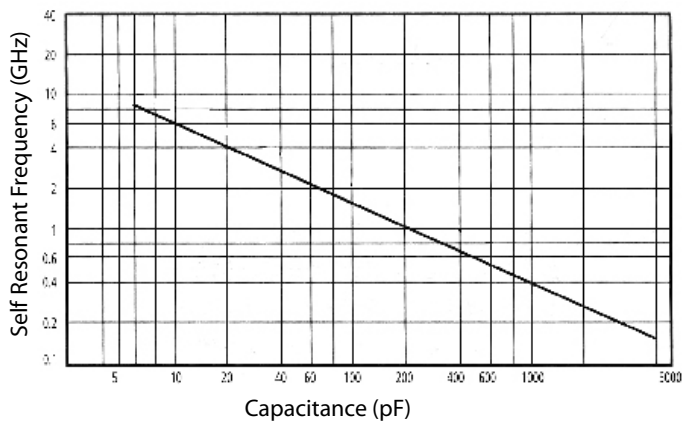
High Temperature 200°C "T" Series
COG (NPO) RF/Microwave Multilayer Capacitors

Specification and Performance

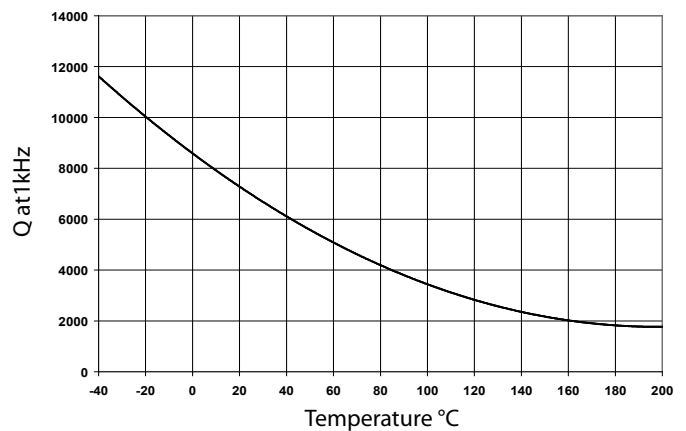
Piezoelectric and Aging Effects:	None
Temperature Range:	-55°C to +200°C
Temperature Coefficient of Capacitance:	0±30ppm/°C
Quality Factor (Q):	<200pF at 1 MHz >10k ≥200pF to 1000pF at 1 MHz >1k
Insulation Resistance (IR, at Rated Voltage):	>10 ⁵ MΩ at 25°C >10 ⁴ MΩ at 200°C
Dielectric Withstand Voltage (DWV):	200% of Rated Voltage
Capacitance Drift:	±0.02% or 0.02 pF

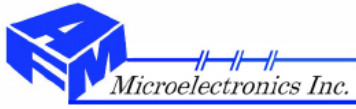
Performance Curve

Self Resonant Frequency vs. Capacitance



Q vs. Temperature





MPT 12

High Temperature 200°C "T" Series
Porcelain RF/Microwave Multilayer Capacitors

Features

- Capacitance Range: 0.1pF to 1000pF
- Operating Temperature: -55°C to 200°C
- Rated Voltage: 50V to 300V
- Low Noise
- Low ESR/ESL
- High Self-Resonance

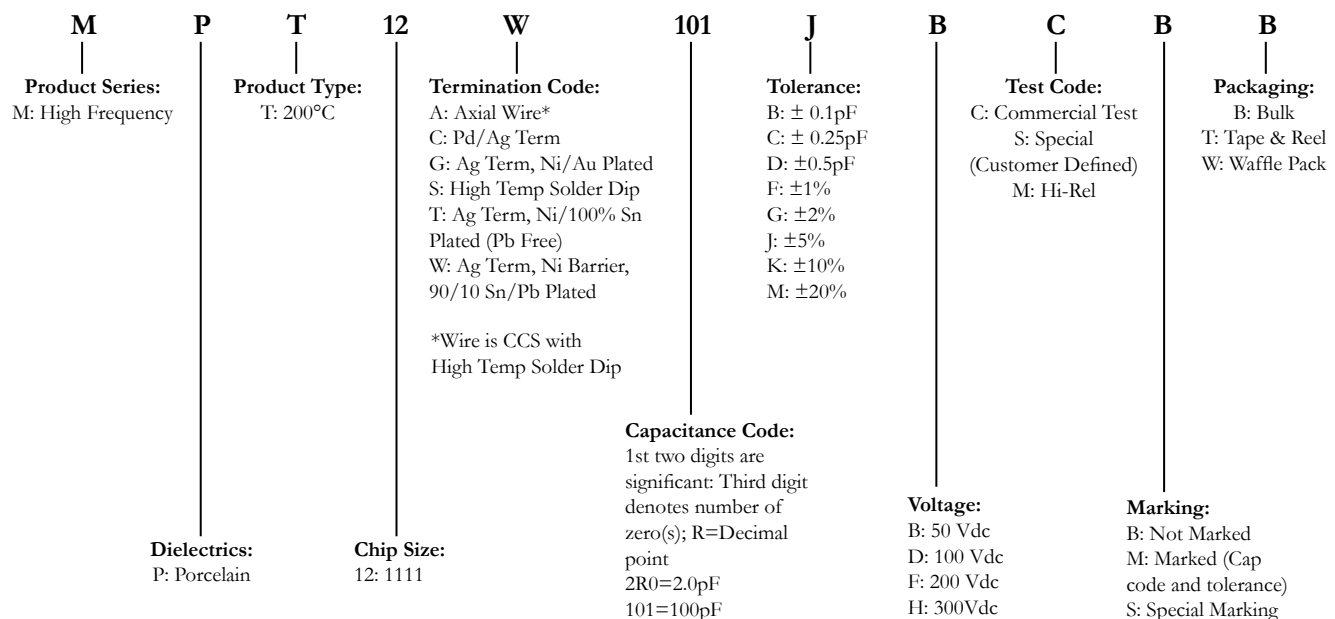


The MPT series is high temperature, high frequency capacitors that is now available with an extended operating temperature up to 200°C. The MPT12 Series is available with a rated voltage from 50 volts to 300 volts based on capacitance value. Leaded capacitors are available as AFM HPT Series and are encapsulated to protect capacitors from contaminants that may be experienced due to severe environmental conditions. This Series can be supplied compliant to the EU's RoHS standard.

Applications

Typical functional applications include oil, natural gas and geothermal exploration equipment; high temperature engine controls and sensors and any other applications having severe environments.

AFM Part Number Code

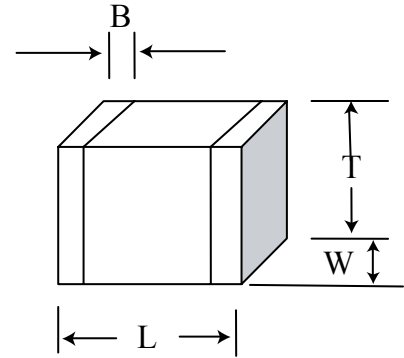


MPT 12

High Temperature 200°C "T" Series
Porcelain RF/Microwave Multilayer Capacitors

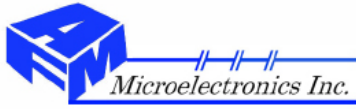
Chip Dimensions

Length	.110in (2.79mm)
Width	.110in (2.79mm)
Thickness	.102in (2.59mm)
Band	.015in (0.38mm)



Standard Capacitance Values

CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc
0R1	0.1	B	300	2R4	2.4	F, G, J, K, M	300	180	18	F, G, J, K, M	300	131	130		200
0R2	0.2			2R7	2.7			200	20			151	150		
0R3	0.3	B, C		3R0	3.0			220	22			161	160		
0R4	0.4			3R3	3.3			240	24			181	180		
0R5	0.5	B, C, D		3R6	3.6			270	27			201	200		
0R6	0.6			3R9	3.9			300	30			221	220		
0R7	0.7			4R3	4.3			330	33			241	240		
0R8	0.8			4R7	4.7			360	36			271	270		
0R9	0.9			5R1	5.1			390	39			301	300		
1R0	1.0			5R6	5.6			430	43			331	330		
1R1	1.1			6R2	6.2			470	47			361	360		
1R2	1.2			6R8	6.8			510	51			391	390		
1R3	1.3			7R5	7.5			560	56			431	430		
1R4	1.4			8R2	8.2			620	62			471	470		
1R5	1.5			9R1	9.1			680	68			511	510		
1R6	1.6			100	10			750	75			561	560		
1R7	1.7			110	11			820	82			621	620		
1R8	1.8			120	12			910	91			681	680		
1R9	1.9			130	13			101	100			751	750		
2R0	2.0			150	15			111	110			821	820		
2R1	2.1		160	16	121	120	911	910							
2R2	2.2						102	1000							



MPT 12

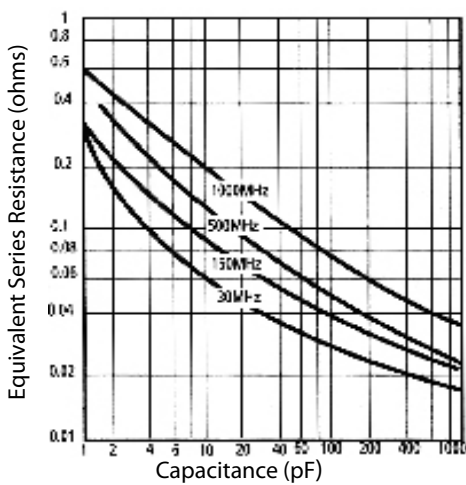
High Temperature 200°C "T" Series
Porcelain RF/Microwave Multilayer Capacitors

Specification and Performance

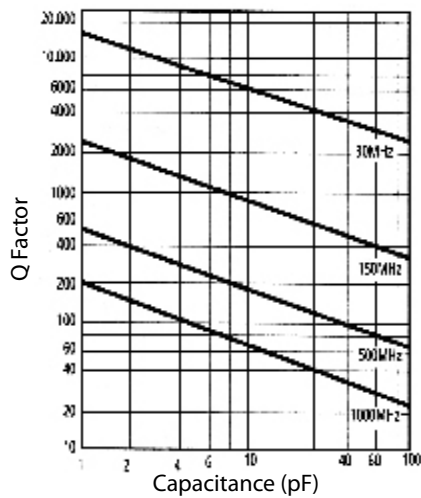
Piezoelectric and Aging Effects:	None
Temperature Range:	-55°C to +200°C
Temperature Coefficient of Capacitance:	+90±30ppm/°C
Insulation Resistance (IR, at Rated Voltage):	>10 ⁶ MΩ at 25°C >10 ⁵ MΩ at 125°C >10 ⁴ MΩ at 200°C
Dielectric Withstand Voltage (DWV):	250% of Rated Voltage
Capacitance Drift:	±0.02% or 0.02 pF

Performance Curve

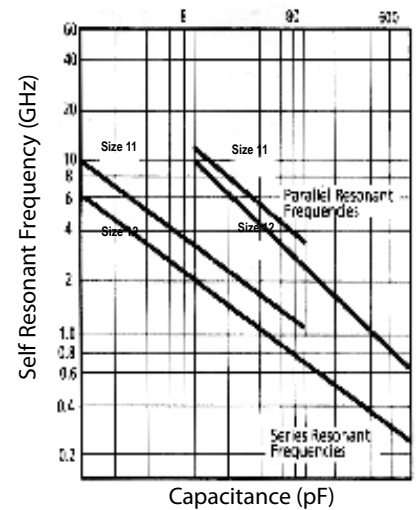
ESR vs. Capacitance



Q vs. Capacitance



Resonance

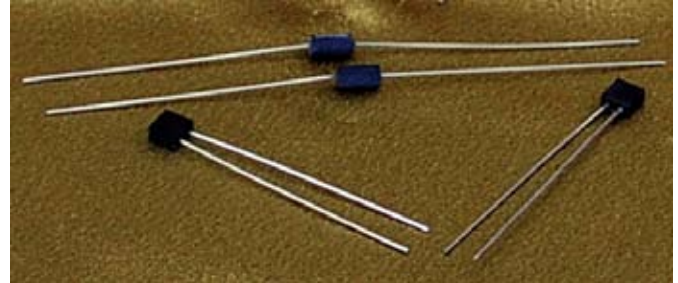


HPT 12

High Temperature 200°C "T" Series
Radial and Axial Leaded Capacitors

Features

- Capacitance Range: 0.1pF to 1000pF
- Operating Temperature: -55°C to 200°C
- Rated Voltage: 50V to 300V
- Low Noise
- Low ESR/ESL
- High Self-Resonance

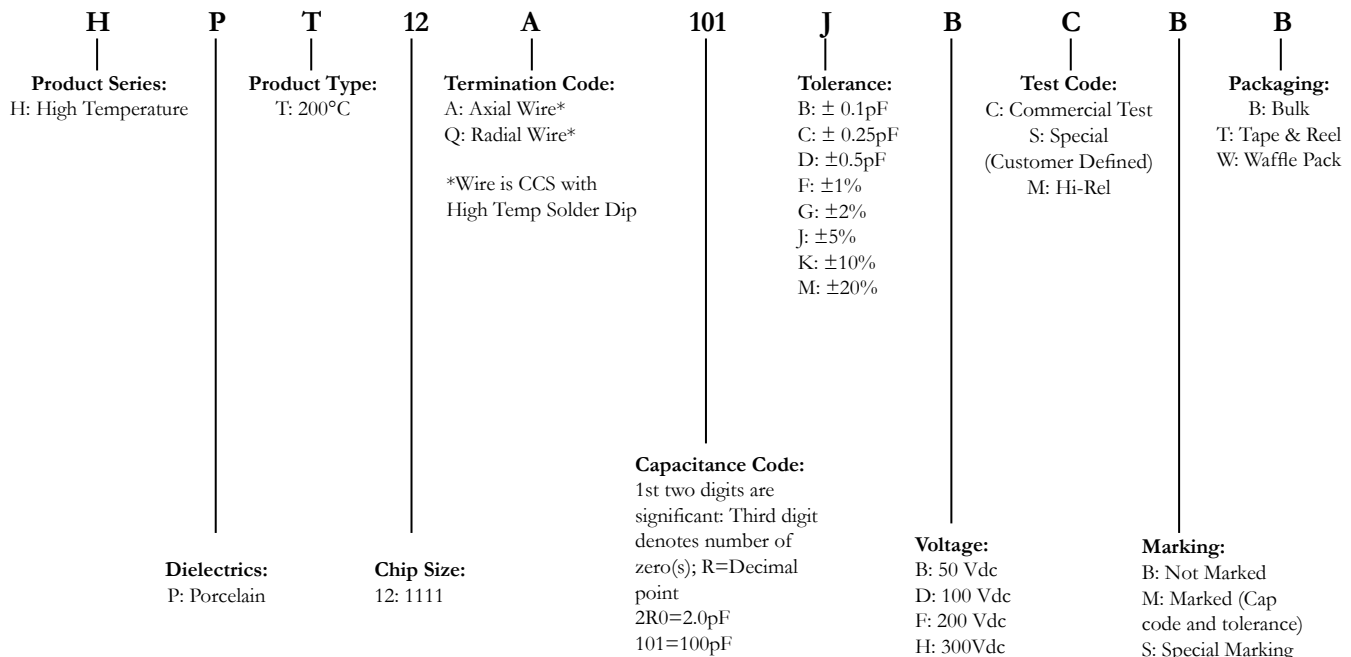


HPT 12 Series is an extension of the proven MPT12 high Q, low loss microporcelain chip capacitors. The HPT12 Series is available with a rated voltage from 50 volts to 300 volts based on capacitance value. These radial or axial leaded capacitors are encapsulated with a unique high temperature polymer case and minimize partial discharges to protect capacitors from contaminants that may be experienced due to severe environmental conditions.

Applications

Typical functional applications include oil, natural gas and geothermal exploration equipment; high temperature engine controls and sensors and any other applications having severe environments.

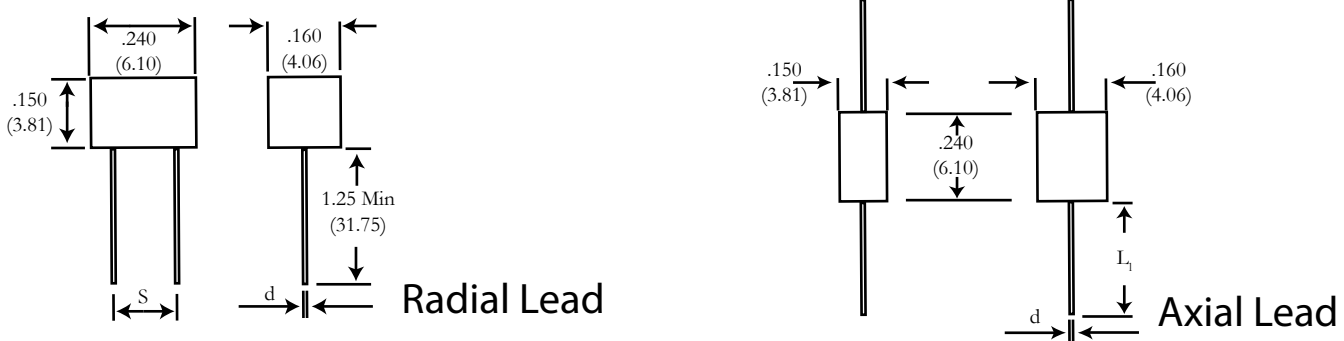
AFM Part Number Code



HPT 12

High Temperature 200°C "T" Series
Radial and Axial Leaded Capacitors

Chip Dimensions:



Standard Capacitance Values

CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc	CAP CODE	CAP (pF)	TOL	RATED WVdc
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1R5	1.5			9R1	9.1			680	68			511	510		
1R6	1.6			100	10			750	75			561	560		
1R7	1.7			110	11			820	82			621	620		
1R8	1.8			120	12			910	91			681	680		
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2R0	2.0			150	15			111	110			821	820		
2R1	2.1		160	16	121	120	200	911	910						
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