

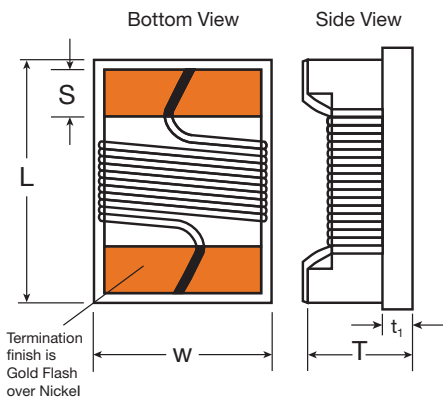
Miniature RF Chip Inductors

Features

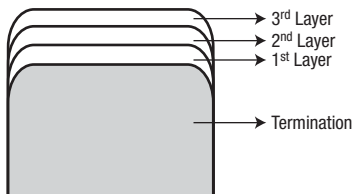
- High Q values
- High SRF
- Wide inductance range, 1nH to 47 μ H
- Excellent solderability and resistance to soldering heat suitable for flow or reflow soldering
- High reliability and high speed surface mount assembly

Dimensions

Unit: inch (mm)



SERIES	L	W	T	S	(t ₁)	QTY/REEL
MRFI 0402 (1005)	0.039 ± .004 (1.0 ± 0.10)	0.022 ± .004 (0.55 ± 0.10)	0.020 ± .006 (0.5 ± 0.15)	0.008 ± 0.004 (0.20 ± 0.1)	0.20	10,000
MRFI 0603 (1608)	0.063 ± 0.008 (1.6 ± 0.2)	0.041 ± 0.008 (1.05 ± 0.2)	0.041 ± 0.008 (1.05 ± 0.2)	0.014 ± 0.004 (0.35 ± 0.1)	0.50	3,000
MRFI 0805 (2012)	0.080 ± 0.008 (2.0 ± 0.2)	0.050 ± 0.008 (1.25 ± 0.2)	0.048 ± 0.008 (1.2 ± 0.2)	0.016 ± 0.004 (0.4 ± 0.1)	0.60	2,000
MRFI 1008 (2520)	0.098 ± 0.008 (2.6 ± 0.2)	0.080 ± 0.008 (2.1 ± 0.2)	0.063 ± 0.008 (1.6 ± 0.2)	0.020 ± 0.004 (0.5 ± 0.1)	0.70	2,000
MRFI 1210 (3225)	0.126 ± .008 (3.2 ± 0.2)	0.102 ± .008 (2.6 ± 0.2)	0.087 ± 0.008 (2.2 ± 0.2)	0.020 ± 0.004 (0.5 ± 0.1)	1.10	2,000



	Ceramic Type	Ferrite Type
a) 1 st Layer	Mo/Mn or Pd/Ag	Pd/Ag
b) 2 nd Layer	Ni	Ni
c) 3 rd Layer	Au	Sn

How To Order

MRFI0603

Series

- 4N7

Inductance Value
 4N7: 4.7nH
 47N: 47nH
 R47: 470nH
 4R7: 4.7 μ H
 470: 47 μ H

S

Tolerance
 B: ± 0.2nH
 S: ± 0.3nH
 G: ± 2%
 J: ± 5%
 K: ± 10%
 M: ± 20%

T

Packaging
 T: Tape
 Termination finish is Gold Flash over Nickel

NOTE: Core composition is either Ceramic or Ferrite depending on size and value. See note on the bottom of each data sheet.

Please Note: Venkel offers Engineering Kits for this product. See page 120 for details.

All components in this section are RoHS compliant per the EU directives and definitions.

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MRFI 0402 SERIES (1005) - Electrical Characteristics

Part Number	Inductance (nH)	Tolerance	Q		S.R.F. Min. (MHz)	R _{dc} Max (Ω)	I _{dc} Max (mA)	Color Coding**
			Min.	Typical @ 900MHz				
MRFI 0402 - 1N0 □ T	1.0 @ 250 MHz	B, S	13	26	6,000	0.045	1360	N/A
MRFI 0402 - 1N9 □ T	1.9 @ 250 MHz	B, S	16	29	6,000	0.070	1040	N/A
MRFI 0402 - 2N0 □ T	2.0 @ 250 MHz	B, S	16	30	6,000	0.070	1040	N/A
MRFI 0402 - 2N2 □ T	2.2 @ 250 MHz	B, S	18	32	6,000	0.070	960	N/A
MRFI 0402 - 2N4 □ T	2.4 @ 250 MHz	B, S	16	35	6,000	0.068	790	N/A
MRFI 0402 - 2N7 □ T	2.7 @ 250 MHz	B, S	16	31	6,000	0.120	640	N/A
MRFI 0402 - 3N3 □ T	3.3 @ 250 MHz	K, J, B	20	41	6,000	0.066	840	N/A
MRFI 0402 - 3N6 □ T	3.6 @ 250 MHz	K, J, B	20	43	6,000	0.066	840	N/A
MRFI 0402 - 3N9 □ T	3.9 @ 250 MHz	K, J, B	20	41	5,800	0.066	840	N/A
MRFI 0402 - 4N3 □ T	4.3 @ 250 MHz	K, J, B	18	45	6,000	0.091	700	N/A
MRFI 0402 - 4N7 □ T	4.7 @ 250 MHz	K, J, B	15	45	4,775	0.130	640	N/A
MRFI 0402 - 5N1 □ T	5.1 @ 250 MHz	K, J, B	23	49	5,800	0.083	800	N/A
MRFI 0402 - 5N6 □ T	5.6 @ 250 MHz	K, J, B	23	46	5,800	0.083	760	N/A
MRFI 0402 - 6N2 □ T	6.2 @ 250 MHz	K, J, B	23	49	5,800	0.083	760	N/A
MRFI 0402 - 6N8 □ T	6.8 @ 250 MHz	K, J, B	20	50	4,800	0.083	680	N/A
MRFI 0402 - 7N5 □ T	7.5 @ 250 MHz	K, J, B	25	50	5,800	0.104	680	N/A
MRFI 0402 - 8N2 □ T	8.2 @ 250 MHz	K, J, B	25	49	4,400	0.104	680	N/A
MRFI 0402 - 8N7 □ T	8.7 @ 250 MHz	K, J, B	18	50	4,100	0.200	480	N/A
MRFI 0402 - 9N0 □ T	9.0 @ 250 MHz	K, J, B	25	49	4,160	0.104	680	N/A
MRFI 0402 - 9N5 □ T	9.5 @ 250 MHz	K, J, B	18	45	4,000	0.200	680	N/A
MRFI 0402 - 10N □ T	10 @ 250 MHz	K, J, G	23	47	3,900	0.195	480	N/A
MRFI 0402 - 11N □ T	11 @ 250 MHz	K, J, G	26	56	3,680	0.120	640	N/A
MRFI 0402 - 12N □ T	12 @ 250 MHz	K, J, G	26	51	3,600	0.120	640	N/A
MRFI 0402 - 13N □ T	13 @ 250 MHz	K, J, G	24	54	3,450	0.210	560	N/A
MRFI 0402 - 15N □ T	15 @ 250 MHz	K, J, G	26	54	3,280	0.172	560	N/A
MRFI 0402 - 16N □ T	16 @ 250 MHz	K, J, G	24	54	3,100	0.220	560	N/A
MRFI 0402 - 18N □ T	18 @ 250 MHz	K, J, G	25	52	3,100	0.230	420	N/A
MRFI 0402 - 19N □ T	19 @ 250 MHz	K, J, G	26	50	3,040	0.202	480	N/A
MRFI 0402 - 20N □ T	20 @ 250 MHz	K, J, G	25	51	3,000	0.250	420	N/A
MRFI 0402 - 22N □ T	22 @ 250 MHz	K, J, G	25	52	2,800	0.300	400	N/A
MRFI 0402 - 23N □ T	23 @ 250 MHz	K, J, G	26	53	2,720	0.214	400	N/A
MRFI 0402 - 24N □ T	24 @ 250 MHz	K, J, G	25	51	2,700	0.300	400	N/A
MRFI 0402 - 27N □ T	27 @ 250 MHz	K, J, G	26	48	2,480	0.298	400	N/A
MRFI 0402 - 30N □ T	30 @ 250 MHz	K, J, G	25	46	2,350	0.300	400	N/A
MRFI 0402 - 33N □ T	33 @ 250 MHz	K, J, G	24	48	2,350	0.350	400	N/A
MRFI 0402 - 36N □ T	36 @ 250 MHz	K, J, G	26	48	2,320	0.403	320	N/A
MRFI 0402 - 39N □ T	39 @ 250 MHz	K, J, G	25	45	2,100	0.550	320	N/A
MRFI 0402 - 40N □ T	40 @ 250 MHz	K, J, G	26	48	2,240	0.438	320	N/A
MRFI 0402 - 43N □ T	43 @ 250 MHz	K, J, G	25	46	2,030	0.810	100	N/A
MRFI 0402 - 47N □ T	47 @ 200 MHz	K, J, G	26	46	2,100	0.830	150	N/A
MRFI 0402 - 51N □ T	51 @ 200 MHz	K, J	25	40	1,750	0.820	100	N/A
MRFI 0402 - 56N □ T	56 @ 200 MHz	K, J	22	42	1,760	0.970	100	N/A
MRFI 0402 - 68N □ T	68 @ 200 MHz	K, J	22	36	1,620	1.120	100	N/A
MRFI 0402 - 82N □ T	82 @ 150 MHz	K, J	20	33	1,500	1.250	100	N/A
MRFI 0402 - R10 □ T	100 @ 150 MHz	K, J	20	30	1,300	2.520	100	N/A

NOTE: All 0402's have Ceramic core.

Note: * For values not listed, please consult your salesperson.

NOTE

- Inductance: HP-4287A RF LCR meter with HP-16193 fixture
- Q: HP-4287A RF LCR meter with HP-16193 fixture
- S.R.F (Self-resonance Frequency) ENA E5071B network analyzer
- R_{dc} (DC Resistance): HP-4338B milliohmeter
- I_{dc} (Allowable Current)
- □ (Inductance Tolerance) (B = ±0.2nH, S = ±0.3nH, G = ±2% J = ±5%, K = ±10%, M = ±20%)
- ** Color code or marking is not applicable for this series

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Miniature RF Chip Inductors

MRFI 0603 SERIES (1608) - Electrical Characteristics

Part Number	Inductance (nH)	Tolerance	Q		S.R.F. Min. (MHz)	R _{dc} Max (Ω)	I _{dc} Max (mA)	Color Coding**
			Min.	Typical @ 900MHz				
MRFI 0603 – 1N6 □ T	1.6 @ 250 MHz	B, S	24	40	12,500	0.030	700	N/A
MRFI 0603 – 1N8 □ T	1.8 @ 250 MHz	B, S	16	35	12,500	0.045	700	N/A
MRFI 0603 – 2N0 □ T	2.0 @ 250 MHz	B, S	16	31	6,900	0.080	700	N/A
MRFI 0603 – 3N9 □ T	3.9 @ 250 MHz	B, S	22	51	6,900	0.080	700	N/A
MRFI 0603 – 4N3 □ T	4.3 @ 250 MHz	B, S	22	45	5,900	0.080	700	N/A
MRFI 0603 – 4N7 □ T	4.7 @ 250 MHz	B, S	20	47	5,800	0.130	700	N/A
MRFI 0603 – 5N1 □ T	5.1 @ 250 MHz	K, J	20	47	5,700	0.140	700	N/A
MRFI 0603 – 5N6 □ T	5.6 @ 250 MHz	K, J	16	40	5,500	0.150	700	N/A
MRFI 0603 – 6N8 □ T	6.8 @ 250 MHz	K, J, B	30	63	5,800	0.110	700	N/A
MRFI 0603 – 7N5 □ T	7.5 @ 250 MHz	K, J, B	28	64	4,800	0.106	700	N/A
MRFI 0603 – 8N2 □ T	8.2 @ 250 MHz	K, J, B	30	72	4,600	0.100	700	N/A
MRFI 0603 – 8N7 □ T	8.7 @ 250 MHz	K, J, B	28	66	4,600	0.109	700	N/A
MRFI 0603 – 9N1 □ T	9.1 @ 250 MHz	K, J	28	60	4,000	0.135	700	N/A
MRFI 0603 – 10N □ T	10 @ 250 MHz	K, J, G	30	66	3,800	0.130	700	N/A
MRFI 0603 – 12N □ T	12 @ 250 MHz	K, J, G	35	72	4,000	0.130	700	N/A
MRFI 0603 – 15N □ T	15 @ 250 MHz	K, J, G	35	68	4,000	0.170	700	N/A
MRFI 0603 – 18N □ T	18 @ 250 MHz	K, J, G	38	77	3,100	0.170	700	N/A
MRFI 0603 – 20N □ T	20 @ 250 MHz	K, J	38	72	3,000	0.220	700	N/A
MRFI 0603 – 22N □ T	22 @ 250 MHz	K, J, G	38	70	3,000	0.220	700	N/A
MRFI 0603 – 24N □ T	24 @ 250 MHz	K, J	37	75	2,650	0.135	700	N/A
MRFI 0603 – 27N □ T	27 @ 250 MHz	K, J, G	40	75	2,800	0.220	600	N/A
MRFI 0603 – 30N □ T	30 @ 250 MHz	K, J	45	57	2,300	0.220	600	N/A
MRFI 0603 – 33N □ T	33 @ 250 MHz	K, J, G	43	78	2,300	0.220	600	N/A
MRFI 0603 – 36N □ T	36 @ 250 MHz	K, J	43	70	2,200	0.250	600	N/A
MRFI 0603 – 39N □ T	39 @ 250 MHz	K, J, G	43	66	2,200	0.250	600	N/A
MRFI 0603 – 43N □ T	43 @ 250 MHz	K, J	38	62	2,000	0.280	600	N/A
MRFI 0603 – 47N □ T	47 @ 200 MHz	K, J, G	40	65	2,000	0.280	600	N/A
MRFI 0603 – 51N □ T	51 @ 200 MHz	K, J	40	66	1,900	0.310	600	N/A
MRFI 0603 – 56N □ T	56 @ 200 MHz	K, J, G	40	66	1,900	0.310	600	N/A
MRFI 0603 – 62N □ T	62 @ 200 MHz	K, J	40	60	1,700	0.340	600	N/A
MRFI 0603 – 68N □ T	68 @ 200 MHz	K, J, G	40	57	1,700	0.340	600	N/A
MRFI 0603 – 72N □ T	72 @ 150 MHz	K, J, G	35	60	1,700	0.490	400	N/A
MRFI 0603 – 82N □ T	82 @ 150 MHz	K, J, G	35	58	1,700	0.540	400	N/A
MRFI 0603 – R10 □ T	100 @ 150 MHz	K, J, G	35	51	1,400	0.630	400	N/A
MRFI 0603 – R12 □ T	120 @ 150 MHz	K, J, G	35	45	1,300	0.650	300	N/A
MRFI 0603 – R13 □ T	130 @ 150 MHz	K, J	35	40	1,000	0.920	280	N/A
MRFI 0603 – R15 □ T	150 @ 150 MHz	K, J, G	35	33	1,000	0.920	280	N/A
MRFI 0603 – R18 □ T	180 @ 100MHz	K, J, G	30	26	1,000	1.250	240	N/A
MRFI 0603 – R20 □ T	200 @ 100 MHz	K, J	30	23	1,000	1.250	240	N/A
MRFI 0603 – R21 □ T	210 @ 100 MHz	K, J	27	23	1,000	1.700	200	N/A
MRFI 0603 – R22 □ T	220 @ 100 MHz	K, J, G	30	23	1,000	1.700	200	N/A
MRFI 0603 – R24 □ T	240 @ 100 MHz	K, J	30	15	1,000	1.700	200	N/A
MRFI 0603 – R27 □ T	270 @ 100 MHz	K, J, G	30	10	1,000	1.800	170	N/A
MRFI 0603 – R33 □ T	330 @ 100 MHz	K, J	25	–	450	2.000	150	N/A
MRFI 0603 – R39 □ T	390 @ 100 MHz	K, J	20	–	350	2.000	170	N/A

NOTE: All 0603's have Ceramic core.

Note: * For values not listed, please consult your salesperson.

- NOTE**
- Inductance: HP-4287A RF LCR meter with HP-16193 fixture
 - Q: HP-4287A RF LCR meter with HP-16193 fixture
 - S.R.F (Self-resonance Frequency) ENA E5071B network analyzer
 - R_{dc} (DC Resistance): HP-4338B milliohmmeter
 - I_{dc} (Allowable Current)
 - □ (Inductance Tolerance) (B = ±0.2nH, S = ±0.3nH, G = ±2% J = ±5%, K = ±10%, M = ±20%)
 - ** Color code or marking is not applicable for this series

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MRFI 0805 SERIES (2012) - Electrical Characteristics

Part Number	Inductance (nH)	Tolerance	Q Min.	S.R.F. Min. (MHz)	Rdc Max (Ω)	Ibc Max (mA)	Color Coding**
MRFI 0805 – 2N2 □T	2.2 @ 250 MHz	B, S	50 @ 1000 MHz	6,000	0.06	800	Gray
MRFI 0805 – 2N7 □T	2.7 @ 250 MHz	B, S	35 @ 1000 MHz	6,000	0.08	800	Brown
MRFI 0805 – 3N3 □T	3.3 @ 250 MHz	B, S	60 @ 1000 MHz	6,000	0.08	800	Black
MRFI 0805 – 3N9 □T	3.9 @ 250 MHz	B, S	60 @ 1000 MHz	6,000	0.06	600	Red
MRFI 0805 – 4N7 □T	4.7 @ 250 MHz	B, S	60 @ 1000 MHz	5,800	0.06	600	Yellow
MRFI 0805 – 5N1 □T	5.1 @ 250 MHz	K, J, B	60 @ 1000 MHz	5,800	0.08	600	Blue
MRFI 0805 – 5N6 □T	5.6 @ 250 MHz	K, J, B	60 @ 1000 MHz	5,800	0.08	600	Orange
MRFI 0805 – 6N8 □T	6.8 @ 250 MHz	K, J, B	60 @ 1000 MHz	5,500	0.06	600	Brown
MRFI 0805 – 8N2 □T	8.2 @ 250 MHz	K, J, B	60 @ 1000 MHz	5,500	0.06	600	Red
MRFI 0805 – 10N □T	10 @ 250 MHz	K, J, G	60 @ 500 MHz	4,800	0.08	600	Blue
MRFI 0805 – 12N □T	12 @ 250 MHz	K, J, G	60 @ 500 MHz	4,100	0.08	600	Orange
MRFI 0805 – 15N □T	15 @ 250 MHz	K, J, G	60 @ 500 MHz	3,600	0.08	600	Yellow
MRFI 0805 – 18N □T	18 @ 250 MHz	K, J, G	60 @ 500 MHz	3,400	0.08	600	Green
MRFI 0805 – 22N □T	22 @ 250 MHz	K, J, G	60 @ 500 MHz	3,300	0.10	600	Blue
MRFI 0805 – 27N □T	27 @ 250 MHz	K, J, G	60 @ 500 MHz	2,600	0.12	600	Violet
MRFI 0805 – 33N □T	33 @ 250 MHz	K, J, G	60 @ 500 MHz	2,400	0.15	500	Gray
MRFI 0805 – 39N □T	39 @ 250 MHz	K, J, G	60 @ 500 MHz	2,100	0.18	500	White
MRFI 0805 – 47N □T	47 @ 200 MHz	K, J, G	60 @ 500 MHz	1,700	0.15	500	Black
MRFI 0805 – 56N □T	56 @ 200 MHz	K, J, G	60 @ 500 MHz	1,600	0.25	500	Brown
MRFI 0805 – 68N □T	68 @ 200 MHz	K, J, G	60 @ 500 MHz	1,450	0.27	500	Red
MRFI 0805 – 82N □T	82 @ 150 MHz	K, J, G	60 @ 500 MHz	1,350	0.32	500	Orange
MRFI 0805 – R10 □T	100 @ 150 MHz	K, J, G	60 @ 500 MHz	1,200	0.43	500	Yellow
MRFI 0805 – R12 □T	120 @ 150 MHz	K, J, G	50 @ 250 MHz	1,100	0.48	500	Green
MRFI 0805 – R15 □T	150 @ 100 MHz	K, J, G	50 @ 250 MHz	950	0.56	400	Blue
MRFI 0805 – R18 □T	180 @ 100 MHz	K, J, G	50 @ 250 MHz	900	0.78	400	Violet
MRFI 0805 – R22 □T	220 @ 100 MHz	K, J, G	50 @ 250 MHz	860	1.00	400	Gray
MRFI 0805 – R27 □T	270 @ 100 MHz	K, J, G	45 @ 250 MHz	850	1.46	350	White
MRFI 0805 – R33 □T	330 @ 100 MHz	K, J, G	45 @ 250 MHz	800	1.65	300	Black
MRFI 0805 – R39 □T	390 @ 100 MHz	K, J, G	45 @ 250 MHz	780	2.20	210	Brown
*MRFI 0805 – R47 □T	470 @ 25 MHz	K, J	45 @ 100 MHz	375	0.95	500	Red
*MRFI 0805 – R56 □T	560 @ 25 MHz	K, J	45 @ 100 MHz	340	1.10	450	Green
*MRFI 0805 – R68 □T	680 @ 25 MHz	K, J	35 @ 100 MHz	188	1.20	400	Orange
*MRFI 0805 – R82 □T	820 @ 25 MHz	K, J	35 @ 100 MHz	215	1.50	300	Gray
*MRFI 0805 – 1R0 □T	1000 @ 25 MHz	K, J	35 @ 50 MHz	200	2.13	180	Yellow
*MRFI 0805 – 1R2 □T	1200 @ 7.96 MHz	K, J	15 @ 7.96 MHz	200	2.38	150	Brown
*MRFI 0805 – 1R5 □T	1500 @ 7.96 MHz	K, J	15 @ 7.96 MHz	200	2.90	130	Green
*MRFI 0805 – 1R8 □T	1800 @ 7.96 MHz	K, J	15 @ 7.96 MHz	120	3.00	120	Blue
*MRFI 0805 – 2R2 □T	2200 @ 7.96 MHz	K, J	15 @ 7.96 MHz	110	3.10	110	Brown
*MRFI 0805 – 2R7 □T	2700 @ 7.96 MHz	K, J	15 @ 7.96 MHz	100	3.50	100	Violet
*MRFI 0805 – 3R3 □T	3300 @ 7.96 MHz	K, J	15 @ 7.96 MHz	70	2.30	210	Gray
*MRFI 0805 – 3R9 □T	3900 @ 7.96 MHz	K, J	15 @ 7.96 MHz	60	2.50	200	White
*MRFI 0805 – 4R7 □T	4700 @ 7.96 MHz	K, J	15 @ 7.96 MHz	50	2.80	180	Black
*MRFI 0805 – 5R6 □T	5600 @ 7.96 MHz	K, J	15 @ 7.96 MHz	45	3.00	160	Red
*MRFI 0805 – 6R8 □T	6800 @ 7.96 MHz	K, J	15 @ 7.96 MHz	45	3.20	130	Brown
*MRFI 0805 – 8R2 □T	8200 @ 7.96 MHz	K, J	15 @ 7.96 MHz	40	3.50	120	Red
*MRFI 0805 – 100 □T	10000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	40	5.00	80	Orange

NOTE: All values, 390nH and lower have a Ceramic core with Gold plating.

Note: * For values not listed, please consult your salesperson.

* All values higher than 390nH have a Ferrite core with Lead Free solder plating.

- NOTE**
- L, Q; HP-4287A at 100MHz (Test fixture: HP-16193)
 - S.R.F: Self-resonance Frequency; ENA E5071B network analyzer
 - Rdc: DC Resistance; HP-4338B
 - Ibc: Allowable Current
 - □ Inductance Tolerance (B = ±0.2nH, S = ±0.3nH, G = ±2% J = ±5%, K = ±10%, M = ±20%)
 - ** A color dot is put on these components for internal lot identification purposes

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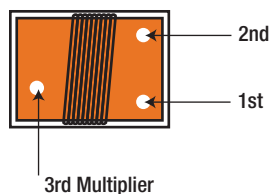
MRFI 1008 SERIES (2520) - Electrical Characteristics

Part Number	Inductance (nH)	Tolerance	Q Min.	S.R.F. Min. (MHz)	Rdc Max (Ω)	Ibc Max (mA)	Color Coding		
							1st	2nd	3rd
MRFI 1008 - 3N3 □	3.3 @ 100 MHz	B, S	50 @ 1000 MHz	6,000	0.06	1000	Black	Orange	Orange
MRFI 1008 - 6N8 □	6.8 @ 100 MHz	K, J, B	50 @ 1000 MHz	5,500	0.06	1000	Black	Blue	Gray
MRFI 1008 - 8N2 □	8.2 @ 100 MHz	K, J, B	50 @ 1000 MHz	5,500	0.06	1000	Black	Gray	Red
MRFI 1008 - 10N □	10 @ 100 MHz	K, J, G	50 @ 1000 MHz	4,300	0.08	1000	Brown	Black	Black
MRFI 1008 - 12N □	12 @ 100 MHz	K, J, G	60 @ 500 MHz	3,600	0.08	1000	Brown	Red	Black
MRFI 1008 - 15N □	15 @ 100 MHz	K, J, G	60 @ 500 MHz	2,700	0.08	1000	Brown	Green	Black
MRFI 1008 - 18N □	18 @ 100 MHz	K, J, G	60 @ 350 MHz	2,700	0.10	1000	Brown	Gray	Black
MRFI 1008 - 22N □	22 @ 100 MHz	K, J, G	60 @ 350 MHz	2,500	0.10	1000	Red	Red	Black
MRFI 1008 - 27N □	27 @ 100 MHz	K, J, G	60 @ 350 MHz	1,800	0.10	1000	Red	Violet	Black
MRFI 1008 - 33N □	33 @ 100 MHz	K, J, G	60 @ 350 MHz	1,700	0.10	1000	Orange	Orange	Black
MRFI 1008 - 39N □	39 @ 100 MHz	K, J, G	60 @ 350 MHz	1,500	0.10	1000	Orange	White	Black
MRFI 1008 - 47N □	47 @ 100 MHz	K, J, G	60 @ 350 MHz	1,500	0.10	1000	Yellow	Violet	Black
MRFI 1008 - 56N □	56 @ 100 MHz	K, J, G	60 @ 350 MHz	1,350	0.12	1000	Green	Blue	Black
MRFI 1008 - 68N □	68 @ 100 MHz	K, J, G	60 @ 350 MHz	1,300	0.15	1000	Blue	Gray	Black
MRFI 1008 - 82N □	82 @ 100 MHz	K, J, G	60 @ 350 MHz	1,100	0.18	1000	Gray	Red	Black
MRFI 1008 - R10 □	100 @ 100 MHz	K, J, G	60 @ 350 MHz	1,100	0.18	1000	Brown	Black	Brown
MRFI 1008 - R12 □	120 @ 25 MHz	K, J, G	45 @ 100 MHz	950	0.20	800	Brown	Red	Brown
MRFI 1008 - R15 □	150 @ 25 MHz	K, J, G	45 @ 100 MHz	880	0.22	800	Brown	Green	Brown
MRFI 1008 - R18 □	180 @ 25 MHz	K, J, G	45 @ 100 MHz	800	0.33	800	Brown	Gray	Brown
MRFI 1008 - R22 □	220 @ 25 MHz	K, J, G	45 @ 100 MHz	730	0.45	800	Red	Red	Brown
MRFI 1008 - R27 □	270 @ 25 MHz	K, J, G	45 @ 100 MHz	650	0.75	600	Red	Violet	Brown
MRFI 1008 - R33 □	330 @ 25 MHz	K, J, G	45 @ 100 MHz	570	0.90	500	Orange	Orange	Brown
MRFI 1008 - R39 □	390 @ 25 MHz	K, J, G	45 @ 100 MHz	530	1.06	470	Orange	White	Brown
MRFI 1008 - R47 □	470 @ 25 MHz	K, J, G	45 @ 100 MHz	480	1.17	420	Yellow	Violet	Brown
MRFI 1008 - R56 □	560 @ 25 MHz	K, J, G	45 @ 100 MHz	430	1.50	310	Green	Blue	Brown
MRFI 1008 - R68 □	680 @ 25 MHz	K, J, G	45 @ 100 MHz	380	2.06	230	Blue	Gray	Brown
MRFI 1008 - R75 □	750 @ 25 MHz	K, J, G	45 @ 100 MHz	360	2.20	200	Violet	Green	Brown
MRFI 1008 - R82 □	820 @ 25 MHz	K, J, G	45 @ 100 MHz	350	2.30	180	Gray	Red	Brown
MRFI 1008 - R91 □	910 @ 25 MHz	K, J, G	45 @ 100 MHz	330	3.18	150	White	Brown	Brown
MRFI 1008 - 1R0 □	1000 @ 25 MHz	K, J, G	35 @ 50 MHz	310	3.30	120	Brown	Black	Red

NOTE: All values 1000nH (1.0 uH) and lower have a Ceramic core with Gold plating.

Note: * For values not listed, please consult your salesperson.

- NOTE**
- Inductance: HP-4287A RF LCR meter with HP-16193 fixture
 - Q: HP-4287A RF LCR meter with HP-16193 fixture
 - S.R.F (Self-resonance Frequency) ENA E5071B network analyzer
 - Rdc (DC Resistance): HP-4338B milliohmmeter
 - Ibc (Allowable Current)
 - □ (Inductance Tolerance) (B = ±0.2nH, S = ±0.3nH, G = ±2% J = ±5%, K = ±10%, M = ±20%)



These parts are marked with 3 color dots. The table above shows the significance of each color. Dots 1 and 2 indicate the inductance in nanoHenries. Dot 3 indicates the number of zeros to be added.

Examples:

Gray Red Black = 82nH
 Brown Red Brown = 120 nH
 Yellow Violet Red = 4700nH

Values below 10nH

On these parts, the third dot is not a multiplier. Refer to the table above for specific inductance values.

MRFI 1008 Series
 Black Gray Red = 8.2nH

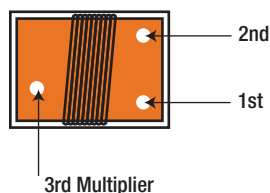
MRFI 1008 SERIES (2520) - Electrical Characteristics

Part Number	Inductance (nH)	Tolerance	Q Min.	S.R.F. Min. (MHz)	Rbc Max (Ω)	Ibc Max (mA)	Color Coding		
							1st	2nd	3rd
*MRFI 1008 – 1R2 □T	1200 @ 7.96 MHz	K, J	20 @ 7.96 MHz	280	1.30	230	Brown	Red	Red
*MRFI 1008 – 1R5 □T	1500 @ 7.96 MHz	K, J	20 @ 7.96 MHz	250	1.65	220	Brown	Green	Red
*MRFI 1008 – 1R8 □T	1800 @ 7.96 MHz	K, J	20 @ 7.96 MHz	200	2.20	210	Brown	Gray	Red
*MRFI 1008 – 2R2 □T	2200 @ 7.96 MHz	K, J	20 @ 7.96 MHz	160	2.35	200	Red	Red	Red
*MRFI 1008 – 2R7 □T	2700 @ 7.96 MHz	K, J	20 @ 7.96 MHz	130	2.60	195	Red	Violet	Red
*MRFI 1008 – 3R3 □T	3300 @ 7.96 MHz	K, J	20 @ 7.96 MHz	80	2.85	185	Orange	Orange	Red
*MRFI 1008 – 3R9 □T	3900 @ 7.96 MHz	K, J	20 @ 7.96 MHz	50	4.00	180	Orange	White	Red
*MRFI 1008 – 4R7 □T	4700 @ 7.96 MHz	K, J	20 @ 7.96 MHz	45	4.30	175	Yellow	Violet	Red
*MRFI 1008 – 5R6 □T	5600 @ 7.96 MHz	K, J	20 @ 7.96 MHz	42	2.60	170	Green	Blue	Red
*MRFI 1008 – 6R8 □T	6800 @ 7.96 MHz	K, J	20 @ 7.96 MHz	39	2.80	165	Blue	Gray	Red
*MRFI 1008 – 8R2 □T	8200 @ 7.96 MHz	K, J	20 @ 7.96 MHz	36	3.05	160	Gray	Red	Red
*MRFI 1008 – 100 □T	10000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	33	3.50	150	Brown	Black	Orange
*MRFI 1008 – 120 □T	12000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	30	3.60	140	Brown	Red	Orange
*MRFI 1008 – 150 □T	15000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	26	4.00	130	Brown	Green	Orange
*MRFI 1008 – 180 □T	18000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	24	4.50	120	Brown	Gray	Orange
*MRFI 1008 – 220 □T	22000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	22	4.80	110	Red	Red	Orange
*MRFI 1008 – 270 □T	27000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	21	5.30	95	Red	Violet	Orange
*MRFI 1008 – 330 □T	33000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	20	6.10	85	Orange	Orange	Orange
*MRFI 1008 – 390 □T	39000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	18	8.30	60	Orange	White	Orange
*MRFI 1008 – 470 □T	47000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	17	12.60	45	Yellow	Violet	Orange

Note: * For values not listed, please consult your salesperson.

NOTE: * All values higher than 1000nH (1.0 uH) have a Ferrite core with Lead Free solder plating.

- NOTE**
- Inductance: HP-4287A RF LCR meter with HP-16193 fixture
 - Q: HP-4287A RF LCR meter with HP-16193 fixture
 - S.R.F (Self-resonance Frequency) ENA E5071B network analyzer
 - R_{DC} (DC Resistance): HP-4338B milliohmeter
 - I_{DC} (Allowable Current)
 - □ (Inductance Tolerance) (B = ±0.2nH, S = ±0.3nH, G = ±2% J = ±5%, K = ±10%, M = ±20%)



These parts are marked with 3 color dots. The table above shows the significance of each color. Dots 1 and 2 indicate the inductance in nanoHenries. Dot 3 indicates the number of zeros to be added.

Examples:

- Gray Red Black = 82nH
- Brown Red Brown = 120 nH
- Yellow Violet Red = 4700nH

Color Code Scheme (nH)

Color Code	Significant Digit Associated with Color	Color Code	Significant Digit Associated with Color
Black	0	Green	5
Brown	1	Blue	6
Red	2	Violet	7
Orange	3	Gray	8
Yellow	4	White	9

NOTE: For values below 10nH, the color code scheme does not apply. Refer to the data sheet for actual values.

Miniature RF Chip Inductors

MRFI 1210 SERIES (3225) - Electrical Characteristics

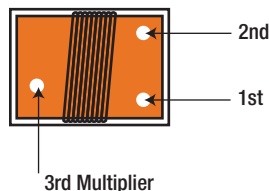
Part Number	Inductance (nH)	Tolerance	Q Min.	S.R.F. Min. (MHz)	R _{dc} Max (Ω)	I _{bc} Max (mA)	Color Coding		
							1st	2nd	3rd
MRFI 1210 - 4N7 □T	4.7 @ 100 MHz	B, S	50 @ 1000 MHz	6,000	0.06	1000	Black	Yellow	Violet
MRFI 1210 - 5N6 □T	5.6 @ 100 MHz	K, J, B	50 @ 1000 MHz	5,500	0.06	1000	Black	Green	Blue
MRFI 1210 - 10N □T	10 @ 100 MHz	K, J, G	60 @ 500 MHz	4,000	0.06	1000	Brown	Black	Black
MRFI 1210 - 12N □T	12 @ 100 MHz	K, J, G	60 @ 500 MHz	3,400	0.06	1000	Brown	Red	Black
MRFI 1210 - 15N □T	15 @ 100 MHz	K, J, G	60 @ 500 MHz	3,200	0.06	1000	Brown	Green	Black
MRFI 1210 - 18N □T	18 @ 100 MHz	K, J, G	60 @ 300 MHz	2,800	0.06	1000	Brown	Gray	Black
MRFI 1210 - 22N □T	22 @ 100 MHz	K, J, G	60 @ 300 MHz	2,100	0.08	1000	Red	Red	Black
MRFI 1210 - 27N □T	27 @ 100 MHz	K, J, G	60 @ 300 MHz	1,900	0.08	1000	Red	Violet	Black
MRFI 1210 - 33N □T	33 @ 100 MHz	K, J, G	60 @ 300 MHz	1,700	0.08	1000	Orange	Orange	Black
MRFI 1210 - 39N □T	39 @ 100 MHz	K, J, G	60 @ 300 MHz	1,700	0.08	1000	Orange	White	Black
MRFI 1210 - 47N □T	47 @ 100 MHz	K, J, G	60 @ 300 MHz	1,400	0.08	1000	Yellow	Violet	Black
MRFI 1210 - 56N □T	56 @ 100 MHz	K, J, G	60 @ 300 MHz	1,100	0.10	1000	Green	Blue	Black
MRFI 1210 - 68N □T	68 @ 100 MHz	K, J, G	60 @ 300 MHz	1,000	0.10	1000	Blue	Gray	Black
MRFI 1210 - 82N □T	82 @ 100 MHz	K, J, G	60 @ 300 MHz	1,000	0.10	1000	Gray	Red	Black
MRFI 1210 - R10 □T	100 @ 100 MHz	K, J, G	60 @ 300 MHz	900	0.10	1000	Brown	Black	Brown
MRFI 1210 - R12 □T	120 @ 50 MHz	K, J, G	60 @ 300 MHz	900	0.12	800	Brown	Red	Brown
MRFI 1210 - R15 □T	150 @ 50 MHz	K, J, G	60 @ 300 MHz	800	0.18	800	Brown	Green	Brown
MRFI 1210 - R18 □T	180 @ 50 MHz	K, J, G	60 @ 300 MHz	760	0.21	800	Brown	Gray	Brown
MRFI 1210 - R22 □T	220 @ 50 MHz	K, J, G	60 @ 300 MHz	660	0.27	800	Red	Red	Brown
MRFI 1210 - R27 □T	270 @ 50 MHz	K, J, G	50 @ 300 MHz	600	0.33	700	Red	Violet	Brown
MRFI 1210 - R33 □T	330 @ 50 MHz	K, J, G	50 @ 100 MHz	550	0.37	650	Orange	Orange	Brown
MRFI 1210 - R39 □T	390 @ 50 MHz	K, J, G	50 @ 100 MHz	500	0.63	600	Orange	White	Brown
MRFI 1210 - R47 □T	470 @ 50 MHz	K, J, G	50 @ 100 MHz	450	0.69	550	Yellow	Violet	Brown
MRFI 1210 - R56 □T	560 @ 50 MHz	K, J, G	50 @ 100 MHz	400	0.90	450	Green	Blue	Brown
MRFI 1210 - R68 □T	680 @ 25 MHz	K, J, G	50 @ 100 MHz	380	1.05	400	Blue	Gray	Brown
MRFI 1210 - R82 □T	820 @ 25 MHz	K, J, G	50 @ 100 MHz	350	1.45	350	Gray	Red	Brown
MRFI 1210 - 1R0 □T	1000 @ 25 MHz	K, J, G	45 @ 100 MHz	300	1.90	280	Brown	Black	Red
MRFI 1210 - 1R2 □T	1200 @ 7.96 MHz	K, J	45 @ 50 MHz	300	2.20	250	Brown	Red	Red
MRFI 1210 - 1R5 □T	1500 @ 7.96 MHz	K, J	45 @ 50 MHz	250	2.43	220	Brown	Green	Red
MRFI 1210 - 1R8 □T	1800 @ 7.96 MHz	K, J	45 @ 50MHz	200	3.36	180	Brown	Gray	Red
MRFI 1210 - 2R2 □T	2200 @ 7.96 MHz	K, J	40 @ 50 MHz	200	3.50	150	Red	Red	Red

NOTE: All values 2200nH (2.2 uH) and lower have a Ceramic core with Gold plating.

Note: * For values not listed, please consult your salesperson.

NOTE

- Inductance: HP-4287A RF LCR meter with HP-16193 fixture
- Q: HP-4287A RF LCR meter with HP-16193 fixture
- S.R.F (Self-resonance Frequency) ENA E5071B network analyzer
- R_{dc} (DC Resistance): HP-4338B millohmmeter
- I_{bc} (Allowable Current)
- □ (Inductance Tolerance) (B = ±0.2nH, S = ±0.3nH, G = ±2% J = ±5%, K = ±10%, M = ±20%)



These parts are marked with 3 color dots. The table above shows the significance of each color. Dots 1 and 2 indicate the inductance in nanoHenries. Dot 3 indicates the number of zeros to be added.

Examples:

Gray Red Black = 82nH
 Brown Red Brown = 120 nH
 Yellow Violet Red = 4700nH

Values below 10nH

On these parts, the third dot is not a multiplier. Refer to the table above for specific inductance values.

MRFI 1210 Series
 Black Gray Red = 8.2nH

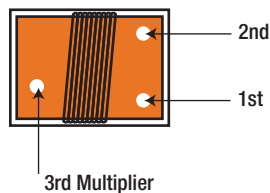
MRFI 1210 SERIES (3225) - Electrical Characteristics

Part Number	Inductance (nH)	Tolerance	Q Min.	S.R.F. Min. (MHz)	Rdc Max (Ω)	Idc Max (mA)	Color Coding		
							1st	2nd	3rd
*MRFI 1210 – 1R2 □T	1200 @ 7.96 MHz	K, J	30 @ 7.96 MHz	100	0.70	390	Brown	Red	Red
*MRFI 1210 – 1R5 □T	1500 @ 7.96 MHz	K, J	30 @ 7.96 MHz	85	0.75	370	Brown	Green	Red
*MRFI 1210 – 1R8 □T	1800 @ 7.96 MHz	K, J	30 @ 7.96 MHz	80	0.80	350	Brown	Gray	Red
*MRFI 1210 – 2R2 □T	2200 @ 7.96 MHz	K, J	30 @ 7.96 MHz	75	0.90	320	Red	Red	Red
*MRFI 1210 – 2R7 □T	2700 @ 7.96 MHz	K, J	30 @ 7.96 MHz	70	1.10	290	Red	Violet	Red
*MRFI 1210 – 3R3 □T	3300 @ 7.96 MHz	K, J	30 @ 7.96 MHz	60	1.40	260	Orange	Orange	Red
*MRFI 1210 – 3R9 □T	3900 @ 7.96 MHz	K, J	30 @ 7.96 MHz	55	1.70	250	Orange	White	Red
*MRFI 1210 – 4R7 □T	4700 @ 7.96 MHz	K, J	30 @ 7.96 MHz	50	2.30	220	Yellow	Violet	Red
*MRFI 1210 – 5R6 □T	5600 @ 7.96 MHz	K, J	20 @ 7.96 MHz	47	1.60	200	Green	Blue	Red
*MRFI 1210 – 6R8 □T	6800 @ 7.96 MHz	K, J	20 @ 7.96 MHz	43	2.20	180	Blue	Gray	Red
*MRFI 1210 – 8R2 □T	8200 @ 7.96 MHz	K, J	20 @ 7.96 MHz	40	2.40	170	Gray	Red	Red
*MRFI 1210 – 100 □T	10000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	36	3.28	150	Brown	Black	Orange
*MRFI 1210 – 120 □T	12000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	33	3.40	140	Brown	Red	Orange
*MRFI 1210 – 150 □T	15000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	30	3.90	125	Brown	Green	Orange
*MRFI 1210 – 180 □T	18000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	27	4.20	110	Brown	Gray	Orange
*MRFI 1210 – 220 □T	22000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	25	6.00	90	Red	Red	Orange
*MRFI 1210 – 270 □T	27000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	20	6.80	80	Red	Violet	Orange
*MRFI 1210 – 330 □T	33000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	17	7.50	70	Orange	Orange	Orange
*MRFI 1210 – 390 □T	39000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	16	8.00	65	Orange	White	Orange
*MRFI 1210 – 470 □T	47000 @ 2.52 MHz	K, J	15 @ 2.52 MHz	15	8.50	60	Yellow	Violet	Orange

Note: * For values not listed, please consult your salesperson.

NOTE: * All values on this page 1200nH (1.2 uH) and higher have a Ferrite core with Lead Free solder plating.

- NOTE**
- Inductance: HP-4287A RF LCR meter with HP-16193 fixture
 - Q: HP-4287A RF LCR meter with HP-16193 fixture
 - S.R.F (Self-resonance Frequency) ENA E5071B network analyzer
 - Rdc (DC Resistance): HP-4338B milliohmeter
 - Idc (Allowable Current)
 - □ (Inductance Tolerance) (B = ±0.2nH, S = ±0.3nH, G = ±2% J = ±5%, K = ±10%, M = ±20%)



These parts are marked with 3 color dots. The table above shows the significance of each color. Dots 1 and 2 indicate the inductance in nanoHenries. Dot 3 indicates the number of zeros to be added.

Examples:

- Gray Red Black = 82nH
- Brown Red Brown = 120 nH
- Yellow Violet Red = 4700nH

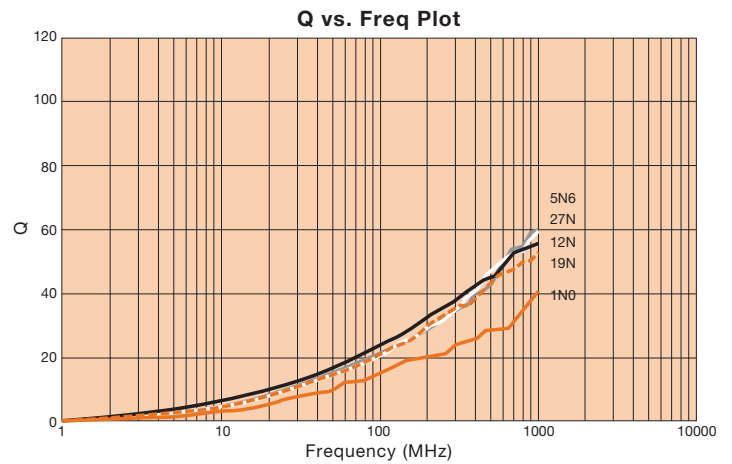
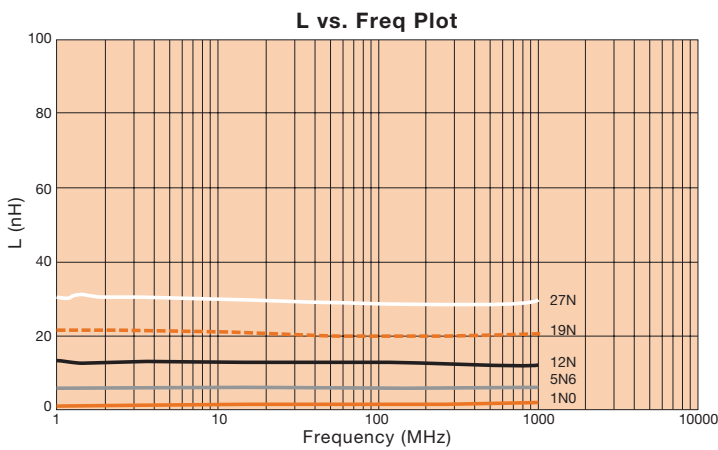
Color Code Scheme (nH)

Color Code	Significant Digit Associated with Color	Color Code	Significant Digit Associated with Color
Black	0	Green	5
Brown	1	Blue	6
Red	2	Violet	7
Orange	3	Gray	8
Yellow	4	White	9

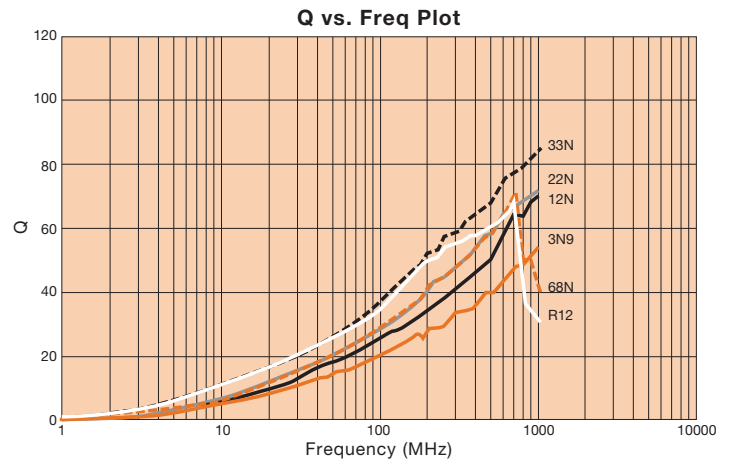
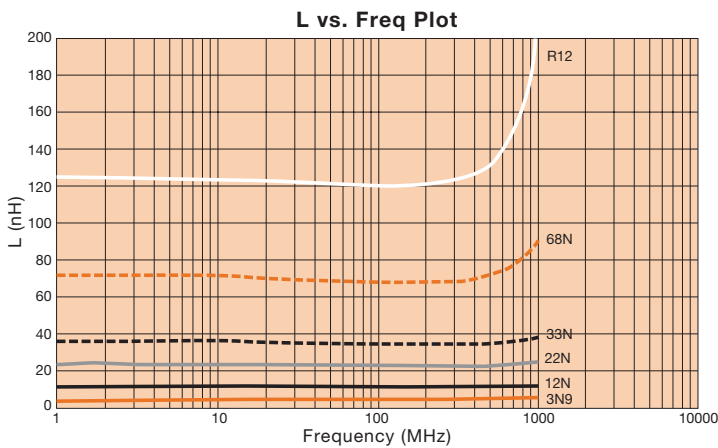
NOTE: For values below 10nH, the color code scheme does not apply. Refer to the data sheet for actual values.

Miniature RF Chip Inductors

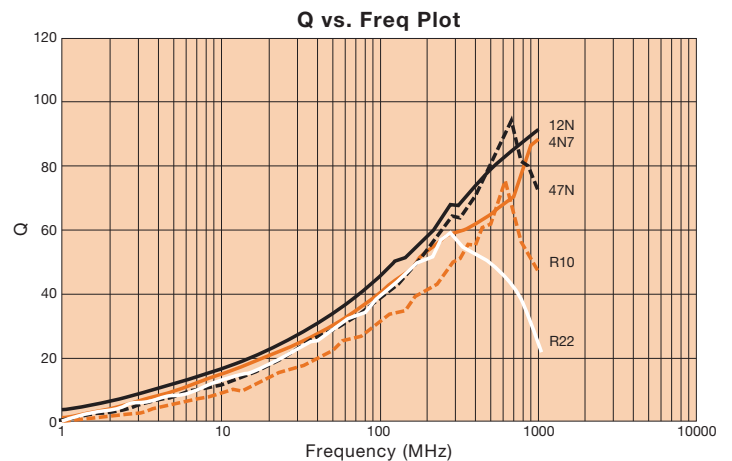
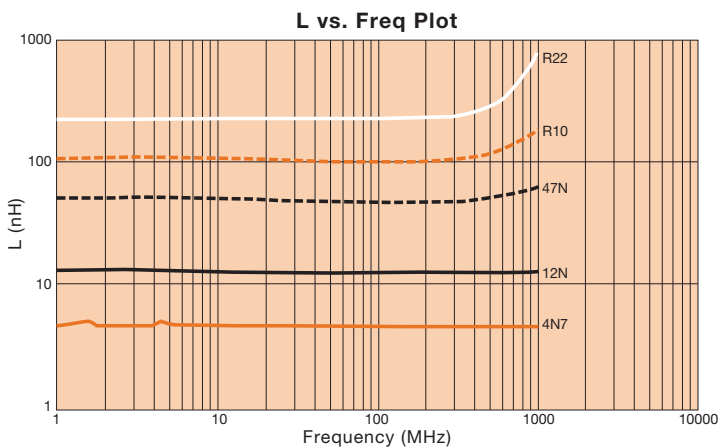
0402 (1005)



0603 (1608)



0805 (2012)



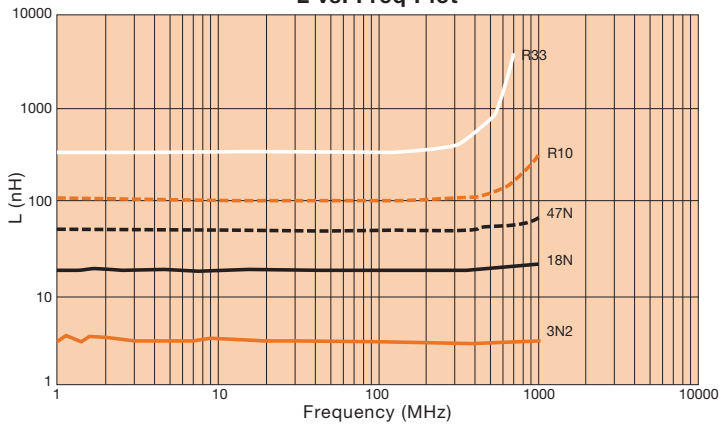
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 Phone: 512 / 794-0081 • Fax: 512 / 794-0087 • Toll Free: 800 / 950-8365
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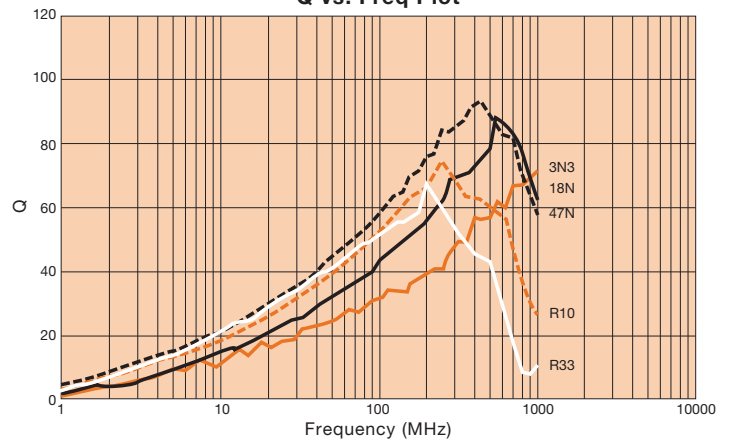
VENKEL LTD.

1008 (2520)

L vs. Freq Plot

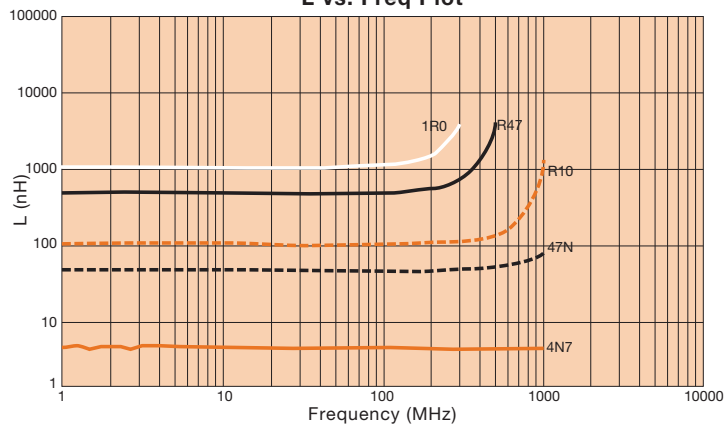


Q vs. Freq Plot

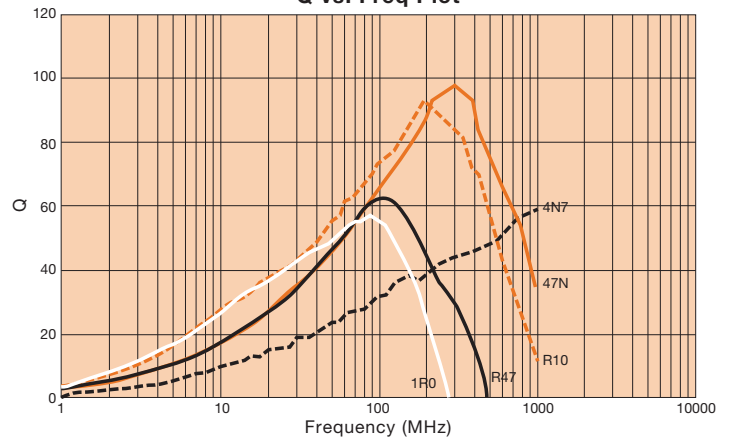


1210 (3225)

L vs. Freq Plot



Q vs. Freq Plot



Miniature RF Chip Inductors

General Characteristics

Operating Temperature Range

Operating Temperature Range is the range of ambient temperature at which the inductor can be operated continuously at rated current.

Temp. Range:

Ceramic material	-40°C to + 125°C
Ferrite material	-40°C to + 85°C

Characteristics

Standards Atmospheric Conditions

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows:

Ambient Temperature:	25°C (20°C) ± 2°C
Relative Humidity:	60% to 70%
Air Pressure:	86 Kpa to 106 Kpa

Item	Condition	Specification
Inductance and Tolerance	Measuring frequency: As shown in Product Table Measuring temperature: 25°C	Within specified tolerance
Quality Factor	Measuring frequency: As shown in Product Table Measuring temperature: 25°C	Within specified tolerance
Insulation Resistance	Measured at 100 VDC between inductor terminal and enclosure.	1000 mega ohms minimum
Dielectric Withstanding Voltage	Measured at 500 VAC between terminal and enclosure for a maximum of 1 minute.	No damage occurs when the test voltage is applied.
Temperature Coefficient of Inductance (TCL)	Over -40°C to +85°C at frequency specified in Product Table.	+25 to 500 PPM/°C $TCL = \frac{L1 - L2}{L1 (T1-T2)} \times 10^6$ (PPM/°C)
Component Adhesion (PUSH TEST)	The component should be reflow soldered onto a P.C. Board (230°C 20 seconds) using a dynameter force gauge apply force to any side of the component.	The component must withstand a minimum force of 1 Kg for Pt/Ag termination and 2 Kg for Mo/Mn termination without any failure of the termination to component attachment.
Thermal Shock Test	Each cycle should consist of 30 minutes at -40°C followed by 30 minutes at +85°C with a 20 second maximum transition time between temperature extremes. Test duration is 10 cycles.	<i>Change In Inductance:</i> No more than 5% <i>Change in Q:</i> No more than 10%
Solderability	Dip pads in flux and dip in solder pot (63Sn/37Pb) at 230°C ±5°C for 5 seconds.	A minimum of 80% of the metalized area being covered with solder.
Resistance to Soldering Heat	Dip the components into flux and dip into solder pot containing 63Sn/37Pb at 260°C ±5°C for 5 seconds ± 1 second.	<i>Change In Inductance:</i> No more than 5% <i>Change In Q:</i> No more than 10%
Vibration (Random)	Inductors should be randomly vibrated per NAVMAT P9492 profile. Sample should be subjected to 10-2,000 Hz: 0.04 G/Hz for a minimum of 15 minutes per axis for each of three axes.	<i>Change In Inductance:</i> No more than 5% <i>Change In Q:</i> No more than 10%
Moisture Resistance	Inductors should be stored in the chamber at 45°C at 90 - 95% R.H. for 240 hours, and then the inductors are to be tested after 2 hours at room temperature.	<i>Change In Inductance:</i> No more than 5% <i>Change In Q:</i> No more than 10%
Cold Temperature Storage	Inductors should be stored at a temperature of -40°C for ±2 hours. Then it should be subjected to standard atmospheric conditions for 1 hour. After that, measurement should be made.	<i>Change In Inductance:</i> No more than 5% <i>Change In Q:</i> No more than 10%.
High Temperature Storage	Inductors should be stored at a temperature of 125°C ± 2°C for 48 ± 2 hours. Then it should be subjected to standard atmospheric conditions for 1 hour. After that, measurement should be made.	<i>Change In Inductance:</i> No more than 5% <i>Change In Q:</i> No more than 10%.
High Temperature with Load	Inductors should be stored in the chamber at 85°C for 1000 hours with rated current applied. Inductors should be tested at the beginning test for 500 hours, 1000 hours, and then Inductors are to be tested after 2 hours at room temperature.	<i>Change In Inductance:</i> No more than 5% <i>Change In Q:</i> No more than 10%.

All components in this section are RoHS compliant per the EU directives and definitions.

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