

## *Data Sheet*

Customer :

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Product Type : Thin Film Chip Inductor (Murata)

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Part No. : AL-M series

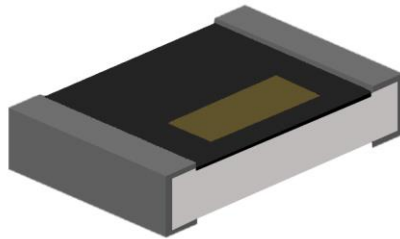
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Issued Date : 3-Jul-14

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Document No AL-M Series REV.C3

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**A-PLUS POWER TECHNOLOGY CO., LTD.**

Produced by (QC)	Checked by (QC)	Approved by (QC)	Prepared by (Sales)	Accepted by (Customer)
3-Jul-14	3-Jul-14	3-Jul-14	3-Jul-14	
<i>Chun</i>	<i>Ann</i>	<i>Ben Chang</i>		

# Thin Film Chip Inductors ( AL-M Series )

## 1. Scope

0402 series inductor is a photo lithographically etched single layer ceramic chip. Its design provides high SRF, excellent Q, and superior temperature stability. This highly stable inductor family is specifically designed for critical tolerance needs.

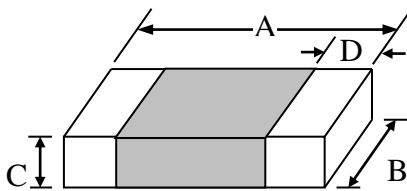
## 2. Features

- Photo lithographic single layer ceramic chip
- High SRF, excellent Q, superior temperature stability
- Tight tolerance of  $\pm 1\%$  or  $\pm 0.1\text{nH}$
- Self resonant frequency controlled within 10%
- Stable inductance in high frequency circuit
- Highly stable design for critical needs

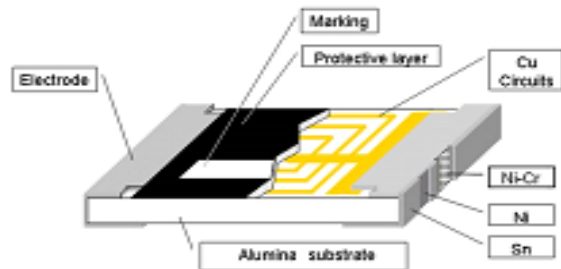
## 3. Applications

- Cellular Telephone, Pagers and GPS Products
- VCO, TCXO Circuit and RF Transceiver Module
- Wireless LAN, Bluetooth Module , Communication Appliances

### 4-1. Dimensions



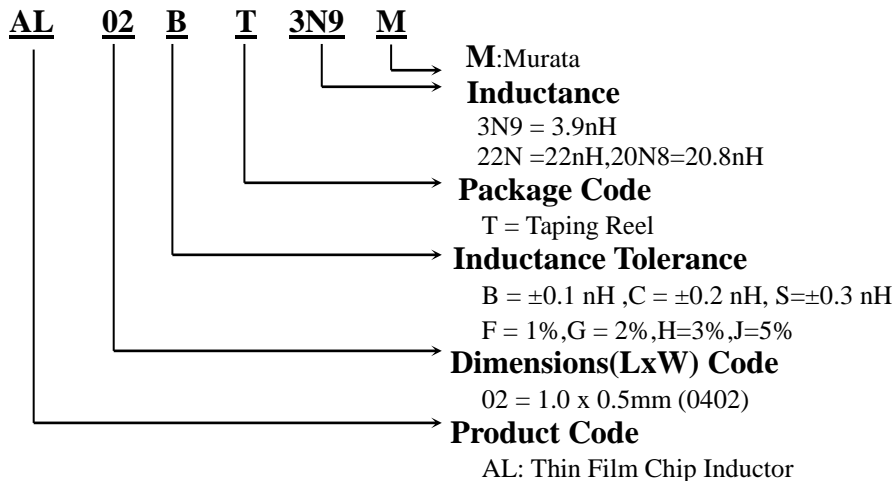
### 4-2. Construc



Unit: mm

Codes	A	B	C	D
AL02	1.0 $\pm$ 0.05	0.5 $\pm$ 0.05	0.32 $\pm$ 0.05	0.20 $\pm$ 0.10

## 5. Part Identification



**6. Standard Electrical Specifications****0402 Chip Inductors**

Inductance (nH)	Tolerance (% or nH)	Quality Factor (Min)	Resistance DC/Max (Ohm)	Current DC/Max (mA)	Self Resonant Frequency/Min (>GHz)
0.2	0.1/0.2/0.3nH	13 / 500MHz	0.10	800	14
0.3	0.1/0.2/0.3nH	13 / 500MHz	0.10	800	14
0.4	0.1/0.2/0.3nH	13 / 500MHz	0.10	800	14
0.5	0.1/0.2/0.3nH	13 / 500MHz	0.15	700	14
0.8	0.1/0.2/0.3nH	13 / 500MHz	0.15	700	14
0.9	0.1/0.2/0.3nH	13 / 500MHz	0.15	700	14
1.0	0.1/0.2/0.3nH	13 / 500MHz	0.15	700	12
1.1	0.1/0.2/0.3nH	13 / 500MHz	0.15	700	12
1.2	0.1/0.2/0.3nH	13 / 500MHz	0.15	700	12
1.3	0.1/0.2/0.3nH	13 / 500MHz	0.25	700	10
1.4	0.1/0.2/0.3nH	13 / 500MHz	0.25	700	10
1.5	0.1/0.2/0.3nH	13 / 500MHz	0.25	700	10
1.6	0.1/0.2/0.3nH	13 / 500MHz	0.25	560	10
1.7	0.1/0.2/0.3nH	13 / 500MHz	0.25	560	10
1.8	0.1/0.2/0.3nH	13 / 500MHz	0.25	560	10
1.9	0.1/0.2/0.3nH	13 / 500MHz	0.35	560	8
2.0	0.1/0.2/0.3nH	13 / 500MHz	0.35	560	8
2.1	0.1/0.2/0.3nH	13 / 500MHz	0.35	440	8
2.2	0.1/0.2/0.3nH	13 / 500MHz	0.35	440	8
2.3	0.1/0.2/0.3nH	13 / 500MHz	0.35	440	8
2.4	0.1/0.2/0.3nH	13 / 500MHz	0.35	440	8
2.5	0.1/0.2/0.3nH	13 / 500MHz	0.35	440	8
2.6	0.1/0.2/0.3nH	13 / 500MHz	0.35	440	8
2.7	0.1/0.2/0.3nH	13 / 500MHz	0.35	440	8
2.8	0.1/0.2/0.3nH	13 / 500MHz	0.45	380	6
2.9	0.1/0.2/0.3nH	13 / 500MHz	0.45	380	6
3.0	0.1/0.2/0.3nH	13 / 500MHz	0.45	380	6
3.1	0.1/0.2/0.3nH	13 / 500MHz	0.45	380	6
3.2	0.1/0.2/0.3nH	13 / 500MHz	0.45	380	6
3.3	0.1/0.2/0.3nH	13 / 500MHz	0.45	380	6
3.4	0.1/0.2/0.3nH	13 / 500MHz	0.55	380	6
3.5	0.1/0.2/0.3nH	13 / 500MHz	0.55	380	6
3.6	0.1/0.2/0.3nH	13 / 500MHz	0.55	380	6
3.7	0.1/0.2/0.3nH	13 / 500MHz	0.55	340	6

## 【AL-M Series】

### Thin Film Chip Inductors

3.8	0.1/0.2/0.3nH	13 / 500MHz	0.55	340	6
3.9	0.1/0.2/0.3nH	13 / 500MHz	0.55	340	6
4.3	0.1/0.2/0.3nH	13 / 500MHz	0.65	320	6
4.7	0.1/0.2/0.3nH	13 / 500MHz	0.65	320	6
5.4	0.1/0.2/0.3nH	13 / 500MHz	0.85	280	6
5.6	0.1/0.2/0.3nH	13 / 500MHz	0.85	280	6
5.9	0.1/0.2/0.3nH	13 / 500MHz	0.85	280	6
6.5	0.1/0.2/0.3nH	13 / 500MHz	1.05	260	6
6.8	0.1/0.2/0.3nH	13 / 500MHz	1.05	260	6
7.2	0.1/0.2/0.3nH	13 / 500MHz	1.05	260	6
8.0	0.1/0.2/0.3nH	13 / 500MHz	1.25	220	5.5
8.1	0.1/0.2/0.3nH	13 / 500MHz	1.25	220	5.5
8.2	0.1/0.2/0.3nH	13 / 500MHz	1.25	220	5.5
9.1	0.1/0.2/0.3nH	13 / 500MHz	1.25	220	5.5
10	1/2/3/5%	13 / 500MHz	1.35	200	4.5
10.8	1/2/3/5%	13 / 500MHz	1.35	200	4.5
12	1/2/3/5%	13 / 500MHz	1.55	180	3.7
13.8	1/2/3/5%	13 / 500MHz	1.75	180	3.7
15	1/2/3/5%	13 / 500MHz	1.75	130	3.3
17	1/2/3/5%	13 / 500MHz	1.95	100	3.1
18	1/2/3/5%	13 / 500MHz	2.15	100	3.1
20.8	1/2/3/5%	13 / 500MHz	2.55	90	2.8
22	1/2/3/5%	13 / 500MHz	2.65	90	2.8
25.7	1/2/3/5%	13 / 500MHz	3.25	75	2.5
27	1/2/3/5%	13 / 500MHz	3.25	75	2.5
31.6	2/3/5%	13 / 500MHz	4.5	75	2.5
33	5%	13 / 500MHz	4.50	75	2.5

Operating Temperature Range: -40°C to +85°C

Test Equipment: HP4287A+Agilent 16196B

\* Viking is capable to manufacture the optional spec based on customer's requirement.

## 7. Residual impedance of shot chip

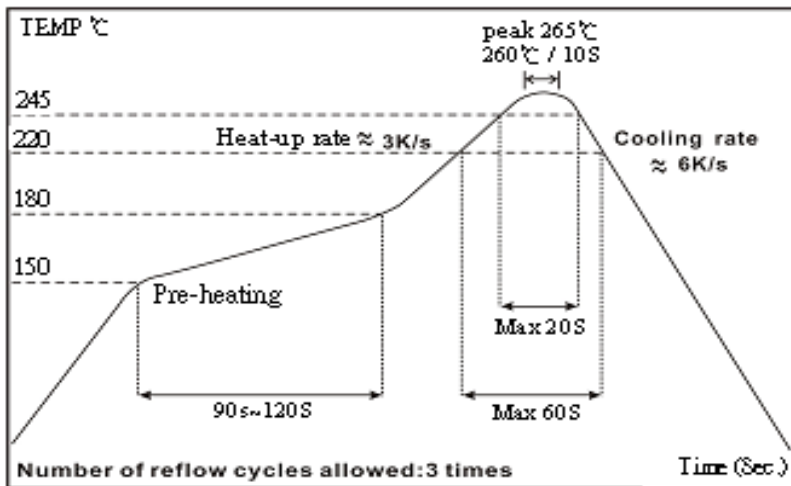
Residual impedance	Series	
	A-PLUS	Murata
+ 0.7 nH	AL02BT-M	LQP15MN

**8. Environmental Characteristics**

Item	Specification	Test Method
1 Bending Test	As SPEC.	JIS-C-5202-6.1.4 Bending Amplitude 3mm for 10 seconds
2 Dielectric Withstand Voltage	By type	<b>MIL-STD-202 Method 301</b> Apply Max Overload Voltage for 1 minute
3 Insulation Resistance	>1000MΩ	MIL-STD-202 Method 302 Apply 100VDC for 1minute.
4 Resistance to Soldering Heat	$\Delta L \leq 10\%$	MIL-STD-202 Method 210E 260±5°C, 10±1seconds
5 High Temperature Exposure	$\Delta L \leq 10\%$	JIS-C-5202-7.2 85±2°C, 1000 +48/-0 hours
6 Moisture Resistance	$\Delta L \leq 10\%$	MIL-STD-202 Method 103B 40±2°C, 90~95%RH, 1000 +48/-0 hours
7 Low Temperature Storage	$\Delta L \leq 10\%$	JIS-C-5202-7.1 -40±3°C, 1000 +48/-0 hours
8 Temperature Cycle	$\Delta L \leq 10\%$	JIS-C-5202-7.4 -40/RT/85/RT, 10 cycles
9 Solderability	95% min coverage	MIL-STD-202 Method 208H 245°C±5°C, 3±0.5(sec)

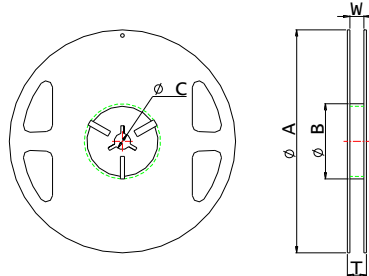
\*Storage Temperature :25±3°C, Humidity <80%RH

**9. Reflow**



**10. Packaging**

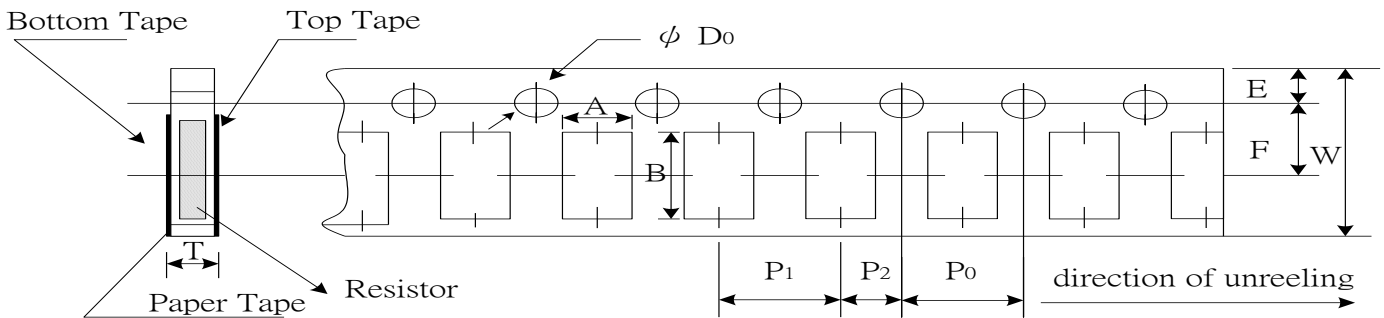
**10-1. Reel Specifications & Packaging Quantity**



Unit: mm

Codes	$\phi A$	$\phi B$	$\phi C$	W	T	Paper Tape (EA)
AL02	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000

**10-2. Paper Tape Specifications**



Unit: mm

Codes	A	B	W	E	F	P0	P1	P2	$\phi D_0$	T
AL02	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03

Remark : Test Method

1. Test fixture : HP16196
2. Test direction: bar mark faces left

**11.p/n and Description Correspondence ( between A-PLUS and Murata )****0402 Series**

A-PLUS				MURATA		
Inductance (nH)	Tolerance (nH or %)	A-PLUS Standard P/N	A-PLUS MURATA series P/N	Inductance (nH)	Tolerance (nH or %)	MURATA P/N
0.2nH	± 0.1nH	AL02BT0N2	AL02BT1N0M	1.0nH	± 0.1nH	LQP15MN1N0B00
0.3nH	± 0.1nH	AL02BT0N3	AL02BT1N1M	1.1nH	± 0.1nH	LQP15MN1N1B00
0.4nH	± 0.1nH	AL02BT0N4	AL02BT1N2M	1.2nH	± 0.1nH	LQP15MN1N2B00
0.5nH	± 0.1nH	AL02BT0N5	AL02BT1N3M	1.3nH	± 0.1nH	LQP15MN1N3B00
0.8nH	± 0.1nH	AL02BT0N8	AL02BT1N5M	1.5nH	± 0.1nH	LQP15MN1N5B00
0.8nH	± 0.3nH	AL02ST0N8	AL02ST1N5M	1.5nH	± 0.3nH	LQP15HN1N5S02
0.9nH	± 0.1nH	AL02BT0N9	AL02BT1N6M	1.6nH	± 0.1nH	LQP15MN1N6B00
1.0nH	± 0.1nH	AL02BT1N0	AL02BT1N7M	1.7nH	± 0.1nH	LQP15MN1N7B00
1.2nH	± 0.1nH	AL02BT1N2	AL02BT1N8M	1.8nH	± 0.1nH	LQP15MN1N8B00
1.2nH	± 0.3nH	AL02ST1N2	AL02ST1N8M	1.8nH	± 0.3nH	LQP15HN1N8S02
1.3nH	± 0.1nH	AL02BT1N3	AL02BT2N0M	2.0nH	± 0.1nH	LQP15MN2N0B00
1.5nH	± 0.1nH	AL02BT1N5	AL02BT2N2M	2.2nH	± 0.1nH	LQP15MN2N2B00
1.6nH	± 0.1nH	AL02BT1N6	AL02BT2N3M	2.3nH	± 0.1nH	LQP15MN2N3B00
1.7nH	± 0.1nH	AL02BT1N7	AL02BT2N4M	2.4nH	± 0.1nH	LQP15MN2N4B00
1.8nH	± 0.1nH	AL02BT1N8	AL02BT2N7M	2.7nH	± 0.1nH	LQP15MN2N7B00
2.0nH	± 0.1nH	AL02BT2N0	AL02BT2N9M	2.9nH	± 0.1nH	LQP15MN2N9B00
2.1nH	± 0.1nH	AL02BT2N1	AL02BT3N0M	3.0nH	± 0.1nH	LQP15MN3N0B00
2.2nH	± 0.1nH	AL02BT2N2	AL02BT3N1M	3.1nH	± 0.1nH	LQP15MN3N1B00
2.4nH	± 0.1nH	AL02BT2N4	AL02BT3N2M	3.2nH	± 0.1nH	LQP15MN3N2B00
2.7nH	± 0.1nH	AL02BT2N7	AL02BT3N3M	3.3nH	± 0.1nH	LQP15MN3N3B00
2.9nH	± 0.1nH	AL02BT2N9	AL02BT3N6M	3.6nH	± 0.1nH	LQP15MN3N6B00
3.0nH	± 0.1nH	AL02BT3N0	AL02BT3N7M	3.7nH	± 0.1nH	LQP15MN3N7B00
3.1nH	± 0.1nH	AL02BT3N1	AL02BT3N9M	3.9nH	± 0.1nH	LQP15MN3N9B00
3.3nH	± 0.1nH	AL02BT3N3	AL02BT4N1M	4.1nH	± 0.1nH	LQP15MN4N1B00
3.6nH	± 0.1nH	AL02BT3N6	AL02BT4N3M	4.3nH	± 0.1nH	LQP15MN4N3B00
3.7nH	± 0.1nH	AL02BT3N7	AL02BT4N5M	4.5nH	± 0.1nH	LQP15MN4N5B00
3.9nH	± 0.1nH	AL02BT3N9	AL02BT4N7M	4.7nH	± 0.1nH	LQP15MN4N7B00
4.3nH	± 0.1nH	AL02BT4N3	AL02BT5N1M	5.1nH	± 0.1nH	LQP15MN5N1B00
4.7nH	± 0.1nH	AL02BT4N7	AL02BT5N6M	5.6nH	± 0.1nH	LQP15MN5N6B00
5.4nH	± 0.1nH	AL02BT5N4	AL02BT6N2M	6.2nH	± 0.1nH	LQP15MN6N2B00

**【AL-M Series】****Thin Film Chip Inductors**

5.6nH	± 0.1nH	AL02BT5N6	AL02BT6N5M	6.5nH	± 0.1nH	LQP15MN6N5B00
5.9nH	± 0.1nH	AL02BT5N9	AL02BT6N8M	6.8nH	± 0.1nH	LQP15MN6N8B00
6.5nH	± 0.1nH	AL02BT6N5	AL02BT7N5M	7.5nH	± 0.1nH	LQP15MN7N5B00
6.8nH	± 0.1nH	AL02BT6N8	AL02BT7N7M	7.7nH	± 0.1nH	LQP15MN7N7B00
7.2nH	± 0.1nH	AL02BT7N2	AL02BT8N2M	8.2nH	± 0.1nH	LQP15MN8N2B00
8.0nH	± 0.1nH	AL02BT8N0	AL02BT9N0M	9.0nH	± 0.1nH	LQP15MN9N0B00
8.1nH	± 0.1nH	AL02BT8N1	AL02BT9N1M	9.1nH	± 0.1nH	LQP15MN9N1B00
8.2nH	± 0.1nH	AL02BT8N2	AL02BT9N2M	9.2nH	± 0.1nH	LQP15MN9N2B00
9.1nH	± 2%	AL02GT9N1	AL02GT10NM	10nH	± 2%	LQP15MN10NG02
10.8nH	± 2%	AL02GT10N8	AL02GT12NM	12nH	± 2%	LQP15MN12NG02
13.8nH	± 2%	AL02GT13N8	AL02GT15NM	15nH	± 2%	LQP15MN15NG02
17nH	± 2%	AL02GT17N	AL02GT18NM	18nH	± 2%	LQP15MN18NG00
20.8nH	± 2%	AL02GT20N8	AL02GT22NM	22nH	± 2%	LQP15MN22NG00
25.7nH	± 2%	AL02GT25N7	AL02GT27NM	27nH	± 2%	LQP15MN27NG02
31.6nH	± 2%	AL02GT31N6	AL02GT33NM	33nH	± 2%	LQP15MN33NG02