ATFC RF Thin Film Chip Inductors

Purpose
To introduce ATFC RF Thin Film Chip Inductors.

Objective
Present the process, advantage, performance and applications of ATFC.

Content
17 pages

Learning Time
10 minutes
Product-ATFC Series
Thin Film Chip Inductors

Dimensions:
- 0201 1.0nH-10nH
- 0402 0.2nH-33nH
- 0603 1nH-100nH

Features:
- Tight Tolerance of 1% or 0.1nH
- Self Resonant Frequency Controlled within 10%
- Stable Inductance in High Frequency Circuit
- Compatible with either Reflow or Flow Soldering

Applications:
- Cellular Telephone, Pagers and GPS Products
- Bluetooth Module
- Wireless LAN and other Communication Appliances.
- VCO, TCXO Circuit and RF Transceiver Module
Process of Thin Film Chip Inductor

1. Ceramic substrate 96%
2. Seed layer sputtering
3. Photoresist
4. Expose and develop
5. Conductor plating
6. PR stripping & seed layer
7. Expose and develop
8. Insulator layer
9. PR stripping & seed layer etching
10. Overcoating
11. Termination
12. MARKING
Inductance Comparison (L)

<table>
<thead>
<tr>
<th>Type</th>
<th>Inductance (nH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin film</td>
<td>0.2~33</td>
</tr>
<tr>
<td>Multilayer</td>
<td>1.0~120</td>
</tr>
<tr>
<td>Wirewound</td>
<td>1.0~68</td>
</tr>
<tr>
<td>Thin film</td>
<td>1.0~100</td>
</tr>
<tr>
<td>Multilayer</td>
<td>1.5~220</td>
</tr>
<tr>
<td>Wirewound</td>
<td>1.6~390</td>
</tr>
</tbody>
</table>

**Legend:**
- Thin film 0402
- Multilayer 0603
- Wirewound
SRF Comparison

0402

Inductance (nH) vs. frequency (GHz)

- Wirewound
- Multilayer
- Thin Film

Inductance (nH)

0.1 1 10 100 1000

Frequency (GHz)
SRF Comparison - Continued

The diagram shows the frequency (GHz) versus inductance (nH) for different types of inductors:
- **Wirewound**
- **Multilayer**
- **Thin Film**

The graph compares the performance of these inductors across a range of frequencies and inductances.
Tolerance Comparison-0402 Series
RF Chip Inductor Field Application

- Wireless LAN (Portable computer, Notebook, LAN card….)
- Bluetooth (USB port, earphone, portable PC….)
- GPS (Globe position system) (PDA, Portable phone….)
- GPRS & GSM (Portable phone)
Planar spiral inductors have become essential elements of communication circuit blocks such as
1. Radio frequency integrated circuits (RFICs):
2. Voltage controlled oscillators (VCO’s)
3. Low-noise amplifiers (LNA’s)
4. Mixers
5. Intermediate frequency filters (IFF’s)
6. Matching networks
7. Bluetooth Module
8. WLAN Card (IEEE 802.11g, 802.11a, a+b)
Application of High Frequency Chip Inductor (2)

The matching coil should be a high-Q type or tight inductance tolerance type coil for improved reliability, in principle.
A thin film type coil is suitable to a receiver circuit, in particular, which requires tight inductance tolerance.

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* An example of the matching circuit
Application of High Frequency Chip Inductor (3)

The matching coil should be a high-Q type or tight inductance tolerance type coil for stable oscillation and signal quality. A film type coil is suitable if tight inductance tolerance is required.

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Application of High Frequency Chip Inductor (4) IF SAW Filter

- The matching coil should be a high-Q type coil to reduce signal losses. It should be a tight inductance tolerance type coil to improve the delay characteristics. A winding type coil is suitable if high Q characteristics are required. A film type coil is suitable if tight inductance tolerance is required.

* An example of the matching circuit
Application of High Frequency Chip Inductor (5) PA

- A multi-layer type coil is generally used.
  A thin film type coil is suitable if tight inductance tolerance is required.
Why Choose Abracon?

High-Level Thin Film Technologies

- Extremely Low Profile Package
- Thin Film Chip Inductor offers tight tolerances +/-0.1nH, or +/- 1%
- High Current & High Q Inductor
- Reduced package 0201 in mass production
- Low Cost with High Performance
- Short Lead Times
- In stock Distribution Support
- Aggressive RD Team, Ongoing New Product Development
Summary
ATFC Thin Film Inductor

Advantages:

- Simple structure with single layer of copper circuit could avoid short & open circuit.
- Good stability of inductance and Q factor.
- Tight Tolerance, 2%, 1%
- It would be Lower cost in large quantity because of high yield rate
- Higher yield in thin film technology, miniature size of 0201 is key demand.
- Can reach size of 0105, only thin film can meet the market in the near future.
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