REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

Prepared in accordance with ASME Y14.100

Source control drawing

REV STATUS OF PAGES	REV																	
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PMIC N/A	**PREPARED BY** Ken Beymer	**DESIGN ACTIVITY** **DLA LAND AND MARITIME** **COLUMBUS, OH 43218-5000**
Original date of drawing 12 September 2011	**CHECKED BY** Ken Beymer **APPROVED BY** Michael A. Radecki	**TITLE** INDUCTORS, SMD, CHIP, THIN FILM, TIGHT TOLERANCE, 0603
	SIZE A / **CODE IDENT. NO.** 037Z3	**DWG NO.** **11018**
	REV	**PAGE** 1 **OF** 8

1. SCOPE

1.1 Scope. This drawing describes the requirements for inductors, SMD, chip. These inductors are composed of a single or double layer dielectric thin film and are of small size and tight tolerances.

1.2 Part or Identifying Number (PIN) The complete PIN is as follows:

11018-	100	J	U	*
Drawing Number	Inductance Value (see 1.2.1)	Inductance Tolerance (see 1.2.2)	Termination Tinish (see 1.2.3)	Testing Option (see 1.2.4)

1.2.1 Inductance Value. The nominal inductance value, expressed in nanohenries (nH), is identified by a three-digit number. The first two digits represent significant figures and the last digit specifies the number of zeros to follow. When the nominal value is less than 10 nH, the letter “R” is used to indicate the decimal point. 1R2 indicates 1.2 nH. 150 indicates 15.0 nH.

1.2.2 Inductance Tolerance. The inductance tolerance is identified by a single letter in accordance with table I.

TABLE I. Inductance Tolerance.

Symbol	Inductance Tolerance (±)
B	0.1 nH
C	0.2 nH
D	0.5 nH
G	2 percent
J	5 percent

1.2.3 Termination Finish. Termination finish is identified by a single letter as shown in table II.

TABLE II. Termination Finish.

Symbol	Termination Finish
U	Base metallization-barrier metal-solder coated (tin/lead alloy with a minimum of 4 percent lead).

1.2.4 Testing Option. To require additional group C testing, use the appropriate letter from table III. If additional testing is not desired, leave this location blank.

TABLE III. Testing Options.

Letter	Testing Option
C	Full additional testing
L	500 hours life test only
H	500 hours steady state humidity only
T	100 temperature cycles only
-	No additional testing

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in section 3 this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents in section 3 of this specification, whether or not they are listed.

2.2 Government Documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-202 - Test Methods Standard Electronic and Electrical Component Parts.

MIL-STD-883 - Test Method Standard Microcircuits.

MIL-STD-1285 - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at https//assist.daps.dla.mil/quicksearch or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094).

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AGILENT TECHNOLOGIES

Agilent Application Note 1369-6 - How To Accurately Evaluate Low ESR, High Q RF Chip Devices.

Agilent Literature Number 5968-5162E - 8720E Family Network Analyzers Configuration Guide.

(Copies of these documents are available online at http://www.agilent.com or from Agilent Technologies, Inc., 5301 Stevens Creek Blvd., Santa Clara CA 95051).

INTERNATIONAL ELECTROTECHNICAL COMMISION (IEC)

IEC 60068-2-58 - Test Methods for Solderability, Resistance to Dissolution of Metallization and to Soldering Heat of Surface Mounting Devices (SMD).

IEC 60068-2-21 - Robustness of Terminations and Integral Mounting Devices.

(Copies of these documents are available online at http://global.ihs.com or from Global Engineering Documents, Attn: Customer Service Department, 15 Inverness Way East, Englewood CO 80112-5776).

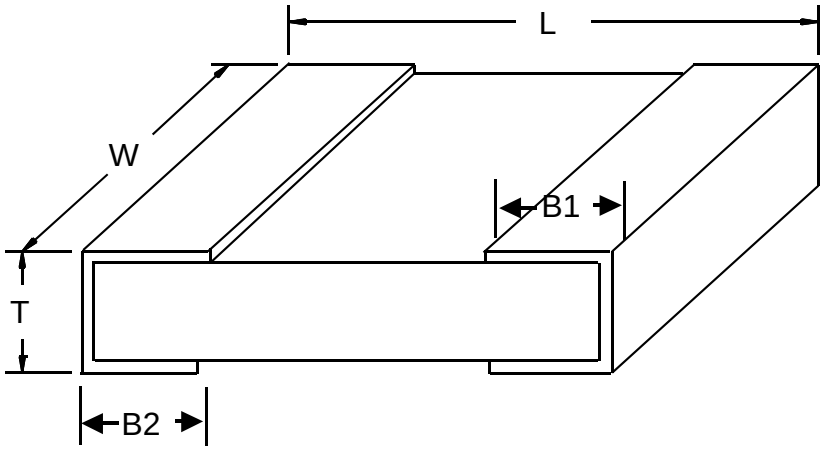
2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item Requirements. The individual item requirements shall be as specified herein. These inductors shall be capable of meeting all stated electrical, environmental, and mechanical requirements.

3.2 Pure Tin. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of inductor components and solder shall not exceed 96 percent, by mass. Tin shall be alloyed with a minimum of 4 percent lead or 4 percent silver, by mass (see 6.4).

3.3 Interface and Physical Dimensions. The interface and physical dimensions shall be as specified herein (see figure 1).



Dimensions				
L ±.0039	W ±.0039	T ±.0039	B1 +.0118	B2 ±.0078
.0630	.0319	.0240	.0000	.0138

Inches	mm
.0039	0.100
.0078	0.200
.0118	0.300
.0138	0.350
.0240	0.610
.0319	0.810
.0630	1.600

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 1. Physical Dimensions and Configuration.

3.4 Electrical Characteristics.

3.4.1 Electrical Testing.

When 100 percent electrically tested, the following conditions will apply:

a. Inductance (L) (at +25°C): Shall be as specified in 3.4.2.

b. Quality Factor (Q) (at +25°C): Shall be as specified in 3.4.3.

c. Direct Current Resistance (Rdc) (at +25°C): Shall be as specified in 3.4.4.

3.4.2 Inductance (L). When tested on Agilent RF Impedance/Material Analyzer in accordance with Agilent Tecnologies Application Note 1369-6, the Inductance shall be as shown in table IV within required tolerance as shown in table I.

Test Frequency: 450 MHz ±50MHz.

3.4.3 Quality Factor (Q). When tested on Agilent RF Impedance/Material Analyzer in accordance with Agilent Tecnologies Application Note 1369-6, the Quality Factor shall be as shown in table IV.

Test Frequency: 450 MHz ±50MHz.

TABLE IV. Electrical Characteristics.

Inductance (nH)	450 MHz Test Frequency		900 MHz Test Frequency		1900 MHz Test Frequency		2400 MHz Test Frequency		SRF min (GHz)	Rdc max (Ohm)	Idc max (mA)
	L (nH)	Q Typical	L (nH)	Q Typical	L (nH)	Q Typical	L (nH)	Q Typical			
1.2	1.2	49	1.2	70	1.2	134	1.2	170	10.0	0.04	1000
1.5	1.5	26	1.54	39	1.52	63	1.52	76	10.0	0.06	1000
1.8	1.8	20	1.74	30	1.73	50	1.72	59	10.0	0.08	1000
2.2	2.2	20	2.2	30	2.24	49	2.24	56	10.0	0.08	1000
2.7	2.7	21	2.7	30	2.75	48	2.79	54	9.0	0.08	750
3.3	3.3	24	3.33	35	3.39	56	3.47	64	8.4	0.10	750
3.9	3.9	25	3.9	57	4.06	60	4.21	69	6.5	0.14	500
4.7	4.7	23	4.68	32	4.92	46	5.2	49	5.5	0.15	500
5.6	5.6	26	5.65	36	5.94	54	6.23	60	5.0	0.25	300
6.8	6.8	23	6.9	33	7.3	47	8.1	39	4.5	0.30	300
8.2	8.2	23	8.4	31	10.0	35	12.1	31	3.8	0.35	300
10.0	10.0	28	10.0	39	11.8	47	14.1	41	3.5	0.45	300
12.0	12.0	28	13.2	38	14.1	30	17.2	20	3.0	0.50	300
15.0	15.0	28	16.2	38	25.9	30	49.8	15	2.5	0.60	300

3.4.4 Direct Current Resistance (Rdc). When tested in accordance with Method 303A of MIL-STD-202G, the Direct Current Resistance shall be as shown in table IV.

3.4.5 Self-Resonant Frequency (SRF). When tested on Agilent 8720E Family Network Analyzers according to Agilent configuration guide, literature number 5968-5162E, the Self-Resonant Frequency shall be as shown in table IV.

3.4.6 Working Current (Idc). When tested by root mean square multimeter, the root mean square Working Current shall be as shown in table IV. The following details shall apply:

a. Inductors are soldered to FR-4 board.
b. Idc max is measured for 15°C rise at 25°C ambient temperature.

3.5 Solderability. When tested in accordance with IEC 60068-2-58, the immersed metallized surface shall be at least 95 percent covered with a smooth solder coating. The remaining 5 percent of the surface may contain small pinholes or exposed termination material; however, these shall not be concentrated in one area. The following details shall apply:

a. Solder temperature: 235°C ± 5°C.
b. Dwell time: 2 + 0, -0.5 seconds.
c. Sample size: 20 pieces with zero defects permitted.

3.6 Resistance to Soldering Heat. When tested in accordance with IEC 60068-2-58, the following details shall apply:

a. Temperature: 260 ± 5°C.
b. Test duration: 10 ± 0.5 seconds.
c. Direct Current Resistance change:
d. Shall change not more than +20% for Resistance values > 50 mΩ.
e. Shall change not more than +10 mΩ for Resistance values ≤ 50 mΩ.

f. Sample size: 20 pieces with zero failures permitted.

3.7 Push-off. When tested in accordance with method Ue2 of IEC 60068-2-21, the inductor shall withstand 5 newton force applied for 10 seconds. The following details shall apply:

a. Inductors are soldered to FR-4 board.
b. Sample size: 20 pieces with zero failures permitted.

3.8 Shear. When tested in accordance with method Ue3 of IEC 60068-2-21, the inductor shall withstand 5 newton force applied for 10 seconds. The following details shall apply:

a. Inductors are soldered to FR-4 board.
b. Sample size: 20 pieces with zero failures permitted.

3.9 Temperature Cycling (air-to-air). When tested in accordance with Method 1010.8 of MIL-STD-883, the following details shall apply:

a. Inductors are soldered to FR-4 board.
b. Number of cycles: 10.
c. Extreme temperatures: +85°C, -40°C.
d. Exposure time at extreme temperatures: 30 ± 1 minute.
e. Direct Current Resistance change: Shall change not more than + 10%, - 20%.
f. Sample size: 21 pieces with zero failures permitted.

3.10 Humidity, Steady State. When tested in accordance with Method 103 of MIL-STD-202, the following details shall apply:

a. Inductors are soldered to FR-4 board.
b. Test duration: 168 hours.
c. Temperature: +85°C.
d. Humidity: 85% RH.
e. Test current: working current Idc as specified in Table IV.
f. Direct Current Resistance change: Shall change not more than + 10%, - 20%.
g. Sample size: 21 pieces with zero failures permitted.

3.11 Life (at elevated ambient temperature). When tested in accordance with Method 108A of MIL-STD-202, the following details shall apply:

a. Inductors are soldered to FR-4 board.
b. Test duration: 4 hours.
c. Temperature: +125°C.
d. Test current: working current Idc as specified in Table IV.
e. Direct Current Resistance change: Shall change not more than + 10%, - 20%.
f. Sample size: 21 pieces with zero failures permitted.

3.12 Marking. As a minimum, marking shall be on the package due to the small size of the chips. The package marking shall be in accordance with MIL-STD-1285, except the PIN shall be as specified in paragraph 1.2 with manufacturer's name or CAGE code and date code. The manufacturer may, at their option, mark some information on the chips.

3.13 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall perform the inspections specified herein on a sample of parts agreed upon by the manufacturer and DLA Land and Maritime - VAT.

3.14 Certificate of compliance. A certificate of compliance shall be required from manufacturers requesting to be an approved source of supply.

3.15 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

4. VERIFICATION

4.1 Qualification inspection. Qualification inspection is not required.

4.2 Conformance inspection (see 3).

4.2.1 Inspection of product for delivery. Inspection of product for delivery shall consist of all tests specified herein. PPM testing and calculation are not applicable.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Inductors conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. This drawing is intended exclusively to prevent the proliferation of unnecessary duplicate specifications, drawings, and stock catalog listings. When a military specification exists and the product covered by this drawing has been qualified for listing, this drawing becomes obsolete and will not be used for new design.

6.2 Ordering data. The contract or purchase order should specify the following:

a. Complete PIN (see 1.2).

b. Requirements for delivery of one copy of the conformance inspection data or certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.

c. Requirements for notification of change of product to acquiring activity, if applicable.

d. Requirements for packaging and packing.

6.3 Replaceability. Inductors covered by this drawing will replace the same commercial device covered by a contractor-prepared specification or drawing.

6.4 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin).

6.5 Users of record. Coordination of this document for future revisions is coordinated only with the approved sources of supply and the users of record of this document. Requests to be added as a recorded user of this drawing should be in writing to: DLA Land and Maritime, Columbus, ATTN: DLA Land and Maritime - VAT, Post Office Box 3990, Columbus, OH 43218-3990, by e-mail to transformer@dla.mil or by telephone (614) 692-0557 or DSN 850-0557.

6.6 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. For assistance in the use of this drawing, contact DLA Land and Maritime, Columbus, ATTN: DLA Land and Maritime-VAT, Post Office Box 3990, Columbus, OH 43218-3990, by e-mail to transformer@dla.mil, or by telephone (614) 692-0557 or DSN 850-0557.

TABLE V. Inductor Values and Tolerances. 1/

2/ DLA-Land and Maritime Drawing 11018- 3/	Inductance (nH)	Available Tolerances	Vendor A Similar designation 4/
1R2 * U *	1.2	B, C, D	DQL031R2_GWTR
1R5 * U *	1.5	B, C, D	DQL031R5_GWTR
1R8 * U *	1.8	B, C, D	DQL031R8_GWTR
2R2 * U *	2.2	B, C, D	DQL032R2_GWTR
2R7 * U *	2.7	B, C, D	DQL032R7_GWTR
3R3 * U *	3.3	B, C, D	DQL033R3_GWTR
3R9 * U *	3.9	B, C, D	DQL033R9_GWTR
4R7 * U *	4.7	B, C, D	DQL034R7_GWTR
5R6 * U *	5.6	C, D	DQL035R6_GWTR
6R8 * U *	6.8	C, D	DQL036R8_GWTR
8R2 * U *	8.2	C, D	DQL038R2_GWTR
100 * U *	10.0	G, J	DQL03100_GWTR
120 * U *	12.0	G, J	DQL03120_GWTR
150 * U *	15.0	G, J	DQL03150_GWTR

1/ When "*" is used for coded values, it's the contractors responsibility to select those options alowed by the DLA-Land and Maritime drawing.
2/ Parts must be purchased to the DLA-Land and Maritime PIN to assure that all performance requirements and tests are met.
3/ Complete PIN shall include symbols to indicate inductance tolerance and testing option (see 1.2).
4/ Complete vendor "A" PIN shall include symbols to indicate inductance tolerance.

Vendor	Vendor CAGE	Vendor name and address
A	SNU53	AVX Israel LTD 3 Hamarpe Har Hahotzvim Jerusalem, Israel 97774
	1154G	AVX Czech Republic s.r.o. - zavod Sokolovska Uherske Hradiste, Czech Republic 68601