
Title Qualification Plan for Ceramic Chip Antenna

1. SCOPE

1.1. Content

This specification describes characteristic, test and quality requirements for TE Connectivity (TE) Ceramic Chip ANTENNA

1.2. Qualification

Unless otherwise specified when tests are performed on the subject product line, shall meet the requirement of the test description by specified procedure and measurement method in Figure 1& Figure 2 of example shall be used.

All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

For a successful qualification test for that product line, refer to 501-161718 qualification test report in paragraph 2.1.

1.4. Revision Summary

Revisions to this specification include :

- Initial release of specification.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of the specification and the reference documents, this specification shall take precedence.

2.1. TE Documents

- [501-161718](#) Qualification Test Report

2.2. Industry Documents

- IEC 60512 Basic testing procedures and measuring methods for electromechanical components, and electronic equipment.
- EIA 364-108TP-108 Impedance, Reflection Coefficient, Return Loss and VSWR Measured in the Time and Frequency Domain Test Procedure for Electrical Connectors, Cable
- IEC 60068 Basic environmental testing procedures.

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

3.2. Materials

Materials used in the construction of this production shall be as specified on the applicable TE drawing.

- Material : Based on Ceramic Chip Material

3.3. Ratings

Characteristic Impedance	Temperature
50Ω (Reference)	-40°C to 85°C (Operation) -5°C to 40°C (Storage)

3.4. Performance Requirements and Test Descriptions

The Product shall be designed to meet the electrical, mechanical and environmental performance requirement specified in Paragraph 3.5.

All tests shall be performed in the room temperature, unless otherwise specified.

Unless otherwise specified, all tests are performed at ambient environmental conditions per IEC specification 60068-1 clause 5.3 and if applicable performed with each antenna loaded inside its dedicated fixture (antenna in mated condition inside the fixture).

3.5. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Para.	TEST DESCRIPTION	REQUIREMENT	PROCEDURE
3.5.1.	Initial examination of product	Meets requirements of product drawing.	Visual, dimensional and functional per applicable inspection plan. In acc. With IEC60512-1-1 Magnification 10x
3.5.2	Final examination of product	Meets visual requirements.	Visual, dimensional and functional per applicable inspection
ELECTRICAL			
3.5.3.	VSWR	Low and high band-edge frequency (per functional antenna frequency band) should be in range of product drawing specification.	Measured 50Ω system of Network Analyzer with dedicated VSWR test See Fig.1 & 2
MECHANICAL			
3.5.4.	Examination of product	Meets requirements of product drawings admit of appearances and their section to be not occurred the antennas performance damages as a special case	No physical damage to cause antenna performance degradation.
ENVIRONMENTAL			
3.5.5.	High Temperature Exposure	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Expose the specimen to +125°C for 1000 hours and then to normal temperature/humidity for 24 hours or more.
3.5.6.	Operational Life	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Expose the specimen to +125°C for 1000 hours and then to normal temperature/humidity for 24 hours or more.

3.5.7.	Biased Humidity	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Subject the object to the environmental conditions of +85°C and 85% relative humidity for 1000 hours, then expose it to normal temperature/humidity for 24 hours or more.
3.5.8.	Board Flex test	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Follow AEC-Q200-005 Test condition : as shown in Fig.5.2
3.5.9.	Adhesion test (Terminal strength)	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	The device is subjected to be soldered on test PCB. Then apply 1.8Kg (17.7N) of force for 60±1 seconds in the direction of parallel to the substrate. (be done by reflow and heat shock conditions) Test condition : as shown in Fig.5.3
3.5.10.	TCT-VT-sine-MST-half (Temperature cycling)	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Temp. transition time<1Min. Number of cycle : 1000 Check interval : 500 th , 1000 th Cycle With normal temperature/humidity Test condition: as shown in Fig.5.4
3.5.11.	TCT-VT-sine-MST-half (Vibration test)	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Refer to MIL-STD-202 Method 213 As shown Fig.5.5
3.5.12.	TCT-VT-sine-MST-half (Mechanical shock test)	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Refer to MIL-STD-202 Method 213 As shown Fig.5.6



NOTE

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Paragraph 3.6.

3.6. Product Qualification and Requalification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)								
	1	2	3	4	5	6	7	8	9
	TEST SEQUENCE (b)								
Initial examination of product	1	1	1	1	1	1	1	1	1
V.S.W.R	2	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4
High Temperature Exposure		3							
Operational Life			3						
Biased Humidity				3					
Board Flex test					3				

Adhesion test(Terminal strength)						3			
TCT-VT-sine-MST-half (Temperature cycling)							3		
TCT-VT-sine-MST-half (Vibration)								3	
TCT-VT-sine-MST-half (Mechanical shock)									3
Final examination of product	3	5	5	5	5	5	5	5	5



NOTE

- (a) See a paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable procedure and shall be selected at random from current production. Each test group shall consist of a minimum of 5 Antennas.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in paragraph 3.6.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to product or manufacturing process, product assurance shall coordinate re-qualification testing, consisting of all or part of original testing sequence as determined by product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that product meets requirements of Para 3.5. Failures attributed to equipment, test set-up, test sub-components or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

Testing to confirm corrective action is required before re-submittal.

4.4. Quality Conformance Inspection

Applicable TE Connectivity quality inspection plan will specify sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with applicable product drawing and this specification.

5. FIGURES (EXAMPLE)

5.1. Measurement Method of V.S.W.R

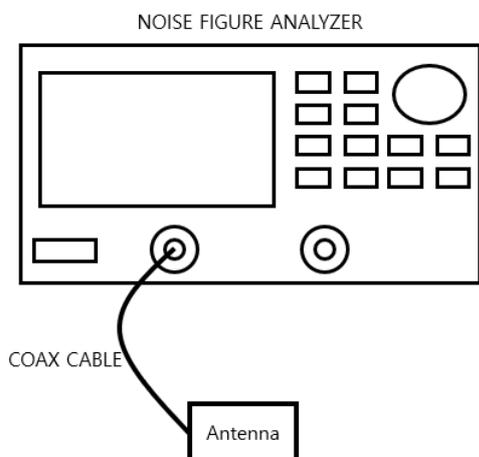


Figure 1 - VSWR Test

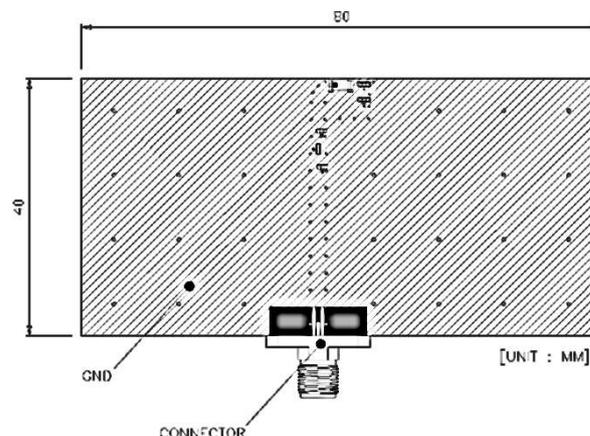


Figure 2 - Mounted PCB for V.S.W.R test

5.2. Board Flex test

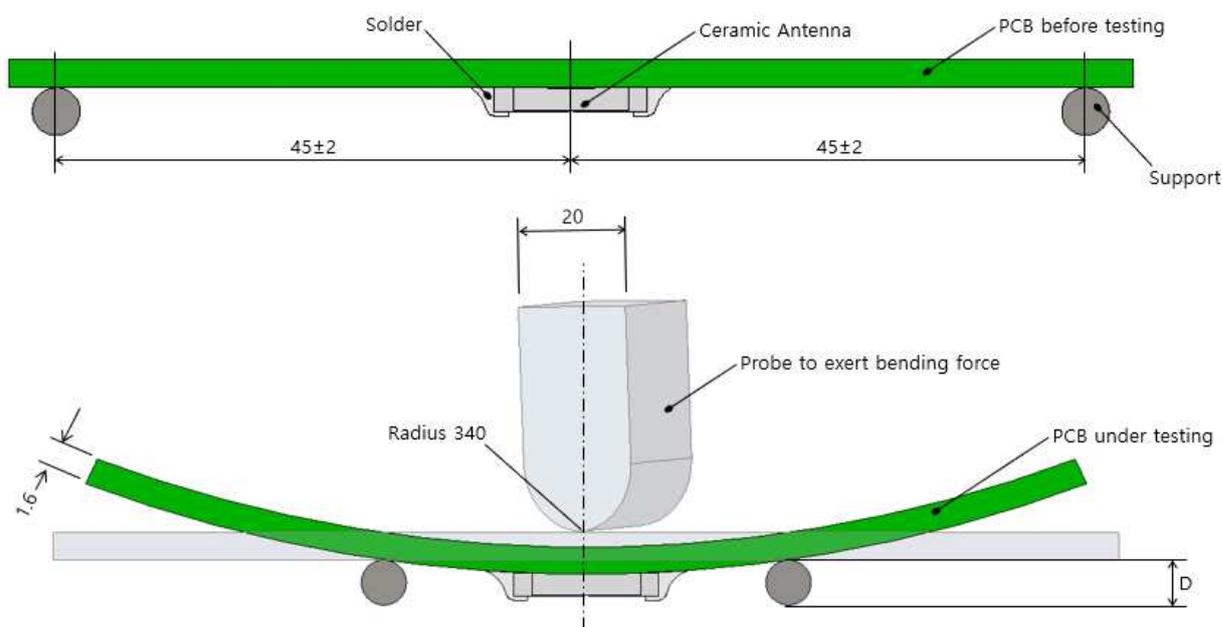


Figure 3 – Board flex test

Place the 100mm x 40mm board into a fixture similar to the one above figure with the component facing down. The apparatus shall consist of mechanical means to apply a force which will bend the board (D) $x=2$ mm minimum (or as defined in the customer specification of !200). The duration of the applied forces shall be 60(+5) sec. the force is to be applied only once to the board.

5.3. Adhesive Strength of Termination

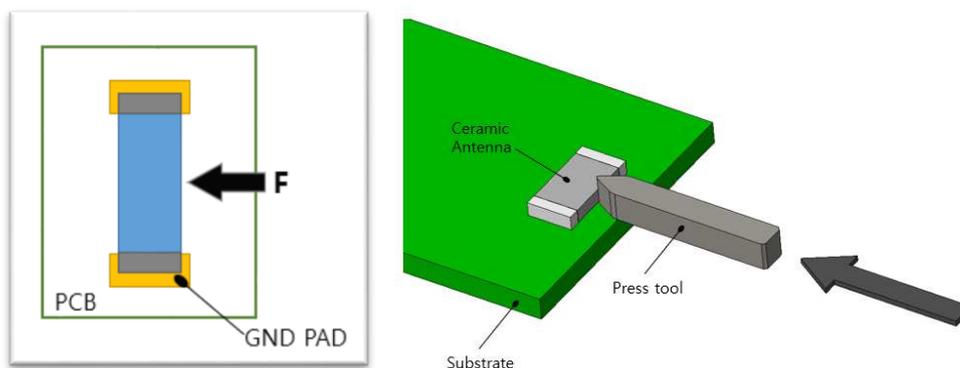


Figure 4- Applied force on SMD chip detached point from PCB

With the component mounted on the substrate with the device to be tested, apply a 17.7N(1.8kgf) to the side of a device being tested. This force shall be applied for 60+1 sec. Also the force shall be applied gradually as not to apply a shock to the component being tested.

5.4. TCT-VT Sine-MST-Half (Temperature cycling test)

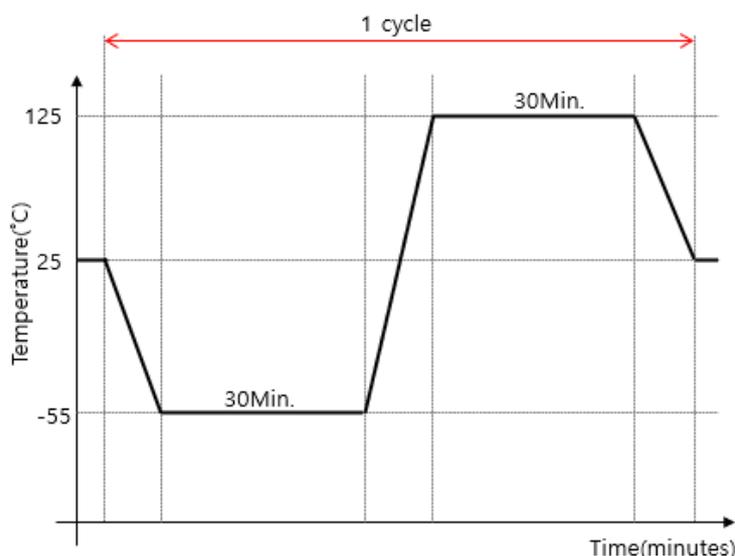


Figure 5- Temperature cycling test for TCT-VT sine MST-Half

- Units are Non-operating.
- Temperature transition time <1 minute
- Number of cycles : 1000 cycles
- Check interval : the appearance check at 500th and 1000th cycles

5.5. TCT-VT Sine-MST-Half (Vibration test)

Vibration Frequency	Vibration acceleration	Displacement
10Hz	-	0.06inch
40Hz	5g	-
2000Hz	5g	-

- Units are Non-operating.
- Cycle time : 20minutes
- Number of cycles : 12cycles for each axis(X, Y, Z)

5.6. TCT-VT Sine-MST-Half (Mechanical shock test)

- Units are Non-operating.
- Pulse shape : Half-sine waveform
- Impact acceleration : 1500g
- Pulse duration : 0.5ms
- Number of shocks : 18 shocks (3shocks for each face)

6. HISTORY

LTR	REVISION RECORD	PREPARED BY	APPROVED BY	DATE
1	Initial Release			09-DEC-24
A	Associate with test report			06-JAN-25