



# Validation Test Report

Standard PCB Element Antenna

September 27, 2018.

Tested & Reported By	Reviewed By	Approved By	Test Date	From September 17, 2018 To September 27, 2018
			Classification	Unrestricted

## ● TE CONNECTIVITY RELIABILITY TEST REPORT

Test Name : Validation for Standard PCB Element Antenna
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### 1. Introduction

#### 1-1 Purpose

Testing was performed on the Standard PCB Element Antenna to determine if it conformance to the requirements of Product Specification 108-61420, Rev.A

#### 1-2 Scope

This report covers the electrical, environmental performance requirements of the Standard PCB Element Antenna.

The testing was performed between September 17, 2018 and September 27, 2018.

#### 1-3 Test Samples

The test samples were randomly selected from normal current production lots.

P/N	Description
2108994-2	4G LTE ANTENNA(PCB TYPE)

#### 1-4 Conclusion

The Standard PCB Element Antenna meets the electrical and environmental performance requirements of Product Specification 108-61420, Rev.A

#### 1-5 Attachment

- 1) Test Sequence
- 2) Requirements and Test Procedure
- 3) Test Result
- 4) Photograph of Test

1) Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)						
	1	2	3	4	5	6	7
	TEST SEQUENCE (b)						
Initial examination of product	1	1	1	1	1	1	1
V.S.W.R	2			2,4	2,4	2,4	2,4
Solderability		2					
Resistance of reflow heat			2				
Heat Resistance				3			
Cold Resistance					3		
Humidity (Steady state)						3	
Temperature Cycle							3
Final examination of product	3	3	3	5	5	5	5

## 2) Requirements and Test Procedure

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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
<b>ELECTRICAL</b>			
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
<b>MECHANICAL</b>			
3.5.4.	Examination of product	Meets requirements of product drawings	No physical damage to cause antenna
		admit of appearances and their section to be not occurred the antennas performance damages as a special case	performance degradation.
<b>ENVIRONMENTAL</b>			
3.5.5.	Solderability	Wet solder coverage: 90% Min.	Solder Temperature: 245+/-3°C
3.5.6.	Resistance of reflow heat	No physical damage allowed. (Meet 3.5.2)	Temperature profile: as shown in Fig.3 Peak: 250°C
3.5.7.	Heat Resistance	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	85±3°C for 96hr. Then in shall be subjected to standard atmospheric condition for 1hr, after which measurement shall be made.
3.5.8.	Cold Resistance	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	-40±3°C for 48hr. Then in shall be subjected to standard atmospheric condition for 1hr, after which measurement shall be made.

3.5.9.	Humidity (Steady state)	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	85±3°C and 90 ~ 95% R.H for 96hr. Then in shall be subjected to standard atmospheric condition for 1hr, after which measurement shall be made.
3.5.10.	Temperature Cycle	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	-40±3°C/30min, Room temp: 10 ~ 15min. 85±3°C/30min, Room temp: 10 ~ 15min. Making this a cycle, repeat 5 cycles. Then in shall be subjected to standard atmospheric condition for 1hr, after which measurement shall be made.

3) Test Result  
- Test Group 1

NO.	Test Items	Test Condition	Acceptance criteria	Unit	Test Result					Max.	Avg.	Judgment	
					S1	S2	S3	S4	S5				
1	Examination of Product	Initial	No physical damage.	-	OK	OK	OK	OK	OK	-	-	OK	
					3.96	3.96	3.97	3.98	3.99	3.99	3.97	OK	
2	VSWR	Initial	VSWR<4.5, at 698~960MHz	-	3.09	3.06	3.03	3.09	3.03	3.03	3.09	3.06	OK
					2.40	2.37	2.39	2.41	2.41	2.41	2.40	OK	
					2.02	2.03	2.05	2.07	2.09	2.09	2.05	OK	
												2.40	OK
			1710~2690MHz									2.40	OK
			2690MHz									2.05	OK

- Test Group 2

NO.	Test Items	Test Condition	Acceptance criteria	Unit	Test Result					Max.	Avg.	Judgment
					S1	S2	S3	S4	S5			
1	Examination of Product	Initial	No physical damage.	-	OK	OK	OK	OK	OK	-	-	OK
2	Solderability	Initial	Wet solder coverage:90%Min.	-	OK	OK	OK	OK	OK	-	-	OK

- Test Group 3

NO.	Test Items	Test Condition	Acceptance criteria	Unit	Test Result					Max.	Avg.	Judgment
					S1	S2	S3	S4	S5			
1	Examination of Product	Initial	No physical damage.	-	OK	OK	OK	OK	OK	-	-	OK
		Final			OK	OK	OK	OK	OK	-	-	OK
2	Resistance of reflow heat	Initial	No physical damage.	-	OK	OK	OK	OK	OK	-	-	OK

- Test Group 4

NO.	Test Items	Test Condition	Acceptance criteria	Unit	Test Result					Min.	Max.	Avg.	Judgment		
					S1	S2	S3	S4	S5						
1	Examination of Product	Initial	No physical damage.	-	OK	OK	OK	OK	OK	-	-	-	OK		
		Final			OK	OK	OK	OK	OK	-	-	-	-	OK	
2	VSWR	Initial	VSWR<4.5, at 698MHz	-	3.98	3.97	3.95	3.99	3.99	3.95	3.99	3.98	OK		
			960MHz		3.05	3.05	3.03	3.08	3.05	3.08	3.05	3.03	3.08	3.05	OK
			1710MHz		2.38	2.37	2.41	2.37	2.40	2.37	2.41	2.37	2.37	2.41	2.39
		After Heat resistance	2690MHz		2.05	2.10	2.10	2.08	2.07	2.05	2.10	2.05	2.10	2.08	OK
			698MHz		3.96	3.97	3.99	3.97	3.96	3.96	3.99	3.96	3.96	3.97	OK
			960MHz		3.07	3.02	3.06	3.10	3.04	3.02	3.10	3.02	3.10	3.06	OK
3	Heat resistance	Initial	VSWR<3.5, at 1710MHz	-	2.43	2.39	2.40	2.41	2.37	2.37	2.43	2.40	OK		
			2690MHz		2.03	2.05	2.07	2.08	2.05	2.08	2.03	2.03	2.06	2.06	OK
			No physical damage.	-	OK	OK	OK	OK	OK	-	-	-	OK		

- Test Group 5

NO.	Test Items	Test Condition	Acceptance criteria	Unit	Test Result					Min.	Max.	Avg.	Judgment		
					S1	S2	S3	S4	S5						
1	Examination of Product	Initial	No physical damage.	-	OK	OK	OK	OK	OK	-	-	-	OK		
		Final			OK	OK	OK	OK	OK	-	-	-	-	OK	
2	VSWR	Initial	VSWR<4.5, at 698MHz	-	3.96	3.97	3.98	3.95	3.99	3.95	3.99	3.97	OK		
			960MHz		3.02	3.08	3.09	3.08	3.08	3.02	3.09	3.02	3.09	3.07	OK
			1710MHz		2.39	2.37	2.38	2.40	2.39	2.37	2.40	2.37	2.40	2.39	OK
		After Cold resistance	2690MHz		2.07	2.02	2.00	2.06	2.02	2.00	2.07	2.00	2.07	2.03	OK
			698MHz		3.95	3.95	3.98	3.97	3.98	3.95	3.98	3.95	3.98	3.97	OK
			960MHz		3.07	3.04	3.07	3.09	3.04	3.04	3.09	3.04	3.09	3.06	OK
3	Cold resistance	Initial	VSWR<3.5, at 1710MHz	-	2.37	2.37	2.41	2.38	2.41	2.37	2.41	2.39	OK		
			2690MHz		2.06	2.02	2.02	2.05	2.06	2.02	2.06	2.02	2.04	2.04	OK
			No physical damage.	-	OK	OK	OK	OK	OK	-	-	-	OK		

- Test Group 6

NO.	Test Items	Test Condition	Acceptance criteria	Unit	Test Result					Min.	Max.	Avg.	Judgment
					S1	S2	S3	S4	S5				
1	Examination of Product	Initial	No physical damage.	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final			OK	OK	OK	OK	OK	-	-	-	-
2	VSWR	Initial	VSWR<4.5, at 698MHz	-	3.99	3.98	3.98	3.97	3.97	3.97	3.99	3.98	OK
			960MHz		3.03	3.09	3.06	3.04	3.03	3.09	3.05	OK	
			1710MHz		2.41	2.38	2.42	2.43	2.41	2.43	2.41	2.41	OK
		After Humidity	1710~2690MHz		2.01	2.01	2.07	2.05	2.02	2.01	2.07	2.03	OK
			VSWR<4.5, at 698MHz		3.96	3.98	3.99	3.99	3.96	3.99	3.99	3.98	OK
			960MHz		3.09	3.04	3.04	3.08	3.10	3.10	3.10	3.07	OK
3	Humidity(steady state)	Initial	VSWR<3.5, at 1710MHz	-	2.39	2.37	2.43	2.39	2.39	2.37	2.43	2.39	OK
			2690MHz		2.01	2.06	2.09	2.03	2.03	2.01	2.09	2.04	OK
			No physical damage.	-	OK	OK	OK	OK	OK	-	-	-	OK




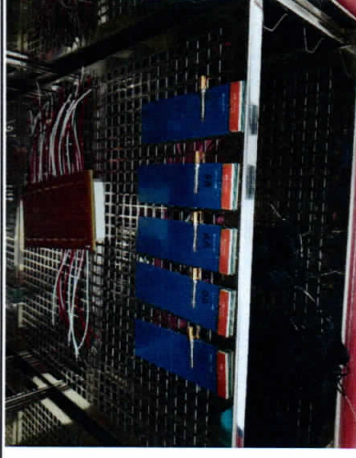

- Test Group 7

NO.	Test Items	Test Condition	Acceptance criteria	Unit	Test Result					Min.	Max.	Avg.	Judgment	
					S1	S2	S3	S4	S5					
1	Examination of Product	Initial	No physical damage.	-	OK	OK	OK	OK	OK	-	-	-	OK	
		Final			OK	OK	OK	OK	OK	-	-	-	-	OK
2	VSWR	Initial	VSWR<4.5, at 698MHz	-	3.96	3.95	3.99	3.98	3.95	3.95	3.99	3.97	OK	
			960MHz		3.1	3.07	3.03	3.03	3.07	3.03	3.10	3.06	OK	
			1710MHz		2.43	2.37	2.41	2.41	2.40	2.43	2.43	2.40	OK	
		After Temperature cycle	1710~2690MHz		2.01	2.09	2.01	2.06	2.04	2.01	2.09	2.04	OK	
			VSWR<4.5, at 698MHz		3.98	3.98	3.96	3.98	3.98	3.98	3.98	3.98	3.98	OK
			960MHz		3.06	3.08	3.09	3.06	3.06	3.09	3.06	3.07	OK	
3	Temperature cycle	Initial	VSWR<3.5, at 1710MHz	-	2.40	2.43	2.37	2.39	2.38	2.37	2.43	2.39	OK	
			2690MHz		2.03	2.03	2.09	2.04	2.03	2.09	2.04	2.04	OK	
			No physical damage.	-	OK	OK	OK	OK	OK	-	-	-	OK	



4) Photograph of Test

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NO.	Test Items	Photograph	Remark
1	Solderability		-
2	Heat resistance		-
3	Cold resistance		-
NO.	Test Items	Photograph	Remark
4	Humidity		-
5	Temperature cycle		-
6	-	-	-