



FCC RADIO TEST REPORT

FCC ID : RAXWN9711
Equipment : Wireless LAN Network Module
Brand Name : Arcadyan
Model Name : WN9711BTAAC-YA
Applicant : Arcadyan Technology Corporation
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Manufacturer : Arcadyan Technology Corporation
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Standard : 47 CFR FCC Part 15.247

The product was received on Jun. 05, 2017, and testing was started from Apr. 19, 2018 and completed on Apr. 19, 2018. We, SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
1 General Description	5
1.1 Information.....	5
1.2 Testing Applied Standards	9
1.3 Testing Location Information	9
1.4 Measurement Uncertainty	9
2 Test Configuration of EUT.....	10
2.1 The Worst Case Measurement Configuration.....	10
2.2 EUT Operation during Test	10
2.3 Accessories	10
2.4 Support Equipment.....	10
2.5 Test Setup Diagram	11
3 Transmitter Test Result	12
3.1 Emissions in Restricted Frequency Bands.....	12
4 Test Equipment and Calibration Data	15
Appendix A. Photographs of EUT	
Appendix B. Test Results of Emissions in Restricted Frequency Bands	
Appendix C. Test Photos	



History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB Ver1.0

Page Number : 3 of 15
Issued Date : May 07, 2018
Report Version : 01



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Reviewed by: Sam Chen**Report Producer: Cindy Peng**



1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20)	2412-2462	1-11 [11]
2400-2483.5	n (HT40)	2422-2452	3-9 [7]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	1TX
2.4-2.4835GHz	802.11g	20	1TX
2.4-2.4835GHz	802.11n HT20	20	1TX
2.4-2.4835GHz	802.11n HT40	40	1TX

Note:

- ♦ 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- ♦ 11g, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- ♦ BWch is the nominal channel bandwidth.
- ♦ Nss-Min is the minimum number of spatial streams.
- ♦ Nant is the number of outputs. e.g., 2(2,3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.

1.1.2 Antenna Information

Set	Ant.	Brand	Model Name	Type	Connector	Gain (dBi)		Cable Length (mm)
						2.4GHz	5GHz	
1	1	ACON	AEMEE-10000	Dipole	Reversed-SMA	3.24	4.54	Note 1
	2		AEMEE-10000	Dipole	Reversed-SMA	3.24	4.54	
Set	Ant.	Brand	Model Name	Type	Connector	Gain (dBi)		Cable Length (mm)
						2.4GHz	5GHz	
2	3	ACON	AEP6P-100009 (Black)	PIFA	I-PEX	3.15	3.15	300
	4		AEP6P-100010 (Gray)	PIFA	I-PEX	2.30	3.15	400
3	5	Walsin Technology Corporation	RFMTA370615IMLB302 (Black)	PIFA	I-PEX	3.10	4.32	150
	6		RFMTA270710IM5B301 (Gray)	PIFA	I-PEX	-	4.26	99
4	7	Walsin Technology Corporation	RFMTA370620IMLB302 (Black)	PIFA	I-PEX	2.39	3.91	206
	8		RFMTA270718IM5B301 (Gray)	PIFA	I-PEX	-	2.89	180
5	9	WNC	81XCBA15.G01(Black)	PIFA	I-PEX	2.49	3.91	400
	10		81XCBA15.G02(Gray)	PIFA	I-PEX	-	1.86	400
6	11	WNC	81XCBA15.G03(Black)	PIFA	I-PEX	1.96	2.52	300
	12		81XCBA15.G04(Gray)	PIFA	I-PEX	-	4.18	250

Note 1:

Dipole Cable	Brand	Model Name	Cable Length (mm)	Cable Loss (dB)		True Gain (dBi)	
				2.4GHz / BT	5GHz	2.4GHz / BT	5GHz
1	ACON	AEC8P-1000000 (Gray) AEC8P-1000001 (Black)	30	0.08	0.12	3.16	4.42
2	ACON	AEC8P-1000002 (Gray) AEC8P-1000003 (Black)	50	0.13	0.19	3.11	4.35
3	ACON	AEC8P-1000004 (Gray) AEC8P-1000005 (Black)	70	0.19	0.27	3.05	4.27
4	ACON	AEC8P-1000006 (Gray) AEC8P-1000007 (Black)	90	0.24	0.35	3.00	4.19

Dipole Cable	Brand	Model Name	Cable Length (mm)	Cable Loss (dB)		True Gain (dBi)	
				2.4GHz / BT	5GHz	2.4GHz / BT	5GHz
5	ACON	AEC8P-1000008 (Gray) AEC8P-1000009 (Black)	120	0.32	0.46	2.92	4.08
6	ACON	AEC8P-1000010 (Gray) AEC8P-1000011 (Black)	160	0.43	0.62	2.81	3.92
7	ACON	AEC8P-1000012 (Gray) AEC8P-1000013 (Black)	200	0.54	0.77	2.70	3.77
8	ACON	AEC8P-1000014 (Gray) AEC8P-1000015 (Black)	240	0.64	0.93	2.60	3.61
9	ACON	AEC8P-1000016 (Gray) AEC8P-1000017 (Black)	280	0.75	1.08	2.49	3.46
10	ACON	AEC8P-1000018 (Gray) AEC8P-1000019 (Black)	320	0.86	1.24	2.38	3.30
11	ACON	AEC8P-1000020 (Gray) AEC8P-1000021 (Black)	360	0.96	1.39	2.28	3.15
12	ACON	AEC8P-1000022 (Gray) AEC8P-1000023 (Black)	400	1.07	1.54	2.17	3.00
13	ACON	AEC8P-1000024 (Gray) AEC8P-1000025 (Black)	450	1.21	1.74	2.03	2.80
14	ACON	AEC8P-1000026 (Gray) AEC8P-1000027 (Black)	500	1.34	1.93	1.90	2.61

Note 2: 1. The EUT has two radios.

Radio 1 supports WLAN 2.4GHz, WLAN 5GHz and Bluetooth function, Radio 2 supports WLAN 5GHz function only.

Radio 1 collocate with Black antenna cable, Radio 2 collocate with Gray antenna cable.

2. The EUT has two type antennas, and there are two antennas for each set.

Dipole Antenna collocate with 14 set cable selling, only the higher gain antenna "cable 1" was tested and recorded in the report.

PIFA Antenna collocate with 5 set selling, the higher gain antennas "set 2 for 2.4GHz and set 3 for 5GHz for CTX, set 3 for Normal Link" were tested and recorded in the report.

For Radio 1 (WLAN 2.4GHz, WLAN 5GHz and Bluetooth):

For IEEE 802.11a/b/g/n/ac mode (1TX/1RX):

Dipole Antenna: Only Ant. 1 (Port 1) can be used as transmitting/receiving antenna.

PIFA Antenna: Only Ant. 3 (Port 1) can be used as transmitting/receiving antenna.



For Radio 2 (WLAN 5GHz):

For IEEE 802.11a/n/ac mode (1TX/1RX):

Dipole Antenna: Only Ant. 2 (Port 1) can be used as transmitting/receiving antenna.

PIFA Antenna: Only Ant. 6 (Port 1) can be used as transmitting/receiving antenna.

1.1.3 EUT Operational Condition

EUT Power Type	From host system			
Beamforming Function	☐	With beamforming	☒	Without beamforming
Function	☒	Point-to-multipoint	☐	Point-to-point
Test Software Version	MTool_3.0.0.3.exe			

1.1.4 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR770523-01AA

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Adding 4 set antennas for PIFA antenna.	Emissions in Restricted Frequency Bands below 1GHz test.



1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013
- ♦ FCC KDB 558074 D01 v04
- ♦ FCC KDB 662911 D01 v02r01

1.3 Testing Location Information

Testing Location				
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.		
		TEL : 886-3-327-3456	FAX : 886-3-318-0055	
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.		
		TEL : 886-3-656-9065	FAX : 886-3-656-9085	

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated	03CH01-CB	Joy Tseng, Lance Hsieh, Ekko Hsieh	22°C / 54%	Apr. 19, 2018

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%



2 Test Configuration of EUT

2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Normal Link
According to the original test report, EUT in Z axis AP Mode - Radio 1 (2.4GHz+Bluetooth)+ Radio 2 (5GHz) has been evaluated to be the worst case. So the measurement will follow this same test configuration.	
1	EUT in Z axis AP Mode - Radio 1 (2.4GHz+Bluetooth)+ Radio 2 (5GHz) with PIFA antenna set 3

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
Operating Mode	
1	Radio 1 (2.4GHz + Bluetooth) + Radio 2 (5GHz)
2	Radio 1 (5GHz + Bluetooth) + Radio 2 (5GHz)
Refer to Sporton Test Report No.: FA770523-03 for Co-location RF Exposure Evaluation.	

2.2 EUT Operation during Test

During the test, the EUT operation to normal function.

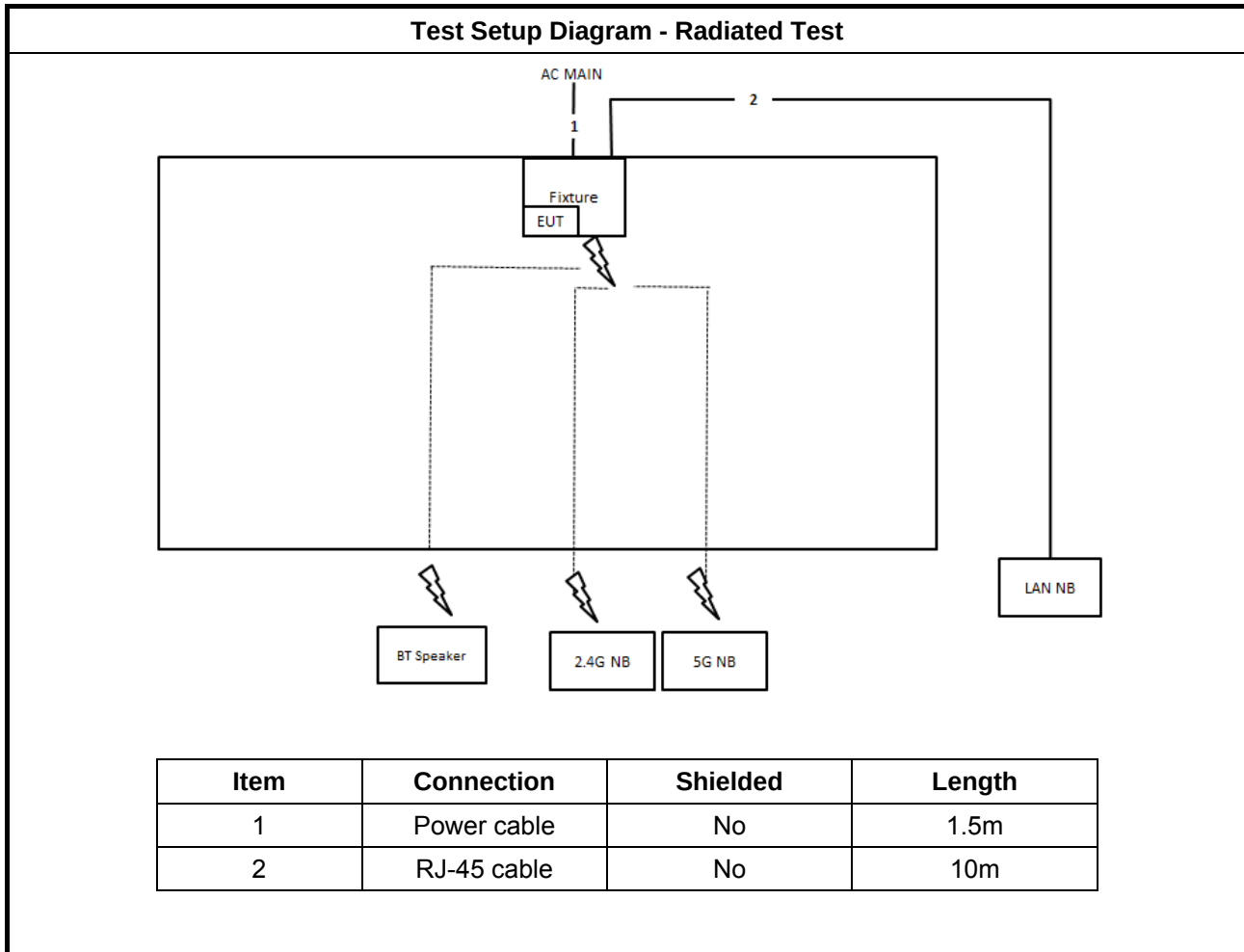
2.3 Accessories

N/A

2.4 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	NB	DELL	E4300	DoC
2	NB*2	Apple	Mac Book	DoC
3	Bluetooth Speaker	MARUS	MSK06C-RD	DoC
4	Fixture	Arcadyan	WN9711BTAAC Test jig	N/A

2.5 Test Setup Diagram





3 Transmitter Test Result

3.1 Emissions in Restricted Frequency Bands

3.1.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.1.2 Measuring Instruments

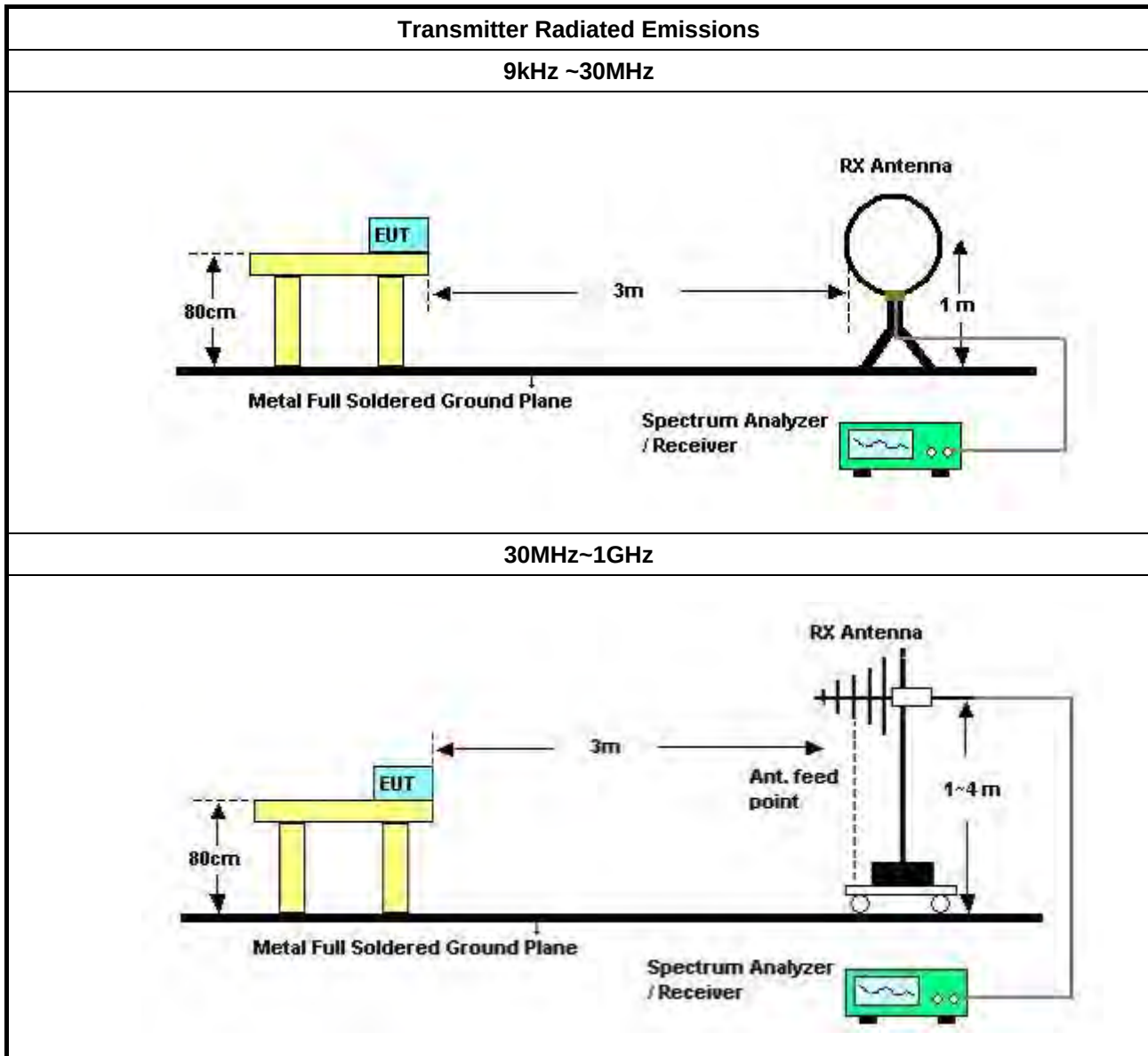
Refer a test equipment and calibration data table in this test report.



3.1.3 Test Procedures

Test Method	
The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
Refer as ANSI C63.10, clause 6.9.2.2 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.	
For the transmitter unwanted emissions shall be measured using following options below:	
	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
☐	Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$)
☐	Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
☒	Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW $\geq 1/T$).
☐	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time.
☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
☒	Refer as FCC KDB 558074, clause 12.2.4 measurement procedure peak limit.
For the transmitter band-edge emissions shall be measured using following options below:	
	Refer as FCC KDB 558074 clause 13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	Refer as FCC KDB 558074, clause 13.2 (ANSI C63.10, clause 6.9.3) for marker-delta method for band-edge measurements.
	Refer as FCC KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
For conducted and cabinet radiation measurement, refer as FCC KDB 558074, clause 12.2.2.	
	For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add $10 \log(N)$ dB
	For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.

3.1.4 Test Setup



3.1.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10 harmonic or 40 GHz, whichever is appropriate.

3.1.6 Test Result of Transmitter Radiated Unwanted Emissions

Refer as Appendix B

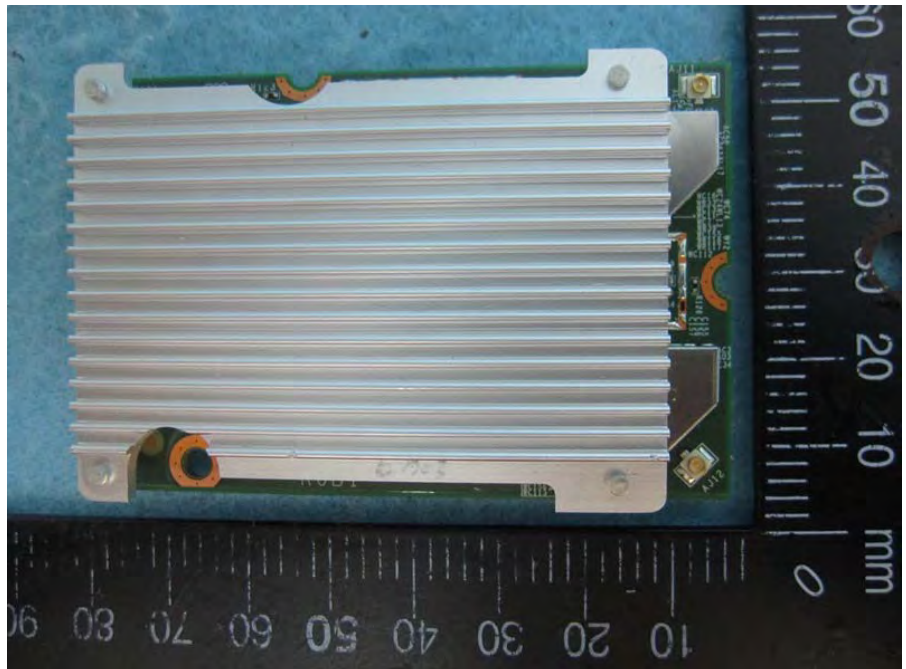
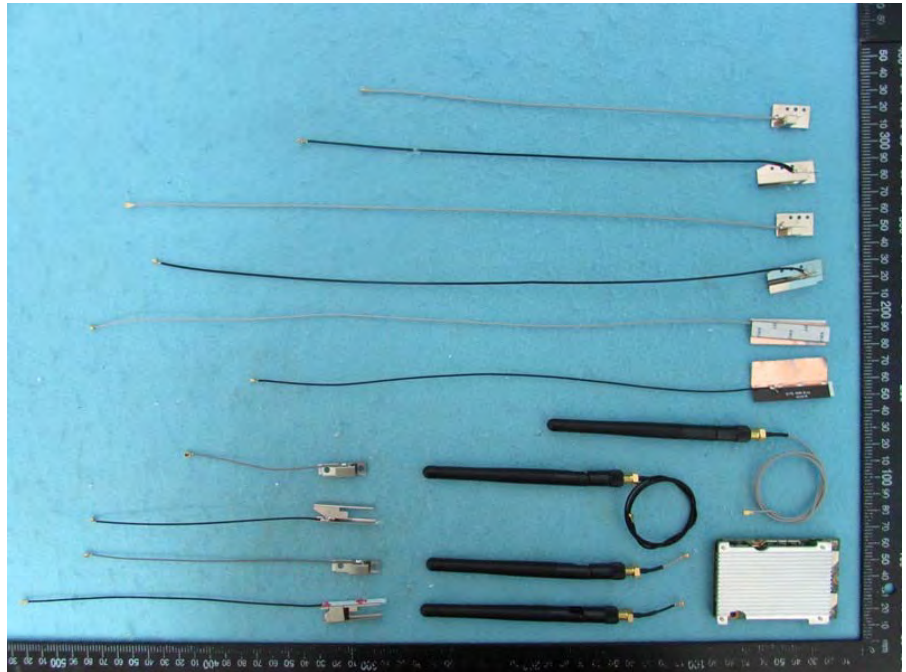


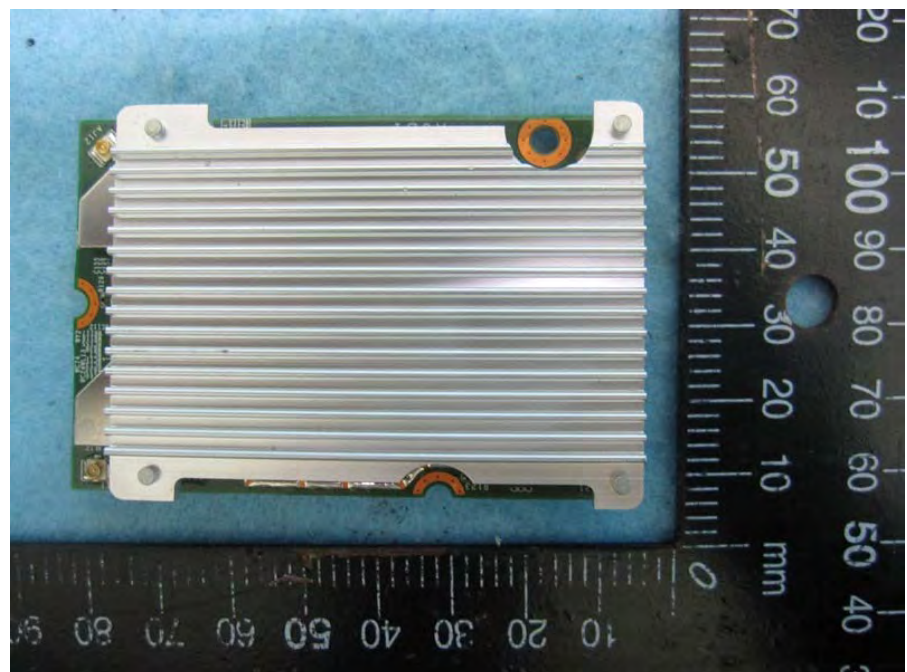
4 Test Equipment and Calibration Data

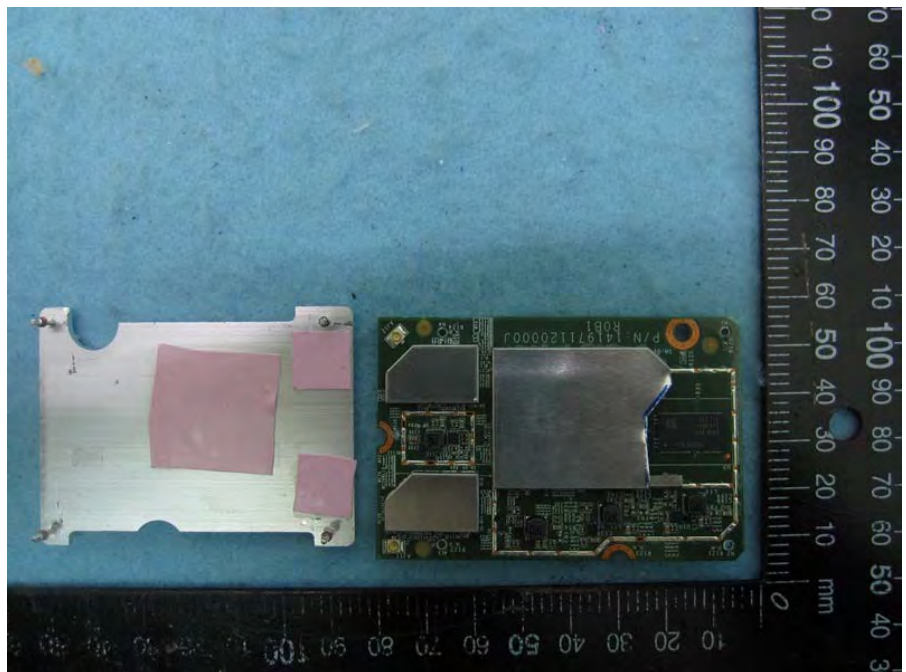
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2018	Mar. 15, 2019	Radiation (03CH01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2017	Aug. 29, 2018	Radiation (03CH01-CB)
Pre-Amplifier	EMCI	EMC330N	980332	20MHz ~ 3GHz	May 02, 2017	May 01, 2018	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 23, 2017	Nov. 22, 2018	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 06, 2017	May 05, 2018	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 11, 2017	Oct. 10, 2018	Radiation (03CH01-CB)

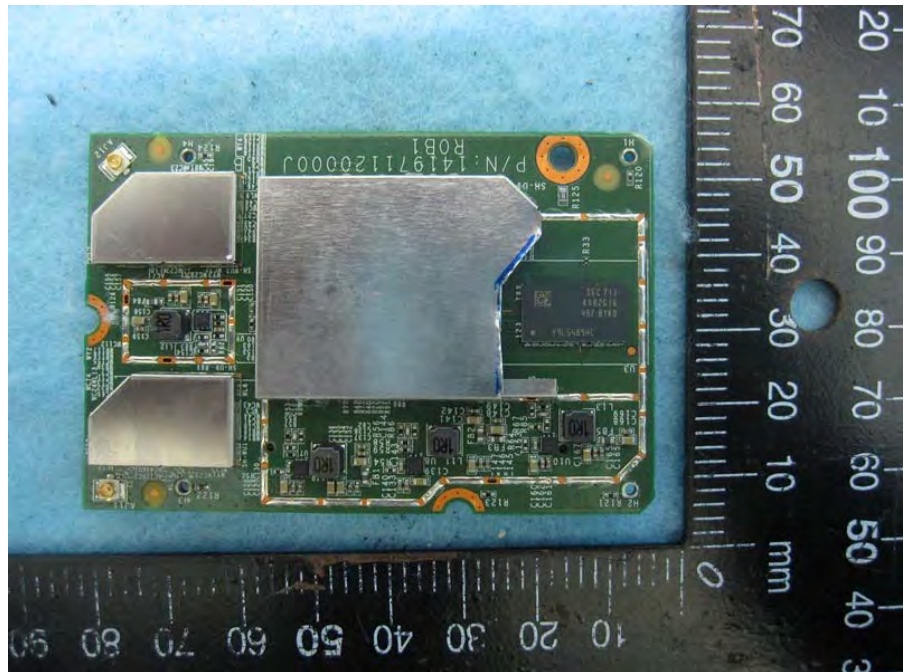
Note: Calibration Interval of instruments listed above is one year.

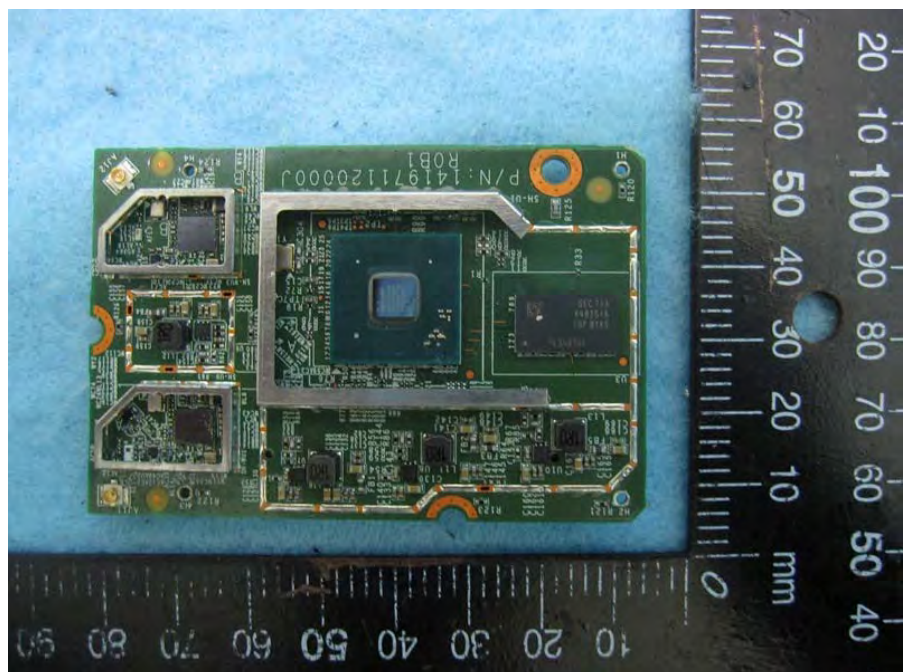
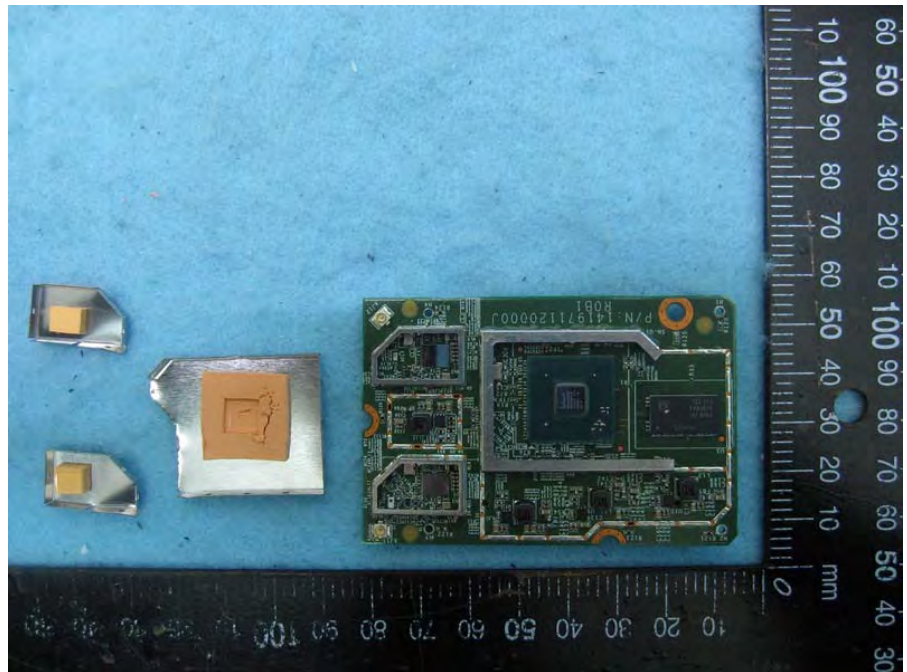
Brand Name: Arcadyan Model Name: WN9711BTAAC-YA



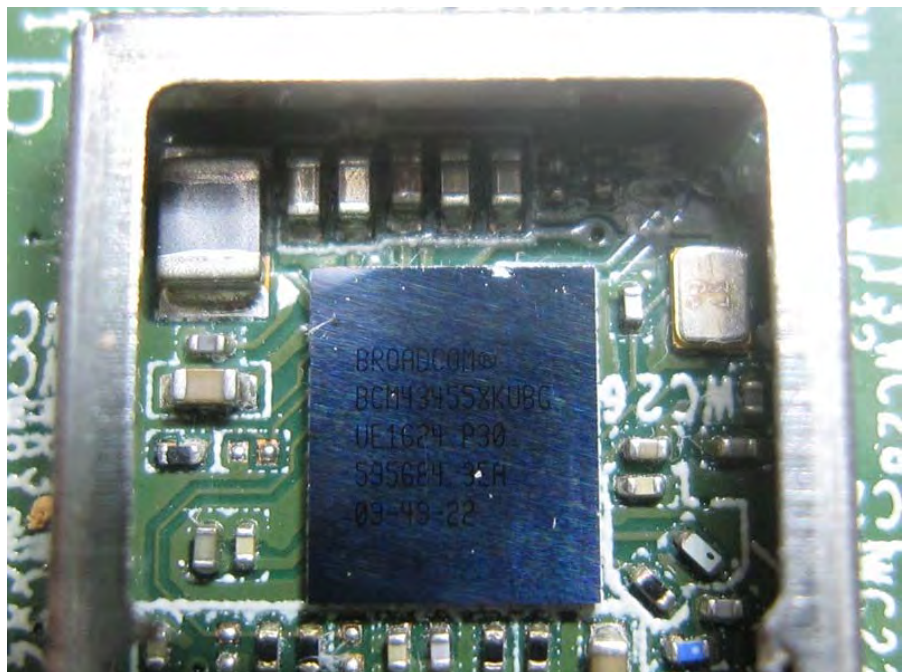
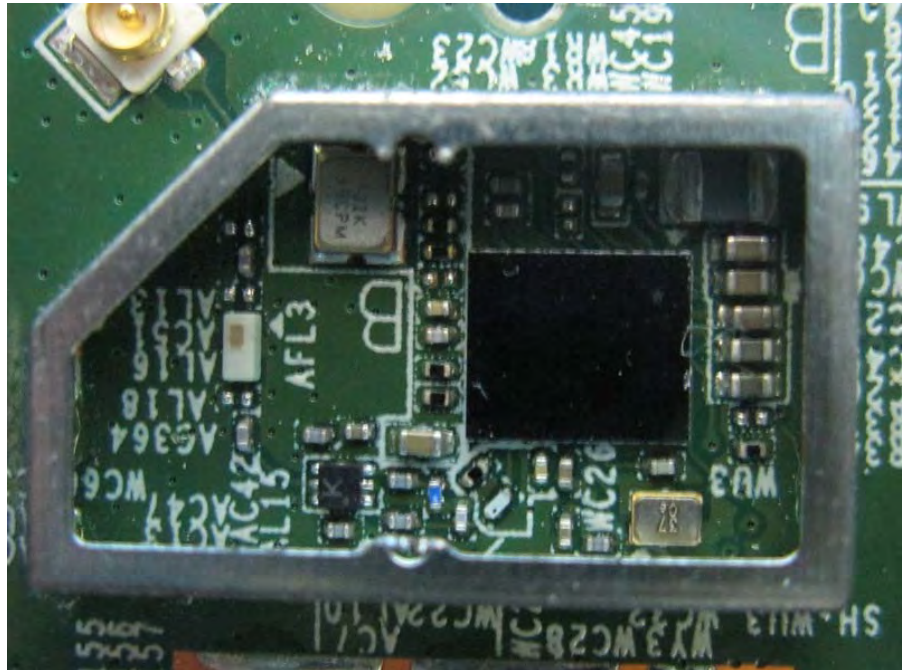


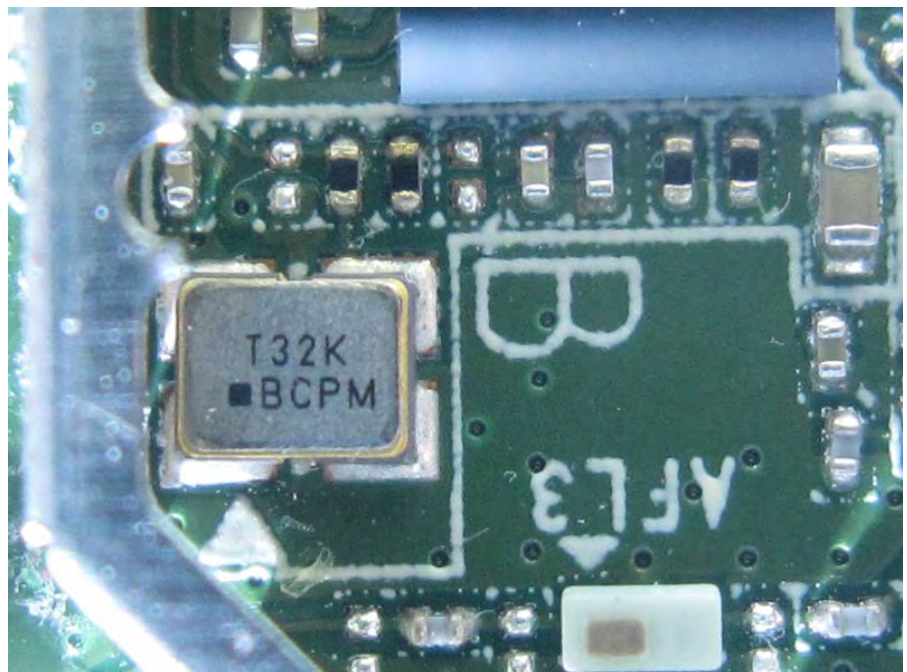
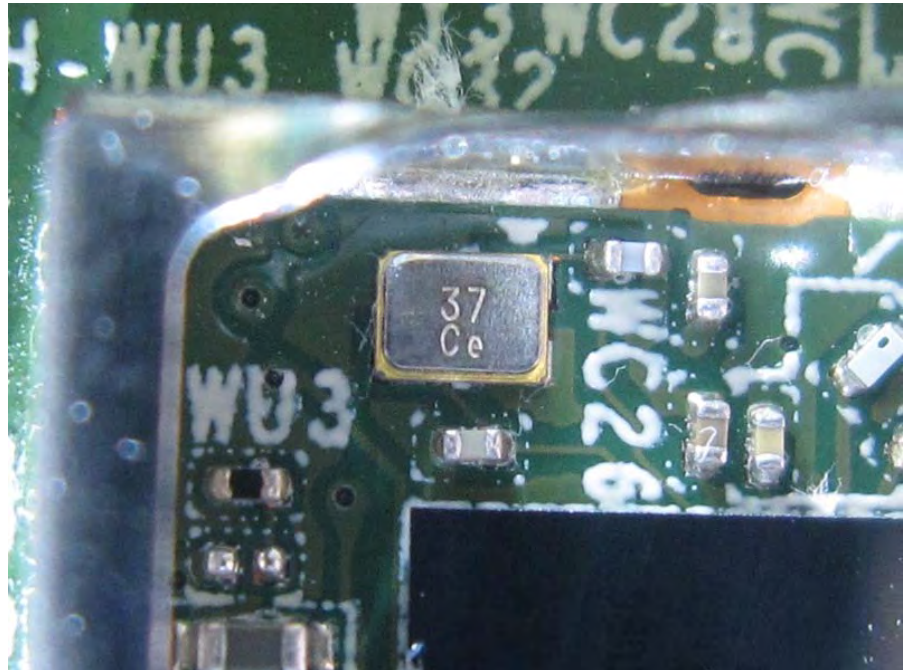


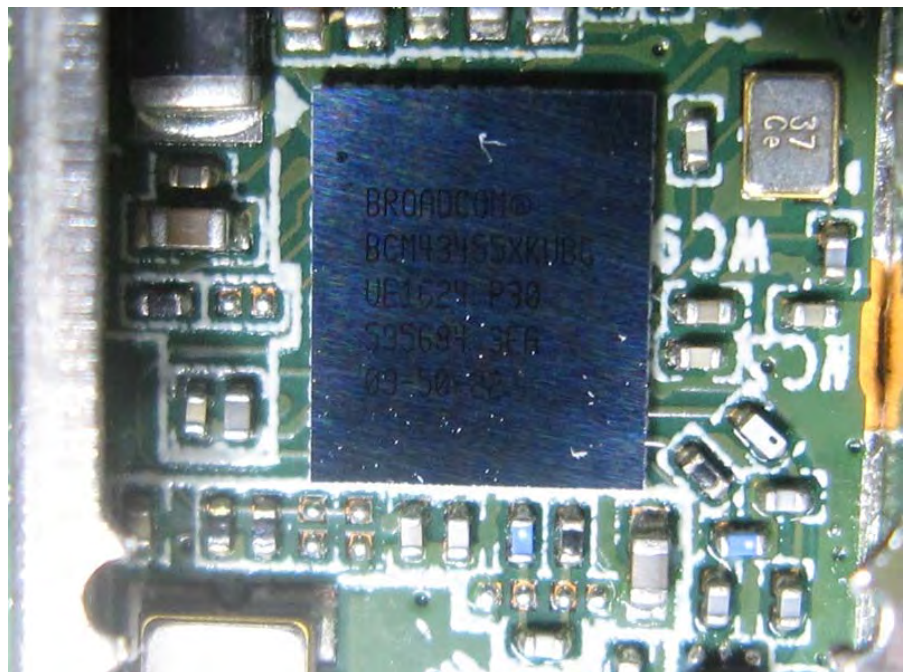
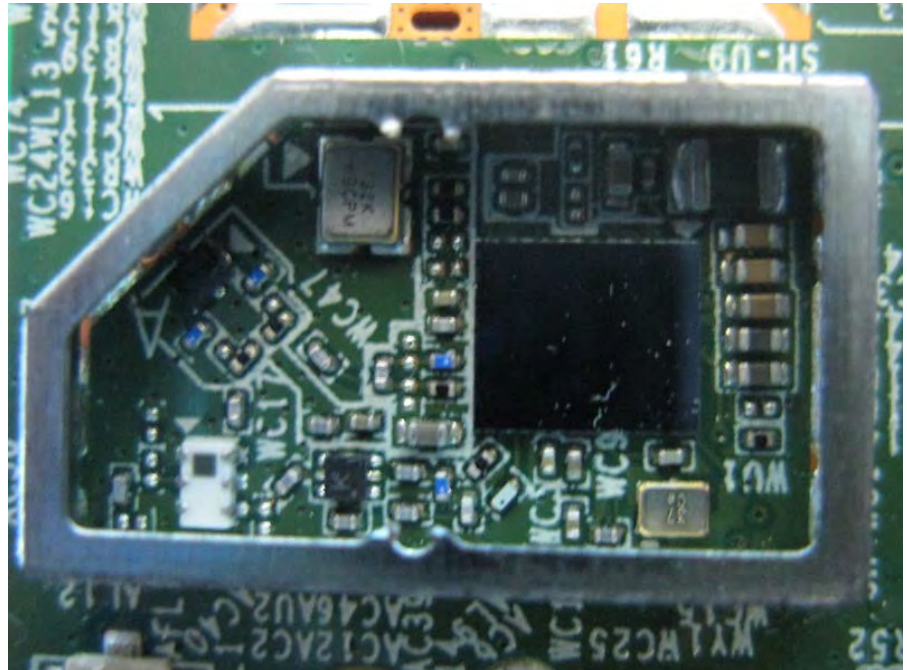


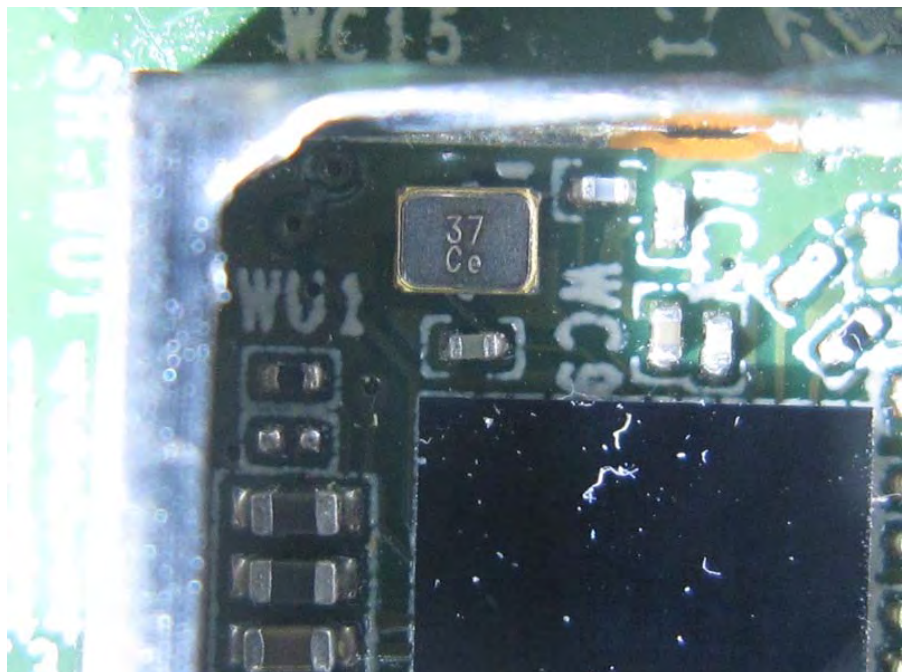


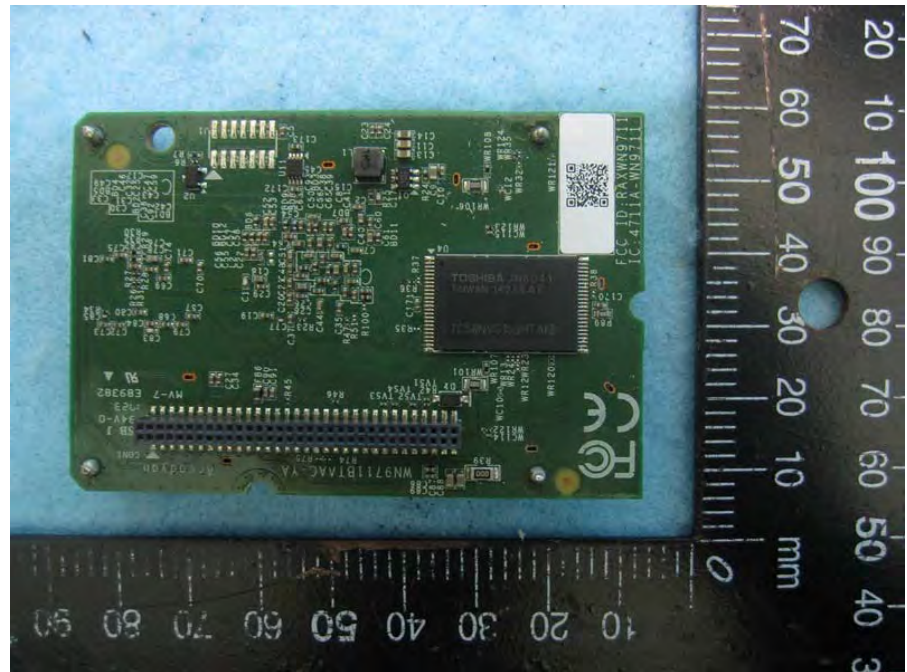












Dipole Antenna

Cable length: 500mm





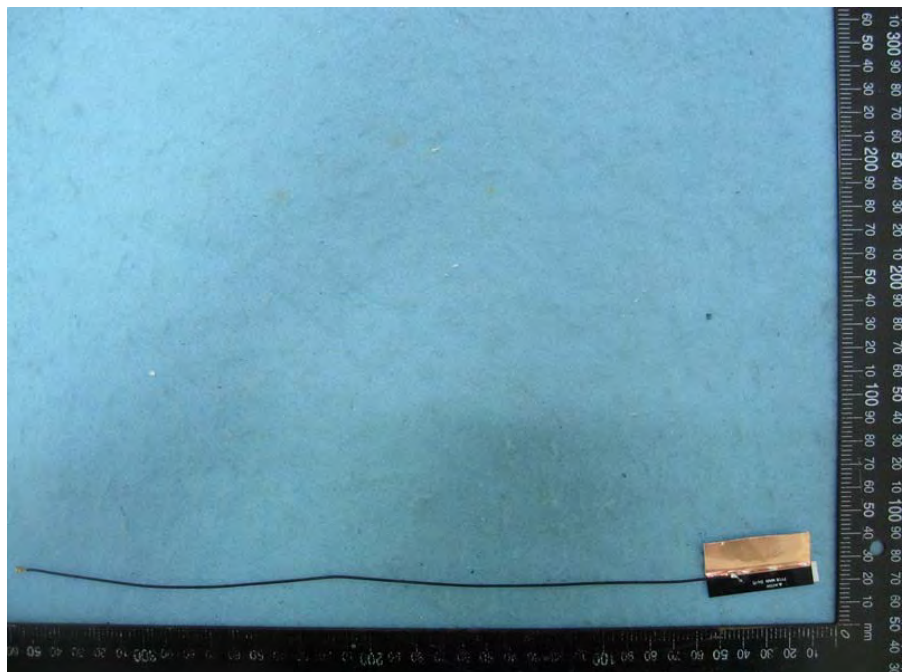
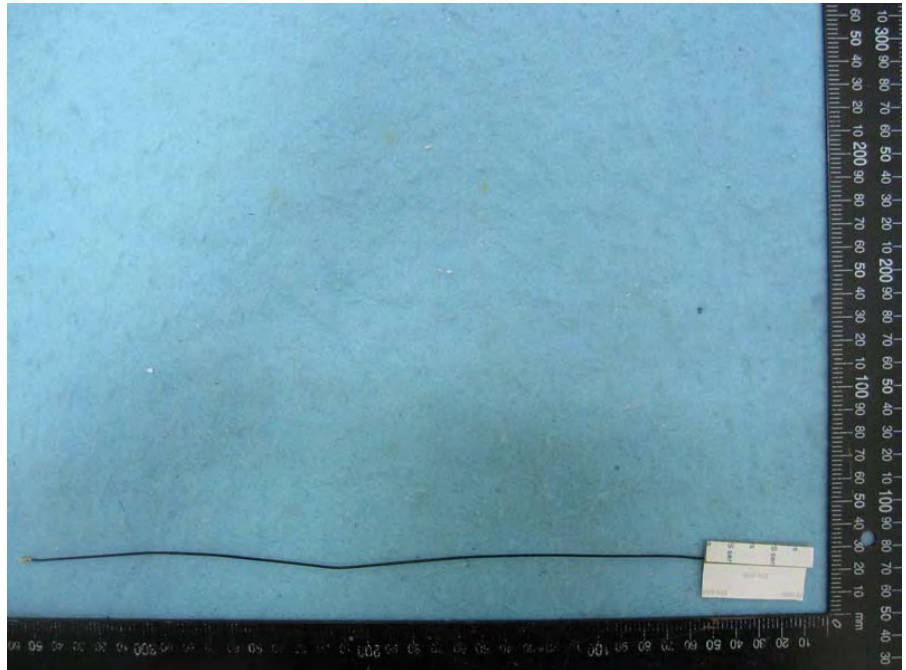
Dipole Antenna

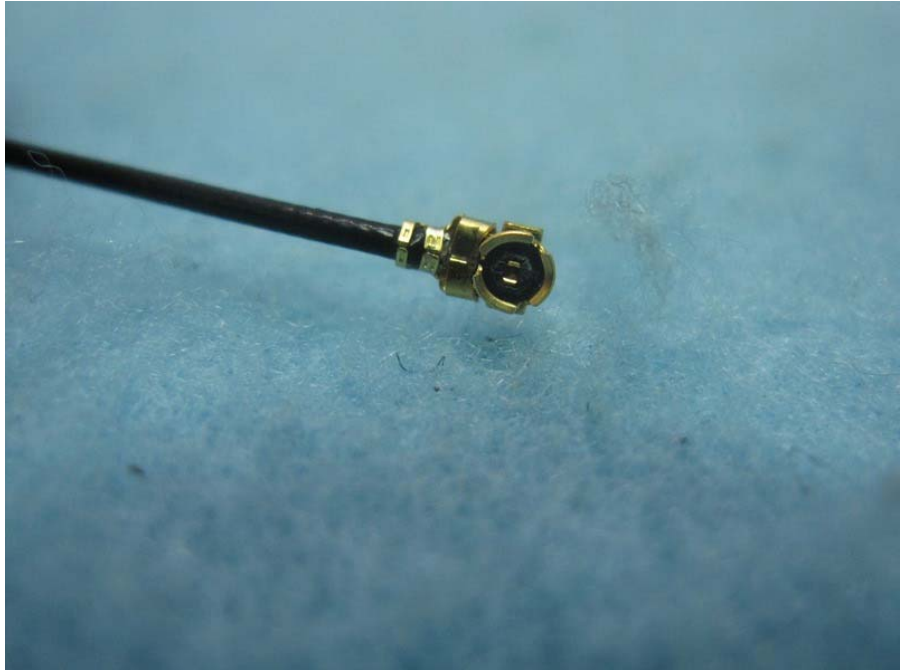
Cable length: 30mm





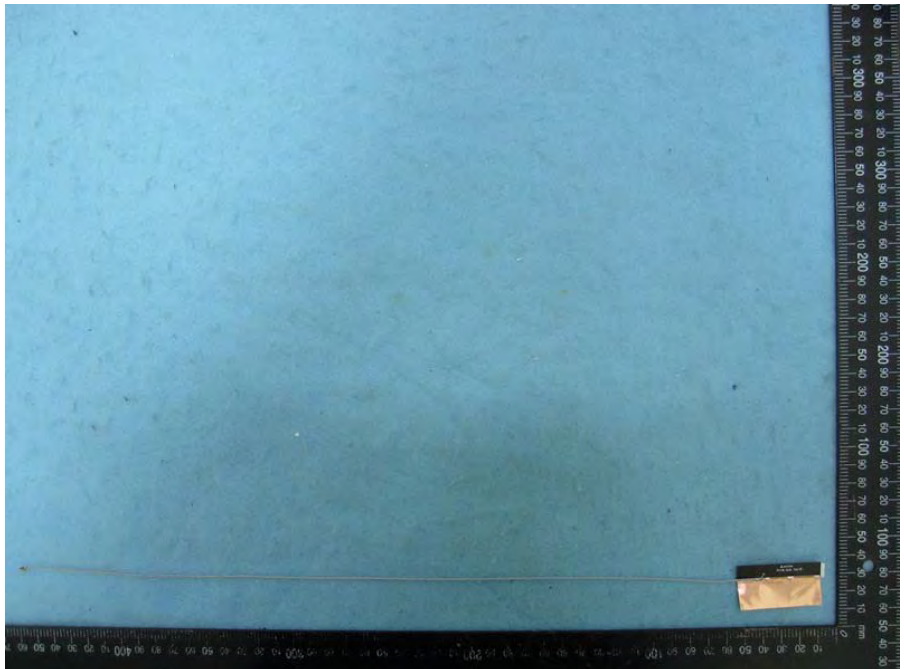
PIFA Antenna
Cable length: 300mm

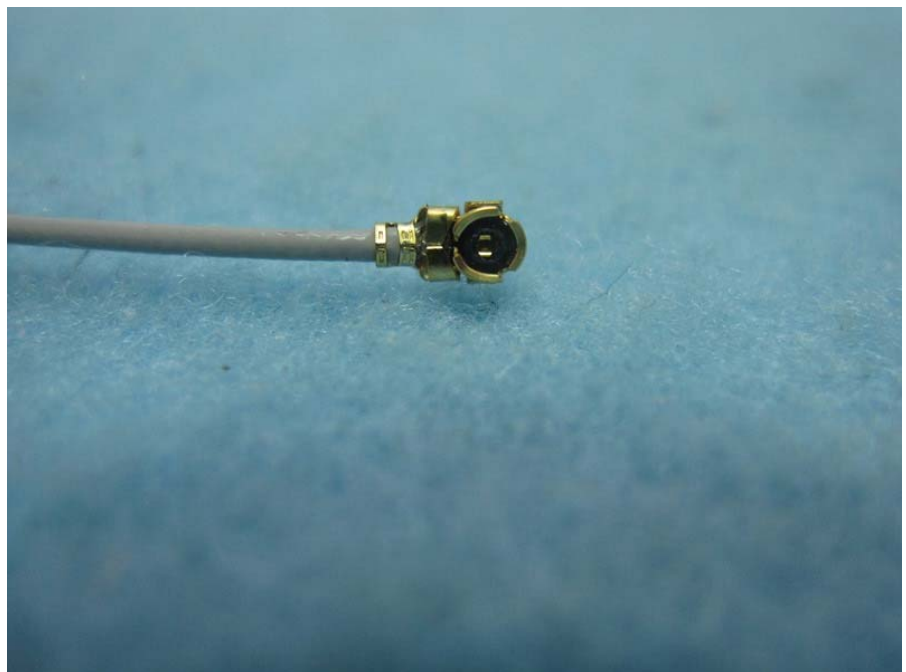
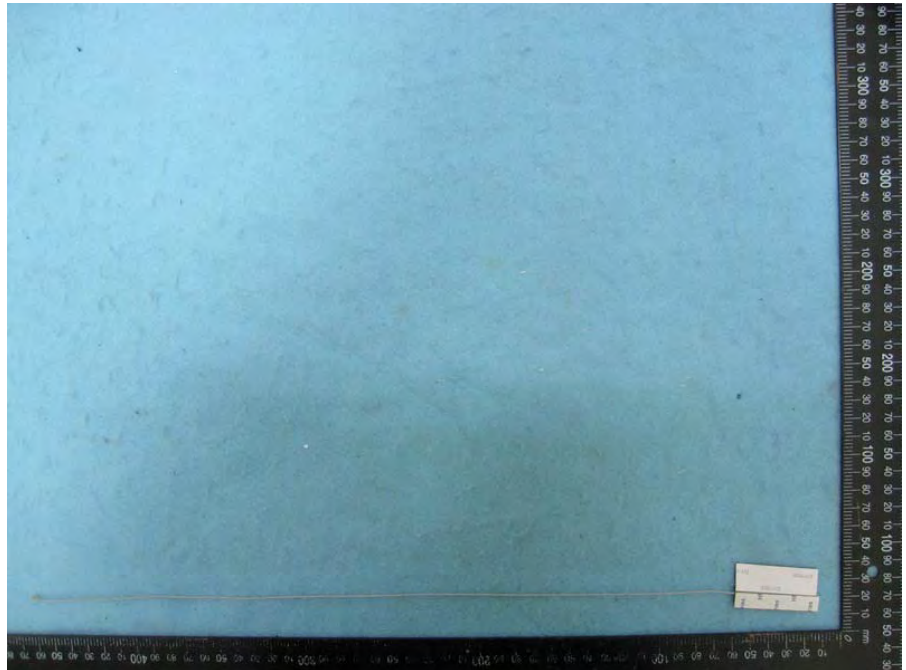




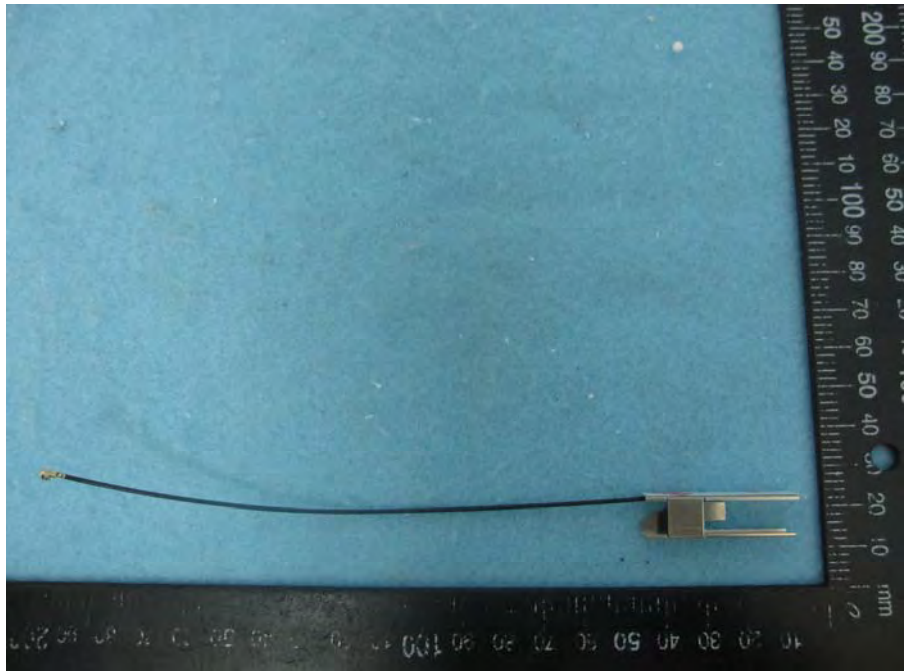
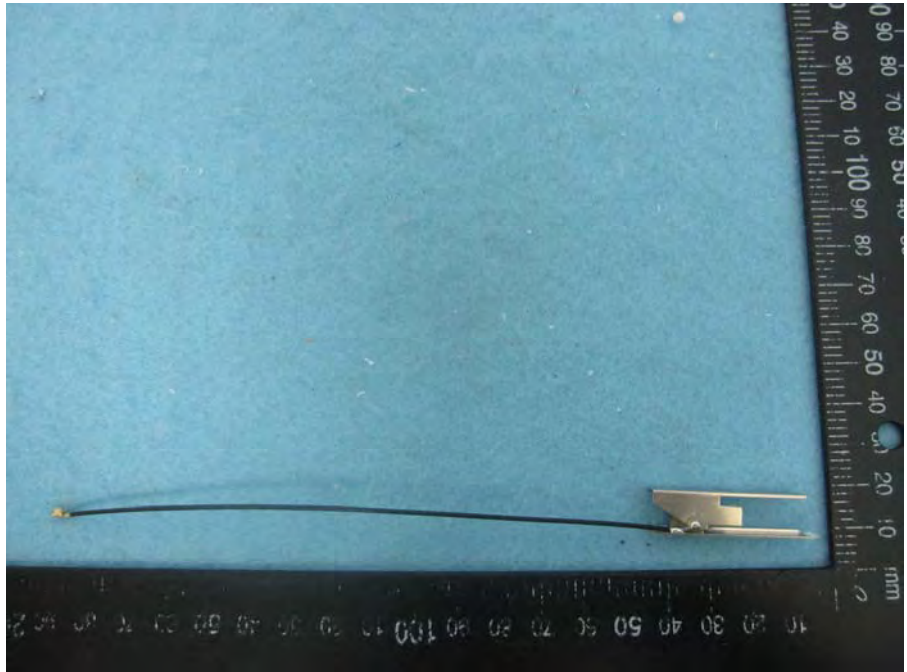
PIFA Antenna

Cable length: 400mm





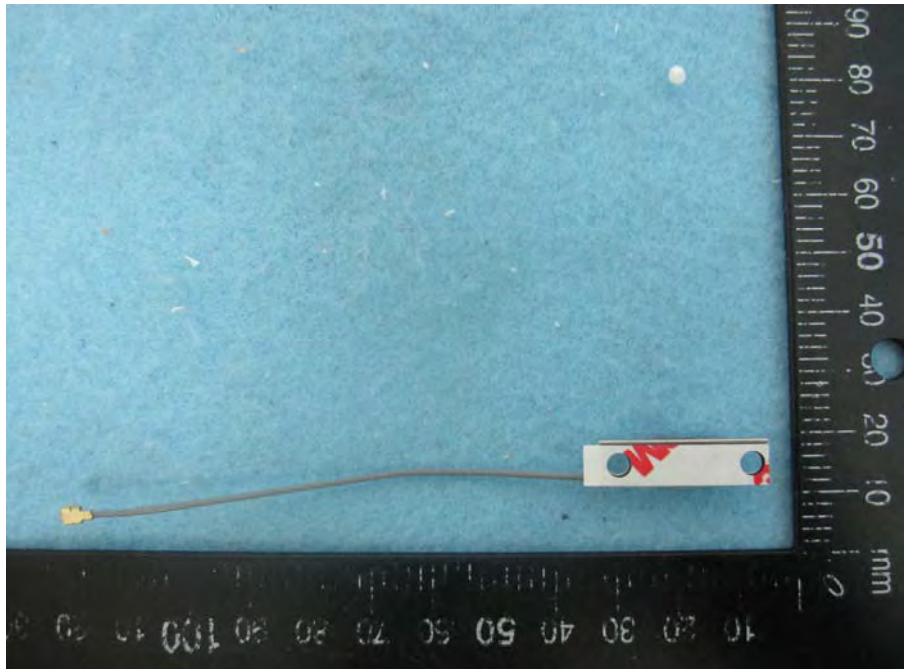
PIFA Antenna
Cable length: 150mm

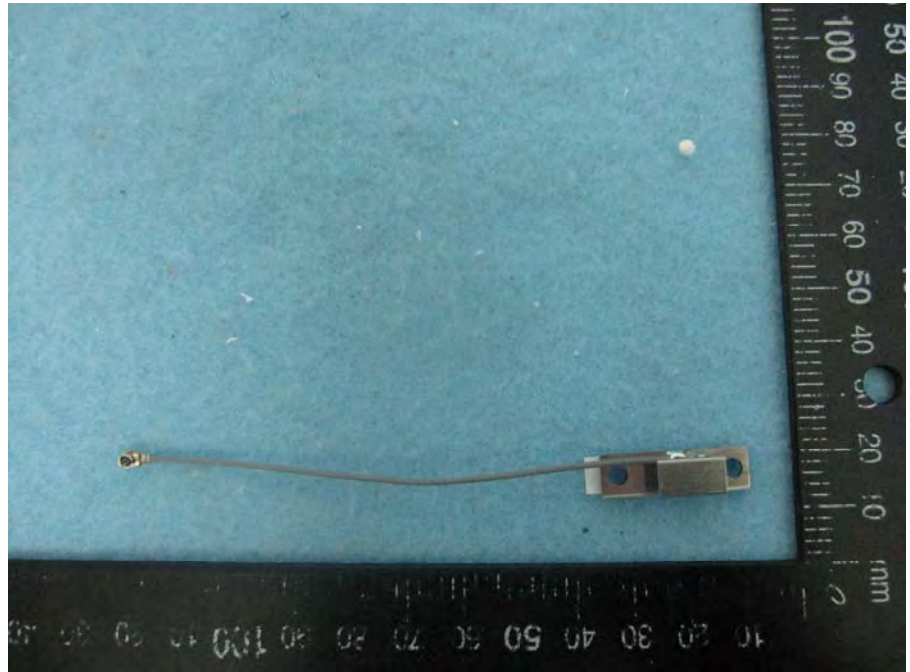




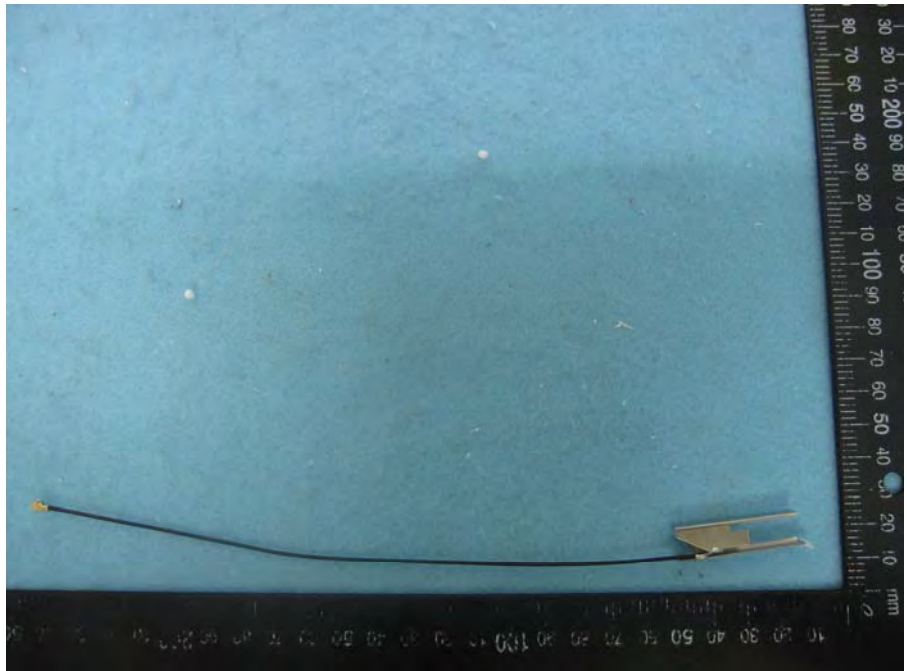
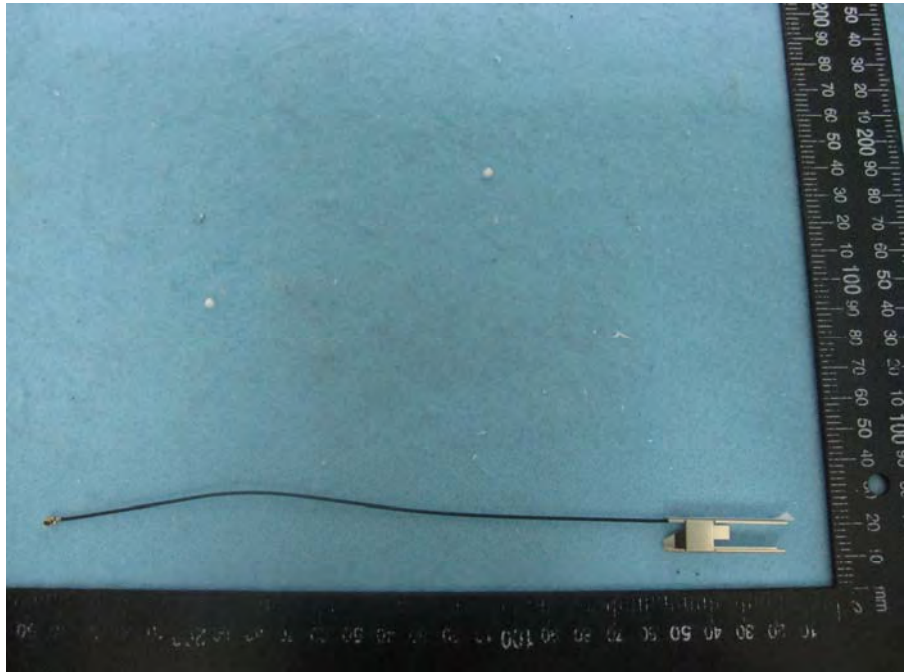
PIFA Antenna

Cable length: 99mm





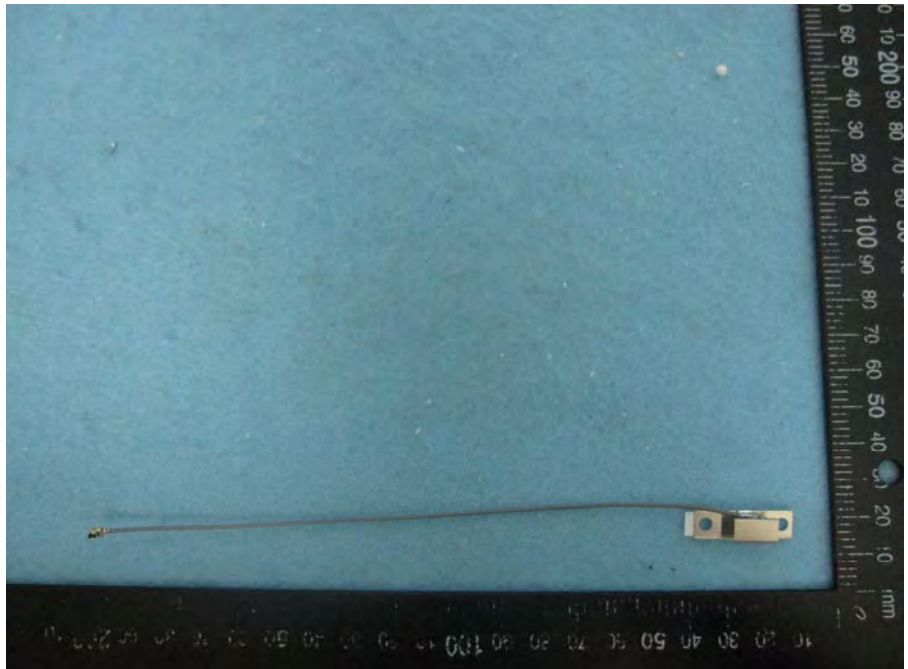
PIFA Antenna
Cable length: 206mm

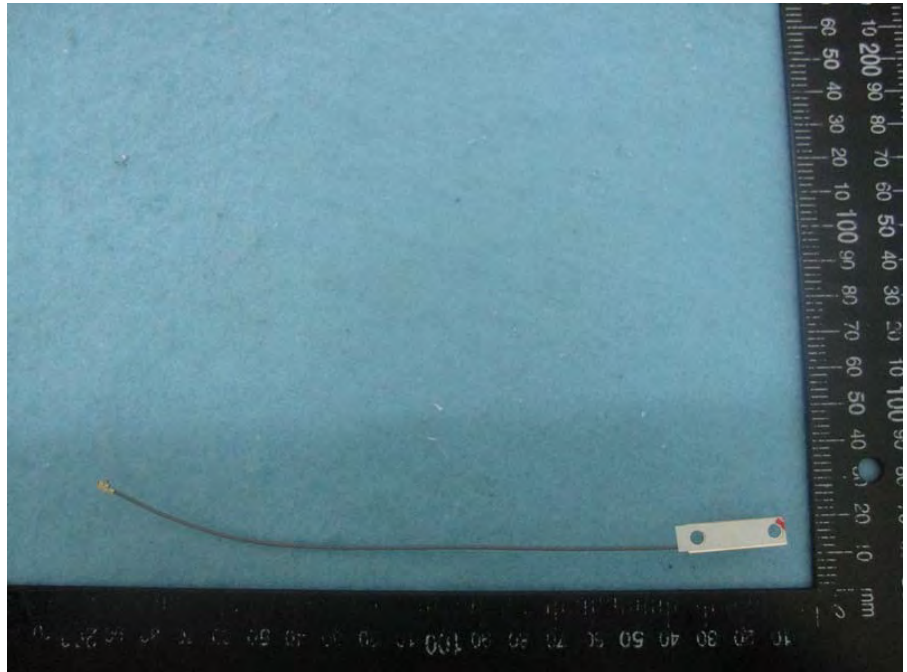




PIFA Antenna

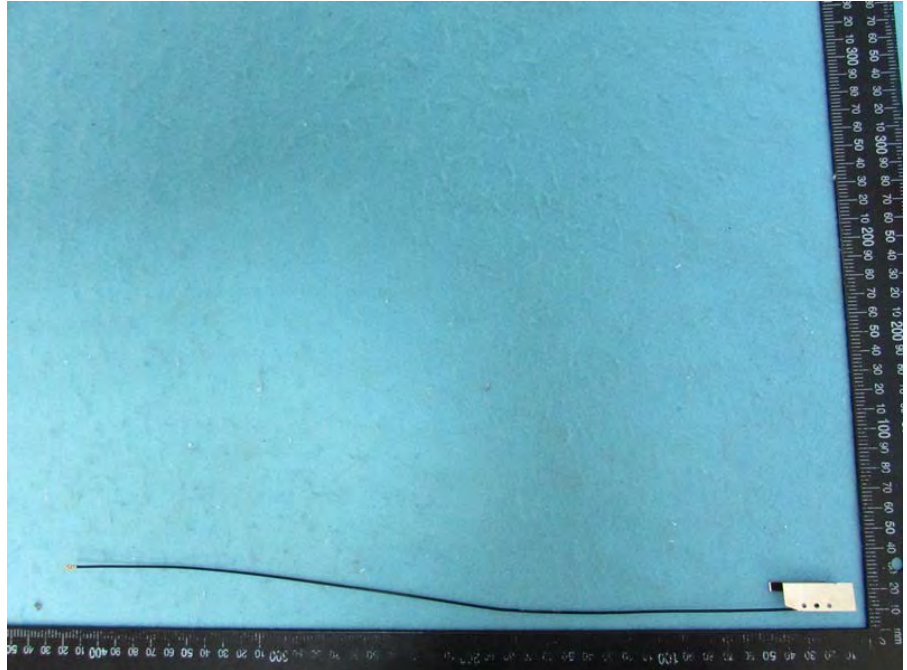
Cable length: 180mm





PIFA Antenna

Cable length: 400mm





PIFA Antenna

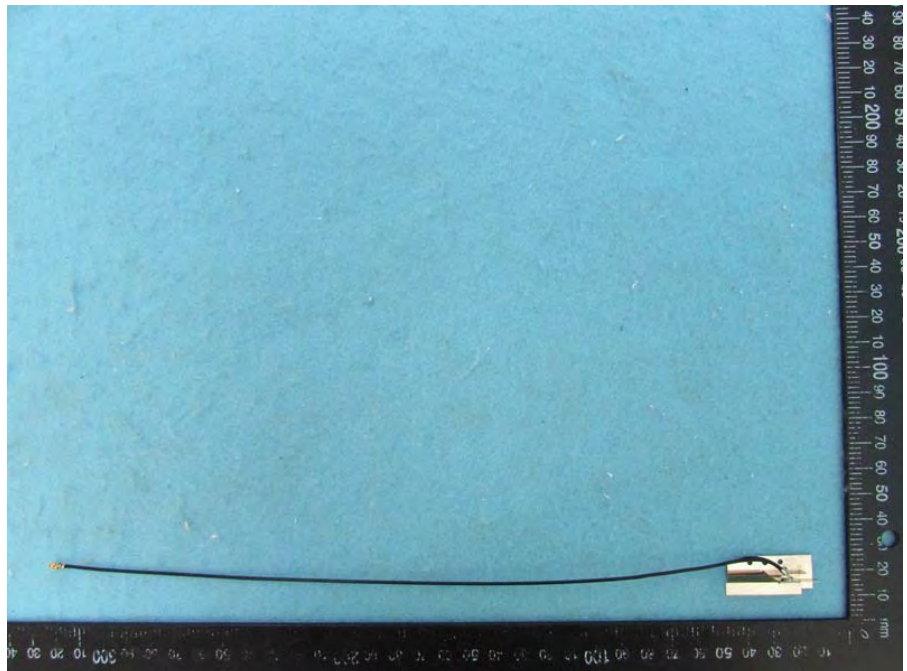
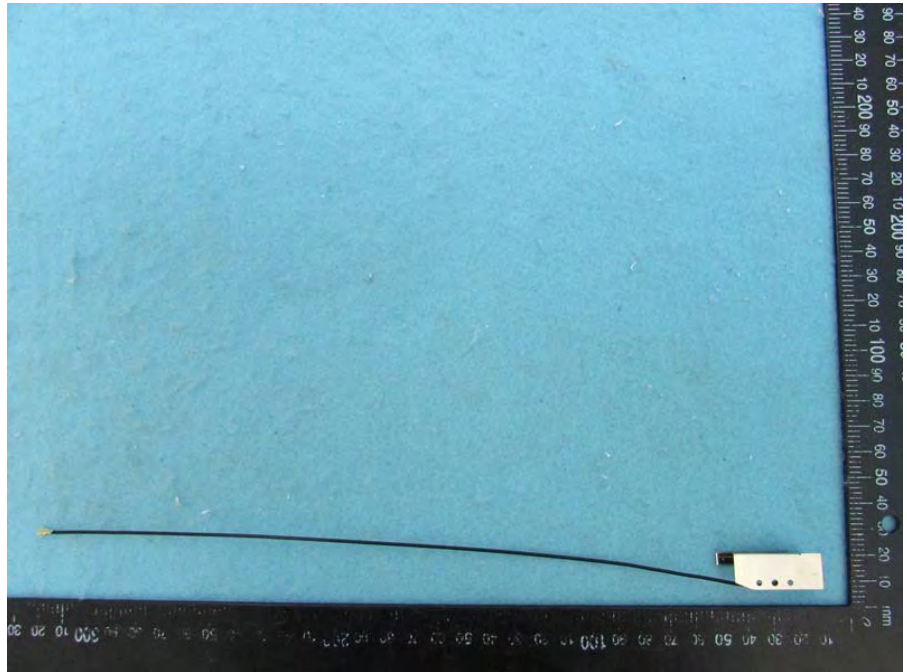
Cable length: 400mm





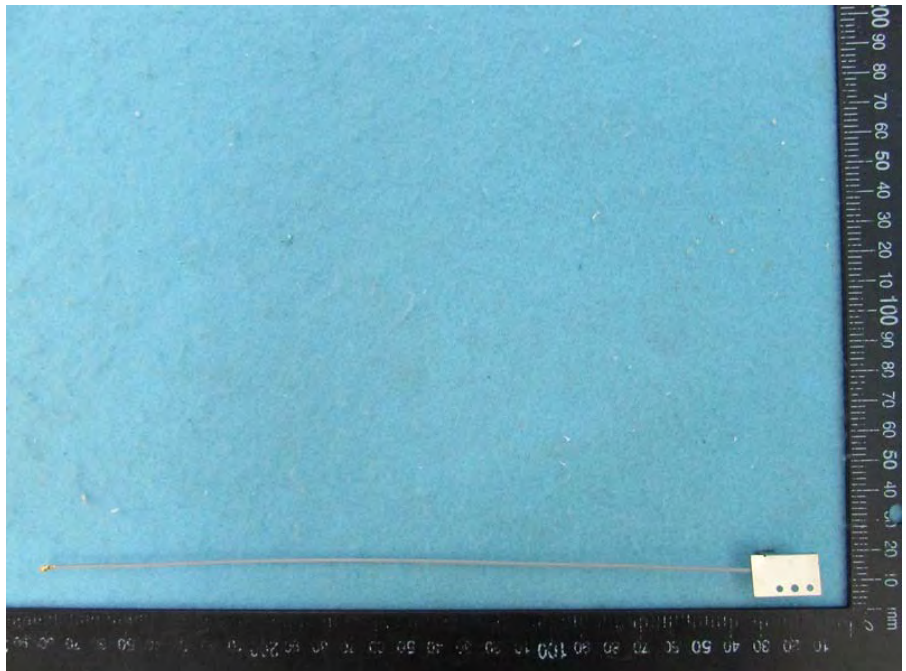
PIFA Antenna

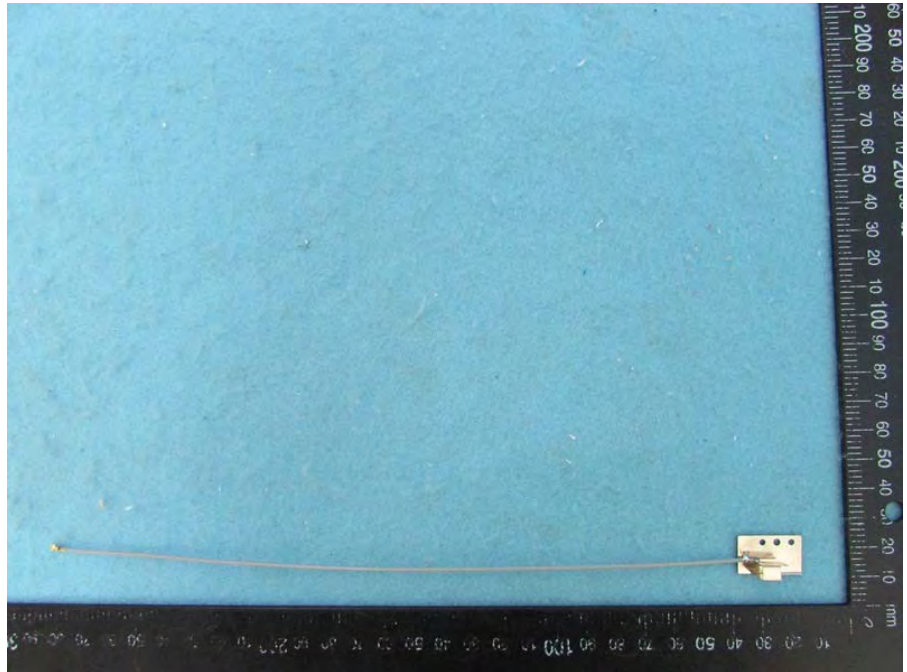
Cable length: 300mm





PIFA Antenna
Cable length: 250mm

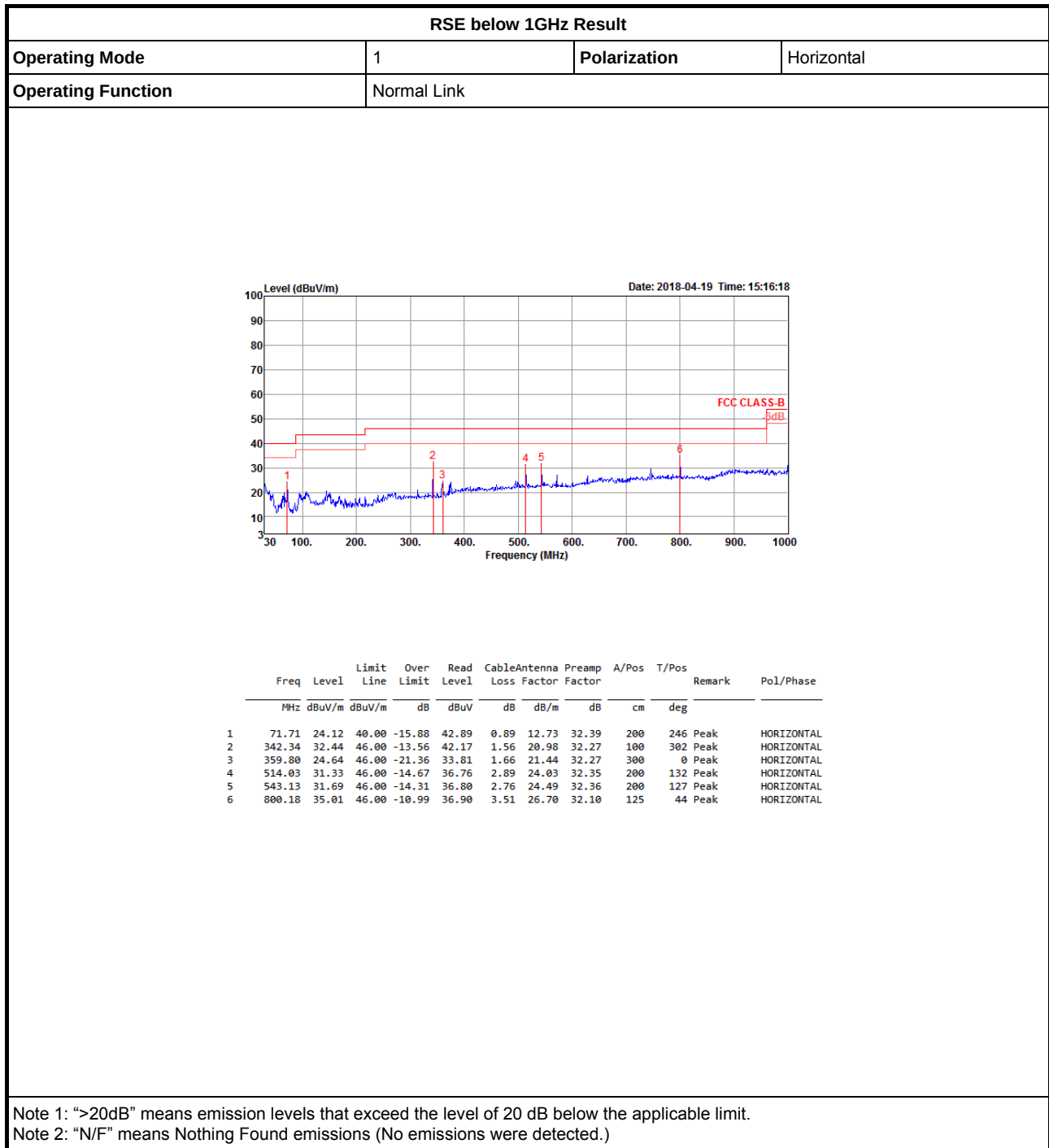






RSE below 1GHz Result

Appendix B





RSE below 1GHz Result

Appendix B

