FCC RF Test Report

APPLICANT	:	TECOM CO., LTD.
EQUIPMENT	:	WiMAX Indoor CPE
BRAND NAME	:	Alvarion
MODEL NAME	:	WM5347N-3G8
FCC ID	:	D6XWM5347N
STANDARD	:	47 CFR Part 2, 90(Z)
CLASSIFICATION	:	Licensed Non-Broadcast Station Transmitter (TNB)
TX FREQUENCY RANGE	:	3650 MHz ~ 3700 MHz
Rx FREQUENCY RANGE	:	3650 MHz ~ 3700 MHz
MAX. EIRP POWER	:	0.36 W (QPSK, BW 5MHz) 0.41 W (QPSK, BW 10MHz) 0.34 W (16QAM, BW 5MHz) 0.43 W (16QAM, BW 10MHz)
MAX. EIRP POWER DENSITY	:	0.07 W/MHz (QPSK, BW 5MHz) 0.06 W/MHz (QPSK, BW 10MHz) 0.10 W/MHz (16QAM, BW 5MHz) 0.06 W/MHz (16QAM, BW 10MHz)
EMISSION DESIGNATOR	:	4M48G7D (QPSK, BW 5MHz) 9M32G7D (QPSK, BW 10MHz) 4M48W7D (16QAM, BW 5MHz) 9M32W7D (16QAM, BW 10MHz)

The product was received on Aug. 10, 2011 and completely tested on Aug. 22, 2011. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and 47 CFR FCC Part 90 Subpart Z and shown compliance with the applicable technical standards.
The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FW180414	Rev. 01	Initial issue of report	Sep. 14, 2011
FW180414	Rev. 02	Modified statement for Power Density in §3.1	Mar. 21, 2012

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1033 §2.1046 §90.1321	Maximum Output Power / Power Density	< 25 Watt / 25MHz < 1 Watts / 1MHz	PASS	-
3.1	§2.1033 §2.1046 §90.1323	Band Edge Emissions	< -13 dBm	PASS	-
3.1	§90.1321	Equivalent Isotropic Radiated Power / EIRP Density	< 25 Watt / 25MHz < 1 Watts / 1MHz	PASS	-
3.2	§2.1049	Emissions Bandwidth	N/A	PASS	-
3.3	§2.1051 §90.1323	Conducted Spurious Emissions	< $43+10\log_{10}$(P[Watts])	PASS	-
3.4	§2.1053 §90.1323	Field Strength of Spurious Radiation	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 17.37 dB at 11025 MHz
3.5	§2.1055	Frequency Stability for Temperature & Voltage	2.5 ppm	PASS	-

1 General Description

1.1 Applicant

TECOM CO., LTD.
23, R&D ROAD 2 SCIENCE-BASED INDUSTRIAL PARK HSIN-CHU TAIWAN R.O.C.

1.2 Manufacturer

TECOM CO.,LTD.
23, R&D ROAD 2 SCIENCE-BASED INDUSTRIAL PARK HSIN-CHU TAIWAN R.O.C.

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	WiMAX Indoor CPE
Brand Name	Alvarion
Model Name	WM5347N-3G8
FCC ID	D6XWM5347N
Tx Frequency	3650 MHz ~ 3700 MHz
Rx Frequency	3650 MHz ~ 3700 MHz
Channel Bandwidth	5MHz / 10MHz
Maximum Output Power to Antenna	27.17 dBm (QPSK, BW 5MHz) 27.28 dBm (QPSK, BW 10MHz) 27.34 dBm (16QAM, BW 5MHz) 27.30 dBm (16QAM, BW 10MHz)
Maximum EIRP	0.36 W (25.55 dBm) (QPSK, BW 5MHz) 0.41 W (26.12 dBm) (QPSK, BW 10MHz) 0.34 W (25.29 dBm) (16QAM, BW 5MHz) 0.43 W (26.32 dBm) (16QAM, BW 10MHz)
Maximum EIRP Density	0.07 W/MHz (18.15 dBm/MHz) (QPSK, BW 5MHz) 0.06 W/MHz (17.87 dBm/MHz) (QPSK, BW 10MHz) 0.10 W/MHz (20.13 dBm/MHz) (16QAM, BW 5MHz) 0.06 W/MHz (17.70 dBm/MHz) (16QAM, BW 10MHz)
Antenna Type	PCB Antenna
HW Version	RD6
SW Version	V2881
Type of Modulation	Uplink : OFDMA (QPSK / 16QAM)
Type of Emission	4M48G7D (QPSK, BW 5MHz) 9M32G7D (QPSK, BW 10MHz) 4M48W7D (16QAM, BW 5MHz) 9M32W7D (16QAM, BW 10MHz)
EUT Stage	Production Unit

Remark:

1. This test report recorded only product characteristics and test results of Licensed Non-Broadcast Station Transmitter (TNB).

2. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	**Sporton Site No.**		**FCC Registration No.**
	TH02-HY	03CH07-HY	D6XWM5347N

1.5 Applied Standards

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

- 47 CFR Part 2, 90(Z)
- ANSI C63.4-2003
- ANSI TIA-603-C-2004

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.

2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B (Certification), recorded in a separate test report.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	WiMAX Base Station	Agilent	E6651A	N/A	N/A	Unshielded, 1.8 m
2.	Notebook	Acer	Z12	FCC DoC	N/Ac	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range.

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
802.16e (Modulation : OFDMA)	■ QPSK, BW 5MHz Link ■ QPSK, BW 10MHz Link ■ 16QAM, BW 5MHz Link ■ 16QAM, BW 10MHz Link	■ QPSK, BW 5MHz Link ■ QPSK, BW 10MHz Link ■ 16QAM, BW 5MHz Link ■ 16QAM, BW 10MHz Link

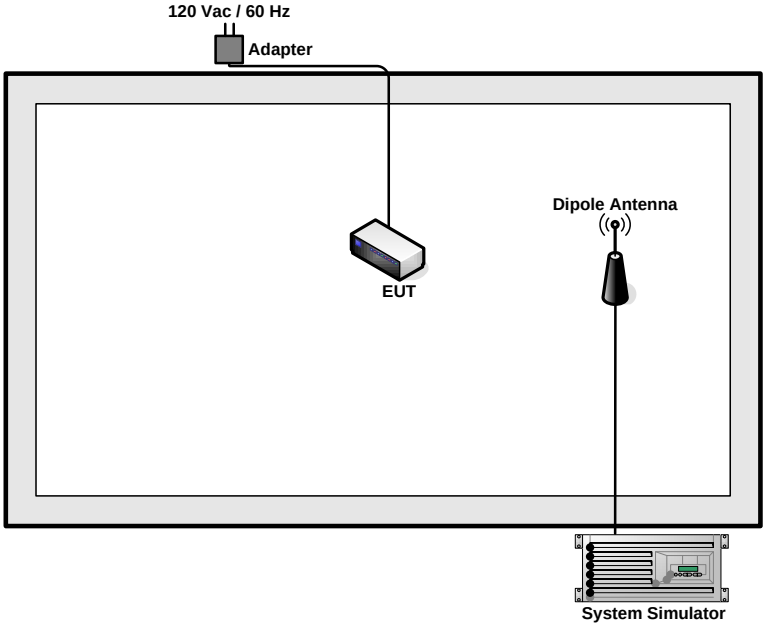
Note: The maximum average power levels are on PUSC and coding rate, 1/2 mode for QPSK, BW 5MHz, QPSK, BW 10MHz, 16QAM, BW 5MHz, and 16QAM, BW 10MHz Link ; only these modes were used for all tests.

The conducted power tables are as follows:

Conducted Power								
Channel	**Modulation Type**	**Coding Rate**	**5MHz Bandwidth**			**10MHz Bandwidth**		
			Total Power (dBm)	**Power Density (dBm/MHz)**	**PAR (dB)**	**Total Power (dBm)**	**Power Density (dBm/MHz)**	**PAR (dB)**
Low	**QPSK**	1/2	26.80	20.83	10.16	26.99	18.25	10.60
		3/4	27.02	20.66	10.32	**27.28**	18.48	10.52
	16QAM	1/2	**27.34**	20.86	10.28	**27.30**	18.75	10.48
		3/4	26.73	20.63	10.20	26.97	18.23	10.72
Middle	**QPSK**	1/2	26.78	20.65	10.28	27.08	18.35	10.64
		3/4	**27.17**	20.84	10.28	27.22	18.64	10.68
	16QAM	1/2	26.95	20.57	10.16	26.80	18.35	10.56
		3/4	26.72	21.09	10.12	27.06	18.26	10.60
High	**QPSK**	1/2	27.07	21.24	10.32	27.14	18.34	10.68
		3/4	26.69	20.44	10.24	26.66	18.21	10.68
	16QAM	1/2	26.55	20.63	10.36	26.92	18.09	10.68
		3/4	26.97	20.81	10.32	26.74	18.19	10.76

Note: PAR = Peak to Average Ratio

2.2 Connection Diagram of Test System



3 Test Result

3.1 Maximum Output Power, Band Edge, Effective Isotropic Radiated Power and EIRP Density Measurement

3.1.1 Limit

For fixed and base stations are limited to 25 watts / 25MHz EIRP and the peak EIRP power density is limited to 1.0 watt / MHz. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (p) by a factor of fixed digital stations, the attenuation factor shall be not less than 43 + 10 log (p) dB from the channel edge.

3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

For Conducted Power and Band Edge Measurement:

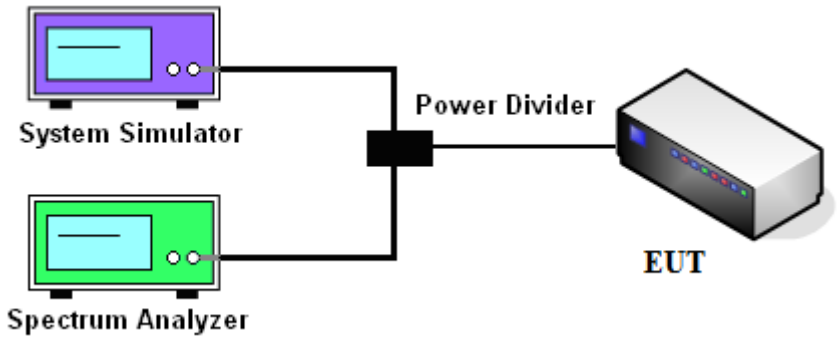
The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

For Effective Isotropic Radiated Power / EIRP Density Measurement:

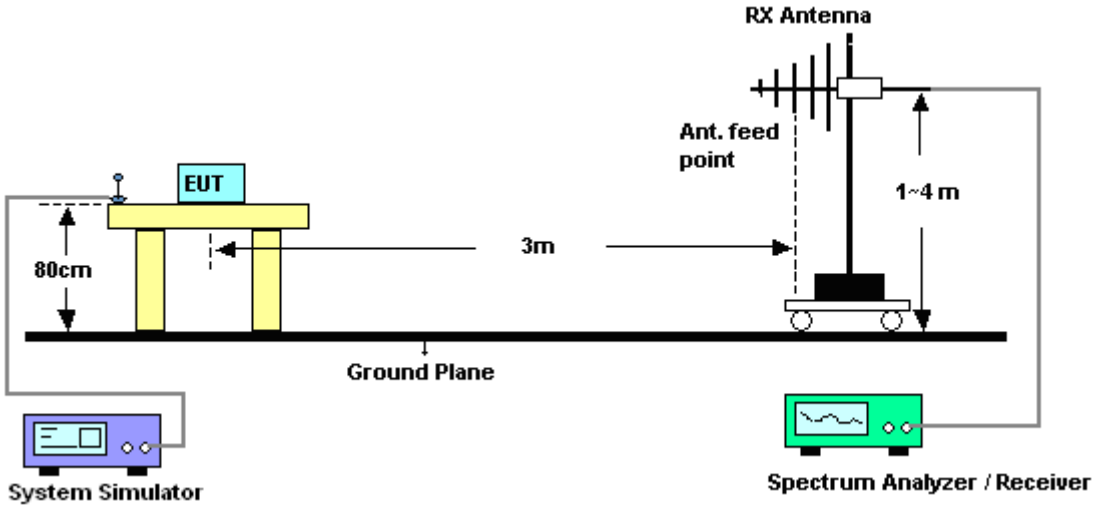
1. The EUT was placed on an non-conductive rotating platform with 0.8 meter height in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m.
2. During the measurement, the EUT was enforced in maximum power. The highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Effective Isotropic Radiated Power (EIRP) and EIRP density were measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (substitution antenna) at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, EIRP= LVL + Correction factor.

3.1.4 Test Setup

<Conducted Power and Band Edge Measurement>



<Effective Isotropic Radiated Power and EIRP Density Measurement>



3.1.5 Test Result of Maximum Output Power

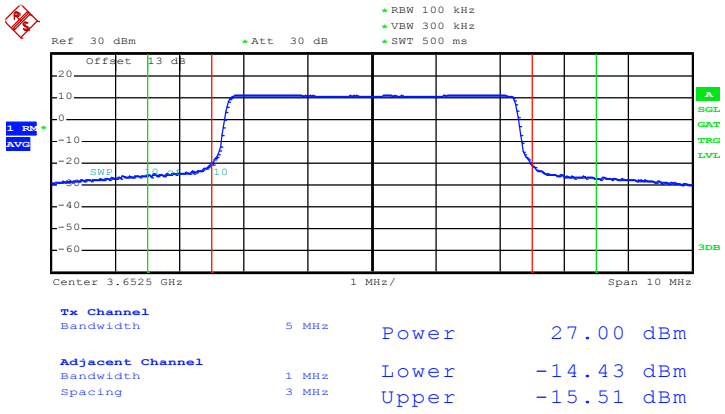
Conducted Power								
Channel	Modulation Type	Coding Rate	5MHz Bandwidth			10MHz Bandwidth		
			Total Power (dBm)	Power Density (dBm/MHz)	PAR (dB)	Total Power (dBm)	Power Density (dBm/MHz)	PAR (dB)
Low	QPSK	1/2	26.80	20.83	10.16	26.99	18.25	10.60
		3/4	27.02	20.66	10.32	**27.28**	18.48	10.52
	16QAM	1/2	**27.34**	20.86	10.28	**27.30**	18.75	10.48
		3/4	26.73	20.63	10.20	26.97	18.23	10.72
Middle	QPSK	1/2	26.78	20.65	10.28	27.08	18.35	10.64
		3/4	**27.17**	20.84	10.28	27.22	18.64	10.68
	16QAM	1/2	26.95	20.57	10.16	26.80	18.35	10.56
		3/4	26.72	21.09	10.12	27.06	18.26	10.60
High	QPSK	1/2	27.07	21.24	10.32	27.14	18.34	10.68
		3/4	26.69	20.44	10.24	26.66	18.21	10.68
	16QAM	1/2	26.55	20.63	10.36	26.92	18.09	10.68
		3/4	26.97	20.81	10.32	26.74	18.19	10.76

Note: PAR = Peak to Average Ratio

3.1.6 Test Result of Band Edge Measurement

Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 5MHz		

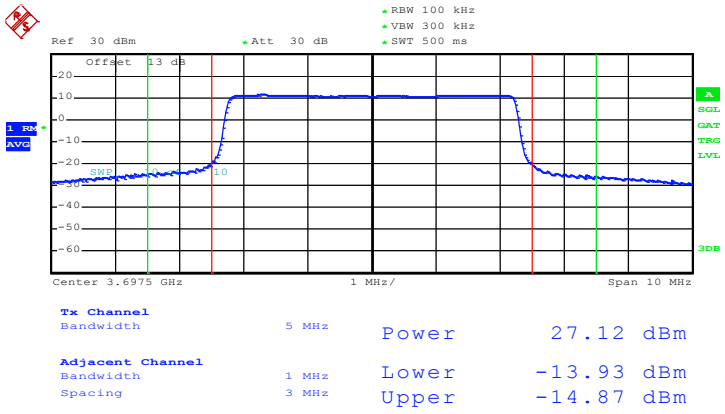
Band Edge Plot on Low Channel



Bandedge limit: -13dBm

Date: 17.AUG.2011 16:04:20

Band Edge Plot on High Channel

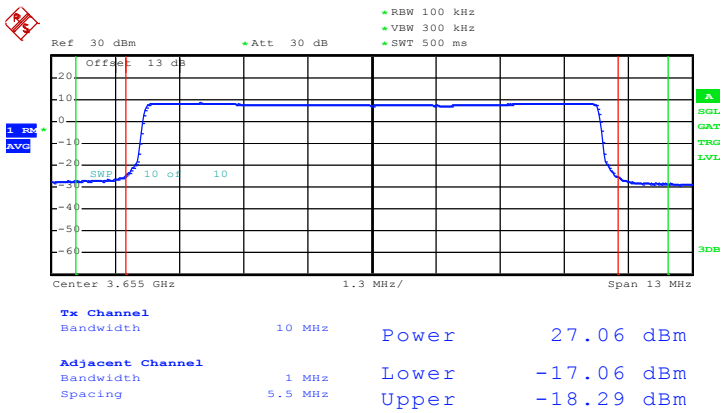


Bandedge limit: -13dBm

Date: 17.AUG.2011 16:00:48

Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 10MHz		

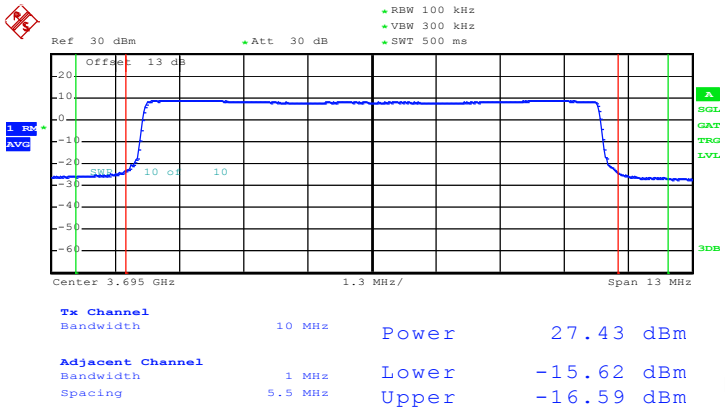
Edge Plot on Low Channel



Bandedge limit: -13dBm

Date: 17.AUG.2011 16:06:47

Band Edge Plot on High Channel



Bandedge limit: -13dBm

Date: 17.AUG.2011 16:07:57

3.1.7 Test Result of Effective Isotropic Radiated Power

802.16e (QPSK, BW 5MHz) Radiated Power (EIRP)				
Horizontal Polarization				
Channel	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
Low	-20.30	44.79	24.49	0.28
Middle	-19.57	45.12	25.55	0.36
High	-21.68	45.3	23.62	0.23
Vertical Polarization				
Channel	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
Low	-23.51	45.95	22.44	0.18
Middle	-23.48	46.04	22.56	0.18
High	-24.33	47.13	22.80	0.19

802.16e (QPSK, BW 10MHz) Radiated Power (EIRP)				
Horizontal Polarization				
Channel	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
Low	-20.70	44.76	24.06	0.25
Middle	-19.83	45.12	25.29	0.34
High	-20.17	45.48	25.31	0.34
Vertical Polarization				
Channel	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
Low	-20.83	46.12	25.29	0.34
Middle	-21.85	46.04	24.19	0.26
High	-21.04	47.16	26.12	0.41

802.16e (16QAM, BW 5MHz) Radiated Power (EIRP)				
Horizontal Polarization				
Channel	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
Low	-20.41	44.79	24.38	0.27
Middle	-20.02	45.12	25.10	0.32
High	-20.01	45.3	25.29	0.34
Vertical Polarization				
Channel	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
Low	-22.41	45.95	23.54	0.23
Middle	-23.31	46.04	22.73	0.19
High	-22.96	47.13	24.17	0.26

802.16e (16QAM, BW 10MHz) Radiated Power (EIRP)				
Horizontal Polarization				
Channel	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
Low	-20.85	44.76	23.91	0.25
Middle	-19.95	45.12	25.17	0.33
High	-19.98	45.48	25.50	0.35
Vertical Polarization				
Channel	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
Low	-20.67	46.12	25.45	0.35
Middle	-21.90	46.04	24.14	0.26
High	-20.84	47.16	26.32	0.43

3.1.8 Test Result of Effective Isotropic Radiated Power Density

802.16e (QPSK, BW 5MHz) EIRP Density				
Horizontal Polarization				
Channel	**LVL (dBm/MHz)**	**Correction Factor (dB)**	**EIRP Density (dBm/MHz)**	**EIRP Density (W/MHz)**
Low	-26.96	44.79	17.83	0.06
Middle	-26.97	45.12	18.15	0.07
High	-28.92	45.3	16.38	0.04
Vertical Polarization				
Channel	**LVL (dBm/MHz)**	**Correction Factor (dB)**	**EIRP Density (dBm/MHz)**	**EIRP Density (W/MHz)**
Low	-28.73	45.95	17.22	0.05
Middle	-28.00	46.04	18.04	0.06
High	-31.03	47.13	16.10	0.04

802.16e (QPSK, BW 10MHz) EIRP Power Density				
Horizontal Polarization				
Channel	**LVL (dBm/MHz)**	**Correction Factor (dB)**	**EIRP Density (dBm/MHz)**	**EIRP Density (W/MHz)**
Low	-28.72	44.76	16.04	0.04
Middle	-27.97	45.12	17.15	0.05
High	-28.51	45.48	16.97	0.05
Vertical Polarization				
Channel	**LVL (dBm/MHz)**	**Correction Factor (dB)**	**EIRP Density (dBm/MHz)**	**EIRP Density (W/MHz)**
Low	-31.31	46.12	14.81	0.03
Middle	-29.58	46.04	16.46	0.04
High	-29.29	47.16	17.87	0.06

802.16e (16QAM, BW 5MHz) EIRP Power Density				
Horizontal Polarization				
Channel	**LVL (dBm/MHz)**	**Correction Factor (dB)**	**EIRP Density (dBm/MHz)**	**EIRP Density (W/MHz)**
Low	-25.57	44.79	19.22	0.08
Middle	-24.99	45.12	20.13	0.10
High	-26.00	45.3	19.30	0.09
Vertical Polarization				
Channel	**LVL (dBm/MHz)**	**Correction Factor (dB)**	**EIRP Density (dBm/MHz)**	**EIRP Density (W/MHz)**
Low	-27.48	45.95	18.47	0.07
Middle	-28.08	46.04	17.96	0.06
High	-27.81	47.13	19.32	0.09

802.16e (16QAM, BW 10MHz) EIRP Power Density				
Horizontal Polarization				
Channel	**LVL (dBm/MHz)**	**Correction Factor (dB)**	**EIRP Density (dBm/MHz)**	**EIRP Density (W/MHz)**
Low	-28.59	44.76	16.17	0.04
Middle	-28.07	45.12	17.05	0.05
High	-28.54	45.48	16.94	0.05
Vertical Polarization				
Channel	**LVL (dBm/MHz)**	**Correction Factor (dB)**	**EIRP Density (dBm/MHz)**	**EIRP Density (W/MHz)**
Low	-31.44	46.12	14.68	0.03
Middle	-29.43	46.04	16.61	0.05
High	-29.46	47.16	17.70	0.06

3.2 Emission Bandwidth

3.2.1 Description of Emission Bandwidth Measurement

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. The designated emission bandwidth using a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission and a video bandwidth is more than resolution bandwidth.

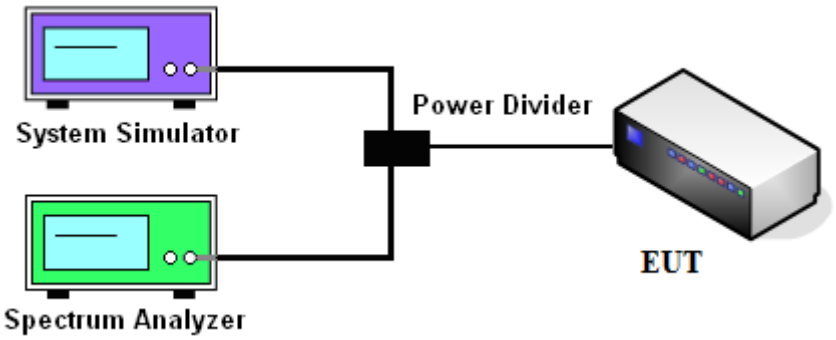
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and System Simulator via power divider.
2. The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers were measured.

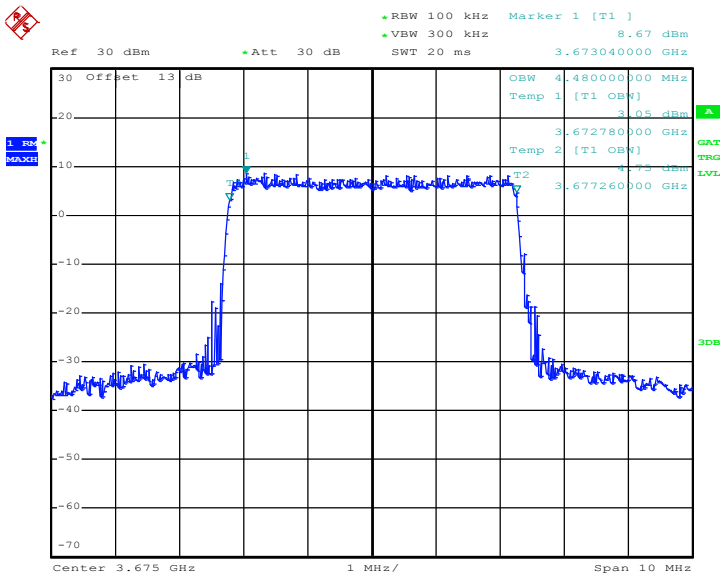
3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

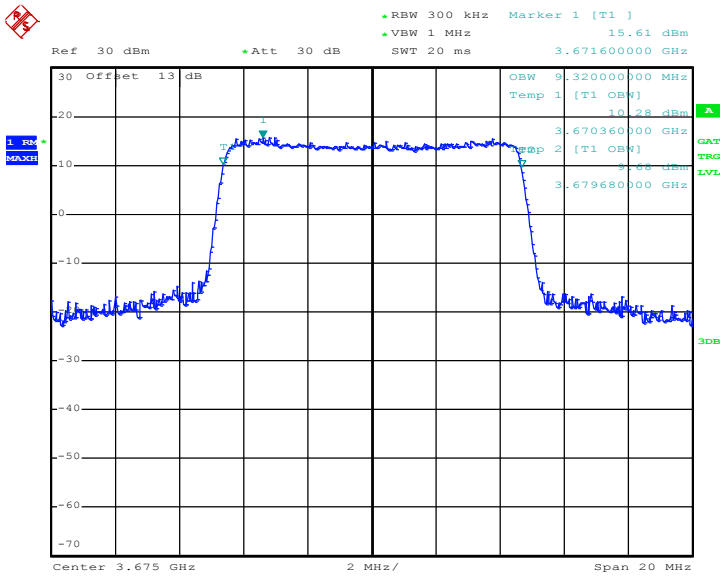
Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 5MHz		

99% Occupied Bandwidth Plot on Middle Channel



Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 10MHz		

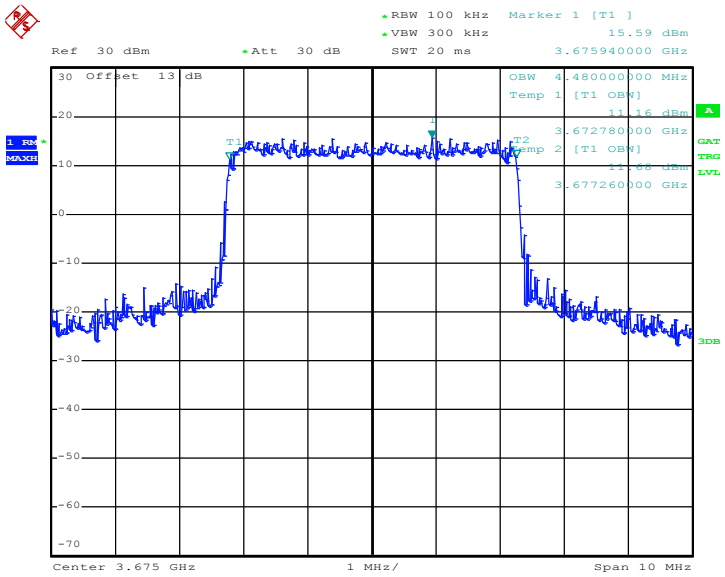
99% Occupied Bandwidth Plot on Middle Channel



Date: 17.AUG.2011 13:56:46

Band :	802.16e	Power Stage :	High
Test Mode :	16QAM, BW 5MHz		

99% Occupied Bandwidth Plot on Middle Channel



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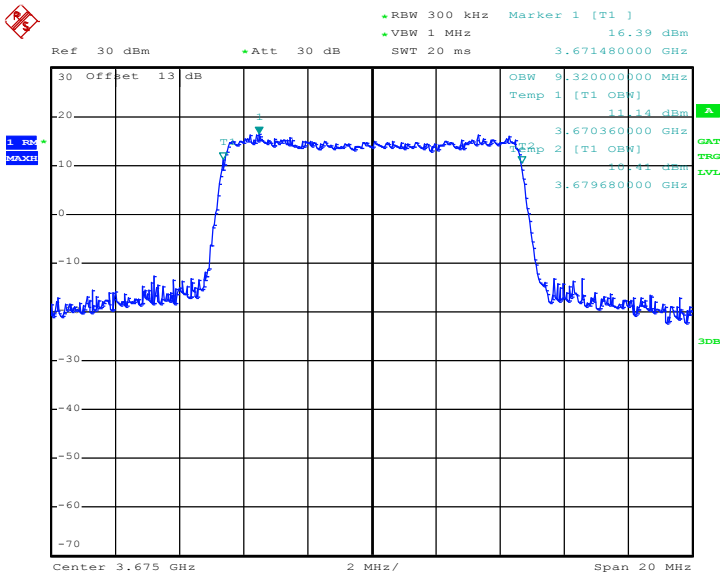
Band :	802.16e	Power Stage :	High
Test Mode :	16QAM, BW 10MHz		

99% Occupied Bandwidth Plot on Middle Channel



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3.3 Conducted Spurious Emission Measurement

3.3.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of mobile digital stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge and 55 + 10 log (P) dB at 5.5 MHz from the channel edges. It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10^{th} harmonic.

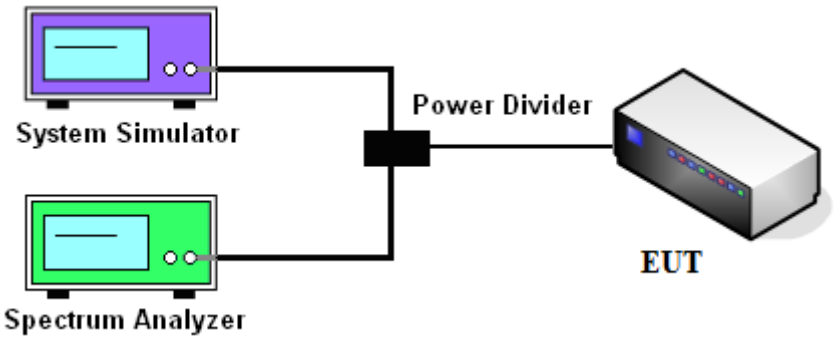
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The EUT was connected to spectrum analyzer and System Simulator via power divider.
2. The conducted spurious emission for the whole frequency range was taken.

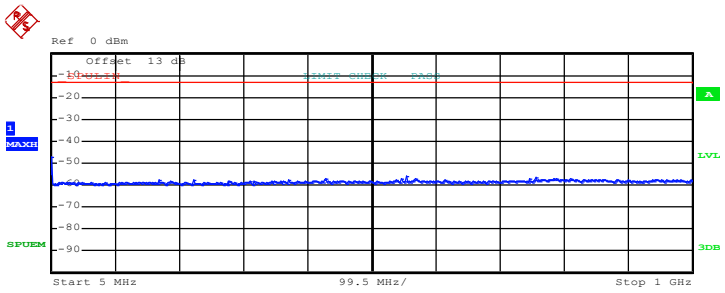
3.3.4 Test Setup



3.3.5 Test Plots of Spurious Emission

Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 5MHz	Channel :	Low

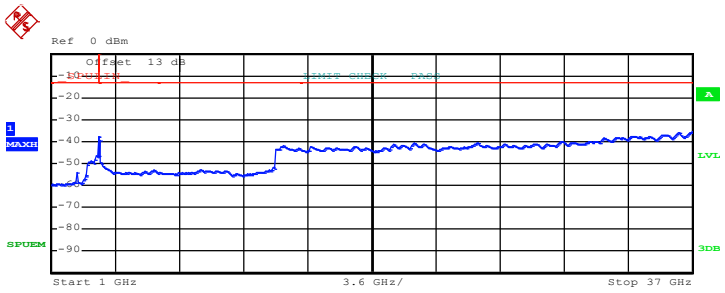
Conducted Spurious Emission Plot between 5MHz ~ 1GHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
5.000 M	1.000 G	1.00 M	5.000000 M	-47.20	-34.20

Date: 17.AUG.2011 16:35:14

Conducted Spurious Emission Plot between 1GHz ~ 37GHz

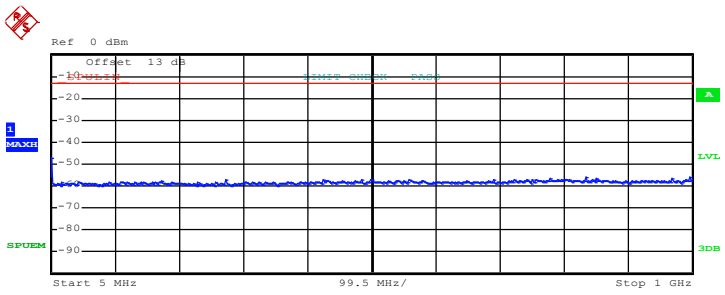


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.640 G	1.00 M	3.638680 G	-37.75	-24.75
3.665 G	7.000 G	1.00 M	3.666668 G	-39.67	-26.67
7.000 G	15.000 G	1.00 M	14.064000 G	-42.05	-29.05
15.000 G	37.000 G	1.00 M	36.978000 G	-35.68	-22.68

Date: 17.AUG.2011 16:41:26

Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 5MHz	Channel :	Middle

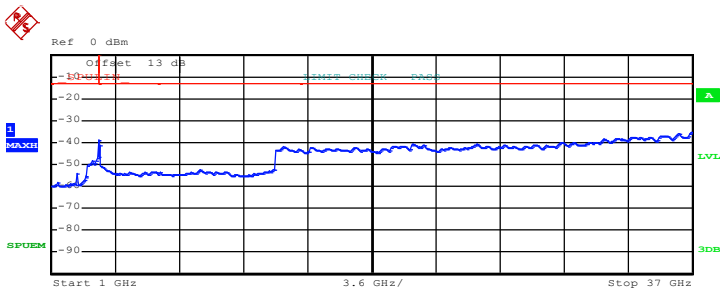
Conducted Spurious Emission Plot between 5MHz ~ 1GHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
5.000 M	1.000 G	1.00 M	5.000000 M	-47.26	-34.26

Date: 17.AUG.2011 16:37:53

Conducted Spurious Emission Plot between 1GHz ~ 37GHz

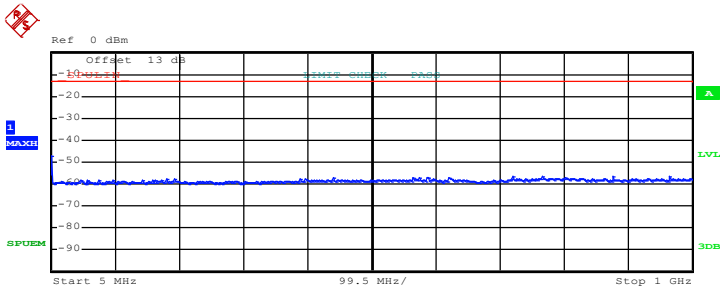


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.663 G	1.00 M	3.661169 G	-40.65	-27.65
3.688 G	7.000 G	1.00 M	3.689156 G	-45.13	-32.13
7.000 G	15.000 G	1.00 M	14.016000 G	-41.91	-28.91
15.000 G	37.000 G	1.00 M	36.890000 G	-35.61	-22.61

Date: 17.AUG.2011 16:39:50

Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 5MHz	Channel :	High

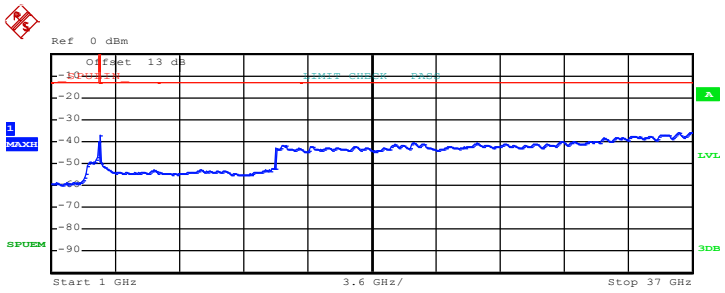
Conducted Spurious Emission Plot between 5MHz ~ 1GHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
5.000 M	1.000 G	1.00 M	5.000000 M	-47.21	-34.21

Date: 17.AUG.2011 16:36:48

Conducted Spurious Emission Plot between 1GHz ~ 37GHz

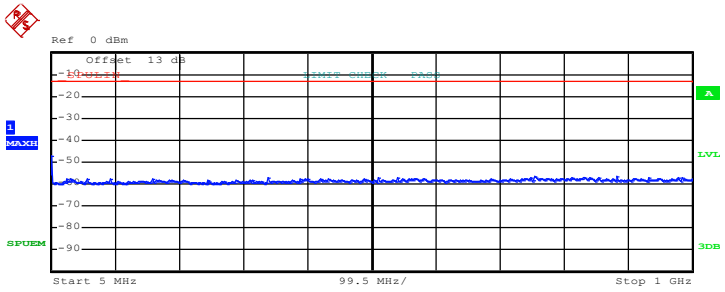


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.685 G	1.00 M	3.683657 G	-39.97	-26.97
3.710 G	7.000 G	1.00 M	3.711645 G	-42.02	-29.02
7.000 G	15.000 G	1.00 M	13.996000 G	-41.94	-28.94
15.000 G	37.000 G	1.00 M	36.978000 G	-35.72	-22.72

Date: 17.AUG.2011 16:42:30

Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 10MHz	Channel :	Low

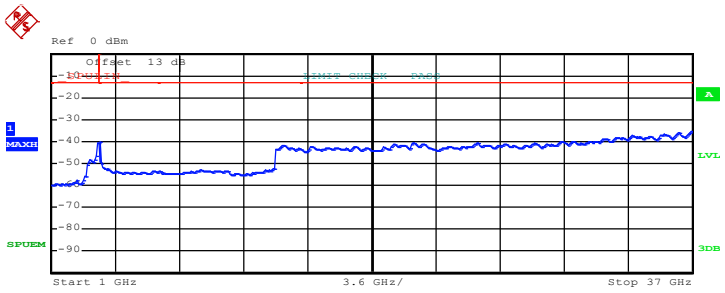
Conducted Spurious Emission Plot between 5MHz ~ 1GHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
5.000 M	1.000 G	1.00 M	5.000000 M	-47.22	-34.22

Date: 17.AUG.2011 16:33:37

Conducted Spurious Emission Plot between 1GHz ~ 37GHz

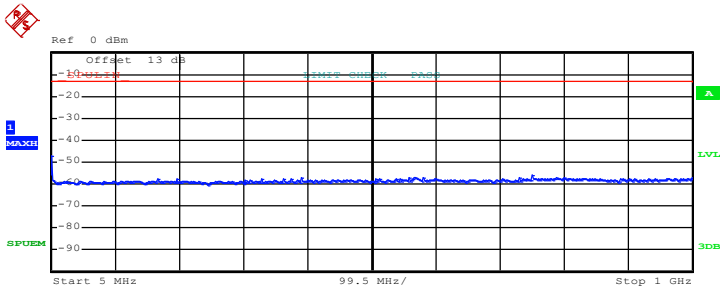


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.630 G	1.00 M	3.626055 G	-40.59	-27.59
3.680 G	7.000 G	1.00 M	3.681660 G	-40.34	-27.34
7.000 G	15.000 G	1.00 M	13.992000 G	-41.66	-28.66
15.000 G	37.000 G	1.00 M	36.934000 G	-35.56	-22.56

Date: 17.AUG.2011 16:27:13

Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 10MHz	Channel :	Middle

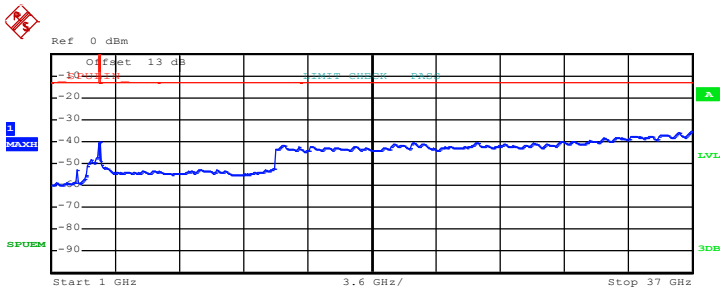
Conducted Spurious Emission Plot between 5MHz ~ 1GHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
5.000 M	1.000 G	1.00 M	5.000000 M	-47.16	-34.16

Date: 17.AUG.2011 16:32:36

Conducted Spurious Emission Plot between 1GHz ~ 37GHz

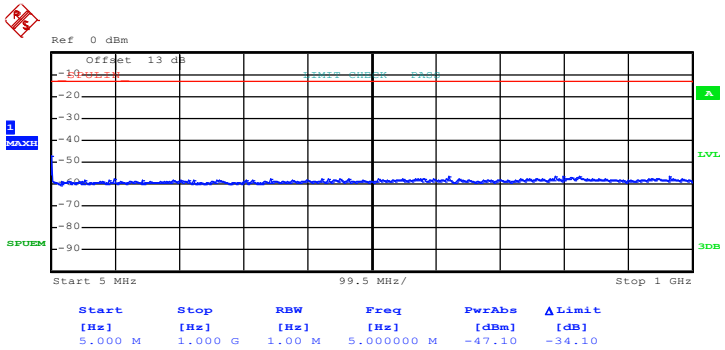


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.650 G	1.00 M	3.648675 G	-42.58	-29.58
3.700 G	7.000 G	1.00 M	3.701650 G	-40.44	-27.44
7.000 G	15.000 G	1.00 M	13.976000 G	-41.91	-28.91
15.000 G	37.000 G	1.00 M	36.978000 G	-35.51	-22.51

Date: 17.AUG.2011 16:25:34

Band :	802.16e	Power Stage :	High
Test Mode :	QPSK, BW 10MHz	Channel :	High

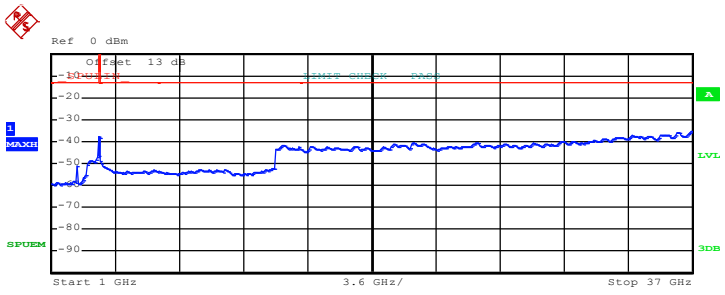
Conducted Spurious Emission Plot between 5MHz ~ 1GHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
5.000 M	1.000 G	1.00 M	5.000000 M	-47.10	-34.10

Date: 17.AUG.2011 16:31:27

Conducted Spurious Emission Plot between 1GHz ~ 37GHz



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.000 G	3.670 G	1.00 M	3.668665 G	-39.10	-26.10
3.720 G	7.000 G	1.00 M	3.721640 G	-38.83	-25.83
7.000 G	15.000 G	1.00 M	14.056000 G	-41.73	-28.73
15.000 G	37.000 G	1.00 M	36.989000 G	-35.51	-22.51

Date: 17.AUG.2011 16:30:28

3.4 Radiated Emissions Measurement

3.4.1 Description of Radiated Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of mobile digital stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge and 55 + 10 log (P) dB at 5.5 MHz from the channel edges. It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10^{th} harmonic.

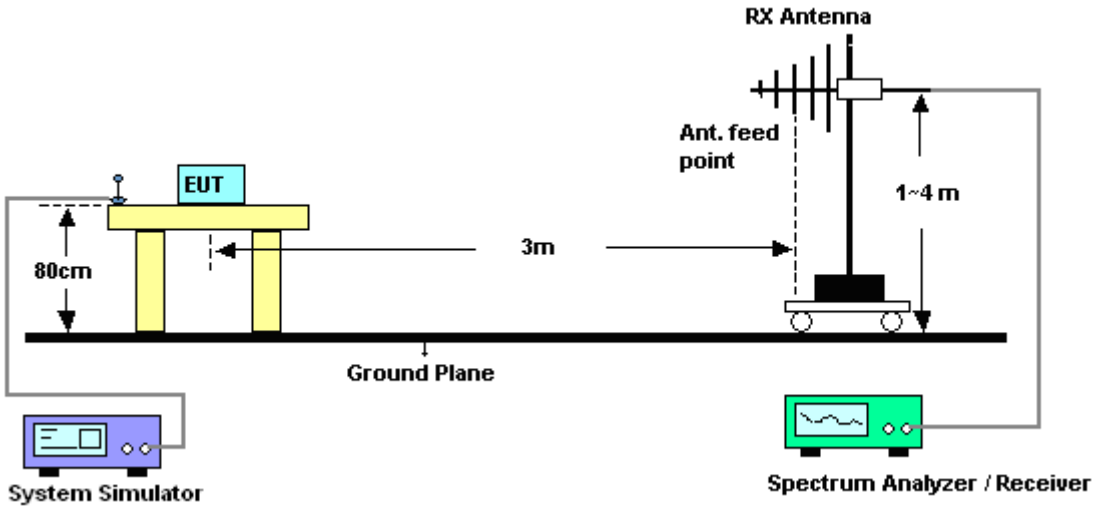
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

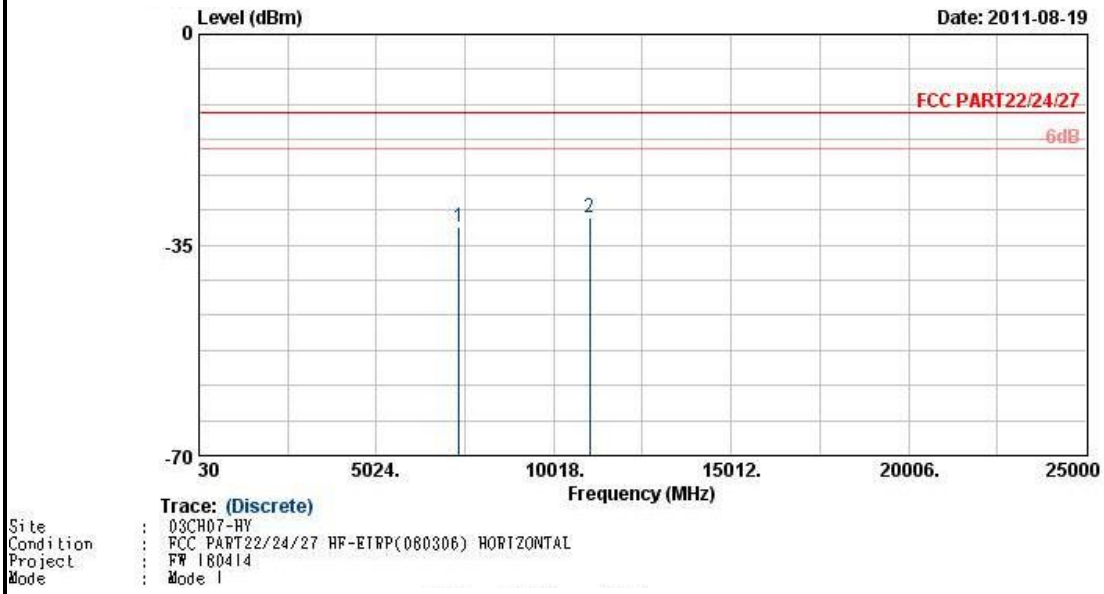
1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 1MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. Emission level (dBm) = output power + substitution Gain.

3.4.4 Test Setup



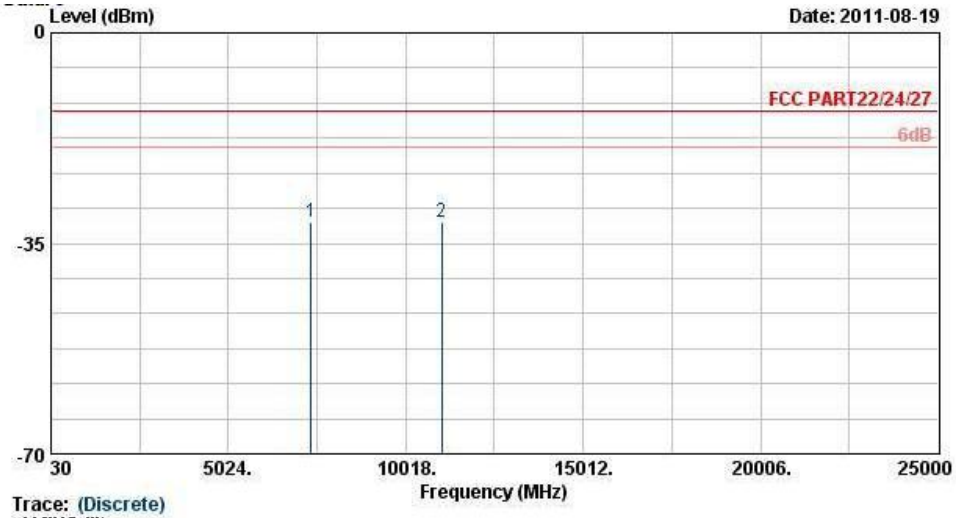
3.4.5 Test Result of Radiated Emissions

Band :	802.16e	Temperature :	22~24°C
Test Mode :	BW 5MHz, Middle Ch (2593MHz)	Relative Humidity :	45~47%
Test Engineer :	David Yang	Polarization :	Horizontal



Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
7350	-32.08	-13	-19.08	-59.52	-38.62	5.38	11.92	H	Pass
11025	-30.37	-13	-17.37	-59.72	-36.59	6.89	13.11	H	Pass

Band :	802.16e	Temperature :	22~24°C
Test Mode :	BW 5MHz, Middle Ch (2593MHz)	Relative Humidity :	45~47%
Test Engineer :	David Yang	Polarization :	Vertical



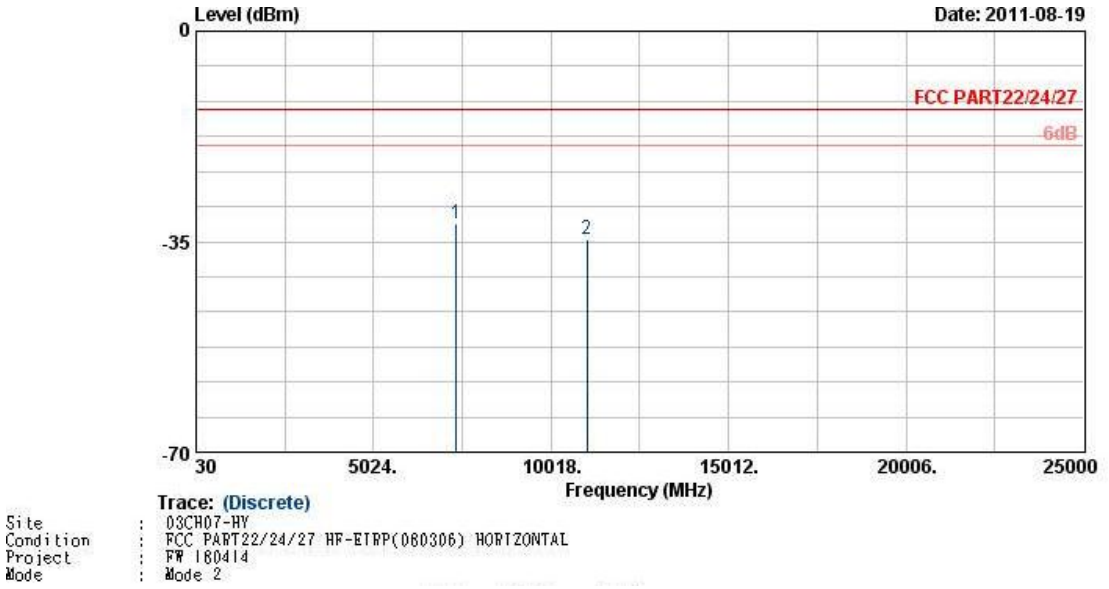
Trace: (Discrete)

Site : 03CH07-HY
Condition : FCC PART22/24/27 HF-EIRP(080306) VERTICAL
Project : FW 180414
Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Remark
	MHz	dBm	dB	dBm	dBm	dB	
1 @	7350.00	-31.41	-18.41	-13.00	-57.66	26.25	Peak
2	11025.00	-31.60	-18.60	-13.00	-59.60	28.00	Peak

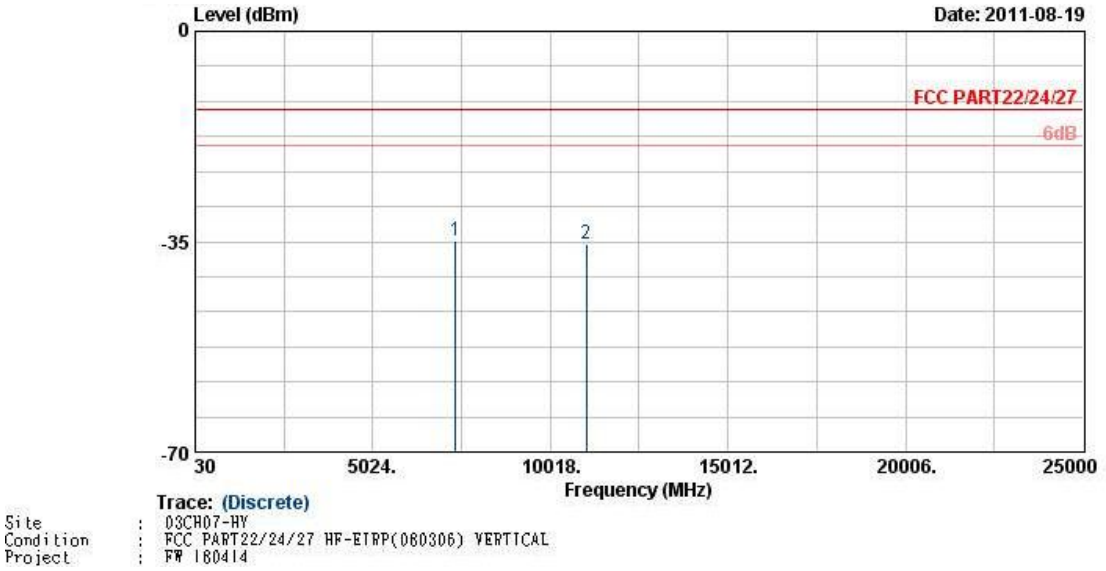
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
7350	-31.41	-13	-18.41	-59.02	-37.95	5.38	11.92	V	Pass
11025	-31.60	-13	-18.60	-60.82	-37.82	6.89	13.11	V	Pass

Band :	802.16e	Temperature :	22~24°C
Test Mode :	BW 10MHz, Middle Ch (2593MHz)	Relative Humidity :	45~47%
Test Engineer :	David Yang	Polarization :	Horizontal



Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
7350	-32.11	-13	-19.11	-59.45	-38.65	5.38	11.92	H	Pass
11025	-34.50	-13	-21.50	-63.52	-40.72	6.89	13.11	H	Pass

Band :	802.16e	Temperature :	22~24°C
Test Mode :	BW 10MHz, Middle Ch (2593MHz)	Relative Humidity :	45~47%
Test Engineer :	David Yang	Polarization :	Vertical



Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
7350	-34.74	-13	-21.74	-61.44	-41.28	5.38	11.92	V	Pass
11025	-35.42	-13	-22.42	-64.34	-41.64	6.89	13.11	V	Pass

3.5 Frequency Stability Measurement

3.5.1 Description of Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency band. For equipment authorization purposes, this is a reporting requirement only.

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

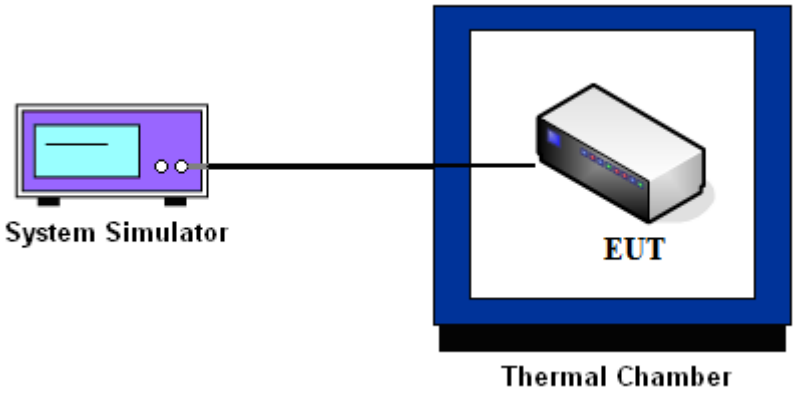
3.5.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the System Simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT cannot be turned on at -30°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

3.5.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 25±5° C and connected with the System Simulator.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

3.5.5 Test Setup



3.5.6 Test Result of Temperature Variation

Band :	802.16e	Channel :	Middle (2593MHz)
Limit (ppm) :	2.5		

Temperature (°C)	QPSK, BW 5MHz		QPSK, BW 10MHz		Result
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	
0	-52.34	-0.014	-49.95	-0.014	PASS
10	-45.19	-0.012	-47.47	-0.013	
20	-50.06	-0.014	-60.13	-0.016	
30	-60.48	-0.016	-65.01	-0.018	
40	-67.40	-0.018	-68.49	-0.019	
45	-73.78	-0.020	-64.49	-0.018	

Temperature (°C)	16QAM, BW 5MHz		16QAM, BW 10MHz		Result
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	
0	-60.27	-0.016	-41.33	-0.011	PASS
10	-52.71	-0.014	-37.84	-0.010	
20	-51.53	-0.014	-49.24	-0.013	
30	-64.36	-0.018	-57.49	-0.016	
40	-61.11	-0.017	-62.79	-0.017	
45	-70.37	-0.019	-66.53	-0.018	

Note: The manufacturer declared that the EUT could work properly between temperatures 0°C~45°C.

3.5.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Result
802.16e Middle (2593MHz)	QPSK, BW 5MHz	12	-56.51	-0.015	PASS
		7	-55.07	-0.015	
		16	-57.62	-0.016	
	QPSK, BW 10MHz	12	-66.87	-0.018	PASS
		7	-63.06	-0.017	
		16	-65.71	-0.018	
	16QAM, BW 5MHz	12	-58.79	-0.016	PASS
		7	-51.92	-0.014	
		16	-55.59	-0.015	
	16QAM, BW 10MHz	12	-63.58	-0.017	PASS
		7	-70.57	-0.019	
		16	-62.63	-0.017	

Note: Normal Voltage = 12Vdc.

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 13, 2011	Jun. 12, 2012	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D35P	TBN-930701	N/A	Jul. 27, 2011	Jul. 26, 2012	Conducted (TH02-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 30, 2010	Oct. 29, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP30	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 10, 2011	Aug. 09, 2012	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 06, 2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32dB. GAIN	Mar. 29, 2011	Mar. 28, 2012	Radiation (03CH07-HY)
EMI TEST RECEIVER	R&S	ESCI 7	100724	9kHz~7GHz	Aug.19, 2010	Aug.19, 2011	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-00 101800-30-1	159088	1GHz ~ 18GHz	Feb. 21, 2011	Feb. 20, 2012	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty Uc(y)	**1.27**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**		

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

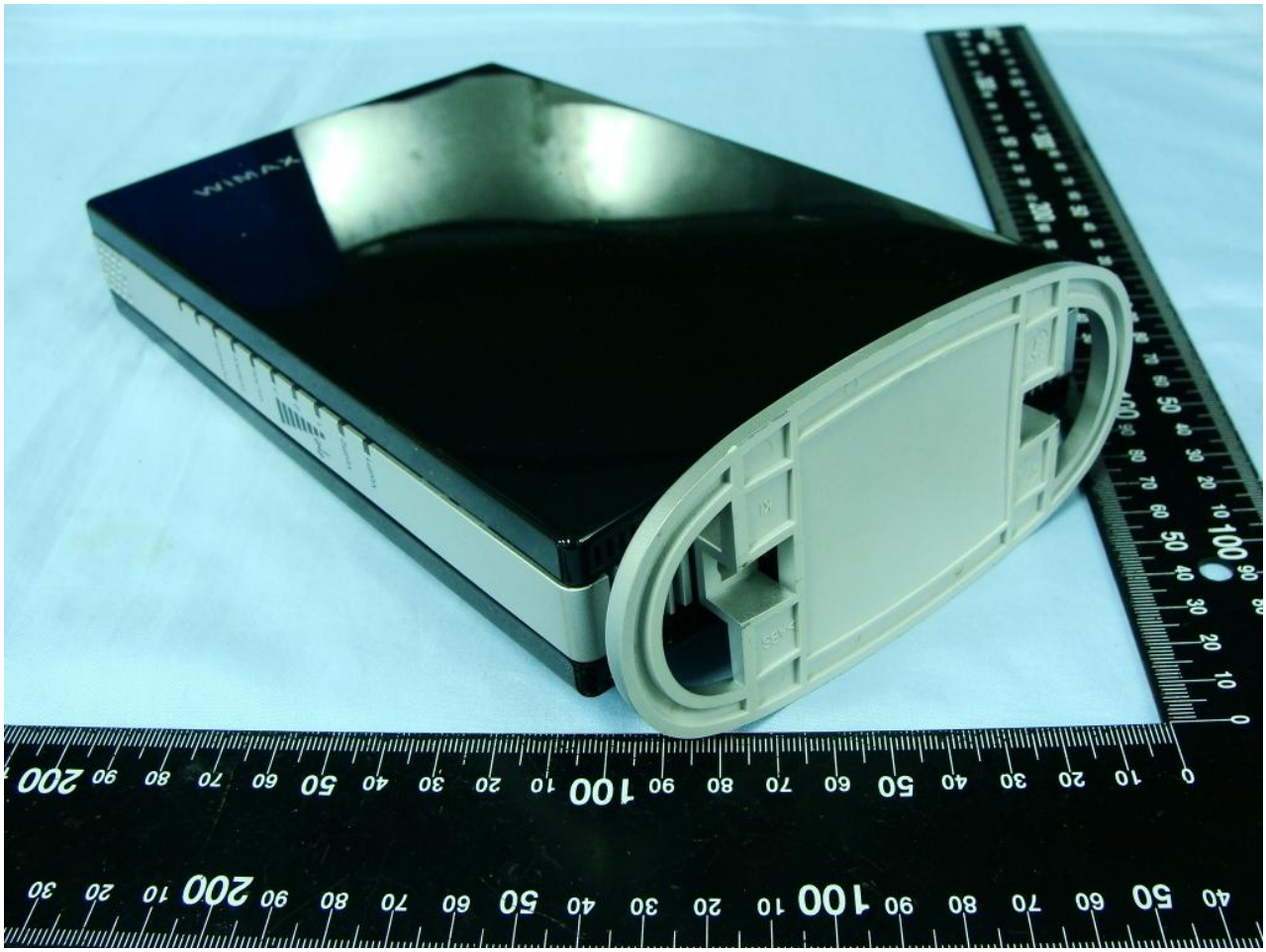
Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site Imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**				

Appendix A. Photographs of EUT

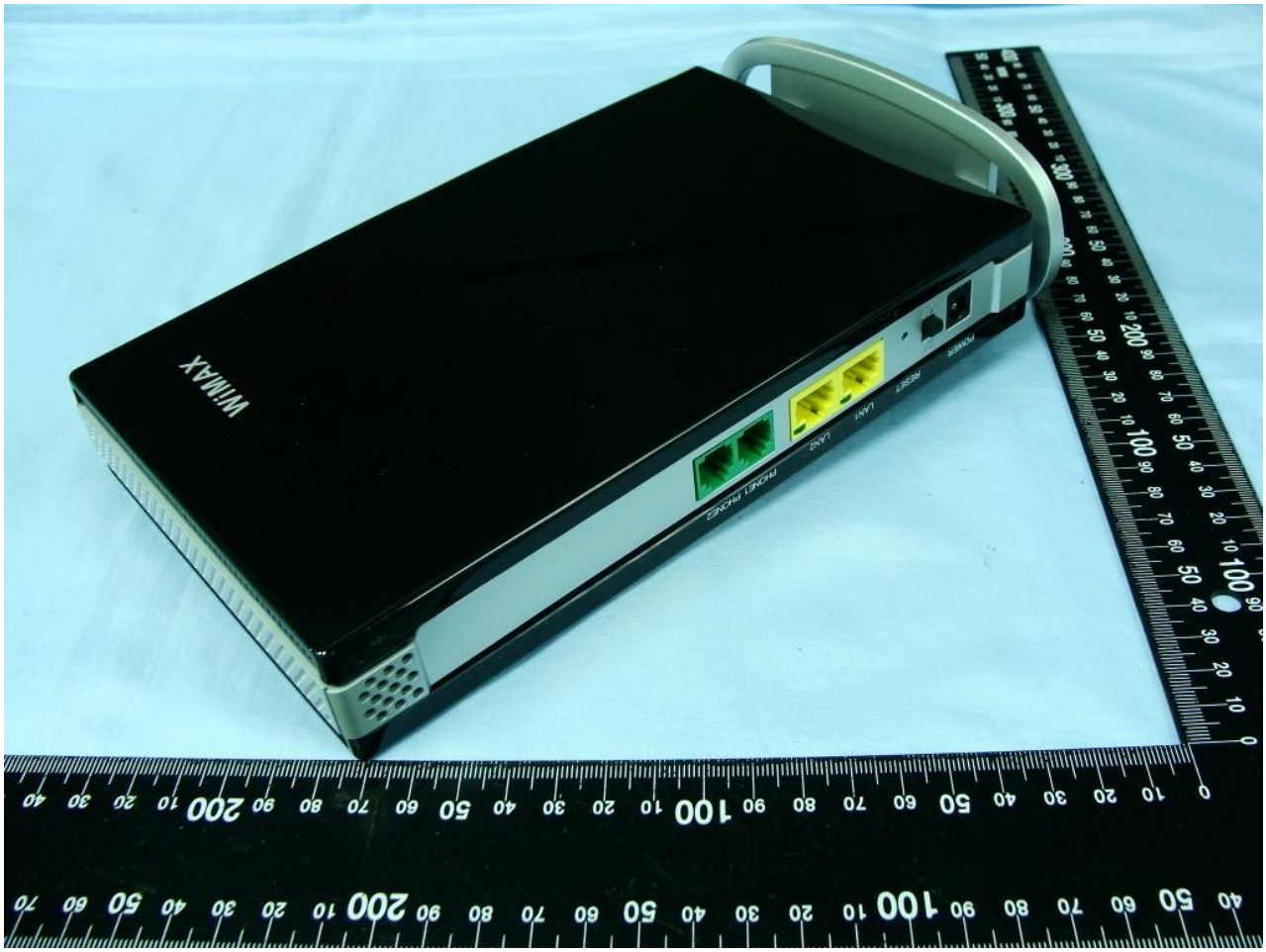
Please refer to Sporton report number EP180414 as below.

1. External Photograph of EUT

Brand Name: Alvarion / Model Name: WM5347N-3G8



Brand Name: Alvarion / Model Name: WM5347N-3G8



2. Photograph of Accessory

Brand Name: Alvarion / Model Name: WM5347N-3G8

List of Accessory:

Specification of Accessory		
AC Adapter	**Brand Name**	Technics Electronic Co., Ltd.
	Model Name	TESA2G-1202100d

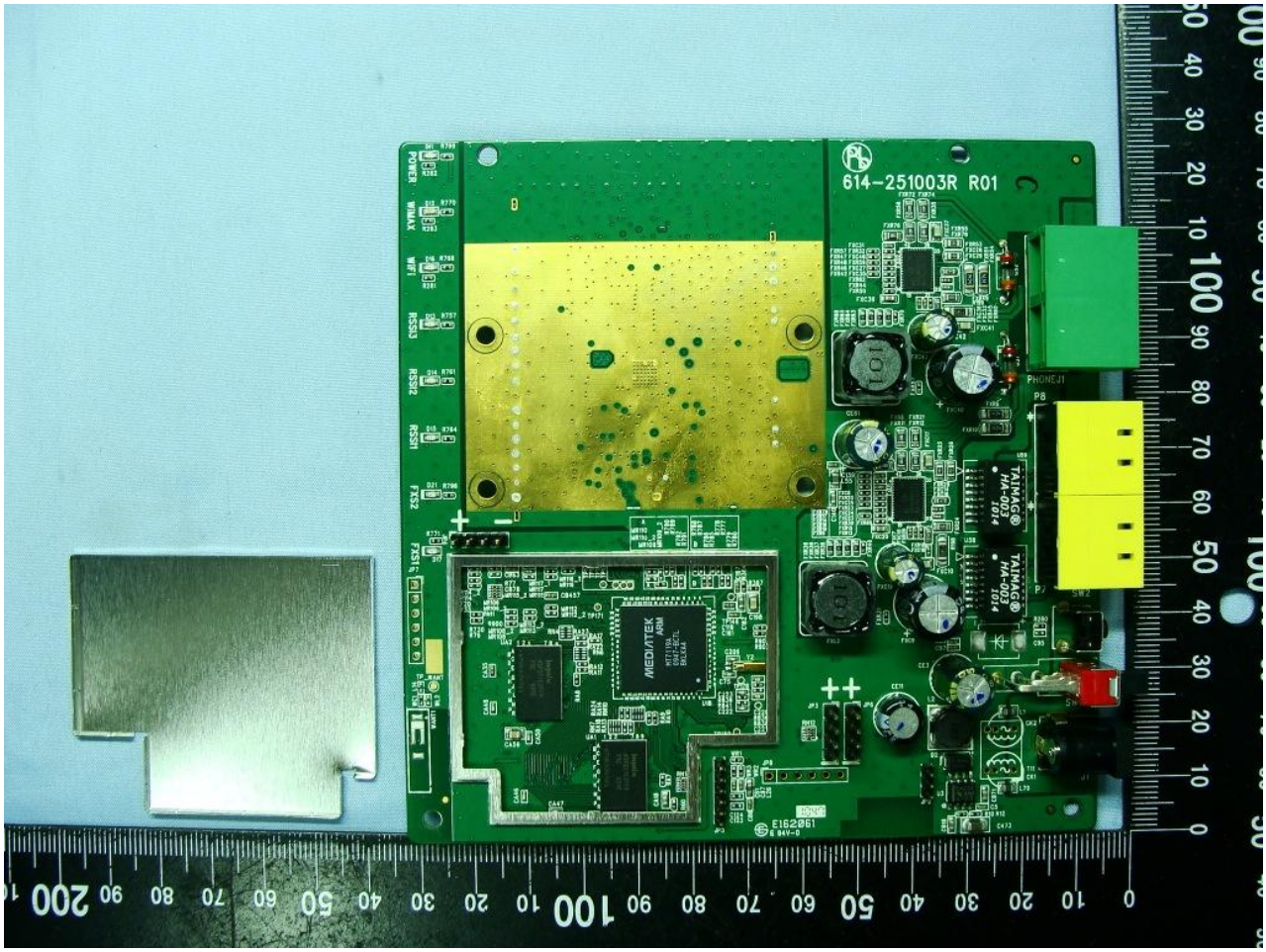
Remark: For accessories equipped with this EUT, please refer to the following photos.

Brand Name: Alvarion / Model Name: WM5347N-3G8

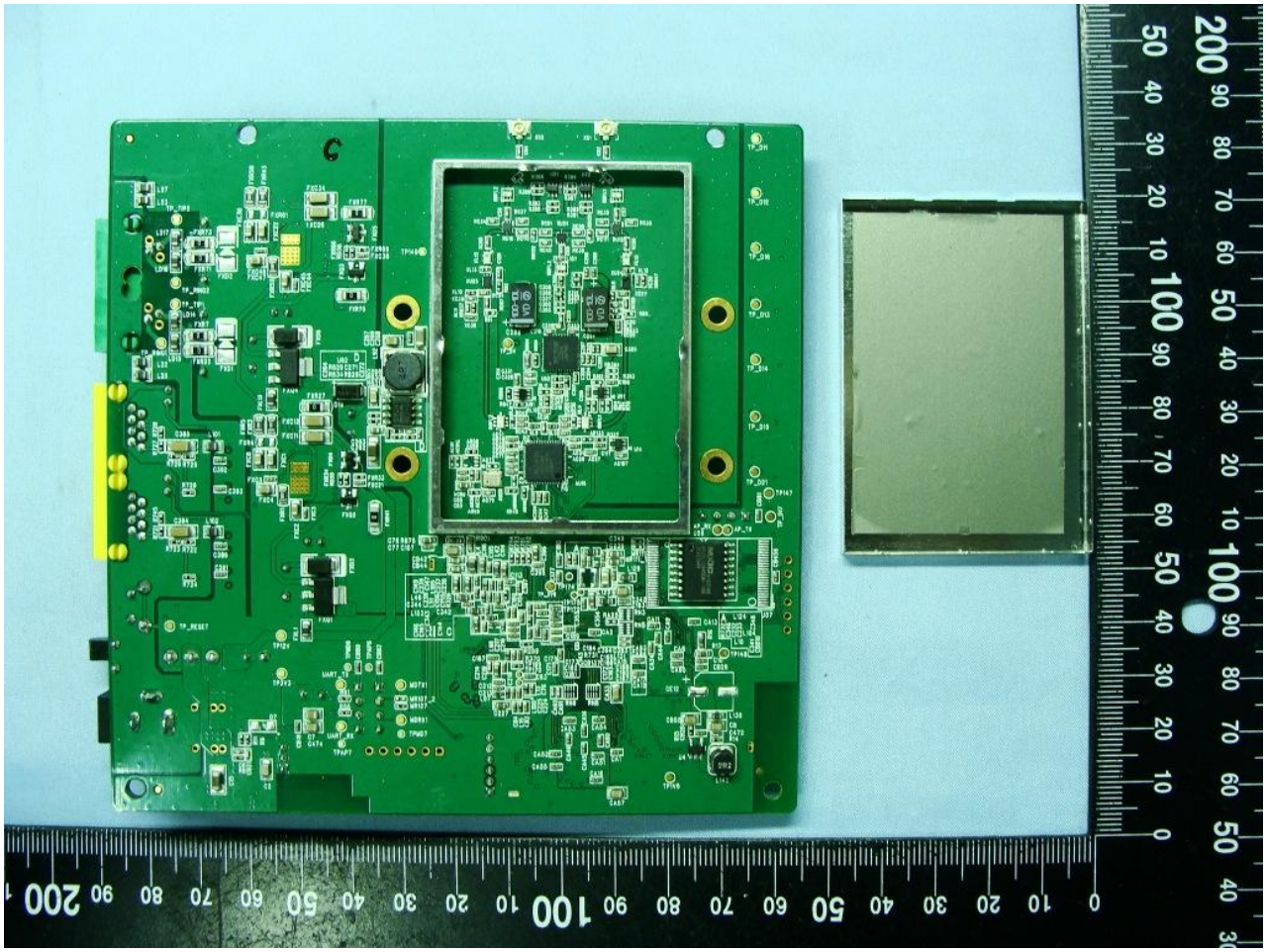
Brand Name: Alvarion / Model Name: WM5347N-3G8

3. Internal Photograph of EUT

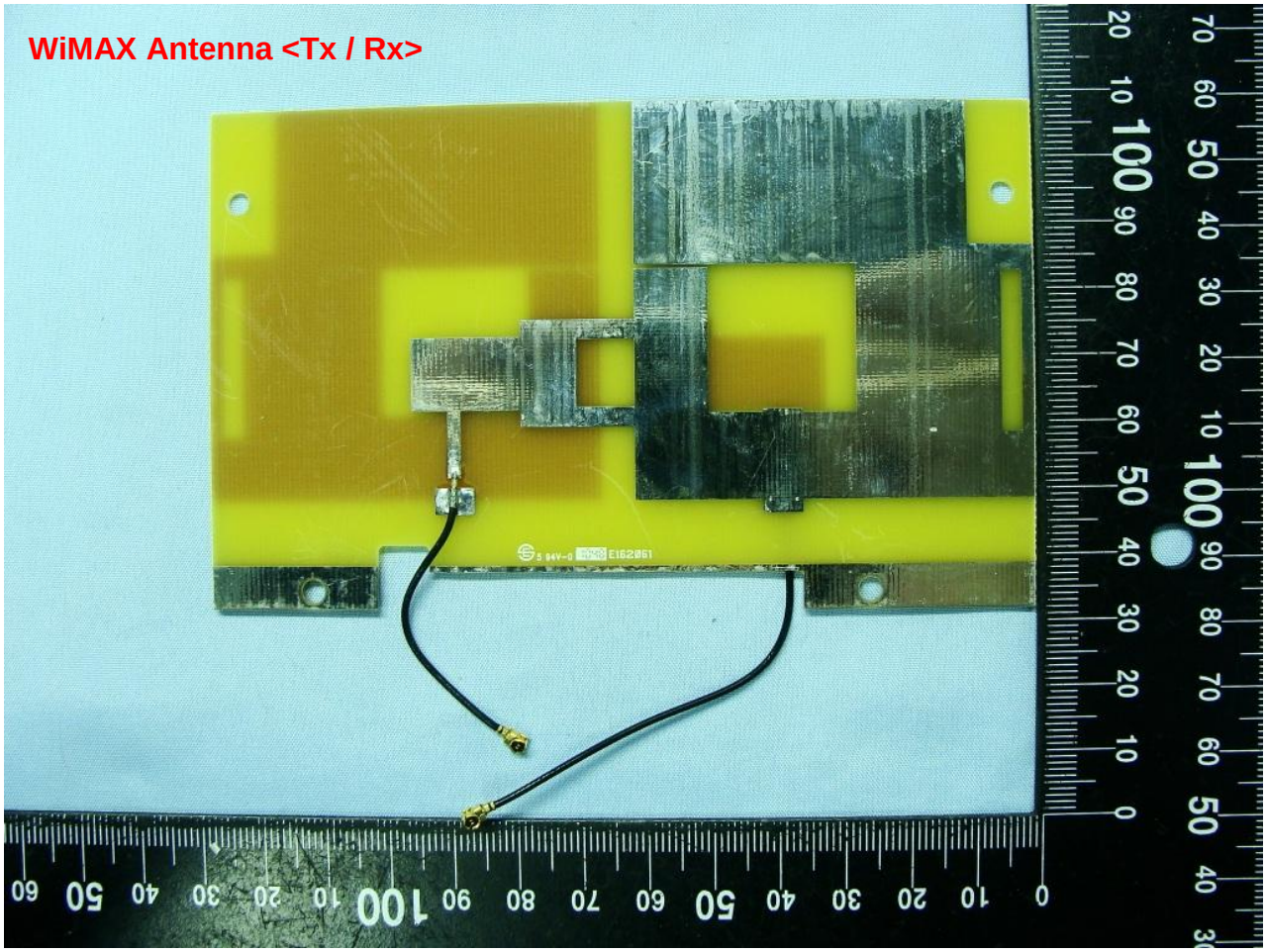
Brand Name: Alvarion / Model Name: WM5347N-3G8



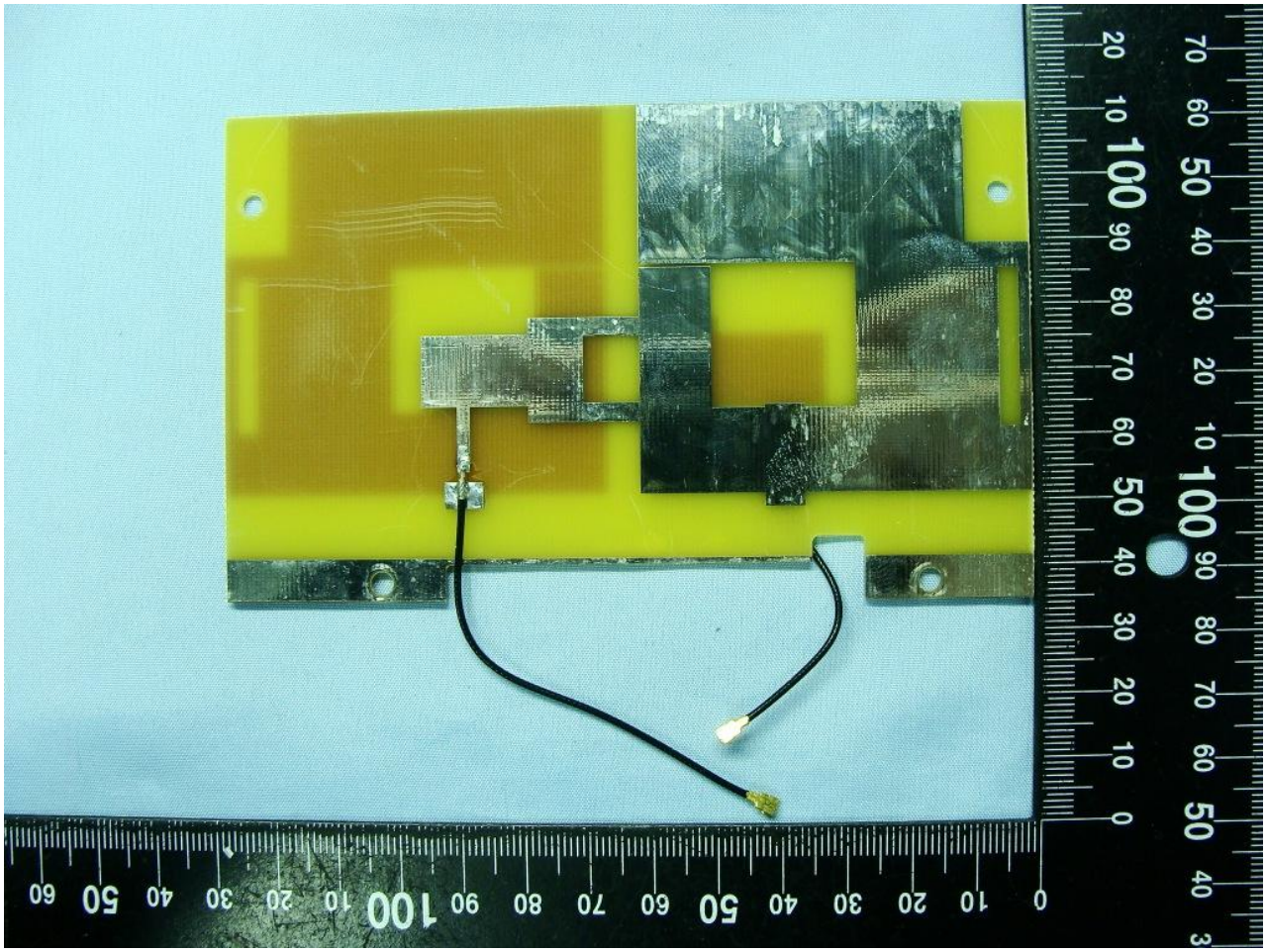
Brand Name: Alvarion / Model Name: WM5347N-3G8



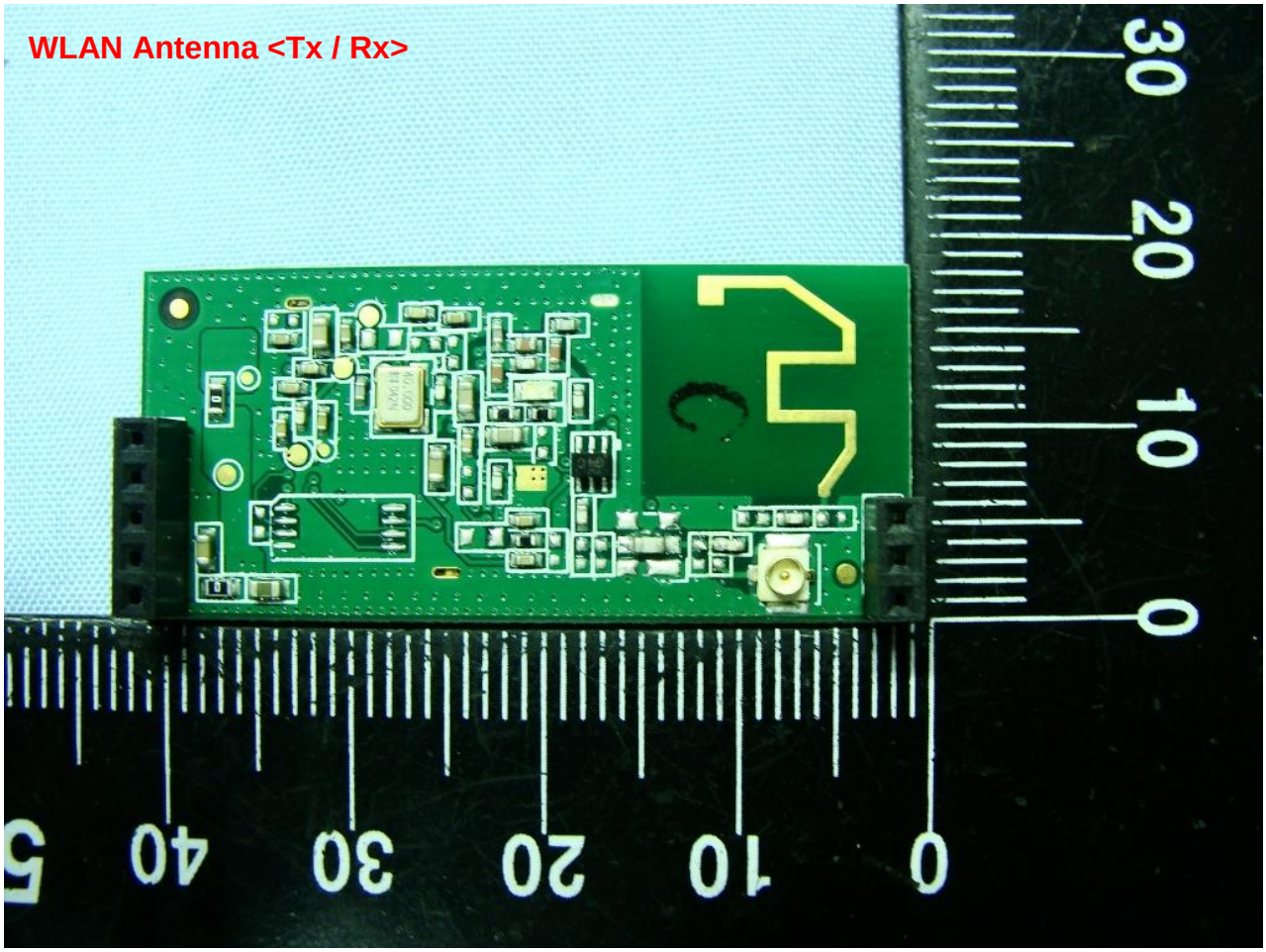
Brand Name: Alvarion / Model Name: WM5347N-3G8



Brand Name: Alvarion / Model Name: WM5347N-3G8



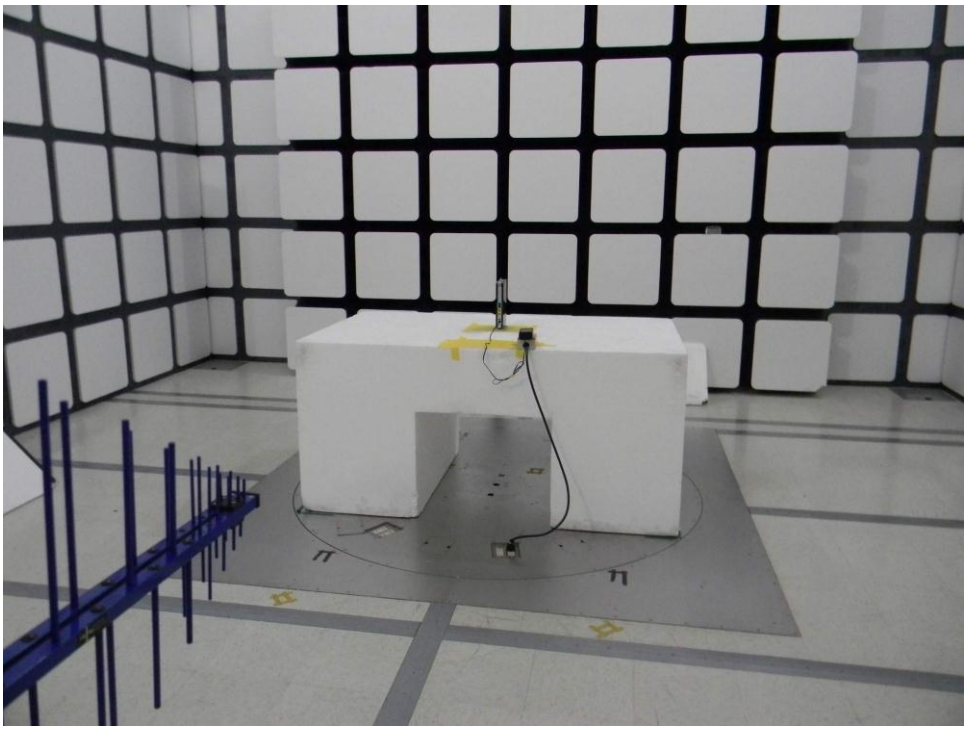
Brand Name: Alvarion / Model Name: WM5347N-3G8



Appendix B. Setup Photographs

<Radiated Emission>

LF



HF