

APPLICATION CERTIFICATION FCC Part 15C

On Behalf of

SES-imagotag Deutschland GmbH

Sub-GHz AP module for Lancom
Model No.: LANCOM AP MODULE

FCC ID: 2APO5-LANCOM

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Report No. : ATE20180285
Date of Test : Nov. 15-Nov. 17, 2017
Date of Report : March 5, 2018

TABLE OF CONTENTS

Description	Page
Test Report Certification	
1. GENERAL INFORMATION	5
1.1. Description of Device (EUT).....	5
1.2. Accessory and Auxiliary Equipment	5
1.3. Carrier Frequency of Channels.....	6
1.4. Description of Test Facility	7
1.5. Measurement Uncertainty.....	7
2. MEASURING DEVICE AND TEST EQUIPMENT	8
3. OPERATION OF EUT DURING TESTING	9
3.1. Operating Mode	9
3.2. Configuration and peripherals	9
4. TEST PROCEDURES AND RESULTS	10
5. POWER LINE CONDUCTED MEASUREMENT	11
5.1. Block Diagram of Test Setup.....	11
5.2. Power Line Conducted Emission Measurement Limits.....	12
5.3. Configuration of EUT on Measurement	12
5.4. Operating Condition of EUT	12
5.5. Test Procedure	12
5.6. Data Sample.....	13
5.7. Power Line Conducted Emission Measurement Results	13
6. 20DB BANDWIDTH TEST.....	18
6.1. Block Diagram of Test Setup.....	18
6.2. The Requirement For Section 15.247(a)(1).....	18
6.3. EUT Configuration on Measurement	18
6.4. Operating Condition of EUT	18
6.5. Test Procedure	18
6.6. Test Result	19
7. CARRIER FREQUENCY SEPARATION TEST.....	21
7.1. Block Diagram of Test Setup.....	21
7.2. The Requirement For Section 15.247(a)(1).....	21
7.3. EUT Configuration on Measurement	21
7.4. Operating Condition of EUT	21
7.5. Test Procedure	22
7.6. Test Result	22
8. NUMBER OF HOPPING FREQUENCY TEST	25
8.1. Block Diagram of Test Setup.....	25
8.2. Limit	25
8.3. EUT Configuration on Measurement	25
8.4. Operating Condition of EUT	25
8.5. Test Procedure	25
8.6. Test Result	26
9. DWELL TIME TEST	27
9.1. Block Diagram of Test Setup.....	27
9.2. Limit	27

9.3.	EUT Configuration on Measurement	27
9.4.	Operating Condition of EUT	27
9.5.	Test Procedure	27
9.6.	Photos of Dwell time Measurement.....	28
9.7.	Test Result	28
10.	MAXIMUM PEAK OUTPUT POWER TEST	30
10.1.	Block Diagram of Test Setup.....	30
10.2.	Limit	30
10.3.	EUT Configuration on Measurement	30
10.4.	Operating Condition of EUT	30
10.5.	Test Procedure	30
10.6.	Test Result	31
11.	RADIATED EMISSION TEST	33
11.1.	Block Diagram of Test Setup.....	33
11.2.	The Limit For Section 15.247(d)	34
11.3.	Restricted bands of operation	35
11.4.	Configuration of EUT on Measurement	35
11.5.	Operating Condition of EUT	35
11.6.	Test Procedure	36
11.7.	Data Sample.....	37
11.8.	The Field Strength of Radiation Emission Measurement Results	37
12.	BAND EDGE COMPLIANCE TEST	50
12.1.	Block Diagram of Test Setup.....	50
12.2.	The Requirement For Section 15.247(d)	50
12.3.	EUT Configuration on Measurement	50
12.4.	Operating Condition of EUT	50
12.5.	Test Procedure	51
12.6.	Test Result	51
13.	ANTENNA REQUIREMENT.....	59
13.1.	The Requirement	59
13.2.	Antenna Construction	59
14.	PHOTOS	60

Test Report Certification

Applicant : SES-imagotag Deutschland GmbH
Manufacturer : SES-imagotag Deutschland GmbH
EUT Description : Sub-GHz AP module for Lancom
Model No. : LANCOM AP MODULE
Trade Mark : N/A

Measurement Procedure Used:

**FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013**

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : Nov. 15-Nov. 17, 2017
Date of Report : March 5, 2018

Prepared by : _____
(Star Yang, Engineer)

Approved & Authorized Signer : _____
(Sean Liu, Manager)



1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Sub-GHz AP module for Lancom
Model Number	:	LANCOM AP MODULE
Frequency Range	:	902.75-927.25MHz
Number of Channels	:	99
Antenna Gain	:	0dBi
Antenna type	:	External Antenna
Power Supply	:	DC 3.3V
Modulation mode	:	GFSK
Applicant	:	SES-imagotag Deutschland GmbH
Address	:	Bundesstraße 16, D-77955 Ettenheim Germany
Manufacuter	:	SES-imagotag Deutschland GmbH
Address	:	Bundesstraße 16, D-77955 Ettenheim Germany

1.2. Accessory and Auxiliary Equipment

AC/DC Power Adapter (provided by laboratory)	:	Model:TEKA006-0501000UKU
		Input: 100-240V~50/60Hz 0.3A
		Output: DC 5V/1A

Base board : (provided by manufacturer)

1.3. Carrier Frequency of Channels

Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)
1	902,750	35	911,250	69	919,750
2	903,000	36	911,500	70	920,000
3	903,250	37	911,750	71	920,250
4	903,500	38	912,000	72	920,500
5	903,750	39	912,250	73	920,750
6	904,000	40	912,500	74	921,000
7	904,250	41	912,750	75	921,250
8	904,500	42	913,000	76	921,500
9	904,750	43	913,250	77	921,750
10	905,000	44	913,500	78	922,000
11	905,250	45	913,750	79	922,250
12	905,500	46	914,000	80	922,500
13	905,750	47	914,250	81	922,750
14	906,000	48	914,500	82	923,000
15	906,250	49	914,750	83	923,250
16	906,500	50	915,000	84	923,500
17	906,750	51	915,250	85	923,750
18	907,000	52	915,500	86	924,000
19	907,250	53	915,750	87	924,250
20	907,500	54	916,000	88	924,500
21	907,750	55	916,250	89	924,750
22	908,000	56	916,500	90	925,000
23	908,250	57	916,750	91	925,250
24	908,500	58	917,000	92	925,500
25	908,750	59	917,250	93	925,750
26	909,000	60	917,500	94	926,000
27	909,250	61	917,750	95	926,250
28	909,500	62	918,000	96	926,500
29	909,750	63	918,250	97	926,750
30	910,000	64	918,500	98	927,000
31	910,250	65	918,750	99	927,250
32	910,500	66	919,000		
33	910,750	67	919,250		
34	911,000	68	919,500		

1.4. Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358
		Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2
		Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193
		Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.5. Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 07, 2017	Jan. 06, 2018
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 07, 2017	Jan. 06, 2018
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 07, 2017	Jan. 06, 2018
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 07, 2017	Jan. 06, 2018
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 13, 2017	Jan. 12, 2018
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 13, 2017	Jan. 12, 2018
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 13, 2017	Jan. 12, 2018
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 13, 2017	Jan. 12, 2018
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 07, 2017	Jan. 06, 2018
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 07, 2017	Jan. 06, 2018
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 07, 2017	Jan. 06, 2018
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 07, 2017	Jan. 06, 2018

3. OPERATION OF EUT DURING TESTING

3.1. Operating Mode

The mode is used: Transmitting mode

Low Channel: 902.75MHz

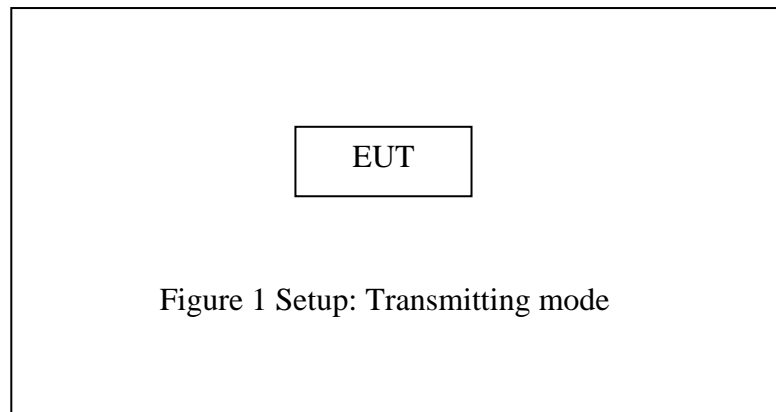
Middle Channel: 915MHz

High Channel: 927.25MHz

Hopping

Note: The wireless has been tested under continuous transmission mode

3.2. Configuration and peripherals



(EUT: Sub-GHz AP module for Lancom)

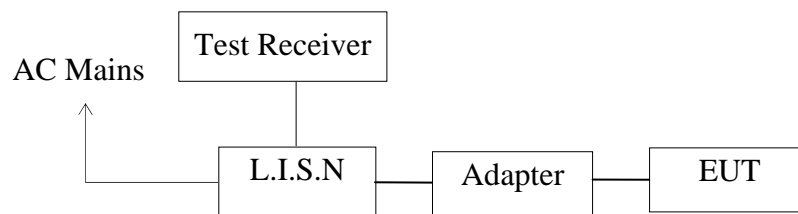
4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission Test	Compliant
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d) Section 15.209	Radiated Emission Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. POWER LINE CONDUCTED MEASUREMENT

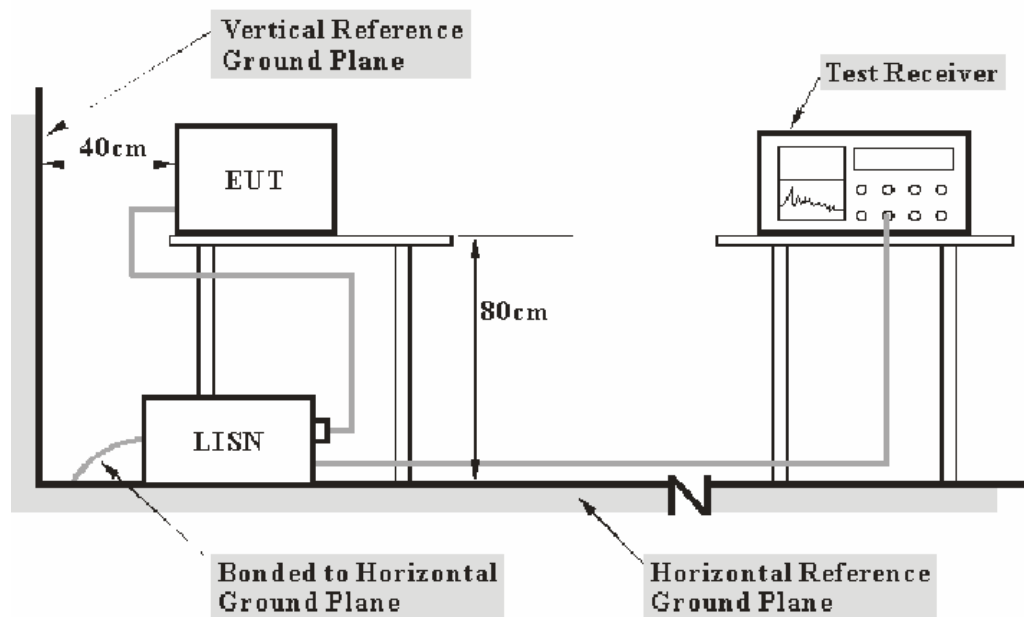
5.1. Block Diagram of Test Setup

5.1.1. Block diagram of connection between the EUT and simulators



(EUT: Sub-GHz AP module for Lancom)

5.1.2. Test System Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

5.2. Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0

NOTE1: The lower limit shall apply at the transition frequencies.
 NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

5.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

5.4. Operating Condition of EUT

- 5.4.1. Setup the EUT and simulator as shown as Section 5.1.
- 5.4.2. Turn on the power of all equipment.
- 5.4.3. Let the EUT work in test mode and measure it.

5.5. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10 on Conducted Emission Measurement. The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

5.6.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dBμV) = Limit stated in standard

Margin = Limit (dBμV) - Level (dBμV)

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

5.7.Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT. Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

The spectral diagrams are attached as below.

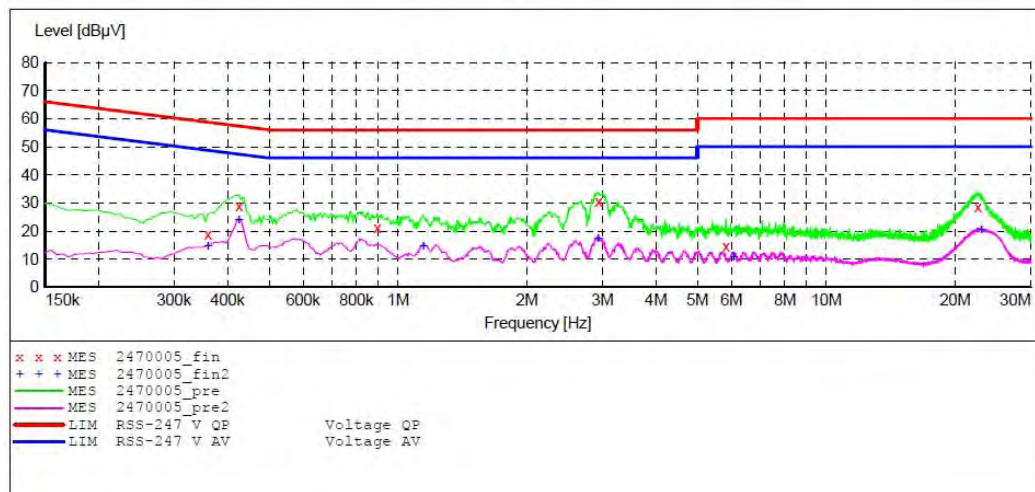
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15C

EUT: Sub-GHz AP module for Lancom M/N:LANCOM AP Module
 Manufacturer: SES-imagotag Deutschland GmbH
 Operating Condition: TX Communication
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: N 120V/60Hz
 Comment: Report No.:ATE20180285
 Start of Test: 11/17/2017 / 5:17:19PM

SCAN TABLE: "V 9K-30MHz fin"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "2470005_fin"

11/17/2017 5:20PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.360000	18.80	10.6	59	39.9	QP	N	GND
0.425000	28.80	10.7	57	28.5	QP	N	GND
0.895000	21.20	10.8	56	34.8	QP	N	GND
2.940000	30.50	11.1	56	25.5	QP	N	GND
5.830000	14.60	11.2	60	45.4	QP	N	GND
22.585000	28.70	11.4	60	31.3	QP	N	GND

MEASUREMENT RESULT: "2470005_fin2"

11/17/2017 5:20PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.360000	14.50	10.6	49	34.2	AV	N	GND
0.425000	24.00	10.7	47	23.3	AV	N	GND
1.145000	14.40	10.9	46	31.6	AV	N	GND
2.930000	17.30	11.1	46	28.7	AV	N	GND
6.070000	10.70	11.2	50	39.3	AV	N	GND
23.020000	20.20	11.4	50	29.8	AV	N	GND

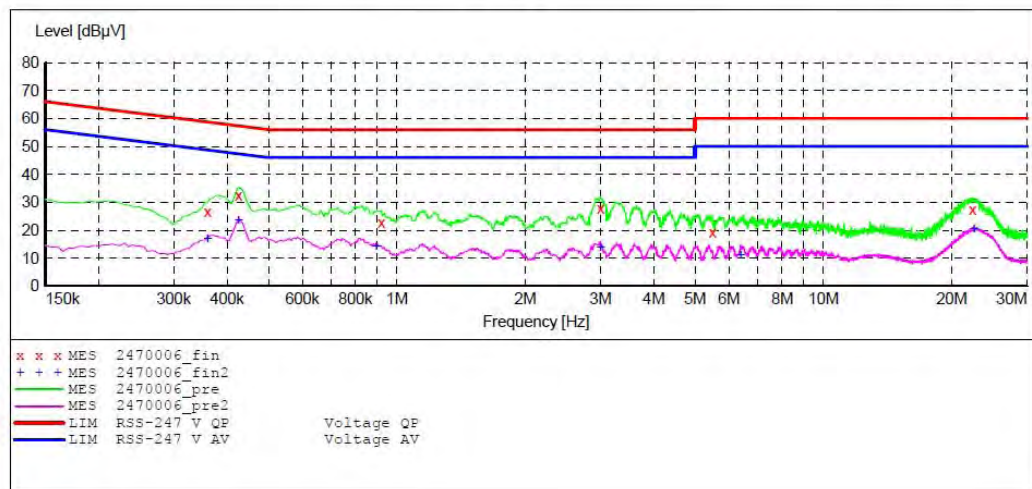
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15C

EUT: Sub-GHz AP module for Lancom M/N:LANCOM AP Module
 Manufacturer: SES-imagotag Deutschland GmbH
 Operating Condition: TX Communication
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: L 120V/60Hz
 Comment: Report No.:ATE20180285
 Start of Test: 11/17/2017 / 5:21:20PM

SCAN TABLE: "V 9K-30MHz fin"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "2470006_fin"

11/17/2017 5:24PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.360000	26.60	10.6	59	32.1	QP	L1	GND
0.425000	32.60	10.7	57	24.7	QP	L1	GND
0.920000	22.50	10.8	56	33.5	QP	L1	GND
3.000000	27.70	11.1	56	28.3	QP	L1	GND
5.490000	19.40	11.2	60	40.6	QP	L1	GND
22.360000	27.30	11.4	60	32.7	QP	L1	GND

MEASUREMENT RESULT: "2470006_fin2"

11/17/2017 5:24PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.360000	16.80	10.6	49	31.9	AV	L1	GND
0.425000	23.30	10.7	47	24.0	AV	L1	GND
0.895000	14.10	10.8	46	31.9	AV	L1	GND
3.000000	13.60	11.1	46	32.4	AV	L1	GND
6.390000	11.10	11.2	50	38.9	AV	L1	GND
22.540000	20.20	11.4	50	29.8	AV	L1	GND

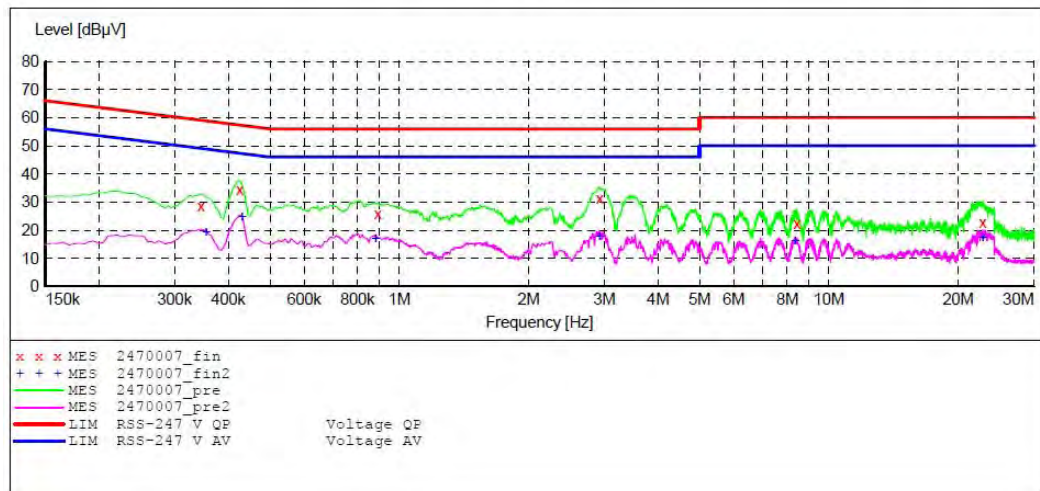
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15C

EUT: Sub-GHz AP module for Lancom M/N:LANCOM AP Module
 Manufacturer: SES-imagotag Deutschland GmbH
 Operating Condition: TX Communication
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: L 240V/60Hz
 Comment: Report No.:ATE20180285
 Start of Test: 11/17/2017 / 5:25:34PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 9.0 kHz 150.0 kHz 100.0 Hz QuasiPeak 1.0 s 200 Hz NSLK8126 2008
 Average
 150.0 kHz 30.0 MHz 5.0 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "2470007_fin"

11/17/2017 5:29PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.345000	28.70	10.6	59	30.4	QP	L1	GND
0.425000	34.40	10.7	57	22.9	QP	L1	GND
0.890000	25.70	10.8	56	30.3	QP	L1	GND
2.930000	31.40	11.1	56	24.6	QP	L1	GND
8.420000	22.40	11.3	60	37.6	QP	L1	GND
22.780000	22.60	11.4	60	37.4	QP	L1	GND

MEASUREMENT RESULT: "2470007_fin2"

11/17/2017 5:29PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.355000	19.10	10.6	49	29.7	AV	L1	GND
0.430000	24.80	10.7	47	22.5	AV	L1	GND
0.880000	16.90	10.8	46	29.1	AV	L1	GND
2.920000	17.80	11.1	46	28.2	AV	L1	GND
8.340000	15.90	11.3	50	34.1	AV	L1	GND
22.825000	17.10	11.4	50	32.9	AV	L1	GND

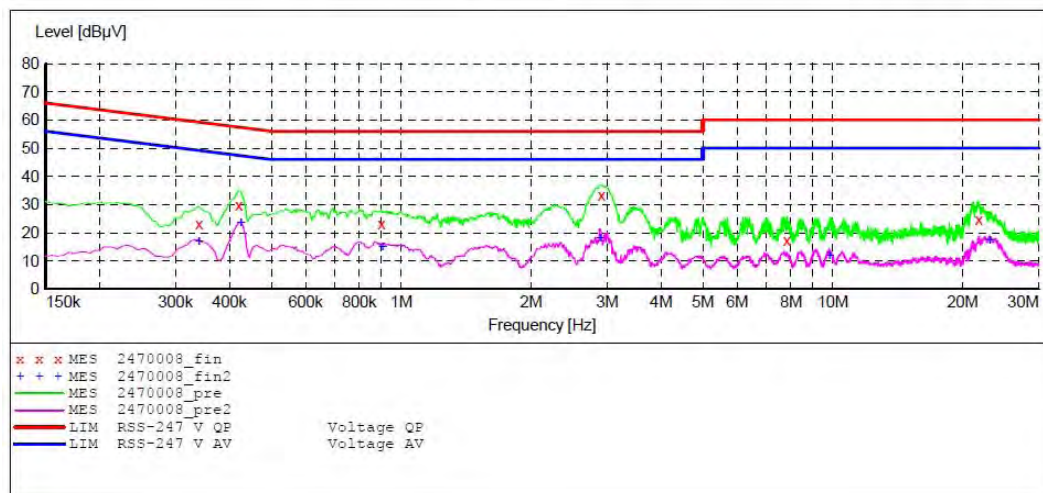
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15C

EUT: Sub-GHz AP module for Lancom M/N:LANCOM AP Module
 Manufacturer: SES-imagotag Deutschland GmbH
 Operating Condition: TX Communication
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: N 240V/60Hz
 Comment: Report No.:ATE20180285
 Start of Test: 11/17/2017 / 5:29:37PM

SCAN TABLE: "V 9K-30MHz fin"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "2470008_fin"

11/17/2017 5:38PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.340000	22.90	10.6	59	36.3	QP	N	GND
0.420000	29.70	10.7	57	27.7	QP	N	GND
0.900000	22.90	10.8	56	33.1	QP	N	GND
2.910000	33.40	11.0	56	22.6	QP	N	GND
7.820000	17.30	11.2	60	42.7	QP	N	GND
21.775000	24.70	11.4	60	35.3	QP	N	GND

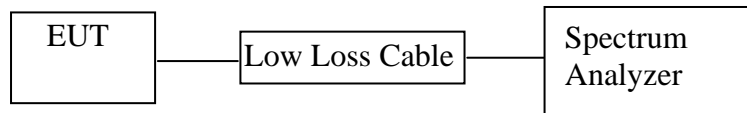
MEASUREMENT RESULT: "2470008_fin2"

11/17/2017 5:38PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.340000	16.70	10.6	49	32.5	AV	N	GND
0.425000	23.30	10.7	47	24.0	AV	N	GND
0.905000	15.00	10.8	46	31.0	AV	N	GND
2.890000	18.00	11.0	46	28.0	AV	N	GND
9.830000	11.80	11.3	50	38.2	AV	N	GND
23.095000	17.20	11.4	50	32.8	AV	N	GND

6. 20DB BANDWIDTH TEST

6.1. Block Diagram of Test Setup



(EUT: Sub-GHz AP module for Lancom)

6.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

6.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 902.75-927.25MHz. We select 902.75MHz, 915MHz, and 927.25MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.

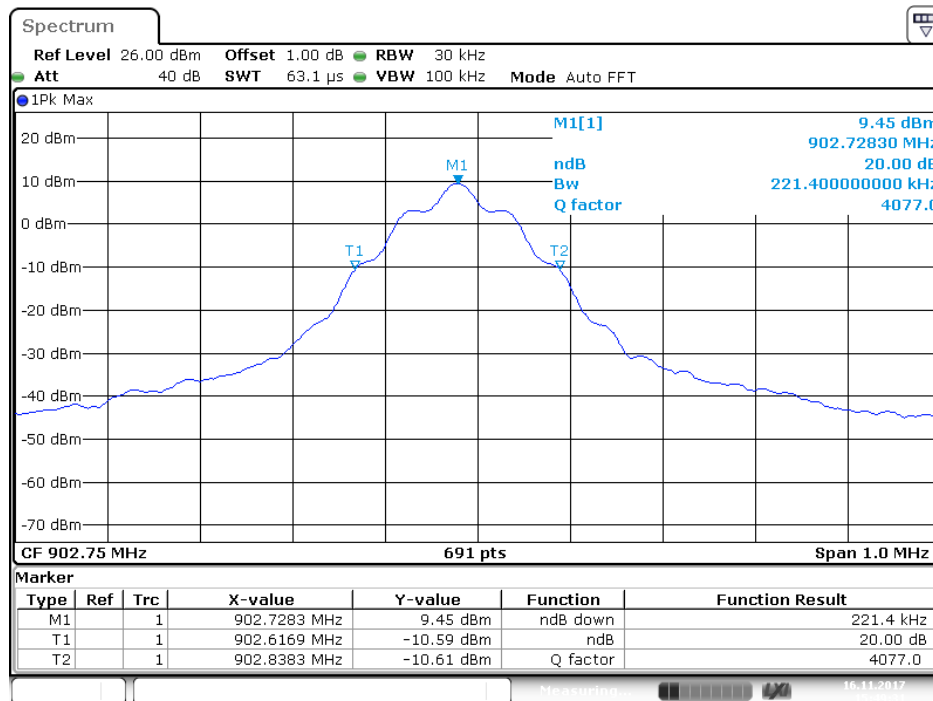
6.5.3. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

6.6. Test Result

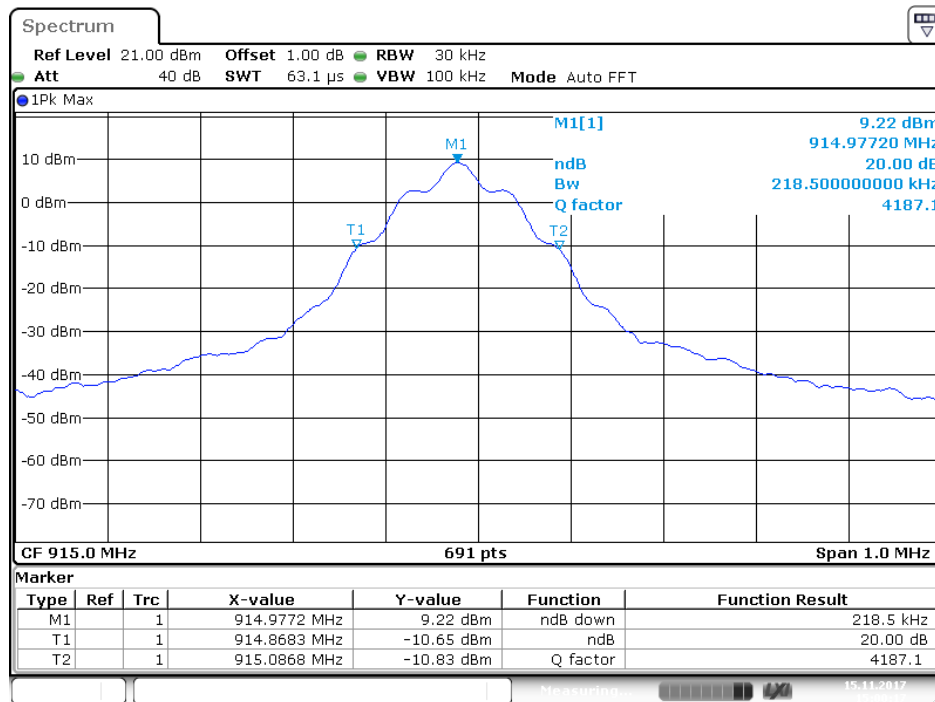
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	902.75	0.221
Middle	915.00	0.219
High	927.25	0.223

The spectrum analyzer plots are attached as below.

Low channel

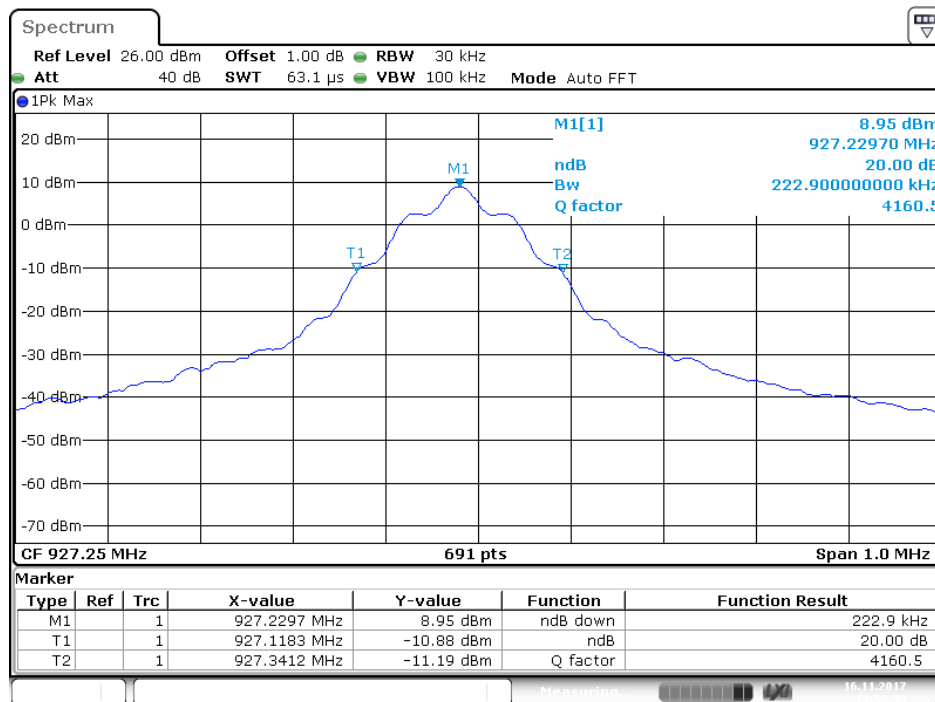


Middle channel



Date: 15.NOV.2017 15:00:17

High channel



Date: 16.NOV.2017 15:55:54

7. CARRIER FREQUENCY SEPARATION TEST

7.1. Block Diagram of Test Setup



(EUT: Sub-GHz AP module for Lancom)

7.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 902-928 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

7.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 902.75-927.25MHz. We select 902.75MHz, 915MHz, and 927.25MHz TX frequency to transmit.

7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz. Adjust Span to 500kHz.

7.5.3. Set the adjacent channel of the EUT maxhold another trace.

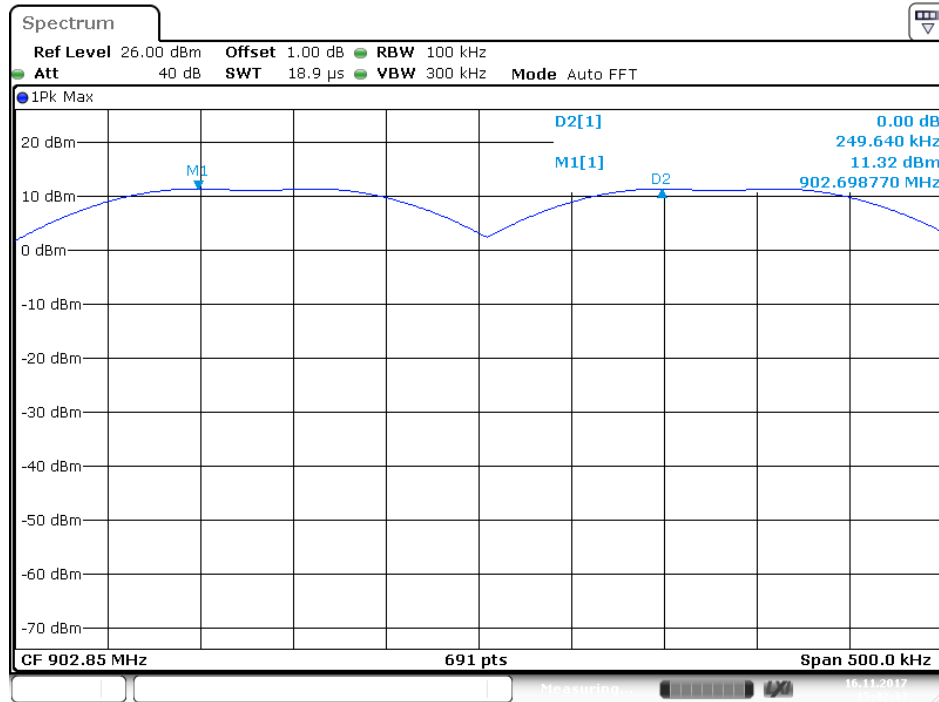
7.5.4. Measurement the channel separation

7.6. Test Result

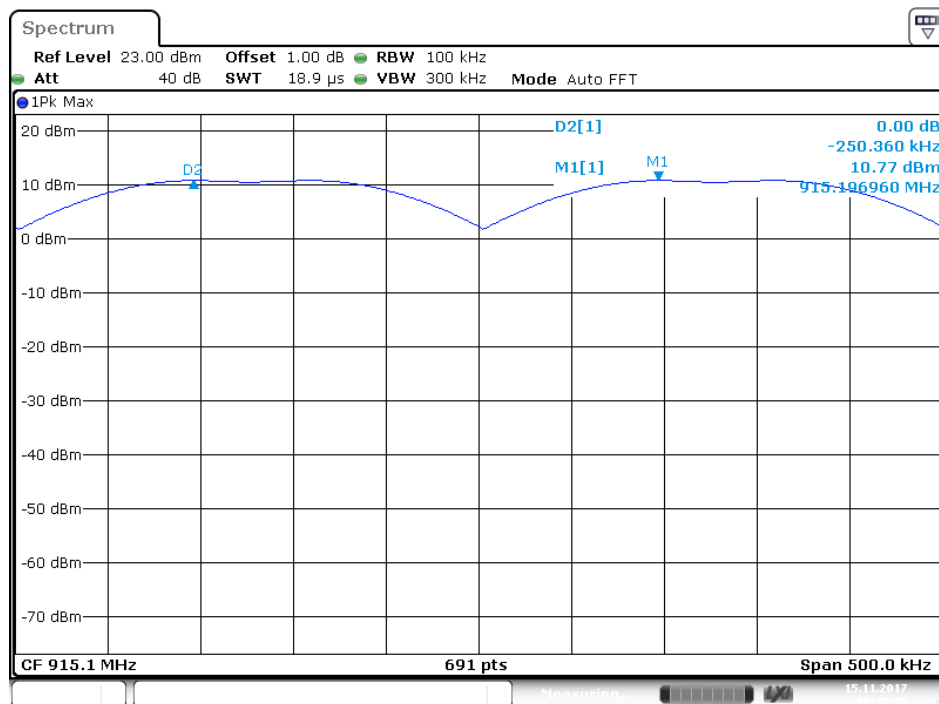
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	902.75	0.250	25KHz or 20dB bandwidth	PASS
	903.00			
Middle	915.00	0.250	25KHz or 20dB bandwidth	PASS
	915.25			
High	927.00	0.250	25KHz or 20dB bandwidth	PASS
	927.25			

The spectrum analyzer plots are attached as below.

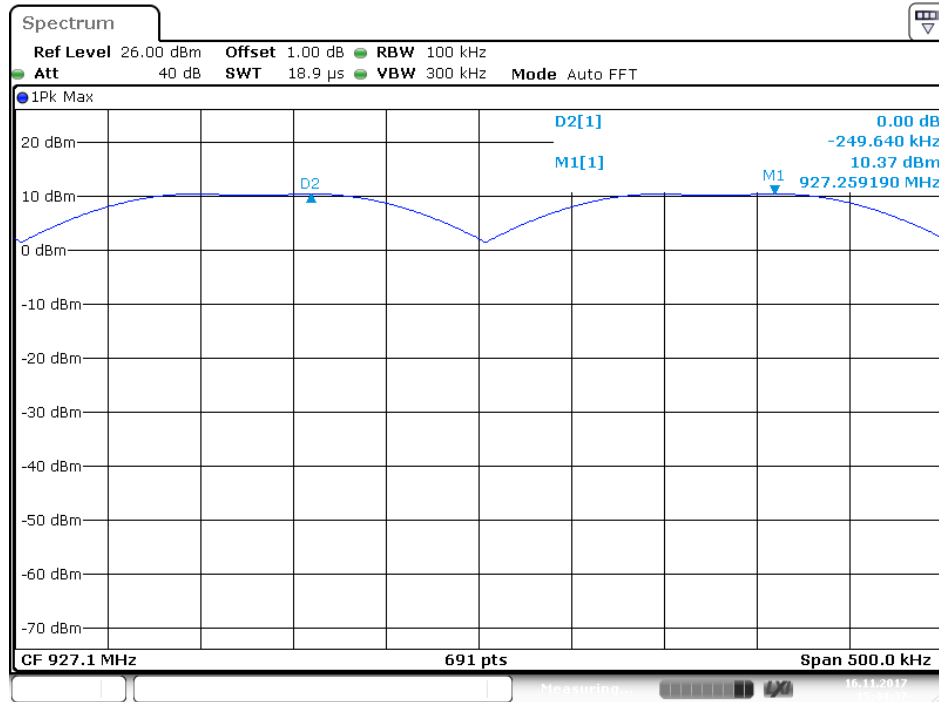
Low channel



Middle channel



High channel



Date: 16.NOV.2017 15:44:38

8. NUMBER OF HOPPING FREQUENCY TEST

8.1. Block Diagram of Test Setup



(EUT: Sub-GHz AP module for Lancom)

8.2. Limit

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

8.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX (Hopping on) modes measure it.

8.5. Test Procedure

8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.2. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz.

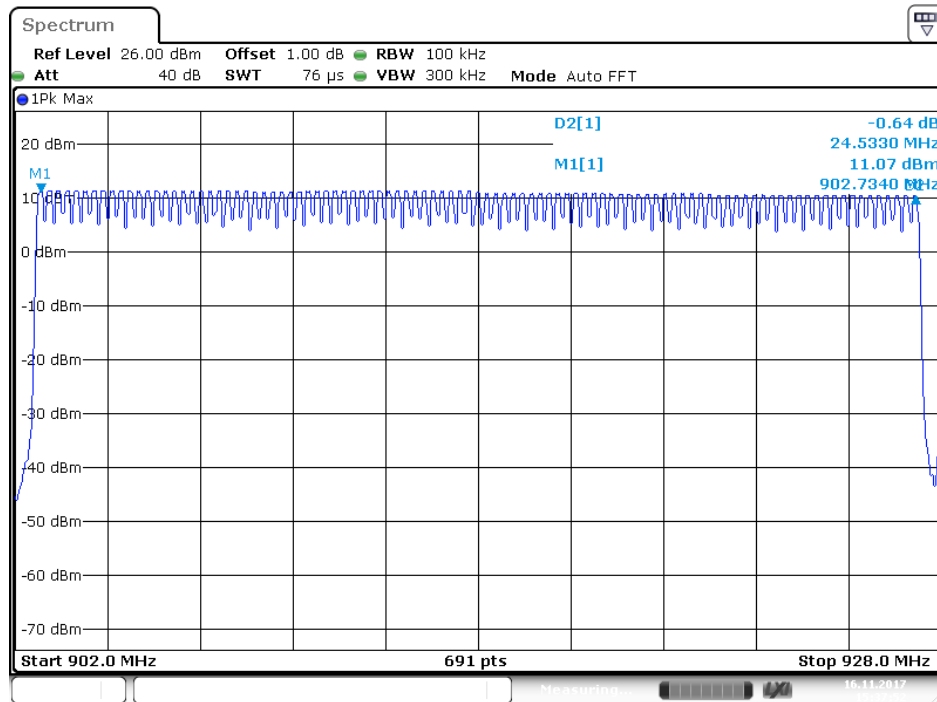
8.5.3. Max hold, view and count how many channel in the band.

8.6. Test Result

Total number of hopping channel	Measurement result(CH)	Limit(CH)
		99

The spectrum analyzer plots are attached as below.

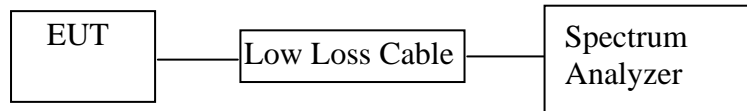
Number of hopping channels (GFSK)



Date: 16.NOV.2017 15:37:52

9. DWELL TIME TEST

9.1. Block Diagram of Test Setup



(EUT: Sub-GHz AP module for Lancom)

9.2. Limit

if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

9.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 902.75-927.25MHz. We select 902.75MHz, 915MHz, and 927.25MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Set center frequency of spectrum analyzer = operating frequency.

9.5.3. Set the spectrum analyzer as RBW=100kHz, VBW=300kHz, Span=0Hz, Adjust Sweep=20s. Get the pulse time.

9.5.4. Repeat above procedures until all frequency measured were complete.

9.6.Photos of Dwell time Measurement

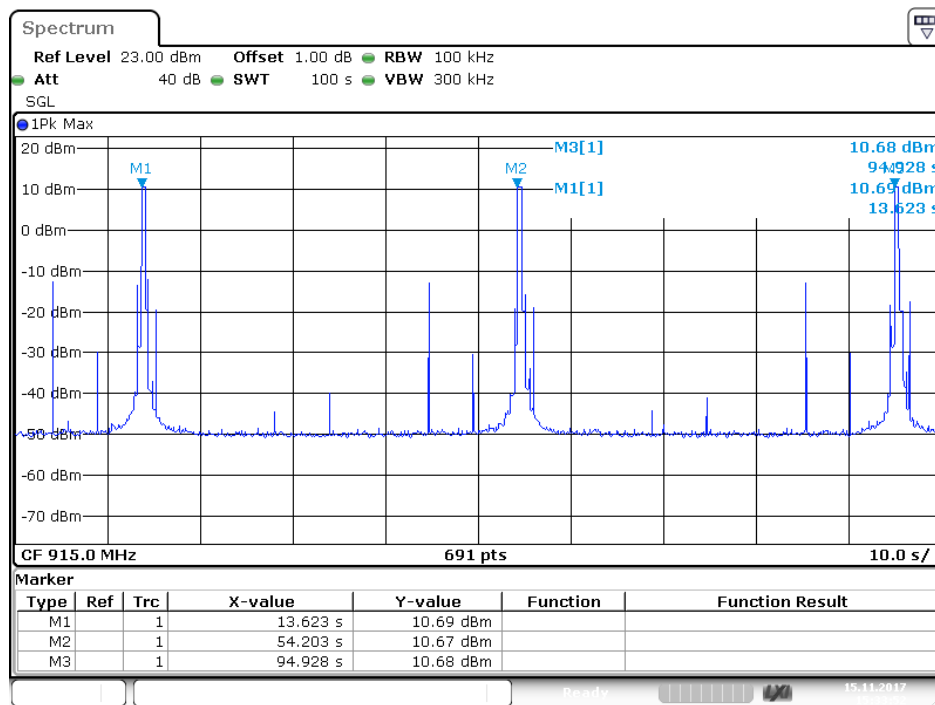
In the connection mode RFID uses 99 channels,As defined in 15.247, a 1 I, the limit for time of occupancy is 0.4s over time of 20s.

9.7.Test Result

Limit	Result
≤0.4s over 20s period	396ms

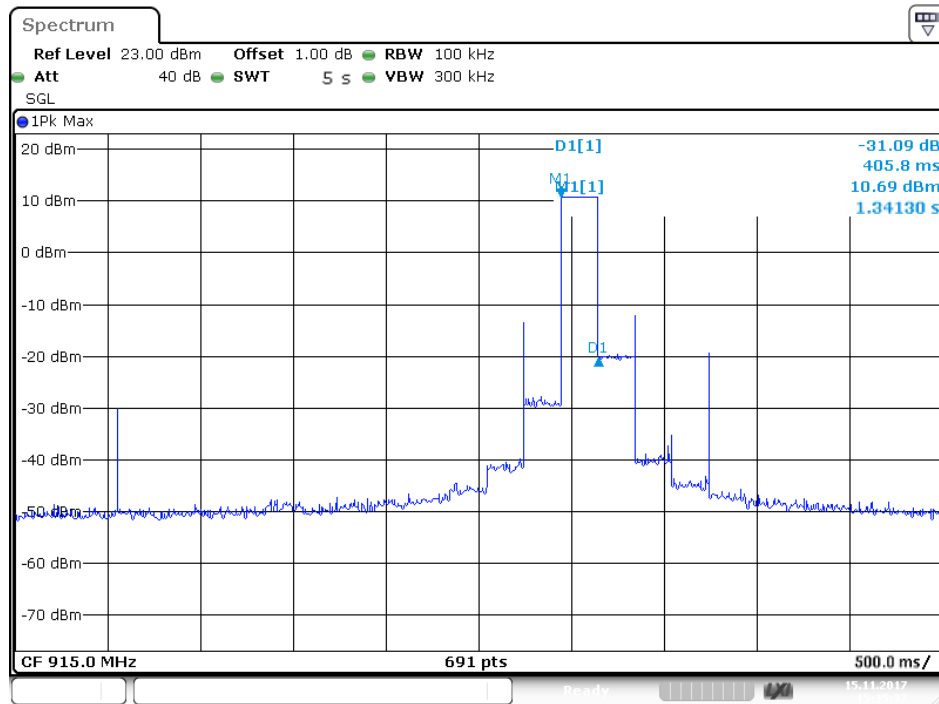
Note:

The number of occupied channels second	1/40.58=0.025 (number/ sec)
The total number of occupied channels per second	99*1/40.58=2.440(number/ sec)
Occupied time for each channel	405.8ms
Dwell time per second	99*1/40.58*405.8=990ms
Dwell time for 0.4second	99*1/40.58*405.8*0.4=396ms



Date: 15.NOV.2017 15:33:52

Effective period of the cycle: 54.203-13.623=40.58s

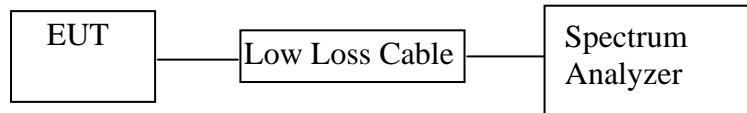


Date: 15.NOV.2017 15:35:37

The graph shows the duration of 'on' signal. From marker 1 to Delta 2, duration is 405.8ms.

10. MAXIMUM PEAK OUTPUT POWER TEST

10.1. Block Diagram of Test Setup



(EUT: Sub-GHz AP module for Lancom)

10.2. Limit

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under para-graph (a)(1)(i) of this section. the maximum output power should not exceed 29dBm.

10.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.4. Operating Condition of EUT

10.4.1. Setup the EUT and simulator as shown as Section 10.1.

10.4.2. Turn on the power of all equipment.

10.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 902.75-927.25MHz. We select 902.75MHz, 915MHz, and 927.25MHz TX frequency to transmit.

10.5. Test Procedure

10.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

10.5.2. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz.

10.5.3. Measurement the maximum peak output power.

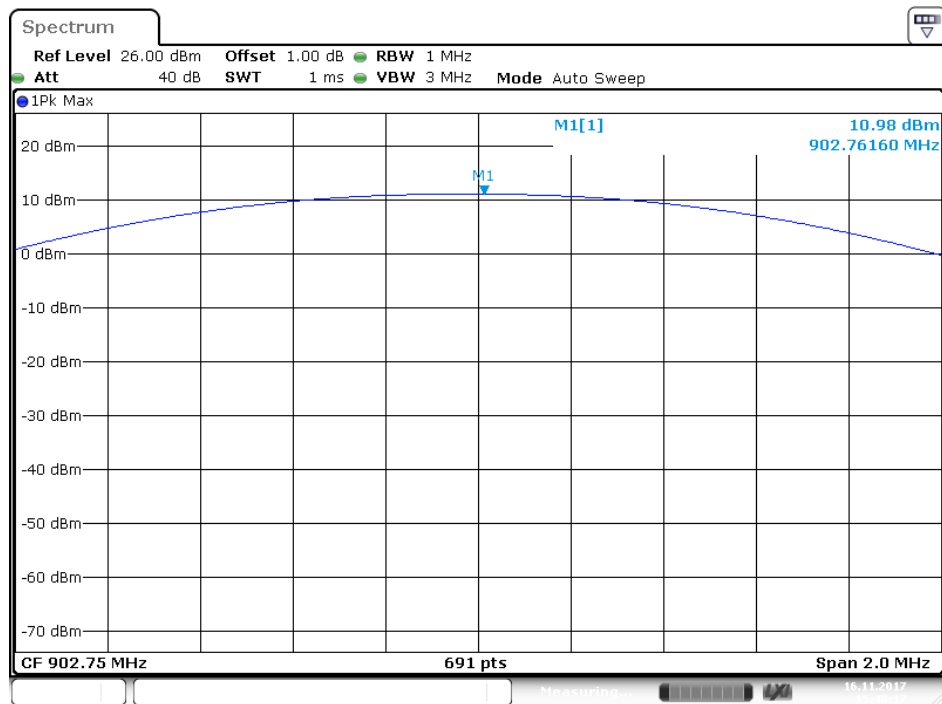
10.6.Test Result

FSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	902.75	10.98/0.0125	30/ 1.0
Middle	915.00	10.85/0.0122	30/ 1.0
High	927.25	10.44/0.0111	30/ 1.0

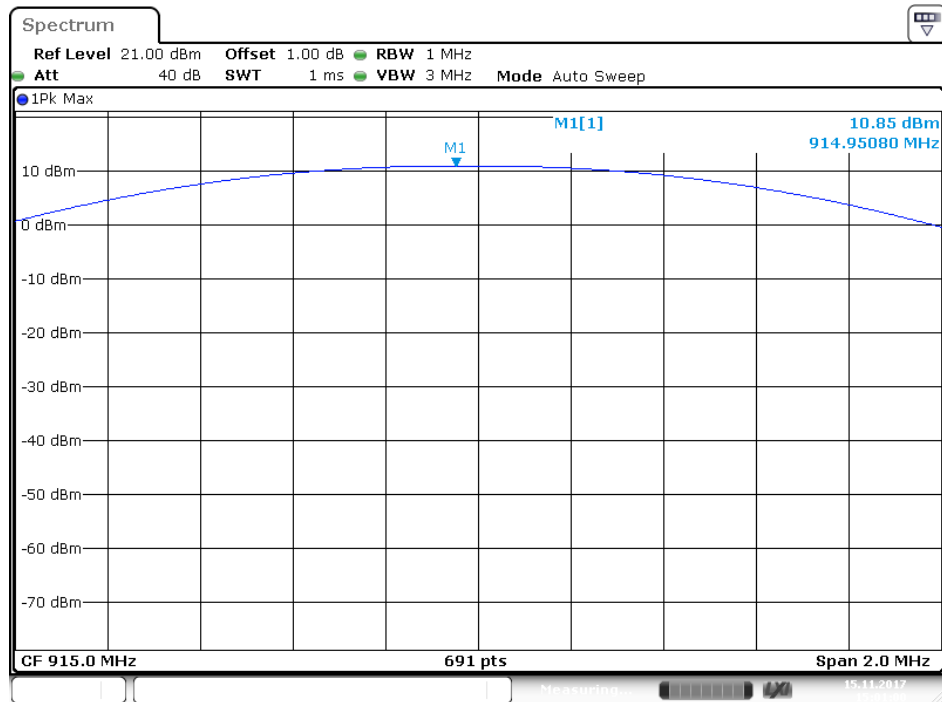
The spectrum analyzer plots are attached as below.

Low channel



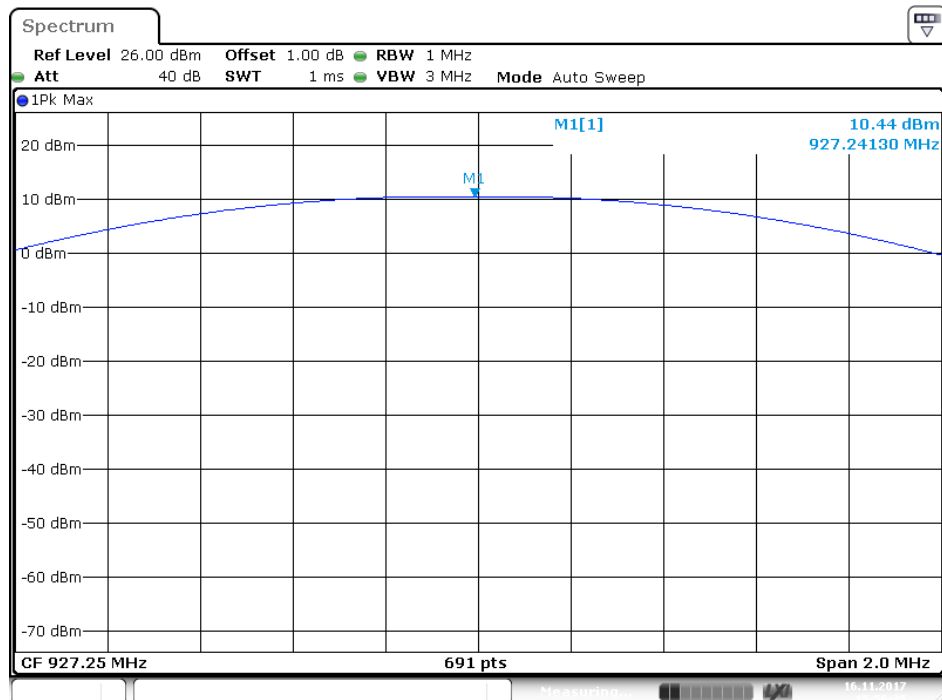
Date: 16.NOV.2017 15:48:18

Middle channel



Date: 15.NOV.2017 15:01:00

High channel

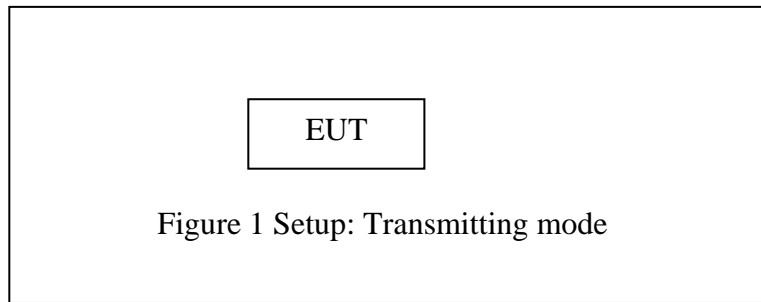


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11. RADIATED EMISSION TEST

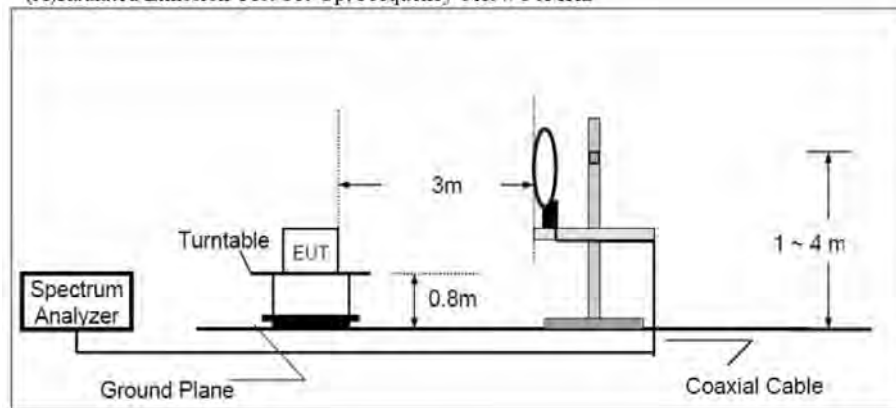
11.1. Block Diagram of Test Setup

11.1.1. Block diagram of connection between the EUT and peripherals

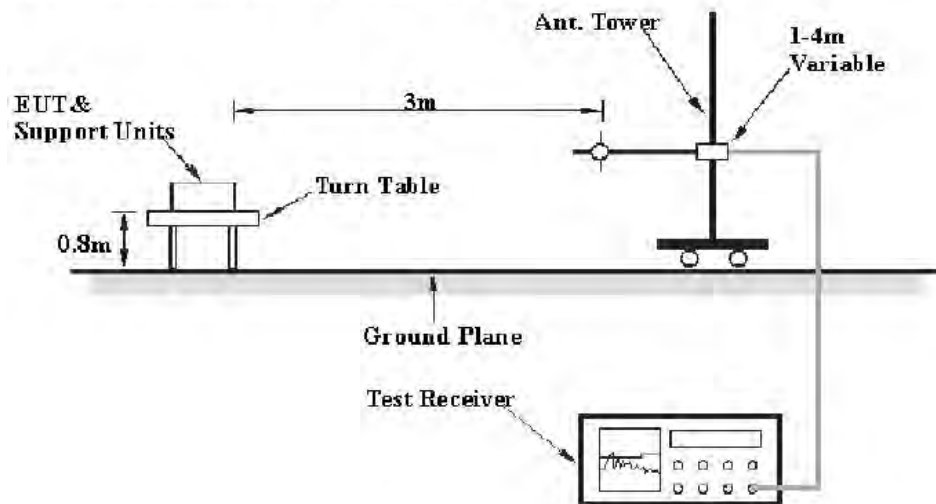


11.1.2. Semi-Anechoic Chamber Test Setup Diagram

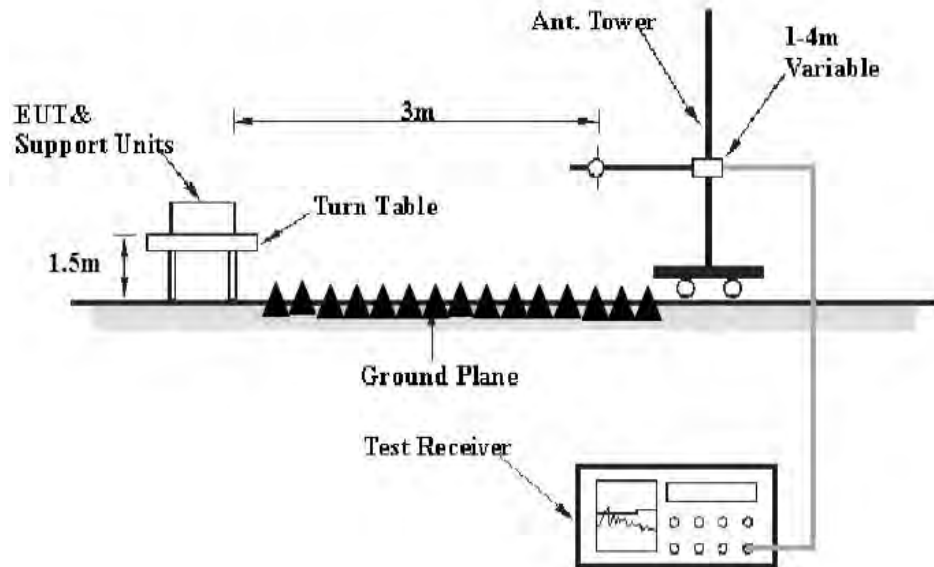
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30MHz-1GHz



(C) Radiated Emission Test Set-Up. Frequency above 1GHz



11.2. The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.Restricted bands of operation

11.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

11.4.Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.5.Operating Condition of EUT

11.5.1.Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 902.75-927.25MHz. We select 902.75MHz, 915MHz, and 927.25MHz TX frequency to transmit.

11.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

11.7.Data Sample

Frequency (MHz)	Reading (dBμv)	Factor (dB/m)	Result (dBμv/m)	Limit (dBμv/m)	Margin (dB)	Remark
X.XX	48.69	-13.35	35.34	46	-10.66	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dBμv) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dBμv/m) = Reading(dBμv) + Factor(dB/m)

Limit (dBμv/m) = Limit stated in standard

Margin (dB) = Result(dBμv/m) - Limit (dBμv/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dBμV/m)–Limit(dBμV/m)

Result(dBμV/m)= Reading(dBμV)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

11.8.The Field Strength of Radiation Emission Measurement Results

Note: The test frequency is from 9KHz to 10GHz, The 9KHz-30MHz emissions are not reported, because the levels are too low against the limit.

The spectrum analyzer plots are attached as below.

Below 1GHz


ACCURATE TECHNOLOGY CO., LTD.

 F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
 Science & Industry Park,Nanshan Shenzhen,P.R.China

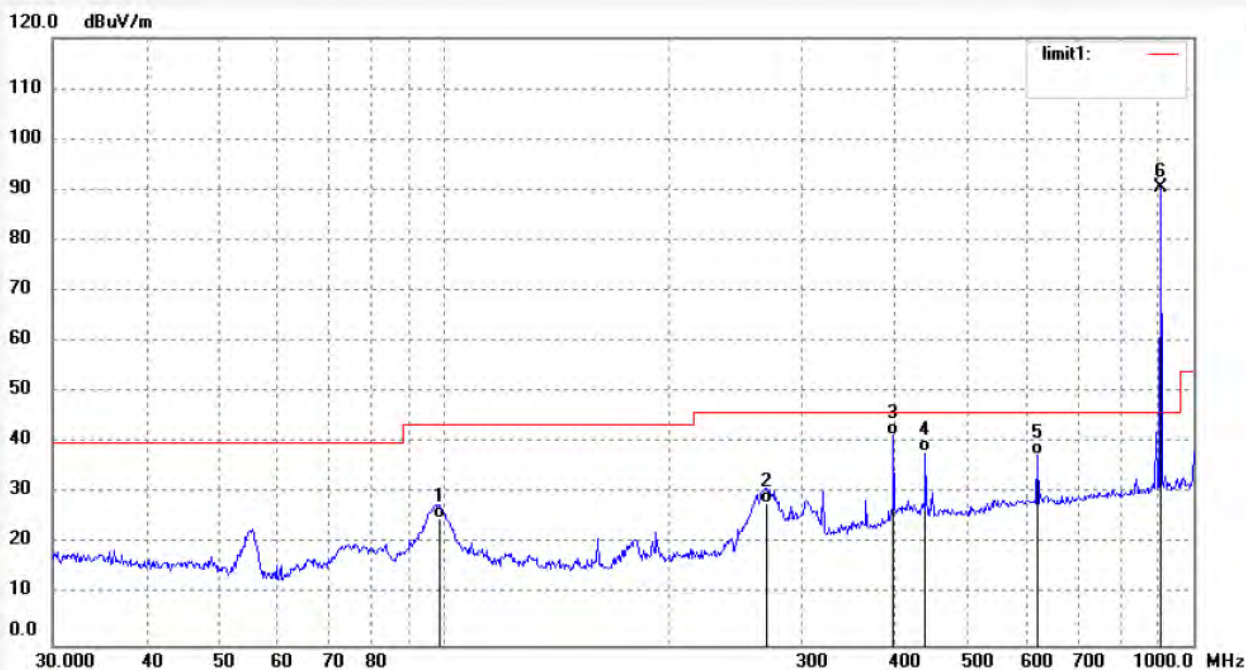
Site: 2# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2016 #2462	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/13/36
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 902.75MHz	Distance: 3m
Model: LANCOM AP Module	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180285

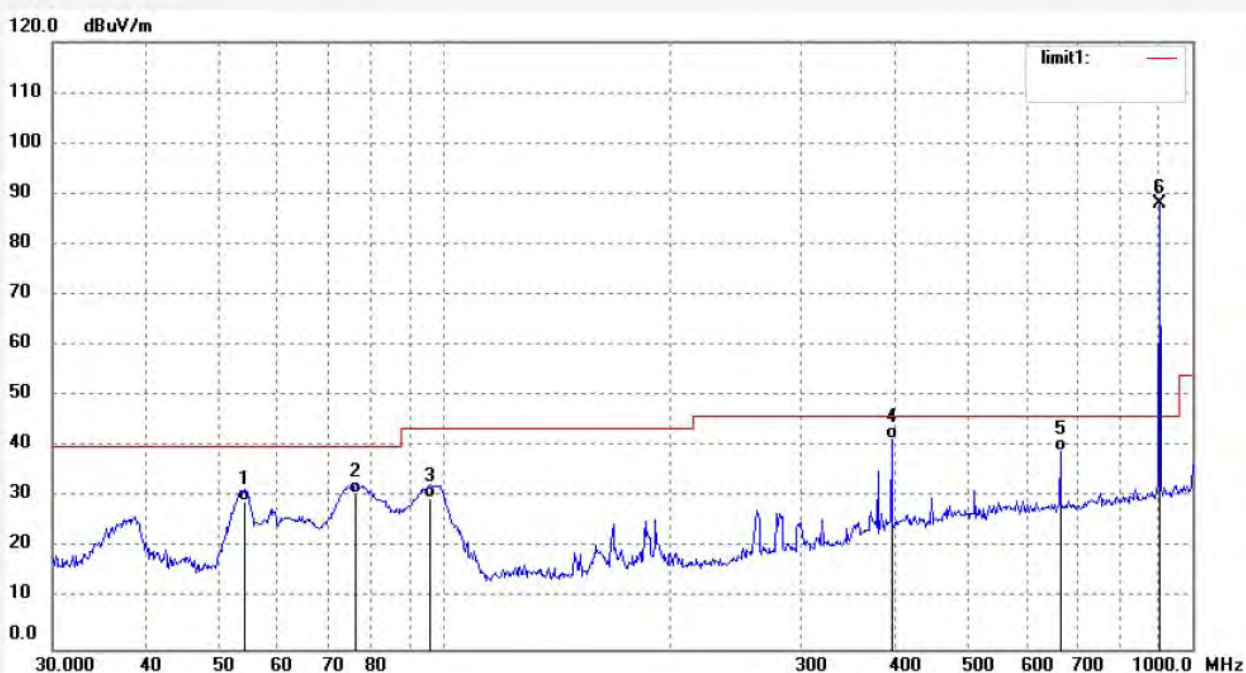


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	98.4866	38.01	-12.89	25.12	43.50	-18.38	QP	200	105	
2	269.4284	36.00	-7.93	28.07	46.00	-17.93	QP	200	145	
3	397.6334	45.67	-4.07	41.60	46.00	-4.40	QP	200	136	
4	438.6554	41.51	-3.41	38.10	46.00	-7.90	QP	200	188	
5	618.5369	38.15	-0.55	37.60	46.00	-8.40	QP	200	241	
6	902.7504	88.02	2.30	90.32			peak	200	239	

Job No.: STAR2016 #2463
 Standard: FCC Class B 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 23 C / 48 %
 EUT: Sub-GHz AP module for Lancom
 Mode: TX 902.75MHz
 Model: LANCOM AP Module
 Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
 Power Source: DC 3.3V
 Date: 2017/11/15
 Time: 10/14/58
 Engineer Signature: star
 Distance: 3m

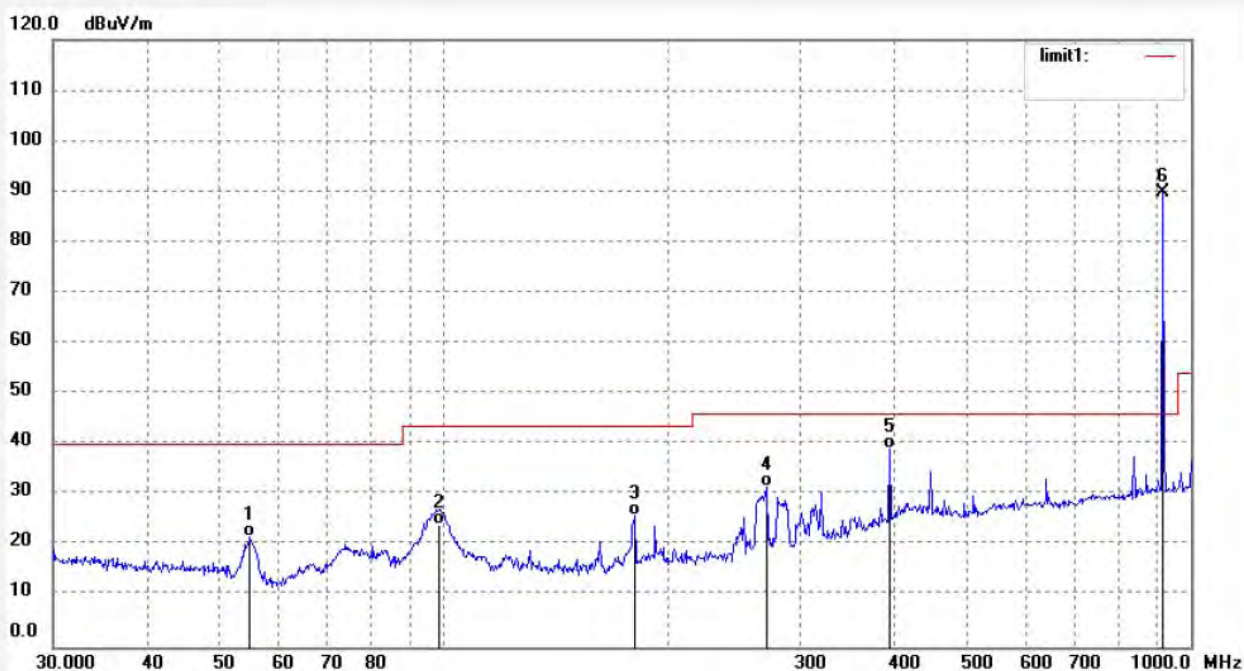
Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	54.0711	43.02	-13.72	29.30	40.00	-10.70	QP	100	189	
2	76.2442	45.31	-14.46	30.85	40.00	-9.15	QP	100	71	
3	95.7622	42.58	-12.83	29.75	43.50	-13.75	QP	100	236	
4	396.2414	45.57	-4.10	41.47	46.00	-4.53	QP	100	205	
5	665.8034	39.81	-0.55	39.26	46.00	-6.74	QP	100	174	
6	902.7503	85.87	2.30	88.17			peak	100	59	

Job No.: STAR2016 #2466	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/19/29
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 915MHz	Distance: 3m
Model: LANCOM AP Module	
Manufacturer: SES-imagotag Deutschland GmbH	

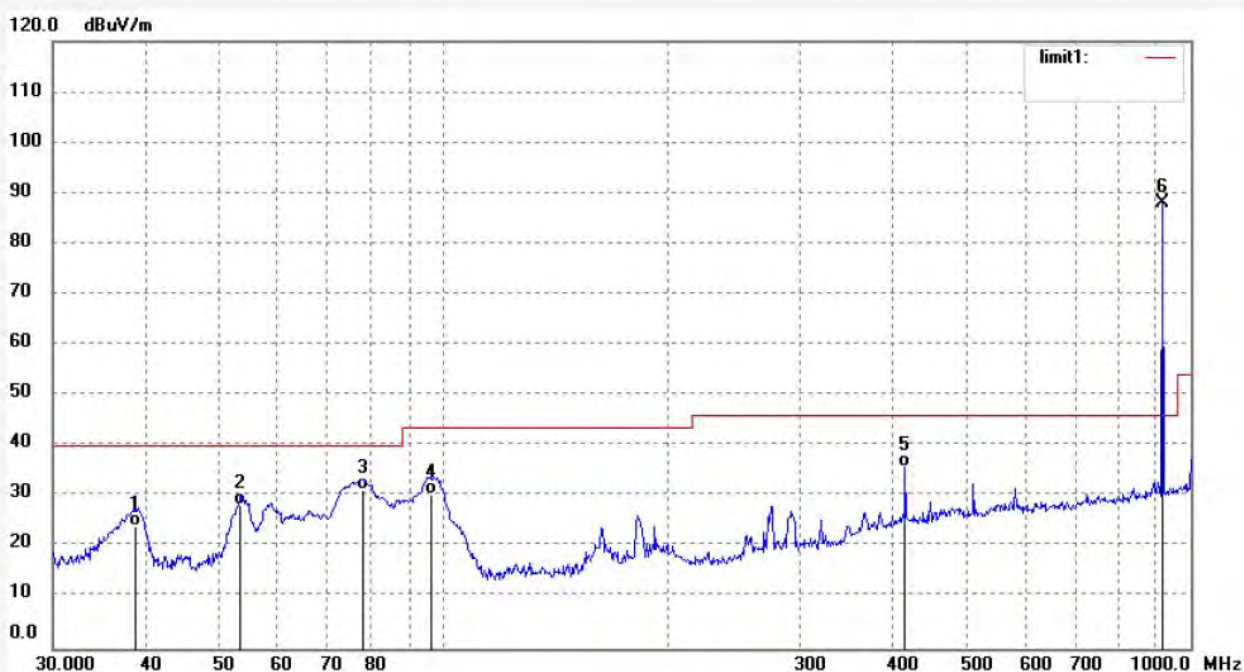
Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	55.0274	35.84	-13.98	21.86	40.00	-18.14	QP	200	100	
2	98.4866	37.00	-12.89	24.11	43.50	-19.39	QP	200	136	
3	180.0165	36.68	-10.78	25.90	43.50	-17.60	QP	200	258	
4	270.3748	39.55	-7.98	31.57	46.00	-14.43	QP	200	144	
5	394.8545	43.32	-4.13	39.19	46.00	-6.81	QP	200	197	
6	915.0687	87.28	2.49	89.77			peak	200	256	

Job No.: STAR2016 #2465	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/16/49
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 915MHz	Distance: 3m
Model: LANCOM AP Module	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	38.6160	35.32	-11.23	24.09	40.00	-15.91	QP	100	285	
2	53.5052	41.82	-13.57	28.25	40.00	-11.75	QP	100	133	
3	77.8653	45.25	-14.04	31.21	40.00	-8.79	QP	100	206	
4	96.4361	43.15	-12.84	30.31	43.50	-13.19	QP	100	246	
5	414.7223	39.05	-3.20	35.85	46.00	-10.15	QP	100	187	
6	915.0687	85.68	2.49	88.17			peak	100	260	

Job No.: STAR2016 #2467

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Sub-GHz AP module for Lancom

Mode: TX 927.25MHz

Model: LANCOM AP Module

Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Horizontal

Power Source: DC 3.3V

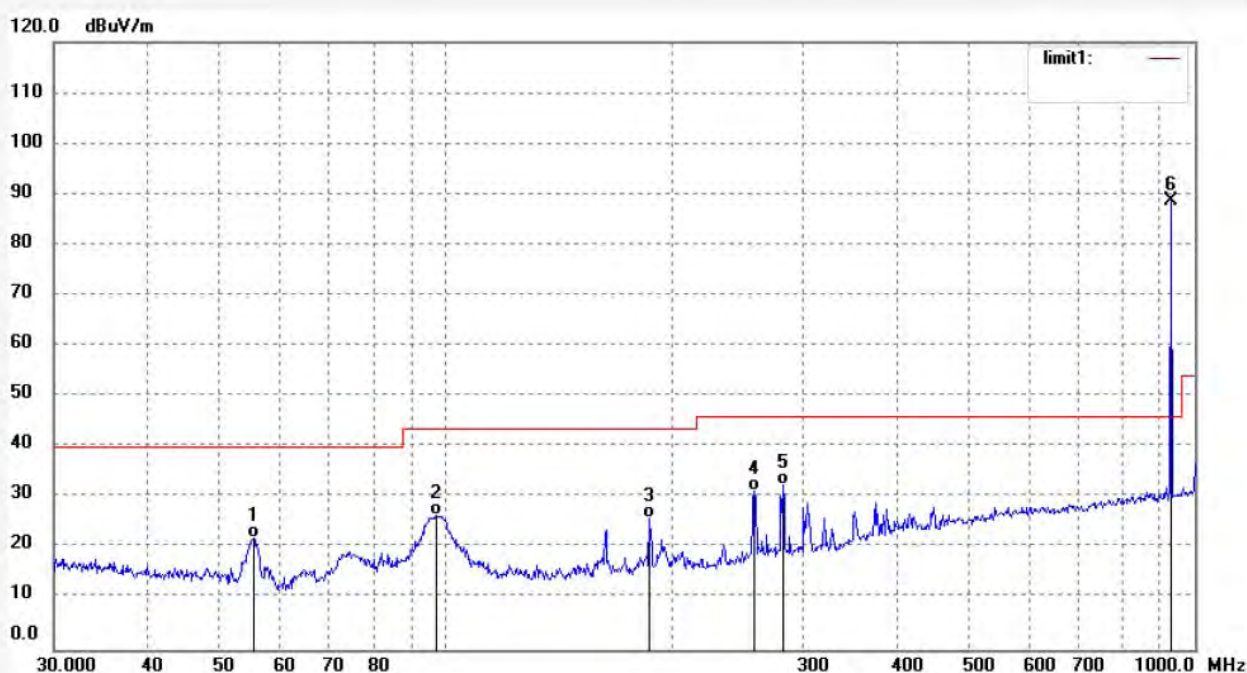
Date: 2017/11/15

Time: 10/22/22

Engineer Signature: star

Distance: 3m

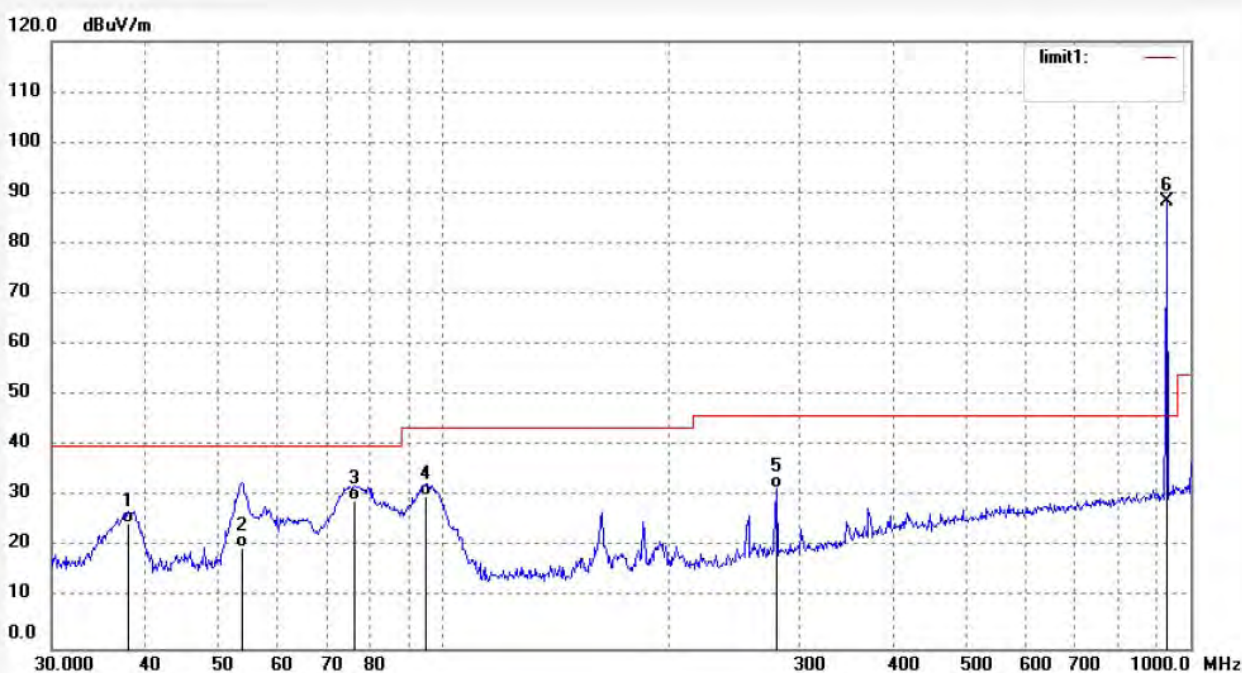
Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	55.4147	36.20	-14.06	22.14	40.00	-17.86	QP	200	42	
2	97.1148	39.42	-12.86	26.56	43.50	-16.94	QP	200	325	
3	187.0958	36.39	-10.49	25.90	43.50	-17.60	QP	200	136	
4	258.3264	39.14	-7.87	31.27	46.00	-14.73	QP	200	177	
5	281.9946	40.39	-7.79	32.60	46.00	-13.40	QP	200	268	
6	927.2502	85.90	2.82	88.72			peak	200	255	

Job No.: STAR2016 #2468	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/23/14
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 927.25MHz	Distance: 3m
Model: LANCOM AP Module	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	37.9450	35.69	-11.08	24.61	40.00	-15.39	QP	100	175	
2	53.8817	33.50	-13.67	19.83	40.00	-20.17	QP	100	130	
3	76.2442	43.69	-14.46	29.23	40.00	-10.77	QP	100	122	
4	94.7600	42.93	-12.83	30.10	43.50	-13.40	QP	100	259	
5	280.0237	39.42	-7.85	31.57	46.00	-14.43	QP	100	342	
6	927.2501	85.43	2.82	88.25			peak	100	244	

Above 1GHz


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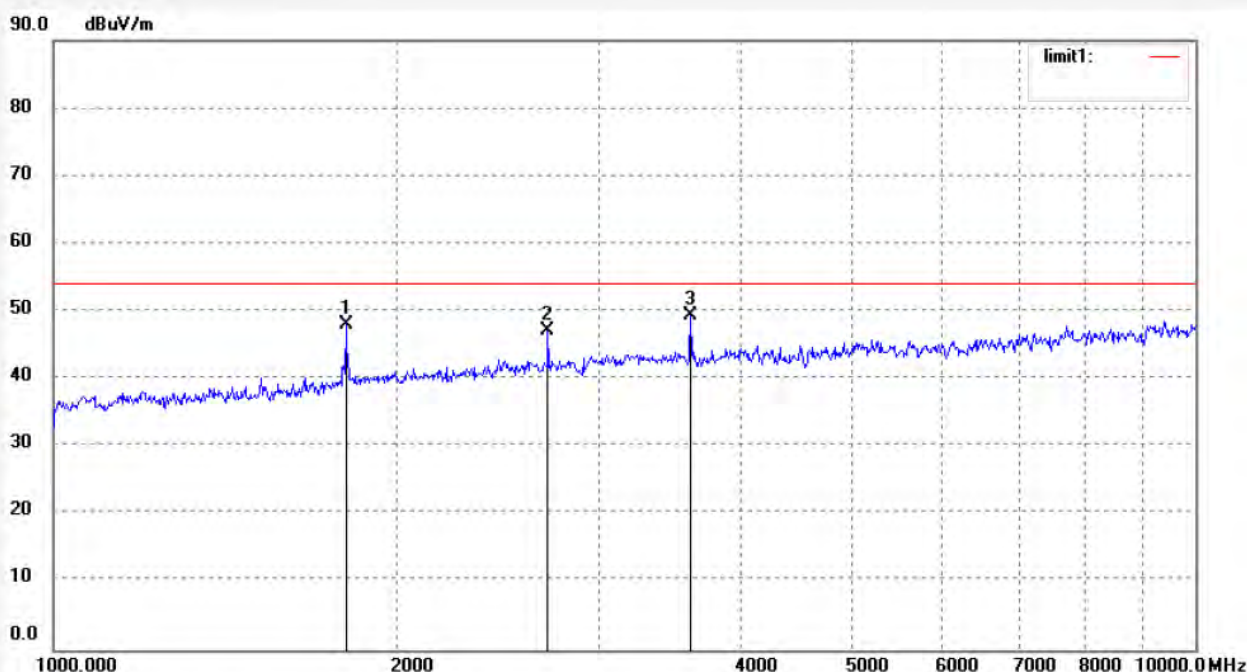
Site: 2# Chamber

Tel:+86-0755-26503290

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Job No.: STAR2016 #2474	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/36/17
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 902.75MHz	Distance: 3m
Model: LANCOM AP Module	
Manufacturer: SES-imagotag Deutschland GmbH	

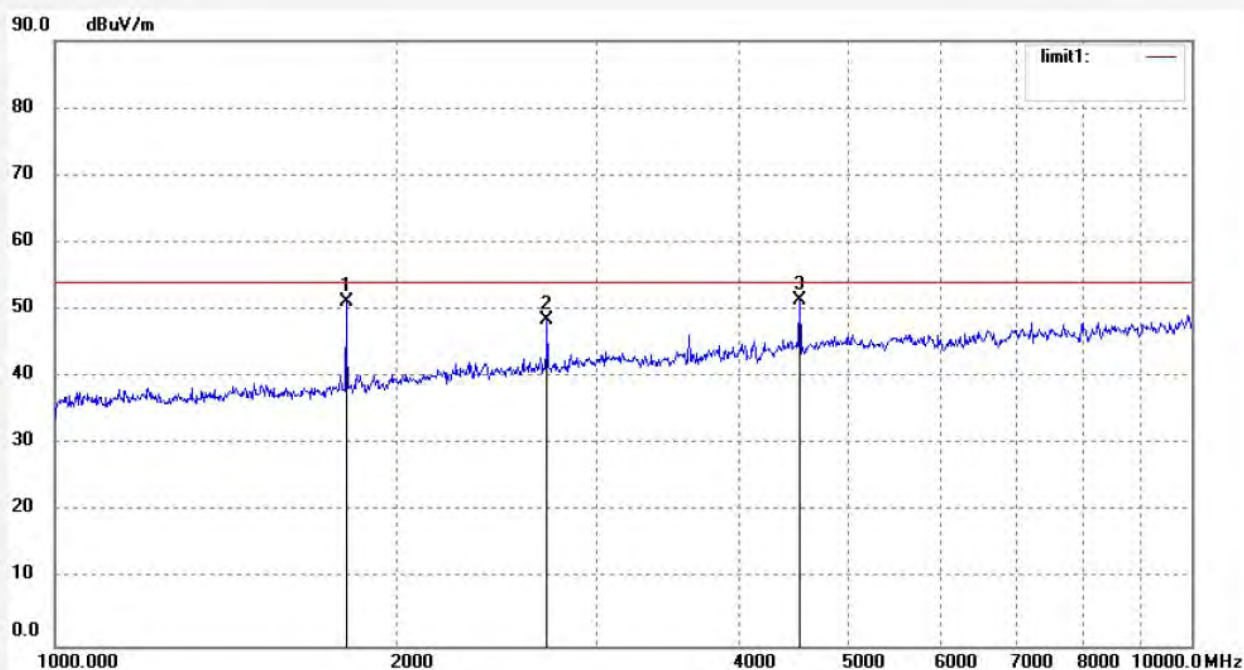
Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1805.018	15.03	32.90	47.93	54.00	-6.07	peak	200	91	
2	2708.252	10.60	36.56	47.16	54.00	-6.84	peak	200	106	
3	3611.099	12.63	36.68	49.31	54.00	-4.69	peak	200	281	

Job No.: STAR2016 #2473	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/35/16
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 902.75MHz	Distance: 3m
Model: LANCOM AP Module	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180285

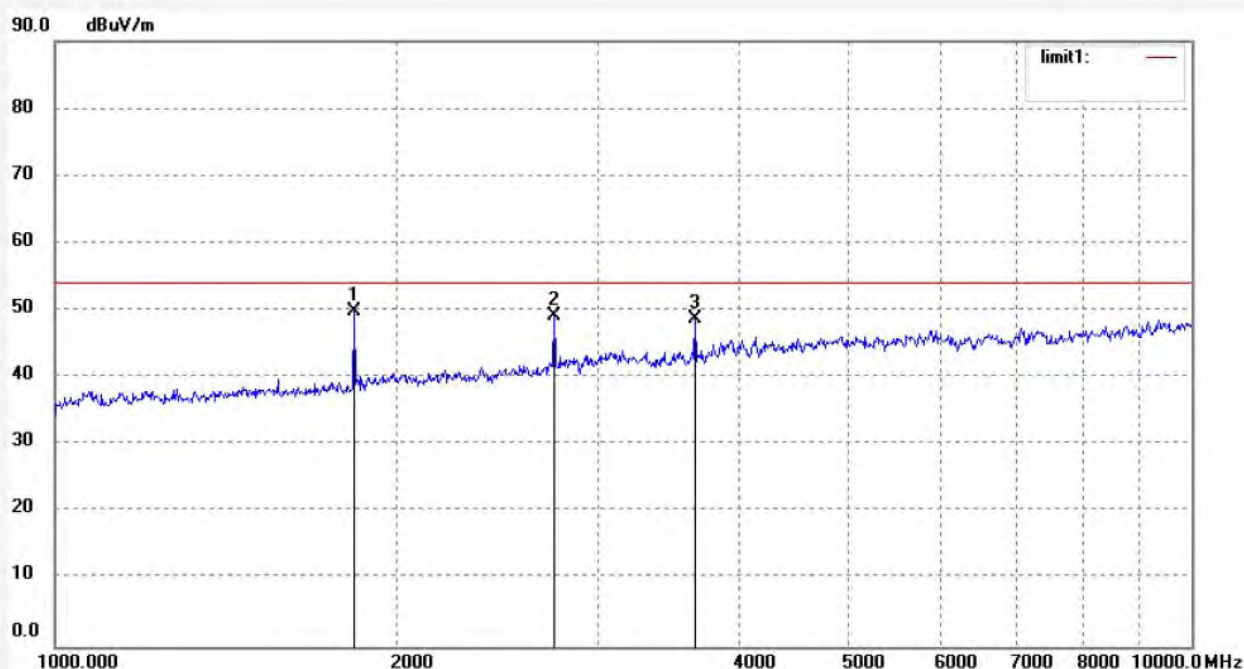


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1805.018	18.19	32.90	51.09	54.00	-2.91	peak	150	332	
2	2708.251	11.83	36.56	48.39	54.00	-5.61	peak	150	190	
3	4513.759	11.28	40.14	51.42	54.00	-2.58	peak	150	148	

Job No.: STAR2016 #2472
 Standard: FCC Class B 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 23 C / 48 %
 EUT: Sub-GHz AP module for Lancom
 Mode: TX 915MHz
 Model: LANCOM AP Module
 Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Horizontal
 Power Source: DC 3.3V
 Date: 2017/11/15
 Time: 10/32/21
 Engineer Signature: star
 Distance: 3m

Note: Report No.: ATE20180285

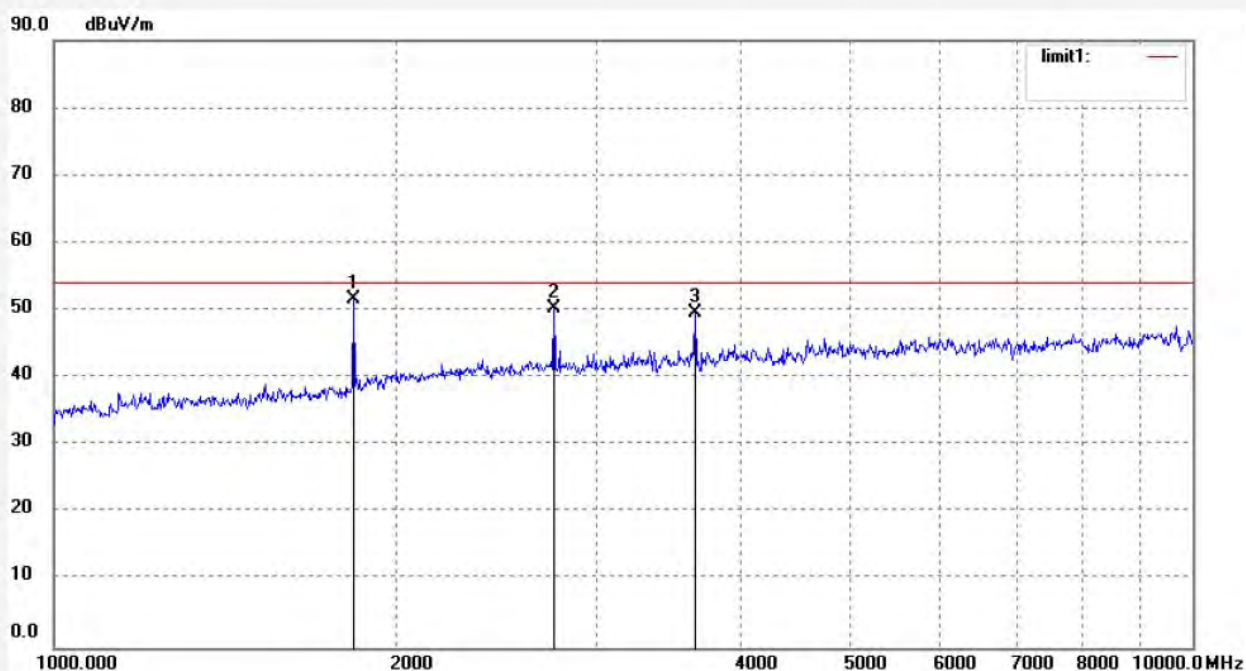


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1830.314	16.68	33.11	49.79	54.00	-4.21	peak	200	199	
2	2745.094	12.59	36.54	49.13	54.00	-4.87	peak	200	276	
3	3660.048	11.82	36.79	48.61	54.00	-5.39	peak	200	300	

Job No.: STAR2016 #2471
 Standard: FCC Class B 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 23 C / 48 %
 EUT: Sub-GHz AP module for Lancom
 Mode: TX 915MHz
 Model: LANCOM AP Module
 Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
 Power Source: DC 3.3V
 Date: 2017/11/15
 Time: 10/30/27
 Engineer Signature: star
 Distance: 3m

Note: Report No.: ATE20180285

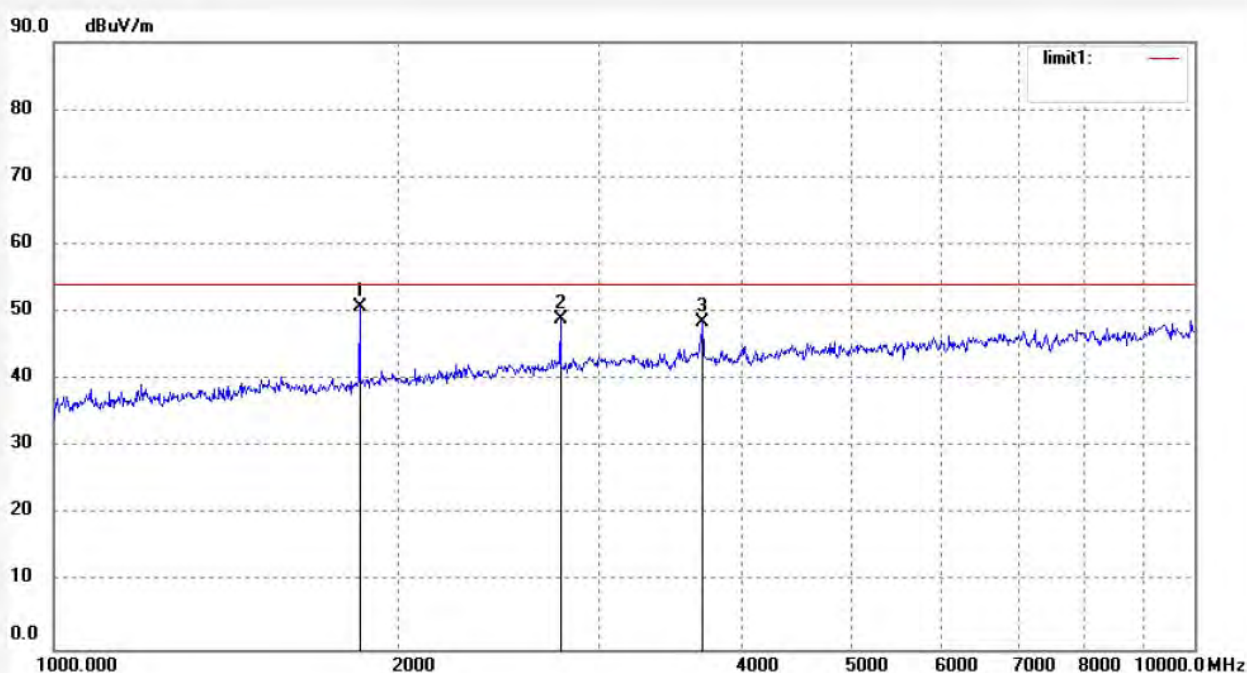


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1830.014	18.50	33.11	51.61	54.00	-2.39	peak	150	120	
2	2745.094	13.68	36.54	50.22	54.00	-3.78	peak	150	136	
3	3660.048	12.81	36.79	49.60	54.00	-4.40	peak	150	258	

Job No.: STAR2016 #2469
 Standard: FCC Class B 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 23 C / 48 %
 EUT: Sub-GHz AP module for Lancom
 Mode: TX 927.25MHz
 Model: LANCOM AP Module
 Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Horizontal
 Power Source: DC 3.3V
 Date: 2017/11/15
 Time: 10/27/55
 Engineer Signature: star
 Distance: 3m

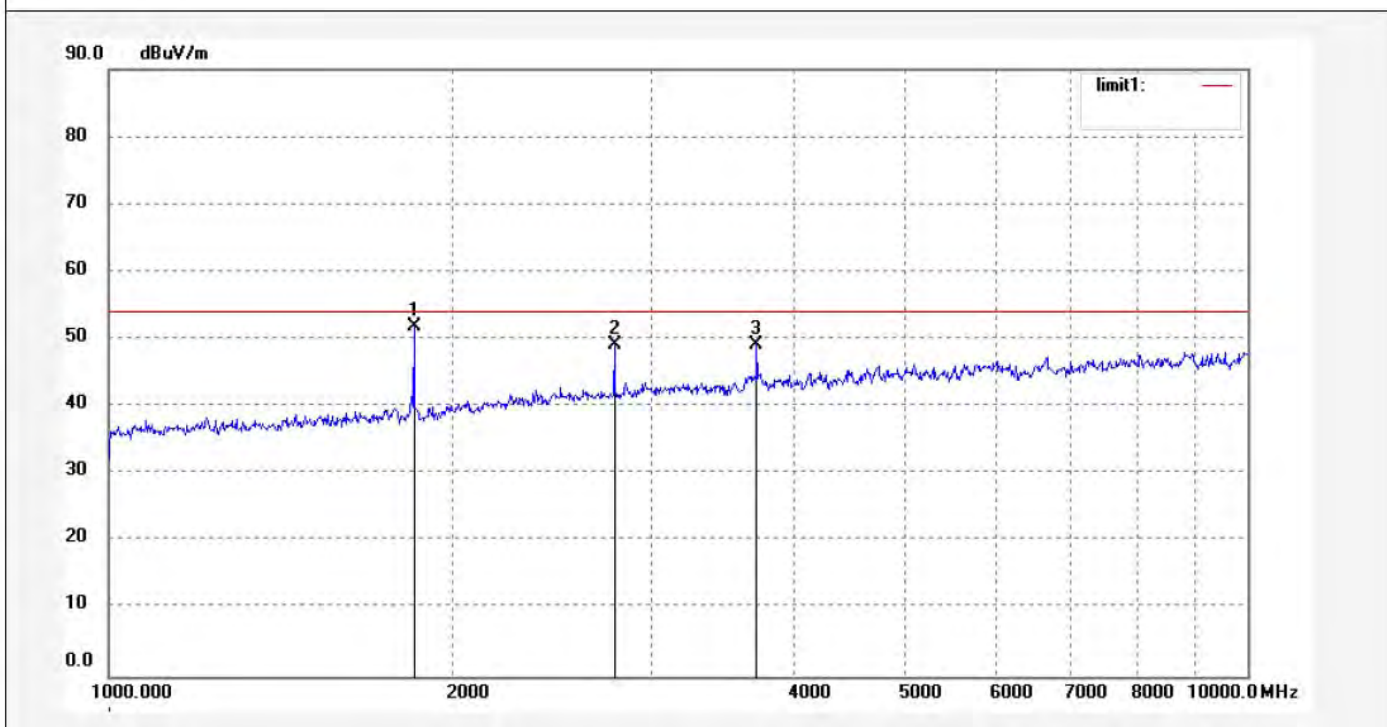
Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1854.532	17.41	33.27	50.68	54.00	-3.32	peak	200	169	
2	2781.753	12.48	36.53	49.01	54.00	-4.99	peak	200	281	
3	3709.007	11.64	36.93	48.57	54.00	-5.43	peak	200	222	

Job No.: STAR2016 #2470	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 10/29/08
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 927.25MHz	Distance: 3m
Model: LANCOM AP Module	
Manufacturer: SES-imagotag Deutschland GmbH	

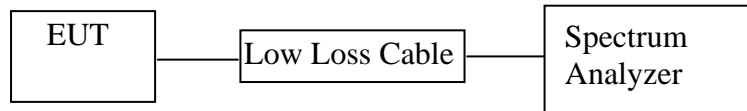
Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1854.532	18.53	33.27	51.80	54.00	-2.20	peak	150	163	
2	2781.753	12.73	36.53	49.26	54.00	-4.74	peak	150	254	
3	3709.007	12.29	36.93	49.22	54.00	-4.78	peak	150	233	

12.BAND EDGE COMPLIANCE TEST

12.1.Block Diagram of Test Setup



(EUT: Sub-GHz AP module for Lancom)

12.2.The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

12.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

12.4. Operating Condition of EUT

12.4.1.Setup the EUT and simulator as shown as Section 12.1.

12.4.2.Turn on the power of all equipment.

12.4.3.Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 902.75-927.25MHz. We select 902.75MHz, 927.25MHz TX frequency to transmit.

12.5. Test Procedure

12.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

12.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

12.5.3. The band edges was measured and recorded.

12.6. Test Result

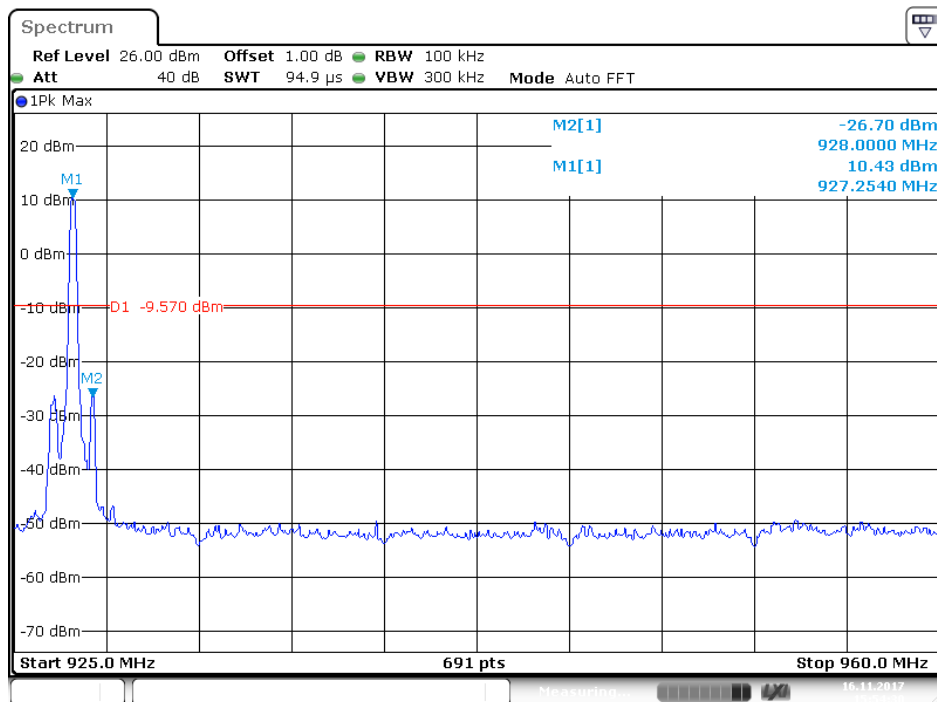
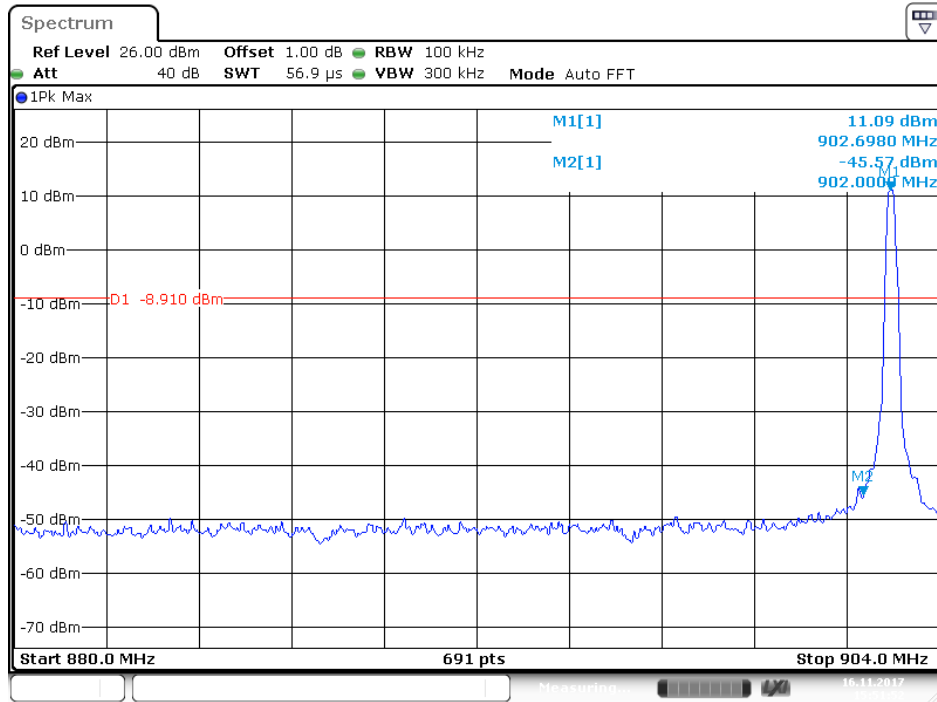
Band edge compliance of RF-conducted emissions was measured by setting the band edge as center frequency in the spectrum analyzer and measuring the power on the transmission on channels 1 and 99. The measured power and power on the band edge was then compared.

Note: Both hopping-on mode and hopping-off mode had been pre-tested, and only the worst case was recorded in the test report.

Hopping off mode:

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
GFSK		
902.75	56.66	> 20dBc
927.25	37.13	> 20dBc

The spectrum analyzer plots are attached as below.



Radiate Band Edge:

Hopping off mode



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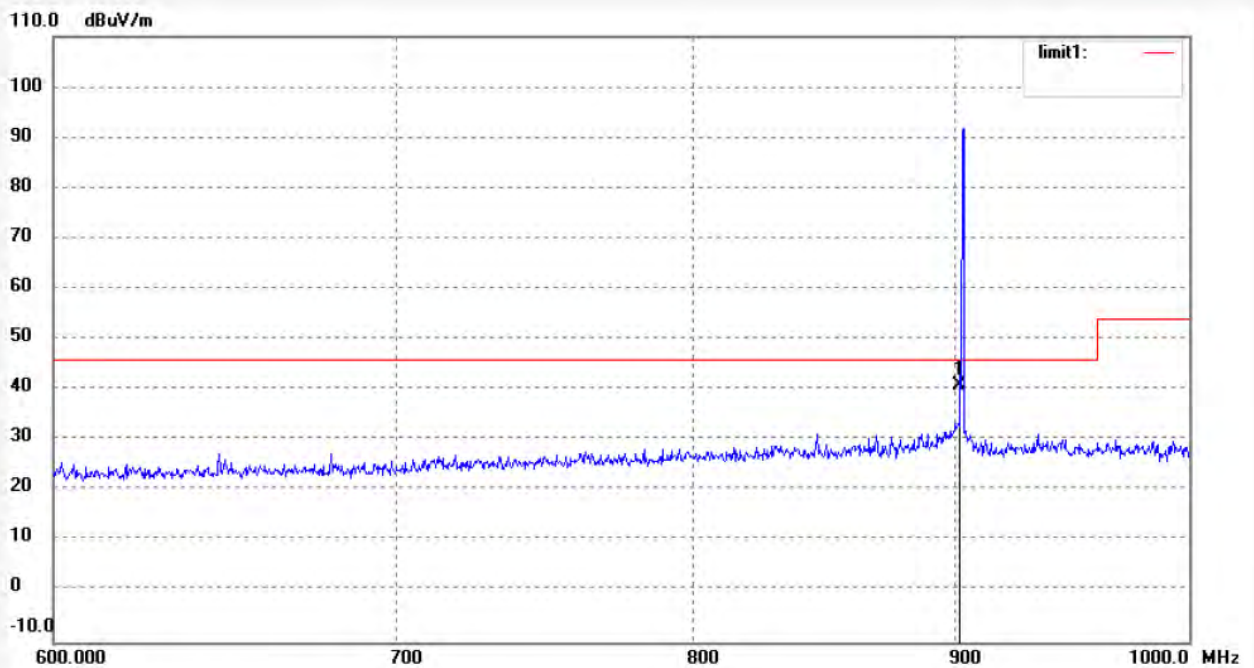
Site: 2# Chamber

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Job No.: STAR2016 #2233	Polarization: Horizontal
Standard: FCC Class C 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 15:22:04
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 902.75M	Distance: 3m
Model: LANCOM AP MODULE	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180285

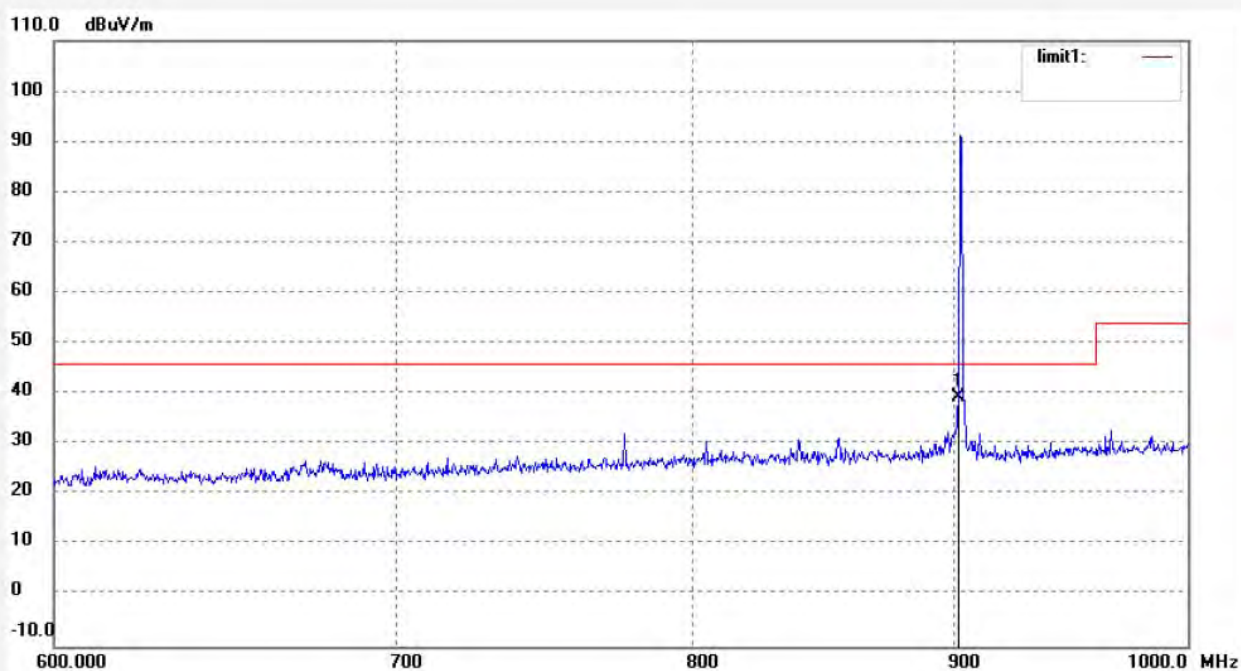


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	902.0000	12.30	28.68	40.98	46.00	-5.02	peak	200	123	

Job No.: STAR2016 #2234
 Standard: FCC Class C 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 23 C / 48 %
 EUT: Sub-GHz AP module for Lancom
 Mode: TX 902.75M
 Model: LANCOM AP MODULE
 Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
 Power Source: DC 3.3V
 Date: 2017/11/15
 Time: 15:25:14
 Engineer Signature: star
 Distance: 3m

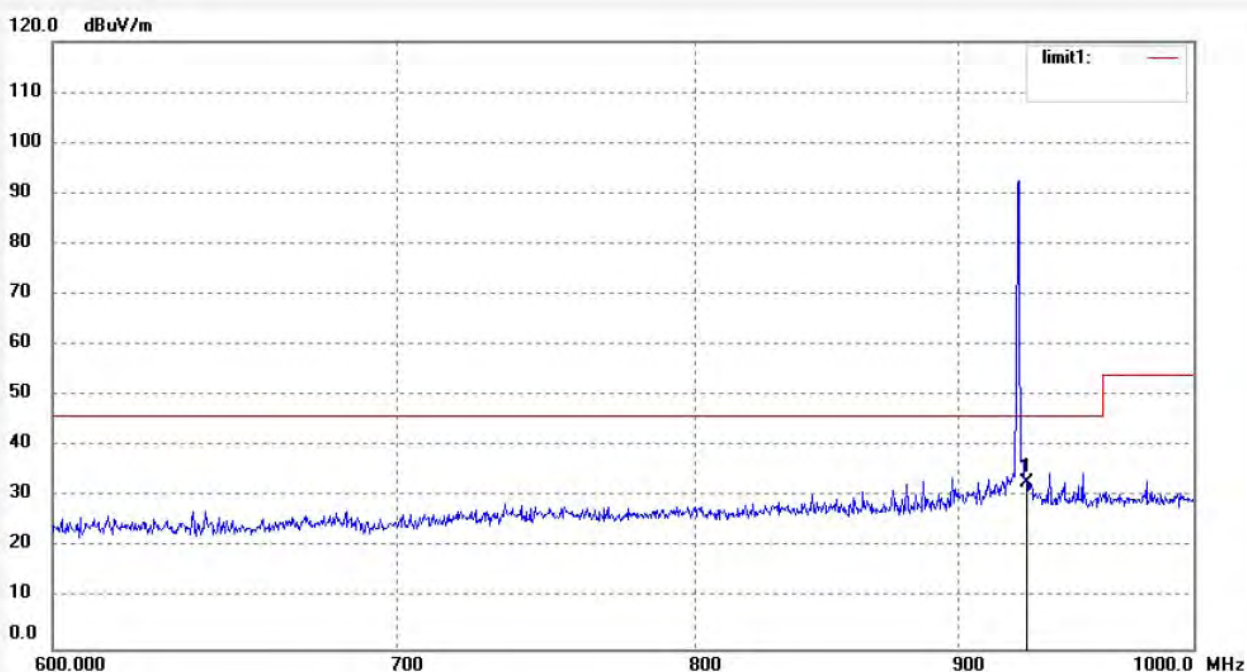
Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	902.0000	10.63	28.68	39.31	46.00	-6.69	peak	100	293	

Job No.: STAR2016 #2217	Polarization: Horizontal
Standard: FCC Class C 3M Radiated	Power Source: DC 3.3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 15:30:47
EUT: Sub-GHz AP module for Lancom	Engineer Signature: star
Mode: TX 927.25M	Distance: 3m
Model: LANCOM AP MODULE	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180285

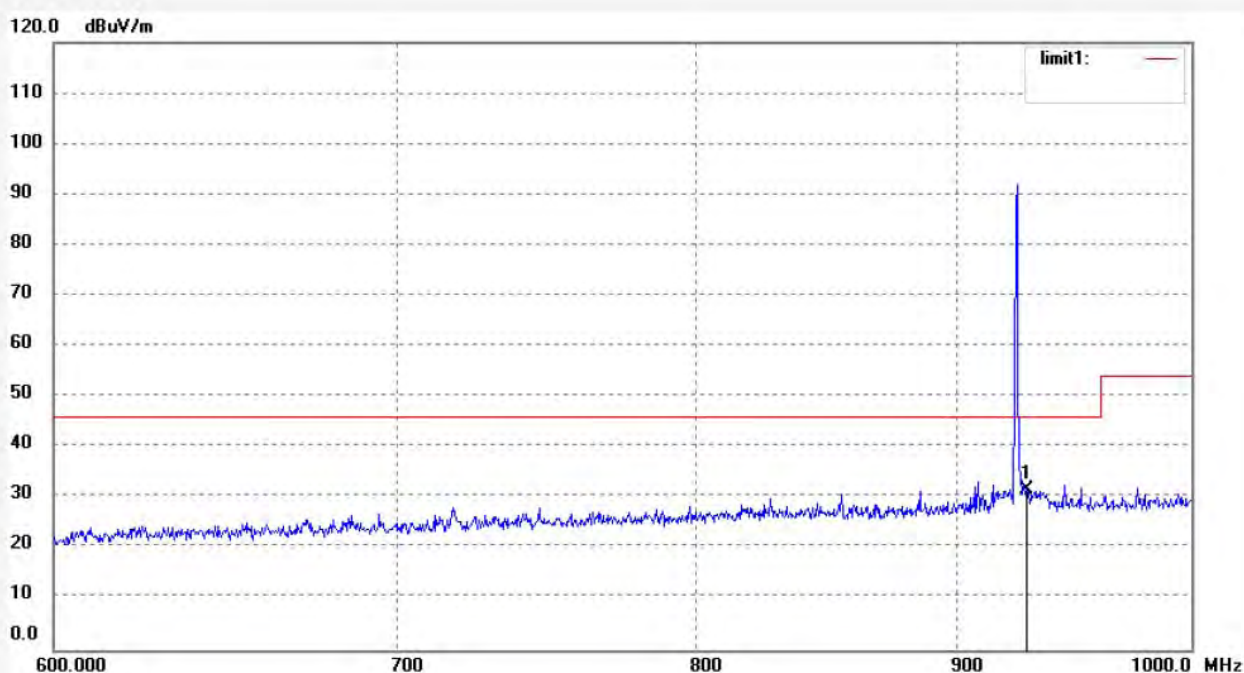


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	928.0000	3.64	29.15	32.79	46.00	-13.21	peak	200	103	

Job No.: STAR2016 #2218
 Standard: FCC Class C 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 23 C / 48 %
 EUT: Sub-GHz AP module for Lancom
 Mode: TX 927.25M
 Model: LANCOM AP MODULE
 Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
 Power Source: DC 3.3V
 Date: 2017/11/15
 Time: 15:34:24
 Engineer Signature: star
 Distance: 3m

Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	928.0000	2.64	29.15	31.79	46.00	-14.21	peak	100	301	

Hopping mode


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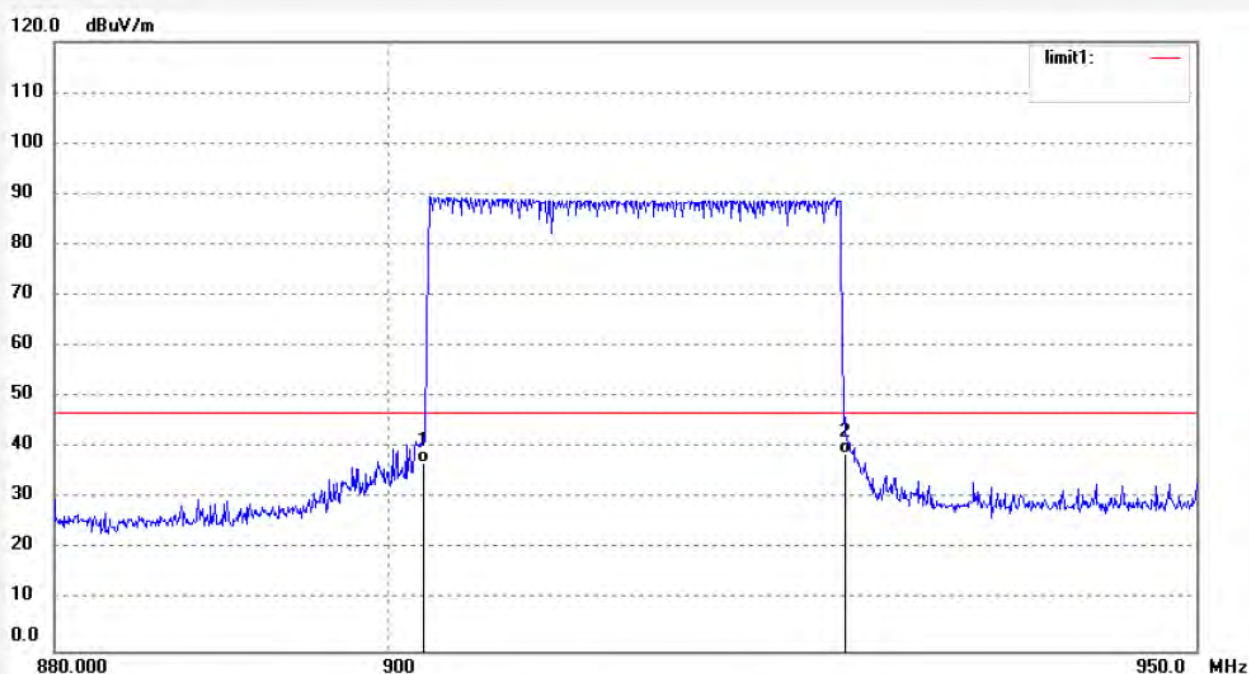
Tel:+86-0755-26503290

Fax:+86-0755-26503396

 Job No.: STAR2016 #2236
 Standard: FCC Class C 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 23 C / 48 %
 EUT: Sub-GHz AP module for Lancom
 Mode: HOPPING
 Model: LANCOM AP MODULE
 Manufacturer: SES-imagotag Deutschland GmbH

 Polarization: Horizontal
 Power Source: DC 3.3V
 Date: 2017/11/15/
 Time: 15/49/32
 Engineer Signature: star
 Distance: 3m

Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	902.0000	34.98	2.18	37.16	46.00	-8.84	QP	200	40	
2	928.0000	36.02	2.73	38.75	46.00	-7.25	QP	200	147	


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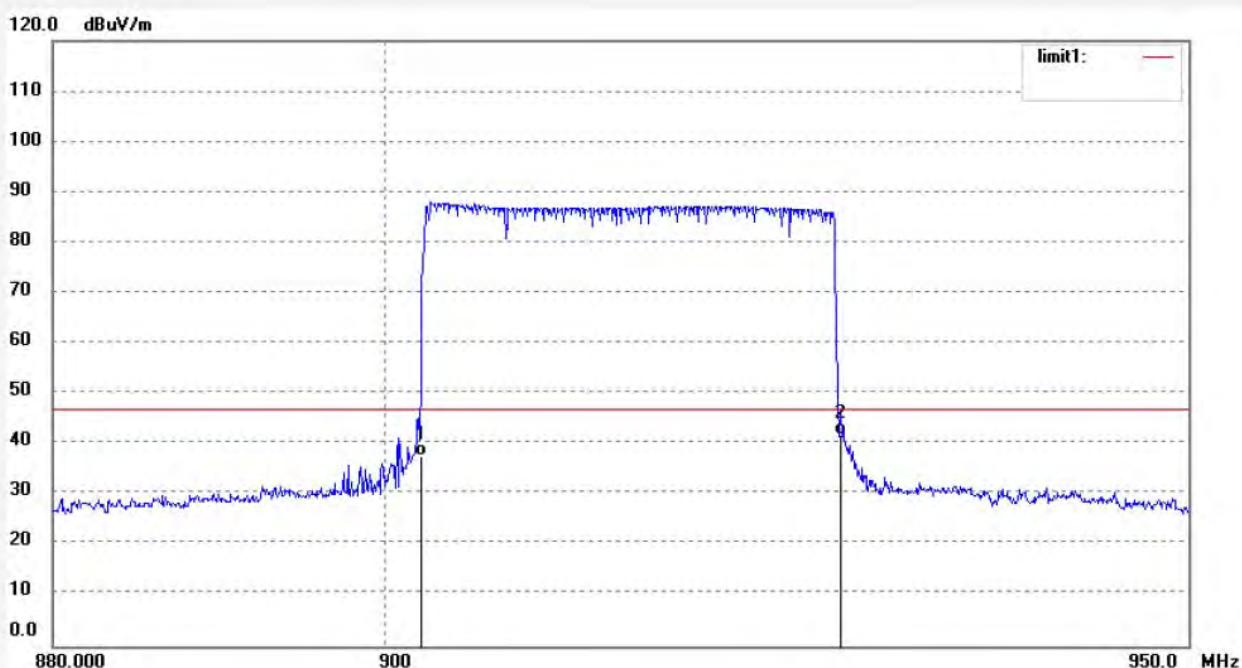
Tel:+86-0755-26503290

Fax:+86-0755-26503396

 Job No.: STAR2016 #2235
 Standard: FCC Class C 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 23 C / 48 %
 EUT: Sub-GHz AP module for Lancom
 Mode: HOPPING
 Model: LANCOM AP MODULE
 Manufacturer: SES-imagotag Deutschland GmbH

 Polarization: Vertical
 Power Source: DC 3.3V
 Date: 2017/11/15/
 Time: 15/45/11
 Engineer Signature: star
 Distance: 3m

Note: Report No.: ATE20180285



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	902.0000	35.60	2.18	37.78	46.00	-8.22	QP	100	157	
2	928.0000	39.14	2.73	41.87	46.00	-4.13	QP	100	293	

Note:

- Emissions attenuated more than 20 dB below the permissible value are not reported.
- The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$
- Display the measurement of peak values.

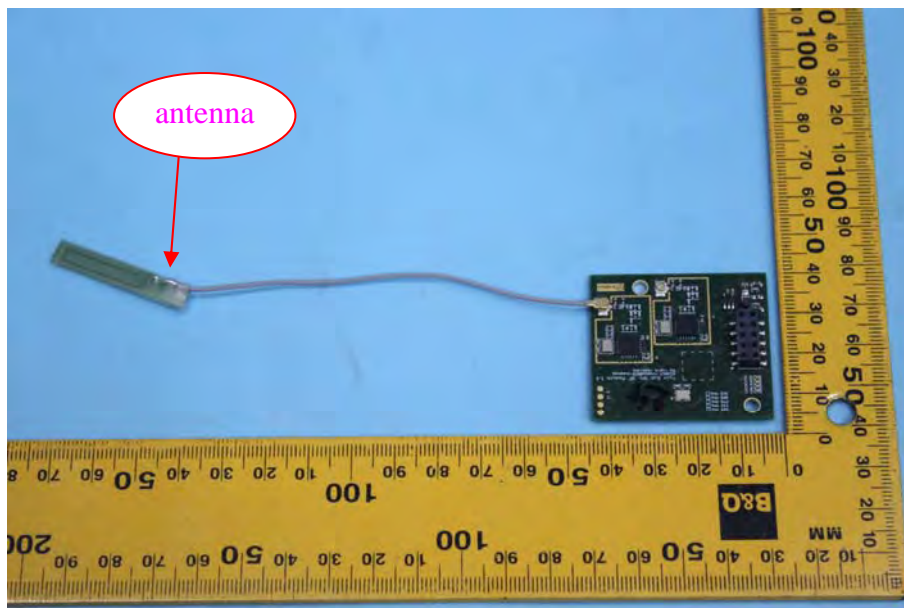
13.ANTENNA REQUIREMENT

13.1.The Requirement

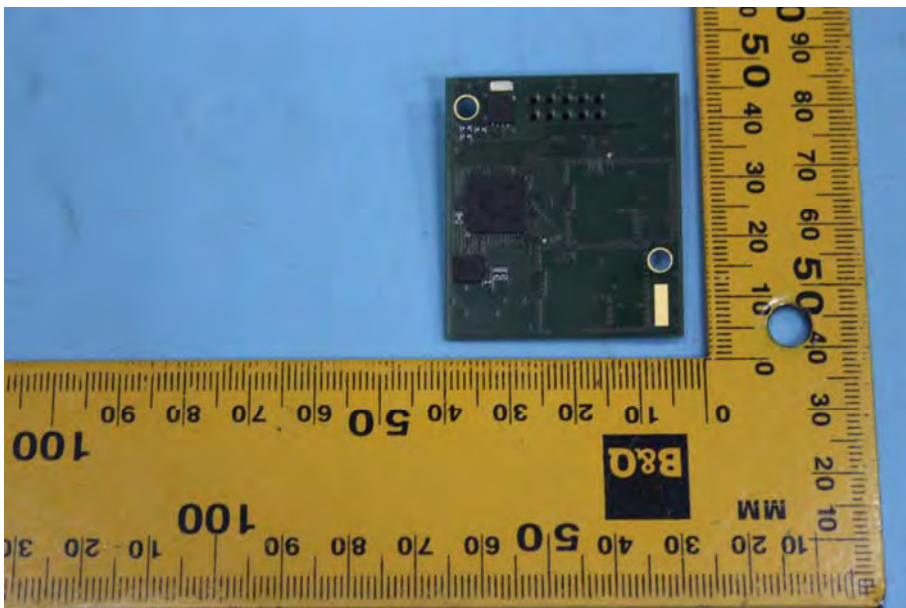
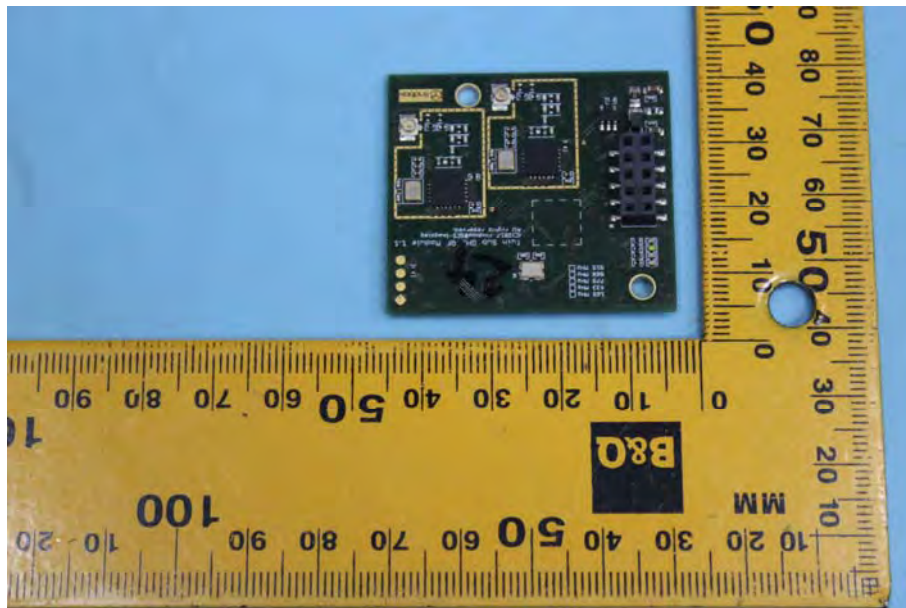
According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

13.2.Antenna Construction

The antenna use a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. The antenna jack of EUT correspond to the standard. The Antenna gain of EUT is 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



14.PHOTOS



******* End of Test Report *******