APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
SES-imagotag Deutschland GmbH

VUSION ESL
Model No.: Vusion 1.6", Vusion 2.2", Vusion 2.6", Vusion 4.2", Vusion 7.4", Vusion 4.5", Vusion 6.0", Vusion 12", fashiontag 1.6", fashiontag 2.7"

FCC ID: 2APO5-ESL

Prepared for	:	SES-imagotag Deutschland GmbH
Address	:	Bundesstrasse 16, D-77955 Ettenheim Germany
Prepared by	:	Shenzhen Accurate Technology Co., Ltd.
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Report No.	:	ATE20180281
Date of Test	:	Nov. 15-Nov. 17, 2017
Date of Report	:	March 5, 2018

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Description Page

Test Report Certification

Applicant	:	SES-imagotag Deutschland GmbH
Manufacturer	:	SES-imagotag Deutschland GmbH
EUT Description	:	VUSION ESL
Model No.	:	Vusion 1.6", Vusion 2.2", Vusion 2.6", Vusion 4.2", Vusion 7.4", Vusion 4.5", Vusion 6.0", Vusion 12", fashiontag 1.6", fashiontag 2.7"
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	:	VUSION ESL
Model Number	:	Vusion 1.6", Vusion 2.2", Vusion 2.6", Vusion 4.2", Vusion 7.4", Vusion 4.5", Vusion 6.0", Vusion 12", fashiontag 1.6", fashiontag 2.7" (Note: Above models are identical in schematic, structure and critical components except for model name and appearance size of the, So we prepare Vusion 2.2" for test.)
Frequency Range	:	902.5-927.5MHz
Number of Channels	:	101
Antenna Gain	:	0dBi
Antenna type	:	Integral Antenna
Power Supply	:	DC 3V (Powered by battery)
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

N/A

1.3. Carrier Frequency of Channels

Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)
1	902,500	35	911,000	69	919,500
2	902,750	36	911,250	70	919,750
3	903,000	37	911,500	71	920,000
4	903,250	38	911,750	72	920,250
5	903,500	39	912,000	73	920,500
6	903,750	40	912,250	74	920,750
7	904,000	41	912,500	75	921,000
8	904,250	42	912,750	76	921,250
9	904,500	43	913,000	77	921,500
10	904,750	44	913,250	78	921,750
11	905,000	45	913,500	79	922,000
12	905,250	46	913,750	80	922,250
13	905,500	47	914,000	81	922,500
14	905,750	48	914,250	82	922,750
15	906,000	49	914,500	83	923,000
16	906,250	50	914,750	84	923,250
17	906,500	51	915,000	85	923,500
18	906,750	52	915,250	86	923,750
19	907,000	53	915,500	87	924,000
20	907,250	54	915,750	88	924,250
21	907,500	55	916,000	89	924,500
22	907,750	56	916,250	90	924,750
23	908,000	57	916,500	91	925,000
24	908,250	58	916,750	92	925,250
25	908,500	59	917,000	93	925,500
26	908,750	60	917,250	94	925,750
27	909,000	61	917,500	95	926,000
28	909,250	62	917,750	96	926,250
29	909,500	63	918,000	97	926,500
30	909,750	64	918,250	98	926,750
31	910,000	65	918,500	99	927,000
32	910,250	66	918,750	100	927,250
33	910,500	67	919,000	101	927,500
34	910,750	68	919,250		

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 (ISEDC) 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	CBLU1183540-01	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	WHKX3.6/18G-10SS	N/A	Jan. 07, 2017	Jan. 06, 2018
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	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: 902.5MHz
Middle Channel: 915MHz
High Channel: 927.5MHz
Hopping

Note: The equipment under test (EUT) was tested under full battery.
The wireless has been tested under continuous transmission mode

3.2.Configuration and peripherals

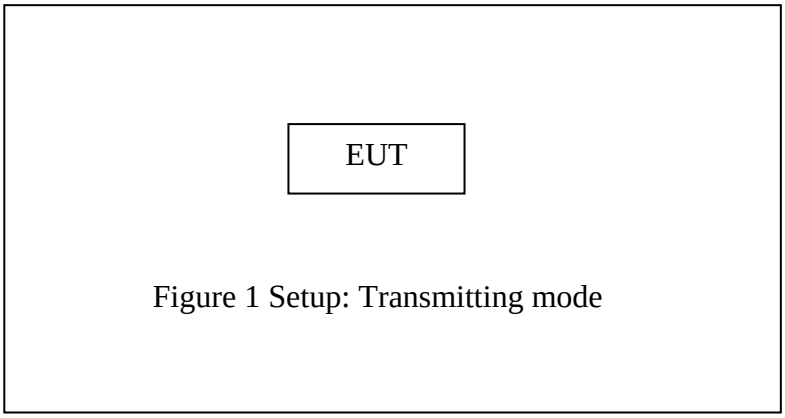


Figure 1 Setup: Transmitting mode

(EUT: VUSION ESL)

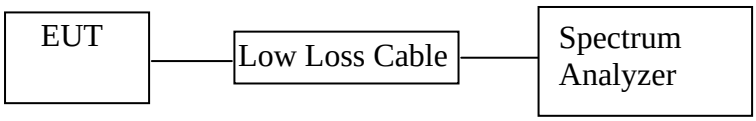
4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission Test	N/A
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

Noet: The EUT Powered by DC 3V battery . Therefore, the Conducted Emission test is not applicable and skipped

5. 20DB BANDWIDTH TEST

5.1.Block Diagram of Test Setup



(EUT: VUSION ESL)

5.2.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.

5.3.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.

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 TX (Hopping off) modes measure it. The transmit frequency are 902.5-927.5MHz. We select 902.5MHz, 915MHz, and 927.5MHz TX frequency to transmit.

5.5.Test Procedure

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

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

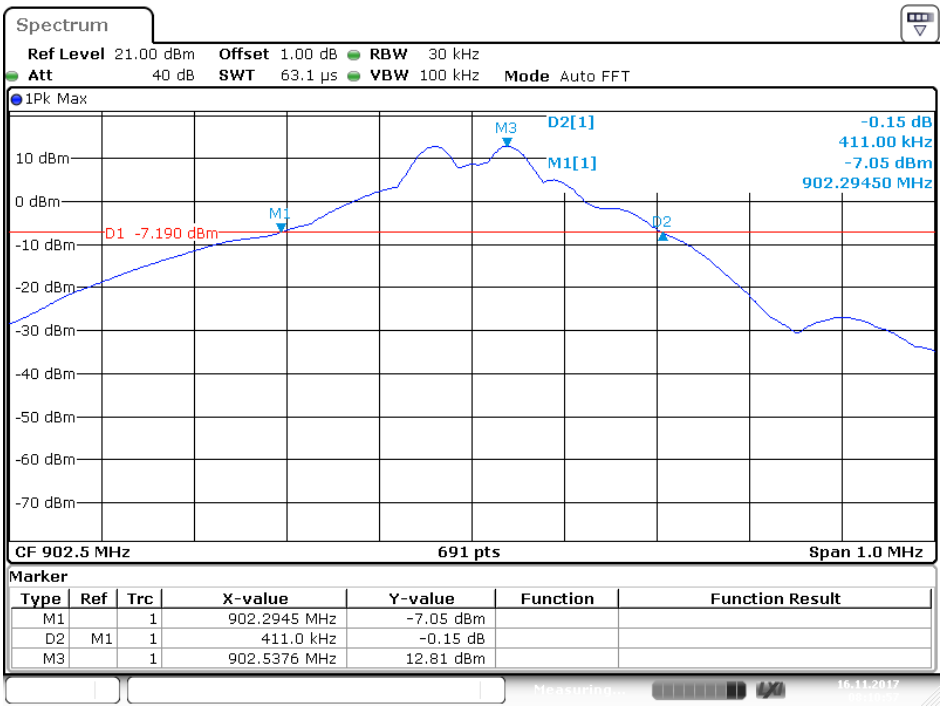
5.5.3.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

5.6.Test Result

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	902.5	0.411
Middle	915.0	0.407
High	927.5	0.394

The spectrum analyzer plots are attached as below.

Low channel



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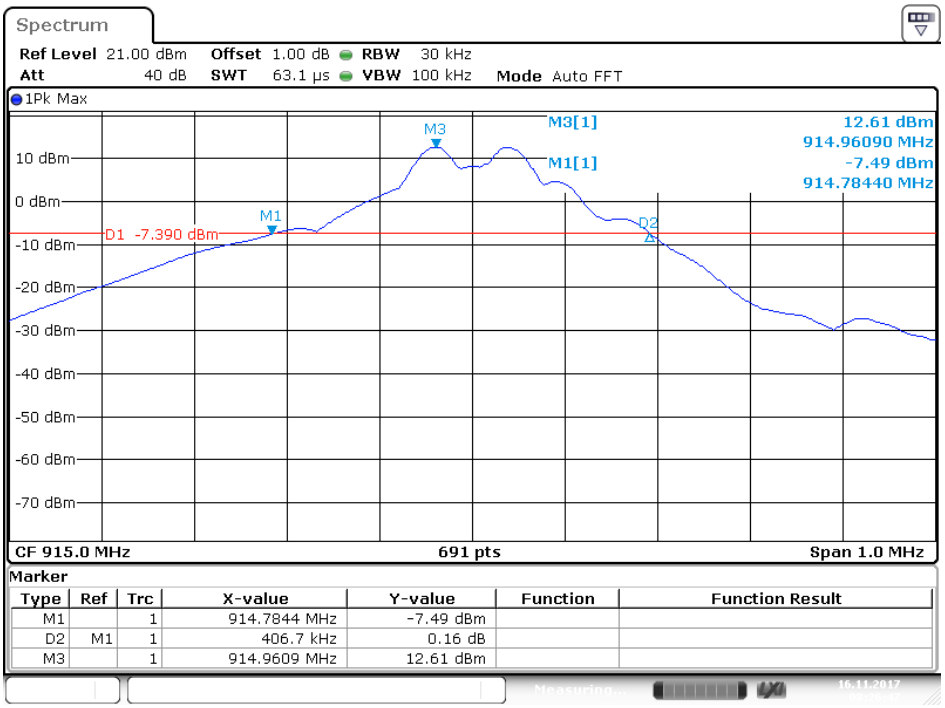
Middle channel



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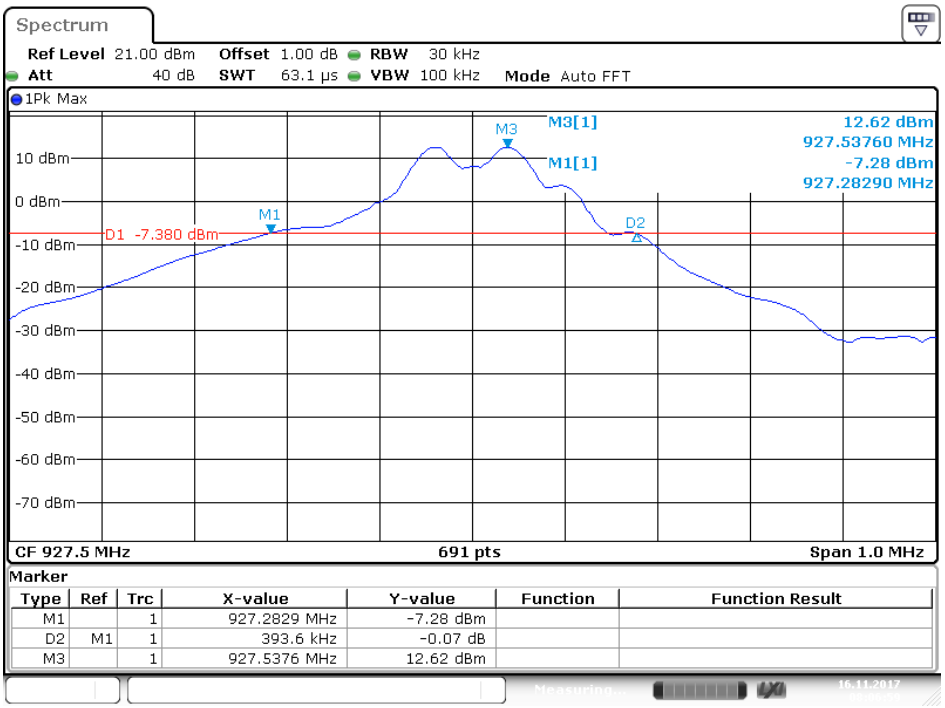
High channel



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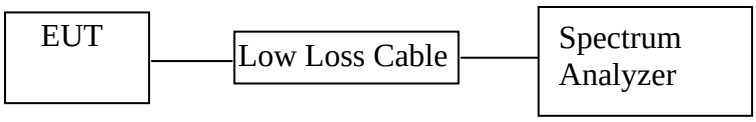
6. CARRIER FREQUENCY SEPARATION TEST

6.1.Block Diagram of Test Setup



(EUT: VUSION ESL)

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. 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.

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 on) modes measure it. The transmit frequency are 902.5-927.5MHz. We select 902.5MHz, 915MHz, and 927.5MHz 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 100 kHz and VBW to 300 kHz. Adjust Span to 500kHz.

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

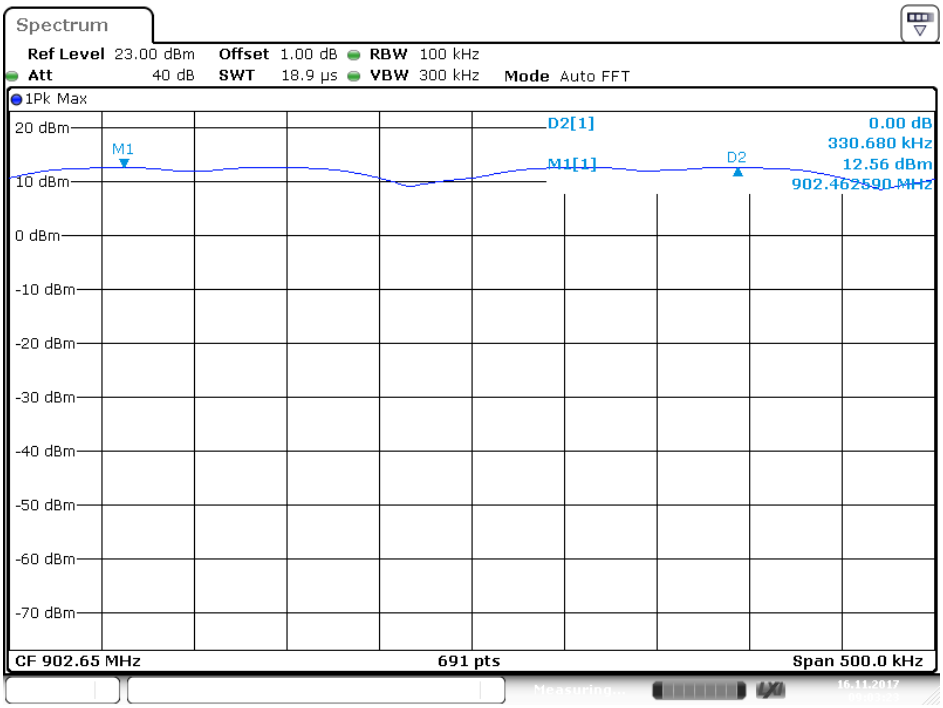
6.5.4.Measurement the channel separation

6.6.Test Result

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	902.50	0.331	25KHz or 2/3*20dB bandwidth	PASS
	902.75			
Middle	915.00	0.331	25KHz or 2/3*20dB bandwidth	PASS
	915.25			
High	927.25	0.329	25KHz or 2/3*20dB bandwidth	PASS
	927.50			

The spectrum analyzer plots are attached as below.

Low channel



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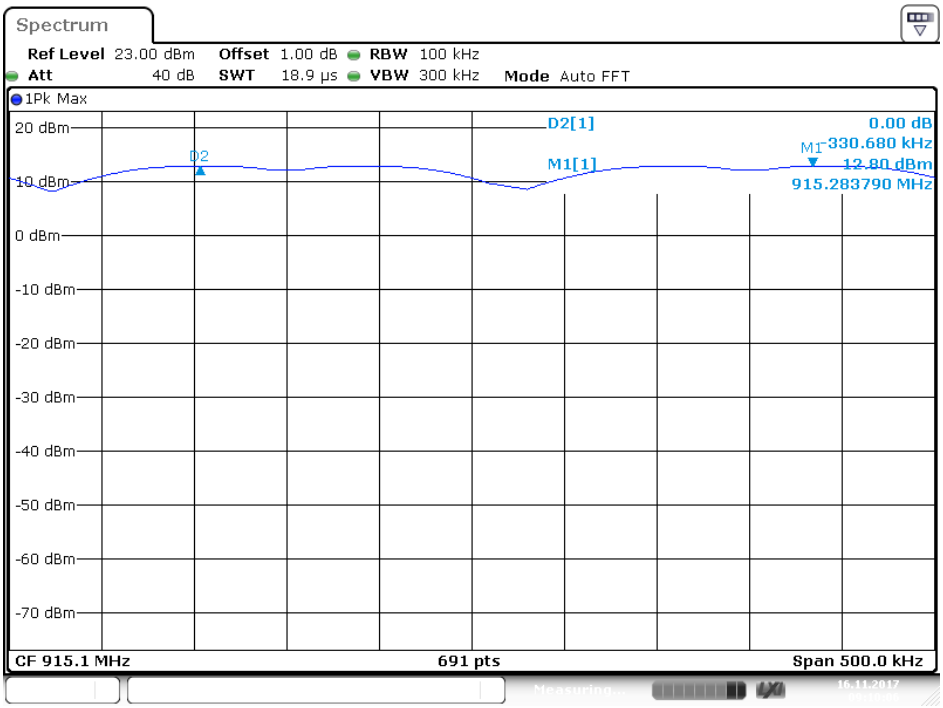
Middle channel



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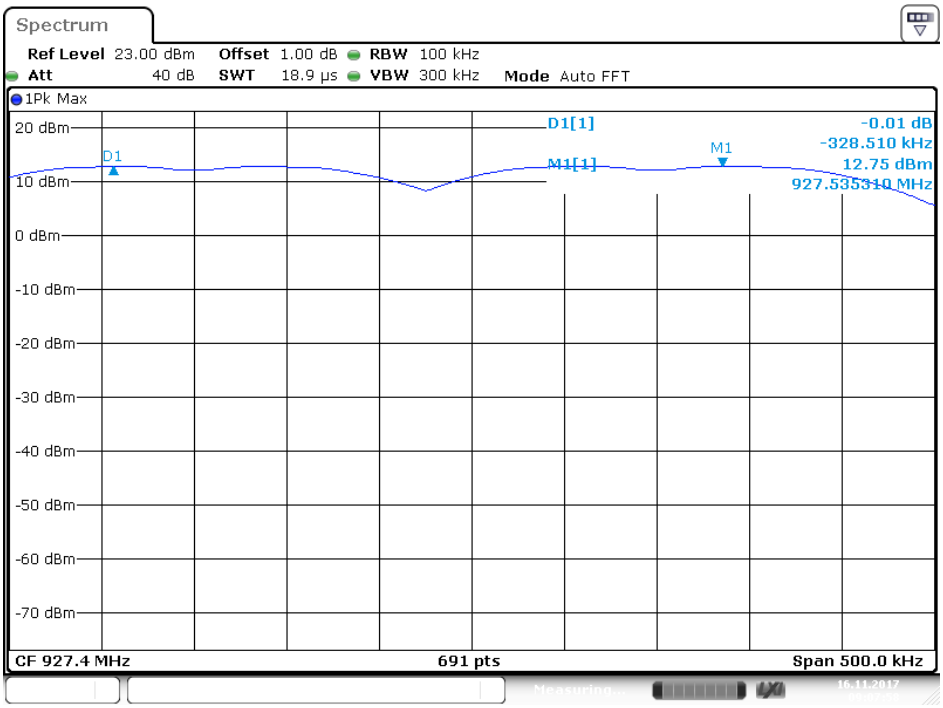
High channel



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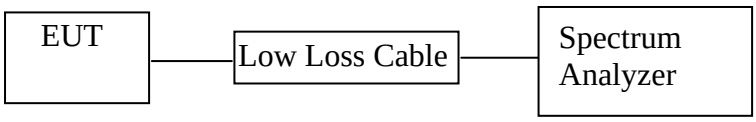
7. NUMBER OF HOPPING FREQUENCY TEST

7.1.Block Diagram of Test Setup



(EUT: VUSION ESL)

7.2.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 sys-tem shall use at least 25 hopping fre-quencies and the average time of occu-pancy 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.

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.

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

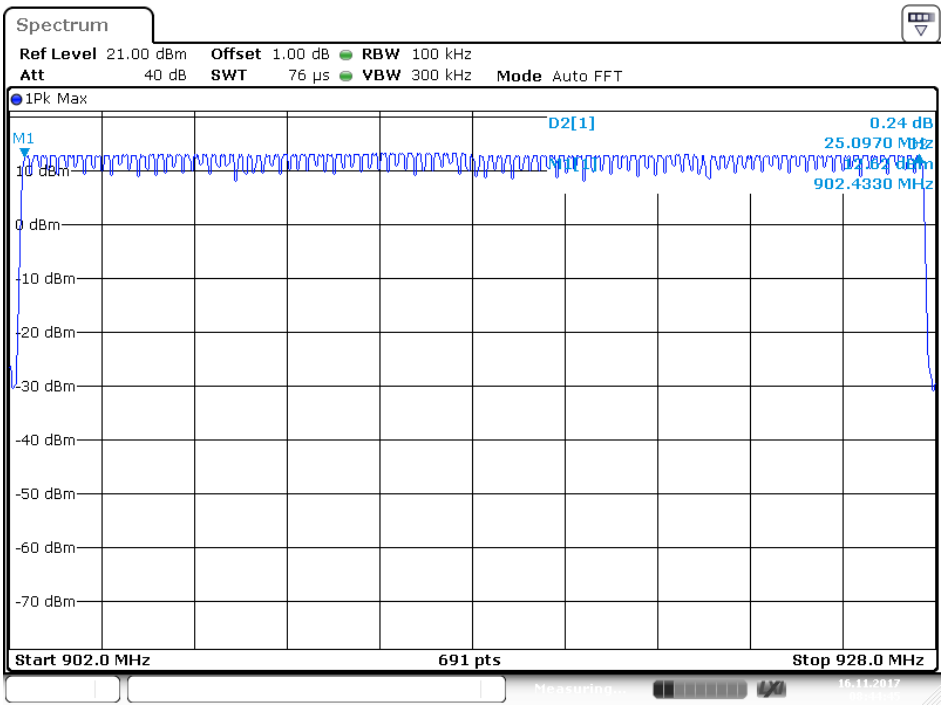
7.5.3.Max hold, view and count how many channel in the band.

7.6.Test Result

Total number of hopping channel	Measurement result(CH)	Limit(CH)
	101	⩾50

The spectrum analyzer plots are attached as below.

Number of hopping channels (GFSK)



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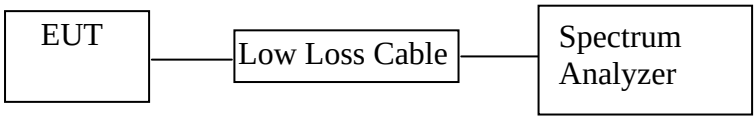
8. DWELL TIME TEST

8.1.Block Diagram of Test Setup



(EUT: VUSION ESL)

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.

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. The transmit frequency are 902.5-927.5MHz. We select 902.5MHz, 915MHz, and 927.5MHz TX frequency to transmit.

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 center frequency of spectrum analyzer = operating frequency.

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

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

8.6.Photos of Dwell time Measurement

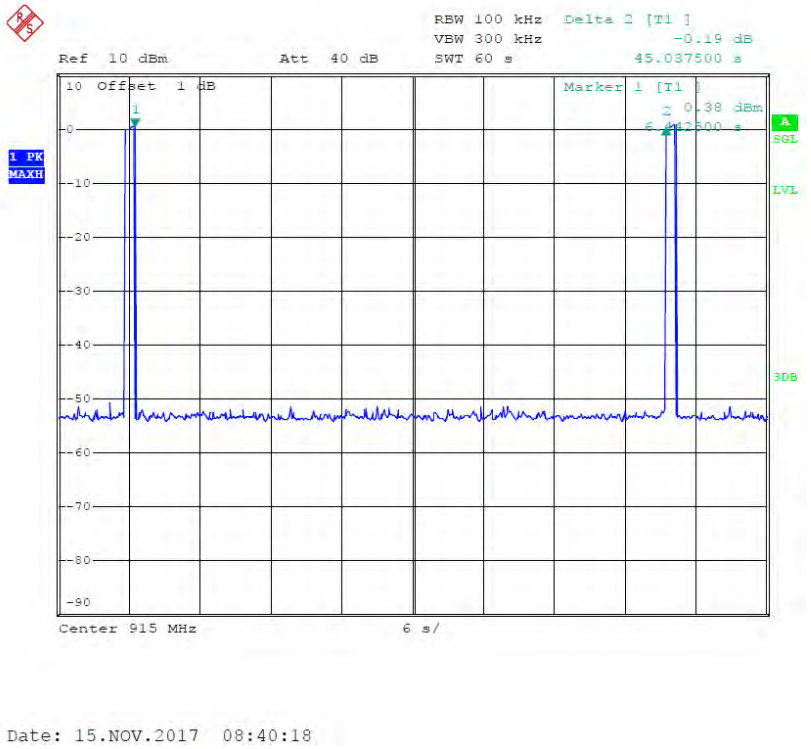
In the connection mode RFID uses 101 channels,As defined in 15.247, a 1 I, the limit for time of occupancy is 0.4s over time of 20s.

8.7.Test Result

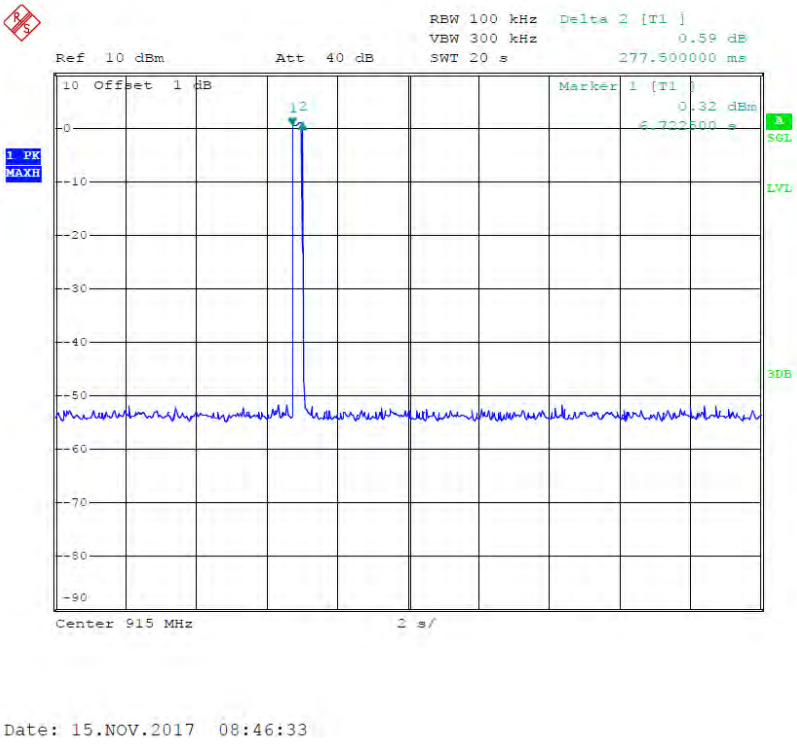
Limit	Result
≤0.4s over 20s period	248.91ms

Note:

The number of occupied channels second	1/45.04=0.022(number/ sec)
The total number of occupied channels per second	101*1/45.04=2.242(number/ sec)
Occupied time for each channel	277.5ms
Dwell time per second	101*1/45.04*277.5=622.28ms
Dwell time for 0.4second	101*1/45.04*277.5*0.4=248.91ms



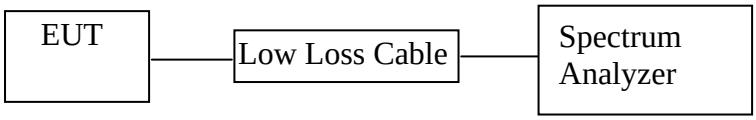
Effective period of the cycle: 45.04s



The graph shows the duration of ‘on’ signal. From marker 1 to Delta 2, duration is 277.5ms.

9. MAXIMUM PEAK OUTPUT POWER TEST

9.1.Block Diagram of Test Setup



(EUT: VUSION ESL)

9.2.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 hop-ping 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.

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 off) modes measure it. The transmit frequency are 902.5-927.5MHz. We select 902.5MHz, 915MHz, and 927.5MHz 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 RBW of spectrum analyzer to 1MHz and VBW to 3MHz.

9.5.3.Measurement the maximum peak output power.

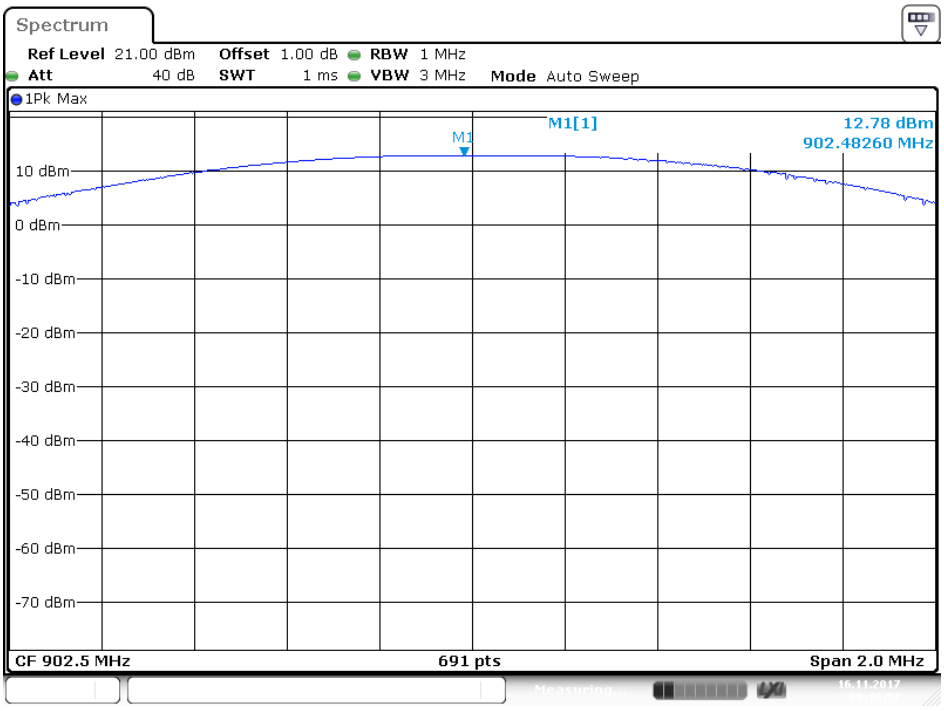
9.6.Test Result

FSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	902.5	12.78/0.0190	21/ 0.125
Middle	915.0	12.67/0.0185	21/ 0.125
High	927.5	12.59/0.0182	21/ 0.125

The spectrum analyzer plots are attached as below.

Low channel



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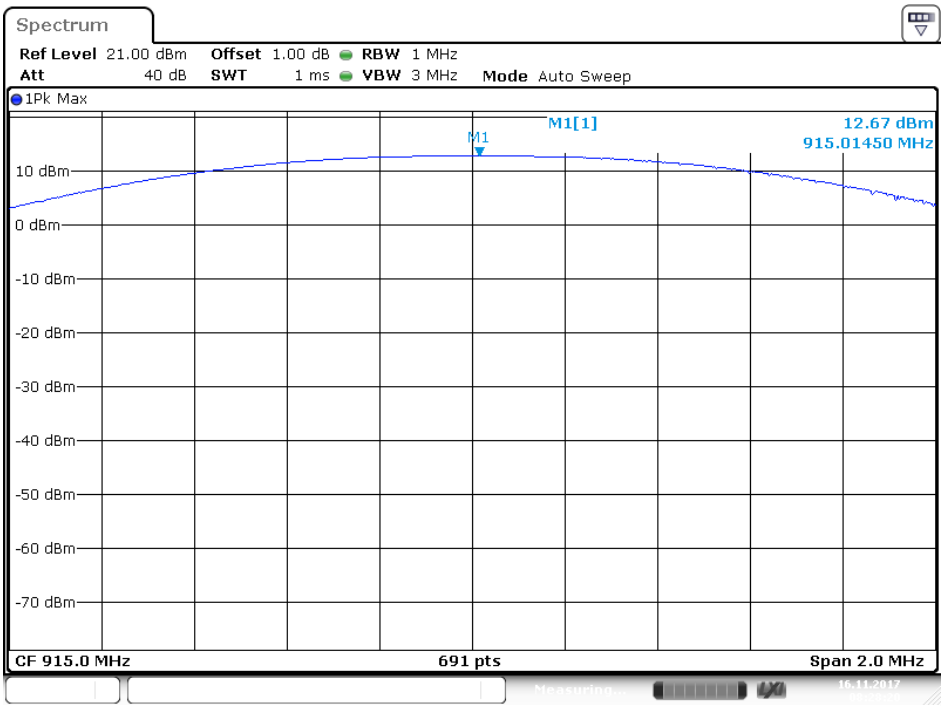
Middle channel



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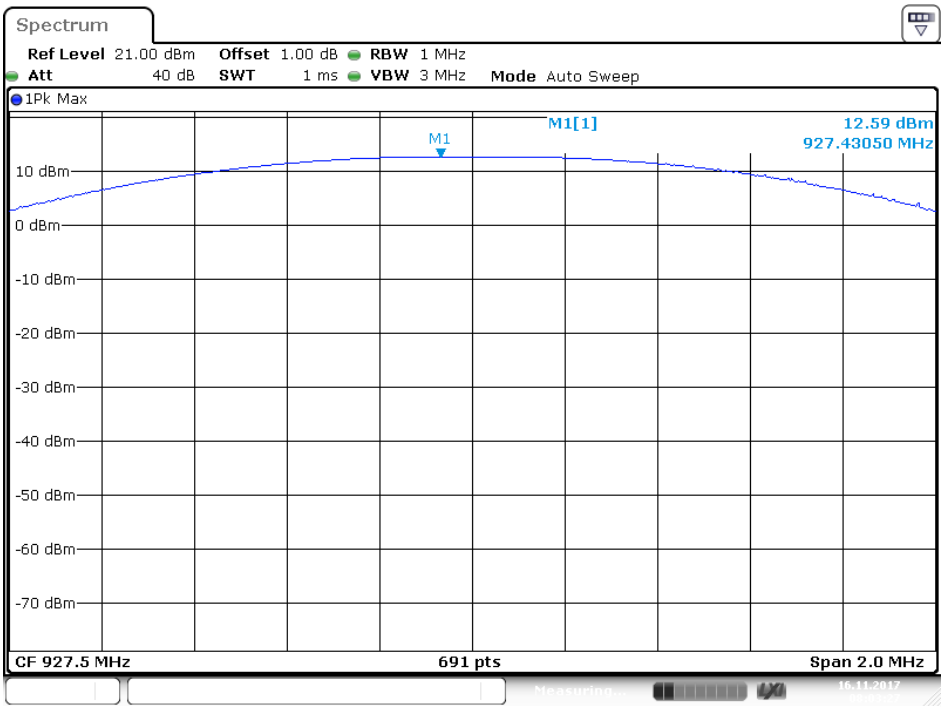
High channel



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10.RADIATED EMISSION TEST

10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and peripherals

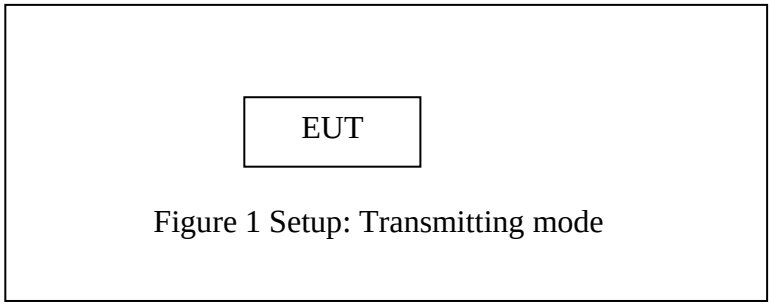
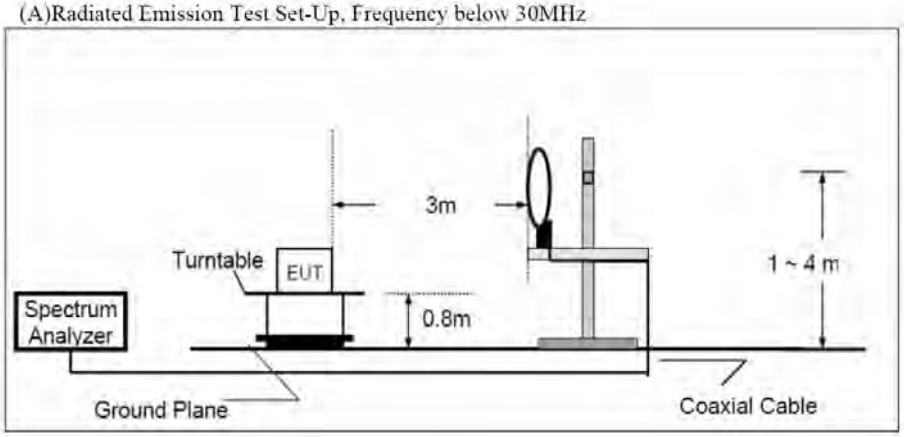


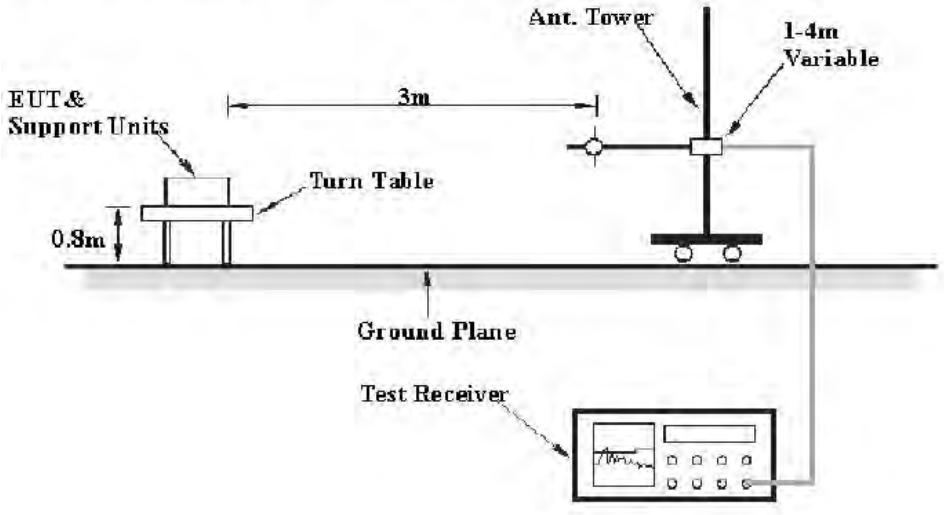
Figure 1 Setup: Transmitting mode

10.1.2.Semi-Anechoic Chamber Test Setup Diagram

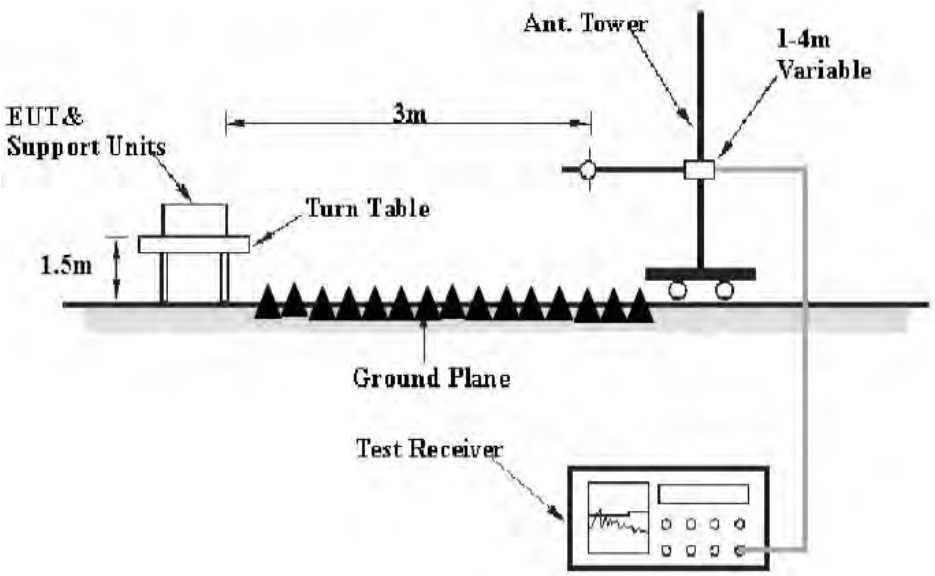
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



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



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



10.2.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).

10.3.Restricted bands of operation

10.3.1.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			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510
[2]Above 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 Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.4.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.

10.5.Operating Condition of EUT

10.5.1.Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 902.5-927.5MHz. We select 902.5MHz, 915MHz, and 927.5MHz TX frequency to transmit.

10.6. 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.

10.7. 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.

10.8. 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

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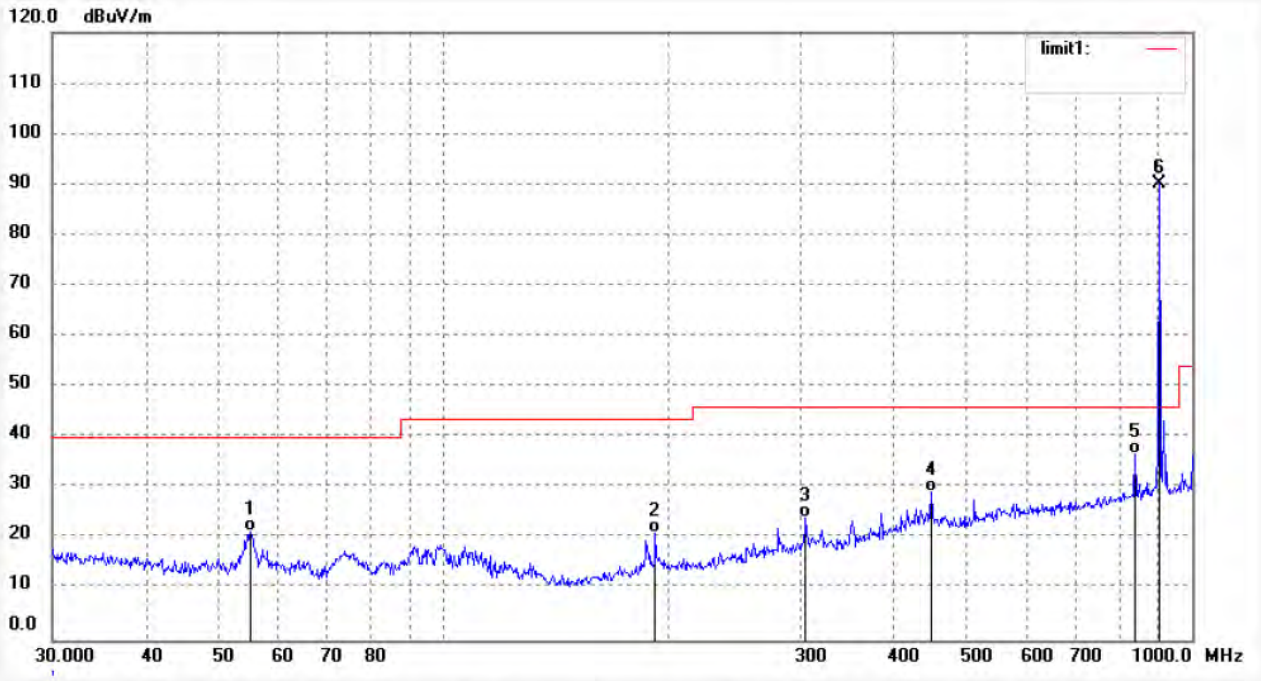
Job No.: STAR2016 #2454	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 9/57/05
EUT: VUSION ESL	Engineer Signature: star
Mode: TX 902.5MHz	Distance: 3m
Model: Vusion 2.2"	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.:ATE20180281



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	55.2207	34.57	-13.02	21.55	40.00	-18.45	QP	200	90	
2	191.7450	33.67	-12.59	21.08	43.50	-22.42	QP	200	103	
3	304.6099	33.29	-9.21	24.08	46.00	-21.92	QP	200	125	
4	447.9822	35.12	-5.81	29.31	46.00	-16.69	QP	200	144	
5	839.1818	36.18	0.64	36.82	46.00	-9.18	QP	200	198	
6	902.5094	88.73	1.30	90.03			peak	200	205	

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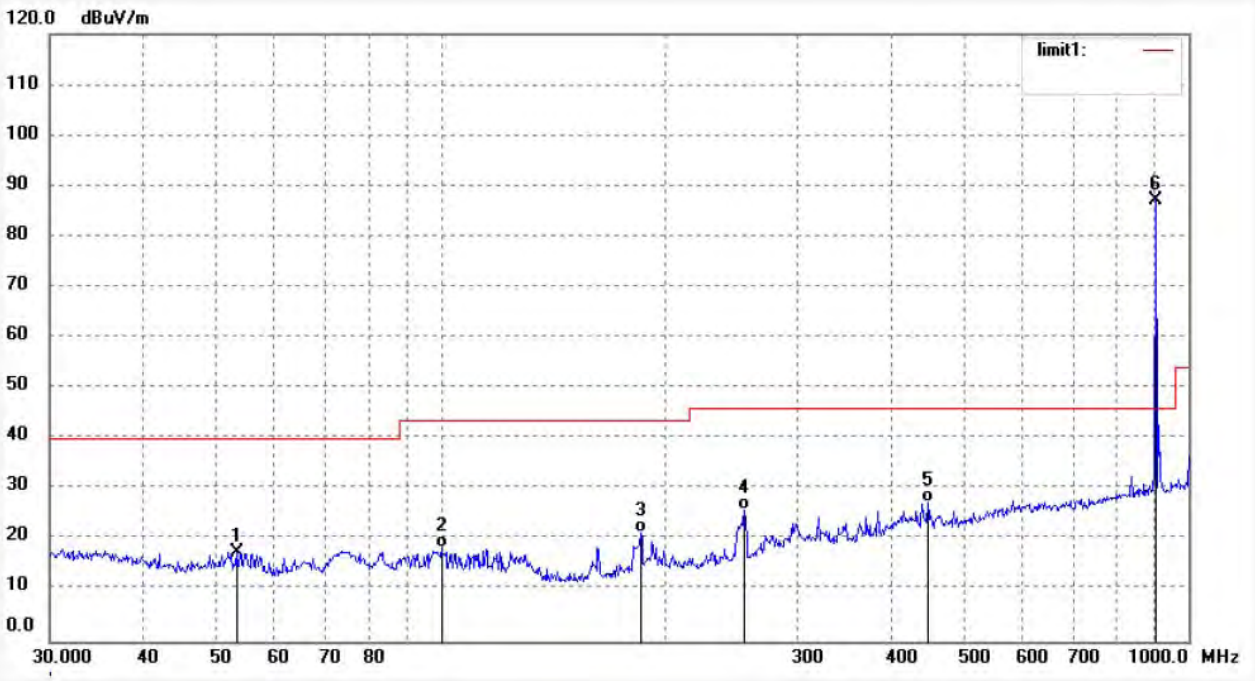
Job No.: STAR2016 #2455
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 902.5MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
Power Source: DC 3V
Date: 2017/11/15
Time: 9/59/25
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	53.3179	30.27	-12.85	17.42	40.00	-22.58	peak	100	17	
2	100.2286	31.53	-13.16	18.37	43.50	-25.13	QP	100	36	
3	185.1379	34.09	-12.71	21.38	43.50	-22.12	QP	100	124	
4	254.7283	36.84	-10.76	26.08	46.00	-19.92	QP	100	155	
5	447.9821	33.25	-5.81	27.44	46.00	-18.56	QP	100	169	
6	902.5093	85.76	1.30	87.06			peak	100	245	

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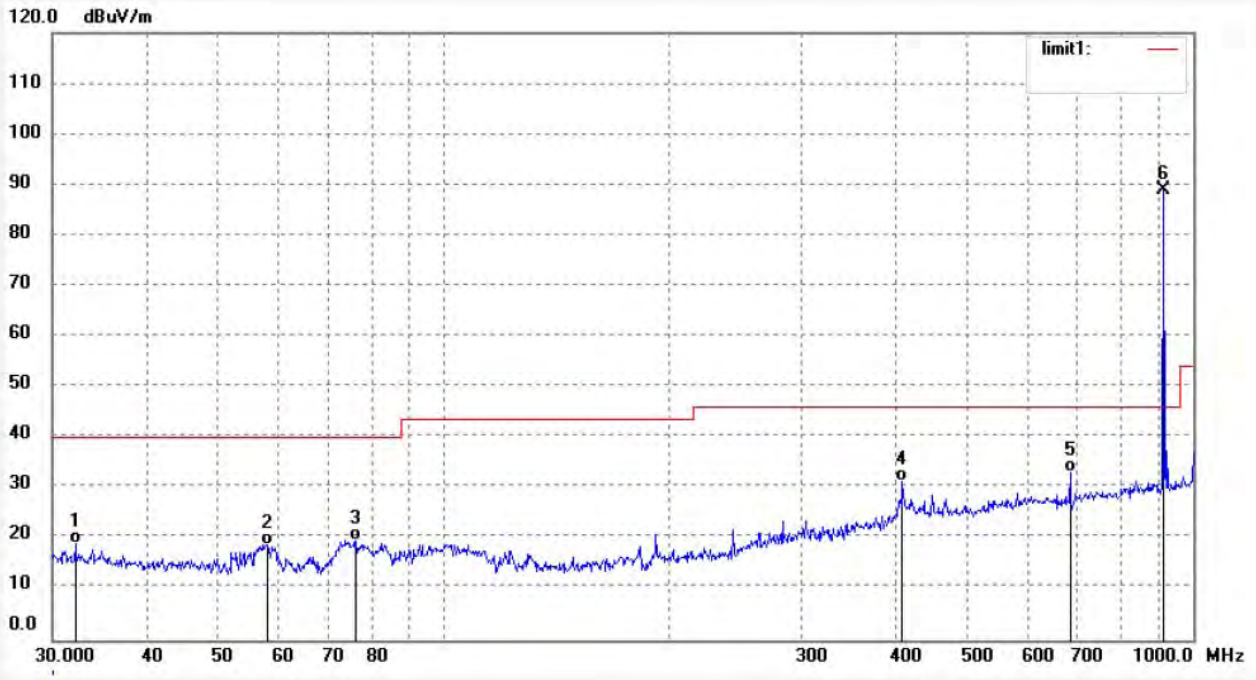
Job No.: STAR2016 #2460
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 915MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Horizontal
Power Source: DC 3V
Date: 2017/11/15
Time: 10/08/25
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	32.1795	29.21	-10.14	19.07	40.00	-20.93	QP	200	96	
2	57.9993	33.24	-14.55	18.69	40.00	-21.31	QP	200	42	
3	76.2442	34.16	-14.46	19.70	40.00	-20.30	QP	200	103	
4	408.9460	34.64	-3.42	31.22	46.00	-14.78	QP	200	286	
5	684.7454	33.37	-0.29	33.08	46.00	-12.92	QP	200	299	
6	915.1620	86.63	2.40	89.03			peak	200	305	

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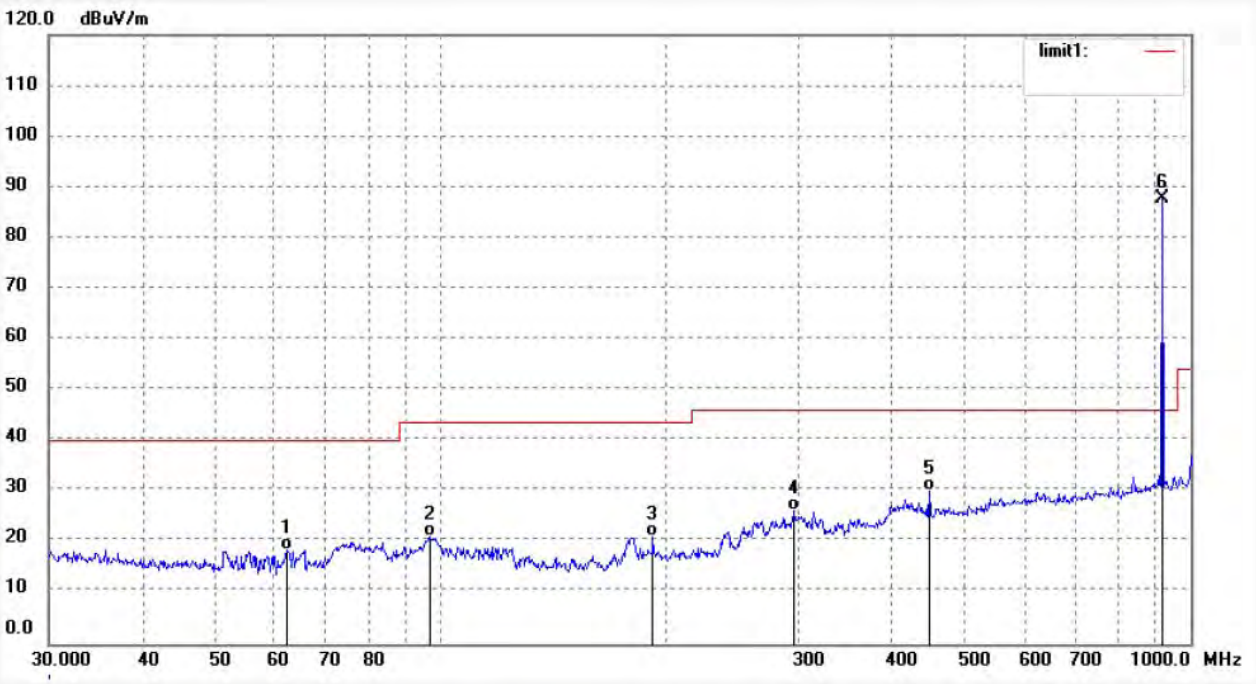
Job No.: STAR2016 #2461
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 915MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
Power Source: DC 3V
Date: 2017/11/15
Time: 10/10/41
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	62.4313	33.80	-15.33	18.47	40.00	-21.53	QP	100	163	
2	96.7749	34.07	-12.85	21.22	43.50	-22.28	QP	100	253	
3	191.7450	31.65	-10.46	21.19	43.50	-22.31	QP	100	200	
4	296.1836	33.61	-7.46	26.15	46.00	-19.85	QP	100	214	
5	447.9821	33.37	-3.35	30.02	46.00	-15.98	QP	100	198	
6	915.0687	85.17	2.49	87.66			peak	100	340	

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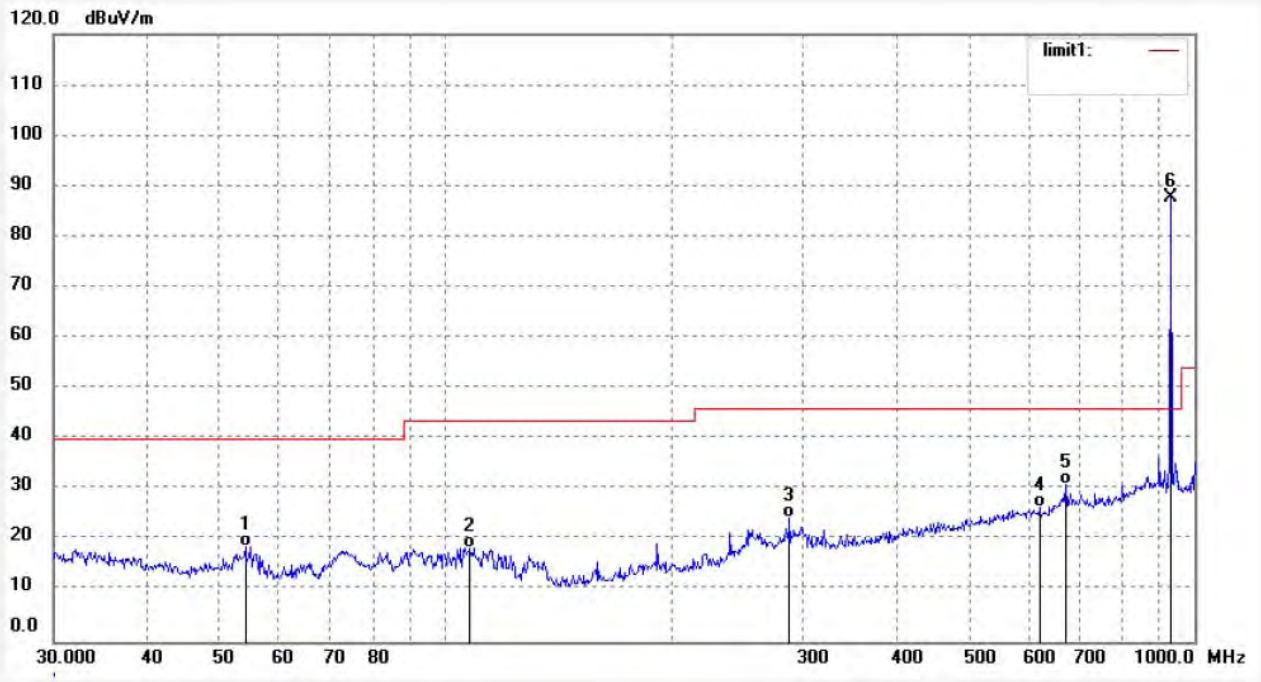
Job No.: STAR2016 #2453
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 927.5MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Horizontal
Power Source: DC 3V
Date: 2017/11/15
Time: 9/54/54
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



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	31.65	-12.91	18.74	40.00	-21.26	QP	200	139	
2	107.8877	32.39	-13.92	18.47	43.50	-25.03	QP	200	177	
3	287.9904	34.13	-9.61	24.52	46.00	-21.48	QP	200	259	
4	620.7096	29.28	-2.70	26.58	46.00	-19.42	QP	200	271	
5	672.8444	33.04	-2.10	30.94	46.00	-15.06	QP	200	200	
6	927.5082	85.91	1.82	87.73			peak	200	154	

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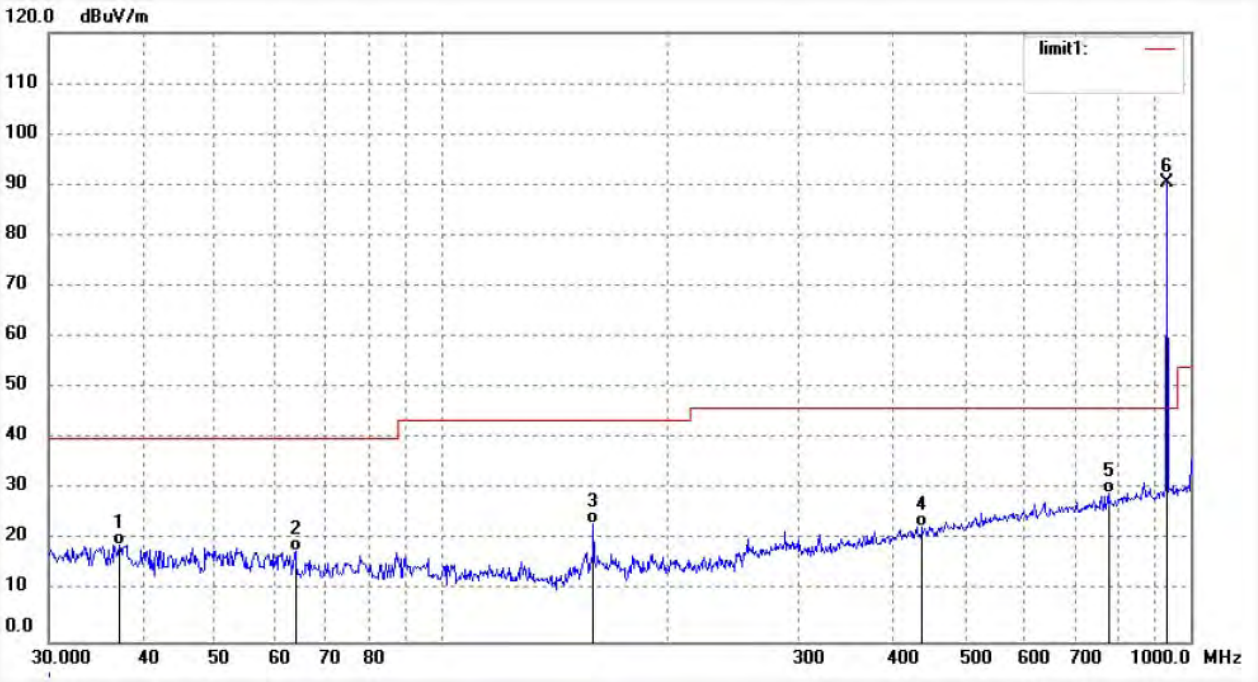
Job No.: STAR2016 #2452
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 927.5MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
Power Source: DC 3V
Date: 2017/11/15
Time: 9/53/54
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	37.2855	29.92	-10.93	18.99	40.00	-21.01	QP	100	175	
2	63.9828	33.16	-15.37	17.79	40.00	-22.21	QP	100	36	
3	159.7844	37.84	-14.57	23.27	43.50	-20.23	QP	100	91	
4	438.6554	28.64	-5.92	22.72	46.00	-23.28	QP	100	103	
5	776.8778	29.89	-0.51	29.38	46.00	-16.62	QP	100	253	
6	927.5082	88.52	1.82	90.34			peak	100	211	

Above 1GHz

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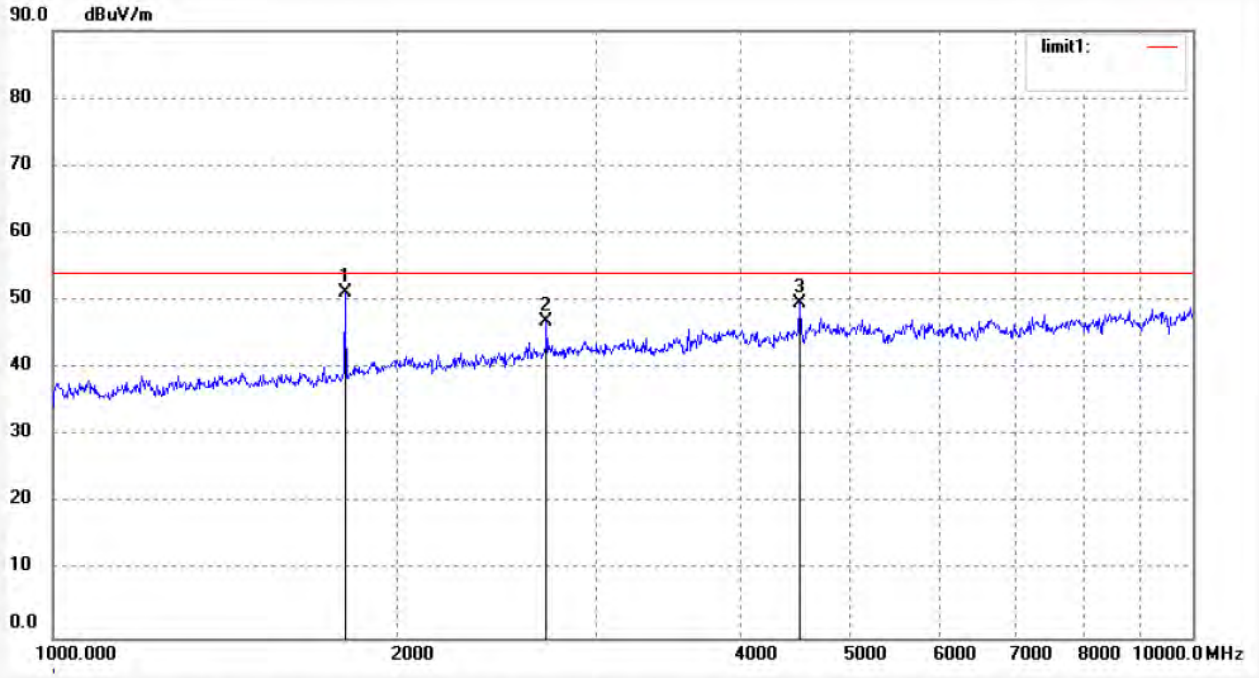
Job No.: STAR2016 #2456
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 902.5MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Horizontal
Power Source: DC 3V
Date: 2017/11/15
Time: 10/01/30
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



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	18.20	32.90	51.10	74.00	-22.90	peak	200	253	
2	2707.512	10.42	36.56	46.98	74.00	-27.02	peak	200	209	
3	4512.559	9.53	40.14	49.67	74.00	-24.33	peak	200	182	

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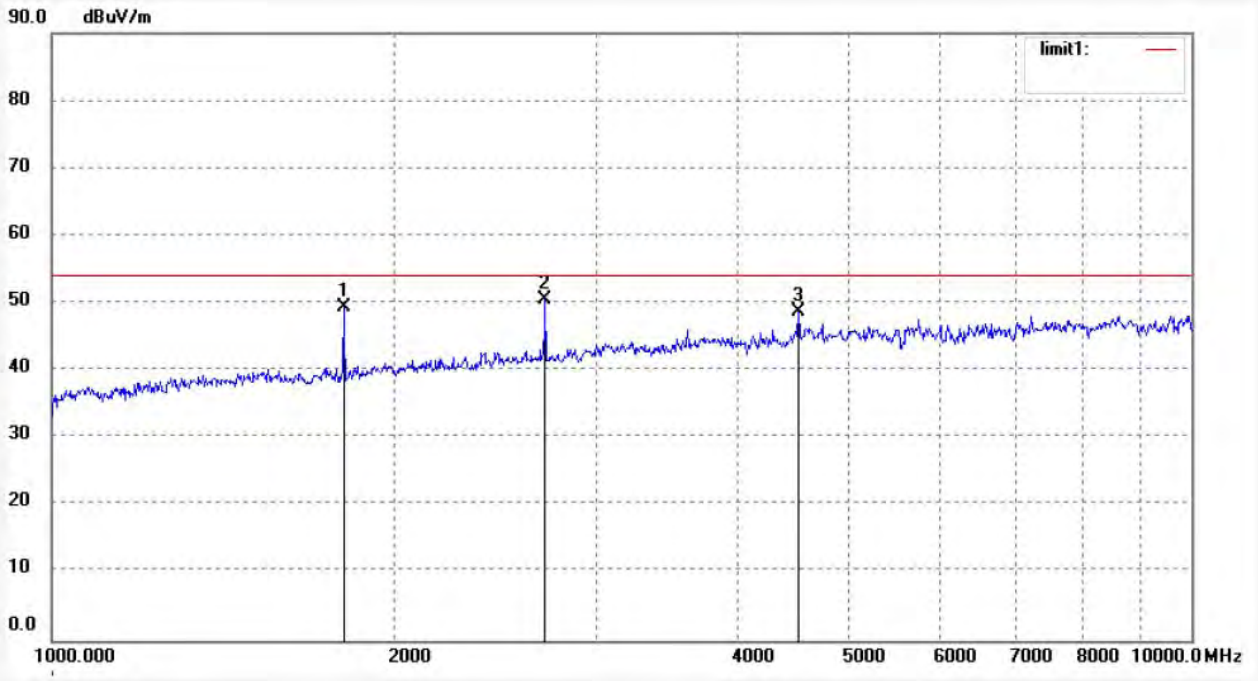
Job No.: STAR2016 #2457
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 902.5MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
Power Source: DC 3V
Date: 2017/11/15
Time: 10/02/30
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



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	16.54	32.90	49.44	74.00	-24.56	peak	150	58	
2	2707.522	13.91	36.56	50.47	74.00	-23.53	peak	150	135	
3	4512.559	8.58	40.14	48.72	74.00	-25.28	peak	150	144	

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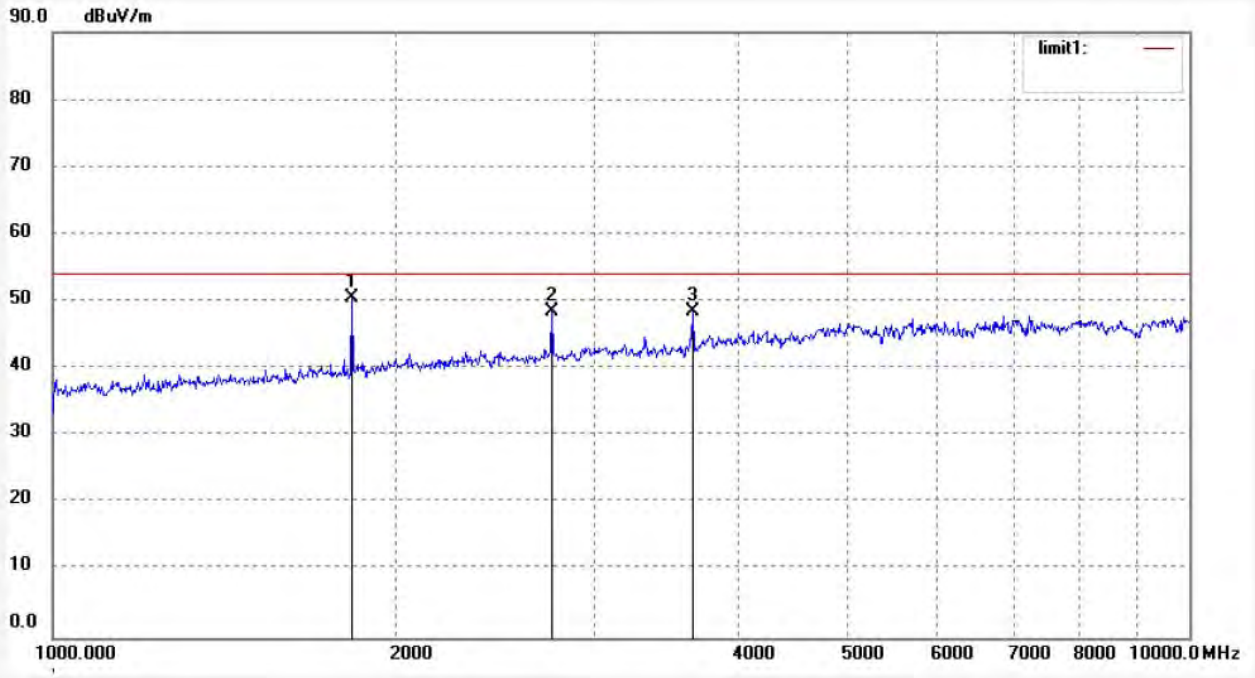
Job No.: STAR2016 #2459
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 915MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Horizontal
Power Source: DC 3V
Date: 2017/11/15
Time: 10/06/02
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



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	17.38	33.11	50.49	74.00	-23.51	peak	200	108	
2	2745.194	12.05	36.54	48.59	74.00	-25.41	peak	200	113	
3	3660.248	11.65	36.79	48.44	74.00	-25.56	peak	200	146	

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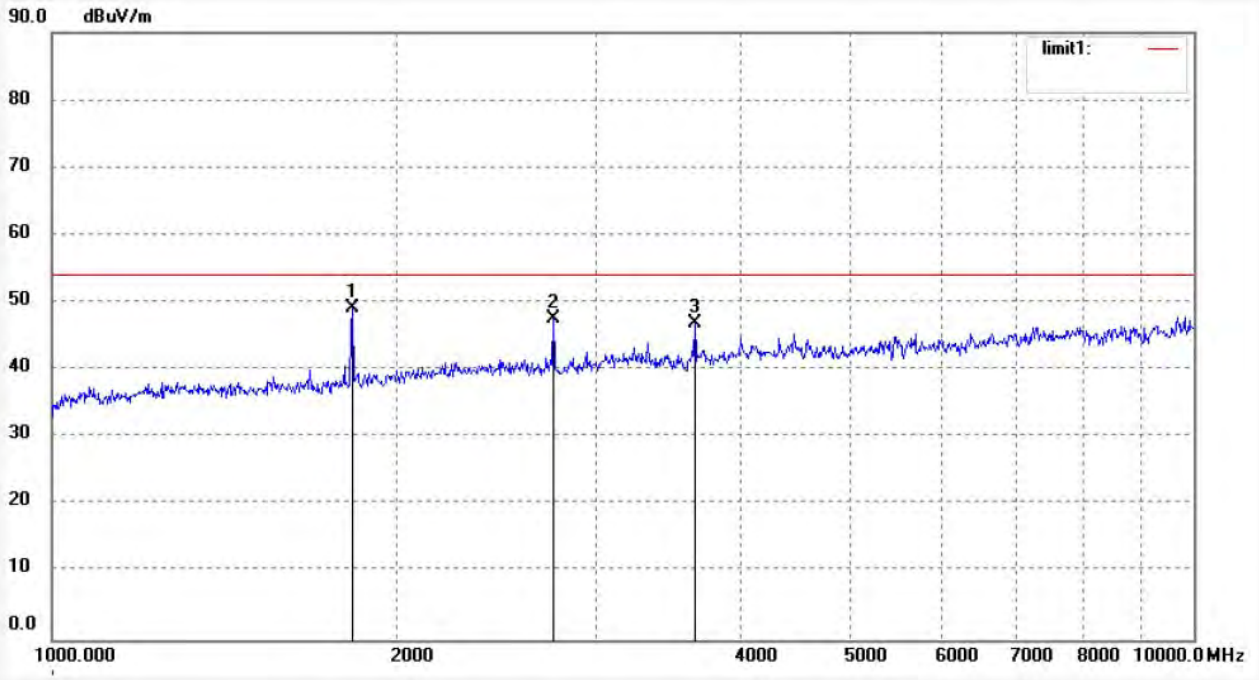
Job No.: STAR2016 #2458
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 915MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
Power Source: DC 3V
Date: 2017/11/15
Time: 10/03/56
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



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	16.01	33.11	49.12	74.00	-24.88	peak	150	75	
2	2745.194	10.97	36.54	47.51	74.00	-26.49	peak	150	199	
3	3660.148	10.06	36.79	46.85	74.00	-27.15	peak	150	235	

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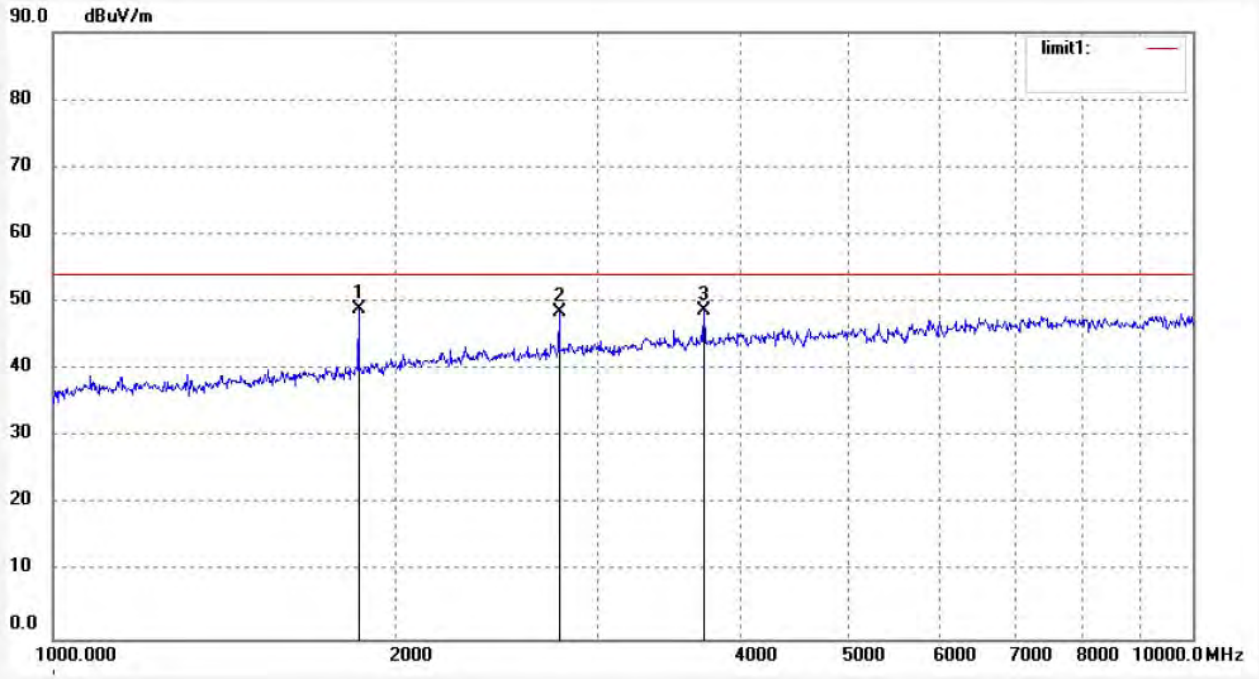
Job No.: STAR2016 #2451
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 927.5MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Horizontal
Power Source: DC 3V
Date: 2017/11/15
Time: 9/51/28
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180281



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1855.232	15.67	33.27	48.94	74.00	-25.06	peak	200	143	
2	2782.513	11.90	36.53	48.43	74.00	-25.57	peak	200	256	
3	3710.217	11.74	36.98	48.72	74.00	-25.28	peak	200	86	

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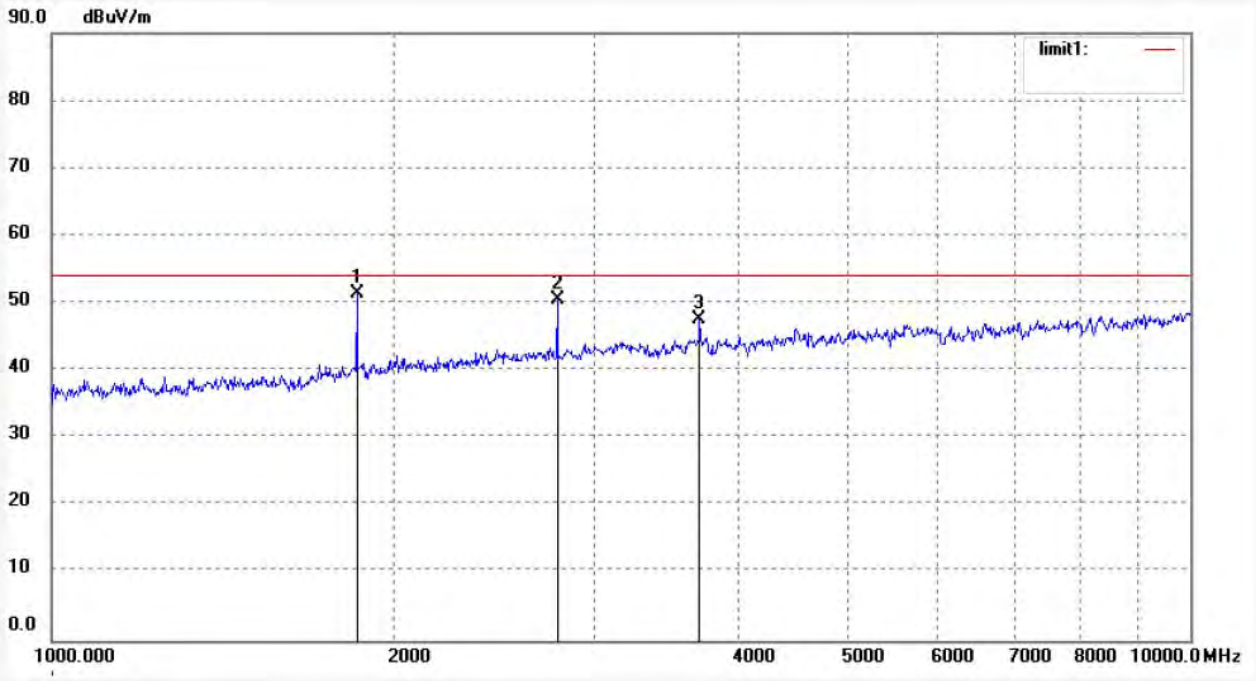
Job No.: STAR2016 #2450
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 927.5MHz
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
Power Source: DC 3V
Date: 2017/11/15
Time: 9/50/09
Engineer Signature: star
Distance: 3m

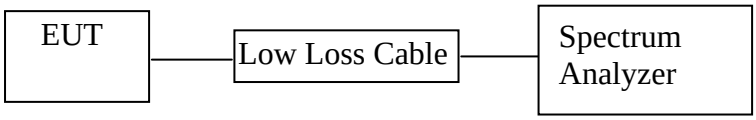
Note: Report No.:ATE20180281



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1855.532	18.14	33.27	51.41	74.00	-22.59	peak	150	325	
2	2782.513	14.01	36.53	50.54	74.00	-23.46	peak	150	158	
3	3710.107	10.56	36.93	47.49	74.00	-26.51	peak	150	225	

11. BAND EDGE COMPLIANCE TEST

11.1. Block Diagram of Test Setup



(EUT: VUSION ESL)

11.2. 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).

11.3. 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.

11.4. Operating Condition of EUT

11.4.1. Setup the EUT and simulator as shown as Section 11.1.

11.4.2. Turn on the power of all equipment.

11.4.3. Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 902.5-927.5MHz. We select 902.5MHz, 927.5MHz TX frequency to transmit.

11.5.Test Procedure

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

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

11.5.3.The band edges was measured and recorded.

11.6.Test Result

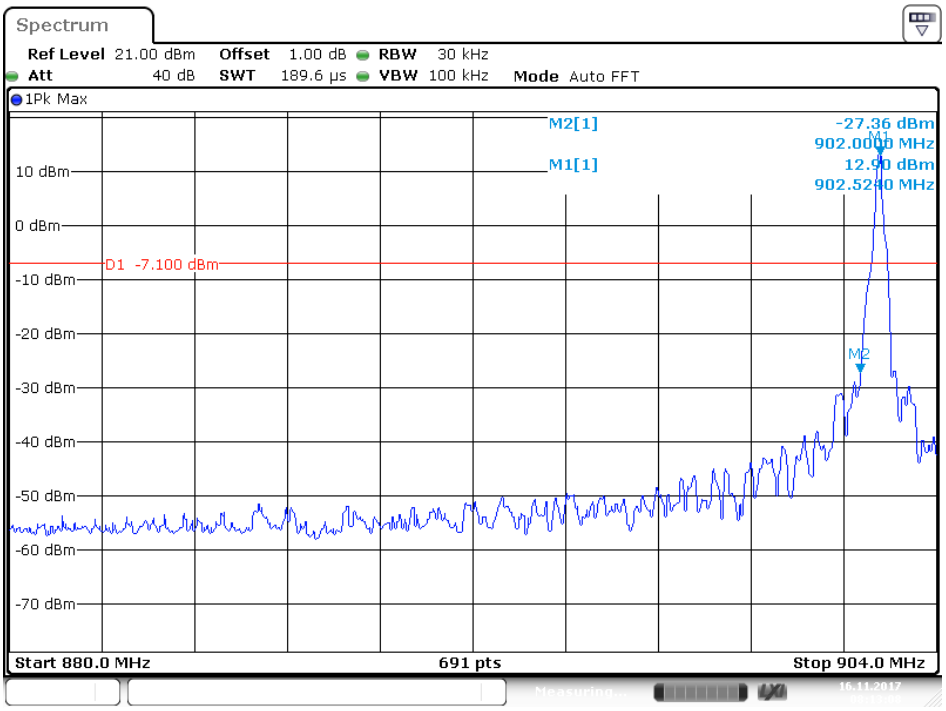
Band edge compliance of RF-conducted emissions was measured by setting the band edge as center frequency in the spectrum analyzer and measuring the power on the transmission on channels 1 and 101. The measured power and power on the band edge was then compared.

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)
FSK		
902.5	40.26	> 20dBc
927.5	39.36	> 20dBc

The spectrum analyzer plots are attached as below.



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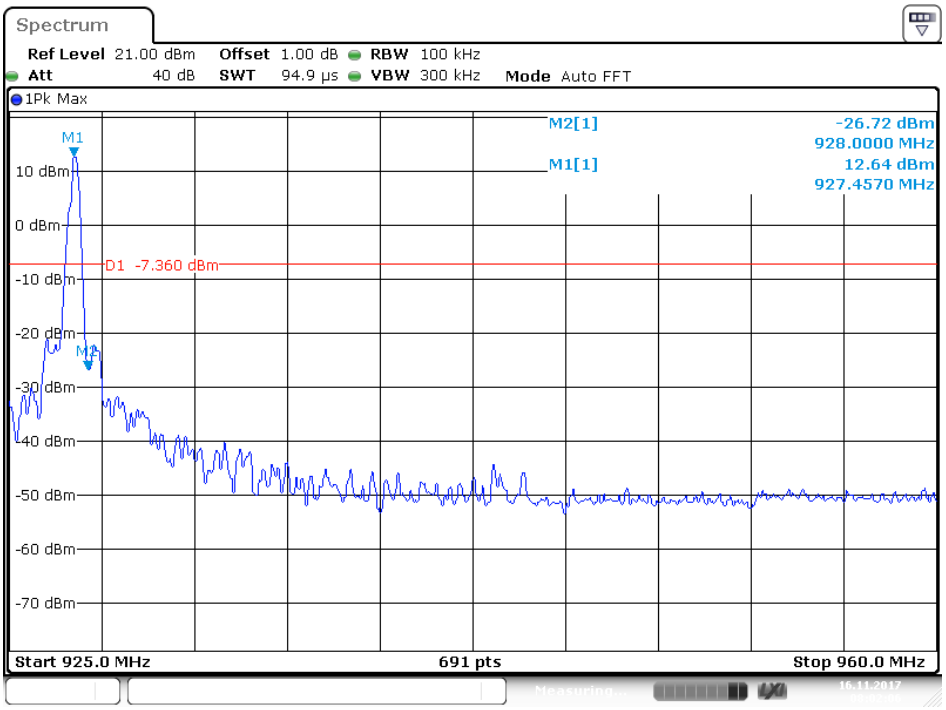

Date: 16.NOV.2017 08:02:06

Radiate Band Edge: Hopping off mode

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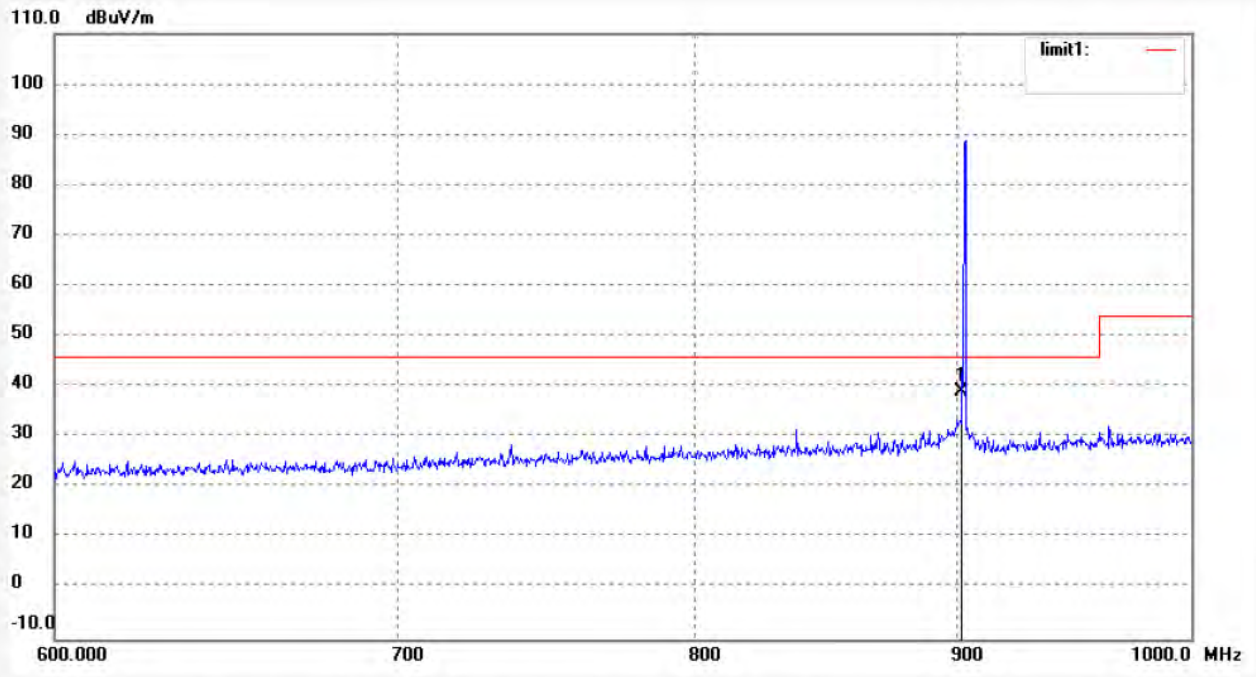
Job No.: STAR2016 #2209	Polarization: Horizontal
Standard: FCC Class C 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 14:18:07
EUT: VUSION ESL	Engineer Signature: star
Mode: TX 902.5M	Distance: 3m
Model: Vusion 2.2"	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180281



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	10.24	28.68	38.92	46.00	-7.08	peak	200	64	

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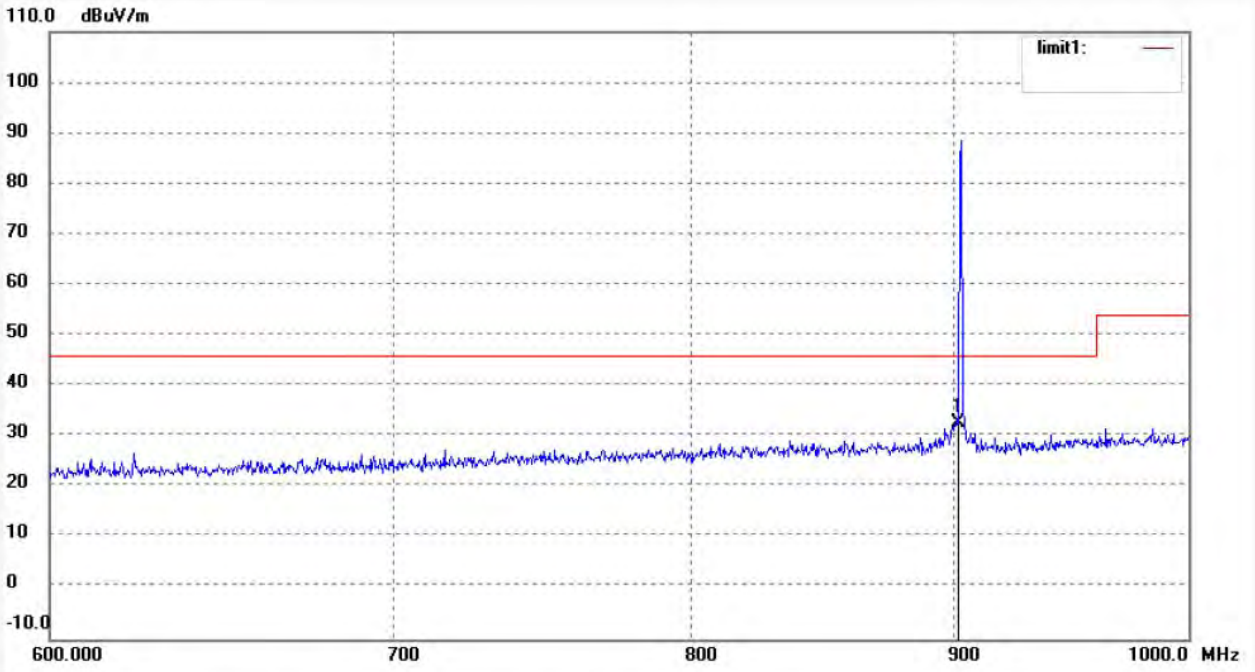
Job No.: STAR2016 #2210
Standard: FCC Class C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: TX 902.5M
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
Power Source: DC 3V
Date: 2017/11/15
Time: 14:18:51
Engineer Signature: star
Distance: 3m

Note: Report No.: ATE20180281



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	4.13	28.68	32.81	46.00	-13.19	peak	100	291	

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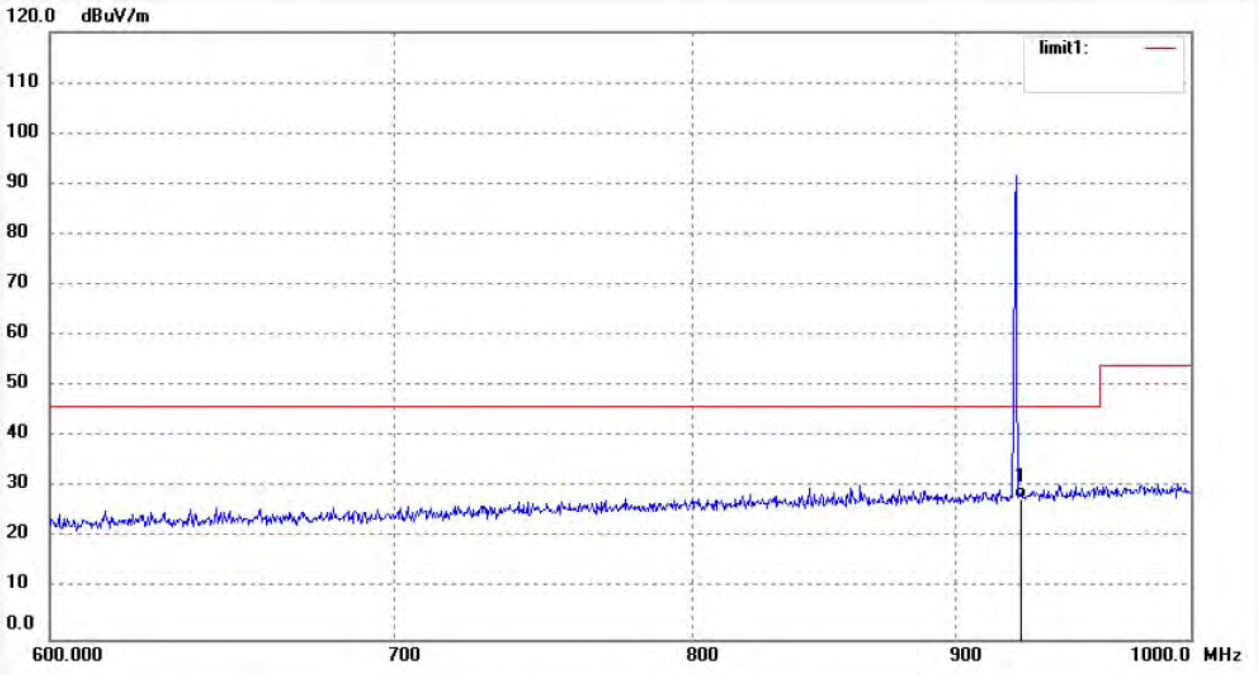
Job No.: STAR2016 #2217	Polarization: Horizontal
Standard: FCC Class C 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 14:49:12
EUT: VUSION ESL	Engineer Signature: star
Mode: TX 927.5M	Distance: 3m
Model: Vusion 2.2"	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180281



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	-1.36	29.15	27.79	46.00	-18.21	QP	200	145	

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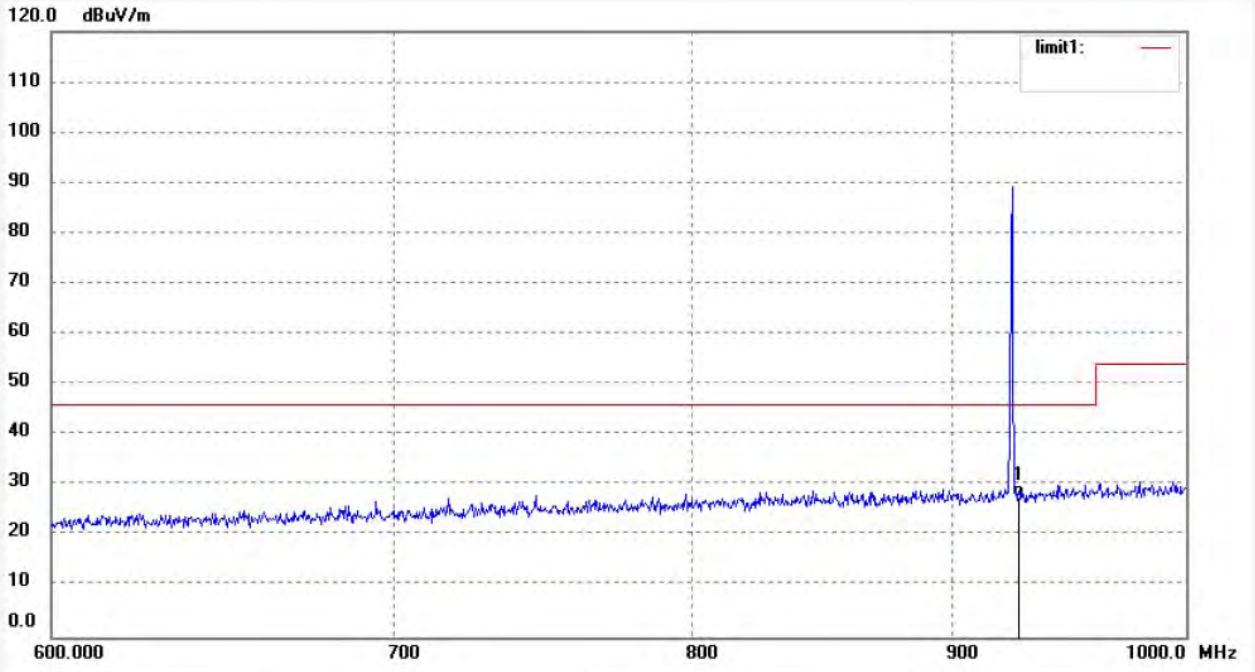
Job No.: STAR2016 #2218	Polarization: Vertical
Standard: FCC Class C 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 2017/11/15
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 14:51:13
EUT: VUSION ESL	Engineer Signature: star
Mode: TX 927.5M	Distance: 3m
Model: Vusion 2.2"	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180281



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	-1.36	29.15	27.79	46.00	-18.21	QP	100	83	

Hopping mode

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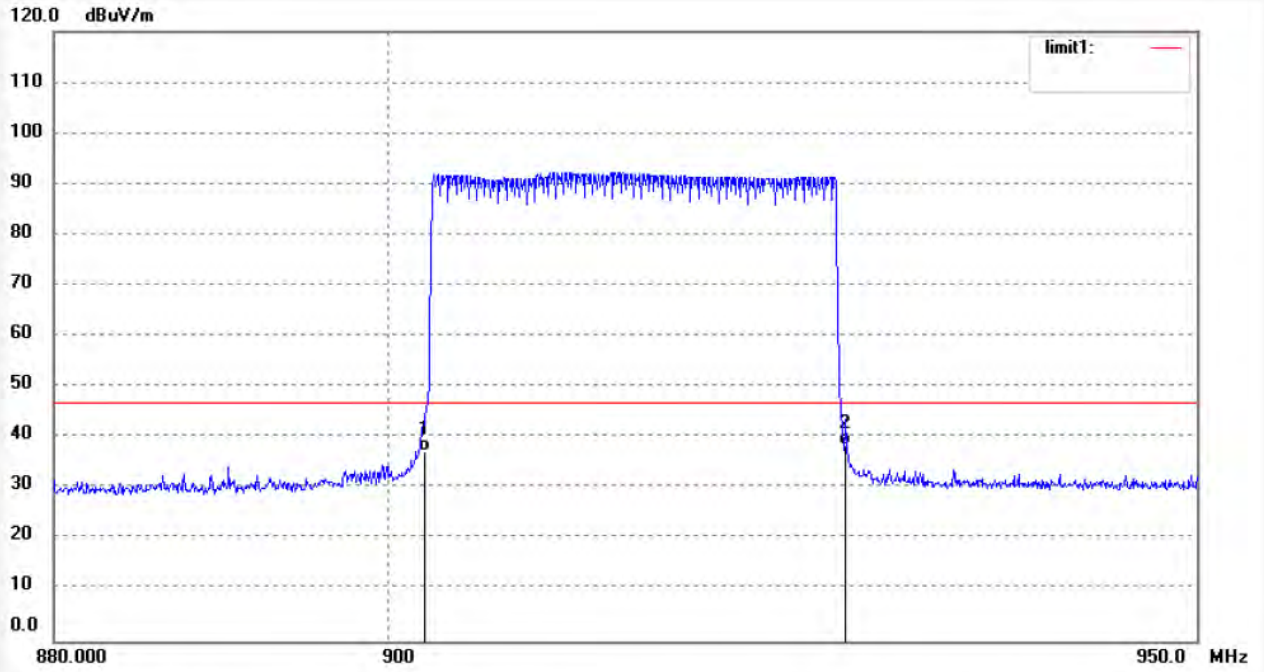
Job No.: STAR2016 #2284	Polarization: Horizontal
Standard: FCC Class C 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 2017/11/15/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 16/11/06
EUT: VUSION ESL	Engineer Signature: star
Mode: HOPPING	Distance: 3m
Model: Vusion 2.2"	
Manufacturer: SES-imagotag Deutschland GmbH	

Note: Report No.: ATE20180281



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	35.12	2.18	37.30	47.00	-9.70	QP	200	95	
2	928.0000	35.93	2.73	38.66	47.00	-8.34	QP	200	117	

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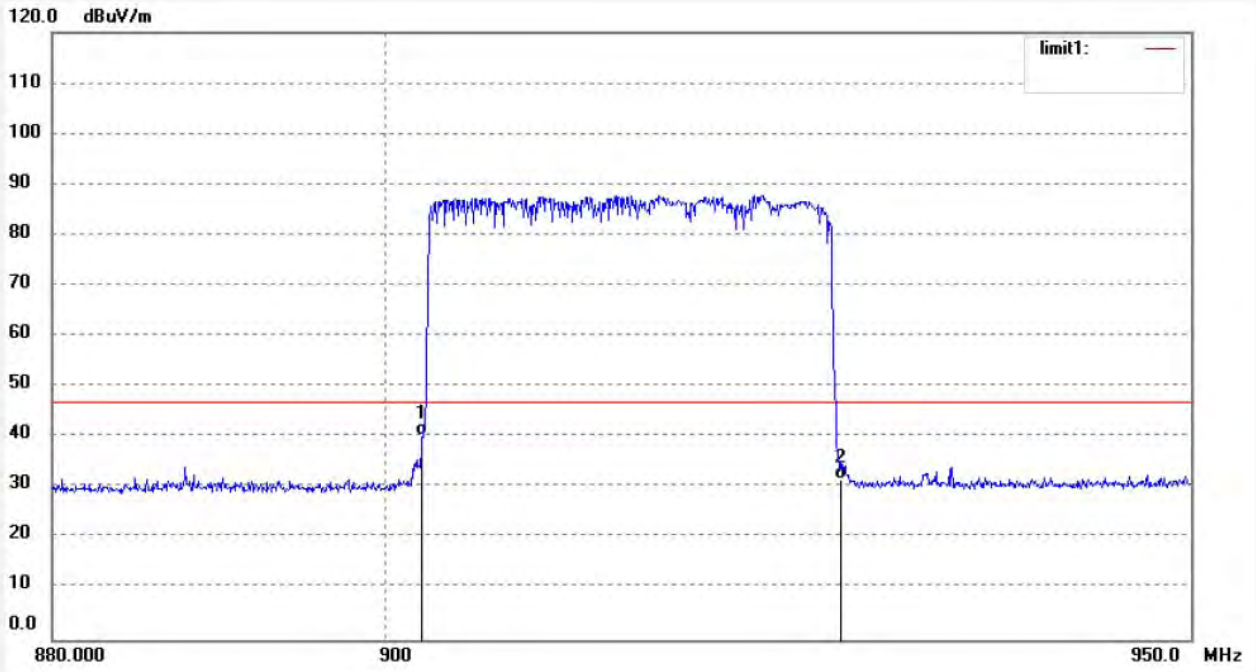
Job No.: STAR2016 #2283
Standard: FCC Class C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: VUSION ESL
Mode: HOPPING
Model: Vusion 2.2"
Manufacturer: SES-imagotag Deutschland GmbH

Polarization: Vertical
Power Source: DC 3V
Date: 2017/11/15/
Time: 16/09/43
Engineer Signature: star
Distance: 3m

Note: Report No.: ATE20180281



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	38.32	2.18	40.50	47.00	-6.50	QP	100	212	
2	928.0000	29.00	2.73	31.73	47.00	-15.27	QP	100	311	

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. 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:
Result = Reading + Corrected Factor
3. Display the measurement of peak values.

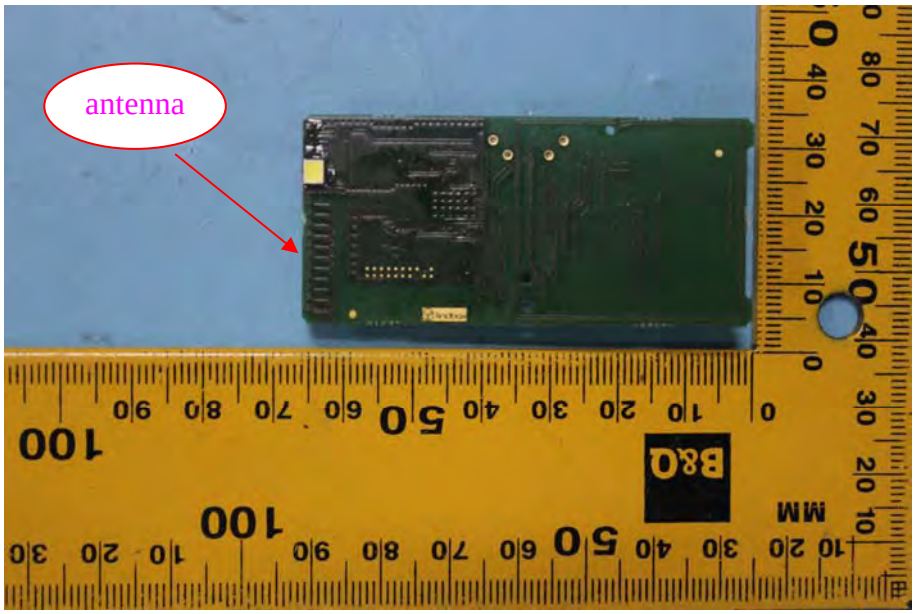
12. ANTENNA REQUIREMENT

12.1. The Requirement

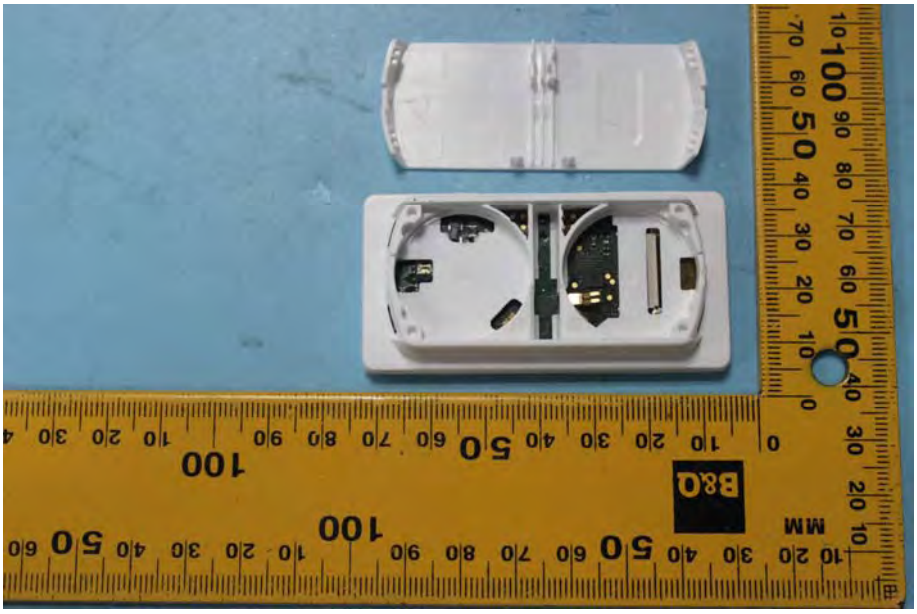
According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

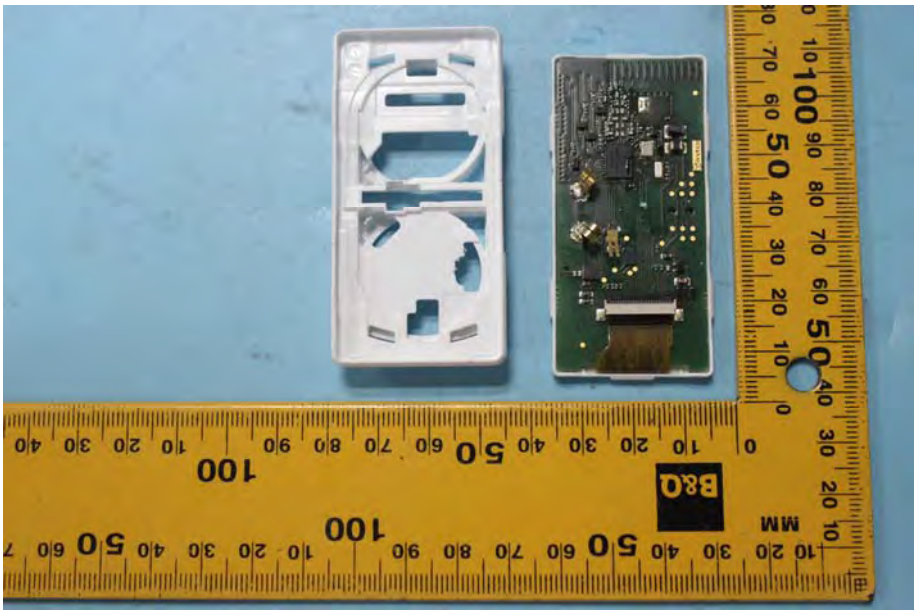
12.2. Antenna Construction

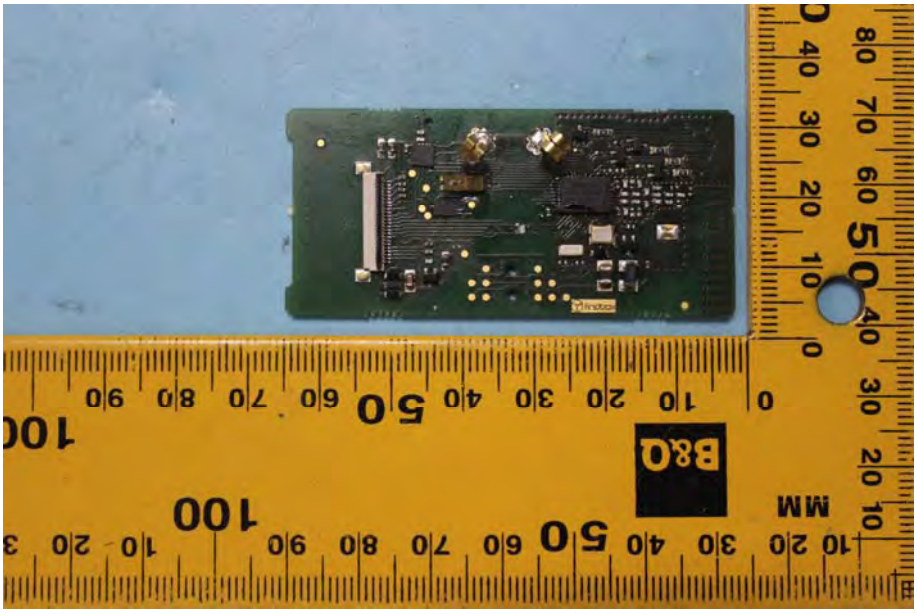
Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.

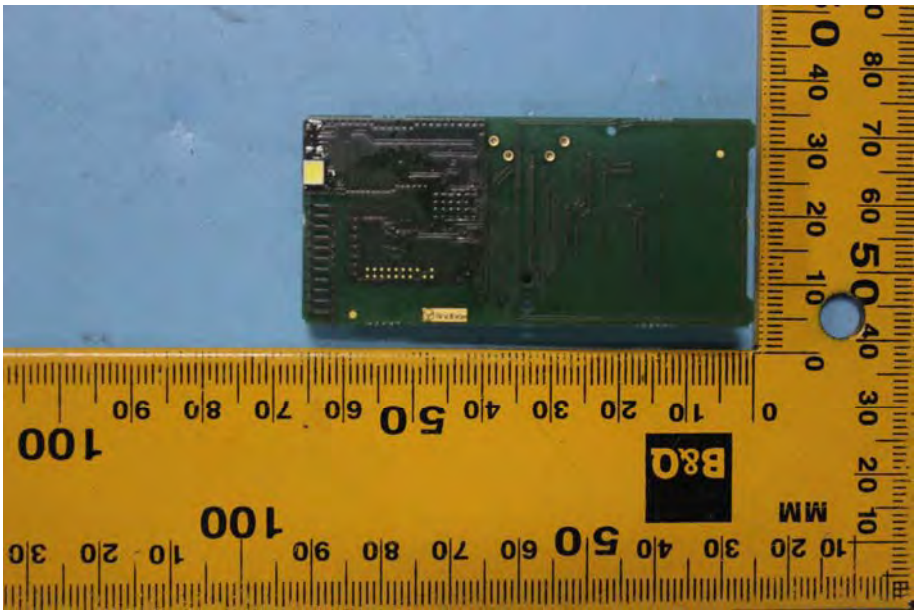


13.PHOTOS









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