SGS-CSTC Standards Technical Services
(Shanghai) Co., Ltd.

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1 Cover Page

RF TEST REPORT

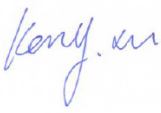
Application No.:	SHEM1411003009RF
Applicant:	Hansong (Nanjing) Technology Ltd.
FCC ID:	XCO-NANOTX
Equipment Under Test (EUT): **NOTE:** The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	RCC-NANO1-TX
Model No.(EUT):	RCC NANO ONE TRANSMITTER
Standards:	FCC PART 15 Subpart C: 2014
Date of Receipt:	November 26, 2014
Date of Test:	January 26, 2015 to March 10, 2015
Date of Issue:	April 20, 2015
Test Result:	**Pass***

* In the configuration tested, the EUT (Equipment under test) complied with the standards specified above.

Parlam Zhan
E&E Section Manager
SGS-CSTC (Shanghai) Co., Ltd.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00	/	April 20, 2015	/	Original

Authorized for issue by:				
Engineer		Eddy Zong **Print Name**		
Clerk		Susie Liu **Print Name**		
Reviewer		Keny Xu **Print Name**		

3 Test Summary

Test Item	FCC Test Requirement	Test method	Result
Antenna Requirement	FCC Part 15, Subpart C Section 15.203/15.247 (c)	---	PASS
AC Power Line Conducted Emission	FCC Part 15, Subpart C Section 15.207	ANSI C63.10 (2009) Section 6.2	PASS
20dB Occupied Bandwidth	FCC Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2009) Section 6.9.1	PASS
Conducted Peak Output Power	FCC Part 15, Subpart C Section 15.247 (b)(1)	ANSI C63.10 (2009) Section 6.10.1	PASS
Carrier Frequencies Separation	FCC Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2009) Section 7.7.2	PASS
Hopping Channel Number	FCC Part 15, Subpart C Section 15.247 (b)	ANSI C63.10 (2009) Section 7.7.3	PASS
Dwell Time	FCC Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2009) Section 7.7.4	PASS
RF Conducted Spurious Emissions and Band-edge	FCC Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2009) Section 7.7.9&7.7.10	PASS
Radiated Spurious Emissions and Band-edge	FCC Part 15, Subpart C Section 15.209&15.205	ANSI C63.10 (2009) Section 6.5&6.6&6.7	PASS

4 Contents

5 General Information

5.1 Client Information

Applicant:	Hansong (Nanjing) Technology Ltd.
Address of Applicant:	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.
Manufacturer:	ARTISON, LLC
Address of Manufacturer:	2231 Meridian Blvd. #1, Minden, NV 89423, USA
Factory:	Hansong (Nanjing) Technology Ltd.
Address of Factory:	8th Kangping Road, Jiangning Economy and Technology Development Zone, Nanjing, 211106, China.

5.2 General Description of E.U.T.

Brand Name:		ARTISON
Rated Input:		DC 5V 1A via adapter
Adapter:	Model No.:	GPE053B-050100-Z
	Rated Input:	AC 100V-240V 50Hz 0.2A
	Rated Output:	DC 5.0V 1000mA
	Cable length:	AC port: 2 wires
		DC port: 140 cm

5.3 Technical Specifications

Operation Frequency:	2403.5MHz~2477.3MHz
Modulation Technique:	FSK (FHSS)
Number of Channel:	49
Antenna Type	Integral PCB print antenna
Antenna Gain	1.5 dBi

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Supplied by
iPod	Apple	A1446	SGS

5.5 Test Mode

Test Mode	Description of Test Mode
Hopping disabled mode	Using test software to control EUT working in continuous transmitting, and select channel and modulation type.
Hopping enabled mode	Using test software to control EUT working in continuous transmitting, and hopping on status.

5.6 Test Channel

Using test software was control EUT work in continuous transmitter mode. Before the test, the software has been burn onto device. Using difference software select test channel as below:

Channel	Frequency (MHz)
Low Channel	2403.5
Middle Channel	2440.4
High Channel	2477.3

5.7 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
No.588 West Jindu Road, Songjiang District, Shanghai, China.201612.
Tel: +86 21 6191 5666
Fax: +86 21 6191 5678

5.8 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**
  CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2017-07-14.

- **FCC – Registration No.: 402683**
  SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2017-09-16.

- **Industry Canada (IC) – IC Assigned Code: 8617A**
  The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1. Expiry Date: 2017-06-18.

- **VCCI (Member No.: 3061)**
  The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868 and C-4336 respectively. Date of Registration: 2012-05-29. Date of Expiry: 2015-05-28.

5.9 Deviation from Standards

For Radiated Spurious Emissions test, we use the test setup reference ANSI C63.10:2013 with EUT height 1.5m for emission above 1GHz.

5.10 Measurement Uncertainty

No.	Parameter	Measurement Uncertainty
1	Radio Frequency	< ±1 x 10^{-5}
2	Total RF power, conducted	< ±1.5 dB
3	RF power density, conducted	< ±3 dB
4	Spurious emissions, conducted	< ±3 dB
5	All emissions, radiated	< ±6 dB (30MHz – 1GHz) < ±6 dB (above 1GHz)
6	Temperature	< ±1°C
7	Humidity	< ±5 %
8	DC and low frequency voltages	< ±3 %

6 Equipments Used during Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESCS30	100086	2015-01-22	2016-01-21
2	Line impedance stabilization network	SCHWARZBECK	NSLK8127	8127490	2015-01-22	2016-01-21
3	Line impedance stabilization network	ETS	3816/2	00034161	2015-01-22	2016-01-21
4	Spectrum Analyzer	Rohde & Schwarz	FSP-30	2705121009	2015-01-22	2016-01-21
5	EMI test receiver	Rohde & Schwarz	ESU40	100109	2015-02-13	2016-02-12
6	Active Loop Antenna (9kHz to 30MHz)	Schwarzbeck - Mess-Elektronik	FMZB 1519	1519-034	2015-02-07	2016-02-06
7	Broadband UHF-VHF ANTENNA (25MHz to 2GHz)	SCHWARZBECK	VULB9168	9168-313	2015-02-07	2016-02-06
8	Ultra broadband antenna (25MHz to3GHz)	Rohde & Schwarz	HL562	100227	2014-08-30	2015-08-29
9	Horn Antenna (1GHz to 18GHz)	Rohde & Schwarz	HF906	100284	2015-02-07	2016-02-06
10	Horn Antenna (1GHz to 18GHz)	SCHWARZBECK	BBHA9120D	9120D-679	2015-02-07	2016-02-06
11	Horn Antenna (14GHz to 40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170373	2015-02-13	2016-02-12
12	Pre-amplifier (9KHz – 2GHz)	LNA6900	TESEQ	71033	2014-12-27	2015-12-27
13	Pre-amplifier (1GHz – 26.5GHz)	Rohde & Schwarz	SCU-F0118-G40-BZ4-CSS(F)	10001	2015-01-22	2016-01-21
14	Pre-amplifier (14GHz – 40GHz)	Rohde & Schwarz	SCU-F1840-G35-BZ3-CSS(F)	10001	2015-01-22	2016-01-21
15	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT800.0/880.0-0.2/40-5SSK	9170397	/	/
16	High pass Filter	FSCW	HP 12/2800-5AA2	19A45-02	/	/
17	High-low temperature cabinet	Suzhou Zhihe	TL-40	50110050	2014-09-11	2015-09-10
18	AC power stabilizer	WOCEN	6100	51122	2015-01-02	2016-01-01
19	DC power	QJE	QJ30003SII	611145	2015-01-02	2016-01-01
20	Signal Generator (Interferer)	Agilent	SMR40	100555	2014-08-10	2015-08-09
21	Signal Generator (Blocker)	Rohde & Schwarz	SMJ100A	02.20.360.142	2015-01-22	2016-01-21
22	Splitter	Anritsu	MA1612A	M12265	/	/
23	Coupler	e-meca	803-S-1	900-M01	/	/

7 Test Results

7.1 E.U.T. test conditions

Test Power: AC 120V, 60Hz

Requirements: 15.31(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Operating Environment:

Temperature:	20.0 -25.0 °C
Humidity:	35-75 % RH
Atmospheric Pressure:	99.2 -102 kPa

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top. 1 near middle and 1 near bottom

Pursuant to Part 15.31(c) For swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.

Test frequency is the lowest channel: (2403.5MHz), middle channel: (2440.4MHz) and highest channel: (2477.3MHz) with fixed at channel.

7.2 Antenna Requirement

Standard requirement:

15.203 requirement:

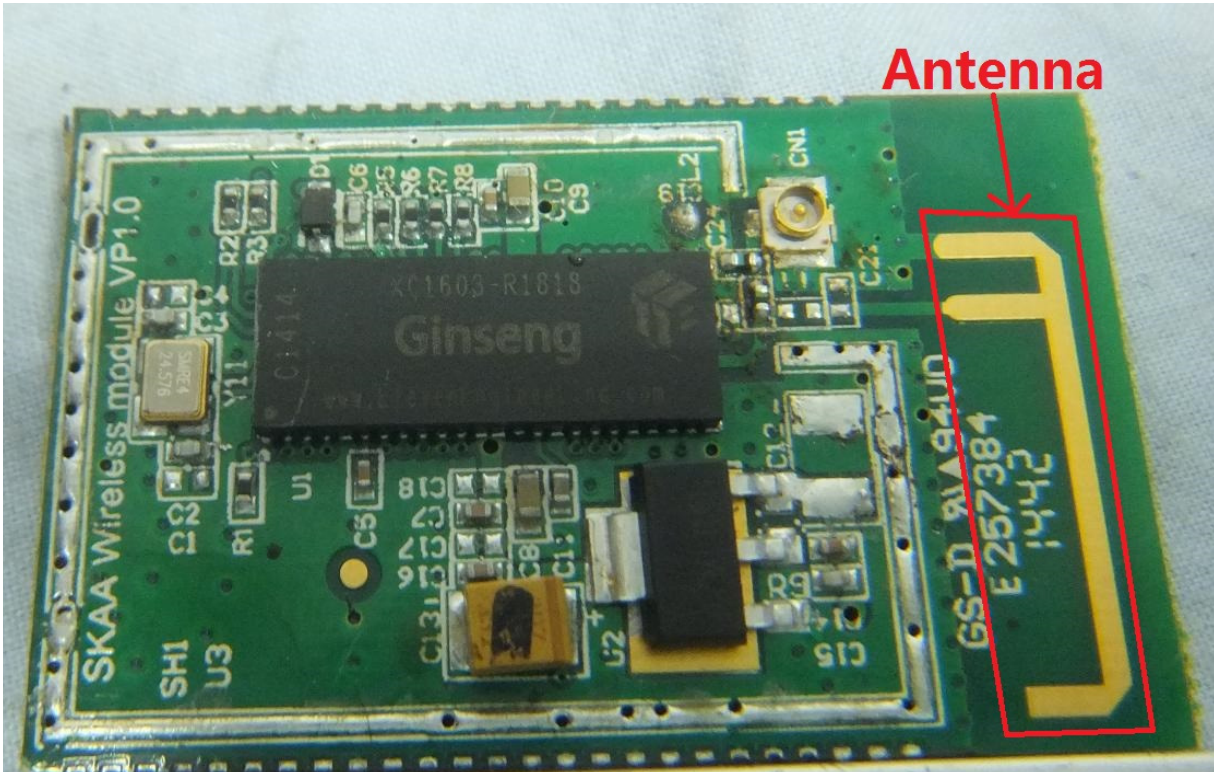
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The BT antenna is Plug-in antenna. The gain of the antenna is less than 1.5 dBi.



7.3 Conducted Emissions on Mains Terminals

Frequency Range: 150 KHz to 30 MHz

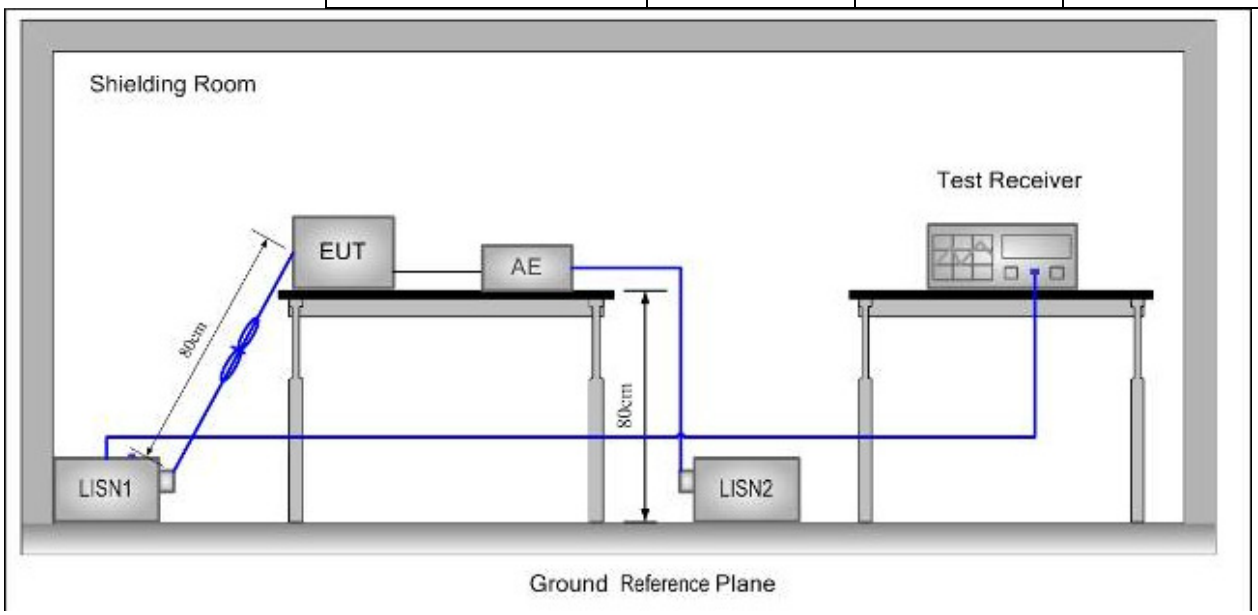
Class/Severity: Class B

Limit:

Frequency range MHz	Class B Limits: dB (μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz. Note2: The lower limit is applicable at the transition frequency.		

Test site/setup: Test instrumentation set-up:

Frequency Range	Detector	RBW	VBW
9KHz to 150Hz	Quasi-peak	200Hz	500Hz
150KHz to 30MHz	Quasi-peak	9kHz	30kHz



Test Procedure:

1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane.

And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

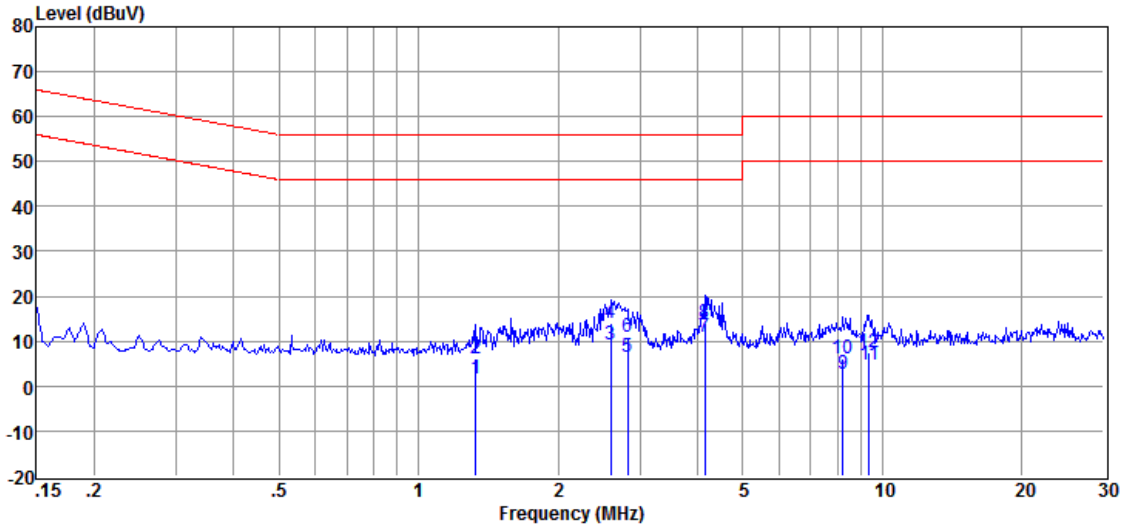
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment were at least 0.8 m from the LISN.

Remark: Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected. Pretest under all modes; choose the worst case mode (Hopping enabled mode) record on the report. Please see the attached Quasi-peak and Average test results.

Test Result: Pass

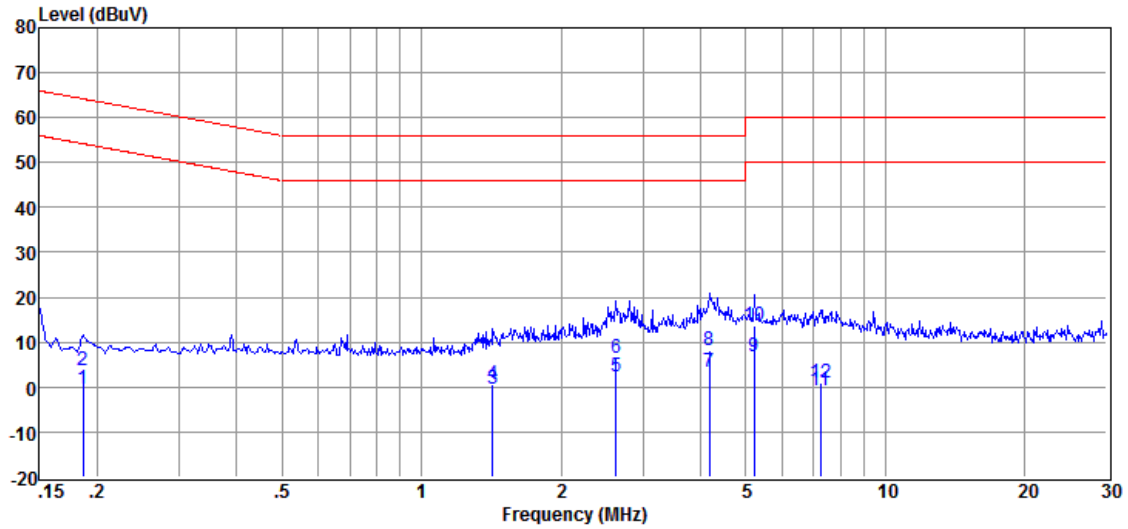
Test Data:

Test Mode: Hopping enabled mode **Test Port:** AC Live Line



Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)	
1	1.331	1.34	0.25	0.10	1.69	46.00	-44.31	Average
2	1.331	5.74	0.25	0.10	6.09	56.00	-49.91	QP
3	2.594	8.87	0.37	0.13	9.37	46.00	-36.63	Average
4	2.594	13.36	0.37	0.13	13.86	56.00	-42.14	QP
5	2.824	5.83	0.37	0.14	6.34	46.00	-39.66	Average
6	2.824	10.25	0.37	0.14	10.76	56.00	-45.24	QP
7	4.136	10.33	0.38	0.18	10.89	46.00	-35.11	Average
8	4.136	13.48	0.38	0.18	14.04	56.00	-41.96	QP
9	8.235	1.98	0.38	0.15	2.51	50.00	-47.49	Average
10	8.235	5.45	0.38	0.15	5.98	60.00	-54.02	QP
11	9.352	4.14	0.33	0.12	4.59	50.00	-45.41	Average
12	9.352	7.12	0.33	0.12	7.57	60.00	-52.43	QP

Test Mode: Hopping enabled mode **Test Port:** AC Neutral Line

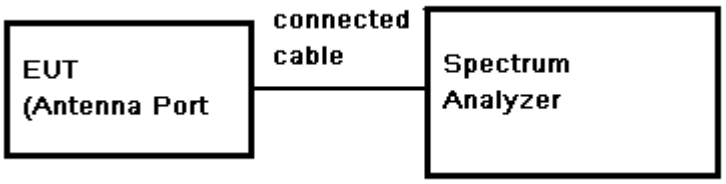


Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)	
1	0.186	-0.78	0.30	0.10	-0.38	54.20	-54.58	Average
2	0.186	3.31	0.30	0.10	3.71	64.20	-60.49	QP
3	1.426	-1.25	0.62	0.10	-0.53	46.00	-46.53	Average
4	1.426	-0.12	0.62	0.10	0.60	56.00	-55.40	QP
5	2.622	1.27	0.83	0.13	2.23	46.00	-43.77	Average
6	2.622	5.50	0.83	0.13	6.46	56.00	-49.54	QP
7	4.180	2.57	0.53	0.18	3.28	46.00	-42.72	Average
8	4.180	7.51	0.53	0.18	8.22	56.00	-47.78	QP
9	5.221	6.34	0.42	0.20	6.96	50.00	-43.04	Average
10	5.221	12.92	0.42	0.20	13.54	60.00	-46.46	QP
11	7.252	-1.49	0.45	0.19	-0.85	50.00	-50.85	Average
12	7.252	0.20	0.45	0.19	0.84	60.00	-59.16	QP

Remark: Level = Read Level + LISN/ISN Factor + Cable Loss.

7.4 20dB Occupied Bandwidth

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centred on the hopping channel;
3. Set the spectrum analyzer: RBW >= 1% of the 20dB bandwidth (set 30 kHz). VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points.

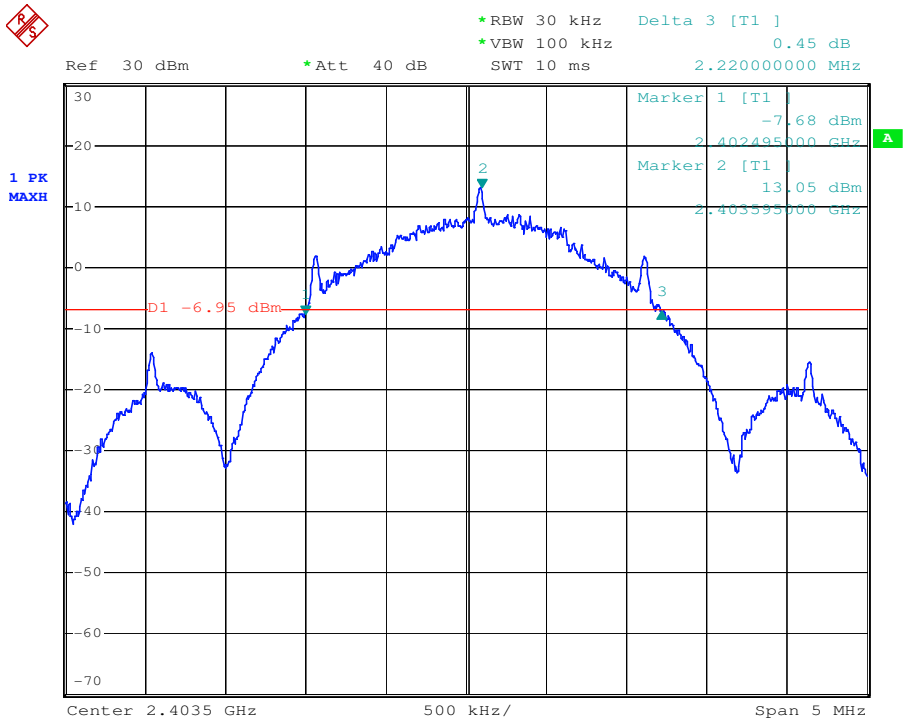
Test Result: PASS

Test date:

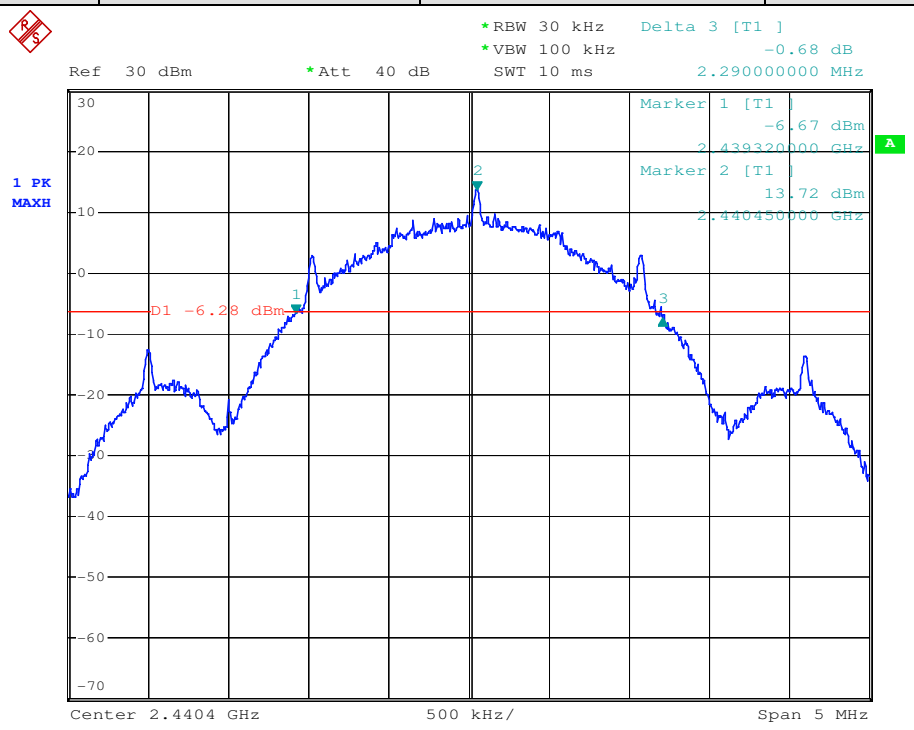
Test Channel	Channel Frequency(MHz)	Modulation	Bandwidth(MHz)
Low	2403.5	FSK	2.22
Middle	2440.4	FSK	2.29
High	2477.3	FSK	2.28

Test plot as follows:

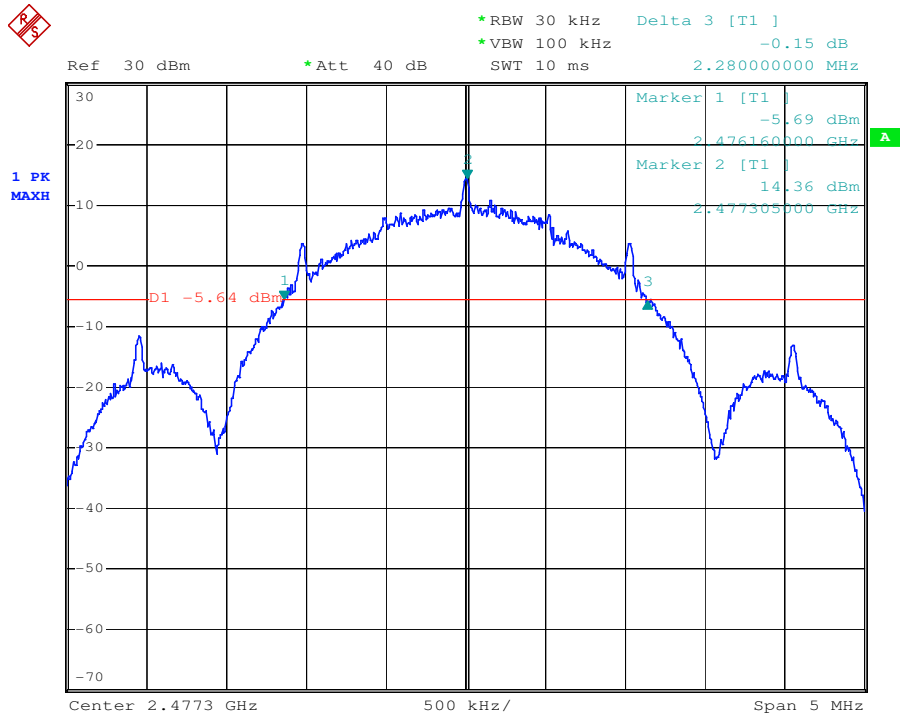
Test mode:	FSK	Test channel:	Lowest



Test mode:	FSK	Test channel:	Middle



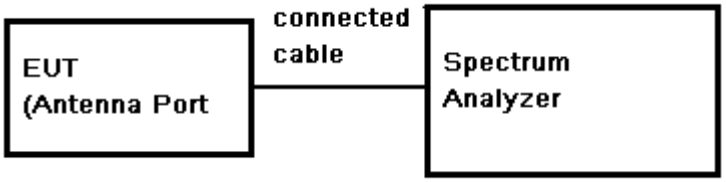
Test mode:	FSK	Test channel:	Highest



7.5 Conducted Peak Output Power

Test Limit: Regulation 15.247 (b)(1)For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Refer to the result "Hopping channel number" of this document. The 1 watt (30.0dBm) limit applies.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3 MHz, VBW = 3 MHz, Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

Test Result: Pass

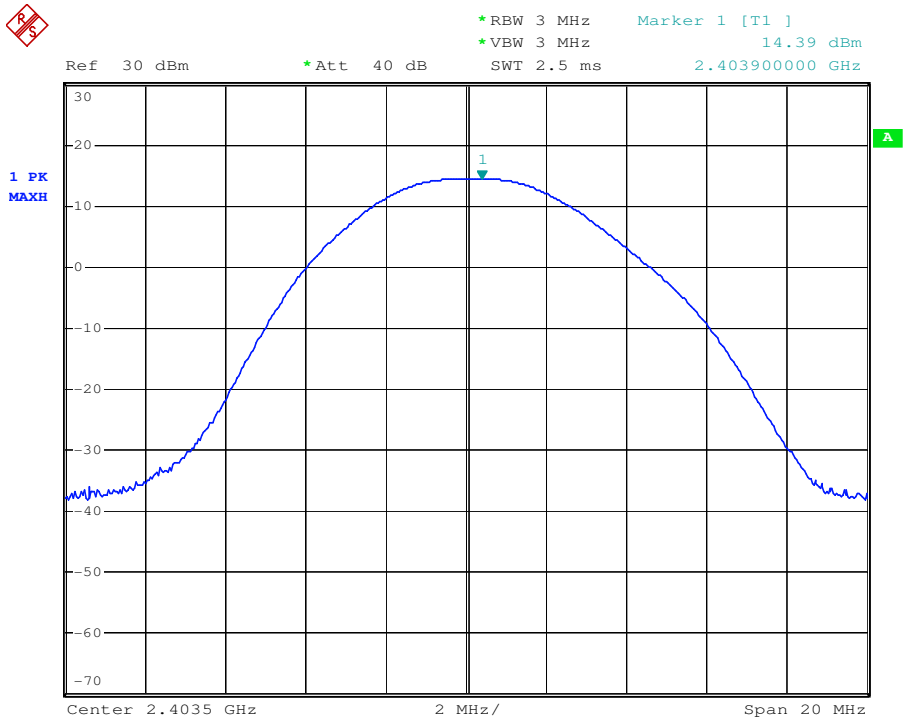
Test Data:

Test Channel	Modulation	Fundamental Frequency (MHz)	Reading Power (dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Lowest	FSK	2403.5	14.39	0.5	14.89	30	32.97
Middle	FSK	2440.4	14.89	0.5	15.39	30	30.38
Highest	FSK	2477.3	15.47	0.5	15.97	30	29.02

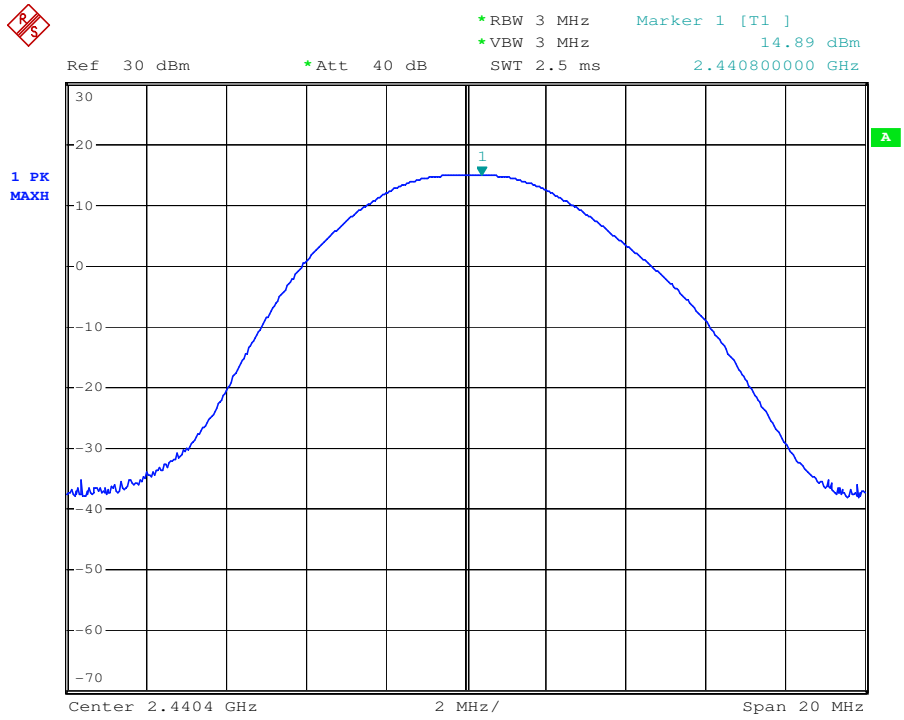
Remark: Output Power=Reading Power + Cable loss

Test result plot as follows:

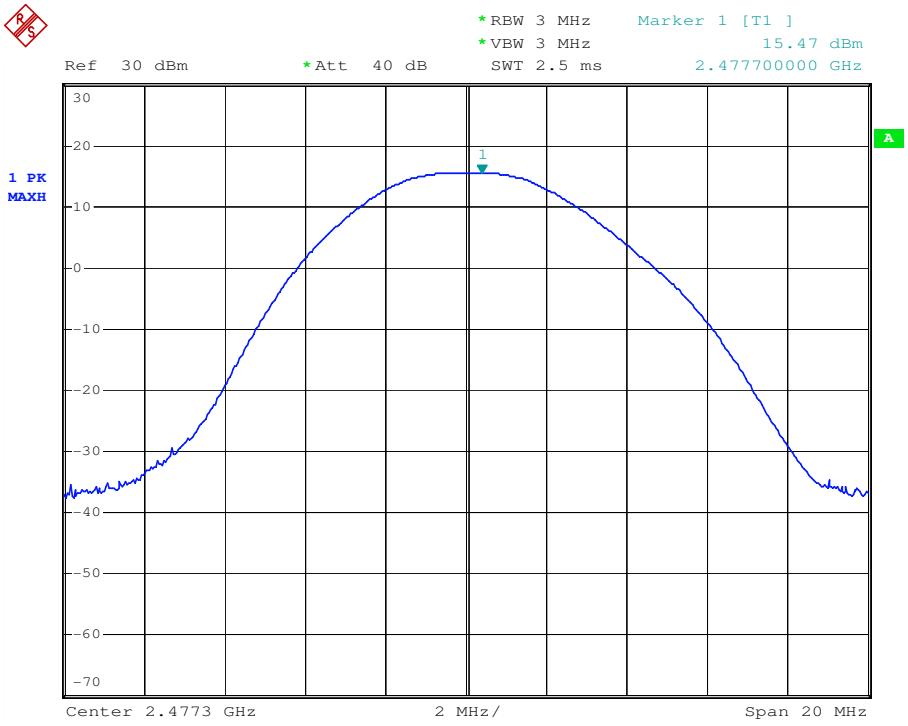
Test mode:	FSK	Test channel:	Lowest



Test mode:	FSK	Test channel:	Middle



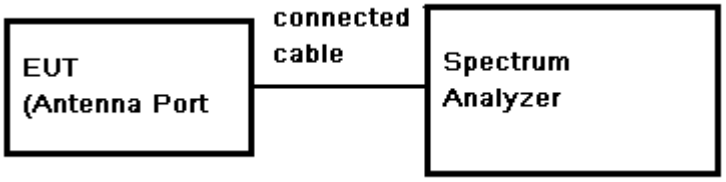
Test mode:	FSK	Test channel:	Highest



7.6 Carrier Frequencies Separated

Limit: 0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW >= 1% of the span (set 30 kHz). VBW >= RBW, Span = 3MHz. Sweep = auto; Detector Function = Peak. Trace = Maxhold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

Test result: Pass

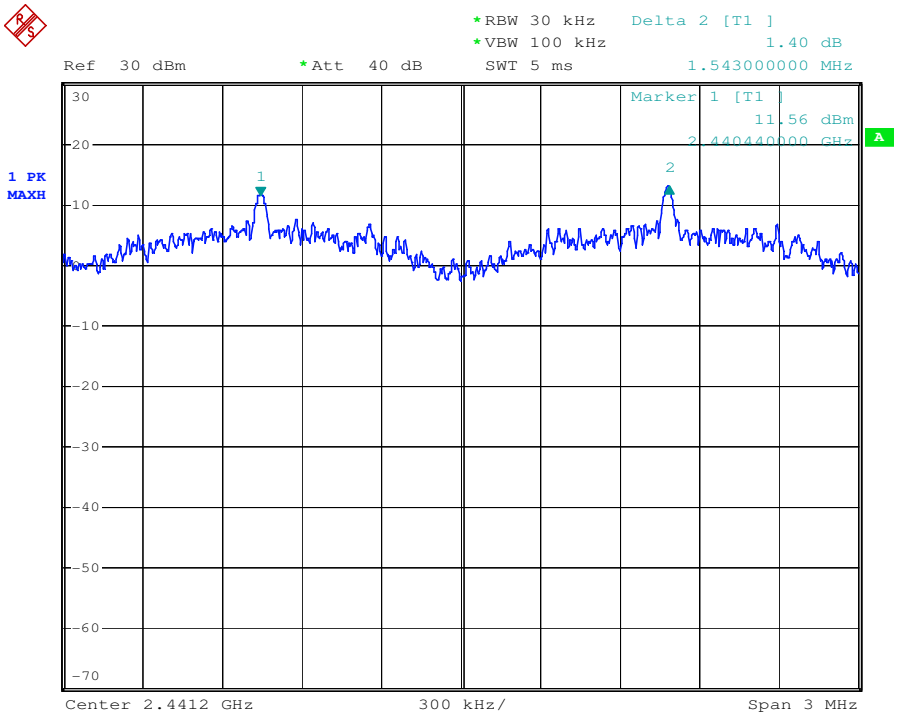
Test data:

Test Channel	Modulation	Carrier Frequencies Separated (MHz)	Limit (25kHz or two-thirds of the 20 dB bandwidth)	Results
Middle Channels (channel 25 and channel 26)	FSK	1.543	25kHz/1527kHz	PASS

Remark: 1. According to the section 7.6, the conducted power measured is less than 125mW and 2/3 of 20dB bandwidth is used for limit.
2. 20dB bandwidth reference Section 7.5

Test plot as follows:

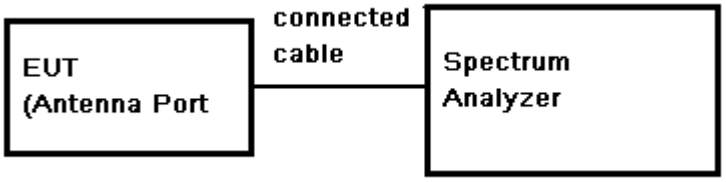
Test mode:	FSK	Test channel:	Middle



7.7 Hopping Channel Number

Limit: At least 15 channels

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 100 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

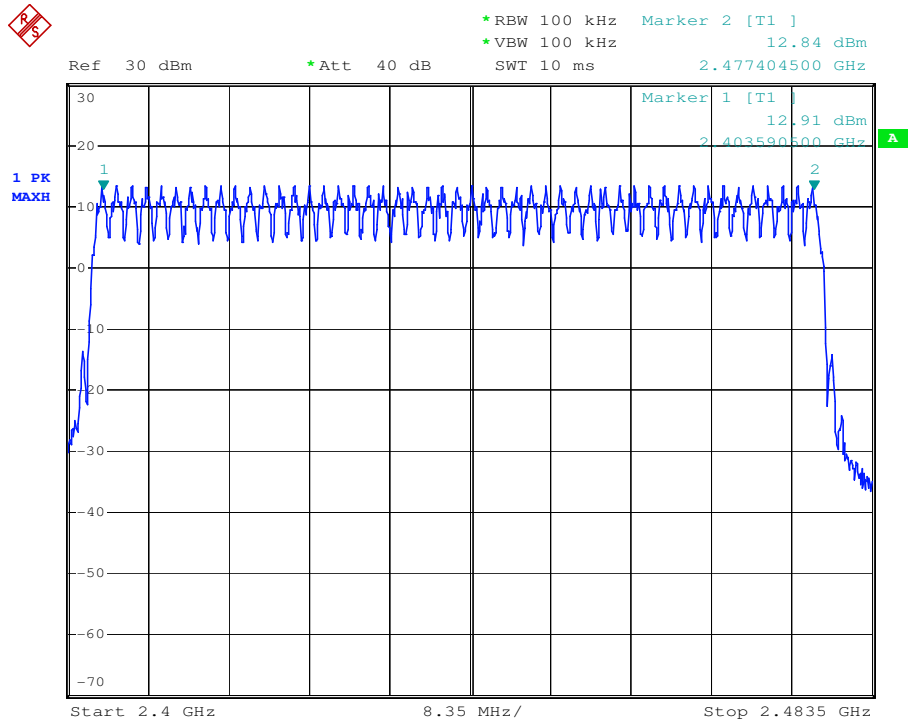
Test Result: Pass

Test Data:

Mode	Hopping channel numbers	Limit	Results
FSK	49	≥15	Pass

Test plot as follows:

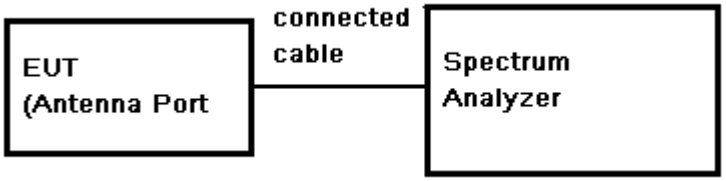
Test mode:	FSK	Test channel:	Middle



7.8 Dwell Time

Limit: Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum. Keep EUT in Hopping transmitting with all kind of modulation.
2. Set spectrum analyzer span = 0. centered on a hopping channel;
3. Use Emission width * No. of Hopping Channels in 19.6s to determine the dwell time.

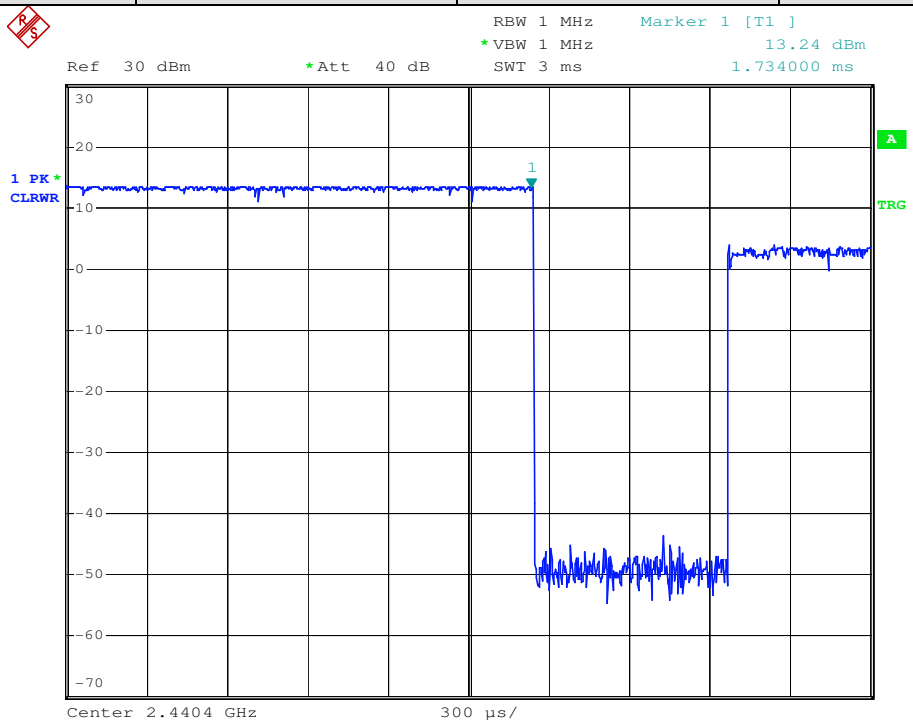
Test Result: Pass

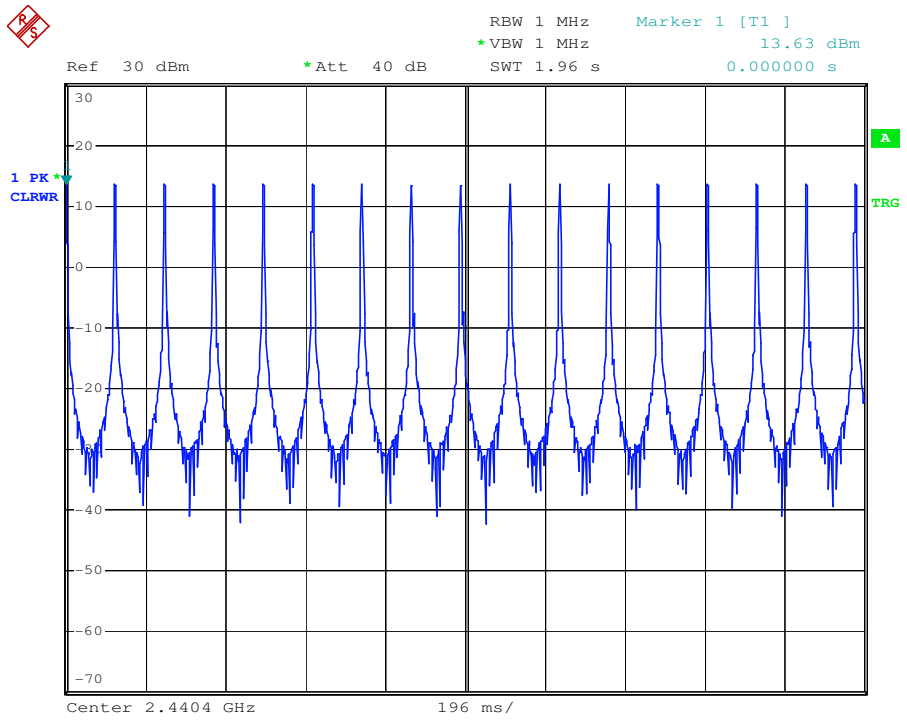
Test Data:

Frequency (MHz)	Modulation	Emission Width (ms)	Number of Hopping Channel in 19.6s	Average Time of Occupancy(s)	Limit(s)	Result
2440.4	FSK	1.734	170	0.295	0.4	Pass

Test plot as follows:

Test mode:	FSK-DH1	Test channel:	Middle

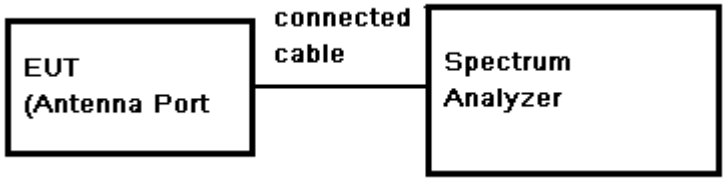




7.9 Conducted Spurious Emissions and Band-edge

Limit: (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.

Test Configuration:



Test Procedure: 1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 100KHz. VBW >= RBW. Sweep = auto; Detector Function = Peak (Max. hold).

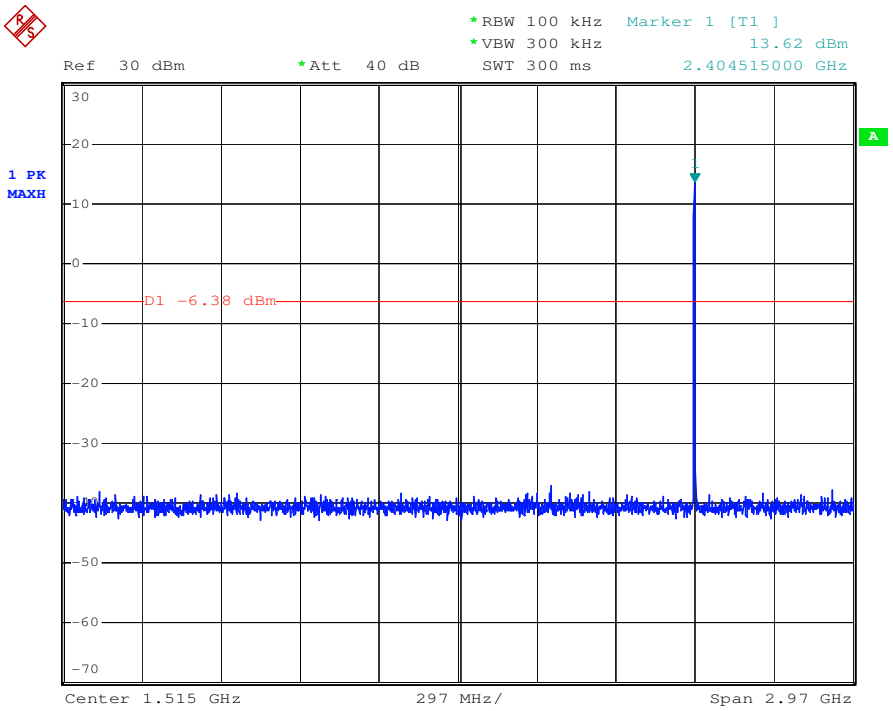
Test Result: Pass

7.9.1 Conducted spurious emission

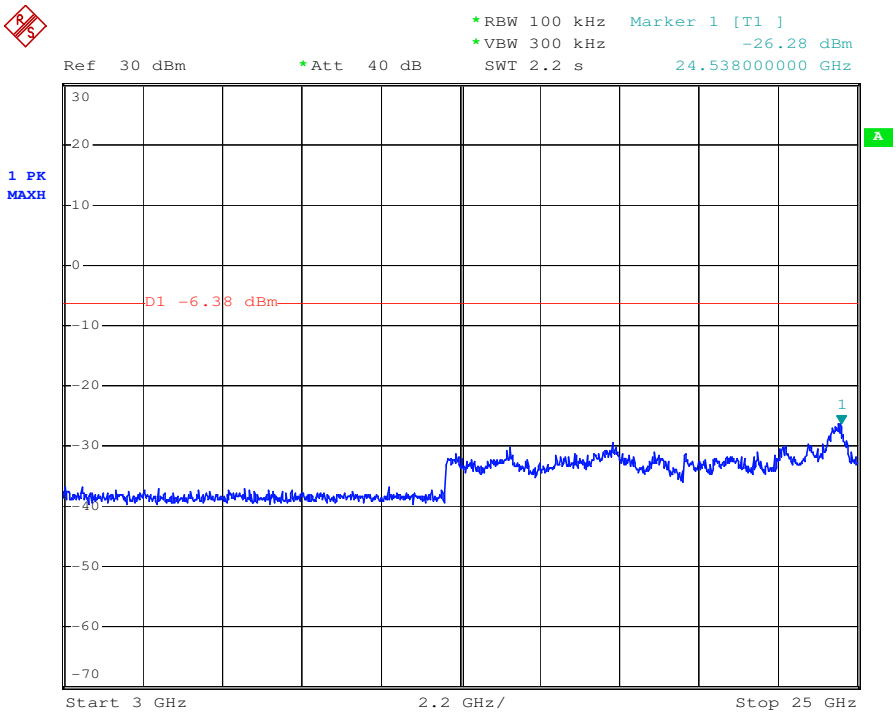
Test plot as follows:

Test mode:	FSK	Test channel:	Lowest

30MHz-3GHz:

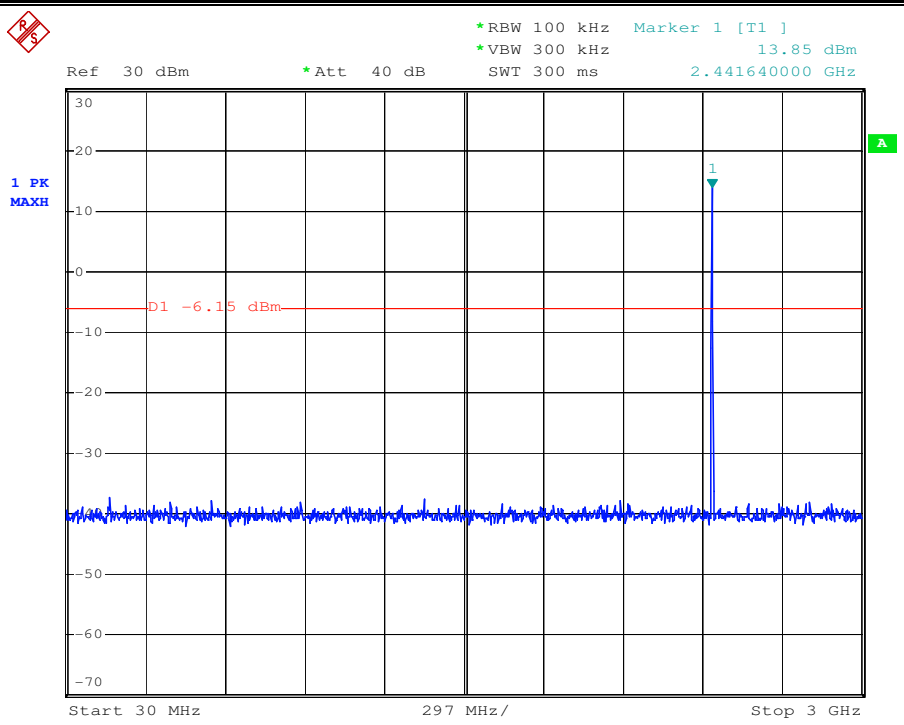


3GHz-25GHz:

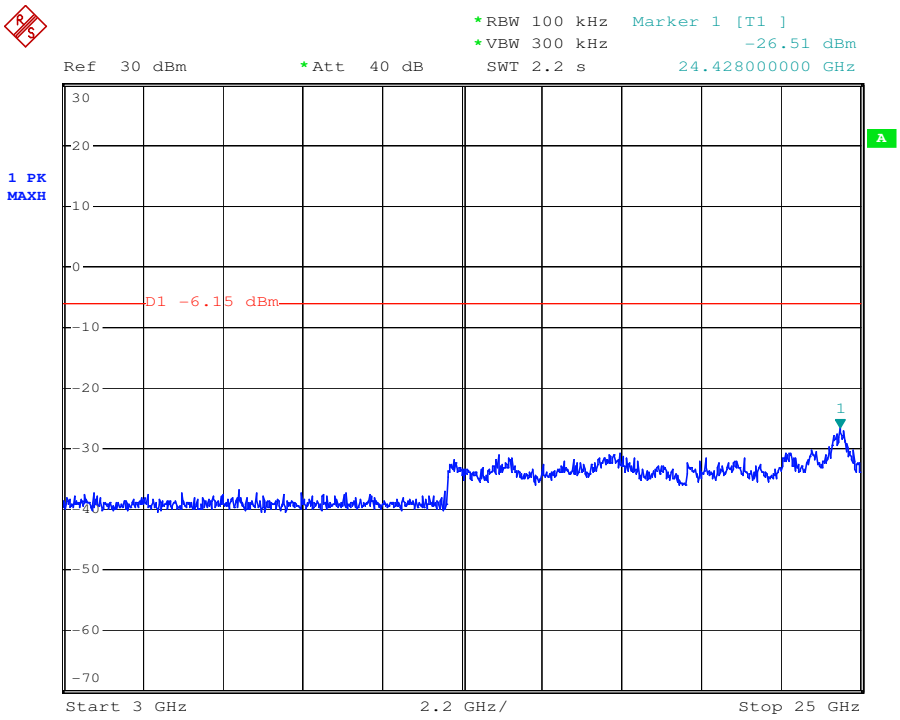


Test mode:	FSK	Test channel:	Middle

30MHz-3GHz:

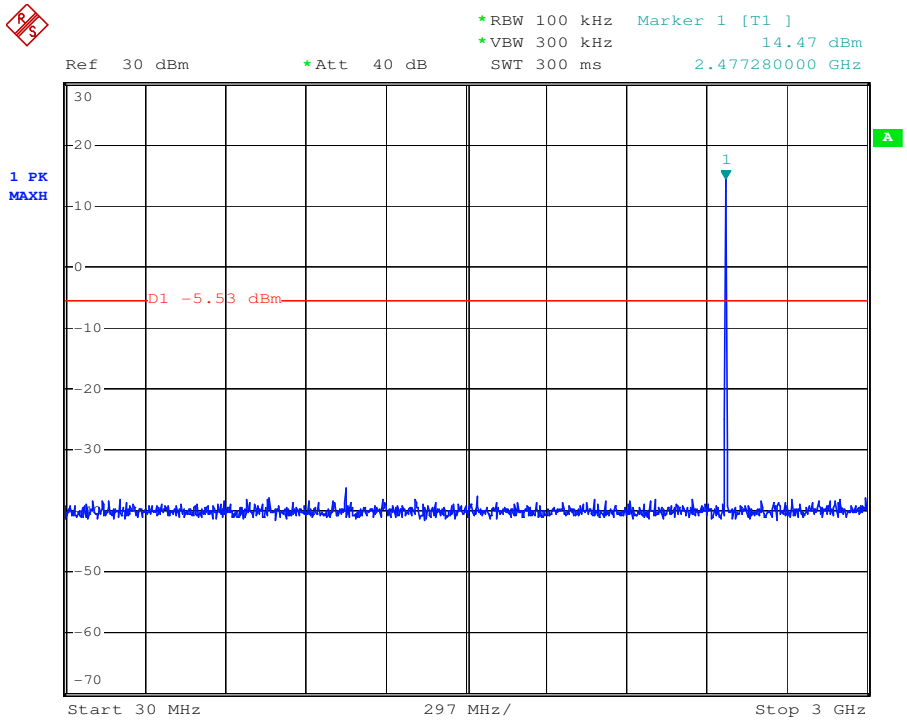


3GHz-25GHz:

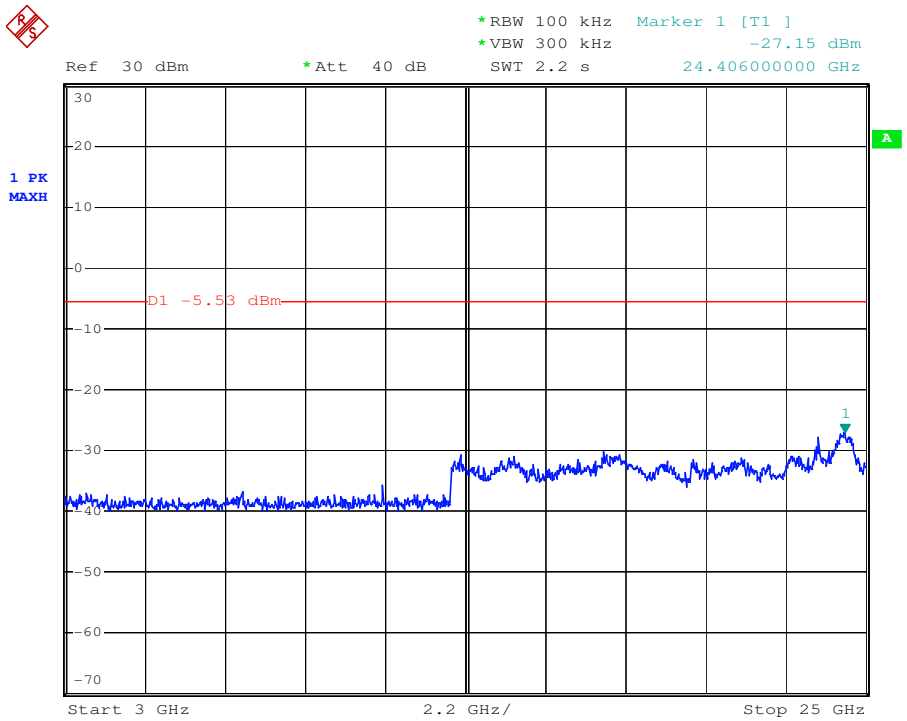


Test mode:	FSK	Test channel:	Highest

30MHz-3GHz:



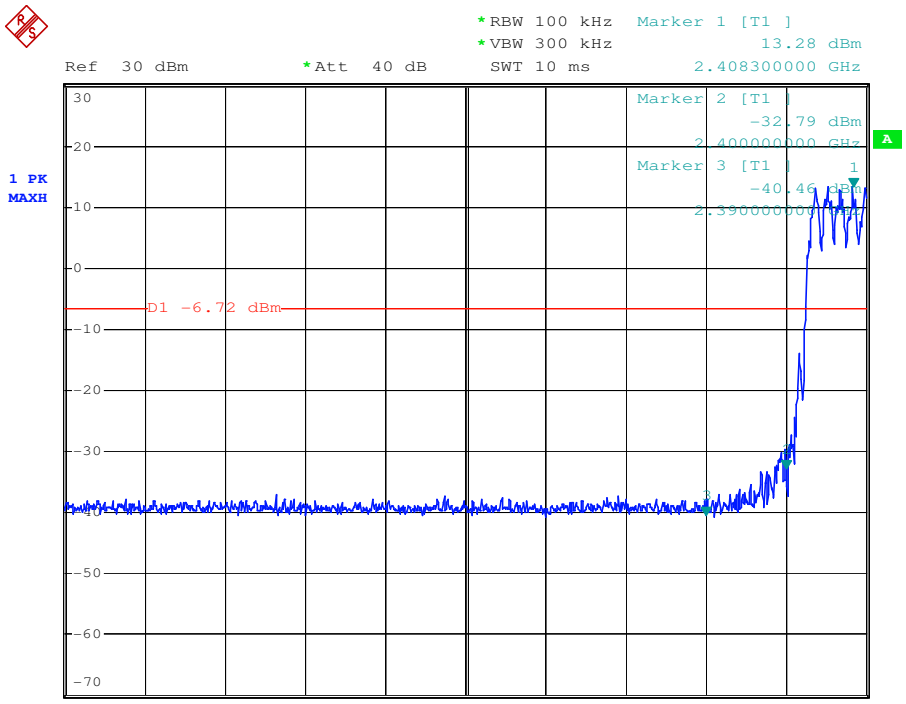
3GHz-25GHz:

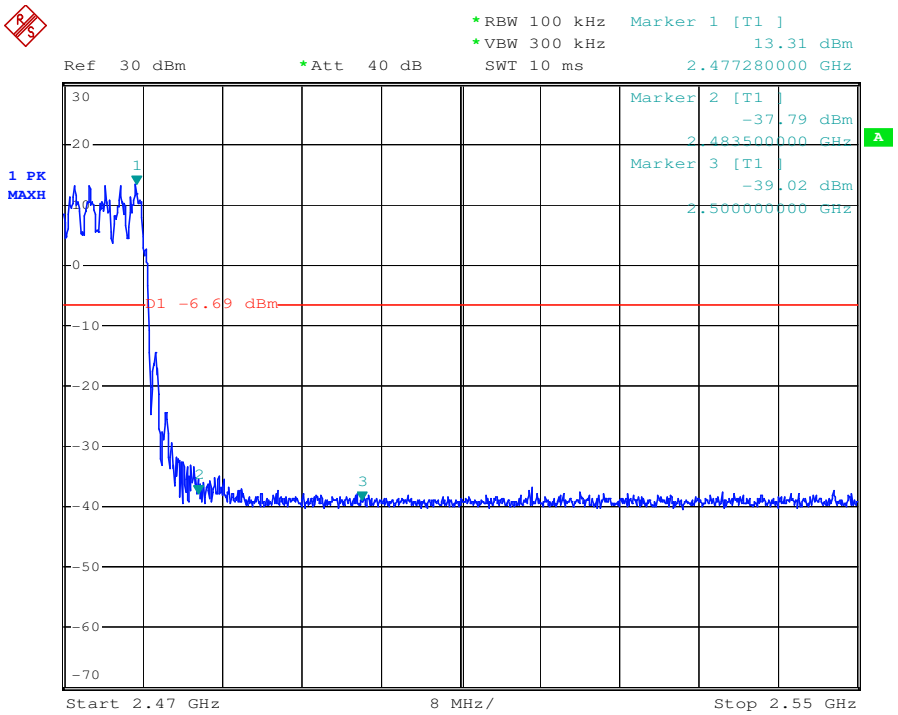


7.9.2 Conducted Band-edge

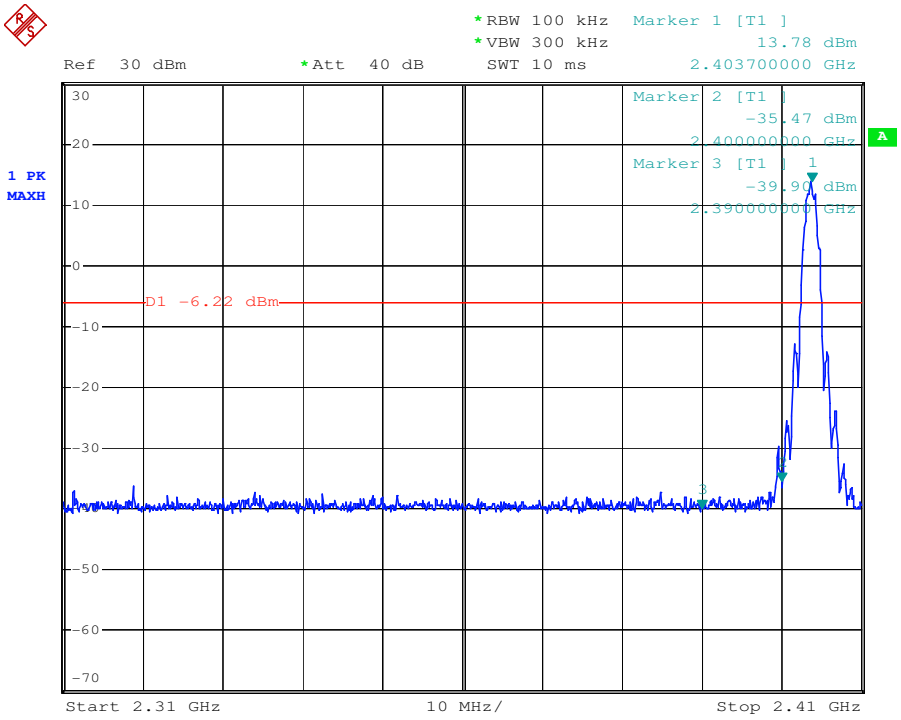
Test plot as follows:

Test mode:	FSK	Test channel:	Hopping enabled

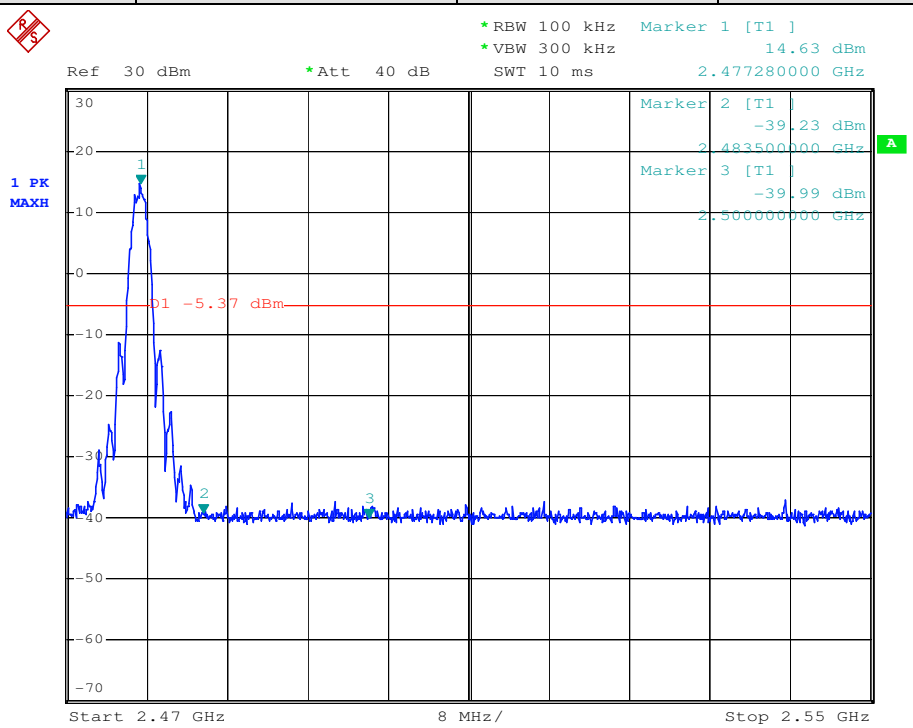




Test mode:	FSK	Test channel:	Hopping disabled- Lowest



Test mode:	FSK	Test channel:	Hopping disabled- Highest



7.10 Radiated Spurious Emissions and Band-edge

Frequency Range: 9KHz to 25GHz

Test site/setup:

Measurement Distance: 3m (Semi-Anechoic Chamber)
Test instrumentation set-up:

Frequency Range	Detector	RBW	VBW
0.009MHz-0.090MHz	Peak	10kHz	30kHz
0.009MHz-0.090MHz	Average	10kHz	30kHz
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz
0.110MHz-0.490MHz	Peak	10kHz	30kHz
0.110MHz-0.490MHz	Average	10kHz	30kHz
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz
30MHz-1GHz	Quasi-peak	100kHz	300kHz
Above 1GHz	Peak	RBW=1MHz	VBW≥RBW
	Average		VBW=10Hz

Sweep=Auto

15.209 Limit:

Frequency	Limit (dBuV/m)
0.009MHz-0.490MHz	128.5 ~ 93.8
0.490MHz-1.705MHz	73.8 ~63.0
1.705MHz-30MHz	69.5
30MHz-88MHz	40.0
88MHz-216MHz	43.5
216MHz-960MHz	46.0
960MHz-1GHz	54.0
Above 1GHz	54.0

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Test Configuration: Receive antenna scan height 1 m - 4 m. polarization Vertical / Horizontal

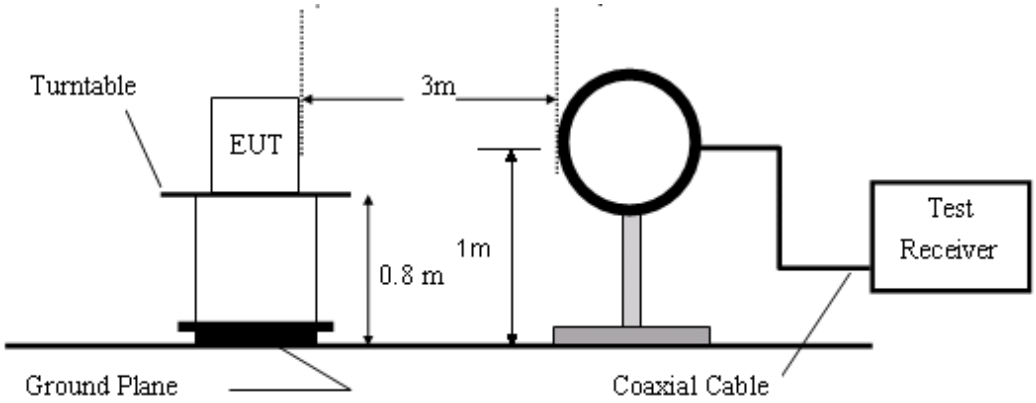


Figure1. 30MHz to 1GHz radiated emissions test configuration

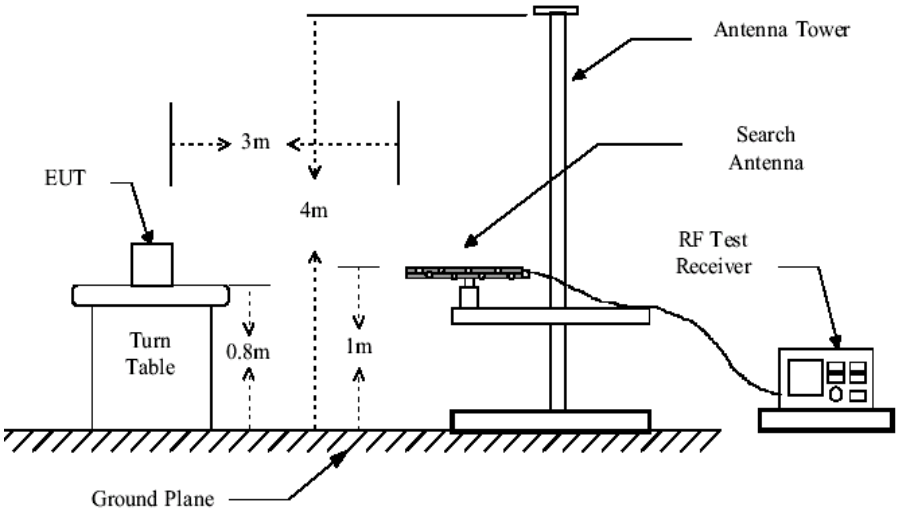


Figure2. 30MHz to 1GHz radiated emissions test configuration

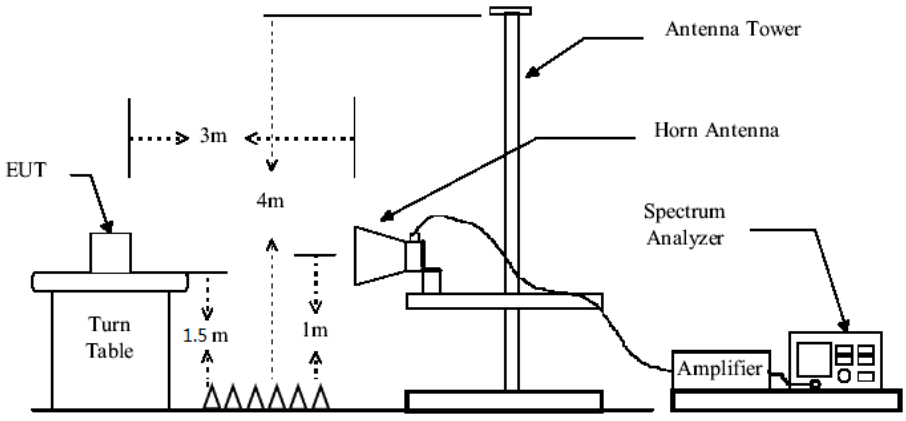


Figure3. Above 1GHz radiated emissions test configuration

Test Procedure: The procedure used was ANSI Standard C63.10. The receiver was scanned from 9KHz to 25GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

Low noise amplifier was used below 1GHz, High pass Filter was used above 3GHz.

Between 1G and 3GHz, we did not use any amplifier or filter.

Pre-test was performed on all modes, Compliance test was performed on worse case (8DPSK mode).

Test were performed for their spatial orthogonal(X, Y, Z), the worst test data (X orthogonal) was submitted.

1) For this intentional radiator operates below 25 GHz. the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 5rd harmonic.
2) As shown in Section, for frequencies above 1000MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

Test Result: Pass

7.10.1 Radiated Spurious Emissions

30MHz-1GHz:

lowest Channel

Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		
1	93.951	31.37	8.63	23.66	0.86	17.20	43.50	-26.30	QP	Horizontal
2	591.206	22.19	19.15	23.80	2.69	20.23	46.00	-25.77	QP	Horizontal
3	730.021	21.39	20.90	23.89	3.04	21.44	46.00	-24.56	QP	Horizontal
4	784.997	21.15	22.11	23.92	3.18	22.52	46.00	-23.48	QP	Horizontal
5	841.201	21.02	22.11	23.93	3.31	22.51	46.00	-23.49	QP	Horizontal
6	939.616	22.92	23.44	23.94	3.56	25.98	46.00	-20.02	QP	Horizontal
1	32.626	34.60	12.55	23.71	0.15	23.59	40.00	-16.41	QP	Vertical
2	39.960	35.04	13.08	23.70	0.27	24.69	40.00	-15.31	QP	Vertical
3	61.001	28.96	11.97	23.68	0.53	17.78	40.00	-22.22	QP	Vertical
4	639.213	21.81	19.51	23.83	2.81	20.30	46.00	-25.70	QP	Vertical
5	816.445	21.65	21.87	23.93	3.24	22.83	46.00	-23.17	QP	Vertical
6	945.576	25.34	23.61	23.94	3.56	28.57	46.00	-17.43	QP	Vertical

Middle Channel

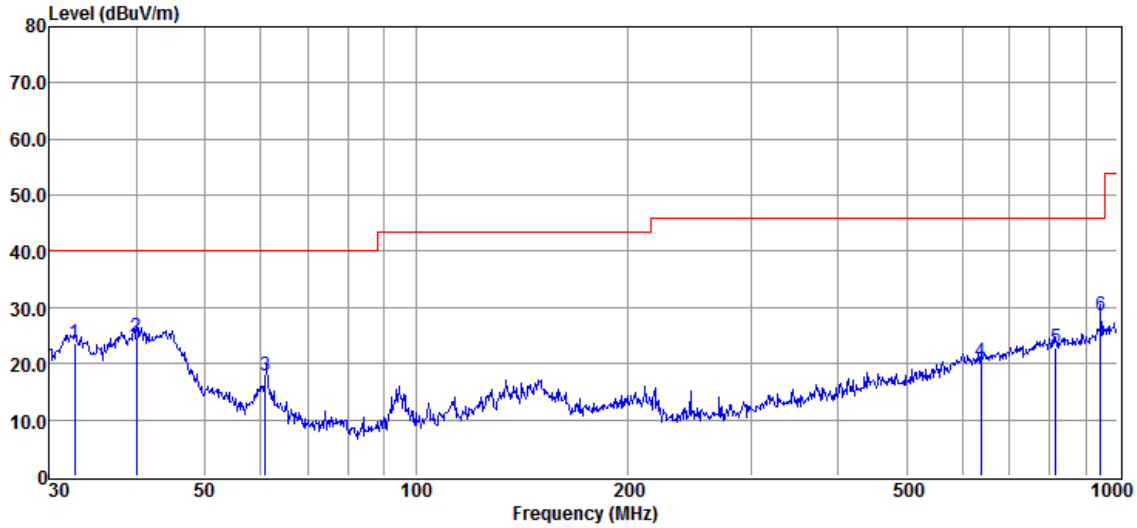
Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		
1	95.104	30.26	8.74	23.66	0.87	16.21	43.50	-27.29	QP	Horizontal
2	163.240	26.21	12.27	23.63	1.24	16.09	40.00	-23.91	QP	Horizontal
3	214.988	28.26	9.05	23.63	1.44	15.12	43.50	-28.38	QP	Horizontal
4	295.233	35.34	11.58	23.67	1.86	25.11	46.00	-20.89	QP	Horizontal
5	783.456	21.71	22.11	23.92	3.18	23.08	46.00	-22.92	QP	Horizontal
6	945.708	24.56	23.61	23.94	3.56	27.79	46.00	-18.21	QP	Horizontal
1	35.458	33.77	12.65	23.71	0.19	22.90	40.00	-17.10	QP	Vertical
2	45.880	31.98	13.04	23.70	0.34	21.66	40.00	-18.34	QP	Vertical
3	97.335	39.44	8.93	23.66	0.89	25.60	43.50	-17.90	QP	Vertical
4	143.760	30.33	11.93	23.64	1.14	19.76	43.50	-23.74	QP	Vertical
5	211.590	31.22	9.08	23.63	1.44	18.11	43.50	-25.39	QP	Vertical
6	945.705	24.49	23.61	23.94	3.56	27.72	46.00	-18.28	QP	Vertical

Highest Channel

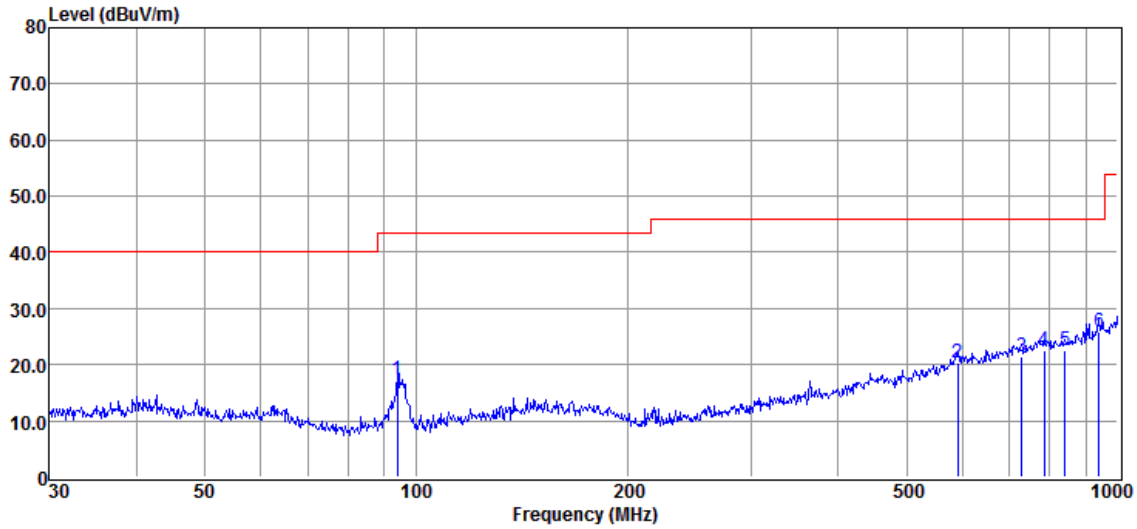
Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector	Polarization
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
1	168.414	30.85	12.21	23.63	1.27	20.70	43.50	-22.80	QP	Horizontal
2	264.746	33.96	10.79	23.65	1.66	22.76	46.00	-23.24	QP	Horizontal
3	519.065	25.32	16.88	23.75	2.48	20.93	46.00	-25.07	QP	Horizontal
4	543.274	32.85	17.25	23.77	2.56	28.89	46.00	-17.11	QP	Horizontal
5	663.473	30.35	19.88	23.85	2.87	29.25	46.00	-16.75	QP	Horizontal
6	807.429	23.96	21.83	23.93	3.23	25.09	46.00	-20.91	QP	Horizontal
1	33.562	31.82	12.57	23.71	0.16	20.84	40.00	-19.16	QP	Vertical
2	313.276	40.39	12.51	23.67	1.92	31.15	46.00	-14.85	QP	Vertical
3	494.198	33.64	16.20	23.73	2.42	28.53	46.00	-17.47	QP	Vertical
4	687.151	28.40	20.21	23.86	2.92	27.67	46.00	-18.33	QP	Vertical
5	711.673	28.73	20.55	23.88	2.99	28.39	46.00	-17.61	QP	Vertical
6	737.071	27.74	21.00	23.89	3.06	27.91	46.00	-18.09	QP	Vertical

Result Level = Read Level + Antenna Factor + Cable loss - Preamp Factor

Below is the plot of worst case on lowest channel:
Vertical:



Horizontal:



Lowest Channel(2403.5MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4807	40.24	6.20	46.44	54	-7.56	peak	Horizontal
2	7210.5	39.57	10.65	50.22	54	-3.78	peak	Horizontal
3	9614	37.63	14.38	52.01	54	-1.99	peak	Horizontal
4	4807	45.14	6.20	51.34	54	-2.66	peak	Vertical
5	7210.5	40.33	10.65	50.98	54	-3.02	peak	Vertical
6	9614	36.86	14.38	51.24	54	-2.76	peak	Vertical

Above 1GHz:

Middle Channel(2440.4MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4880.8	37.24	6.99	44.23	54	-9.77	peak	Horizontal
2	7321.2	39.45	11.13	50.58	54	-3.42	peak	Horizontal
3	9761.6	38.71	14.35	53.06	54	-0.94	peak	Horizontal
4	4880.8	42.39	6.99	49.38	54	-4.62	peak	Vertical
5	7321.2	40.08	11.13	51.21	54	-2.79	peak	Vertical
6	9761.6	37.95	14.35	52.30	54	-1.70	peak	Vertical

Highest Channel(2477.3MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4954.6	42.37	7.47	49.84	54	-4.16	peak	Horizontal
2	7431.9	40.96	11.62	52.58	54	-1.42	peak	Horizontal
3	9909.2	38.85	14.39	53.24	54	-0.76	peak	Horizontal
4	4954.6	45.69	7.47	53.16	54	-0.84	peak	Vertical
5	7431.9	40.98	11.62	52.60	54	-1.40	peak	Vertical
6	9909.2	37.83	14.39	52.22	54	-1.78	peak	Vertical

Remark: 1. Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

2. No any other emissions level which are attenuated less than 20dB below the limit. According to 15.31(o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.

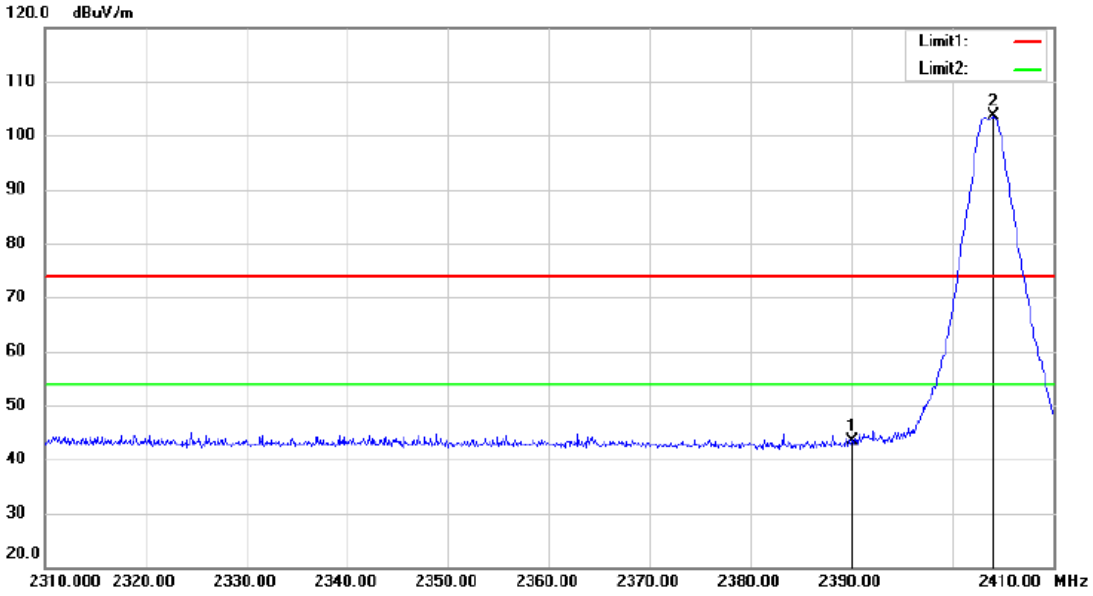
3. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

7.10.2 Radiated Band edge

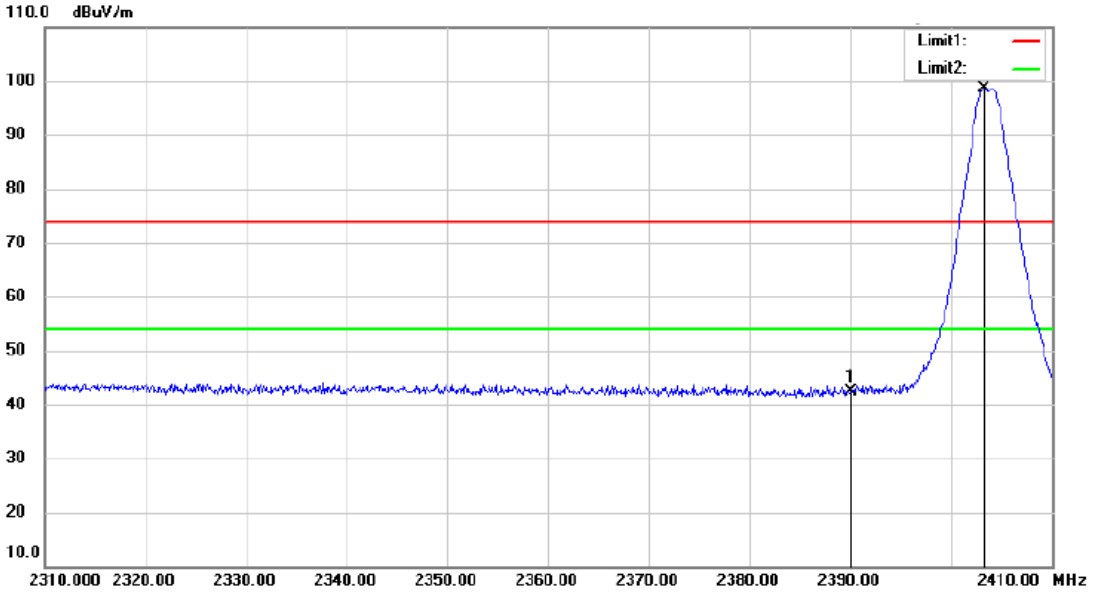
Lowest Channel(2403.5MHz) **Modulation: FSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2390.0	47.26	-3.89	43.37	54	-10.63	Peak	Horizontal
2	2404.1	107.44	-3.92	103.52	54	49.52	Peak	Horizontal
1	2390.0	46.33	-3.89	42.44	54	-11.56	Peak	Vertical
2	2403.2	102.45	-3.93	98.52	54	44.52	Peak	Vertical

Horizontal:



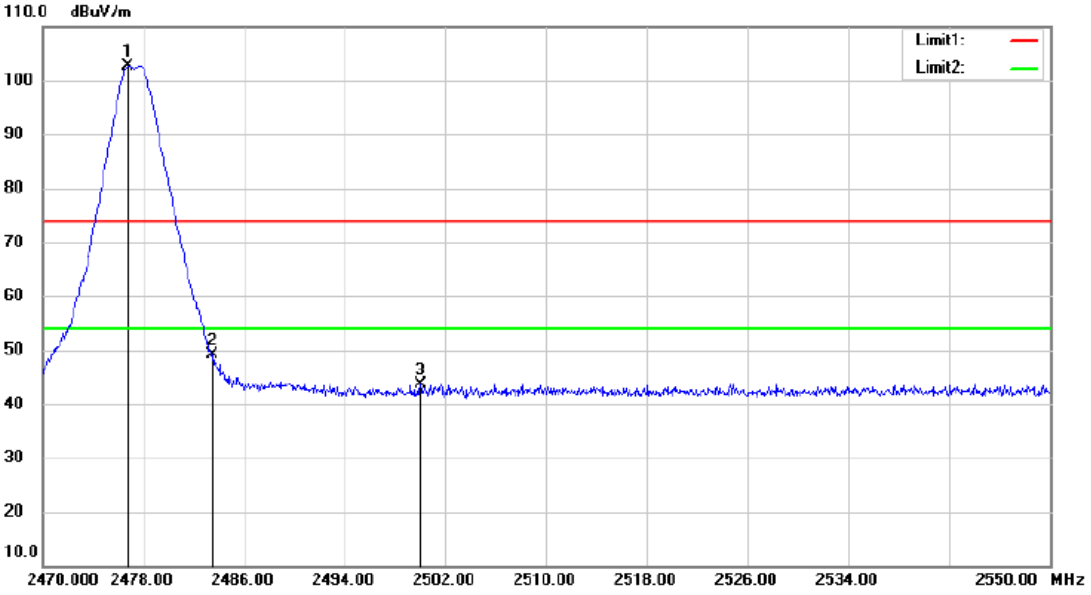
Vertical:



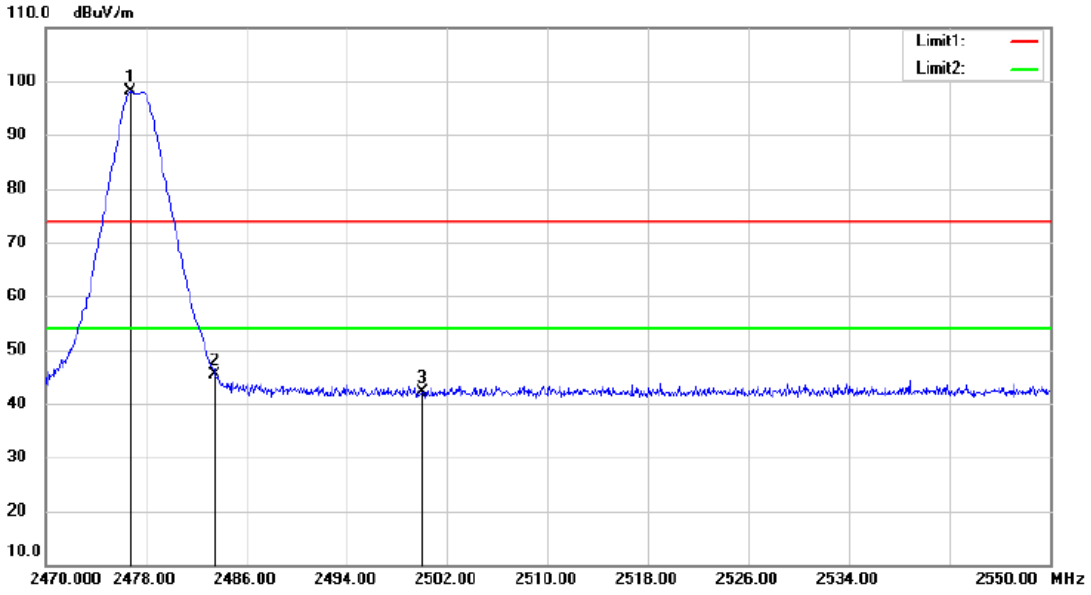
CH Low 2477.3MHz **Modulation: FSK**

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2476.8	106.71	-4.00	102.71	54	48.71	Peak	Horizontal
2	2483.5	53.18	-4.01	49.17	54	-4.83	Peak	Horizontal
3	2500.0	47.78	-4.03	43.75	54	-10.25	Peak	Horizontal
1	2476.8	102.02	-4.00	98.02	54	44.02	Peak	Vertical
2	2483.5	49.37	-4.01	45.36	54	-8.64	Peak	Vertical
3	2500.0	46.20	-4.03	42.17	54	-11.83	Peak	Vertical

Horizontal:



Vertical:



Remark: 1. Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

2. No any other emissions level which are attenuated less than 20dB below the limit. According to 15.31(o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.
3. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

All frequencies within the "Restricted bands" have been evaluated to compliance.
Except as shown in paragraph of this section, only spurious emissions are permitted in any of the frequency bands listed below:
FCC Part 15, Subpart C Section 15.205 Restricted bands of operation.

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	10.5 - 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	2655 - 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	
13.36 - 13.41			

8 Test Setup Photographs

Refer to the < RCC NANO ONE TRANSMITTER _Test Setup photos-FCC>.

9 EUT Constructional Details

Refer to the < RCC NANO ONE TRANSMITTER _External Photos-FCC > & < RCC NANO ONE TRANSMITTER _Internal Photos-FCC>.

--End of the Report--