Radio Test Report

FCC ID: TQYBMNF2301000M
IC: 6233A-BM2301MA

This report concerns (check one) : ☐ **Original Grant** ☒ **Class II Change**

Issued Date : Mar. 28, 2014
Project No. : 1310117
Equipment : Bluetooth Module
Model Name : NF2301

Applicant : JAZZ HIPSTER CORPORATION
Address : 2FD, NO.512, YUAN-SAN RD., CHUNG-HO DISTRICT, NEW TAIPEI CITY, TAIWAN.

Tested by: Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Sep. 26, 2012
Date of Test: Sep. 26, 2012 ~ Jan. 04, 2013

Testing Engineer : Rush Kao
(Rush Kao)

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Testing Laboratory
0659

Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C**., or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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REPORT ISSUED HISTORY

Issue No.	Description	Issued Date
NEI-FCCP-1-1209063	Original Report.	Mar. 18, 2013
NEI-FCCP-1-1310117	Original Issue. Compared with the previous report (NEI-FCCP-1-1209063) the antenna board is changed and all test results are as same.	Mar. 28, 2014

1 CERTIFICATION

Equipment	: Bluetooth Module
Brand Name	: JS
Model Name	: NF2301
Applicant	: JAZZ HIPSTER CORPORATION
Date of Test	: Sep. 26, 2012 ~ Jan. 04, 2013
Standards	: RSS-210, Issue 8, 2010
	FCC Part 15, Subpart C: 2012
	ANSI C63.4: 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1310117) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

RSS-210, Issue 8, 2010; FCC Part 15, Subpart C: 2012			
Standard Clause		**Test Item**	**Result**
RSS-210	**FCC Part 15, Subpart C**		
NOTE (2)	15.207	Conducted Emission	**N/A**
A8.5	15.247 (c)	Antenna conducted Spurious Emission	**PASS**
A8.1 (b)	15.247 (a)(1)	Hopping Channel Separation	**PASS**
A8.4 (2)	15.247 (b)	Maximum Peak Conducted Output Power	**PASS**
NOTE (3)	15.247 (c)	Radiated Spurious Emission	**PASS**
A8.1 (d)	15.247 (b)(1)	Number of Hopping Frequency	**PASS**
A8.1 (d)	15.247 (a)(1)	Average time of occupancy	**PASS**
NOTE (4)	15.205	Restricted Bands	**PASS**
NOTE (5)	15.203	Antenna Requirement	**PASS**
NOTE (6)	1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	**PASS**

NOTE:

1. **N/A**: denotes test is not applicable in this Test Report
2. Reference standerads is RSS-GEN 7.2.4
3. Reference standerads is RSS-GEN 7.2.5
4. Reference standerads is RSS-GEN 7.2.2
5. Reference standerads is RSS-GEN 7.1.2
6. Reference standerads is RSS-102

2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

Radiated emission Test (Below 1 GHz):

CB08: (FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

Radiated emission Test (Above 1 GHz):

CB08: (VCCI RN: G-91; FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty is not specified by FCC rules and for reference only.

The reported uncertainty of measurement **y ± U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95**%.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

Radiated emission test:

Test Site	Item	Measurement Frequency Range		Uncertainty	NOTE
CB08	Radiated emission at 3m	Horizontal Polarization	30 - 200MHz	3.35 dB	
			200 - 1000MHz	3.11 dB	
			1 - 18GHz	3.97 dB	
			18 - 40GHz	4.01 dB	
		Vertical Polarization	30 - 200MHz	3.22 dB	
			200 - 1000MHz	3.24 dB	
			1 - 18GHz	4.05 dB	
			18 - 40GHz	4.04 dB	

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our U_{lab} values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR}, as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our U_{lab} values are smaller than U_{CISPR}.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Bluetooth Module
Brand Name	JS
Model Name	NF2301
OEM Brand/Model Name	N/A
Model Difference	N/A
Product Description	<table><tr><td>Operation Frequency</td><td>2402 MHz ~ 2480 MHz</td></tr><tr><td>Modulation Type</td><td>FHSS(GFSK, π/4-DQPSK, 8-DPSK)</td></tr><tr><td>Bit Rate of Transmitter</td><td>1/2/3 Mbps</td></tr><tr><td>Number Of Channel</td><td>Please refer to the Note 2.</td></tr><tr><td>Antenna Designation</td><td>Please refer to the Note 3.</td></tr><tr><td>Antenna Gain(Peak)</td><td>Please refer to the Note 3.</td></tr><tr><td>Maximum Peak Conducted Output Power:</td><td>1 Mbps: 2.28 dBm (0.0017 W) 3 Mbps: 0.72 dBm (0.0012 W)</td></tr></table> More details of EUT technical specification please refer to the User's Manual.
Power Source	DC Voltage supplied from DC Source
Power Rating	I/P: DC 3.3V
Connecting I/O Port(s)	Please refer to the User's Manual
Products Covered	N/A
EUT Modification(s)	N/A

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed	N/A	-3.19

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Items	Mode	Data Rate	Tested Channel/Mode
Antenna conducted Spurious Emission	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Hopping Channel Separation	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Maximum Peak Conducted Output Power	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Radiated Spurious Emission (30 MHz to 1 GHz)	GFSK	1 Mbps	2441 MHz
Radiated Spurious Emission (above 1 GHz)	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Number of Hopping Frequency	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Average time of occupancy	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Restricted Bands	GFSK	1 Mbps	2402 MHz, 2441 MHz, 2480 MHz
	8DPSK	3 Mbps	
Antenna Requirement	---	---	---
RF Exposure Compliance	---	---	---

NOTE: The measurements are performed at the highest, middle, lowest available channels.

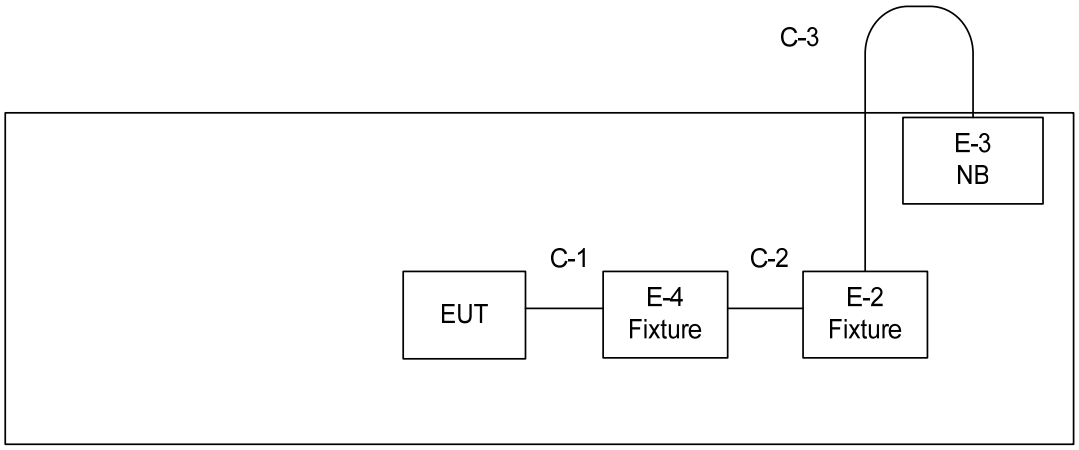
3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Data Rate	1 Mbps		
Test software Version	Bluetooth test3		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameter	63	63	63

Data Rate	3 Mbps		
Test software Version	Bluetooth test3		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameter	63	63	63

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	Bluetooth Module	JS	NF2301	FCC ID: TQYBMNF2301000M IC: 6233A-BM2301MA	N/A	EUT
E-2	Fixture	N/A	N/A	N/A	N/A	
E-3	Notebook PC	DELL	D600	DOC	7T390 A03	
E-4	Fixture	N/A	N/A	N/A	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	10cm	Control line
C-2	NO	NO	10cm	Control line
C-3	NO	NO	1.5M	RS-232

NOTE: The support equipment was authorized by Declaration of Conformity (DOC).

4 ANTENNA CONDUCTED SPURIOUS EMISSION

4.1 LIMIT

Test Item	Frequency Range (MHz)	Limit
Antenna conducted Spurious Emission	30-25000	20 dB less than the peak value of fundamental frequency

4.2 MEASUREMENT INSTRUMENTS LIST

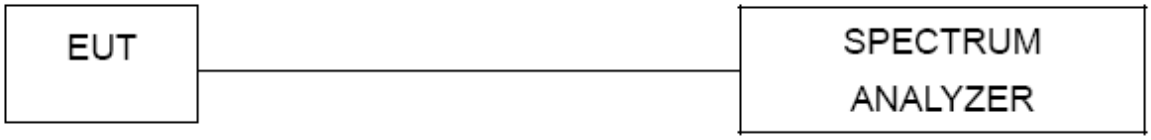
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 01, 2013

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

4.3 TEST PROCEDURES

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

4.4 TEST SETUP LAYOUT



4.5 DEVIATION FROM TEST STANDARD

No deviation

4.6 EUT OPERATING CONDITIONS

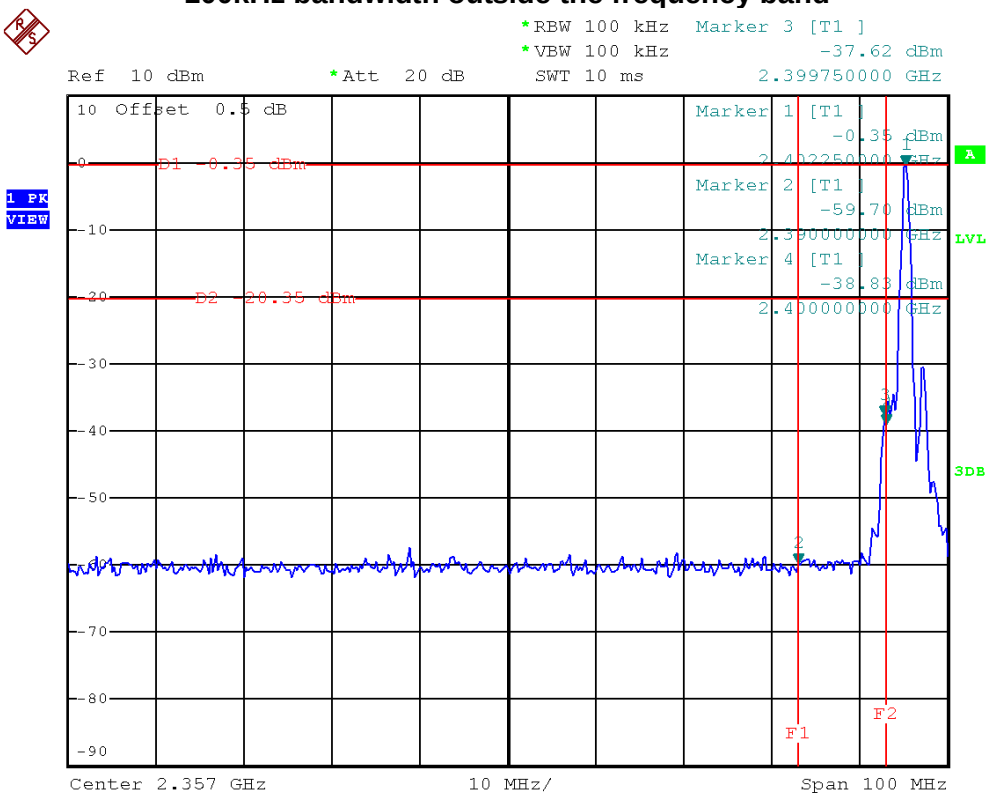
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

4.7 TEST RESULTS

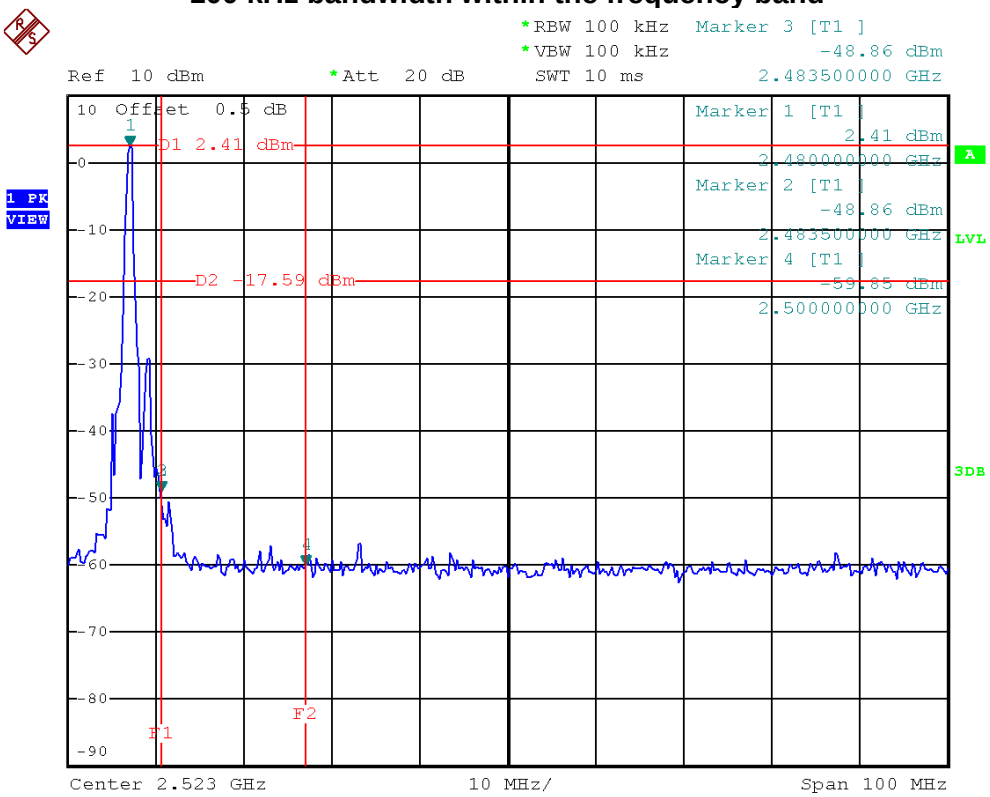
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps		

Channel of Worst Data			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2399.75	-37.62	2483.50	-48.86
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

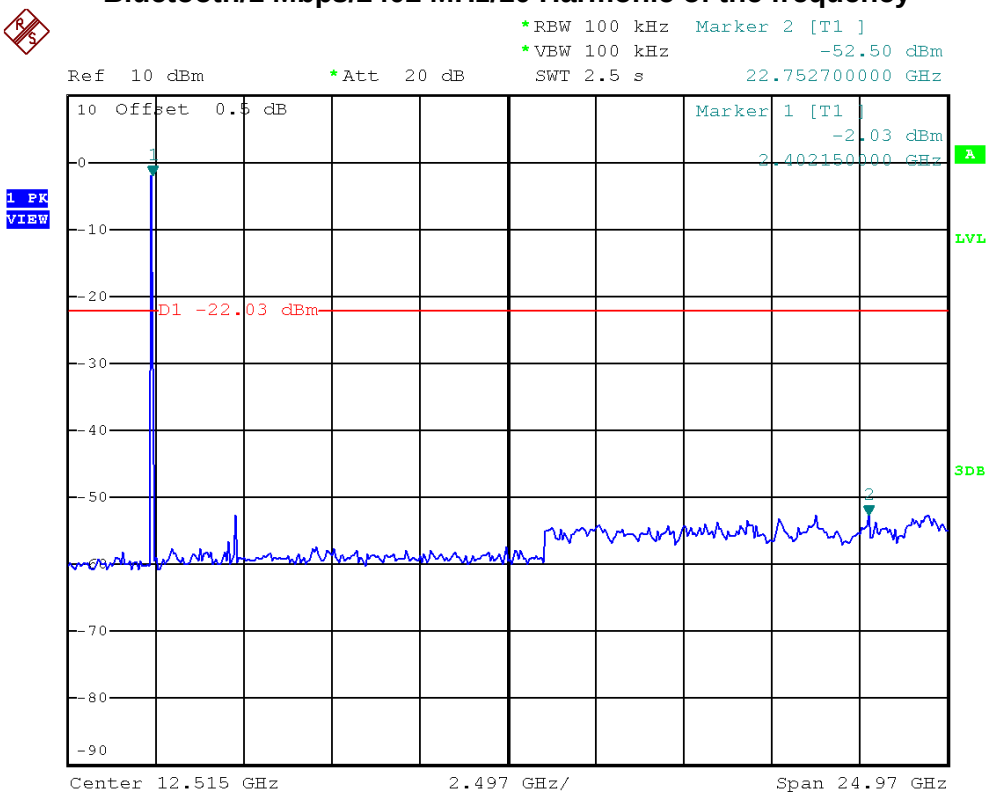
Bluetooth/1 Mbps/The max. radio frequency power in any 100kHz bandwidth outside the frequency band



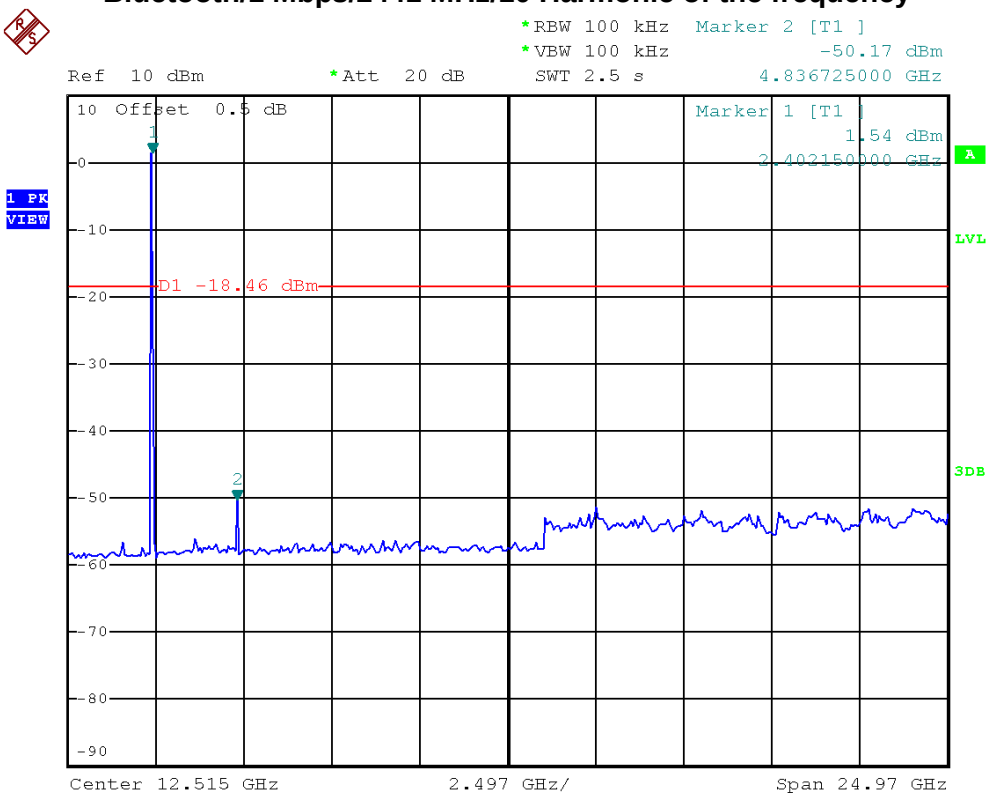
Bluetooth/1 Mbps/The max. radio frequency power in any 100 kHz bandwidth within the frequency band



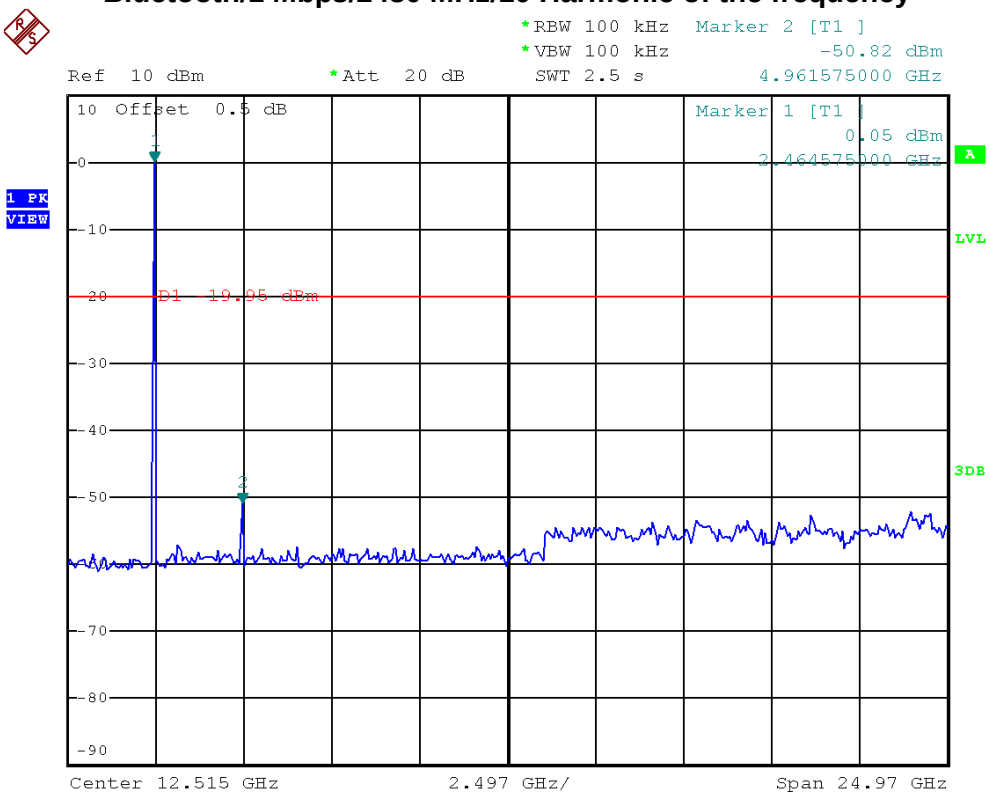
Bluetooth/1 Mbps/2402 MHz/10 Harmonic of the frequency



Bluetooth/1 Mbps/2441 MHz/10 Harmonic of the frequency



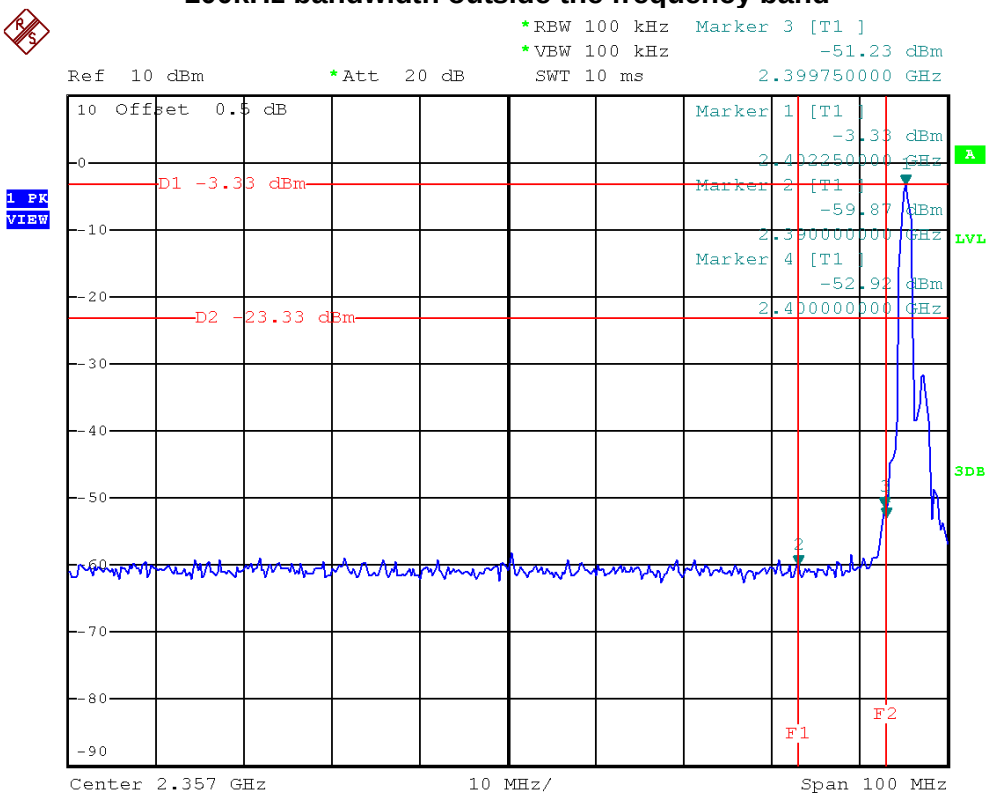
Bluetooth/1 Mbps/2480 MHz/10 Harmonic of the frequency



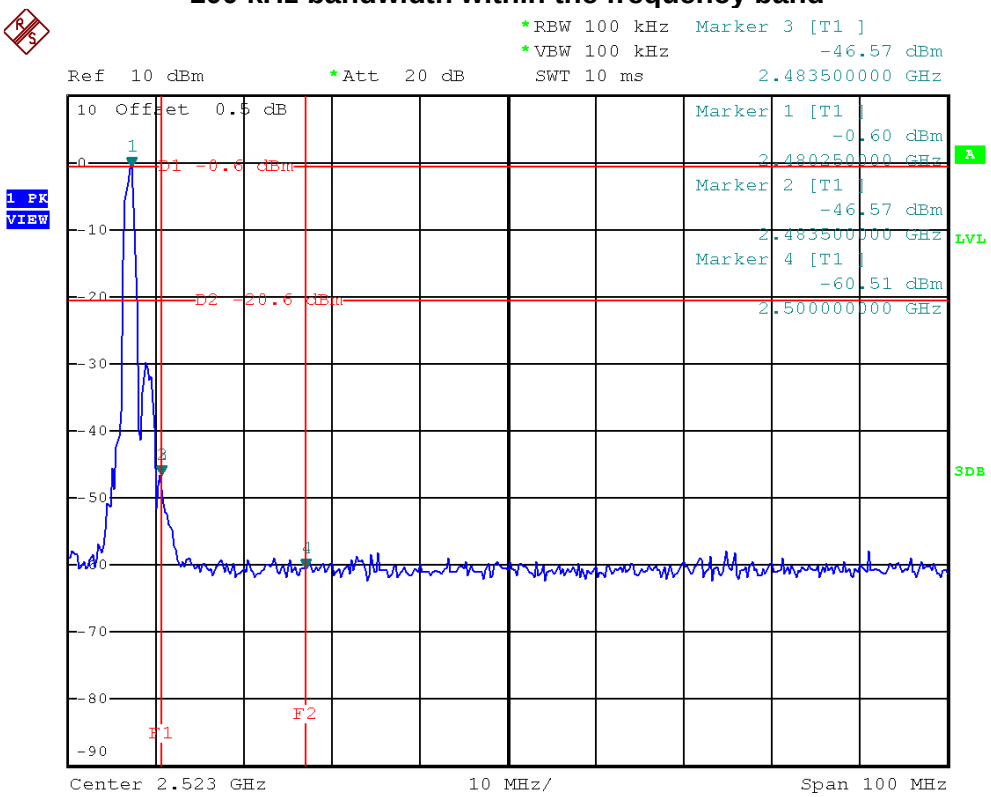
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps		

Channel of Worst Data			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2399.75	-51.23	2483.50	-46.57
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

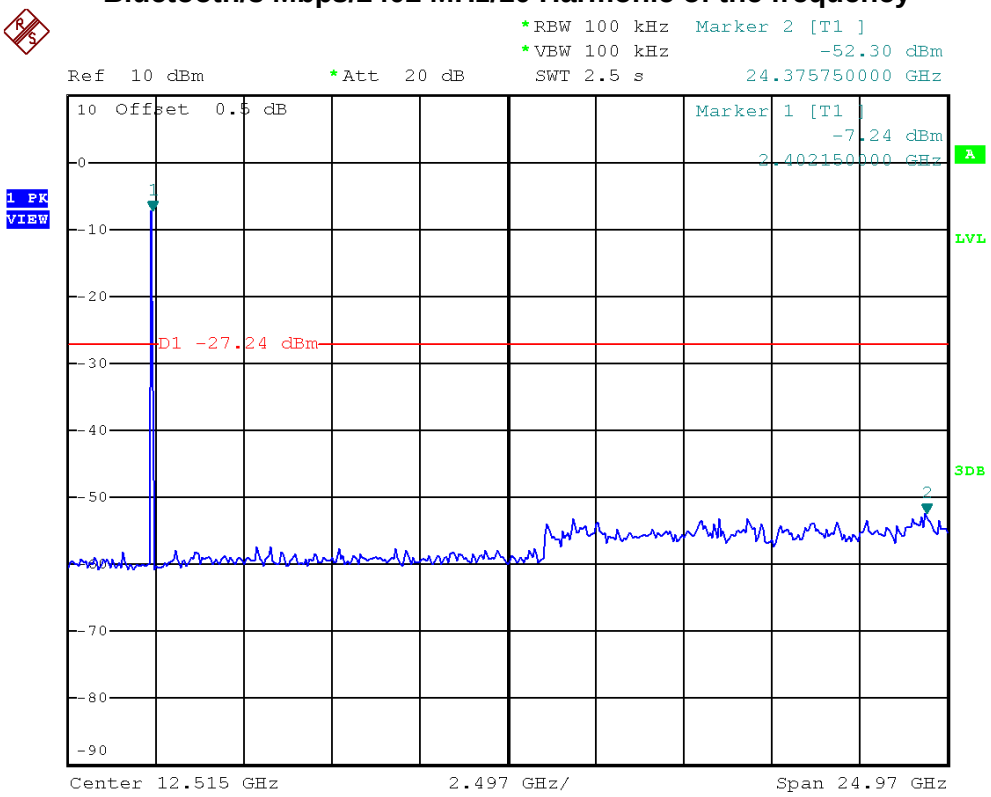
Bluetooth/3 Mbps/The max. radio frequency power in any 100kHz bandwidth outside the frequency band



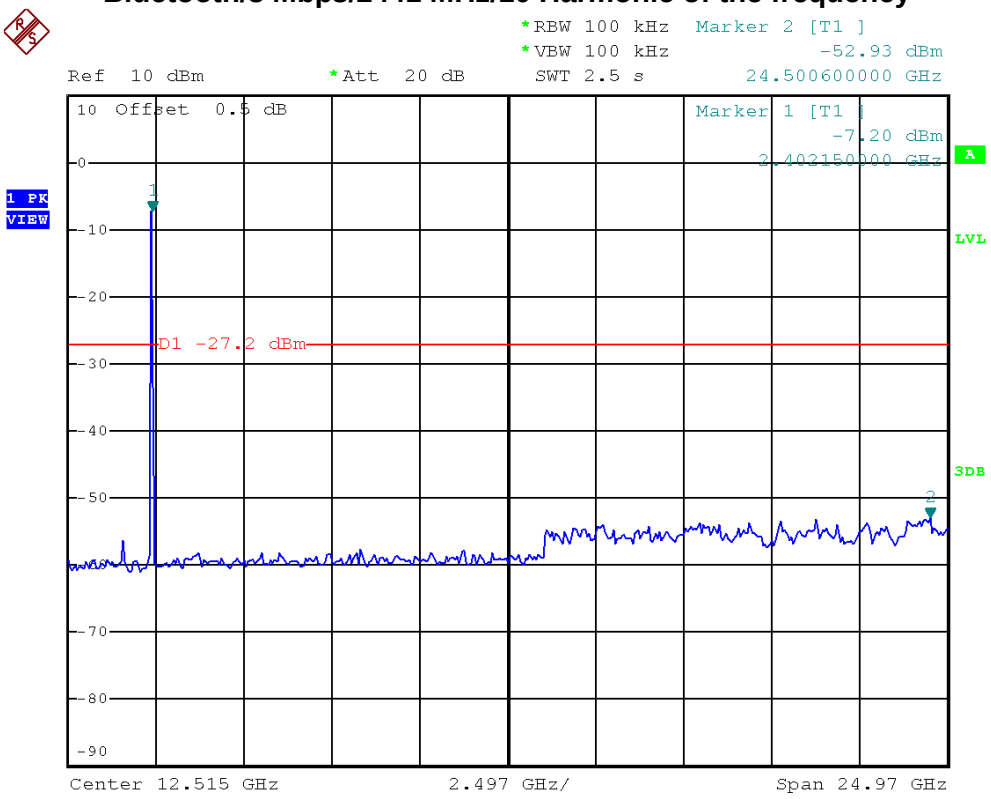
Bluetooth/3 Mbps/The max. radio frequency power in any 100 kHz bandwidth within the frequency band



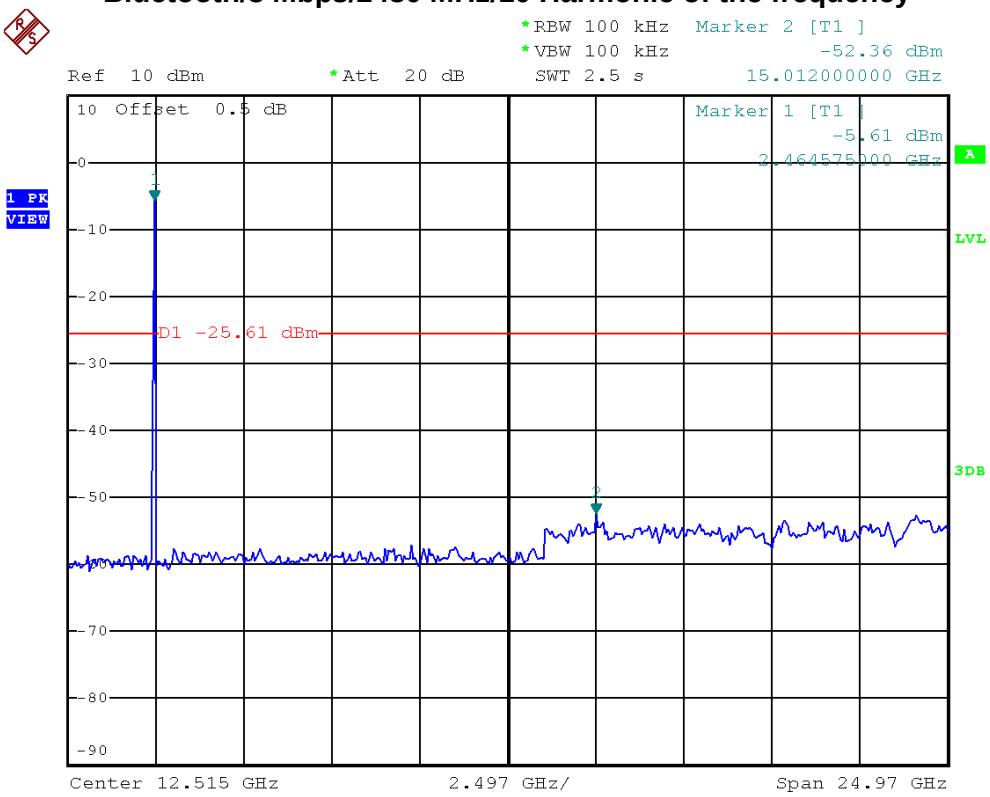
Bluetooth/3 Mbps/2402 MHz/10 Harmonic of the frequency



Bluetooth/3 Mbps/2441 MHz/10 Harmonic of the frequency



Bluetooth/3 Mbps/2480 MHz/10 Harmonic of the frequency



5 HOPPING CHANNEL SEPARATION

5.1 LIMIT

Frequency hopping systems operating in the 2400-2483.5 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.

5.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 01, 2013

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

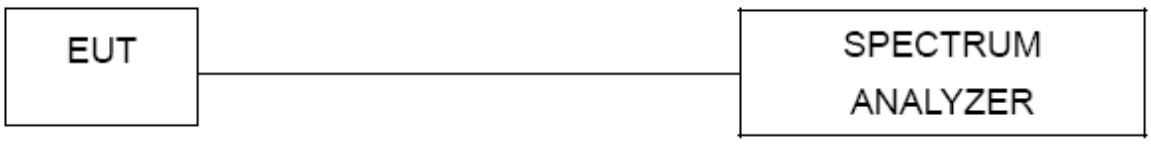
5.3 MEASURING INSTRUMENTS SETTING

EMI Test Receiver	Parameter Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.4 TEST PROCEDURES

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

5.5 TEST SETUP LAYOUT



5.6 DEVIATION FROM TEST STANDARD

No deviation

5.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

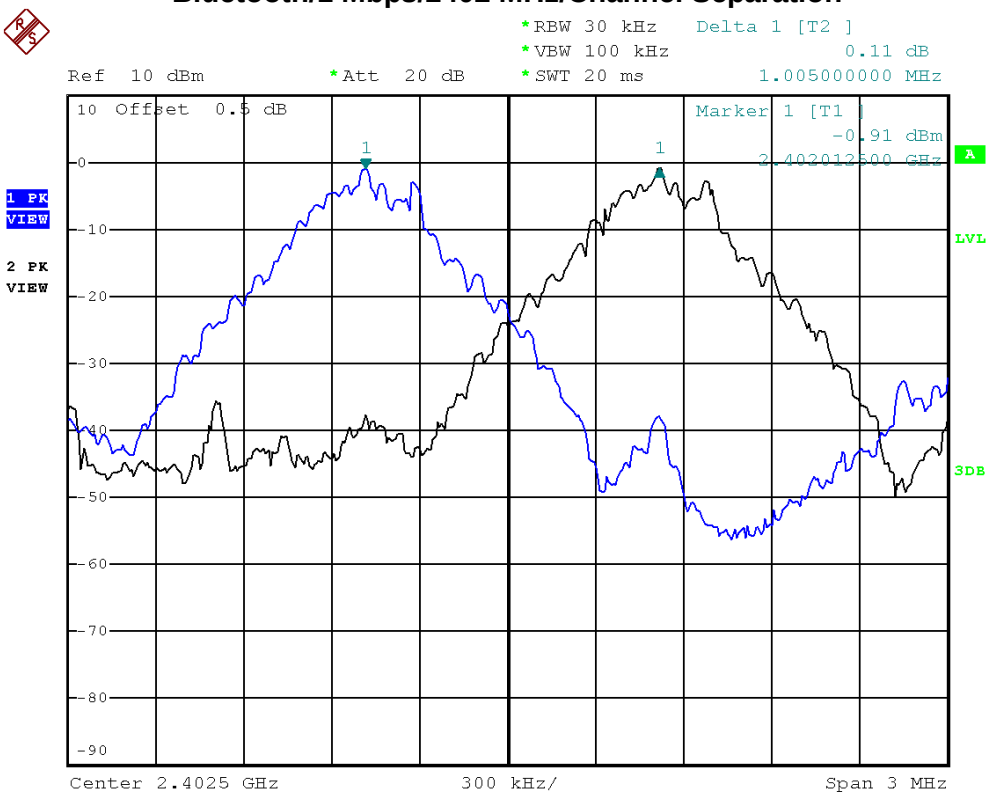
5.8 TEST RESULTS

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz, 2441 MHz, 2480 MHz		

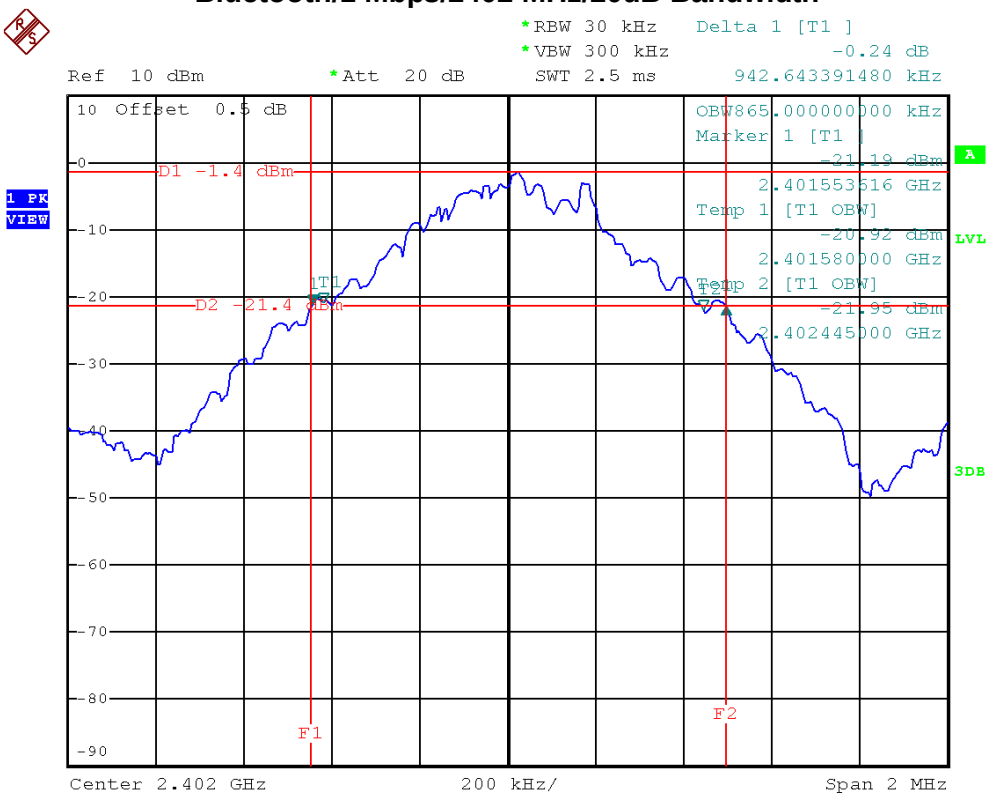
Frequency	Channel Separation (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Two-thirds of the 20 dB Bandwidth	Result
2402 MHz	1.01	0.943	0.865	0.629	PASS
2441 MHz	1.00	0.928	0.875	0.619	PASS
2480 MHz	1.00	0.938	0.860	0.625	PASS

NOTE: Ch. Separation Limits: >25 KHz or >2/3 of 20dB bandwidth

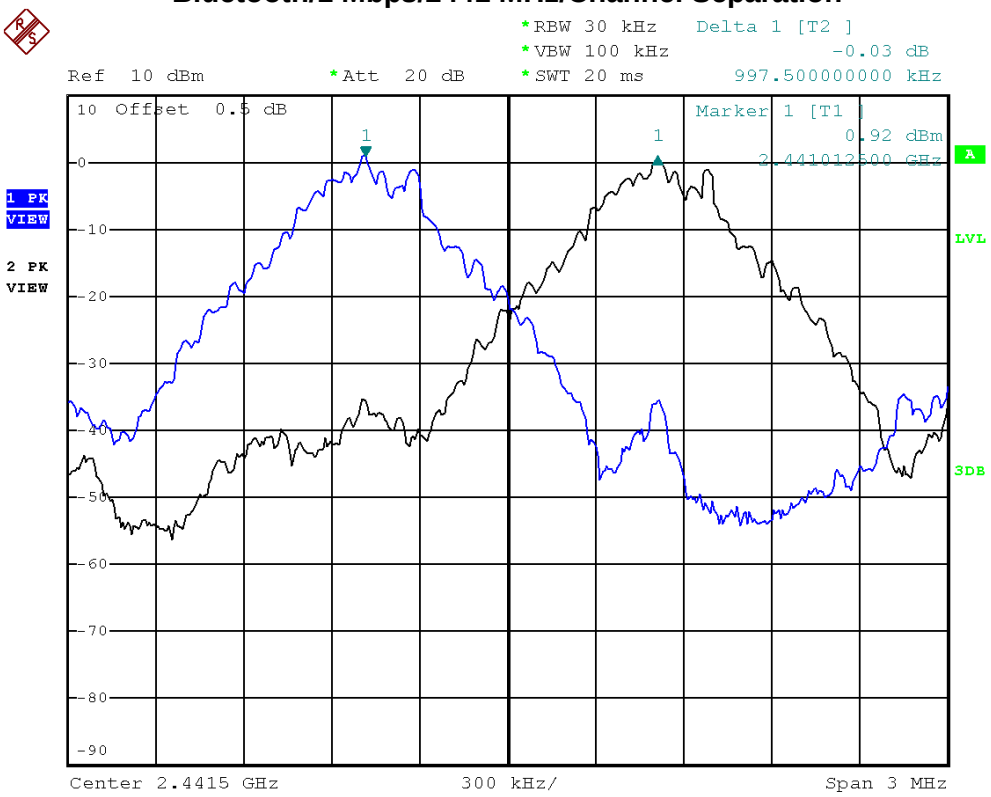
Bluetooth/1 Mbps/2402 MHz/Channel Separation



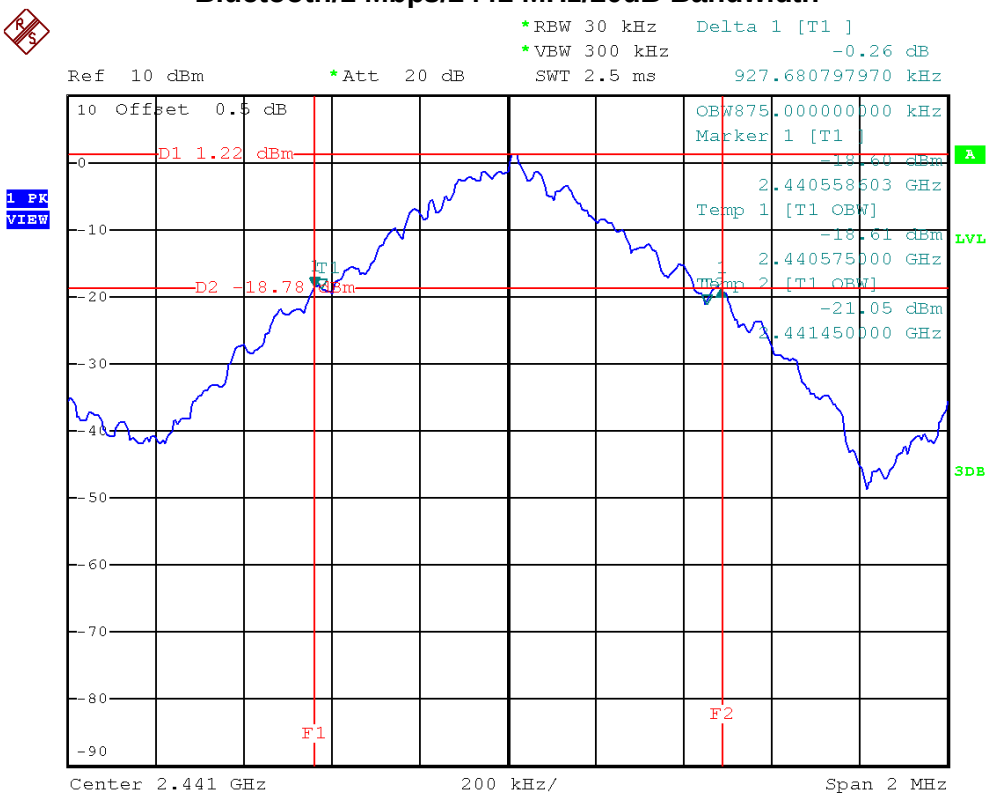
Bluetooth/1 Mbps/2402 MHz/20dB Bandwidth



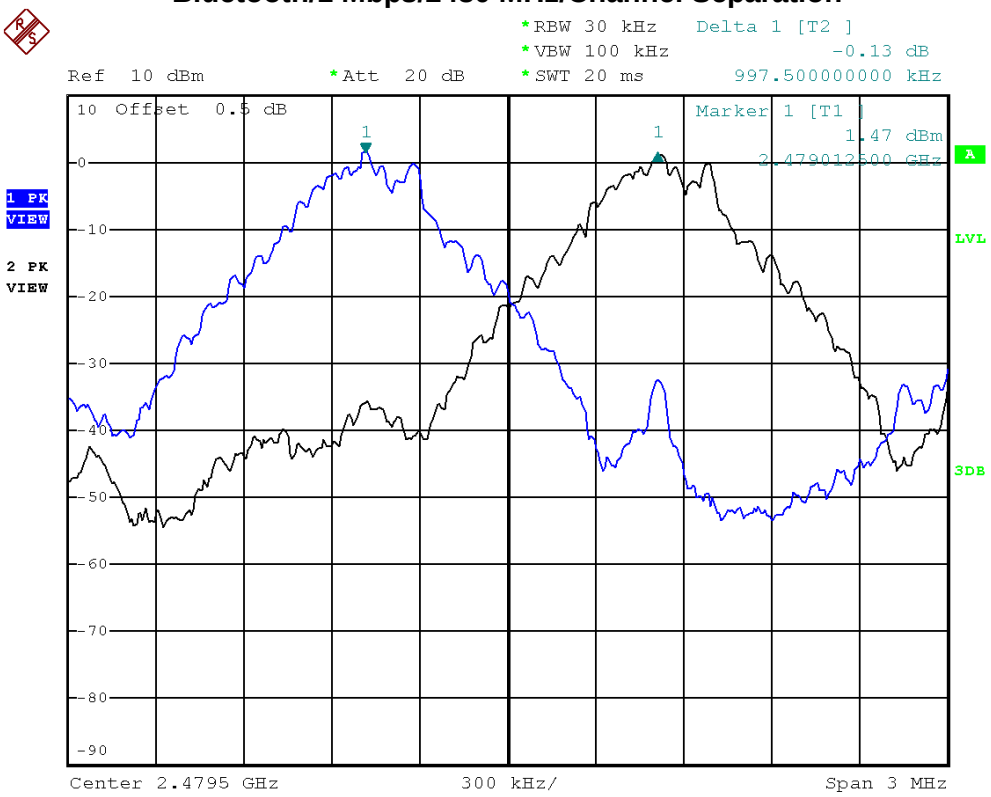
Bluetooth/1 Mbps/2441 MHz/Channel Separation



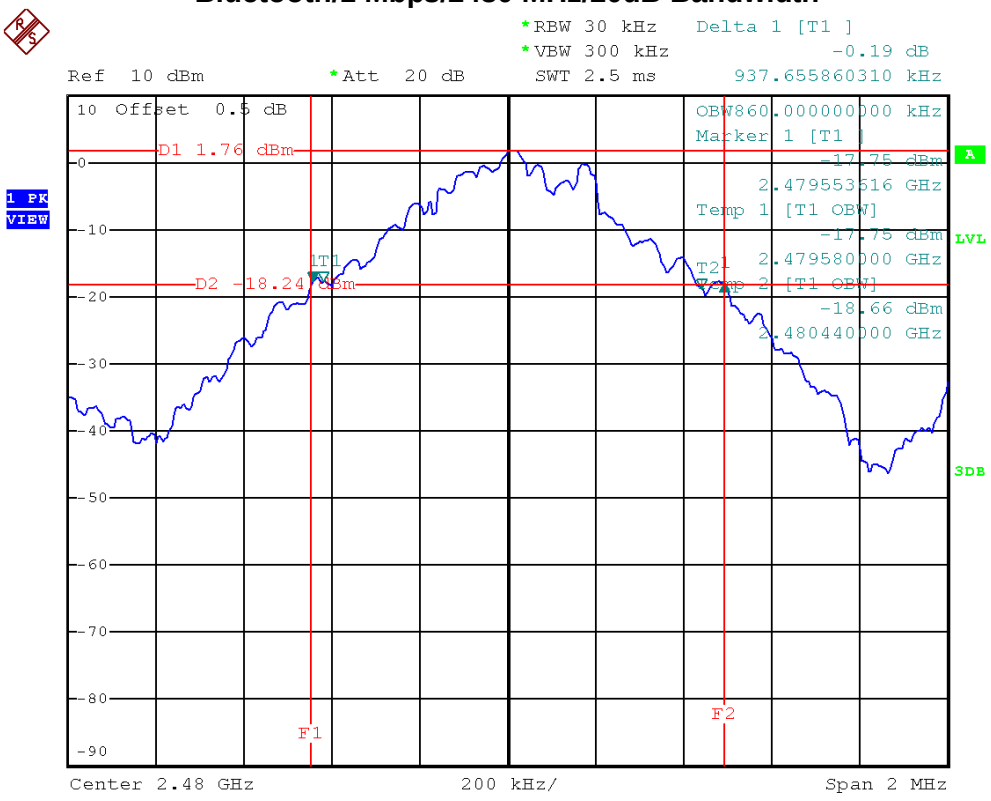
Bluetooth/1 Mbps/2441 MHz/20dB Bandwidth



Bluetooth/1 Mbps/2480 MHz/Channel Separation



Bluetooth/1 Mbps/2480 MHz/20dB Bandwidth

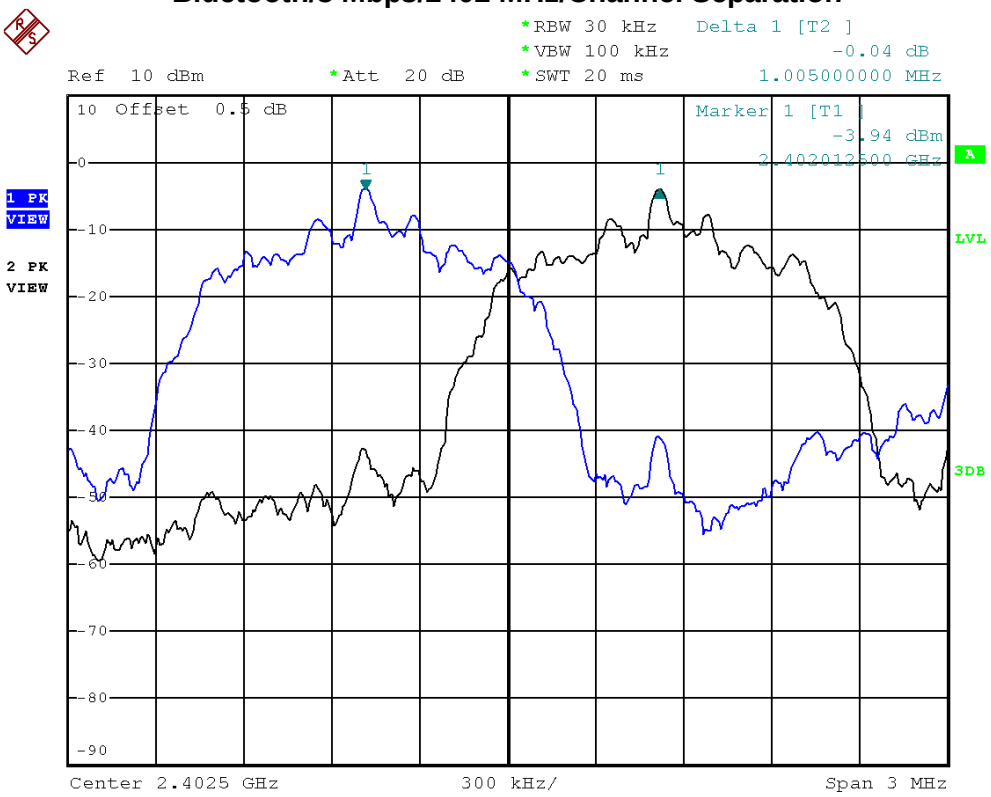


EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz, 2441 MHz, 2480 MHz		

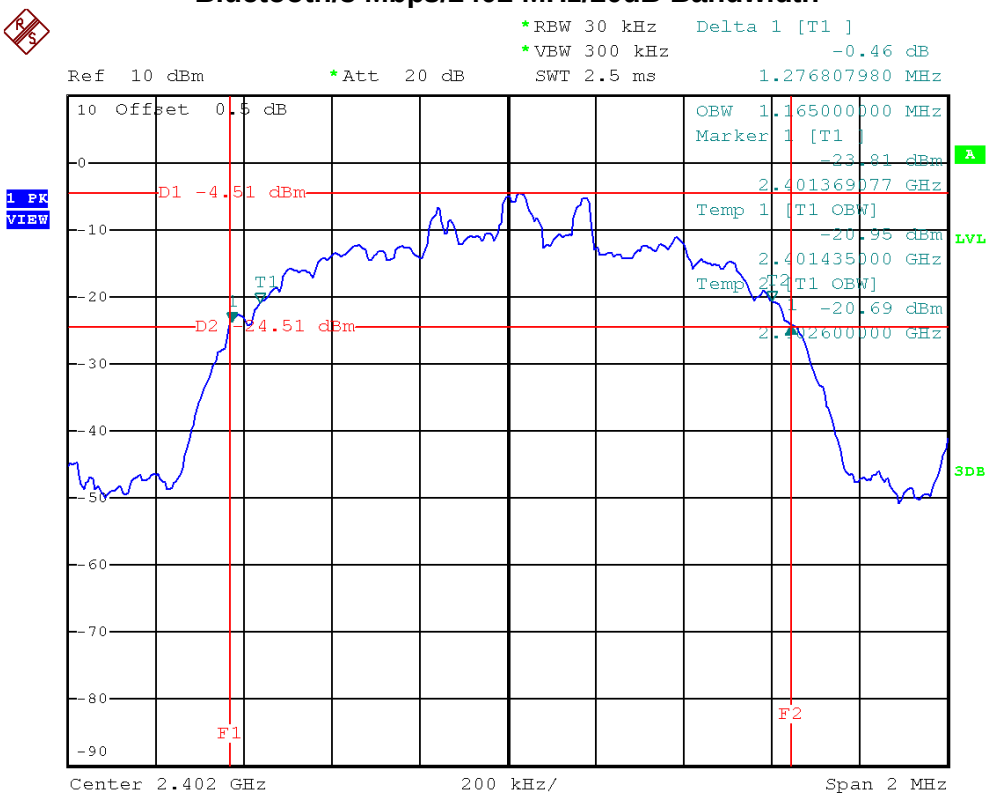
Frequency	Channel Separation (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Two-thirds of the 20 dB Bandwidth	Result
2402 MHz	1.01	1.277	1.165	0.851	PASS
2441 MHz	1.00	1.252	1.160	0.835	PASS
2480 MHz	1.01	1.257	1.155	0.838	PASS

NOTE: Ch. Separation Limits: >25 KHz or >2/3 of 20dB bandwidth

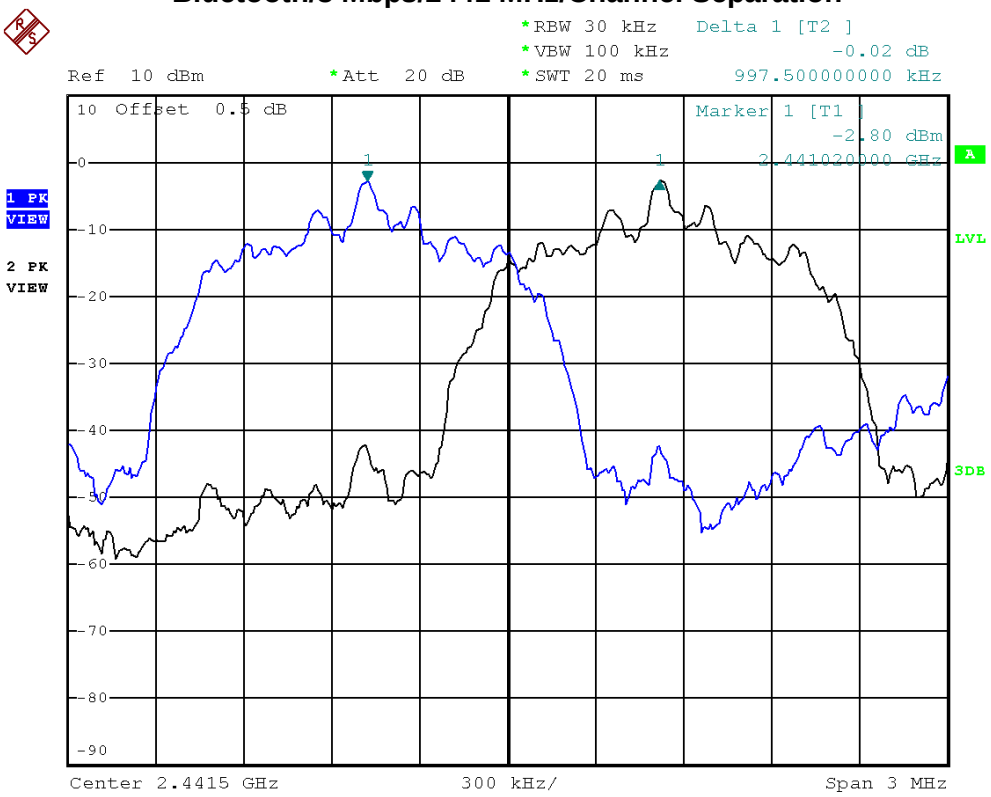
Bluetooth/3 Mbps/2402 MHz/Channel Separation



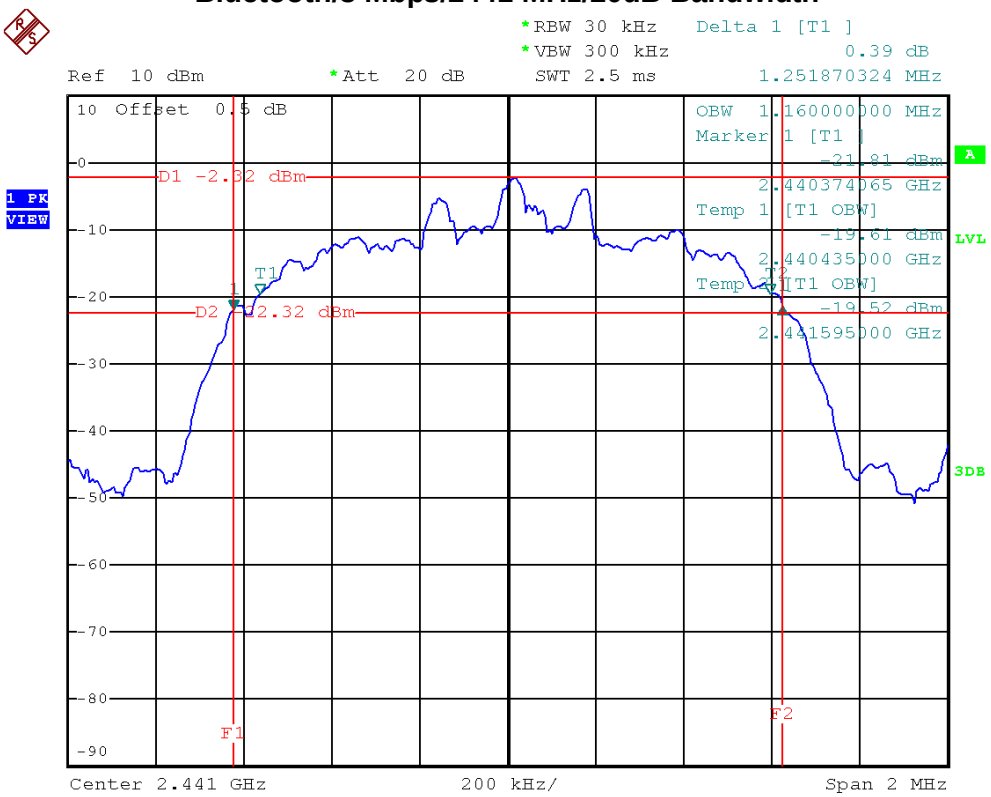
Bluetooth/3 Mbps/2402 MHz/20dB Bandwidth



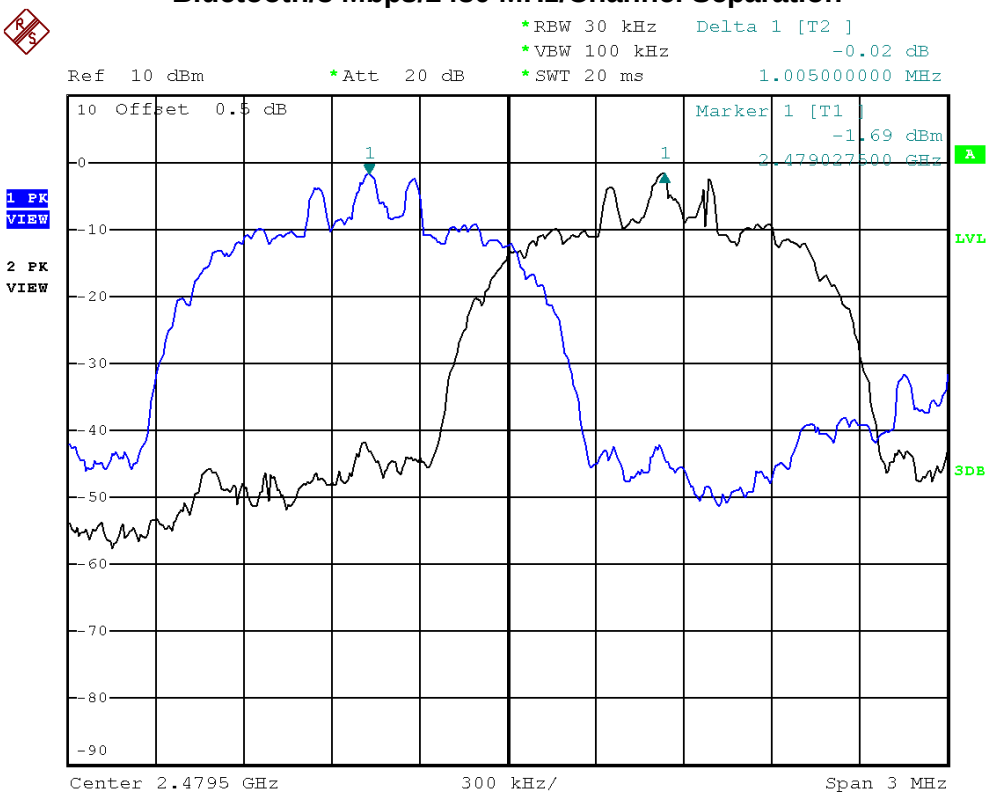
Bluetooth/3 Mbps/2441 MHz/Channel Separation



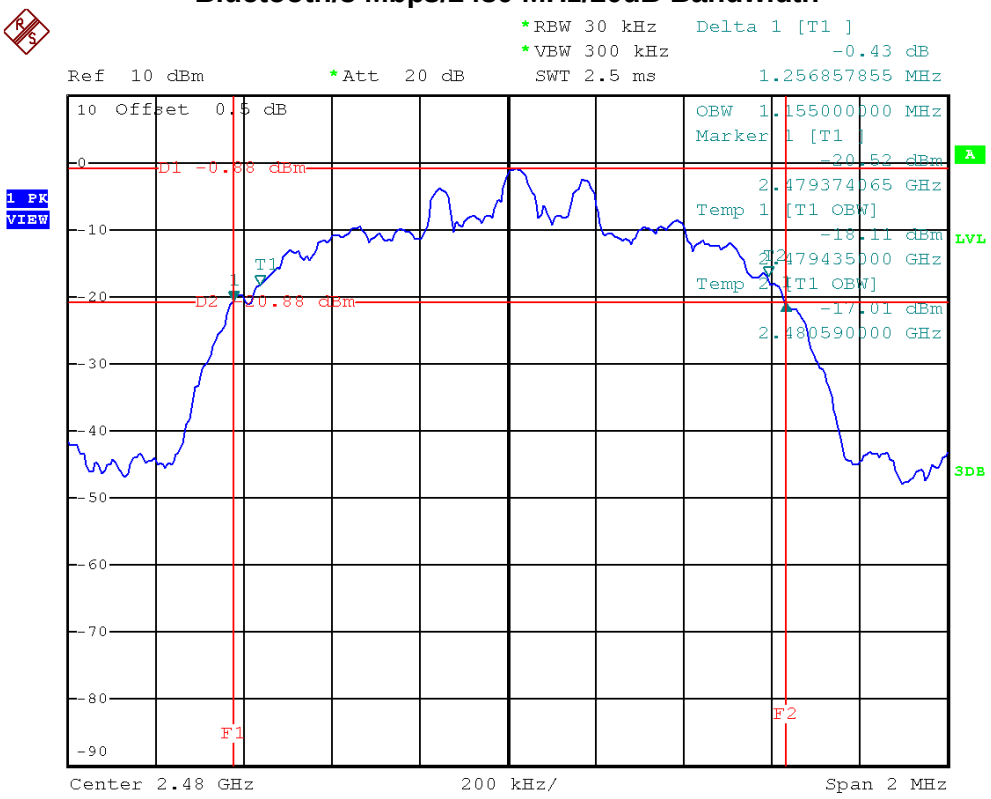
Bluetooth/3 Mbps/2441 MHz/20dB Bandwidth



Bluetooth/3 Mbps/2480 MHz/Channel Separation



Bluetooth/3 Mbps/2480 MHz/20dB Bandwidth



6 MAXIMUM PEAK CONDUCTED OUTPUT POWER

6.1 LIMIT

Test Item	Frequency Range (MHz)	Limit
Maximum Peak Conducted Output Power	2400-2483.5	1 watt or 30 dBm

6.2 MEASUREMENT INSTRUMENTS LIST

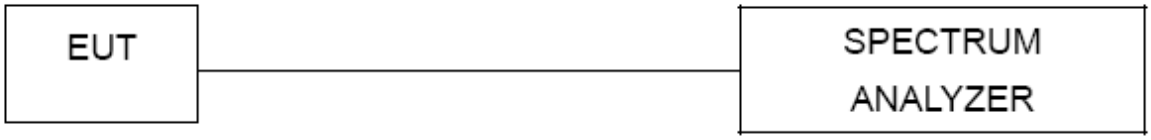
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 01, 2013

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

6.3 TEST PROCEDURES

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW= 3 MHz, VBW= 3 MHz, Sweep time = Auto.

6.4 TEST SETUP LAYOUT



6.5 DEVIATION FROM TEST STANDARD

No deviation

6.6 EUT OPERATING CONDITIONS

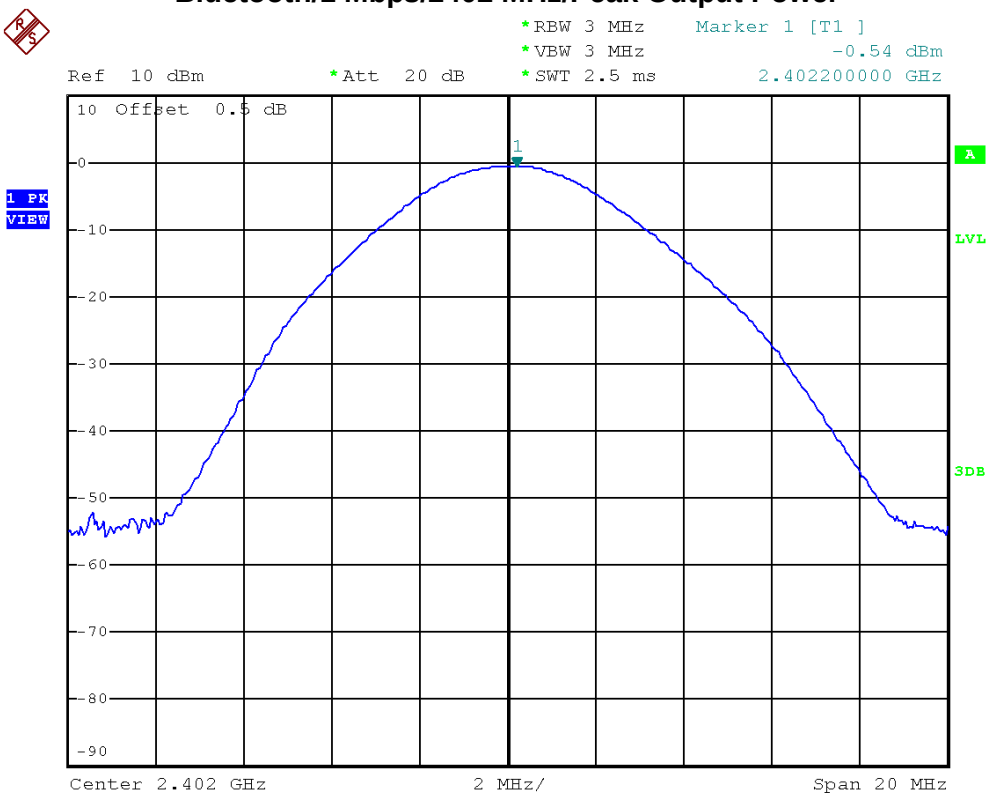
The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

6.7 TEST RESULTS

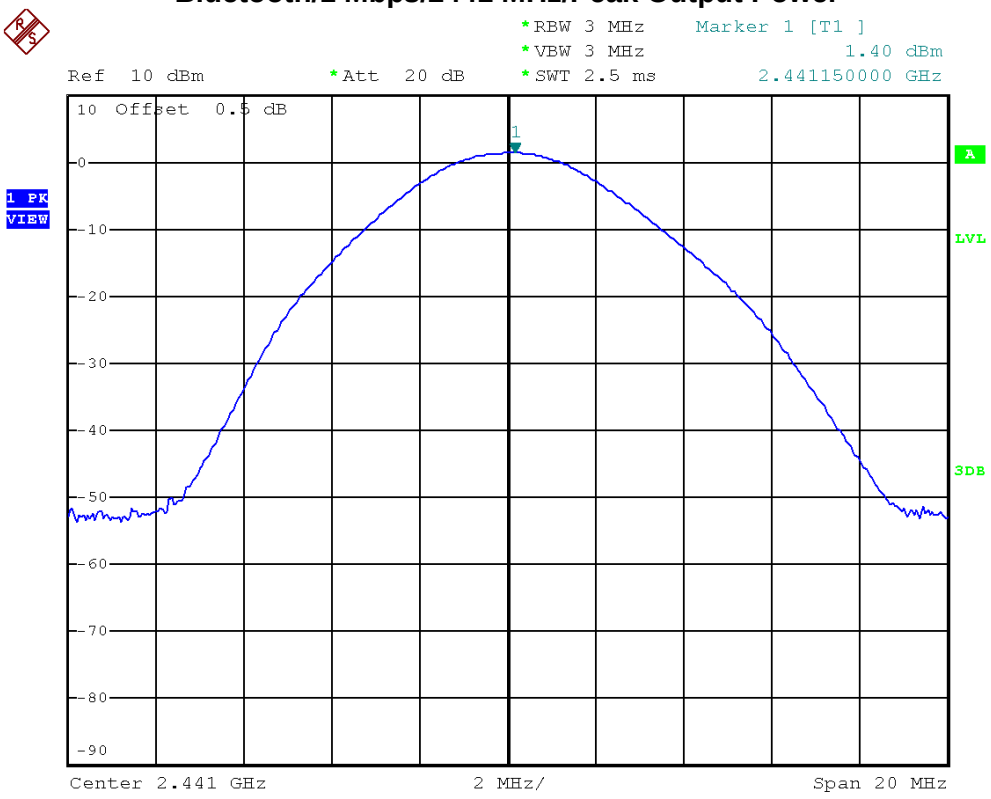
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz, 2441 MHz, 2480 MHz		

Frequency	Peak Output Power		Limit		Result
	(dBm)	(W)	(dBm)	(W)	
2402 MHz	-0.54	0.0009	30	1	PASS
2441 MHz	1.40	0.0014	30	1	PASS
2480 MHz	2.28	0.0017	30	1	PASS

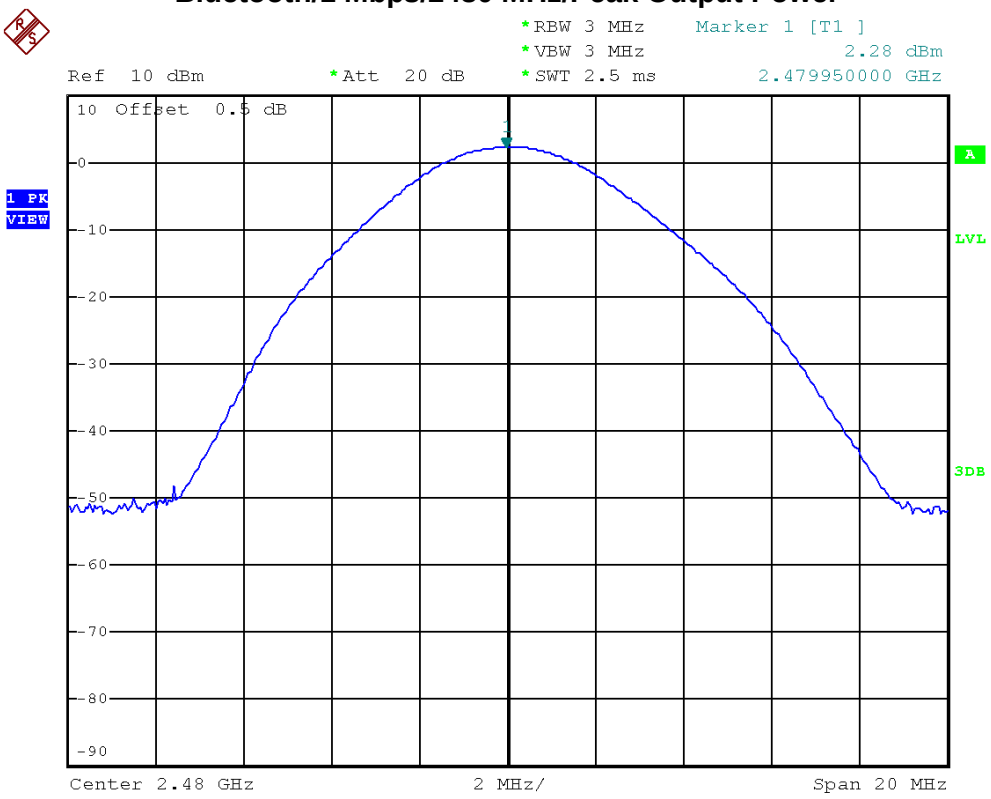
Bluetooth/1 Mbps/2402 MHz/Peak Output Power



Bluetooth/1 Mbps/2441 MHz/Peak Output Power



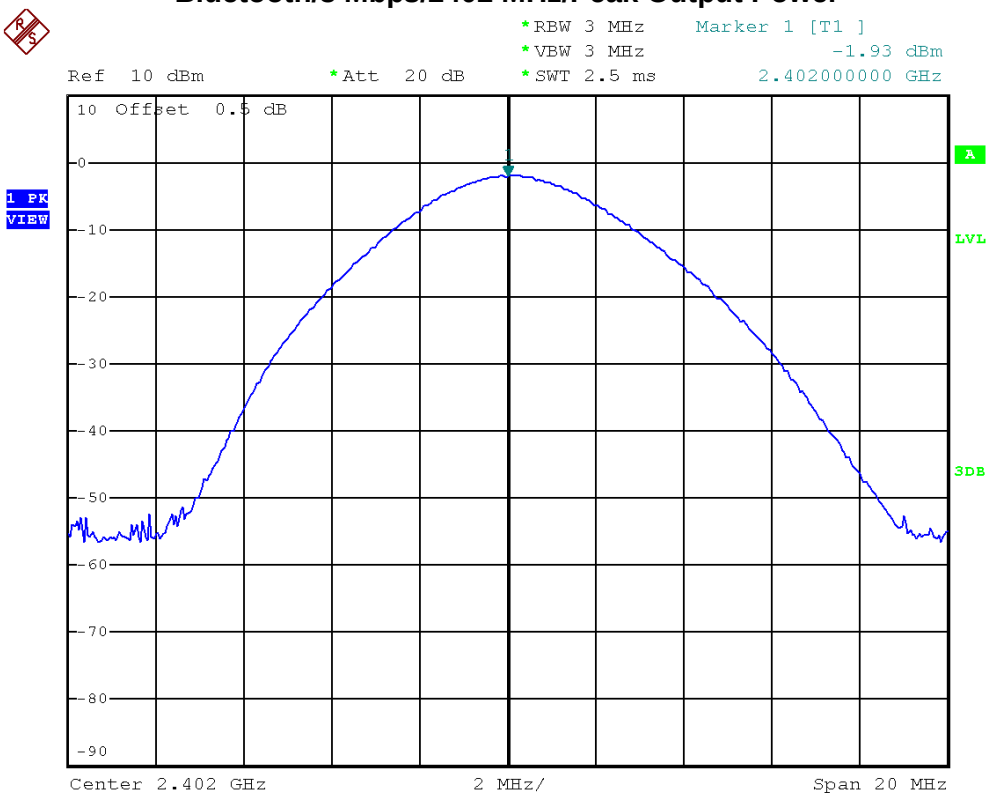
Bluetooth/1 Mbps/2480 MHz/Peak Output Power



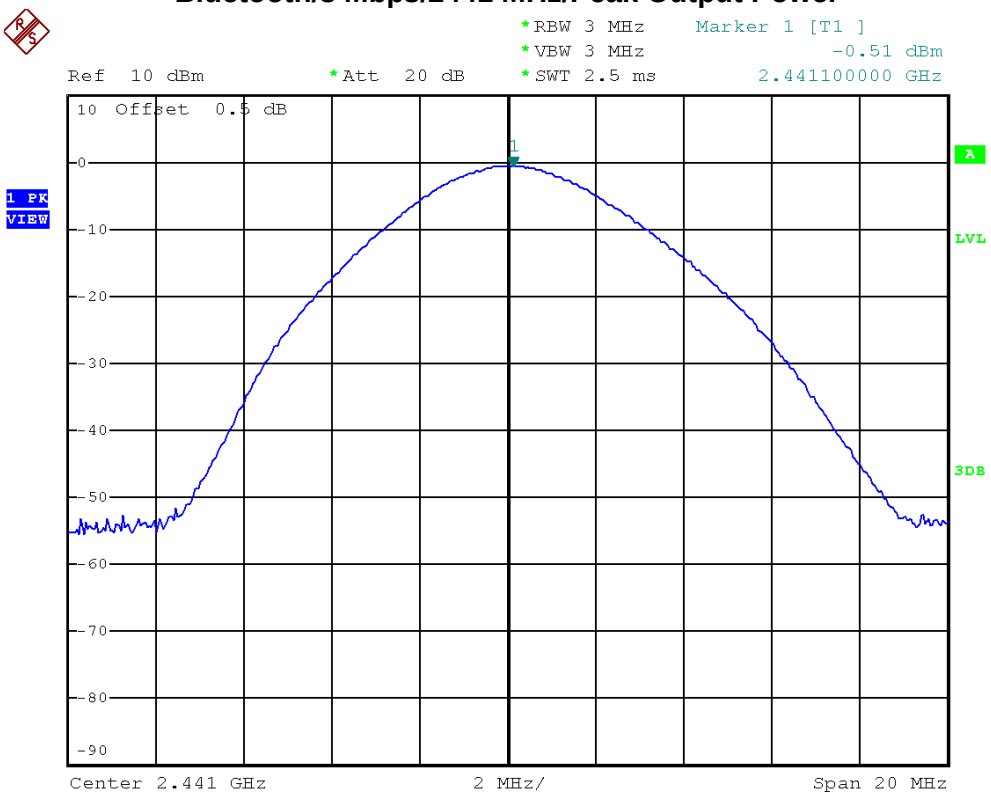
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz, 2441 MHz, 2480 MHz		

Frequency	Peak Output Power		Limit		Result
	(dBm)	(W)	(dBm)	(W)	
2402 MHz	-1.93	0.0006	30	1	PASS
2441 MHz	-0.51	0.0009	30	1	PASS
2480 MHz	0.72	0.0012	30	1	PASS

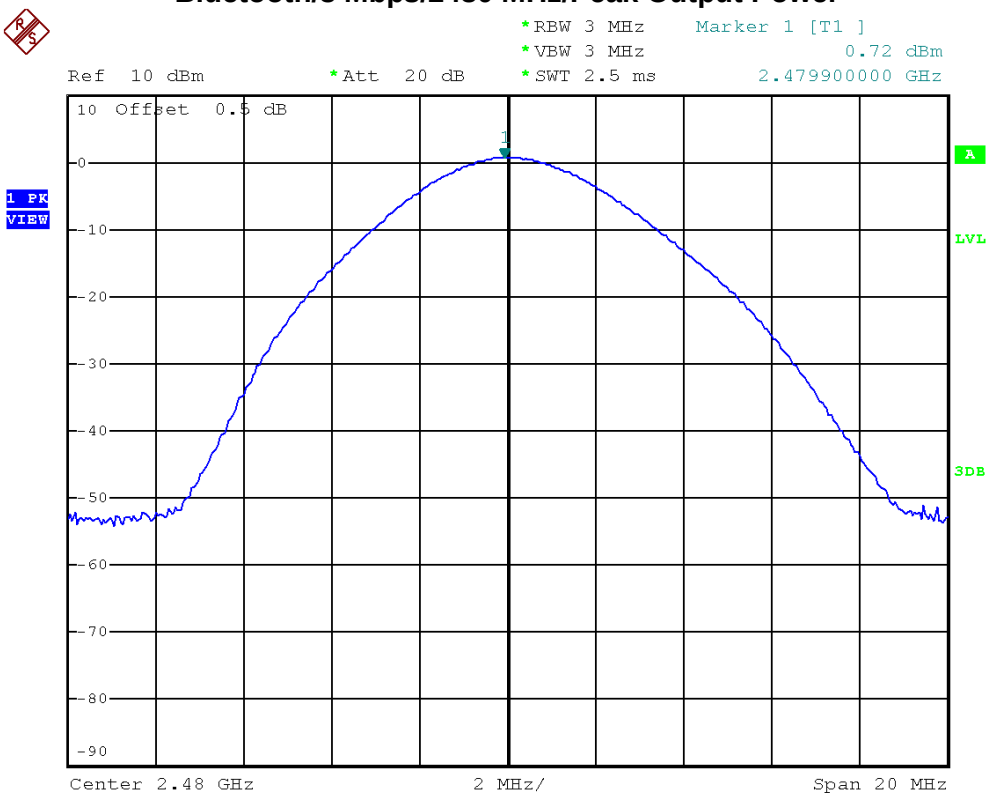
Bluetooth/3 Mbps/2402 MHz/Peak Output Power



Bluetooth/3 Mbps/2441 MHz/Peak Output Power



Bluetooth/3 Mbps/2480 MHz/Peak Output Power



7 RADIATED SPURIOUS EMISSION (9 KHZ TO 1 GHZ)

7.1 LIMIT

20 dB in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency Range: 9 kHz to 1 GHz		
FREQUENCY (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Frequency Range: above 1 GHz				
FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
above 1 GHz	80	60	74	54

NOTE:

(1) The limit for radiated test was performed according to FCC PART 15B.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).
(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain(if use)
Margin Level = Measurement Value – Limit Value

7.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 01, 2013
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 16, 2013
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 17, 2013
4	Microflex Cable	N/A	N/A	1m	Apr. 14, 2013
5	Microflex Cable	AISI	S104-SMAP-1	10m	Apr. 14, 2013
6	Microflex Cable	N/A	N/A	3m	Apr. 14, 2013
7	Test Cable	N/A	LMR-400	966_12m	May. 15, 2013
8	Test Cable	N/A	LMR-400	966_3m	May. 15, 2013
9	Pre-Amplifier	EMC	EMC-330	980001	May. 31, 2013
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 12, 2013
11	Preamplifier With Adaptor	EMC	EMC2654045	980030	Feb. 19, 2013
12	Horn Antenna	Schwarzbeck	BBHA 9170	187	Dec. 24, 2013

Remark: “N/A” denotes No Model Name, No Serial No. or No Calibration specified.

7.3 MEASURING INSTRUMENTS SETTING

EMI Test Receiver	Parameter Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

7.4 TEST PROCEDURES

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1 GHz. For frequencies above 1 GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
g. The testing follows the guidelines in ANSI C63.4 and FCC Public Notice DA 00-705 Measurement Guidelines. In case the emission is fail due to the used RBW/VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

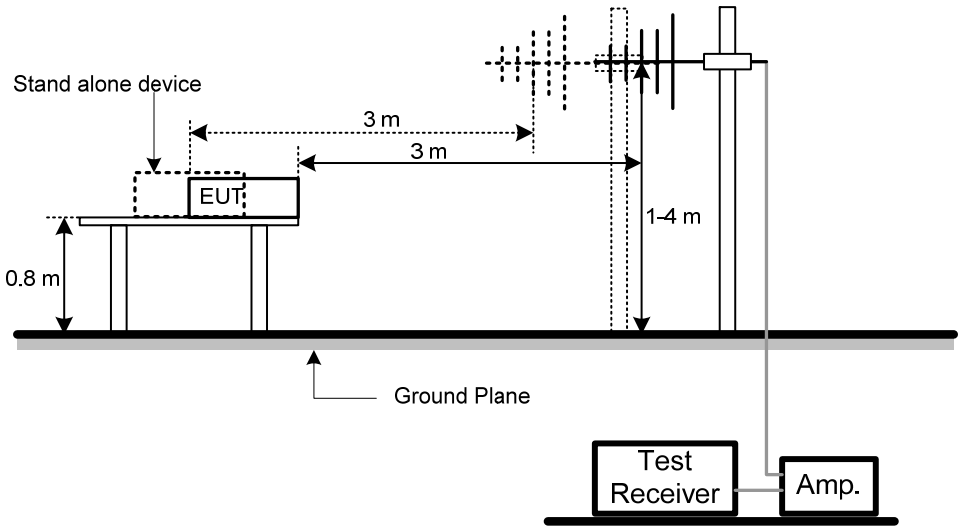
NOTE:

a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz; SPA setting in RBW=100 kHz, VBW =100 kHz, Swp. Time = 0.3 sec./ MHz.
b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform.

7.5 DEVIATION FROM TEST STANDARD

No deviation

7.6 TEST SETUP LAYOUT



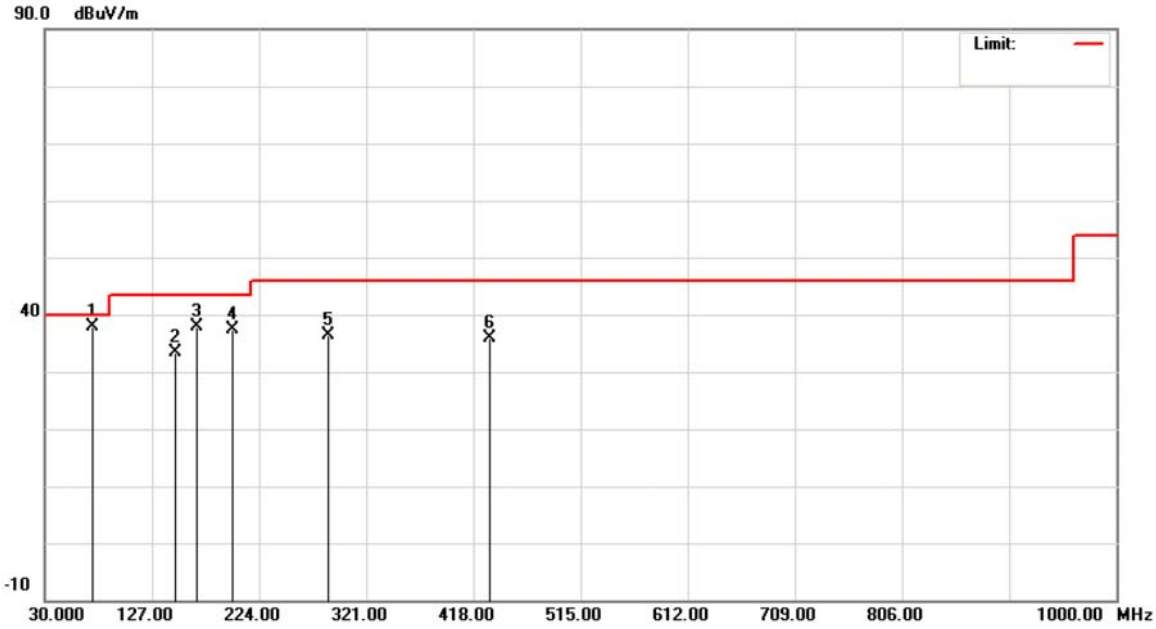
7.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

7.8 TEST RESULTS

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

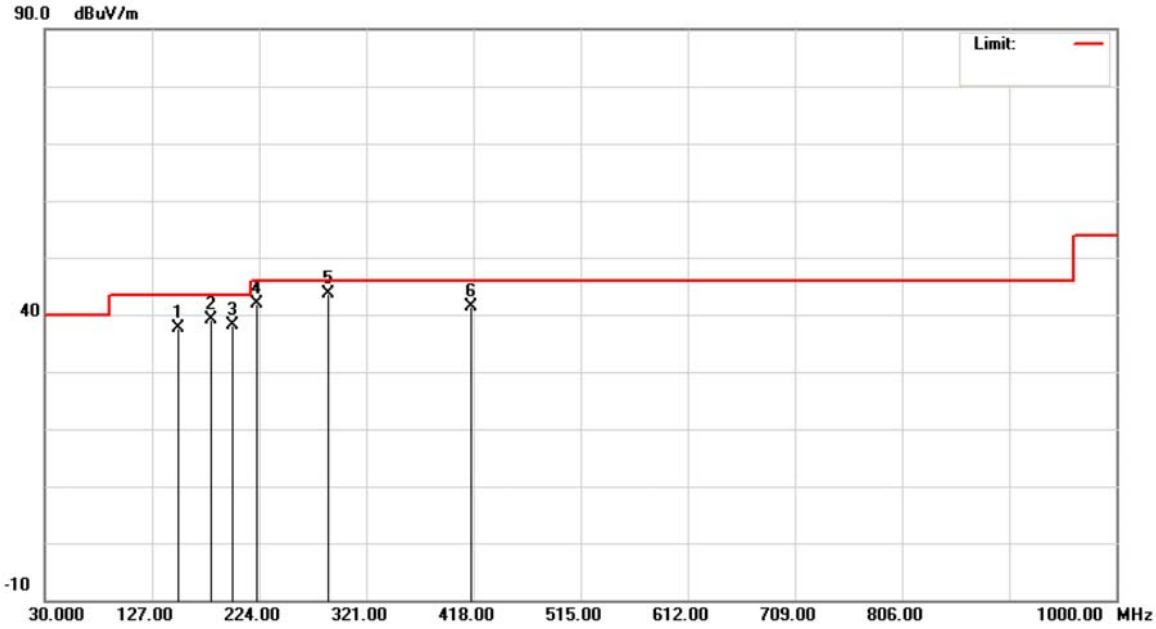
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	73.6500	59.53	-21.54	37.99	40.00	-2.01	QP	
2		148.0000	52.37	-18.92	33.45	43.50	-10.05	peak	
3		168.2250	57.29	-19.36	37.93	43.50	-5.57	peak	
4		199.7500	58.94	-21.52	37.42	43.50	-6.08	peak	
5		287.0500	54.74	-18.45	36.29	46.00	-9.71	peak	
6		432.5500	50.73	-14.95	35.78	46.00	-10.22	peak	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		151.2500	56.68	-18.95	37.73	43.50	-5.77	peak	
2		180.3500	59.74	-20.72	39.02	43.50	-4.48	peak	
3		199.7500	59.65	-21.52	38.13	43.50	-5.37	peak	
4		221.5749	63.35	-21.36	41.99	46.00	-4.01	peak	
5	*	287.0498	62.13	-18.45	43.68	46.00	-2.32	peak	
6		415.5750	56.77	-15.34	41.43	46.00	-4.57	peak	

8 RADIATED SPURIOUS EMISSION (ABOVE 1 GHZ)

8.1 LIMIT

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency Range: 9 kHz to 1 GHz		
FREQUENCY (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Frequency Range: above 1 GHz				
FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
above 1 GHz	80	60	74	54

NOTE:

(1) The limit for radiated test was performed according to FCC PART 15B.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).
(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain(if use)
Margin Level = Measurement Value – Limit Value

8.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 01, 2013
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 16, 2013
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 17, 2013
4	Microflex Cable	N/A	N/A	1m	Apr. 14, 2013
5	Microflex Cable	AISI	S104-SMAP-1	10m	Apr. 14, 2013
6	Microflex Cable	N/A	N/A	3m	Apr. 14, 2013
7	Test Cable	N/A	LMR-400	966_12m	May. 15, 2013
8	Test Cable	N/A	LMR-400	966_3m	May. 15, 2013
9	Pre-Amplifier	EMC	EMC-330	980001	May. 31, 2013
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 12, 2013
11	Preamplifier With Adaptor	EMC	EMC2654045	980030	Feb. 19, 2013
12	Horn Antenna	Schwarzbeck	BBHA 9170	187	Dec. 24, 2013

Remark: “N/A” denotes No Model Name, No Serial No. or No Calibration specified.

8.3 MEASURING INSTRUMENTS SETTING

Spectrum Analyzer	Parameter Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

8.4 TEST PROCEDURES

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1 GHz. For frequencies above 1 GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
g. The testing follows the guidelines in ANSI C63.4 and FCC Public Notice DA 00-705 Measurement Guidelines. In case the emission is fail due to the used RBW/VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

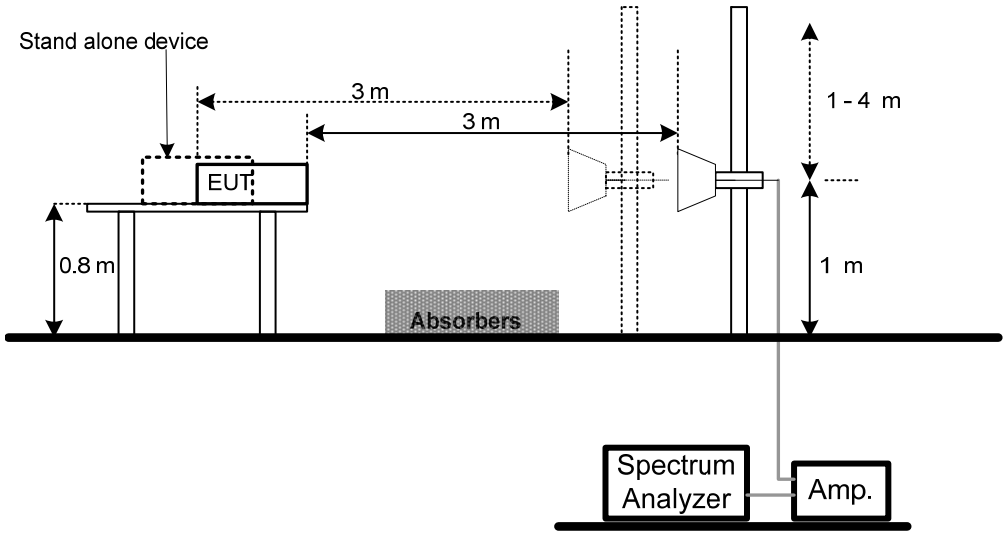
NOTE:

a. Reading in which marked as Peak means measurements by using are Peak Mode with instrument setting in RBW= 1 MHz, VBW= 1 MHz, Swp. Time = Auto.
Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW= 1 MHz, VBW= 10 Hz, Swp. Time = Auto.
b. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform.

8.5 DEVIATION FROM TEST STANDARD

No deviation

8.6 TEST SETUP LAYOUT



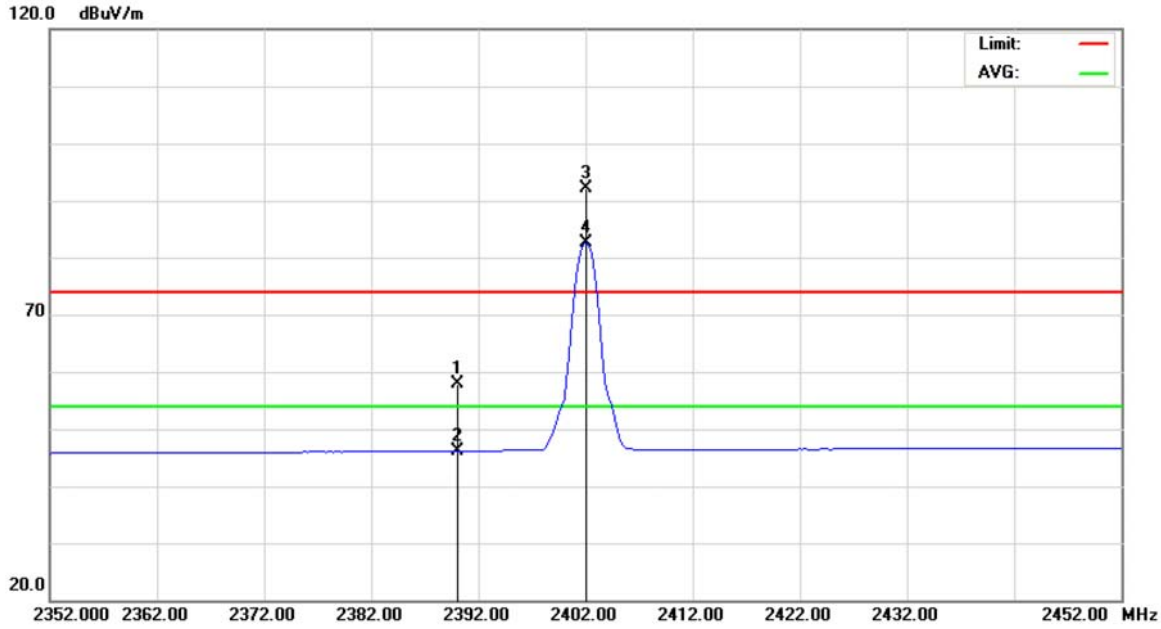
8.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

8.8 TEST RESULTS

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

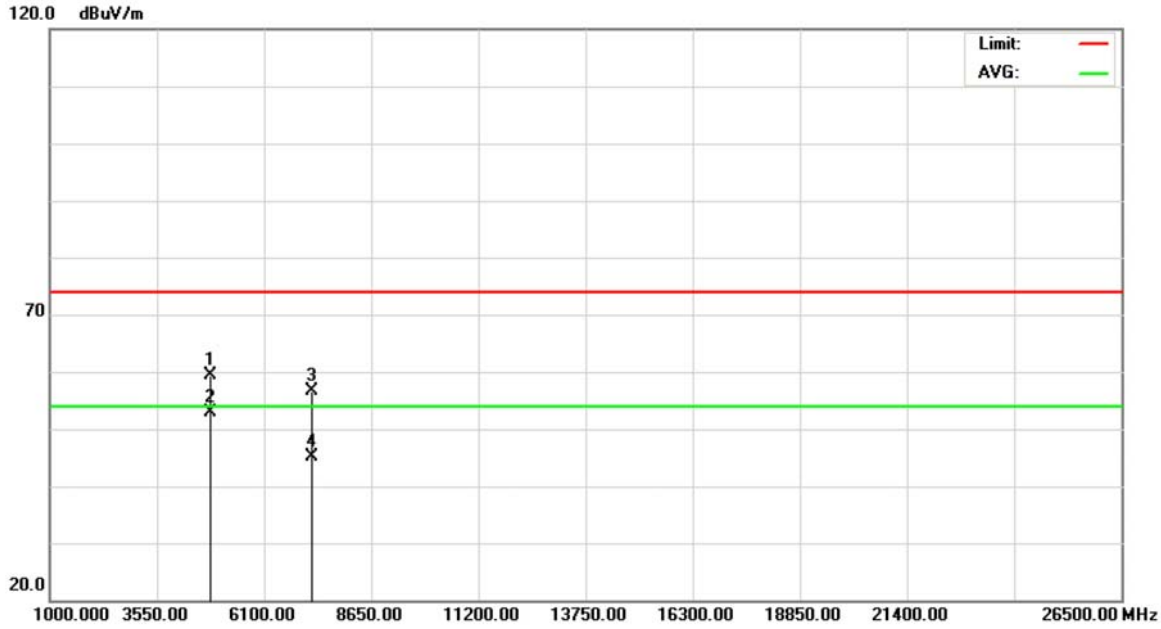
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.98	32.99	57.97	74.00	-16.03	peak	
2		2390.000	13.15	32.99	46.14	54.00	-7.86	AVG	
3	X	2402.000	59.07	33.06	92.13	74.00	18.13	peak	
4	*	2402.000	49.58	33.06	82.64	54.00	28.64	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

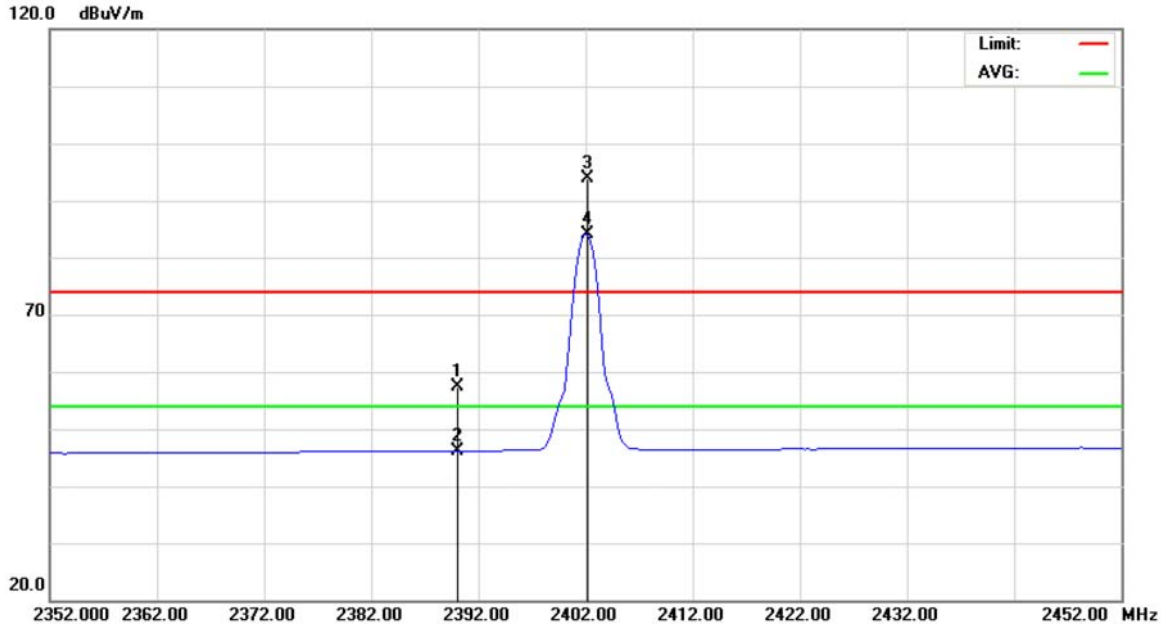
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.063	51.92	7.41	59.33	74.00	-14.67	peak	
2	*	4804.063	45.35	7.41	52.76	54.00	-1.24	AVG	
3		7205.962	41.89	14.79	56.68	74.00	-17.32	peak	
4		7205.962	30.27	14.79	45.06	54.00	-8.94	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

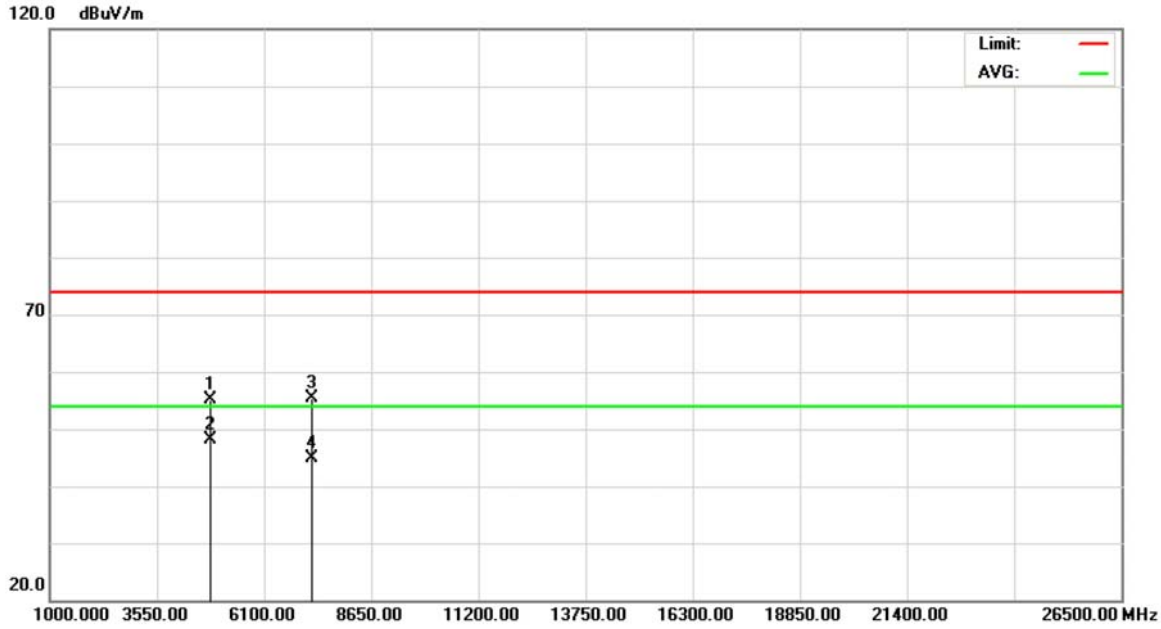
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.40	32.99	57.39	74.00	-16.61	peak	
2		2390.000	13.14	32.99	46.13	54.00	-7.87	AVG	
3	X	2402.075	60.89	33.06	93.95	74.00	19.95	peak	
4	*	2402.075	51.06	33.06	84.12	54.00	30.12	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

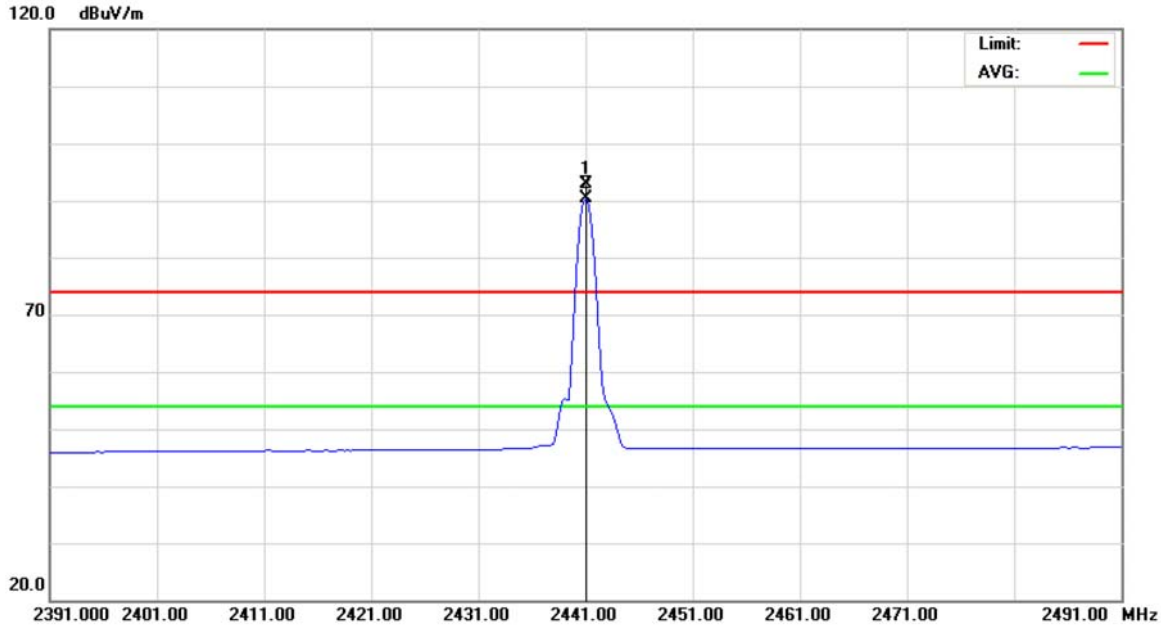
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.038	47.72	7.41	55.13	74.00	-18.87	peak	
2	*	4804.038	40.78	7.41	48.19	54.00	-5.81	AVG	
3		7205.962	40.51	14.79	55.30	74.00	-18.70	peak	
4		7205.962	30.20	14.79	44.99	54.00	-9.01	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

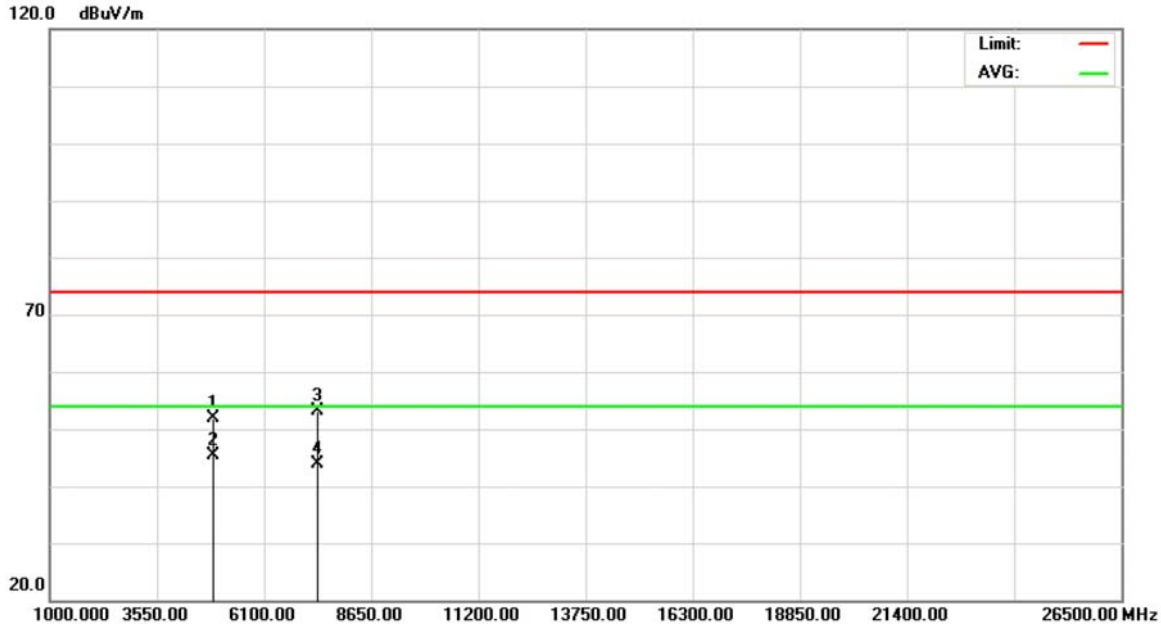
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	59.49	33.27	92.76	74.00	18.76	peak	
2	*	2441.000	57.08	33.27	90.35	54.00	36.35	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

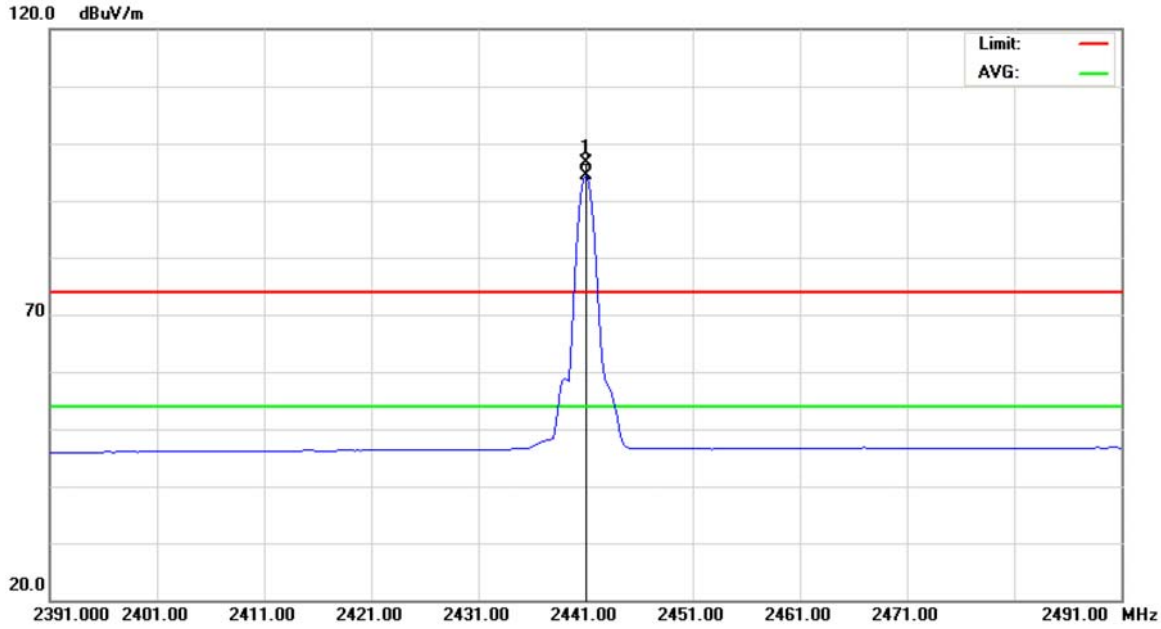
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.025	45.11	6.86	51.97	74.00	-22.03	peak	
2	*	4882.025	38.42	6.86	45.28	54.00	-8.72	AVG	
3		7323.000	39.17	13.84	53.01	74.00	-20.99	peak	
4		7323.000	30.03	13.84	43.87	54.00	-10.13	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

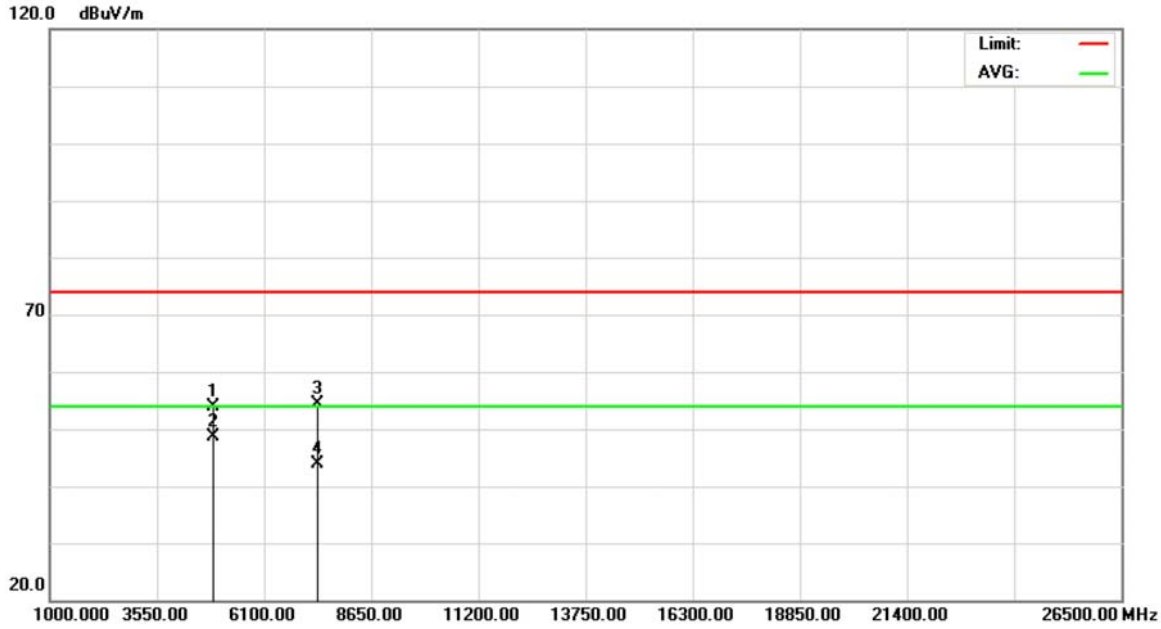
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	63.48	33.27	96.75	74.00	22.75	peak	
2	*	2441.000	61.17	33.27	94.44	54.00	40.44	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

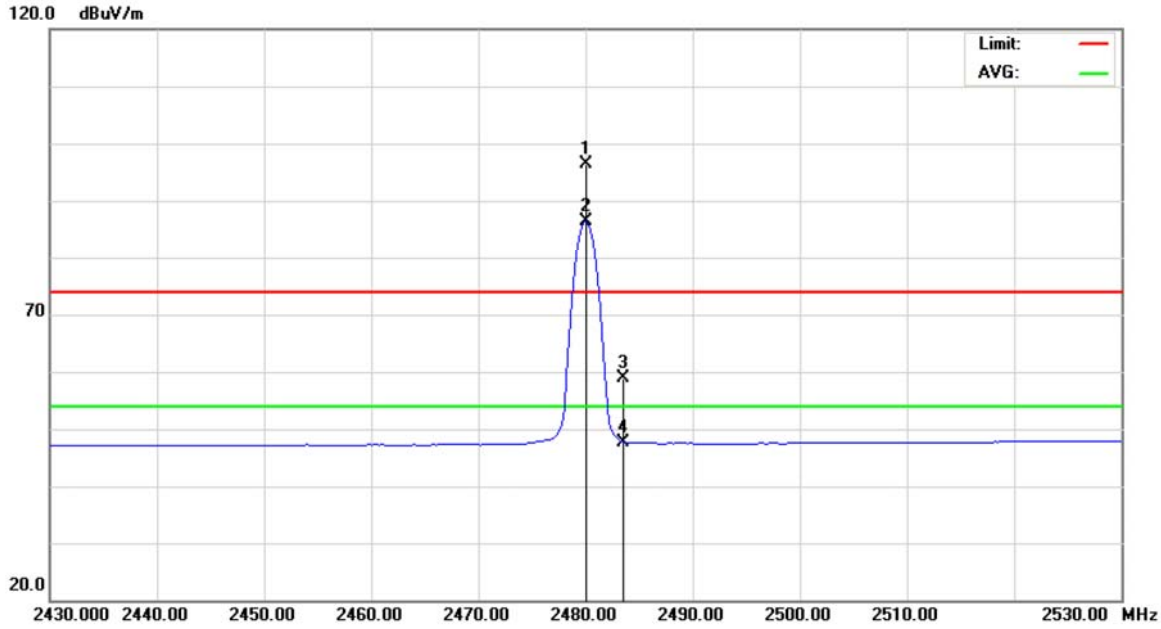
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4881.994	46.98	6.86	53.84	74.00	-20.16	peak	
2	*	4881.994	41.65	6.86	48.51	54.00	-5.49	AVG	
3		7323.000	40.46	13.84	54.30	74.00	-19.70	peak	
4		7323.000	30.07	13.84	43.91	54.00	-10.09	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

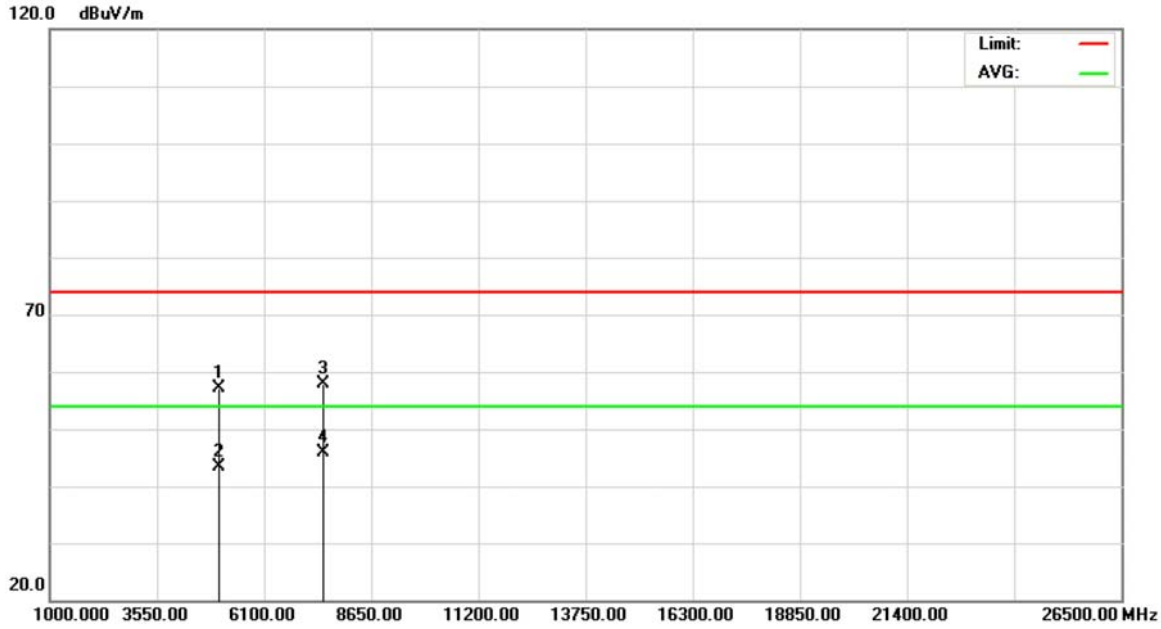
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	62.52	33.90	96.42	74.00	22.42	peak	
2	*	2480.000	52.37	33.90	86.27	54.00	32.27	AVG	
3		2483.500	24.98	33.92	58.90	74.00	-15.10	peak	
4		2483.500	13.80	33.92	47.72	54.00	-6.28	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

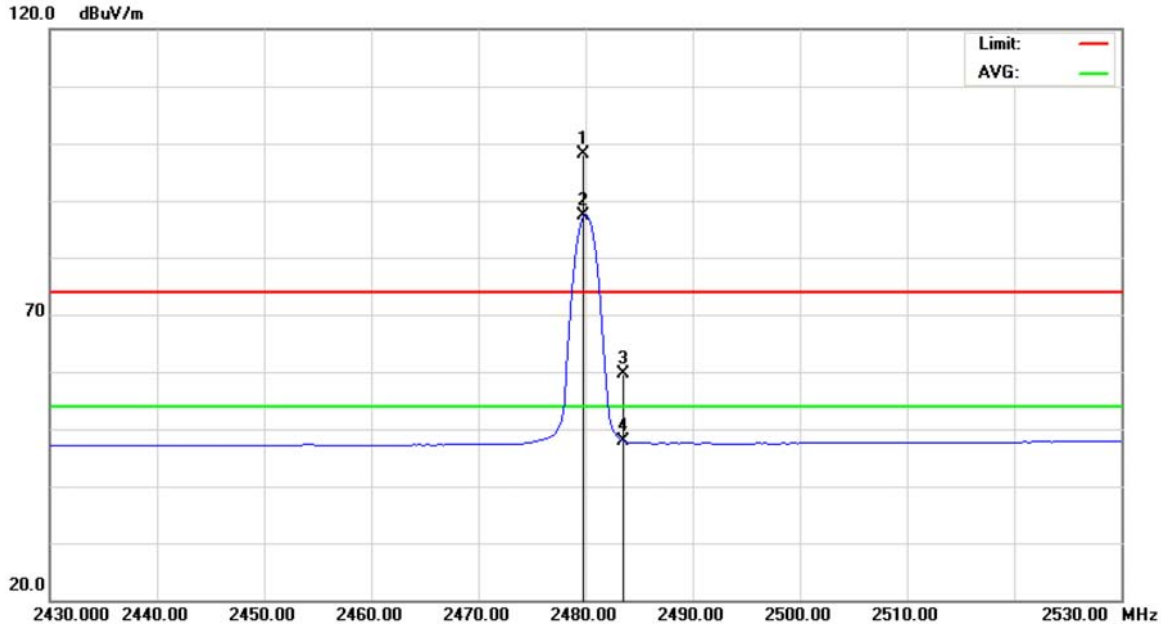
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.050	49.20	7.98	57.18	74.00	-16.82	peak	
2		4960.050	35.40	7.98	43.38	54.00	-10.62	AVG	
3		7439.975	42.59	15.40	57.99	74.00	-16.01	peak	
4	*	7439.975	30.55	15.40	45.95	54.00	-8.05	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

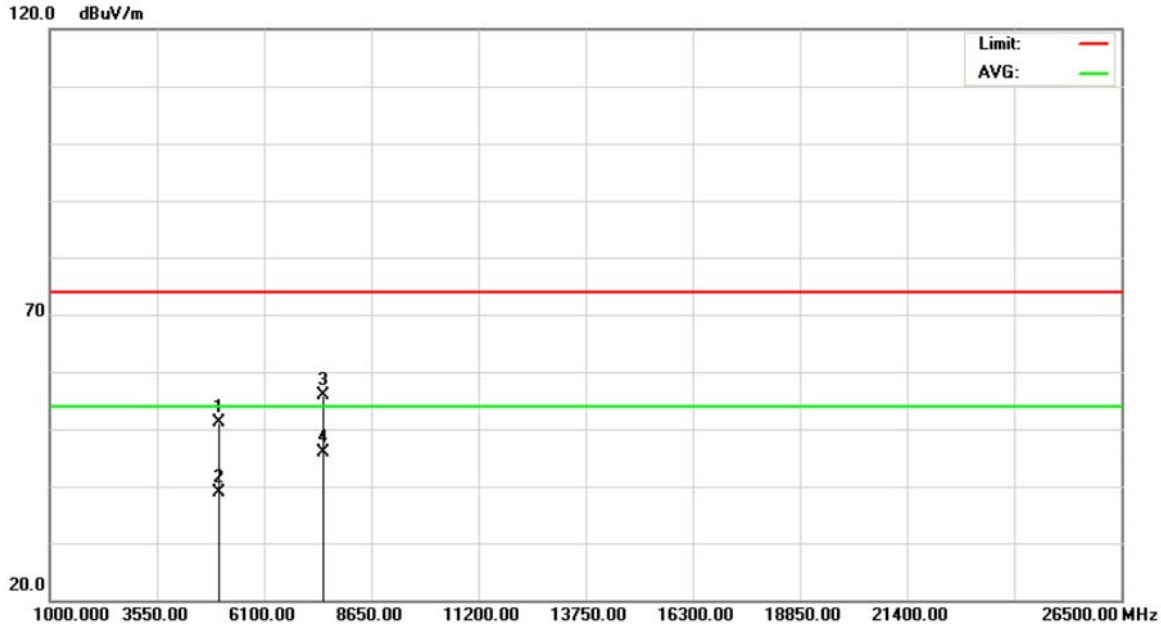
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2479.750	64.27	33.90	98.17	74.00	24.17	peak	
2	*	2479.750	53.56	33.90	87.46	54.00	33.46	AVG	
3		2483.500	25.83	33.92	59.75	74.00	-14.25	peak	
4		2483.500	13.92	33.92	47.84	54.00	-6.16	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

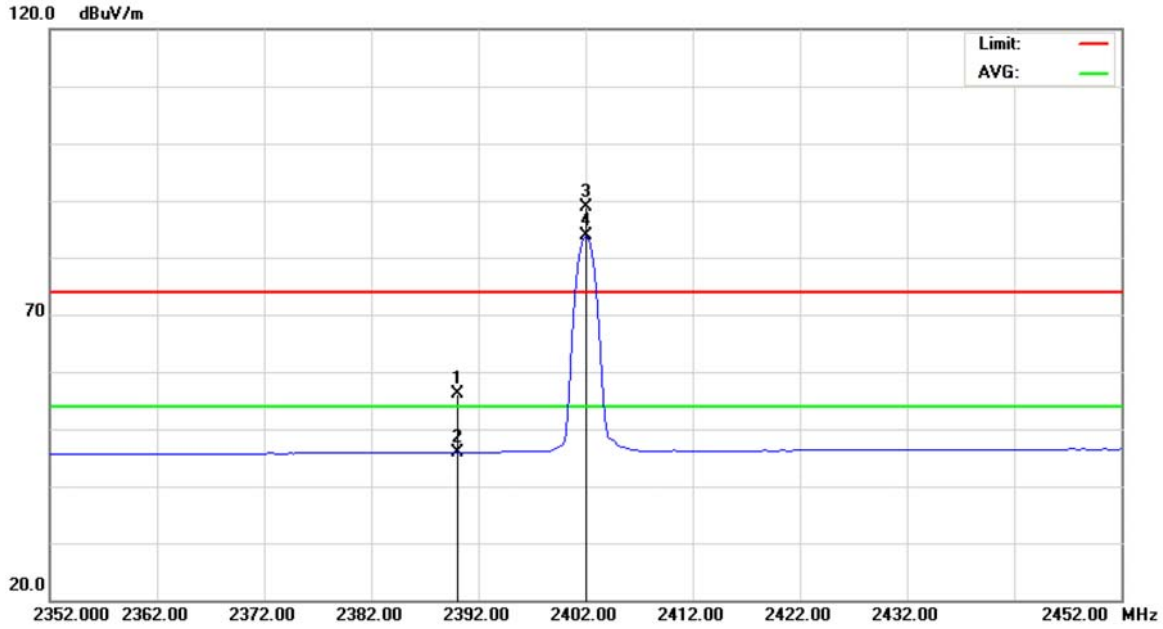
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.038	43.12	7.98	51.10	74.00	-22.90	peak	
2		4960.038	30.94	7.98	38.92	54.00	-15.08	AVG	
3		7439.975	40.56	15.40	55.96	74.00	-18.04	peak	
4	*	7439.975	30.52	15.40	45.92	54.00	-8.08	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

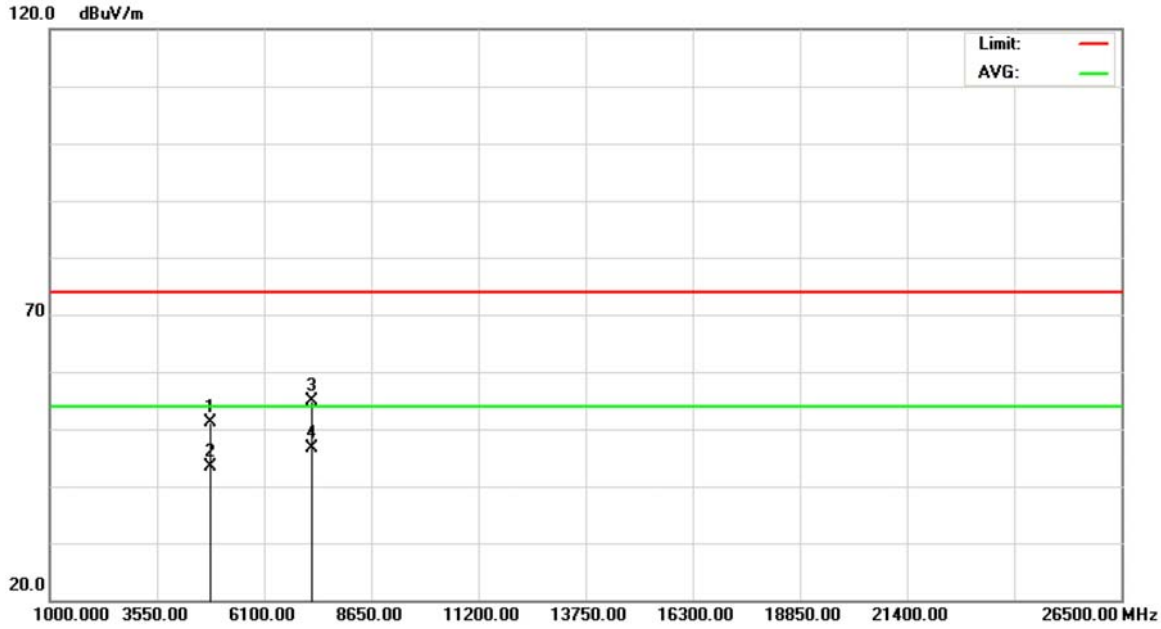
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	23.17	32.99	56.16	74.00	-17.84	peak	
2		2390.000	12.94	32.99	45.93	54.00	-8.07	AVG	
3	X	2402.000	55.70	33.06	88.76	74.00	14.76	peak	
4	*	2402.000	50.71	33.06	83.77	54.00	29.77	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

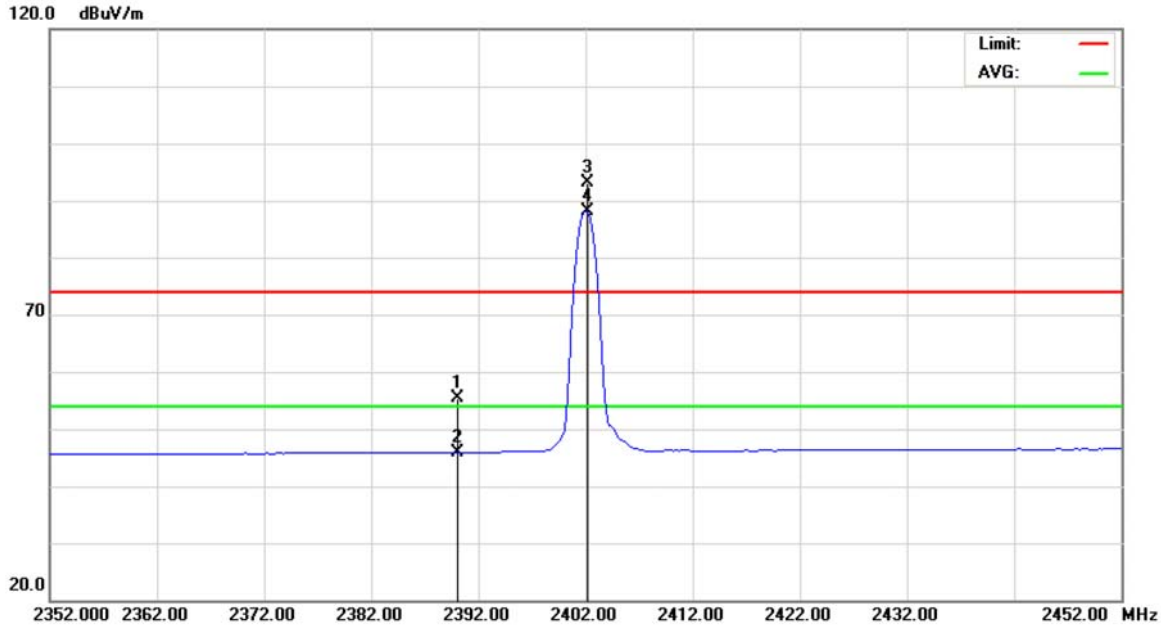
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.038	43.72	7.41	51.13	74.00	-22.87	peak	
2		4804.038	35.89	7.41	43.30	54.00	-10.70	AVG	
3		7205.888	40.19	14.79	54.98	74.00	-19.02	peak	
4	*	7205.888	31.87	14.79	46.66	54.00	-7.34	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

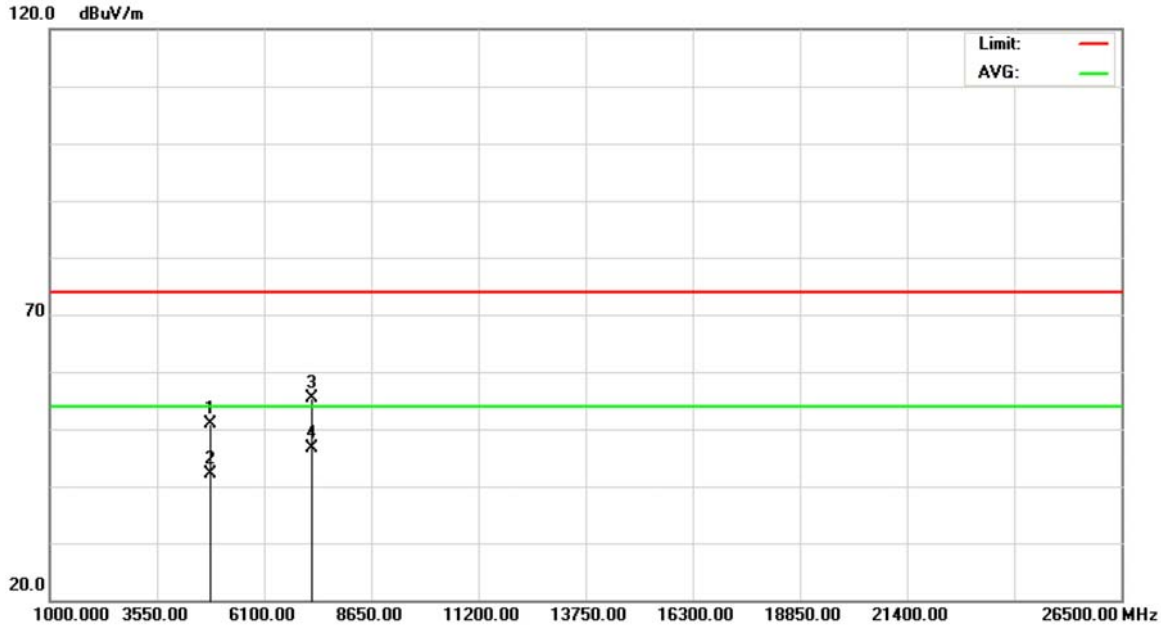
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	22.28	32.99	55.27	74.00	-18.73	peak	
2		2390.000	12.94	32.99	45.93	54.00	-8.07	AVG	
3	X	2402.250	60.10	33.06	93.16	74.00	19.16	peak	
4	*	2402.250	55.05	33.06	88.11	54.00	34.11	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

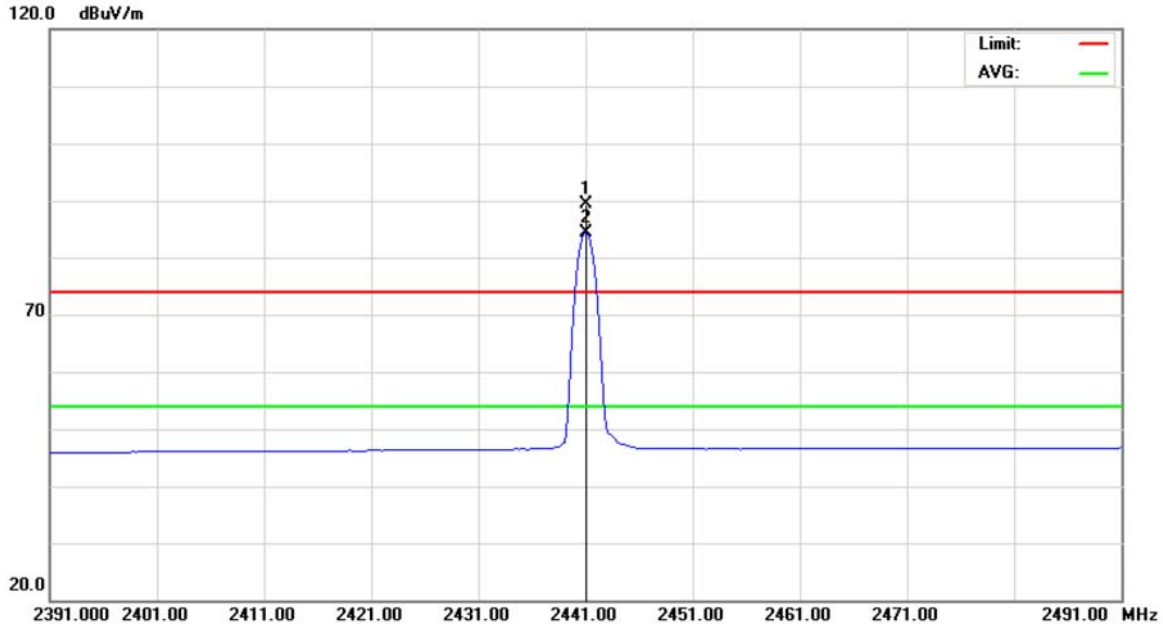
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	43.54	7.41	50.95	74.00	-23.05	peak	
2		4804.000	34.73	7.41	42.14	54.00	-11.86	AVG	
3		7205.950	40.62	14.79	55.41	74.00	-18.59	peak	
4	*	7205.950	31.88	14.79	46.67	54.00	-7.33	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

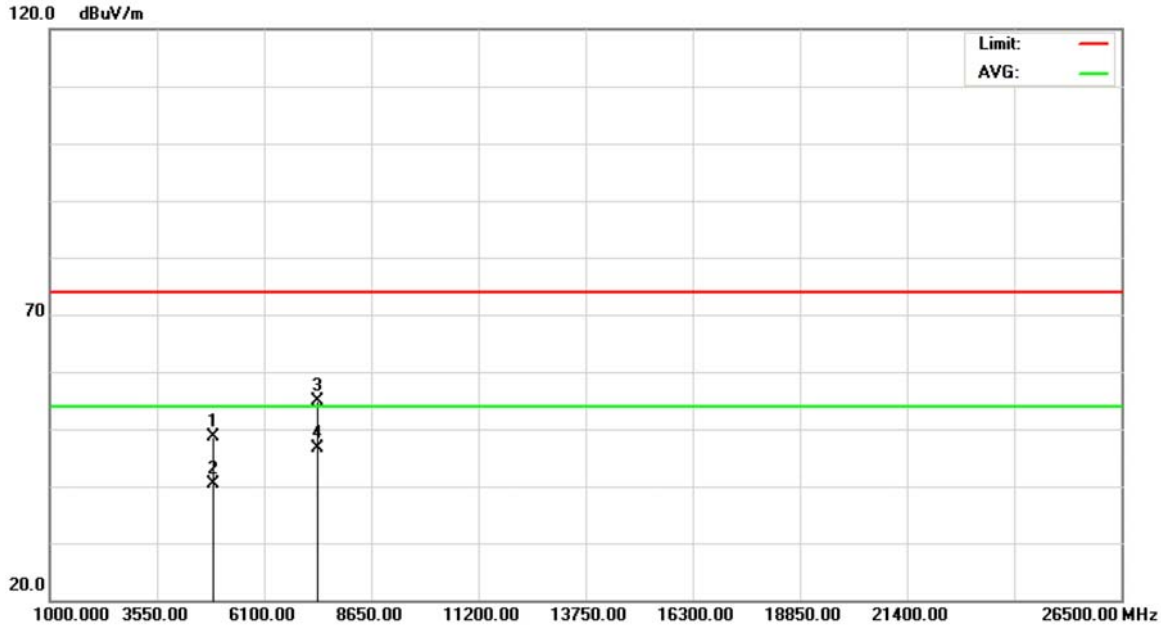
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	56.17	33.27	89.44	74.00	15.44	peak	
2	*	2441.000	51.17	33.27	84.44	54.00	30.44	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

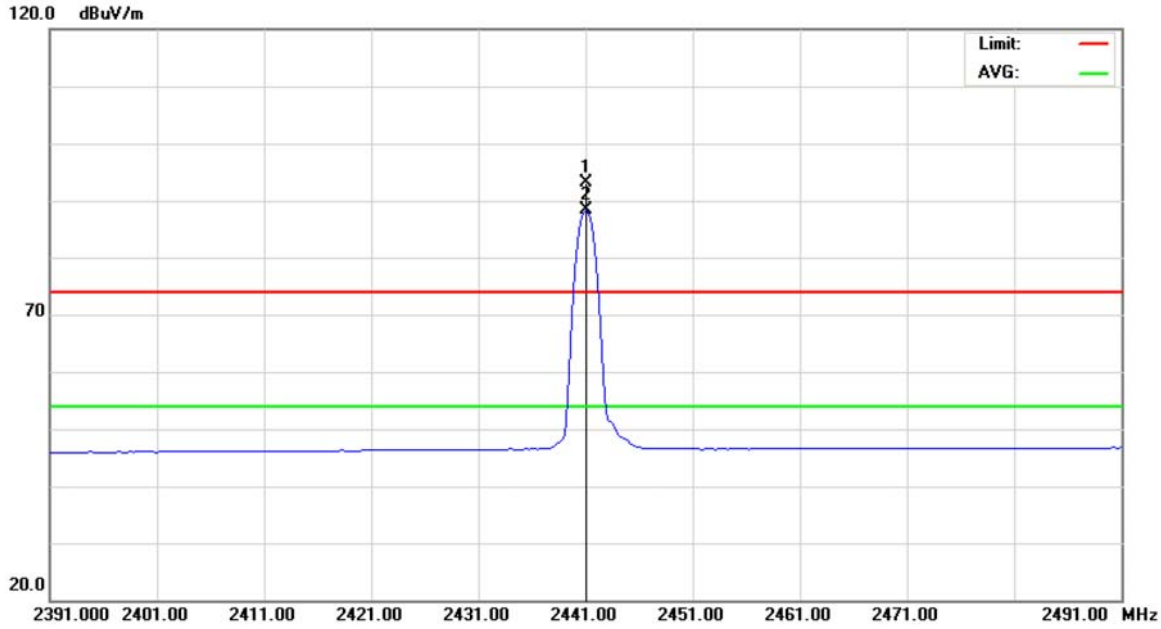
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.025	40.89	7.70	48.59	74.00	-25.41	peak	
2		4882.025	32.80	7.70	40.50	54.00	-13.50	AVG	
3		7323.100	39.71	15.10	54.81	74.00	-19.19	peak	
4	*	7323.100	31.47	15.10	46.57	54.00	-7.43	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

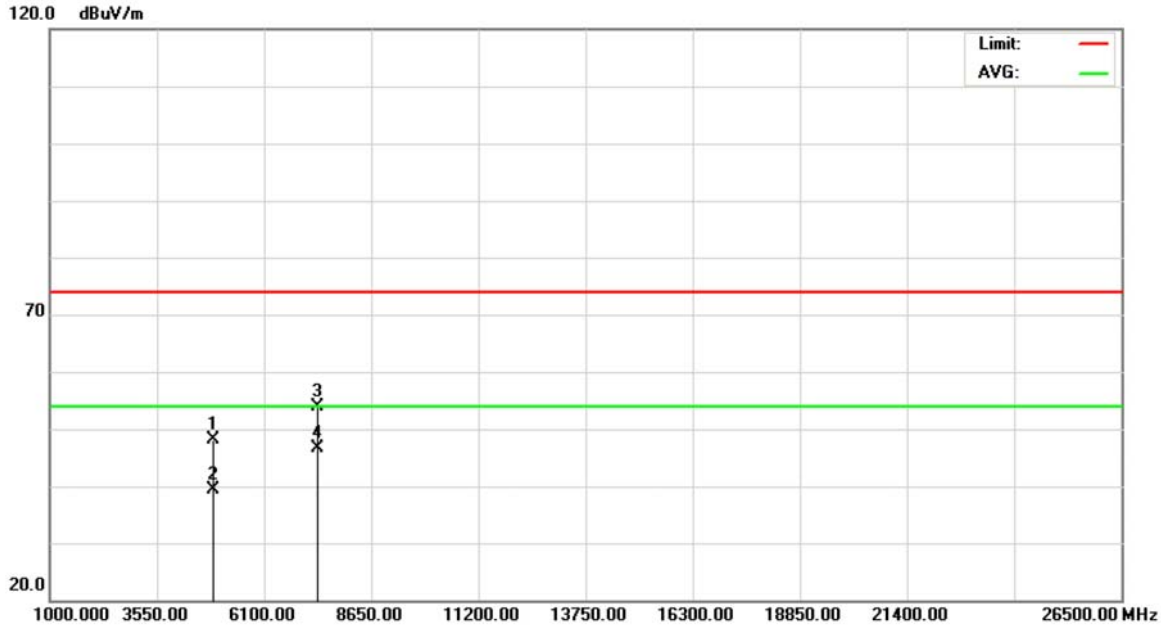
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2441.000	59.97	33.27	93.24	74.00	19.24	peak	
2	*	2441.000	55.02	33.27	88.29	54.00	34.29	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

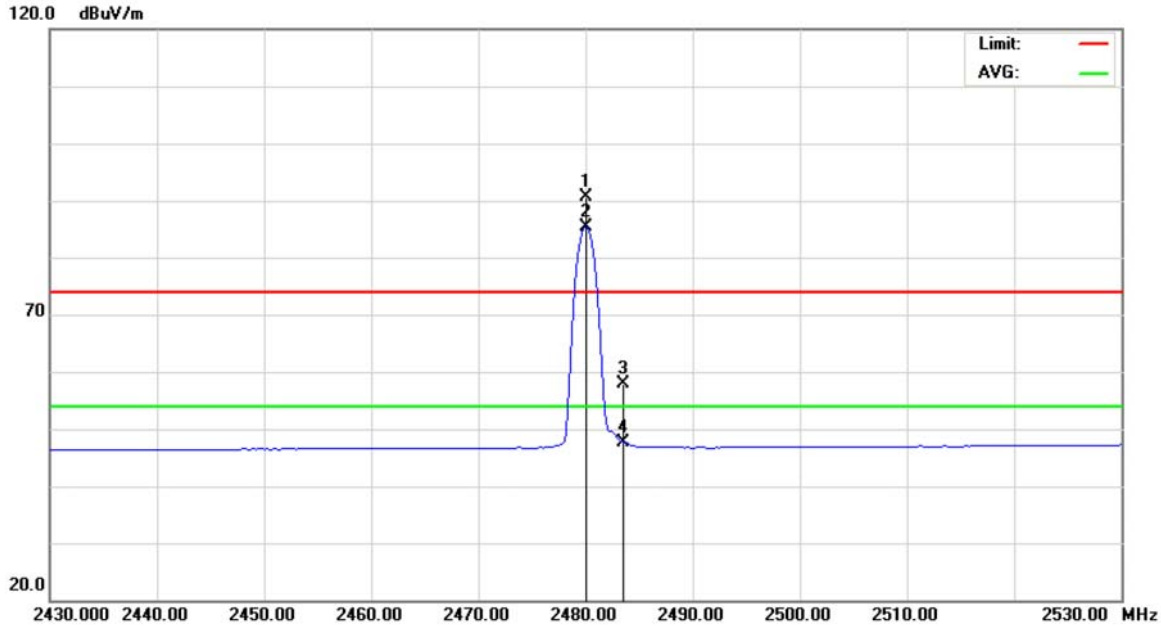
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.025	40.40	7.70	48.10	74.00	-25.90	peak	
2		4882.025	31.68	7.70	39.38	54.00	-14.62	AVG	
3		7322.925	38.70	15.10	53.80	74.00	-20.20	peak	
4	*	7322.925	31.47	15.10	46.57	54.00	-7.43	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

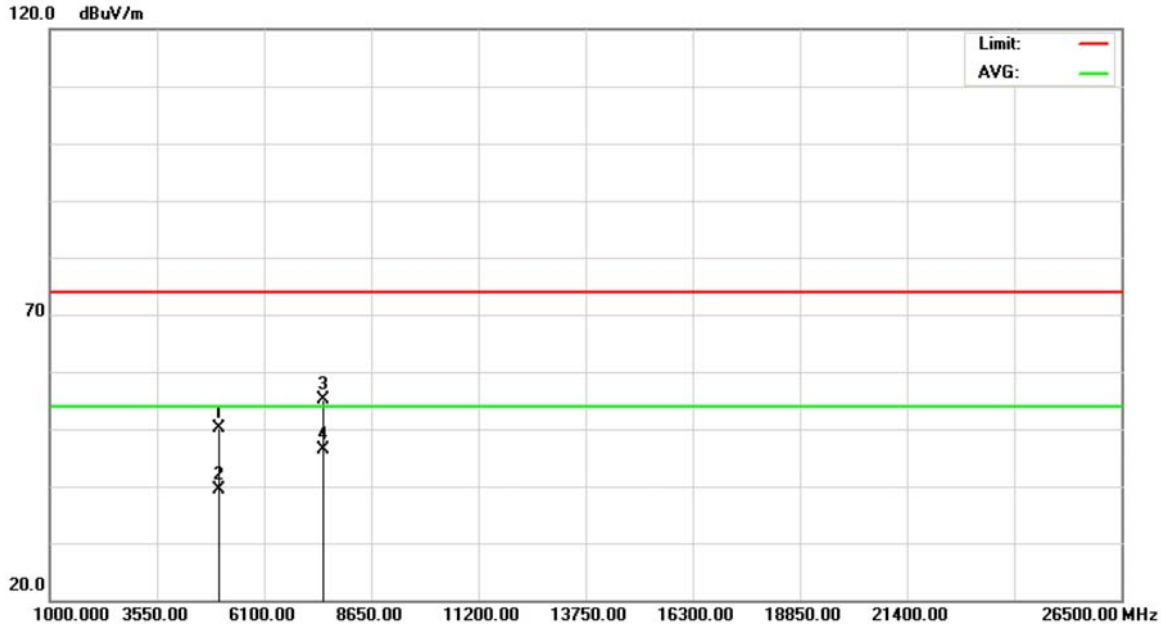
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	57.09	33.48	90.57	74.00	16.57	peak	
2	*	2480.000	52.01	33.48	85.49	54.00	31.49	AVG	
3		2483.500	24.37	33.50	57.87	74.00	-16.13	peak	
4		2483.500	14.18	33.50	47.68	54.00	-6.32	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

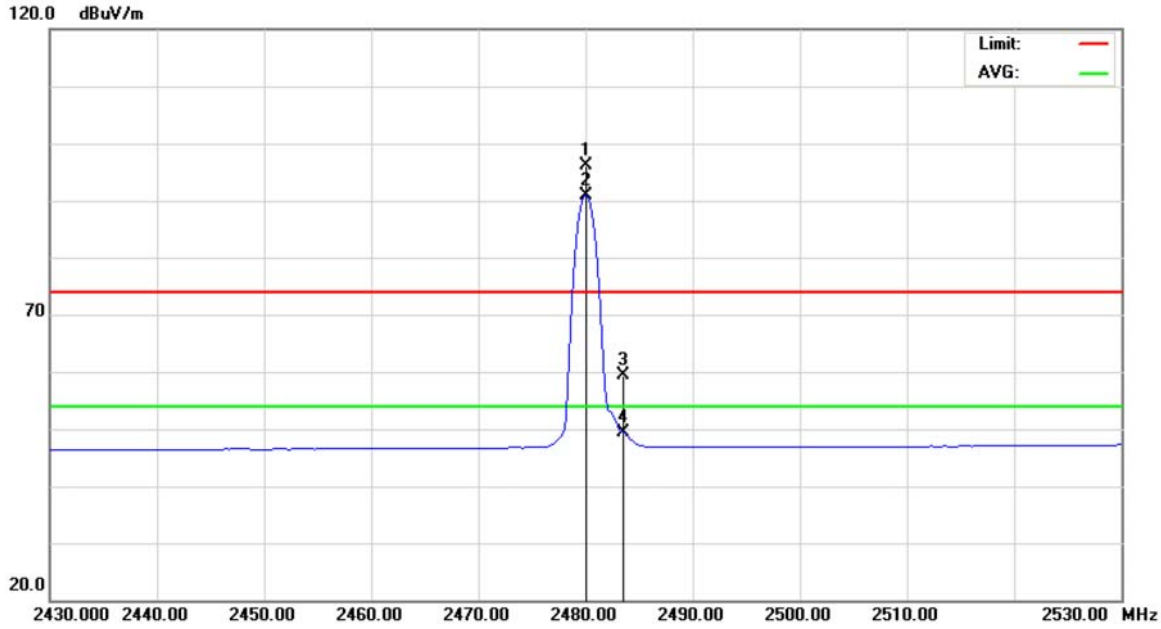
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.100	43.01	7.16	50.17	74.00	-23.83	peak	
2		4960.100	32.14	7.16	39.30	54.00	-14.70	AVG	
3		7439.925	41.15	14.08	55.23	74.00	-18.77	peak	
4	*	7439.925	32.26	14.08	46.34	54.00	-7.66	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

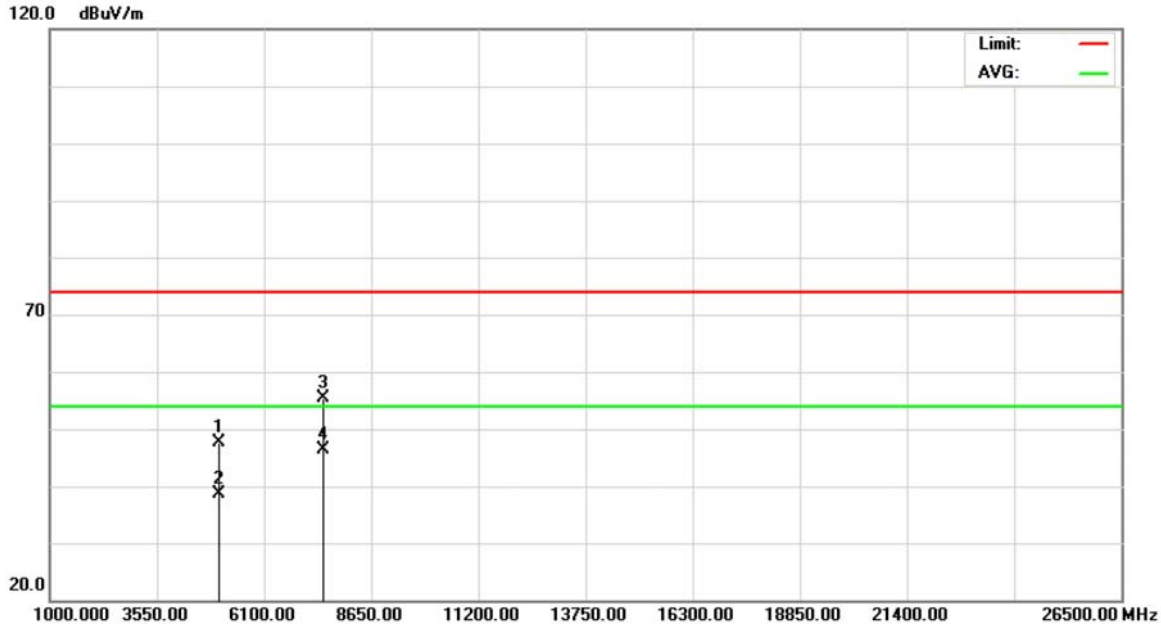
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2480.000	62.60	33.48	96.08	74.00	22.08	peak	
2	*	2480.000	57.50	33.48	90.98	54.00	36.98	AVG	
3		2483.500	25.87	33.50	59.37	74.00	-14.63	peak	
4		2483.500	16.00	33.50	49.50	54.00	-4.50	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

Polarization: Horizontal

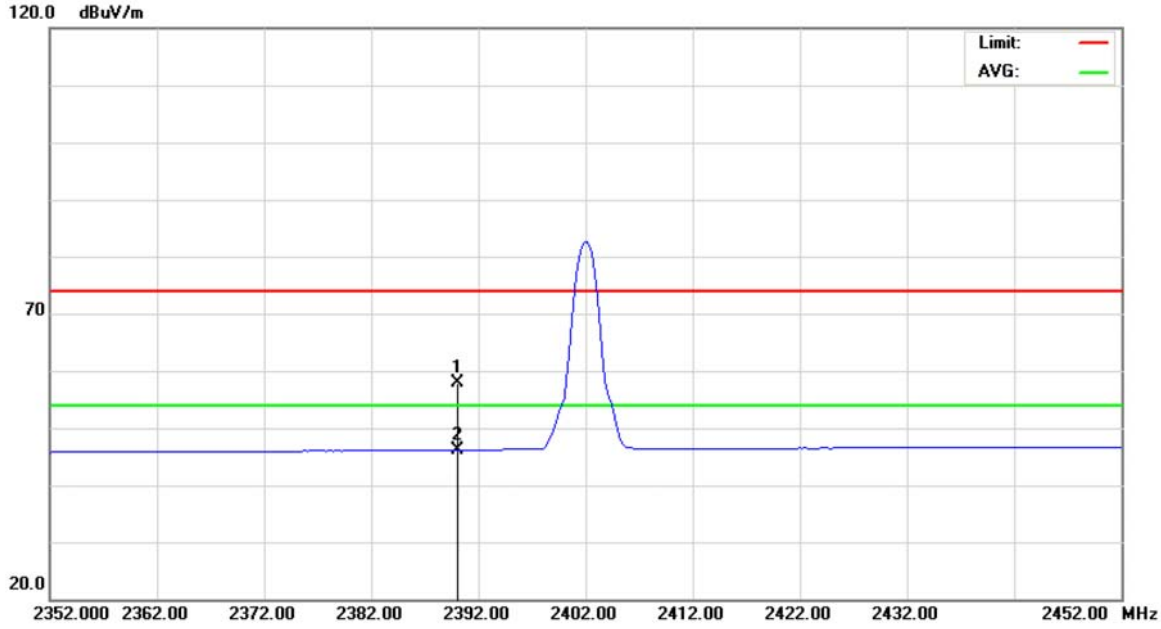


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.013	40.50	7.16	47.66	74.00	-26.34	peak	
2		4960.013	31.44	7.16	38.60	54.00	-15.40	AVG	
3		7440.000	41.31	14.08	55.39	74.00	-18.61	peak	
4	*	7440.000	32.23	14.08	46.31	54.00	-7.69	AVG	

8.9 TEST RESULTS (RESTRICTED BANDS)

EUT	Bluetooth Module	Model Name	NF2301
Temperature	24°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz		
NOTE	The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz.		

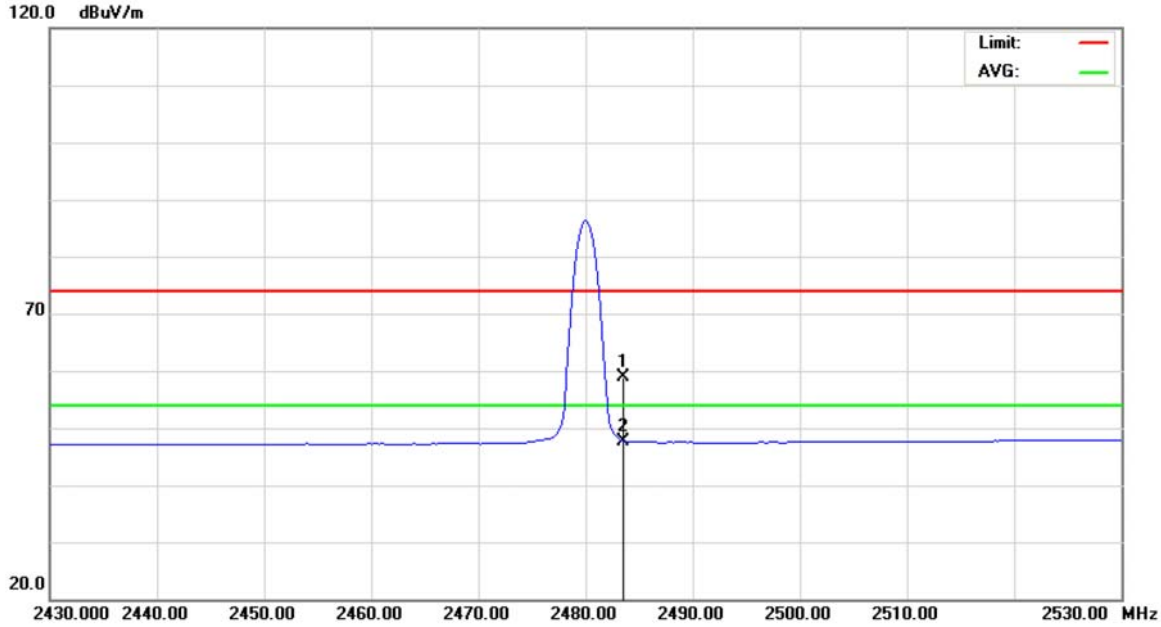
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.98	32.99	57.97	74.00	-16.03	peak	
2	*	2390.000	13.15	32.99	46.14	54.00	-7.86	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	24°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2480 MHz		
NOTE	The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz.		

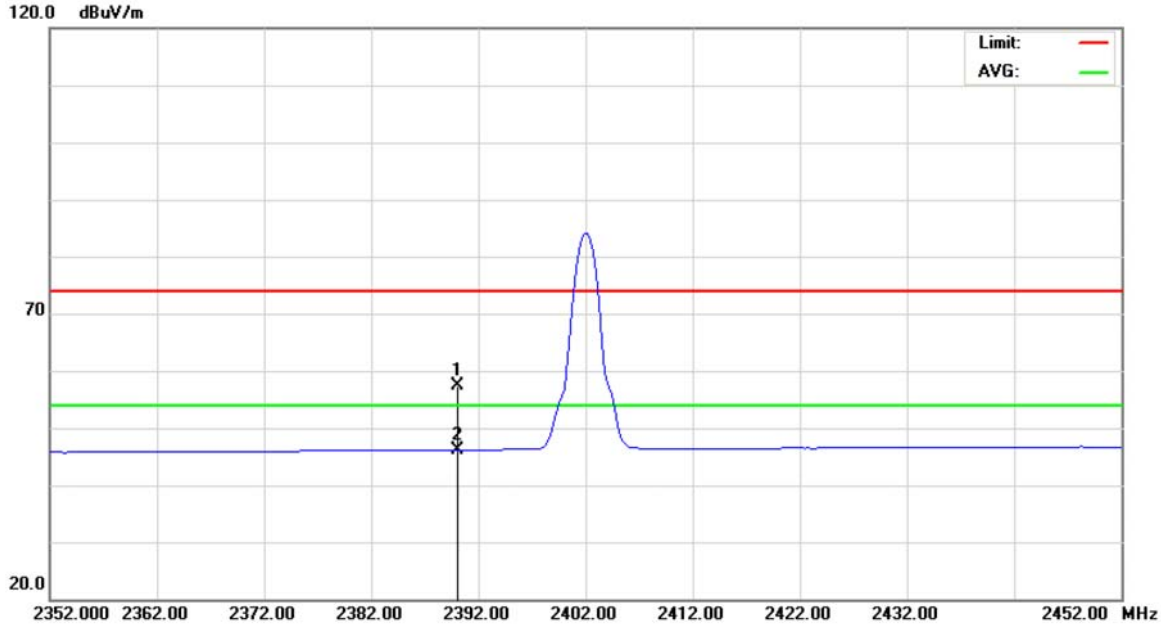
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	24.98	33.92	58.90	74.00	-15.10	peak	
2	*	2483.500	13.80	33.92	47.72	54.00	-6.28	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	24°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz		
NOTE	The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz.		

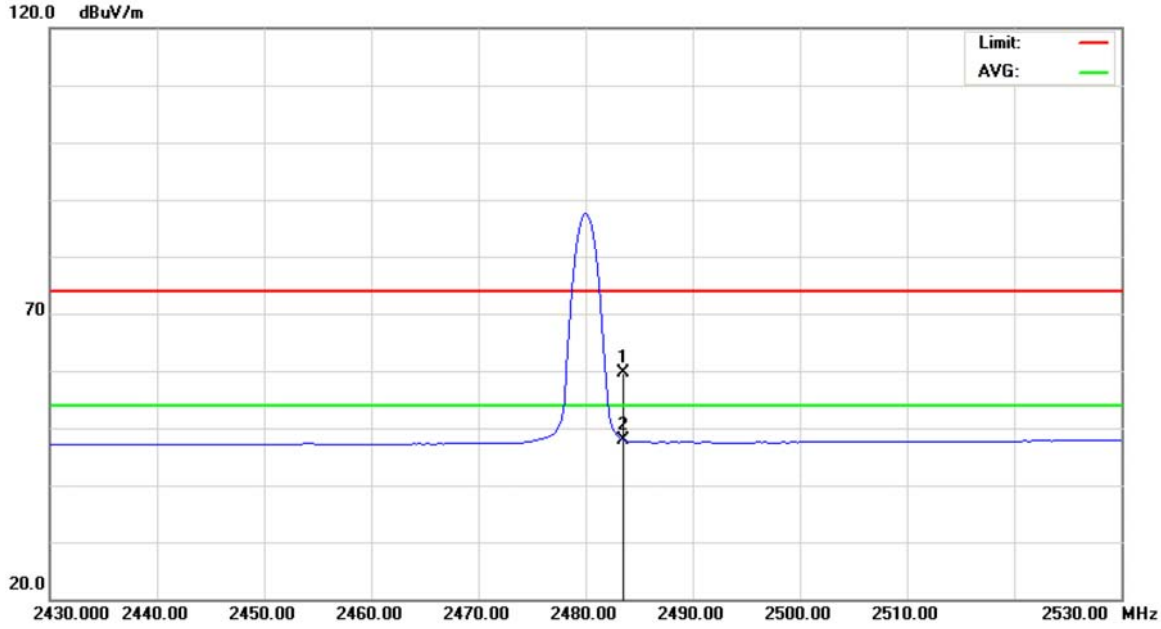
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	24.40	32.99	57.39	74.00	-16.61	peak	
2	*	2390.000	13.14	32.99	46.13	54.00	-7.87	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	24°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2480 MHz		
NOTE	The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz.		

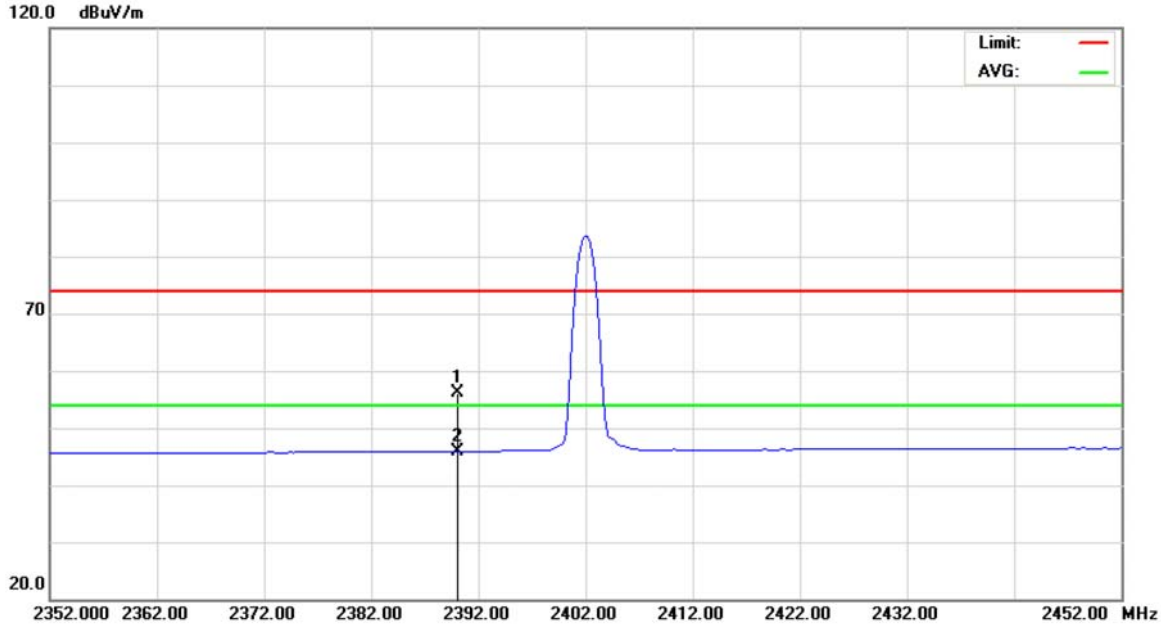
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	25.83	33.92	59.75	74.00	-14.25	peak	
2	*	2483.500	13.92	33.92	47.84	54.00	-6.16	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	24°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz		
NOTE	The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz.		

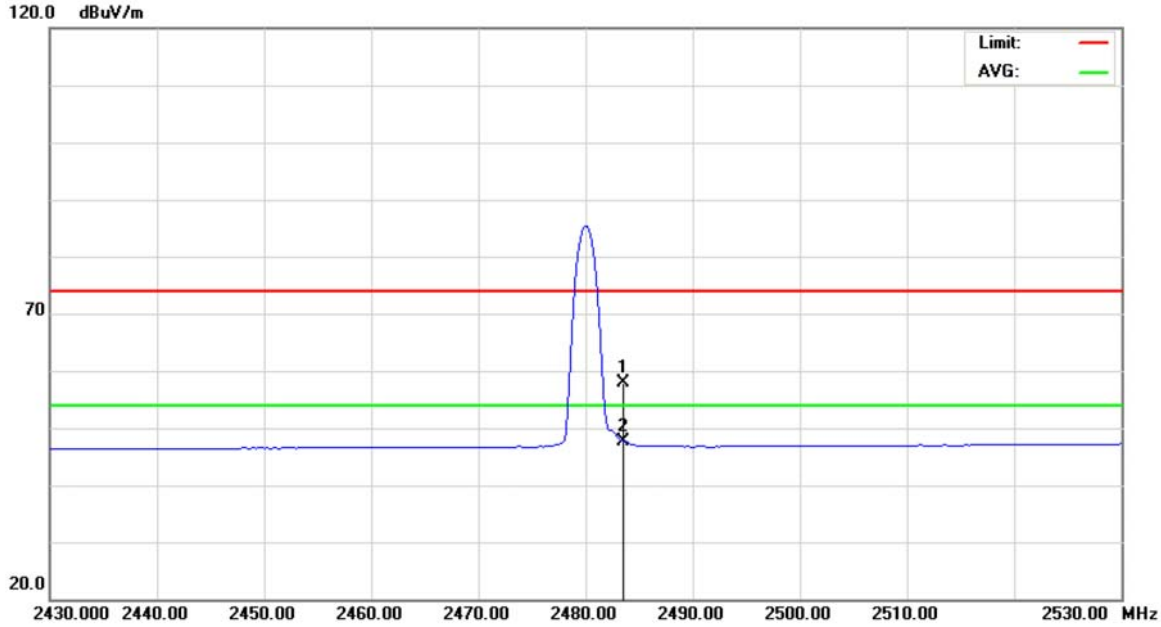
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	23.17	32.99	56.16	74.00	-17.84	peak	
2	*	2390.000	12.94	32.99	45.93	54.00	-8.07	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	24°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2480 MHz		
NOTE	The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz.		

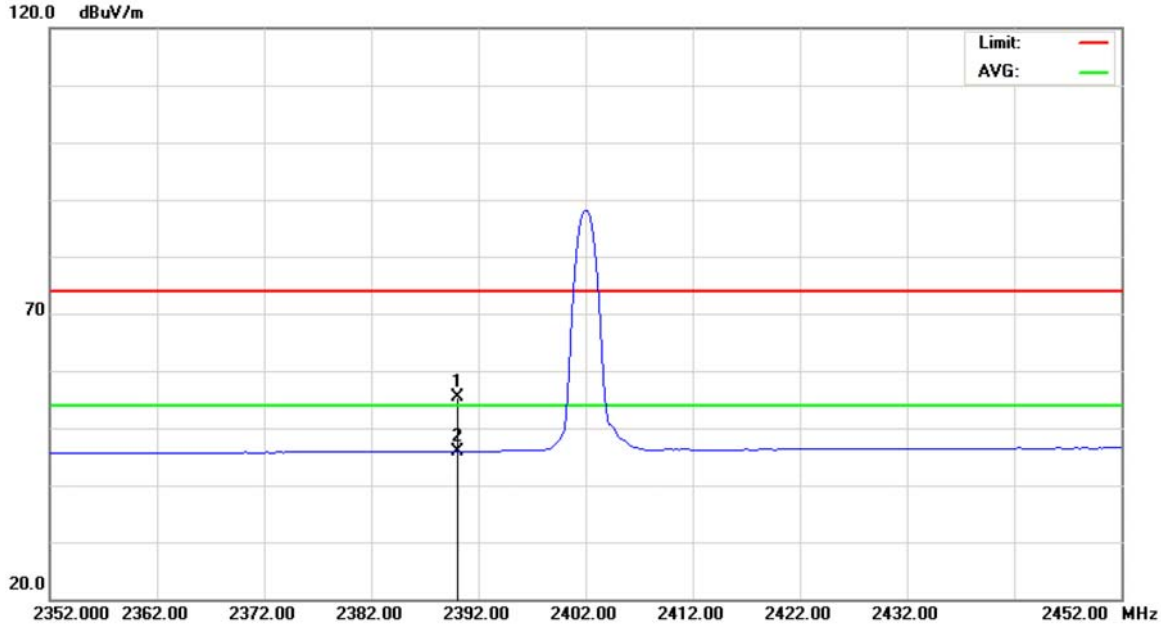
Polarization: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	24.37	33.50	57.87	74.00	-16.13	peak	
2	*	2483.500	14.18	33.50	47.68	54.00	-6.32	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	24°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz		
NOTE	The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz.		

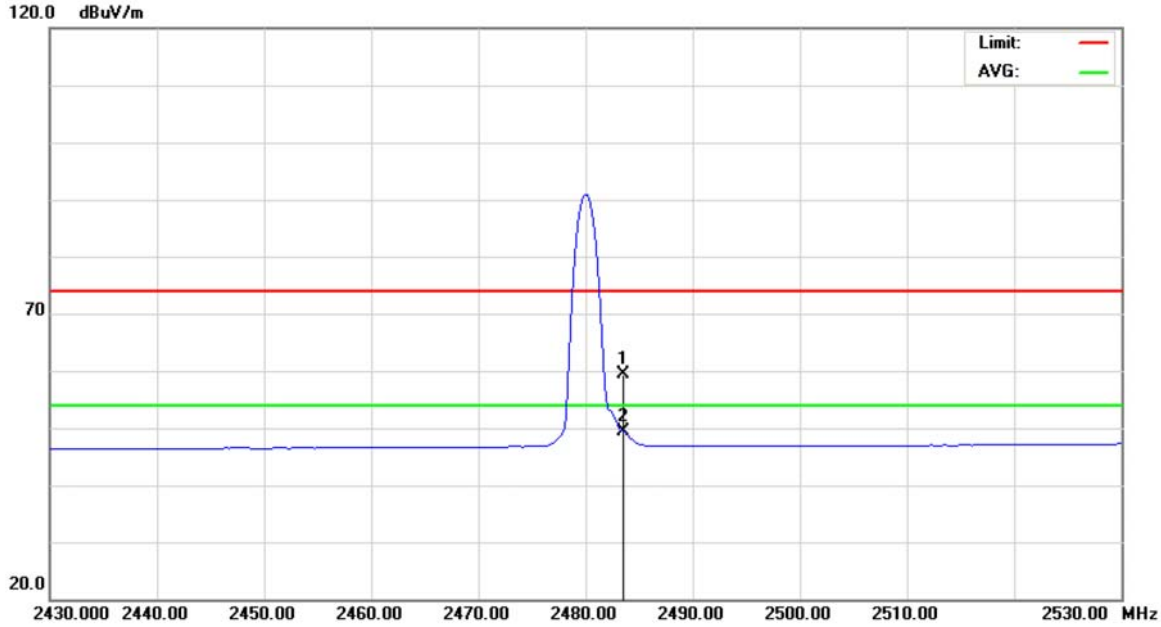
Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	22.28	32.99	55.27	74.00	-18.73	peak	
2	*	2390.000	12.94	32.99	45.93	54.00	-8.07	AVG	

EUT	Bluetooth Module	Model Name	NF2301
Temperature	24°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2480 MHz		
NOTE	The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz.		

Polarization: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	25.87	33.50	59.37	74.00	-14.63	peak	
2	*	2483.500	16.00	33.50	49.50	54.00	-4.50	AVG	

9 NUMBER OF HOPPING FREQUENCY

9.1 LIMIT

Test Item	Frequency Range (MHz)	Limit
Number of Hopping Channel	2400-2483.5	shall use at least 15 channels

9.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 01, 2013

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

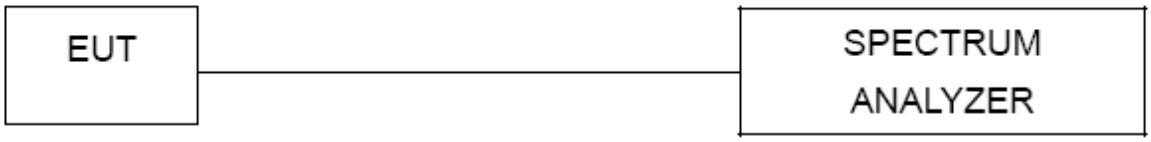
9.3 MEASURING INSTRUMENTS SETTING

Spectrum Analyzer	Parameter Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

9.4 TEST PROCEDURES

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW= 100 kHz, VBW=100 kHz, Sweep time = Auto.

9.5 TEST SETUP LAYOUT



9.6 DEVIATION FROM TEST STANDARD

No deviation

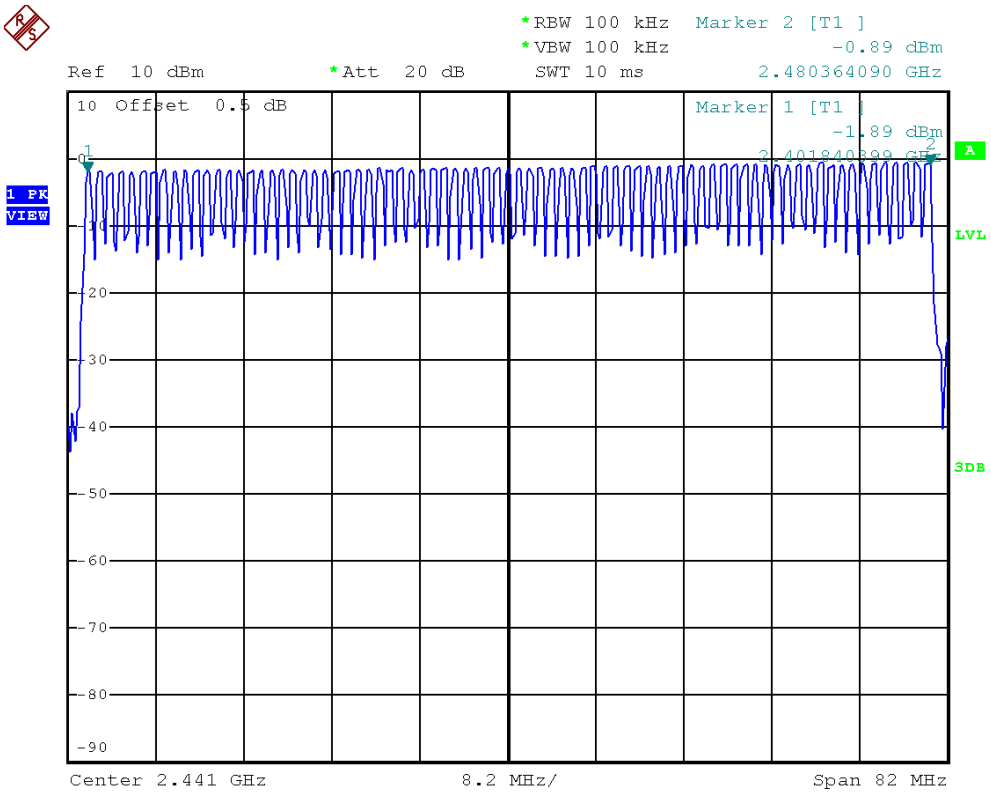
9.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

9.8 TEST RESULTS

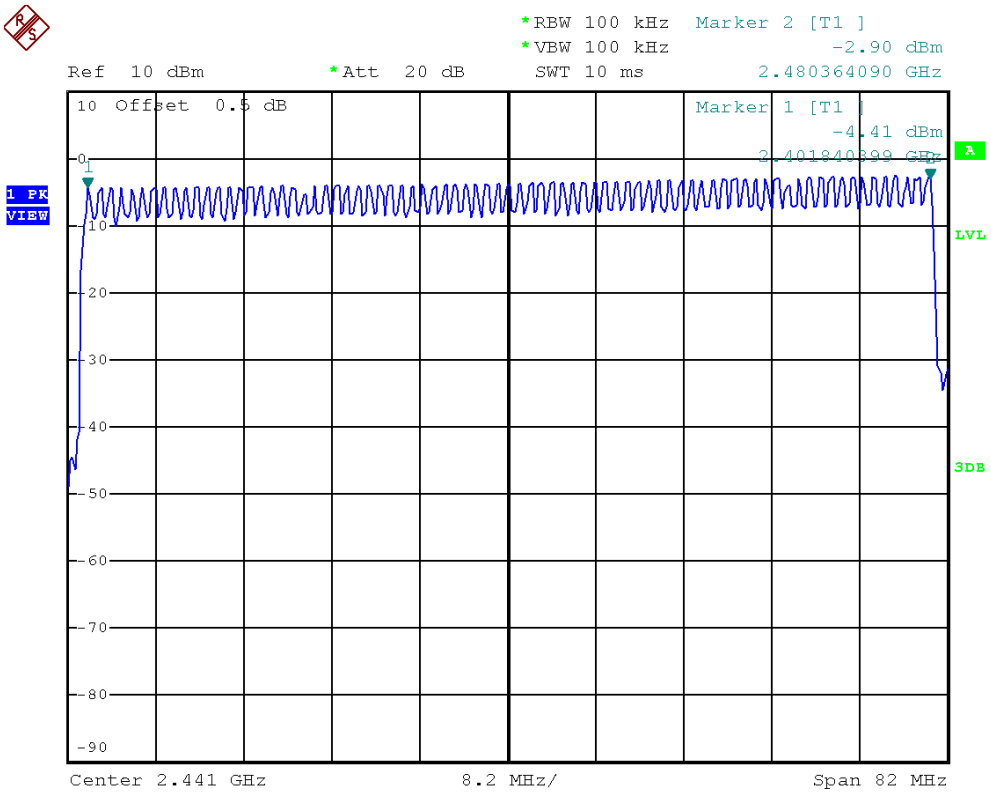
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps		

Number of Hopping Channel	Limit	Result
79	15	Pass



EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps		

Number of Hopping Channel	Limit	Result
79	15	Pass



10 AVERAGE TIME OF OCCUPANCY

10.1LIMIT

Test Item	Frequency Range (MHz)	Limit
Average time of occupancy	2400-2483.5	shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

10.2MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 01, 2013

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

10.3TEST PROCEDURES

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 100 kHz and VBW to 100 kHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds.
j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.
k. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.

10.4TEST SETUP LAYOUT

10.5DEVIATION FROM TEST STANDARD

No deviation

10.6 EUT OPERATING CONDITIONS

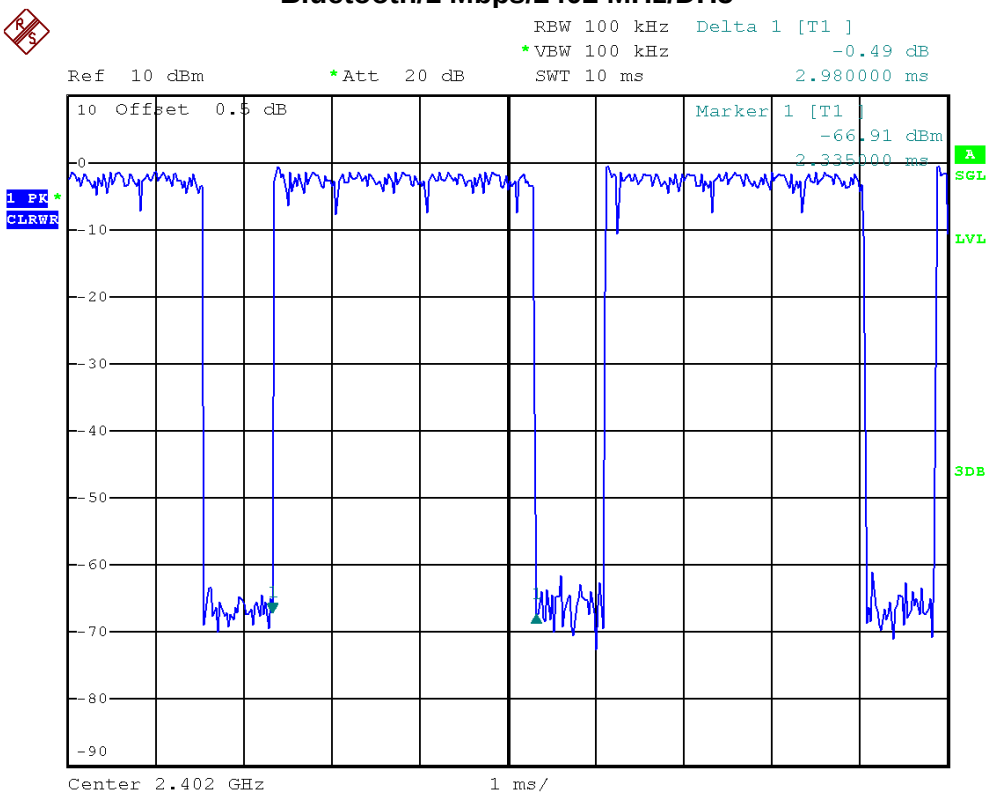
The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

10.7TEST RESULTS

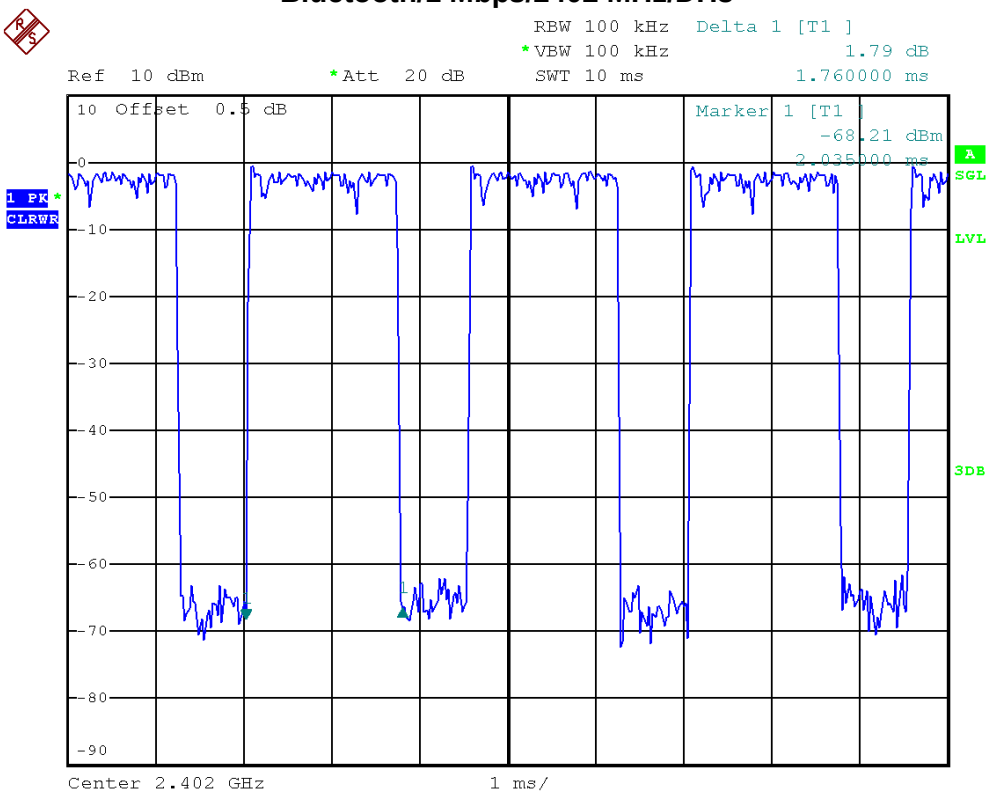
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2402 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2402 MHz	2.9800	0.3179	0.4	PASS
DH3	2402 MHz	1.7600	0.2816	0.4	PASS
DH1	2402 MHz	0.5000	0.1600	0.4	PASS

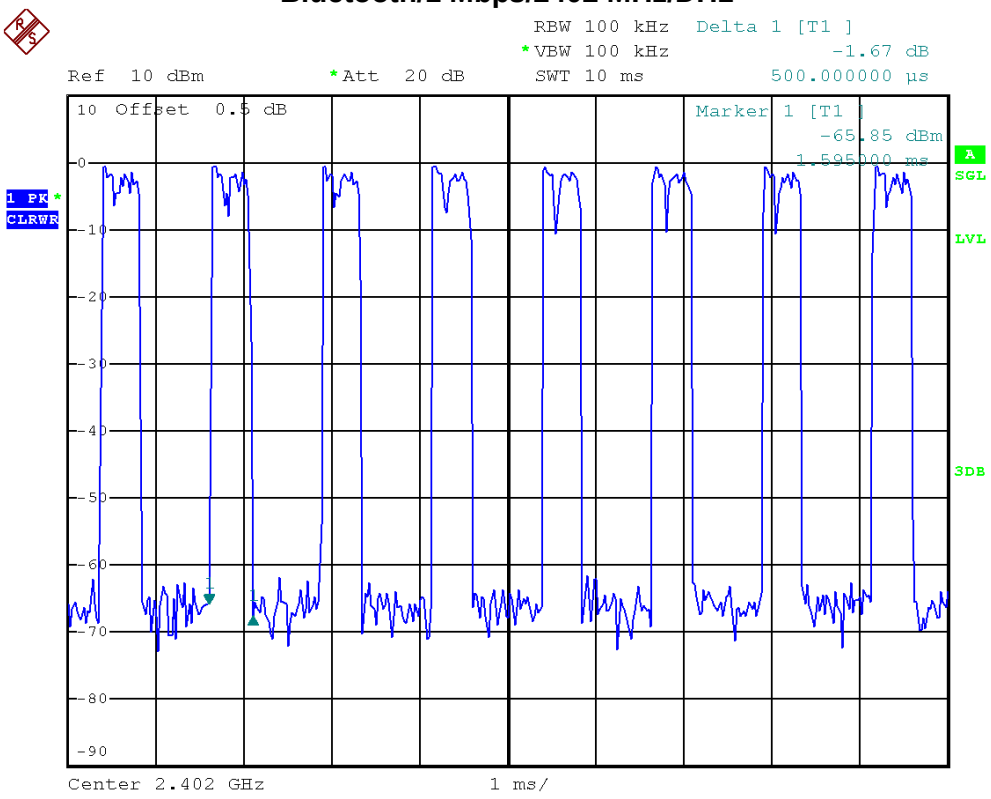
Bluetooth/1 Mbps/2402 MHz/DH5



Bluetooth/1 Mbps/2402 MHz/DH3



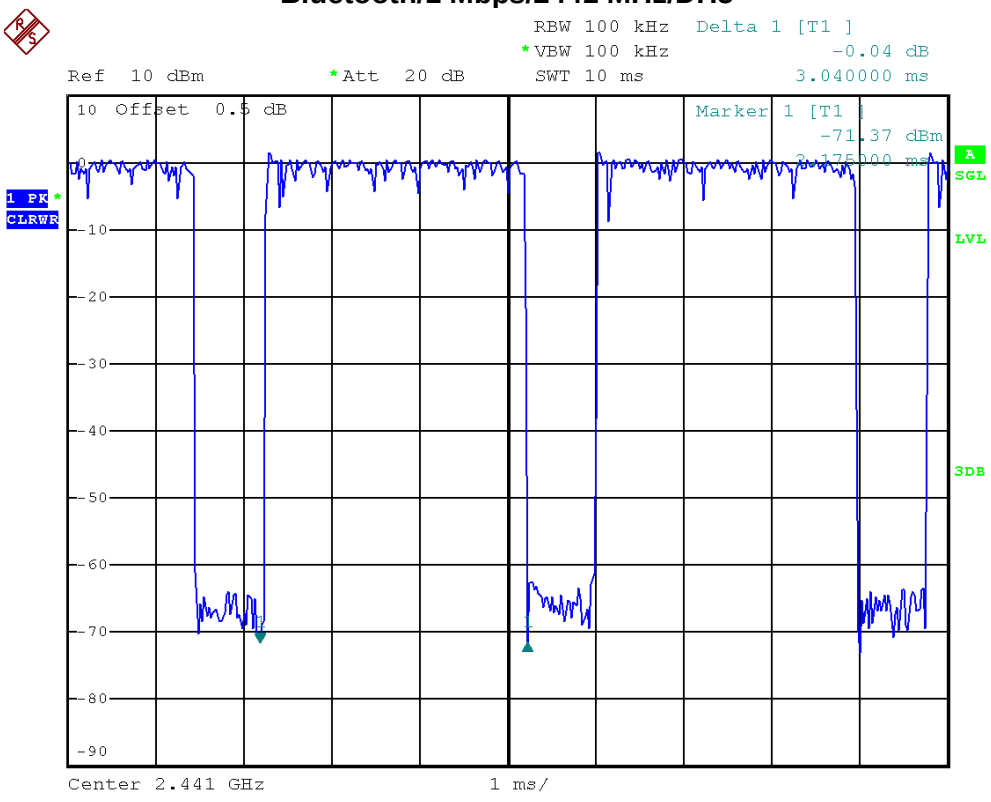
Bluetooth/1 Mbps/2402 MHz/DH1



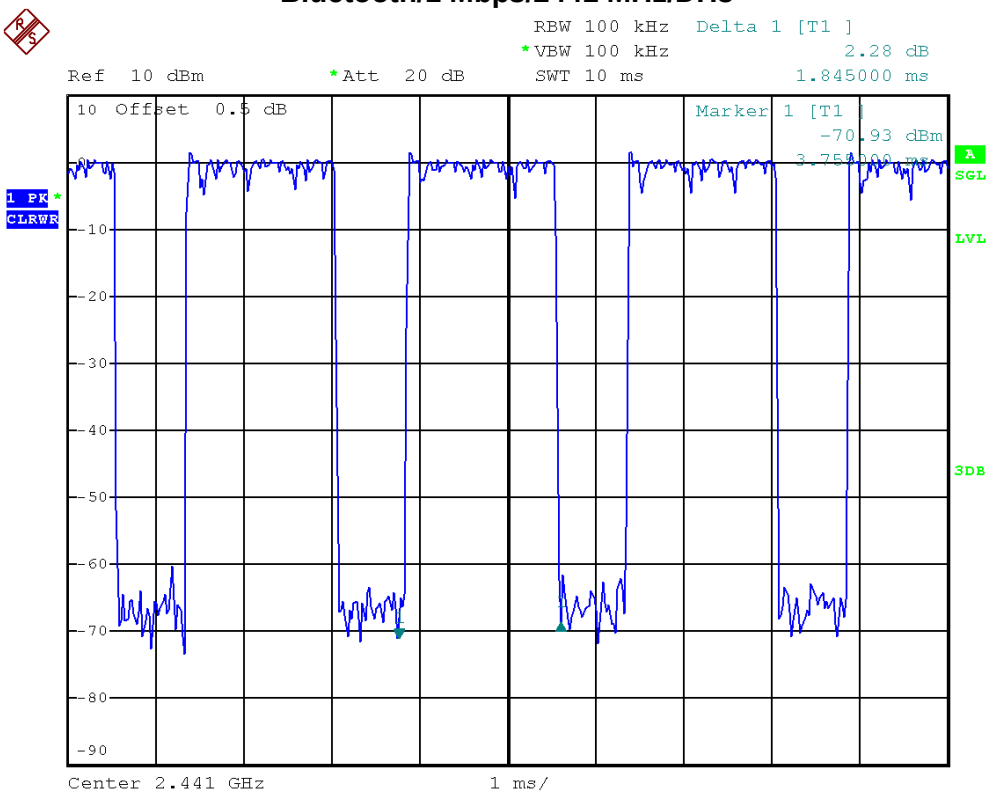
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2441 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2441 MHz	3.0400	0.3243	0.4	PASS
DH3	2441 MHz	1.8450	0.2952	0.4	PASS
DH1	2441 MHz	0.5600	0.1792	0.4	PASS

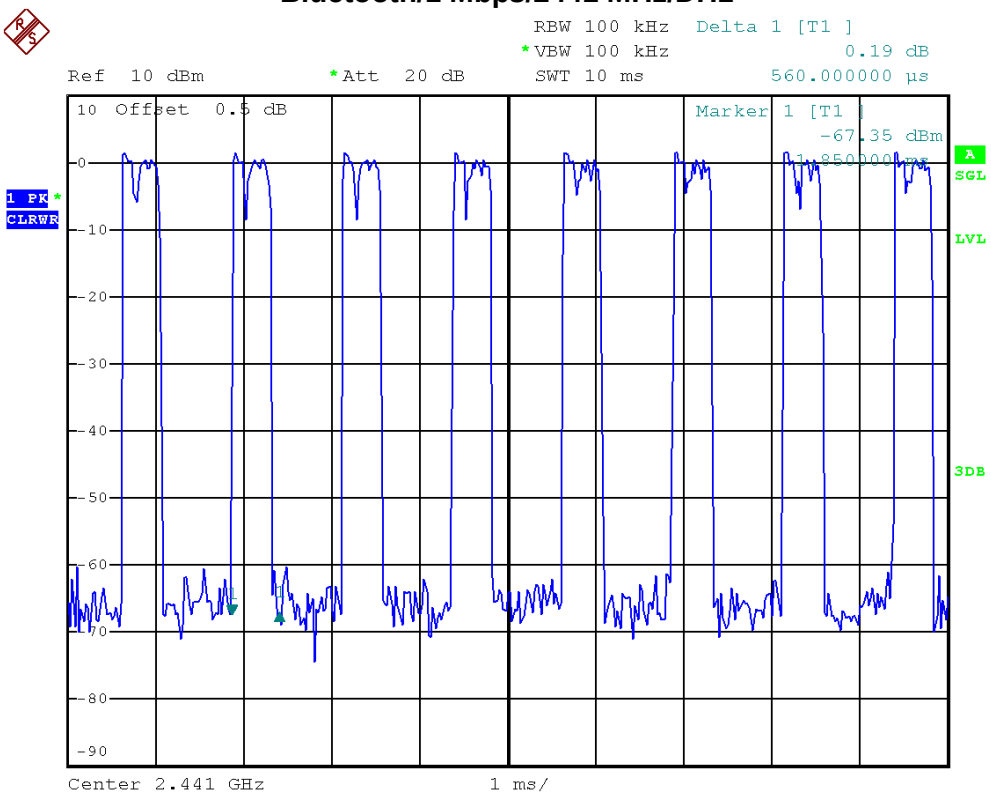
Bluetooth/1 Mbps/2441 MHz/DH5



Bluetooth/1 Mbps/2441 MHz/DH3



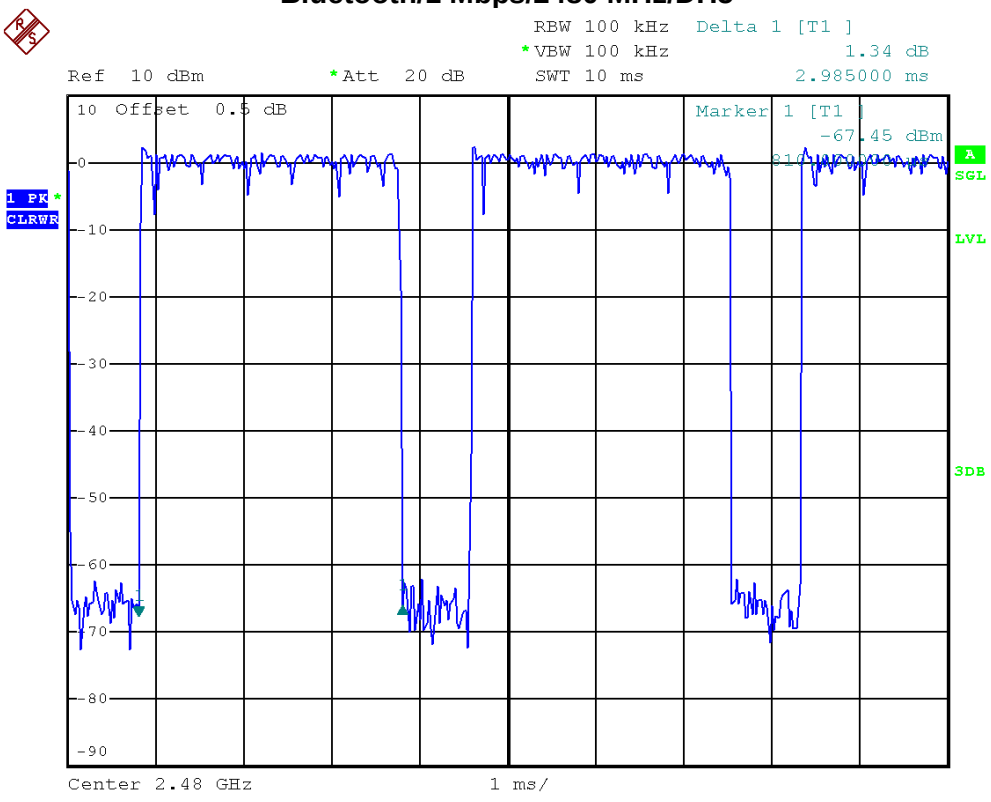
Bluetooth/1 Mbps/2441 MHz/DH1



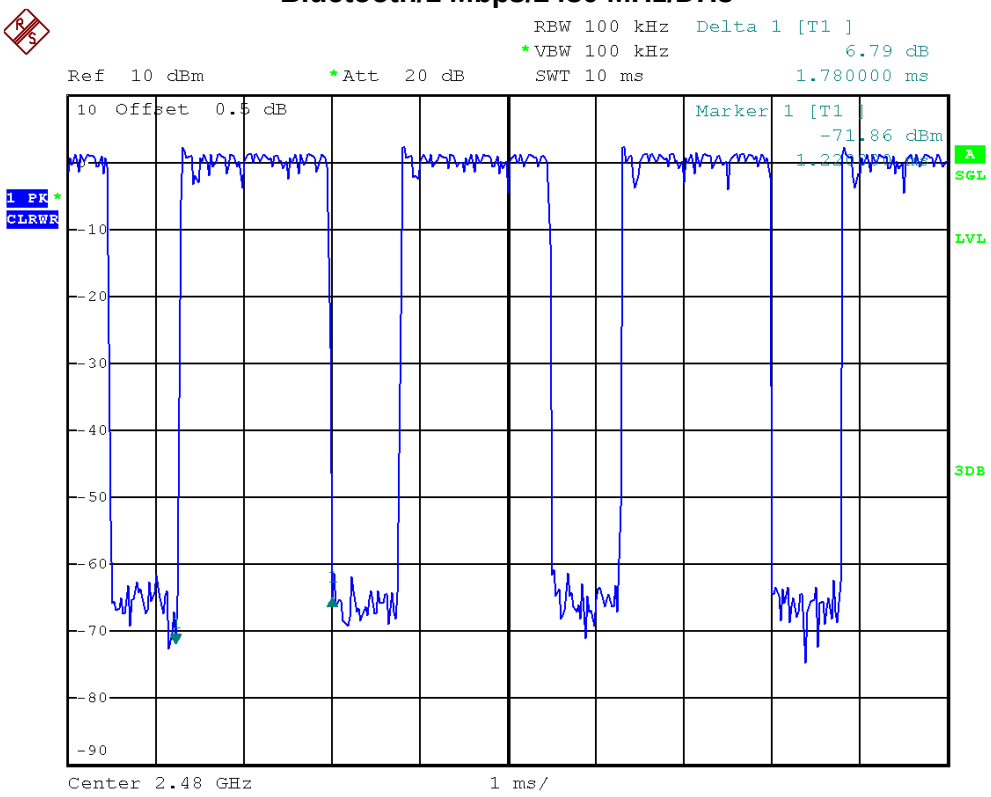
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/1 Mbps/2480 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2480 MHz	2.9850	0.3184	0.4	PASS
DH3	2480 MHz	1.7800	0.2848	0.4	PASS
DH1	2480 MHz	0.4800	0.1536	0.4	PASS

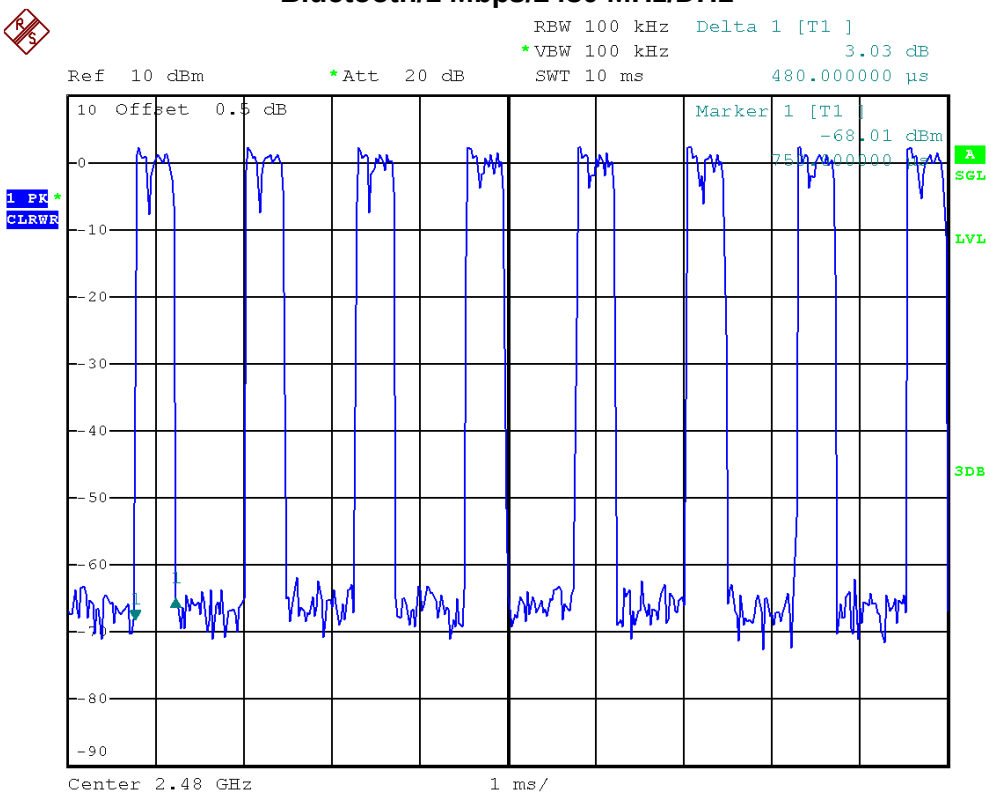
Bluetooth/1 Mbps/2480 MHz/DH5



Bluetooth/1 Mbps/2480 MHz/DH3



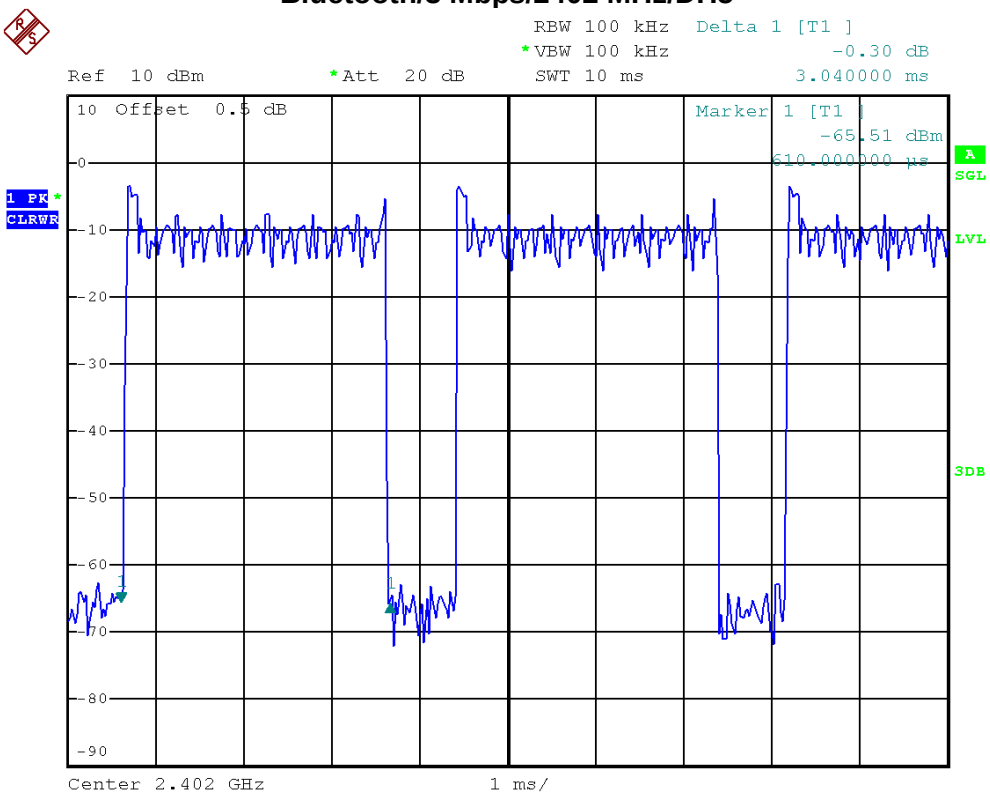
Bluetooth/1 Mbps/2480 MHz/DH1



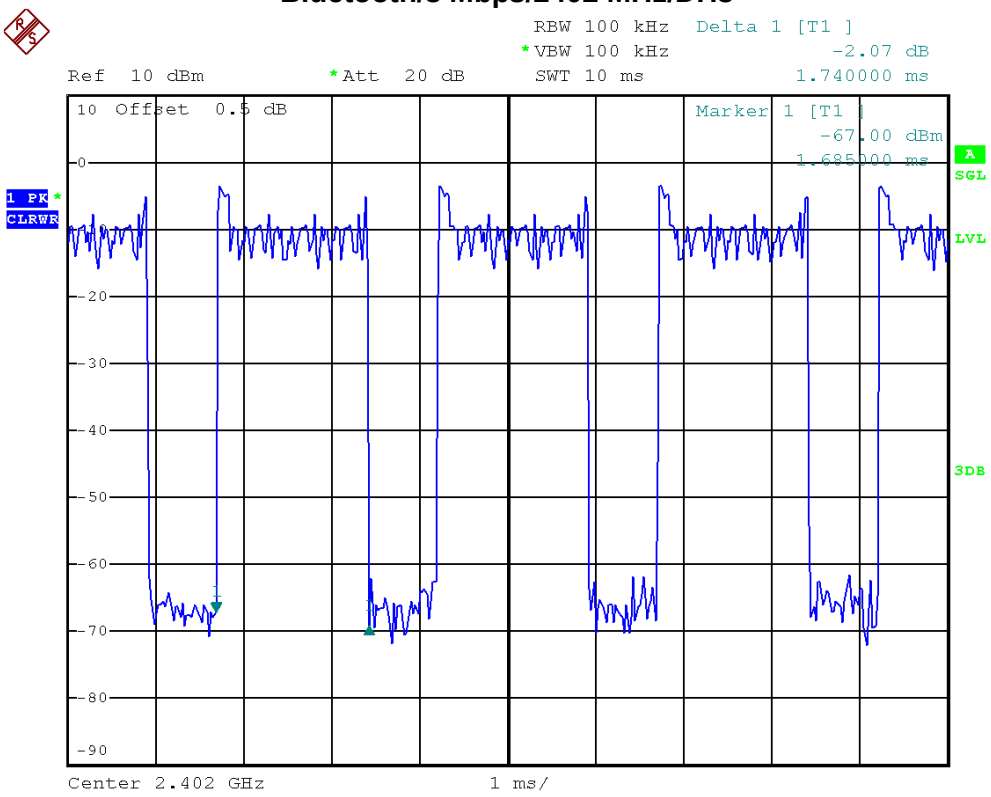
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2402 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2402 MHz	3.0400	0.3243	0.4	PASS
DH3	2402 MHz	1.7400	0.2784	0.4	PASS
DH1	2402 MHz	0.5200	0.1664	0.4	PASS

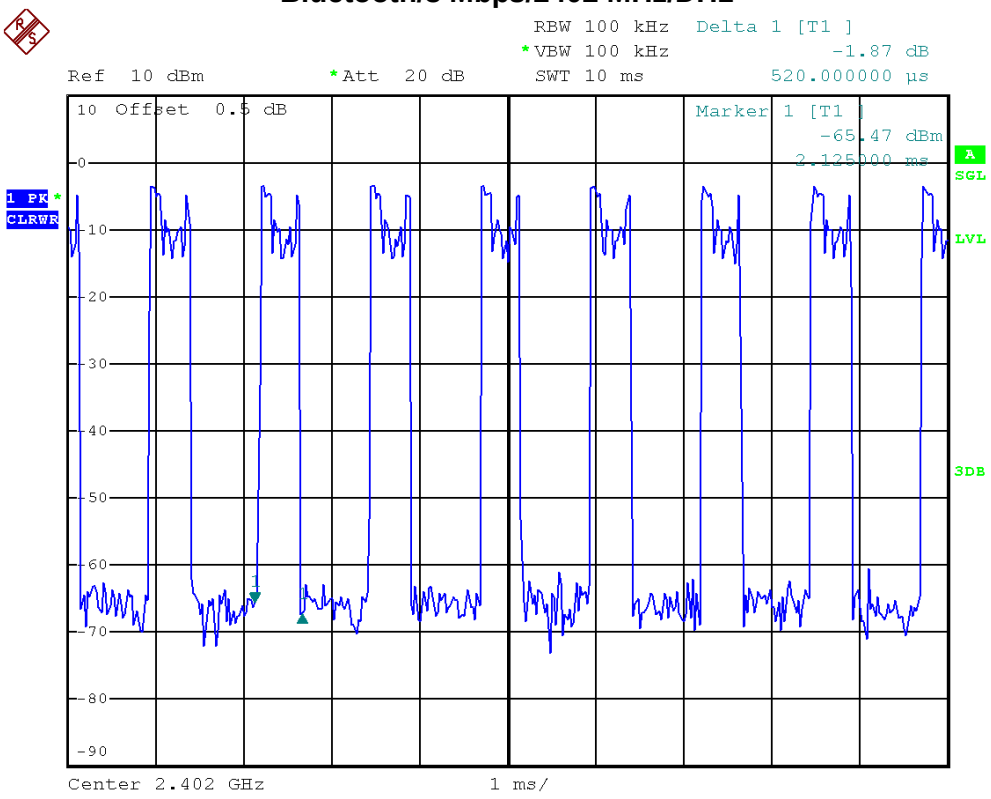
Bluetooth/3 Mbps/2402 MHz/DH5



Bluetooth/3 Mbps/2402 MHz/DH3



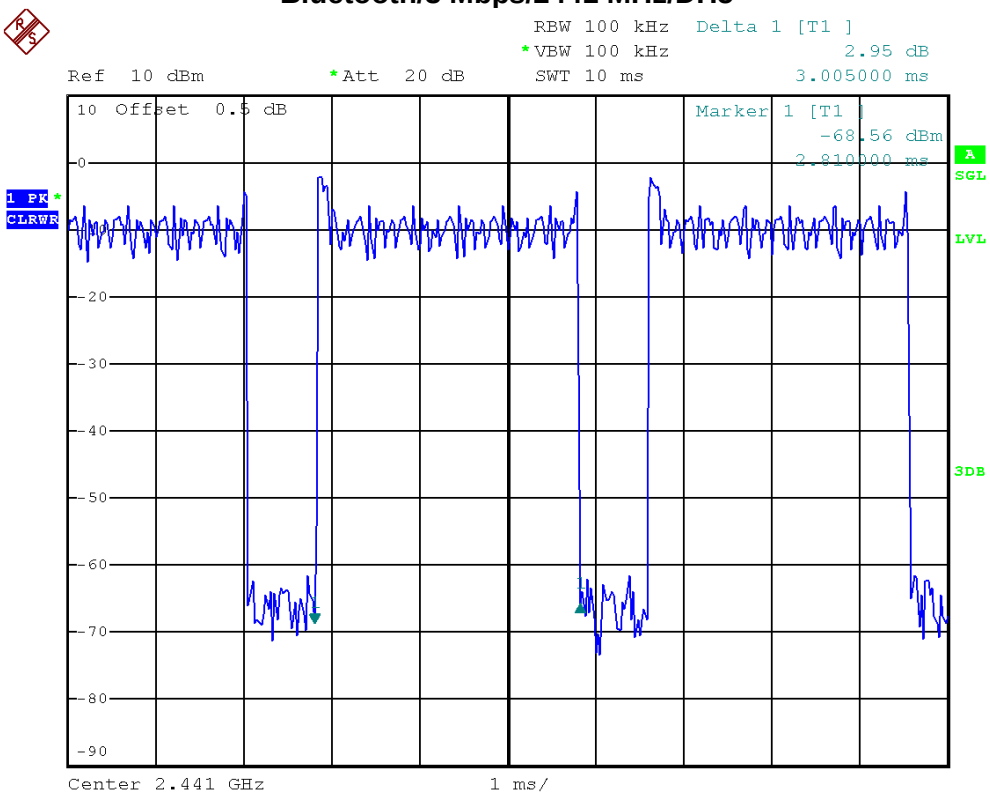
Bluetooth/3 Mbps/2402 MHz/DH1



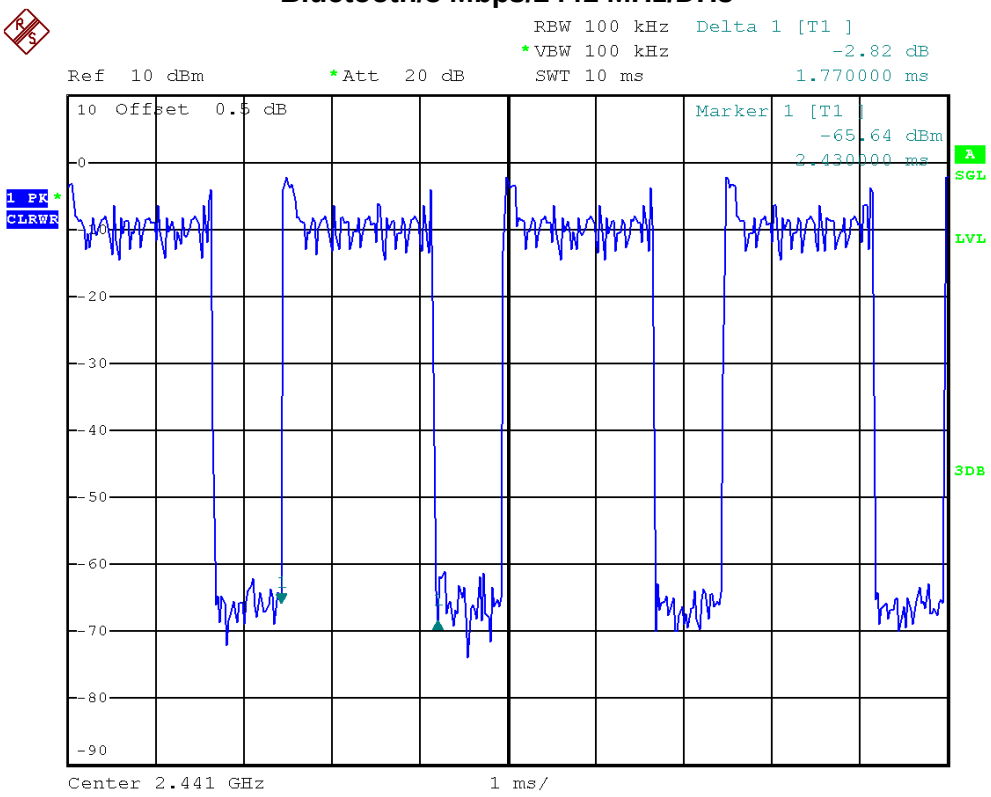
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2441 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2441 MHz	3.0050	0.3205	0.4	PASS
DH3	2441 MHz	1.7700	0.2832	0.4	PASS
DH1	2441 MHz	0.5200	0.1664	0.4	PASS

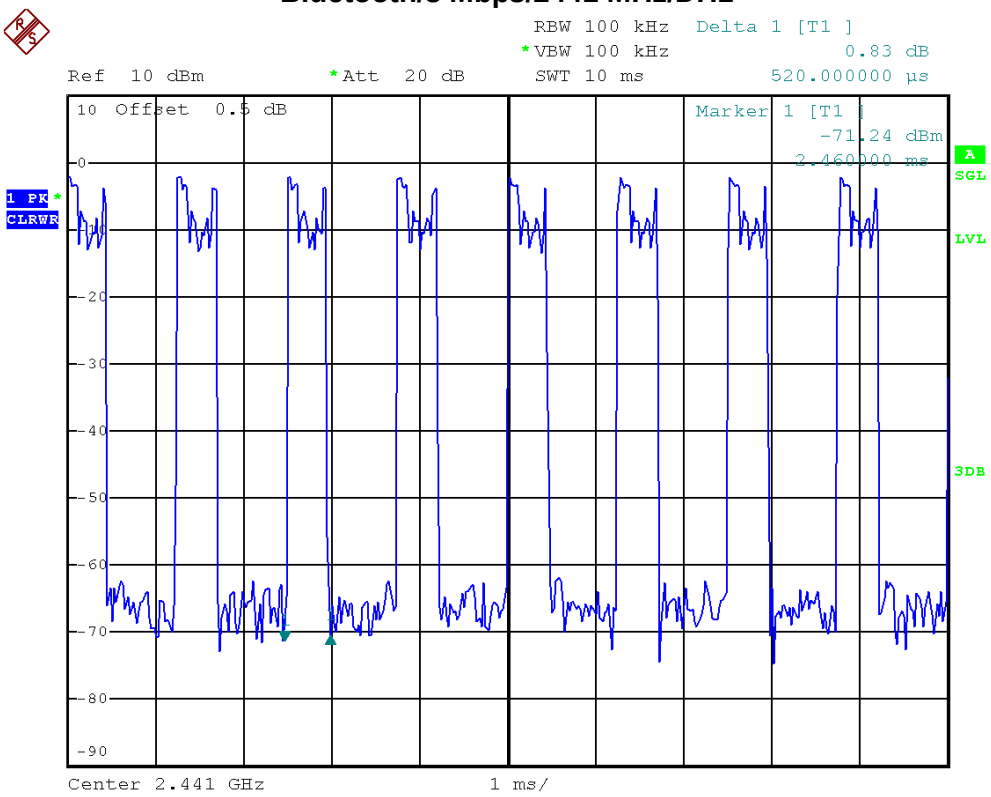
Bluetooth/3 Mbps/2441 MHz/DH5



Bluetooth/3 Mbps/2441 MHz/DH3



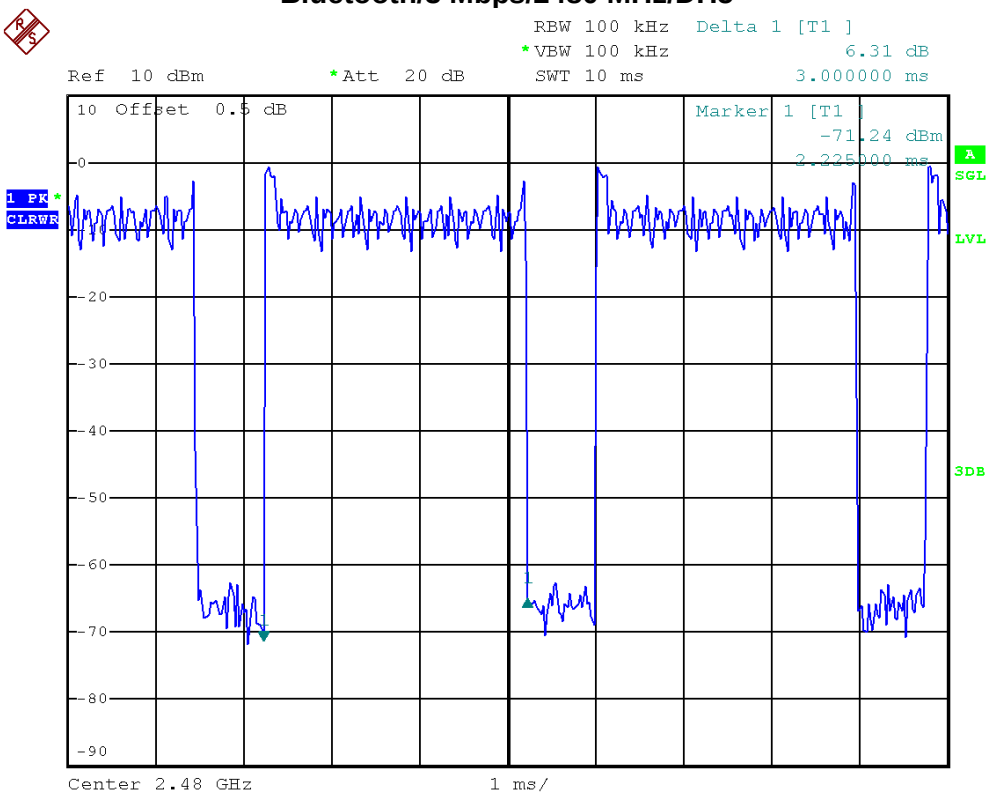
Bluetooth/3 Mbps/2441 MHz/DH1



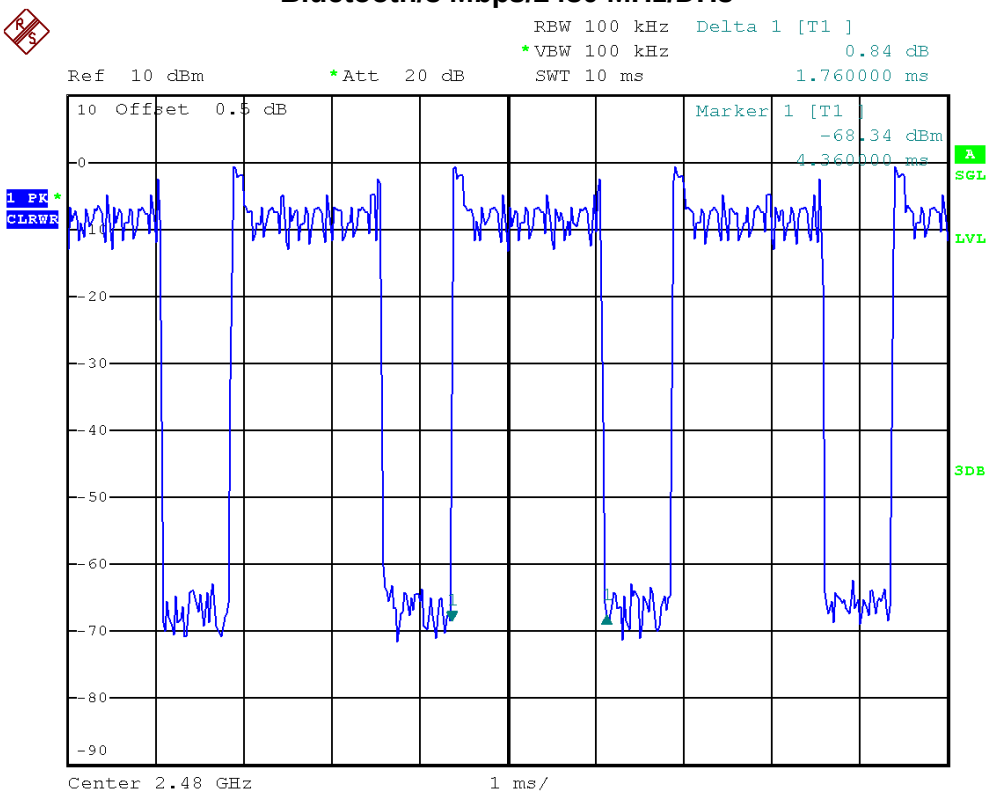
EUT	Bluetooth Module	Model Name	NF2301
Temperature	26°C	Relative Humidity	60%
Test Voltage	DC 5V		
Test Mode	Bluetooth/3 Mbps/2480 MHz		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Result
DH5	2480 MHz	3.0000	0.3200	0.4	PASS
DH3	2480 MHz	1.7600	0.2816	0.4	PASS
DH1	2480 MHz	0.5800	0.1856	0.4	PASS

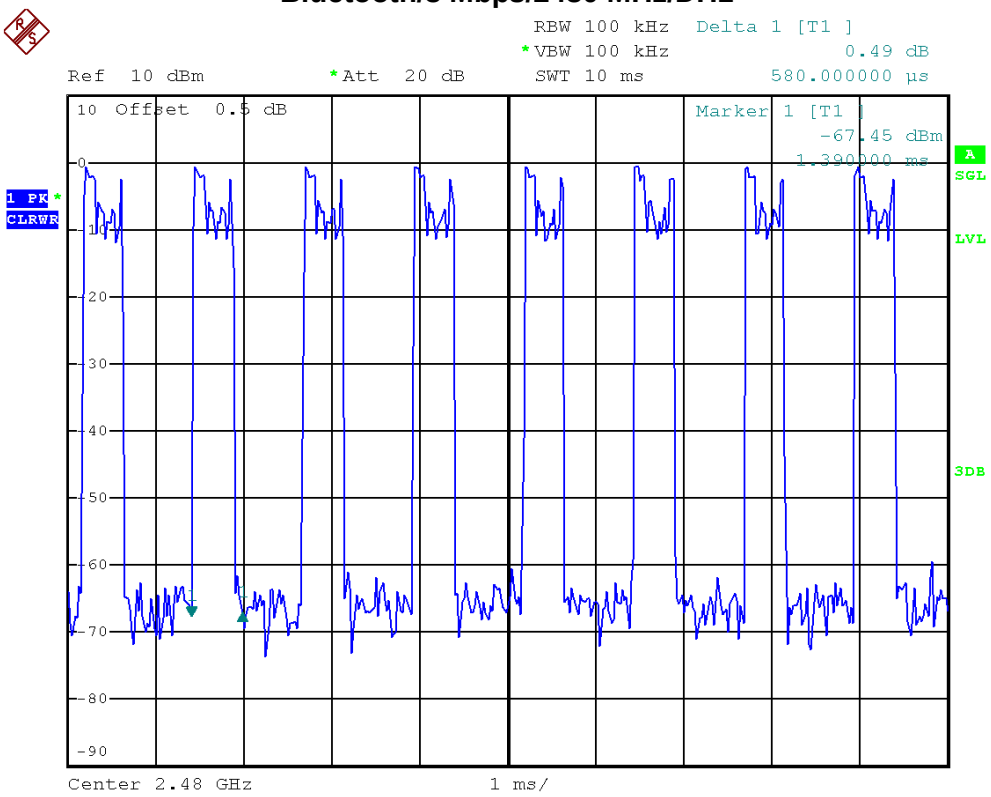
Bluetooth/3 Mbps/2480 MHz/DH5



Bluetooth/3 Mbps/2480 MHz/DH3



Bluetooth/3 Mbps/2480 MHz/DH1



11 RF EXPOSURE COMPLIANCE

11.1LIMIT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

NOTE: f = frequency in MHz ; *Plane-wave equivalent power density.

11.2MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2495A	1128008	Feb,20,2013
2	Power Meter Sensor	Anritsu	MA2411B	1126001	Feb,20,2013

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

11.3MPE CALCULATION METHOD

E (V/m) $= \frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) $= \frac{E^2}{377}$

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

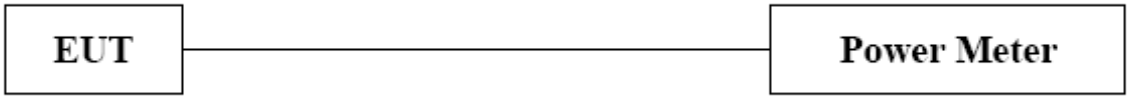
d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

11.4TEST SETUP LAYOUT



11.5DEVIATION FROM TEST STANDARD

No deviation

11.6EUT OPERATING CONDITIONS

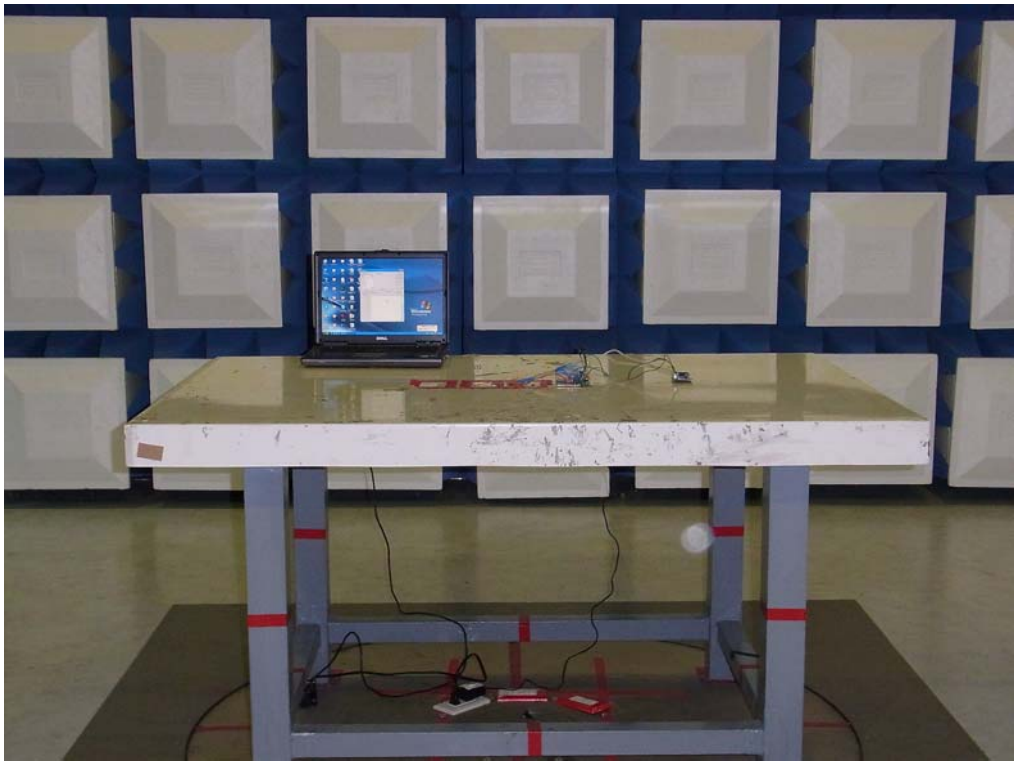
The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

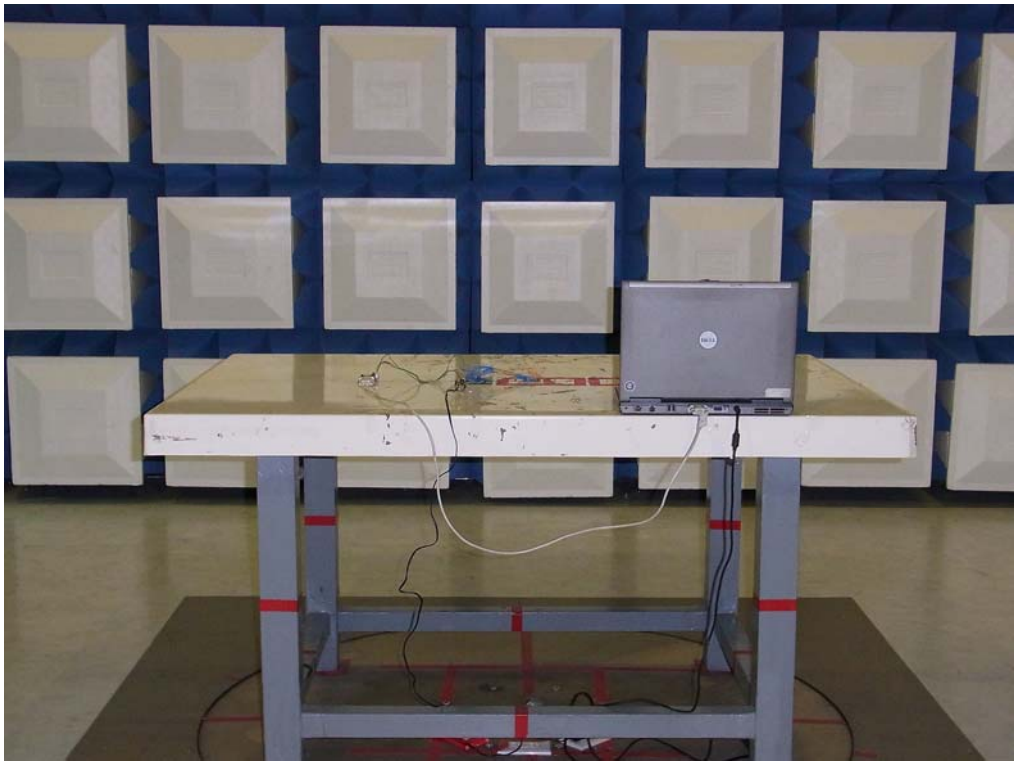
11.7TEST RESULTS

The power is so low so there is no need for RF calculations.

12 EUT TEST PHOTO

Radiated spurious emission test photos





Radiated spurious emission test photos