FCC Part 15C
Measurement and Test Report

For

Shenzhen See Me Here Electronic Co., Ltd.

3-4th Floor, Building D, TongFuYu Industrial Park, Xixiang Town, Bao'an District, Shenzhen, China

FCC ID: 2ABNJ-BV270

FCC Rule(s):	FCC Part 15.247
Product Description:	Bluetooth speaker
Tested Model:	BV270
Report No.:	STR16078039I-1
Tested Date:	2016-07-05 to 2016-07-28
Issued Date:	2016-07-28
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TABLE OF CONTENTS

1. GENERAL INFORMATION....4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)....4
1.2 TEST STANDARDS....5
1.3 TEST METHODOLOGY....5
1.4 TEST FACILITY....5
1.5 EUT SETUP AND TEST MODE....6
1.6 MEASUREMENT UNCERTAINTY....7
1.7 TEST EQUIPMENT LIST AND DETAILS....7

2. SUMMARY OF TEST RESULTS....8

3. RF EXPOSURE....9
3.1 STANDARD APPLICABLE....9
3.2 TEST RESULT....9

4. ANTENNA REQUIREMENT....10
4.1 STANDARD APPLICABLE....10
4.2 EVALUATION INFORMATION....10

5. FREQUENCY HOPPING SYSTEM REQUIREMENTS....11
5.1 STANDARD APPLICABLE....11
5.2 FREQUENCY HOPPING SYSTEM....11
5.3 EUT PSEUDORANDOM FREQUENCY HOPPING SEQUENCE....12

6. QUANTITY OF HOPPING CHANNELS AND CHANNEL SEPARATION....13
6.1 STANDARD APPLICABLE....13
6.2 TEST PROCEDURE....13
6.3 ENVIRONMENTAL CONDITIONS....13
6.4 SUMMARY OF TEST RESULTS/PLOTS....14

7. DWELL TIME OF HOPPING CHANNEL....18
7.1 STANDARD APPLICABLE....18
7.2 TEST PROCEDURE....18
7.3 ENVIRONMENTAL CONDITIONS....18
7.4 SUMMARY OF TEST RESULTS/PLOTS....19

8. 20DB BANDWIDTH....29
8.1 STANDARD APPLICABLE....29
8.2 TEST PROCEDURE....29
8.3 ENVIRONMENTAL CONDITIONS....29
8.4 SUMMARY OF TEST RESULTS/PLOTS....29

9. RF OUTPUT POWER....33
9.1 STANDARD APPLICABLE....33
9.2 TEST PROCEDURE....33
9.3 ENVIRONMENTAL CONDITIONS....33
9.4 SUMMARY OF TEST RESULTS/PLOTS....33

10. FIELD STRENGTH OF SPURIOUS EMISSIONS....35
10.1 STANDARD APPLICABLE....35
10.2 TEST PROCEDURE....35
10.3 CORRECTED AMPLITUDE & MARGIN CALCULATION....36
10.4 ENVIRONMENTAL CONDITIONS....36
10.5 SUMMARY OF TEST RESULTS/PLOTS....37

11. OUT OF BAND EMISSIONS....44
11.1 STANDARD APPLICABLE....44
11.2 TEST PROCEDURE....44
11.3 ENVIRONMENTAL CONDITIONS....45
11.4 SUMMARY OF TEST RESULTS/PLOTS....45

12. CONDUCTED EMISSIONS....49
12.1 TEST PROCEDURE....49

12.2 BASIC TEST SETUP BLOCK DIAGRAM....49
12.3 ENVIRONMENTAL CONDITIONS....49
12.4 TEST RECEIVER SETUP....50
12.5 SUMMARY OF TEST RESULTS/PLOTS....50
12.6 CONDUCTED EMISSIONS TEST DATA....50

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Shenzhen See Me Here Electronic Co., Ltd.
Address of applicant: 3-4th Floor, Building D, TongFuYu Industrial Park, Xixiang Town, Bao'an District, Shenzhen, China

Manufacturer: Shenzhen See Me Here Electronic Co., Ltd.
Address of manufacturer: 3-4th Floor, Building D, TongFuYu Industrial Park, Xixiang Town, Bao'an District, Shenzhen, China Shenzhen

General Description of EUT	
Product Name:	Bluetooth speaker
Trade Name:	See me here
Model No.:	BV270
Adding Model(s):	/
Rated Voltage:	DC 3.7V battery
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT	
Bluetooth Version:	V4.0 (Compatible V3.0 mode)
Frequency Range:	2402-2480MHz
RF Output Power:	3.235dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, Pi/4 DQPSK, 8DPSK
Quantity of Channels:	79
Channel Separation:	1MHz
Type of Antenna:	PCB Antenna
Antenna Gain:	1.0dBi
Lowest Internal Frequency of EUT:	32.768kHz

1.2 Test Standards

The following report is prepared on behalf of the Shenzhen See Me Here Electronic Co., Ltd. in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The measurement guide DA 00-705 for frequency hopping spread spectrum systems shall be performed also.

1.4 Test Facility

FCC – Registration No.: 934118
Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062
Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	2402MHz
TM2	Middle Channel	2441MHz
TM3	High Channel	2480MHz
TM4	Hopping	2402-2480MHz

Modulation Configure			
Modulation	Packet	Packet Type	Packet Size
GFSK	DH1	4	27
	DH3	11	183
	DH5	15	339
Pi/4 DQPSK	2DH1	20	54
	2DH3	26	367
	2DH5	30	379
8DPSK	3DH1	24	83
	3DH3	27	552
	3DH5	31	1021
Normal mode: the Bluetooth has been tested on the modulation of GFSK, (Pi/4)DQPSK and 8DPSK, compliance test and record the worst case.			

Accessories Equipment List and Details			
Description	**Manufacturer**	**Model No.**	**Serial Number**
/	/	/	/
Accessories Cable List and Details			
Cable Description	**Length (m)**	**Shielded/Unshielded**	**With Core/Without Core**
/	/	/	/
EUT Cable List and Details			
Cable Description	**Length (m)**	**Shielded/Unshielded**	**With Core/Without Core**
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	±2.88dB
Transmitter Spurious Emissions	Radiated	±5.1dB

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2016-06-04	2017-06-03
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2016-06-04	2017-06-03
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
SEMT-1042	Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03
SEMT-1121	Horn Antenna	ETS	3116B	00088203	2016-06-04	2017-06-03
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-04	2017-06-03
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2016-06-04	2017-06-03
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2016-06-04	2017-06-03
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2016-06-04	2017-06-03

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	RF Exposure	Compliant
§ 15.203; § 15.247(b)(4)(i)	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.209(a)	Radiated Spurious Emissions	Compliant
§ 15.247(a)(1)(iii)	Quantity of Hopping Channel	Compliant
§ 15.247(a)(1)	Channel Separation	Compliant
§ 15.247(a)(1)(iii)	Time of Occupancy (Dwell time)	Compliant
§ 15.247(a)	20dB Bandwidth	Compliant
§ 15.247(b)(1)	RF Power Output	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant
§ 15.247(a)(1)	Frequency Hopping Sequence	Compliant
§ 15.247(g), (h)	Frequency Hopping System	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has a PCB antenna, fulfill the requirement of this section.

5. Frequency Hopping System Requirements

5.1 Standard Applicable

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

5.2 Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centred from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.

This device was tested with an bluetooth system receiver to check that the device maintained hopping synchronization, and the device complied with these requirements for DA 00-705 and FCC Part 15.247 rule.

5.3 EUT Pseudorandom Frequency Hopping Sequence

Pseudorandom Frequency Hopping Sequence Table as below:
Channel: 08, 24, 40, 56, 40, 56, 72, 09, 01, 09, 33, 41, 33, 41, 65, 73, 53, 69, 06, 22, 04, 20, 36, 52, 38, 46, 70, 78, 68, 76, 21, 29, 10, 26, 42, 58, 44, 60, 76, 13, 03, 11, 35, 43, 37, 45, 69, 77, 55, 71, 08, 24, 08, 24, 40, 56, 40, 48, 72, 01, 72, 01, 25, 33, 12, 28, 44, 60, 42, 58, 74, 11, 05, 13, 37, 45 etc.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

6. Quantity of Hopping Channels and Channel Separation

6.1 Standard Applicable

According to FCC 15.247(a)(1), 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, and frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

6.2 Test Procedure

According to the DA 00-705, the number of hopping frequencies test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Set span = the frequency band of operation (2400MHz to 2483.5MHz)
RBW ⩾ 1% of the span
VBW ⩾ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize, observed the band of 2400MHz to 2483.5MHz, than count it out the number of channels for comparing with the FCC rules.

The channel spacing test method as follows:

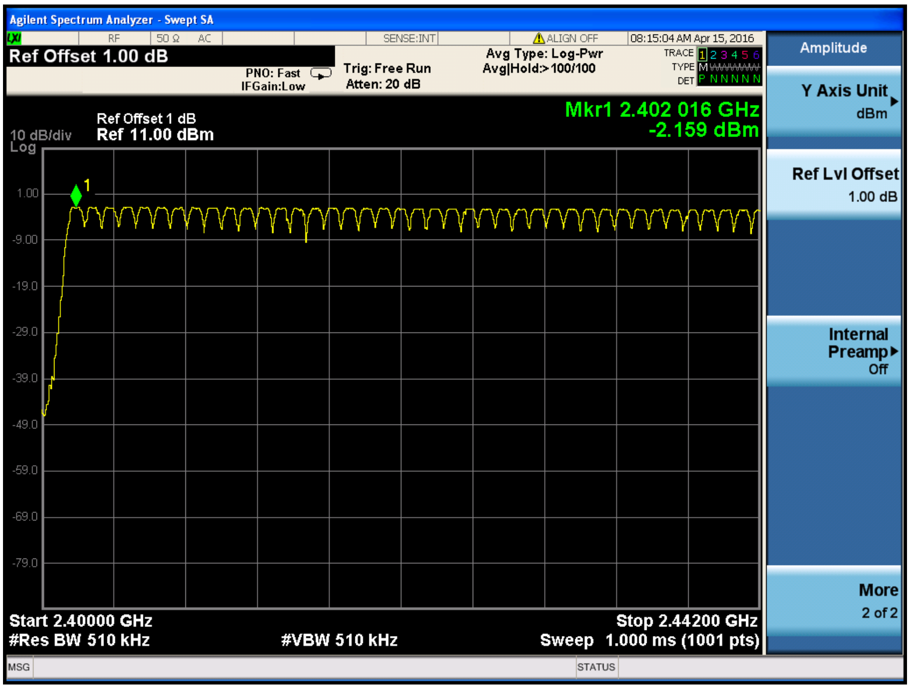
Set span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ⩾ 1% of the span
Video (or Average) Bandwidth (VBW) ⩾ RBW
Sweep = auto; Detector function = peak; Trace = max hold
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

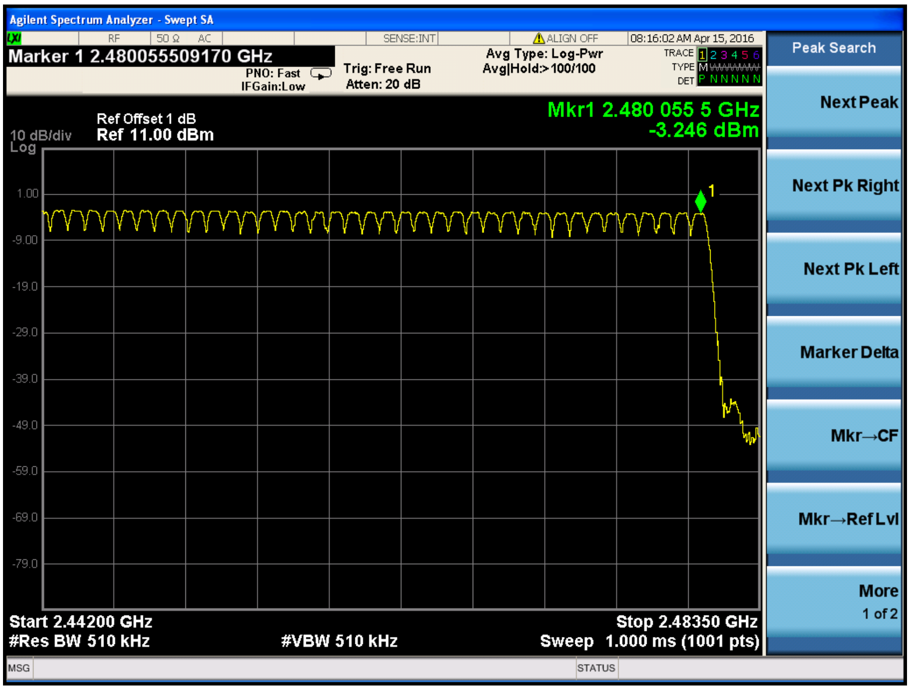
6.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

6.4 Summary of Test Results/Plots

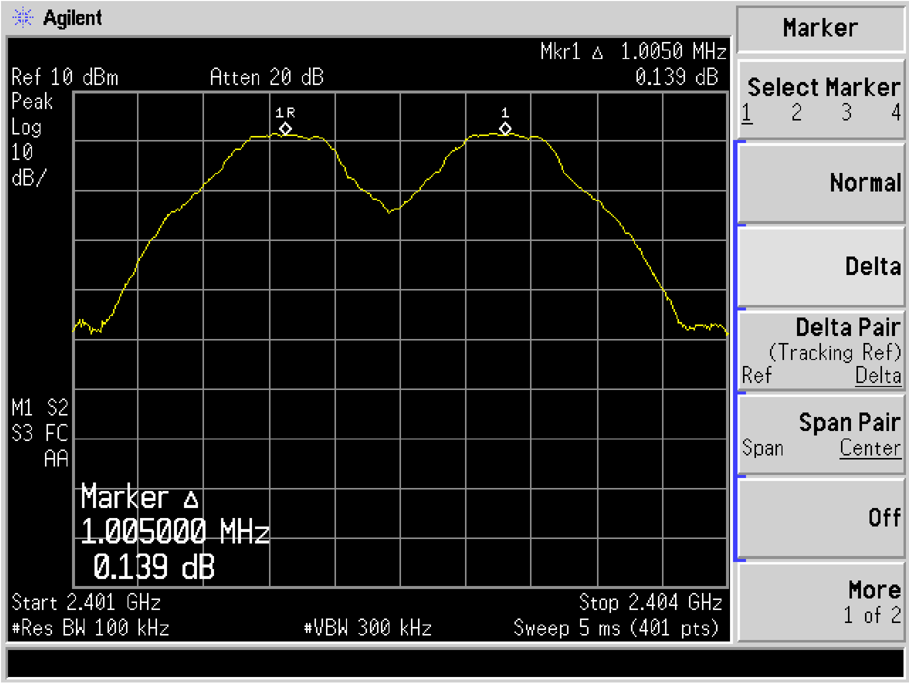
No. of Channel = 79



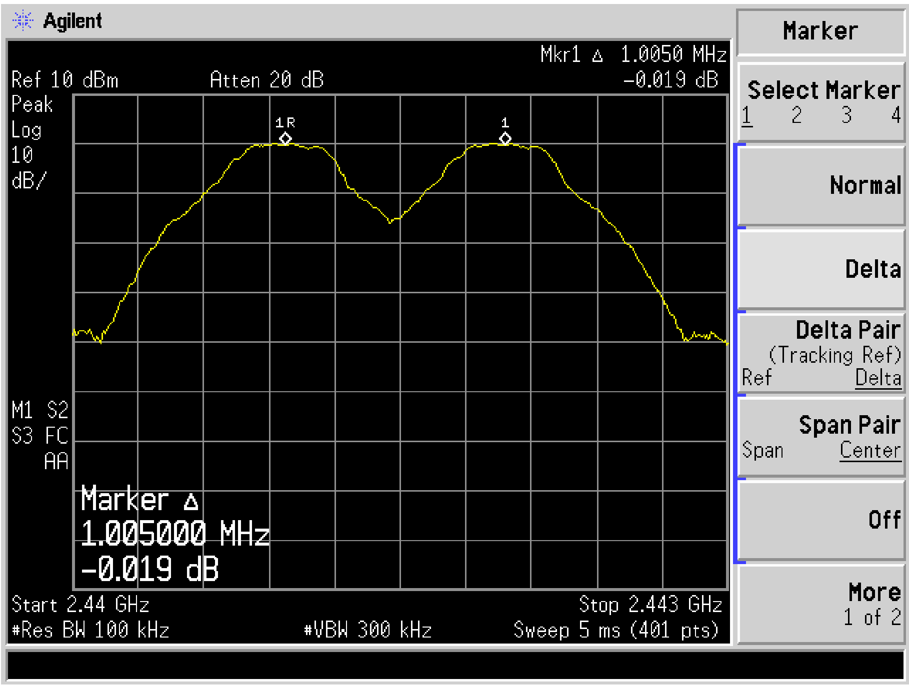


For GFSK mode

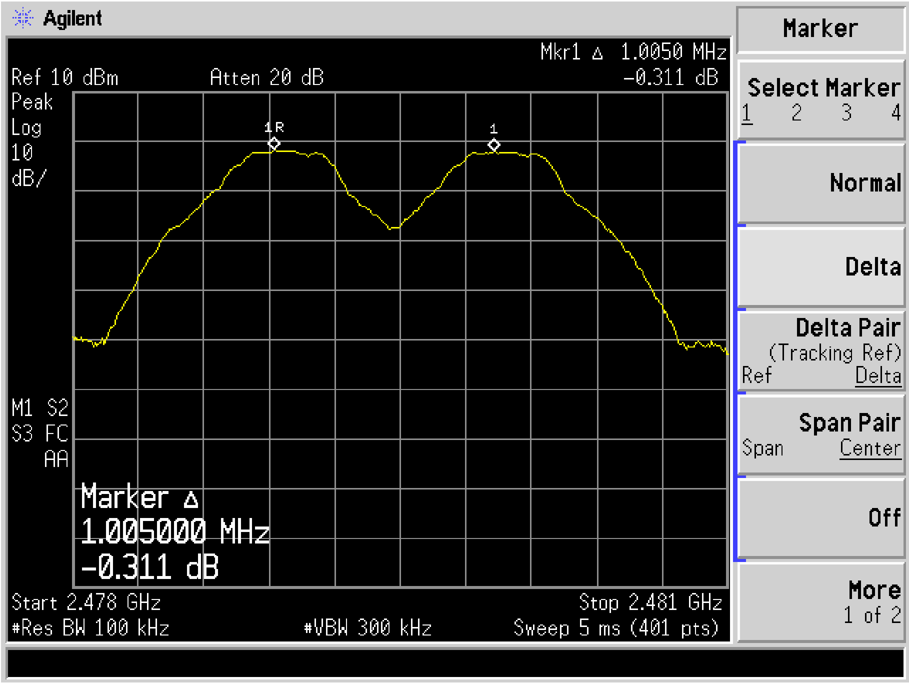
Channel Spacing (Low CH=1MHz)



Channel Spacing (Middle CH=1MHz)

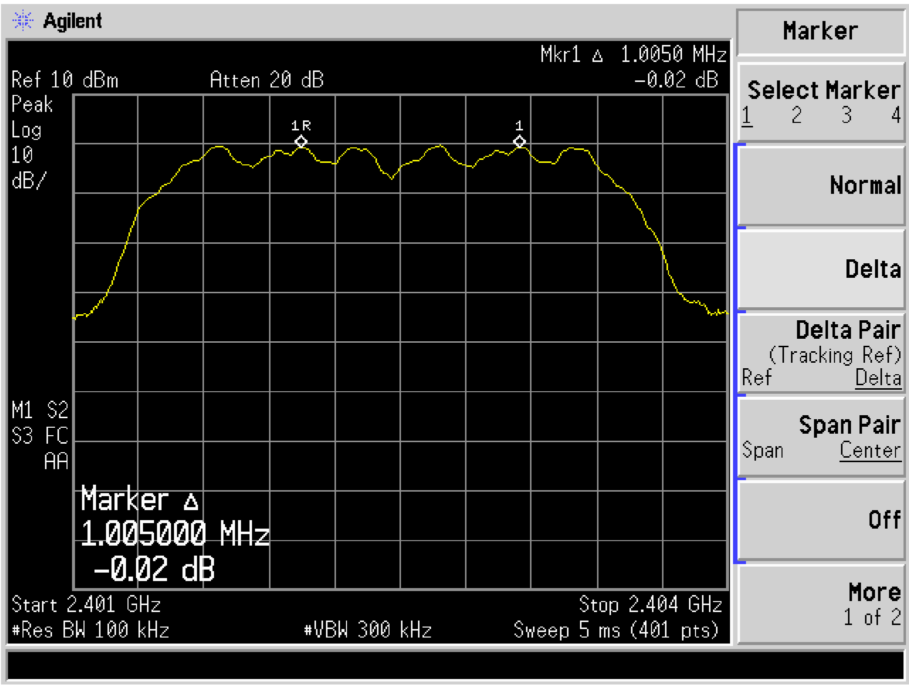


Channel Spacing (High CH=1MHz)

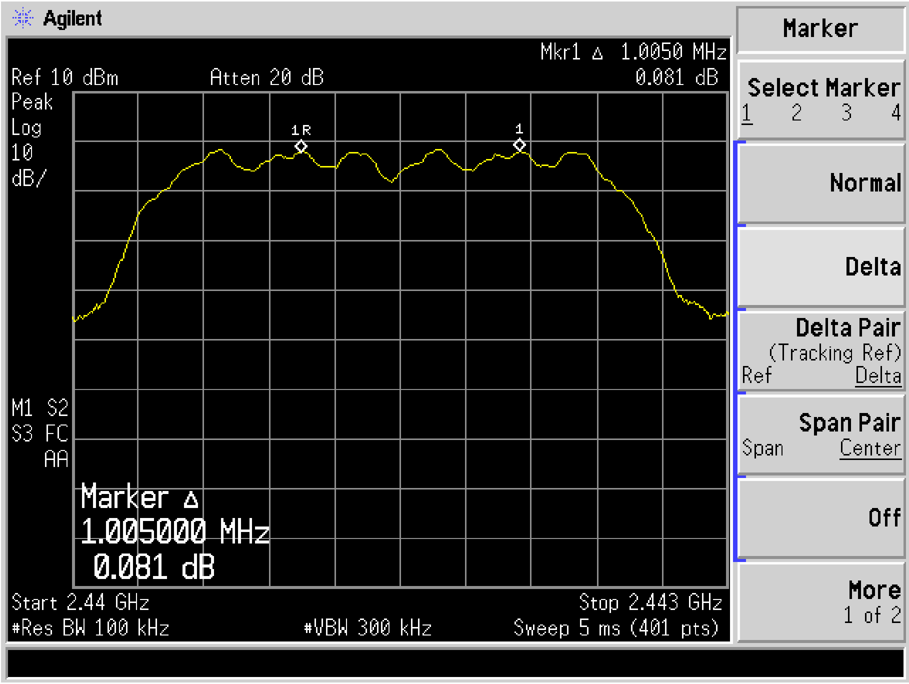


For 8DPSK mode

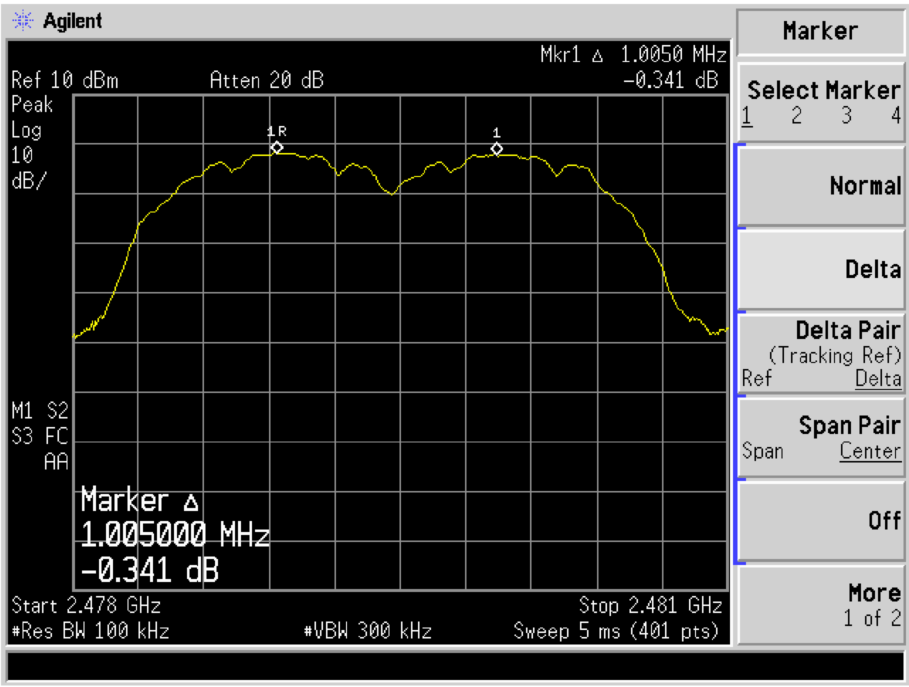
Channel Spacing (Low CH=1MHz)



Channel Spacing (Middle CH=1MHz)



Channel Spacing (High CH=1MHz)



7. Dwell Time of Hopping Channel

7.1 Standard Applicable

According to 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.

7.2 Test Procedure

According to the DA 00-705, the dwell time of a hopping channel test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Span = zero span, centered on a hopping channel
RBW = 1 MHz
VBW ≥ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel
Detector function = peak
Trace = max hold
Use the marker-delta function to determine the dwell time

7.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

7.4 Summary of Test Results/Plots

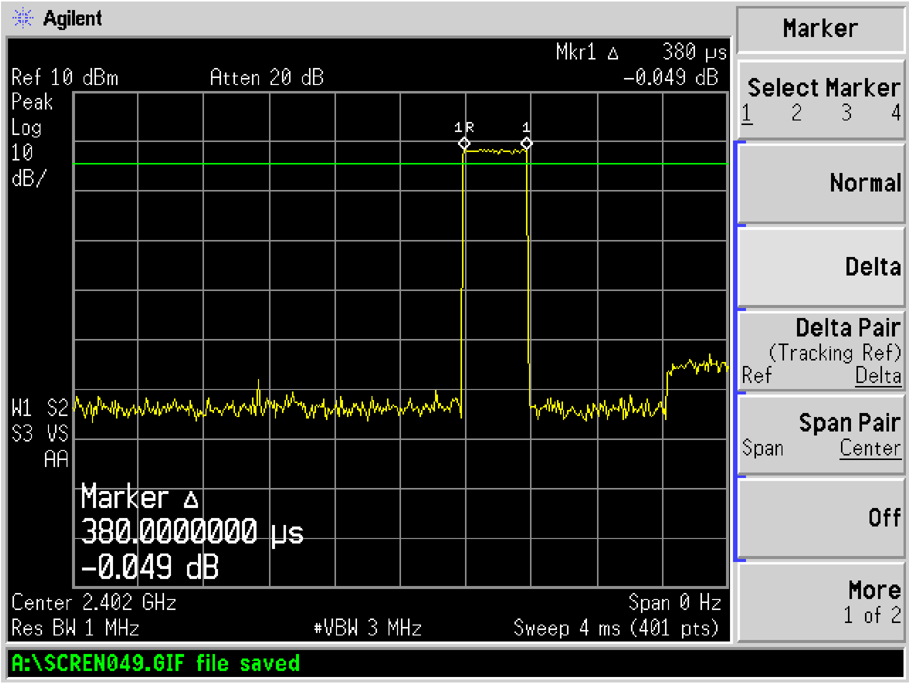
The dwell time within a period in data mode is independent from the packet type (packet length).
Test data is corrected with the worse case, which the packet length is DH1, DH3, and DH5.

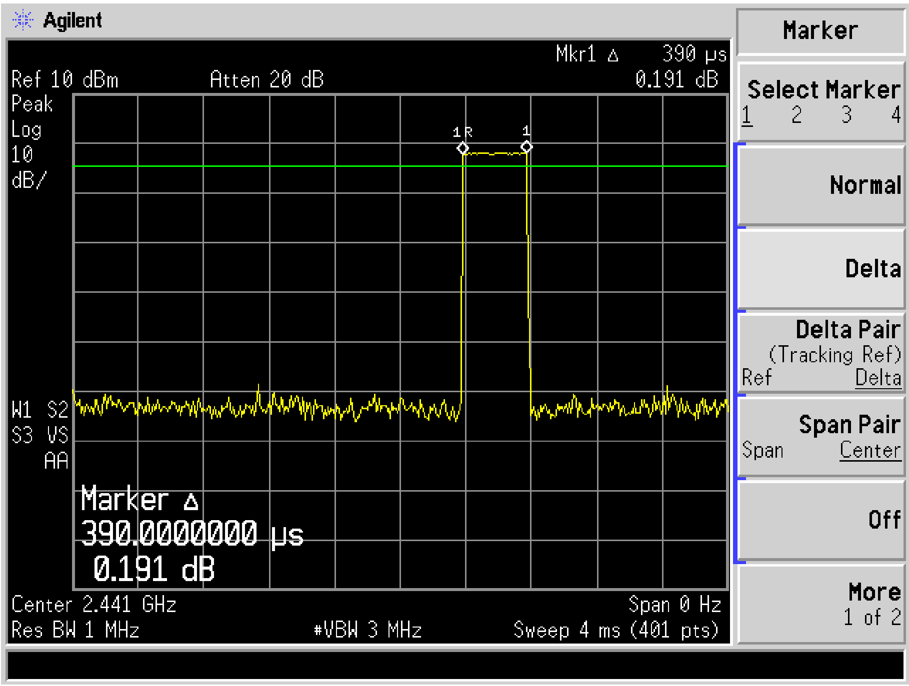
The test period: T = 0.4 Second * 79 Channel = 31.6 s
Dwell time = time slot length * (Hopping rate / Number of hopping channels) * Period

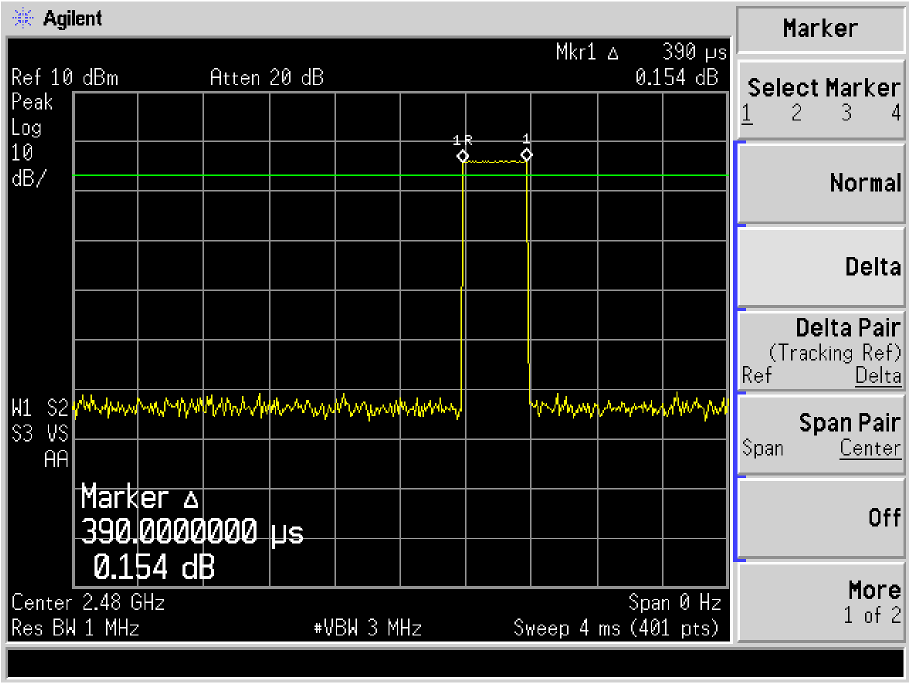
Modulation	Test Channel	Packet	Time Slot Length	Dwell Time	Limit
			ms	ms	ms
GFSK	2402MHz	DH1	0.38	121.600	400
		DH3	1.64	262.400	400
		DH5	2.89	308.267	400
	2441MHz	DH1	0.39	124.800	400
		DH3	1.64	262.400	400
		DH5	2.89	308.267	400
	2480MHz	DH1	0.39	124.800	400
		DH3	1.65	264.000	400
		DH5	2.89	308.267	400
8DPSK	2402MHz	3DH1	0.39	124.800	400
		3DH3	1.63	260.800	400
		3DH5	2.90	309.333	400
	2441MHz	3DH1	0.39	124.800	400
		3DH3	1.64	262.400	400
		3DH5	2.90	309.333	400
	2480MHz	3DH1	0.38	121.600	400
		3DH3	1.64	262.400	400
		3DH5	2.90	309.333	400

Please refer to the test plots as below:

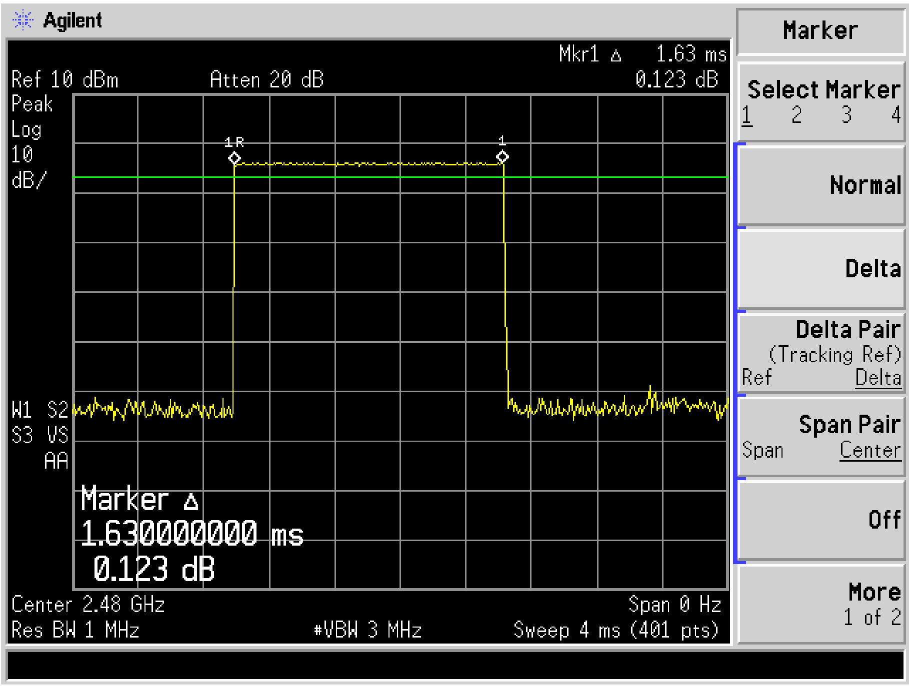
DH1 time slot (Low, Middle, High Channels)

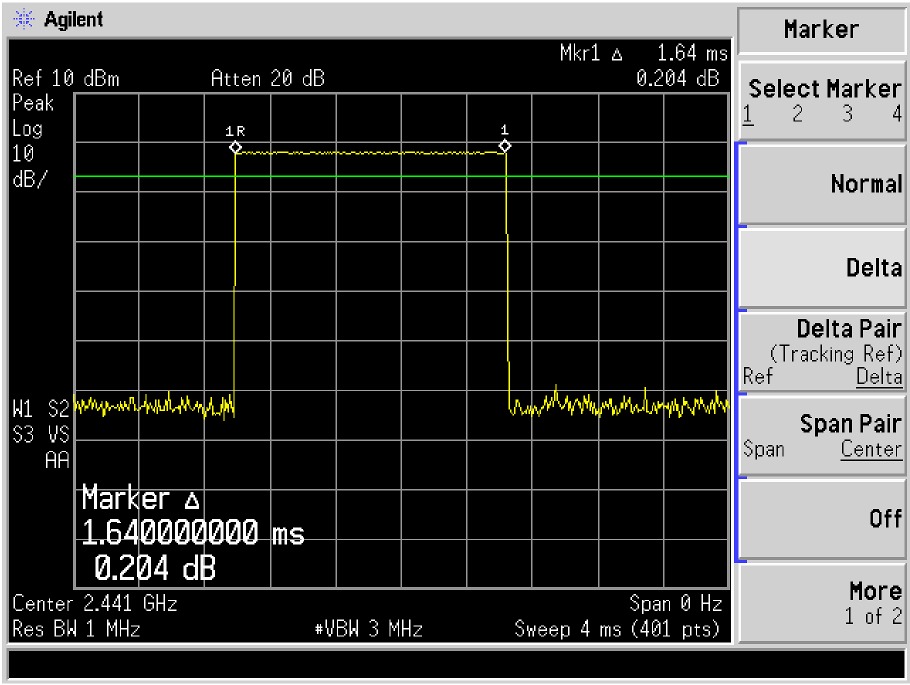


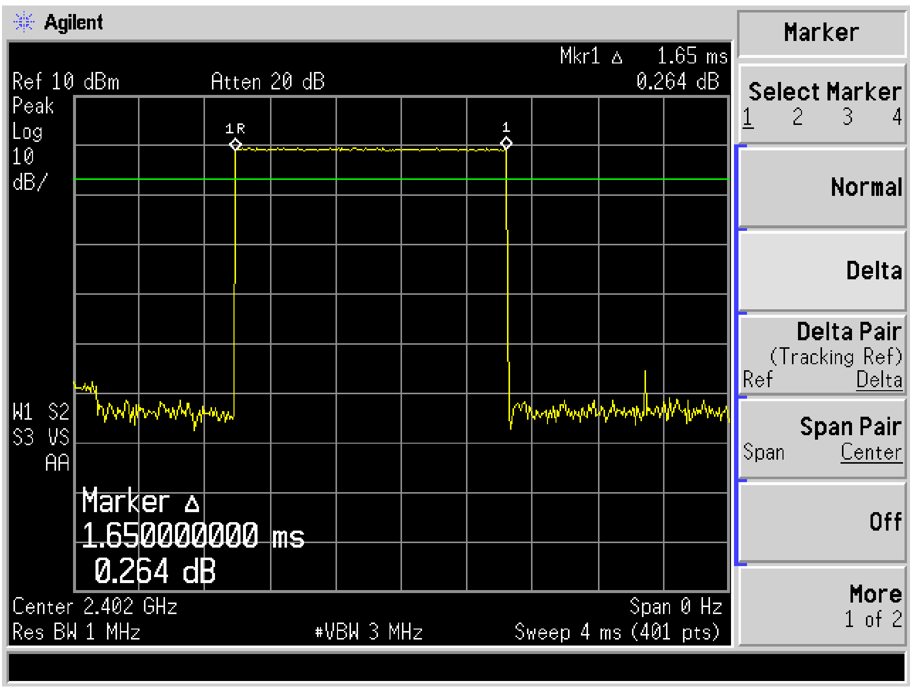




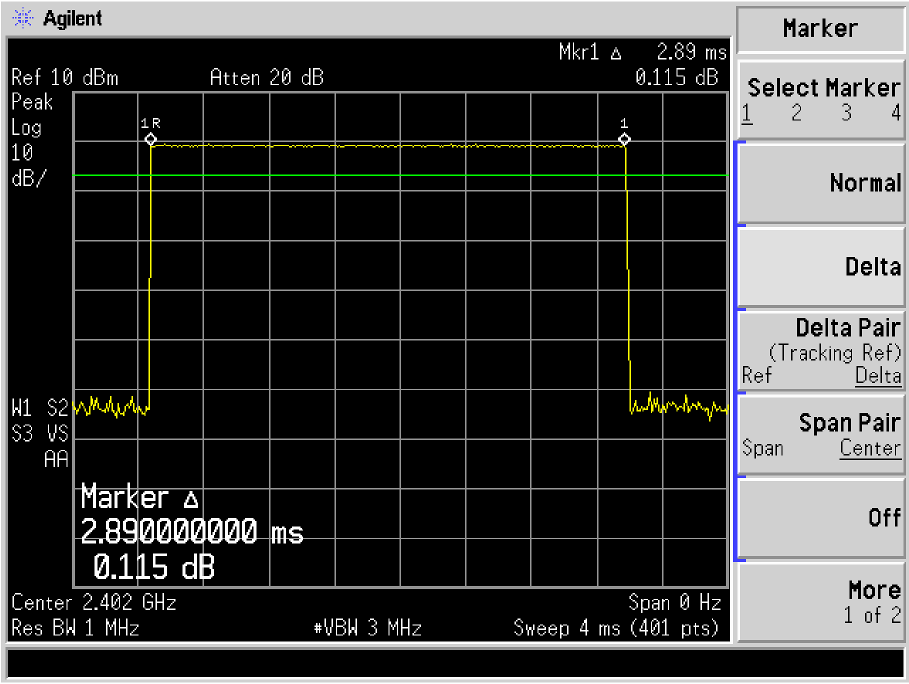
DH3 time slot (Low, Middle, High Channels)

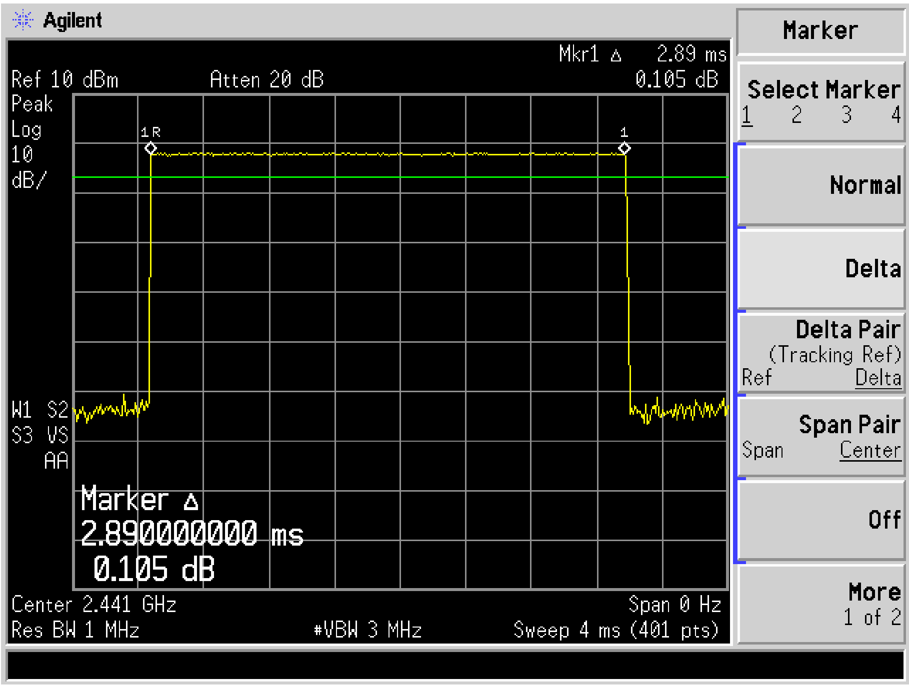


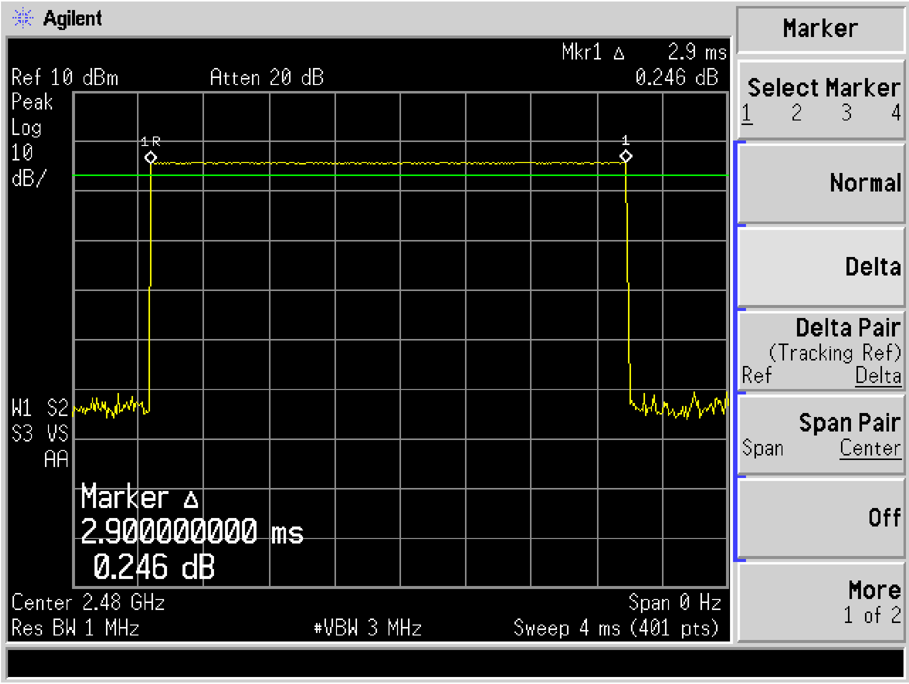

Agilent
Mkr1 Δ 1.64 ms
Ref 10 dBm Atten 20 dB 0.204 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 VS
AA
Marker Δ
1.640000000 ms
0.204 dB
Center 2.441 GHz Span 0 Hz
Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 Δ 1.65 ms
Ref 10 dBm Atten 20 dB 0.264 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 VS
AA
Marker Δ
1.650000000 ms
0.264 dB
Center 2.402 GHz Span 0 Hz
Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

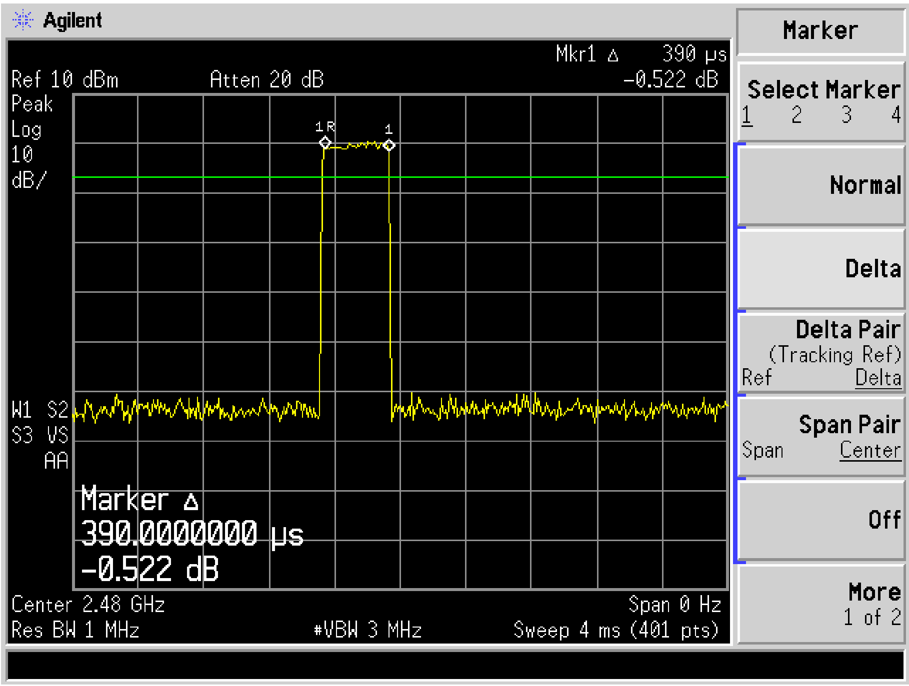
DH5 time slot (Low, Middle, High Channels)

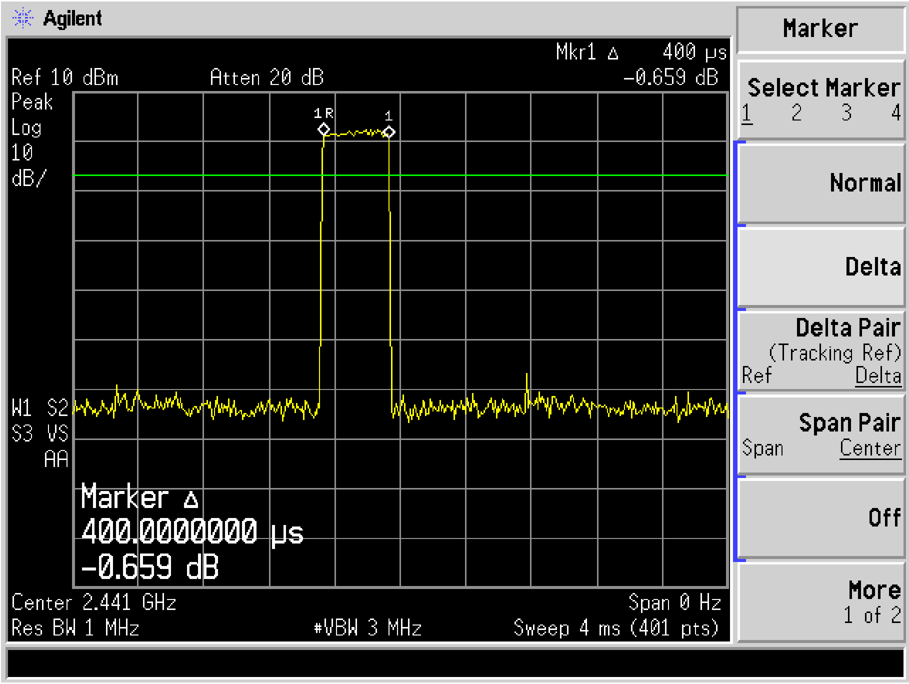


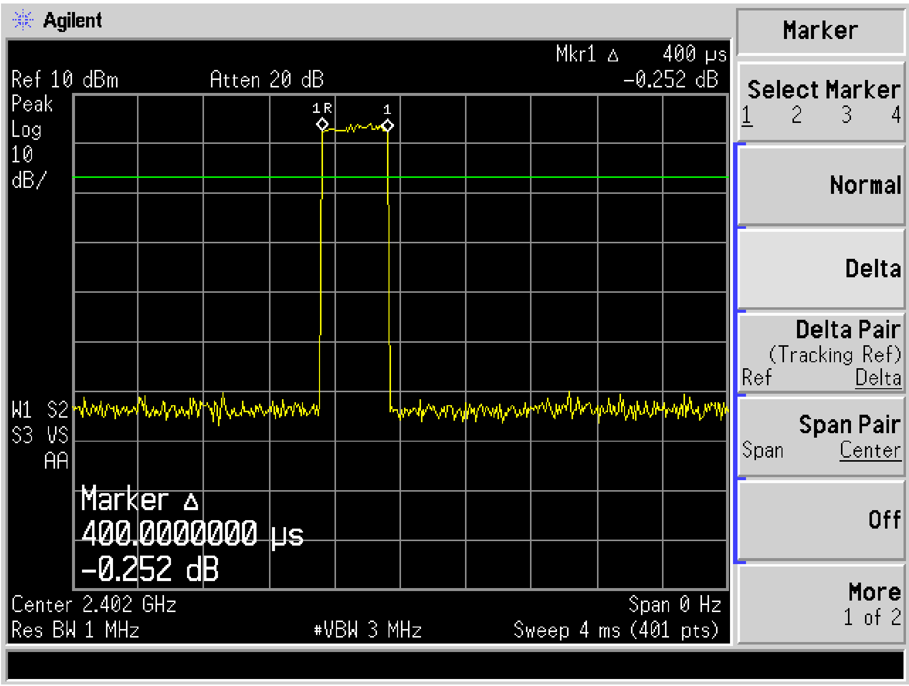




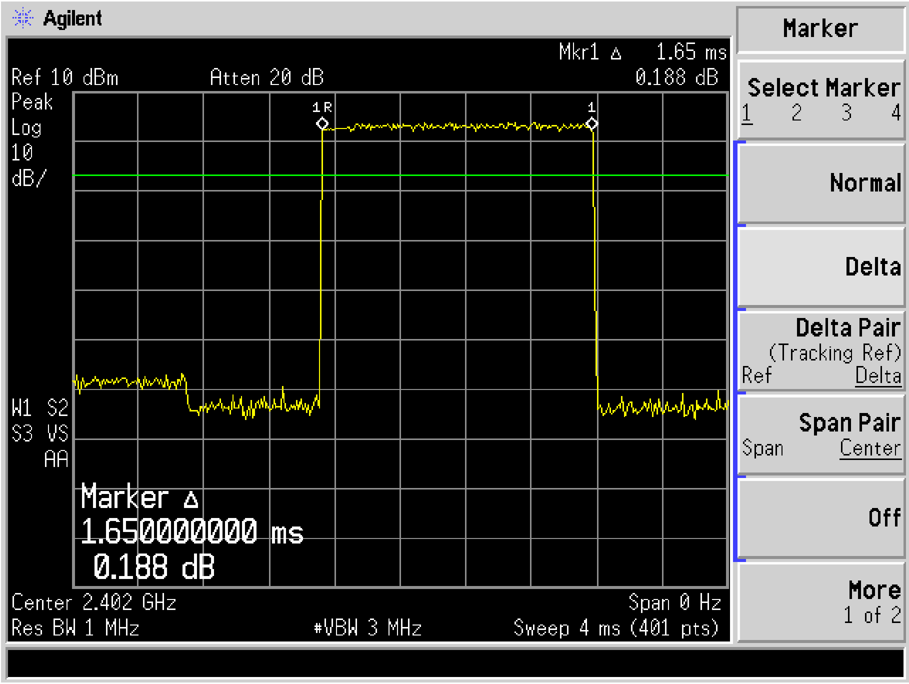
3DH1 time slot (Low, Middle, High Channels)

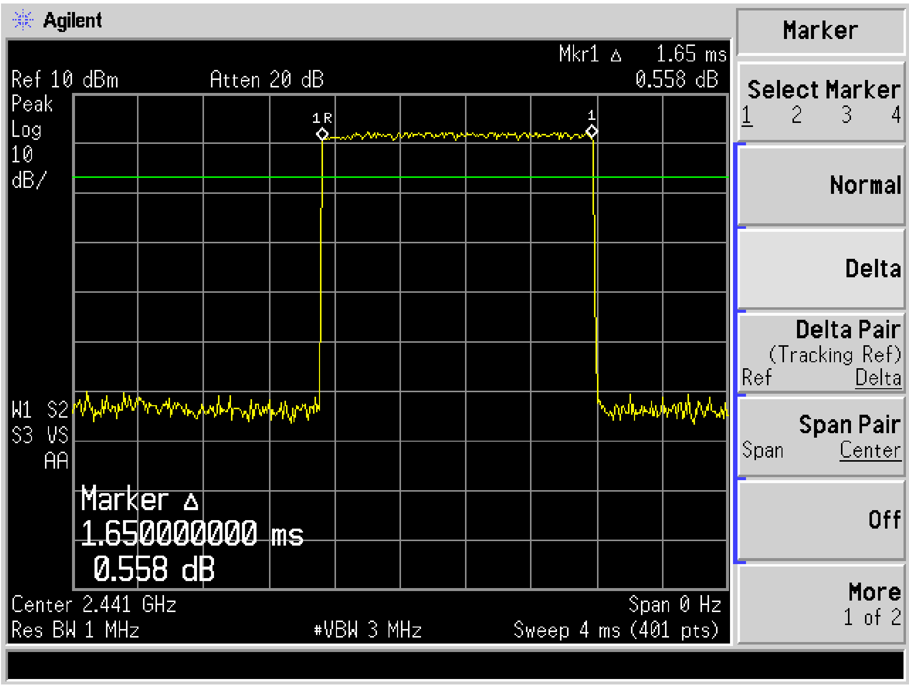


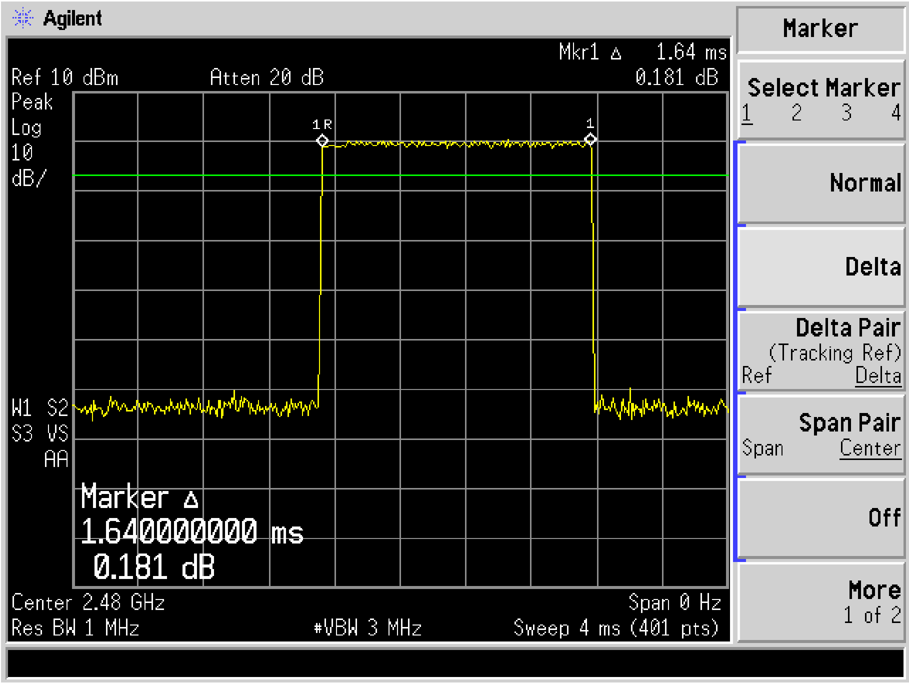

Agilent
Mkr1 Δ 400 μs
Ref 10 dBm Atten 20 dB -0.659 dB
Peak
Log
10
dB/
W1 S2
S3 VS
AA
Marker Δ
400.0000000 μs
-0.659 dB
Center 2.441 GHz Span 0 Hz
Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 Δ 400 μs
Ref 10 dBm Atten 20 dB -0.252 dB
Peak
Log
10
dB/
W1 S2
S3 VS
AA
Marker Δ
400.0000000 μs
-0.252 dB
Center 2.402 GHz Span 0 Hz
Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

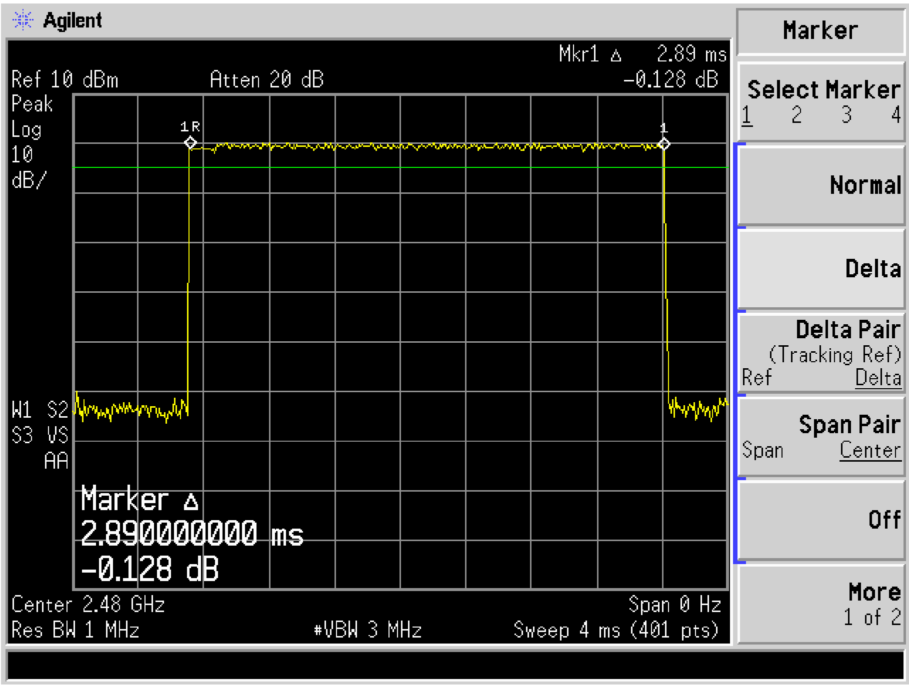
3DH3 time slot (Low, Middle, High Channels)

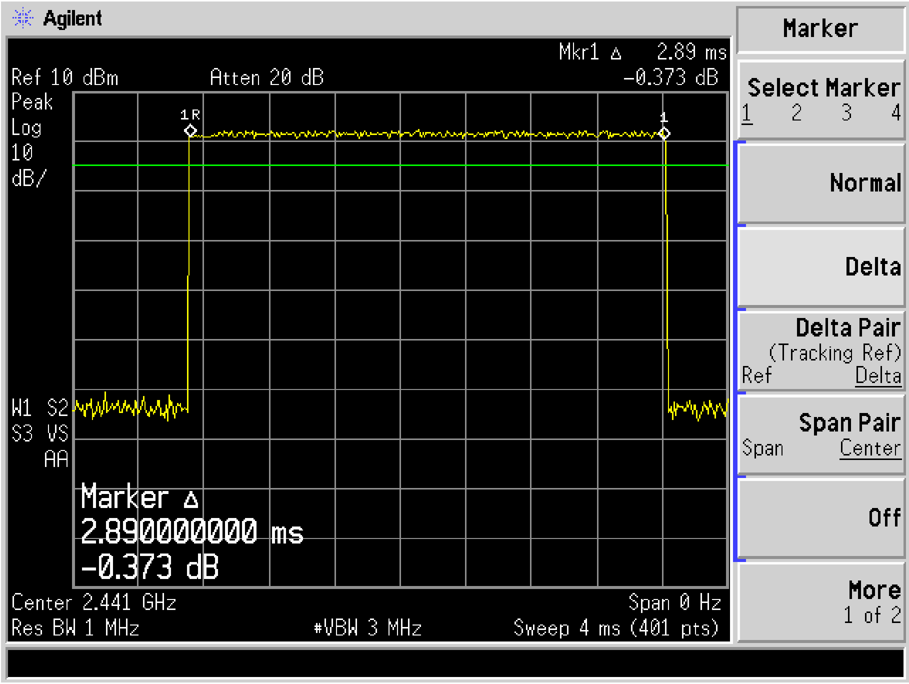


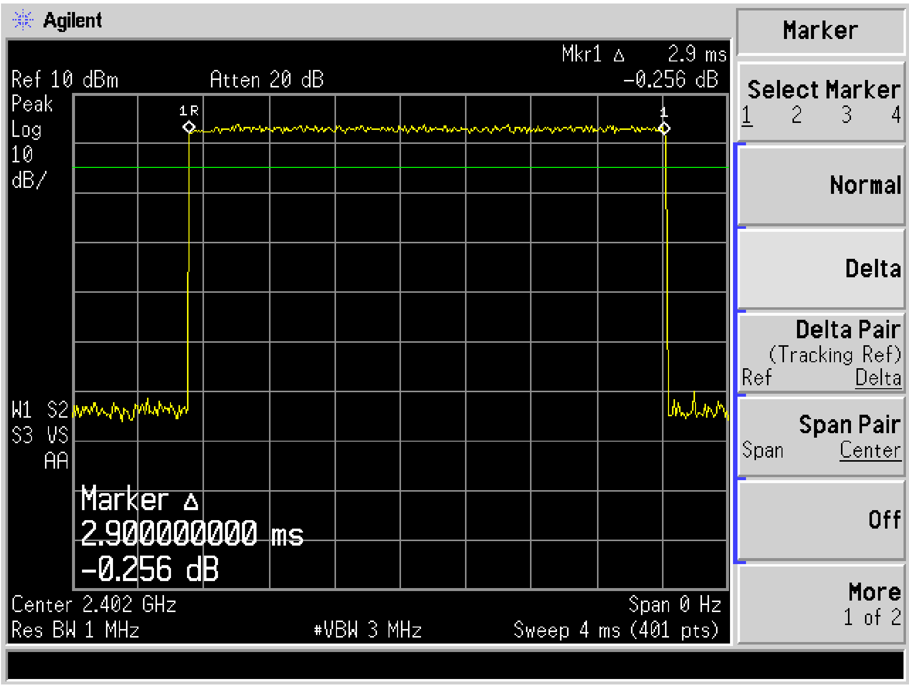




3DH5 time slot (Low, Middle, High Channels)




Agilent
Mkr1 Δ 2.89 ms
Ref 10 dBm Atten 20 dB -0.373 dB
Peak
Log
10
dB/
W1 S2
S3 VS
AA
Marker Δ
2.890000000 ms
-0.373 dB
Center 2.441 GHz Span 0 Hz
Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 Δ 2.9 ms
Ref 10 dBm Atten 20 dB -0.256 dB
Peak
Log
10
dB/
W1 S2
S3 VS
AA
Marker Δ
2.900000000 ms
-0.256 dB
Center 2.402 GHz Span 0 Hz
Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

8. 20dB Bandwidth

8.1 Standard Applicable

According to 15.247(a) and 15.215(c). 20dB bandwidth is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

8.2 Test Procedure

According to the DA 00-705, the 20dB bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth
VBW ≥ RBW
Sweep = auto; Detector function = peak
Trace = max hold
All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down bandwidth of the emission.

8.3 Environmental Conditions

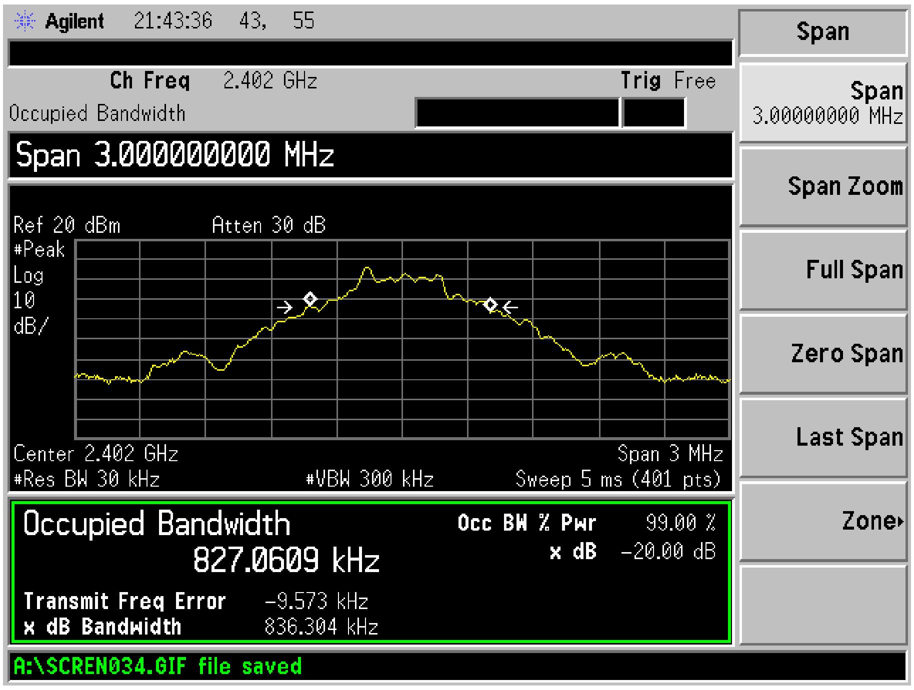
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

8.4 Summary of Test Results/Plots

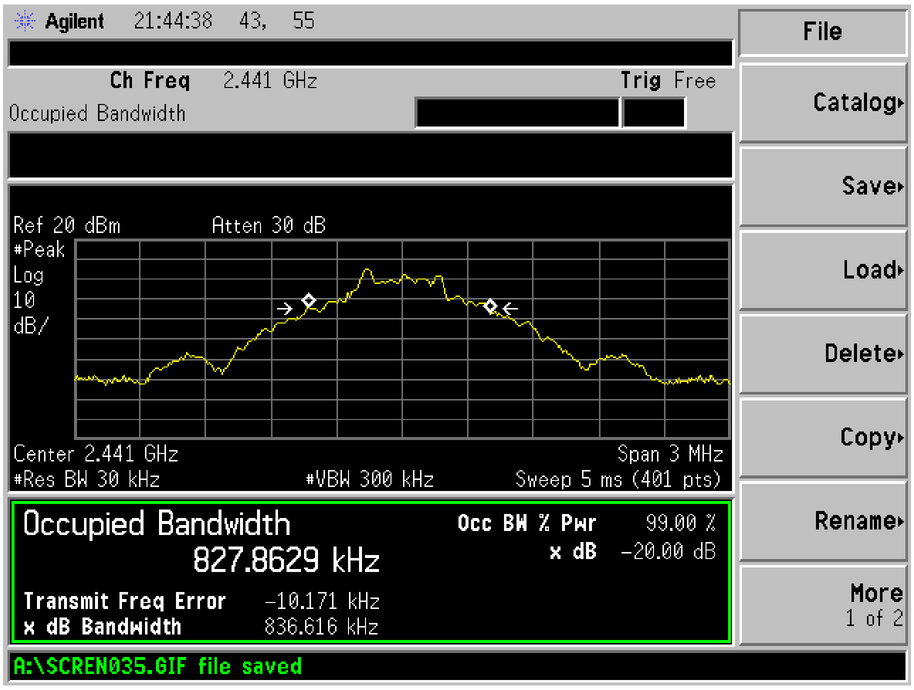
Test Mode	Test Channel MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Result
GFSK	2402	836.304	827.0609	Pass
	2441	836.616	827.8629	Pass
	2480	837.054	837.6812	Pass
8DPSK	2402	1152	1079.3	Pass
	2441	1166	1078.6	Pass
	2480	1156	1072.5	Pass

For GFSK

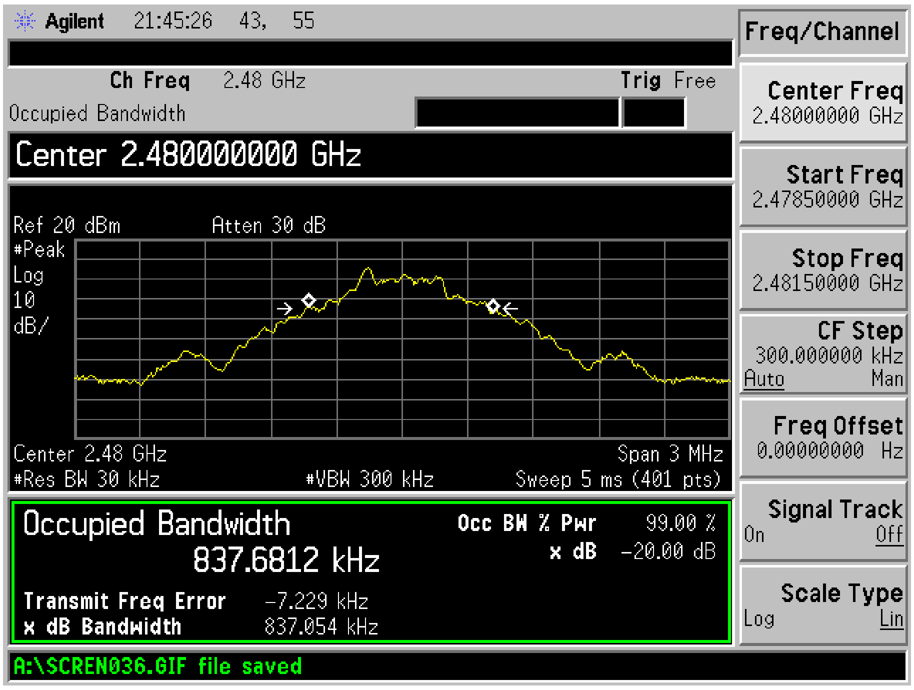
Low Channel:



Middle Channel:

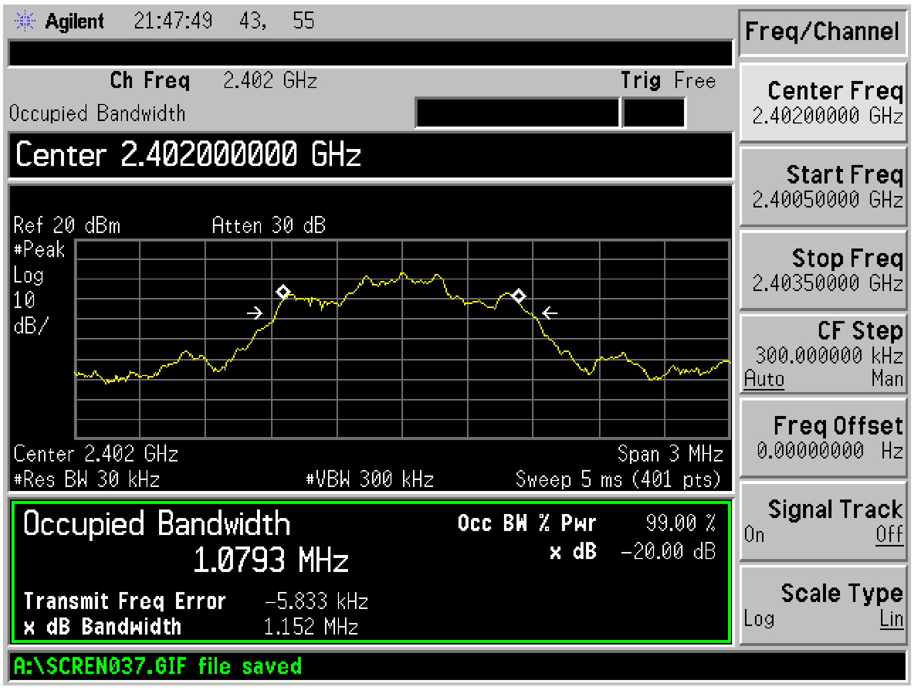


High Channel:

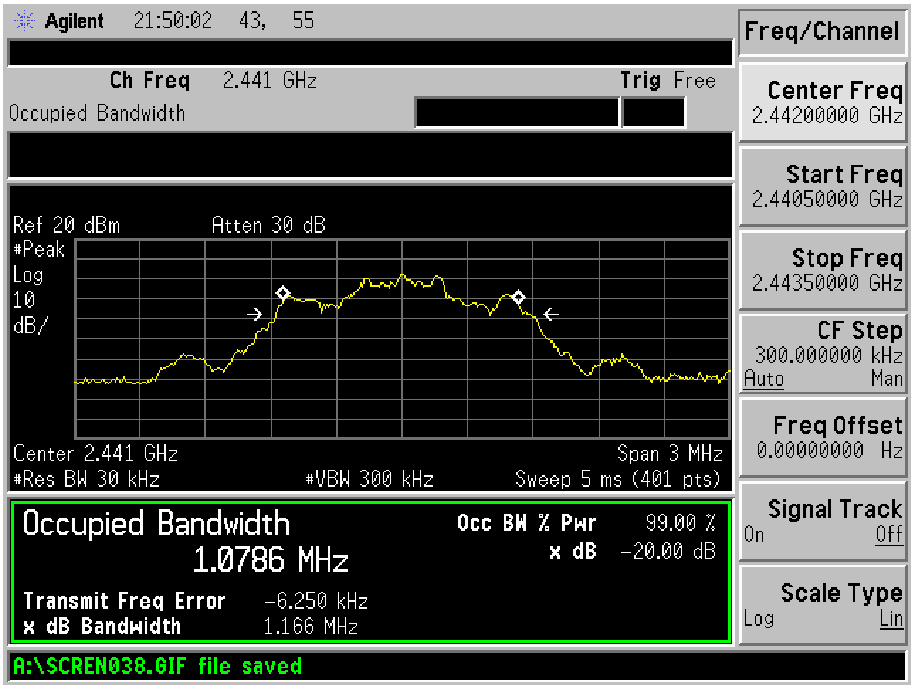


For 8DPSK

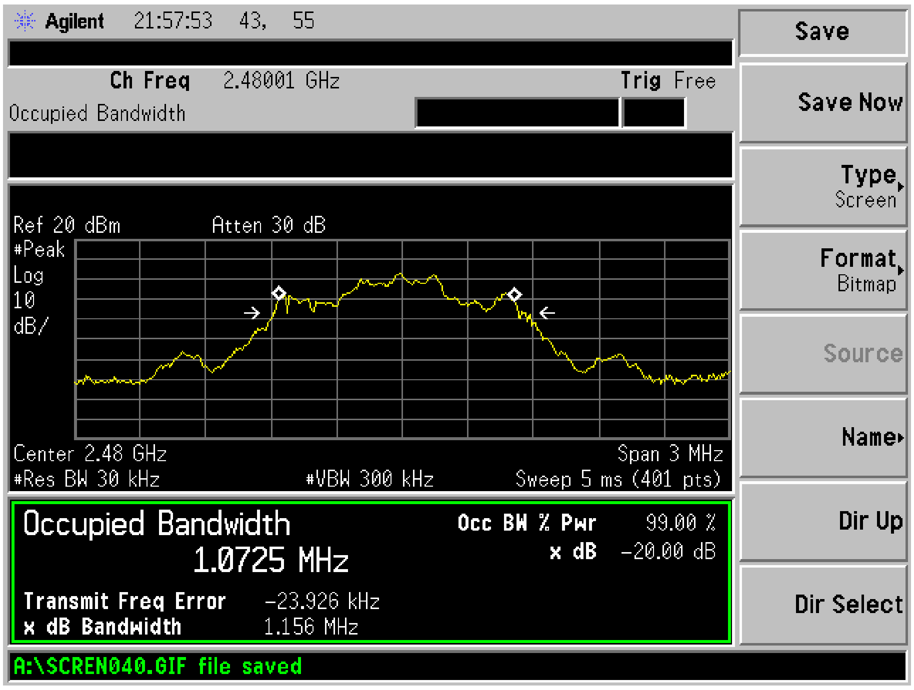
Low Channel:



Middle Channel:



High Channel:



9. RF Output Power

9.1 Standard Applicable

According to 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.

9.2 Test Procedure

According to the DA 00-705, the peak output power test method as follows.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, the indicated level is the peak output power (the external attenuation and cable loss shall be considered).

9.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

9.4 Summary of Test Results/Plots

For GFSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	2.702	1.86	1000
Middle Channel	2441	1.217	1.32	1000
High Channel	2480	-0.844	0.82	1000

For Pi/4 QDPSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	3.093	2.04	1000
Middle Channel	2441	1.771	1.50	1000
High Channel	2480	-0.253	0.94	1000

For 8DPSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	3.235	2.11	1000
Middle Channel	2441	1.803	1.51	1000
High Channel	2480	-0.321	0.93	1000

Note: the antenna gain of 1.0dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

10. Field Strength of Spurious Emissions

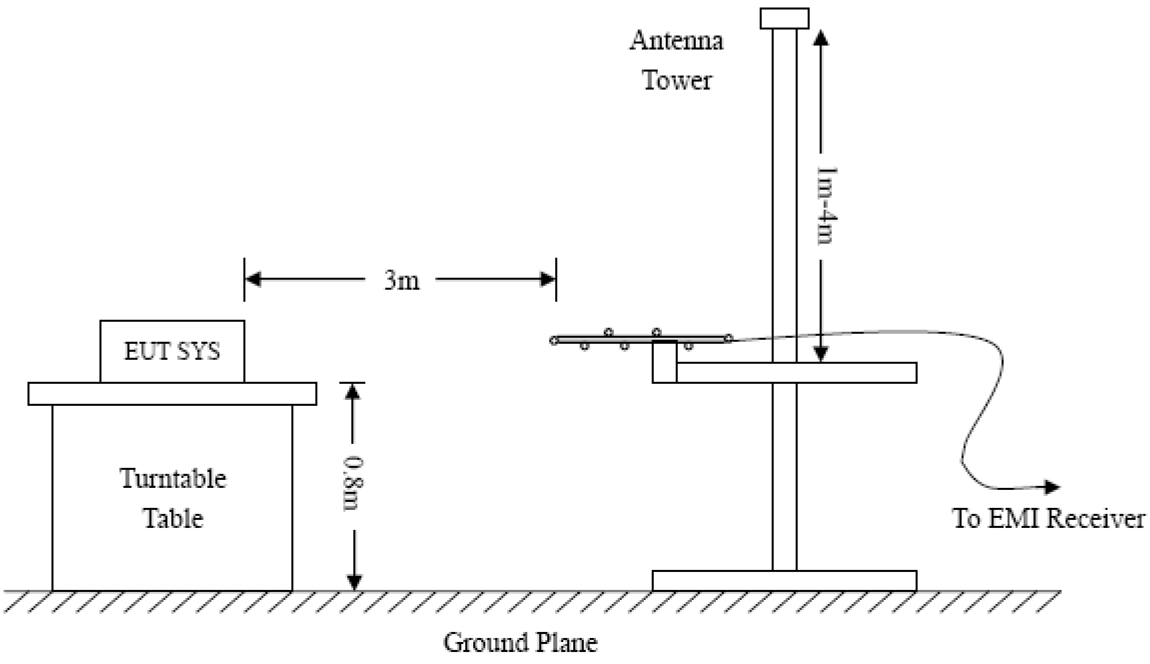
10.1 Standard Applicable

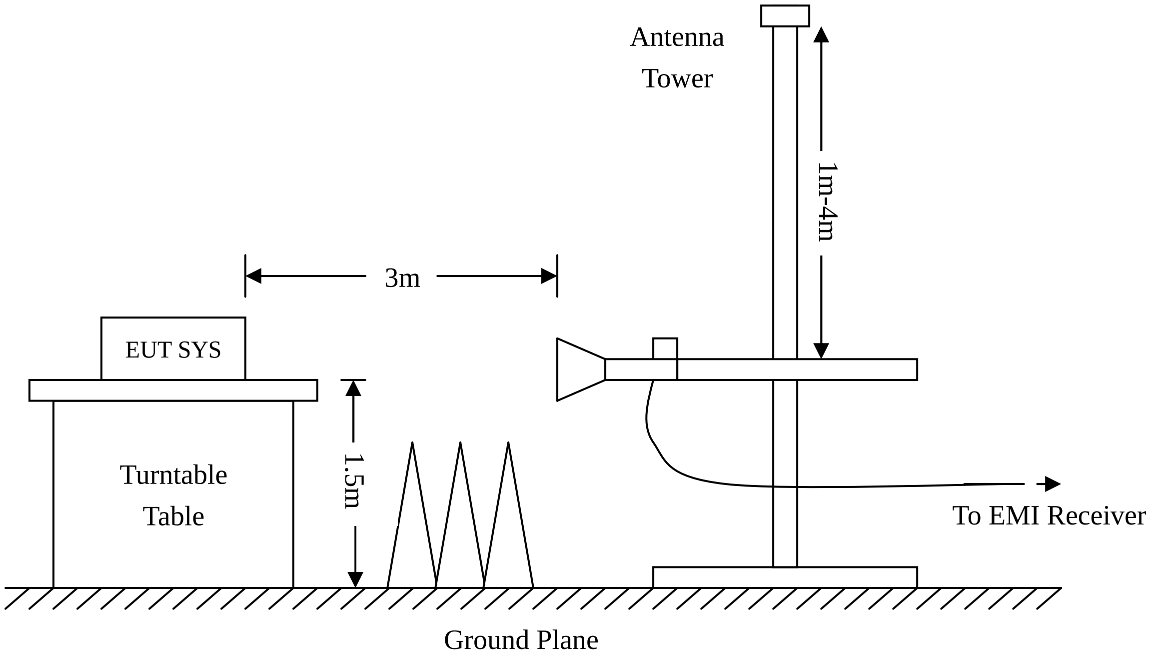
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within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

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

10.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.





Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

10.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

10.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

10.5 Summary of Test Results/Plots

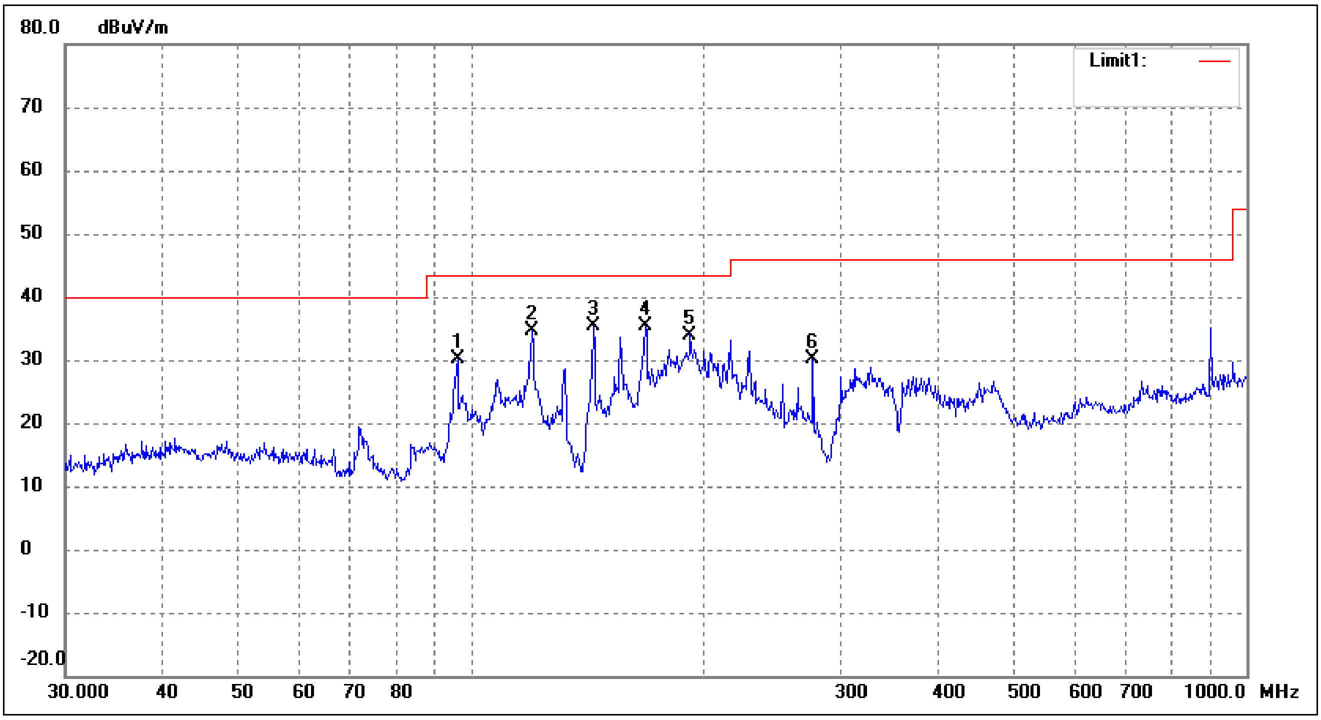
According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

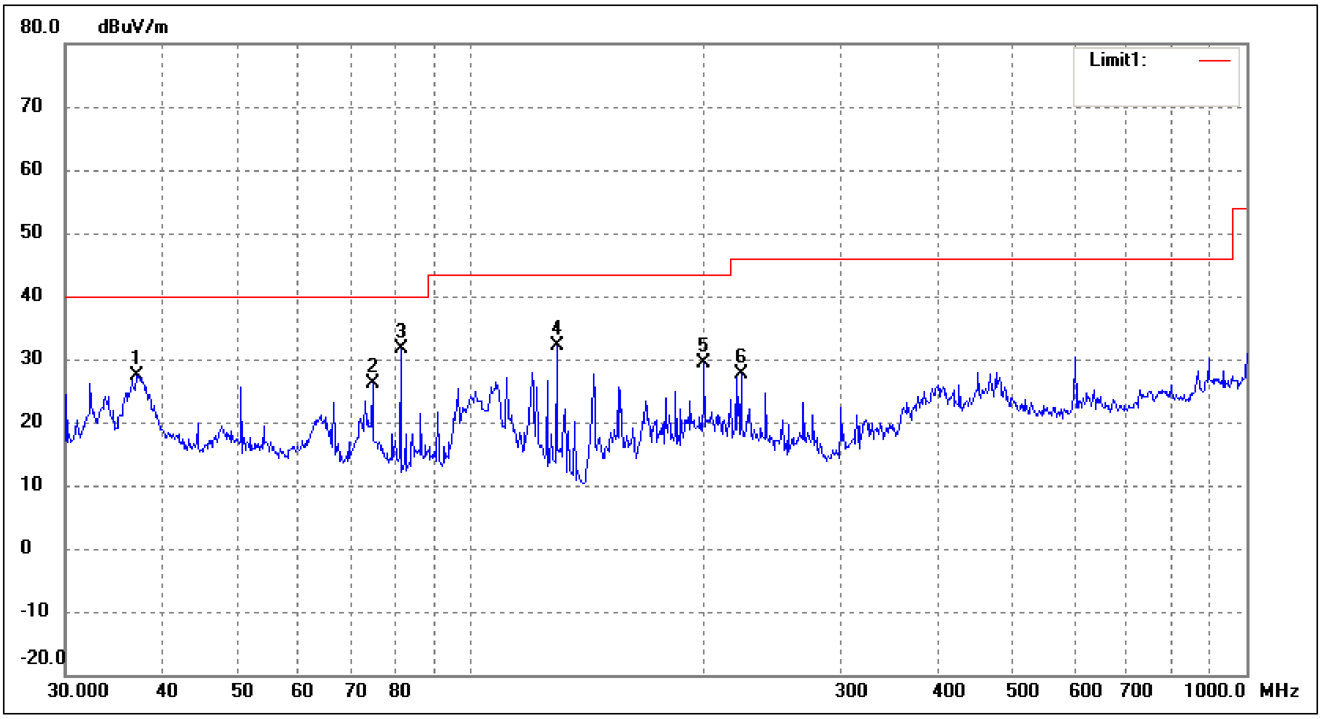
EUT: *Bluetooth speaker*
Tested Model: *BV270*
Operating Condition: *Transmitting Low Channel (2402MHz)*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	96.0986	37.96	-7.88	30.08	43.50	-13.42	0	100	peak
2	119.8556	43.95	-9.33	34.62	43.50	-8.88	0	100	peak
3	143.8295	46.33	-10.95	35.38	43.50	-8.12	0	100	peak
4	167.8243	46.36	-10.87	35.49	43.50	-8.01	0	100	peak
5	191.7450	43.24	-9.24	34.00	43.50	-9.50	0	100	peak
6	276.1236	36.64	-6.57	30.07	46.00	-15.93	0	100	peak

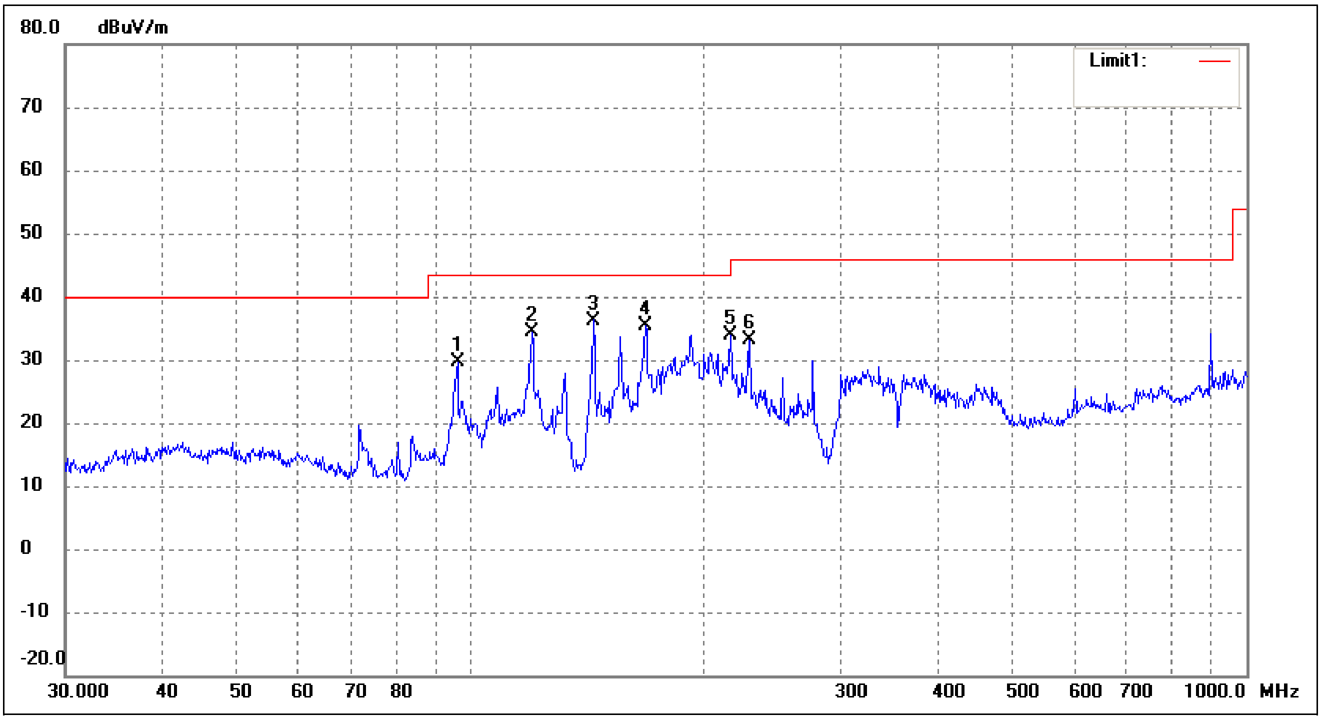
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	37.0249	37.81	-10.45	27.36	40.00	-12.64	0	100	peak
2	74.6569	38.80	-12.69	26.11	40.00	-13.89	0	100	peak
3	81.2117	44.84	-13.15	31.69	40.00	-8.31	0	100	peak
4	129.0146	43.31	-11.20	32.11	43.50	-11.39	0	100	peak
5	199.9856	41.29	-12.00	29.29	43.50	-14.21	0	100	peak
6	222.9502	34.99	-7.46	27.53	46.00	-18.47	0	100	peak

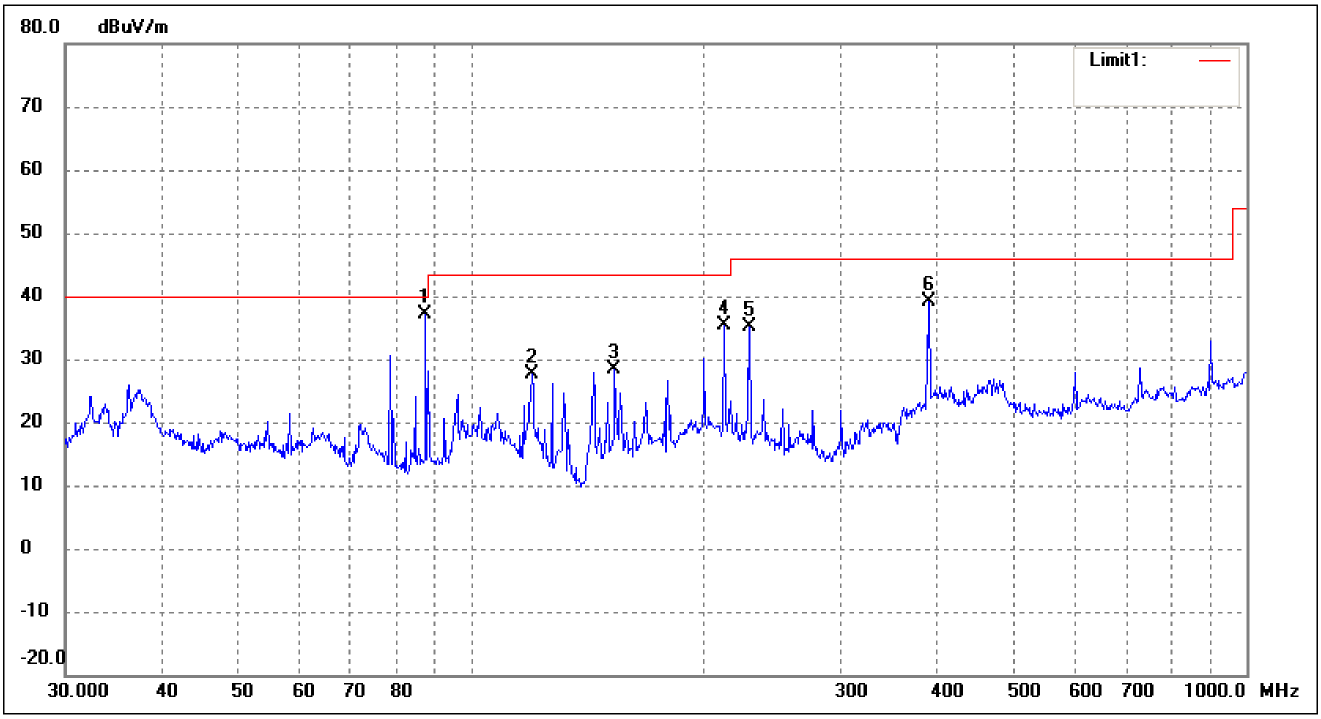
Operating Condition: *Transmitting Middle Channel (2441MHz)*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	96.0986	37.59	-7.88	29.71	43.50	-13.79	0	100	peak
2	119.8556	43.81	-9.33	34.48	43.50	-9.02	0	100	peak
3	143.8295	47.20	-10.95	36.25	43.50	-7.25	0	100	peak
4	167.8243	46.17	-10.87	35.30	43.50	-8.20	0	100	peak
5	216.0240	42.74	-8.81	33.93	46.00	-12.07	0	100	peak
6	228.4904	41.68	-8.48	33.20	46.00	-12.80	0	100	peak

Test Specification: *Vertical*

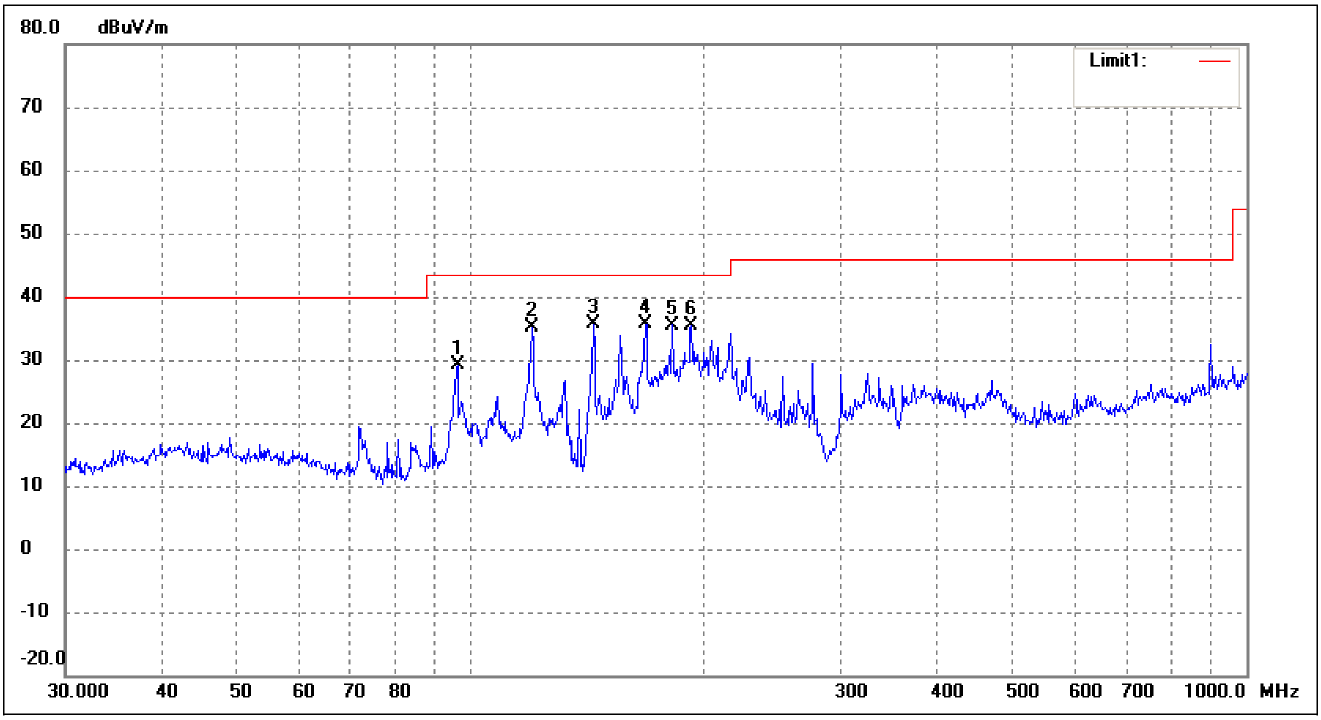


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	87.4177	49.27	-12.17	37.10	40.00	-2.90	0	100	peak
2	119.8556	38.04	-10.45	27.59	43.50	-15.91	0	100	peak
3	153.2004	41.01	-12.68	28.33	43.50	-15.17	0	100	peak
4	212.2695	44.80	-9.32	35.48	43.50	-8.02	0	100	peak
5	228.4904	42.37	-7.13	35.24	46.00	-10.76	0	100	peak
6	389.3549	41.47	-2.35	39.12	46.00	-6.88	0	100	peak

Operating Condition: *Transmitting High Channel (2480MHz)*

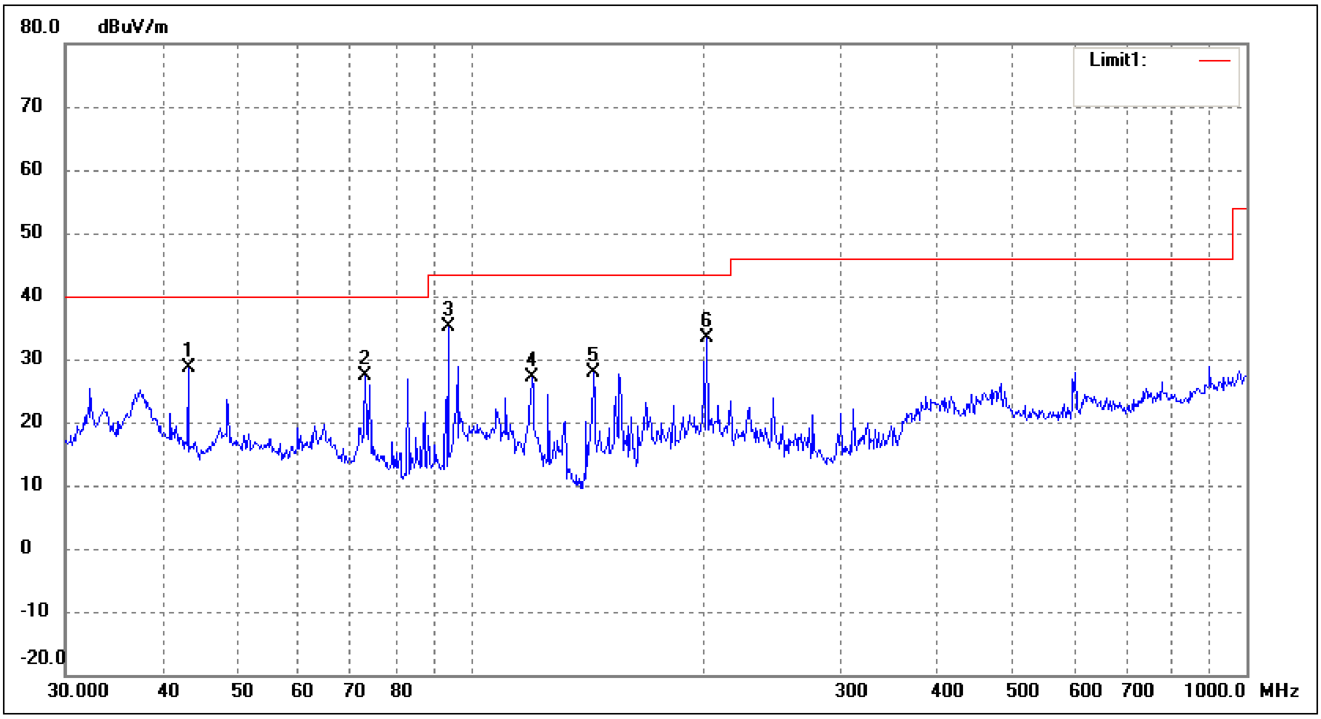
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	96.0986	37.10	-7.88	29.22	43.50	-14.28	0	100	peak
2	119.8556	44.41	-9.33	35.08	43.50	-8.42	0	100	peak
3	143.8295	46.46	-10.95	35.51	43.50	-7.99	0	100	peak
4	167.8243	46.53	-10.87	35.66	43.50	-7.84	0	100	peak
5	181.9202	45.86	-10.36	35.50	43.50	-8.00	0	100	peak
6	192.4186	44.57	-9.16	35.41	43.50	-8.09	0	100	peak

Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	43.2017	38.58	-9.95	28.63	40.00	-11.37	0	100	peak
2	73.1025	39.81	-12.49	27.32	40.00	-12.68	0	100	peak
3	93.4402	46.34	-11.25	35.09	43.50	-8.41	0	100	peak
4	119.8556	37.70	-10.45	27.25	43.50	-16.25	0	100	peak
5	143.8295	40.16	-12.28	27.88	43.50	-15.62	0	100	peak
6	201.3930	45.18	-11.70	33.48	43.50	-10.02	0	100	peak

Spurious Emissions Above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2402MHz							
4804	53.64	-3.59	50.05	74	-23.95	H	PK
4804	42.73	-3.59	39.14	54	-14.86	H	AV
7206	57.27	-0.52	56.75	74	-17.25	H	PK
7206	46.36	-0.52	45.84	54	-8.16	H	AV
4804	59.09	-3.59	55.50	74	-18.50	V	PK
4804	44.55	-3.59	40.96	54	-13.04	V	AV
7206	53.64	-0.52	53.12	74	-20.88	V	PK
7206	42.73	-0.52	42.21	54	-11.79	V	AV
Middle Channel-2441MHz							
4882	53.64	-3.49	50.15	74	-23.85	H	PK
4882	41.82	-3.49	38.33	54	-15.67	H	AV
7323	53.64	-0.47	53.17	74	-20.83	H	PK
7323	49.09	-0.47	48.62	54	-5.38	H	AV
4882	56.36	-3.49	52.87	74	-21.13	V	PK
4882	44.55	-3.49	41.06	54	-12.94	V	AV
7323	53.64	-0.47	53.17	74	-20.83	V	PK
7323	43.64	-0.47	43.17	54	-10.83	V	AV
High Channel-2480MHz							
4960	52.73	-3.41	49.32	74	-24.68	H	PK
4960	49.09	-3.41	45.68	54	-8.32	H	AV
7440	54.55	-0.42	54.13	74	-19.87	H	PK
7440	42.73	-0.42	42.31	54	-11.69	H	AV
4960	59.09	-3.41	55.68	74	-18.32	V	PK
4960	42.73	-3.41	39.32	54	-14.68	V	AV
7440	60.00	-0.42	59.58	74	-14.42	V	PK
7440	49.09	-0.42	48.67	54	-5.33	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

11. Out of Band Emissions

11.1 Standard Applicable

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

11.2 Test Procedure

According to the DA 00-705, the band-edge radiated test method as follows.

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2410MHz for low bandedge, 2470MHz to 2500MHz for the high bandedge)
RBW = 1MHz, VBW = 1MHz for peak value measured
RBW = 1MHz, VBW = 10Hz for average value measured
Sweep = auto; Detector function = peak; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation porduct outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the DA 00-705, the band-edge conducted test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2380MHz to 2410MHz for low bandedge, 2470MHz to 2500MHz for the high bandedge)
RBW = 100kHz, VBW = 300kHz
Sweep = auto; Detector function = peak; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation porduct outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the limit specified in this section (at least 20dB attenuation).

11.3 Environmental Conditions

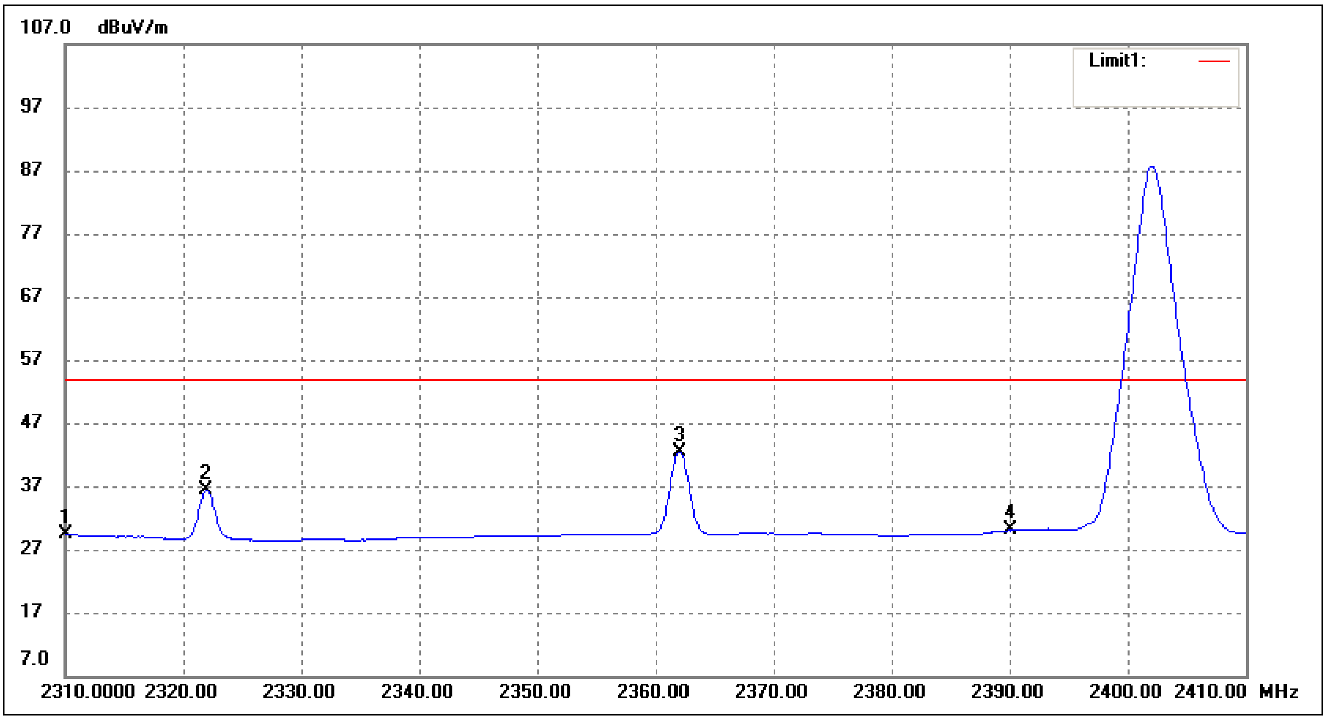
Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

11.4 Summary of Test Results/Plots

Bandedge (Radiated)

Lowest Bandedge

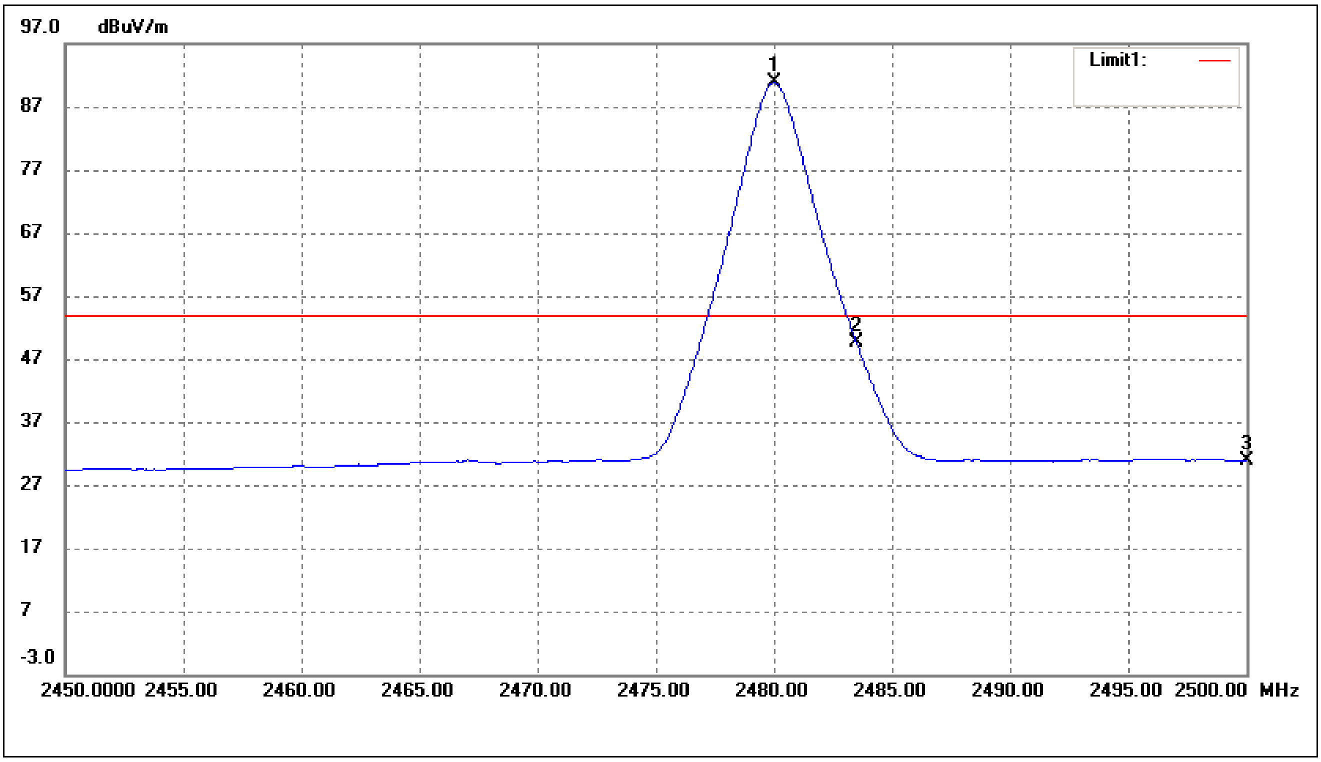
Horizontal (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	33.94	-4.53	29.41	54.00	-24.59	Average Detector
	2310.000	45.97	-4.53	41.44	74.00	-32.56	Peak Detector
2	2321.900	40.93	-4.56	36.37	54.00	-17.63	Average Detector
	2322.100	49.05	-4.56	44.49	74.00	-29.51	Peak Detector
3	2362.000	47.17	-4.69	42.48	54.00	-11.52	Average Detector
	2361.700	52.82	-4.69	48.13	74.00	-25.87	Peak Detector
4	2390.000	34.80	-4.77	30.03	54.00	-23.97	Average Detector
	2390.000	47.32	-4.77	42.55	74.00	-31.45	Peak Detector

Highest Bandedge

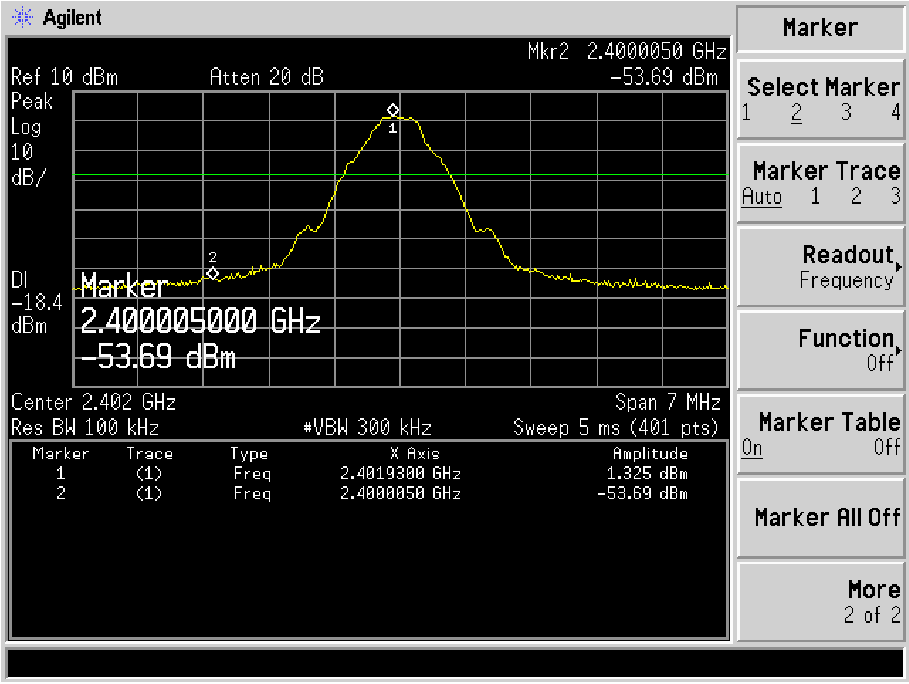
Horizontal (Worst case)



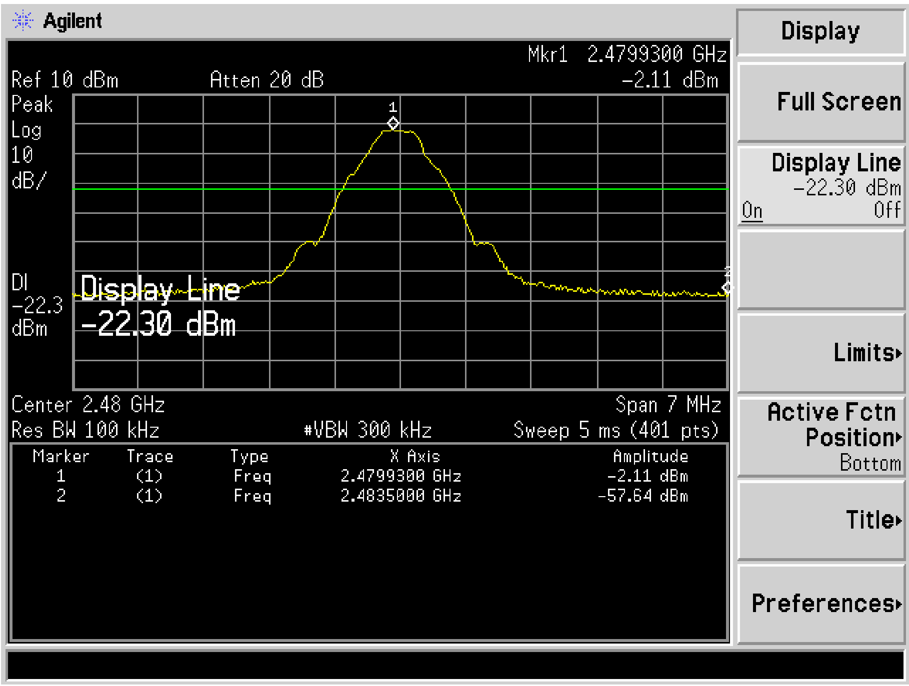
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2480.000	94.16	-3.36	90.80	54.00	36.80	Average Detector
	2480.050	94.95	-3.36	91.59	74.00	17.59	Peak Detector
2	2483.500	Delta = 41.3dBc		49.56	54.00	-4.44	Average Detector
	2483.500			53.12	74.00	-20.88	Peak Detector
3	2500.000	34.00	-3.00	31.00	54.00	-23.00	Average Detector
	2500.000	46.83	-3.00	43.83	74.00	-30.17	Peak Detector

Bandedge (Conducted)

Lowest

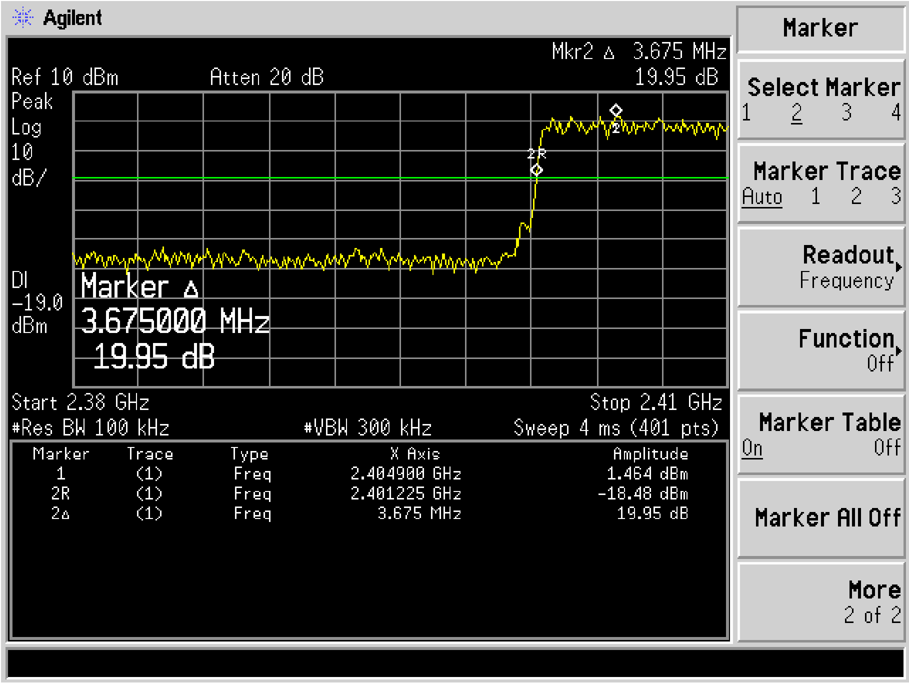


Highest

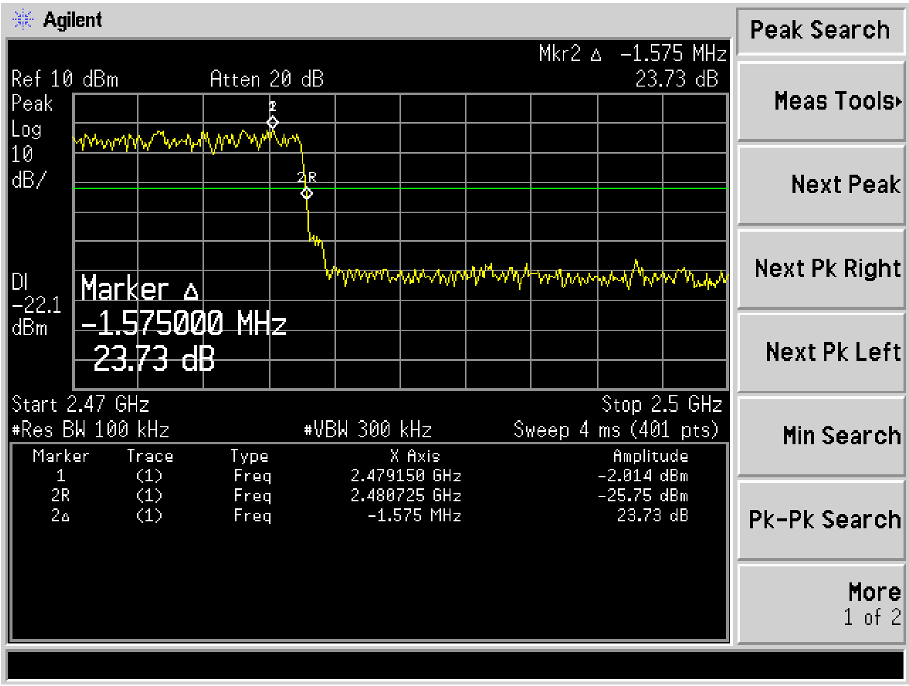


Hopping Bandedge (Conducted)

Lowest Bandedge



Highest Bandedge



12. Conducted Emissions

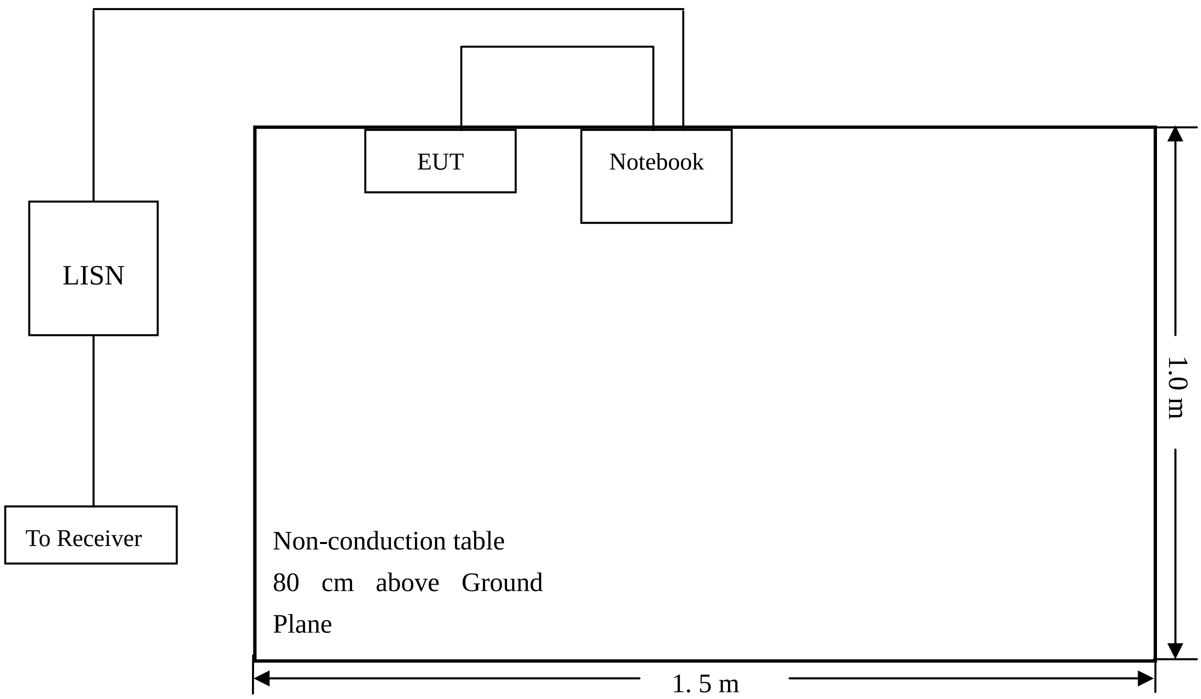
12.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

12.2 Basic Test Setup Block Diagram



12.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

12.4 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency .... 150 kHz
Stop Frequency... 30 MHz
Sweep Speed .... Auto
IF Bandwidth... 10 kHz
Quasi-Peak Adapter Bandwidth .... 9 kHz
Quasi-Peak Adapter Mode .... Normal

12.5 Summary of Test Results/Plots

According to the data in section 12.6, the EUT complied with the FCC Part 15.207 Conducted margin for this device, with the *worst* margin reading of:

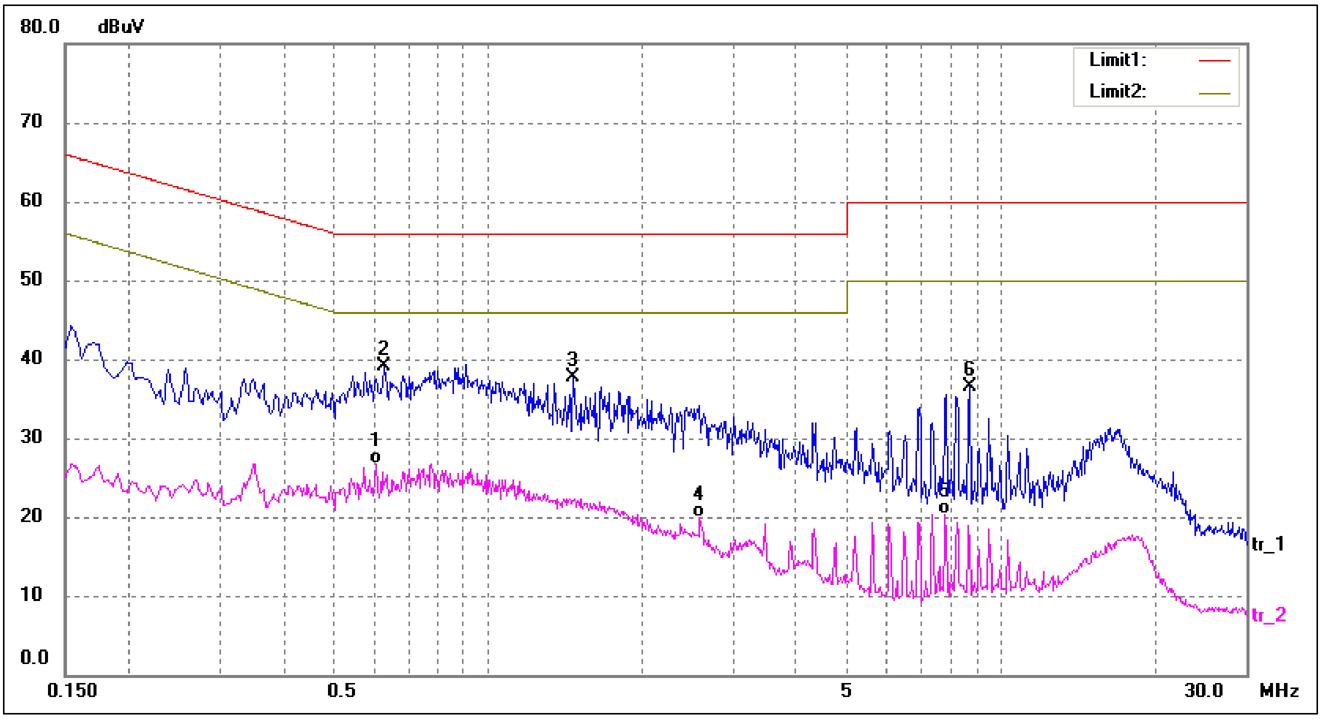
-16.51 dB at 0.7220 MHz in the **Line** mode**, peak** detector, **0.15-30MHz**

12.6 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

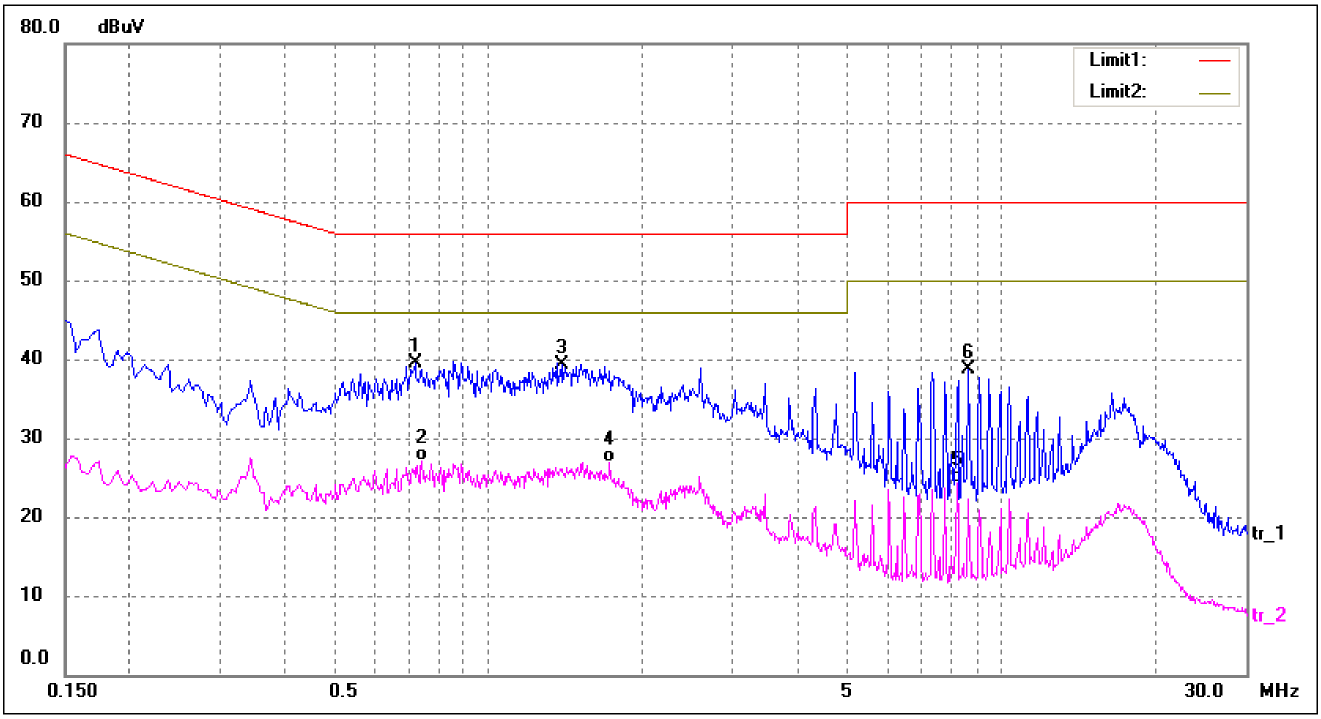
EUT: *Bluetooth speaker*
Tested Model: *BV270*
Operating Condition: *BT Transmitting*
Comment: *AC 120V/60Hz; USB 5V*

Test Specification: *Neutral*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.6060	17.10	9.59	26.69	46.00	-19.31	AVG
2*	0.6300	29.53	9.59	39.12	56.00	-16.88	peak
3	1.4660	27.91	9.75	37.66	56.00	-18.34	peak
4	2.5940	9.97	9.90	19.87	46.00	-26.13	AVG
5	7.7820	10.03	10.31	20.34	50.00	-29.66	AVG
6	8.7060	26.08	10.33	36.41	60.00	-23.59	peak

Test Specification: *Line*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.7220	29.88	9.61	39.49	56.00	-16.51	peak
2	0.7460	17.49	9.62	27.11	46.00	-18.89	AVG
3	1.3980	29.59	9.74	39.33	56.00	-16.67	peak
4	1.7300	17.09	9.78	26.87	46.00	-19.13	AVG
5	8.2100	14.03	10.32	24.35	50.00	-25.65	AVG
6	8.6540	28.41	10.33	38.74	60.00	-21.26	peak

******* END OF REPORT *******