FCC Part 15C
Measurement and Test Report

For

Shenzhen Heui Xint Technology Co., Ltd

E Building,Huafeng Industry,Hangcheng Road,Xixiang town,Baoan district,Shenzhen,China

FCC ID: SKJ- M0

FCC Rule(s):	FCC Part 15C
Product Description:	bluetooth speaker
Tested Model:	M0
Report No.:	STR13098283I
Tested Date:	2013-09-22 to 2013-10-23
Issued Date:	2013-10-23
Tested By:	Daniel Liu / Engineer
Reviewed By:	Lahm Peng / EMC Manager
Approved & Authorized By:	Jandy so / PSQ Manager

Prepared By:

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Shenzhen Heui Xint Technology Co., Ltd
Address of applicant:	E Building,Huafeng Industry,Hangcheng Road, Xixiang town,Baoan district,Shenzhen,China
Manufacturer:	Shenzhen Heui Xint Technology Co., Ltd
Address of manufacturer:	E Building,Huafeng Industry,Hangcheng Road, Xixiang town,Baoan district,Shenzhen,China

General Description of EUT	
Product Name:	bluetooth speaker
Trade Name:	mctim
Model No.:	M0
Adding Model(s):	/
Rated Voltage:	USB: DC 5V Battery: DC 3.7V
Power Adapter Model:	/
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT	
Bluetooth Version:	V4.0
Frequency Range:	2402-2480MHz
RF Output Power:	-1.83 dBm (Conducted)
Data Rate:	1Mbps, 2Mbps, 3Mbps
Modulation:	GFSK, Pi/4 QDPSK, 8DPSK
Quantity of Channels:	79/40
Channel Separation:	1MHz/2MHz
Type of Antenna:	PCB
Antenna Gain:	0dBi
Lowest Internal Frequency	26MHz

1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Heui Xint Technology 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 C63.4-2003, 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 public notice KDB 558074 D01 V03 for digital transmission systems shall be performed also.

1.4 Test Facility

- **FCC – Registration No.: 994117**
  SEM.Test Compliance Services 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 994117.

- **Industry Canada (IC) Registration No.: 7673A**
  The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Electronics Service 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 3/F, Jinbao Commerce Building, Xin'an Fanshen 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	GFSK	2402MHz, 2441MHz, 2480MHz
TM2	Pi/4 DQPSK	2402MHz, 2441MHz, 2480MHz
TM3	8DPSK	2402MHz, 2441MHz, 2480MHz
TM4	BLE	2402MHz, 2442MHz, 2480MHz
TM5	Hopping	2402-2480MHz
TM6	Charging & AUX in	USB Port & AUX Port

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	1.0	Unshielded	Without Ferrite
Audio Cable	0.45	Unshielded	Without Ferrite

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenove	E23	EB12648265

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
§ 15.207(a)	Conducted Emission	Compliant
§ 15.247(e)	Power Spectral Density	Compliant
§ 15.247(a)(2)	6 dB Bandwidth	Compliant
§ 15.247(b)(3)	RF Output Power	Compliant
§ 15.209(a)(d)	Radiated Emission	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant
§15.205	Restricted Band of Operation	Compliant
§ 15.209(a)(f)	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)	Power Output	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. Power Spectral Density

6.1 Standard Applicable

According to 15.247(a)(1)(iii), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

6.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

6.3 Test Procedure

According to the KDB 558074 D01 v03r01, the test method of power spectral density as below:

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.4 Environmental Conditions

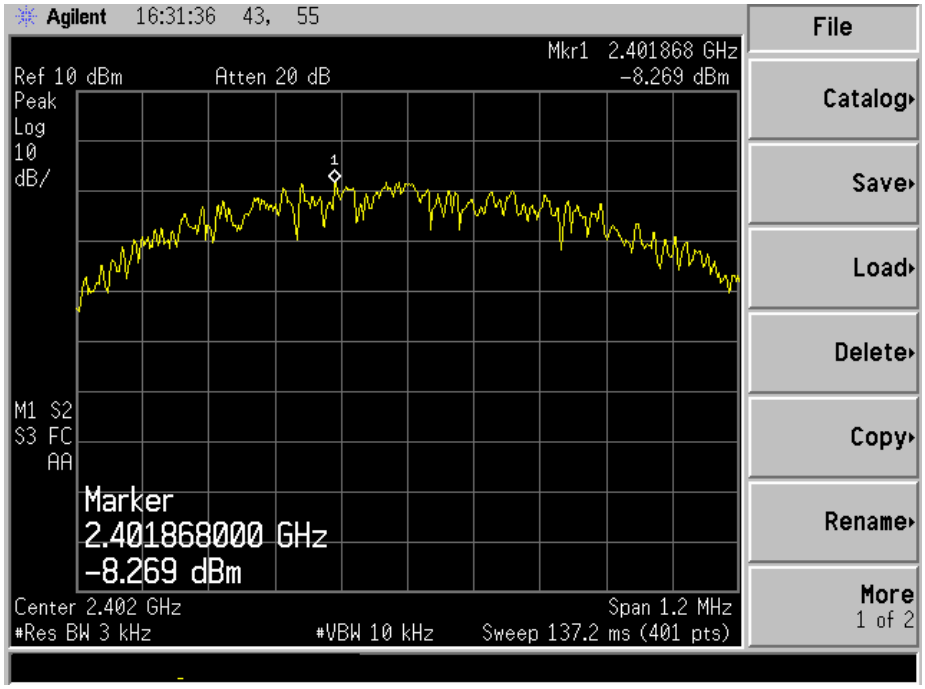
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

6.5 Summary of Test Results/Plots

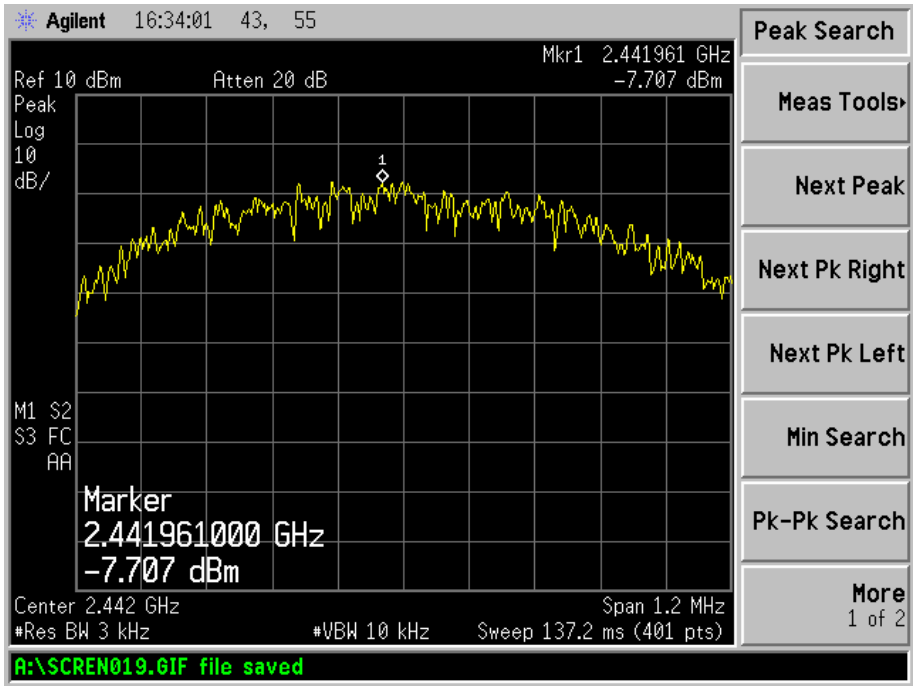
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
BLE	2402	-8.269	8
	2442	-7.707	8
	2480	-7.284	8

Please refer to the following test plots:

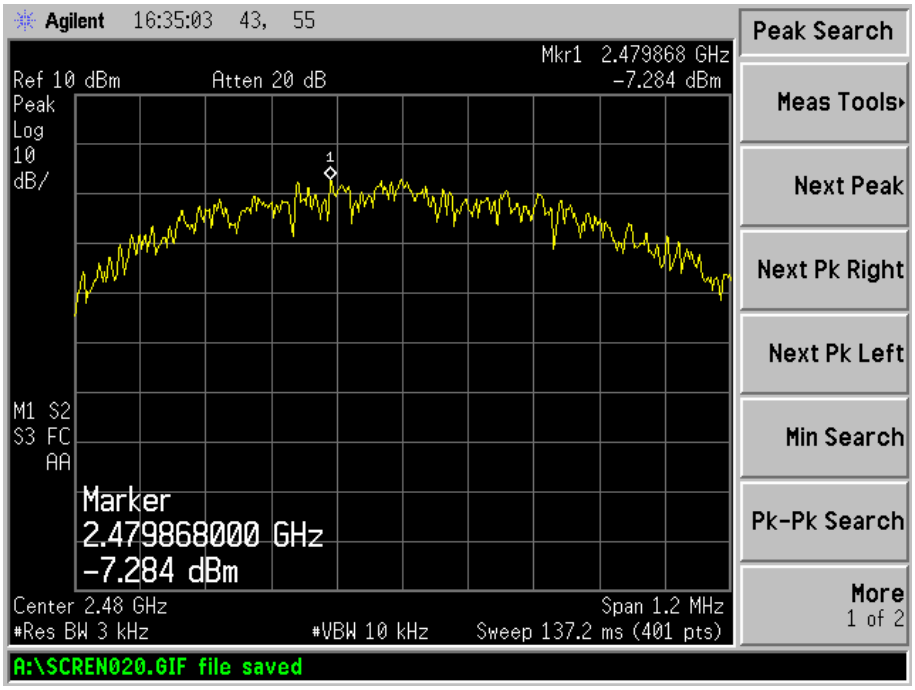
BLE-Low Channel



BLE-Middle Channel



BLE-High Channel



7. Quantity of Hopping Channels and Channel Separation

7.1 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.

7.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

7.3 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 = 100kHz, VBW = 100kHz
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:

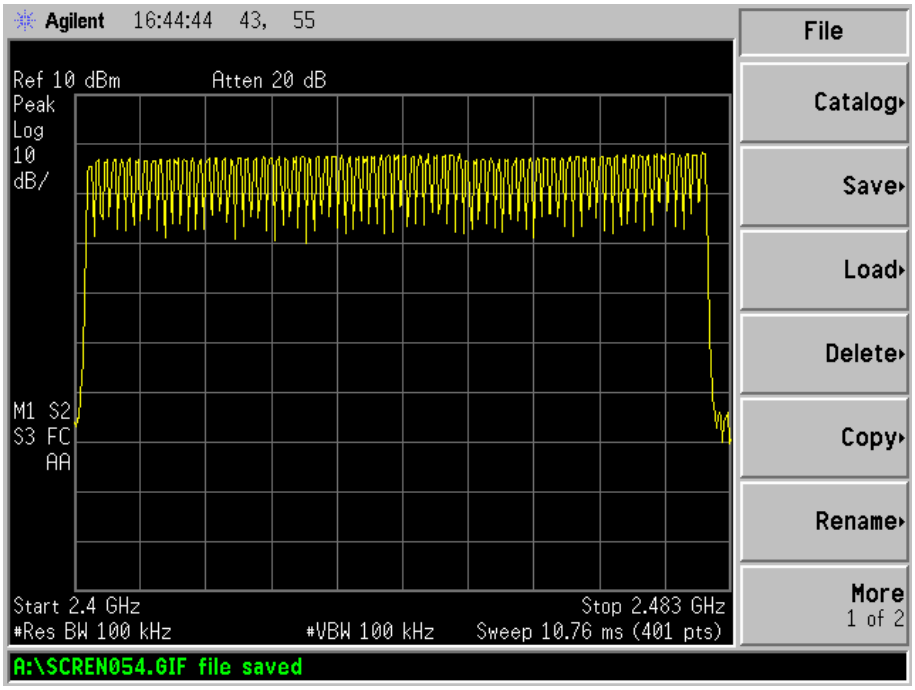
Set span = wide enough to capture the peaks of two adjacent channels
Other setting as above
Allow the trace to stabilize, Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

7.4 Environmental Conditions

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

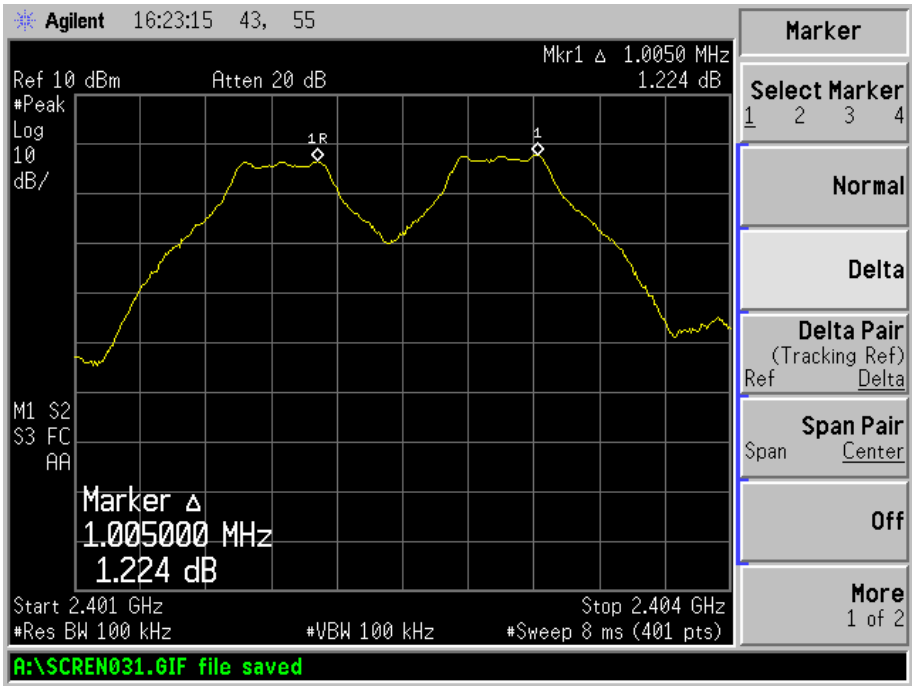
7.5 Summary of Test Results/Plots

No. of Channel = 79

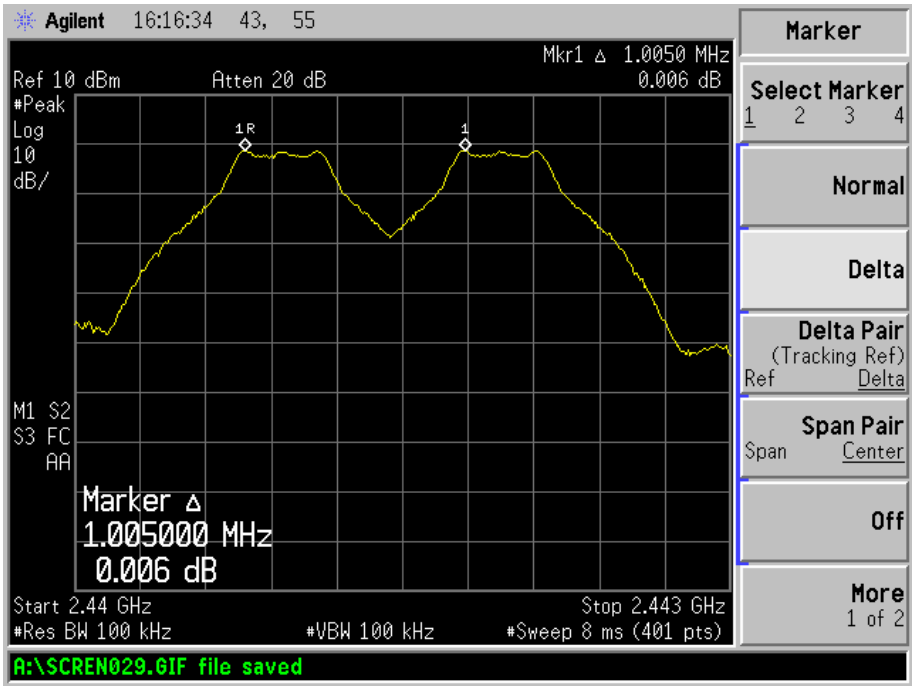


For GFSK mode

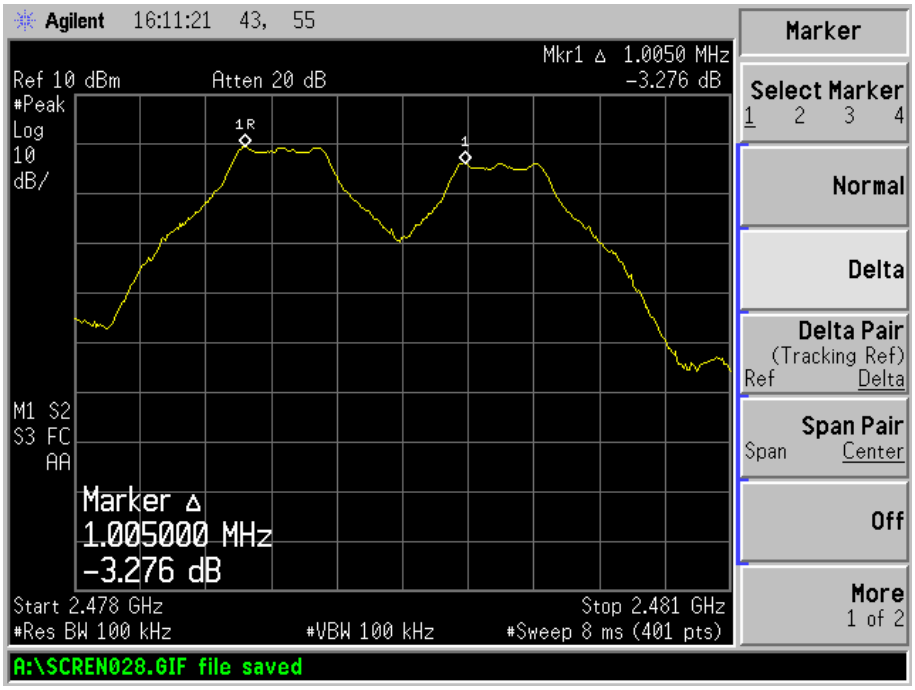
Channel Spacing (Low CH=1MHz)



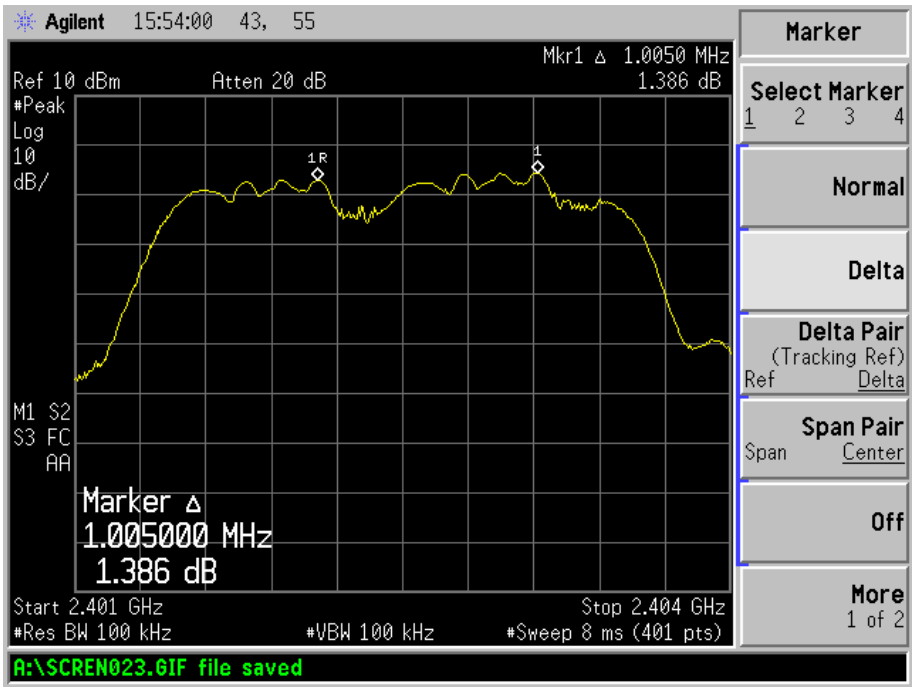
Channel Spacing (Middle CH=1MHz)



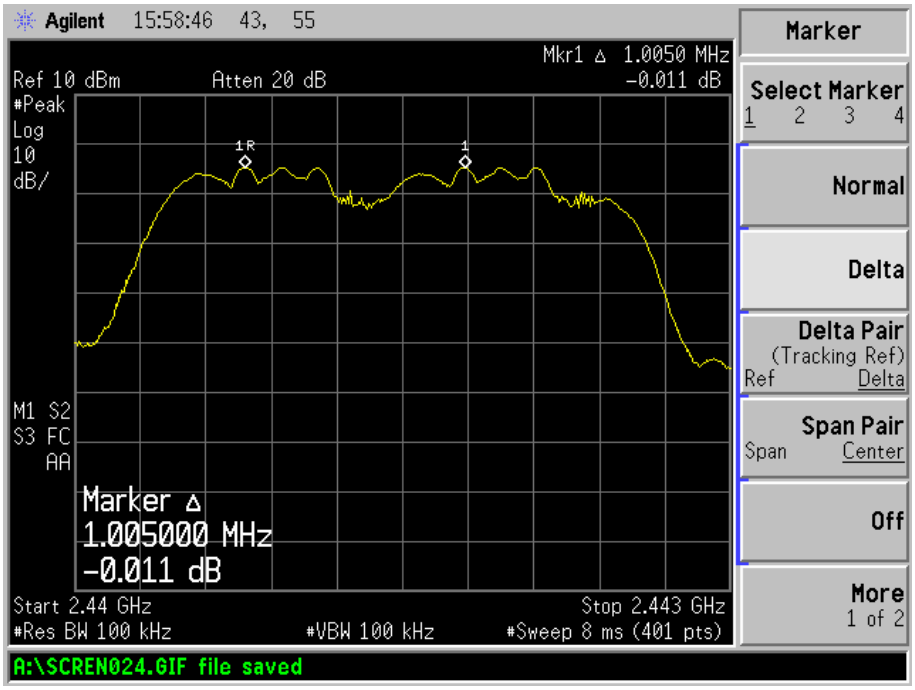
Channel Spacing (High CH=1MHz)



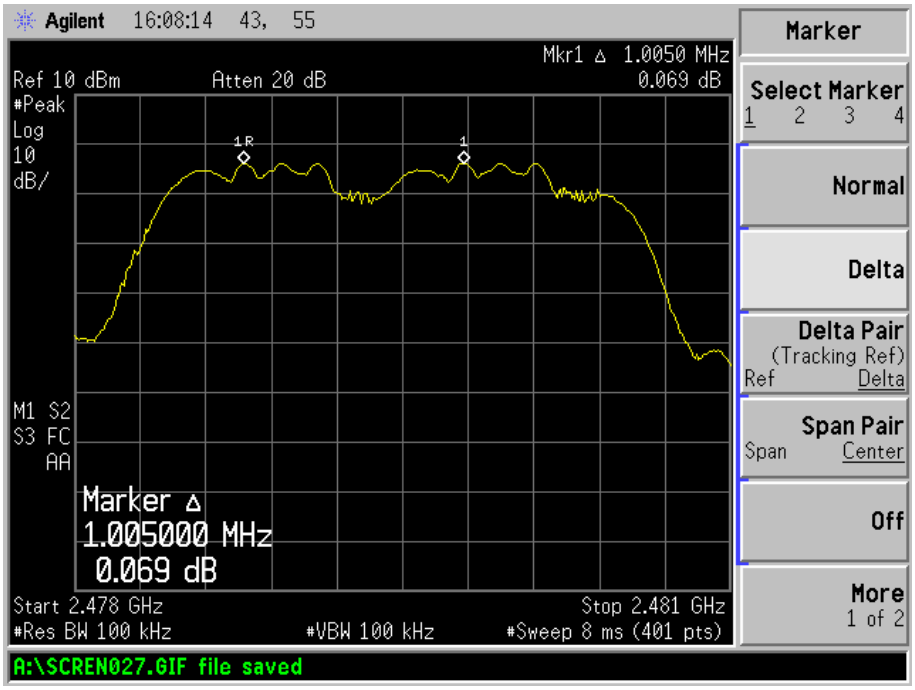
For 8DPSK mode
Channel Spacing (Low CH=1MHz)



Channel Spacing (Middle CH=1MHz)



Channel Spacing (High CH=1MHz)



8. Dwell Time of Hopping Channel

8.1 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.

8.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

8.3 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.
Set span = zero span, centered on a hopping channel
RBW = 1MHz, VBW = 1MHz
Sweep = auto
Detector function = peak
Trace = max hold
Use the marker-delta function to determine the dwell time

8.4 Environmental Conditions

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

8.5 Summary of Test Results/Plots

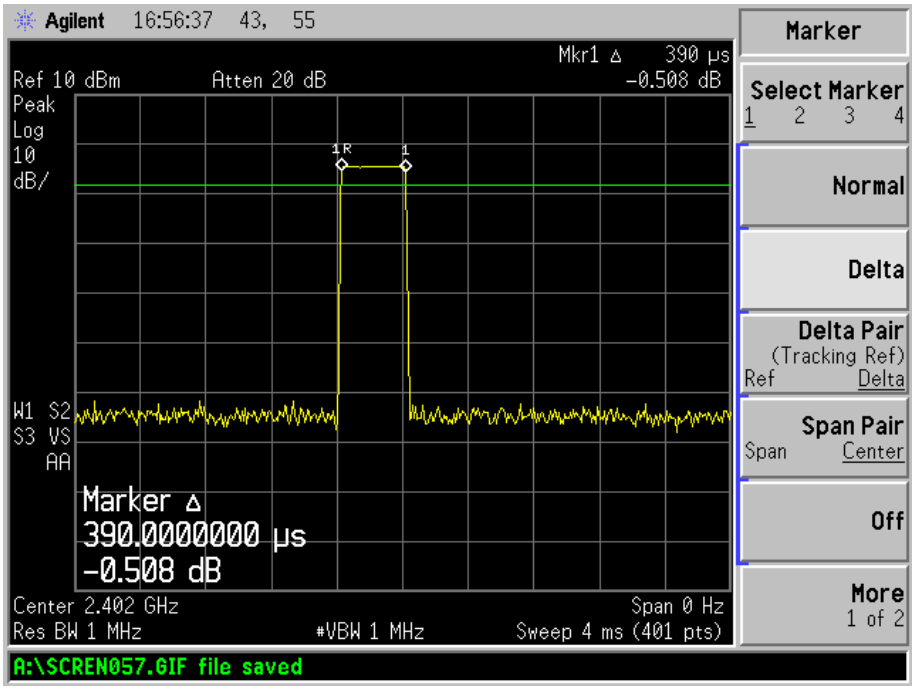
The dwell time within a period in data mode is independent from the packet type (packet length).
Test data is corrected with the worse case, which the packet length is DH1, DH3, and DH5.

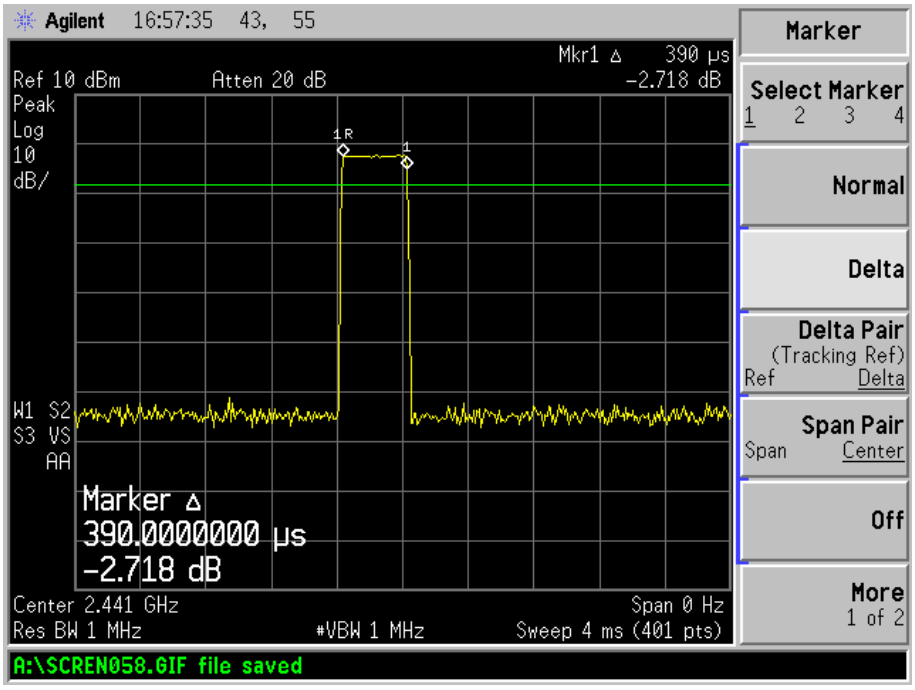
The test period: T = 0.4 Second * 79 Channel = 31.6 s
Dwell time = time slot length * (Hopping rate / Number of hopping channels) * Period

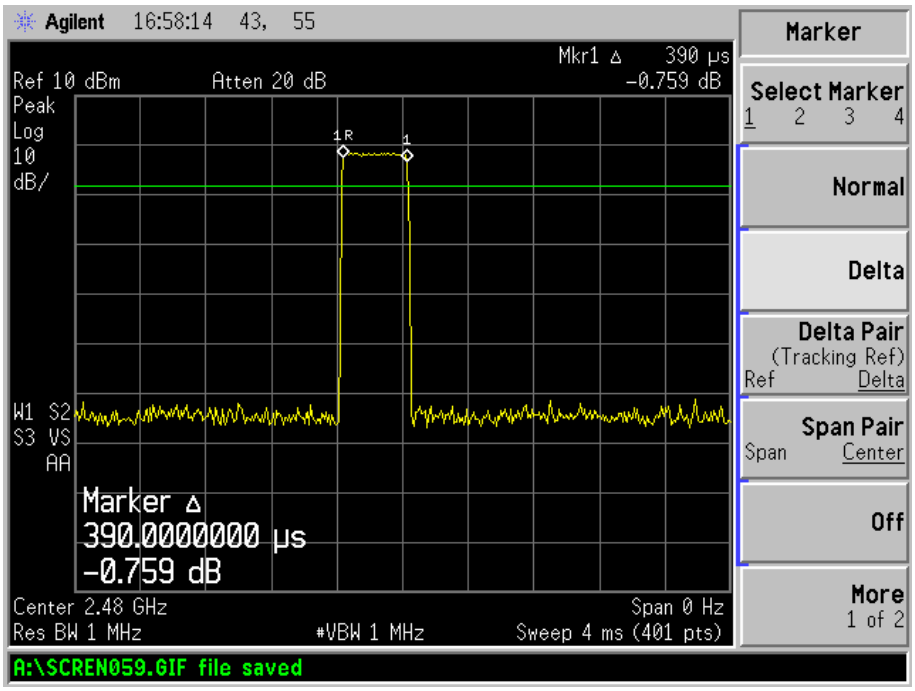
Modulation	Test Channel	Packet	Time Slot Length	Dwell Time	Limit
			ms	ms	ms
GFSK	2402MHz	DH1	0.390	124.80	400
		DH3	1.64	262.40	400
		DH5	2.88	307.20	400
	2441MHz	DH1	0.390	124.80	400
		DH3	1.64	262.40	400
		DH5	2.87	306.13	400
	2480MHz	DH1	0.390	124.80	400
		DH3	1.64	262.40	400
		DH5	2.89	308.27	400
8DPSK	2402MHz	3DH1	0.390	124.80	400
		3DH3	1.65	264.00	400
		3DH5	2.90	309.33	400
	2441MHz	3DH1	0.390	124.80	400
		3DH3	1.65	264.00	400
		3DH5	2.90	309.33	400
	2480MHz	3DH1	0.390	124.80	400
		3DH3	1.65	264.00	400
		3DH5	2.90	309.33	400

Please refer to the test plots as below:

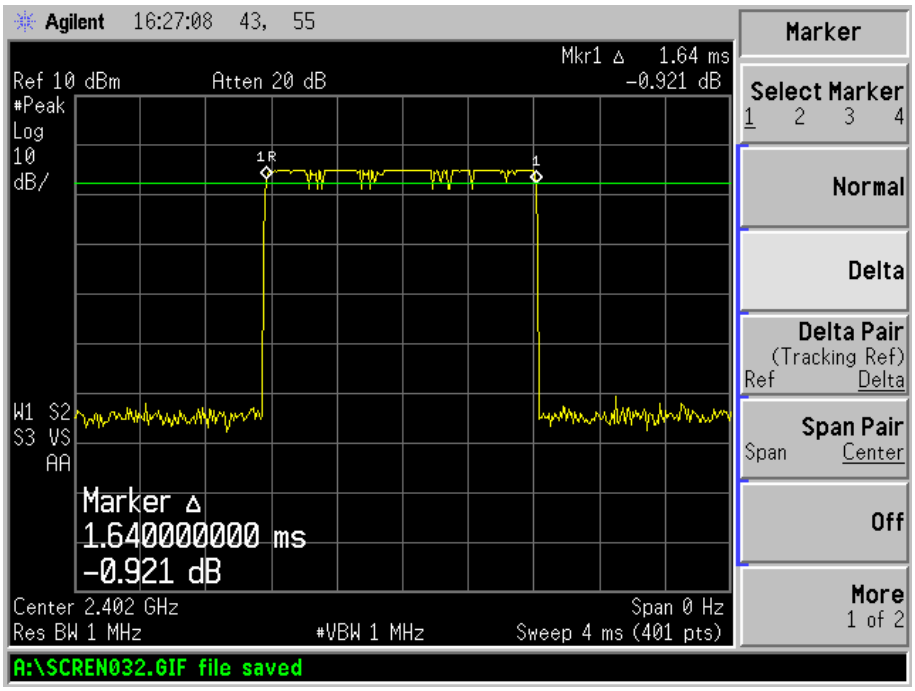
DH1 time slot (Low, Middle, High Channels)

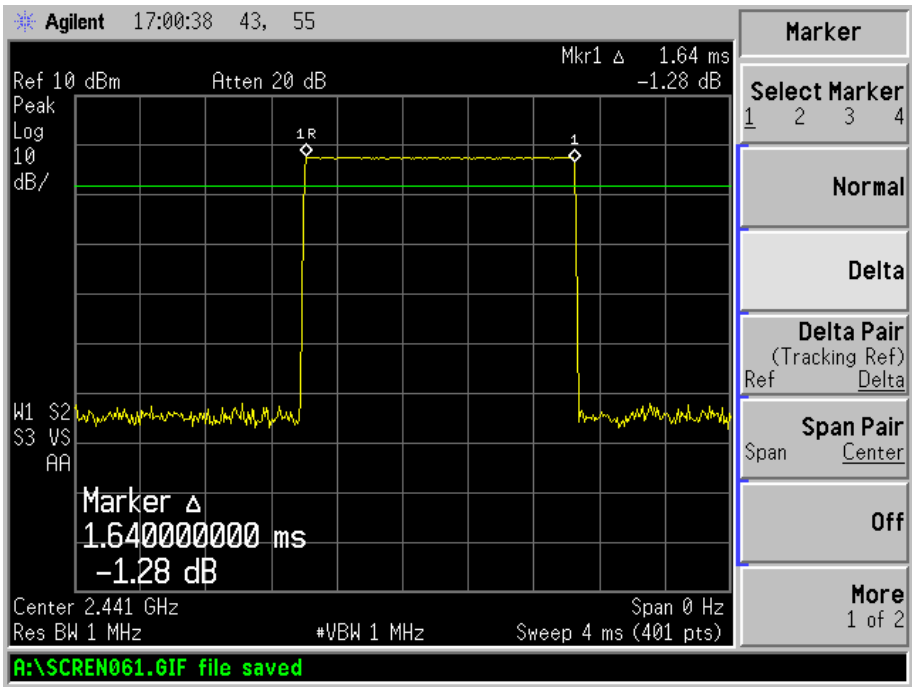


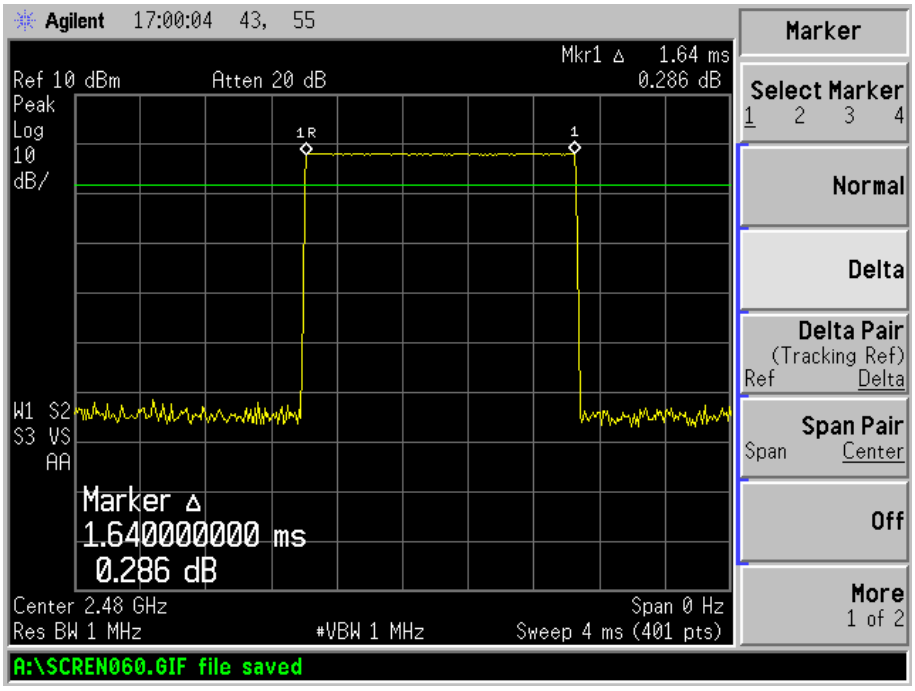




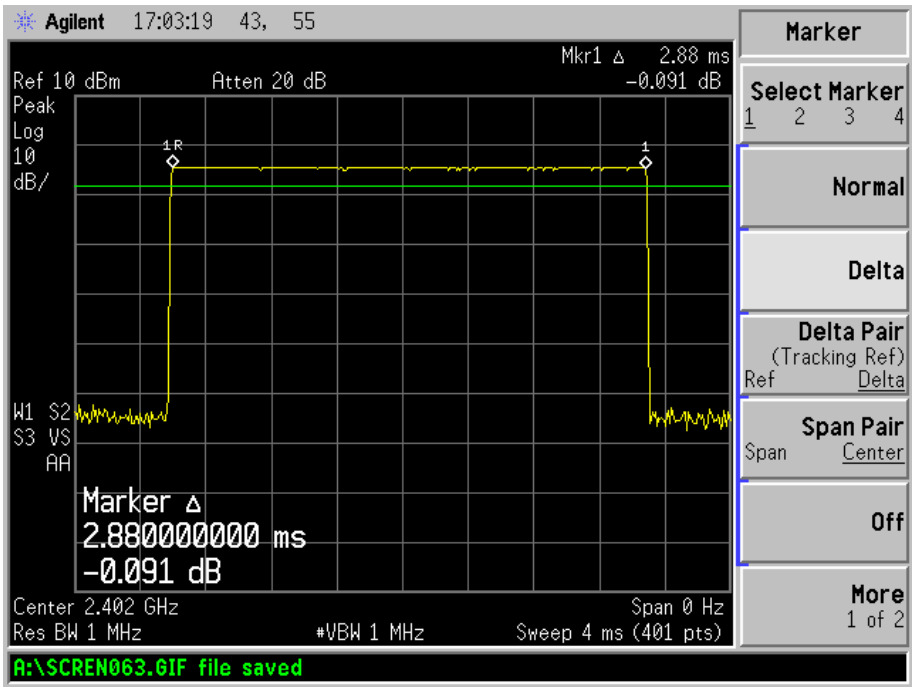
DH3 time slot (Low, Middle, High Channels)

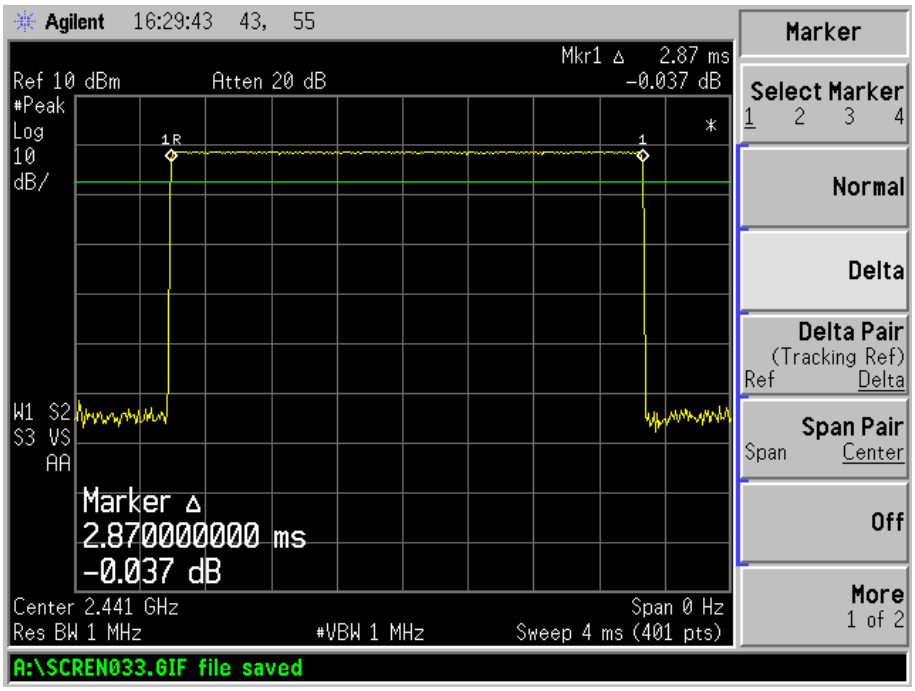


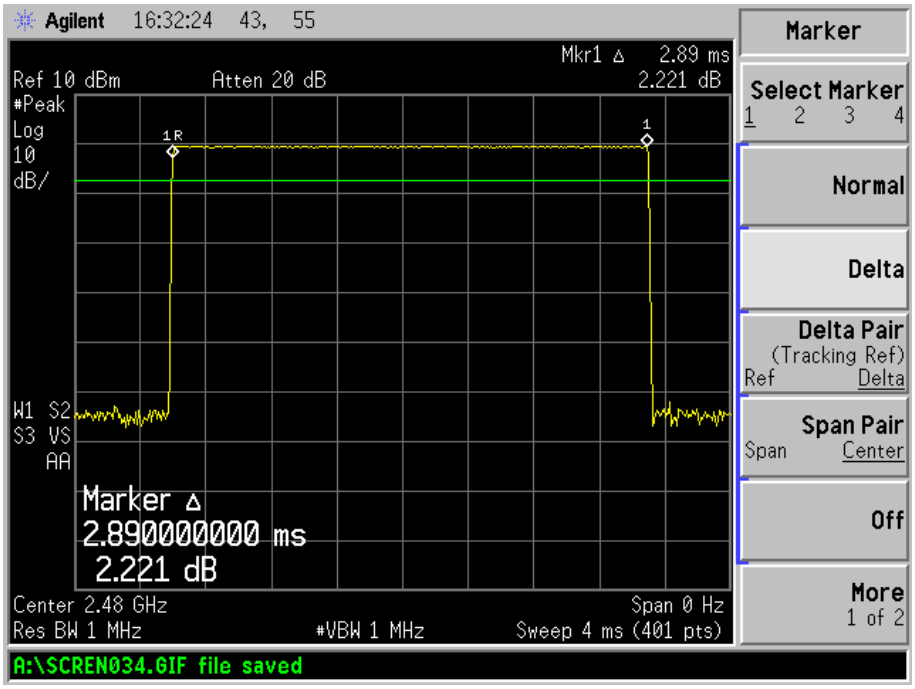

Agilent 17:00:38 43, 55
Mkr1 Δ 1.64 ms
Ref 10 dBm
Atten 20 dB
-1.28 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 VS
AA
Marker Δ
1.640000000 ms
-1.28 dB
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
A:\SCREN061.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent 17:00:04 43, 55
Mkr1 Δ 1.64 ms
Ref 10 dBm
Atten 20 dB
0.286 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 VS
AA
Marker Δ
1.640000000 ms
0.286 dB
Center 2.48 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
A:\SCREN060.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

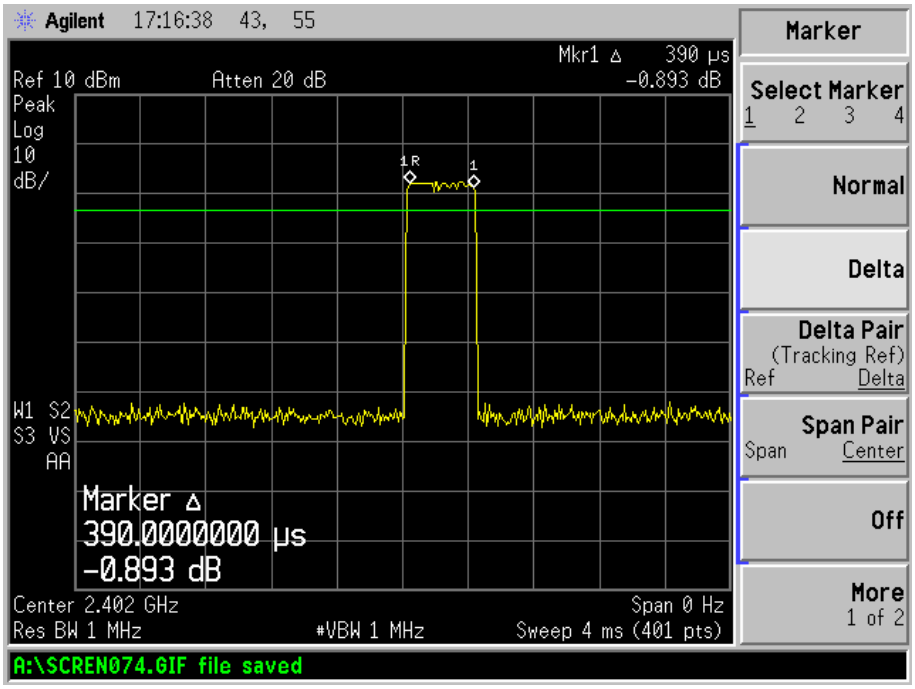
DH5 time slot (Low, Middle, High Channels)

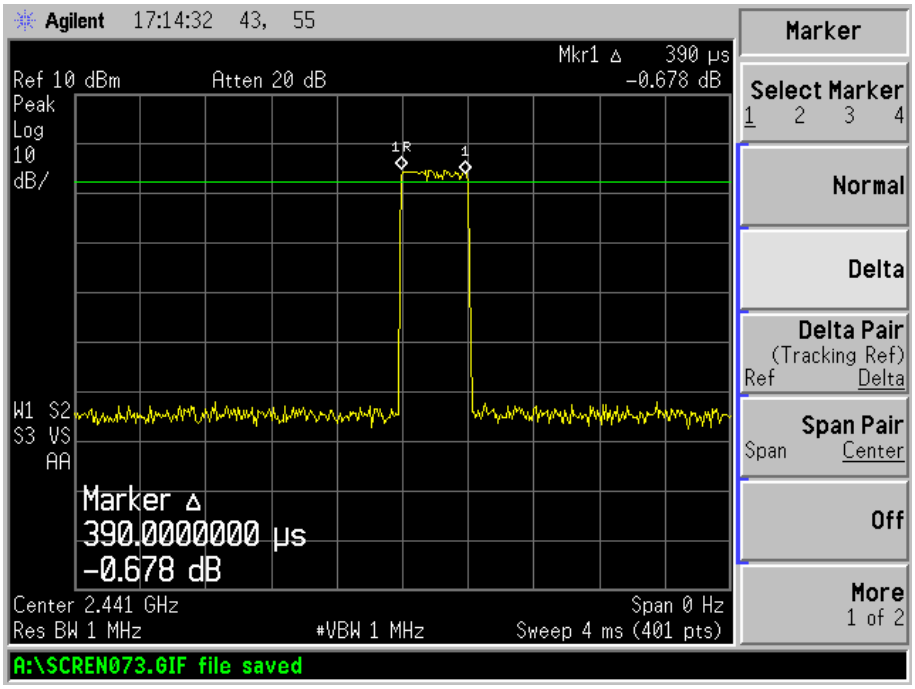


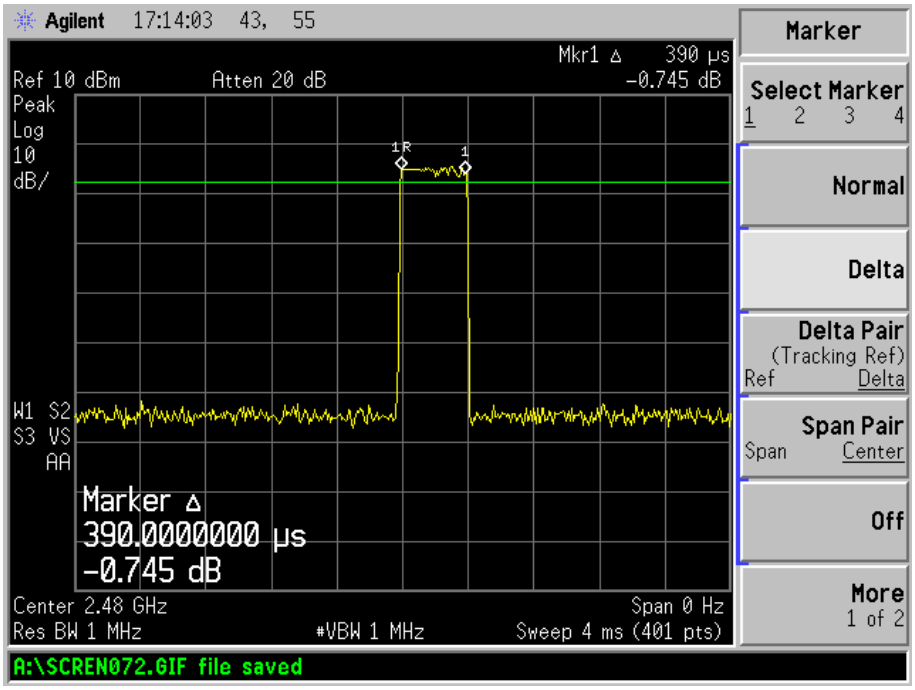




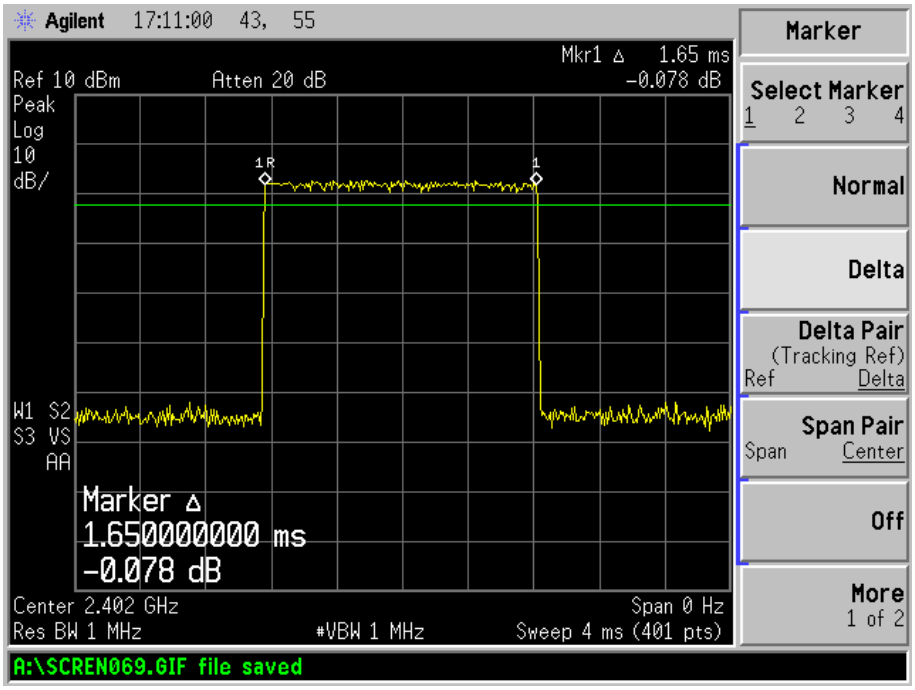
3DH1 time slot (Low, Middle, High Channels)

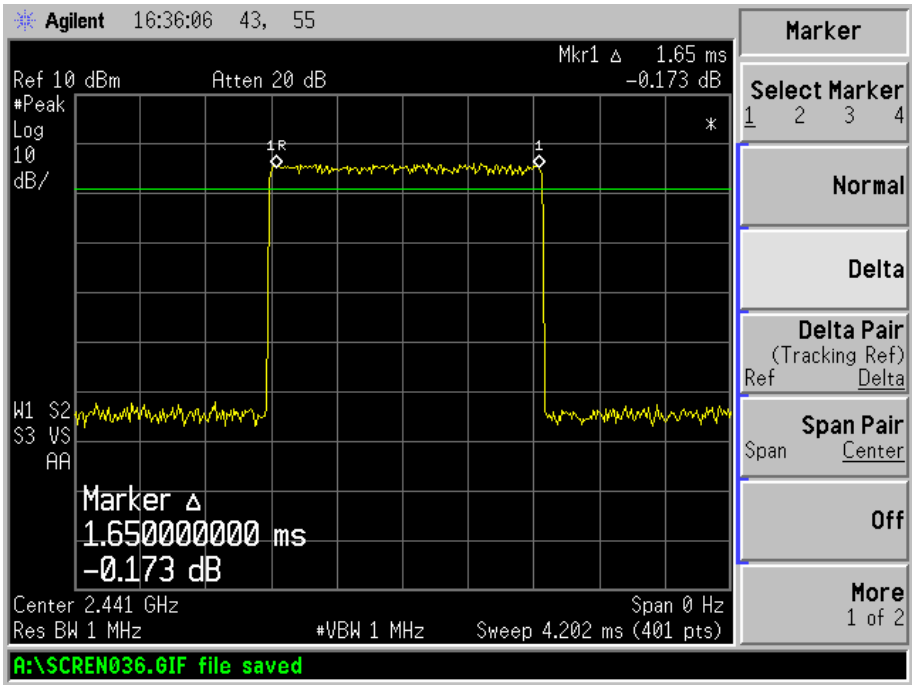


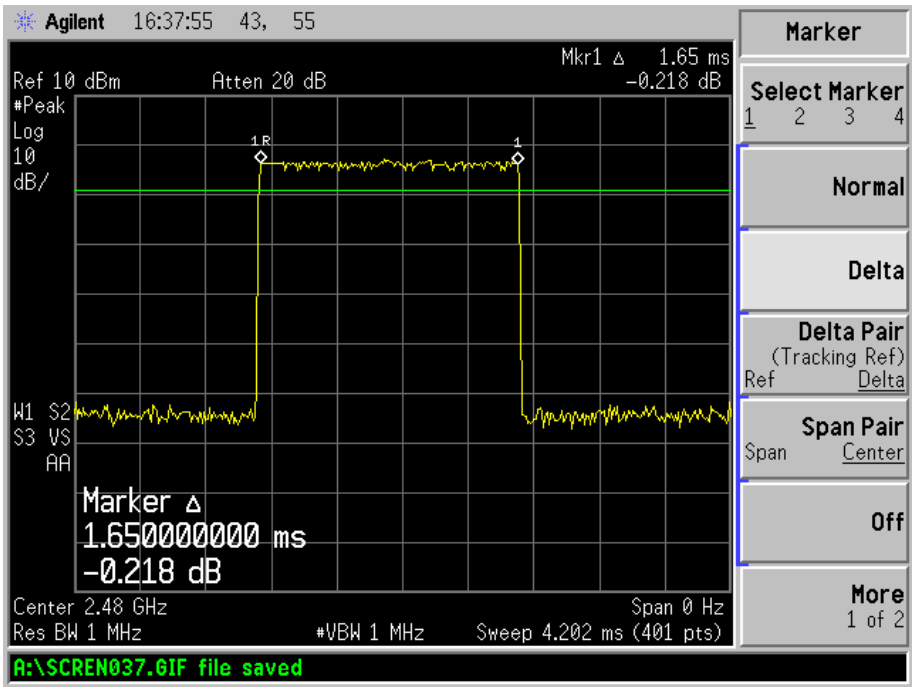

Agilent 17:14:32 43, 55
Mkr1 Δ 390 µs
Ref 10 dBm Atten 20 dB -0.678 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 VS
AA
Marker Δ
390.0000000 µs
-0.678 dB
Center 2.441 GHz Span 0 Hz
Res BW 1 MHz #VBW 1 MHz Sweep 4 ms (401 pts)
A:\SCREN073.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent 17:14:03 43, 55
Mkr1 Δ 390 µs
Ref 10 dBm Atten 20 dB -0.745 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 VS
AA
Marker Δ
390.0000000 µs
-0.745 dB
Center 2.48 GHz Span 0 Hz
Res BW 1 MHz #VBW 1 MHz Sweep 4 ms (401 pts)
A:\SCREN072.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

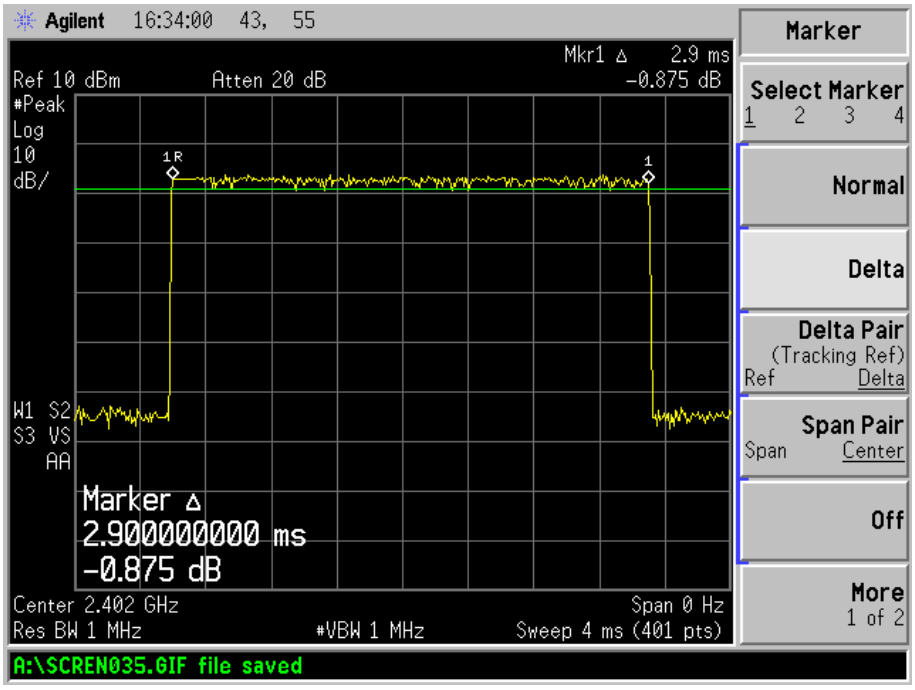
3DH3 time slot (Low, Middle, High Channels)

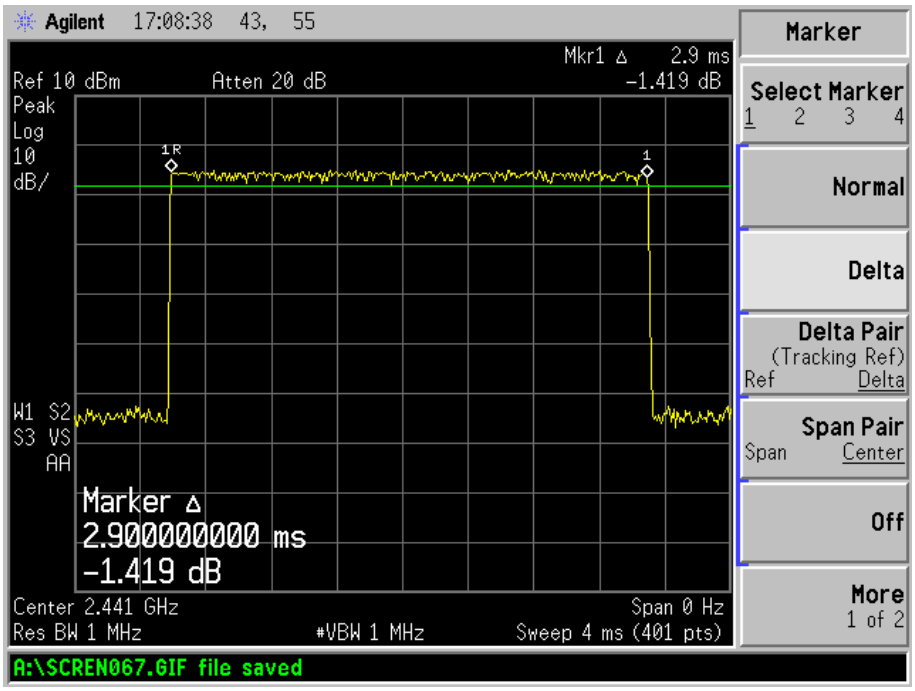


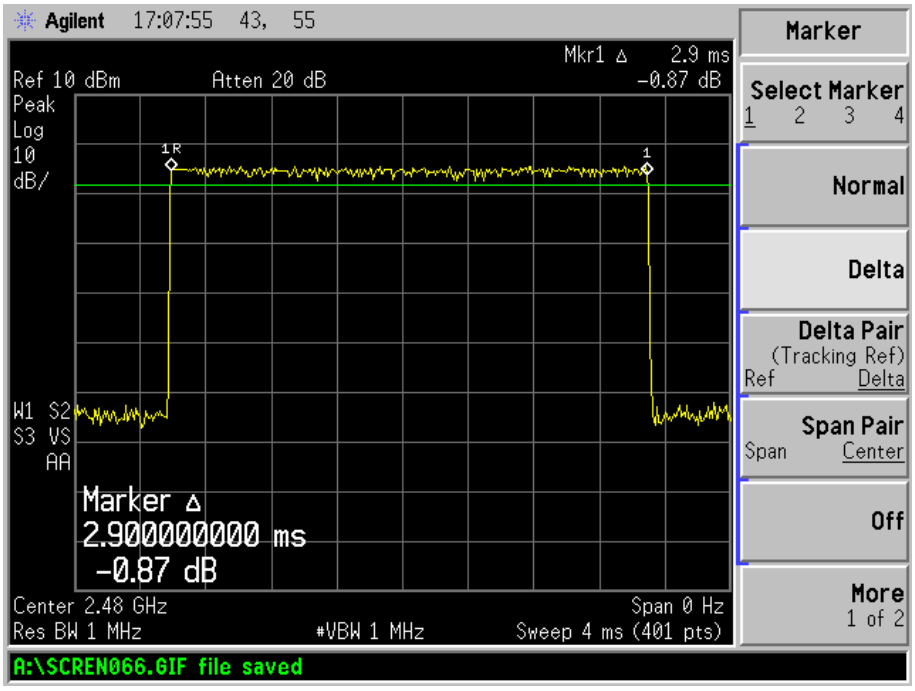




3DH5 time slot (Low, Middle, High Channels)




Agilent 17:08:38 43, 55
Mkr1 Δ 2.9 ms
Ref 10 dBm
Atten 20 dB
-1.419 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 VS
AA
Marker Δ
2.900000000 ms
-1.419 dB
Center 2.441 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
A:\SCREN067.GIF file saved
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 17:07:55 43, 55
Mkr1 Δ 2.9 ms
Ref 10 dBm
Atten 20 dB
-0.87 dB
Peak
Log
10
dB/
1R
1
W1 S2
S3 VS
AA
Marker Δ
2.900000000 ms
-0.87 dB
Center 2.48 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 4 ms (401 pts)
A:\SCREN066.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

9. 6dB Bandwidth

9.1 Standard Applicable

According to 15.247(a)(2). Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

9.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set RBW = 100 kHz.
3. Set the video bandwidth (VBW) ≥ 3XRBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

9.4 Environmental Conditions

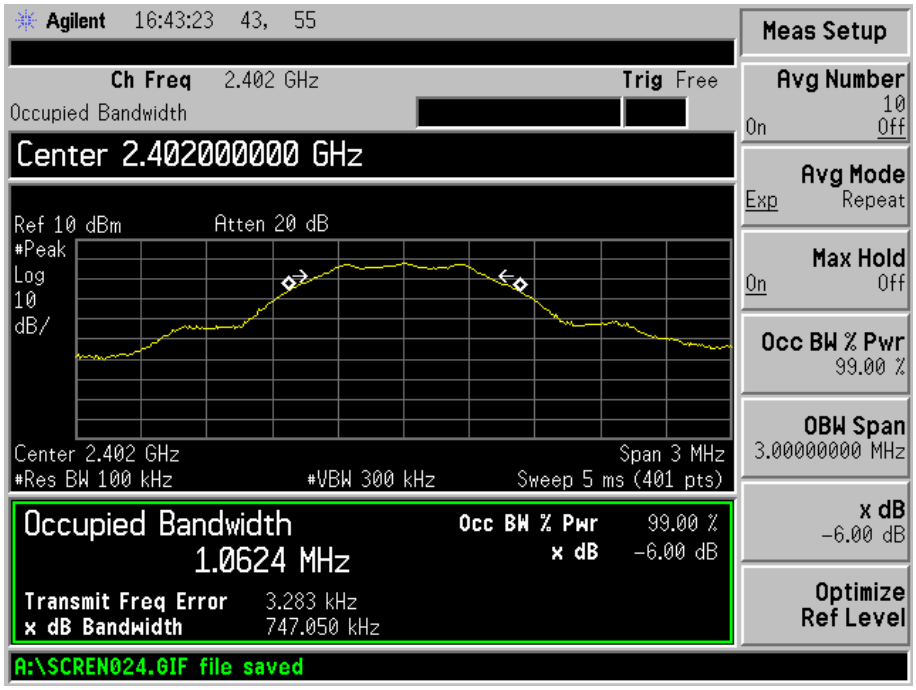
Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

9.5 Summary of Test Results/Plots

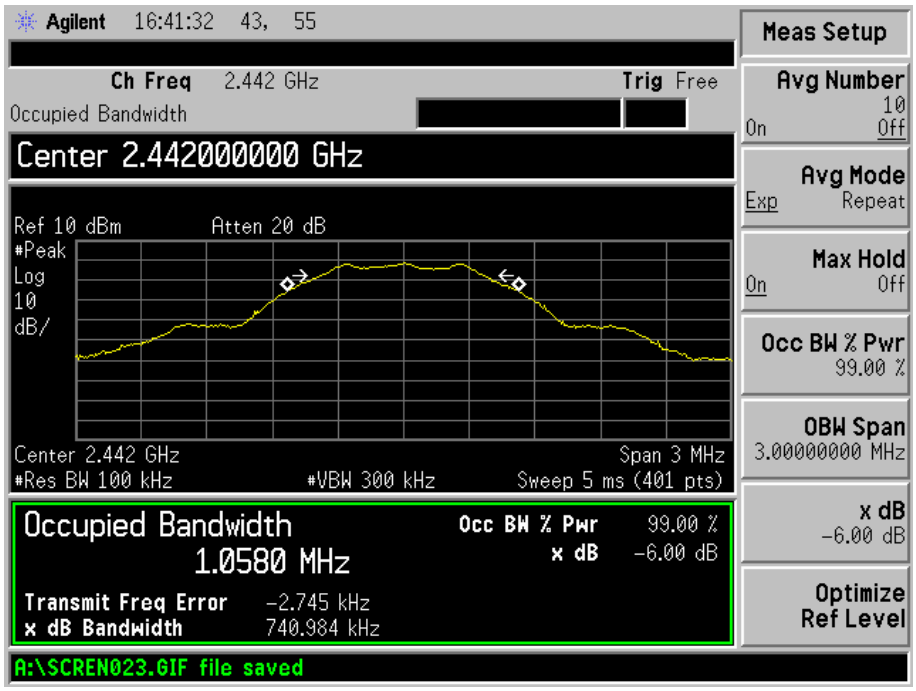
Test Mode	Test Channel MHz	6 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz
BLE	2402	747.050	1062.4	500
	2442	740.984	1058.0	500
	2480	750.345	1059.6	500

Please refer to the following test plots:

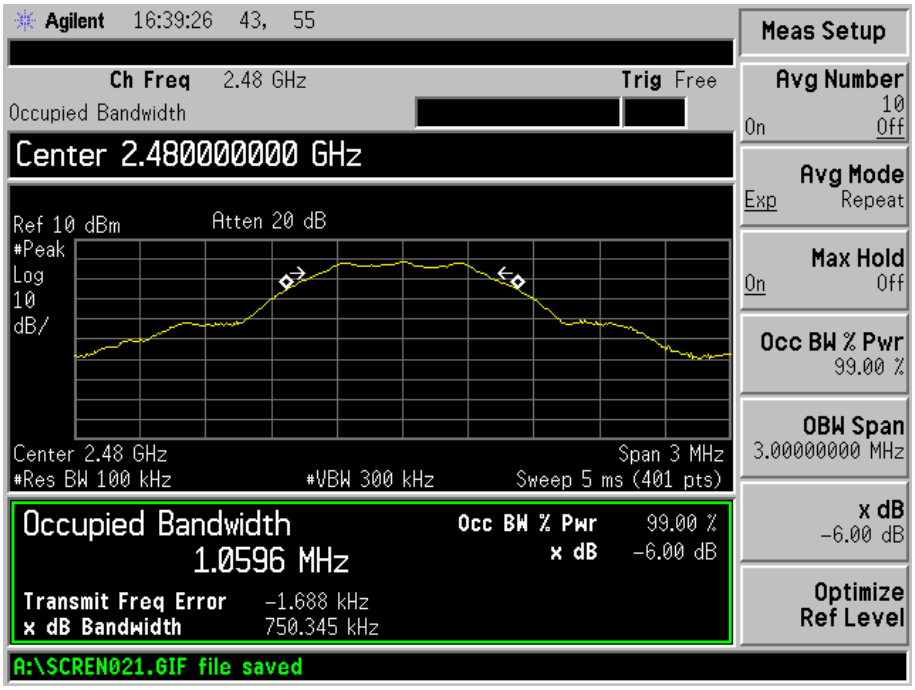
BLE-Low Channel



BLE -Middle Channel



BLE -High Channel



10. 20dB Bandwidth

10.1 Standard Applicable

According to 15.247(a)(1)(iii). For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

10.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

10.3 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.
Set span = 2MHz, centered on a hopping channel
RBW ≥1% 20dB 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.

10.4 Environmental Conditions

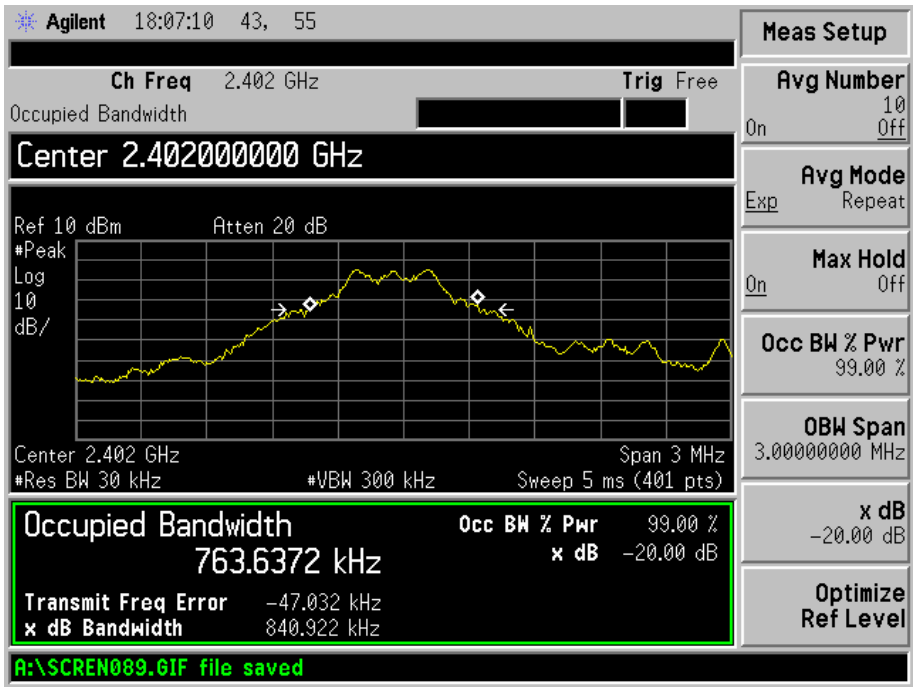
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

10.5 Summary of Test Results/Plots

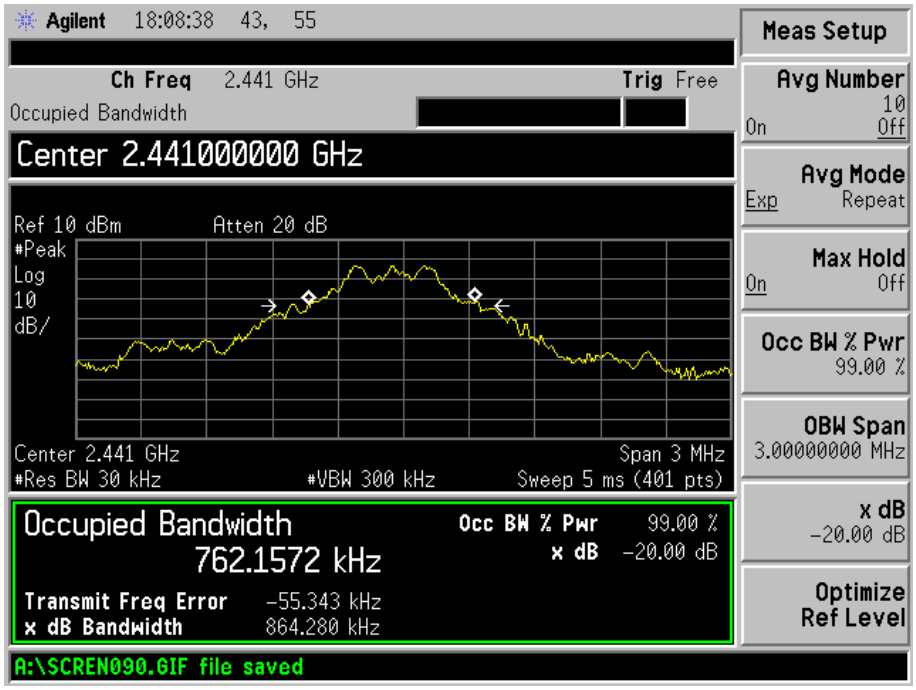
Channel	Frequency MHz	20dB Bandwidth (GFSK) kHz	20dB Bandwidth (8DPSK) kHz
Low Channel	2402	840.922	1241.0
Middle Channel	2441	864.280	1240.0
High Channel	2480	798.866	1251.0

For GFSK

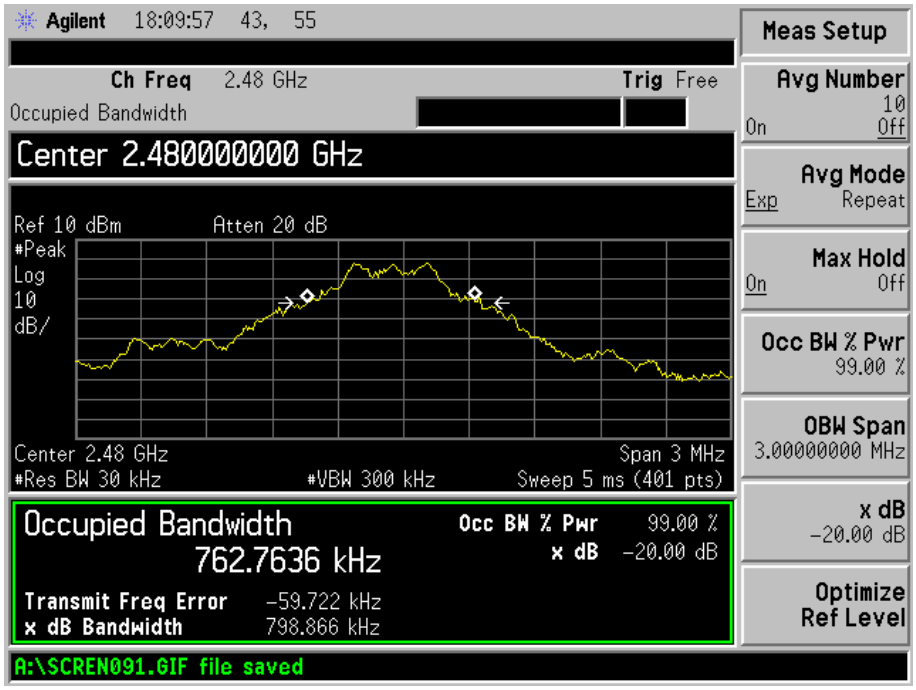
Low Channel:



Middle Channel:

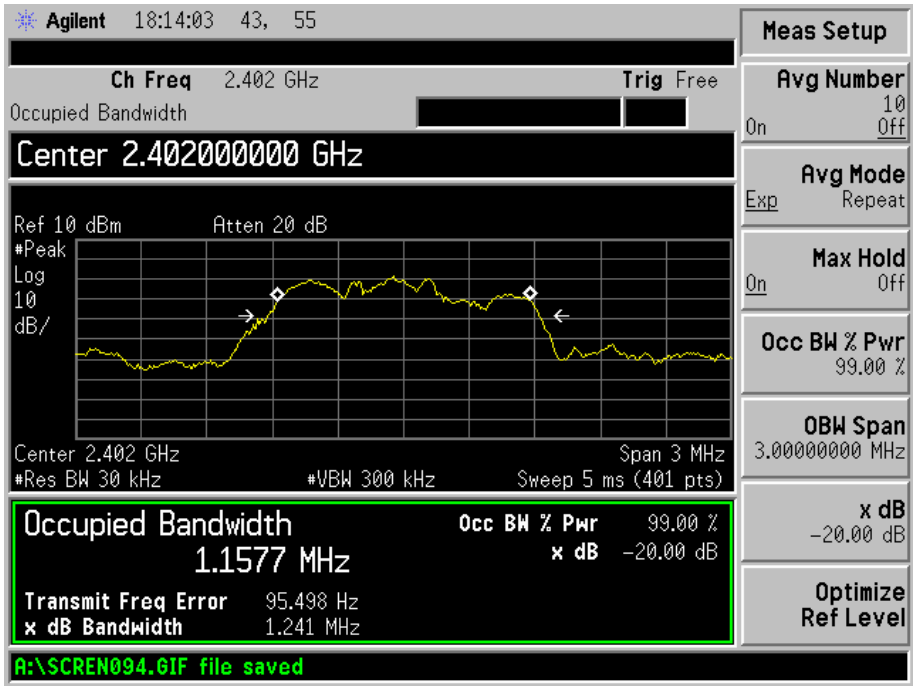


High Channel:

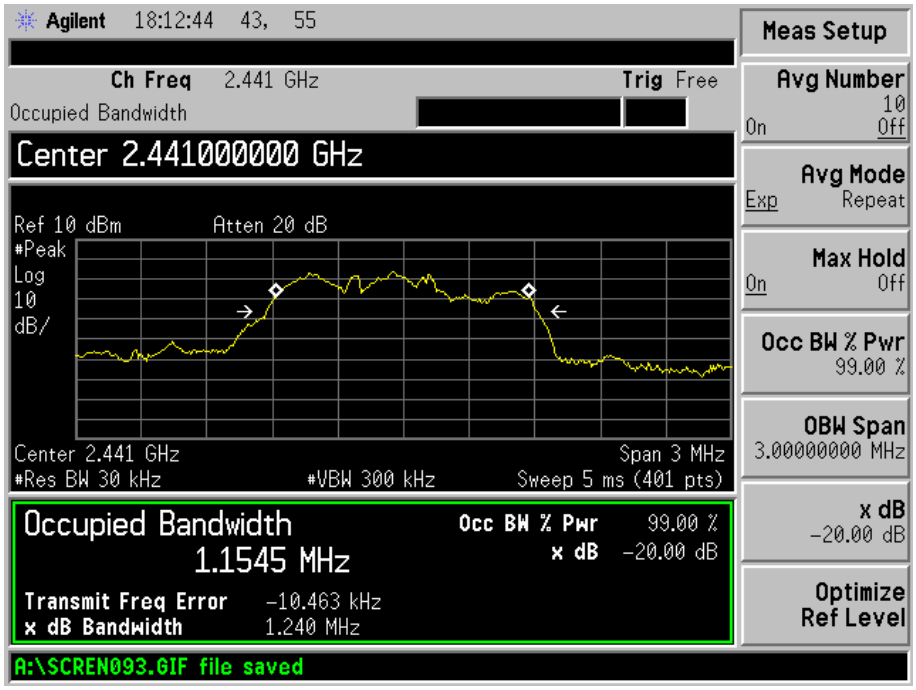


For 8DPSK

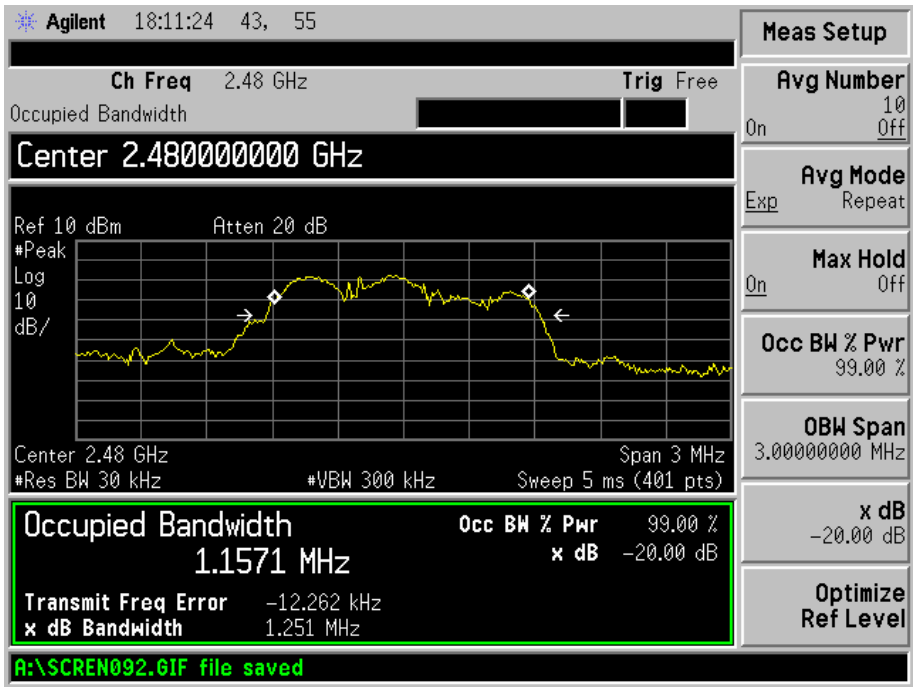
Low Channel:



Middle Channel:



High Channel:



11. RF Output Power

11.1 Standard Applicable

According to 15.247(b)(3). For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

11.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

11.3 Test Procedure

According to section 15.247(b)-power output of theKDB 558074 D01 v03r01, 8.1.2 Option 2 (channel integration method) this procedure should only be used when the maximum available RBW of the spectrum/signal analyzer is less than the DTS bandwidth.

1. Set the RBW = 1 MHz.
2. Set the VBW ≥ 3 RBW
3. Set the span ≥ 1.5 x DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

11.4 Environmental Conditions

Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

11.5 Summary of Test Results/Plots

Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
GFSK	2402	-4.62	0.3451	1000
	2441	-2.42	0.5728	1000
	2480	-1.83	0.6561	1000
Pi/4 DQPSK	2402	-4.58	0.3483	1000
	2441	-2.44	0.5702	1000
	2480	-1.83	0.6561	1000
8DPSK	2402	-4.64	0.3436	1000
	2441	-2.46	0.5675	1000
	2480	-1.83	0.6561	1000
BLE	2402	-5.67	0.2710	1000
	2442	-5.07	0.3112	1000
	2480	-4.82	0.3296	1000

Note: the antenna gain of 0 dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

12. Field Strength of Spurious Emissions

12.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.10 dB.

12.2 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).

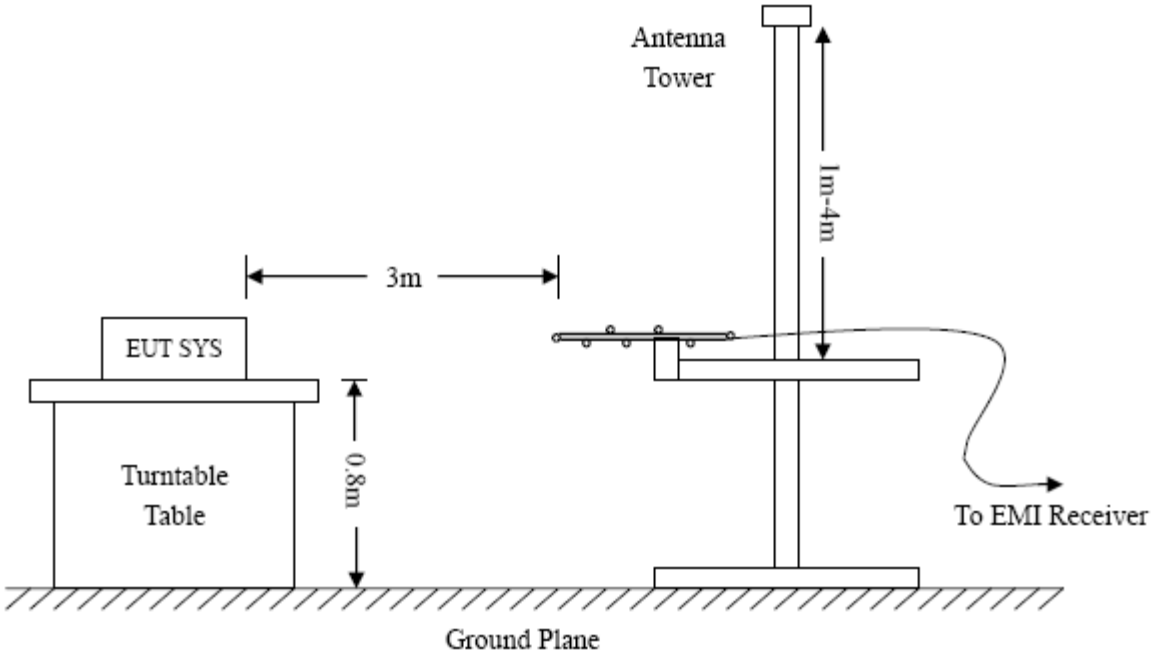
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

12.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2013-05-07	2014-05-06
EMI Test Receiver	R&S	ESVB	825471/005	2013-05-07	2014-05-06
Pre-amplifier	Agilent	8447F	3113A06717	2013-05-07	2014-05-06
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-05-07	2014-05-06
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-04-20	2014-04-19
Horn Antenna	ETS	3117	00086197	2013-04-20	2014-04-19
Horn Antenna	ETS	3116B	00088203	2013-04-20	2014-04-19
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2013-04-20	2014-04-19

12.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 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

12.5 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 for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

12.6 Environmental Conditions

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

12.7 Summary of Test Results/Plots

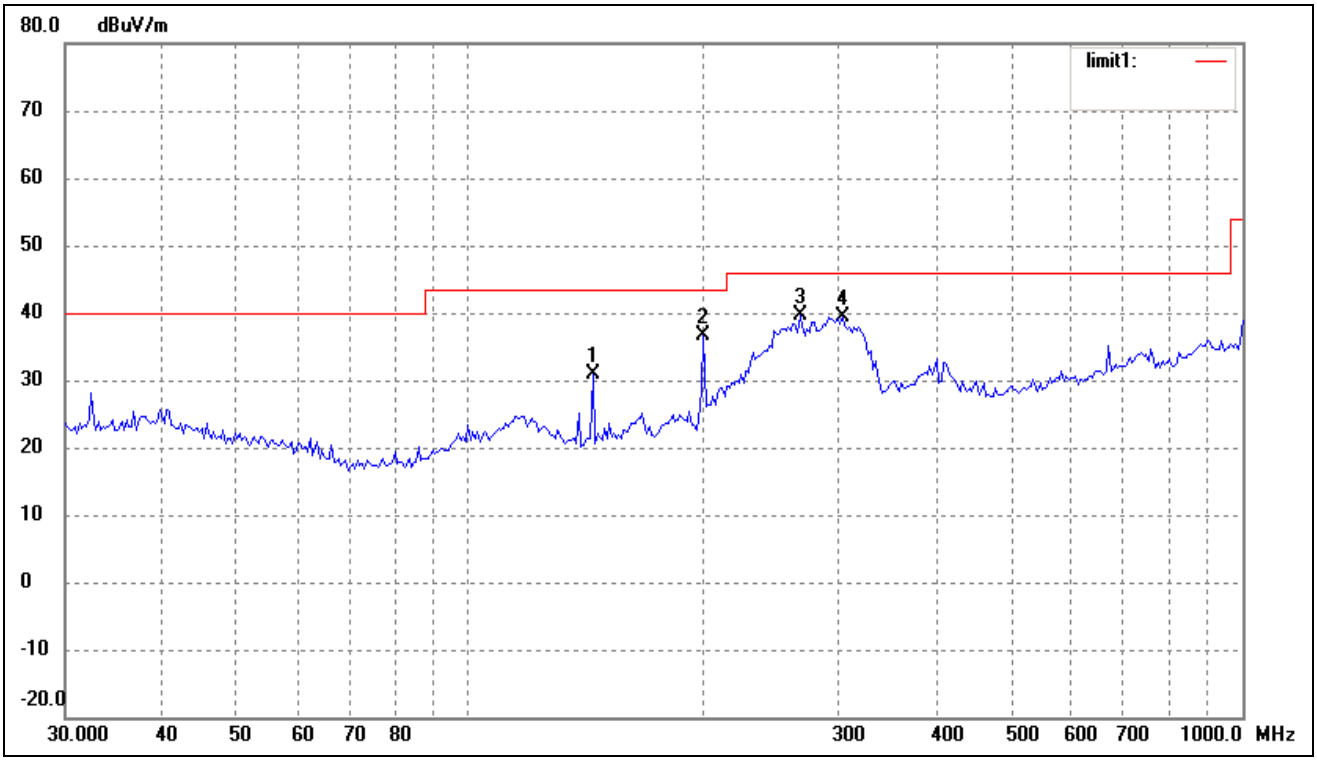
According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

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)

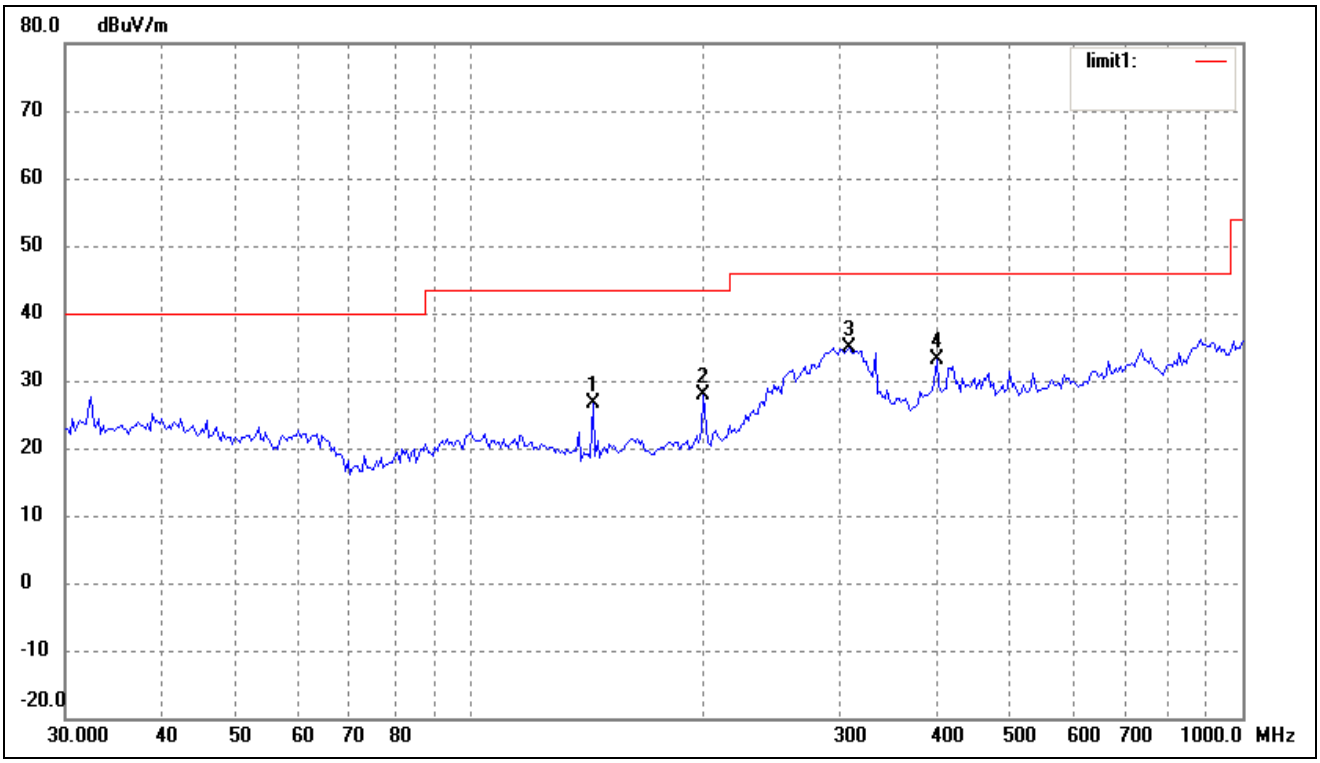
EUT: *bluetooth speaker*
Tested Model: *M0*
Operating Condition: *Charging & AUX in*
Comment: *AC 120V/60Hz; USB 5V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	27.51	3.46	30.97	43.50	-12.53	360	100	peak
2	200.6881	31.89	4.69	36.58	43.50	-6.92	360	100	peak
3	267.5455	31.34	8.28	39.62	46.00	-6.38	360	100	peak
4	303.5437	29.16	10.24	39.40	46.00	-6.60	360	100	peak

Test Specification: *Vertical*

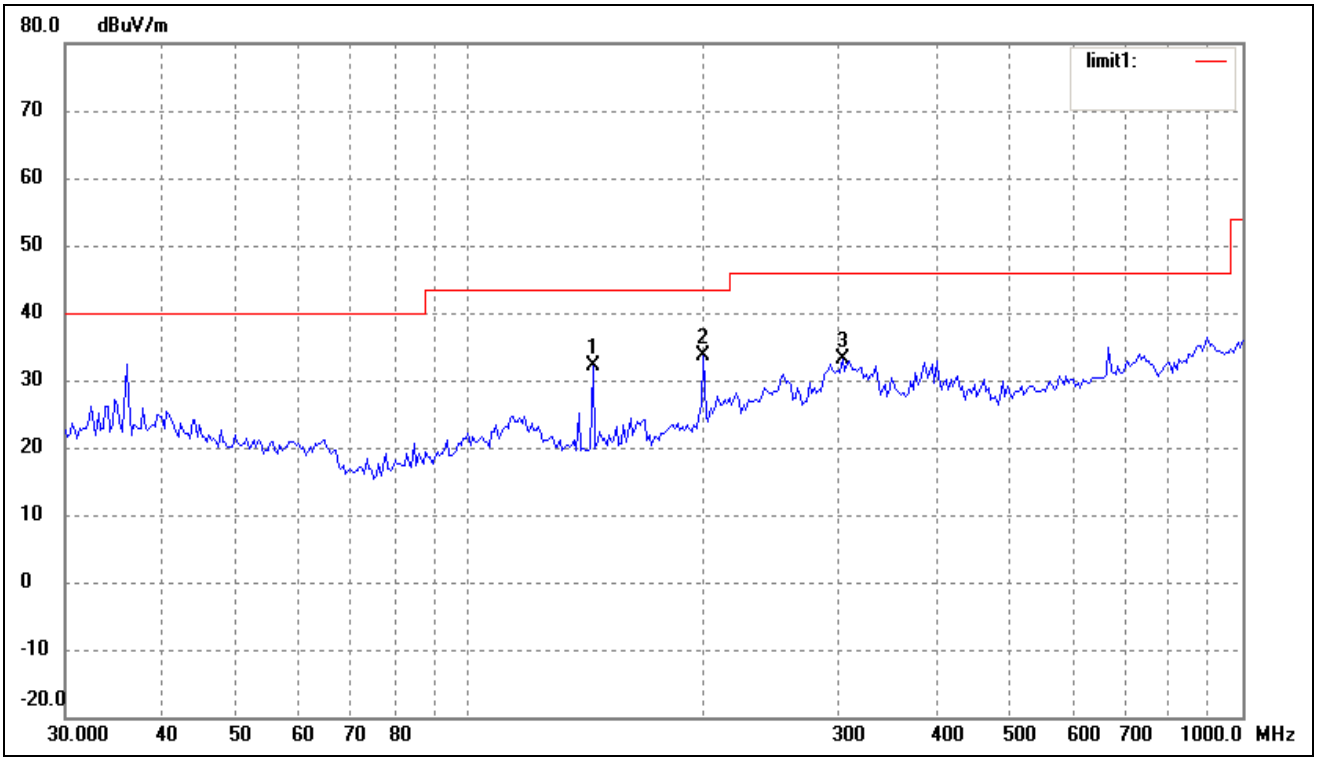


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	23.16	3.46	26.62	43.50	-16.88	360	100	peak
2	200.6881	23.29	4.69	27.98	43.50	-15.52	360	100	peak
3	309.9977	24.55	10.33	34.88	46.00	-11.12	360	100	peak
4	401.8385	21.55	11.47	33.02	46.00	-12.98	360	100	peak

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

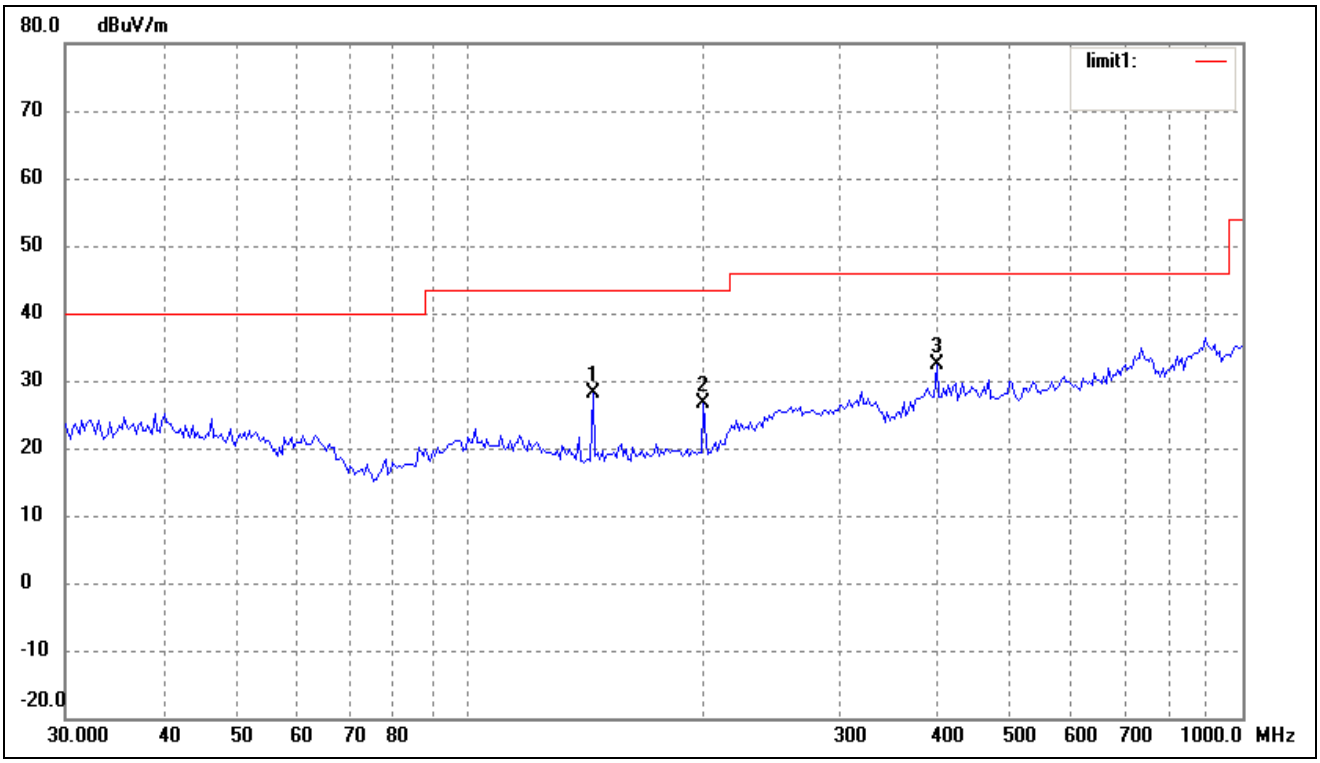
EUT: *bluetooth speaker*
Tested Model: *M0*
Operating Condition: *Transmitting Low Channel (2402MHz)*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	28.67	3.46	32.13	43.50	-11.37	360	100	peak
2	200.6881	28.88	4.69	33.57	43.50	-9.93	360	100	peak
3	303.5437	22.84	10.24	33.08	46.00	-12.92	360	100	peak

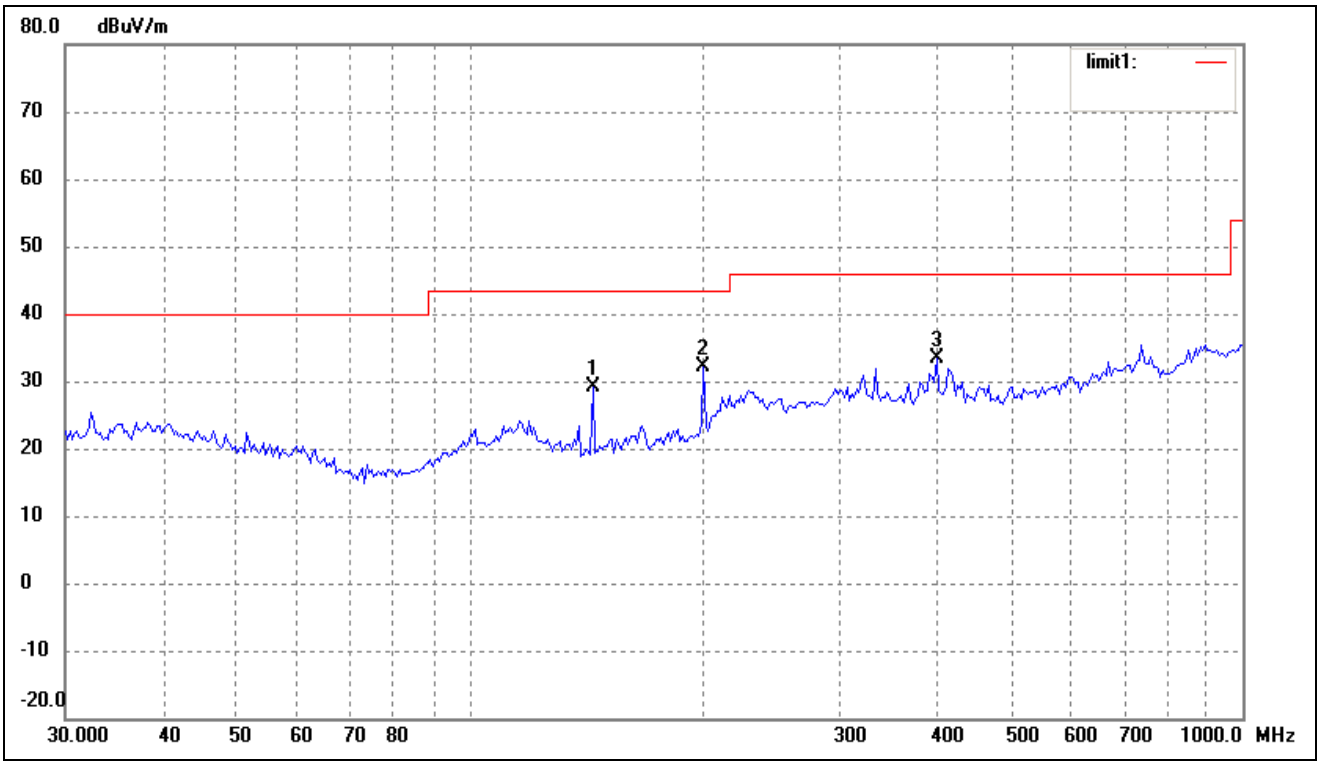
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	24.73	3.46	28.19	43.50	-15.31	360	100	peak
2	200.6881	22.00	4.69	26.69	43.50	-16.81	360	100	peak
3	401.8385	20.84	11.47	32.31	46.00	-13.69	360	100	peak

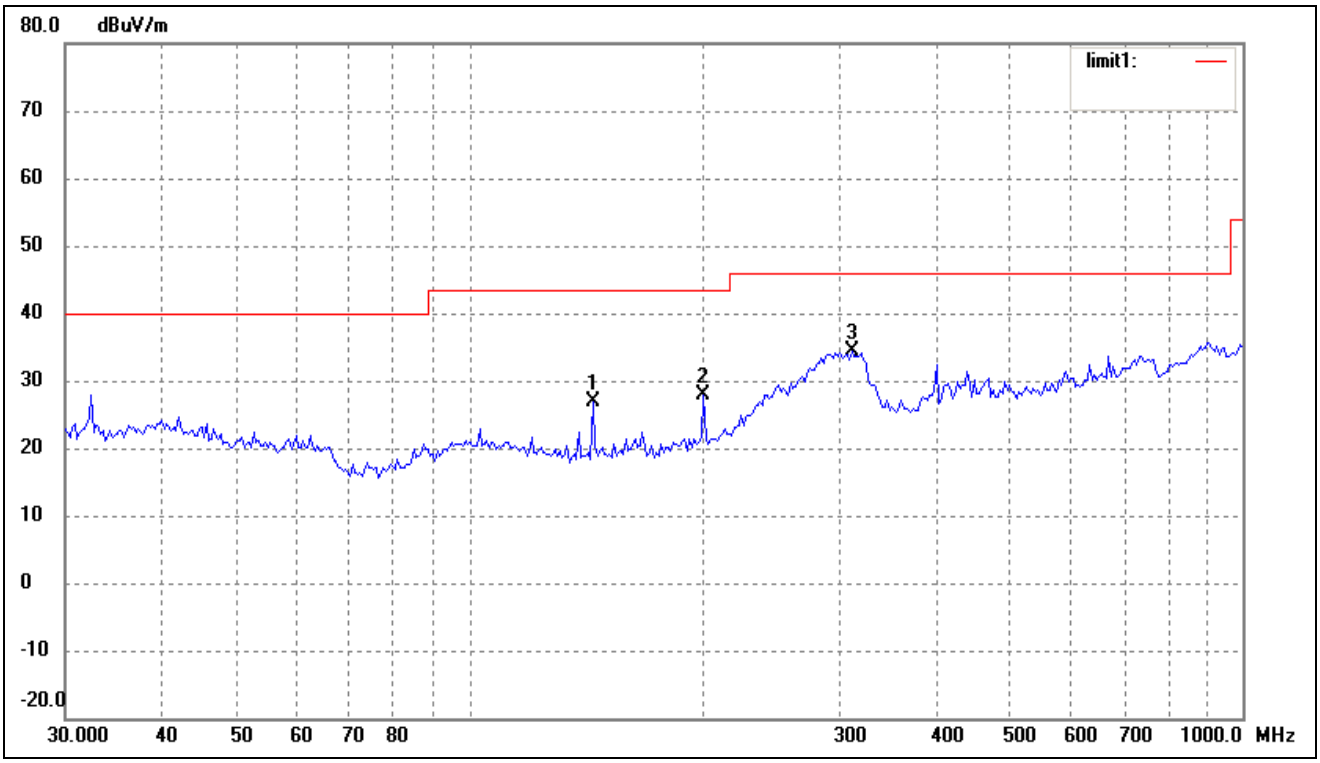
Operating Condition: *Transmitting Middle Channel (2441MHz)*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	25.71	3.46	29.17	43.50	-14.33	360	100	peak
2	200.6881	27.39	4.69	32.08	43.50	-11.42	360	100	peak
3	401.8385	21.92	11.47	33.39	46.00	-12.61	360	100	peak

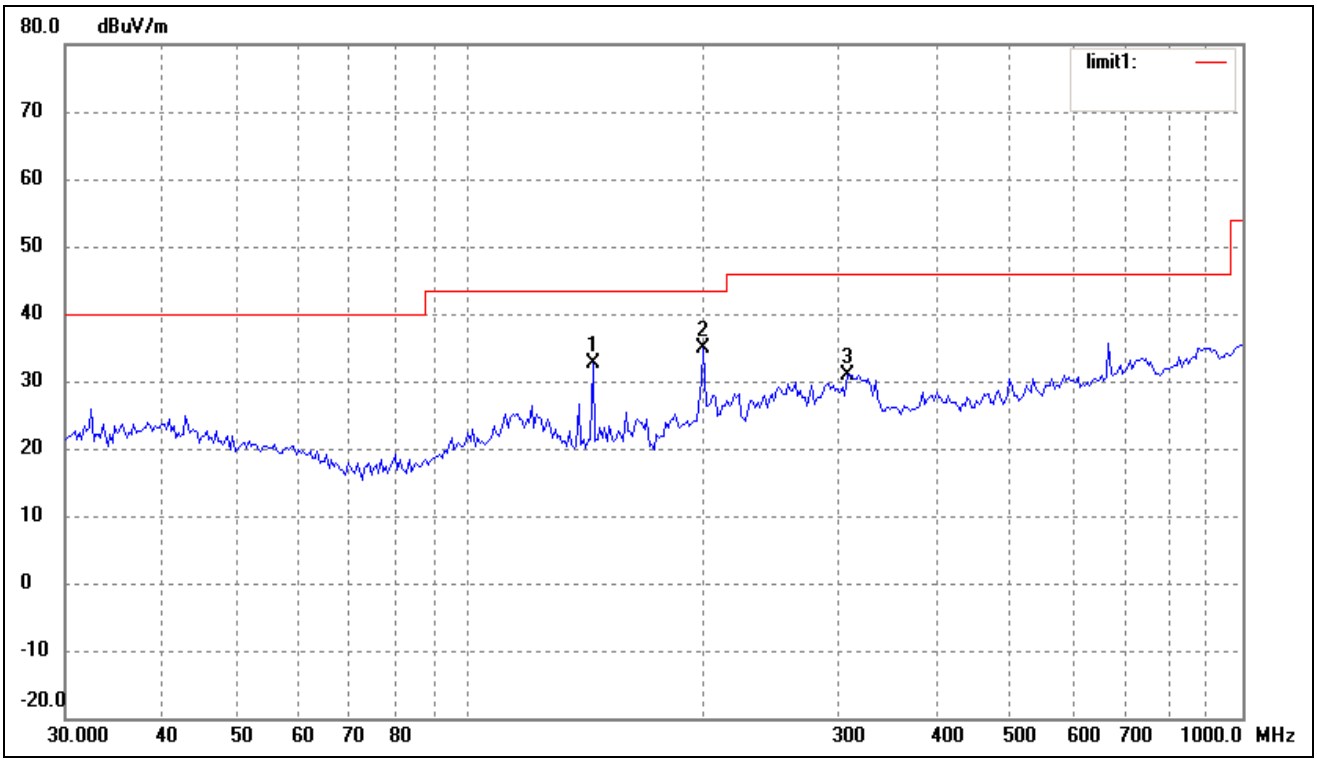
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	23.54	3.46	27.00	43.50	-16.50	360	100	peak
2	200.6881	23.20	4.69	27.89	43.50	-15.61	360	100	peak
3	312.1794	23.90	10.36	34.26	46.00	-11.74	360	100	peak

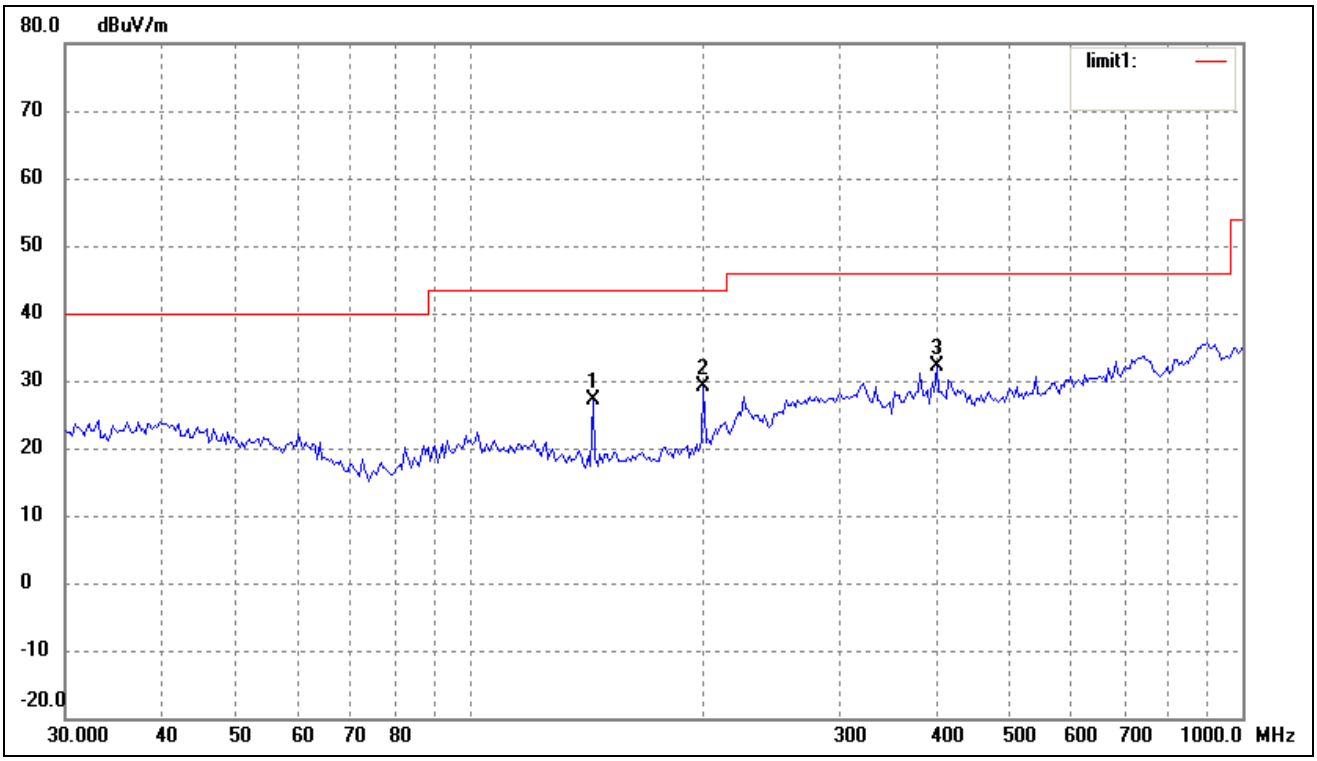
Operating Condition: *Transmitting High Channel (2480MHz)*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	29.27	3.46	32.73	43.50	-10.77	360	100	peak
2	200.6881	30.12	4.69	34.81	43.50	-8.69	360	100	peak
3	307.8312	20.61	10.30	30.91	46.00	-15.09	360	100	peak

Test Specification: *Vertical*

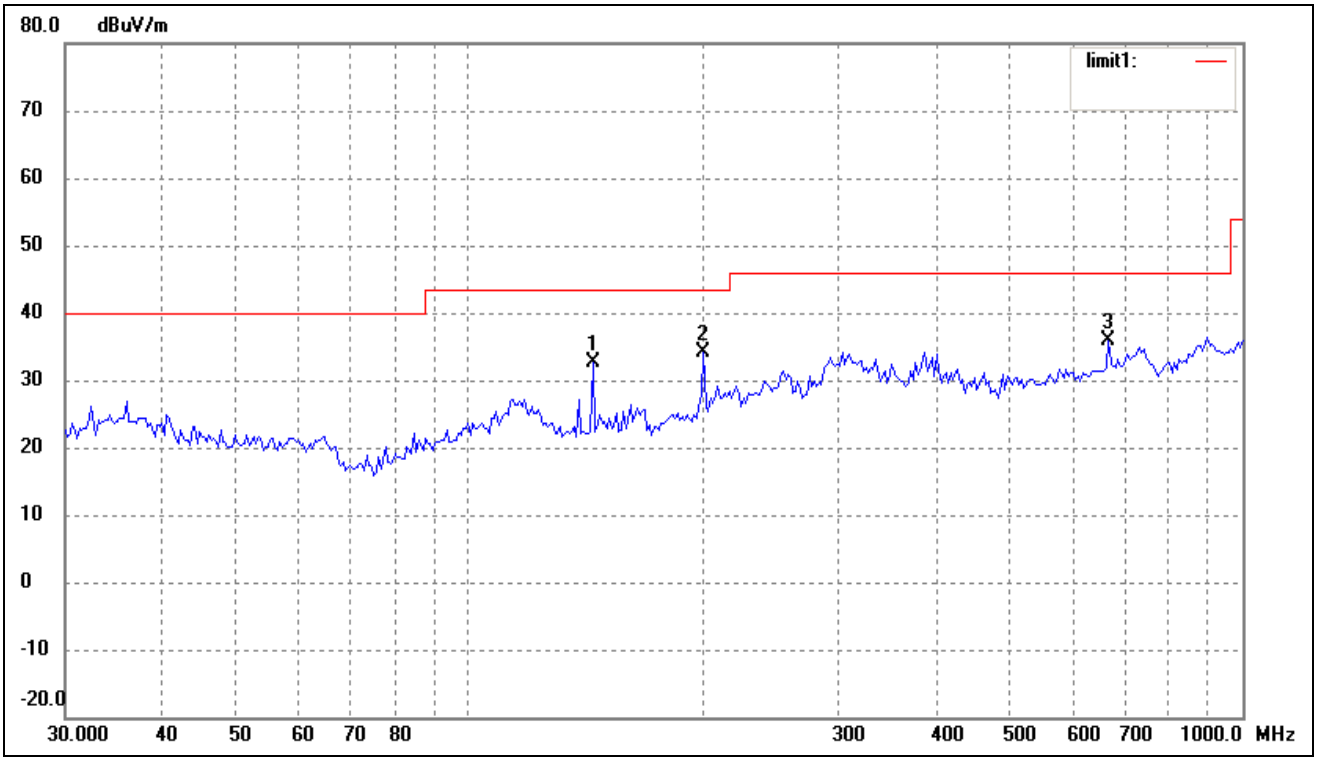


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	23.60	3.46	27.06	43.50	-16.44	360	100	peak
2	200.6881	24.52	4.69	29.21	43.50	-14.29	360	100	peak
3	401.8385	20.72	11.47	32.19	46.00	-13.81	360	100	peak

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

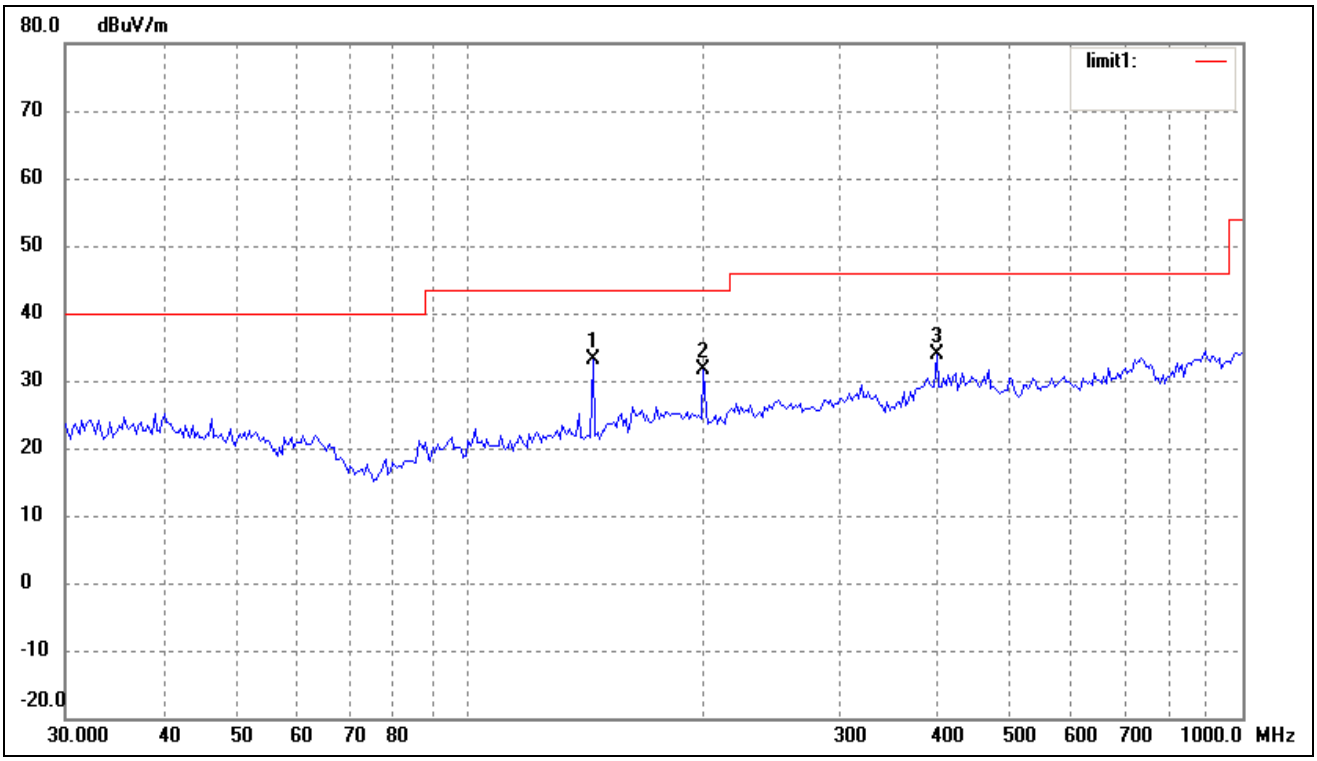
EUT: *bluetooth speaker*
Tested Model: *M0*
Operating Condition: *Transmitting Low Channel (2402MHz)-BLE*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	29.17	3.46	32.63	43.50	-10.87	360	100	peak
2	200.6879	29.38	4.69	34.07	43.50	-9.43	360	100	peak
3	670.4891	20.62	15.17	35.79	46.00	-10.21	360	100	peak

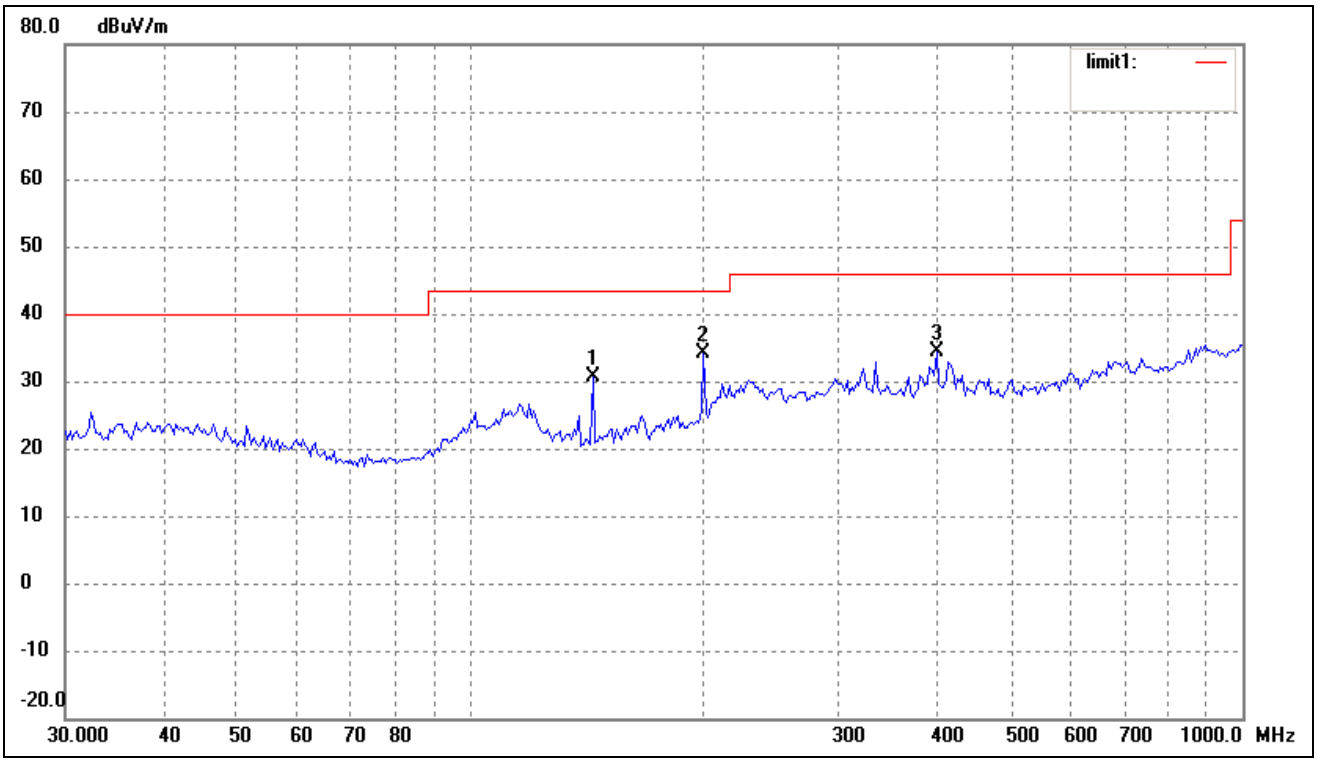
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	29.73	3.46	33.19	43.50	-10.31	360	100	peak
2	200.6879	26.99	4.69	31.68	43.50	-11.82	360	100	peak
3	401.8385	22.34	11.47	33.81	46.00	-12.19	360	100	peak

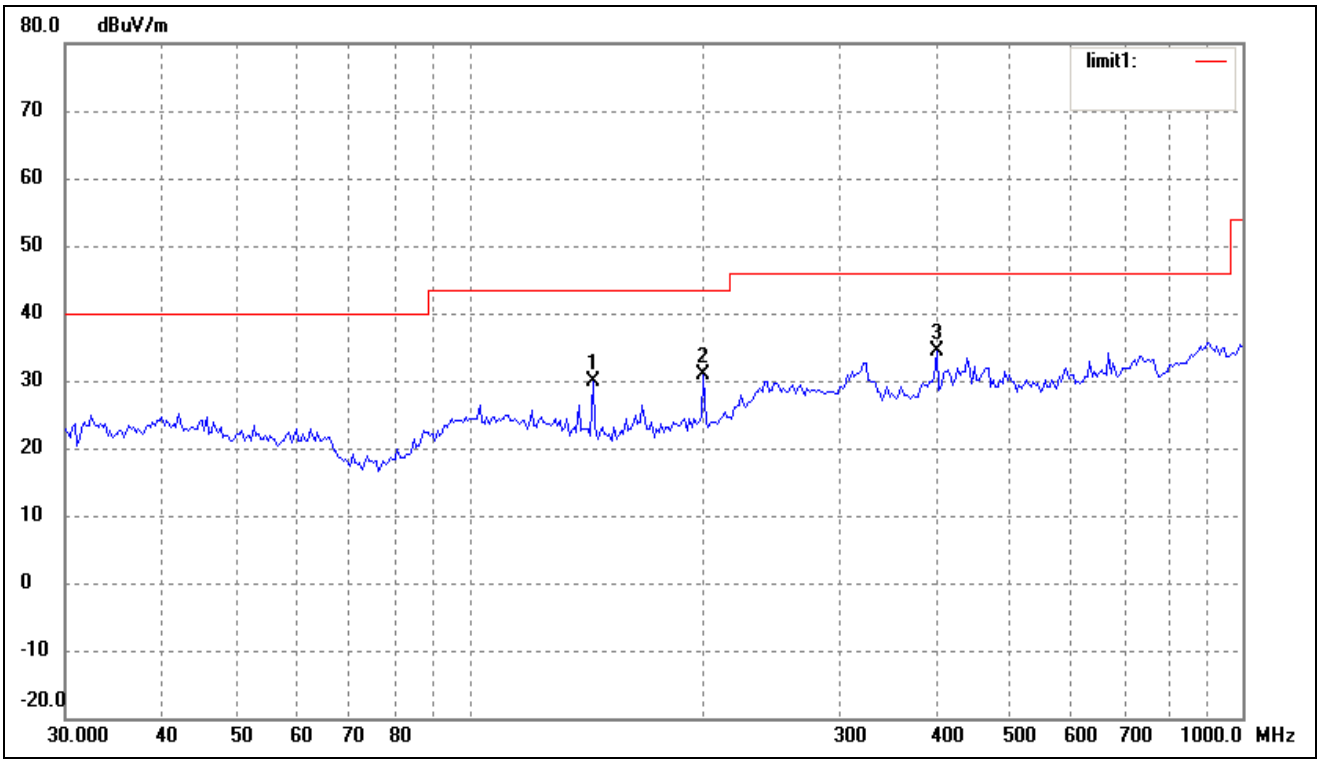
Operating Condition: *Transmitting Middle Channel (2442MHz)-BLE*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	27.21	3.46	30.67	43.50	-12.83	360	100	peak
2	200.6879	29.39	4.69	34.08	43.50	-9.42	360	100	peak
3	401.8385	22.92	11.47	34.39	46.00	-11.61	360	100	peak

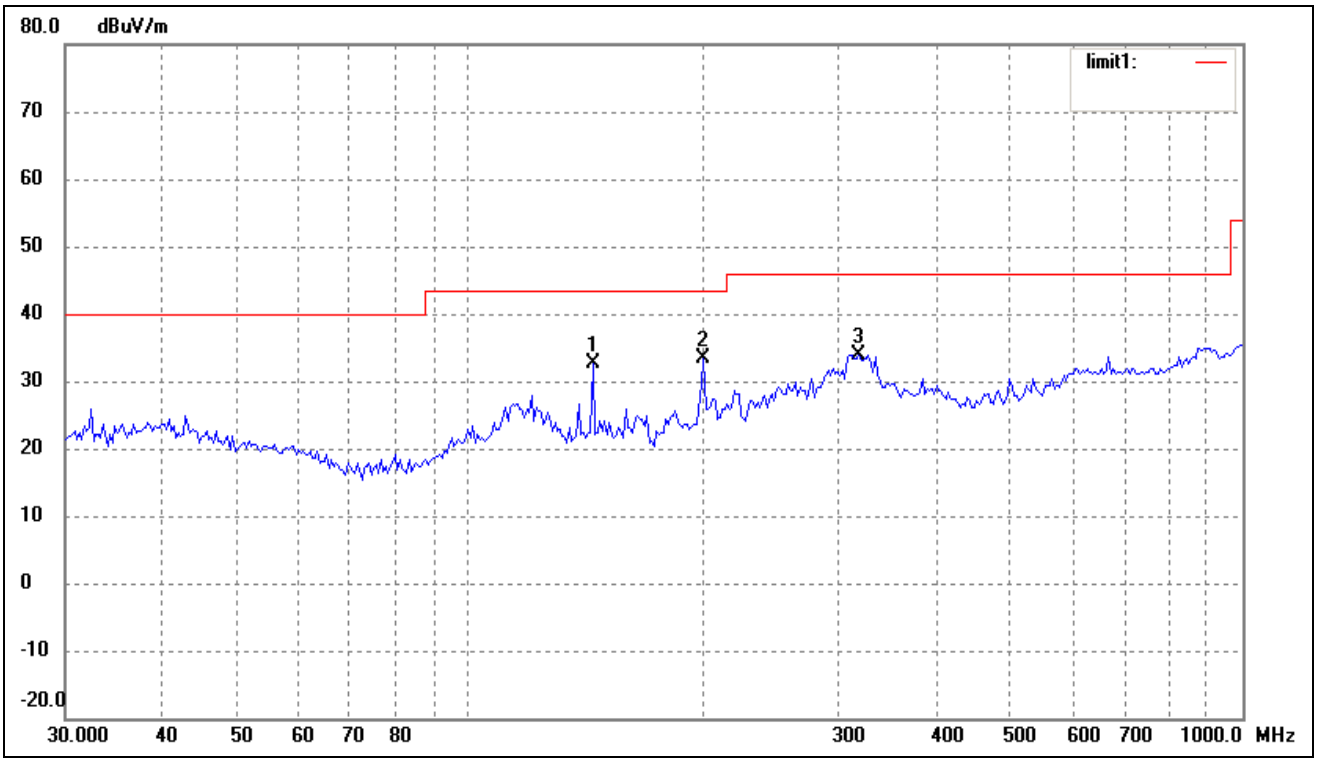
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	26.54	3.46	30.00	43.50	-13.50	360	100	peak
2	200.6879	26.20	4.69	30.89	43.50	-12.61	360	100	peak
3	401.8385	22.97	11.47	34.44	46.00	-11.56	360	100	peak

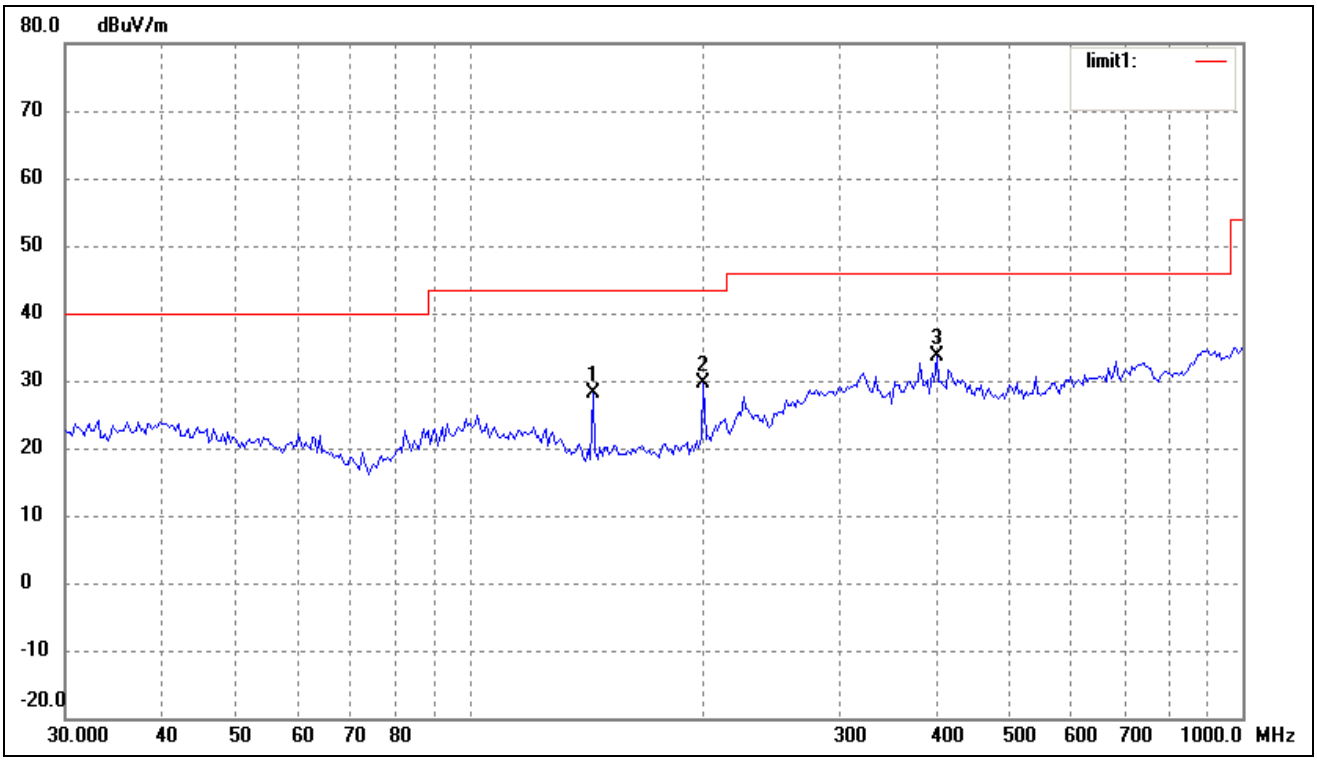
Operating Condition: *Transmitting High Channel (2480MHz)-BLE*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	29.27	3.46	32.73	43.50	-10.77	360	100	peak
2	200.6879	28.62	4.69	33.31	43.50	-10.19	360	100	peak
3	318.8170	23.41	10.46	33.87	46.00	-12.13	360	100	peak

Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	144.3348	24.60	3.46	28.06	43.50	-15.44	360	100	peak
2	200.6879	25.02	4.69	29.71	43.50	-13.79	360	100	peak
3	401.8385	22.22	11.47	33.69	46.00	-12.31	360	100	peak

Spurious Emissions Above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2402MHz(GFSK)							
4804	46.37	-3.59	42.78	74	-31.33	H	PK
4804	35.61	-3.59	32.02	54	-21.98	H	AV
7206	46.49	-0.52	45.97	74	-28.03	H	PK
7206	34.86	-0.52	34.34	54	-19.66	H	AV
4804	47.07	-3.59	43.48	74	-30.52	V	PK
4804	35.48	-3.59	31.89	54	-22.11	V	AV
7206	46.85	-0.52	46.33	74	-27.67	V	PK
7206	34.80	-0.52	34.28	54	-19.72	V	AV
Middle Channel-2441MHz(GFSK)							
4882	47.41	-3.49	43.92	74	-30.08	H	PK
4882	35.31	-3.49	31.82	54	-22.18	H	AV
7323	47.30	-0.47	47.30	74	-26.70	H	PK
7323	35.17	-0.47	34.70	54	-19.30	H	AV
4882	47.55	-3.49	44.06	74	-29.94	V	PK
4882	35.36	-3.49	31.85	54	-22.13	V	AV
7323	46.87	-0.47	46.40	74	-25.60	V	PK
7323	35.15	-0.47	34.68	54	-19.32	V	AV
High Channel-2480MHz(GFSK)							
4960	46.63	-3.41	43.22	74	-30.78	H	PK
4960	35.22	-3.41	31.81	54	-22.19	H	AV
7440	47.64	-0.42	47.22	74	-26.78	H	PK
7440	35.21	-0.42	34.79	54	-19.21	H	AV
4960	46.72	-3.41	43.31	74	-30.69	V	PK
4960	35.44	-3.41	32.03	54	-21.97	V	AV
7440	46.88	-0.42	46.46	74	-27.54	V	PK
7440	35.18	-0.42	34.76	54	-19.24	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2402MHz(BLE)							
4804	46.37	-3.59	42.78	74	-31.33	H	PK
4804	33.61	-3.59	30.02	54	-23.98	H	AV
7206	45.49	-0.52	44.97	74	-29.03	H	PK
7206	32.86	-0.52	32.34	54	-21.66	H	AV
4804	47.07	-3.59	43.48	74	-30.52	V	PK
4804	35.48	-3.59	31.89	54	-22.11	V	AV
7206	45.85	-0.52	45.33	74	-28.67	V	PK
7206	32.80	-0.52	32.28	54	21.72	V	AV
Middle Channel-2442MHz(BLE)							
4884	48.41	-3.49	44.92	74	-29.08	H	PK
4884	35.31	-3.49	31.82	54	-22.18	H	AV
7326	46.30	-0.47	46.30	74	-27.70	H	PK
7326	34.17	-0.47	33.70	54	-20.30	H	AV
4884	47.65	-3.49	44.16	74	-29.84	V	PK
4884	35.36	-3.49	31.85	54	-22.13	V	AV
7326	46.87	-0.47	46.40	74	-27.60	V	PK
7326	34.15	-0.47	33.68	54	-20.32	V	AV
High Channel-2480MHz(BLE)							
4960	47.63	-3.41	44.22	74	-29.78	H	PK
4960	35.22	-3.41	31.81	54	-22.19	H	AV
7440	46.64	-0.42	46.22	74	-27.78	H	PK
7440	34.21	-0.42	33.79	54	-20.21	H	AV
4960	46.72	-3.41	43.31	74	-30.69	V	PK
4960	35.44	-3.41	32.03	54	-21.97	V	AV
7440	45.88	-0.42	45.46	74	-28.54	V	PK
7440	34.18	-0.42	33.76	54	-20.24	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
The measurements greater than 20dB below the limit from 9kHz to 30MHz.

13. Out of Band Emissions

13.1 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).

13.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2013-05-07	2014-05-06
EMI Test Receiver	R&S	ESVB	825471/005	2013-05-07	2014-05-06
Pre-amplifier	Agilent	8447F	3113A06717	2013-05-07	2014-05-06
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-05-07	2014-05-06
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-04-20	2014-04-19
Horn Antenna	ETS	3117	00086197	2013-04-20	2014-04-19

13.3 Test Procedure

According to the KDB 558074 D01 v03r01, 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 2420MHz for low bandedge, 2460MHz 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/average; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product 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 KDB 558074 D01 v03r01, the conducted spurious emissions test method as follows:

1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW ≥ 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

13.4 Environmental Conditions

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

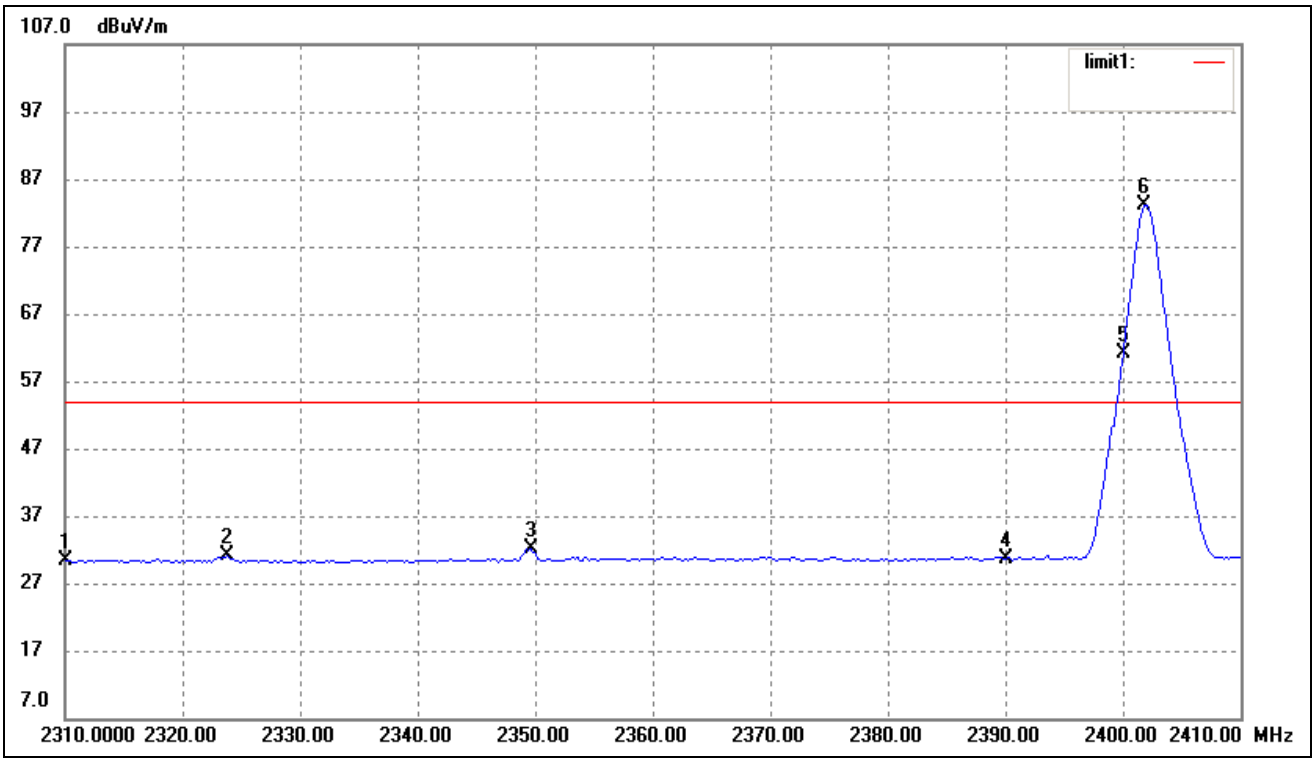
13.5 Summary of Test Results/Plots

Please refer to the test plots as below.

Bandedge (Radiated)

Lowest Bandedge

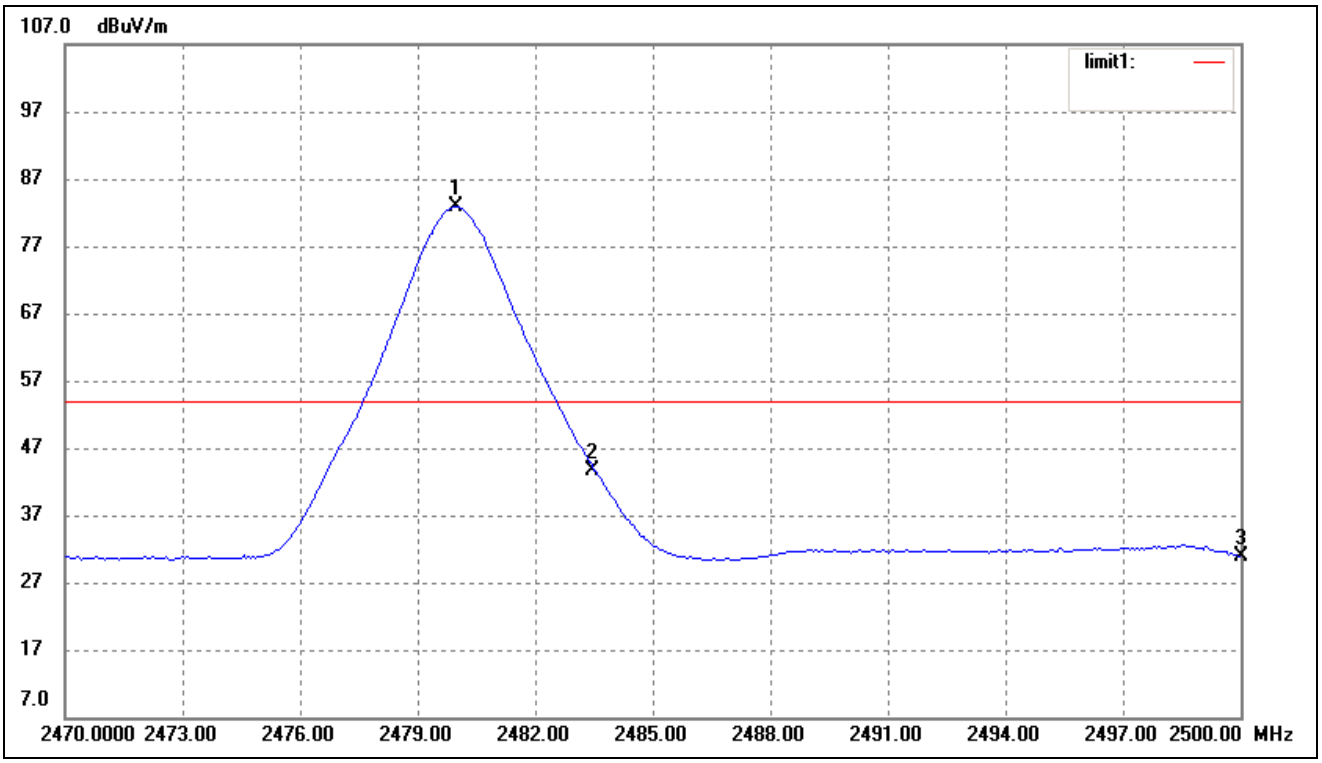
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	34.08	-3.71	30.37	54.00	-23.63	Average Detector
	2310.000	47.66	-3.71	43.95	74.00	-30.05	Peak Detector
2	2323.943	34.71	-3.68	31.03	54.00	-22.97	Average Detector
	2323.943	48.16	-3.68	44.48	74.00	-29.52	Peak Detector
3	2349.691	35.87	-3.62	32.25	54.00	-21.75	Average Detector
	2323.943	47.55	-3.63	43.92	74.00	-30.08	Peak Detector
4	2390.000	34.23	-3.54	30.69	54.00	-23.31	Average Detector
	2390.000	51.47	-3.54	47.93	74.00	-26.07	Peak Detector
5	2400.000	64.72	-3.51	61.21	Delta = 21.97 dBc		Average Detector
6	2401.843	86.69	-3.51	83.18			Average Detector

Highest Bandedge

Vertical (Worst case)

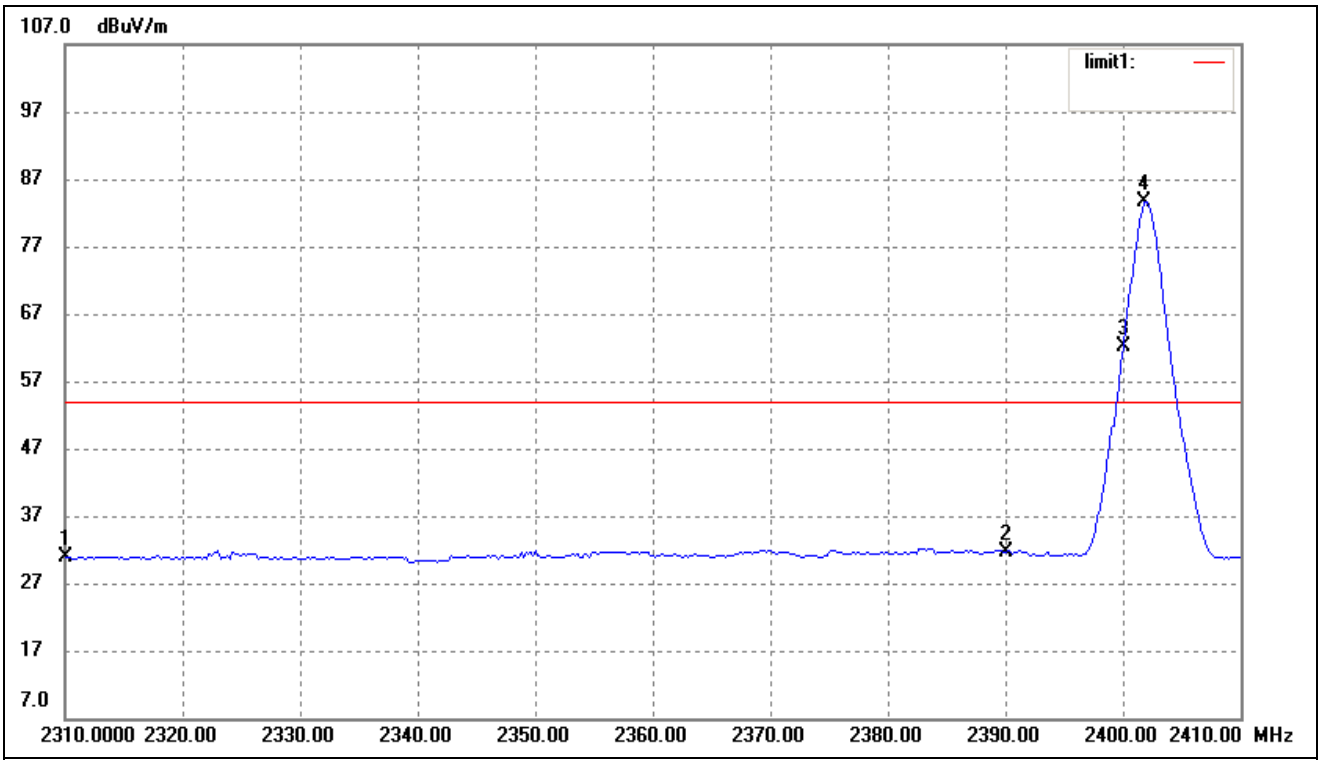


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2479.980	86.16	-3.33	82.83	/	/	Average
	2479.980	90.90	-3.33	87.57	/	/	Peak Detector
2	2483.500	Delta = 56.39 dBc		26.44	54.00	-27.56	Average
	2483.500			31.18	74.00	-42.82	Peak Detector
3	2500.000	34.19	-3.28	30.91	54.00	-23.09	Average
	2500.000	48.00	-3.28	44.72	74.00	-29.28	Peak Detector

Bandedge (Radiated)

BLE-Lowest Bandedge

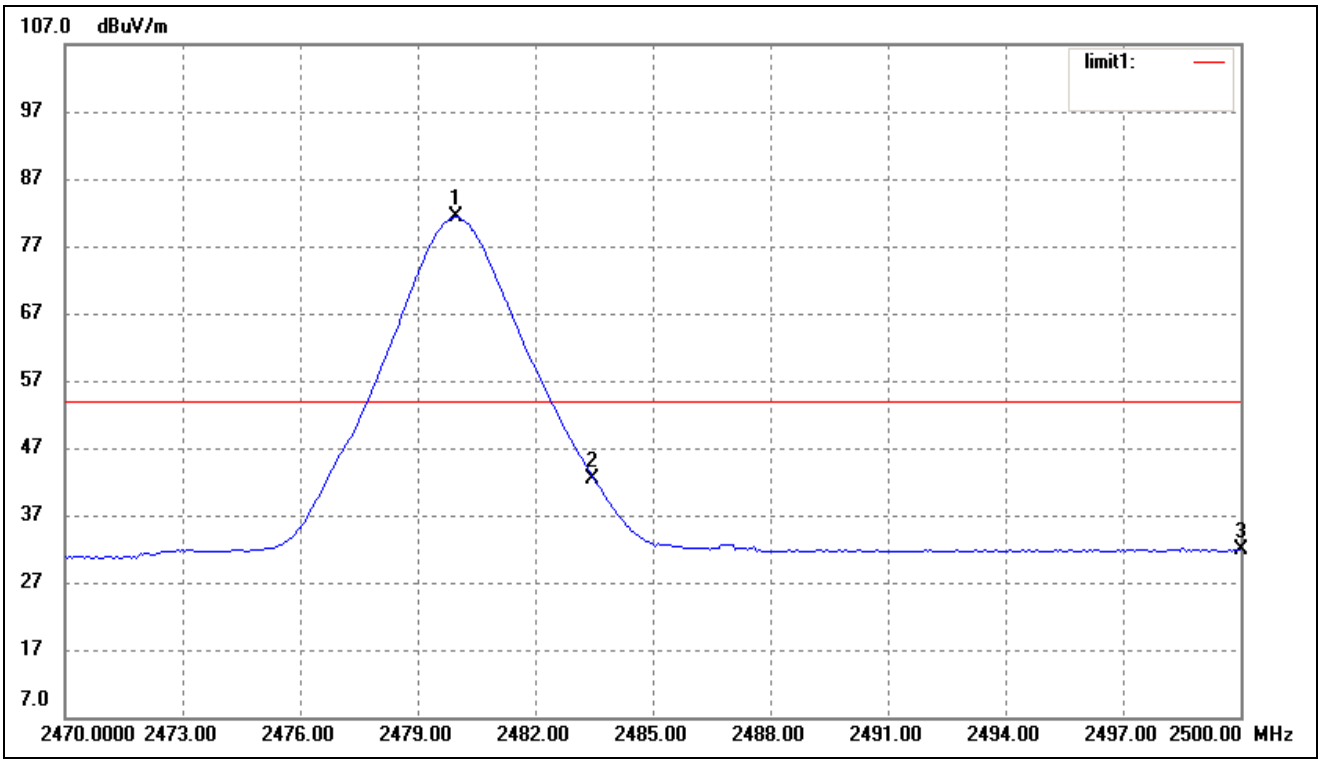
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	34.58	-3.71	30.87	54.00	-23.13	Average Detector
	2310.000	48.16	-3.71	44.45	74.00	-29.55	Peak Detector
2	2390.000	35.23	-3.54	31.69	54.00	-22.31	Average Detector
	2390.000	53.47	-3.54	49.93	74.00	-24.07	Peak Detector
3	2400.000	65.72	-3.51	62.21	Delta = 21.47 dBc		Average Detector
4	2401.843	87.19	-3.51	83.68			Average Detector

BLE-Highest Bandedge

Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2479.980	84.63	-3.33	81.30	/	/	Average
	2479.980	89.30	-3.33	85.97	/	/	Peak Detector
2	2483.500	Delta = 48.33 dBc		32.97	54.00	-21.03	Average
	2483.500			37.64	74.00	-36.36	Peak Detector
3	2500.000	35.06	-3.28	31.78	54.00	-22.22	Average
	2500.000	48.46	-3.28	45.18	74.00	-28.82	Peak Detector

14. Conducted Emissions

14.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

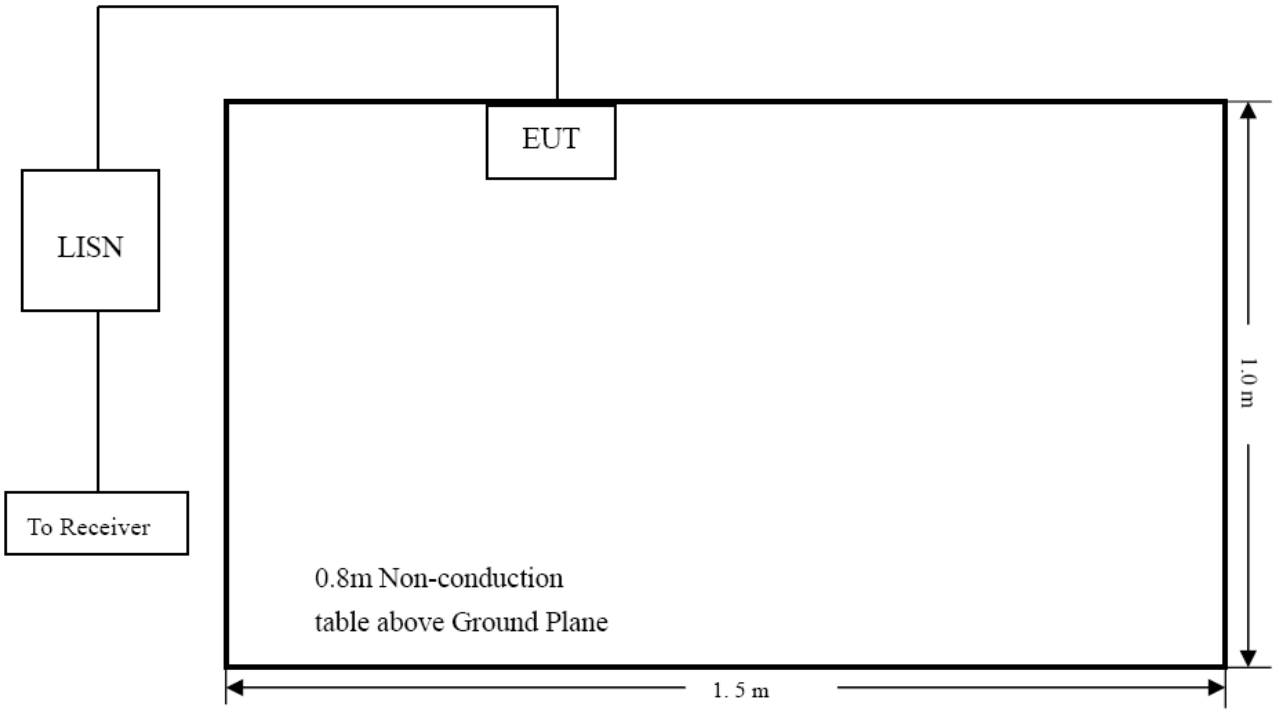
14.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2013-05-07	2014-05-06
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2013-05-07	2014-05-06
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2013-05-07	2014-05-06

14.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 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.

14.4 Basic Test Setup Block Diagram



14.5 Environmental Conditions

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

14.6 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

14.7 Summary of Test Results/Plots

According to the data in section 9.8, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-7.07 dB at 2.922 MHz in the **Neutral** mode**, Peak** detector, **0.15-30MHz**

14.8 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

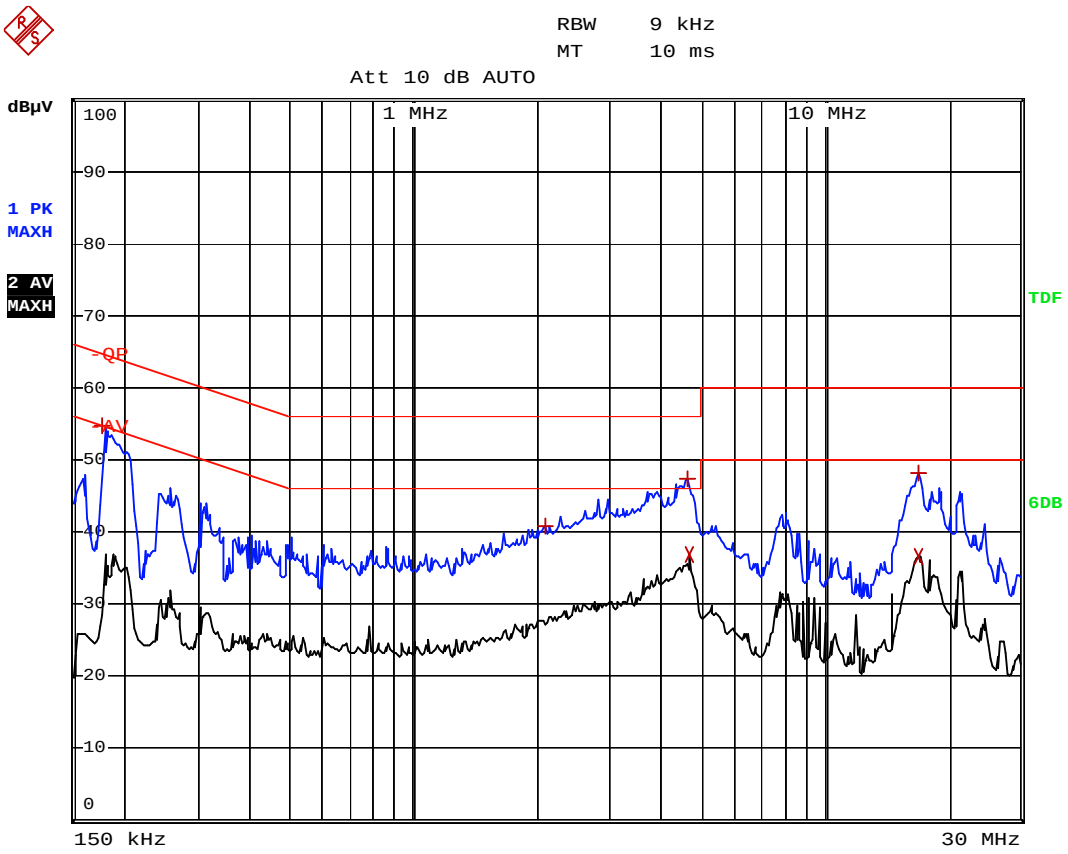
EUT: *bluetooth speaker*

Tested Model: *M0*

Operating Condition: *TM5/TM6*

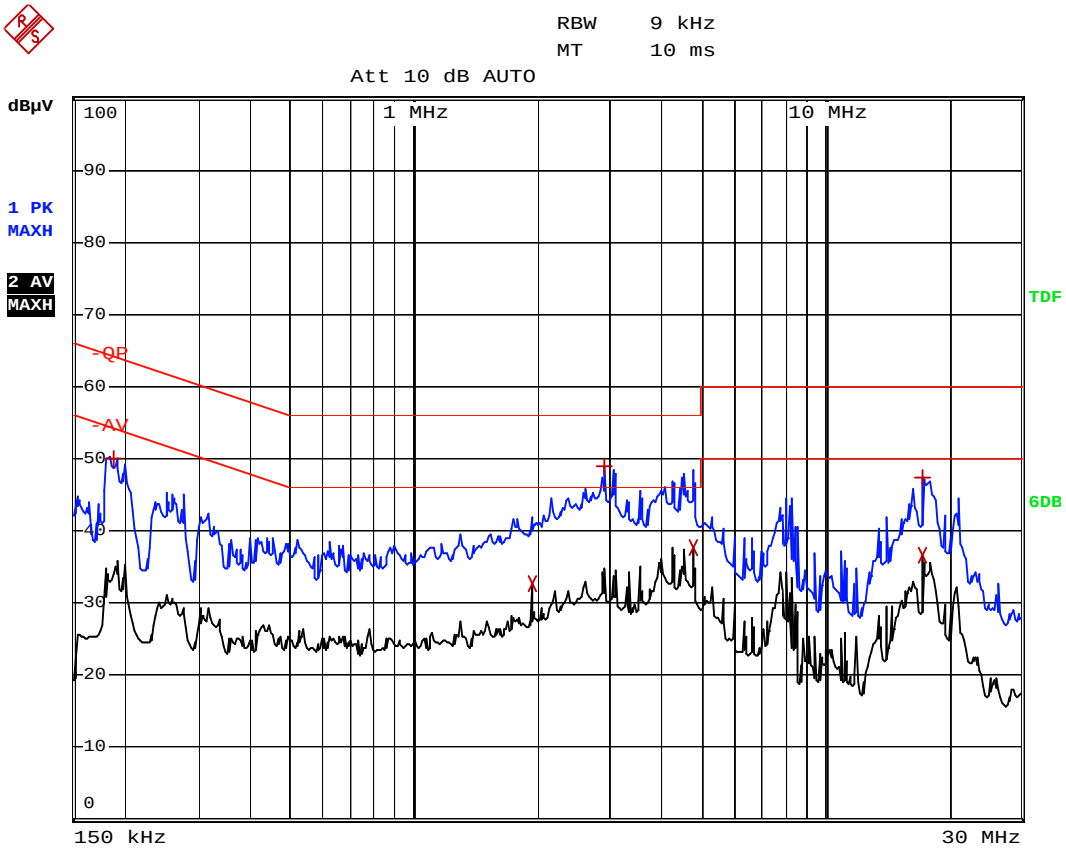
Comment: *AC 120V/60Hz; USB 5V*

Test Specification: *Line*



EDIT PEAK LIST (Prescan Results)			
Trace1:	-QP		
Trace2:	-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Max Peak	178 kHz	54.66	-9.91
1 Max Peak	2.102 MHz	40.88	-15.12
1 Max Peak	4.63 MHz	47.29	-8.70
2 Average	4.674 MHz	36.85	-9.14
1 Max Peak	16.994 MHz	48.12	-11.87
2 Average	16.994 MHz	36.66	-13.34

Test Specification: *Neutral*



EDIT PEAK LIST (Prescan Results)			
Trace1:	-QP		
Trace2:	-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Max Peak	190 kHz	50.12	-13.91
2 Average	1.95 MHz	32.60	-13.40
1 Max Peak	2.922 MHz	48.92	-7.07
2 Average	4.806 MHz	37.73	-8.26
1 Max Peak	17.254 MHz	47.48	-12.51
2 Average	17.266 MHz	36.50	-13.49

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