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Compliance Laboratory

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FCC CFR47 PART 15 SUBPART C CERTIFICATION

TEST REPORT

For

Bluetooth Module

Model Number: BT010M

FCC ID: LW5BT010M

Report Number: 0048-080608-01

Prepared for
Metrologic Instruments, Inc.
90 Coles Road
Blackwood, NJ 08012
USA

Prepared by
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Revision No: A
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1. TEST RESULT CERTIFICATION

COMPANY NAME: METROLOGIC INSTRUMENTS, INC.
90 Coles Road
Blackwood, NJ 08012, U.S.A.

EUT DESCRIPTION: BLUETOOTH MODULE

MODEL: BT010M

DATE TESTED: June 12, 2008 to June 16, 2008

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Advanced Compliance Laboratory, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Advanced Compliance Laboratory, Inc. (ACL) and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by ACL, Advanced Compliance Laboratory, Inc. will constitute fraud and shall nullify the document.

Approved & Released For ACL By:

Wei Li
Manager
Advanced Compliance Laboratory, Inc.

Tested By:

Edward Lee
EMC Engineer

2. EUT DESCRIPTION

The EUT is a Bluetooth Module operating in the 2402-2480 MHz band.

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
2402-2480	3.97 (max)	2.5

The radio utilizes an Integral antenna with a maximum gain of 1dBi. / average & 3dBi /Peak.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at Somerset, New Jersey, USA The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1,
"Radio Interference Measuring Apparatus and Measurement Methods."

ACL is accredited by NVLAP, Laboratory Code 200101-0. The full accreditation can be viewed at http://www.ac-lab.com

No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. MEASUREMENT UNCERTAINTY

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty u_c	norm.	±2.36	±2.99	±1.83

5.3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Manufacture	Model	Serial No.	Description	Last Cal dd/mm/yy	Cal Due dd/mm/yy
Hewlett-Packard	HP8546A	3448A00290	EMI Receiver	12/01/08	12/01/09
Agilent	E4440A	US40420700	PSA Spectrum Analyzer	11/07/07	11/07/08
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	12/02/08	12/02/09
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	09/02/08	09/02/09
EMCO	6502	2665	10KHz-30MHz Active Loop Antenna	27/02/08	27/02/09
EMCO	3115	4945	Double Ridge Guide Horn Antenna	18/08/07	18/08/08
Fischer Custom	LISN-2	900-4-0008	Line Impedance Stabilization Networks	15/09/07	15/09/08
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	23/08/07	23/08/08

All Test Equipment Used are Calibrated Traceable to NIST Standards.

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

n/a

TEST SETUP

The system was configured for testing in a typical fashion (as a customer would normally use it). And its antenna was permanently located on EUT's PCB.

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 20 dB bandwidth. The VBW/RBW is set to one or three. The sweep time is coupled.

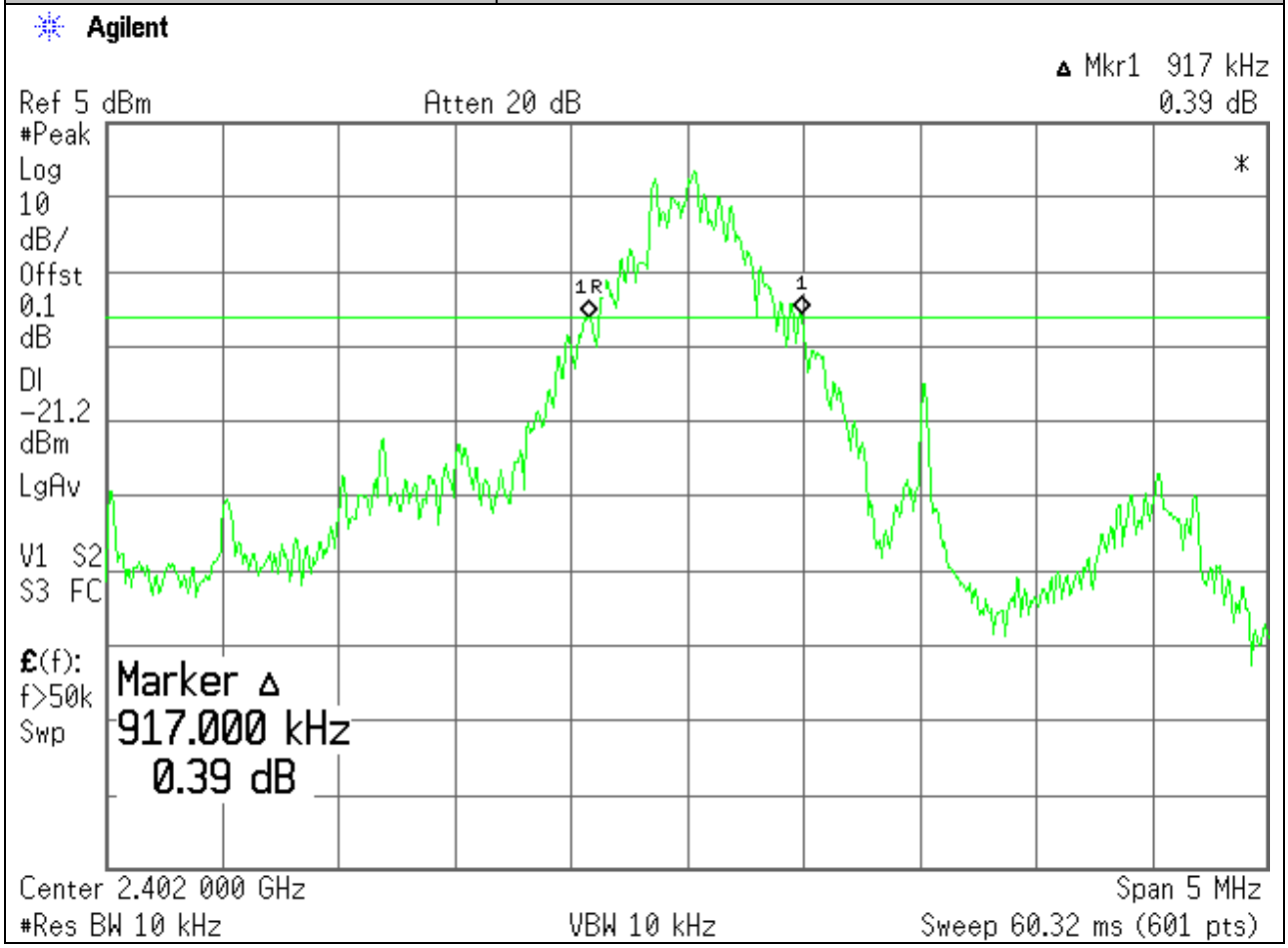
RESULTS

No non-compliance noted:

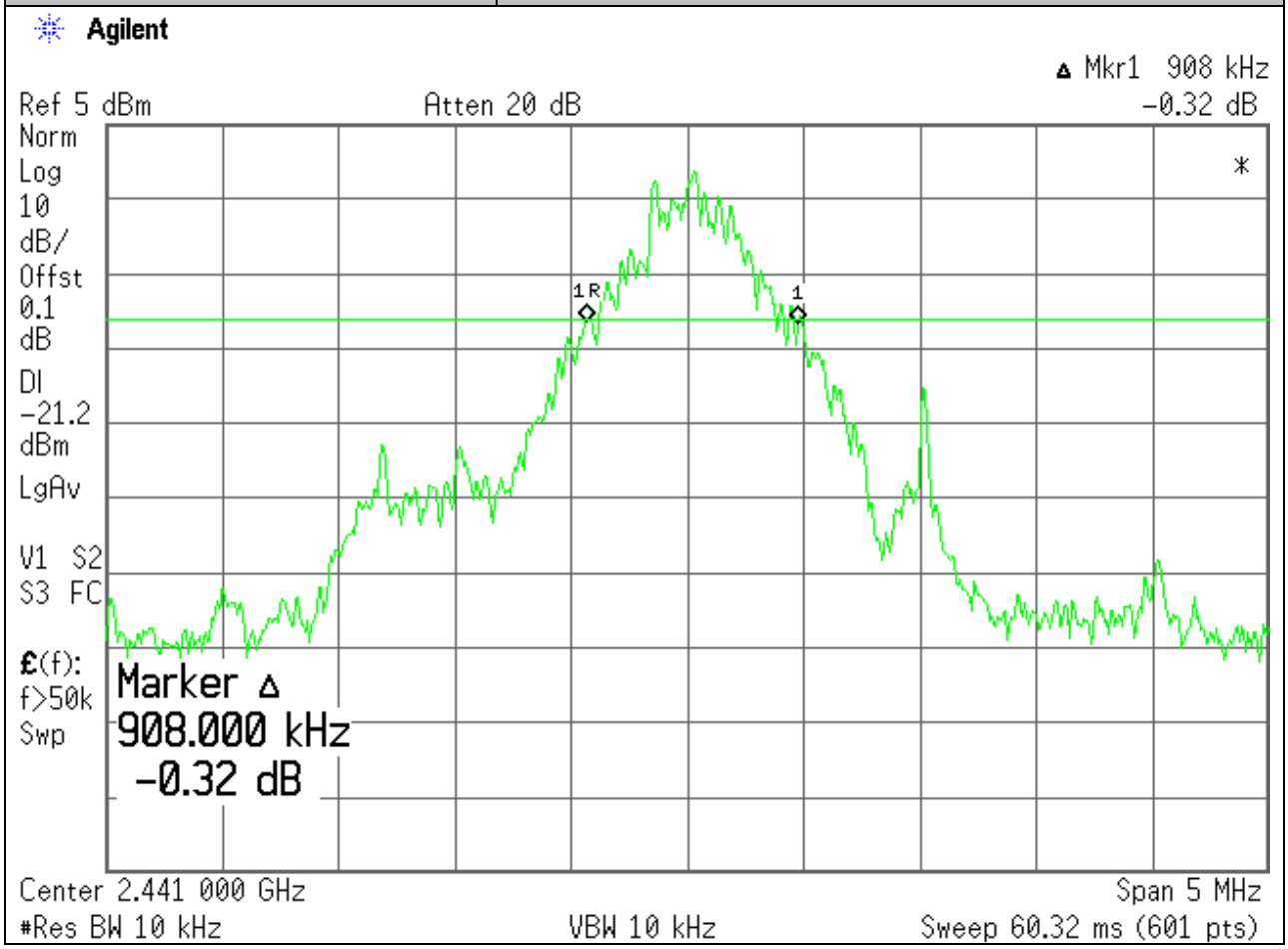
Channel	Frequency (MHz)	20 dB Bandwidth (KHz)
Low	2402.0	917
Middle	2441.0	908
High	2480.0	917

20 dB BANDWIDTH

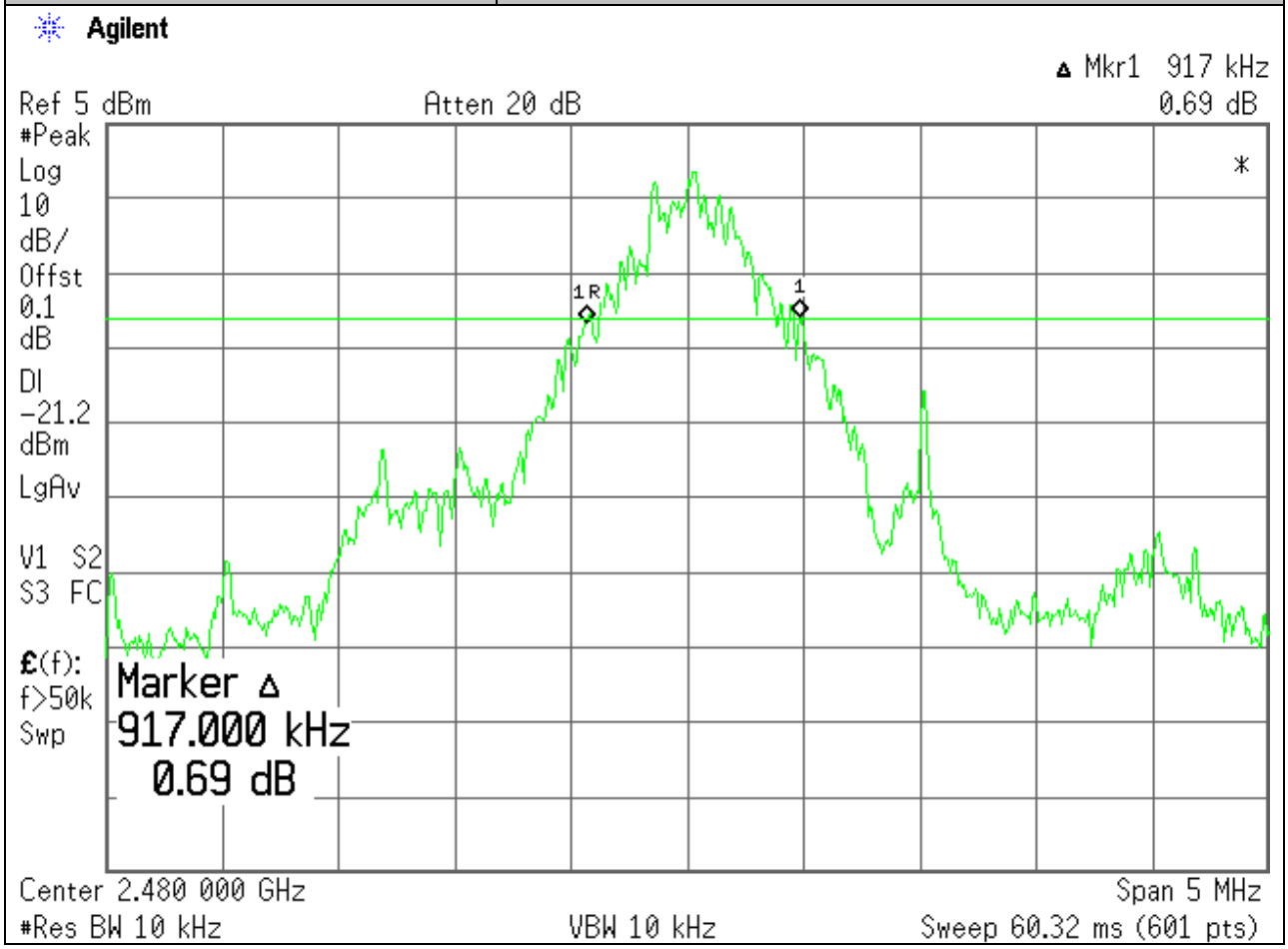
Plot Name:	20DB Bandwidth Low CH



Plot Name:	20DB Bandwidth Mid CH



Plot Name:	20DB Bandwidth High CH



7.2. HOPPING FREQUENCY SEPARATION

LIMIT

§15.247 (a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:
(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

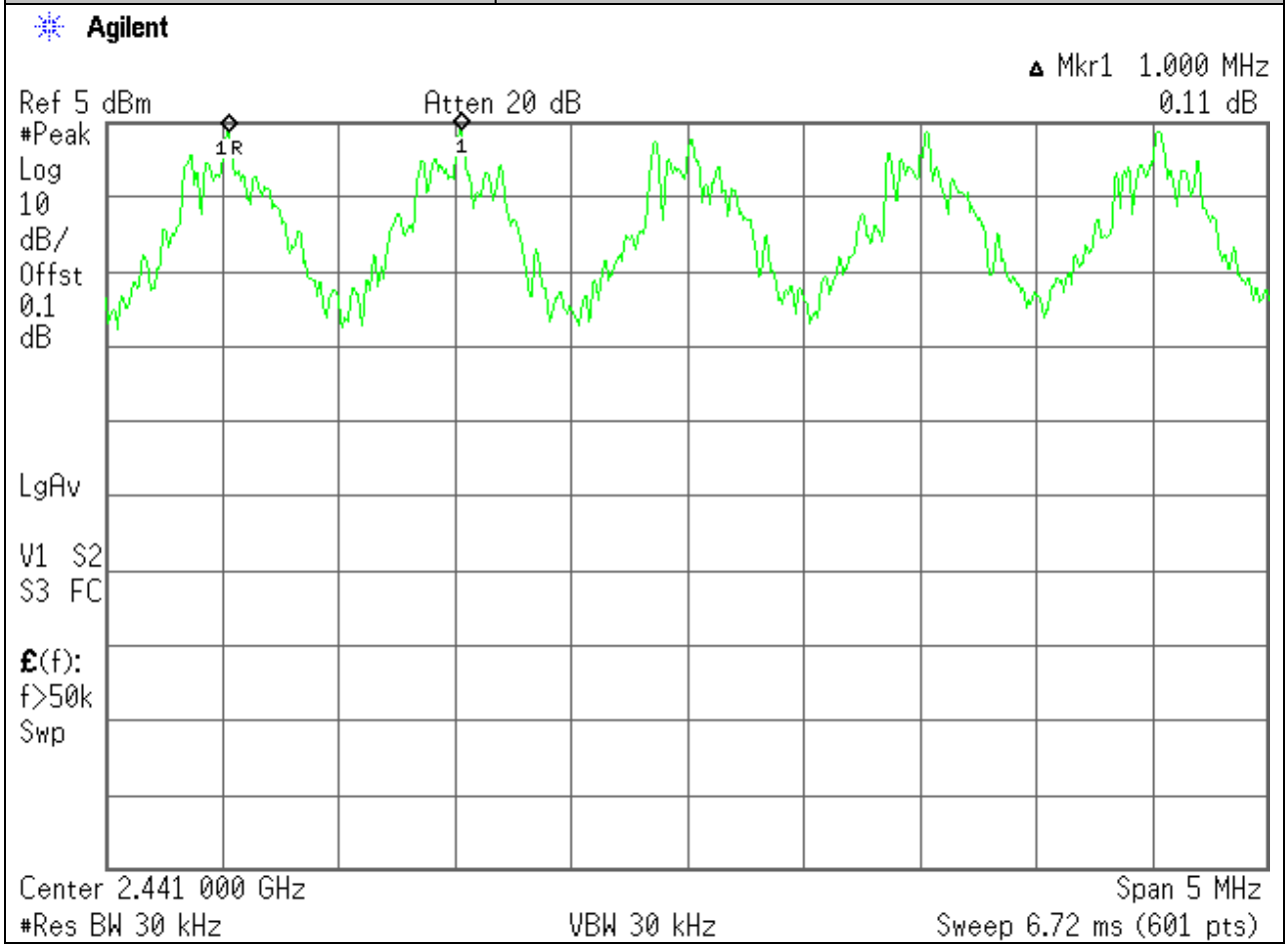
RESULTS

No non-compliance noted.

Channel Separation (KHz)	20 dB Bandwidth (KHz)
1000	917

HOPPING FREQUENCY SEPARATION

Plot Name:	FH Channel Separation



7.3. NUMBER OF HOPPING CHANNELS

LIMIT

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 1 % of the span. The analyzer is set to Max Hold.

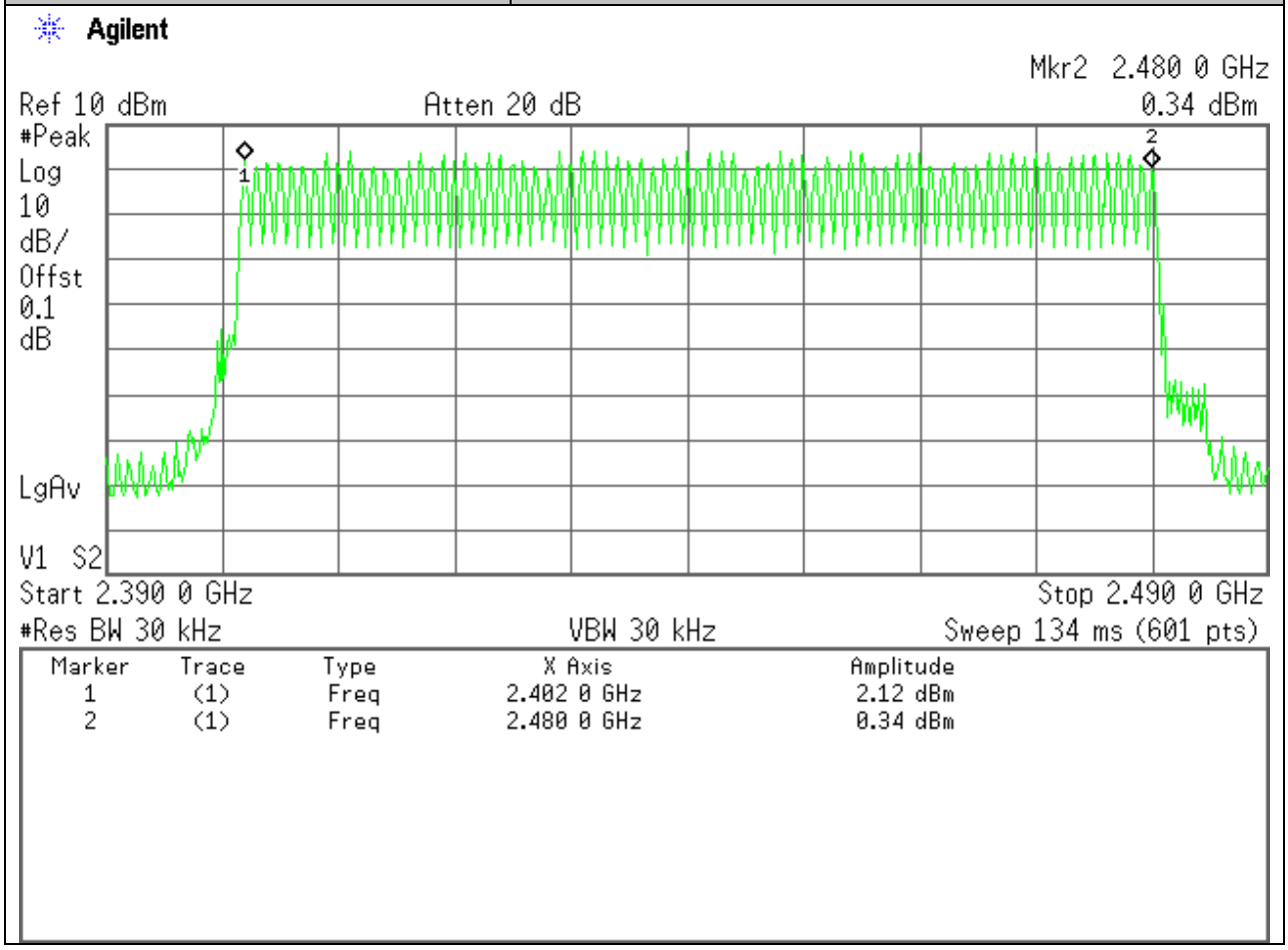
RESULTS

Channels Observed
79

No non-compliance noted:

NUMBER OF HOPPING CHANNELS

Plot Name:	FH Channel Number



7.4. TIME OF OCCUPANCY

LIMIT

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. In this case, we selected the mid channel. RBW(IF)=1MHz, VBW=1MHz. The width of a single pulse was measured and the number of the pulses was measured in the period of 3.16 seconds to enable resolution of each occurrence. The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.
DH1, DH3, DH5 packets were investigated.

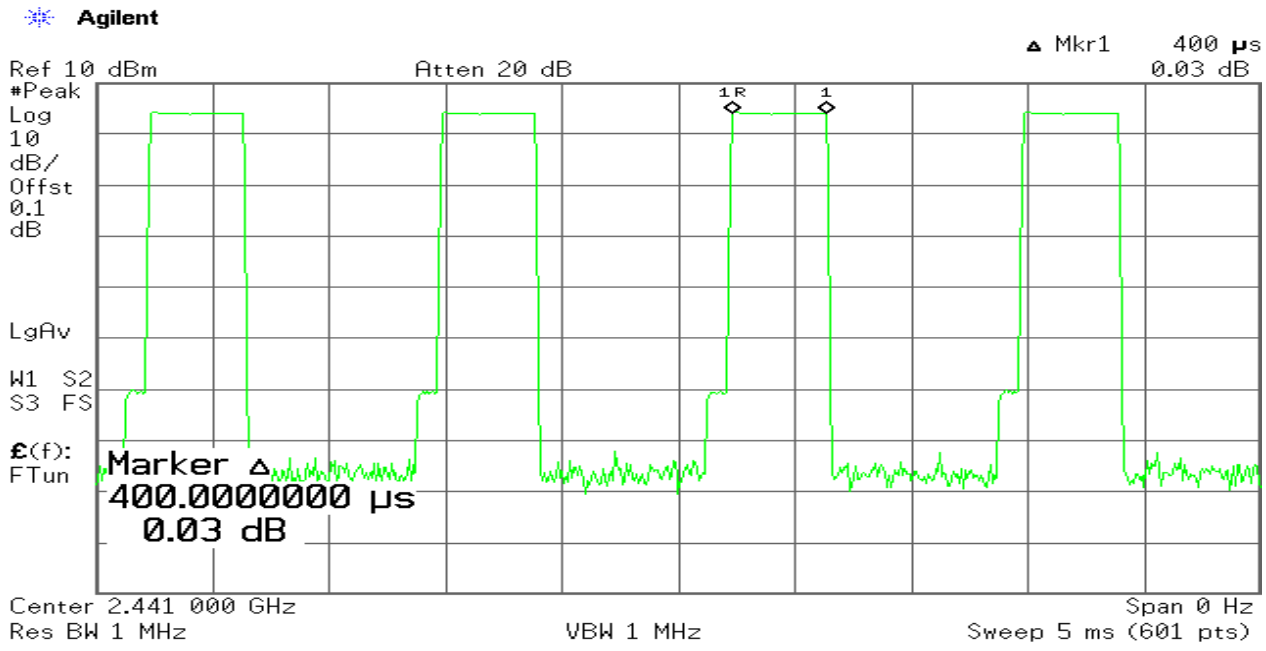
RESULTS

No non-compliance noted.

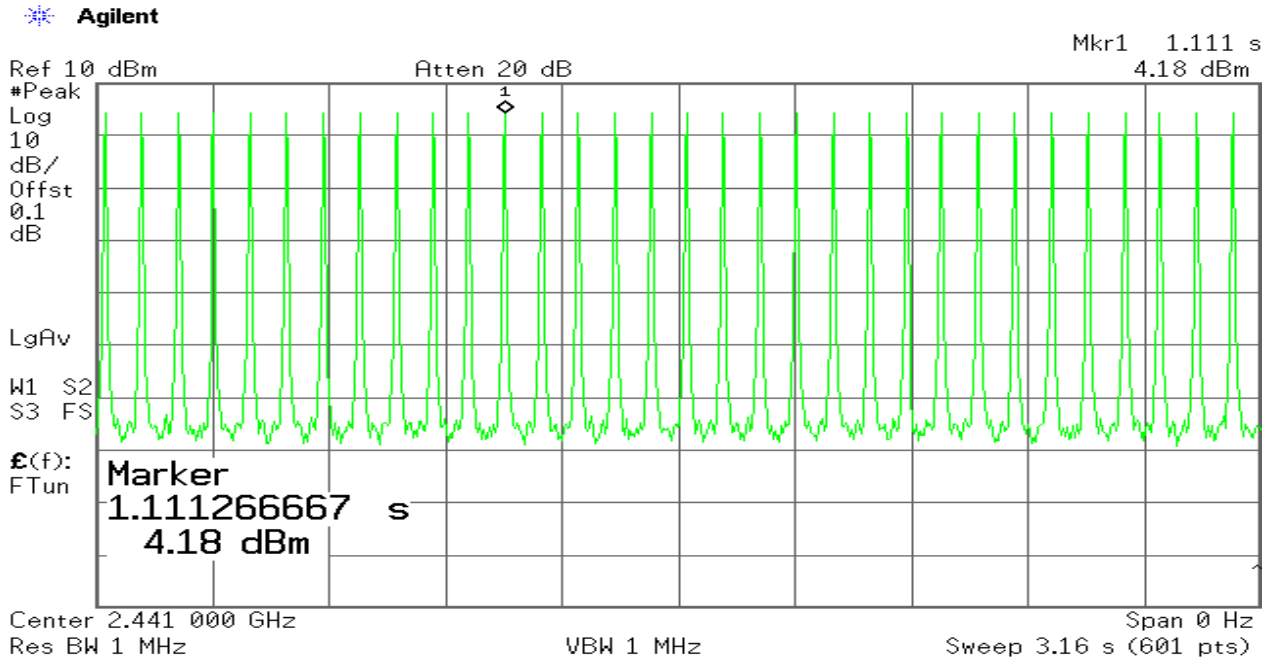
DH Packet	Pulse Width (msec)	Numbers of Pulses in 3.16 seconds	Average time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.400	32	0.128	0.4	-0.272
DH2	1.642	16	0.267	0.4	-0.133
DH3	2.900	11	0.319	0.4	-0.081

DH1:

Plot Name:	Pulse Width

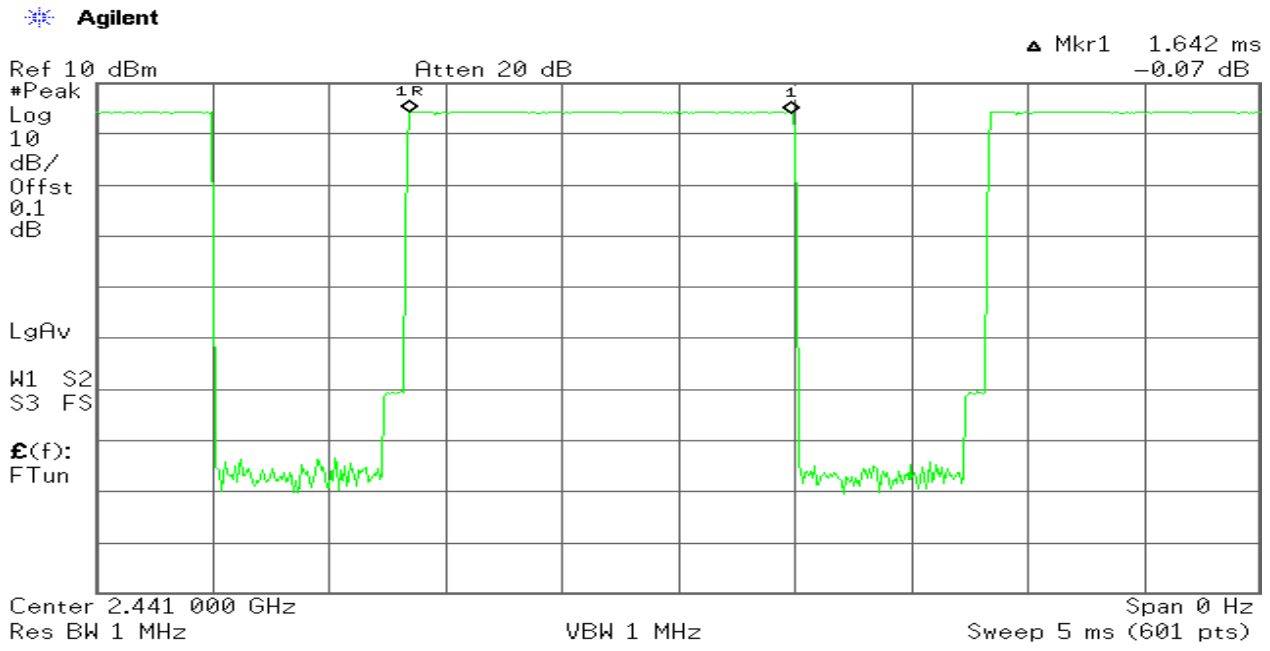


Plot Name:	Pulse Numbers in 3.16 sec

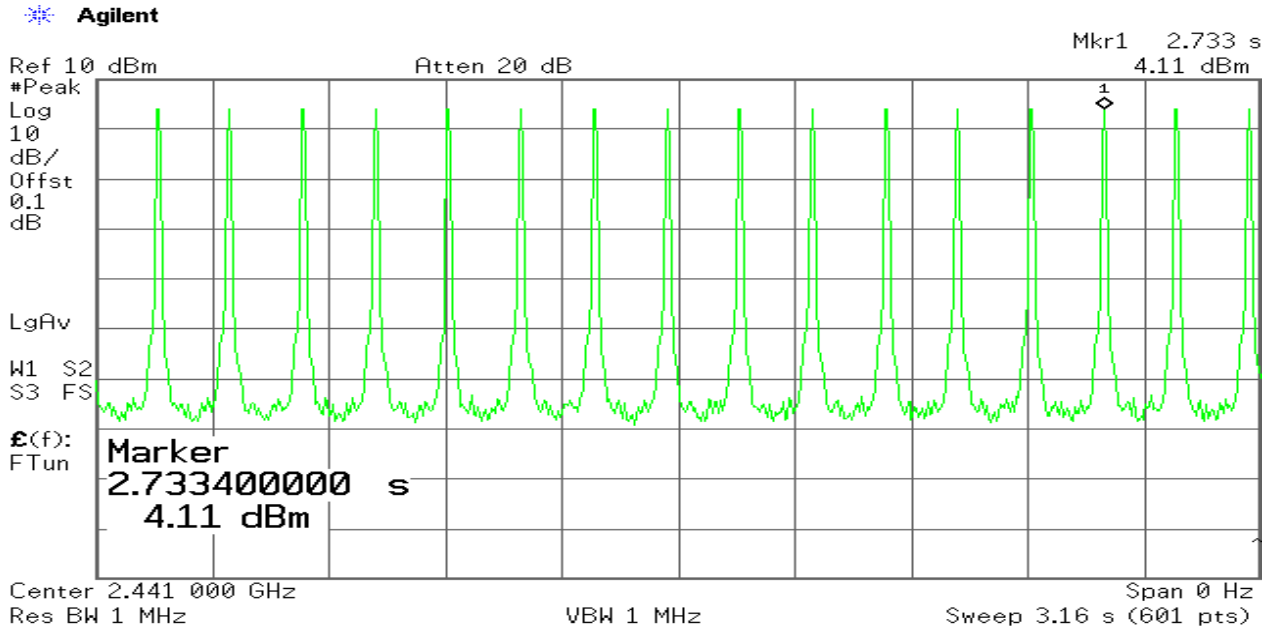


DH3:

Plot Name:	Pulse Width

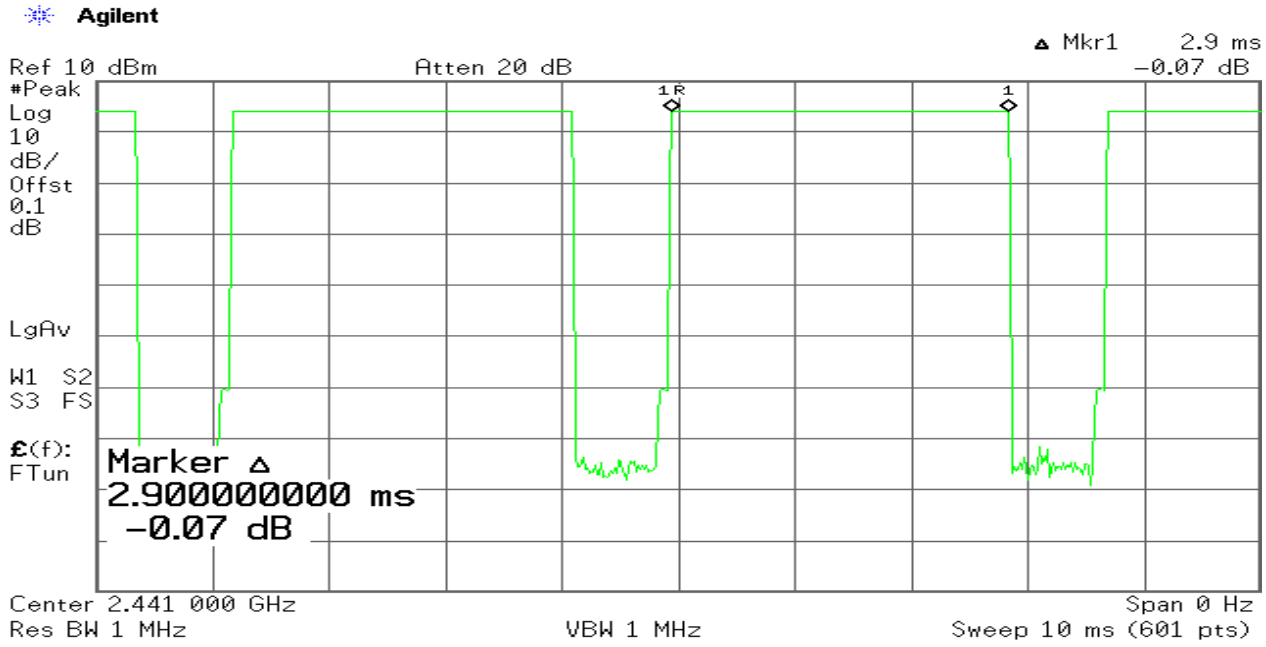


Plot Name:	Pulse Numbers in 3.16 sec

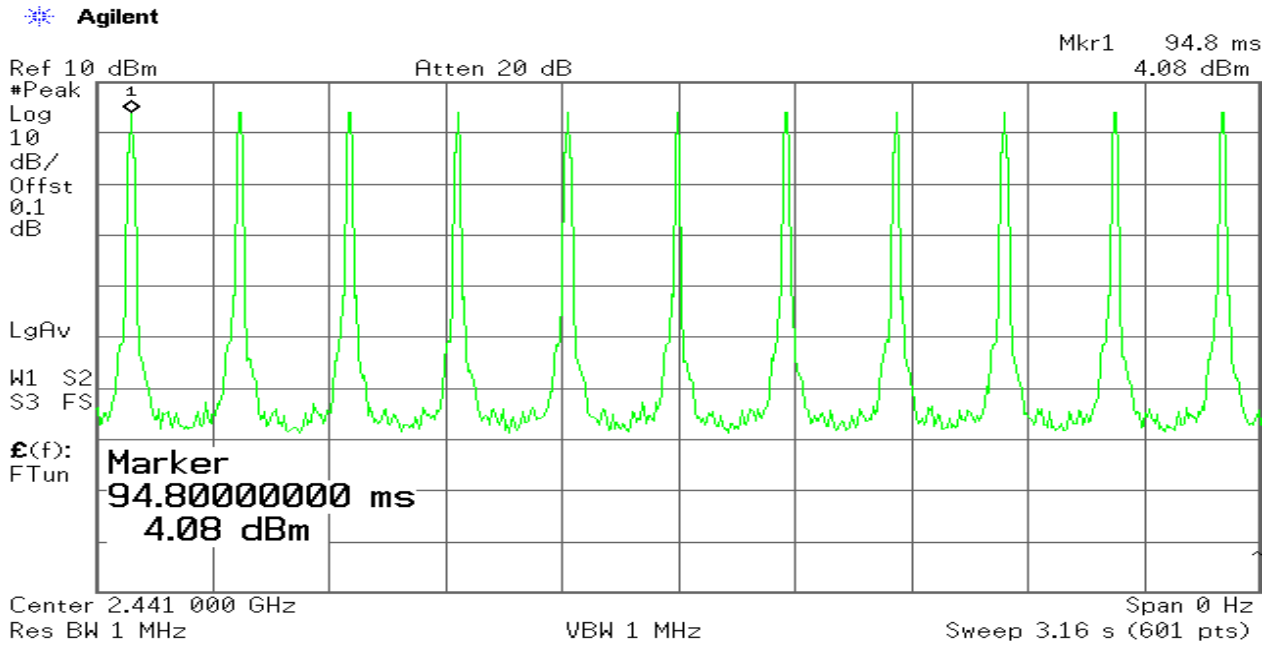


DH5:

Plot Name:	Pulse Width



Plot Name:	Pulse Numbers in 3.16 sec



7.5. PEAK OUTPUT POWER

PEAK POWER LIMIT

§15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:
(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.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

The maximum antenna gain is 3dBi, which is lower than 6dBi. Therefore, the limit in (b)(2) is 1Watt, which is +30dBm.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

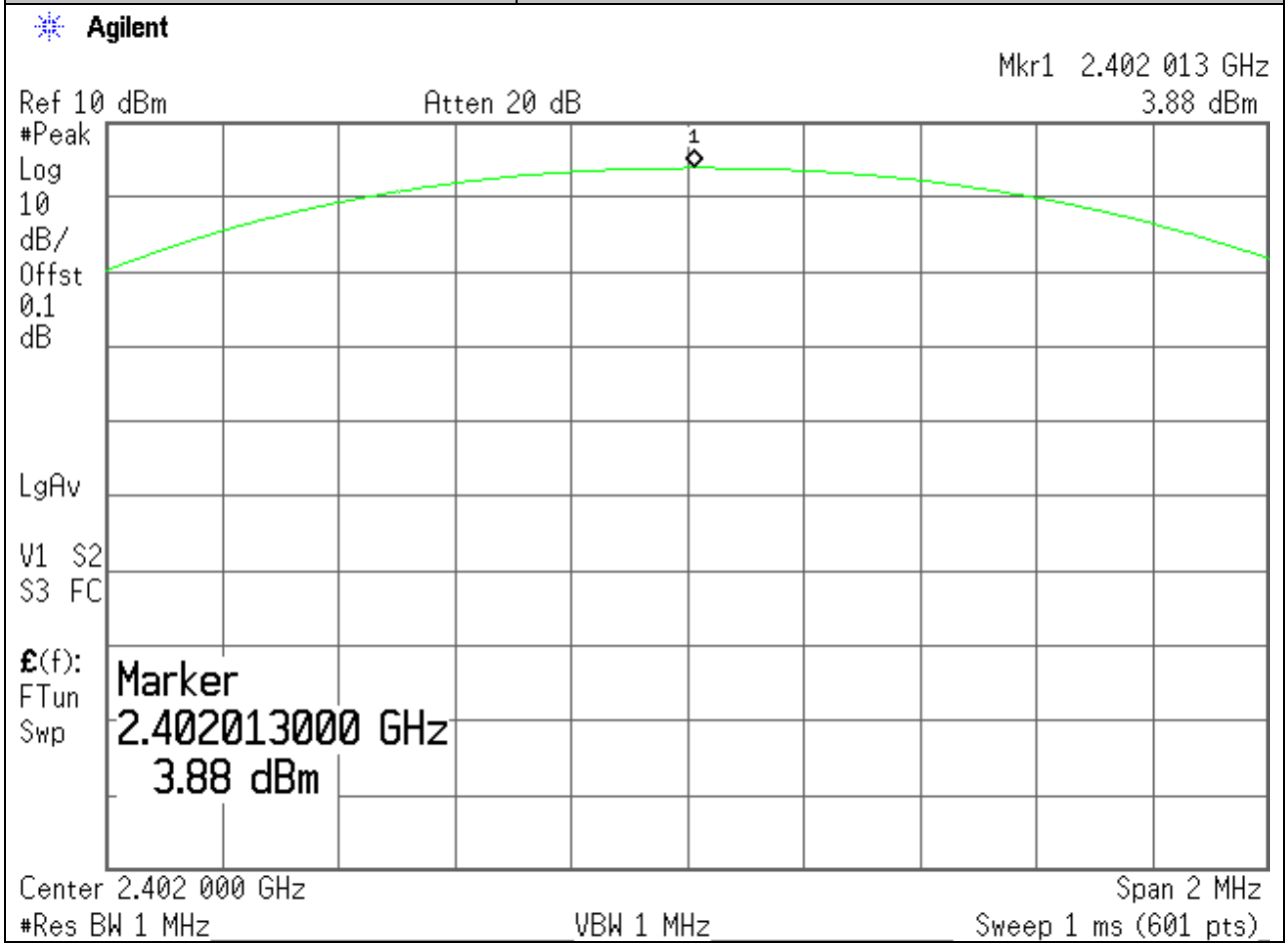
RESULTS

No non-compliance noted:

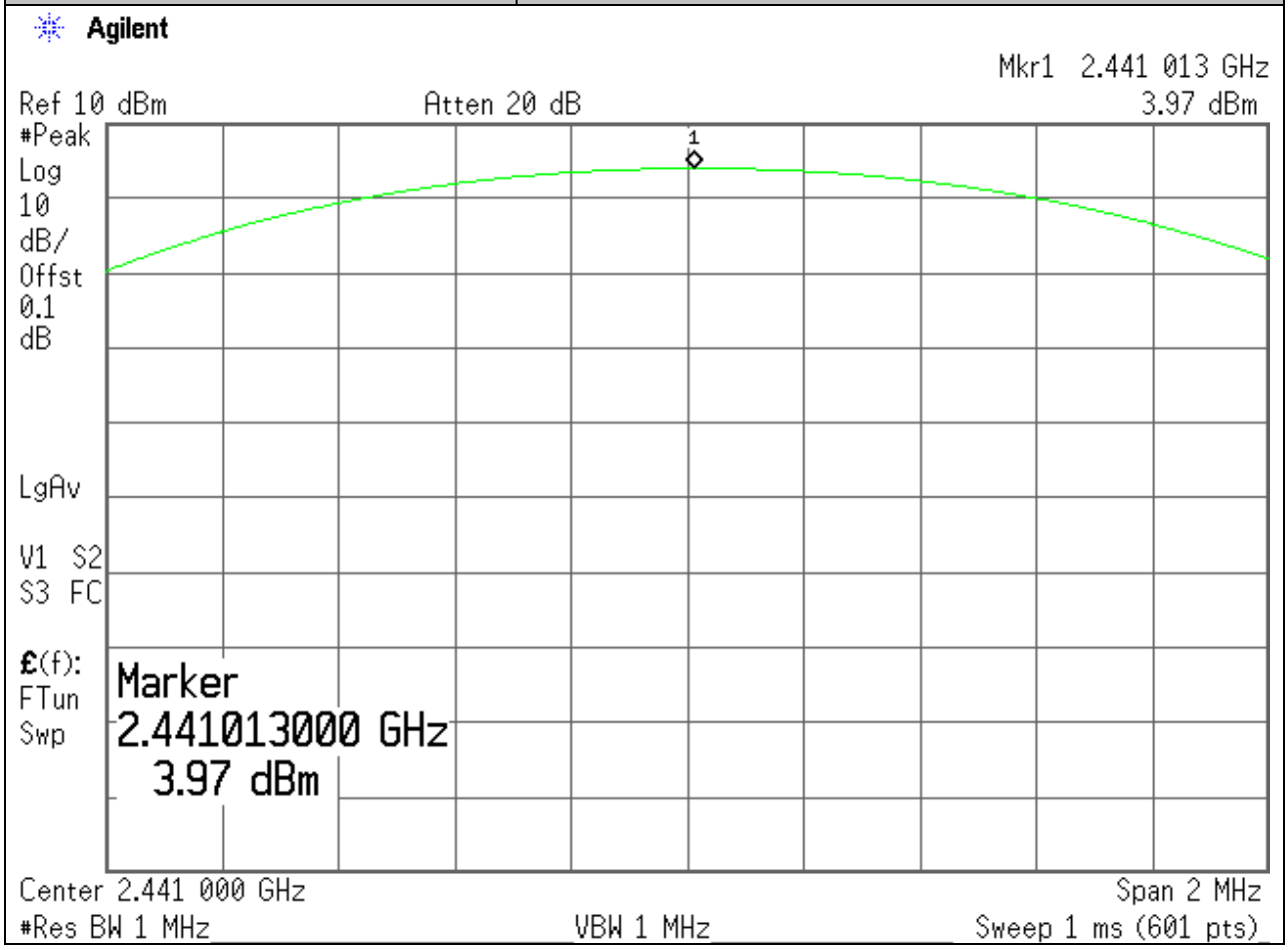
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dBm)
Low	2402	3.88	30	-26.12
Middle	2441	3.97	30	-26.03
High	2480	3.70	30	-26.30

OUTPUT PEAK POWER

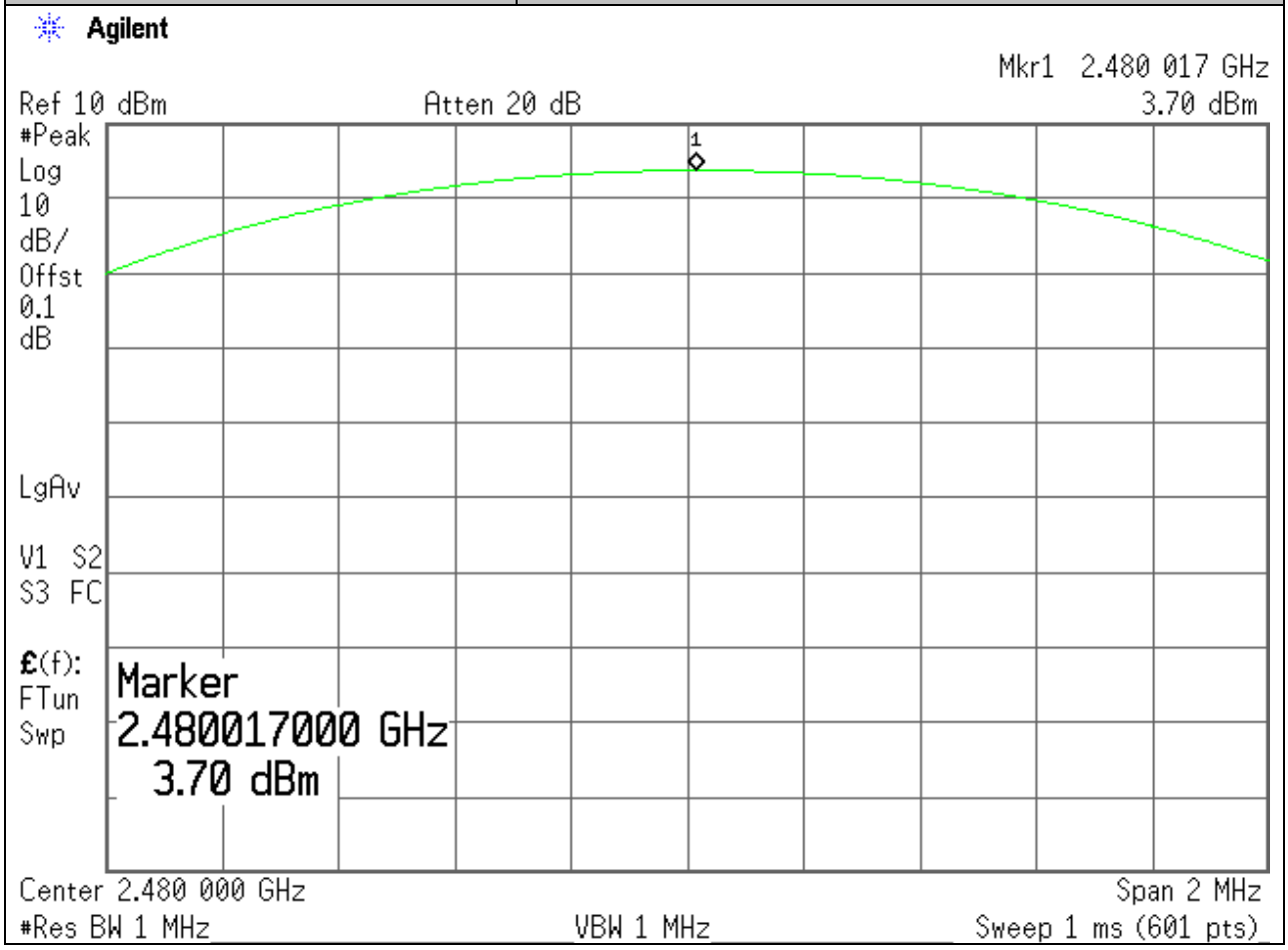
Plot Name:	Output Peak Power @ Low CH



Plot Name:	Output Peak Power @ Mid CH



Plot Name:	Output Peak Power @ High CH



7.6. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E \wedge 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 \wedge ((P + G) / 20) / \sqrt{S}$ Equation (1)

$S = 0.796 * 10 \wedge ((P + G)/10) / d\wedge 2$ Equation (2)

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.
Equation (2) and the measured peak power is used to calculate the Power density.

LIMITS

From §1.1310 Table 1 (B), S = 0.6 mW/cm^2

RESULTS

No non-compliance noted:

For this EUT, P=3.97 dBm, G=3 dBi, and d=20cm

Plug all three items into equation (2), and yields,

Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
0.6	3.97	3	0.01

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.7. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

Channel	Frequency (MHz)	Average Power (dBm/mW)
Low	2402	3.38
Middle	2441	3.44
High	2480	3.25

7.8. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak 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.

§15.247 (f) The digital modulation operation of the hybrid system, with the Bluetooth turned off, shall comply with the power density requirements of paragraph (d) of this section.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

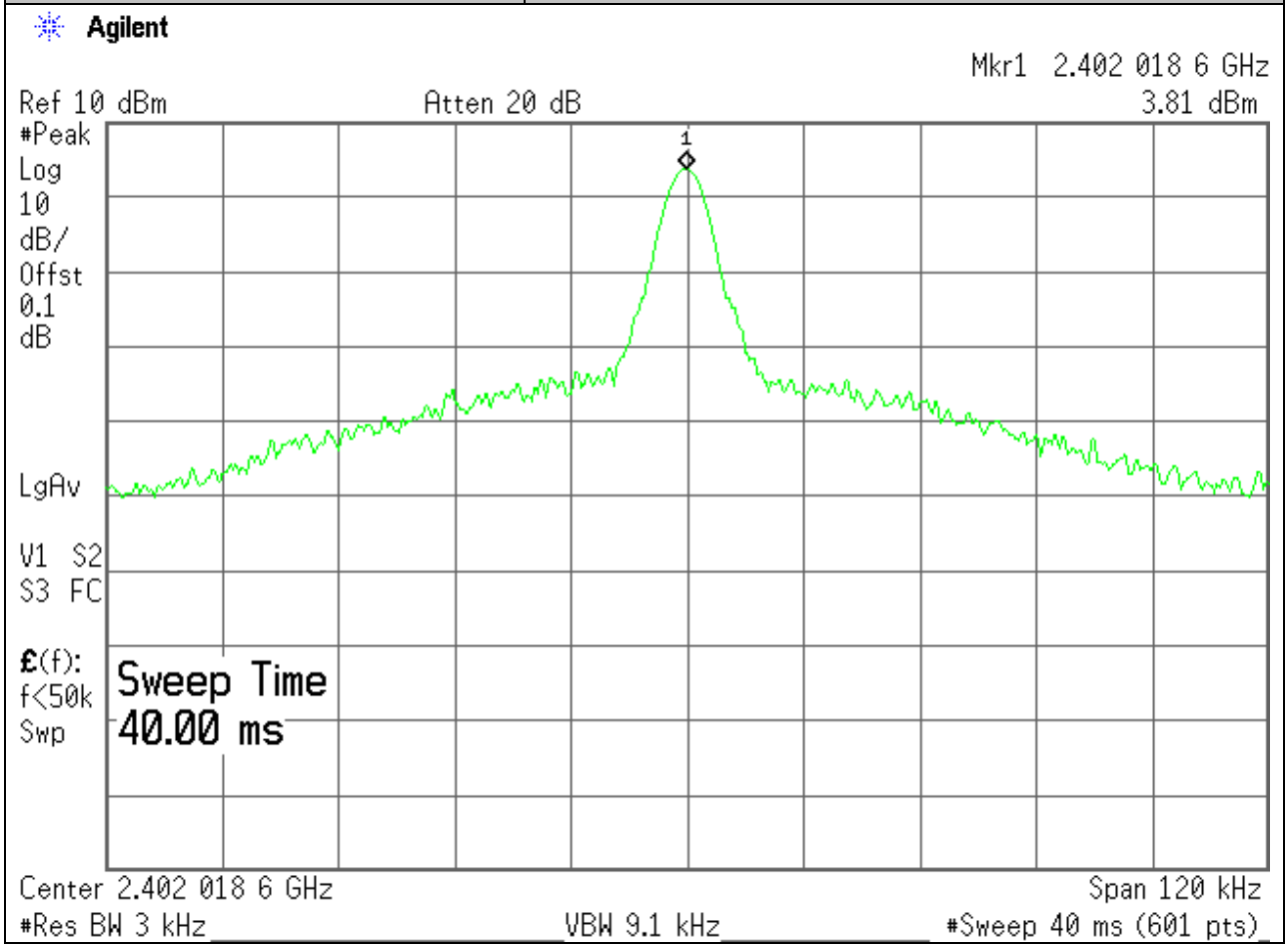
RESULTS

No non-compliance noted:

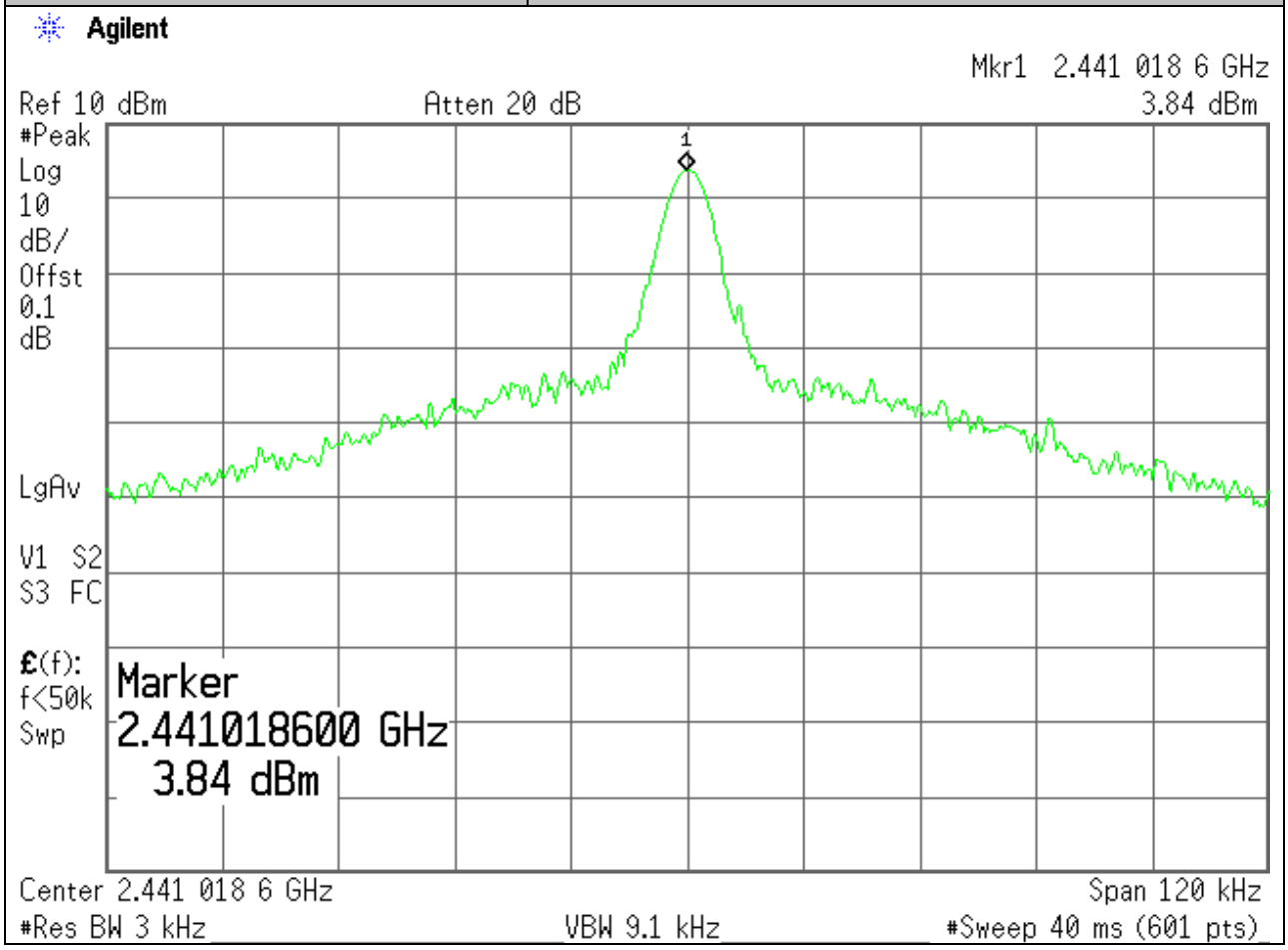
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.81	8	-4.19
Middle	2441	3.84	8	-4.16
High	2480	3.36	8	-4.64

PEAK POWER SPECTRAL DENSITY

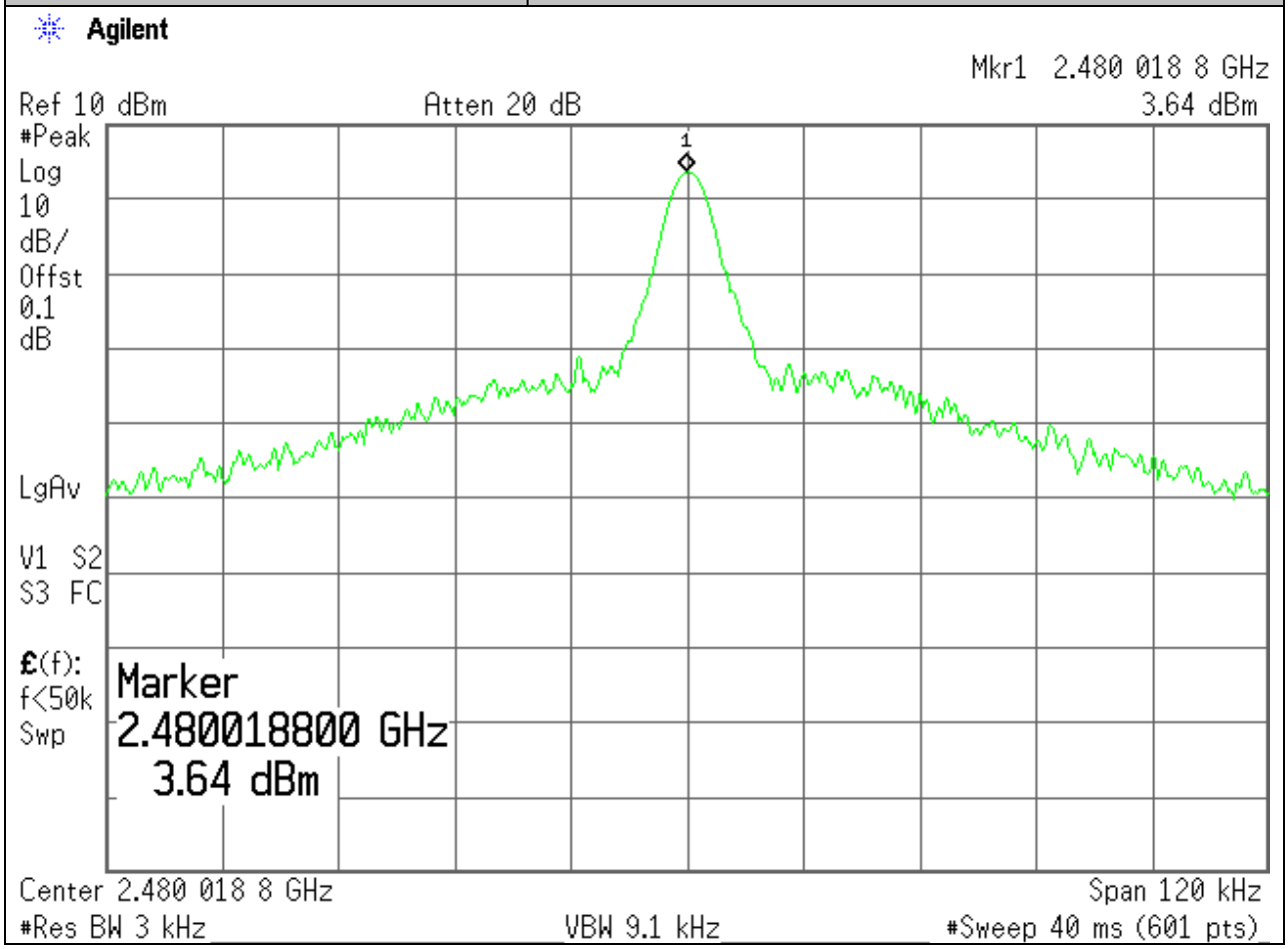
Plot Name:	PPSD @Low CH



Plot Name:	PPSD @ Mid CH



Plot Name:	PPSD @ High CH



7.9. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§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) (see §15.205(c)).

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

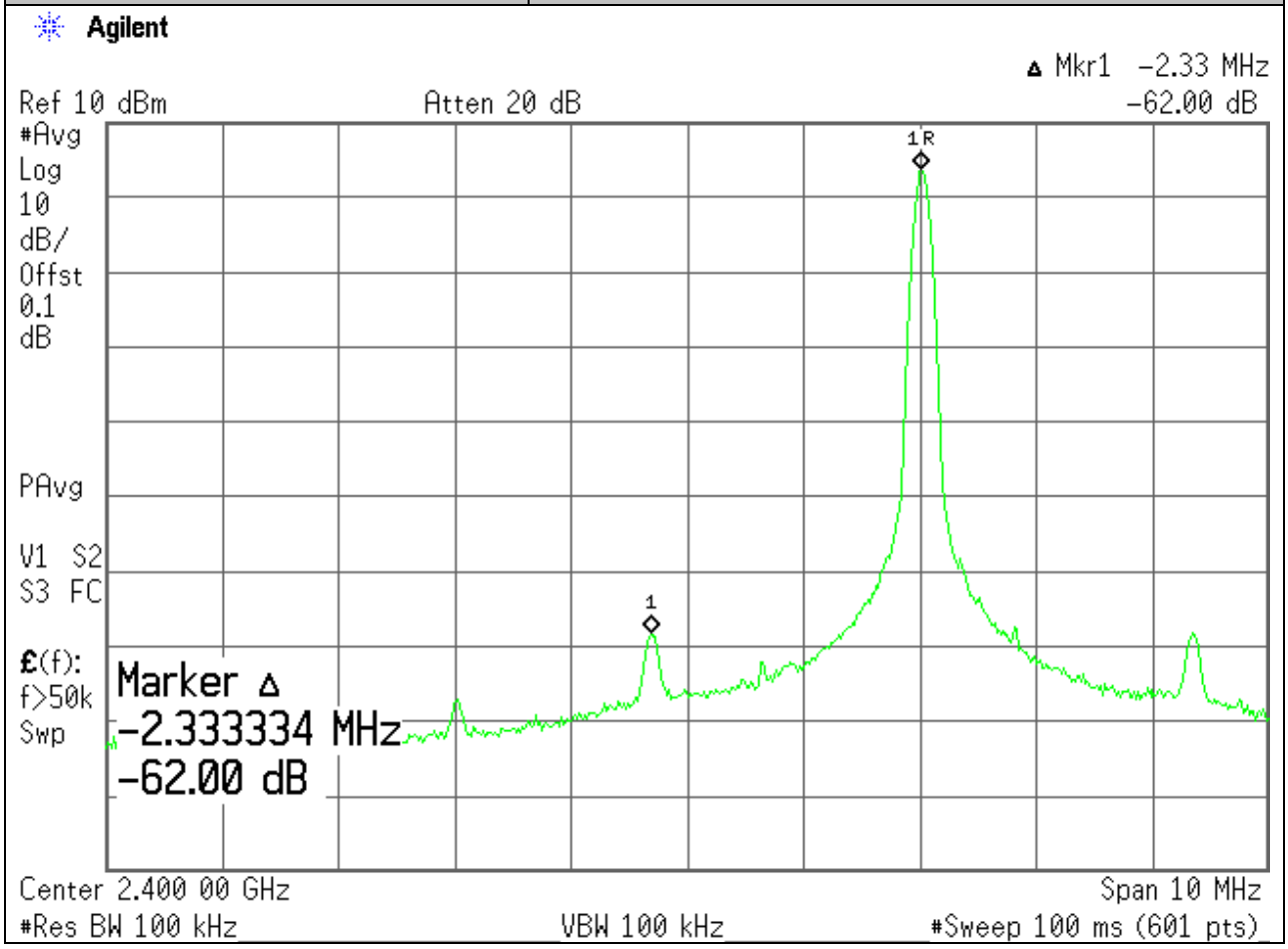
The spectrum from 30 MHz to 25 GHz was investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

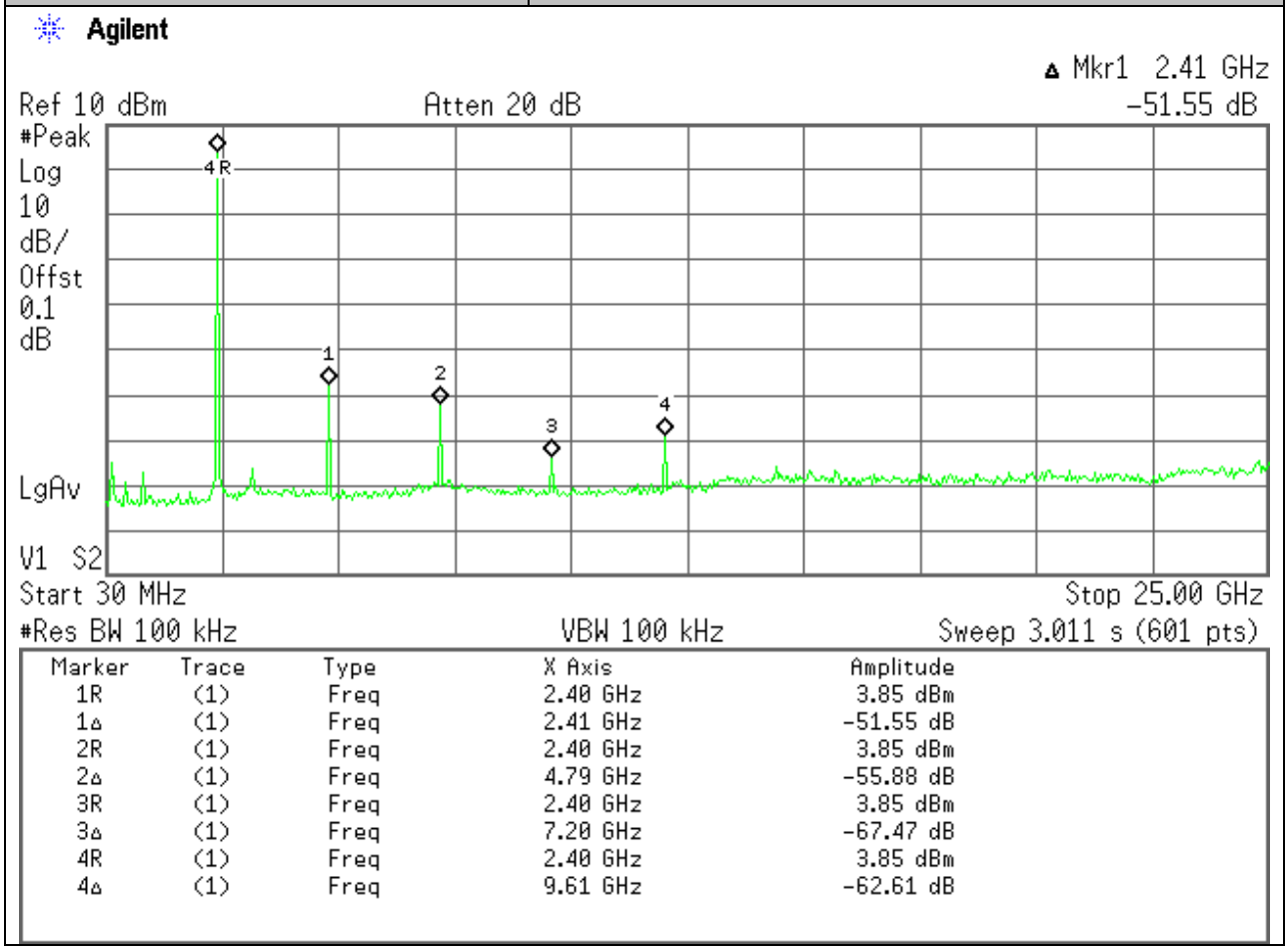
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL

Plot Name:	Band Edge @ Low CH

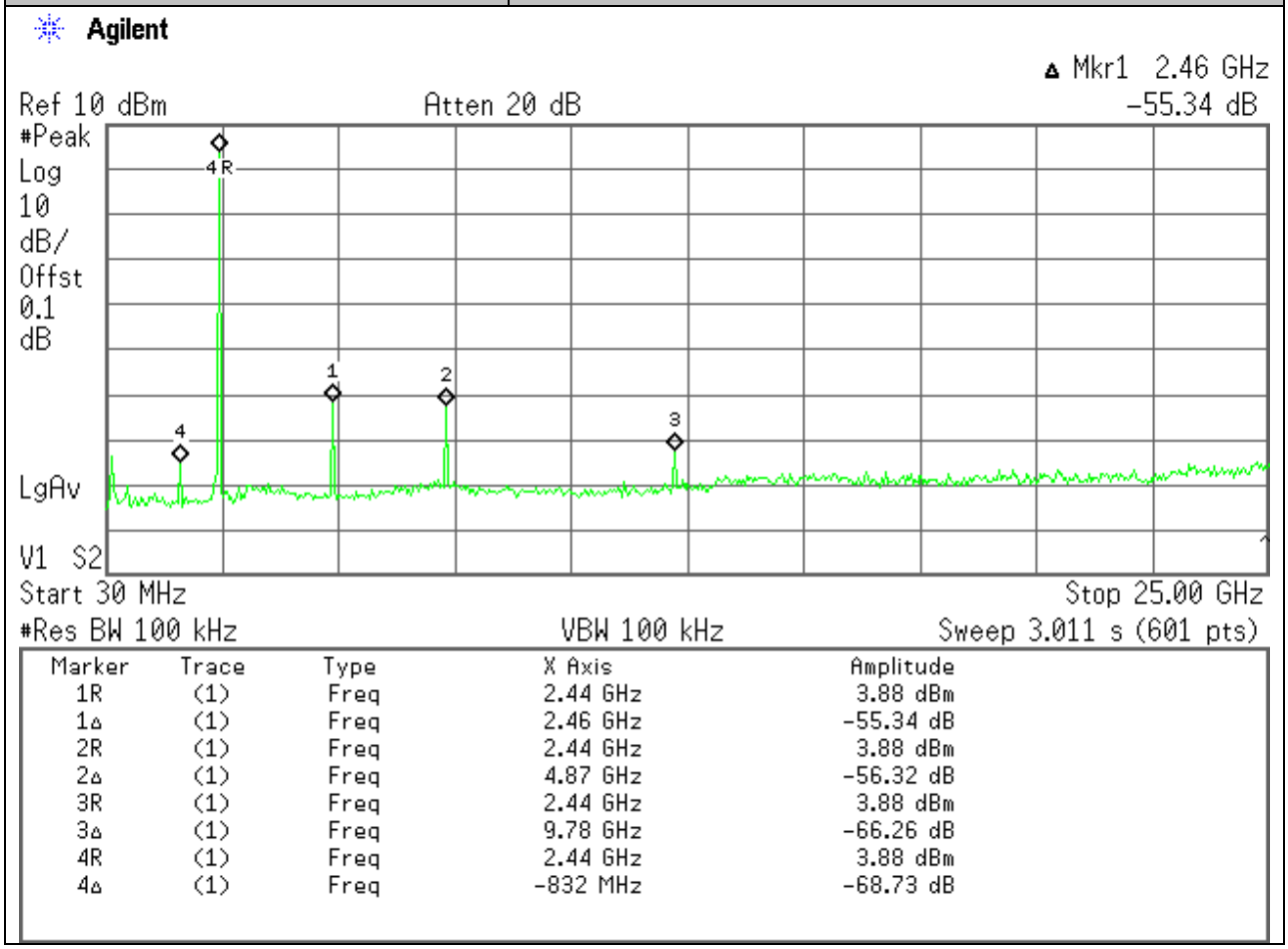


Plot Name:	Spurious @ Low CH



Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	2.40 GHz	3.85 dBm
1Δ	(1)	Freq	2.41 GHz	-51.55 dB
2R	(1)	Freq	2.40 GHz	3.85 dBm
2Δ	(1)	Freq	4.79 GHz	-55.88 dB
3R	(1)	Freq	2.40 GHz	3.85 dBm
3Δ	(1)	Freq	7.20 GHz	-67.47 dB
4R	(1)	Freq	2.40 GHz	3.85 dBm
4Δ	(1)	Freq	9.61 GHz	-62.61 dB

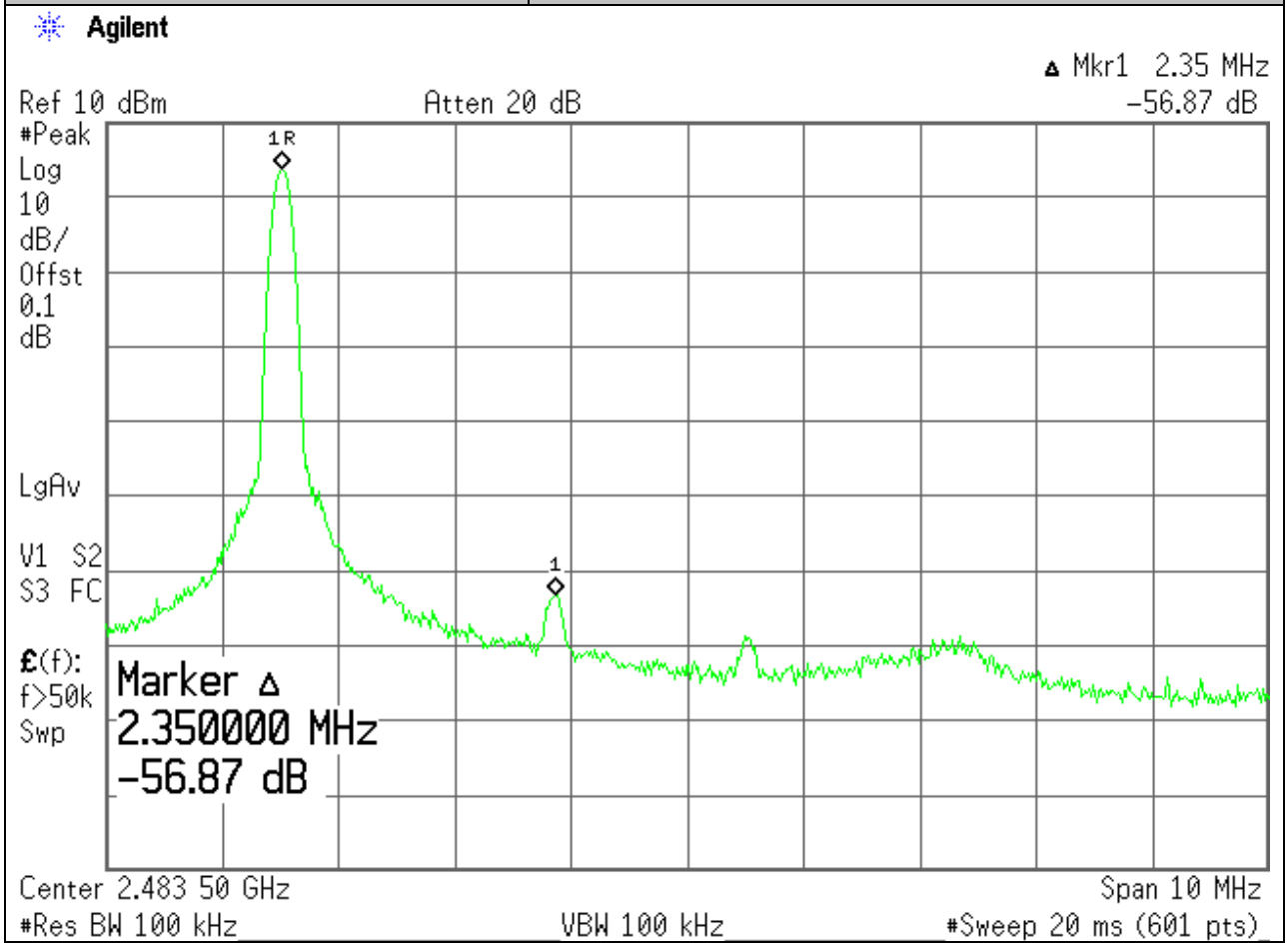
Plot Name:	Spurious @ Mid CH



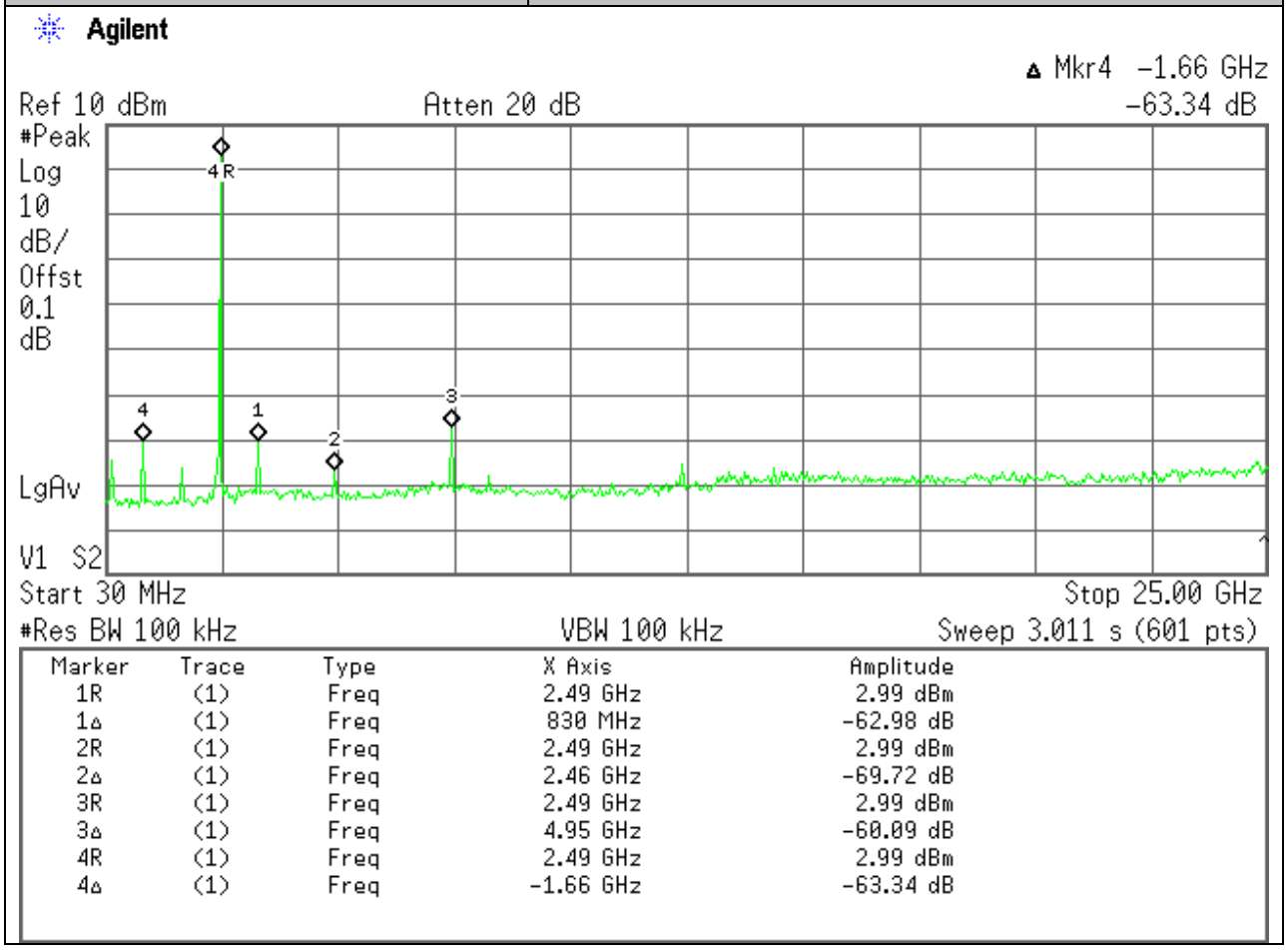
Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	2.44 GHz	3.88 dBm
1Δ	(1)	Freq	2.46 GHz	-55.34 dB
2R	(1)	Freq	2.44 GHz	3.88 dBm
2Δ	(1)	Freq	4.87 GHz	-56.32 dB
3R	(1)	Freq	2.44 GHz	3.88 dBm
3Δ	(1)	Freq	9.78 GHz	-66.26 dB
4R	(1)	Freq	2.44 GHz	3.88 dBm
4Δ	(1)	Freq	-832 MHz	-68.73 dB

SPURIOUS EMISSIONS, HIGH CHANNEL

Plot Name:	Band Edge @ High CH



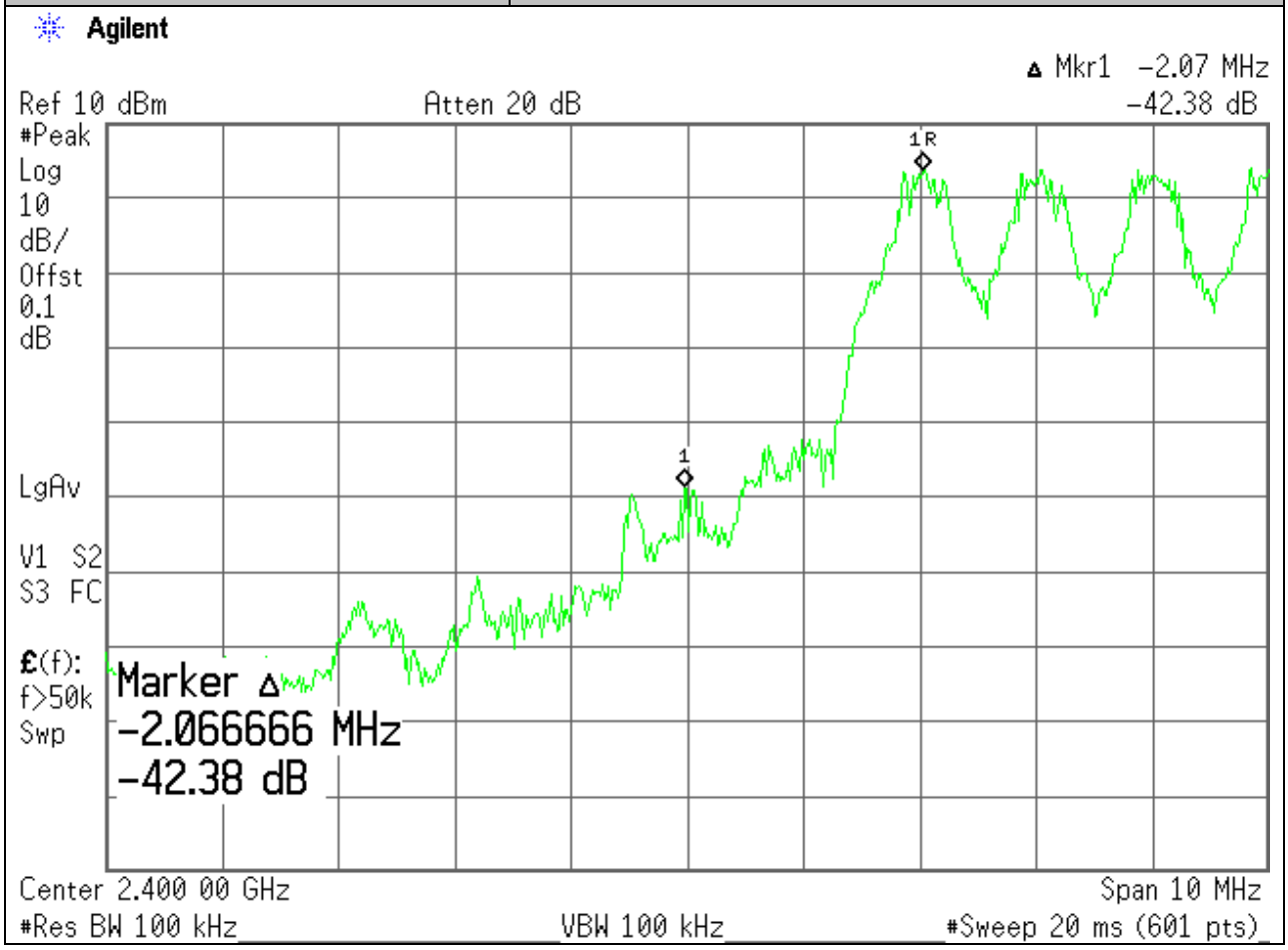
Plot Name:	Spurious @ High CH



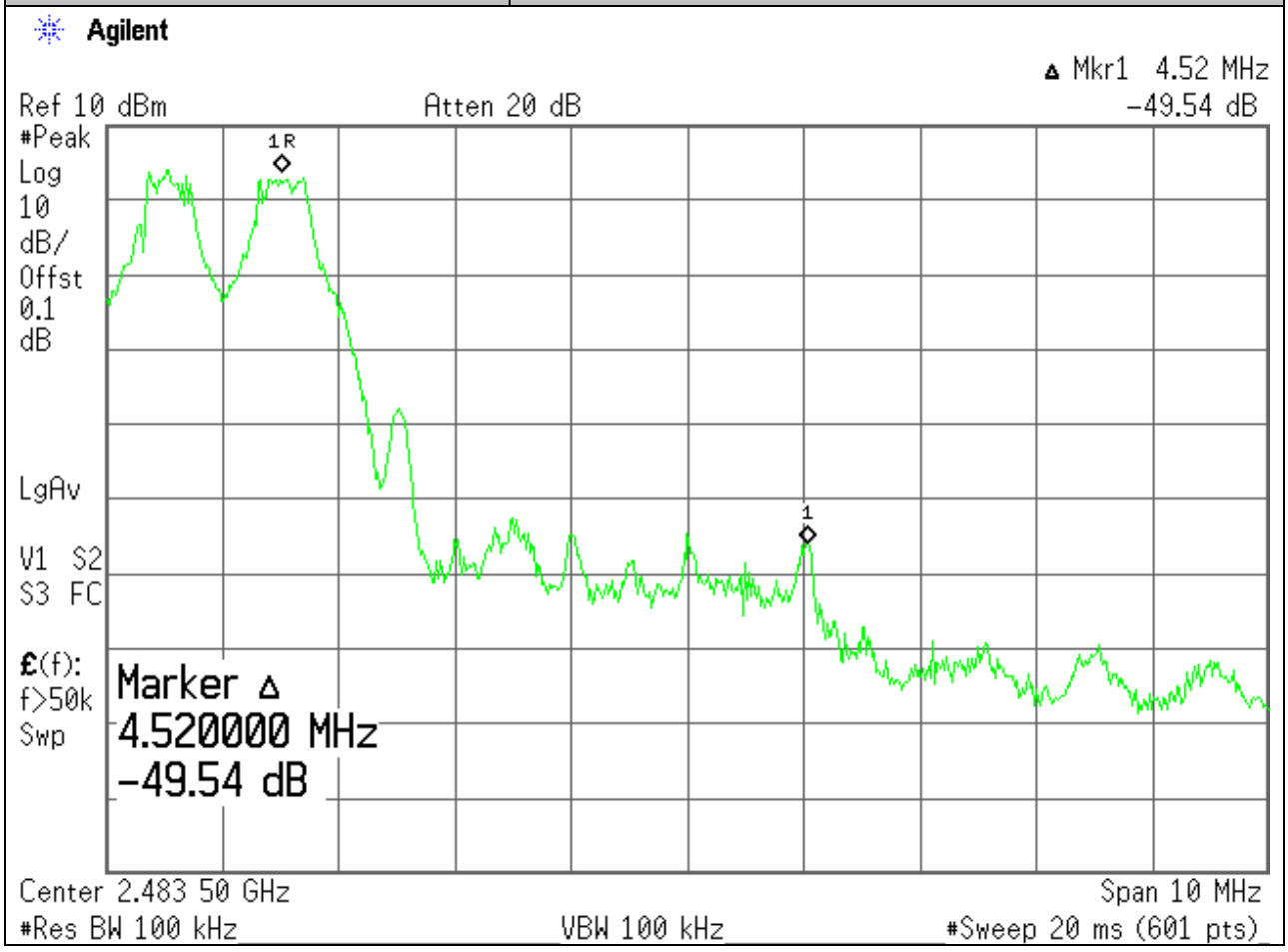
Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	2.49 GHz	2.99 dBm
1Δ	(1)	Freq	830 MHz	-62.98 dB
2R	(1)	Freq	2.49 GHz	2.99 dBm
2Δ	(1)	Freq	2.46 GHz	-69.72 dB
3R	(1)	Freq	2.49 GHz	2.99 dBm
3Δ	(1)	Freq	4.95 GHz	-60.09 dB
4R	(1)	Freq	2.49 GHz	2.99 dBm
4Δ	(1)	Freq	-1.66 GHz	-63.34 dB

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

Plot Name:	Band Edge w/ Hopping ON @ Low CH



Plot Name:	Band Edge w/ Hopping ON @ High CH



7.10. RADIATED EMISSIONS

7.10.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 25 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

RESULTS

No non-compliance noted:

7.10.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

HARMONICS AND SPURIOUS EMISSIONS

A. Transmitting Mode

Low Channel Harmonics/Spurious

Freq. (MHz)	Position (H,V-X,Y,Z)	Dist. (m)	D Corr (dB)	Peak@1m (dBuV/m)	Avg@3m (dBuV/m)	PK Lim (dBuV/m)	Avg.Lim (dBuV/m)	PK Mar (dBuV/m)	Avg.Mar. (dBuV/m)
1601.3	H,X	1	-10.5	**63.0**	52.5	74	54	-21.5	-1.5
2402.0	H,X	1	-10.5	**101.5**	91	74	54	17**	37
4804.0	H,X	1	-10.5	**63.3**	52.8	74	54	-21.2	-1.2
7206.0*	H,X	1	-10.5	**60.0**	49.5	74	54	-24.5	-4.5
1601.3	V,X	1	-10.5	**54.6**	44.1	74	54	-29.9	-9.9
2402.0	V,X	1	-10.5	**94.5**	84	74	54	10	30
4804.0	V,X	1	-10.5	**60.1**	49.6	74	54	-24.4	-4.4
7206.0	V,X	1	-10.5	**58.8**	48.3	74	54	-25.7	-5.7
1601.3	H,Y	1	-10.5	**56.8**	46.3	74	54	-27.7	-7.7
2402.0	H,Y	1	-10.5	**97.2**	86.7	74	54	12.7	32.7
4804.0	H,Y	1	-10.5	**64.2**	53.7	74	54	-20.3	-0.3
7206.0	H,Y	1	-10.5	**59.0**	48.5	74	54	-25.5	-5.5
1601.3	V,Y	1	-10.5	**58.3**	47.8	74	54	-26.2	-6.2
2402.0	V,Y	1	-10.5	**96.8**	86.3	74	54	12.3	32.3
4804.0	V,Y	1	-10.5	**60.5**	50	74	54	-24	-4
7206.0	V,Y	1	-10.5	**57.7**	47.2	74	54	-26.8	-6.8
1601.3	H,Z	1	-10.5	**56.9**	46.4	74	54	-27.6	-7.6
2402.0	H,Z	1	-10.5	**101.1**	90.6	74	54	16.6	36.6
4804.0	H,Z	1	-10.5	**62.3**	51.8	74	54	-22.2	-2.2
7206.0	H,Z	1	-10.5	**59.8**	49.3	74	54	-24.7	-4.7
1601.3	V,Z	1	-10.5	**60.6**	50.1	74	54	-23.9	-3.9
2402.0	V,Z	1	-10.5	**96.4**	85.9	74	54	11.9	31.9
4804.0	V,Z	1	-10.5	**63.9**	53.4	74	54	-20.6	-0.6
7206.0	V,Z	1	-10.5	**58.0**	47.5	74	54	-26.5	-6.5

Middle Channel Harmonics/Spurious

Freq. (MHz)	Position (H,V-X,Y,Z)	Dist. (m)	D Corr (dB)	Peak@1m (dBuV/m)	Avg@3m (dBuV/m)	PK Lim (dBuV/m)	Avg.Lim (dBuV/m)	PK Mar (dBuV/m)	Avg.Mar. (dBuV/m)
1627.3	H,X	1	-10.5	**63.9**	53.4	74	54	-20.6	-0.6
2441.0	H,X	1	-10.5	**100.9**	90.4	74	54	16.4	36.4
4882.0	H,X	1	-10.5	**57.5**	47	74	54	-27	-7
7323.0	H,X	1	-10.5	**58.2**	47.7	74	54	-26.3	-6.3
1627.3	V,X	1	-10.5	**53.2**	42.7	74	54	-31.3	-11.3
2441.0	V,X	1	-10.5	**89.7**	79.2	74	54	5.2	25.2
4882.0	V,X	1	-10.5	**54.2**	43.7	74	54	-30.3	-10.3
7323.0	V,X	1	-10.5	**56.1**	45.6	74	54	-28.4	-8.4
1627.3	H,Y	1	-10.5	**56.9**	46.4	74	54	-27.6	-7.6
2441.0	H,Y	1	-10.5	**101.9**	91.4	74	54	17.4	37.4
4882.0	H,Y	1	-10.5	**53.5**	43	74	54	-31	-11
7323.0	H,Y	1	-10.5	**57.0**	46.5	74	54	-27.5	-7.5

1627.3	V,Y	1	-10.5	**55.7**	45.2	74	54	-28.8	-8.8
2441.0	V,Y	1	-10.5	**95.0**	84.5	74	54	10.5	30.5
4882.0	V,Y	1	-10.5	**63.5**	53	74	54	-21	-1
7323.0	V,Y	1	-10.5	**57.2**	46.7	74	54	-27.3	-7.3
1627.3	H,Z	1	-10.5	**58.3**	47.8	74	54	-26.2	-6.2
2441.0	H,Z	1	-10.5	**95.4**	84.9	74	54	10.9	30.9
4882.0	H,Z	1	-10.5	**52.6**	42.1	74	54	-31.9	-11.9
7323.0	H,Z	1	-10.5	**56.2**	45.7	74	54	-28.3	-8.3
1627.3	V,Z	1	-10.5	**61.9**	51.4	74	54	-22.6	-2.6
2441.0	V,Z	1	-10.5	**95.5**	85	74	54	11	31
4882.0	V,Z	1	-10.5	**57.5**	47	74	54	-27	-7
7323.0	V,Z	1	-10.5	**57.0**	46.5	74	54	-27.5	-7.5

High Channel Harmonics/Spurious

Freq. (MHz)	Position (H,V-X,Y,Z)	Dist. (m)	D Corr (dB)	Peak@1m (dBuV/m)	Avg@3m (dBuV/m)	PK Lim (dBuV/m)	Avg.Lim (dBuV/m)	PK Mar (dBuV/m)	Avg.Mar. (dBuV/m)
1653.3	H,X	1	-10.5	**63.8**	53.3	74	54	-20.7	-0.7
2480.0	H,X	1	-10.5	**100.7**	90.2	74	54	16.2	36.2
4960.0	H,X	1	-10.5	**51.4**	40.9	74	54	-33.1	-13.1
7440.0	H,X	1	-10.5	**55.0**	44.5	74	54	-29.5	-9.5
1653.3	V,X	1	-10.5	**54.0**	43.5	74	54	-30.5	-10.5
2480.0	V,X	1	-10.5	**88.7**	78.2	74	54	4.2	24.2
4960.0	V,X	1	-10.5	**45.6**	35.1	74	54	-38.9	-18.9
7440.0	V,X	1	-10.5	**54.1**	43.6	74	54	-30.4	-10.4
1653.3	H,Y	1	-10.5	**57.7**	47.2	74	54	-26.8	-6.8
2480.0	H,Y	1	-10.5	**94.5**	84	74	54	10	30
4960.0	H,Y	1	-10.5	**54.7**	44.2	74	54	-29.8	-9.8
7440.0	H,Y	1	-10.5	**55.0**	44.5	74	54	-29.5	-9.5
1653.3	V,Y	1	-10.5	**57.8**	47.3	74	54	-26.7	-6.7
2480.0	V,Y	1	-10.5	**96.8**	86.3	74	54	12.3	32.3
4960.0	V,Y	1	-10.5	**44.6**	34.1	74	54	-39.9	-19.9
7440.0	V,Y	1	-10.5	**53.9**	43.4	74	54	-30.6	-10.6
1653.3	H,Z	1	-10.5	**56.9**	46.4	74	54	-27.6	-7.6
2480.0	H,Z	1	-10.5	**98.3**	87.8	74	54	13.8	33.8
4960.0	H,Z	1	-10.5	**47.7**	37.2	74	54	-36.8	-16.8
7440.0	H,Z	1	-10.5	**54.0**	43.5	74	54	-30.5	-10.5
1653.3	V,Z	1	-10.5	**62.5**	52	74	54	-22	-2
2480.0	V,Z	1	-10.5	**95.3**	84.8	74	54	10.8	30.8
4960.0	V,Z	1	-10.5	**50.3**	39.8	74	54	-34.2	-14.2
7440.0	V,Z	1	-10.5	**55.2**	44.7	74	54	-29.3	-9.3

No other harmonics or spurious emissions were detected in the rest band above system floor, noise above -20dB to the limit.
Average field strength is less than peak field strenth.
* Using lower limit for 7206MHz since the emission level is low.
** readings &margins for Fundamental are listed here for reference only.

B. Receiving Mode

Freq. (MHz)	Position (H,V-X,Y,Z)	Dist. (m)	D Corr (dB)	Peak (dBuV/m)	Quasi-Peak (dBuV/m)	Avg. (dBuV/m)	FCC-15 3m Lim (dBuV/m)	Mar. (dBuV/m)
No significant harmonics or spurious emissions were detected in the rest band above system floor, noise above -20dB to the limit.								
Worst case: operation frequency=2441MHz								

7.10.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

No significant emissions were detected in this band above system floor, noise above -20dB to the limit.

7.10.4 Conducted Emission Test

The EUT was setup and located so that the distance between the boundary of the EUT and the closest surface to the LISN was 0.8m or more.

EUT test configuration was according to CISPR22 and Section 7 of ANSI C63.4/2003.

Conducted disturbance was measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.150 - 30 MHz was investigated.

The EMI receiver was set to PEAK detector setting, and swept continuously over the frequency range to be investigated. The resolution bandwidth was set to 9KHz minimum. The EMI receiver input cable was connected to LINE 1 RF measurement connection on the LISN. A 50ohm terminator was connected to the unused RF port on the LISN. For each mode of EUT operation, emissions readings were maximized by manipulating cable and wire positions. The configuration for each EUT power cord which produced emissions closest to the limit was recorded. The same procedure was repeated for LINE 2 of each EUT power cord.

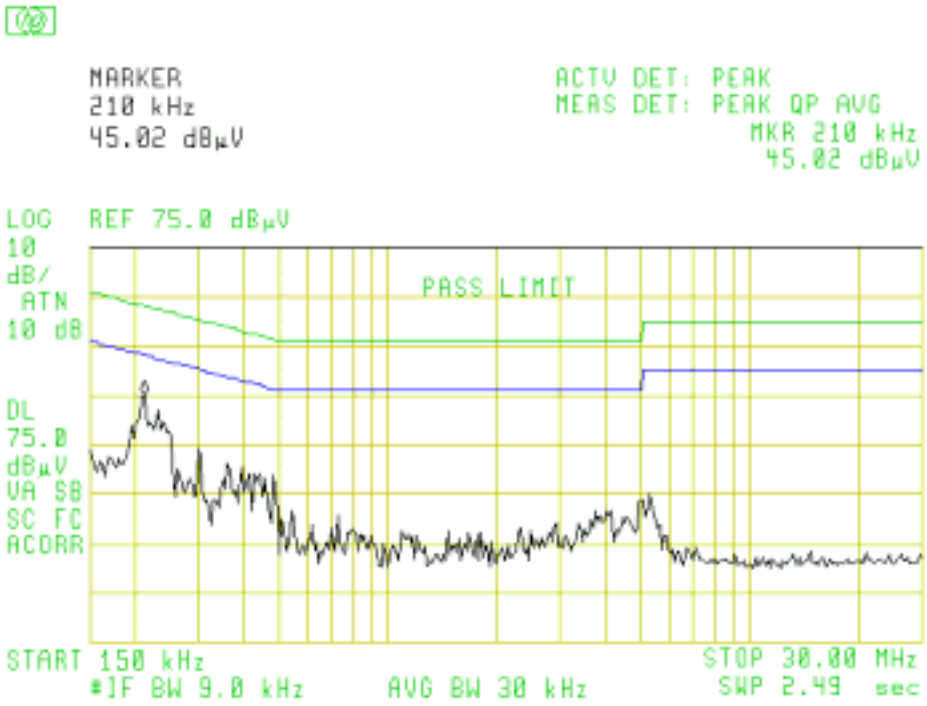
Instrument Settings

Frequency Range	**Peak**	**Quasi-Peak**	**Average**
0.15 – 30 MHz	9 kHz	9 kHz	30 kHz

Limit: FCC Part 15 / CISPR22 Class B

Result: No non-compliance noted

Line Conducted Emission



Neutral Conducted Emission