7.3. Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

For frequency hopping systems operating in the 2400-2483.5 MHz bands, which use fewer than 75 hopping frequencies, may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels are used.

For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

7.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2009 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Span = the frequency band of operation

RBW ≥ 1% of the span , VBW ≥ RBW

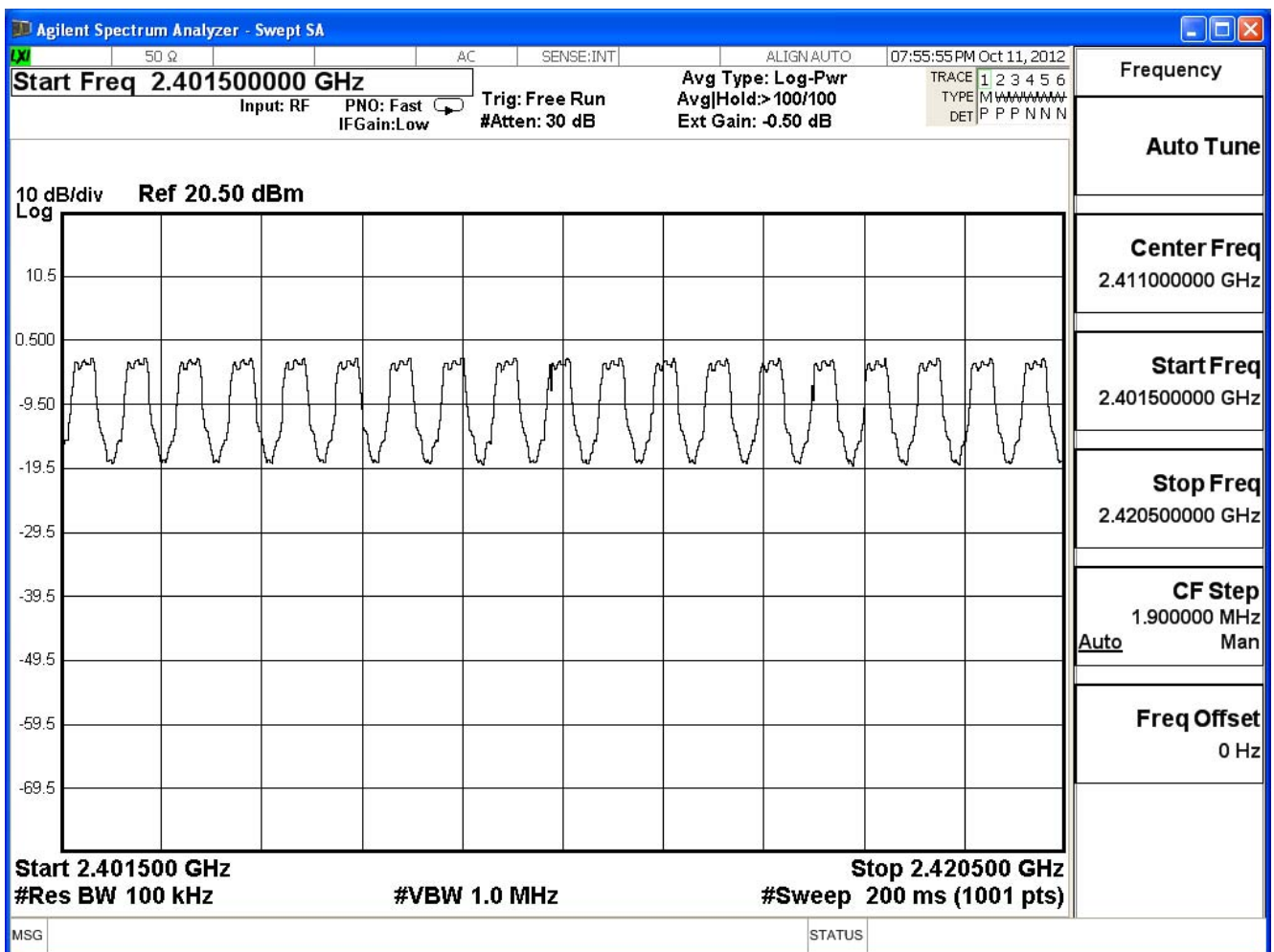Sweep = auto, Detector function = peak, Trace = max hold

7.5. Test Specification

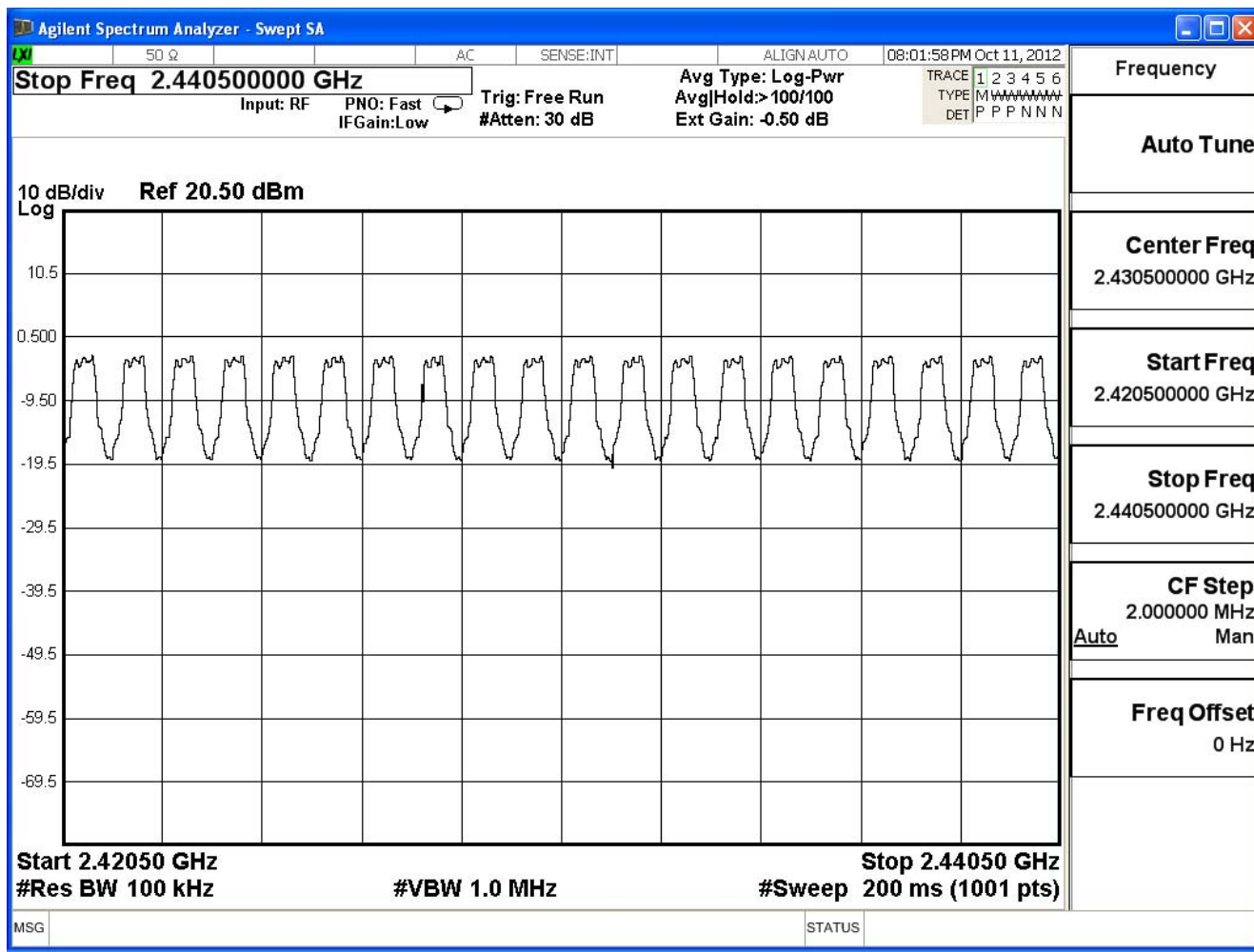According to FCC Part 15 Subpart C Paragraph 15.247: 2011

7.6. Test Result

Product	Bluetooth 4.0 USB Dongle		
Test Item	Number of hopping frequency		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

i

Frequency Range (MHz)	Measure Level (Channels)	Limit (Channels)	Result
2402 ~ 2480	79	>75	Pass

2401.5-2420.5MHz

2420.5-2440.5MHz

2440.5-2460.5MHz

2460.5-2480.5MHz

Agilent Spectrum Analyzer - Swept SA

| | 50 Ω | | | AC | SENSE:INT | | ALIGN AUTO | 08:13:15 PM Oct 11, 2012 |

Start Freq 2.460500000 GHz

Input: RF   PNO: Fast   Trig: Free Run   Avg Type: Log-Pwr   TRACE 1 2 3 4 5 6
IFGain:Low   #Atten: 30 dB   Avg|Hold:>100/100   TYPE M WWWWW
Ext Gain: -0.50 dB   DET P P P N N N

10 dB/div   Ref 20.50 dBm
Log

10.5

0.500

-9.50

-19.5

-29.5

-39.5

-49.5

-59.5

-69.5

Start 2.46050 GHz   Stop 2.48050 GHz
#Res BW 100 kHz   #VBW 1.0 MHz   #Sweep 200 ms (1001 pts)

MSG   STATUS

Frequency

Auto Tune

Center Freq
2.470500000 GHz

Start Freq
2.460500000 GHz

Stop Freq
2.480500000 GHz

CF Step
2.000000 MHz
Auto   Man

Freq Offset
0 Hz

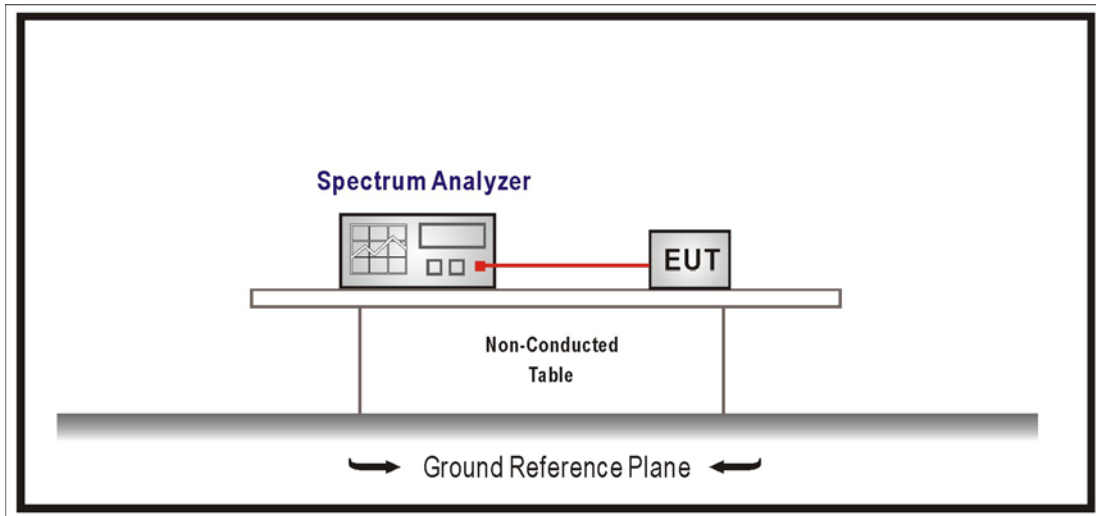# 8. Carrier Frequency Separation

8.1. Test Equipment

The following test equipment is used during the test:

Carrier Frequency Separation / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2013/02/19

Note:　1. All equipments that need to calibrate are with calibration period of 1 year.

8.2. Test Setup

8.3. Limits

For frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

8.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2009 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Span = wide enough to capture the peaks of two adjacent channels

Resolution Bandwidth (RBW) ≥ 1% of the span, VBW ≥ RBW

Sweep = auto, Detector function = peak, Trace = max hold

8.5. Test Specification

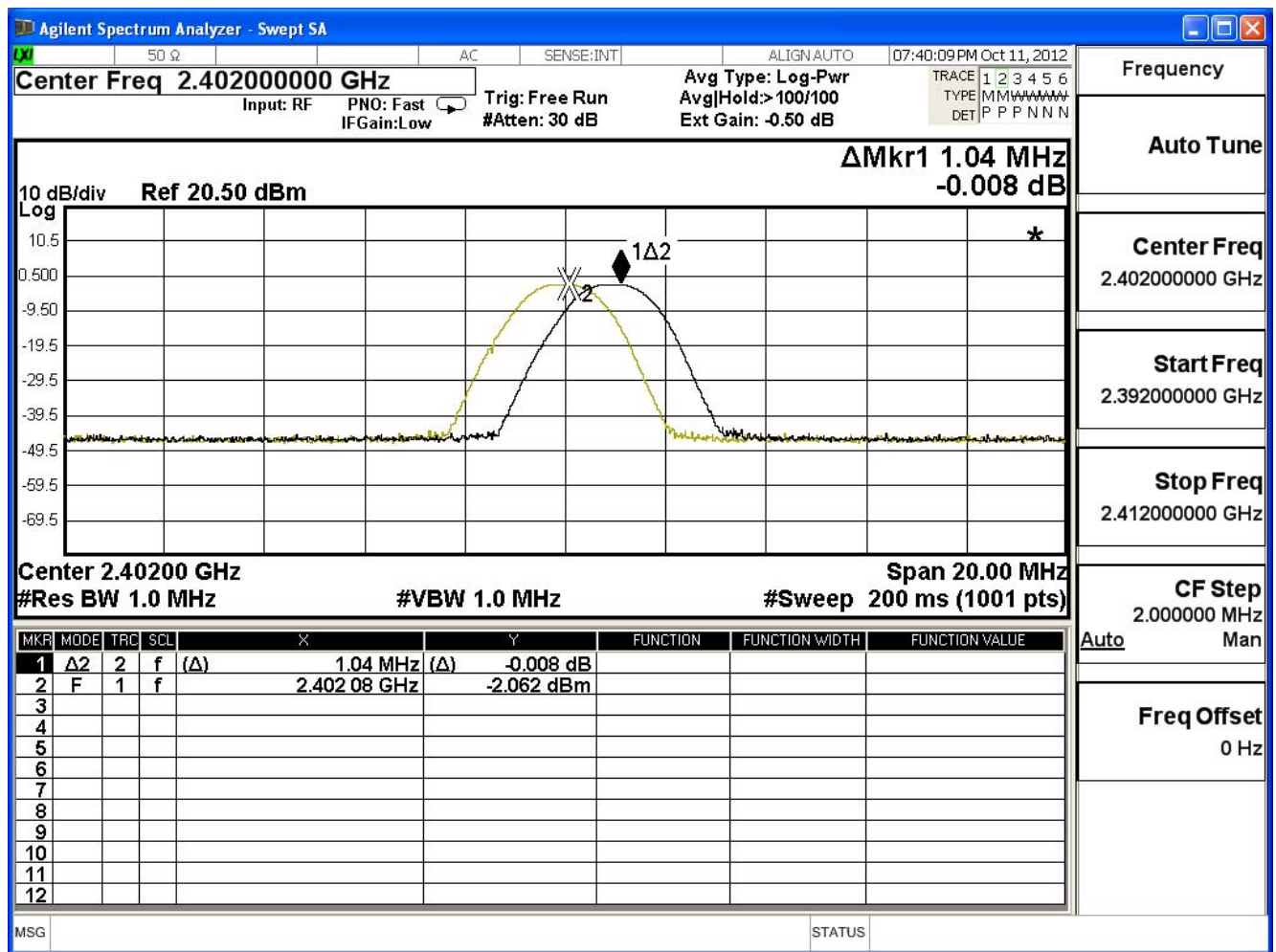According to FCC Part 15 Subpart C Paragraph 15.247: 2011

8.6. Test Result

Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

GFSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
00	2402	1.040	≧0.744	Pass

Channel 00

Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

GFSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
39	2441	1.000	≧0.744	Pass

Channel 39
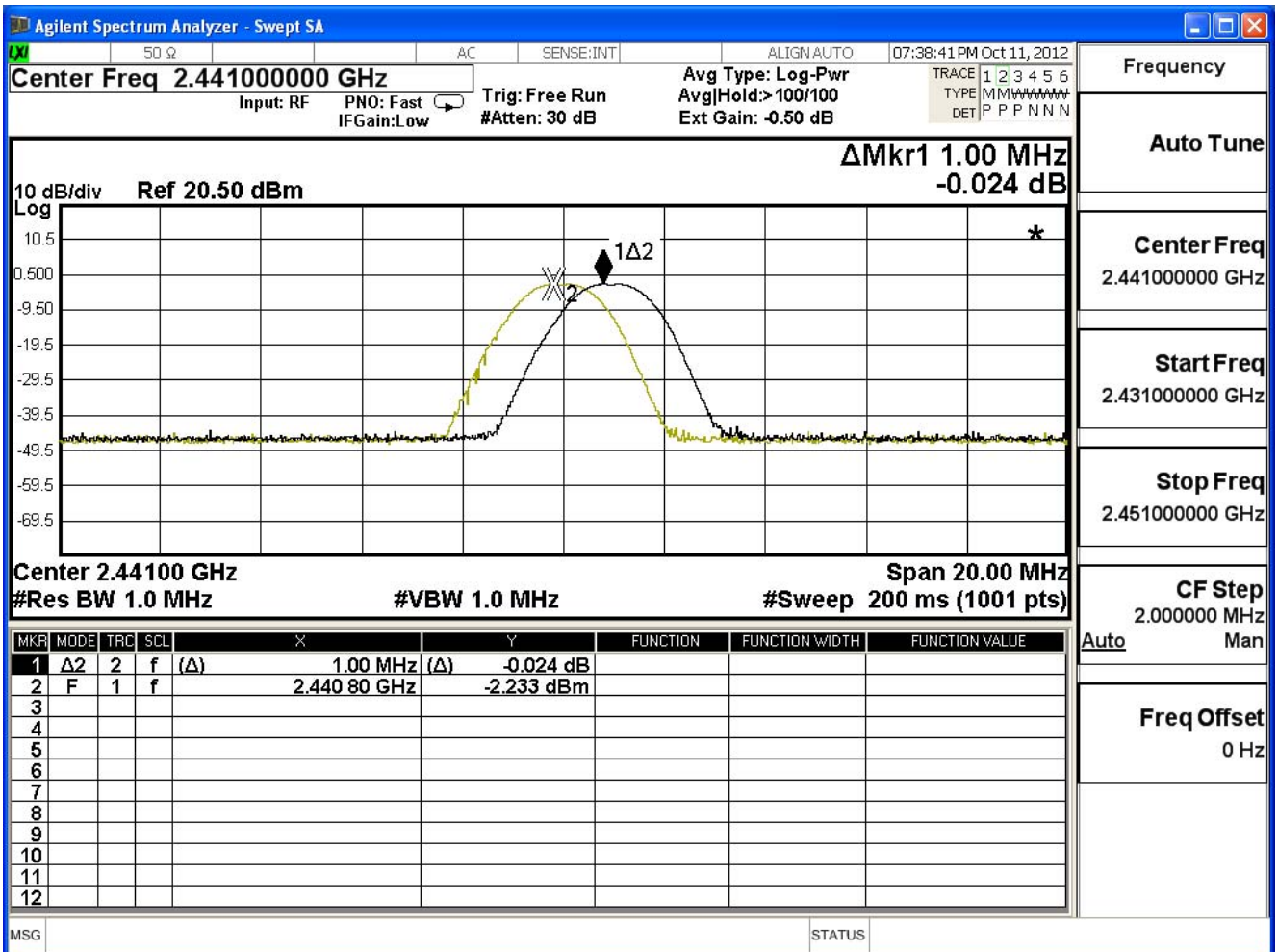
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

GFSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
78	2480	1.000	$\geqq 0.744$	Pass

Channel 78
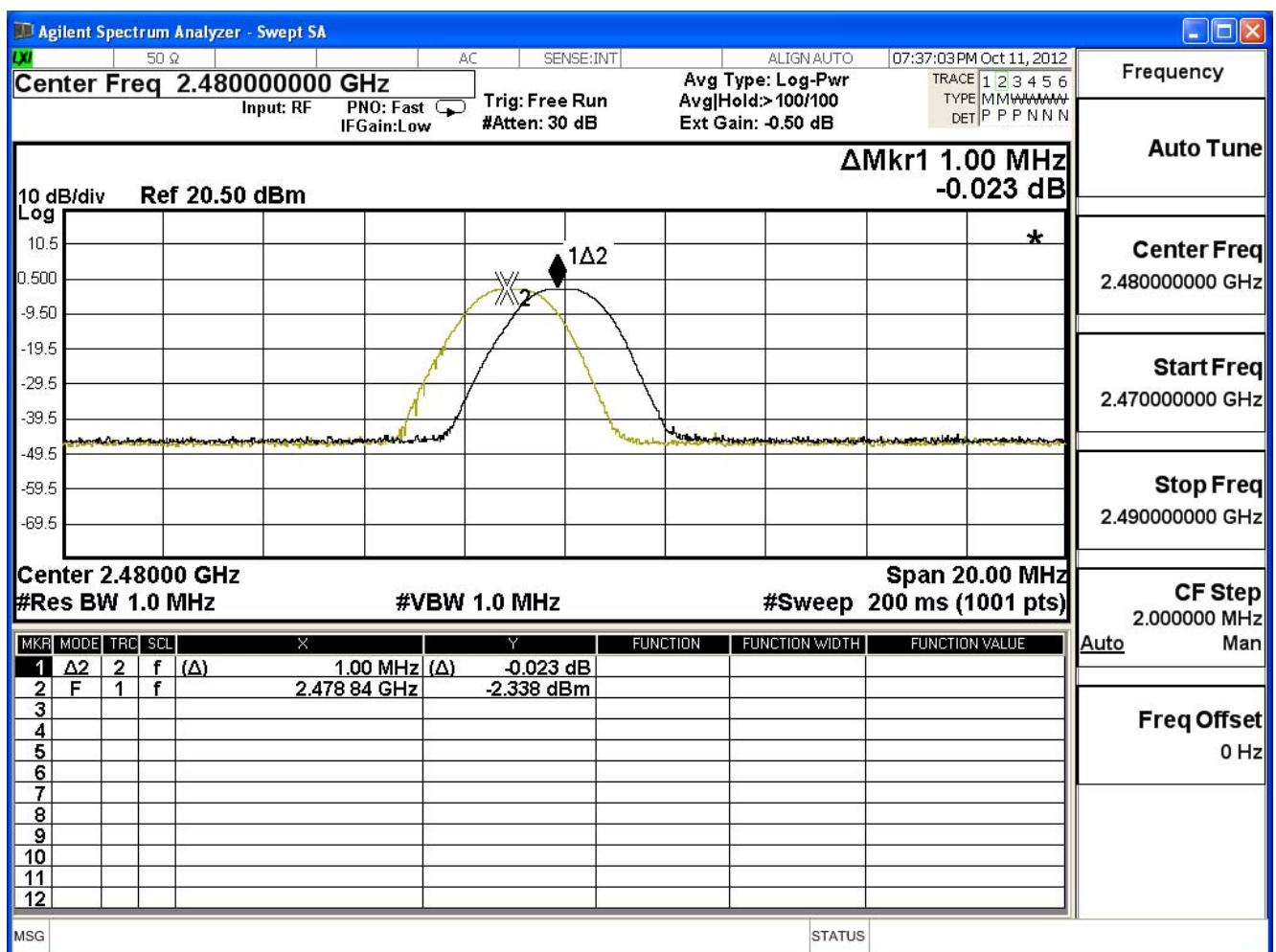
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

π/4-DQPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
00	2402	1.000	≧0.896	Pass

Channel 00
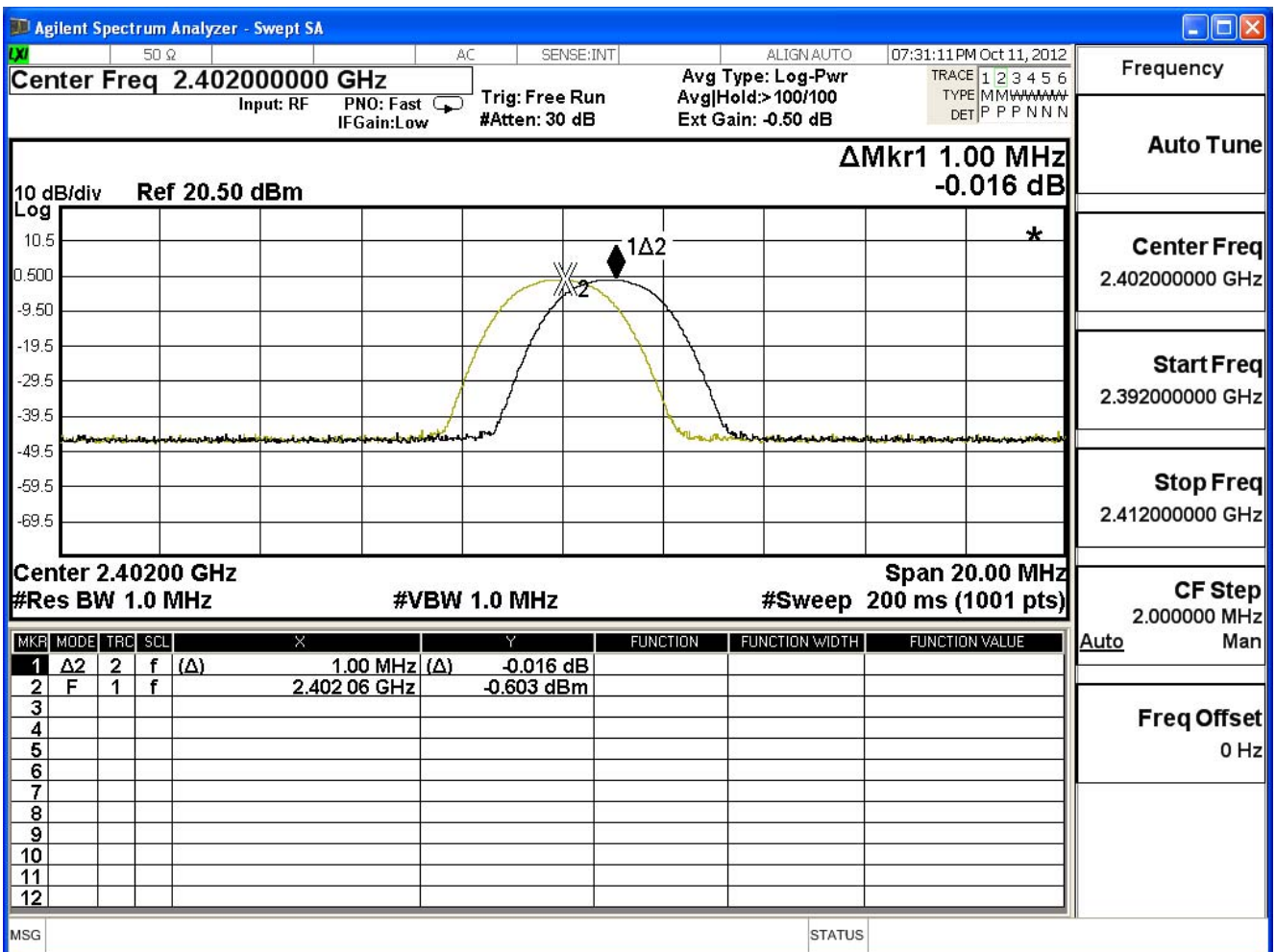
Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

π/4-DQPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
39	2441	1.000	≧0.897	Pass

Channel 39
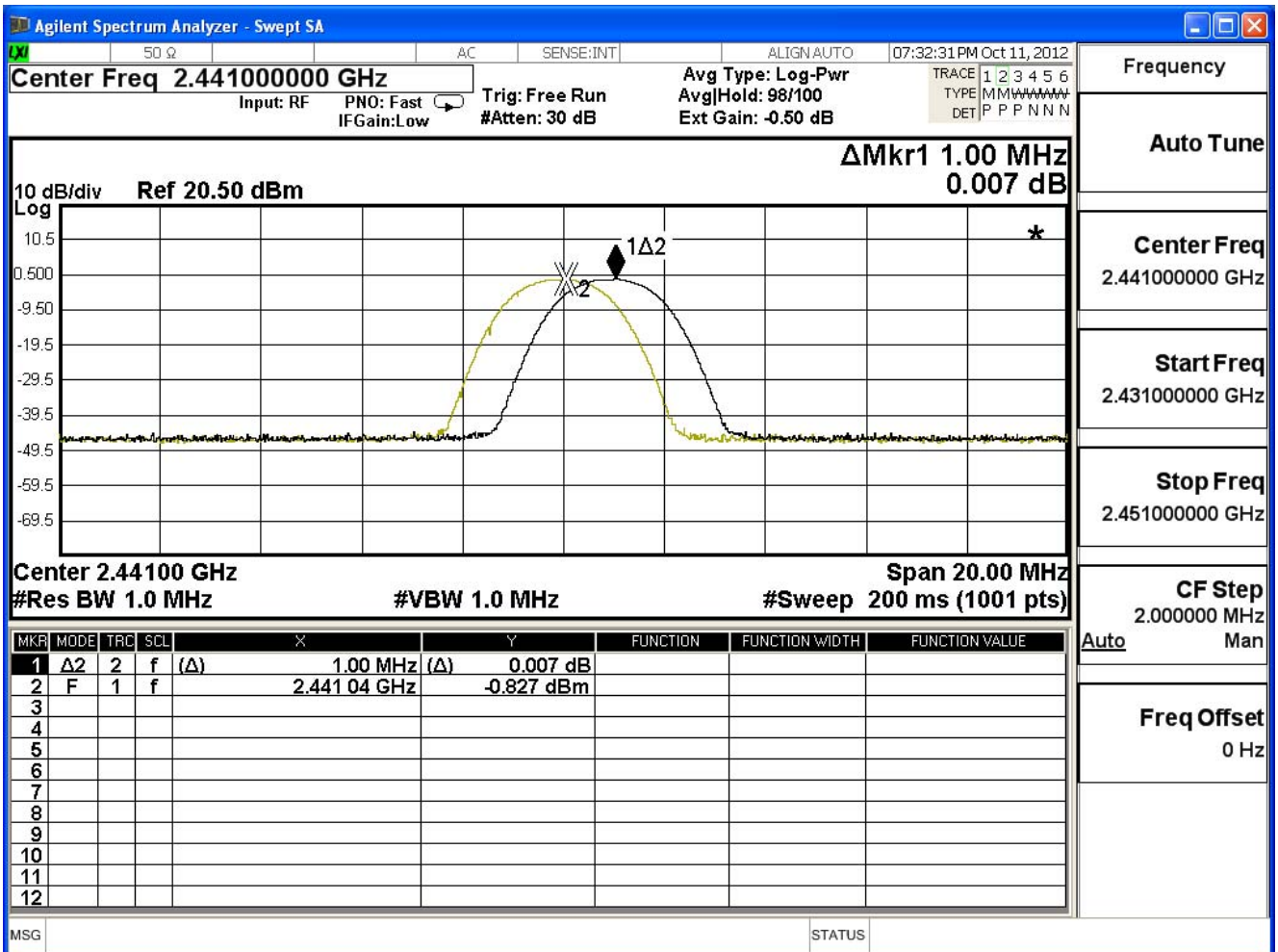
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

π/4-DQPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
78	2480	1.020	≧0.896	Pass

Channel 78
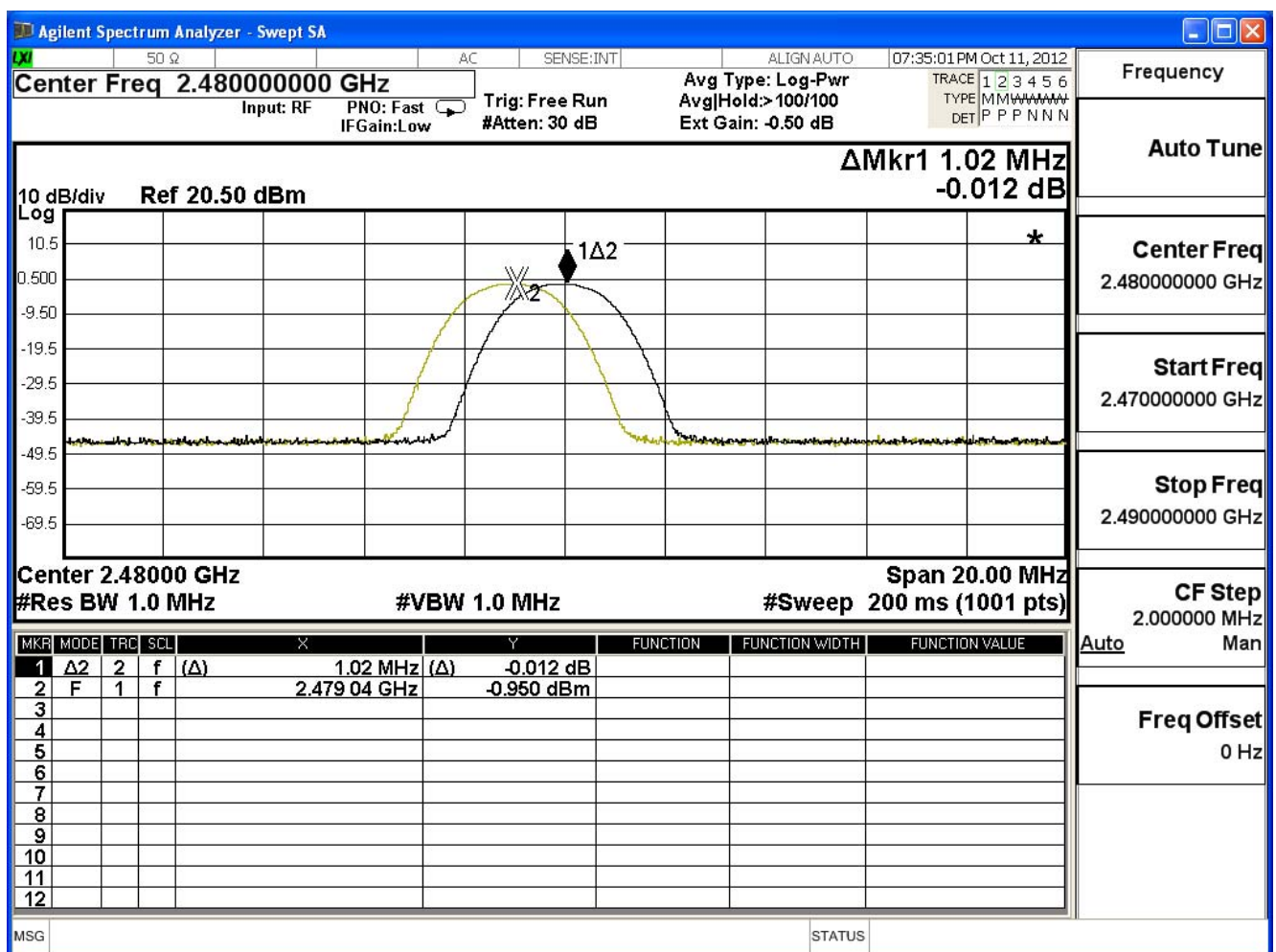
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

8-DPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
00	2402	1.040	≧0.894	Pass

Channel 00
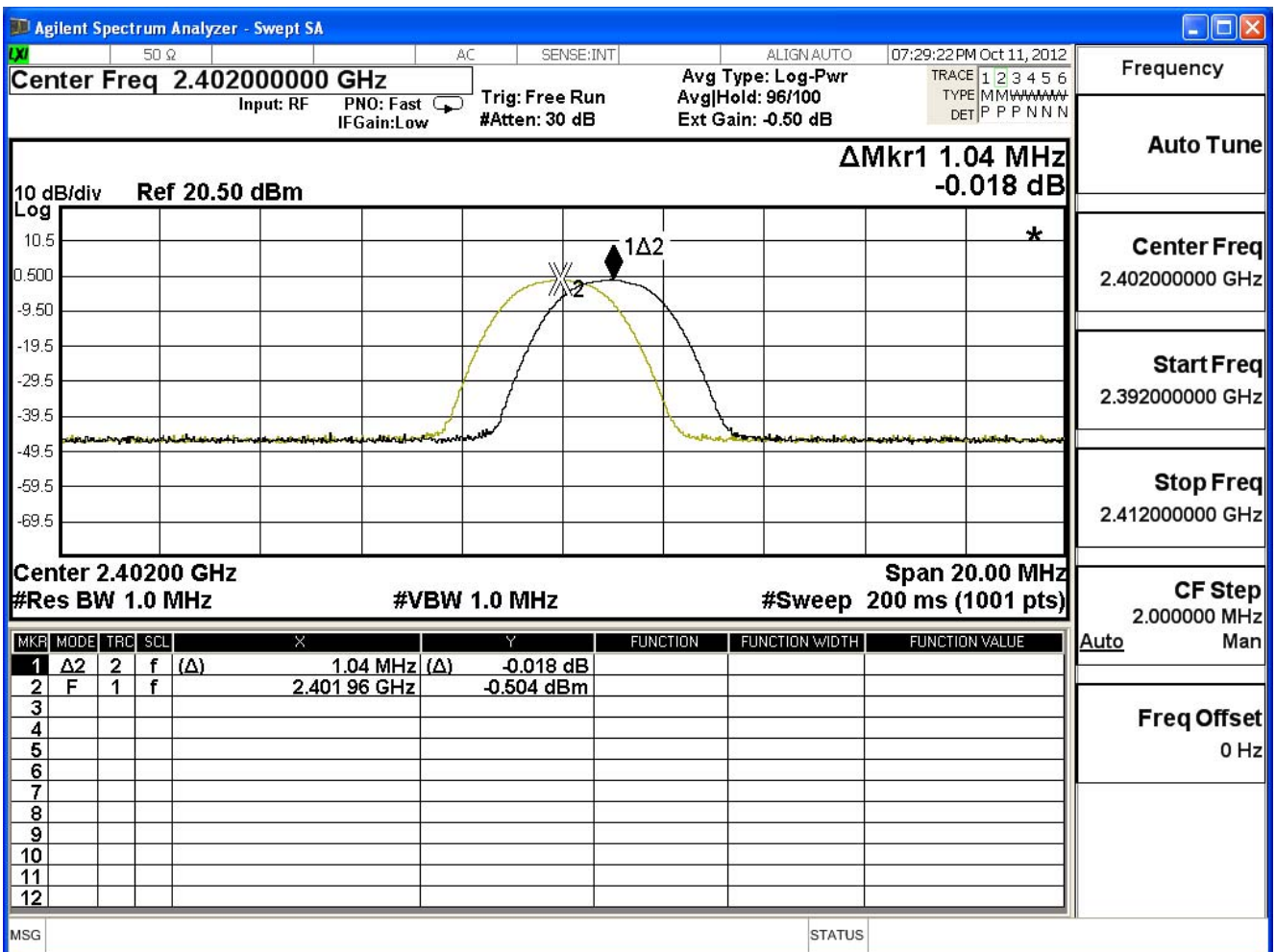
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

8-DPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
39	2441	1.000	≧0.895	Pass

Channel 39
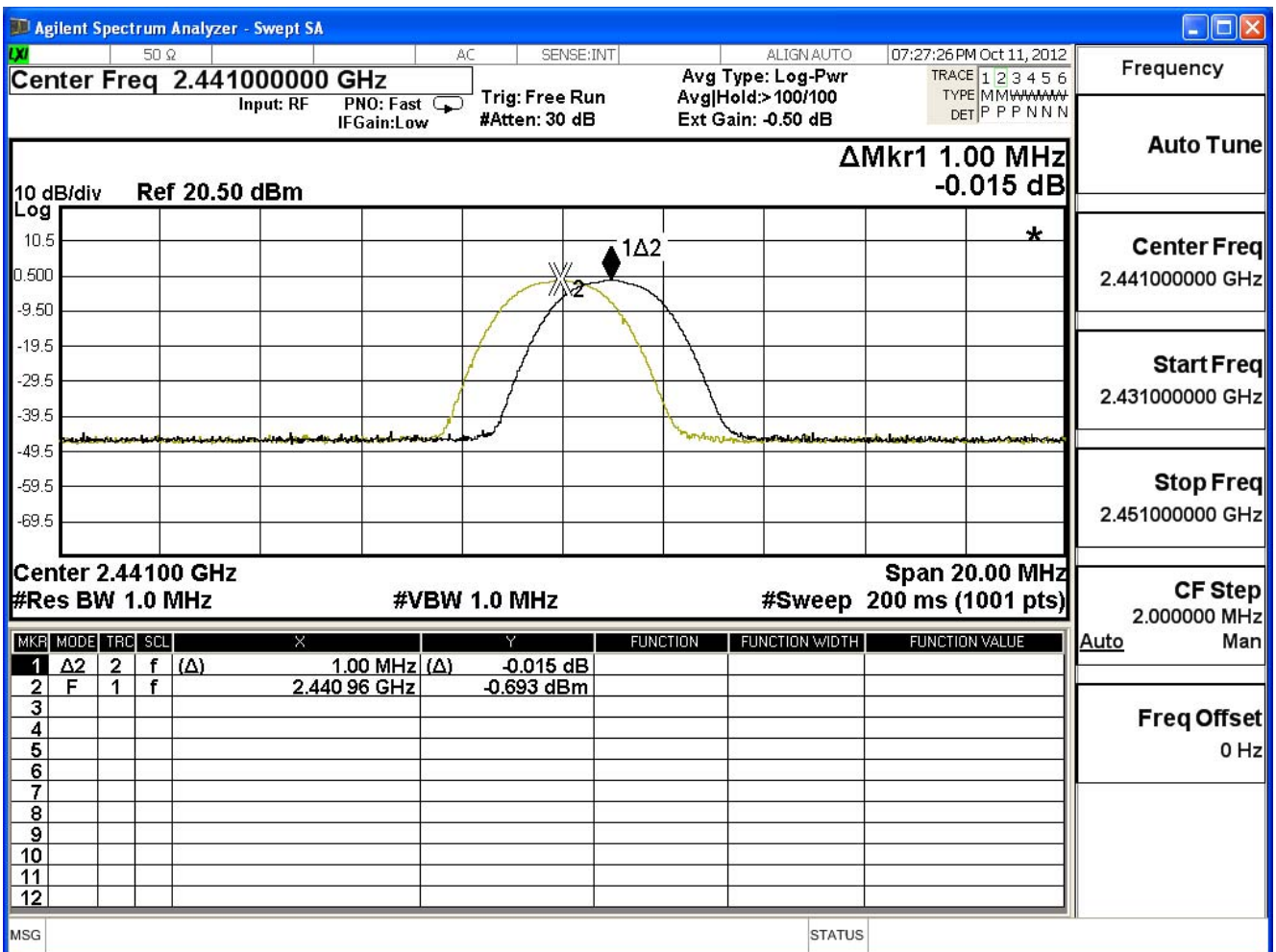
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

8-DPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
78	2480	1.000	≧0.896	Pass

Channel 78

9.   Occupied Bandwidth

9.1.   Test Equipment

The following test equipment is used during the test:

Occupied Bandwidth / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2013/02/19

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

9.2.   Test Setup

9.3. Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

For frequency hopping systems operating in the 5725-5850 MHz bands. The maximum 20 dB bandwidth of the hopping channel is 1 MHz.

For 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.

9.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2009 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Use the following spectrum analyzer settings:

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

The EUT should be transmitting at its maximum data rate.

9.5. Test Specification

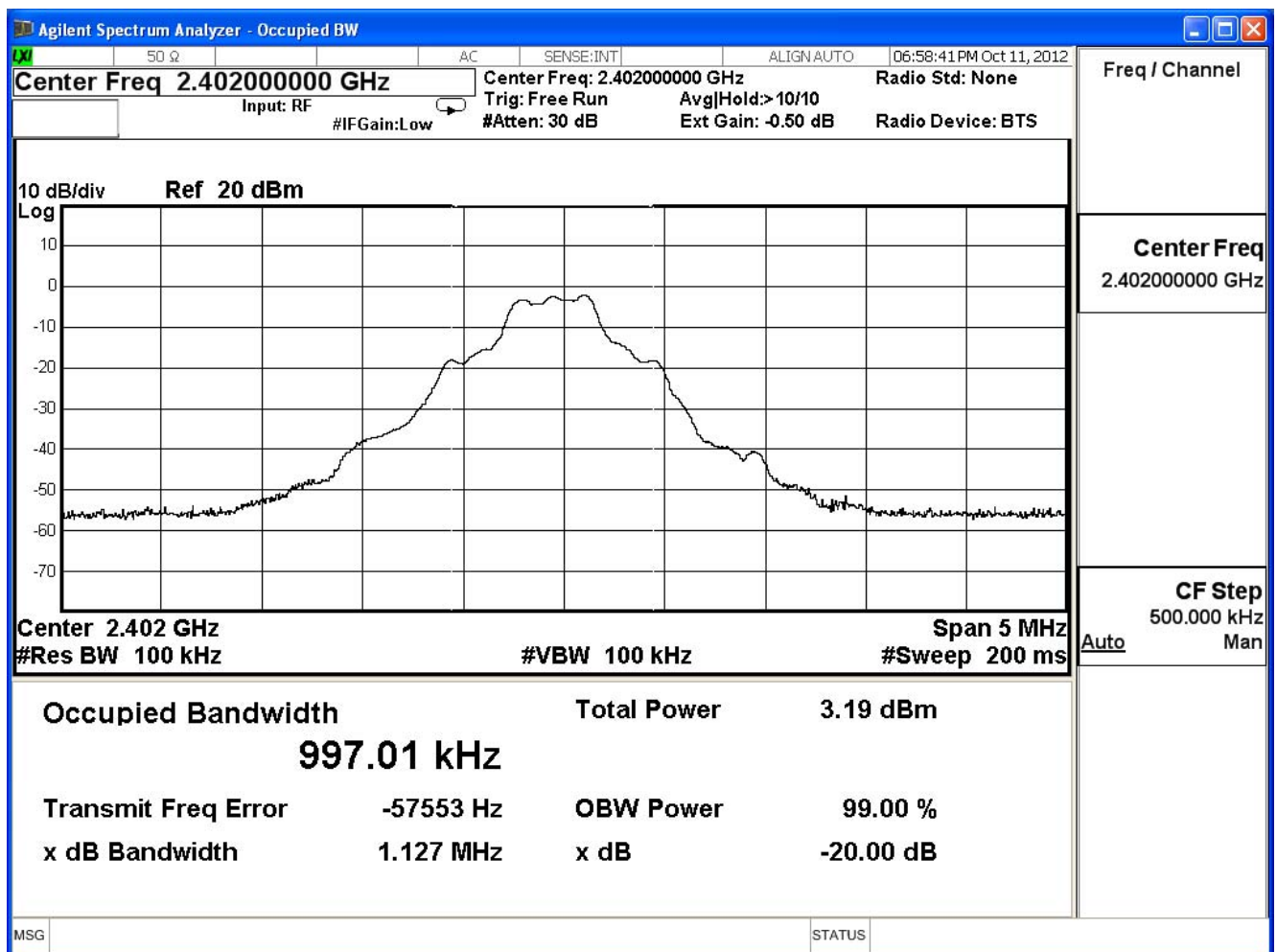According to FCC Part 15 Subpart C Paragraph 15.247: 2011

9.6. Test Result

Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

GFSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
00	2402	1.127	--	Pass

Channel 00

QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

GFSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
39	2441	1.127	--	Pass

Channel 39
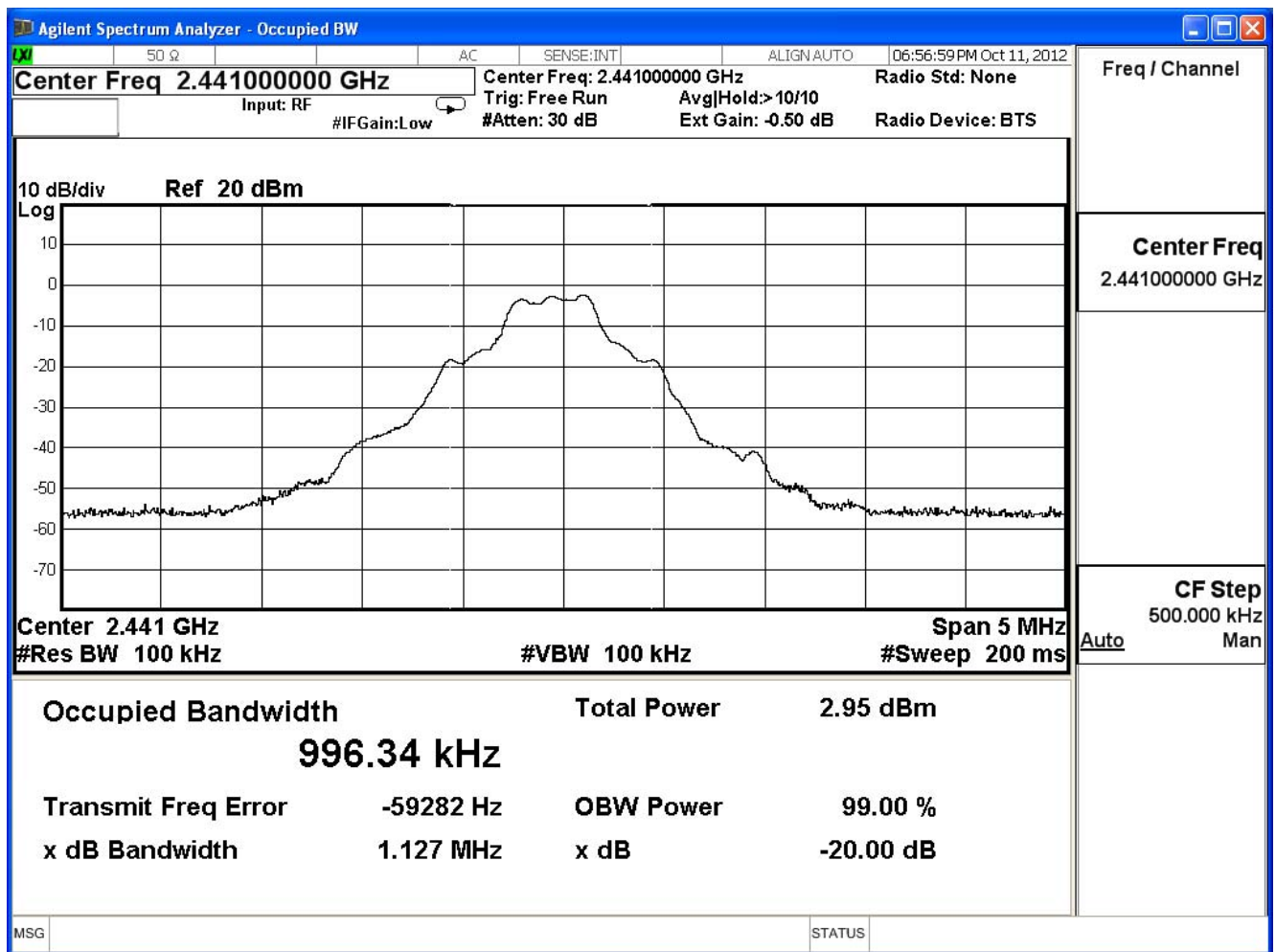
Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

GFSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
78	2480	1.128	--	Pass

Channel 78
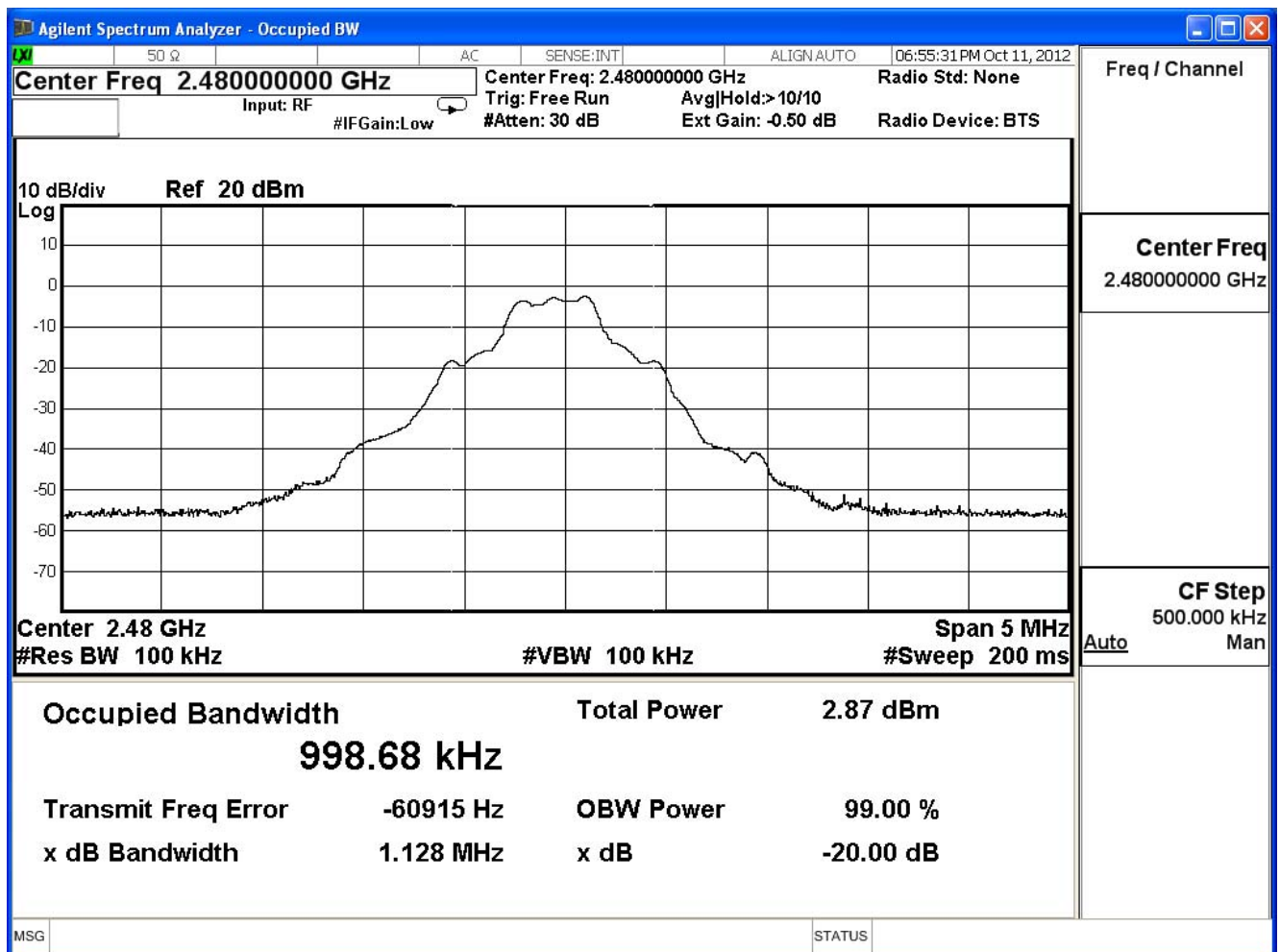
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

π/4-DQPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
00	2402	1.358	--	Pass

Channel 00
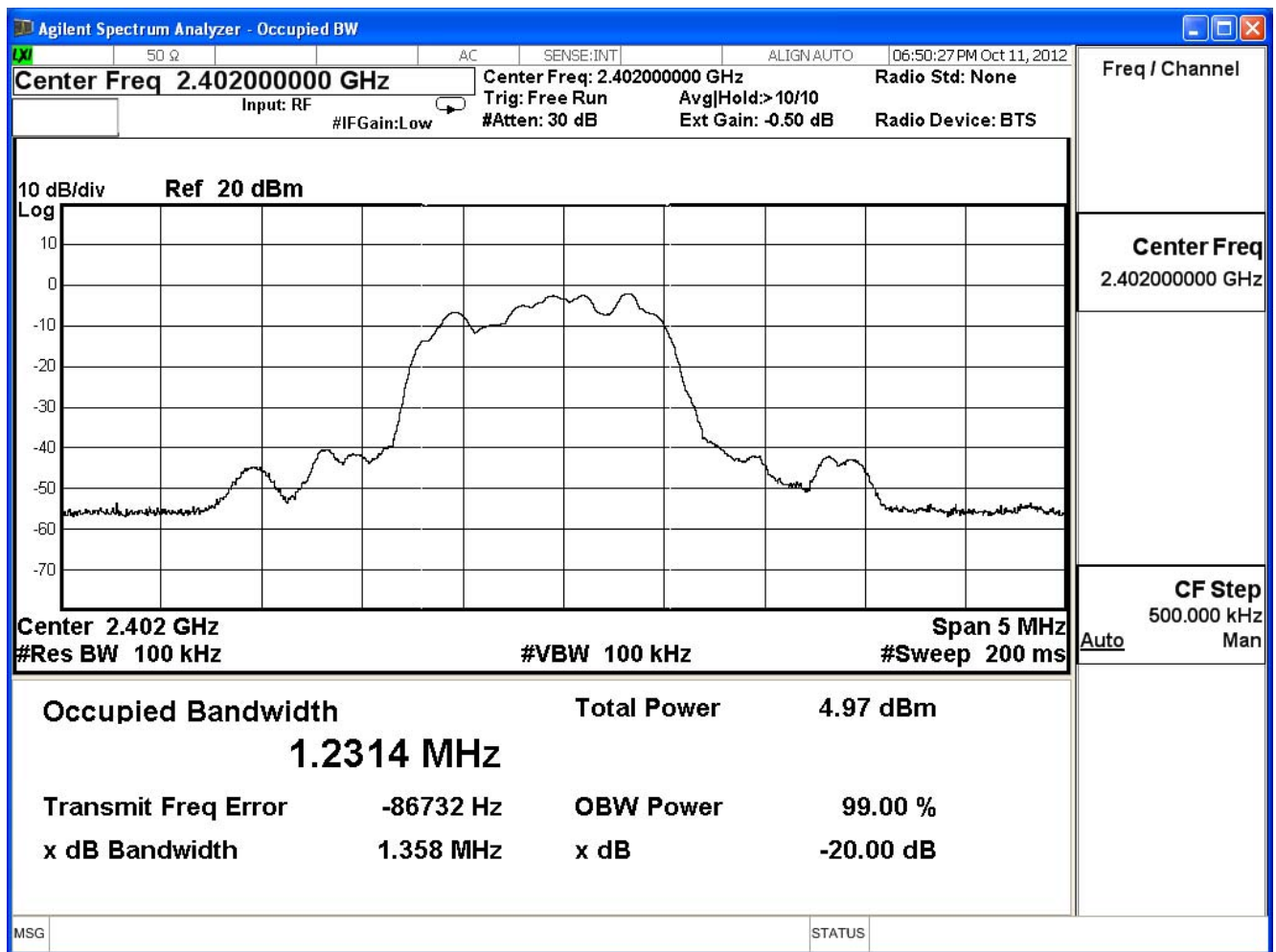
Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

π/4-DQPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
39	2441	1.359	--	Pass

Channel 39
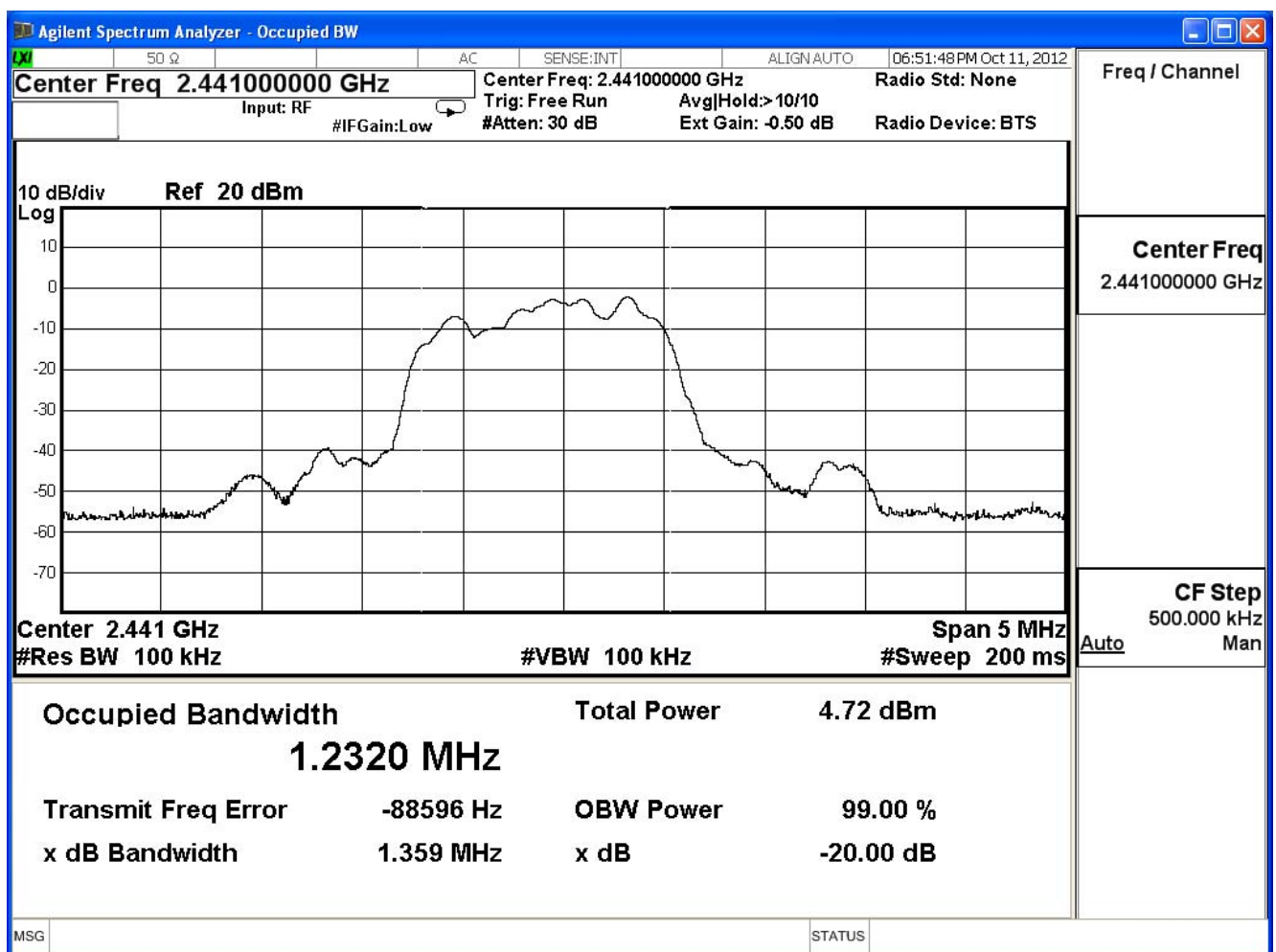
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

π/4-DQPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
78	2480	1.358	--	Pass

Channel 78
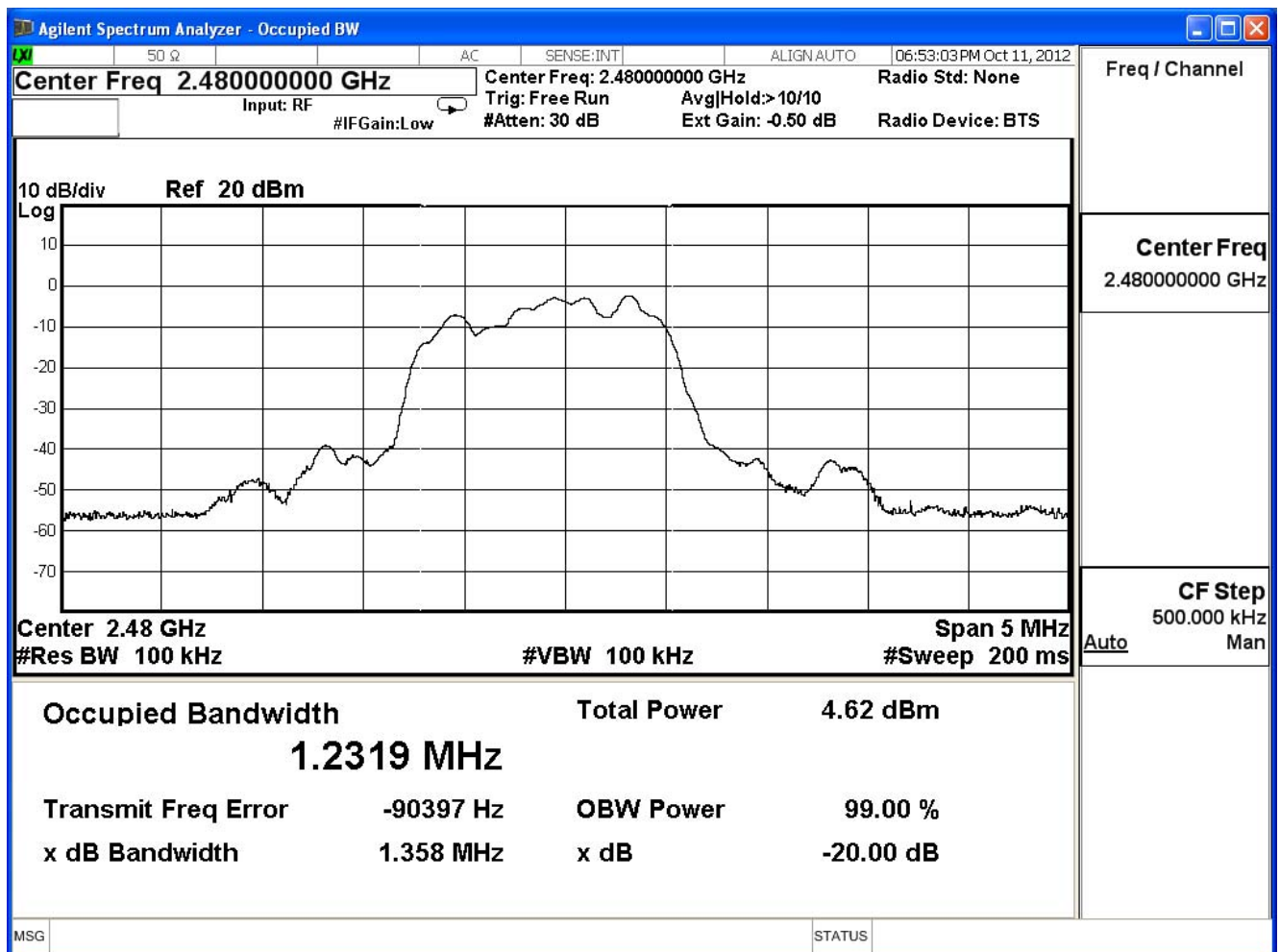
Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

8-DPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
00	2402	1.354	--	Pass

Channel 00
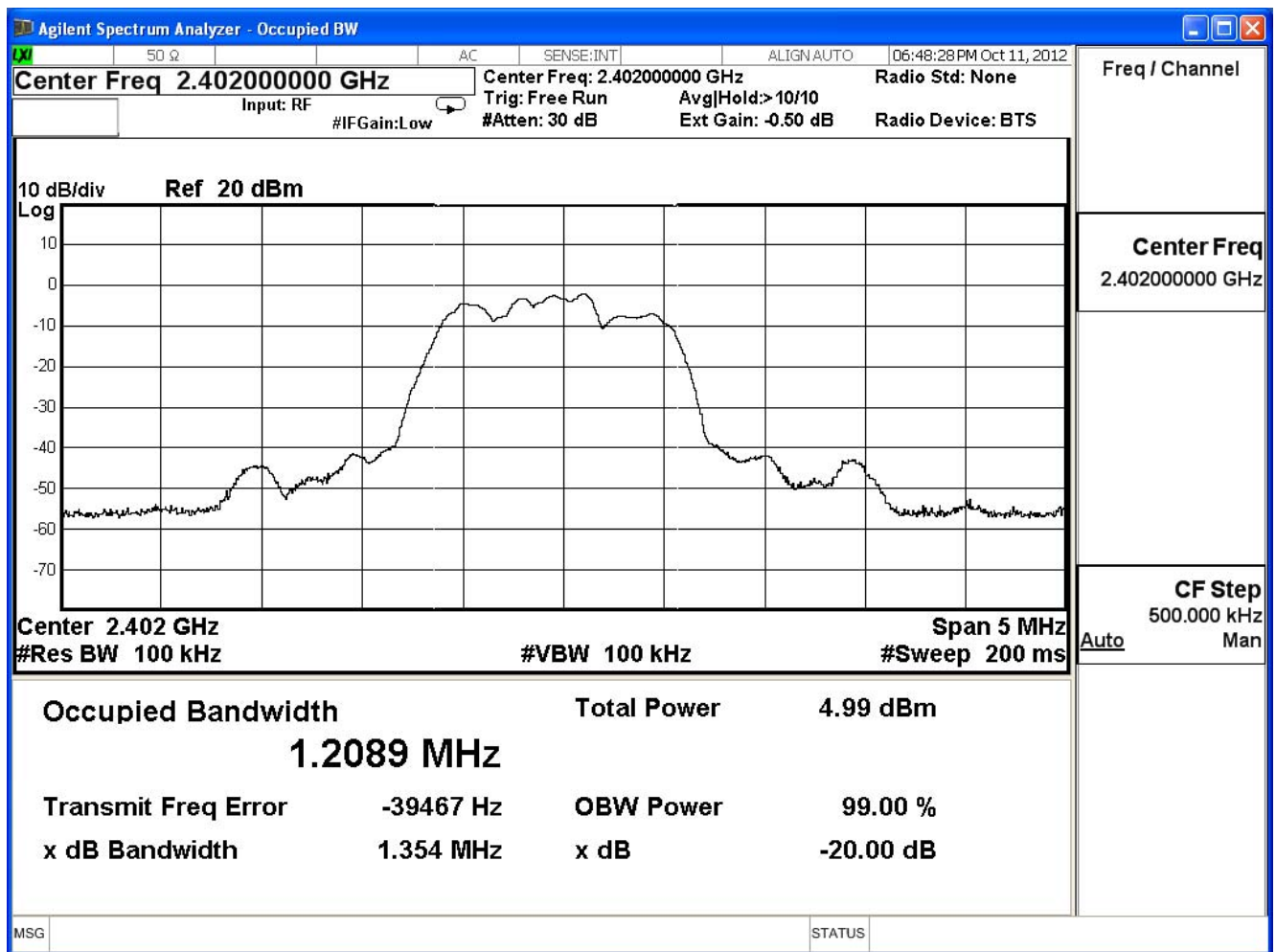
Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

8-DPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
39	2441	1.356	--	Pass

Channel 39
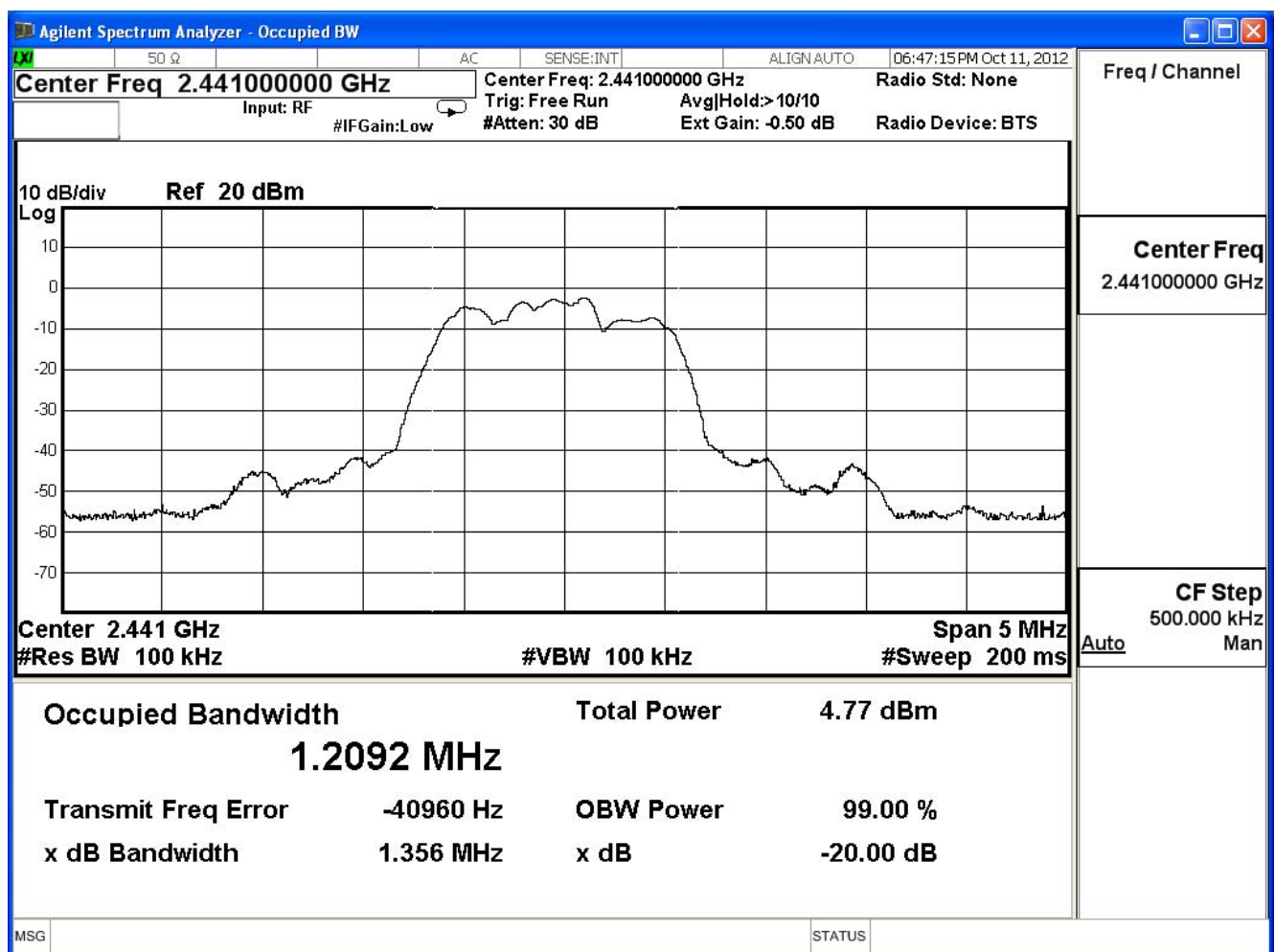
QuieTek

Product	Bluetooth 4.0 USB Dongle		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

8-DPSK

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
78	2480	1.357	--	Pass

Channel 78
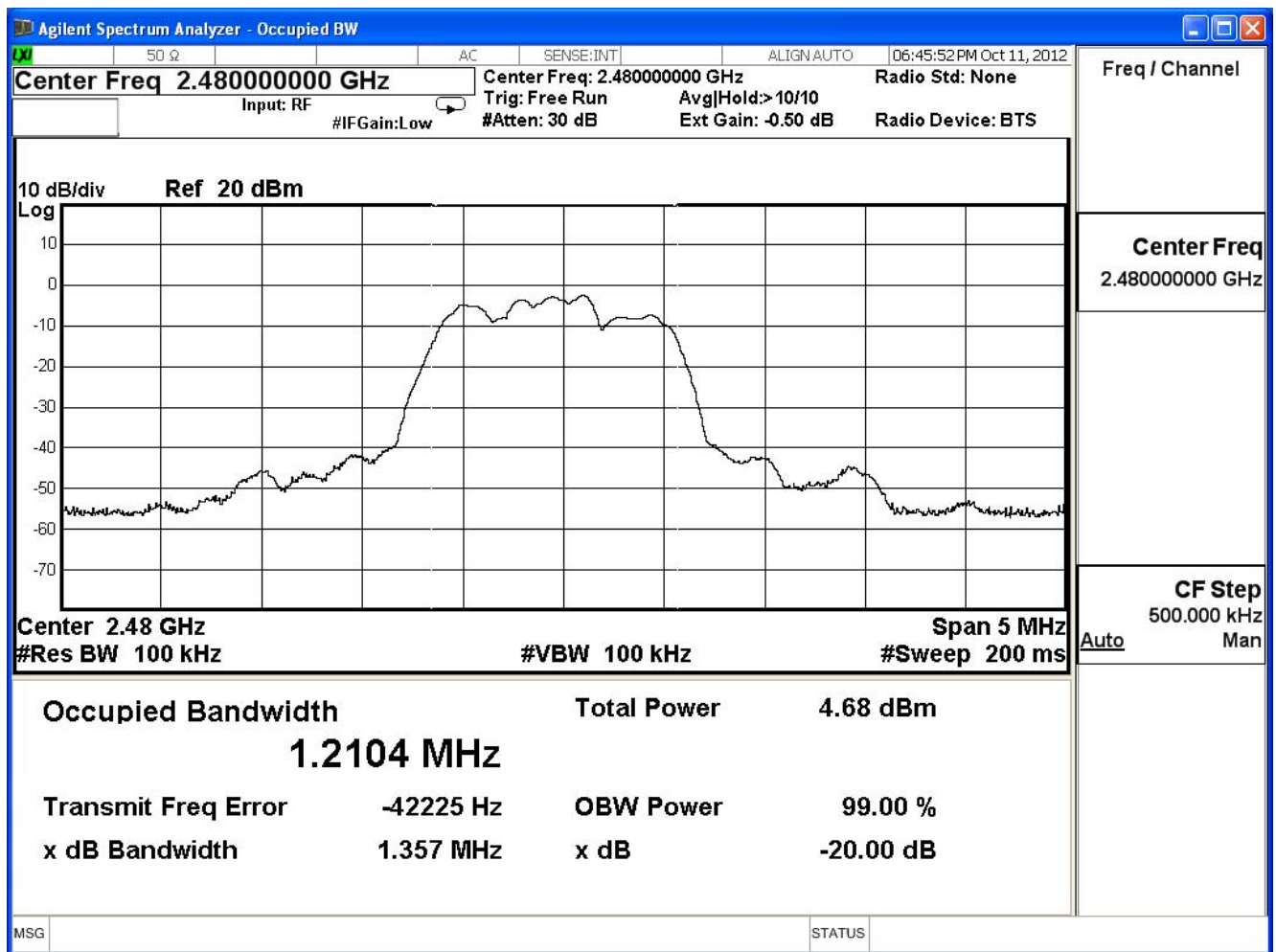
10. Dwell Time

10.1. Test Equipment

The following test equipment is used during the test:

Dwell Time / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2013/02/19

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

10.2. Test Setup
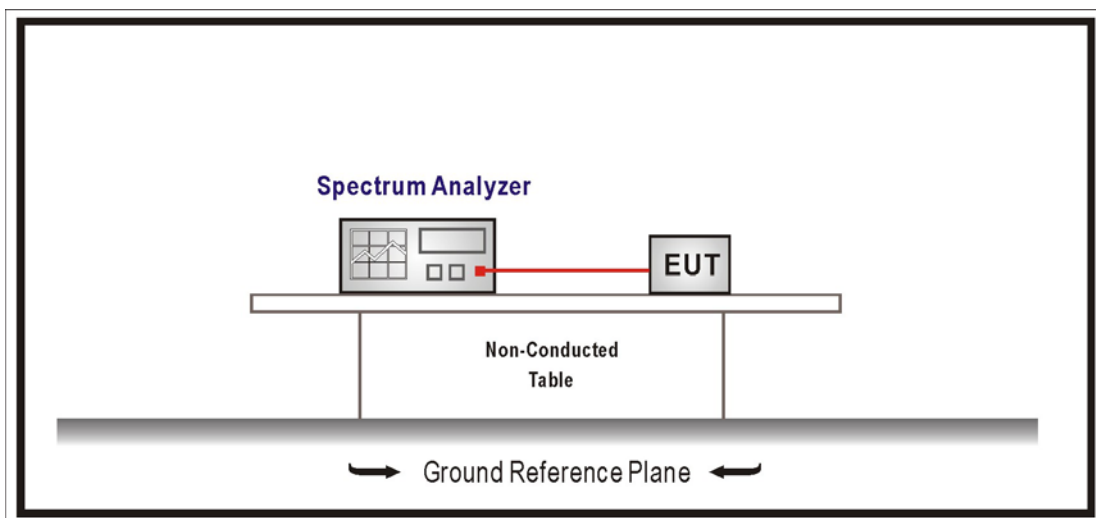
10.3. Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. For frequency hopping systems operating in the 2400-2483.5 MHz bands. 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.
For frequency hopping systems operating in the 5725-5850 MHz bands. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

10.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2009 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements
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

10.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2011

10.6. Test Result

Product	Bluetooth 4.0 USB Dongle		
Test Item	Dwell Time		
Test Mode	Mode 1: Transmit		
Date of Test	2012/10/11	Test Site	SR7

Occupancy Time of Frequency Hopping System

A) 2402MHz Test Time Period: 0.4*79=31.6sec，Hopping Times Within 1sec: 5/20msec=250 /sec

    The Maximum Occupancy Time Within 31.6sec: 0.003*(250/79)*31.6=0.3sec。

B) 2441MHz Test Time Period: 0.4*79=31.6sec，Hopping Times Within 1sec: 5/20msec=250 /sec

    The Maximum Occupancy Time Within 31.6sec: 0.003*(250/79)*31.6=0.3sec。

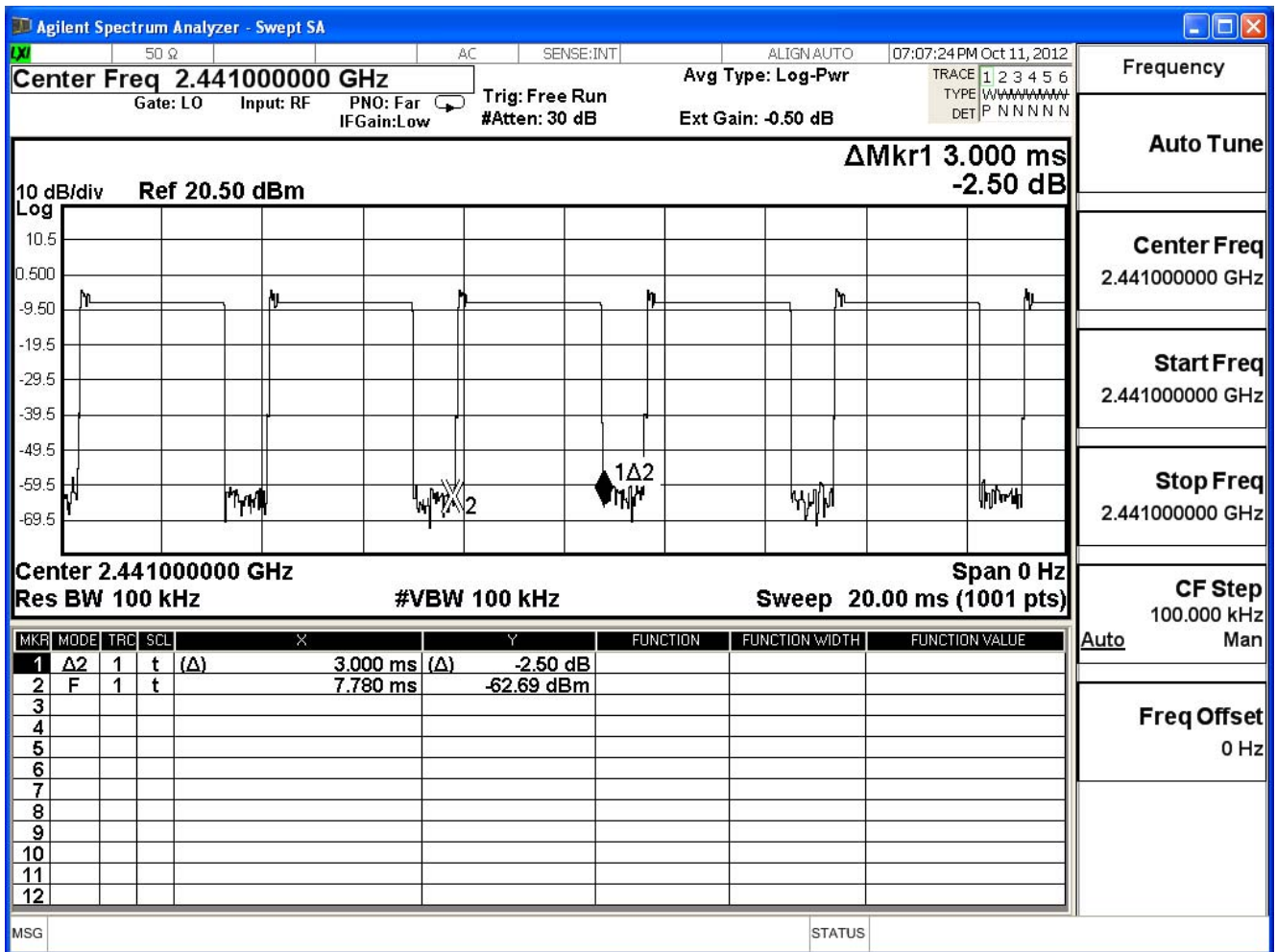C) 2480MHz Test Time Period: 0.4*79=31.6sec，Hopping Times Within 1sec: 5/20msec=250 /sec

    The Maximum Occupancy Time Within 3.06sec: 0.003*(250/79)*31.6=0.3sec。

Test Result: The Average Occupancy Time of Each Highest，Middle and Lowest Channel Is Less Than

0.4sec，And Corresponds to The Standard。

Hop rate-2402MHz
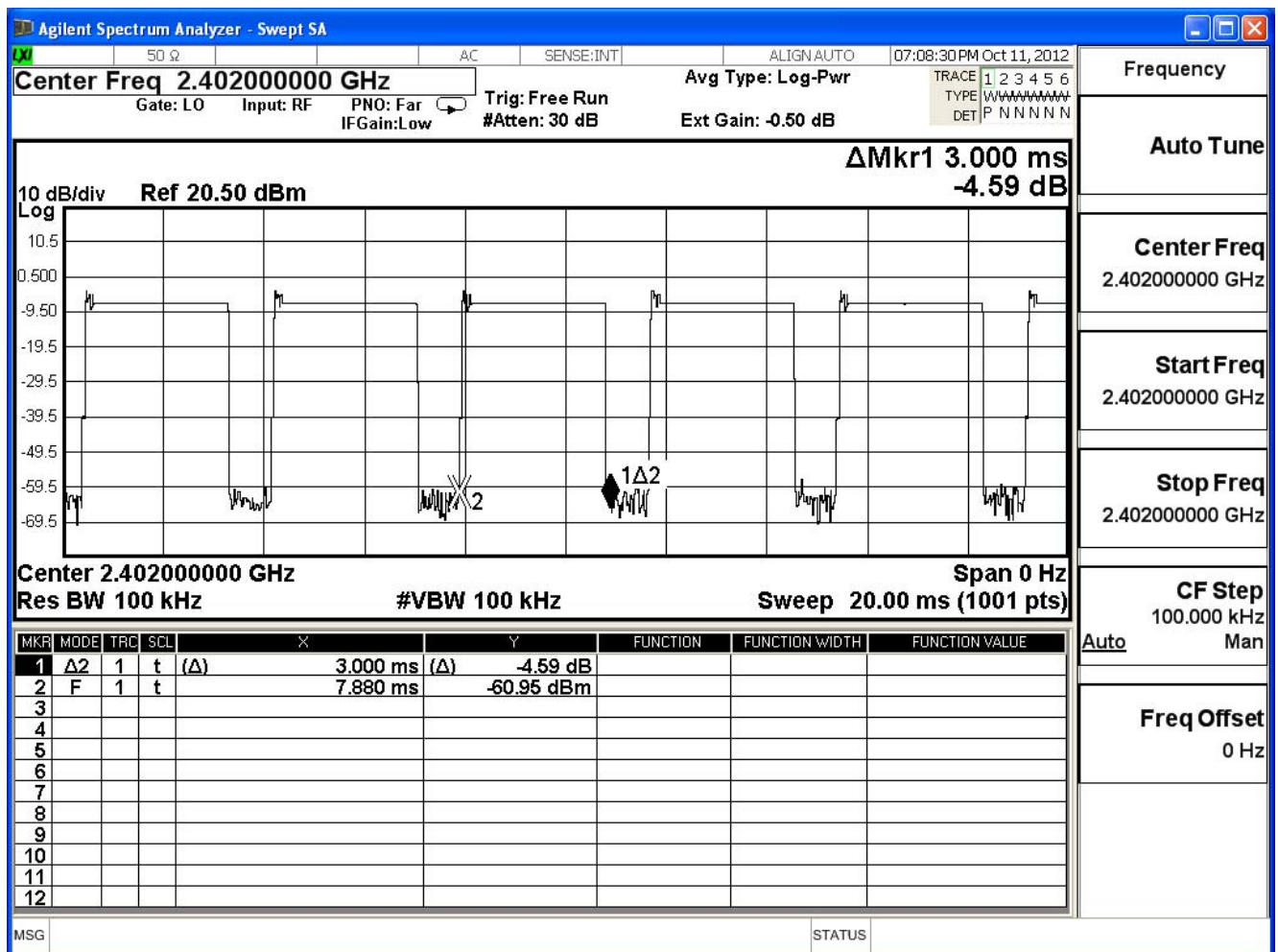
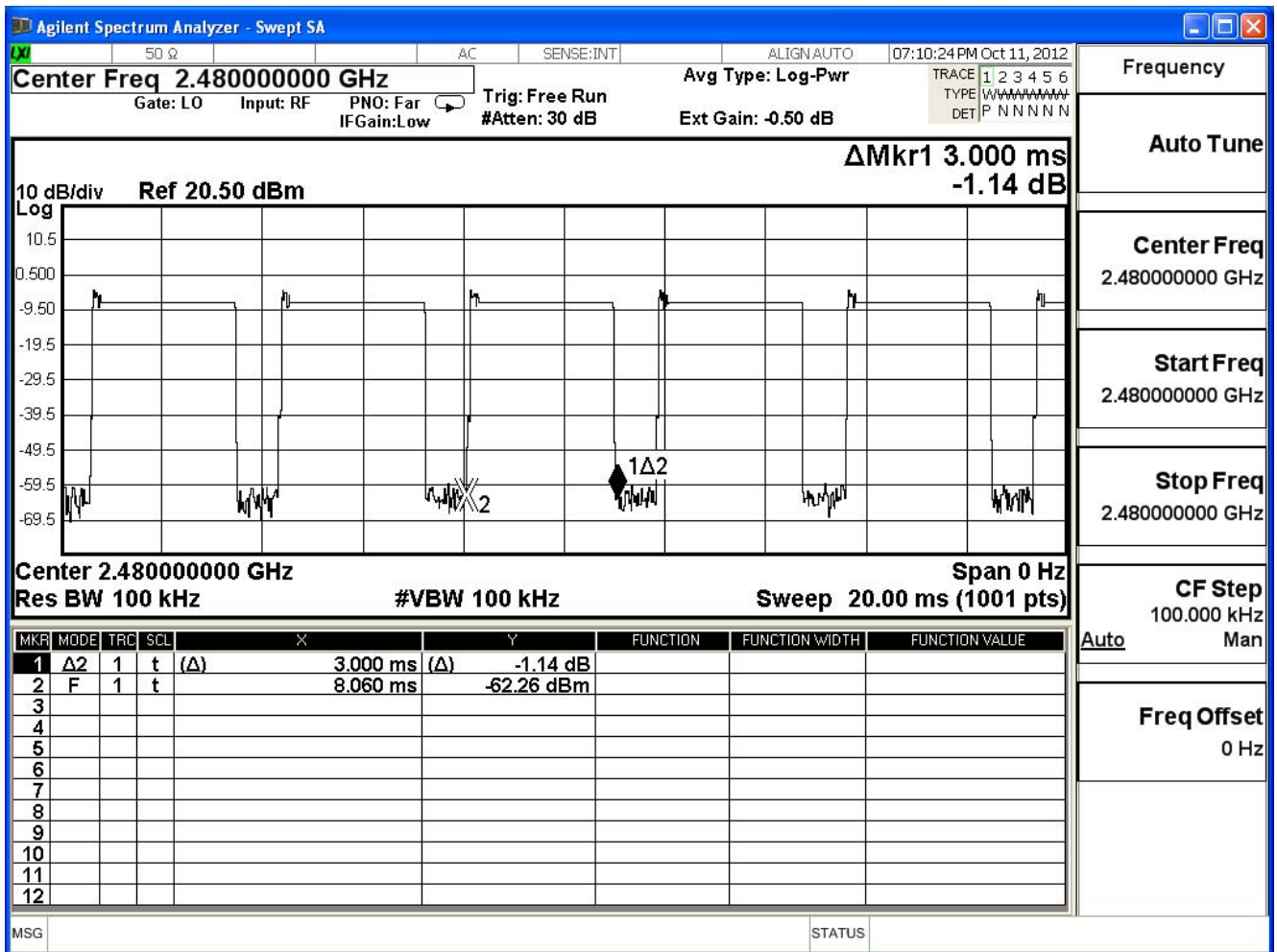## Hop rate-2441MHz

Hop rate-2480MHz

Note: Dwell time＝time slot length * hop rate / number of hopping channels * period