

7. DWELL TIME MEASUREMENT

7.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	PXA Signal Analyzer	Agilent	N9030A	MY53120367	2013-06-24	2014-06-23

7.2. Block Diagram of Test Setup

Same as section 5.2.

7.3. Specification Limits (§15.247(a)(1)(iii))

Frequency hopping systems in the 2400-2483.5MHz shall use at least 15 non-overlapping 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 number of hopping channels employed.

7.4. Test Procedure

The EUT was connected to the notebook. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 1MHz RBW and 1MHz VBW. VBW = RBW; Span=zero span. Centred on a hopping channel sweep=as necessary to capture the entire dwell time per hopping channel ; Detector function=peak ; Trace=Max hold
The measurement guideline was according to FCC Public Notice DA 00-705.

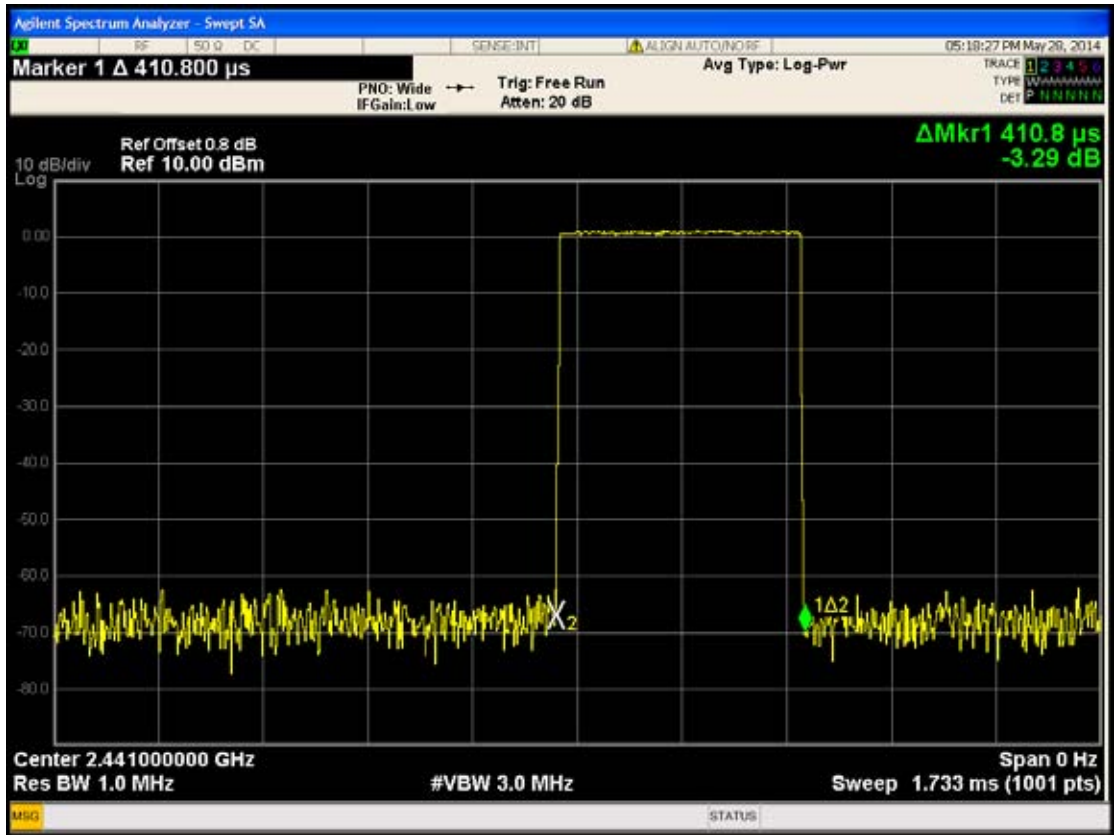
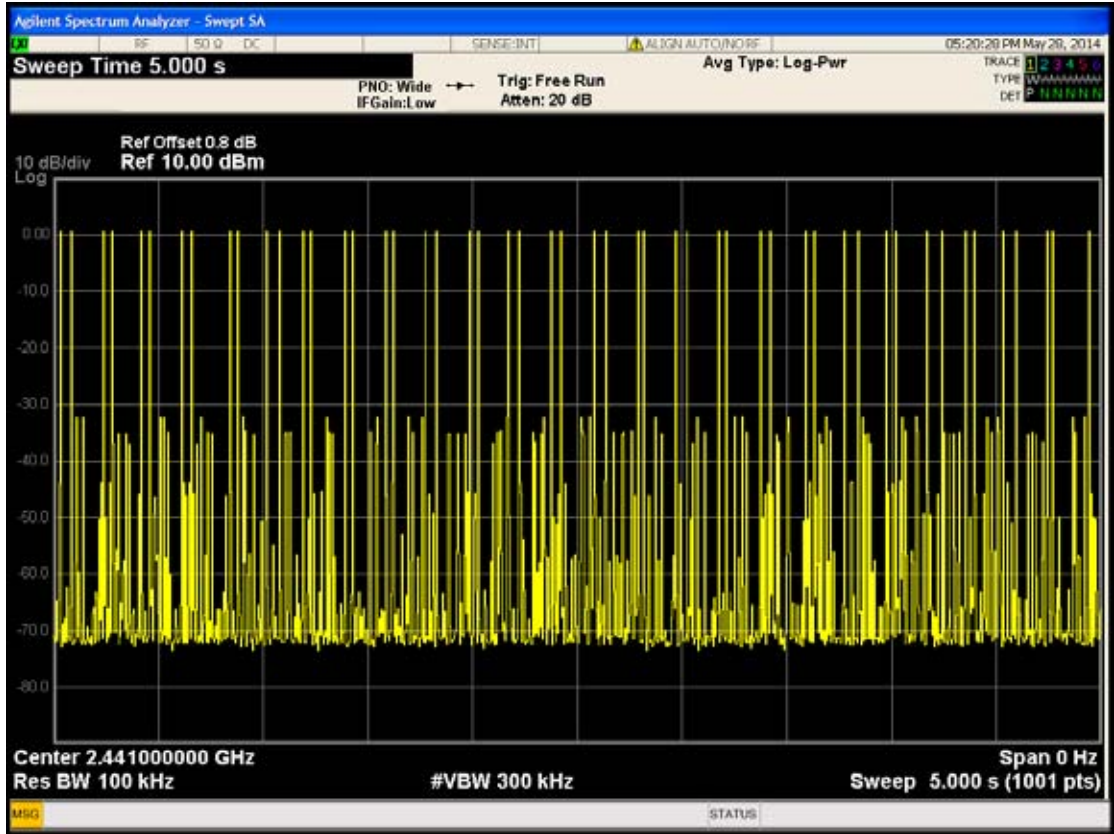
7.5. Test Results

PASSED. All the test results are attached in next pages.

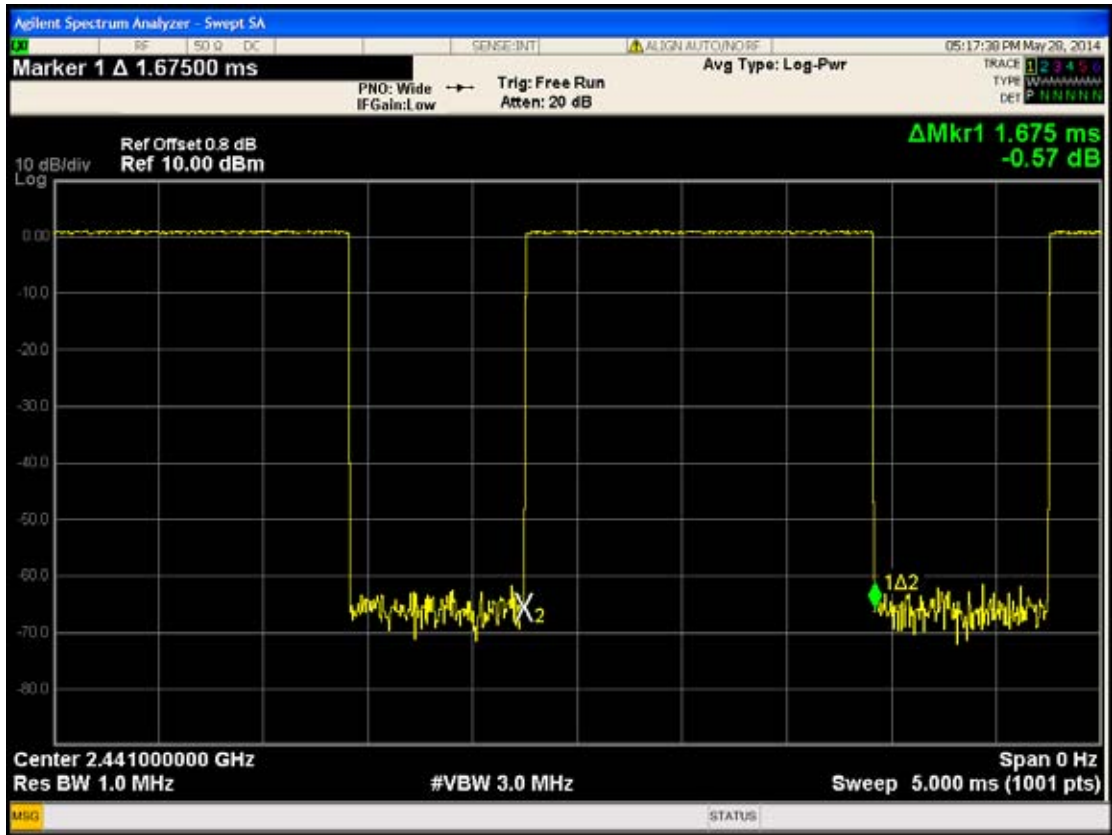
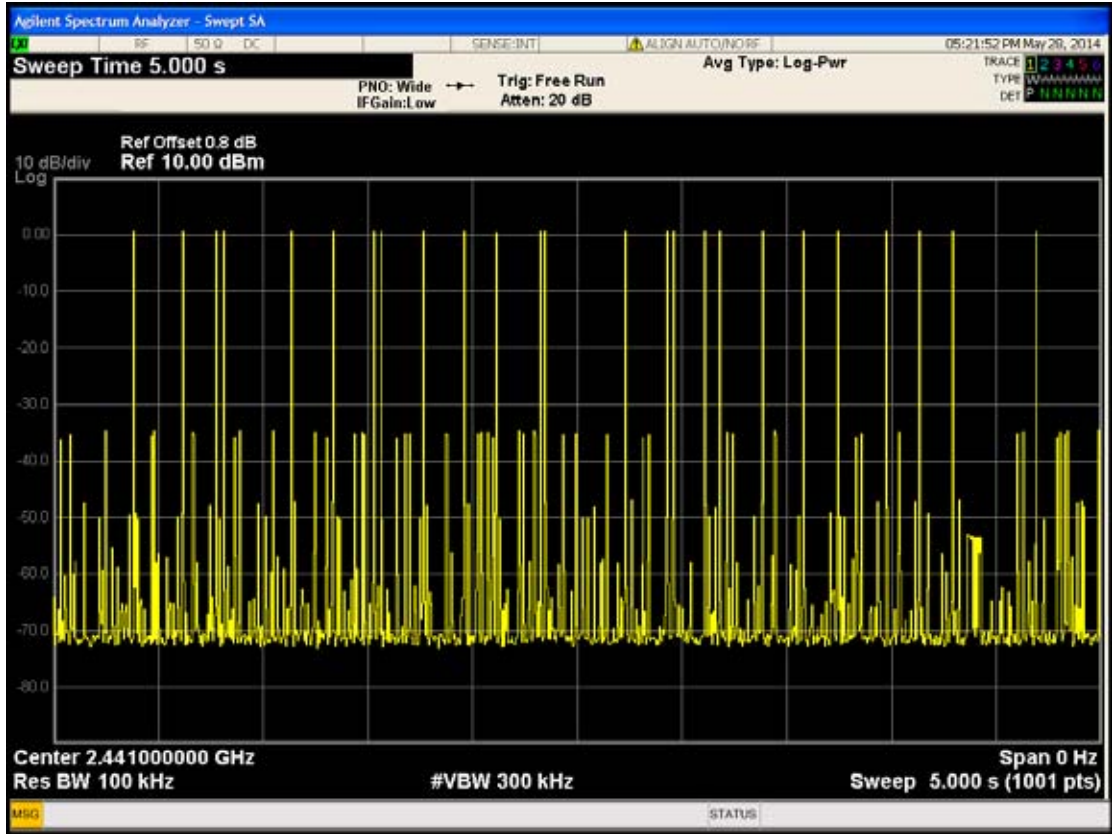
DH	dwell time	Limit	Conclusion
1	$51\text{hops}/5\text{s} \times 0.4 \times 79\text{channels} \times 0.4108\text{ms} = 132.409\text{ms}$	<400ms	PASS
3	$25\text{hops}/5\text{s} \times 0.4 \times 79\text{channels} \times 1.675 = 264.65\text{ms}$	<400ms	PASS
5	$18\text{hops}/5\text{s} \times 0.4 \times 79\text{channels} \times 2.925\text{ms} = 332.748\text{ms}$	<400ms	PASS

3DH	dwell time	Limit	Conclusion
1	$50\text{ hops}/5\text{s} \times 0.4 \times 79\text{channels} \times 0.4278\text{ms} = 135.185\text{ms}$	<400ms	PASS
3	$26\text{hops}/5\text{s} \times 0.4 \times 79\text{channels} \times 1.684\text{ms} = 276.715\text{ms}$	<400ms	PASS
5	$17\text{hops}/5\text{s} \times 0.4 \times 79\text{channels} \times 2.939\text{ms} = 315.766\text{ms}$	<400ms	PASS

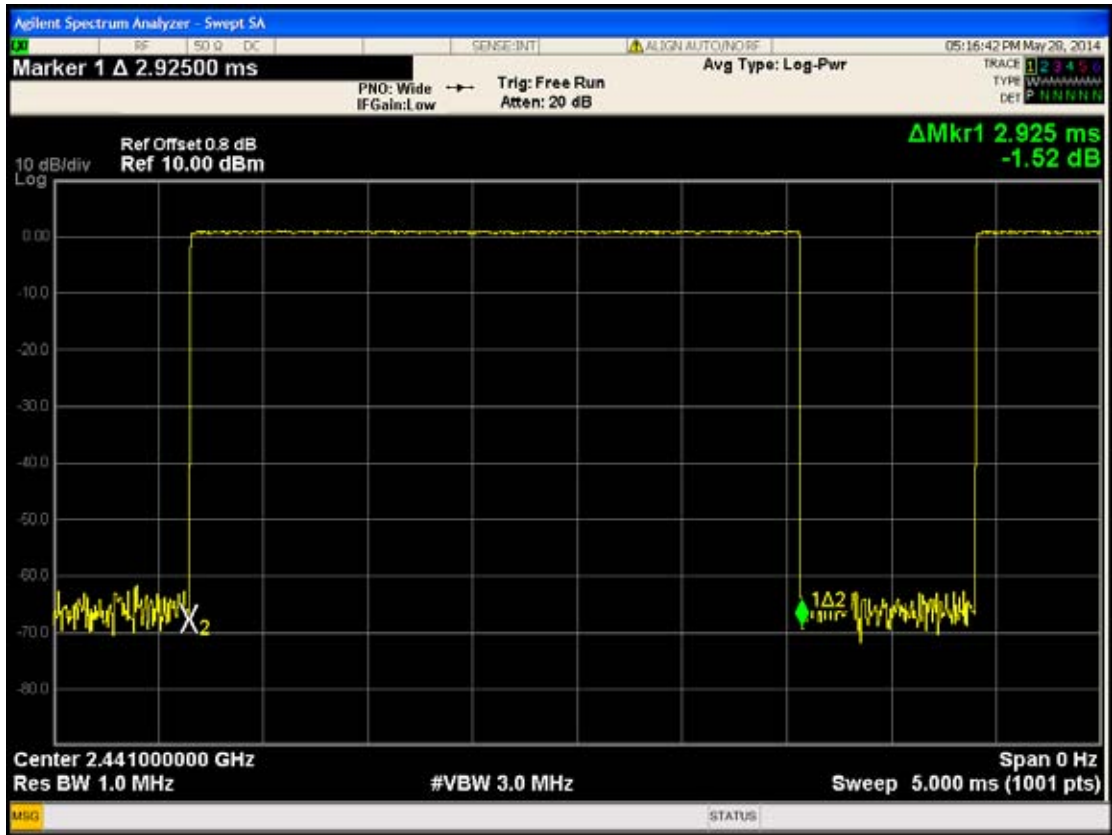
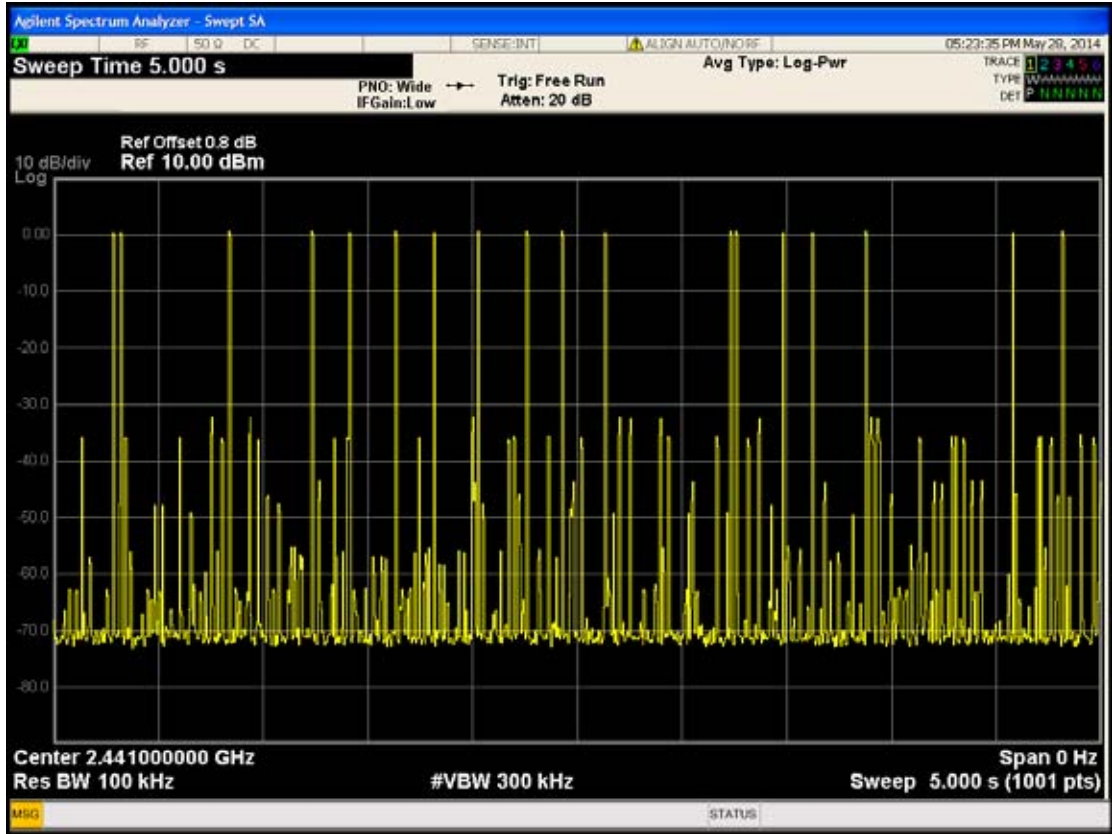
DH1:



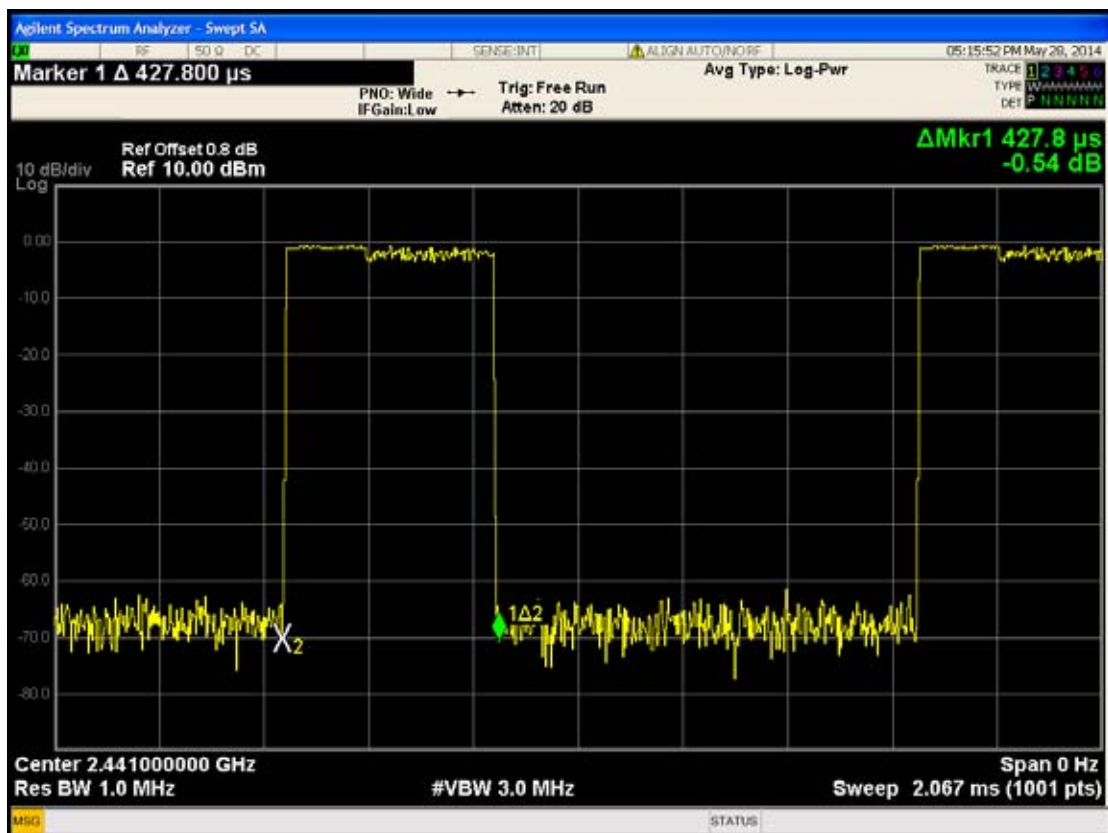
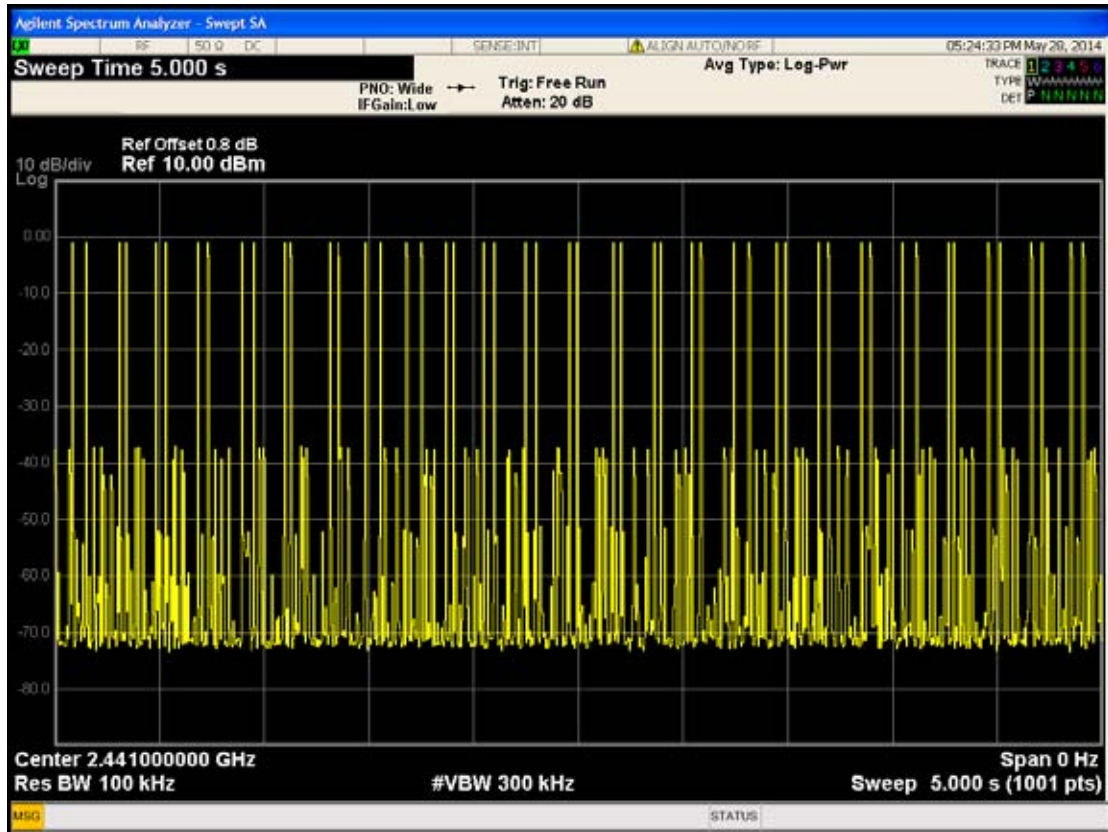
DH3:



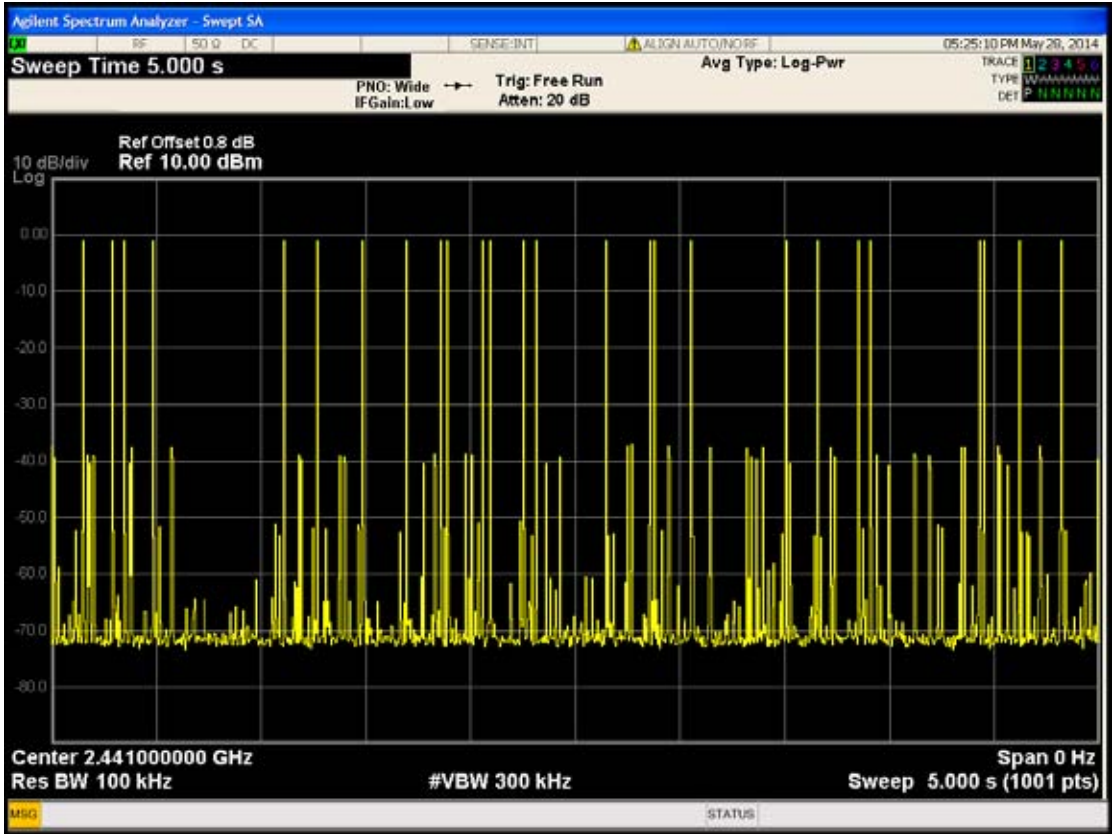
DH5:



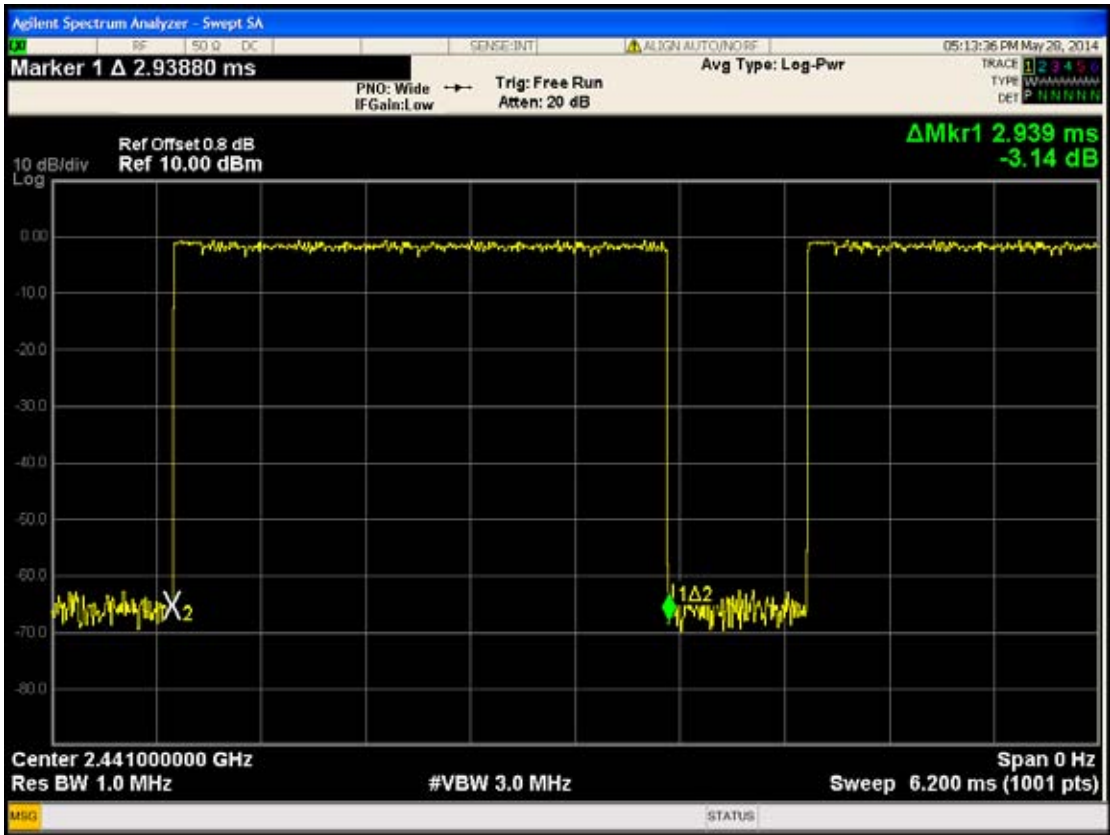
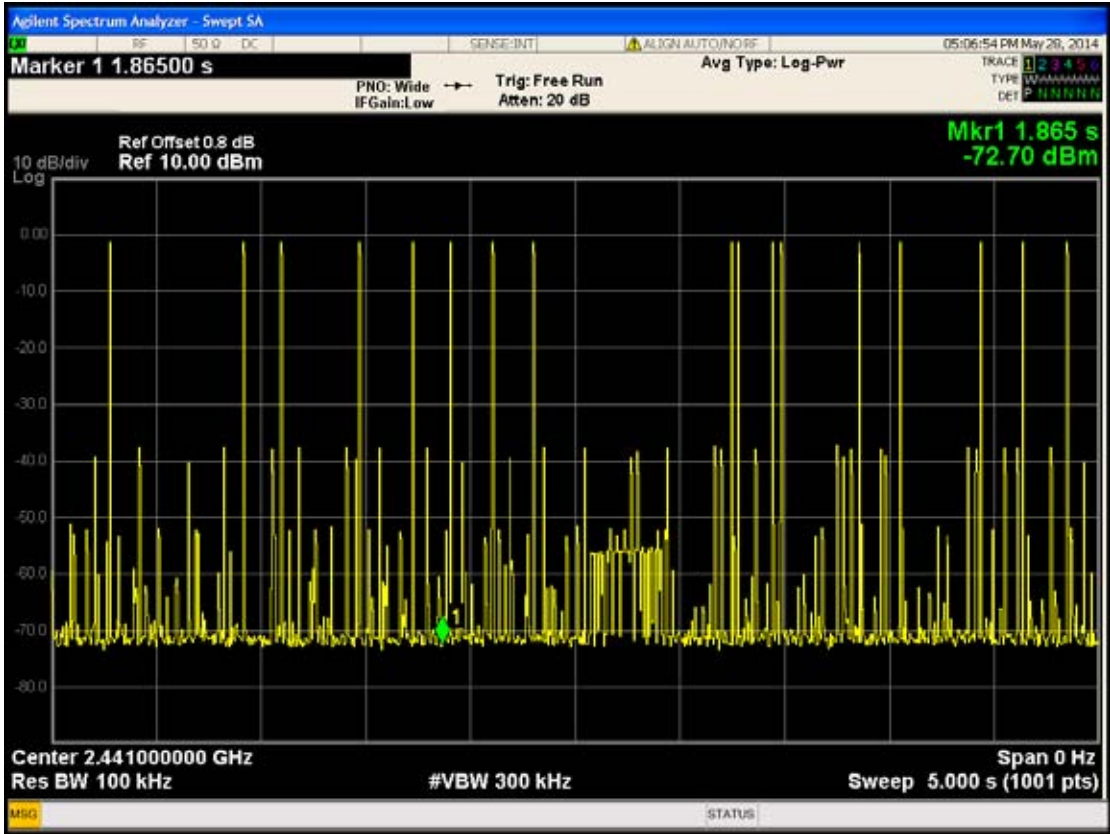
3DH1:



3DH3:



3DH5:



8. NUMBER OF HOPPING CHANNELS MEASUREMENT

8.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	PXA Signal Analyzer	Agilent	N9030A	MY53120367	2013-06-24	2014-06-23

8.2. Block Diagram of Test Setup

Same as section 5.2.

8.3. Specification Limits (§15.247(a)(1)(iii))

Frequency hopping systems which use fewer than 20 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.

8.4. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW.

Sweep=Auto ; Detector function=peak; Trace=Max hold

The measurement guideline was according to FCC Public Notice DA 00-705.

8.5. Test Results

PASSED. All the test results are attached in next pages.

DH1: The number of hopping channel is 79;

DH3: The number of hopping channel is 79;

DH5: The number of hopping channel is 79;

3DH1: The number of hopping channel is 79;

3DH3: The number of hopping channel is 79;

3DH5: The number of hopping channel is 79;

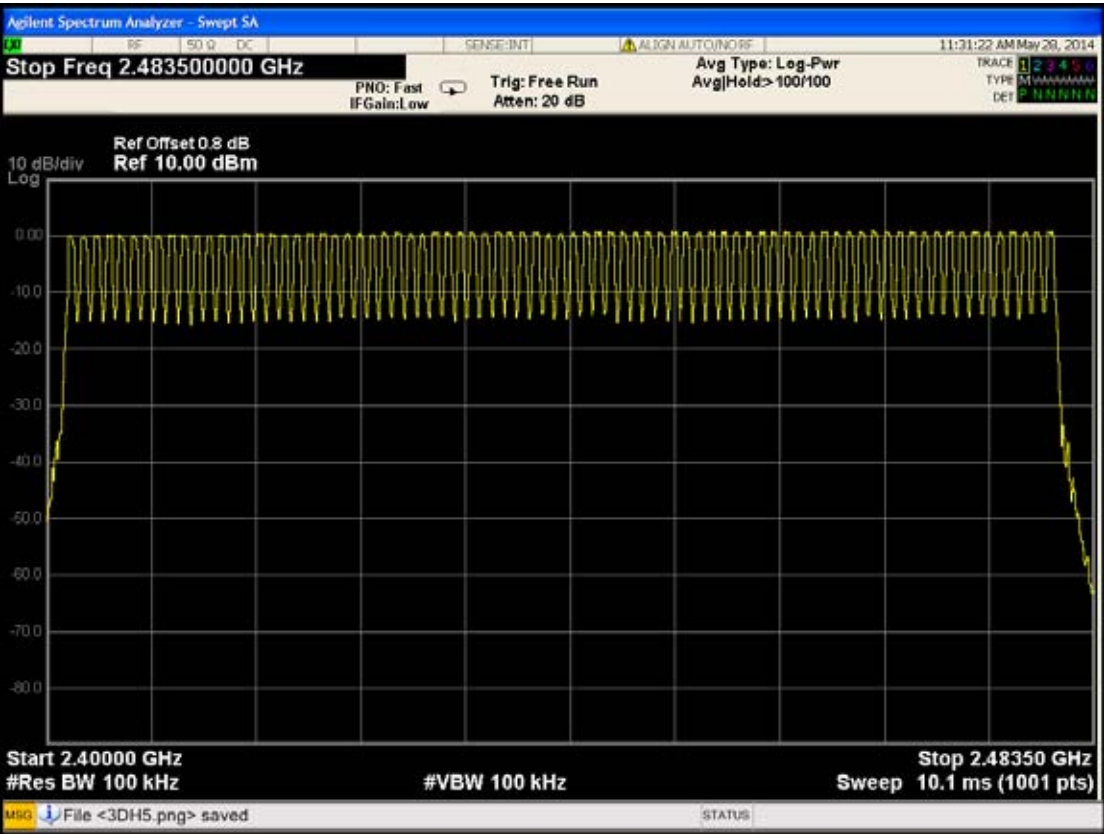
DH1:



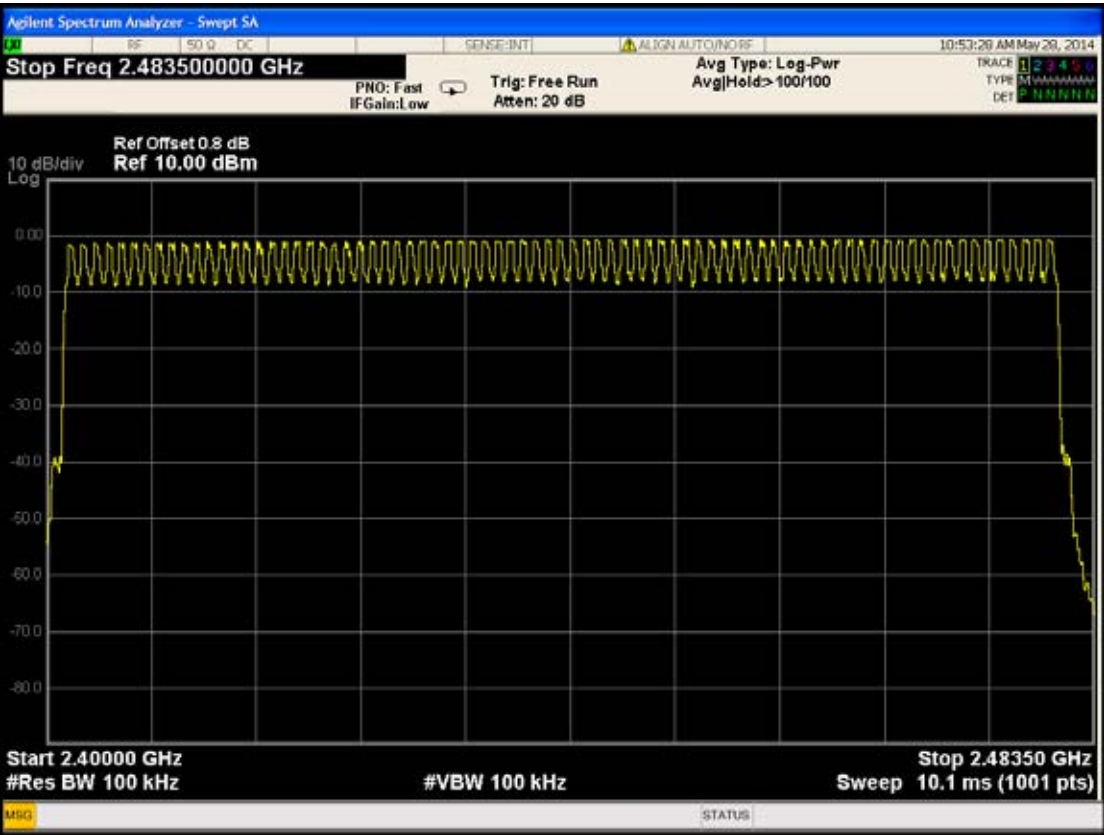
DH3:



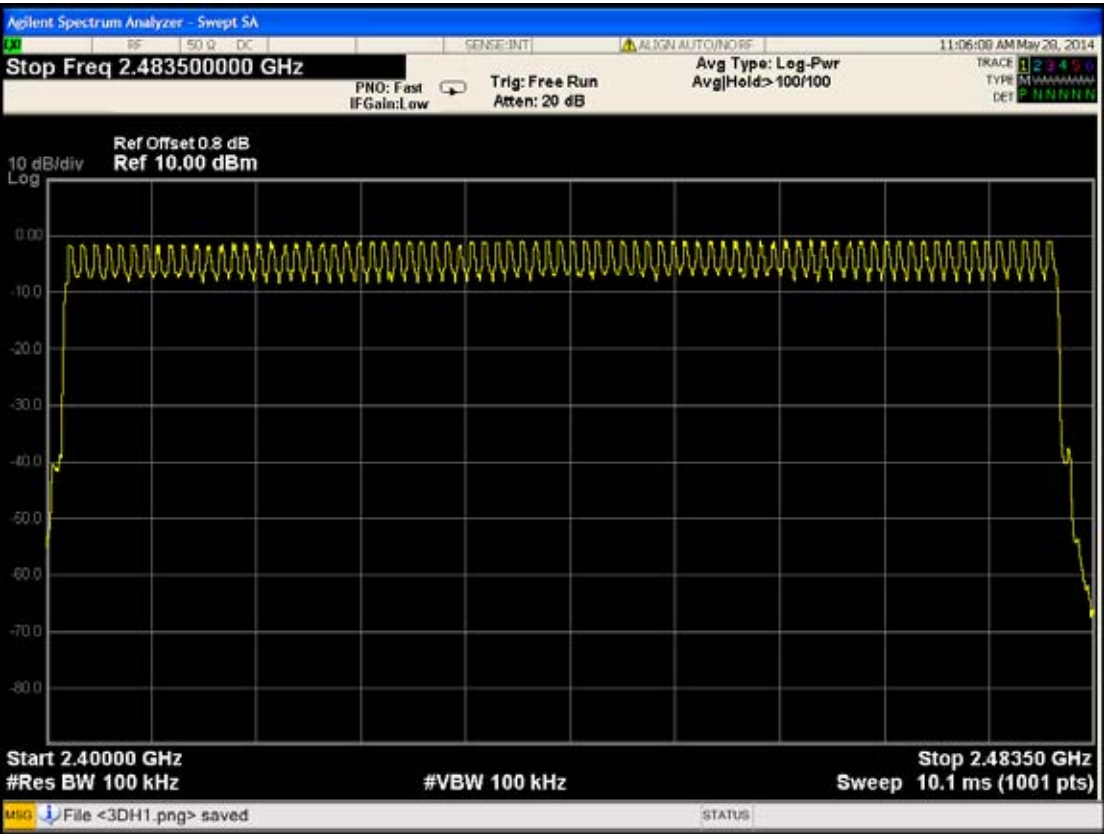
DH5:



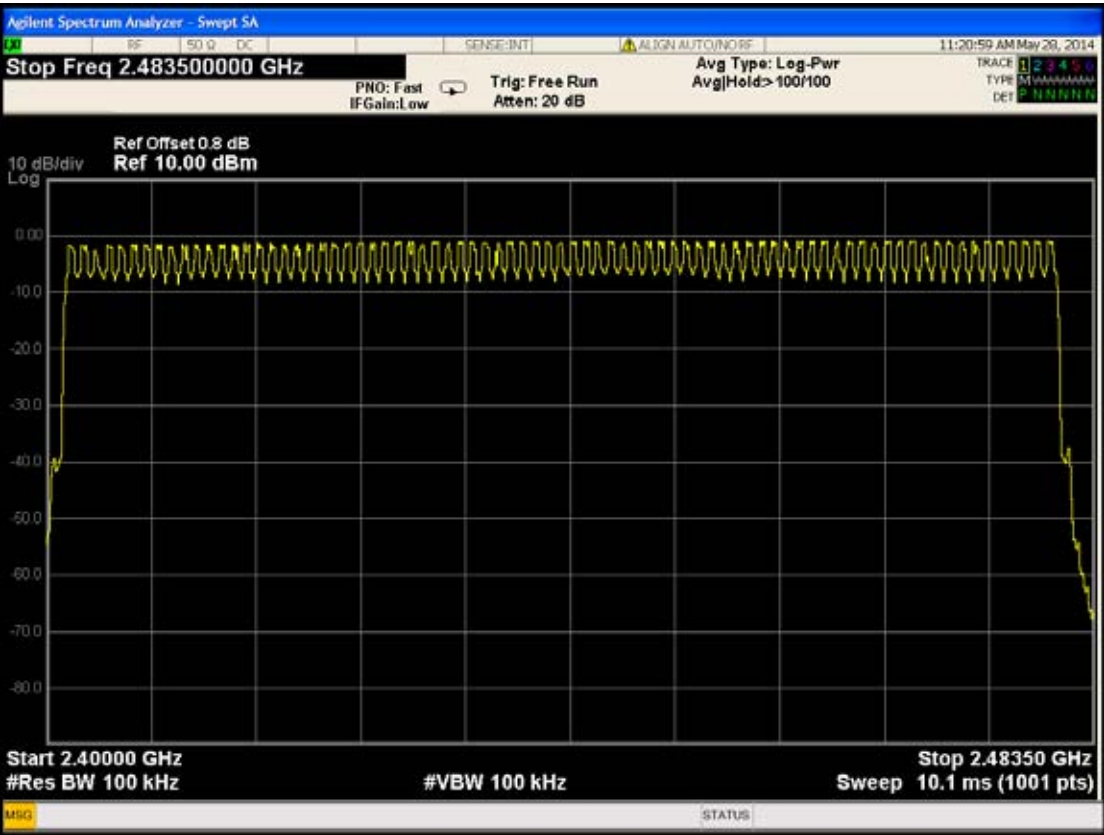
3DH1:



3DH3:



3DH5:

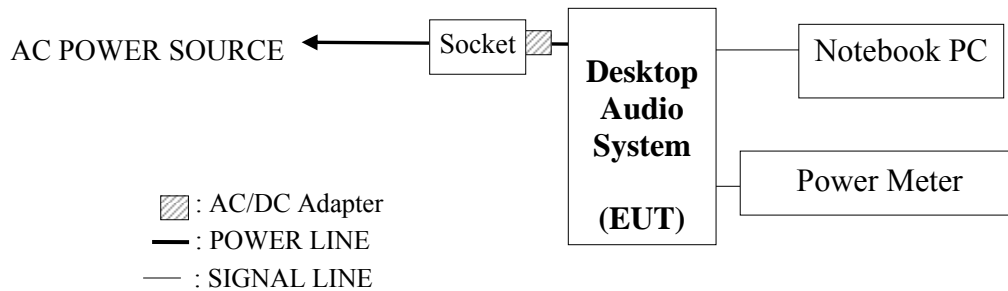


9. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

9.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	P-series Power Meter Single Channel	Agilent	N1911A	MY45100361	2014-01-05	2015-01-04

9.2. Block Diagram of Test Setup



9.3. Specification Limits (§15.247(b)-(1))

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (20.96dBm)

9.4. Test Procedure

This is an RF conducted test. Use a direct connection between the antenna port of the transmitter and the power meter, through suitable attenuation. The transmitter output was connected to the power meter that was designed to detect peak value automatically.

Note: The bandwidth of the power meter is 20MHz.

9.5. Test Results

PASSED. All the test results are attached in next pages.

DH1

Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]
0	2402	1.25	20.96
39	2441	1.50	20.96
78	2480	1.46	20.96

DH5

Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]
0	2402	1.32	20.96
39	2441	1.49	20.96
78	2480	1.39	20.96

3DH1

Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]
0	2402	-0.13	20.96
39	2441	0.06	20.96
78	2480	0.02	20.96

3DH5

Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]
0	2402	-0.11	20.96
39	2441	0.08	20.96
78	2480	0.05	20.96

10.BAND EDGES MEASUREMENT

10.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	PXA Signal Analyzer	Agilent	N9030A	MY53120367	2013-06-24	2014-06-23

10.2. Block Diagram of Test Setup

The same as section 5.2.

10.3. Specification Limits (§15.247(c))

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).

(This test result attaching to §3.6.3)

10.4. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge. The measurement guideline was according to FCC Public Notice DA 00-705.

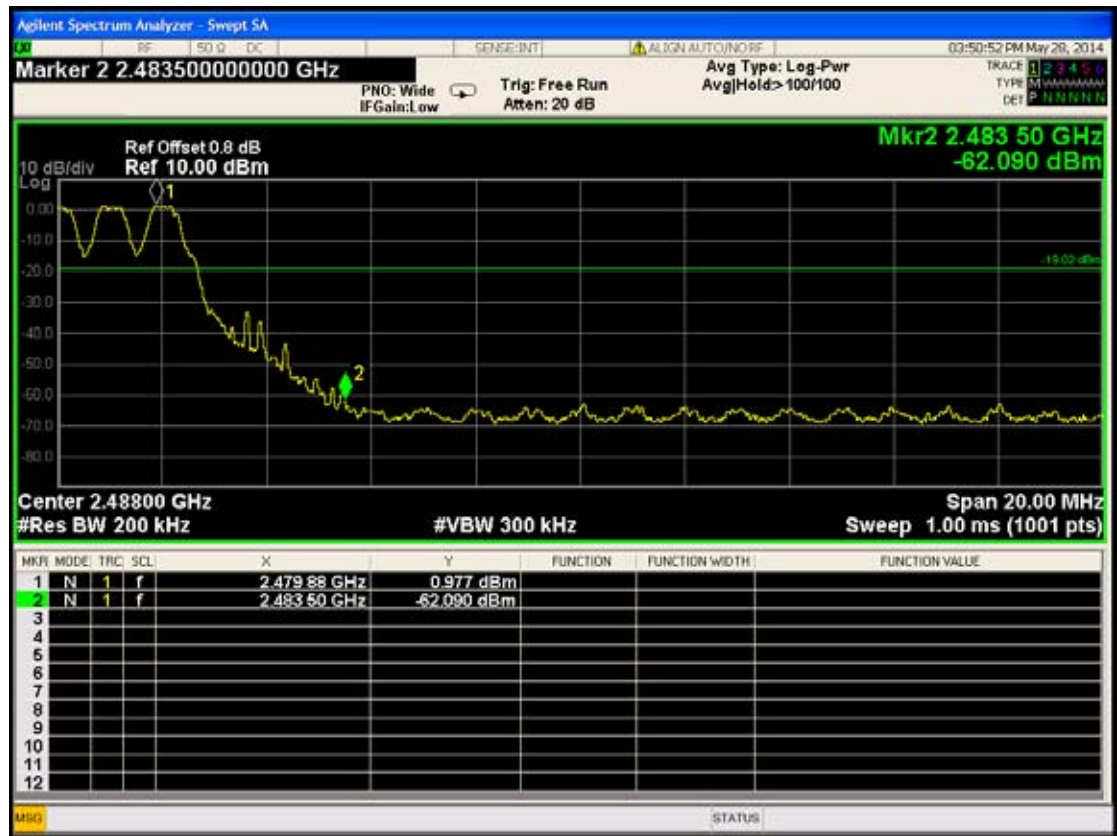
10.5. Test Results

PASSED. The testing data was attached in the next pages.

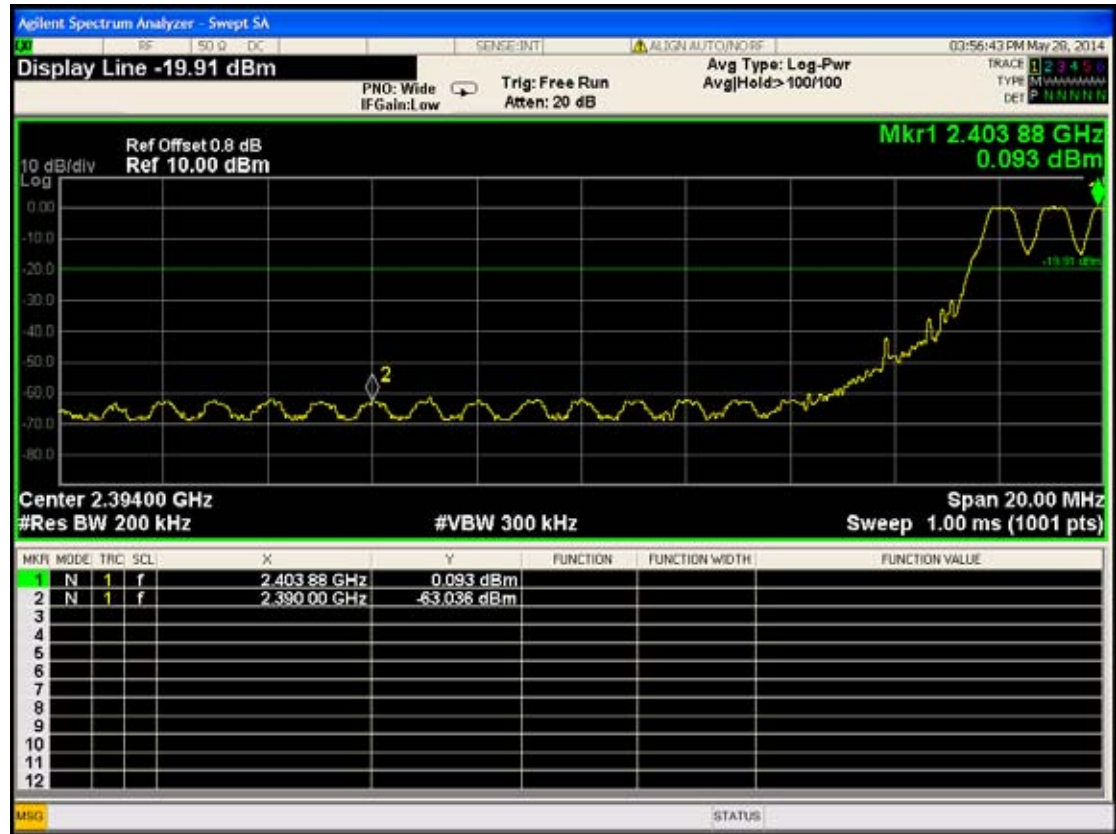
Hopping:
DH1-CH0



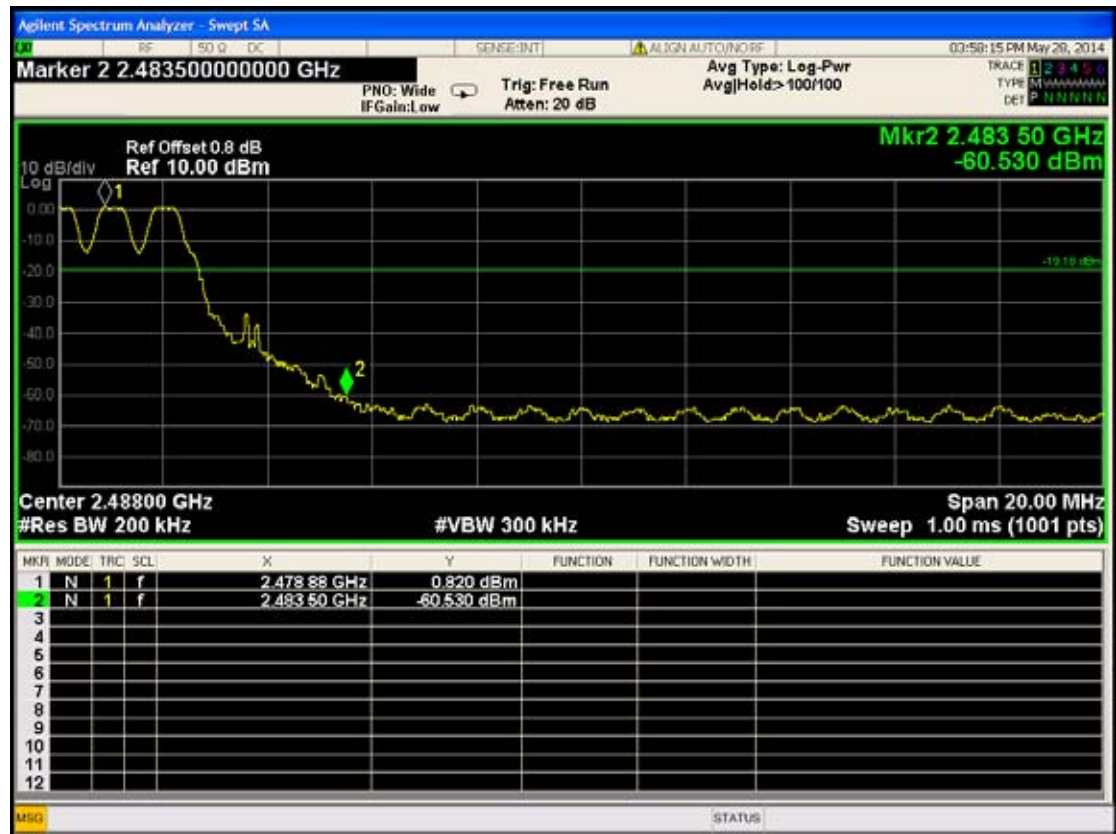
DH1-CH78



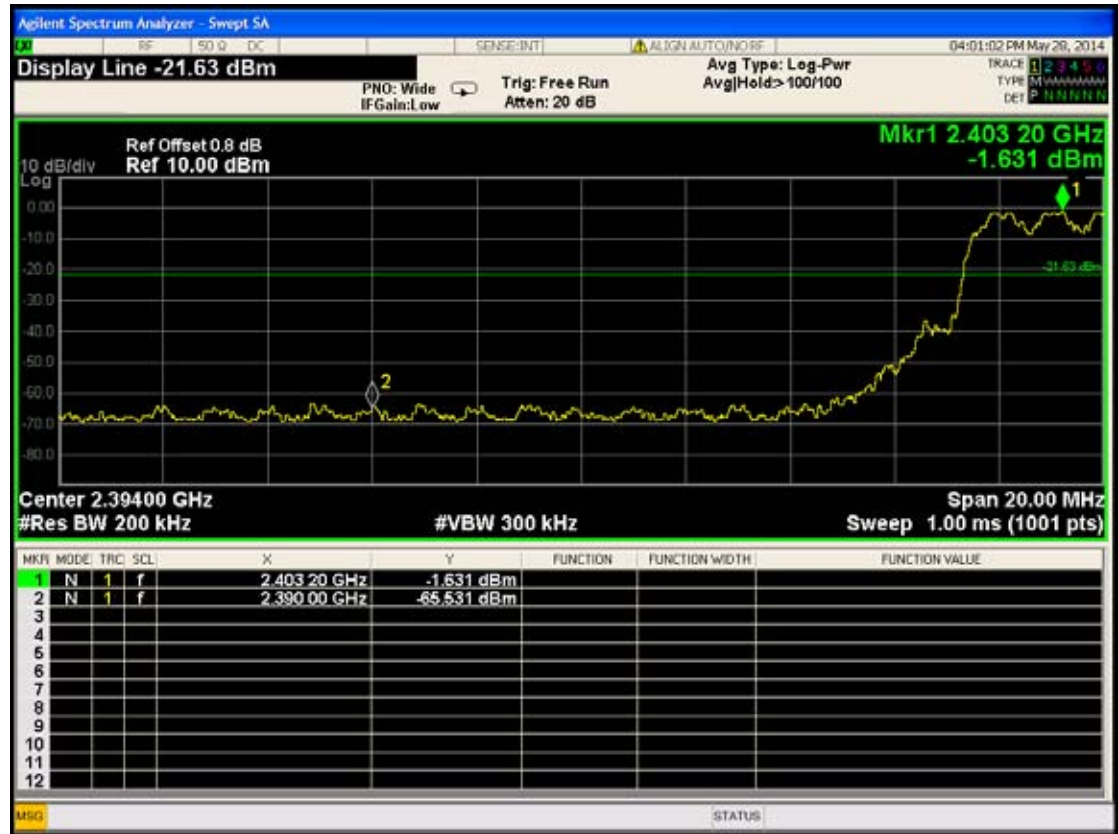
DH5-CH0



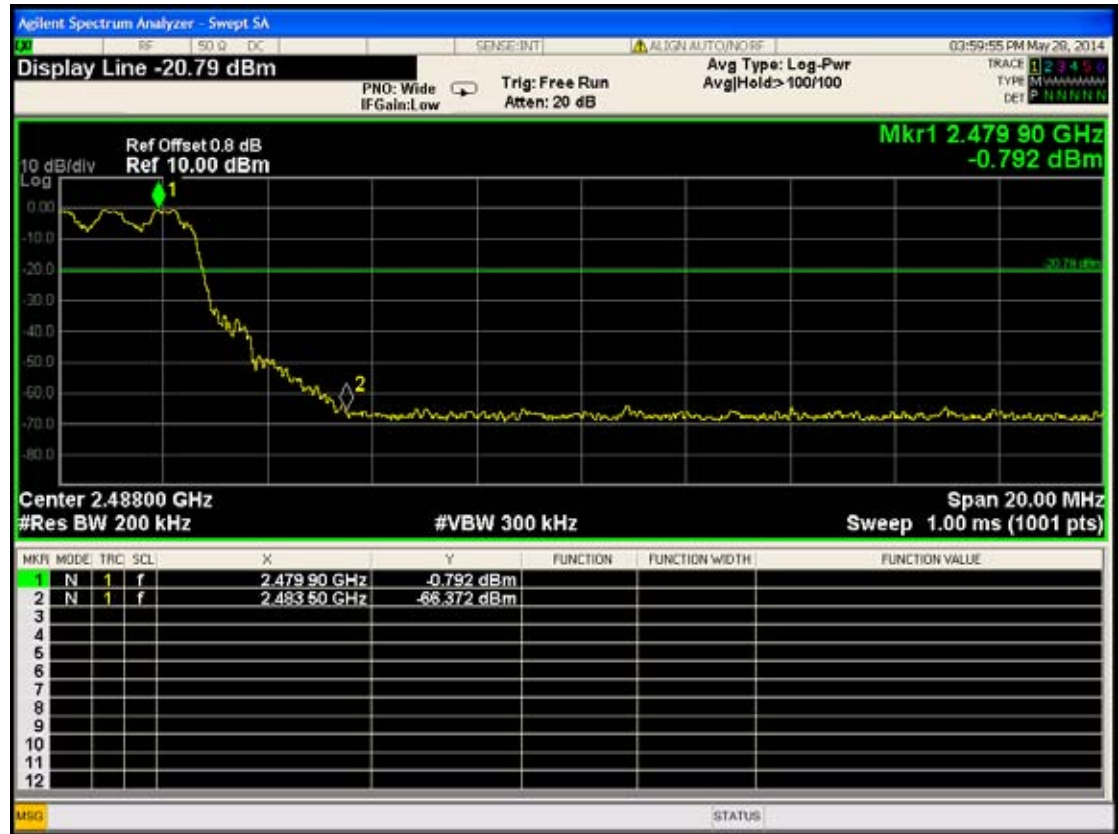
DH5-CH78



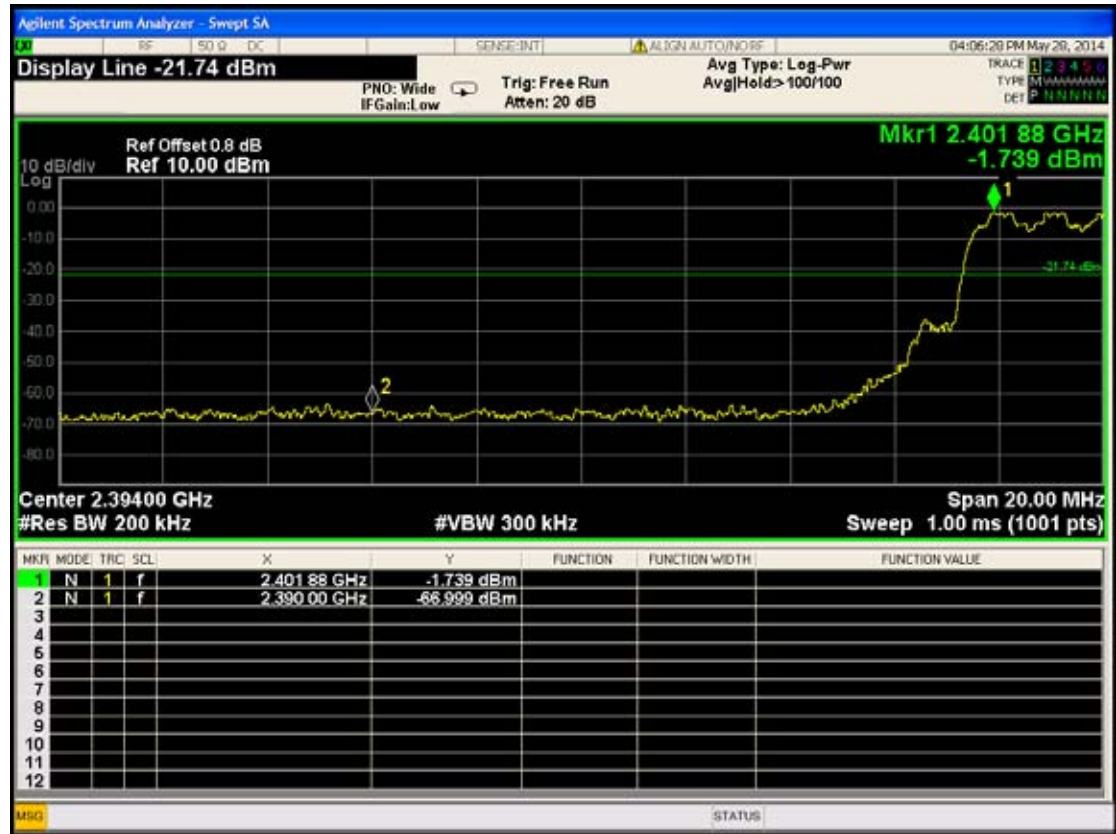
3DH1-CH0



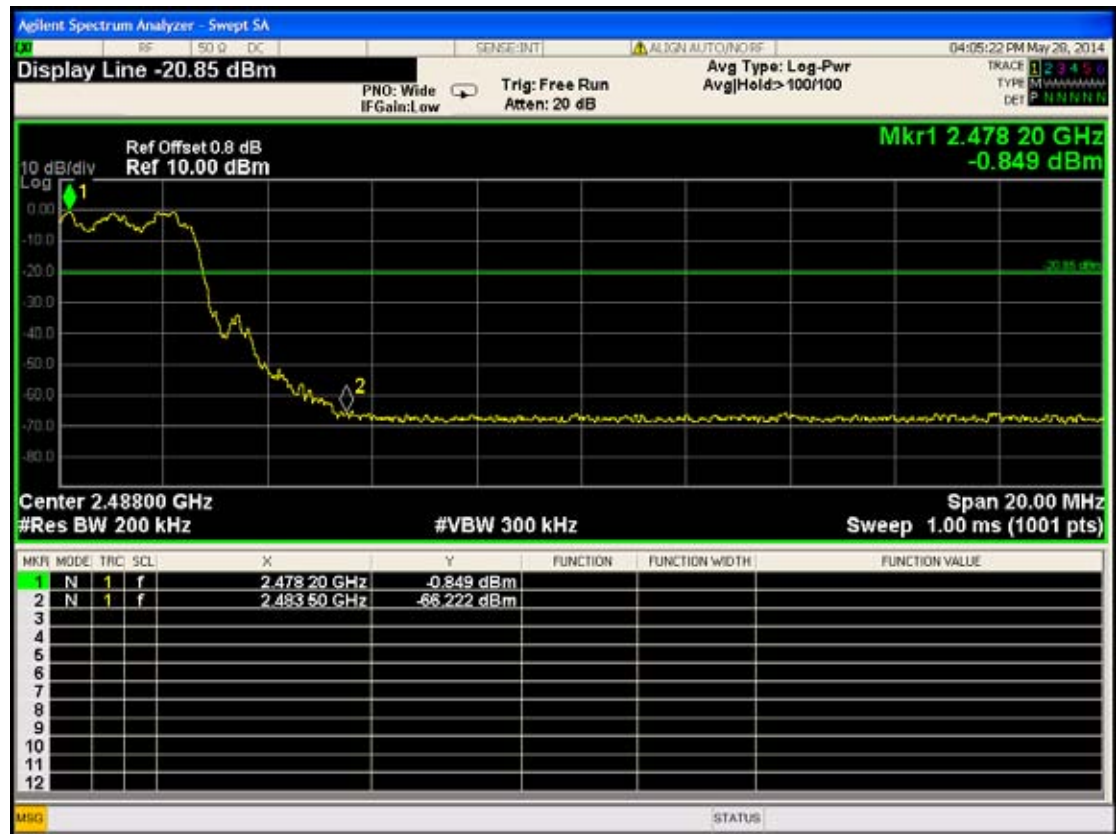
3DH1-CH78



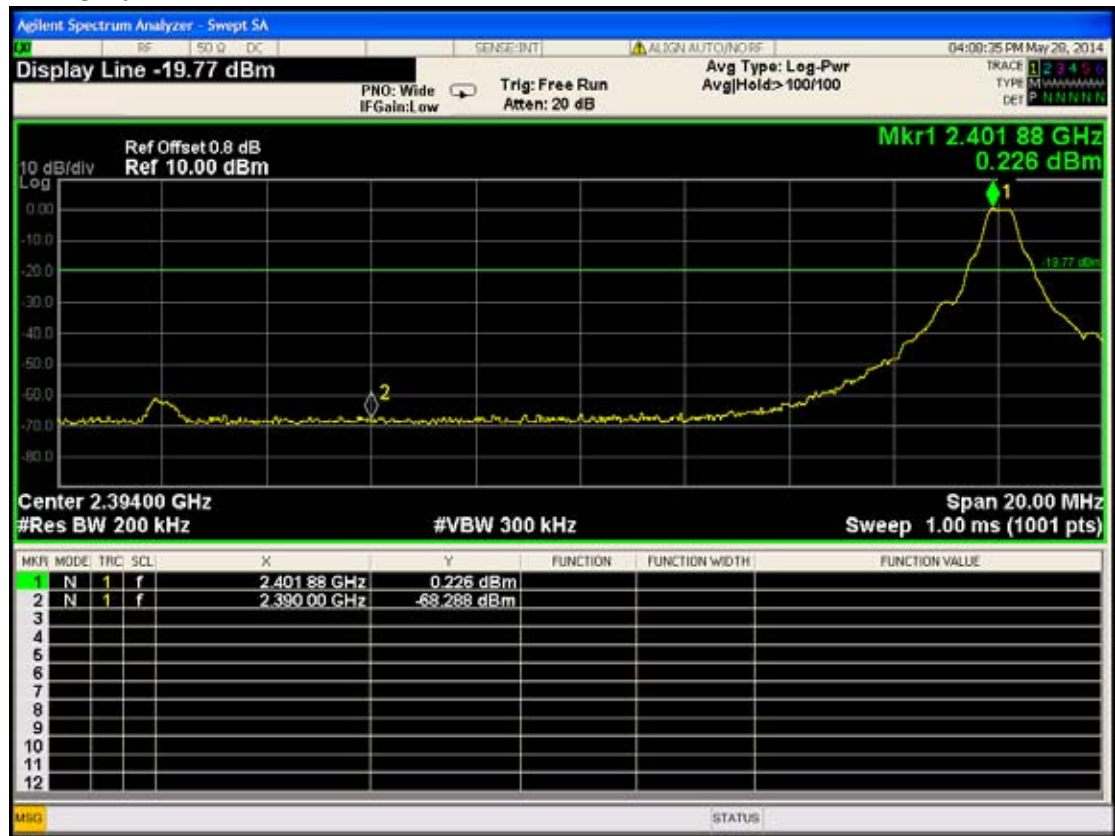
3DH5-CH0



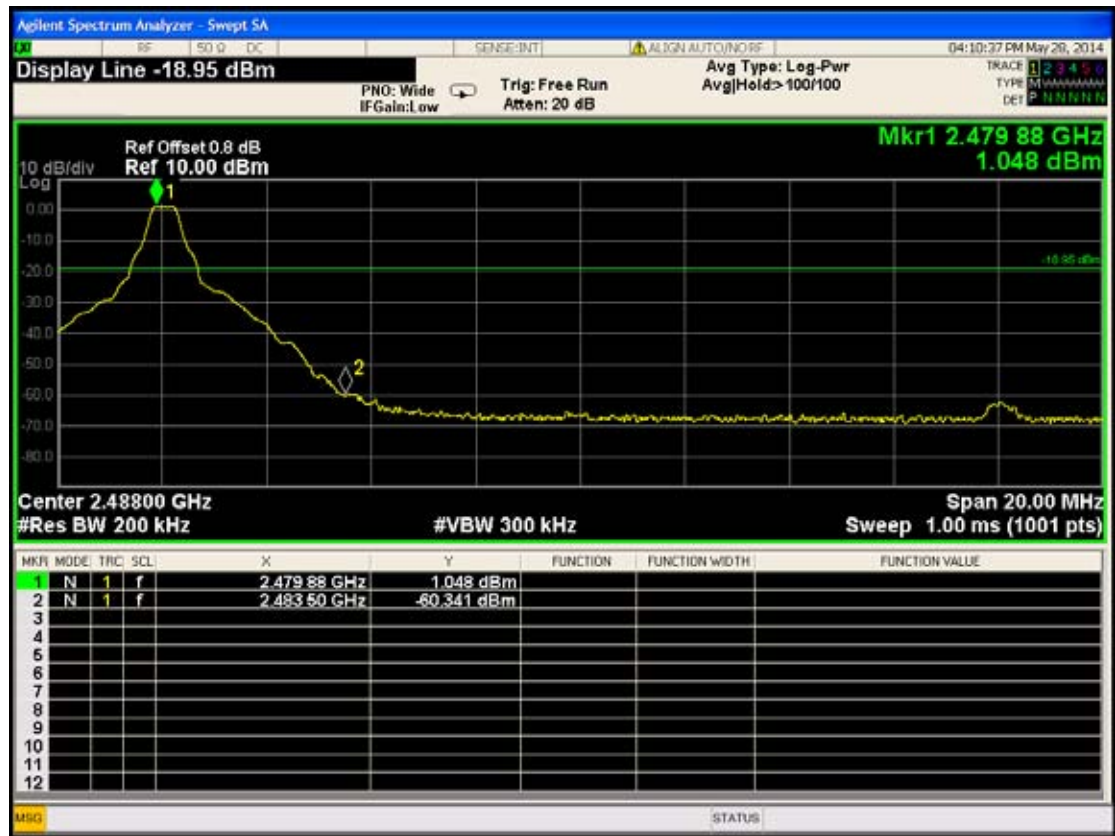
3DH5-CH78



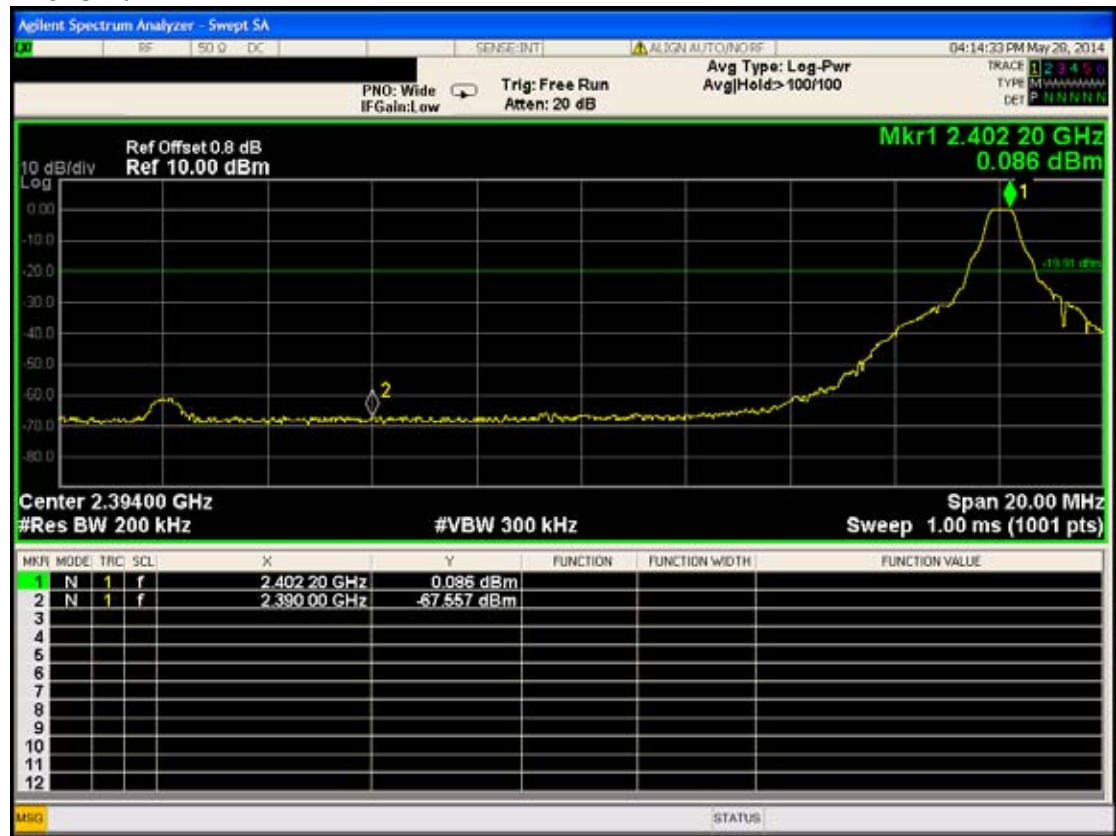
Hopping off:
DH1-CH0



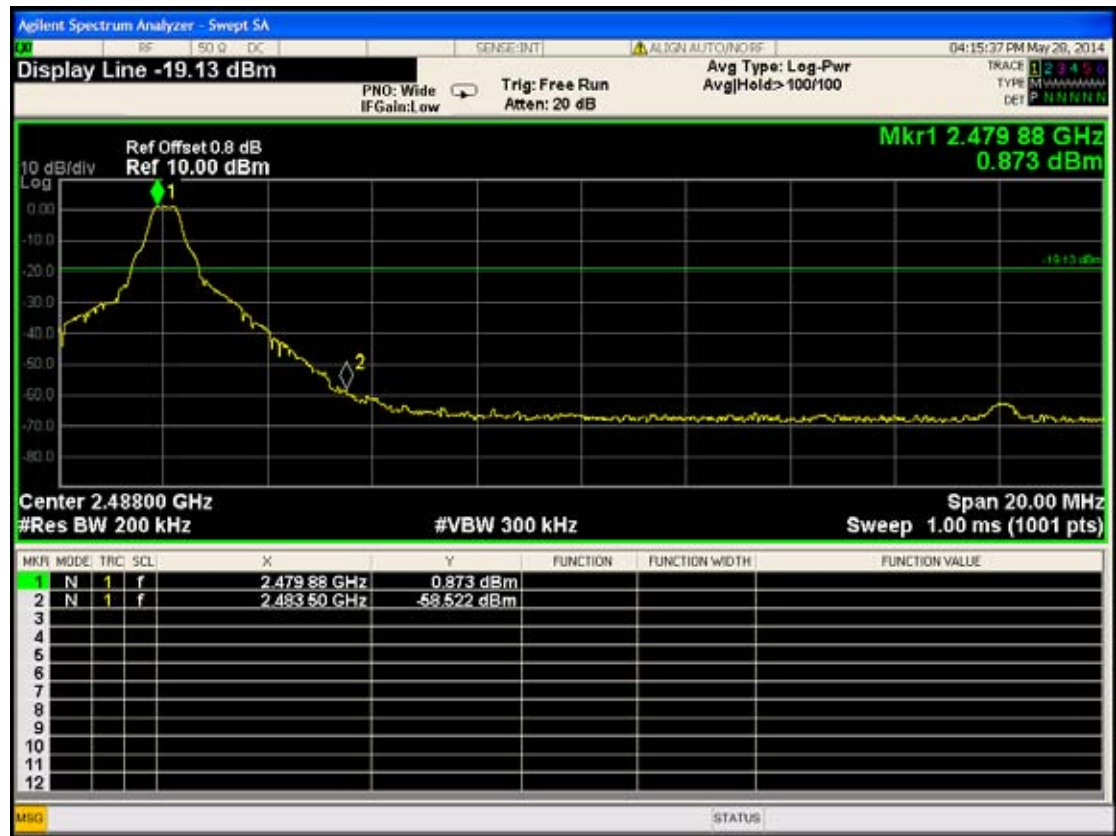
DH1-CH78



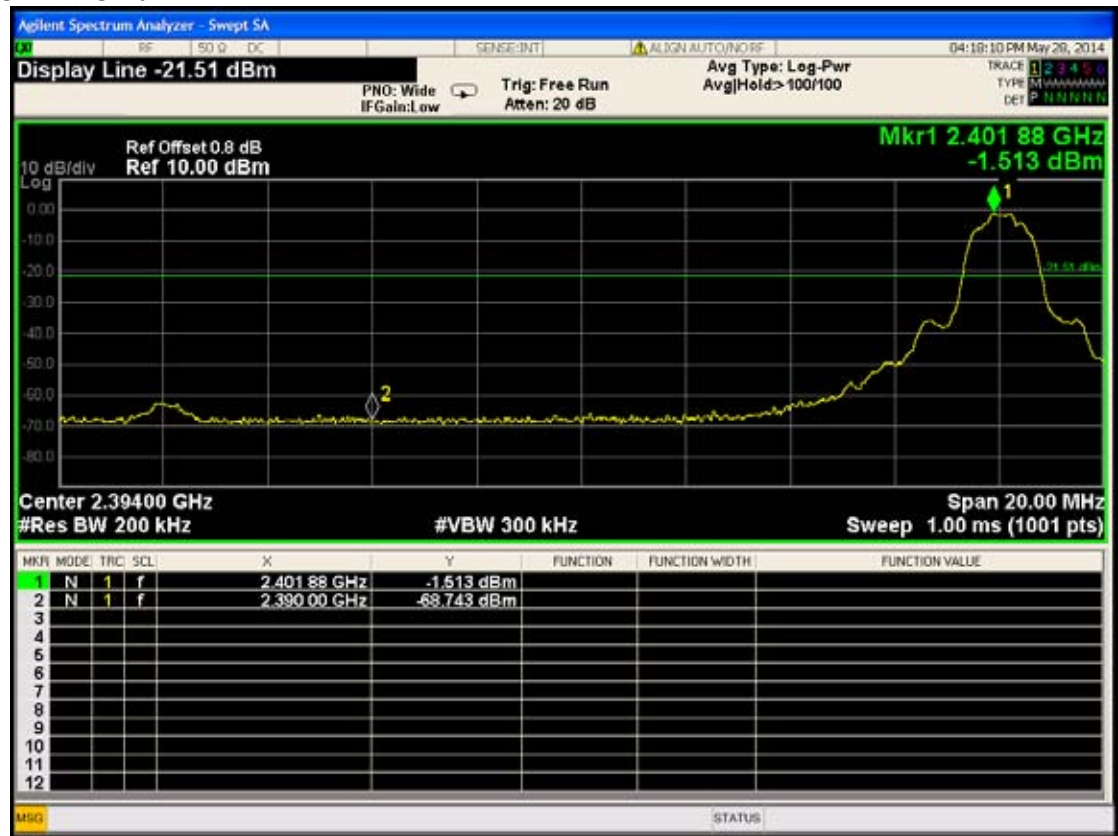
DH5-CH0



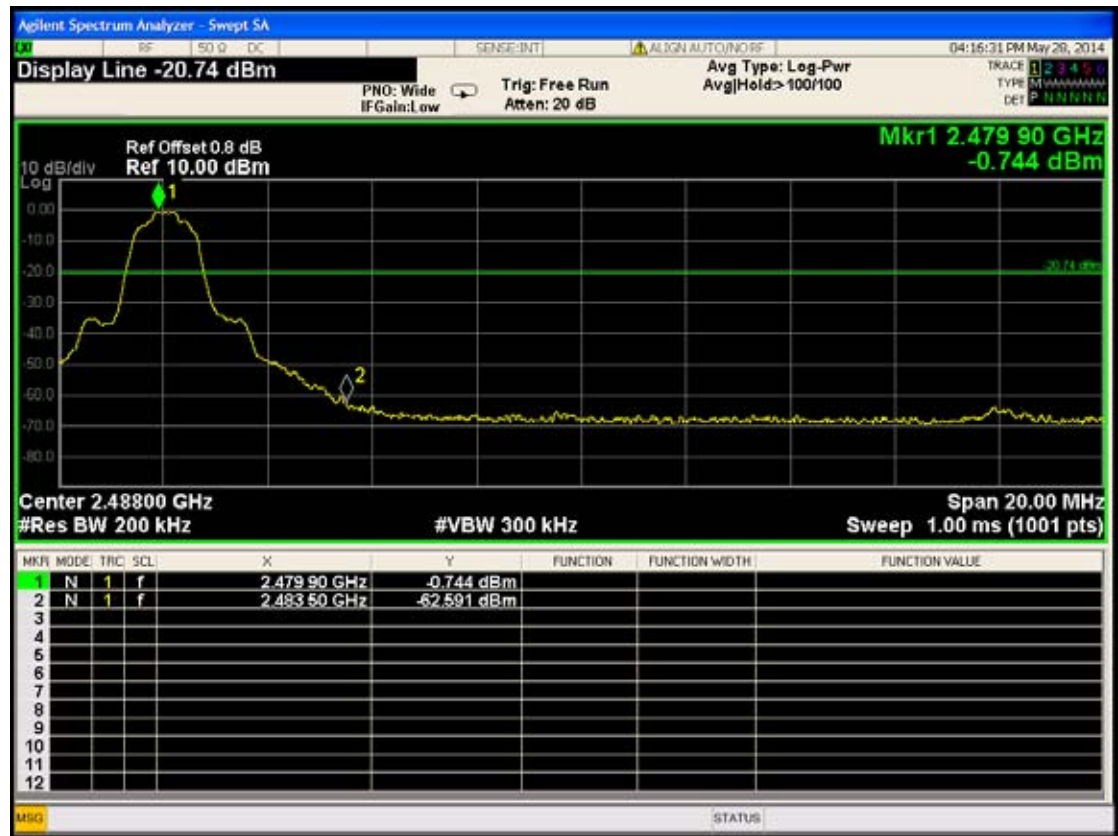
DH5-CH78



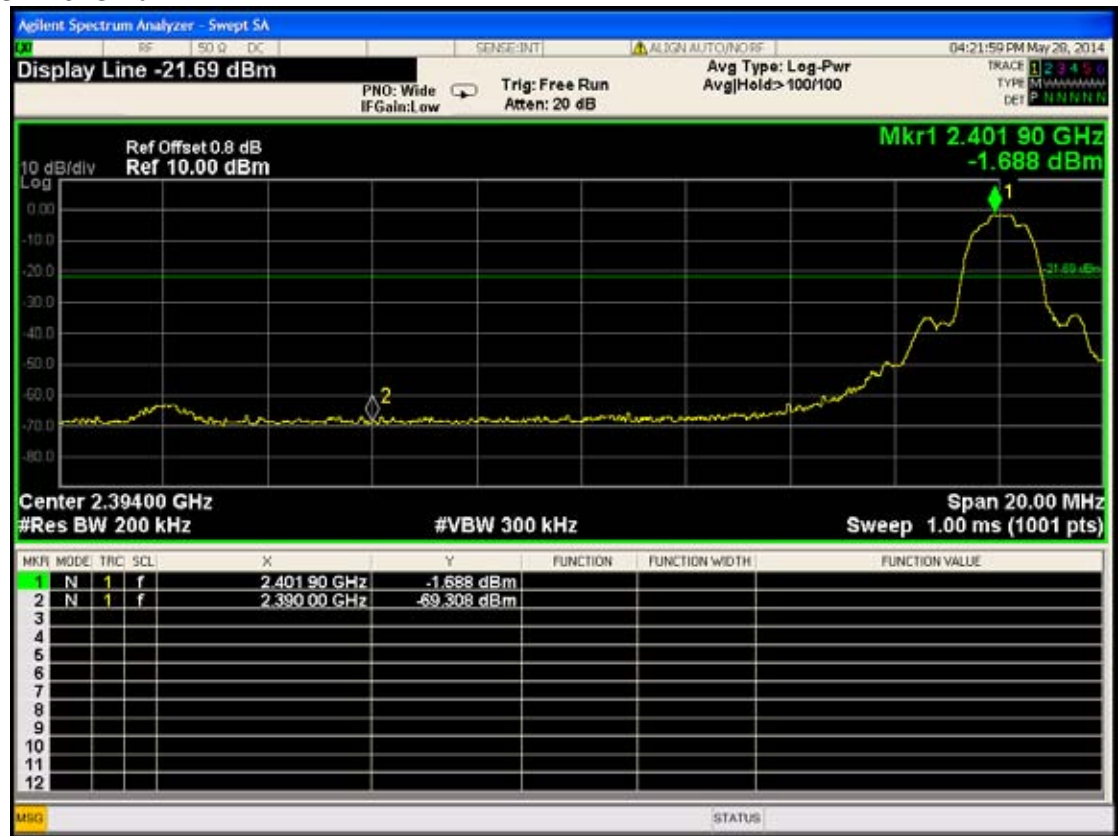
3DH1-CH0



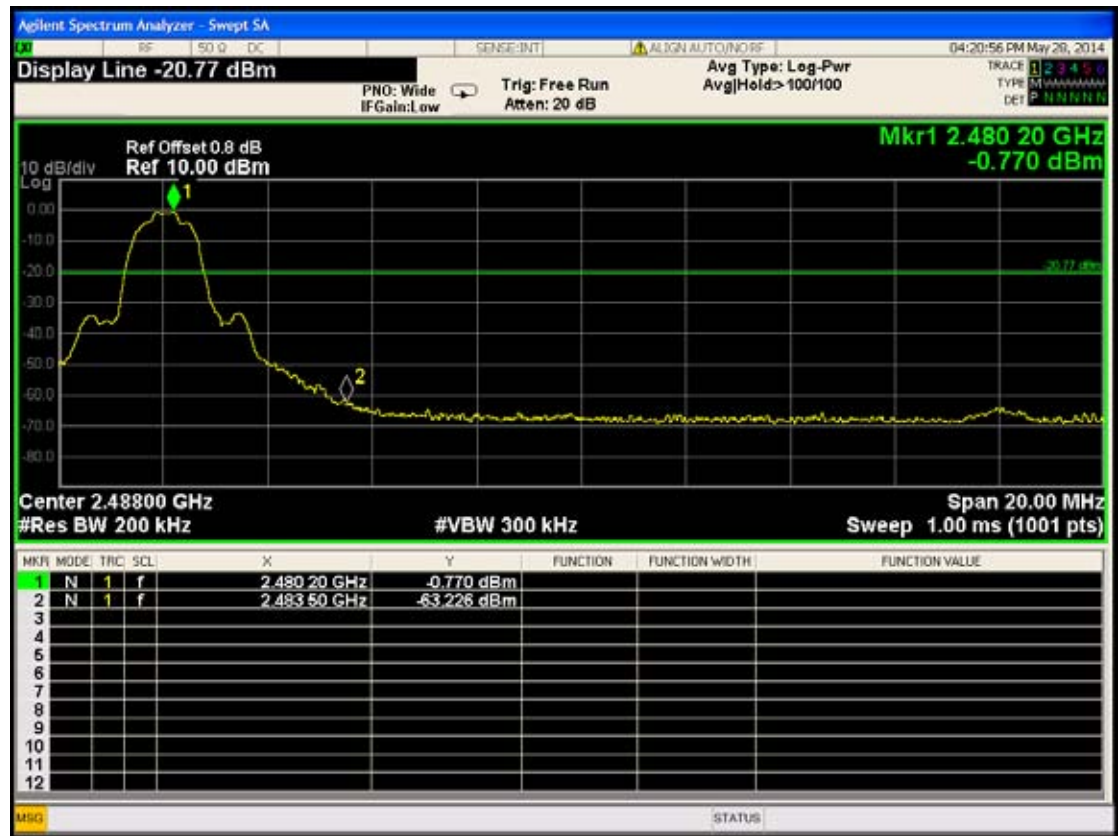
3DH1-CH78



3DH5-CH0



3DH5-CH78



11.EMISSION LIMITATIONS MEASUREMENT

11.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	PXA Signal Analyzer	Agilent	N9030A	MY53120367	2013-06-24	2014-06-23

11.2. Block Diagram of Test Setup

The same as section 5.2.

11.3. Specification Limits (§15.247(c))

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).(This test result attaching to §3.6.3)

The reference level for determining limit of emission limitations is according to the value measured indicated in plots at section 9.5.

11.4. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.

The measurement guideline was according to FCC Public Notice DA 00-705.