ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 210

OF

Product Name:	**BTD2**
Marketing Name:	**SUPERTOOH**
Brand Name:	**SUPERTOOH**
Model No.:	**BTD2**
Model Difference:	**N/A**
FCC ID:	**QVNBTD2**
IC:	**7717A-BTD2**
Report No.:	**ER/2012/90008**
Issue Date:	**Sep. 28, 2012**
FCC Rule Part:	**§15.247, Cat: DSS**
IC Rule Part:	**RSS-210 issue 8 :2010, Annex 8**
Prepared for:	**Euro Communication Equipements SAS Route de Foix 11500 Nebias, Quillan, France**
Prepared by:	**SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803**

Testing Laboratory
0513

VERIFICATION OF COMPLIANCE

Applicant:	Euro Communication Equipements SAS Route de Foix 11500 Nebias, Quillan, France
Product Name:	BTD2
Marketing Name:	SUPERTOOH
Brand Name:	SUPERTOOH
Model No.:	BTD2
Model Difference:	N/A
FCC ID:	QVNBTD2
IC:	7717A-BTD2
File Number:	ER/2012/90008
Date of test:	Sep. 07, 2012 ~ Sep. 28, 2012
Date of EUT Received:	Sep. 07, 2012

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and RSS-Gen. issue 3 the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247 and IC RSS 210 issue 8: 2010 Annex 8.

The test results of this report relate only to the tested sample identified in this report.

Test By:	Marcus Tseng	***Date:***	Sep. 28, 2012
	Marcus Tseng / Engineer		
Prepared By:	Bondi Liu	***Date:***	Sep. 28, 2012
	Bondi Liu / Sr. Engineer		
Approved By:	Jim Chang	***Date:***	Sep. 28, 2012
	Jim Chang / Supervisor		

Version

Version No.	Date	Description
00	Sep. 28, 2012	Initial creation of document

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1. GENERAL INFORMATION

General:

Product Name:	BTD2	
Marketing Name:	SUPERTOOH	
Brand Name:	SUPERTOOH	
Model No.:	BTD2	
Model difference:	N/A	
Hardware Version:	V1	
Software Version:	R1	
Power Supply	9.6Vdc Ni-MH battery or 14Vdc from adapter.	
	Battery:	Model: 8XNR44AAA700P, Supplier: GREPOW
	Adapter :	Model: P6140042US, Supplier: Something High Electric(Xiamen) Co., Ltd.

Bluetooth:

Bluetooth Version:	V2.0
Channel number:	79 channels
Modulation type:	GFSK
Transmit Power:	5.94 dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	<= 0.4s
Operating Mode:	Point-to-Point
Antenna Designation:	Printed Inverted-F meander Antenna, Gain: 2.5dBi

The test report compliance for Bluetooth function.

1.1 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: QVNBTD2** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and **IC: 7717A-BTD2** filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 8. The composite system (digital device) is compliance with Subpart B is authorized under a Doc procedure.

1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2009. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with FCC Public Notice DA 00-705

1.3 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan .which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2009. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-4

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4: 2009.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4: 2009 and DA00-705.

2.4 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration

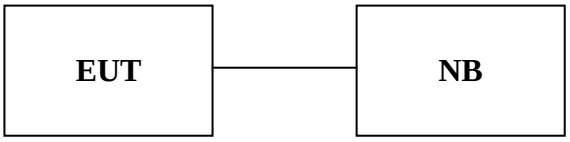


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test software	BlueSuite	CSR	V2.4	N/A	N/A
2	Notebook	DELL	D505	20995915456	N/A	N/A

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a) RSS-Gen §7.2.4	Conducted Emission	Compliant
§15.247(b)(1) RSS-210 issue 8,§A8.4(2)	Peak Output Power	Compliant
§15.247(a)(1) RSS210 issue ,§A8.1(b) RSS-Gen §4.6.1	20dB Bandwidth & 99% Power Bandwidth	Compliant
§15.247(d) RSS-210 issue 8,§A8.5	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.209(a) (f) RSS-Gen §7.2.5 RSS-210 issue 8,§A2.9	Spurious Emission	Compliant
§15.247(a)(1) RSS-210 issue 8,§A8.1(b)	Frequency Separation	Compliant
§15.247(a)(1)(iii) RSS-210 issue 8,§A8.1(d)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii) RSS-210 issue 8,§A8.1(d)	Time of Occupancy	Compliant
§15.203, §15.247(b)(4)(i) RSS- Gen issue §7.1.2	Antenna Requirement	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel Low, Mid and High with highest rated data rate were chosen as worst case for full tesing.

The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth Transmitter for channel Low, Mid and High the worst case H position was reported.

In comparison with BDR mode, emission carried out by BDR is chosen as the most representative measurement to perform measurement of every test item pursuant to Part 15C.

5. MEASUREMENT UNCERTAINTY FOR FIELD STRENGTH OF SPURIOUS RADIATION

Measurement uncertainty (Polarization : **Vertical**)	30MHz - 180MHz: 3.37dB
	180MHz -417MHz: 3.19dB
	0.417GHz-1GHz: 3.19dB
	1GHz - 18GHz: 4.04dB
	18GHz - 40GHz: 4.04dB

Measurement uncertainty (Polarization : **Horizontal**)	30MHz - 167MHz: 4.22dB
	167MHz -500MHz: 3.44dB
	0.5GHz-1GHz: 3.39dB
	1GHz - 18GHz: 4.08dB
	18GHz - 40GHz: 4.08dB

6. CONDUCTED EMISSION TEST

6.1 Standard Applicable

According to §15.207 and RSS-Gen §7.2.4, frequency within 150KHz to 30MHz shall not exceed the limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

6.3 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4: 2009.
2. The EUT was plug-in the AC/DC Power adapter. The host system was placed on the center of the back edge on the test table. The peripherals was placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The spacing between the peripherals was 10 centimeters.
4. External I/O cables were draped along the edge of the test table and bundle when necessary.
5. The host system was connected with 120Vac/60Hz power source.

6.3 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

6.4 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
EMI Receiver	R&S	ESCS 30	828985/004	09/23/2012	09/22/2013
LISN	Rolf-Heine	NNB-2/16Z	99012	03/23/2012	03/22/2013
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2012	03/22/2013
Coaxial Cables	N/A	WK CE Cable	N/A	01/05/2012	01/04/2013

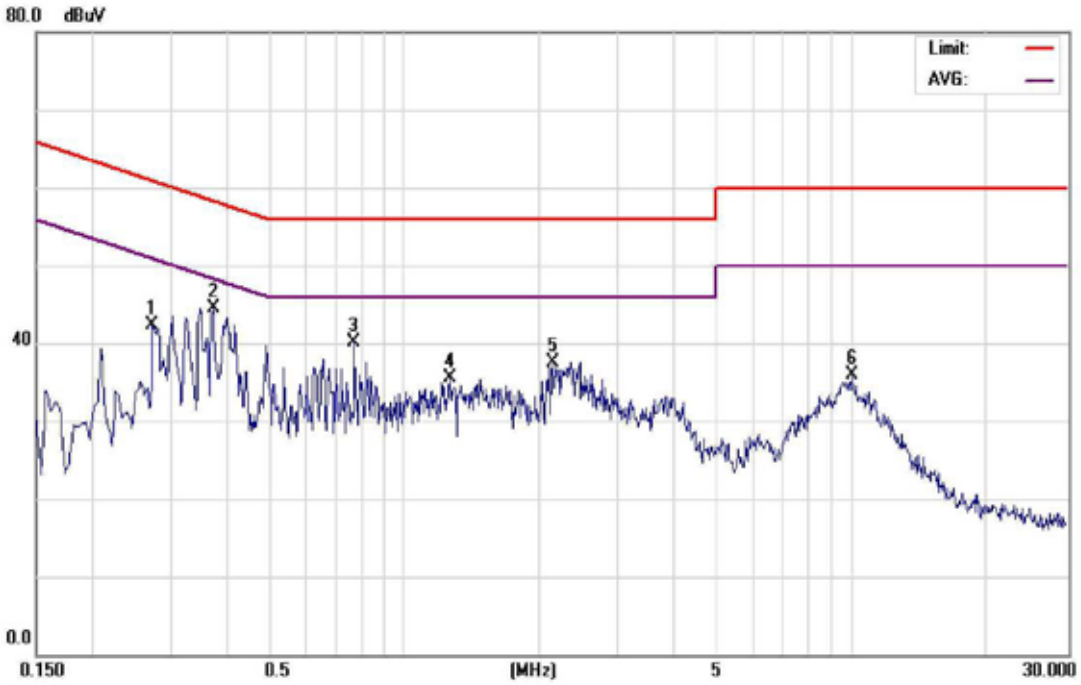
6.5 Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation			Test Date:	Sep. 25, 2012
Temperature:	26 ℃	Humidity:	60 %	Test By:	Tai

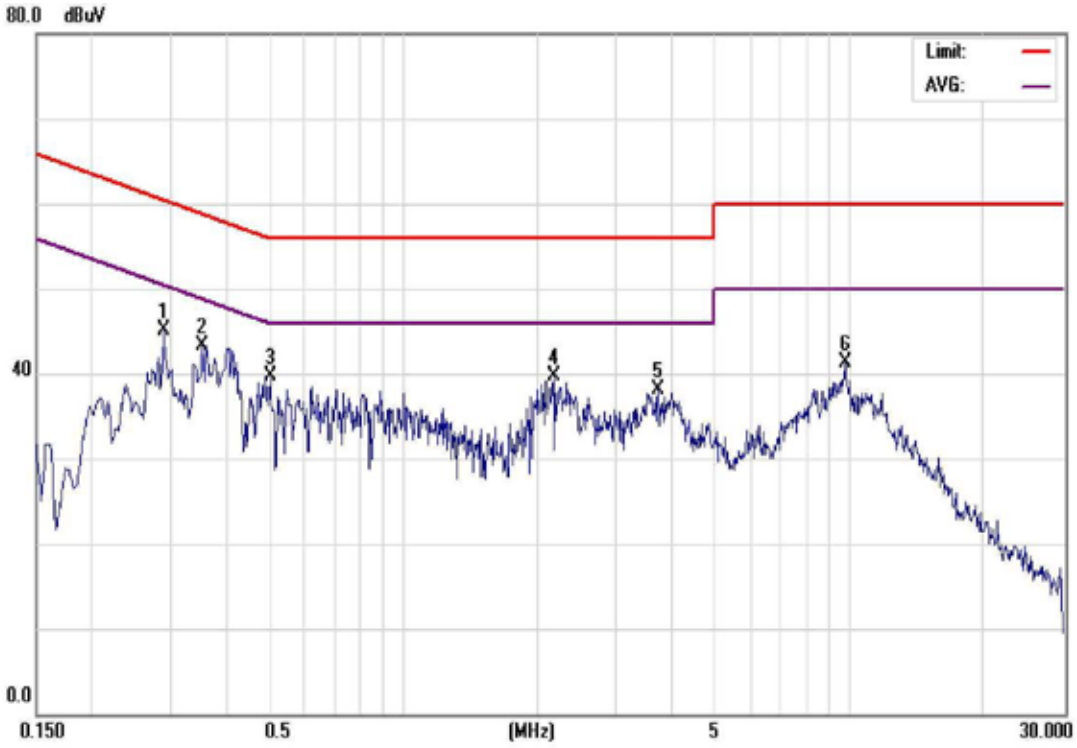


Site ConductionRoom
Limit: FCC Class B Conduction(QP)
EUT: BTD2
M/N: BTD2
Mode: Operationmode
Note:

Phase: L1
Power: AC 120V/60Hz
Distance:

Temperature: 26 ℃
Humidity: 60%

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2740	42.05	0.21	42.26	61.00	-18.74	peak	
2	*	0.3740	44.26	0.22	44.48	58.41	-13.93	peak	
3		0.7740	39.96	0.22	40.18	56.00	-15.82	peak	
4		1.2660	35.29	0.23	35.52	56.00	-20.48	peak	
5		2.1460	37.25	0.25	37.50	56.00	-18.50	peak	
6		10.0020	35.42	0.43	35.85	60.00	-24.15	peak	



Site ConductionRoom
Limit: FCC Class B Conduction(QP)
EUT: BTD2
M/N: BTD2
Mode: Operationmode
Note:

Phase: N
Power: AC 120V/60Hz
Distance:

Temperature: 26 ℃
Humidity: 60%

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.2900	44.79	0.32	45.11	60.52	-15.41	peak	
2		0.3540	43.03	0.34	43.37	58.87	-15.50	peak	
3		0.5020	39.46	0.33	39.79	56.00	-16.21	peak	
4		2.1740	39.47	0.33	39.80	56.00	-16.20	peak	
5		3.7300	37.83	0.35	38.18	56.00	-17.82	peak	
6		9.7660	40.83	0.46	41.29	60.00	-18.71	peak	

7. PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable

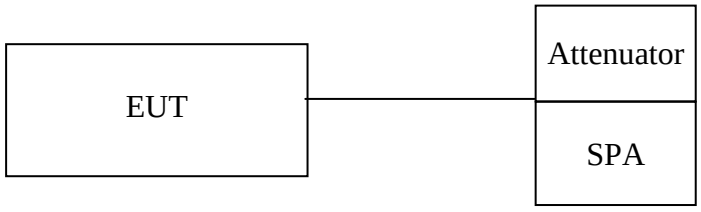
According to §15.247(b)(1),, for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

According to RSS-210 issue 8,§A8.4(2), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

7.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Power Sensor	Anritsu	ML2495A	1005007	02/08/2012	02/07/2014
Power Meter	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/17/2012	03/16/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2012	02/27/2013
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2012	01/04/2013
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2012	02/27/2013
Splitter	Agilent	11636B	N/A	02/28/2012	02/27/2013

7.3 Test Set-up:



7.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max peak function, >20dB bandwidth, >=RBW)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

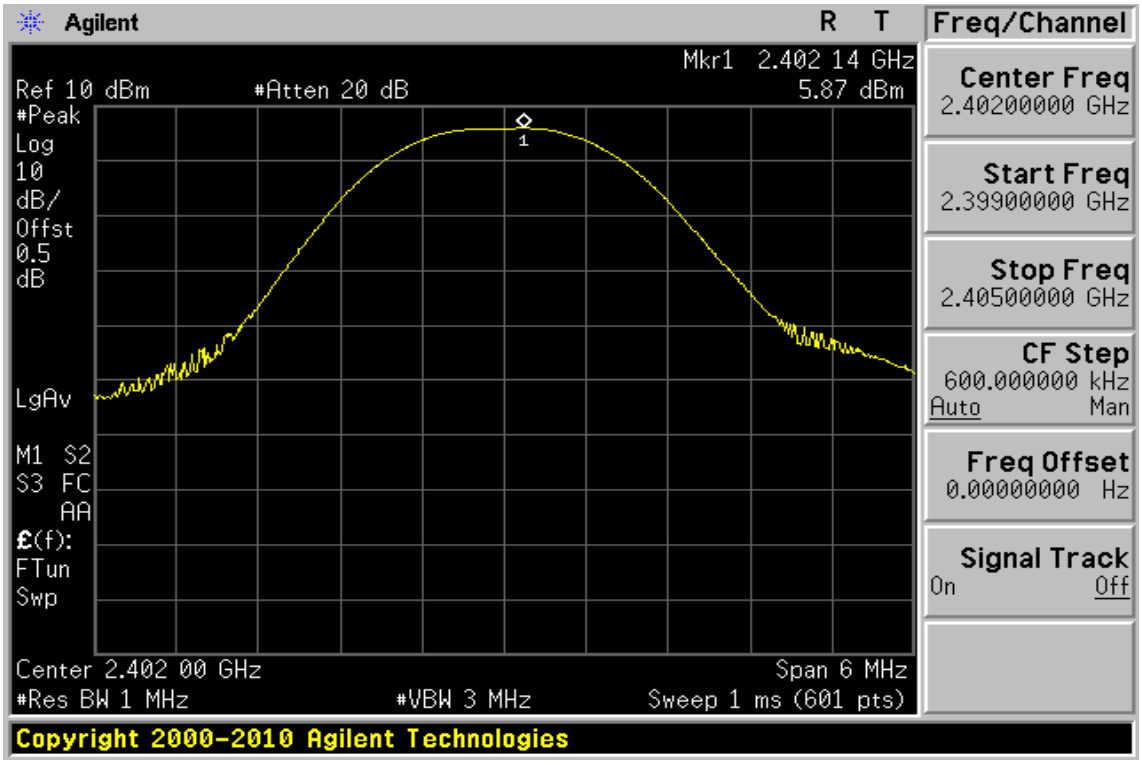
7.5 Measurement Result

BDR mode:

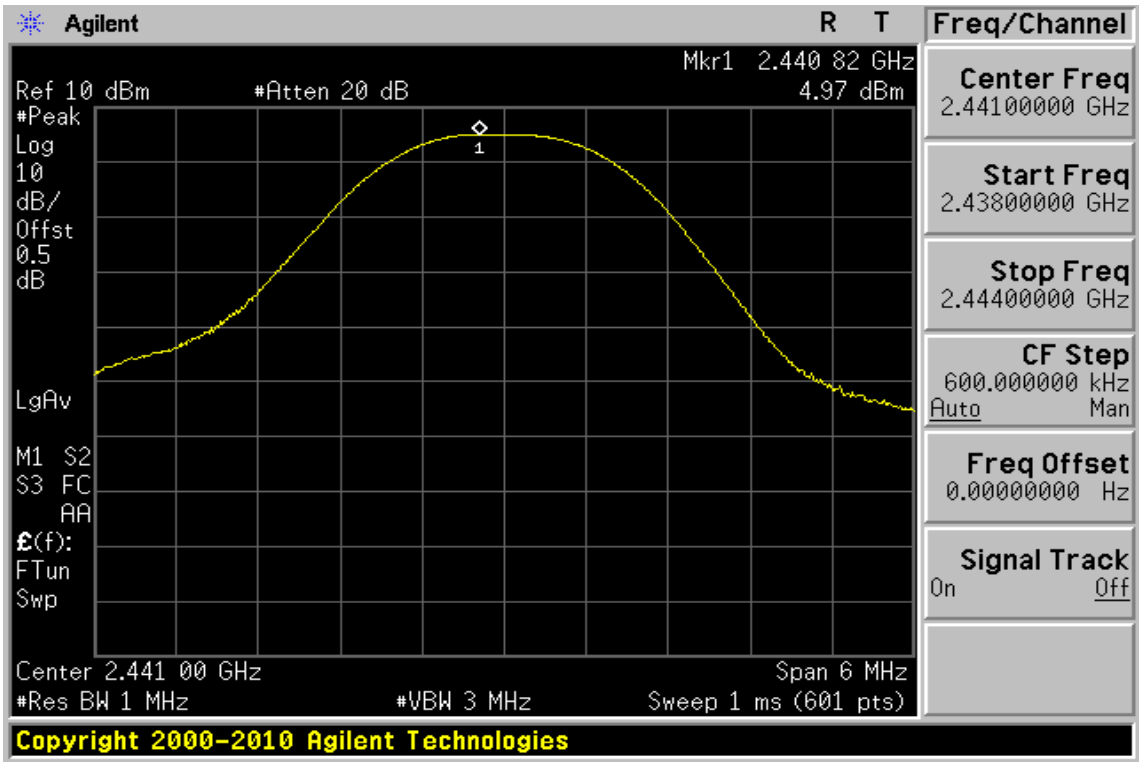
Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	5.87	5.87	0.00386	1
2441.00	4.97	4.97	0.00314	1
2480.00	5.94	5.94	0.00393	1

NOTE: offset: 0.5dB

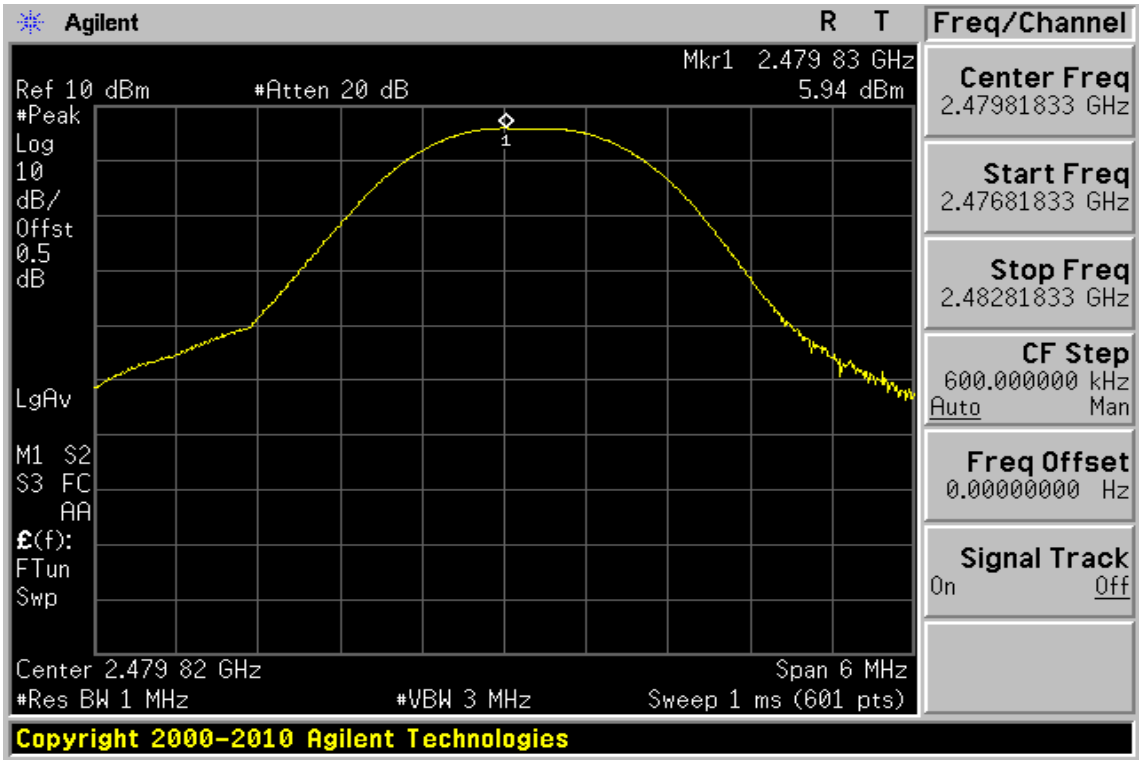
Peak Power Output Data Plot (CH Low) (BDR mode)



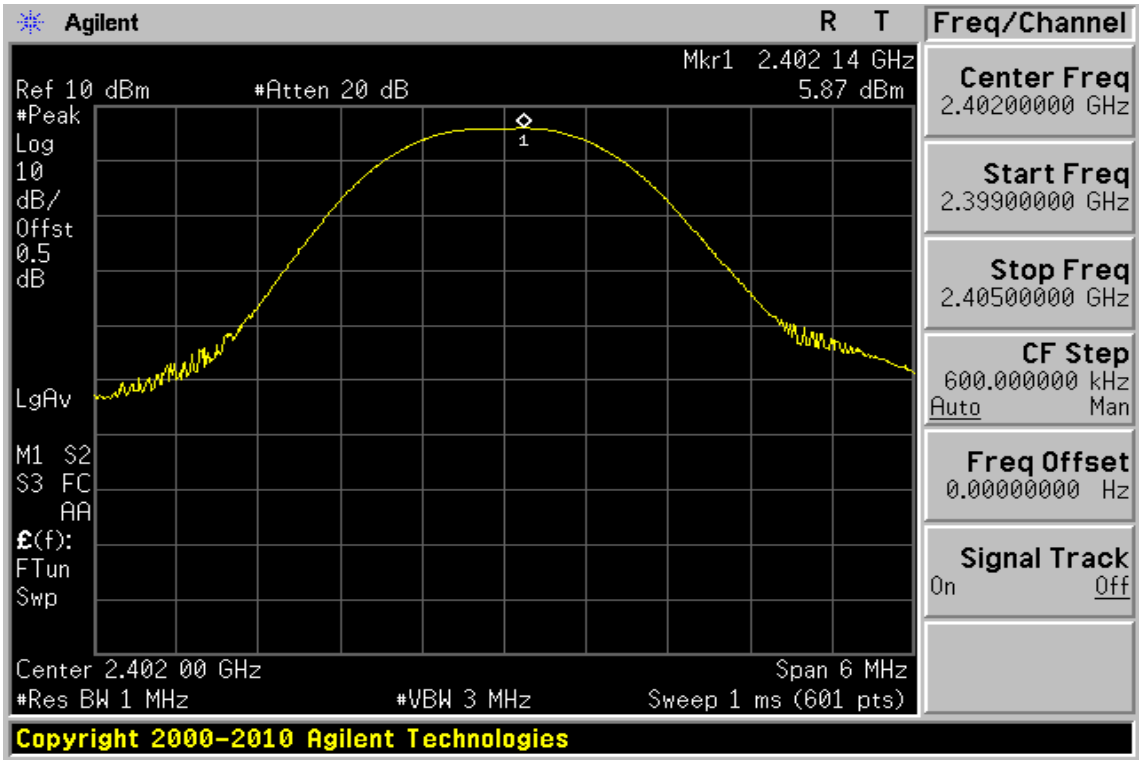
Peak Power Output Data Plot (CH Mid) (BDR mode)



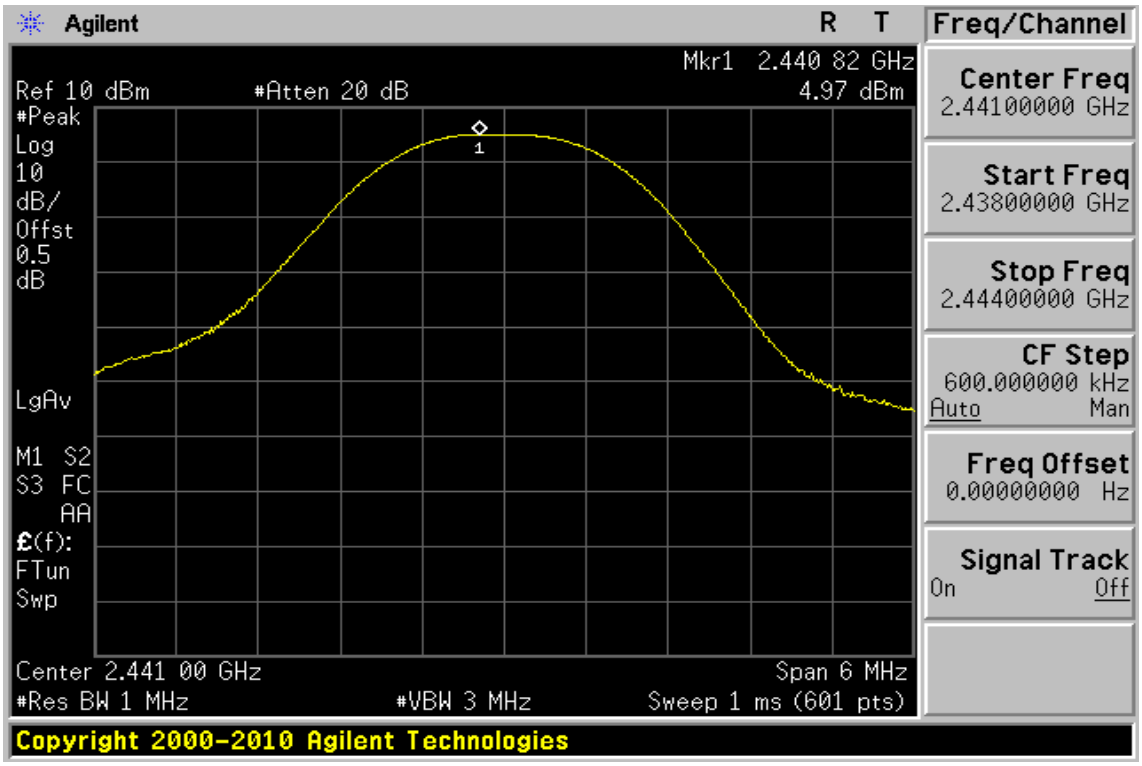
Peak Power Output Data Plot (CH High) (BDR mode)



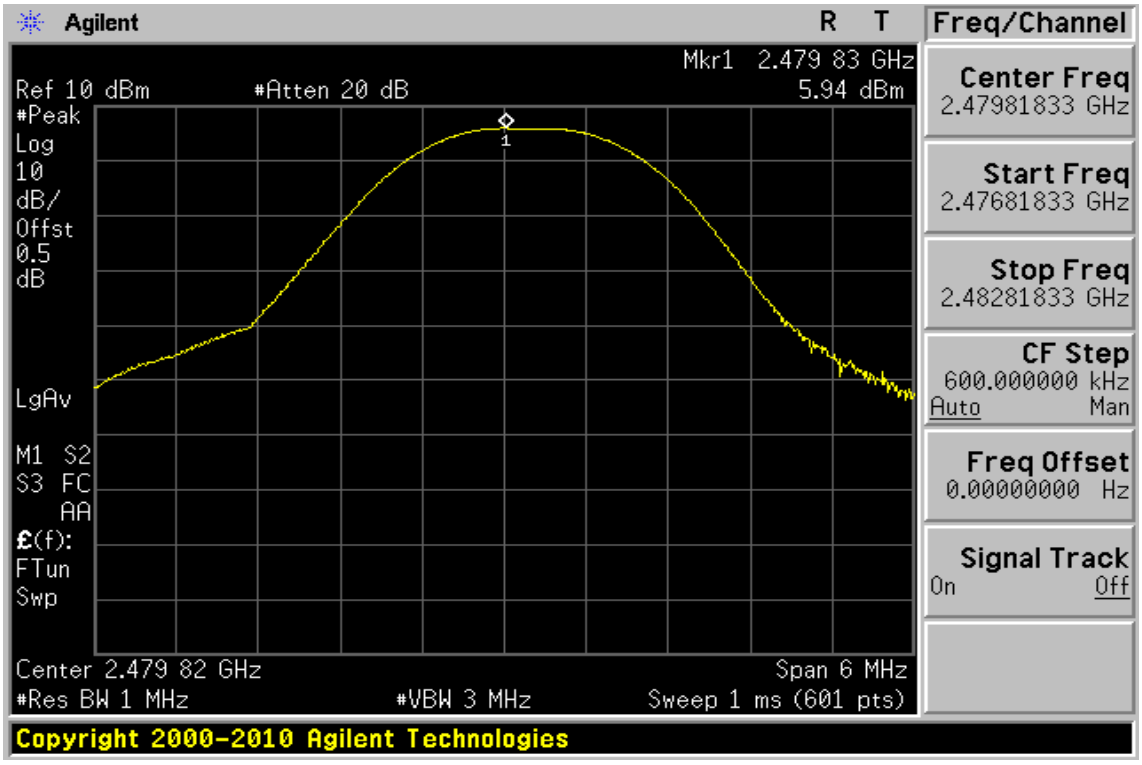
Peak Power Output Data Plot (CH Low) (BDR mode)



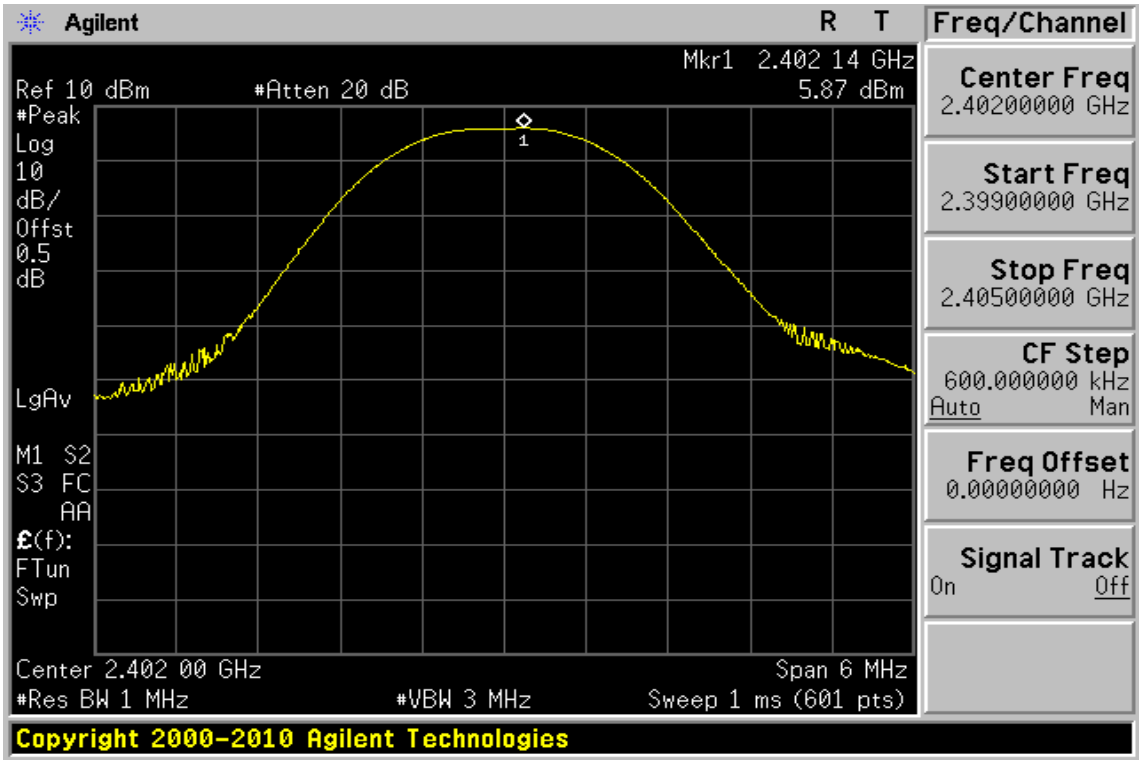
Peak Power Output Data Plot (CH Mid) (BDR mode)



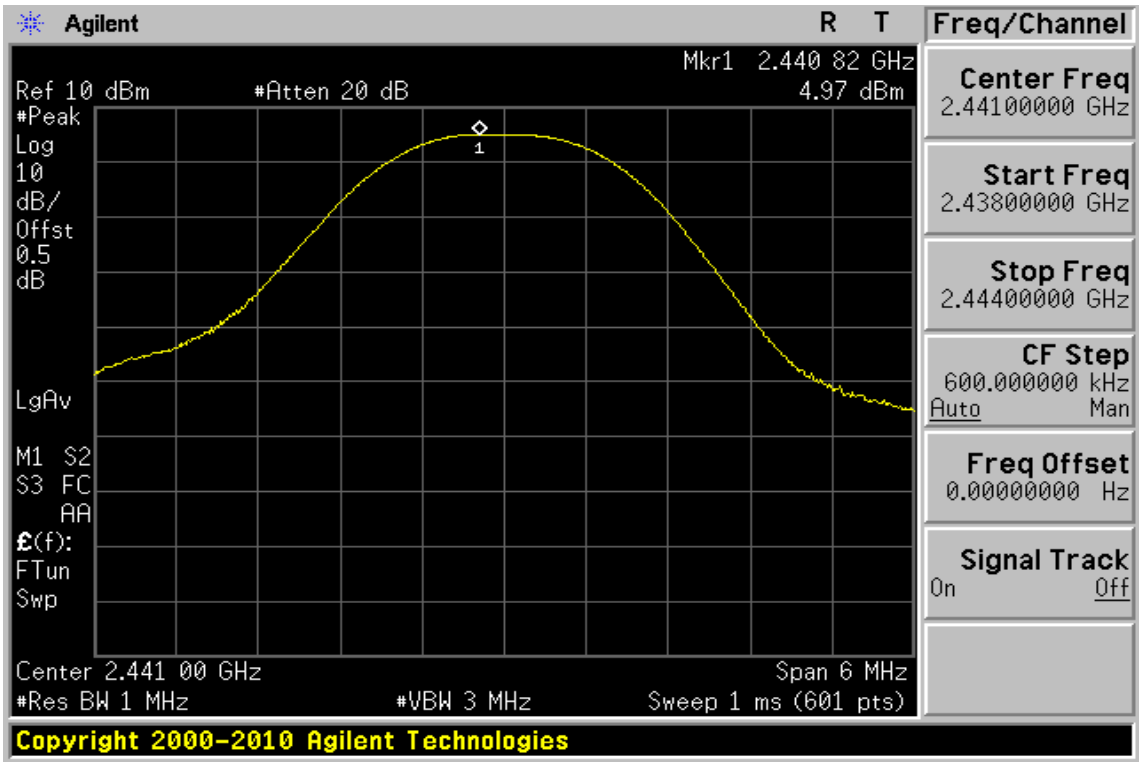
Peak Power Output Data Plot (CH High) (BDR mode)



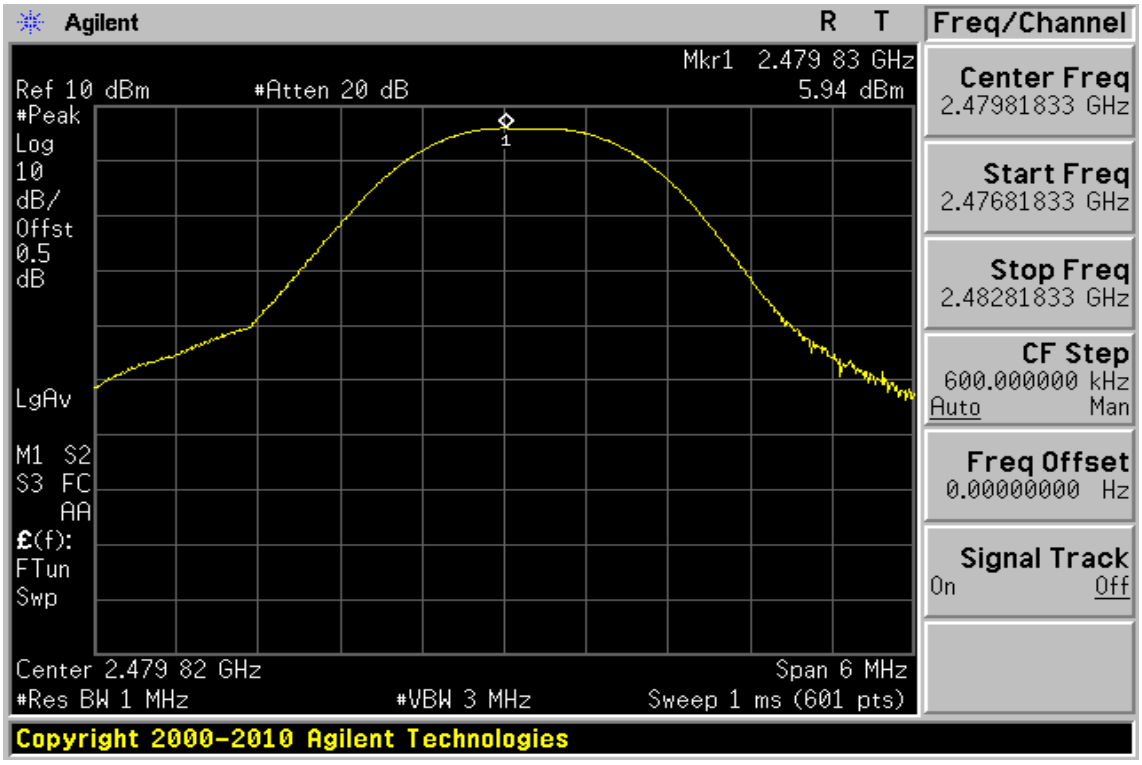
Peak Power Output Data Plot (CH Low) (BDR mode)



Peak Power Output Data Plot (CH Mid) (BDR mode)



Peak Power Output Data Plot (CH High) (BDR mode)



8. 20dB BANDWIDTH & 99% BANDWIDTH

8.1 Standard Applicable

For 20dB Bandwidth

According to §15.247(a)(1) and RSS210 A8.1(b), for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

For 99% Bandwidth

RSS-Gen §4.6.1, the transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

8.2 Measurement Equipment Used

Refer to section 7.2 for details.

8.3 Test Set-up

Refer to section 7.3 for details.

8.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW≧ 1 % of Bandwidth. VBW≧RBW, Span= 3MHz, Sweep=auto for 99% Bandwidth test.
4. Mark the peak frequency and –20dB (upper and lower) frequency and Turn on the 20dB bandwidth function, max reading.
5. Repeat above procedures until all frequency measured were complete.

8.5 Measurement Result:

20dB Bandwidth:

BDR mode:

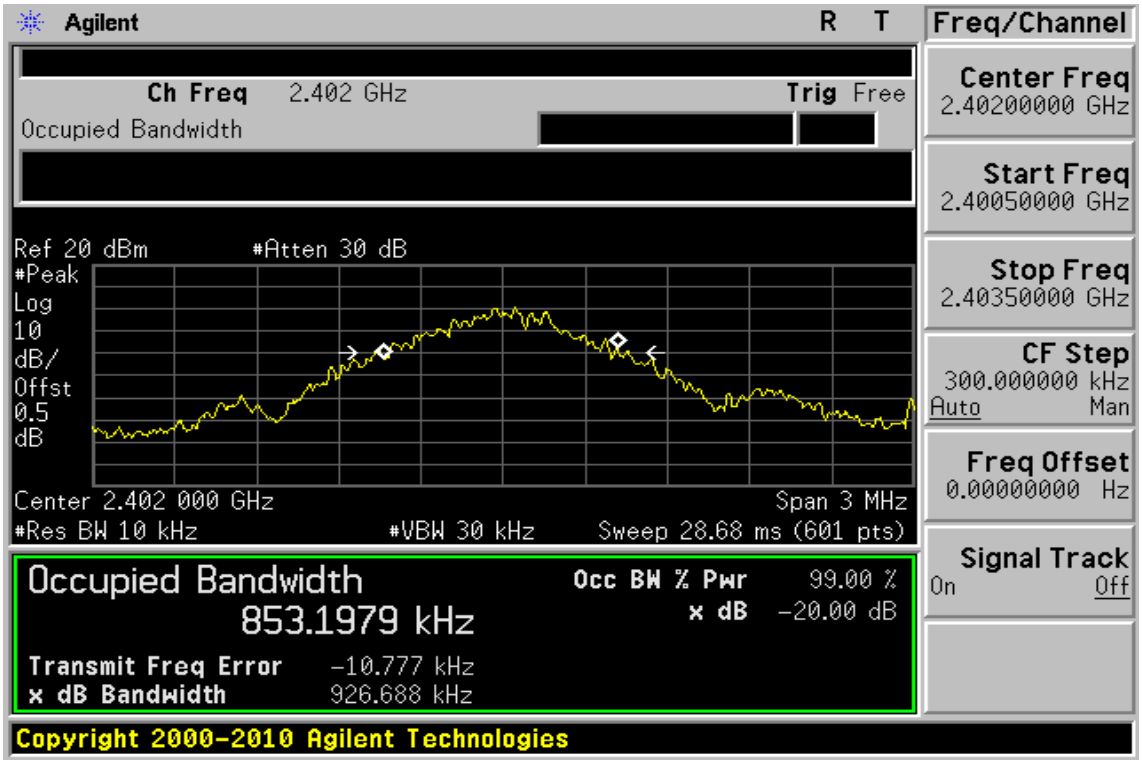
CH	Bandwidth (KHz)
Lower	926.688
Mid	926.318
Higher	926.170

99% Bandwidth:

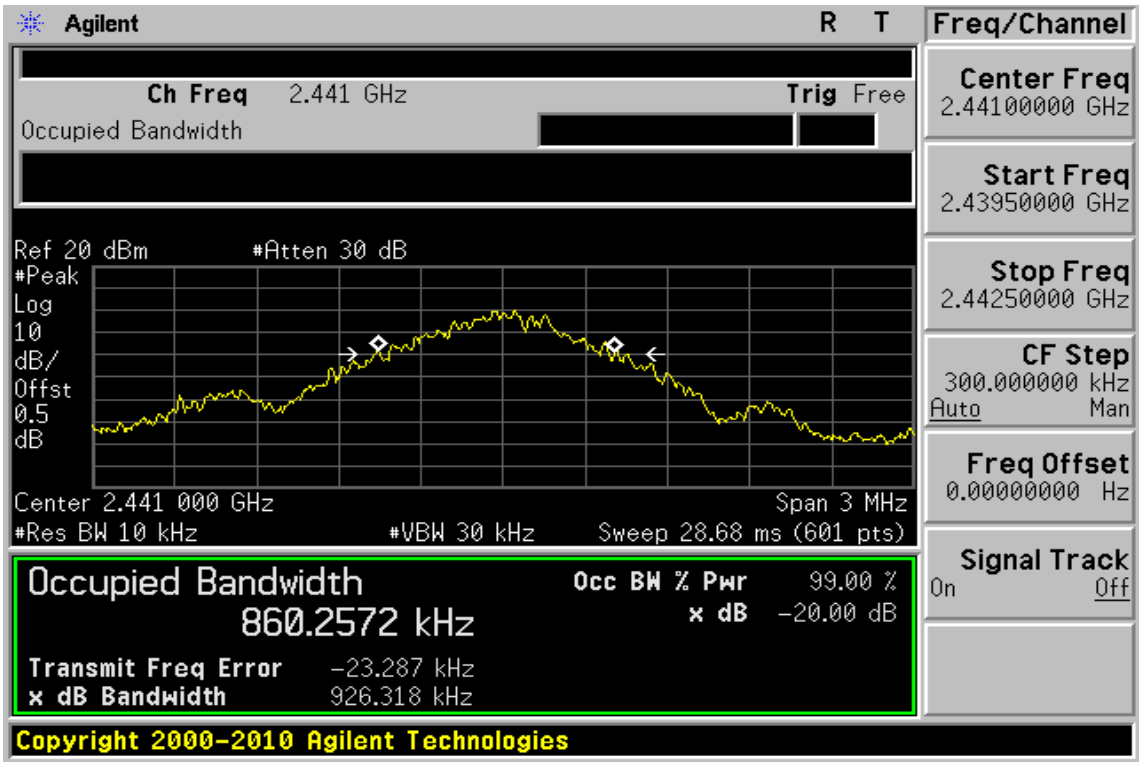
BDR mode:

CH	99% Bandwidth (KHz)
Lower	854.6886
Mid	873.7911
Higher	866.7057

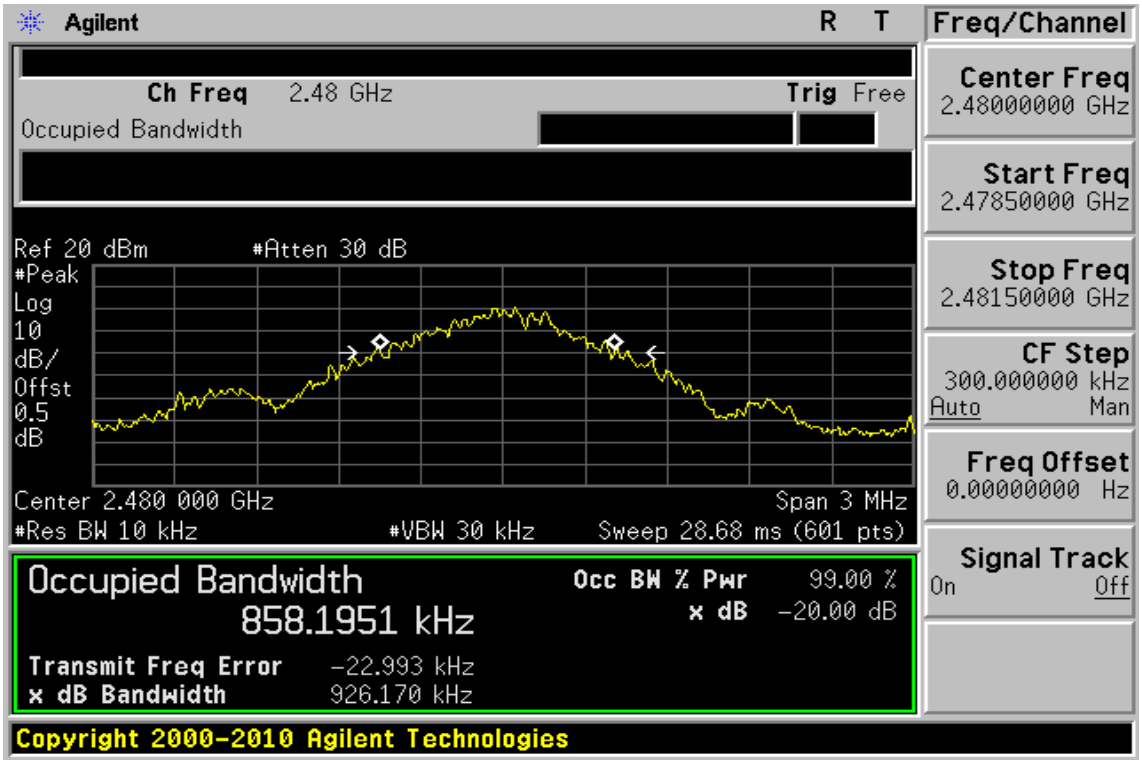
20dB Band Width Test Data CH-Low (BDR mode)



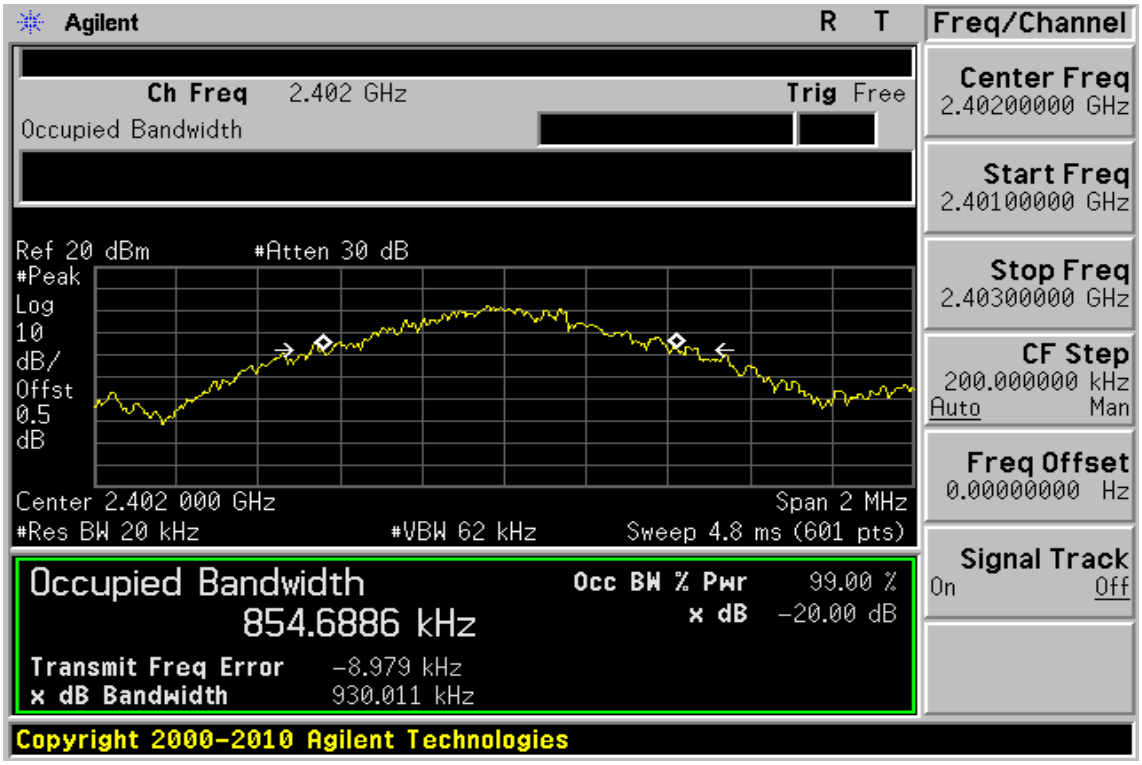
20dB Band Width Test Data CH-Mid (BDR mode)



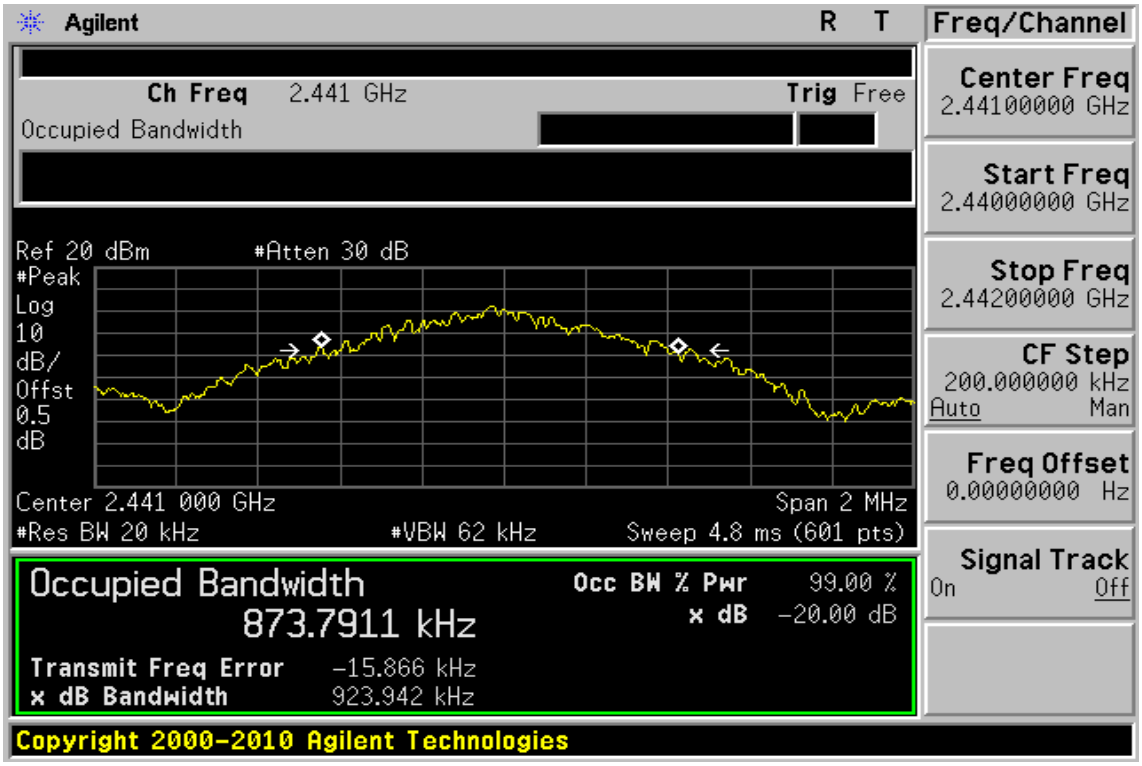
20dB Band Width Test Data CH-High (BDR mode)



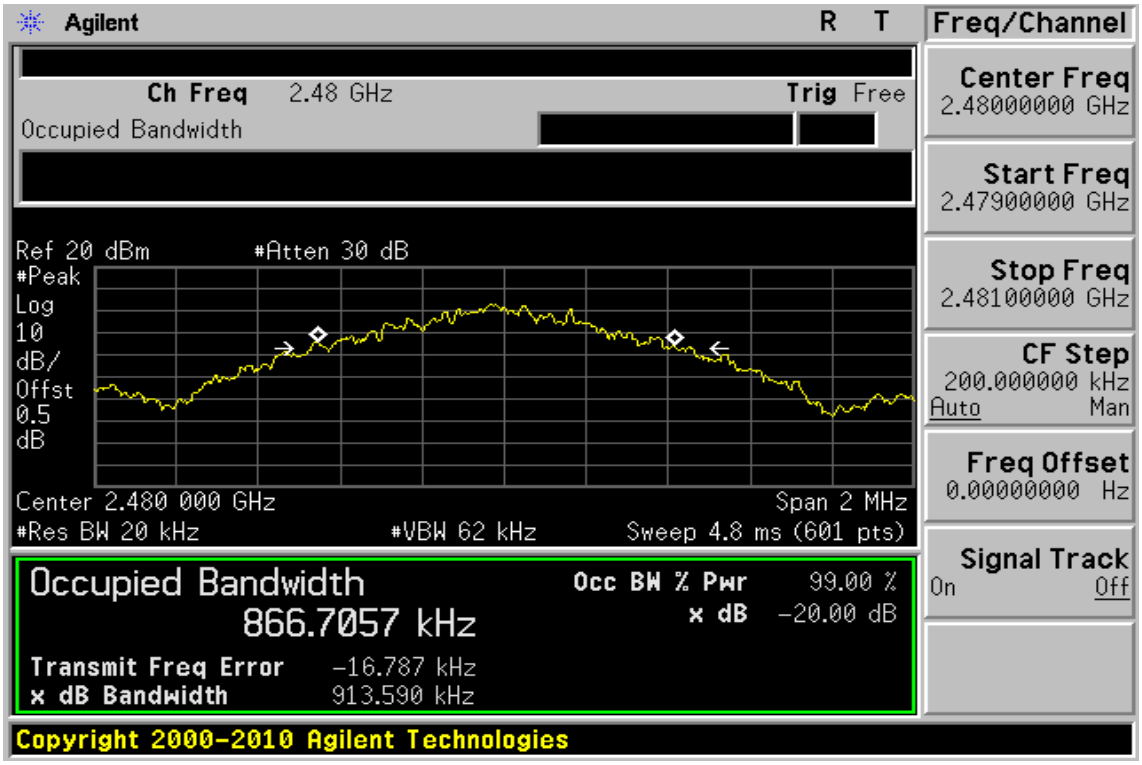
99% Band Width Test Data CH-Low (BDR mode)



99%Band Width Test Data CH-Mid (BDR mode)



99%Band Width Test Data CH-High (BDR mode)



9. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

9.1 Standard Applicable

According to §15.247(c), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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, 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 in15.209(a).

According to RSS-210 issue 8,§A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

9.2 Measurement Equipment Used

9.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

9.2.2 Radiated emission:

966 Chamber					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/15/2011	02/14/2013
Spectrum Analyzer	R&S	FSV-30	101398	10/18/2011	10/17/2013
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2011	05/18/2013
Horn Antenna	Schwarzbeck	BBHA9170	185	07/11/2011	07/10/2013
Pre-Amplifier	Agilent	8447D	2944A07676	01/04/2012	01/03/2013
Pre-Amplifier	EMC Instruments Corp.	EMC012653 0	980038	01/04/2012	01/03/2013
Filter 2400-2483.5 MHz	EWT	EWT-14-016 6	M2	02/28/2012	02/28/2013
Attenuator	Mini-Circuit	BW-S10W2 +	004	02/28/2012	02/27/2013
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/04/2012	01/03/2013
3m Site NSA	SGS	966 chamber	N/A	07/15/2012	07/14/2013

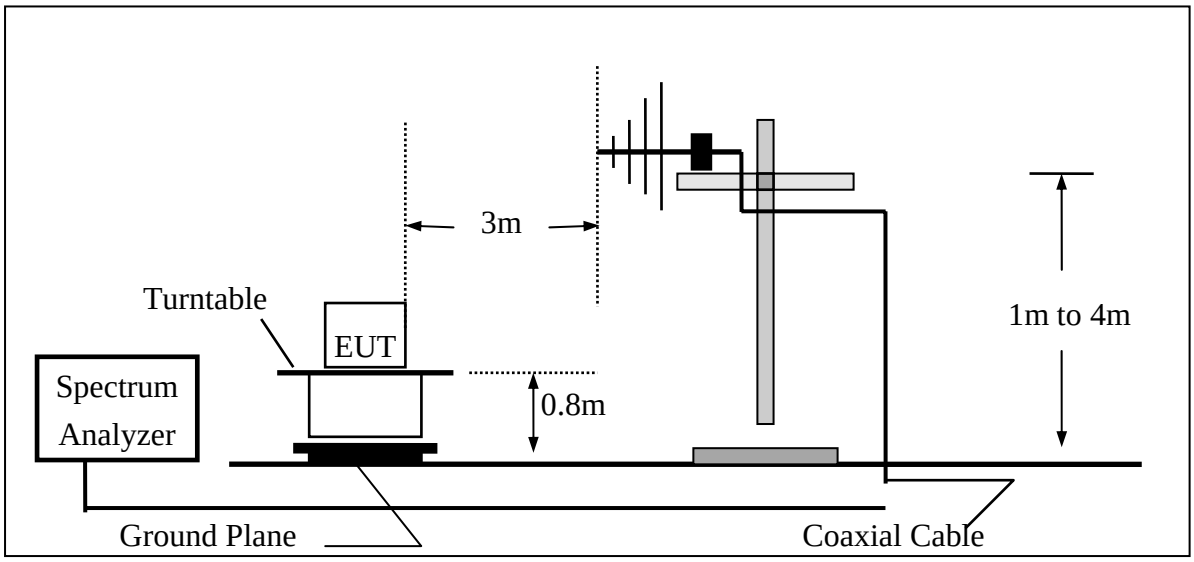
9.3 Test SET-UP:

9.3.1 Conducted Emission at antenna port:

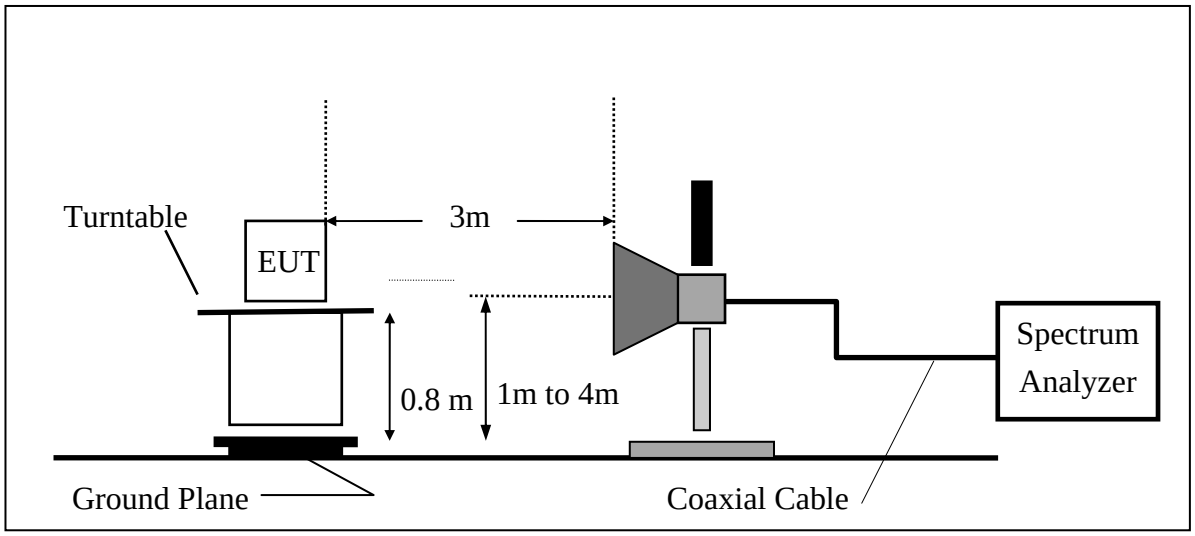
Refer to section 7.3 for details.

9.3.2 Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



9.4 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.
7. Radiated Emission refer to section 9.

9.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

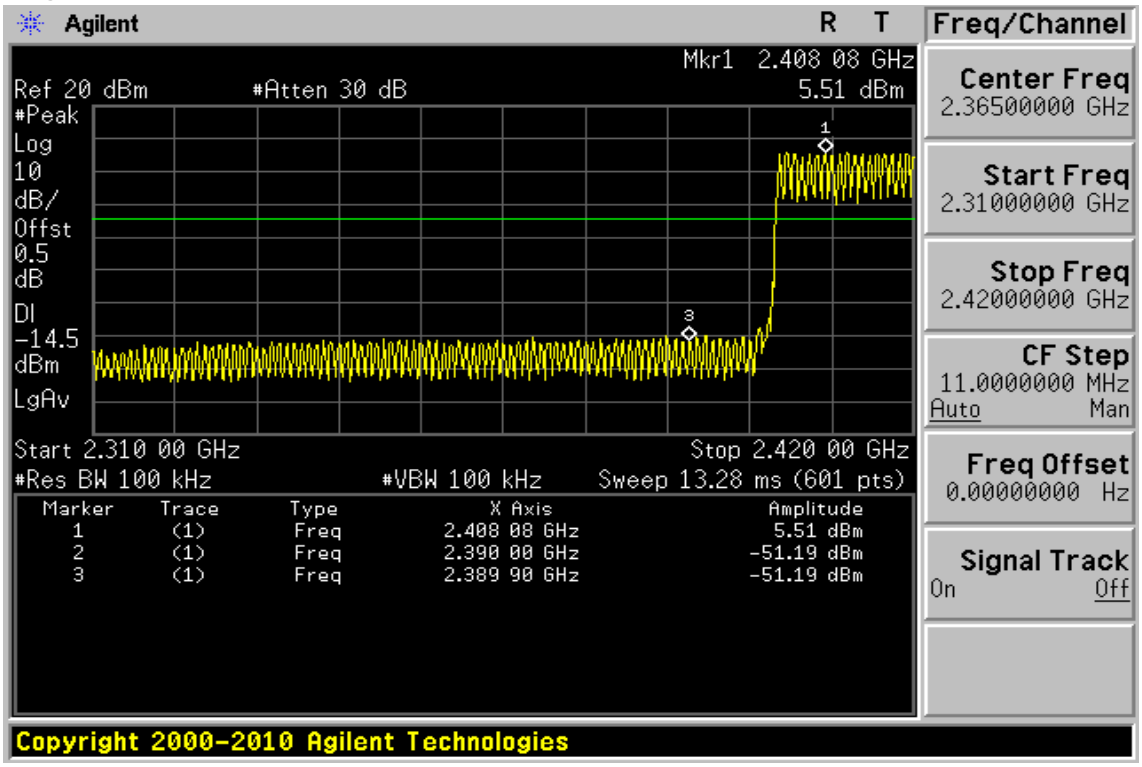
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

9.6 Measurement Result

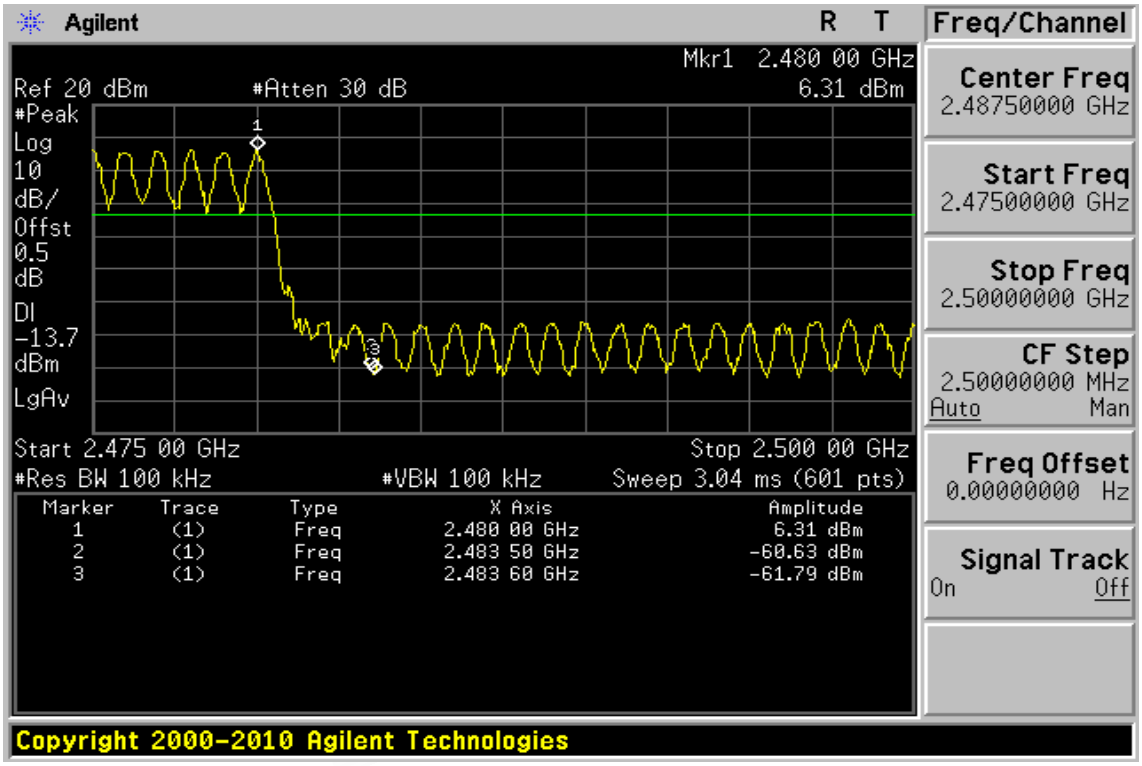
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

BDR Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: (BDR mode)

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2402 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:BANDEDGE LOW	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.
The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	E	Average	31.93	4.68	36.61	54.00	-17.39
2390.00	E	Peak	45.27	4.68	49.95	74.00	-24.05

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2402 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:BANDEDGE LOW	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.
The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2390.00	E	Average	32.45	5.30	37.75	54.00	-16.25
2390.00	E	Peak	45.81	5.30	51.11	74.00	-22.89

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2480 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:BANDEDGE HIGH	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.
The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	E	Average	32.85	5.26	38.11	54.00	-15.89
2483.50	E	Peak	45.73	5.26	50.99	74.00	-23.01

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2480 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:BANDEDGE HIGH	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.
The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	E	Average	32.58	6.29	38.87	54.00	-15.13
2483.50	E	Peak	48.79	6.29	55.08	74.00	-18.92

10. SPURIOUS RADIATED EMISSION TEST

10.1 Standard Applicable

According to §15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

According to RSS-Gen §7.2.5 and RSS-210 issue 8,§A2.9, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

10.2 Measurement Equipment Used:

10.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

10.2.2 Radiated emission:

Refer to section 9.2.2 for details.

10.3. Test SET-UP:

10.3.1 Conducted Emission at antenna port:

Refer to section 7.3 for details.

10.3.2 Radiated emission:

Refer to section 9.3.2 for details.

10.4 Measurement Procedure:

Radiated Emission:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

Conducted Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 100K & VBW = 100K on Spectrum.
3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz
4. Via Software, combine 5 spans of frequency range into one plot

10.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

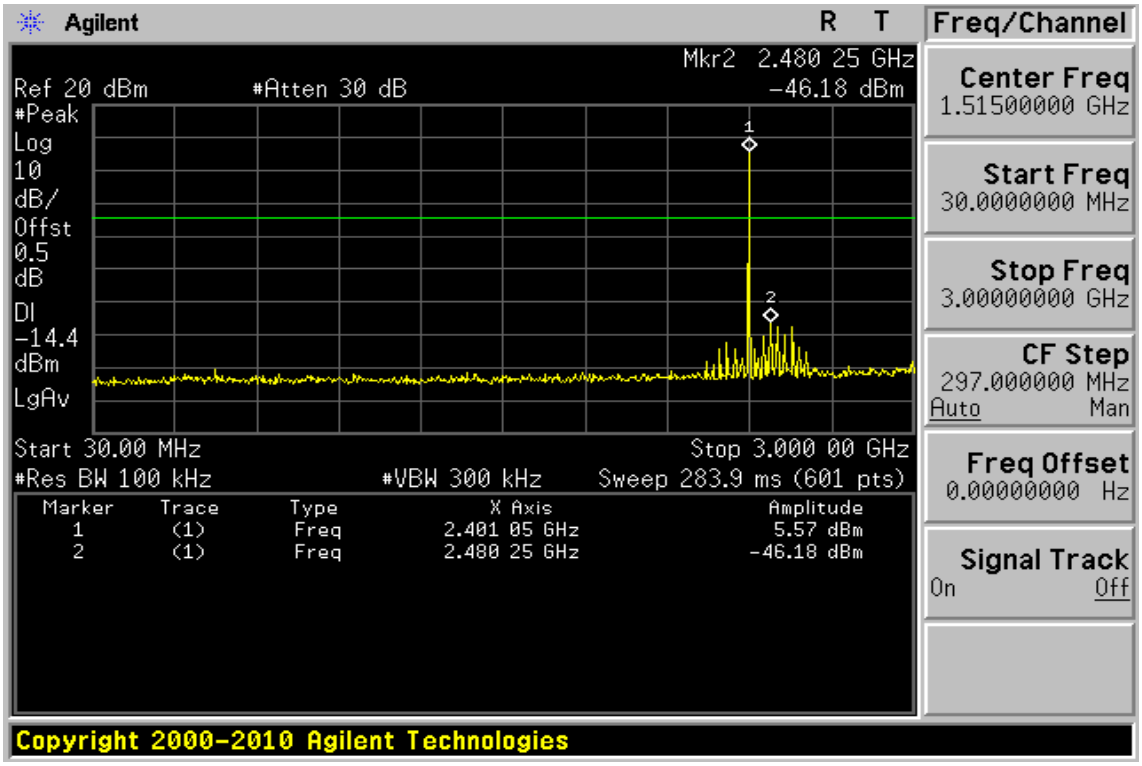
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

10.6 Measurement Result:

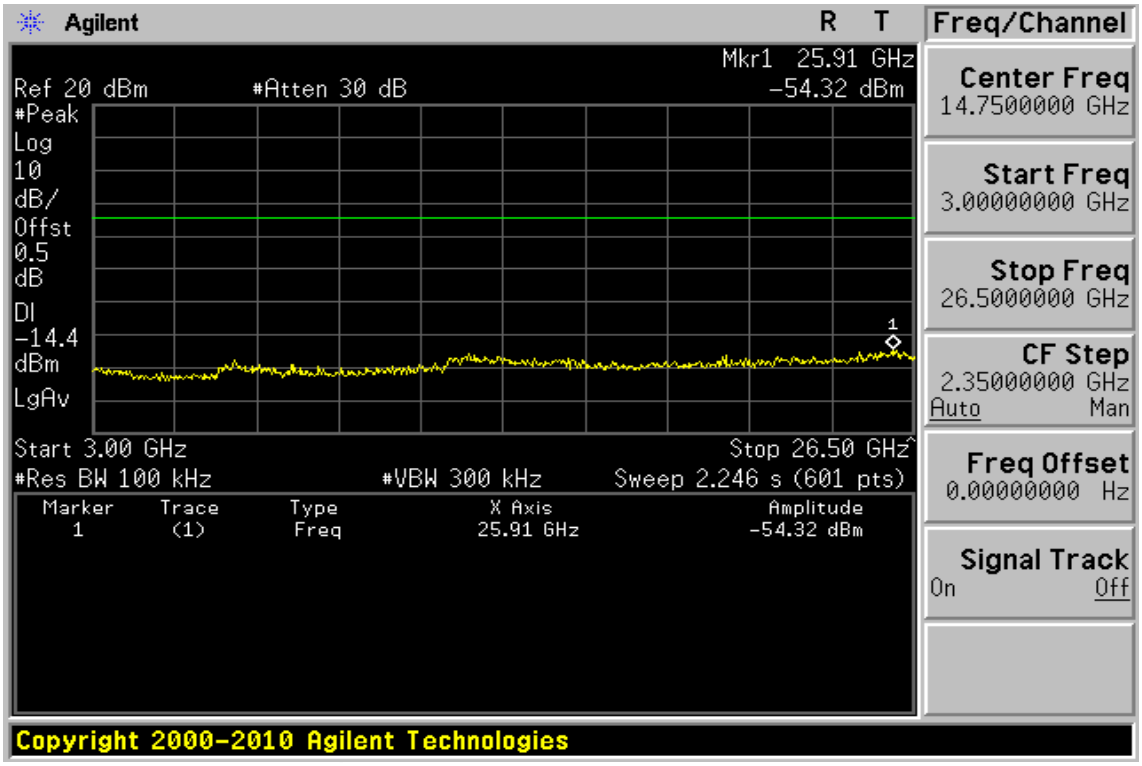
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

BDR Mode Conducted Spurious Emission Measurement Result

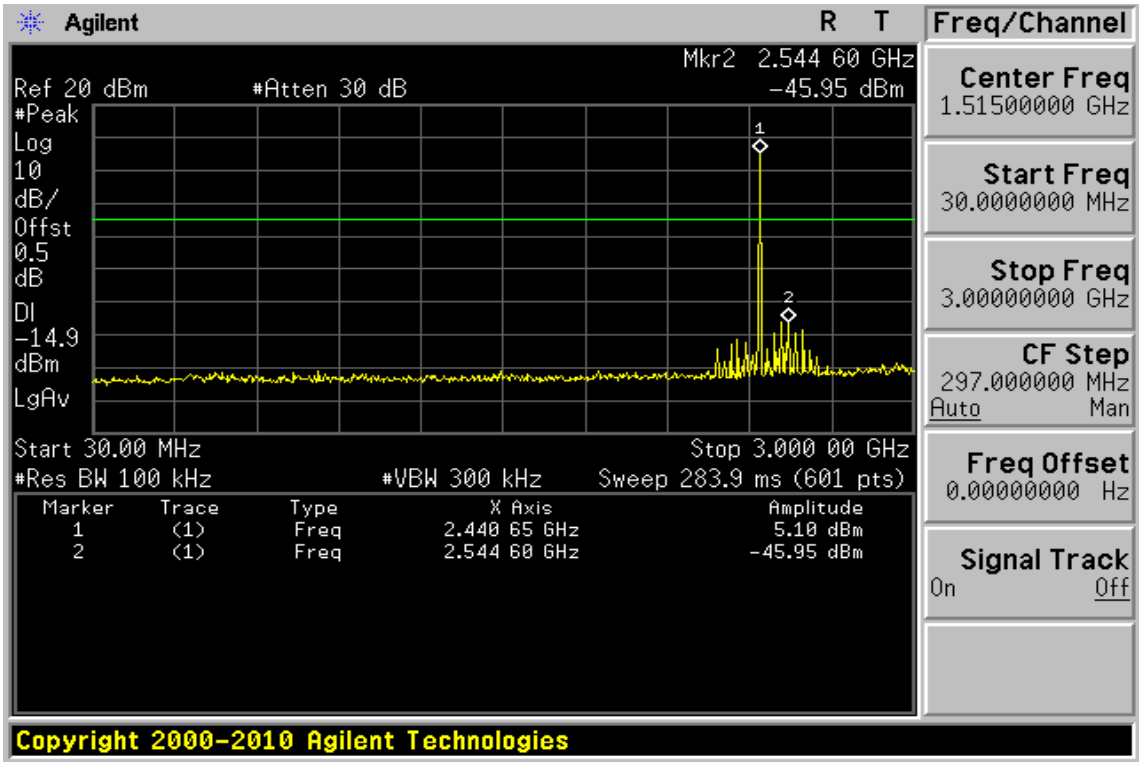
Ch Low 30MHz – 3GHz



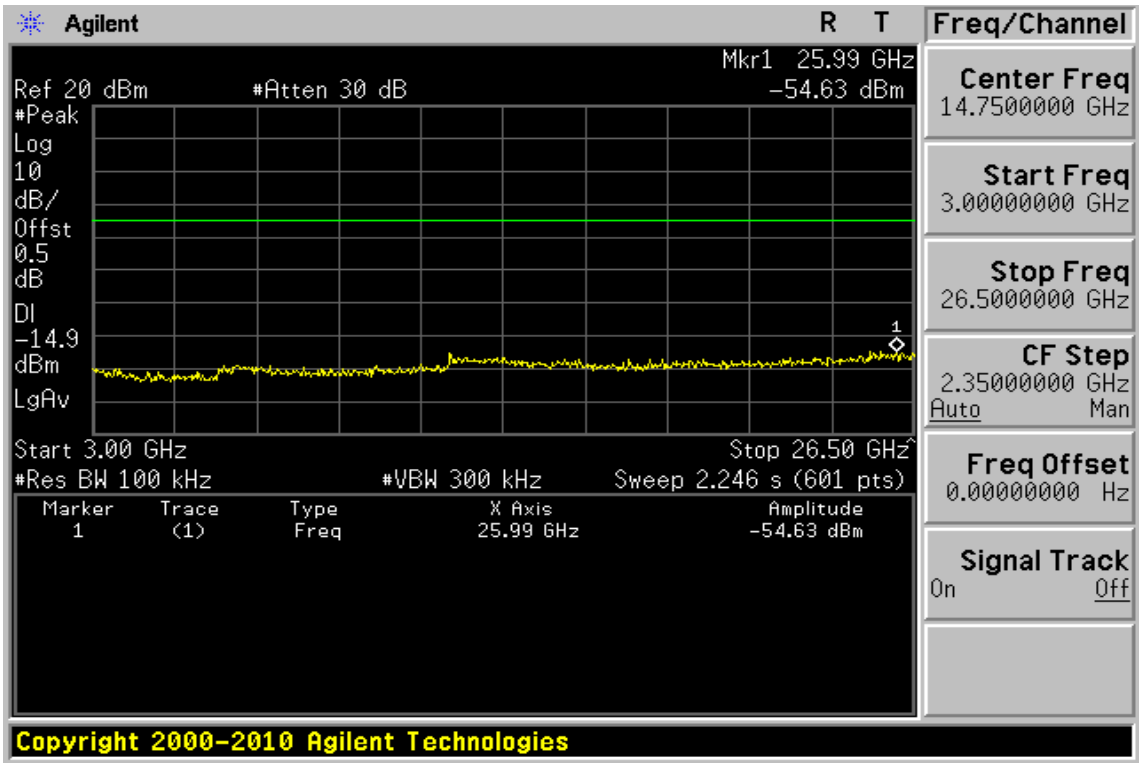
Ch Low 3GHz – 26.5GHz



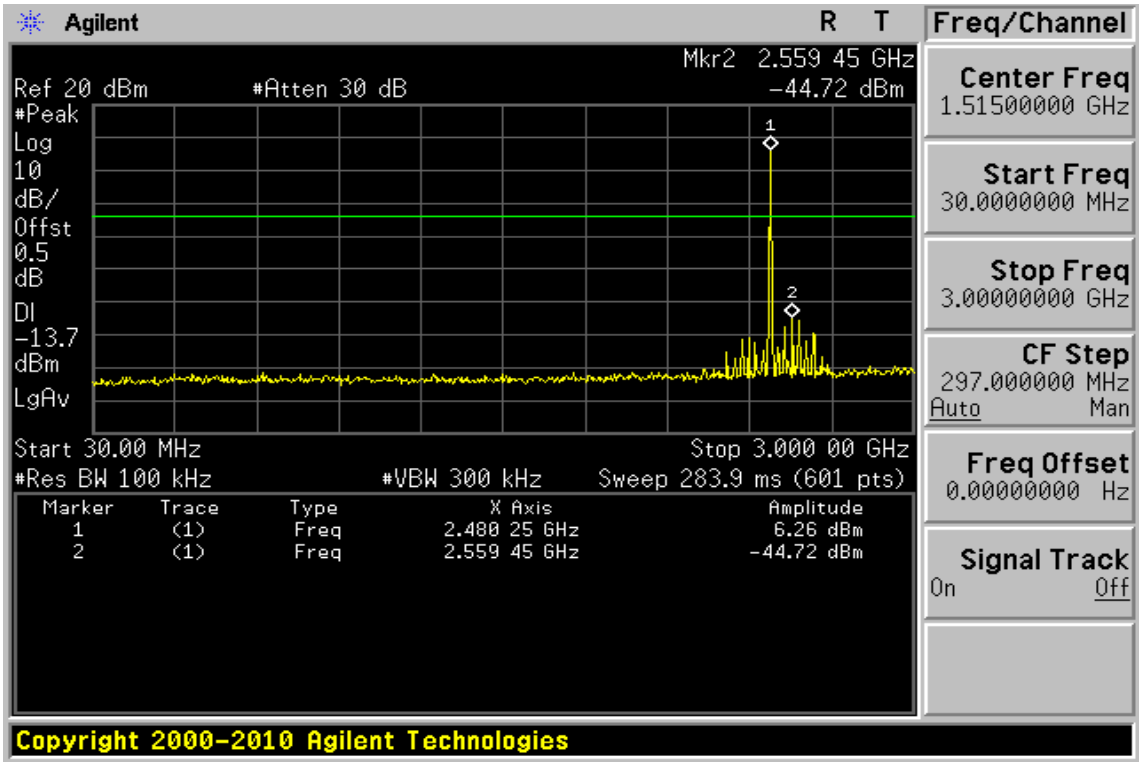
Ch Mid 30MHz – 3GHz



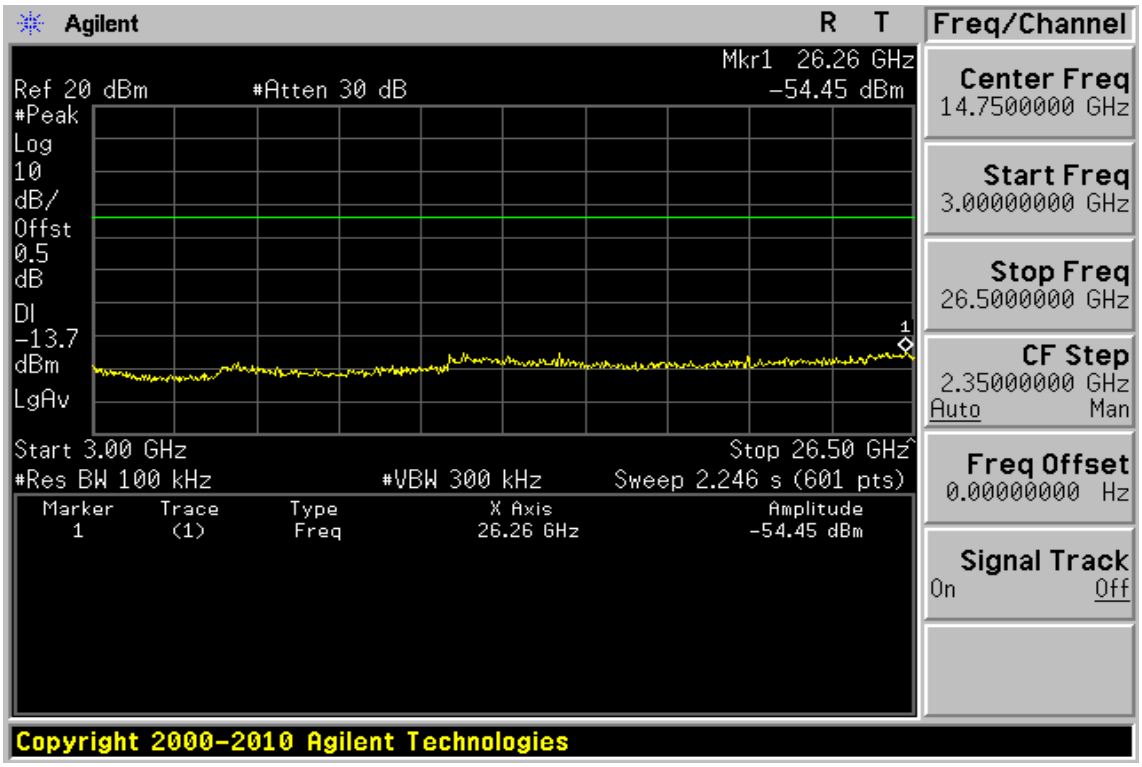
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz

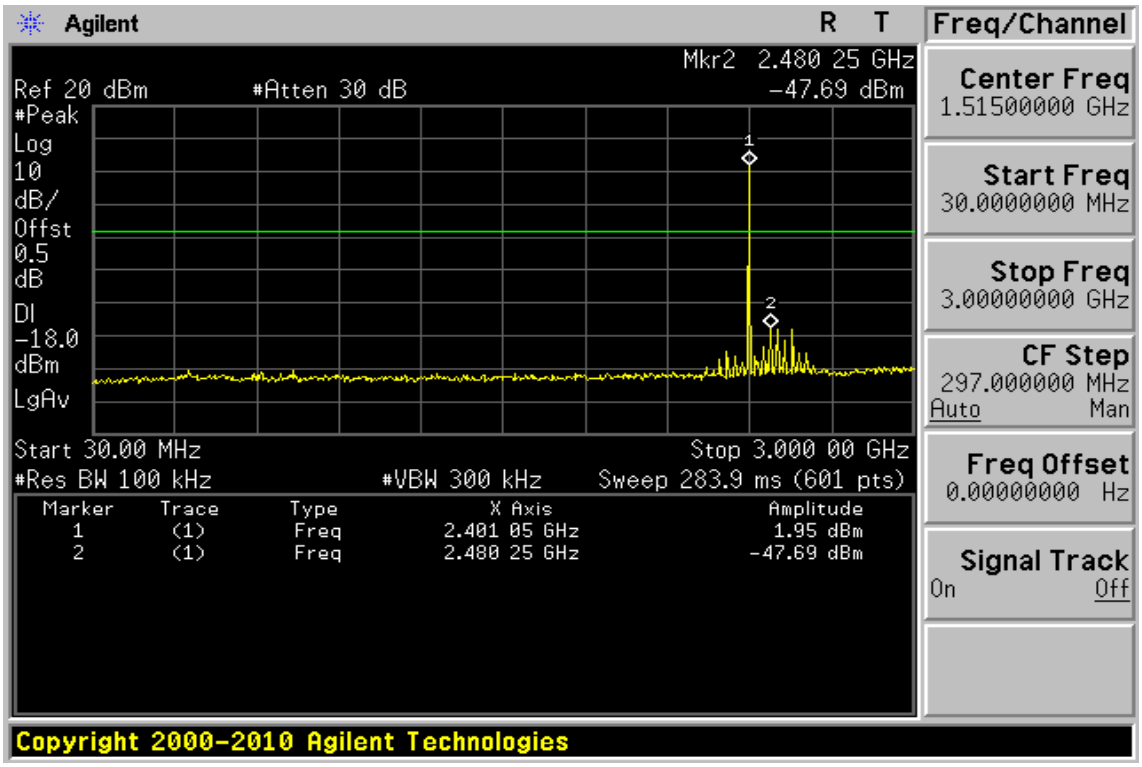


Ch High 3GHz – 26.5GHz

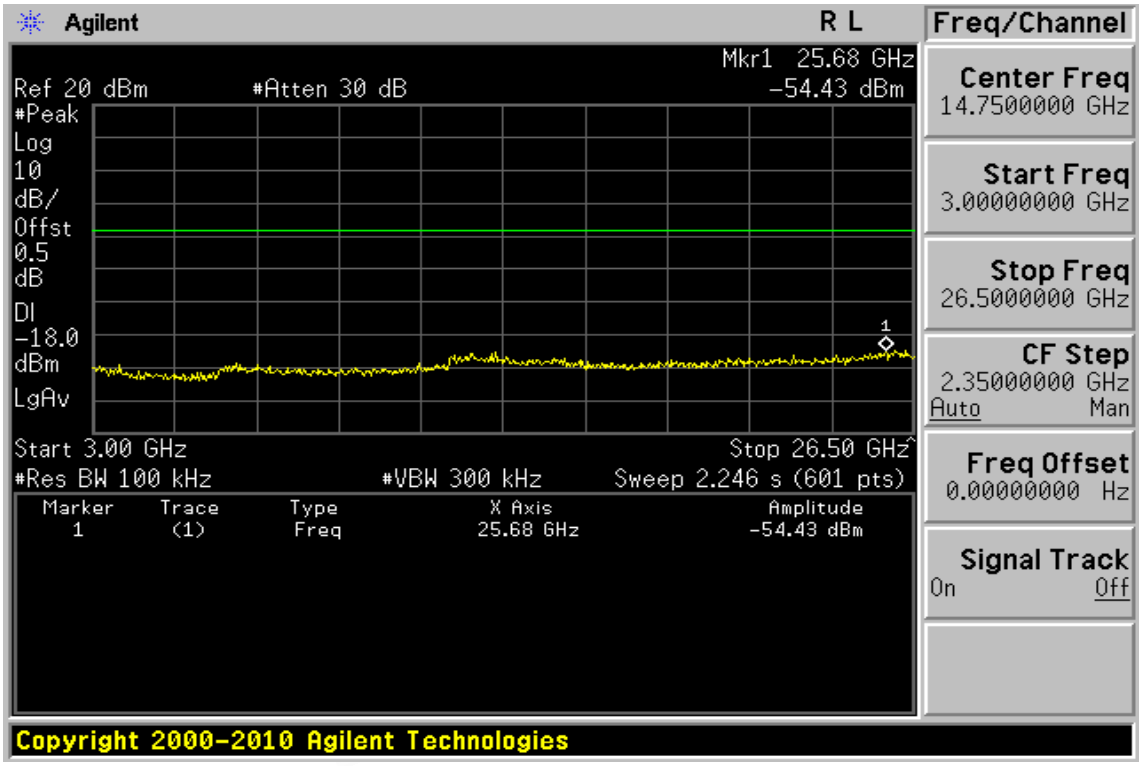


Conducted Spurious Emission Measurement Result (EDR mode)

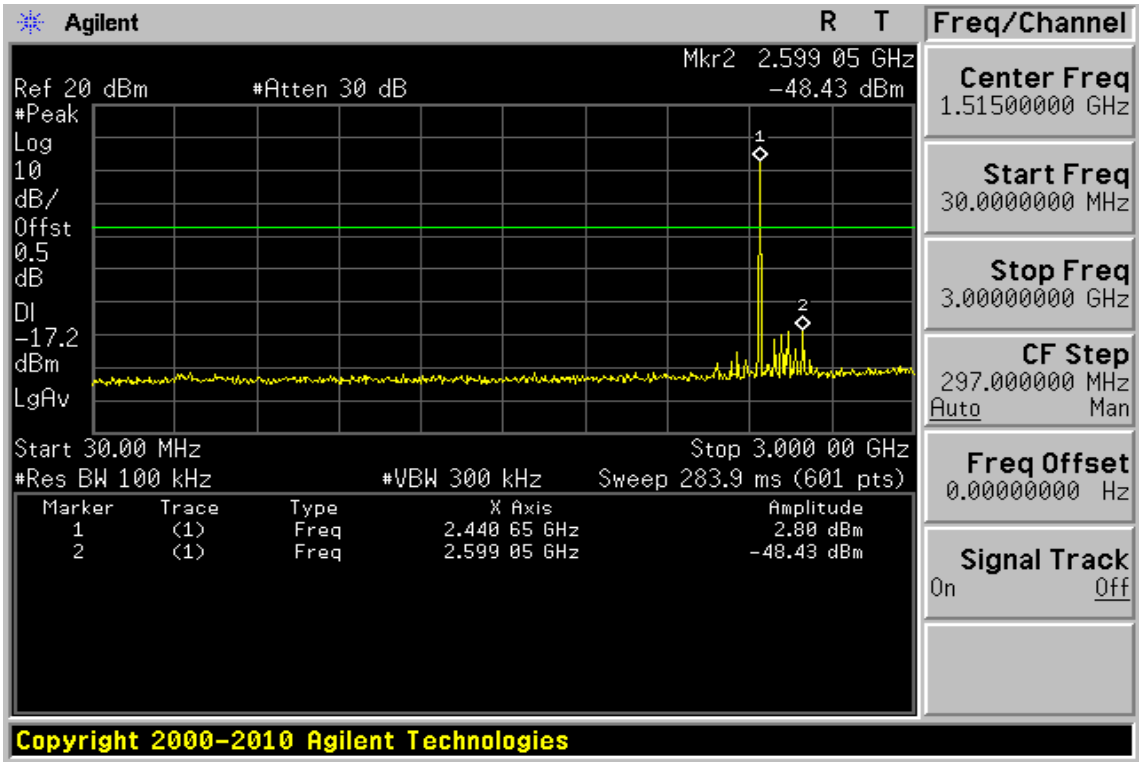
Ch Low 30MHz – 3GHz



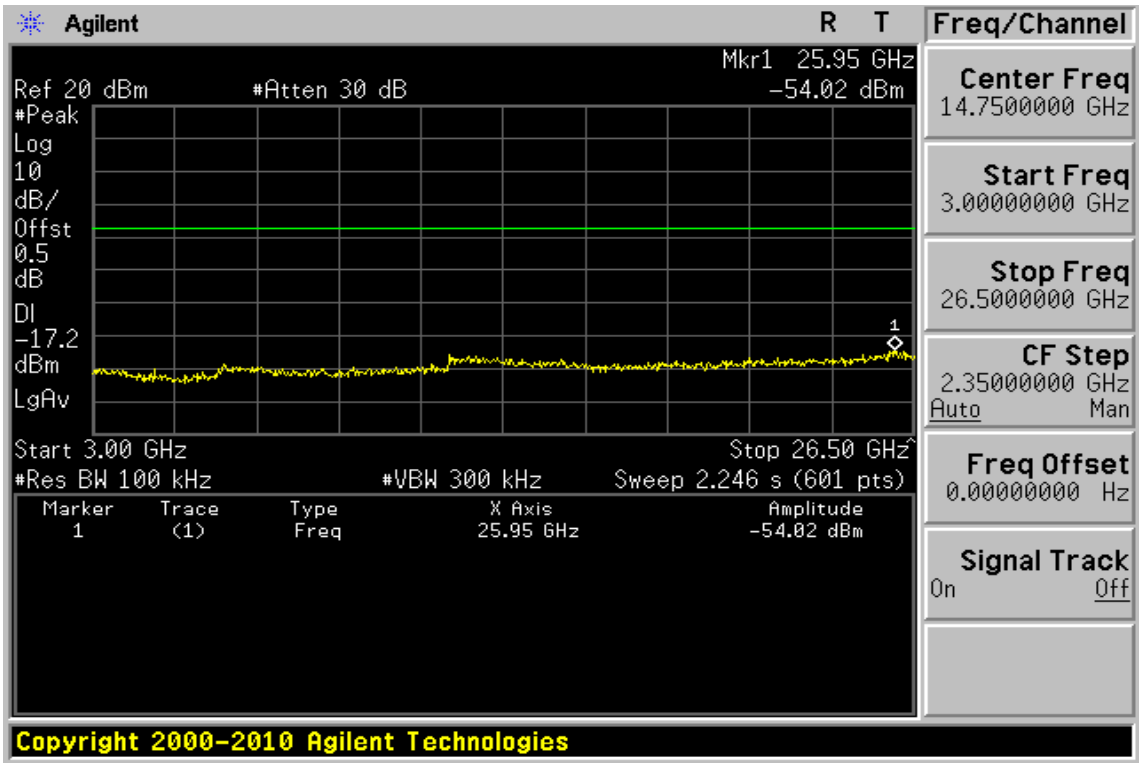
Ch Low 3GHz – 26.5GHz



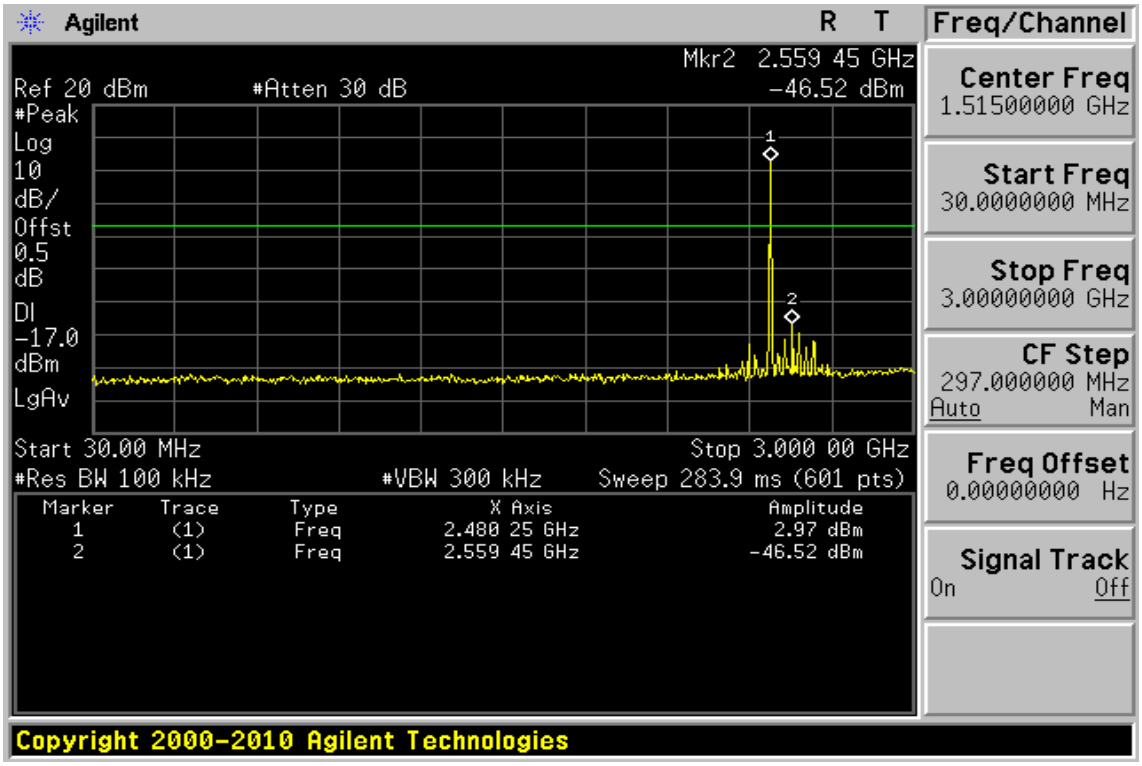
Ch Mid 30MHz – 3GHz



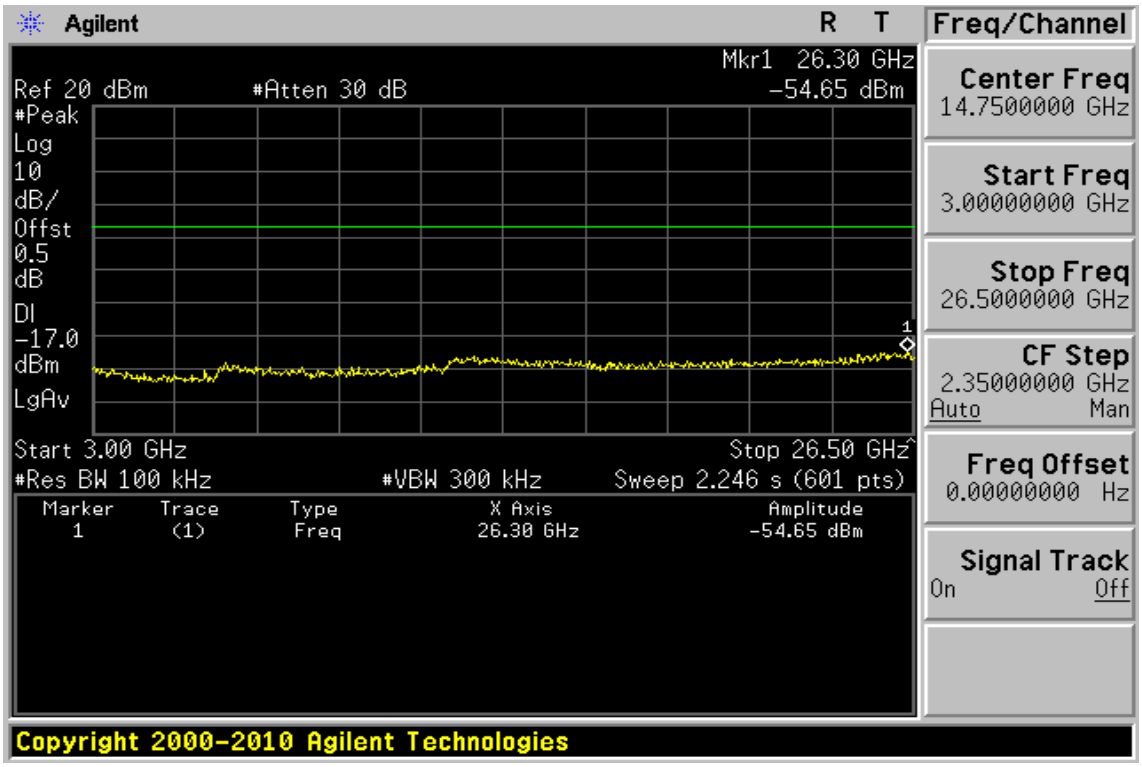
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



Radiated Spurious Emission Measurement Result (worst case BDR mode)

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2402 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:TX LOW	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
39.70	S	Peak	44.44	-13.47	30.97	40.00	-9.03
144.46	S	Peak	40.46	-12.74	27.72	43.50	-15.78
300.63	S	Peak	37.42	-12.55	24.87	46.00	-21.13
419.94	S	Peak	36.80	-10.65	26.15	46.00	-19.85
500.45	S	Peak	42.45	-9.58	32.87	46.00	-13.13
666.32	S	Peak	39.48	-6.27	33.21	46.00	-12.79
4804.00	H	Average	36.11	9.65	45.76	54.00	-8.24
4804.00	H	Peak	43.86	9.65	53.51	74.00	-20.49
7206.00	H	---					
9608.00	H	---					
12010.00	H	---					
14412.00	H	---					
16814.00	H	---					
19216.00	H	---					
21618.00	H	---					
24020.00	H	---					

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2402 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:TX LOW	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
67.83	S	Peak	39.90	-16.05	23.85	40.00	-16.15
200.72	S	Peak	41.44	-16.10	25.34	43.50	-18.16
365.62	S	Peak	43.05	-11.49	31.56	46.00	-14.44
500.45	S	Peak	40.55	-9.58	30.97	46.00	-15.03
666.32	S	Peak	40.65	-6.27	34.38	46.00	-11.62
701.24	S	Peak	40.00	-5.73	34.27	46.00	-11.73
4804.00	H	Average	39.55	9.69	49.24	54.00	-4.76
4804.00	H	Peak	45.12	9.69	54.81	74.00	-19.19
7206.00	H	---					
9608.00	H	---					
12010.00	H	---					
14412.00	H	---					
16814.00	H	---					
19216.00	H	---					
21618.00	H	---					
24020.00	H	---					

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2441 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:TX MID	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
39.70	S	Peak	46.92	-13.47	33.45	40.00	-6.55
144.46	S	Peak	39.51	-12.74	26.77	43.50	-16.73
300.63	S	Peak	37.68	-12.55	25.13	46.00	-20.87
500.45	S	Peak	41.83	-9.58	32.25	46.00	-13.75
666.32	S	Peak	39.47	-6.27	33.20	46.00	-12.80
832.19	S	Peak	31.94	-3.86	28.08	46.00	-17.92
4882.00	H	Average	33.46	10.15	43.61	54.00	-10.39
4882.00	H	Peak	43.63	10.15	53.78	74.00	-20.22
7323.00	H	---					
9764.00	H	---					
12205.00	H	---					
14646.00	H	---					
17087.00	H	---					
19528.00	H	---					
21969.00	H	---					
24410.00	H	---					

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2441 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:TX MID	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
39.70	S	Peak	42.02	-13.47	28.55	40.00	-11.45
152.22	S	Peak	37.23	-12.32	24.91	43.50	-18.59
367.56	S	Peak	42.61	-11.46	31.15	46.00	-14.85
499.48	S	Peak	40.27	-9.60	30.67	46.00	-15.33
667.29	S	Peak	39.21	-6.25	32.96	46.00	-13.04
834.13	S	Peak	33.27	-3.85	29.42	46.00	-16.58
4882.00	H	Average	25.36	10.09	35.45	54.00	-18.55
4882.00	H	Peak	42.45	10.09	52.54	74.00	-21.46
7323.00	H	---					
9764.00	H	---					
12205.00	H	---					
14646.00	H	---					
17087.00	H	---					
19528.00	H	---					
21969.00	H	---					
24410.00	H	---					

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2480 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:TX HIGH	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
39.70	S	Peak	44.17	-13.47	30.70	40.00	-9.30
166.77	S	Peak	41.48	-12.87	28.61	43.50	-14.89
300.63	S	Peak	38.00	-12.55	25.45	46.00	-20.55
500.45	S	Peak	41.81	-9.58	32.23	46.00	-13.77
667.29	S	Peak	37.77	-6.25	31.52	46.00	-14.48
893.30	S	Peak	35.44	-2.94	32.50	46.00	-13.50
4960.00	H	Average	34.75	10.04	44.79	54.00	-9.21
4960.00	H	Peak	45.00	10.04	55.04	74.00	-18.96
7440.00	H	---					
9920.00	H	---					
12400.00	H	---					
14880.00	H	---					
17360.00	H	---					
19840.00	H	---					
22320.00	H	---					
24800.00	H	---					

Operation Band	:BDR	Test Date	:2012-09-15
Fundamental Frequency	:2480 MHz	Temp./Humi.	:26.2 deg_C / 60 RH
Operation Mode	:TX HIGH	Engineer	:Marcus
EUT Pol.	:H plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV / m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV / m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
31.94	S	Peak	44.14	-14.30	29.84	40.00	-10.16
200.72	S	Peak	41.32	-16.10	25.22	43.50	-18.28
300.63	S	Peak	42.61	-12.55	30.06	46.00	-15.94
366.59	S	Peak	43.02	-11.48	31.54	46.00	-14.46
500.45	S	Peak	39.72	-9.58	30.14	46.00	-15.86
701.24	S	Peak	39.66	-5.73	33.93	46.00	-12.07
4960.00	H	Average	35.97	9.89	45.86	54.00	-8.14
4960.00	H	Peak	42.47	9.89	52.36	74.00	-21.64
7440.00	H	---					
9920.00	H	---					
12400.00	H	---					
14880.00	H	---					
17360.00	H	---					
19840.00	H	---					
22320.00	H	---					
24800.00	H	---					

11. FREQUENCY SEPARATION

11.1 Standard Applicable

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

According to RSS 210 issue 8, A8.1(b), 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.

11.2 Measurement Equipment Used:

Refer to section 7.2 for details.

11.3 Test Set-up:

Refer to section 7.3 for details.

11.4 Measurement Procedure:

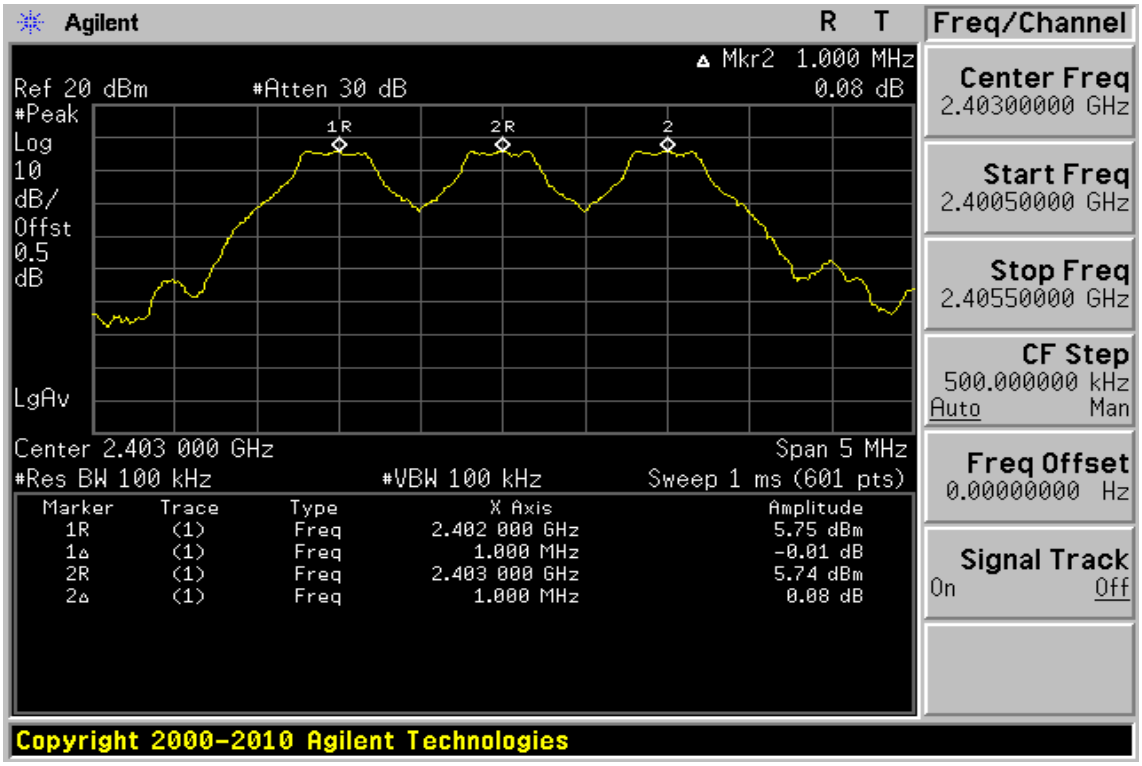
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW, VBW=100KHz, Adjust Span to 5MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

11.5 Measurement Result:

Channel separation (MHz)	Limit	Result
1	>=25KHz or 2/3 times 20dB bandwidth	PASS

Note: Refer to next page for plots.

Frequency Separation Test Data



12. NUMBER OF HOPPING FREQUENCY

12.1 Standard Applicable

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

According to RSS-210 issue 8,§A8.1(d), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

12.2 Measurement Equipment Used:

Refer to section 7.2 for details.

12.3 Test Set-up:

Refer to section 7.3 for details.

12.4 Measurement Procedure:

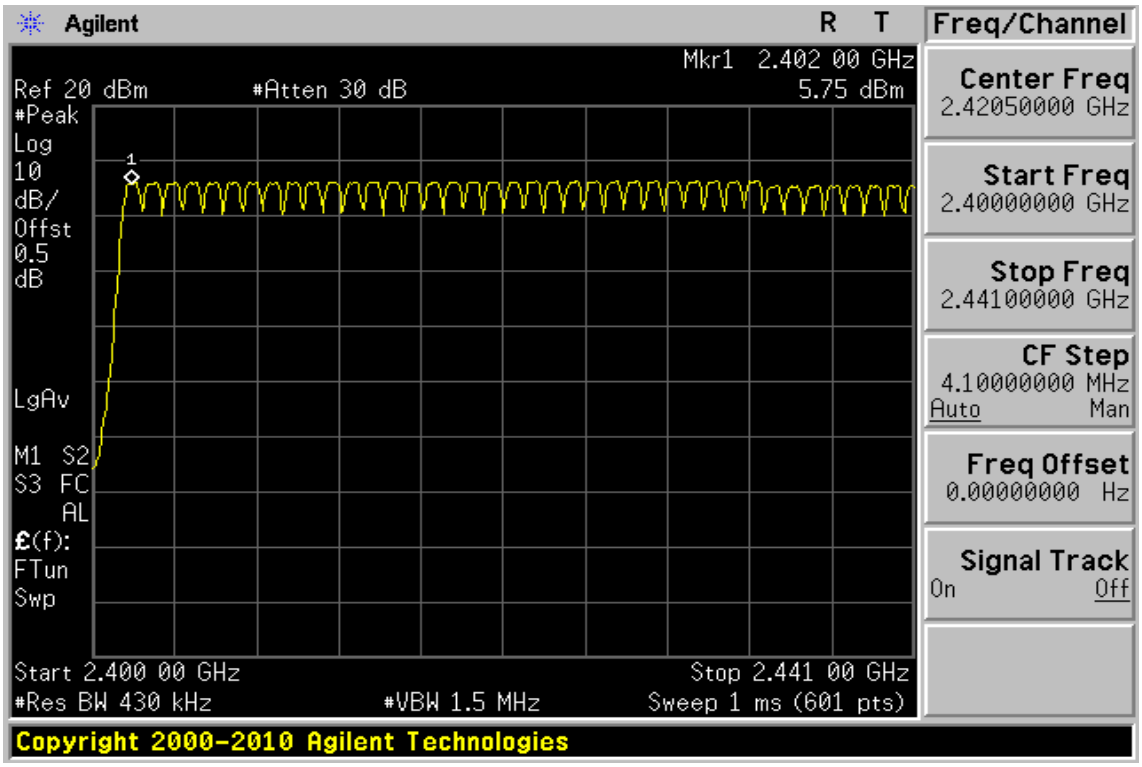
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW=430KHz,, VBW=1.5MHz.
5. Max hold, view and count how many channel in the band.

12.5 Measurement Result:

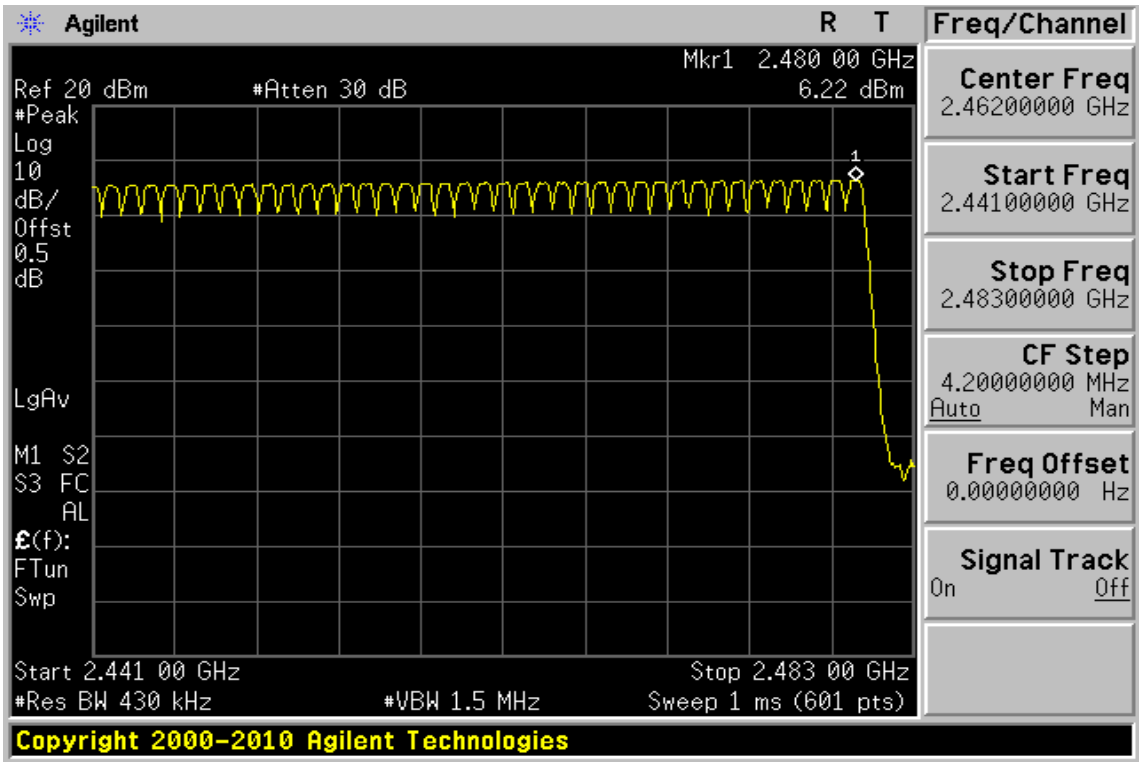
Note: Refer to next page for plots.

Channel Number

2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



13. TIME OF OCCUPANCY (DWELL TIME)

13.1 Standard Applicable

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

According to RSS-210 issue 8,§A8.1(d), Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping 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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

13.2 Measurement Equipment Used:

Refer to section 7.2 for details.

13.3 Test Set-up:

Refer to section 7.3 for details.

13.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=1MHz, 3MHz, Span = 0Hz , Adjust Sweep = 2~7ms.
5. Repeat above procedures until all frequency measured were complete.

13.5 Measurement Result

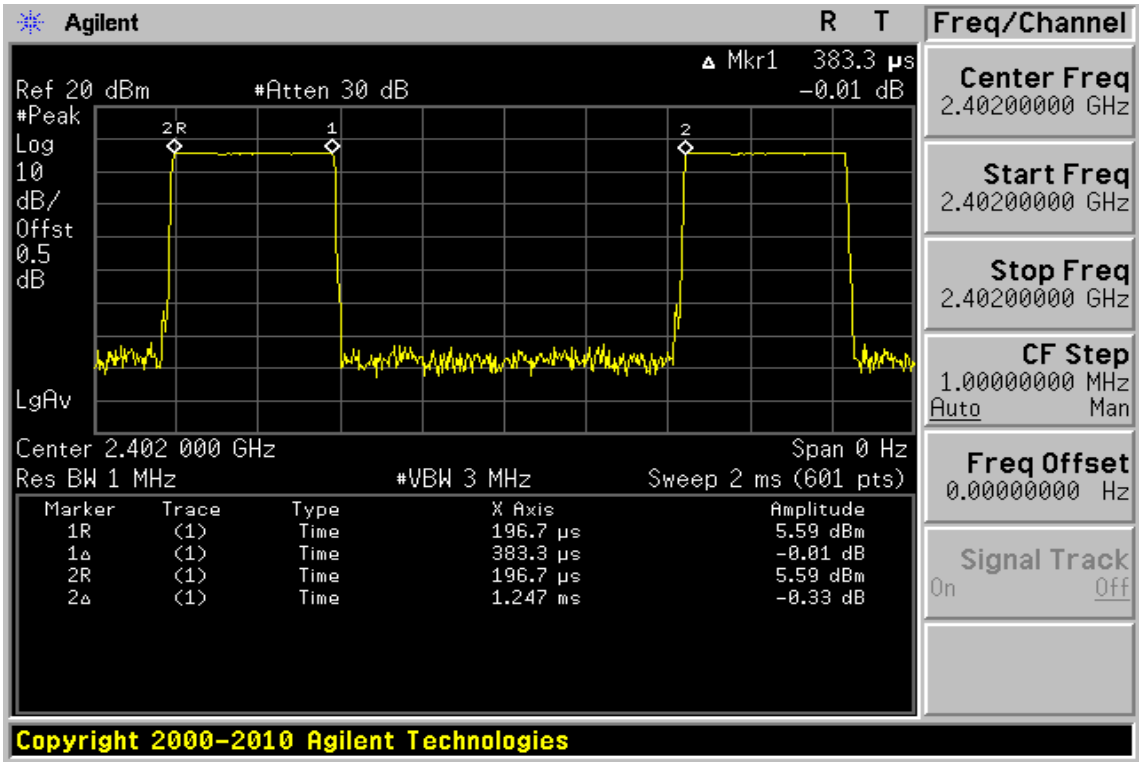
A period time = 0.4 (s) * 79 = 31.6 (s)

CH Low	DH1 time slot =	0.3833 (ms)	* (1600/2/79) * 31.6 =	122.56	(ms)
	DH3 time slot =	1.642 (ms)	* (1600/4/79) * 31.6 =	262.72	(ms)
	DH5 time slot =	2.895 (ms)	* (1600/6/79) * 31.6 =	308.8	(ms)
CH Mid	DH1 time slot =	0.3833 (ms)	* (1600/2/79) * 31.6 =	122.56	(ms)
	DH3 time slot =	1.642 (ms)	* (1600/4/79) * 31.6 =	262.72	(ms)
	DH5 time slot =	2.895 (ms)	* (1600/6/79) * 31.6 =	308.8	(ms)
CH High	DH1 time slot =	0.3833 (ms)	* (1600/2/79) * 31.6 =	122.56	(ms)
	DH3 time slot =	1.642 (ms)	* (1600/4/79) * 31.6 =	262.72	(ms)
	DH5 time slot =	2.895 (ms)	* (1600/6/79) * 31.6 =	308.8	(ms)

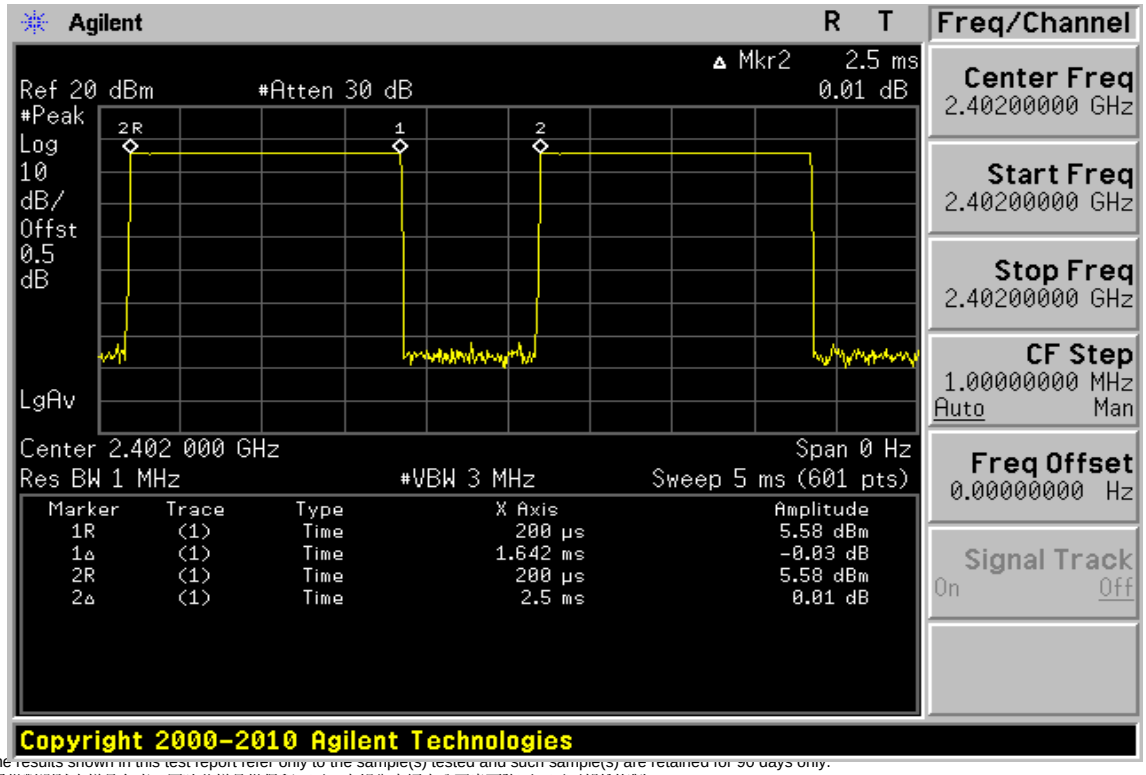
Note: Refer to next page for plots.

CH-Low

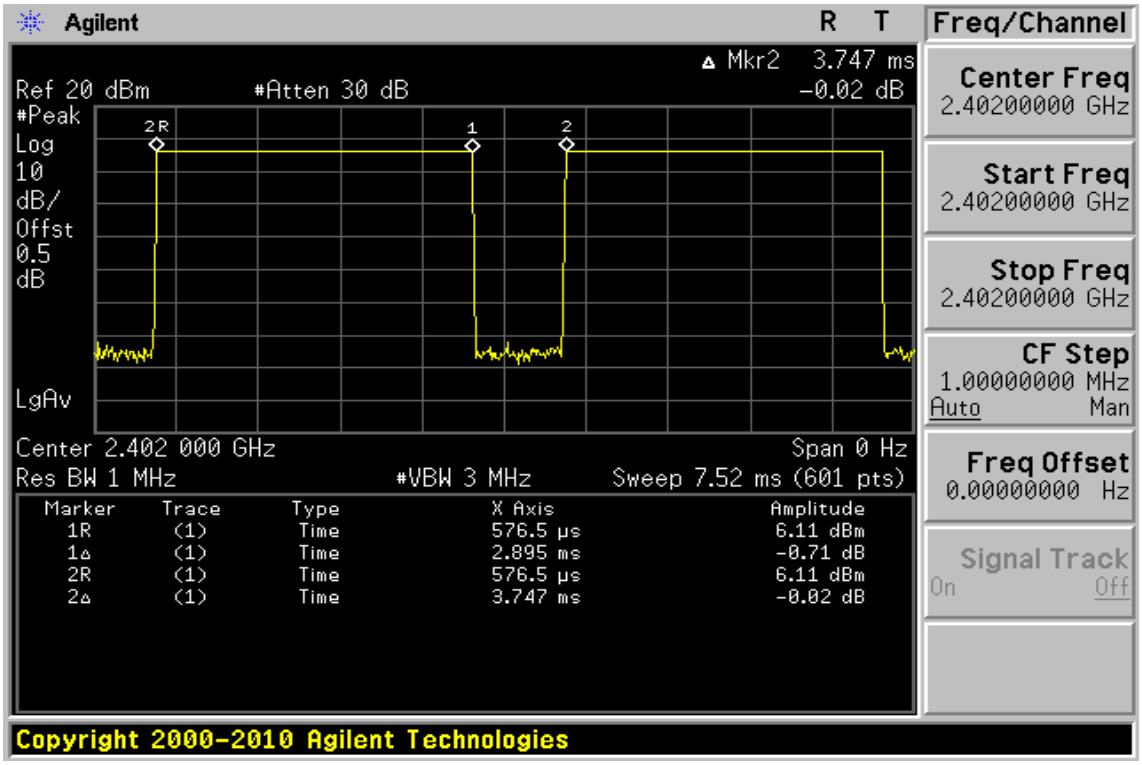
DH1



DH3

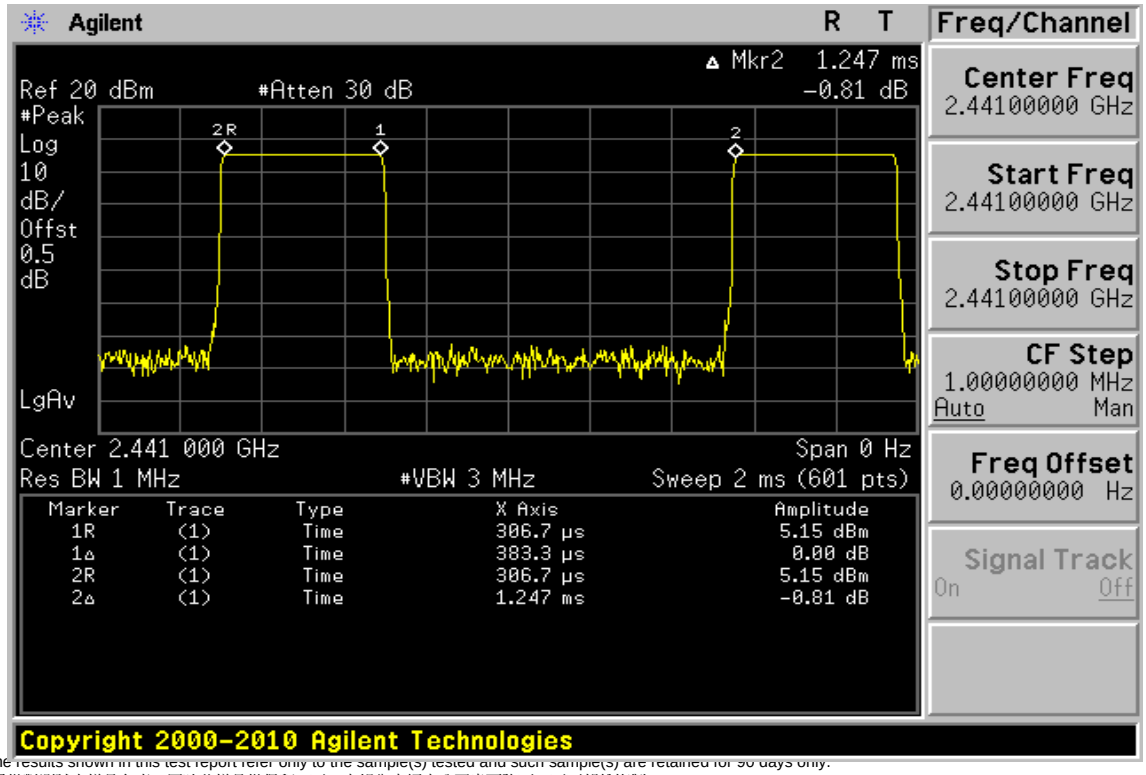


DH5

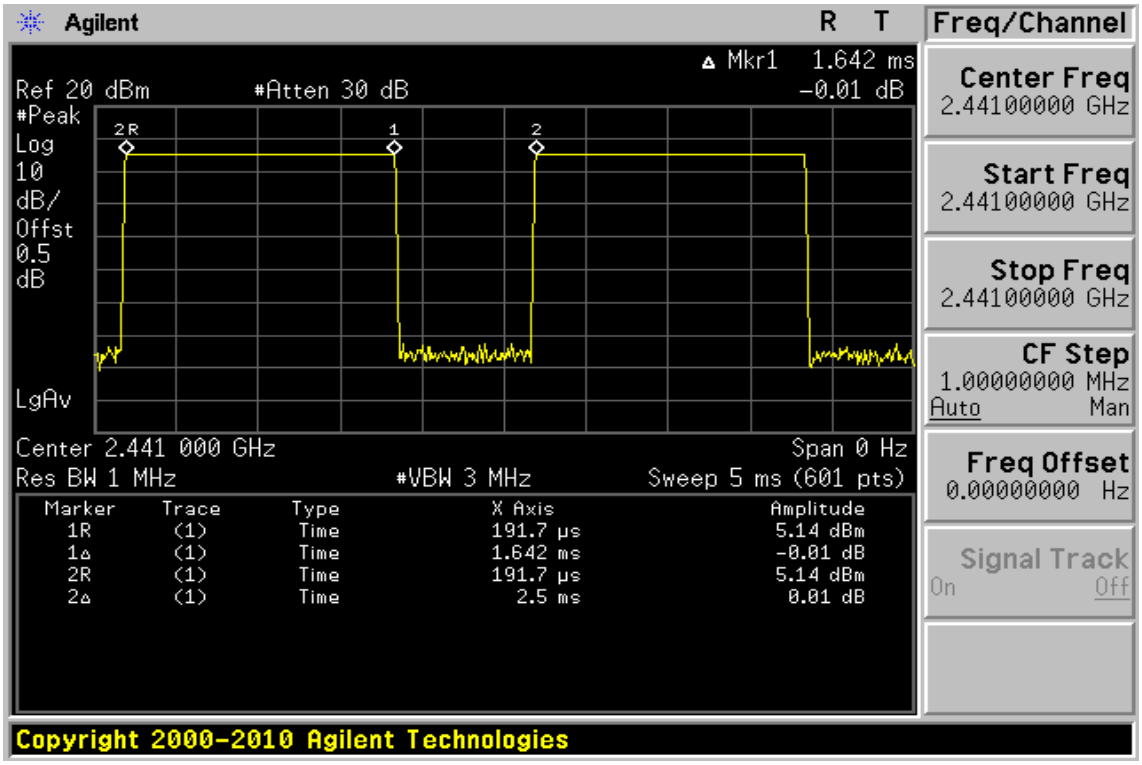


CH-Mid

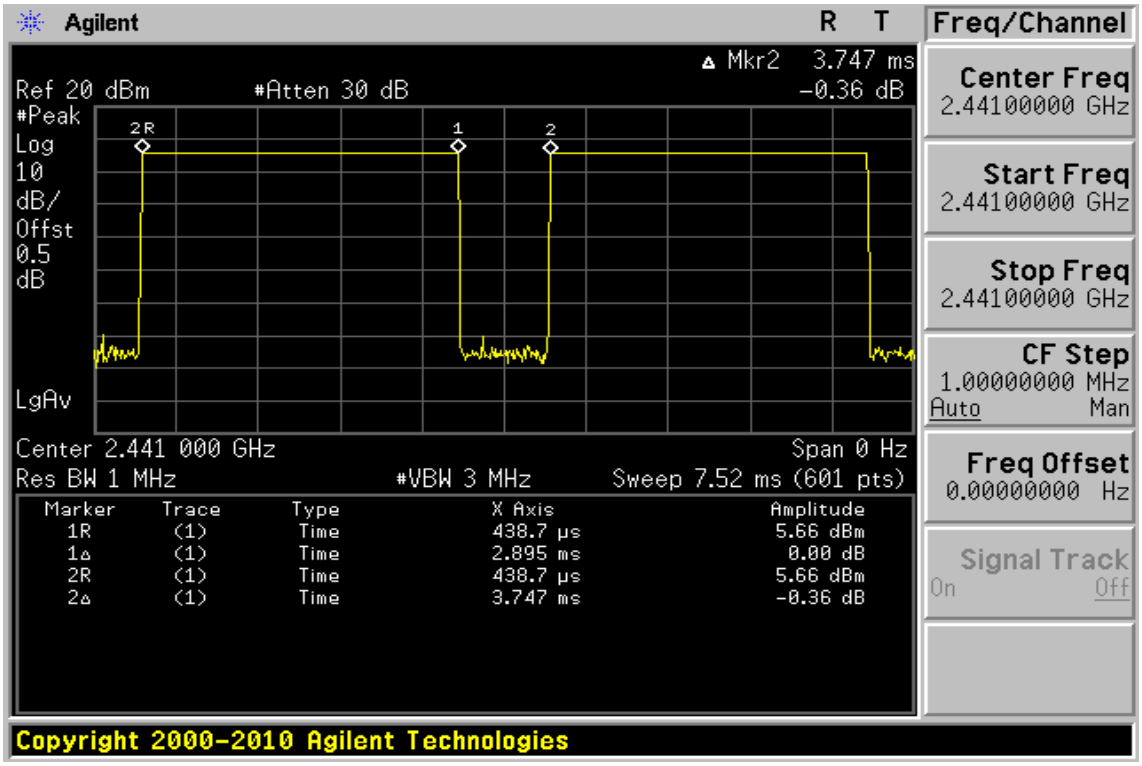
DH1



DH3

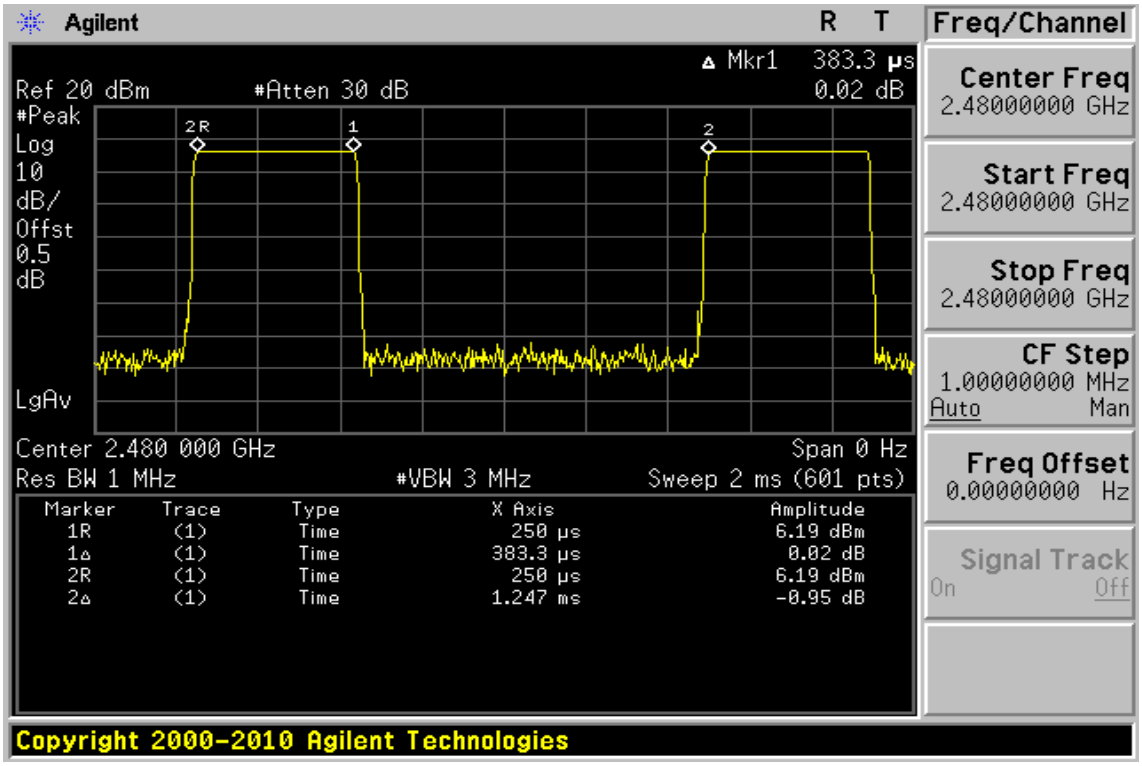


DH5

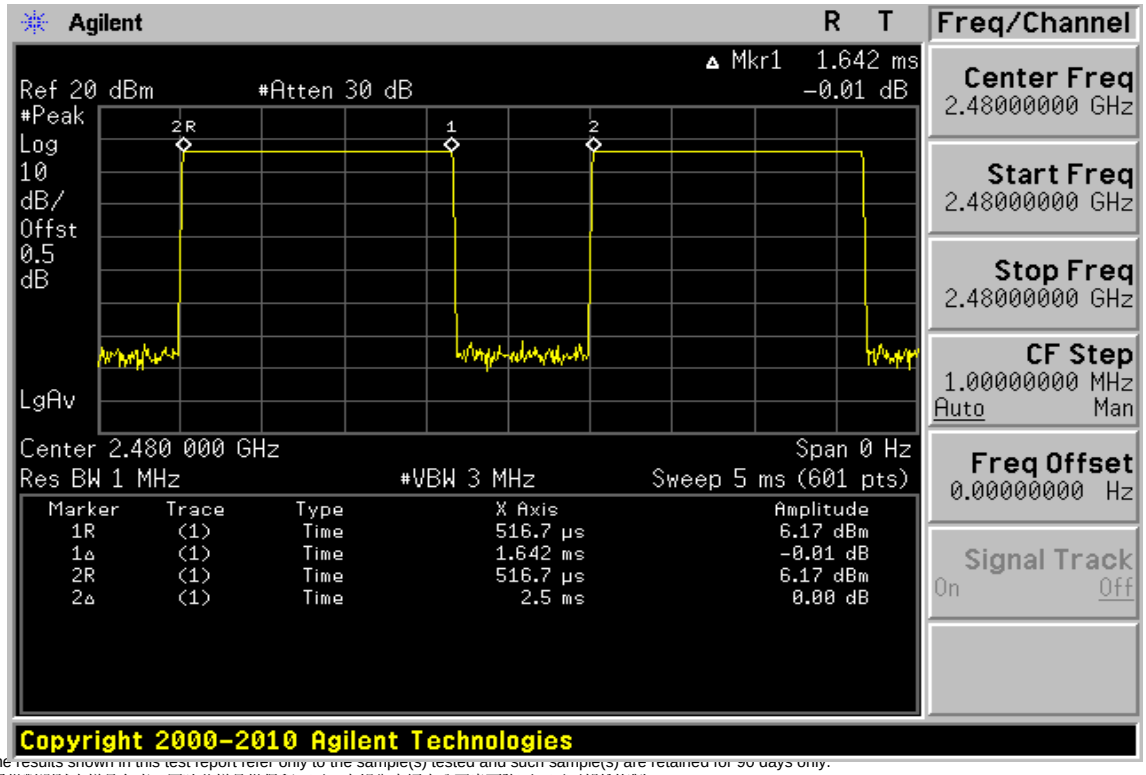


CH-High

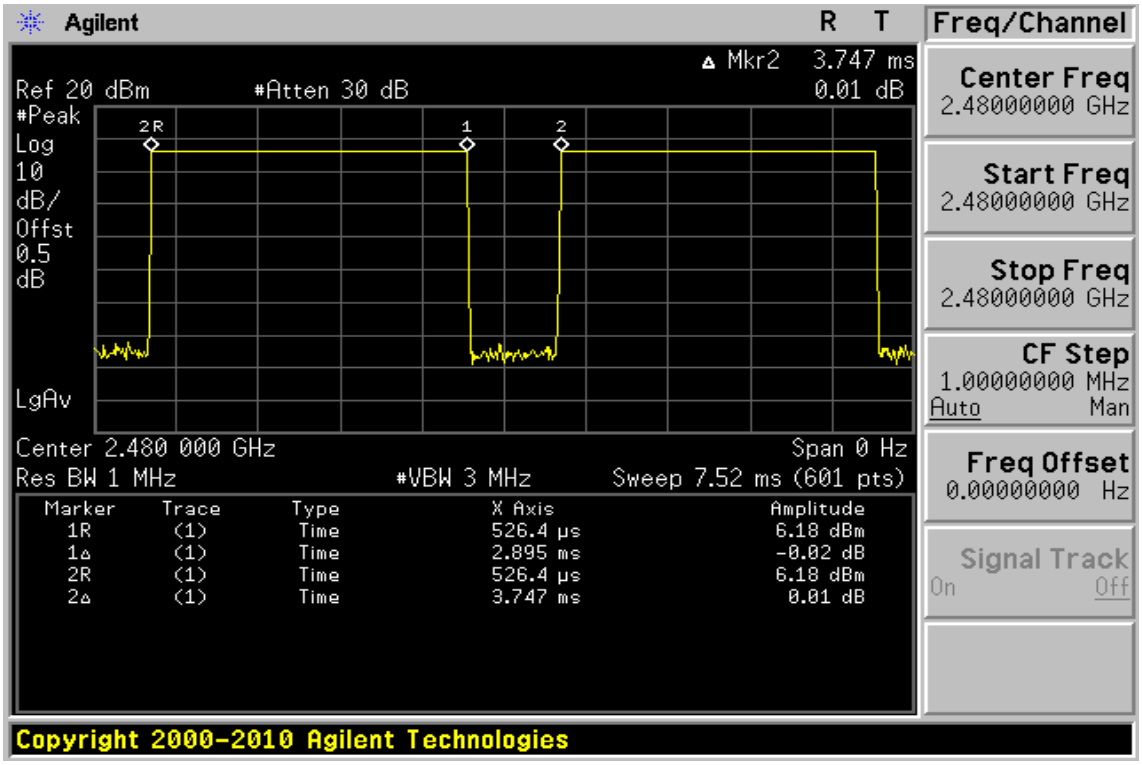
DH1



DH3



DH5



14. ANTENNA REQUIREMENT

14.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

According to RSS-GEN 7.1.2, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

14.2 Antenna Connected Construction

The directional gains of antenna used for transmitting is 2.5 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~