ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

OF

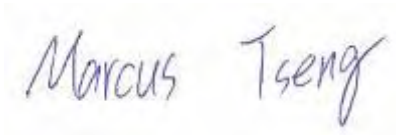
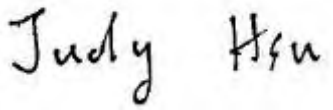
Product Name:	**POS terminal**
Brand Name:	**INGENICO**
Model No.:	**IPA280-01P1802**
Model Differences:	**N/A**
FCC ID:	**XKBIPA280NEWMODEM**
IC:	**2586D-IPA280NWMDM**
Report No.:	**EH/2011/70053**
Issue Date:	**Dec. 21, 2011**
Rule Part:	**§15.247, Cat: DSS** **RSS-210 issue 8:2010, Annex 8**
Prepared for:	**INGENICO** **192, avenue Charles de Gaulle , 92200 Neuilly-sur-Seine, FRANCE**
Prepared by:	**SGS Taiwan Ltd.** **Electronics & Communication Laboratory** **No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan.**

CERTIFICATION OF COMPLIANCE

Applicant:	INGENICO 192, avenue Charles de Gaulle , 92200 Neuilly-sur-Seine, FRANCE
Product Name:	POS terminal
Brand Name:	INGENICO
FCC ID:	XKBIPA280NEWMODEM
IC:	2586D-IPA280NWMDM
Model No.:	IPA280-01P1802
Model Difference:	N/A
File Number:	EH/2011/70053
Date of test:	Nov. 08, 2011 ~ Dec. 20, 2011
Date of EUT Received:	Nov. 08, 2011

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. 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 (2003) and RSS-Gen. issue 3:2010, 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 15C:2007, §15.247 and 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:		***Date:***	Dec. 21, 2011
	Marcus Tseng / Engineer		
Prepared By:		***Date:***	Dec. 21, 2011
	Judy Hsu / Clerk		
Approved By:		***Date:***	Dec. 21, 2011
	Jim Chang / Supervisor		

Version

Version No.	Date	Description
00	Dec. 21, 2011	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name:	POS terminal	
Brand Name:	INGENICO	
Model No.:	IPA280-01P1802	
Model Difference:	N/A	
Data Cable:	Model No.: N/A, Supplier: Ingenico	
Hardware Version:	PRE-DVT	
Software Version:	0.60.00.G	
Power Supply:	3.6Vdc Lithium Ion battery or 5Vdc by AC/DC power adapter	
	Battery:	Model No.: IPA200-BAT, Supplier: Ingenico
	Adapter:	Model No.: DSA-10CU-05, Supplier: DVE

Bluetooth:

Bluetooth Version	☐ V1.1 (GFSK) ☐ V1.2 (GFSK) ☐ V2.0 (GFSK) ☐ V2.1 (GFSK) ☐ V2.0 + EDR (GFSK + π/4DQPSK + 8DPSK) ☒ V2.1 + EDR (GFSK + π/4DQPSK + 8DPSK)
Frequency Range	2402 – 2480MHz
Channel number	79 channels max.
Rated Power	1.83 dBm (Peak)
Modulation type	Frequency Hopping Spread Spectrum
Antenna Designation	PIFA Antenna / Gain: 2.41dBi

The EUT is compliance with Bluetooth V2.1 (GFSK + π/4DQPSK + 8DPSK) and IEEE 802.11 b/g Standard standard.

This test report applies for Bluetooth.

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: XKBIPA280NEWMODEM** filing to comply with Section 15.247 of the FCC Part 15C, Subpart C Rules.
And **IC: 2586D-IPA280NWMDM** filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 8.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003) and RSS-Gen: 2010. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

1.4. 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. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. 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. 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.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. 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 tested with a test program to fix the Tx/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

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, 13 of ANSI C63.4-2003 and RSS-Gen:2010.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 of ANSI C63.4-2003 and DA 00-705..

2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

Radiated Emission

Remote Side

Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.
1.	Bluetooth Test Set	Anritsu	MT8852B	6k00006107

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)/ RSS-Gen §7.2.4	AC Power line Conducted Emission	Compliant
§15.247(b)(1)/ RSS-210 issue 8,§A8.4(2)	Peak Output Power	Compliant
§15.247(d) RSS-210 issue 8,§A8.5	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(c) RSS-Gen §7.2.3 RSS-210 issue 8,§A2.9	TX/RX 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)(ii)/ RSS-210 issue 8,§A8.1(d)	Time of Occupancy	Compliant
§15.247/ RSS-210 issue 8,§A8.2(b)	Peak Power Density	Compliant
§15.247(a)(1) RSS210 issue 8,§A8.1(b)	20dB Bandwidth & 99% Power Bandwidth	Compliant
§15.203, §15.247(c)/ RSS-GEN 7.1.2, RSS-210 issue 8,§A8.4	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 (2402MHz)、mid (2441MHz) and high (2480MHz) with BDR mode and DH5 highest data rate are chosen for full testing.

5. AC POWER LINE CONDUCTED EMISSION TEST

5.1. Standard Applicable:

According to §15.207 and RSS-Gen §7.2.2, frequency range 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.		

5.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCS30	828985/004	09/23/2010	09/22/2012
LISN	Rolf-Heine	NNB-2/16Z	99012	03/31/2011	03/30/2012
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/31/2011	03/30/2012
Coaxial Cables	N/A	WK CE Cable	N/A	01/04/2011	01/05/2013

5.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

5.4. 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.

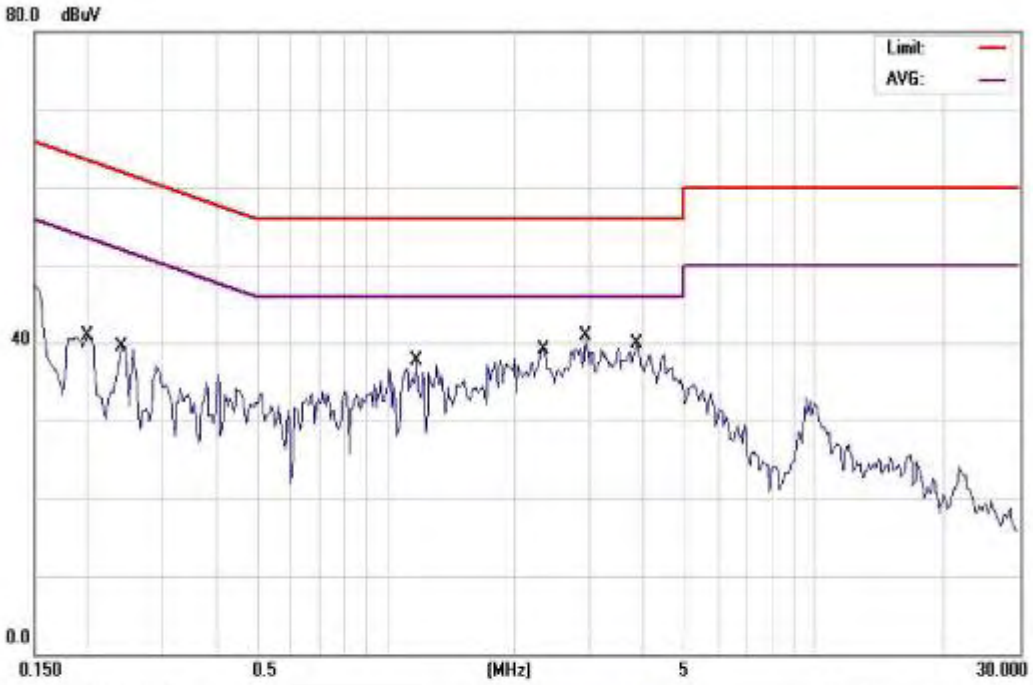
5.5. Measurement Result:

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:	Bluetooth Mode			Test Date:	Dec. 14, 2011
Temperature:	26 ℃	Humidity:	59 %	Test By:	Marcus

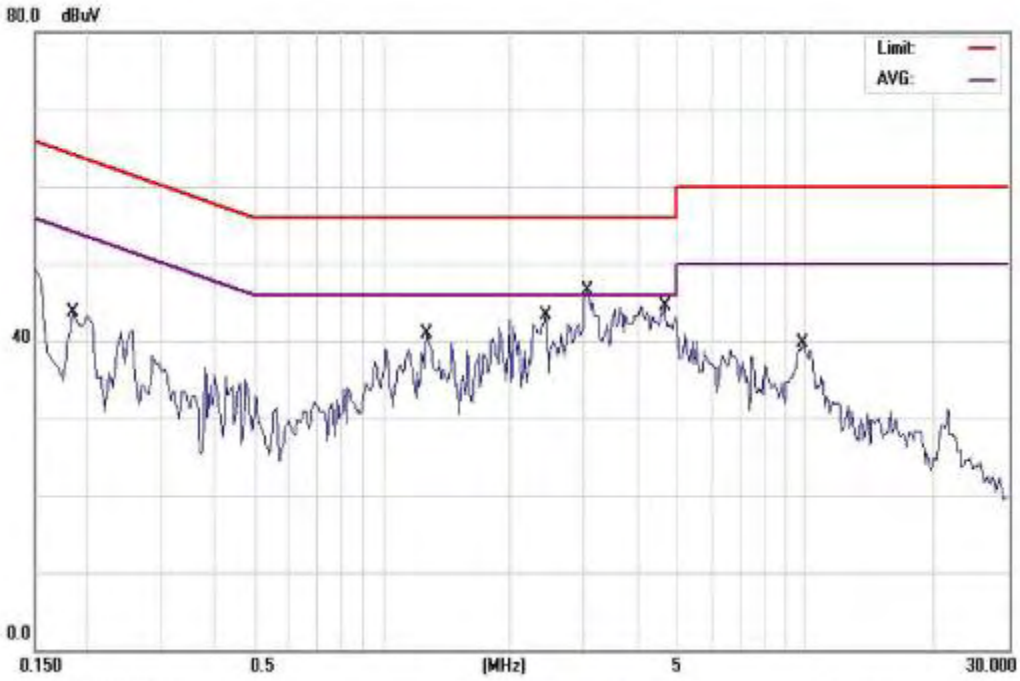


Site SGS CONDUCTED #1
Limit: FCC Class B Conduction(QP)
EUT: IPA280-01P1802
M/N: NA
Note: BT+Adapter

Phase: L1
Power: AC 110V/60Hz
Distance:

Temperature: 26 ℃
Humidity: 59%
Air Pressure: hpa

No.	Mk.	Freq.	Reading Level	Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2000	40.72	0.09	40.81	63.61	-22.80	QP	
2		0.2400	39.36	0.09	39.45	62.10	-22.65	QP	
3		1.1800	37.54	0.08	37.62	56.00	-18.38	QP	
4		2.3400	38.94	0.10	39.04	56.00	-16.96	QP	
5	*	2.9200	40.78	0.11	40.89	56.00	-15.11	QP	
6		3.8600	39.74	0.12	39.86	56.00	-16.14	QP	



Site SGS CONDUCTED #1
Limit: FCC Class B Conduction(QP)
EUT: IPA280-01P1802
M/N: NA
Note: BT+Adapter

Phase: N
Power: AC 110V/60Hz
Distance:

Temperature: 26 ℃
Humidity: 59%
Air Pressure: hpa

No.	Mk.	Freq.	Reading Level	Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1850	43.62	0.14	43.76	64.26	-20.50	QP	
2		1.2700	40.70	0.12	40.82	56.00	-15.18	QP	
3		2.4400	43.18	0.13	43.31	56.00	-12.69	QP	
4		3.0600	41.60	0.15	41.75	56.00	-14.25	QP	
5	*	4.6500	44.38	0.17	44.55	56.00	-11.45	QP	
6		9.8800	39.42	0.20	39.62	60.00	-20.38	QP	

6. PEAK OUTPUT POWER MEASUREMENT

6.1. Standard Applicable:

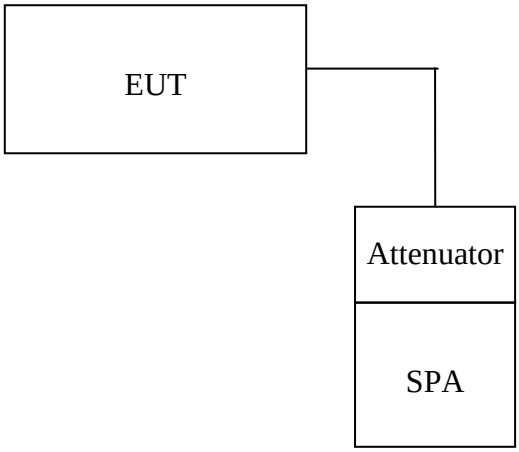
According to §15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

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.

6.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Power Sensor	Anritsu	MA2411B	917032	01/21/2010	01/20/2012
Power Meter	Anritsu	ML2495A	1005007	02/17/2010	02/16/2012
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2010	04/18/2012
Spectrum Analyzer	Agilent	E4440A	MY45304525	01/25/2011	01/24/2012
DC Block	Agilent	BLK-18	155452	07/05/2011	07/04/2012
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2011	01/04/2012
Attenuator	Mini-Circuit	BW-S6W5	001	01/05/2011	01/04/2012
Attenuator	Mini-Circuit	BW-S10W5	001	01/05/2011	01/04/2012
Attenuator	Mini-Circuit	BW-S20W5	001	01/05/2011	01/04/2012
Splitter	Agilent	11636B	N/A	01/05/2011	01/04/2012

6.3. .Test Set-up:



6.4. 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, RBW> 20dB bandwidth, VBW>RBW)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

6.5. Measurement Result:

BDR mode:

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	1.40	1.40	0.00138	1
2441.00	1.83	1.83	0.00152	1
2480.00	1.61	1.61	0.00145	1

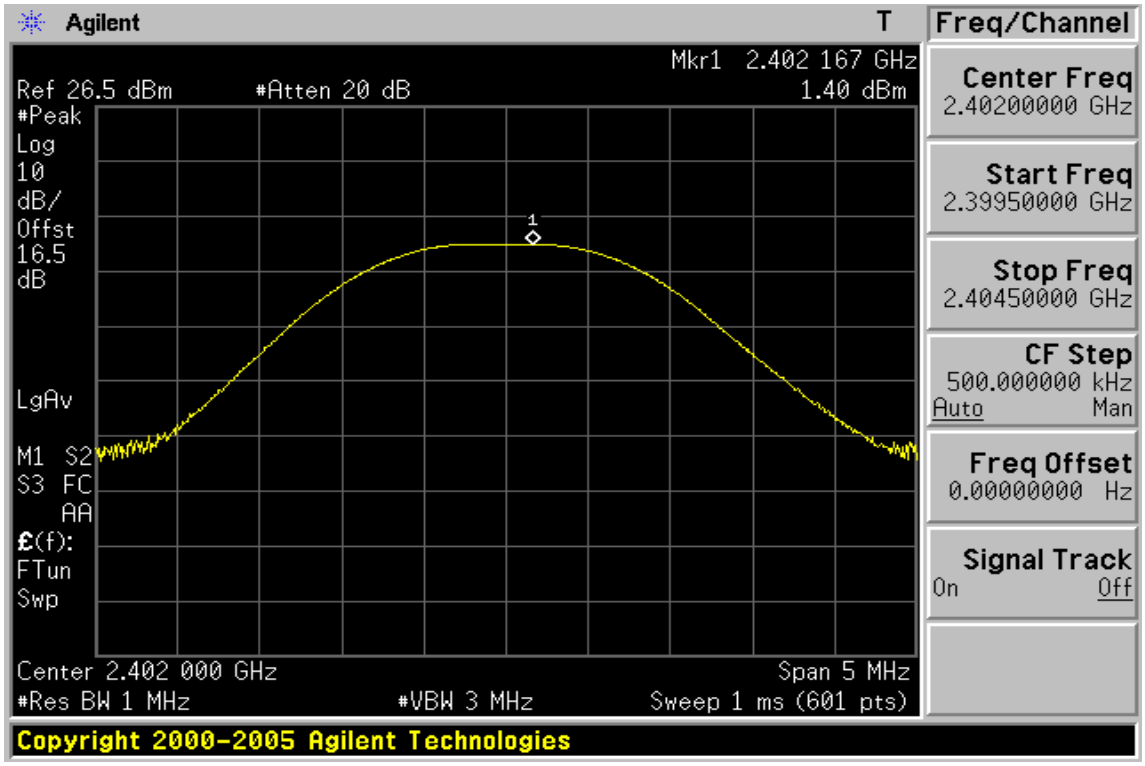
EDR mode:

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	0.58	0.58	0.00114	1
2441.00	1.00	1.00	0.00126	1
2480.00	0.53	0.53	0.00113	1

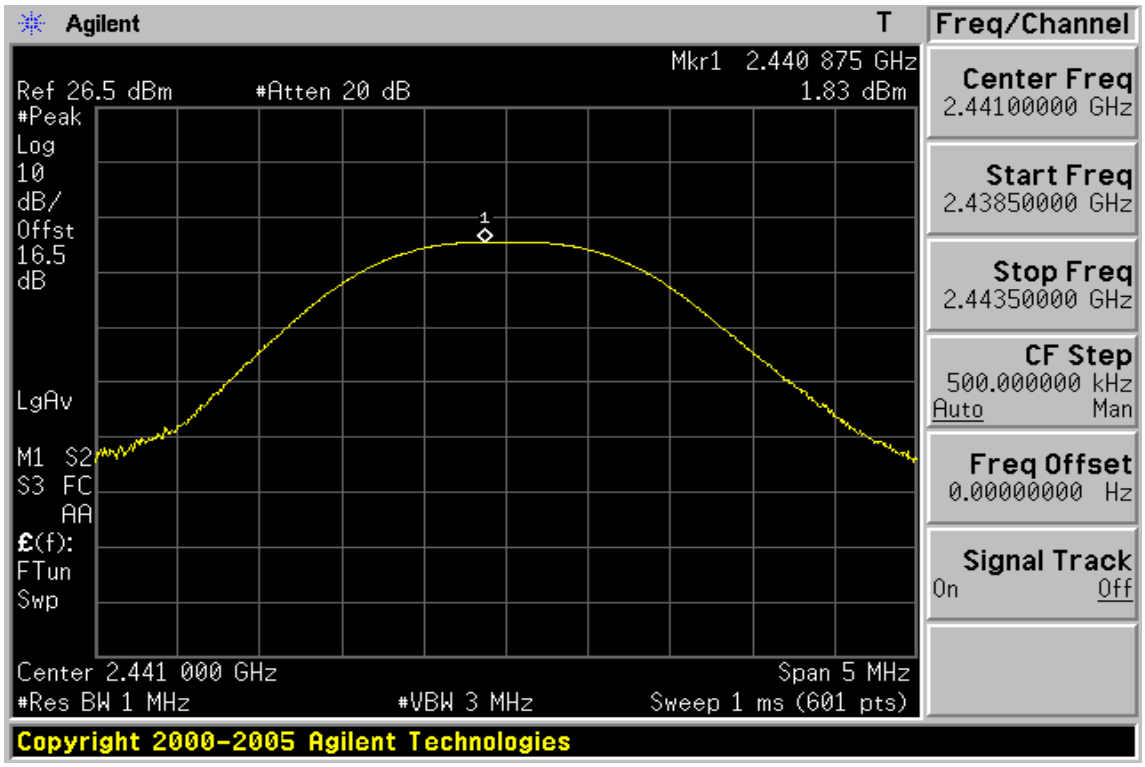
Offset: 16.5dB

Note: Refer to next page for plots.

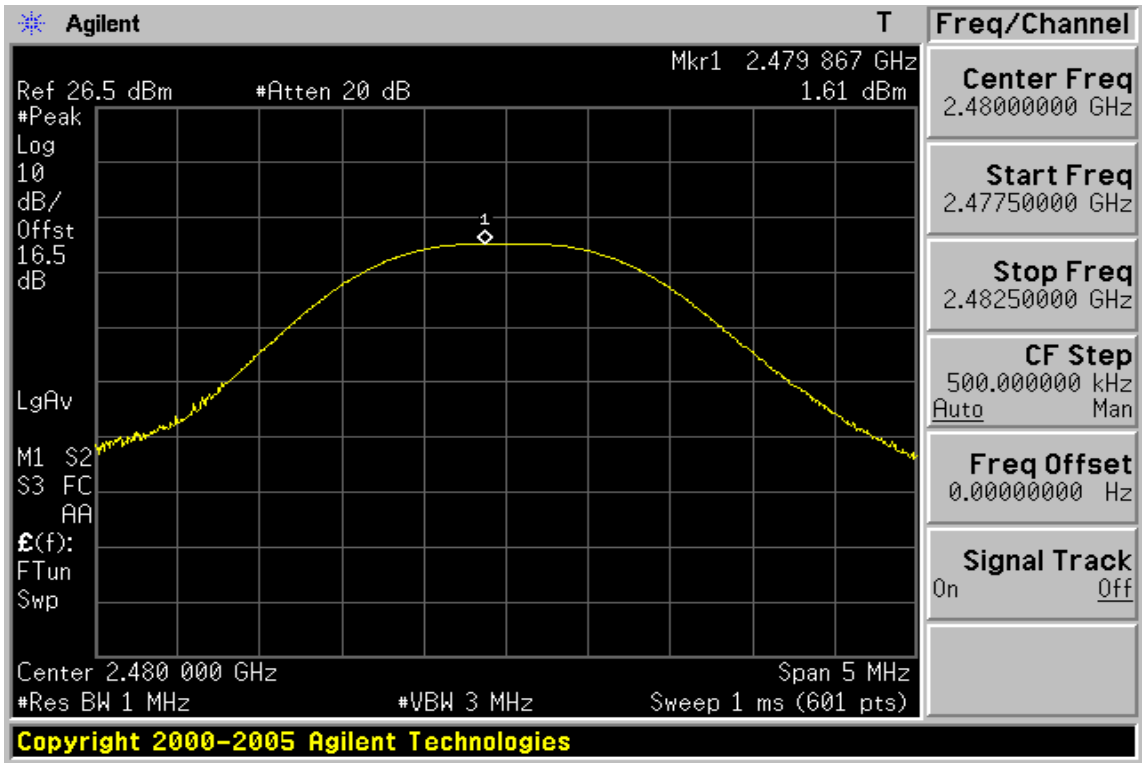
Peak Power Output Data Plot (CH Low) (BDR mode)



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



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



7. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

7.1. Standard Applicable:

According to §15.247(d), 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.

7.2. Measurement Equipment Used:

7.2.1. Conducted Emission at antenna port:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2010	04/18/2012
Spectrum Analyzer	Agilent	E4440A	MY45304525	01/25/2011	01/24/2012
Spectrum Analyzer	R&S	FSP 40	100034	03/30/2011	03/29/2012
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2011	01/04/2012
Attenuator	Mini-Circuit	BW-S6W5	N/A	01/05/2011	01/04/2012
Software	Audix	Ver 6.2009 – 23B	N/A	N/A	N/A

7.2.2. Radiated emission:

966 Chamber					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	R&S	FSP 40	100034	03/30/2011	03/29/2012
Bilog Antenna	SCHWAZBECK	VULB9160	3136	11/19/2011	11/18/2013
Horn antenna	ETS.LINDGREN	3117	123995	03/19/2011	03/18/2013
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2011	11/27/2013
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2011	01/04/2012
Radio Communication Analyzer	R & S	CMU200	102189	08/12/2010	08/11/2012
DC Block	Agilent	BLK-18	155452	01/05/2011	01/04/2012
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	SUCOFLEX 104PEA-10M	10m	01/05/2011	01/04/2012
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2011	01/04/2012
3m Site	SGS	966 chamber	N/A	07/15/2011	07/14/2012

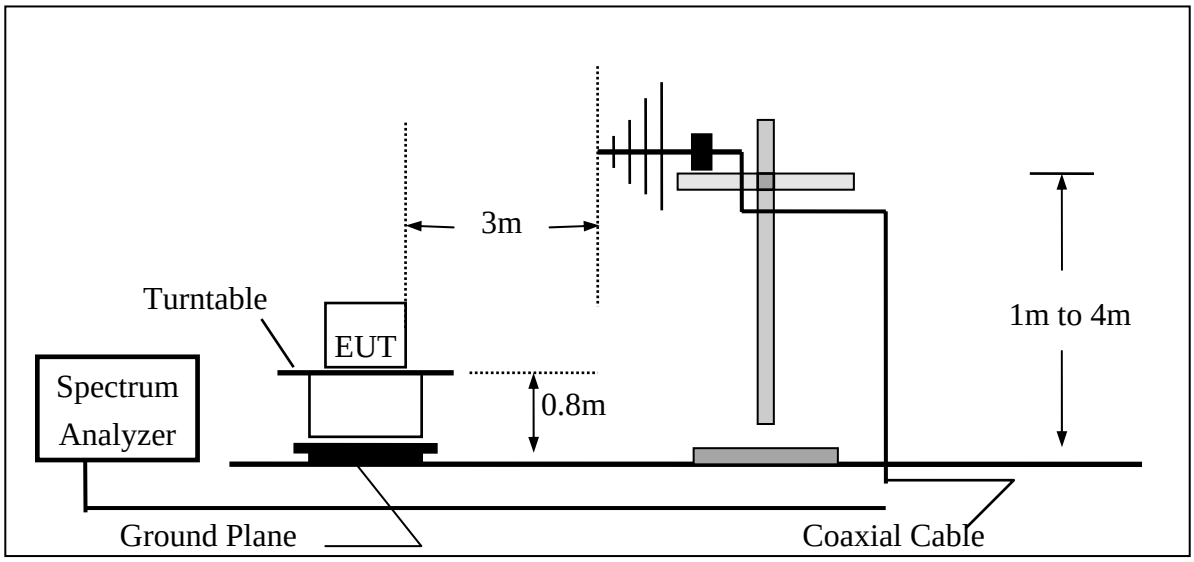
7.3. Test SET-UP:

7.3.1. Conducted Emission at antenna port:

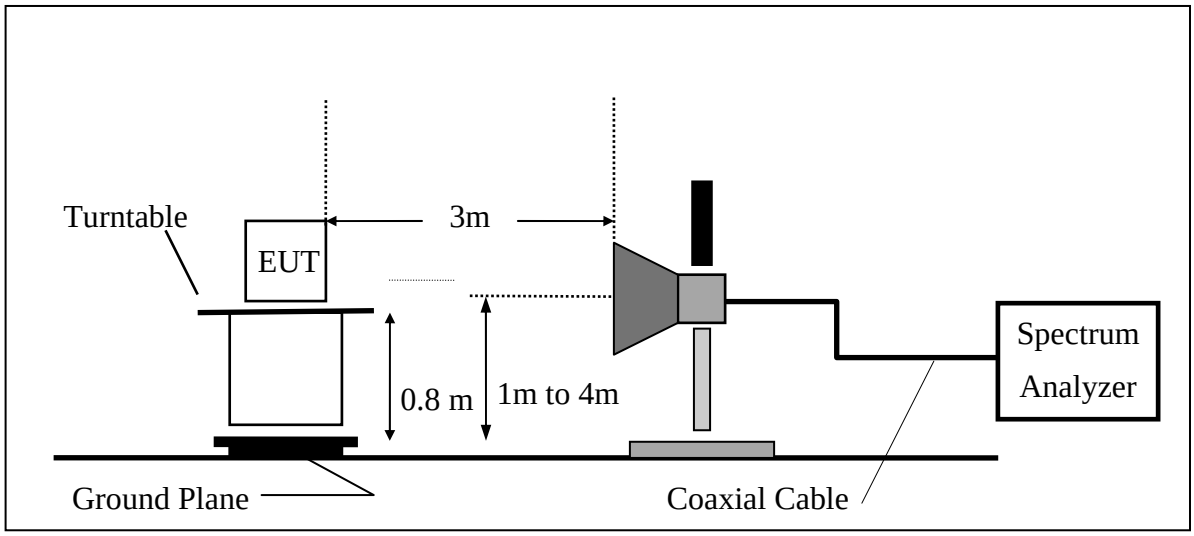
Refer to section 6.3 for details.

7.3.2. Radiated emission:

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



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



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 spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, 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.

7.5. 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:

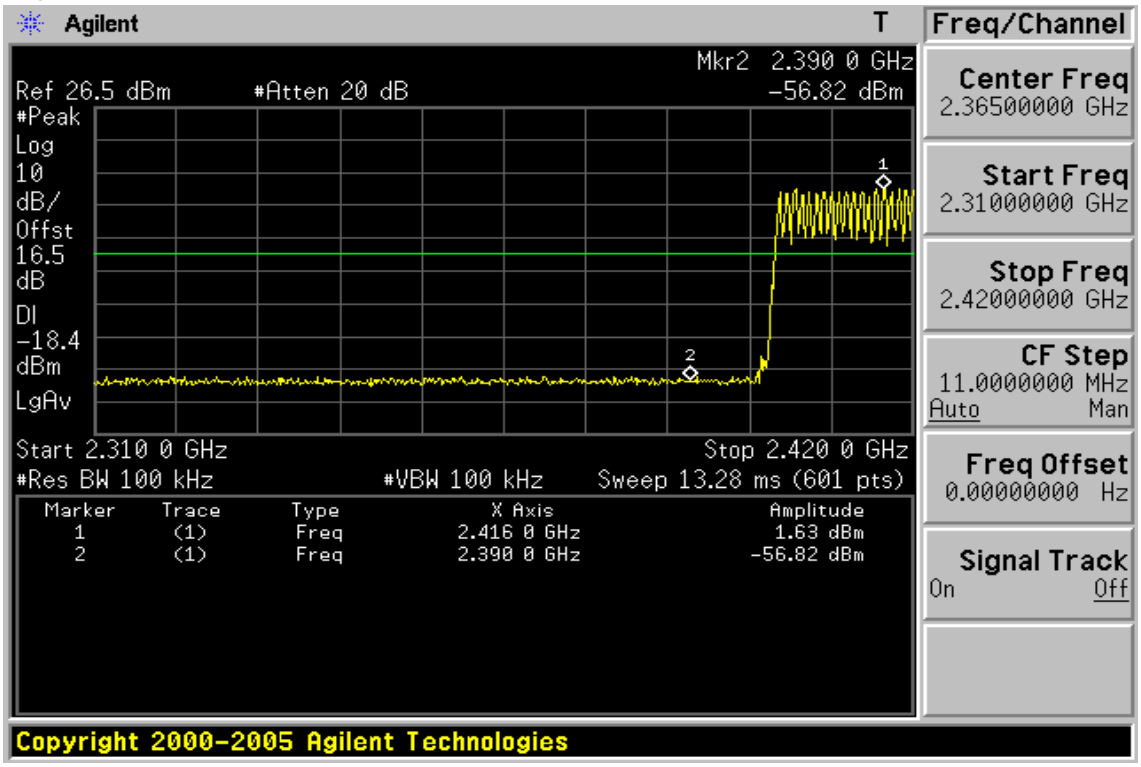
FS = RA + AF + CL - AG

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

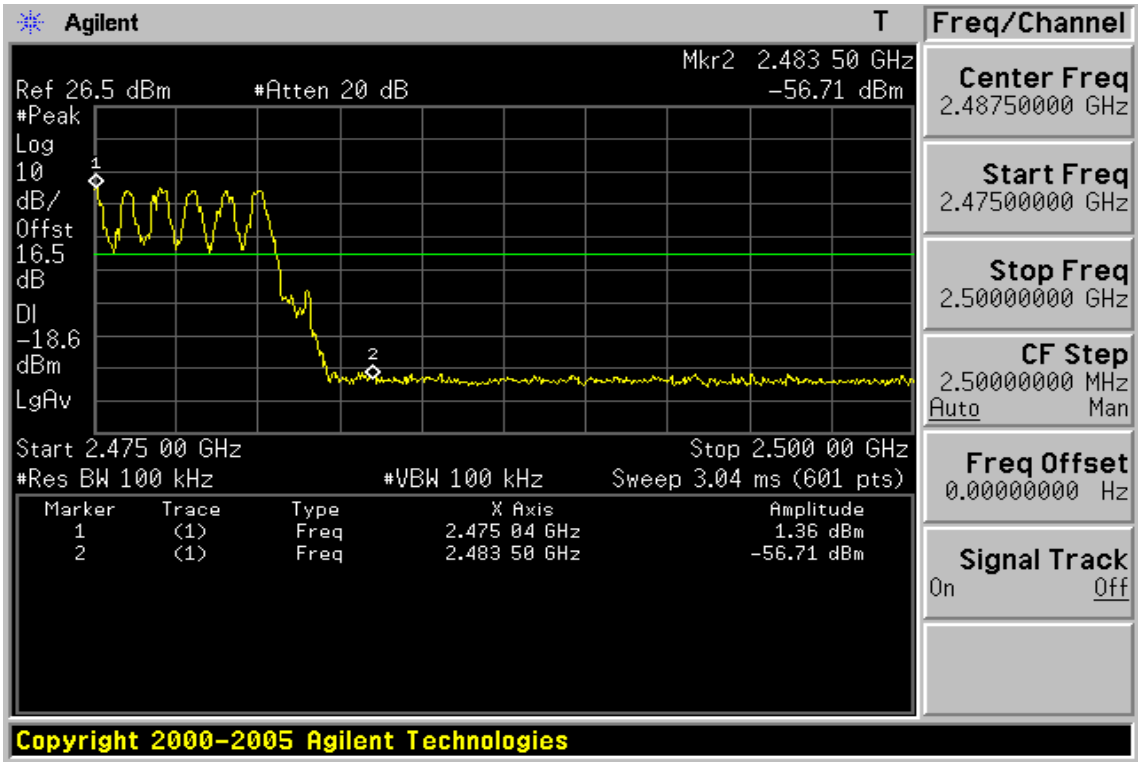
7.6. Measurement Result:

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	:2011-12-20
Fundamental Frequency	:2402 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX LOW BANDEDGE	Engineer	:Jazz
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	33.04	5.17	38.21	54.00	-15.79
2390.00	E	Peak	45.19	5.17	50.36	74.00	-23.64

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2402 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX LOW BANDEDGE	Engineer	:Jazz
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	33.00	5.79	38.79	54.00	-15.21
2390.00	E	Peak	45.88	5.79	51.67	74.00	-22.33

Radiated Emission:

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2480 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX HIGH BANDEDGE	Engineer	:Jazz
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	32.91	5.69	38.60	54.00	-15.40
2483.50	E	Peak	44.94	5.69	50.63	74.00	-23.37

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2480 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX HIGH BANDEDGE	Engineer	:Jazz
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	32.93	6.72	39.65	54.00	-14.35
2483.50	E	Peak	46.09	6.72	52.81	74.00	-21.19

8. SPURIOUS EMISSION TEST

8.1. 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 §7.2.3 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.

8.2. Measurement Equipment Used:

8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

8.2.2. Radiated emission:

Refer to section 7.2.2 for details.

8.3. Test SET-UP:

8.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

8.3.2. Radiated emission:

Refer to section 7.3.2 for details.

8.4. Measurement Procedure:

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

8.5. 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

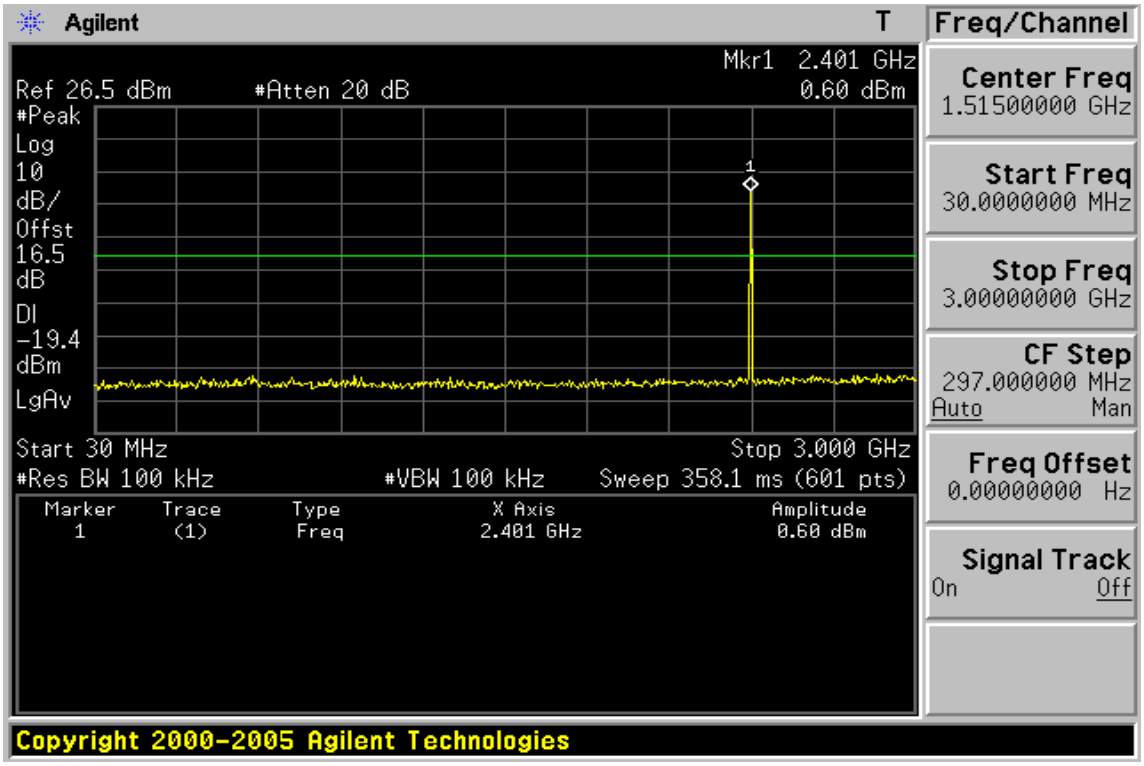
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

8.6. Measurement Result:

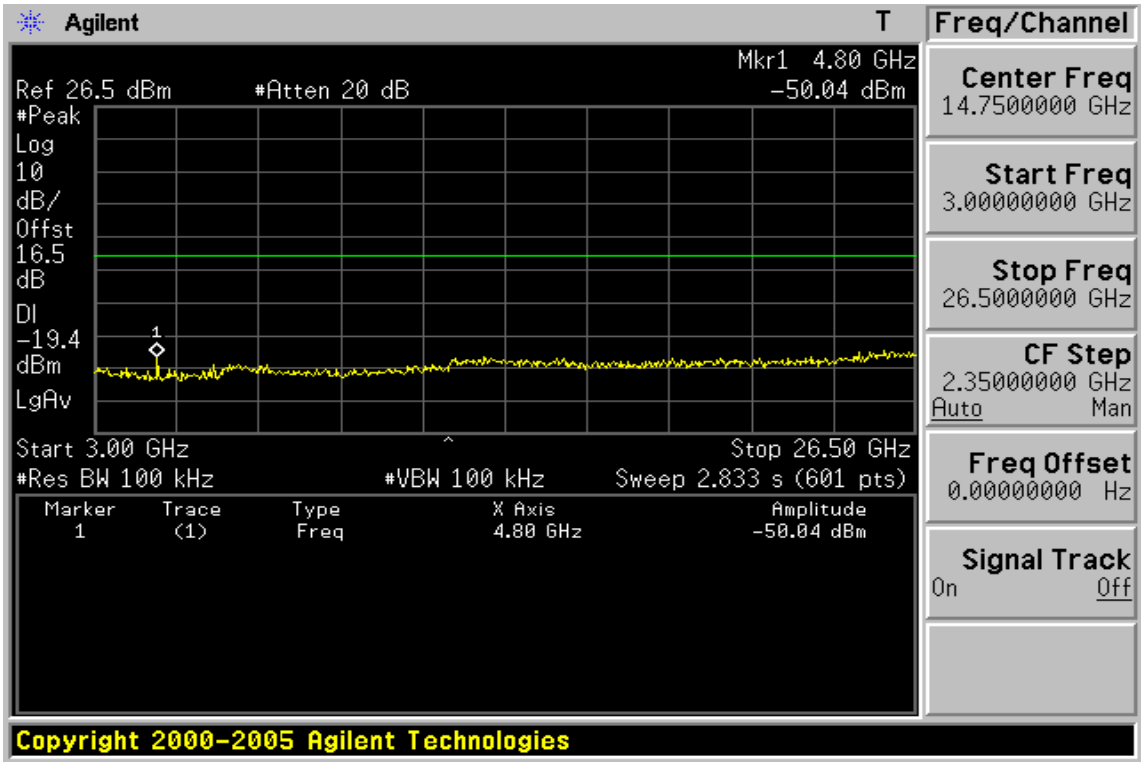
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Conducted Spurious Emission Measurement Result (BDR mode)

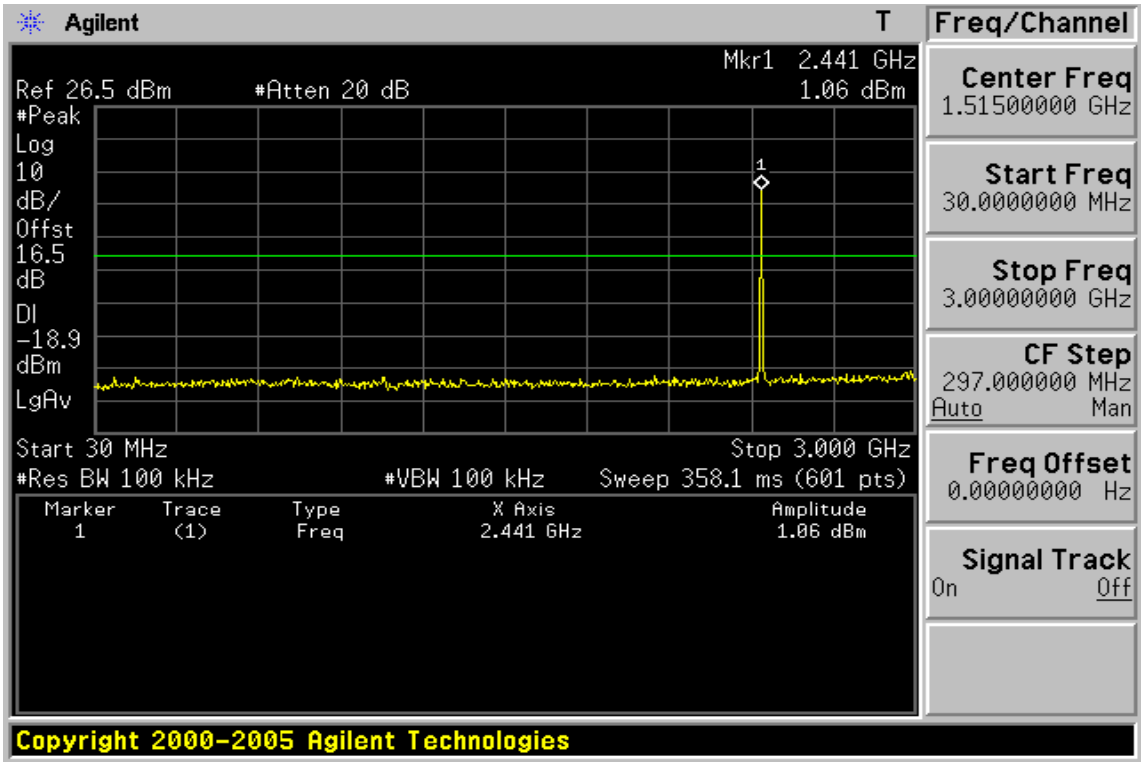
Ch Low 30MHz – 3GHz



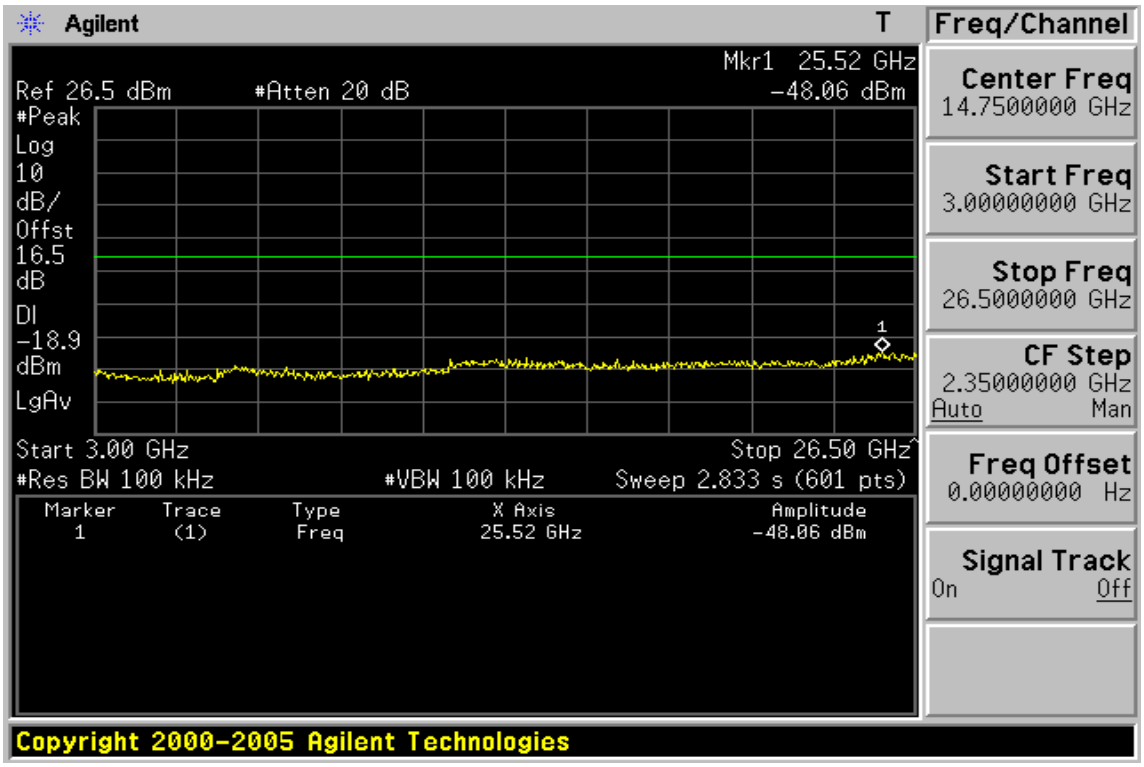
Ch Low 3GHz – 26.5GHz



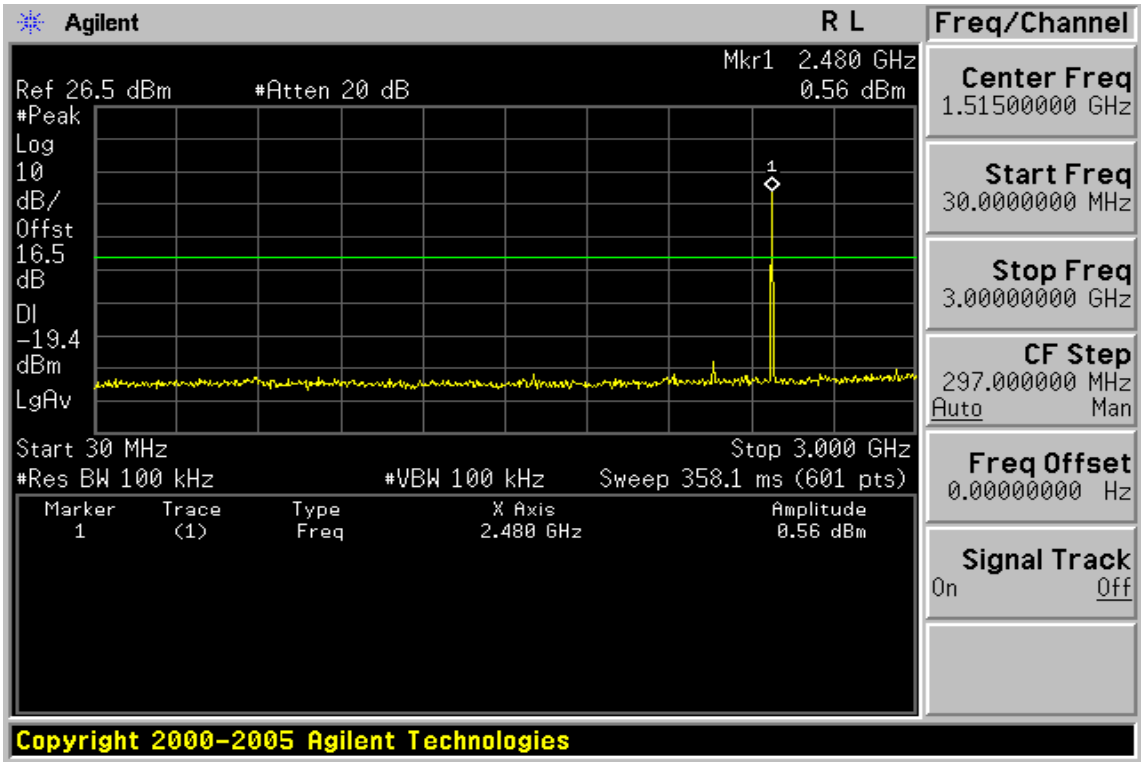
Ch Mid 30MHz – 3GHz



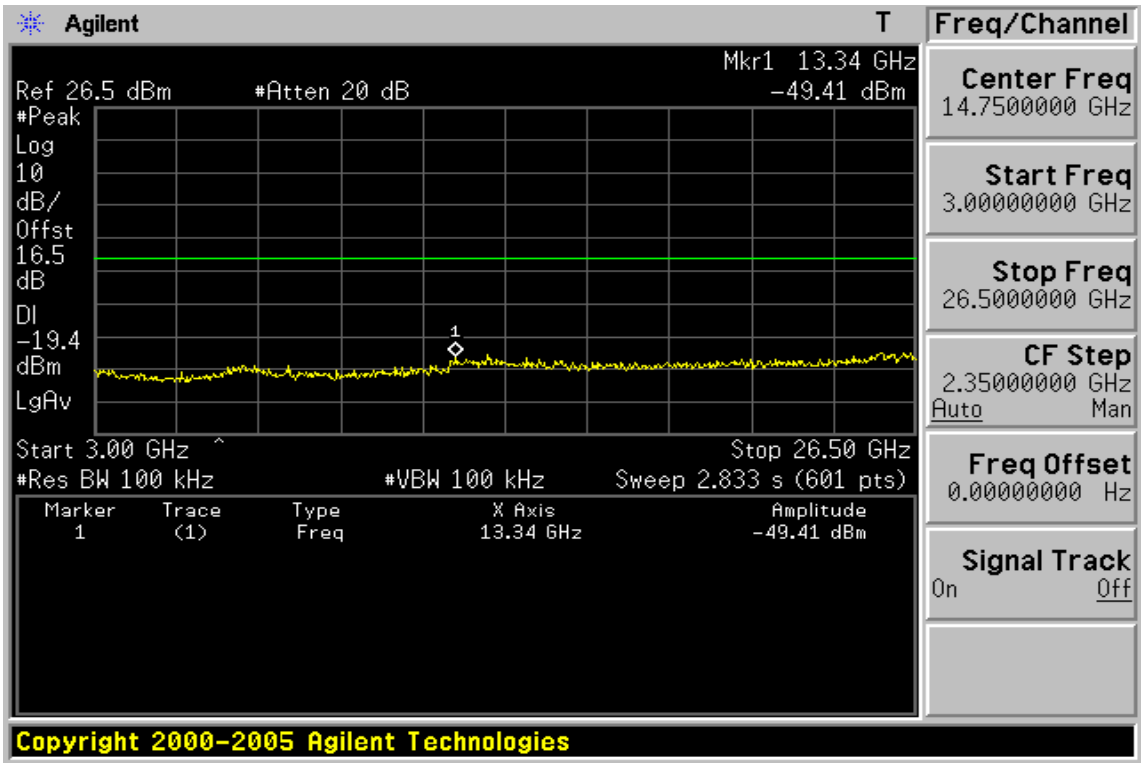
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



Radiated Spurious Emission Measurement Result(Worst)

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2402 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX LOW	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	34.40	-16.85	17.55	43.50	-25.95
182.29	S	Peak	33.65	-14.05	19.60	43.50	-23.90
259.89	S	Peak	28.83	-12.96	15.87	46.00	-30.13
391.81	S	Peak	33.53	-10.31	23.22	46.00	-22.78
651.77	S	Peak	30.39	-5.86	24.53	46.00	-21.47
974.78	S	Peak	27.35	-1.15	26.20	54.00	-27.80
4804.00	H	Peak	36.67	9.95	46.62	74.00	-27.38
7206.00	---						
9608.00	---						
12010.00	---						
14412.00	---						
16814.00	---						
19216.00	---						
21618.00	---						
24020.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2402 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX LOW	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	32.11	-16.85	15.26	43.50	-28.24
182.29	S	Peak	36.23	-14.05	22.18	43.50	-21.32
259.89	S	Peak	36.36	-12.96	23.40	46.00	-22.60
387.93	S	Peak	40.65	-10.38	30.27	46.00	-15.73
812.79	S	Peak	28.98	-3.33	25.65	46.00	-20.35
862.26	S	Peak	31.48	-2.66	28.82	46.00	-17.18
4804.00	H	Peak	35.06	9.99	45.05	74.00	-28.95
7206.00	---						
9608.00	---						
12010.00	---						
14412.00	---						
16814.00	---						
19216.00	---						
21618.00	---						
24020.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2441 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX MID	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	33.72	-16.85	16.87	43.50	-26.63
143.49	S	Peak	32.10	-12.17	19.93	43.50	-23.57
259.89	S	Peak	28.15	-12.96	15.19	46.00	-30.81
389.87	S	Peak	33.33	-10.33	23.00	46.00	-23.00
649.83	S	Peak	31.56	-5.86	25.70	46.00	-20.30
911.73	S	Peak	28.66	-1.88	26.78	46.00	-19.22
4882.00	H	Peak	36.00	10.28	46.28	74.00	-27.72
7323.00	---						
9764.00	---						
12205.00	---						
14646.00	---						
17087.00	---						
19528.00	---						
21969.00	---						
24410.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2441 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX MID	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	33.20	-16.85	16.35	43.50	-27.15
182.29	S	Peak	35.85	-14.05	21.80	43.50	-21.70
259.89	S	Peak	36.49	-12.96	23.53	46.00	-22.47
392.78	S	Peak	39.29	-10.34	28.95	46.00	-17.05
651.77	S	Peak	31.97	-5.86	26.11	46.00	-19.89
862.26	S	Peak	31.92	-2.66	29.26	46.00	-16.74
4882.00	H	Peak	35.08	10.22	45.30	74.00	-28.70
7323.00	---						
9764.00	---						
12205.00	---						
14646.00	---						
17087.00	---						
19528.00	---						
21969.00	---						
24410.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2480 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX HIGH	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	33.24	-16.85	16.39	43.50	-27.11
182.29	S	Peak	32.92	-14.05	18.87	43.50	-24.63
259.89	S	Peak	28.38	-12.96	15.42	46.00	-30.58
389.87	S	Peak	32.17	-10.33	21.84	46.00	-24.16
647.89	S	Peak	30.03	-5.91	24.12	46.00	-21.88
968.96	S	Peak	27.64	-1.17	26.47	54.00	-27.53
4960.00	H	Peak	34.96	10.91	45.87	74.00	-28.13
7440.00	---						
9920.00	---						
12400.00	---						
14880.00	---						
17360.00	---						
19840.00	---						
22320.00	---						
24800.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2480 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX HIGH	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	30.41	-16.85	13.56	43.50	-29.94
182.29	S	Peak	36.32	-14.05	22.27	43.50	-21.23
259.89	S	Peak	35.95	-12.96	22.99	46.00	-23.01
392.78	S	Peak	39.39	-10.34	29.05	46.00	-16.95
779.81	S	Peak	30.09	-3.77	26.32	46.00	-19.68
862.26	S	Peak	31.63	-2.66	28.97	46.00	-17.03
4960.00	H	Peak	33.91	10.76	44.67	74.00	-29.33
7440.00	---						
9920.00	---						
12400.00	---						
14880.00	---						
17360.00	---						
19840.00	---						
22320.00	---						
24800.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2402 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX LOW	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	34.48	-16.85	17.63	43.50	-25.87
182.29	S	Peak	32.99	-14.05	18.94	43.50	-24.56
259.89	S	Peak	28.14	-12.96	15.18	46.00	-30.82
391.81	S	Peak	33.69	-10.31	23.38	46.00	-22.62
807.94	S	Peak	27.48	-3.42	24.06	46.00	-21.94
911.73	S	Peak	28.50	-1.88	26.62	46.00	-19.38
4804.00	H	Peak	34.44	9.95	44.39	74.00	-29.61
7206.00	---						
9608.00	---						
12010.00	---						
14412.00	---						
16814.00	---						
19216.00	---						
21618.00	---						
24020.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2402 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX LOW	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	32.52	-16.85	15.67	43.50	-27.83
182.29	S	Peak	36.19	-14.05	22.14	43.50	-21.36
259.89	S	Peak	36.98	-12.96	24.02	46.00	-21.98
387.93	S	Peak	39.84	-10.38	29.46	46.00	-16.54
649.83	S	Peak	31.54	-5.86	25.68	46.00	-20.32
862.26	S	Peak	31.60	-2.66	28.94	46.00	-17.06
4804.00	H	Peak	34.78	9.99	44.77	74.00	-29.23
7206.00	---						
9608.00	---						
12010.00	---						
14412.00	---						
16814.00	---						
19216.00	---						
21618.00	---						
24020.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2441 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX MID	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	33.92	-16.85	17.07	43.50	-26.43
143.49	S	Peak	32.20	-12.17	20.03	43.50	-23.47
259.89	S	Peak	27.97	-12.96	15.01	46.00	-30.99
389.87	S	Peak	32.86	-10.33	22.53	46.00	-23.47
649.83	S	Peak	31.73	-5.86	25.87	46.00	-20.13
976.72	S	Peak	27.52	-1.14	26.38	54.00	-27.62
4882.00	H	Peak	34.24	10.28	44.52	74.00	-29.48
7323.00	---						
9764.00	---						
12205.00	---						
14646.00	---						
17087.00	---						
19528.00	---						
21969.00	---						
24410.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2441 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX MID	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	31.87	-16.85	15.02	43.50	-28.48
182.29	S	Peak	36.14	-14.05	22.09	43.50	-21.41
259.89	S	Peak	36.06	-12.96	23.10	46.00	-22.90
391.81	S	Peak	39.23	-10.31	28.92	46.00	-17.08
653.71	S	Peak	32.52	-5.81	26.71	46.00	-19.29
862.26	S	Peak	32.35	-2.66	29.69	46.00	-16.31
4882.00	H	Peak	33.75	10.22	43.97	74.00	-30.03
7323.00	---						
9764.00	---						
12205.00	---						
14646.00	---						
17087.00	---						
19528.00	---						
21969.00	---						
24410.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2480 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX HIGH	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	34.61	-16.85	17.76	43.50	-25.74
182.29	S	Peak	33.78	-14.05	19.73	43.50	-23.77
259.89	S	Peak	28.01	-12.96	15.05	46.00	-30.95
389.87	S	Peak	31.83	-10.33	21.50	46.00	-24.50
648.86	S	Peak	31.39	-5.89	25.50	46.00	-20.50
911.73	S	Peak	29.74	-1.88	27.86	46.00	-18.14
4960.00	H	Peak	33.34	10.91	44.25	74.00	-29.75
7440.00	---						
9920.00	---						
12400.00	---						
14880.00	---						
17360.00	---						
19840.00	---						
22320.00	---						
24800.00	---						

Radiated Spurious Emission Measurement Result

Operation Band	:BDR	Test Date	:2011-12-20
Fundamental Frequency	:2480 MHZ	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX HIGH	Engineer	:Marcus
EUT Pol.	:E1	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	33.42	-16.85	16.57	43.50	-26.93
182.29	S	Peak	36.14	-14.05	22.09	43.50	-21.41
259.89	S	Peak	35.73	-12.96	22.77	46.00	-23.23
389.87	S	Peak	39.30	-10.33	28.97	46.00	-17.03
649.83	S	Peak	32.73	-5.86	26.87	46.00	-19.13
862.26	S	Peak	31.95	-2.66	29.29	46.00	-16.71
4960.00	H	Peak	33.39	10.76	44.15	74.00	-29.85
7440.00	---						
9920.00	---						
12400.00	---						
14880.00	---						
17360.00	---						
19840.00	---						
22320.00	---						
24800.00	---						

9. FREQUENCY SEPARATION

9.1. Standard Applicable:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 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.

9.2. Measurement Equipment Used:

Refer to section 6.2 for details.

9.3. Test Set-up:

Refer to section 6.3 for details.

9.4. Measurement Procedure:

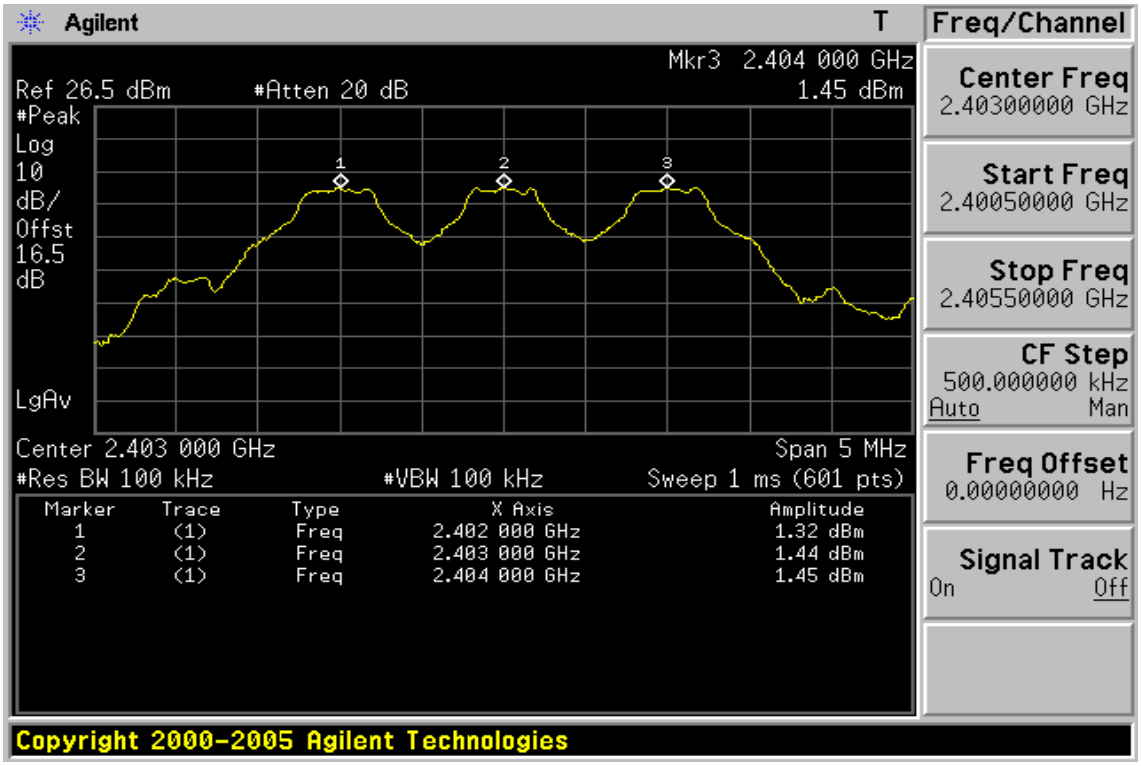
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=100KHz, Adjust Span to 3.0 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

9.5. 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



10. NUMBER OF HOPPING FREQUENCY

10.1. 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.

10.2. Measurement Equipment Used:

Refer to section 6.2 for details.

10.3. Test Set-up:

Refer to section 6.3 for details.

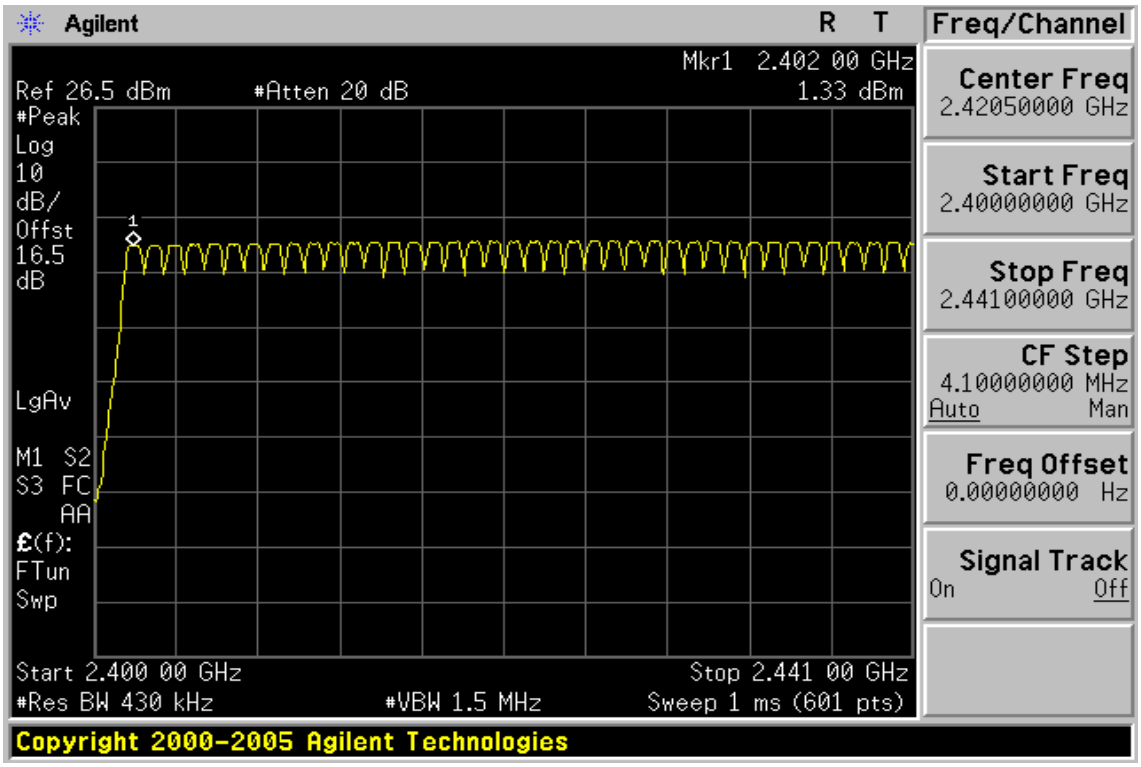
10.4. Measurement Procedure:

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=1.3MHz,
5. Max hold, view and count how many channel in the band.

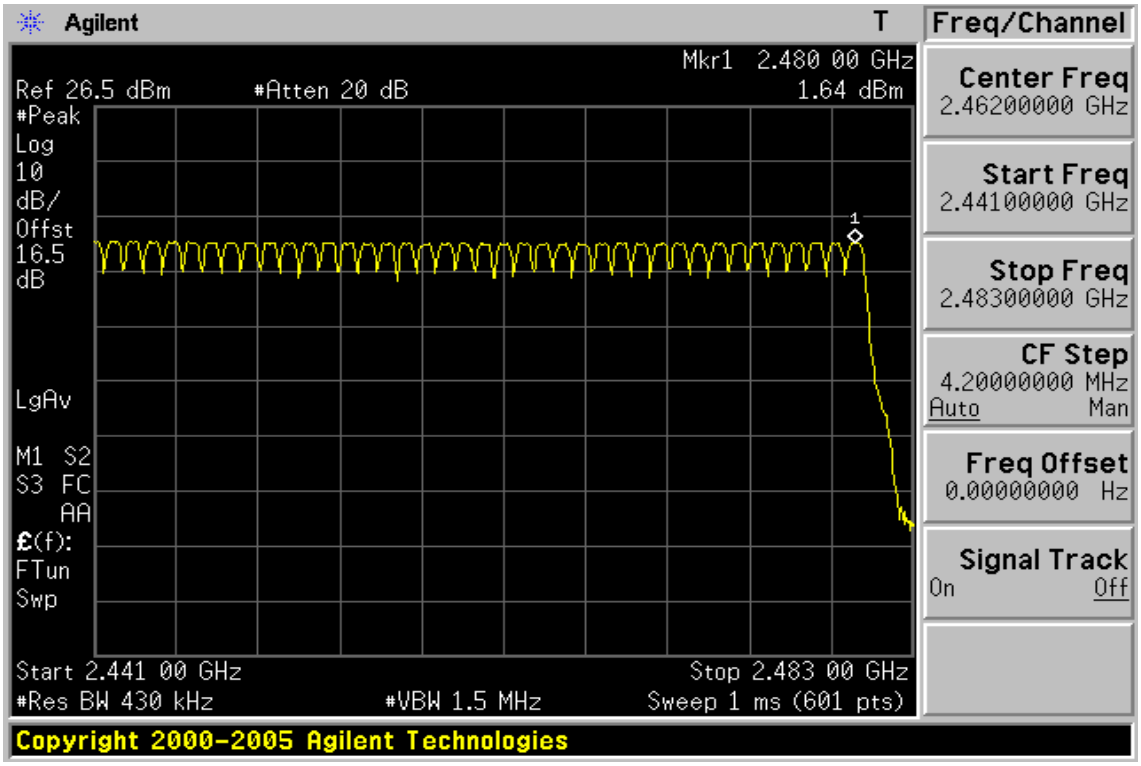
10.5. Measurement Result:

Note: Refer to next page for plots.

Channel Number
2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



11. TIME OF OCCUPANCY (DWELL TIME)

11.1. 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.

11.2. Measurement Equipment Used:

Refer to section 6.2 for details.

11.3. Test Set-up:

Refer to section 6.3 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 = operating frequency.
4. Set the spectrum analyzer as RBW=1MHz,VBW=3MHz, Span = 0Hz , Adjust Sweep = 15ms.
5. Repeat above procedures until all frequency measured were complete.

11.5. Measurement Result:

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

CH Low: DH1 time slot = 0.407 (ms) * (1600/(2*79)) * 31.6 = 130.24 (ms)

DH3 time slot = 1.658 (ms) * (1600/(4*79)) * 31.6 = 265.28 (ms)

DH5 time slot = 2.920 (ms) * (1600/(6*79)) * 31.6 = 311.47 (ms)

CH Mid: DH1 time slot = 0.407 (ms) * (1600/(2*79)) * 31.6 = 130.24 (ms)

DH3 time slot = 1.667 (ms) * (1600/(4*79)) * 31.6 = 266.72 (ms)

DH5 time slot = 2.908 (ms) * (1600/(6*79)) * 31.6 = 310.19 (ms)

CH High: DH1 time slot = 0.407 (ms) * (1600/(2*79)) * 31.6 = 130.24(ms)

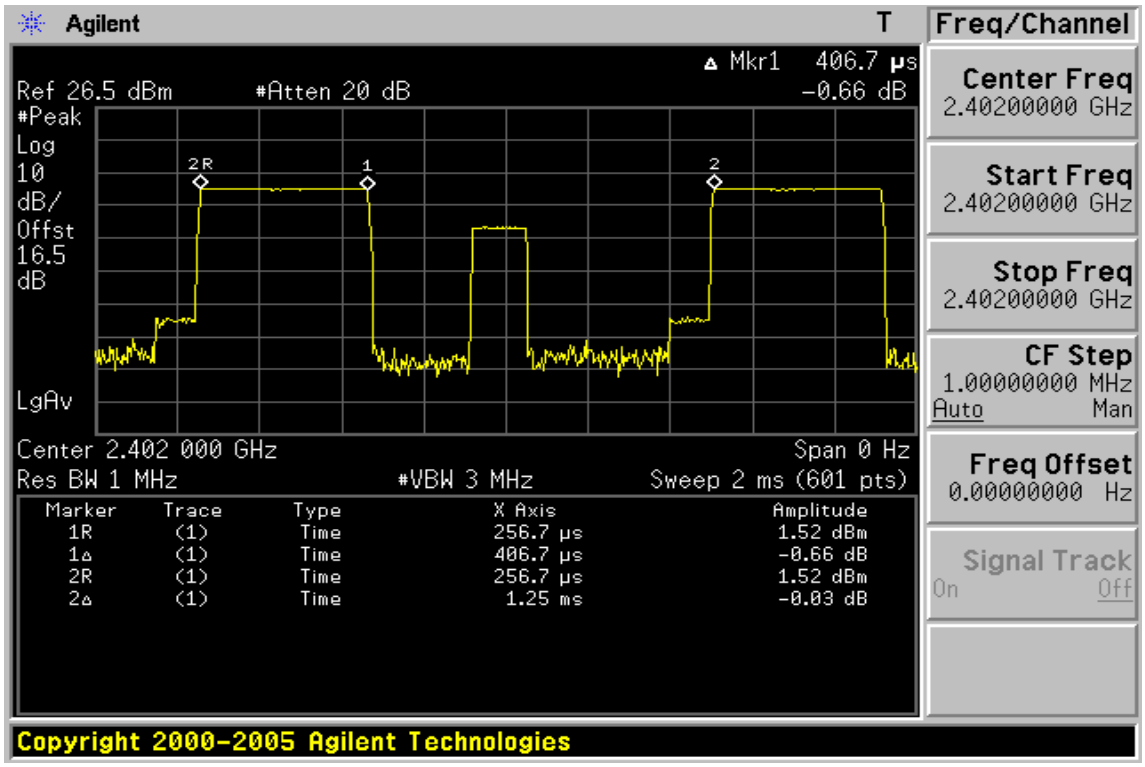
DH3 time slot = 1.658 (ms) * (1600/(4*79)) * 31.6 = 265.28 (ms)

DH5 time slot = 2.908 (ms) * (1600/(6*79)) * 31.6 = 310.19 (ms)

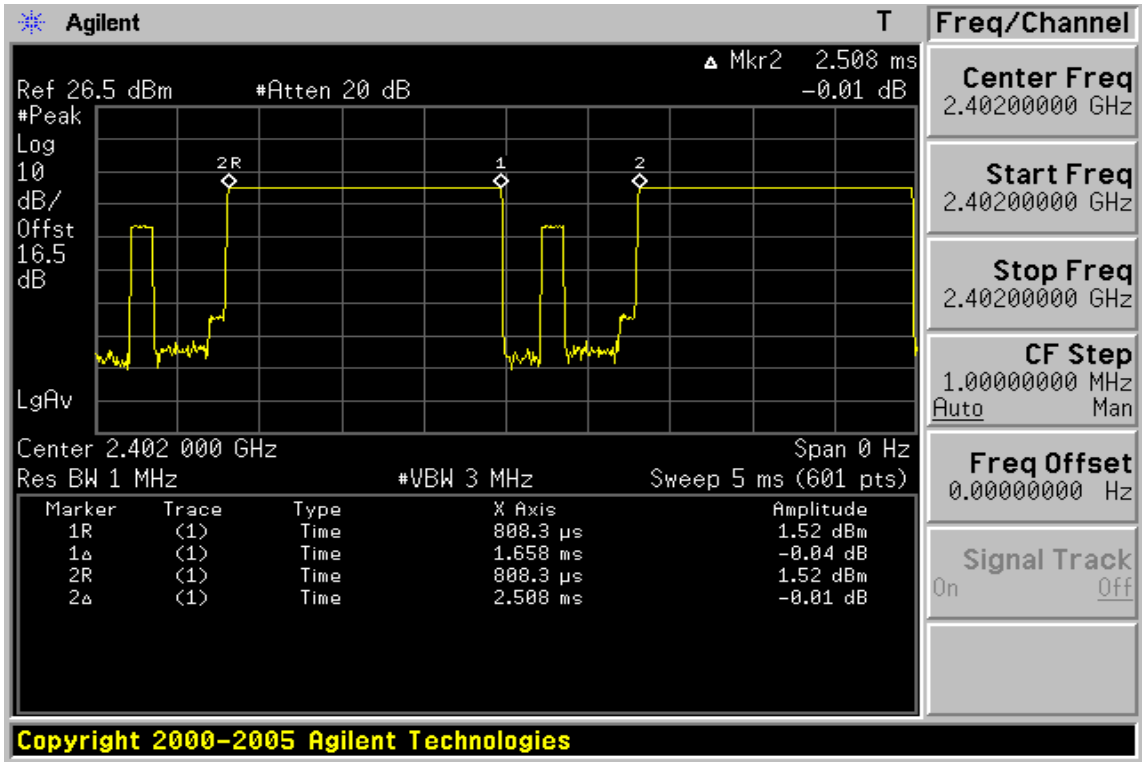
Note: Refer to next page for plots.

CH-Low

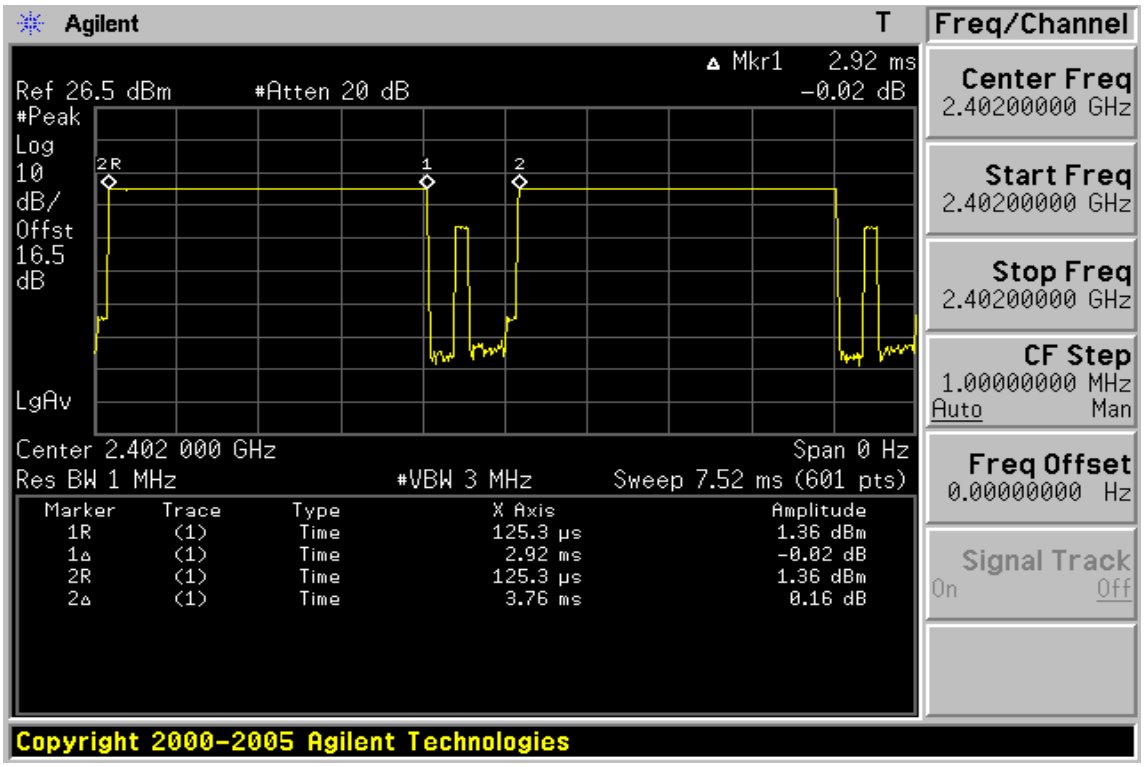
DH1



DH3

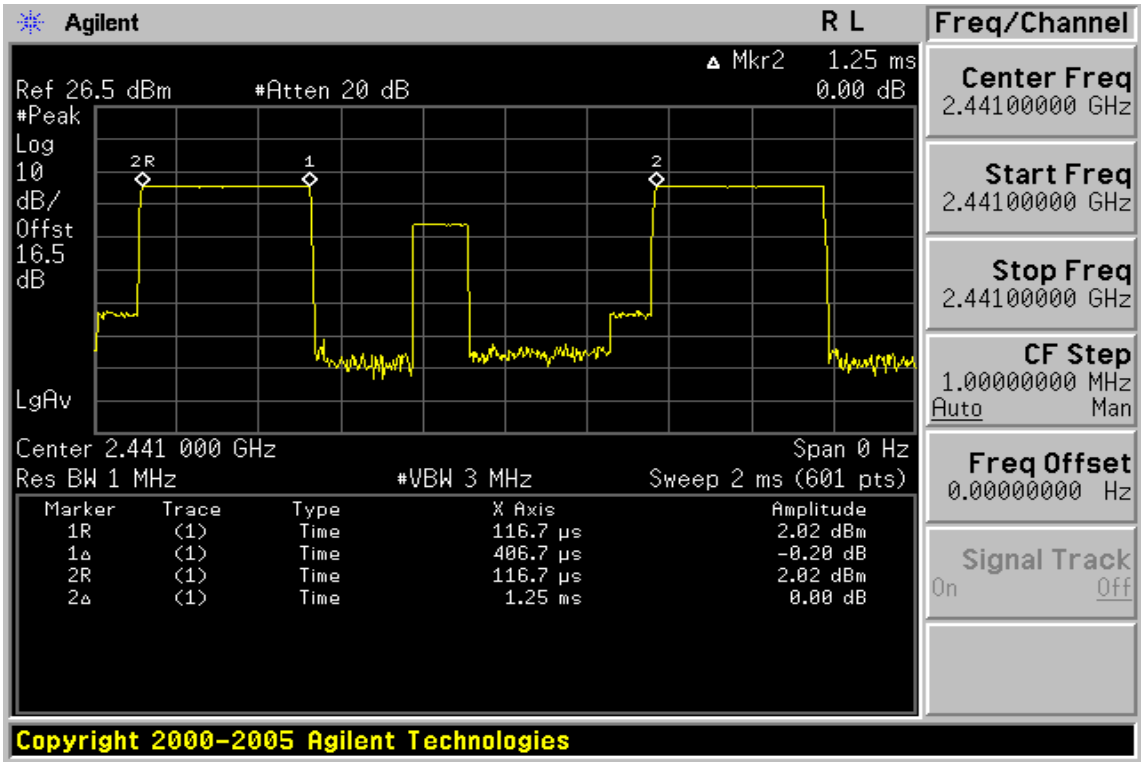


DH5

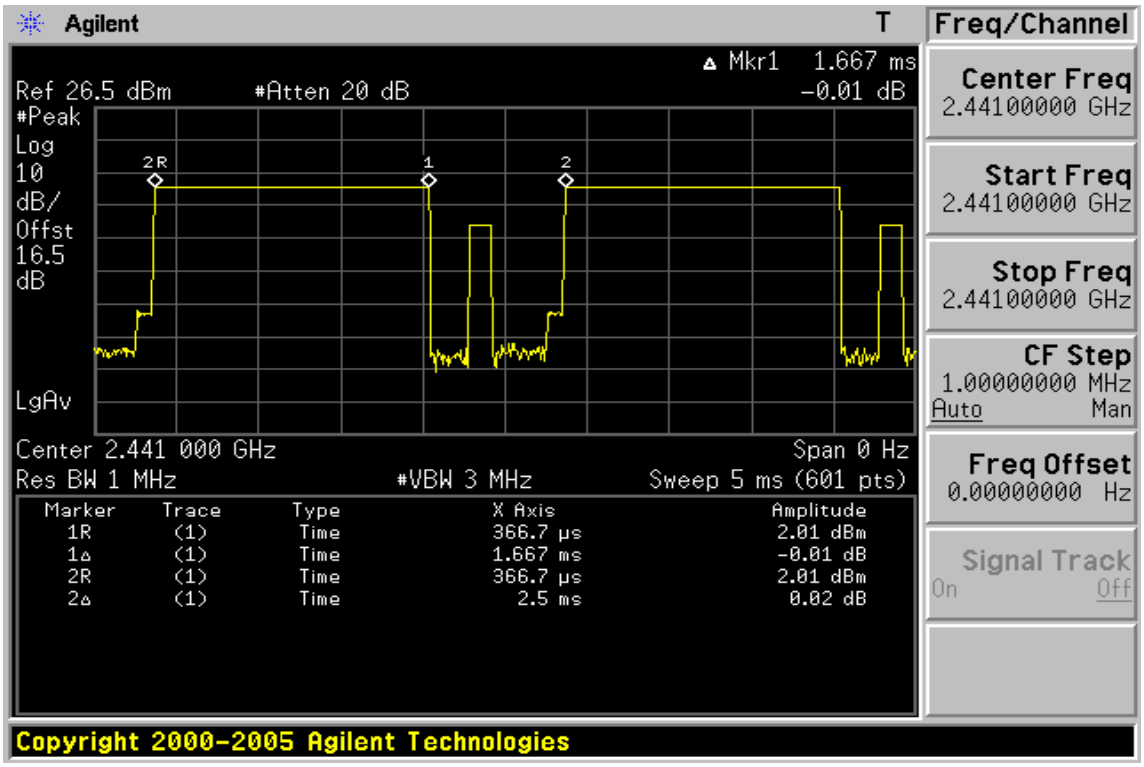


CH-Mid

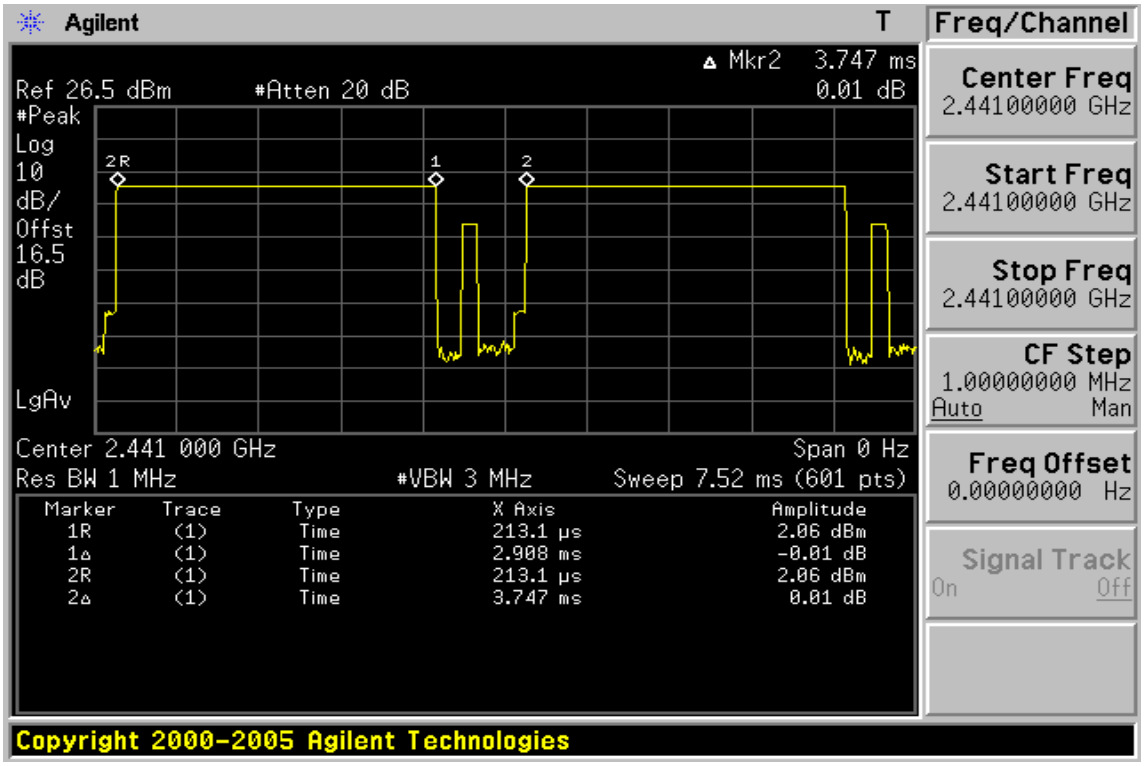
DH1



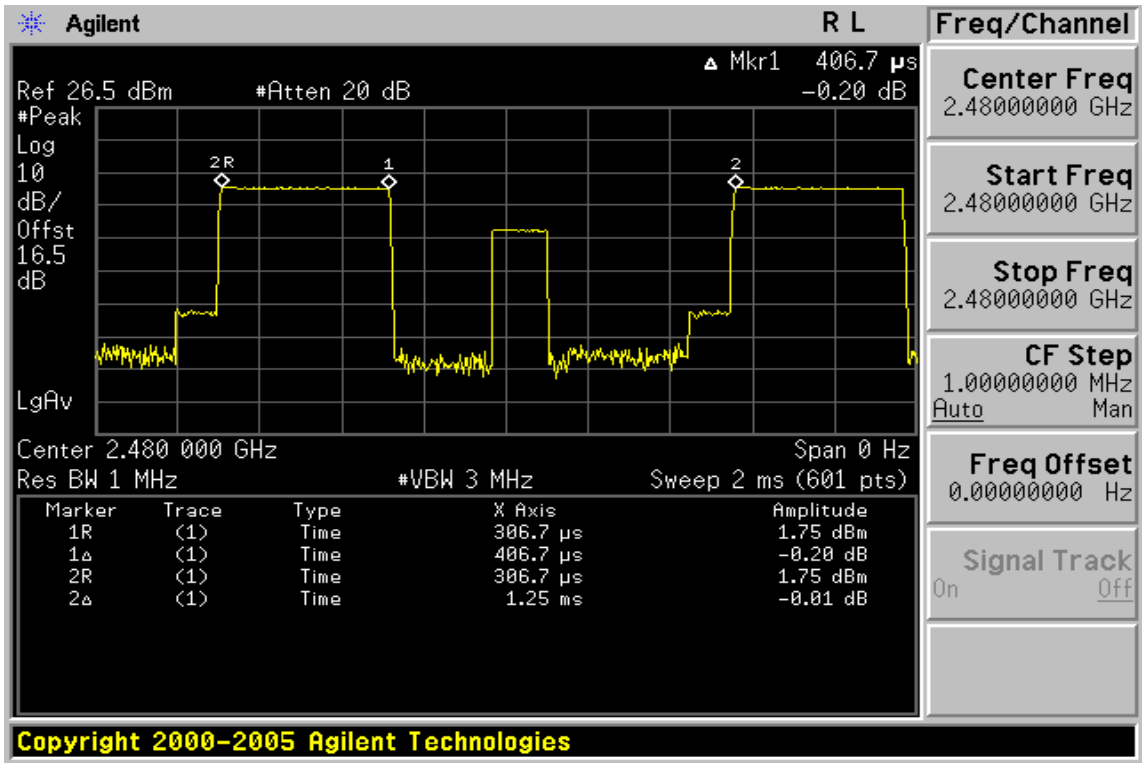
DH3



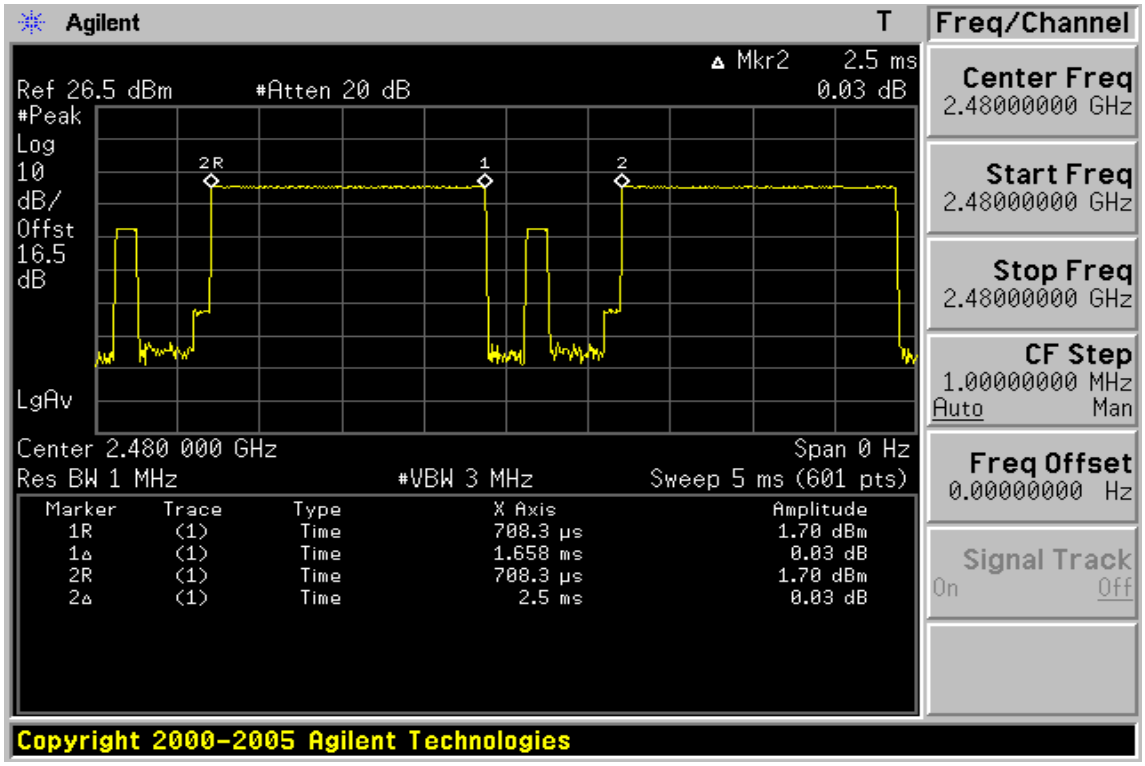
DH5



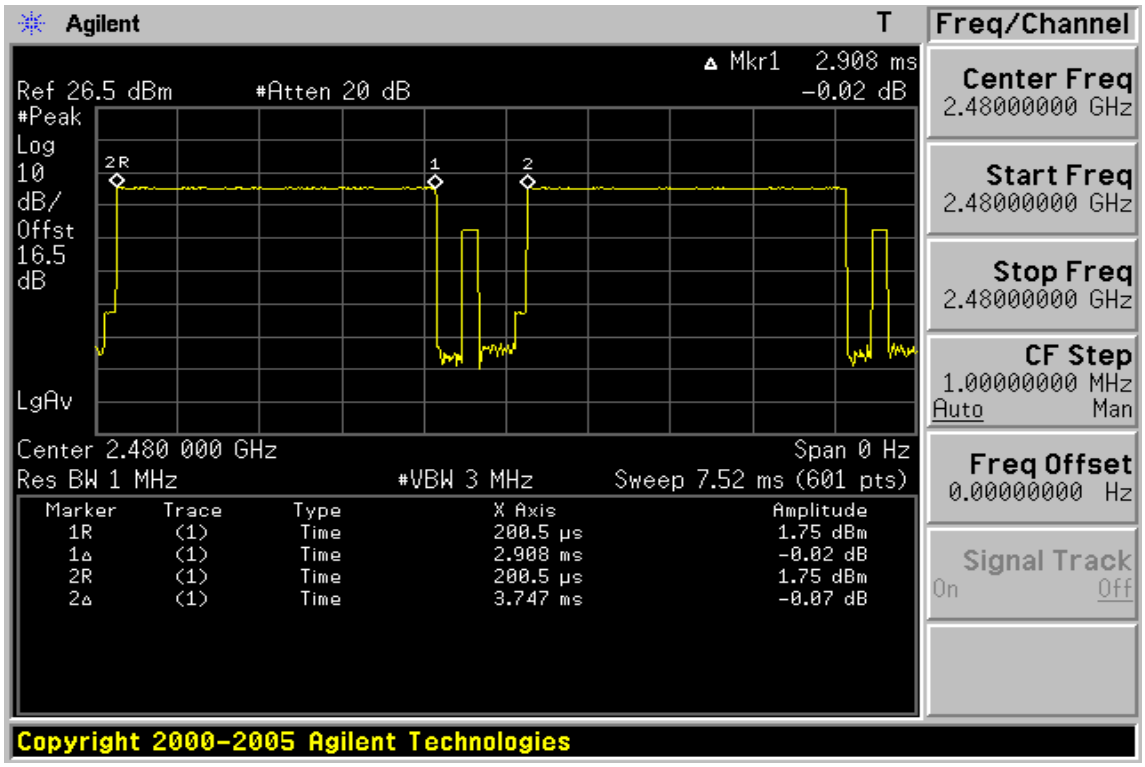
CH-High
DH1



DH3



DH5



12. Peak Power Spectral Density

12.1. Standard Applicable:

According to §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 3kHz band during any time interval of continuous transmission.

According to RSS-210 issue 8, §A8.2(b) and §A8.3(2), The transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.

12.2. Measurement Equipment Used:

Refer to section 6.2 for details.

12.3. Test Set-up:

Refer to section 6.3 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 the spectrum analyzer as RBW = 3KHz, VBW = 10KHz, Span = 1.5MHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

12.5. Measurement Result:

BDR Mode

CH	RF Power Density Reading (dBm)	RF Power Density Level (dBm)	Maximum Limit (dBm)	Result
Low	-9.40	-9.40	8	PASS
Mid	-9.35	-9.35	8	PASS
High	-9.64	-9.64	8	PASS

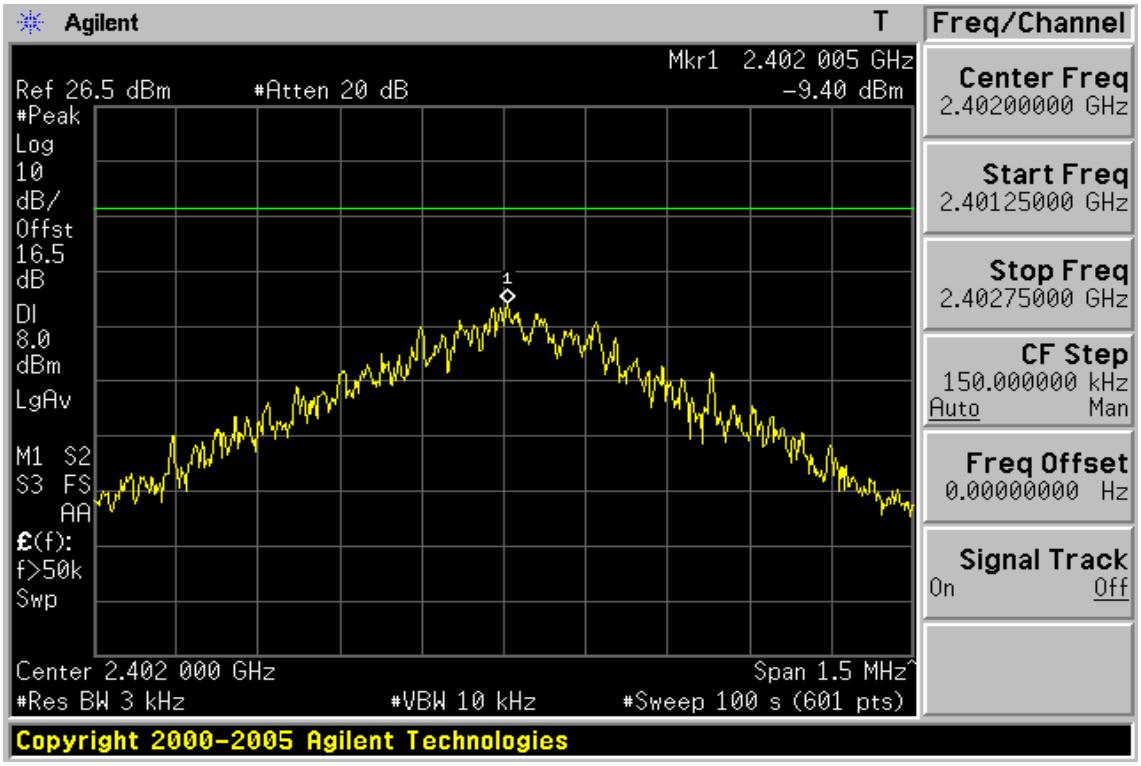
EDR Mode

CH	RF Power Density Reading (dBm)	RF Power Density Level (dBm)	Maximum Limit (dBm)	Result
Low	-10.94	-10.94	8	PASS
Mid	-10.83	-10.83	8	PASS
High	-12.14	-12.14	8	PASS

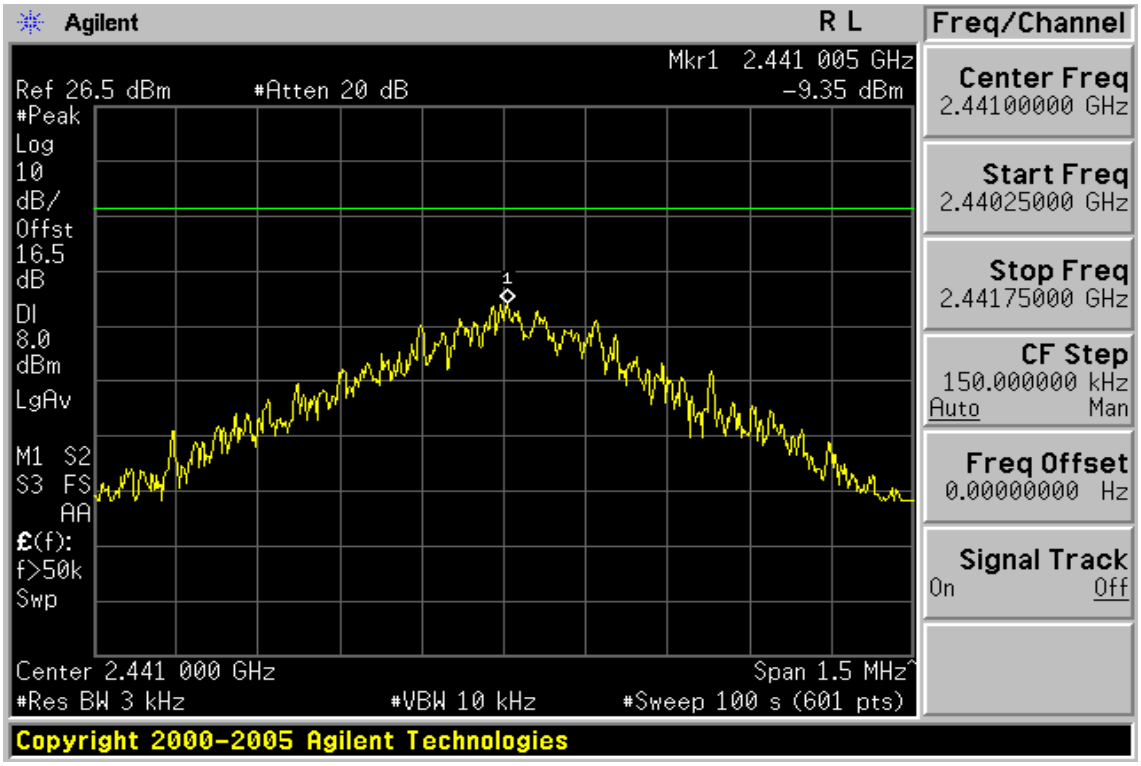
Offset: 16.50dB

Note: Refer to next page for plots.

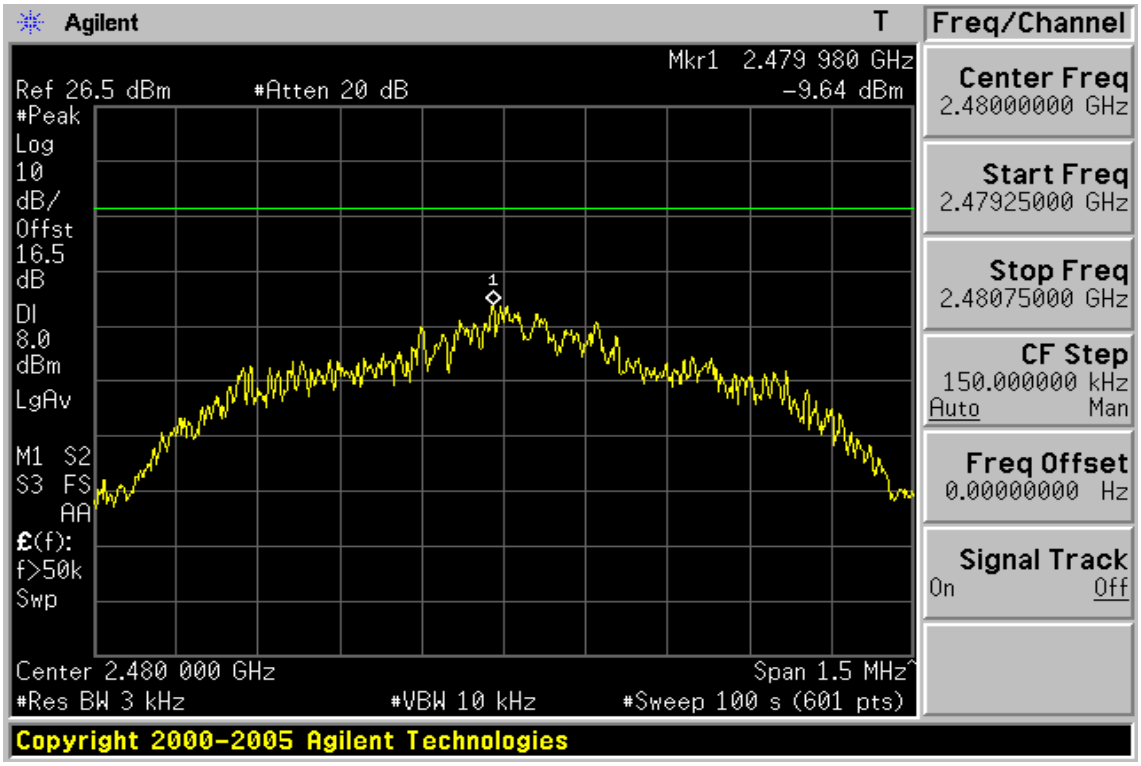
Power Spectral Density Test Plot (CH-Low) (BDR)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High) (BDR)



13. 20dB Bandwidth & 99% Bandwidth

13.1. Standard Applicable:

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.

13.2. Measurement Equipment Used:

Refer to section 6.2 for details.

13.3. Test Set-up:

Refer to section 6.3 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 the spectrum analyzer as RBW≧ 1 % of Bandwidth.VBW≧RBW, Span= 3MHz, Sweep=auto
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

13.5. Measurement Result:

20dB Bandwidth :

BDR Mode

CH	Bandwidth (kHz)
Lower	919.582
Mid	927.402
Higher	844.999

EDR mode:

CH	Bandwidth (MHz)	2/3 Bandwidth (MHz)
Lower	1.235	0.823
Mid	1.247	0.831
Higher	1.240	0.827

99% Bandwidth :

BDR Mode

CH	Bandwidth (kHz)
Lower	918.2436
Mid	947.7094
Higher	928.0406

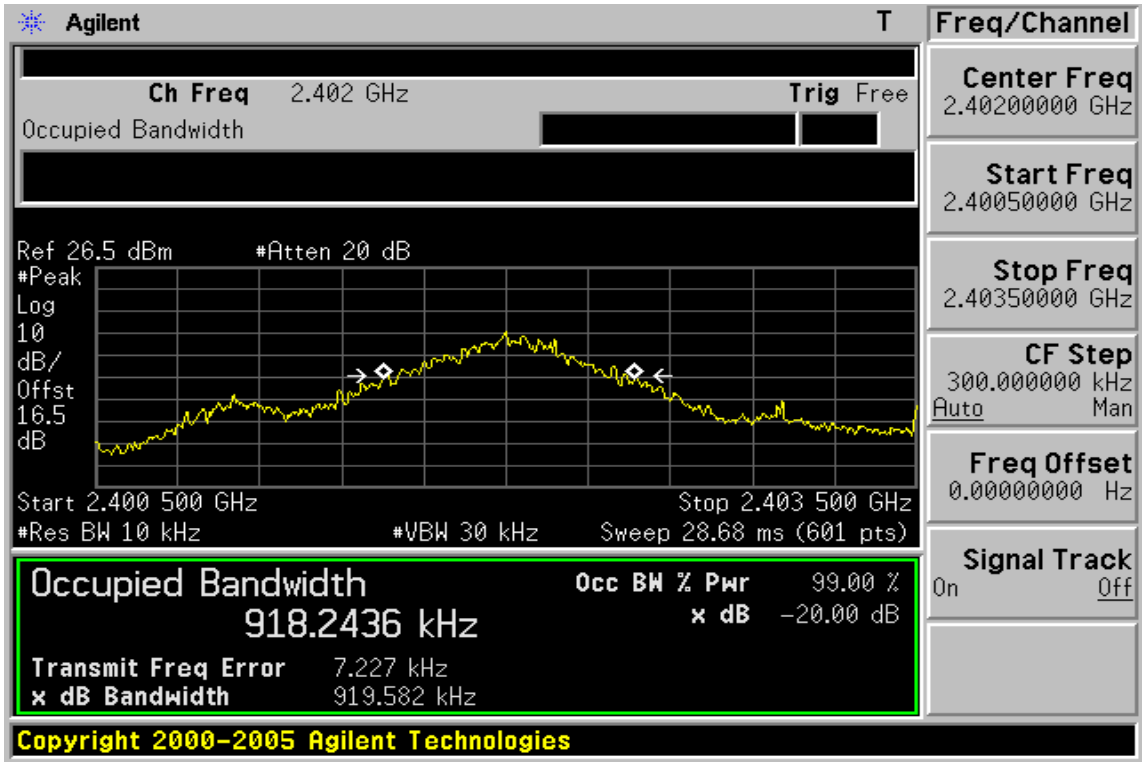
EDR Mode

CH	Bandwidth (MHz)
Lower	1.1888
Mid	1.1871
Higher	1.1893

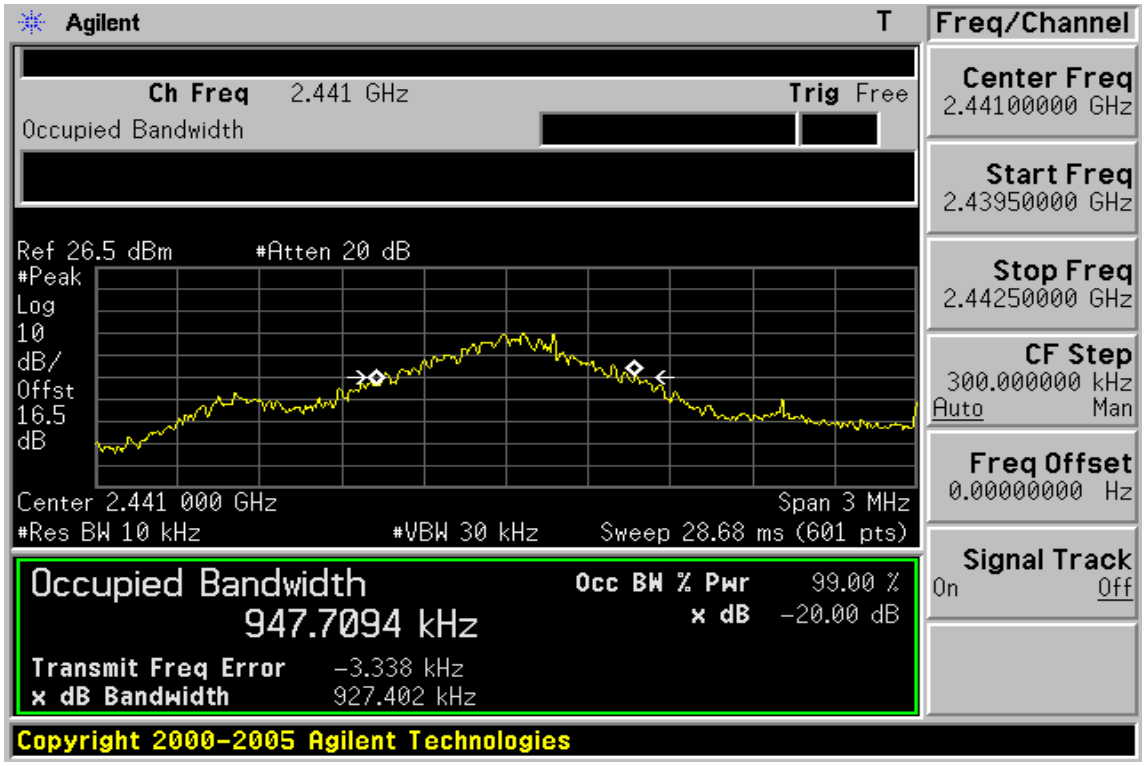
Note: Refer to next page for plots.

BDR Mode

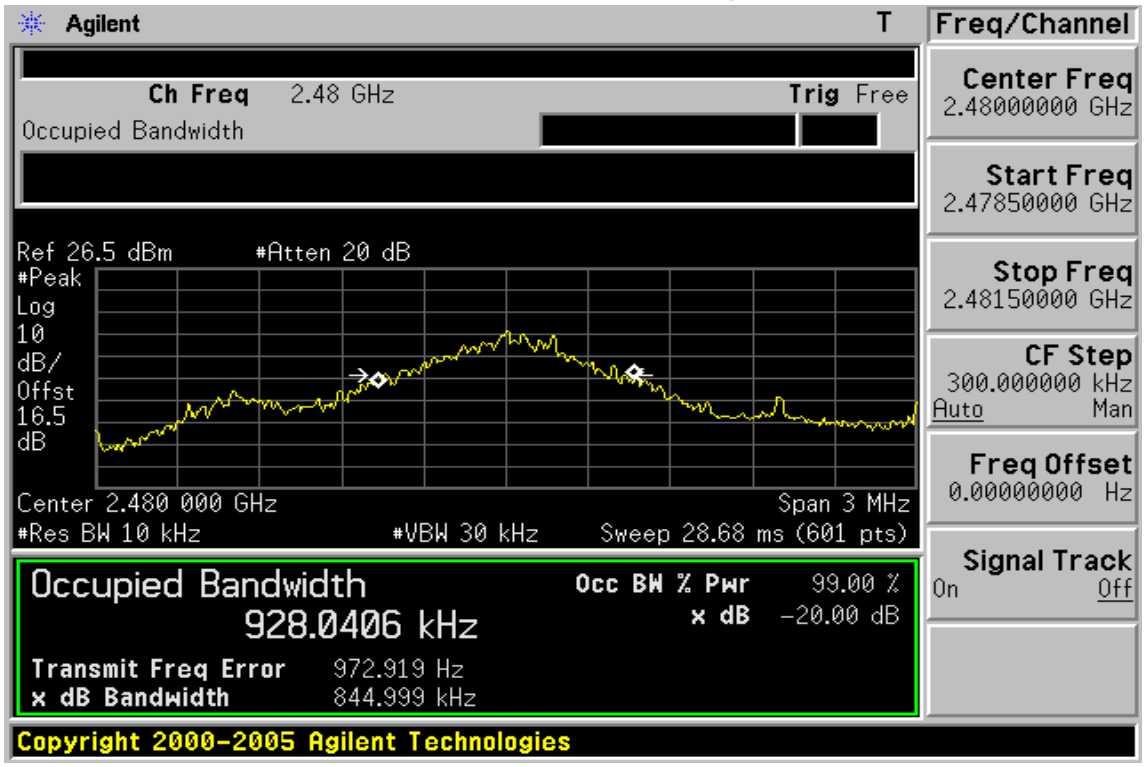
20dB Bandwidth & 99% Bandwidth Test Data CH-Low



20dB Bandwidth & 99% Bandwidth Test Data CH-Mid

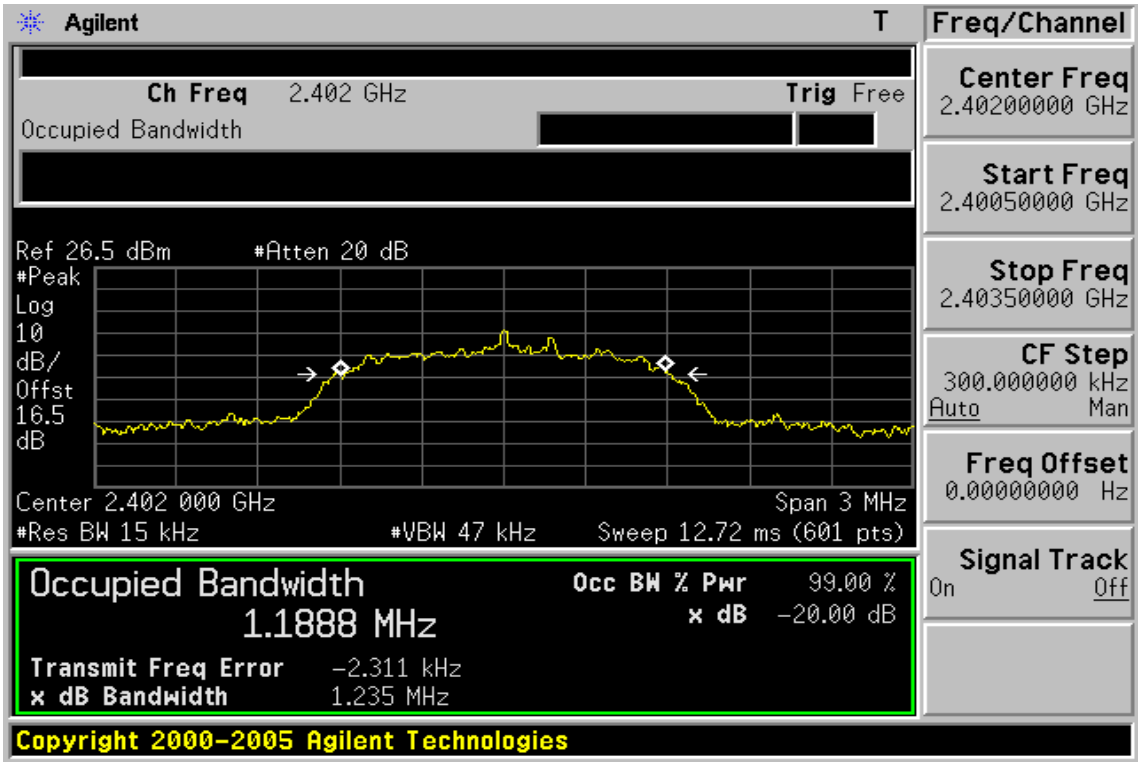


20dB Bandwidth & 99% Bandwidth Test Data CH-High

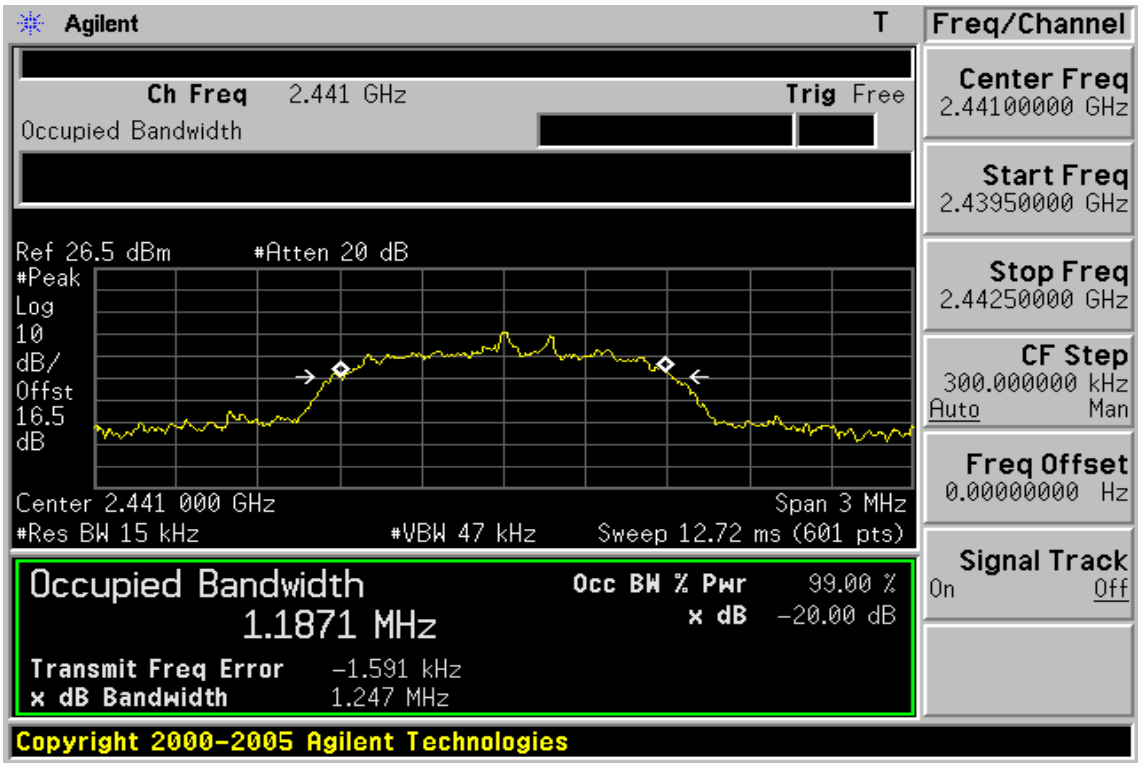


EDR Mode

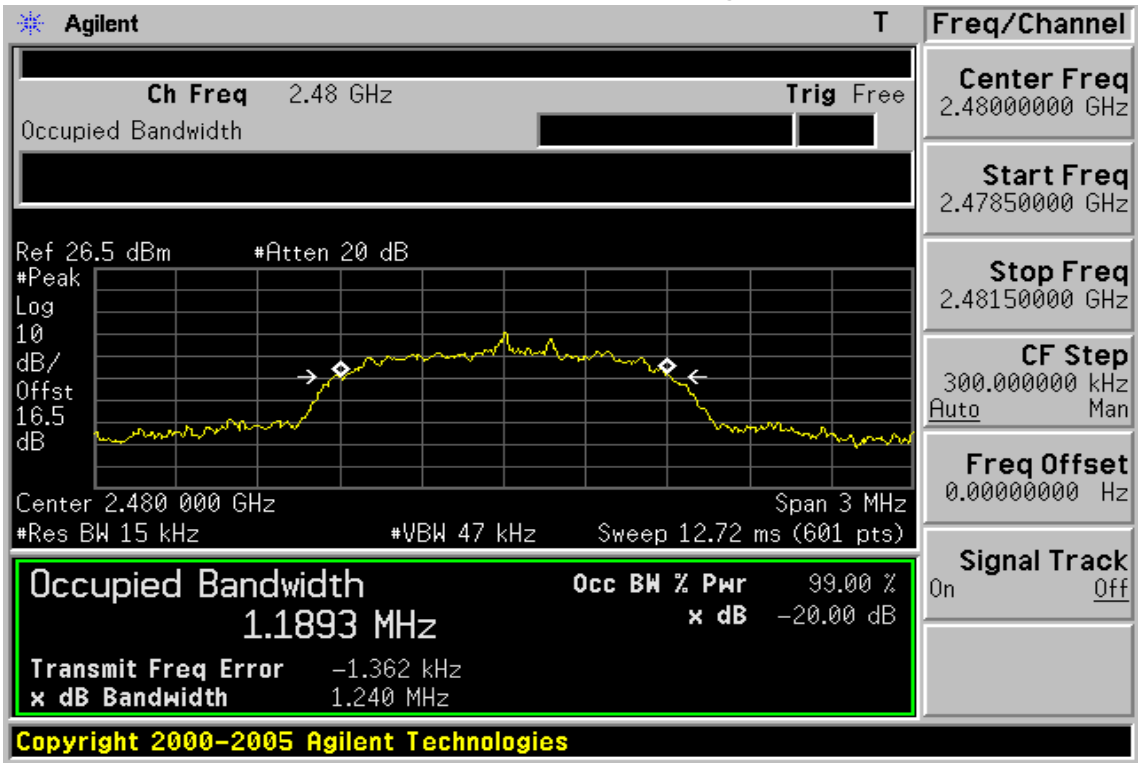
20dB Bandwidth & 99% Bandwidth Test Data CH-Low



20dB Bandwidth & 99% Bandwidth Test Data CH-Mid



20dB Bandwidth & 99% Bandwidth Test Data CH-High



14. ANTENNA REQUIREMENT

14.1. Standard Applicable:

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 §15.246(1), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in 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 2.41dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

15. RF EXPOSURE

15.1. Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a portable device.

15.2. Measurement Result:

This is a portable device and the Max peak output power is 1.83 dBm (0.00152W) lower than low threshold 60/fGHz mW (24.48mW), d<2.5cm in general population category；

The SAR measurement is not necessary.