

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT
AND INDUSTRY CANADA RSS 210**

OF

Product Name: Windows Phone
Brand Name: HTC
Model No.: PI06130
Model Difference: N/A
FCC ID: NM8PI06130
IC: 4115B-PI06130
Report No.: EH/2011/B0012
Issue Date: Dec. 16, 2011
FCC Rule Part: §15.247, Cat: DSS
IC Rule Part: RSS-210 issue 8 :2010, Annex 8
Prepared for: HTC Corporation
No. 23, Xinghua Rd., Taoyuan City, Taoyuan
County 330, Taiwan, R.O.C.
SGS Taiwan Ltd.
Prepared by: Electronics & Communication Laboratory
No. 134, Wu Kung Rd., Wuku Industrial Zone,
Taipei County, Taiwan



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t (886-2) 2299-3279

f (886-2) 2298-0488

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VERIFICATION OF COMPLIANCE

Applicant: HTC Corporation
No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan,
R.O.C.

Product Name: Windows Phone

Brand Name: HTC

Model No.: PI06130

Model Difference: N/A

FCC ID: NM8PI06130

IC: 4115B-PI06130

File Number: EH/2011/B0012

Date of test: Nov. 17, 2011 ~ Dec. 15, 2011

Date of EUT Received: Nov. 17, 2011

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 (2003) 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:

Jay Lin

Date:

Dec. 16, 2011

Jay Lin / Engineer

Prepared By:

Celine Chou

Date:

Dec. 16, 2011

Celine Chou / Clerk

Approved By:

Jim Chang

Date:

Dec. 16, 2011

Jim Chang / Supervisor

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Version

Version No.	Date	Description
00	Dec. 16, 2011	Initial creation of document

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1. GENERAL INFORMATION

General:

Product Name:	Windows Phone	
Brand Name:	HTC	
Model No.:	PI06130	
Model Difference:	N/A	
Simple Hands-Free:	1. Model No.: HS G400, Supplier: FOSTER 2. Model No.: HS G400, Supplier: COTRON 3. Model No.: HS G400, Supplier: MERRY	
USB Cable:	1. Model No.: DC M410, Supplier: Coxoc 2. Model No.: DC M410, Supplier: Foxlink	
Power Supply:	3.7Vdc Li-Ion battery or 5 Vdc from AC/DC adapter	
	Battery:	1. Model No.: BG 58100, Supplier: TWS 2. Model No.: BG 58100, Supplier: WTE
	Adapter:	1. Model No.: TC U250, Supplier: Delta 2. Model No.: TC U250, Supplier: Phihong

Bluetooth:

Bluetooth Version:	V2.1 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK)
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Transmit Power:	0.85dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	$\leq 0.4s$
Operating Mode:	Point-to-Point
Antenna Designation:	PIFA Antenna, -0.32dBi.
Type of Emission:	1M34F1D

The test report compliance for Bluetooth.

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

This submittal(s) (test report) is intended for **FCC ID: NM8PI06130** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and **IC: 4115B-PI06130** 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: 2003. 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 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. 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.

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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 placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4: 2003, conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a 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: 2003.

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2.4. Configuration of Tested System

Fig. 2-1 AC Power line and Radiated Emission Configuration

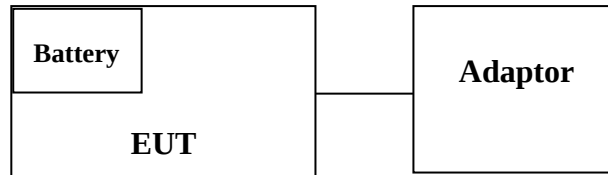


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	N/A					

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f (886-2) 2298-0488

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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) RSS210 issue ,§A8.1(b) RSS-Gen §4.6.1	20dB Bandwidth & 99% Power Bandwidth	Compliant
§15.247I 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 lowest rated data rate were chosen as worst case for full testing.

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

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5. CONDUCTED EMISSION TEST

5.1. 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.		

5.2. 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 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.

5.3. 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.

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5.4. 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-50/250-2 5-2-01	04034	03/31/2011	03/30/2012
Coaxial Cables	N/A	WK CE Cable	N/A	11/28/2011	11/27/2012

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.

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t (886-2) 2299-3279

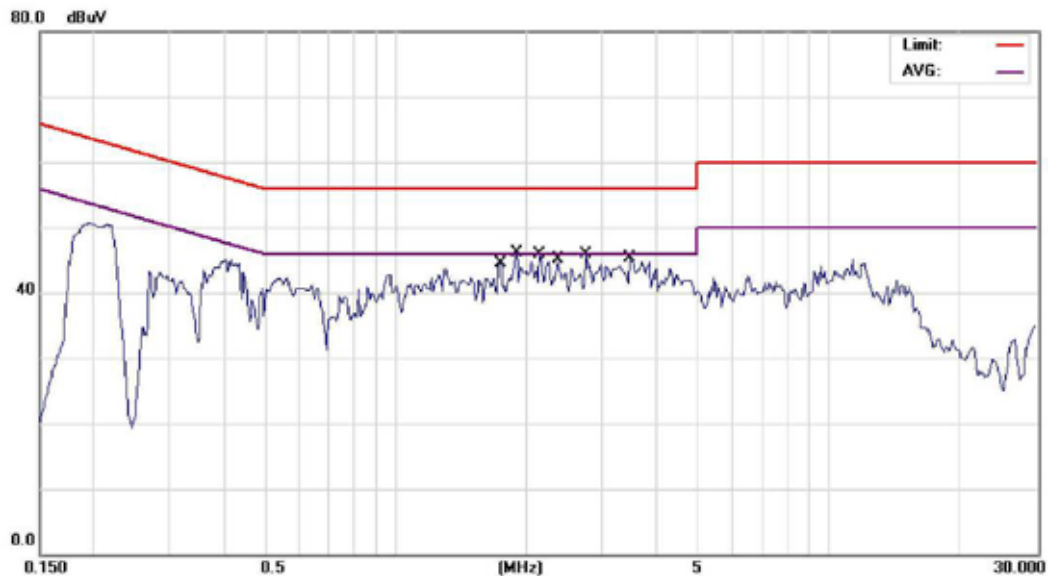
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation			Test Date:	Nov. 20, 2011
Temperature:	24	Humidity:	59 %	Test By:	Jay



Site: SGS CONDUCTED #1

Phase: L1

Temperature: 23 °C

Limit: FCC Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 58%

EUT: Windows Phone

Distance:

Air Pressure: hpa

M/N: PI06130

Note: BT mode

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	1.7413	37.82	0.17	37.99	56.00	-18.01	QP	
2		1.7413	25.79	0.17	25.96	46.00	-20.04	AVG	
3		1.8948	37.37	0.19	37.56	56.00	-18.44	QP	
4		1.8948	25.05	0.19	25.24	46.00	-20.76	AVG	
5		2.1444	37.17	0.19	37.36	56.00	-18.64	QP	
6		2.1444	25.32	0.19	25.51	46.00	-20.49	AVG	
7		2.3568	37.59	0.20	37.79	56.00	-18.21	QP	
8		2.3568	25.71	0.20	25.91	46.00	-20.09	AVG	
9		2.7347	37.30	0.21	37.51	56.00	-18.49	QP	
10		2.7347	25.08	0.21	25.29	46.00	-20.71	AVG	
11		3.4649	36.98	0.22	37.20	56.00	-18.80	QP	
12		3.4649	24.82	0.22	25.04	46.00	-20.96	AVG	

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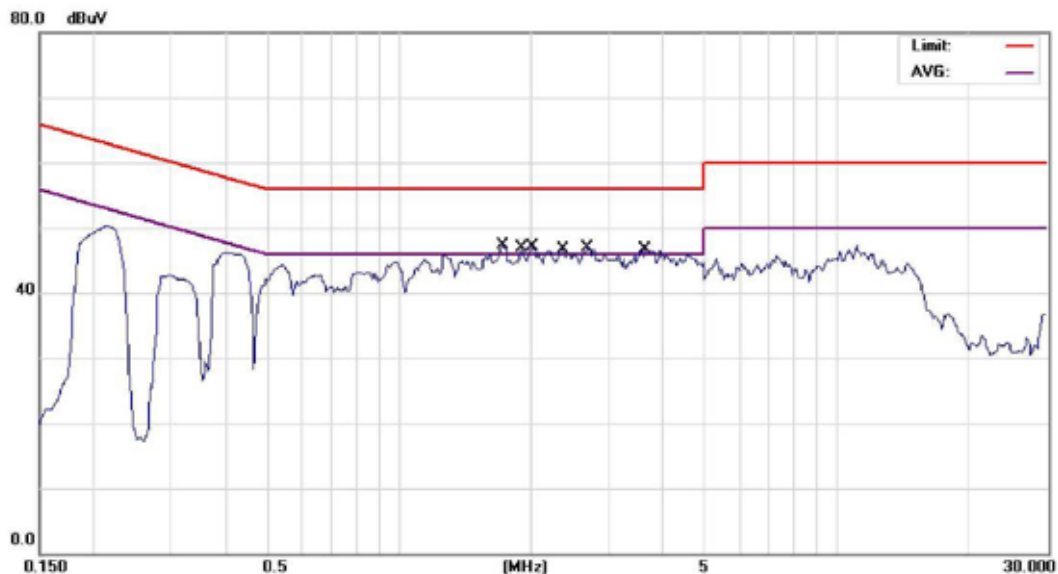
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Site: SGS CONDUCTED #1
Limit: FCC Class B Conduction(QP)
EUT: Windows Phone
MN: PI06130
Note: BT mode

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

Temperature: 23 °C
Humidity: 58%
Air Pressure: hpa

No.	Mk.	Freq.	Reading Level	Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	1.7275	38.45	0.17	38.62	56.00	-17.38	QP	
2		1.7275	24.16	0.17	24.33	46.00	-21.67	AVG	
3		1.8984	37.64	0.19	37.83	56.00	-18.17	QP	
4		1.8984	23.71	0.19	23.90	46.00	-22.10	AVG	
5		2.0148	38.26	0.19	38.45	56.00	-17.55	QP	
6		2.0148	24.10	0.19	24.29	46.00	-21.71	AVG	
7		2.3572	38.38	0.19	38.57	56.00	-17.43	QP	
8		2.3572	23.96	0.19	24.15	46.00	-21.85	AVG	
9		2.6911	37.53	0.21	37.74	56.00	-18.26	QP	
10		2.6911	23.18	0.21	23.39	46.00	-22.61	AVG	
11		3.6596	37.11	0.23	37.34	56.00	-18.66	QP	
12		3.6596	23.45	0.23	23.68	46.00	-22.32	AVG	

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6. PEAK OUTPUT POWER MEASUREMENT

6.1. Standard Applicable

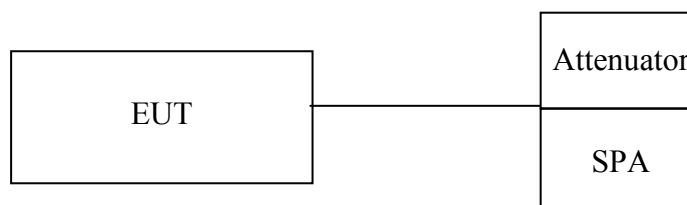
According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

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:



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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, >20dB bandwidth, >=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	-0.62	-0.62	0.00087	1
2441.00	0.28	0.28	0.00107	1
2480.00	0.07	0.07	0.00102	1

EDR mode:

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	-0.18	-0.18	0.00096	1
2441.00	0.85	0.85	0.00122	1
2480.00	0.49	0.49	0.00112	1

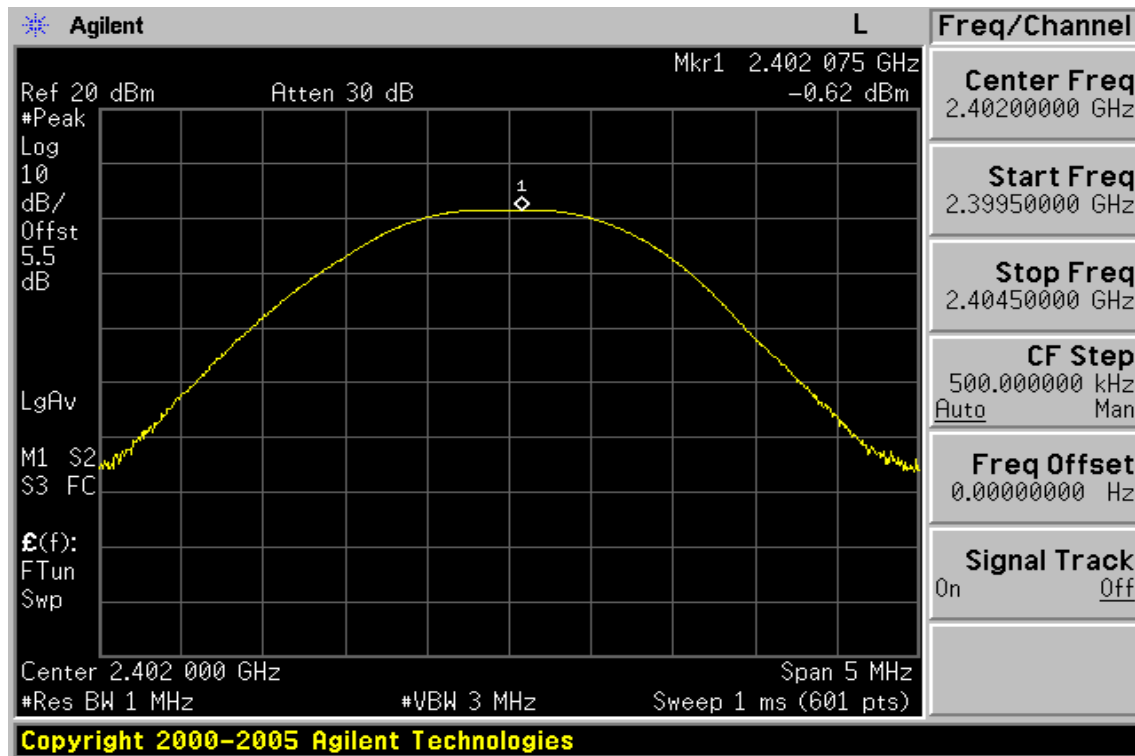
NOTE: offset: 5.5dB

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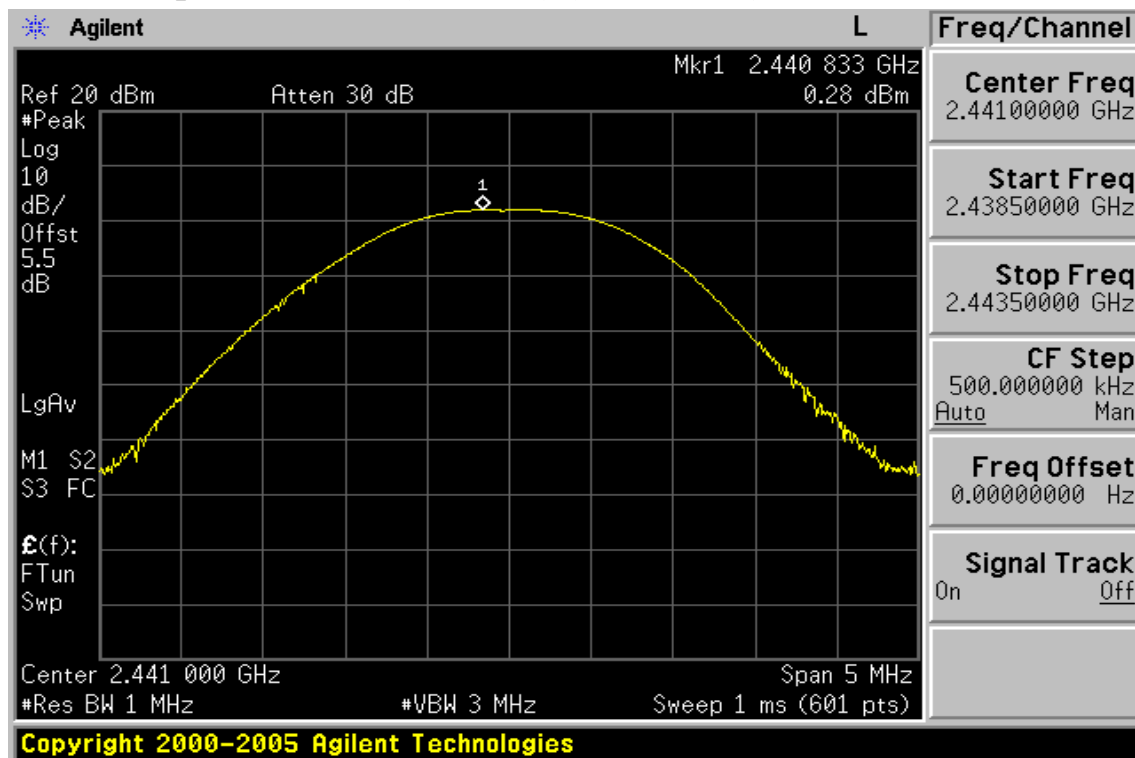
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Peak Power Output Data Plot (CH Low) (BDR mode)



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

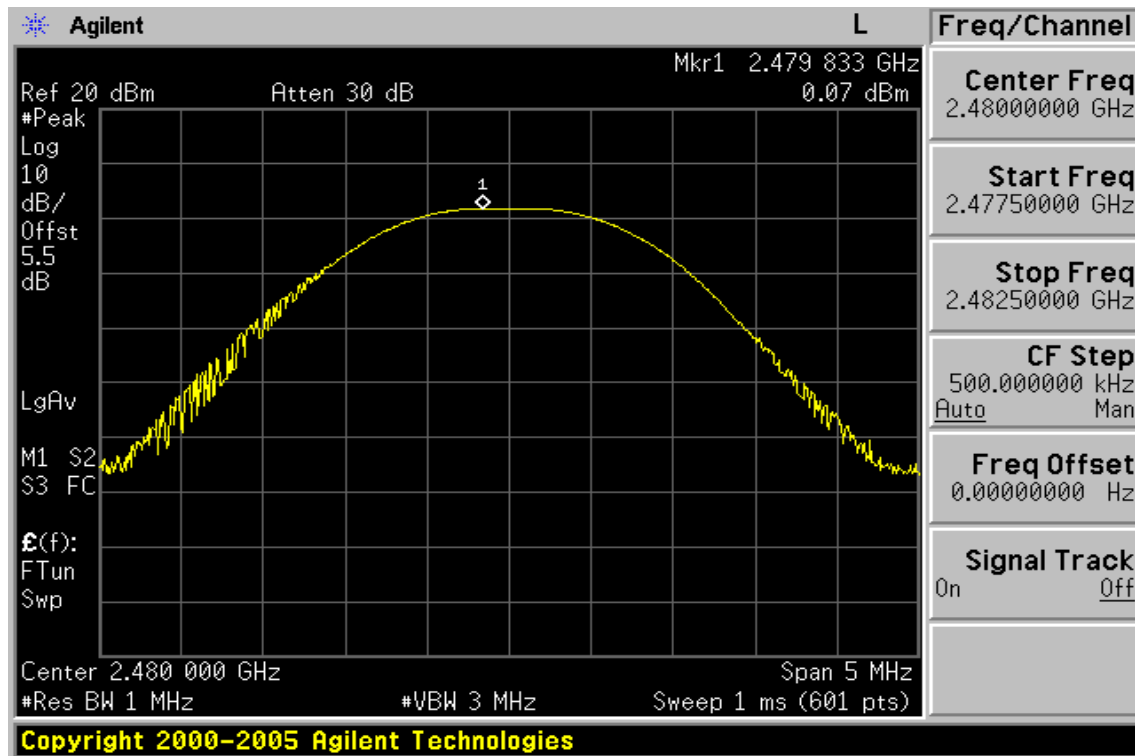


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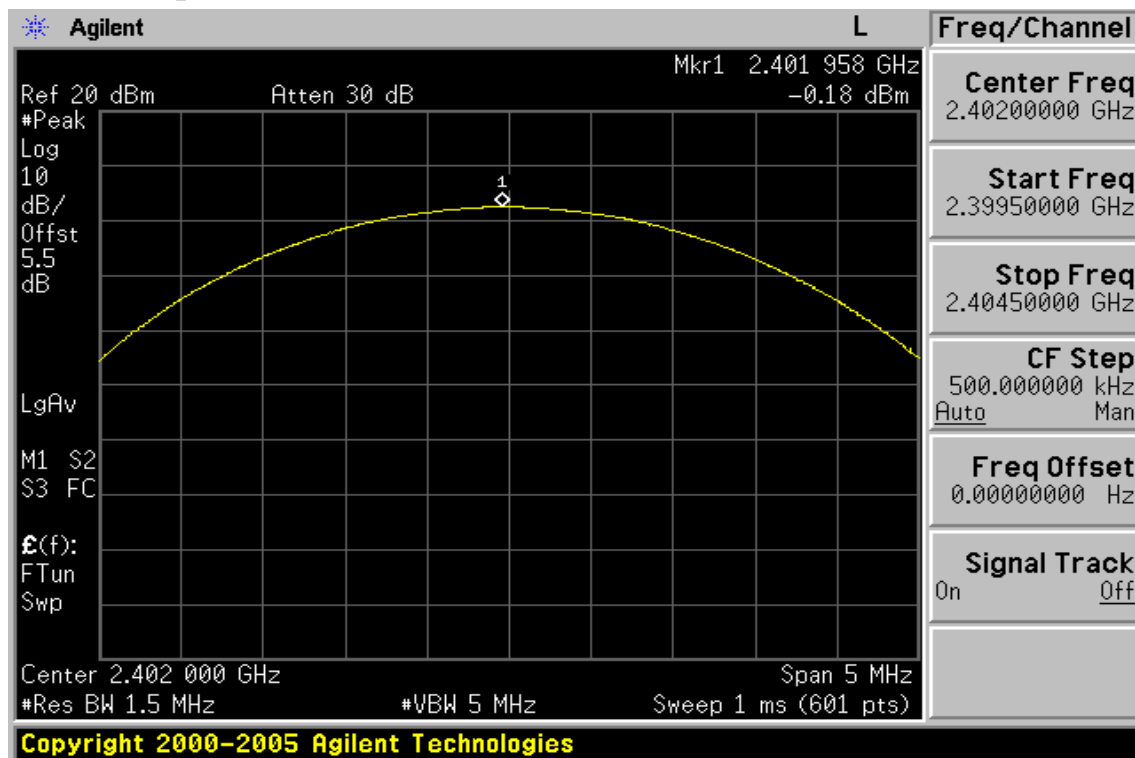
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Peak Power Output Data Plot (CH High) (BDR mode)



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

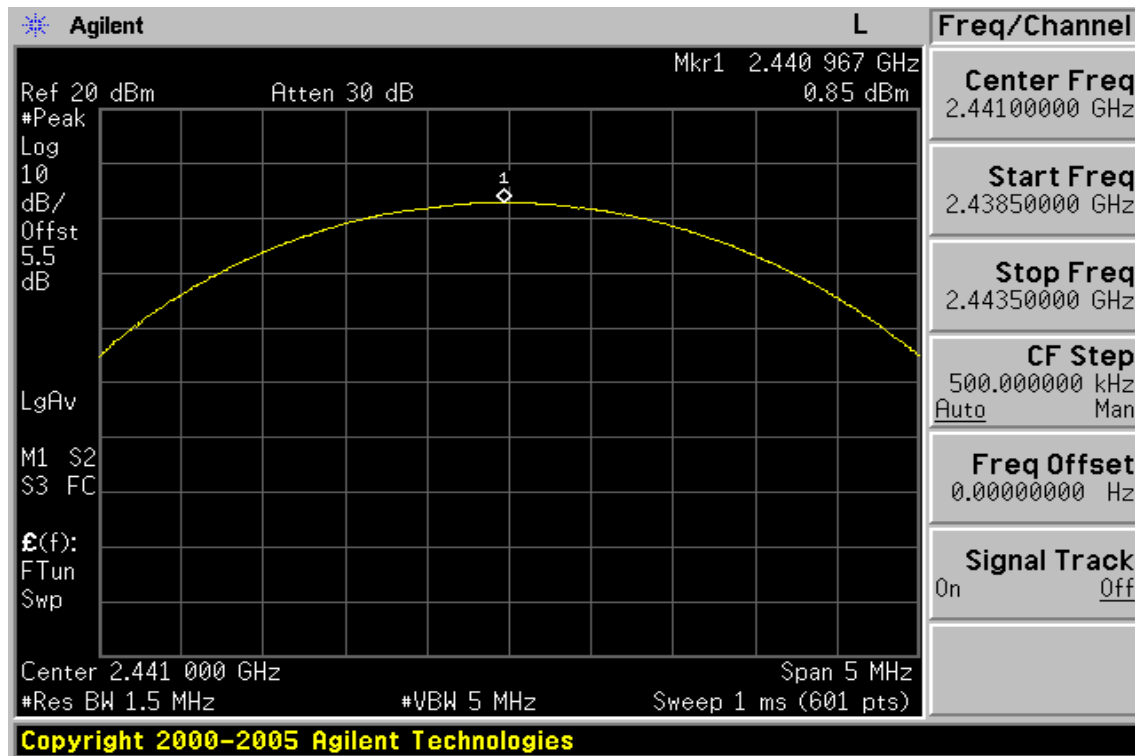


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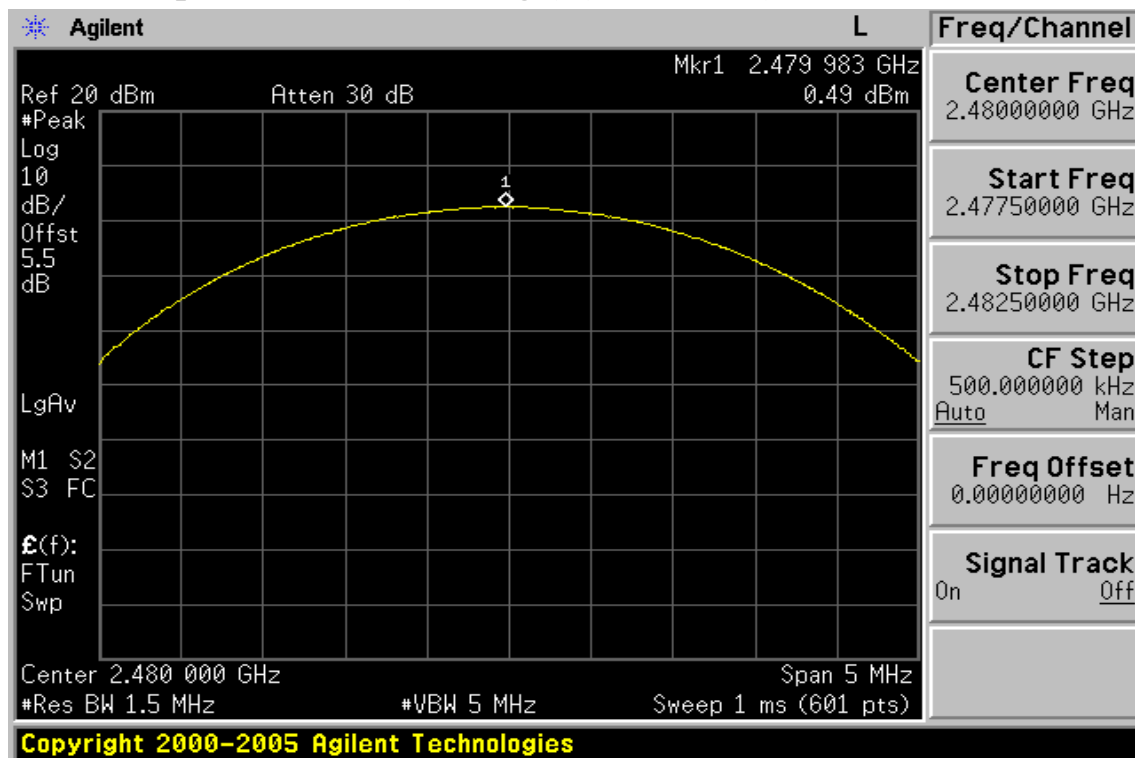
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Peak Power Output Data Plot (CH Mid) (EDR mode)



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



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7. 20dB BANDWIDTH & 99% BANDWIDTH

7.1. 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.

7.2. Measurement Equipment Used

Refer to section 6.2 for details.

7.3. Test Set-up

Refer to section 6.3 for details.

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 the spectrum analyzer as RBW=10KHz (1 % of Bandwidth.), Span= 3MHz, Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency and Turn on the 99% bandwidth function, max reading..
5. Repeat above procedures until all frequency measured were complete.

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7.5. Measurement Result:**20dB Bandwidth:**

BDR mode:

CH	Bandwidth (KHz)
Lower	922.255
Mid	923.148
Higher	920.222

EDR mode:

CH	Bandwidth (MHz)	2/3 Bandwidth (MHz)
Lower	1.336	0.891
Mid	1.331	0.887
Higher	1.339	0.893

99% Bandwidth:

BDR mode:

CH	99% Bandwidth (KHz)
Lower	869.3631
Mid	871.4896
Higher	877.8141

EDR mode:

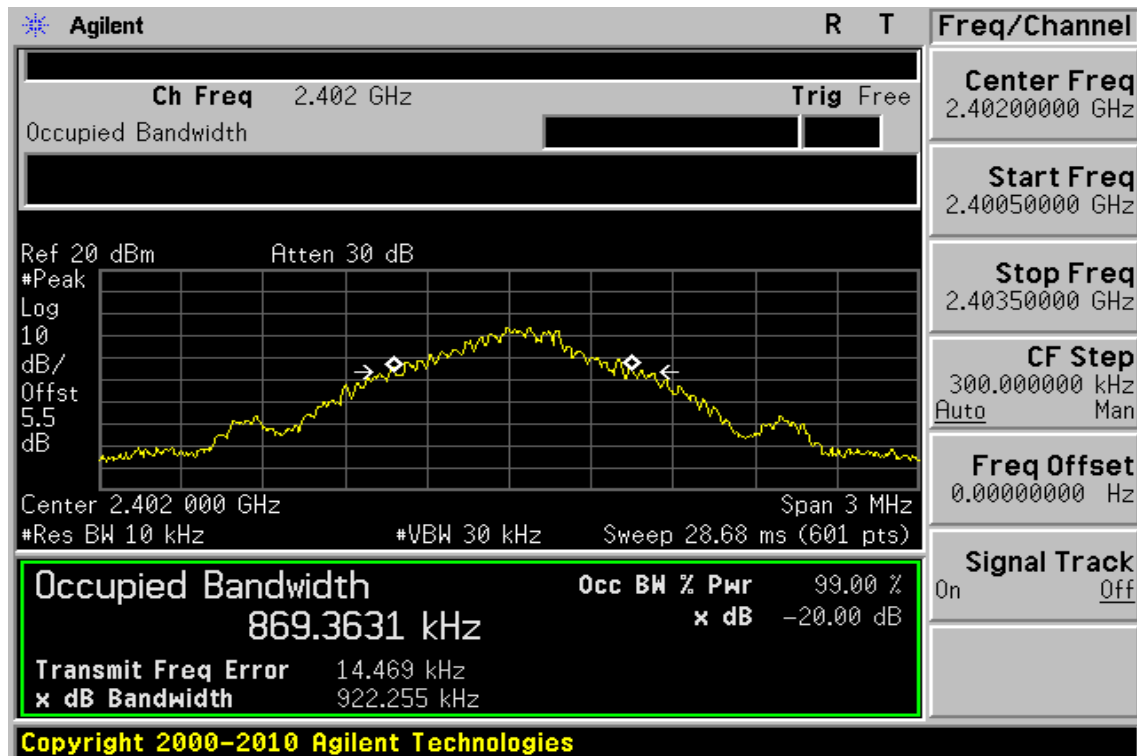
CH	99% Bandwidth (MHz)
Lower	1.2035
Mid	1.2085
Higher	1.2090

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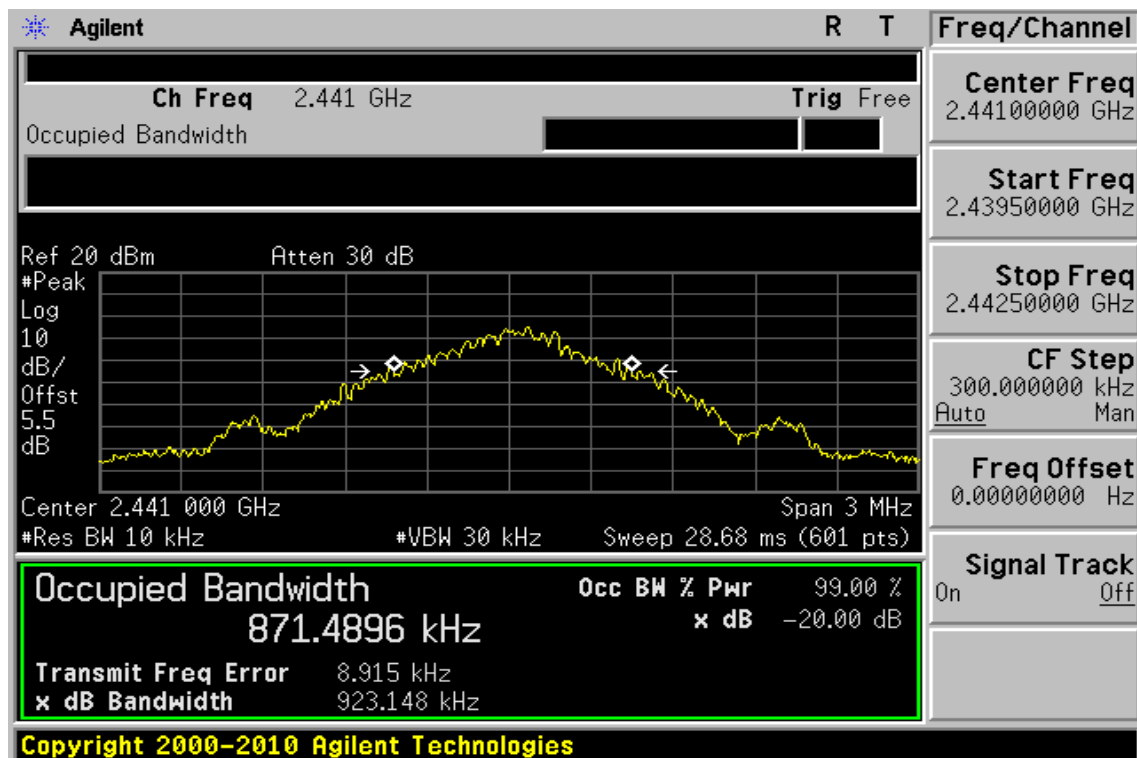
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20dB Band Width and & 99% Band Width Test Data CH-Low (BDR mode)



20dB Band Width and & 99% Band Width Test Data CH-Mid (BDR mode)

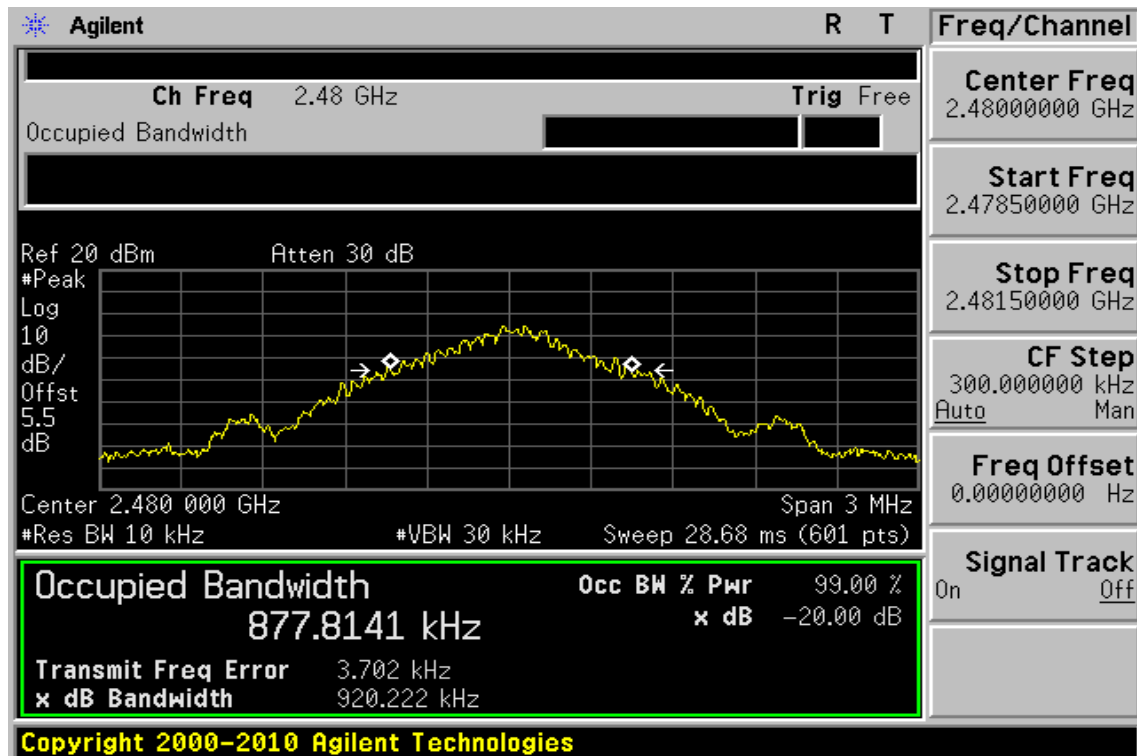


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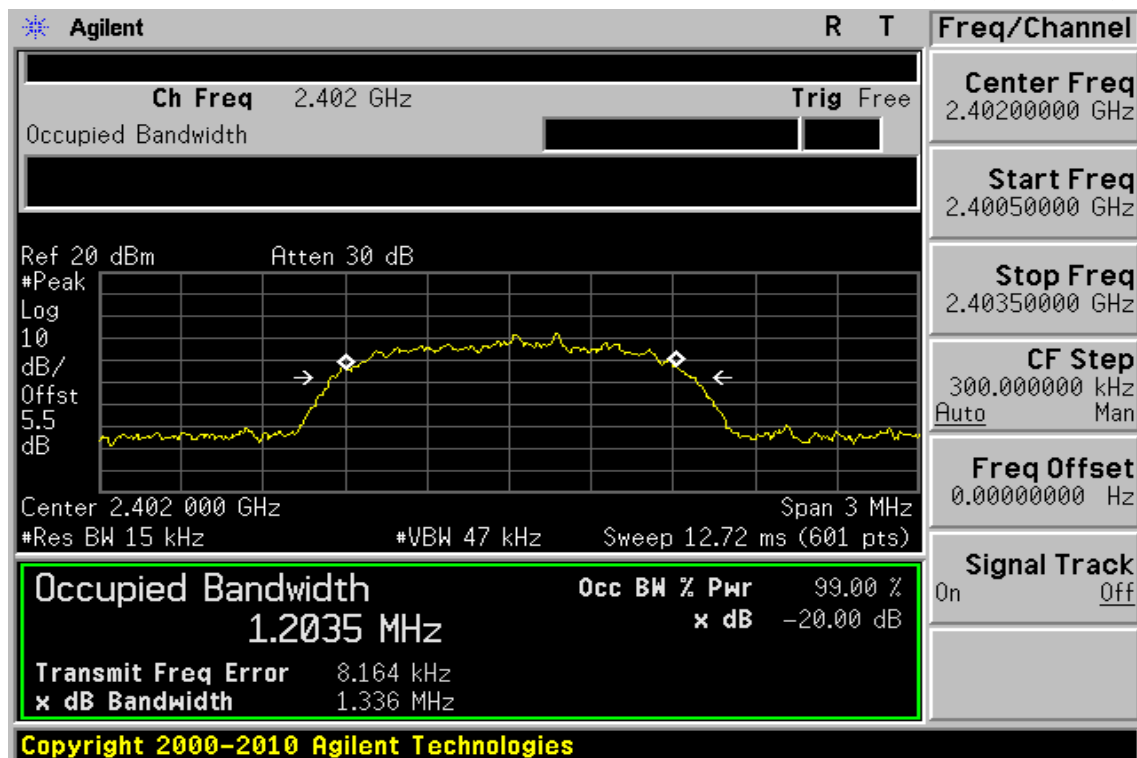
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20dB Band Width and & 99% Band Width Test Data CH-High (BDR mode)



20dB Band Width and & 99% Band Width Test Data CH-Low (EDR mode)

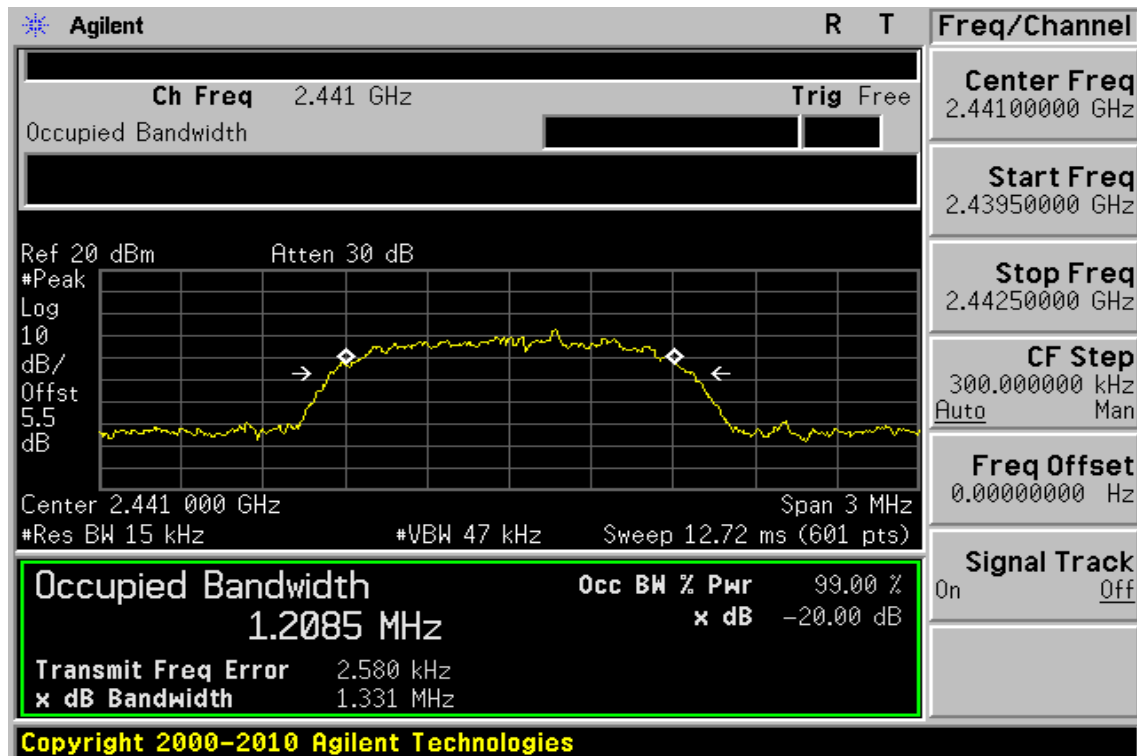


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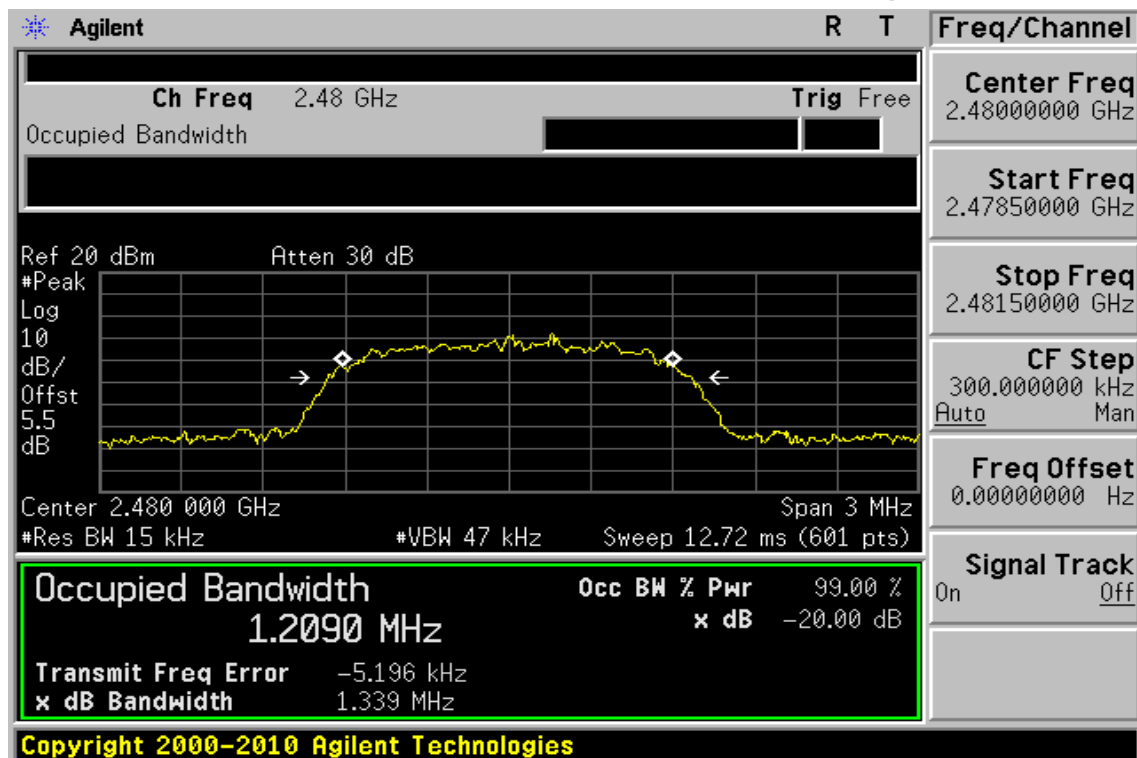
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20dB Band Width and & 99% Band Width Test Data CH-Mid (EDR mode)



20dB Band Width and & 99% Band Width Test Data CH-High (EDR mode)



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8. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

8.1. Standard Applicable

According to §15.247(c), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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.

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台灣檢驗科技股份有限公司

No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

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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:

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	11/18/2012
Horn antenna	SCHWAZBECK	BBHA 9120D	309/320	01/22/2010	01/21/2012
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2011	11/27/2012
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

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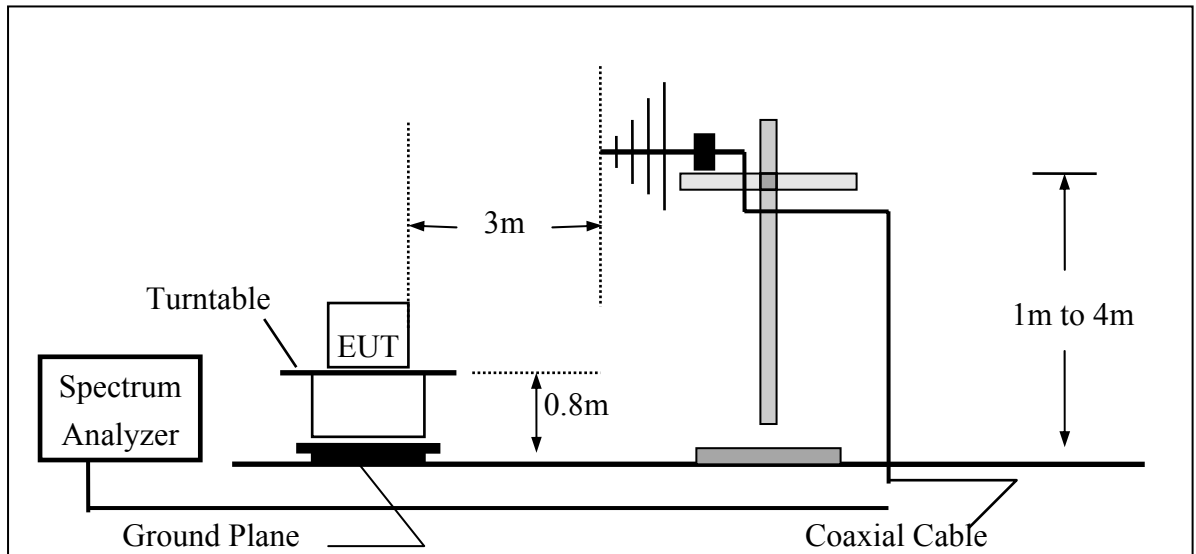
8.3. Test SET-UP:

8.3.1. Conducted Emission at antenna port:

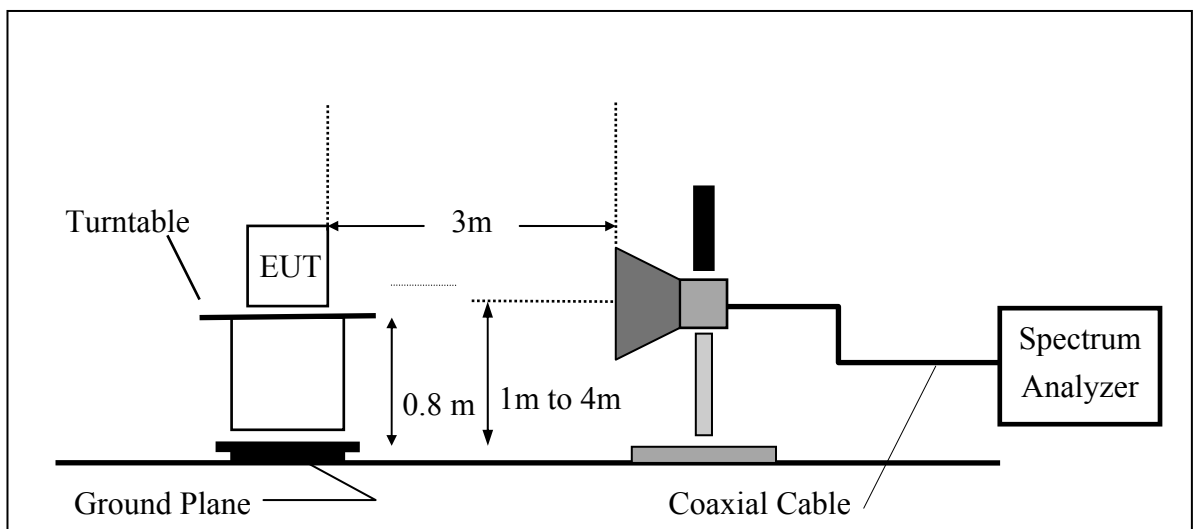
Refer to section 6.3 for details.

8.3.2. Radiated emission:

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



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



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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 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. Radiated Emission refer to section 9.

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

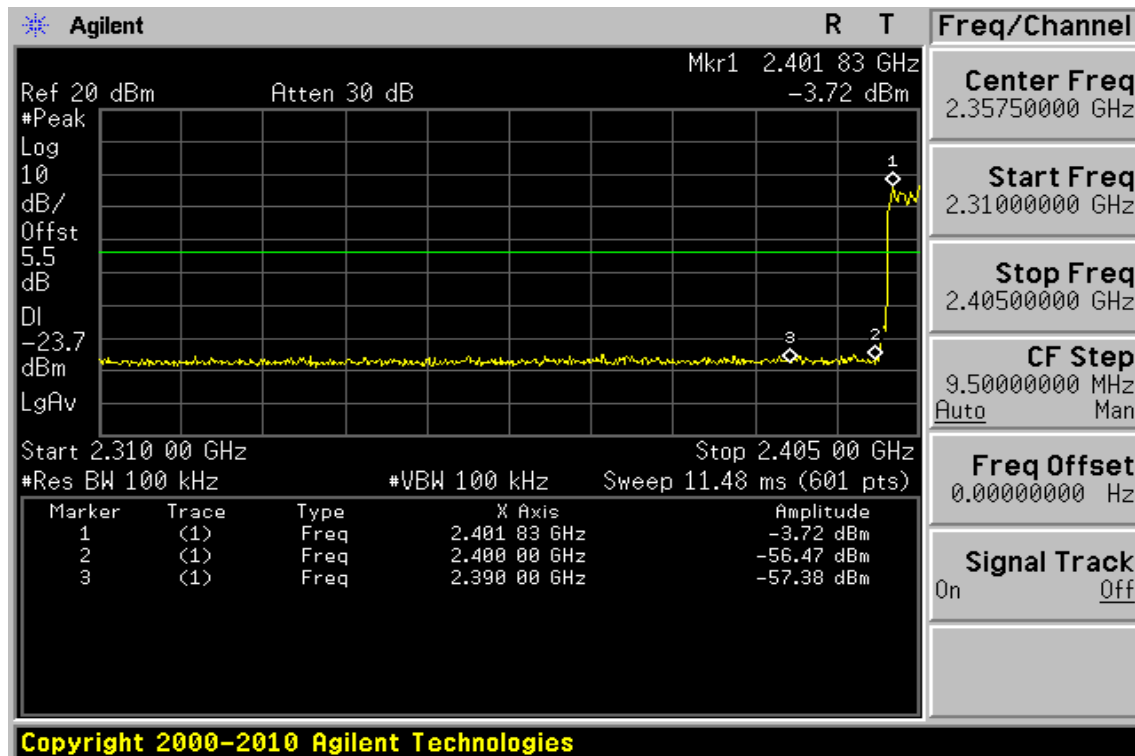
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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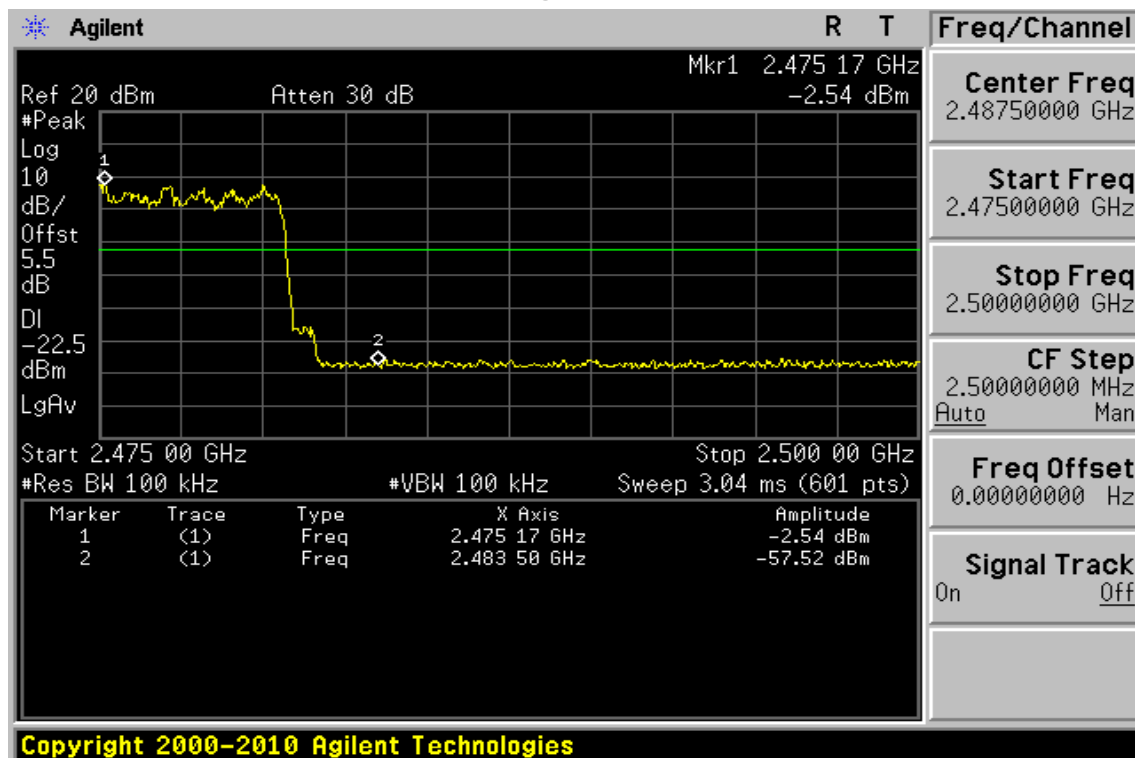
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Conducted Emission: Test Data CH-Low (worse case EDR mode)



Conducted Emission: Test Data CH-High



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Radiated Emission: (worse case EDR mode)

Operation Mode	TX CH Low	Test Date	Nov. 16, 2011
Fundamental Frequency	2402 MHz	Test By	Jay
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF (dB)	Actual FS		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
				Peak (dBuV/m)	AV (dBuV/m)				
2390.00	46.04	---	-0.67	45.37	---	74.00	54.00	-8.63	Peak

Operation Mode	TX CH Low	Test Date	Nov. 16, 2011
Fundamental Frequency	2402 MHz	Test By	Jay
Temperature	25	Pol	Hor.
Humidity	65 %		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF (dB)	Actual FS		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
				Peak (dBuV/m)	AV (dBuV/m)				
2390.00	45.85	---	-0.67	45.18	---	74.00	54.00	-8.82	Peak

Remark :

- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Operation Mode TX CH High
Fundamental Frequency 2480 MHz
Temperature 25
Humidity 65 %

Test Date Nov. 16, 2011
Test By Jay
Pol Ver.

F req. (MHz)	Peak Reading	AV Reading	Ant./CL CF (dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
2483.50	46.10	--	-0.52	45.58	--	74.00	54.00	-8.42	Peak

Operation Mode TX CH High
Fundamental Frequency 2480 MHz
Temperature 25
Humidity 65 %

Test Date Nov. 16, 2011
Test By Jay
Pol Hor.

F req. (MHz)	Peak Reading	AV Reading	Ant./CL CF (dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
2483.50	45.99	--	-0.52	45.47	--	74.00	54.00	-8.53	Peak

Remark :

- (1) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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9. SPURIOUS RADIATED EMISSION TEST

9.1. 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.

9.2. Measurement Equipment Used:

9.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

9.2.2. Radiated emission:

Refer to section 7.2 for details.

9.3. Test SET-UP:

9.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

9.3.2. Radiated emission:

Refer to section 7.3 for details.

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9.4. 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.

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:

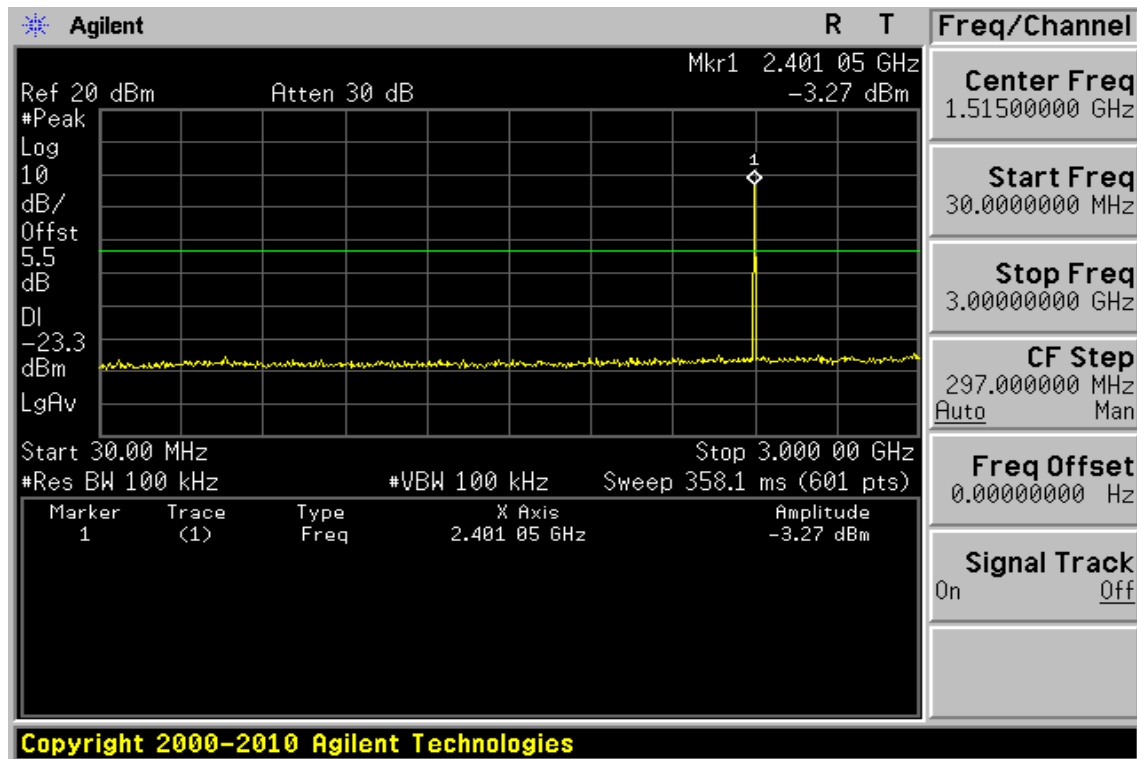
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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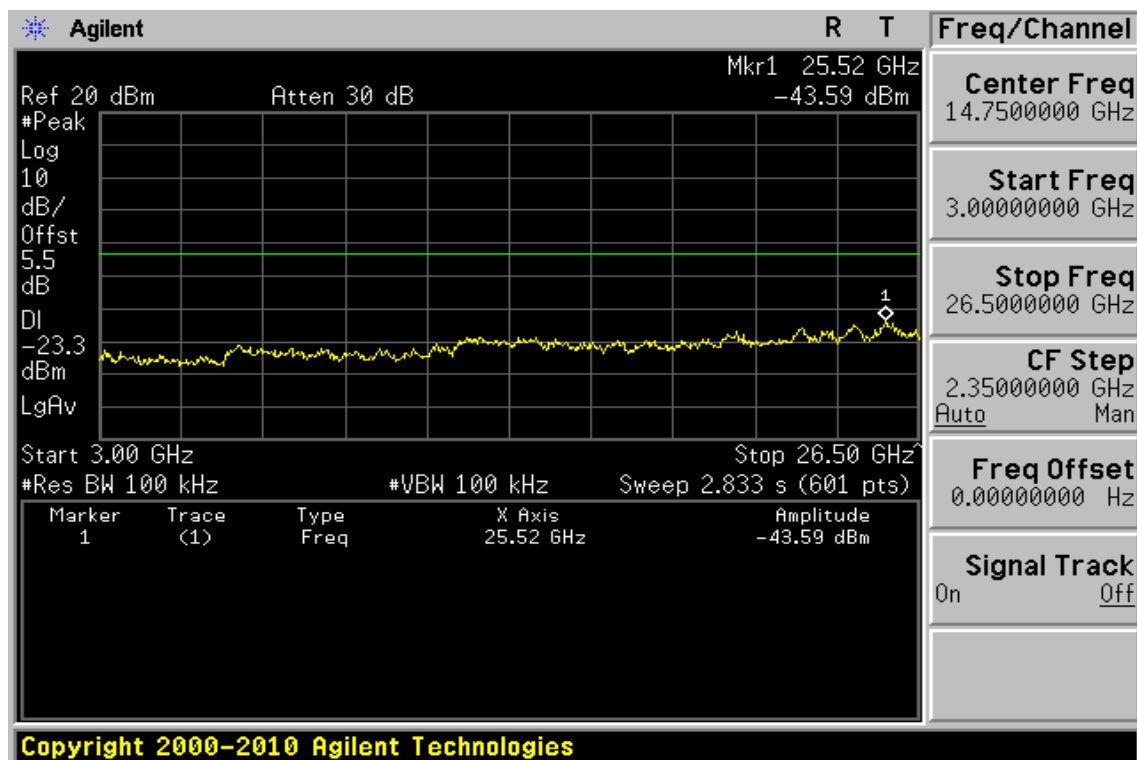
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Conducted Spurious Emission Measurement Result (EDR mode worst case) Ch Low 30MHz – 3GHz



Ch Low 3GHz – 26.5GHz

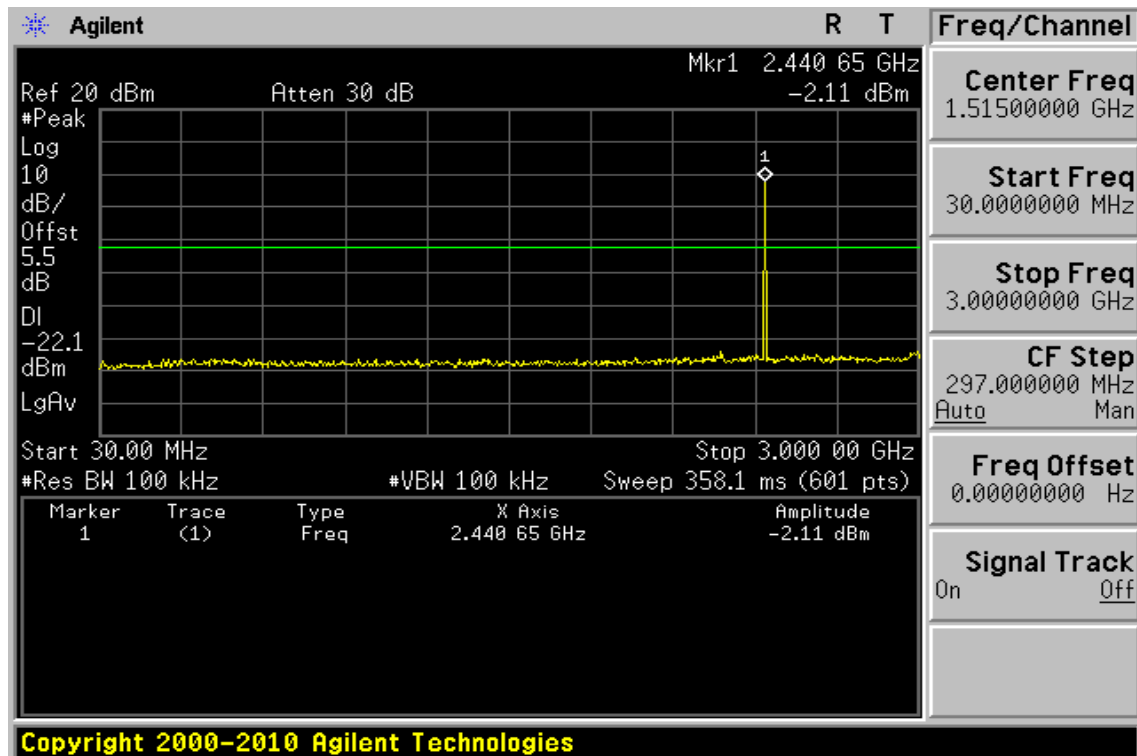


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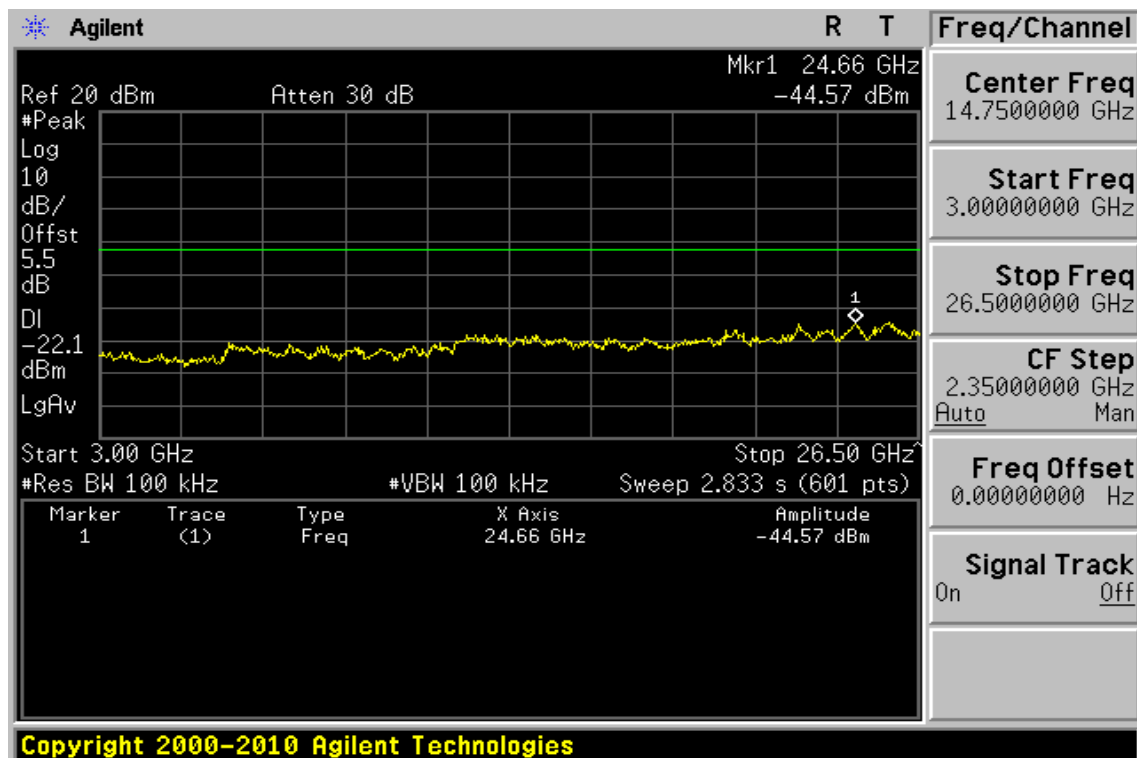
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Ch Mid 30MHz – 3GHz



Ch Mid 3GHz – 26.5GHz

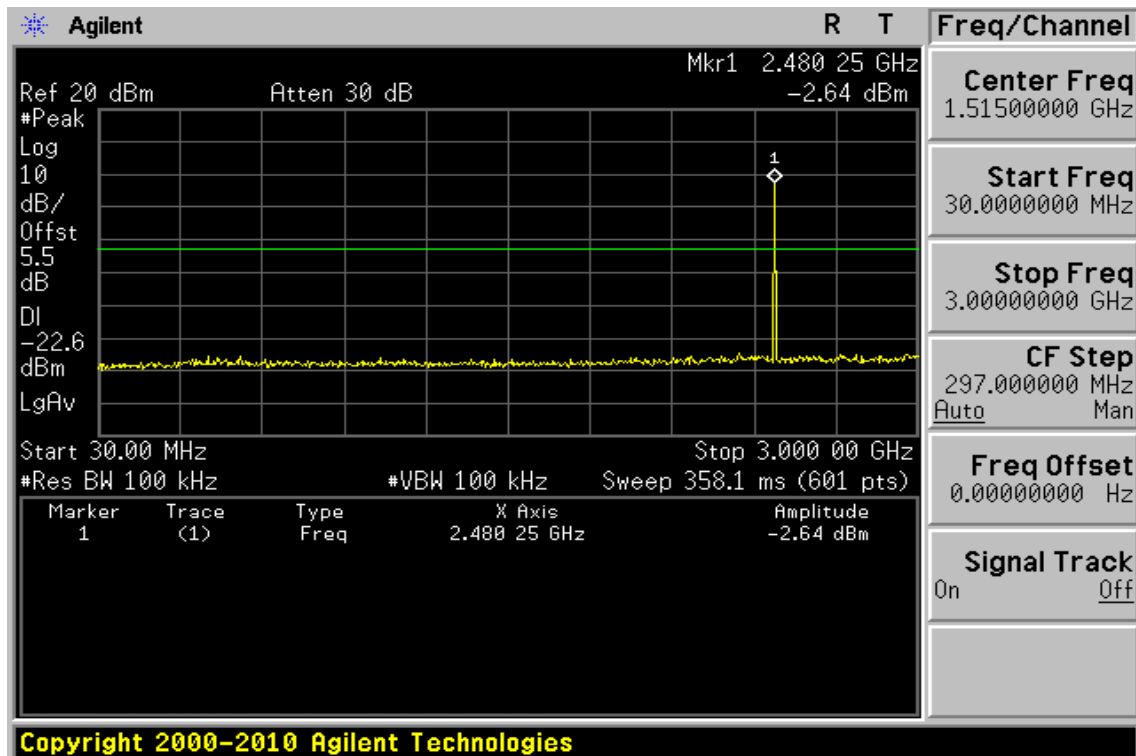


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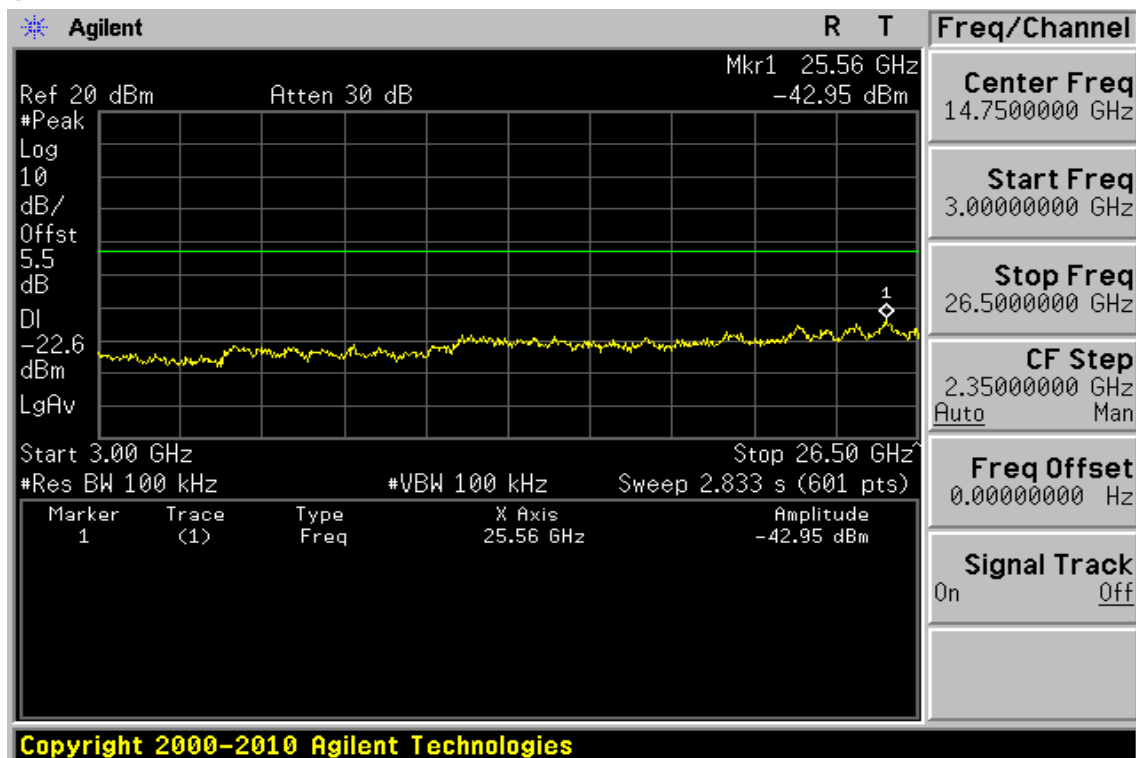
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Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



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Radiated Spurious Emission Measurement Result (below 1GHz) (worst case EDR mode)

Operation Mode	TX CH Low	Test Date	Nov. 16, 2011
Fundamental Frequency	2402MHz	Test By	Jay
Temperature	25	Pol	Ver./Hor.
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Mar- gin (dB)
30.00	V	Peak	44.54	-14.25	30.29	40.00	-9.71
39.40	V	Peak	44.96	-13.38	31.58	40.00	-8.42
43.95	V	Peak	46.50	-15.26	31.24	40.00	-8.76
88.20	V	Peak	40.02	-17.52	22.50	43.50	-21.00
120.21	V	Peak	38.47	-14.45	24.02	43.50	-19.48
172.59	V	Peak	40.31	-13.20	27.11	43.50	-16.39
40.67	H	Peak	36.16	-13.38	22.78	40.00	-17.22
63.95	H	Peak	43.39	-15.26	28.13	40.00	-11.87
88.20	H	Peak	37.31	-17.52	19.79	43.50	-23.71
139.61	H	Peak	41.82	-13.10	28.72	43.50	-14.78
170.65	H	Peak	44.04	-12.91	31.13	43.50	-12.37
251.16	H	Peak	35.54	-13.84	21.70	46.00	-24.30

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz.
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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Operation Mode TX CH Mid
Fundamental Frequency 2441MHz
Temperature 25
Humidity 65 %

Test Date Nov. 16, 2011
Test By Jay
Pol Ver./Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Mar- gin (dB)
39.69	V	Peak	43.63	-13.38	30.25	40.00	-9.75
52.31	V	Peak	43.79	-13.92	29.87	40.00	-10.13
66.86	V	Peak	47.40	-16.00	31.40	40.00	-8.60
86.26	V	Peak	40.27	-17.55	22.72	40.00	-17.28
120.21	V	Peak	38.86	-14.45	24.41	43.50	-19.09
172.59	V	Peak	39.58	-13.20	26.38	43.50	-17.12
40.67	H	Peak	35.79	-13.38	22.41	40.00	-17.59
63.95	H	Peak	43.62	-15.26	28.36	40.00	-11.64
89.17	H	Peak	37.15	-17.48	19.67	43.50	-23.83
127.00	H	Peak	38.83	-14.09	24.74	43.50	-18.76
142.52	H	Peak	41.11	-12.81	28.30	43.50	-15.20
170.65	H	Peak	44.03	-12.91	31.12	43.50	-12.38

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz.
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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Operation Mode TX CH High
Fundamental Frequency 2480MHz
Temperature 25
Humidity 65 %

Test Date Nov. 16, 2011
Test By Jay
Pol Ver./Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Mar- gin (dB)
31.94	V	Peak	45.18	-14.19	30.99	40.00	-9.01
39.70	V	Peak	43.20	-13.38	29.82	40.00	-10.18
51.34	V	Peak	43.21	-13.93	29.28	40.00	-10.72
64.92	V	Peak	45.75	-15.64	30.11	40.00	-9.89
140.58	V	Peak	37.56	-12.96	24.60	43.50	-18.90
175.50	V	Peak	39.60	-13.79	25.81	43.50	-17.69
40.67	H	Peak	35.59	-13.38	22.21	40.00	-17.79
63.95	H	Peak	44.22	-15.26	28.96	40.00	-11.04
89.17	H	Peak	37.64	-17.48	20.16	43.50	-23.34
140.58	H	Peak	41.17	-12.96	28.21	43.50	-15.29
170.65	H	Peak	43.73	-12.91	30.82	43.50	-12.68
246.31	H	Peak	34.47	-13.95	20.52	46.00	-25.48

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz.
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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Radiated Spurious Emission Measurement Result (above 1GHz) (worst case EDR mode)

Operation Band	:EDR	Test Date	:2011-11-17
Fundamental Frequency	:2402	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX LOW	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
4804.00	H	Peak	33.80	9.94	43.74	74.00	-30.26
7206.00	---						
9608.00	---						
12010.00	---						
14412.00	---						
16814.00	---						
19216.00	---						
21618.00	---						
24020.00	---						

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Operation Band :EDR Test Date :2011-11-17
Fundamental Frequency :2402 Temp./Humi. :27 deg_C / 66 RH
Operation Mode :TX LOW Engineer :Jay
EUT Pol. :H 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. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
4804.00	H	Peak	34.78	9.98	44.76	74.00	-29.24
7206.00	---						
9608.00	---						
12010.00	---						
14412.00	---						
16814.00	---						
19216.00	---						
21618.00	---						
24020.00	---						

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Operation Band :EDR Test Date :2011-11-17
Fundamental Frequency :2441 Temp./Humi. :27 deg_C / 66 RH
Operation Mode :TX MID Engineer :Jay
EUT Pol. :H 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. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
4882.00	H	Peak	34.83	10.29	45.12	74.00	-28.88
7323.00	---						
9764.00	---						
12205.00	---						
14646.00	---						
17087.00	---						
19528.00	---						
21969.00	---						
24410.00	---						

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Operation Band :EDR Test Date :2011-11-17
Fundamental Frequency :2441 Temp./Humi. :27 deg_C / 66 RH
Operation Mode :TX MID Engineer :Jay
EUT Pol. :H 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. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
4882.00	H	Peak	35.18	10.24	45.42	74.00	-28.58
7323.00	---						
9764.00	---						
12205.00	---						
14646.00	---						
17087.00	---						
19528.00	---						
21969.00	---						
24410.00	---						

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Operation Band :EDR Test Date :2011-11-17
Fundamental Frequency :2480 Temp./Humi. :27 deg_C / 66 RH
Operation Mode :TX HIGH Engineer :Jay
EUT Pol. :H 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. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Safe Margin dB
4960.00	H	Peak	33.67	10.91	44.58	74.00	-29.42
7440.00	---						
9920.00	---						
12400.00	---						
14880.00	---						
17360.00	---						
19840.00	---						
22320.00	---						
24800.00	---						

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Operation Band :EDR Test Date :2011-11-17
Fundamental Frequency :2480 Temp./Humi. :27 deg_C / 66 RH
Operation Mode :TX HIGH Engineer :Jay
EUT Pol. :H 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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level		FS	@3m	Margin
		PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4960.00	H	Peak	34.29	10.76	45.05	74.00	-28.95
7440.00	---						
9920.00	---						
12400.00	---						
14880.00	---						
17360.00	---						
19840.00	---						
22320.00	---						
24800.00	---						

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Radiated Spurious Emission Measurement Result (below 1GHz) (worst case EDR mode)

Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2402	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX LOW	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
91.11	S	Peak	43.34	-16.85	26.49	43.50	-17.01
152.22	S	Peak	41.17	-11.62	29.55	43.50	-13.95
223.03	S	Peak	39.64	-14.22	25.42	46.00	-20.58
453.89	S	Peak	27.85	-9.29	18.56	46.00	-27.44
741.01	S	Peak	28.70	-4.94	23.76	46.00	-22.24
973.81	S	Peak	27.24	-1.13	26.11	54.00	-27.89

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SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2402	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX LOW	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
115.36	S	Peak	31.50	-14.44	17.06	43.50	-26.44
123.12	S	Peak	39.44	-13.62	25.82	43.50	-17.68
217.21	S	Peak	44.00	-14.70	29.30	46.00	-16.70
372.41	S	Peak	30.21	-10.57	19.64	46.00	-26.36
791.45	S	Peak	28.10	-3.66	24.44	46.00	-21.56
951.50	S	Peak	27.45	-1.24	26.21	46.00	-19.79

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2441	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX MID	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
90.14	S	Peak	44.21	-16.97	27.24	43.50	-16.26
154.16	S	Peak	40.89	-11.69	29.20	43.50	-14.30
224.00	S	Peak	40.05	-14.19	25.86	46.00	-20.14
452.92	S	Peak	27.72	-9.27	18.45	46.00	-27.55
785.63	S	Peak	28.62	-3.72	24.90	46.00	-21.10
953.44	S	Peak	27.01	-1.24	25.77	46.00	-20.23

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2441	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX MID	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
115.36	S	Peak	31.98	-14.44	17.54	43.50	-25.96
123.12	S	Peak	39.34	-13.62	25.72	43.50	-17.78
220.12	S	Peak	43.23	-14.42	28.81	46.00	-17.19
377.26	S	Peak	29.30	-10.49	18.81	46.00	-27.19
786.60	S	Peak	27.35	-3.73	23.62	46.00	-22.38
993.21	S	Peak	27.18	-1.15	26.03	54.00	-27.97

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2480	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX HIGH	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
89.17	S	Peak	44.11	-17.02	27.09	43.50	-16.41
159.01	S	Peak	41.82	-11.67	30.15	43.50	-13.35
230.79	S	Peak	39.38	-13.78	25.60	46.00	-20.40
465.53	S	Peak	27.66	-9.18	18.48	46.00	-27.52
797.27	S	Peak	27.56	-3.58	23.98	46.00	-22.02
877.78	S	Peak	29.44	-2.48	26.96	46.00	-19.04

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2480	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX HIGH	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
115.36	S	Peak	34.33	-14.44	19.89	43.50	-23.61
123.12	S	Peak	38.69	-13.62	25.07	43.50	-18.43
220.12	S	Peak	43.39	-14.42	28.97	46.00	-17.03
375.32	S	Peak	29.87	-10.55	19.32	46.00	-26.68
787.57	S	Peak	28.09	-3.71	24.38	46.00	-21.62
954.41	S	Peak	26.73	-1.24	25.49	46.00	-20.51

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Radiated Spurious Emission Measurement Result (above 1GHz) (worst case EDR mode)

Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2402	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX LOW	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
4804.00	H	Peak	34.56	9.95	44.51	74.00	-29.49
7206.00	---						
9608.00	---						
12010.00	---						
14412.00	---						
16814.00	---						
19216.00	---						
21618.00	---						
24020.00	---						

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2402	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX LOW	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
4804.00	H	Peak	34.58	9.99	44.57	74.00	-29.43
7206.00	---						
9608.00	---						
12010.00	---						
14412.00	---						
16814.00	---						
19216.00	---						
21618.00	---						
24020.00	---						

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2441	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX MID	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
4882.00	H	Peak	33.63	10.28	43.91	74.00	-30.09
7323.00	---						
9764.00	---						
12205.00	---						
14646.00	---						
17087.00	---						
19528.00	---						
21969.00	---						
24410.00	---						

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2441	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX MID	Engineer	:Jay
EUT Pol.	:H	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
4882.00	H	Peak	34.12	10.22	44.34	74.00	-29.66
7323.00	---						
9764.00	---						
12205.00	---						
14646.00	---						
17087.00	---						
19528.00	---						
21969.00	---						
24410.00	---						

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2480	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX HIGH	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
4960.00	H	Peak	35.80	10.91	46.71	74.00	-27.29
7440.00	---						
9920.00	---						
12400.00	---						
14880.00	---						
17360.00	---						
19840.00	---						
22320.00	---						
24800.00	---						

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Operation Band	:EDR	Test Date	:2011-12-14
Fundamental Frequency	:2480	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:RX HIGH	Engineer	:Jay
EUT Pol.	:H	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	Spectrum	Factor	Actual	Limit	Safe
MHz	F/H/E/S	Mode	Reading Level	dB	FS	@3m	Margin
		PK/QP/AV	dBμV		dBμV/m	dBμV/m	dB
4960.00	H	Peak	33.68	10.76	44.44	74.00	-29.56
7440.00	---						
9920.00	---						
12400.00	---						
14880.00	---						
17360.00	---						
19840.00	---						
22320.00	---						
24800.00	---						

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10. FREQUENCY SEPARATION

10.1. Standard Applicable

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the $2/3 \times 20\text{dB}$ 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.

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 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.

10.5. Measurement Result:

Channel separation (MHz)	Limit	Result
1	$\geq 25\text{KHz}$ or $2/3$ times 20dB bandwidth	PASS

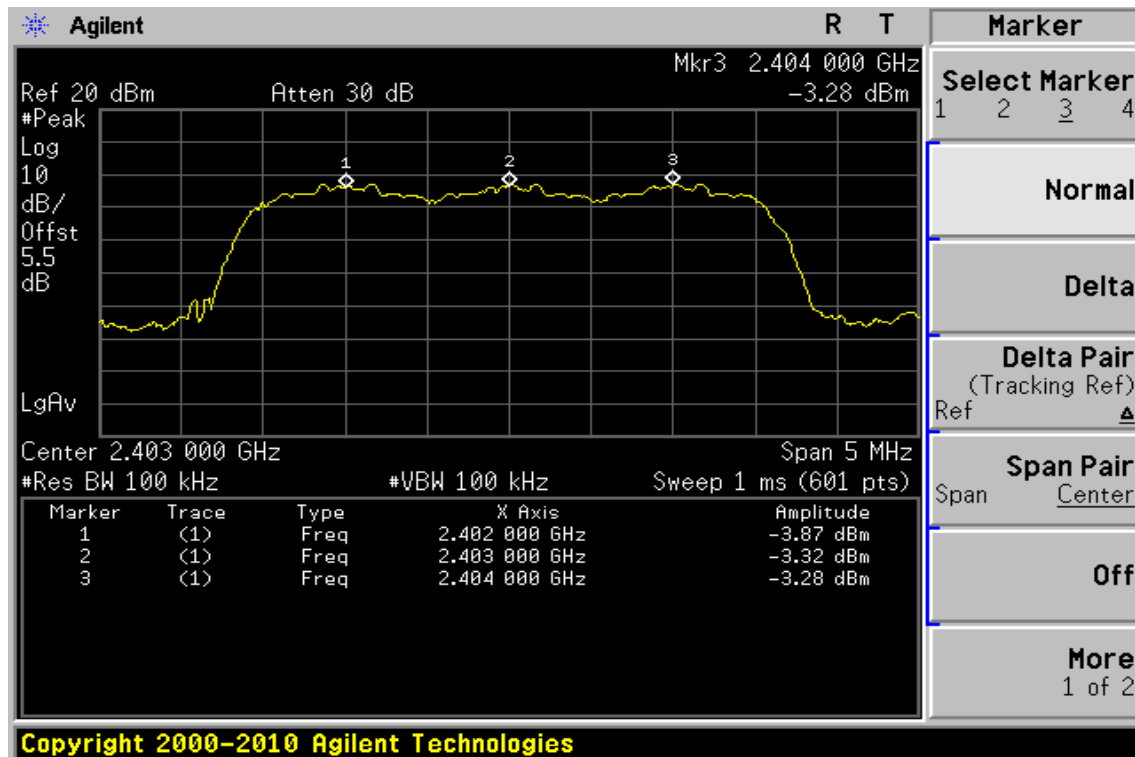
Note: Refer to next page for plots.

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Frequency Separation Test Data



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11. NUMBER OF HOPPING FREQUENCY

11.1. 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.

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 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.

11.5. Measurement Result:

Note: Refer to next page for plots.

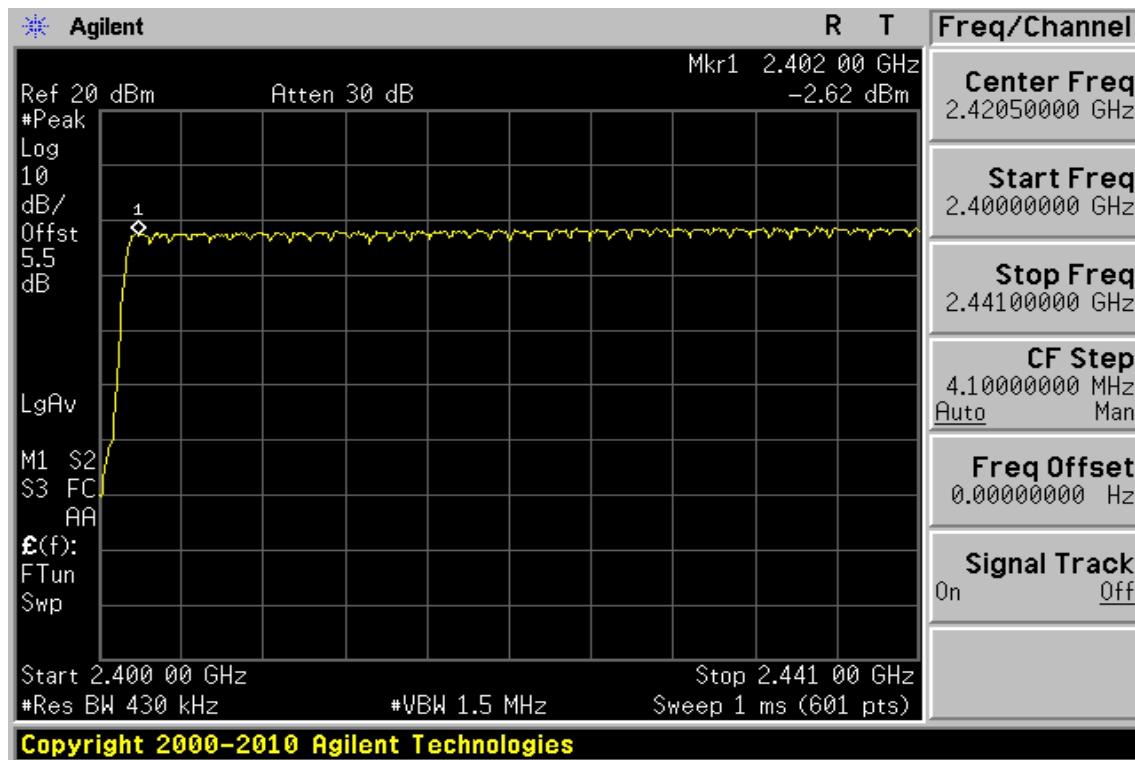
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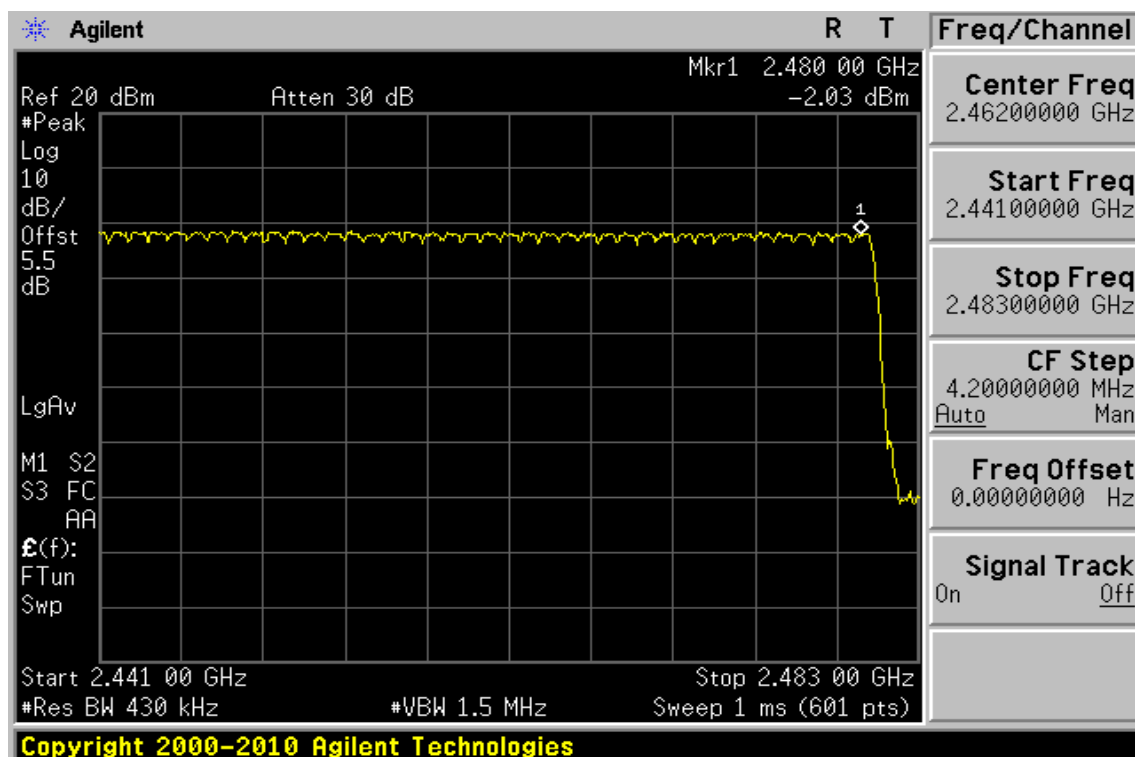
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Channel Number

2.4 GHz – 2.441GHz



2.441 GHz – 2.4835GHz



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12. TIME OF OCCUPANCY (DWELL TIME)

12.1. 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.

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 center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span = 0Hz, Adjust Sweep = 2~7ms.
5. Repeat above procedures until all frequency measured were complete.

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12.5. Measurement Result

A period time = $0.4 \text{ (s)} * 79 = 31.6 \text{ (s)}$

CH Low DH1 time slot = $0.387 \text{ (ms)} * (1600/2/79) * 31.6 = 123.84 \text{ (ms)}$

DH3 time slot = $1.642 \text{ (ms)} * (1600/4/79) * 31.6 = 262.72 \text{ (ms)}$

DH5 time slot = $2.883 \text{ (ms)} * (1600/6/79) * 31.6 = 307.52 \text{ (ms)}$

CH Mid DH1 time slot = $0.383 \text{ (ms)} * (1600/2/79) * 31.6 = 122.56 \text{ (ms)}$

DH3 time slot = $1.642 \text{ (ms)} * (1600/4/79) * 31.6 = 262.72 \text{ (ms)}$

DH5 time slot = $2.883 \text{ (ms)} * (1600/6/79) * 31.6 = 307.52 \text{ (ms)}$

CH High DH1 time slot = $0.383 \text{ (ms)} * (1600/2/79) * 31.6 = 122.56 \text{ (ms)}$

DH3 time slot = $1.642 \text{ (ms)} * (1600/4/79) * 31.6 = 262.72 \text{ (ms)}$

DH5 time slot = $2.883 \text{ (ms)} * (1600/6/79) * 31.6 = 307.52 \text{ (ms)}$

Note: Refer to next page for plots.

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台灣檢驗科技股份有限公司

No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五工路 134 號

t (886-2) 2299-3279

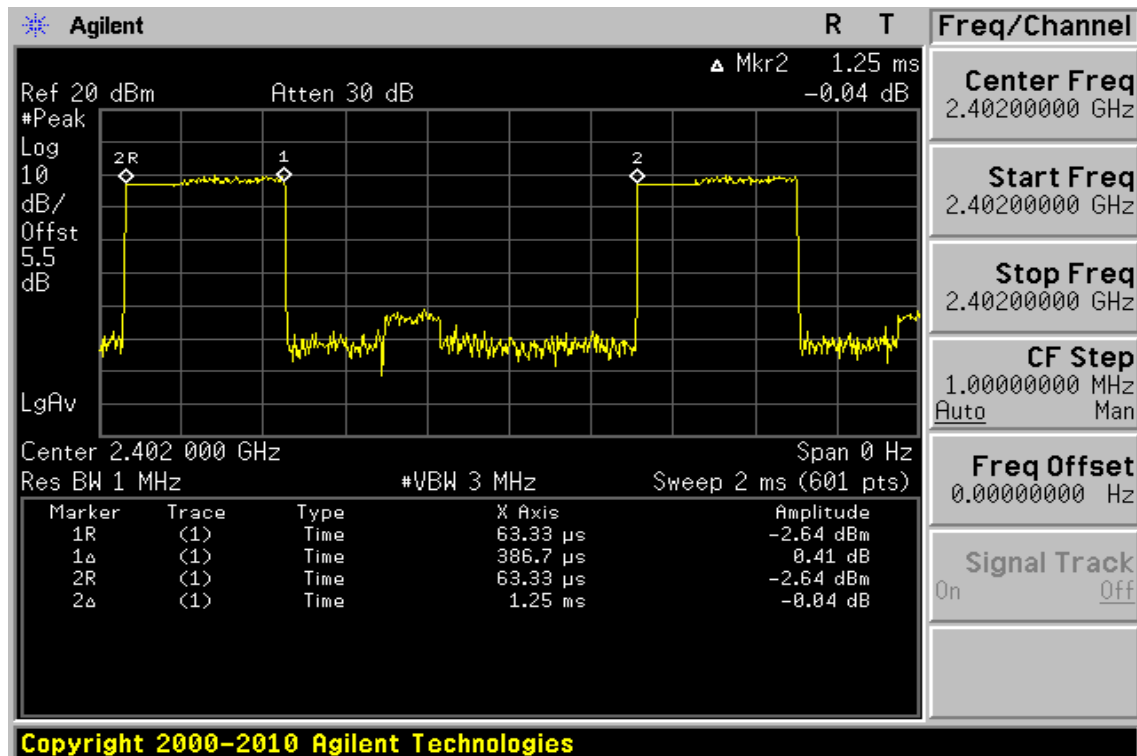
f (886-2) 2298-0488

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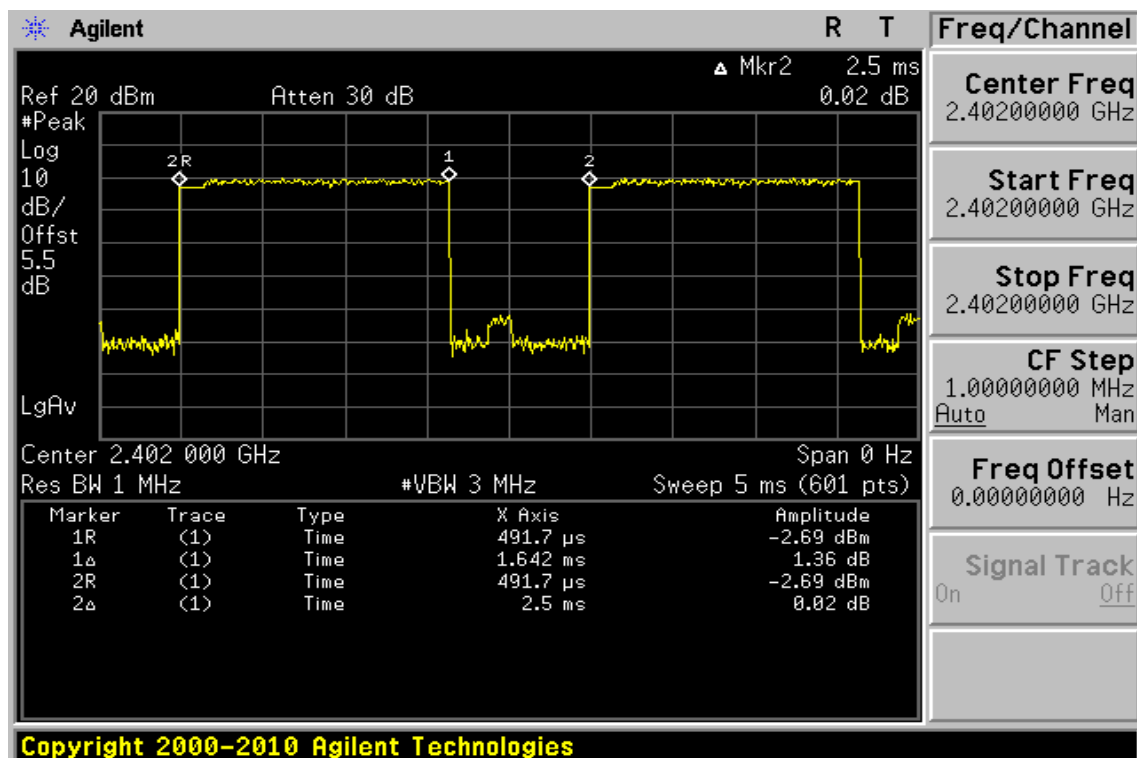
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CH-Low

DH1



DH3

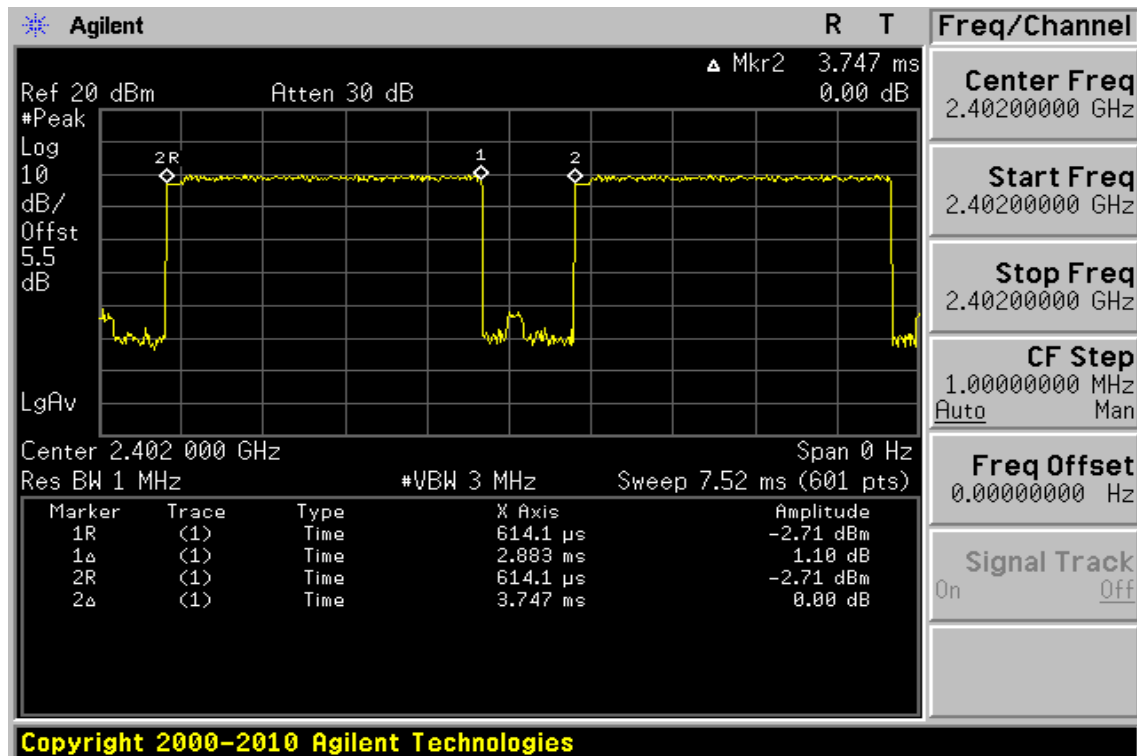


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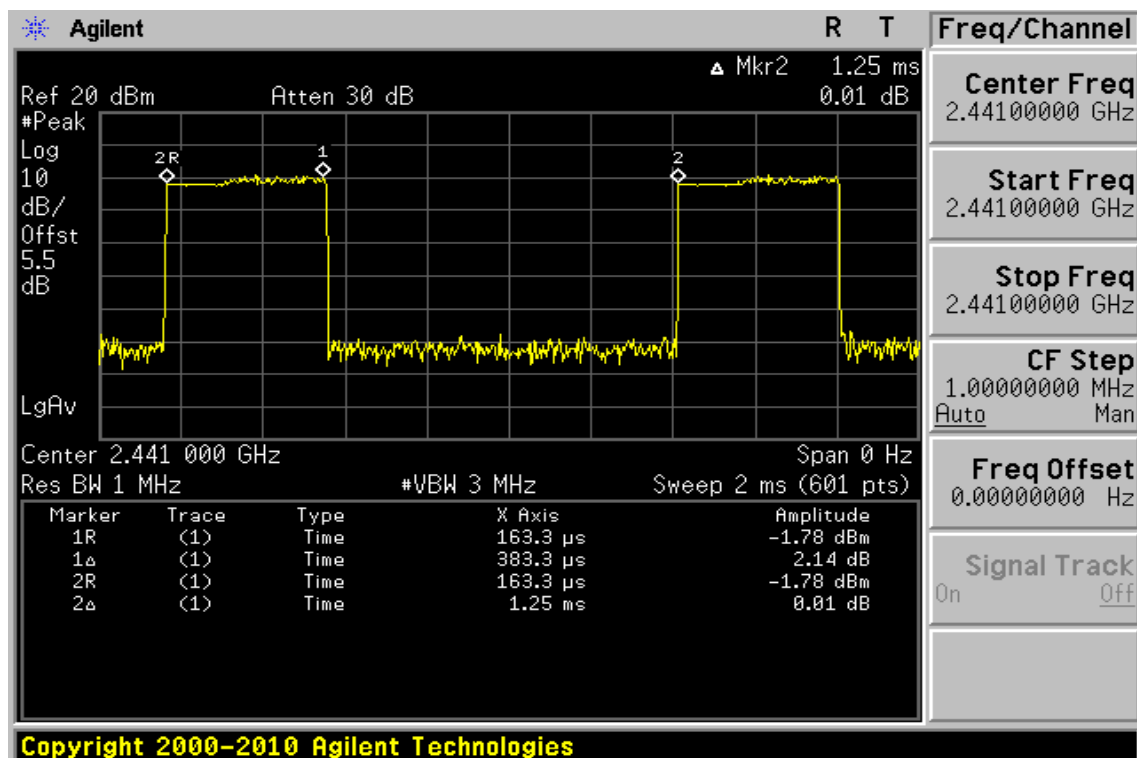
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DH5



CH-Mid

DH1

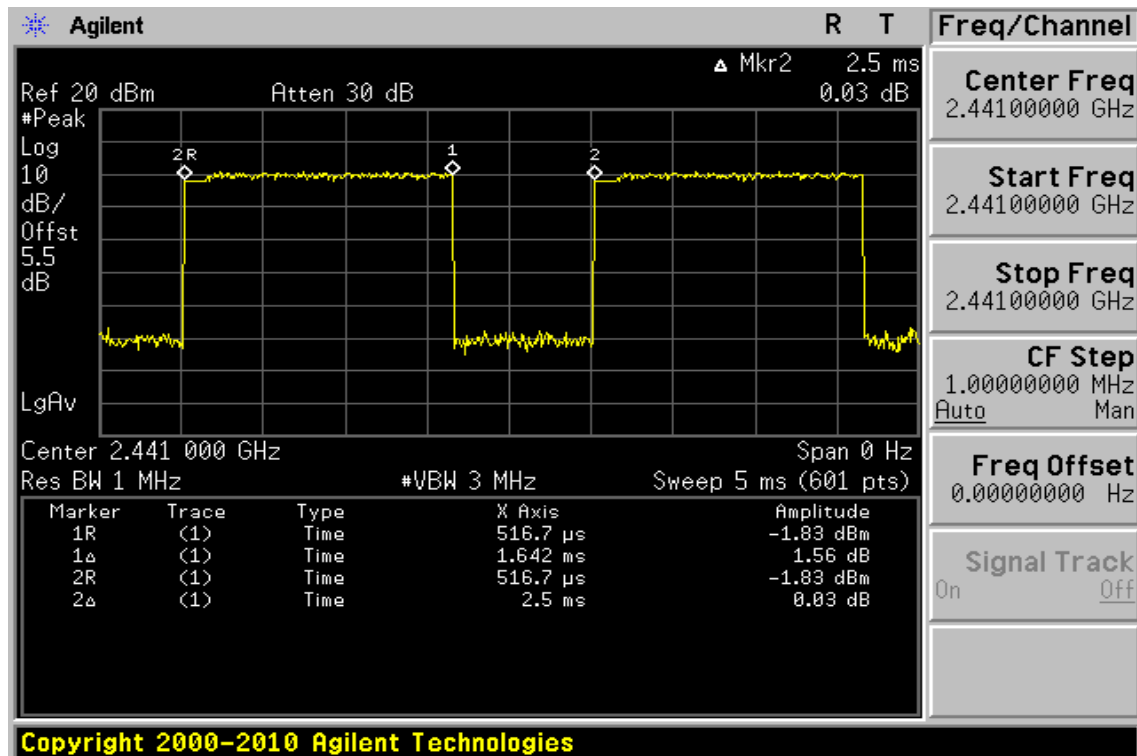


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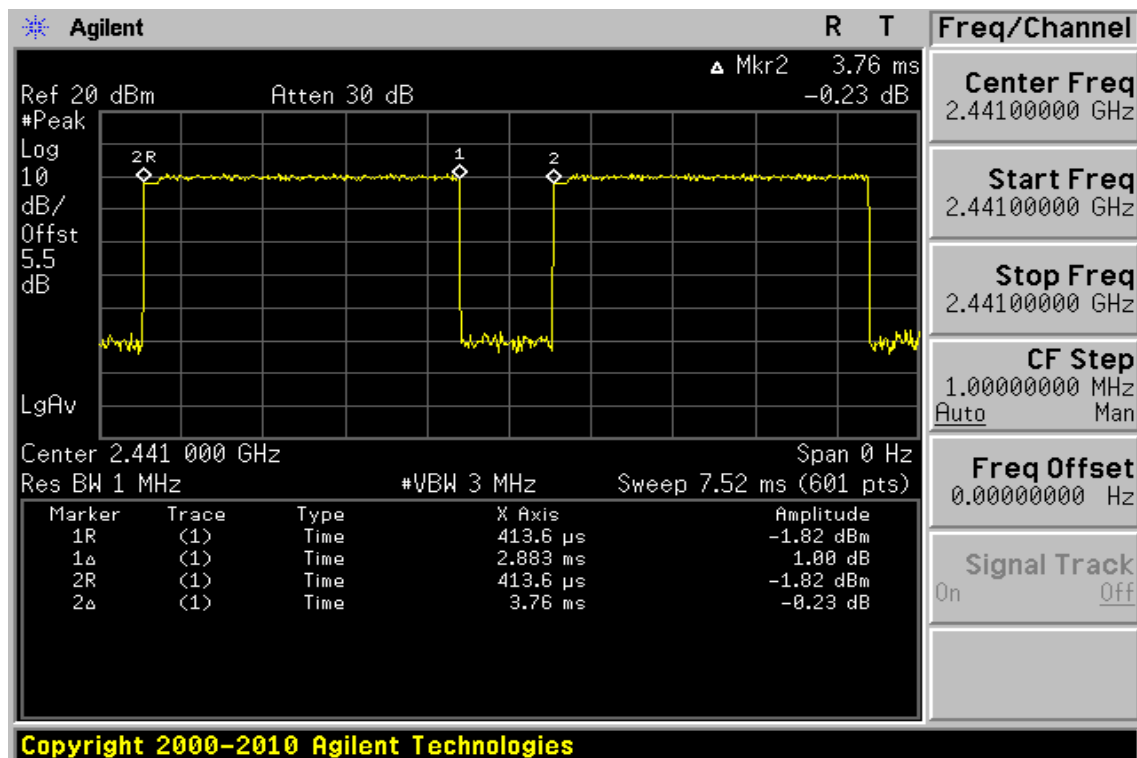
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DH3



DH5



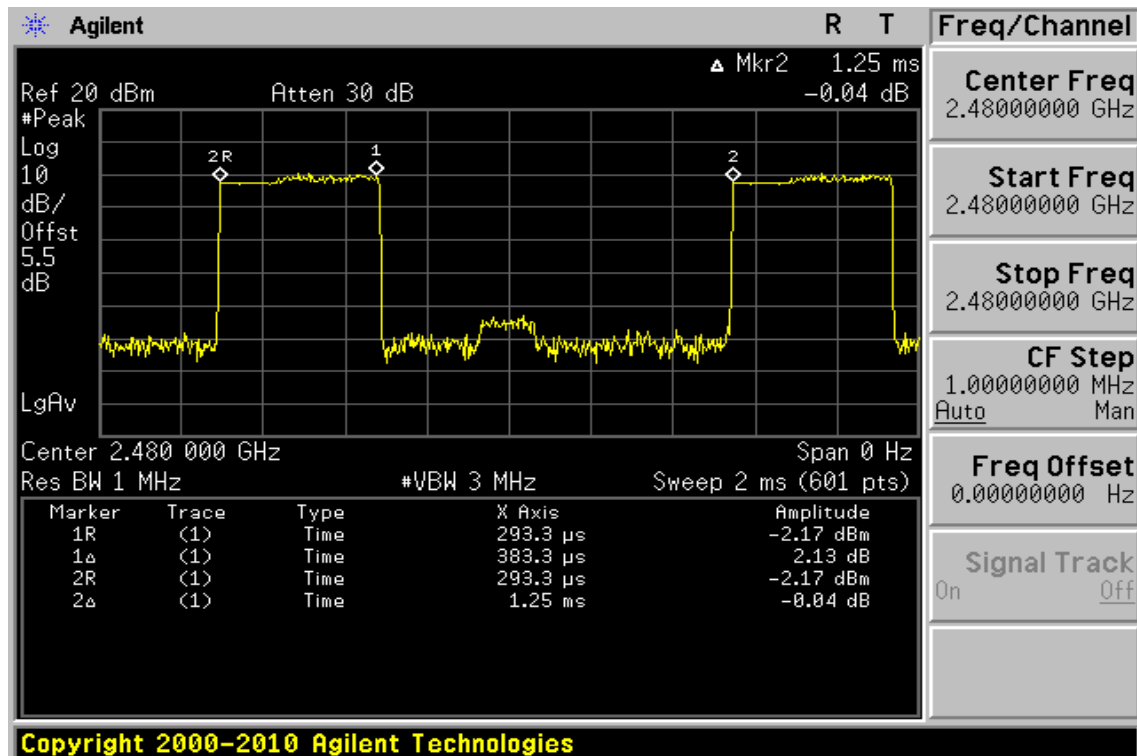
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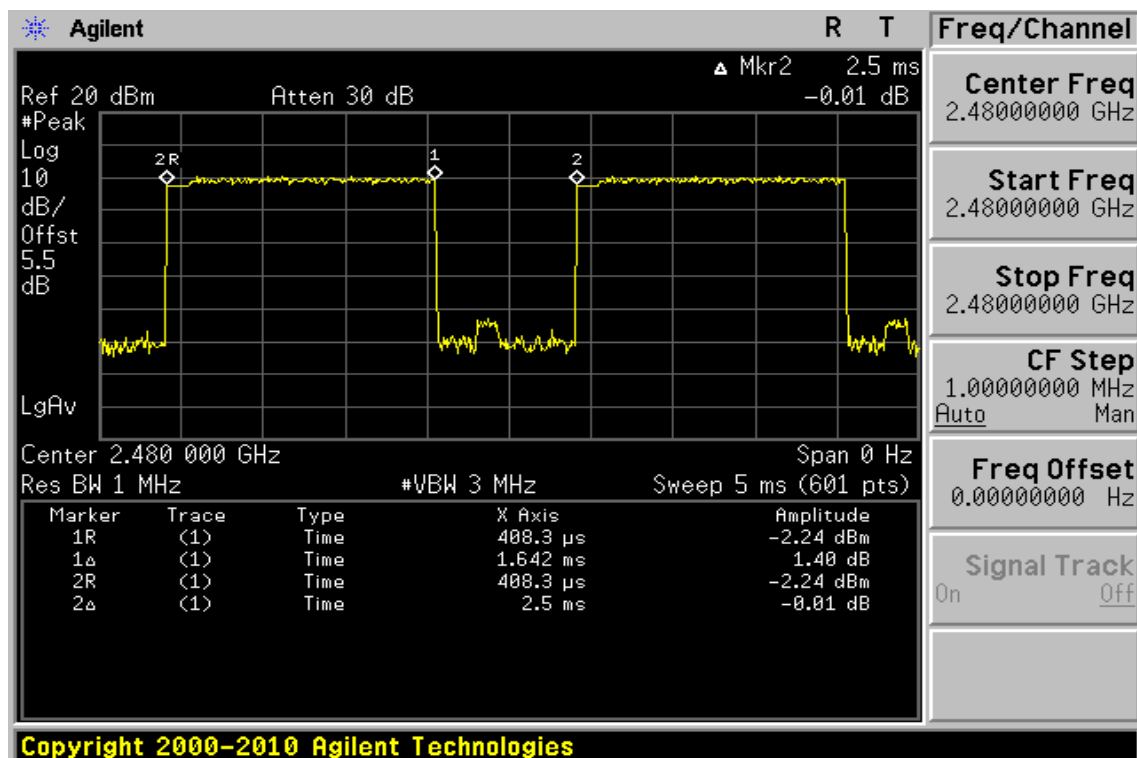
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CH-High

DH1



DH3

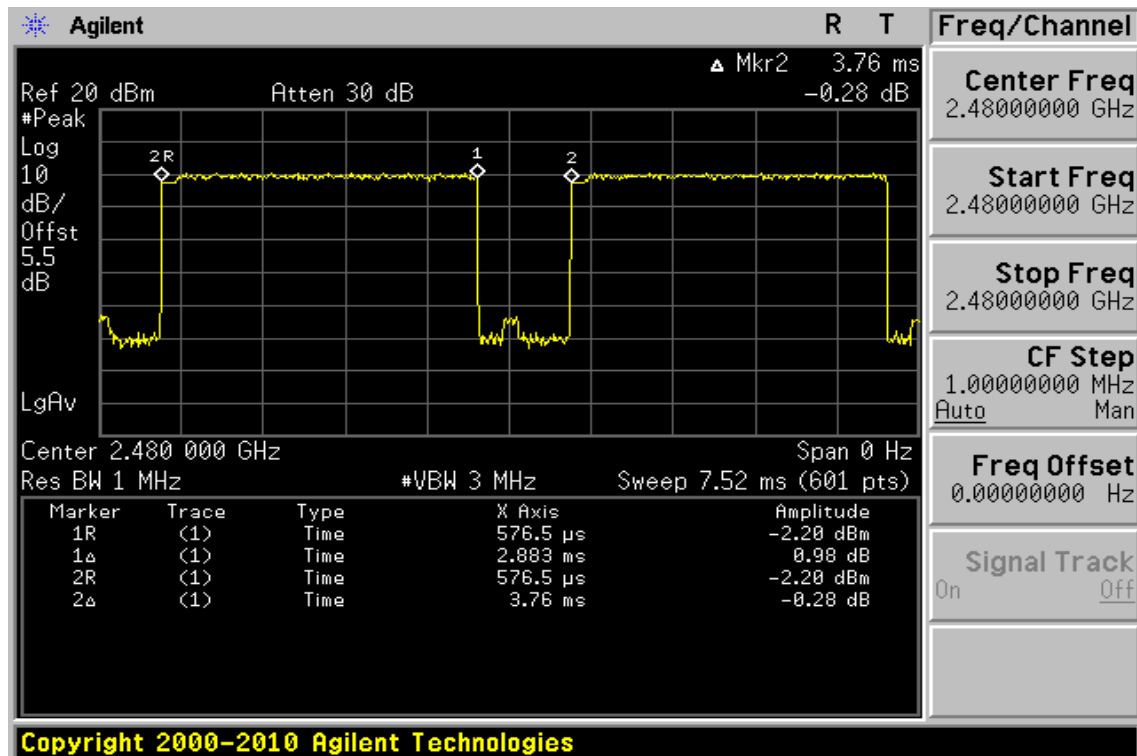


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DH5



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13. ANTENNA REQUIREMENT

13.1. 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.

13.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is -0.32 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

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