

8.3 POWER SPECTRAL DENSITY (802.11a/b/g/n)

Test Requirements and limit, §15.247(e)

The peak power spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard – the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

■ TEST CONFIGURATION

■ TEST PROCEDURE

We tested according to KDB 558074(issued 1/18/2012).

The spectrum analyzer is set to :

1. Span = 5 – 30 % greater than the EBW
2. RBW = 100 kHz
3. VBW = 300 kHz
4. Sweep = Auto couple
5. Detector Mode = Peak
6. Trace Mode = Max hold
7. Search peak

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■ **Sample Calculation**

PSD = Reading Value + ATT loss + Cable loss(1 ea) + BWCF

Output Power = -5 dBm + 10 dB + 0.8 dB -15.2 dB= 0.6 dBm

Where: BWCF(Bandwidth Correction Factor) = $10\log(3 \text{ kHz}/100 \text{ kHz}) = -15.2 \text{ dB}$

Note :

1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
- 3 We apply to the offset in the 2.4 GHz and 5.8 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.11
	2437	10.10
	2462	10.12
5.8 GHz	5745	10.37
	5785	10.38
	5825	10.37

(Actual value of loss for the attenuator and cable combination)

■ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Spectrum Value(dBm)	BWCF (dB)	PSD (dBm)	Limit (dBm)	Pass/Fail
2412	1	802.11b	8.814	-15.2	-6.386	8	Pass
2437	6		8.691	-15.2	-6.509	8	Pass
2462	11		9.167	-15.2	-6.033	8	Pass
2412	1	802.11g	3.225	-15.2	-11.975	8	Pass
2437	6		3.258	-15.2	-11.942	8	Pass
2462	11		2.417	-15.2	-12.783	8	Pass
2412	1	802.11n 2.4 GHz Band	1.173	-15.2	-14.027	8	Pass
2437	6		1.012	-15.2	-14.188	8	Pass
2462	11		0.329	-15.2	-14.871	8	Pass
5745	149	802.11a	-1.140	-15.2	-16.340	8	Pass
5785	157		4.640	-15.2	-10.560	8	Pass
5825	165		-1.200	-15.2	-16.400	8	Pass
5745	149	802.11n_ 20 MHz BW 5.8 GHz Band	-0.550	-15.2	-15.750	8	Pass
5785	157		2.750	-15.2	-12.450	8	Pass
5825	165		0.150	-15.2	-15.050	8	Pass
5755	151	802.11n_ 40 MHz BW 5.8 GHz Band	-0.380	-15.2	-15.580	8	Pass
5795	159		-1.146	-15.2	-16.346	8	Pass

Note : PSD = Spectrum Value + BWCF

RESULT PLOTS

Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11b-CH 6)



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Power Spectral Density (802.11b-CH 11)

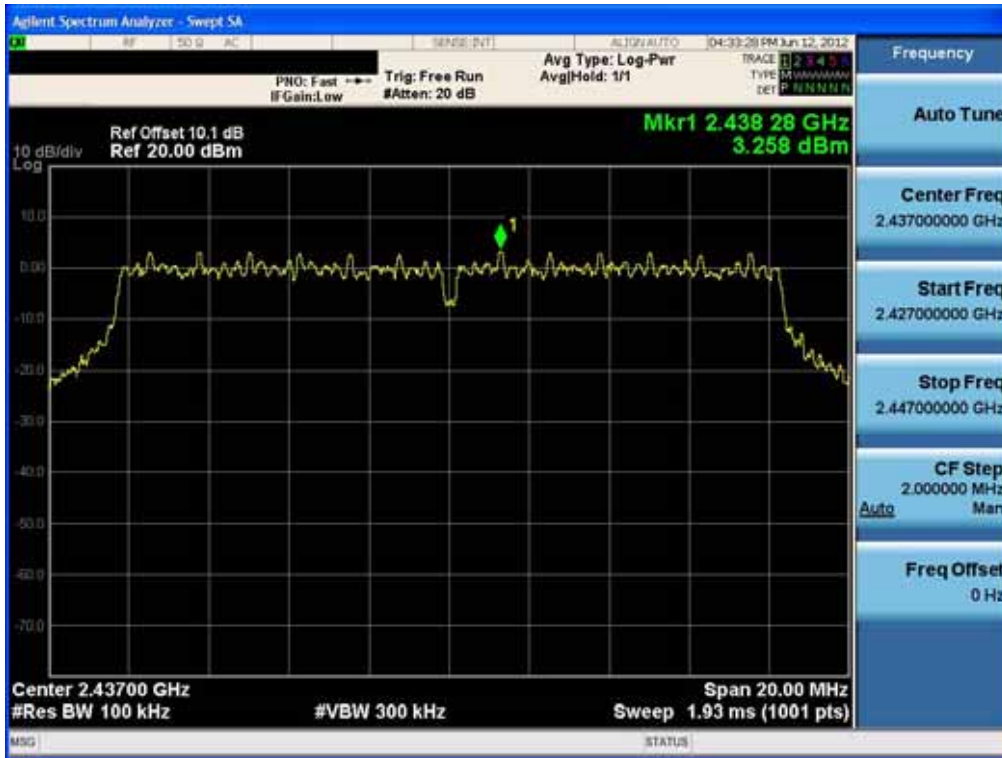


Power Spectral Density (802.11g-CH 1)

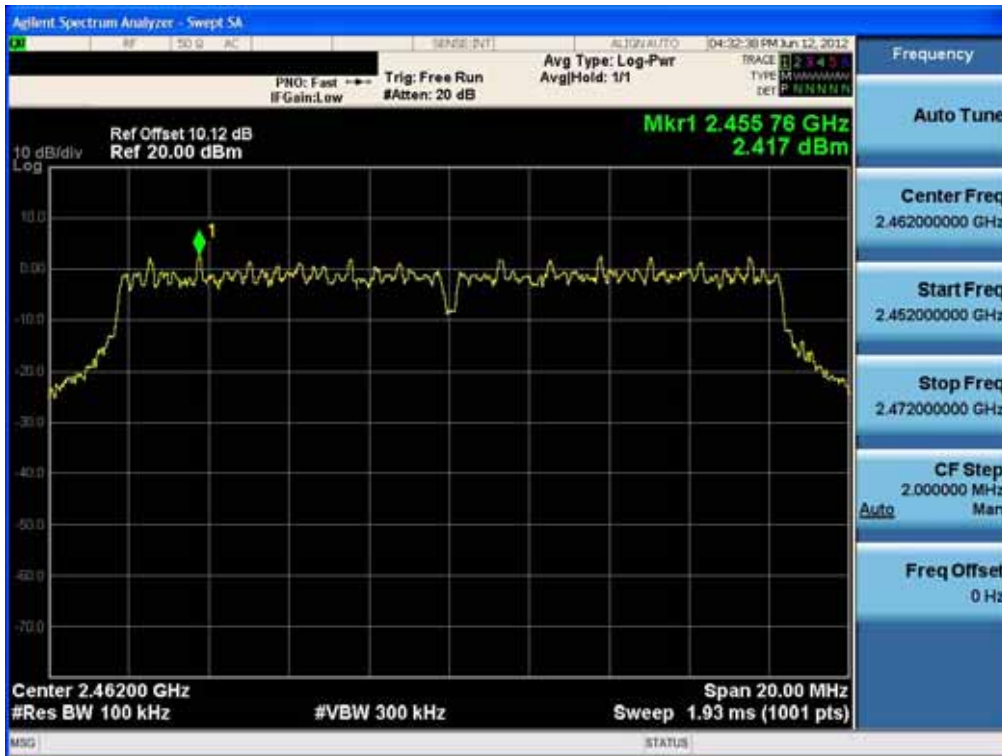


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Power Spectral Density (802.11g-CH 6)

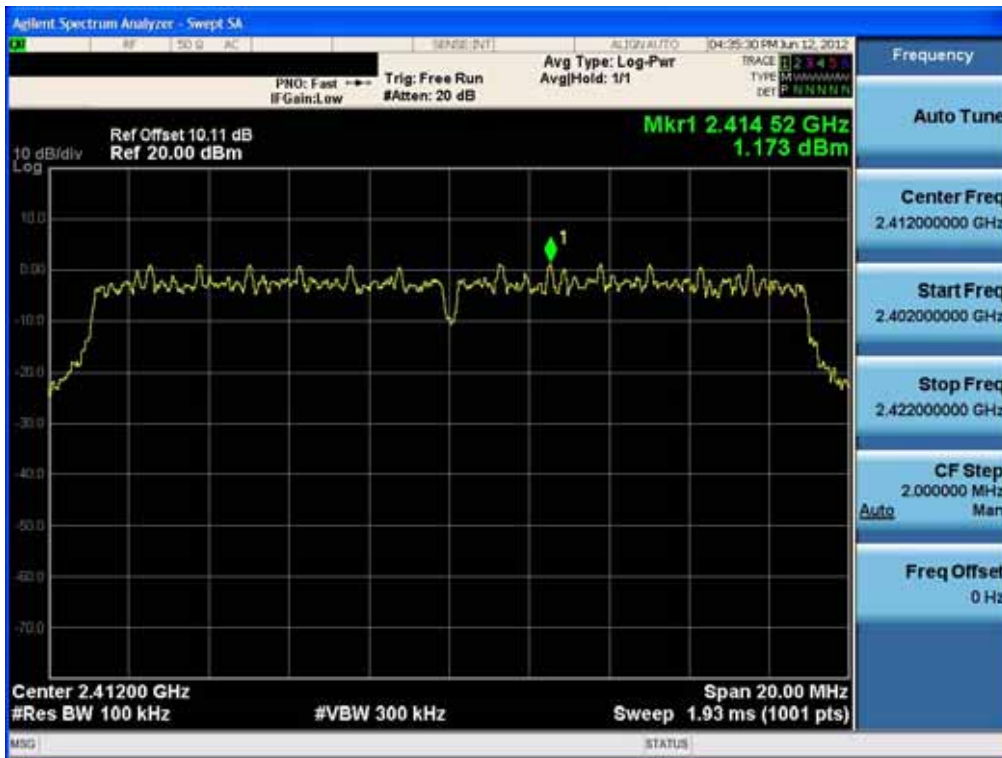


Power Spectral Density (802.11g-CH11)

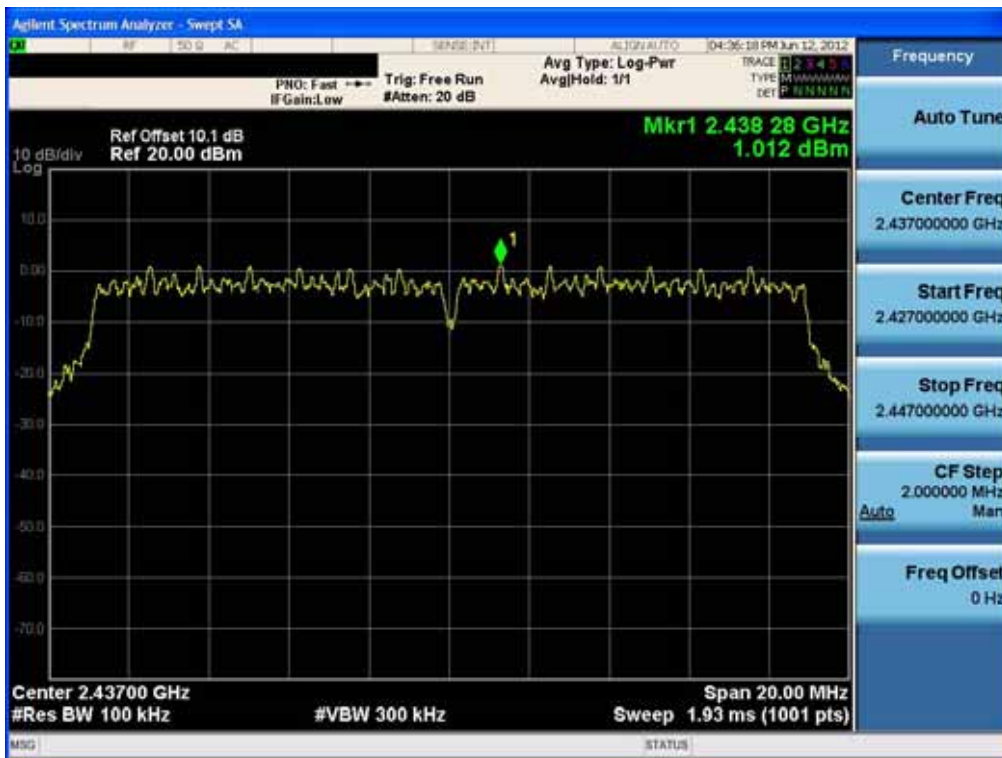


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Power Spectral Density (802.11n-CH 1)

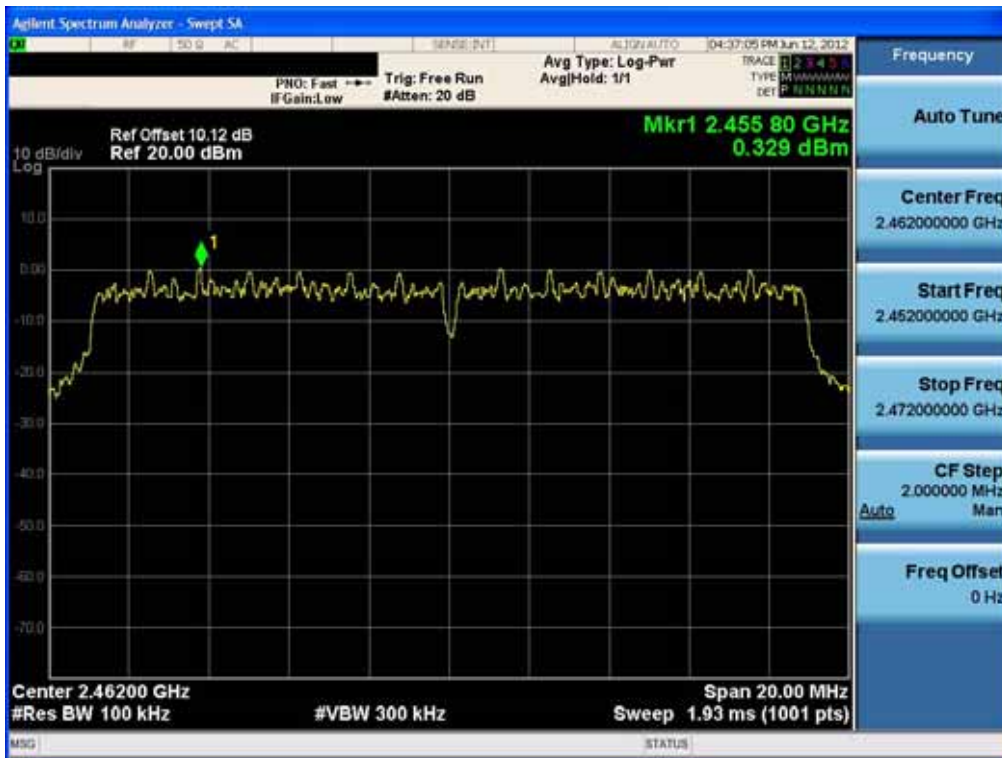


Power Spectral Density (802.11n-CH 6)

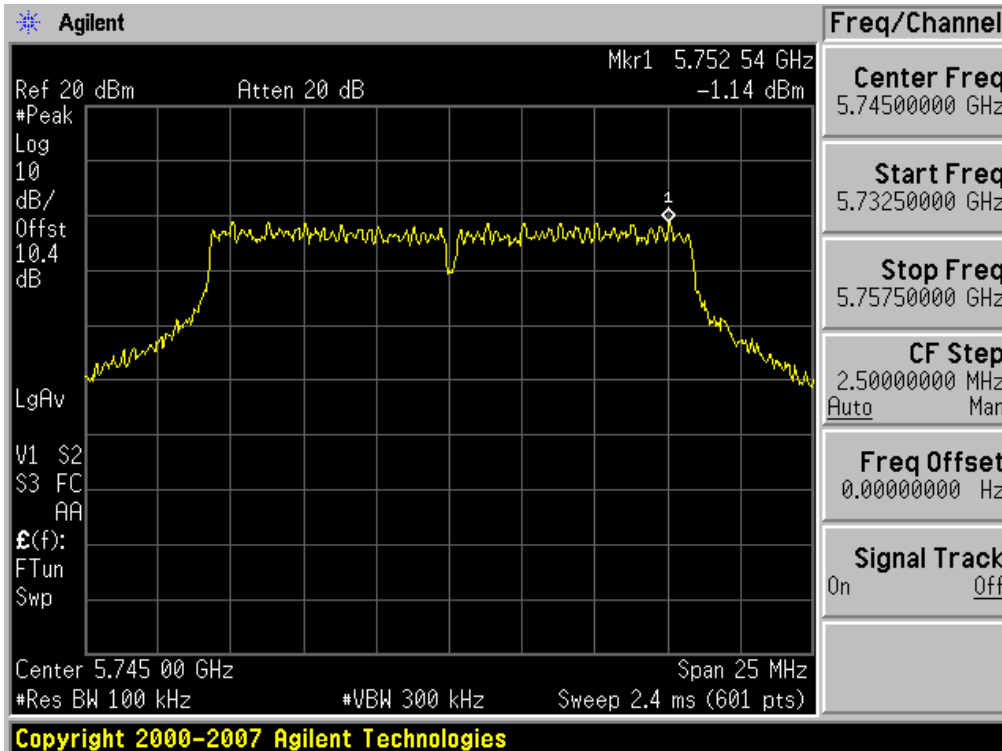


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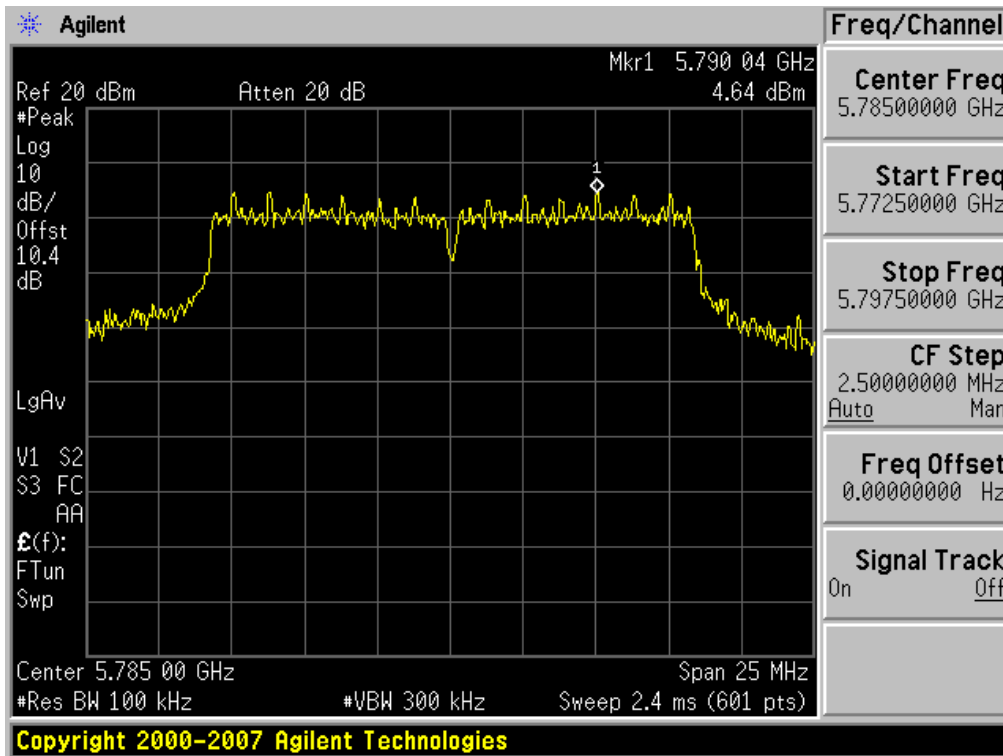
Power Spectral Density (802.11n-CH11)



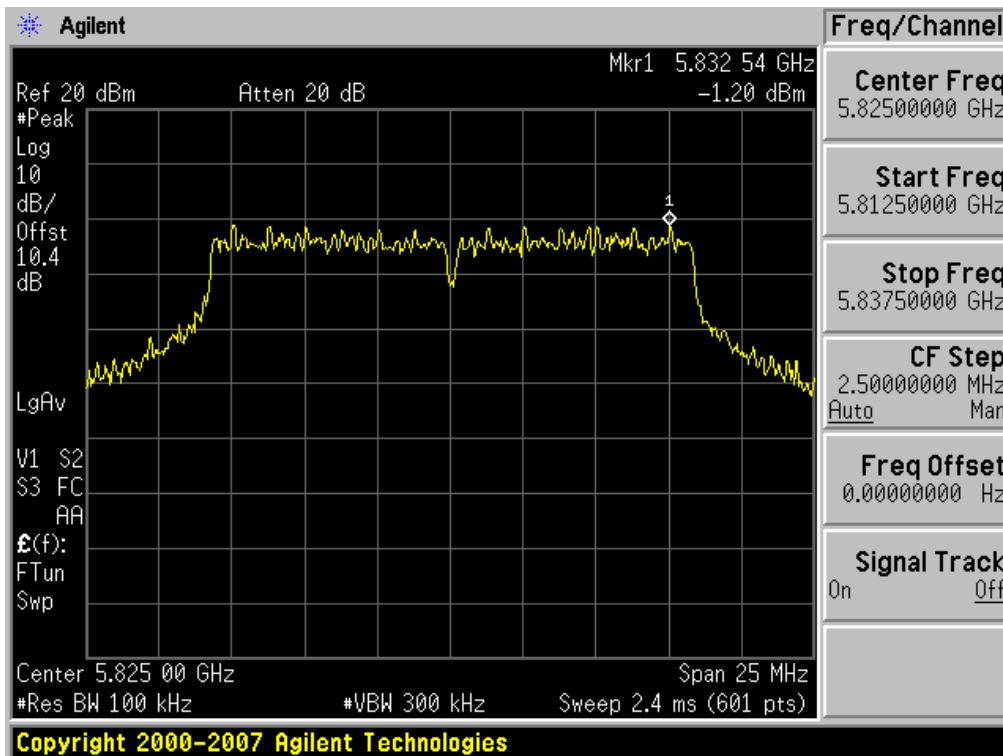
Power Spectral Density (802.11a-CH 149)



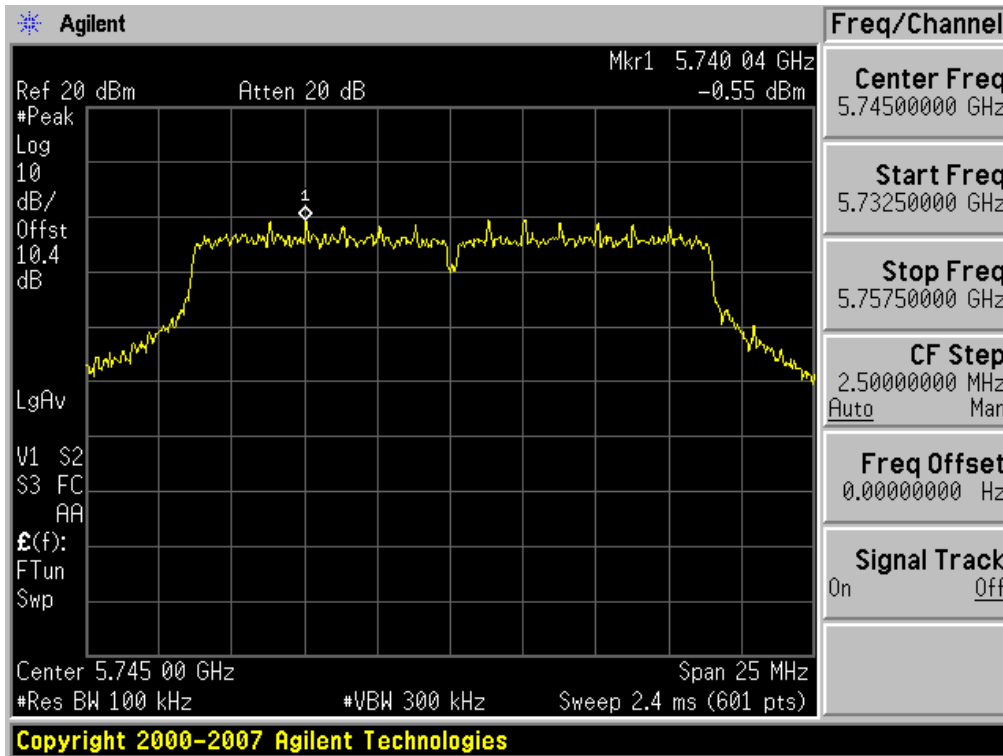
Power Spectral Density (802.11a-CH 157)



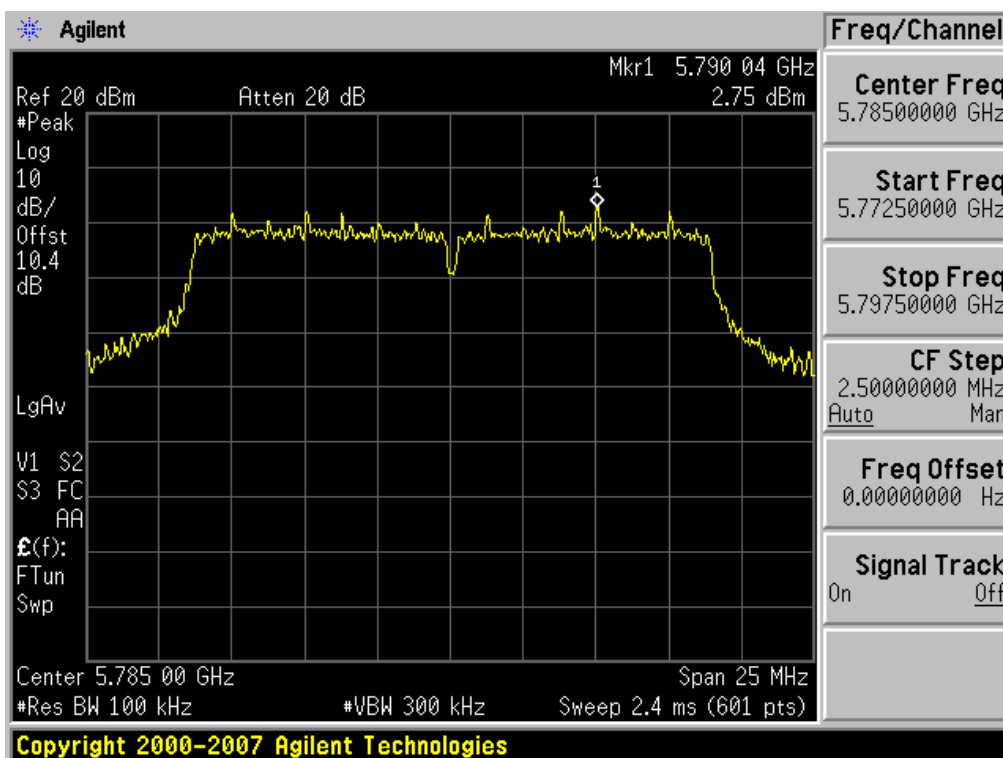
Power Spectral Density (802.11a-CH 165)



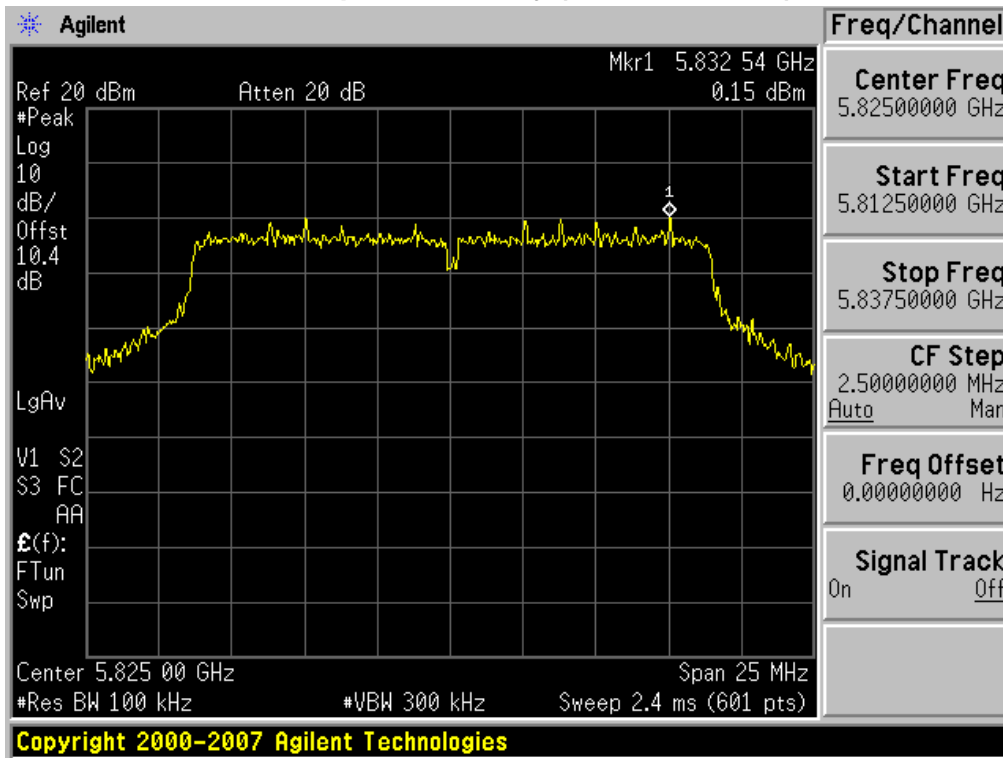
Power Spectral Density (802.11n-CH 149)



Power Spectral Density (802.11n-CH 157)



Power Spectral Density (802.11n-CH 165)

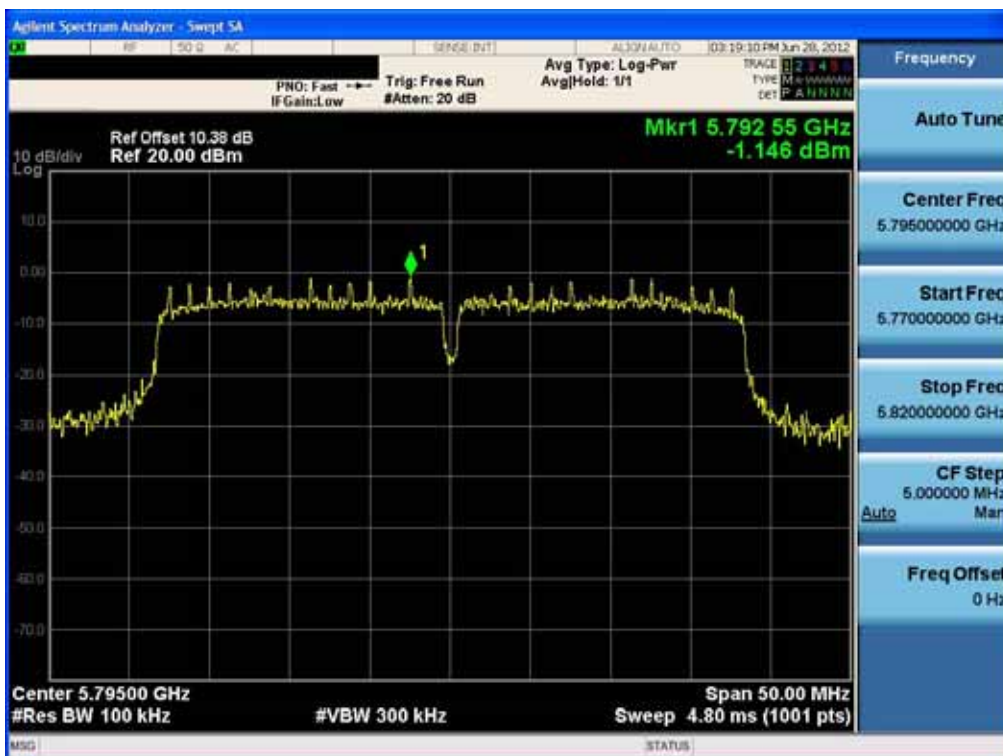


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Power Spectral Density (802.11n-CH 151)



Power Spectral Density (802.11n-CH 159)



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8.4 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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 paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. 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) (see § 15.205(c)).

Limit : 20 dBc

■ TEST CONFIGURATION

■ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer.

RBW = 100 kHz(Upon 1 GHz = 1 MHz)

VBW = 300 kHz(Upon 1 GHz = 1 MHz)

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep = auto couple

Measurements are made over the 30 MHz to 26 GHz range with the transmitter set to the lowest, middle, and highest channels.

Note :

1. The band edge results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz and 5.8 GHz range that was rounded off to the closest tenth dB.
Actual value of loss for the attenuator and cable combination is below table.

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Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.11
	2437	10.10
	2462	10.12
5.8 GHz	5745	10.37
	5785	10.38
	5825	10.37

(Actual value of loss for the attenuator and cable combination)

5. In case of conducted spurious emissions test, please check factors blow table.

■ FACTORS FOR FREQUENCY

Freq(MHz)	Factor(dB)
30	10.37
100	10.16
200	10.15
300	10.14
400	10.18
500	10.19
600	10.20
700	10.30
800	10.25
900	10.28
1000	10.29
2000	10.17
2412*	10.11
2437*	10.10
2462*	10.12
3000	10.26
4000	10.31
5000	9.85
5745*	10.37
5785*	10.38
5825*	10.37
6000	10.20
7000	10.60
8000	10.53
9000	10.23
10000	10.41
11000	10.65
12000	11.19
13000	10.97
14000	11.42
15000	12.01
16000	11.77
17000	10.78
18000	10.76
19000	11.15
20000	10.75
21000	10.82
22000	10.82
23000	11.26
24000	11.08
25000	11.18

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26000	10.90
27000	11.32
28000	11.33
29000	11.77
30000	11.40
31000	11.82
32000	11.07
33000	13.05
34000	15.68
35000	14.08
36000	15.88
37000	17.32
38000	15.44
39000	14.48
40000	16.50

Note : 1. ** is fundamental frequency range.
2. Factor = Cable loss + Attenuator loss

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RESULT PLOTS

BandEdge (802.11b-CH1)

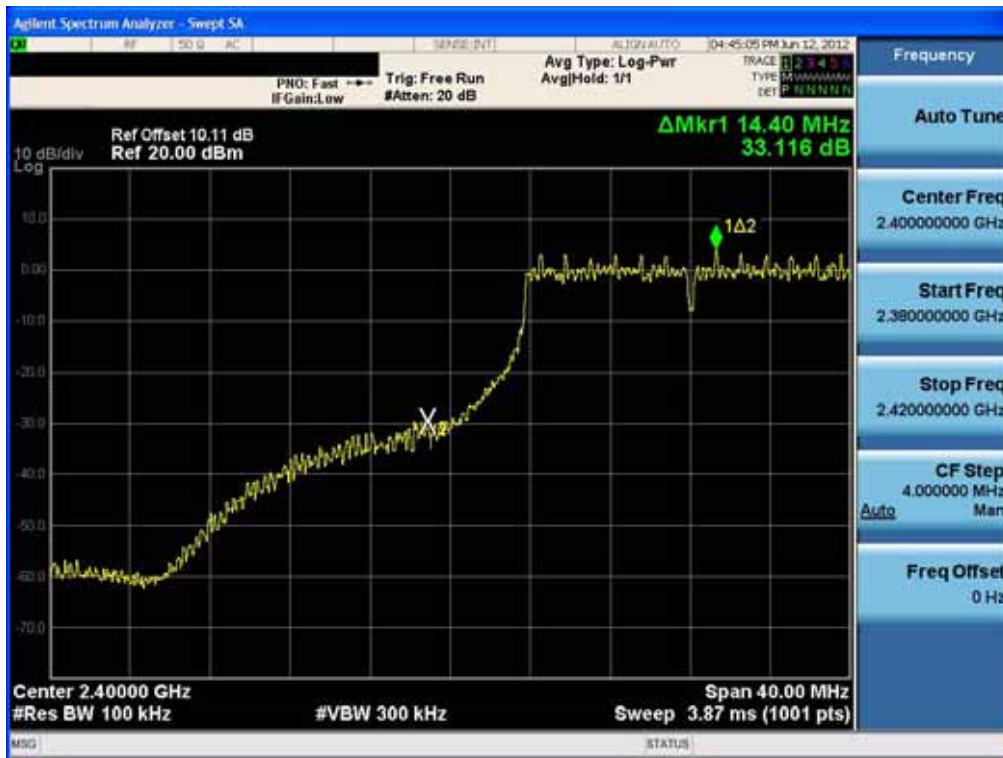


BandEdge (802.11b-CH11)



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BandEdge (802.11g-CH1)



BandEdge (802.11g-CH11)

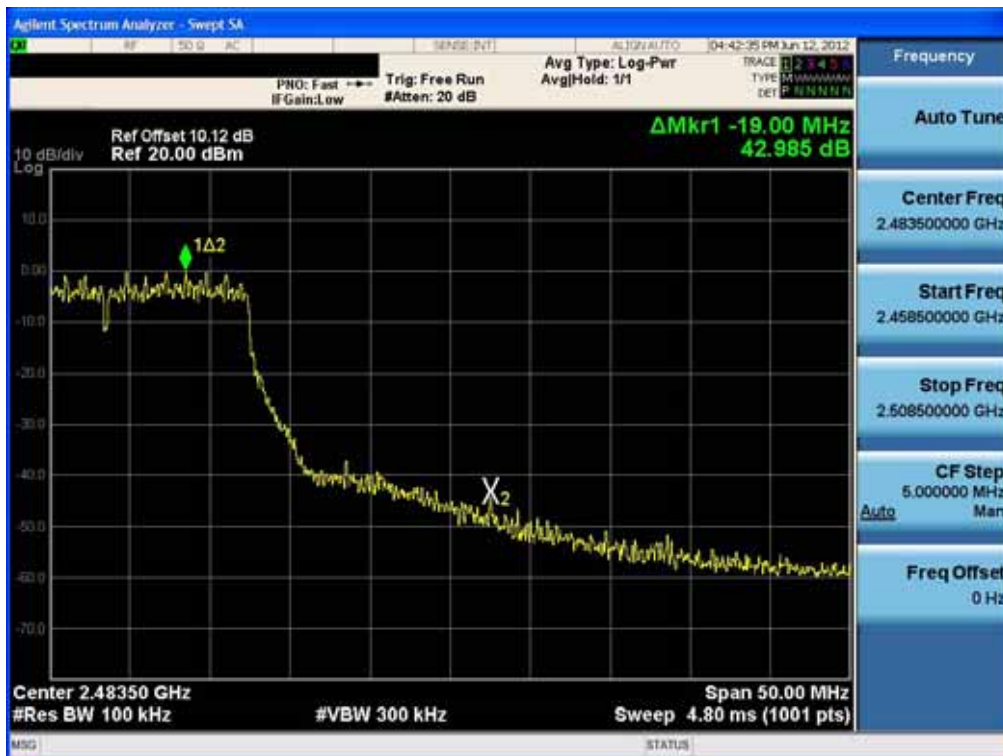


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BandEdge (802.11n-CH1)

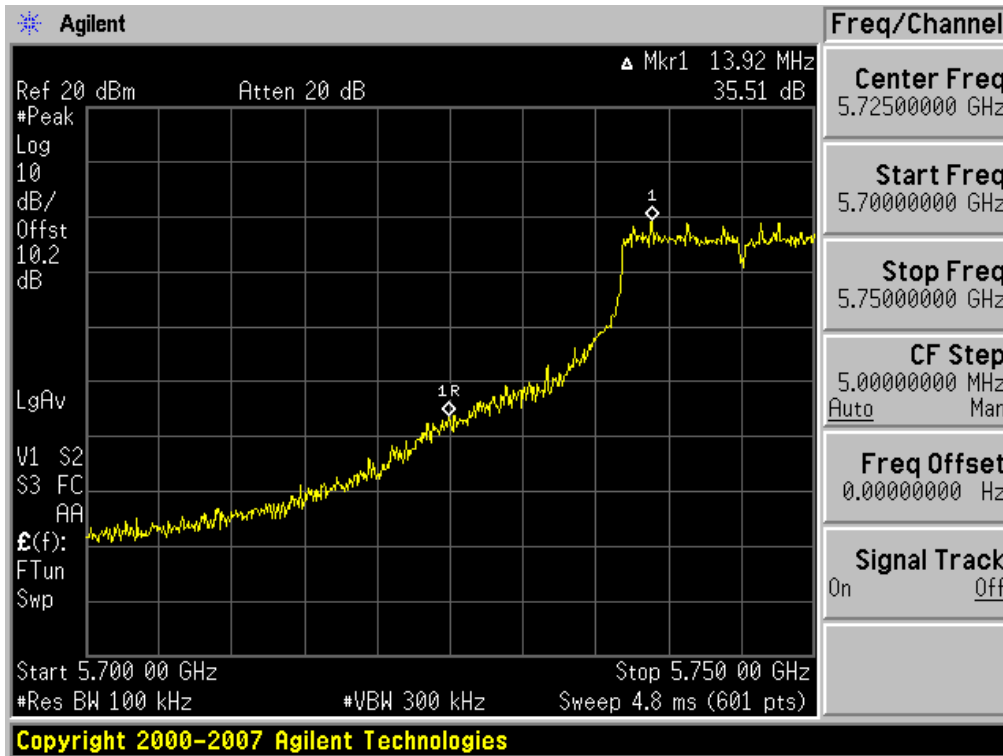


BandEdge (802.11n-CH11)

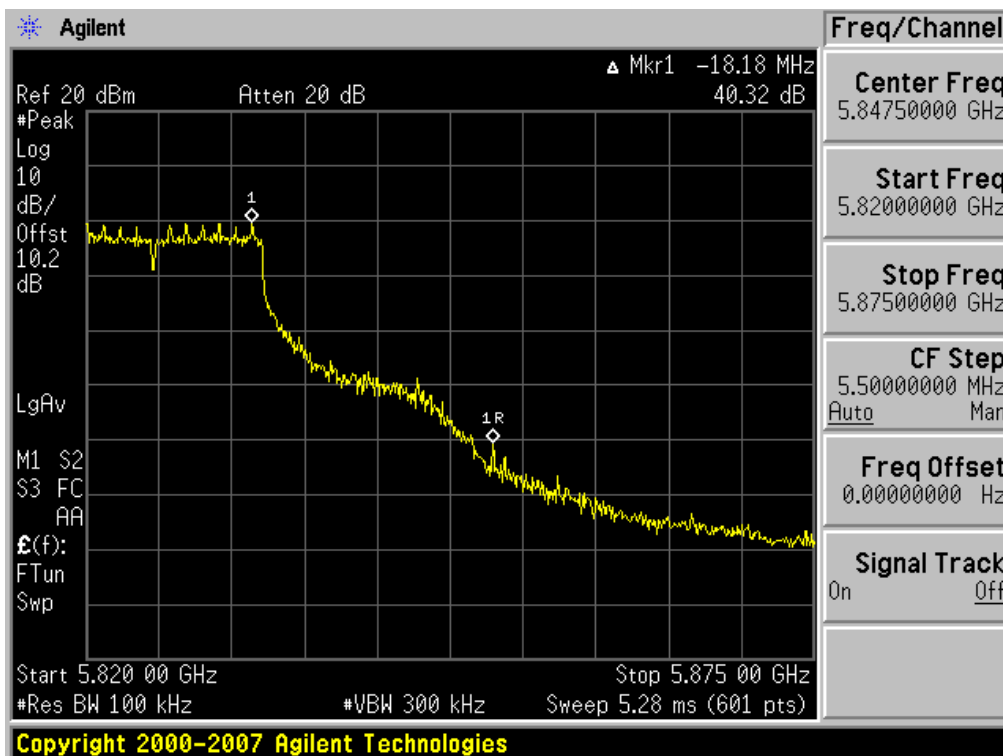


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BandEdge (802.11a-CH 149)

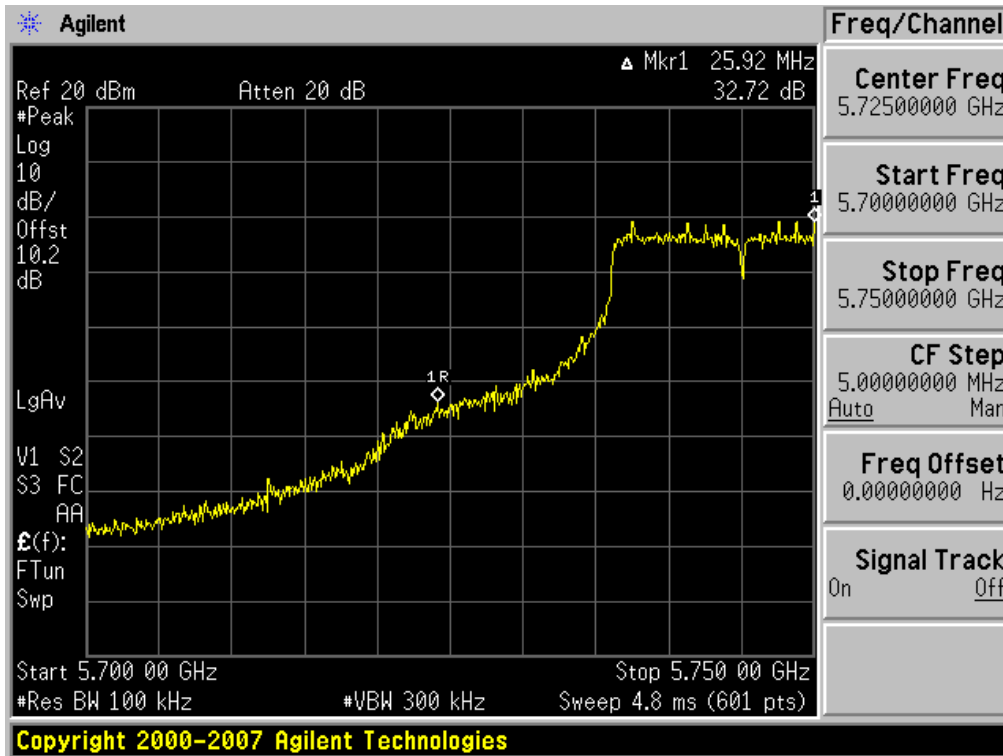


BandEdge (802.11a-CH 165)

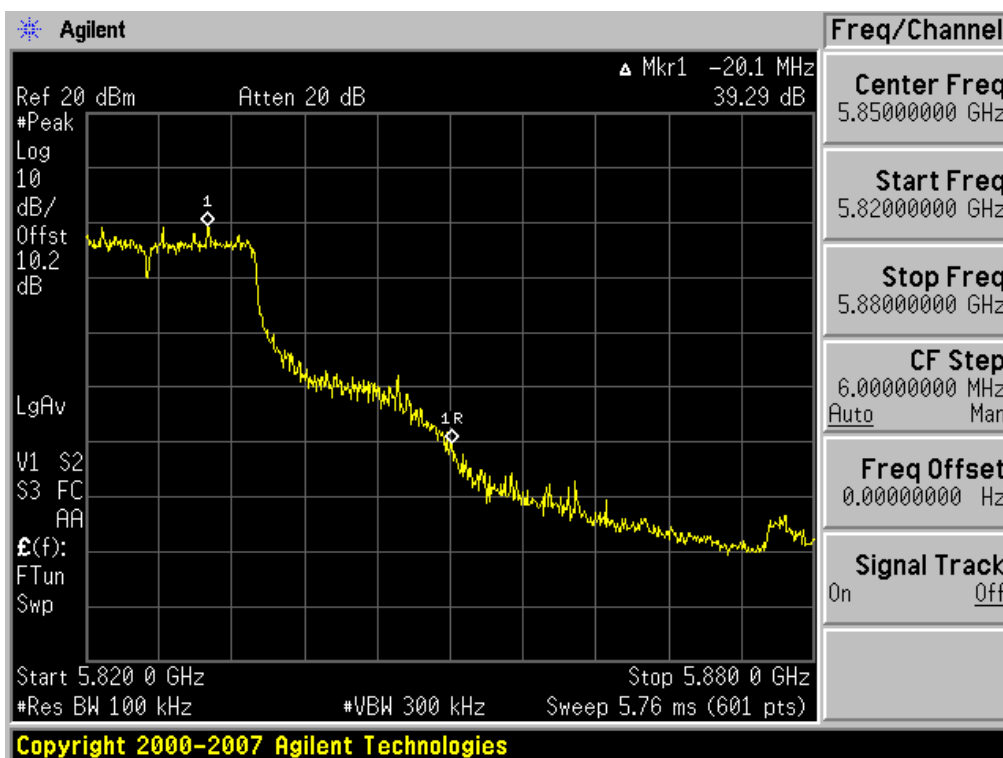


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BandEdge (802.11n-CH 149)



BandEdge (802.11n-CH 165)



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BandEdge (802.11n-CH 151)

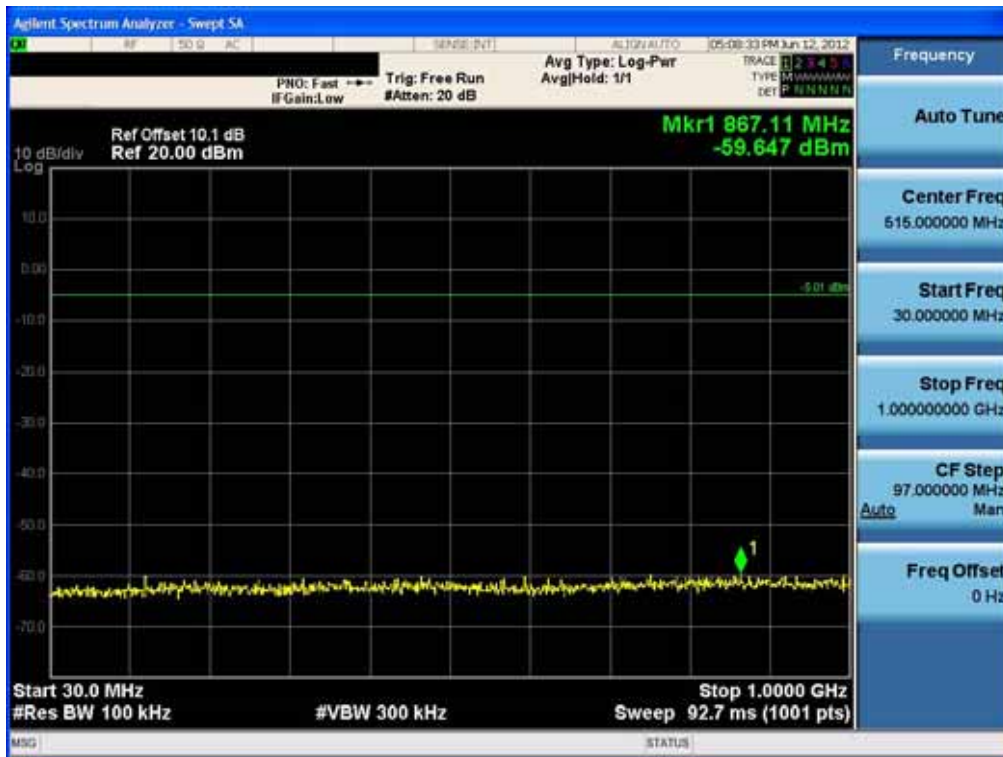


BandEdge (802.11n-CH 159)

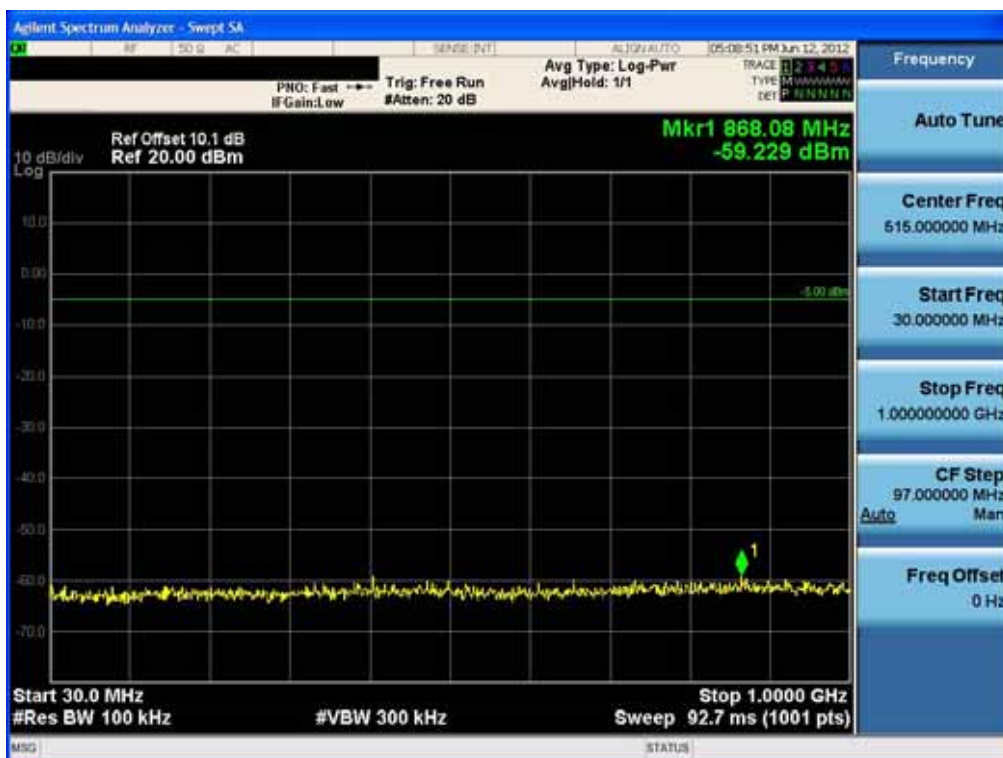


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Conducted Spurious Emission (802.11b-CH1)

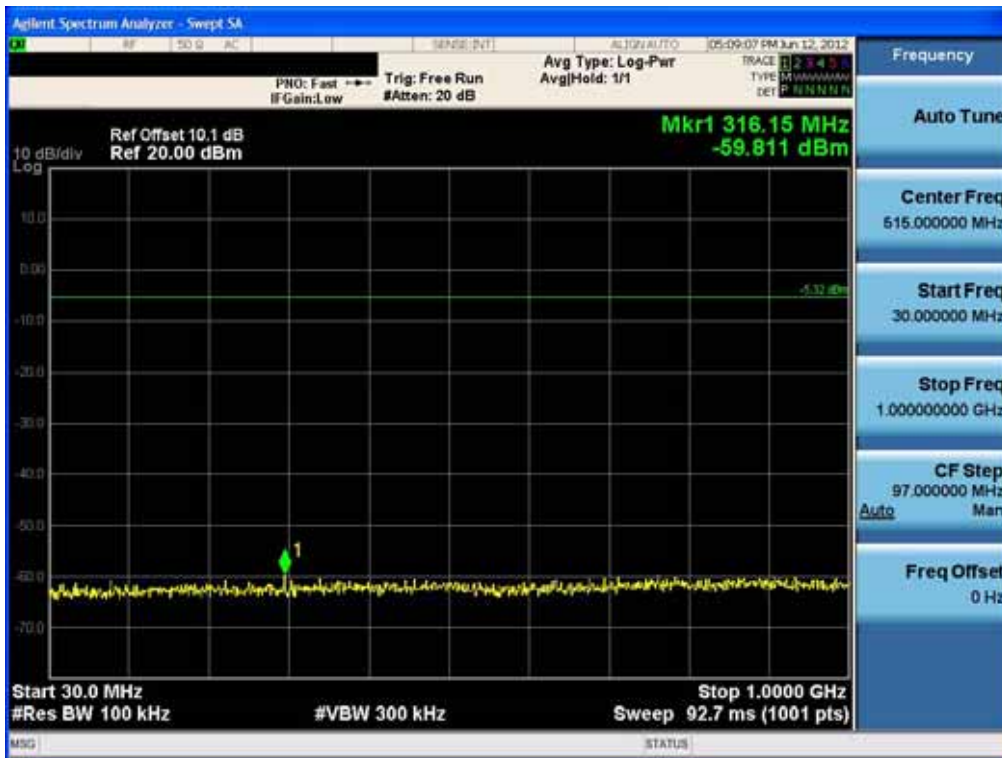


Conducted Spurious Emission (802.11b-CH6)

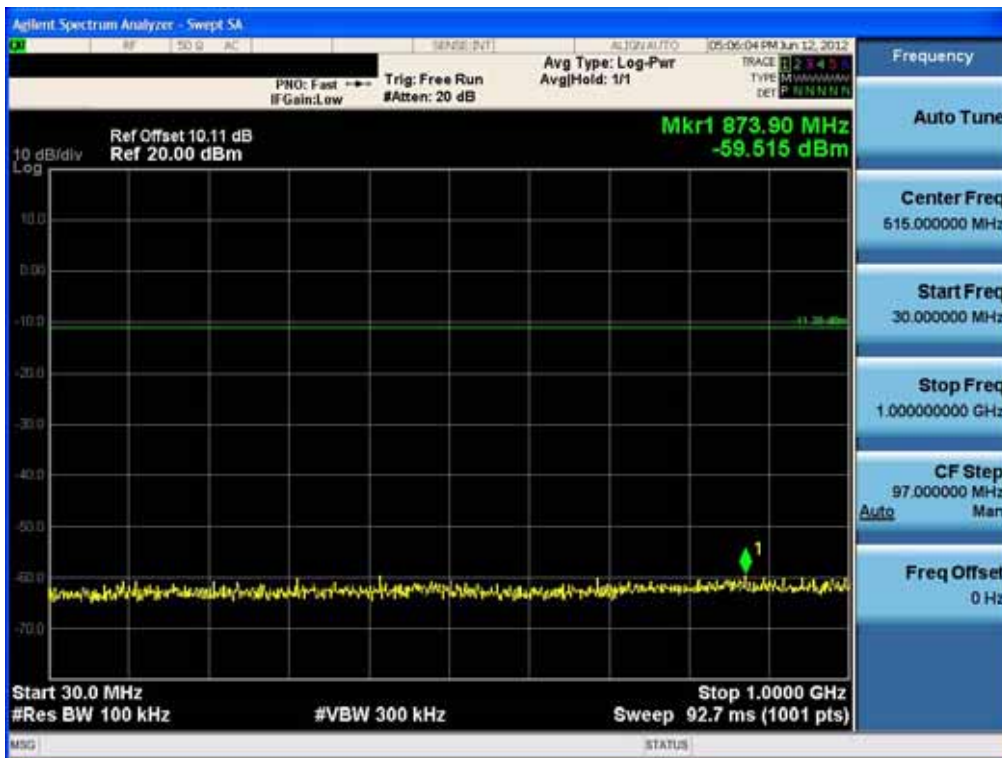


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Conducted Spurious Emission (802.11b-CH11)

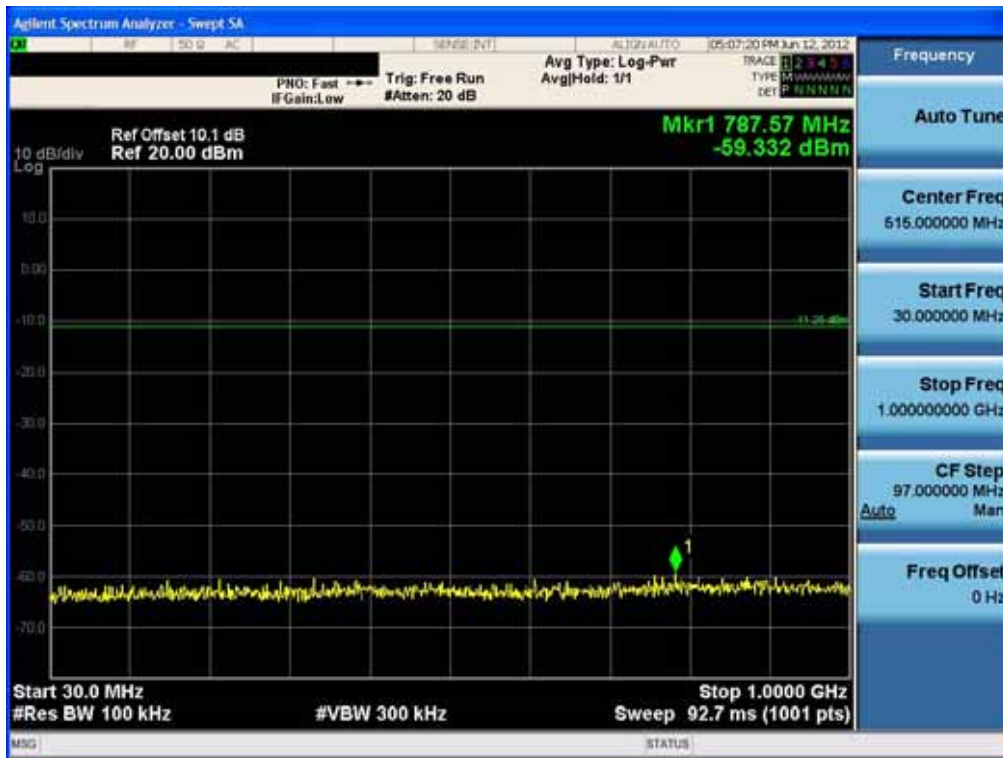


Conducted Spurious Emission (802.11g-CH1)

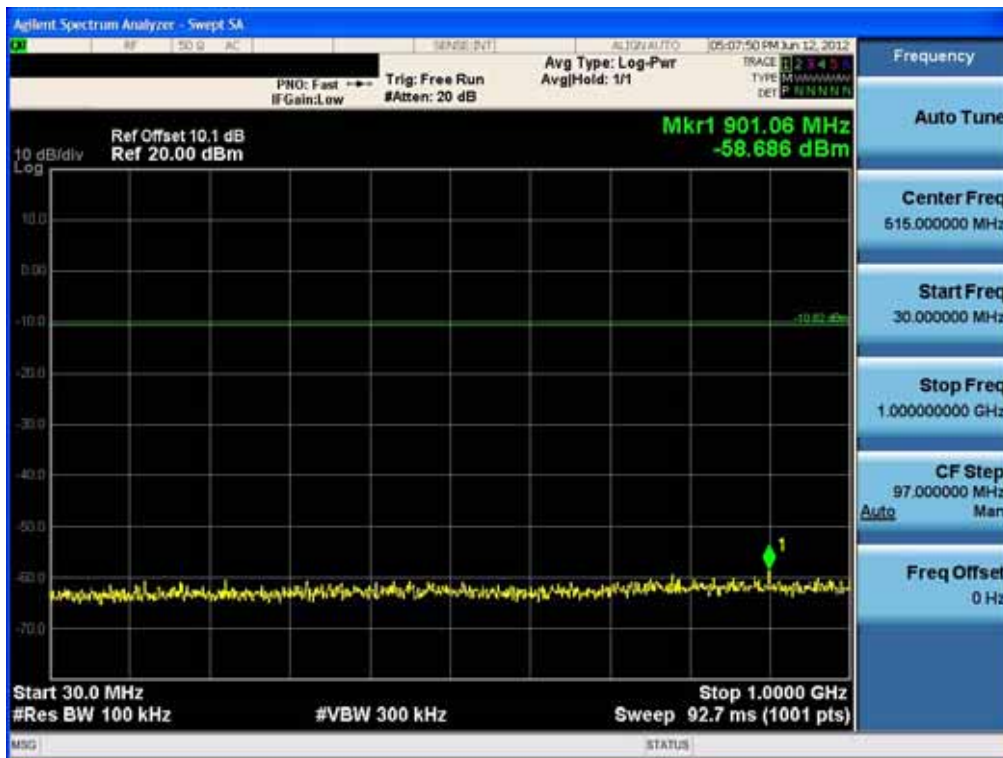


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Conducted Spurious Emission (802.11g-CH6)

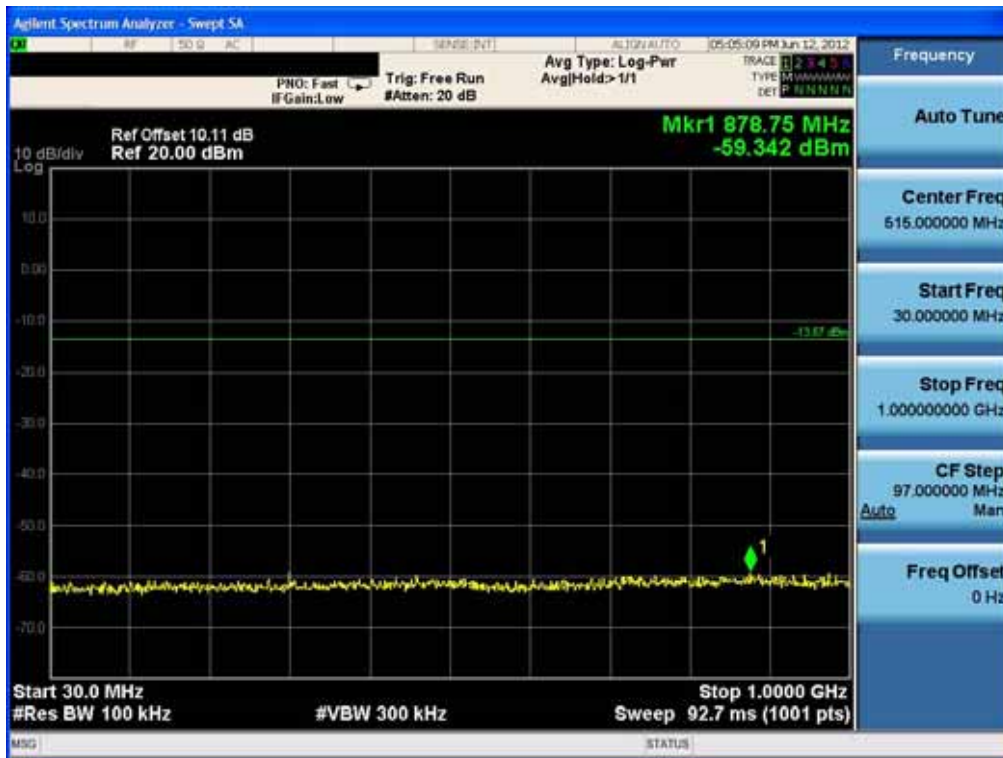


Conducted Spurious Emission (802.11g-CH11)

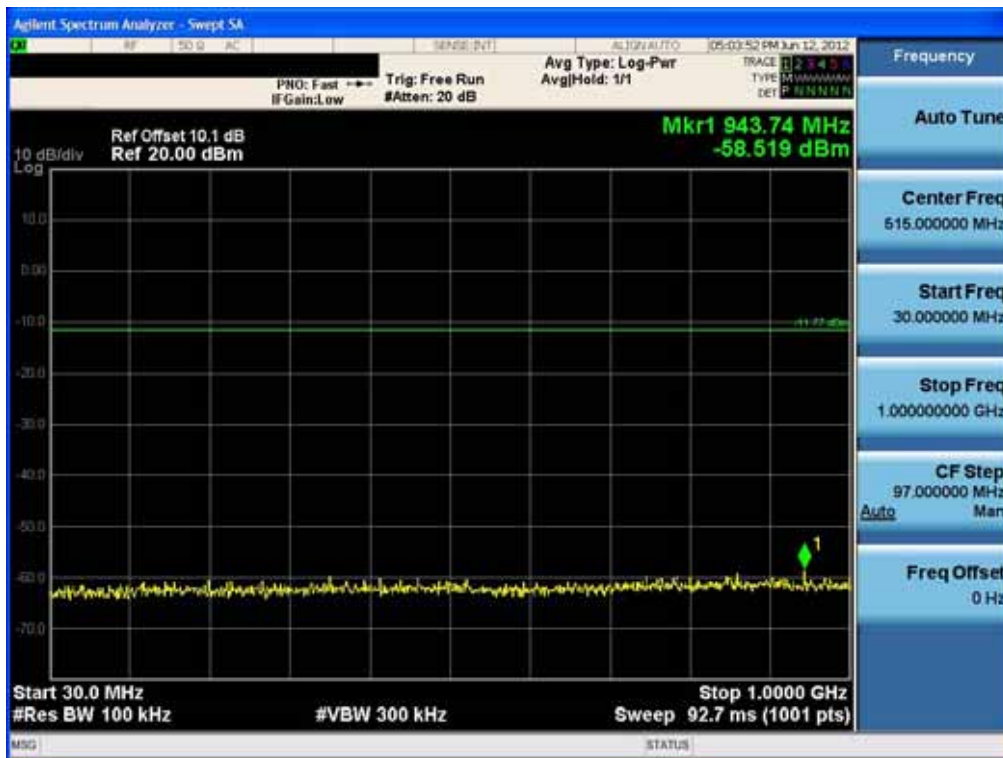


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Conducted Spurious Emission (802.11n-CH1)

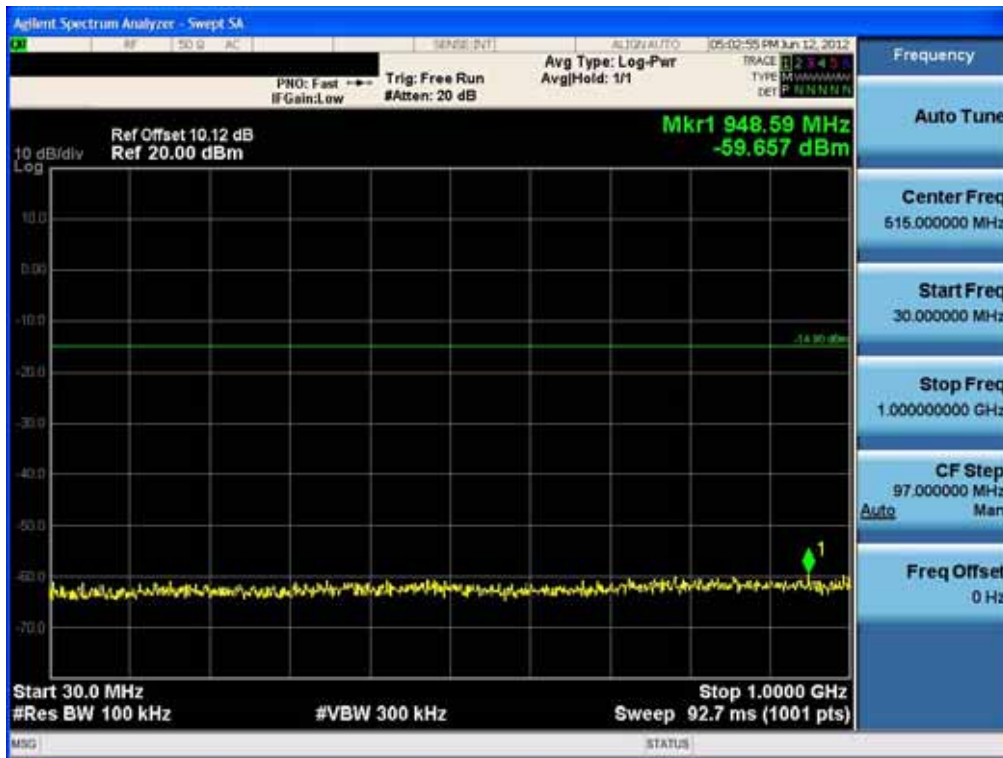


Conducted Spurious Emission (802.11n-CH6)



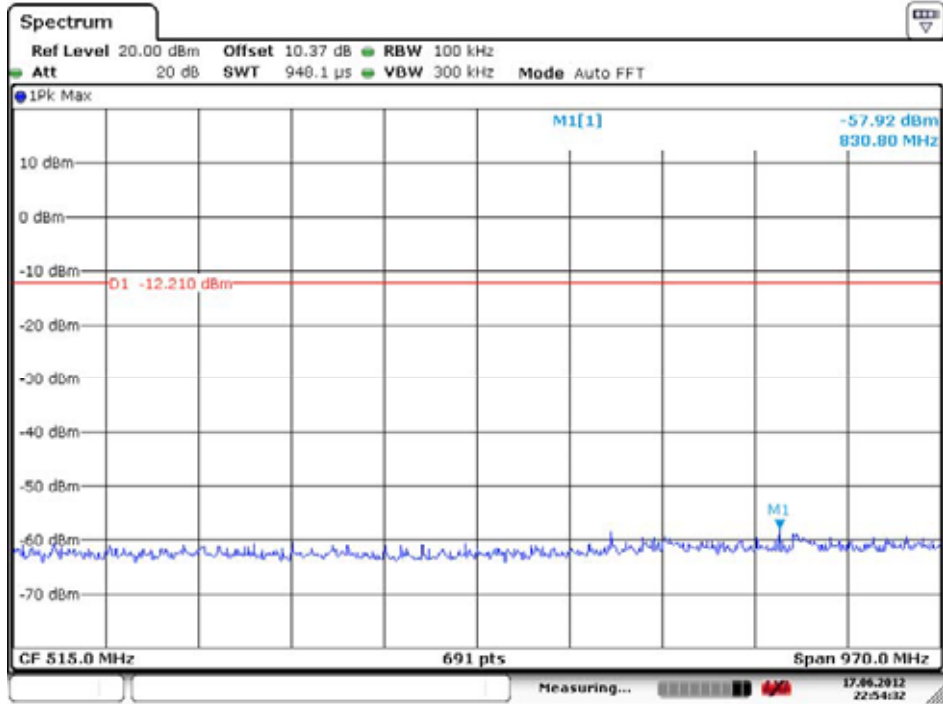
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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Conducted Spurious Emission (802.11n-CH11)



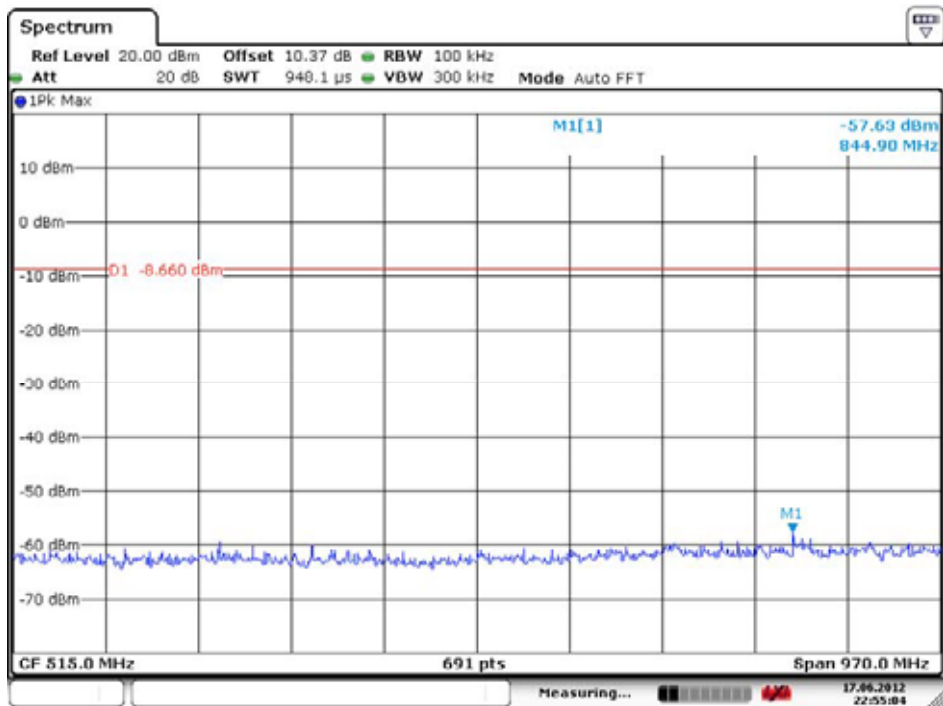
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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Conducted Spurious Emission (802.11a-CH149)



Date: 17.JUN.2012 22:54:33

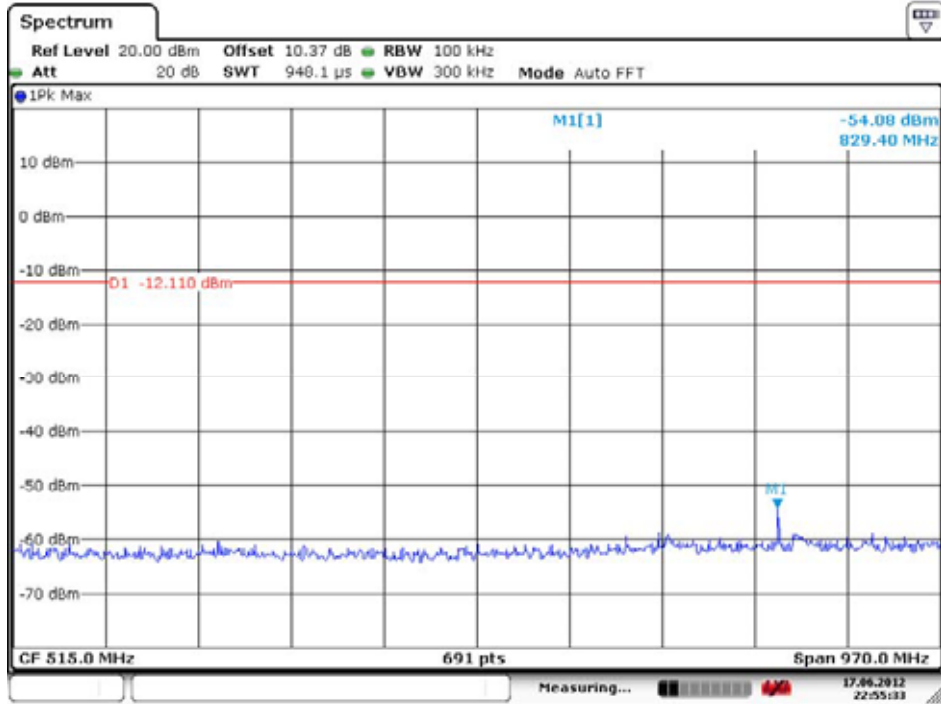
Conducted Spurious Emission (802.11a-CH157)



Date: 17.JUN.2012 22:55:04

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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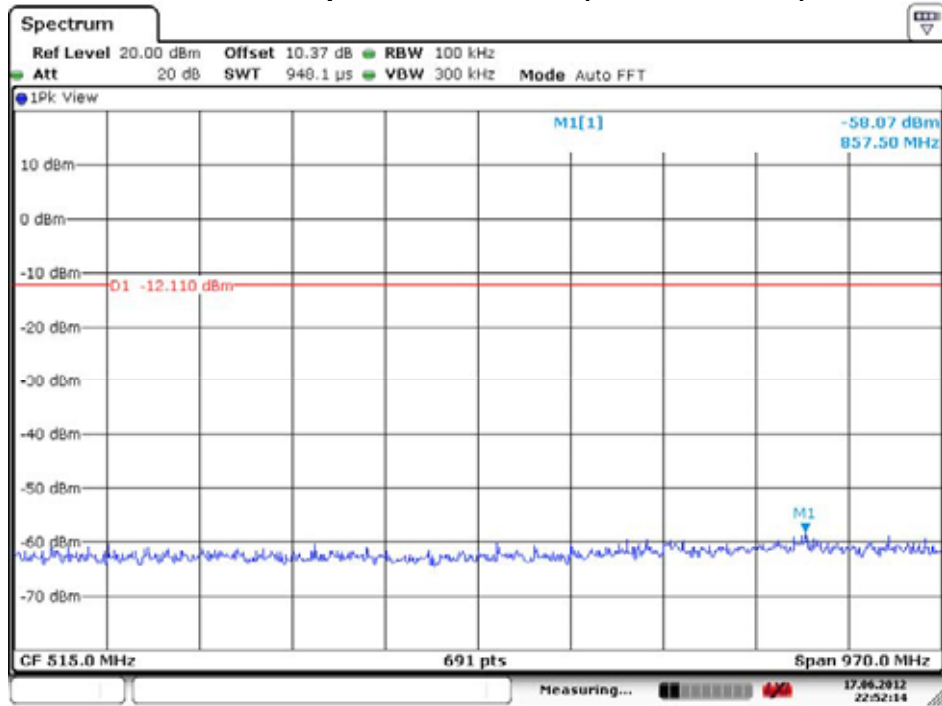
Conducted Spurious Emission (802.11a-CH165)



Date: 17.JUN.2012 22:55:33

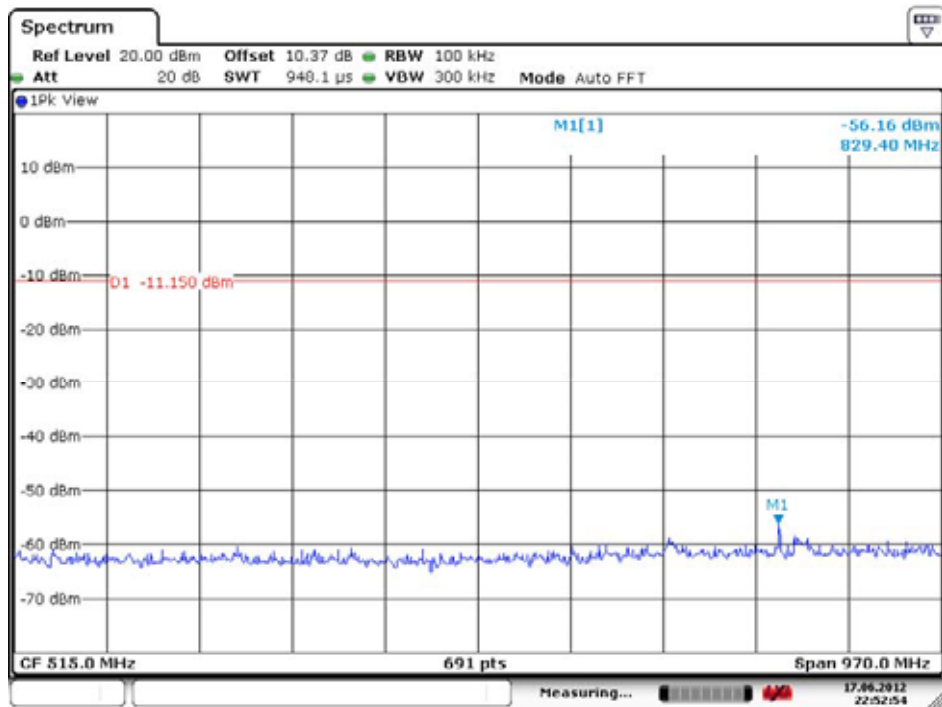
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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Conducted Spurious Emission (802.11n-CH149)



Date: 17.JUN.2012 22:52:14

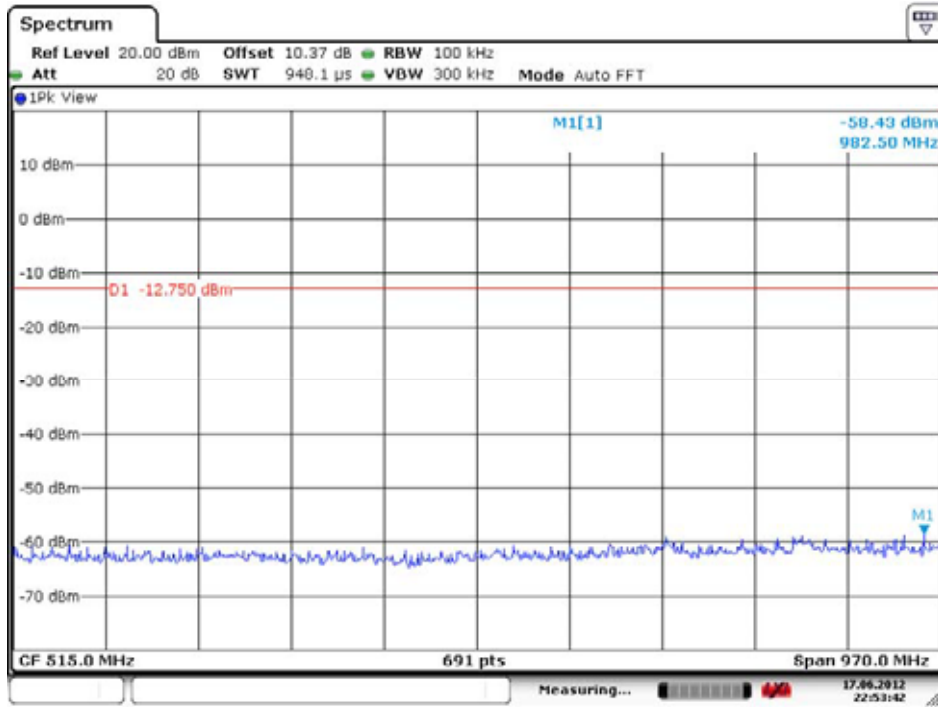
Conducted Spurious Emission (802.11n-CH157)



Date: 17.JUN.2012 22:52:54

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Conducted Spurious Emission (802.11n-CH165)



Date: 17.JUN.2012 22:53:42

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1 GHz ~ 26 GHz

Conducted Spurious Emission (802.11b-CH1)



Conducted Spurious Emission (802.11b-CH6)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

Conducted Spurious Emission (802.11b-CH11)



Conducted Spurious Emission (802.11g-CH1)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

Conducted Spurious Emission (802.11g-CH6)



Conducted Spurious Emission (802.11g-CH11)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

Conducted Spurious Emission (802.11n-CH1)



Conducted Spurious Emission (802.11n-CH6)



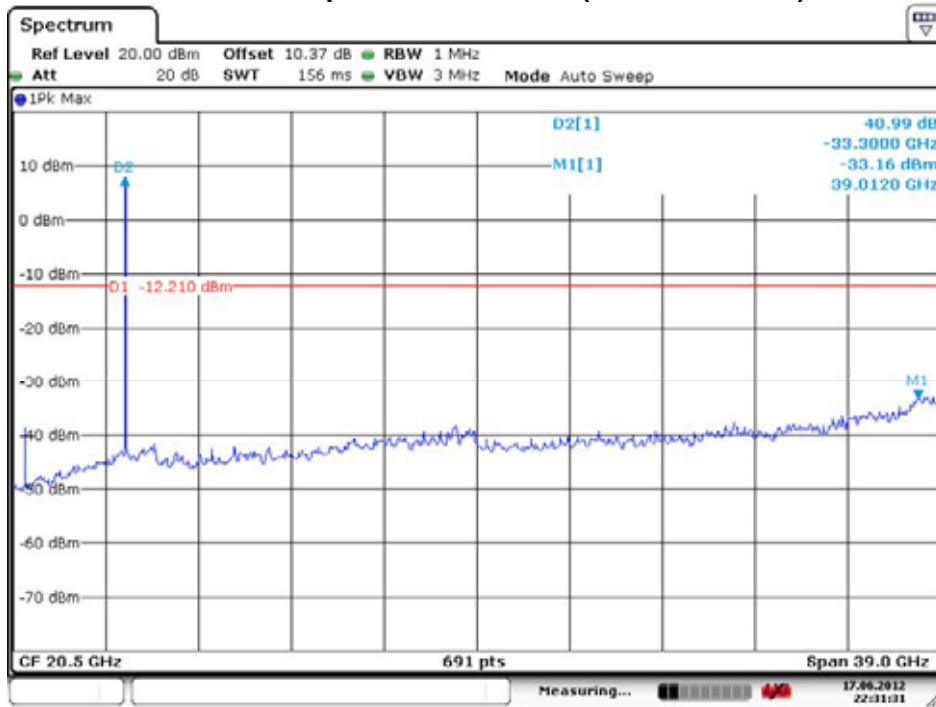
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

Conducted Spurious Emission (802.11n-CH11)



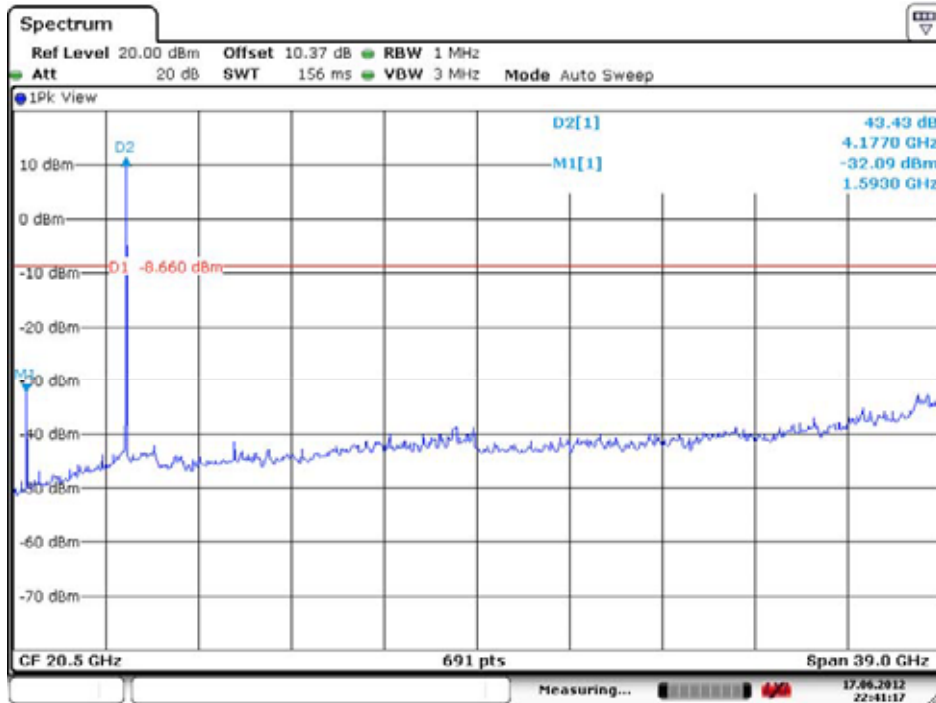
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

Conducted Spurious Emission (802.11a-CH149)



Date: 17.JUN.2012 22:31:31

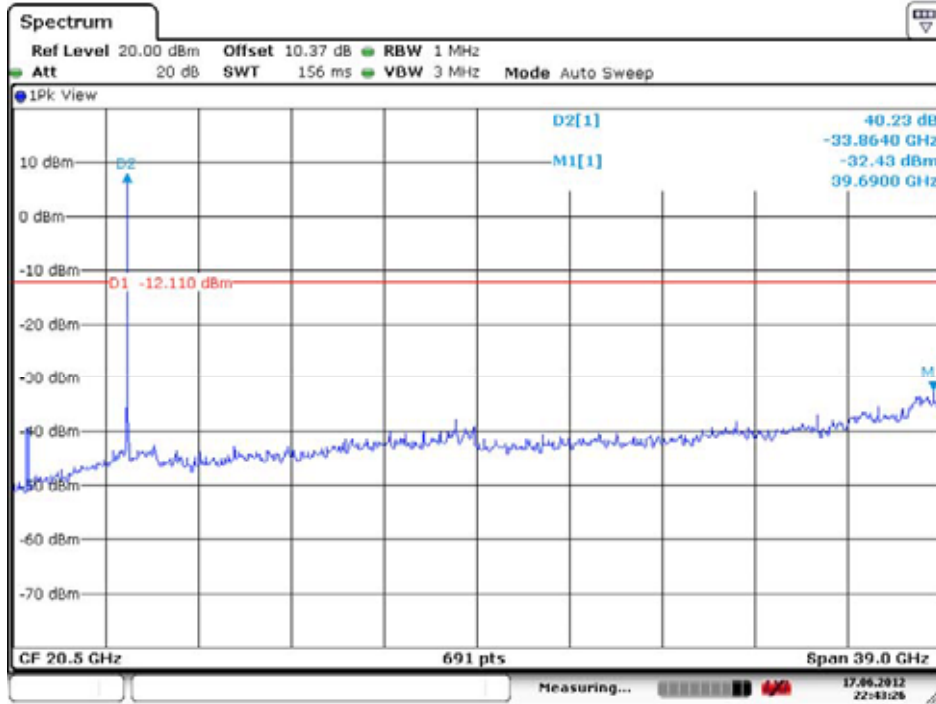
Conducted Spurious Emission (802.11a-CH157)



Date: 17.JUN.2012 22:41:17

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

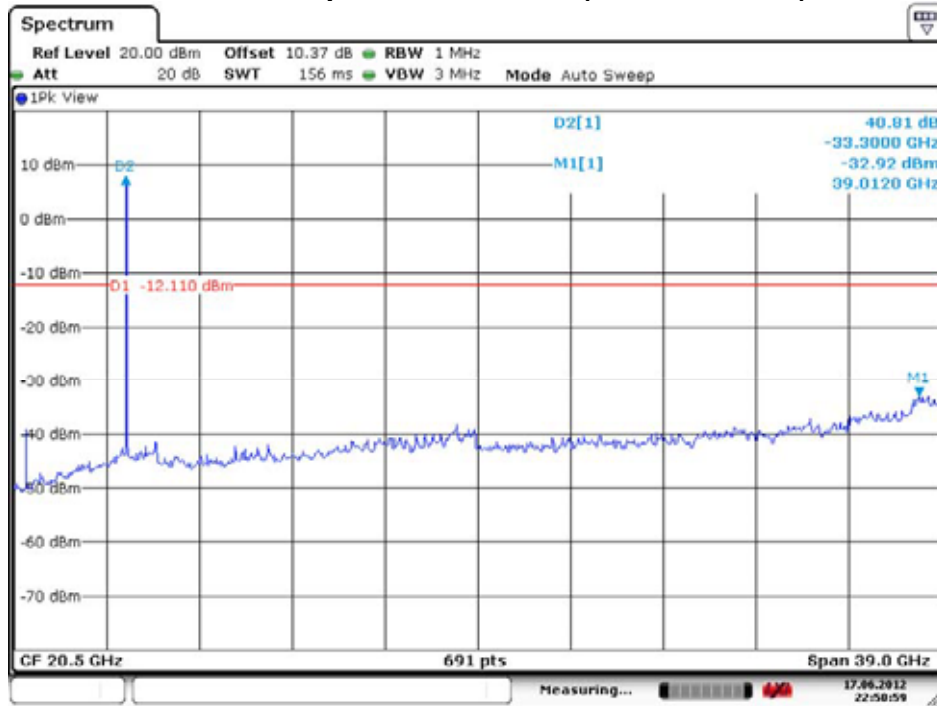
Conducted Spurious Emission (802.11a-CH165)



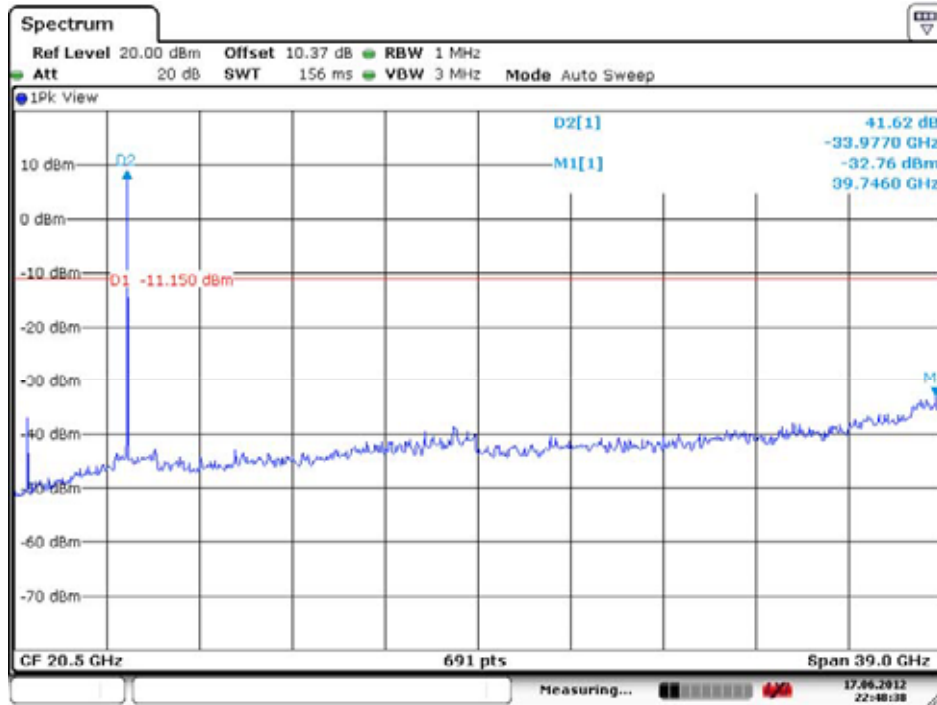
Date: 17.JUN.2012 22:43:26

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

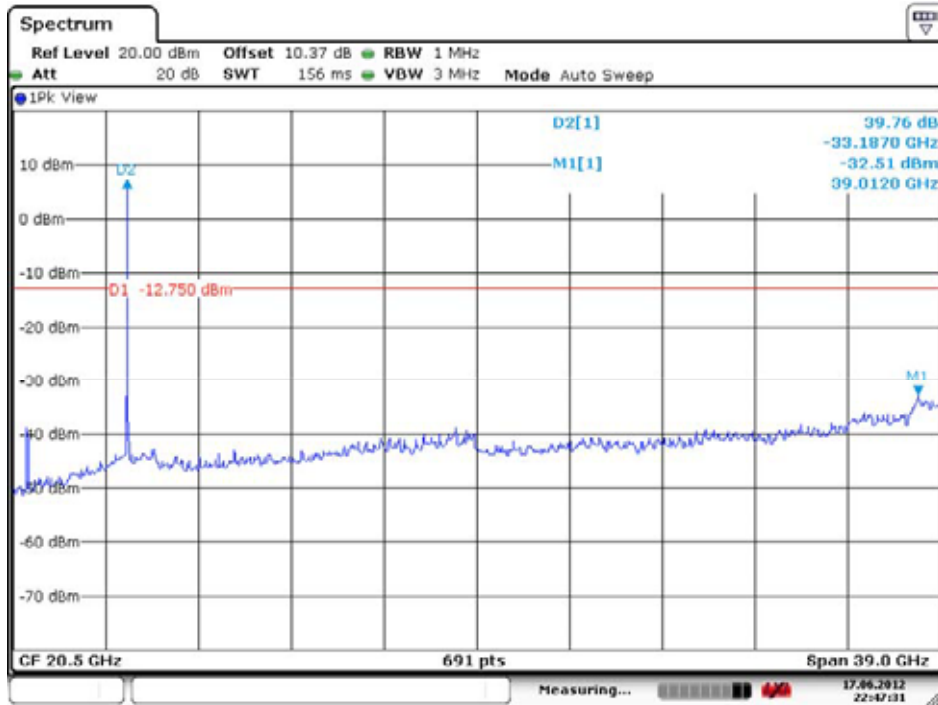
Conducted Spurious Emission (802.11n-CH149)



Conducted Spurious Emission (802.11n-CH157)



Conducted Spurious Emission (802.11n-CH165)



Date: 17.JUN.2012 22:47:31

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

Conducted Spurious Emission (802.11n-CH151)



Conducted Spurious Emission (802.11n-CH159)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

8.5 RADIATED MEASUREMENT.

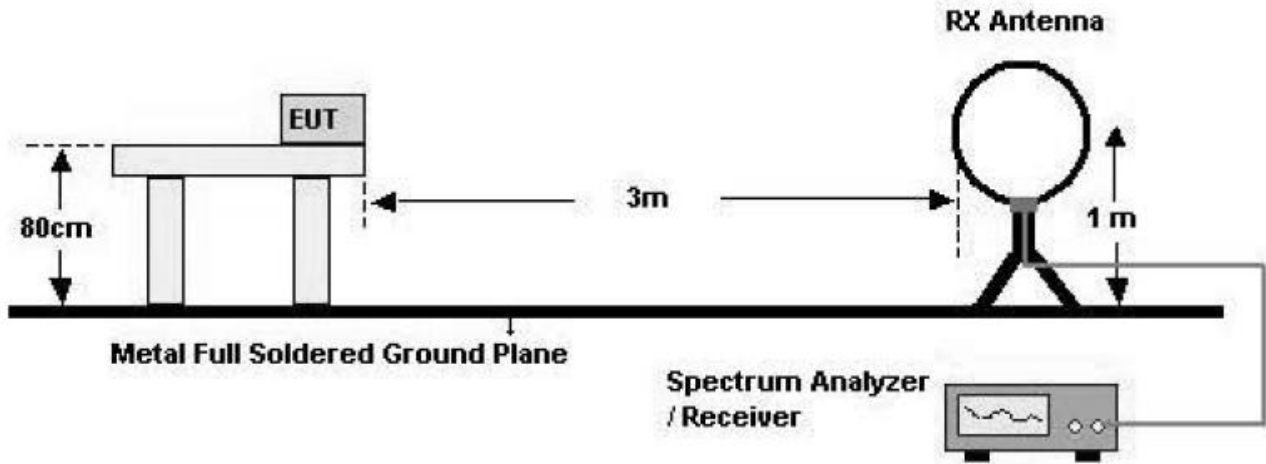
8.5.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209

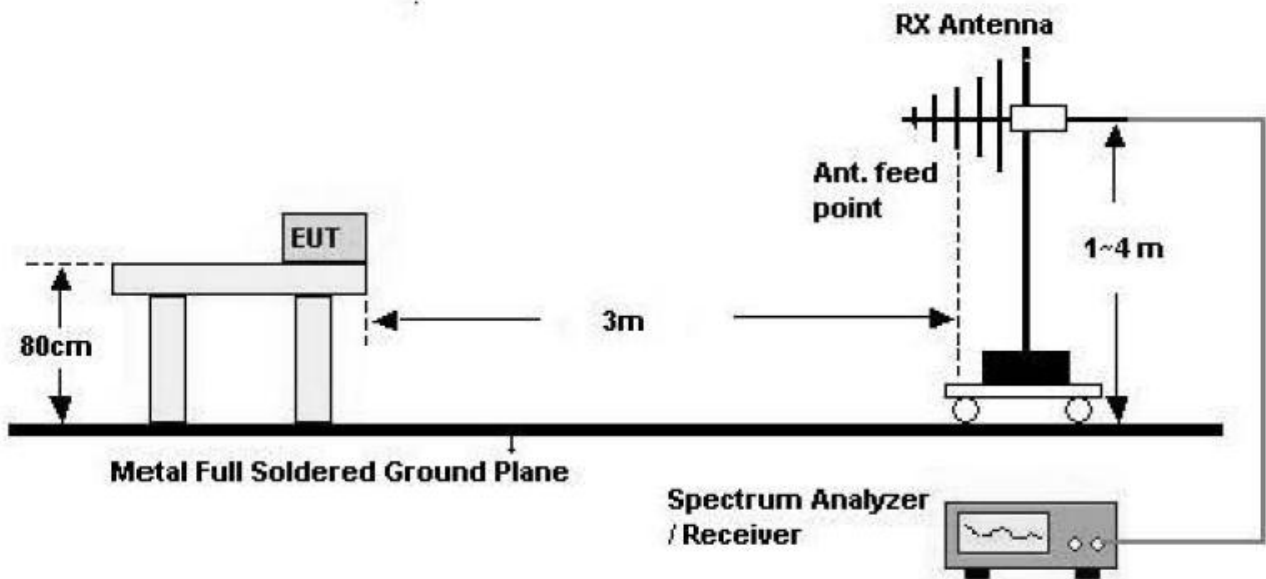
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

Below 30 MHz

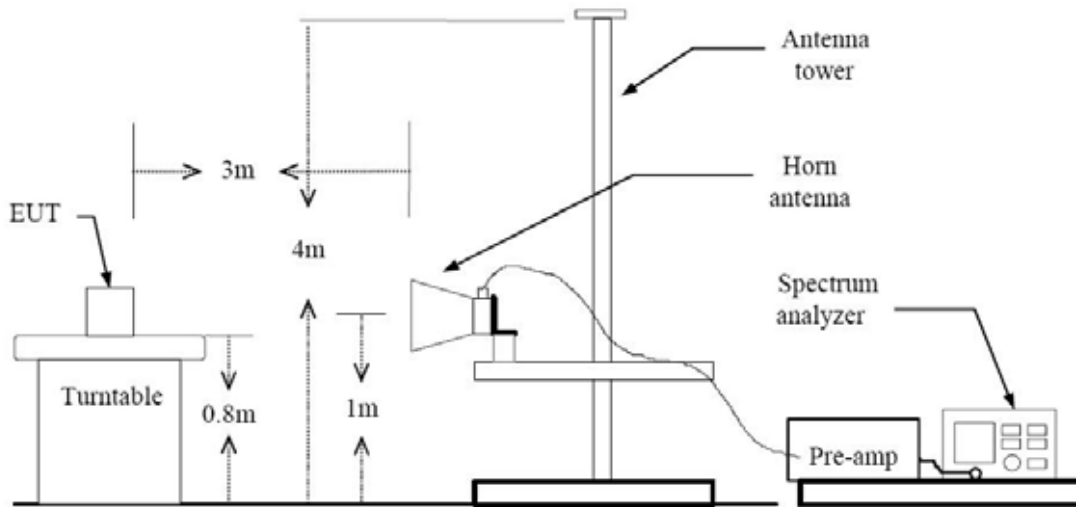


30 MHz - 1 GHz



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1206FR15-1	Date of Issue: July 18, 2012	EUT Type: 850/1900 GSM/GPRS/EDGE/WCDMA Phone with Bluetooth/WLAN/NFC	FCC ID: JYCP9090

Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

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TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	50.92	-0.10	V	50.82	74	23.18	PK
4824	37.49	-0.10	V	37.39	54	16.61	AV
7236	48.83	10.13	V	58.96	74	15.04	PK
7236	34.58	10.13	V	44.71	54	9.29	AV
4824	50.01	-0.10	H	49.91	74	24.09	PK
4824	37.38	-0.10	H	37.28	54	16.72	AV
7236	48.87	10.13	H	59.00	74	15.00	PK
7236	34.90	10.13	H	45.03	54	8.97	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. 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.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11b/g/n(2.4 GHz) mode test. Worst case of EUT is 1 Mbps in 802.11b.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



Operation Mode: 802.11 b
 Transfer Rate: 1 Mbps
 Operating Frequency: 2437
 Channel No. 06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	50.45	0.13	V	50.58	74	23.42	PK
4874	38.36	0.13	V	38.49	54	15.51	AV
7311	48.20	10.01	V	58.21	74	15.79	PK
7311	35.49	10.01	V	45.50	54	8.50	AV
4874	49.36	0.13	H	49.49	74	24.51	PK
4874	37.55	0.13	H	37.68	54	16.32	AV
7311	47.81	10.01	H	57.82	74	16.18	PK
7311	34.12	10.01	H	44.13	54	9.87	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. 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.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11b/g/n(2.4 GHz) mode test. Worst case of EUT is 1 Mbps in 802.11b.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
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Operation Mode: 802.11 b
 Transfer Rate: 1 Mbps
 Operating Frequency: 2462
 Channel No. 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	49.42	0.45	V	49.87	74	24.13	PK
4924	35.70	0.45	V	36.15	54	17.85	AV
7386	48.12	10.17	V	58.29	74	15.71	PK
7386	34.78	10.17	V	44.95	54	9.05	AV
4924	49.27	0.45	H	49.72	74	24.28	PK
4924	36.81	0.45	H	37.26	54	16.74	AV
7386	48.55	10.17	H	58.72	74	15.28	PK
7386	34.77	10.17	H	44.94	54	9.06	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. 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.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11b/g/n(2.4 GHz) mode test. Worst case of EUT is 1 Mbps in 802.11b.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	5.8 GHz
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5745 MHz
Channel No.	149 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11490	43.97	10.64	V	54.61	74.0	19.39	PK
11490	39.21	10.64	V	49.85	54.0	4.15	AV
17235	44.42	19.85	V	64.27	74.0	9.73	PK
17235	30.28	19.85	V	50.13	54.0	3.87	AV
11490	44.91	10.64	H	55.55	74.0	18.45	PK
11490	40.38	10.64	H	51.02	54.0	2.98	AV
17235	45.67	19.85	H	65.52	74.0	8.48	PK
17235	30.32	19.85	H	50.17	54.0	3.83	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. 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.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11a/n(5.8 GHz) mode test. Worst case of EUT is 6 Mbps in 802.11a.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	5.8 GHz
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11570	44.24	10.41	V	54.65	74.0	19.35	PK
11570	39.09	10.41	V	49.50	54.0	4.50	AV
17355	44.34	19.23	V	63.57	74.0	10.43	PK
17355	30.64	19.23	V	49.87	54.0	4.13	AV
11570	45.17	10.41	H	55.58	74.0	18.42	PK
11570	39.98	10.41	H	50.39	54.0	3.61	AV
17355	44.15	19.23	H	63.38	74.0	10.62	PK
17355	30.63	19.23	H	49.86	54.0	4.14	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. 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.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11a/n(5.8 GHz) mode test. Worst case of EUT is 6 Mbps in 802.11a.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	5.8 GHz
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11650	43.38	10.24	V	53.62	74.0	20.38	PK
11650	37.59	10.24	V	47.83	54.0	6.17	AV
17475	45.50	20.73	V	66.23	74.0	7.77	PK
17475	29.35	20.73	V	50.08	54.0	3.92	AV
11650	44.41	10.24	H	54.65	74.0	19.35	PK
11650	39.20	10.24	H	49.44	54.0	4.56	AV
17475	45.46	20.73	H	66.19	74.0	7.81	PK
17475	29.36	20.73	H	50.09	54.0	3.91	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. 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.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11a/n(5.8 GHz) mode test. Worst case of EUT is 6 Mbps in 802.11a.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	5.8 GHz
Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5755 MHz
Channel No.	151 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11510	44.24	10.58	V	54.82	74.0	19.18	PK
11510	39.29	10.58	V	49.87	54.0	4.13	AV
17265	44.32	19.96	V	64.28	74.0	9.72	PK
17265	31.07	19.96	V	51.03	54.0	2.97	AV
11510	45.16	10.58	H	55.74	74.0	18.26	PK
11510	40.57	10.58	H	51.15	54.0	2.85	AV
17265	44.36	19.96	H	64.32	74.0	9.68	PK
17265	31.06	19.96	H	51.02	54.0	2.98	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. 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.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done all data rate in 802.11n_40 MHz BW(5.8 GHz) mode. Worst case of EUT is 13.5 Mbps in 802.11n.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Band :	5.8 GHz
Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5795 MHz
Channel No.	159 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11590	43.77	10.41	V	54.18	74.0	19.82	PK
11590	37.73	10.41	V	48.14	54.0	5.86	AV
17385	43.57	19.69	V	63.26	74.0	10.74	PK
17385	30.58	19.69	V	50.27	54.0	3.73	AV
11590	45.43	10.41	H	55.84	74.0	18.16	PK
11590	40.80	10.41	H	51.21	54.0	2.79	AV
17385	44.11	19.69	H	63.80	74.0	10.20	PK
17385	30.57	19.69	H	50.26	54.0	3.74	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. 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.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 40 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done all data rate in 802.11n_40 MHz BW(5.8 GHz) mode. Worst case of EUT is 13.5 Mbps in 802.11n.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

8.5.2 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	33.84	33.86	H	67.70	74	6.30	PK
2390.0	16.25	33.86	H	50.11	54	3.89	AV
2390.0	29.32	33.86	V	63.18	74	10.82	PK
2390.0	13.44	33.86	V	47.30	54	6.70	AV
2483.5	35.65	34.02	H	69.67	74	4.33	PK
2483.5	17.82	34.02	H	51.84	54	2.16	AV
2483.5	30.14	34.02	V	64.16	74	9.84	PK
2483.5	14.08	34.02	V	48.10	54	5.90	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss
2. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
3. We have done 802.11b/g/n mode test. . Worst case of EUT is 6 Mbps in 802.11g

8.6 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. We are performed the AC Power Line Conducted Emission test for 11 Mbps, Ch.6 and 802.11b.
Because 802.11b mode is worst case.

■ RESULT PLOTS

Conducted Emissions (Line 1)

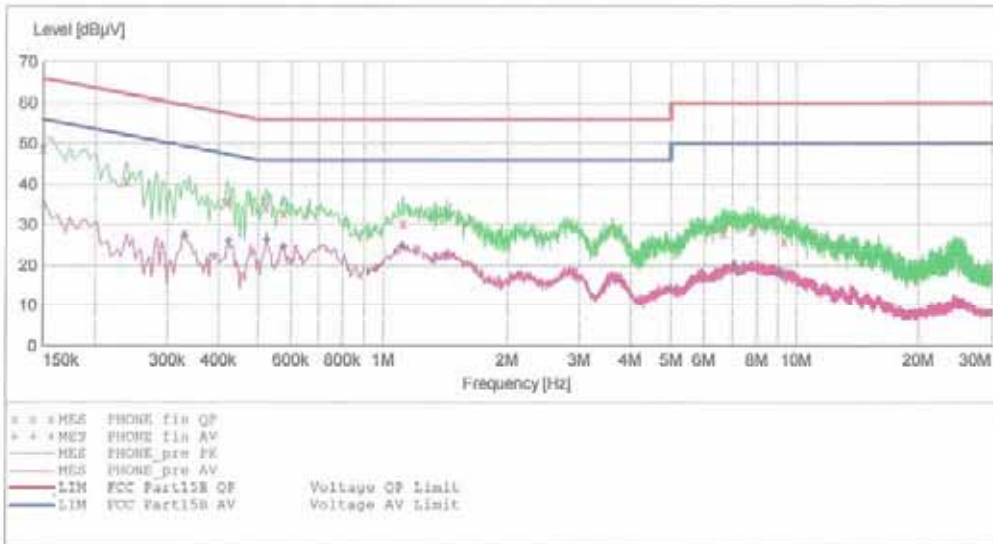
HCT

EMC

EUT: P9090
 Manufacturer: PANTECH
 Operating Condition: WLAN MODE(DTS)
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15 CLASS B
 Comment: N

SCAN TABLE: "FCC PART 15 B(N)"

Short Description:			FCC PART 15 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "PHONE_fin QP"

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Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150010	48.90	10.0	66	17.1	---	---
0.238010	40.70	10.1	62	21.5	---	---
0.418010	35.70	10.1	58	21.8	---	---
0.520000	34.50	10.0	56	21.5	---	---
0.576000	33.00	10.1	56	23.0	---	---
1.116000	30.40	10.1	56	25.6	---	---
6.656000	28.00	10.7	60	32.0	---	---
7.792000	28.60	10.8	60	31.4	---	---
9.300000	25.90	10.8	60	34.1	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150010	34.40	10.0	56	21.6	---	---
0.330010	27.40	10.0	50	22.1	---	---
0.422010	26.10	10.1	47	21.3	---	---
0.524000	26.40	10.1	46	19.6	---	---
0.576000	24.60	10.1	46	21.4	---	---
1.112000	24.60	10.1	46	21.4	---	---
5.000000	14.30	10.5	46	31.7	---	---
7.068000	19.50	10.7	50	30.5	---	---
9.148000	18.10	10.8	50	31.9	---	---

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Conducted Emissions (Line 2)

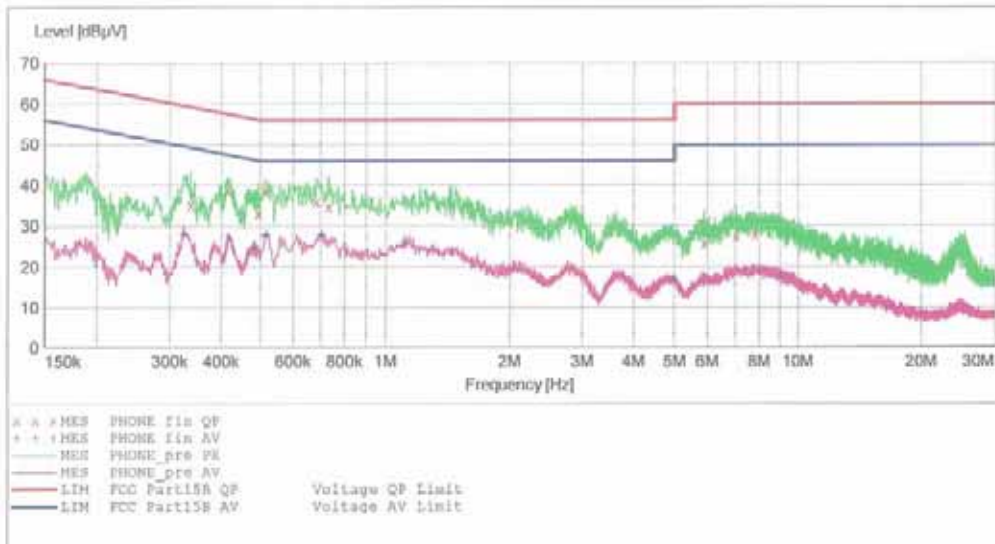
HCT

EMC

EUT: P9090
 Manufacturer: PANTECH
 Operating Condition: WLAN MODE (DTS)
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15 CLASS B
 Comment: H

SCAN TABLE: "FCC PART 15 B(H)"

Short Description:			FCC PART 15 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	1.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "PHONE_fin_QP"

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Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.336010	35.20	10.1	59	24.1	---	---
0.416010	38.70	10.1	58	18.8	---	---
0.493010	33.10	10.1	56	23.0	---	---
0.512000	38.60	10.1	56	17.4	---	---
0.684000	35.90	10.1	56	20.1	---	---
0.732000	34.70	10.1	56	21.3	---	---
5.896000	25.80	10.6	60	34.2	---	---
7.024000	27.60	10.8	60	32.4	---	---
7.820000	28.10	10.8	60	31.9	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

6/22/2012 9:37AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.324010	28.30	10.1	50	21.3	---	---
0.417010	27.40	10.1	48	20.1	---	---
0.484010	25.10	10.1	46	21.2	---	---
0.516000	27.80	10.1	46	18.2	---	---
0.704000	27.80	10.1	46	18.2	---	---
1.116000	26.30	10.2	46	19.7	---	---
5.000000	16.80	10.5	46	29.2	---	---
8.036000	19.20	10.8	50	30.8	---	---
9.120000	17.80	10.8	50	32.2	---	---

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9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ESH2-Z5/ LISN	Annual	02/03/2013	861741/013
Schwarzbeck	VULB 9168/ TRILOG Antenna	Biennial	02/09/2013	200
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	05/03/2013	831564103
Rohde & Schwarz	FSV 40 / Signal Analyzer	Annual	06/11/2013	1307.9002k40-100931-NK
Agilent	E4440A/ Spectrum Analyzer	Annual	05/02/2013	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	09/23/2012	MY51110020
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	ESH3-Z2/ PULSE LIMITER	Annual	08/01/2012	375.8810.352
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/19/2012	10094
MITEQ	AMF-6B-180265-35-10P / POWER AMP	Annual	04/16/2013	667624
CERNEX	CBL26405040 / POWER AMP	Annual	04/16/2013	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	10/17/2013	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/26/2012	BBHA9170342
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	02/09/2013	839117/011
Agilent	E4416A /Power Meter	Annual	11/07/2012	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	05/02/2013	MY4442009
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	Annual	05/02/2013	1
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	Annual	05/02/2013	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	Annual	05/02/2013	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	05/02/2013	1
Hewlett Packard	11636B/Power Divider	Annual	11/07/2012	11377
Hewlett Packard	11667B / Power Splitter	Annual	11/04/2012	10126
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	11/07/2012	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	11/07/2012	010002156287001199
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	05/02/2013	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/11/2014	9009-2536
MITEQ	AMF-6D-001180-35-20P/ POWER AMP	Annual	12/26/2012	990893
Agilent	8493C / Attenuator(10 dB)	Annual	09/23/2012	76649
WEINSCHL	2-3 / Attenuator(3 dB)	Annual	11/07/2013	BR0617

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