

INTERNAL REGULATORY COMPLIANCE REPORT

TITLE: FCC Test Report for FCC Part 101 (952 - 960 MHz) Transmitter

900 BCR Radio

AUTHOR: W. Raymond Stoner

REV	CCO	DESCRIPTION OF CHANGE	DATE	APPROVALS	
001		INITIAL RELEASE		Engineering	
				Regulatory	

REVISION HISTORY

A		first filing	02dec09	Engineering	
				Regulatory	
B		answer 1 st nonconforms; voltage variation, MPE, etc.	11dec09	Engineering	
				Regulatory	
C1		answers to second round: voltage variation is not required; test standard	17dec	Engineering	
				Regulatory	

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Test Data Summary

FCC Part 101 Transmitter
900 BCR Radio, 952 – 960 MHz for EUT
FCC ID: EO9BCR900

Part Numbers: 900 BCR Radio
Serial Numbers – see below
OATS Registration Number: FCC 90716, IC 864D-1

Rule	Description	Spec Limit	Max. Reading	Pass/Fail
FCC 15.207	AC Power line Conducted Emissions	Table	36.5 dBuV/m	Pass
FCC 101.113	EIRP of Fundamental Emissions – FCC	<14 dBW	-4.5 dBW	Pass
FCC 101.109	Occupied Bandwidth (99%) – FCC	< 12.5kHz	3.4705kHz	Pass
FCC 101.111a(5)	Transmit Mask - FCC	table	see plot	Pass
FCC 101.111(a)(5)(iv)	EIRP of Transmitter Spurious Emissions	< 50+ log(P) or 70dBc	-21.68 dBm	Pass
FCC 101.107	Frequency Stability	<1.5ppm	0.90ppm	Pass
Parts 1.1310 & 2.1093 (portable) and KDB447498	RF Safety	< 60/F(GHz)	see SAR Test Report	Pass

Rule versions: FCC Part 1; FCC Part 2; FCC Part 15; FCC Part 101

Reference docs: TIA-603-C; ANSI C63.4-2003; OET65 (08-1997); OET65C (06-2001); IEEE C95.3-2002.

Cognizant Personnel	
<u>Name</u> W. Raymond Stoner	<u>Title</u> Engineer
<u>Name</u> Jay Holcomb	<u>Title</u> Regulatory Manager
<u>Name</u> Drew Rosenberg	<u>Title</u> Project Lead

CONDITIONS DURING TESTING

No Modifications to the EUT were necessary during the testing.

TIA-603-C Temperature and Humidity During Testing, unless stated in the test.

The temperature during testing was within +20° C and +35° C.

The Relative humidity was between 45% and 75%.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Itron declares that the EUT tested was representative of a production unit.

EQUIPMENT UNDER TEST

EUT Module

Manuf:	Itron, Inc.
Model:	900 BCR Radio
Serial Number(s)	Listed Below
Power source	Belt clip charging cradle

Plot Information

In the zero span measurements, the line in the display is the trigger level.

Peripheral Devices

The EUT was tested with the following peripheral devices:

12VDC Power Supply

Manuf: CUI Inc.
Model: DSA-0421S-121
Serial: NA

Charging Cradle

Manuf: Itron Inc
Model: NA
Serial: NA

AC Adapter for PC

Manuf: Lite-On Technology Corporation
Model: LA90PSO-00
Serial: CN-ODF266-71615-65O-202C

Laptop PC

Manuf: Dell Inc
Model: PP18L
Serial: 21216189133

FCC 15.207

Power line Conducted Emissions

Measure the AC power line conducted emissions from 150kHz to 30 MHz using a 50uH/50 ohm line impedance stabilization network (LISN) according to the procedure specified in ANSI C63.4. Verify that no emissions exceed the following limits:

Frequency (MHz)	Quasi-Peak (dBuV)	Average (dBuV)
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Decreases with the logarithm of frequency

Equipment Used	Serial Number	Cal Date	Due
Agilent SA E4407B	MY45107856	3/09	3/11
Emco-3810/2 LISN	00026824	4/09	4/10
Agilent Transient limiter 11947A	3107A03963	3/09	3/10
Date	Tested by		
11/02/09	W. Raymond Stoner		

Unit tested: 67400139

1	2	3	4	5	6	7	8
Frequency		Peak	Transient		Corrected		
MHz	Polarity	Level	limiter	LISN	Value	Spec	Margin
0.962	Black	25.4	10	0	35.4	46	-10.6
2.319	White	25.4	10	0.1	35.5	46	-10.5
3.641	White	25.5	10	0.1	35.6	46	-10.4
3.901	Black	26.3	10	0.2	36.5	46	-9.5
4.011	White	25.2	10	0.2	35.4	46	-10.6
4.135	Black	25.7	10	0.2	35.9	46	-10.1
4.194	Black	25.2	10	0.2	35.4	46	-10.6
4.39	White	26.3	10	0.2	36.5	46	-9.5
4.454	Black	25.7	10	0.2	35.9	46	-10.1
4.59	Black	26	10	0.2	36.2	46	-9.8

3+4+5=6

6-7=8

FCC 101.113

EIRP of Fundamental Emissions

(a) On any authorized frequency, the average power delivered to an antenna in this service must be the minimum amount of power necessary to carry out the communications desired. Application of this principle includes, but is not to be limited to, requiring a licensee who replaces one or more of its antennas with larger antennas to reduce its antenna input power by an amount appropriate to compensate for the increased primary lobe gain of the replacement antenna(s). In no event shall the average equivalent isotropically radiated power (EIRP), as referenced to an isotropic radiator, exceed the values specified below. In cases of harmful interference, the Commission may, after notice and opportunity for hearing, order a change in the effective radiated power of this station. Further, the output power of a transmitter on any authorized frequency in this service may not exceed the following:

Frequency (MHz)	Fixed (dBW)	Mobile (dBW)
952-960	40	14

Equipment Used	Serial Number	Cal Date	Due
HP4407B	MY45107856	3/09	3/11
Date	Tested by		
11 November 2009	W. Raymond Stoner		

Unit tested: 67400139

Fill in the white spaces in the table below for each frequency measured:

Frequency (MHz)	Reading (dBm)	Attenuation (dB)	Power Level (dBm)	Rated Power	Deviation
952.5	23.3	0	23.3	23.5	-0.2
956.5	23.4	0	23.4	23.5	-0.1
960	23.5	0	23.5	23.5	0

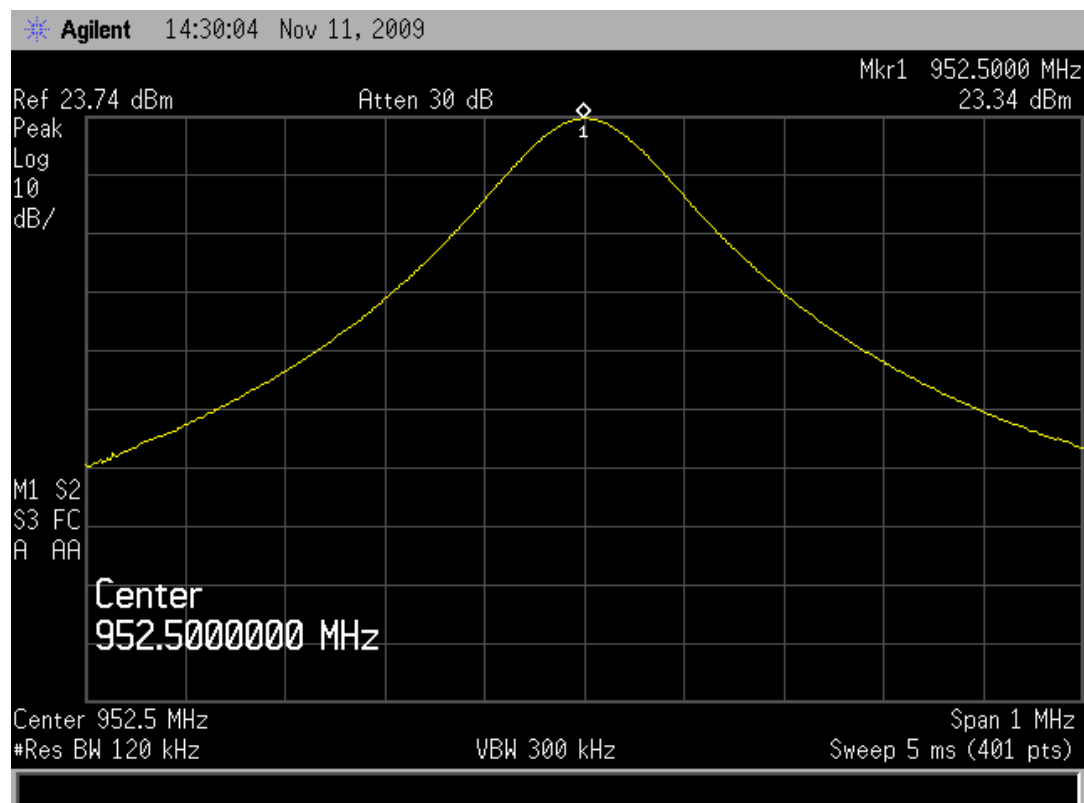
This device uses a third party OEM antenna with a gain of 2.0 dbi

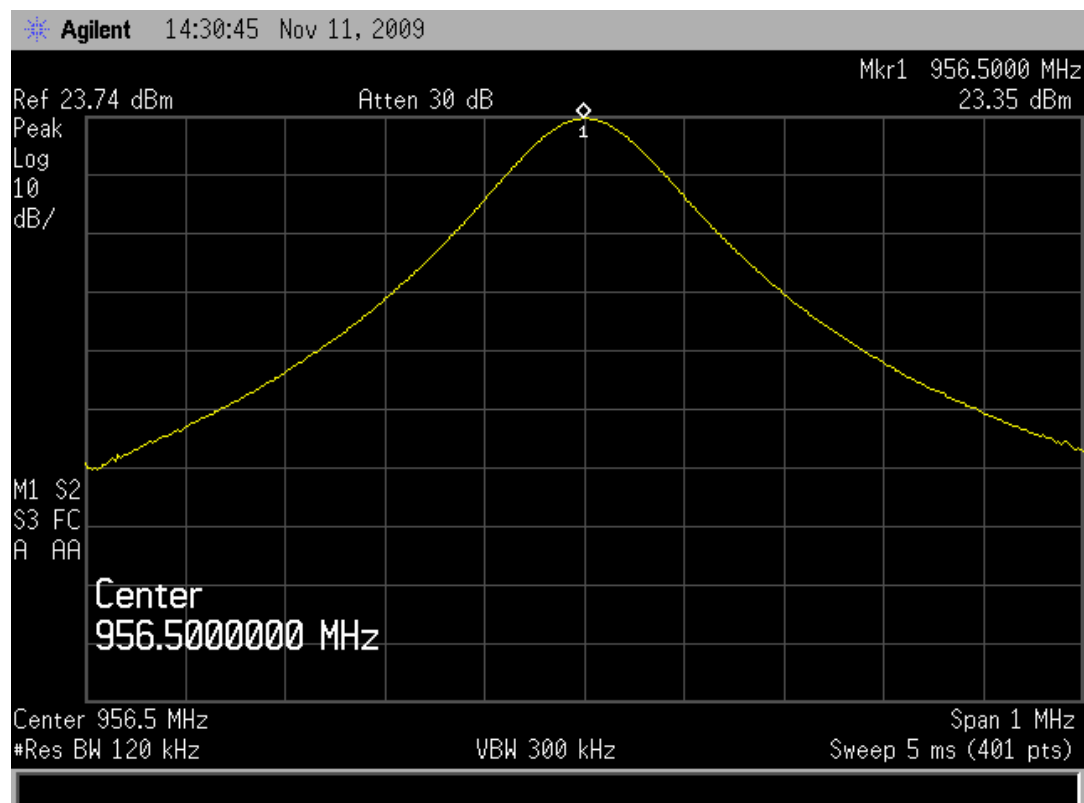
EIRP for this device is:

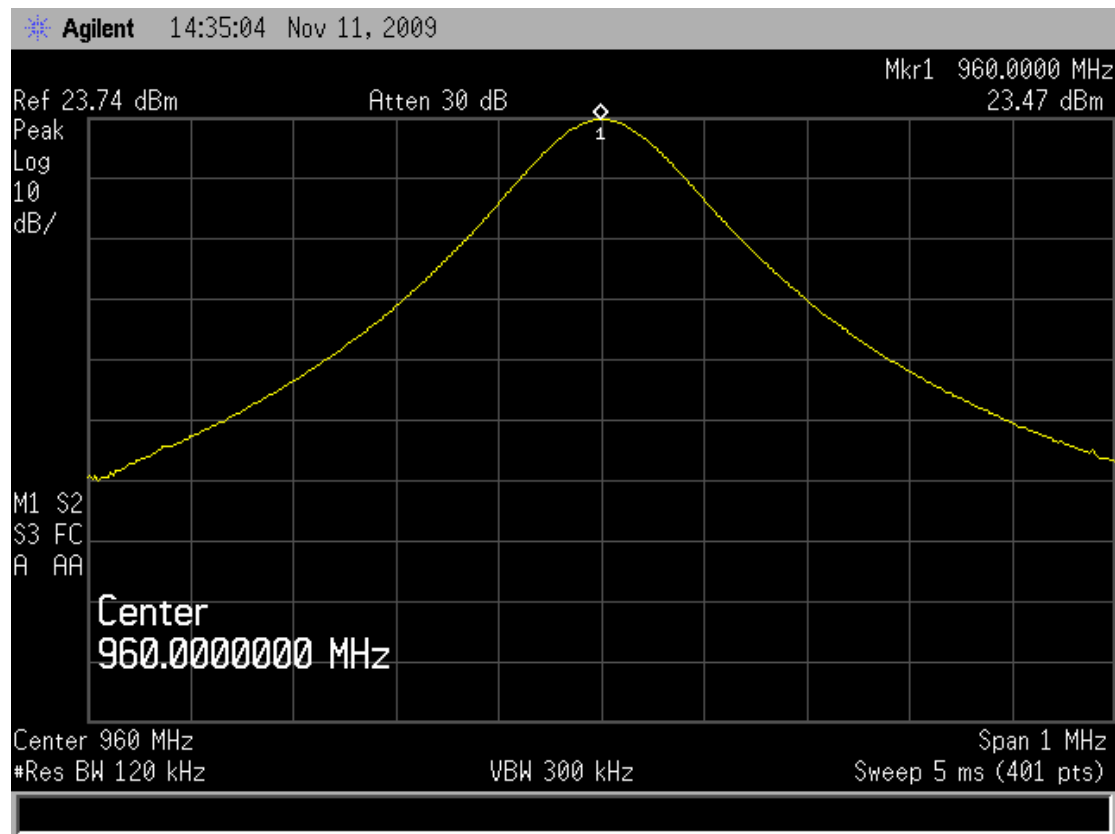
Antenna conducted power = 0.224W (23.5 dbm)

Antenna Gain = 2.0dbi

EIRP = 25.5 dbm (0.355W or -4.5 dBW)







FCC 101.109

Occupied Bandwidth

(c) The maximum bandwidth which will be authorized per frequency assigned is set out in the table that follows. Regardless of the maximum authorized bandwidth specified for each frequency band, the Commission reserves the right to issue a license for less than the maximum bandwidth if it appears that a lesser bandwidth would be sufficient to support an applicant's intended communications.

952 to 960 200 kHz^{1, 5, 6}
footnote 5 & 6 point to 101.147 (b)

5. A 12.5 kHz bandwidth applies only to frequencies listed in §101.147(b)(1 through 4).

6. For frequencies listed in §101.147(b)(1 through 4), consideration will be given on a case-by-case basis to authorizing bandwidths up to 50 kHz.

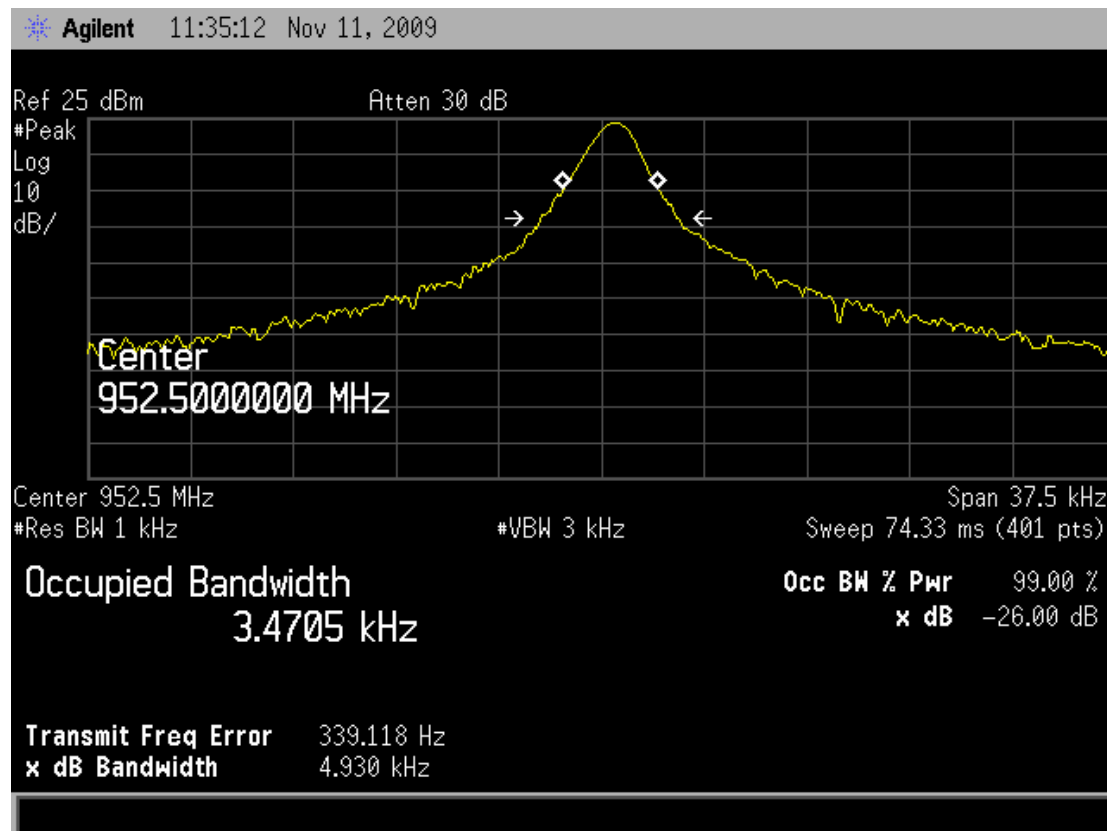
147 (b) The normal channel bandwidth assigned will be 12.5 kHz. EA licensees, however, may combine contiguous channels without limit or justification. Equipment that is used to create additional frequencies by narrowing bandwidth (whether authorized for a 12.5 kHz, 25 kHz or greater bandwidth) will be required to meet, at a minimum, the ± 0.00015 percent tolerance requirement so that all subfrequencies will be within the emission mask.

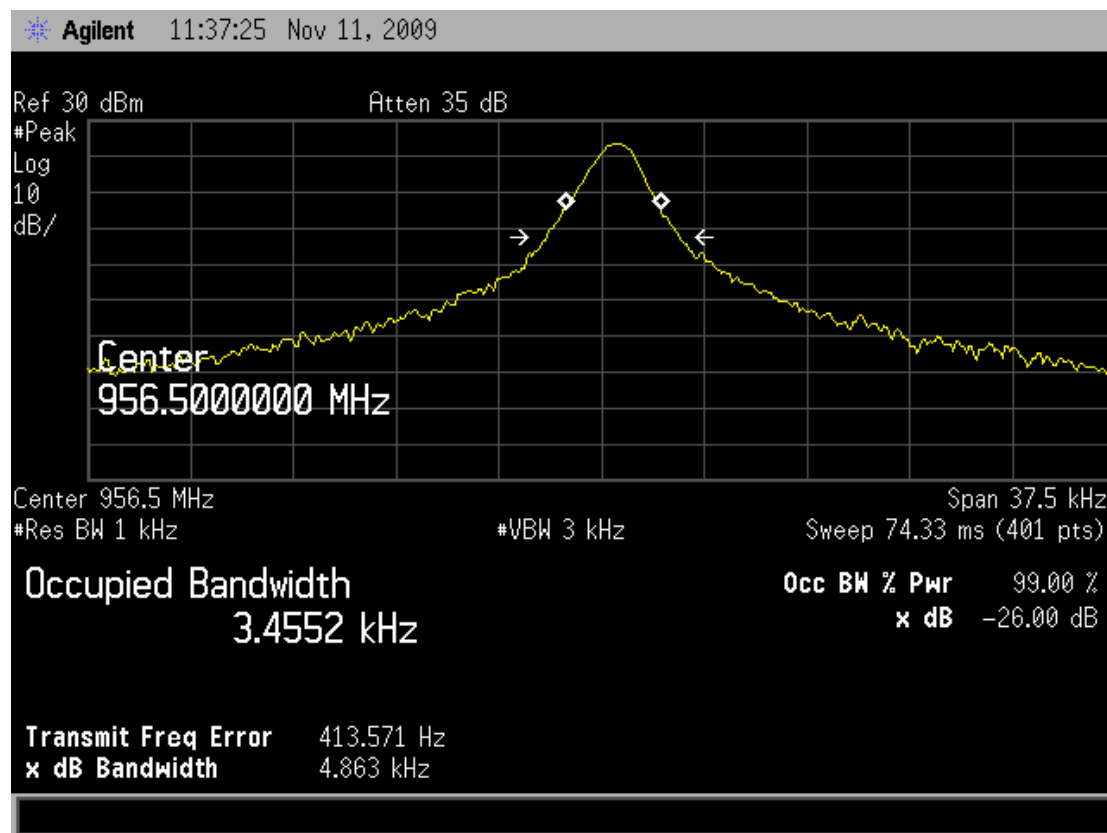
Equipment Used	Serial Number	Cal Date	Due
HP4407B	MY45107856	3/09	3/11
Date	Tested by		
11 November 2009	W. Raymond Stoner		

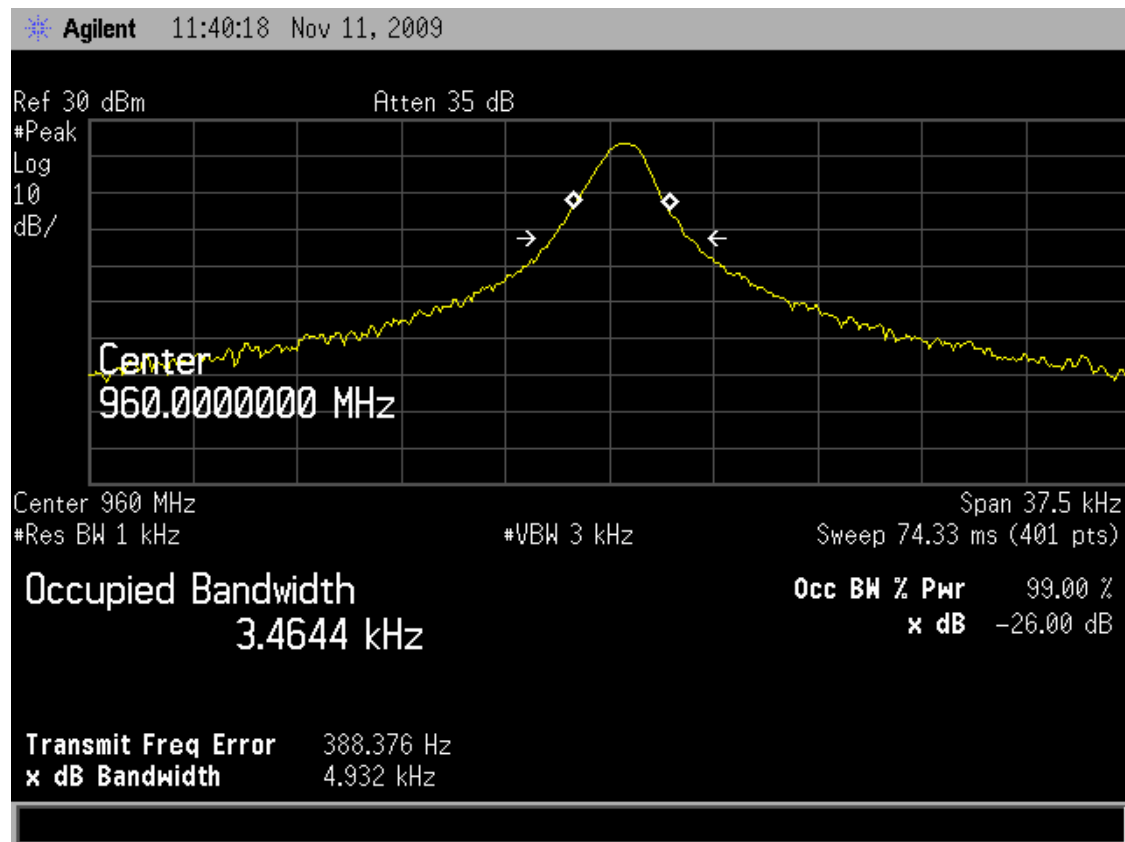
Measure the occupied bandwidth (99% bandwidth).

Unit tested: 67400139

Frequency, MHz	total BW, Hz
952.5	3470.5
956.5	3455.2
960	3464.4







FCC 101.111a(5)

Transmitter Mask (US)- conducted

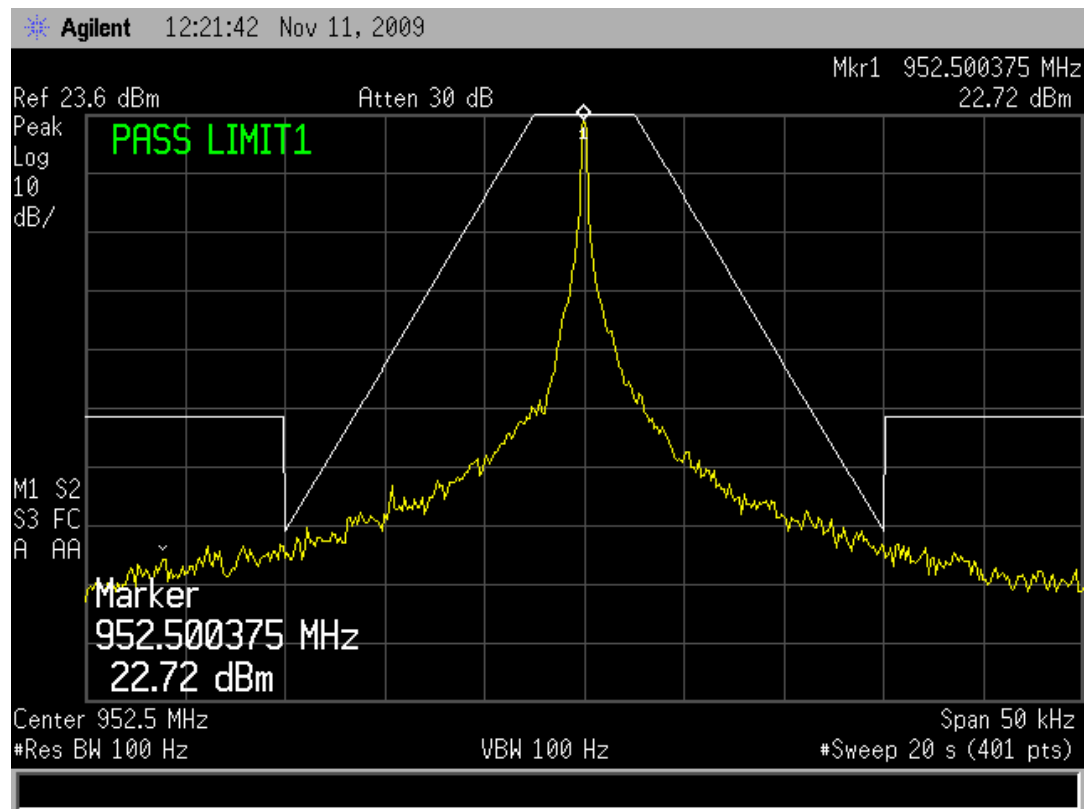
(5) When using transmissions employing digital modulation techniques on the 900 MHz multiple address frequencies with a 12.5 kHz bandwidth, the power of any emission must be attenuated below the un-modulated carrier power of the transmitter (P) in accordance with the following schedule:

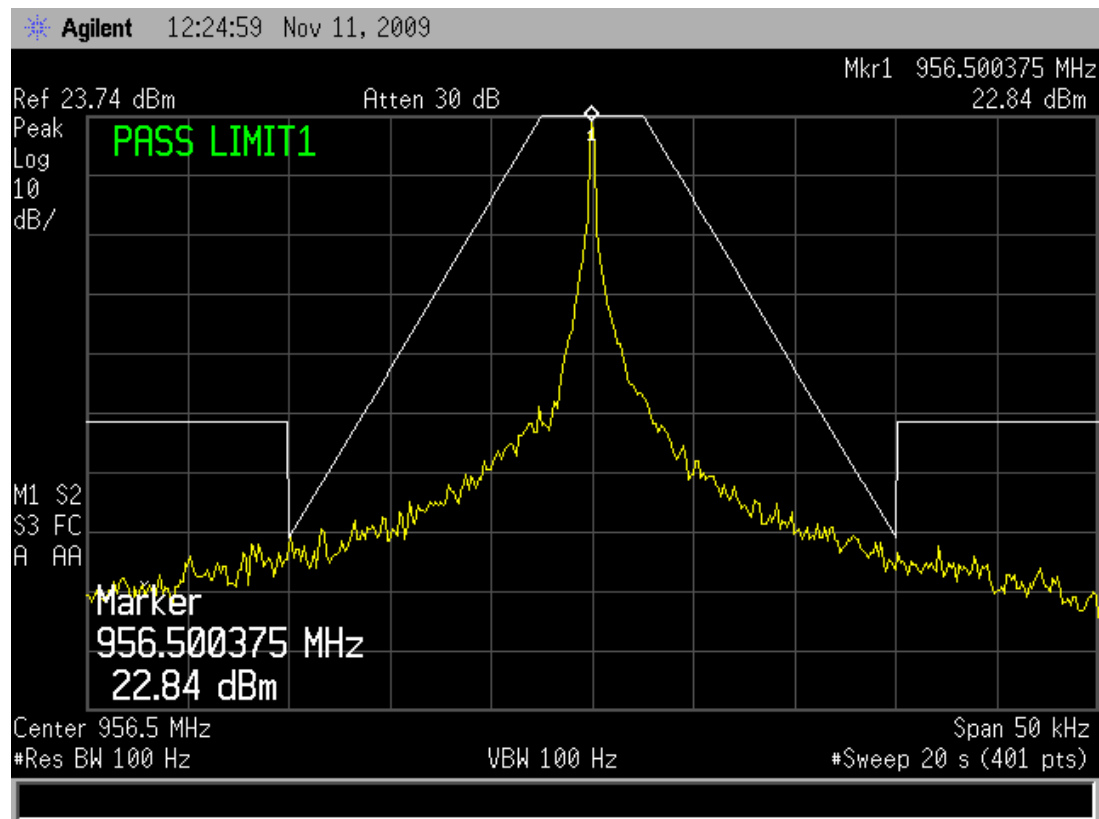
Minimum Displacement Frequency (kHz)	Maximum Displacement Frequency (kHz)	Attenuation below un-modulated carrier (dB)
2.5	6.25	$53 \cdot \log(f_d/2.5)$
6.25	9.5	$103 \cdot \log(f_d/3.9)$
9.5	15	$157 \cdot \log(f_d/5.3)$
15	>15	$50 + \log(P)$ or 70

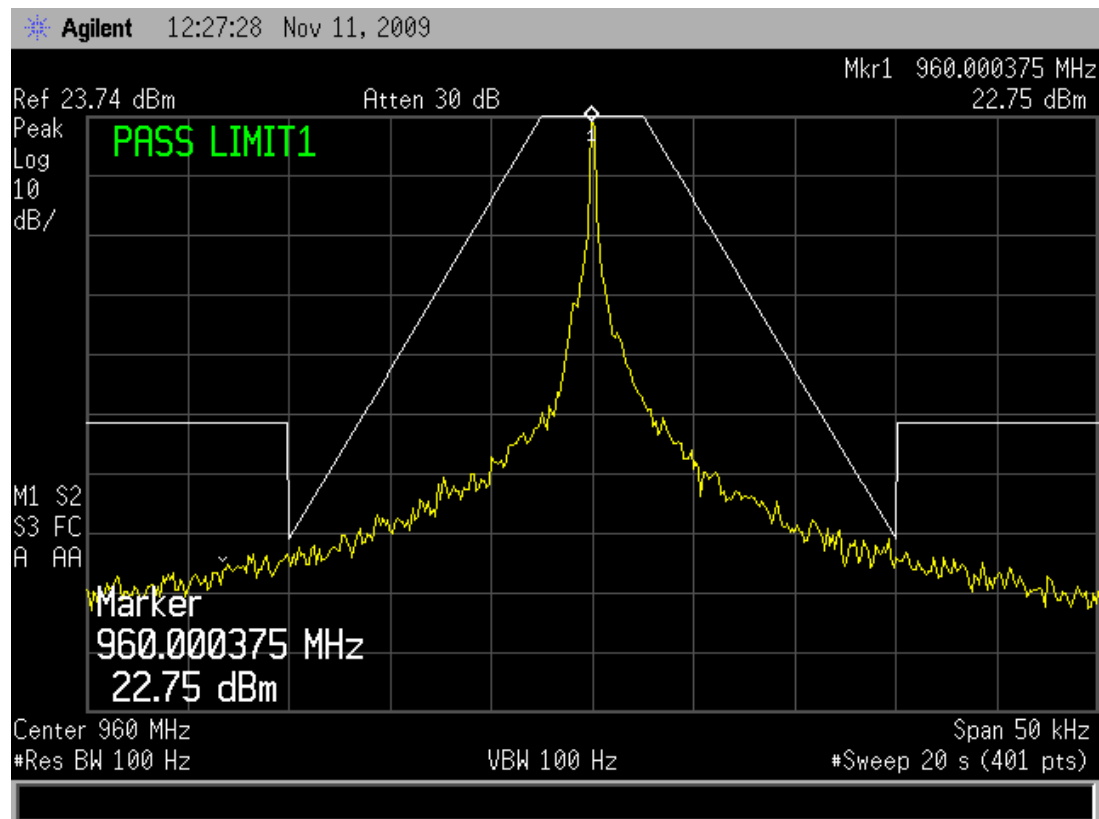
Equipment Used	Serial Number	Cal Date	Due
HP4407B	MY45107856	3/09	3/11
Date	Tested by		
11 November 2009	W. Raymond Stoner		

Measure the transmitter mask, referenced to an un-modulated carrier, according to the above schedule:

Unit tested: **67400139**







FCC 101.111(a)(5)(iv)

EIRP of Transmitter Spurious Emissions

Measure the EIRP of all transmitter spurious emissions that are >15kHz away from the center of the fundamental peak. The EIRP of these emissions may not exceed 50+10log(P) or 70dB below the EIRP which ever is lesser, of the fundamental (measured in test above). Use the antenna substitution procedure to perform these measurements (TIA-603-C section 2.2.12).

Which is lesser:

For 0.355watts == $50 + 10\log(0.355) = 45.5 \text{ dBW}$; this is less than 70, per the rule.
therefore: $W = -4.5\text{dBW} - 45.5\text{dBw} = \mathbf{-50\text{dBW} == -20\text{dBm}}$.

Equipment Used	Serial Number	Cal Date	Due
AH systems preamplifier model PAM 0126	135	12/07	12/08
H/S Sucoflex 40ft cable	220297001	12/07	12/09
Agilent E7405A Spectrum Analyzer	MY45113415	7/09	7/10
Emco 6502 Loop (9kHz to 30Mhz)	9509-2970	10/08	10/10
Emco 3110B Biconical (30MHz-to 300MHz)	9807-3129	10/09	10/11
Emco 3148 Log Periodic (200Mhz to 1GHz)	9901-1044	10/09	10/11
Emco 3115 wave guide (1GHz-18GHz)	9205-3878	3/08	3/10
Date	Tested by	Temp: 11.3 - 17.6C	Humidity: 40.7-52.8C
11/19/09/09	W. Raymond Stoner		

for the following table:

$5 = 3 - 4$; $8 = 5 + 6 + 7$ $10 = 8 - 9$

Note: These measurements were done with DUT's normal antenna, and not a non-radiating load.

1	2	3	4	5	6	7	8	9	10
Frequency (MHz)	Polarity	Analyzer Reading of Device Emissions (dBm)	Analyzer Reading of Generator Emissions (dBm)	Difference (add to ERP reading)	Substitution Antenna Gain (dBi)	Generator Output (dBm)	EIRP (dBm)	Spec Limit (dBm)	Margin (dB)
1904	Vertical	-43.37	-42.88	-0.49	8.6	-45.8	-37.69	-20	-17.69
1904	Horizontal	-42.21	-39.28	-2.93	8.6	-42.9	-37.23	-20	-17.23
1912	Vertical	-46.62	-46.89	0.27	8.6	-49.66	-40.79	-20	-20.79
1912	Horizontal	-41.59	-41.18	-0.41	8.6	-44.28	-36.09	-20	-16.09
1920	Vertical	-40.96	-39.59	-1.37	8.6	-42.61	-35.38	-20	-15.38
1920	Horizontal	-41.34	-39.02	-2.32	8.6	-43.1	-36.82	-20	-16.82
2856	Vertical	-31.14	-31.8	0.66	9.5	-34.56	-24.4	-20	-4.4
2856	Horizontal	-28.17	-29.69	1.52	9.5	-32.7	-21.68	-20	-1.68
2868	Vertical	-36.13	-36.24	0.11	9.5	-38.32	-28.71	-20	-8.71
2868	Horizontal	-29.56	-29.69	0.13	9.5	-32.4	-22.77	-20	-2.77
2880	Vertical	-30.66	-30.88	0.22	9.5	-32.85	-23.13	-20	-3.13
2880	Horizontal	-28.91	-28.4	-0.51	9.5	-30.76	-21.77	-20	-1.77
3808	Vertical	-54.87	-53.79	-1.08	9.2	-50.4	-42.28	-20	-22.28
3808	Horizontal	-54.58	-54.18	-0.4	9.2	-52.25	-43.45	-20	-23.45
3824	Vertical	-55.81	-55.37	-0.44	9.2	-51.58	-42.82	-20	-22.82
3824	Horizontal	-59.99	-58.51	-1.48	9.2	-57.7	-49.98	-20	-29.98
3840	Vertical	-55.42	-55.29	-0.13	9.2	-51.95	-42.88	-20	-22.88
3840	Horizontal	-61.44	-60.9	-0.54	9.2	-58.58	-49.92	-20	-29.92
4760	Vertical	-47.35	-47.07	-0.28	11	-44.25	-33.53	-20	-13.53
4760	Horizontal	-53.26	-54.41	1.15	11	-52.06	-39.91	-20	-19.91
4780	Vertical	-47.68	-47.28	-0.4	11	-44.47	-33.87	-20	-13.87
4780	Horizontal	-49.15	-49.75	0.6	11	-47.71	-36.11	-20	-16.11
4800	Vertical	-48.64	-48.17	-0.47	11	-45.72	-35.19	-20	-15.19
4800	Horizontal	-49.28	-50.07	0.79	11	-47.4	-35.61	-20	-15.61
5712	Vertical	-59.18	-59.19	0.01	11.4	-54.77	-43.36	-20	-23.36
5712	Horizontal	-60.23	-60.1	-0.13	11.4	-54.81	-43.54	-20	-23.54
5736	Vertical	-58.5	-58.85	0.35	11.4	-53.8	-42.05	-20	-22.05
5736	Horizontal	-58.34	-57.97	-0.37	11.4	-52.69	-41.66	-20	-21.66
5760	Vertical	-58.02	-58.91	0.89	11.4	-54.01	-41.72	-20	-21.72
5760	Horizontal	-58.98	-57.96	-1.02	11.4	-52.7	-42.32	-20	-22.32
6664	Vertical	-53.03	-52.55	-0.48	11.8	-42.18	-30.86	-20	-10.86
6664	Horizontal	-52.51	-52.57	0.06	11.8	-44.64	-32.78	-20	-12.78
6692	Vertical	-52.44	-52.4	-0.04	11.6	-44.41	-32.85	-20	-12.85
6692	Horizontal	-50.69	-51.36	0.67	11.6	-43.16	-30.89	-20	-10.89
6720	Vertical	-51.6	-51.21	-0.39	11.6	-44.66	-33.45	-20	-13.45
6720	Horizontal	-51.74	-52.49	0.75	11.6	-42.6	-30.25	-20	-10.25
7616	Vertical	-46.23	-46.91	0.68	11.5	-40.1	-27.92	-20	-7.92
7616	Horizontal	-46.7	-45.6	-1.1	11.5	-37.1	-26.7	-20	-6.7
7648	Vertical	-45.43	-44.68	-0.75	11.5	-37.52	-26.77	-20	-6.77
7648	Horizontal	-44.15	-45.56	1.41	11.5	-36.76	-23.85	-20	-3.85
7680	Vertical	-46.05	-45.97	-0.08	11.5	-38.54	-27.12	-20	-7.12
7680	Horizontal	-45.36	-45.62	0.26	11.5	-35.76	-24	-20	-4
8568	Vertical	-46.74	-47.11	0.37	11.6	-38.83	-26.86	-20	-6.86
8568	Horizontal	-44.39	-43.89	-0.5	11.6	-34.1	-23	-20	-3
8604	Vertical	-46.31	-47.16	0.85	11.6	-38.3	-25.85	-20	-5.85
8604	Horizontal	-45.89	-45.03	-0.86	11.6	-34.58	-23.84	-20	-3.84
8640	Vertical	-47.05	-47.64	0.59	11.6	-38.77	-26.58	-20	-6.58
8640	Horizontal	-44.85	-45.18	0.33	11.6	-34.85	-22.92	-20	-2.92

FCC 101.107

Frequency Stability

(a) The carrier frequency of each transmitter authorized in these services must be maintained within the following percentage of the reference frequency except as otherwise provided in paragraph (b) of this section or in the applicable subpart of this part (unless otherwise specified in the instrument of station authorization the reference frequency will be deemed to be the assigned frequency):

Frequency (MHz)	Tolerance (percentage)
952 to 960	0.0005

footnote 5: For private operational fixed point-to-point microwave systems, with a channel greater than or equal to 50 KHz bandwidth, $\pm 0.0005\%$; for multiple address master stations, regardless of bandwidth, $\pm 0.00015\%$; for multiple address remote stations with 12.5 KHz bandwidths, $\pm 0.00015\%$; for multiple address remote stations with channels greater than 12.5 KHz bandwidth, $\pm 0.0005\%$.

Equipment Used	Serial Number	Cal Date	Due
HP4407B	MY45107856	3/09	3/11
Date	Tested by		
23 November 2009	W. Raymond Stoner		

At the device's rated voltage level, measure the carrier frequency at every 10 degrees from -30°C to +50°C. At +20°C, measure the carrier frequency with the device powered at 85% and 115% of the device's rated voltage level. If the device is battery powered, then measurements should be made at the maximum and cutoff battery voltages.

The carrier frequency may not deviate from the reference level measured at +20°C and with the device powered at its rated voltage level by more than $\pm 0.00015\%$.

Fill in the white spaces in the following tables. For tables that do not apply, enter a "-":

Temperature (°C)	20	-30	-20	-10	0
Frequency (MHz)	956.000775	956.000725	956.000425	956.000900	956.000800
Deviation (%)	0.00000%	-0.00001%	-0.00004%	0.00001%	0.00000%

Temperature (°C)	20	10	30	40	50
Frequency (MHz)	956.000775	956.000850	956.000600	956.000550	955.999925
Deviation (%)	0.00000%	0.00001%	-0.00002%	-0.00002%	-0.00009%

Battery Voltage	Peak 4.2V	Cutoff 3.4V
Frequency (Hz)	956.001000	956.001875
Deviation (%)	0.00000%	0.00009%

1.1310 & 2.1093(portable) & KDB447498*RF Safety Evaluation*

This device is considered a body worn portable device, MPE does not apply.. A SAR evaluation was performed, and shows this transmitter is below limits, refer to SAR report for this device, included with this filing.

This transmitter can only transmit simultaneously with the BlueTooth module, all other transmitters are disabled. Refer to the SAR report that shows these levels are below limits.