



PCTEST ENGINEERING LABORATORY, INC.

6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6554
<http://www.pctestlab.com>



CERTIFICATE OF COMPLIANCE FCC Part 74 Certification

Applicant Name:
SONY Corporation
6-7-35 Kitashinagawa, Shinagawa-ku
Tokyo, 141-0001
JAPAN

Date of Testing:
November 16, 2006
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0611030977

FCC ID:	AK8WRT8P2
APPLICANT:	SONY CORPORATION

Application Type:	Certification
FCC Classification:	Licensed Broadcast Transmitter Held to Face (TBF)
FCC Rule Part(s):	§ 2 & § 74 Subpart H – Low Power Auxiliary Stations
EUT Type:	UHF Synthesized Transmitter – Wireless Microphone System
Model(s):	SONY WRT-8P (42)
TX Frequency Range:	638.125 – 661.875 MHz
Frequency Tolerance	±0.005 %
RF Power Output:	250 mW / 50 mW (selectable)
Frequency Response	50 to 18,000 Hz
Emission Designator(s):	116KF3E
Test Device Serial No.:	S/N: 8004

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in Part 74 and Part 2 of the FCC Rules.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Grant Conditions: (M4) Operation of this unit is limited to use at stations licensed for use under Part 74 of FCC Rules.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.


Randy Ortanez
President



PCTEST® Part 74(H) Certification	 FCC MEASUREMENT REPORT 			Reviewed by:
				Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 1 of 29



TABLE OF CONTENTS

1.0	SCOPE	4
1.1	GENERAL INFORMATION.....	4
2.0	INTRODUCTION	5
2.1	TESTING FACILITY	5
2.2	ACCREDITATIONS.....	5
3.0	PRODUCT (EUT) SPECIFICATIONS.....	6
4.0	SUMMARY OF TEST RESULTS	7
5.0	TEST CONFIGURATION.....	8
5.1	TEST CONFIGURATION	8
5.2	OPERATING CONDITION OF EUT	8
5.3	GENERATING AND OPERATING FREQUENCY	8
5.4	EMI SUPPRESSION DEVICE(S)	8
6.0	RF OUTPUT POWER MEASUREMENT	9
6.1	APPLICABLE STANDARDS – §74.861(E)(1)(II) & §2.1046	9
6.2	TEST PROCEDURE	9
6.3	TEST DATA.....	9
6.4	RF OUTPUT POWER MEASUREMENT PLOTS	10
	SEE ATTACHED.	10
7.0	MODULATION CHARACTERISTICS	11
7.1	APPLICABLE STANDARDS – §74.861(E)(3) & §2.1047(A)	11
7.2	TEST PROCEDURE	11
7.3	TEST DATA.....	11
7.4	MODULATION CHARACTERISTICS PLOTS	12
	SEE ATTACHED GRAPHS:	12
7.4.A	AUDIO FREQUENCY RESPONSE	12
7.4.B	MODULATION LIMITING	12
8.0	OCCUPIED BANDWIDTH EMISSION LIMITS	13
8.1	APPLICABLE STANDARDS – §74.861(E)(5), §74.861(E)(6) & §2.1049(C)(1)	13
8.2	TEST PROCEDURE	13
8.3	TEST DATA.....	13
8.4	EMISSION MASK (OCCUPIED BANDWIDTH) PLOTS.....	14
	SEE ATTACHED.	14
9.0	FIELD STRENGTH OF RADIATED SPURIOUS EMISSION.....	15
9.1	APPLICABLE STANDARDS – §74.861(E)(6) & §2.1053.....	15
9.2	TEST PROCEDURE	15
9.3	TEST DATA.....	15
9.3	TEST DATA (CONTINUED)	16
9.3.A	EFFECTIVE RADIATED POWER (ERP) - HIGH POWER	16
9.3	TEST DATA (CONTINUED)	17
9.3.C	FIELD STRENGTH OF SPURIOUS RADIATION: PEAK POWER (LOW CHANNEL).....	17
9.3	TEST DATA (CONTINUED)	18
9.3.D	FIELD STRENGTH OF SPURIOUS RADIATION: PEAK POWER (MID CHANNEL)	18

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT		SONY	Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 2 of 29	



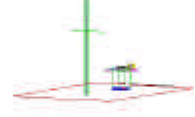
9.3	TEST DATA (CONTINUED)	19
9.3.E	FIELD STRENGTH OF SPURIOUS RADIATION: PEAK POWER (HIGH CHANNEL)	19
10.0	SPURIOUS EMISSION AT ANTENNA PORT	20
10.1	APPLICABLE STANDARDS – §74.861(E)(6) & §2.1051	20
10.2	TEST PROCEDURE	20
10.3	TEST DATA	20
10.4	CONDUCTED SPURIOUS EMISSION PLOTS	21
11.0	FREQUENCY STABILITY	22
11.1	APPLICABLE STANDARDS – §74.861(E)(4) & §2.1055	22
11.2	TEST PROCEDURE	22
11.3	FREQUENCY STABILITY TEST DATA	23
11.4	FREQUENCY STABILITY GRAPH	24
12.0	RADIATED EMISSIONS	25
12.1	APPLICABLE STANDARDS – §15.109	25
12.2	TEST PROCEDURE	25
12.3	RADIATED EMISSIONS TEST DATA	26
13.0	TEST EQUIPMENT	27
14.0	SAMPLE CALCULATIONS	28
12.3	EMISSION DESIGNATOR	28
15.0	CONCLUSION	29

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT		SONY	Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 3 of 29	

1.0 SCOPE



Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and Industry Canada.



1.1 General Information

The following information about the applicant and the product to be certified are required in accordance with §2.1033 of FCC Rules & §5.10 of ISO/IEC 17025 International Standard.

Applicant Name:	SONY Corporation
Address:	6-7-35 Kitashinagawa, Shinagawa-ku Tokyo, 141-0001 JAPAN

- FCC ID: AK8WRT8P2
- Trade Name: SONY
- Model Name/No.: WRT-8P (42)
- FCC Classification(s): Licensed Broadcast Tx Held to Face (TBF)
- Equipment (EUT) Type: UHF Synthesized Transmitter – Wireless Microphone System
- Tx Frequency Range: 638.125 – 661.875 MHz
- Frequency Tolerance: $\pm 0.005\%$
- Max. RF Output Power: 0.250 W ERP
- Emission Designators: 116KF3E
- Bandwidth: 110 kHz
- FCC Rule Part(s): § 2 & § 74 Subpart H – Low Power Auxiliary Stations
- Quantity: Quantity production is planned
- Dates of Tests: November 10, 2006
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: 0611030977
- Deviation from measurement procedure – None

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 4 of 29	

2.0 INTRODUCTION

2.1 Testing Facility



Figure 1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.

These measurement tests were conducted at PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on January 27, 2006 and Industry Canada.

2.2 Accreditations

Measurements were performed at PCTEST Engineering Lab in Columbia, MD 21045, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC 2451).
- PCTEST Lab is accredited by the U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) in EMC, Telecommunications, and FCC for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations, NIST Handbook 150 and International Standard ISO/IEC 17025. (NVLAP Lab code: 100431-0)
- PCTEST Lab is accredited by the American Association for Laboratory Accreditation (A2LA) for meeting ISO/IEC 17025 requirements and for technical competence in the field of Electrical Testing. A2LA accreditation is granted to perform Wireless tests on CDMA & AMPS handsets, OTA, Telecommunications, HAC and SAR (FCC & IC).
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules.
- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.

PCTEST® Part 74(H) Certification		FCC MEASUREMENT REPORT		Reviewed by: Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 5 of 29



3.0 PRODUCT (EUT) SPECIFICATIONS

The Equipment Under Test (EUT) is the **SONY** Model WRT-8P (42) UHF Synthesized Transmitter – Wireless Microphone System (**FCC ID: AK8WRT8P2**).

The EUT is for FCC Certification classified as a Licensed Broadcast Transmitter Held to Face (TBF) operating under Part 74H as Low Power Auxiliary Station.

- Tx Frequency Range: 638.125 – 661.875 MHz
- Max. RF Output Power: 0.250 W ERP
- Max. Power Rating: 250mW / 50mW (selectable)
- Power Input: 9V DC Alkaline Battery
- Frequency Tolerance: ± 0.005 %
- Emission Designators: 116KF3E
- Bandwidth: 110 kHz
- EUT Serial No.: #8004

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 6 of 29	

4.0 SUMMARY OF TEST RESULTS

<u>Chapter</u>	<u>FCC Rule(s)</u>	<u>Description of Test</u>	<u>Results / Notes</u>
6.0	§§ 2.1046 & 74.861(e)(1)(ii)	RF Output Power Measurement	Compliant
7.0	§§ 2.1047 & 74.861(e)(3)	Modulation Characteristics:	
7.4.a	§ 2.1047(a)	Audio Frequency Response	Compliant
7.4.b	§ 2.1047(b)	Modulation Limiting	Compliant
8.0	§§§ 2.1049, 74.861(e)(5) & 74.861(e)(6)	Occupied Bandwidth Emission Limits	Compliant
9.0	§§ 2.1053 & 74.861(e)(6)	Field Strength of Spurious Radiation	Compliant
10.0	§§ 2.1051 & 74.861(e)(6)	Spurious Emission at Antenna Port	Compliant
11.0	§§ 2.1055 & 74.861(e)(4)	Frequency Stability	Compliant
-	§§ 2.1093 & 1.1307(b)(1)	RF Exposure Requirement	(see SAR Test Report)
-	§ 15.107 / § 15.207	AC Line Conducted Emission	Not Applicable
12.0	§ 15.109	Radiated Emission	Compliant

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT	SONY	Reviewed by: Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 7 of 29



5.0 TEST CONFIGURATION

5.1 Test Configuration

The equipment under test (EUT) & support equipment consists of:

- | | | | |
|----|-----------------------------|------------------|-----------|
| 1. | UHF Synthesized Transmitter | SONY WRT-8P (42) | S/N: 8004 |
| 2. | Microphone | SONY F-112 | S/N: none |

5.2 Operating Condition of EUT

Power supply voltage comes from 9VDC (Alkaline Battery).

The EUT is in Transmit mode while undergoing tests.

5.3 Generating and Operating Frequency

TX Operating Frequencies:

- ☐ 638.125MHz
- ☐ 650.125MHz
- ☐ 661.875MHz

5.4 EMI Suppression Device(s)

EMI suppression device(s) added and/or modification(s) made during testing:

- ☐ None

PCTEST [®] Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 8 of 29	



6.0 RF OUTPUT POWER MEASUREMENT

6.1 Applicable Standards – §74.861(e)(1)(ii) & §2.1046

According to §74.861(e)(1)(ii) of the FCC Rules, for low power auxiliary station operating in the 614-806MHz band, the power of the measured unmodulated carrier power and the output of the transmitter power amplifier (antenna input power) may not exceed 250mW.

6.2 Test Procedure

The maximum peak output power was measured with a spectrum analyzer connected to the antenna terminal (conducted measurement) while EUT was operating in normal situation. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz. The radiated power output and the field strength of the transmitter harmonic and spurious radiation measurements were made outdoors at a 3-meter test range away from the transmitter, as the equipment under test (EUT), placed on a wooden turntable 3-meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

6.3 Test Data

Environmental Conditions

Temperature: 23.1 °C (15-35°C)
Relative Humidity: 56 % (10-75%)
Atmospheric Pressure: 93 kPa (86-106kPa)

Test Results

Channel	Spec Freq (MHz)	Peak Output Power (dBm)		Limit (dBm)	Result
		ERP	Conducted		
Low	638.125	23.4	22.34	24	pass
Mid	650.125	24.0	22.34	24	pass
High	661.875	23.5	22.39	24	pass

PCTEST® Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 9 of 29	



6.4 RF Output Power Measurement Plots

See attached.

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT		SONY	Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 10 of 29	

7.0 MODULATION CHARACTERISTICS

7.1 Applicable Standards – §74.861(e)(3) & §2.1047(a)

According to §2.1047(a) of the FCC Rules, for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100Hz to 5000Hz shall be measured. For equipment required to have an audio low-pass filter, the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be measured.

According to §74.861(e)(3) of the FCC Rules, any form of modulation may be used. A maximum deviation of ± 75 kHz is permitted when frequency modulation is employed.

7.2 Test Procedure

The audio signal generator was connected to the input circuit of the EUT through a matching network. The audio signal input was adjusted to obtain 50% modulation at the maximum audio frequency response of the transmitter, and this point was taken as the 0db reference level. The frequency of the input signal was changed from 100Hz to 20kHz and the input level to obtain 50% modulation was plotted. The modulation response was measured up to a maximum modulation for each of three tones: 100Hz, 2500Hz and 15kHz. The audio input level was changed to 10% modulation up to a maximum rated modulation.

7.2.a Audio Frequency Response

- 1) Position the EUT to connect to Modulation Analyzer and Audio Generator.
- 2) Adjust the audio input frequency from 300Hz to 20KHz in sequence and keep the input level constant according to TIA/EIA Standard 603-C

7.2.b Modulation Limit

- 1) Position the EUT to connect to Modulation Analyzer and Audio Generator.
- 2) Adjust the audio input frequency to 100 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.
- 3) Repeat step 1 with changing the input frequency for 300, 1000, 2500 and 3000 Hz in sequence.

7.3 Test Data

Environmental Conditions

Temperature: 23.1 °C (15-35°C)
 Relative Humidity: 56 % (10-75%)
 Atmospheric Pressure: 93 kPa (86-106kPa)

PCTEST® Part 74(H) Certification		FCC MEASUREMENT REPORT SONY		Reviewed by:
				Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 11 of 29



7.4 Modulation Characteristics Plots

See attached graphs:

7.4.a Audio Frequency Response

7.4.b Modulation Limiting

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 12 of 29	

8.0 OCCUPIED BANDWIDTH EMISSION LIMITS

8.1 Applicable Standards – §74.861(e)(5), §74.861(e)(6) & §2.1049(c)(1)

With radiotelephone transmitters, according to §2.1049(c)(1) of the FCC Rules, “other than single sideband or independent sideband transmitter– when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.”

According to §74.861(e)(5) & §74.861(e)(6) of the FCC Rules,

(1) the operating bandwidth shall not exceed 200 kHz

(2)(i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;

(ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;

(iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\log_{10}$ (mean output power in watts) dB.

8.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Install new batteries in the EUT. Turn on the EUT and set it to any one convenient frequency within its operating range.

8.3 Test Data

Environmental Conditions

Temperature: 23.1 °C (15-35°C)
 Relative Humidity: 56 % (10-75%)
 Atmospheric Pressure: 93 kPa (86-106kPa)

Test Results

Channel	Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Result
Low	638.125	75.0	200	pass
Mid	650.125	75.7	200	pass
High	661.875	76.3	200	pass

Emission Designator:

Calculated Emission: $2M + 2D = (2 \times 18\text{kHz}) + (2 \times 40\text{kHz}) = 116\text{KF3E}$

PCTEST® Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 13 of 29	



8.4 Emission Mask (Occupied Bandwidth) Plots

See attached.

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT		SONY	Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 14 of 29	

9.0 FIELD STRENGTH OF RADIATED SPURIOUS EMISSION

9.1 Applicable Standards – §74.861(e)(6) & §2.1053

According to §2.1053 of the FCC Rules, measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediated circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a half wave dipole antenna.

According to §74.861(e)(6) of the FCC Rules, the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

1. On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.
2. On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.
3. On any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the un-modulated carrier by at least 43 plus 10 Log (output power in watts) dB.

9.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

9.3 Test Data

Environmental Conditions

Temperature: 23.1 °C (15-35°C)
 Relative Humidity: 56 % (10-75%)
 Atmospheric Pressure: 93 kPa (86-106kPa)

Spurious Emissions

Spurious emissions in dB = 10 Log (TXpwr in Watts/0.001) – the absolute level

Spurious Attenuation Limit

Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts)

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT		Reviewed by: Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 15 of 29



9.3 Test Data (continued)

9.3.A Effective Radiated Power (ERP) - HIGH Power

FREQ. (MHz)	REF. LEVEL (dBm)	POL (H/V)	ERP (dBm)	ERP (W)	Battery
638.125	-15.000	H	23.443	0.221	Standard
650.125	-14.650	H	23.973	0.250	Standard
661.875	-15.400	H	23.453	0.222	Standard

PCTEST [®] Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 16 of 29	



9.3 Test Data (continued)

9.3.C Field Strength of Spurious Radiation: Peak Power (Low Channel)

OPERATING FREQUENCY: 638.1250
 CHANNEL: (Low)
 MEASURED OUTPUT POWER: 23.973 dBm = W
 MODULATION SIGNAL: FM (Internal)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10} (W) =$ 36.98

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	(dBc)
1276.25	-36.53	8.70	-27.83	51.8
1914.38	-47.23	9.70	-37.53	61.5
2552.50	-49.43	9.90	-39.53	63.5
3190.63	-50.43	11.40	-39.03	63.0
3828.75	-59.23	12.10	-47.13	71.1

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 17 of 29	



9.3 Test Data (continued)

9.3.D Field Strength of Spurious Radiation: Peak Power (Mid Channel)

OPERATING FREQUENCY: 650.1250 MHz
CHANNEL: (Mid)
MEASURED OUTPUT POWER: 23.973 dBm = 0.250 W
MODULATION SIGNAL: FM (Internal)
DISTANCE: 3 meters
LIMIT: $43 + 10 \log_{10} (W) =$ 36.98 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
1300.25	-37.23	8.70	-28.53	H	52.5
1950.38	-48.03	9.70	-38.33	H	62.3
2600.50	-41.13	9.90	-31.23	H	55.2
3250.63	-48.23	11.40	-36.83	H	60.8
3900.75	-50.53	12.10	-38.43	H	62.4

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 18 of 29	



9.3 Test Data (continued)

9.3.E Field Strength of Spurious Radiation: Peak Power (High Channel)

OPERATING FREQUENCY: 661.8750 MHz
 CHANNEL: (High)
 MEASURED OUTPUT POWER: 23.973 dBm = 0.250 W
 MODULATION SIGNAL: FM (Internal)
 DISTANCE: 3 meters
 LIMIT: $43 + 10 \log_{10}(W) =$ 36.98 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
1323.75	-36.93	8.70	-28.23	H	52.2
1985.63	-47.33	9.70	-37.63	H	61.6
2647.50	-32.33	9.90	-22.43	H	46.4
3309.38	-39.43	11.40	-28.03	H	52.0
3971.25	-45.93	12.10	-33.83	H	57.8

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 19 of 29	



10.0 SPURIOUS EMISSION AT ANTENNA PORT

10.1 Applicable Standards – §74.861(e)(6) & §2.1051

According to §2.1051 of the FCC Rules, the radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions, which are attenuated more than 20 dB below the permissible value, need not be specified

According to §74.861(e)(6) of the FCC Rules, the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

1. On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.
2. On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.
3. On any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the unmodulated carrier by at least 43 plus 10 Log (output power in watts) dB.

10.2 Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete

10.3 Test Data

Environmental Conditions

Temperature: 23.1 °C (15-35°C)
Relative Humidity: 56 % (10-75%)
Atmospheric Pressure: 93 kPa (86-106kPa)

PCTEST® Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 20 of 29	



10.4 Conducted Spurious Emission Plots

See attached.

PCTEST [®] Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 21 of 29	

11.0 FREQUENCY STABILITY

11.1 Applicable Standards – §74.861(e)(4) & §2.1055

According to §2.1055(a)(1) of the FCC Rules, the frequency stability shall be measure with variation of ambient temperature from –30°C to +50°C, and according to FCC 2.1055(d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to §74.861(e)(4) of the FCC Rules, the frequency tolerance of the transmitter shall be 0.005 percent.

11.2 Test Procedure

The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +60°C using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.005 (±50 ppm) of the center frequency.

Time Period and Procedure:

1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (22°C to 25°C to provide a reference).
2. The equipment is subjected to an overnight “soak” at -30°C without any power applied.
3. After the overnight “soak” at -30°C (usually 14-16 hours), the equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter and the individual oscillators is made within a three minute interval after applying power to the transmitter.
4. Frequency measurements are made at 10°C interval up to room temperature. At least a period of one and one half-hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency measurements are at 10 intervals starting at -30°C up to +50°C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after re-applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

NOTE: The EUT is tested down to the battery endpoint.

PCTEST® Part 74(H) Certification		FCC MEASUREMENT REPORT		Reviewed by: Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 22 of 29



11.3 Frequency Stability Test Data

Environmental Conditions

Temperature: 23.1 °C (15-35°C)
 Relative Humidity: 56 % (10-75%)
 Atmospheric Pressure: 93 kPa (86-106kPa)

OPERATING FREQUENCY: 650,125,009.000 Hz

CHANNEL: Mid

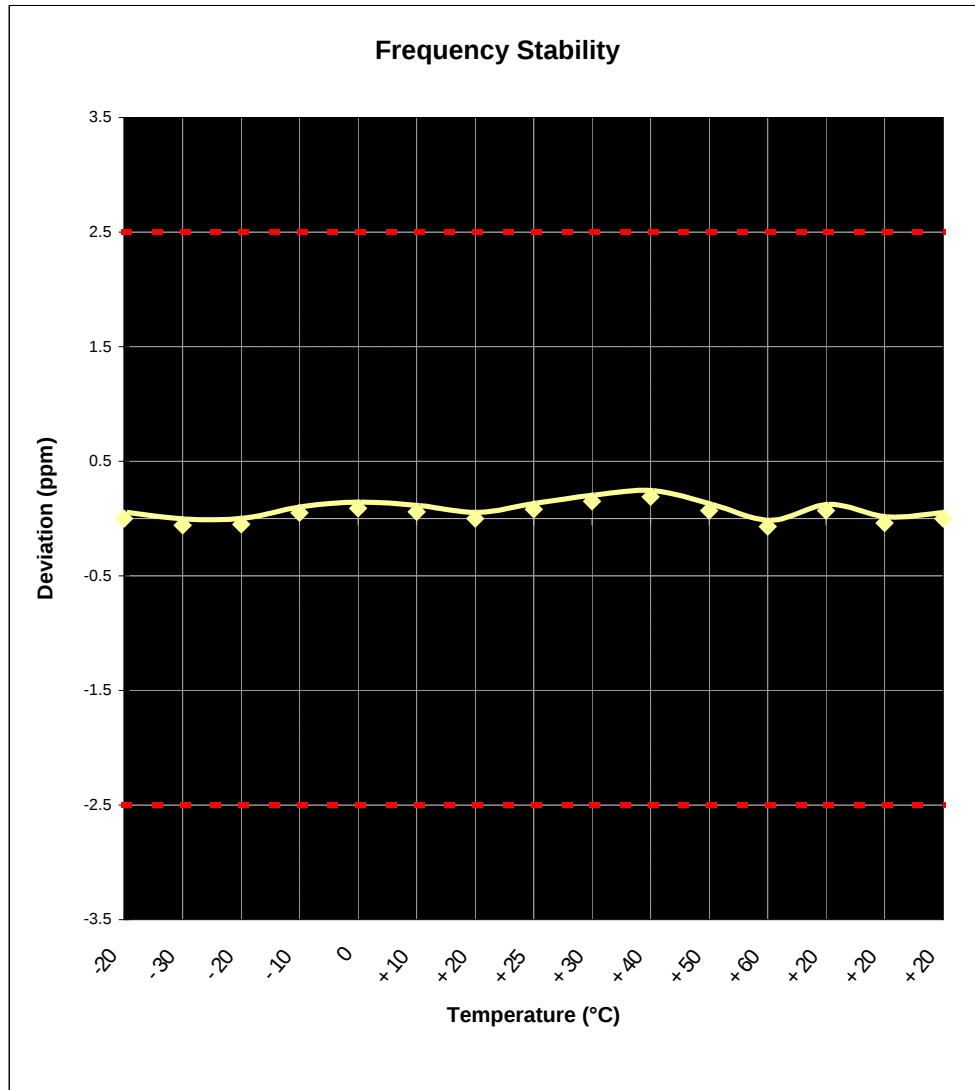
REFERENCE VOLTAGE: 9 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ. (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	9.00	+ 20 (Ref)	650,125,009	0.00	0.000000
100 %		- 30	650,125,048	-39.01	-0.000006
100 %		- 20	650,125,042	-32.51	-0.000005
100 %		- 10	650,124,976	32.51	0.000005
100 %		0	650,124,950	58.51	0.000009
100 %		+ 10	650,124,970	39.01	0.000006
100 %		+ 20	650,125,009	0.00	0.000000
100 %		+ 25	650,124,957	52.01	0.000008
100 %		+ 30	650,124,911	97.52	0.000015
100 %		+ 40	650,124,885	123.52	0.000019
100 %		+ 50	650,124,963	45.51	0.000007
100 %		+ 60	650,125,055	-45.51	-0.000007
85 %	7.65	+ 20	650,124,963	45.51	0.000007
UPPER VOLTAGE LIMIT	9.99	+ 20	650,125,035	-26.01	-0.000004
BATT. ENDPOINT	7.50	+ 20	650,125,009	0.00	0.000000

PCTEST® Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 23 of 29	

11.4 Frequency Stability Graph



PCTEST [®] Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 24 of 29	



12.0 RADIATED EMISSIONS

12.1 Applicable Standards – §15.109

According to §15.109 of the FCC Rules, the spurious emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

12.2 Test Procedure

Final radiated measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antenna. The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2 meter area adjacent to the measurement area. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to quasi-peak mode and the bandwidth of the receiver was set to 100kHz or 1 MHz depending on the frequency or type of signal. Above 1GHz the detector function was set to average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1x1.5 meter table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Each EME reported was calibrated using the HP8640B signal generator.

Above 1 GHz, linearly polarized double ridge horn antennas were used.

PCTEST [®] Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 25 of 29	



12.3 Radiated Emissions Test Data

Environmental Conditions

Temperature: 23.1 °C (15-35°C)
 Relative Humidity: 56 % (10-75%)
 Atmospheric Pressure: 93 kPa (86-106kPa)

FREQ (MHz)	Level (dBm)	AFCL (dB)	POL (H/V)	Height (m)	Azimuth (° angle)	F/S (uV/M)	Margin (dB)
66.5	-90.31	5.81	H	3.3	20	13.39	-17.5
96.1	-91.11	9.21	H	2.6	90	18.04	-18.4
86.5	-93.51	8.22	V	2.7	210	12.21	-18.3
531.1	-101.93	26.74	H	1.4	150	38.95	-14.2
675.9	-106.87	29.48	V	1.3	120	30.25	-16.4
688.2	-104.79	29.69	H	1.1	200	39.41	-14.1

PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N:	Test Dates:	EUT Type: (TBF)	FCC ID: AK8WRT8P2	Page 26 of 29	
0611030977	November 10, 2006	UHF Synthesized TX — Wireless Microphone System			



13.0 TEST EQUIPMENT

TYPE	MODEL	CAL DUE DATE	S/N
Signal Generator*	Rohde & Schwarz (0.1-1000MHz)	9/11/2007	894215/012
Ailtech/Eaton Receiver	NM 37/57A-SL (30-1000MHz)	4/12/2007	0792-03271
Ailtech/Eaton Receiver	NM 37/57A (30-1000MHz)	3/11/2007	0805-03334
Ailtech/Eaton Receiver	NM 17/27A (0.1-32MHz)	9/17/2007	0608-03241
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	3/11/2007	0194-04082
Harmonic/Flicker	Test System HP 6841A (IEC 555-2/3)	2/11/2007	3531A00115/ PCT468
Shielded Screen Room	RF Lindgren Model 26-2/2-0	N/A	6710 (PCT270)
Shielded Semi-Anechoic Chamber	Ray Proof Model S81	N/A	R2437 (PCT278)
Quasi-Peak Adapter	HP 85650A	8/9/2007	2043A00301
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	8/15/2007	3638A08713
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	4/17/2007	2542A11898
Spectrum Analyzer/Tracking Gen.	HP 8591A (100Hz-1.8GHz)	9/12/2007	3144A02458
Signal Generator	HP 8648D (9kHz-4GHz)	5/1/2007	3613A00315
Spectrum Analyzer	HP 8594A	11/2/2007	3051A00187
Spectrum Analyzer (2)	HP 8591A	10/15/2007	3034A01395, 3108A02053
Audio Analyzer	HP 8903B		3011A09025
Modulation Analyzer	HP 8901A		2432A03467
Power Meter	HP 437B		3125J24437
Power Sensor	HP 8482H (30mW-3W)		2237A02084
Broadband Amplifier (2)	HP 8447D		1145A00470, 1937A03348
Broadband Amplifier	HP 8447F		2443A03784
Network Analyzer	HP 8753E (30kHz-3GHz)		JP38020182
Attenuator	HP 8495A (0-70dB) DC-4GHz		
Horn Antenna	EMCO Model 3115 (1-18GHz)		9704-5182
Horn Antenna	EMCO Model 3115 (1-18GHz)		9205-3874
Horn Antenna	EMCO Model 3116 (18-40GHz)		9203-2178
Biconical Antenna (4)	Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance Design		1295, 1332, 0355
Log-Spiral Antenna (3)	Ailtech/Eaton 93490-1		0608, 1103, 1104
Roberts Dipoles	Compliance Design (1 set)		
Ailtech Dipoles	DM-105A (1 set)		33448-111
EMCO LISN (6)	3816/2		1079
Microwave Preamplifier 40dB	Gain HP 83017A (0.5-26.5GHz)		3123A00181
Microwave Cables	MicroCoax (1.0-26.5GHz)		
Gigatronics Universal Power Meter	8657A		1835256
Gigatronics Power Sensor	80701A (0.05-18GHz)		1833460
Amplifier Research	5S1G4 (5W, 800MHz-4.2GHz)		22322
Microwave Survey Meter	Holaday Model 1501 (2.450GHz)		80931
Digital Thermometer	Extech Instruments 421305		426966
Bi? Directional Coax Coupler	Narda 3020A (50-1000MHz)		
Environmental Chamber	Associated Systems Model 1025 (Temperature/Humidity)		PCT285

PCTEST [®] Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 27 of 29	



14.0 SAMPLE CALCULATIONS

12.3 Emission Designator

Emission Designator = 120KF3E

BW = 120 kHz

F = Frequency Modulation

3 = Composite Digital Info

E = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

Calculated Emission:

2M + 2D

= (2x18kHz) + (2x40kHz)

= 36kHz + 80kHz

= 116KF3E

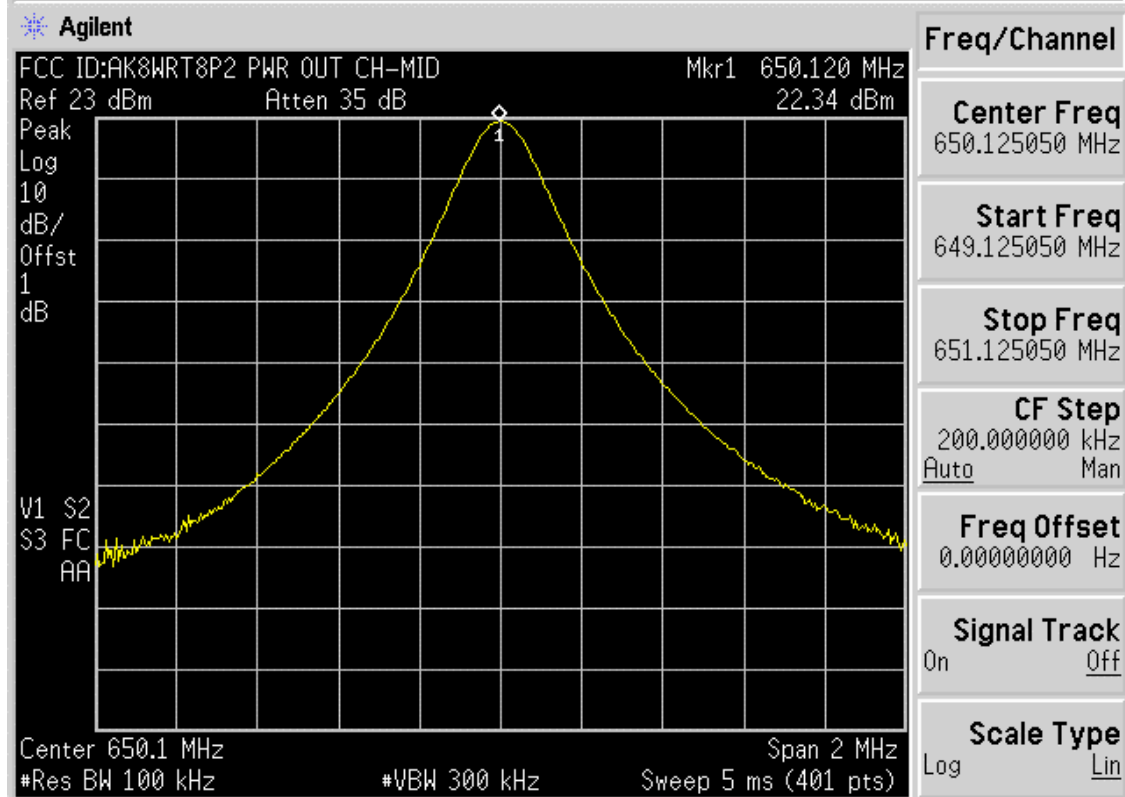
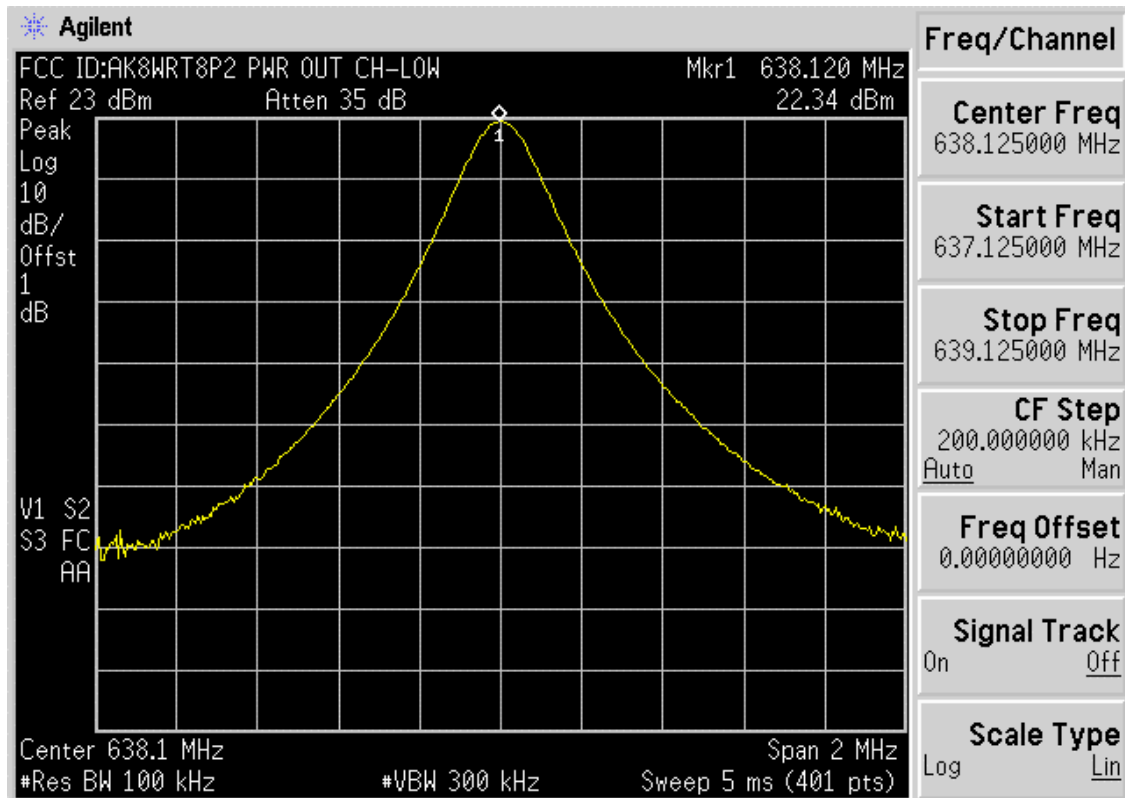
PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT			Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 28 of 29	

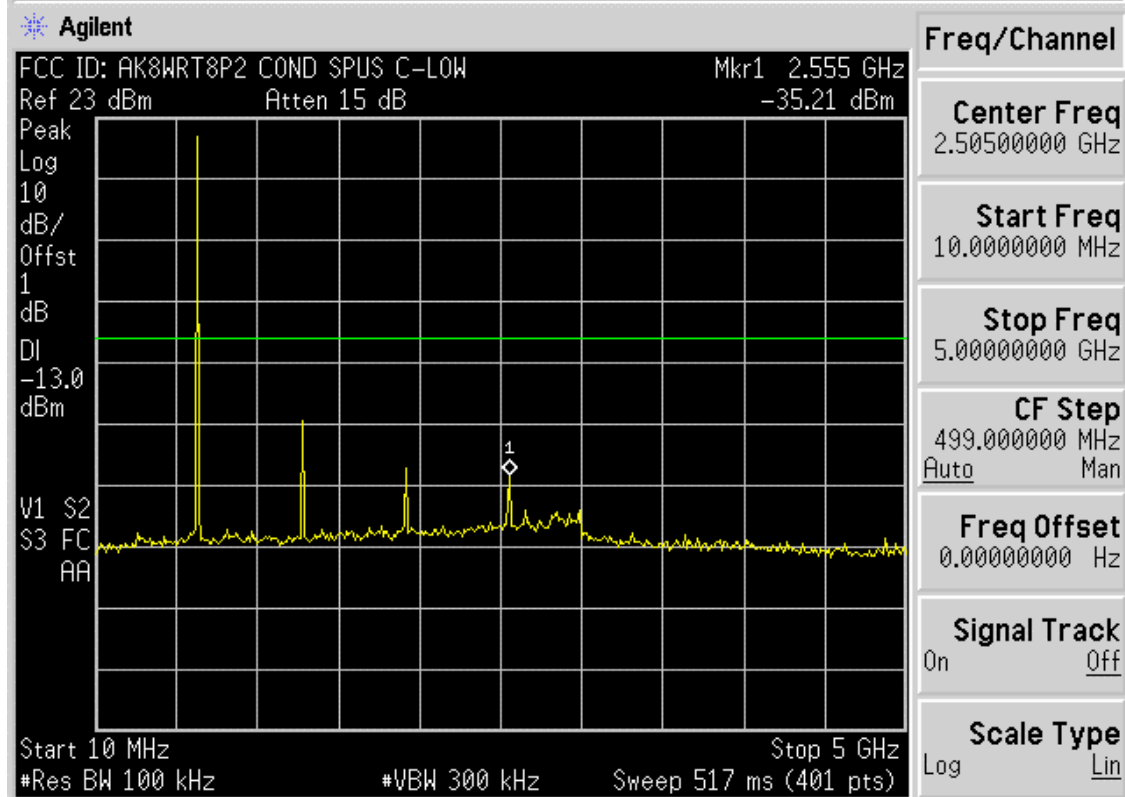
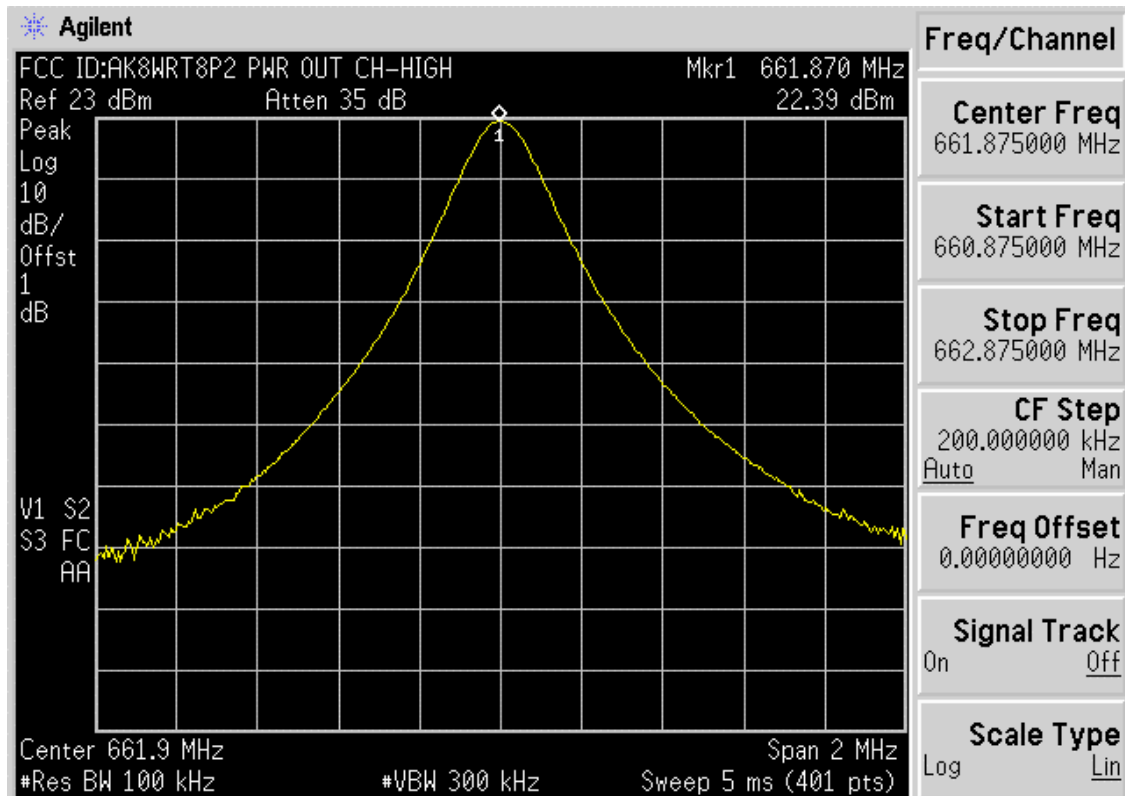


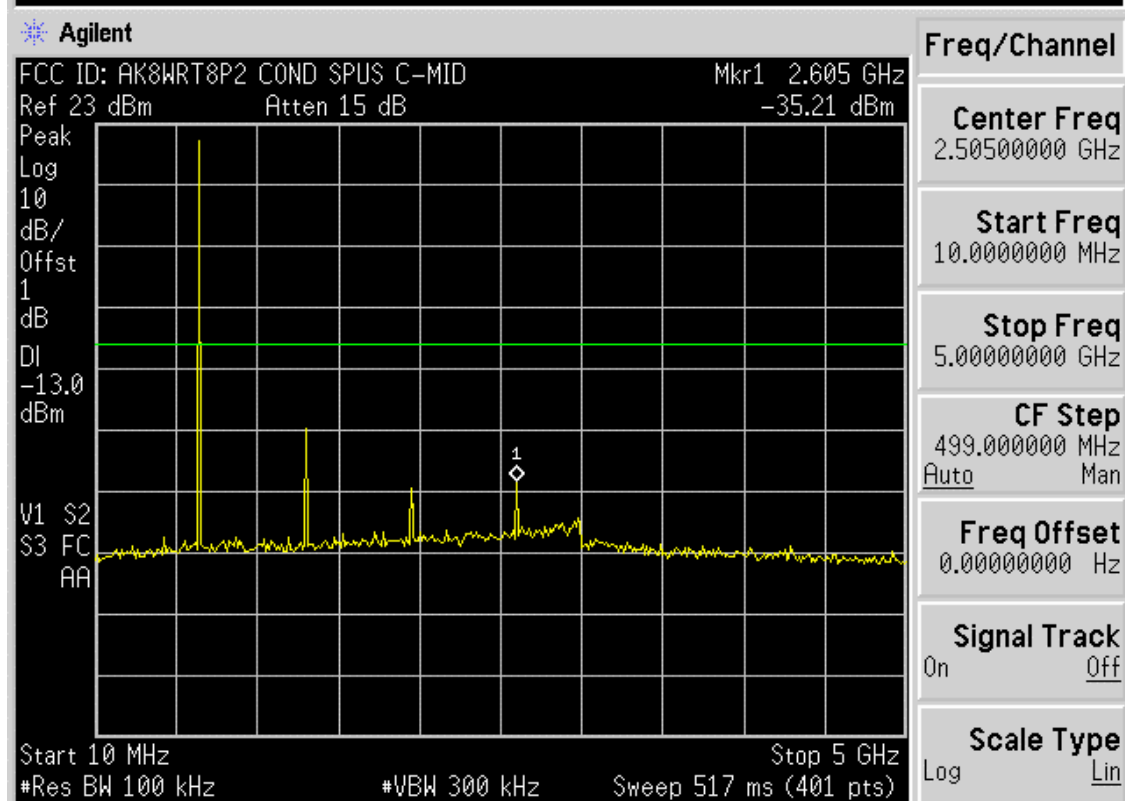
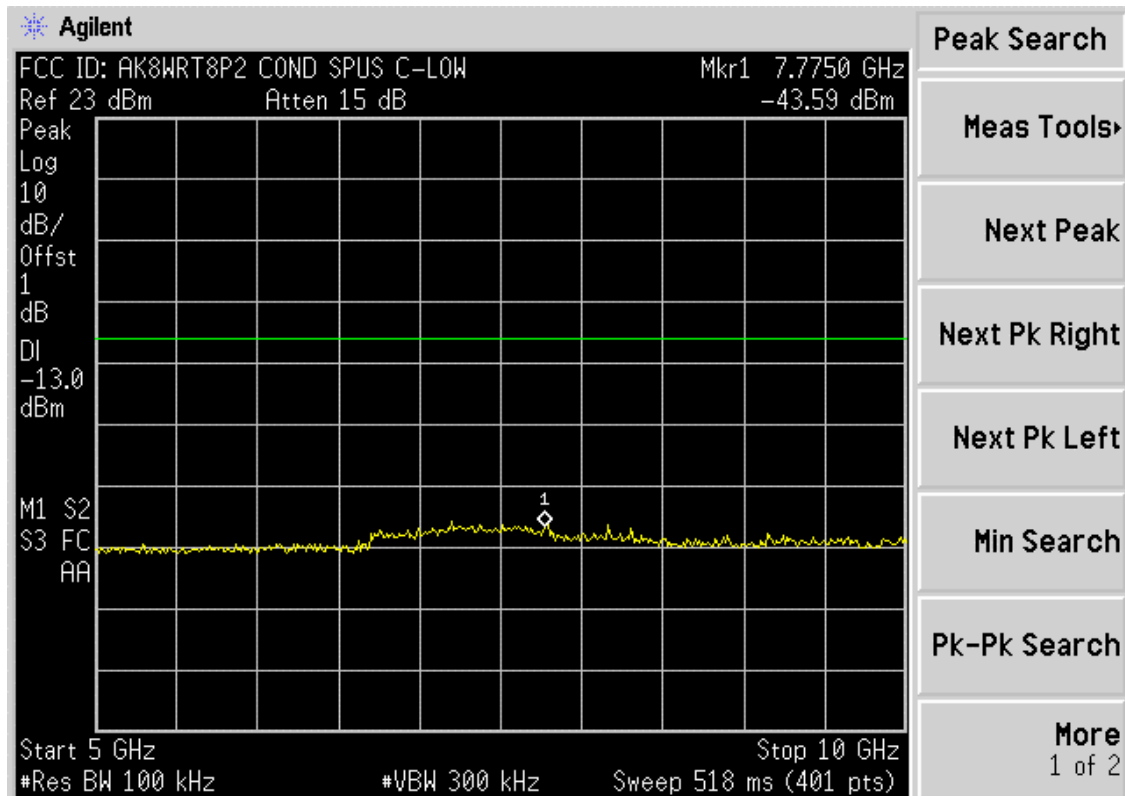
15.0 CONCLUSION

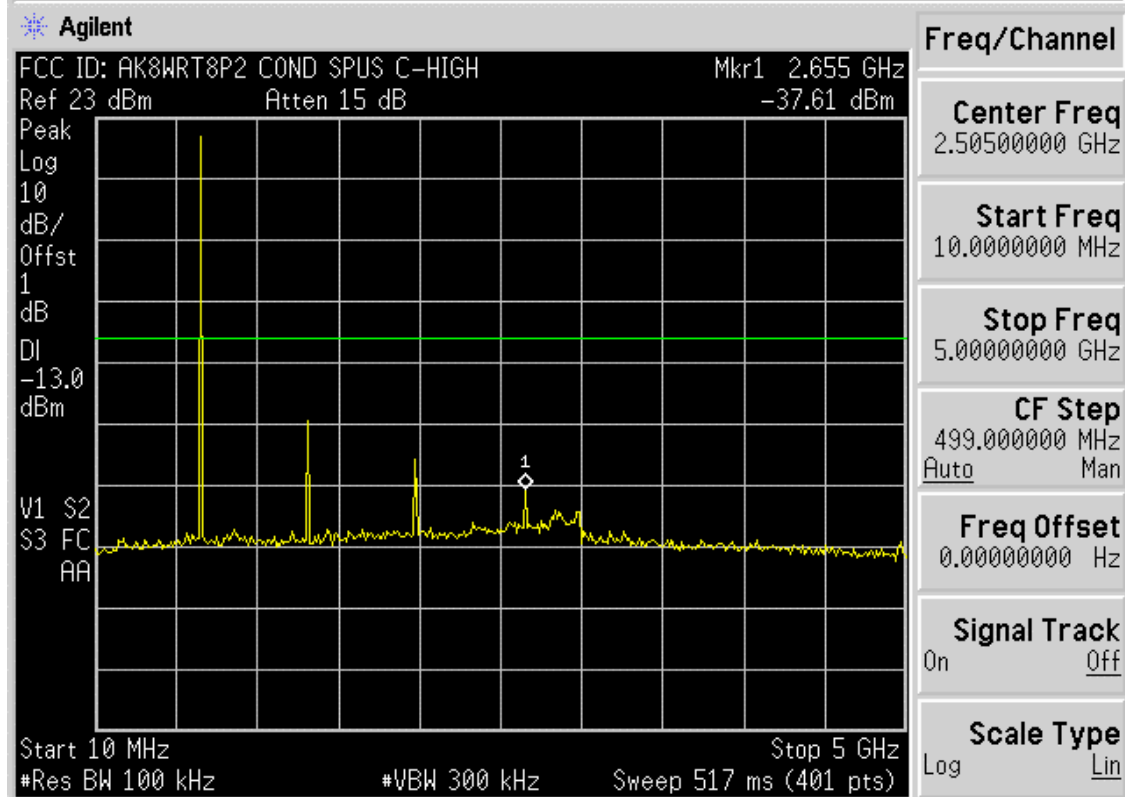
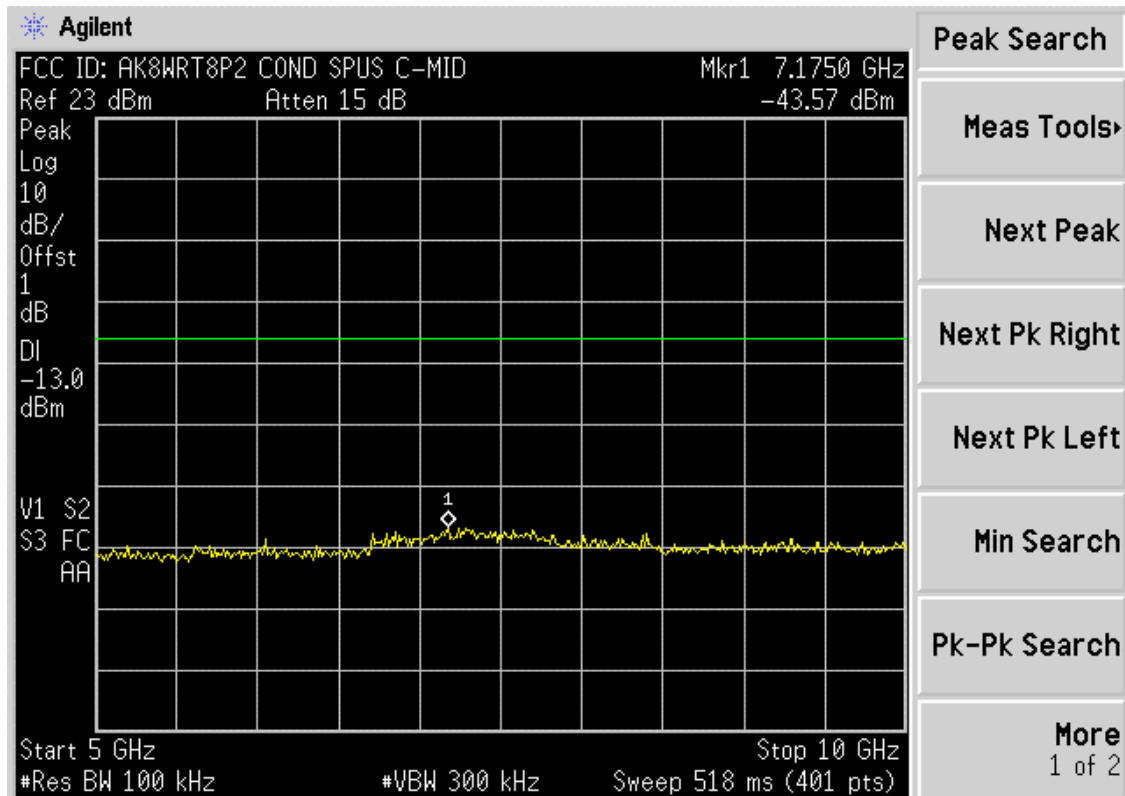
The data collected shows that the SONY Corporation UHF Synthesized Transmitter – Wireless Microphone System FCC ID: AK8WRT8P2 complies with all the requirements of Parts 2 and 74 of the FCC rules.

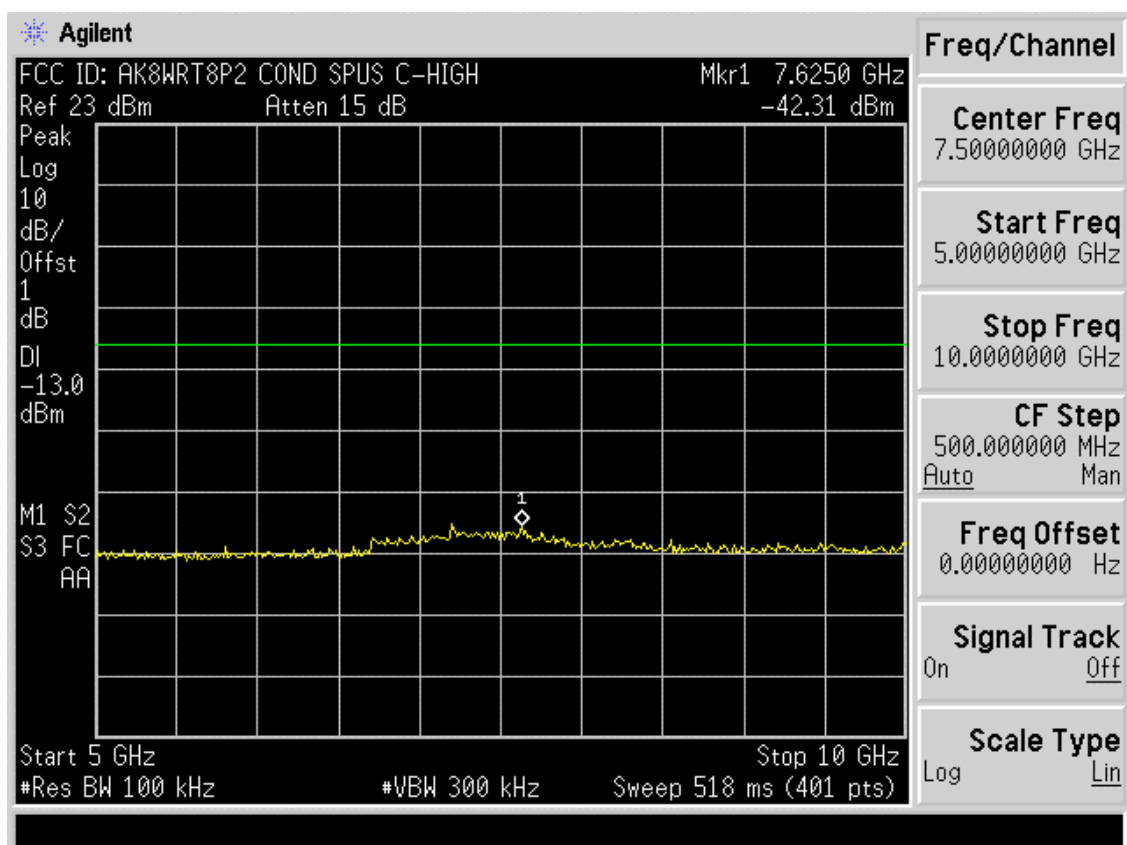
PCTEST Part 74(H) Certification		FCC MEASUREMENT REPORT		SONY	Reviewed by:
					Quality Manager
Test Report S/N: 0611030977	Test Dates: November 10, 2006	EUT Type: (TBF) UHF Synthesized TX — Wireless Microphone System	FCC ID: AK8WRT8P2	Page 29 of 29	











PCTEST Engineering Lab.

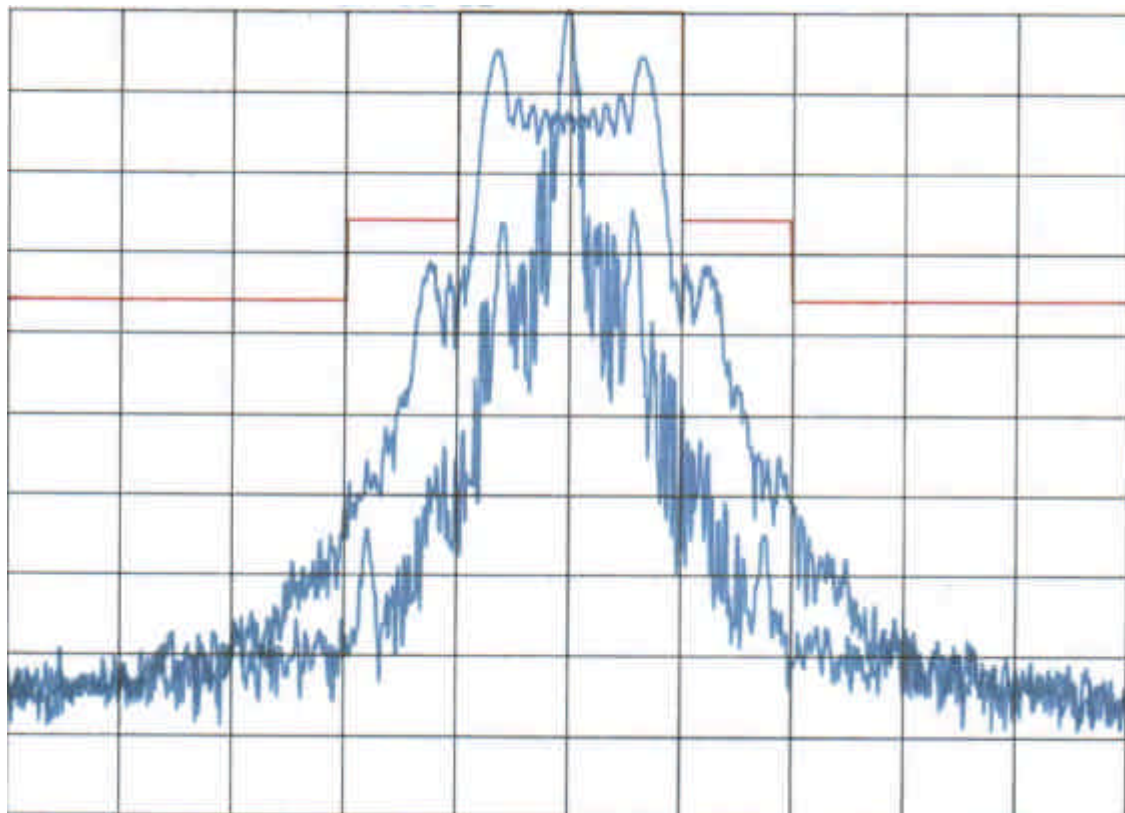
SPECTRUM ANALYZER PRESENTATION

FCC ID: AK8WRT8P2

Sony WRT-8P (42)

Operating Frequency: 650.125 MHz

Output Power : 22.50 dBm



650.125 MHz

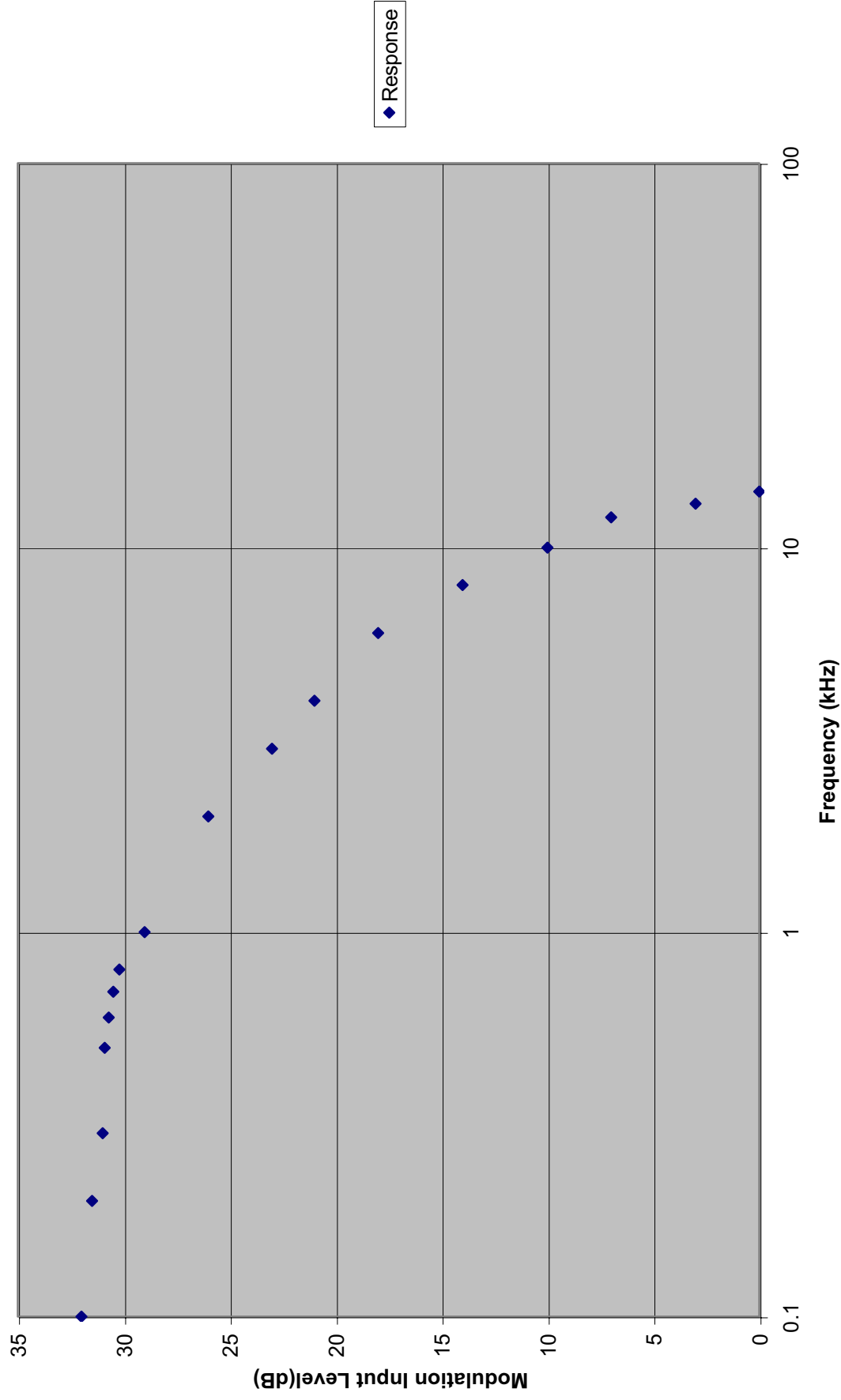
RES BW 3 KHz

VBW 10 kHz

SPAN 554 kHz

SWP 166 msec

Frequency Response



Modulation Characteristics

