

TEST RESULT SUMMARY

FCC Part 15 Subpart D IC RSS-213 Issue 2

MANUFACTURER	Revolabs Inc
NAME OF EQUIPMENT	Solo Wireless Microphone
MODEL NUMBERS	01-EXEMIC-BLK-11
MANUFACTURER'S ADDRESS	63 Great Road Maynard, MA 01754
TEST REPORT NUMBER	DI602355
TEST DATES	05 May-16 June 2006

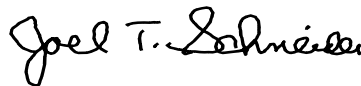
According to testing performed at TÜV America Inc and TRL, the above-mentioned system is in compliance with the applicable electromagnetic compatibility (EMC) portions of the requirements defined in FCC Parts 15 Subpart D and Industry Canada RSS-213 Issue 2.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable EMC requirements of FCC Part 15 Subpart D "Unlicensed Personal Communications Service Devices" and Industry Canada RSS-213 Issue 2 "2 GHz Licence-exempt Personal Communications Service Devices (LE-PCS)".

Date: 21 June 2006

Location: Taylors Falls MN
USA



J. T. Schneider
Senior Engineer



G. S. Jakubowski
Test Engineer

Not Transferable

EMC Emission - TEST REPORT

Test Report File No. : **DI602355** Date of issue: 21 June 2006

Model Nos. : **01-EXEMIC-BLK-11**

Product Name : **Sole Wireless Microphone System**

Product Type : **Transmitter operating in 1920-1930 MHz band**

Applicant : **Revolabs Inc.**

Manufacturer : **Revolabs Inc.**

License Holder : **Revolabs Inc.**

Address : **63 Great Road
Maynard, MA 01754**

Test Result : ☒ **Positive** ☐ **Negative**

Test Project Number :
Reference(s) : **DI602355**

Total pages including Appendices : **38**

TÜV America Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV America Inc issued reports.

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*TÜV America Inc and its professional staff hold government and professional organization certifications and are members of
AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI*

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Test Results

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Sign Explanations:

- ☐ - not applicable
- ☒ - applicable

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- | | | |
|---|---|------------------------------------|
| ☐ - EN 50081-1 / 1991 | ☐ - Group 1 | ☐ - Group 2 |
| ☐ - EN 55011 / 1991 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55013 / 1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1987 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55014 / A2:1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1993 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55015 / 1987 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55015 / A1:1990 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55015 / 1993 | | |
| ☐ - EN 55022 / 1987 | | |
| ☐ - EN 55022 / 1991 | | |
| ☐ - BS | | |
| ☐ - VCCI | ☐ - Class A | ☐ - Class B |
| ☐ - FCC Part 15 Subpart B | ☐ - Class A | ☐ - Class B |
| ☒ - FCC Part 15 Subpart D | | |
| ☐ - FCC Part 24 | | |
| ☐ - FCC Part 22 | | |
| ☐ - CISPR 11 (1990) | ☐ - Group 1 | ☐ - Group 2 |
| | ☐ - Class A | ☐ - Class B |
| ☐ - CISPR 22 (1993) | ☐ - Class A | ☐ - Class B |
| ☐ - IC RSS-Gen Issue 1 | | |
| ☐ - IC RSS-193 Issue 1 | | |
| ☒ - IC RSS-213 Issue 2 | | |

Subpart B requirements for system: FCC 15.309(b)

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Minimum margin of compliance for radiated emissions is 4 dB at 47.4 MHz for the microphone battery charger.

Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)

☒ - Wild River Lab Small Test Site (Open Area Test Site)

Test Distance

☐ - 3 meters

☒ - 10 meters

☐ - Conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3995	EM-6917B	Electro-Metrics	Biconicalog Periodic	151	31-Mar-07
2679	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00550	23-Nov-06
8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	28-Mar-07
8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	28-Mar-07
2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	02/17/2007-B

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment

Test limit

FCC Part 15 Subpart B

RADIATED EMISSIONS



Test Report #: DI602355 Run 3 Test Area: STS

EUT Model #: SOLO BASE CHARGER(T1 Date: 5/19/2006

EUT Serial #: N/A EUT Power: 60Hz/120VAC Temperature: 18.0 °C

Test Method: FCC 15 SUBPART B Air Pressure: 96.0 kPa

Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE CHARGER

Notes: CHARGING MODE

Data File Name: 2355.dat

Page: 1 of 3

List of measurements for run #: 3

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 CISPR-22- B <1GHz 10m (2005)	DELTA2
47.445 MHz	38.65 Qp	1.07 / 13.71 / 28.2 / 0.0	25.23	V / 1.00 / 0	-4.77	n/a
50.475 MHz	33.6 Qp	1.09 / 12.99 / 28.13 / 0.0	19.54	V / 1.00 / 0	-10.46	n/a
66.267 MHz	33.9 Qp	1.24 / 9.72 / 27.81 / 0.0	17.06	V / 1.00 / 0	-12.94	n/a
73.827 MHz	32.35 Qp	1.32 / 8.54 / 27.85 / 0.0	14.37	V / 1.00 / 0	-15.63	n/a
85.486 MHz	34.55 Qp	1.38 / 6.83 / 27.91 / 0.0	14.85	V / 1.00 / 0	-15.15	n/a
103.174 MHz	42.05 Qp	1.49 / 8.04 / 28.0 / 0.0	23.57	V / 1.00 / 0	-6.43	n/a
66.267 MHz	33.6 Qp	1.24 / 9.72 / 27.81 / 0.0	16.76	V / 1.00 / 90	-13.24	n/a
66.267 MHz	34.55 Qp	1.24 / 9.72 / 27.81 / 0.0	17.71	V / 1.00 / 180	-12.29	n/a
73.827 MHz	33.0 Qp	1.32 / 8.54 / 27.85 / 0.0	15.02	V / 1.00 / 270	-14.98	n/a
MAXIMIZED.						
47.445 MHz	38.74 Qp	1.07 / 13.71 / 28.2 / 0.0	25.32	V / 1.20 / 0	-4.68	n/a
END OF VERTICAL SCAN.						
NO NEW OR HIGHER EMISSIONS FOUND WITH HORIZONTAL POLARIZATION AT ALL AZIMUTHS 1-4 METERS.						
END OF SCAN 30 - 1000MHz.						

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RADIATED EMISSIONS



Test Report #: DI602355 Run 3 Test Area: STS

EUT Model #: SOLO BASE CHARGER(T1 Date: 5/19/2006

EUT Serial #: N/A EUT Power: 60Hz/120VAC Temperature: 18.0 °C

Test Method: FCC 15 SUBPART B Air Pressure: 96.0 kPa

Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE CHARGER

Notes: CHARGING MODE

Data File Name: 2355.dat Page: 2 of 3

Measurement summary for limit1: CISPR-22- B <1GHz 10m (2005) (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 CISPR-22- B <1GHz 10m (2005)
47.445 MHz	38.74 Qp	1.07 / 13.71 / 28.2 / 0.0	25.32	V / 1.20 / 0	-4.68
103.174 MHz	42.05 Qp	1.49 / 8.04 / 28.0 / 0.0	23.57	V / 1.00 / 0	-6.43
50.475 MHz	33.6 Qp	1.09 / 12.99 / 28.13 / 0.0	19.54	V / 1.00 / 0	-10.46
66.267 MHz	34.55 Qp	1.24 / 9.72 / 27.81 / 0.0	17.71	V / 1.00 / 180	-12.29
73.827 MHz	33.0 Qp	1.32 / 8.54 / 27.85 / 0.0	15.02	V / 1.00 / 270	-14.98
85.486 MHz	34.55 Qp	1.38 / 6.83 / 27.91 / 0.0	14.85	V / 1.00 / 0	-15.15

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RADIATED EMISSIONS



Test Report #: DI602355 Run 3 Test Area: STS

EUT Model #: SOLO BASE CHARGER(T1 Date: 5/19/2006

EUT Serial #: N/A EUT Power: 60Hz/120VAC Temperature: 18.0 °C

Test Method: FCC 15 SUBPART B Air Pressure: 96.0 kPa

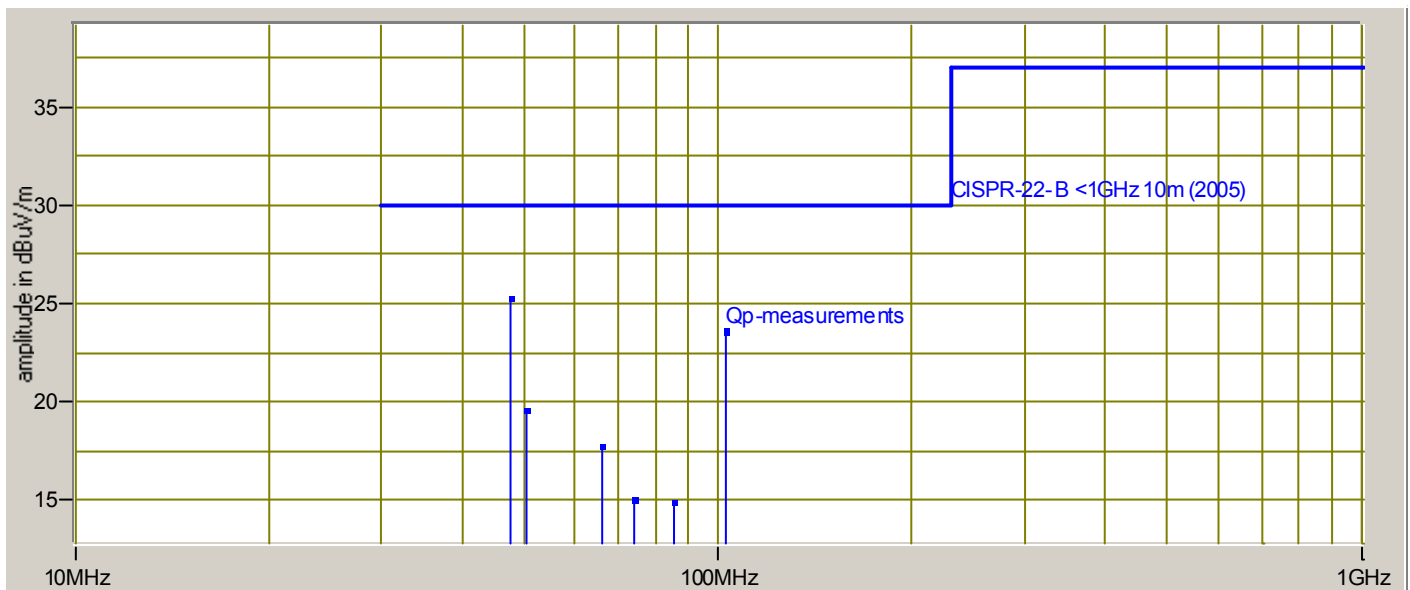
Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE CHARGER

Notes: CHARGING MODE

Data File Name: 2355.dat Page: 3 of 3

Graph:



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Conducted limits: FCC 15.315, IC RSS-213 6.3

Test summary

The requirements are: ■ - MET □ - NOT MET

Minimum margin of compliance for conducted emissions is 14 dB at 1.5 MHz for the microphone battery charger.

Test location

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☒ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Wild River Lab Shield Room

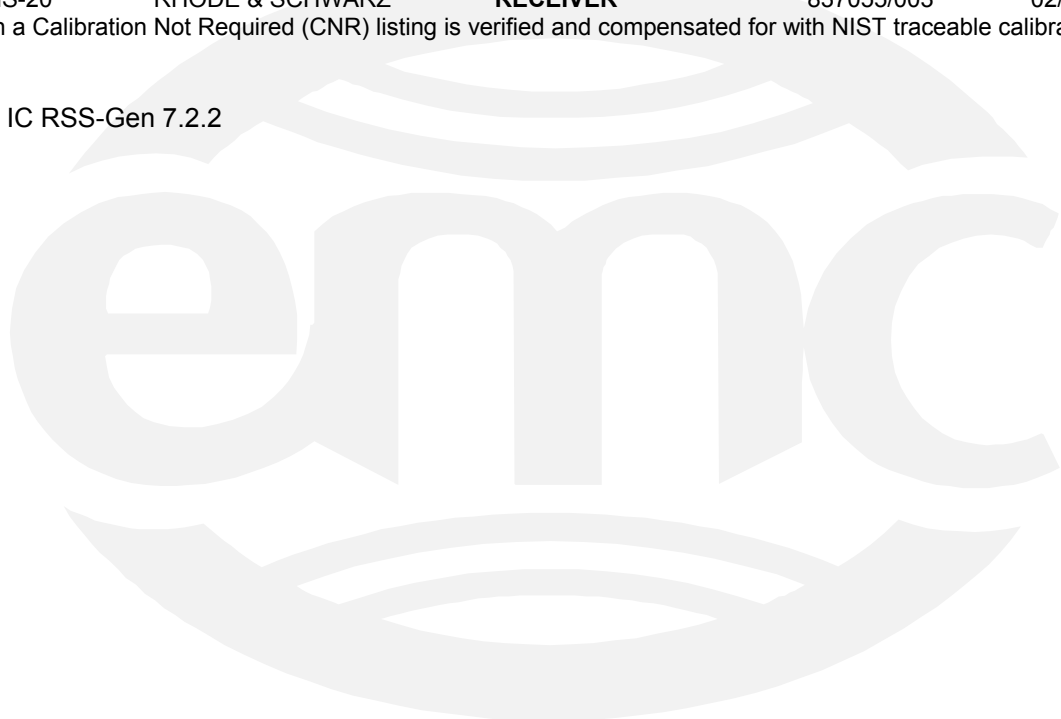
Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
2079	3825/2	EMCO	LISN	1329	04/04/2007-B
2534	ESHS-20	RHODE & SCHWARZ	RECEIVER	837055/003	02/27/2007

Equipment with a Calibration Not Required (CNR) listing is verified and compensated for with NIST traceable calibrated equipment.

Test limit

FCC 15.207, IC RSS-Gen 7.2.2



CONDUCTED EMISSIONS



Test Report #: DI602355 Run 2 Test Area: STS

EUT Model #: SOLO BASE CHARGER (T1 UNIT #1) Date: 5/19/2006

EUT Serial #: N/A EUT Power: 60Hz/120VAC Temperature: 18.0 °C

Test Method: FCC 15 SUBPART D Air Pressure: 96.0 kPa

Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE CHARGER

Notes: CHARGING MODE

Data File Name: 2355.dat

Page: 1 of 5

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp	DELTA2 EN55022 B Avg
16.995 MHz	-1.53 Qp	2.13 / 0.27 / 0.0 / 0.0	0.87	L1	-59.13	n/a
165.0 kHz	46.19 Qp	0.23 / 0.26 / 0.0 / 0.0	46.68	L1	-18.52	n/a
185.0 kHz	43.9 Qp	0.24 / 0.21 / 0.0 / 0.0	44.35	L1	-19.91	n/a
580.0 kHz	14.46 Qp	0.36 / 0.1 / 0.0 / 0.0	14.92	L1	-41.08	n/a
860.0 kHz	18.44 Qp	0.41 / 0.1 / 0.0 / 0.0	18.95	L1	-37.05	n/a
1.515 MHz	40.89 Qp	0.54 / 0.0 / 0.0 / 0.0	41.43	L1	-14.57	n/a
165.0 kHz	17.51 Av	0.23 / 0.26 / 0.0 / 0.0	18.0	L1	n/a	-37.2
185.0 kHz	16.57 Av	0.24 / 0.21 / 0.0 / 0.0	17.02	L1	n/a	-37.24
580.0 kHz	5.71 Av	0.36 / 0.1 / 0.0 / 0.0	6.17	L1	n/a	-39.83
860.0 kHz	14.32 Av	0.41 / 0.1 / 0.0 / 0.0	14.83	L1	n/a	-31.17
1.515 MHz	22.85 Av	0.54 / 0.0 / 0.0 / 0.0	23.39	L1	n/a	-22.61
16.995 MHz	-7.17 Av	2.13 / 0.27 / 0.0 / 0.0	-4.77	L1	n/a	-54.77
165.0 kHz	46.45 Qp	0.23 / 0.26 / 0.0 / 0.0	46.94	N	-18.26	n/a
185.0 kHz	44.14 Qp	0.24 / 0.21 / 0.0 / 0.0	44.59	N	-19.67	n/a
580.0 kHz	14.7 Qp	0.36 / 0.1 / 0.0 / 0.0	15.16	N	-40.84	n/a
860.0 kHz	13.16 Qp	0.41 / 0.1 / 0.0 / 0.0	13.67	N	-42.33	n/a
1.515 MHz	22.74 Qp	0.54 / 0.0 / 0.0 / 0.0	23.28	N	-32.72	n/a
16.995 MHz	2.51 Qp	2.13 / 0.27 / 0.0 / 0.0	4.91	N	-55.09	n/a
165.0 kHz	17.57 Av	0.23 / 0.26 / 0.0 / 0.0	18.06	N	n/a	-37.14
185.0 kHz	13.52 Av	0.24 / 0.21 / 0.0 / 0.0	13.97	N	n/a	-40.29
580.0 kHz	9.87 Av	0.36 / 0.1 / 0.0 / 0.0	10.33	N	n/a	-35.67
860.0 kHz	1.45 Av	0.41 / 0.1 / 0.0 / 0.0	1.96	N	n/a	-44.04
1.515 MHz	12.43 Av	0.54 / 0.0 / 0.0 / 0.0	12.97	N	n/a	-33.03
16.995 MHz	-3.17 Av	2.13 / 0.27 / 0.0 / 0.0	-0.77	N	n/a	-50.77

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Reviewed by: Greg Jakubowski

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CONDUCTED EMISSIONS



Test Report #: DI602355 Run 2 Test Area: STS
EUT Model #: SOLO BASE CHARGER (T1 UNIT #1) Date: 5/19/2006
EUT Serial #: N/A EUT Power: 60Hz/120VAC Temperature: 18.0 °C
Test Method: FCC 15 SUBPART D Air Pressure: 96.0 kPa
Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE CHARGER

Notes: CHARGING MODE

Data File Name: 2355.dat

Page: 2 of 5

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp	DELTA2 EN55022 B Avg
END OF SCAN.						

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CONDUCTED EMISSIONS



Test Report #: DI602355 Run 2 Test Area: STS

EUT Model #: SOLO BASE CHARGER (T1 UNIT #1) Date: 5/19/2006

EUT Serial #: N/A EUT Power: 60Hz/120VAC Temperature: 18.0 °C

Test Method: FCC 15 SUBPART D Air Pressure: 96.0 kPa

Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE CHARGER

Notes: CHARGING MODE

Data File Name: 2355.dat Page: 3 of 5

Measurement summary for limit1: EN55022 B Qp (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp
1.515 MHz	40.89 Qp	0.54 / 0.0 / 0.0 / 0.0	41.43	L1	-14.57
165.0 kHz	46.45 Qp	0.23 / 0.26 / 0.0 / 0.0	46.94	N	-18.26
185.0 kHz	44.14 Qp	0.24 / 0.21 / 0.0 / 0.0	44.59	N	-19.67
860.0 kHz	18.44 Qp	0.41 / 0.1 / 0.0 / 0.0	18.95	L1	-37.05
580.0 kHz	14.7 Qp	0.36 / 0.1 / 0.0 / 0.0	15.16	N	-40.84
16.995 MHz	2.51 Qp	2.13 / 0.27 / 0.0 / 0.0	4.91	N	-55.09

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CONDUCTED EMISSIONS



Test Report #: DI602355 Run 2 Test Area: STS

EUT Model #: SOLO BASE CHARGER (T1 UNIT #1) Date: 5/19/2006

EUT Serial #: N/A EUT Power: 60Hz/120VAC Temperature: 18.0 °C

Test Method: FCC 15 SUBPART D Air Pressure: 96.0 kPa

Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE CHARGER

Notes: CHARGING MODE

Data File Name: 2355.dat Page: 4 of 5

Measurement summary for limit2: EN55022 B Avg (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA2 EN55022 B Avg
1.515 MHz	22.85 Av	0.54 / 0.0 / 0.0 / 0.0	23.39	L1	-22.61
860.0 kHz	14.32 Av	0.41 / 0.1 / 0.0 / 0.0	14.83	L1	-31.17
580.0 kHz	9.87 Av	0.36 / 0.1 / 0.0 / 0.0	10.33	N	-35.67
165.0 kHz	17.57 Av	0.23 / 0.26 / 0.0 / 0.0	18.06	N	-37.14
185.0 kHz	16.57 Av	0.24 / 0.21 / 0.0 / 0.0	17.02	L1	-37.24
16.995 MHz	-3.17 Av	2.13 / 0.27 / 0.0 / 0.0	-0.77	N	-50.77

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CONDUCTED EMISSIONS



Test Report #: DI602355 Run 2 Test Area: STS

EUT Model #: SOLO BASE CHARGER (T1 UNIT #1) Date: 5/19/2006

EUT Serial #: N/A EUT Power: 60Hz/120VAC Temperature: 18.0 °C

Test Method: FCC 15 SUBPART D Air Pressure: 96.0 kPa

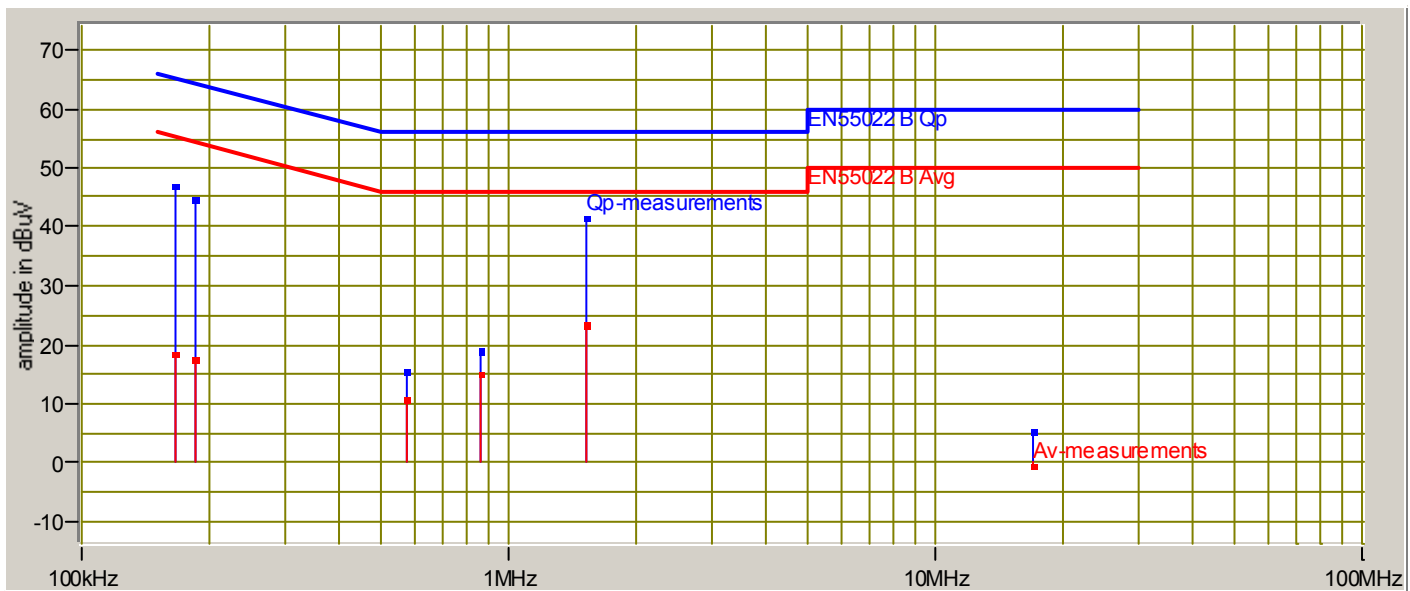
Customer: REVOLABS Rel. Humidity: 78.0 %

EUT Description: WIRELESS MICROPHONE BASE CHARGER

Notes: CHARGING MODE

Data File Name: 2355.dat Page: 5 of 5

Graph:



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General technical requirements

Digital modulation techniques: FCC 15.319(b), IC RSS-213 6.1

The DECT standard GFSK modulation is used.

Peak transmit power: FCC 15.319(c), IC RSS-213 6.5

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

The peak transmit power does not exceed 100 microwatts multiplied by the square root of the emission bandwidth in Hertz.

Test location

- ☒ - Wild River Lab Large Test Site (Open Area Test Site) – radiated measurement for microphone
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Wild River Lab Shield Room – conducted measurement for base station

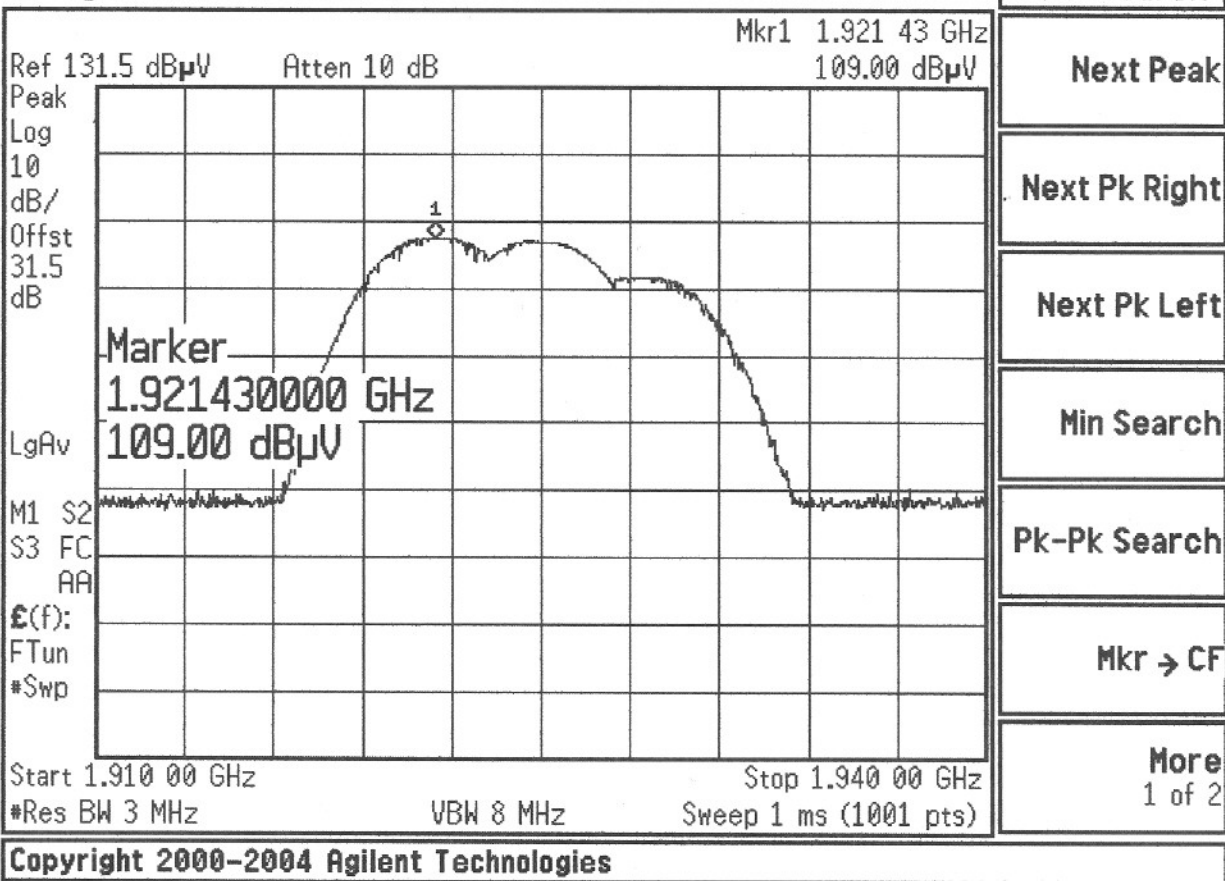
Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	03-Nov-06
2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Antenna	9001-3275	08-Dec-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

Test limits

120 milliwatts, based on 100 microwatts x (1460000 Hz)^{1/2}



x-axis - hor. ant. pol. - worst case

mike 105

109 dBμV/m = 14.5 mW ERP @ 3m

$$\text{LIMIT} = 100 \mu\text{W} \times \sqrt{1.46 \times 10^6} = 120 \text{ mW}$$

all channels

Power spectral density: FCC 15.319(d), IC RSS-213 6.6

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Power spectral density does not exceed 3 milliwatts in any bandwidth of 3 kHz as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

Test location

- ☒ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)

Test Distance

- ☒ - 3 meters
☐ - 10 meters
☐ - Conducted measurement

Test equipment

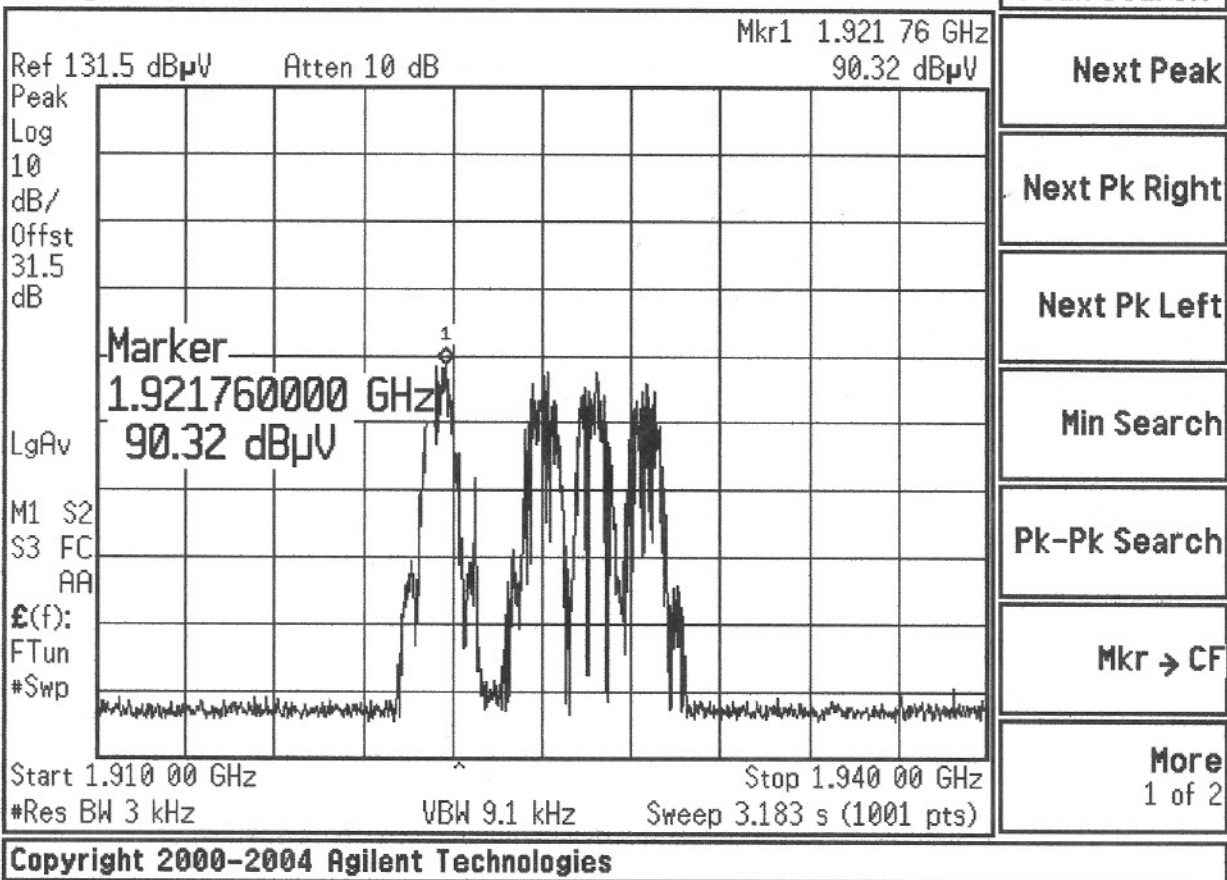
TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	03-Nov-06
2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Antenna	9001-3275	08-Dec-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

Test limit

3 milliwatts in any bandwidth of 3 kHz

* Agilent 13:39:27 May 5, 2006



power density limit = 3 mW / 3 KHz

90.3 dB μ V/m = 196 μ W ERP @ 3 m

all channels

microphone

Emission bandwidth: FCC 15.323(a), IC RSS-213 6.4**Test summary**

The requirements are: ☒ - MET ☐ - NOT MET

Operation is contained within the 1920-1930 MHz band. The emission bandwidth is less than 2.5 MHz. The power level is as specified in 15.319(c), but in no event is the emission bandwidth less than 50 kHz.

Test Distance

- ☒ - 3 meters
☐ - 10 meters
☐ - Conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	03-Nov-06
2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Antenna	9001-3275	08-Dec-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

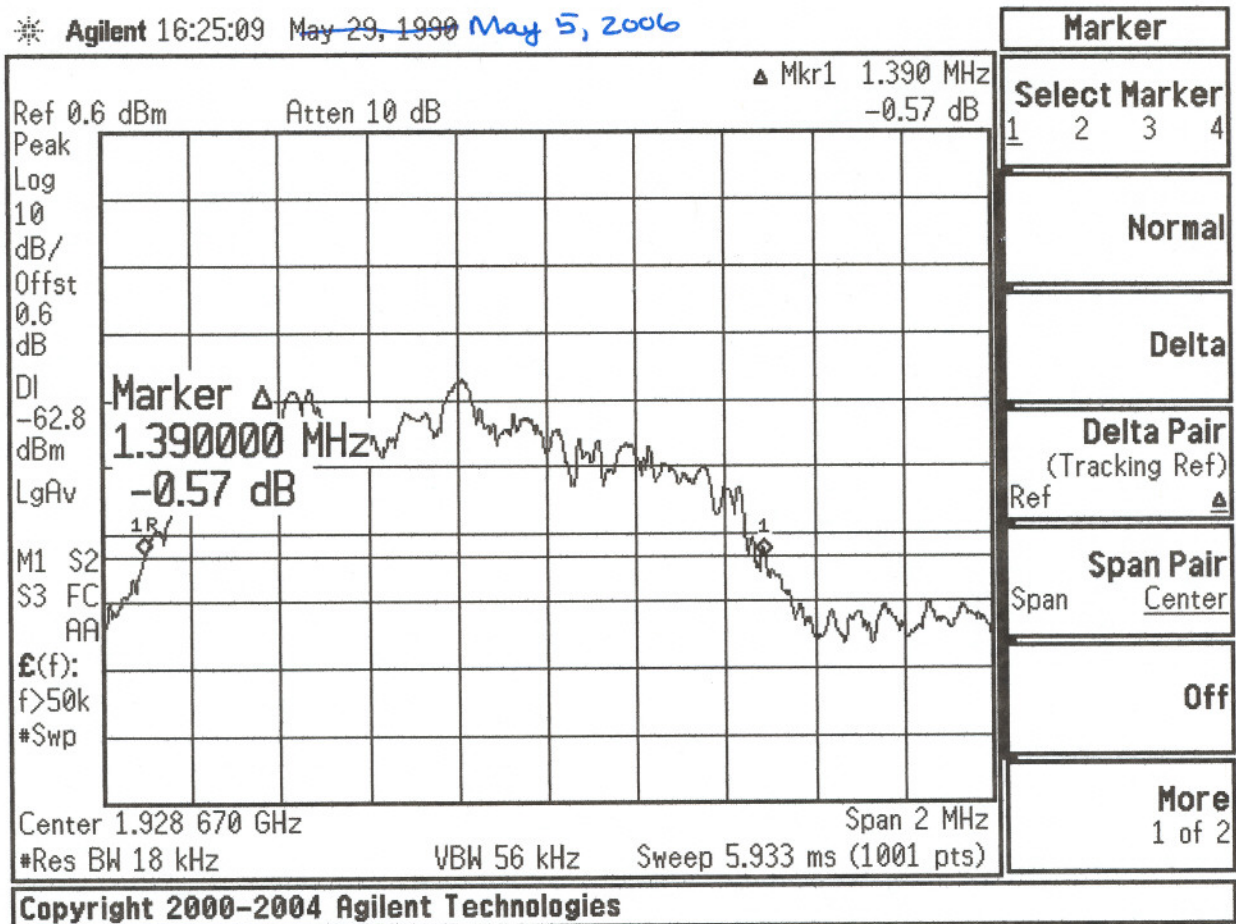
Test limit

Minimum 50 kHz, maximum 2.5 MHz

Test data

Maximum measured 1.46 MHz, minimum measured 1.39 MHz

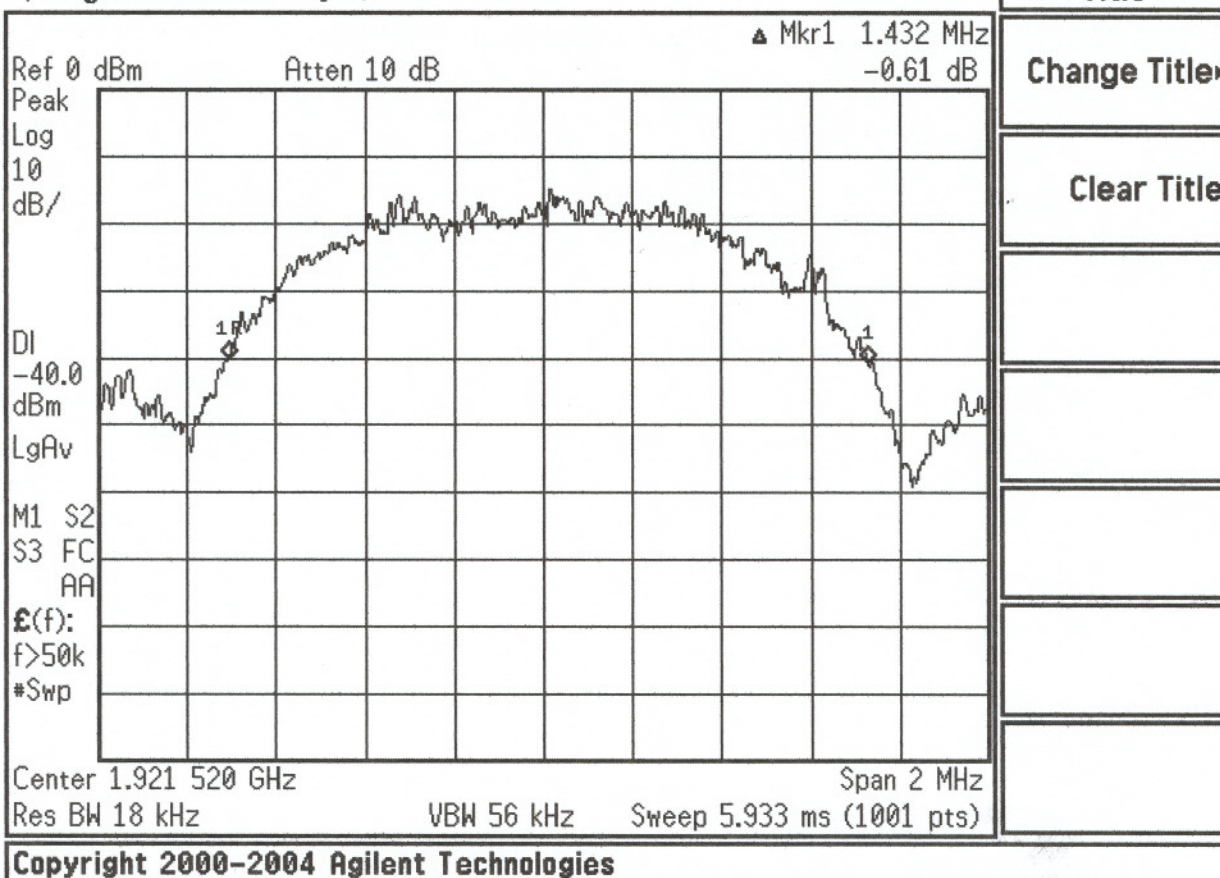
* Agilent 16:25:09 May 29, 1990 May 5, 2006



microphone

emission bw - high channel

✱ Agilent 10:43:48 May 5, 2006

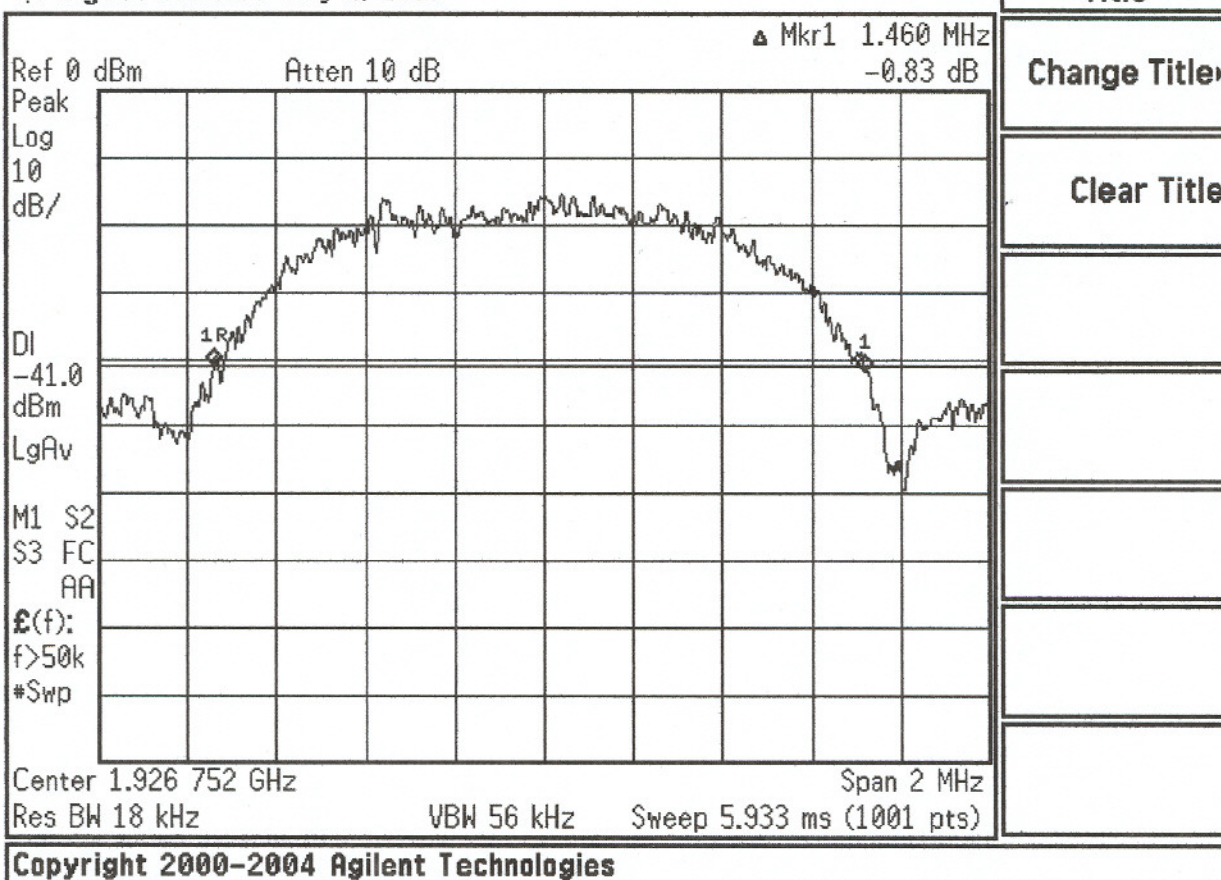


mike 106 - emission bw

mike 103 - emission bw

mike 100 - emission bw

* Agilent 10:50:12 May 5, 2006



mike 101 - emission bw
 mike 110 - emission bw
 base port 1 - emission bw
 All channels tested - this is max.

Emissions outside and inside the sub-band: FCC 15.323(d), IC RSS-213 6.7.2, 6.7.1

Test summary

The requirements are: ■ - MET □ - NOT MET

Test Distance

- - 3 meters
- - 10 meters
- - Conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3995	EM-6917B	Electro-Metrics	Biconicalog Periodic	151	31-Mar-07
2679	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00550	23-Nov-06
8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	28-Mar-07
8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	28-Mar-07
2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	02/17/2007-B
2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Antenna	9001-3275	08-Dec-06
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	03-Nov-06
6717	3116	Electro-Mechanics (EMCO)	Ridge Guide Antenna	2005	19-Sep-06
3958	SL18B4020	Phase One Microwave	Preamplifier	0002	Code B

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

Test limits

Emissions outside the sub-band shall be attenuated below a reference power of 112 milliwatts as follows:
 30 dB between the sub-band and 1.25 MHz above or below the sub-band
 50 dB between 1.25 and 2.5 MHz above or below the sub-band
 60 dB between 2.5 MHz or greater above or below the sub-band

Emissions inside the sub-band must comply with the following emission mask:

30 dB below 120 mW between 1B and 2B
 50 dB below 120 mW between 2B and 3B
 60 dB below 120 mW between 3B and sub-band edge

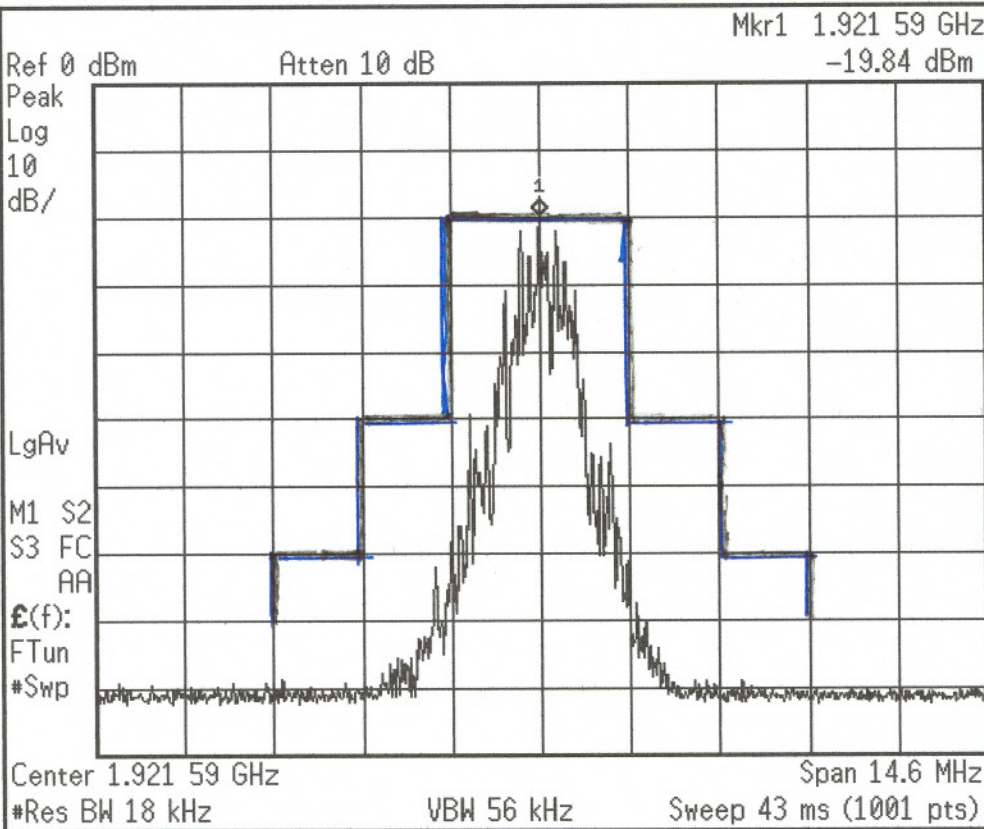
Test data

Plot demonstrates device meets inside sub-band mask for 15 mW, so also meets inside sub-band mask for 120 mW (9 dB higher). B = 1.46 MHz.

Plots demonstrate device meets outside sub-band, band edge limits are met by 60 dB below 112 mW level being reached inside sub-band.

Radiated emissions show outside sub-band requirements met by minimum of 5 dB at 960.7 MHz.

Agilent 20:42:47 ~~Sep 30, 1998~~ 17 MAY 2006



Display

Full Screen

Display Line

-73.50 dBm

On

Off

Limits

Active Fctn

Position

Center

Title

Preferences

Copyright 2000-2004 Agilent Technologies

in-band mask - low channel

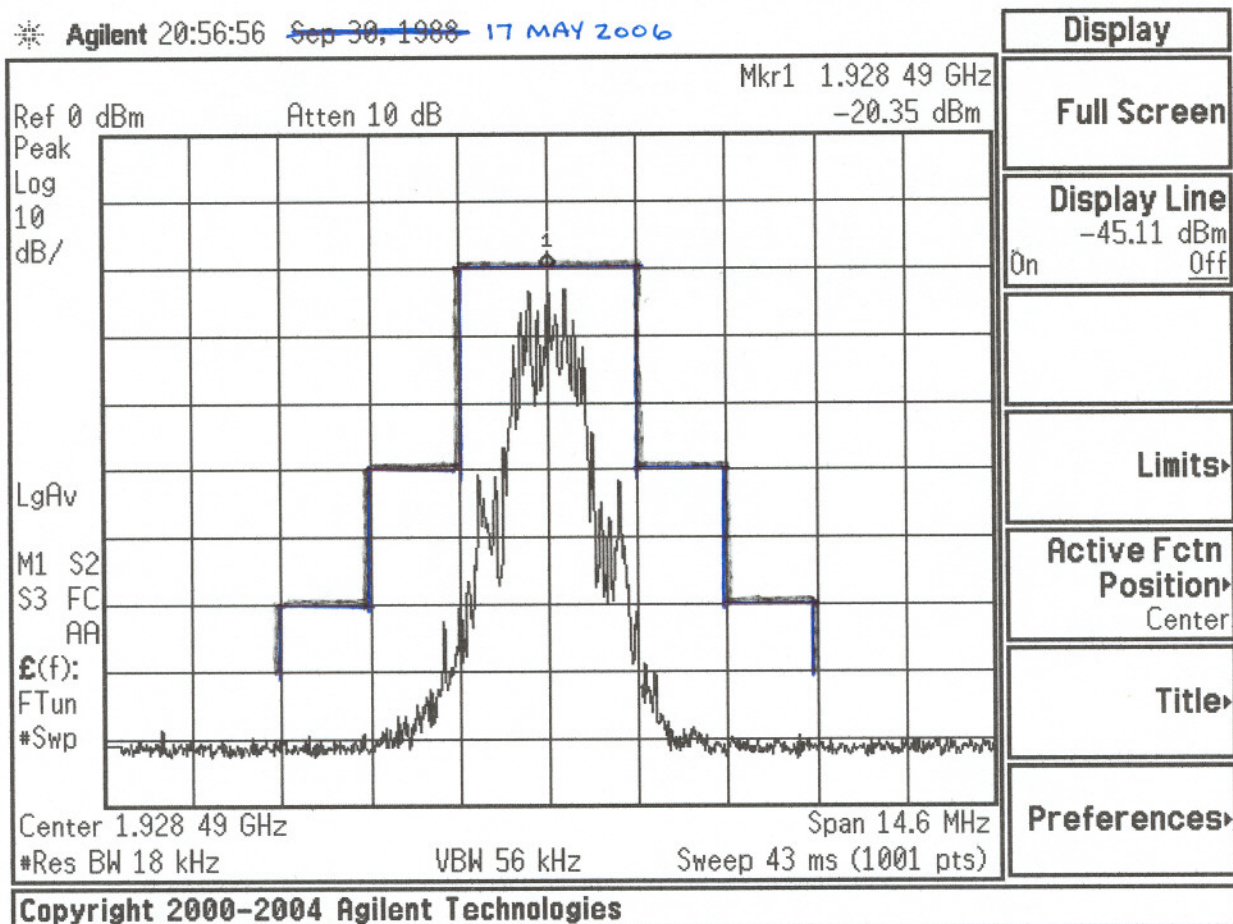
$B = 1.46 \text{ MHz}$

same for base + mic

mask drawn is for 15mW permitted xmit power

mask for 120mw transmit power would be

9 dB higher



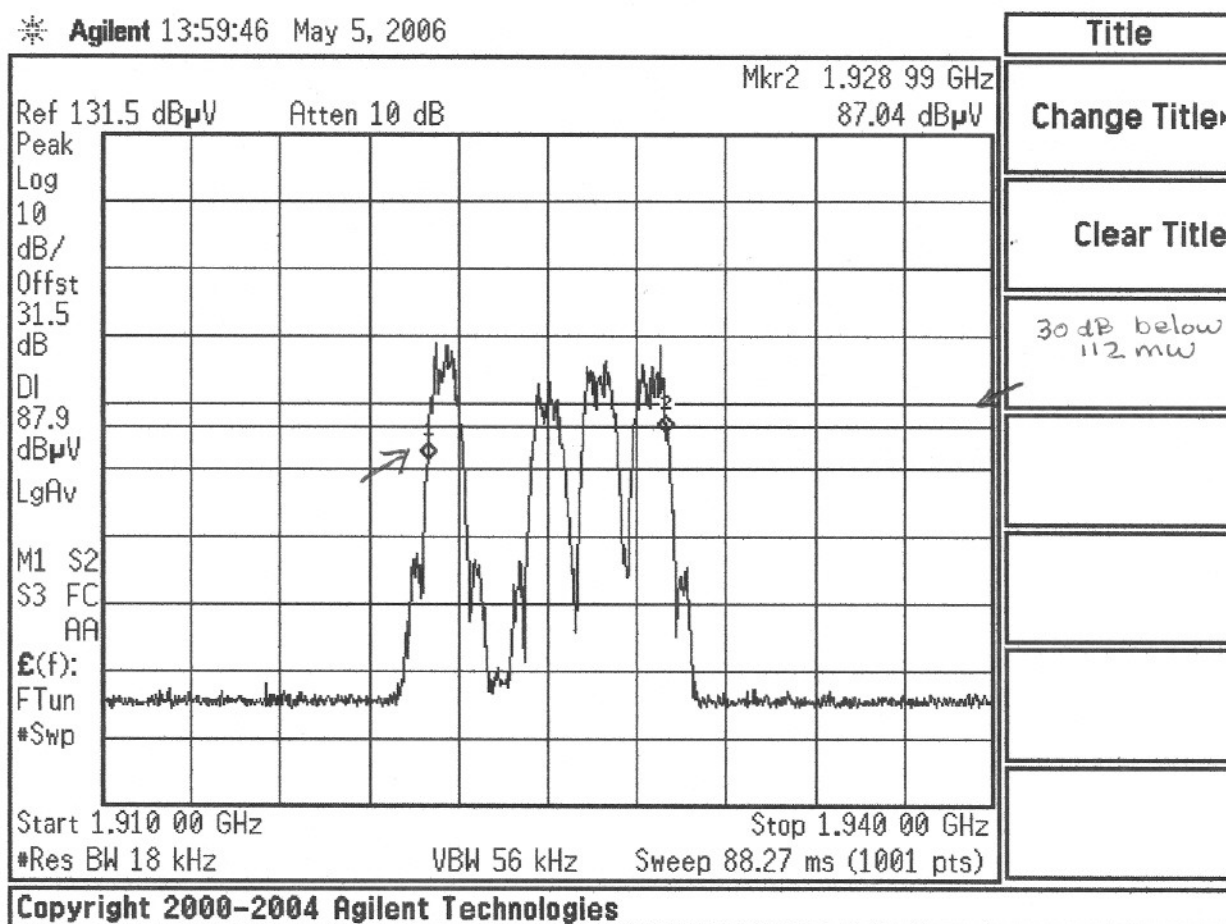
in-band mask - high channel

$$B = 1.46 \text{ MHz}$$

same for base + mic

mask drawn is for 15 mw permitted xmit power

mask for 120 mw transmit power would be
9 dB higher



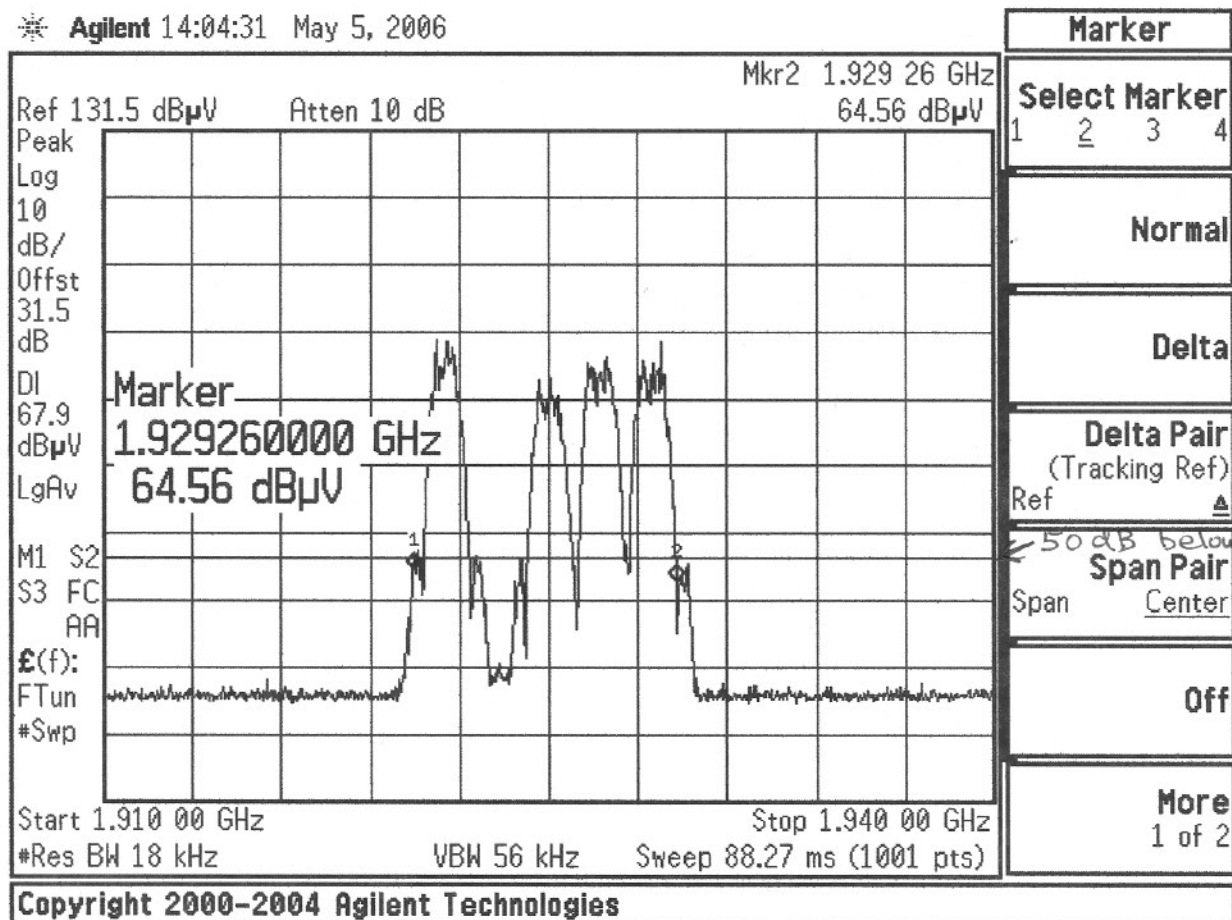
Marker 1 - 1920.9 MHz
 Marker 2 - 1928.9 MHz

reaches 30dB below 112mW in sub-band

emissions outside sub-band

microphone

* Agilent 14:04:31 May 5, 2006



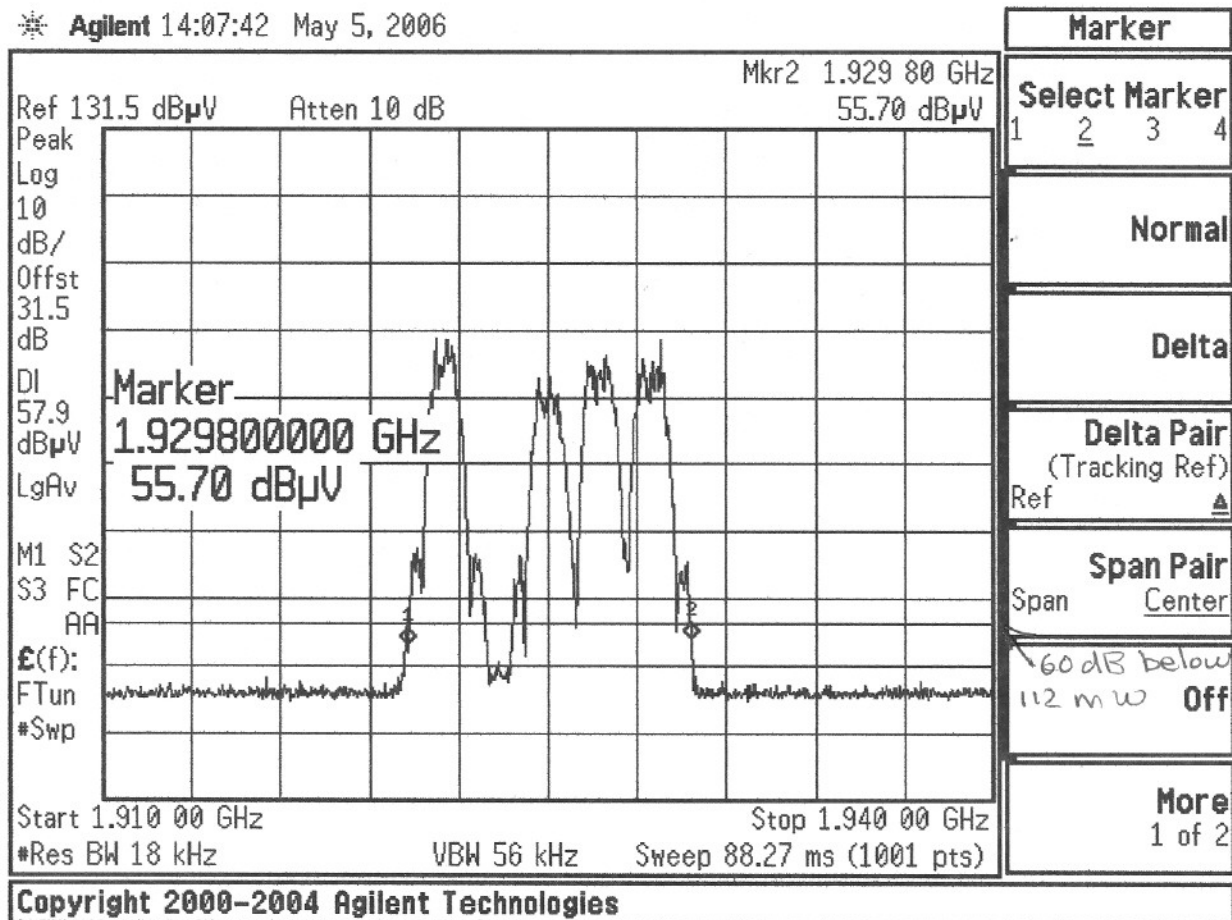
Marker 1 = 1920.4 MHz

Marker 2 = 1929.2 MHz

reaches 50 dB below 112 mW in sub-band

emissions outside sub-band

✱ Agilent 14:07:42 May 5, 2006



Marker 1 = 1920.2 MHz

Marker 2 = 1929.8 MHz

reaches 60 dB below 112 mW in sub-band

emissions outside sub-band

microphone

RADIATED EMISSIONS



Test Report #: DI602355 Run 1 Test Area: LTS
EUT Model #: SOLO Date: 5/18/2006
EUT Serial #: 105 EUT Power: BATTERY Temperature: 21.0 °C
Test Method: FCC 15 SUBPART D Air Pressure: 98.0 kPa
Customer: REVOLABS Rel. Humidity: 32.0 %

EUT Description: WIRELESS MICROPHONE

Notes: SPURIOUS SCAN

Data File Name: _____ Page: 1 of 1

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	FCC Part 15 Subpart D – dBuV/m	DELTA2
ALL READINGS MAXIMIZED.						
57.9 dBuV/m = 60 dB below 112 mW						
LOW CHANNEL.						
960.753 MHz	52.8 Pk	2.59 / 22.82 / 27.5 / 0.0	50.7	V / 1.00 / 0	57.9	n/a
HIGH CHANNEL.						
964.242 MHz	50.2 Pk	2.59 / 22.88 / 27.51 / 0.0	48.17	V / 1.00 / 30	57.9	n/a
NO EMISSIONS DETECTED ABOVE 1GHz IN EITHER CHANNEL.						
END OF SCAN 30MHz - 19.3GHz.						

Tested by: Ross M Johnson

Printed

Signature

Reviewed by: Greg Jakubowski

Printed

Signature

Frequency stability: FCC 15.323(f), IC RSS-213 6.2

Test summary

The requirements are: ■ - MET □ - NOT MET

Degrees C	Frequency (MHz) – Channel 1	Frequency (MHz) – Channel 5
-20	1921.558 (+4 ppm)	1928.492 (+4 ppm)
-10	1921.550 (0 ppm)	1928.483 (0 ppm)
0	1921.558 (+4 ppm)	1928.500 (+8 ppm)
10	1921.550 (0 ppm)	1928.500 (+8 ppm)
20	1921.550	1928.483
30	1921.567 (+8 ppm)	1928.492 (+4 ppm)
40	1921.550 (0 ppm)	1928.467 (-8 ppm)
50	1921.550 (0 ppm)	1928.467 (-8 ppm)
VAC		
102	1921.560 (+5 ppm)	1928.480 (-1 ppm)
138	1921.568 (+9 ppm)	1928.480 (-1 ppm)

Environtronics SH27, s/n 09963482-S

Agilent E4440A spectrum analyzer, #3367, cal due 02 September 2006.

Staco variac, #3846

Fluke 77 voltmeter, #2103, cal due 30 March 2007

Worst case of microphone/base station over 15 minute period are recorded, voltage measurements only apply to base station.

Test limits

±10 ppm

Appendix A

Constructional Data Form





EMC Test Plan and Constructional Data Form

America

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.

Company: Revolabs, Incorporated
 Address: 63 Great Road
Maynard, MA 01754
 Contact: Edward Chu Position: Senior Program Manager
 Phone: 978.897.5655 x113 Fax: 978.897.5616
 E-mail Address: echu@revolabs.com

General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description Wireless Microphone Base Station & Wireless Microphone
 EUT Name Solo Executive Base Station & Solo Executive Microphones
 Model No.: 01-EXERAC-BLK-11 Serial No.: 501050000001
& 01-EXEMIC-BLK-11 & 501050000003
 Product Options: _____
 Configurations to be tested: _____

Equipment Modification (If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)

Modifications since last test: _____
 Modifications made during test: _____

Test Objective(s): Please indicate the tests to be performed, entering the applicable standard(s) where noted.

- | | |
|---|--|
| ☐ EMC Directive 89/336/EEC (EMC)
Std: _____ | ☒ FCC: Class ☐ A ☒ B Part <u>15</u> |
| ☐ Machinery Directive 89/392/EEC (EMC)
Std: _____ | ☐ VCCI: Class ☐ A ☐ B |
| ☐ Medical Device Directive 93/42/EEC (EMC)
Std: _____ | ☐ BSMI: Class ☐ A ☐ B |
| ☐ Vehicle Directive 72/245/EEC (EMC)
Std: _____ | ☒ Canada: Class ☐ A ☒ B |
| ☐ FDA Reviewers Guidance for Premarket
Notification Submissions (EMC) | ☐ Australia: Class ☐ A ☐ B |
| | ☐ Other: _____ |

Third Party Certification, if applicable (*Signature on Page 6 Required)

- | | |
|--|---|
| ☐ Attestation of Conformity (AoC)* | ☐ EMC Certification (used with Octagon Mark)* |
| ☐ Certificate of Conformity (CoC)*
Protection Class (N/A for vehicles) | ☐ Compliance Document* |
| (Press F1 when field is selected to show additional information on Protection Class.) | ☐ Class I ☐ Class II ☐ Class III |
| ☒ FCC / TCB Certification | ☒ Industry Canada / FCB Certification |
| ☐ E-Mark Certification | ☐ Taiwan Certification |

**EMC Test Plan and Constructional Data Form****Attendance**Test will be: ☐ Attended by the customer ☒ Unattended by the customer**Failure - Complete this section if testing will not be attended by the customer.**

If a failure occurs, TÜV America should:

- ☐ Call contact listed above, if not available then stop testing. (After hrs phone): 508.494.4439
- ☒ Continue testing to complete test series.
- ☐ Continue testing to define corrective action.
- ☐ Stop testing.

EUT Specifications and RequirementsLength: 16.9" Width: 8.0" Height: 1.7" Weight: 6.5 lbs.**Power Requirements**

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 110 (If battery powered, make sure battery life is sufficient to complete testing.)# of Phases: 1Current (Amps/phase(max)): 1 Current (Amps/phase(nominal)): .09Other Charger Base 110 V, 0.3A AC, 5V 2A DC (max)**Other Special Requirements****Typical Installation and/or Operating Environment**(ie. Hospital, Small Business, Industrial/Factory, etc.)
Business conference room.**EUT Power Cable**

☐ Permanent OR ☒ Removable Length (in meters): 1.8

☐ Shielded OR ☒ Unshielded

☐ Not Applicable



EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables														
Type	Analog	Digital	During Test		Qty	Shielding		Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent	
			Active	Passive		Yes	No							Type
EXAMPLE: RS232	☐	☒	☒	☐	2	☒	☐	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	☒	☐
Audio line-level in/out	☒	☐	☒	☐	16	☒	☐	2 condutor audio with shield	bare wire	3.5mm mini-phoenix	none	1	☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
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	☐	☐	☐	☐		☐	☐						☐	☐



EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: c7490_r4

Description: Operating software

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Base Station and eight microphones, all connected over air.
2. Base Station powered on but no connections. Eight microphones docked in charger, and synchronized to Base (i.e. listening within radio range)
- 3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #
Solo Executive Base Station (1)	01-EXERAC-BLK-11	501050000001	0014898290
Solo Executive Charger Base (1) includes PSU	01-EXECHG-STD-11	501050000002	0014898290
Solo Executive Microphone (8)	01-EXEMIC-BLK-11	501050000003 - 10	0014898290



EMC Test Plan and Constructional Data Form

America

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)
This information is required for FCC & Taiwan testing.

<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>
None - EUT is standalone.			

Oscillator Frequencies

<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
10.368MHz		4 Crystal on Base Station	processor clock and radio sythesizer reference
10.368Mhz		1 Crystal on microphone	processor clock and radio sythesizer reference
315MHz		1 SAW resonator on Charger Base	315MHz transmitter module
315MHz		1 SAW receiver on Base Station	315MHz receiver module

Power Supply

<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
Phihong	PSC10A-050S		☒ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
XP Power	ACS20US05		☒ Switched-mode: (Frequency) <u>50-70 kHz</u> ☐ Linear ☐ Other: _____

Power Line Filters

<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>



EMC Test Plan and Constructional Data Form

Critical EMI Components (Capacitors, ferrites, etc.)

<i>Description</i>	<i>Manufacturer</i>	<i>Part # or Value</i>	<i>Qty</i>	<i>Component # / Location</i>
No major components.				
Many small ceramic bypass capacitors.				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

Multilayer PCBs with ground planes and careful layout.
 Series resistance on most external connections.
 BPF and LPF on RF connections.

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

Authorization Signatures (Signature Required for Certifications checked on pg 1)

Marty Bodley, CEO

June 21, 2006

Customer authorization to perform tests
 according to this test plan.

Date

Tom Zimmerman

June 21, 2006

Test Plan/CDF Prepared By (please print)

Date

Appendix B

Measurement Protocol



MEASUREMENT PROTOCOL

Environmental conditions in the lab, (TUV)

Temperature: 22 - 26° C

Relative Humidity: 20 - 22 %

Atmospheric pressure: 98.0 – 99.0 kPa

Test Methodology

Emissions testing is performed according to the procedures in ANSI C63.4-2003.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of ± 1.8 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of ± 4.8 dB. The equipment comprising the test systems is calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

Radiated Emissions

The final level, in dB μ V/m, equals the reading from the spectrum analyzer (Level dB μ V), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL (dB μ V)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL (dB μ V/m)	POL/HGT/AZ (m) (deg)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

Substitution Method

Radiated emissions from the EUT are measured in the frequency range of 30 to 19500 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. Intentional radiators are positioned through 3 orthogonal axes to determine the maximum level. The field strength levels were measured per ANSI C63.4. The EUT is then replaced with a tuned dipole antenna (below 1 GHz) or horn antenna (above 1 GHz). The substitute antenna was placed in the same polarization as the test antenna. A signal generator was used to generate a signal level that matched the highest level measured from the EUT. The signal generator level minus the cable loss from the signal generator to the substitute antenna plus the substitute antenna gain equals the power level.

Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.