



TEST NUMBER - 277-01

TESTING TO

**FEDERAL COMMUNICATIONS COMMISSION CFR47 PART 15.239**

**Low Power License-Exempt Radiocommunication Devices**  
**Intentional Radiators**

for

Akoo. Inc  
2500 North Harlem Avenue  
Elmwood Park, IL 60707

708-583-9600

of

Link-it

FCC ID#: O5UFMLINK

on

9/26/2001

Tested by

A ndrew Mertinooke

Andrew Mertinooke

Reviewed by

Clifton P. B rick

Clifton P. Brick

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TEST DESCRIPTION

1. TEST OBJECTIVE

**To test the Link-it to Part 15 Subpart C Rules and write a report.**

2. E.U.T. DESCRIPTION

GENERAL

**The Link-it is an FM Band low power transmitter used to "Link" an MP3 or CD player to an automobile or domestic stereo receiver.**

SERIAL NUMBERS:

**Production Prototype.**

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#### **TEST RESULTS AND CONCLUSIONS**

PRODUCT TESTED - Link-it

#### **RADIATED TEST RESULTS**

The test results show that the emissions radiated from this equipment are in compliance with FCC Rules Part 15 Subpart C.

#### **OCCUPIED BANDWIDTH & OUTPUT POWER**

The test results show that the occupied bandwidth and output power of this equipment are in compliance with FCC Rules Part 15 Subpart C .

#### **CONDUCTED TEST RESULTS**

Conducted testing is not applicable to this product as it is solely powered from AAA batteries.

#### **ANALYSIS AND CONCLUSIONS**

Based upon the radiated and conducted measurements we find that this equipment is within the limits of the FCC Rules Part 15 Subpart C. All results are based on a test of one sample, and represent other production units, only in as much as a sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

#### **NOTES (Special conditions unique to this test)**

Please see the note on the bottom of page 6 and the notes on page 26.



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**TEST PROCEDURES**

1. TEST EQUIPMENT

- A. HP 8546A (9 kHz - 6.5 GHz) EMI Receiver w/ RF Filter Section, S/N 3704A00323 / 3650A00360. Calibration Date 8-28-2001, calibrated annually.
- B. Com-Power Biconilog Antenna, Model AC220, S/N 25509. Calibration Date 12-9-2000, calibrated annually.

2. FREQUENCY RANGE TO BE SCANNED.

- A. Radiated Test from 30 MHz to 40 GHz (or the 10<sup>th</sup> harmonic of the highest frequency whichever is lower).

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### 3. TEST PROCEDURES.

#### **Radiated test procedure:**

The EUT, associated cables and peripheral devices are placed on the supporting table and any support equipment is placed off the site. The EUT is turned on and any necessary operating or test software installed and allowed to warm up. The EUT is pre-scanned in our ferrite tile lined chamber where it is rotated 360 degrees and examined in both horizontal and vertical polarization, all emission frequencies are identified and recorded. The EUT is then moved to the OATS and the frequency band from 30 MHz to 40 GHz is scanned, all frequencies identified in the chamber are investigated, as well as harmonic frequencies of the EUT. When an emission is found the emission is maximized by varying the bundle position of the connecting cables, the antenna height, the antenna polarization (vertical and horizontal) and the table orientation (360 degrees). The maximum reading is recorded and the next signal is searched for.

#### **Conducted test procedure:**

The power line of the EUT is connected to the LISN (Line Impedance Stabilization Network). A measurement of the emissions are made from the power line for both phase and neutral on the analyzer in the frequency range from 450 kHz to 30 MHz. The maximum readings are recorded for each phase.

All measurements are made according to the procedures defined in: "ANSI C63.4-1992 Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz, American National Standard for (ISBN 1-55937-215-5).

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**Part 15 TEST LIMITS**

1. FCC Part 15.209, 15.235, 15.239, 15.249 Radiation Limits:  
Limits are using a Quasi-Peak detector unless otherwise noted.

Frequency MHz	Distance meters	Limit dB $\mu$ V/m	Limit $\mu$ V/m
1.705 - 30	30	29.5*	30*
30 - 88	3	40.0	100
49.82 - 49.90	3	80.0*	10,000*
88-108	3	48.0*	250*
88 - 216	3	43.5	150
216 - 960	3	46.0	200
902 - 928	3	94.0*	50,000*
960 - 1000	3	54.0	500
1000 - 40000	3	54.0*	500*

\*NOTE: Average Limits

2. FCC Part 15.207 Conduction Limits (Quasi-Peak)

Frequency MHz	Limit dB $\mu$ V/m	Limit $\mu$ V/m
0.450 - 30.0	48.0	250



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### TEST FACILITY DESCRIPTION

Compliance Worldwide is located on 357 Main Street in Sandown, New Hampshire. The conducted and radiated test sites, located at C.W. are used for Federal Communications Commission (FCC) testing and Industry Canada Testing. A site description is on file with the FCC in Columbia, MD USA. Site information is also on file with Industry Canada, anyone wishing to review this Test Facility Description is referred to file number **IC 3023**. This is currently on file at Industry Canada, 1241 Clyde Avenue, Ottawa, ON K2C 1Y3.

The radiated site is a 3/10 meter indoor site with an enclosure for the product and a basement for the personnel, support equipment and test equipment.

The conducted site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical metal wall required by EN 55022.

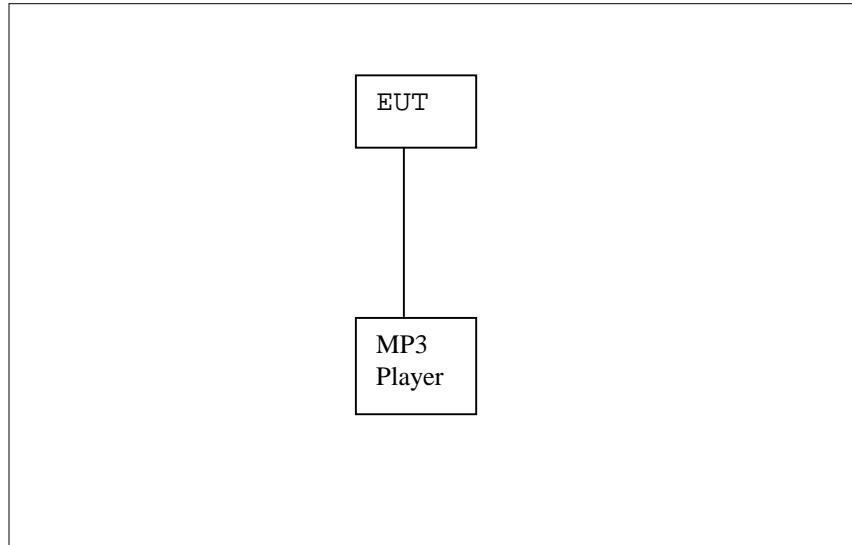
Both sites are designed to test products or systems 1.5 meter x 1.0 meter, floor standing or table top.

**DATE ON FILE FCC: August 10, 2000**

**DATE ON FILE IC: August 11, 2000**

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**TEST SET UP  
AND  
PERIPHERAL CONNECTION INFORMATION**





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PLEASE NOTE - EUT (equipment under test) is Link-it.

The cables directly connected to this equipment are listed below. Please see below for a complete list of FCC ID's etc. on the supporting equipment.

Connection Descriptions

1. Audio In Cable/ Antenna  
(description)

EUT  
(from device)

Auxilliary equipmentment (MuzM MP3 player)  
(to device)

CABLE LENGTH 6.5" (S) SHIELDED or (U) UNSHIELDED U

2. N/A  
(description)

(from device)

(to device)

CABLE LENGTH  (S) SHIELDED or (U) UNSHIELDED

3. N/A  
(description)

(from device)

(to device)

CABLE LENGTH  (S) SHIELDED or (U) UNSHIELDED



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#### **RADIATED TEST RESULTS**

Frequency Range: 30 - 1000 MHz  
Measurement Distance: 3.0 Meters.  
Bandwidth: 120 kHz, Per ANSI C63.4-1992.\*  
Detector Functions: Peak, Quasi Peak, Average  
Video Filter: 300 kHz  
Table Height: 0.8 meters  
Antenna Height Variation: 1 - 4 Meters.

Horizontal and Vertical Polarization Measurements Taken.

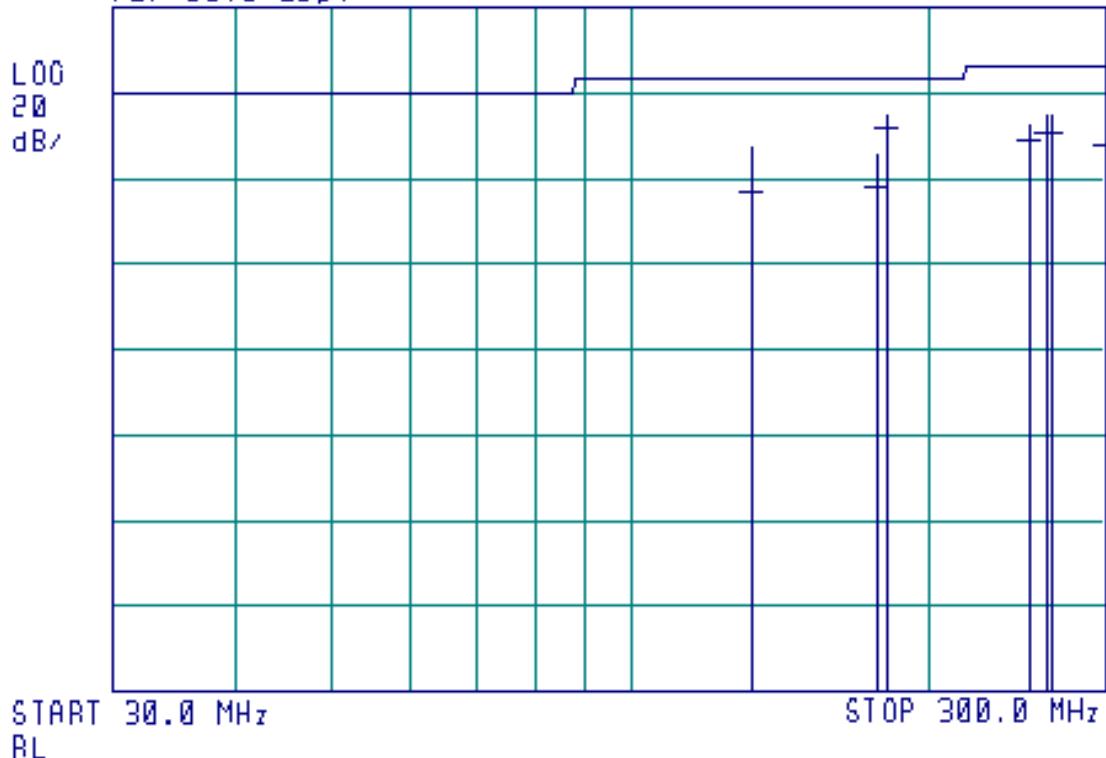
\*Measurement Bandwidth is 1 MHz above 1 GHz

**PLEASE SEE NEXT PAGE FOR RADIATED TEST DATA**

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**Radiated Horizontal Data Log Plot**

16:02:20 SEP 26 2001 RADIATED HORIZ 30-1000M  
TEST# 277-01 AKOO, INC. LINK-IT  
REF 60.0 dB $\mu$ V



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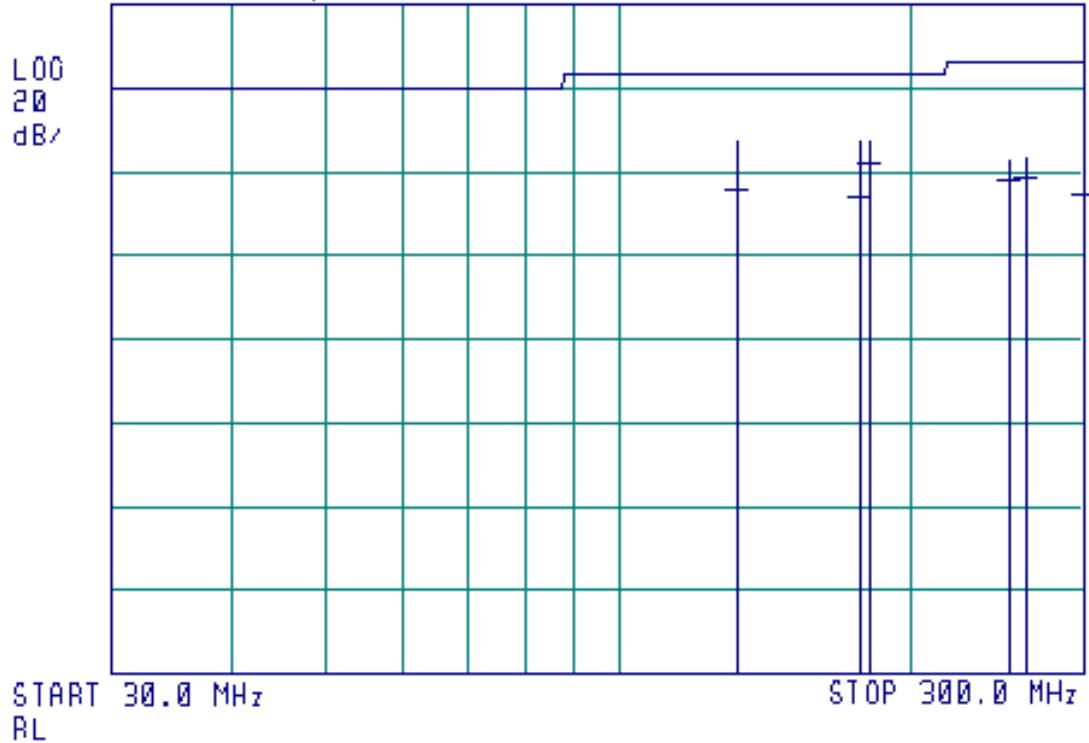
**Radiated Horizontal Tabular Data**

Freq (MHz)	Azimuth (Degrees)	Antenna Height (meters)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)
132.621265	80	4.0	27.79	17.42	43.50	-26.08
176.583250	294	1.0	25.74	18.21	43.50	-25.29
180.644729	100	1.8	35.21	32.66	43.50	-10.84
251.202220	98	1.0	33.06	29.49	46.00	-16.51
262.468873	104	1.0	34.53	30.66	46.00	-15.34
265.003125	308	1.0	35.39	31.75	46.00	-14.25
299.192194	98	1.0	32.59	28.04	46.00	-17.96
353.2	Emission is greater than 25 dB below the limit.					
441.5						
529.8						
618.1						
706.4						
794.7						
883.0						

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**Radiated Vertical Data Log Plot**

15:47:31 SEP 26, 2001 RADIATED VERTICAL 30-1000M  
TEST# 277-01 AKOO, INC. LINK-IT  
REF 60.0 dB $\mu$ V



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**Radiated Vertical Tabular Data**

Freq (MHz)	Azimuth (Degrees)	Antenna Height (Meters)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dB)
132.621265	254	1.0	27.84	15.73	43.50	-27.77
176.531000	8	2.8	27.81	14.18	43.50	-29.32
180.644729	240	1.6	27.81	22.49	43.50	-21.01
251.202220	190	1.5	23.30	18.59	46.00	-27.41
262.468873	354	1.4	23.55	19.25	46.00	-26.75
299.192194	210	1.0	22.62	15.09	46.00	-30.91
264.9	Emission is greater than 25 dB below the limit.					
353.2						
441.5						
529.8						
706.4						
794.7						
883.0						



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**RADIATED OUTPUT POWER & OCCUPIED BANDWIDTH TEST RESULTS**

Frequency Range: 88.1-88.7 MHz.  
Measurement Distance: 3.0 Meters.  
Bandwidth: As Noted, Per ANSI C63.4-1992.  
Detector Functions: Peak, Average.  
Video Filter: 300 kHz  
Table Height: 0.8 meters  
Antenna Height Variation: 1 - 4 Meters.  
Horizontal and Vertical Polarization Measurements Taken, Worst Case Reported.

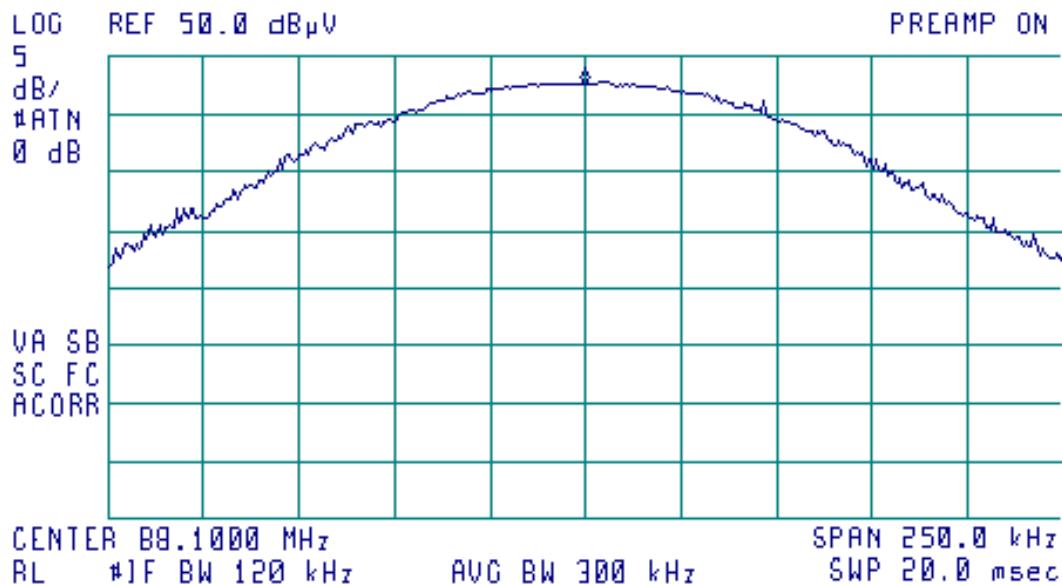
**PLEASE SEE NEXT PAGE(S) FOR OCCUPIED BANDWIDTH RADIATED TEST DATA**

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**Channel A Output Power Plot**

 13:51:11 SEP 26, 2001 CHANNEL A 88.1MHZ  
 TEST# 277-01 AKOO, INC. L1NK-1T

FREQ 88.10 MHz
PEAK 48.4 dB <sub>μ</sub> V
QP NOT SELECTED
Avg 47.6 dB <sub>μ</sub> V

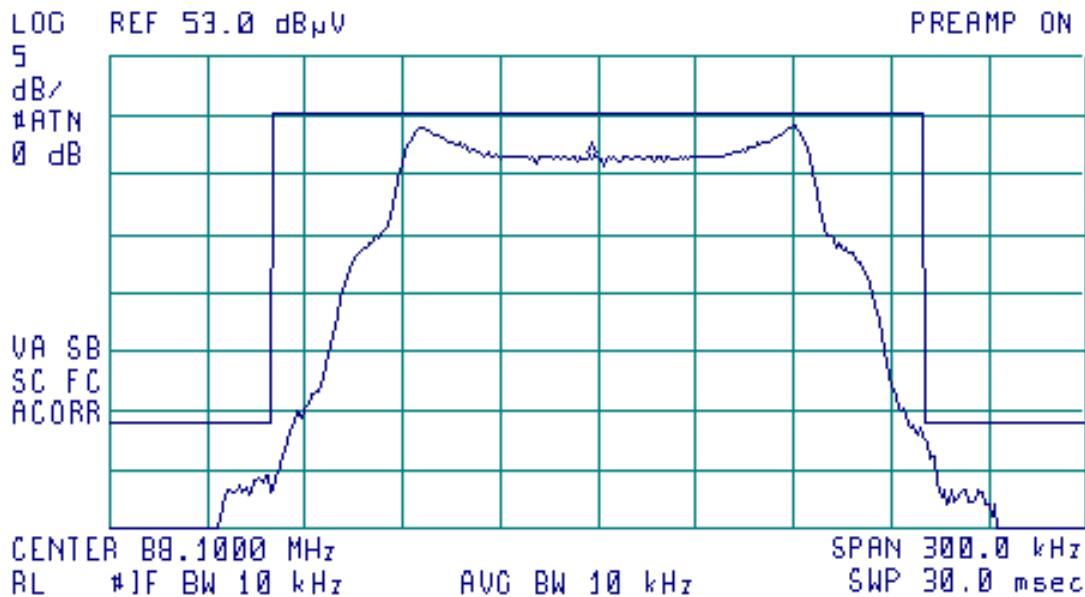

**Horizontal Tabular Data for Channel 1**

Freq (MHz)	Azimuth (Degrees)	Antenna Height (meters)	Peak Amp (dB <sub>u</sub> V/m)	Avg Amp (dB <sub>u</sub> V/m)	Avg Limit (dB <sub>u</sub> V/m)	Avg Margin (dB)
88.10	140	2.1	48.4	47.6	48.0	-0.4

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**Channel A Occupied Bandwidth Plot** 13:16:51 SEP 25, 2001 CHANNEL 1 BANDWIDTH  
AKOO, INC. LINK-IT TEST#277-01

ACTV DET: PEAK  
MEAS DET: PEAK OP  
MKR 88.0978 MHz  
44.24 dB $\mu$ V



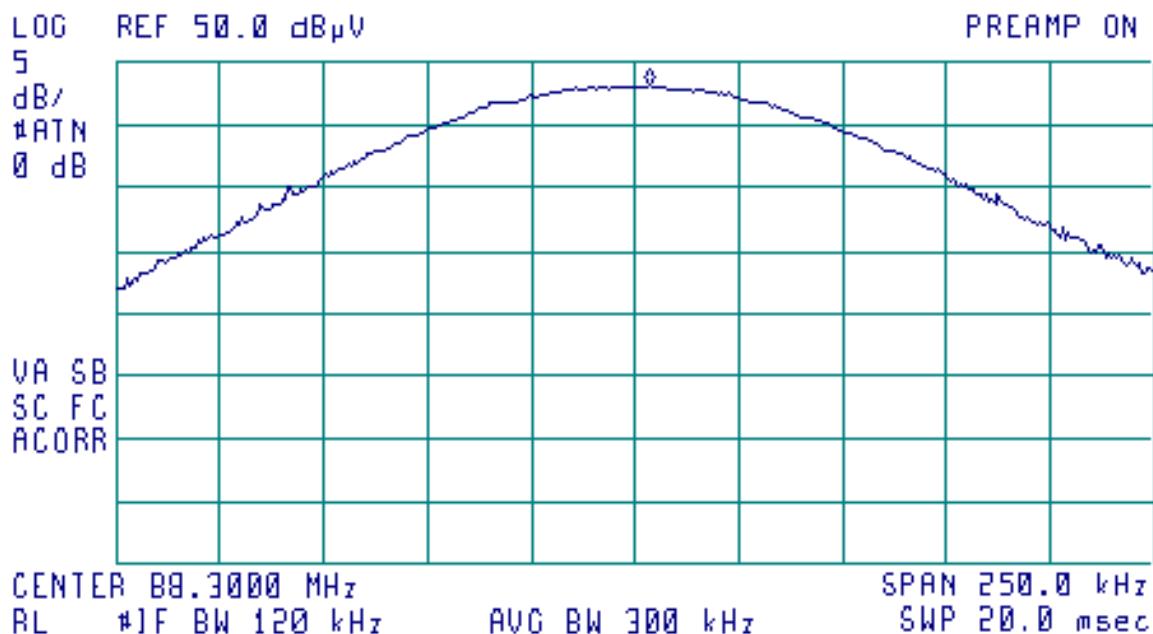
Display shows a mask with the top limit at 48 dB $\mu$ V, and the lower flanks 200 kHz wide and 26 dB below the top limit.

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## Channel B Output Power Plot

 13:53:35 SEP 26, 2001 CHANNEL B 88.3MHZ  
 TEST# 277-01 AKOO, INC. LINK-11

FREQ	88.30	MHz
PEAK	48.4	dB $\mu$ V
QP	NOT SELECTED	
Avg	47.9	dB $\mu$ V



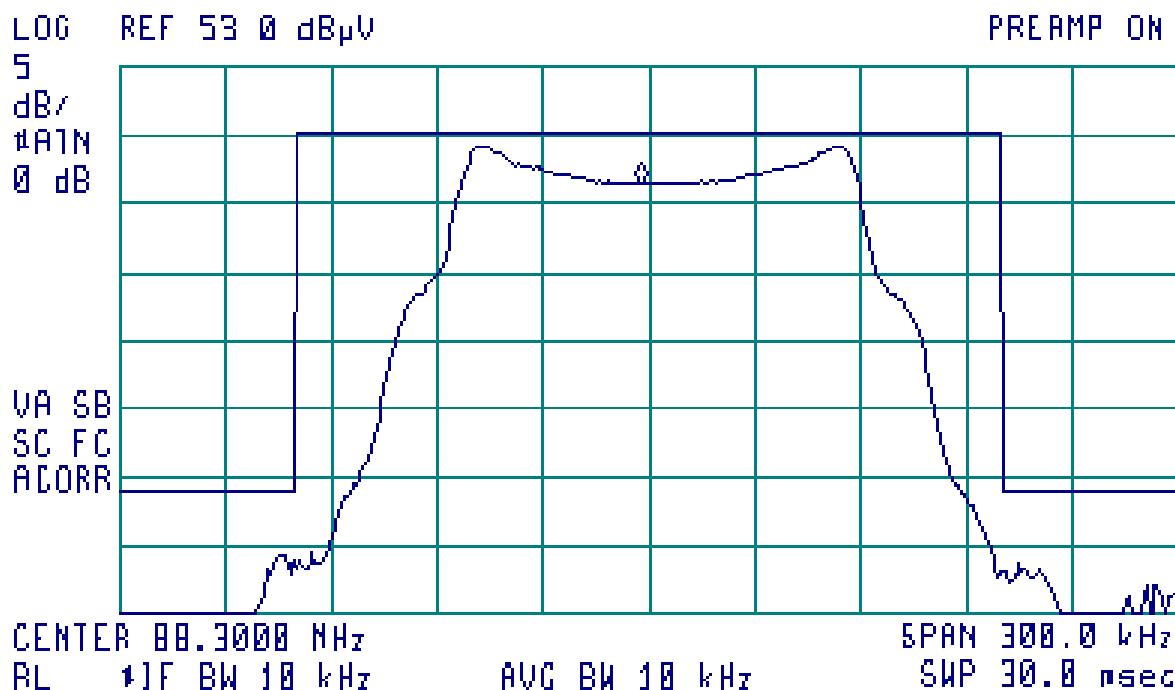
## Horizontal Tabular Data for Channel 2

Freq (MHz)	Azimuth (Degrees)	Antenna Height (meters)	Peak Amp (dB $\mu$ V/m)	Avg Amp (dB $\mu$ V/m)	Avg Limit (dB $\mu$ V/m)	Avg Margin (dB)
88.30	140	2.1	48.4	47.9	48.0	-0.1

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## Channel B Occupied Bandwidth Plot

 13:19:18 SEP 25, 2001 CHANNEL 2 BANDWIDTH  
 AKOO, INC. LINK-11 TEST#277-01  
 CENTER 88.3000 MHz ACTV DET: PEAK  
 MEAS DET: PEAK QP  
 MNR 88.2978 MHz  
 44.56 dB<sub>μ</sub>V



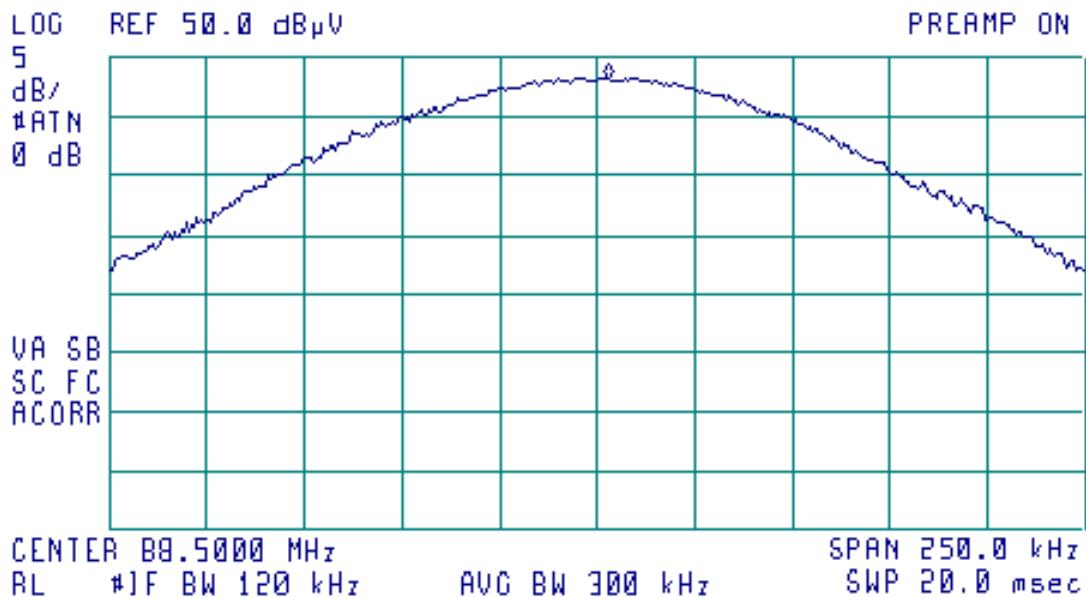
Display shows a mask with the top limit at 48 dB<sub>μ</sub>V, and the lower flanks 200 kHz wide and 26 dB below the top limit.

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**Channel C Output Power Plot**

 13:55:47 SEP 26, 2001 CHANNEL C 88.5MHZ  
 TEST# 277-01 AKOO, INC. LINR-1T

FREQ 88.50 MHz
PEAK 48.5 dB $\mu$ V
QP NOT SELECTED
Avg 47.9 dB $\mu$ V



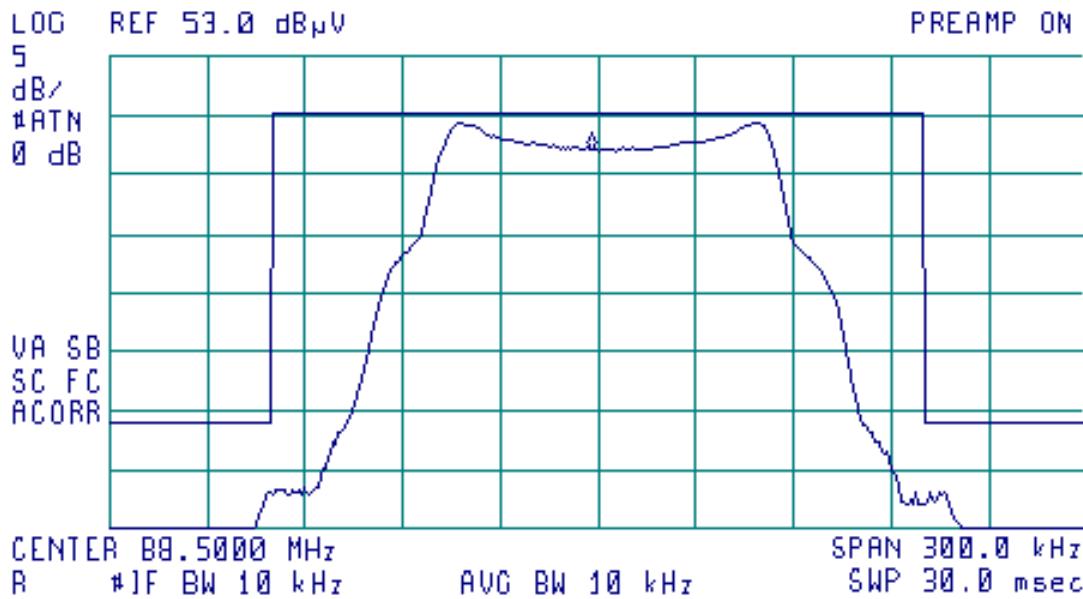
Horizontal Tabular Data for Channel 3

Freq (MHz)	Azimuth (Degrees)	Antenna Height (meters)	Peak Amp (dB $\mu$ V/m)	Avg Amp (dB $\mu$ V/m)	Avg Limit (dB $\mu$ V/m)	Avg Margin (dB)
88.50	140	2.1	48.5	47.9	48.0	-0.1

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**Channel C Occupied Bandwidth Plot** 13:21:23 SEP 25, 2001 CHANNEL 3 BANDWIDTH  
AKOO, INC. LINK-IT TEST#277-01

ACTV DET: PEAK  
MEAS DET: PEAK OP  
MKR 88.4978 MHz  
45.07 dB $\mu$ V



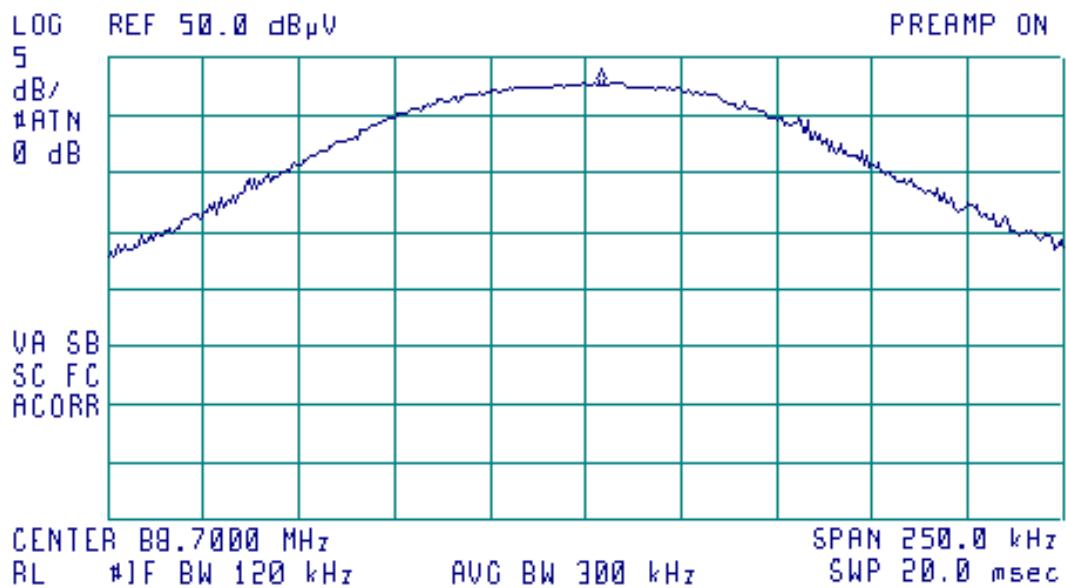
Display shows a mask with the top limit at 48 dB $\mu$ V, and the lower flanks 200 kHz wide and 26 dB below the top limit.

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**Channel D Output Power Plot**

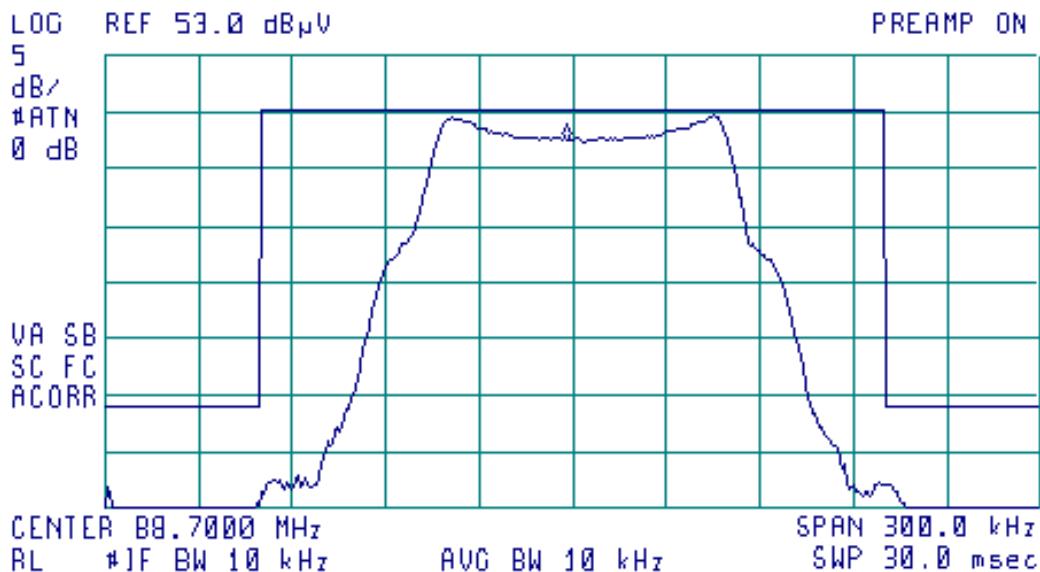
 13:59:41 SEP 26, 2001 CHANNEL D 88.7MHz  
 TEST# 277-01 AKOO, INC. LINK-1T

FREQ	88.70	MHz
PEAK	48.0	dB $\mu$ V
QP	NOT SELECTED	
AVG	47.5	dB $\mu$ V


**Horizontal Tabular Data for Channel 1**

Freq (MHz)	Azimuth (Degrees)	Antenna Height (meters)	Peak Amp (dBuV/m)	Avg Amp (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)
88.70	140	2.1	48.0	47.5	48.0	-0.5

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**Channel D Occupied Bandwidth Plot****13:22:39 SEP 25, 2001 CHANNEL 4 BANDWIDTH**  
AKOO, INC. LINK-IT TEST#277-01**ACTV DET: PEAK  
MEAS DET: PEAK OP  
MRR 88.6978 MHz  
45.49 dB $\mu$ V**

Display shows a mask with the top limit at 48 dB $\mu$ V, and the lower flanks 200 kHz wide and 26 dB below the top limit.

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#### **CONDUCTED TEST RESULTS**

Frequency Range: 450 kHz to 30.0 MHz.  
Bandwidth: 9 kHz per ANSI C63.4-1992.  
Detector Functions: Peak, Quasi-Peak, Average  
Table Height: 0.8 meters  
Video Bandwidth: 30 kHz.

Phase and Neutral Measurements Taken.

**Conducted testing is not applicable as the EUT is powered only by AAA batteries.**



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**NOTES AND COMMENTS**

(Special conditions unique to this test)

A new set of 2 Duracell AAA batteries were used during testing.

Per the manufacturers specification, 320mVPP 1kHz tone was input on the audio in connector for occupied bandwidth testing.

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**Compliance Worldwide, Inc. – 357 Main Street – Sandown, NH 03873**  
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