TEST NUMBER – 354-05

**TEST REPORT TO**

**FEDERAL COMMUNICATIONS COMMISSION CFR47 PART95**

**Low Power Licensed Radio communication Devices**
**Medical Telemetry Service Transceiver**
**In the bands 1395-1400 and 1427-1432 MHz**

for

Philips Medical Systems
Cardiac and Monitoring Systems
3000 Minuteman Drive
Andover, MA 01810
978-659-2800

of

Instrument Telemetry Service Module-ITS

Model M4840-65708

on

December 6 – 8, 2005

Brian F. Breault

Reviewed by

Larry K. Stillings

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TEST DESCRIPTION

1. TEST OBJECTIVE

**To test the Instrument Telemetry Service Module, Model M4840-65708 to FCC Part 95 Rules and write a report.**

2. E.U.T. DESCRIPTION

GENERAL

**The Instrument Telemetry Service Module, Model M4840-65708 is RF module that provides an RF link to a monitoring station via Philips telemetry infrastructure including the Access Point transceiver.**

FREQUENCIES USED : 1395.9, 1397.5, 1399.1, 1427.9, 1429.5, 1431.1 MHz

MODULATION SCHEME: FSK with Root Raised Cosine Filtering

SERIAL NUMBERS : A00010

## TEST RESULTS AND CONCLUSIONS

| Rule Section | Requirement | Notes | Pass | Fail |
|---|---|---|---|---|
| 95.1109(b) | Labeling | See Exhibits FCC Label Sample and Label Location. | 1 | |
| 95.115(a)(2) | Field Strength Limits | | X | |
| 95.115(b) | Undesired Emissions Limits | | X | |
| 95.115(c) | Emission Type | Transmits Data and ECG Waveform | X | |
| 95.115(e) | Frequency Stability | Data Provided By Philips Medical | 1 | |
| 95.1125 | RF Safety | Statement and Technical Basis | 1 | |

Note 1.) Exhibits provided by Philips for approval submission.

## TEST RESULTS AND CONCLUSIONS

PRODUCT TESTED - Instrument Telemetry Service Module-ITS

MODEL NUMBER - M4840-65708

### RADIATED EMISSIONS TEST RESULTS

The test results show that the emissions radiated from this equipment are in compliance with FCC Rules Part 95.

### 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 95 .

### CONDUCTED EMISSIONS TEST RESULTS

N/A (see Part 15 report)

### ANALYSIS AND CONCLUSIONS

Based upon the radiated and conducted measurements we find that this equipment is within the limits of the FCC Rules Part 95. 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)

None.

**TEST PROCEDURES**

1. TEST EQUIPMENT

A. HP 8546A (9 kHz - 6.5 GHz) EMI Receiver w/ RF Filter Section, S/N 3704A00323 / 3650A00360.

B. HP 8593E (9 kHz - 26.5 GHz) Spectrum Analyzer, S/N 3829A03887.

C. Com-Power Biconilog Antenna, Model AC220, S/N 25509.

D. Electro-Metrics Double Ridged Guide Antenna, Model EM-6961, S/N 6337.

E. HP 1 - 26.5 GHz Preamplifier, Model 08449B, S/N 3008A01323.

F. Mini-Circuits DC - 18 GHz, 6 dB Attenuator, Model MCL BW-S6W2, S/N 0431.

G. Mini-Circuits 3 GHz - 7 GHz, High Pass Filter, Model VHP-26, S/N 0334.

H. Bandpass Filter 8 GHz - 12 GHz, Model 22102-0001, S/N 0304.

2. FREQUENCY RANGE TO BE SCANNED.

A. Radiated Test from 30 MHz to 40 GHz (or the $10^{th}$ harmonic of the highest frequency, whichever is lower).

B. Conducted Test from 150 kHz to 30 MHz.

3. TEST PROCEDURES.

**Radiated Emissions 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 Emissions 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 C63.4-2003 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).

## FCC Part 95.1115 Test Limits

1. Part 95.1115(a)(2) Field Strength Radiation Limits:

| Frequency MHz | Distance meters | Limit dBμV/m | Limit μV/m |
|---|---|---|---|
| 1395-1400 | 3 | 117.4* | 740000* |
| 1427-1429.5 | 3 | 117.4* | 740000* |

*NOTE: Average Limits

2. FCC Part 95.1115(b) Out-of-band emissions Limits (Quasi-Peak):

| Frequency MHz | Distance meters | Limit dBμV/m | Limit μV/m |
|---|---|---|---|
| Below 960 | 3 | 46 | 200 |
| Above 960 | 3 | 54* | 500* |

*NOTE: Average Limits

## 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.

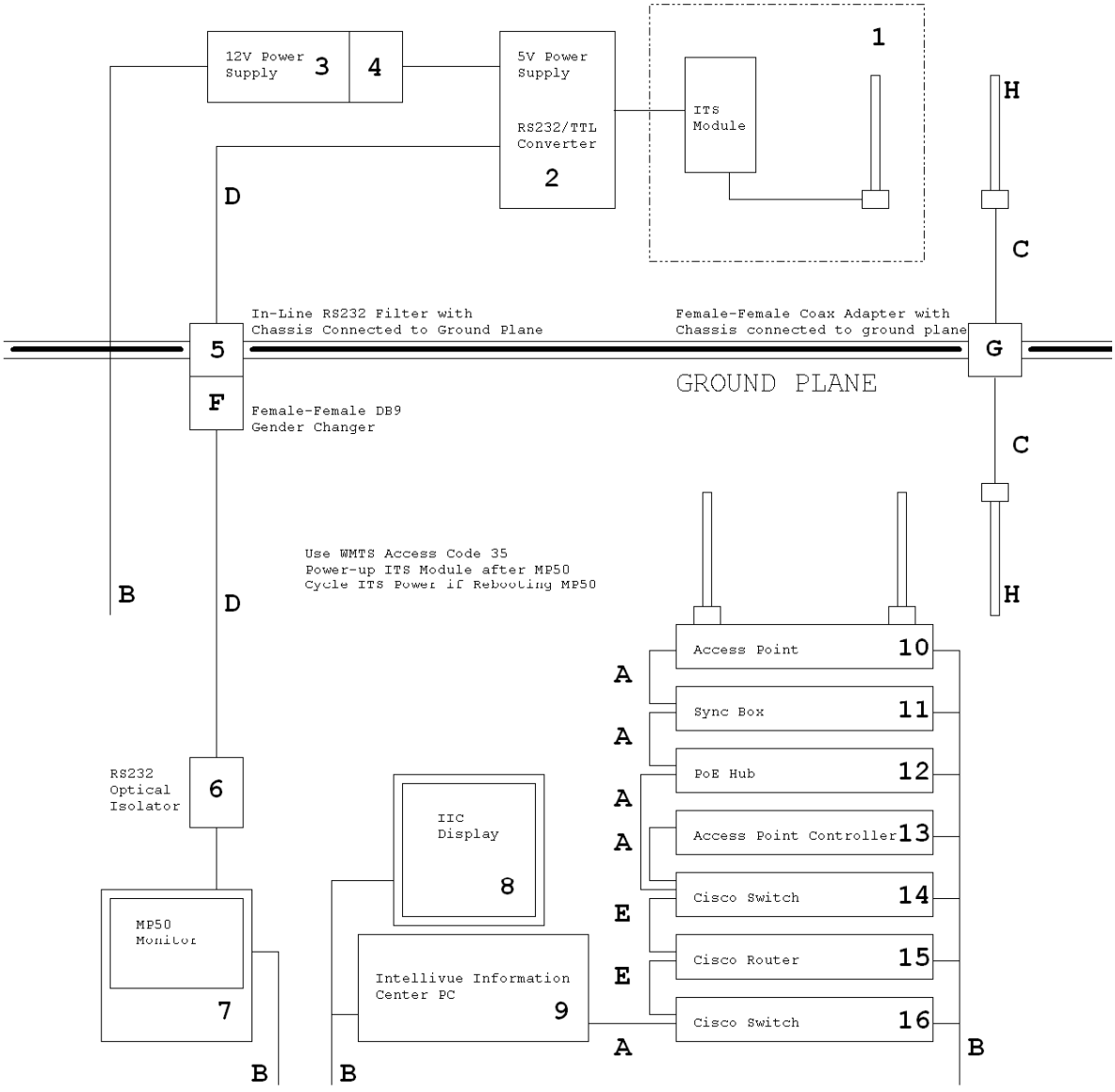
The radiated site is a 3/10 meter indoor site with an enclosure for the product and a basement for the personnel, support equipment and test equipment.

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.

## TEST SET UP
## and
## PERIPHERAL CONNECTION INFORMATION

### Block Diagram





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## TEST SET UP
## and
## PERIPHERAL CONNECTION INFORMATION (continued)

**EUT**

| Block # | Mfr. | Model / Part # | Opt.(s) | HW Rev. | FW Rev. | SW Rev | Serial # (if available) | Nominal Test Voltage/Freq. | Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Philips | M4840-65708* | NA | 0001 | 5.1 | NA | 042410094 | DC from UPC Supply | Instrument Telemetry Service Module- ITS |
| 2 | Philips | M809026491 | NA | NA | NA | NA | 000053 | 5VDC | ITS Interafce Adapter Board |
| 3 | Philips | 453563464761 | NA | NA | NA | NA | 1402C043613504-D | 12VDC | UPC Universal Power Supply |
| 4 | Philips | 453563469711 | NA | NA | NA | NA | NA | 12VDC | UPC 12 V Output Cable DB9 to LAN/DC Plug |

* NOTE: 1.4GHz antennas for ITS are not available at this time. 2.4GHz antennas with necessary adapters will be used instead. This is not critical. Unshielded unterminated wire will also do the job. Just so there is no confusion --> The ITS module and Access Point come with, and will be tested with, the correct 1.4GHz antennas..

**Support Equipment**

| Block # | Mfgr | Model / Part # | Opt.(s) | HW Rev. | FW Rev. | SW Rev. | Serial # (if available) | Nom. Test Voltage | Description |
|---|---|---|---|---|---|---|---|---|---|
| 5 | Spectrum Control | 56-105-004 | NA | NA | NA | NA | NSN | NA | 9-Pin D-Sub 470pF in-line filter |
| 6 | B&B Electronics | 6 9POP4 | NA | NA | NA | NA | NSN | NA | 9-Pin RS232 Optical Isolator with 12V adapter |
| 7a | Philips | M8004A | A34 | NA | NA | B.11.04 | DE44009956 | 230 VAC | Intellivue MP50 Patient Bedside Monitor |
| 7b | Philips | M3001A | C18 | NA | NA | NA | DE22752096 | NA | Parameter Module, ECG/Resp., SP02, NBP, IBP, Temp. |
| 7c | Philips | M3001A | C18 | NA | NA | NA | DE12500024 | NA | Parameter Module, ECG/Resp., SP02, NBP, IBP, Temp. |
| 7d | Philips | M1032A | A02, ABA | NA | NA | NA | 3805G06345 | NA | VueLink Ventilator |
| 7e | Philips | M1020B | NA | NA | NA | NA | DE49001189 | NA | SP02 Module |
| 7f | Philips | M1012A | C10 | NA | NA | NA | 3805621352 | NA | CCO/C.O. Module |
| 8 | Philips | 107T56 | NA | NA | NA | NA | CNN52201RY | 100-240V | Standard 17" monitor |
| 9 | Philips | 7100 CMT | NA | NA | NA | NA | 2UA5270VKY | 100-240V | IntelliVue Information Center (PC) |
| 10 | Philips | M4842A | NA | NA | NA | NA | US52401414 | 120V | WMTS Access Point |
| 11 | Philips | M4844A | NA | NA | NA | NA | US42500087 | 100-240V | Sync Box |
| 12 | Power DSine | PD6006/AC | NA | NA | NA | NA | 1043468090016 55D03 | 100-240V | Power-over-Ethernet Hub |
| 13 | Philips | M3171-6006 | NA | NA | NA | NA | US4400238 | 120 VAC | WMTS Access Point Controller |
| 14 | Cisco | WS-C2950T-24 | NA | NA | NA | NA | FOC0904S0AY | 100-240V | Ethernet Switch |
| 15 | Cisco | WS-C3550-24-EMI | NA | NA | NA | NA | CAT0846X0AN | 100-240V | Ethernet Router |
| 16 | Cisco | 2950 | NA | NA | NA | NA | FOC0904S09Q | 100-240V | Ethernet Switch |

## TEST SET UP
## and
## PERIPHERAL CONNECTION INFORMATION (continued)

### Cables

| Block Item Letter | Part # | Shielded? Y or N | Length | No. of Conductors (if avail.) | Port Tested? (Y/N) | Termination | Function / Description |
|---|---|---|---|---|---|---|---|
| A | NPN | N | 2 m | 8 | N | Various devices | Category 5 UTP LAN cable (Generic) |
| B | NPN | N | 2 m | 3 | N | Various devices | AC power cord |
| C | NPN | Y | 5m | 2 | N | Aux. Antennas | 50 Ohm Coax Cable (for auxiliary coupling of RF signal to Intellivue system. |
| D | NPN | Y | 5m | 9 | N | TTL Converter | 9-Pin Standard RS232 Serial cable |
| E | NPN | N | 2m | 8 | N | CISCO Switch & Router | Crossover LAN Cable (Generic) |
| F | NPN | Y | NA | 9 | N | Optical Isolator | 9-Pin D-Sub Female-Female Gender Changer (Generic) |
| G | NPN | Y | NA | 2 | N | Aux. Antennas | Female-Female Coax adapter (Generic) |
| H | HG2405RD-NM | Y | NA | 2 | Y | ITS Module | HyperLink 2.4GHz Antenna with RP-TNC to coax adapter |

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## DETERMINATION OF AVERAGE FACTOR

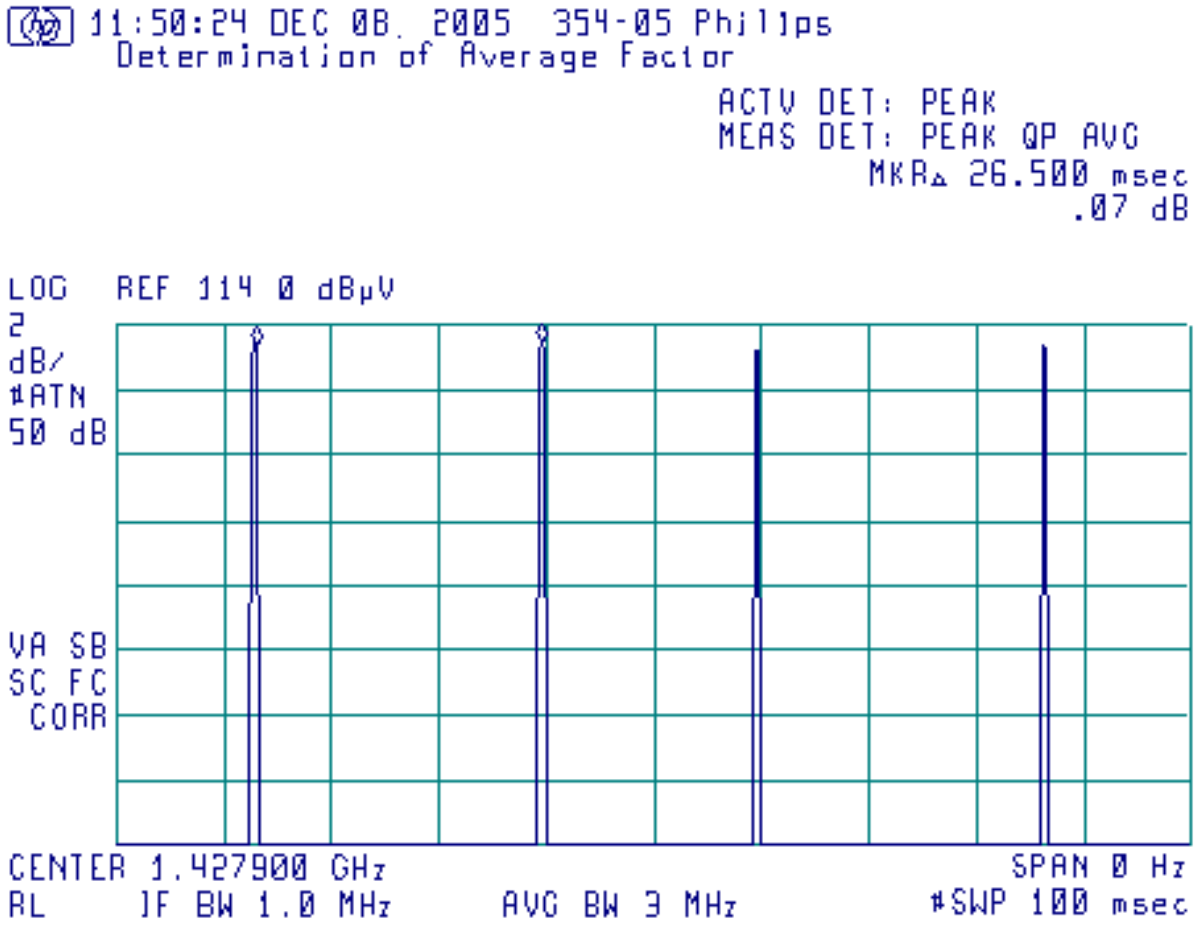
| | |
|---|---|
| Total Duration of 1 cycle: | 100ms |
| Total On-Time in 1 cycle: | 4*<412uS=1.7mS |
| On-Time divided by cycle: | 1.7ms/100ms = 0.017 |
| Average Factor: | 20*log(0.017) = -35.4dB |

FCC maximum allowed average factor is –20dB.

See the following pages for supporting data.

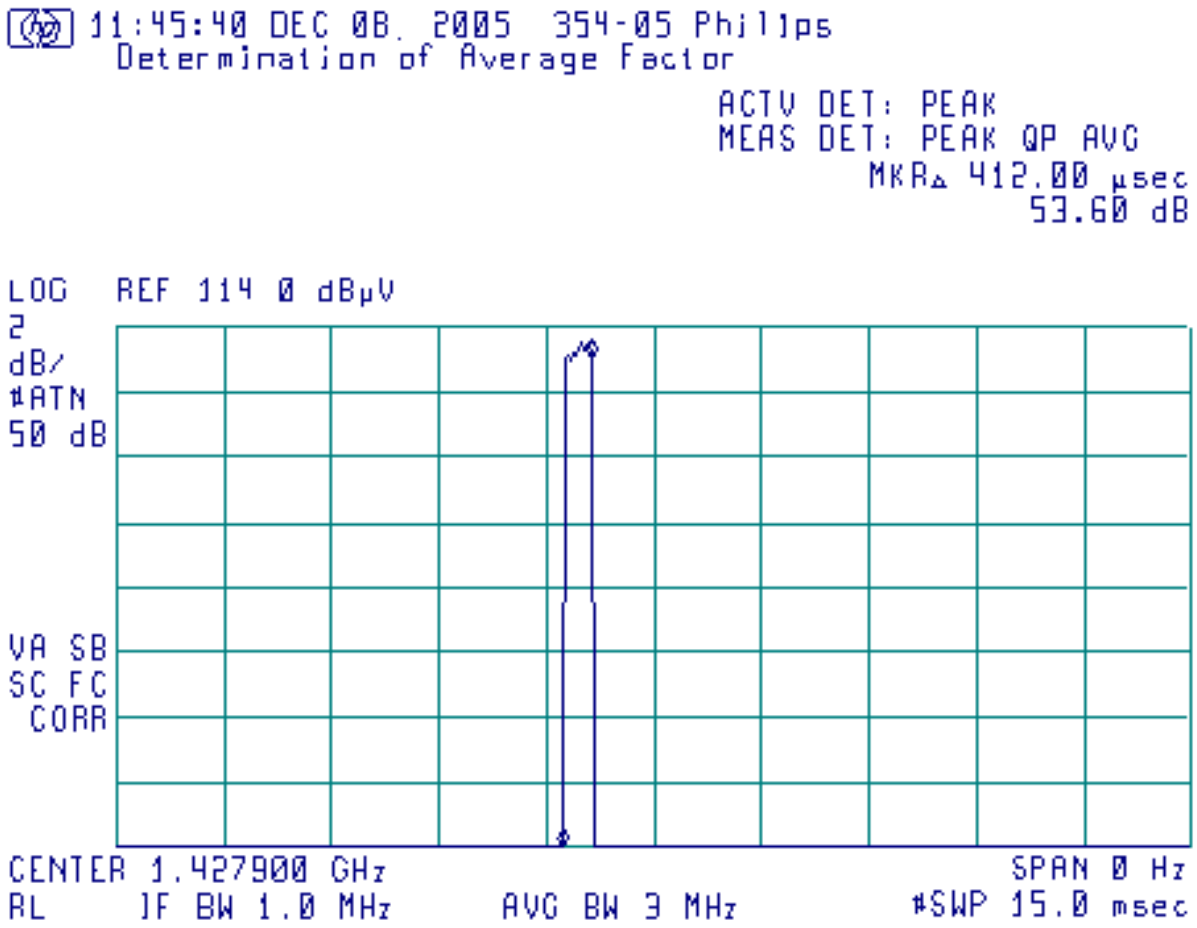
## DETERMINATION OF AVERAGE FACTOR

Plot showing 4 transmissions in 100 ms window.



## DETERMINATION OF AVERAGE FACTOR

Plot showing the length of individual transmission at 412uS.



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## RADIATED EMISSIONS TEST RESULTS

| | |
|---|---|
| Frequency Range: | 30 MHz – 14.5 GHz. |
| Measurement Distance: | 3.0 Meters. |
| Bandwidth: | 120 kHz, Per ANSI C63.4-2003.* |
| Detector Functions: | Peak, Quasi Peak |
| Table Height: | 0.8 meters |
| Antenna Height Variation: | 1 - 4 Meters. |

Horizontal and Vertical Polarization Measurements Taken.

*Measurement Bandwidth is 1 MHz above 960 MHz.

**PLEASE SEE THE FOLLOWING PAGE FOR RADIATED EMISSIONS TEST DATA**

## Radiated Worst Case Tabular Data

### Data taken at 1 meter

Channel 1 frequency 1395.9 MHz

| Frequency (MHz) | Polarization (H/V) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Avg Limit (dBµV/m) | Ave Margin (dB) |
|---|---|---|---|---|---|
| 2791.18 | V | 67.32 | 47.32 | 64.0 | **-16.68** |
| 4188.40 | V | 64.33 | 44.33 | 64.0 | **-19.67** |
| 5584.54 | V | 51.89 | 31.89 | 64.0 | **-32.11** |
| 6979.50 | V | 52.96 | 32.96 | 64.0 | **-31.04*** |
| 8373.61 | V | 60.40 | 40.40 | 64.0 | **-23.60** |
| 9769.51 | V | 62.00 | 42.00 | 64.0 | **-22.00*** |
| 11167.20 | V | 66.95 | 46.95 | 64.0 | **-17.05*** |

* Noise Floor Measurement

Channel 3 Frequency 1399.1

| Frequency (MHz) | Polarization (H/V) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Limit (dBµV/m) | Ave Margin (dB) |
|---|---|---|---|---|---|
| 2798.69 | V | 72.72 | 52.72 | 64.0 | **-11.28** |
| 4198.09 | V | 59.07 | 39.07 | 64.0 | **-24.93** |
| 5595.19 | V | 62.11 | 42.11 | 64.0 | **-21.89** |
| 6994.24 | V | 54.36 | 34.36 | 64.0 | **-29.64*** |
| 8396.53 | V | 61.51 | 41.51 | 64.0 | **-22.49** |
| 9793.45 | V | 62.12 | 42.12 | 64.0 | **-21.88*** |
| 11195.11 | V | 67.75 | 47.75 | 64.0 | **-16.25*** |

* Noise Floor Measurement

Channel 4 Frequency 1427.9 MHz

| Frequency (MHz) | Polarization (H/V) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Limit (dBµV/m) | Ave Margin (dB) |
|---|---|---|---|---|---|
| 2855.84 | V | 69.22 | 49.22 | 64.0 | **-14.78** |
| 4282.77 | V | 51.17 | 31.17 | 64.0 | **-32.83** |
| 5712.64 | V | 51.68 | 31.68 | 64.0 | **-32.32** |
| 7140.53 | V | 52.96 | 32.96 | 64.0 | **-31.04*** |
| 8567.33 | V | 58.41 | 38.41 | 64.0 | **-25.59*** |
| 9995.21 | V | 62.52 | 42.52 | 64.0 | **-21.48*** |
| 11423.10 | V | 66.75 | 46.75 | 64.0 | **-17.25*** |

* Noise Floor Measurement

## Radiated Worst Case Tabular Data Continued

Channel 6 Frequency 1431.1 MHz

| Frequency (MHz) | Polarization (H/V) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Limit (dBµV/m) | Ave Margin (dB) |
|---|---|---|---|---|---|
| 2862.20 | V | 63.82 | 43.82 | 64.0 | **-20.18** |
| 4294.04 | V | 67.63 | 47.63 | 64.0 | **-16.37** |
| 5725.51 | V | 49.48 | 29.48 | 64.0 | **-34.52*** |
| 7155.50 | V | 53.06 | 33.06 | 64.0 | **-30.94*** |
| 8587.34 | V | 58.41 | 38.41 | 64.0 | **-25.59*** |
| 10018.44 | V | 61.92 | 41.92 | 64.0 | **-22.08*** |
| 11449.54 | V | 67.15 | 47.15 | 64.0 | **-16.85*** |

* Noise Floor Measurement

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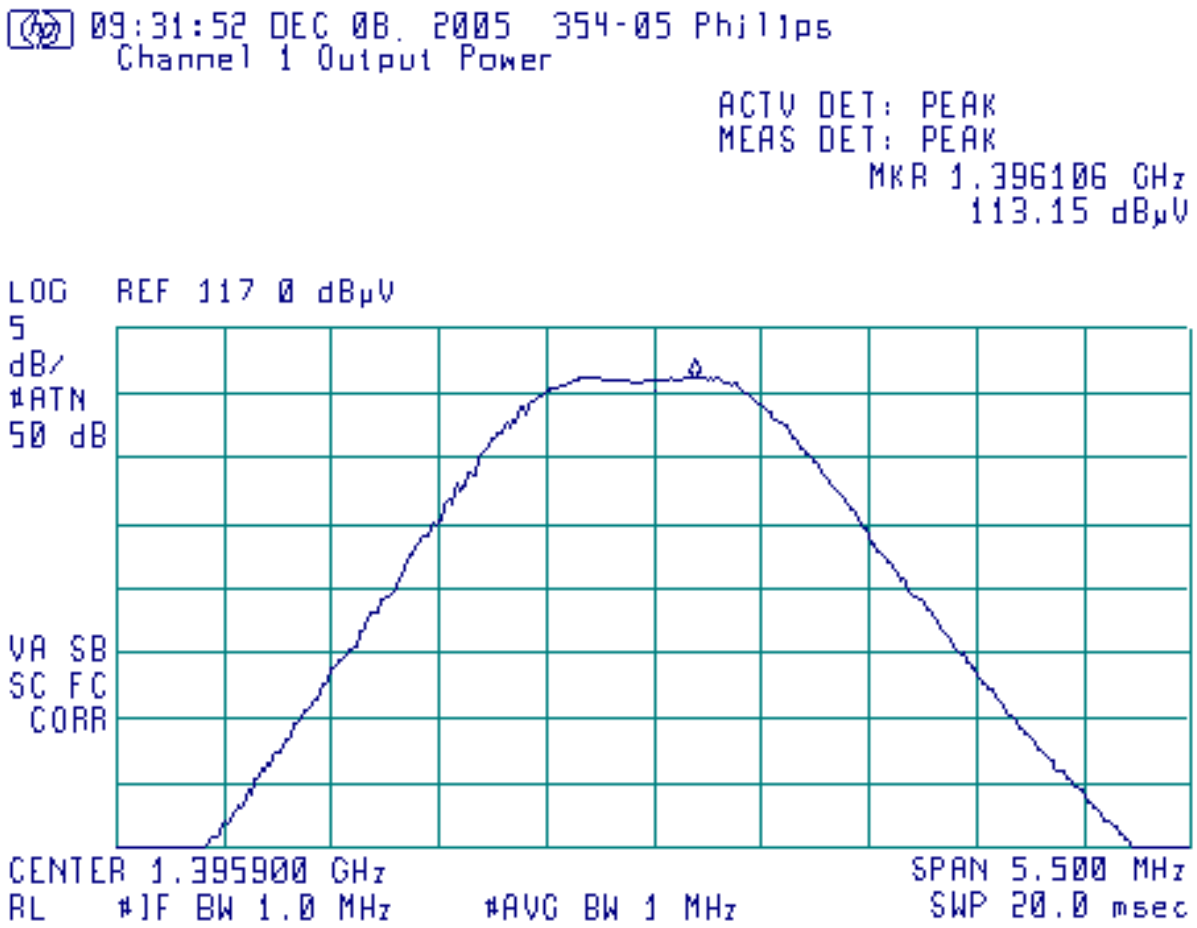
## RADIATED OUTPUT POWER & OCCUPIED BANDWIDTH TEST RESULTS

| | |
|---|---|
| Frequency Range: | 1395-1400 and 1427-1429.5 MHz. |
| Measurement Distance: | 3.0 Meters. |
| Bandwidth: | As Noted, Per ANSI C63.4-2003. |
| Detector Functions: | Peak |
| Table Height: | 0.8 meters |
| Antenna Height Variation: | 1 - 4 Meters. |

Horizontal and Vertical Polarization Measurements Taken, Worst Case Reported.

**PLEASE SEE THE FOLLOWING PAGES FOR OCCUPIED BANDWIDTH RADIATED TEST DATA**

**Channel 1 Output Power Plot**




| Freq (MHz) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Avg Limit (dBµV/m) | Avg Margin (dB) |
|---|---|---|---|---|
| 1395.9 | 113.15 | 93.15 | 117.4 | -23.8 |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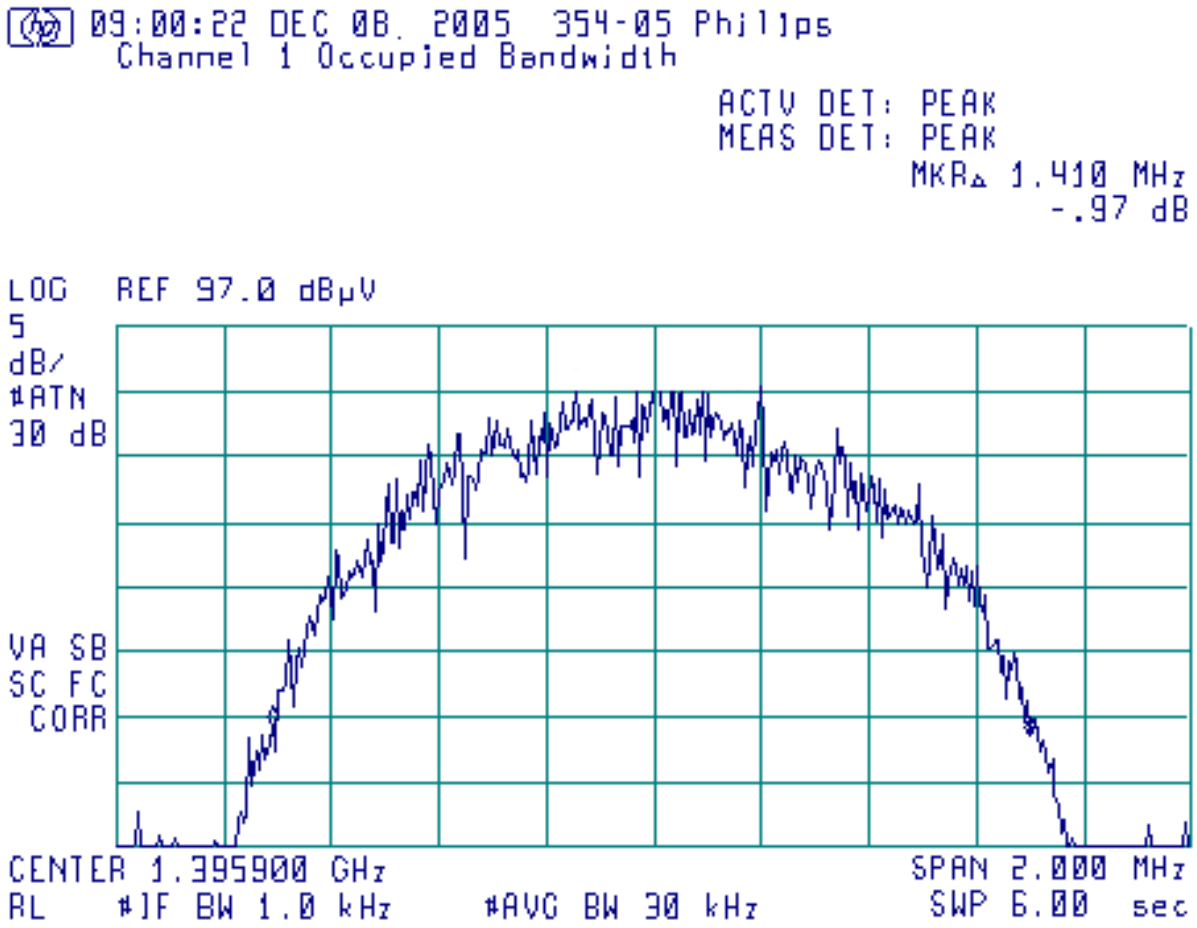
**Channel 1 Occupied Bandwidth Plot**




| Freq (MHz) | 26 dB Bandwidth (MHz) |
|---|---|
| 1395.9 | 1.410 |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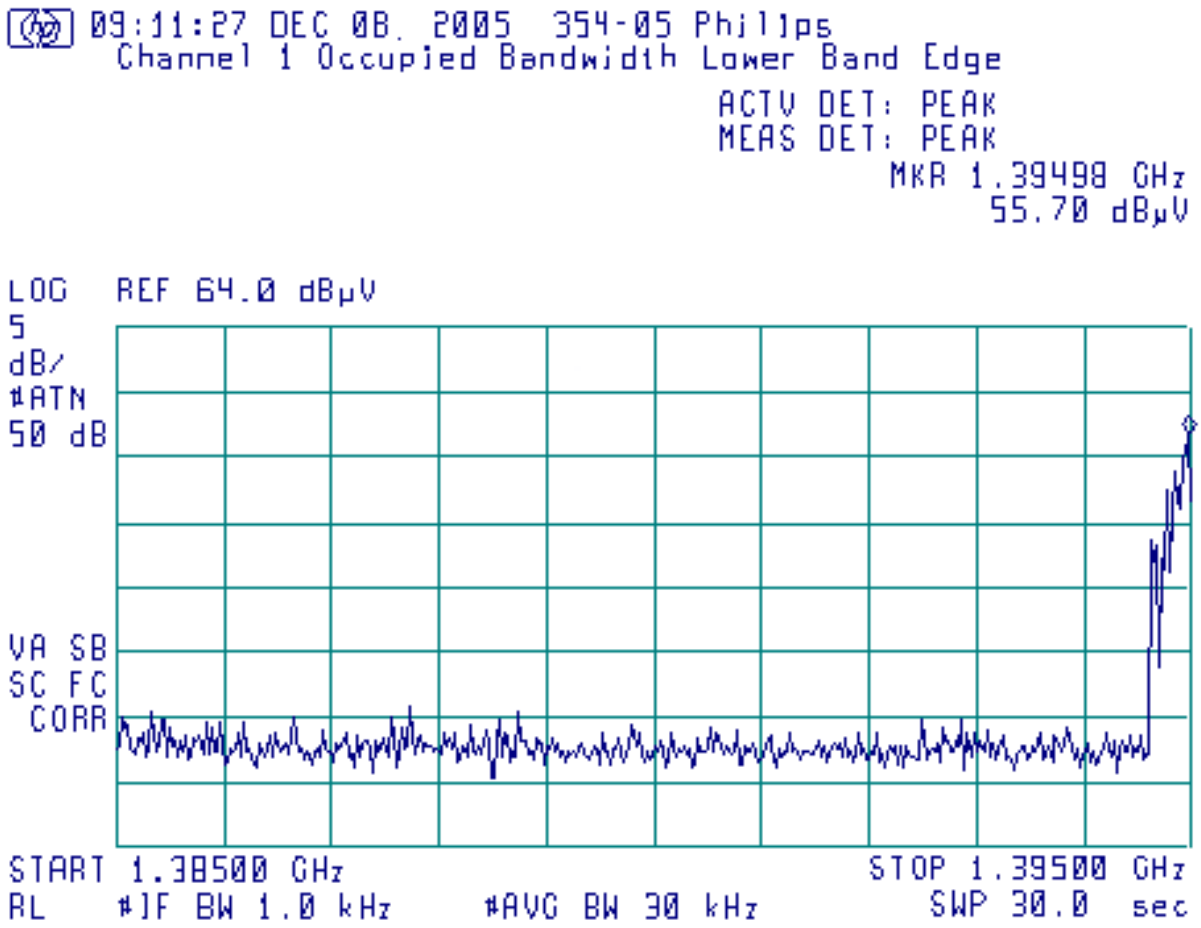
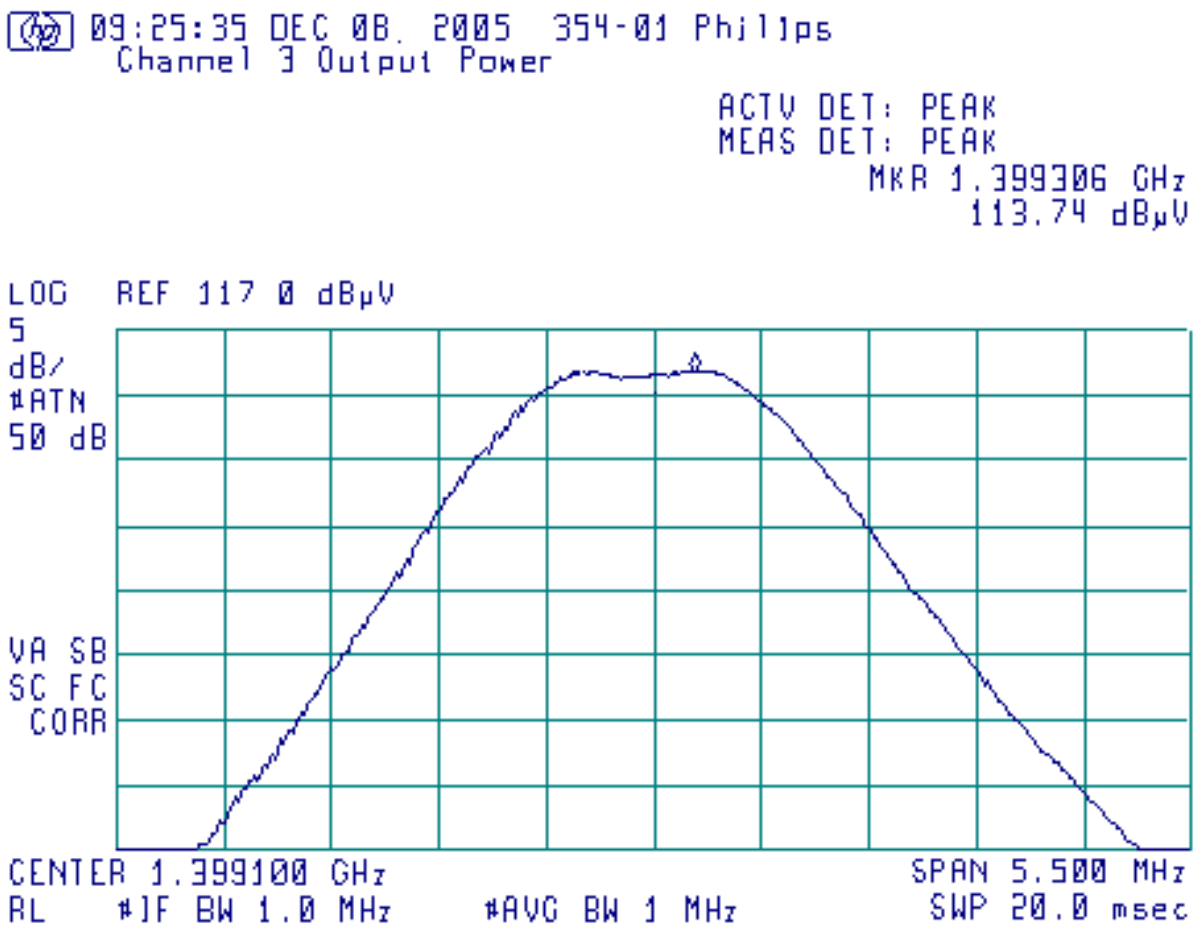
**Channel 1 Occupied Bandwidth Lower Band Edge**



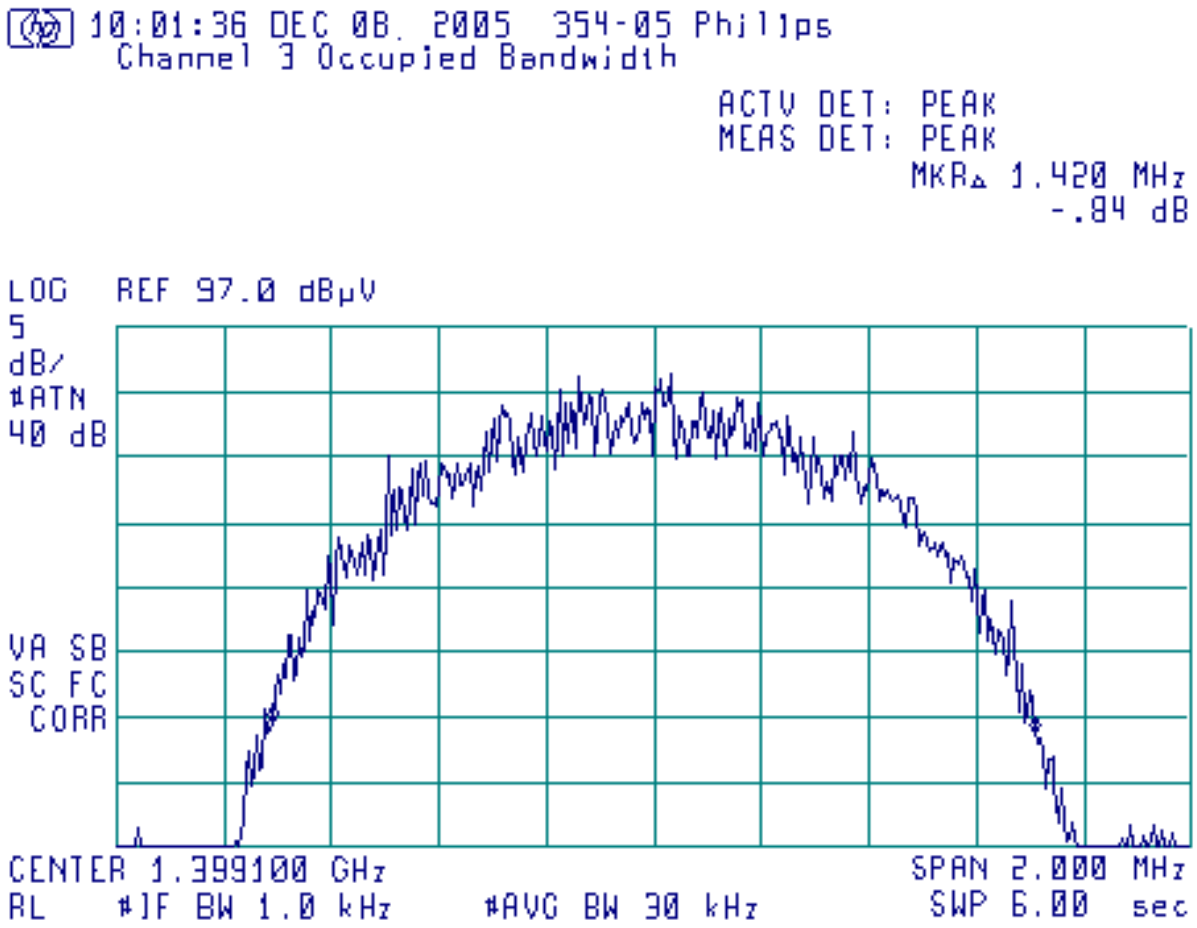

The Channel 1 lower band edge is on the right side of a plot with a 10 MHz frequency span. The measured level is 55.70 dBµV/m peak and 35.70 dBµV/m average. The limit is 74 dBµV/m peak and 54 dBµV/m average, respectively. The resulting margin is –18.3 dB.

**Channel 3 Output Power Plot**




| Freq (MHz) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Avg Limit (dBµV/m) | Avg Margin (dB) |
|---|---|---|---|---|
| 1399.1 | 113.74 | 93.74 | 117.4 | -23.66 |

**Channel 3 Occupied Bandwidth Plot**




| Freq (MHz) | 26dB Bandwidth (MHz) |
|---|---|
| 1399.1 | 1.420 |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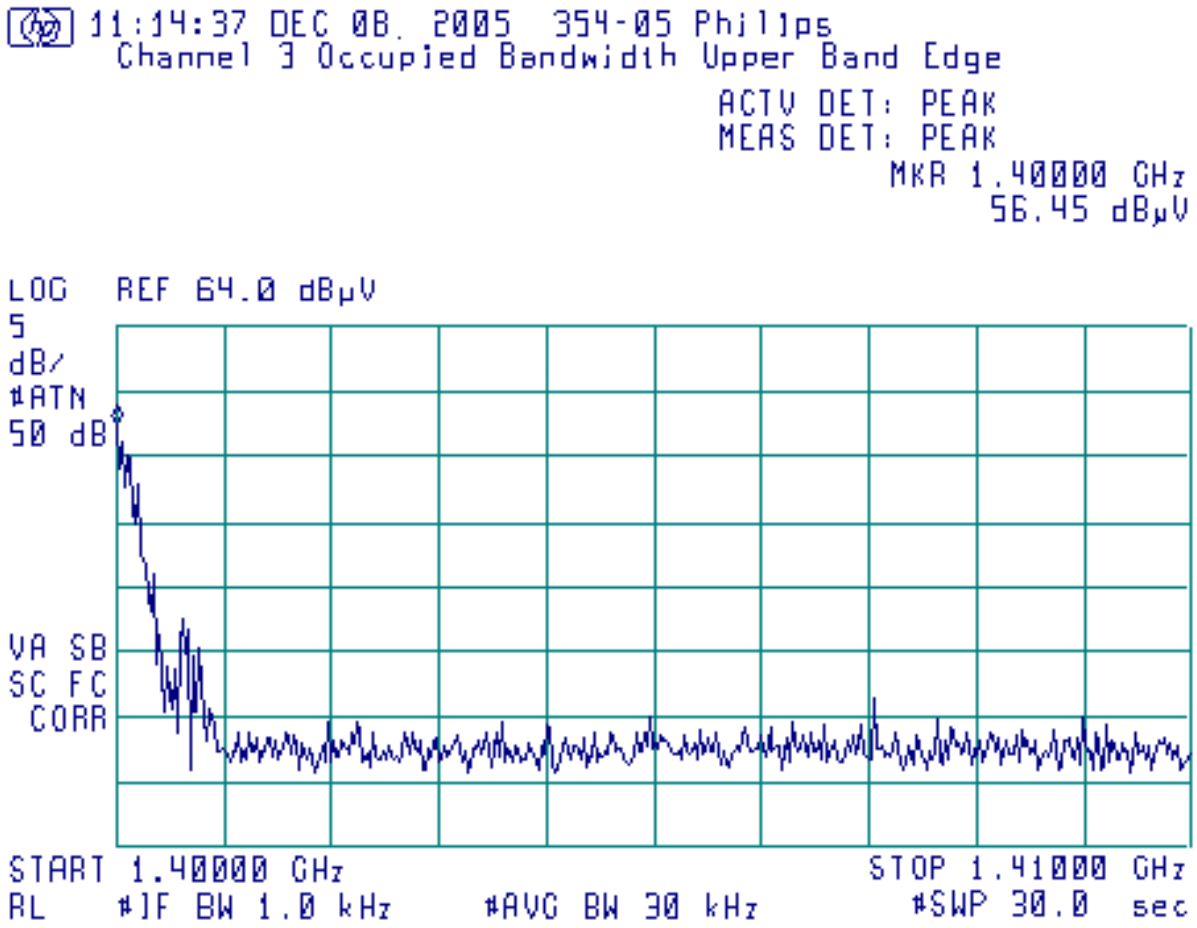
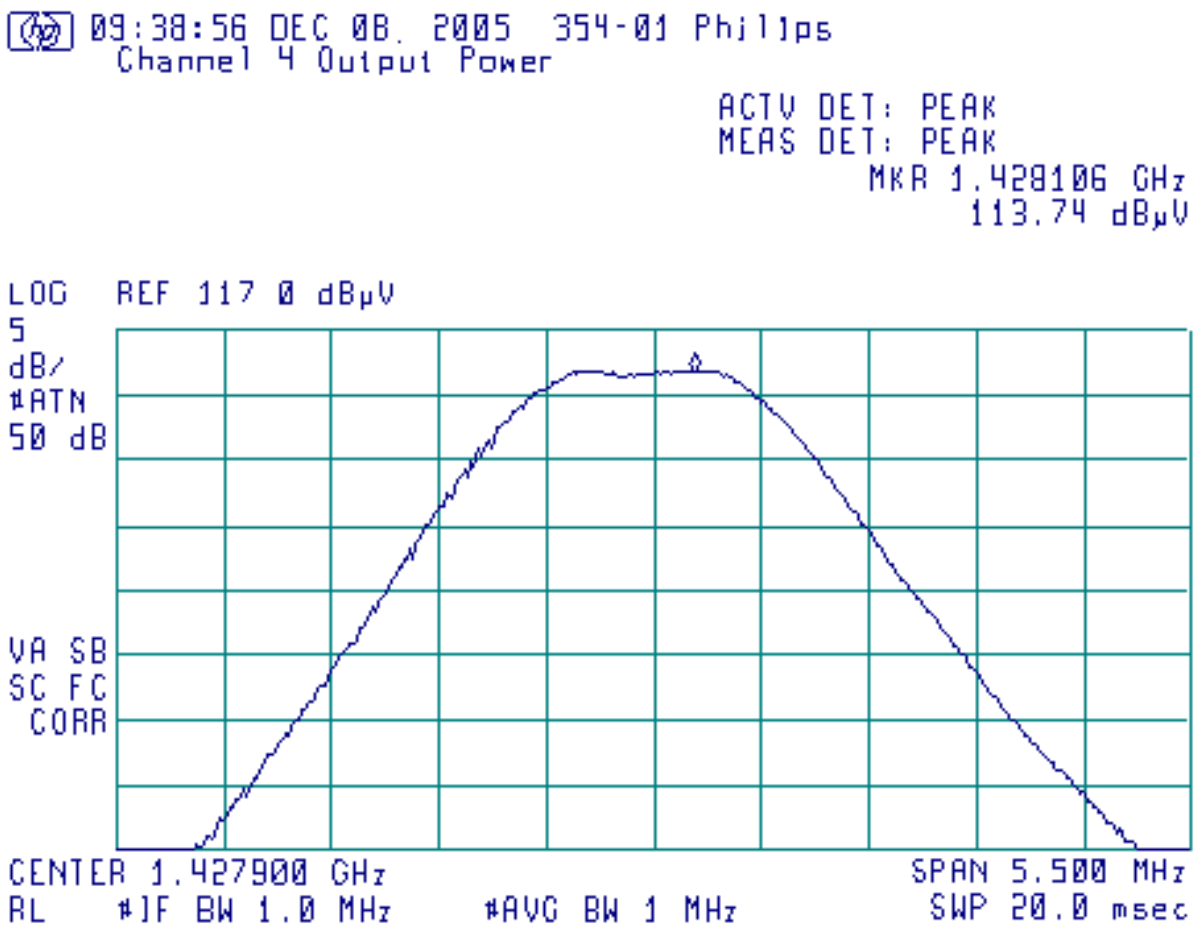
**Channel 3 Occupied Bandwidth Upper Band Edge**



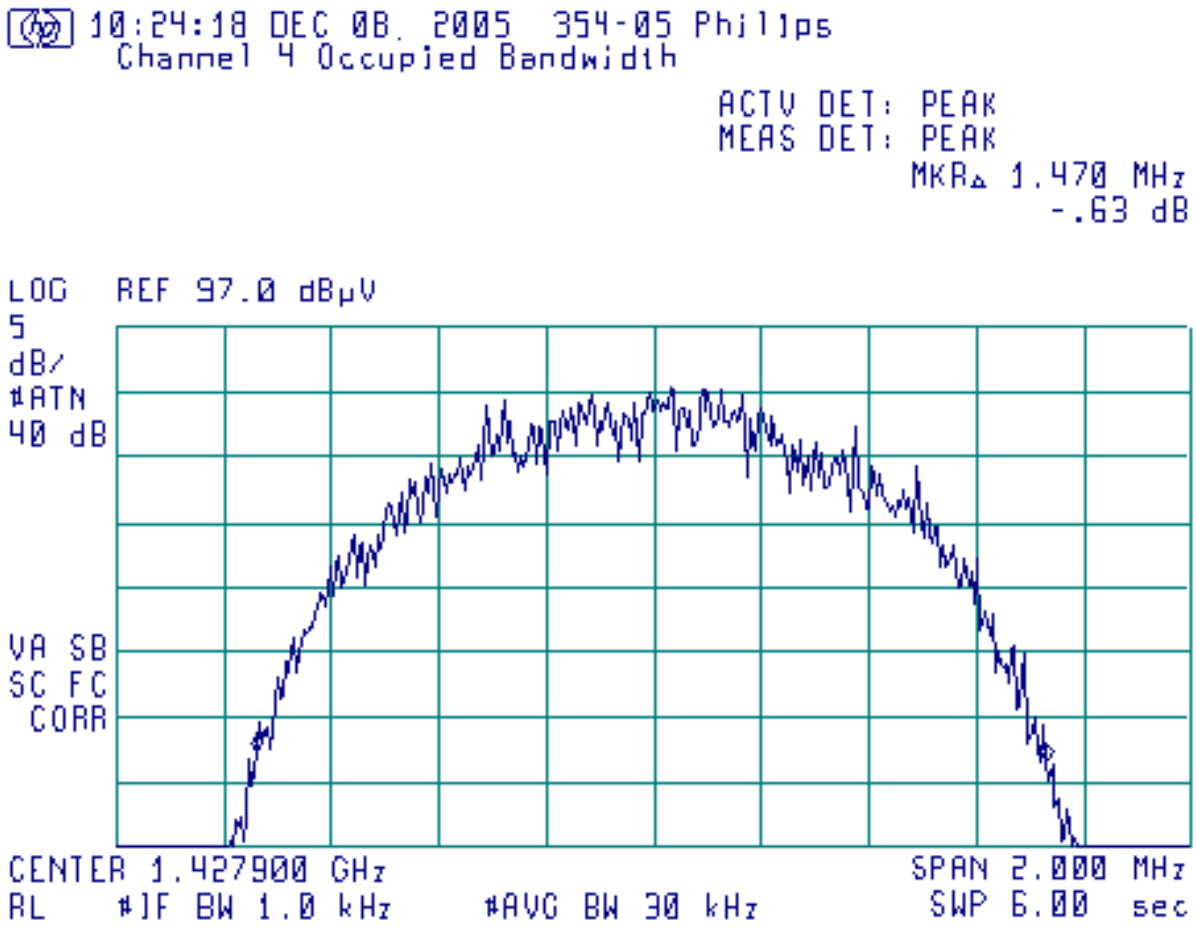

The Channel 3 upper band edge is on the left side of a plot with a 10 MHz frequency span. The measured level is 56.45 dBµV/m peak and 36.45 dBµV/m average. The limit is 74 dBµV/m peak and 54 dBµV/m average, respectively. The resulting margin is –17.55 dB.

**Channel 4 Output Power Plot**




| Freq (MHz) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Avg Limit (dBµV/m) | Avg Margin (dB) |
|---|---|---|---|---|
| 1427.9 | 113.74 | 93.74 | 117.4 | -23.66 |

**Channel 4 Occupied Bandwidth Plot**




| Freq (MHz) | 26dB Bandwidth (MHz) |
|---|---|
| 1427.9 | 1.470 |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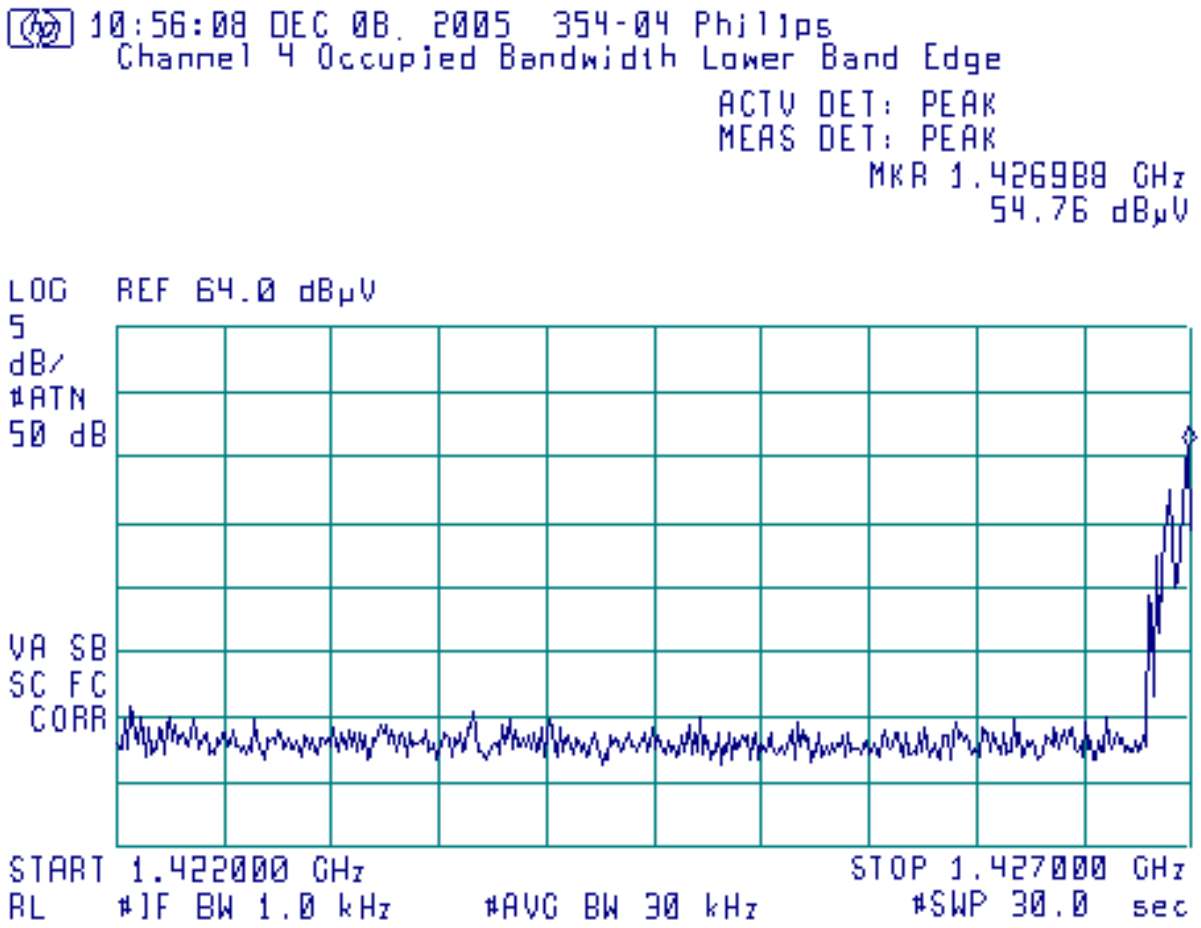
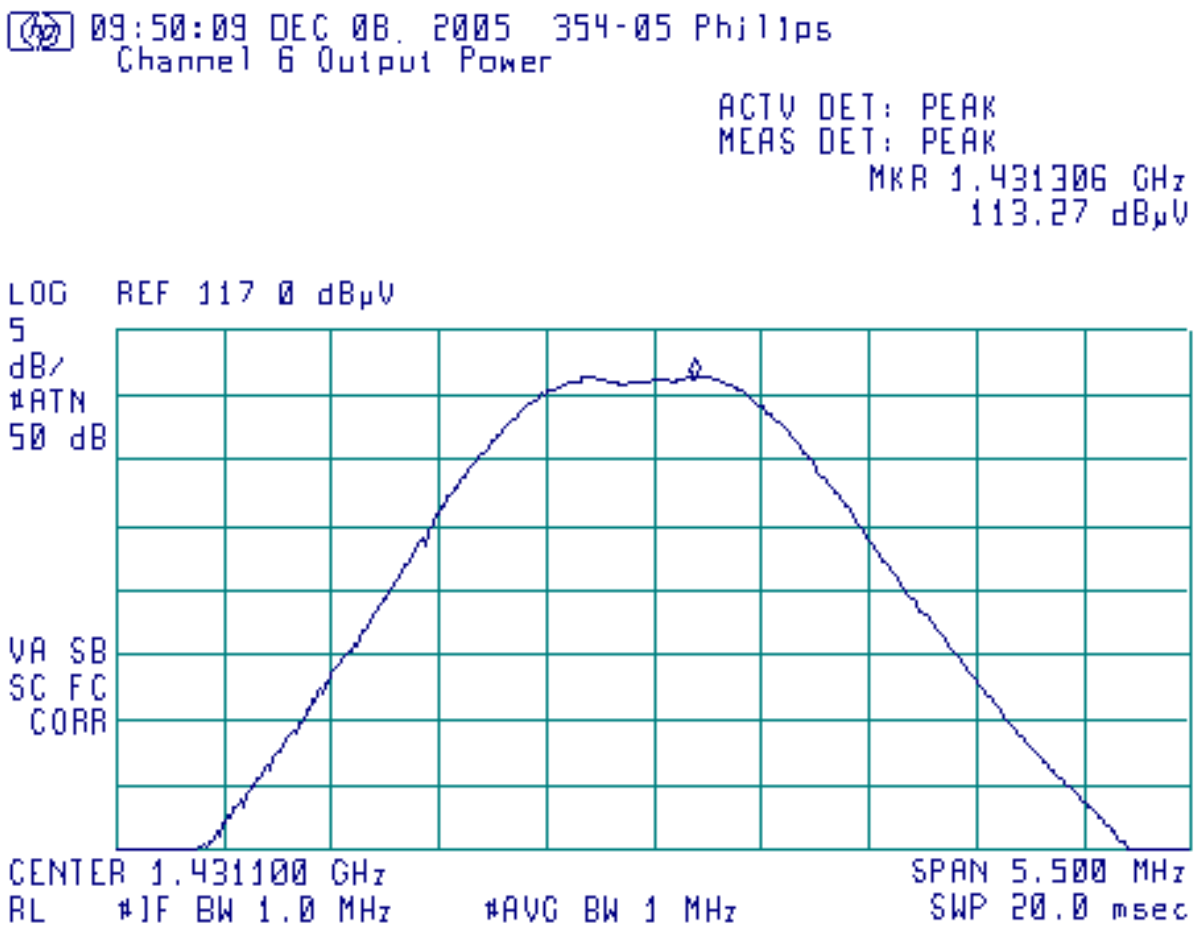
**Channel 4 Occupied Bandwidth Lower Band Edge Plot**



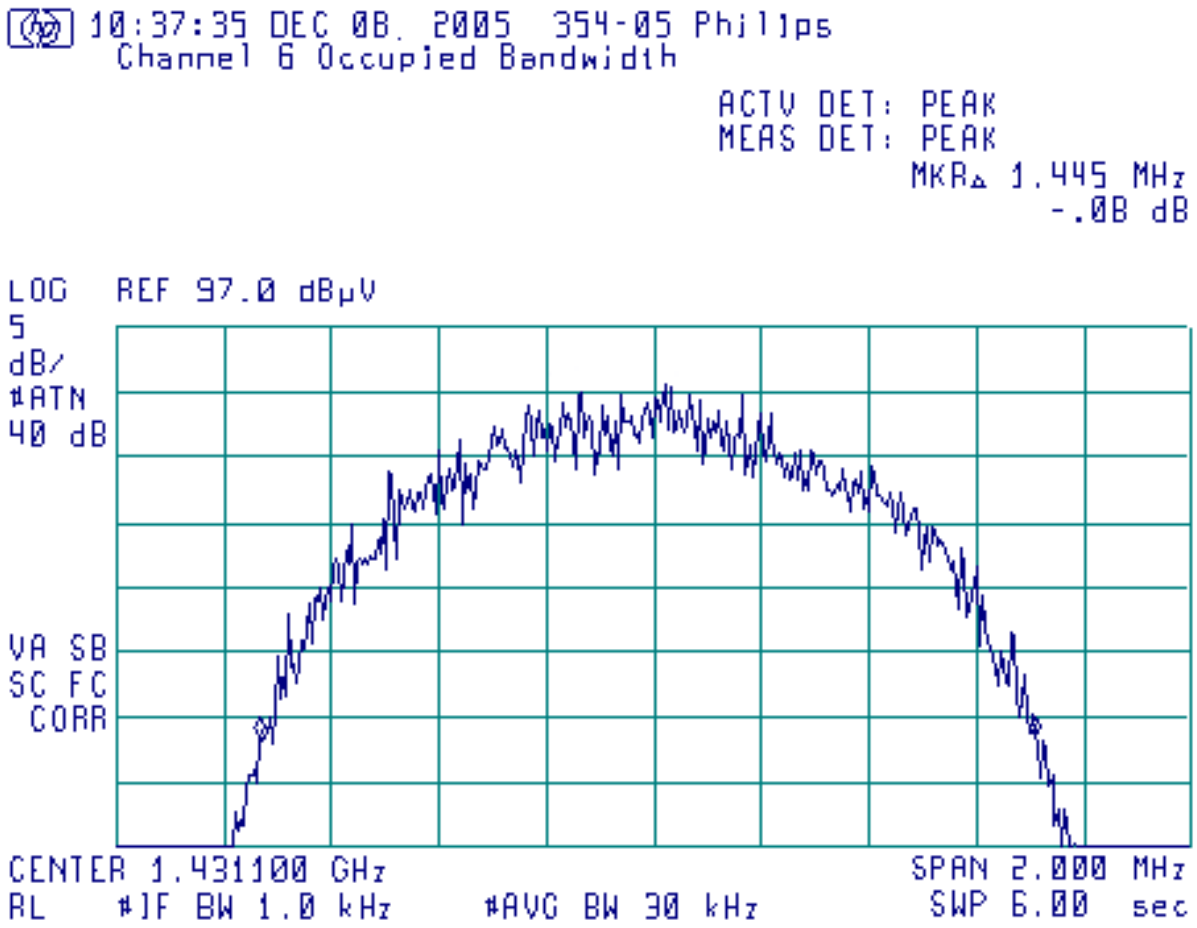

The Channel 4 lower band edge is on the right side of a plot with a 10 MHz frequency span. The measured level is 54.76 dBµV/m peak and 34.76 dBµV/m average. The limit is 74 dBµV/m peak and 54 dBµV/m average, respectively. The resulting margin is -19.24 dB.

**Channel 6 Output Power Plot**




| Freq (MHz) | Peak Amp (dBµV/m) | Avg Amp (dBµV/m) | Avg Limit (dBµV/m) | Avg Margin (dB) |
|---|---|---|---|---|
| 1431.1 | 113.27 | 93.27 | 117.4 | -24.13 |

**Channel 6 Occupied Bandwidth Plot**




| Freq (MHz) | 26dB Bandwidth (MHz) |
|---|---|
| 1431.1 | 1.445 |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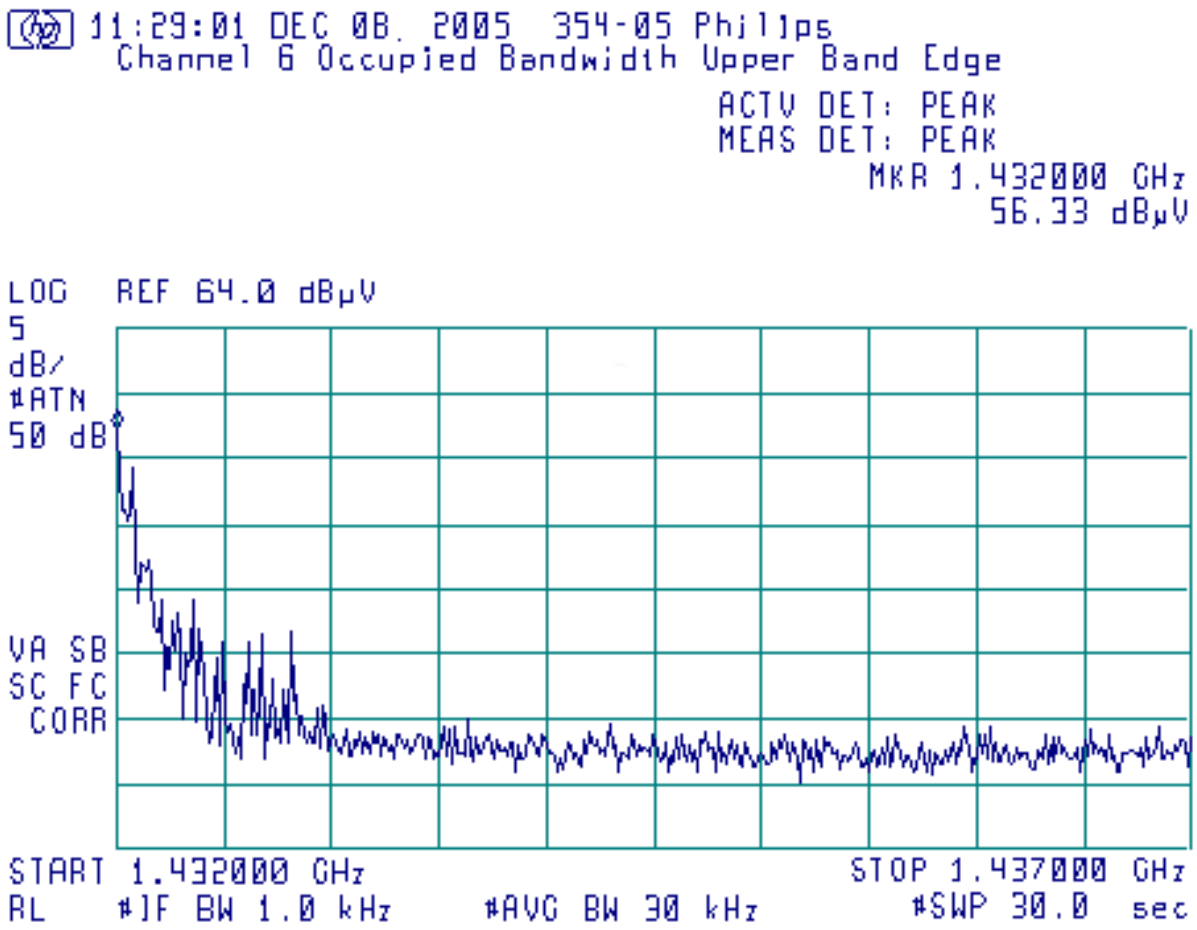
**Channel 6 Occupied Bandwidth Upper Band Edge Plot**




The Channel 6 upper band edge is on the right side of a plot with a 10 MHz frequency span. The measured level is 56.33 dBµV/m peak and 36.33 dBµV/m average. The limit is 74 dBµV/m peak and 54 dBµV/m average, respectively. The resulting margin is -17.67 dB.

TEST NUMBER - 354-05

## NOTES AND COMMENTS

(Special conditions unique to this test)

None.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