TEST NUMBER - 114-04

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

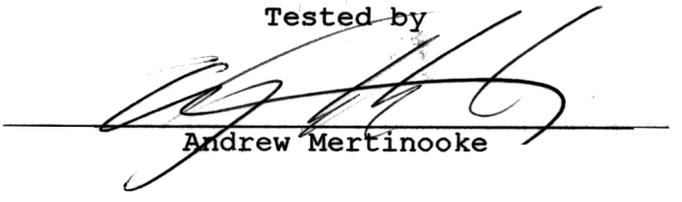
Patient Worn Device ECG/SpO2 Transceiver

Model M4841A

on

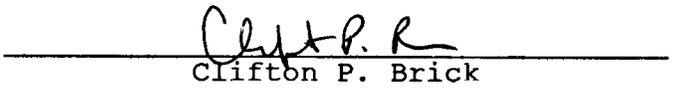
1/21/2004

Tested by



Andrew Mertinooke

Reviewed by



Clifton P. Brick

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TEST DESCRIPTION

1. TEST OBJECTIVE

To test the Patient Worn Device with ECG and SpO2 transceiver Model M4841A to FCC Part 95 Rules and write a report.

2. E.U.T. DESCRIPTION

GENERAL

The Patient Worn Device with ECG and SpO2 Transceiver Model M4841A is an ECG and SpO2 monitoring device 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: US1100227

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 - Patient Worn Device ECG/SpO2 Transceiver

MODEL NUMBER - M4841A

RADIATED 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 TEST RESULTS

N/A

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)

The EUT is battery Powered; no power line conducted testing applies.

A full investigation of the spectrum of this devices digital circuitry and it’s associated equipment can be found in Test reports #114-04b, 120-04, 135-04 and 146-04.

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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 1-16-2004, calibrated annually.

B. HP 8593E (9 kHz - 26.5 GHz) Spectrum Analyzer, S/N 3829A03887. Calibration Date 11-21-2003, calibrated annually.

B. Com-Power Biconilog Antenna, Model AC220, S/N 25509. Calibration Date 3-11-2003, calibrated annually.

C. Electro-Metrics Double Ridged Guide Antenna, Model EM-6961, S/N 6337. Calibration Date: 6-24-2003, calibrated annually.

D. HP 1 - 26.5 GHz Preamplifier, Model 08449B, S/N 3008A01323. Calibration Date: 2-19-2003, calibrated annually.

E. EMCO LISN, Model EM 3825/2, S/N 9109-1860. Calibration Date: 3-9-2003, calibrated annually.

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 450 kHz to 30 MHz.

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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).

FCC Part 95.1115 Test Limits

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

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*

TEST FACILITY DESCRIPTION

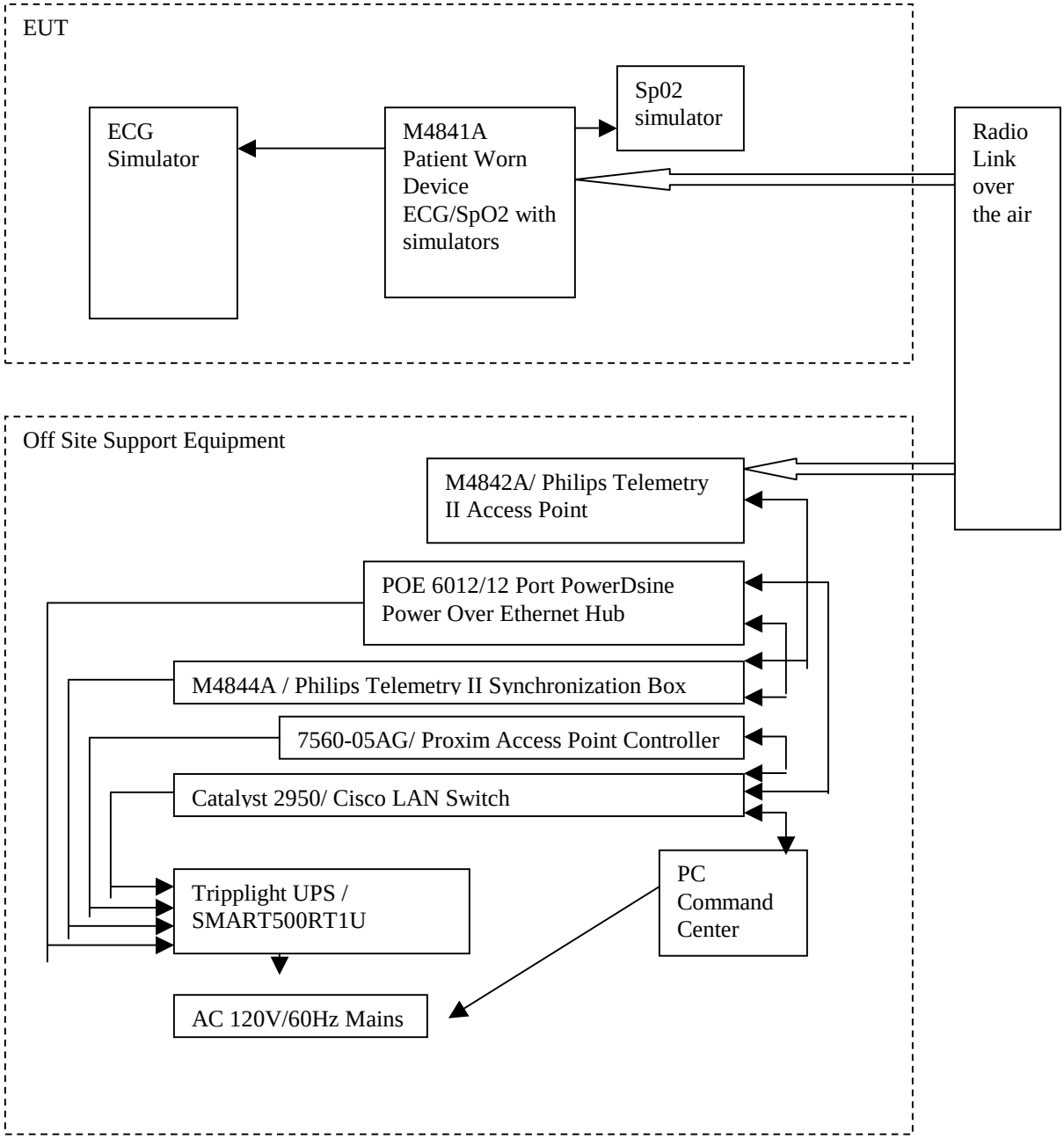
Compliance Worldwide is located on 357 Main Street in Sandown, New Hampshire. The conducted and radiated test sites, located at C.W. are used for Federal Communications Commission (FCC) testing and Industry Canada Testing. A site description is on file with the FCC in Columbia, MD USA. Site information 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



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PLEASE NOTE - EUT (equipment under test) is Patient Worn Device ECG/SpO2 Transceiver.

The cables directly connected to this equipment are listed below.

Connection Descriptions

1. __SpO2 Saturation transducer cable____P/N M1191A_____
(description)

___SpO2 Saturation simulator_____
(from device)

___EUT_____
(to device)

CABLE LENGTH _2m__ (S) SHIELDED or (U) UNSHIELDED __U_

2. __ECG Lead Set____P/N 392 925_____
(description)

____ECG Simulator_____
(from device)

____EUT_____
(to device)

CABLE LENGTH ___1m_ (S) SHIELDED or (U) UNSHIELDED _U__

3. ___N/A_____
(description)

_____
(from device)

_____
(to device)

CABLE LENGTH _____ (S) SHIELDED or (U) UNSHIELDED ____

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TEST SET UP
AND
PERIPHERAL CONNECTION INFORMATION

Support Equipment Located off site:

Mfgr	Model / Part #	HW Rev.	SW Rev.	Serial # (if available)	Description
Philips	M4842A/ 453563495091	PP1	A34. 5.3	US34300020	Philips Telemetry II Access Point
Philips	M4844A/ 453563495101	PP1	N/A	US34300015	Philips Telemetry II Synchronization Box
Power-D-sine	PD-6012/AC	NA	NA	M03026804510392	Power-over-Ethernet hub
Cisco	WS-C2950C-24	NA	NA	FHKD65221KG	10/100 Base-T hub
Proxim	756005AG	NA	NA	756005AG-24600010	Philips Telemetry II Access Point Controller
Tripplite	SMART550RT1U	N/A	N/A	9249ALCSM472600005	Uninterruptible Power Supply
Philips	M3150B	N/A	N/A	US10308052	Philips Information Center (PIC) (HP PC)
HP	D8907	N/A	N/A	KR22722975	Display for PIC system

Equipment included in EUT:

Mfgr	Model / Part #	HW Rev.	SW Rev.	Serial # (if available)	Description
Bio-Tek	Lionheart 2	N/A	N/A	158998	Multi-parameter patient simulator Recall #125005
DNI Nevada	Oxitest 7	N/A	N/A	DOS03010611	SpO2 simulator Recall #125346
Philips	862439 M4840-83003	N/A	N/A	US1100227	Philips Telemetry II Patient Worn Device

DETERMINATION OF AVERAGE FACTOR

Total Duration of 1 cycle:	100ms
Total On-Time in 1 cycle:	4*<425uS=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 next pages for supporting data.

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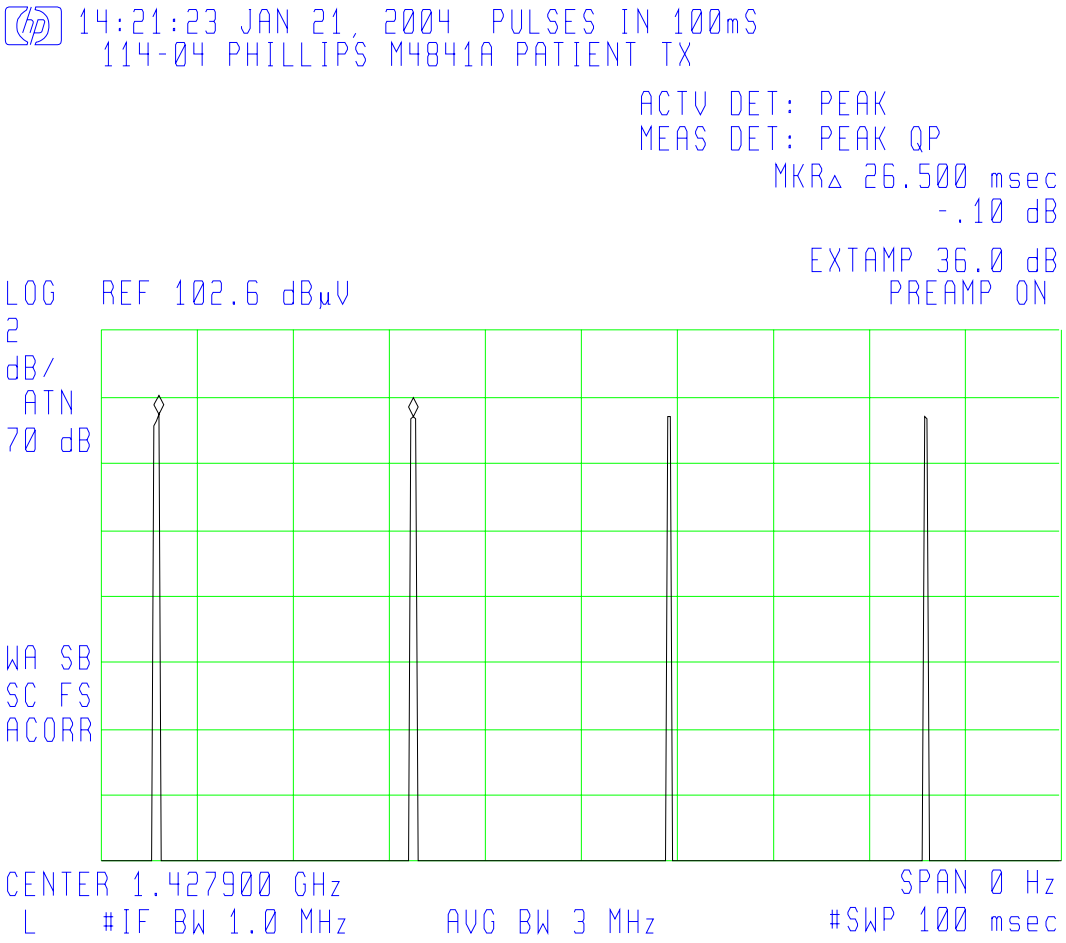
DETERMINATION OF AVERAGE FACTOR

Plot showing 4 transmissions in 100 ms window.



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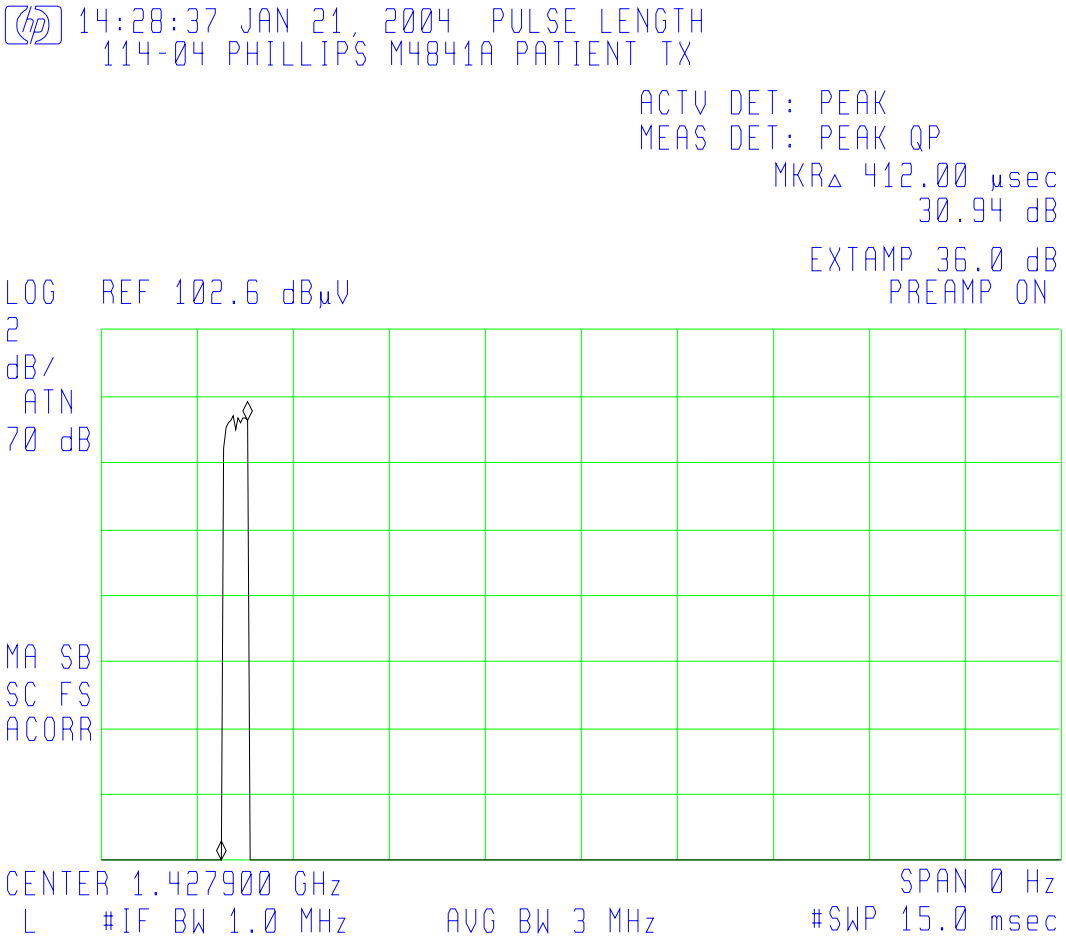
DETERMINATION OF AVERAGE FACTOR

Plot showing the length of individual transmission at 412uS.



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RADIATED TEST RESULTS

Frequency Range:	30 MHz – 14.5 GHz.
Measurement Distance:	3.0 Meters.
Bandwidth:	120 kHz, Per ANSI C63.4-1992.*
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 NEXT PAGE FOR RADIATED TEST DATA

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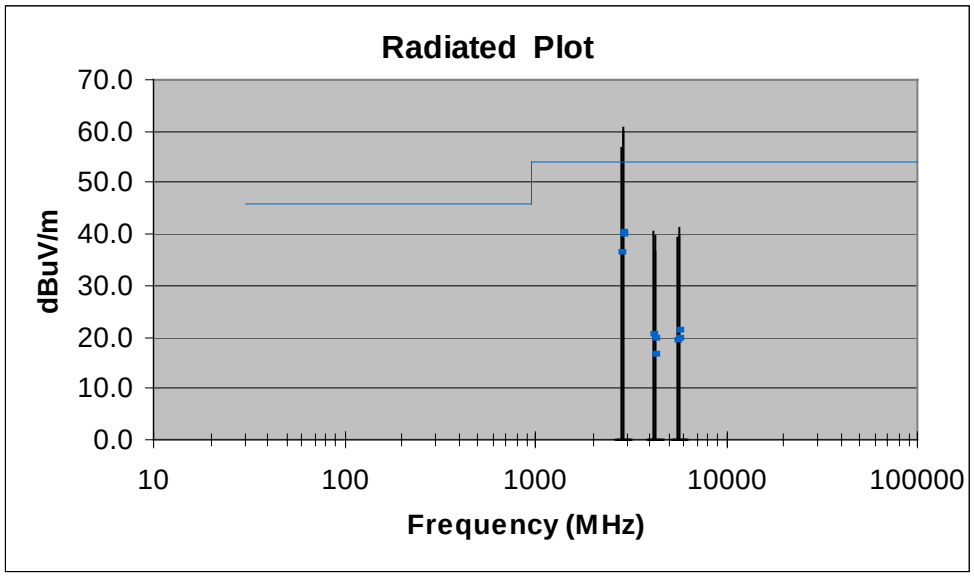
Radiated Horizontal Data Log Plot



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Radiated Horizontal Tabular Data

Frequency (MHz)	Peak Amp (dBuV/m)	Polarization (H/V)	Avg Amp (dBuV/m)	Limit (dBuV/m)	QP Margin (dB)
2791.8	56.8	H	36.8	54.0	-17.3
4187.7	40.5	H	20.5	54.0	-33.5
5583.6	39.3	H	19.3	54.0	-34.7
2855.8	60.1	H	40.1	54.0	-14.0
4283.7	36.7	H	16.7	54.0	-37.3
5711.6	39.8	H	19.8	54.0	-34.2
2862.2	60.5	H	40.5	54.0	-13.5
4293.3	39.8	H	19.8	54.0	-34.2
5724.4	41.2	H	21.2	54.0	-32.8

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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 C63.4-1992.
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 NEXT PAGE(S) FOR OCCUPIED BANDWIDTH RADIATED TEST DATA

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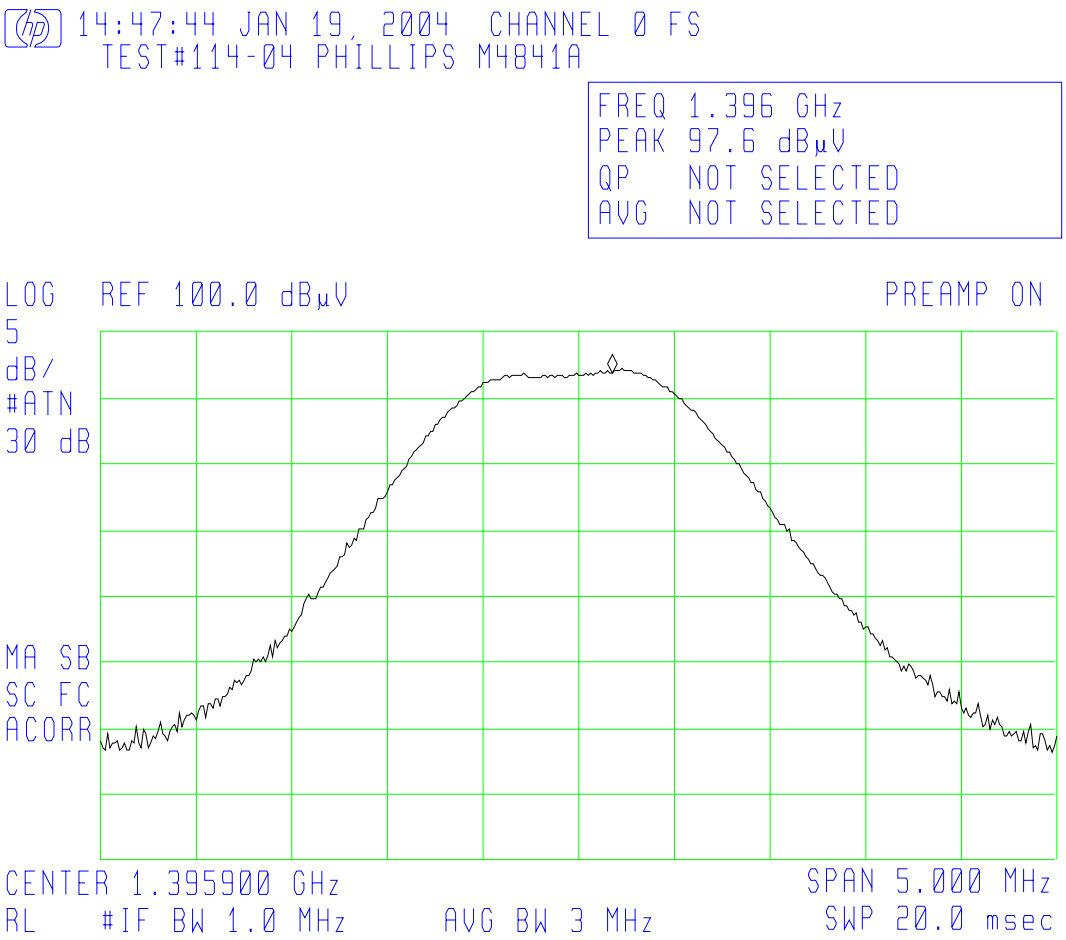
Channel 0 Output Power Plot



Freq (MHz)	Polarization (H/V)	Peak Amp (dBuV/m)	Avg Amp (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)
1392.9	H	97.6	77.6	117.4	-39.8

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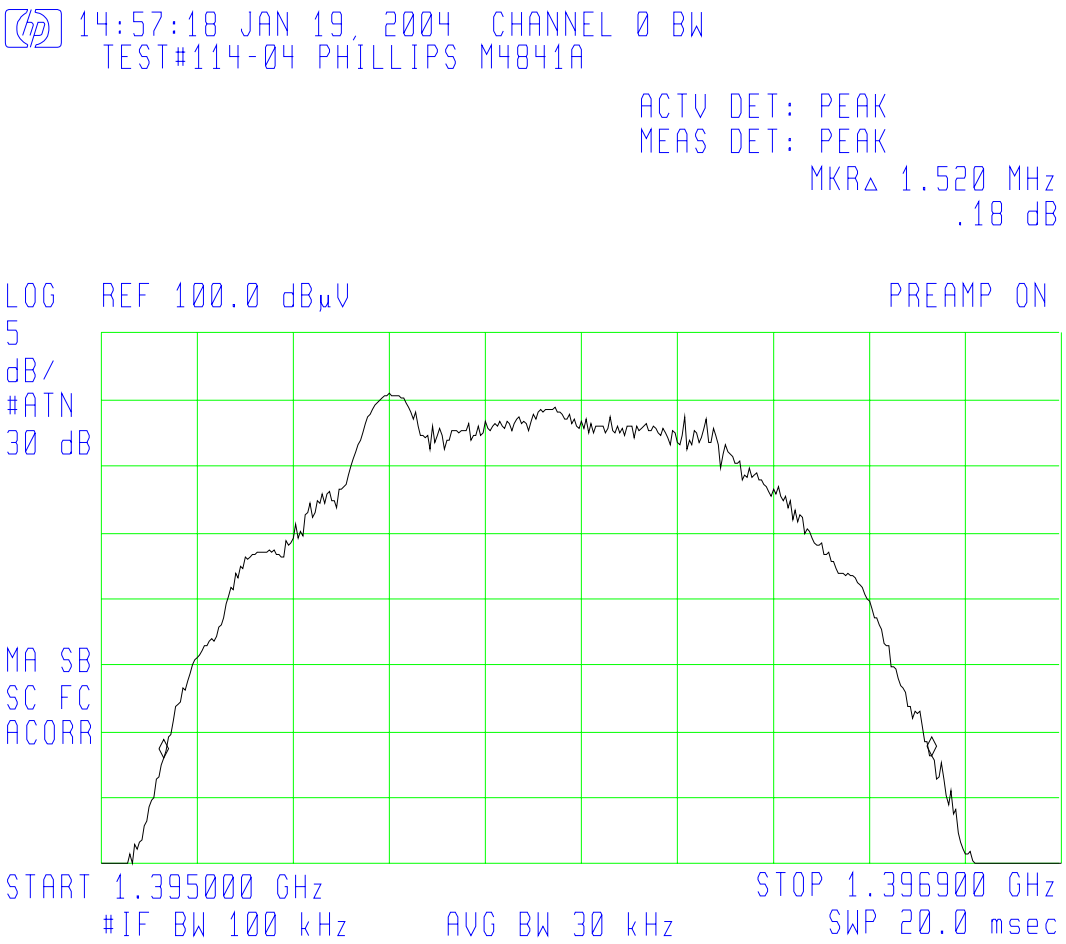
Channel 0 Occupied Bandwidth Plot



Freq (MHz)	26dB Bandwidth (MHz)
1392.9	1.520

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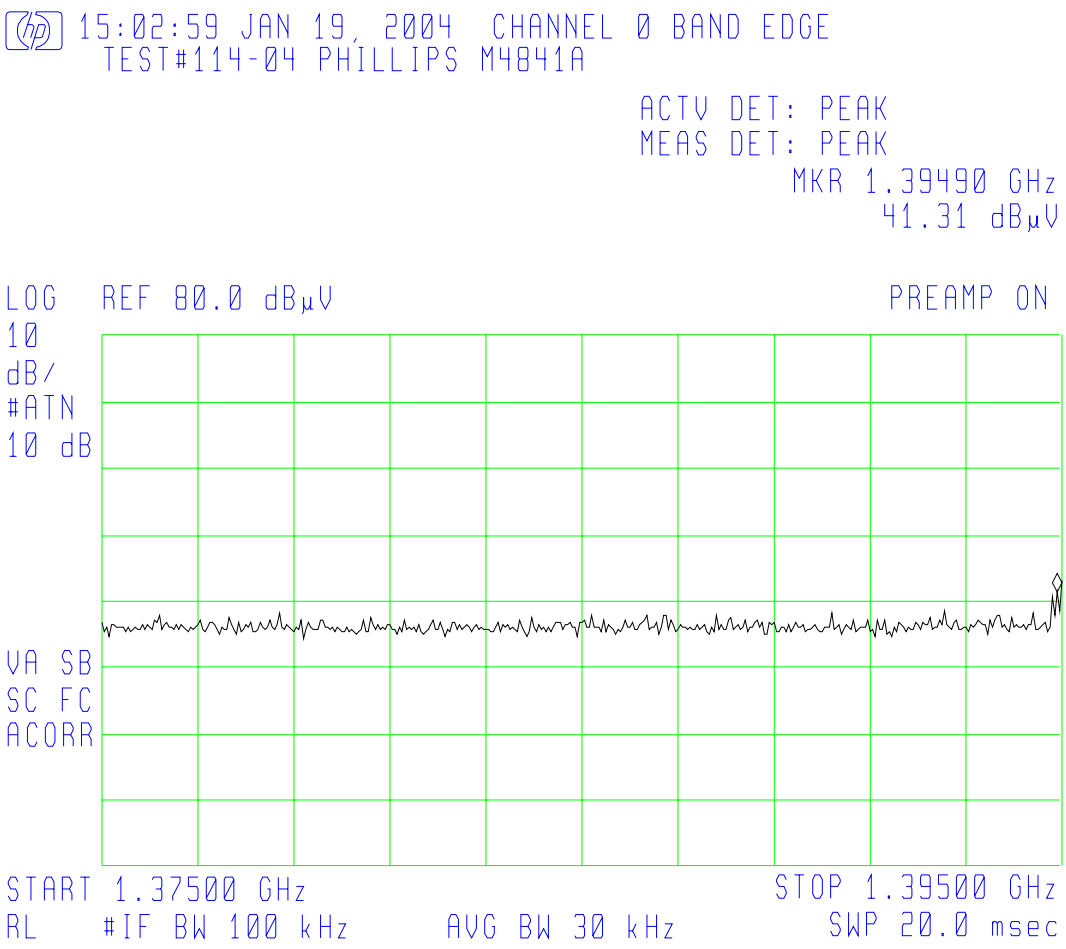
Channel 0 Occupied Bandwidth Lower Band Edge



Plot shows lower band edge on right and 20 MHz window. A peak measurement of 41.31 dBuV/m with a limit of 54 dBuV/m avg, data shows a margin of 12.69 dB.

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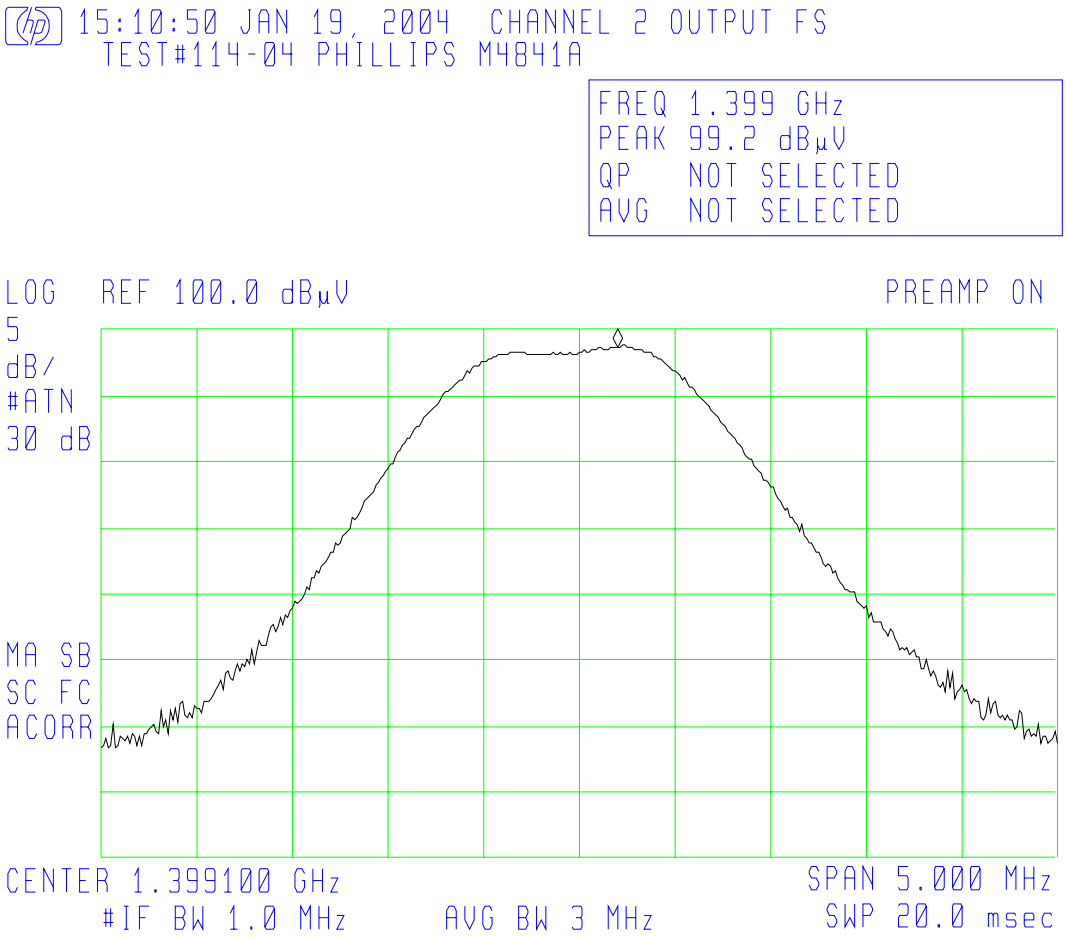
Channel 2 Output Power Plot



Freq (MHz)	Polarization (H/V)	Peak Amp (dBuV/m)	Avg Amp (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)
1399.1	H	99.2	79.2	117.4	-38.2

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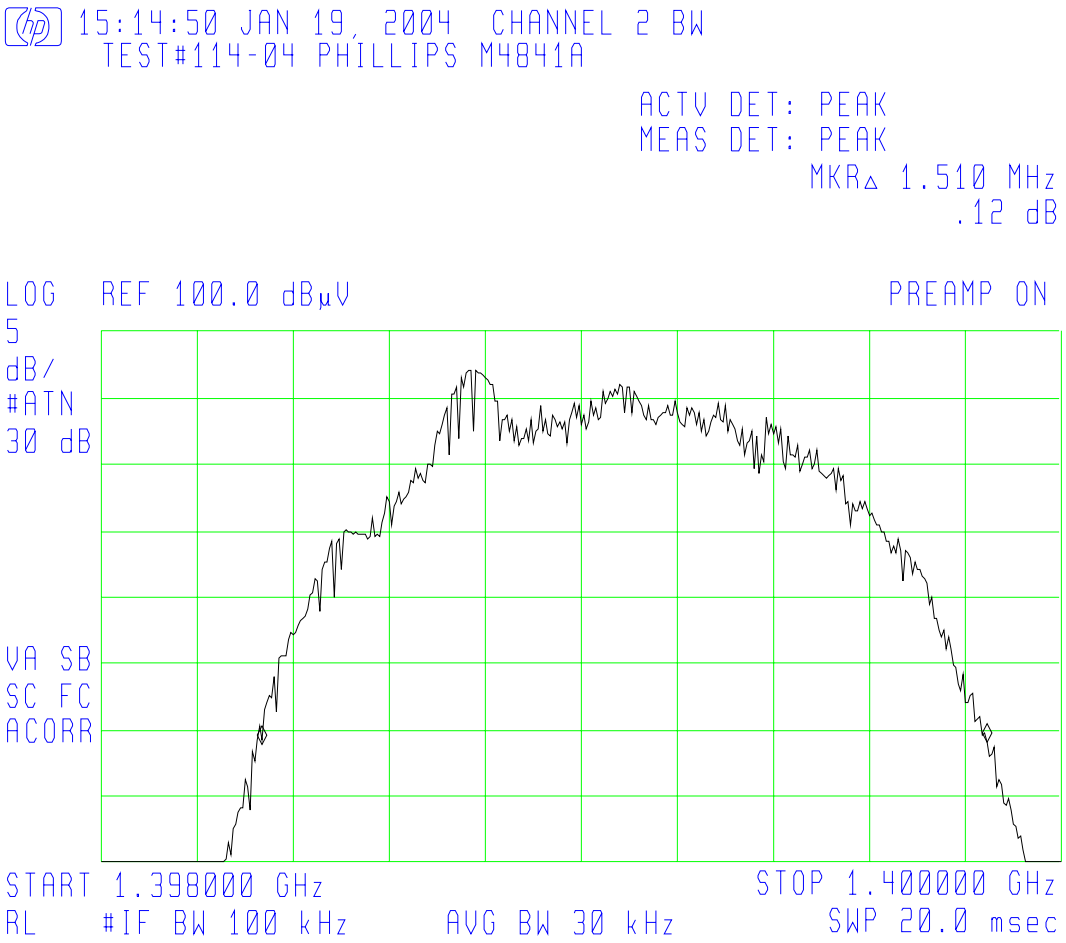
Channel 2 Occupied Bandwidth Plot



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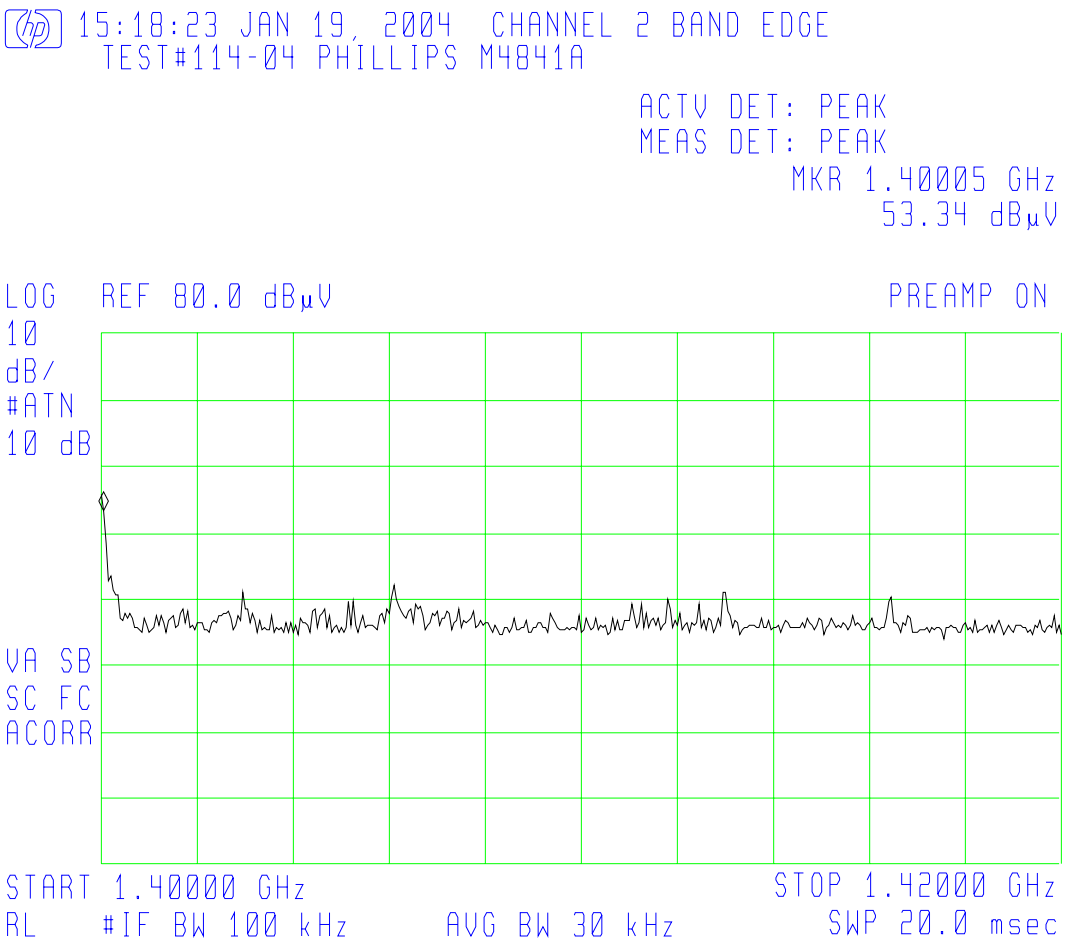
Channel 2 Occupied Bandwidth Upper Band Edge



Plot shows upper band edge on left and 20 MHz window. A peak measurement of 53.34 dBuV/m peak, 33.34 dBuV/m Avg with a limit of 54 dBuV/m avg, data shows a margin of 20.66 dB.

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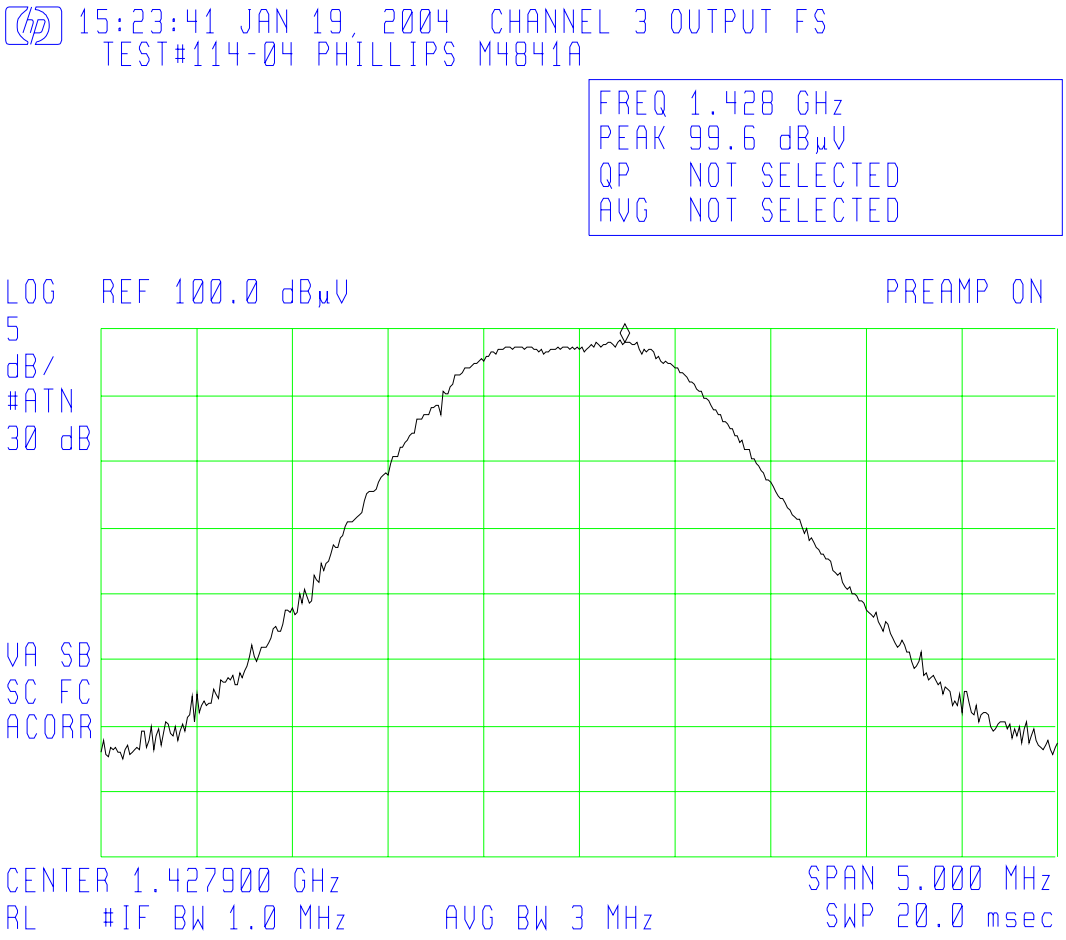
Channel 3 Output Power Plot



Freq (MHz)	Polarization (H/V)	Peak Amp (dBuV/m)	Avg Amp (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)
1427.9	H	99.6	79.6	117.4	-37.8

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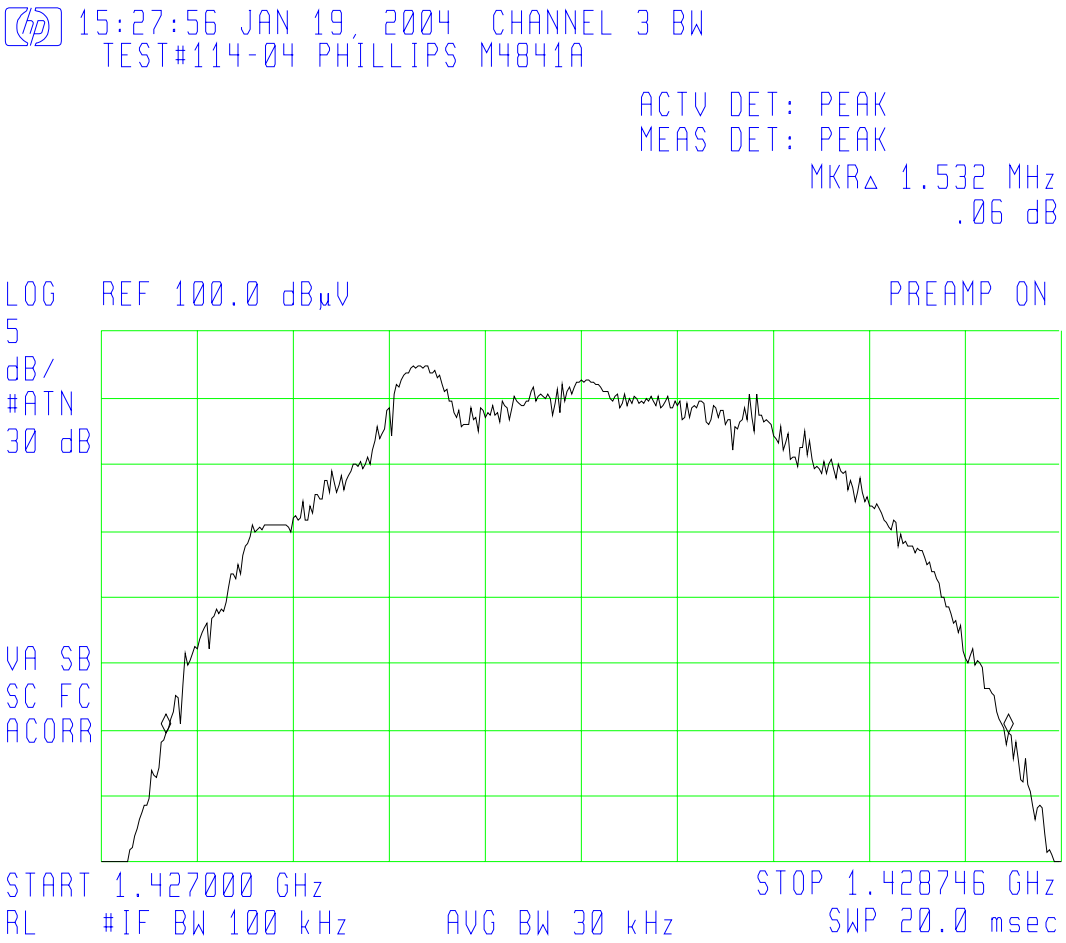
Channel 3 Occupied Bandwidth Plot



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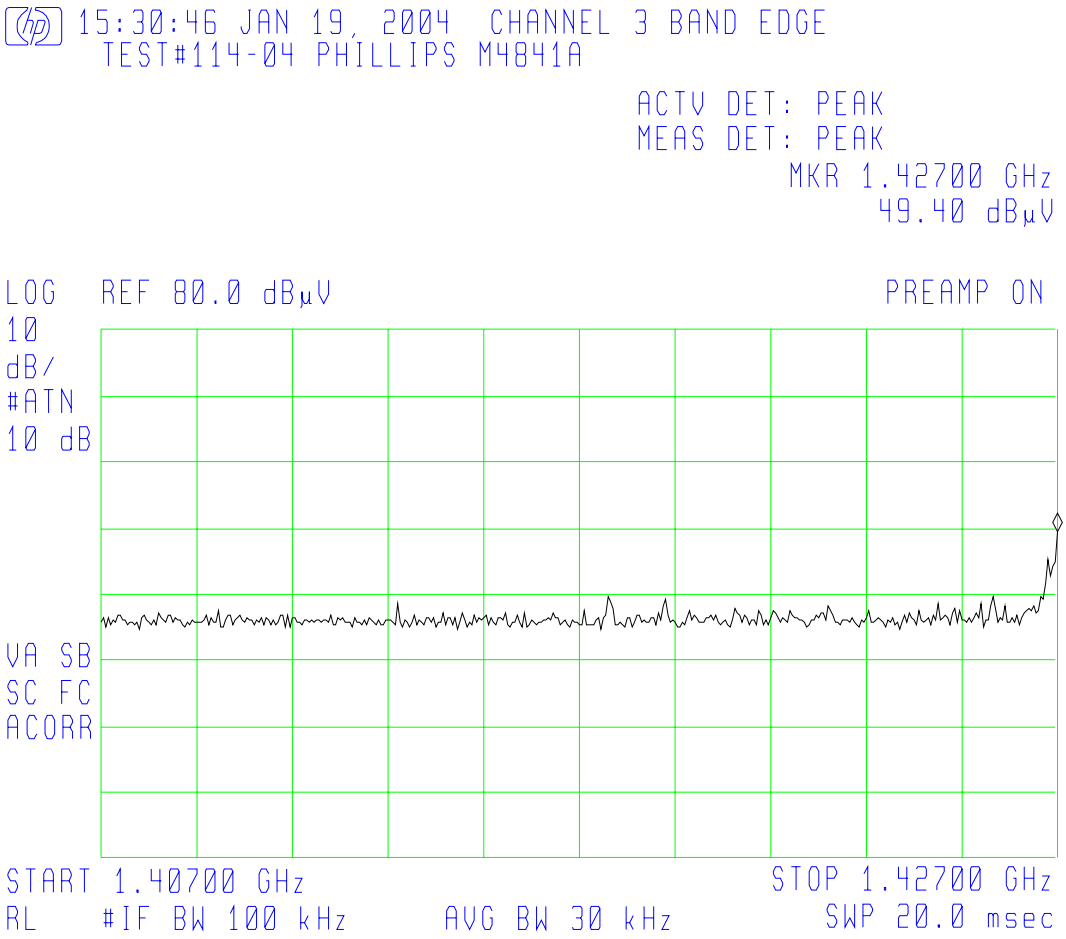
Channel 3 Occupied Bandwidth Lower Band Edge Plot



Plot shows lower band edge on right and 20 MHz window. A peak measurement of 49.40 dBuV/m with a limit of 54 dBuV/m avg, data shows a margin of 4.60 dB.

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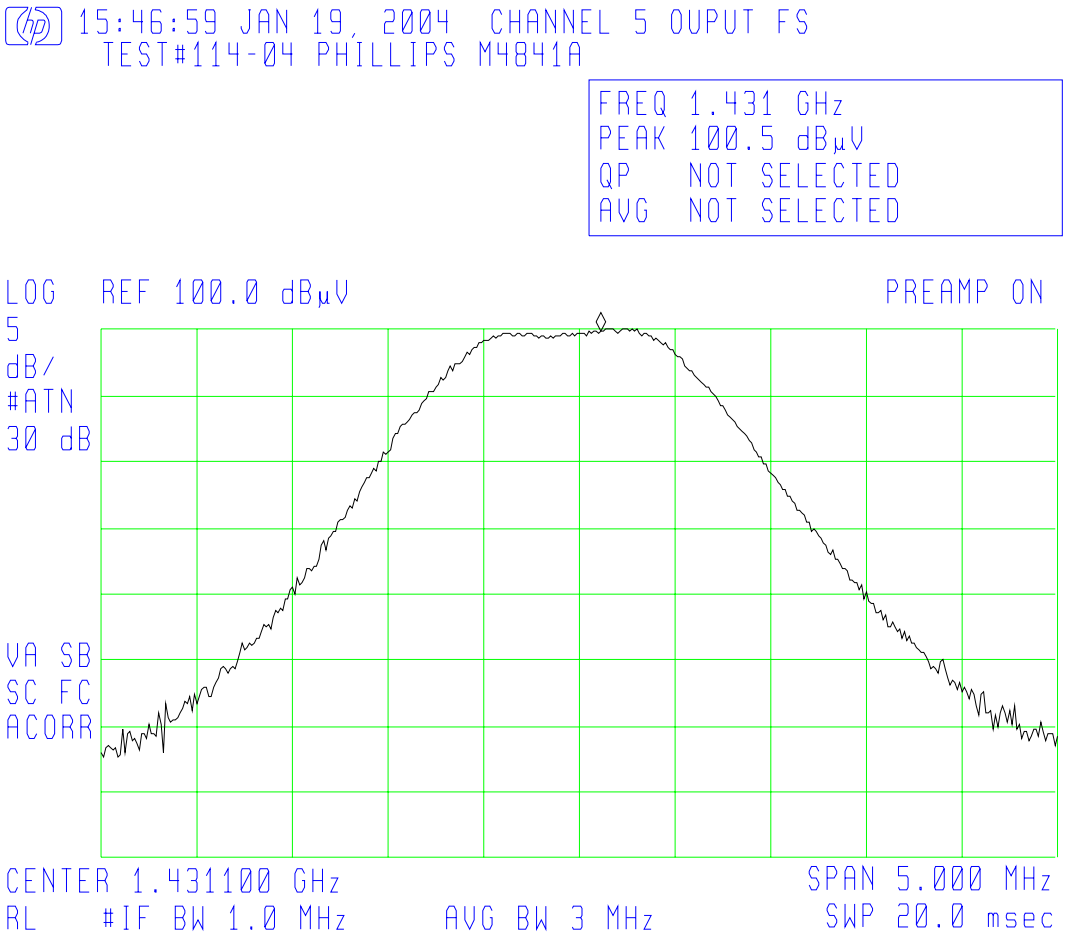
Channel 5 Output Power Plot



Freq (MHz)	Polarization (H/V)	Peak Amp (dBuV/m)	Avg Amp (dBuV/m)	Avg Limit (dBuV/m)	Avg Margin (dB)
1431.1	H	100.5	80.5	117.4	-36.9

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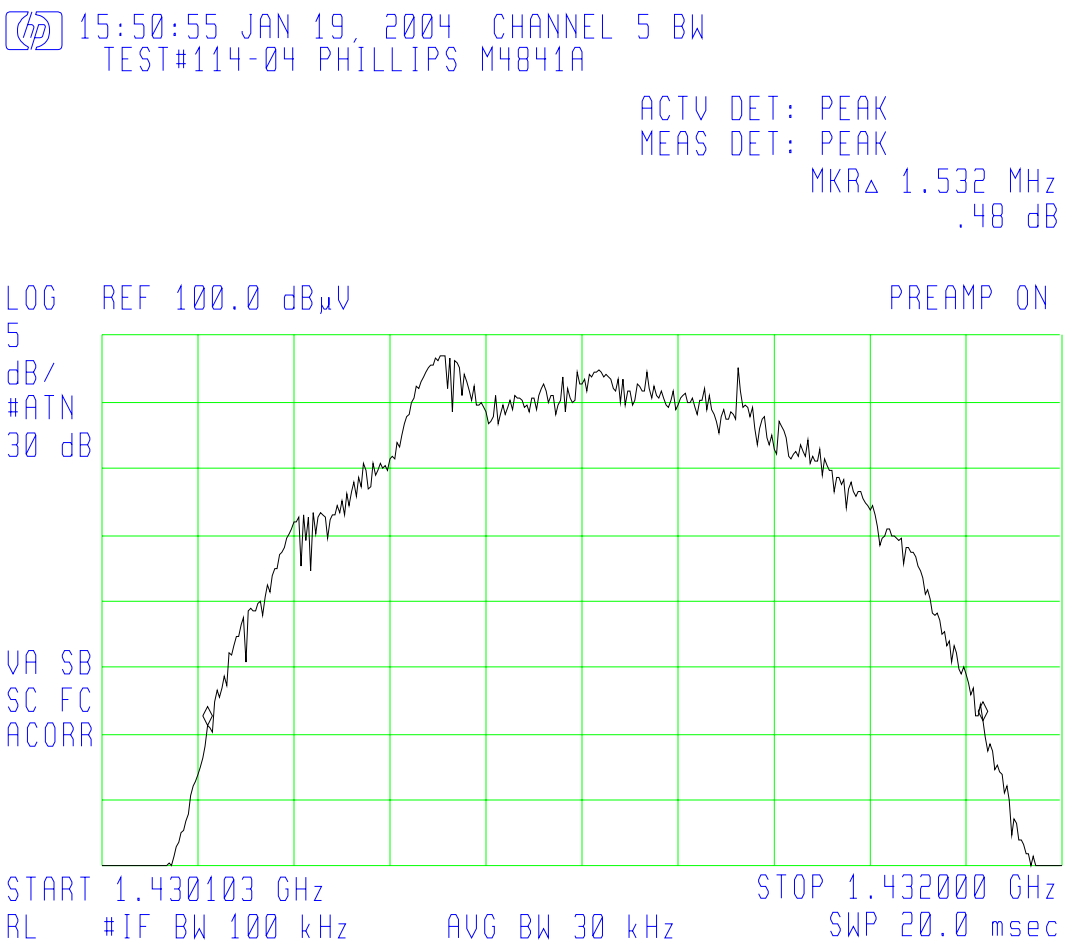
Channel 5 Occupied Bandwidth Plot



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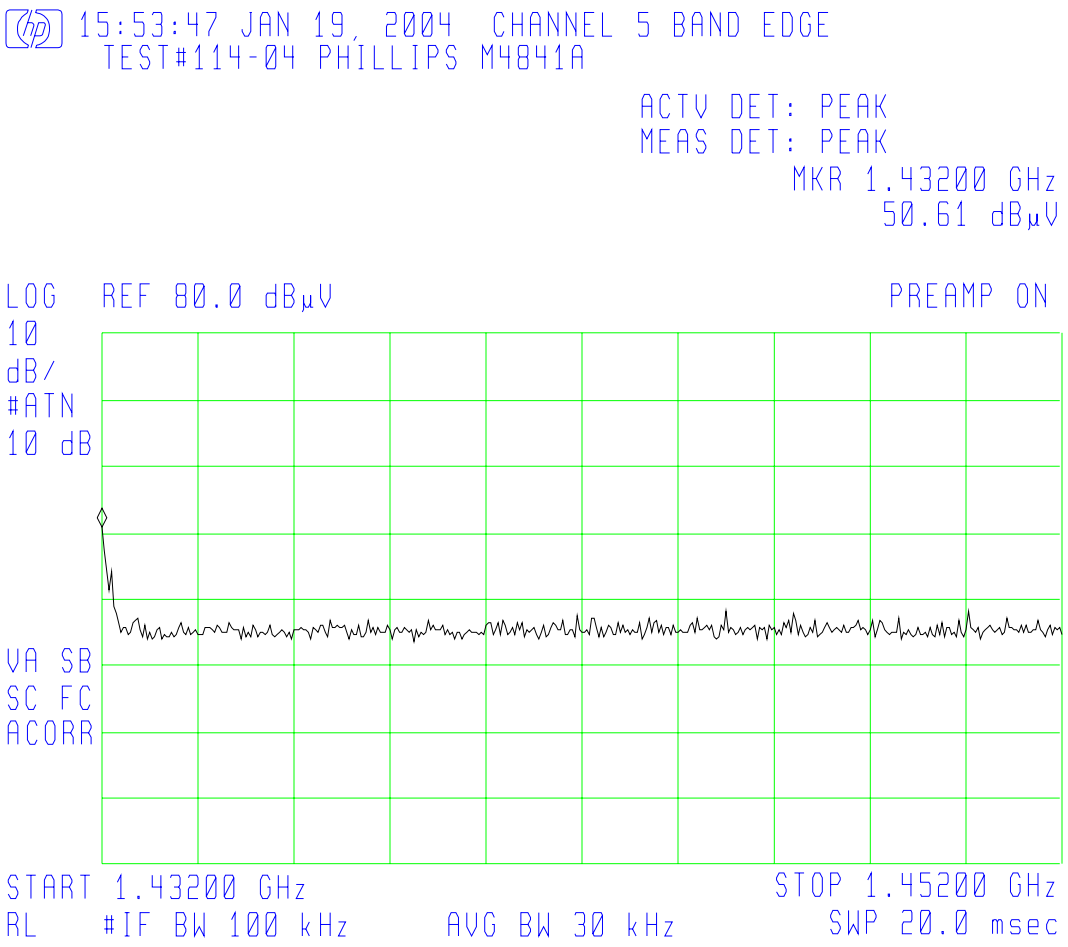
Channel 5 Occupied Bandwidth Upper Band Edge Plot



Plot shows upper band edge on left and 20 MHz window. A peak measurement of 50.61dBuV/m with a limit of 54 dBuV/m avg, data shows a margin of 3.39 dB.

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NOTES AND COMMENTS

(Special conditions unique to this test)

A full investigation of the spectrum of this devices digital circuitry and it’s associated equipment can be found in Test reports #114-04b, 120-04, 135-04 and 146-04.

The EUT is battery Powered; no power line conducted testing applies.

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