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# ELECTROMAGNETIC EMISSION TEST REPORT

**ACCORDING TO 47CFR PART 15, SUBPART C § 15.249, 15.209, 15.205 and SUBPART B**

**for**

## Hi-G-Tek Ltd.

**EQUIPMENT UNDER TEST:**

## DataSeal transceiver

## Model IG-RS-40-916

This report is in conformity with and ISO/IEC 17025. The A2LA logo endorsement applies only to the test methods and the standards that are listed in the scope of Hermon Laboratories accreditation.
The test results relate only to the items tested. **This test report must not be reproduced in any form except in full with the approval of Hermon Laboratories Ltd.**



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# 1 Project information

## Description of equipment under test

| | |
|---|---|
| Test items | DataSeal transceiver |
| Manufacturer | Hi-G-Tek |
| Type (Model) | IG-RS-40-916 |
| Equipment FCC code[1] | DSR |

## Applicant information

| | |
|---|---|
| Applicant's responsible person | Mr. A Genin, project manager |
| Company | Hi-G-Tek |
| Address | 16 Haharoshet street, |
| Postal code | 60375 |
| City | Or-Yehuda |
| Country | Israel |
| Telephone number | +972 3 5331575 |
| Telefax number | +972 3 5339225 |

## Test performance

| | |
|---|---|
| Project number: | 14832 |
| Location | Hermon Laboratories |
| Receipt date | October 4, 2001 |
| Test started | October 4, 2001 |
| Test completed | February 26, 2002 |
| Purpose of test | Apparatus compliance verification in accordance with emission requirements |
| Test specifications | 47CFR Part 15, §15.249, 15.209, 15.205 and subpart B |

[1] FCC Equipment codes – see Appendix D

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# 2 Summary of tests

The tests listed in the table below were performed. The EUT was found complying with the limits of 47CFR Part 15, §15.249, 15.209, 15.205 and subpart B.

| Parameter | | Subclause | C | NC | NT | NA | Tested by | Date tested | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| **Transmitter characteristics, §15.249, 15.209** | | | | | | | | | |
| **Field strength of fundamental** | **916.5 MHz** | 15.249(a) | **C** | | | | Mrs. E. Pitt, test engineer | February 26, 2002 | |
| | **125 kHz** | 15.209(a) | **C** | | | | | | |
| **Field strength of harmonics for916.5 MHz fundamental** | | 15.249(a) (a) | **C** | | | | Mrs. E. Pitt, test engineer | February 26, 2002 | |
| **Out of band spurious emissions (radiated) for fundamental** | **916.5 MHz** | 15.249(c) | **C** | | | | Mrs. E. Pitt, test engineer | February 26, 2002 | |
| | **125 kHz** | 15.209(c) | **C** | | | | | | |
| **Unintentional radiation, §15.107, §15.109** | | | | | | | | | |
| **Conducted emissions** | | 15.107 | | | | **NA** | | | |
| **Radiated emissions** | | 15.109 | **C** | | | | Mrs. E. Pitt, test engineer | February 26, 2002 | |
| **Receiver characteristics, §15.109** | | | | | | | | | |
| **Spurious radiated emissions** | | 15.109 | **C** | | | | Mrs. E. Pitt, test engineer | February 26, 2002 | |

NOTE: C: The parameter is compliant with the requirements.
NC: The parameter is not compliant with the requirements.
NT: The parameter is not tested.
NA: The test of this parameter is not applicable.

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| Parameter | Subclause | C | NC | NT | NA | Remarks |
|---|---|---|---|---|---|---|
| **General conditions under Part 15** | | | | | | |
| The Intentional radiator operates at 125 kHz and 916.5 MHz. | 15.209, 15.249 | **C** | | | | |
| The intentional radiator does not operate in the restricted bands of operation. | 15.205 | **C** | | | | |
| The intentional radiator has permanently attached antenna or antenna that uses a unique coupling to the intentional radiator. | 15.203 | **C** | | | | |
| The intentional radiator has a standard connector and must be professionally installed. To demonstrate that professional installation is required, the following three points must be addressed: (a) the application (or intended use) of the EUT; (b) the installation requirements of the EUT, and (c) the method by which the EUT will be marketed. | 15.203 | | | | **NA** | |
| No antenna other than that furnished by the responsible party can be used with the device. | 15.203 | | | | **NA** | |
| Antenna technical characteristics, as referred to in "Transmitter description" table in the test report | 15.204 | **C** | | | | |
| NOTE: C: The parameter is compliant with the requirements.<br>NC: The parameter is not compliant with the requirements.<br>NT: The parameter is not tested.<br>NA: The test of this parameter is not applicable. | | | | | | |

**Test report prepared by:** Ms. N. Averin, certification engineer

Mr. M. Nikishin, EMC group leader

**Test report approved by:** Mr. A. Usoskin, QA manager

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# 3 EUT description

## 3.1 General description

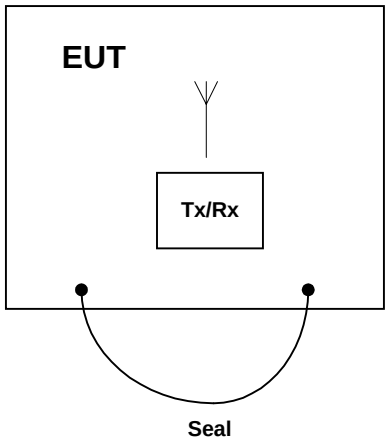
The EUT, DataSeal, model IG-RS-40-916, is a transceiver intended for automatic processing of secured cargoes and real time monitoring of cargoes in transit and in storage. The device includes a transmitter/receiver unit, a real-time clock, a processor, a memory and sensing circuitry for sealing verification. The sealing wire prevents any attempt of opening, bypassing or tampering with the seal without alerting the system and recording of the event. The DataSeal is capable of communicating its ID and status to 30 m distance. It transmits the information in reply to an interrogation by the DataReader.
The DataSeal is a stand-alone unit, it has two RF channels, high frequency and low frequency. The device operates at 916.5 MHz and at 125 kHz.
The EUT is powered from 3.6 V lithium battery.

Local oscillator frequencies are: 8 MHz and 28 MHz.

## 3.2 EUT test configuration

The EUT test configuration is shown in Figure 3.2.1.

**Figure 3.2.1 EUT test configuration**



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## 3.3 Transmitter description

| | | | | | | |
|---|---|---|---|---|---|---|
| **Type of equipment** | | | | | | |
| v | Stand-alone (Equipment with or without its own control provisions) | | | | | |
| | Combined equipment (Equipment where the radio part is fully integrated within another type of equipment) | | | | | |
| | Plug-in card (Equipment intended for a variety of host systems) | | | | | |
| | Other: | | | | | |
| **Operating frequency** | A: 916.5 MHz<br>B: 125 kHz | | | | | |
| **Transmitter aggregate data rate** (bits per second) | A: 15625<br>B: 4000 | | | | | |
| **Normal test signal** | Transmit carrier & transmit message | | | | | |
| **Maximum rated output power** | | | | | | |
| | At transmitter permanent external 50 Ω rf output connector (dBm) | | | | | |
| | Effective radiated power (for equipment with integral antenna) (dBm) | A: -7<br>B: -25 | | | | |
| | Is transmitter output power variable? | v | No | | | |
| | | | Yes | | continuous variable | |
| | | | | | stepped variable | |
| | | | | | stepsize (dB): | |
| | | | | | minimum RF power (dBm): | |
| | | | | | maximum RF power (dBm): | |
| **Transmitter power source** | | | | | | |
| v | **Battery** | **Nominal rated voltage (VDC)** | **3.6** | | | |
| | Nickel Cadmium | | | | | |
| v | Lithium | | | | | |
| | Other | | | | | |
| | **DC** | **Nominal rated voltage (VDC)** | | | | |
| | **AC mains** | **Nominal rated voltage (VAC)** | | | | |
| Is there common power source for transmitter and receiver | | | v | yes | | no |

| **Antenna technical characteristics** | | | | | | |
|---|---|---|---|---|---|---|
| | | | **Type** | **Manufacturer** | **Model number** | **Gain** |
| Integral | | with temporary RF connector | | | | |
| | v | without temporary RF connector | A: Path | HI-G-TEK | SA47062 | -5dBi |
| | | | B: Ferrite | HI-G-TEK | FR0640A1 | NA |
| External | | | | | | |

| **External antenna connection** | | | |
|---|---|---|---|
| | | | |

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# 4 Tests results

## 4.1 Field strength of fundamental according to § 15.249 (a), §15.209(a)

METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.4
DATE: February 26, 2002
RELATIVE HUMIDITY: 43 %
AMBIENT TEMPERATURE: 22 °C
TEST PERFORMED IN: ANECHOIC CHAMBER
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
ANTENNA TYPE: BICONILOG

**Peak detector**

| Carrier frequency, MHz | Field strength, dB(µV/m) | Specification limit, dB(µV/m) | Margin, dB | Reference to Plots in Appendix A |
|---|---|---|---|---|
| 916.5 | 87.70 | 94 | 6.30 | A1 |
| Measurement uncertainty, dB | | +5.73 / -5.57 | | |

**TEST EQUIPMENT USED:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| HL 0465 | HL 0521 | HL 0589 | HL 0593 | HL 0594 | HL 0604 | HL 1004 | HL 2009 |

**LIMIT**

| Operating frequency range, MHz | Field strength of fundamental, dB(µV/m) |
|---|---|
| 902-928 | 94 |
| 2400-2483.5 | 94 |
| 5275-5850 | 94 |
| 24000-24250 | 107.95 |

**For frequencies above 1000 MHz, the above field strength limits are based on average limits.**

**TEST PROCEDURE**

The EUT was tested, being placed on a wooden 80 cm height table in each of three orthogonal planes in turn.

To find maximum radiation the turntable was rotated 360$^{o}$, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

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METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.4
DATE: February 26, 2002
RELATIVE HUMIDITY: 43 %
AMBIENT TEMPERATURE: 22 °C
TEST PERFORMED IN: ANECHOIC CHAMBER
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
ANTENNA TYPE: LOOP

**Peak detector**

| Carrier frequency, kHz | Field strength, dB(μV/m) | Limit*, dB(μV/m) | Margin, dB | Reference to Plots in Appendix A |
|---|---|---|---|---|
| 126.0 | 69.36 | 105.6 | 36.24 | A2 |
| Measurement uncertainty, dB | | ±4 | | |

* The limit is based on measurements employing an average detector according to §15.209(d).

**TEST EQUIPMENT USED:**

| | | | | | | |
|---|---|---|---|---|---|---|
| HL 0446 | HL 0465 | HL 0521 | HL 0589 | HL 1004 | HL 2009 | |

**LIMIT**

| Frequency, MHz | Limit dB(μV/m) | Measurement distance, m |
|---|---|---|
| 0.009 – 0.490 | 67.60-20logF* | 300** |
| 0.490 – 1.705 | 87.60-20logF* | 30** |
| 1.705 - 30 | 29.5 | 30** |
| 30 - 88 | 40.0 | 3 |
| 88 - 216 | 43.5 | 3 |
| 216 - 960 | 46.0 | 3 |
| Above 960* | 54.0 | 3 |

* F is frequency in kHz.

**The limit for 3 m distance was calculated using the inverse square distance extrapolation factor as follows:

$Lim S_2 = Lim\ S_1 + 40 \log (S_1/S_2)$, where $S_1$ = 300 m or 30 m, $S_2$ = 3 m.

**TEST PROCEDURE**

The EUT was tested, being placed on a wooden 80 cm height table in each of three orthogonal planes in turn.

The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

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## 4.2 Field strength of harmonics according to § 15.249 (a)

METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.4
DATE: February 26, 2002
RELATIVE HUMIDITY: 43 %
AMBIENT TEMPERATURE: 22 °C
CARRIER FREQUENCY: 916.5 MHz
TEST PERFORMED IN: ANECHOIC CHAMBER
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
ANTENNA TYPE: DOUBLE RIDGED GUIDE

**Peak detector**

| Harmonic, MHz | Field strength, dB(μV/m) | Average limit, dB(μV/m) | Margin, dB | Reference to Plots in Appendix A |
|---|---|---|---|---|
| 1833 | 52.0 | 54 | 2.0 | A3, A4 |
| 2750 | 53.0 | 54 | 1.0 | A5 |
| Measurement uncertainty, dB | | ± 2.36 | | |

**TEST EQUIPMENT USED:**

| | | | | | | |
|---|---|---|---|---|---|---|
| HL 0041 | HL 0465 | HL 0521 | HL 0589 | HL 0593 | HL 0594 | HL 1947 |

**LIMIT**

| Operating frequency range, MHz | Field strength of harmonics, dB(μV/m) | |
|---|---|---|
| | Peak limit | Average limit |
| 902-928 | 74 | 54 |
| 2400-2483.5 | 94 | 74 |
| 5275-5850 | 94 | 74 |
| 24000-24250 | 107.95 | 87.95 |

**TEST PROCEDURE**

The EUT was tested, being placed on a wooden 80 cm height table in each of three orthogonal planes in turn.

To find maximum radiation the turntable was rotated $360^{o}$, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

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## 4.3 Out of band spurious emissions according to § 15.249 (d), §15.209

METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.4/ §13.1.5
EQUIPMENT UNDER TEST: DataSeal
MODE OF OPERATION: Tx + Rx
DATE: February 26, 2002
RELATIVE HUMIDITY: 43 %
AMBIENT TEMPERATURE: 22 °C
TEST DISTANCE: 3 m
CARRIER FREQUENCY: 916.5 MHz
FIELD STRENGTH LEVEL AT WHICH THE MEASUREMENT HAS BEEN PERFORMED: 87.7 dB(µV/m)
FREQUENCY RANGE: 9 kHz – 9.5 GHz

TEST PERFORMED IN: ANECHOIC CHAMBER
FREQUENCY RANGE: 9 kHz – 30 MHz
ANTENNA TYPE: LOOP

**Peak detector**

| Frequency, MHz | Radiated emission, dB (■V/m) | Limit (50 dB below carrier), dB(■V/m) | Margin, dB | Reference to Plots in Appendix A |
|---|---|---|---|---|
| 0.009 – 0.15 | No spurious emissions were found | | | A6 |
| 0.15 - 30 | No spurious emissions were found | | | A7 |
| Measurement uncertainty, dB | ±4 | | | |

TEST PERFORMED IN: ANECHOIC CHAMBER
FREQUENCY RANGE: 30 MHz – 2 GHz

**Quasi-peak detector**

| Frequency, MHz | Antenna polarization | Turntable position, (°) | Radiated emission, dB (■V/m) | Limit, dB(■V/m) | Margin, dB | Reference to Plots in Appendix A |
|---|---|---|---|---|---|---|
| 285.4 | V | 0 | 29.35 | 46.00 | 16.65 | A8 |
| 630.1 | V | 0 | 38.73 | 46.00 | 7.27 | A8, A9 |
| 902.5 | H | 0.8 | 41.90 | 46.00 | 4.10 | A8, A10 |
| 928.1 | H | 0.8 | 40.10 | 46.00 | 5.90 | A11, A12 |
| Measurement uncertainty, dB | +5.73 / -5.57 | | | | | |

**Average detector**

| Frequency, MHz | Antenna polarization | Turntable position, (°) | Radiated emission, dB (■V/m) | Limit, dB(■V/m) | Margin, dB | Reference to Plots in Appendix A |
|---|---|---|---|---|---|---|
| 1200.9 | H | 0 | 40.80 | 54.00 | 13.20 | A12 |
| 1833 | V | 0 | 52.00 | 54.00 | 2.00 | A12 |
| Measurement uncertainty, dB | +5.73 / -5.57 | | | | | |

The test results recorded in the tables were obtained throughout the testing with biconilog antenna at 2.06 m height.

**Table abbreviations:**
Antenna polarization: V = vertical, H = horizontal
Turntable position: $0^{o}$ = EUT front panel faces the receiving antenna
Margin = dB below (negative if above) specification limit.

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TEST PERFORMED IN: ANECHOIC CHAMBER
FREQUENCY RANGE: 2 – 9.5 GHz
ANTENNA TYPE: DOUBLE RIDGED GUIDE

**Peak detector**

| Frequency, MHz | Antenna polarization | Radiated emission, dB (μV/m) | Limit, dB(μV/m) | Margin, dB | Reference to Plots in Appendix A |
|---|---|---|---|---|---|
| 2000 – 4000 | V+H | No spurious emissions were found except harmonics | | | A13 |
| 4000 – 6500 | V+H | No spurious emissions were found except harmonics | | | A14 |
| 6000 – 9500 | V+H | No spurious emissions were found except harmonics | | | A15 |
| Measurement uncertainty, dB | | ± 2.36 | | | |

**Table abbreviations:**
Antenna polarization: V = vertical, H = horizontal

**LIMIT**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

**TEST EQUIPMENT USED:**

| | | | | | | |
|---|---|---|---|---|---|---|
| HL 0041 | HL 0465 | HL 0521 | HL 0589 | HL 0593 | HL 0594 | HL 0604 |
| HL 1004 | HL 1424 | HL 1566 | HL 1863 | HL 1864 | HL 1947 | HL 2009 |

**TEST PROCEDURE**

The EUT was tested, being placed on a wooden 80 cm height table in each of three orthogonal planes in turn.

**9 kHz – 30 MHz frequency range.** The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

**30 MHz – 9.5 GHz frequency range.** To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

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| | |
|---|---|
| METHOD OF MEASUREMENTS: | ANSI 63.4 §13.1.4/ §13.1.5 |
| EQUIPMENT UNDER TEST: | DataSeal |
| MODE OF OPERATION: | Tx + Rx |
| DATE: | February 26, 2002 |
| RELATIVE HUMIDITY: | 43 % |
| AMBIENT TEMPERATURE: | 22 °C |
| TEST DISTANCE: | 3 m |
| CARRIER FREQUENCY: | 125 kHz |
| FIELD STRENGTH LEVEL AT WHICH THE MEASUREMENT HAS BEEN PERFORMED: | 69.36 dB(μV/m) |
| FREQUENCY RANGE: | 9 kHz – 30 MHz |
| | |
| TEST PERFORMED IN: | ANECHOIC CHAMBER |
| FREQUENCY RANGE: | 9 kHz – 30 MHz |
| ANTENNA TYPE: | LOOP |

**Peak detector**

| Frequency, MHz | Radiated emission, dB (■V/m) | Limit, dB(■V/m) | Margin, dB | Reference to Plots in Appendix A |
|---|---|---|---|---|
| 0.009 – 0.15 | No spurious emissions were found | | | A16 |
| 0.15 - 30 | No spurious emissions were found | | | A17 |
| Measurement uncertainty, dB | ±4 | | | |

**LIMIT**

| |
|---|
| Radiated emissions must comply with §15.209(a) limits. |

**TEST EQUIPMENT USED:**

| | | | | | | |
|---|---|---|---|---|---|---|
| HL 0446 | HL 0465 | HL 0521 | HL 0589 | HL 1004 | HL 2009 | |

**TEST PROCEDURE**

The EUT was tested, being placed on a wooden 80 cm height table in each of three orthogonal planes in turn.

The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

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## 4.4 Receiver spurious emissions, according to §15.109

METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
TEST PERFORMED IN: ANECHOIC CHAMBER
MODE OF OPERATION: Rx
DATE: February 26, 2002
RELATIVE HUMIDITY: 43 %
AMBIENT TEMPERATURE: 22 °C
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
THE EUT WAS TESTED AS: TABLE-TOP

RECEIVER OPERATING FREQUENCY: 916.5 MHz
FREQUENCY RANGE: 30 MHz – 5 GHz

| The EUT highest used frequency (not including operating frequency), MHz | Upper frequency of measurement range, MHz |
|---|---|
| Below 1.705 | 30 |
| 1.705 – 108 | 1000 |
| 108 – 500 | 2000 |
| 500 – 1000 | 5000 |
| Above 1000 | 5th harmonic of the highest frequency or 40 GHz, whichever is lower |

**LIMIT**

**(§ 15.109)**

| Frequency, MHz | Class A equipment @ 10 m dB(μV/m) | Class B equipment @ 3 m dB(μV/m) |
|---|---|---|
| 30 - 88 | 39.0 | 40 |
| 88 - 216 | 43.5 | 43.5 |
| 216 - 960 | 46.4 | 46 |
| 960 - 5000 | 49.5 | 54 |

The EUT was tested in Tx + Rx mode. The limits of § 15.209 were used. For test results refer to Paragraph 4.3 of the test report and Plots A8 to A12.

RECEIVER OPERATING FREQUENCY: 125 kHz
FREQUENCY RANGE: 9 kHz – 30 MHz

| The EUT highest used frequency (not including operating frequency), MHz | Upper frequency of measurement range, MHz |
|---|---|
| Below 1.705 | 30 |
| 1.705 – 108 | 1000 |
| 108 – 500 | 2000 |
| 500 – 1000 | 5000 |
| Above 1000 | 5th harmonic of the highest frequency or 40 GHz, whichever is lower |

The EUT was tested in Tx + Rx mode. The limits of § 15.209 were used. For test results refer to Paragraph 4.3 of the test report and Plots A16, A17.

**TEST PROCEDURE**

The EUT was tested, being placed on a wooden 80 cm height table.
**9 kHz – 30 MHz frequency range.** The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

**30 MHz – 9.5 GHz frequency range.** To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

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## 4.5 Unintentional radiated emissions test according to §15.109

METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
TEST PERFORMED IN: ANECHOIC CHAMBER
DATE: February 26, 2002
RELATIVE HUMIDITY: 43 %
AMBIENT TEMPERATURE: 22 °C
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
THE EUT WAS TESTED AS: TABLE-TOP
FREQUENCY RANGE: 30 MHz – 5 GHz

| | The EUT highest used frequency (not including operating frequency), MHz | Upper frequency of measurement range, MHz |
|---|---|---|
| | Below 1.705 | 30 |
| | 1.705 – 108 | 1000 |
| | 108 – 500 | 2000 |
| | 500 – 1000 | 5000 |
| | Above 1000 | 5th harmonic of the highest frequency or 40 GHz, whichever is lower |

**30 – 1000 MHz frequency range**

DETECTOR TYPE: PEAK
RESOLUTION BANDWIDTH: 120 kHz

**All the measured emissions were found more than 20 dB below specification limit, refer to Plot A18.**

**TEST EQUIPMENT USED:**

| | | | | | | |
|---|---|---|---|---|---|---|
| HL 0041 | HL 0465 | HL 0521 | HL 0589 | HL 0593 | HL 0594 | HL 0604 |
| HL 1004 | HL 1947 | HL 2009 | | | | |

**LIMIT (§ 15.109)**

| Frequency, MHz | Class A equipment @ 10 m dB(μV/m) | Class B equipment @ 3 m dB(μV/m) |
|---|---|---|
| 30 - 88 | 39.0 | 40 |
| 88 - 216 | 43.5 | 43.5 |
| 216 - 960 | 46.4 | 46 |
| 960 - 5000 | 49.5 | 54 |

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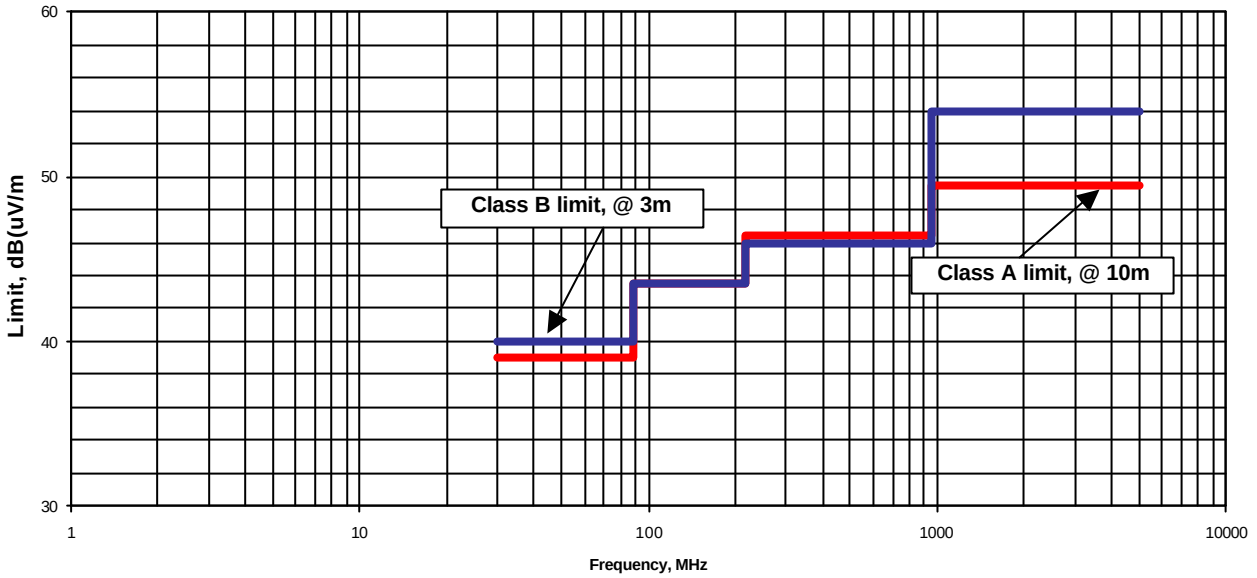
**Unintentional radiated emissions test according to § 15.109.**




**TEST PROCEDURE**

The EUT was tested, being placed on a wooden 80 cm height table.

To find maximum radiation the turntable was rotated 360$^{o}$, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

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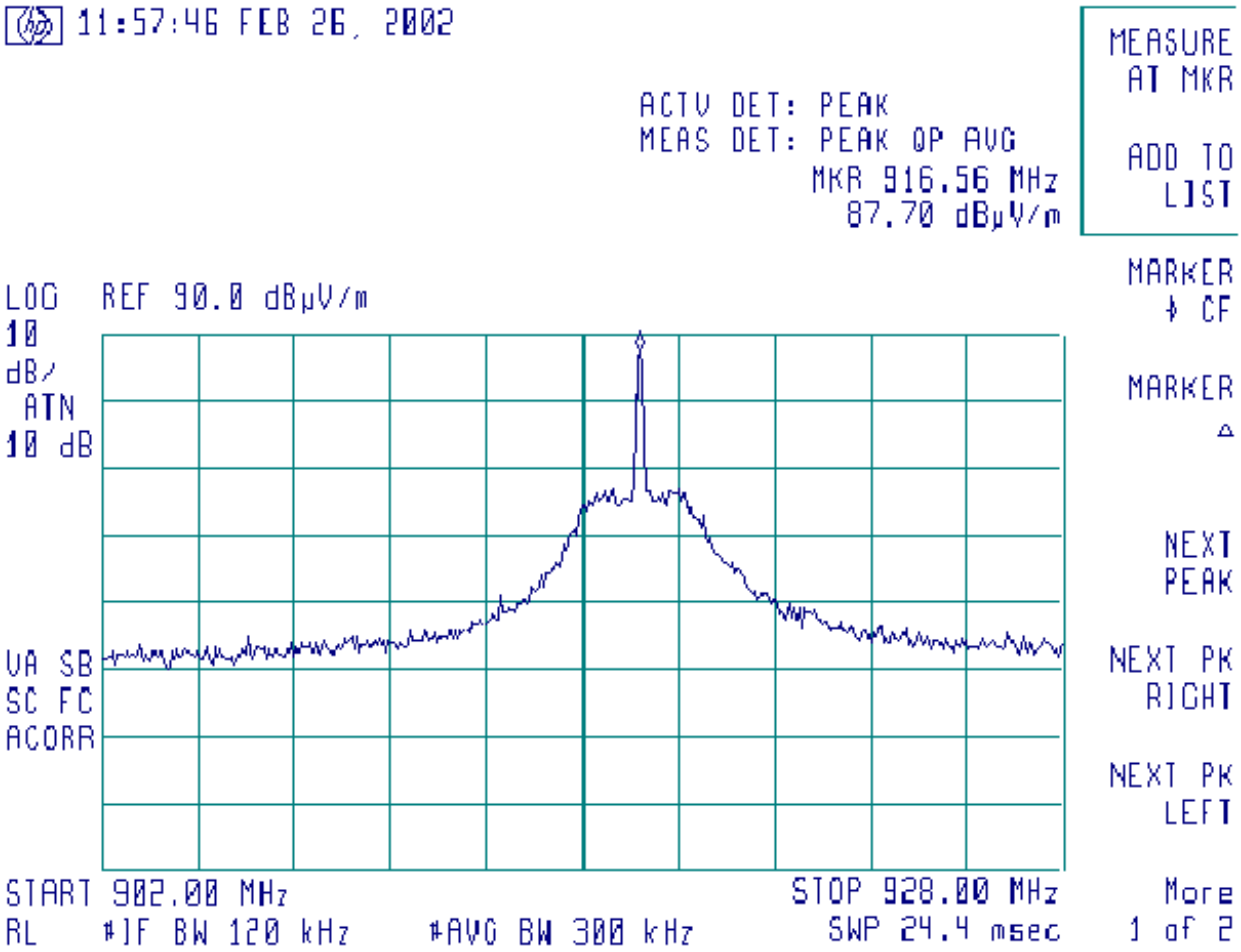
# Appendix A Plots

**Plot A1**
**916.5 MHz carrier field strength**



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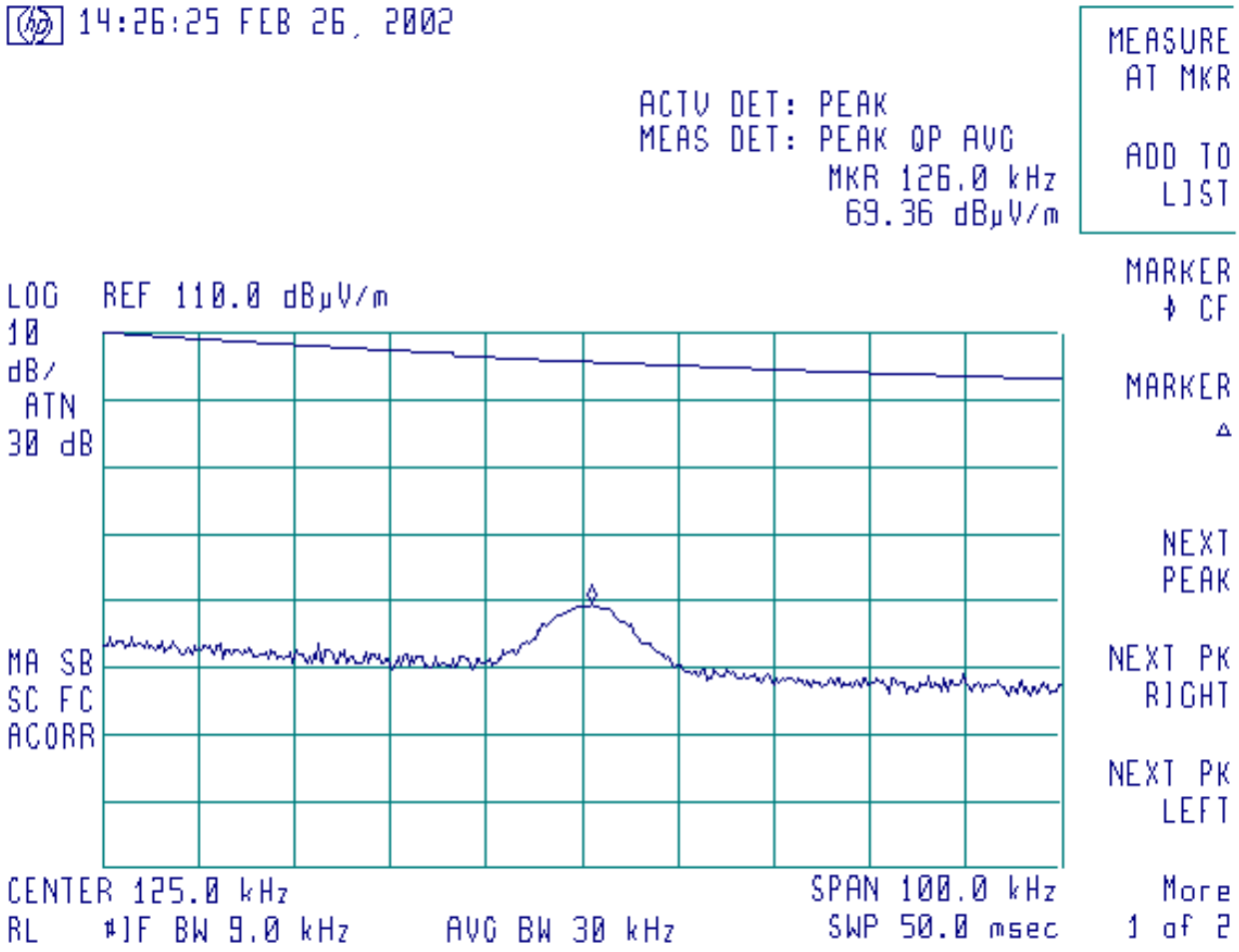
**Plot A2**
**125 kHz carrier field strength**



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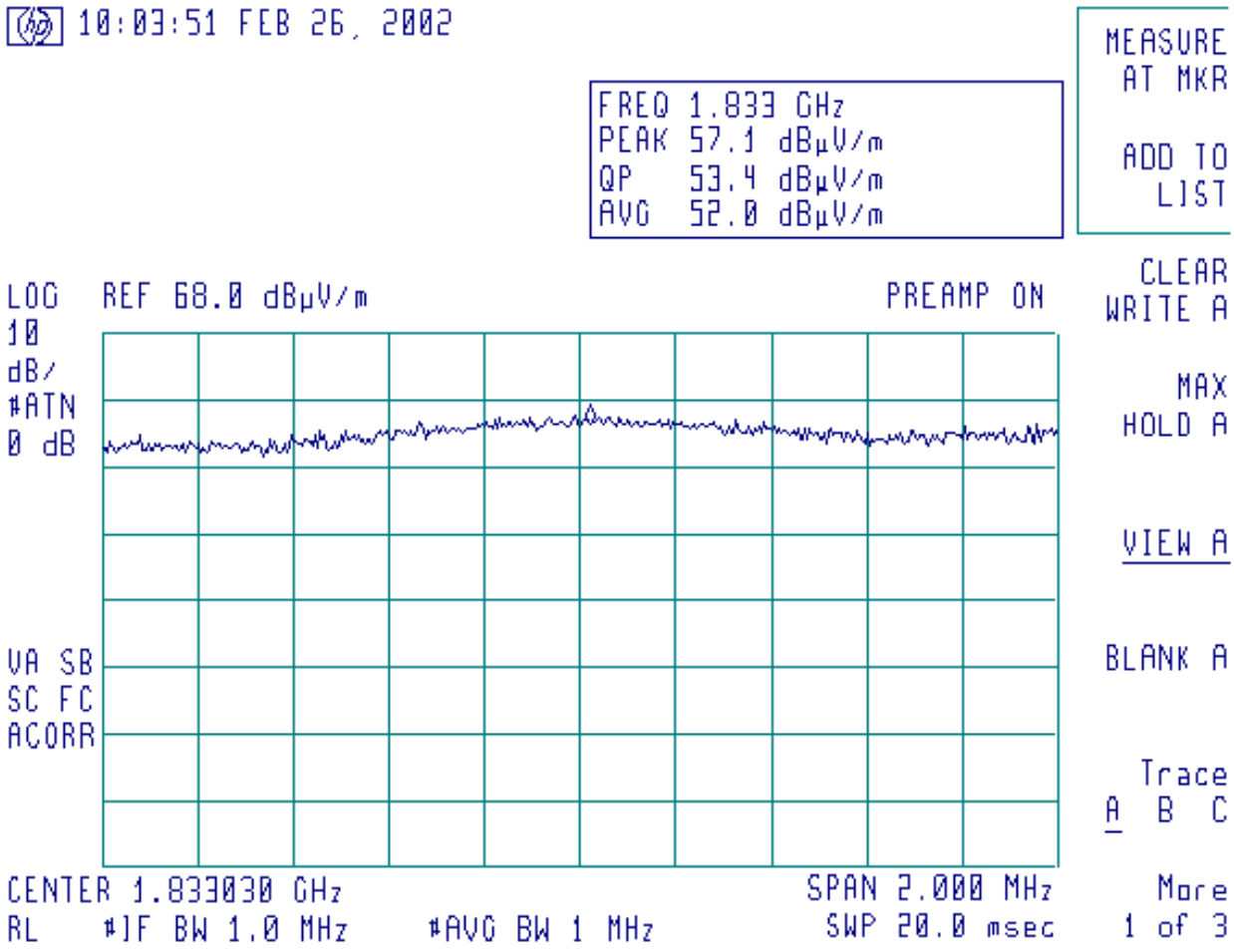
**Plot A3**
**The 2nd harmonic of 916.5 MHz carrier field strength,**
**1 MHz resolution bandwidth**



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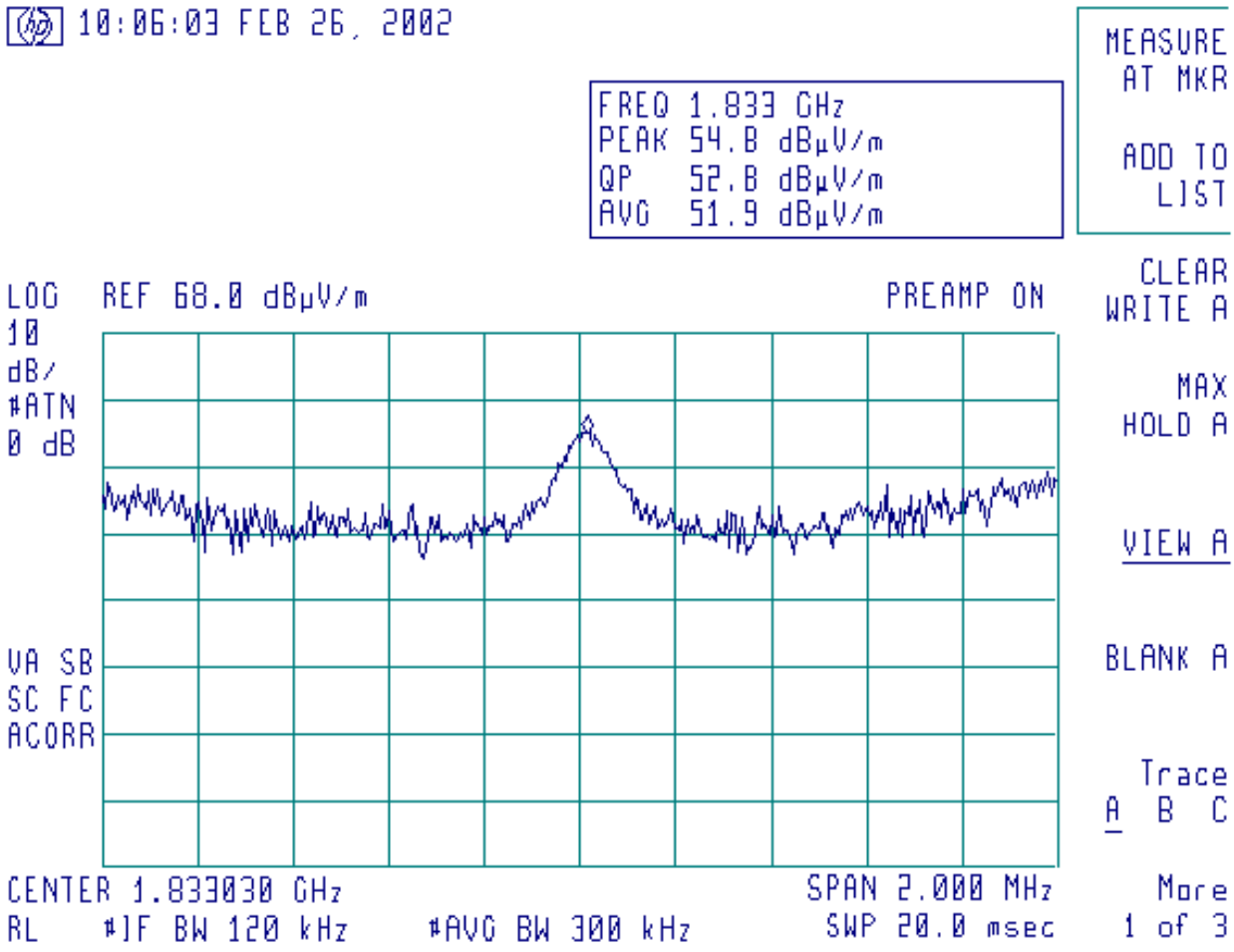
**Plot A4**
**The 2nd harmonic of 916.5 MHz carrier field strength,**
**120 kHz resolution bandwidth**



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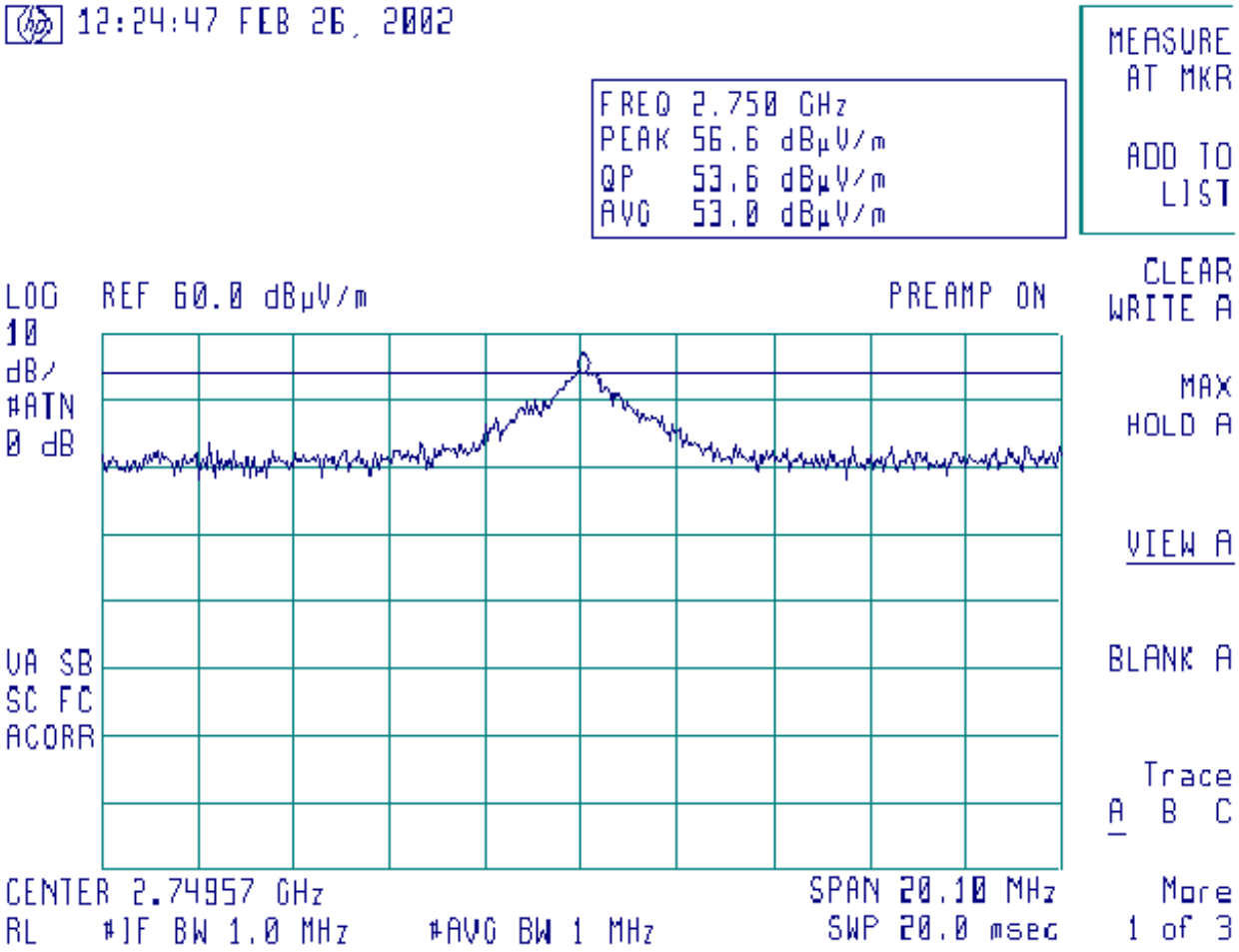
**Plot A5**
**The 3rd harmonic of 916.5 MHz carrier field strength**



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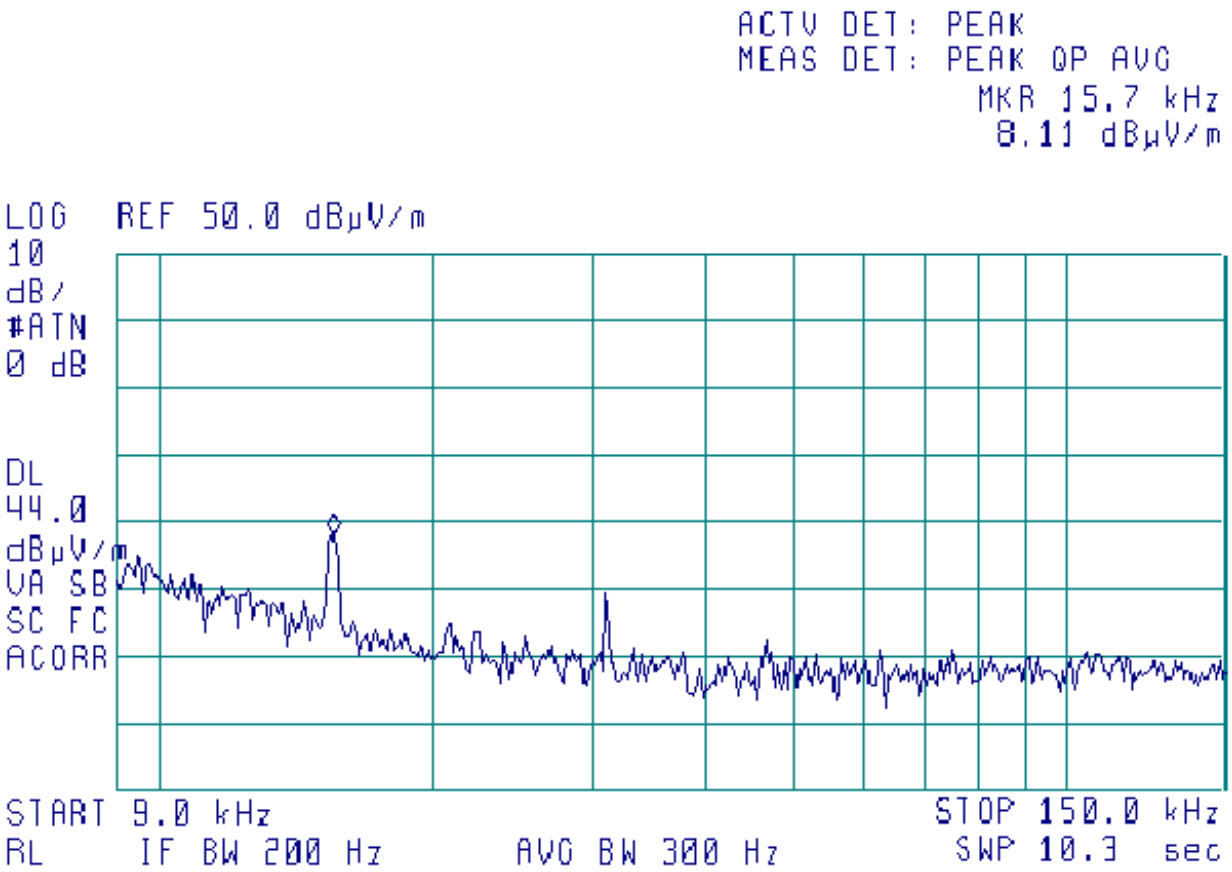
**Plot A6**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 9 – 150 kHz |



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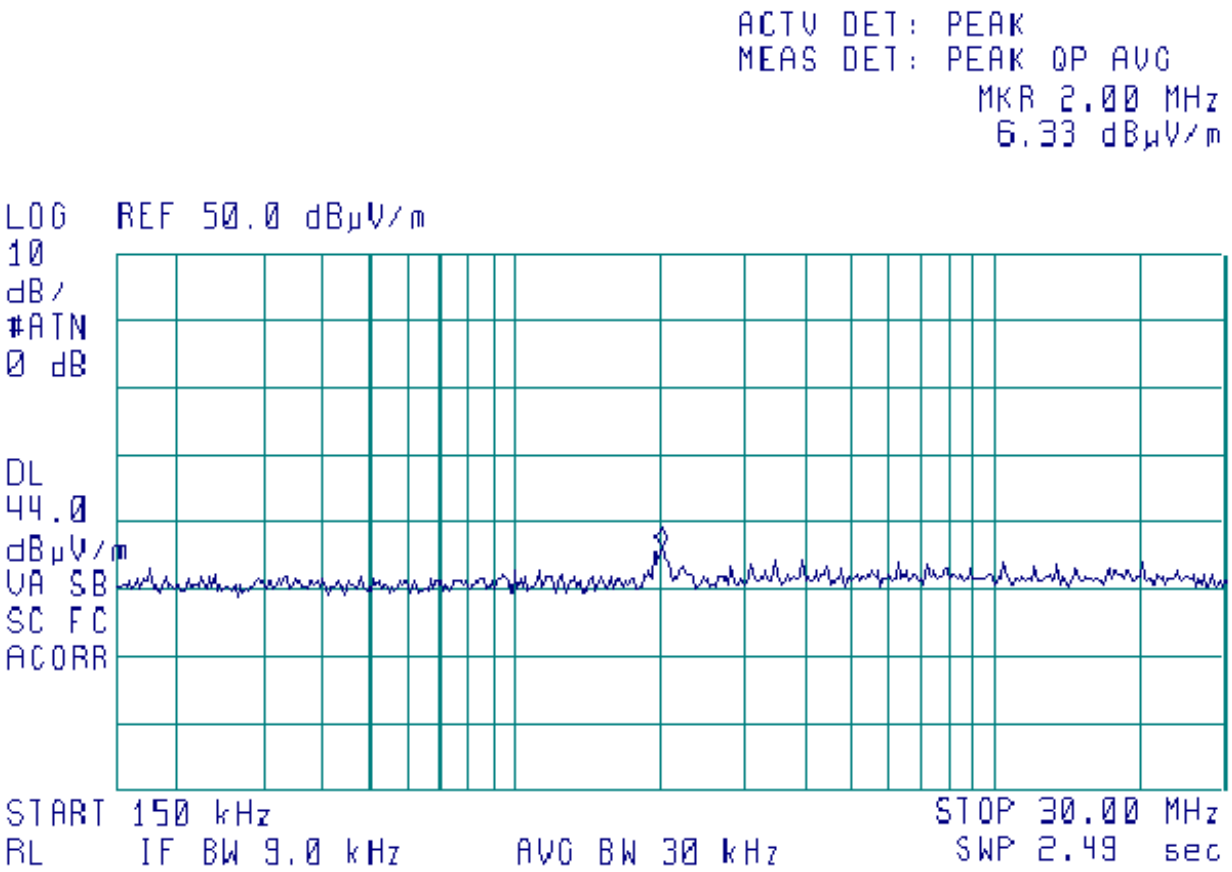
**Plot A7**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 0.15 – 30 MHz |



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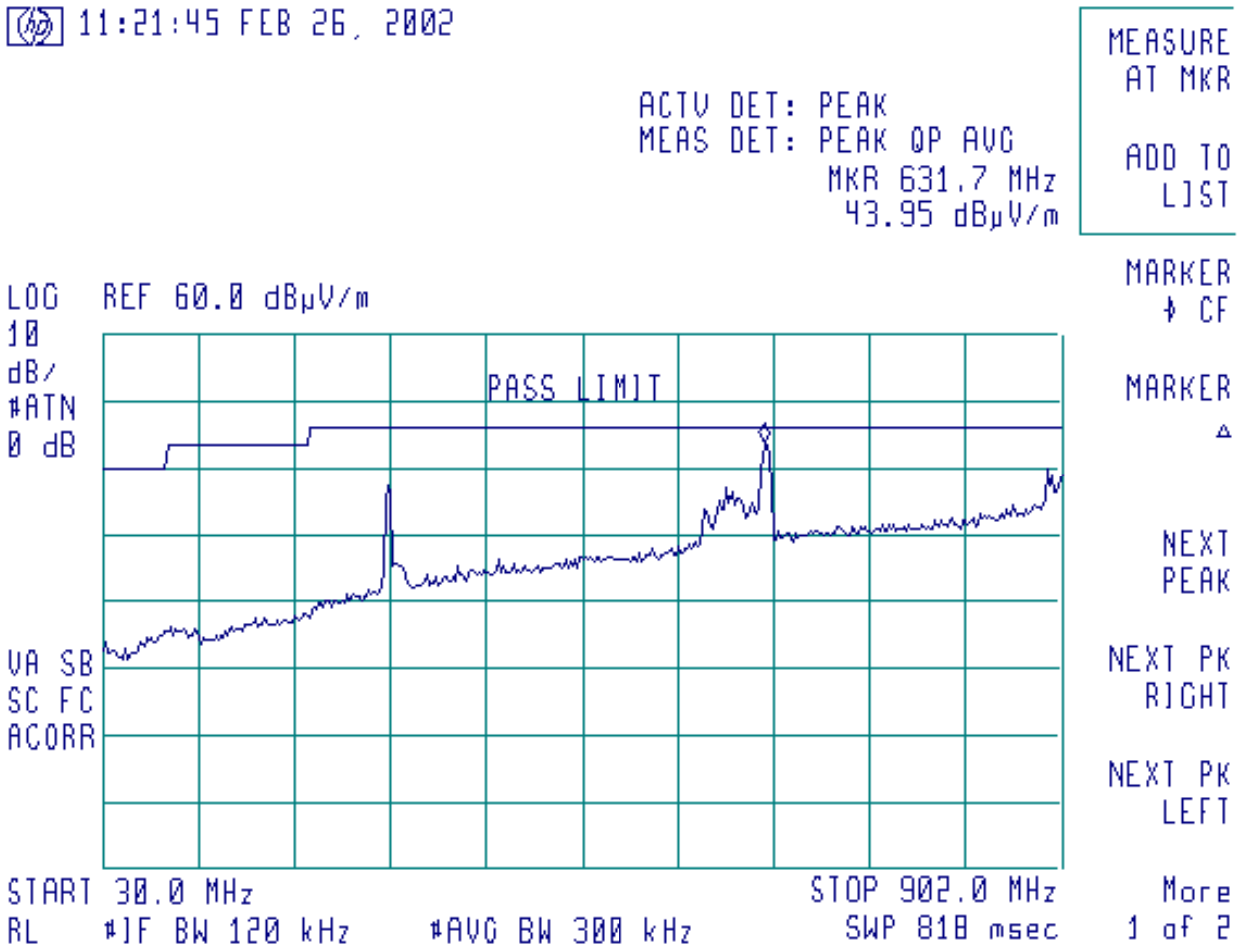
**Plot A8**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 30 – 902 MHz |



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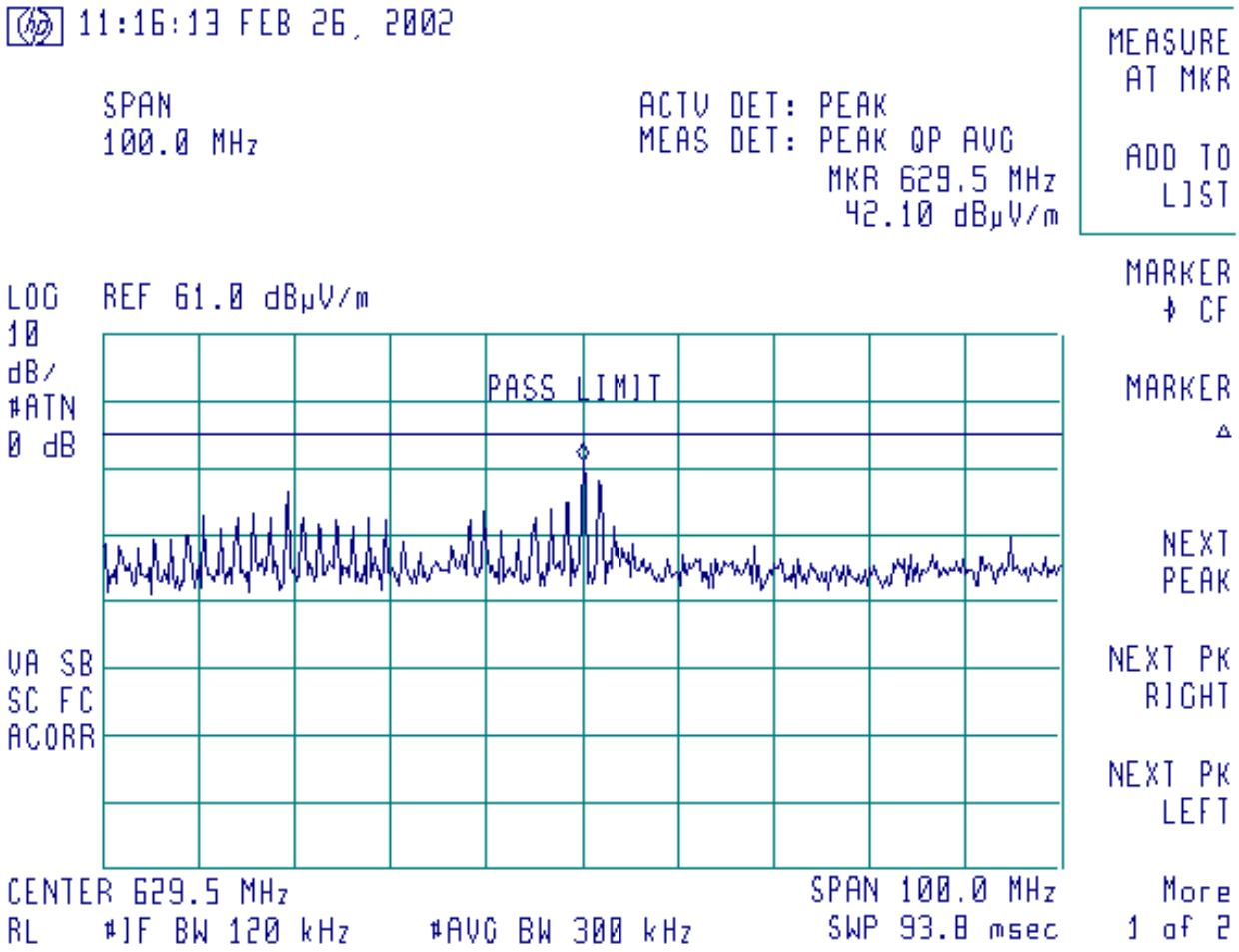
**Plot A9**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| CENTER FREQUENCY: | 629.5 MHz |



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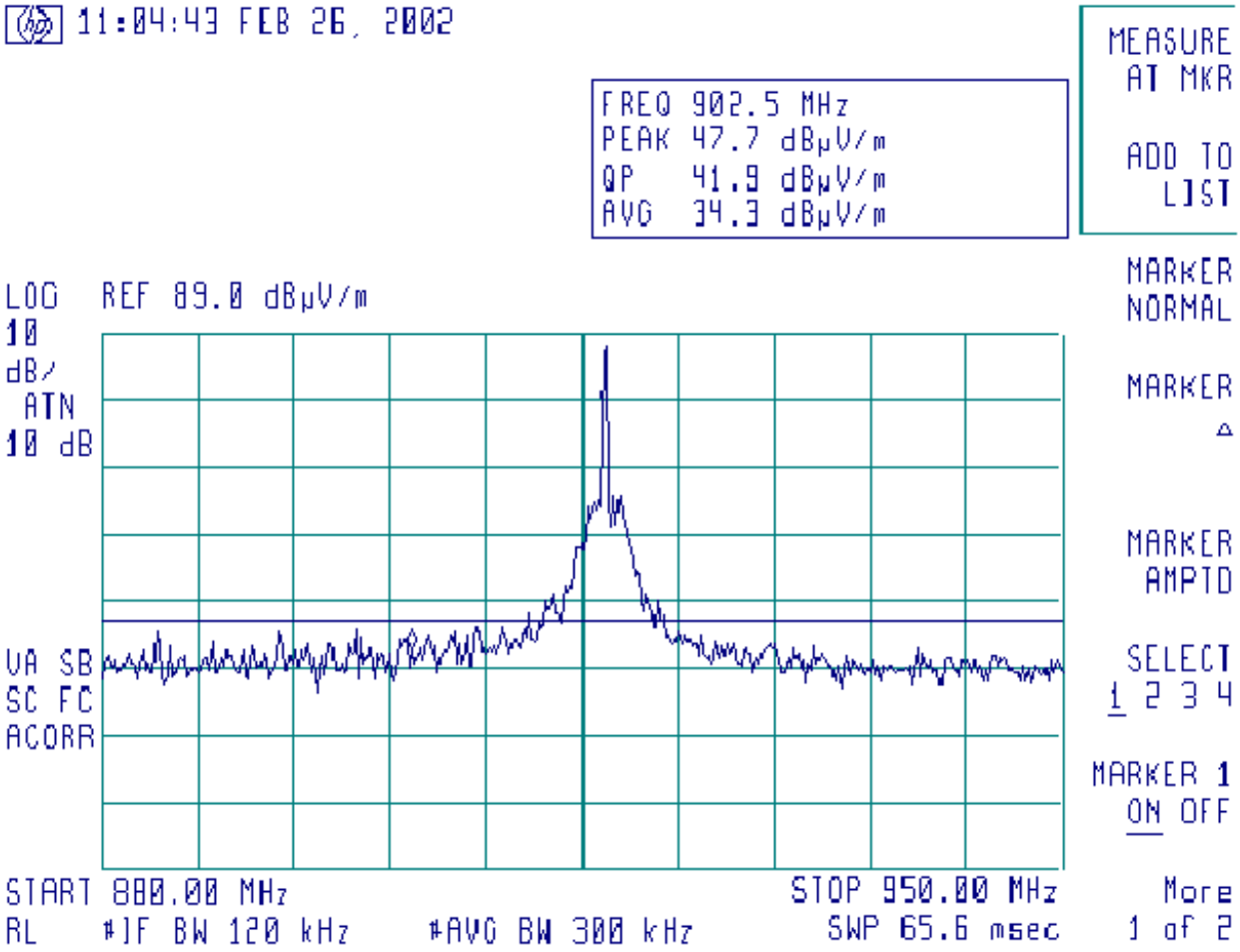
**Plot A10**
**Out of band spurious emissions test results**
**902.5 MHz center frequency**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 880 – 950 MHz |



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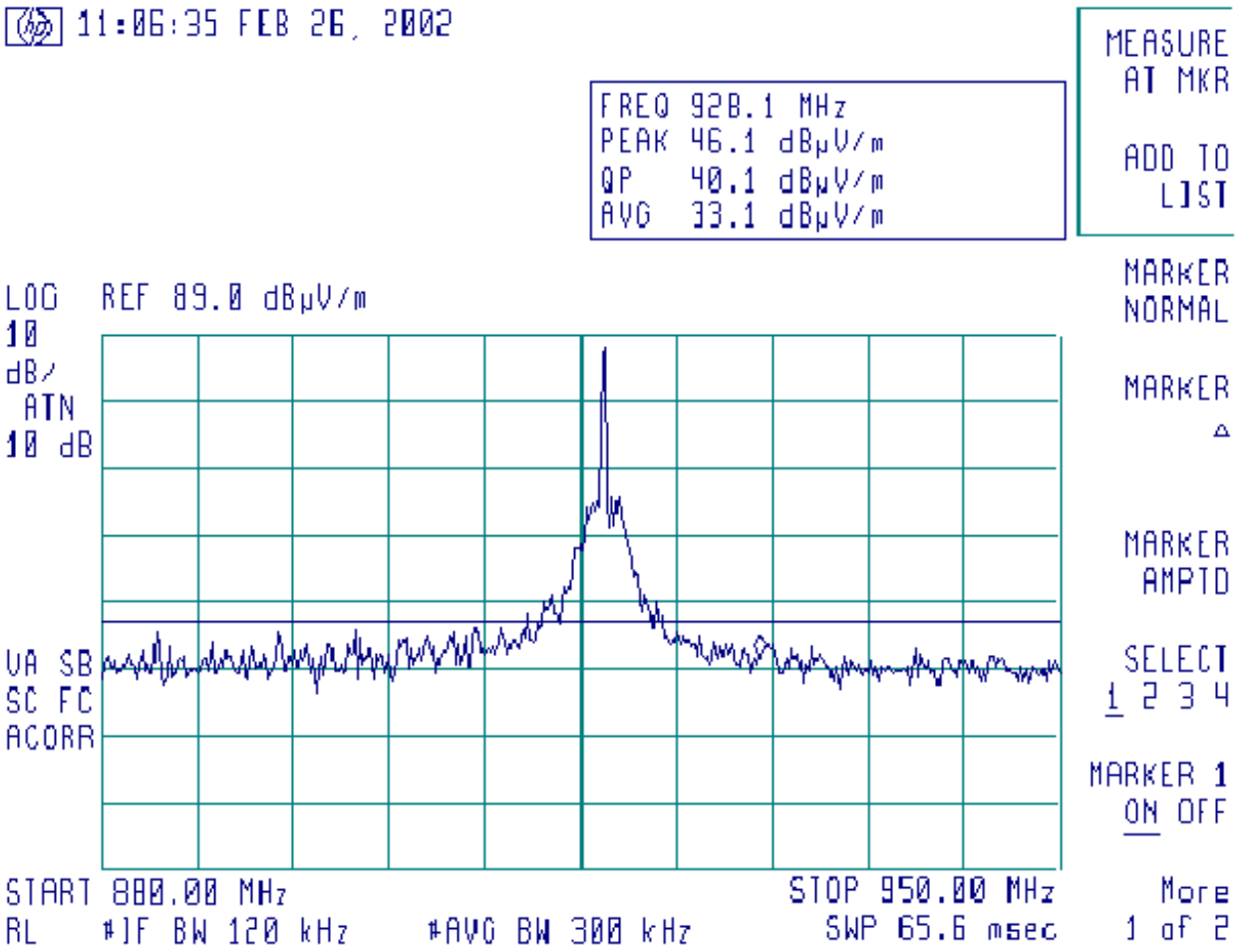
**Plot A11**
**Out of band spurious emissions test results**
**928.1 MHz center frequency**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 880 – 950 MHz |



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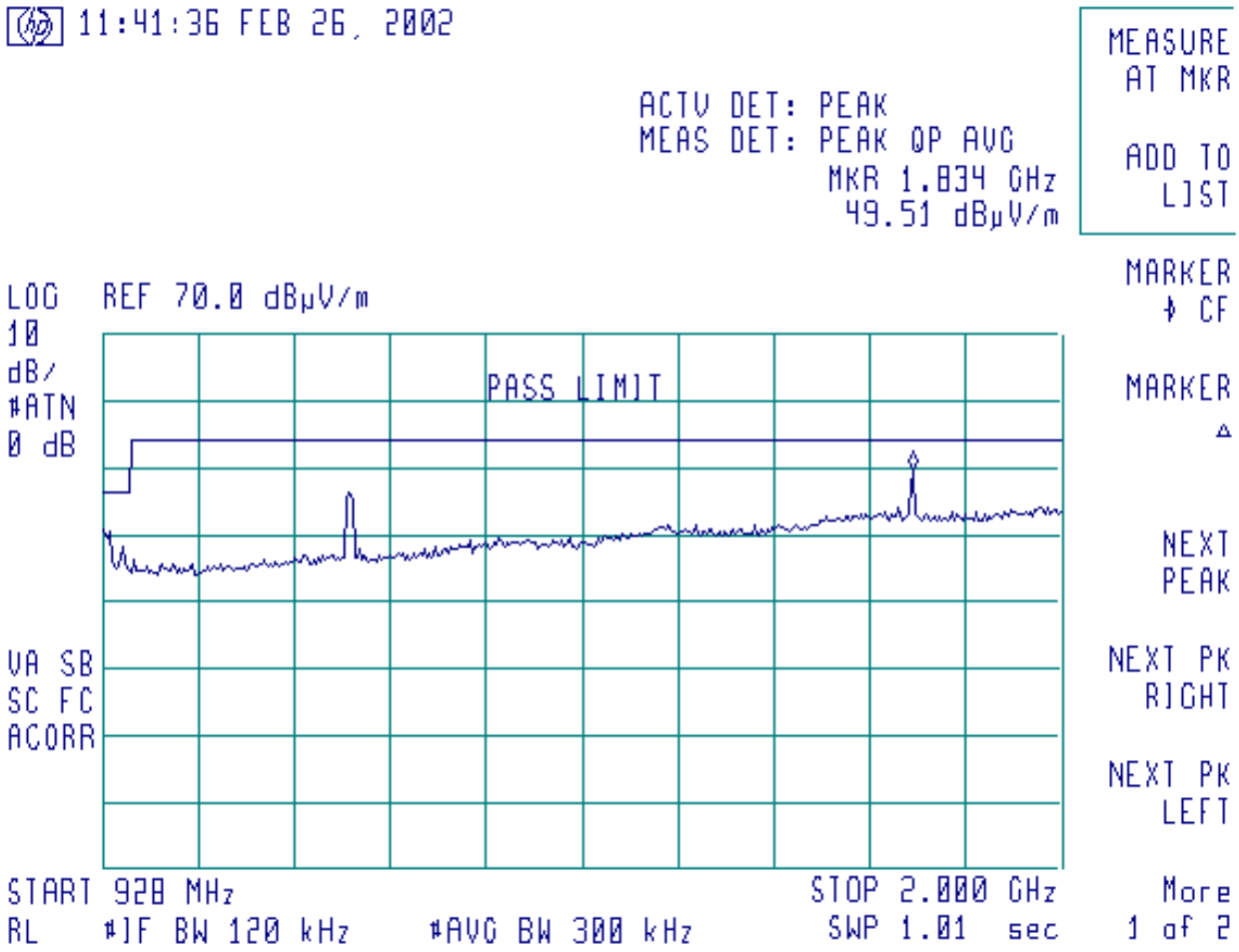
**Plot A12**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 928 – 2000 MHz |



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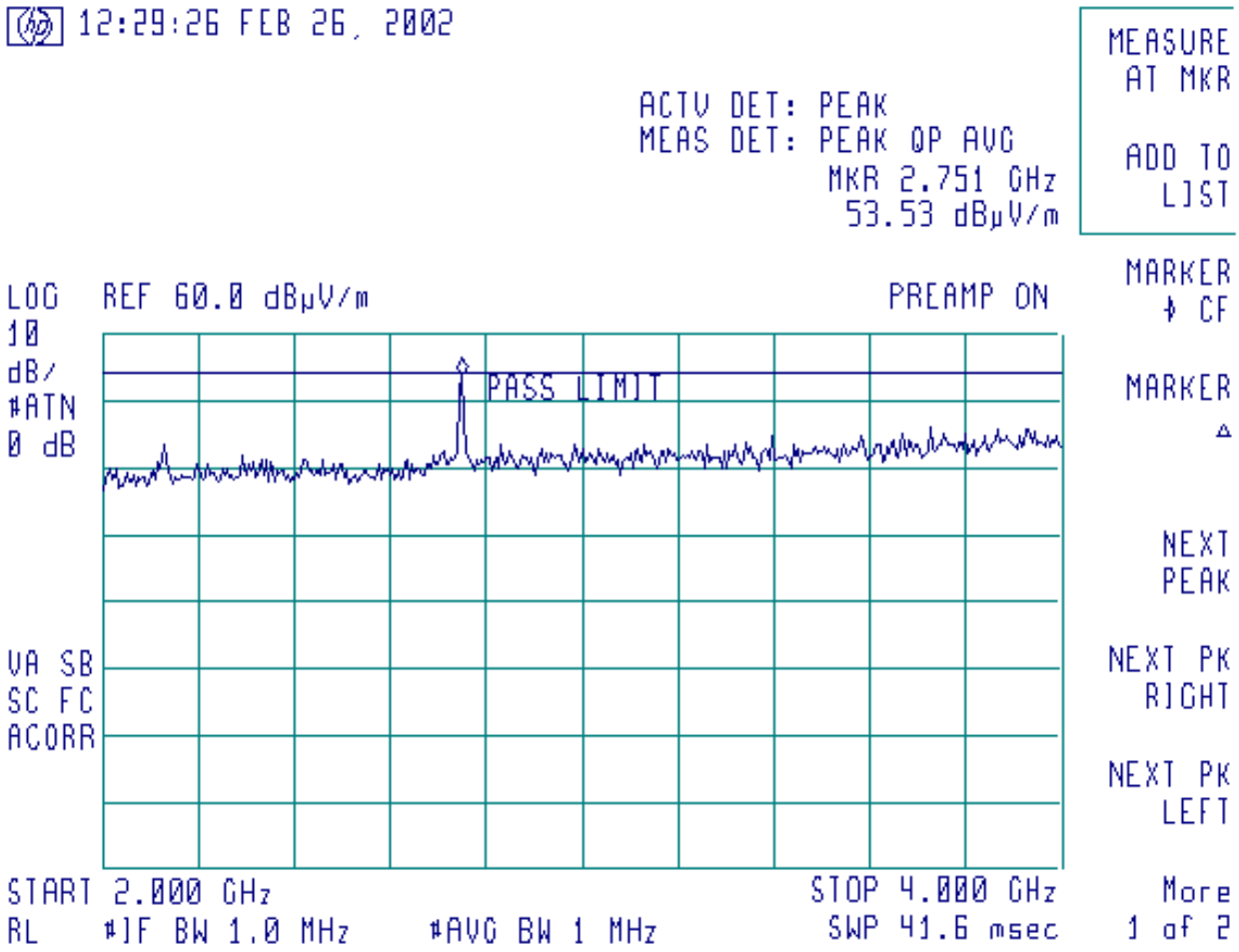
**Plot A13**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 2000 – 4000 MHz |



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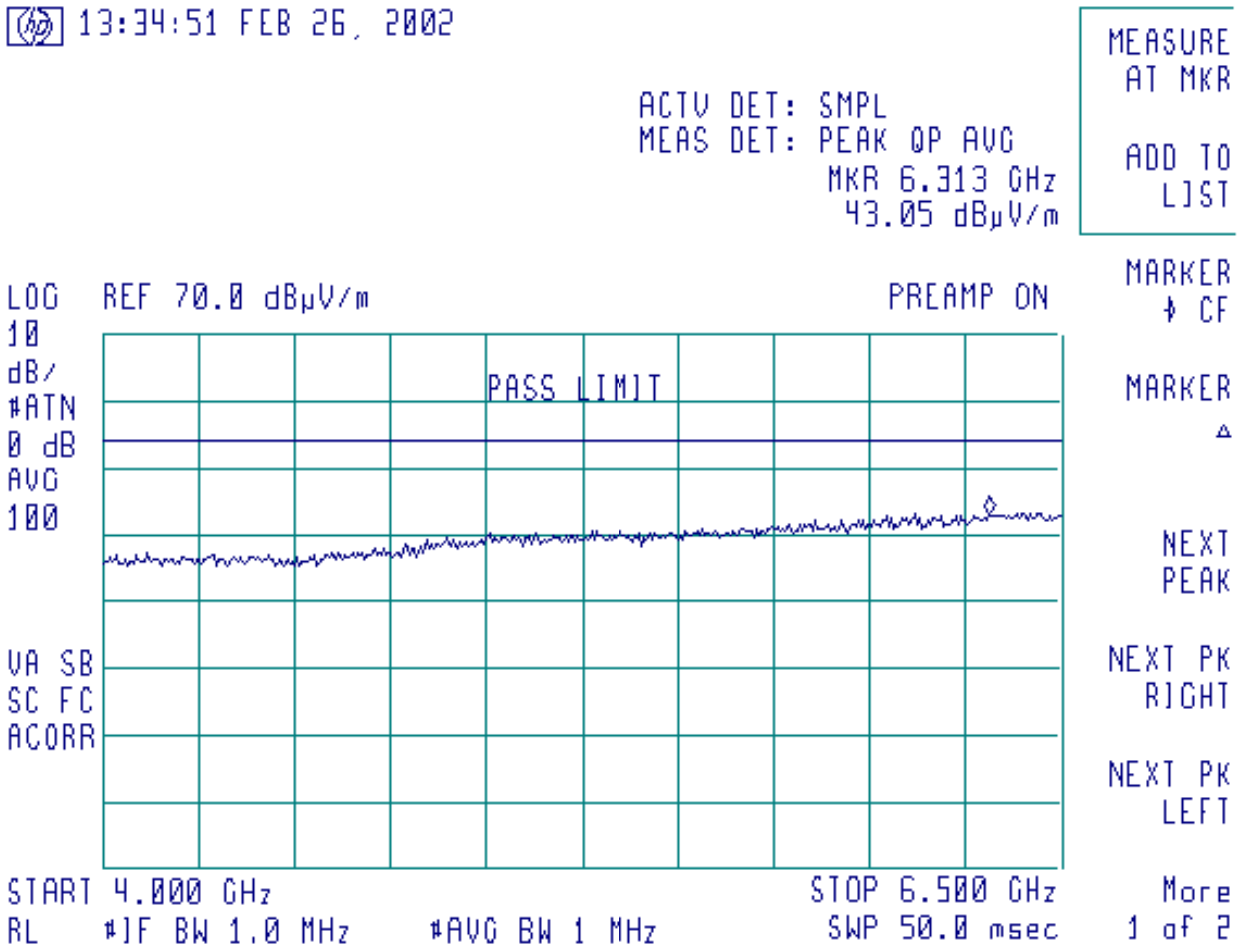
**Plot A14**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 4000 – 6500 MHz |



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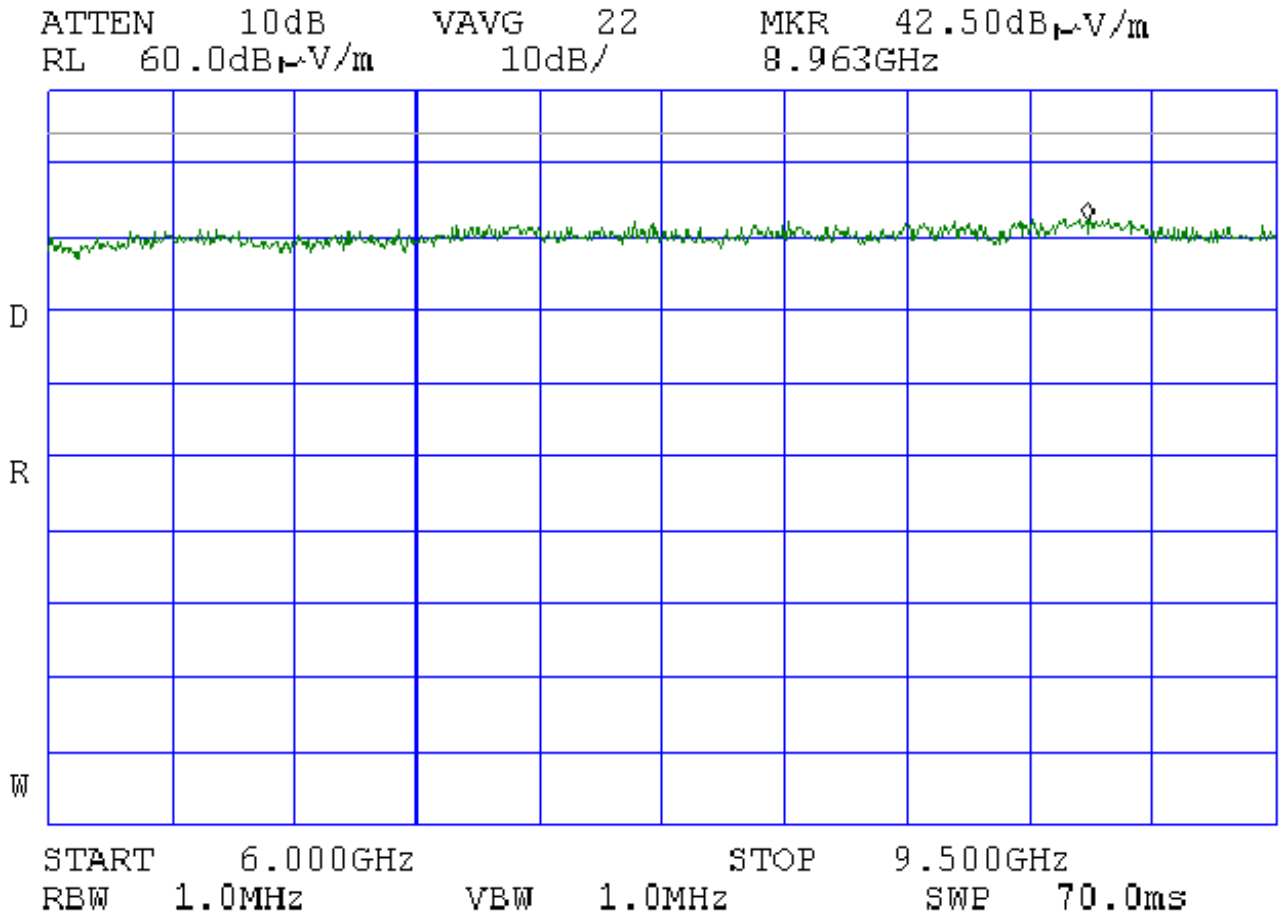
**Plot A15**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 916.5 MHz |
| FREQUENCY RANGE: | 6000 – 9500 MHz |



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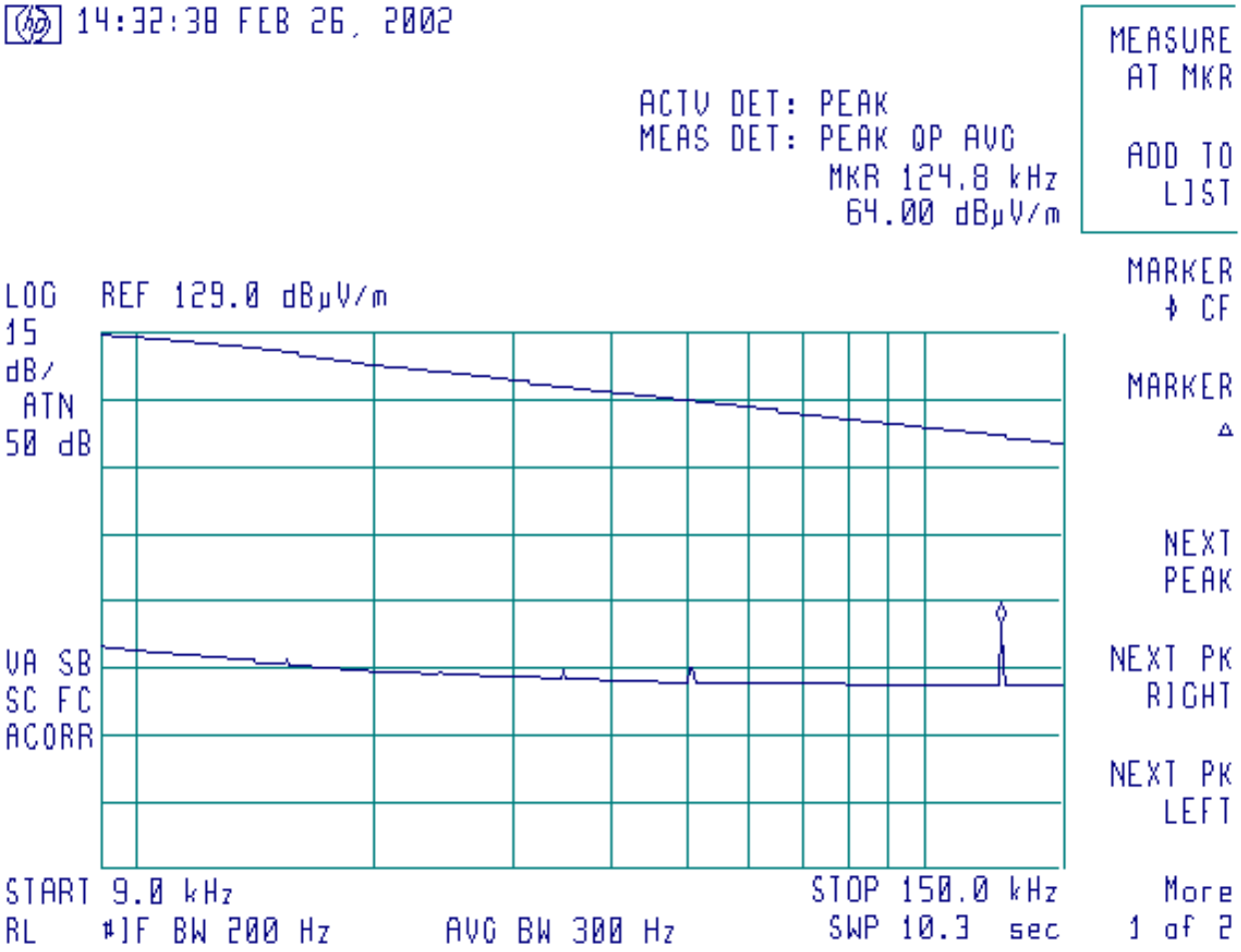
**Plot A16**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 125 kHz |
| FREQUENCY RANGE: | 9 – 150 kHz |



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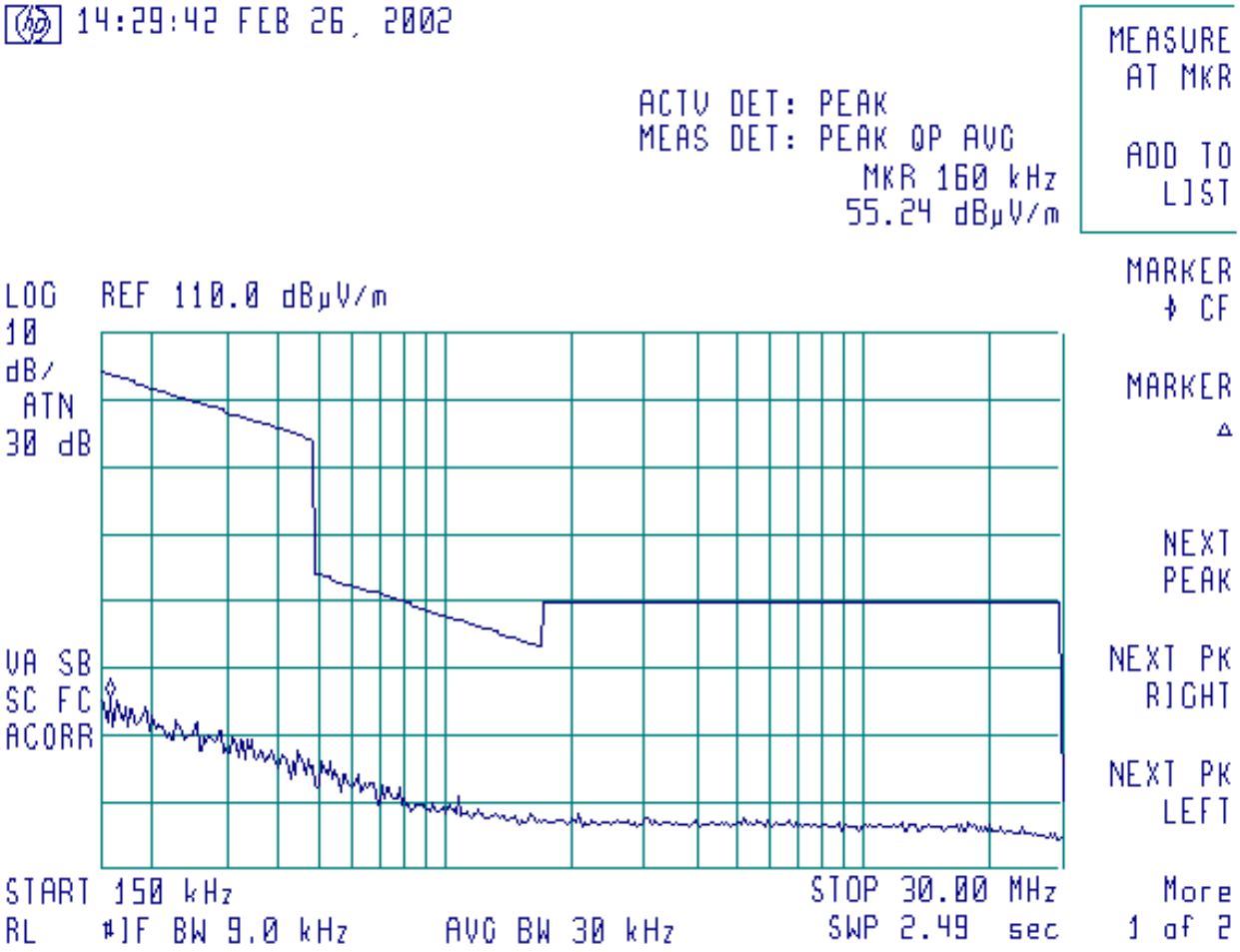
**Plot A17**
**Out of band spurious emissions test results**

| | |
|---|---|
| EUT OPERATING FREQUENCY: | 125 kHz |
| FREQUENCY RANGE: | 150 kHz – 30 MHz |



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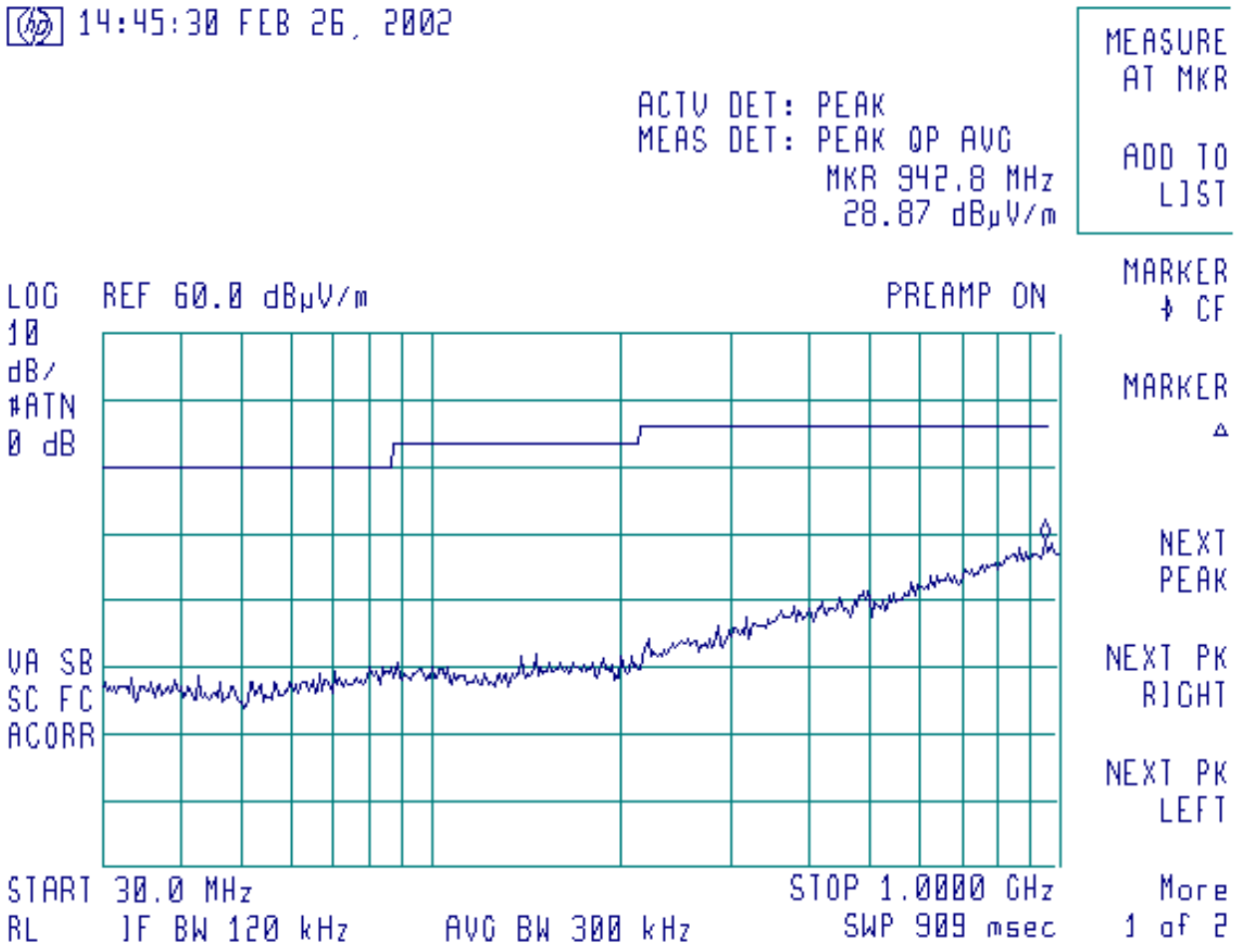
**Plot A18**
**Unintentional radiated emissions test results**

FREQUENCY RANGE: 30 – 1000 MHz



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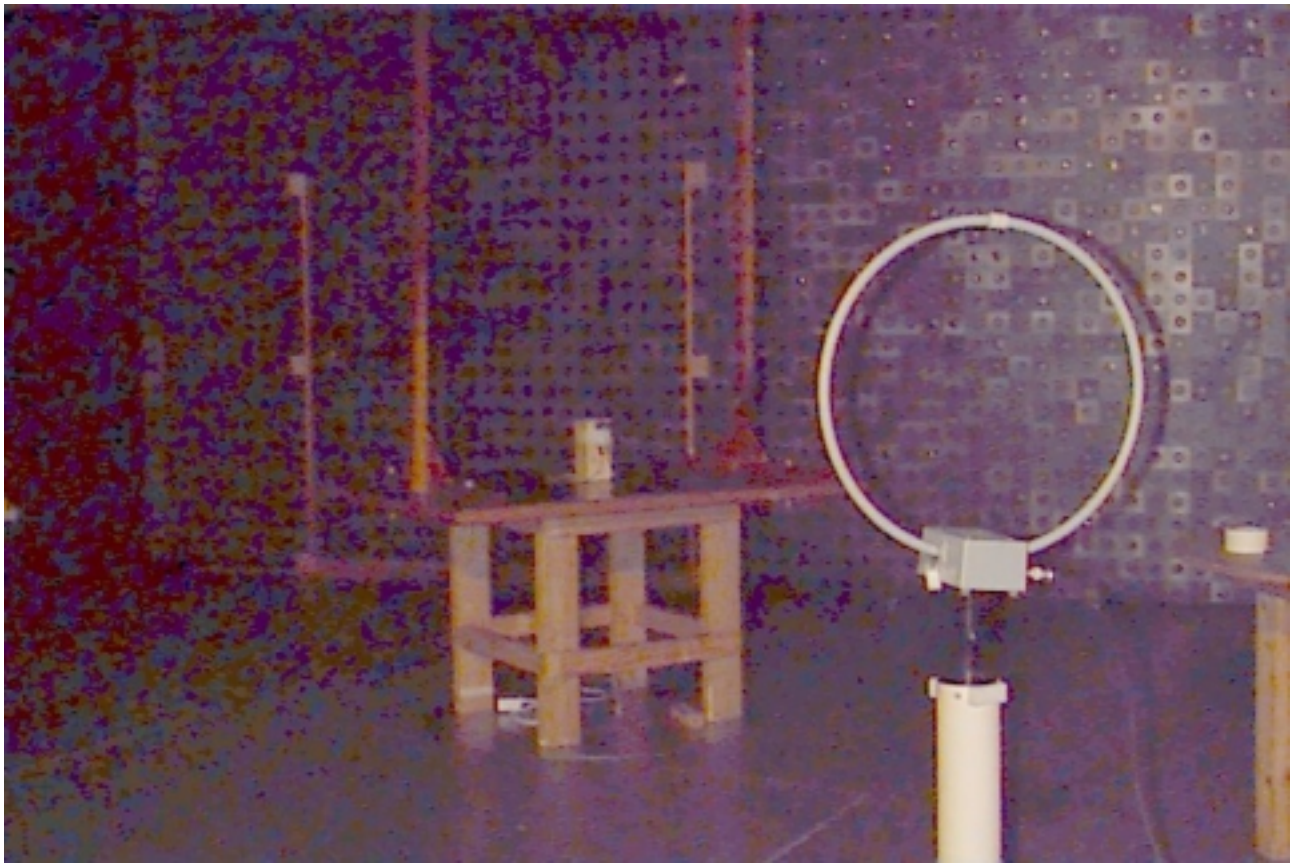
# Appendix B Test setup photographs

**Photograph 1**
**Radiated emission measurements test setup with loop antenna,**
**9 kHz – 30 MHz frequency range, anechoic chamber method**



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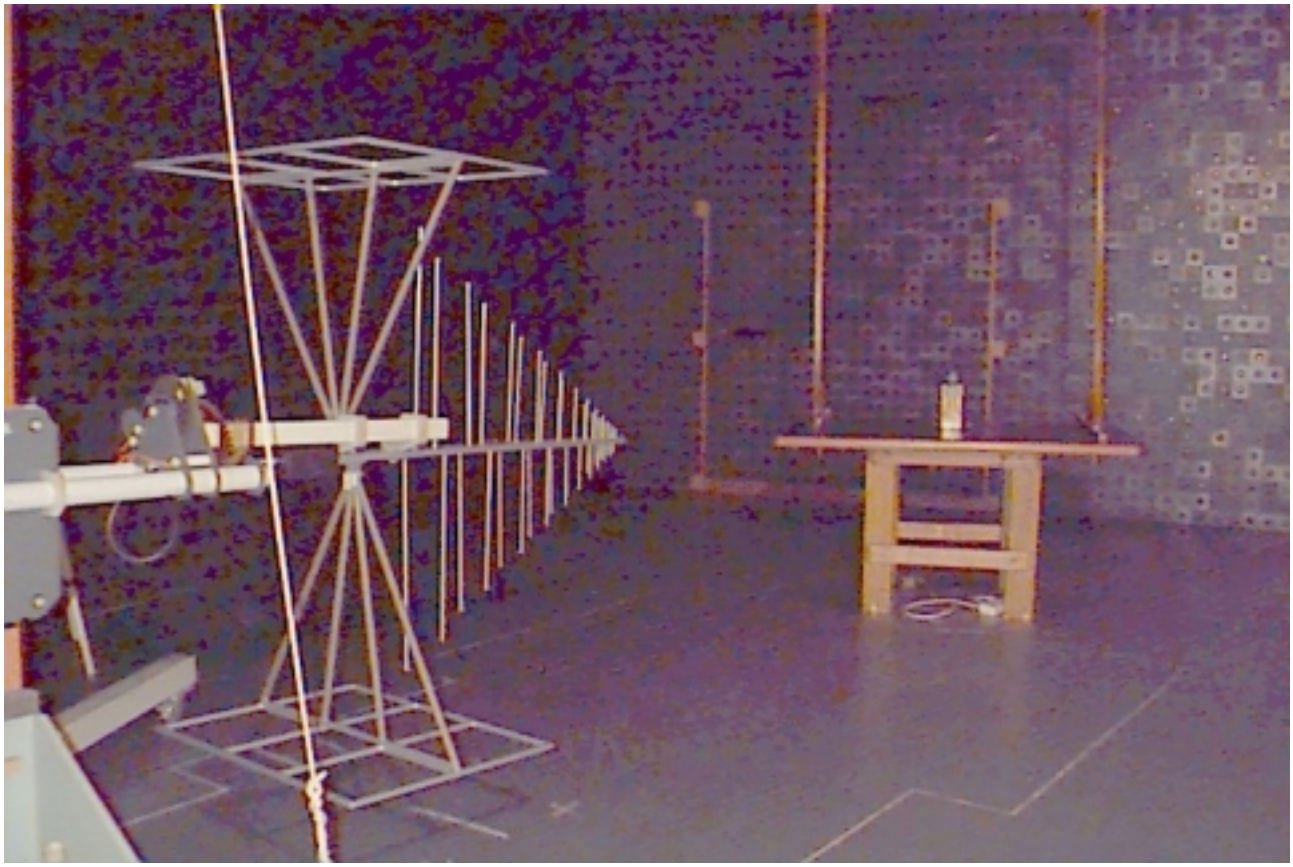
**Photograph 2**
**Radiated emission measurements test setup with biconilog antenna,**
**30 MHz – 2000 MHz frequency range, anechoic chamber method**



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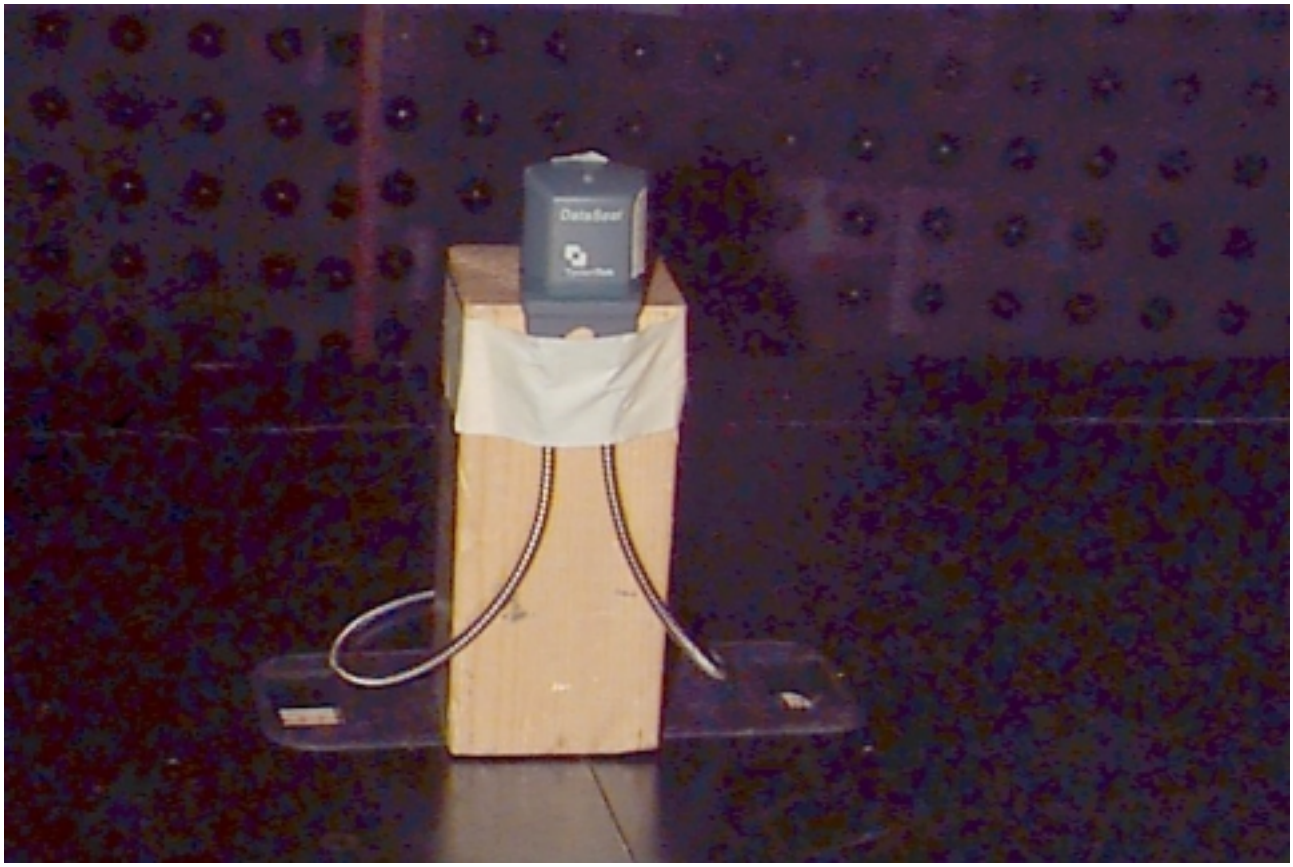
**Photograph 3**
**Radiated emission measurements test setup with biconilog antenna,**
**30 MHz – 2000 MHz frequency range, anechoic chamber method**



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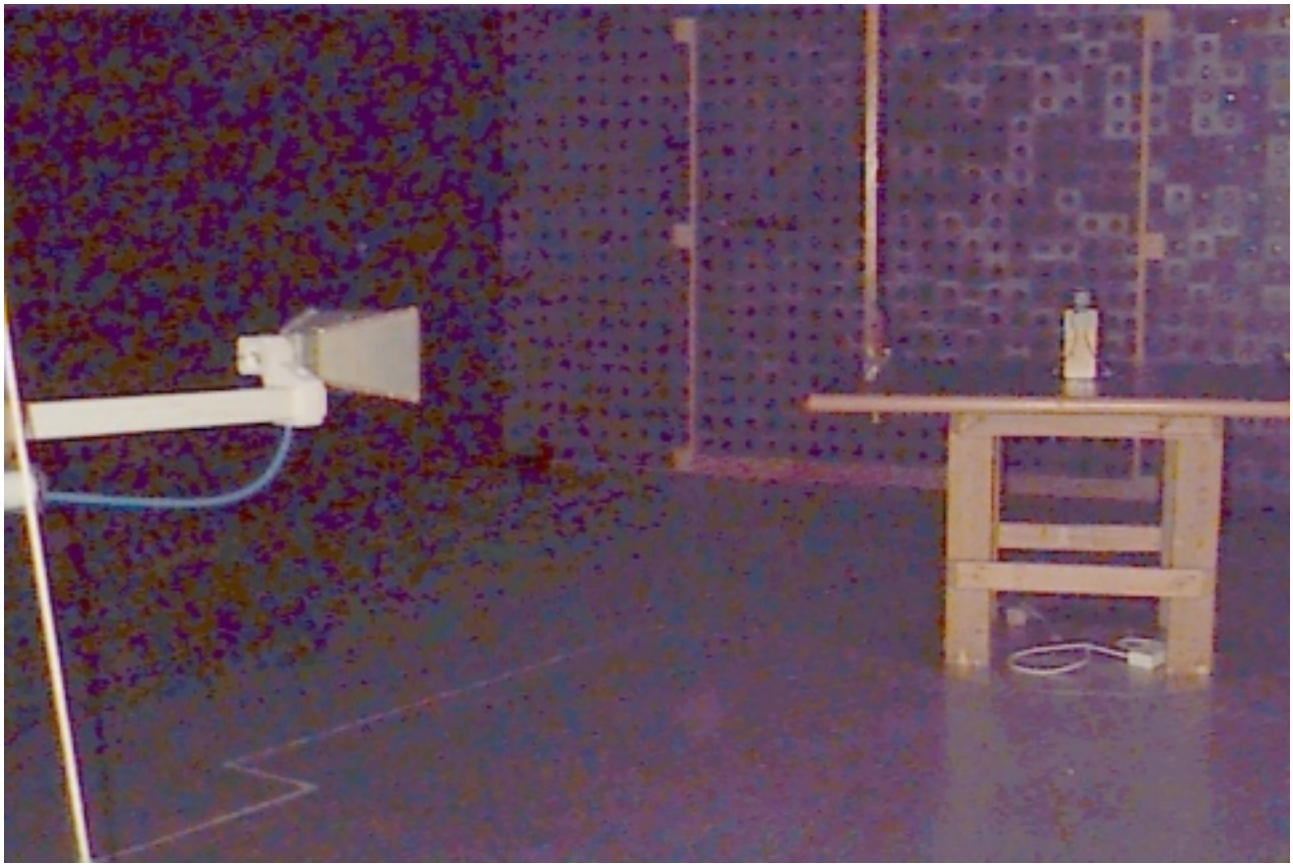
**Photograph 4**
**Radiated emission measurements test setup with double ridge guide antenna,**
**2 GHz – 9.5 GHz frequency range, anechoic chamber method**



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# Appendix C Test equipment used for tests

| HL Serial No. | Description | Manufacturer information | | | Due Calibr. Month/Year |
|---|---|---|---|---|---|
| | | Name | Model No. | Serial No. | |
| 0041 | Double ridged guide antenna, 1-18 GHz | Electro-Metrics | RGA 50/60 | 2811 | 3/03 |
| 0446 | Active loop antenna 10 kHz-30 MHz | Electro-Mechanics | 6502 | 2857 | 11/02 |
| 0465 | Anechoic chamber 9 (L) x 6.5 (W) x 5.5 (H) m | Hermon Labs | AC-1 | 023 | 11/02 |
| 0521 | Spectrum analyzer with RF filter section (EMI receiver 9 kHz - 6.5 GHz) | Hewlett Packard | 8546A | 0319 | 9/02 |
| 0589 | Cable coaxial, GORE A2POL118.2, 3m | Hermon Labs | GORE-3 | 589 | 11/02 |
| 0593 | Antenna mast, 1-4 m/ 1-6 m pneumatic | Hermon Labs | AM-F1 | 101 | 2/03 Check |
| 0594 | Turntable for anechoic chamber, flush mounted, d=1.2 m, pneumatic | Hermon Labs | WDC1 | 102 | 1/03 Check |
| 0604 | Antenna biconilog log-periodic/T Bow-Tie, 26 - 2000 MHz | EMCO | 3141 | 9611-1011 | 1/03 |
| 1004 | Cable, coaxial ANDREW PSWJ4, 6 m | Hermon Labs | ANDREW-6 | 163 | 12/02 |
| 1424 | Spectrum analyzer, 30 Hz – 40 GHz | Agilent Technologies | 8564 EC | 3946A00219 | 8/02 |
| 1566 | Cable RF, 2 m | Huber-Suhner | Sucoflex 104PE | 13094/4PE | 12/02 |
| 1863 | Amplifier 6 – 18 GHz | Avantek | SA85-1866 | F95468644 | 5/02 Check |
| 1864 | Amplifier 6 – 18 GHz | Avantek | SA81-2416 | 96438442 | 5/02 Check |
| 1947 | Cable 18 GHz, 6.5 m, blue | Rhophase Microwave Ltd. | NPS-1803A-6500-NPS | T4974 | 10/02 |
| 2009 | Cable RF, 8 m | Alpha Wire | RG-214 | C-56 | 12/02 |

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# Appendix D General information

## Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private EMC, Safety and Telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47) and by Industry Canada for electromagnetic emissions (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, Telecommunications, Safety standards, and by AMTAC (UK) for safety of Medical Devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for Electromagnetic Compatibility, Product Safety, Telecommunications Testing and Environmental Simulation (for exact scope please refer to Certificate No. 839.01).

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Person for contact: Mr. Alex Usoskin, QA manager.

## Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

| | |
|---|---|
| cm | centimeter |
| dB | decibel |
| dBm | decibel referred to one milliwatt |
| dB(μV) | decibel referred to one microvolt |
| dB(μV/m) | decibel referred to one microvolt per meter |
| EMC | electromagnetic compatibility |
| EUT | equipment under test |
| GHz | gigahertz |
| H | height |
| Hz | hertz |
| kHz | kilohertz |
| kV | kilovolt |
| L | length |
| m | meter |
| MHz | megahertz |
| NA | not applicable |
| QP | quasi-peak |
| RF | radio frequency |
| RE | radiated emission |
| rms | root mean square |
| s | second |
| V | volt |
| W | width |

## Specification references

| | |
|---|---|
| 47CFR part 15: 2001 | Radio Frequency Devices |
| ANSI C63.2: 1996 | American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications. |
| ANSI C63.4: 1992 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |

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## FCC Equipment codes and descriptions

| | |
|---|---|
| CYY | Communications Receiver used w/ P.15 transmitter |
| DCD | Part 15 Low Power transmitter Below 1705 kHz |
| DSC | Part 15 Security/Remote Control Transmitter |
| DSR | Part 15 Remote Control/Security Device Transceiver |
| DSS | Part 15 Spread Spectrum Transmitter |
| DXX | Part 15 Low Power Communication Device Transmitter |
| EAV | Part 15 Automatic Vehicle Identification System |
| ETB | Part 15 Cordless Telephone Base Transceiver |
| ETR | Part 15 Cordless Telephone Remote Transceiver |
| ETS | Part 15 Cordless telephone system |
| FAP | Part 15 Anti-Pilferage Device |
| FDS | Part 15 Field Disturbance Sensor |
| GAT | Part 15 Auditory Assistance Device (Transmitter) |
| HID | Part 15 TV Interface Device |
| JBC | Part 15 Class B Computing Device/ Personal Computer |
| JBP | Part 15 Class B Computing Device Peripheral |
| PUB | Part 15 Unlicensed PCS base station |
| PUE | Part 15 Unlicensed PCS portable Tx held to ear |
| PUF | Part 15 Unlicensed PCS portable Tx held to face |
| PUT | Part 15 Unlicensed PCS portable Tx worn on body |

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# Appendix E Test equipment correction factors

**Antenna Factor**
**Active Loop Antenna**
**Model 6502**
**S/N 2857**

| Frequency, MHz | Antenna Factor, dB |
|---|---|
| 0.009 | -32.8 |
| 0.010 | -33.8 |
| 0.020 | -38.3 |
| 0.050 | -41.1 |
| 0.075 | -41.3 |
| 0.100 | -41.6 |
| 0.150 | -41.7 |
| 0.250 | -41.6 |
| 0.500 | -41.8 |
| 0.750 | -41.9 |
| 1.000 | -41.4 |
| 2.000 | -41.5 |
| 3.000 | -41.4 |
| 4.000 | -41.4 |
| 5.000 | -41.5 |
| 10.000 | -41.9 |
| 15.000 | -41.9 |
| 20.000 | -42.2 |
| 25.000 | -42.8 |
| 30.000 | -44.0 |

Antenna factor is to be added to receiver meter reading in dB(μV) to convert to field intensity in dB(μV)/meter

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**Antenna Factor**
**Biconilog Antenna EMCO Model 3141**
**Ser.No.1011**

| Frequency, MHz | Antenna Factor, dB(1/m) | Frequency, MHz | Antenna Factor, dB(1/m) |
|---|---|---|---|
| 26 | 7.8 | 940 | 24.0 |
| 28 | 7.8 | 960 | 24.1 |
| 30 | 7.8 | 980 | 24.5 |
| 40 | 7.2 | 1000 | 24.9 |
| 60 | 7.1 | 1020 | 25.0 |
| 70 | 8.5 | 1040 | 25.2 |
| 80 | 9.4 | 1060 | 25.4 |
| 90 | 9.8 | 1080 | 25.6 |
| 100 | 9.7 | 1100 | 25.7 |
| 110 | 9.3 | 1120 | 26.0 |
| 120 | 8.8 | 1140 | 26.4 |
| 130 | 8.7 | 1160 | 27.0 |
| 140 | 9.2 | 1180 | 27.0 |
| 150 | 9.8 | 1200 | 26.7 |
| 160 | 10.2 | 1220 | 26.5 |
| 170 | 10.4 | 1240 | 26.5 |
| 180 | 10.4 | 1260 | 26.5 |
| 190 | 10.3 | 1280 | 26.6 |
| 200 | 10.6 | 1300 | 27.0 |
| 220 | 11.6 | 1320 | 27.8 |
| 240 | 12.4 | 1340 | 28.3 |
| 260 | 12.8 | 1360 | 28.2 |
| 280 | 13.7 | 1380 | 27.9 |
| 300 | 14.7 | 1400 | 27.9 |
| 320 | 15.2 | 1420 | 27.9 |
| 340 | 15.4 | 1440 | 27.8 |
| 360 | 16.1 | 1460 | 27.8 |
| 380 | 16.4 | 1480 | 28.0 |
| 400 | 16.6 | 1500 | 28.5 |
| 420 | 16.7 | 1520 | 28.9 |
| 440 | 17.0 | 1540 | 29.6 |
| 460 | 17.7 | 1560 | 29.8 |
| 480 | 18.1 | 1580 | 29.6 |
| 500 | 18.5 | 1600 | 29.5 |
| 520 | 19.1 | 1620 | 29.3 |
| 540 | 19.5 | 1640 | 29.2 |
| 560 | 19.8 | 1660 | 29.4 |
| 580 | 20.6 | 1680 | 29.6 |
| 600 | 21.3 | 1700 | 29.8 |
| 620 | 21.5 | 1720 | 30.3 |
| 640 | 21.2 | 1740 | 30.8 |
| 660 | 21.4 | 1760 | 31.1 |
| 680 | 21.9 | 1780 | 31.0 |
| 700 | 22.2 | 1800 | 30.9 |
| 720 | 22.2 | 1820 | 30.7 |
| 740 | 22.1 | 1840 | 30.6 |
| 760 | 22.3 | 1860 | 30.6 |
| 780 | 22.6 | 1880 | 30.6 |
| 800 | 22.7 | 1900 | 30.6 |
| 820 | 22.9 | 1920 | 30.7 |
| 840 | 23.1 | 1940 | 30.9 |
| 860 | 23.4 | 1960 | 31.2 |
| 880 | 23.8 | 1980 | 31.6 |
| 900 | 24.1 | 2000 | 32.0 |
| 920 | 24.1 | | |

Antenna factor is to be added to receiver meter reading in dB(μV) to convert to field intensity in dB(μV/meter).

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**Antenna Factor**
**Double Ridged Guide Antenna**
**Model RGA-50/60**
**S/N 2811**

| Frequency, MHz | Antenna Factor, dB |
|---|---|
| 1000 | 24.3 |
| 1500 | 25.4 |
| 2000 | 28.4 |
| 2500 | 29.2 |
| 3000 | 30.5 |
| 3500 | 31.6 |
| 4000 | 33.7 |
| 4500 | 32.2 |
| 5000 | 34.5 |
| 5500 | 34.5 |
| 6000 | 34.6 |
| 6500 | 35.3 |
| 7000 | 35.5 |
| 7500 | 35.9 |
| 8000 | 36.6 |
| 8500 | 37.3 |
| 9000 | 37.7 |
| 9500 | 37.7 |
| 10000 | 38.2 |
| 10500 | 38.5 |
| 11000 | 39.0 |
| 11500 | 40.1 |
| 12000 | 40.2 |
| 12500 | 39.3 |
| 13000 | 39.9 |
| 13500 | 40.6 |
| 14000 | 41.1 |
| 14500 | 40.5 |
| 15000 | 39.9 |
| 15500 | 37.8 |
| 16000 | 39.1 |
| 16500 | 41.1 |
| 17000 | 41.7 |
| 17500 | 45.1 |
| 18000 | 44.3 |

Antenna factor is to be added to receiver meter reading in dB(μV) to convert to field intensity in dB(μV)/meter

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**Cable RF, 2m, model: Sucoflex 104PE, s/n 13094/4PE (HL 1566)**
**Calibration data**

| No. | Parameter | SET, MHz | Measured, dB | Deviation, dB | Tolerance (Specification), dB | Meas. Uncert., dB | Notes |
|---|---|---|---|---|---|---|---|
| 1 | Insertion Loss | 30 | 0.10 | - | ≤ 5.0 | ±0.12 | |
| 2 | | 50 | 0.13 | - | | | |
| 3 | | 100 | 0.20 | - | | | |
| 4 | | 300 | 0.33 | - | | | |
| 5 | | 500 | 0.45 | - | | | |
| 6 | | 800 | 0.60 | - | | | |
| 7 | | 1000 | 0.65 | - | | | |
| 8 | | 1500 | 0.91 | - | | | |
| 9 | | 2000 | 1.08 | - | | | |
| 10 | | 2500 | 1.19 | - | | | |
| 11 | | 3000 | 1.28 | - | | | |
| 12 | | 3500 | 1.49 | - | | | |
| 13 | | 4000 | 1.63 | - | | | |
| 14 | Insertion Loss | 4500 | 1.63 | - | ≤ 5.0 | ±0.17 | |
| 15 | | 5000 | 1.66 | - | | | |
| 16 | | 5500 | 1.88 | - | | | |
| 17 | | 6000 | 1.96 | - | | | |
| 18 | | 6500 | 1.93 | - | | | |
| 19 | | 7000 | 2.07 | - | | | |
| 20 | | 7500 | 2.37 | - | | | |
| 21 | | 8000 | 2.34 | - | | | |
| 22 | | 8500 | 2.64 | - | | | |
| 23 | | 9000 | 2.68 | - | | | |
| 24 | | 9500 | 2.64 | - | | | |
| 25 | | 10000 | 2.70 | - | | | |
| 26 | | 10500 | 2.84 | - | | | |
| 27 | | 11000 | 2.88 | - | | | |
| 28 | | 11500 | 3.19 | - | | | |
| 29 | | 12000 | 3.15 | | | | |
| 30 | Insertion Loss | 12500 | 3.20 | | ≤ 5.0 | ±0.26 | |
| 31 | | 13000 | 3.22 | | | | |
| 32 | | 13500 | 3.47 | | | | |
| 33 | | 14000 | 3.41 | | | | |
| 34 | | 14500 | 3.59 | | | | |
| 35 | | 15000 | 3.79 | | | | |
| 36 | | 15500 | 4.24 | | | | |
| 37 | | 16000 | 4.12 | | | | |
| 38 | | 16500 | 4.46 | | | | |
| 39 | | 17000 | 4.50 | | | | |
| 40 | | 17500 | 4.49 | | | | |
| 41 | | 18000 | 4.45 | | | | |

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**Cable 18GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, s/n T4974 (HL 1947)**
**Calibration data**

| Frequency, GHz | Insertion Loss, dB |
|---|---|
| | HL1947 |
| 0.03 | 0.30 |
| 0.05 | 0.38 |
| 0.10 | 0.53 |
| 0.20 | 0.74 |
| 0.30 | 0.91 |
| 0.40 | 1.05 |
| 0.50 | 1.18 |
| 0.60 | 1.29 |
| 0.70 | 1.40 |
| 0.80 | 1.50 |
| 0.90 | 1.59 |
| 1.00 | 1.68 |
| 1.10 | 1.77 |
| 1.20 | 1.86 |
| 1.30 | 1.94 |
| 1.40 | 2.01 |
| 1.50 | 2.08 |
| 1.60 | 2.16 |
| 1.70 | 2.22 |
| 1.80 | 2.29 |
| 1.90 | 2.36 |
| 2.00 | 2.42 |
| 2.10 | 2.48 |
| 2.20 | 2.54 |
| 2.30 | 2.60 |
| 2.40 | 2.66 |
| 2.50 | 2.71 |
| 2.60 | 2.77 |
| 2.70 | 2.83 |
| 2.80 | 2.89 |
| 2.90 | 2.95 |
| 3.10 | 3.06 |
| 3.30 | 3.17 |
| 3.50 | 3.28 |
| 3.70 | 3.39 |
| 3.90 | 3.51 |
| 4.10 | 3.62 |
| 4.30 | 3.76 |
| 4.50 | 3.87 |
| 4.70 | 4.01 |
| 4.90 | 4.10 |
| 5.10 | 4.21 |
| 5.30 | 4.31 |
| 5.50 | 4.43 |
| 5.70 | 4.56 |
| 5.90 | 4.71 |

| Frequency, GHz | Insertion Loss, dB |
|---|---|
| | HL1947 |
| 6.10 | 4.87 |
| 6.30 | 4.95 |
| 6.50 | 4.94 |
| 6.70 | 4.88 |
| 6.90 | 4.87 |
| 7.10 | 4.83 |
| 7.30 | 4.85 |
| 7.50 | 4.86 |
| 7.70 | 4.91 |
| 7.90 | 4.96 |
| 8.10 | 5.03 |
| 8.30 | 5.08 |
| 8.50 | 5.13 |
| 8.70 | 5.21 |
| 8.90 | 5.22 |
| 9.10 | 5.34 |
| 9.30 | 5.35 |
| 9.50 | 5.52 |
| 9.70 | 5.51 |
| 9.90 | 5.66 |
| 10.10 | 5.70 |
| 10.30 | 5.78 |
| 10.50 | 5.79 |
| 10.70 | 5.82 |
| 10.90 | 5.86 |
| 11.10 | 5.94 |
| 11.30 | 6.06 |
| 11.50 | 6.21 |
| 11.70 | 6.44 |
| 11.90 | 6.61 |
| 12.10 | 6.76 |
| 12.40 | 6.68 |
| 13.00 | 6.66 |
| 13.50 | 6.81 |
| 14.00 | 6.90 |
| 14.50 | 6.90 |
| 15.00 | 6.97 |
| 15.50 | 7.17 |
| 16.00 | 7.28 |
| 16.50 | 7.27 |
| 17.00 | 7.38 |
| 17.50 | 7.68 |
| 18.00 | 7.92 |

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**Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, s/n 176 (HL 0589)**
**+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, s/n 163 (HL 1004)**
**Calibration data**

| No. | Parameter | SET, MHz | Measured, dB | Deviation, dB | Tolerance (Specification), dB | Meas. Uncert., dB | Notes |
|---|---|---|---|---|---|---|---|
| 1 | Insertion Loss | 30 | 0.33 | - | ≤ 6.5 | ±0.12 | |
| 2 | | 50 | 0.40 | - | | | |
| 3 | | 100 | 0.57 | - | | | |
| 4 | | 300 | 0.97 | - | | | |
| 5 | | 500 | 1.25 | - | | | |
| 6 | | 800 | 1.59 | - | | | |
| 7 | | 1000 | 1.81 | - | | | |
| 8 | | 1200 | 1.97 | - | | | |
| 9 | | 1400 | 2.15 | - | | | |
| 10 | | 1600 | 2.28 | - | | | |
| 11 | | 1800 | 2.43 | - | | | |
| 12 | | 2000 | 2.61 | - | | | |
| 13 | | 2200 | 2.75 | - | | | |
| 14 | | 2400 | 2.89 | - | | | |
| 15 | | 2600 | 2.97 | - | | | |
| 16 | Insertion Loss | 2800 | 3.21 | - | ≤ 6.5 | ±0.12 | |
| 17 | | 3000 | 3.32 | - | | | |
| 18 | | 3300 | 3.47 | - | | | |
| 19 | | 3600 | 3.62 | - | | | |
| 20 | | 3900 | 3.84 | - | | | |
| 21 | | 4200 | 3.92 | - | | ±0.17 | |
| 22 | | 4500 | 4.07 | - | | | |
| 23 | | 4800 | 4.36 | - | | | |
| 24 | | 5100 | 4.62 | - | | | |
| 25 | | 5400 | 4.78 | - | | | |
| 26 | | 5700 | 5.16 | - | | | |
| 27 | | 6000 | 5.67 | - | | | |
| 28 | | 6500 | 5.99 | - | | | |

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**Cable RF, 8 m, model:RG-214, s/n C-56 (HL 2009)**
**Calibration data**

| No. | Parameter | SET, MHz | Measured, dB | Deviation | Tolerance (Specification) | Meas. Uncert., dB | Notes |
|---|---|---|---|---|---|---|---|
| 1 | Insertion Loss | 1 | 0.10 | NA | NA | ±0.12 | |
| 2 | | 10 | 0.14 | | | | |
| 3 | | 30 | 0.25 | | | | |
| 4 | | 50 | 0.34 | | | | |
| 5 | | 100 | 0.53 | | | | |
| 6 | | 300 | 0.99 | | | | |
| 7 | | 500 | 1.31 | | | | |
| 8 | | 800 | 1.73 | | | | |
| 9 | | 1000 | 1.98 | | | | |
| 10 | | 1100 | 2.11 | | | | |
| 11 | | 1200 | 2.21 | | | | |
| 12 | | 1300 | 2.35 | | | | |
| 13 | | 1400 | 2.46 | | | | |
| 14 | | 1500 | 2.55 | | | | |
| 15 | | 1600 | 2.68 | | | | |
| 16 | | 1700 | 2.78 | | | | |
| 17 | | 1800 | 2.88 | | | | |
| 18 | | 1900 | 2.98 | | | | |
| 19 | | 2000 | 3.09 | | | | |