TIMCO ENGINEERING, Inc.

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# TEST REPORT
# FCC PART 15.247 FHSS

| | |
|---|---|
| **APPLICANT** | KAR-TECH INC. |
| **ADDRESS** | 111 ENTERPRISE ROAD<br>P.O. BOX 180606<br>DELAFIELD WISCONSIN 53018 USA |
| **FCC ID** | P4U-MOD164 |
| **MODEL NUMBER** | MOD164 |
| **PRODUCT DESCRIPTION** | FHSS Modular transmitter |
| **DATE SAMPLE RECEIVED** | May 15th 2014 |
| **DATE TESTED** | May 19th 2014 |
| **DATE REPORT ISSUED** | May 23rd 2014 |
| **TESTED BY** | Mario de Aranzeta |
| **APPROVED BY** | Mario de Aranzeta |
| **TIMCO REPORT NO.** | 790AUT14 Test Report |
| **TEST RESULTS** | ☒ PASS ☐ FAIL |

## Table of Contents

## ATTESTATION

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

**AUTHORIZED BY: Mario de Aranzeta**


**SIGNATURE:**

**FUNCTION: Project Manager**

**DATE: May 23rd 2014**

## REPORT SUMMARY

| | |
|---|---|
| Disclaimer: | The test results relate only to the items tested. |
| Purpose of Test: | To demonstrate that the DUT is compliant with FCC Pt 15.247 requirements for a FHSS radio. |
| Applicable Standards: | DA 00-705, ANSI C63.4: 2003, ANSI TIA-603D: 2010, FCC Pt 15.109 & 15.247. |
| Related Reports: | N/A |

## TEST ENVIRONMENT AND TEST SETUP

| | |
|---|---|
| Test Facilities: | All measurements were made at one or more of the test sites of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669. |
| Laboratory Test Conditions: | Temperature: 26°C<br>Humidity: 55% |
| Test Exercise: | The DUT was operated in a normal mode except for the radiation emissions where the DUT was set in continuous transmit mode of operation. |
| Deviation to the Standards: | There was no deviation from the standard. |
| Modification to the DUT: | No modification was made. |
| Supporting Accessories: | None |

## DUT DESCRIPTION

| | |
|---|---|
| **DUT Description** | FHSS Modular transmitter |
| **FCC ID** | P4U-MOD164 |
| **Model Number** | MOD164 |
| **Maximum Output Power** | 0.08 Watts |
| **Operating Frequency** | 902.5 to 927 MHz |
| **Type of Modulation** | QPSK, G1D |
| **DUT Power Source** | ☐ 110–120Vac/50– 60Hz |
| | ☒ DC Power |
| | ☐ Battery Operated Exclusively |
| **Test Item** | ☐ Prototype |
| | ☒ Pre-Production |
| | ☐ Production |
| **Type of Equipment** | ☐ Fixed |
| | ☒ Mobile |
| | ☐ Portable |
| **Antenna** | 1.8 dBi monopole |
| **Antenna Connector** | Reverse SMA |

The external antenna is:

| Manufacturer | Model | Type | Gain |
|---|---|---|---|
| Linx | ANT-916-CW-QW | Monopole | 1.8 dBi |
| None | None | Wire monopole | 1.8 dBi |

## EQUIPMENT LIST

| Device | Manufacturer | Model | Serial Number | Cal/Char Date | Due Date |
|---|---|---|---|---|---|
| 3-Meter Semi-Anechoic Chamber | Panashield | N/A | N/A | 12/31/13 | 12/31/2015 |
| EMI Test Receiver | Rhode & Schwarz | ESU 40 | 100320 | 03/21/13 | 03/21/2015 |
| Software: Field Strength Program | Timco | N/A | Version 4.0 | NR | NR |
| EMI Test Receiver | Rhode & Schwarz | ESIB 40 | 100274 | 02/15/13 | 02/15/15 |
| Power Meter | Boonton | 4531 | 11793 | 1/19/13 | 1/19/2015 |
| Power meter Sensor | Boonton | 51072A | 34647 | 1/19/13 | 1/19/2015 |
| Firmware ESU40 | Rohde & Schwarz | ESU 40 | Version 4.43 SP3 | NA | NA |
| Firmware ESIB40 | Rohde & Schwarz | ESIB 40 | Version 4.34.3 | NA | NA |
| Antenna Log-Periodic | Electro-metrics | LPA-25 | 1122 | 5/09/13 | 5/09/2015 |
| Antenna Bi-conical | Eaton | 94455-1 | 1096 | 5/10/13 | 5/10/2015 |
| Antenna Loop | EMCO | 6512 | 9706-1211 | 6/14/12 | 6/14/2014 |
| Antenna DR Horn | ETS Lindgren | 3117 | 62529 | 10/09/13 | 10/09/2015 |
| Software: Field Strength Program | Timco | N/A | Version 4.0 | NA | NA |

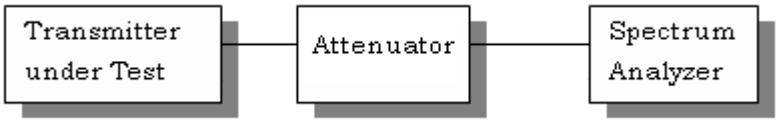
## TEST PROCEDURES

**POWER LINE CONDUCTED INTERFERENCE:** The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed with the DUT transmitting. The resolution bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

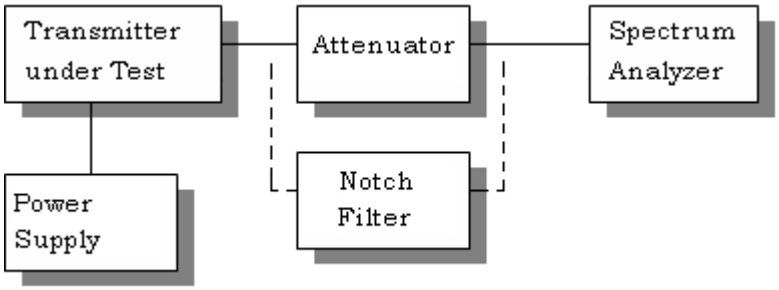
**BANDWIDTH 20 dB**: The procedure used was DA-00-705A. The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 10 kHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

**RF Power Output:** The RF power output was measured using the procedure as described in DA 00-705A at the antenna feed point using a spectrum analyzer.

Output Power Test Setup Diagram




**ANTENNA CONDUCTED EMISSIONS:** The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz. Power was measured by disconnecting the antennas and measuring across a 50 ohm load as recommended by the manufacturer using a peak power meter.



**RADIATION INTERFERENCE:** The test procedure used was ANSI C63.4-2003 using an Agilent spectrum receiver with preselector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

**RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND:**
An in band field strength measurement of the fundamental emission using the RBW and detector function required by ANSI C63.4-2003 and the FCC rules.

**POWER LINE CONDUCTED INTERFERENCE**

**RULES PART NO.**:15.207

**REQUIREMENTS:**

| Emission Frequency (MHz) | Conducted Limit (dBµV) | |
|---|---|---|
| | Quasi-peak (QP) | Average (AV) |
| 0.15 – 0.5 | 66 to 56 * | 56 to 46 * |
| 0.5 – 5 | 56 | 46 |
| 5 – 30 | 60 | 50 |
| * Decreases with the logarithm of the frequency. | | |

**TEST DATA:** The following plots represent the emissions read for power line conducted. Both lines were observed

Not applicable EUT was tested in a battery operated configuration.

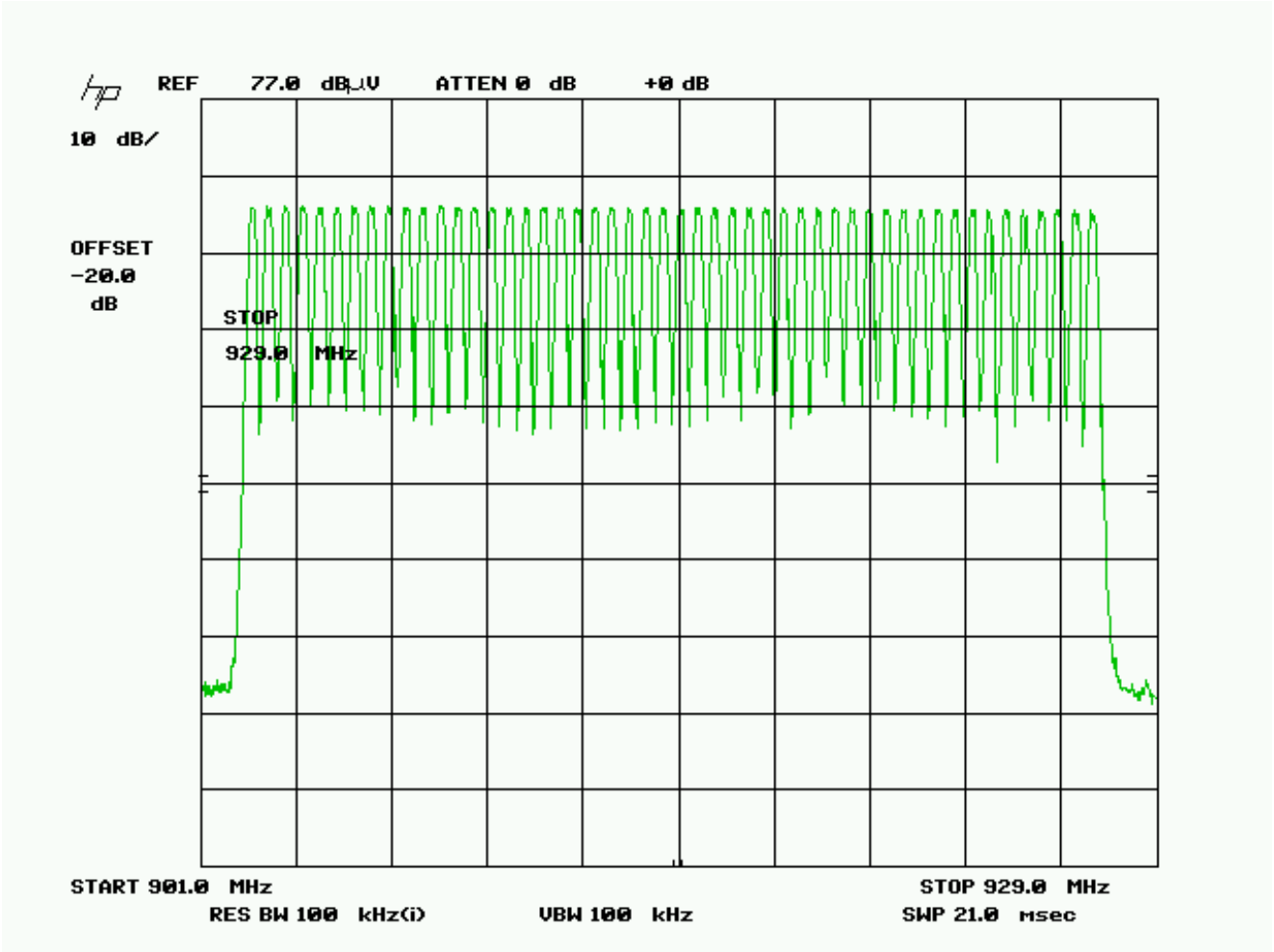
## NUMBER OF HOPPING CHANNELS

**Rules Part No.**: 15.247(a)(1), RSS-210

**Requirements:**

| | |
|---|---|
| 902-928 MHz | If the 20 dB bandwidth is < 250 kHz, the system shall use at least 50 hopping frequencies. |
| | If the 20 dB bandwidth is 250 kHz or greater, the system shall use at least 25 hopping frequencies. |
| 2400-2483.5 MHz | At least 15 channels |
| 5725-5850 MHz | At least 75 channels |

**Test Data:** There are 50 hopping channels



**DWELL TIME OF A HOPPING CHANNEL**

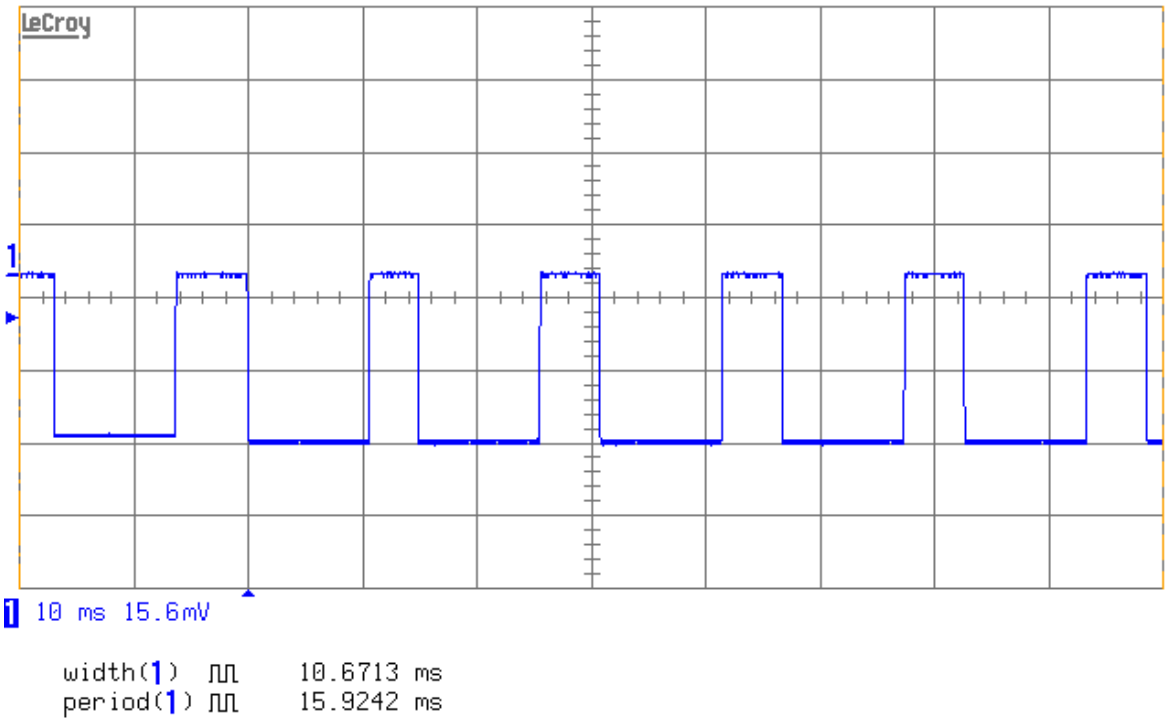
**RULES PART NO.**:15.247(a)(1)(i)

**REQUIREMENTS:**

| | |
|---|---|
| 902-928 MHz | If 20 dB bandwidth is < 250 kHz, average time of occupancy of any frequency shall not exceed 0.4 sec in 20 seconds. |
| | If 20 dB bandwidth is 250 kHz or greater, dwell time < = 0.4 seconds n a 10 second period. |
| 2400-2483.5 MHz | < = 0.4 seconds in a 0.4 seconds multiplied the number of hopping channels employed. |
| 5725-5850 MHz | < = 0.4 seconds in a 30 second period. |

**TEST DATA:** The dwell time is 11 ms per hop.
Three places in the band were measured and the worst case presented.

The dwell time is 350ms in a 20 second period.



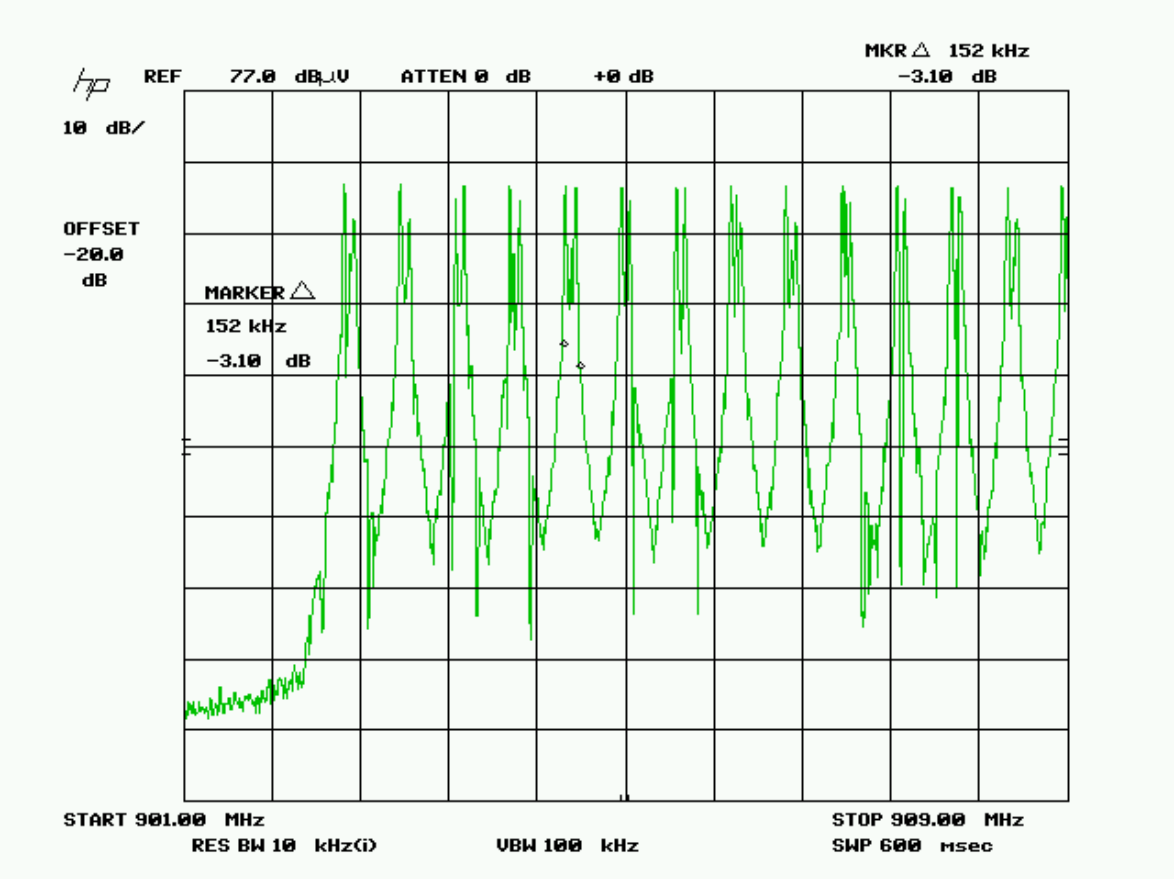

Three places in the band were measured and the worst case presented.

## 20 dB BANDWIDTH

**RULES PART NO.:** 15.247(a)(2), RSS-210

**REQUIREMENTS:** The 20 dB bandwidth must be less than 500 kHz.

**TEST DATA:** See the following plot(s). 150 kHz



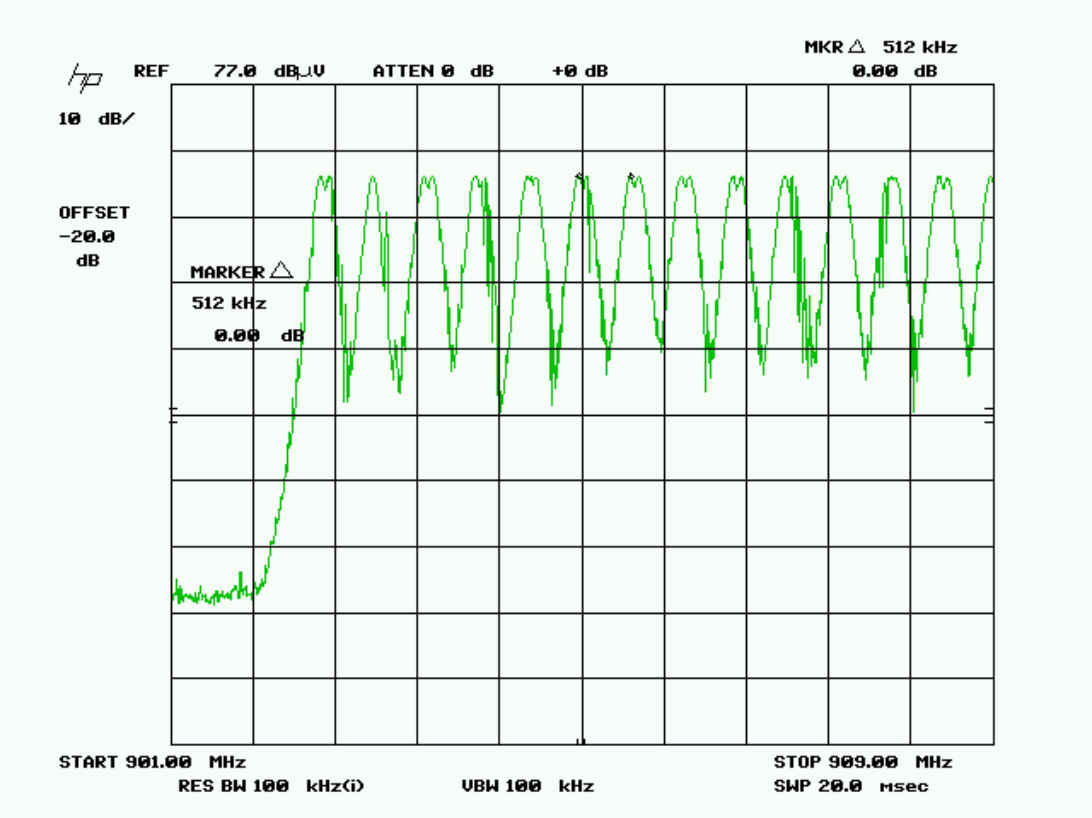

Three places in the band were measured and the worst case presented above.

## CHANNEL SEPARATION

**RULES PART NO.:**15.247(a)(2)

**REQUIREMENTS:** The hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

**TEST DATA:** The separation is 512 kHz



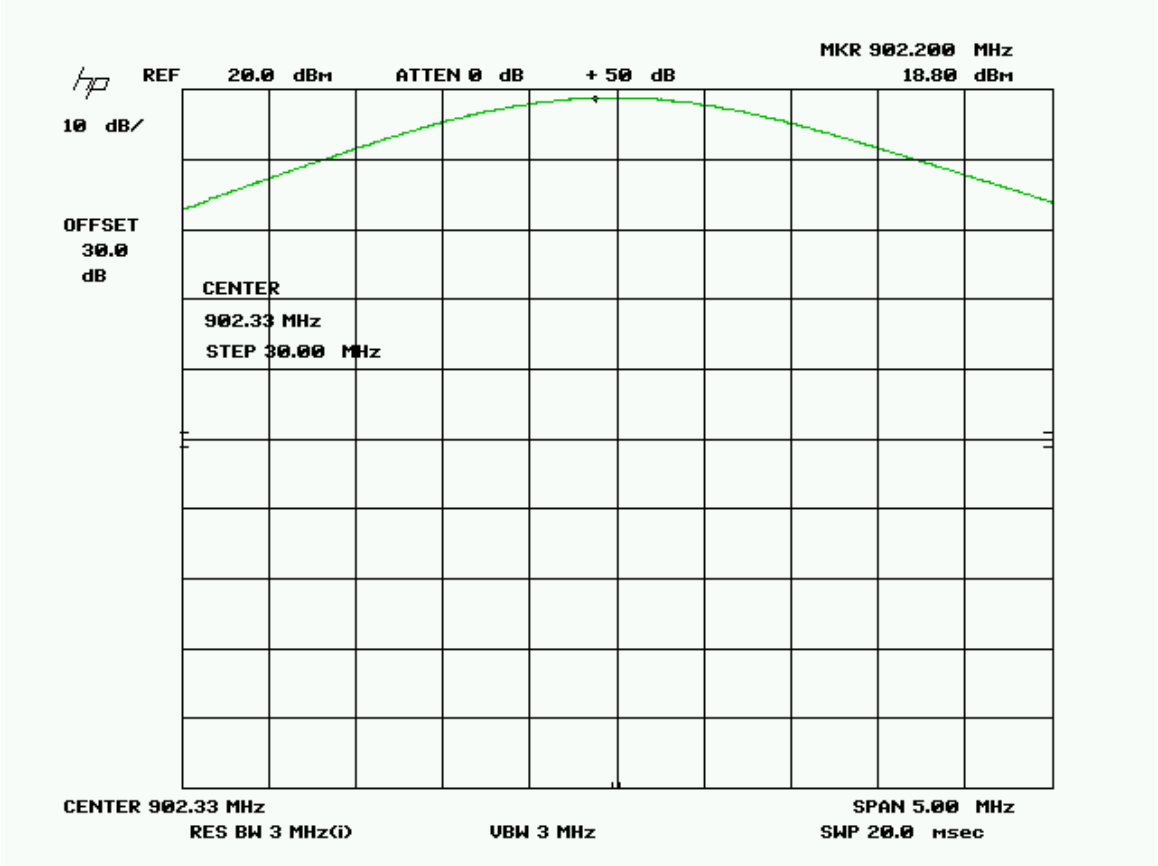
## POWER OUTPUT

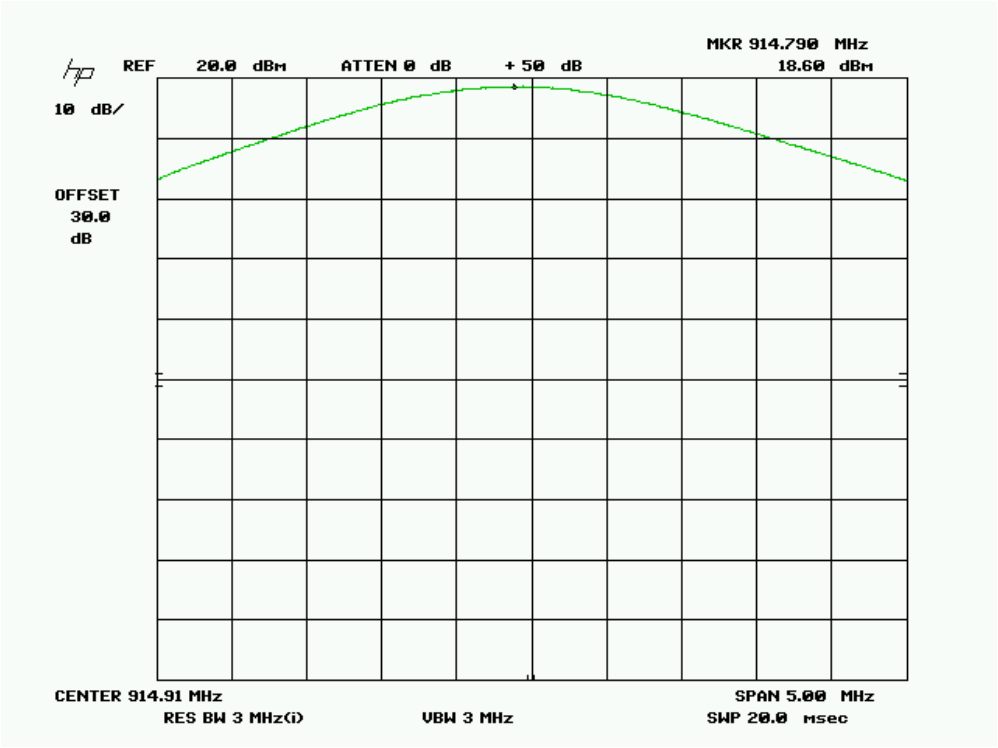
**Rules Part No.:** 15.247(b)

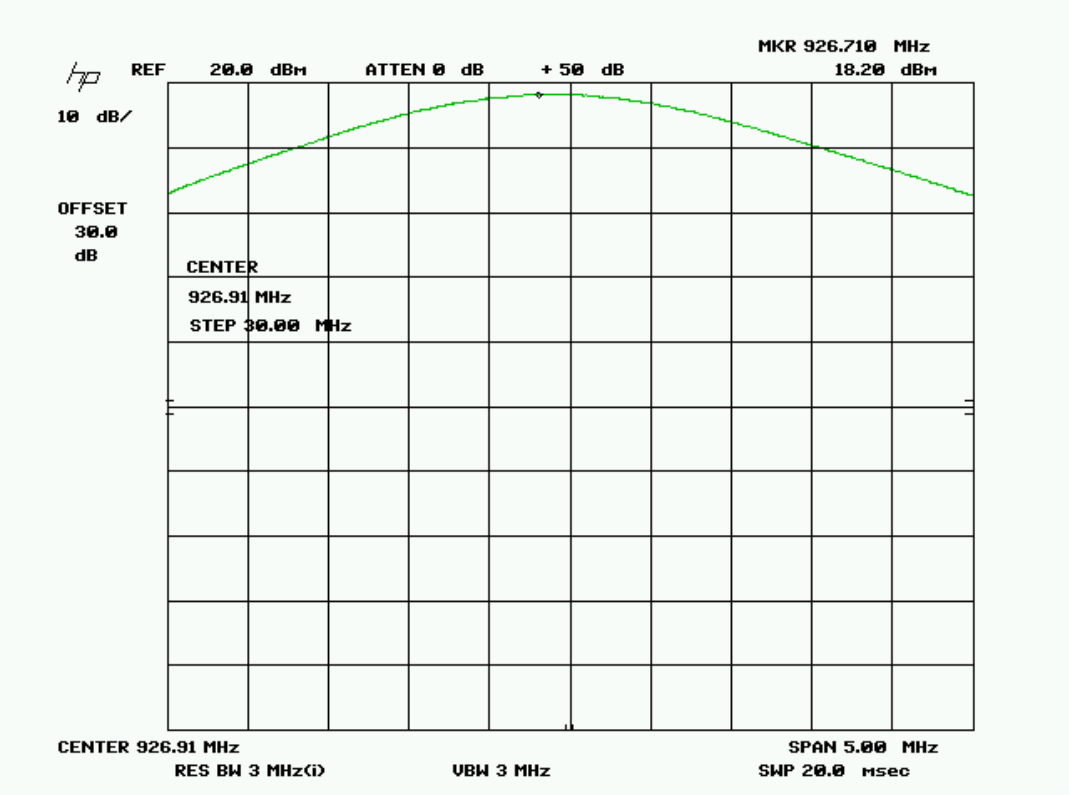
**Requirements:** The maximum peak output power shall not exceed 1 watt (30 dBm). If directional transmitting antennas with a gain of more than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**Test Data:** added 0.25 for cable loss.

| Frequency MHz | Power dBm | Power Watts |
|---|---|---|
| 902.5 | 19.05 | 0.080 |
| 915 | 18.85 | 0.077 |
| 927 | 18.45 | 0.07 |




MKR 914.790 MHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
18.60 dBm
10 dB/
OFFSET
30.0
dB
CENTER 914.91 MHz
SPAN 5.00 MHz
RES BW 3 MHz(i)
VBW 3 MHz
SWP 20.0 msec


MKR 926.710 MHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
18.20 dBm
10 dB/
OFFSET
30.0
dB
CENTER
926.91 MHz
STEP 30.00 MHz
CENTER 926.91 MHz
SPAN 5.00 MHz
RES BW 3 MHz(i)
VBW 3 MHz
SWP 20.0 msec

## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

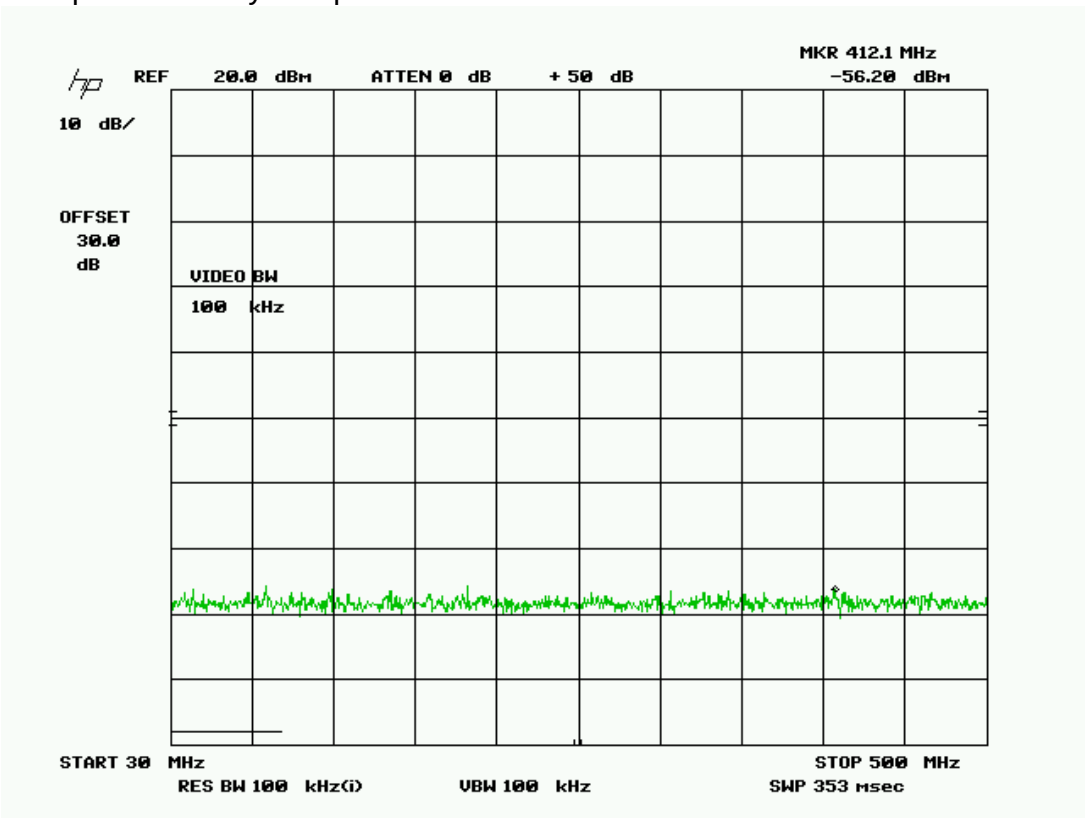
**RULES PART NO.:**15.247(c)

**REQUIREMENTS:** Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

Note: The spectrum was measured from the lowest frequency generated or 9 kHz to the tenth harmonic.

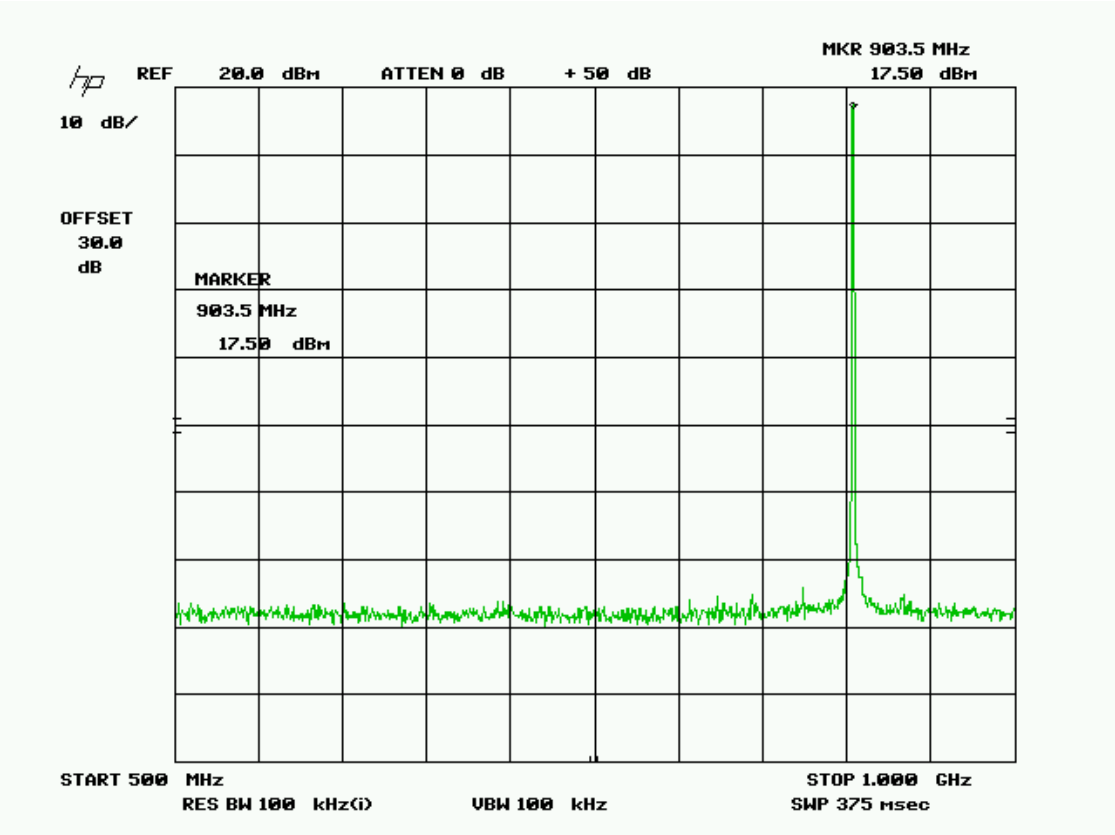
## TEST DATA

The emissions from the lowest frequency generated to 500 MHz for all 3 channels are identical. The data from 30 to 500 MHz for the transmitter operating on the lowest channel is represented by the plot below.

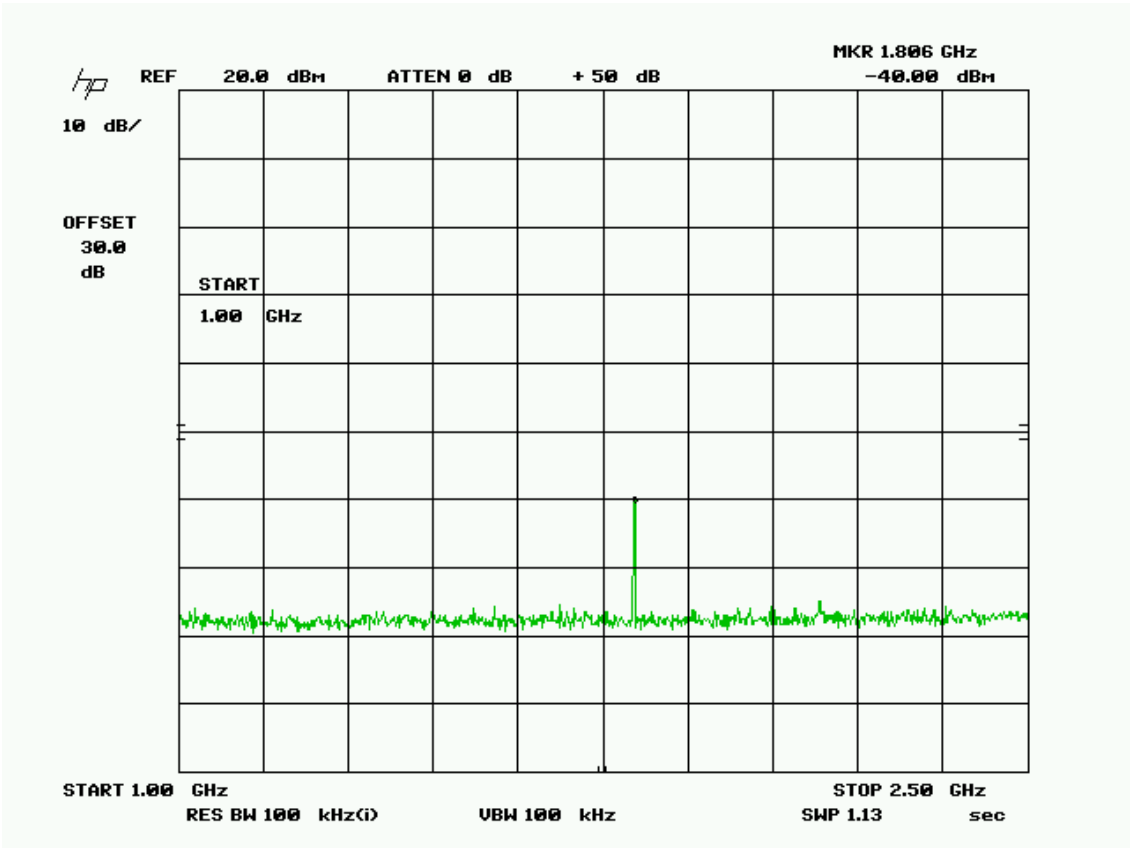



903 MHz
30 to 500 MHz

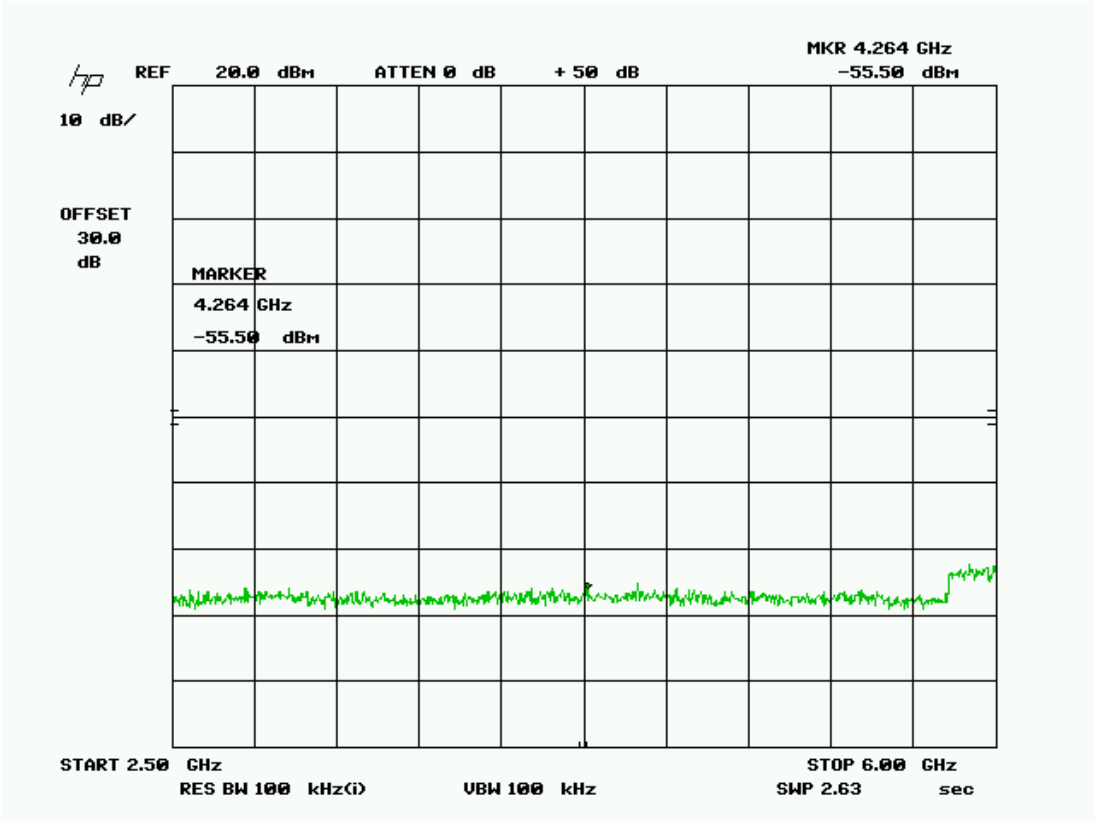
903 MHz channel



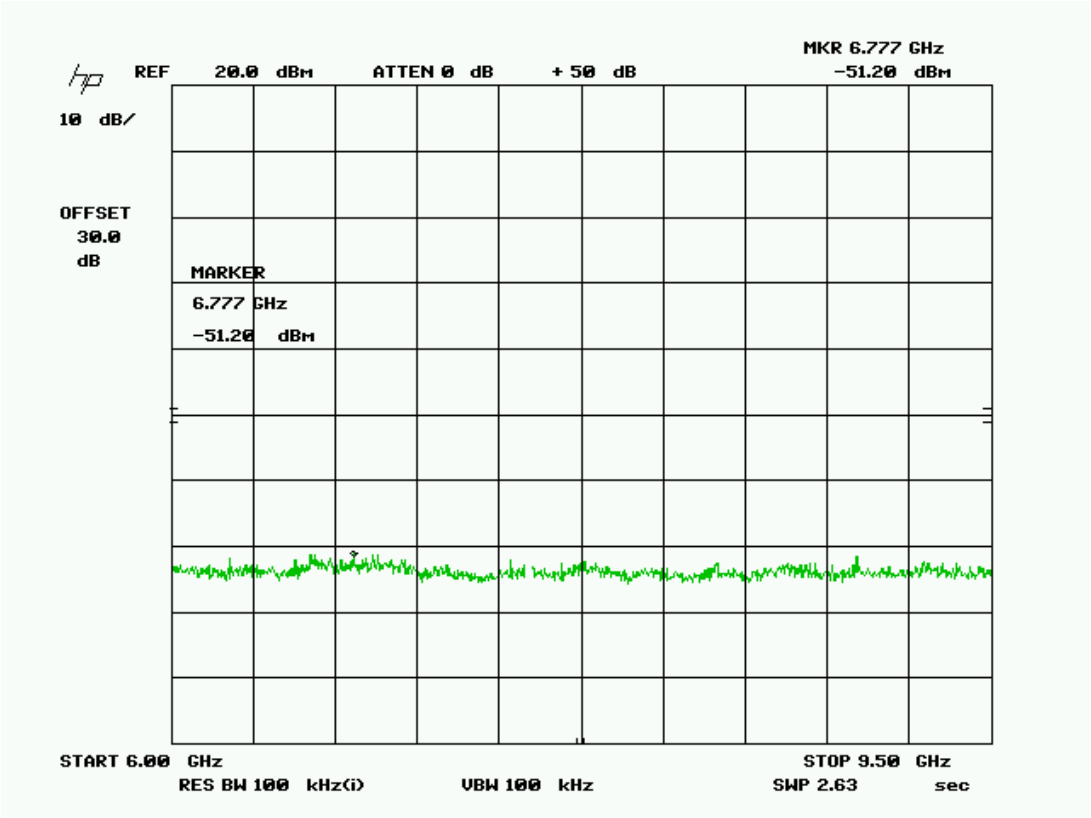

500 to 1000 MHz


MKR 1.806 GHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
-40.00 dBm
10 dB/
OFFSET
30.0
dB
START
1.00 GHz
START 1.00 GHz
STOP 2.50 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 1.13 sec

1 to 2.5 GHz

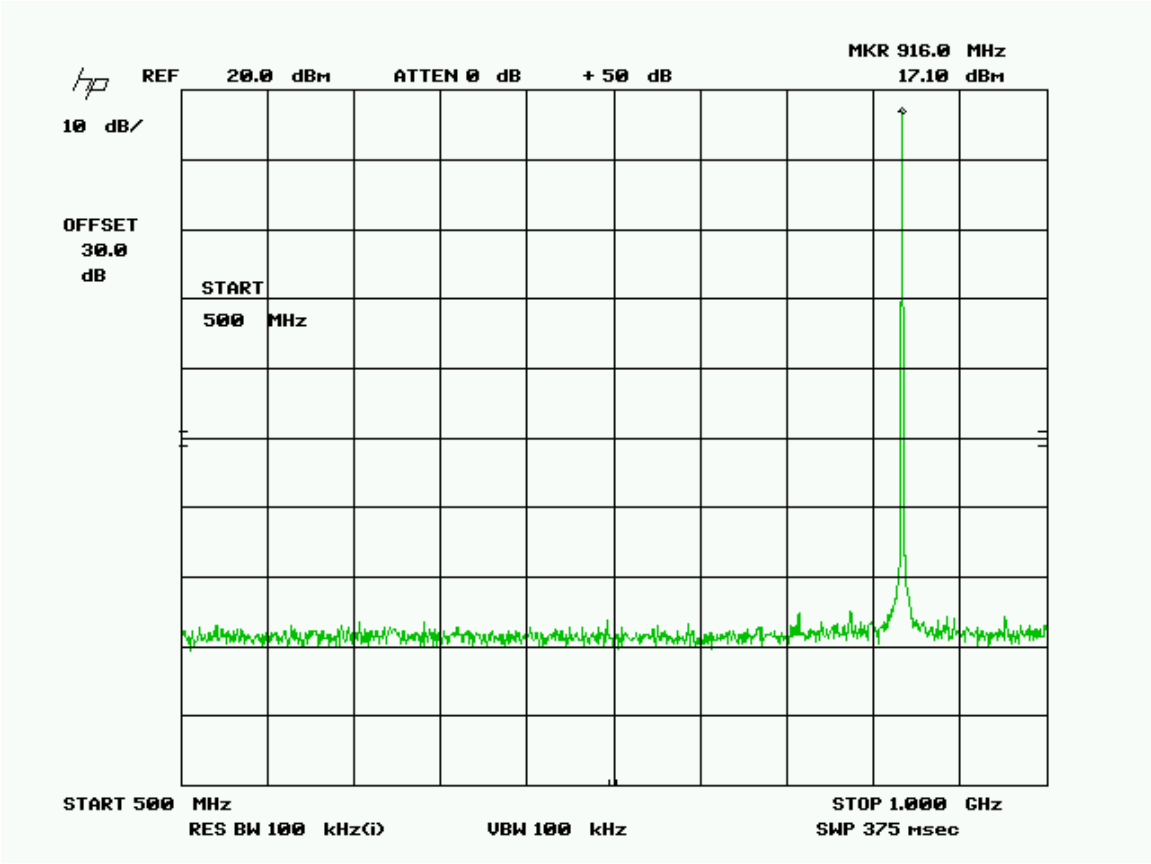

MKR 4.264 GHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
-55.50 dBm
10 dB/
OFFSET
30.0
dB
MARKER
4.264 GHz
-55.50 dBm
START 2.50 GHz
STOP 6.00 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 2.63 sec

2.5 to 6 GHz

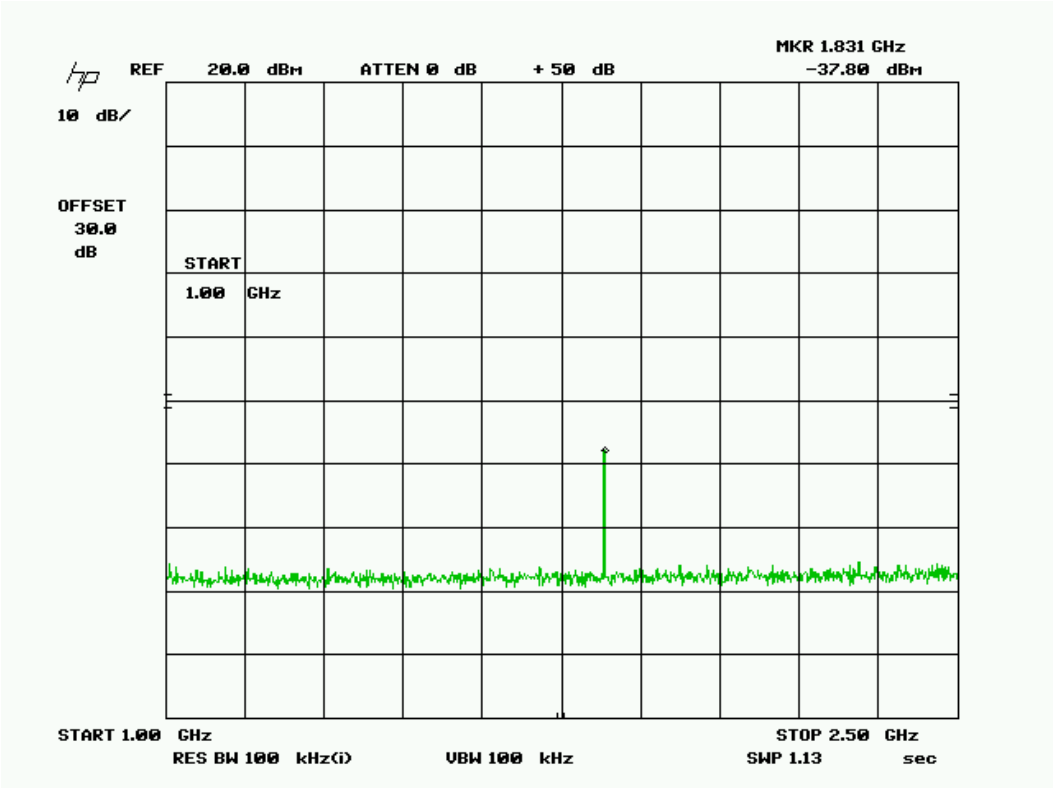

MKR 6.777 GHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
-51.20 dBm
10 dB/
OFFSET
30.0
dB
MARKER
6.777 GHz
-51.20 dBm
START 6.00 GHz
STOP 9.50 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 2.63 sec

6 to 9.5 GHz

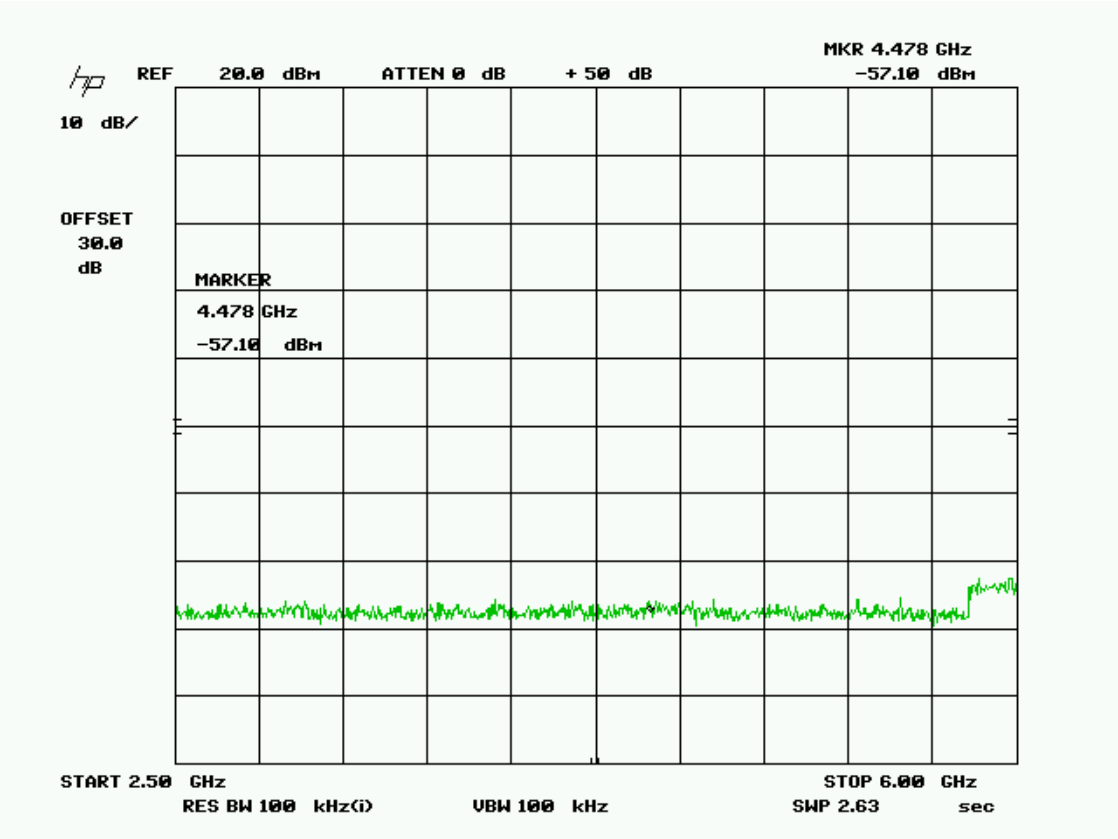
915 MHz channel



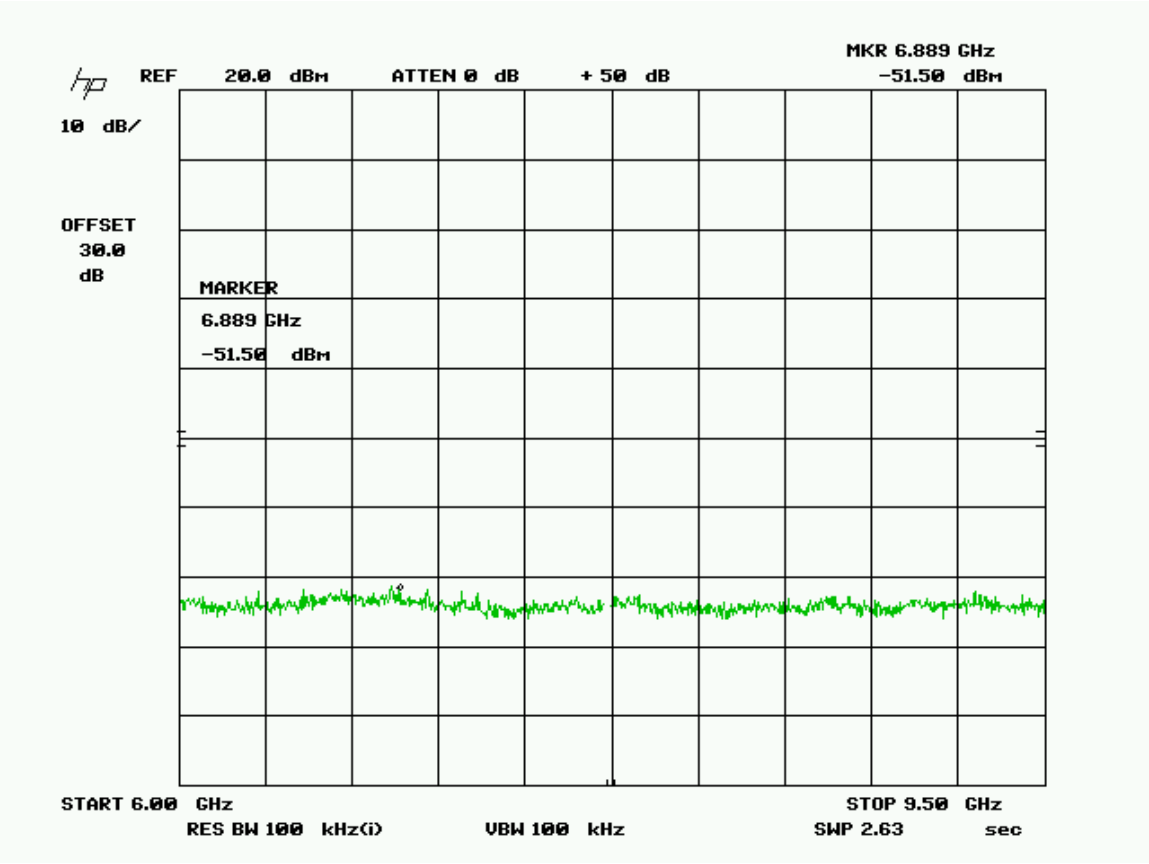

500 to 1000 MHz


MKR 1.831 GHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
-37.80 dBm
10 dB/
OFFSET
30.0
dB
START
1.00 GHz
START 1.00 GHz
STOP 2.50 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 1.13 sec

1 to 2.5 GHz

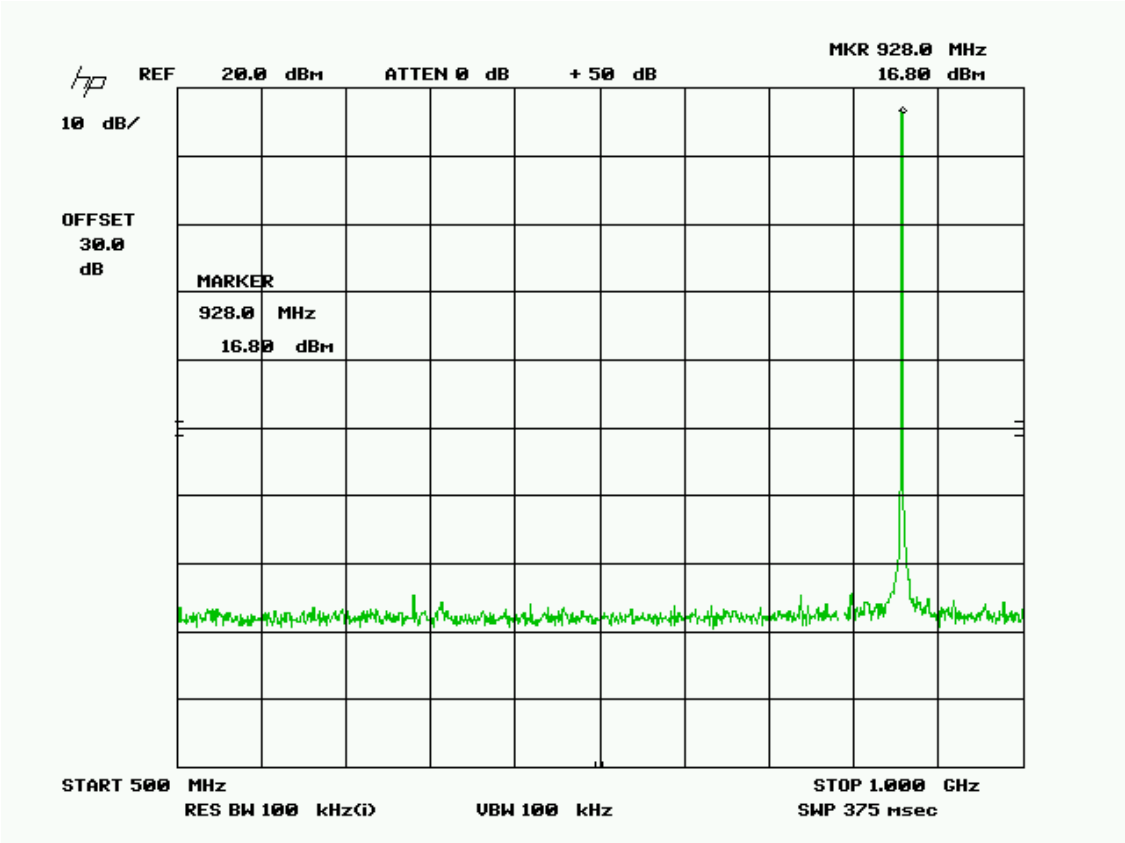

MKR 4.478 GHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
-57.10 dBm
10 dB/
OFFSET
30.0
dB
MARKER
4.478 GHz
-57.10 dBm
START 2.50 GHz
STOP 6.00 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 2.63 sec

2.5 to 6 GHz

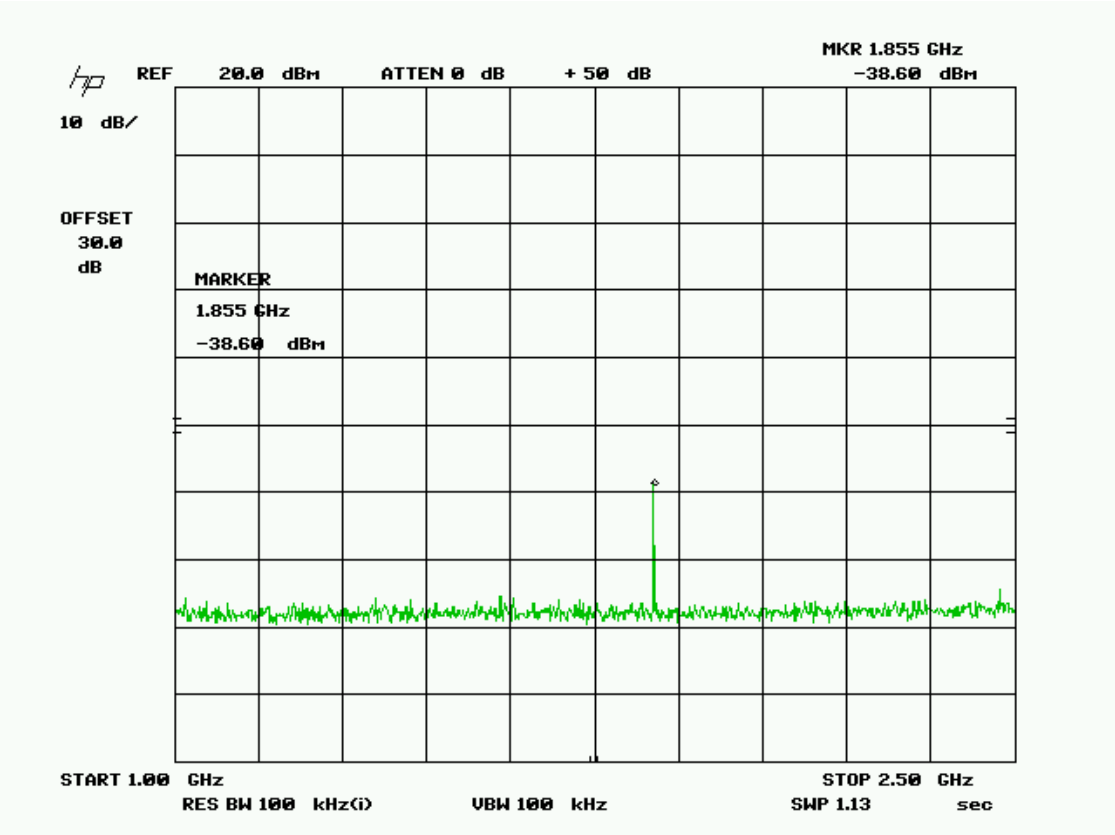

MKR 6.889 GHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
-51.50 dBm
10 dB/
OFFSET
30.0
dB
MARKER
6.889 GHz
-51.50 dBm
START 6.00 GHz
STOP 9.50 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 2.63 sec

6 to 9.5 GHz

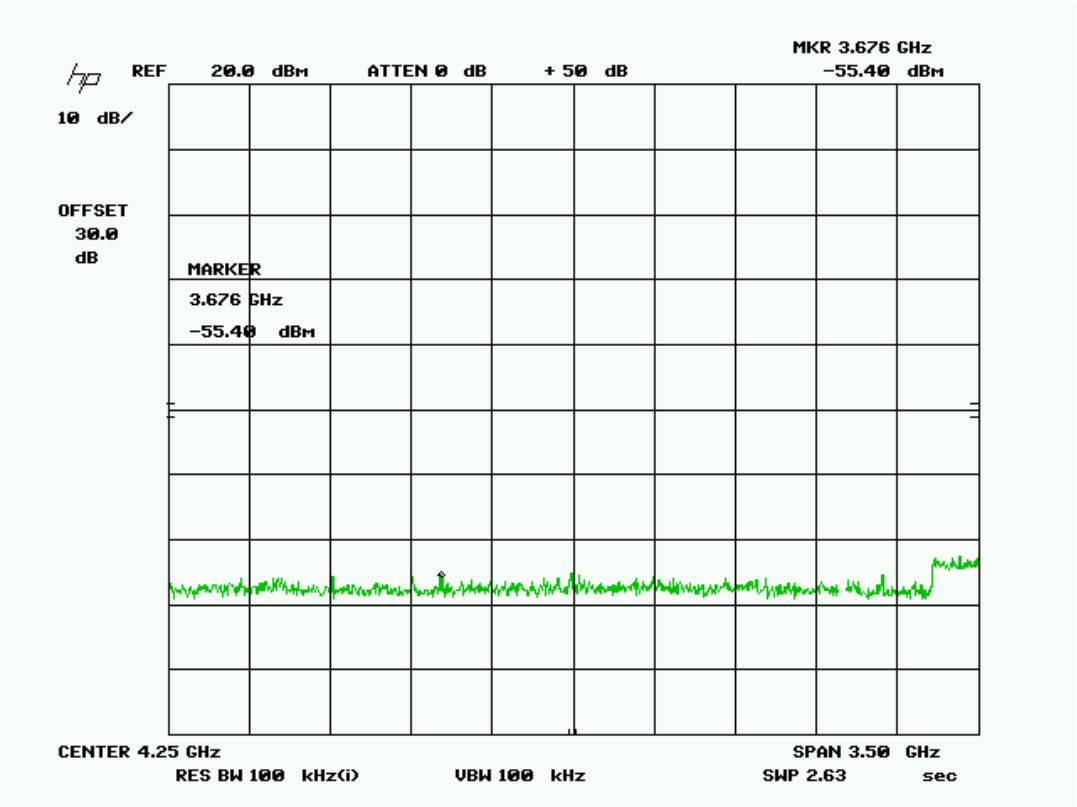
927 MHz channel



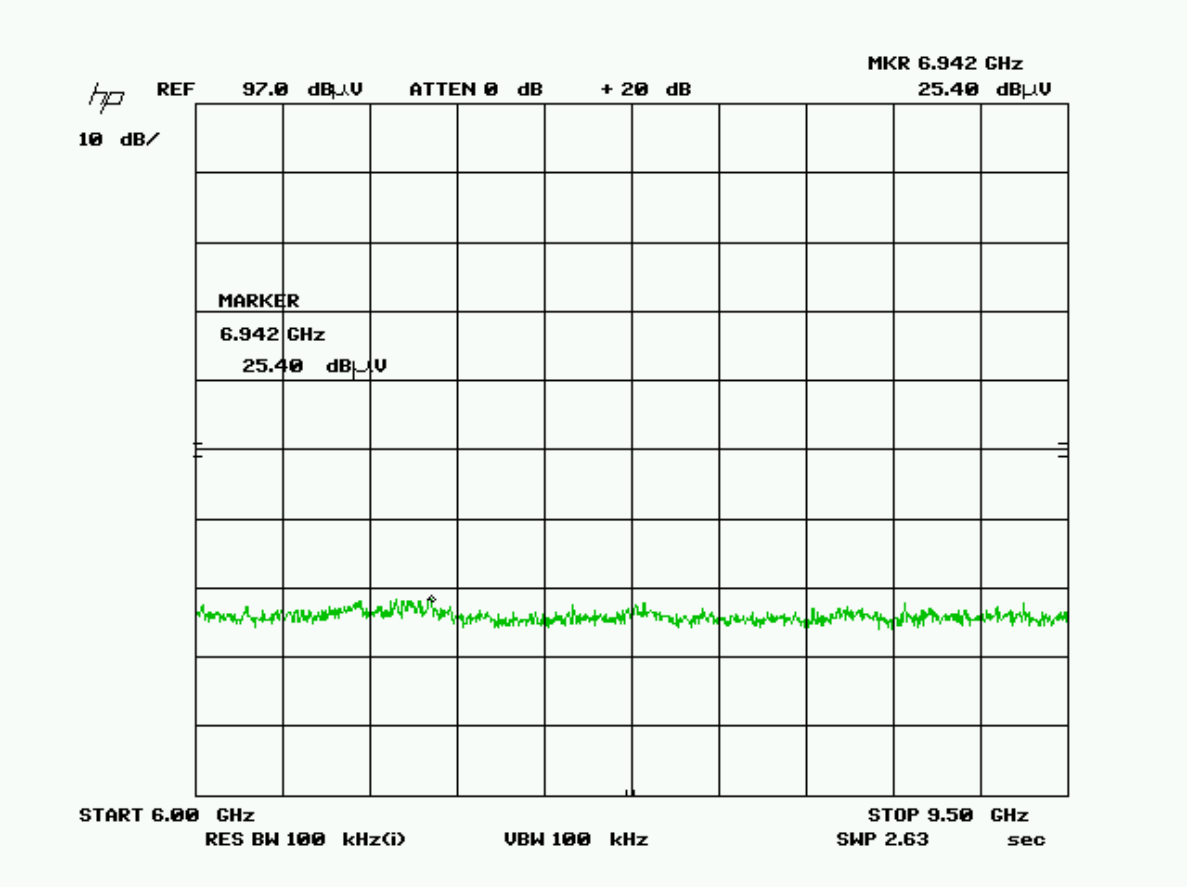

500 to 1000 MHz


MKR 1.855 GHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
-38.60 dBm
10 dB/
OFFSET
30.0
dB
MARKER
1.855 GHz
-38.60 dBm
START 1.00 GHz
STOP 2.50 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 1.13 sec

1 to 2.5 GHz


MKR 3.676 GHz
REF 20.0 dBm
ATTEN 0 dB
+ 50 dB
-55.40 dBm
10 dB/
OFFSET
30.0
dB
MARKER
3.676 GHz
-55.40 dBm
CENTER 4.25 GHz
SPAN 3.50 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 2.63 sec

2.5 to 6 GHz


MKR 6.942 GHz
REF 97.0 dBµV
ATTEN 0 dB
+ 20 dB
25.40 dBµV
10 dB/
MARKER
6.942 GHz
25.40 dBµV
START 6.00 GHz
STOP 9.50 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SWP 2.63 sec

6 to 9.5 GHz

## FIELD STRENGTH OF SPURIOUS EMISSIONS

**RULES PART NO.:** 15.247(c), 15.205 &15.209(b)

**REQUIREMENTS:**

| §15.247(c)& §15.205 | |
|---|---|
| (Fundamental) Frequency | (Field Strength) Limits |
| 902 – 928MHz<br>2.4 – 2.4835GHz | 127.37dBuV/m |
| §15.209 | |
| 30 - 88 MHz | 40 dBµV/m @3M |
| 88 -216 MHz | 43.5 dBµV/m @3M |
| 216 -960 MHz | 46 dBµV/m @3M |
| ABOVE 960 MHz | 54dBuV/m |

Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54 dBµV/m). Spurious not in a restricted band must be 20 dBc.

Emissions were measured from the lowest frequency generated or 9 kHz to the 10$^{th}$ harmonic. The attached plots represent the emissions generated in this region of frequencies.

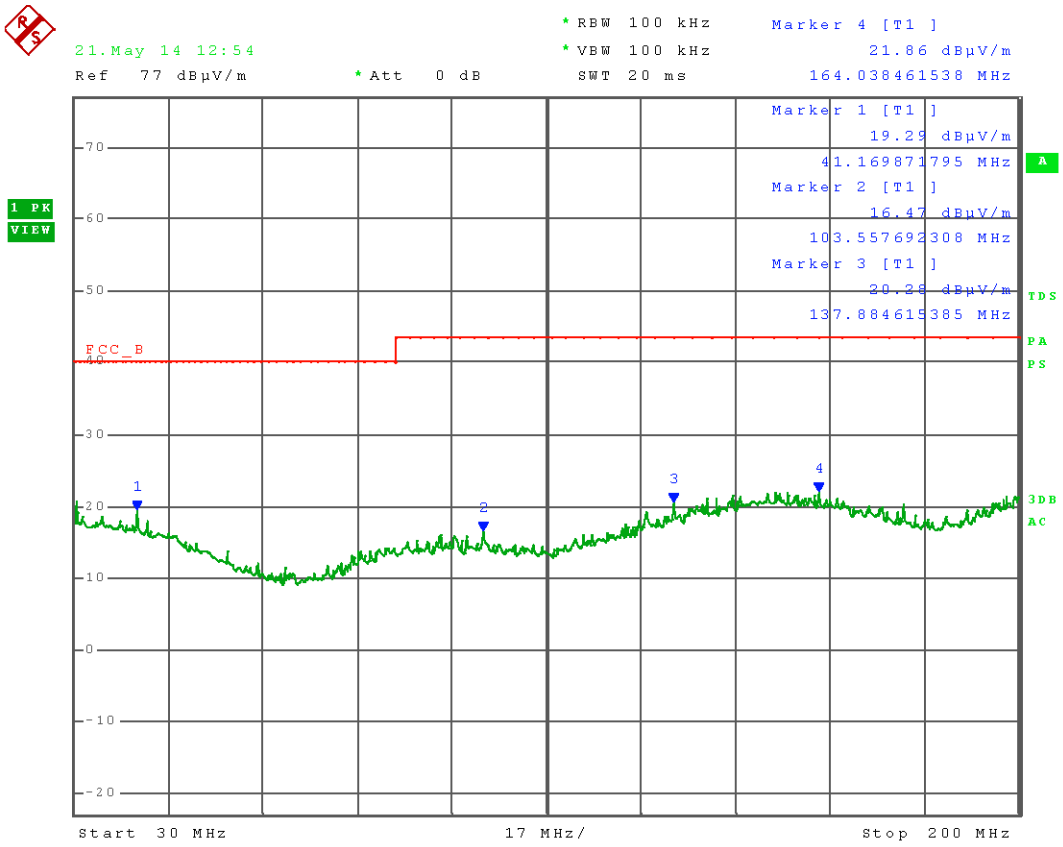
There were no significant emissions from 9 kHz to 30 MHz for all 3 channels.

**Test Data:**

All readings are peak unless marked otherwise.

## Radiated Emissions

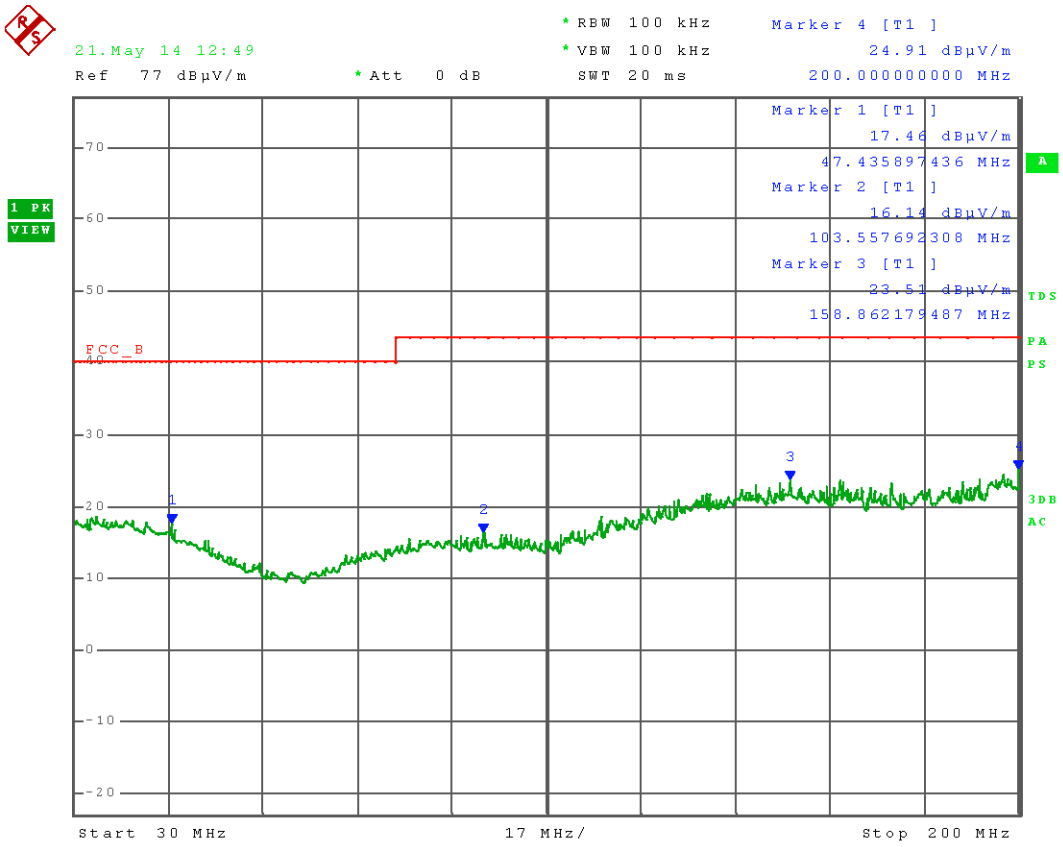
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




30 to 200 MHz

# Radiated Emissions

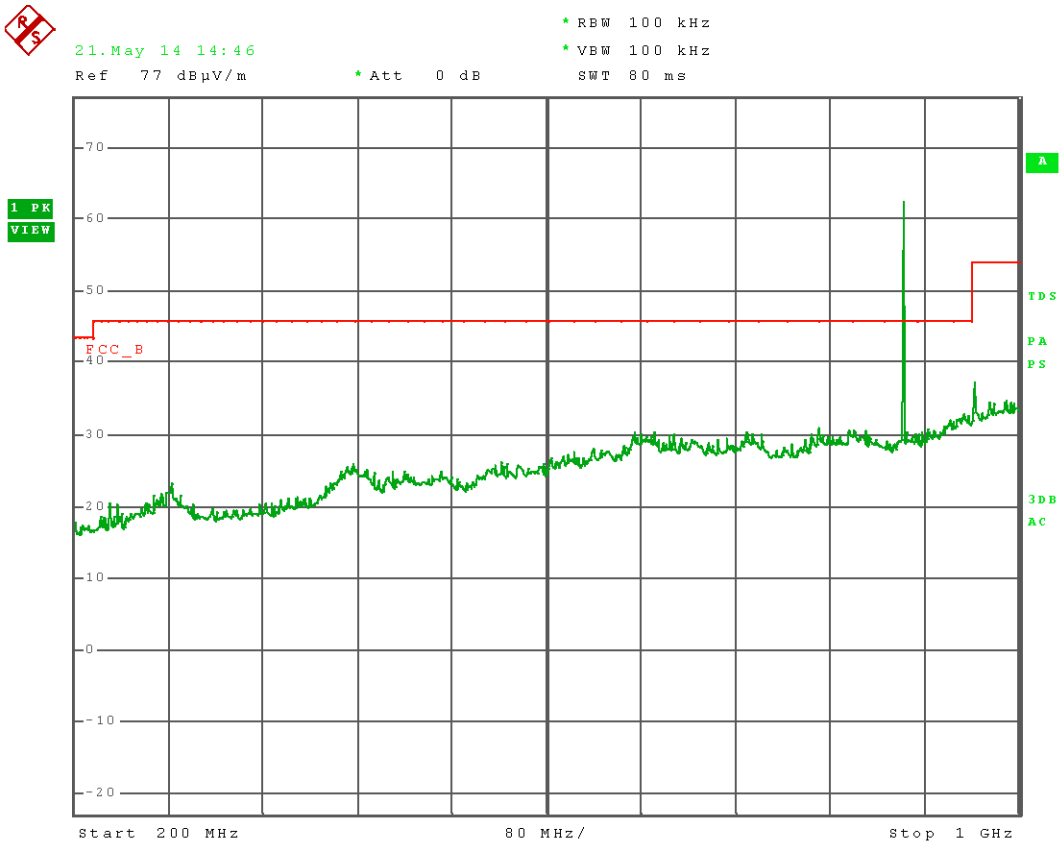
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




30 to 200 MHz

# Radiated Emissions

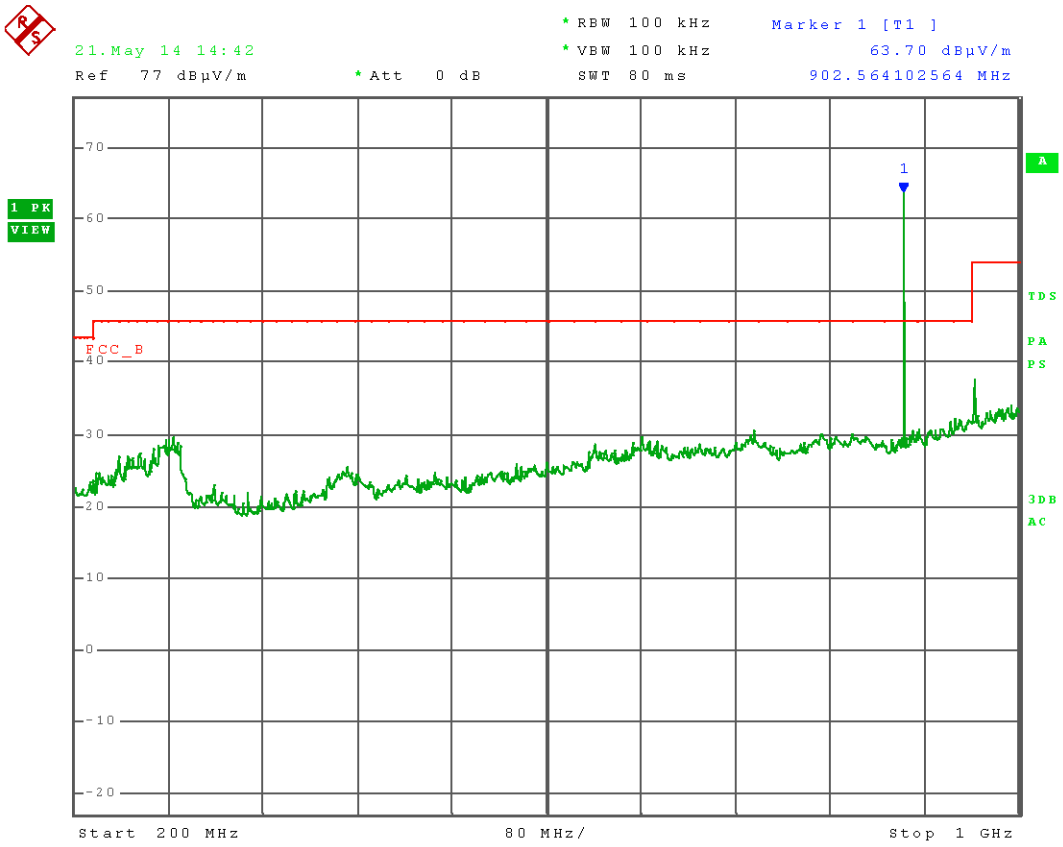
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




200 to 1000 MHz

# Radiated Emissions

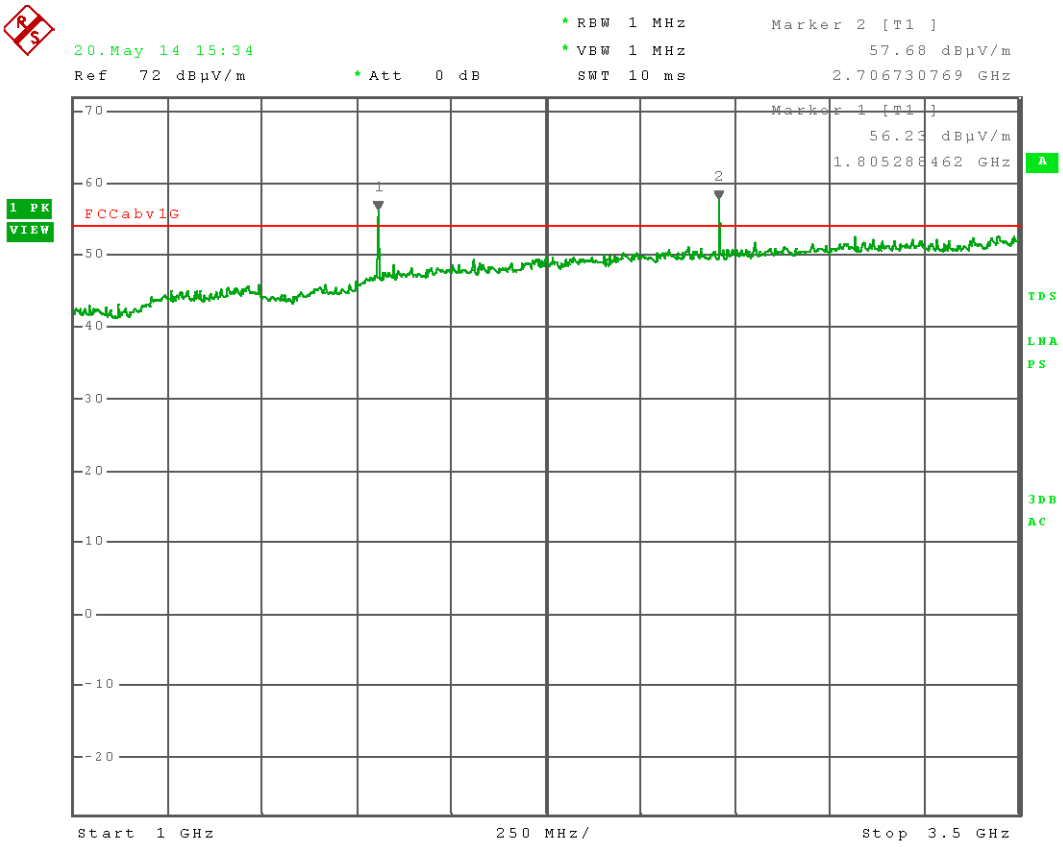
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




200 to 1000 MHz

# Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Max Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |

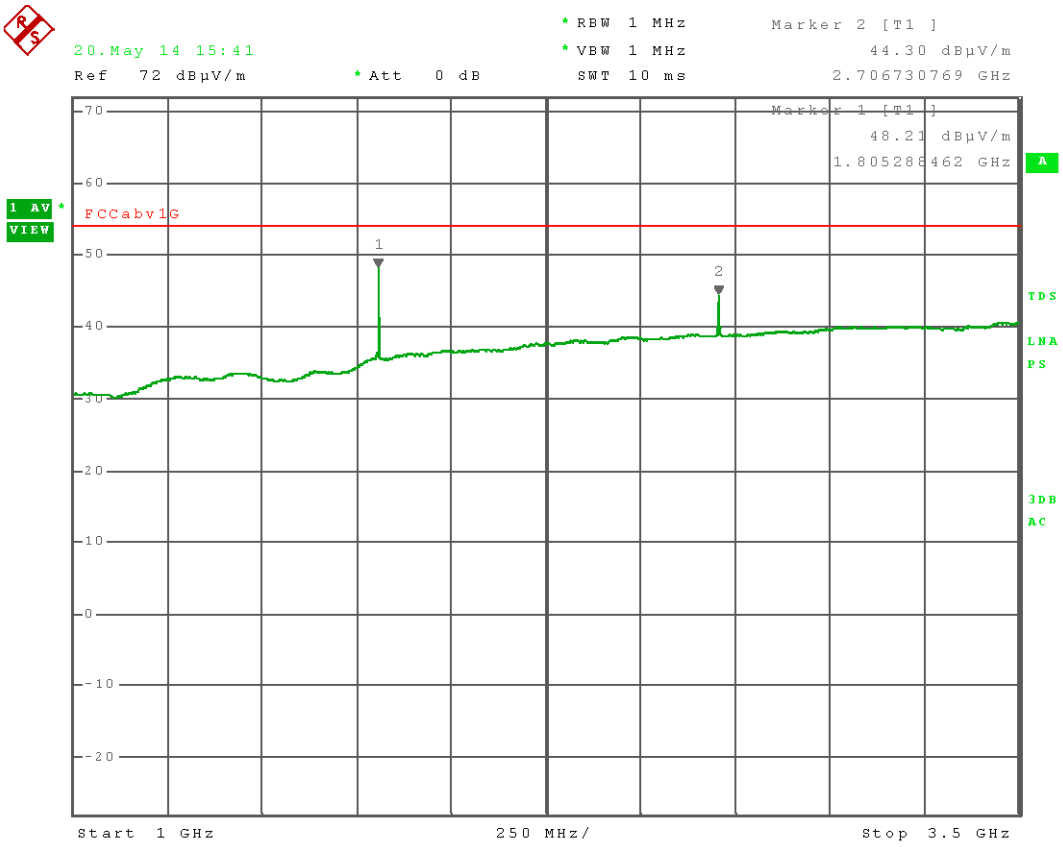



1 to 3.5 GHz (Peak)

TIMCO ENGINEERING, Inc.

# Radiated Emissions

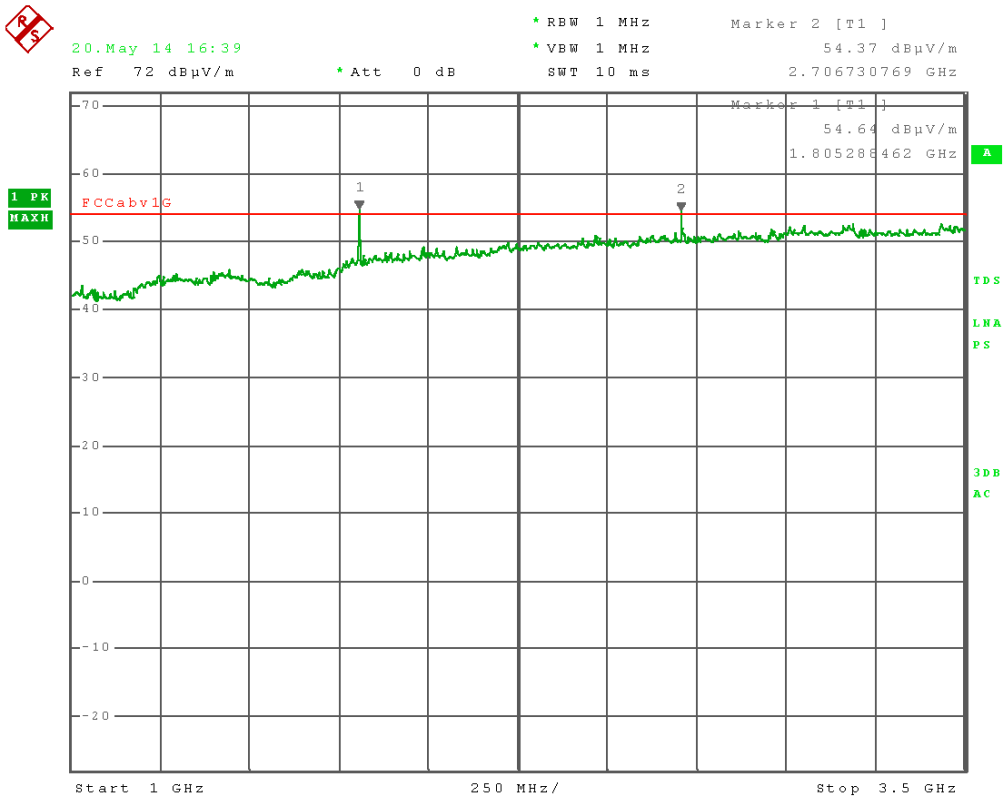
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




1 to 3.5 GHz (Average)

## Radiated Emissions

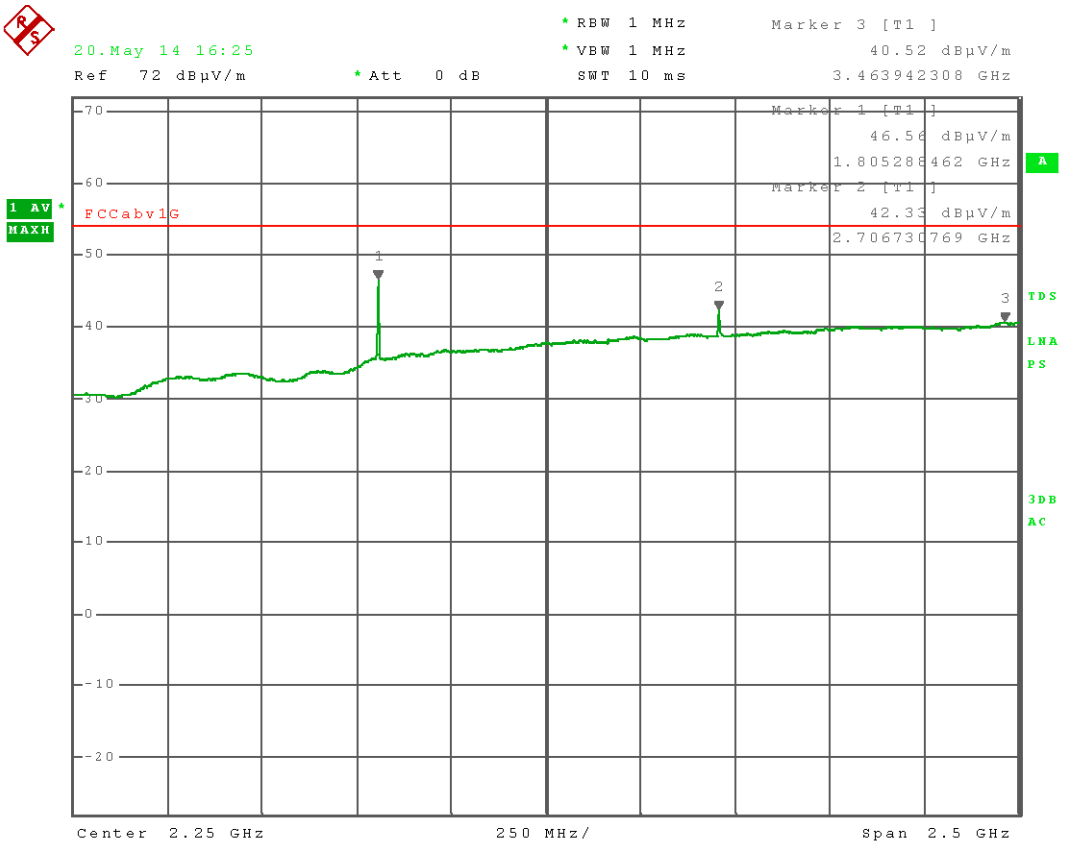
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




1 to 3.5 GHz (Peak)

# Radiated Emissions

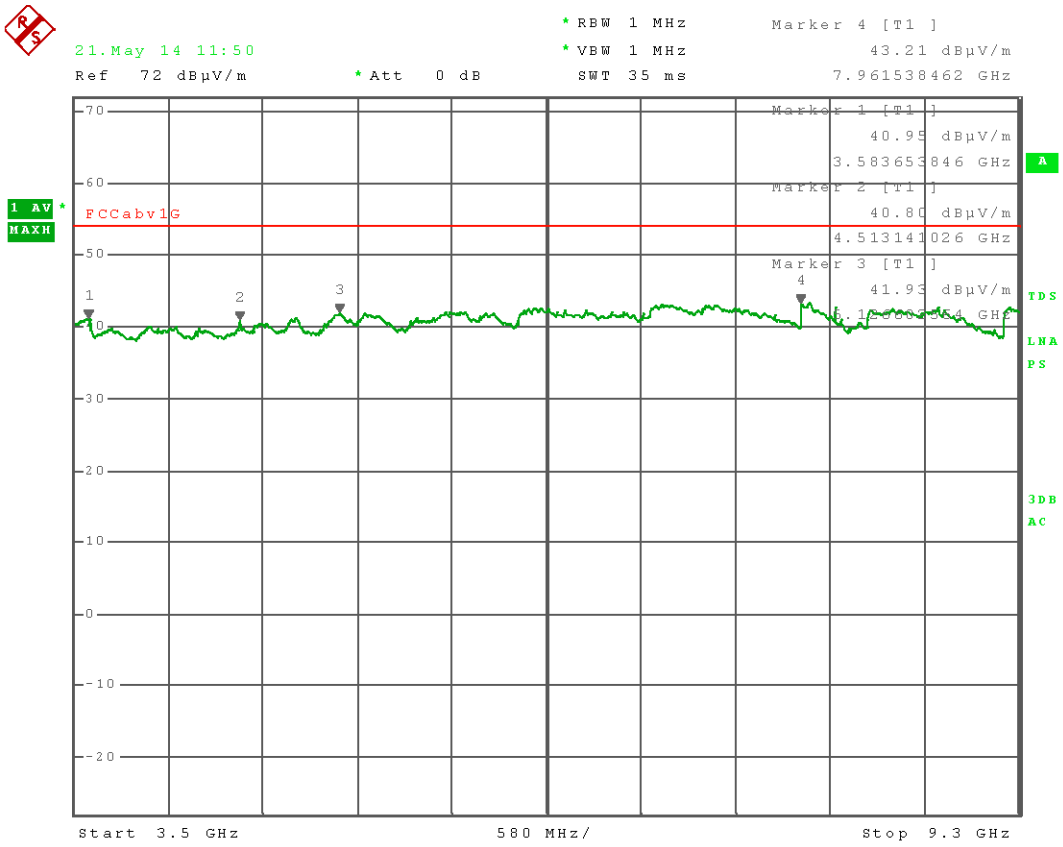
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




1 to 3.5 GHz (Average)

## Radiated Emissions

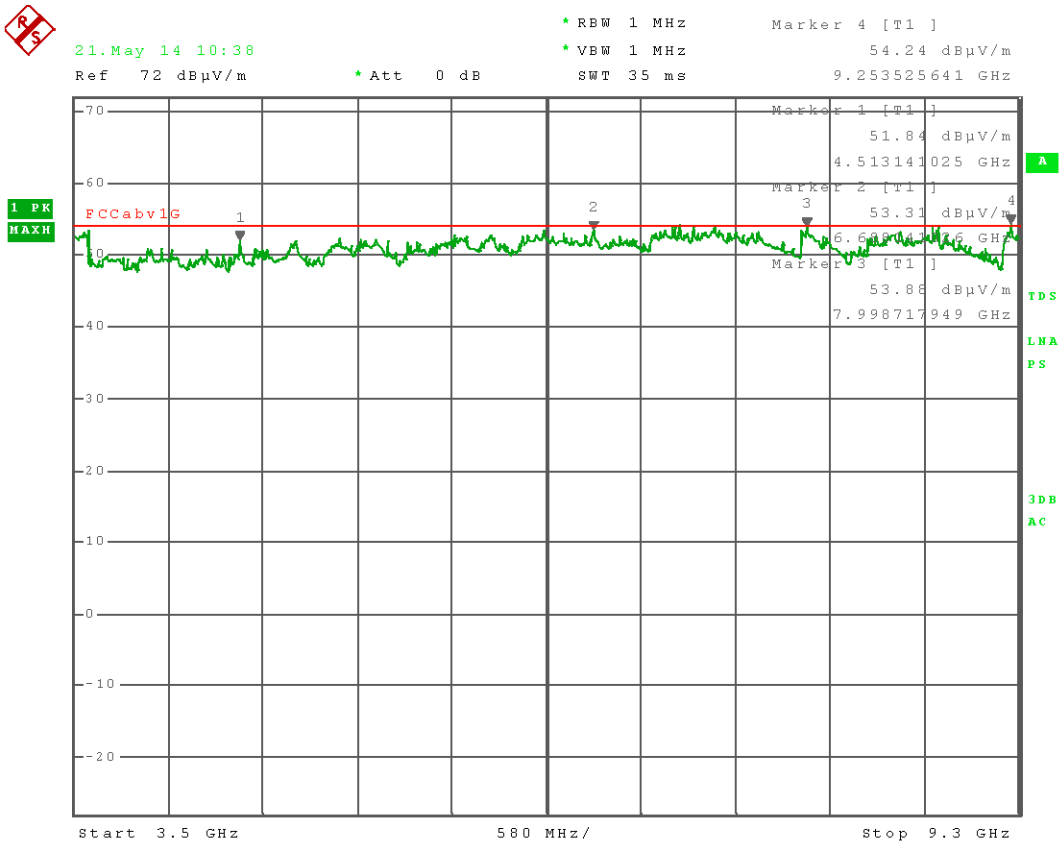
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




3.5 to 9.3 GHz (Average)
No significant emissions peak

# Radiated Emissions

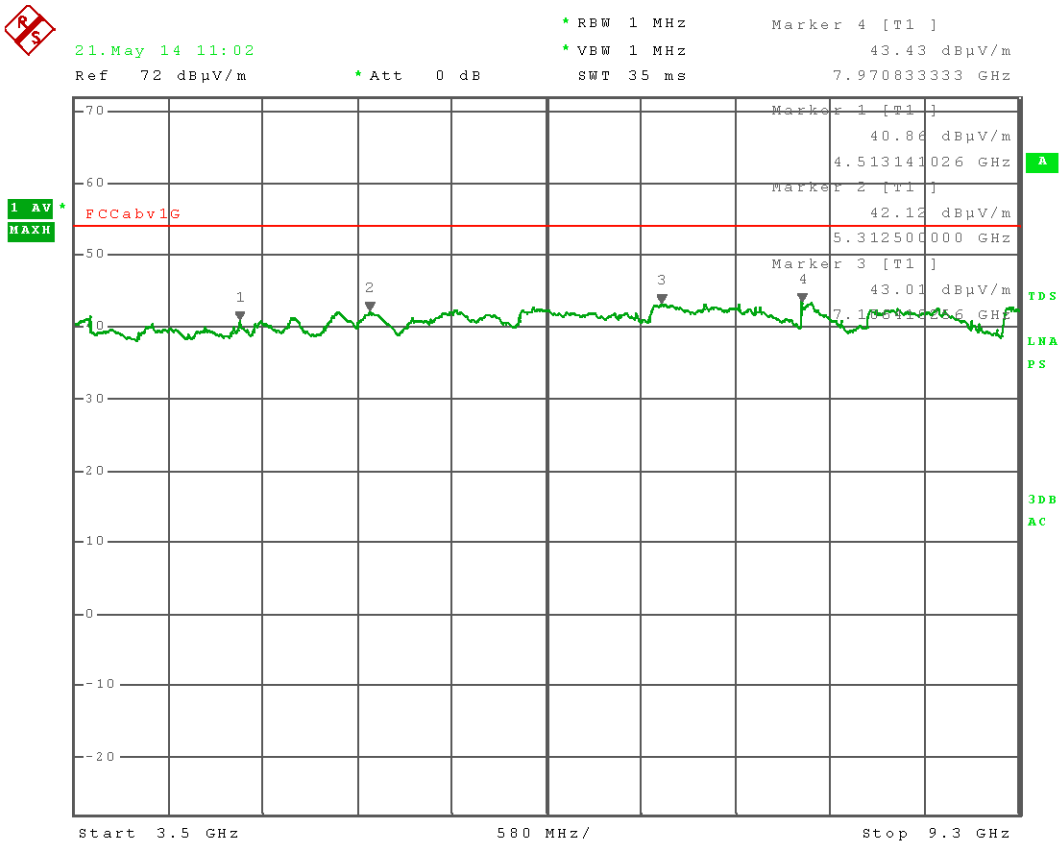
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




3.5 to 9.3 GHz (Peak)

# Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |

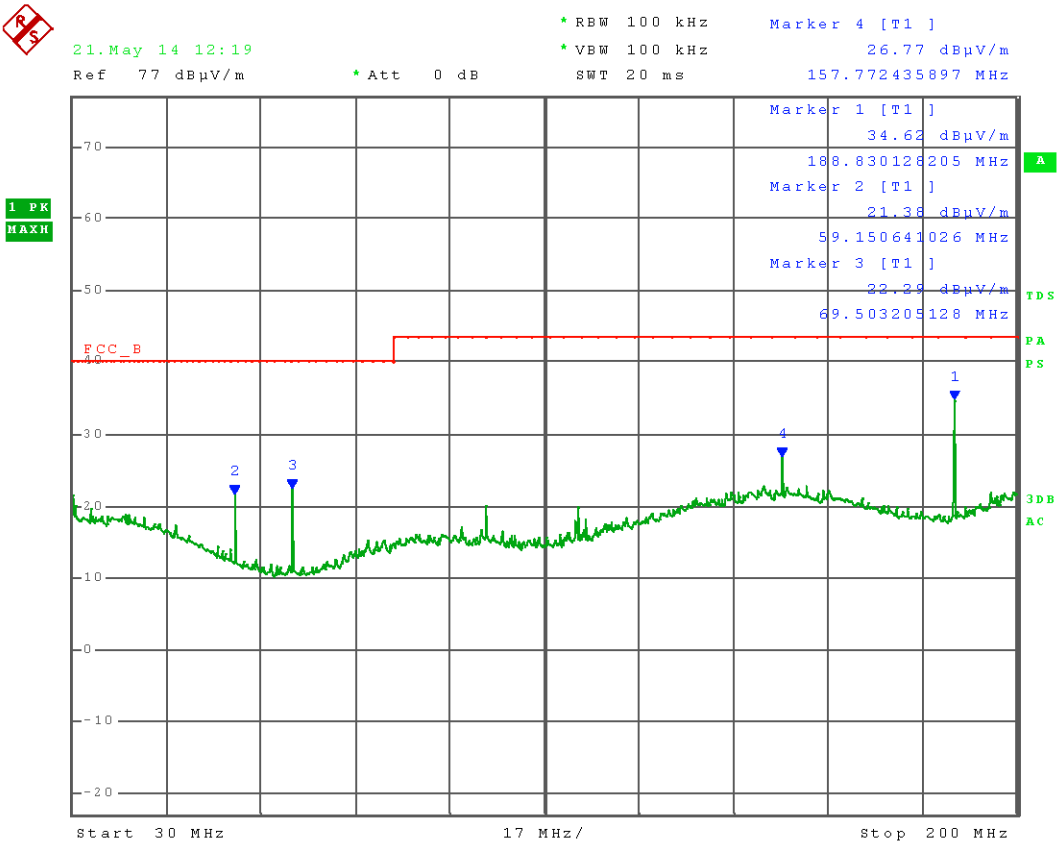



3.5 to 9.3 GHz (Average)

915 MHz

## Radiated Emissions

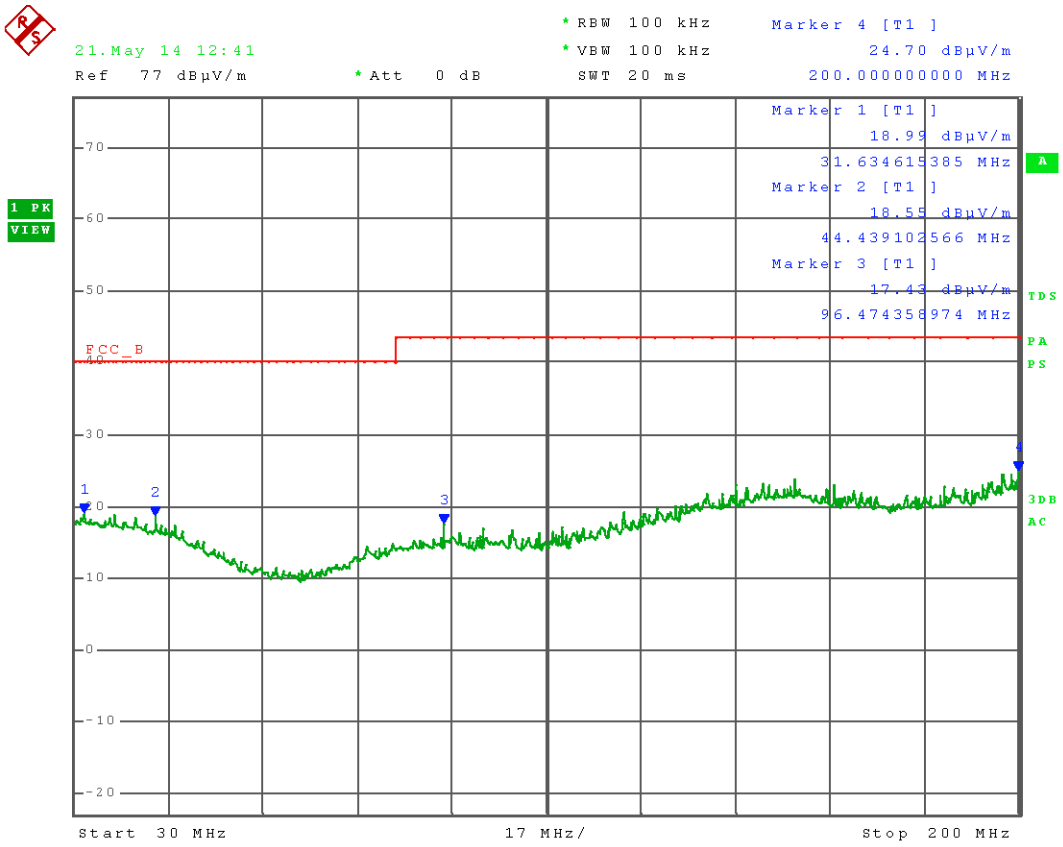
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




30 to 200 MHz

# Radiated Emissions

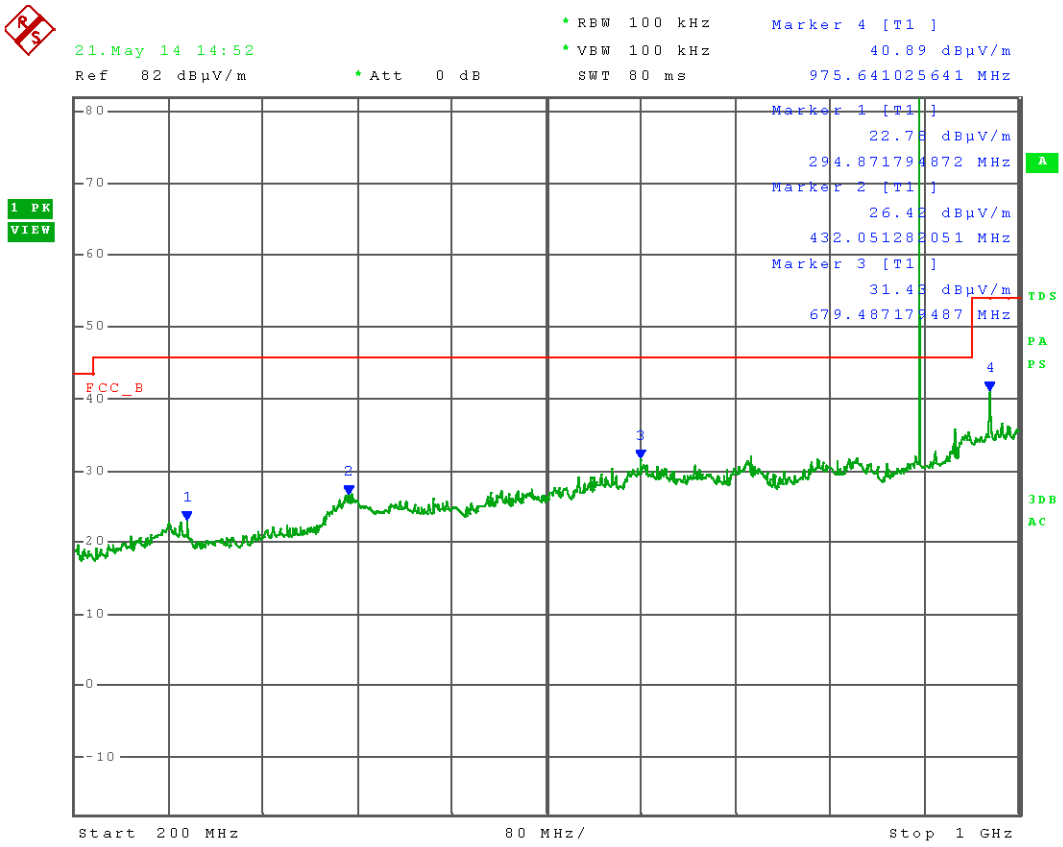
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




30 to 200 MHz

# Radiated Emissions

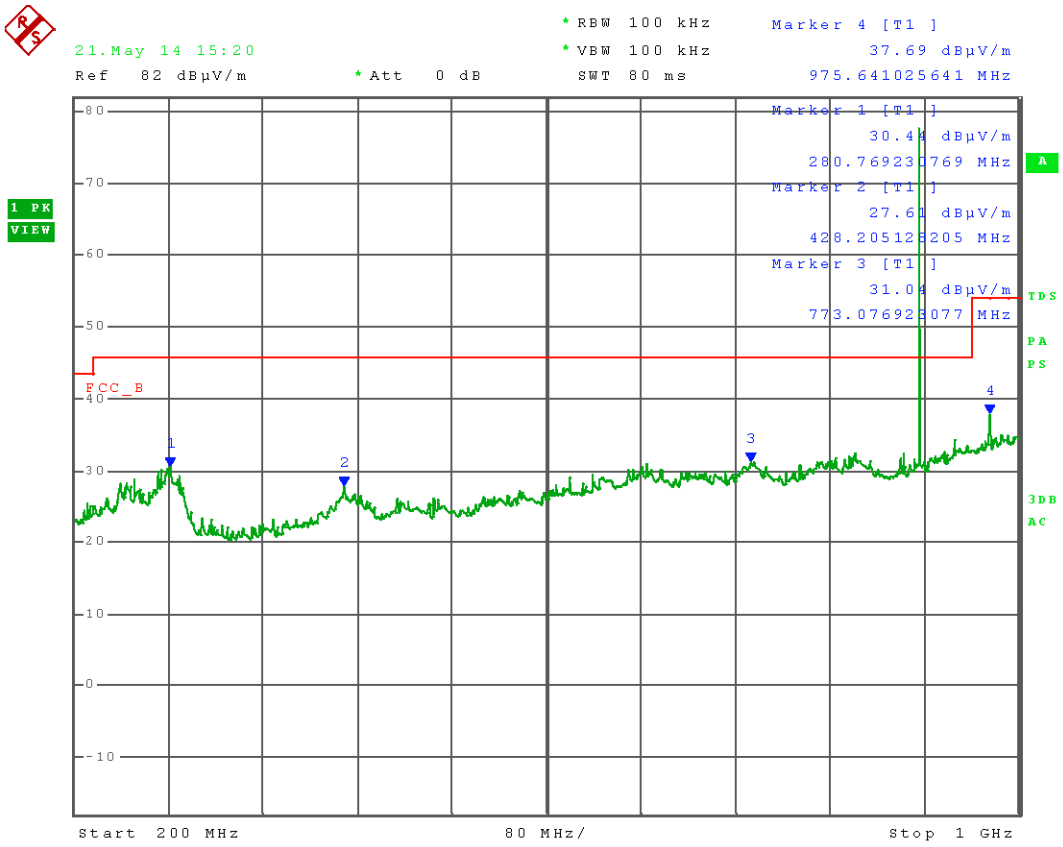
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




200 MHz to 1 GHz

# Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |



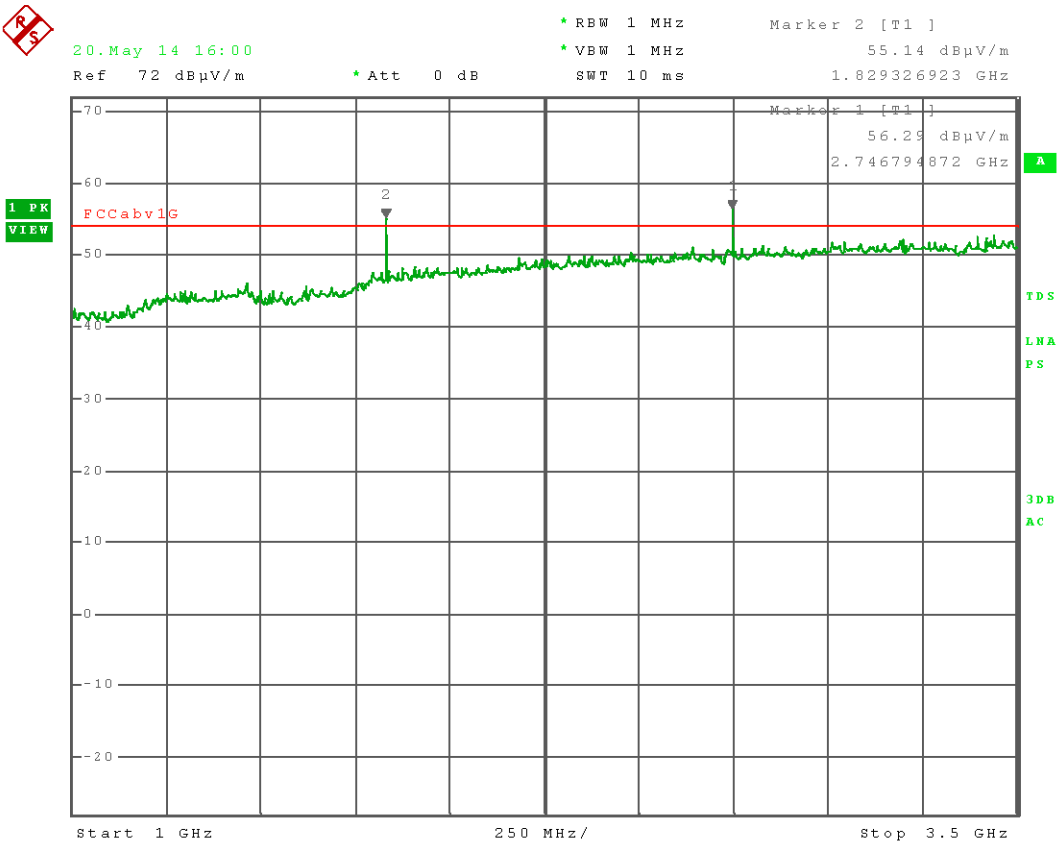

200 MHz to 1 GHz
Desired at 903 MHz

# Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |

**Test Specification**

15.247



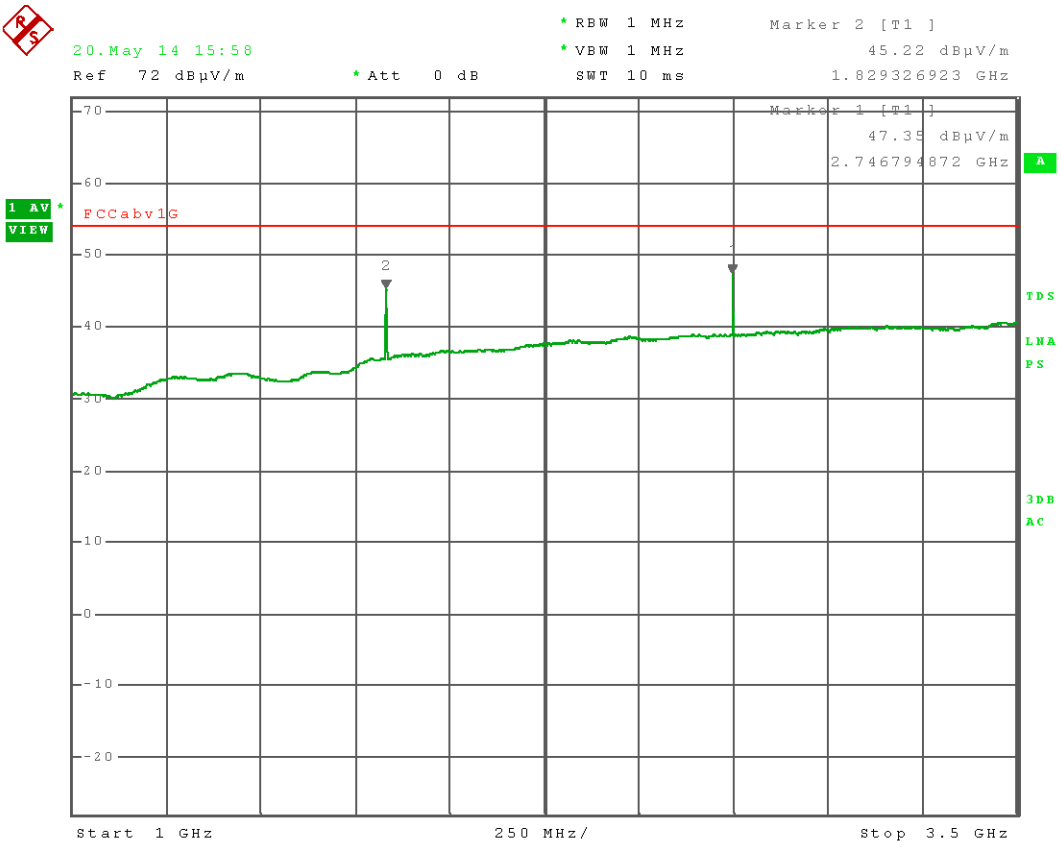

1 to 3.5 GHz (Peak)

## Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |

**Test Specification**

15.247



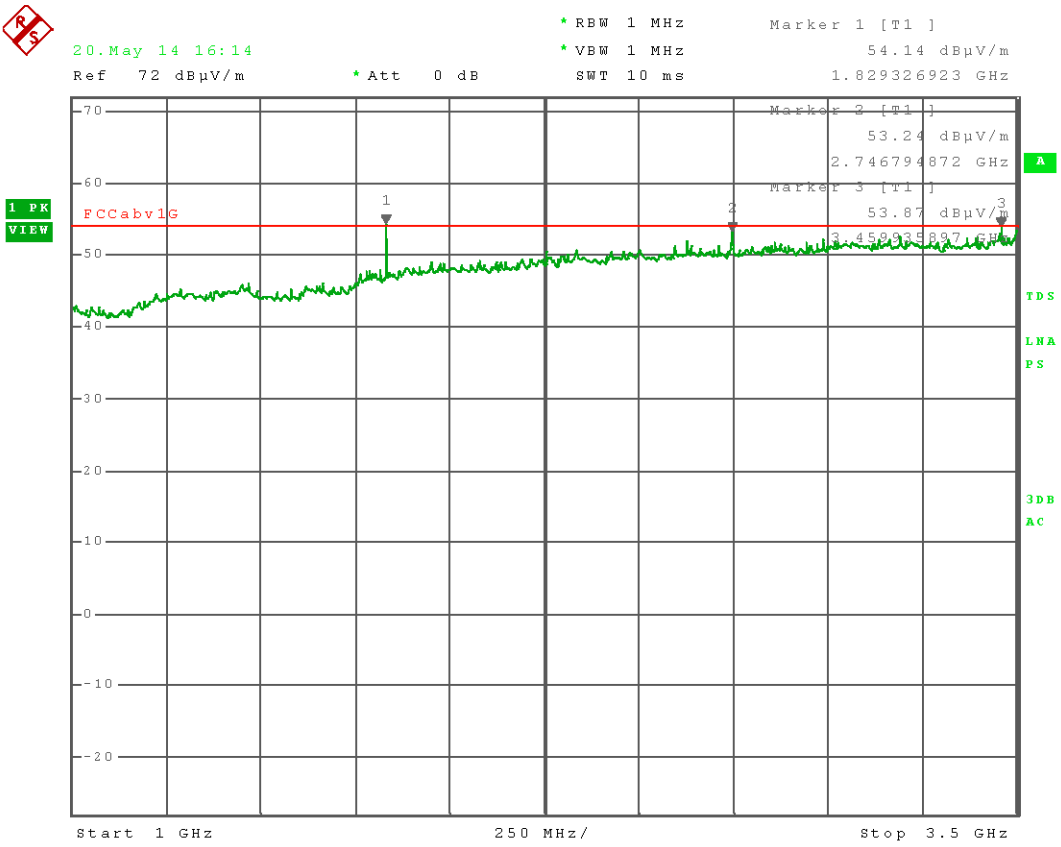

1 to 3.5 GHz (Average)

## Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |

**Test Specification**

15.247



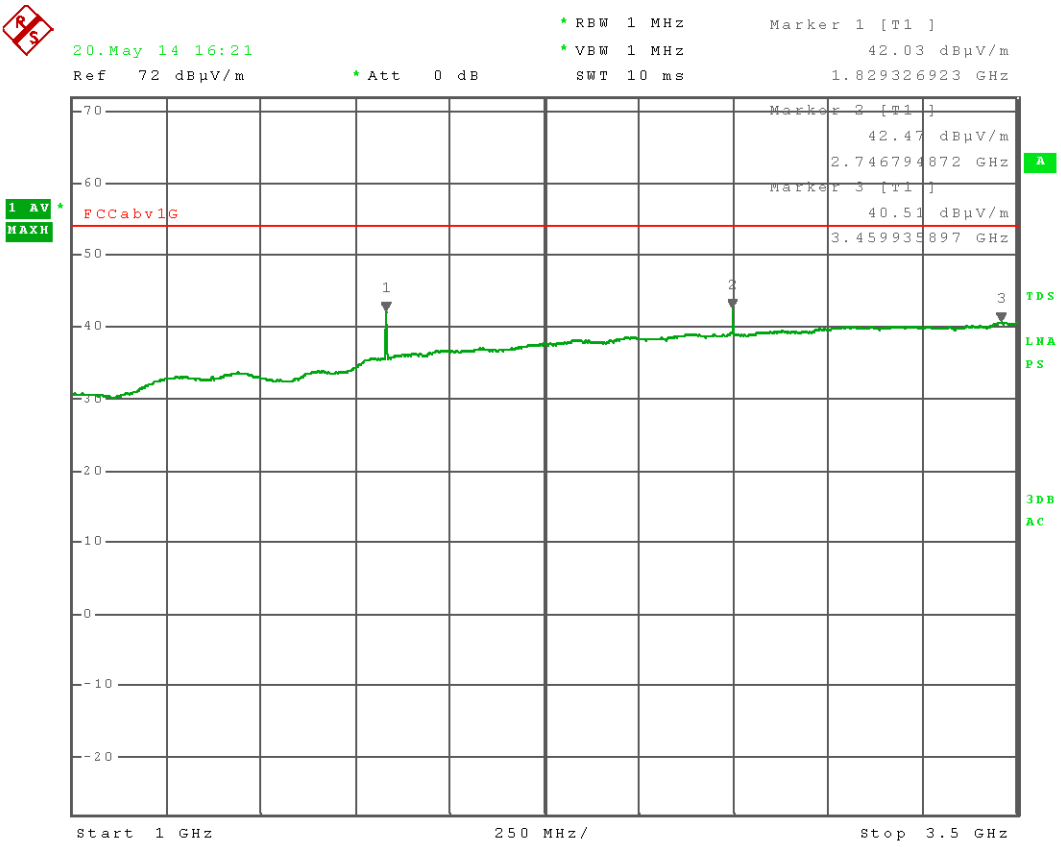

1 to 3.5 GHz (Peak)

# Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |

**Test Specification**

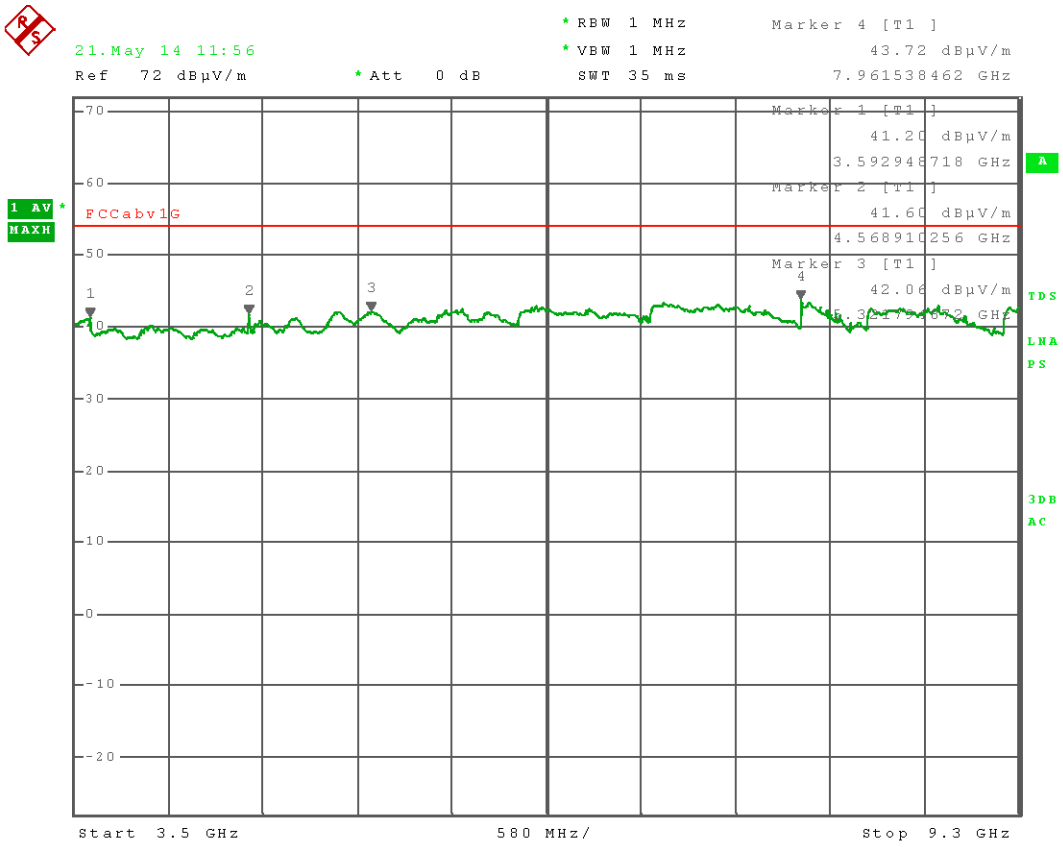
15.247




1 to 3.5 GHz (Average)

## Radiated Emissions

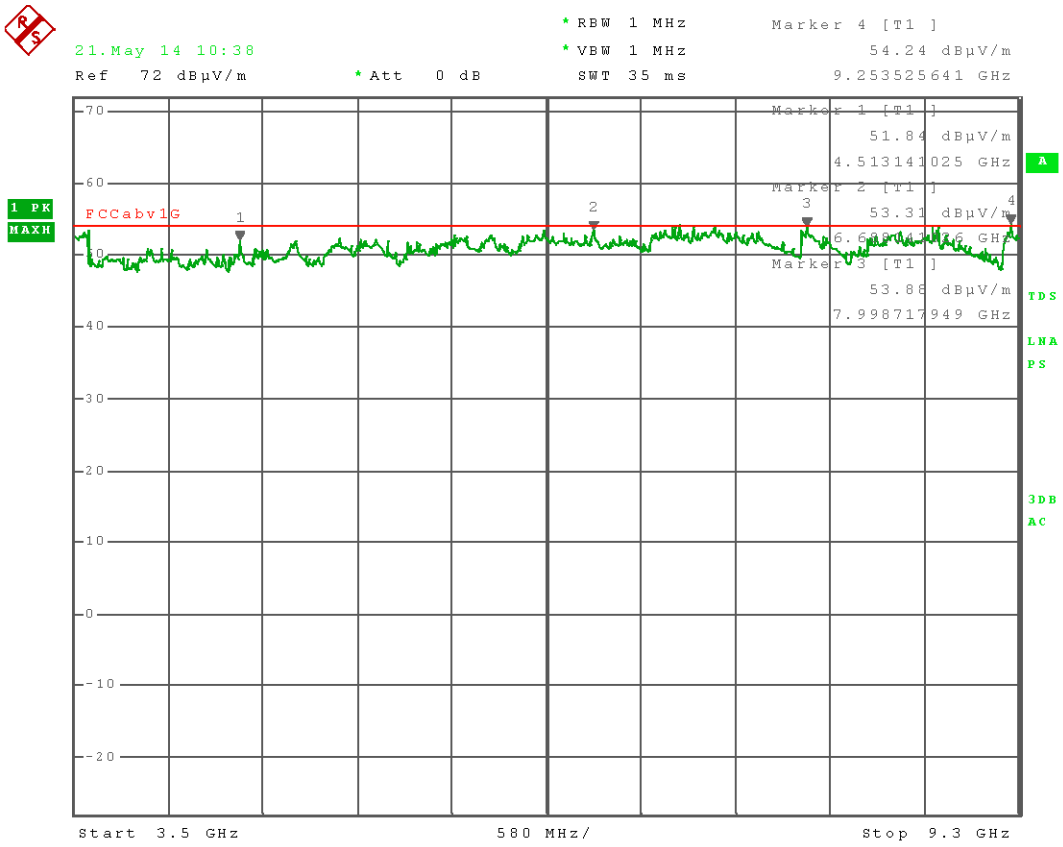
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




3.5 to 9.3 GHz (Average)
No significant emissions peak

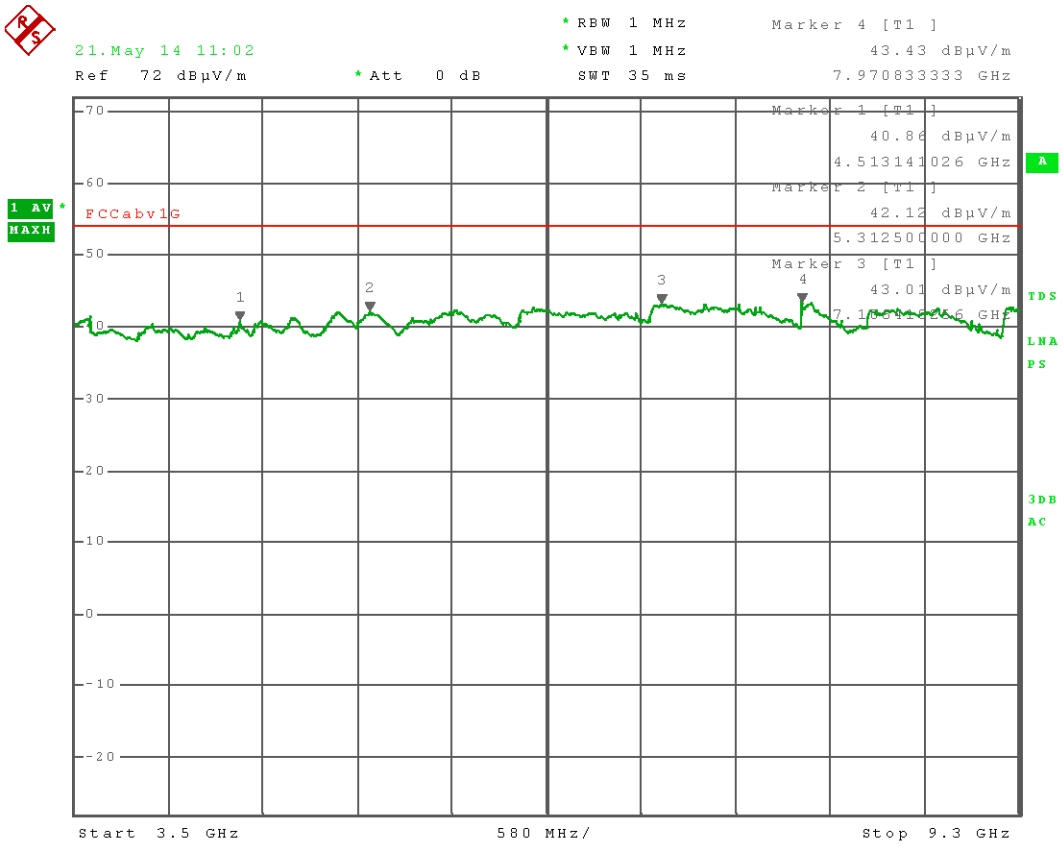
# Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |



# Radiated Emissions

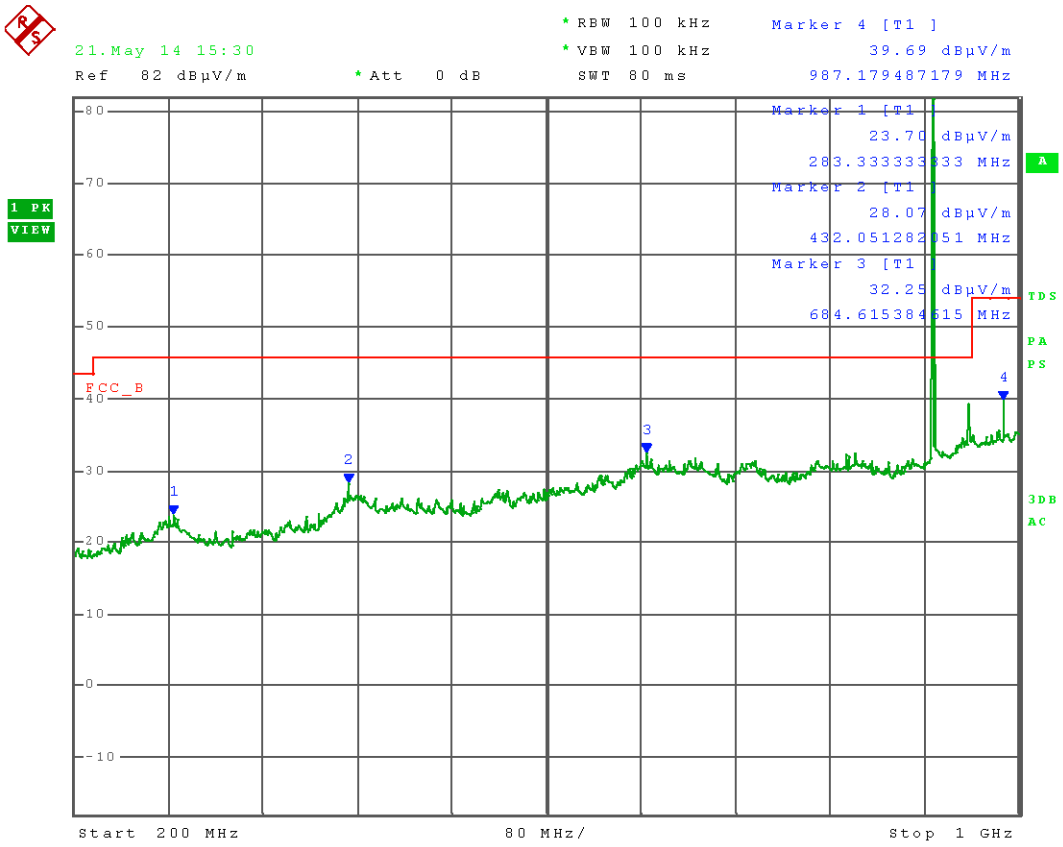
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




3.5 to 9.3 GHz

## Radiated Emissions

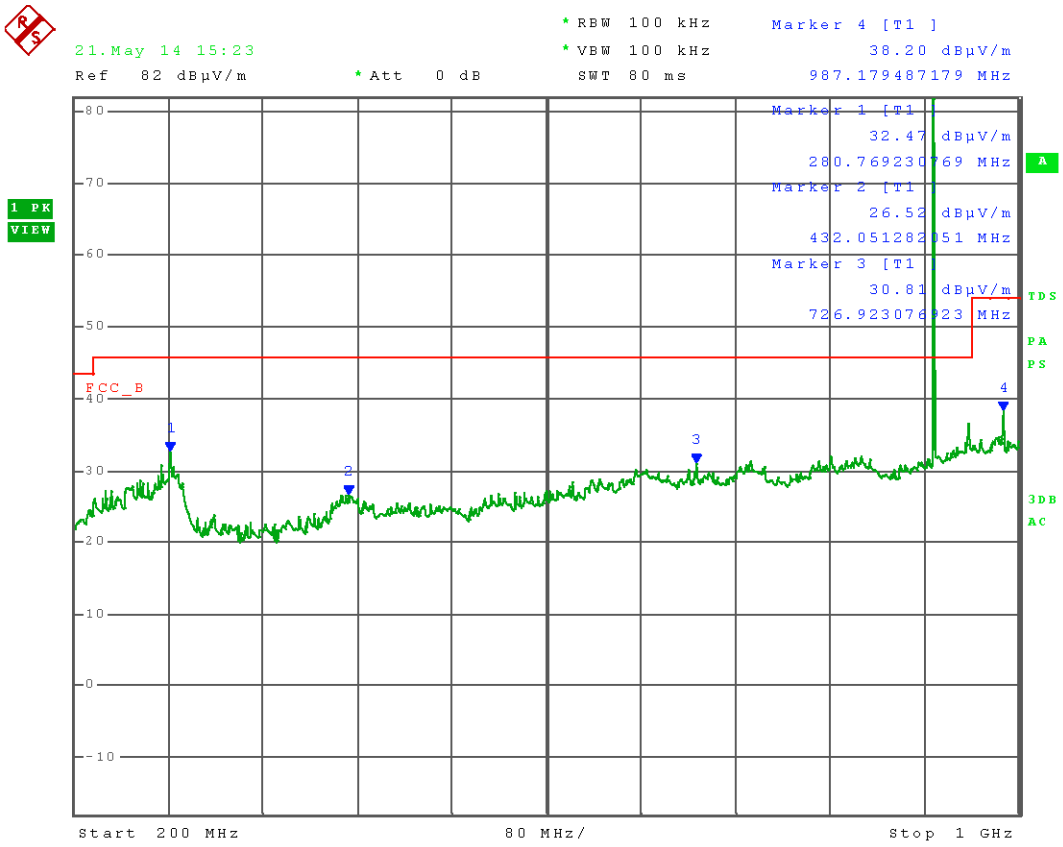
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




200 MHz to 1 GHz

# Radiated Emissions

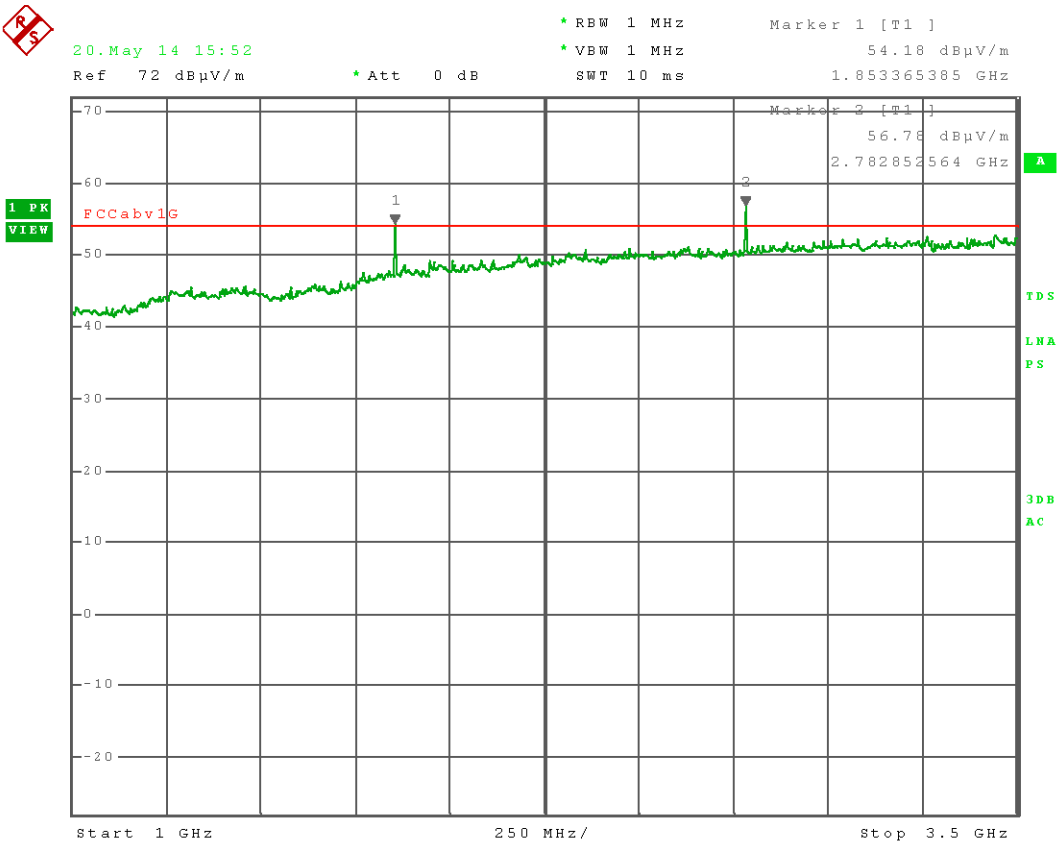
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




200 MHz to 1 GHz

# Radiated Emissions

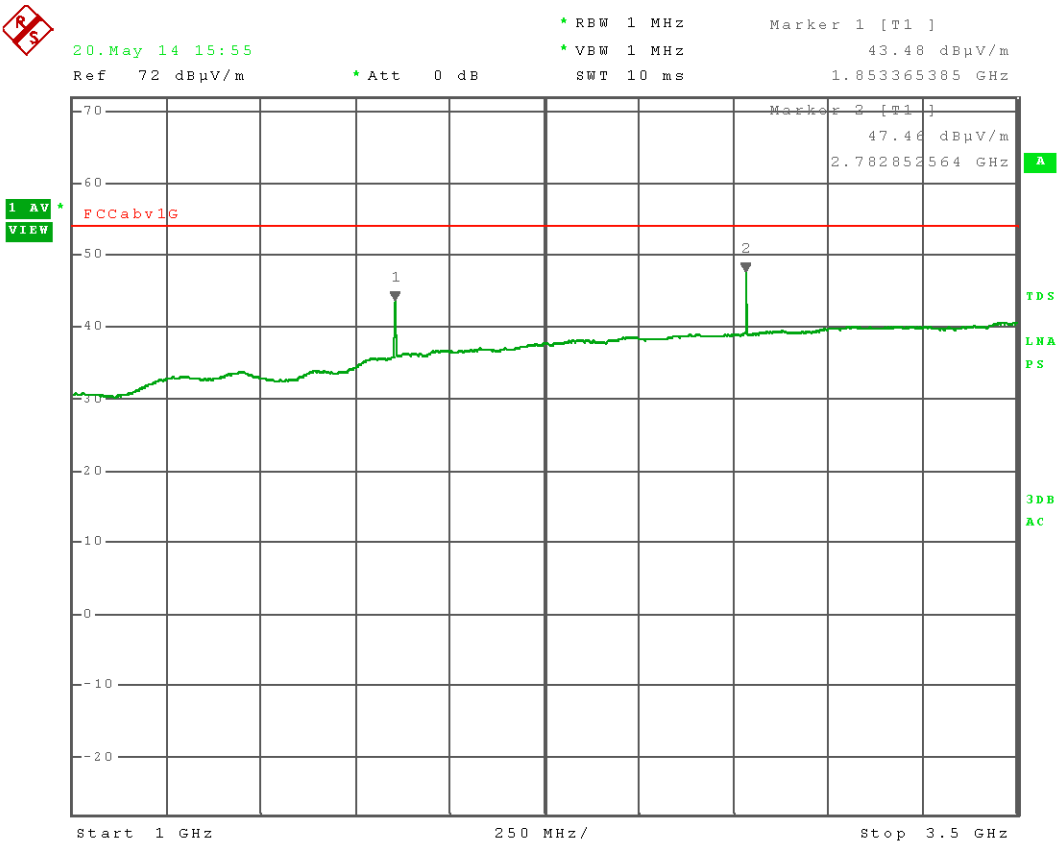
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




1 to 3.5 GHz (Peak)

# Radiated Emissions

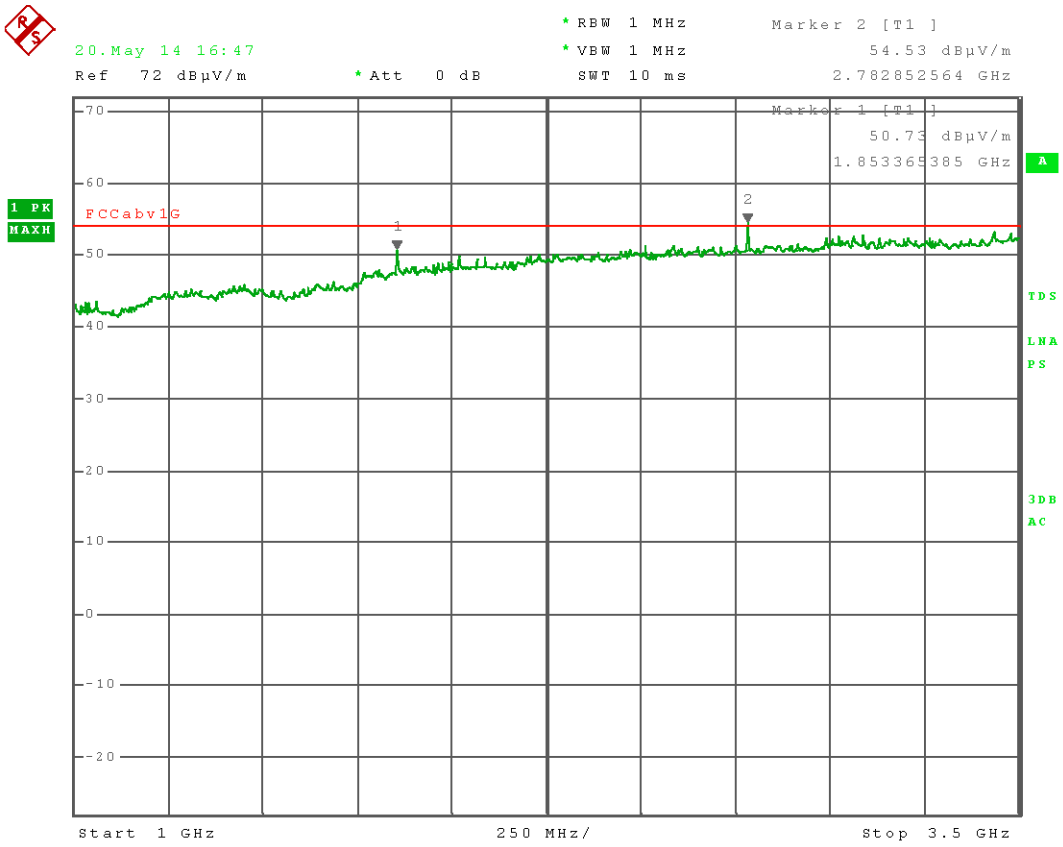
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




1 to 3.5 GHz (Average)

# Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |



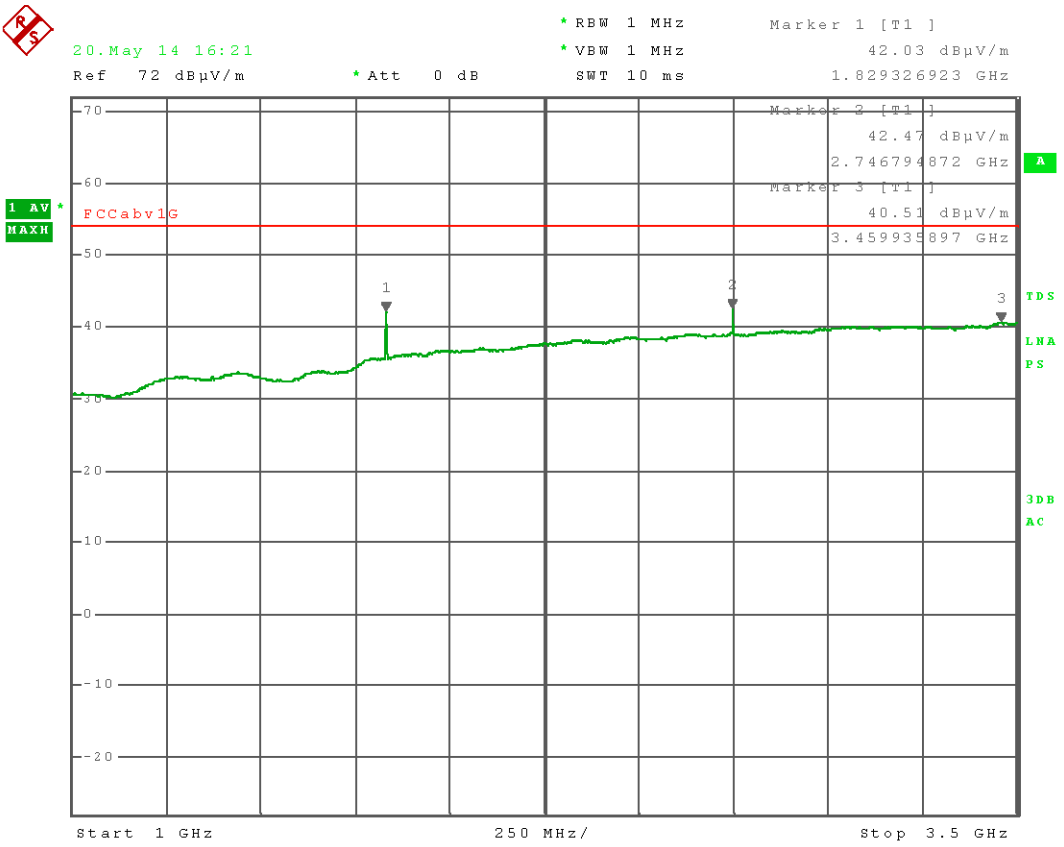

1 to 3.5 GHz (Peak)

## Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |

**Test Specification**

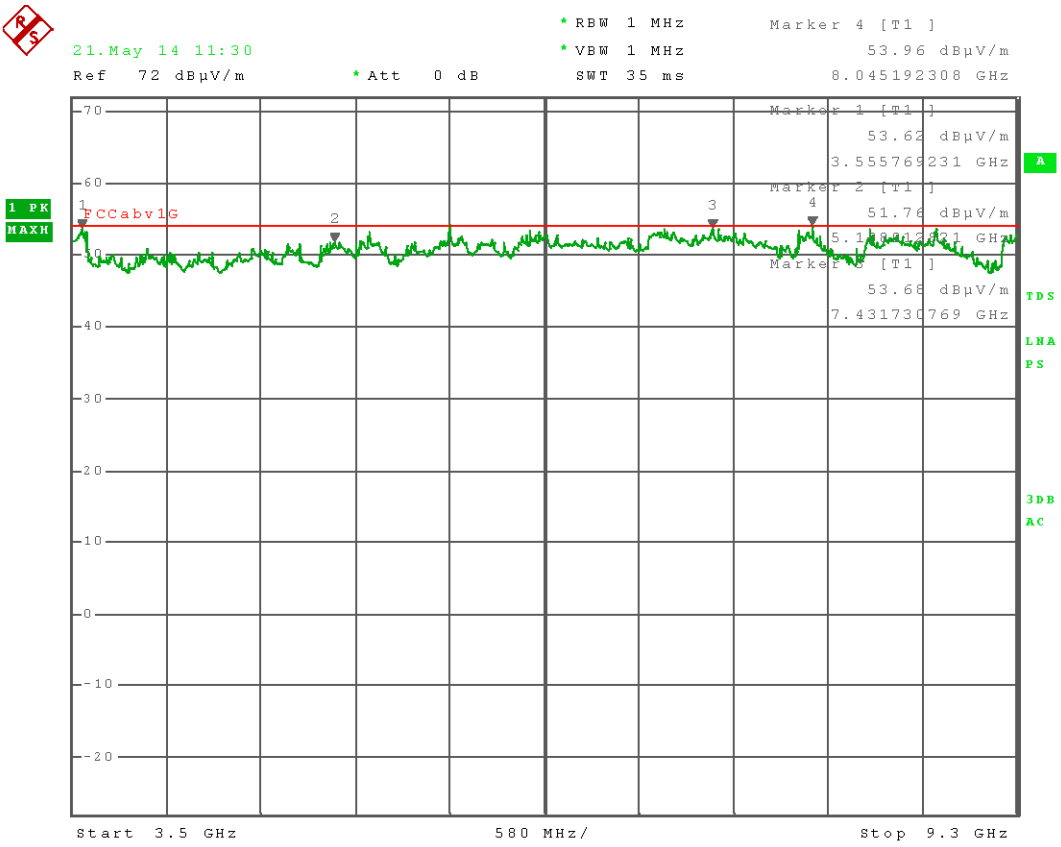
15.247




1 to 3.5 GHz (Average)

## Radiated Emissions

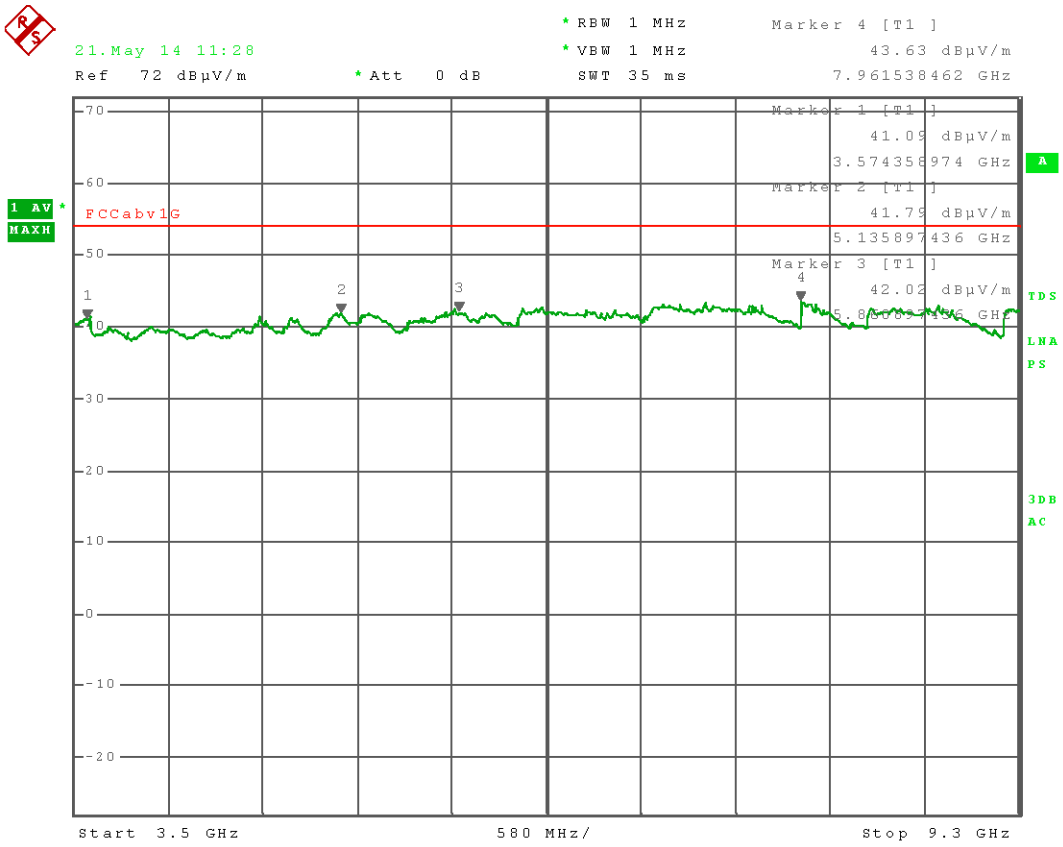
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




3.5 to 9.3 GHz (Peak)

## Radiated Emissions

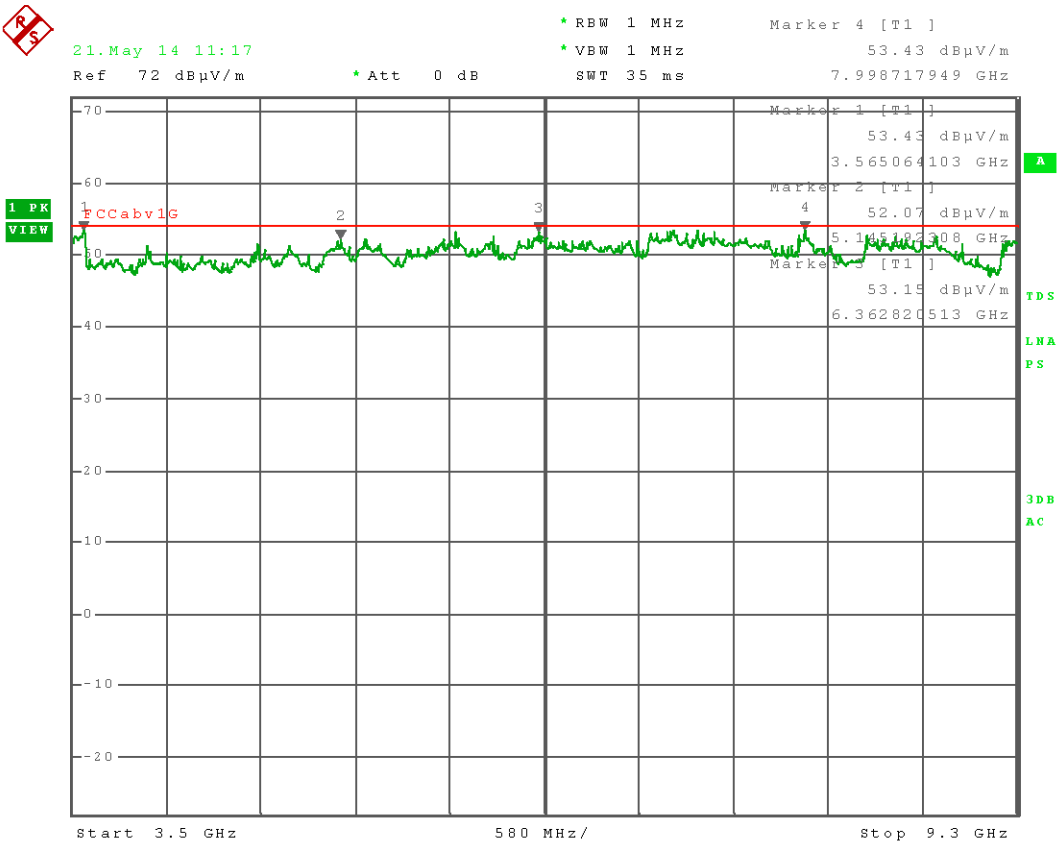
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Vertical |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




3.5 to 9.3 GHz (Average)

## Radiated Emissions

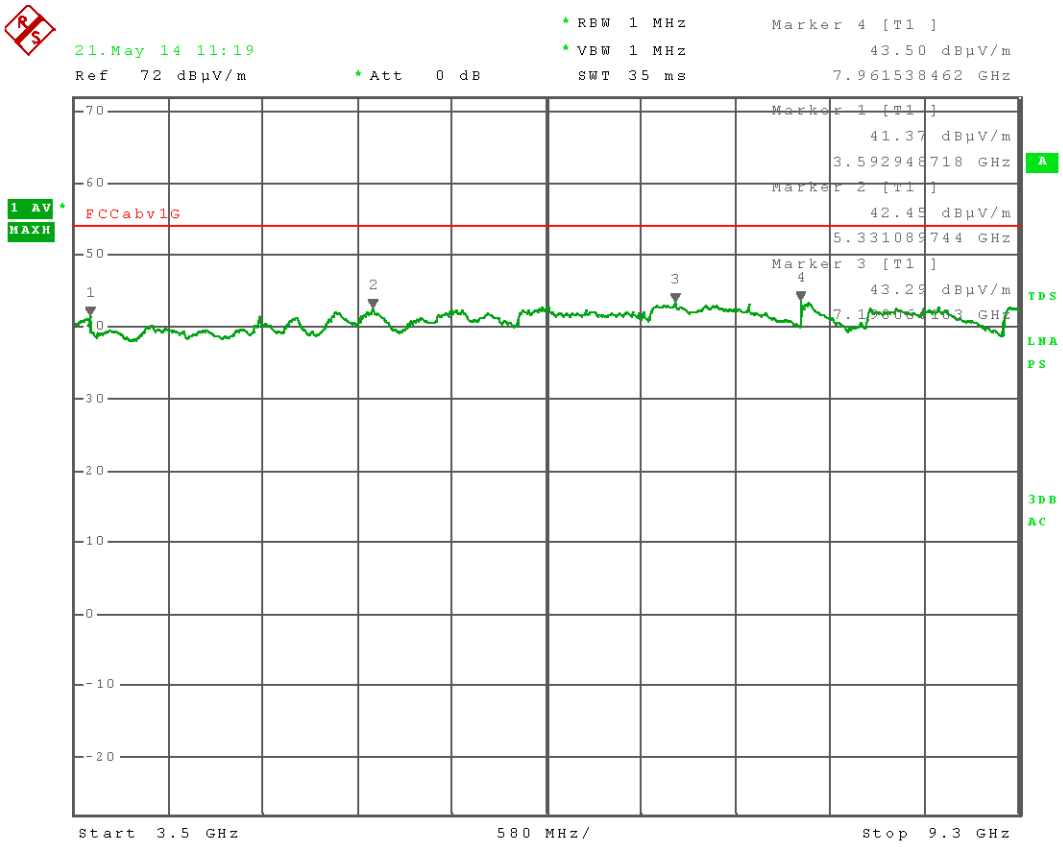
| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Peak |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |




3.5 to 9.3 GHz (Peak)

# Radiated Emissions

| | |
|---|---|
| **Equipment Under Test** | Frequency Hopper |
| **Test Mode** | Transmit |
| **Antenna Polarity** | Horizontal |
| **Detectors Used** | Average |
| **Test Operator** | Mario de Aranzeta |
| **Test Specification** | 15.247 |



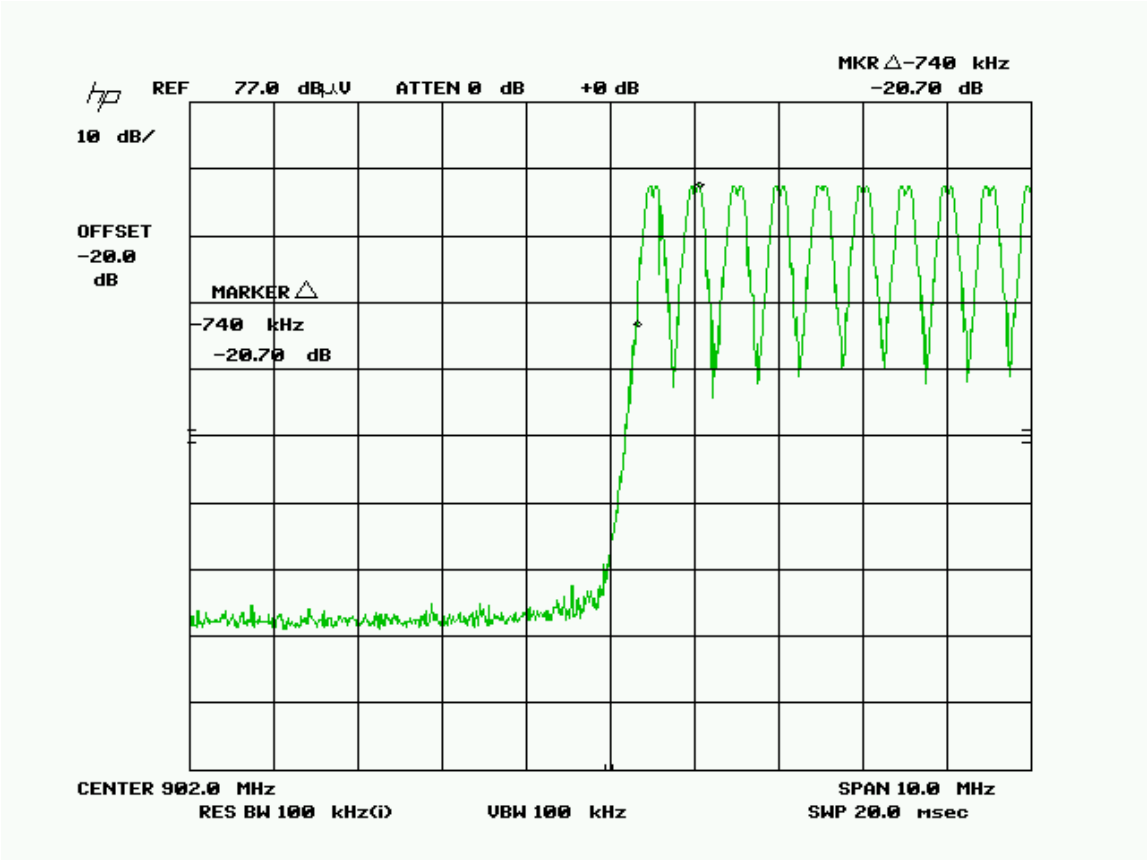

3.5 to 9.3 GHz (Average)

## SPURIOUS EMISSIONS INTO ADJACENT BAND

**REQUIREMENTS**: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.

**TEST DATA:** The plots are presented below.

Lower bandedge peak detector (conducted)



Upper bandedge (peak detector) (conducted)