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# FCC PART 15.249 TEST REPORT

# UNLICENSED INTENTIONAL RADIATOR

| | |
|---|---|
| **Applicant** | SIMPLY HOME LLC |
| **Address** | 1985 HENDERSONVILLE ROAD<br>SUITE 110 |
| | ASHEVILLE NC 28803 USA |
| **FCC ID** | YTI-SH003-102010 |
| **Product Description** | MOTION DETECTOR |
| **Date Sample Received** | 4/4/2011 |
| **Date Tested** | 4/5/2011 |
| **Tested By** | Joe Scoglio |
| **Approved By** | Mario R. de Aranzeta |
| **Report Number** | 2353ZT11TestReport.doc |
| **Test Results** | ☒ PASS ☐ FAIL |



ACCREDITED
**Certificate # 0955-01**

**TABLE OF CONTENT**

**GENERAL REMARKS**

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

**Summary**

The device under test does:

☒ fulfill the general approval requirements as identified in this test report
☐ not fulfill the general approval requirements as identified in this test report

**Attestations**

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

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

ACCREDITED

Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669

TIMCO ENGINEERING INC.

**Authorized Signatory Name:**

Mario de Aranzeta C.E.T.
Compliance Engineer/ Lab. Supervisor

**Date:** 4/5/2011

## GENERAL INFORMATION

### DUT Specification

| The test results relate only to the items tested. | | | |
|---|---|---|---|
| Applicable Standard | Part 15.249 | | |
| DUT Description | MOTION DETECTOR | | |
| FCC ID | YTI-SH003-102010 | | |
| Operating Frequency | TX: 2405.00-2480.00 MHz | RX: Same | |
| 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 Connector | FCC Rules require that the antenna connector be unique. | | |
| Test Facility | Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA. | | |
| Test Conditions | Temperature: 26°C<br>Relative humidity: 50% | | |
| Test Exercise | The DUT was placed in continuous transmit mode of operation. | | |
| Modifications | None | | |

### Test Supporting Equipment

| Supporting Device | Manufacturer | Model / FCC ID | Serial Number |
|---|---|---|---|
| N/A | | | |

**EMC EQUIPMENT LIST**

| Device | Manufacturer | Model | Serial Number | Cal/Char Date | Due Date |
|---|---|---|---|---|---|
| 3-Meter Semi-Anechoic Chamber | Panashield | N/A | N/A | Listed 3/10/10 | 3/10/12 |
| | | | | | |
| Antenna: Dipole Kit | Electro-Metrics | TDA-30/1-4 | 153 | CHAR 6/10/09 | 6/10/11 |
| Frequency Counter | HP | 5385A | 3242A07460 | CAL 5/26/09 | 5/26/11 |
| Modulation Analyzer | HP | 8901A | 3435A06868 | CAL 5/26/09 | 5/26/11 |
| Digital Multimeter | Fluke | FLUKE-77-3 | 79510405 | CAL 5/18/09 | 5/18/11 |
| Analyzer Tan Tower Preamplifier | HP | 8449B-H02 | 3008A00372 | CAL 11/21/09 | 11/21/11 |
| Analyzer Tan Tower Quasi-Peak Adapter | HP | 85650A | 3303A01690 | CAL 11/22/09 | 11/22/11 |
| Analyzer Tan Tower RF Preselector | HP | 85685A | 3221A01400 | CAL 11/21/09 | 11/21/11 |
| Analyzer Tan Tower Spectrum Analyzer | HP | 8566B Opt 462 | 3138A07786 3144A20661 | CAL 11/24/09 | 11/24/11 |
| Temperature Chamber | Tenney Engineering | TTRC | 11717-7 | CHAR 4/25/10 | 4/25/12 |

## TEST PROCEDURES

**Radiation Interference:** ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

**Formula Of Conversion Factors:** The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

| Example: | | | |
|---|---|---|---|
| Freq (MHz) | Meter Reading | + ACF | + CL = FS |
| 33 | 20 dBµV | + 10.36 dB | + 0.5 = 30.86 dBµV/m @ 3m |

**Power Line Conducted Interference:** The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

**Occupied Bandwidth**: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

**ANSI C63.4-2003 10.1 Measurement Procedures:** The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. Emissions attenuated more than 20 dB below the permissible value are not reported.

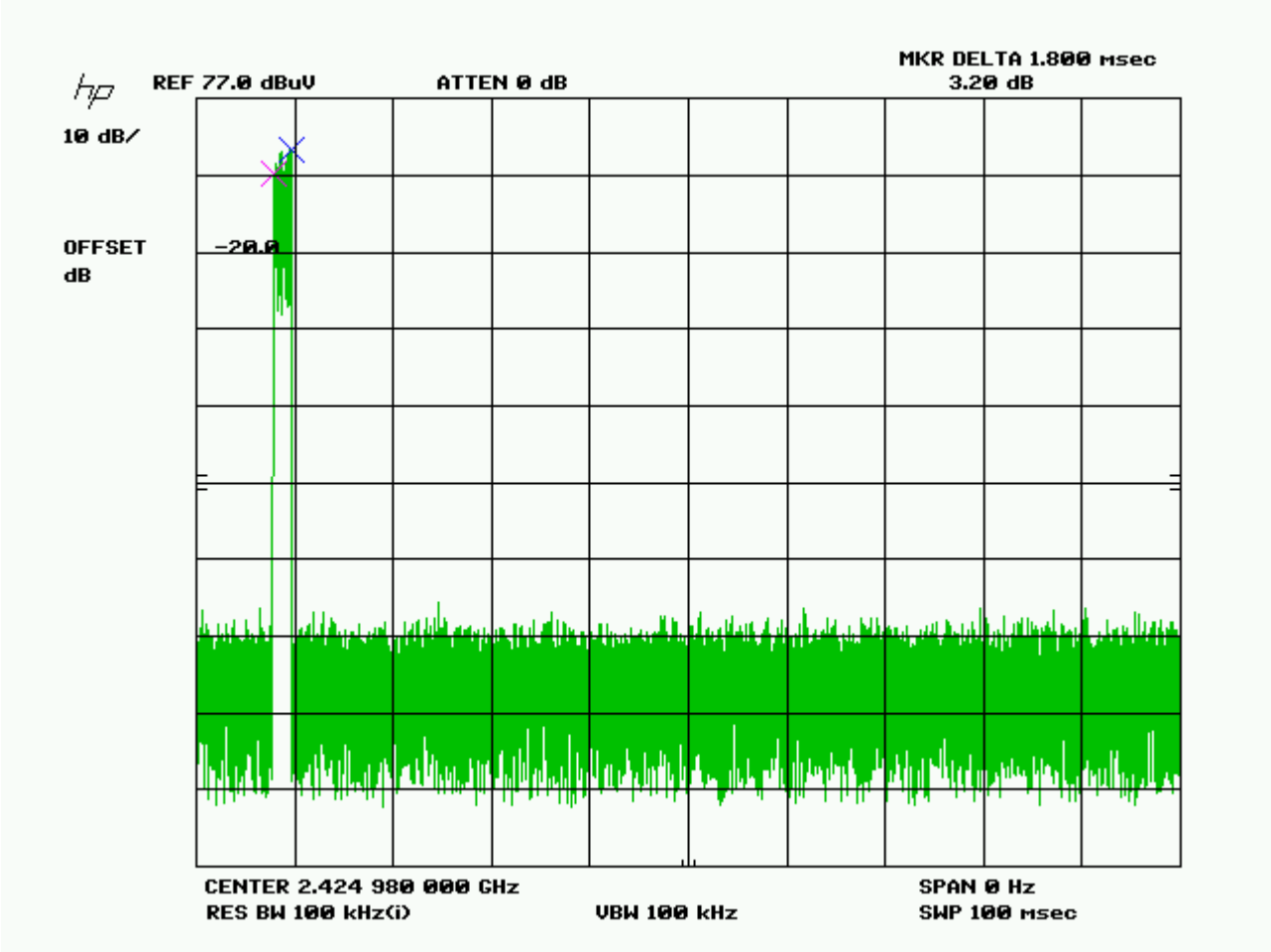
**CALCULATION OF DUTY CYCLE**

The period of the pulse train is determined by observing it on an oscilloscope or a spectrum analyzer with zero (0) frequency span. A plot is then made of the pulse train with a sweep time of 100 milliseconds. This sweep determines the duration of the pulse train. This sweep allows the determination of the number of and type of pulses, i.e. long & short. Plots are then made showing the duration of each type of pulse and its duration. From the 100-millisecond plot, the number of a given type of pulse is then multiplied by the duration of that type pulse. This allows the calculation of the amount of time the DUT is on within 100 ms.

| | |
|---|---|
| Long Pulse | 1.8 ms |
| Short Pulse | - |
| On Time | 1.8 ms |
| Length of Pulse Train | 100 ms |
| Total | |

dB = 20*log(ON TIME)/PERIOD
dB = 20*log(1.8/100)
dB = 20*log(0.018)
dB = -34.89

See the following plots.


REF 77.0 dBuV
ATTEN 0 dB
MKR DELTA 1.800 msec
3.20 dB
10 dB/
OFFSET
dB
-20.0
CENTER 2.424 980 000 GHz
RES BW 100 kHz(i)
VBW 100 kHz
SPAN 0 Hz
SWP 100 msec

## RADIATION INTERFERENCE

**Rules Part No.:** 15.249, 15.209

**Requirements:**

| Frequency | Limits |
|---|---|
| Part 15.209 | |
| 9 to 490 kHz | 2400/F (kHz) µV/m @ 300 meters |
| 490 to 1705 kHz | 24000/F (kHz) µV/m @ 30 meters |
| 1705 kHz to 30 MHz | 29.54 dBµV/m @ 30 meters |
| 30 – 88 | 40.0 dBµV/m @ 3 meters |
| 80 – 216 | 43.5 dBµV/m @ 3 meters |
| 216 – 960 | 46.0 dBµV/m @ 3 meters |
| Above 960 | 54.0 dBµV/m @ 3 meters |
| Part 15.249 | |
| Fundamental 902 – 928 MHz | 94.0 dBµV/m @ 3 meters |
| Fundamental 2.4 – 2.4835 MHz | 94.0 dBµV/m @ 3 meters |
| Harmonics | 54.0 dBµV/m @ 3 meters |

**Test Data:**

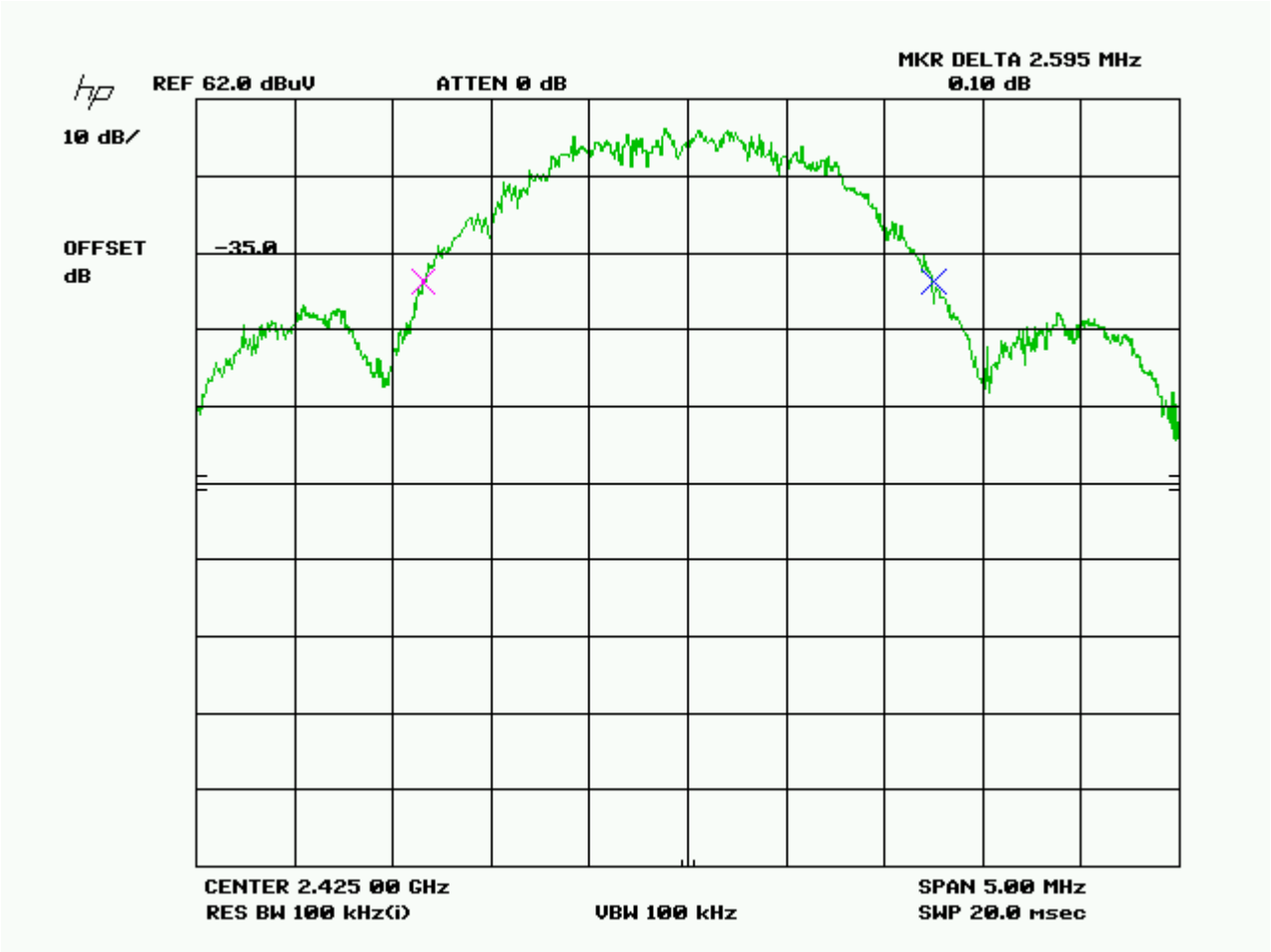
| Tuned Frequency MHz | Emission Frequency MHz | Meter Reading dBµV | Ant. Pol | Coax Loss dB | Correction Factor dB | Duty Cycle Correction Factor dB | Field Strength dBµV/m | Margin dB |
|---|---|---|---|---|---|---|---|---|
| 2,405.0 | 2,405.00 | 40.6 | V | 3.18 | 32.25 | -34.89 | 41.14 | 52.86 |
| 2,405.0 | 2,405.00 | 48.4 | H | 3.18 | 32.25 | -34.89 | 48.94 | 45.06 |
| 2,405.0 | 4,810.00 | 10.1 | V | 4.91 | 34.10 | -34.89 | 14.22 | 39.78 |
| 2,405.0 | 4,810.00 | 16.6 | H | 4.91 | 34.10 | -34.89 | 20.72 | 33.28 |
| 2,425.0 | 2,425.00 | 42.7 | V | 3.20 | 32.31 | -34.89 | 43.32 | 50.68 |
| 2,425.0 | 2,425.00 | 49.3 | H | 3.20 | 32.31 | -34.89 | 49.92 | 44.08 |
| 2,425.0 | 4,850.00 | 12.1 | V | 4.93 | 34.10 | -34.89 | 16.24 | 37.76 |
| 2,425.0 | 4,850.00 | 14.6 | H | 4.93 | 34.10 | -34.89 | 18.74 | 35.26 |
| 2,480.0 | 2,480.00 | 40.3 | V | 3.24 | 32.45 | -34.89 | 41.10 | 52.90 |
| 2,480.0 | 2,480.00 | 45.6 | H | 3.24 | 32.45 | -34.89 | 46.40 | 47.60 |
| 2,480.0 | 4,960.00 | 17.3 | V | 4.98 | 34.10 | -34.89 | 21.49 | 32.51 |
| 2,480.0 | 4,960.00 | 19.8 | H | 4.98 | 34.10 | -34.89 | 23.99 | 30.01 |

## OCCUPIED BANDWIDTH

**Rules Part No.:** 15.249 (d)

**Requirements**: The field strength of any emissions appearing outside the bandedges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

**Test Data:**



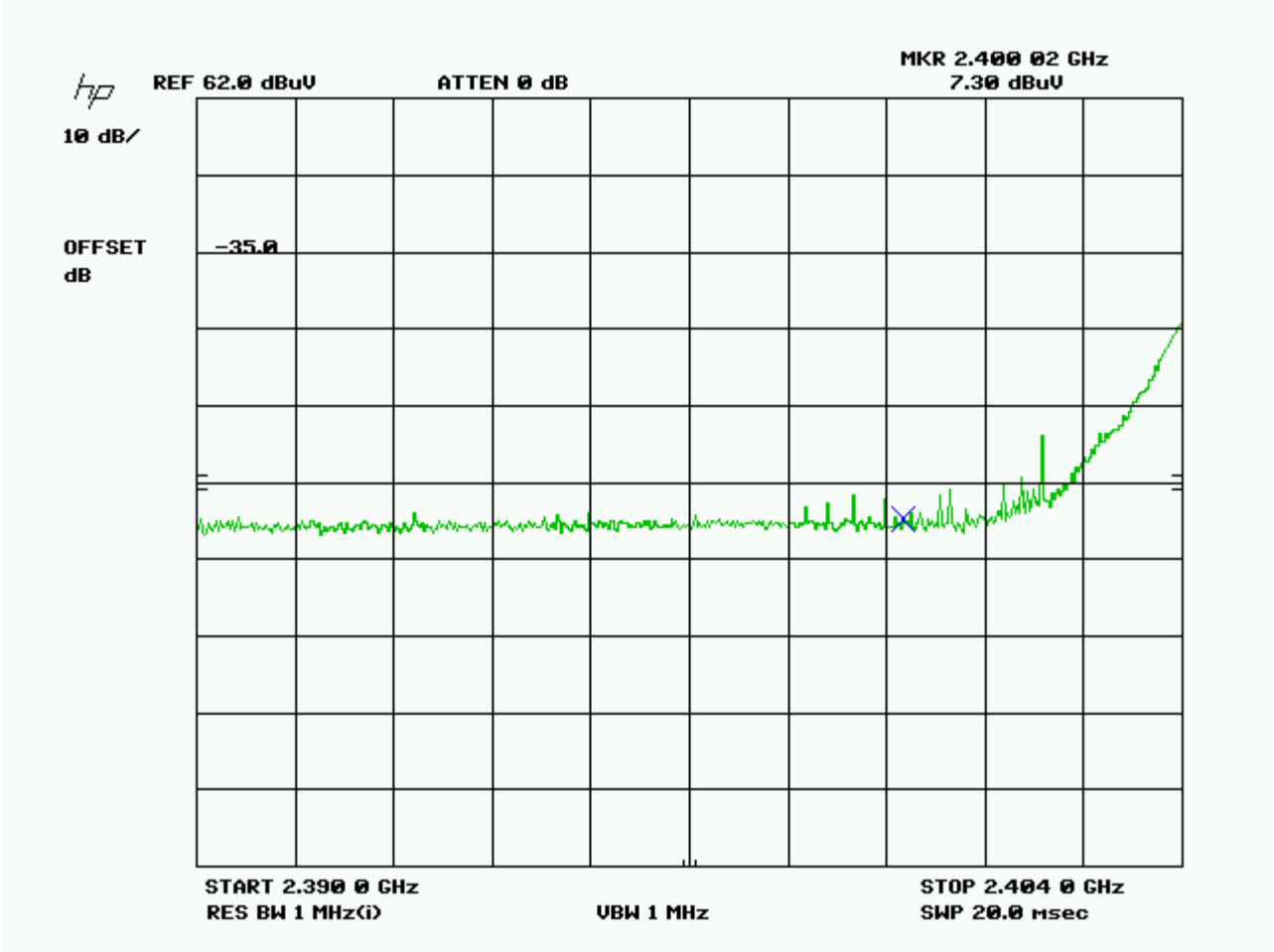
## BAND EDGE COMPLIANCE

**Rules Part No.:** 15.249 (d)

**Requirements**: 40 dBc or in the case of restricted bands 54 dBµV/m.

**Test Data:**

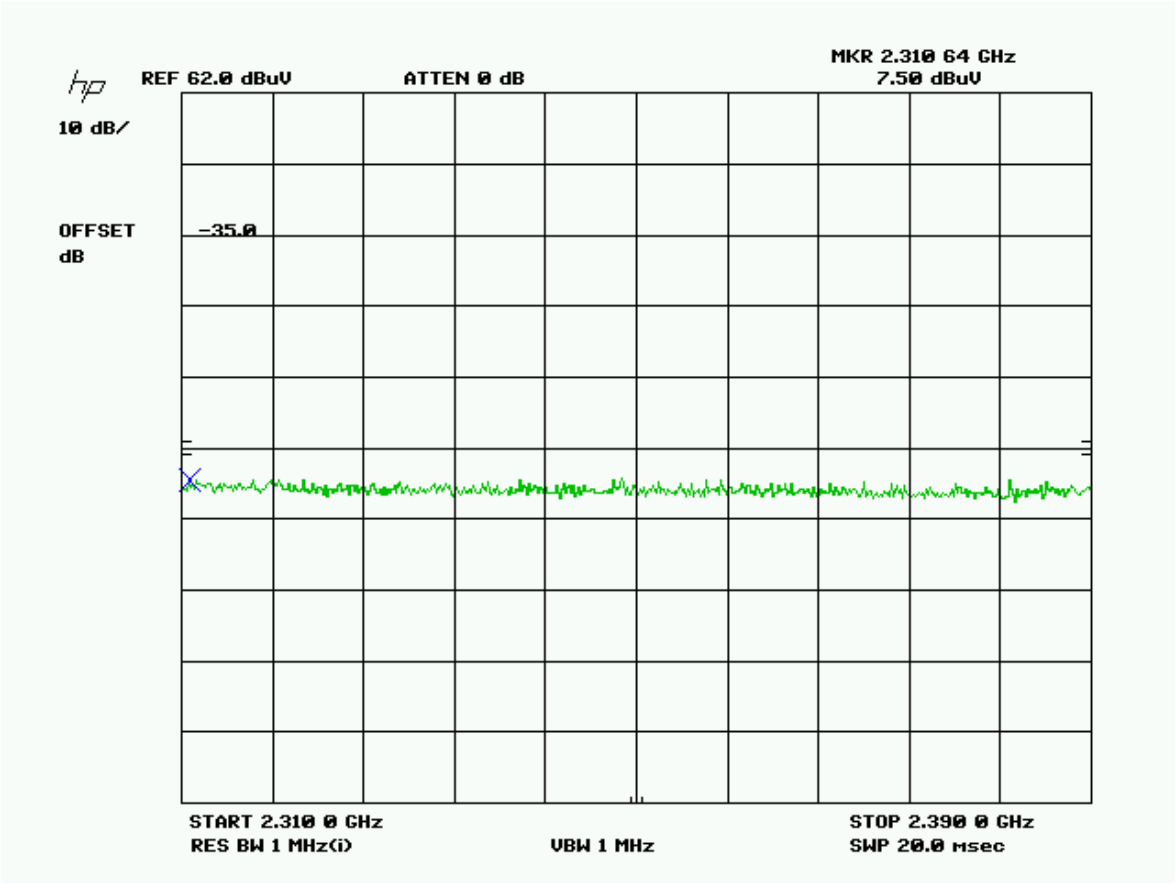
Lower bandedge




Peak Plot

| Tuned Frequency MHz | Emission Frequency MHz | Meter Reading dBµV | Ant. Polarity V/H | Coax Loss dB | Correction Factor dB/m | Field Strength dBµV/m | Margin dB |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 2,405.0 | 2,400.00 | 7.3 | H | 3.18 | 32.24 | 42.72 | 11.28 |

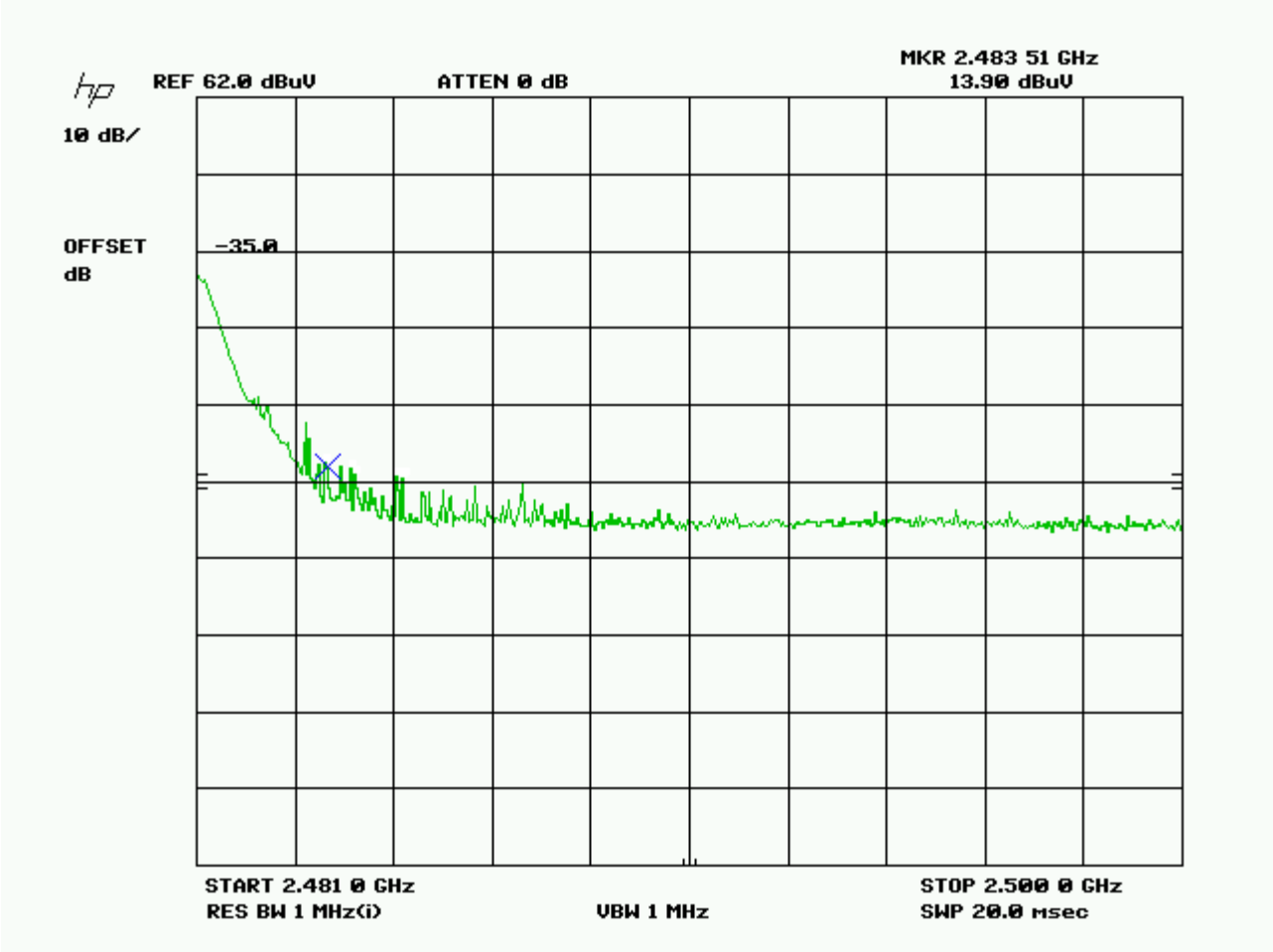
Lower non-adjacent restricted band




Peak Plot

| Tuned Frequency MHz | Emission Frequency MHz | Meter Reading dBµV | Ant. Polarity V/H | Coax Loss dB | Correction Factor dB/m | Field Strength dBµV/m | Margin dB |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 2,405.0 | 2,310.60 | 7.5 | H | 3.12 | 32.01 | 42.63 | 11.37 |

Upper bandedge




Peak Plot

| Tuned Frequency MHz | Emission Frequency MHz | Meter Reading dBµV | Ant. Polarity V/H | Coax Loss dB | Correction Factor dB/m | Field Strength dBµV/m | Margin dB |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 2,405.0 | 2,483.50 | 13.9 | H | 3.24 | 32.46 | 49.60 | 4.40 |

## POWER LINE CONDUCTED INTERFERENCE

**Rules Part No.:** 15.207

**Requirements:**

| Frequency (MHz) | Quasi Peak Limits (dBµV) | Average Limits (dBµV) |
|---|---|---|
| 0.15 – 0.5 | 66 – 56 | 56 – 46 |
| 0.5 – 5.0 | 56 | 46 |
| 5.0 – 30 | 60 | 50 |

**Test Data:** Not applicable. Batttery operated.