# Radio Test Report

## FCC ID: UFOOPN3002I

**This report concerns (check one) :** ☒ **Original Grant** ☐ **Class II Change**

**Issued Date** : Apr. 12, 2013
**Project No.** : 1303025
**Equipment** : Bluetooth Barcode Scanner
**Model Name** : OPN-3002i

**Applicant** : OPTOELECTRONICS CO., LTD.
**Address** : 4-12-17, Tsukagoshi, Warabi-Shi, Saitama-ken, 335-0002, Japan

**Tested by:** Neutron Engineering Inc. EMC Laboratory
**Date of Receipt:** Mar. 05, 2013
**Date of Test:** Mar. 05, 2013 ~ Mar. 19, 2013

**Testing Engineer :** (Josh Lin)

**Technical Manager :** (Jeff Yang)

**Authorized Signatory :** (Andy Chiu)

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Testing Laboratory
0659

## Declaration

**Neutron** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C**., or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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## Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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## REPORT ISSUED HISTORY

| Revised Version No. | Description | Issued Date |
|---|---|---|
| - | Initial Issue. | Apr. 12, 2013 |

## 1 CERTIFICATION

| | | |
|---|---|---|
| Equipment | : | Bluetooth Barcode Scanner |
| Brand Name | : | OPTICON |
| Model Name | : | OPN-3002i |
| Applicant | : | OPTOELECTRONICS CO., LTD. |
| Date of Test | : | Mar. 05, 2013 ~ Mar. 19, 2013 |
| Standards | : | FCC Part 15, Subpart C: 2012<br>ANSI C63.4: 2009 |

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1303025) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).

## 2. SUMMARY OF TEST RESULTS

| Standard Clause | Test Item | Result |
|---|---|---|
| 15.207 | Conducted Emission | **PASS** |
| 15.247 (c) | Antenna conducted Spurious Emission | **PASS** |
| 15.247 (a)(1) | Hopping Channel Separation | **PASS** |
| 15.247 (b) | Maximum Peak Conducted Output Power | **PASS** |
| 15.247 (c) | Radiated Spurious Emission | **PASS** |
| 15.247 (b)(1) | Number of Hopping Frequency | **PASS** |
| 15.247 (a)(1) | Average time of occupancy | **PASS** |
| 15.205 | Restricted Bands | **PASS** |
| 15.203 | Antenna Requirement | **PASS** |
| 1.1307<br>1.1310<br>2.1091<br>2.1093 | RF Exposure Compliance | **PASS** |

NOTE:

1. **N/A**: denotes test is not applicable in this Test Report
2. Portable device; SAR report is required.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

**Conducted emission Test:**

**C01:** (VCCI RN: C-2918; FCC RN: 95335; FCC DN: TW1010)
No.132-1, Ln. 329, Sec. 2, Balian Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

**Radiated emission Test (Below 1 GHz):**

**CB08:** (FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

**Radiated emission Test (Above 1 GHz):**

**CB08:** (VCCI RN: G-91; FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

## 2.2 MEASUREMENT UNCERTAINTY

**The measurement uncertainty is not specified by FCC rules and for reference only.**
The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95**%.
The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

A. Conducted emission test:

| Test Site | Measurement Frequency Range | U，(dB) | NOTE |
|---|---|---|---|
| C01 | 150 kHz ~ 30 MHz | 1.94 | |

B. Radiated emission test:

| Test Site | Item | Measurement Frequency Range | | Uncertainty | NOTE |
|---|---|---|---|---|---|
| CB08 | Radiated emission at 3m | Horizontal Polarization | 30 - 200MHz | 3.35 dB | |
| | | | 200 - 1000MHz | 3.11 dB | |
| | | | 1 - 18GHz | 3.97 dB | |
| | | | 18 - 40GHz | 4.01 dB | |
| | | Vertical Polarization | 30 - 200MHz | 3.22 dB | |
| | | | 200 - 1000MHz | 3.24 dB | |
| | | | 1 - 18GHz | 4.05 dB | |
| | | | 18 - 40GHz | 4.04 dB | |

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our $U_{lab}$ values in CISPR 16-4-2 terminology.
Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called $U_{CISPR}$, as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB
Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our $U_{lab}$ values are smaller than $U_{CISPR}$.

# 3 GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>Bluetooth Barcode Scanner</td></tr>
<tr><td>Brand Name</td><td>OPTICON</td></tr>
<tr><td>Model Name</td><td>OPN-3002i</td></tr>
<tr><td>OEM Brand/Model Name</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a Bluetooth Barcode Scanner.
<table>
<tr><td>Operation Frequency</td><td>2402 MHz~ 2480 MHz</td></tr>
<tr><td>Modulation Type</td><td>FHSS(GFSK、Pi/4-DQPSK、8DPSK)</td></tr>
<tr><td>Bit Rate of Transmitter</td><td>1/2/3 Mbps</td></tr>
<tr><td>Number Of Channel</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Antenna Designation</td><td>Please refer to the Note 3.</td></tr>
<tr><td>Antenna Gain(Peak)</td><td>Please refer to the Note 3.</td></tr>
<tr><td>Maximum Peak Conducted Output Power:</td><td>1 Mbps: -0.7dBm<br>3 Mbps: 2.28dBm</td></tr>
</table>
More details of EUT technical specification, please refer to the User's Manual.</td></tr>
<tr><td>Power Source</td><td>Battery supplied.</td></tr>
<tr><td>Power Rating</td><td>I/P: DC 3.7V, 600mAh(Li-ion)</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
<tr><td>Products Covered</td><td>N/A</td></tr>
<tr><td>EUT Modification(s)</td><td>N/A</td></tr>
</table>

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Channel List:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 00 | 2402 | 27 | 2429 | 54 | 2456 |
| 01 | 2403 | 28 | 2430 | 55 | 2457 |
| 02 | 2404 | 29 | 2431 | 56 | 2458 |
| 03 | 2405 | 30 | 2432 | 57 | 2459 |
| 04 | 2406 | 31 | 2433 | 58 | 2460 |
| 05 | 2407 | 32 | 2434 | 59 | 2461 |
| 06 | 2408 | 33 | 2435 | 60 | 2462 |
| 07 | 2409 | 34 | 2436 | 61 | 2463 |
| 08 | 2410 | 35 | 2437 | 62 | 2464 |
| 09 | 2411 | 36 | 2438 | 63 | 2465 |
| 10 | 2412 | 37 | 2439 | 64 | 2466 |
| 11 | 2413 | 38 | 2440 | 65 | 2467 |
| 12 | 2414 | 39 | 2441 | 66 | 2468 |
| 13 | 2415 | 40 | 2442 | 67 | 2469 |
| 14 | 2416 | 41 | 2443 | 68 | 2470 |
| 15 | 2417 | 42 | 2444 | 69 | 2471 |
| 16 | 2418 | 43 | 2445 | 70 | 2472 |
| 17 | 2419 | 44 | 2446 | 71 | 2473 |
| 18 | 2420 | 45 | 2447 | 72 | 2474 |
| 19 | 2421 | 46 | 2448 | 73 | 2475 |
| 20 | 2422 | 47 | 2449 | 74 | 2476 |
| 21 | 2423 | 48 | 2450 | 75 | 2477 |
| 22 | 2424 | 49 | 2451 | 76 | 2478 |
| 23 | 2425 | 50 | 2452 | 77 | 2479 |
| 24 | 2426 | 51 | 2453 | 78 | 2480 |
| 25 | 2427 | 52 | 2454 | | |
| 26 | 2428 | 53 | 2455 | | |

3. Table for Filed Antenna

| Ant. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|---|---|---|---|---|---|
| 1 | Panasonic | EBMGH5A245GJ | CHIP | N/A | 0.5 |

### 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Test Items | Mode | Data Rate | Tested Channel/Mode |
|---|---|---|---|
| Conducted Emission | FHSS(GFSK) | 1 Mbps | 2441 MHz |
| Antenna conducted Spurious Emission | FHSS(GFSK) | 1 Mbps | 2402 MHz, 2441 MHz, 2480 MHz |
| | | 3 Mbps | |
| Hopping Channel Separation | FHSS(GFSK) | 1 Mbps | 2402 MHz, 2441 MHz, 2480 MHz |
| | | 3 Mbps | |
| Maximum Peak Conducted Output Power | FHSS(GFSK) | 1 Mbps | 2402 MHz, 2441 MHz, 2480 MHz |
| | | 3 Mbps | |
| Radiated Spurious Emission (30 MHz to 1 GHz) | FHSS(GFSK) | 1 Mbps | 2441 MHz |
| Radiated Spurious Emission (above 1 GHz) | FHSS(GFSK) | 1 Mbps | 2402 MHz, 2441 MHz, 2480 MHz |
| | | 3 Mbps | |
| Number of Hopping Frequency | FHSS(GFSK) | 1 Mbps | 2402 MHz, 2441 MHz, 2480 MHz |
| | | 3 Mbps | |
| Average time of occupancy | FHSS(GFSK) | 1 Mbps | 2402 MHz, 2441 MHz, 2480 MHz |
| | | 3 Mbps | |
| Restricted Bands | FHSS(GFSK) | 1 Mbps | 2402 MHz, 2441 MHz, 2480 MHz |
| | | 3 Mbps | |
| Antenna Requirement | FHSS(GFSK) | --- | --- |
| RF Exposure Compliance | FHSS(GFSK) | --- | --- |

NOTE: The measurements are performed at the highest, middle, lowest available channels.

### 3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

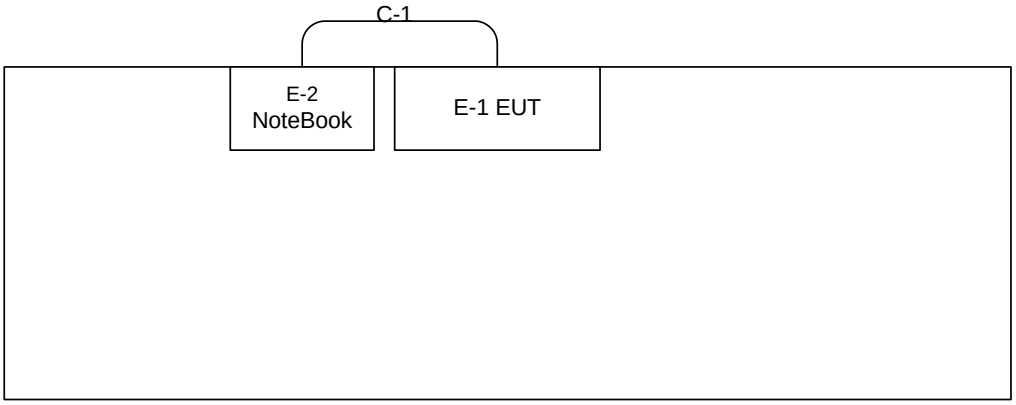
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

| Data Rate | 1 Mbps | | |
|---|---|---|---|
| Test software Version | | | |
| Frequency | 2402 MHz | 2441 MHz | 2480 MHz |
| Parameter | Max | Max | Max |

| Data Rate | 3 Mbps | | |
|---|---|---|---|
| Test software Version | | | |
| Frequency | 2402 MHz | 2441 MHz | 2480 MHz |
| Parameter | Max | Max | Max |

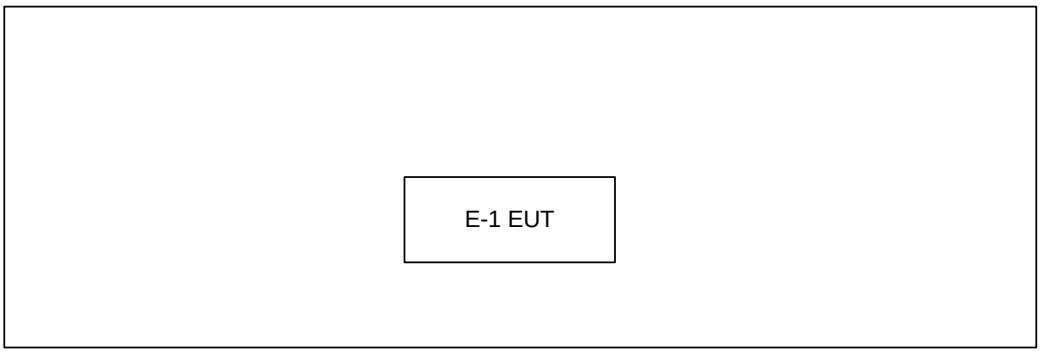
## 3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

### Conducted Emission




C-1 USB Cable

### Radiated Spurious Emission



### 3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. | Note |
|---|---|---|---|---|---|---|
| E-1 | Bluetooth Barcode Scanner | OPTICON | OPN-3002i | UFOOPN3002I | N/A | EUT |
| E-2 | Notebook PC | DELL | PP18L | DOC | PF329 A01 | |

| Item | Shielded Type | Ferrite Core | Length | Note |
|---|---|---|---|---|
| C-1 | YES | NO | 1M | |

NOTE: The support equipment was authorized by Declaration of Conformity (DOC).

# 4 CONDUCTED EMISSION

## 4.1 LIMIT

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 - 0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * |
| 0.50 - 5.0 | 73.00 | 60.00 | 56.00 | 46.00 |
| 5.0 - 30.0 | 73.00 | 60.00 | 60.00 | 50.00 |

NOTE:

1. The tighter limit applies at the band edges.
2. The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
3. The test result calculated as following:
   Measurement Value = Reading Level + Correct Factor
   Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
   Margin Level = Measurement Value – Limit Value

## 4.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | TWO-LINE V-NETWORK | R&S | ENV216 | 101051 | Jun. 13, 2013 |
| 2 | Test Cable | TIMES | LMR-400 | C01 | Jun. 14, 2013 |
| 3 | EMI Test Receiver | Agilent | N9038A | MY51210215 | Jan. 25, 2014 |
| 4 | Measurement Software | EZ | EZ_EMC (Version NB-02A) | N/A | N/A |

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

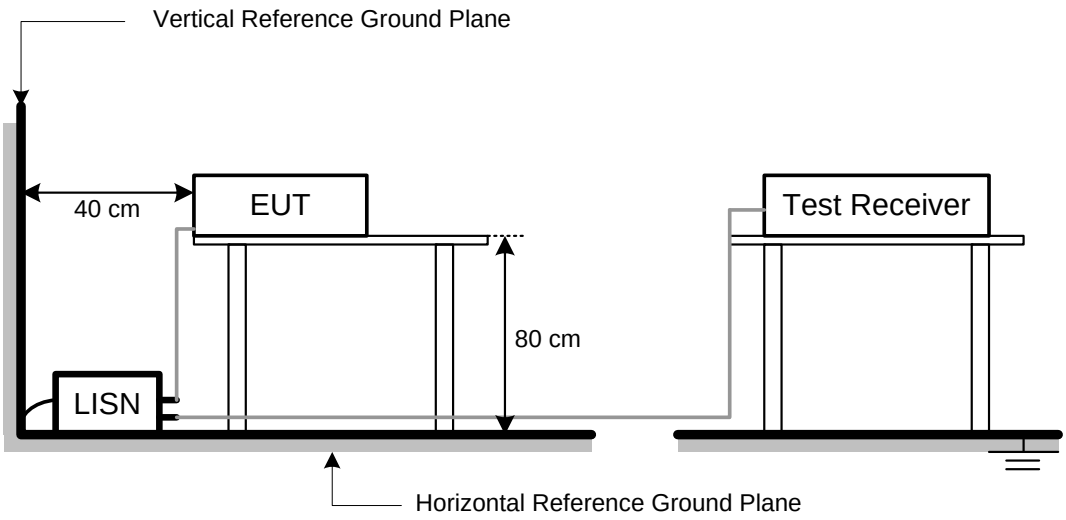
## 4.3 TEST PROCEDURES

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

**NOTE:**

a. Reading in which marked as Peak, QP or AVG means measurements by using are Quasi-Peak or Average Mode with Detector BW=9 kHz (6 dB Bandwidth).
b. All readings are Peak Mode value unless otherwise stated QP or AVG in column of Note. If the Peak or QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only Peak or QP Mode was measured, but AVG Mode didn‘t perform.

## 4.4 TEST SETUP LAYOUT




## 4.5 DEVIATION FROM TEST STANDARD

No deviation

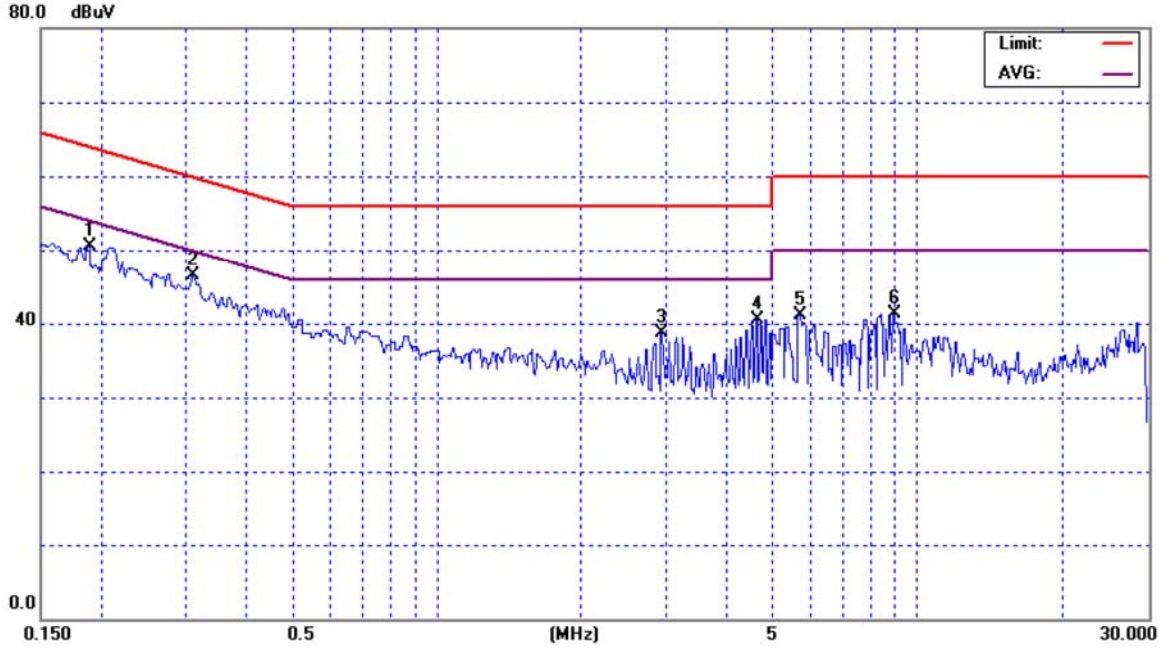
## 4.6 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

## 4.7 TEST RESULTS

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 48% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

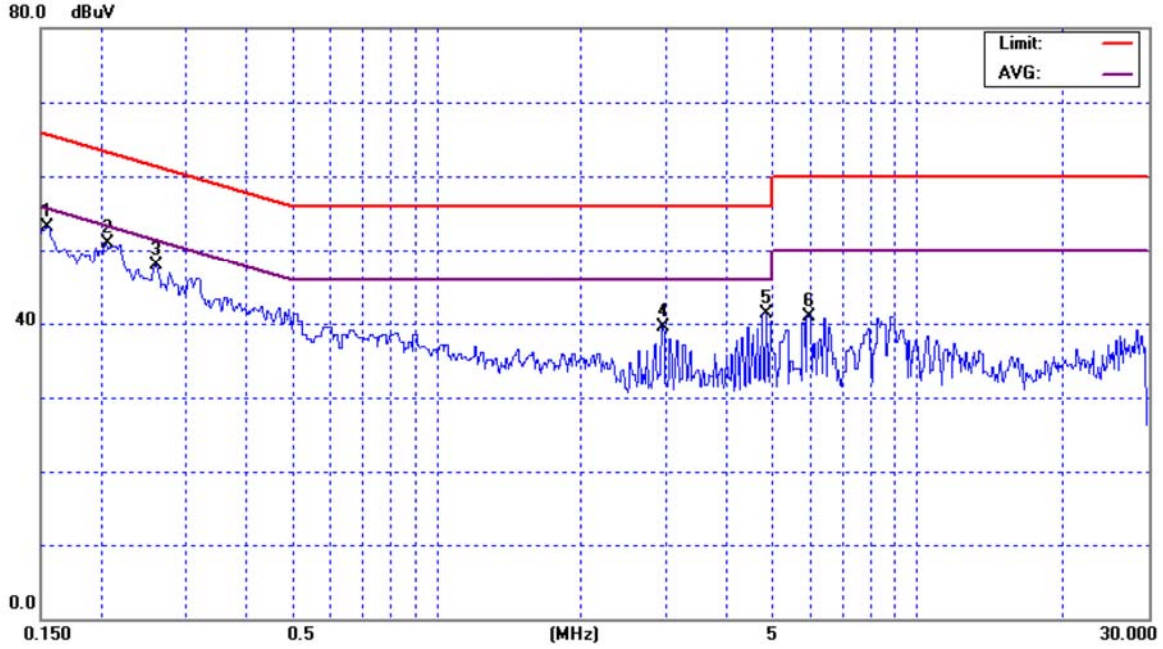
**Phase: Line**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1885 | 40.91 | 9.68 | 50.59 | 64.10 | -13.51 | peak | |
| 2 | | 0.3101 | 36.78 | 9.67 | 46.45 | 59.97 | -13.52 | peak | |
| 3 | | 2.9412 | 28.96 | 9.79 | 38.75 | 56.00 | -17.25 | peak | |
| 4 | | 4.6288 | 30.62 | 9.84 | 40.46 | 56.00 | -15.54 | peak | |
| 5 | | 5.6875 | 31.18 | 9.89 | 41.07 | 60.00 | -18.93 | peak | |
| 6 | | 8.9375 | 31.27 | 10.09 | 41.36 | 60.00 | -18.64 | peak | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 24°C | Relative Humidity | 48% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

**Phase: Neutral**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1544 | 43.41 | 9.67 | 53.08 | 65.76 | -12.68 | peak | |
| 2 | * | 0.2051 | 41.17 | 9.72 | 50.89 | 63.40 | -12.51 | peak | |
| 3 | | 0.2594 | 38.19 | 9.70 | 47.89 | 61.45 | -13.56 | peak | |
| 4 | | 2.9525 | 29.63 | 9.81 | 39.44 | 56.00 | -16.56 | peak | |
| 5 | | 4.8538 | 31.49 | 9.86 | 41.35 | 56.00 | -14.65 | peak | |
| 6 | | 5.9375 | 31.03 | 9.91 | 40.94 | 60.00 | -19.06 | peak | |

# 5 ANTENNA CONDUCTED SPURIOUS EMISSION

## 5.1 LIMIT

| Test Item | Frequency Range (MHz) | Limit |
|---|---|---|
| Antenna conducted Spurious Emission | 30-25000 | 20 dB less than the peak value of fundamental frequency |

## 5.2 MEASUREMENT INSTRUMENTS LIST

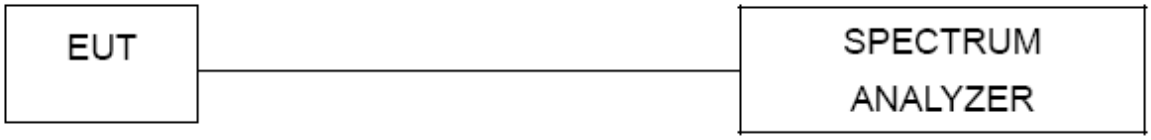
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Oct. 01, 2013 |

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

## 5.3 TEST PROCEDURES

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

## 5.4 TEST SETUP LAYOUT




## 5.5 DEVIATION FROM TEST STANDARD

No deviation

## 5.6 EUT OPERATING CONDITIONS

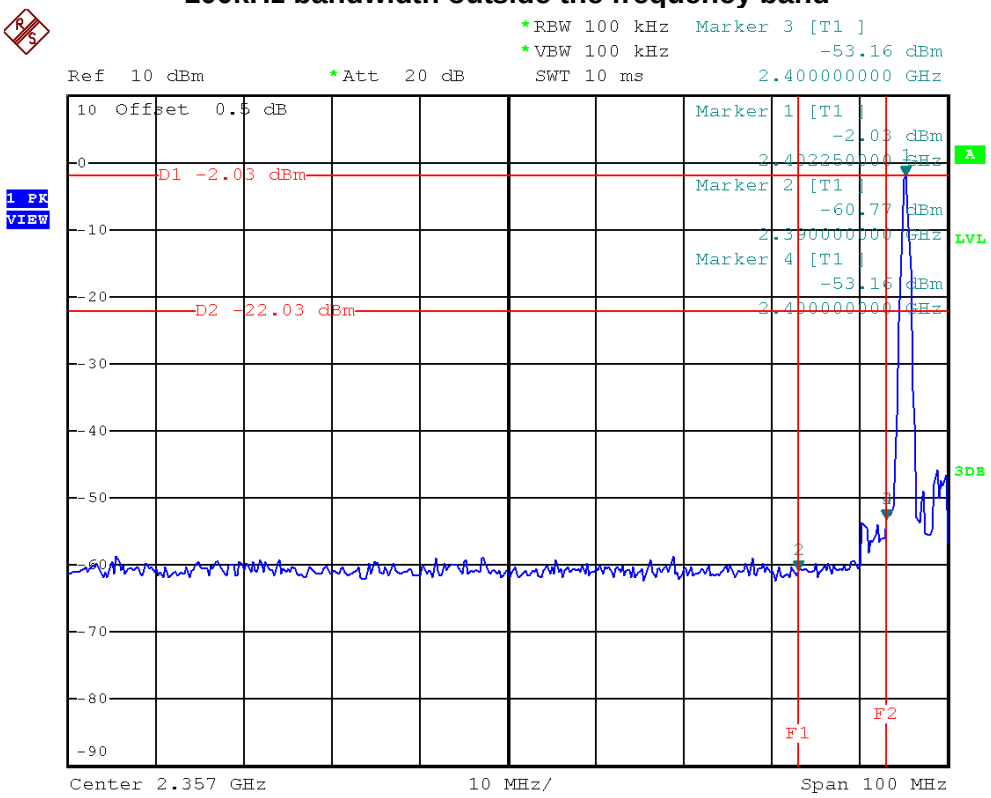
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

## 5.7 TEST RESULTS

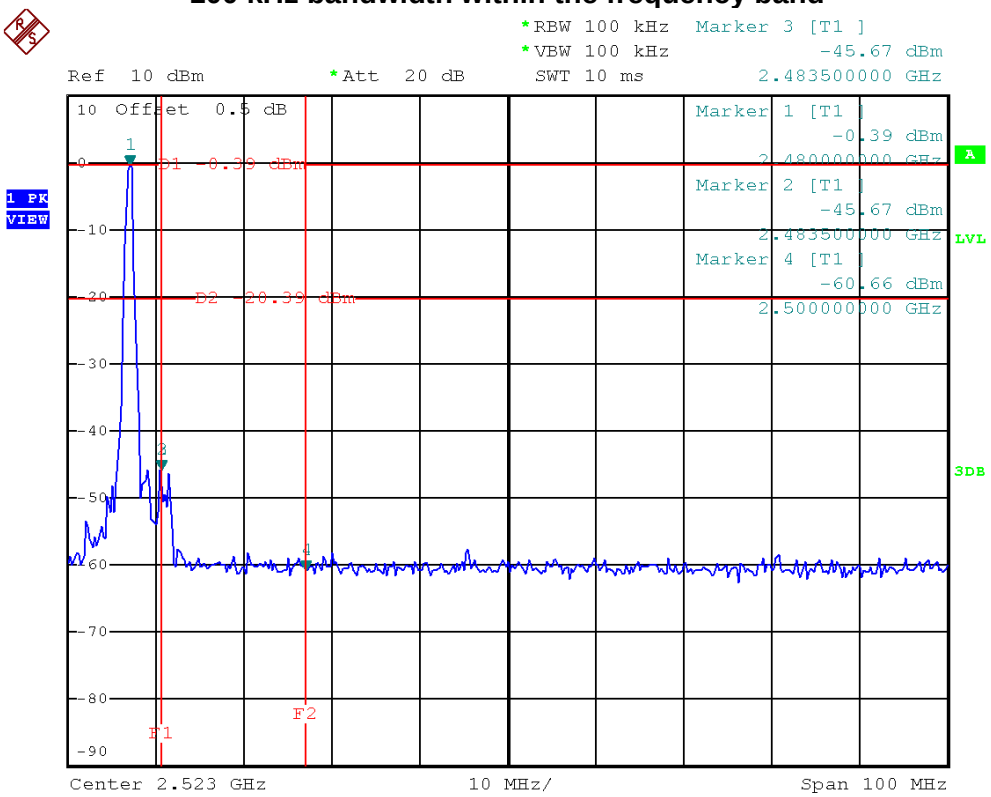
| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps | | |

| Channel of Worst Data | | | |
|---|---|---|---|
| The max. radio frequency power in any 100kHz bandwidth outside the frequency band | | The max. radio frequency power in any 100 kHz bandwidth within the frequency band. | |
| FREQUENCY(MHz) | POWER(dBm) | FREQUENCY(MHz) | POWER(dBm) |
| 2400.00 | -53.16 | 2483.50 | -45.67 |
| Result | | | |
| In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power. | | | |

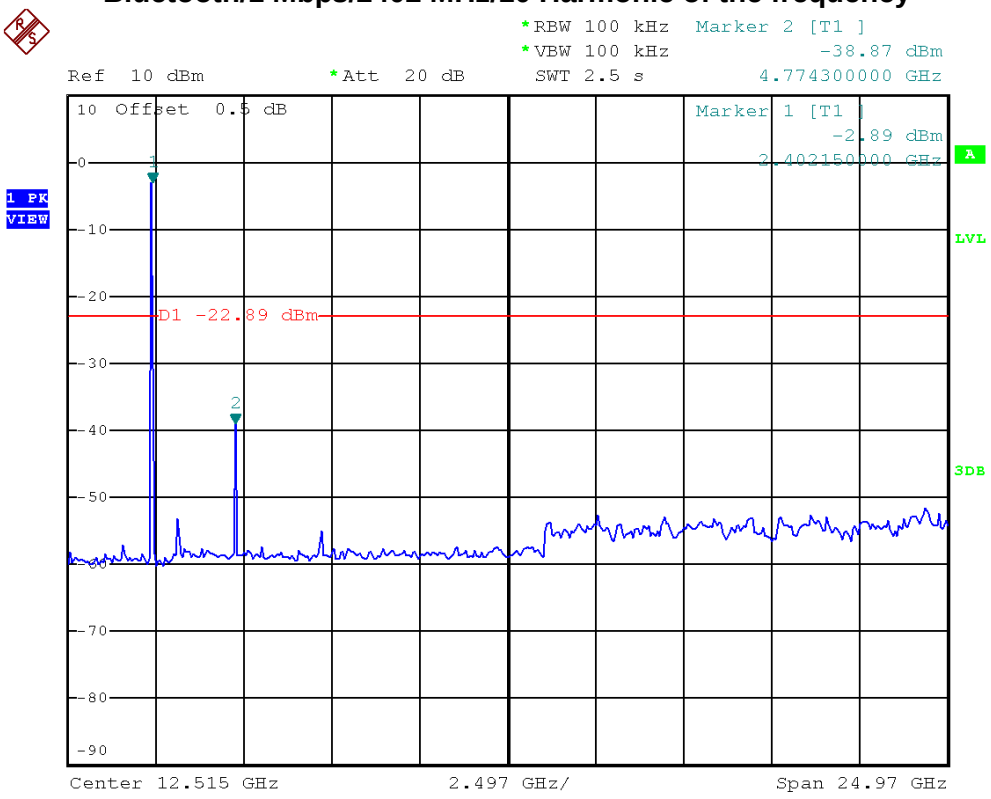
## Bluetooth/1 Mbps/The max. radio frequency power in any 100kHz bandwidth outside the frequency band



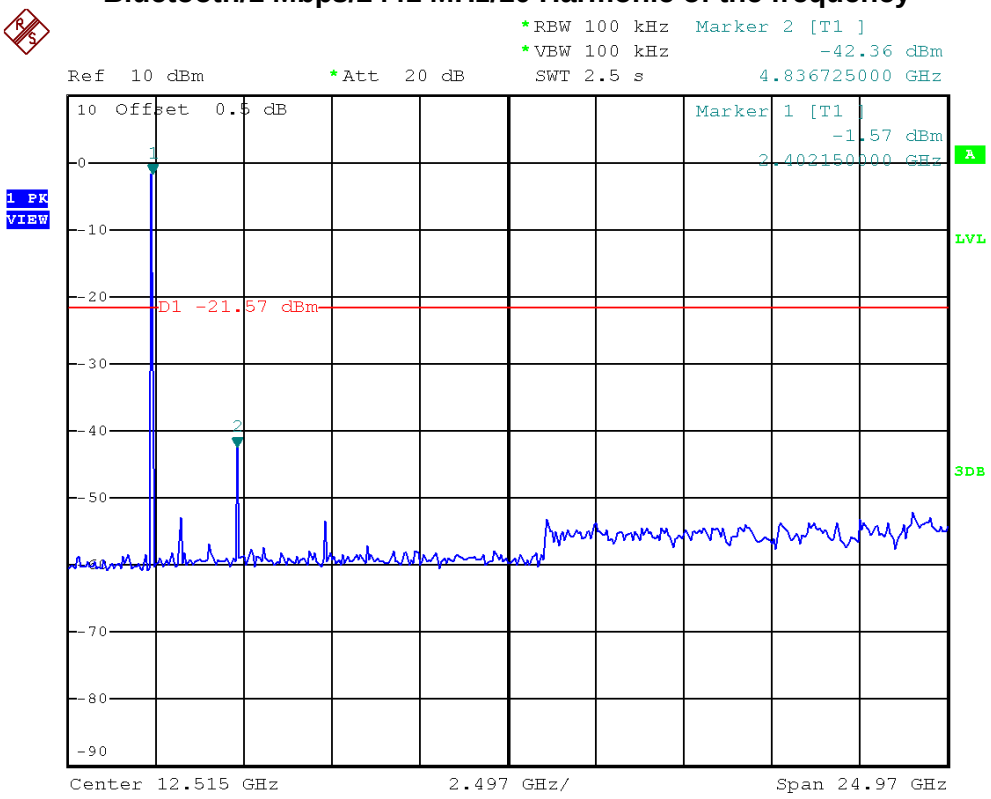

## Bluetooth/1 Mbps/The max. radio frequency power in any 100 kHz bandwidth within the frequency band



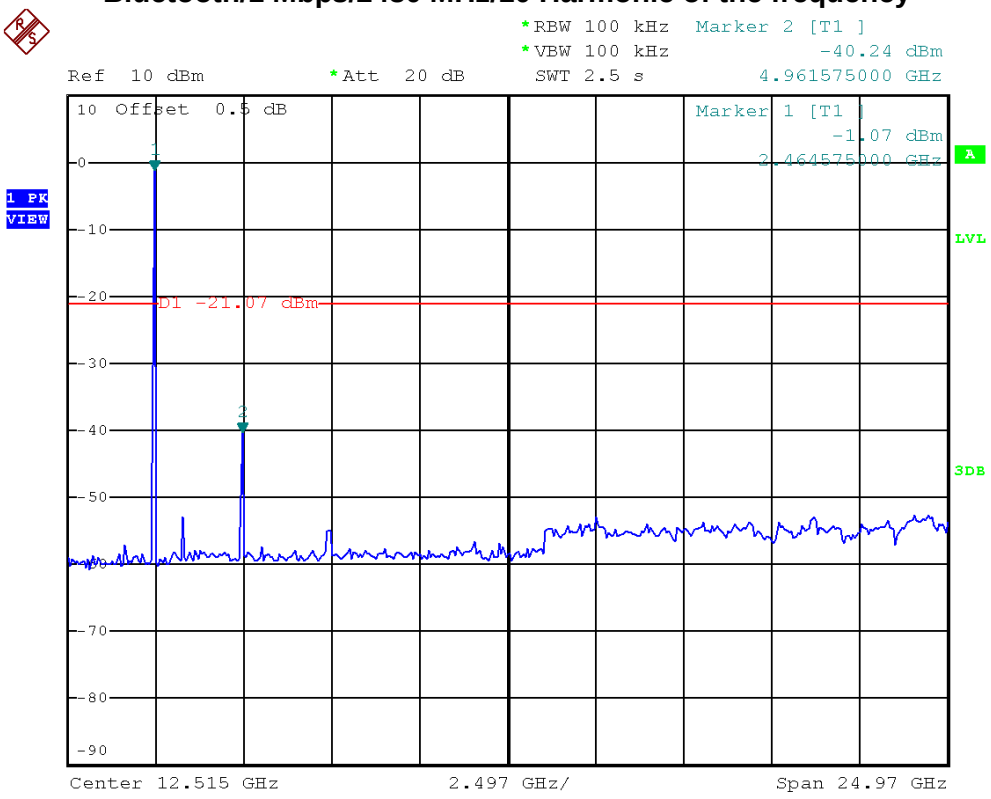
## Bluetooth/1 Mbps/2402 MHz/10 Harmonic of the frequency




## Bluetooth/1 Mbps/2441 MHz/10 Harmonic of the frequency



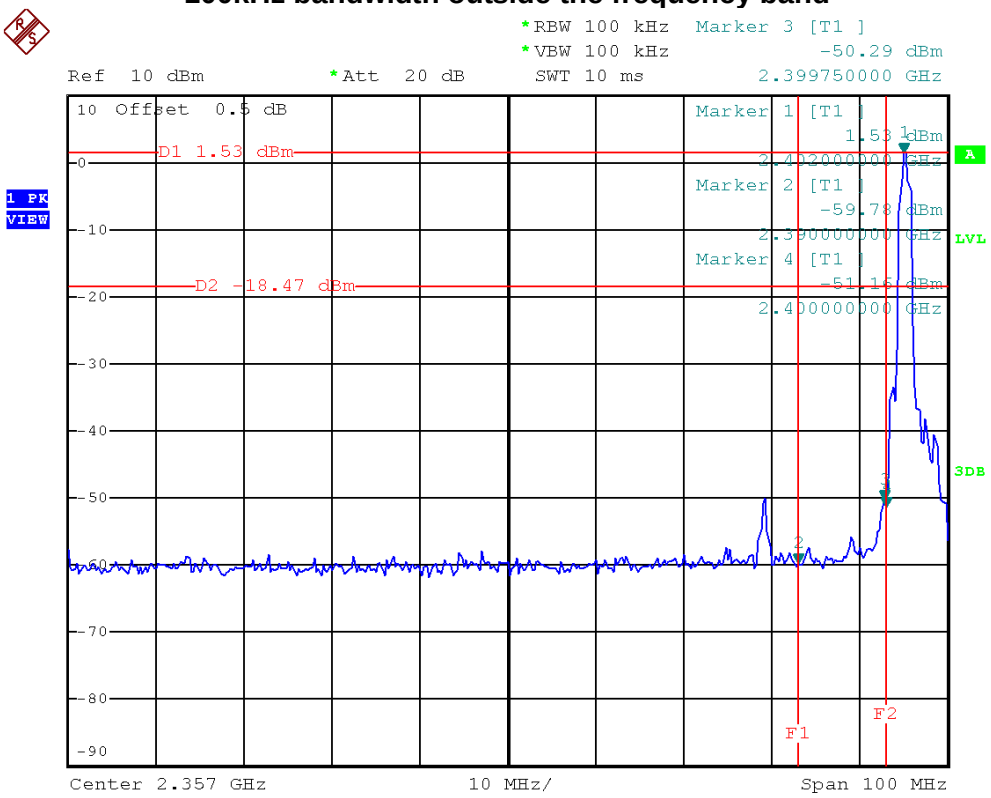
## Bluetooth/1 Mbps/2480 MHz/10 Harmonic of the frequency



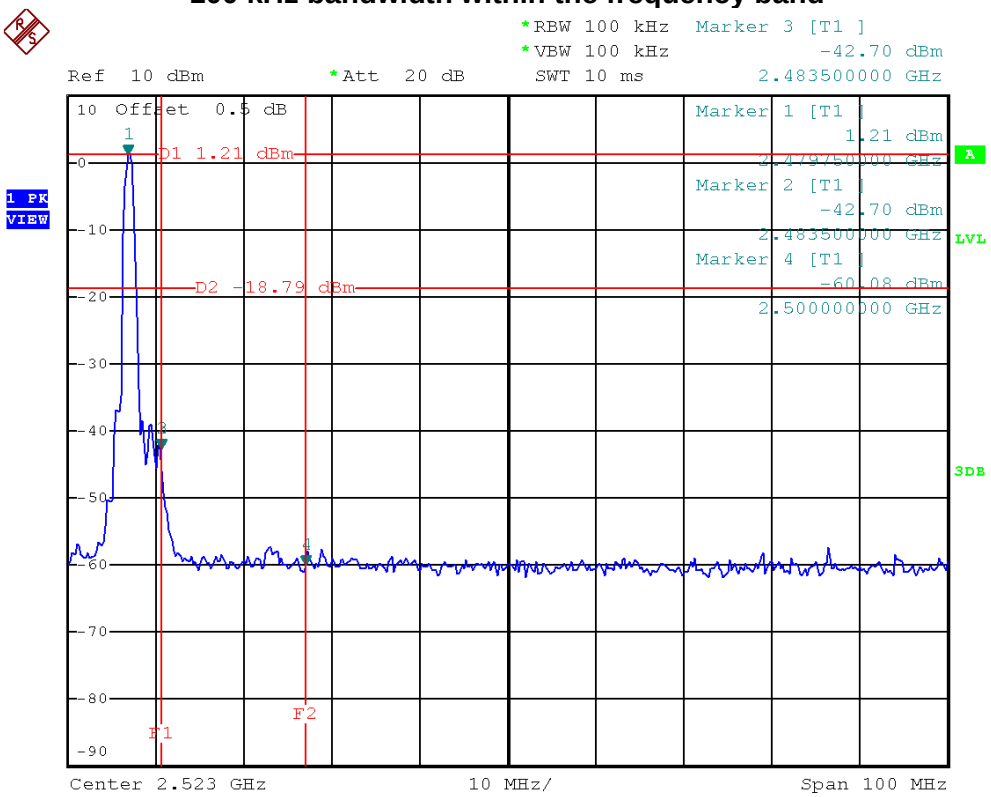
| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps | | |

| Channel of Worst Data | | | |
|---|---|---|---|
| The max. radio frequency power in any 100kHz bandwidth outside the frequency band | | The max. radio frequency power in any 100 kHz bandwidth within the frequency band. | |
| FREQUENCY(MHz) | POWER(dBm) | FREQUENCY(MHz) | POWER(dBm) |
| 2399.75 | -50.29 | 2483.50 | -42.70 |
| Result | | | |
| In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power. | | | |

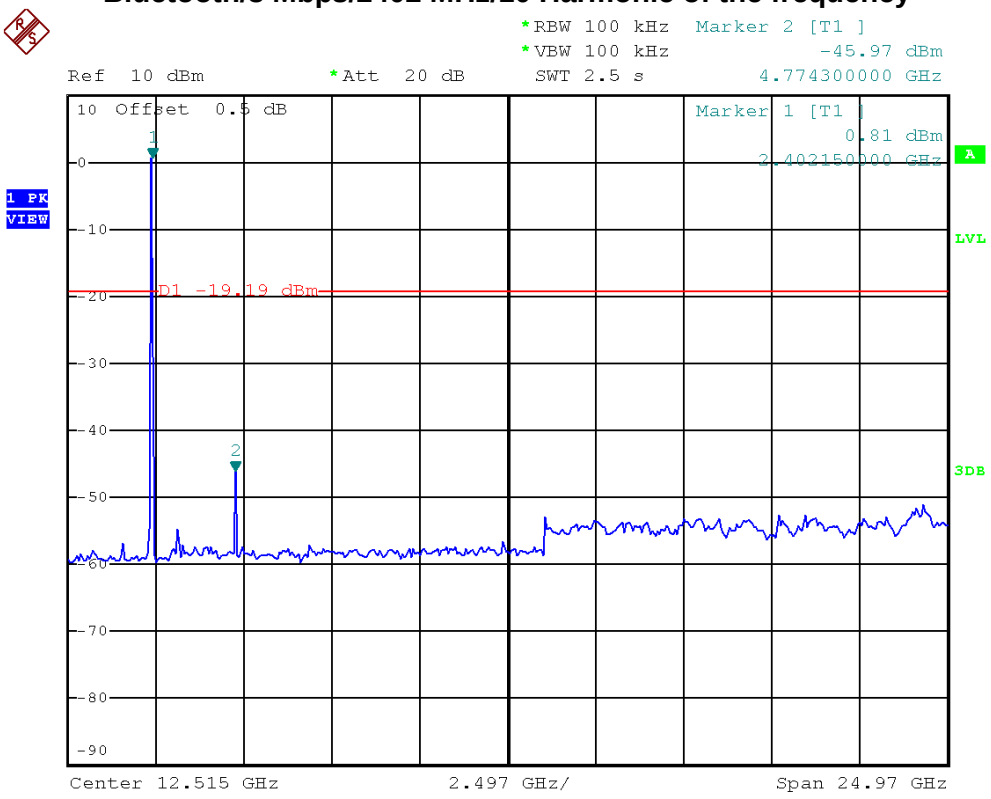
## Bluetooth/3 Mbps/The max. radio frequency power in any 100kHz bandwidth outside the frequency band



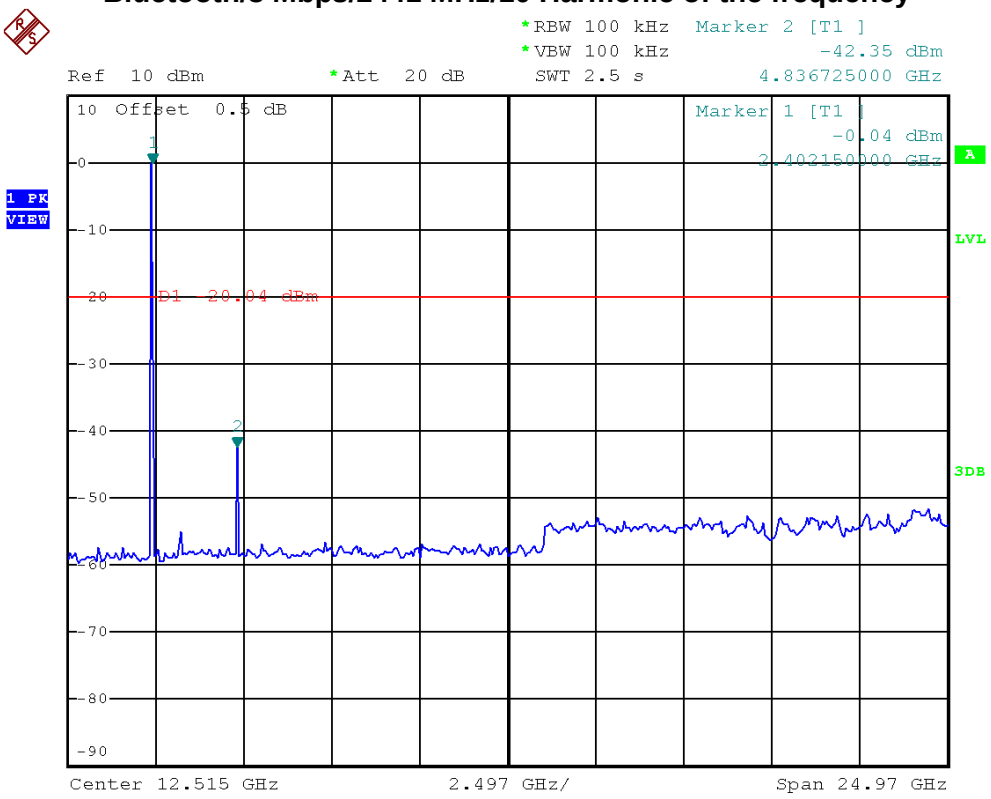

## Bluetooth/3 Mbps/The max. radio frequency power in any 100 kHz bandwidth within the frequency band



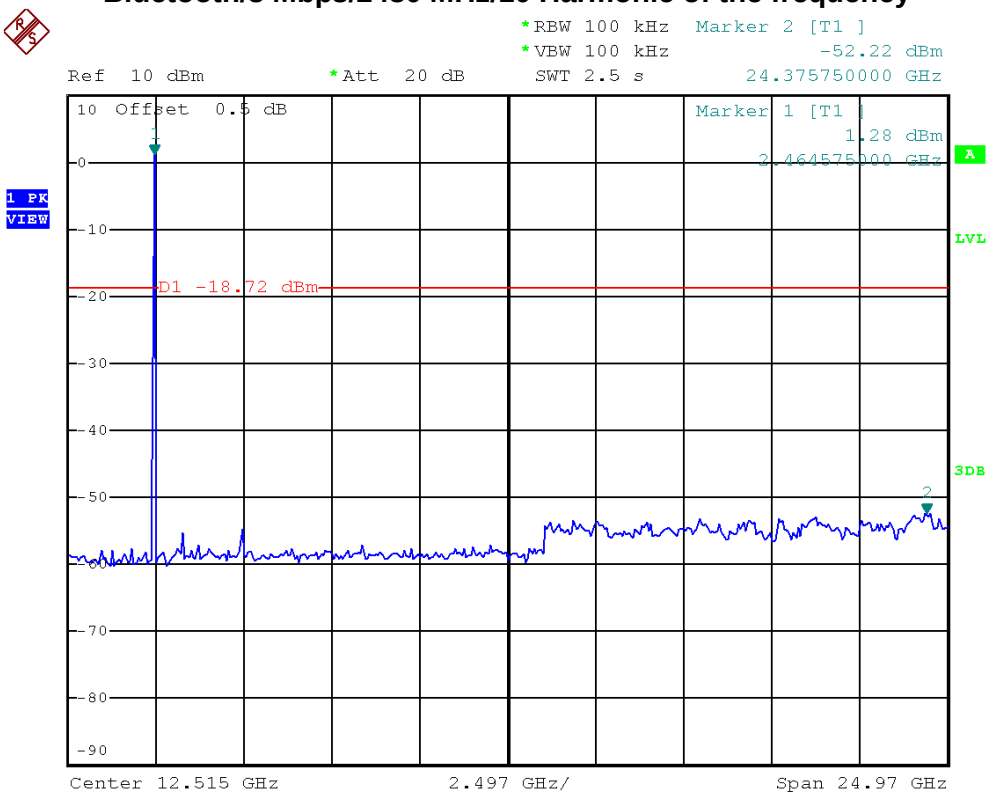
## Bluetooth/3 Mbps/2402 MHz/10 Harmonic of the frequency




## Bluetooth/3 Mbps/2441 MHz/10 Harmonic of the frequency



## Bluetooth/3 Mbps/2480 MHz/10 Harmonic of the frequency



# 6 HOPPING CHANNEL SEPARATION

## 6.1 LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

## 6.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Oct. 01, 2013 |

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

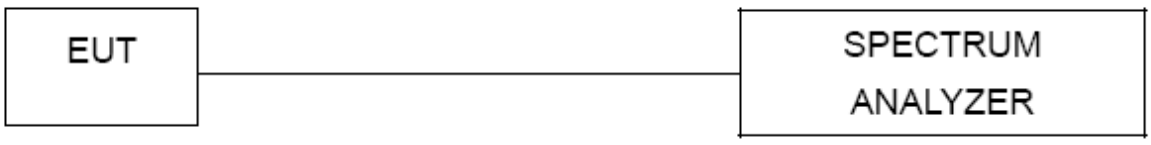
## 6.3 MEASURING INSTRUMENTS SETTING

| EMI Test Receiver | Parameter Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Measurement Bandwidth or Channel Separation |
| RB | 30 kHz (20dB Bandwidth) / 100 kHz (Channel Separation) |
| VB | 100 kHz (20dB Bandwidth) / 300 kHz (Channel Separation) |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

## 6.4 TEST PROCEDURES

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

## 6.5 TEST SETUP LAYOUT




## 6.6 DEVIATION FROM TEST STANDARD

No deviation

## 6.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

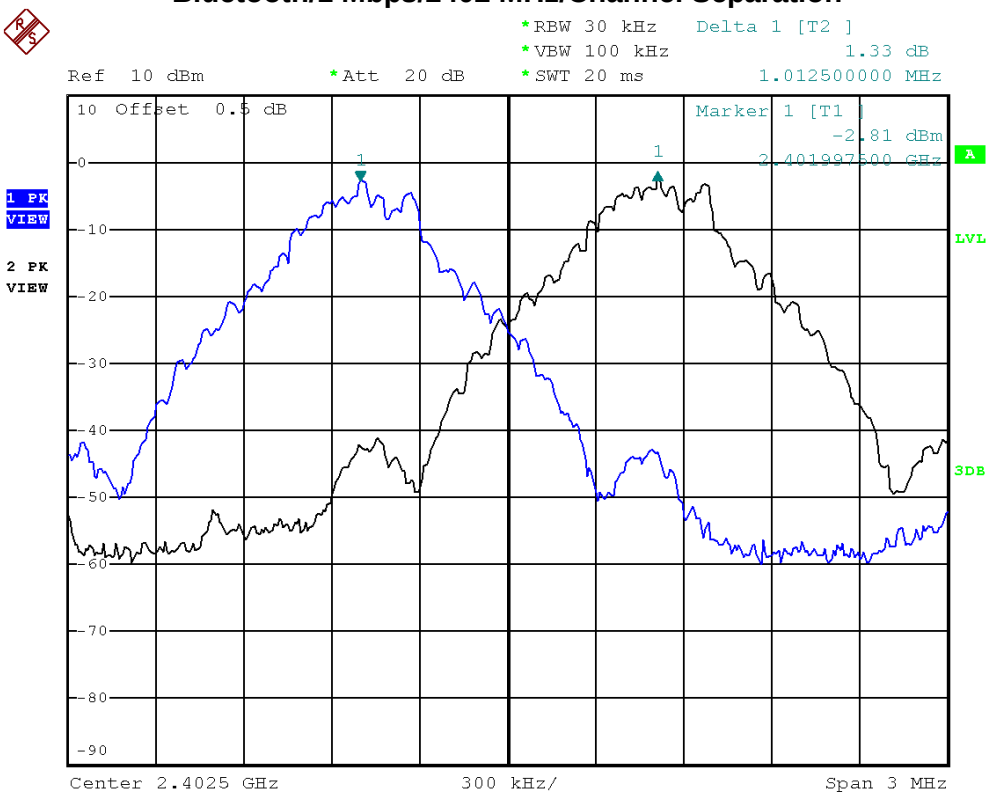
## 6.8 TEST RESULTS

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz, 2441 MHz, 2480 MHz | | |

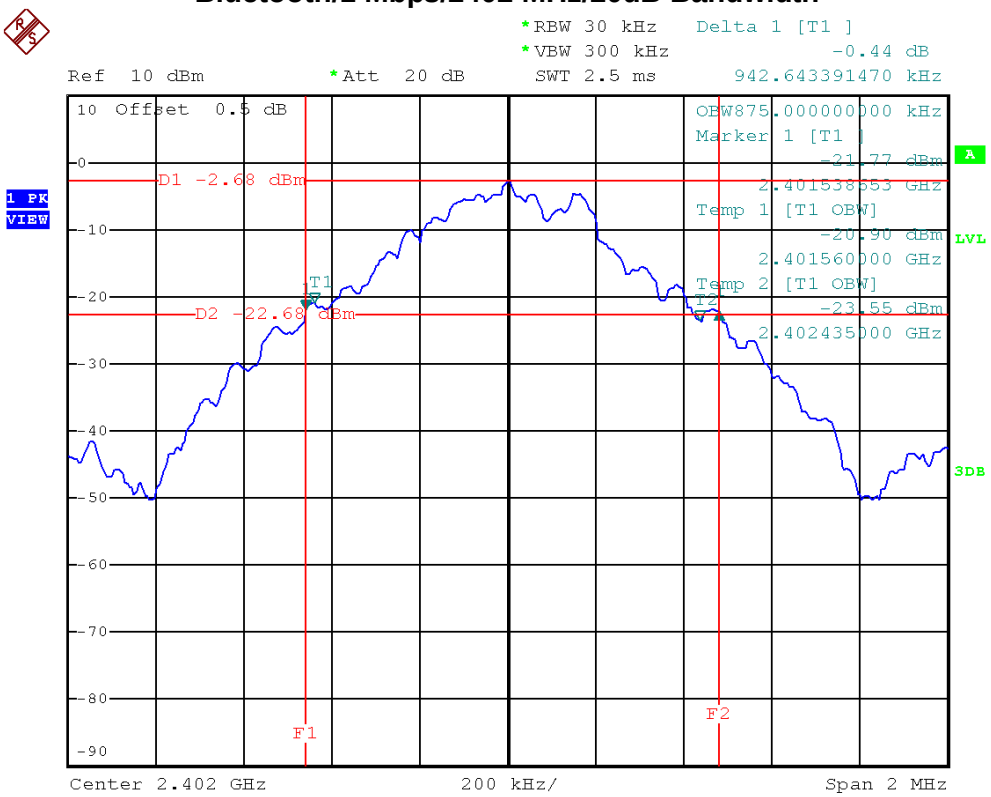
| Frequency | Channel Separation (MHz) | 20 dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) | Two-thirds of the 20 dB Bandwidth | Result |
|---|---|---|---|---|---|
| 2402 MHz | 1.01 | 0.943 | 0.875 | 0.629 | PASS |
| 2441 MHz | 1.00 | 0.933 | 0.870 | 0.622 | PASS |
| 2480 MHz | 1.01 | 0.948 | 0.875 | 0.632 | PASS |

NOTE: Ch. Separation Limits: >25 KHz or >2/3 of 20dB bandwidth

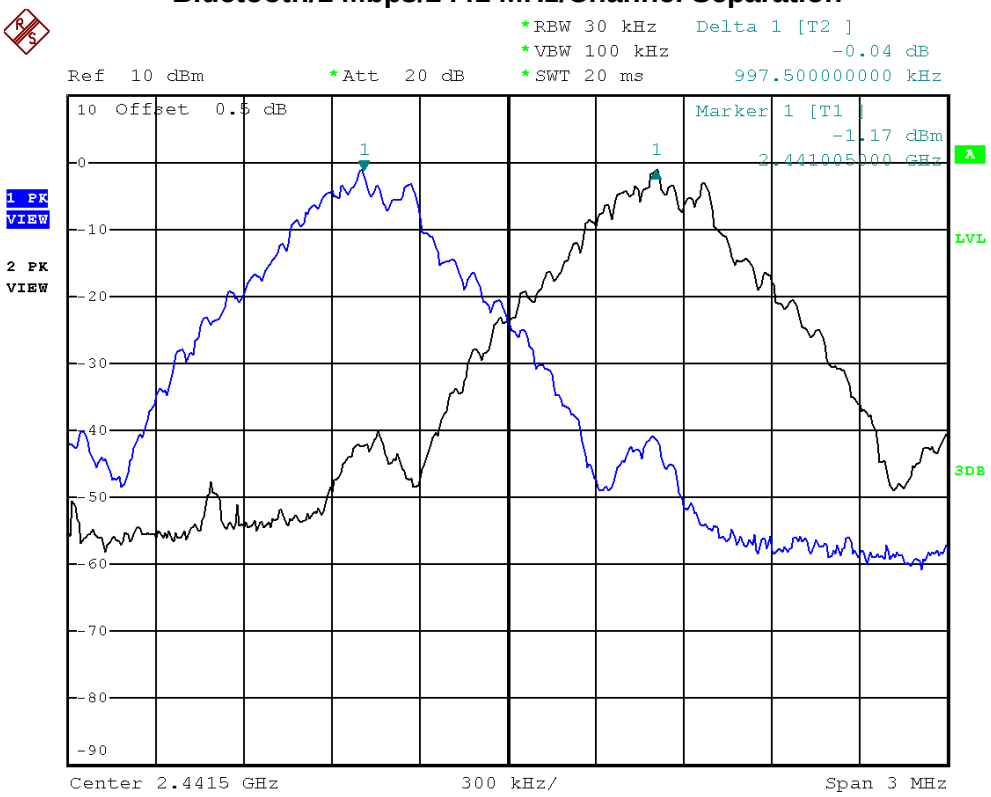
## Bluetooth/1 Mbps/2402 MHz/Channel Separation



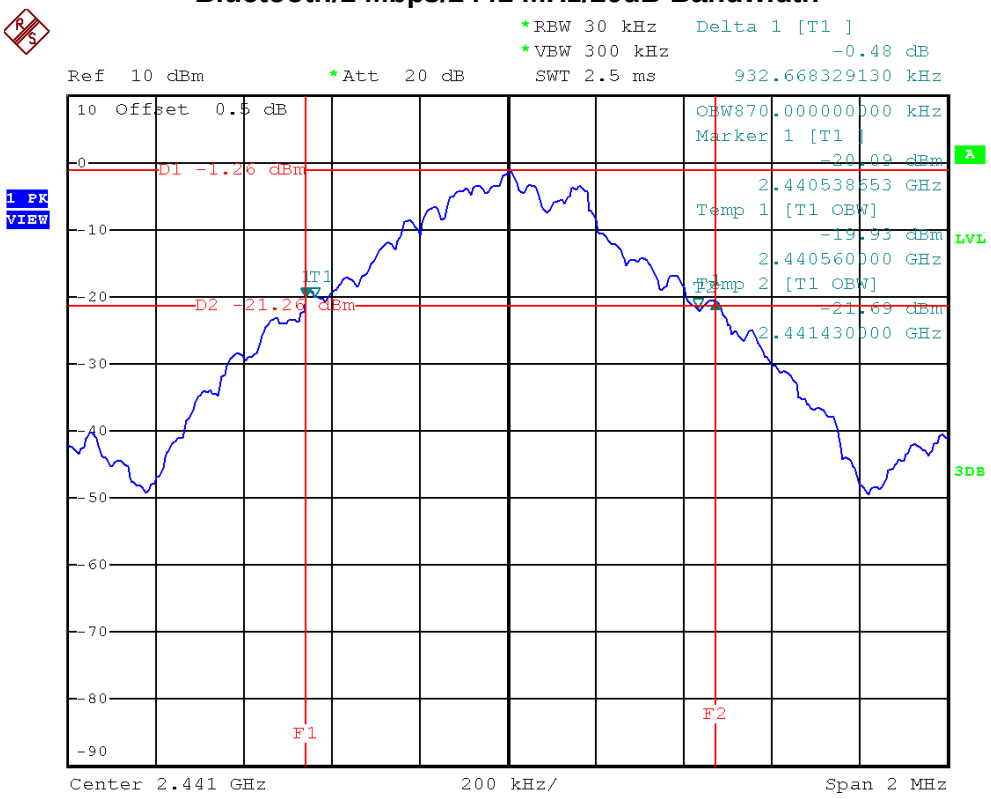

## Bluetooth/1 Mbps/2402 MHz/20dB Bandwidth



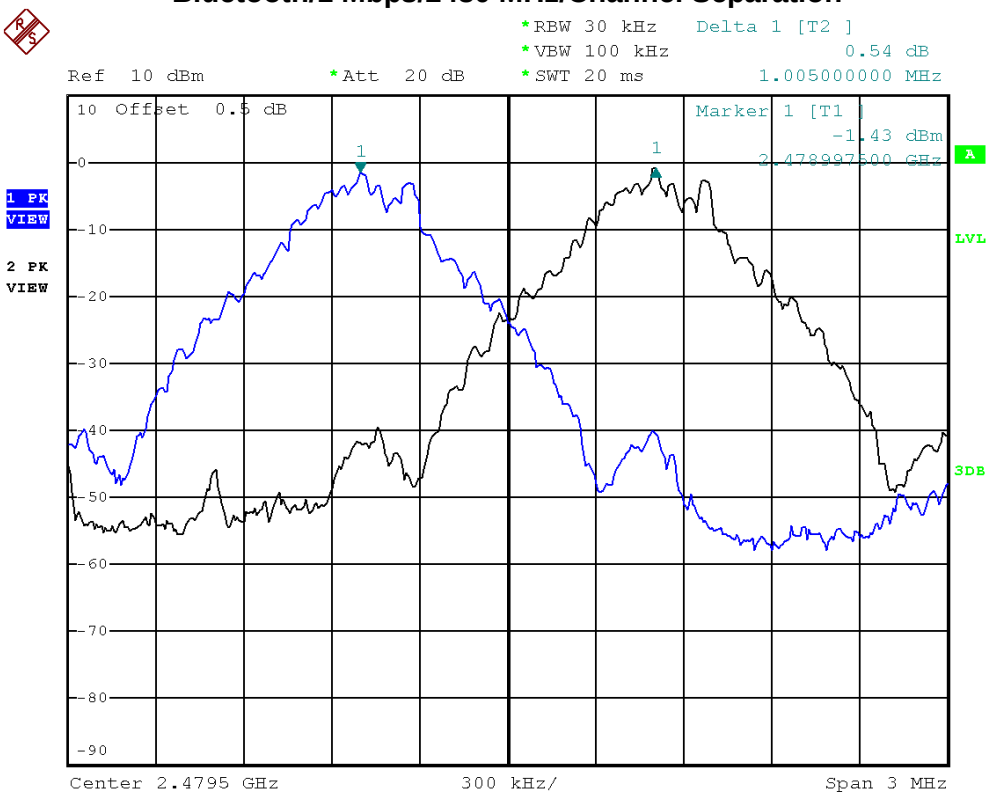
## Bluetooth/1 Mbps/2441 MHz/Channel Separation



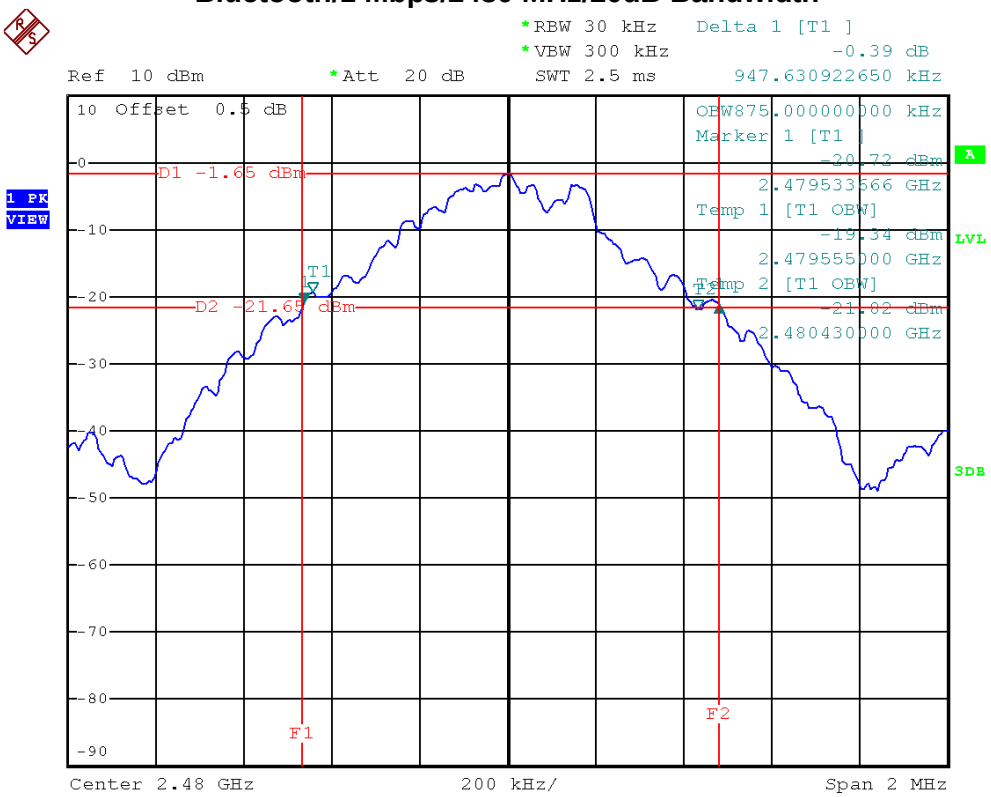

## Bluetooth/1 Mbps/2441 MHz/20dB Bandwidth



## Bluetooth/1 Mbps/2480 MHz/Channel Separation




## Bluetooth/1 Mbps/2480 MHz/20dB Bandwidth

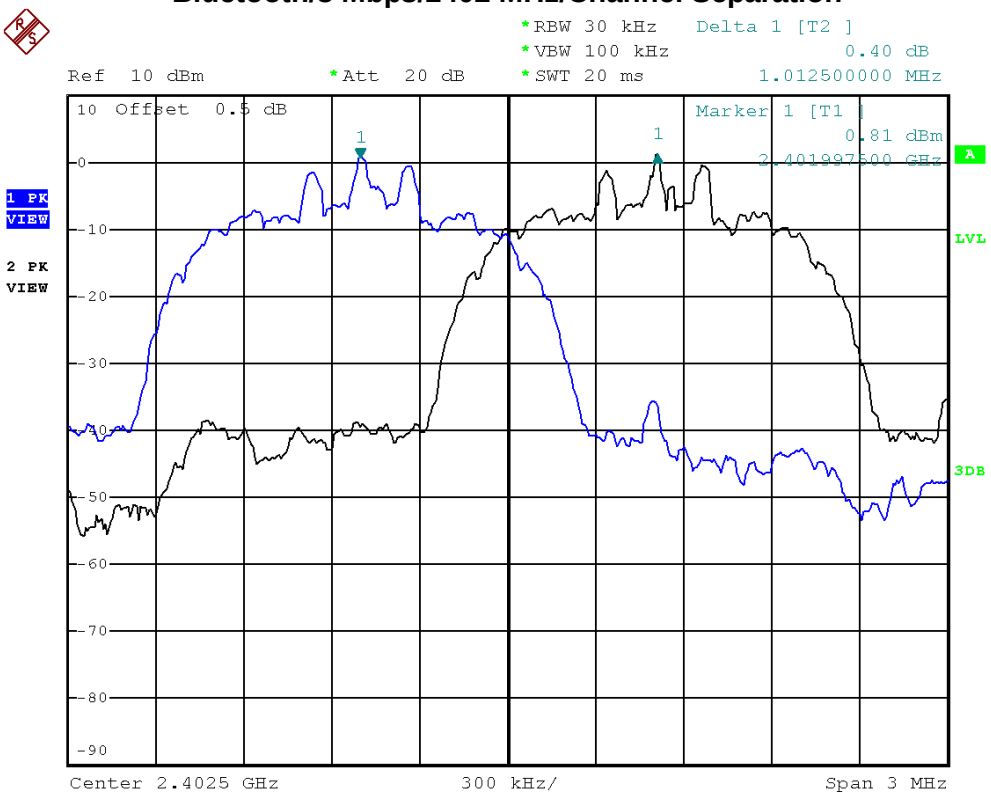


| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz, 2441 MHz, 2480 MHz | | |

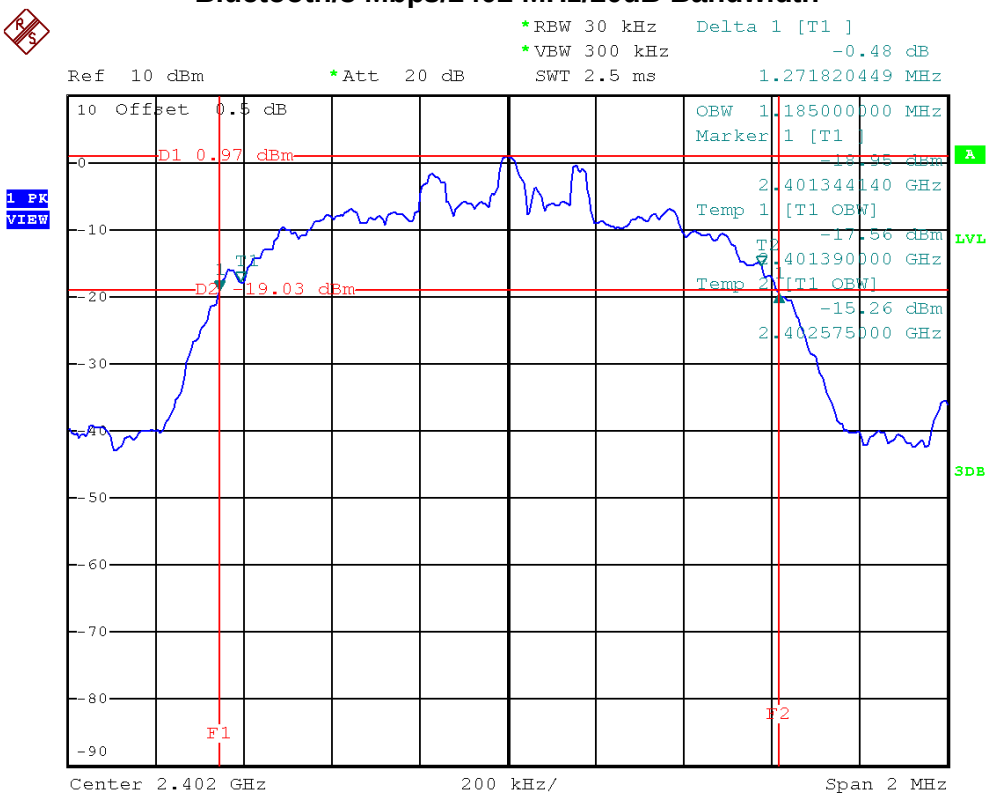
| Frequency | Channel Separation (MHz) | 20 dB Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) | Two-thirds of the 20 dB Bandwidth | Result |
|---|---|---|---|---|---|
| 2402 MHz | 1.01 | 1.272 | 1.185 | 0.848 | PASS |
| 2441 MHz | 1.01 | 1.267 | 1.175 | 0.845 | PASS |
| 2480 MHz | 1.00 | 1.262 | 1.175 | 0.841 | PASS |

NOTE: Ch. Separation Limits: >25 KHz or >2/3 of 20dB bandwidth

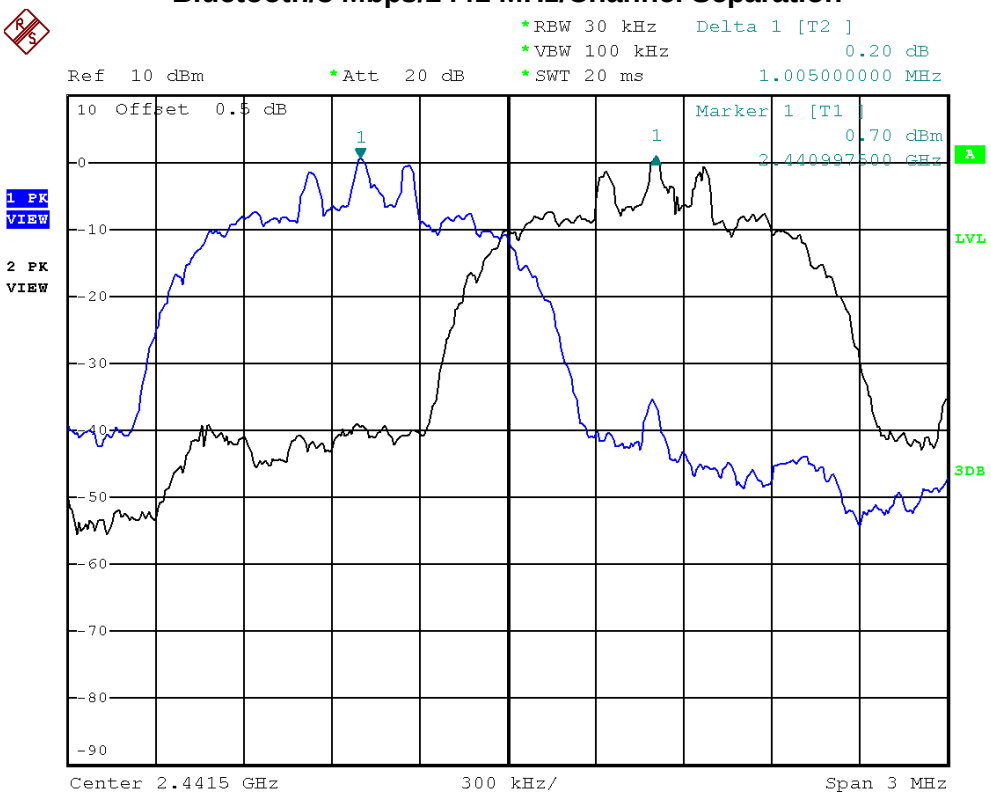
## Bluetooth/3 Mbps/2402 MHz/Channel Separation



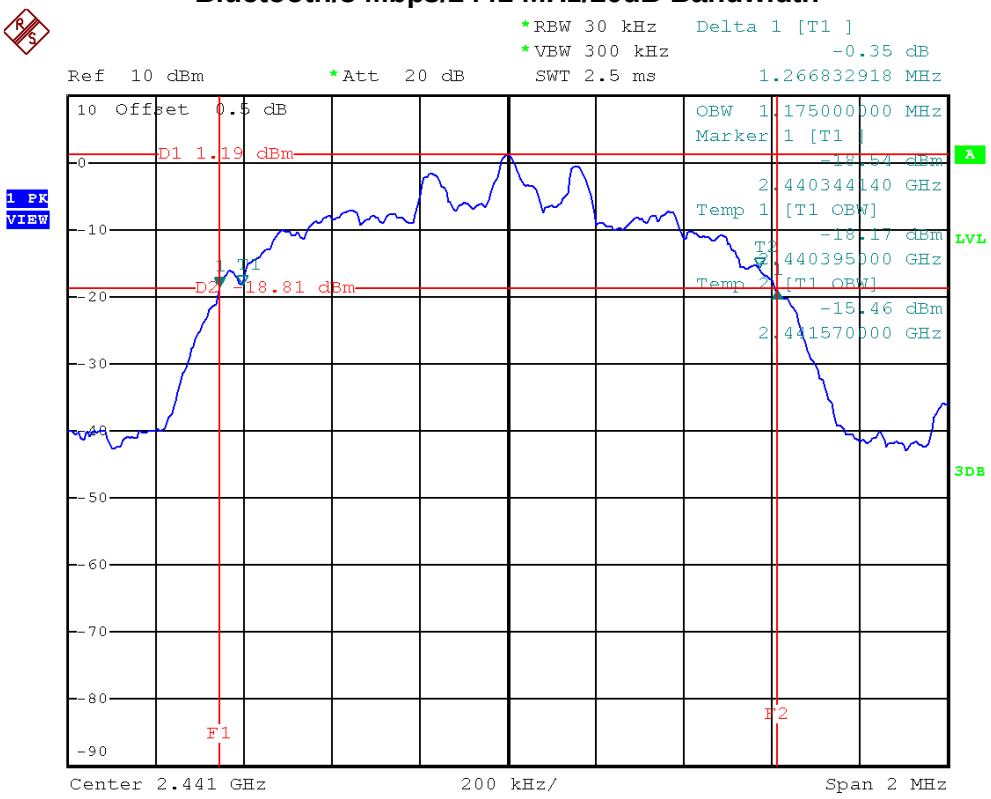

## Bluetooth/3 Mbps/2402 MHz/20dB Bandwidth



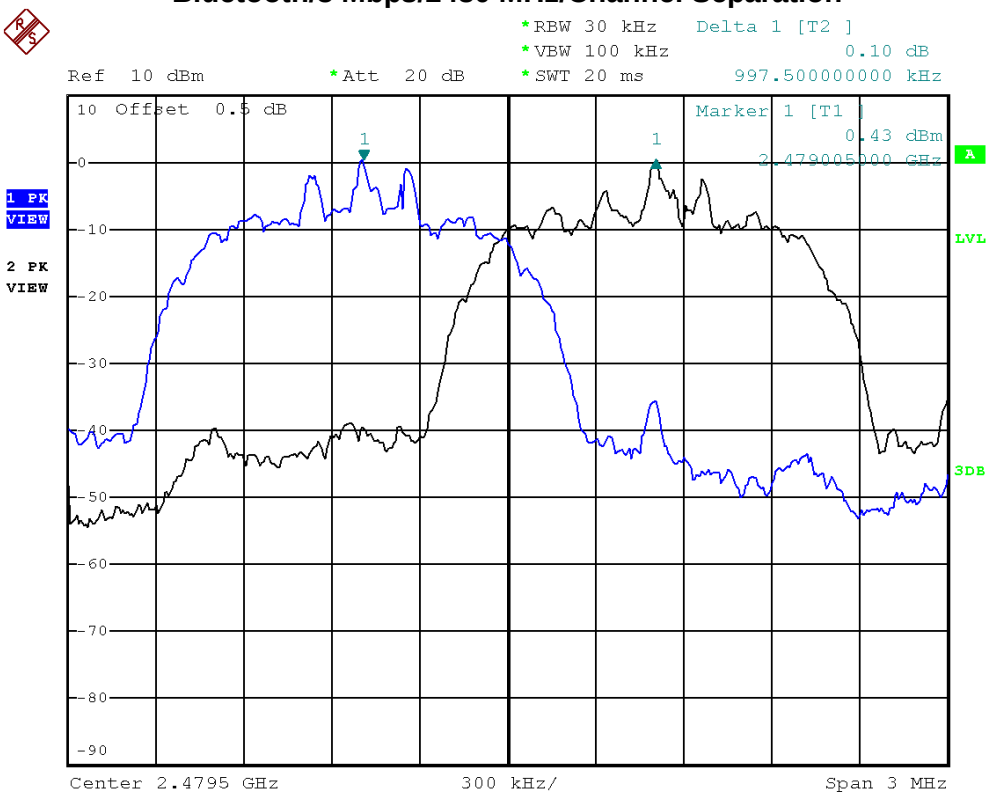
## Bluetooth/3 Mbps/2441 MHz/Channel Separation



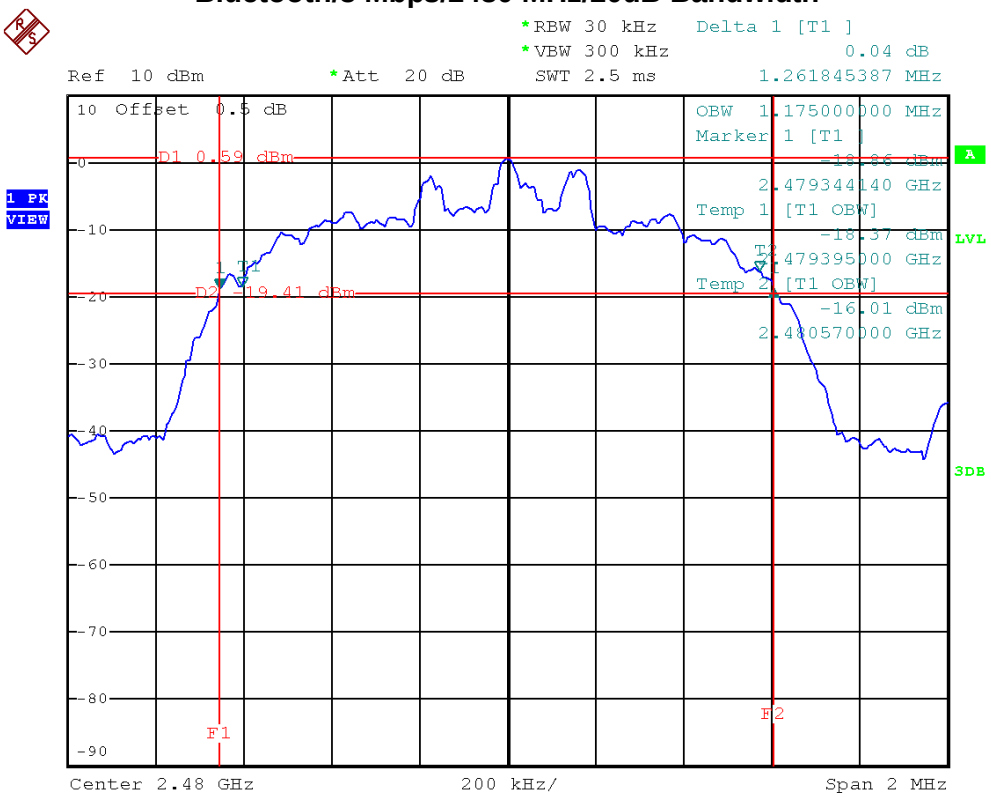

## Bluetooth/3 Mbps/2441 MHz/20dB Bandwidth



## Bluetooth/3 Mbps/2480 MHz/Channel Separation




## Bluetooth/3 Mbps/2480 MHz/20dB Bandwidth



# 7 MAXIMUM PEAK CONDUCTED OUTPUT POWER

## 7.1 LIMIT

| Test Item | Frequency Range (MHz) | Limit |
|---|---|---|
| Maximum Peak Conducted Output Power | 2400-2483.5 | 1 watt or 30 dBm |

## 7.2 MEASUREMENT INSTRUMENTS LIST

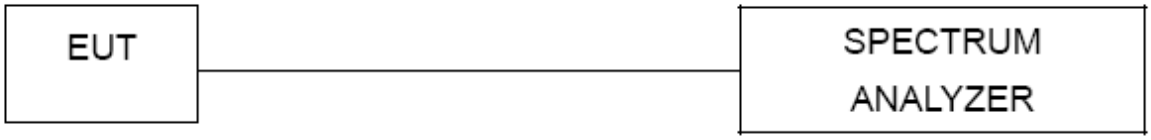
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Oct. 01, 2013 |

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

## 7.3 TEST PROCEDURES

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW= 3 MHz, VBW= 3 MHz, Sweep time = Auto.

## 7.4 TEST SETUP LAYOUT




## 7.5 DEVIATION FROM TEST STANDARD

No deviation

## 7.6 EUT OPERATING CONDITIONS

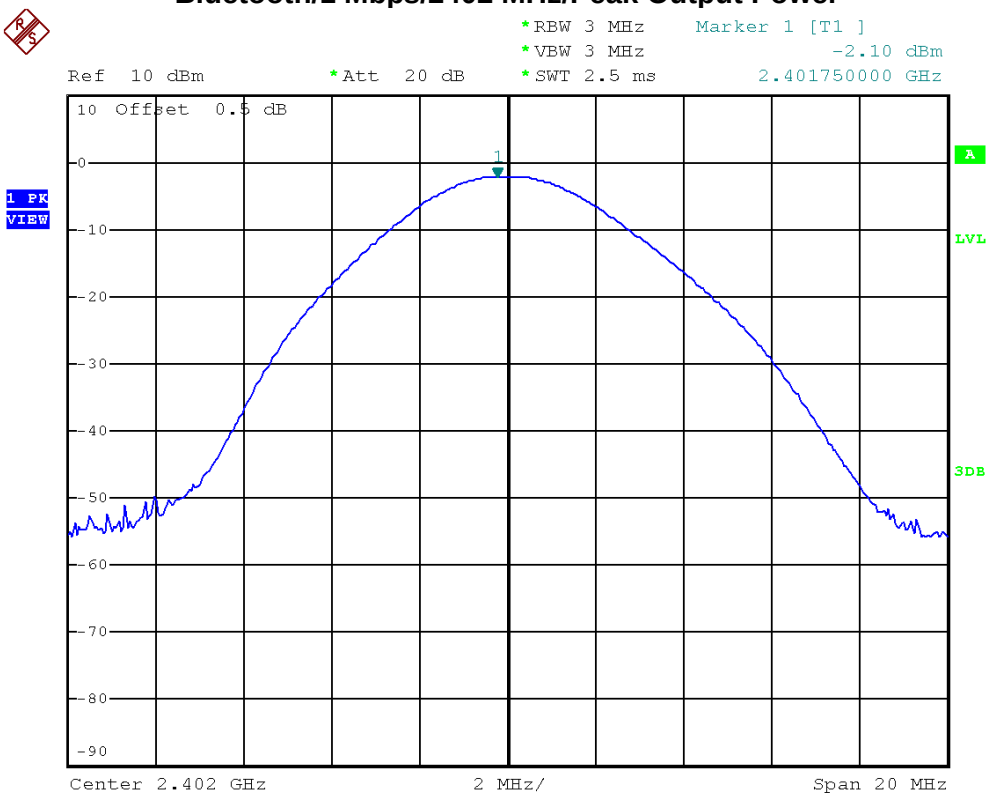
The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

## 7.7 TEST RESULTS

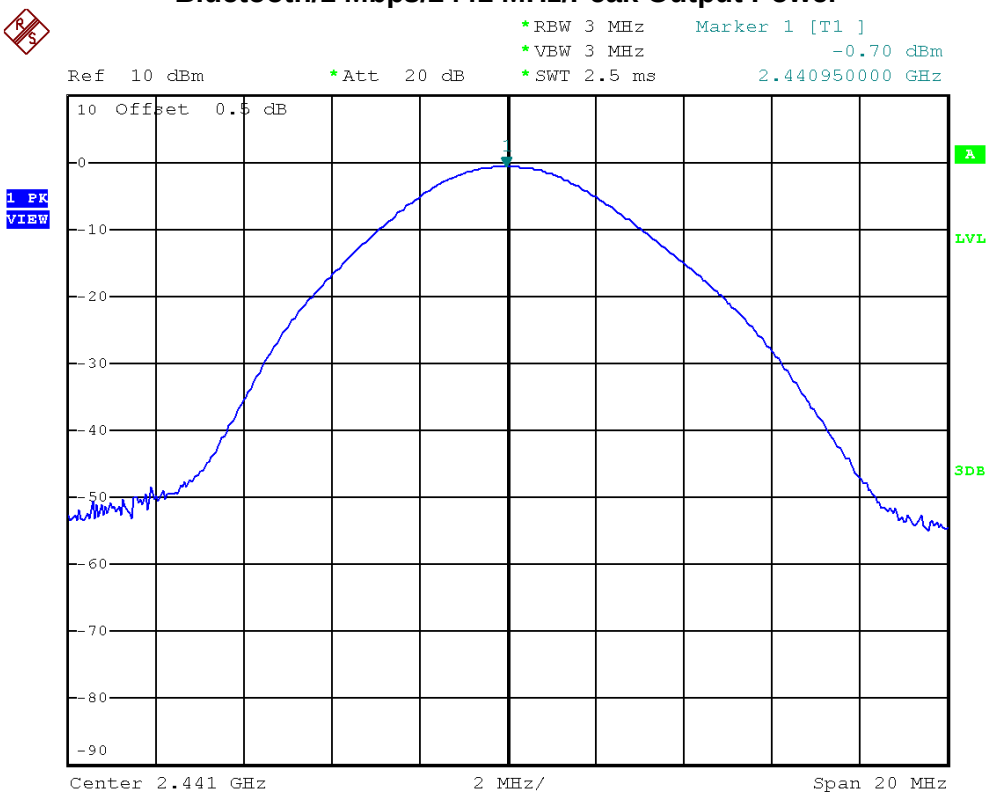
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz, 2441 MHz, 2480 MHz | | |

| Frequency | Peak Output Power (dBm) | LIMIT (dBm) | Result |
|---|---|---|---|
| 2402 MHz | -2.10 | 30 | PASS |
| 2441 MHz | -0.70 | 30 | PASS |
| 2480 MHz | -0.75 | 30 | PASS |

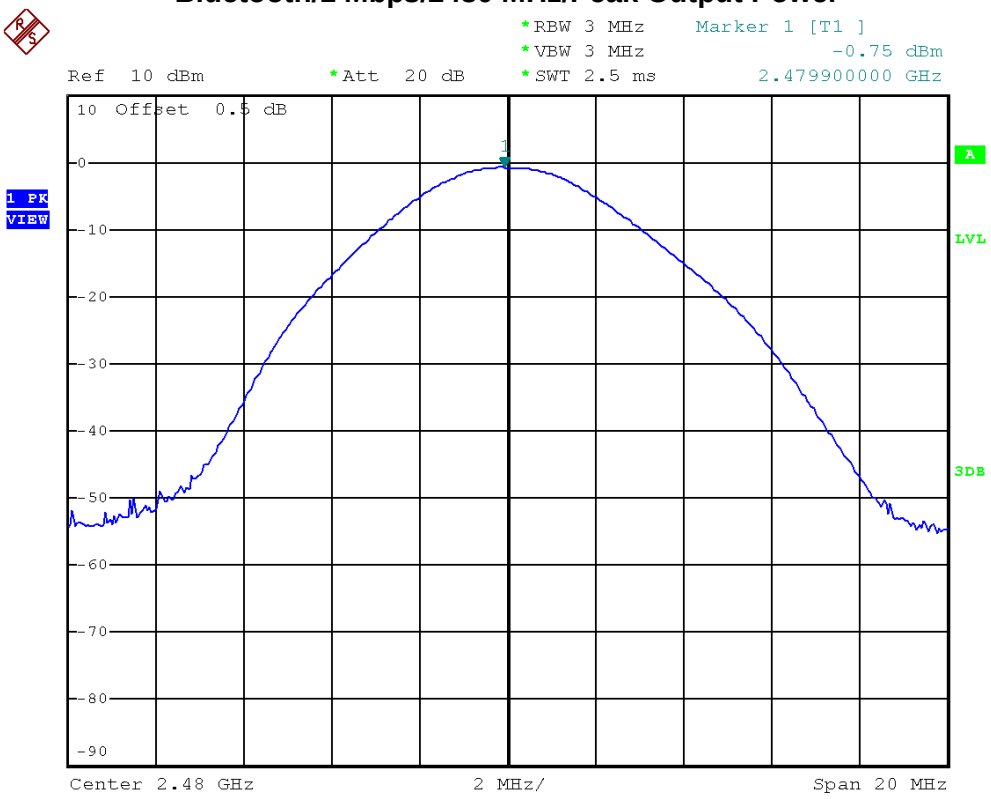
**Bluetooth/1 Mbps/2402 MHz/Peak Output Power**



## Bluetooth/1 Mbps/2441 MHz/Peak Output Power



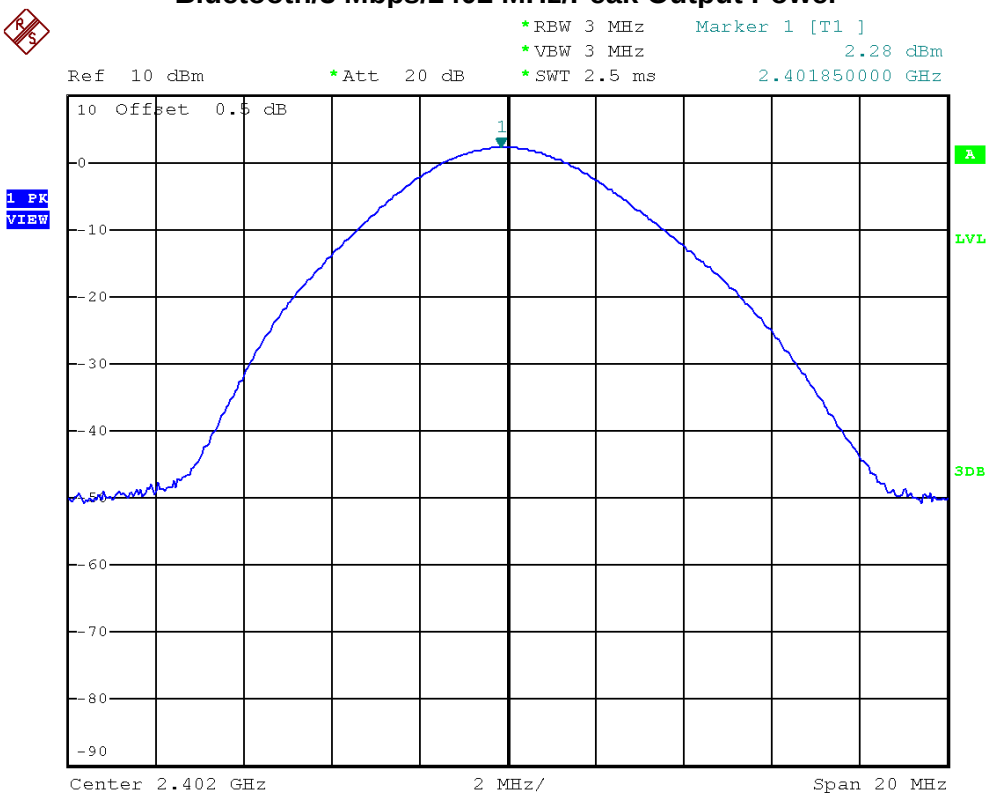

## Bluetooth/1 Mbps/2480 MHz/Peak Output Power



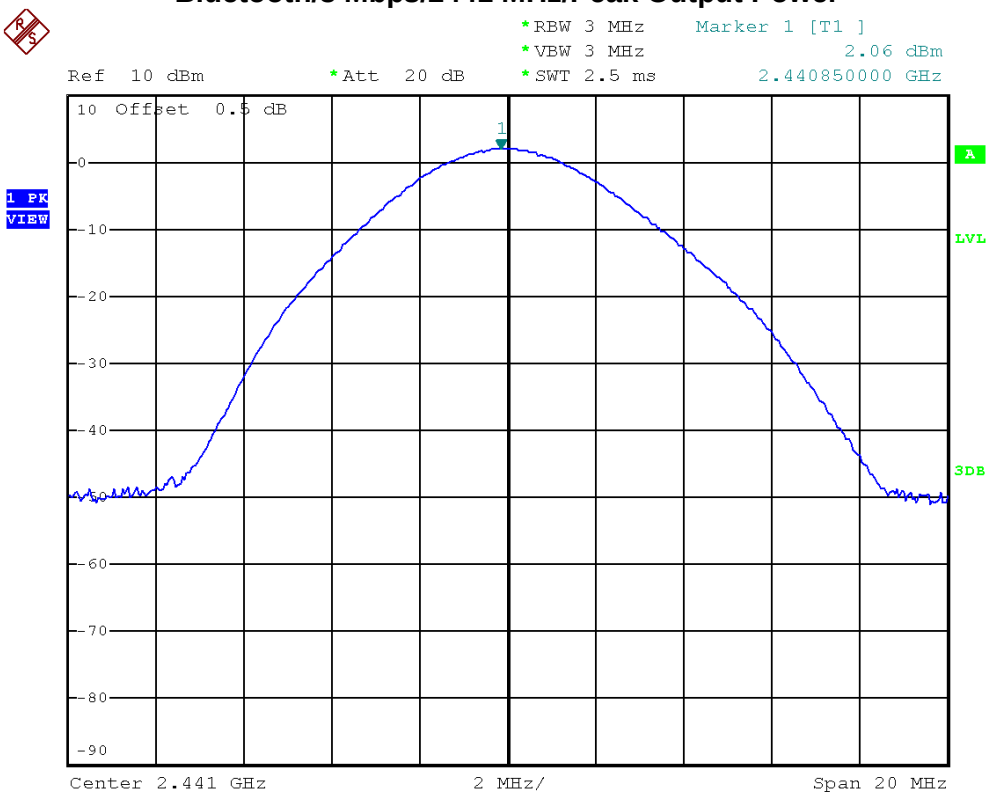
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz, 2441 MHz, 2480 MHz | | |

| Frequency | Peak Output Power (dBm) | LIMIT (dBm) | Result |
|---|---|---|---|
| 2402 MHz | 2.28 | 30 | PASS |
| 2441 MHz | 2.06 | 30 | PASS |
| 2480 MHz | 1.61 | 30 | PASS |

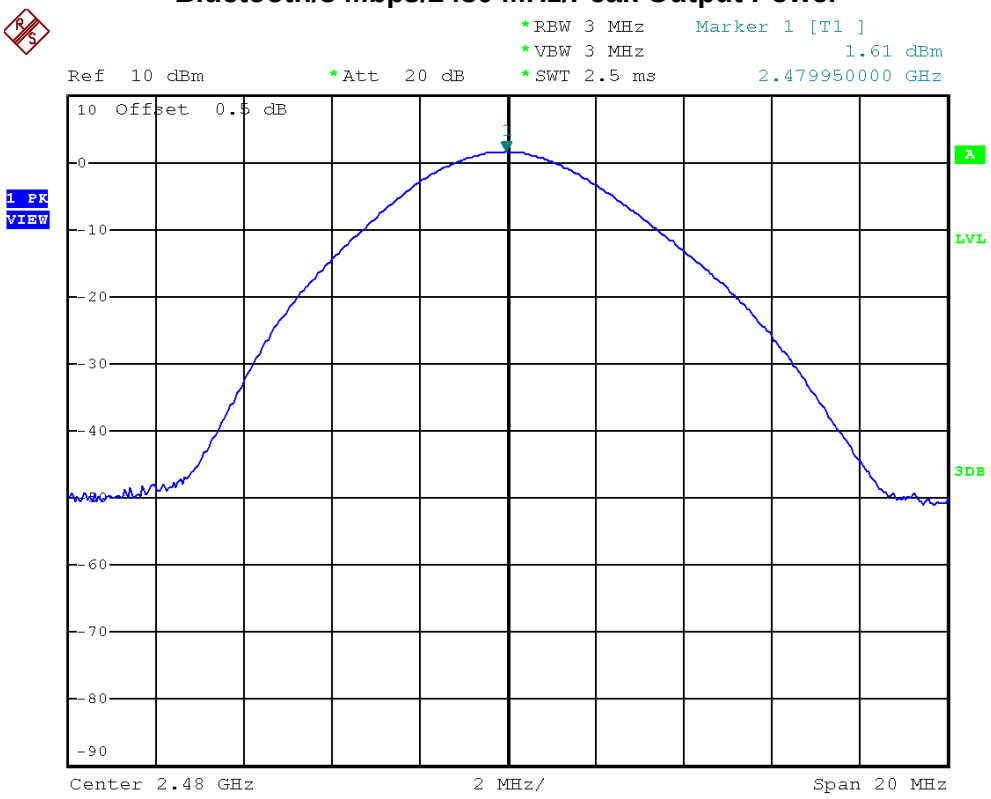
**Bluetooth/3 Mbps/2402 MHz/Peak Output Power**



## Bluetooth/3 Mbps/2441 MHz/Peak Output Power




## Bluetooth/3 Mbps/2480 MHz/Peak Output Power



# 8 RADIATED SPURIOUS EMISSION (9 KHZ TO 1 GHZ)

## 8.1 LIMIT

20 dB in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequency Range: 9 kHz to 1 GHz | | |
|---|---|---|
| FREQUENCY (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

| Frequency Range: above 1 GHz | | | | |
|---|---|---|---|---|
| FREQUENCY (MHz) | Class A (dBuV/m) (at 3m) | | Class B (dBuV/m) (at 3m) | |
| | PEAK | AVERAGE | PEAK | AVERAGE |
| above 1 GHz | 80 | 60 | 74 | 54 |

NOTE:

(1) The limit for radiated test was performed according to FCC PART 15B.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).
(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain(if use)
Margin Level = Measurement Value – Limit Value

## 8.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Oct. 01, 2013 |
| 2 | Horn Antenna | Schwarzbeck | BBHA 9120 | D-325 | Apr. 16, 2013 |
| 3 | Microwave Pre_amplifier | Agilent | 8449B | 3008A01714 | Apr. 17, 2013 |
| 4 | Microflex Cable | N/A | N/A | 1m | Apr. 14, 2013 |
| 5 | Microflex Cable | AISI | S104-SMAP-1 | 10m | Apr. 14, 2013 |
| 6 | Microflex Cable | N/A | N/A | 3m | Apr. 14, 2013 |
| 7 | Test Cable | N/A | LMR-400 | 966_12m | May. 15, 2013 |
| 8 | Test Cable | N/A | LMR-400 | 966_3m | May. 15, 2013 |
| 9 | Pre-Amplifier | EMC | EMC-330 | 980001 | May. 31, 2013 |
| 10 | Log-Bicon Antenna | Schwarzbeck | VULB9168-352 | 9168-352 | Jun. 12, 2013 |

Remark: “N/A” denotes No Model Name, No Serial No. or No Calibration specified.

## 8.3 MEASURING INSTRUMENTS SETTING

| EMI Test Receiver | Parameter Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

## 8.4 TEST PROCEDURES

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1 GHz. For frequencies above 1 GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
g. The testing follows the guidelines in ANSI C63.4 and FCC Public Notice DA 00-705 Measurement Guidelines. In case the emission is fail due to the used RBW/VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

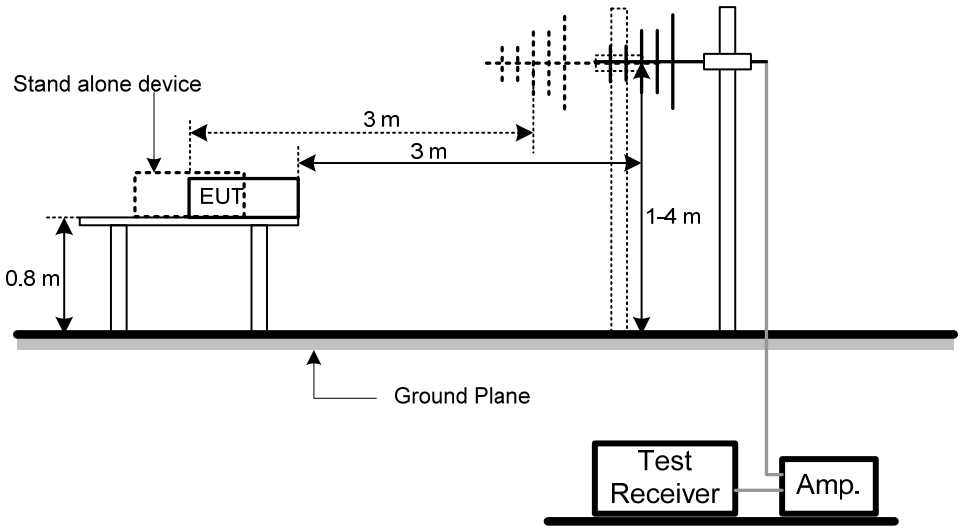
**NOTE:**

a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz; SPA setting in RBW=100 kHz, VBW =100 kHz, Swp. Time = 0.3 sec./ MHz.
b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform.

## 8.5 DEVIATION FROM TEST STANDARD

No deviation

## 8.6 TEST SETUP LAYOUT



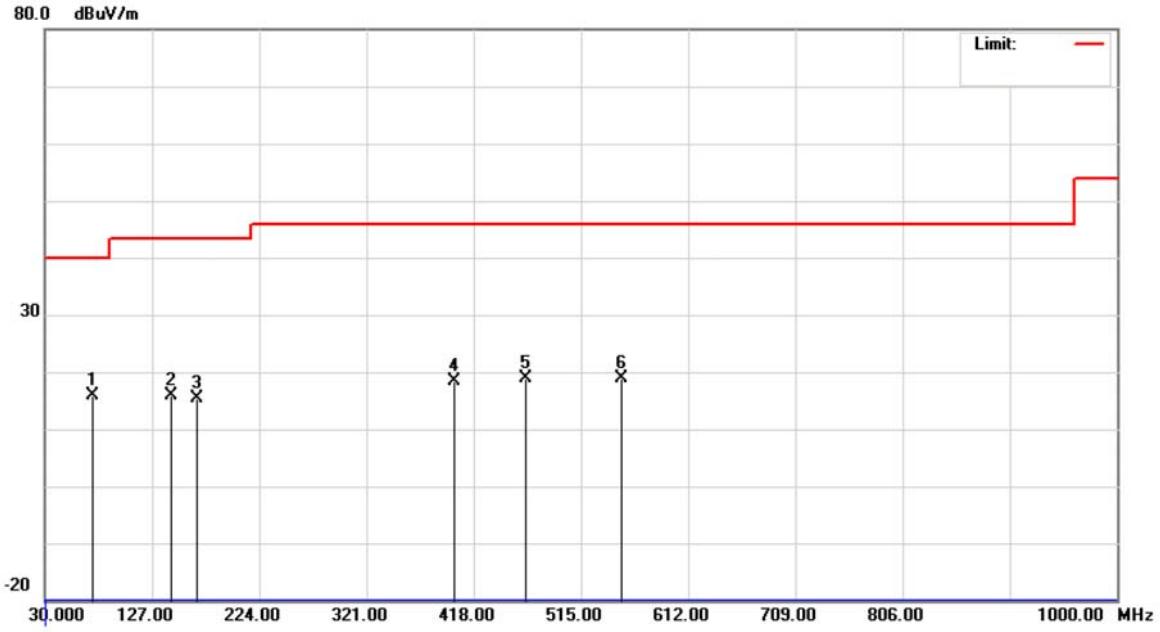
## 8.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

## 8.8 TEST RESULTS

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

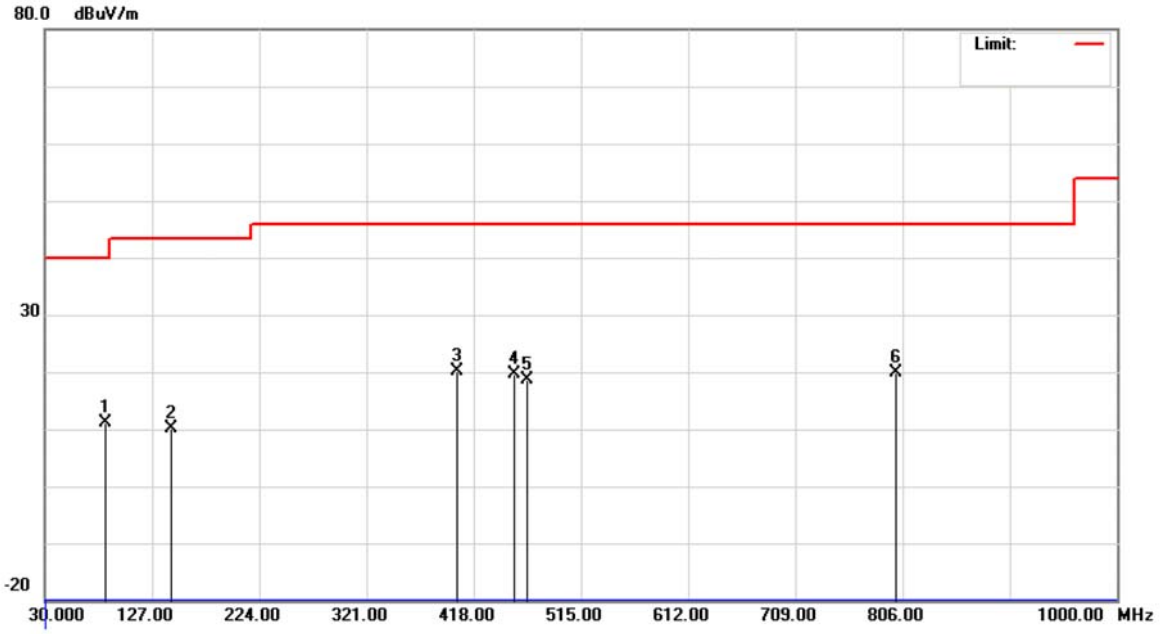
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 72.6800 | 37.26 | -21.30 | 15.96 | 40.00 | -24.04 | peak | |
| 2 | | 144.4600 | 34.73 | -18.86 | 15.87 | 43.50 | -27.63 | peak | |
| 3 | | 167.7400 | 34.64 | -19.34 | 15.30 | 43.50 | -28.20 | peak | |
| 4 | | 400.5400 | 34.14 | -15.69 | 18.45 | 46.00 | -27.55 | peak | |
| 5 | | 464.5599 | 33.06 | -14.26 | 18.80 | 46.00 | -27.20 | peak | |
| 6 | | 551.8599 | 31.56 | -12.62 | 18.94 | 46.00 | -27.06 | peak | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 84.3199 | 35.22 | -24.12 | 11.10 | 40.00 | -28.90 | peak | |
| 2 | | 144.4600 | 28.99 | -18.86 | 10.13 | 43.50 | -33.37 | peak | |
| 3 | * | 402.4800 | 35.65 | -15.64 | 20.01 | 46.00 | -25.99 | peak | |
| 4 | | 454.8599 | 33.97 | -14.45 | 19.52 | 46.00 | -26.48 | peak | |
| 5 | | 466.5000 | 32.95 | -14.22 | 18.73 | 46.00 | -27.27 | peak | |
| 6 | | 800.1799 | 28.22 | -8.35 | 19.87 | 46.00 | -26.13 | peak | |

# 9 RADIATED SPURIOUS EMISSION (ABOVE 1 GHZ)

## 9.1 LIMIT

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequency Range: 9 kHz to 1 GHz | | |
|---|---|---|
| FREQUENCY (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

| Frequency Range: above 1 GHz | | | | |
|---|---|---|---|---|
| FREQUENCY (MHz) | Class A (dBuV/m) (at 3m) | | Class B (dBuV/m) (at 3m) | |
| | PEAK | AVERAGE | PEAK | AVERAGE |
| above 1 GHz | 80 | 60 | 74 | 54 |

NOTE:

(1) The limit for radiated test was performed according to FCC PART 15B.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).
(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain(if use)
Margin Level = Measurement Value – Limit Value

## 9.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Oct. 01, 2013 |
| 2 | Horn Antenna | Schwarzbeck | BBHA 9120 | D-325 | Apr. 16, 2013 |
| 3 | Microwave Pre_amplifier | Agilent | 8449B | 3008A01714 | Apr. 17, 2013 |
| 4 | Microflex Cable | N/A | N/A | 1m | Apr. 14, 2013 |
| 5 | Microflex Cable | AISI | S104-SMAP-1 | 10m | Apr. 14, 2013 |
| 6 | Microflex Cable | N/A | N/A | 3m | Apr. 14, 2013 |
| 7 | Test Cable | N/A | LMR-400 | 966_12m | May. 15, 2013 |
| 8 | Test Cable | N/A | LMR-400 | 966_3m | May. 15, 2013 |
| 9 | Pre-Amplifier | EMC | EMC-330 | 980001 | May. 31, 2013 |
| 10 | Log-Bicon Antenna | Schwarzbeck | VULB9168-352 | 9168-352 | Jun. 12, 2013 |

Remark: “N/A” denotes No Model Name, No Serial No. or No Calibration specified.

## 9.3 MEASURING INSTRUMENTS SETTING

| Spectrum Analyzer | Parameter Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (other emission) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |

## 9.4 TEST PROCEDURES

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1 GHz. For frequencies above 1 GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
g. The testing follows the guidelines in ANSI C63.4 and FCC Public Notice DA 00-705 Measurement Guidelines. In case the emission is fail due to the used RBW/VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

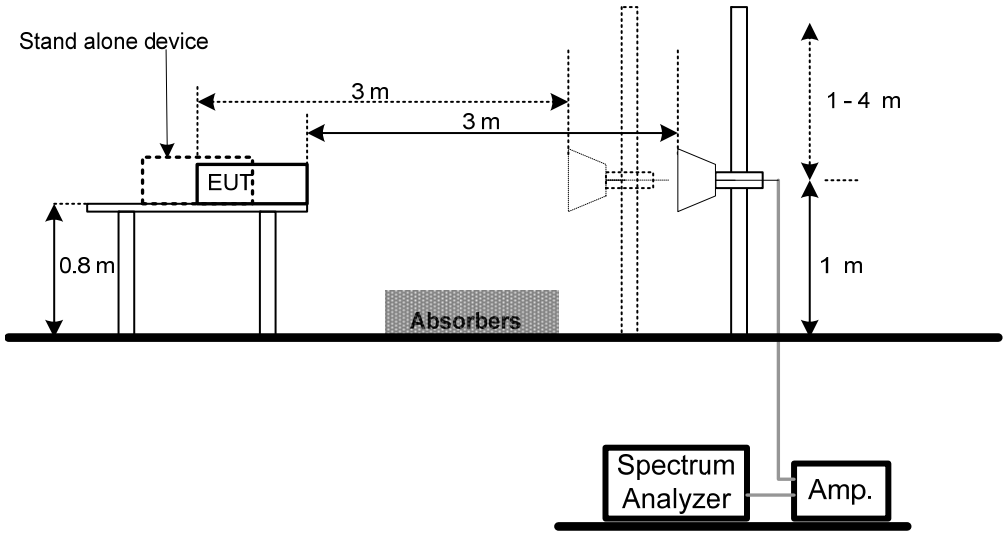
**NOTE:**

a. Reading in which marked as Peak means measurements by using are Peak Mode with instrument setting in RBW= 1 MHz, VBW= 1 MHz, Swp. Time = Auto.
Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW= 1 MHz, VBW= 10 Hz, Swp. Time = Auto.
b. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform.

## 9.5 DEVIATION FROM TEST STANDARD

No deviation

## 9.6 TEST SETUP LAYOUT



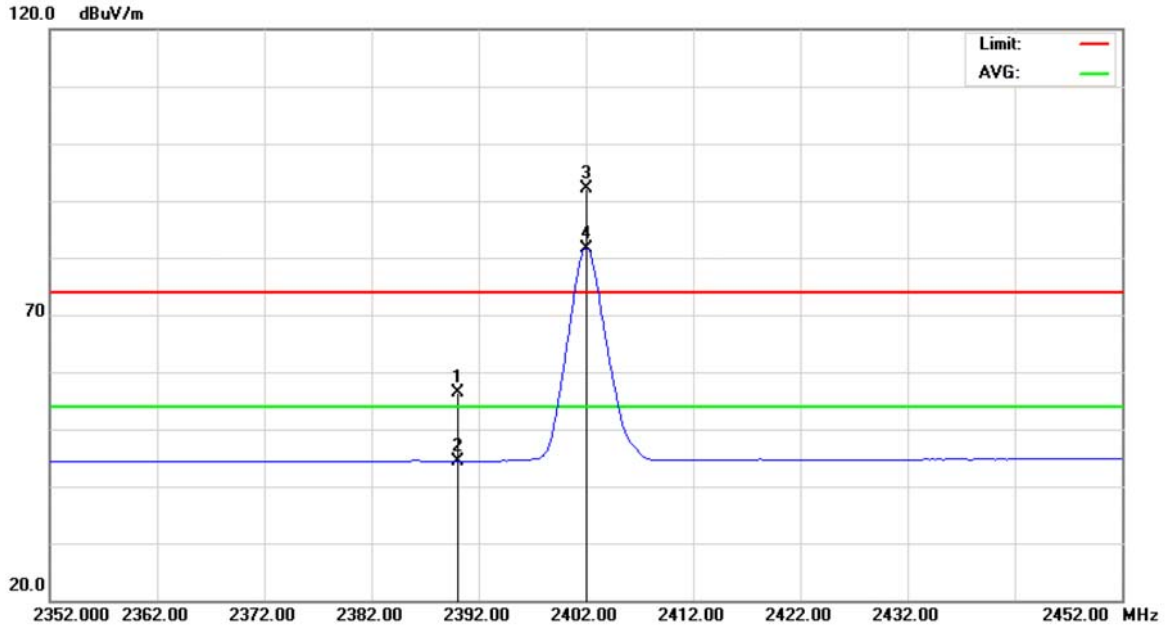
## 9.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

## 9.8 TEST RESULTS

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz | | |

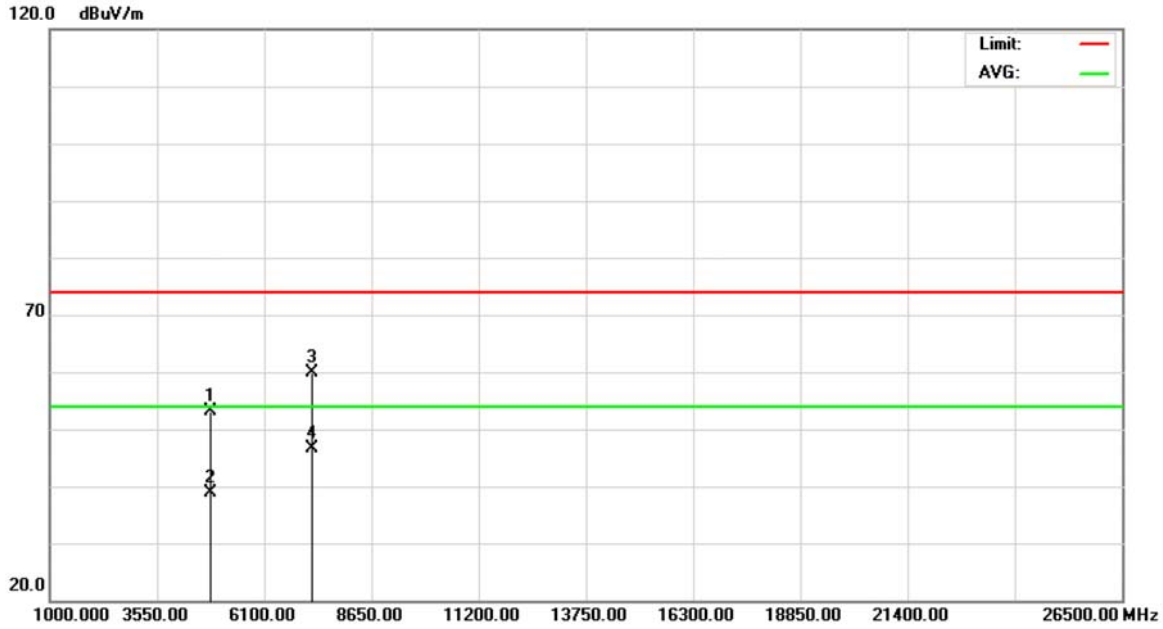
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2390.000 | 23.43 | 32.99 | 56.42 | 74.00 | -17.58 | peak | |
| 2 | | 2390.000 | 11.46 | 32.99 | 44.45 | 54.00 | -9.55 | AVG | |
| 3 | X | 2402.000 | 59.15 | 33.06 | 92.21 | 74.00 | 18.21 | peak | |
| 4 | * | 2402.000 | 48.58 | 33.06 | 81.64 | 54.00 | 27.64 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz | | |

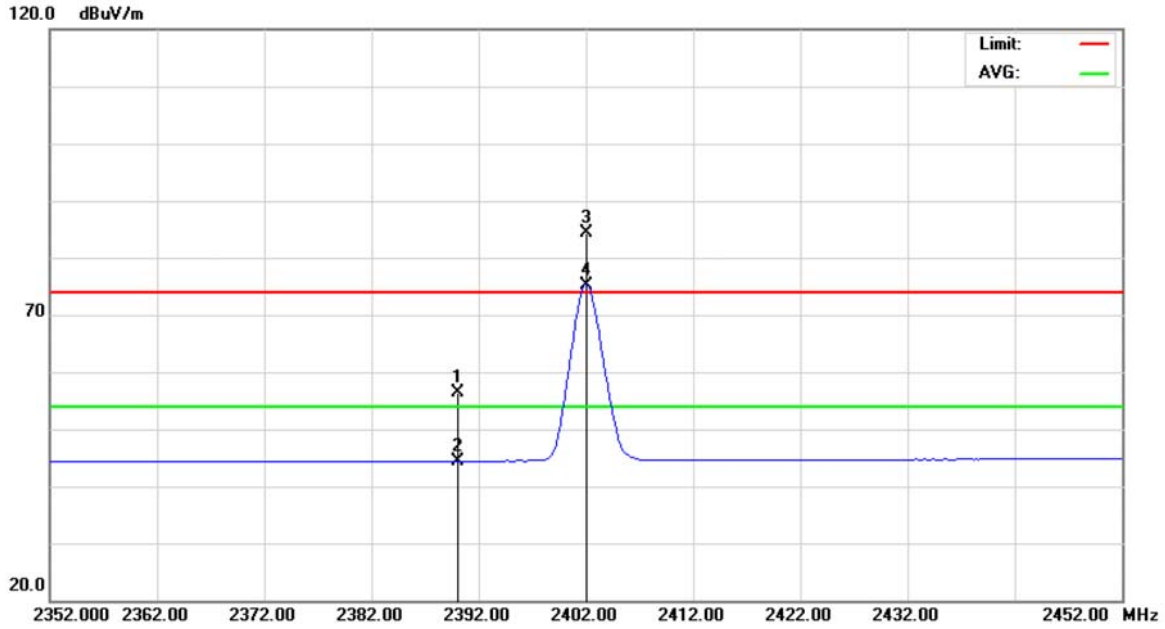
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4802.440 | 45.77 | 7.41 | 53.18 | 74.00 | -20.82 | peak | |
| 2 | | 4802.440 | 31.58 | 7.41 | 38.99 | 54.00 | -15.01 | AVG | |
| 3 | | 7206.390 | 45.12 | 14.79 | 59.91 | 74.00 | -14.09 | peak | |
| 4 | * | 7206.390 | 31.81 | 14.79 | 46.60 | 54.00 | -7.40 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz | | |

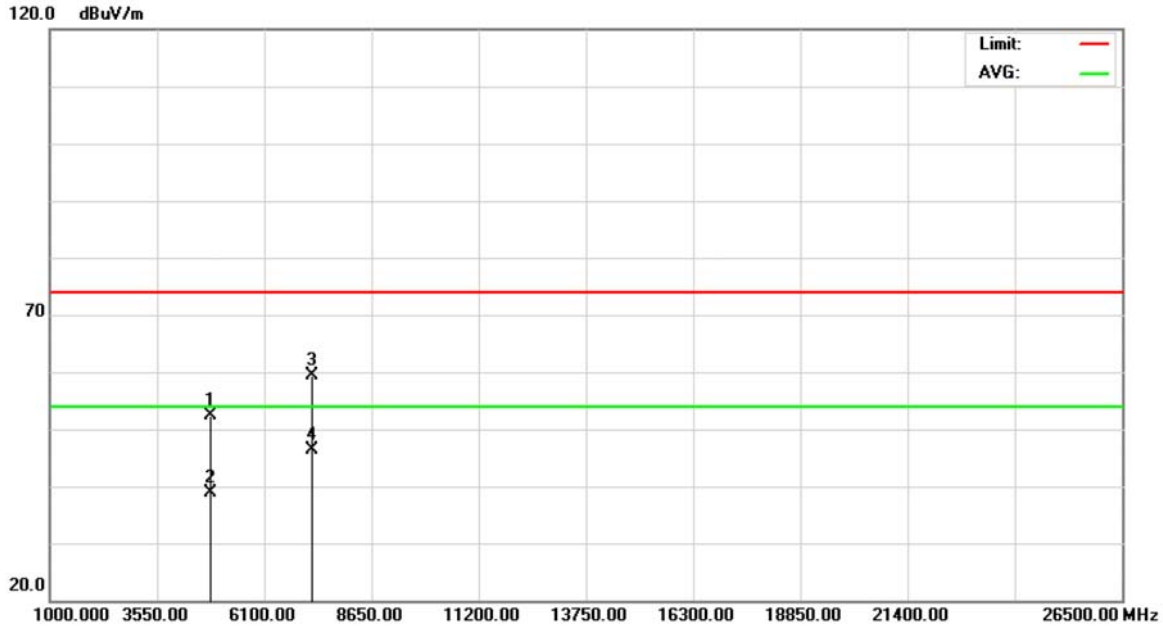
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2390.000 | 23.32 | 32.99 | 56.31 | 74.00 | -17.69 | peak | |
| 2 | | 2390.000 | 11.43 | 32.99 | 44.42 | 54.00 | -9.58 | AVG | |
| 3 | X | 2402.000 | 51.41 | 33.06 | 84.47 | 74.00 | 10.47 | peak | |
| 4 | * | 2402.000 | 42.19 | 33.06 | 75.25 | 54.00 | 21.25 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz | | |

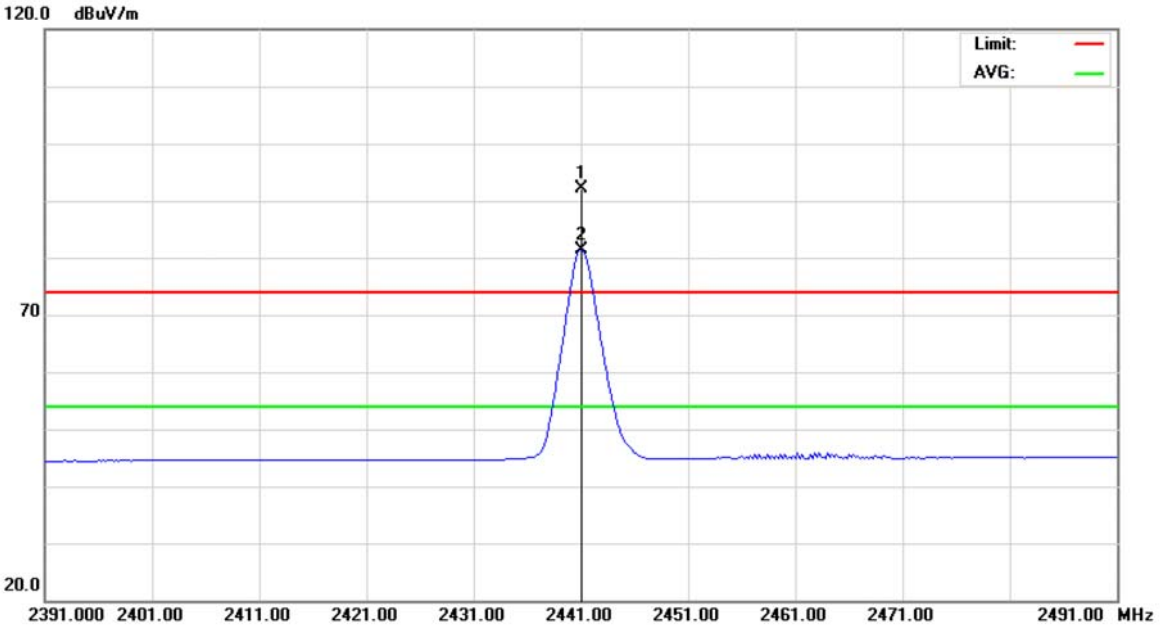
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4803.100 | 44.94 | 7.41 | 52.35 | 74.00 | -21.65 | peak | |
| 2 | | 4803.100 | 31.49 | 7.41 | 38.90 | 54.00 | -15.10 | AVG | |
| 3 | | 7206.000 | 44.67 | 14.79 | 59.46 | 74.00 | -14.54 | peak | |
| 4 | * | 7206.000 | 31.61 | 14.79 | 46.40 | 54.00 | -7.60 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

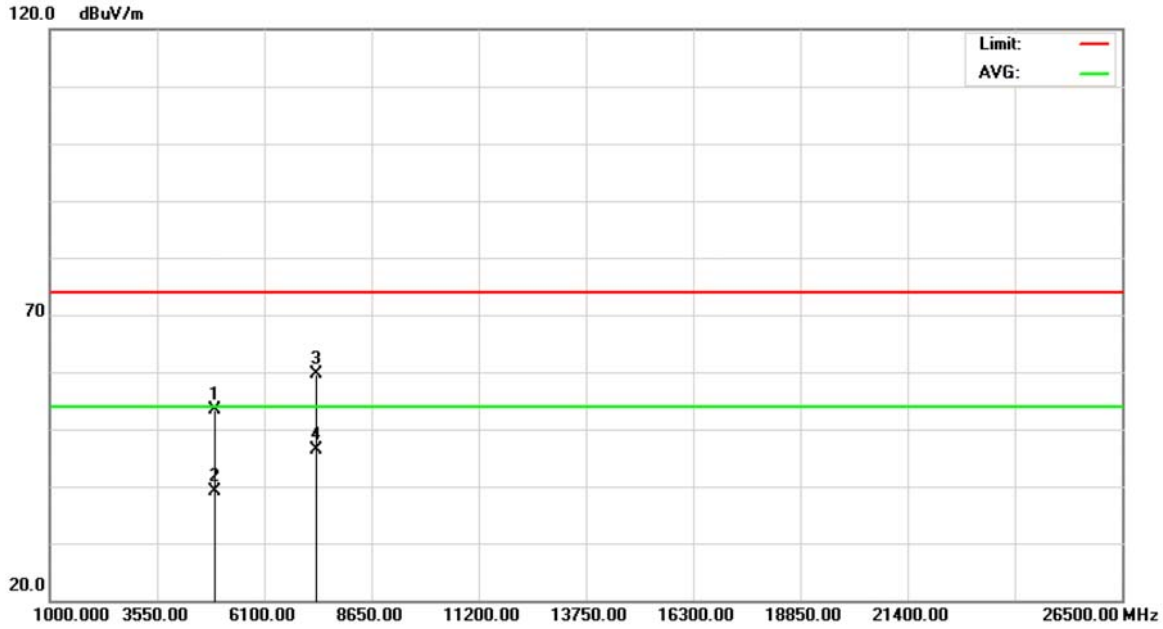
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | X | 2441.000 | 58.80 | 33.27 | 92.07 | 74.00 | 18.07 | peak | |
| 2 | * | 2441.000 | 48.15 | 33.27 | 81.42 | 54.00 | 27.42 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

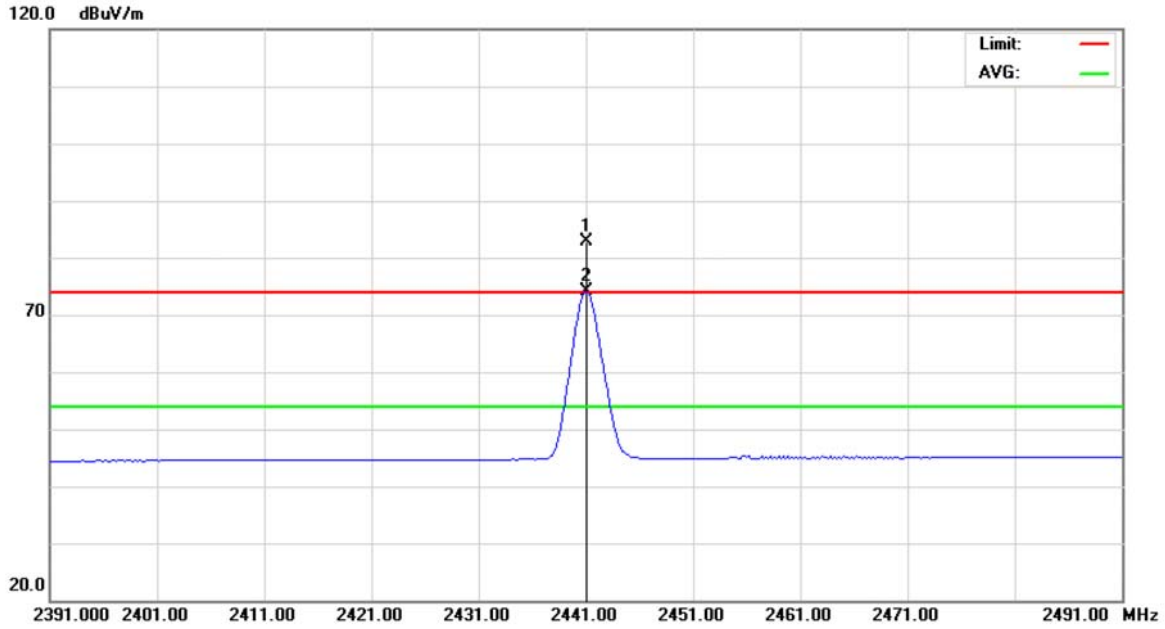
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4882.250 | 45.79 | 7.70 | 53.49 | 74.00 | -20.51 | peak | |
| 2 | | 4882.250 | 31.40 | 7.70 | 39.10 | 54.00 | -14.90 | AVG | |
| 3 | | 7322.690 | 44.64 | 15.10 | 59.74 | 74.00 | -14.26 | peak | |
| 4 | * | 7322.690 | 31.28 | 15.10 | 46.38 | 54.00 | -7.62 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

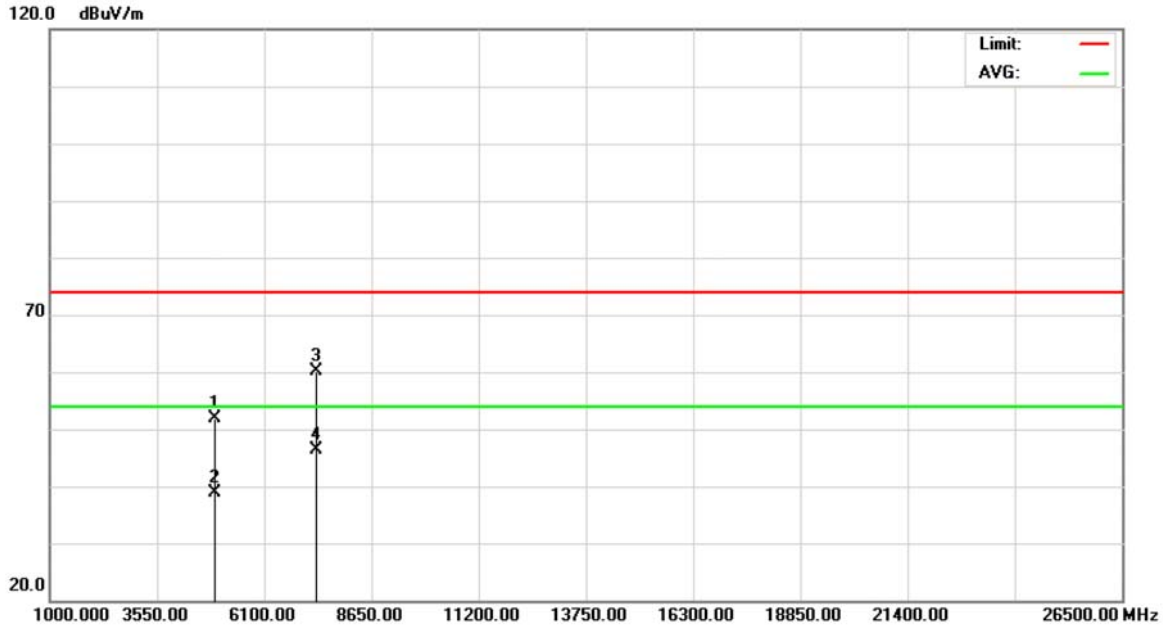
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | X | 2441.000 | 49.56 | 33.27 | 82.83 | 74.00 | 8.83 | peak | |
| 2 | * | 2441.000 | 40.76 | 33.27 | 74.03 | 54.00 | 20.03 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

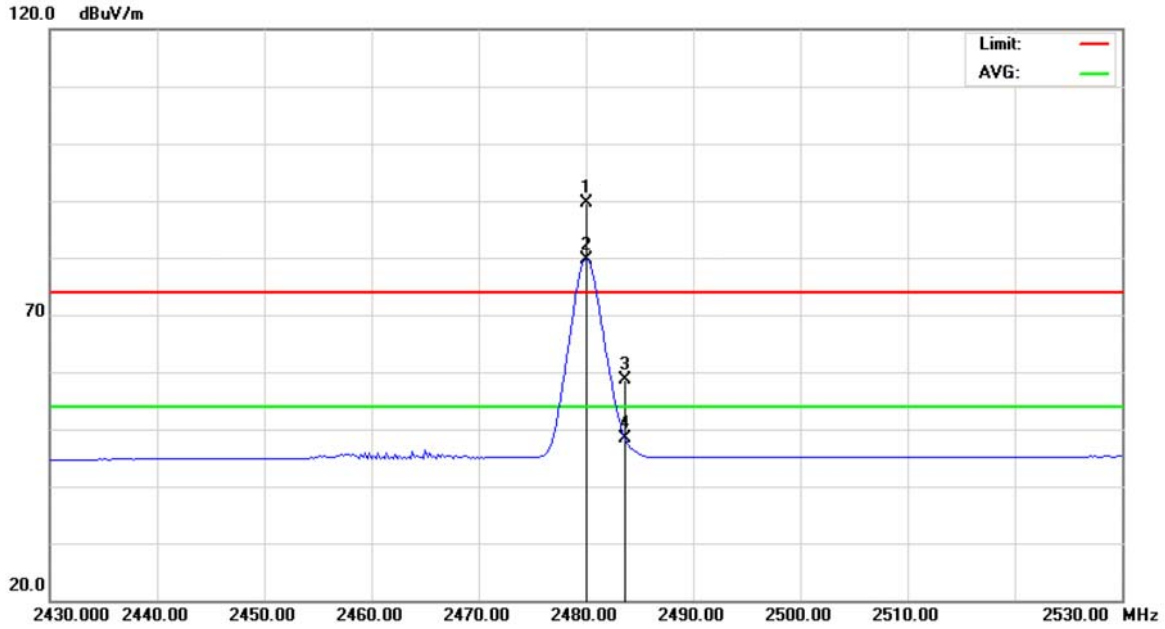
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4880.830 | 44.23 | 7.69 | 51.92 | 74.00 | -22.08 | peak | |
| 2 | | 4880.830 | 31.14 | 7.69 | 38.83 | 54.00 | -15.17 | AVG | |
| 3 | | 7323.300 | 44.91 | 15.10 | 60.01 | 74.00 | -13.99 | peak | |
| 4 | * | 7323.300 | 31.18 | 15.10 | 46.28 | 54.00 | -7.72 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2480 MHz | | |

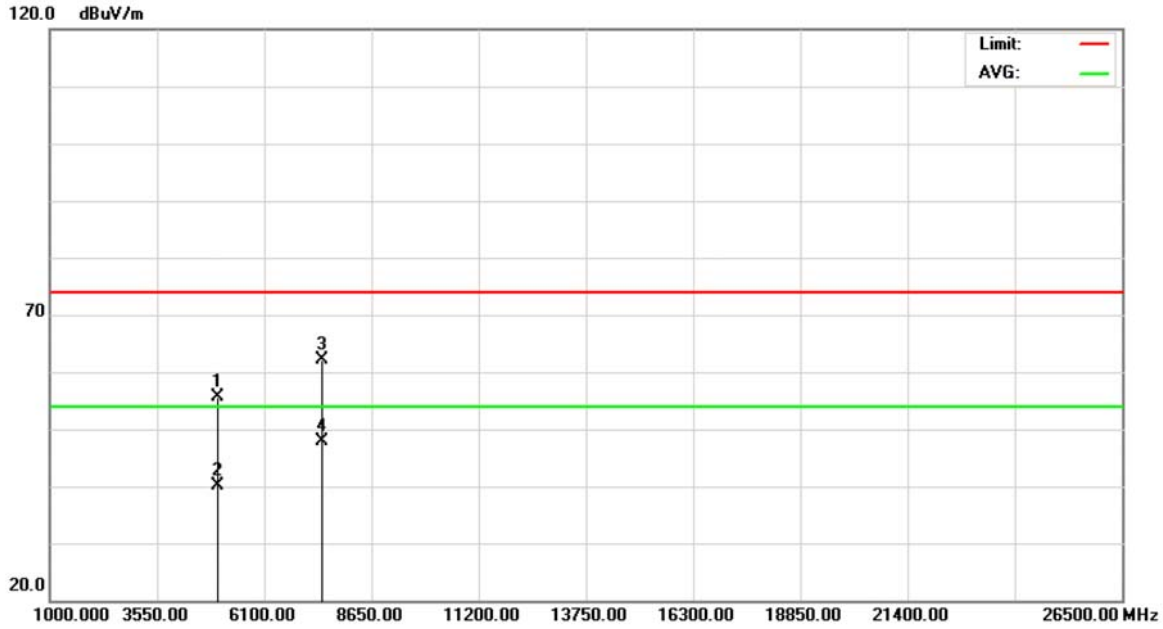
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | X | 2480.000 | 56.16 | 33.48 | 89.64 | 74.00 | 15.64 | peak | |
| 2 | * | 2480.000 | 46.24 | 33.48 | 79.72 | 54.00 | 25.72 | AVG | |
| 3 | | 2483.500 | 25.05 | 33.50 | 58.55 | 74.00 | -15.45 | peak | |
| 4 | | 2483.500 | 14.93 | 33.50 | 48.43 | 54.00 | -5.57 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2480 MHz | | |

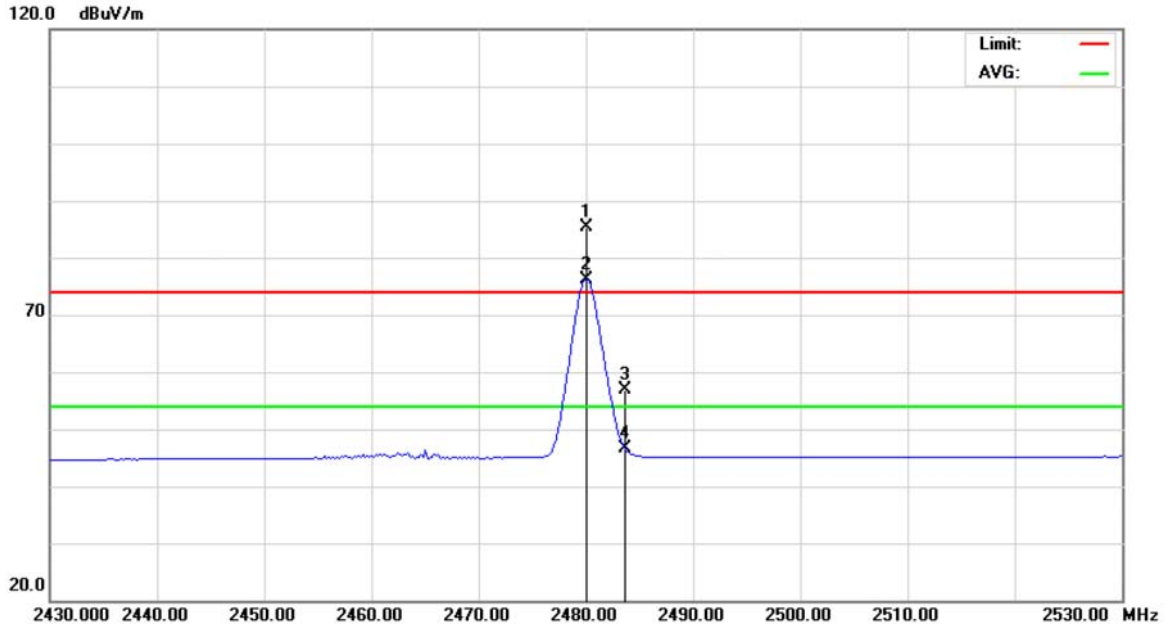
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4959.110 | 47.60 | 7.97 | 55.57 | 74.00 | -18.43 | peak | |
| 2 | | 4959.110 | 32.10 | 7.97 | 40.07 | 54.00 | -13.93 | AVG | |
| 3 | | 7439.890 | 46.64 | 15.40 | 62.04 | 74.00 | -11.96 | peak | |
| 4 | * | 7439.890 | 32.58 | 15.40 | 47.98 | 54.00 | -6.02 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2480 MHz | | |

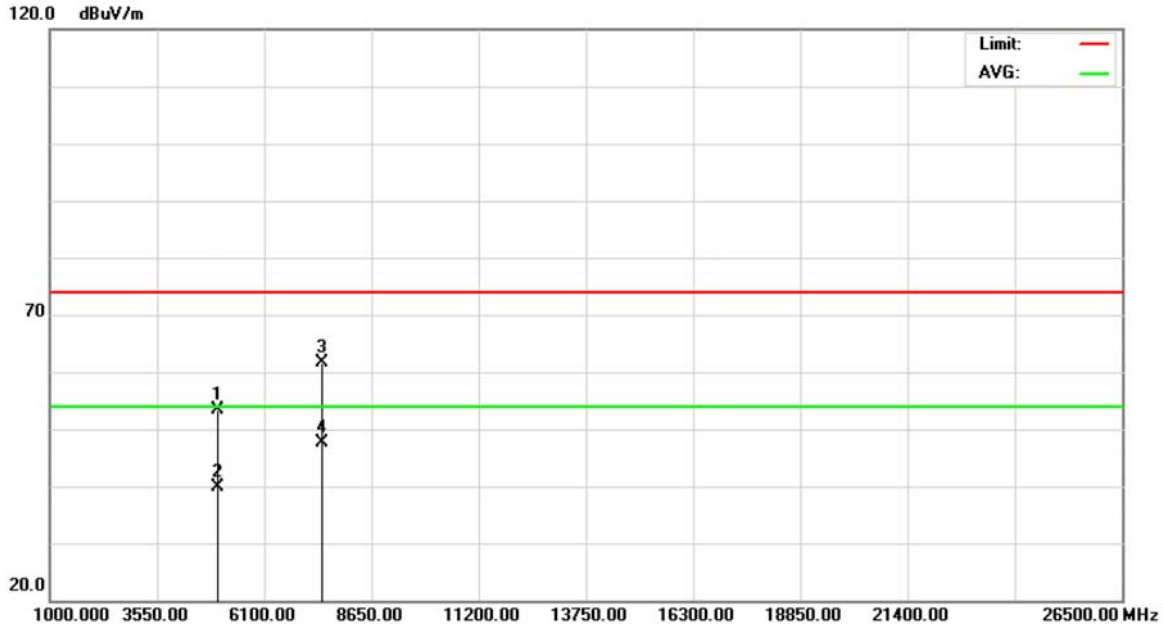
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | X | 2480.000 | 51.91 | 33.48 | 85.39 | 74.00 | 11.39 | peak | |
| 2 | * | 2480.000 | 42.75 | 33.48 | 76.23 | 54.00 | 22.23 | AVG | |
| 3 | | 2483.500 | 23.41 | 33.50 | 56.91 | 74.00 | -17.09 | peak | |
| 4 | | 2483.500 | 13.11 | 33.50 | 46.61 | 54.00 | -7.39 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2480 MHz | | |

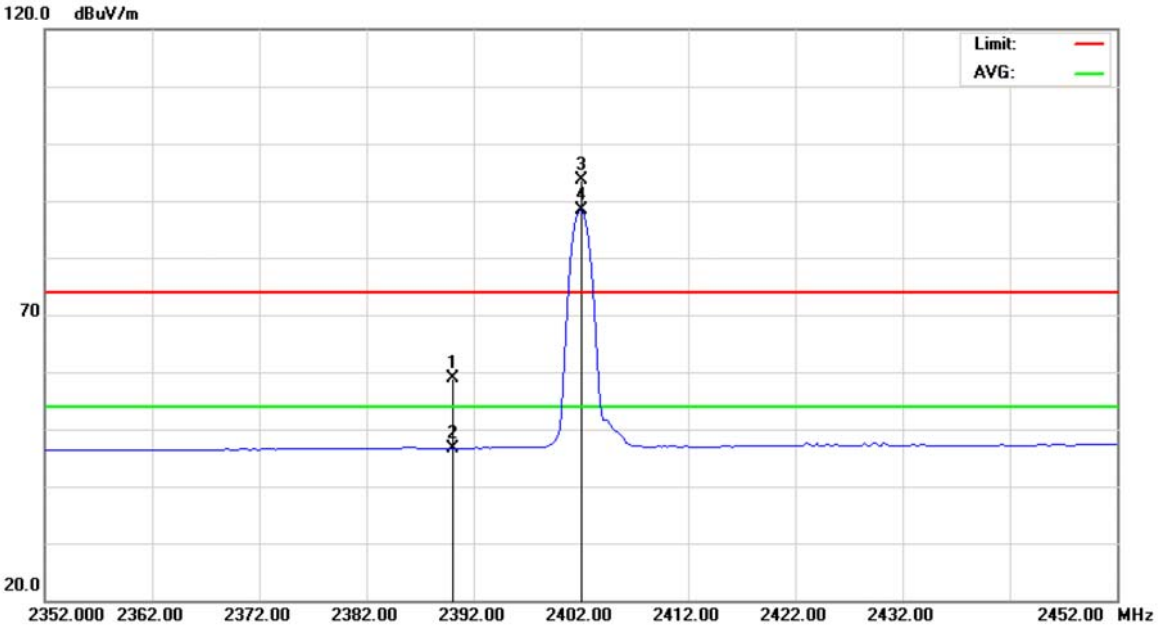
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4959.890 | 45.29 | 7.98 | 53.27 | 74.00 | -20.73 | peak | |
| 2 | | 4959.890 | 31.89 | 7.98 | 39.87 | 54.00 | -14.13 | AVG | |
| 3 | | 7440.430 | 46.19 | 15.40 | 61.59 | 74.00 | -12.41 | peak | |
| 4 | * | 7440.430 | 32.32 | 15.40 | 47.72 | 54.00 | -6.28 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz | | |

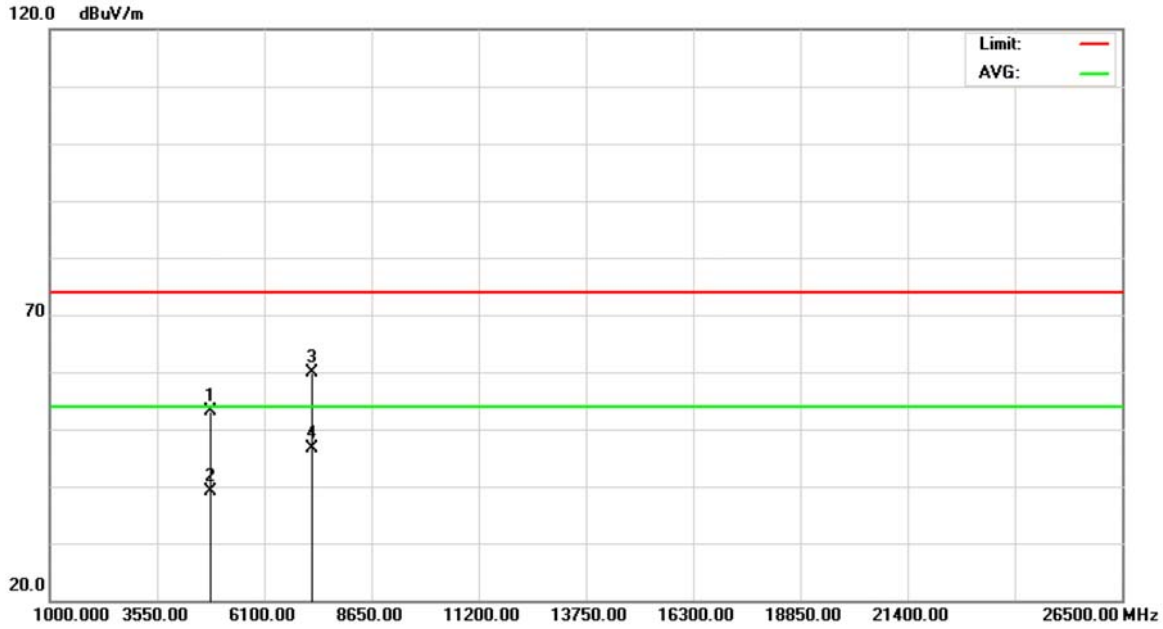
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2390.000 | 25.57 | 33.25 | 58.82 | 74.00 | -15.18 | peak | |
| 2 | | 2390.000 | 13.42 | 33.25 | 46.67 | 54.00 | -7.33 | AVG | |
| 3 | X | 2402.000 | 60.38 | 33.31 | 93.69 | 74.00 | 19.69 | peak | |
| 4 | * | 2402.000 | 55.00 | 33.31 | 88.31 | 54.00 | 34.31 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz | | |

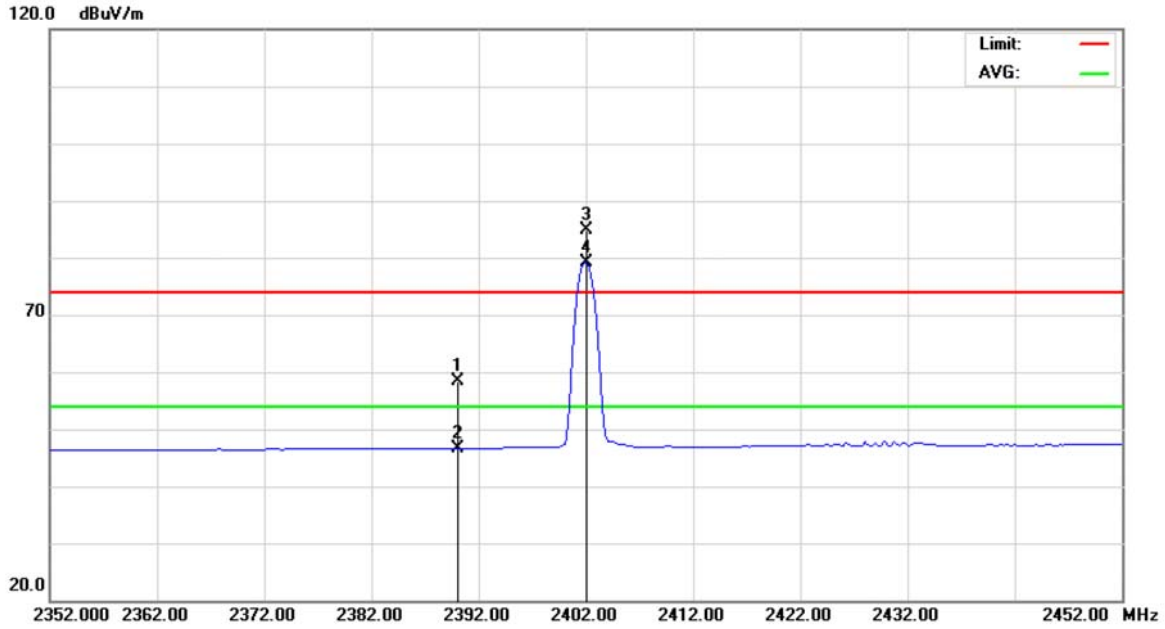
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4803.320 | 45.71 | 7.41 | 53.12 | 74.00 | -20.88 | peak | |
| 2 | | 4803.320 | 31.64 | 7.41 | 39.05 | 54.00 | -14.95 | AVG | |
| 3 | | 7208.440 | 45.17 | 14.80 | 59.97 | 74.00 | -14.03 | peak | |
| 4 | * | 7208.440 | 31.77 | 14.80 | 46.57 | 54.00 | -7.43 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz | | |

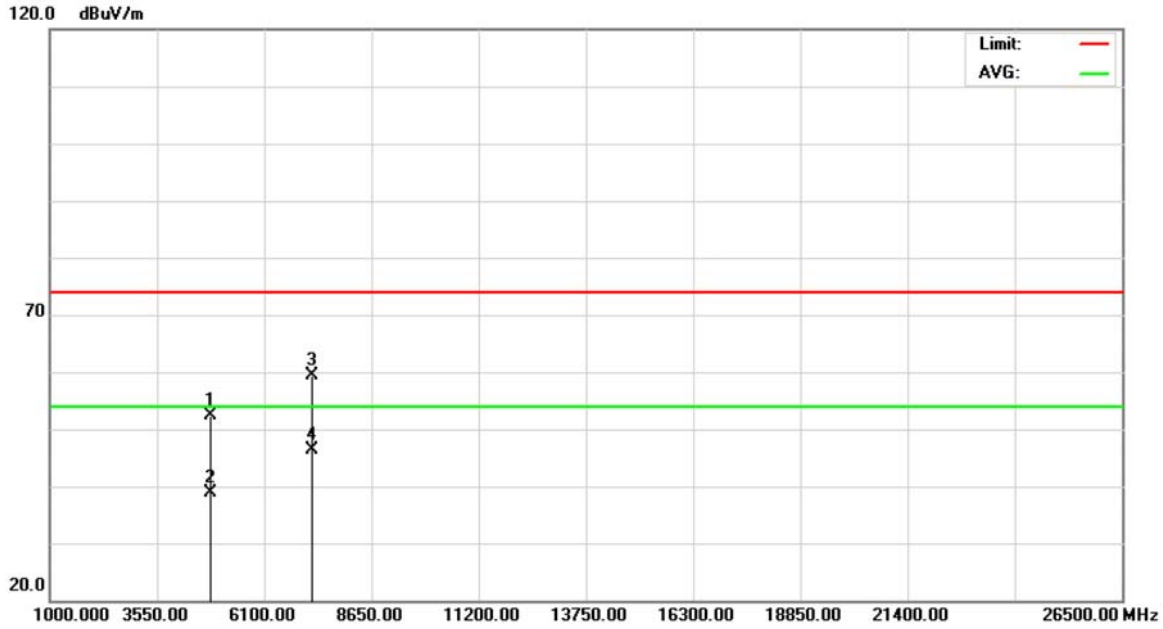
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2390.000 | 25.24 | 33.25 | 58.49 | 74.00 | -15.51 | peak | |
| 2 | | 2390.000 | 13.42 | 33.25 | 46.67 | 54.00 | -7.33 | AVG | |
| 3 | X | 2402.000 | 51.51 | 33.31 | 84.82 | 74.00 | 10.82 | peak | |
| 4 | * | 2402.000 | 45.90 | 33.31 | 79.21 | 54.00 | 25.21 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz | | |

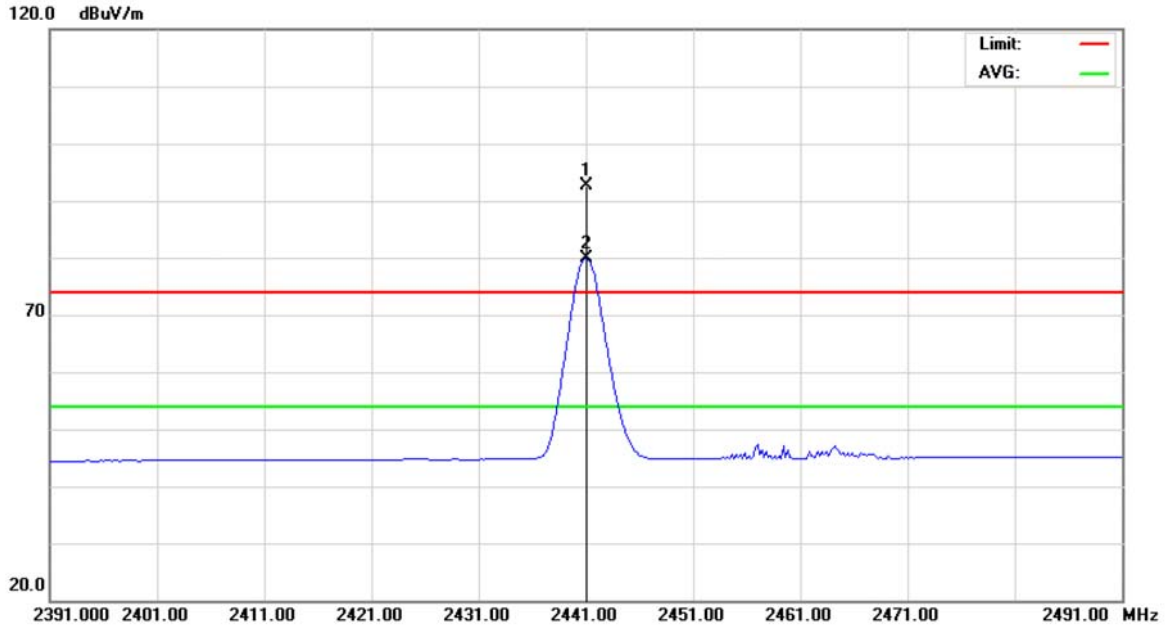
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4803.860 | 45.09 | 7.41 | 52.50 | 74.00 | -21.50 | peak | |
| 2 | | 4803.860 | 31.48 | 7.41 | 38.89 | 54.00 | -15.11 | AVG | |
| 3 | | 7205.840 | 44.66 | 14.79 | 59.45 | 74.00 | -14.55 | peak | |
| 4 | * | 7205.840 | 31.54 | 14.79 | 46.33 | 54.00 | -7.67 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2441 MHz | | |

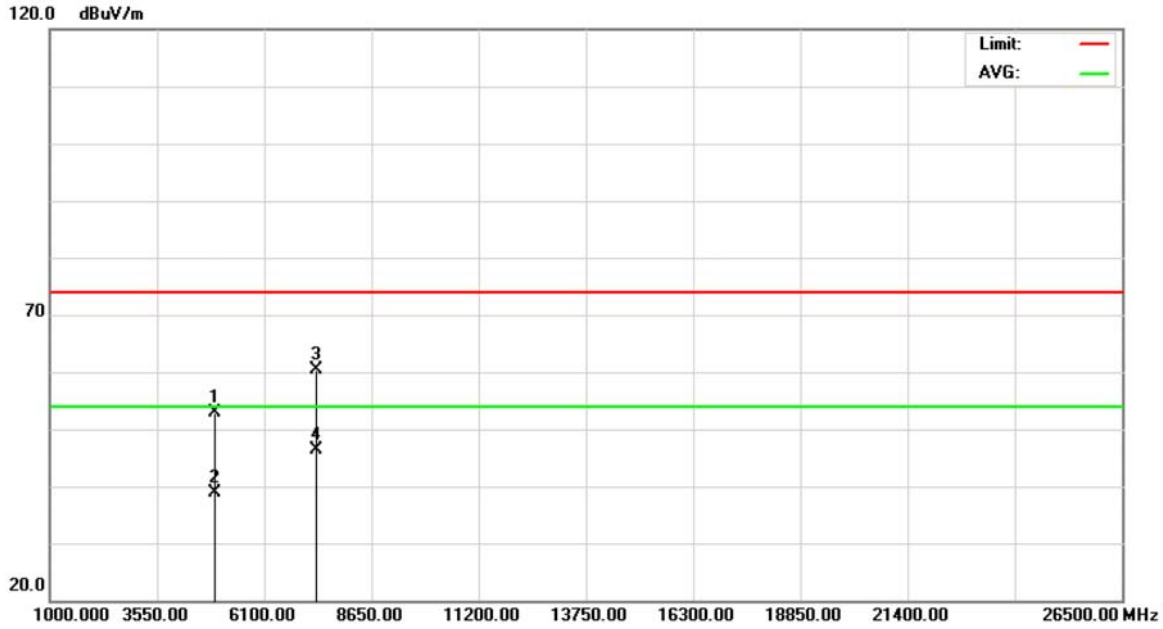
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | X | 2441.000 | 59.46 | 33.27 | 92.73 | 74.00 | 18.73 | peak | |
| 2 | * | 2441.000 | 46.50 | 33.27 | 79.77 | 54.00 | 25.77 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2441 MHz | | |

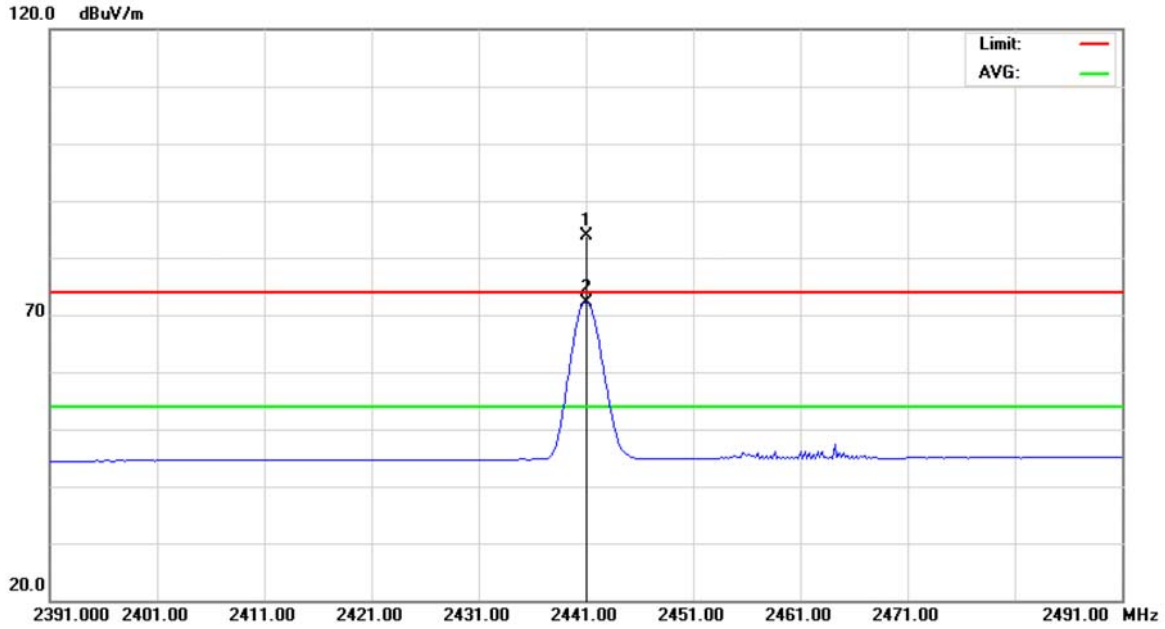
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4880.590 | 45.29 | 7.69 | 52.98 | 74.00 | -21.02 | peak | |
| 2 | | 4880.590 | 31.26 | 7.69 | 38.95 | 54.00 | -15.05 | AVG | |
| 3 | | 7323.060 | 45.26 | 15.10 | 60.36 | 74.00 | -13.64 | peak | |
| 4 | * | 7323.060 | 31.19 | 15.10 | 46.29 | 54.00 | -7.71 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2441 MHz | | |

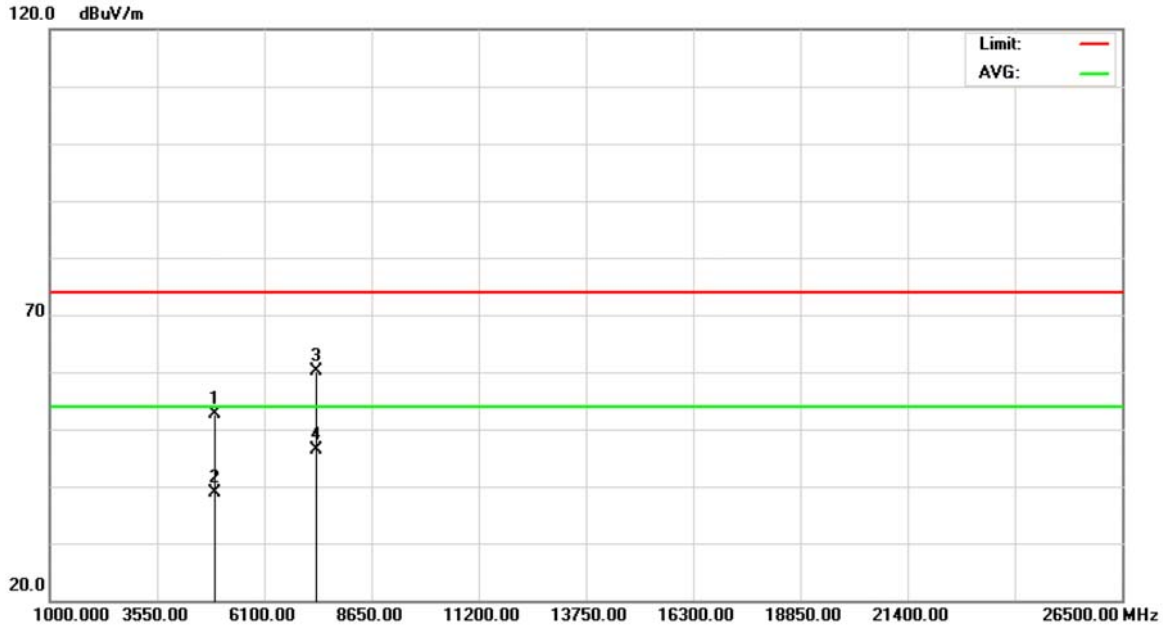
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | X | 2441.000 | 50.59 | 33.27 | 83.86 | 74.00 | 9.86 | peak | |
| 2 | * | 2441.000 | 38.92 | 33.27 | 72.19 | 54.00 | 18.19 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2441 MHz | | |

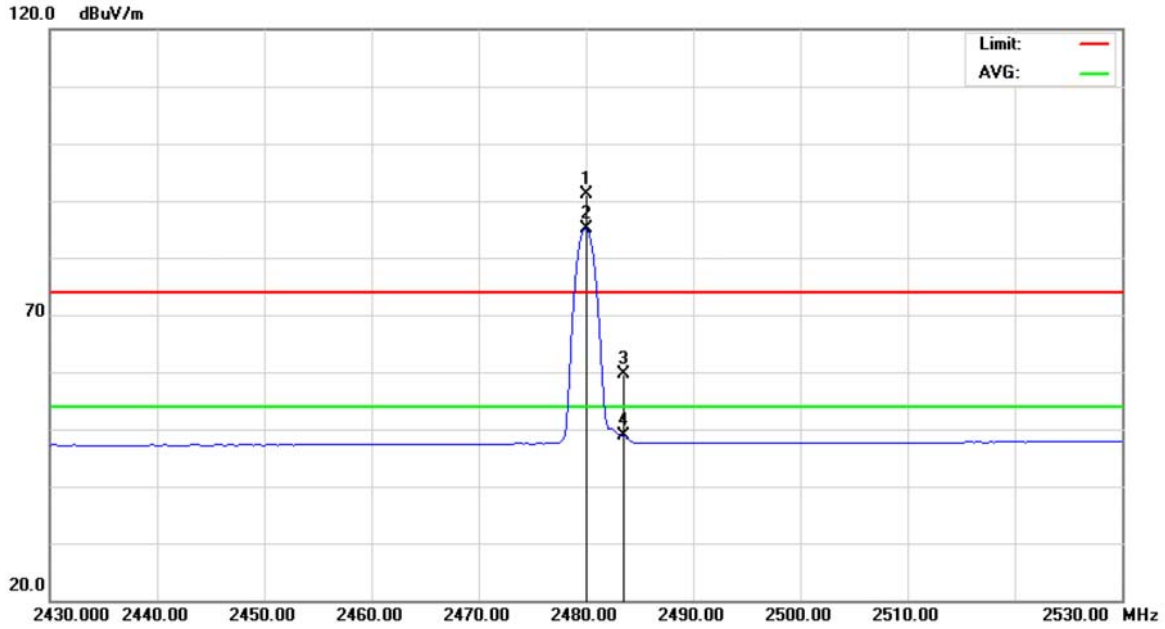
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4883.940 | 44.98 | 7.70 | 52.68 | 74.00 | -21.32 | peak | |
| 2 | | 4883.940 | 31.16 | 7.70 | 38.86 | 54.00 | -15.14 | AVG | |
| 3 | | 7323.330 | 45.09 | 15.10 | 60.19 | 74.00 | -13.81 | peak | |
| 4 | * | 7323.330 | 31.22 | 15.10 | 46.32 | 54.00 | -7.68 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2480 MHz | | |

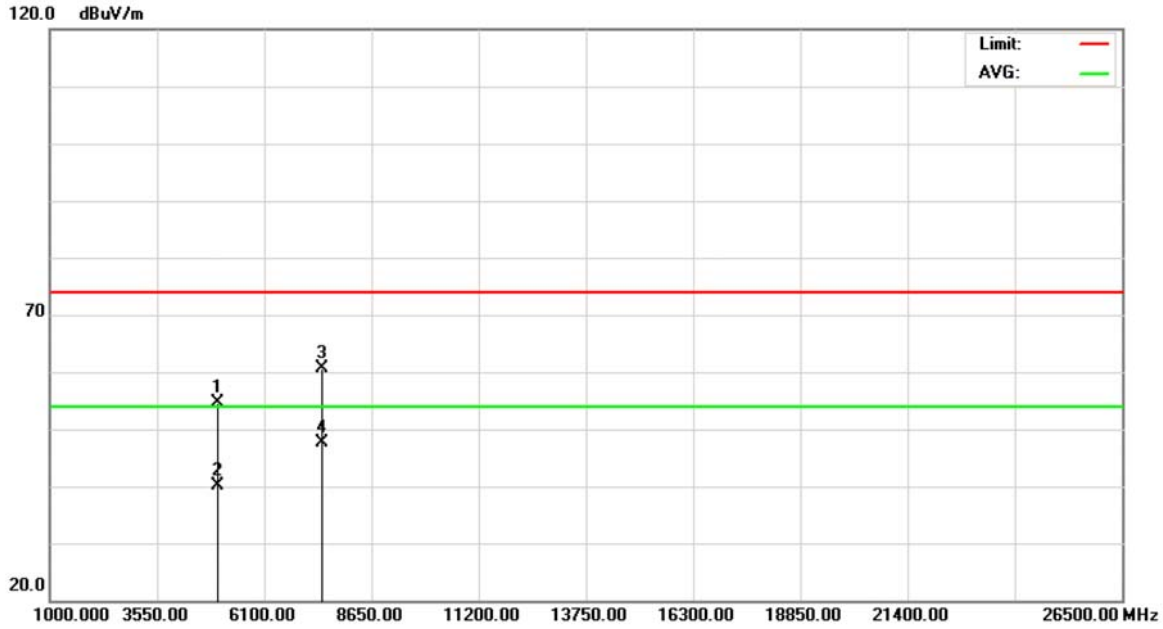
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | X | 2480.000 | 57.28 | 33.73 | 91.01 | 74.00 | 17.01 | peak | |
| 2 | * | 2480.000 | 51.43 | 33.73 | 85.16 | 54.00 | 31.16 | AVG | |
| 3 | | 2483.500 | 25.85 | 33.75 | 59.60 | 74.00 | -14.40 | peak | |
| 4 | | 2483.500 | 15.06 | 33.75 | 48.81 | 54.00 | -5.19 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2480 MHz | | |

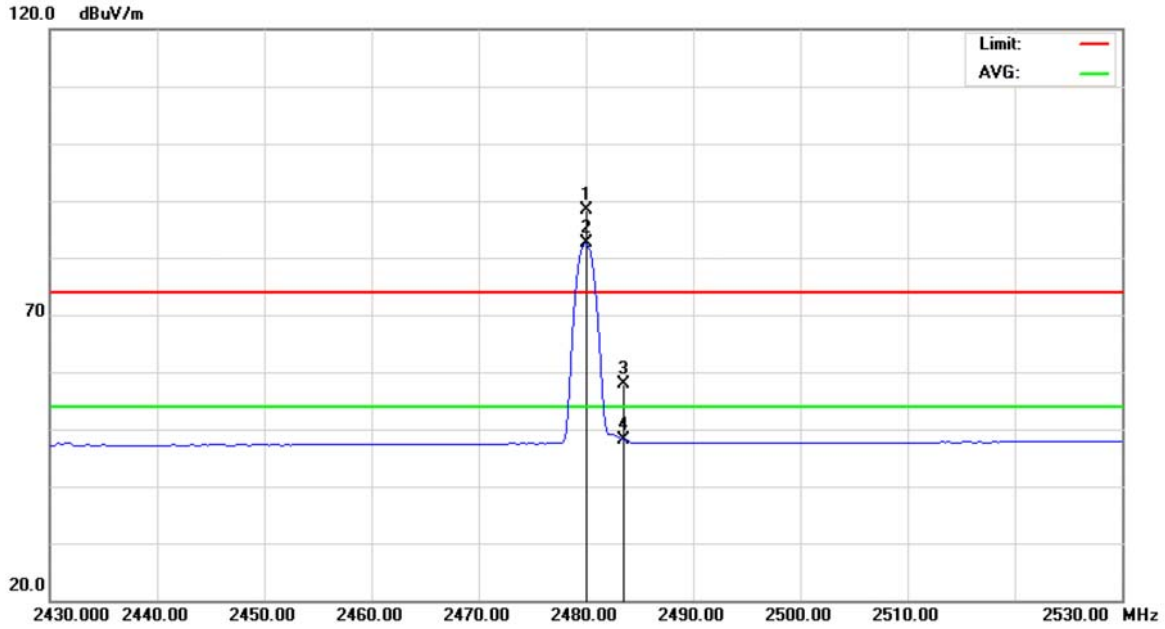
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4961.780 | 46.58 | 7.98 | 54.56 | 74.00 | -19.44 | peak | |
| 2 | | 4961.780 | 32.04 | 7.98 | 40.02 | 54.00 | -13.98 | AVG | |
| 3 | | 7439.860 | 45.32 | 15.40 | 60.72 | 74.00 | -13.28 | peak | |
| 4 | * | 7439.860 | 32.12 | 15.40 | 47.52 | 54.00 | -6.48 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2480 MHz | | |

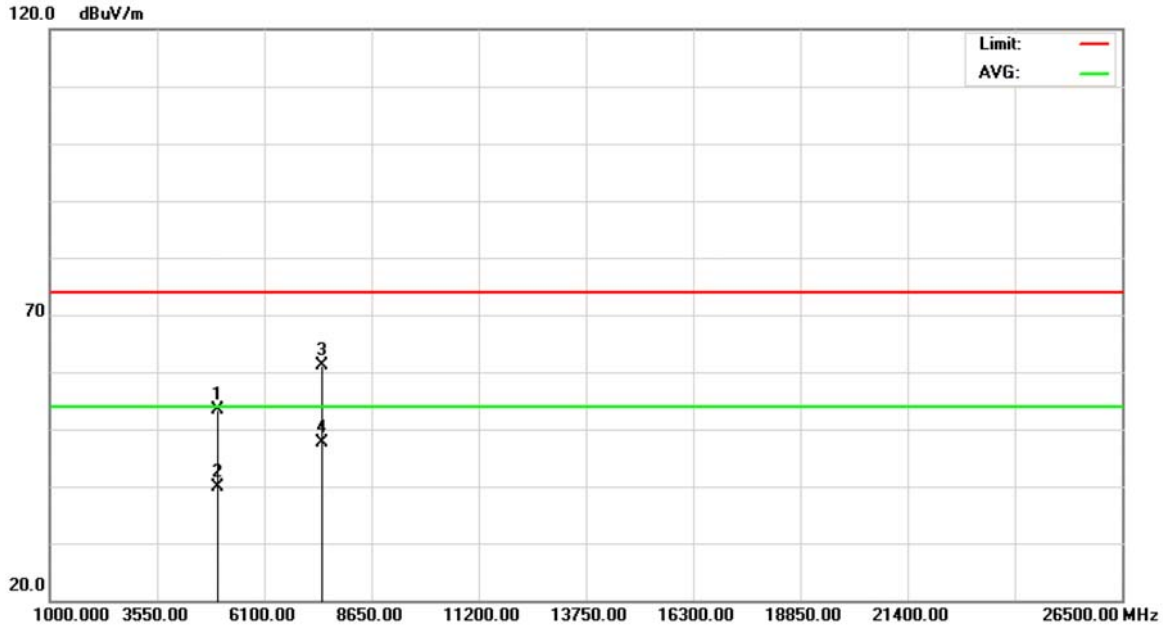
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | X | 2480.000 | 54.63 | 33.73 | 88.36 | 74.00 | 14.36 | peak | |
| 2 | * | 2480.000 | 48.85 | 33.73 | 82.58 | 54.00 | 28.58 | AVG | |
| 3 | | 2483.500 | 24.10 | 33.75 | 57.85 | 74.00 | -16.15 | peak | |
| 4 | | 2483.500 | 14.49 | 33.75 | 48.24 | 54.00 | -5.76 | AVG | |

| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2480 MHz | | |

**Polarization: Horizontal**

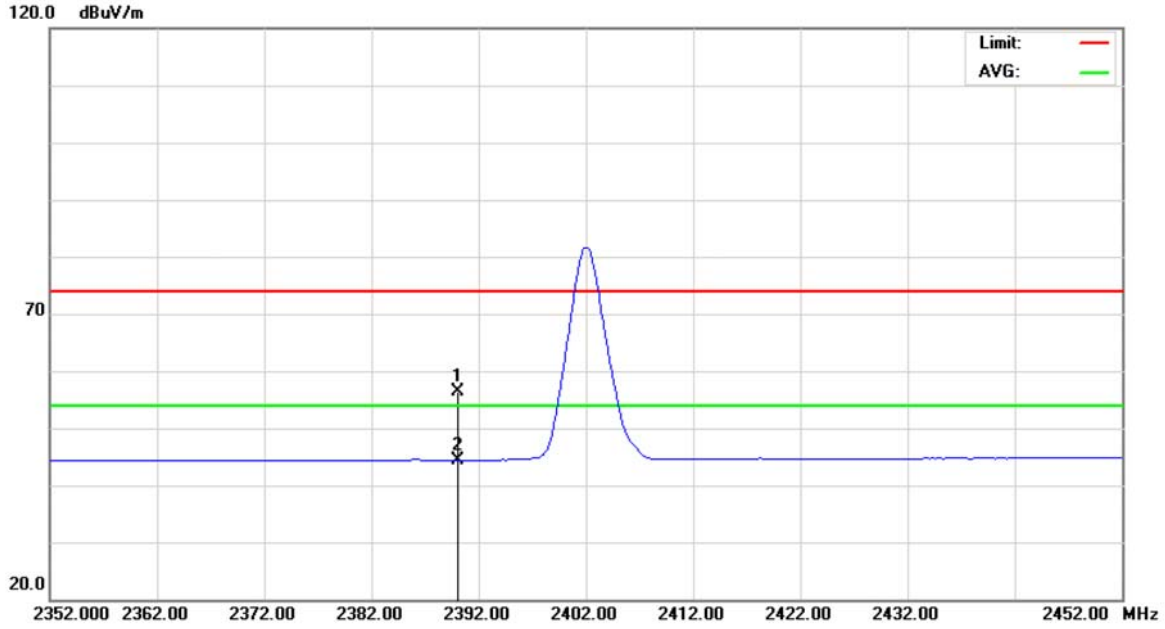



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 4960.360 | 45.42 | 7.98 | 53.40 | 74.00 | -20.60 | peak | |
| 2 | | 4960.360 | 31.89 | 7.98 | 39.87 | 54.00 | -14.13 | AVG | |
| 3 | | 7438.270 | 45.81 | 15.40 | 61.21 | 74.00 | -12.79 | peak | |
| 4 | * | 7438.270 | 32.19 | 15.40 | 47.59 | 54.00 | -6.41 | AVG | |

## 9.9 TEST RESULTS (RESTRICTED BANDS)

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz | | |
| NOTE | The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz. | | |

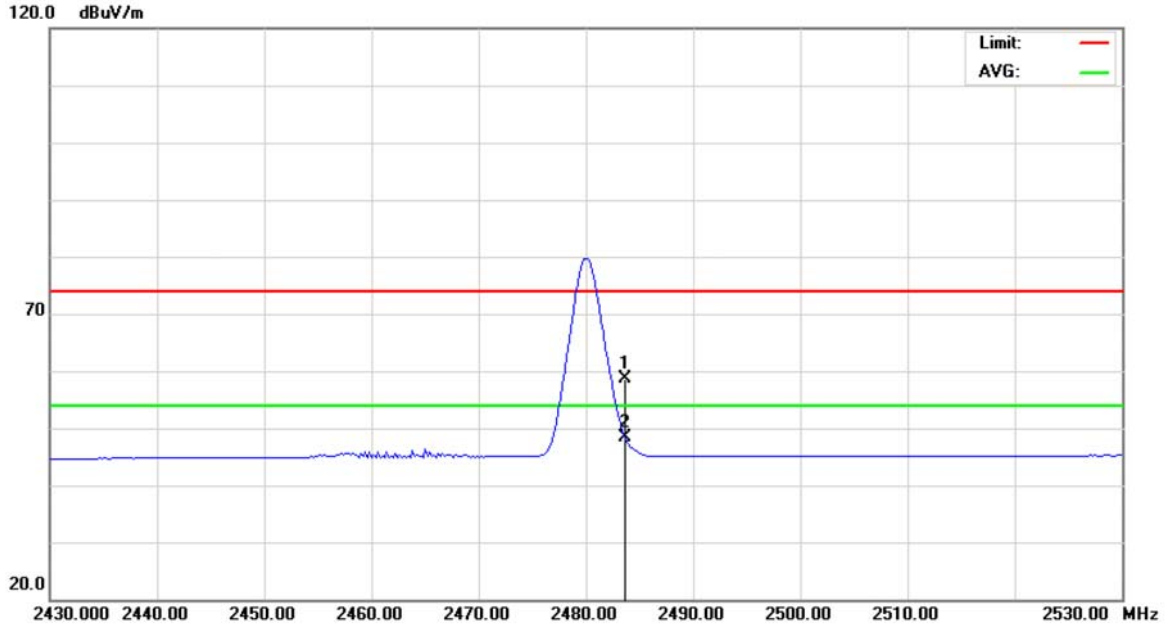
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2390.000 | 23.43 | 32.99 | 56.42 | 74.00 | -17.58 | peak | |
| 2 | * | 2390.000 | 11.46 | 32.99 | 44.45 | 54.00 | -9.55 | AVG | |

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2480 MHz | | |
| NOTE | The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz. | | |

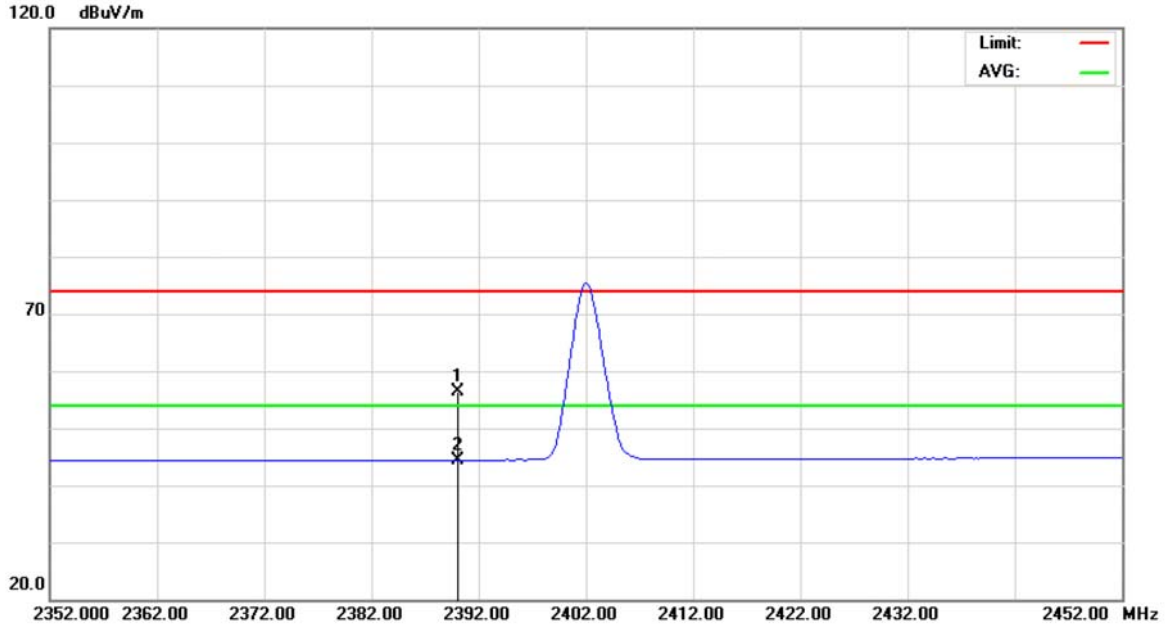
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2483.500 | 25.05 | 33.50 | 58.55 | 74.00 | -15.45 | peak | |
| 2 | * | 2483.500 | 14.93 | 33.50 | 48.43 | 54.00 | -5.57 | AVG | |

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz | | |
| NOTE | The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz. | | |

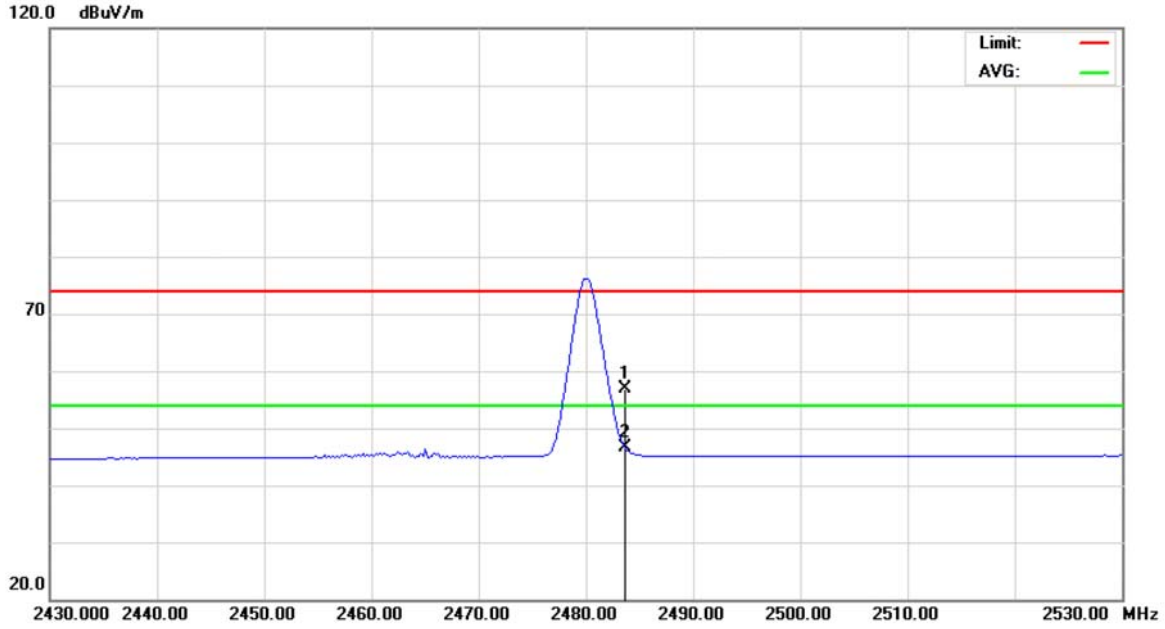
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2390.000 | 23.32 | 32.99 | 56.31 | 74.00 | -17.69 | peak | |
| 2 | * | 2390.000 | 11.43 | 32.99 | 44.42 | 54.00 | -9.58 | AVG | |

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2480 MHz | | |
| NOTE | The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz. | | |

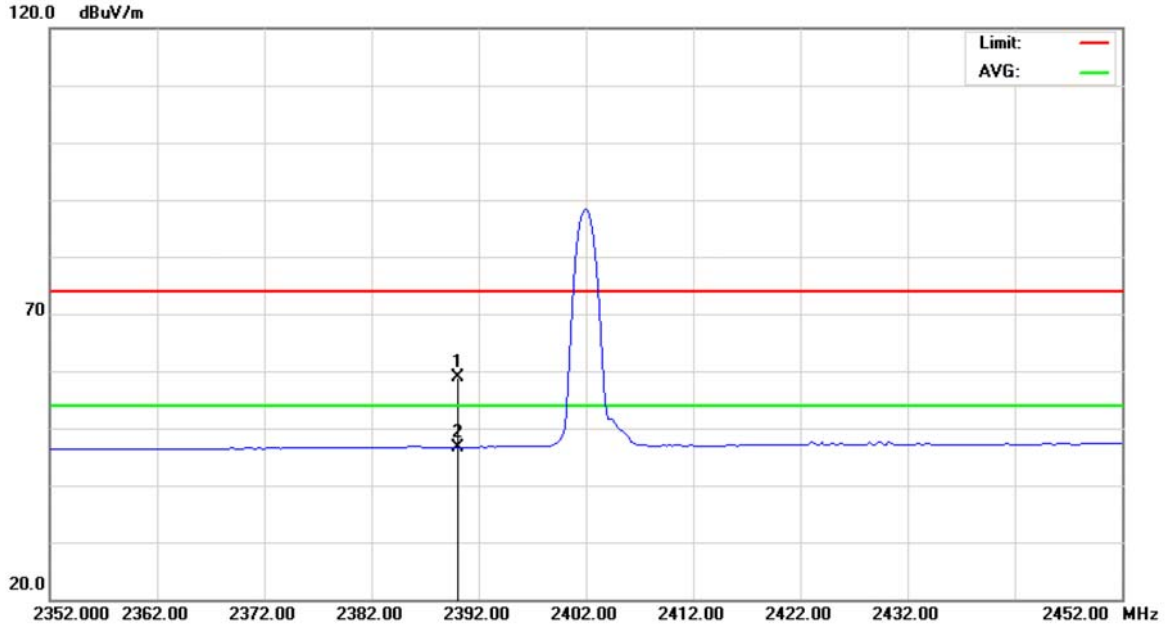
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2483.500 | 23.41 | 33.50 | 56.91 | 74.00 | -17.09 | peak | |
| 2 | * | 2483.500 | 13.11 | 33.50 | 46.61 | 54.00 | -7.39 | AVG | |

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz | | |
| NOTE | The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz. | | |

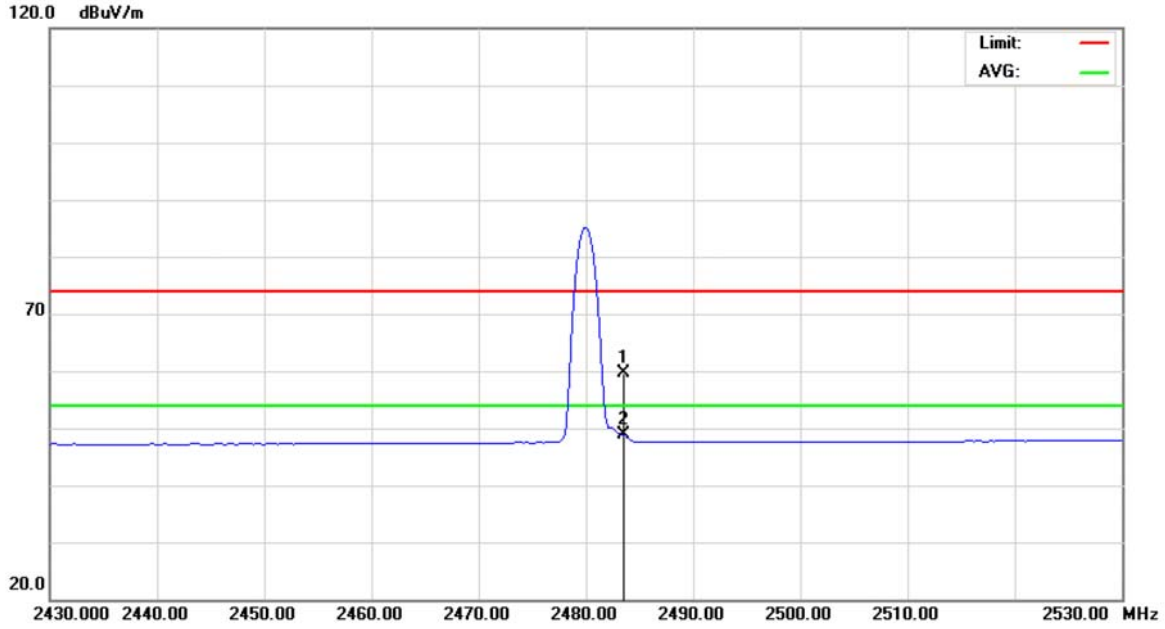
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2390.000 | 25.57 | 33.25 | 58.82 | 74.00 | -15.18 | peak | |
| 2 | * | 2390.000 | 13.42 | 33.25 | 46.67 | 54.00 | -7.33 | AVG | |

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2480 MHz | | |
| NOTE | The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz. | | |

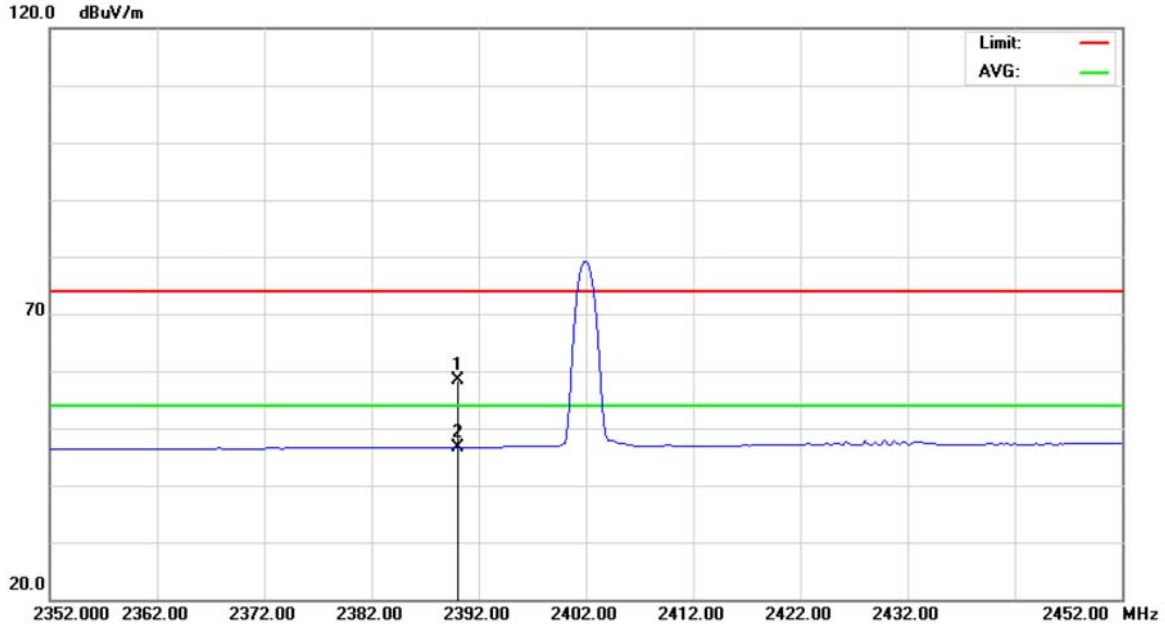
**Polarization: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2483.500 | 25.85 | 33.75 | 59.60 | 74.00 | -14.40 | peak | |
| 2 | * | 2483.500 | 15.06 | 33.75 | 48.81 | 54.00 | -5.19 | AVG | |

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz | | |
| NOTE | The transmitter was setup to transmit at the lowest channel and the field strength was measured at 2310-2390 MHz. | | |

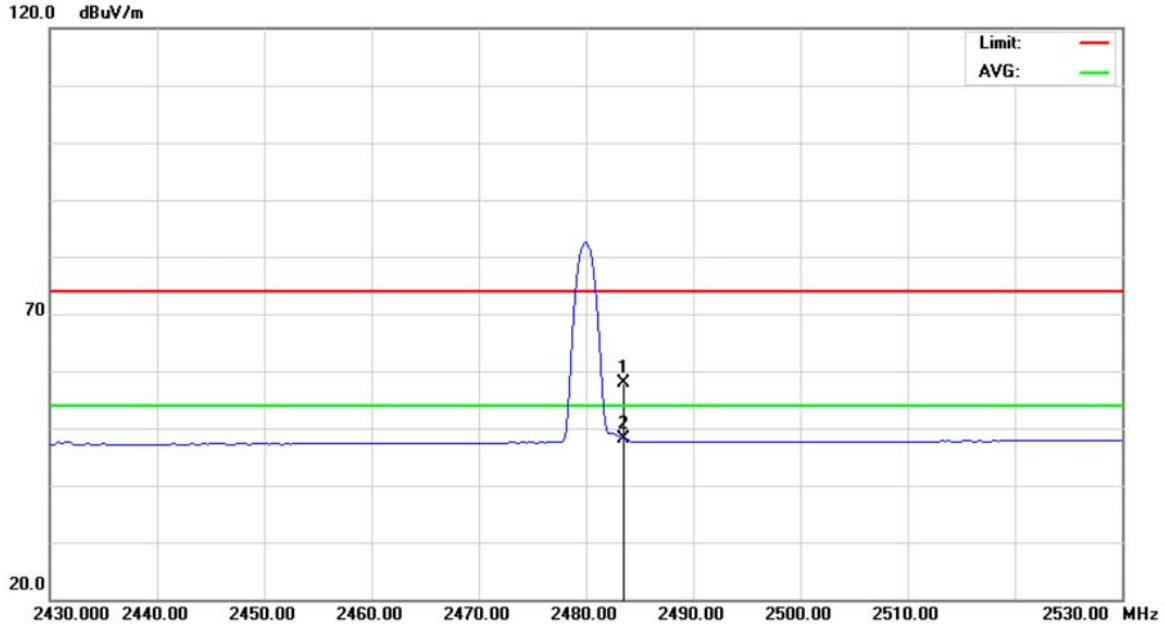
**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2390.000 | 25.24 | 33.25 | 58.49 | 74.00 | -15.51 | peak | |
| 2 | * | 2390.000 | 13.42 | 33.25 | 46.67 | 54.00 | -7.33 | AVG | |

| | | | |
|---|---|---|---|
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
| Temperature | 24°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2480 MHz | | |
| NOTE | The transmitter was setup to transmit at the highest channel and the field strength was measured at 2483.5-2500 MHz. | | |

**Polarization: Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 2483.500 | 24.10 | 33.75 | 57.85 | 74.00 | -16.15 | peak | |
| 2 | * | 2483.500 | 14.49 | 33.75 | 48.24 | 54.00 | -5.76 | AVG | |

# 10 NUMBER OF HOPPING FREQUENCY

## 10.1 LIMIT

| Test Item | Frequency Range (MHz) | Limit |
|---|---|---|
| Number of Hopping Channel | 2400-2483.5 | shall use at least 15 channels |

## 10.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Oct. 01, 2013 |

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

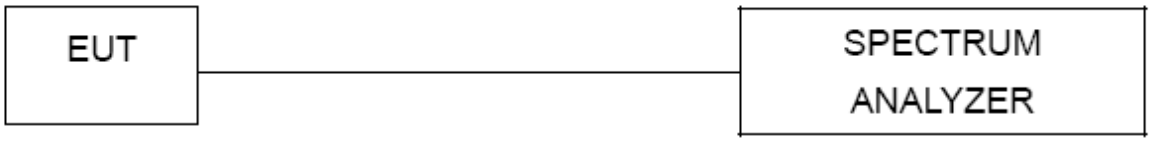
## 10.3 MEASURING INSTRUMENTS SETTING

| Spectrum Analyzer | Parameter Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Operating Frequency Range |
| RB | 100 kHz |
| VB | 100 kHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

## 10.4 TEST PROCEDURES

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW= 100 kHz, VBW=100 kHz, Sweep time = Auto.

## 10.5 TEST SETUP LAYOUT




## 10.6 DEVIATION FROM TEST STANDARD

No deviation

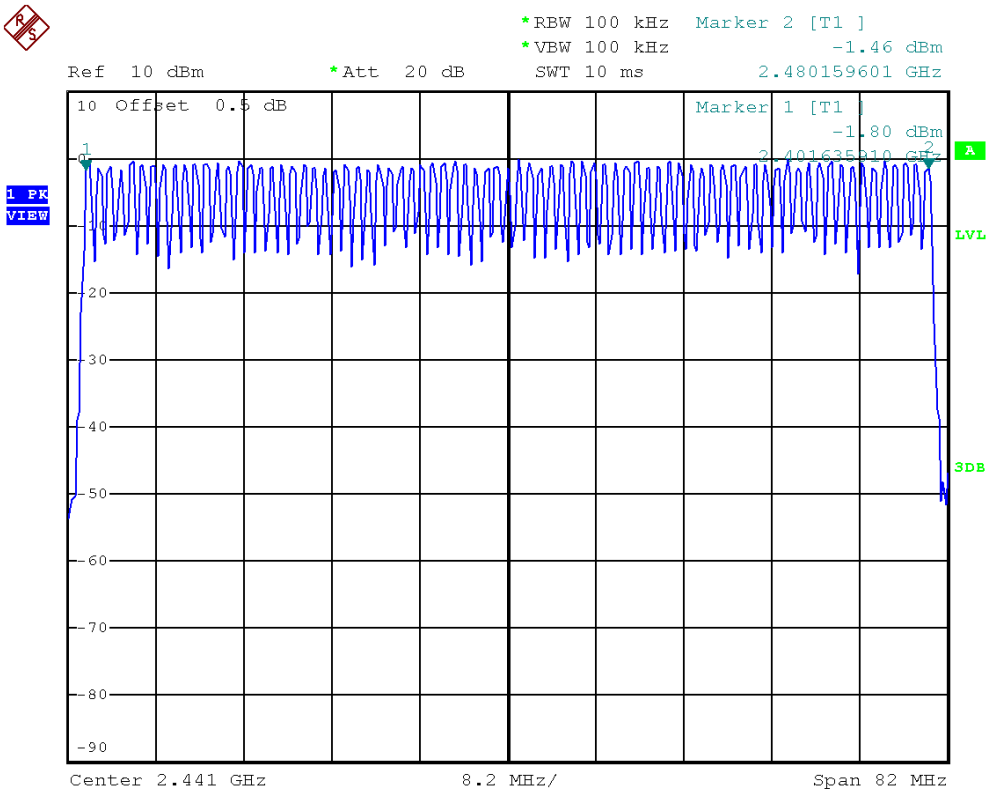
## 10.7 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

## 10.8TEST RESULTS

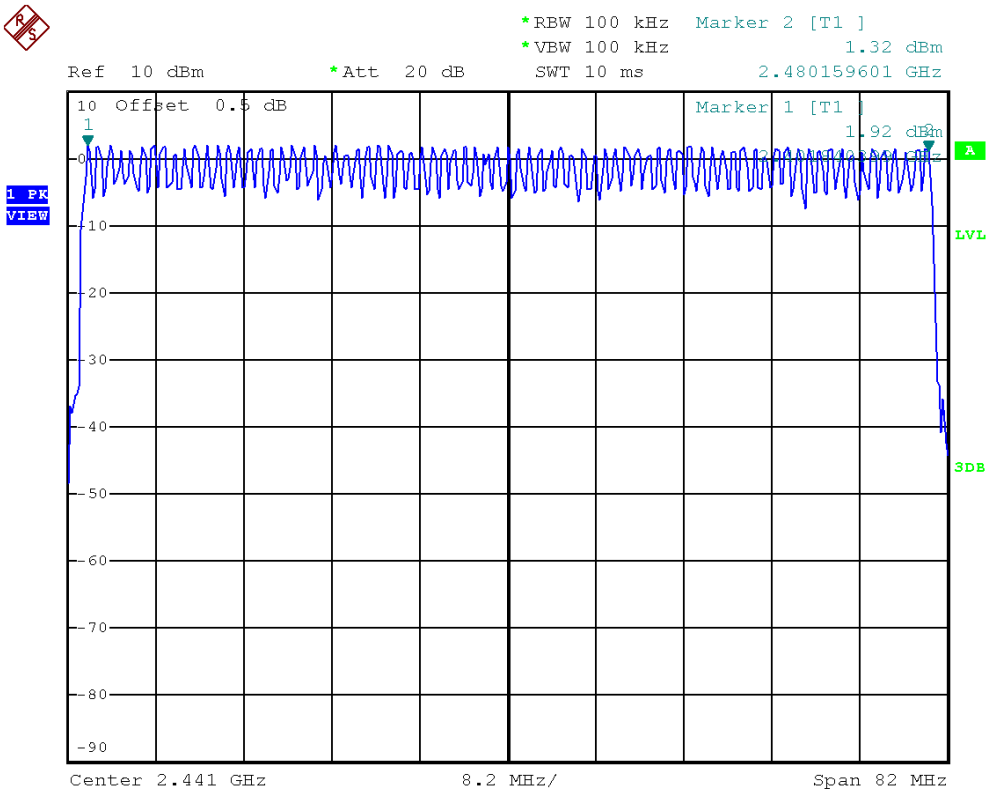
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps | | |

| Number of Hopping Channel | Limit | Result |
|---|---|---|
| 79 | 15 | Pass |



| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 60% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps | | |

| Number of Hopping Channel | Limit | Result |
|---|---|---|
| 79 | 15 | Pass |



# 11 AVERAGE TIME OF OCCUPANCY

## 11.1LIMIT

| Test Item | Frequency Range (MHz) | Limit |
|---|---|---|
| Average time of occupancy | 2400-2483.5 | shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. |

## 11.2MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | R&S | FSP-40 | 100129 | Oct. 01, 2013 |

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

## 11.3TEST PROCEDURES

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 100 kHz and VBW to 100 kHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds.
j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.
k. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.

## 11.4TEST SETUP LAYOUT


## 11.5DEVIATION FROM TEST STANDARD

No deviation

## 11.6EUT OPERATING CONDITIONS

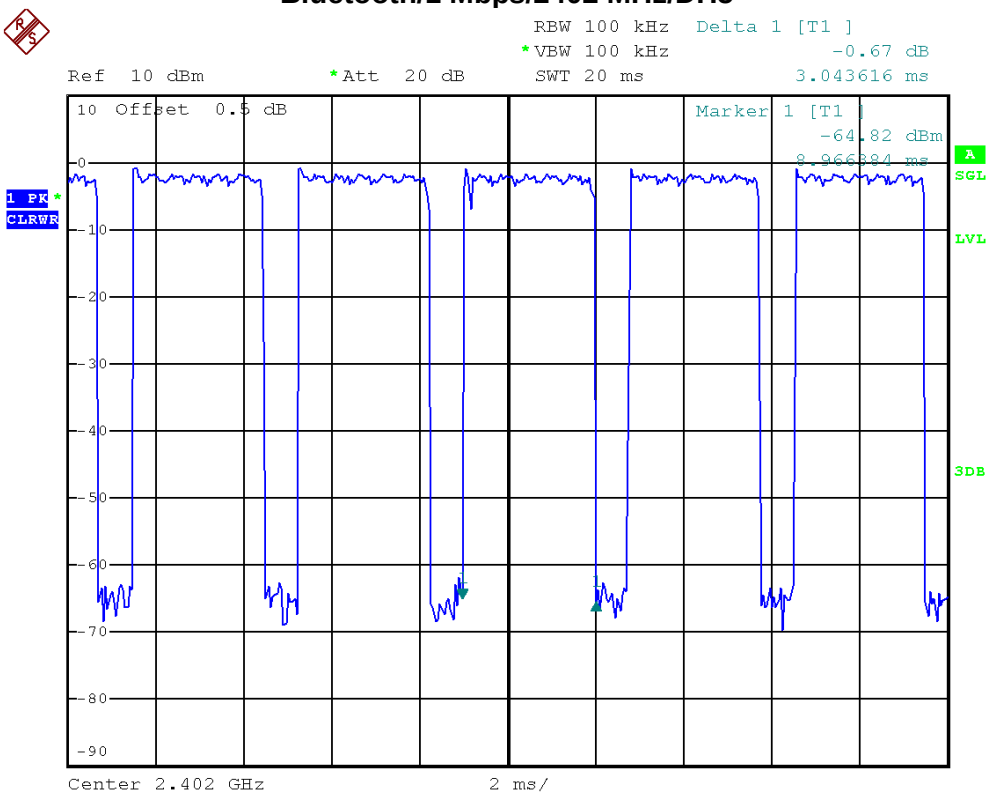
The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.

## 11.7TEST RESULTS

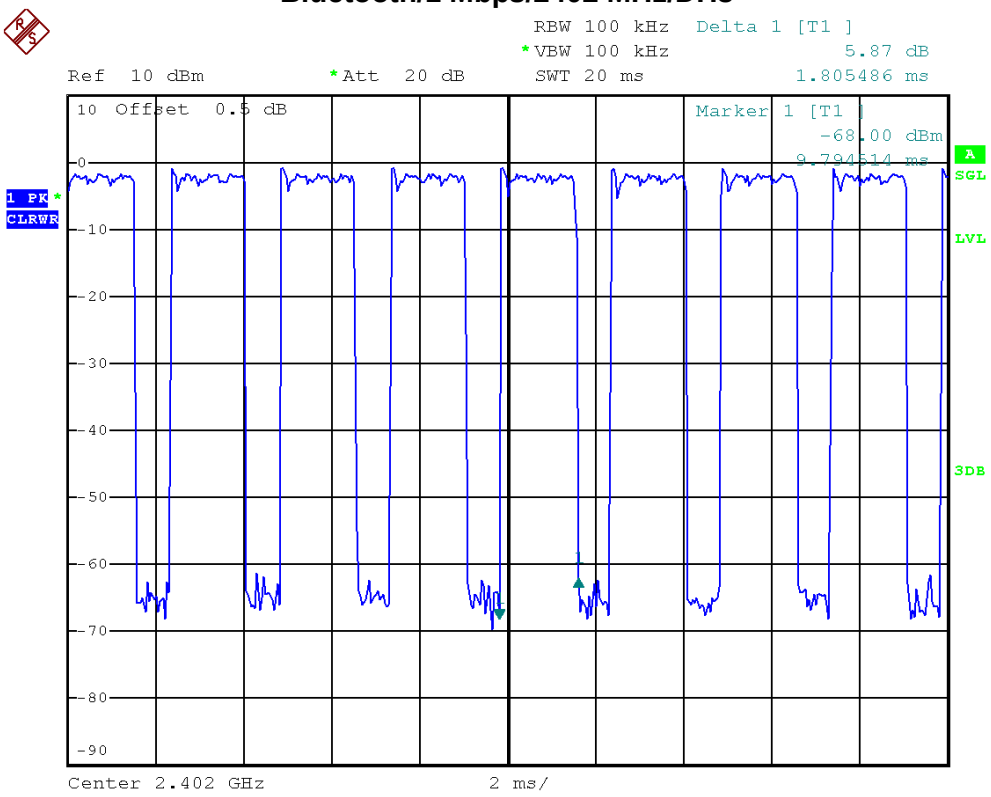
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2402 MHz | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (s) | Limit (s) | Result |
|---|---|---|---|---|---|
| DH5 | 2402 MHz | 3.0436 | 0.3247 | 0.4 | PASS |
| DH3 | 2402 MHz | 1.8055 | 0.2889 | 0.4 | PASS |
| DH1 | 2402 MHz | 0.5527 | 0.1769 | 0.4 | PASS |

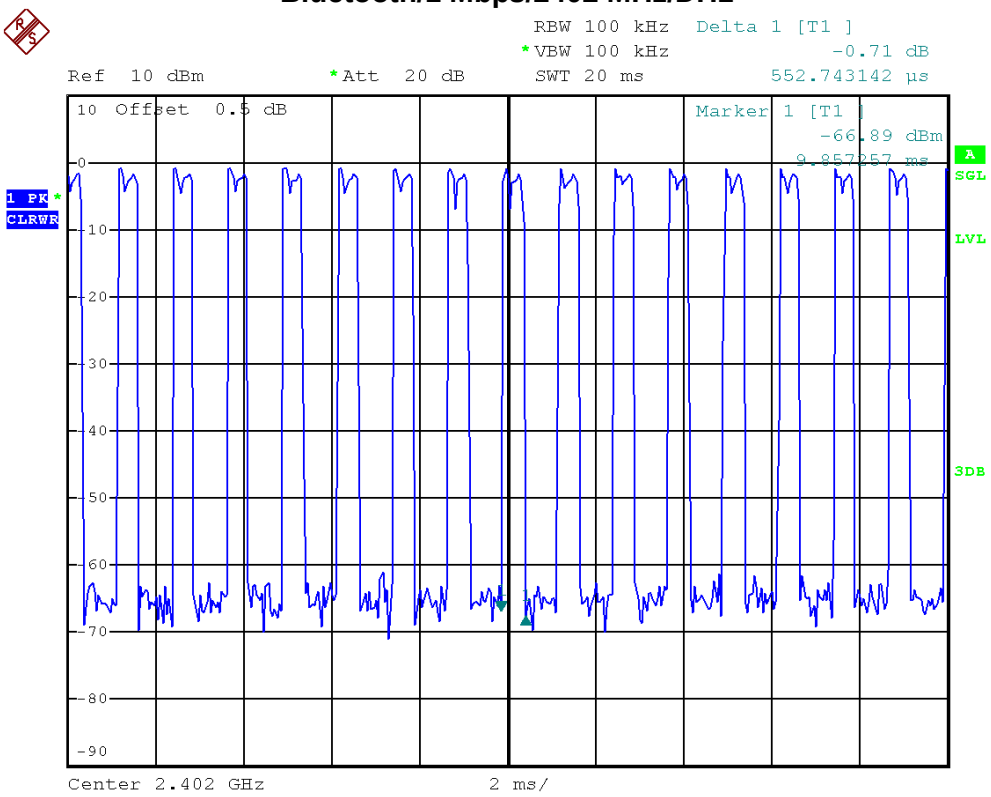
**Bluetooth/1 Mbps/2402 MHz/DH5**



## Bluetooth/1 Mbps/2402 MHz/DH3



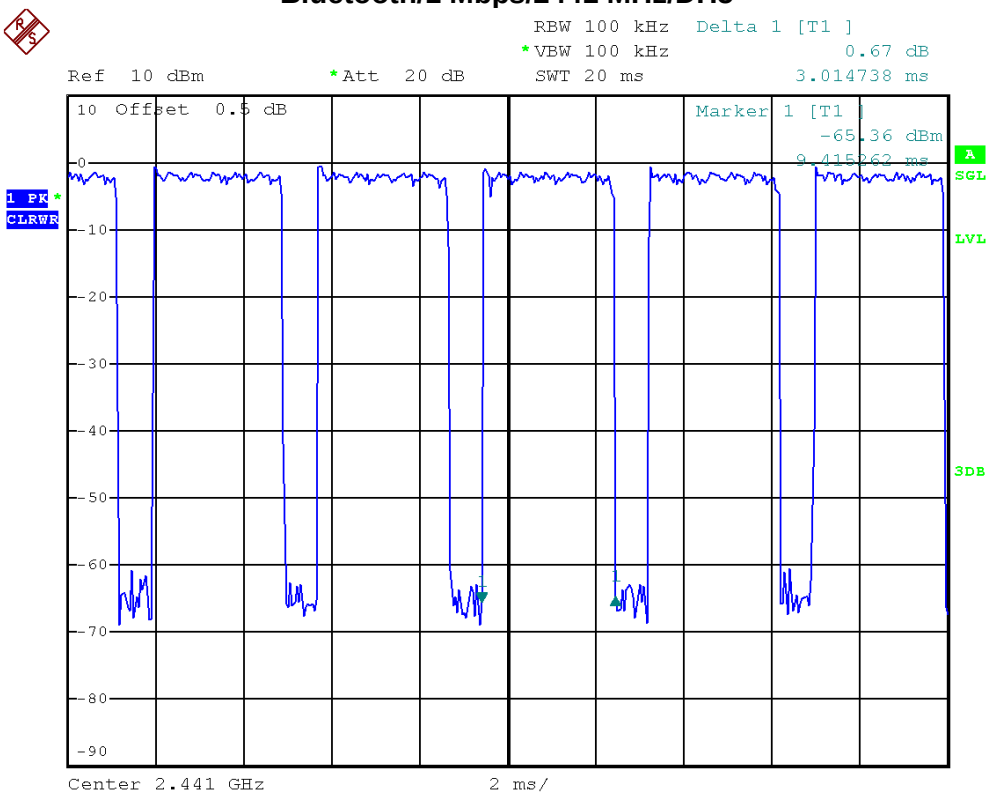

## Bluetooth/1 Mbps/2402 MHz/DH1



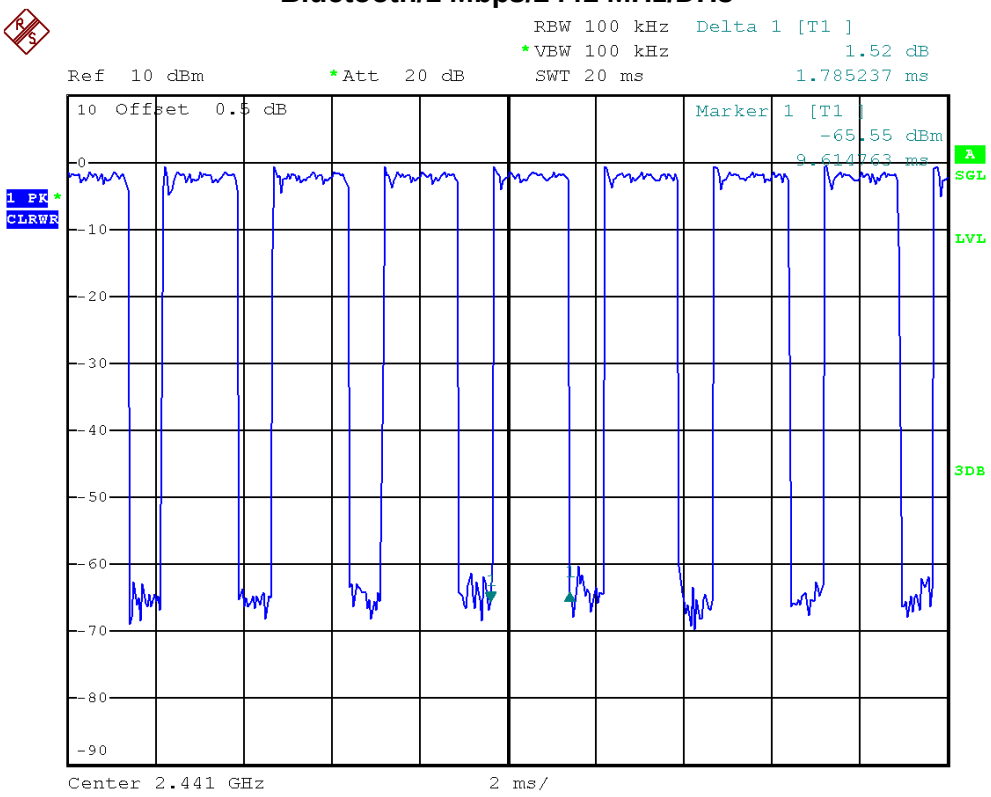
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2441 MHz | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (s) | Limit (s) | Result |
|---|---|---|---|---|---|
| DH5 | 2441 MHz | 3.0147 | 0.3216 | 0.4 | PASS |
| DH3 | 2441 MHz | 1.7852 | 0.2856 | 0.4 | PASS |
| DH1 | 2441 MHz | 0.5302 | 0.1697 | 0.4 | PASS |

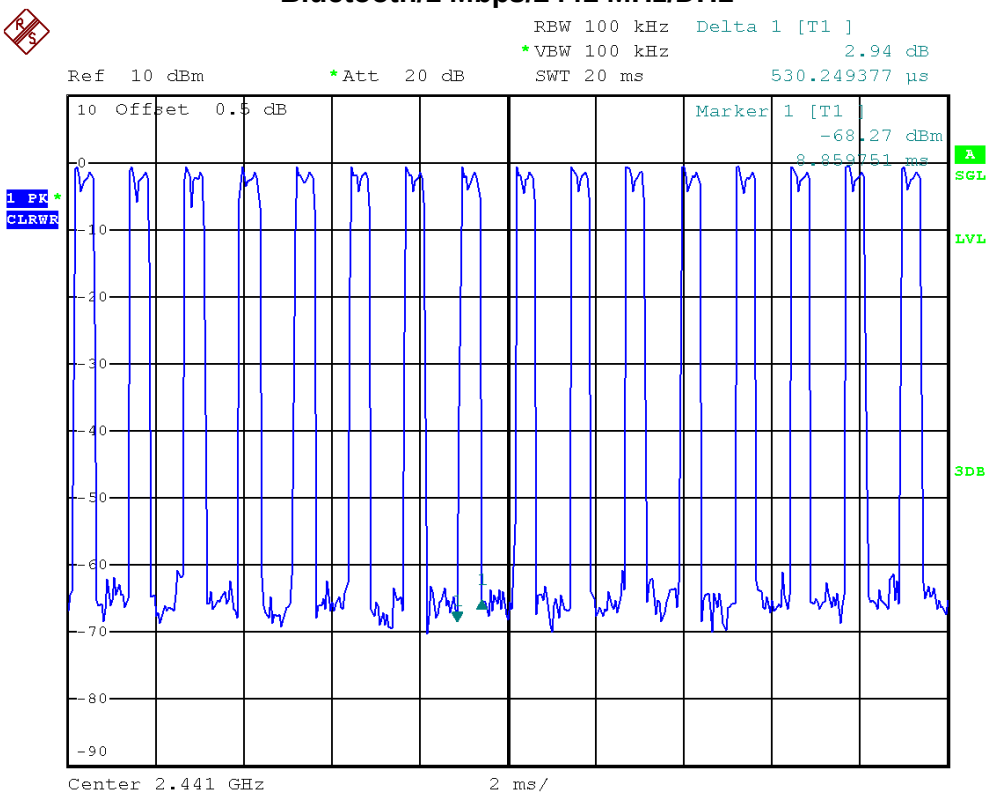
**Bluetooth/1 Mbps/2441 MHz/DH5**



## Bluetooth/1 Mbps/2441 MHz/DH3



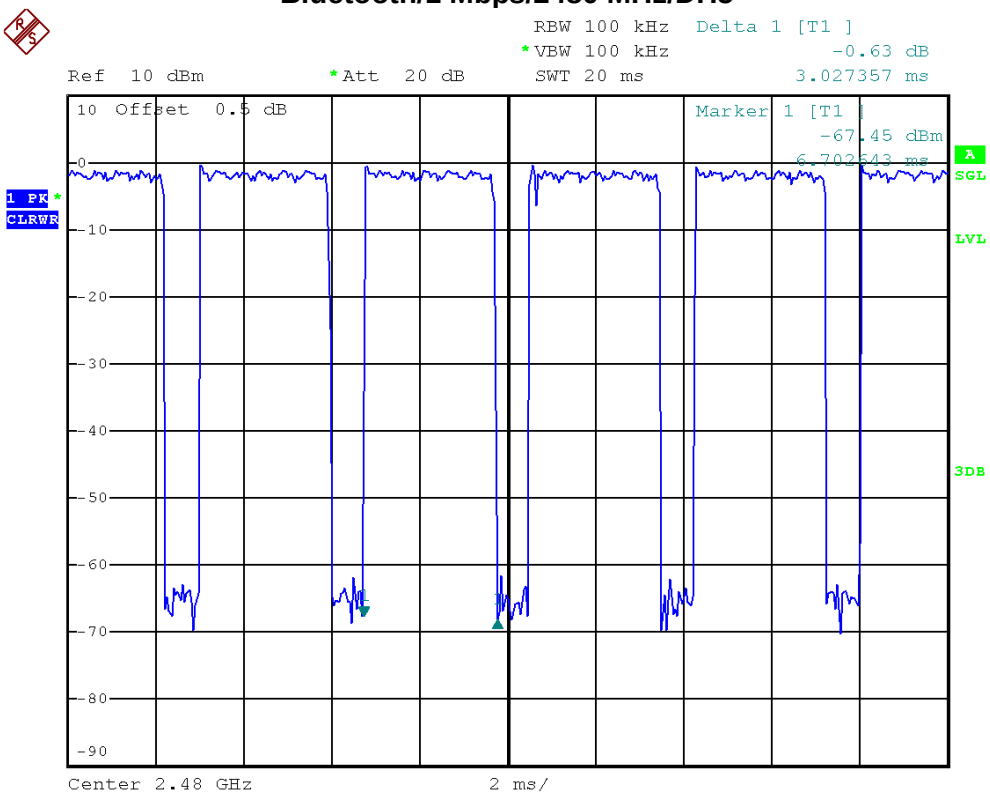

## Bluetooth/1 Mbps/2441 MHz/DH1



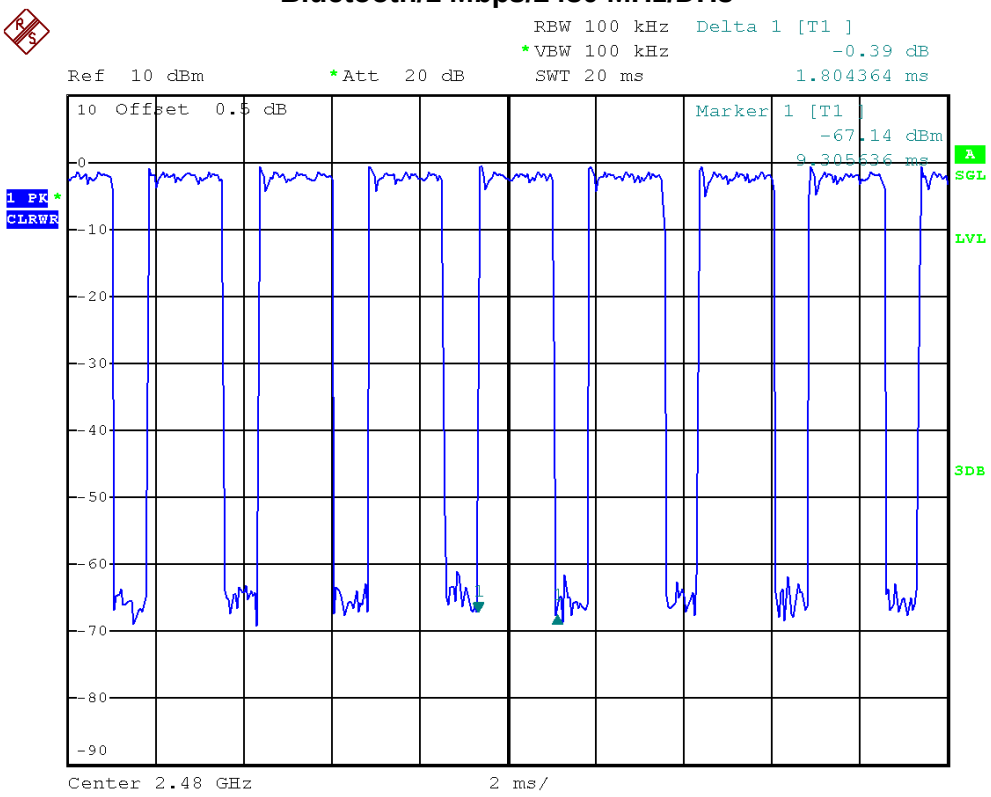
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/1 Mbps/2480 MHz | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (s) | Limit (s) | Result |
|---|---|---|---|---|---|
| DH5 | 2480 MHz | 3.0274 | 0.3229 | 0.4 | PASS |
| DH3 | 2480 MHz | 1.8044 | 0.2887 | 0.4 | PASS |
| DH1 | 2480 MHz | 0.5311 | 0.1700 | 0.4 | PASS |

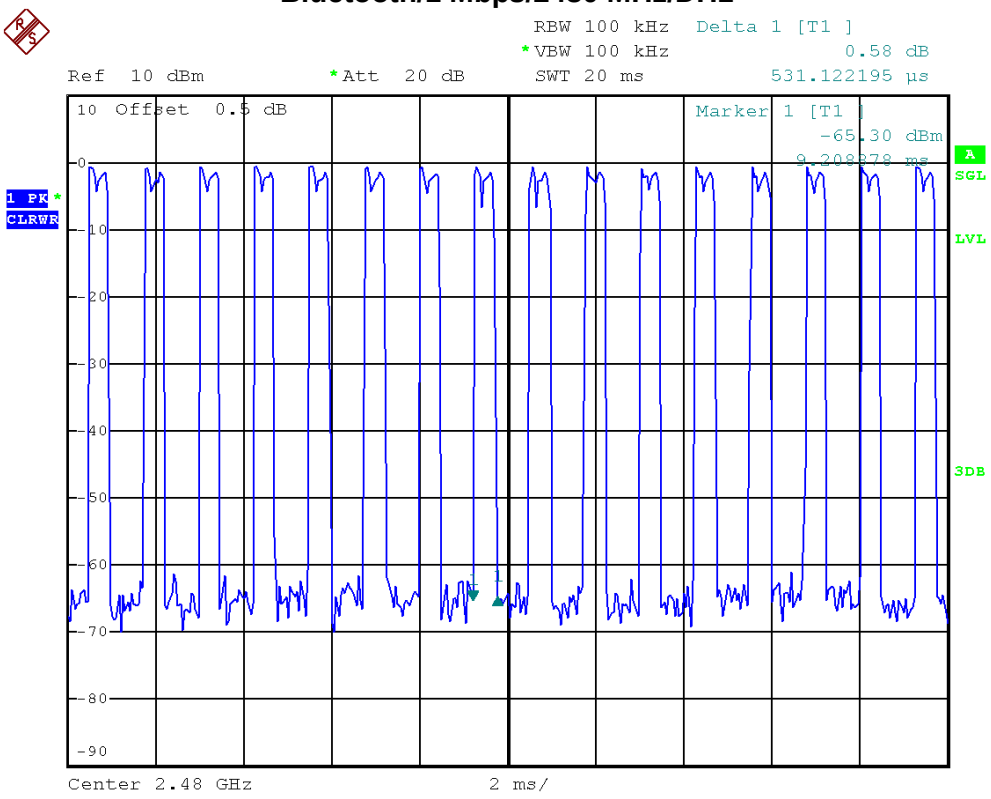
**Bluetooth/1 Mbps/2480 MHz/DH5**



## Bluetooth/1 Mbps/2480 MHz/DH3



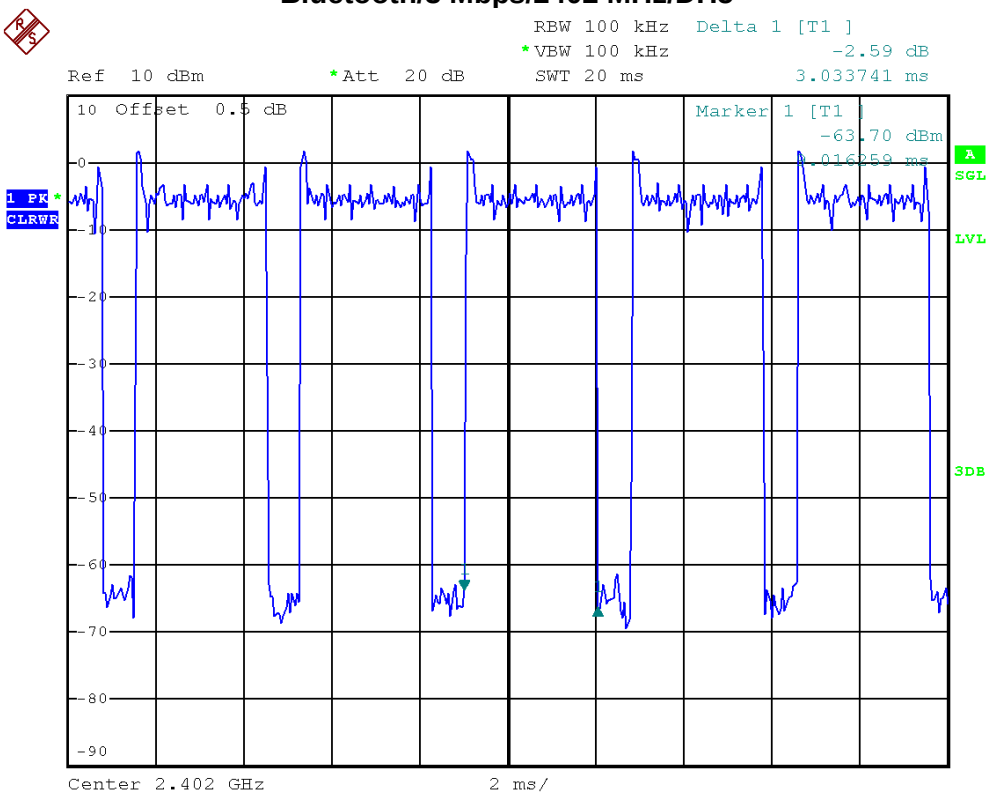

## Bluetooth/1 Mbps/2480 MHz/DH1



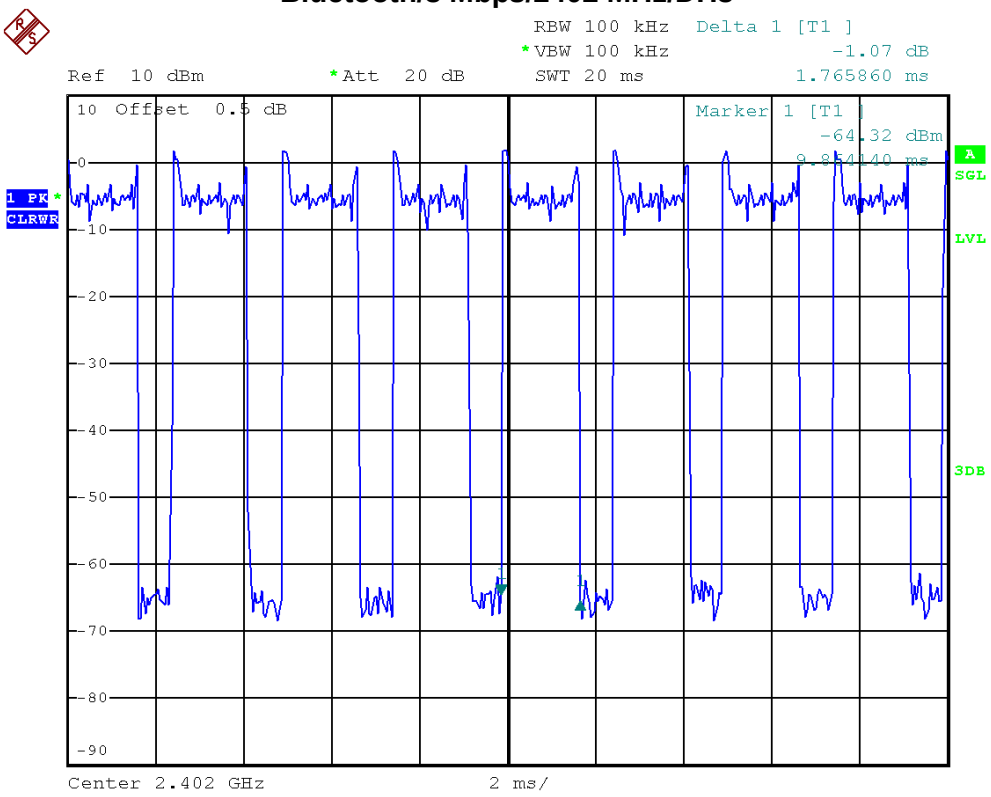
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2402 MHz | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (s) | Limit (s) | Result |
|---|---|---|---|---|---|
| DH5 | 2402 MHz | 3.0337 | 0.3236 | 0.4 | PASS |
| DH3 | 2402 MHz | 1.7659 | 0.2825 | 0.4 | PASS |
| DH1 | 2402 MHz | 0.5503 | 0.1761 | 0.4 | PASS |

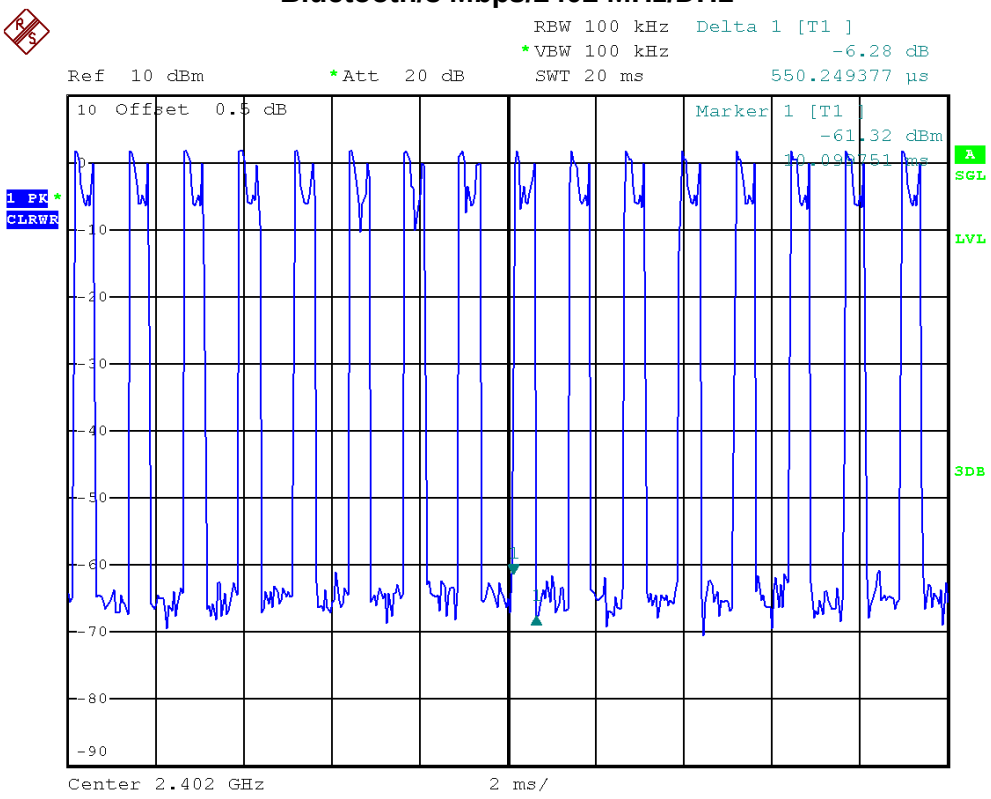
**Bluetooth/3 Mbps/2402 MHz/DH5**



## Bluetooth/3 Mbps/2402 MHz/DH3



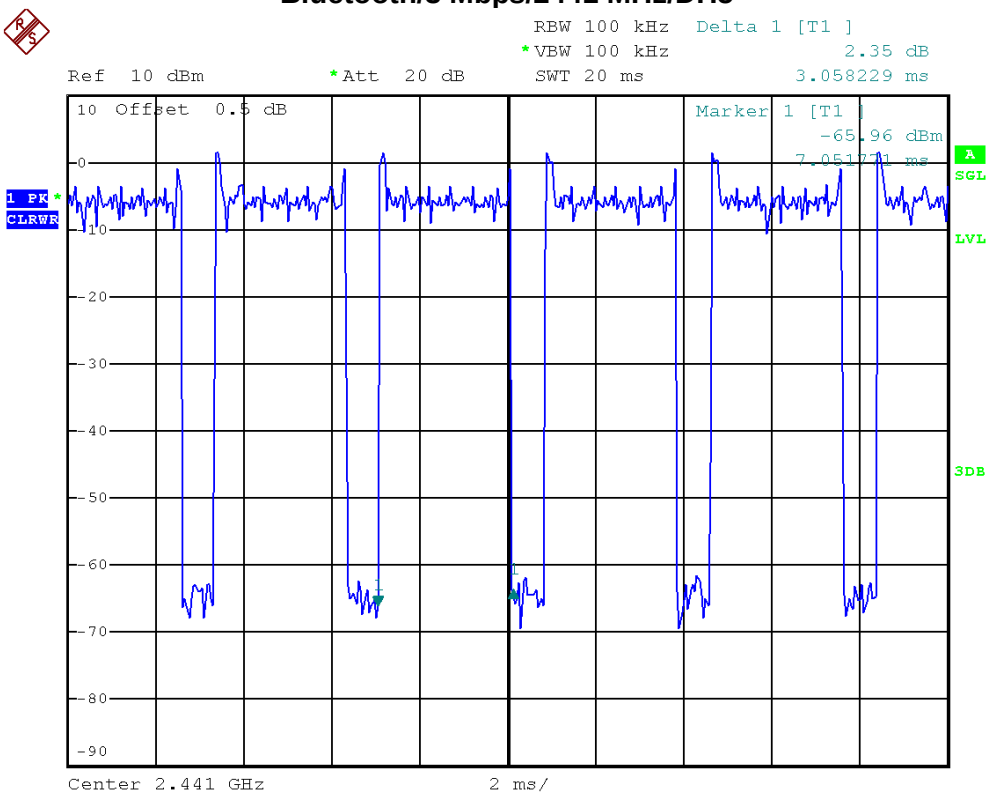

## Bluetooth/3 Mbps/2402 MHz/DH1



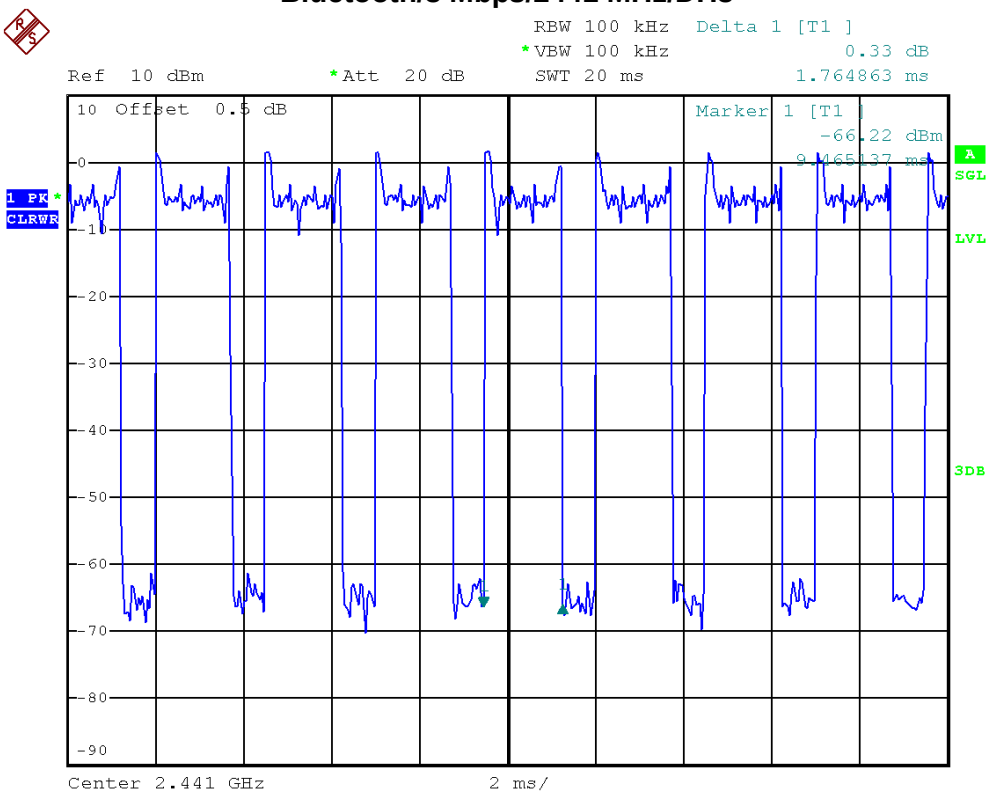
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2441 MHz | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (s) | Limit (s) | Result |
|---|---|---|---|---|---|
| DH5 | 2441 MHz | 3.0582 | 0.3262 | 0.4 | PASS |
| DH3 | 2441 MHz | 1.7649 | 0.2824 | 0.4 | PASS |
| DH1 | 2441 MHz | 0.5310 | 0.1699 | 0.4 | PASS |

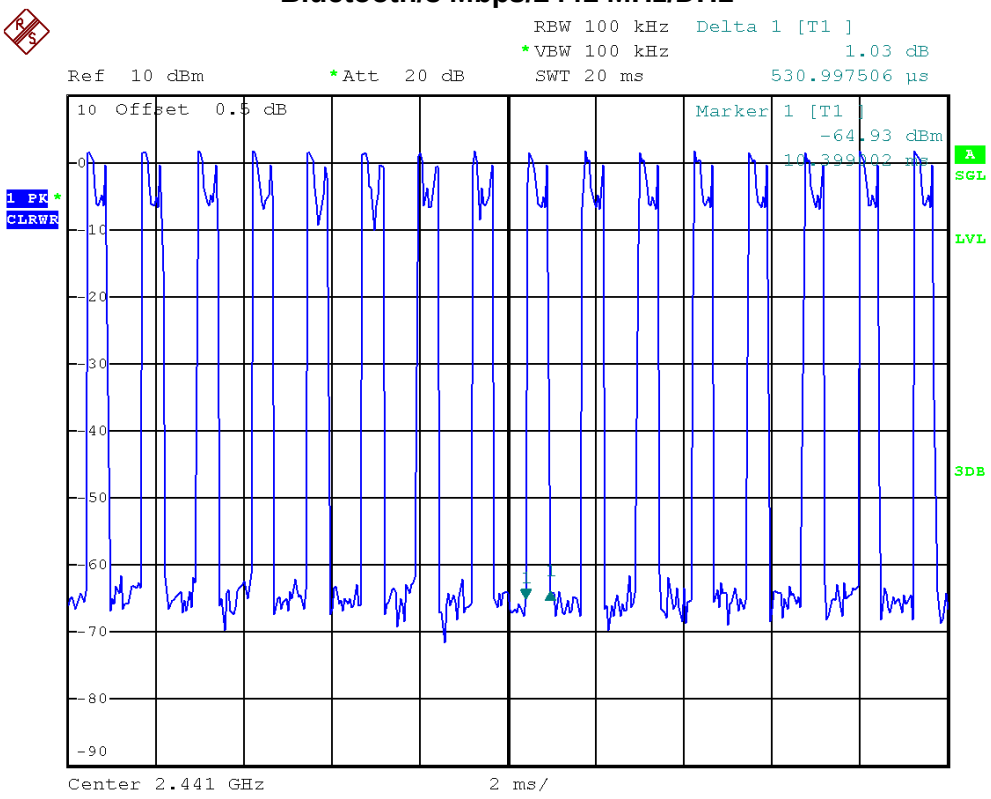
**Bluetooth/3 Mbps/2441 MHz/DH5**



## Bluetooth/3 Mbps/2441 MHz/DH3



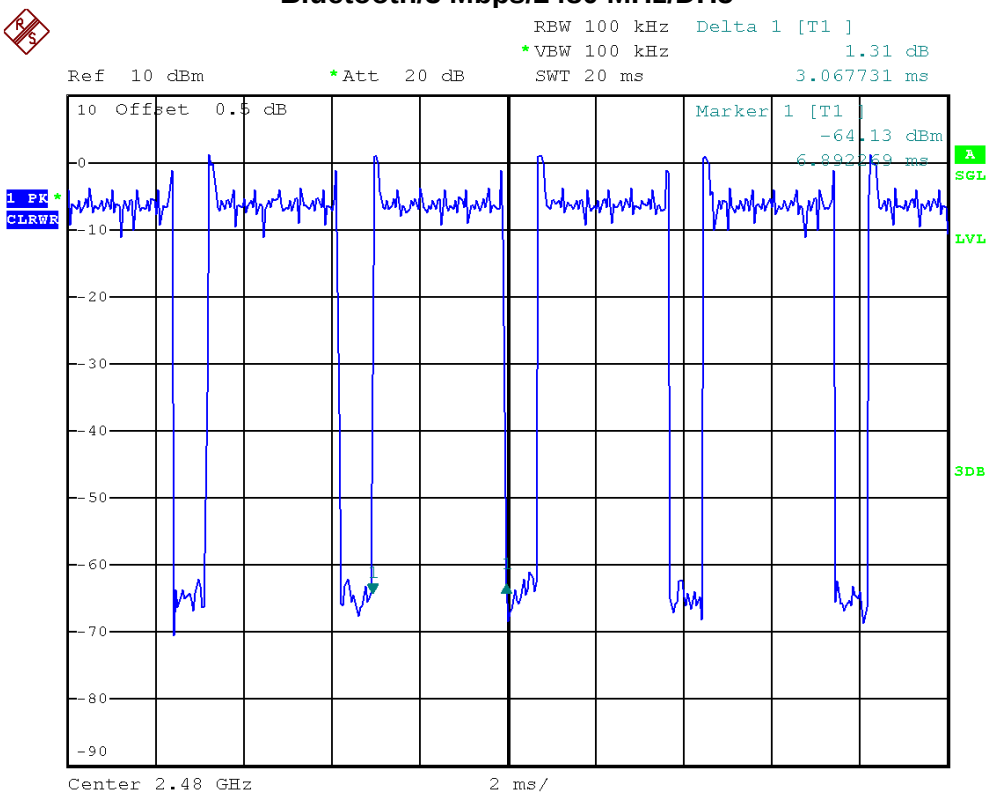

## Bluetooth/3 Mbps/2441 MHz/DH1



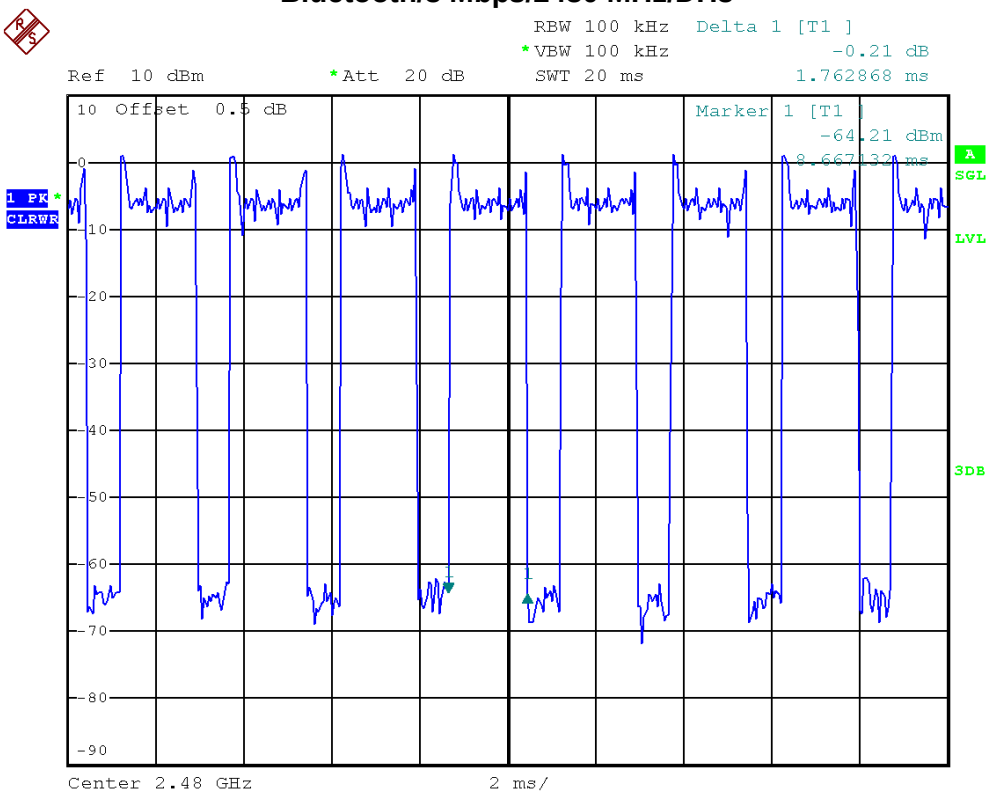
| E.U.T | Bluetooth Barcode Scanner | Model Name | OPN-3002i |
|---|---|---|---|
| Temperature | 26°C | Relative Humidity | 46% |
| Test Voltage | DC 3.7V | | |
| Test Mode | Bluetooth/3 Mbps/2480 MHz | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (s) | Limit (s) | Result |
|---|---|---|---|---|---|
| DH5 | 2480 MHz | 3.0677 | 0.3272 | 0.4 | PASS |
| DH3 | 2480 MHz | 1.7629 | 0.2821 | 0.4 | PASS |
| DH1 | 2480 MHz | 0.5622 | 0.1799 | 0.4 | PASS |

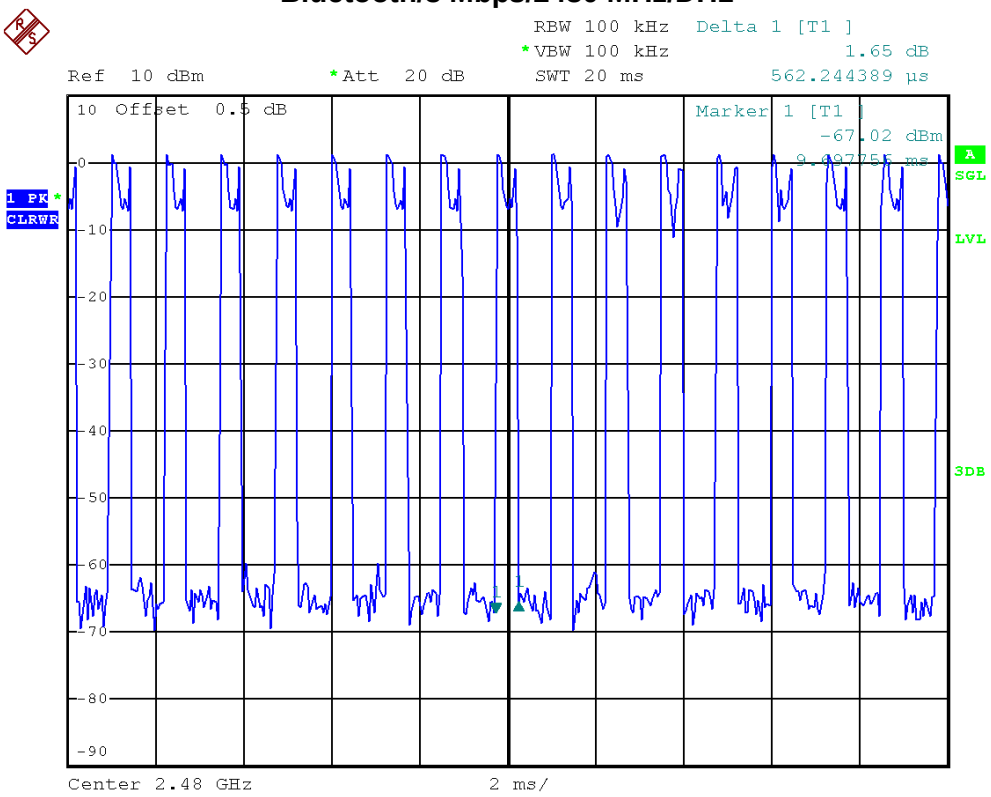
**Bluetooth/3 Mbps/2480 MHz/DH5**



## Bluetooth/3 Mbps/2480 MHz/DH3




## Bluetooth/3 Mbps/2480 MHz/DH1



## 12 RF EXPOSURE COMPLIANCE

### 12.1LIMIT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ $cm^2$) | Averaging Time $\|E\|^2$,$\|H\|^2$or S (minutes) |
|---|---|---|---|---|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842 / f | 4.89 / f | (900 / f)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | | | F/300 | 6 |
| 1500-100,000 | | | 5 | 6 |

(B) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ $cm^2$) | Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes) |
|---|---|---|---|---|
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | | | F/1500 | 30 |
| 1500-100,000 | | | 1.0 | 30 |

NOTE: f = frequency in MHz ; *Plane-wave equivalent power density.

### 12.2MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Power Meter | Anritsu | ML2495A | 1128008 | Jul. 22, 2013 |
| 2 | Power Meter Sensor | Anritsu | MA2411B | 1126001 | Jul. 22, 2013 |

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

### 12.3MPE CALCULATION METHOD

E (V/m) $= \frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) $= \frac{E^2}{377}$

**E** = Electric field (V/m)

**P** = Peak RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

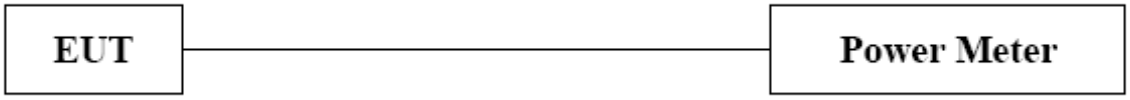
**d** = Separation distance between radiator and human body (m)

The formula can be changed to

***Pd*** $= \frac{30 \times P \times G}{377 \times d^2}$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

## 12.4TEST SETUP LAYOUT




## 12.5DEVIATION FROM TEST STANDARD

No deviation

## 12.6EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.

## 12.7TEST RESULTS

The power is so low so there is no need for RF calculations.