

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                            |                                                                                  |                  |                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------|---------------------------------------|
| <b>Prüfbericht-Nr.:</b><br>Test report no.:                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>NN23C2NI 001</b>                                                                        | <b>Auftrags-Nr.:</b><br>Order no.:                                               | <b>168439281</b> | <b>Seite 1 von 21</b><br>Page 1 of 21 |
| <b>Kunden-Referenz-Nr.:</b><br>Client reference no.:                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A                                                                                        | <b>Auftragsdatum:</b><br>Order date:                                             | 2023-08-05       |                                       |
| <b>Auftraggeber:</b><br>Client:                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>IKEA of Sweden AB</b><br>Box 702, SE-343 81 Älmhult, Sweden                             |                                                                                  |                  |                                       |
| <b>Prüfgegenstand:</b><br>Test item:                                                                                                                                                                                                                                                                                                                                                                                                                                  | Plug Smart                                                                                 |                                                                                  |                  |                                       |
| <b>Bezeichnung / Typ-Nr.:</b><br>Identification / Type no.:                                                                                                                                                                                                                                                                                                                                                                                                           | E2220<br>(Trademark: IKEA)                                                                 |                                                                                  |                  |                                       |
| <b>Auftrags-Inhalt:</b><br>Order content:                                                                                                                                                                                                                                                                                                                                                                                                                             | Test Report                                                                                |                                                                                  |                  |                                       |
| <b>Prüfgrundlage:</b><br>Test specification:                                                                                                                                                                                                                                                                                                                                                                                                                          | CFR47 FCC Part 15: Subpart C Section 15.247<br>CFR47 FCC Part 15: Subpart C Section 15.207 | RSS-247 Issue 3 August 2023<br>RSS-Gen Issue 5 February 2021<br>ANSI C63.10:2013 |                  |                                       |
| <b>Wareneingangsdatum:</b><br>Date of sample receipt:                                                                                                                                                                                                                                                                                                                                                                                                                 | 2023-08-15                                                                                 | Please refer to Photo Document                                                   |                  |                                       |
| <b>Prüfmuster-Nr.:</b><br>Test sample no.:                                                                                                                                                                                                                                                                                                                                                                                                                            | A003538734-001-004                                                                         |                                                                                  |                  |                                       |
| <b>Prüfzeitraum:</b><br>Testing period:                                                                                                                                                                                                                                                                                                                                                                                                                               | 2023-08-05 – 2023-08-25                                                                    |                                                                                  |                  |                                       |
| <b>Ort der Prüfung:</b><br>Place of testing:                                                                                                                                                                                                                                                                                                                                                                                                                          | TÜV Rheinland<br>(Shenzhen) Co., Ltd.                                                      |                                                                                  |                  |                                       |
| <b>Prüflaboratorium:</b><br>Testing laboratory:                                                                                                                                                                                                                                                                                                                                                                                                                       | TÜV Rheinland<br>(Shenzhen) Co., Ltd.                                                      |                                                                                  |                  |                                       |
| <b>Prüfergebnis*:</b><br>Test result*:                                                                                                                                                                                                                                                                                                                                                                                                                                | Pass                                                                                       |                                                                                  |                  |                                       |
| <b>geprüft von:</b><br>tested by:                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>genehmigt von:</b><br>authorized by:                                                    |                                                                                  |                  |                                       |
| <b>Datum:</b><br>Date:                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Ausstellungsdatum:</b><br>Issue date:                                                   |                                                                                  |                  |                                       |
| <b>Stellung / Position:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Stellung / Position:</b>                                                                |                                                                                  |                  |                                       |
| <b>Sonstiges /</b><br><b>Other:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                            |                                                                                  |                  |                                       |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br>Condition of the test item at delivery:                                                                                                                                                                                                                                                                                                                                                                       | <b>Prüfmuster vollständig und unbeschädigt</b><br>Test item complete and undamaged         |                                                                                  |                  |                                       |
| <p>* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet<br/>* Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested</p>                                                                                                                                                                      |                                                                                            |                                                                                  |                  |                                       |
| <p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b><br/>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</p> |                                                                                            |                                                                                  |                  |                                       |

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**Anmerkungen**  
*Remarks*

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.<br/>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>                                                                                                                                                                 |
| 2 | <p>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.</p> <p><i>As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.</i></p>                                                                                      |
| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.<br/>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i><br/><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p> |

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## ***Test Summary***

**5.1.1 ANTENNA REQUIREMENT**

*RESULT: Pass*

**5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER**

*RESULT: Pass*

**5.1.3 CONDUCTED POWER SPECTRAL DENSITY**

*RESULT: Pass*

**5.1.4 99%dB BANDWIDTH**

*RESULT: Pass*

**5.1.5 6dB BANDWIDTH**

*RESULT: Pass*

**5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHz BANDWIDTH**

*RESULT: Pass*

**5.1.7 RADIATED SPURIOUS EMISSION**

*RESULT: Pass*

**5.1.8 CONDUCTED EMISSION ON AC MAINS**

*RESULT: Pass*

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# 1 General Remarks

## 1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of Conducted & Radiated Testing

Appendix B: Photographs of the Test Set-up

# 2 Test Sites

## 2.1 Test Facilities

**TÜV Rheinland (Shenzhen) Co., Ltd.**

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Registration No.: 694916

IC Registration No.: 25069 and the CAB identifier is CN0078.

## 2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

| Radio Spectrum Testing (SRD-Tonscend)     |              |                   |              |            |
|-------------------------------------------|--------------|-------------------|--------------|------------|
| Equipment                                 | Manufacturer | Model             | Serial No.   | Cal. until |
| Wireless Connectivity Tester              | R&S          | CMW270            | 101375       | 2024-07-25 |
| Signal Analyzer                           | R&S          | FSV 40            | 101441       | 2024-07-25 |
| Vector Signal Generator                   | R&S          | SMBV100A          | 263301       | 2024-07-25 |
| Signal Generator                          | R&S          | SMB100A           | 115186       | 2024-07-25 |
| OSP                                       | R&S          | OSP 150           | 101017       | 2023-11-21 |
| Control PC                                | DELL         | OptiPlex 7050     | FTJZ9P2      | N/A        |
| Test Software                             | R&S          | WMS32(V11.00.00)  | N/A          | N/A        |
| Power Meter                               | R&S          | NRP2              | 107105       | 2023-11-21 |
| Power Sensor                              | R&S          | NRP-Z81           | 105677       | 2024-07-25 |
| Unwanted Emission Testing (TS9975)        |              |                   |              |            |
| Equipment                                 | Manufacturer | Model             | Serial No.   | Cal. until |
| EMI Test Receiver                         | R&S          | ESR 7             | 102021       | 2024-07-25 |
| Signal Analyzer                           | R&S          | FSV 40            | 101439       | 2024-07-25 |
| System Controller Interface               | R&S          | SCI-100           | S10010038    | N/A        |
| Filterbank                                | R&S          | Wlan              | 100759       | 2024-07-25 |
| OSP                                       | R&S          | OSP 120           | 102040       | N/A        |
| Pre-amplifier                             | R&S          | SCU08F1           | 08320031     | 2024-07-25 |
| Amplifier                                 | R&S          | SCU-18F           | 180070       | 2024-07-25 |
| Amplifier                                 | R&S          | SCU40A            | 100475       | 2024-07-25 |
| Trilog Broadband Antenna (30 MHz - 7 GHz) | Schwarzbeck  | VULB 9162         | 193          | 2024-06-08 |
| Double-Ridged Antenna (1 -18 GHz)         | ETS-LINDGREN | 3117              | 00218717     | 2024-06-08 |
| Wideband Ridged Horn Antenna (18-40 GHz)  | Steatite     | QMS-00880         | 19067        | 2024-08-27 |
| Active Loop Antenna                       | Schwarzbeck  | FMZB 1513         | 302          | 2024-06-08 |
| Test software                             | R&S          | EMC32 (V10.60.10) | N/A          | N/A        |
| Control PC                                | Dell         | OptiPlex 7050     | 36NV9P2      | N/A        |
| 3m Semi-Anechoic Chamber                  | Albatross    | SAC-3m            | APC17151-SAC | 2024-06-22 |

| Conducted Emissions      |              |                     |        |                  |
|--------------------------|--------------|---------------------|--------|------------------|
| Equipment                | Manufacturer | M/N                 | S/N    | Calibrated until |
| EMI Test Receiver        | R&S          | ESR3                | 102680 | 2024-07-30       |
| Artificial Mains Network | R&S          | ENV216              | 101445 | 2024-08-01       |
| EMC32 test software      | R&S          | EMC32(Ver.10.50.00) | N/A    | N/A              |

## 2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

## 2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

| Parameter                                              | Uncertainty (k=2)     |
|--------------------------------------------------------|-----------------------|
| Occupied Channel Bandwidth                             | ± 2.08 %              |
| RF output power, conducted                             | ± 0.99 dB             |
| RF power density, conducted                            | ± 0.99 dB             |
| Unwanted Emissions, conducted                          | ± 0.89 dB             |
| All emissions, radiated                                | ± 4.17 dB             |
| Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz) | ± 3.70 dB / ± 3.30 dB |

## 2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

## 2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

## 3 General Product Information

### 3.1 Product Function and Intended Use

The EUT is Plug Smart which supports 2.4GHz ZigBee wireless technology.

For details refer to the User Manual and Circuit Diagram.

### 3.2 Ratings and System Details

**Table 2: Technical Specification of EUT**

| General Information of EUT        | Value                                            |
|-----------------------------------|--------------------------------------------------|
| Kind of Equipment                 | Plug Smart                                       |
| Type Designation                  | E2220                                            |
| Trademark                         | IKEA                                             |
| FCC ID                            | FHO-E2220                                        |
| IC                                | 10912A-E2220                                     |
| HVIN                              | E2220                                            |
| Operating Voltage                 | AC 120V 50/60Hz                                  |
| Testing Voltage                   | DC 3.3V From USB debugging board<br>AC 120V 60Hz |
| Technical Specification of ZigBee |                                                  |
| Characteristic                    | Description                                      |
| Frequency Range                   | 2405.0 - 2480.0 MHz                              |
| Type of Modulation                | DSSS(OQPSK)                                      |
| Channel Number                    | 16 channels                                      |
| Channel Separation                | 5 MHz                                            |
| Receiver Categories               | Receiver category 2                              |
| Antenna Type                      | Internal Antenna                                 |
| Antenna Gain                      | 0 dBi                                            |

**Table 3: RF Channel and Frequency of ZigBee**

| RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) |
|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 11         | 2405.0          | 15         | 2425.0          | 19         | 2445.0          | 23         | 2465.0          |
| 12         | 2410.0          | 16         | 2430.0          | 20         | 2450.0          | 24         | 2470.0          |
| 13         | 2415.0          | 17         | 2435.0          | 21         | 2455.0          | 25         | 2475.0          |
| 14         | 2420.0          | 18         | 2440.0          | 22         | 2460.0          | 26         | 2480.0          |

Test frequencies are lowest channel: 2405.0 MHz, middle channel: 2445.0 MHz and highest channel: 2480.0MHz.

### 3.3 Independent Operation Modes

The basic operation modes are:

- A. On, ZigBee transmitting mode
  - 1. Low channel
  - 2. Middle channel
  - 3. High channel
- B. On, normal operating
- C. Off

### 3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

### 3.5 Submitted Documents

- |                                  |                  |
|----------------------------------|------------------|
| - Application Form               | - Photo Document |
| - Block Diagram                  | - Schematics     |
| - FCC/IC Label and Location Info | - User Manual    |
| - Operation Description          |                  |

## 4 Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

**Radio Spectrum:** The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

**Table 4: List of Power Level setting under Test**

| Test Mode | Power Level setting in software |
|-----------|---------------------------------|
| ZigBee    | 10                              |

### 4.3 Special Accessories and Auxiliary Equipment

**Table 5: List of Accessories and Auxiliary Equipment**

| Description        | Manufacturer                    | Model             | S/N      |
|--------------------|---------------------------------|-------------------|----------|
| Personnal Computer | Lenovo                          | ThinkCenter M910t | M70760G2 |
| Zigbee Modular     | LEEDARSON<br>LIGHTING CO., LTD. | LDS73B000A        | N/A      |
| Bulb               | LEEDARSON<br>LIGHTING CO., LTD. | N/A               | N/A      |

### 4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

## 4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 30MHz)

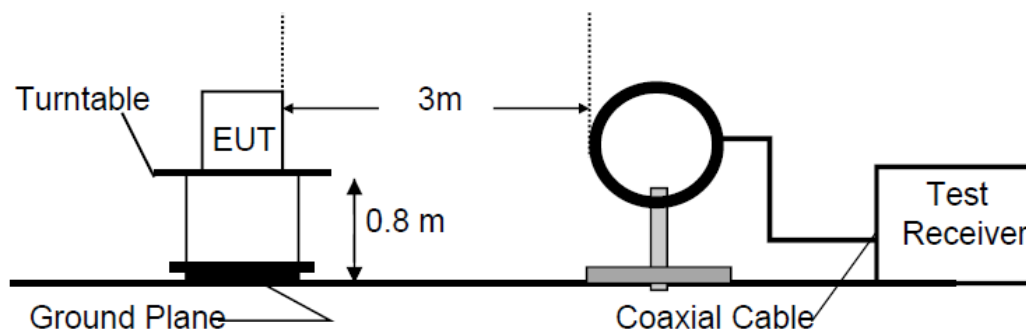


Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

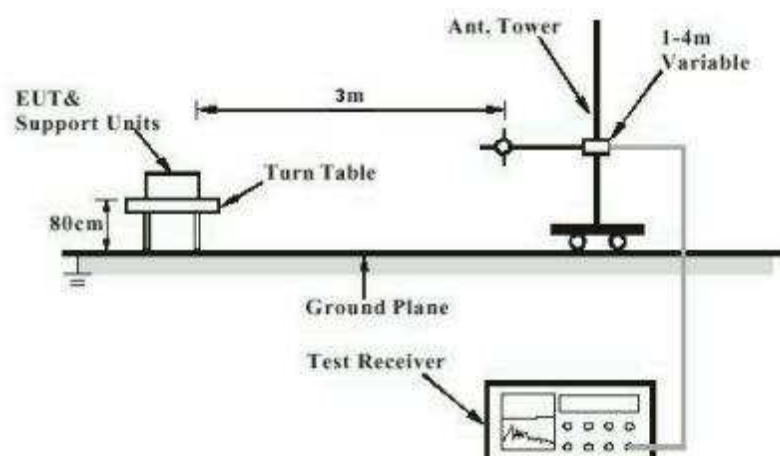
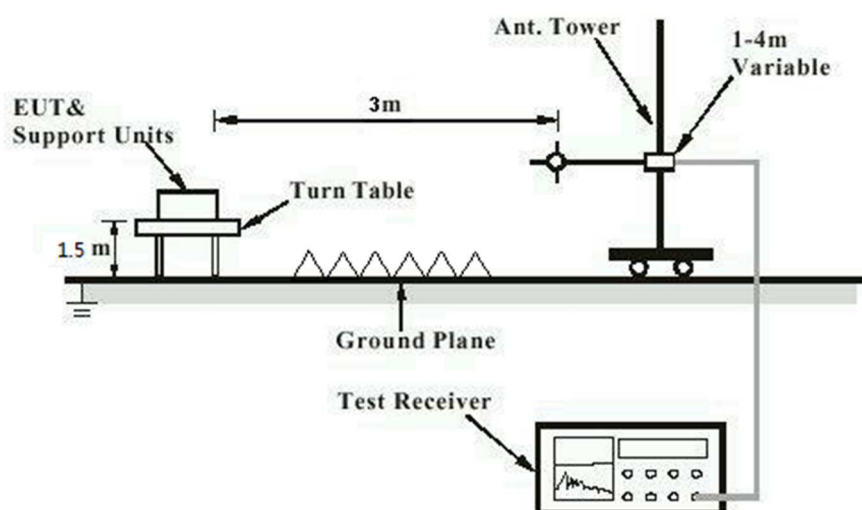
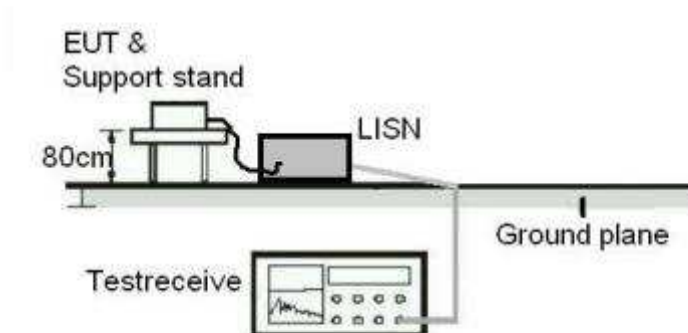


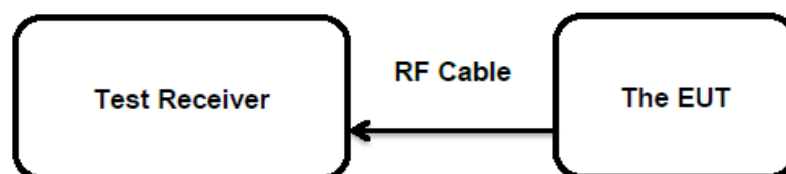
Diagram of Measurement Configuration for Radiation Test (Above 1GHz)



**Diagram of Measurement Configuration for Mains Conduction Measurement**



**Diagram of Measurement Configuration for Conducted Transmitter Measurement**



## 5 Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Antenna Requirement

**RESULT:****Pass****Test Specification**

|               |   |                                                                        |
|---------------|---|------------------------------------------------------------------------|
| Test standard | : | FCC Part 15.247(b)(4) and Part 15.203<br>RSS-Gen Clause 6.8            |
| Limit         | : | the use of antennas with directional gains that do not<br>exceed 6 dBi |

According to the manufacturer declared, the EUT has one Internal antenna, the directional gain of antennas are 0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

## 5.1.2 Maximum Peak Conducted Output Power

**RESULT:**
**Pass**
**Test Specification**

|                   |   |                                         |
|-------------------|---|-----------------------------------------|
| Test standard     | : | FCC Part 15.247(b)(3)                   |
|                   | : | RSS-247 Clause 5.4(a)&(d)               |
| Basic standard    | : | ANSI C63.10: 2013                       |
| Limits            | : | < 1 Watt (Maximum Conducted Peak Power) |
|                   | : | e.i.r.p. <4W                            |
| Kind of test site | : | Shielded Room                           |

**Test Setup**

|                      |   |                                  |
|----------------------|---|----------------------------------|
| Date of testing      | : | 2023-08-22                       |
| Input voltage        | : | DC 3.3V From USB debugging board |
| Operation mode       | : | A                                |
| Test channel         | : | Low / Middle / High              |
| Ambient temperature  | : | 25.2 °C                          |
| Relative humidity    | : | 42 %                             |
| Atmospheric pressure | : | 101 kPa                          |

For details refer to following test result.

**Table 6: Test Result of Maximum Peak Conducted Output Power**

| Test Mode              | Antenna | Test Channel (MHz) | Measured Peak Power |        | Limit (W) |
|------------------------|---------|--------------------|---------------------|--------|-----------|
|                        |         |                    | (dBm)               | (W)    |           |
| ZigBee                 | Ant1    | 2405               | 11.88               | 0.0154 | < 1.0     |
|                        |         | 2445               | 11.83               | 0.0152 |           |
|                        |         | 2480               | 11.90               | 0.0155 |           |
| Maximum Measured Value |         |                    | 11.90               | 0.0155 |           |

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 0 dBi

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### 5.1.3 Conducted Power Spectral Density

**RESULT:****Pass****Test Specification**

|                   |                                                                   |
|-------------------|-------------------------------------------------------------------|
| Test standard     | : FCC Part 15.247(e)<br>RSS-247 Clause 5.2(b), RSS-247 Clause 5.3 |
| Basic standard    | : ANSI C63.10: 2013                                               |
| Limits            | : 8 dBm / 3kHz                                                    |
| Kind of test site | : Shielded Room                                                   |

**Test Setup**

|                      |                                    |
|----------------------|------------------------------------|
| Date of testing      | : 2023-08-22                       |
| Input voltage        | : DC 3.3V From USB debugging board |
| Operation mode       | : A                                |
| Test channel         | : Low / Middle / High              |
| Ambient temperature  | : 25.2 °C                          |
| Relative humidity    | : 42 %                             |
| Atmospheric pressure | : 101 kPa                          |

For the measurement records, refer to the appendix A.

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### 5.1.4 99%dB Bandwidth

**RESULT:****Pass****Test Specification**

|                   |                      |
|-------------------|----------------------|
| Test standard     | : RSS-Gen clause 6.7 |
| Basic standard    | : ANSI C63.10: 2013  |
| Kind of test site | : Shielded Room      |

**Test Setup**

|                      |                                    |
|----------------------|------------------------------------|
| Date of testing      | : 2023-08-22                       |
| Input voltage        | : DC 3.3V From USB debugging board |
| Operation mode       | : A                                |
| Test channel         | : Low / Middle / High              |
| Ambient temperature  | : 25.2 °C                          |
| Relative humidity    | : 42 %                             |
| Atmospheric pressure | : 101 kPa                          |

For the measurement records, refer to the appendix A.

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### 5.1.5 6dB Bandwidth

**RESULT:****Pass****Test Specification**

|                   |   |                       |
|-------------------|---|-----------------------|
| Test standard     | : | FCC Part 15.247(a)(2) |
|                   | : | RSS-247 Clause 5.2(a) |
| Basic standard    | : | ANSI C63.10: 2013     |
| Kind of test site | : | Shielded Room         |

**Test Setup**

|                      |   |                                  |
|----------------------|---|----------------------------------|
| Date of testing      | : | 2023-08-22                       |
| Input voltage        | : | DC 3.3V From USB debugging board |
| Operation mode       | : | A                                |
| Test channel         | : | Low / Middle / High              |
| Ambient temperature  | : | 25.2 °C                          |
| Relative humidity    | : | 42 %                             |
| Atmospheric pressure | : | 101 kPa                          |

For the measurement records, refer to the appendix A.

## 5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

**RESULT:****Pass****Test Specification**

|                   |                                                                                                                                                                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test standard     | : FCC Part 15.247(d)<br>RSS-247 Clause 5.5                                                                                                                                                                                                                         |
| Basic standard    | : ANSI C63.10: 2013                                                                                                                                                                                                                                                |
| Limits            | : 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power);<br>In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a) |
| Kind of test site | : Shielded Room                                                                                                                                                                                                                                                    |

**Test Setup**

|                      |                                    |
|----------------------|------------------------------------|
| Date of testing      | : 2023-08-22                       |
| Input voltage        | : DC 3.3V From USB debugging board |
| Operation mode       | : A                                |
| Test channel         | : Low / Middle / High              |
| Ambient temperature  | : 25.2 °C                          |
| Relative humidity    | : 42 %                             |
| Atmospheric pressure | : 101 kPa                          |

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix A.

## 5.1.7 Radiated Spurious Emission

**RESULT:****Pass****Test Specification**

|                   |   |                                                                       |
|-------------------|---|-----------------------------------------------------------------------|
| Test standard     | : | FCC Part 15.247(d) & FCC Part 15.205<br>RSS-247 Clause 3.3 & 5.5      |
| Basic standard    | : | ANSI C63.10: 2013                                                     |
| Limits            | : | Refer to 15.209(a) of FCC part 15.247(d)<br>RSS-Gen Table 4 & Table 5 |
| Kind of test site | : | 3m Semi-anechoic Chamber                                              |

**Test Setup**

|                      |   |                          |
|----------------------|---|--------------------------|
| Date of testing      | : | 2023-08-20 to 2023-08-23 |
| Input voltage        | : | AC 120V 60Hz             |
| Operation mode       | : | A                        |
| Test channel         | : | Low / Middle / High      |
| Ambient temperature  | : | Refer to test result     |
| Relative humidity    | : | Refer to test result     |
| Atmospheric pressure | : | 101 kPa                  |

**Remark:**

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A.

## 5.1.8 Conducted Emission on AC Mains

**RESULT:****Pass****Test Specification**

|                      |                                            |
|----------------------|--------------------------------------------|
| Test standard        | : FCC Part 15.207(a)<br>RSS-Gen Clause 8.8 |
| Basic standard       | : ANSI C63.10: 2013                        |
| Frequency range      | : 0.15 – 30MHz                             |
| Limits               | : FCC Part 15.207(a)<br>RSS-Gen Table 4    |
| Kind of test site    | : Shielded Room                            |
| Date of testing      | : 2023-08-20 to 2023-08-23                 |
| Input voltage        | : AC 120V 60Hz                             |
| Operation mode       | : A                                        |
| Test channel         | : Low / Middle / High                      |
| Ambient temperature  | : Refer to test result                     |
| Relative humidity    | : Refer to test result                     |
| Atmospheric pressure | : 101 kPa                                  |

**Remark:**

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A.

## 6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix B.

## 7 List of Tables

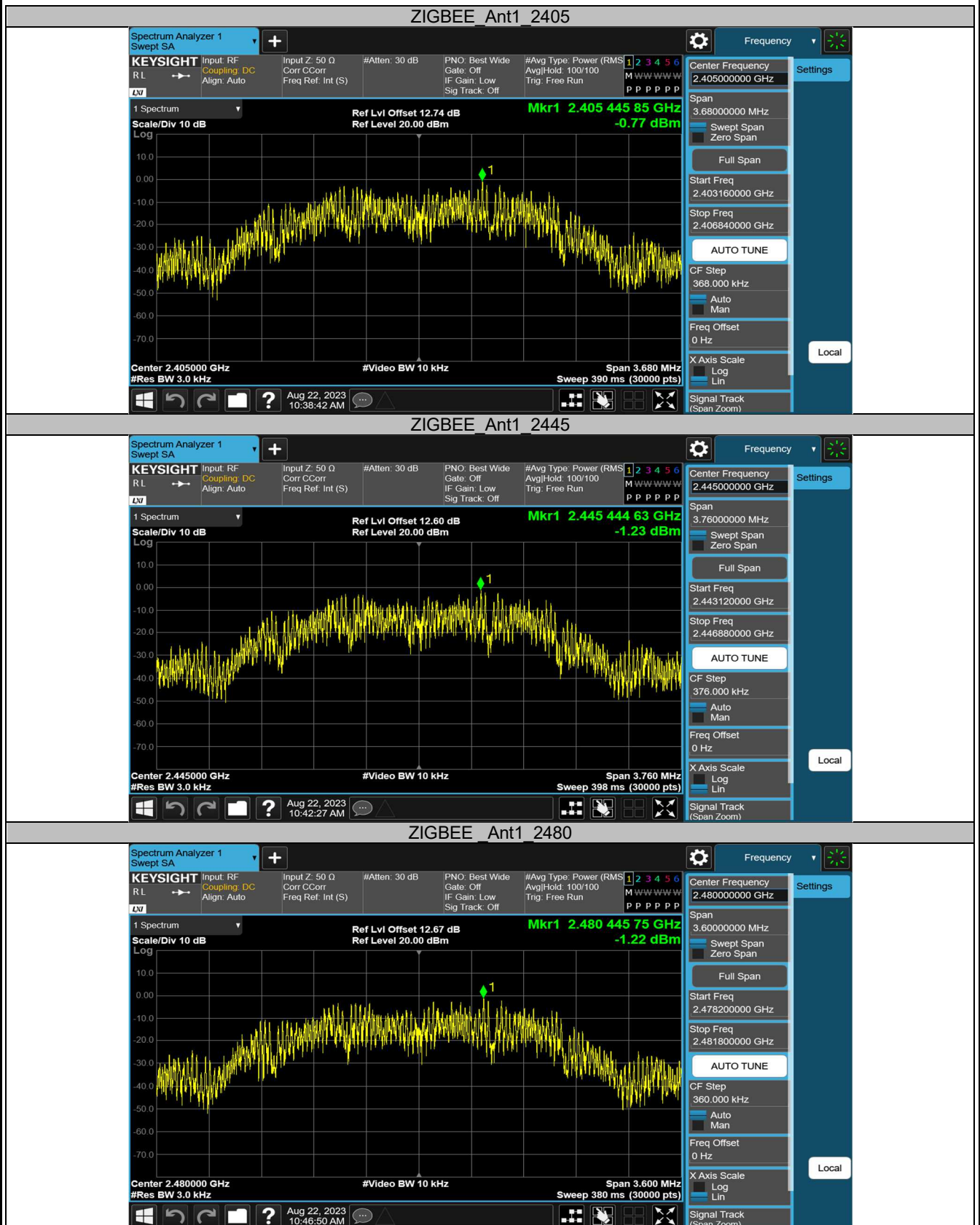
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## Appendix A: Test Results

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## Appendix A.1: Test Results of Conducted Power Spectral Density

| TestMode | Antenna | Frequency[MHz] | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|----------|---------|----------------|----------------------|-----------------|---------|
| Zigbee   | Ant1    | 2405           | -0.77                | ≤8.00           | PASS    |
|          |         | 2445           | -1.23                | ≤8.00           | PASS    |
|          |         | 2480           | -1.22                | ≤8.00           | PASS    |



## Appendix A.2: Test Results of 6dB Bandwidth

| TestMode | Antenna | Frequency[MHz] | DTS BW [MHz] | FL[MHz]  | FH[MHz]  | Limit[MHz] | Verdict |
|----------|---------|----------------|--------------|----------|----------|------------|---------|
| Zigbee   | Ant1    | 2405           | 1.840        | 2404.090 | 2405.930 | >0.5       | PASS    |
|          |         | 2445           | 1.880        | 2444.080 | 2445.960 | >0.5       | PASS    |
|          |         | 2480           | 1.800        | 2479.120 | 2480.920 | >0.5       | PASS    |

## ZIGBEE Ant1 2405



## ZIGBEE Ant1 2445



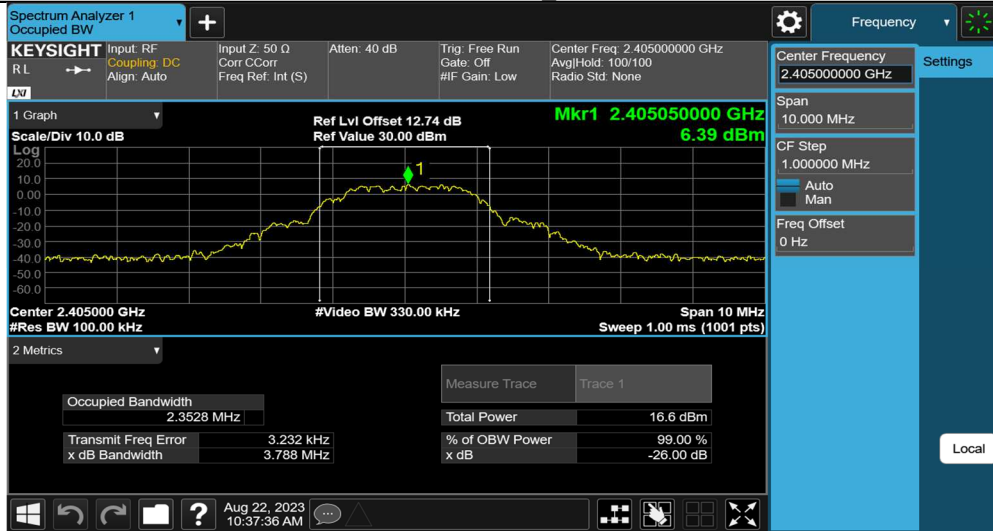
## ZIGBEE Ant1 2480



### Appendix A.3: Test Results of 99% Bandwidth

| TestMode | Antenna | Frequency[MHz] | OCB [MHz] | FL[MHz]   | FH[MHz]   | Limit[MHz] | Verdict |
|----------|---------|----------------|-----------|-----------|-----------|------------|---------|
| Zigbee   | Ant1    | 2405           | 2.3528    | 2403.8268 | 2406.1796 | ---        | PASS    |
|          |         | 2445           | 2.3622    | 2443.8144 | 2446.1766 | ---        | PASS    |
|          |         | 2480           | 2.3670    | 2478.8161 | 2481.1831 | ---        | PASS    |

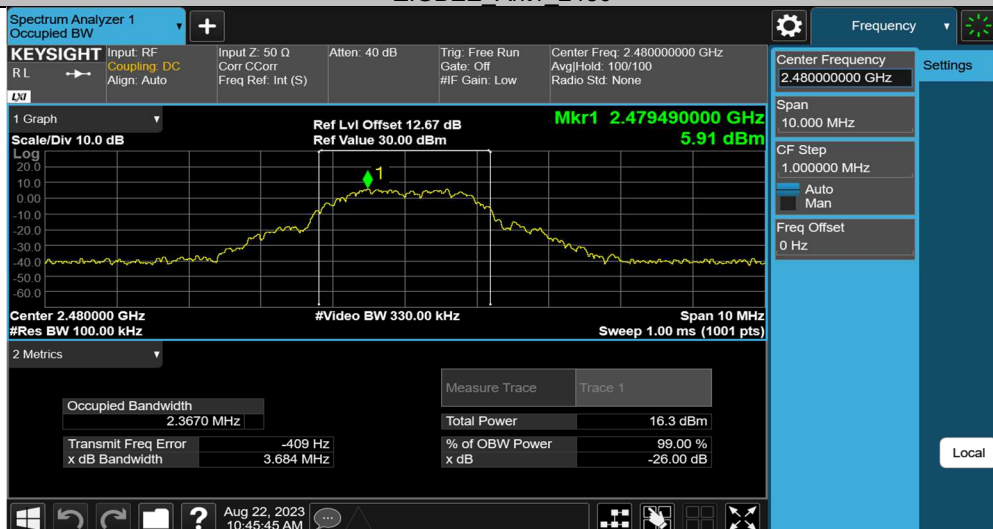
ZIGBEE Ant1\_2405



ZIGBEE Ant1\_2445



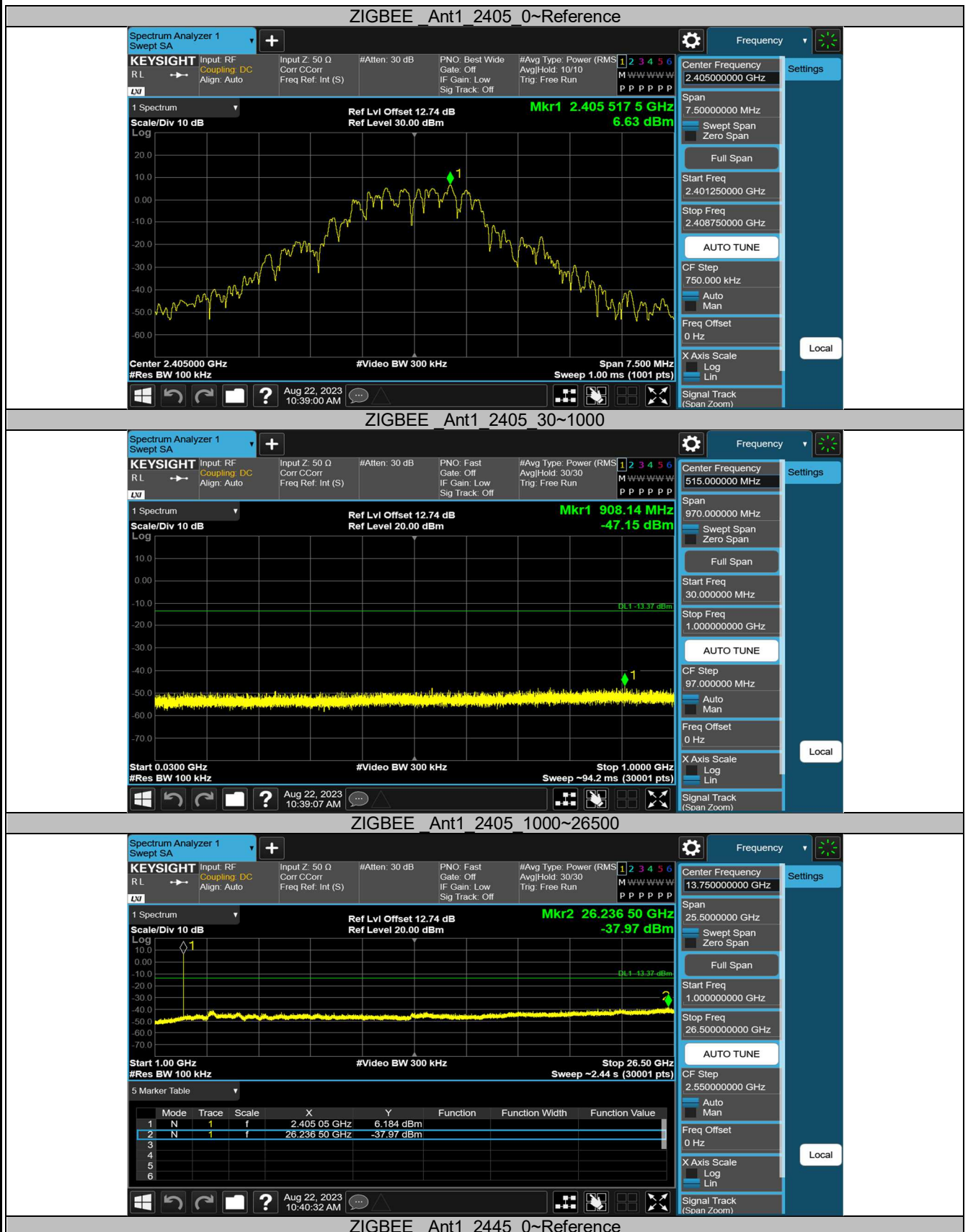
ZIGBEE Ant1\_2480



## Appendix A.4: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

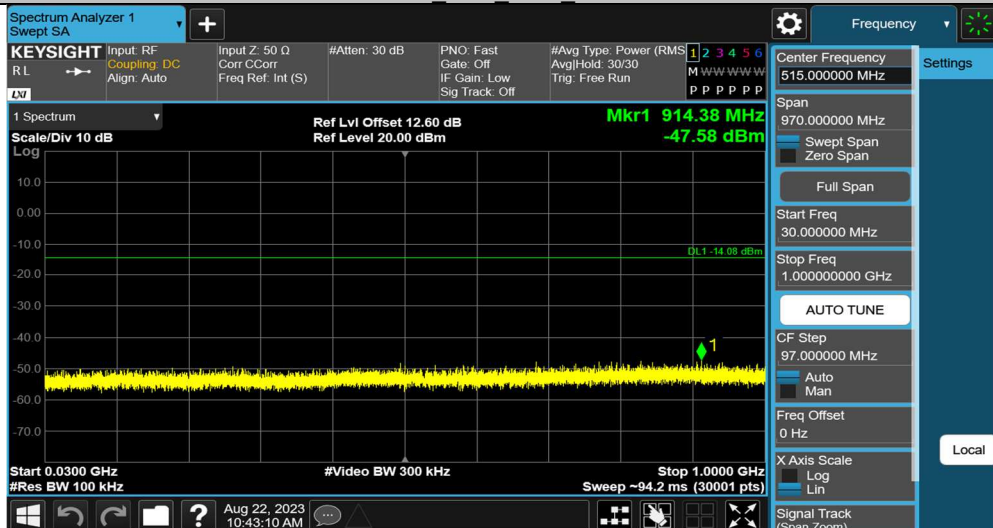
### Conducted Spurious Emission

| TestMode | Antenna | Frequency[MHz] | FreqRange [MHz] | RefLevel [dBm] | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|----------------|-----------------|----------------|-------------|------------|---------|
| Zigbee   | Ant1    | 2405           | Reference       | 6.63           | 6.63        | ---        | PASS    |
|          |         |                | 30~1000         | 6.63           | -47.15      | ≤-13.37    | PASS    |
|          |         |                | 1000~26500      | 6.63           | -37.97      | ≤-13.37    | PASS    |
|          |         | 2445           | Reference       | 5.92           | 5.92        | ---        | PASS    |
|          |         |                | 30~1000         | 5.92           | -47.58      | ≤-14.08    | PASS    |
|          |         |                | 1000~26500      | 5.92           | -37.92      | ≤-14.08    | PASS    |
|          |         | 2480           | Reference       | 4.88           | 4.88        | ---        | PASS    |
|          |         |                | 30~1000         | 4.88           | -47.49      | ≤-15.12    | PASS    |
|          |         |                | 1000~26500      | 4.88           | -38.82      | ≤-15.12    | PASS    |

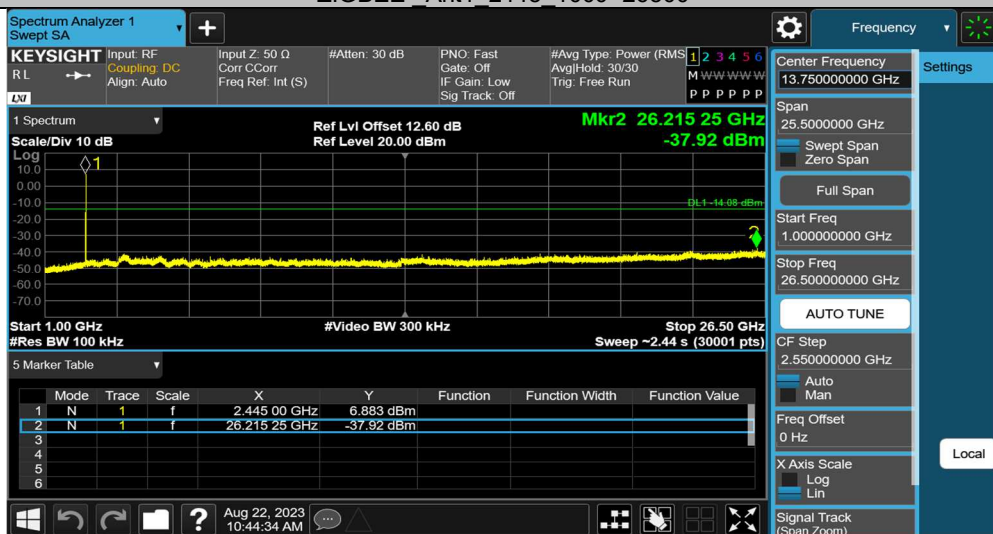




ZIGBEE Ant1 2445 30~1000



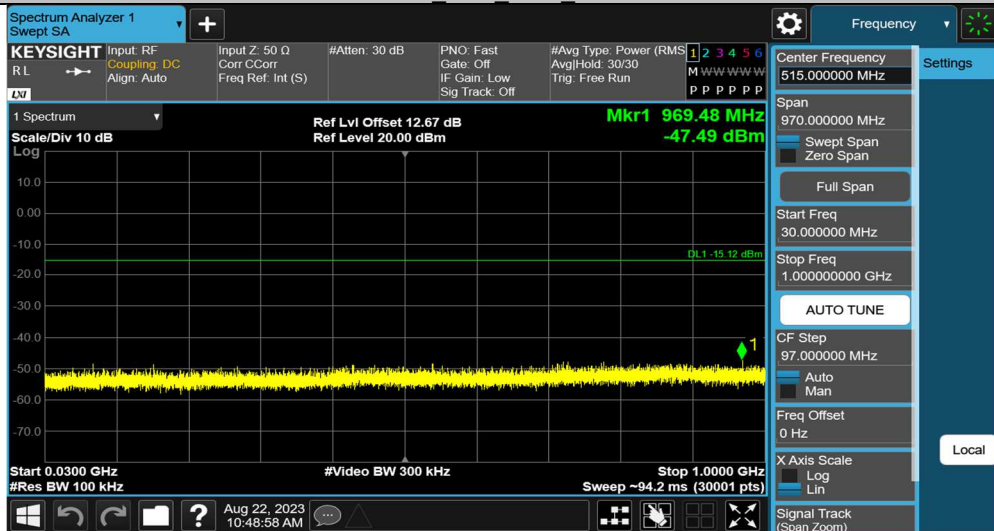
ZIGBEE Ant1 2445 1000~26500



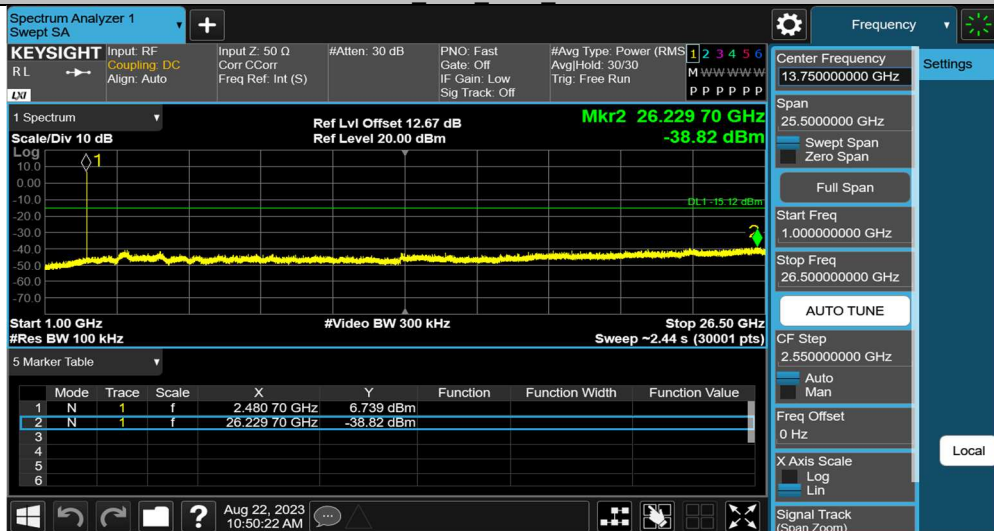
ZIGBEE OPERATING Ant1 2480 0~Reference



ZIGBEE Ant1 2480 30~1000



ZIGBEE Ant1 2480 1000~26500



Prüfbericht - Produkte  
Test Report - Products

Band Edge

| TestMode | Antenna | ChName | Frequency[MHz] | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|--------|----------------|---------------|-------------|------------|---------|
| Zigbee   | Ant1    | Low    | 2405           | 5.81          | -47.9       | ≤-14.18    | PASS    |
|          |         | High   | 2480           | 10.98         | -44.2       | ≤-13.77    | PASS    |



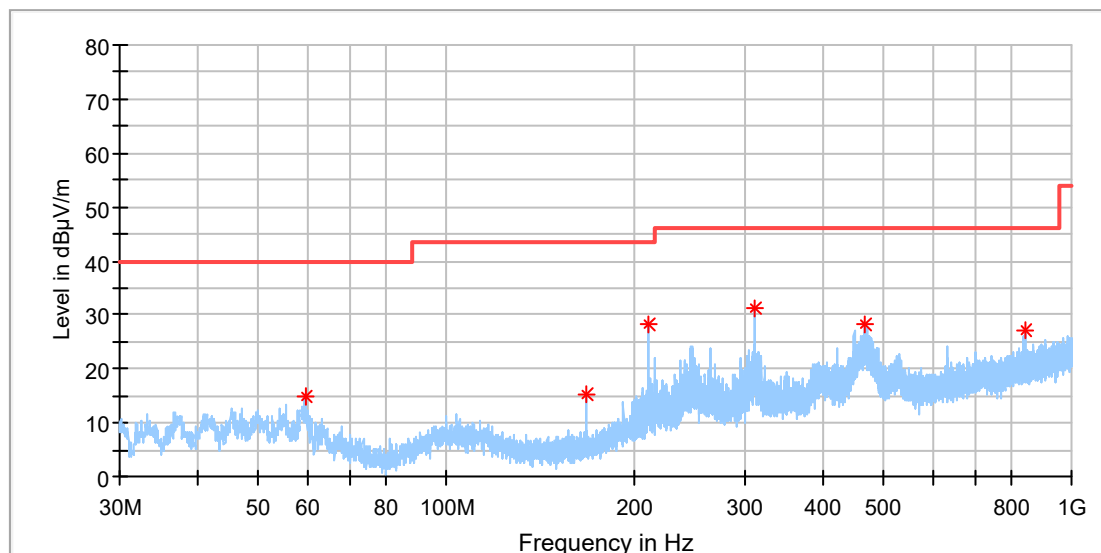
## Appendix A.5: Test Results of Radiated Spurious Emissions

Note:

- 1) This testing was carried out on different modulations, but only the worst case was presented in this report.
- 2) Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

30 MHz to 1GHz

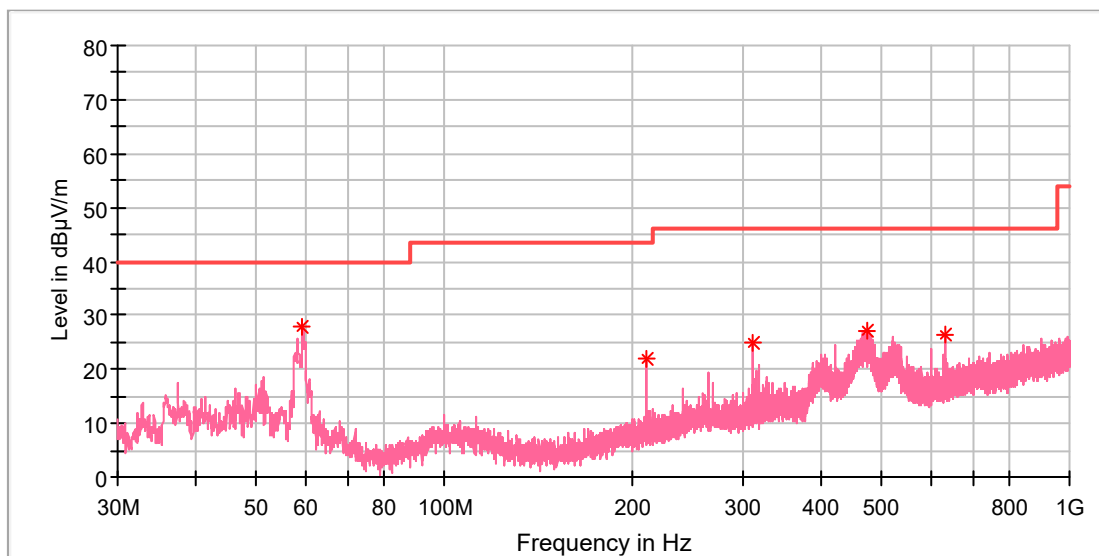
|                     |                          |
|---------------------|--------------------------|
| EUT Name:           | Plug Smart               |
| Model:              | E2220                    |
| Test Mode:          | Zigbee                   |
| Order No/Sample No: | 168439281/A003538734-001 |
| Test Voltage::      | AC 120V 60Hz             |
| Remark:             | Temp 24 Humi:50%         |
| Test Standard:      | FCC 15.247               |
| Tested By:          | Kei Zhang                |
| Reviewed By:        | Terry Yin                |



### Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 59.547692       | 14.90            | 40.00          | 25.10       | 100.0       | H   | 75.0          | -19.2        |
| 168.001154      | 15.23            | 43.50          | 28.27       | 100.0       | H   | 124.0         | -21.7        |
| 210.345385      | 28.38            | 43.50          | 15.12       | 100.0       | H   | 93.0          | -19.2        |
| 312.008846      | 31.39            | 46.00          | 14.61       | 100.0       | H   | 236.0         | -16.3        |
| 466.164231      | 28.14            | 46.00          | 17.86       | 100.0       | H   | 280.0         | -12.9        |
| 841.479615      | 26.98            | 46.00          | 19.02       | 100.0       | H   | 253.0         | -6.0         |

EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



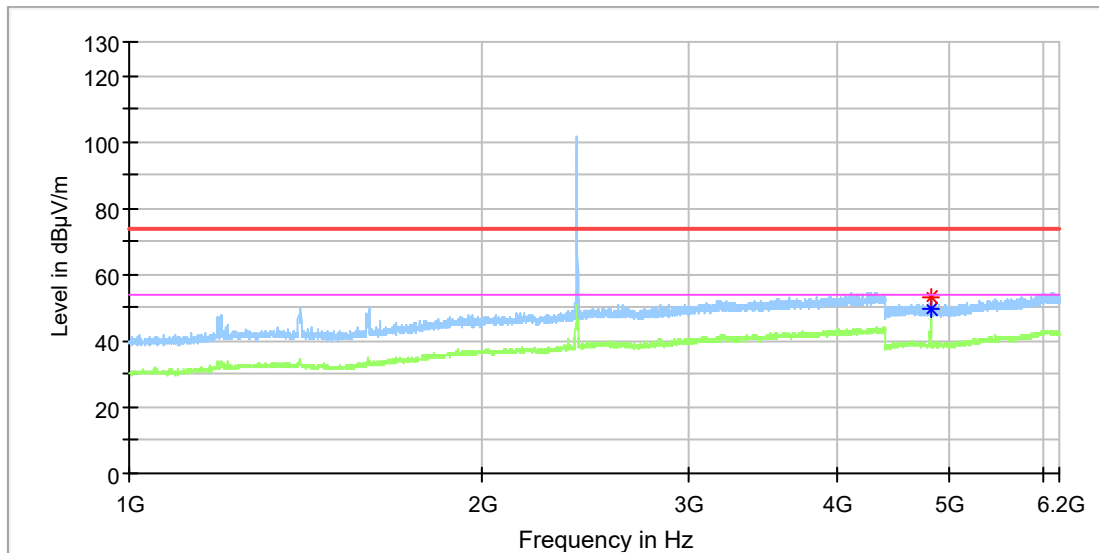
### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 59.361154       | 28.01            | 40.00          | 11.99       | 100.0       | V   | 295.0         | -19.2        |
| 210.345385      | 22.13            | 43.50          | 21.37       | 100.0       | V   | 146.0         | -19.2        |
| 312.008846      | 25.01            | 46.00          | 20.99       | 100.0       | V   | 0.0           | -16.3        |
| 473.103462      | 27.35            | 46.00          | 18.66       | 100.0       | V   | 34.0          | -12.7        |
| 631.101539      | 26.42            | 46.00          | 19.58       | 100.0       | V   | 354.0         | -9.7         |

1GHz-18GHz

Note: The highest waveform in the figure is Zigbee operating Fundamental.

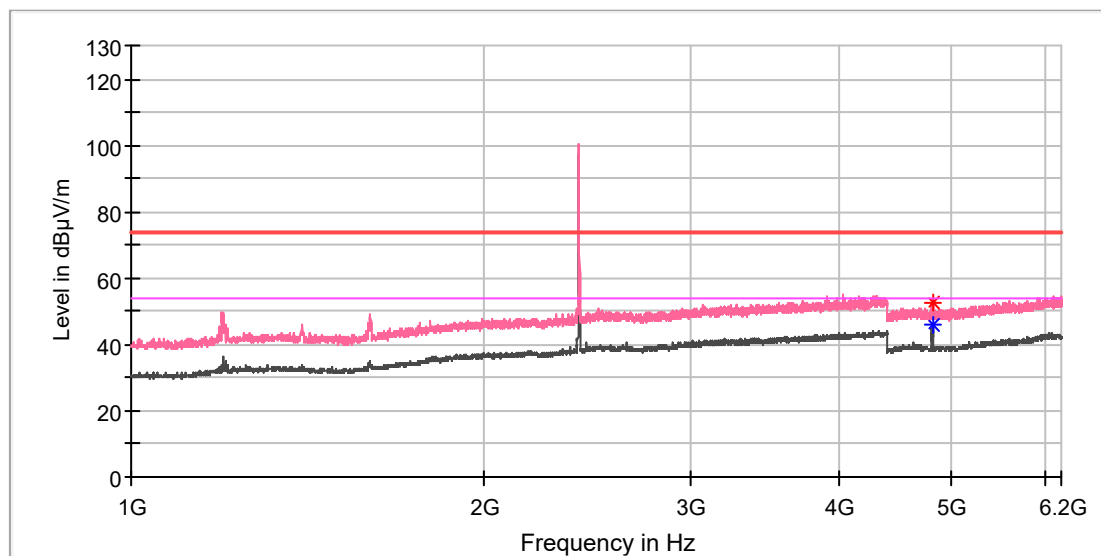
|                     |                          |
|---------------------|--------------------------|
| EUT Name:           | Plug Smart               |
| Model:              | E2220                    |
| Test Mode:          | Zigbee_Low channel       |
| Order No/Sample No: | 168439281/A003538734-001 |
| Test Voltage::      | AC 120V 60Hz             |
| Remark:             | Temp 24 Humi:50%         |
| Test Standard:      | FCC 15.247               |
| Tested By:          | Kei Zhang                |
| Reviewed By:        | Terry Yin                |



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBμV/m) | Average (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 4812.500000     | 53.25            | ---              | 74.00          | 20.75       | 100.0       | H   | 84.0          | 11.8         |
| 4812.500000     | ---              | 49.42            | 54.00          | 4.58        | 100.0       | H   | 84.0          | 11.8         |

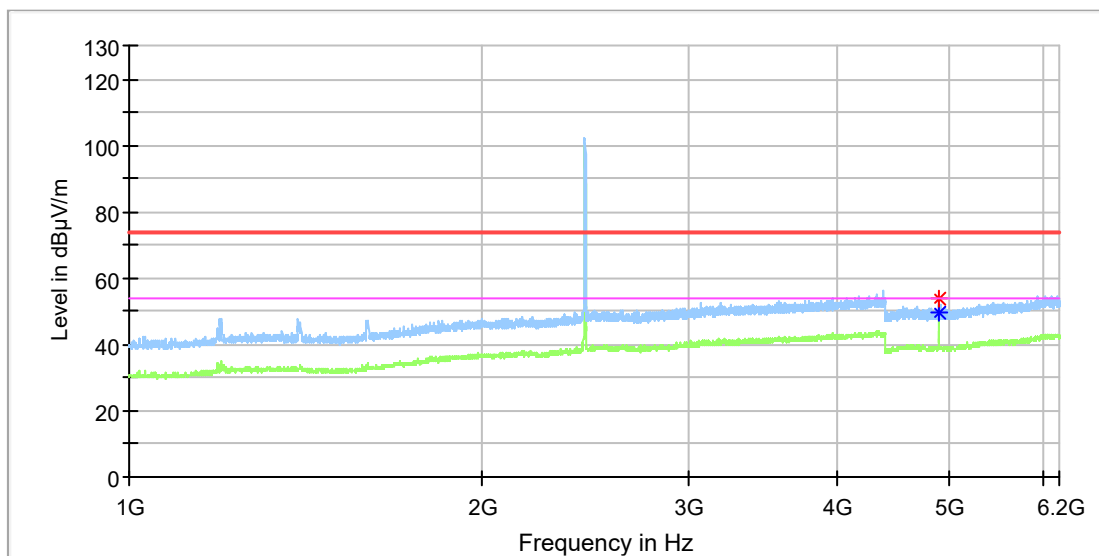
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_Low channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 4812.500000     | ---              | 46.05            | 54.00          | 7.95        | 100.0       | V   | 199.0         | 11.8         |
| 4813.000000     | 52.49            | ---              | 74.00          | 21.51       | 100.0       | V   | 187.0         | 11.8         |

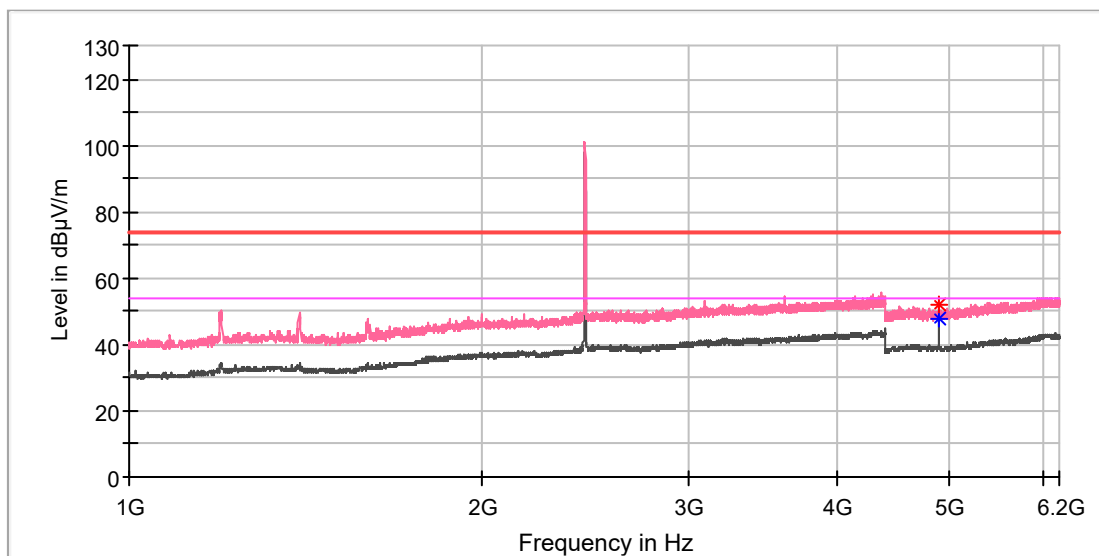
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_Mid channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 4892.500000     | 53.52            | ---              | 74.00          | 20.48       | 100.0       | H   | 88.0          | 11.8         |
| 4892.500000     | ---              | 49.29            | 54.00          | 4.71        | 100.0       | H   | 88.0          | 11.8         |

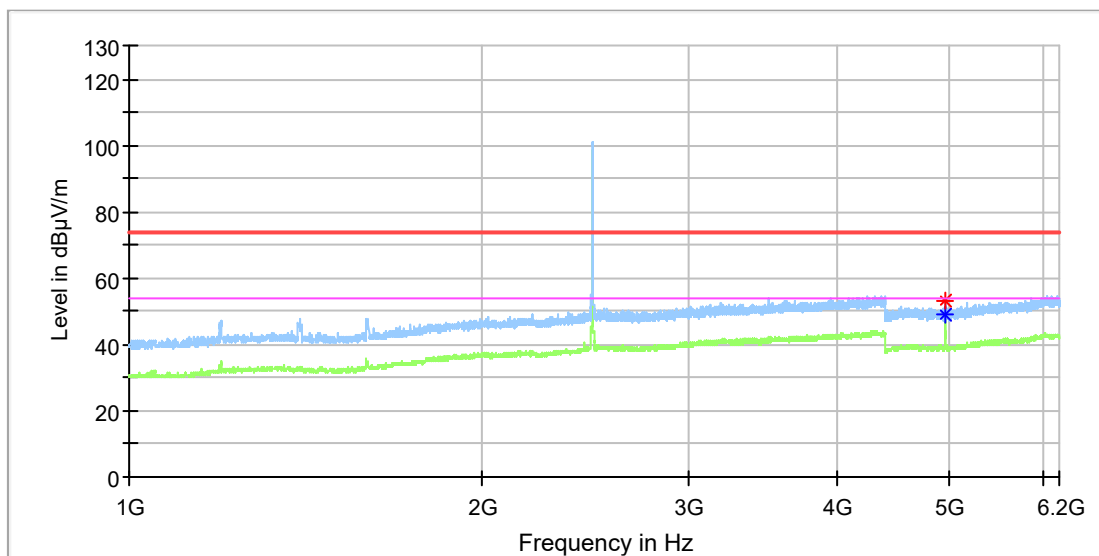
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_Mid channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 4892.500000     | 52.28            | ---              | 74.00          | 21.72       | 100.0       | V   | 181.0         | 11.8         |
| 4892.500000     | ---              | 47.56            | 54.00          | 6.44        | 100.0       | V   | 181.0         | 11.8         |

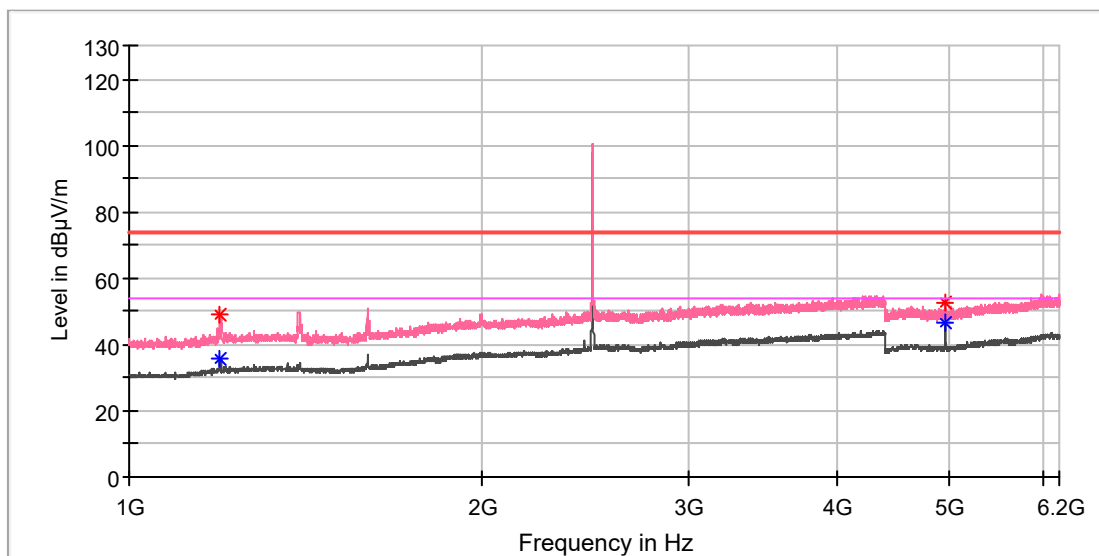
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_High channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 4961.000000     | 53.43            | ---              | 74.00          | 20.57       | 100.0       | H   | 73.0          | 11.8         |
| 4962.500000     | ---              | 49.01            | 54.00          | 4.99        | 100.0       | H   | 91.0          | 11.8         |

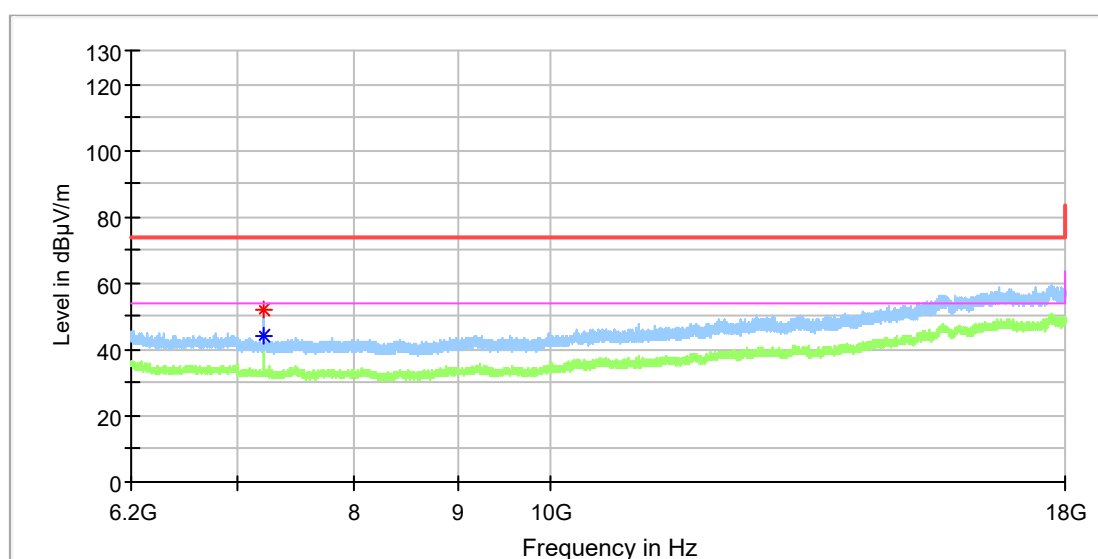
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_High channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1195.500000     | 49.08            | ---              | 74.00          | 24.92       | 100.0       | V   | 22.0          | 1.1          |
| 1195.500000     | ---              | 35.92            | 54.00          | 18.08       | 100.0       | V   | 22.0          | 1.1          |
| 4962.500000     | 52.63            | ---              | 74.00          | 21.37       | 100.0       | V   | 191.0         | 11.8         |
| 4962.500000     | ---              | 46.42            | 54.00          | 7.58        | 100.0       | V   | 191.0         | 11.8         |

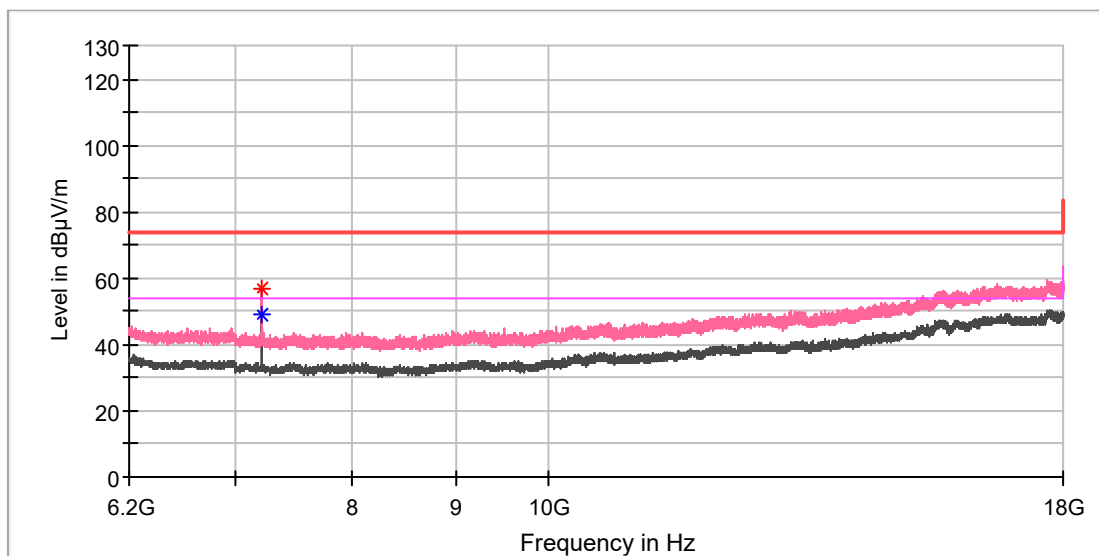
EUT Name: Plug Smart  
 Model: E2220  
 Test Mode: Zigbee\_Low channel  
 Order No/Sample No: 168439281/A003538734-001  
 Test Voltage:: AC 120V 60Hz  
 Remark: Temp 24 Humi:50%  
 Test Standard: FCC 15.247  
 Tested By: Kei Zhang  
 Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 7213.325000     | 52.28            | ---              | 74.00          | 21.72       | 100.0       | H   | 104.0         | 8.7          |
| 7213.325000     | ---              | 44.25            | 54.00          | 9.75        | 100.0       | H   | 104.0         | 8.7          |

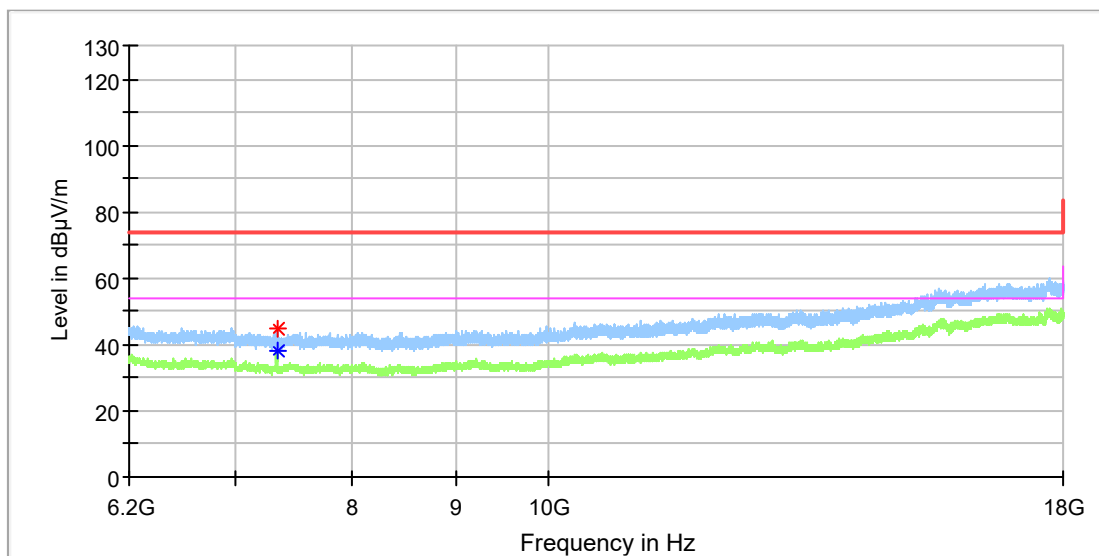
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_Low channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 7215.783333     | ---              | 49.22            | 54.00          | 4.78        | 100.0       | V   | 325.0         | 8.7          |
| 7216.275000     | 56.97            | ---              | 74.00          | 17.03       | 100.0       | V   | 325.0         | 8.7          |

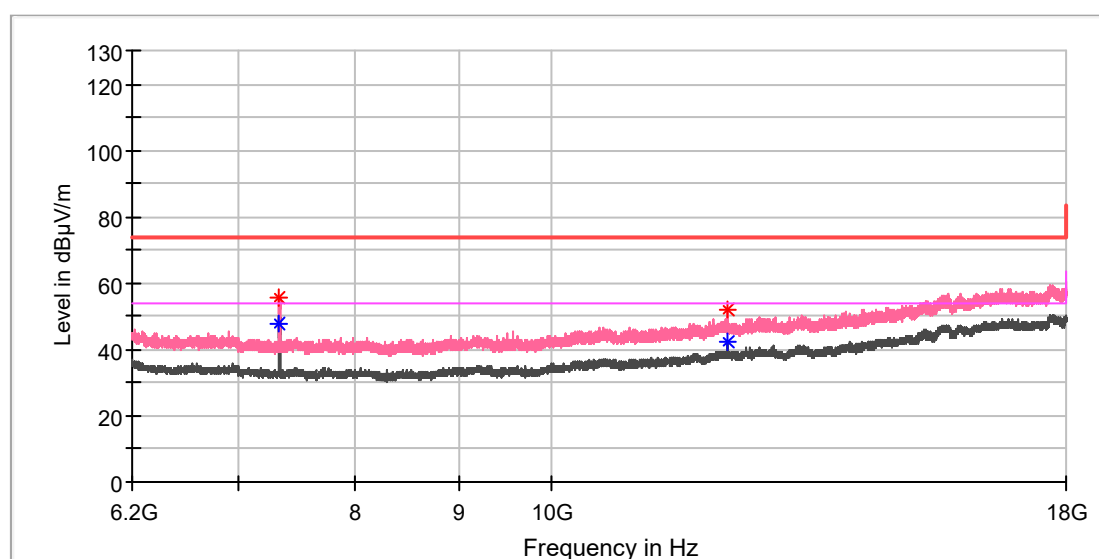
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_Mid channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 7336.241667     | ---              | 38.19            | 54.00          | 15.81       | 100.0       | H   | 0.0           | 8.1          |
| 7336.733333     | 44.62            | ---              | 74.00          | 29.38       | 100.0       | H   | 0.0           | 8.1          |

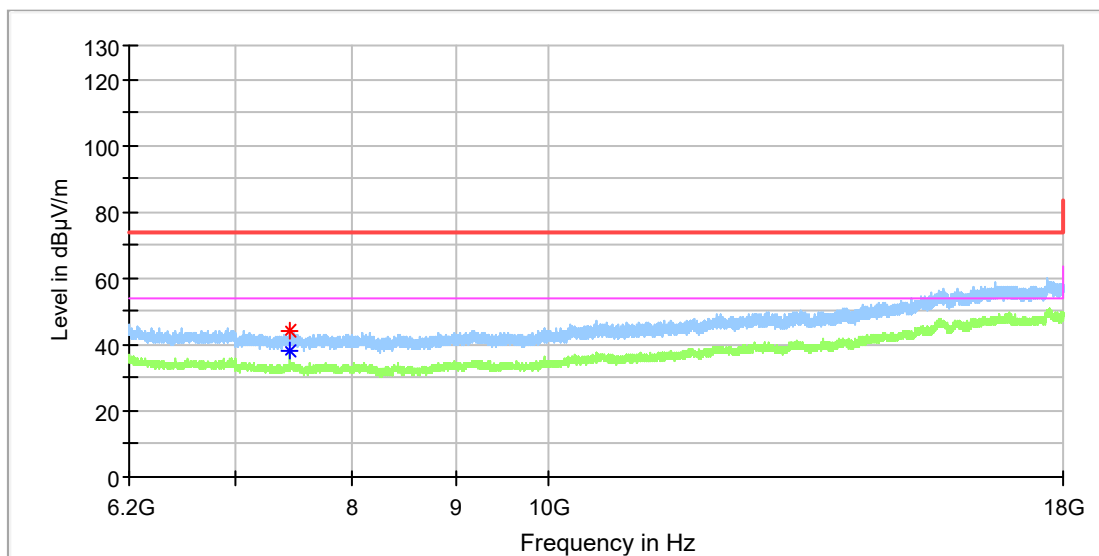
EUT Name: Plug Smart  
 Model: E2220  
 Test Mode: Zigbee\_Mid channel  
 Order No/Sample No: 168439281/A003538734-001  
 Test Voltage:: AC 120V 60Hz  
 Remark: Temp 24 Humi:50%  
 Test Standard: FCC 15.247  
 Tested By: Kei Zhang  
 Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 7332.800000     | ---              | 47.57            | 54.00          | 6.43        | 100.0       | V   | 5.0           | 8.1          |
| 7333.783333     | 55.58            | ---              | 74.00          | 18.42       | 100.0       | V   | 5.0           | 8.1          |
| 12227.833333    | 51.79            | ---              | 74.00          | 22.21       | 100.0       | V   | 5.0           | 14.7         |
| 12227.833333    | ---              | 42.58            | 54.00          | 11.42       | 100.0       | V   | 5.0           | 14.7         |

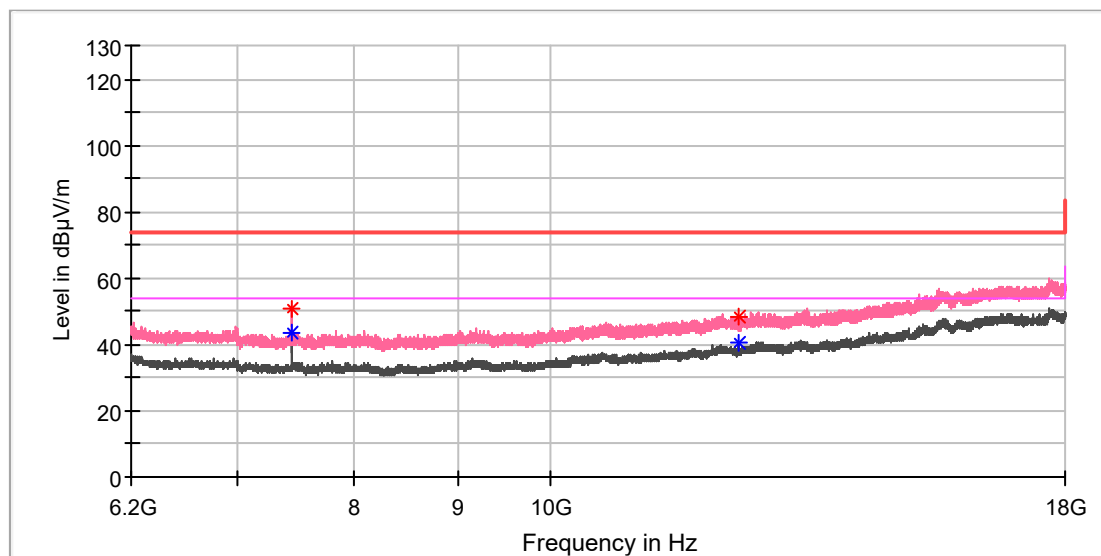
EUT Name: Plug Smart  
 Model: E2220  
 Test Mode: Zigbee\_High channel  
 Order No/Sample No: 168439281/A003538734-001  
 Test Voltage:: AC 120V 60Hz  
 Remark: Temp 24 Humi:50%  
 Test Standard: FCC 15.247  
 Tested By: Kei Zhang  
 Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 7438.508333     | 44.20            | ---              | 74.00          | 29.80       | 100.0       | H   | 171.0         | 8.4          |
| 7438.508333     | ---              | 37.98            | 54.00          | 16.02       | 100.0       | H   | 171.0         | 8.4          |

EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_High channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

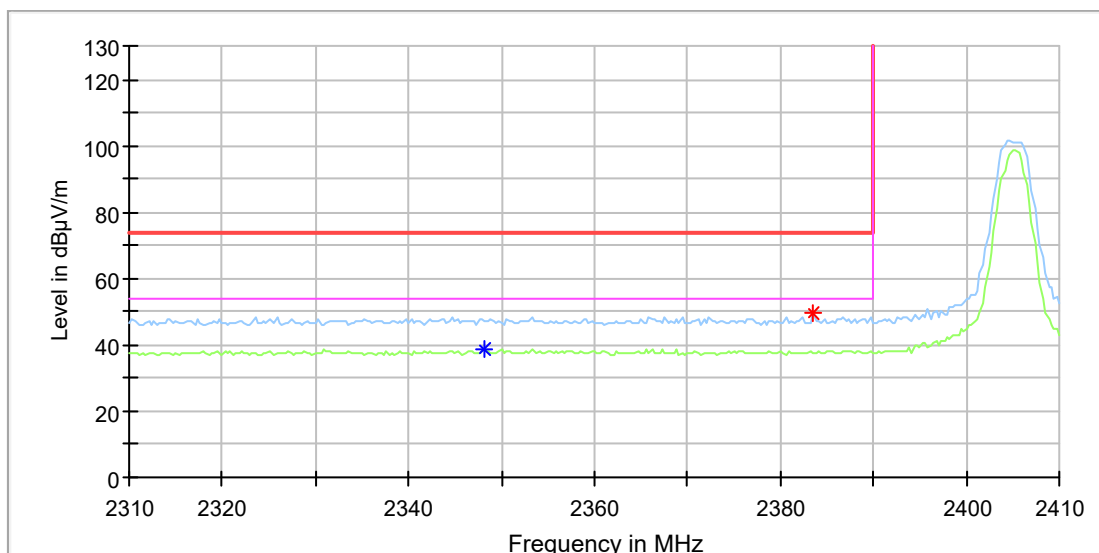


### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 7438.508333     | 50.51            | ---              | 74.00          | 23.49       | 100.0       | V   | 19.0          | 8.4          |
| 7441.458333     | ---              | 43.72            | 54.00          | 10.28       | 100.0       | V   | 19.0          | 8.4          |
| 12397.458333    | 48.52            | ---              | 74.00          | 25.48       | 100.0       | V   | 163.0         | 14.7         |
| 12397.458333    | ---              | 40.71            | 54.00          | 13.29       | 100.0       | V   | 163.0         | 14.7         |

## Appendix A.6: Test Results of Radiated Emissions in Restricted Bands

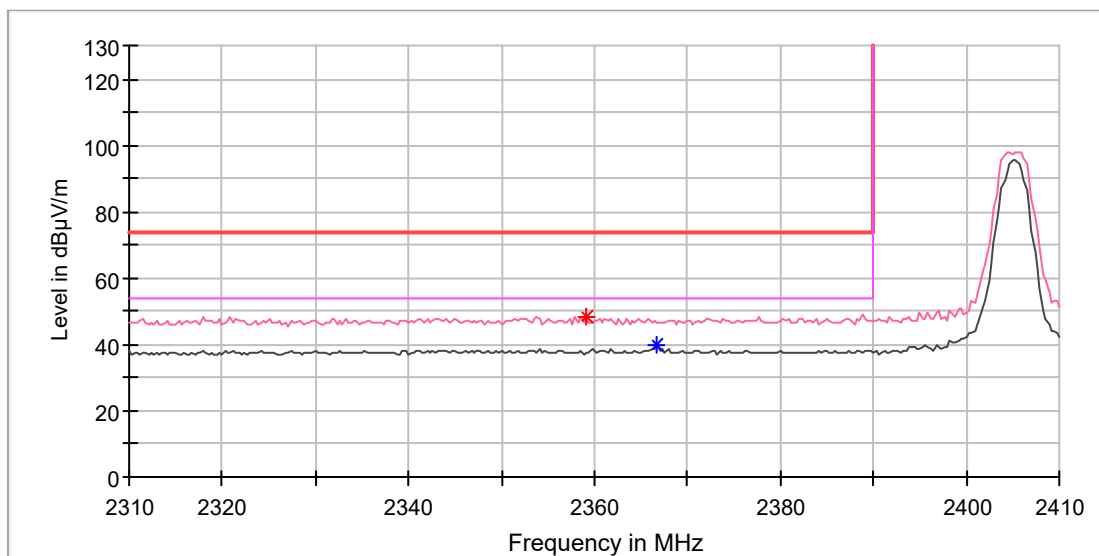
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_Low channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 2348.235294     | ---              | 38.41            | 54.00          | 15.59       | 100.0       | H   | 315.0         | 6.9          |
| 2383.529412     | 49.33            | ---              | 74.00          | 24.67       | 100.0       | H   | 287.0         | 7.0          |

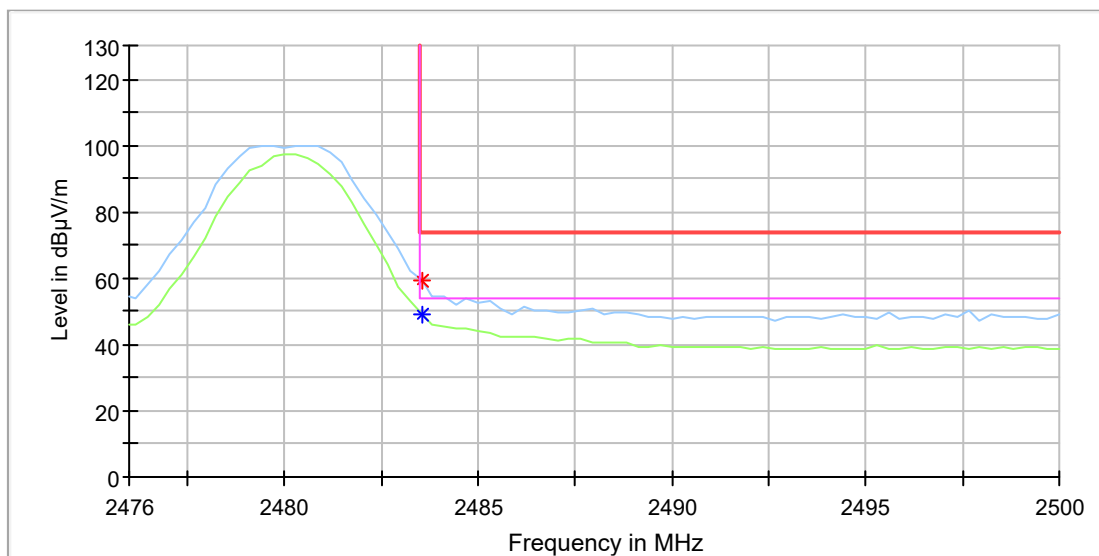
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_Low channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 2359.117647     | 48.56            | ---              | 74.00          | 25.44       | 100.0       | V   | 23.0          | 6.9          |
| 2366.764706     | ---              | 39.87            | 54.00          | 14.13       | 100.0       | V   | 65.0          | 6.9          |

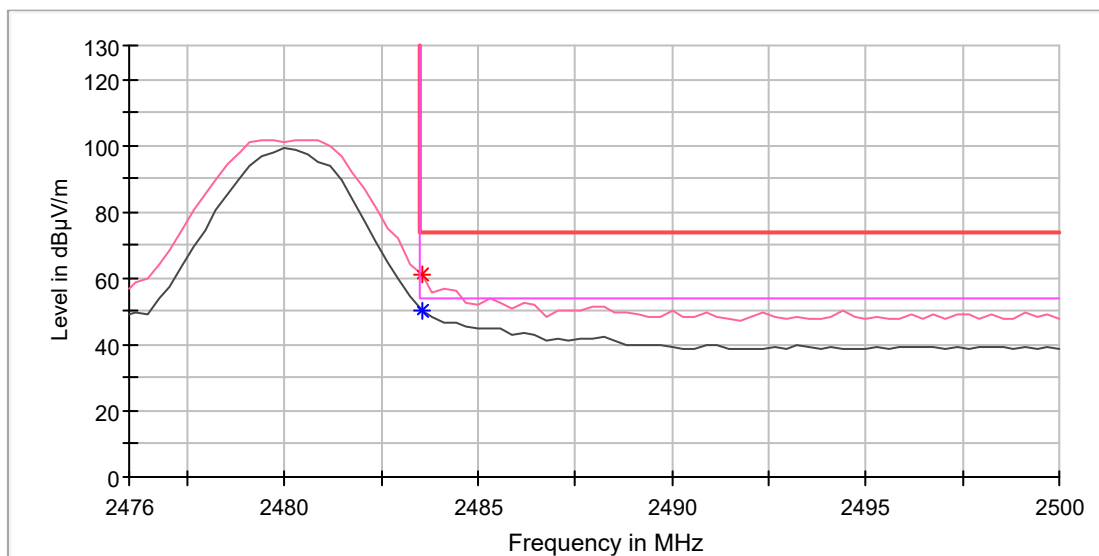
EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_High channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin



### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 2483.529412     | 59.43            | ---              | 74.00          | 14.57       | 100.0       | H   | 315.0         | 7.4          |
| 2483.529412     | ---              | 48.74            | 54.00          | 5.26        | 100.0       | H   | 315.0         | 7.4          |

EUT Name: Plug Smart  
Model: E2220  
Test Mode: Zigbee\_High channel  
Order No/Sample No: 168439281/A003538734-001  
Test Voltage:: AC 120V 60Hz  
Remark: Temp 24 Humi:50%  
Test Standard: FCC 15.247  
Tested By: Kei Zhang  
Reviewed By: Terry Yin

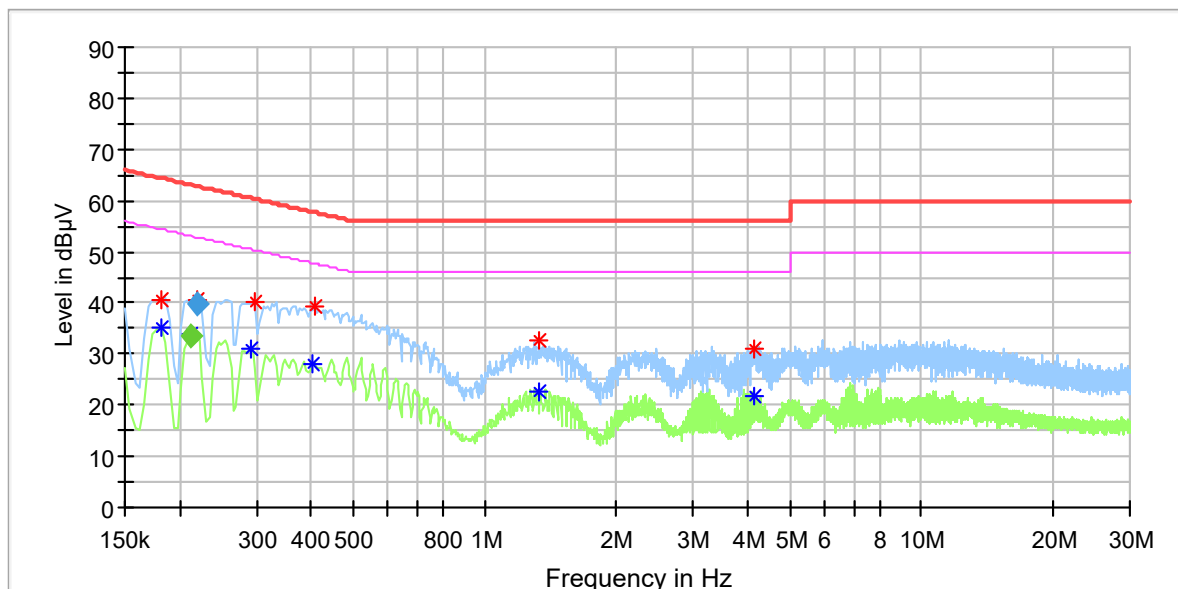


### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 2483.529412     | 61.10            | ---              | 74.00          | 12.90       | 100.0       | V   | 190.0         | 7.4          |
| 2483.529412     | ---              | 50.21            | 54.00          | 3.79        | 100.0       | V   | 190.0         | 7.4          |

## Appendix A.7: Test Results of Conducted Emission

EUT Name: Plug Smart  
Order Number: 168349281 40  
Model: E2220  
Test Mode: Zigbee mode  
Test Voltage: AC 120V 60Hz  
Test By:/Review By: Soloman Wu/Gary Chen  
Tem./Hum./Pressure: 24.3°C/51.8%/101kPa  
Remark: SR1



### Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Line | Corr. (dB) |
|-----------------|----------------|----------------|--------------|-------------|------|------------|
| 0.182000        | ---            | 35.06          | 54.39        | 19.34       | L1   | 9.7        |
| 0.182000        | 40.63          | ---            | 64.39        | 23.76       | L1   | 9.7        |
| 0.212500        | ---            | 34.05          | 52.90        | 18.85       | L1   | 9.8        |
| 0.220500        | 40.68          | ---            | 62.90        | 22.21       | L1   | 9.8        |
| 0.290000        | ---            | 30.77          | 50.52        | 19.75       | L1   | 9.8        |
| 0.298000        | 40.22          | ---            | 60.30        | 20.07       | L1   | 9.8        |
| 0.402000        | ---            | 28.14          | 47.81        | 19.67       | L1   | 9.9        |
| 0.410000        | 39.34          | ---            | 57.65        | 18.31       | L1   | 9.9        |
| 1.332000        | 32.86          | ---            | 56.00        | 23.14       | L1   | 9.8        |
| 1.336000        | ---            | 22.48          | 46.00        | 23.52       | L1   | 9.8        |
| 4.156000        | ---            | 21.68          | 46.00        | 24.32       | L1   | 10.0       |
| 4.160000        | 30.89          | ---            | 56.00        | 25.11       | L1   | 10.0       |

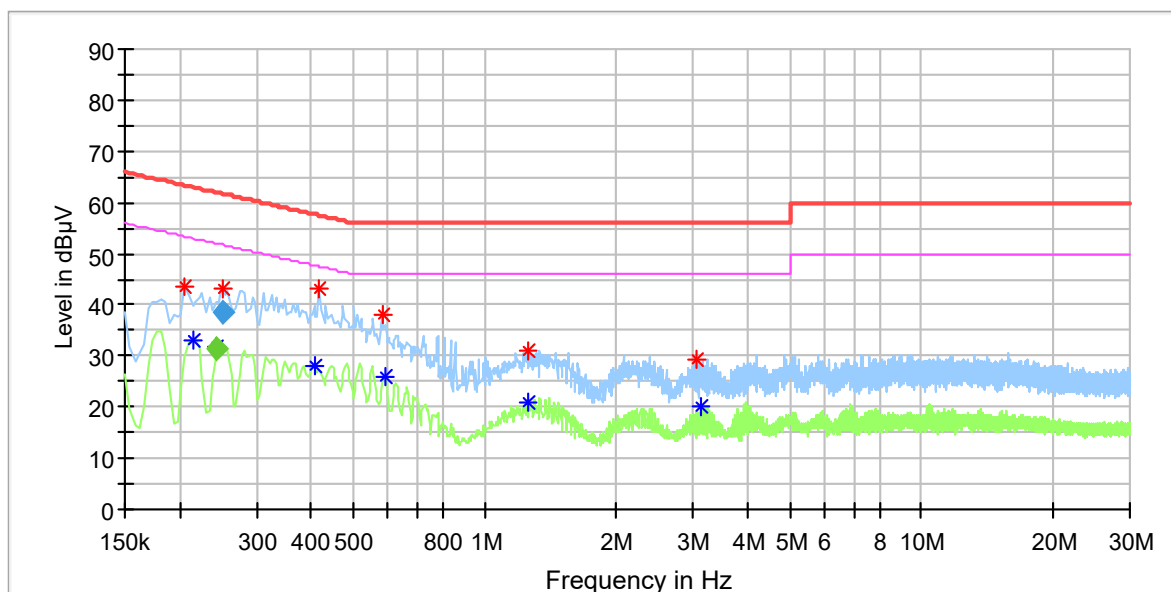
### Final Result

| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.212500        | ---              | 33.43          | 53.11        | 19.68       | 1000.0          | 9.000           | L1   | 9.8        |
| 0.220500        | 39.65            | ---            | 62.80        | 23.15       | 1000.0          | 9.000           | L1   | 9.8        |

## Prüfbericht - Produkte

Test Report - Products

EUT Name: Plug Smart  
 Order Number: 168349281 40  
 Model: E2220  
 Test Mode: Zigbee mode  
 Test Voltage: AC 120V 60Hz  
 Test By:/Review By: Soloman Wu/Gary Chen  
 Tem./Hum./Pressure: 24.3°C/51.8%/101kPa  
 Remark: SR1



## Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Line | Corr. (dB) |
|-----------------|----------------|----------------|--------------|-------------|------|------------|
| 0.206000        | 43.54          | ---            | 63.37        | 19.82       | N    | 9.7        |
| 0.214000        | ---            | 33.01          | 53.05        | 20.04       | N    | 9.7        |
| 0.244500        | ---            | 31.92          | 51.63        | 19.70       | N    | 9.7        |
| 0.252500        | 43.00          | ---            | 61.76        | 18.75       | N    | 9.7        |
| 0.406000        | ---            | 28.18          | 47.73        | 19.55       | N    | 9.7        |
| 0.418000        | 43.14          | ---            | 57.49        | 14.35       | N    | 9.7        |
| 0.584000        | 38.15          | ---            | 56.00        | 17.85       | N    | 9.7        |
| 0.592000        | ---            | 25.77          | 46.00        | 20.23       | N    | 9.8        |
| 1.252000        | 31.14          | ---            | 56.00        | 24.86       | N    | 9.7        |
| 1.264000        | ---            | 20.84          | 46.00        | 25.16       | N    | 9.7        |
| 3.068000        | 29.38          | ---            | 56.00        | 26.62       | N    | 10.0       |
| 3.128000        | ---            | 19.98          | 46.00        | 26.02       | N    | 10.0       |

## Final\_Result

| Frequency (MHz) | QuasiPeak (dBμV) | Average (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.244500        | ---              | 31.42          | 51.94        | 20.52       | 1000.0          | 9.000           | N    | 9.7        |
| 0.252500        | 38.52            | ---            | 61.68        | 23.16       | 1000.0          | 9.000           | N    | 9.7        |