| | | | | |
|---|---|---|---|---|
| **Prüfbericht-Nr.:** *Test Report No.*: | **CN246QGG 001** | **Auftrags-Nr.:** *Order No.*: | **158286703** | **Seite 1 von 15** *Page 1 of* 15 |
| **Kunden-Referenz-Nr.:** *Client Reference No.*: | **N/A** | **Auftragsdatum:** *Order date*: | **20.03.2024** | |
| **Auftraggeber:** *Client*: | **Carrera Toys GmbH** **Rennbahn Allee 1, 5412 Puch, Salzburg, Austria** | | | |
| **Prüfgegenstand:** *Test Item*: | **Short Range Device - Radio Control Toy Transmitter (2.4GHz)** | | | |
| **Bezeichnung / Typ-Nr.:** *Identification / Type No.*: | **370410515** | | | |
| **Auftrags-Inhalt:** *Order content*: | **Radio Equipment testing** | | | |
| **Prüfgrundlage:** *Test specification*: | **EN 300 440 V2.2.1:2018, EN 301 489-1 V2.2.3:2019 , EN 301 489-3 V2.3.2:2023, EN 62479:2010, AS/NZS 4268:2017+A1:2021, Radiation Protection Series S-1 (Rev. 1), RPS S-1 Advisory Note** | | | |

| | |
|---|---|
| **Wareneingangsdatum:** *Date of receipt*: | **20.03.2024** |
| **Prüfmuster-Nr.:** *Test sample No.*: | **A003678339-001** |
| **Prüfzeitaum:** *Testing period:* | **20.03.2024 –27.03.2024** |
| **Ort der Prüfung:** *Place of testing:* | **Shenzhen** |
| **Prüflaboratorium:** *Testing laboratory*: | **TÜV Rheinland Hong Kong Ltd.** |
| **Prüfergebnis*:** *Test result**: | **Pass** |

| **geprüft von /** *tested by***:** | | | **kontrolliert von** / *reviewed by*: | | |
|---|---|---|---|---|---|
| 13.05.2024 | Gigi Tam<br>Engineer | | 13.05.2024 | Billy Yip<br>Laboratory Manager | |
| **Datum**<br>*Date* | **Name / Stellung**<br>*Name / Position* | **Unterschrift**<br>*Signature* | **Datum**<br>*Date* | **Name / Stellung**<br>*Name / Position* | **Unterschrift**<br>*Signature* |

**Sonstiges** / *Other*: Client declared conformity with Directive 2009/48/EC.
"Decision Rule" document announced in our website (https://www.tuv.com/landingpage/en/qm-gcn/) describes the statement of conformity and its rule of enforcement for test results are applicable throughout this test report.

| | |
|---|---|
| **Zustand des PrüfgegenstandesbeiAnlieferung:** *Condition of the test item at delivery*: | Prüfmuster vollständig und unbeschädigt<br>Test item complete and undamaged |

| | | | | |
|---|---|---|---|---|
| * Legende: | P(ass) = entsprichto.g. Prüfgrundlage(n) | F(ail) = entsprichtnichto.g. Prüfgrundlage(n) | N/A = nichtanwendbar | N/T = nichtgetestet |
| ** 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* |

| | |
|---|---|
| **1** | 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.<br><br>*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.*<br>*Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.* |
| **2** | 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. Informationen zur Verifizierung der Authentizität unserer Dokumente erhalten Sie auf folgender Webseite: go.tuv.com/digital-signature<br><br>*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. For information on verifying the authenticity of our documents, please visit the following website: go.tuv.com/digital-signature* |
| **3** | 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.<br><br>*Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.*<br>*Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.* |
| **4** | Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen 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 bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.<br><br>*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.* |

# Table of Content

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# Product Information

The equipment under test (EUT) is a radio control toy controller operating at 2.4GHz. It is powered by battery only.

## Client Declaration

| | |
|---|---|
| **General** | Declared temperature range<br>$T_{nor}$: 25°C<br>$T_{min}$: -10°C<br>$T_{max}$: +55°C |
| | System employs transponder ☐ Yes ☒ No |
| | Primary function<br>☒ Data, message transfer<br>☐ Audio transfer<br>☐ Others, --- |
| **Transmitter** | Specification<br>☒ Not capable to produce an unmodulated carrier<br>☐ Amplitude modulation<br>☐ Frequency modulation<br>☐ Sequence of pulses in frequency modulation<br>☐ Phase modulation<br>☒ Gaussian Frequency Shift Keying |
| | Antenna<br>☐ Permanent External Antenna<br>☒ Integral Antenna<br>☐ Dedicated Antenna<br>☐ External Telescopic Antenna<br>Antenna gain (dBi) 0.0 |
| | Carrier output power<br>Different carrier power settings:<br>☒ No<br>☐ Yes,<br>Maximum radiated peak power 10 mW<br>Frequency<br>Operating Frequency 2410 - 2473 MHz |
| | Power supply<br>☐ Mains voltage<br>Voltage: V<br>Frequency: Hz<br>☒ Battery operated<br>☐ Regulated lead-acid battery<br>☒ Others, 2 x 1.5V, AAA size battery<br>=> Nominal test voltage $V_{nor}$: 3.0 V<br>Minimal test voltage $V_{min}$: 2.7 V<br>Maximal test voltage $V_{max}$: 3.3 V |

| | | |
|---|---|---|
| **EMC** | Type of equipment Standalone device<br>Equipmentclassification<br>☐ Fixed use<br>☒ Portable use<br>☐ Vehicle use<br>List of ports<br>☒ No input/output port<br>☐ AC mains input/output ports<br>☐ DC power input/output ports, DC-cable longer than 3 m ☐ Yes ☐ No<br>☐ Signal ports<br>☐ Wired network ports<br>☐ Control ports<br>Independent Operation Modes<br>Transmitter:<br>☒ Transmitting<br>☐ Standby<br>Reference Receiver:<br>☒ Forward, backward, left and right movement<br>☒ Standby<br>Minimum performance level declared by the manufacturer<br>Transceiver can transmit the signal and properly respond to the received signal.<br>Primary functions during EMC exposure<br>Transceiver can transmit the signal and properly respond to the received signal. | |
| **Others** | The manufacturer declares that the models listed below are all identical in schematics, PCB layout, and electronic components used except model number. | |
| **Models** | **Identification** | **Description** |
| | 370410515 | 2.4GHz RC toy transmitter |

## Submitted Documents

- Declaration of Equivalence
- Declaration of Conformity in Toy Safety Directive 2009/48/EC

## Remarks

A reference receiver of model 370400020 / 370400021 provided by the client was used to perform the EMC test. The test report number of receiver 370400020 / 370400021 is CN245VIB 001 issued by TÜV Rheinland Hong Kong Ltd.

# List of Test and Measurement Instruments

## Global United Technology Services Co., Ltd.

### Radio Frequency Test

| Equipment | Manufacturer | Type | S/N | Cal Date | Due Date |
|---|---|---|---|---|---|
| MXA Signal Analyzer | Agilent | N9020A | GTS566 | April 14, 2023 | April 13, 2024 |
| EMI Test Receiver | R&S | ESCI 7 | GTS552 | April 14, 2023 | April 13, 2024 |
| PSA Series Spectrum Analyzer | Agilent | E4440A | GTS536 | April 14, 2023 | April 13, 2024 |
| MXG vector Signal Generator | Agilent | N5182A | GTS567 | April 14, 2023 | April 13, 2024 |
| ESG Analog Signal Generator | Agilent | E4428C | GTS568 | April 14, 2023 | April 13, 2024 |
| USB RF Power Sensor | DARE | RPR3006W | GTS569 | April 14, 2023 | April 13, 2024 |
| RF Switch Box | Shongyi | RFSW3003328 | GTS571 | April 14, 2023 | April 13, 2024 |
| Programmable Constant Temp &Humi Test Chamber | WEWON | WHTH-150L-40-880 | GTS572 | April 14, 2023 | April 13, 2024 |
| Thermo meter | JINCHUANG | GSP-8A | GTS641 | April 19, 2023 | April 18, 2024 |

### Spurious Radiation

| Equipment | Manufacturer | Type | S/N | Cal Date | Due Date |
|---|---|---|---|---|---|
| 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.2(L)*6.2(W)* 6.4(H) | GTS250 | June 23, 2021 | June 22, 2024 |
| Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | April 14, 2023 | April 13, 2024 |
| BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9168 | GTS640 | March 19, 2023 | March 18, 2025 |
| Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120 D | GTS208 | April 17, 2023 | April 16, 2025 |
| EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | GTS575 | April 14, 2023 | April 13, 2024 |
| Loop Antenna | ZHINAN | ZN30900A | GTS534 | Nov. 13, 2023 | Nov.12, 2024 |
| Broadband Preamplifier | SCHWARZBECK | BBV9718 | GTS535 | April 14, 2023 | April 13, 2024 |
| Amplifier(1GHz-26.5GHz) | HP | 8449B | GTS601 | April 14, 2023 | April 13, 2024 |
| Horn Antenna (18-26.5GHz) | / | UG-598A/U | GTS664 | Oct. 29, 2023 | Oct. 28, 2024 |
| Horn Antenna (26.5-40GHz) | A.H Systems | SAS-573 | GTS665 | Oct. 29, 2023 | Oct. 28, 2024 |
| FSV·Signal Analyzer (10Hz-40GHz) | Keysight | FSV-40-N | GTS666 | March 12, 2024 | March 11, 2025 |
| Amplifier | / | LNA-1000-30S | GTS650 | April 14, 2023 | April 13, 2024 |
| CDNE M2+M3-16A | HCT | 30MHz-300MHz | GTS692 | Nov. 08, 2023 | Nov.07, 2024 |
| Wideband Amplifier | / | WDA-01004000-15P35 | GTS602 | April 14, 2023 | April 13, 2024 |
| Thermo meter | JINCHUANG | GSP-8A | GTS643 | April 19, 2023 | April 18, 2024 |
| RE cable 1 | GTS | N/A | GTS675 | July 31. 2023 | July 30. 2024 |
| RE cable 2 | GTS | N/A | GTS676 | July 31. 2023 | July 30. 2024 |
| RE cable 3 | GTS | N/A | GTS677 | July 31. 2023 | July 30. 2024 |
| RE cable 4 | GTS | N/A | GTS678 | July 31. 2023 | July 30. 2024 |
| RE cable 5 | GTS | N/A | GTS679 | July 31. 2023 | July 30. 2024 |
| RE cable 6 | GTS | N/A | GTS680 | July 31. 2023 | July 30. 2024 |
| RE cable 7 | GTS | N/A | GTS681 | July 31. 2023 | July 30. 2024 |

| | | | | | |
|---|---|---|---|---|---|
| RE cable 8 | GTS | N/A | GTS682 | July 31. 2023 | July 30. 2024 |

**Electrostatic Discharge**

| Equipment | Manufacturer | Type | S/N | Cal Date | Due Date |
|---|---|---|---|---|---|
| ESD Simulator | LINCEL | ESD-203B | GTS645 | April 17, 2023 | April 16, 2024 |
| Thermo meter | KTJ | TA328 | GTS243 | April 18, 2023 | April 17, 2024 |

**Radio Frequency Electromagnetic Field**

| Equipment | Manufacturer | Type | S/N | Cal Date | Due Date |
|---|---|---|---|---|---|
| Probe | STT | SEM-600 | GTS648 | April 17, 2023 | April 16, 2024 |
| Stacked Log.-Per.-Broadband Antenna | SCHWARZBECK | STLP 9129 | GTS658 | Aug. 04, 2023 | Aug. 03, 2024 |
| MXG vector Signal Generator | Agilent | N5181A | GTS659 | Nov. 08, 2023 | Nov.07, 2024 |
| Power amplifier | Micotop | MPA-20-1000-250 | GTS660 | Aug. 04, 2023 | Aug. 03, 2024 |
| Power amplifier | Micotop | MPA-1000-6000-100 | GTS661 | Aug. 04, 2023 | Aug. 03, 2024 |
| EPM SSERIES POWER METER | Agilent | E4419B | GTS662 | Nov. 08, 2023 | Nov.07, 2024 |
| E-SERIES AVG POWER SENSOR | HP | E9301A | GTS670 | Nov. 08, 2023 | Nov.07, 2024 |
| Thermo meter | JINCHUANG | GSP-8A | GTS643 | April 19, 2023 | April 18, 2024 |

# Results EN 300 440 V2.2.1:2018/ AS/NZS 4268:2017+A1:2021

## Transmitter 2.4 GHz

| EN 300 440 – 4.2.2/ AS/NZS 4268 – 6.3 Equivalent Isotropic Radiated Power | | | | | Pass |
|---|---|---|---|---|---|
| Measurement uncertainty: ±2.5dB<br>**Conducted Measurement** | | | | | |
| **Tx Freq. (MHz)** | **Temp. (°C)** | **Voltage (V)** | **e.i.r.p. (dBm)** | **Limit (dBm)** | **Verdict** |
| 2410 | $T_{nor}$ | $V_{nor}$ | 4.53 | 10.0 | Pass |
| | $T_{min}$ | $V_{min}$ | 4.53 | 10.0 | Pass |
| | $T_{min}$ | $V_{max}$ | 4.53 | 10.0 | Pass |
| | $T_{max}$ | $V_{min}$ | 4.57 | 10.0 | Pass |
| | $T_{max}$ | $V_{max}$ | 4.53 | 10.0 | Pass |
| 2442 | $T_{nor}$ | $V_{nor}$ | 5.01 | 10.0 | Pass |
| | $T_{min}$ | $V_{min}$ | 5.04 | 10.0 | Pass |
| | $T_{min}$ | $V_{max}$ | 5.06 | 10.0 | Pass |
| | $T_{max}$ | $V_{min}$ | 5.08 | 10.0 | Pass |
| | $T_{max}$ | $V_{max}$ | 5.04 | 10.0 | Pass |
| 2473 | $T_{nor}$ | $V_{nor}$ | 5.61 | 10.0 | Pass |
| | $T_{min}$ | $V_{min}$ | 5.62 | 10.0 | Pass |
| | $T_{min}$ | $V_{max}$ | 5.62 | 10.0 | Pass |
| | $T_{max}$ | $V_{min}$ | 5.62 | 10.0 | Pass |
| | $T_{max}$ | $V_{max}$ | 5.64 | 10.0 | Pass |

| EN 300 440 – 4.2.3/ AS/NZS 4268 – 6.5 Emission bandwidth limits | | | | | | Pass |
|---|---|---|---|---|---|---|
| Measurement uncertainty: ±1 x $10^{-7}$ | | | | | | |
| **Tx Freq. (MHz)** | **Temp (°C)** | **Volt (V)** | **Frequency (MHz)** | **Limit (MHz)** | **Verdict** | **Remark** |
| **Occupied bandwidth (99%)** | | | | | | |
| 2410 | $T_{nor}$ | $V_{nor}$ | 2409.43 | > 2400.000 | Pass | Please refer to Appendix 1 |
| | | | 2410.59 | < 2483.500 | Pass | |
| 2442 | $T_{nor}$ | $V_{nor}$ | 2441.35 | > 2400.000 | Pass | |
| | | | 2442.63 | < 2483.500 | Pass | |
| 2473 | $T_{nor}$ | $V_{nor}$ | 2472.30 | > 2400.000 | Pass | |
| | | | 2473.70 | < 2483.500 | Pass | |

| EN 300 440 – 4.2.3/ AS/NZS 4268 – 6.6 Permitted range of operating frequencies | | | | | Pass | |
|---|---|---|---|---|---|---|
| Measurement uncertainty: | | ±1 x $10^{-7}$ | | | | |
| **Tx Freq. (MHz)** | **Temp (°C)** | **Volt (V)** | **Frequency (MHz)** | **Limit (MHz)** | **Verdict** | **Remark** |
| **Frequency range** | | | | | | |
| 2410 | $T_{nor}$ | $V_{nor}$ | 2408.98 | > 2400.000 | Pass | Please refer to Appendix 1 |
| | $T_{min}$ | $V_{min}$ | 2408.98 | | Pass | |
| | $T_{min}$ | $V_{max}$ | 2408.96 | | Pass | |
| | $T_{max}$ | $V_{min}$ | 2408.98 | | Pass | |
| | $T_{max}$ | $V_{max}$ | 2408.98 | | Pass | |
| 2473 | $T_{nor}$ | $V_{nor}$ | 2474.06 | < 2483.500 | Pass | |
| | $T_{min}$ | $V_{min}$ | 2474.06 | | Pass | |
| | $T_{min}$ | $V_{max}$ | 2474.06 | | Pass | |
| | $T_{max}$ | $V_{min}$ | 2474.06 | | Pass | |
| | $T_{max}$ | $V_{max}$ | 2474.06 | | Pass | |

| EN 300 440 – 4.2.4/ AS/NZS 4268 – 6.4 Unwanted emissions in spurious domain | | | | | Pass |
|---|---|---|---|---|---|
| Measurement uncertainty: ±6 dB | | | | | |
| **Operating mode: 2410MHz – Vertical Polarization** | | | | | |
| **Frequency range (MHz)** | **Spurious Frequency (MHz)** | **Power (dBm)** | **Limit (dBm)** | **Margin (dB)** | **Verdict** |
| 25 – 1000 | No Peak Found | -- | -54.00 | -- | Pass |
| 1000 – 25000 | No Peak Found | -- | -30.00 | -- | Pass |
| **Operating mode: 2410MHz – Horizontal Polarization** | | | | | |
| **Frequency range (MHz)** | **Spurious Frequency (MHz)** | **Power (dBm)** | **Limit (dBm)** | **Margin (dB)** | **Verdict** |
| 25 – 1000 | No Peak Found | -- | -54.00 | -- | Pass |
| 1000 – 25000 | 4820.000 | -49.18 | -30.00 | -19.18 | Pass |
| **Operating mode: 2473MHz – Vertical Polarization** | | | | | |
| **Frequency range (MHz)** | **Spurious Frequency (MHz)** | **Power (dBm)** | **Limit (dBm)** | **Margin (dB)** | **Verdict** |
| 25 – 1000 | 68.187 | -72.48 | -54.00 | -18.48 | Pass |
| 1000 – 25000 | 7419.000 | -46.43 | -30.00 | -16.43 | Pass |
| **Operating mode: 2473MHz – Horizontal Polarization** | | | | | |
| **Frequency range (MHz)** | **Spurious Frequency (MHz)** | **Power (dBm)** | **Limit (dBm)** | **Margin (dB)** | **Verdict** |
| 25 – 1000 | No Peak Found | -- | -54.00 | -- | Pass |
| 1000 – 25000 | 4946.000 | -47.79 | -30.00 | -17.79 | Pass |
| | 7419.000 | -46.39 | -30.00 | -16.39 | Pass |
| **Standby mode: Vertical Polarization** | | | | | |
| **Frequency range (MHz)** | **Spurious Frequency (MHz)** | **Power (dBm)** | **Limit (dBm)** | **Margin (dB)** | **Verdict** |
| 25 – 1000 | No Peak Found | -- | -54.00 | -- | Pass |
| 1000 – 25000 | No Peak Found | -- | -30.00 | -- | Pass |
| **Standby mode: Horizontal Polarization** | | | | | |
| **Frequency range (MHz)** | **Spurious Frequency (MHz)** | **Power (dBm)** | **Limit (dBm)** | **Margin (dB)** | **Verdict** |
| 25 – 1000 | 120.342 | -76.86 | -57.00 | -19.86 | Pass |
| 1000 – 25000 | No Peak Found | -- | -30.00 | -- | Pass |
| Remark: If the spurious emissions are 20dB below the limit, the result column will mention no peak found. | | | | | |

| EN 300 440 – 4.2.5 Duty Cycle | Pass |
|---|---|
| According to table 4, clause 4.2.5.4 of EN300 440, the EUT does not have restriction on the duty cycle. | |

# Results EN 301 489-3 V2.3.2:2023

## Emission

| EN 301 489-3 – 7.1.1 General / 7.1.2 Special conditions for emissions<br>EN 301 489-1 – 8.2 Radiated Emission - Enclosure of Ancillary Equipment | N/A |
|---|---|
| No ancillary equipment was provided for testing. | |

| EN 301 489-3 –7.1.1 General / 7.1.2 Special conditions for emissions<br>EN 301 489-1 – 8.3 Conducted Emission - DC Power Input / Output Ports | N/A |
|---|---|
| This test is applicable for radio equipment and ancillary equipment for fixed use that may have DC cables longer than3 m. | |

| EN 301 489-3 –7.1.1 General / 7.1.2 Special conditions for emissions<br>EN 301 489-1 – 8.4 Conducted Emission - AC Mains Power Input / Output Ports | N/A |
|---|---|
| EUT is not indented for direct connection to a dedicated AC/DC power supply. | |

| EN 301 489-3 –7.1.1 General / 7.1.2 Special conditions for emissions<br>EN 301 489-1 – 8.5 Harmonic Current Emissions - AC Mains Input Port | N/A |
|---|---|
| EUT is not indented for direct connection to a dedicated AC/DC power supply. | |

| EN 301 489-3 –7.1.1 General / 7.1.2 Special conditions for emissions<br>EN 301 489-1 – 8.6 Voltage Fluctuations and Flicker - AC Mains Input Port | N/A |
|---|---|
| EUT is not indented for direct connection to a dedicated AC/DC power supply. | |

| EN 301 489-3 –7.1.1 General / 7.1.2 Special conditions for emissions<br>EN 301 489-1 – 8.7 Conducted Emission –Wired Network Ports | N/A |
|---|---|
| There is no telecommunication ports on the EUT. | |

## Immunity

| EN 301 489-3 –7.2.1 General / 7.2.2 Special conditions for immunity<br>EN 301 489-1 – 9.2 Radio Frequency Electromagnetic Field | | | | | | Pass |
|---|---|---|---|---|---|---|
| Ambient Temperature: 24˚C, Relative Humidity: 51%<br><br>Operating mode: I) Motor On mode<br>II)Tx and Rx are switched ON, Standby mode | | | | | | |
| **Frequency range (MHz)** | **Pol.** | **Mod.** | **Level** | **Result** | **Crit.** | **Verdict** |
| 80 - 6000 | Vertical | 80% AM 1kHz | 3V/m | Mode of operation: I & II<br>No unintentional response found.<br>No degradation of performance. | A | Pass |
| 80 - 6000 | Horizontal | 80% AM 1kHz | 3V/m | Mode of operation: I & II<br>No unintentional response found.<br>No degradation of performance. | A | Pass |

| EN 301 489-3 –7.2.1 General / 7.2.2 Special conditions for immunity<br>EN 301 489-1 – 9.3 Electrostatic Discharge | | | | | Pass |
|---|---|---|---|---|---|
| Ambient Temperature: 24˚C, Relative Humidity: 51%<br><br>Operating mode: I) Motor On mode<br>II)Tx and Rx are switched ON, Standby mode | | | | | |
| **Direct application of discharge** | | | | | |
| **Discharge location** | **Discharge type** | **Test level** | **Result** | **Crit.** | **Verdict** |
| Enclosure | Air | ±2,4,8kV | Mode of operation: I & II<br>No unintentional response found.<br>Operated as intended. | B | Pass |
| Screws | Contact | ±4kV | Mode of operation: I & II<br>No unintentional response found.<br>Operated as intended. | B | Pass |
| **Indirect application of discharge** | | | | | |
| **Discharge location** | **Discharge type** | **Test level** | **Result** | **Crit.** | **Verdict** |
| HCP | Contact | ±4kV | Mode of operation: I & II<br>No unintentional response found.<br>Operated as intended. | B | Pass |
| VCP | Contact | ±4kV | Mode of operation: I & II<br>No unintentional response found.<br>Operated as intended. | B | Pass |
| Remark: The intermediate levels of ESD were evaluated and the EUT passes with the ESD test at the highest severity level. | | | | | |

| EN 301 489-3 –7.2.1 General / 7.2.2 Special conditions for immunity<br>EN 301 489-1 – 9.4 Fast Transients, Common Mode | N/A |
|---|---|
| EUT is not indented for direct connection to a dedicated AC/DC power supply. In addition, there is no DC port, signal ports, wired network ports, control ports. | |

| EN 301 489-3 –7.2.1 General / 7.2.2 Special conditions for immunity<br>EN 301 489-1 – 9.5 Radio Frequency, Common Mode | N/A |
|---|---|
| EUT is not indented for direct connection to a dedicated AC/DC power supply. In addition, there is no signal ports, wired network ports, control ports. | |

| EN 301 489-3 –7.2.1 General / 7.2.2 Special conditions for immunity<br>EN 301 489-1 – 9.6 Transients and Surges - Vehicular Environment | N/A |
|---|---|
| The EUT is not intended for vehicular use. | |

| EN 301 489-3 –7.2.1 General / 7.2.2 Special conditions for immunity<br>EN 301 489-1 – 9.7 Voltage Dips and Interruptions | N/A |
|---|---|
| EUT is not indented for direct connection to a dedicated AC/DC power supply. | |

| EN 301 489-3 –7.2.1 General / 7.2.2 Special conditions for immunity<br>EN 301 489-1 – 9.8 Surges | N/A |
|---|---|
| EUT is not indented for direct connection to a dedicated AC/DC power supply. In addition, there is no wired network ports on the EUT. | |

# Results EN 62479:2010

| EN 62479:2010– Human exposure to electromagnetic fields (10 MHz to 300 GHz) Pass | | | |
|---|---|---|---|
| **Test Case** | **Result** | **Limit** | **Verdict** |
| 4.2 | See Test results EN 300 440<br>4.2.2 equivalent isotropic radiated power,<br>4.2.4 unwanted emissions in spurious domain<br>4.3.5 receiver spurious radiation | Low-power electronic and electrical equipment is deemed to comply with the provisions of this standard if available antenna power and/or the average total radiated power is less than or equal to the applicable low-power exclusion level $P_{MAX}$.<br>$P_{MAX}$ = $SAR_{MAX}$*m<br>= 2W/Kg*10g<br>= 20mW<br>$P_{MAX}$: Low-power exclusion level (mW)<br>$SAR_{MAX}$: SAR limit (W/Kg)<br>m: averaging mass (g) | Pass |

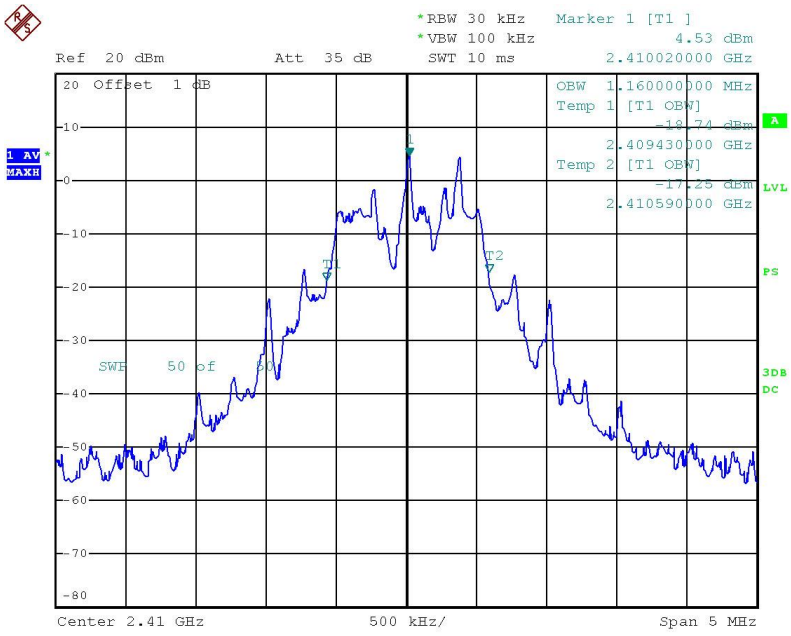
# Results Radiation Protection Series S-1 (Rev. 1)

| RPS S-1 (Rev. 1) –Standard for Limiting Exposure to Radio frequency Fields (100kHz – 300GHz) Pass | | | | |
|---|---|---|---|---|
| **Testing requirements** | **Low Power Exclusion Level at frequency,f** | **Output power (mW)** | **Limit (mW)** | **Verdict** |
| RPS S-1 Advisory Note | 100 kHz ≤ f ≤ 6 GHz | 3.66 | 20mW | Pass |
| | 6 GHz ≤ f ≤ 30 GHz | N/A | 8mW | |
| | 30 GHz ≤ f ≤ 300 GHz | N/A | 4mW | |

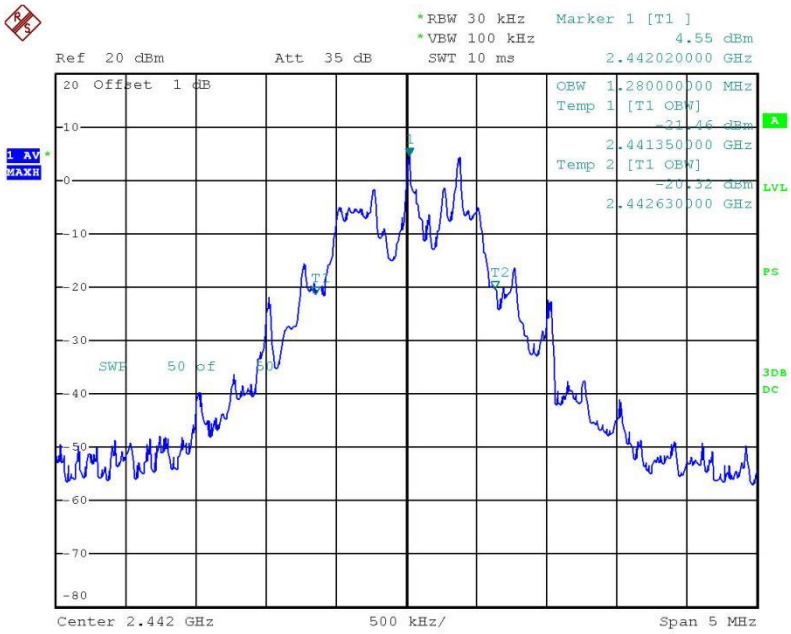
# Appendix 1

# Test protocols

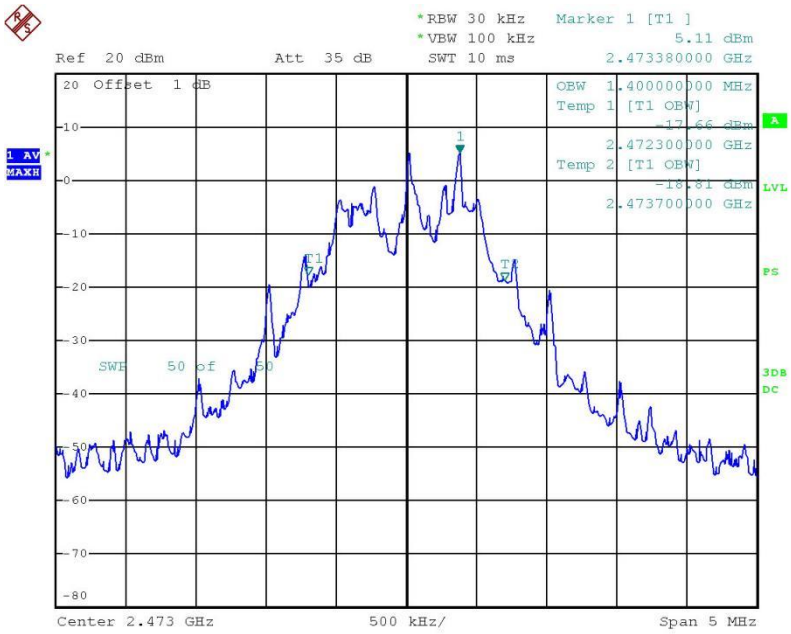
Test results for occupied bandwidth (99%)




2410MHz at 25˚C, 3.0V

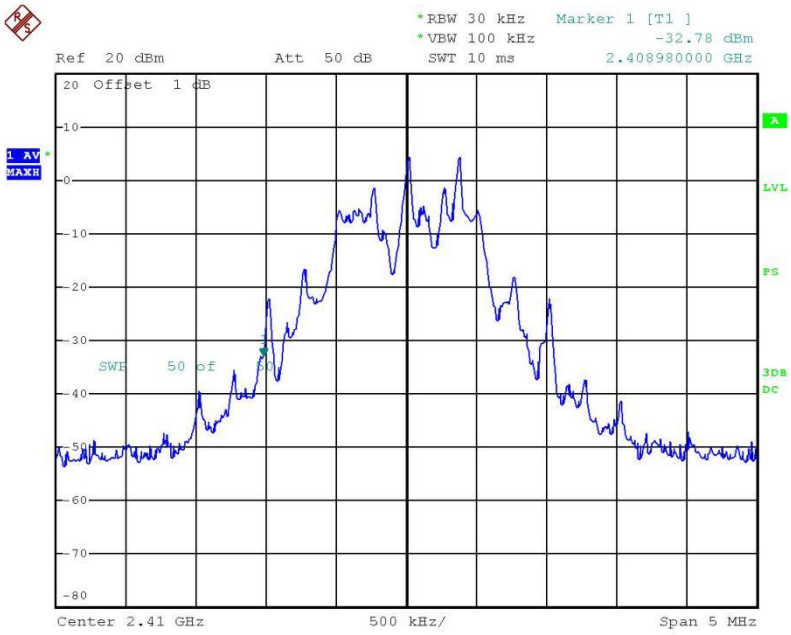



2442MHz at 25˚C, 3.0V

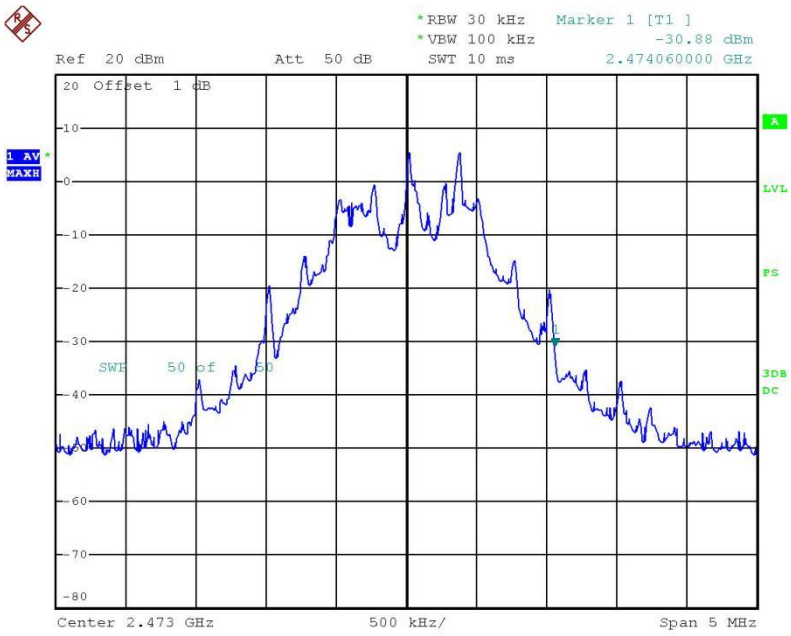



2473MHz at 25˚C, 3.0V

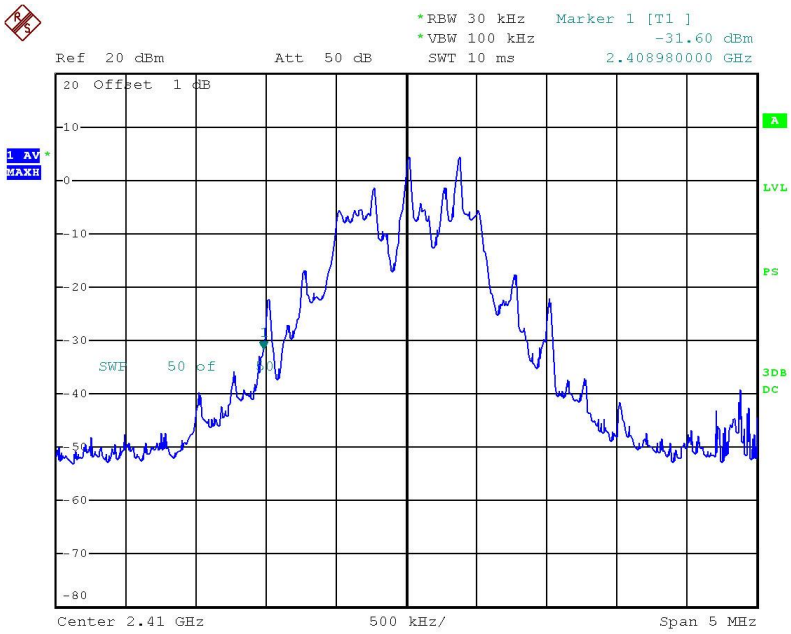
Test results for Permitted range of operating frequencies



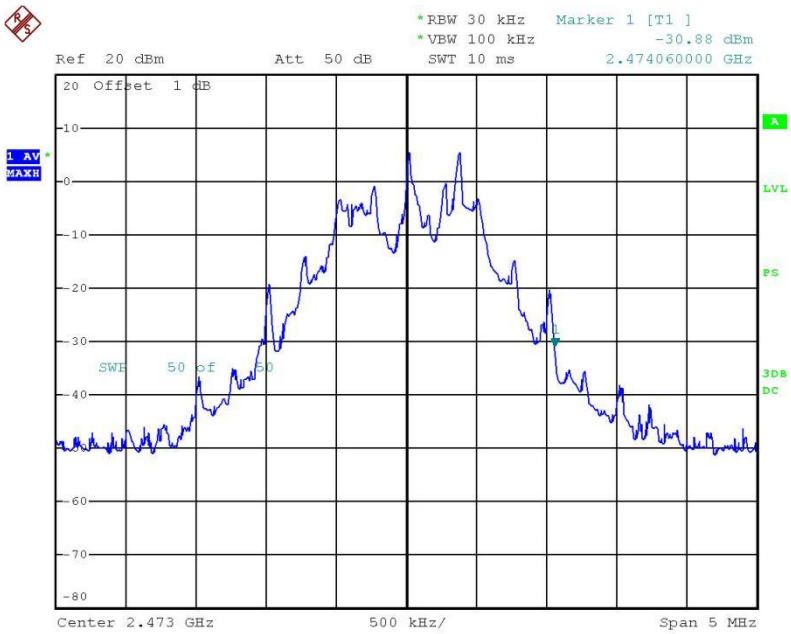

2410MHz at 25˚C, 3.0V



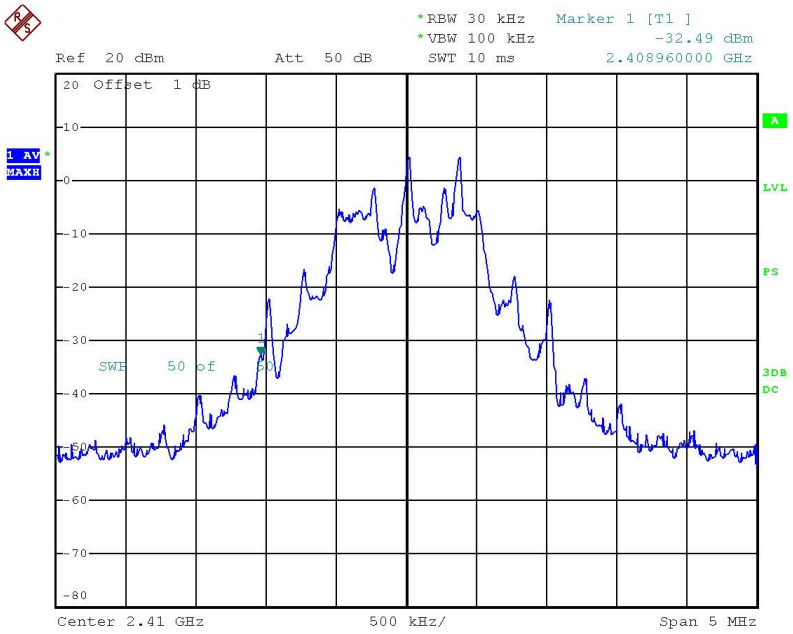

2473MHz at 25˚C, 3.0V



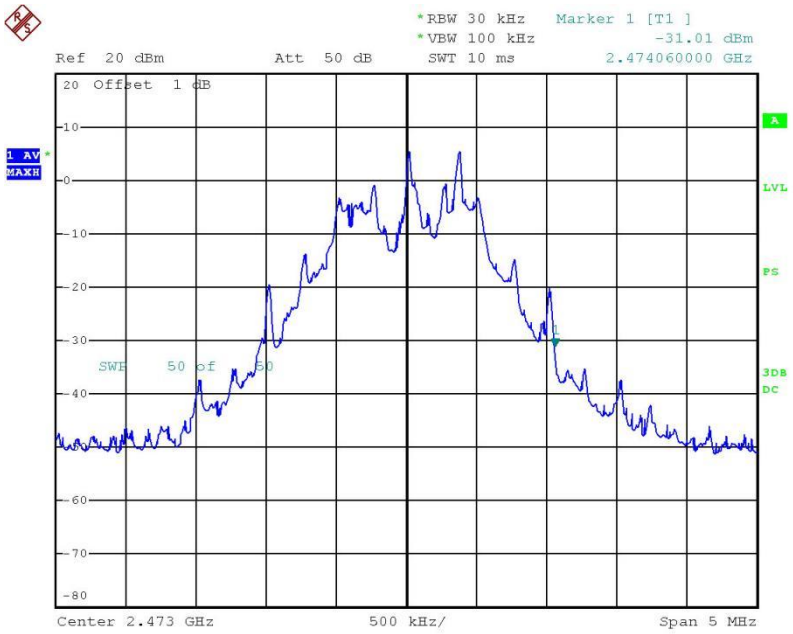

2410MHz at -10˚C, 2.7V



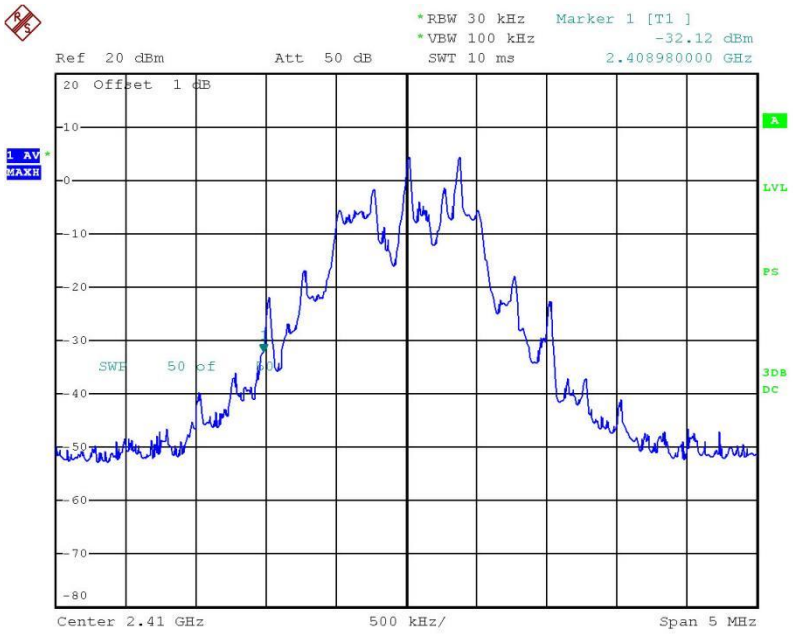

2473MHz at -10˚C, 2.7V



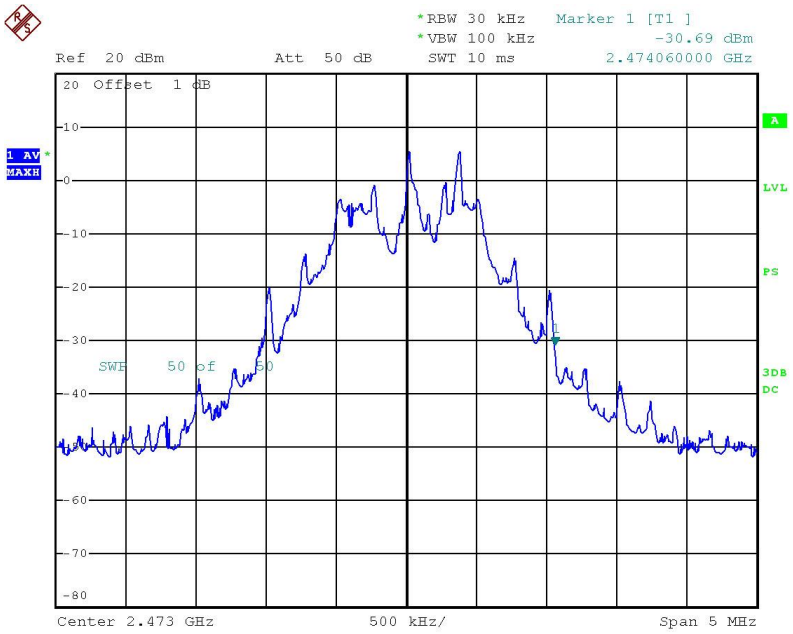

2410MHz at -10˚C, 3.3V



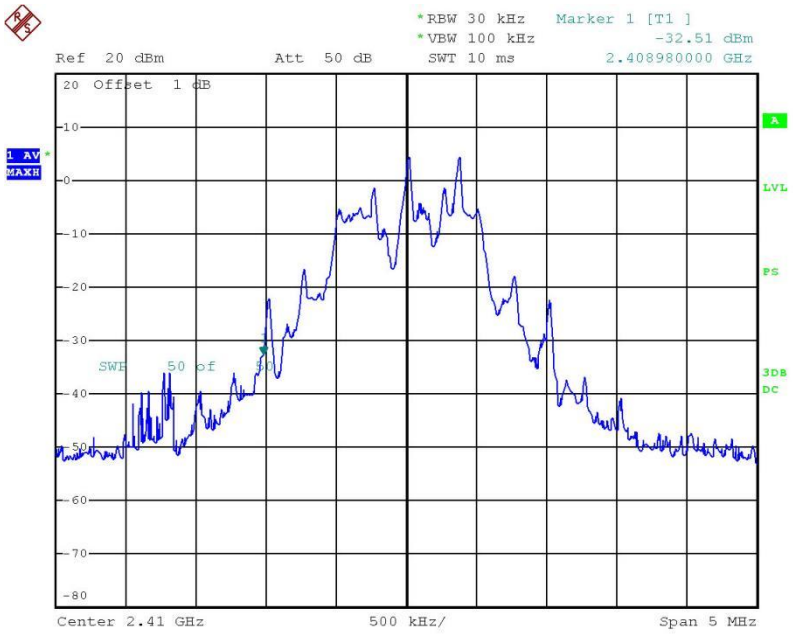

2473MHz at -10˚C, 3.3V



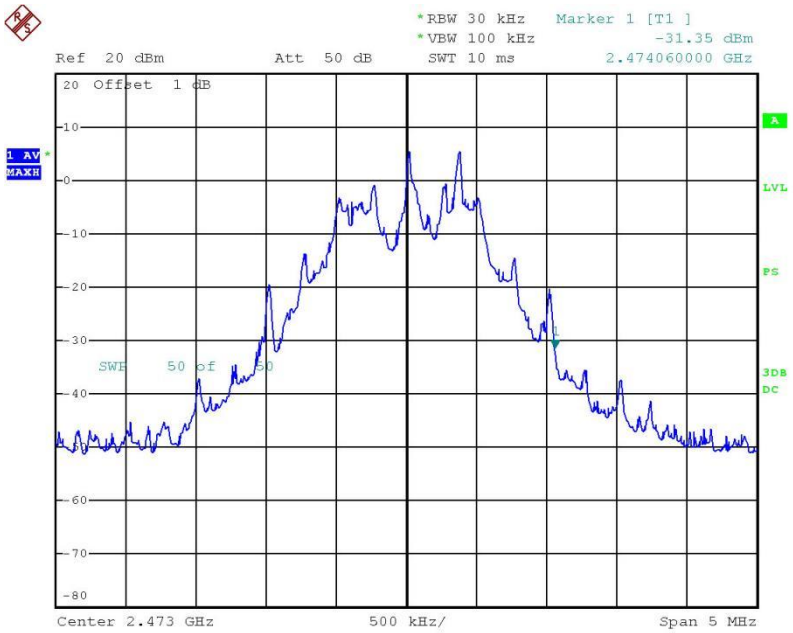

2410MHz at +55˚C, 2.7V




2473MHz at +55˚C, 2.7V



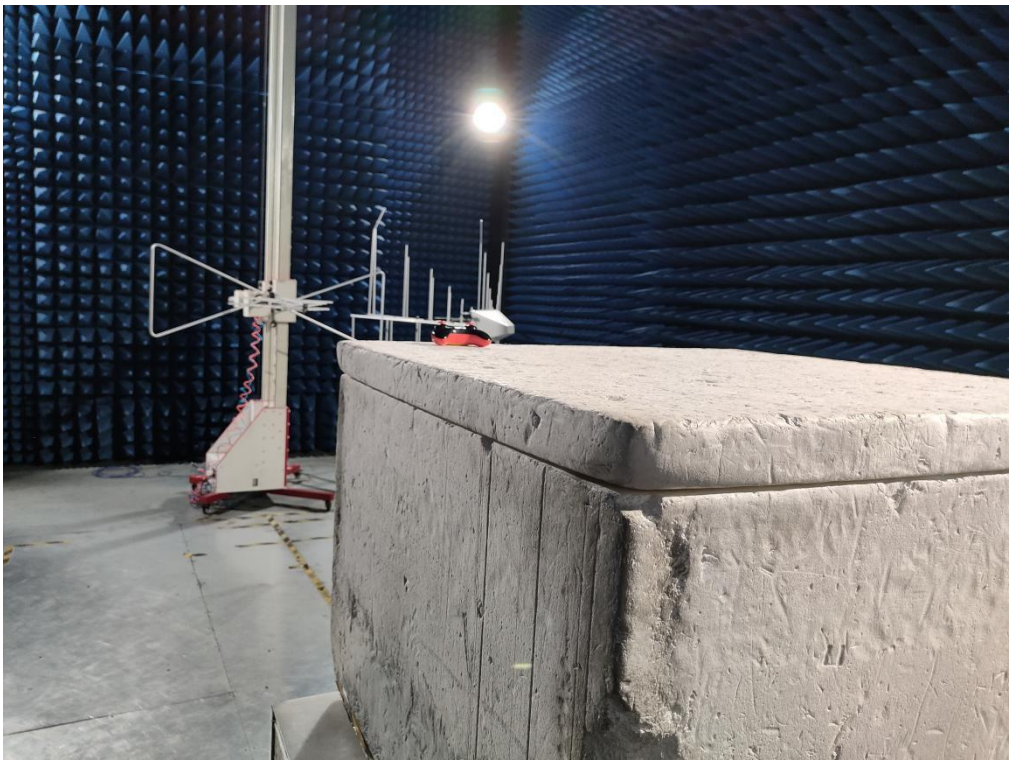

2410MHz at +55˚C, 3.3V



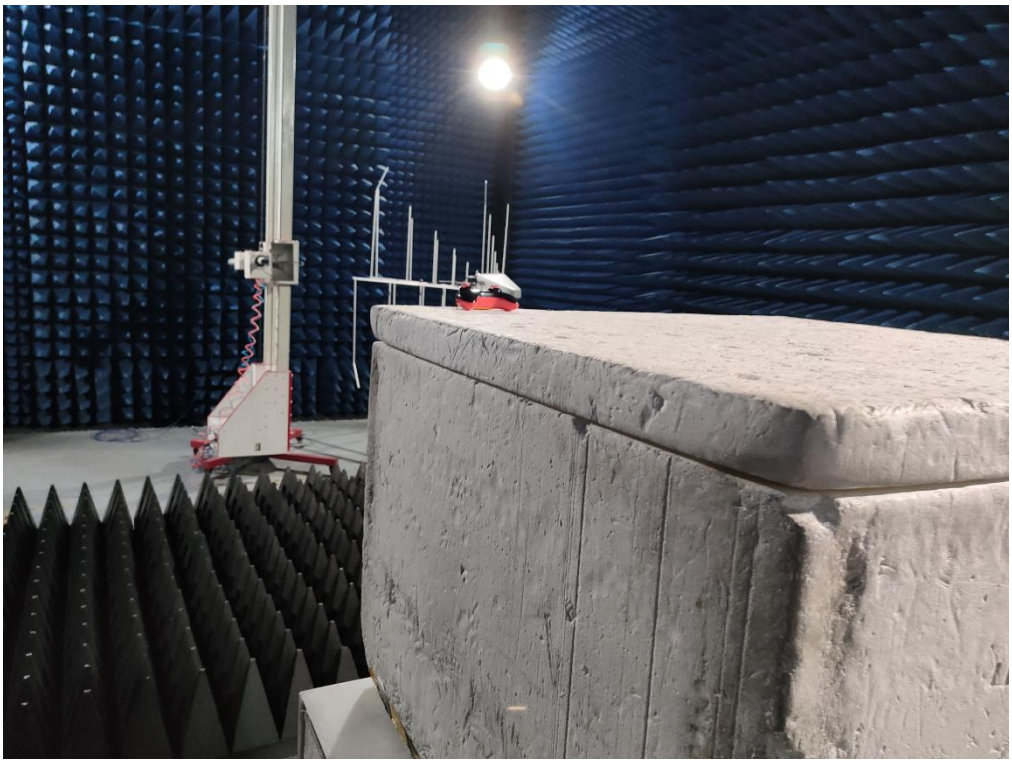

2473MHz at +55˚C, 3.3V

# Appendix 2

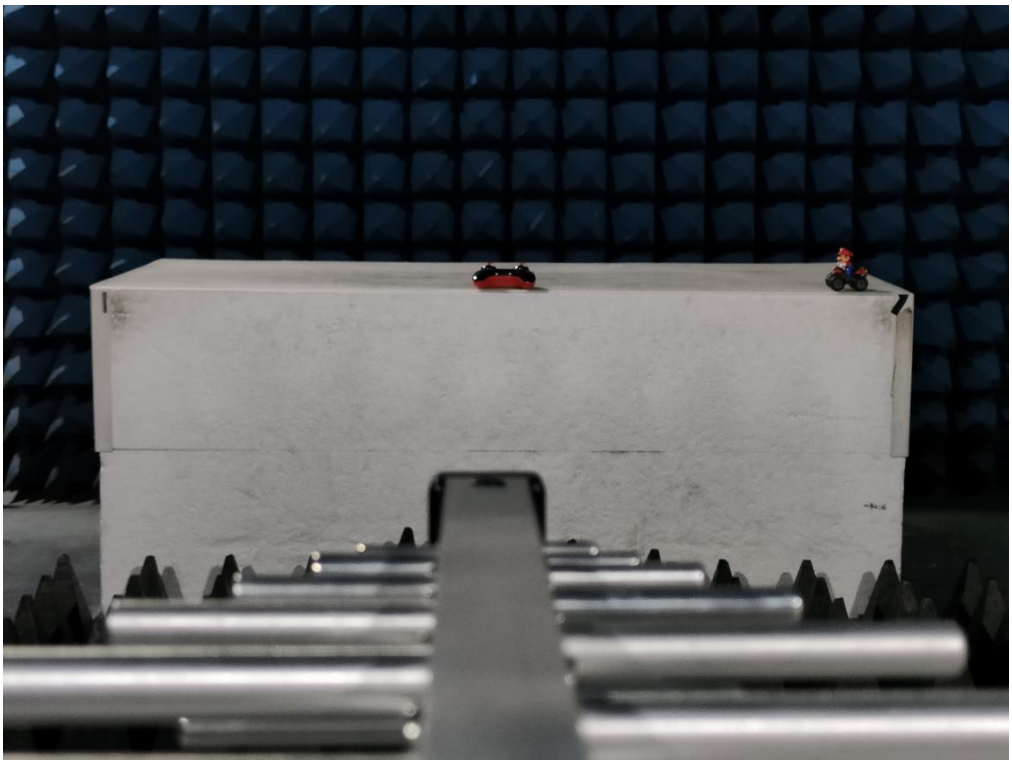
# Test setup



Setup for Radiated Spurious Emission



Setup for Radiated Spurious Emission



Setup for RF Electromagnetic Field

Setup for Electrostatic Discharge

Setup for Electrostatic Discharge

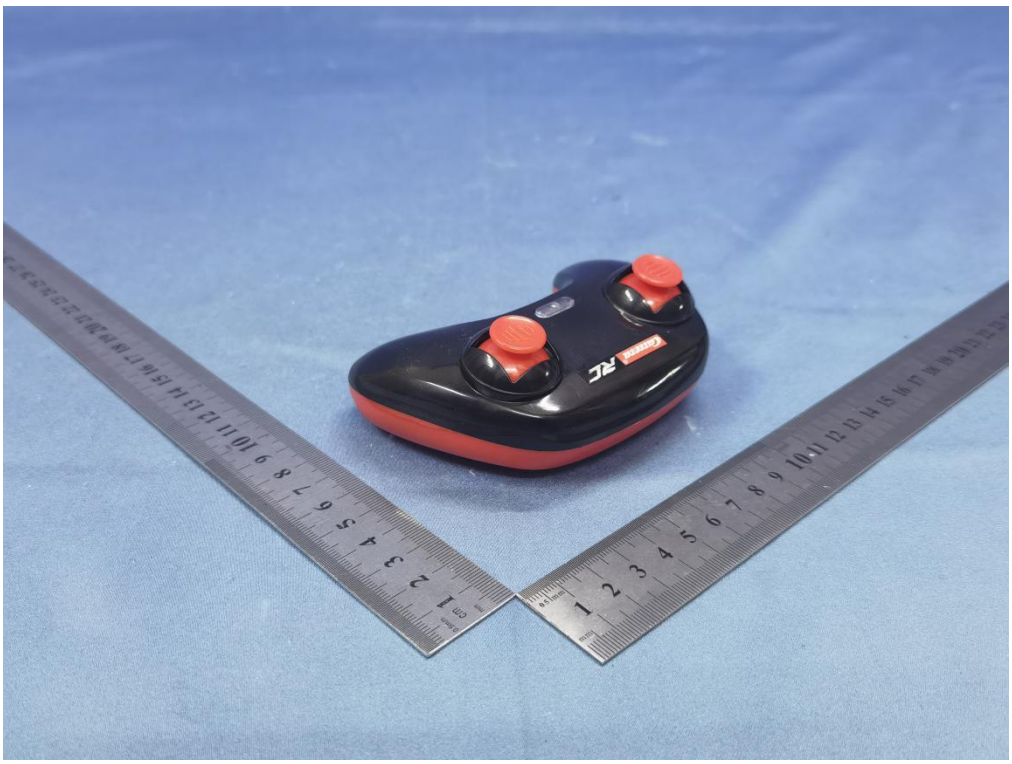
# Appendix 3

# Photo documentation


External View

External View

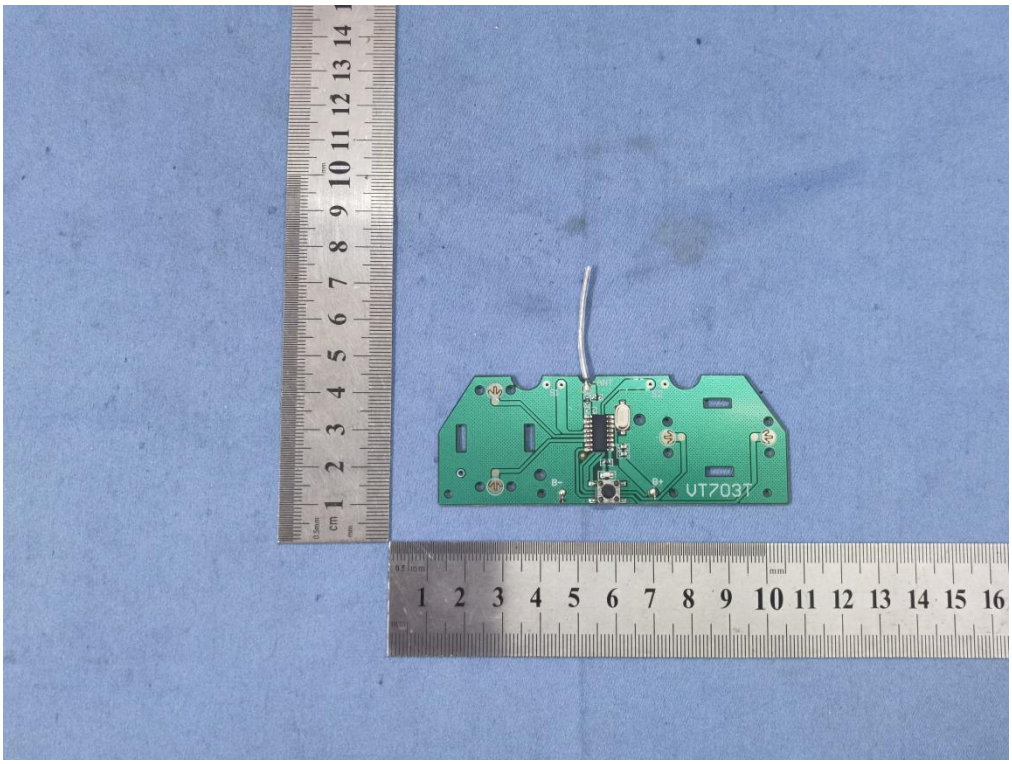
External View



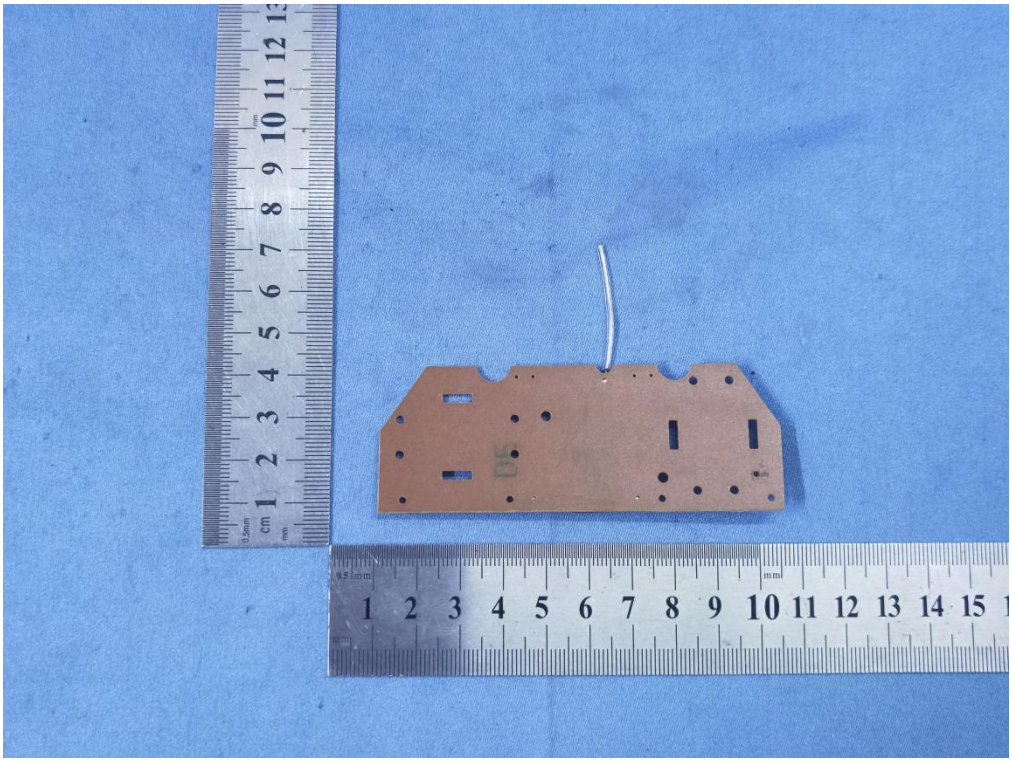
External View


Internal View

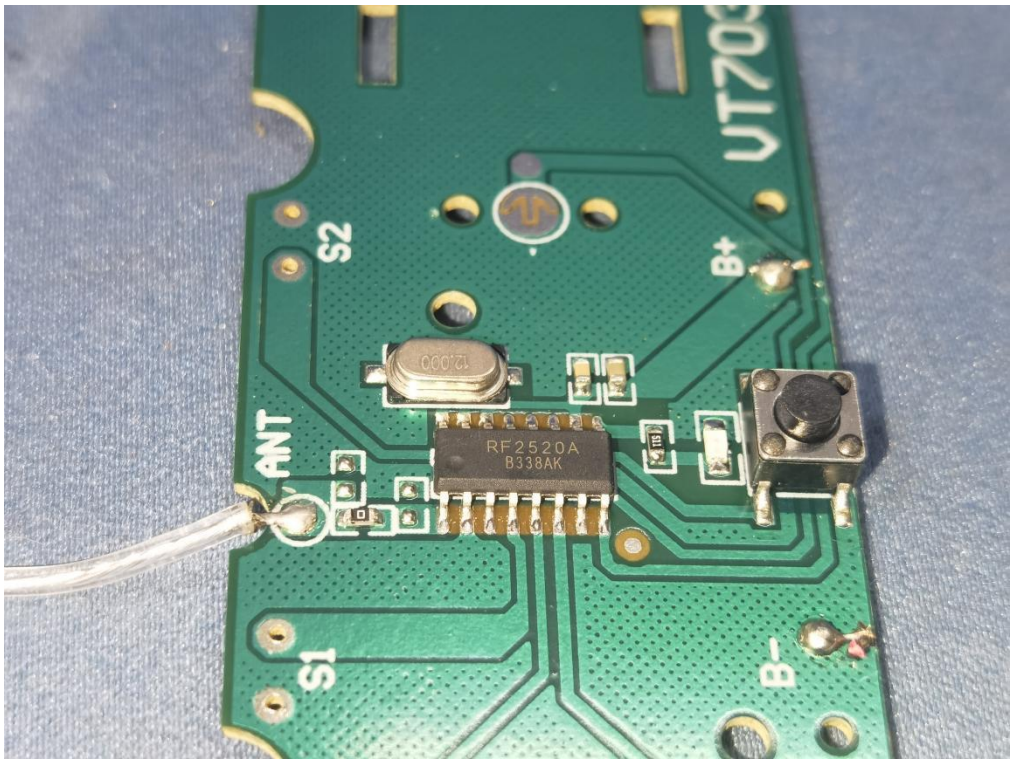

Internal View




Internal View



Internal View




Internal View