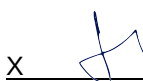


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Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2025-01-13	
Auftraggeber: <i>Client:</i>	Carrera Toys GmbH Rennbahn Allee 1, 5412 Puch, Salzburg, Austria			
Prüfgegenstand: <i>Test item:</i>	Short Range Device - Remote Control Toy Transmitter (2.4GHz)			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	370410544			
Auftrags-Inhalt: <i>Order content:</i>	FCC and ISCED Certification			
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 Subpart C, ANSI C63.10-2013, RSS-210 Issue 11 RSS-Gen Issue 5+Amendment 1+Amendment 2			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2025-01-13			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003947469-003			
Prüfzeitraum: <i>Testing period:</i>	2025-01-13 - 2025-03-24			
Ort der Prüfung: <i>Place of testing:</i>	Hong Kong			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Hong Kong Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by / supervised by:</i>		genehmigt von: <i>authorized by:</i>		
☒ 		☒ 		
Datum: <i>Date:</i>		Ausstellungsdatum: <i>Issue date:</i>		
2025-04-15		2025-04-15		
Stellung / Position:		Stellung / Position:		
Assistant Test Engineer		Laboratory Manager		
Sonstiges / <i>Other:</i>	"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. FCC ID: YFA370410544 IC ID: 12260A-370410544			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * 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				
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. <i>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.</i>				

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Test report no.:

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Anmerkungen Remarks

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. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. <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>
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	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. <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>

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Product Information

PMN: 370410544	HVIN: 370410544
FVIN: N/A	HMN: N/A

Manufacturers declarations

	Transmitter
Operating frequency range	2446-2474MHz
Type of modulation	GFSK
Number of channels	29
Type of antenna	Fixed Integral wire antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	3.0 VDC
Occupied bandwidth	Not available
Channel bandwidth	1MHz
Emission designator	F1D
Frequency stability	Not available

Product function and intended use

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

FCC ID: YFA370410544 / IC ID: 12260A-370410544

Models	Product description
370410544	Short Range Device - Remote Control Toy Transmitter (2.4GHz)

Submitted documents

Nil

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production. 0

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Test Set-up and Operation Mode

Principle of Configuration Selection

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.

Test Operation and Test Software

Test operation should refer to test methodology.

- Test mode samples with maximum RF output power and duty cycle and capable to transmit continuously at the lowest, middle and highest frequency channels is provided by the applicant for the testing.
-

Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- None

Countermeasures to achieve EMC Compliance

- None

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Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 °, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$FS = R + AF + CF + FA - PA$$

Where

- FS = Field Strength in dBuV/m at 3 meters.
- R = Reading of Spectrum Analyzer in dBuV.
- AF = Antenna Factor in dB.
- CF = Cable Attenuation Factor in dB.
- FA = Filter Attenuation Factor in dB.
- PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

Conducted Emission Calculation

Receiver reading R_r (dB μ V)
LISN insertion loss L_I (dB)
Cable loss C_I (dB)

$$\text{Result (dB}\mu\text{V)} = R_r + L_I + C_I$$

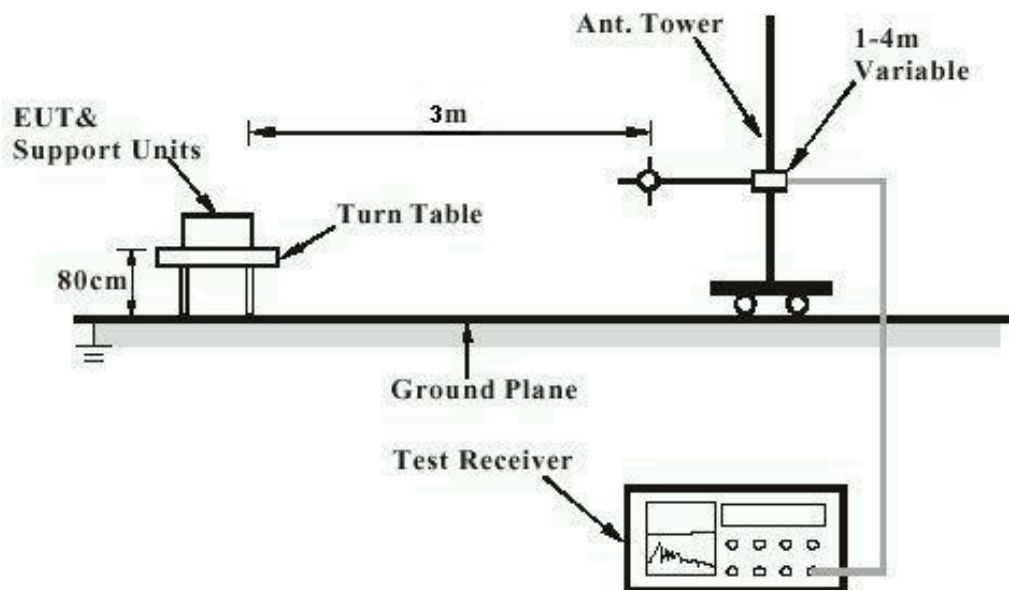
Sample: $R_r = 40.2$ dB μ V
 $L_I = 10.2$ dB
 $C_I = 0.3$ dB

$$\text{Result} = 40.2 + 10.2 + 0.3 = 50.7 \text{ dB}\mu\text{V}$$

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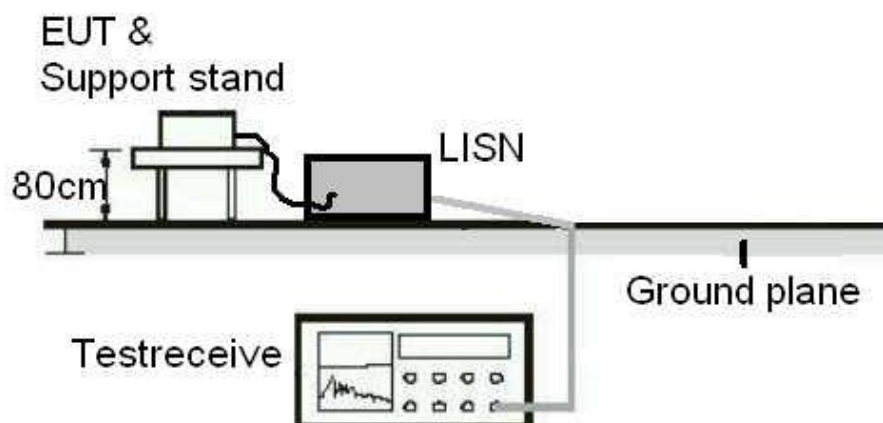
Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



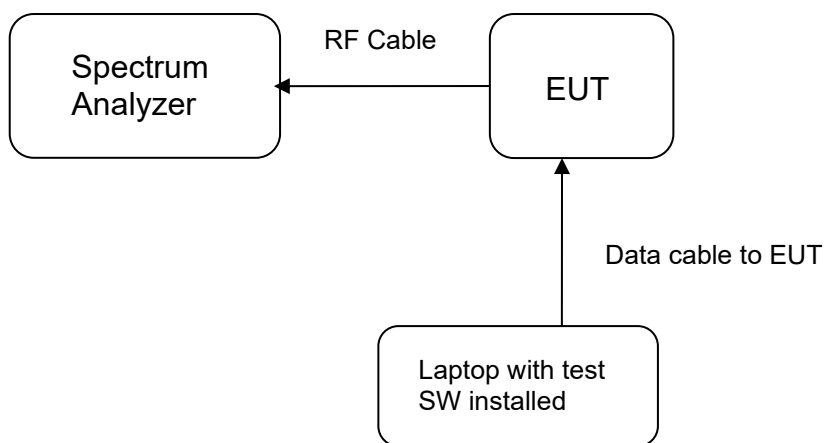
Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



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Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)



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Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.

Address: 3-4/F, Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong

Tel.: +852 2192 1000

Fax: +852 2192 1001

Email: service-gc@tuv.com

The test facility is recognized or accredited by the following organizations:

FCC

Designation Number : HK0013

ISED/IC

Company Number : 26152

Hong Kong Productivity Council

Address: LG1/F, HKPC Building 78 Tat Chee Avenue, Kowloon, Hong Kong

Tel.: +852 2788 6396

Fax: +852 2788 5405

Email: emc@hkpc.org

The test facility is recognized or accredited by the following organizations:

FCC

Designation Number : HK0012

ISED/IC

Company Number : 4780A

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List of Test and Measurement Instruments

Hong Kong Productivity Council

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Multi-functional Anechoic Chamber (NSA)	Albatross	---	2025-01-06	2026-01-06
Multi-functional Anechoic Chamber (VSWR)	Albatross	---	2025-01-04	2026-01-04
Test Receiver	Rohde & Schwarz	ESU40	2025-03-21	2026-03-21
Double-Ridged Waveguide Horn	EMCO	3117	2022-11-21	2025-05-21
Bi-conical Antenna	Rohde & Schwarz	HK116	2022-10-24	2025-04-24
Log Periodic Antenna	Rohde & Schwarz	HL223	2022-10-25	2025-04-25
Cable	SF118/11N/11N /12000MM	Huber+Suhner	2025-01-06	2026-01-06
Microwave amplifier	COM-POWER Corporation	PAM-118A	2025-03-04	2026-03-04
High Pass Filter	Trilithic	23042	2023-10-29	2025-10-29

TÜV Rheinland Hong Kong Ltd.

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSV40	2024-08-07	2025-08-06

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Measurement Uncertainty

The estimated combined standard uncertainty for powerline conducted emissions measurements is $\pm 3.22\text{dB}$.

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 2.44\text{dB}$ (9kHz to 30MHz) and $\pm 5.92\text{dB}$ (30MHz to 1000MHz) and is $\pm 4.92\text{dB}$ (1GHz to 18GHz).

The estimated combined standard uncertainty for antenna conducted emission is $\pm 1.94\text{dB}$

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for the level of confidence is approximately 95%.

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Results FCC Part 15 - Subpart C / RSS-210 Issue 11

FCC 15.203 – Antenna Requirement 1		Pass
FCC Requirements:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	a) Antenna type: Fixed Integral wire antenna b) Manufacturer and model no.: N/A c) Peak Gain: 0 dBi	
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2		Pass
FCC Requirements:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.	
Results:	Only one integral antenna can be used.	
Verdict:	Pass	

FCC 15.207 / RSS-Gen 8.8 – Conducted Emission on AC Mains		N/A
There is no AC power input or output ports on the EUT.		

RSS-Gen 6.3 – External Control		Pass
IC Requirements:	The device shall not have any external controls accessible to the user that enable it to be adjusted, selected or programmed to operate in violation of the limits prescribed in the applicable RSS.	
Results:	The device does not have any transmitter external controls accessible to the user that can be adjusted and operated in violation of the limits of this standard.	
Verdict:	Pass	

RSS-Gen 8.3 – Antenna Requirement		Pass
IC Requirements:	When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer.	
Results:	a) Antenna type: Fixed Integral wire antenna b) Manufacturer: N/A c) Model no.: N/A d) Peak Gain: 0 dBi	
Verdict:	Pass	

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FCC 15.215(c) - 20 dB Bandwidth				Pass
Test Specification	: ANSI C63.10 – 2013			
Test date	: 2025-01-22			
Mode of operation	: Tx mode			
Port of testing	: Temporary antenna port			
Supply voltage	: 3.0 VDC			
Temperature	: 20°C			
Humidity	: 55%			
Requirement:	The intentional radiators must be designed to ensure that the 20dB bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated.			
Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. For test protocols refer to Appendix 1.			
Frequency (MHz)	20 dB left (MHz)	Limit (MHz)	20 dB right (MHz)	Limit (MHz)
2446	2442.874	> 2400	2448.417	< 2483.5
2458	2455.221	> 2400	2459.954	< 2483.5
2474	2472.307	> 2400	2475.346	< 2483.5

RSS-Gen 6.7 – Occupied Bandwidth				N/A
Test Specification	: RSS-Gen			
Test date	: 2025-01-22			
Mode of operation	: Tx mode			
Port of testing	: Temporary antenna port			
Supply voltage	: 3.0 VDC			
Temperature	: 20°C			
Humidity	: 55%			
FCC/ IC Requirement	: N/A			
Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. For test protocols refer to Appendix 1.			
Frequency (MHz)	Left (MHz)	Right (MHz)	99% bandwidth (MHz)	
2446	2443.004	2448.156	5.152	
2458	2455.453	2459.838	4.384	
2474	2472.365	2475.317	2.952	

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FCC 15.249(a) / RSS-210 B.10(a) – Field Strength of Fundamental and Harmonics

Pass

Test Specification : ANSI C63.10 – 2013
Test date : 2025-03-24
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz - 25GHz
Supply voltage : 3.0 VDC
Temperature : 21°C
Humidity : 59%

Requirement: The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.

Results: Pass

Fundamental Frequency: 2446MHz Vertical Polarization

Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m
2446.000	89.7	114.0 / PK
2446.000	76.5	94.0 / AV

Fundamental Frequency: 2446MHz Horizontal Polarization

Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m
2445.990	94.4	114.0 / PK
2445.990	81.4	94.0 / AV

Harmonic: 2446MHz Vertical Polarization

Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m
4891.983	55.2	74.0 / PK
4891.983	41.1	54.0 / AV

Harmonic: 2446MHz Horizontal Polarization

Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m
4891.983	56.2	74.0 / PK
4891.983	42.2	54.0 / AV

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Fundamental Frequency: 2458MHz			Vertical Polarization
Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m	
2457.990	91.5	114.0 / PK	
2457.990	78.4	94.0 / AV	
Fundamental Frequency: 2458MHz			Horizontal Polarization
Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m	
2457.993	94.2	114.0 / PK	
2457.993	81.2	94.0 / AV	
Harmonic: 2458MHz			Vertical Polarization
Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m	
4915.980	53.8	74.0 / PK	
4915.980	39.8	54.0 / AV	
Harmonic: 2458MHz			Horizontal Polarization
Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m	
4915.980	55.7	74.0 / PK	
4915.980	41.6	54.0 / AV	

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Fundamental Frequency: 2474MHz		Vertical Polarization	
Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m	
2473.990	88.9	114.0 / PK	
2473.990	76.3	94.0 / AV	
Fundamental Frequency: 2474MHz		Horizontal Polarization	
Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m	
2473.990	92.4	114.0 / PK	
2473.990	79.4	94.0 / AV	
Harmonic: 2474MHz		Vertical Polarization	
Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m	
4947.983	53.4	74.0 / PK	
4947.983	39.4	54.0 / AV	
Harmonic: 2474MHz		Horizontal Polarization	
Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m	
4947.983	54.0	74.0 / PK	
4947.983	39.9	54.0 / AV	

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FCC 15.249(d) 15.205 / RSS-210 B.10(b) – Out of Band Radiated Emission

Pass

Test Specification : ANSI C63.10 – 2013
Test date : 2025-03-24
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz - 25GHz
Supply voltage : 3.0 VDC
Temperature : 21°C
Humidity : 59%

Requirement: The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.

Results: All three transmit frequency modes comply with the field strength limit of section 15.209. There is no spurious found below 30MHz.

TX Frequency: 2446MHz

Vertical Polarization

Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m
2400.000	41.8	74.0 / PK
2400.000	22.3	54.0 / AV
2390.000	40.5	74.0 / PK
2390.000	21.7	54.0 / AV

TX Frequency: 2446MHz

Horizontal Polarization

Frequency MHz	Level dBuV/m	Limit / Detector dBuV/m
2400.000	42.5	74.0 / PK
2400.000	22.1	54.0 / AV
2390.000	37.4	74.0 / PK
2390.000	21.4	54.0 / AV

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TX Frequency: 2458MHz			Vertical Polarization		
Frequency MHz		Level dBuV/m		Limit / Detector dBuV/m	
No Peak Found		---		74.0 / PK	
No Peak Found		---		54.0 / AV	
TX Frequency: 2458MHz			Horizontal Polarization		
Frequency MHz		Level dBuV/m		Limit / Detector dBuV/m	
No Peak Found		---		74.0 / PK	
No Peak Found		---		54.0 / AV	
TX Frequency: 2474MHz			Vertical Polarization		
Frequency MHz		Level dBuV/m		Limit / Detector dBuV/m	
2483.500		54.5		74.0 / PK	
2483.500		20.5		54.0 / AV	
TX Frequency: 2474MHz			Horizontal Polarization		
Frequency MHz		Level dBuV/m		Limit / Detector dBuV/m	
2483.500		57.1		74.0 / PK	
2483.500		24.6		54.0 / AV	

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Appendix 1

Test Results

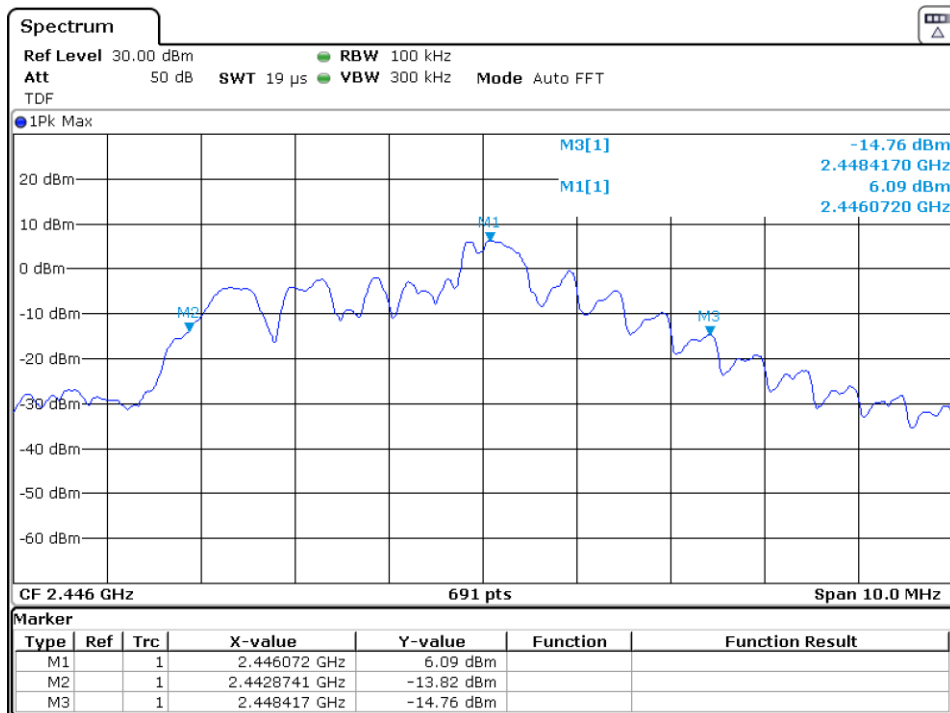
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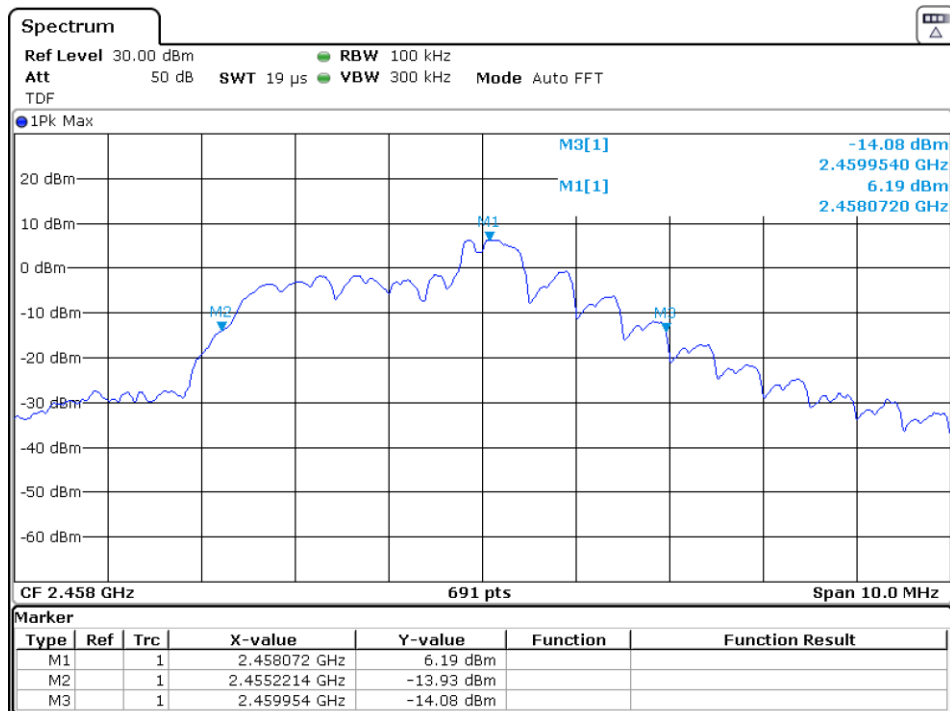
Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen/ Measuring results - Remarks	Ergebnis Result
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Test results of 20 dB Bandwidth



Date: 22.JAN.2025 16:51:13

Tx frequency: 2446MHz



Date: 22.JAN.2025 16:52:19

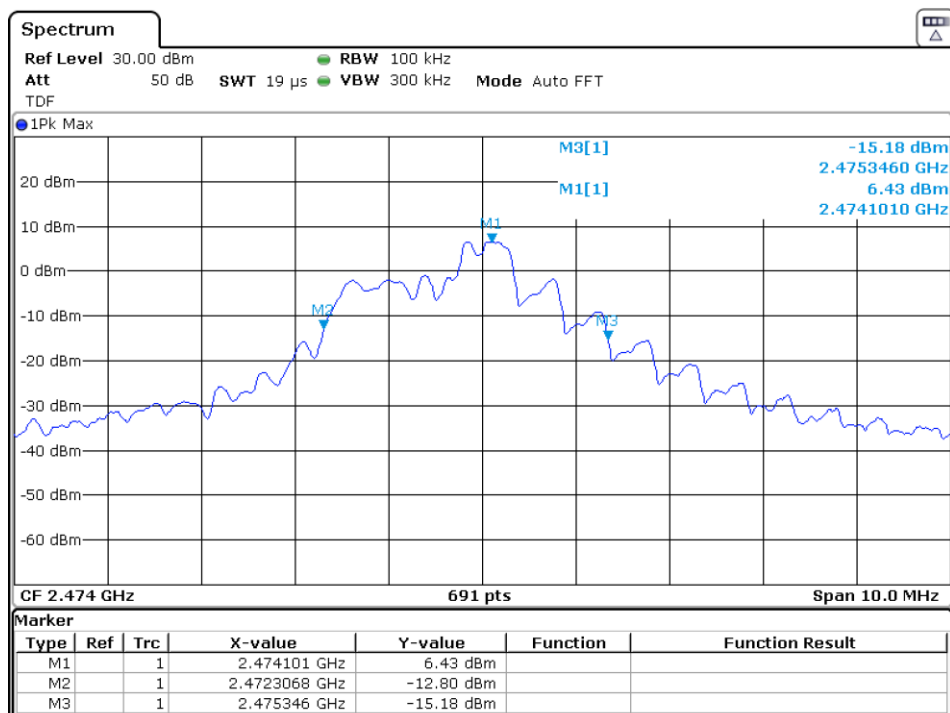
Tx frequency: 2458MHz

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Date: 22.JAN.2025 16:48:40

Tx frequency: 2474MHz

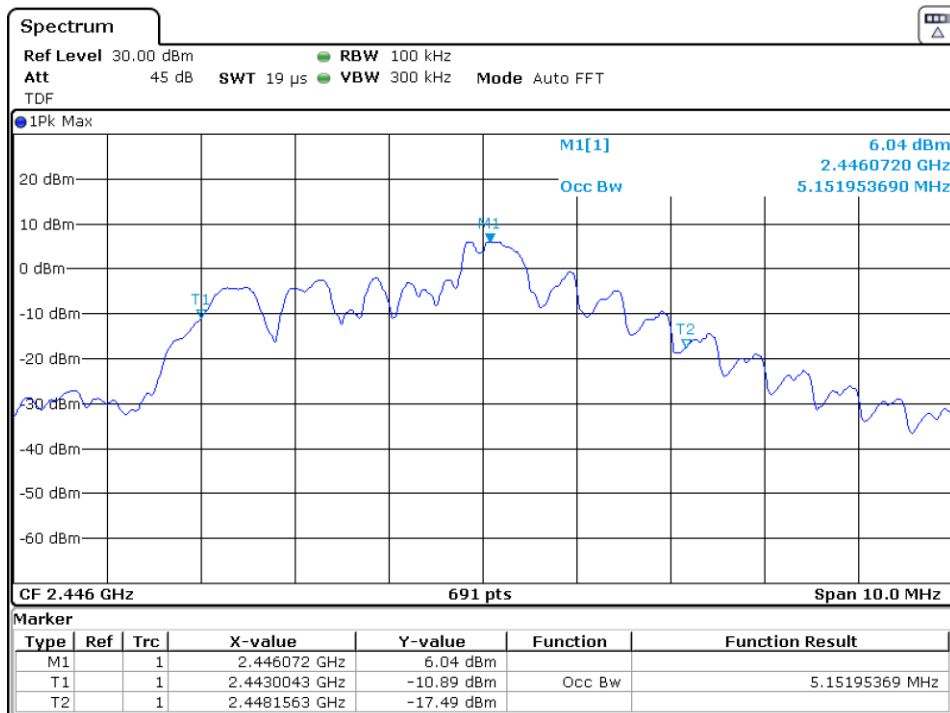
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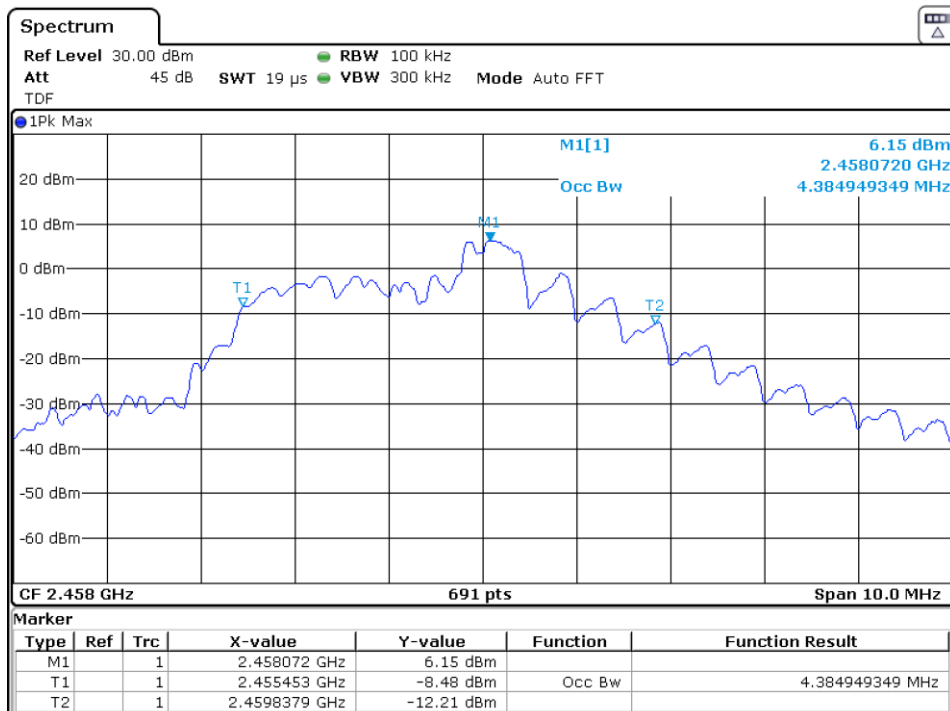
Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen/ Measuring results - Remarks	Ergebnis Result
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Test results of 99% Occupied Bandwidth



Date: 22.JAN.2025 16:50:28

Tx frequency: 2446MHz



Date: 22.JAN.2025 16:51:41

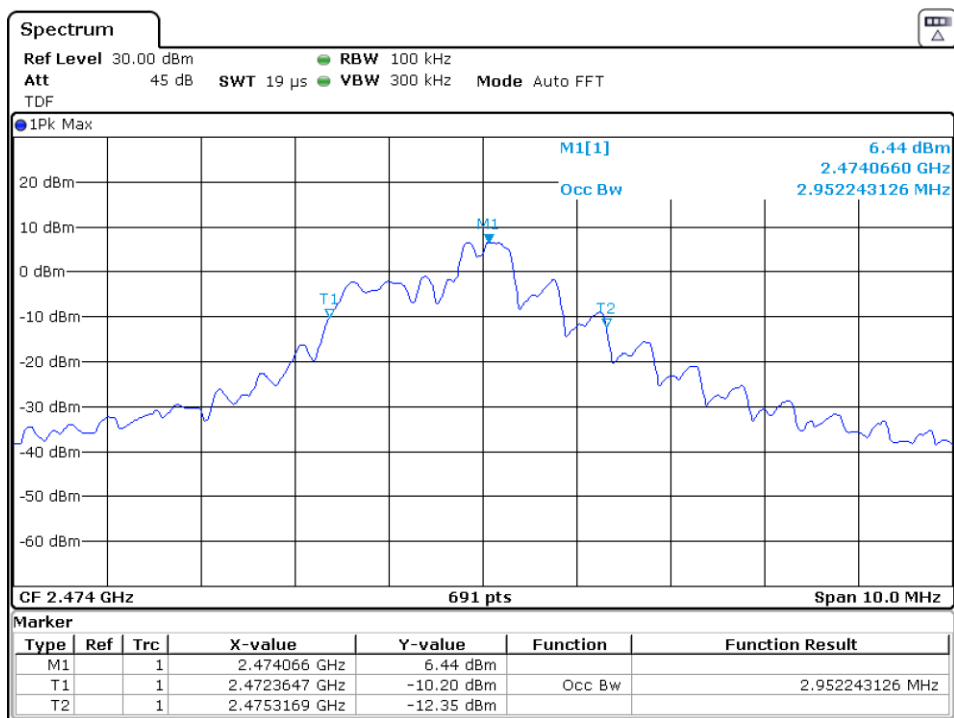
Tx frequency: 2458MHz

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Date: 22.JAN.2025 16:47:57

Tx frequency: 2474MHz

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Appendix 2

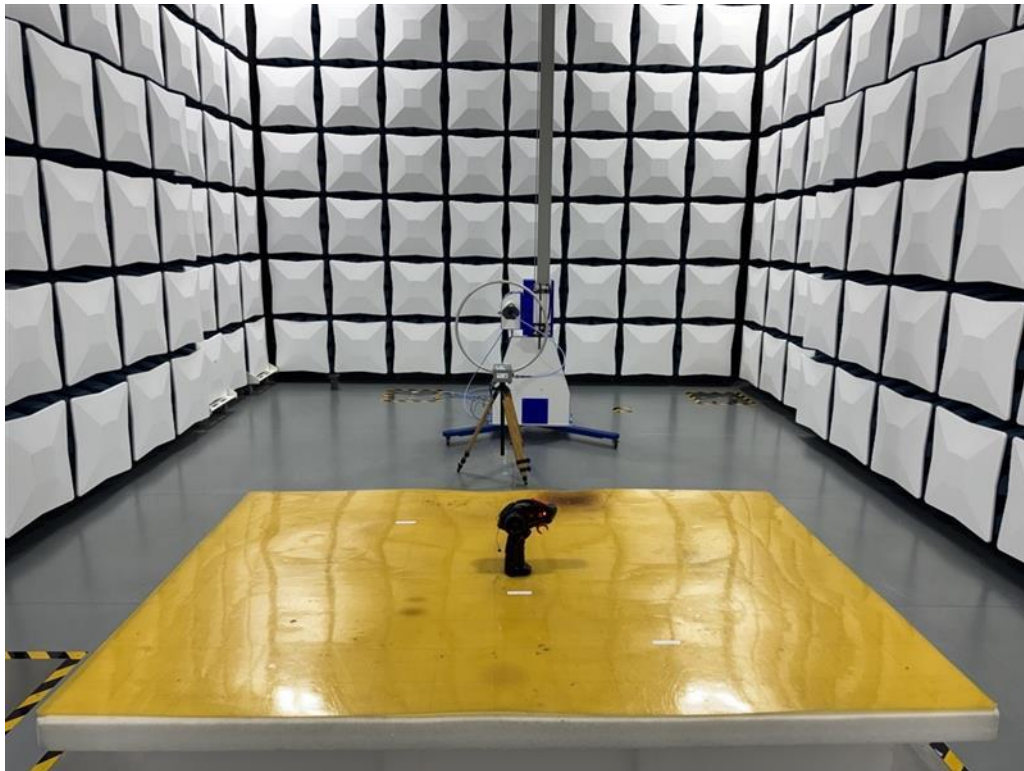
Test Setup Photos

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Set-up for Radiated Emission (9kHz-30MHz)



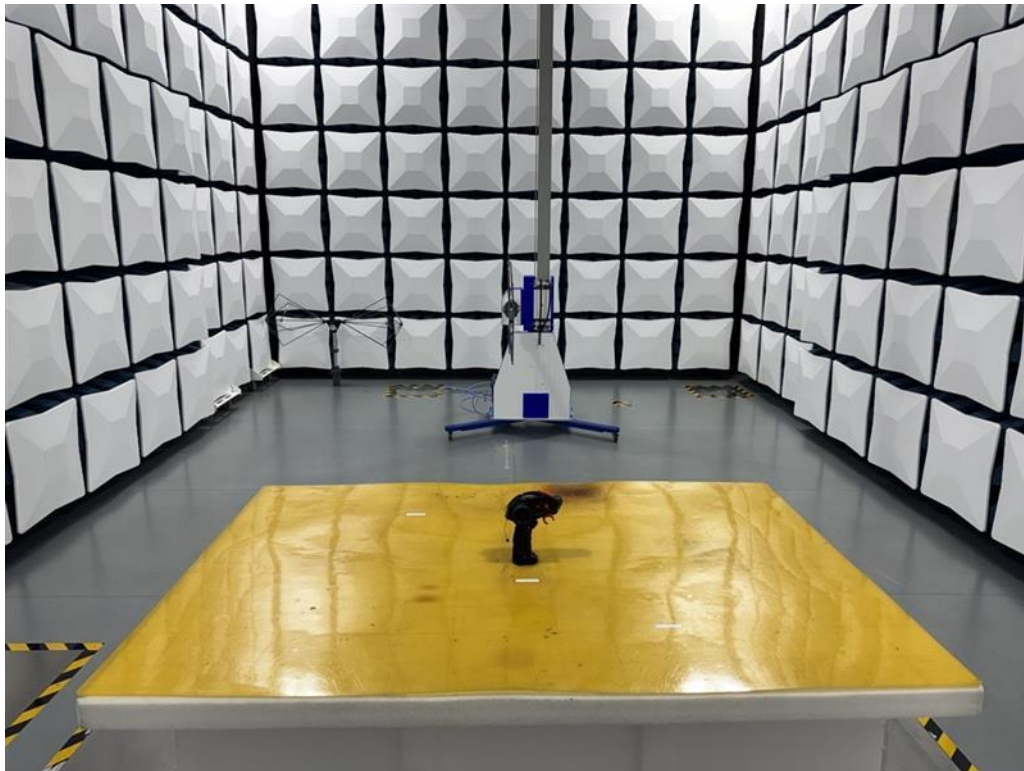
Set-up for Radiated Emission (30MHz-200MHz)

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Set-up for Radiated Emission (200MHz-1000MHz)



Set-up for Radiated Emission (1GHz above)

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Appendix 3

EUT External Photos

FCC ID: YFA370410544
IC ID: 12260A-370410544

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External View



External View

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External View



External View

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External View



External View

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Appendix 4

EUT Internal Photos

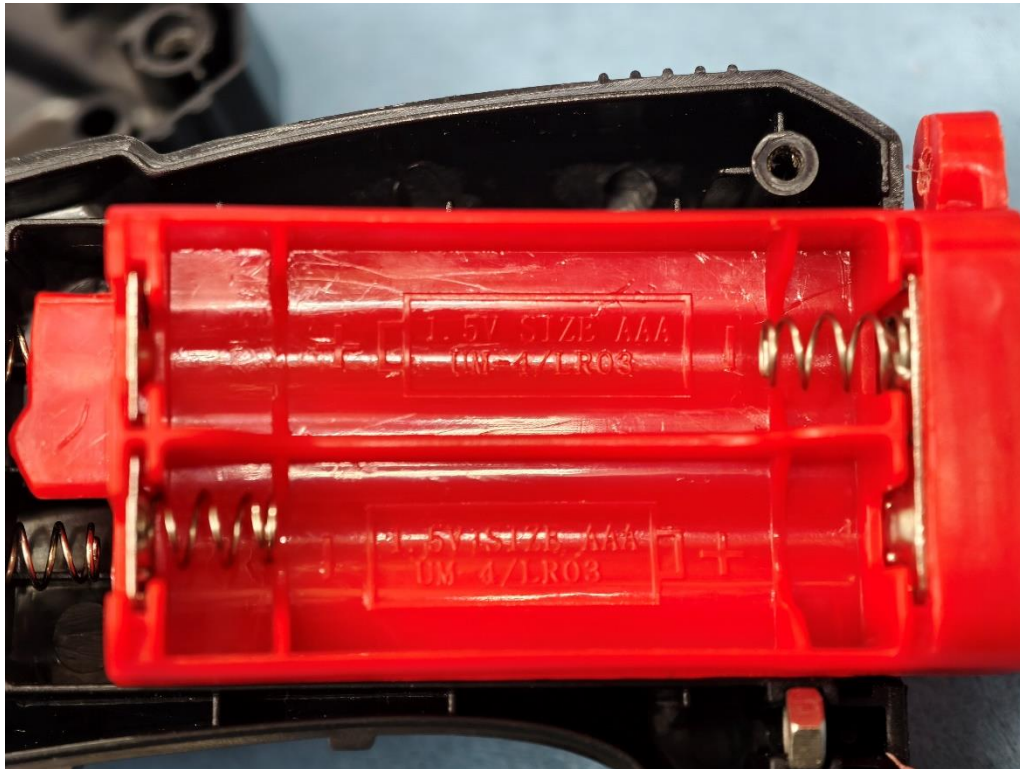
FCC ID: YFA370410544
IC ID: 12260A-370410544

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Internal View



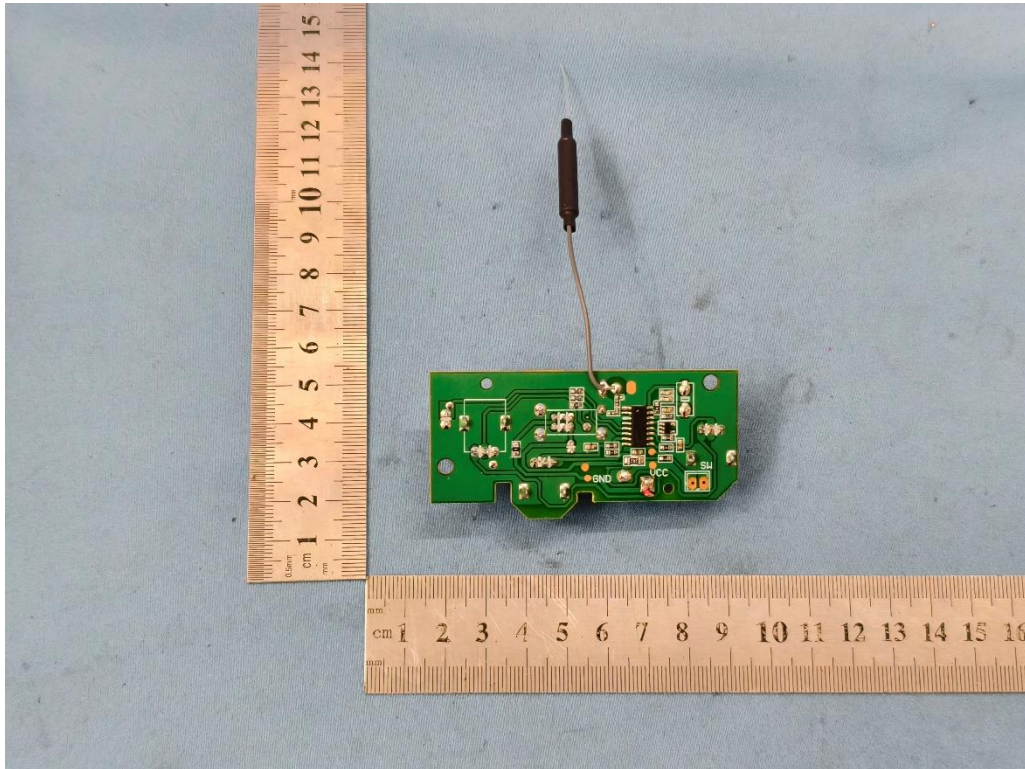
Internal View

Prüfbericht-Nr.:
Test report no.:

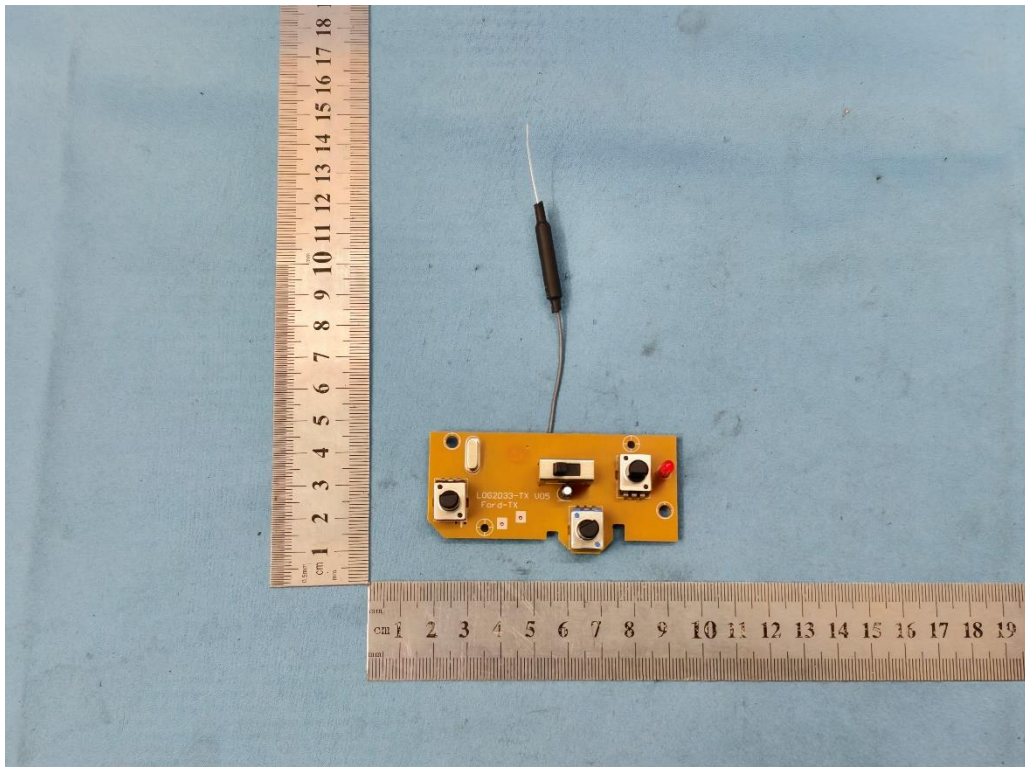
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Internal View



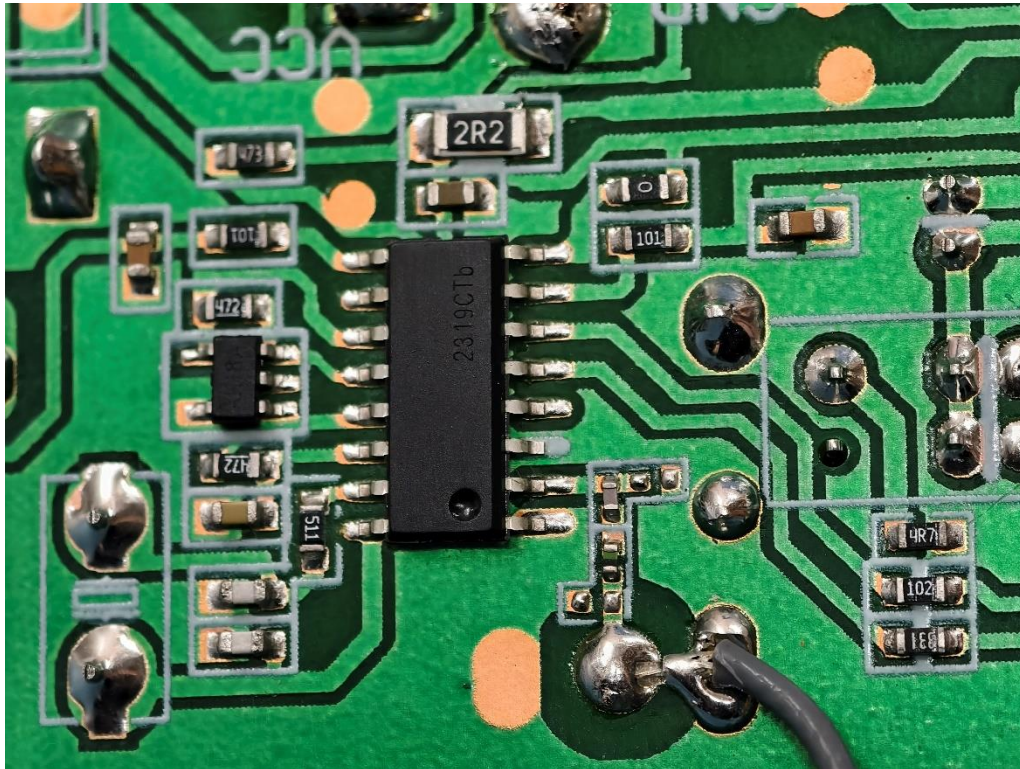
Internal View

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Internal View

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Appendix 5

RF Exposure Information

FCC ID: YFA370410544
IC ID: 12260A-370410544

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Maximum Transmitter Power

Frequency (MHz)	Maximum peak field strength (dBμV/m)	Maximum transmitter power (mW)
2446	94.4	0.8263
2458	94.2	0.7891
2474	92.4	0.5213

Note: The maximum peak field strength was taken from table of "Subclause 15.249(a)/RSS-210 B.10(a) – Field Strength of Fundamental and Harmonics".

For FCC

According to KDB 447498 D01:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 5 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

Result:

$$(0.8263/5) \cdot \sqrt{2.446} = 0.258 < 3.0$$

$$(0.7891/5) \cdot \sqrt{2.458} = 0.247 < 3.0$$

$$(0.5213/5) \cdot \sqrt{2.474} = 0.164 < 3.0$$

Conclusion: No SAR is required.

For ISED

According to table 11 in RSS-102 Issue 6, below exemption limit is applied:

Frequency: 2450 MHz

At separation distance of ≤ 5mm

Exemption limits: 3mW

Results:

max. power of channel = 0.8263mW < 3mW

Conclusion:

The maximum peak output power of the transmitter is less than the SAR evaluation exemption threshold and hence it complies with the RSS-102 RF exposure requirement.