


Produkte
Products

Prüfbericht-Nr.: <i>Test Report No.:</i>	CN236DOP 001	Auftrags-Nr.: <i>Order No.:</i>	158269731	Seite 1 von 12 <i>Page 1 of 12</i>	
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	30.05.2023		
Auftraggeber: <i>Client:</i>	Revell GmbH Henschelstr. 20-30, Buende, 32257, Germany				
Prüfgegenstand: <i>Test Item:</i>	Low Power Transmitter (27.145MHz)				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	24621				
Auftrags-Inhalt: <i>Order content:</i>	Radio equipment testing				
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 Subpart C				
Wareneingangsdatum: <i>Date of receipt:</i>	31.05.2023				
Prüfmuster-Nr.: <i>Test sample No.:</i>	A003484918-001				
Prüfzeitraum: <i>Testing period:</i>	31.05.2023 - 05.06.2023				
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 / tested by:			kontrolliert von / reviewed by:		
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>
07.06.2023	Felicia Chan/ Senior Engineer		07.06.2023	Sharon Li/ Unit Senior Manager	
Sonstiges / Other: FCC ID: 2A7EW246415010 Marginal pass result is marked with asterisks ** "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 Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor 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 relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicate in extracts. This test report does not entitle to carry any test mark.</i>					

Test Summary

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Bandwidth Measurement

Result: Pass

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List of Test and Measurement Instruments

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	3-Mar-23	3-Mar-24
Test Receiver	R & S	ESU40	9-Mar-23	3-Mar-24
Active Loop Antenna	EMCO	6502	20-Feb-23	20-Feb-25
Bi-conical Antenna	R & S	HK116	24-Oct-22	24-Oct-24
Log Periodic Antenna	R & S	HL223	25-Oct-22	25-Oct-24
Coaxial cable	Harbour	SF118/11n/11n/1 2000.0	3-Aug-22	3-Aug-24

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Signal and Spectrum Analyzer	R & S	FSV40	17-Nov-22	17-Nov-23

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is a transmitter for a RC toy car operating at 27.145 MHz. The EUT has two control rods for commanding the forward, backward, left and right movement of the associated receiver.

FCC ID: 2A7EW246415010

Model	Product description
24621	Radio Control Toy Transmitter

Ratings and System Details

	Transmitter
Frequency range	: 27.145MHz
Number of channels	: 1
Type of antenna	: Permanent wired antenna
Power supply	: Battery operated 3V
Ports	: none
Protection Class	: III

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Independent Operation Modes

The basic operation modes are:

- Remote Control: On and Off

For further information refer to User Manual

Submitted Documents

The submitted documents are listed as follow:

- Nil

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

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.

- There was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

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

- none

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed at the middle of the 80 cm height turntable, and the turntable is 3 meters far from the 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.

Test Results

Radiated Emission of Carrier Frequency

Subclause 15.227(a)

RESULT:
Pass

Test Specification : FCC Part 15 Subclause 15.227(a)
 Test Method : ANSI 63.10-2013
 Measurement Location: Semi Anechoic Chamber
 Measurement Distance: 3m
 Detector Function : Peak and Average
 Measurement BW : 120 kHz
 Supply Voltage : DC 3V

Polarization: Vertical

Detector function	Frequency (MHz)	Measured Field strength at 3m (dB μ V/m)	Delta to Limit (dB)
Peak	27.145	71.1	-28.9
Average	27.145	65.9	-14.1

Polarization: Horizontal

Detector function	Frequency (MHz)	Measured Field strength at 3m (dB μ V/m)	Delta to Limit (dB)
Peak	27.145	56.1	-43.9
Average	27.145	50.9	-29.1

Limit
Subclause 15.227(a)

Frequency within the band	Peak Emission		Average Emission	
	(μ V/m)	dB μ V/m	(μ V/m)	dB μ V/m
26.96-27.28 MHz	100,000	100.0	10,000	80.0

According to section 15.35(b), when average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Spurious Radiated Emissions
Subclause 15.227(b)
RESULT:
Pass

Test Specification : FCC Part 15 Subclause 15.209
 Test Method : ANSI 63.10-2013
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Quasi Peak
 Measurement BW : 120 kHz
 Supply Voltage : DC 3V
 Measuring Frequency Range : 30-1000MHz

Polarization: Vertical

Frequency (MHz)	Field strength at 3m (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
**54.290	38.0	40.0	-2.0
81.435	27.8	43.5	-15.7
*108.580	25.8	43.5	-17.7
*135.725	23.5	43.5	-20.0
*162.870	26.1	43.5	-17.4
190.016	28.8	43.5	-14.7
217.161	24.4	46.0	-21.6
*244.306	31.6	46.0	-14.4
*271.451	39.4	46.0	-6.6
298.596	25.2	46.0	-20.8

Polarization: Horizontal

Frequency (MHz)	Field strength at 3m (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
54.290	19.3	40.0	-20.7
81.435	18.2	43.5	-25.3
*108.580	14.9	43.5	-28.6
*135.725	13.9	43.5	-29.6
*162.871	20.6	43.5	-22.9
190.016	23.2	43.5	-20.3
217.161	17.8	46.0	-28.2
*244.306	25.3	46.0	-20.7
*271.451	33.1	46.0	-12.9
298.596	16.2	46.0	-29.8

Remark: (1) '*' indicates the frequency of the emissions fall into the restricted band as defined in Section 15.205(a). They comply with the radiated emission limits specified in Section 15.209.
 (2) '**' indicates the test result is passed marginally.
 (3) There is no spurious emission found between lowest oscillating frequency to 30 MHz.

Limit**Subclause 15.209**

Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

Limit for Radiated Emission under Section 15.209:

Frequency (MHz)	Field strength ($\mu\text{V}/\text{m}$)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	Measurement distance (m)
30-88	100	$20 \cdot \log(100) = 40.0$	3
88-216	150	$20 \cdot \log(150) = 43.5$	3
216-960	200	$20 \cdot \log(200) = 46.0$	3
960-2500	500	$20 \cdot \log(500) = 54.0$	3

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

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Bandwidth Measurement

Port of Testing : Antenna port
Detector Function : Peak
Supply Voltage : DC 3V

The field strength of any emissions appearing at the lower edge 27.1204 MHz and upper edge 27.16954 MHz are 25.98 dB and 25.99 dB below the carrier respectively.

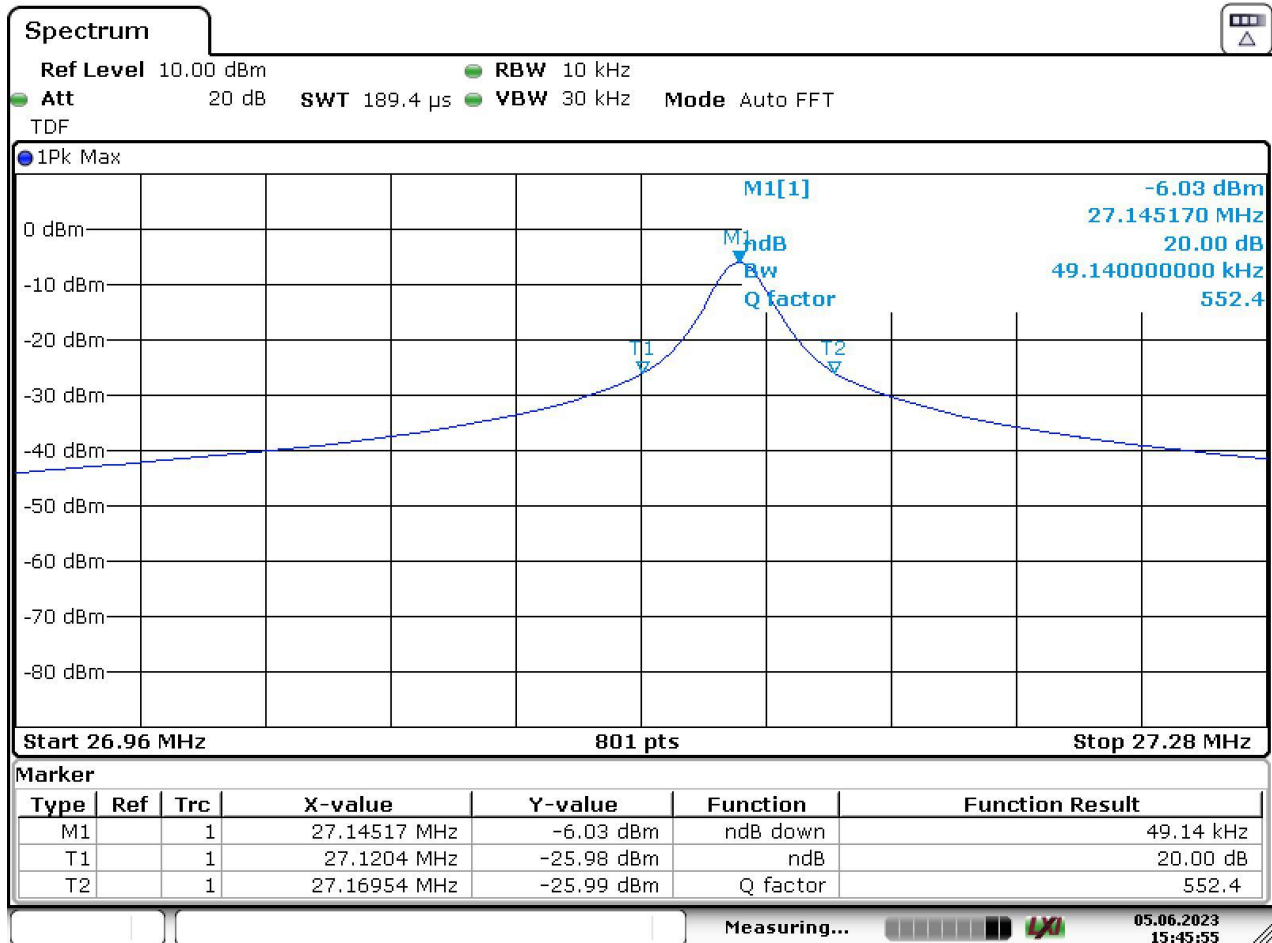
For test results refer to Appendix 1.

Appendix 1

Test Protocol

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Bandwidth



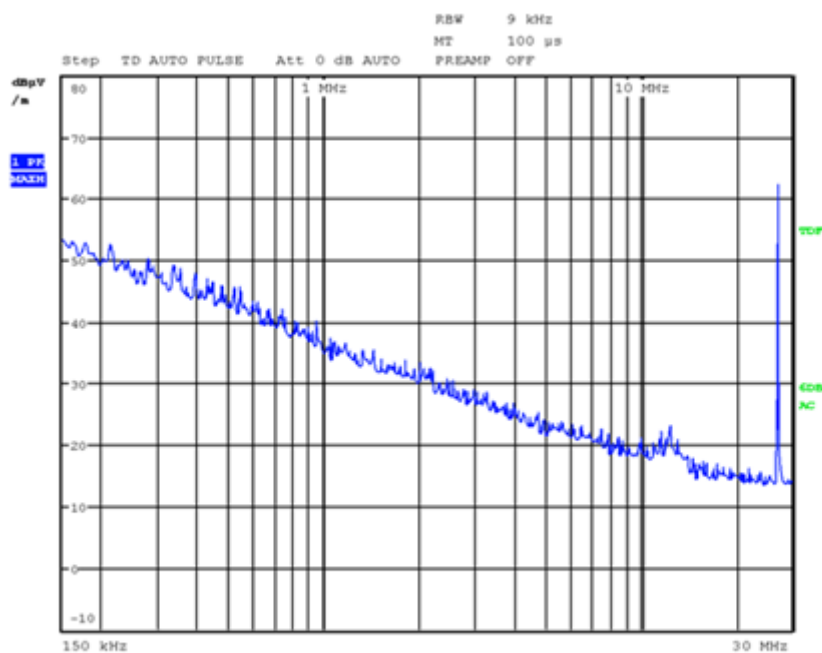
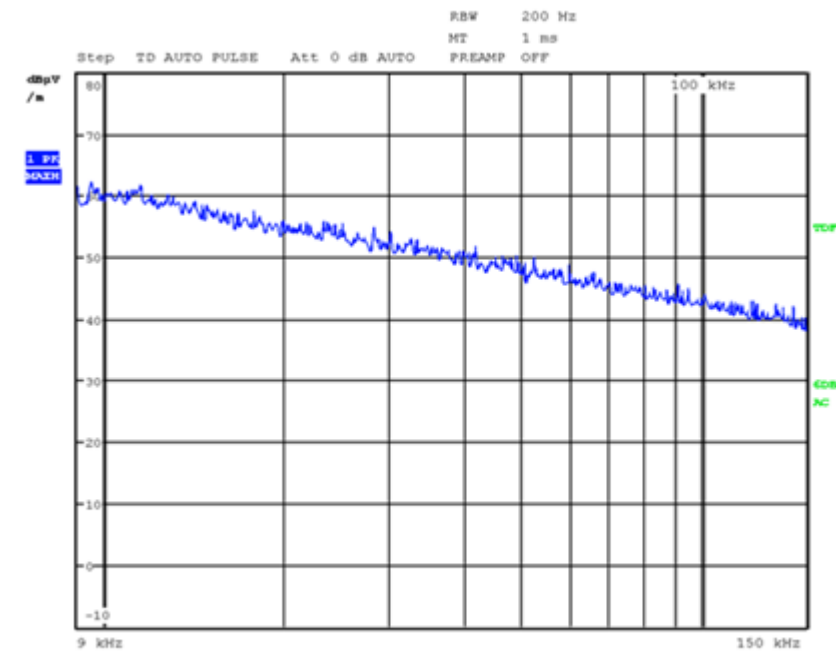
Date: 5.JUN.2023 15:45:55

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Radiated Emission

Tx frequency: 27.145 MHz

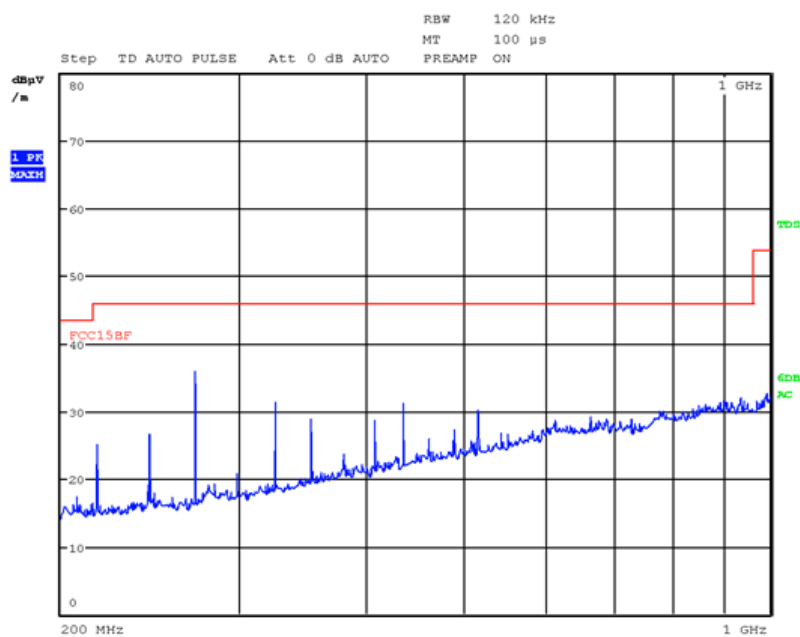
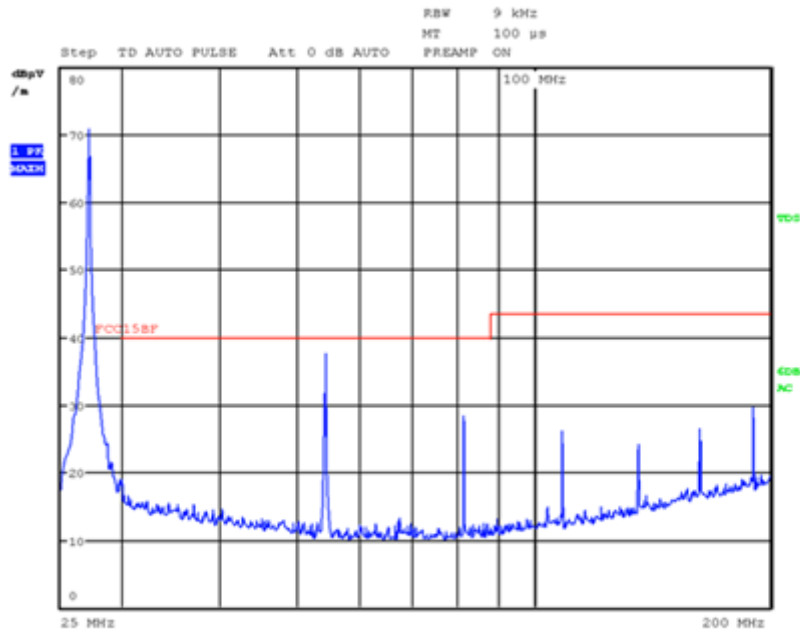
9k – 30MHz



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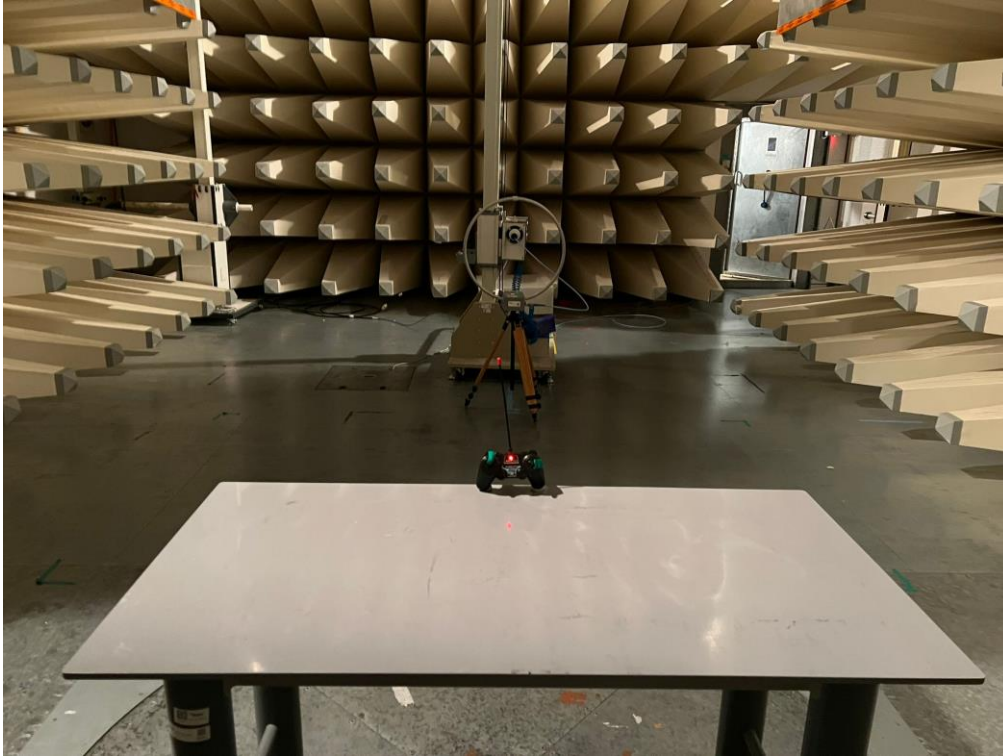
Tx frequency: 27.145 MHz

30MHz – 1000MHz (Vertical)

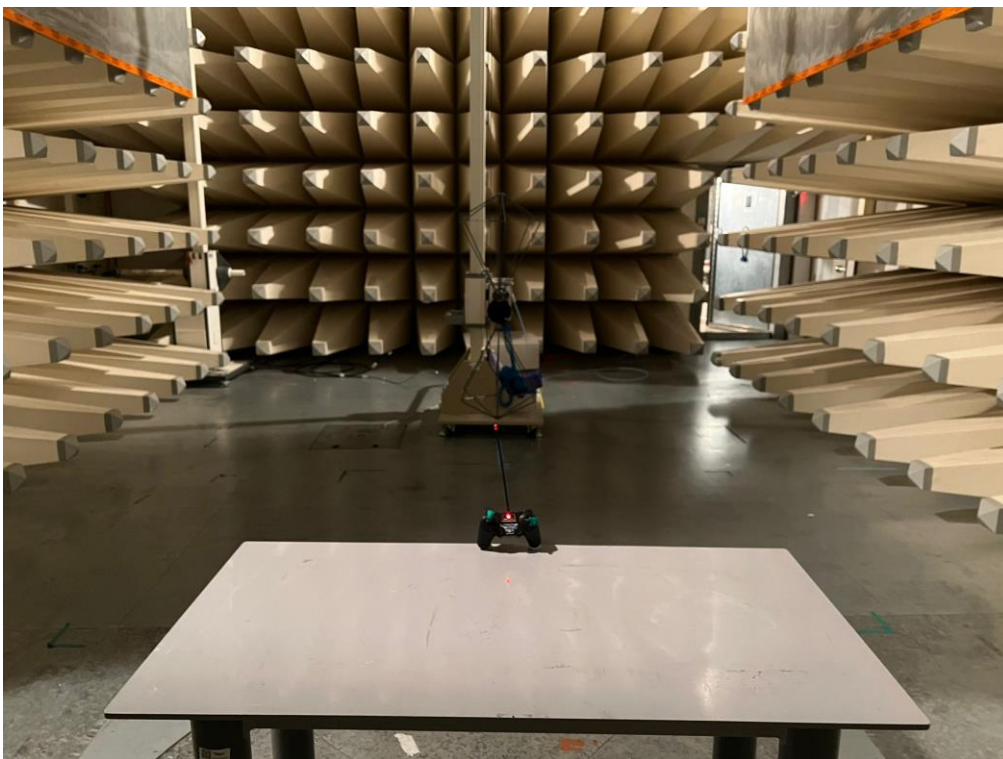


Appendix 2

Test Setup

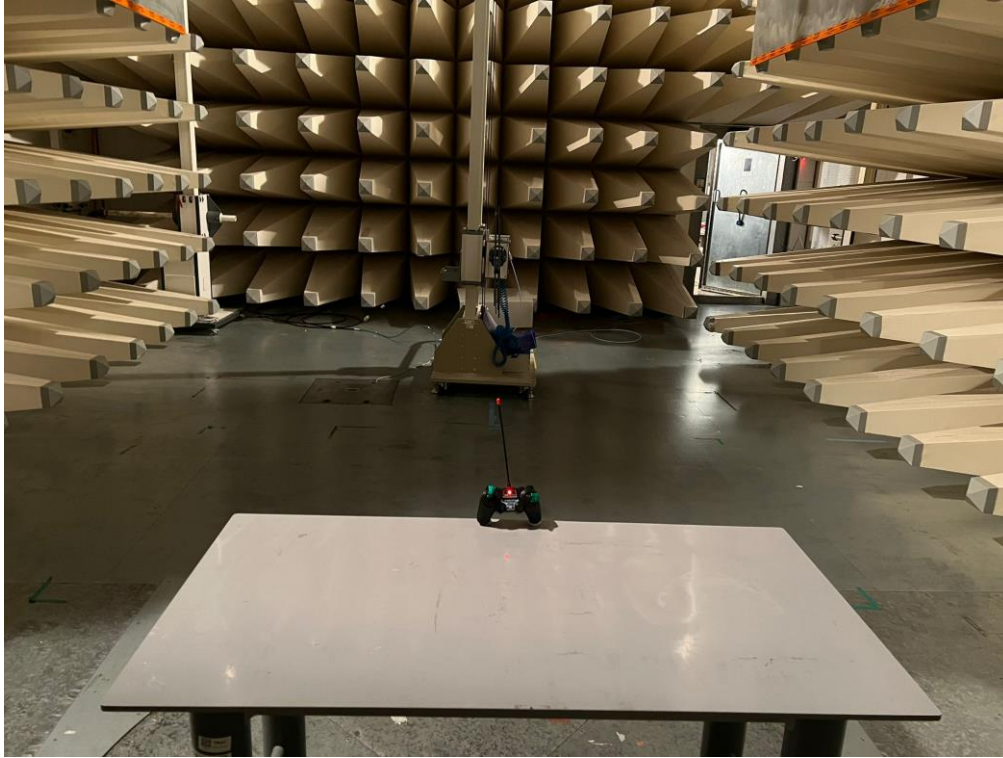


Set-up of Radiation Emission below 30MHz



Set-up of Radiation Emission from 30 – 200MHz

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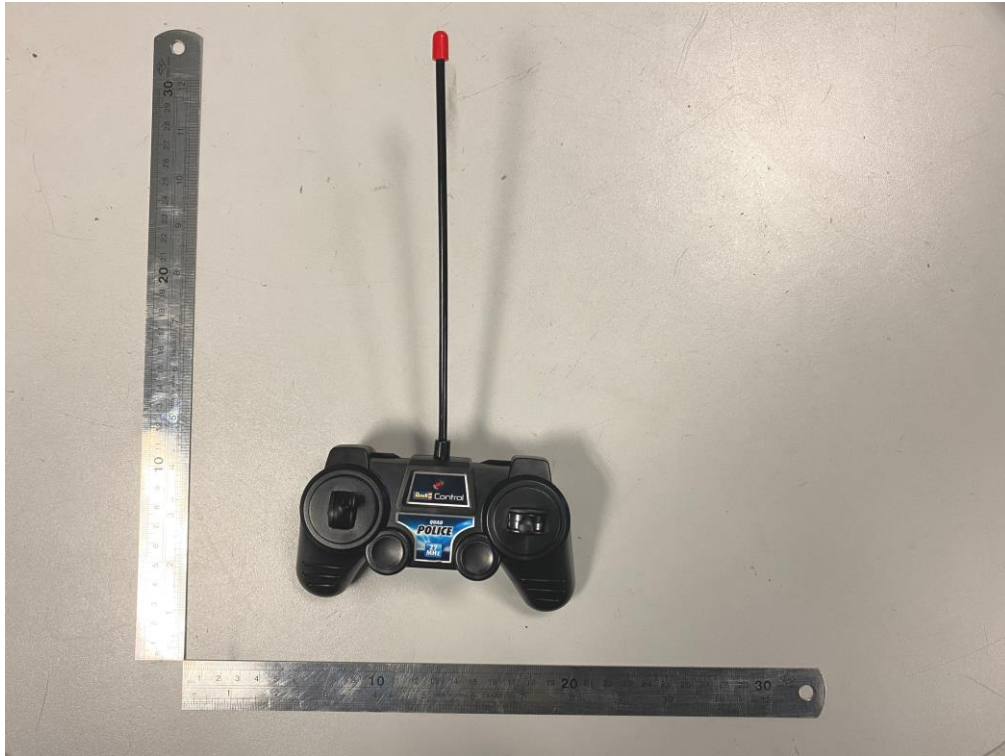


Set-up of Radiation Emission from 200 – 1000MHz

Appendix 3

EUT External Photo

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External view



External view

Appendix 4

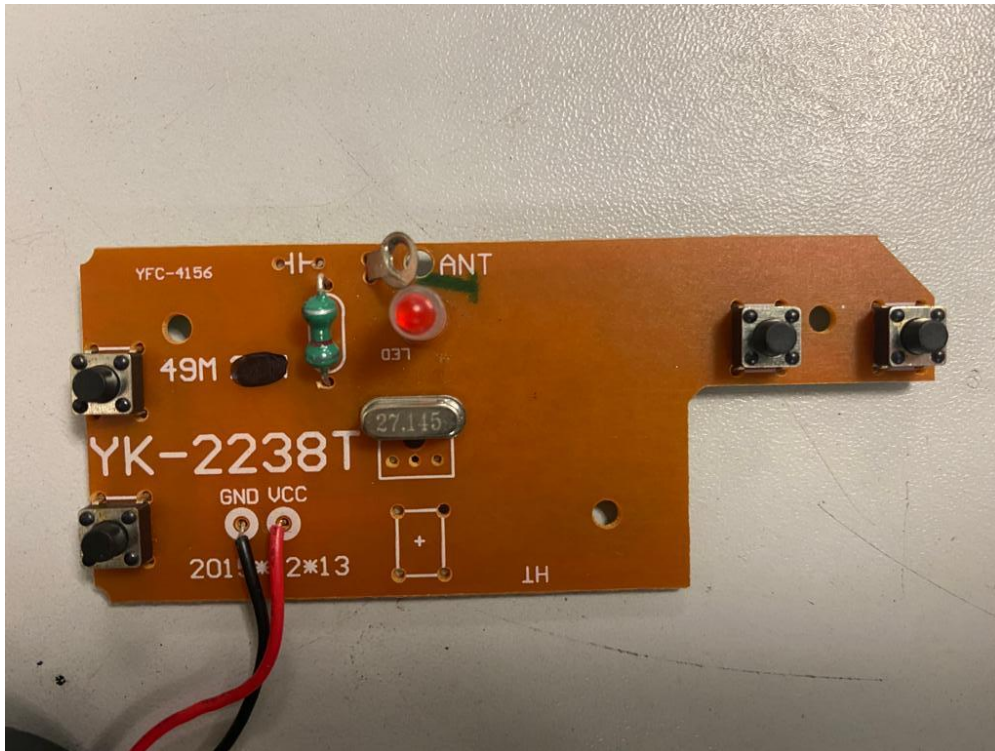
EUT Internal Photo



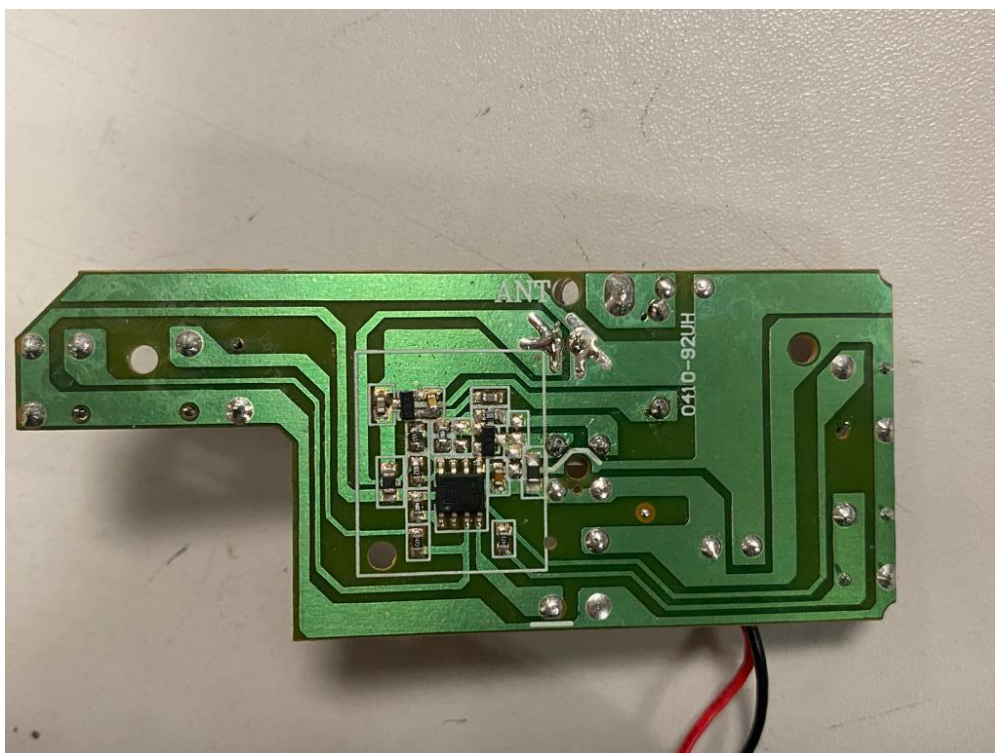
Transmitter (Internal view)



Transmitter (Internal view)



Transmitter (Internal view)



Transmitter (Internal view)

Appendix 5

RF Exposure Information

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Maximum transmitter power:

Frequency (MHz)	Maximum peak output power (dBm)	Maximum peak output power (mW)	Maximum peak field strength (dBuV/m)
27.145	-24.13	0.0038	71.1

Note: The maximum peak field strength was taken from table of "Subclause 15.227(a) – Radiated Emission of Carrier Frequency".

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* ≤50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$

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:

$$(0.0038/5) \cdot \sqrt{0.027145} = 0.0001 < 3.0$$

Conclusion:

No SAR is required.