

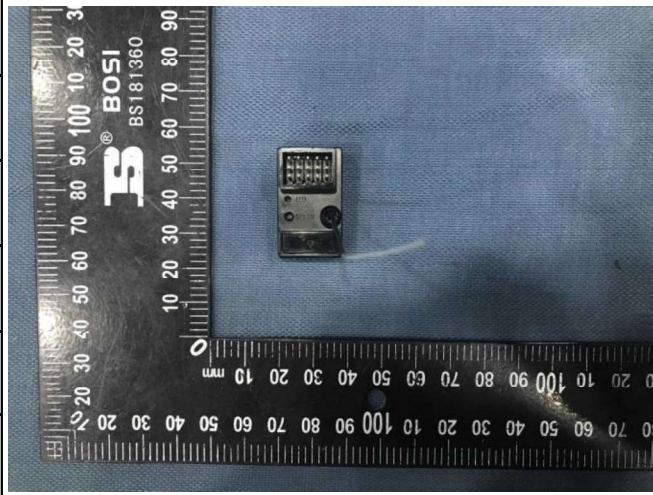
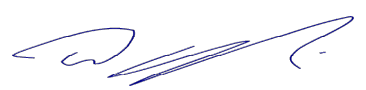
Prüfbericht-Nr.: <i>Test Report No.:</i>	CN204FDV 001	Auftrags-Nr.: <i>Order No.:</i>	158224195	Seite 1 von 19 <i>Page 1 of 19</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	11.03.2021	
Auftraggeber: <i>Client:</i>	KONDO KAGAKU CO., LTD. 4-17-7 Higashi -Nippori, Arakawa-ku, Tokyo, Japan			
Prüfgegenstand: <i>Test item:</i>	2.4G RC Set (TRX)			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	No21013, KR-420XT			
Auftrags-Inhalt: <i>Order content:</i>	FCC Test			
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 Subpart C, ANSI C63.10-2013			
Wareneingangsdatum: <i>Date of receipt:</i>	11.03.2021			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A002978528-004			
Prüfzeitraum: <i>Testing period:</i>	12.03.2021 - 16.03.2021			
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:		
 10.05.2021 Felicia Chan / Assistant Engineer		 10.05.2021 Sharon Li / Unit Senior Manager		
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>
Sonstiges / Other: FCC ID: QH9R13KR4				
Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt <i>Condition of the test item at delivery: 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 only relates to the a. m. 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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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	2404- 2476MHz
Type of modulation	FSK
Number of channels	37
Type of antenna	Pattern Antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	V_{nor} : 7.4 V

Product function and intended use

KR-420XT is 2.4GHz Transceiver for RC Model, including telemetry function with compatible receiver EX-NEXT. It is powered by battery only.

FCC ID: QH9R13KR4

Models	Product description
No21013, KR-420XT	2.4G RC Set (TRX)

Submitted documents

Circuit Diagram
 Block Diagram
 Technical Description
 User manual
 Label

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.
- Normal operation 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.

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.

- During test, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power was selected according to the instruction given by the manufacturer. The setting of the RF output power expected by the customer shall be fixed on the firmware of the final end product.

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 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.

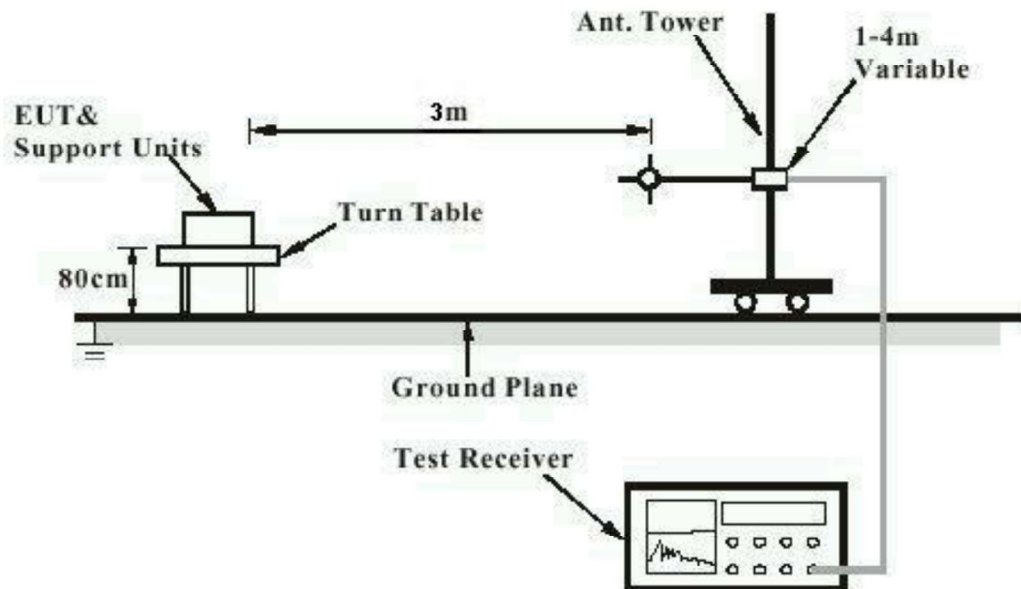
FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

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

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)

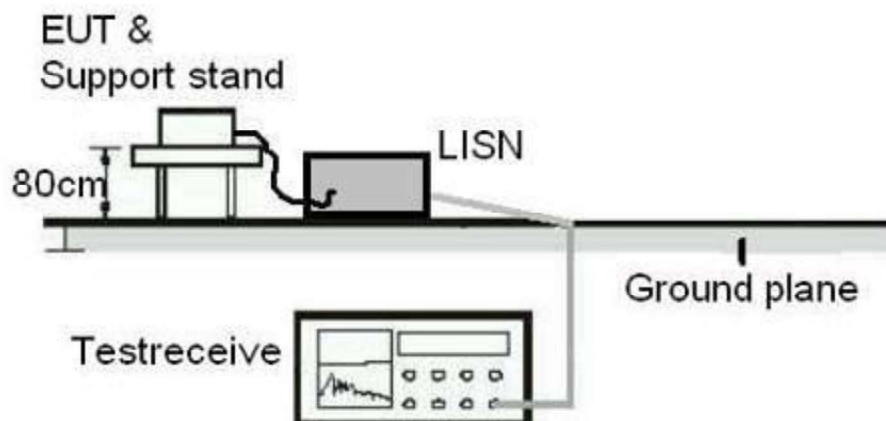
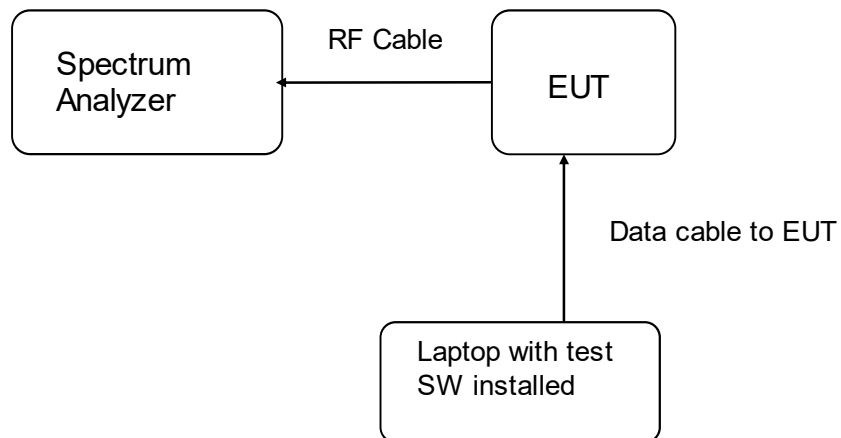


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)

Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.

Address: 3-4, 11/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

Web: www.tuv.com

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

FCC

Type	: Accredited Test Firm
Designation Number	: HK0013
Test Firm Registration Number	: 371735
Scope	: Intentional Radiators

Industry Canada

The 10m Semi-anechoic chamber used by TÜV Rheinland Hong Kong Ltd at Hong Kong Productivity Council has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

Test Site Registration Number	: 26152
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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 (SVSWR)	Albatross	N/A	04 Jan 21	04 Jan 22
Standard Gain Horn	ETS-Lindgren	3160-07	24 Nov 20	24 Nov 22
Standard Gain Horn	ETS-Lindgren	3160-08	24 Nov 20	24 Nov 22
Standard Gain Horn	ETS-Lindgren	3160-10	30 Nov 20	30 Nov 22
Double-Ridged Waveguide Horn	EMCO	3116	30 Nov 20	30 Nov 22
Double-Ridged Waveguide Horn	EMCO	3117	11 Nov 20	11 Nov 22
Test Receiver	R & S	ESU26	07 Oct 20	07 Oct 21
Coaxial cable	Huber+Suhner	SF118/11N/11N/12000MM	07 Jan 21	07 Jan 23
Microwave Preamplifier	COM-POWER Corporation	PAM-118A	06Mar 20	06 Mar 21
Preamplifier 18GHz to 40GHz with cable	A.H. Systems, Inc.	PAM-1840VH	29 Jan 21	29 Jan 22
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30 Oct 19	30 Oct 21
High Frequency Cable	Pasternack	PE3VNA4001-3M	29 Jan 21	29 Jan 23
Multi-functional Anechoic Chamber (NSA)	Albatross	Nil	6-Jan-21	6-Jan-22
Bi-conical Antenna	R & S	HK116	15-Sep-20	15-Sep-22
Log Periodic Antenna	R & S	HL223	15-Sep-20	15-Sep-22
Coaxial cable	Huber+Suhner	SF118/11N/11N/12000MM	7-Jan-21	7-Jan-23
Active Loop Antenna	EMCO	6502	3-Nov-20	3-Nov-22

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSV40	21 Jan 21	21 Jan 22

Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

No.	Item	Measurement Uncertainty
1	Radiated emission 30MHz-1GHz	± 4.6 dB
2	Radiated emission 1GHz-18GHz	± 4.4 dB
3	Radiated emission 18GHz-26GHz	± 4.6 dB
4	Bandwidth	± 1.8 %

Results FCC Part 15 – Subpart C

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

FCC 15.204 – Antenna Requirement 2		Pass
FCC Requirement: 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:	N/A	

Subclause 15.215 (c) – 20 dB Bandwidth				Pass
Test Specification : ANSI C63.10 – 2013 Test date : 16.03.2021 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 7.4VDC Temperature : 23.4°C Humidity : 47.0%				
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)
2404	2403.56665	> 2400	2404.02315	< 2483.5
2440	2439.59265	> 2400	2440.02975	< 2483.5
2476	2475.57160	> 2400	2476.04920	< 2483.5

Subclause 15.249 (a) – Field Strength of Fundamental and Harmonics		Pass
Test Specification : ANSI C63.10 – 2013 Test date : 12.03.2021 to 13.03.2021 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz Supply voltage : 7.4VDC Temperature : 25.2°C Humidity : 50.0%		
Requirement: The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.		
Results: PASS.		
Fundamental Frequency 2404MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2403.639	93.18	114.0 / PK
2403.639	85.04	94.0 / AV
Fundamental Frequency 2404MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2403.960	90.27	114.0 / PK
2403.960	82.13	94.0 / AV
Harmonics 2404MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4808.000	44.83	74.0 / PK
4808.000	28.11	54.0 / AV
9616.000	52.99	74.0 / PK
9616.000	31.88	54.0 / AV
Harmonics 2404MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4808.000	47.71	74.0 / PK
4808.000	27.24	54.0 / AV
9616.000	58.39	74.0 / PK
9616.000	32.28	54.0 / AV

Fundamental Frequency 2440MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2439.719	92.04	114.0 / PK
2439.719	83.90	94.0 / AV
Fundamental Frequency 2440MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2439.639	93.54	114.0 / PK
2439.639	85.04	94.0 / AV
Harmonics 2440MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.000	47.39	74.0 / PK
4880.000	27.14	54.0 / AV
9760.000	49.07	74.0 / PK
9760.000	31.97	54.0 / AV
Harmonics 2440MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.000	47.27	74.0 / PK
4880.000	26.25	54.0 / AV
9760.000	49.17	74.0 / PK
9760.000	31.76	54.0 / AV

Fundamental Frequency 2476MHz		Vertical Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2475.960	93.82	114.0 / PK
2475.960	86.68	94.0 / AV
Fundamental Frequency 2476MHz		Horizontal Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2475.719	92.53	114.0 / PK
2475.719	84.39	94.0 / AV
Harmonics 2476MHz		Vertical Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
7428.000	46.24	74.0 / PK
7428.000	29.83	54.0 / AV
9904.000	48.17	74.0 / PK
9904.000	31.50	54.0 / AV

Harmonics 2476MHz		Horizontal Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
7428.000	45.61	74.0 / PK
7428.000	30.04	54.0 / AV
9904.000	58.20	74.0 / PK
9904.000	32.17	54.0 / AV

Subclause 15.249 (d), 15.205 – Out Of Band Radiated Emission			Pass
Test Specification : ANSI C63.10 – 2013 Test date : 12.03.2021 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz Supply voltage : 7.4VDC Temperature : 25.2°C Humidity : 50.0%			
Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.			
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 2404MHz		Vertical Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2400.000	47.47	74.0 / PK	
2400.000	28.94	54.0 / AV	
Tx frequency 2404Hz		Horizontal Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2400.000	43.93	74.0 / PK	
2400.000	28.70	54.0 / AV	
Tx frequency 2440MHz		Vertical Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
No Peak Found	---	74.0 / PK	
No Peak Found	---	54.0 / AV	
Tx frequency 2440MHz		Horizontal Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
No Peak Found	---	74.0 / PK	
No Peak Found	---	54.0 / AV	
Tx frequency 2476MHz		Vertical Polarization	
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m	
2483.500	39.61	74.0 / PK	

2483.500	27.51	54.0 / AV
Tx frequency 2476MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	42.50	74.0 / PK
2483.500	27.82	54.0 / AV