

Prüfbericht-Nr.: <i>Test report no.:</i>	CN24MNS4 001	Auftrags-Nr.: <i>Order no.:</i>	168444032	Seite 1 von 29 Page 1 of 29										
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2023-09-26											
Auftraggeber: <i>Client:</i>	Shenzhen RAKwireless Technology Co.,Ltd. Room 506, Building B, New Compark, Pingshan First Road, Taoyuan Street, Nanshan District, Shenzhen, Guangdong, P.R. China													
Prüfgegenstand: <i>Test item:</i>	WisGate Edge Pro													
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	RAK7229CV2 (Trademark:)													
Auftrags-Inhalt: <i>Order content:</i>	CIIPC and C4PC Test Report													
Prüfgrundlage: <i>Test specification:</i>	<table border="0"> <tr> <td>*CFR47 FCC Part 15: Subpart C Section 15.247</td> <td>*RSS-247 Issue 2</td> </tr> <tr> <td>*CFR47 FCC Part 22</td> <td>*RSS-130 Issue 2</td> </tr> <tr> <td>*CFR47 FCC Part 24</td> <td>*RSS-132 Issue 3</td> </tr> <tr> <td>*CFR47 FCC Part 27</td> <td>*RSS-133 Issue 6</td> </tr> <tr> <td></td> <td>*RSS-139 Issue 3</td> </tr> </table>				*CFR47 FCC Part 15: Subpart C Section 15.247	*RSS-247 Issue 2	*CFR47 FCC Part 22	*RSS-130 Issue 2	*CFR47 FCC Part 24	*RSS-132 Issue 3	*CFR47 FCC Part 27	*RSS-133 Issue 6		*RSS-139 Issue 3
*CFR47 FCC Part 15: Subpart C Section 15.247	*RSS-247 Issue 2													
*CFR47 FCC Part 22	*RSS-130 Issue 2													
*CFR47 FCC Part 24	*RSS-132 Issue 3													
*CFR47 FCC Part 27	*RSS-133 Issue 6													
	*RSS-139 Issue 3													
Wareneingangsdatum: <i>Date of sample receipt:</i>	2023-09-26	Refer to photos documents												
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003562972-001~002													
Prüfzeitraum: <i>Testing period:</i>	2023-09-26 - 2024-01-11													
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.													
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.													
Prüfergebnis*: <i>Test result*:</i>	Pass													
geprüft von: <i>tested by:</i>	Hardy <i>Suo</i>	genehmigt von: <i>authorized by:</i>	Lin Lin											
Datum: <i>Date:</i>	2024-03-12	Ausstellungsdatum: <i>Issue date:</i>	2024-03-12											
Stellung / Position	Sachverständige(r)/Expert	Stellung / Position	Sachverständige(r)/Expert											
Sonstiges / Other:	FCC ID: 2AF6B-RAK3400, IC ID: 25908-RAK3400 HMN: RAK7229CV2 *The LTE module, BLE module, Wi-Fi module and Lora module are combination in a new host, the co-located radiated spurious emission is arrange re-assessment. ** This product contains transmitter modules; refer to clause 3.2 for details.													
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 P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht	5 = mangelhaft N/T = nicht									
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested	5 = poor 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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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. 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. 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> <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 Co-Located Radiated Spurious Emissions

RESULT: Pass

5.2 Conducted emissions

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 Set-up Photos

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, CAB identifier: CN0078

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Unwanted Emission Testing						
Equip. No.	Description	Manufacturer	Model	Serial No.	Calibrated Date (DD.MM.YYYY)	Calibrated until (DD.MM.YYYY)
G1826021	EMI Test Receiver	R&S	ESR 7	102021	26.07.2023	25.07.2024
G1826023	Signal Analyzer	R&S	FSV 40	101439	26.07.2023	25.07.2024
G1826024	System Controller Interface	R&S	SCI-100	S10010038	N/A	N/A
G1826025	Filterbank	R&S	Wlan	100759	26.07.2023	25.07.2024
G1826026	OSP	R&S	OSP 120	102040	N/A	N/A
G1826028	Pre-amplifier	R&S	SCU08F1	08320031	26.07.2023	25.07.2024
G1826029	Amplifier	R&S	SCU-18F	180070	26.07.2023	25.07.2024
G1826030	Amplifier	R&S	SCU40A	100475	26.07.2023	25.07.2024
G1826031	Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	07.08.2022	06.08.2024
G1826032	Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	07.08.2022	06.08.2024
G1826033	Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	28.08.2022	27.08.2024
G1826034	Active Loop Antenna	Schwarzbeck	FMZB 1513	302	07.08.2022	06.08.2024
G1826036	Test software	R&S	EMC32 (V10.60.10)	N/A	N/A	N/A
G1826037	Control PC	Dell	OptiPlex 7050	36NV9P2	N/A	N/A
G1826433	3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	22.06.2021	22.06.2024

Terminal Disturbance Voltage at Mains Terminals					
Equip. No.	Equipment	Manufacturer	M/N	S/N	Calibrated until
GC-SZ 001009	EMI Test Receiver	R&S	ESR3	102428	2024-09-13
GC-SZ 001010	Artificial Mains Network	R&S	ENV216	102333	2024-07-31
GC-SZ 001011	Artificial Mains Network	R&S	ENV432	101411	2024-07-31
GC-SZ 001017	Impedance Stabilisation Network	R&S	ENY81	100323	2024-07-31
GC-SZ 001018	Impedance Stabilisation Network	R&S	ENY81-CA6	101810	2024-07-31
G1825090	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

Test	Parameters	uncertainty
Conducted Emission	Conducted emission 150kHz-30MHz (AMN)	± 3.70 dB
		± 3.30 dB
Radiated Emission	Radiated emission 30MHz-1GHz	± 4.52 dB
	Radiated emission 1GHz-18GHz	± 4.37 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were at 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 a WisGate Edge Pro which supports Lora+GNSS, 2.4GHz Wi-Fi, BLE and LTE wireless technologies.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Description
Kind of Equipment:	WisGate Edge Pro
Type Designation:	RAK7229CV2
HMN:	RAK7229CV2
Operating Voltage:	DC 12V via DC Source or DC 37 ~ 57V via POE adapter
Testing Voltage:	AC 230V, 50Hz or DC 12V
Operating Temperature Range:	-30 °C ~ +55 °C
Remark: This product assembles multi-transmitter modules: <ul style="list-style-type: none"> - LTE Module (FCC ID: XMR201807EG95NA, IC ID: 10224A-2018EG95NA) - Wi-Fi Module (FCC ID: 2AF6B-RAK634, IC ID: 25908-RAK634) - WisLink LPWAN Concentrator*2 (FCC ID: 2AF6B-RAK5148, FCC ID: 2AF6B-RAK5146, IC ID: 25908-RAK5148, IC ID: 25908-RAK5146) - WisDuo (FCC ID: 2AF6B-RAK3400, IC ID: 25908-RAK3400) 	
Technical Specification of LTE Module	
Characteristic	Description
Operating Frequency	WCDMA Band: II, IV, V LTE Band: 2, 4, 5, 12, 13
Type of Modulation	QPSK, 16QAM
Power Class	4
Antenna Number:	2
Antenna Gain:	5.1dBi for Ant0 (declared by client) PIFA Antenna 4.3dBi for Ant1 (declared by client) PIFA Antenna
Technical Specification of Wi-Fi Module	
Characteristic	Description
Operating Frequency	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
Type of Modulation	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate:	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n
Channel Number:	11 channels for 802.11b/g/n(HT20) 7 channels for 802.11n(HT40)

Antenna Number:	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
Antenna Gain:	4.5dBi for Ant0 (declared by client) PIFA Antenna 4.5dBi for Ant1 (declared by client) PIFA Antenna
Technical Specification of WisLink LPWAN Concentrator	
Characteristic	Description
Operating Frequency	2403 MHz- 2479 MHz for 2.4GHz DTS LoRa 1559 MHz to 1610 MHz (receiver) for GPS L1
Type of Modulation	Chirp Spread Spectrum
Data Rate:	DR0-DR7
Antenna Number:	1
Antenna Gain:	8.00dBi (declared by client) for Omni antenna
Technical Specification of WisLink LPWAN Concentrator	
Characteristic	Description
Operating Frequency	1. 923.3 - 927.5MHz for DTS LoRa 2. 903.9MHz - 905.3MHz for Hybrid LoRa 3. GNSS receiver: 1) GLONASS G1: 1559 to 1610 MHz (Operating Frequency: 1597-1607MHz) 2) GPS L1: 1559 to 1610 MHz (Operating Frequency: 1575.42MHz)
Type of Modulation	FSK/Lora
Data Rate:	Lora: SF7 – SF12 / DR8 – DR13, SF7 – SF10 / DR0 –DR3
Antenna Number:	1
Antenna Gain:	5.10 dBi (declared by client) for Fiber Glass Antenna
Technical Specification of WisDuo	
Characteristic	Description
Operating Frequency	2402 - 2480 MHz
Type of Modulation	GFSK
Data Rate:	1Mbps, 2Mbps
Antenna Number:	1
Antenna Gain:	3.4dBi (declared by client) for PIFA Antenna

Table 3: Information of modules

Information of LTE Module	
Product Name	LTE Module
Model Number	EG95-NA
FCC ID	XMR201807EG95NA
IC ID	10224A-2018EG95NA
Information of Wi-Fi Module	
Product Name	Wi-Fi Module
Model Number	RAK634
FCC ID	2AF6B-RAK634
IC ID	25908-RAK634
Information of WisLink LPWAN Concentrator	
Product Name	WisLink LPWAN Concentrator
Model Number	RAK5148
FCC ID	2AF6B-RAK5148
IC ID	25908-RAK5148
Information of WisLink LPWAN Concentrator	

Product Name	WisLink LPWAN Concentrator
Model Number	RAK5146
FCC ID	2AF6B-RAK5146
IC ID	25908-RAK5146
Information of module WisDuo	
Product Name	WisDuo
Model Number	RAK3401
FCC ID	2AF6B-RAK3400
IC ID	25908-RAK3400

3.3 Independent Operation Modes

The basic operation modes are:

- A, On, WIFI link + BLE link + WCDMA link + Lora DTS link
- B, On, WIFI link + BLE link + WCDMA link + Lora DSS (Hybrid) link
- C, On, WIFI link + BLE link + LTE link + Lora DTS link
- D, On, WIFI link + BLE link + LTE link + Lora DSS (Hybrid) link

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Block Diagram
- Schematics
- Photo Document
- User Manual

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 tests were performed according to the procedures in ANSI C63.10.

Note: The test standard for frequency Bands 698-756 MHz and 777-787 MHz in LTE module test report is RSS-130 issue 1 and the essential requirements remain unchanged in the updated version RSS-130 issue 2, hence it has been updated in current test report without additional test.

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial Number or Rating
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	166305
Portable Laptop	Lenovo	ThinkPad T480	10Q67059
POE Adapter	RAK	R012-4800500	Input: AC 100-240V, 50/60Hz, 0.6A Max Output: DC 48.0V, 0.5A 24.0W

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 1GHz)

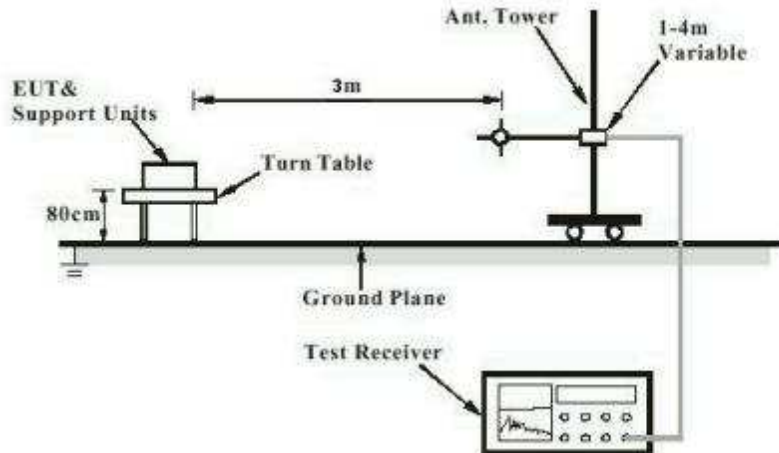


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

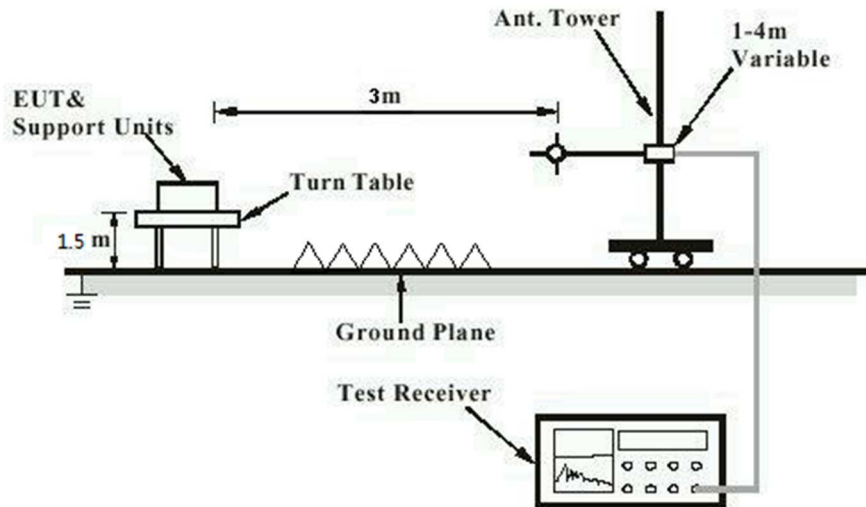
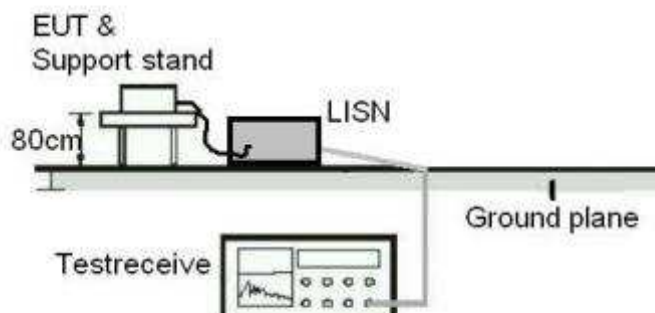


Diagram of Measurement Configuration for Mains Conduction Measurement



5 Test Results

5.1 Co-Located Radiated Spurious Emissions

RESULT:

Pass

Test Specification

Test standard	:	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 22 CFR47 FCC Part 24 CFR47 FCC Part 27 RSS-247 Issue 2 RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-139 Issue 3
Basic standard	:	ANSI C63.10 & ANSI C63.26
Limit	:	KDB 996369 D04 The emissions not exceed the highest limit.
Kind of test site	:	3m Semi-anechoic Chamber

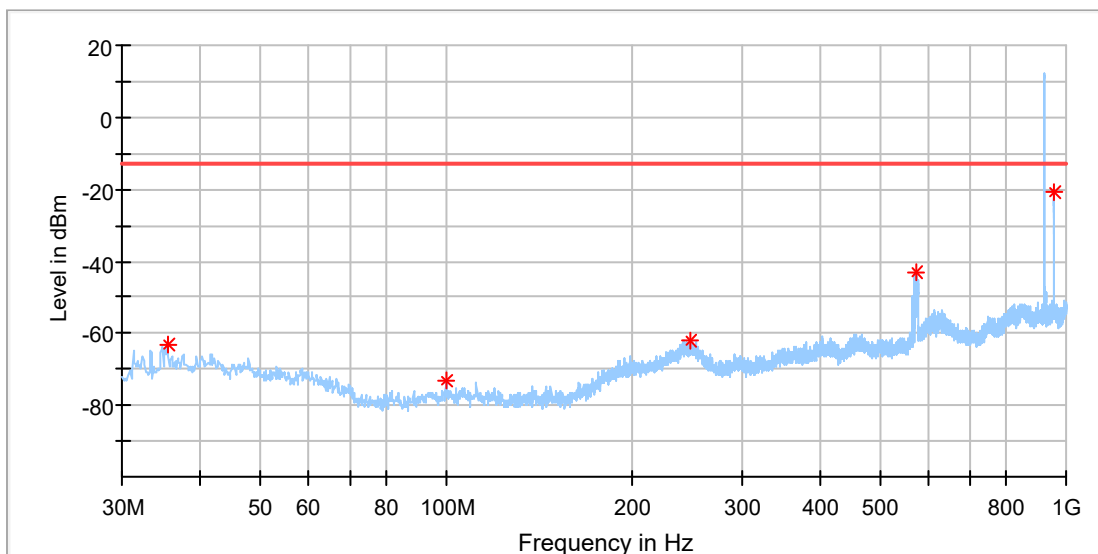
Test Setup

Date of testing	:	2023-09-26 - 2024-01-11
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A, B, C, D
Earthing	:	Not Connected
Ambient temperature	:	Refer to test data
Relative humidity	:	Refer to test data
Atmospheric pressure	:	101 kPa

Note: The test plots of Co-located radiated spurious emissions beyond the limit are the fundamental radio frequency of Lora, BLE, Wi-Fi and LTE.
For the measurement records, refer to the following plots, only the worst case mode are shown in this report.

EUT Information

EUT Name:	WisGate Edge Pro
Model:	RAK7229CV2
Test Mode:	WIFI+BLE+WCDMA+915MHz Lora+2.4G Lora
Order No./Sample No:	168444032/A003562972-001
Test Voltage::	120V/60Hz
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 24
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

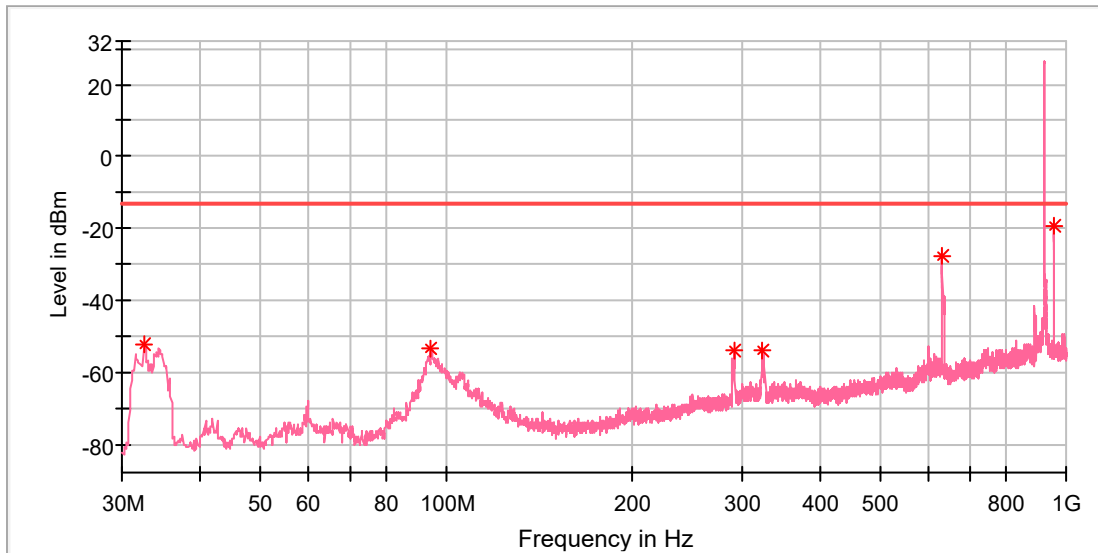


Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.577500	-63.43	-13.00	50.43	100.0	H	184.0	-113.8
99.961250	-73.38	-13.00	60.38	100.0	H	32.0	-120.8
247.765000	-62.16	-13.00	49.16	100.0	H	194.0	-110.0
574.291250	-42.83	-13.00	29.83	100.0	H	133.0	-106.7
958.168750	-20.94	-13.00	7.94	100.0	H	168.0	-101.0

EUT Information

EUT Name:	WisGate Edge Pro
Model:	RAK7229CV2
Test Mode:	WIFI+BLE+WCDMA+915MHz Lora+2.4G Lora
Order No./Sample No:	168444032/A003562972-001
Test Voltage::	120V/60Hz
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 24
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

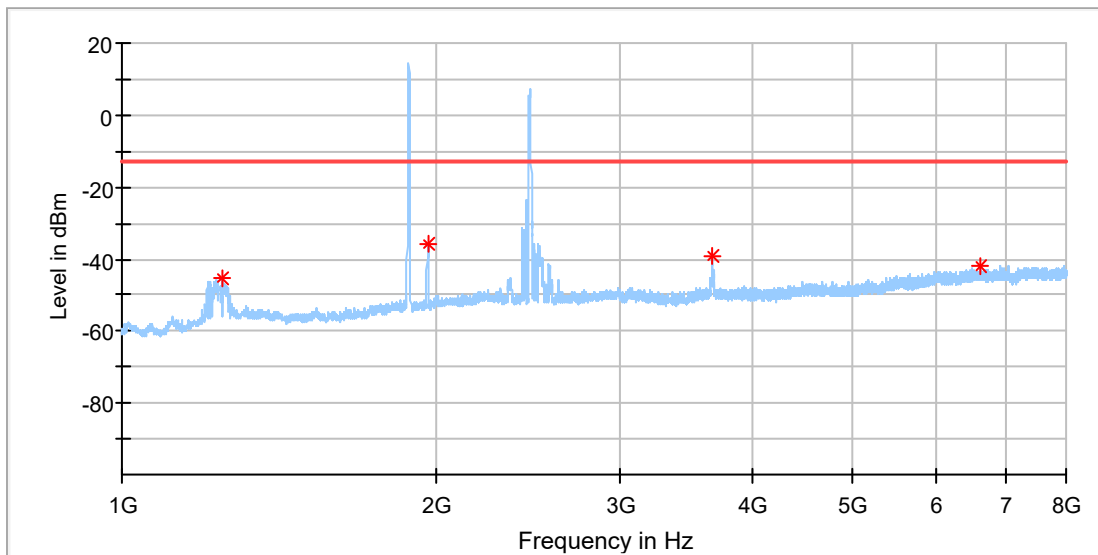


Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.667500	-52.43	-13.00	39.43	100.0	V	342.0	-128.9
94.505000	-53.46	-13.00	40.46	100.0	V	40.0	-99.6
290.808750	-54.01	-13.00	41.01	100.0	V	46.0	-112.4
322.576250	-53.79	-13.00	40.79	100.0	V	342.0	-112.0
631.642500	-27.60	-13.00	14.60	100.0	V	0.0	-106.8
957.320000	-19.26	-13.00	6.26	100.0	V	160.0	-101.2

EUT Information

EUT Name: WisGate Edge Pro
 Model: RAK7229CV2
 Test Mode: WIFI+BLE+WCDMA+915MHz Lora+2.4G Lora
 Order No./Sample No: 168444032/A003562972-001
 Test Voltage:: 120V/60Hz
 Remark: Temp 23 Humi:56%
 Test Standard: FCC Part 24
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

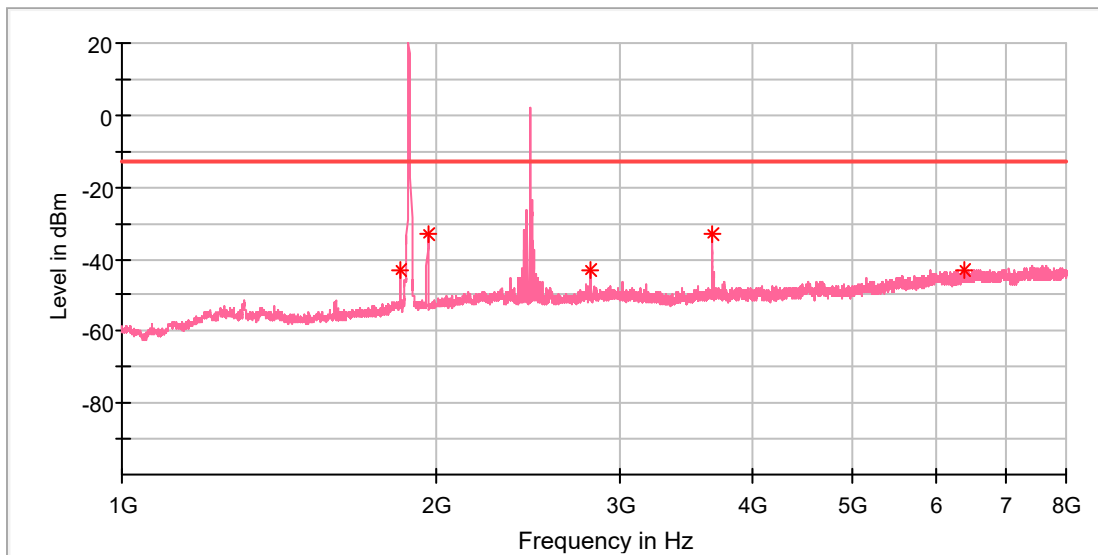


Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1248.500000	-45.43	-13.00	32.43	150.0	H	249.0	-92.5
1958.500000	-35.75	-13.00	22.75	150.0	H	337.0	-89.7
3663.500000	-39.32	-13.00	26.32	150.0	H	151.0	-86.7
6614.500000	-42.07	-13.00	29.07	150.0	H	102.0	-81.2

EUT Information

EUT Name: WisGate Edge Pro
 Model: RAK7229CV2
 Test Mode: WIFI+BLE+WCDMA+915MHz Lora+2.4G Lora
 Order No/Sample No: 168444032/A003562972-001
 Test Voltage:: 120V/60Hz
 Remark: Temp 23 Humi:56%
 Test Standard: FCC Part 24
 Tested By: Kei Zhang
 Reviewed By: Terry Yin



Critical_Freqs

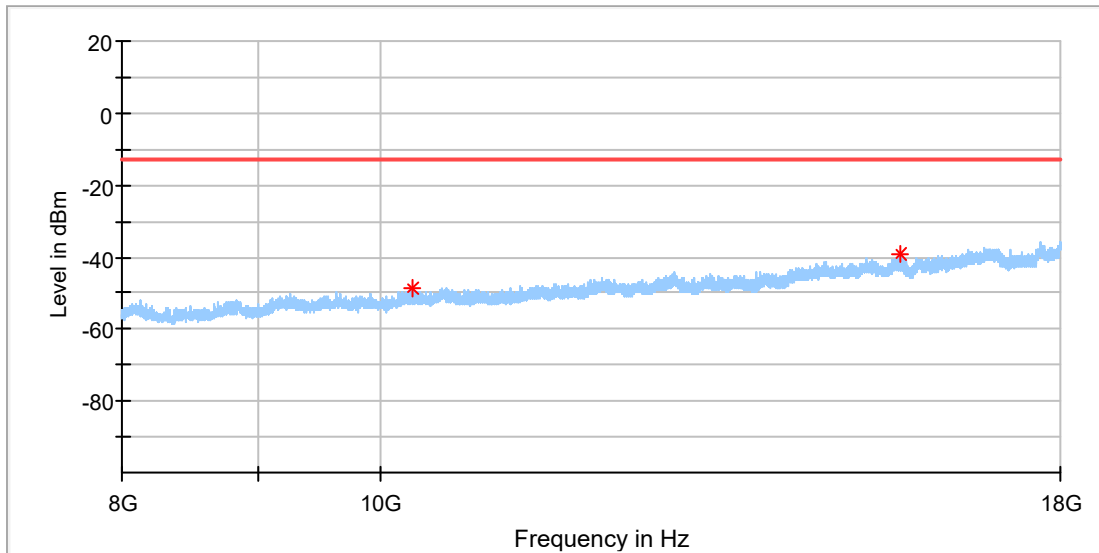
Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1846.000000	-43.23	-13.00	30.23	150.0	V	58.0	-90.2
1960.500000	-33.07	-13.00	20.07	150.0	V	241.0	-89.6
2802.500000	-43.26	-13.00	30.26	150.0	V	169.0	-87.3
3667.000000	-32.84	-13.00	19.84	150.0	V	229.0	-86.8
6401.500000	-43.10	-13.00	30.10	150.0	V	280.0	-81.6

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EUT Information

EUT Name: WisGate Edge Pro
 Model: RAK7229CV2
 Test Mode: WIFI+BLE+WCDMA+915MHz Lora+2.4G Lora
 Order No/Sample No: 168444032/A003562972-001
 Test Voltage:: 120V/60Hz
 Remark: Temp 23 Humi:56%
 Test Standard: FCC Part 24
 Tested By: Kei Zhang
 Reviewed By: Terry Yin



Critical_Freqs

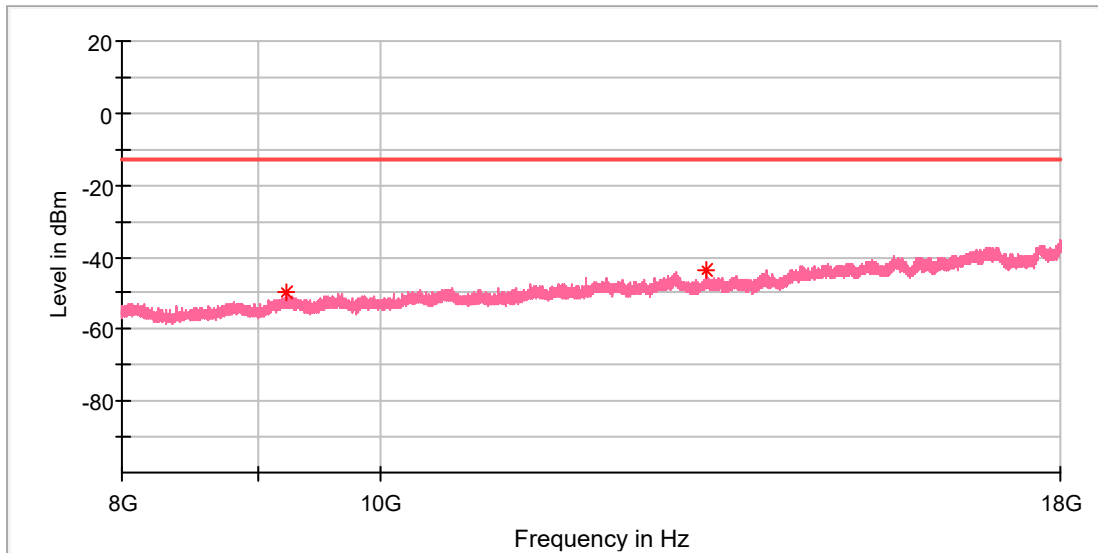
Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
10278.000000	-48.85	-13.00	35.85	150.0	H	165.0	-83.3
15669.500000	-39.37	-13.00	26.37	150.0	H	92.0	-77.8

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EUT Information

EUT Name: WisGate Edge Pro
 Model: RAK7229CV2
 Test Mode: WIFI+BLE+WCDMA+915MHz Lora+2.4G Lora
 Order No/Sample No: 168444032/A003562972-001
 Test Voltage:: 120V/60Hz
 Remark: Temp 23 Humi:56%
 Test Standard: FCC Part 24
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

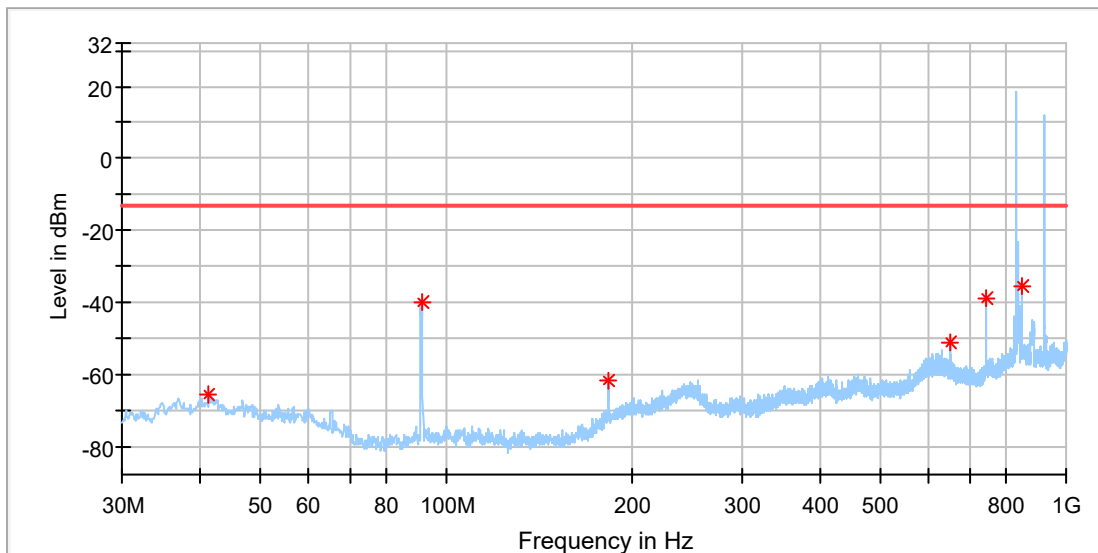


Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
9221.500000	-50.02	-13.00	37.02	150.0	V	5.0	-84.1
13257.500000	-43.79	-13.00	30.79	150.0	V	339.0	-79.5

EUT Information

EUT Name: WisGate Edge Pro
 Model: RAK7229CV2
 Test Mode: WIFI+BLE+LTE+915MHz Lora+2.4G Lora
 Order No/Sample No: 168444032/A003562972-001
 Test Voltage:: 120V/60Hz
 Remark: Temp 23 Humi:56%
 Test Standard: FCC Part 22
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

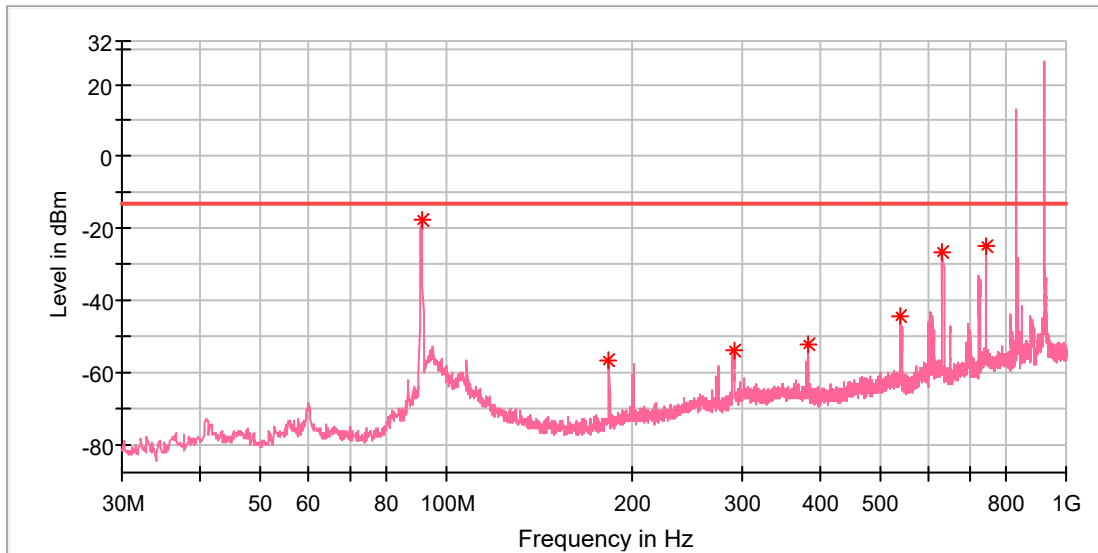


Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.397500	-65.85	-13.00	52.85	100.0	H	7.0	-112.2
91.473750	-40.19	-13.00	27.19	100.0	H	7.0	-123.4
182.168750	-61.52	-13.00	48.52	100.0	H	18.0	-117.6
649.951250	-51.25	-13.00	38.25	100.0	H	14.0	-104.6
740.888750	-38.96	-13.00	25.96	100.0	H	0.0	-104.8
849.650000	-35.50	-13.00	22.50	100.0	H	246.0	-100.1

EUT Information

EUT Name:	WisGate Edge Pro
Model:	RAK7229CV2
Test Mode:	WIFI+BLE+LTE+915MHz Lora+2.4G Lora
Order No/Sample No:	168444032/A003562972-001
Test Voltage::	120V/60Hz
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 22
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

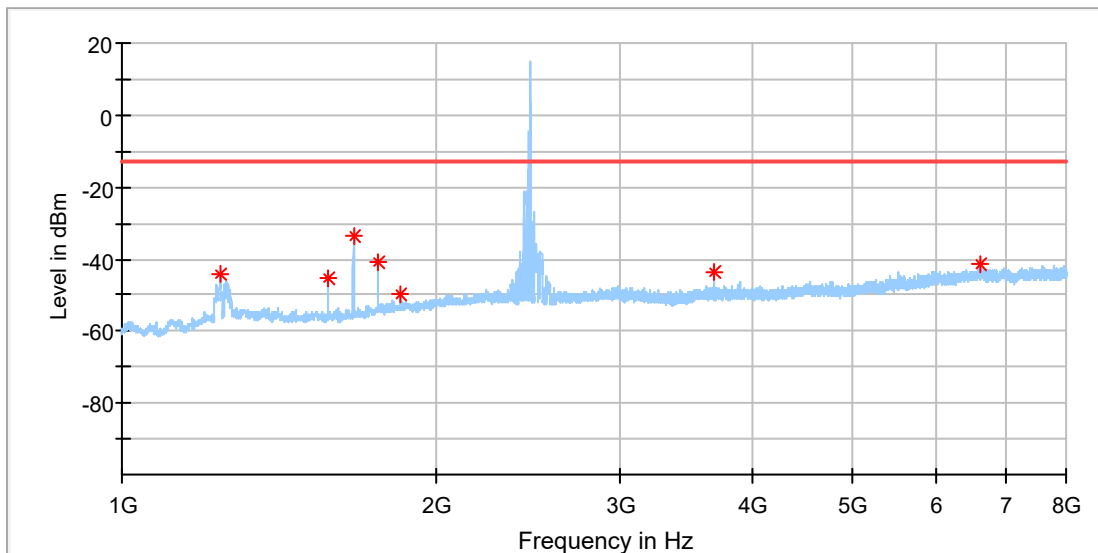


Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
91.473750	-17.49	-13.00	4.49	100.0	V	303.0	-107.1
182.411250	-56.49	-13.00	43.49	100.0	V	15.0	-120.0
291.778750	-53.92	-13.00	40.92	100.0	V	47.0	-112.2
382.231250	-52.47	-13.00	39.47	100.0	V	15.0	-111.0
540.462500	-44.23	-13.00	31.23	100.0	V	15.0	-107.7
632.127500	-26.37	-13.00	13.37	100.0	V	15.0	-106.8
741.010000	-24.82	-13.00	11.82	100.0	V	163.0	-102.0

EUT Information

EUT Name: WisGate Edge Pro
 Model: RAK7229CV2
 Test Mode: WIFI+BLE+LTE+915MHz Lora+2.4G Lora
 Order No./Sample No: 168444032/A003562972-001
 Test Voltage:: 120V/60Hz
 Remark: Temp 23 Humi:56%
 Test Standard: FCC Part 22
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

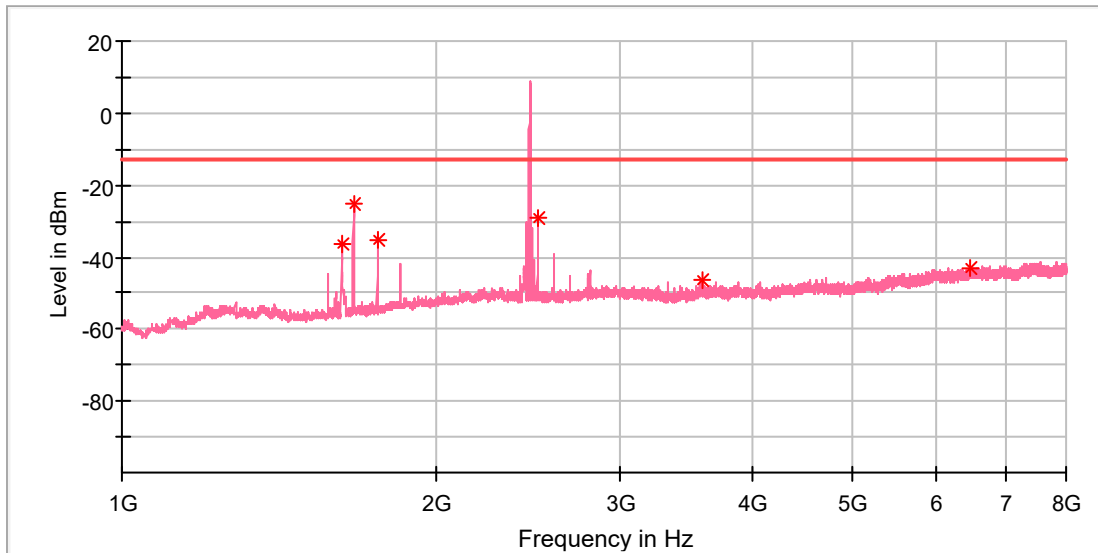


Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1242.000000	-44.25	-13.00	31.25	150.0	H	160.0	-92.5
1573.000000	-45.07	-13.00	32.07	150.0	H	301.0	-93.0
1664.500000	-33.77	-13.00	20.77	150.0	H	113.0	-92.7
1755.500000	-40.98	-13.00	27.98	150.0	H	226.0	-90.9
1847.000000	-49.90	-13.00	36.90	150.0	H	294.0	-90.5
3680.500000	-43.69	-13.00	30.69	150.0	H	87.0	-86.7
6612.500000	-41.59	-13.00	28.59	150.0	H	240.0	-81.2

EUT Information

EUT Name:	WisGate Edge Pro
Model:	RAK7229CV2
Test Mode:	WIFI+BLE+LTE+915MHz Lora+2.4G Lora
Order No/Sample No:	168444032/A003562972-001
Test Voltage::	120V/60Hz
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 22
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

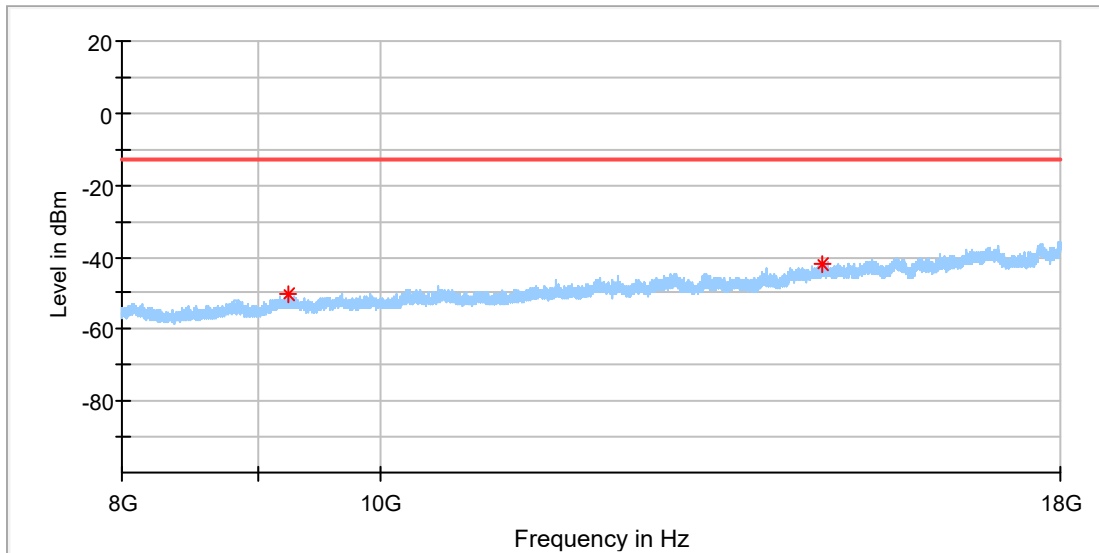
Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1621.000000	-36.49	-13.00	23.49	150.0	V	181.0	-92.8
1664.000000	-25.01	-13.00	12.01	150.0	V	276.0	-92.2
1755.500000	-35.36	-13.00	22.36	150.0	V	301.0	-91.4
2496.500000	-29.13	-13.00	16.13	150.0	V	18.0	-88.0
3585.500000	-46.21	-13.00	33.21	150.0	V	229.0	-87.0
6484.500000	-42.91	-13.00	29.91	150.0	V	307.0	-81.3

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 Test report no.

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EUT Information

EUT Name: WisGate Edge Pro
 Model: RAK7229CV2
 Test Mode: WIFI+BLE+LTE+915MHz Lora+2.4G Lora
 Order No/Sample No: 168444032/A003562972-001
 Test Voltage:: 120V/60Hz
 Remark: Temp 23 Humi:56%
 Test Standard: FCC Part 22
 Tested By: Kei Zhang
 Reviewed By: Terry Yin



Critical_Freqs

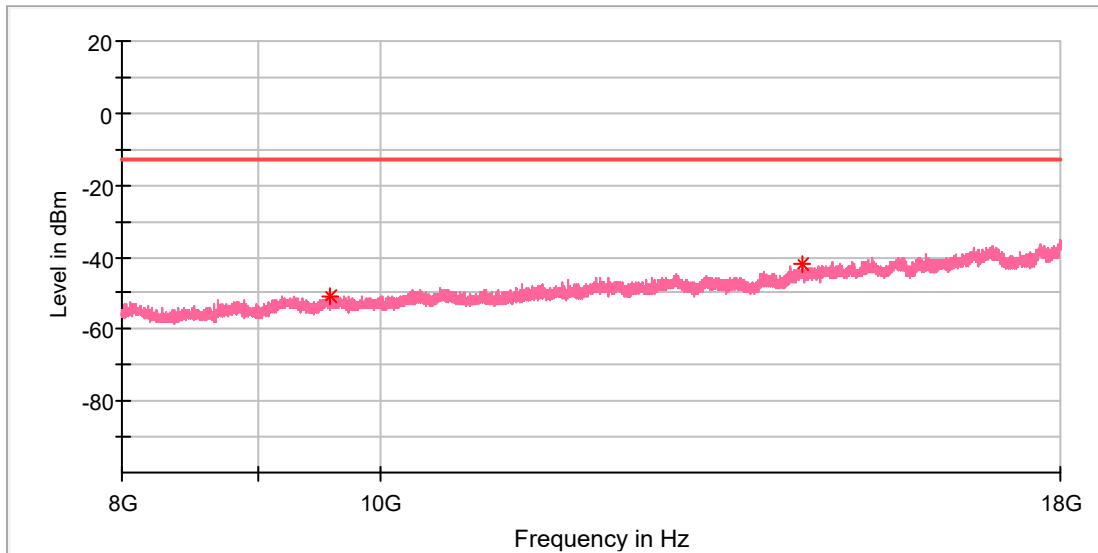
Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
9233.500000	-50.30	-13.00	37.30	150.0	H	69.0	-84.0
14653.000000	-41.78	-13.00	28.78	150.0	H	311.0	-77.1

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EUT Information

EUT Name: WisGate Edge Pro
 Model: RAK7229CV2
 Test Mode: WIFI+BLE+LTE+915MHz Lora+2.4G Lora
 Order No/Sample No: 168444032/A003562972-001
 Test Voltage: 120V/60Hz
 Remark: Temp 23 Humi:56%
 Test Standard: FCC Part 22
 Tested By: Kei Zhang
 Reviewed By: Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
9574.500000	-51.08	-13.00	38.08	150.0	V	330.0	-84.1
14395.500000	-42.08	-13.00	29.08	150.0	V	283.0	-77.3

5.2 Conducted emissions

RESULT:

Pass

Test Specification

Test standard	:	FCC Part 15.207(a) RSS-Gen Clause 8.8
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	150KHz - 30MHz
Classification	:	Class B
Limit	:	FCC Part 15.207(a) RSS-Gen Table 4
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2023-09-26 - 2024-01-11
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A, B, C, D
Earthing	:	Not Connected
Ambient temperature	:	Refer to test data
Relative humidity	:	Refer to test data
Atmospheric pressure	:	101 kPa

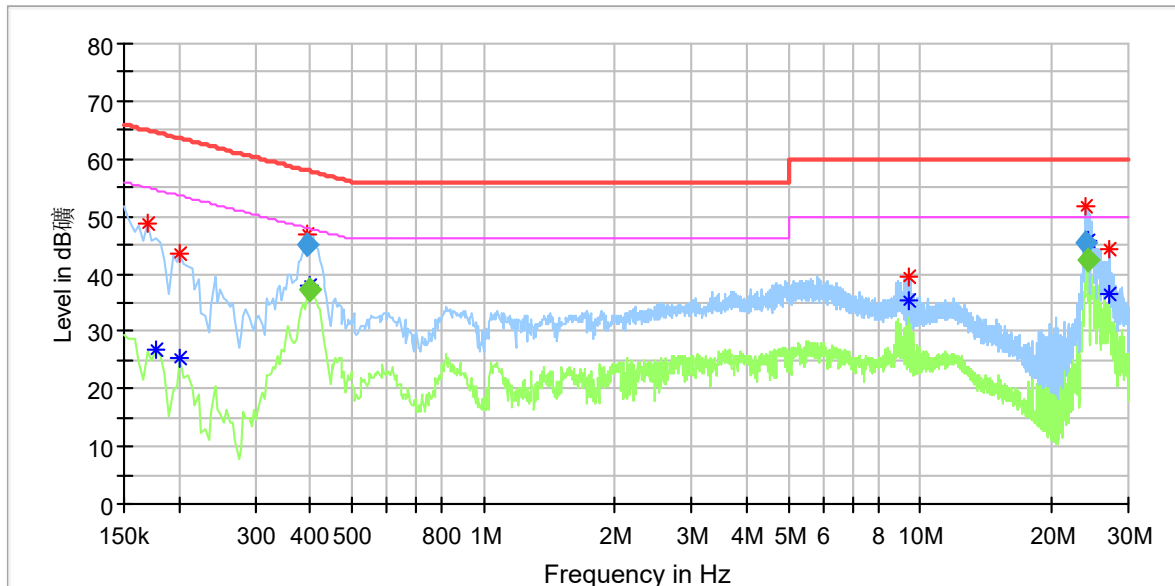
For the measurement records, refer to the following plots, only the worst case mode are shown in this report.

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Test report no.

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EUT Information

EUT Name	RAK_WisGate Edge Pro
Order Number:	168444032(P01216680)
Model:	RAK7229CV2
Test Mode:	Normal Operation by WIFI link + BLE link + LTE link + Lora DTS link + Powered by PoE Adapter
Test Voltage:	AC 120V/60Hz
Test Standard:	FCC Part 15B
Test By:/Review By:	Steven Lan/Gary Chen
Tem./Hum./Pressure:	21.3°C/50.8%/101kPa
Remark:	SR1



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.170000	48.63	---	64.96	16.33	L1	9.7
0.178000	---	26.71	54.58	27.87	L1	9.7
0.202000	---	25.42	53.53	28.10	L1	9.8
0.202000	43.47	---	63.53	20.06	L1	9.8
0.396500	46.93	---	57.73	10.80	L1	9.9
0.400500	---	37.82	47.73	9.91	L1	9.9
9.400000	39.50	---	60.00	20.50	L1	9.9
9.440000	---	35.46	50.00	14.54	L1	9.9
23.957500	51.79	---	60.00	8.21	L1	10.6
24.206500	---	45.67	50.00	4.33	L1	10.6
27.060000	44.34	---	60.00	15.66	L1	10.6
27.120000	---	36.43	50.00	13.57	L1	10.6

Final_Result

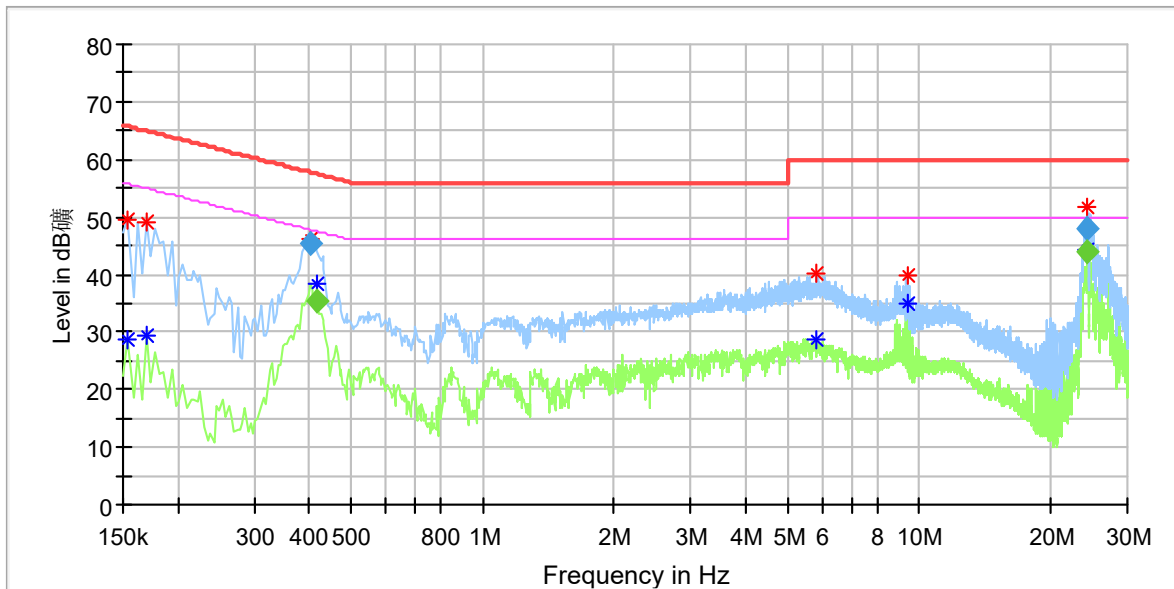
Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.396500	45.09	---	57.93	12.84	1000.0	9.000	L1	9.9
0.400500	---	37.15	47.84	10.70	1000.0	9.000	L1	9.9
23.957500	45.50	---	60.00	14.50	1000.0	9.000	L1	10.6
24.206500	---	42.30	50.00	7.70	1000.0	9.000	L1	10.6

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EUT Information

EUT Name: RAK_WisGate Edge Pro
 Order Number: 168444032(P01216680)
 Model: RAK7229CV2
 Test Mode: Normal Operation by WIFI link + BLE link + LTE link + Lora DTS link + Powered by PoE Adapter
 Test Voltage: AC 120V/60Hz
 Test Standard: FCC Part 15B
 Test By:/Review By: Steven Lan/Gary Chen
 Tem./Hum./Pressure: 21.3°C/50.8%/101kPa
 Remark: SR1



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.154000	---	28.54	55.78	27.24	N	9.8
0.154000	49.62	---	65.78	16.16	N	9.8
0.170000	---	29.42	54.96	25.54	N	9.8
0.170000	49.20	---	64.96	15.76	N	9.8
0.404500	45.98	---	57.90	11.91	N	9.7
0.415500	---	38.15	47.81	9.66	N	9.7
5.784000	---	28.69	50.00	21.31	N	9.9
5.796000	40.10	---	60.00	19.90	N	9.9
9.400000	---	35.12	50.00	14.88	N	10.0
9.400000	39.89	---	60.00	20.11	N	10.0
24.150500	51.74	---	60.00	8.26	N	10.5
24.198500	---	44.45	50.00	5.55	N	10.5

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.404500	45.44	---	57.76	12.32	1000.0	9.000	N	9.7
0.415500	---	35.51	47.54	12.03	1000.0	9.000	N	9.7
24.150500	48.04	---	60.00	11.96	1000.0	9.000	N	10.5
24.198500	---	43.95	50.00	6.05	1000.0	9.000	N	10.5

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