



Prüfbericht-Nr.: <i>Test report no.:</i>	CN22M790 001	Auftrags-Nr.: <i>Order no.:</i>	168363670	Seite 1 von 32 <i>Page 1 of 32</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2022-03-09	
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>	WisBlock NFC Reader Module			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	RAK13600 (Trademark: RAK)			
Auftrags-Inhalt: <i>Order content:</i>	FCC&IC approval			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.225 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 FCC KDB Publication 447498 D01 v06	RSS-210 Issue 10 October 2019 RSS-Gen Issue 5 February 2021 RSS-102 Issue 5 February 2021		
Wareneingangsdatum: <i>Date of sample receipt:</i>	2022-03-22	Please refer to photo documents		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003231507-007 to 009			
Prüfzeitraum: <i>Testing period:</i>	2022-03-25 – 2022-04-08			
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>		genehmigt von: <i>authorized by:</i>		
Datum: <i>Date:</i> 2022-05-07	Signed by: Alex Lan	Ausstellungsdatum: <i>Issue date:</i> 2022-05-09	Signed by: Winnie Hou	
Stellung / Position	Senior Project Engineer	Stellung / Position	Department Manager	
Sonstiges / Other: FCC ID: 2AF6B-RAK13600 IC: 25908-RAK13600, HVIN: RAK13600				
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 specifications(s) F(ail) = failed a.m. test specifications(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>				

V05

Test Summary

5.1.1 ANTENNA REQUIREMENT*RESULT: Pass***5.1.2 EMISSION WITHIN BAND***RESULT: Pass***5.1.3 SPURIOUS EMISSION OUTSIDE BAND***RESULT: Pass***5.1.4 FREQUENCY TOLERANCE OF CARRIER SIGNAL***RESULT: Pass***5.1.5 99% BANDWIDTH***RESULT: Pass***5.1.6 20dB BANDWIDTH***RESULT: Pass***5.1.7 CONDUCTED EMISSIONS***RESULT: Pass***6.1.1 ELECTROMAGNETIC FIELDS***RESULT: Pass*

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1 General Remarks

1.1 Complementary Materials

None

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

Radio Spectrum Testing				
Description	Manufacturer	Model	Serial No.	Calibrated until
Wireless Connectivity Tester	R&S	CMW270	101375	09.08.2022
Signal Analyzer	R&S	FSV 40	101441	09.08.2022
Vector Signal Generator	R&S	SMBV100A	263301	09.08.2022
Signal Generator	R&S	SMB100A	115186	09.08.2022
OSP	R&S	OSP 150	101017	02.12.2022
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
Power Meter	R&S	NRP2	107105	02.12.2022
Power Sensor	R&S	NRP-Z81	105677	09.08.2022
Humid & Temp Programmable Tester	BOST	NTH090-60	19040801	02.04.2023
Shielding Room 8#	Albatross	SR8	APC17151-SR8	22.06.2024
Unwanted Emission Testing				
Description	Manufacturer	Model	Serial No.	Calibrated until
EMI Test Receiver	R&S	ESR 7	102021	10.08.2022
Signal Analyzer	R&S	FSV 40	101439	09.08.2022
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	09.08.2022
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	09.08.2022
Amplifier	R&S	SCU-18F	180070	09.08.2022
Amplifier	R&S	SCU40A	100475	09.08.2022
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	08.08.2022
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	08.08.2022
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	08.08.2022
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	13.09.2022
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	22.06.2024
Conducted Emissions				
Description	Manufacturer	Model	Serial No.	Calibrated

Produkte
Products

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				until
EMI Test Receiver	R&S	ESR3	102428	10.08.2022
Artificial Mains Network	R&S	ENV216	102333	10.08.2022
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	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{CISPR})
Conducted Emission	Level accuracy (9kHz to 150kHz)	± 3.70 dB	± 3.8 dB
	(150kHz to 30MHz)	± 3.30 dB	± 3.4 dB
Radiated Emission (3m SAC)	Level accuracy (30MHz to 1000MHz)	± 4.52 dB	± 6.3 dB
	Level accuracy (above 1000MHz)	± 4.37 dB	N/A

2.6 Location of Original Data

The original copies of all test data taken during actual testing were in 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 WisBlock NFC Reader Module with NFC function (13.56MHz).
For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	WisBlock NFC Reader Module
Type Designation	RAK13600
FCC ID	2AF6B-RAK13600
IC	25908-RAK13600
HVIN	RAK13600
Trade Mark	RAK
Operating Frequency	13.56 MHz
Operating Temperature Range	-30 °C ~ +85 °C
Operating Voltage	DC 2.7 -5.5V via baseboard
Type of Modulation	ASK
Antenna Type	inductance coil Antenna
Antenna Gain	3 dBi

3.3 Independent Operation Modes

The basic operation modes are:

- A. NFC mode
- B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Block Diagram
- Schematics
- User Manual

4 Test Set-up and Operation Modes

4.1 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.

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.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5&6. All testing were performed according to the procedures in ANSI C63.10: 2013 & ANSI C63.4: 2014

4.3 Special Accessories and Auxiliary Equipment

Table 3: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N or Rating
Laptop	Lenovo	T480	10Q67059
Laptop Adapter	Lenovo	ADLX65YLC3D	Input: AC 100-240V, 50/60Hz, 1.8A Output: DC 20V, 3.25A
NFC Card	RAK	N/A	N/A

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 30MHz)

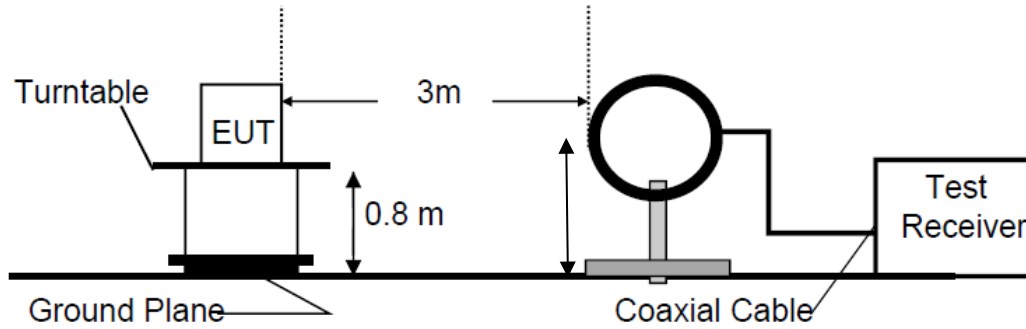


Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

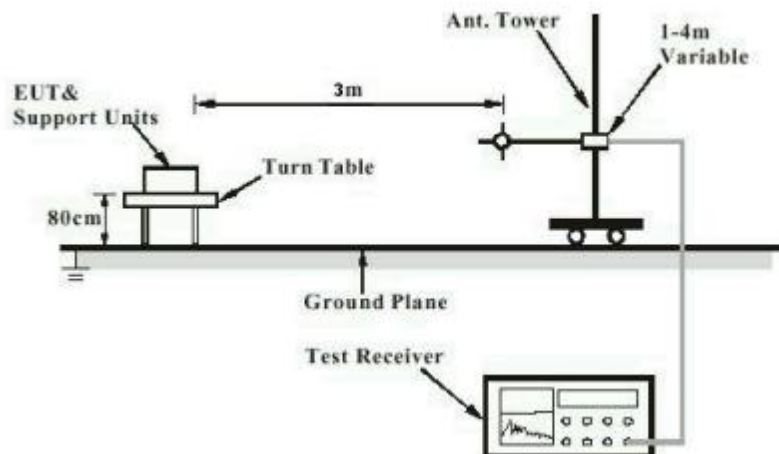


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

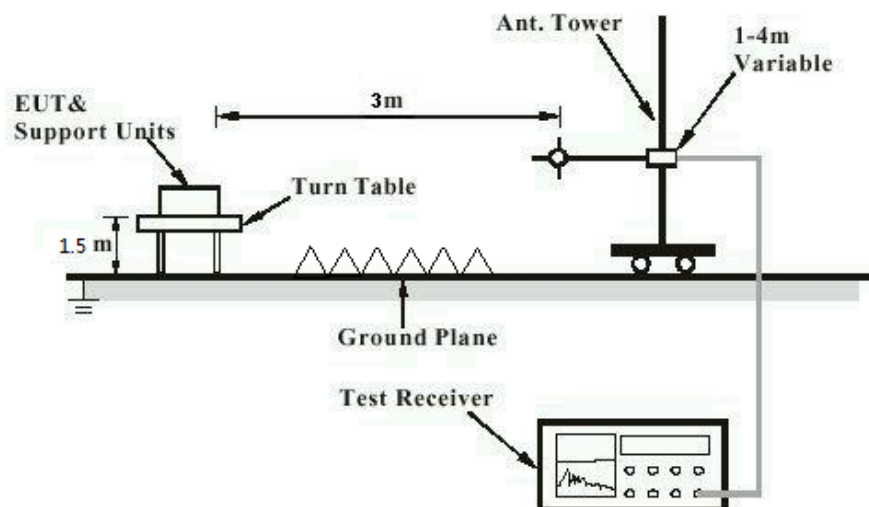
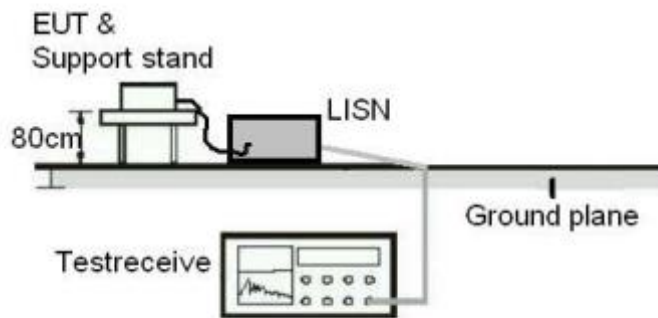


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard	:	Part 15.203
	:	RSS-Gen Clause 6.8
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has one external antenna, the directional gain of antenna is 3 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Emission within band

RESULT: **Pass**

Test Specification

Test standard : FCC Part 15.225 (a), (b), (c)
 RSS-210 .B6 (a) (i), (ii), (iii)
 Basic standard : ANSI C63.10:2013
 Limit : FCC Part 15.225 (a), (b), (c)
 Kind of test site : Shielded Room

Test Setup

Date of testing : 2022-04-08
 Input voltage : DC 5V via baseboard
 Operation mode : A
 Earthing : Not connected
 Ambient temperature : 23 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

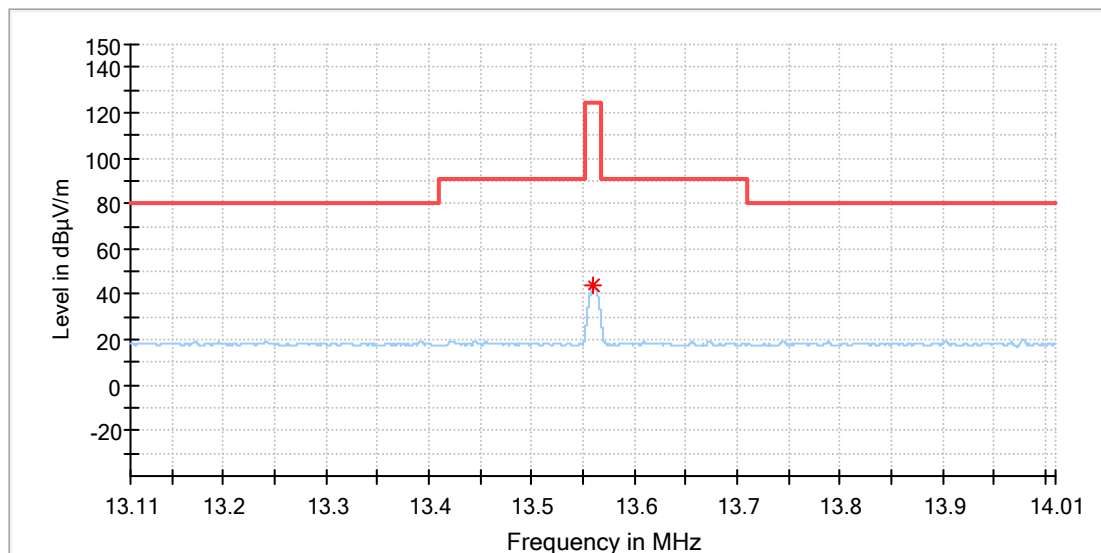
Refer to following test plots for details of test result.

Test result.

Test Mode	Test Polarization	Test data	Result
NFC transmitting	X	43.85 dBuV/m at 3m distance	PASS
	Y	33.27 dBuV/m at 3m distance	PASS
	Z	44.51 dBuV/m at 3m distance	PASS

EUT Information

EUT Name:	WisBlock NFC Reader Module
Model:	RAK13600
Test Mode:	13.56MHz
Order No/Sample No:	168363670/A003231507-009
Test Voltage::	DC 5V From USB
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

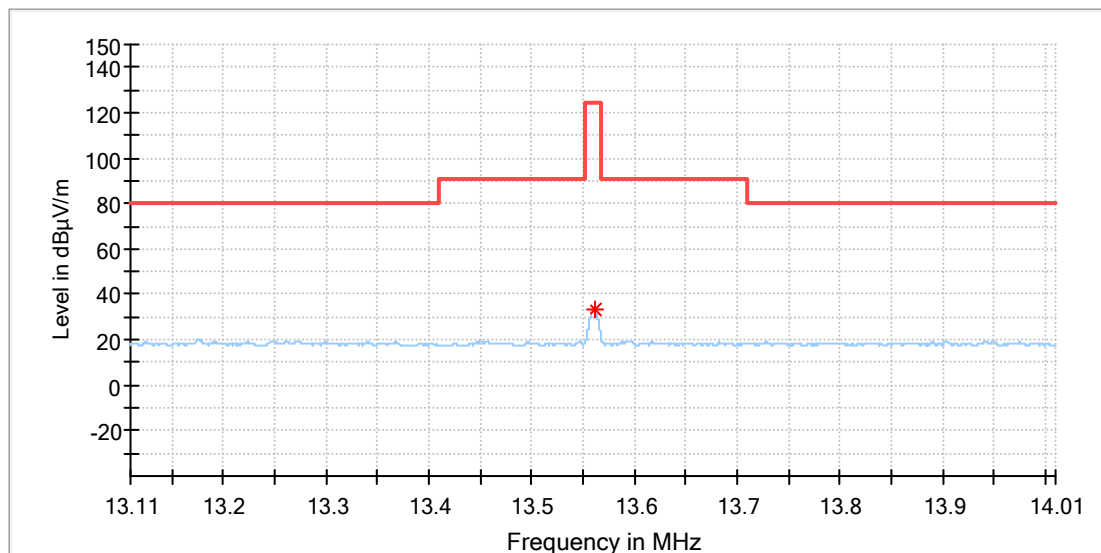
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Preamp (dB)	Trd Corr. (dB/m)
13.560397	43.85	124.00	80.15	100.0	X	27.0	20.0	0.0	20.0

(continuation of the "Critical_Freqs" table from column 19 ...)

Frequency (MHz)	Raw Rec (dBµV)	Comment
13.560397	23.8	11:09:33 AM - 8/4/2022

EUT Information

EUT Name:	WisBlock NFC Reader Module
Model:	RAK13600
Test Mode:	13.56MHz
Order No/Sample No:	168363670/A003231507-009
Test Voltage::	DC 5V From USB
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

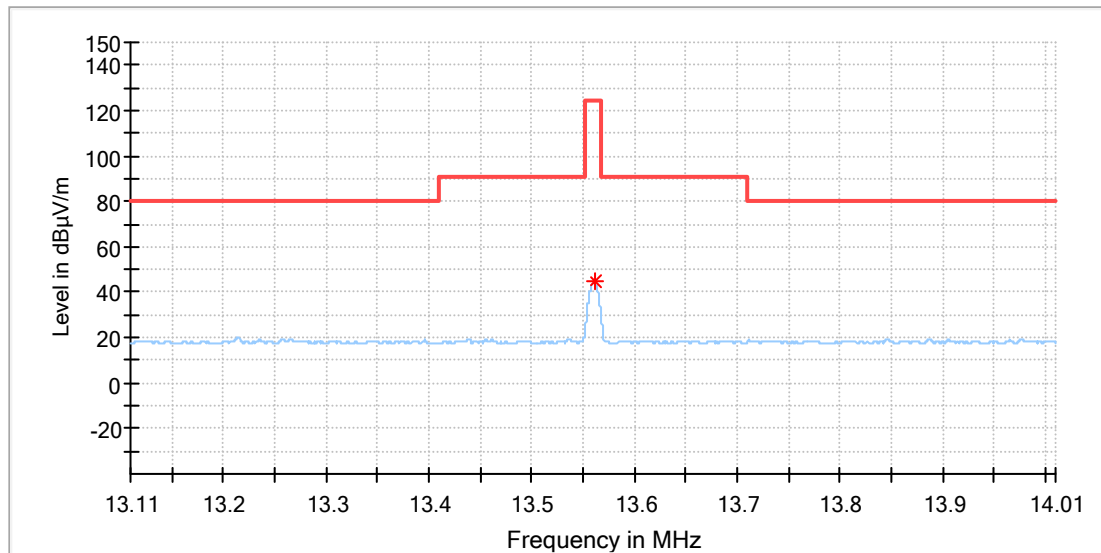
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Preamp (dB)	Trd Corr. (dB/m)
13.561191	33.27	124.00	90.73	100.0	Y	303.0	20.0	0.0	20.0

(continuation of the "Critical_Freqs" table from column 19 ...)

Frequency (MHz)	Raw Rec (dBµV)	Comment
13.561191	13.3	1:39:23 PM - 8/4/2022

EUT Information

EUT Name:	WisBlock NFC Reader Module
Model:	RAK13600
Test Mode:	13.56MHz
Order No/Sample No:	168363670/A003231507-009
Test Voltage::	DC 5V From USB
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Preamp (dB)	Trd Corr. (dB/m)
13.561191	44.51	124.00	79.49	100.0	Z	4.0	20.0	0.0	20.0

(continuation of the "Critical_Freqs" table from column 19 ...)

Frequency (MHz)	Raw Rec (dBµV)	Comment
13.561191	24.5	2:12:46 PM - 8/4/2022

5.1.3 Spurious Emission outside band

RESULT:**Pass****Test Specification**

Test standard : FCC part 15.225 (d)
RSS-210 .B6 (a) (iv)
Basic standard : ANSI C63.10: 2013
Limit : FCC part 15.209(a)
Kind of test site : 3m Semi-anechoic Chamber

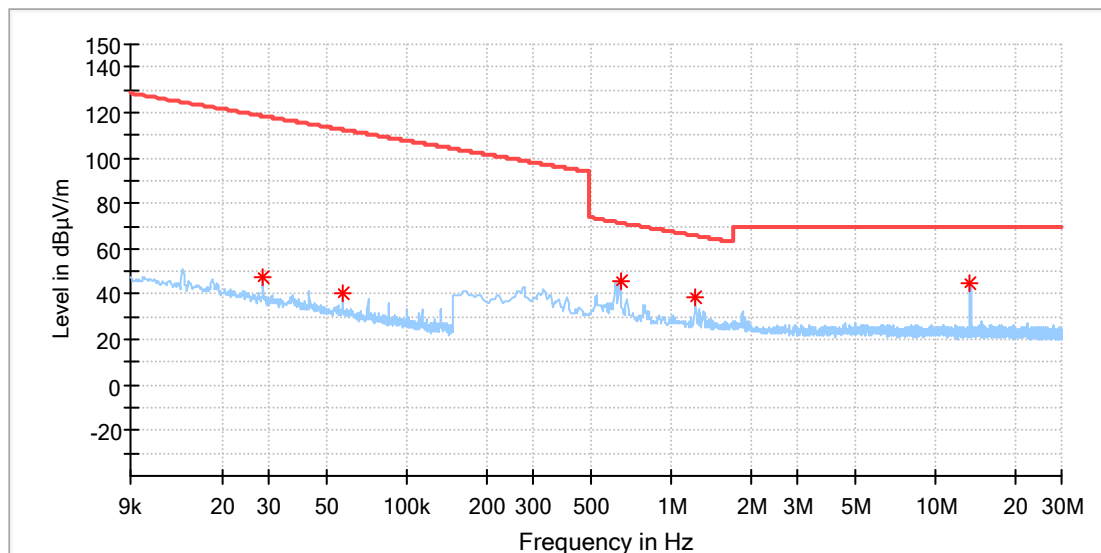
Test Setup

Date of testing : 2022-04-08
Input voltage : DC 5V via baseboard
Operation mode : A
Earthing : Not connected
Ambient temperature : 23 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa

Refer to following test plots for details of test result.

EUT Information

EUT Name:	WisBlock NFC Reader Module
Model:	RAK13600
Test Mode:	13.56MHz
Order No/Sample No:	168363670/A003231507-009
Test Voltage::	DC 5V From USB
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

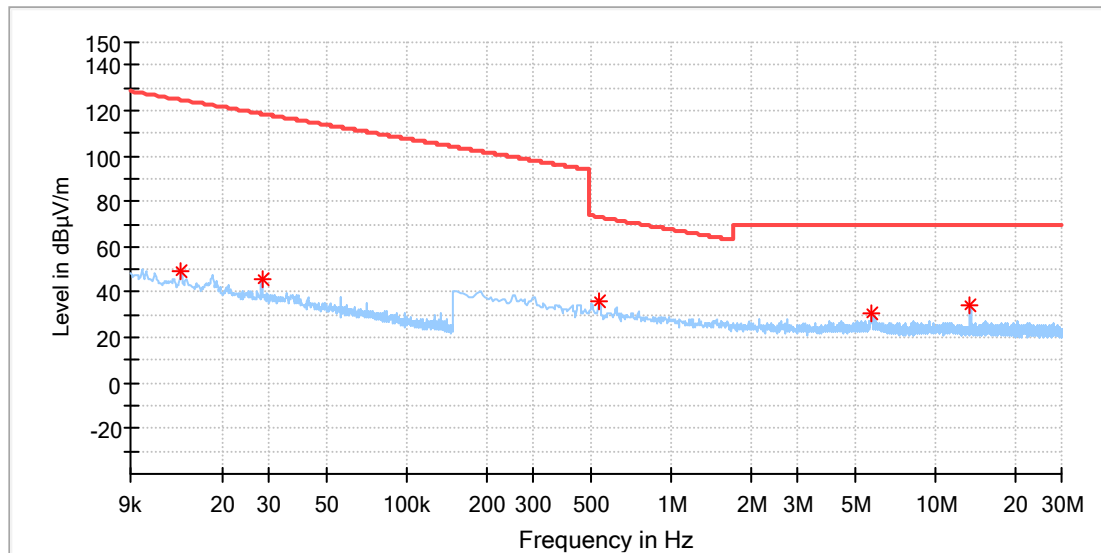


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.028438	47.48	118.51	71.03	100.0	X	82.0	20.1
0.056940	40.33	112.49	72.15	100.0	X	61.0	20.1
0.641647	45.71	71.47	25.75	100.0	X	153.0	20.1
1.238647	38.41	65.77	27.36	100.0	X	156.0	20.1
13.560552	44.60	69.50	24.90	100.0	X	39.0	20.5

EUT Information

EUT Name:	WisBlock NFC Reader Module
Model:	RAK13600
Test Mode:	13.56MHz
Order No/Sample No:	168363670/A003231507-009
Test Voltage::	DC 5V From USB
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

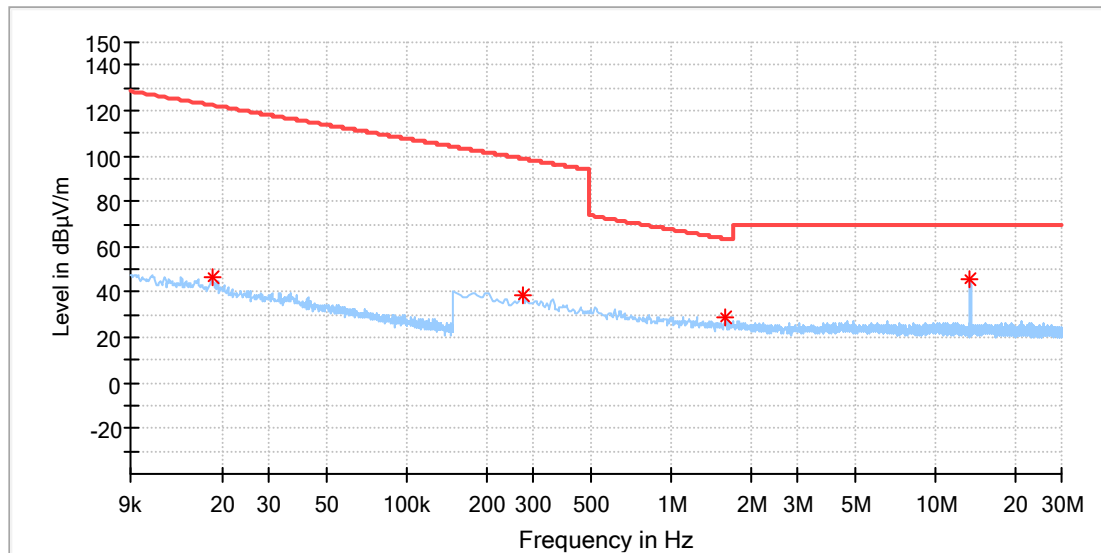


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.014036	49.68	124.64	74.96	100.0	Y	163.0	20.1
0.028236	46.08	118.57	72.50	100.0	Y	136.0	20.1
0.536294	35.63	73.02	37.39	100.0	Y	172.0	20.1
5.729316	30.28	69.50	39.22	100.0	Y	194.0	20.3
13.560552	34.36	69.50	35.14	100.0	Y	302.0	20.5

EUT Information

EUT Name:	WisBlock NFC Reader Module
Model:	RAK13600
Test Mode:	13.56MHz
Order No/Sample No:	168363670/A003231507-009
Test Voltage::	DC 5V From USB
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

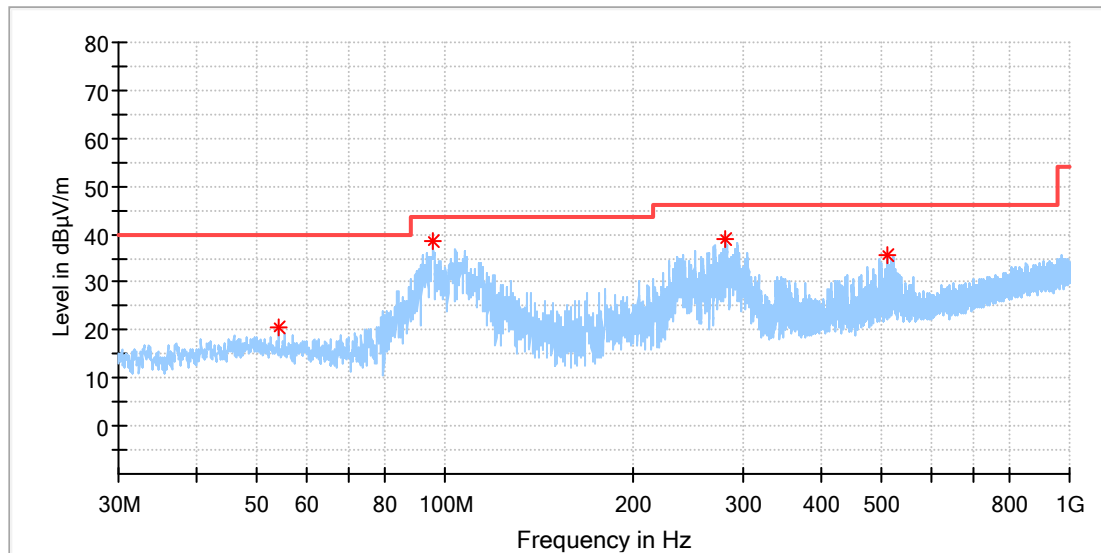


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.018266	46.53	122.36	75.82	100.0	Z	350.0	20.1
0.272912	38.35	98.88	60.53	100.0	Z	112.0	20.1
1.611772	28.89	63.49	34.60	100.0	Z	200.0	20.2
13.560552	45.38	69.50	24.12	100.0	Z	40.0	20.5

EUT Information

EUT Name:	WisBlock NFC Reader Module
Model:	RAK13600
Test Mode:	13.56MHz
Order No/Sample No:	168363670/A003231507-009
Test Voltage::	DC 5V From USB
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

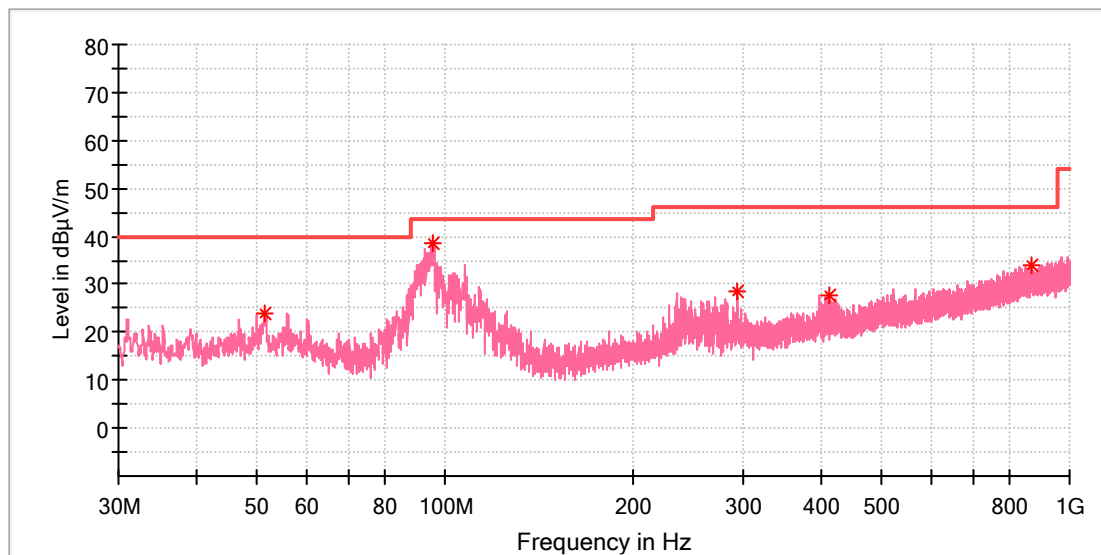


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
54.201500	20.64	40.00	19.36	100.0	H	282.0	-18.4
95.717500	38.55	43.50	4.95	100.0	H	307.0	-19.7
280.939000	38.89	46.00	7.11	100.0	H	195.0	-16.7
509.471000	35.79	46.00	10.21	100.0	H	114.0	-11.7

EUT Information

EUT Name:	WisBlock NFC Reader Module
Model:	RAK13600
Test Mode:	13.56MHz
Order No/Sample No:	168363670/A003231507-009
Test Voltage::	DC 5V From USB
Remark:	Temp 23 Humi:56%
Test Standard:	FCC Part 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
51.485500	23.79	40.00	16.21	100.0	V	342.0	-18.3
95.766000	38.71	43.50	4.79	100.0	V	201.0	-19.7
293.452000	28.54	46.00	17.46	100.0	V	254.0	-16.5
412.374000	27.87	46.00	18.13	100.0	V	79.0	-13.5
866.188500	33.78	46.00	12.22	100.0	V	0.0	-5.3

5.1.4 Frequency tolerance of carrier signal

RESULT:
Pass
Test Specification

Test standard : FCC part 15.225 (e)
RSS-210 .B6 (b)
Basic standard : ANSI C63.10: 2013
Limit : $\pm 0.01\%$
Kind of test site : 3m Semi-Anechoic Chamber

Test Setup

Date of testing : 2022-04-08
Input voltage : DC 5V via baseboard
Operation mode : A
Earthing : Not connected
Ambient temperature : 23 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa

Refer to following test plots for details of test result.

Table 4: Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 4.5V	13.560828	0.828	61.06	100
DC 5V	13.560827	0.827	60.99	
DC 5.5V	13.560826	0.826	60.91	

Table 5: Test result of frequency tolerance of temperature variation

Temperature	Test result (KHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-40	13.560819	0.819	60.40	100
-30	13.560825	0.825	60.84	
-20	13.560827	0.827	60.99	
-10	13.56083	0.83	61.21	
0	13.560826	0.826	60.91	
10	13.560835	0.835	61.58	
20	13.560832	0.832	61.36	
30	13.560816	0.816	60.18	
40	13.560822	0.822	60.62	
60	13.560828	0.828	61.06	
85	13.560819	0.819	60.40	

5.1.5 99% Bandwidth

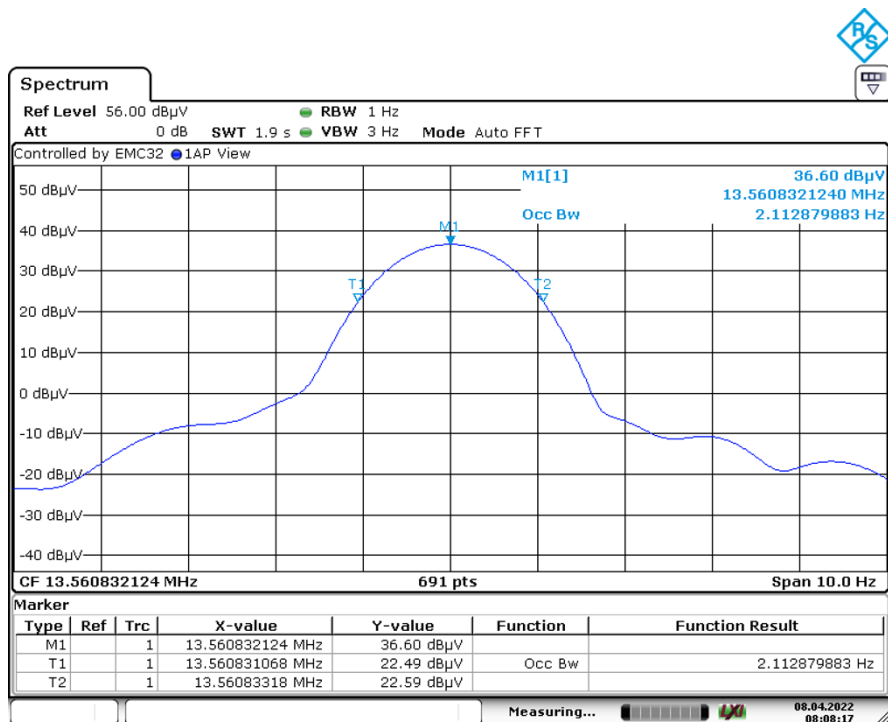
RESULT:
Pass
Test Specification

Test standard : RSS-Gen Clause 6.7
 Basic standard : ANSI C63.10: 2013
 Kind of test site : Shielded Room

Test Setup

Date of testing : 2022-04-08
 Input voltage : DC 5V via baseboard
 Operation mode : A
 Ambient temperature : Not connected
 Relative humidity : 23 °C
 Atmospheric pressure : 101 kPa

For details refer to following test result.



Date: 8.APR.2022 08:08:17

5.1.6 20dB Bandwidth

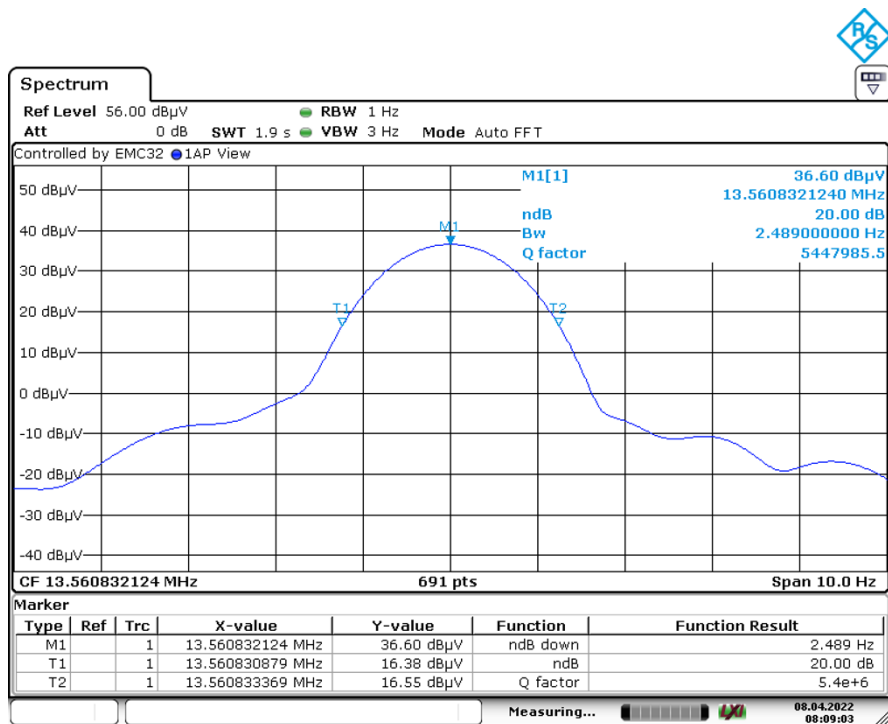
RESULT:
Pass
Test Specification

Test standard : FCC part 15.215
 Basic standard : ANSI C63.10: 2013
 Kind of test site : Shielded Room

Test Setup

Date of testing : 2022-04-08
 Input voltage : DC 5V via baseboard
 Operation mode : A
 Ambient temperature : Not connected
 Relative humidity : 23 °C
 Atmospheric pressure : 101 kPa

For details refer to following test result.



Date: 8.APR.2022 08:09:03

5.1.7 Conducted Emissions

RESULT:**Pass****Test Specification**

Test standard	:	FCC Part 15.207 RSS-Gen Issue 5 March 2019
Basic standard	:	ANSI C63.4: 2014
Frequency range	:	150 kHz – 30 MHz
Kind of test site	:	Shielded Room
Limit	:	FCC Part 15.207 (a) Table 4 of RSS-Gen Issue 5 March 2019

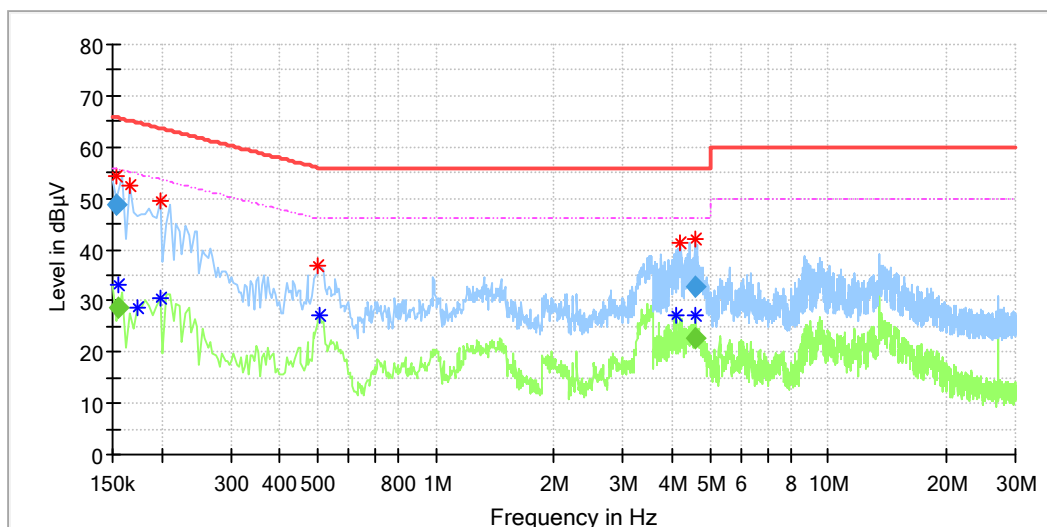
Test Setup

Date of testing	:	2022-03-25
Test voltage	:	AC 120V, 60Hz via PC adapter
Operation mode	:	A
Test Ports	:	AC mains power port
Artificial hand	:	N/A
Earthing	:	Not connected
Ambient temperature	:	23 °C
Relative humidity	:	48 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the following test plots.

EUT Information

EUT Name:	WisBlock NFC Reader Module
Order No:	168363670 80
Model:	RAK13600
Test mode:	NFC card
Test Voltage:	USB 5V by PC
Test By:	Charlie Zha
Review By:	Gary Chen
Remark:	SR2



Critical Freqs

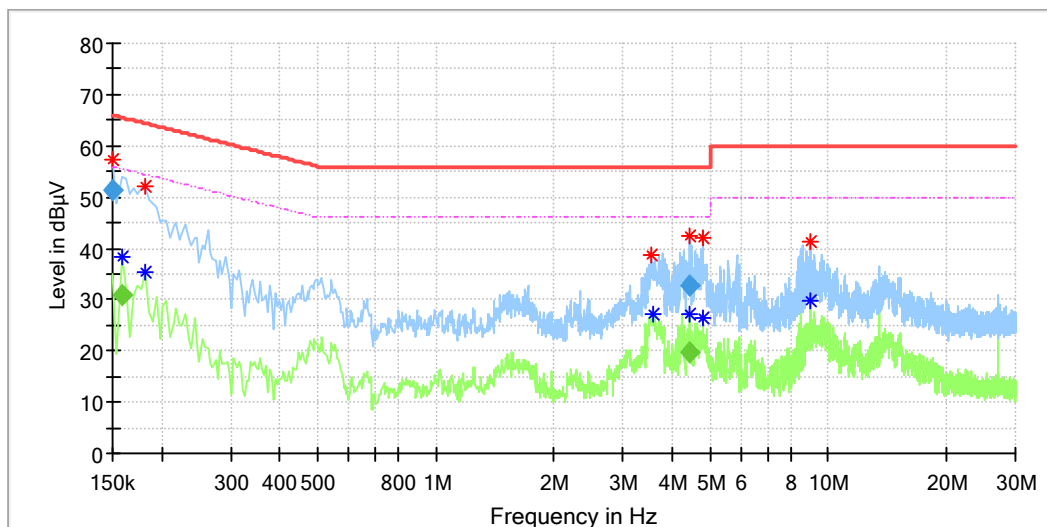
Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.153500	54.17	---	65.57	11.40	L1	9.9
0.154500	---	33.29	56.00	22.71	L1	9.9
0.166000	52.60	---	65.16	12.56	L1	9.9
0.174000	---	28.77	54.77	26.00	L1	9.9
0.198000	---	30.58	53.69	23.11	L1	9.9
0.198000	49.39	---	63.69	14.30	L1	9.9
0.502000	36.83	---	56.00	19.17	L1	10.0
0.506000	---	27.02	46.00	18.98	L1	10.0
4.106000	---	27.21	46.00	18.79	L1	10.2
4.190000	41.13	---	56.00	14.87	L1	10.2
4.597500	42.23	---	56.00	13.77	L1	10.2
4.601500	---	27.05	46.00	18.95	L1	10.2

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.153500	48.73	---	65.81	17.07	1000.0	9.000	L1	9.9
0.154500	---	28.73	55.75	27.03	1000.0	9.000	L1	9.9
4.597500	32.58	---	56.00	23.42	1000.0	9.000	L1	10.2
4.601500	---	22.58	46.00	23.42	1000.0	9.000	L1	10.2

EUT Information

EUT Name:	WisBlock NFC Reader Module
Order No:	168363670 80
Model:	RAK13600
Test mode:	NFC card
Test Voltage:	USB 5V by PC
Test By:	Charlie Zha
Review By:	Gary Chen
Remark:	SR2



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.150000	57.19	---	66.00	8.81	N	9.8
0.158000	---	38.51	55.57	17.06	N	9.8
0.182000	---	35.52	54.39	18.88	N	9.8
0.182000	52.08	---	64.39	12.31	N	9.8
3.542000	38.72	---	56.00	17.28	N	9.9
3.566000	---	27.15	46.00	18.85	N	9.9
4.449500	---	27.14	46.00	18.86	N	9.9
4.450500	42.27	---	56.00	13.73	N	9.9
4.806000	---	26.53	46.00	19.47	N	9.9
4.806000	41.86	---	56.00	14.14	N	9.9
8.982000	---	29.77	50.00	20.23	N	10.0
8.982000	41.27	---	60.00	18.73	N	10.0

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	51.37	---	66.00	14.63	1000.0	9.000	N	9.8
0.158000	---	30.77	55.34	24.57	1000.0	9.000	N	9.8
4.449500	---	19.81	46.00	26.19	1000.0	9.000	N	9.9
4.450500	32.65	---	56.00	23.35	1000.0	9.000	N	9.9

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:**Pass**

Test standard : RSS-102 Issue 5 February 2021
FCC KDB Publication 447498 D01 v06

The maximum peak output power of the transmitter is 0.01uW (-49.85dBm) only, which less than 20mW. Hence the EUT is exempted from routine evaluation limits (SAR Evaluation) according to clause 2.5.1 of RSS-102 Issue 5.

Since maximum peak output power of the transmitter is 0.01uW (-49.85dBm) and the distance from EUT to human is >50mm, hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01 General RF Exposure Guidance v06.

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