TEST REPORT

Report No.:	BCTC2304696679-2E
Applicant:	MINIX Technology Limited
Product Name:	Mini PC
Model/Type Reference:	RIC SJ64-4W
Tested Date:	2023-04-13 to 2023-04-25
Issued Date:	2023-06-30

Shenzhen BCTC Technology Co., Ltd.

Product Name:	Mini PC
Trademark:	MINIX
Model/Type reference:	RIC SJ64-4W, RIC SJ64-8W, RIC SJ64-16W, RIC SJ64-4U, RIC SJ64-8U, RIC SJ64-16U, RIC SJ64-MB, RIC SJ64xxxxxxxxxx (x can be 0-9, A-Z, a-z, "-", "_", "/" or blank for marketing purpose)
Prepared For:	MINIX Technology Limited
Address:	Unit 01, 15/F, Chevalier Commercial Center, No.8 Wang Hoi Road, Kowloon Bay, Kowloon, Hong Kong.
Manufacturer:	MINIX Technology Limited
Address:	Unit 01, 15/F, Chevalier Commercial Center, No.8 Wang Hoi Road, Kowloon Bay, Kowloon, Hong Kong.
Prepared By:	Shenzhen BCTC Technology Co., Ltd.
Address:	1 Floor, Building 2, Huayou Industrial, Yousong Road, Fukang Community, Longhua Street, Longhua District, Shenzhen, Guangdong, China
Sample Received Date:	2023-04-11
Sample tested Date:	2023-04-13 to 2023-04-25
Report No.:	BCTC2304696679-2E
Test Standards:	ETSI EN 300 328 V2.2.2 (2019-07)
Test Results:	PASS
Remark:	This is Bluetooth radio test report.

Tested by: Approved by:

Kang Chen/ Project Handler Sewen Guo/Reviewer

The test report is effective only with both signature and specialized stamp.This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Technology Co., Ltd, this report can't be reproduced except in full.The tested sample(s) and the sample information are provided by the client.

Table of Content

1. Version

Report No.	Issue Date	Description	Approved
BCTC2304696679-2E	2023-06-30	Original	Valid
Remark *: these modules have been tested and comply with EN300328 requirements, According to technical characteristic, only one item need retest for this device.			

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
Transmitter Parameters			
1	RF output power	4.3.1.2	N/A*
2	Duty Cycle, Tx-sequence, Tx-gap	4.3.1.3	N/A*
3	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	4.3.1.4	N/A*
4	Hopping Frequency Separation	4.3.1.5	N/A*
5	Medium Utilization (MU) factor	4.3.1.6	N/A*
6	Adaptivity (Adaptive Frequency Hopping)	4.3.1.7	N/A*
7	Occupied Channel Bandwidth	4.3.1.8	N/A*
8	Transmitter unwanted emissions in the out-of-band domain	4.3.1.9	N/A*
10	Transmitter unwanted emissions in the spurious domain	4.3.1.10	PASS
Receiver Parameters			
11	Receiver spurious emissions	4.3.1.11	N/A*
12	Receiver Blocking	4.3.1.12	N/A
Remark *: these modules have been tested and comply with EN300328 requirements, According to technical characteristic, only one item need retest for this device.			

3. 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.

Test item	uncertainty
RF frequency	1×10^{-7}
RF power, conducted	± 1.0 dB
Duty Cycle and Tx-Sequence and Tx-Gap	±0.9
Dwell Time and Minimum Frequency Occupation	±1.3
Occupied Channel Bandwidth	±2.3
Conducted spurious emission (30MHz-1GHz)	1.28 dB
Conducted spurious emission (1GHz-18GHz)	1.576 dB
Radiated Spurious emission (30MHz-1GHz)	4.30 dB
Radiated Spurious emission (1GHz-18GHz)	4.5 dB
Temperature	0.59 ℃
Humidity	5.3 %

4. Product Information and Test Setup

4.1 Product Information

Model/Type reference:	RIC SJ64-4W, RIC SJ64-8W, RIC SJ64-16W, RIC SJ64-4U, RIC SJ64-8U, RIC SJ64-16U, RIC SJ64-MB, RIC SJ64xxxxxxxxxx (x can be 0-9, A-Z, a-z, "-", "_", "/" or blank for marketing purpose)
Model differences:	Our production units bearing the following model numbers are identical in circuitry and electrical, mechanical and physical construction; The difference is only in model names.
Antenna installation:	External antenna
Antenna Gain:	0dBi
power supply:	AC 100-240V/50-60Hz
Adapter:	Input: AC 100-240V/50-60Hz Output: 19V/3.42A

4.2 Test Setup Configuration

See test photographs attached in EUT test setup photographs for the actual connections between Product and support equipment

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
1.	---	---	---	---	---

Notes:
1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use

4.4 Test Environment

1. Normal Test Conditions:

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Temperature(℃):	26
Test Voltage(AC):	230V

2.Extreme Test Conditions:

For tests at extreme temperatures, measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.

For tests at extreme voltages, measurements shall be made over the extremes of the power source voltage range as declared by the manufacturer.

Test Conditions	LT	HT
Temperature (℃)	-10	35

5. Test Facility and Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Technology Co., Ltd. Address: 1st floor, building 2, Huayou Industrial Zone, Yousong Road, Fukang community, Longhua street, Longhua District, Shenzhen, P. R. China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

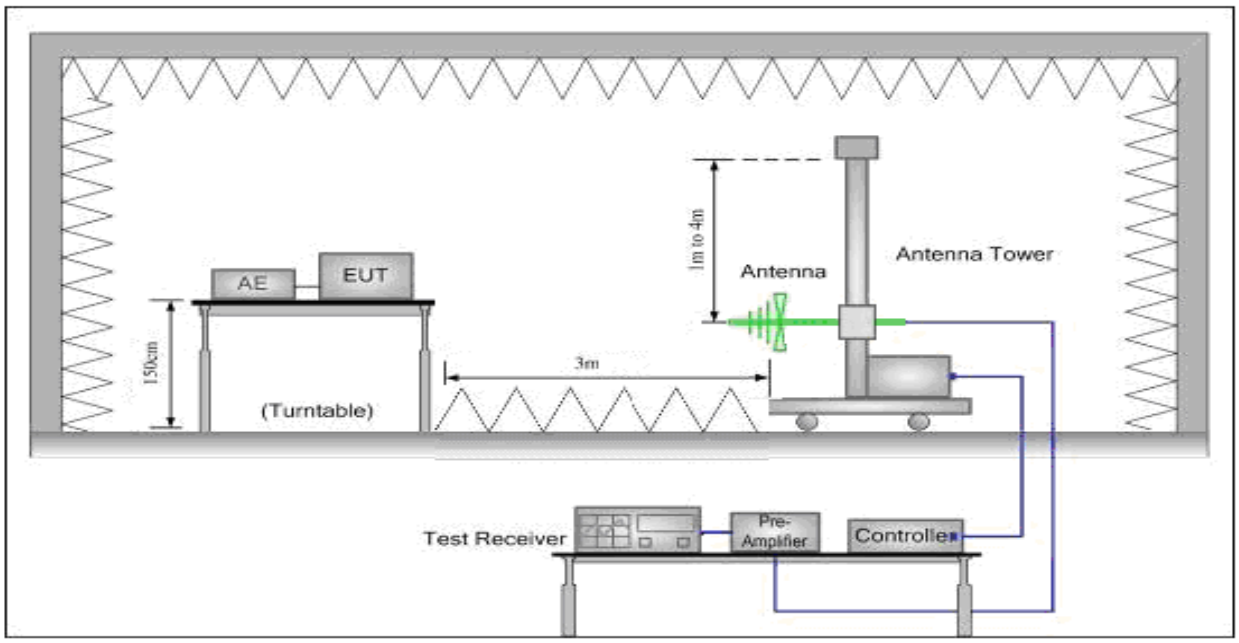
5.2 Test Instrument Used

Radiated Emissions Test (966 Chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	Jun. 06. 2020	Jun. 05, 2023
Receiver	R&S	FSP 40	9K-40GHz	May 24, 2022	May 23, 2023
Receiver	R&S	ESPI	101396	Jun. 1, 2022	May 31, 2023
Broadband antenna	Schwarzbeck	VULB9160	3369	Jun. 6, 2022	Jun. 5, 2023
Loop Antenna	Schwarzbeck	FMZB1519B	014	Jun. 6, 2022	Jun. 5, 2023
Preamplifier	Schwarzbeck	BBV9743	9kHz-6GHz	Jun. 1, 2022	May 31, 2023
Horn antenna	Schwarzbeck	BBHA 9120 D	02792	Dec 22, 2022	Dec 21, 2023
Preamplifier	EMC INSTRUMENTS CORPORATION	EMC0518A45 SEE	EMT-SZ2233	Nov 21, 2022	Nov 20, 2023
Horn Antenn (18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	Jun. 15, 2021	May 23, 2023
Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-H G	2034381	May 26, 2022	May 25, 2023
RF cable 1#	SKET	5M	#10	Dec 23, 2022	Dec 22, 2023
RF cable 2#	/	5M	18038628	Dec 23, 2022	Dec 22, 2023
RF cable 3#	/	8.5M	18038631	Dec 23, 2022	Dec 22, 2023
RF cable 4#	/	9M	18038626	Dec 23, 2022	Dec 22, 2023
RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	May 28, 2021	May 25, 2023
Communication test set	R&S	CMW500	157483	Mar.15, 2023	Mar.14, 2024

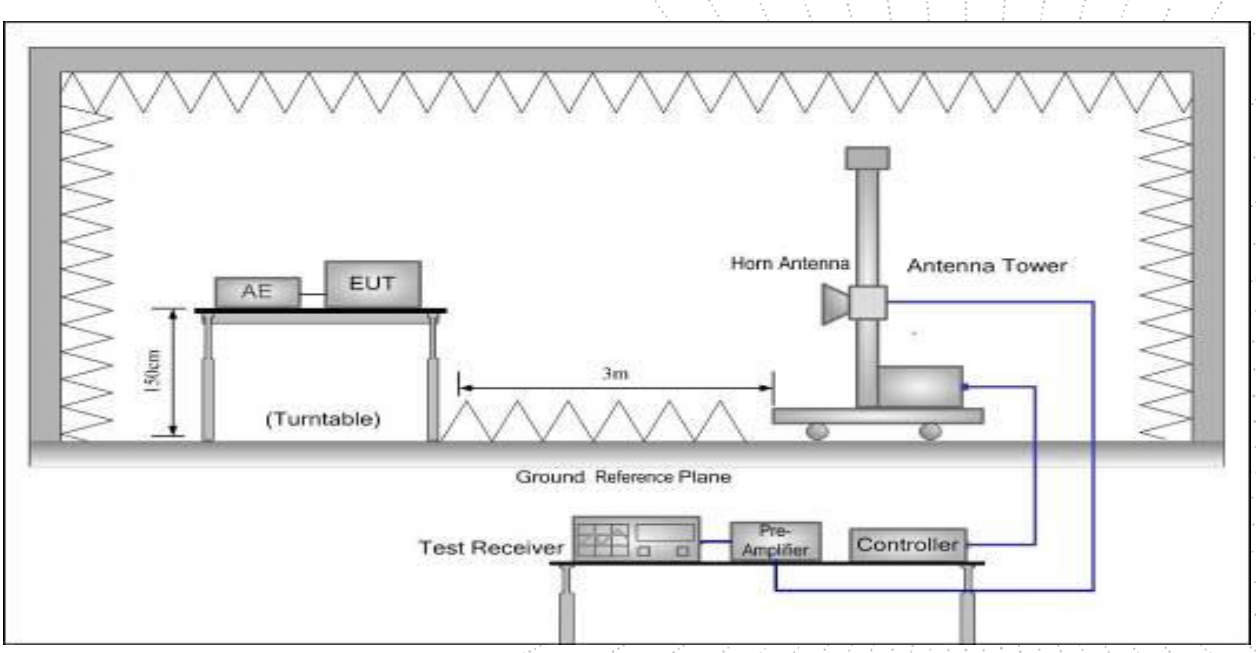
6. Transmitter Unwanted Emissions In The Spurious Domain

6.1 Block Diagram Of Test Setup

Below 1GHz



Above 1GHz



6.2 Limits

Frequency Range	Maximum power	bandwidth
30 MHz to 47 MHz	-36dBm	100kHz
47 MHz to 74 MHz	-54dBm	100kHz
74 MHz to 87.5 MHz	-36dBm	100kHz
87.5MHz to118 MHz	-54dBm	100kHz
118 MHz to174MHz	-36dBm	100kHz
174MHz to 230MHz	-54dBm	100kHz
230 MHz to 470 MHz	-36dBm	100kHz
470 MHz to 694 MHz	-54dBm	100kHz
694 MHz to1 GHz	-36dBm	100kHz
1GHz to12.75 GHz	-30dBm	1MHz

6.3 Test Procedure

Conducted measurement/ Radiated measurement
The spectrum in the spurious domain (see figure 1 or figure 3) shall be searched for emissions that exceed the limit values given in table 4 or table 12 or that come to within 6 dB below these limits. Each occurrence shall be recorded.
The measurement procedure contains 2 parts.
Pre-scan
The test procedure below shall be used to identify potential unwanted emissions of the UUT.
Step 1:
The sensitivity of the measurement set-up should be such that the noise floor is at least 12 dB below the limits given in table 4 or table 12.
Step 2:
The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyser settings:
• Resolution bandwidth: 100 kHz
Video bandwidth: 300 kHz
• Filter type: 3 dB (Gaussian)
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 19 400; For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.
• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.
For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies. The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyser could be used.
Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

Step 3:
The emissions over the range 1 GHz to 12,75 GHz shall be identified.
Spectrum analyser settings:
• Resolution bandwidth: 1 MHz
• Video bandwidth: 3 MHz
• Filter type: 3 dB (Gaussian)
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 23 500; For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.
• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.
For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies. The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyser could be used.
Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.
Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.9.2.1.3.
Step 4:
• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active transmit chains).
Measurement of the emissions identified during the pre-scan
The procedure in step 1 to step 4 below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyser has a Time Domain Power function.
Step 1:
The level of the emissions shall be measured using the following spectrum analyser settings:
• Measurement Mode: Time Domain Power
• Centre Frequency: Frequency of the emission identified during the pre-scan
• Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz)
• Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz)
• Frequency Span: Zero Span
• Sweep mode: Single Sweep
• Sweep time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power
• Sweep points: Sweep time [µs] / (1 µs) with a maximum of 30 000
• Trigger: Video (burst signals) or Manual (continuous signals)
• Detector: RMS
Step 2:
• Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.
Step 3:
In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (Ach).
Sum the measured power (within the observed window) for each of the active transmit chains.
Step 4:
The value defined in step 3 shall be compared to the limits defined in table 4 or table 12.

6.4 Test Results

Modulation : GFSK (the worst data)

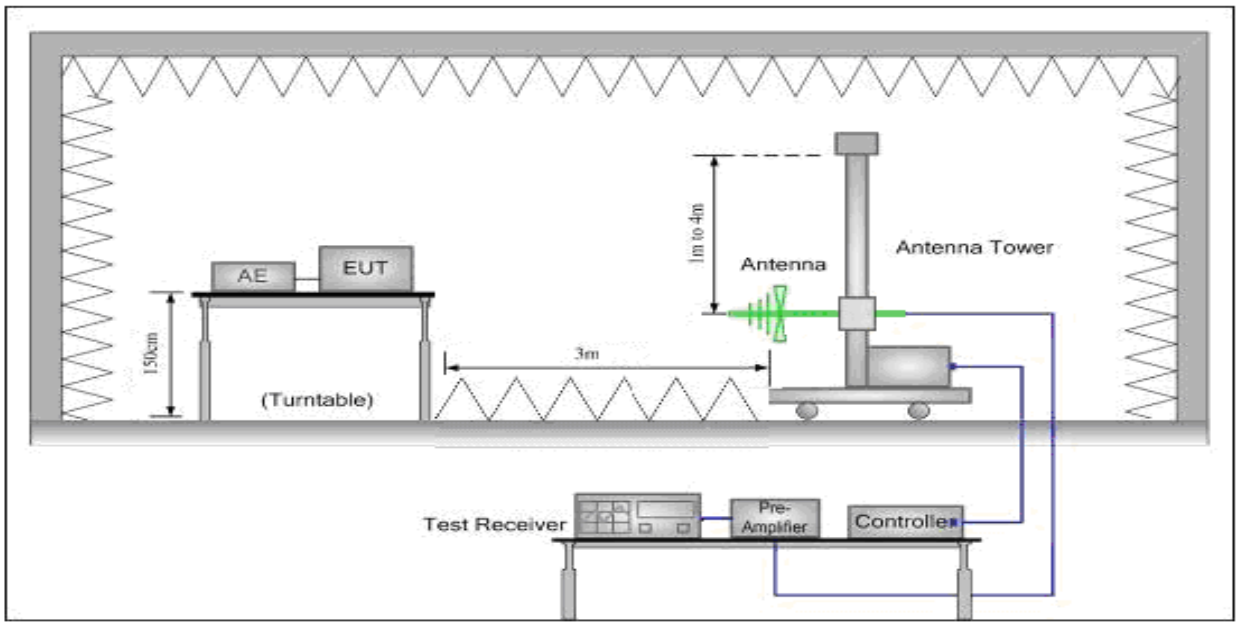
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
GFSK low channel								
563.38	-53.93	321	1.2	H	-7.34	-61.27	-54	-7.27
563.38	-54.28	240	1.4	V	-7.34	-61.63	-54	-7.63
4804.00	-43.54	201	1.2	H	-0.43	-43.97	-30	-13.97
4804.00	-37.85	350	1.5	V	-0.43	-38.28	-30	-8.28
7206.00	-57.62	347	1.6	H	8.31	-49.31	-30	-19.31
7206.00	-61.00	348	1.7	V	8.31	-52.69	-30	-22.69
GFSK high channel								
563.38	-53.24	159	2.0	H	-7.34	-60.58	-54	-6.58
563.38	-54.54	50	1.2	V	-7.34	-61.88	-54	-7.88
4960.00	-43.51	48	1.5	H	-0.32	-43.83	-30	-13.83
4960.00	-38.05	110	1.0	V	-0.32	-38.37	-30	-8.37
7440.00	-57.70	64	1.3	H	9.35	-48.35	-30	-18.35
7440.00	-61.03	192	1.5	V	9.35	-51.68	-30	-21.68

Remark:
Absolute Level = Receiver Reading + Factor
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Margin= Absolute Level- Limit

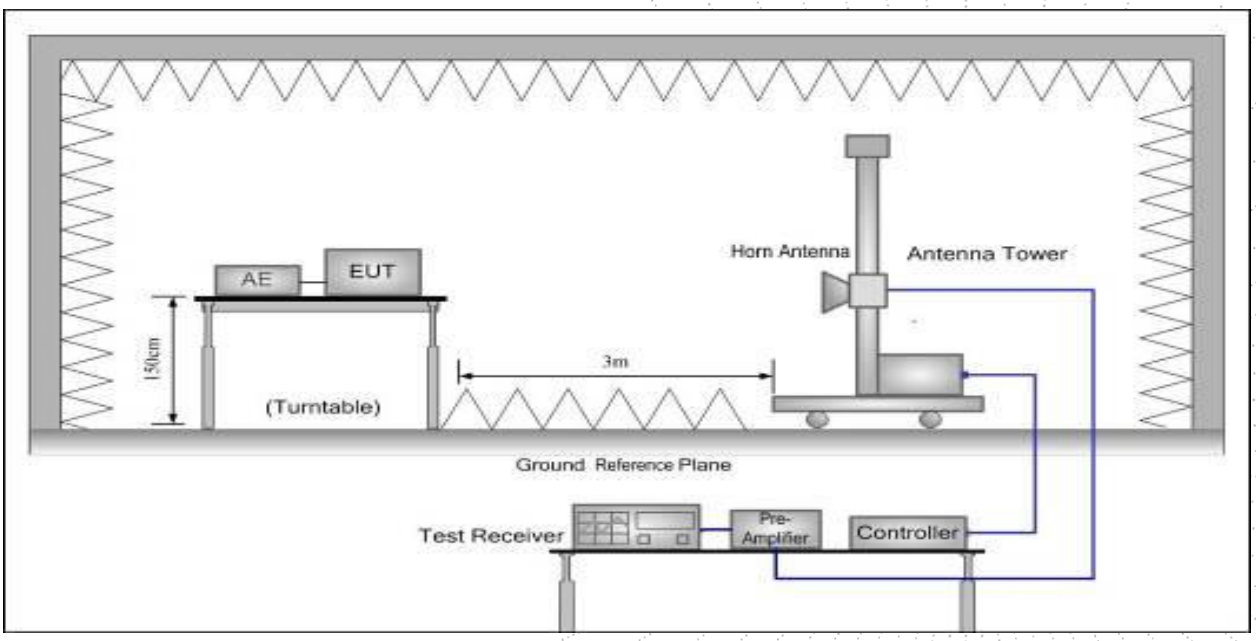
7. Receiver Spurious Emissions

7.1 Block Diagram Of Test Setup

Below 1GHz



Above 1GHz



7.2 Limits

Frequency Range	Maximum power	Measurement Width
30 MHz to 1 GHz	-57 dBm	100kHz
1 GHz to 12.75 GHz	-47 dBm	1MHz

7.3 Test Procedure

Conducted measurement/ Radiated measurement
The spectrum in the spurious domain (see figure 1 or figure 3) shall be searched for emissions that exceed the limit values given in table 4 or table 12 or that come to within 6 dB below these limits. Each occurrence shall be recorded.
The measurement procedure contains 2 parts.
Pre-scan
The test procedure below shall be used to identify potential unwanted emissions of the UUT.
Step 1:
The sensitivity of the measurement set-up should be such that the noise floor is at least 12 dB below the limits given in table 4 or table 12.
Step 2:
The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyser settings:
• Resolution bandwidth: 100 kHz
Video bandwidth: 300 kHz
• Filter type: 3 dB (Gaussian)
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 19 400; For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.
• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.
For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies. The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyser could be used.
Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.
Step 3:
The emissions over the range 1 GHz to 12,75 GHz shall be identified.
Spectrum analyser settings:
• Resolution bandwidth: 1 MHz
• Video bandwidth: 3 MHz
• Filter type: 3 dB (Gaussian)
• Detector mode: Peak
• Trace Mode: Max Hold
• Sweep Points: ≥ 23 500; For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.
• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.
For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyser could be used.
Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.
Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.9.2.1.3.

Step 4:

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active transmit chains).

Measurement of the emissions identified during the pre-scan

The procedure in step 1 to step 4 below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyser has a Time Domain Power function.

Step 1:

The level of the emissions shall be measured using the following spectrum analyser settings:
• Measurement Mode: Time Domain Power
• Centre Frequency: Frequency of the emission identified during the pre-scan
• Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz)
• Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz)
• Frequency Span: Zero Span
• Sweep mode: Single Sweep
• Sweep time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power
• Sweep points: Sweep time [µs] / (1 µs) with a maximum of 30 000
• Trigger: Video (burst signals) or Manual (continuous signals)
• Detector: RMS

Step 2:

• Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.

Step 3:

In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (Ach).
Sum the measured power (within the observed window) for each of the active transmit chains.

Step 4:

The value defined in step 3 shall be compared to the limits defined in table 4 or table 12.

7.4 Test Results

Modulation : GFSK (the worst data)

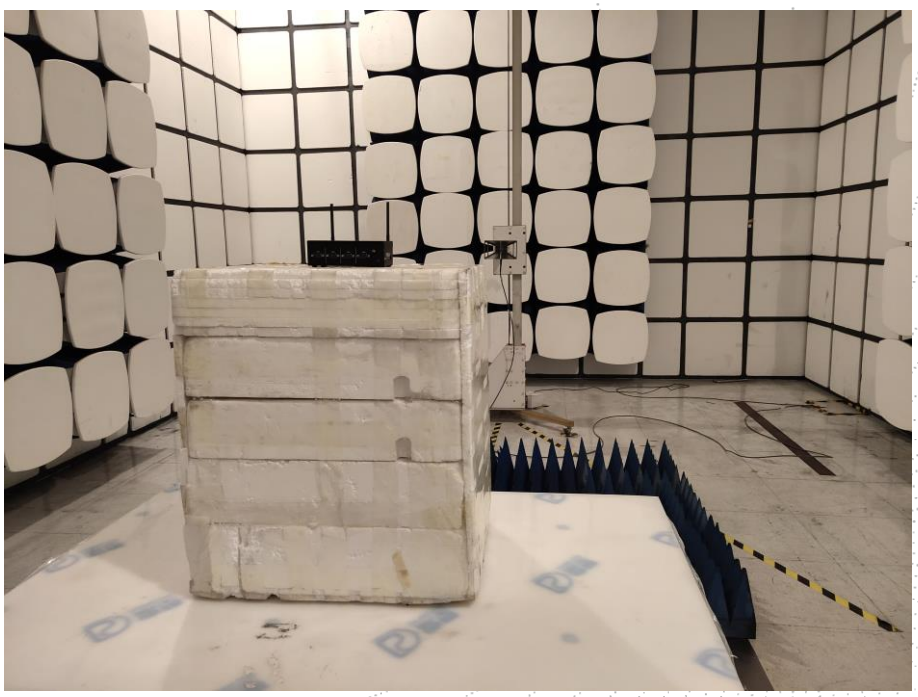
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
GFSK low channel								
240.45	-52.28	225	1.6	H	-15.45	-67.72	-57.00	-10.72
240.45	-53.89	205	1.3	V	-15.45	-69.34	-57.00	-12.34
2396.29	-49.27	329	1.1	H	-6.70	-55.98	-47.00	-8.98
2396.29	-50.65	154	1.2	V	-6.70	-57.35	-47.00	-10.35
GFSK high channel								
240.45	-52.88	321	1.9	H	-15.45	-68.33	-57.00	-11.33
240.45	-54.60	206	1.4	V	-15.45	-70.05	-57.00	-13.05
2396.29	-49.67	292	1.3	H	-6.70	-56.38	-47.00	-9.38
2396.29	-49.92	261	1.5	V	-6.70	-56.62	-47.00	-9.62

Remark:
Absolute Level = Receiver Reading + Factor
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Margin= Absolute Level- Limit

8. EUT Test Setup Photographs

Spurious Emission Test Setup (Below 1GHz)

Spurious Emission Test Setup (Above 1GHz)



STATEMENT

1. The equipment lists are traceable to the national reference standards.

2. The test report can not be partially copied unless prior written approval is issued from our lab.

3. The test report is invalid without the "special seal for inspection and testing".

4. The test report is invalid without the signature of the approver.

5. The test process and test result is only related to the Unit Under Test.

6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.

7. The quality system of our laboratory is in accordance with ISO/IEC17025.

8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:
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E-Mail：bctc@bctc-lab.com.cn

※※※※※ **END** ※※※※※