FM TEST REPORT

No. 24T04Z101872-024

for

Xiaomi Communications Co., Ltd.

Mobile Phone

MODEL NAME: 24116RACCG

with

Hardware Version: 1351000O6

Software Version: Xiaomi HyperOS 1.0

Issued Date: 2024-09-20

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
24T04Z101872-024	Rev.0	1st edition	2024-09-20

Note: the latest revision of the test report supersedes all previous versions.

CONTENTS

1. Test Laboratory

1.1. Testing Location

Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191

1.2. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2024-09-09

Testing End Date: 2024-09-10

1.4. Signature

Zhang Ying

(Prepared this test report)

An Hui

(Reviewed this test report)

Zhang Xia

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Xiaomi Communications Co., Ltd.
Address:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
City:	Beijing
Postal Code:	100085
Country:	China
Contact:	Zeng Qingyao
E-mail:	mi-compliance@xiaomi.com
Telephone:	010-60606666-8088
Fax:	010-60606666-1101

2.2. Manufacturer Information

Company Name:	Xiaomi Communications Co., Ltd.
Address:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
City:	Beijing
Postal Code:	100085
Country:	China
Contact:	Zeng Qingyao
E-mail:	mi-compliance@xiaomi.com
Telephone:	010-60606666-8088
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Mobile Phone
Model Name	24116RACCG

Note: Photographs of EUT are shown in ANNEX A of this test report. Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, CAICT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Note
UT31a	965991070066729/ 965991070066737	1351000O6	Xiaomi HyperOS 1.0	/

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Note
AE1-1	Battery	---
AE1-2	Battery	---
AE2-1	Adapter1	UE First source
AE2-2	Adapter2	UE Second source
AE2-3	Adapter3	UE Third source
AE2-4	Adapter4	UK First source
AE2-5	Adapter5	UK Second source
AE2-6	Adapter6	UK Third source
AE3-1	USB Cable1	---
AE3-2	USB Cable2	---
AE3-3	USB Cable3	---
AE4	HeadSet	---

*AE ID: is used to identify the test sample in the lab internally.

Note: The test samples listed above were selected and prepared by the applicant.

3.4. General Description

Description	Mobile Phone	
Model name	24116RACCG	
Cellular Bands	√GSM	Bands 850/900/1800/1900MHz
	☐CDMA	Bands
	√WCDMA	Bands 1/2/4/5/8
	√LTE	Bands 1/2/3/4/5/7/8/12/13/17/20/26/28/38/40/41/66
	☐5G NR SA	Bands
	☐5G NR NSA	Bands

Unlicensed Radio	√2.4GHz Wi-Fi	√802.11b √802.11g	
		√802.11n	√20MHz ☐40MHz
		☐802.11ac	☐20MHz ☐40MHz ☐80MHz ☐160MHz
		☐802.11ax	☐20MHz ☐40MHz ☐80MHz ☐160MHz
	√5GHz Wi-Fi	√802.11a	
		√802.11n	√20MHz √40MHz
		√802.11ac	√20MHz √40MHz √80MHz ☐160MHz
		☐802.11ax	☐20MHz ☐40MHz ☐80MHz ☐160MHz
	√Bluetooth	√EDR √BLE4 √BLE5	
Other	√GNSS	√GPS √BDS √Gallileo √Glonass	
	√FM √MP3 √MP4 √Camera √USB √NFC √OTG		

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

3.5. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.5	UT31a + AE1-1 + Headset	FM, Headset

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
EN 55032	Electromagnetic compatibility of multimedia equipment — Emission Requirements	2015+A11: 2020
ETSI EN 303 345-1	Broadcast Sound Receivers; Part 1: Generic requirements and measuring methods	V1.1.1
ETSI EN 303 345-3	Broadcast Sound Receivers; Part 3: FM broadcast sound service; Harmonised Standard for access to radio spectrum	V1.1.1

5. OPERATIONAL CONDITIONS DURING TEST

5.1 Operating modes of EUT during Test

5.1.1.1 Working as FM receiver

The EUT is synchronized to a FM signal generator. The EUT is keeping on demodulating the FM signal and outputting the audio signal.

5.2 Remarks

Typical operating condition of EUT during test described in sub-clause 5.1 is declared by manufacturer. Some measures have been done to find worst case of emission and immunity in accordance with basic configuration requested in relevant norms.

6. CHARACTERISTICS OF THE TEST

The ordered services of EUT carried out are the following tests:

6.1. Unwanted emissions in the spurious domain

Standard: ETSI EN 303 345-1, ETSI EN 303 345-3
Limit: EN 55032
Method: EN 55032
Scope of application: Enclosure port

6.2. Adjacent channel selectivity and blocking (FM)

Standard: ETSI EN 303 345-1, ETSI EN 303 345-3
Limit: ETSI EN 303 345-3
Method: ETSI EN 303 345-3
Scope of application: Enclosure port

6.3. Sensitivity (FM)

Standard: ETSI EN 303 345-1, ETSI EN 303 345-3
Limit: ETSI EN 303 345-3
Method: ETSI EN 303 345-3
Scope of application: Enclosure port

7. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Fully-anechoic chamber FAC-1 (7.3 meters×5.4 meters×3.5 meters), **FAC-3** (9 meters×6.5 meters×4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

Additional Humidity Requirements for Electrostatic Discharge Test: Min. = 35%, Max. = 55%.

8. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured
Location Column	huayuan North Road/ kangding Road/ Shouxiang	The test is performed in test location huayuan North Road/ kangding Road/ Shouxiang which are described in section 1.1 of this report

8.1. Summary of Measurement Results of Emissions (FM)

See **ANNEX C** for detail.

SUMMARY OF MEASUREMENT RESULTS OF EMISSION	VERDICT				Test Location
	NA	P	F	NM	
Unwanted emissions in the spurious domain		P			huayuan North Road
Adjacent channel selectivity and blocking		P			huayuan North Road
Sensitivity		P			huayuan North Road

9. Test Equipments Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL. INTERVAL	CAL. DUE DATE
1	EMS Antenna	ATR80M6G	0332603	R&S	/	/
2	Audio Analyzer	UPV	103332	R&S	1 Year	2025-06-28
3	Broadcast Test Center	BTC	101024	R&S	1 Year	2025-04-01
4	Test Receiver	ESW44	103023	R&S	1 year	2025-06-06
5	EMI Antenna	VULB 9163	01223	SCHWARZBECK	2 years	2025-07-18

Test software information(HL)		
Test Item	Software	Manufacturer
Radiated emission	EMC32 V11.50.00	R&S
Adjacent channel selectivity and blocking/ Sensitivity	EMC32 V10.60.20	R&S

10. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Location 1: CTTL(huayuan North Road)

Test item	Frequency ranges	Measurement uncertainty
Radiated Emission	30MHz-1GHz	4.72dB(*k*=2)

ANNEX A: EUT photograph

EUT photos are reflected in specialized prototype documents.

ANNEX B: METHODS OF MEASUREMENT

B.1 Generic methods of measurement

Two generic methods of measurement are applicable to verifying the performance of the receiving equipment in question. The conducted test methods shall be used for receivers with an external antenna connector. The radiated test methods shall be used for all other receivers.

For both generic methods, two generators are needed. One provides the wanted signal, and the other the unwanted signal, or interferer (when required). The two signals are combined in such a way as to maintain isolation between the generators. It is necessary to provide calibrated attenuators for control of the individual levels; very often these will be built into the generators. Where the attenuators are external, cable lengths should be kept short to avoid cross-coupling effects.

The tests require the audio output of the receiver to be measured. All tonal controls (user operated and/or preset, for example, vehicle specific equalizer, etc.) shall be set to provide a flat response during the testing.

B.2 Generic measurement set-up for radiated testing

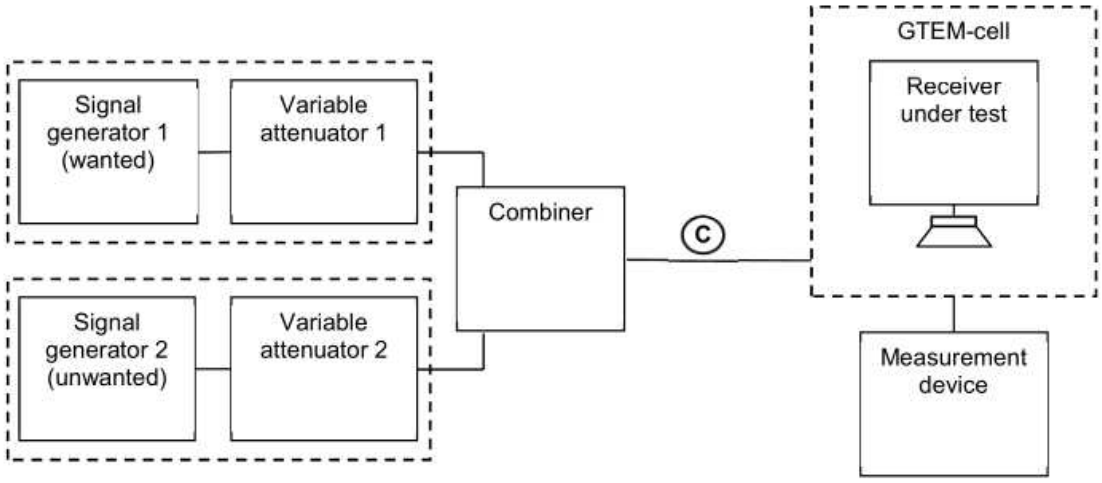


Figure 1: Generic measurement arrangement for receivers with built-in or integral antennas

The combiner shall be appropriate for the frequency range of the testing and shall be designed so as to prevent coupling between the two signal generators. Some test houses have experienced difficulties using hybrid combining networks at LF and MF. In such cases a resistive combiner may be appropriate, but care should be taken to ensure the coupling between the generators does not result in unwanted intermodulation products. Hybrid combiners are available for use at LF and MF and these usually give better performance than resistive combining networks.

Signal generator 1 and signal generator 2 may be combined as a single item of test equipment. In this case either the RF signal or the baseband signal may be combined internally, as long as the signal at calibration point © is equivalent to the signal generated in the setup according to figure 1.

The power levels of the two generators are measured at ©. For a 50 Ω system, when the power at © is P W, the nominal field-strength E is given by:

$$\frac{\sqrt{50 \times P}}{h}$$

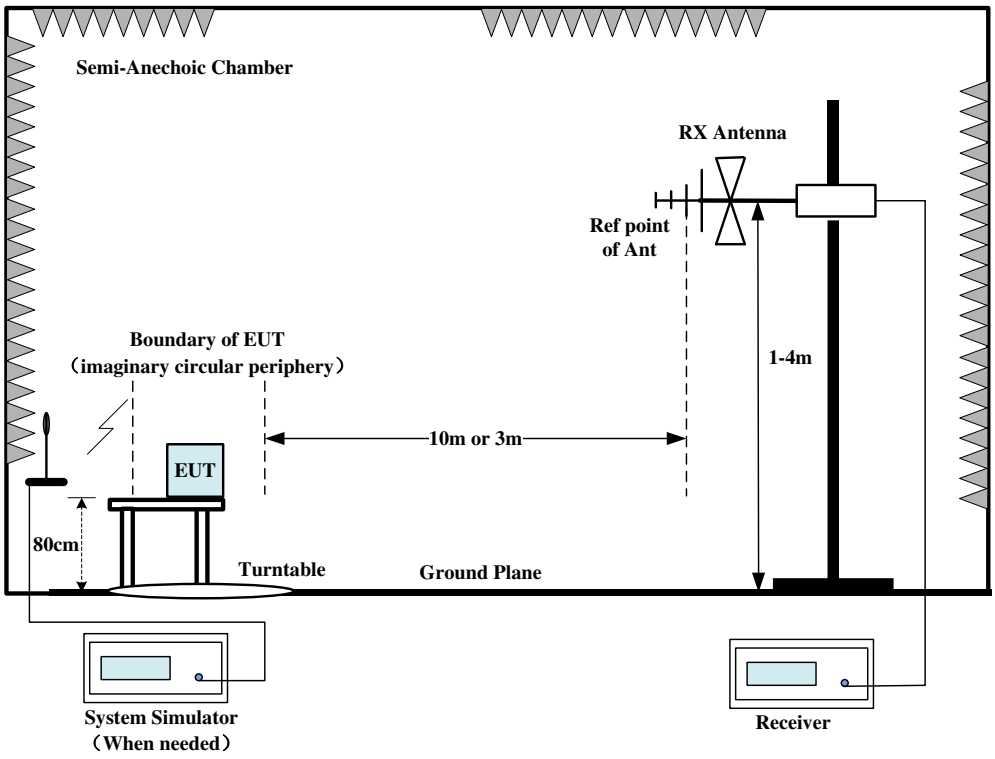
where h is the height of the cell's septum above its floor in metres. The exact relationship between P and E should be obtained from the manufacturer of the cell.

A Semi Anechoic Chamber (SAC) or Fully Anechoic Room (FAR) in compliance with CENELEC EN 55032 [1], table A.1, annex C and annex D may be used in place of a GTEM cell. In these environments, electrical connections from the receiver to the audio measurement device are permitted provided they can be shown not to disturb the electric field; ferrite cores and/or filters are required.

ANNEX C: MEASUREMENT RESULTS

C.1 Unwanted emissions in the spurious domain (Radiated)

Scope of application: Enclosure port of ancillary equipment
Operating condition of EUT: Sub-clause 5.1
Test layout: See Pic.1 in ANNEX E.
Test set-up:
30MHz-1GHz



Limit Line:

Frequency of modulation sound receivers and PC tuner cards	
Frequency Range (MHz)	**Quasi-Peak Limit (dBμV/m)**
<1000 (Fundamental)	50
30 to 300 (Harmonic)	42
300 to 1000 (Harmonic)	46
For other	
Frequency Range (MHz)	**Quasi-Peak Limit (dBμV/m)**
30 to 230	30
230 to 1000	37

Measurement result:

98MHz

Frequency range (MHz)	Quasi-Peak Limit (dBμV/m)	Result (dBμV/m) Set.5	Conclusion
<1000 (Fundamental)	50	See Annex D Fig. 1	P
30 to 300(Harmonic)	42		
300 to 1000(Harmonic)	46		
30 to 230	30		
230 to 1000	37		

C.2 Adjacent channel selectivity and blocking (FM)

Scope of application: Enclosure port of ancillary equipment
Operating condition of EUT: Sub-clause 5.1
Fail criteria: See ETSI EN 303 345-3.
Test layout: See Pic.2 in ANNEX E.
Limit Line:

De-modulation	Tuned frequency band	Wanted signal center frequency (MHz)	Wanted signal level (dBµV/m)		Required I/C ratio			
			Conducted (dBm)	Radiated (dBµV/m)	N=1 (dB)	N=2 (dB)	N=3 (dB)	Blocking (dB)
FM (external antenna)	VHF Band II	98	-84	n/a	3	17	30	30

Impairment criteria for adjacent channel selectivity and blocking tests:

De-modulation	Impairment criteria
FM	SNR ≥ 40 dBQ

Measurement result:

Measurement result for adjacent channel selectivity:

Test Setup	Adjacent channel No.	Adjacent Frequency(MHz)	Wanted signal S(dBV)	Noise signal N(dBV)	SNR	Result
Set.5	4	98.4	-16.702	-79.375	62.7	P
	3	98.3	-16.593	-77.345	60.8	P
	2	98.2	-17.488	-79.257	61.8	P
	-2	97.8	-16.262	-79.865	63.6	P
	-3	97.7	-17.709	-81.013	63.3	P
	-4	97.6	-16.562	-80.449	63.9	P

Measurement result for adjacent channel blocking:

Test Setup	Blocking Frequency(MHz)	Wanted signal S(dBV)	Noise signal N(dBV)	SNR	Result
Set.5	98.8	-16.688	-65.015	48.3	P
	97.2	-17.099	-62.992	45.9	P

C.3 Sensitivity (FM)

Scope of application: Enclosure port of ancillary equipment
Operating condition of EUT: Sub-clause 5.1
Fail criteria: See ETSI EN 303 345-3.
Test layout: See Pic.2 in ANNEX E.
Limit Line:

De-modulation	Tuned frequency band	Wanted signal center frequency (MHz)	Required sensitivity limit	
			Conducted (dBm)	Radiated (dBμV/m)
FM	VHF Band II	98	-90	50 (see note)
NOTE 1: For products with an integral antenna, the requirement is relaxed to 67 dBμV/m.				

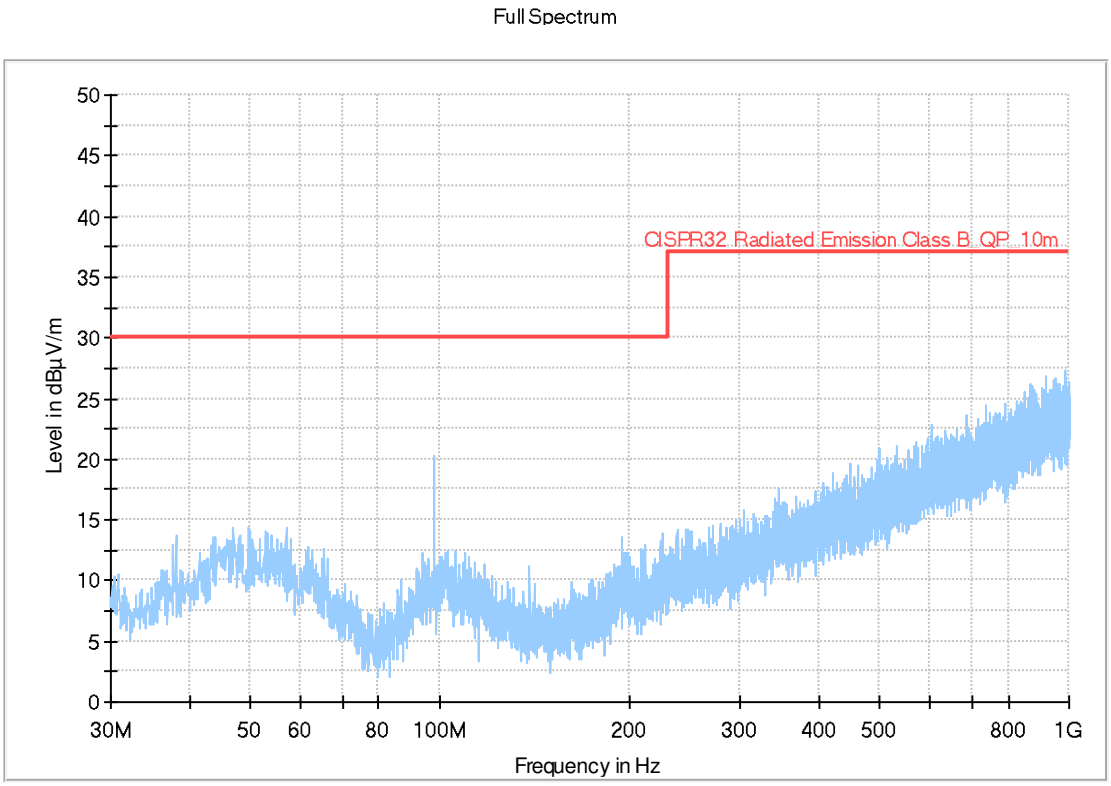
Impairment criteria for sensitivity tests:

De-modulation	Impairment criteria
FM	SNR ≥ 40 dBQ

Measurement result:
Sensitivity

Test Setup	Frequency(MHz)	Wanted signal S(dBV)	Noise signal N(dBV)	SNR	Result
Set.5	98	-16.224	-74.483	58.3	P

ANNEX D: GRAPH RESULTS



Note: the spike over the limit is coming from the FM signal generator.

Note: The measurement results do not need the six highest emissions relative to the limit for each detector type because emissions are 10 dB or more below the limit.

Fig.1 Unwanted emissions in the spurious domain (Radiated) (Set.5: 98MHz)

ANNEX E: TEST LAYOUT

Test layout photos are reflected in specialized prototype documents.

ANNEX F: Persons involved in this testing

Test Item	Tester
Unwanted emissions in the spurious domain (Radiated)	Zhang Tianli
Adjacent channel selectivity and blocking (FM)	Li Pengfei
Sensitivity (FM)	Li Pengfei

*****END OF REPORT*****