

# Doc No./Rev.: SGS-W-TRF-101 v00

## SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Report No.: ZEWM2311001721RG01

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# FCC TEST REPORT PART 0

ZEWM2311001721RG **Application No.:** 

**Applicant:** Xiaomi Communications Co., Ltd. Manufacturer: Xiaomi Communications Co., Ltd.

Mobile Phone **Product Name:** 

Model No.(EUT): XIG05 Trade Mark: Redmi

FCC ID: 2AFZZRA50J Date of Receipt: 2023/11/14

**Date of Test:** 2023/12/08 to 2023/12/12

Date of Issue: 2023/12/25

Test conclusion: **PASS** 

Authorized Signature:

Laboratory Manager



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### **REVISION HISTORY**

Report Number	Revision	Description	Issue Date
ZEWM2311001721RG01	01	Original	2023/12/25

Prepared By	Vito Wang  Vito Wang
Checked By	Roman Pan



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### 1 General Information

### 1.1 Details of Client

Applicant:	Xiaomi Communications Co., Ltd.
Address:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
Manufacturer:	Xiaomi Communications Co., Ltd.
Manufacturer.	Alaonii Communications Co., Ltd.

#### 1.2 Test Location

i.z icst Loou	
Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China
Post code:	518057
Test engineer:	Vito Wang, Ethan Li



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### 1.3 Test Facility

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

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.



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### 1.4 General Description of EUT

Device Type :	portable device	'				
Exposure Category:	uncontrolled environment / general population					
Product Name:	Mobile Phone	Mobile Phone				
Model No.(EUT):	XIG05					
FCC ID:	2AFZZRA50J					
Trade Mark:	Redmi					
Product Phase:	Identical Prototype					
IMEI:	864594070002941,8645940 864594070002826,8645940					
Hardware Version:	13510N16					
Software Version:	Xiaomi HyperOS 1.0					
Device Operating Configuration	ons :					
Modulation Mode:	CP-OFDM (QPSK, 16QAM, WIFI: DSSS, OFDM; BT: G	I; BPSK, QPSK, 16QAM, 64QAM 64QAM, 256QAM)	l, 256QAM),			
Device Class:	В					
GPRS Multi-slots Class:	33	EGPRS Multi-slots Class:	33			
HSDPA UE Category:	24	HSUPA UE Category	7			
DC-HSDPA UE Category:	24					
	4,tested with power level 5(GSM850)					
Power Class	1,tested with power level 0(GSM1900)					
rower Class	3, tested with power control "all 1"(WCDMA Band)					
	3, tested with power control	3, tested with power control Max Power(LTE Band)				
	Band	Tx (MHz)	Rx (MHz)			
	GSM850	824~849	869~894			
	GSM1900	1850~1910	1930~1990			
	WCDMA Band II	1850~1910	1930~1990			
	WCDMA Band IV	1710~1755	2110~2155			
	WCDMA Band V	824~849	869~894			
	LTE Band 2	1850 ~1910	1930 ~1990			
	LTE Band 4	1710~1755	2110~2155			
Francis on Brands	LTE Band 5	824~849	869-894			
Frequency Bands:	LTE Band 7	2500~2570	2620~2690			
	LTE Band 12	699~716	729~746			
	LTE Band 13	777~787	746~756			
	LTE Band 17	704~716	734~746			
	LTE Band 26	814~849	859~894			
	LTE Band 38	2570~2620	2570~2620			
	LTE Band 41	2496~2690	2496~2690			
	LTE Band 66	1710~1780	2110~2200			
	NR Band n5	824~849	869~894			



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	NR Band n38 NR Band n41	2570~2620 2496~2690	2570~2620 2496~2690		
	NR Band n66	1710~1780	2110~2200		
	NR Band n77	3450~3550	3450~3550		
	TVIT Balla III I	3700~3980	3700~3980		
	NR Band n78	3450~3550	3450~3550		
	INK Ballu II/6	3700~3800	3700~3800		
	Bluetooth	2400~2483.5	2400~2483.5		
	Wi-Fi 2.4G	2402~2462	2402~2462		
		5150~5250	5150~5250		
	Wi-Fi 5G	5250~5350	5250~5350		
	WI-FI 3G	5470~5725	5470~5725		
		5725~5850	5725~5850		
NFC	Wireless Technolo	Wireless Technology and Frequency Range			
NFC		mode			
RF Cable:	☐ Provided by t	the applicant $\ \square$ Provided by th	e laboratory		
	Model:	Model: BM5V			
Detter defense etien.	Normal Voltage:	+3.91V	+3.91V		
Battery Information:	Typical capacity:	5020mAh	5020mAh		
	Manufacturer:	NVT			

Note: \*Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.

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### 1.5 Time-Averaging for SAR

The equipment under test (EUT) is a portable handset, it contains the Qualcomm modem supporting 2G/3G/4G/5G NR/BT/WLAN/NFC bands. But only 2G/3G/4G/5G NR are enabled with Qualcomm Smart Transmit feature to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is in compliance with the FCC requirement. GSM/WCDMA are configured for peak exposure mode. For device using Smart Transmit force peak mode or peak mode, we verification the time-window switch test in part2 follows the Qualcomm user guide, but LTE Standalone/NR SA/NSA/Inter band UL CA are not peak mode, we verification the applicable cases in part2.

The compliance test under the static transmission scenario and simultaneous transmission analysis are reported in Part 1 report. The validation of the time-averaging algorithm and compliance under the dynamic (time- varying) transmission scenario for WWAN technologies are reported in Part 2 report.

Nomenclature for Part 0 Reports

Nomenciature for Part 0 Re	_			
Technology	Term	Description		
	Plimit	Power level that corresponds to the exposure design target (SAR_design_target) after accounting for all device design related uncertainties		
WWAN	P <sub>max</sub>	Maximum tune up output power		
	SAR_design_target	Target SAR level < FCC SAR limit after accounting for a device design related uncertainties		
	SAR Char	Table containing Plimit for all technologies and bands		



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### SAR CHARACTERIZATION

### 2.1 DSI and SAR Determination

This device uses different Device State Index (DSI) to configure different time averaged power levels based on certain exposure scenarios. Depending on the detection scheme implemented in the smartphone, the worst-case SAR was determined by measurements for the relevant exposure conditions for that DSI. Detailed descriptions of the detection mechanisms are included in the operational description.

When 1g SAR and 10g SAR exposure comparison is needed, the worst-case was determined from SAR normalized to 1g or 10g SAR limit.

The device state index (DSI) conditions used in Table 1 represent different exposure scenarios.

Scenario	Description	SAR Test Cases		
Head (DSI = 1)	Device positioned next to head	Head SAR per KDB Publication 648474 D04		
, ,	<ul> <li>Receiver Active</li> </ul>			
Body-worn (DSI = 4)	<ul> <li>Device being used with a body-worn accessory</li> </ul>	Body-worn SAR per KDB Publication 648474 D04		
Hotspot mode (DSI = 5)	Device transmits in hotspot mode near body	Hotspot SAR per KDB Publication 941225 D06		
	<ul> <li>Hotspot Mode Active</li> </ul>	·		

DSI and Corresponding Exposure Scenarios



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### 2.2 SAR Design Target And Uncertainty

SAR\_design\_target is determined by ensuring that it is less than FCC SAR limit after accounting for total device designed related uncertainties specified by the manufacturer.

$$SAR\_design\_target < SAR_{regulatory\_limit} \times 10 \frac{-total\ uncertainty}{10}$$

Band	Antenna	Uncertainty	SAR_design_target Head&Body Worn&Hotspot	SAR_design_target Limbs	
CCM 050	0#	1.0	0.87	2.07	
GSM 850	1#	1.0	0.87	2.07	
OCM 4000	3#	1.0	0.87	2.07	
GSM 1900	4#	1.0	0.87	2.07	
WCDMA D2	3#	1.0	0.87	2.07	
WCDMA_B2	4#	1.0	0.87	2.07	
	2#	1.0	0.87	2.07	
MCDMA D4	3#	1.0	0.87	2.07	
WCDMA_B4	4#	1.0	0.87	2.07	
	5#	1.0	0.87	2.07	
VAICEMA DE	0#	1.0	0.87	2.07	
WCDMA_B5	1#	1.0	0.87 0.87 0.87 0.87 0.87 0.87 0.87 0.87	2.07	
	3#	1.0	0.87	2.07	
LTE_B2	4#	1.0	0.87	2.07	
	5#	1.0	0.87	2.07	
	2#	1.0	0.87	2.07	
LTE D4	3#	1.0	0.87	2.07	
LTE_B4	4#	1.0	0.87	2.07	
	5#	1.0	0.87	2.07	
LTE DE	0#	1.0	0.87	2.07	
LTE_B5	1#	0.7	0.94	2.21	
	2#	1.5	0.78	1.84	
	3#	1.0	0.87	2.07	
LTE_B7	4#	1.5	0.78	1.84	
	5#	1.5	0.78	1.84	
LTE D40	0#	1.0	0.87	2.07	
LTE_B12	1#	1.0	0.87	2.07	
LTE 040	0#	1.0	0.87	2.07	
LTE_B13	1#	1.0	0.87	2.07	
LTE D47	0#	1.0	0.87	2.07	
LTE_B17	1#	1.0	0.87	2.07	
LTE DOG	0#	1.0	0.87	2.07	
LTE_B26	1#	0.7	0.94	2.21	
	2#	1.0	0.87	2.07	
LTE DOG	3#	1.0	0.87	2.07	
LTE_B66	4#	1.0	0.87	2.07	
	5#	1.0	0.87	2.07	
	2#	1.0	0.87	2.07	
LTE_B38	3#	1.0	0.87	2.07	
	4#	1.0	0.87	2.07	



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	5#	1.0	0.87	2.07
	2#	1.0	0.87	2.07
LTE D44	3#	1.0	0.87	2.07
LTE_B41	4#	1.0	0.87	2.07
	5#	1.0	0.87	2.07
NDEO NE	0#	1.0	0.87	2.07
NR5G_N5	1#	0.7	0.94	2.21
	2#	1.5	0.78	1.84
NDSO NZ	3#	1.0	0.87	2.07
NR5G_N7	4#	1.5	0.78	1.84
	5#	1.5	0.78	1.84
	2#	1.5	0.78	1.84
NDFO NOO	3#	1.0	0.87	2.07
NR5G_N38	4#	1.5	0.78	1.84
	5#	1.5	0.78	1.84
	2#	1.5	0.78	1.84
NID50 NI44	3#	1.0	0.87	2.07
NR5G_N41	4#	1.5	0.78	1.84
	5#	1.5	0.78	1.84
	2#	1.0	0.87	2.07
	3#	1.0	0.87	2.07
NR5G_N66	4#	1.0	0.87	2.07
	5#	1.0	0.87	2.07
	1#	1.5	0.78	1.84
NR5G_N77	6#	1.0	0.87	2.07
PC2 50%	7#	1.5	0.78	1.84
	8#	1.5	0.78	1.84
	1#	1.5	0.78	1.84
NR5G_N77	6#	0.7	0.94	2.21
PC3 100%	7#	1.5	0.78	1.84
	8#	1.5	0.78	1.84
	1#	1.5	0.78	1.84
NR5G_N78	6#	1.0	0.87	2.07
PC2 50%	7#	1.5	0.78	1.84
	8#	1.5	0.78	1.84
	1#	1.5	0.78	1.84
NR5G_N78	6#	0.7	0.94	2.21
PC3 100%	7#	1.5	0.78	1.84
	8#	1.5	0.78	1.84



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### 2.3 SAR Char

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR design target, below the predefined time-averaged power limit, for each characterized technology and band. Smart Transmit allows the device to transmit at higher power instantaneously, as high as P<sub>max</sub>, when needed, but enforces power limiting to maintain time-averaged transmit power to Plimit. Below table shows Plimit EFS settings and maximum tune up output power P<sub>max</sub> configured for this EUT for various transmit conditions (DSI: Device State Index).

Plimit for supported technologies and bands (actual EFS settings)

			ologies and ba	P <sub>limit</sub> (average)			
Band	Mode	Antenna	P <sub>max*</sub>	Head	Body worn&Limbs	Hotspot	
				DSI 1	DSI 4	DSI 5	
GSM 850	GPRS 4TS	0#	23.5	23.5	23.5	23.5	
GSIVI 650	GPRS 4TS	1#	23.8	20.8	23.8	20.8	
GSM 1900	GPRS 4TS	3#	20.5	19.5	20.5	19.5	
GSW 1900	GPRS 4TS	4#	20.0	20.0	20.0	20.0	
WCDMA_B2	RMC	3#	24.0	18.0	24.0	18.0	
WCDIVIA_DZ	RMC	4#	23.6	23.6	23.6	20.1	
	RMC	2#	19.7	19.7	19.7	19.7	
MCDMA D4	RMC	3#	24.0	17.5	24.0	17.5	
WCDMA_B4	RMC	4#	23.6	23.6	23.6	22.1	
	RMC	5#	22.1	19.6	19.6	19.6	
WCDMA_B5	RMC	0#	24.0	24.0	24.0	24.0	
MCDIMA_B2	RMC	1#	24.5	21.0	22.0	21.0	
	QPSK	3#	24.5	19.0	24.5	19.0	
LTE_B2	QPSK	4#	24.0	24.0	24.0	21.0	
	QPSK	5#	23.0	16.5	20.5	16.5	
	QPSK	2#	20.8	19.8	20.8	19.8	
LTE D4	QPSK	3#	24.5	18.0	23.5	14.5	
LTE_B4	QPSK	4#	23.7	23.7	23.7	22.2	
	QPSK	5#	22.9	19.4	20.4	19.4	
LTE DE	QPSK	0#	24.5	24.5	24.5	24.5	
LTE_B5	QPSK	1#	25.0	21.5	22.0	21.5	
	QPSK	2#	20.2	16.2	17.2	16.2	
. TE D7	QPSK	3#	24.5	18.0	24.5	18.0	
LTE_B7	QPSK	4#	24.2	24.2	24.2	19.7	
	QPSK	5#	22.7	15.7	18.2	15.7	
LTE DAG	QPSK	0#	24.0	24.0	24.0	24.0	
LTE_B12	QPSK	1#	24.4	24.4	24.4	24.4	
LTE D40	QPSK	0#	24.5	24.5	24.5	24.5	
LTE_B13	QPSK	1#	24.7	22.7	24.7	21.7	
LTC D47	QPSK	0#	24.0	24.0	24.0	24.0	
LTE_B17	QPSK	1#	24.4	24.4	24.4	24.4	
LTE DOG	QPSK	0#	24.5	24.5	24.5	24.5	
LTE_B26	QPSK	1#	25.0	22.0	22.0	22.0	
	QPSK	2#	19.7	18.7	19.7	18.7	
LTE DOG	QPSK	3#	23.5	18.0	23.5	18.0	
LTE_B66	QPSK	4#	23.0	23.0	23.0	22.0	
	QPSK	5#	21.7	18.2	18.2	18.2	
	QPSK	2#	18.4	15.4	16.9	15.4	
LTE_B38	QPSK	3#	22.5	17.5	22.5	17.5	
	QPSK	4#	22.2	22.2	22.2	19.7	



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	QPSK	5#	20.8	13.8	16.8	13.8
LTE_B41	QPSK	2#	18.3	15.8	17.3	15.8
	QPSK	3#	22.5	17.5	22.5	17.5
	QPSK	4#	22.3	22.3	22.3	20.3
	QPSK	5#	20.8	13.8	16.3	13.8
NR5G_N5	QPSK	0#	24.5	24.5	24.5	24.5
	QPSK	1#	25.0	22.0	22.0	22.0
NR5G_N7	QPSK	2#	20.5	17.5	18.5	17.5
	QPSK	3#	24.5	18.0	24.5	18.0
	QPSK	4#	24.2	24.2	24.2	19.2
	QPSK	5#	22.7	16.2	19.2	16.2
NR5G_N38	QPSK	2#	20.5	17.5	18.5	17.5
	QPSK	3#	24.5	16.5	24.5	16.5
	QPSK	4#	24.2	24.2	24.2	18.7
	QPSK	5#	22.8	16.3	19.3	16.3
NR5G_N41	QPSK	2#	20.5	18.0	18.5	18.0
	QPSK	3#	24.5	16.5	24.5	16.5
	QPSK	4#	24.2	24.2	24.2	19.2
	QPSK	5#	22.8	16.8	19.8	16.8
NR5G_N66	QPSK	2#	19.5	19.5	19.5	19.5
	QPSK	3#	23.5	18.0	23.5	18.0
	QPSK	4#	22.8	22.8	22.8	22.3
	QPSK	5#	21.7	19.7	20.2	19.7
NR5G_N77 PC2 50%	QPSK	1#	22.6	/	/	/
	QPSK	6#	24.0	/	/	/
	QPSK	7#	20.8	/	20.8	/
	QPSK	8#	18.6	/	/	/
NR5G_N77 PC3 100%	QPSK	1#	23.6	19.1	16.6	16.6
	QPSK	6#	25.0	14.5	14.5	14.5
	QPSK	7#	21.8	15.3	21.8	14.8
	QPSK	8#	19.6	16.1	18.1	16.1
NR5G_N78 PC2 50%	QPSK	1#	22.6	/	/	/
	QPSK	6#	24.0	/	/	
	QPSK	7#	20.8	/	20.8	/
	QPSK	8#	18.6	/	/	/
NR5G_N78 PC3 100%	QPSK	1#	23.6	19.1	16.6	16.6
	QPSK	6#	25.0	14.0	14.0	14.0
	QPSK	7#	21.8	14.8	21.8	14.8
	QPSK	8#	19.6	15.6	17.1	15.6

#### Note:

- 1) \*P<sub>max</sub> is used for RF tune up procedure. The maximum allowed output power is equal to P<sub>max</sub> + Total uncertainty.
- 2) The max allowed output power is the Plimit + Total uncertainty, and if Plimit is higher than Pmax, the device output power will be P<sub>max</sub> instead.
- 3) Note that WLAN operations are not enabled with Smart Transmit.

### ---END---



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