



FCC PART 15B TEST REPORT

No. I23Z70257-EMC01

for

Samsung Electronics Co., Ltd.

Wearable device

Model name: SM-R390

FCC ID: ZCASMR390

with

Hardware Version: REV1.0

Software Version: R390XXU0AWHG

Issued Date: 2023-09-11

Note:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I23Z70257-EMC01	Rev.0	1 st edition	2023-09-11

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

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1. Test Laboratory

1.1. Testing 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°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2023-08-22

Testing End Date: 2023-08-30

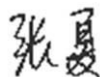
1.4. Signature



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2. Client Information

2.1. Applicant Information

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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Wearable device
Model Name	SM-R390
FCC ID:	ZCASMR390

Note: 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
EUT1	I23Z7025705a	REV1.0	R390XXU0AWHG

*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	Model	Manufacture
AE1	Battery	B319	ATL
AE2	Battery	B319	Sunwoda
AE3	Cable	SLQ-A237A	Saibao
AE4	Charger	/	Provided by laboratory

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

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1 + AE1/AE2 + AE3 + AE4	1 st Source EUT

Note:

Equipment Under Test (EUT) is a model of Wearable device with integrated antenna. It has Bluetooth function. According to the declaration of changes between 1st source and 2nd source EUT, no further test was performed on 2nd source.

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices - Unintentional Radiators	2019
ANSI C63.4	American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

Note: The test methods have no deviation with standards.

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 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 M Ω
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 6GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz—1000MHz, >90dB.
Electrical insulation	> 2 M Ω
Ground system resistance	< 4 Ω

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	NA	Not applicable
	F	Fail

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	B.1	P	CTTL(huayuan North Road)
2	Conducted Emission	15.107(a)	B.2	P	CTTL(huayuan North Road)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATI ON INTERVAL
1	Test Receiver	ESW44	103144	R&S	2023-10-25	1 Year
2	LISN	ENV216	101200	R&S	2024-06-05	1 year
3	Test Receiver	ESCI 7	100344	R&S	2024-02-21	1 Year
4	EMI Antenna	VULB 9163	01222	SCHWARZBECK	2024-02-28	1 year
5	EMI Antenna	3115	6914	ETS-Lindgren	2024-04-25	1 year
6	Software	EMC32	/	R&S	/	/

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission

Reference

FCC: CFR Part 15.109(a).

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (charging mode of MS) at distances of 3 meters is tested. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3/10 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode

The MS is operating in the charging mode. During the test MS is connected to a charger in the case of charging mode.

All equipment is placed on the test table top and arranged in a typical configuration in accordance with ANSI C63.4-2014 and manipulated to obtain worst case emissions.

A.1.3 Measurement Limit

Frequency range (MHz)	Field strength limit ($\mu\text{V/m}$)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

A.1.4 Test Condition

Frequency range (MHz)	RBW/VBW	Sweep Time (s)	Detector
30-1000	120kHz (IF Bandwidth)	5	Peak/Quasi-peak
Above 1000	1MHz/3MHz	15	Peak, Average

A.1.5 Measurement Results

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss". It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{Mea}} + A_{Rpl} = P_{\text{Mea}} + G_A + G_{PL}$$

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case): $U = 4.84 \text{ dB}$, $k=2$.

Measurement results for Set.1:

Charing Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17999.660	45.10	-29.06	46.66	27.50	54.00	8.90	H
17992.180	45.00	-29.06	46.66	27.40	54.00	9.00	H
17991.840	44.90	-29.06	46.66	27.30	54.00	9.10	V
17994.900	44.80	-29.06	46.66	27.20	54.00	9.20	V
17993.880	44.60	-29.06	46.66	27.00	54.00	9.40	H
17977.560	44.40	-29.06	46.66	26.80	54.00	9.60	V

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17778.320	55.10	-29.63	45.95	38.77	74.00	18.90	V
17949.680	54.90	-28.94	46.66	37.18	74.00	19.10	V
17999.320	54.30	-29.06	46.66	36.70	74.00	19.70	H
17996.600	54.20	-29.06	46.66	36.60	74.00	19.80	H
17866.040	54.10	-29.39	45.95	37.54	74.00	19.90	V
17991.160	53.90	-29.06	46.66	36.30	74.00	20.10	V

Measurement results for Set.1:

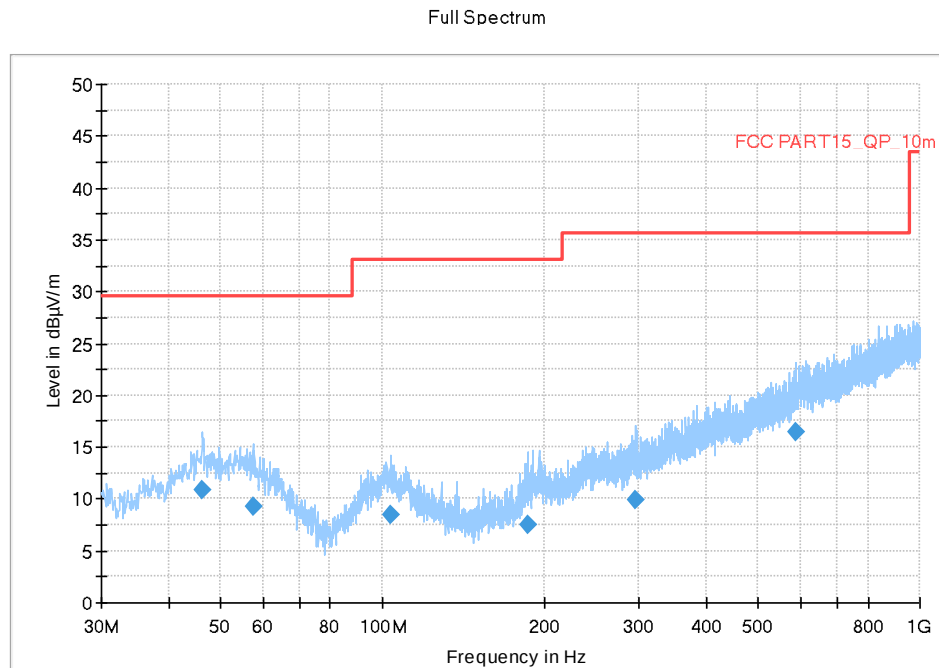


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
46.199000	10.81	29.54	18.73	120.000	302.0	V	135.0
57.451000	9.29	29.54	20.25	120.000	225.0	H	14.0
103.720000	8.41	33.06	24.65	120.000	108.0	V	8.0
186.170000	7.50	33.06	25.56	120.000	108.0	V	239.0
296.168000	9.87	35.56	25.69	120.000	183.0	H	45.0
589.205000	16.45	35.56	19.11	120.000	100.0	H	292.0

Full Spectrum

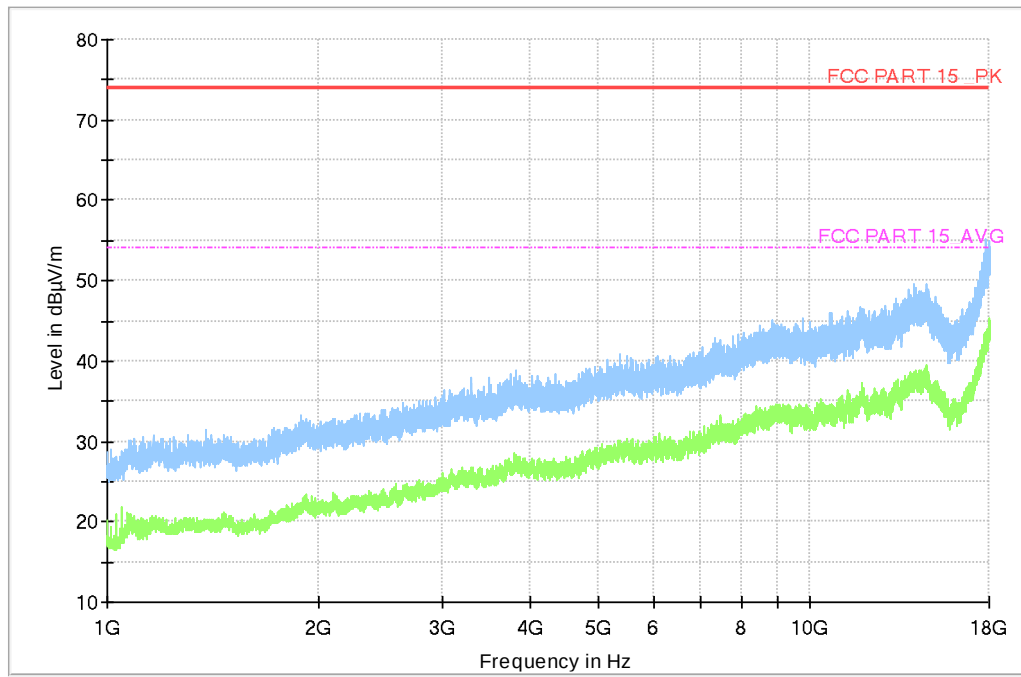


Fig A.2 Radiated Emission from 1GHz to 18GHz

A.2 Conducted Emission

Reference

FCC: CFR Part 15.107(a).

A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 7.3.

A.2.2 EUT Operating Mode

The MS is operating in the charging mode. During the test MS is connected to a charger in the case of charging mode.

A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency		

A.2.4 Test Condition in charging mode

Voltage (V)	Frequency (Hz)
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1

A.2.5 Measurement Results

Measurement uncertainty: $U = 3.08 \text{ dB}$, $k=2$.

Charging Mode, Set.1:

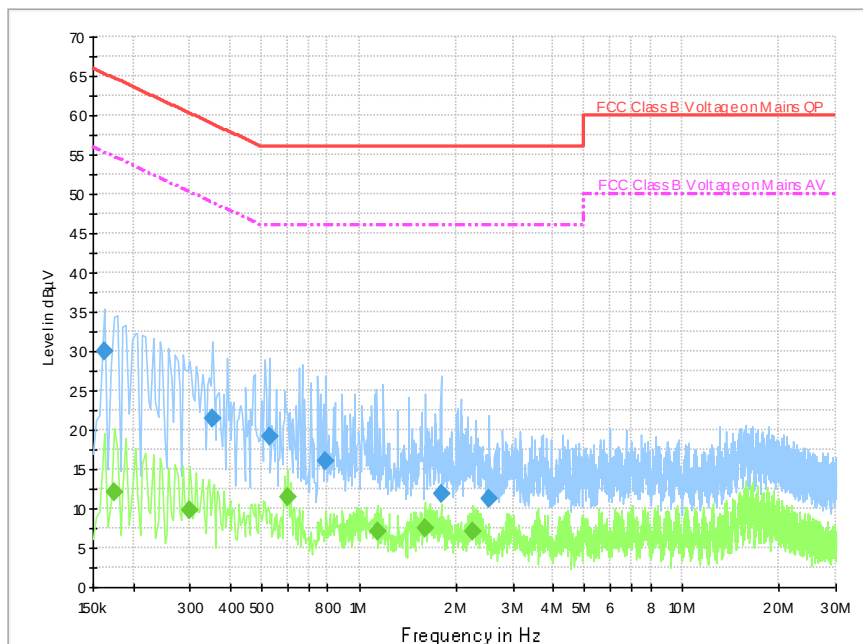


Fig A.3 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.162000	29.9	2000.0	9.000	On	L1	19.8	35.5	65.4	
0.350000	21.5	2000.0	9.000	On	N	19.7	37.5	59.0	
0.526000	19.3	2000.0	9.000	On	N	19.7	36.7	56.0	
0.790000	16.1	2000.0	9.000	On	N	19.7	39.9	56.0	
1.794000	11.8	2000.0	9.000	On	N	19.6	44.2	56.0	
2.534000	11.3	2000.0	9.000	On	N	19.6	44.7	56.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.174000	12.2	2000.0	9.000	On	L1	19.7	42.6	54.8	
0.298000	9.9	2000.0	9.000	On	L1	19.7	40.4	50.3	
0.602000	11.6	2000.0	9.000	On	N	19.6	34.4	46.0	
1.138000	7.0	2000.0	9.000	On	L1	19.7	39.0	46.0	
1.594000	7.5	2000.0	9.000	On	N	19.6	38.5	46.0	
2.258000	7.0	2000.0	9.000	On	N	19.6	39.0	46.0	

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