



# 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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The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

**Test Laboratory:**

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## **REPORT HISTORY**

| <b>Report Number</b> | <b>Revision</b> | <b>Description</b>      | <b>Issue Date</b> |
|----------------------|-----------------|-------------------------|-------------------|
| I23Z70257-EMC01      | Rev.0           | 1 <sup>st</sup> 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



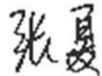
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Wang Xue  
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## **2. Client Information**

### **2.1. Applicant Information**

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Tel: +82-10-2722-4159

### **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**

| <b>EUT ID*</b> | <b>SN or IMEI</b> | <b>HW Version</b> | <b>SW Version</b> |
|----------------|-------------------|-------------------|-------------------|
| 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**

| <b>AE ID*</b> | <b>Description</b> | <b>Model</b> | <b>Manufacture</b>     |
|---------------|--------------------|--------------|------------------------|
| 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**

| <b>EUT set-up No.</b> | <b>Combination of EUT and AE</b> | <b>Remarks</b>             |
|-----------------------|----------------------------------|----------------------------|
| Set.1                 | EUT1 + AE1/AE2 + AE3 + AE4       | 1 <sup>st</sup> 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 1<sup>st</sup> source and 2<sup>nd</sup> source EUT, no further test was performed on 2<sup>nd</sup> source.

## **4. Reference Documents**

### **4.1. Reference Documents for testing**

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

| <b>Reference</b>       | <b>Title</b>   | <b>Version</b> |
|------------------------|--|----------------|
| FCC Part 15, Subpart B | Radio frequency devices - Unintentional Radiators  | 2019           |
| ANSI C63.4             | American National Standard for<br>Methods of Measurement of Radio-<br>Noise Emissions from Low-Voltage<br>Electrical and Electronic Equipment<br>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;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation                           | > 2 M $\Omega$                                  |
| Ground system resistance                        | < 4 $\Omega$                                    |
| Normalised site attenuation (NSA)               | < $\pm 4$ 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;<br>1MHz—1000MHz, >90dB. |
| Electrical insulation    | > 2 M $\Omega$                                |
| Ground system resistance | < 4 $\Omega$                                  |



## 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<br>(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

$P_{\text{Mea}}$ : Measurement result on receiver.

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

#### Measurement results for Set.1:

##### Charing Mode/Average detector

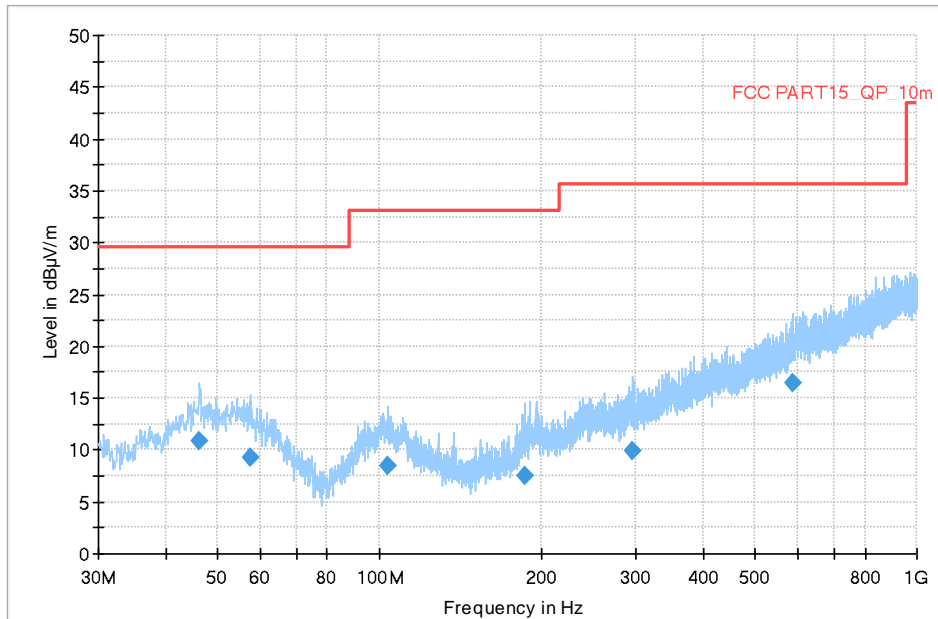
| Frequency (MHz) | Measurement Result (dB $\mu$ V/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dB $\mu$ V) | Limit (dB $\mu$ V/m) | Margin (dB) | Antenna Pol. (H/V) |
|-----------------|-----------------------------------|-----------------|-----------------------|-------------------------------|----------------------|-------------|--------------------|
| 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 (dB $\mu$ V/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dB $\mu$ V) | Limit (dB $\mu$ V/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:**

Full Spectrum

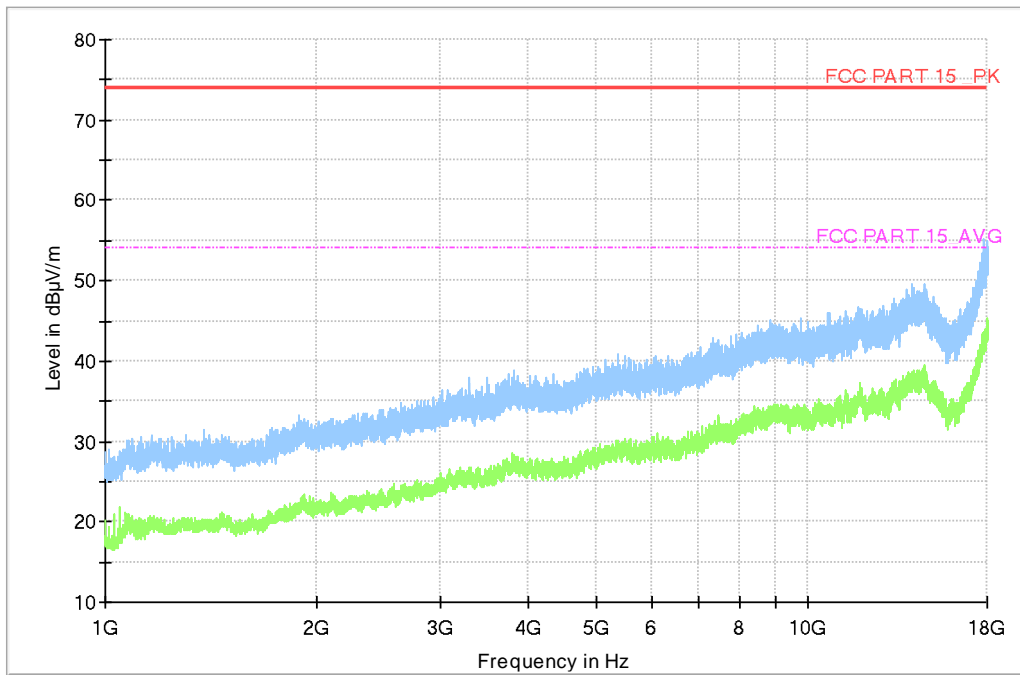


**Fig A.1 Radiated Emission from 30MHz to 1GHz**

**Final Result 1**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Bandwidth (kHz) | Height (cm) | PoI | 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 (dB $\mu$ V) |           |
|-----------------------------|------------------------------|-----------|
|                             | 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:  $U= 3.08$  dB,  $k=2$ .

#### Charging Mode, Set.1:

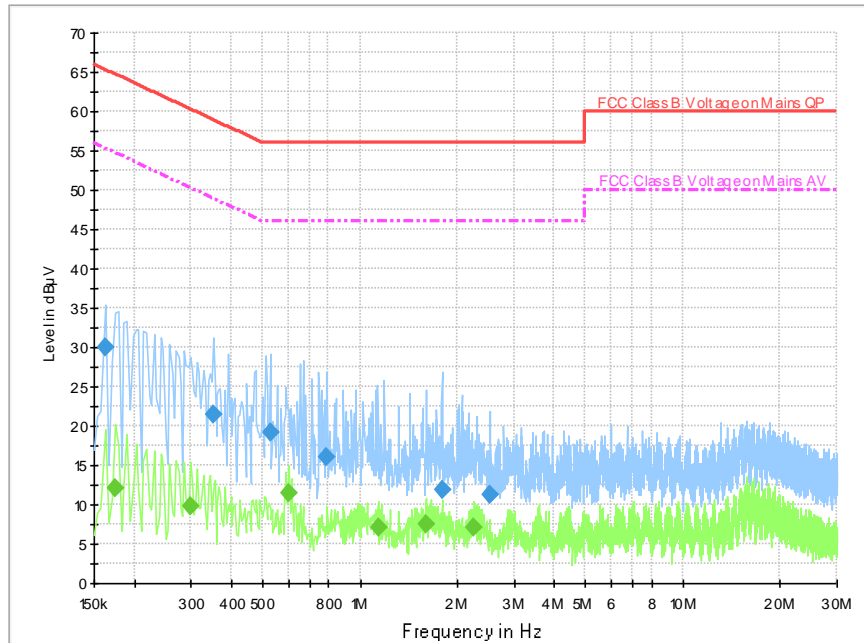


Fig A.3 Conducted Emission from 150kHz to 30MHz

#### 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\*\*\*