

# TEST REPORT

CE MPE Test for SFM20R1

**APPLICANT**

SJI Co.,Ltd

**REPORT NO.**

HCT-RF-1907-CE012-R1

**DATE OF ISSUE**

August 9, 2022

**Tested by**  
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**Technical Manager**  
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REPORT**  
MPE Test for  
SFM20R1

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**Additional Model**  
-

<b>Applicant</b>	<b>SJI Co.,Ltd</b> 54-33, Dongtanhana 1-gil, Gyeonggi-do Hwaseong-si South Korea
<b>Product Name</b> <b>Model Name</b>	Sigfox Quad-mode module SFM20R1
<b>Test Standard Used</b>	EN 62311: 2008
<b>Test Results</b>	Approval for CE Temperature : (24.3 ± 3.0) °C, Relative Humidity : (37.0 ± 3.0) % R.H. Results, Measurement uncertainty : Refer to the attachment
<b>Manufacturer</b>	SJI Co.,Ltd

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.  
This test results were applied only to the test methods required by the standard.

## REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	July 02, 2019	Initial Release
1	August 09, 2022	We modified the applicant name.

Test Report Statement:

The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme) / A2LA(American Association for Laboratory Accreditation), which signed the ILAC-MRA.

If this report is required to confirmation of authenticity, please contact to [www.hct.co.kr](http://www.hct.co.kr)



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## 1. Product information

Equipment	Sigfox Quad-mode module	
Equipment category:	Short Range Device	
Model No.:	SFM20R1	
Standard :	EN 62311: 2008	
frequency range:	WLAN : 2 412 MHz ~ 2 472 MHz Bluetooth : 2 402 MHz ~ 2 480 MHz Sigfox : 868.055 MHz ~ 868.205 MHz	
Version	Hardware : 1.0	
	Software : SFM20R_V204	
Power source:	Normal voltage :	DC 3.30 V
	Extreme lower voltage :	DC 3.20 V
	Extreme upper voltage :	DC 5.00 V
Temperature range:	Normal Temperature :	+24.3°C
	Extreme lower Temperature :	-30.0°C
	Extreme upper Temperature :	+85.0°C
Antenna type:	Dipole Antenna	

### Note:

At the request of the customer, all test requirements were performed EN 62311: 2008

## 2. Power Density Calculation

Consideration of radio frequency radiation exposure for EUT is done as

Calculation standard	EN62311:2008
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SAR test results: not applicable

### Electromagnetic Field Calculation:

The EUT is considered as a base station according to EN 62311:2008

Therefore distance to human body of min. 20 cm is determined.

The antenna used for this base station must provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

A safety statement concerning minimum separation distances from enclosure of the device will be integrated in the user's manual to provide end-users with transmitter operating conditions for satisfying exposure compliance.

Formula:

$$S = \frac{PG}{4\pi R^2} \quad or \quad S = \frac{EIRP}{4\pi R^2}$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

### 3. Test Limit

According to EN 62311:2008, the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiations specified 1999/5/EC

Reference levels for electric, magnetic and electromagnetic fields  
(0 Hz to 300 GHz, unperturbed rms values)

Frequency Range	E-field Strength (V/m)	H-Field Strength (A/m)	B-field (uT)	Equivalent plane Wave power Density S(W/m <sup>2</sup> )
0-1 Hz	--	$3.2 \times 10^4$	$4 \times 10^4$	--
1-8 Hz	10000	$3.2 \times 10^4/f^2$	$4 \times 10^4/f^2$	--
8-25 Hz	10000	$4000/f$	$5000/f$	--
0.025-08 kHz	$250/f$	$4/f$	$5/f$	--
0.8-3 kHz	$250/f$	5	6.25	--
3-150 kHz	87	5	6.25	--
0.15-1 MHz	87	$0.73/f$	$0.92/f$	--
1-10 MHz	$87/f^{1/2}$	$0.73/f$	$0.92/f$	--
10-400 MHz	28	0.073	0.092	2
400-2000 MHz	$1.375 f^{1/2}$	$0.037 f^{1/2}$	$0.0046 f^{1/2}$	$f/200$
2-300 GHz	61	0.16	0.20	10

Notes:

1. F as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10GHz  $S_{eq} E^2 H^2$  and  $B^2$  are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz  $S_{eq} E^2 H^2$  and  $B^2$  are to be averaged over any  $68/f^{1.05}$  minute period (f in GHz)
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided..

#### 4. Calculation

##### [WLAN]

EIRP[Radiated Power]	15.0000	dBm
EIRP[Radiated Power]	31.623	mW
Prediction distance	20.00000	cm
Prediction frequency	2412 ~ 2472	MHz
Power density at prediction frequency (S)	0.006291	mW/cm2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm2

##### [Bluetooth]

EIRP[Radiated Power]	5.0000	dBm
EIRP[Radiated Power]	3.162	mW
Prediction distance	20.00000	cm
Prediction frequency	2402 ~ 2480	MHz
Power density at prediction frequency (S)	0.000629	mW/cm2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm2

##### [Sigfox]

EIRP[Radiated Power]	13.9000	dBm
EIRP[Radiated Power]	24.547	mW
Prediction distance	20.00000	cm
Prediction frequency	868.055 ~ 868.205	MHz
Power density at prediction frequency (S)	0.004883	mW/cm2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm2

##### Simultaneous transmission operations

->Simultaneous MPE 20cm is Sigfox(0.004883/1.0) + Bluetooth (0.000629/1.0) = 0.005512 < 1

->Simultaneous MPE 20cm is Bluetooth (0.000629/1.0) + WLAN(0.006291/1.0) = 0.006920 < 1