

# TEST REPORT

MPE Test for SRM200A

APPLICANT  
SEONG JI INDUSTRIAL CO.,LTD.

REPORT NO.  
HCT-RF-1911-CE014

DATE OF ISSUE  
November 08, 2019

**HCT Co., Ltd.**

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**SEONG JI INDUSTRIAL CO.,LTD**  
54-33, DongtanHana 1-gil, Hwaseong-si, Gyeonggi-do, 18423, Korea

Product Name	Monarch Quad-mode module
Model Name	SRM200A
Test Standard Used	EN 62311:2008
Test Results	Approval for CE Temperature : $(21.5 \pm 3.0)$ °C, Relative Humidity : $(51.7 \pm 3.0)$ % R. H. Results, Measurement uncertainty : Refer to the attachment
Manufacturer	SEONG JI INDUSTRIAL 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.

Tested by  
Hyeong Hoon Lee

Technical Manager  
Seul Ki Lee

**HCT CO., LTD.**

*Soo Chan Lee*  
SooChan Lee / CEO

## REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	November 08, 2019	Initial Release

The test result only corresponds to the tested sample. It is not permitted to copy this Report, in part or in full, without the permission of the laboratory.

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## 1. Product information

Application:	Monarch Quad-mode module	
Equipment category:	Short Range Device	
Model No.:	SRM200A	
Additional Model No.:	-	
Standard:	EN 62311:2008	
Frequency range:	2 402 MHz ~ 2 480 MHz Tx : 868.034 MHz ~ 868.226 MHz Rx : 869.429 MHz ~ 869.621 MHz	
Version:	Hardware : v1.4	
	Software : v1.0.1	
Power source:	Normal voltage :	DC 3.3 V
	Extreme lower voltage :	DC 2.7 V
	Extreme upper voltage :	DC 3.6 V
Temperature range:	Normal Temperature :	+22.5°C
	Extreme lower Temperature :	-30.0°C
	Extreme upper Temperature :	+85.0°C
Antenna type:	External antenna (Dipole Antenna)	
Max. antenna gain:	BT LE: 5.33 dBi Sigfox: 1.76 dBi WLAN: 4.44 dBi	

### 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	1.0

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

##### [BT LE]

EIRP[Radiated Power]	9.24	dBm
EIRP[Radiated Power]	8.39	mW
Prediction distance	20.00	cm
Prediction frequency	2 402 ~ 2 480	MHz
Power density at prediction frequency (S)	0.00167	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00	mW/cm <sup>2</sup>

##### [2.4G WLAN]

EIRP[Radiated Power]	19.36	dBm
EIRP[Radiated Power]	86.30	mW
Prediction distance	20.00	cm
Prediction frequency	2 400 ~ 2 483.5	MHz
Power density at prediction frequency (S)	0.01717	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00	mW/cm <sup>2</sup>

##### [Sigfox]

EIRP[Radiated Power]	14.81	dBm
EIRP[Radiated Power]	30.27	mW
Prediction distance	20.00	cm
Prediction frequency	868.055 ~ 868.205	MHz
Power density at prediction frequency (S)	0.00602	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00	mW/cm <sup>2</sup>

#### Simultaneous transmission operations

->Simultaneous MPE 20cm is BT LE (0.00167 / 1.0) + 2.4G WLAN (0.01717 / 1.0) = 0.01884 < 1

->Simultaneous MPE 20cm is BT LE (0.00167 / 1.0) + Sigfox (0.00602 / 1.0) = 0.00769 < 1