



# FCC RF Test Report

**APPLICANT** : Inseego Corp.  
**EQUIPMENT** : 5G High Performance Sub6 & mmWave  
Outdoor CPE  
**BRAND NAME** : Inseego  
**MODEL NAME** : FW2010-1, FW2010e-1  
**FCC ID** : PKRISGFW2010  
**STANDARD** : 47 CFR Part 2, 27D  
**CLASSIFICATION** : PCS Licensed Transmitter (PCB)

The product was received on Dec. 16, 2020 and completely tested on Feb. 25, 2021. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

This product installed a RF module (Brand Name: Inseego, Model Name: MD2000, FCC ID: PKRISGMD2000) during the test, only conducted power, EIRP and RSE test items are tested in this report, all the other test results are quoted on module RF report.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Reviewed by: Jason Jia / Supervisor

Approved by: Alex Wang / Manager



**Sporton International (Kunshan) Inc.**

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300  
People's Republic of China**



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### REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG0D1611E	Rev. 01	Initial issue of report	Mar. 29, 2021



### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
-	-	Peak-to-Average Ratio	<13dB	N/A	1
3.2	§27.50 (a)(2)	EIRP	EIRP < 20W/5MHz	PASS	-
-	§2.1049	Occupied Bandwidth	Reporting Only	PASS	1
-	§2.1051 §27.53 (a)(3)	Conducted Band Edge Measurement	Refer standard	PASS	1
-	§2.1051 §27.53 (a)(3)	Conducted Spurious Emission	< 70+10log <sub>10</sub> (P[Watts])	PASS	1
-	§2.1055 §27.54	Frequency Stability Temperature & Voltage	Within the band	PASS	1
4.4	§2.1053 §27.53 (a)(3)	Radiated Spurious Emission	< 70+10log <sub>10</sub> (P[Watts])	PASS	Under limit 16.97 dB at 4612.000 MHz

**Note:**

- All conducted test items were leveraged from module RF report which can refer to Report No. "FG090125D"
- The maximum power of host is lower than and very close to the module, therefore, we chose higher power of the module to calculate the EIRP and show in the report.

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



# 1 General Description

## 1.1 Applicant

Inseego Corp.  
9710 Scranton Road, Suite 200 San Diego, CA 92121

## 1.2 Manufacturer

MeiG Smart Technology Co., Ltd  
Floor 2, Office Building No.5, Lingxia Road, Fenghuang Community, Fuyong Street, Bao 'an District, Shenzhen

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	5G High Performance Sub6 & mmWave Outdoor CPE
Brand Name	Inseego
Model Name	FW2010-1, FW2010e-1
FCC ID	PKRISGF2010
EUT supports Radios application	LTE/5G NR/GNSS Bluetooth LE
HW Version	4
SW Version	2.384
EUT Stage	Identical Prototype

## 1.4 Product Specification of Equipment Under Test

Product Feature	
Tx Frequency	LTE Band 30 : 2305 MHz ~ 2315 MHz
Rx Frequency	LTE Band 30 : 2350 MHz ~ 2360 MHz
Bandwidth	5MHz / 10MHz
Maximum Output Power to Antenna	LTE Band 30 : 23.93 dBm
Antenna Gain	LTE Band 30 : 3.56 dBi
Type of Modulation	QPSK / 16QAM / 64QAM

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

### 1.6 Maximum EIRP Power

LTE Band 30		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
10	2310.0	-	-	0.5610	-	-	0.4853
LTE Band 30		64QAM					
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)			
10	2310.0	-	-	0.3639			

Note: Based on engineering evaluation, only the maximum bandwidth and the worst modulation test results are shown in the report.

### 1.7 Testing Site

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

<b>Test Firm</b>	Sporton International (Kunshan) Inc.		
<b>Test Site Location</b>	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People’s Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	03CH04-KS	CN1257	314309

### 1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24a



## 1.9 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, Part 27(D)
- ♦ ANSI C63.26-2015
- ♦ FCC KDB 971168 Power Meas License Digital Systems D01 v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

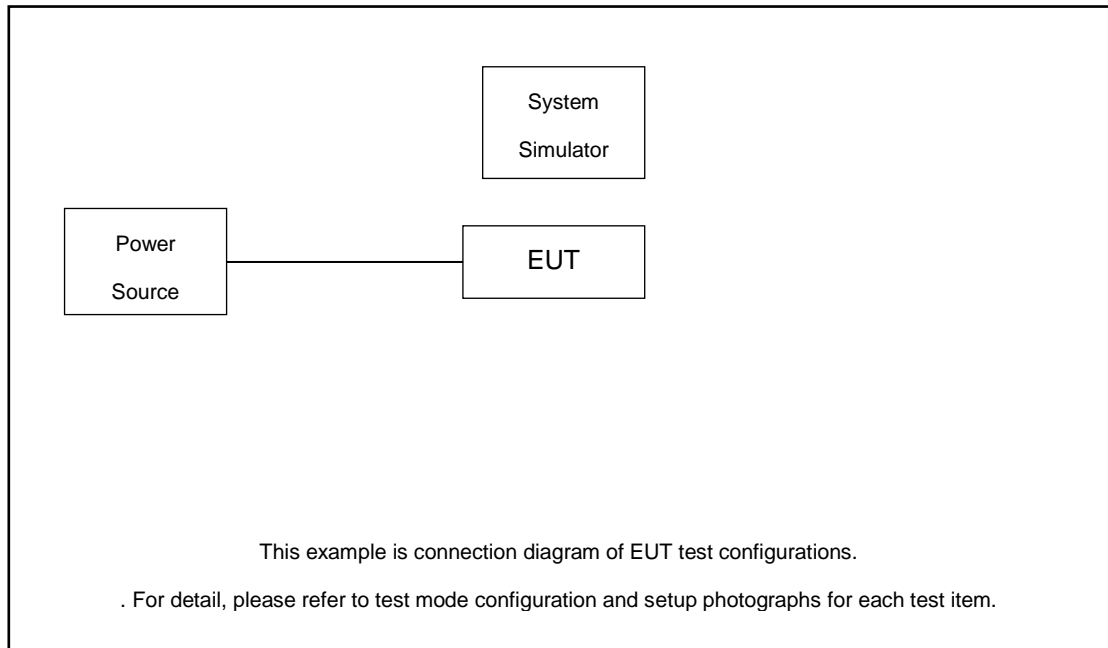
Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Conducted Test Cases	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	30	-	-	V		-	-	V	V	V	V	V	V	V	V	V
		-	-		V	-	-	V	V	V	V	V		V		
E.I.R.P	30	-	-	V		-	-	V	V		V			V	V	V
		-	-		V	-	-	V	V	V	V				V	
Radiated Spurious Emission	30	-	-		V	-	-	V							V	
Note	<ol style="list-style-type: none"> <li>The mark "v " means that this configuration is chosen for testing</li> <li>The mark "- " means that this bandwidth is not supported.</li> <li>The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</li> </ol>															



## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
2.	POE Adapter	N/A	N/A	N/A	N/A	N/A

## 2.4 Frequency List of Low/Middle/High Channels

LTE Band 30 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	27710	-
	Frequency	-	2310	-
5	Channel	27685	27710	27735
	Frequency	2307.5	2310	2312.5

## 3 Conducted Test Items

### 3.1 Conducted Output Power Measurement

#### 3.1.1 Description of the Conducted Output Power Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

#### 3.1.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

## 3.2 EIRP

### 3.2.1 Description of EIRP

For fixed customer premises equipment (CPE) stations transmitting in the 2305-2320 MHz band or in the 2345-2360 MHz band, the peak EIRP must not exceed 20 watts within any 5 megahertz of authorized bandwidth. For fixed WCS CPE using TDD technology, the duty cycle must not exceed 38 percent

### 3.2.2 Test Procedures

1. According to KDB 412172 D01 Power Approach,
2.  $EIRP = P_T + G_T - L_C$ ,  $ERP = EIRP - 2.15$ , where  
 $P_T$  = transmitter output power in dBm  
 $G_T$  = gain of the transmitting antenna in dBi  
 $L_C$  = signal attenuation in the connecting cable between the transmitter and antenna in dB

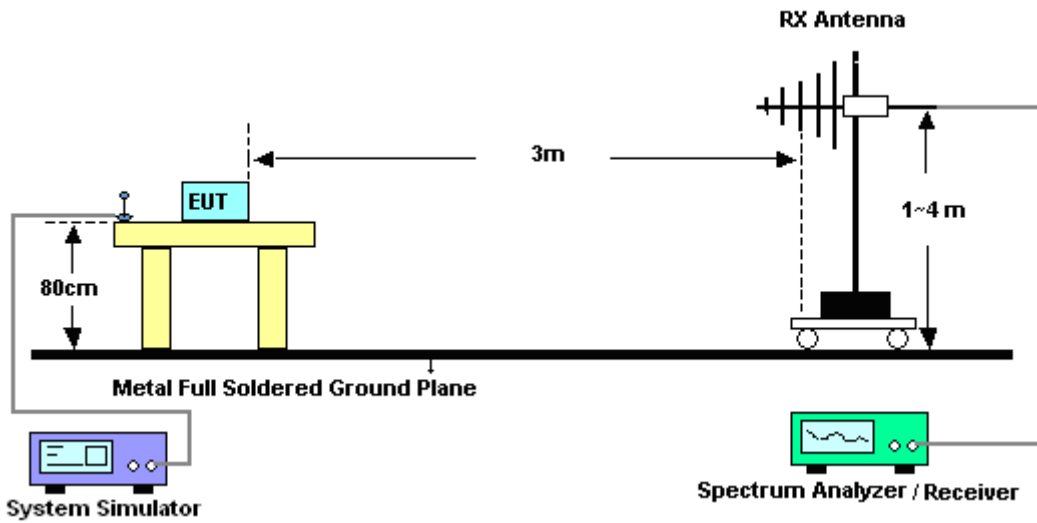
## 4 Radiated Test Items

### 4.1 Measuring Instruments

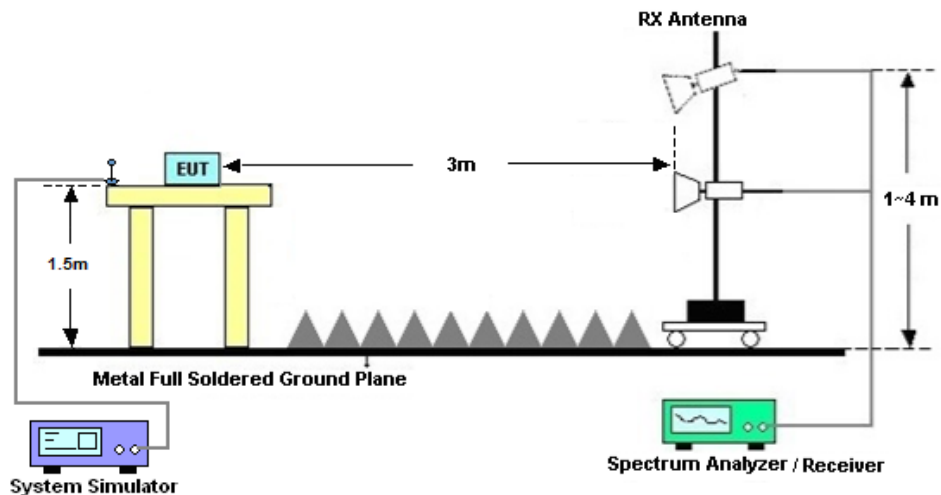
See list of measuring instruments of this test report.

### 4.2 Test Setup

#### 4.2.1 For radiated test from 30MHz to 1GHz



#### 4.2.2 For radiated test above 1GHz



### 4.3 Test Result of Radiated Test

Please refer to Appendix B.

## 4.4 Radiated Spurious Emission Measurement

### 4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI/TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $70 + 10 \log (P)$  dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
1. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.

$$\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$$

$$\text{ERP (dBm)} = \text{EIRP} - 2.15$$

9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from  $70 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [70 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [70 + 10\log(P)] \text{ (dB)}$$

$$= -40\text{dBm.}$$



## 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 15, 2020	Feb. 25, 2021	Apr. 14, 2021	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Jun. 08, 2020	Feb. 25, 2021	Jun. 07, 2021	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1356	1GHz~18GHz	Apr. 20, 2020	Feb. 25, 2021	Apr. 19, 2021	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Jan. 06, 2021	Feb. 25, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 06, 2021	Feb. 25, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 07, 2021	Feb. 25, 2021	Jan. 06, 2022	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 0P	2025788	1Ghz-18Ghz	Jan. 06, 2021	Feb. 25, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 14, 2020	Feb. 25, 2021	Oct. 13, 2021	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Feb. 25, 2021	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Feb. 25, 2021	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Feb. 25, 2021	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required

## 6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage  $K=2$  to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.3dB
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.8dB
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## Appendix A. Test Results of Conducted Test

### Conducted Output Power(Average power)and EIRP

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	ERP		
Channel				27710			ERP		
Frequency (MHz)				2310				M	
10	QPSK	1	0		23.93			0.5610	
10	QPSK	1	25		23.84			0.5495	
10	QPSK	1	49		23.88			0.5546	
10	QPSK	25	0		23.03			0.4560	
10	QPSK	25	12		22.96			0.4487	
10	QPSK	25	25		22.99			0.4519	
10	QPSK	50	0		22.90			0.4426	
10	16QAM	1	0		23.30			0.4853	
10	64QAM	1	0		22.05			0.3639	
Channel				27685	27710	27735	ERP		
Frequency (MHz)				2307.5	2310	2312.5	L	M	H
5	QPSK	1	0	23.84	23.93	23.87	0.5495	0.5610	0.5534
5	16QAM	1	0	23.22	23.28	23.18	0.4764	0.4831	0.4721

## Appendix B. Test Results of Radiated Test

### Radiated Spurious Emission

LTE Band 30 / 10MHz / QPSK / RB Size 1 Offset 0								
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	4612	-58.05	-40	-18.05	-69.51	2.84	14.30	H
	6916	-60.46	-40	-20.46	-70.40	3.49	13.43	H
	9220	-60.75	-40	-20.75	-70.99	3.85	14.09	H
	4612	-56.97	-40	-16.97	-68.43	2.84	14.30	V
	6916	-61.46	-40	-21.46	-71.40	3.49	13.43	V
	9220	-60.68	-40	-20.68	-70.92	3.85	14.09	V

**Remark:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.