Radio Frequency Exposure Evaluation Report

For:

Weathermatic

Model Name:

SLHUB-RF-5

Product Description:

Module receiving weather station data on a 15 or 60 minutes interval

FCC ID: OLPSLHUBRF900MZ

Applied Rules and Standards:
CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091)

Report number: EMC_WEATH_022_20501_FCC_MPE
DATE: 2020-04-08

A2LA Accredited

IC recognized #
3462B-1

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1. Assessment

This RF Exposure evaluation report provides information about compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091).

The device meets the limits as stipulated by the above given FCC rule parts based on available specifications.

Company Name	Product Description	Model #
Weathermatic	Module receiving weather station data on a 15 or 60 minutes interval	SLHUB-RF-5

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2020-04-08	Compliance	Cindy Li (EMC Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I am approving this document Location: Date: 2020-04-08 11:51:34

Responsible for the Report:

Date	Section	Name	Signature
2020-04-08	Compliance	Kris Lazarov (Senior EMC Engineer)	Kris Lazarov Digitally signed by Kris Lazarov Date: 2020.04.08 11:31:25 -07'00'

Contents

2. Administrative Data

2.1. Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Compliance Manager:	Cindy Li
Responsible Project Leader:	Kris Lazarov

2.2. Identification of the Client

Applicant's Name:	Weathermatic
Street Address:	3301 W Kingsley Rd
City/Zip Code	Garland, TX 75041
Country	USA

2.3. Identification of the Manufacturer

Manufacturer's Name:	Same as applicant
Manufacturers Address:	
City/Zip Code	
Country	

3. Equipment under Assessment

Model No	SLHUB-RF-5
HW Version	FR
SW Version	0.21
FHSS Radio Module:	Weathermatic Model: SLHUBRF-5 FCC ID: OLPSLHUBRF900MZ
WiFi / BTLE Module	Espressif Systems Model: ESP32-WROOM-32D FCC ID: 2AC7Z-ESPWROOM32D
Product Description	Module receiving weather station data on a 15 or 60 minutes interval
Transceiver Technology	FHSS Radio: 902.35 to 927.6 MHz WiFi / BT LE radio: 2400 MHz to 2483.5 MHz
Co-located Transmitters/ Antennas?	FHSS radio with two WiFi or BTLE can transmit simultaneously
Power Supply/ Rated Operating Voltage Range	Vmin: 20V dc/ Vnom: 24V dc / Vmax: 27.2V dc
Operating Temperature Range	-40 ºC to 85 ºC
Sample Revision	☐Prototype ■Production ☐ Pre-Production
Device Category	☐Fixed Installation ■Mobile ☐Portable
Exposure Category	☐ Occupational/ Controlled ■ General Population/ Uncontrolled

3.1. Antenna Information

Antenna	Radio Technology	Peak Gain (dBi)
Internal BCB Antenna	FHSS Radio	0
Internal BCB Antenna	WiFi / BTLE	3.7

4. RF Exposure Limits

For the specific described radio apparatus the following basic limits and rules apply

4.1. Power Density Limits acc. to FCC 1.1310(e)

Frequency Range (MHz)	Power density (mW/cm²)	Averaging time (minutes)
300-1500	f/1500	30
1500 – 100.000	1.0	30

4.2. Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c)

- Operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm
- Operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm

Per KDB 447498 D01 FCC allows calculative estimation of RF exposure for mobile applications when routine environmental evaluation categorical exclusion applies and also for fixed applications.

4.3. RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

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

Where: S = power density (mW/cm² or W/m²)
P = power input to the antenna (mW or W)
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 (cm or m)

5. Evaluations

5.1. Routine Environmental Evaluation Applicability Stand Alone transmission

Transmission Mode	EIRP dBm	Duty Cycle	Limits for Routine Environmental Evaluation Applicability, EIRP dBm	Exempt from Routine evaluation (Yes/No)
FHSS	14.6	1:1	< 31.8	Yes
WiFi	30.2	1:1	< 34.8	Yes
BT LE	4.2	1:1	< 34.8	Yes

Note: EIRP power is calculation by adding the antenna gain to the Conducted output power. The conducted output power and the antenna gain is derived from the FCC certification record for both radio modules.

Conclusion:

- Since the EIRP is less than the FCC limit, this equipment is exempt from Routine evaluation.

5.2. Compliance with MPE (Power Density) limits

Power Density Calculation						
Band of Operation MHz	EIRP dBm	Maximum Duty Cycle %	Distance cm	Power Density mW/cm^2	FCC Limit mW/cm^2	Verdict
FHSS	14.6	1:1	20	0.006	0.619	Pass
WiFi	30.2	1:1	20	0.208	1.000	Pass
BT LE	4.2	1:1	20	0.001	1.000	Pass

Conclusion:

- This equipment fulfills the MPE limits for the minimum 20cm distance between the antenna and the human body

6. Routine Environmental Evaluation Applicability Simultaneous Transmission

- Possible simultaneous transmissions: According to the manufacturer, the Wi-Fi / BTLE radio module incorporated within the device operate simultaneously with the Cellular module. Theoretically, the worst case of simultaneous transmission is with the tree transmitters operating at the highest output power mode, within the nearest frequency bands (Wi-Fi + FHSS).

Transmission Mode	Sum of the ratios for the highest Power Densities	Limits for the Highest Combined Ratio	Exempt from Routine evaluation
Wi-Fi + FHSS	0.208+0.006=0.214	< 1	Yes

Note: Power Density to Applicable limit for Stand Alone Operation are derived from table in section 5.2

Conclusion:

- This equipment is excluded from simultaneous transmission MPE test.

7. Revision History

Date	Report Name	Changes to report	Report prepared by
2020-04-08	EMC_WEATH_022_20501_FCC_MPE	Initial Version	Kris Lazarov

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