RF Exposure Evaluation Declaration

FCC ID:	2ACQELR8X
IC:	27195-LR8X
Applicant:	Flowline, Inc.
Product:	LR Radar Level Instrument
Model No.:	LR80, LR81, LR83, LR85
Brand Name:	ECHOBEAM
FCC Rule Part(s):	FCC Part 2.1091
ISED Rules:	RSS-102 Issue 5
Evaluated Date:	December 27, 2023

Reviewed By: Vincent Yu

Approved By: Robin Wu

Revision History

Report No.	Version	Description	Issue Date	Note
2312RSU058-U3	V01	Initial Report	2023-12-22	Invalid
2312RSU058-U3	V02	The MPE calculation method in Section 3 has been updated in accordance with the manufacturer's requirements.	2023-12-29	Valid

CONTENTS

1. GENERAL INFORMATION

1.1. Applicant

Flowline, Inc.

10500 Humbolt St., Los Alamitos, California 90720, United States

1.2. Manufacturer

Flowline, Inc.

10500 Humbolt St., Los Alamitos, California 90720, United States

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China **Laboratory Location (Suzhou - SIP)** 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China
	Laboratory Accreditations
	A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: ☐R-20025 ☐G-20034 ☐C-20020 ☐T-20020 ☐R-20141 ☐G-20134 ☐C-20103 ☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China
	Laboratory Accreditations
	A2LA: 3628.02 CNAS: L10551 FCC: CN1284 ISED: CN0105
☐	**Test Site – MRT Taiwan Laboratory**
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
	Laboratory Accreditations
	TAF: 3261 FCC: 291082, TW3261 ISED: TW3261

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	LR Radar Level Instrument
Model No.	LR80, LR81, LR83, LR85
Brand Name	ECHOBEAM
Bluetooth Version	v4.0 (BLE Only)
LPR Frequency Range	76 ~ 80GHz
Sample ID	LR84PARCM
Hardware Version	H01
Software Version	R01
Operating Temp.	-40 ~ 80°C
Process Temp. at the antenna	-40 ~ 120°C
Normal Supply Voltage	24VDC
Remark: The EUT is made up of electronic part, housing part, process connection part, installation accessories part and antenna. All electronic parts including RF circuit are same within these models, and differences of other parts such as Shell Material, Installation method and power supply method etc. can not affect RF performance of the product. Only the differences of antennas can affect the RF performance and we selected the largest antenna gain for all RF testing. For detailed differences between models, please refer to the declaration letter of model differences.	

3. RF EXPOSURE EVALUATION

3.1. Test Limits

FCC Rule Requirements:

According to FCC §1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b)

Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*($900/f^2$)	<6
30-300	61.4	0.163	1.0	<6
300-1,500	--	--	f/300	<6
1,500-100,000	--	--	5	<6
(B) Limits for General Population/ Uncontrolled Exposures				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*($180/f^2$)	<30
30-300	27.5	0.073	0.2	<30
300-1,500	--	--	f/1500	<30
1,500-100,000	--	--	1.0	<30

f= frequency in MHz. * = Plane-wave equivalent power density.

ISED Rule Requirements:

According to RSS-102 section 2.5.2: Exemption Limits for Routine Evaluation - RF Exposure Evaluation, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

3.2. Test Result

Product	LR Radar Level Instrument
Test Item	RF Exposure Evaluation

For FCC:

Test Mode	Frequency Range (MHz)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Result
LPR	76000 ~ 80000	33.29	0.4244	1	Pass
BLE	2402 ~ 2480	0.10	0.0002	1	Pass

Note 1: R is from the product manual.

Note 2: The maximum EIRP of LPR is from BV report (Report No.: MDE_BVCPS_2202_FCC_03)

Note 3: The maximum EIRP of BLE is from MRT report (Report No.: 2312RSU058-U2)

CONCLUSION:

The EUT supports LPR and BLE simultaneous transmissions.

RF Exposure Ratio = 0.4244/1 + 0.0002/1 = 0.4246 < 1

Therefore, this device qualifies for RF exposure requirement.

For ISED

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Worst-case Exemption Limits (mW)	Result
LPR	76000 ~ 80000	33.29	2133.04	5000.0	Pass
BLE	2402 ~ 2480	0.10	1.02	2676.4	Pass

Note 1: The maximum EIRP of LPR is from BV report (Report No.: MDE_BVCPS_2202_FCC_03)

Note 2: The maximum EIRP of BLE is from MRT report (Report No.: 2312RSU058-U2)

CONCLUSION:

The EUT supports LPR and BLE simultaneous transmissions.

RF Exposure Ratio = 2133.04/5000 + 1.02/2676.4 = 0.4270 < 1

Therefore, this device qualifies for RF exposure test exemption.

The End