MEASUREMENT REPORT

FCC PART 15.256 / RSS-211

FCC ID:	2ACQELR8X
IC:	27195-LR8X
Applicant:	Flowline, Inc.
Application Type:	Certification
Product:	LR Radar Level Instrument
Model No.:	LR84
Serial Model No.:	LR80, LR81, LR82, LR83, LR85, LR86
Brand Name:	ECHOBEAM
FCC Classification:	LPR - Level Probing Radar
FCC Rule Part(s):	FCC PART 15.256
ISED Rule(s):	RSS-211 Issue 1, RSS-GEN Issue 5
Test Procedure(s):	KDB890966 D01 Meas level Probing Radars v01r01 TR14-1007 Measurement of FMCW ANSI C63.10-2013, ETSI EN 302 372
Test Date:	March 08 ~ May 25, 2021

Reviewed By: Vincent Yu

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB890966 D01 v01r01. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2102RSU015-U1	Rev. 01	Initial Report	05-26-2021	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	
☐	**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: L3261-190725	
	FCC: 291082, TW3261	ISED: TW3261

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	LR Radar Level Instrument
Model No.	LR84
Serial Model No.	LR80, LR81, LR82, LR83, LR85, LR86
Brand Name	ECHOBEAM
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 model LR84 with the largest antenna gain for all RF testing. For detailed differences between models, please refer to the declaration letter of model differences.	

2.2. Product Specification Subjective to this Report

LPR Frequency Range	76 ~ 80GHz
Modulation	FMCW
Antenna Type	Lens Antenna
Max Antenna Gain	30dBi

Note 1: Above information is provided by applicant.

Note 2: For other features of this EUT, test report will be issued separately.

2.3. Test Mode

Test Mode	Transmit by 76 ~ 80GHz

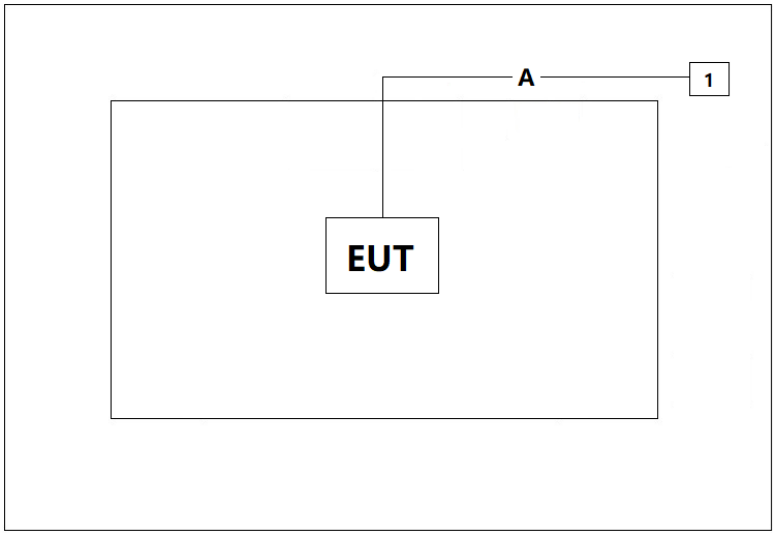
2.4. Test Environment Condition

Ambient Temperature	15°C ~ 35°C
Relative Humidity	20%RH ~75%RH

2.5. Test Software

The engineer test sample was provided by the manufacturer, and it was configured into continuous transmit status after power on.

2.6. Test Configuration

Connection Diagram for Radiated Emissions Measurement


Cable Type		Cable Description
A	Power Cable	Non-Shielding, > 2 m

2.7. Test System Details

Product		Manufacturer	Model No.
1	DC Power Supply	GWINSTEK	DPS-3303C

3. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of this device is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATE

Radiated Emission (SIP-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/09/03
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06646	1 year	2021/12/17
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06648	1 year	2021/12/17
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2021/12/17
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/14
Preamplifier	EMCI	EMC051845SE	MRTSUE06644	1 year	2021/11/12
Micro-Wave Antenna	MI-WWAVE	261U-25	MRTSUE06273	N/A	N/A
Micro-Wave Antenna	MI-WWAVE	261E-25	MRTSUE06276	N/A	N/A
Micro-Wave Antenna	MI-WWAVE	261F-25	MRTSUE06275	N/A	N/A
Micro-Wave Antenna	MI-WWAVE	261G	MRTSUE06274	N/A	N/A
Standard Gain Horn Antenna	A-INFOMW	LB-10-25-A	MRTSUE06410	N/A	N/A
Standard Gain Horn Antenna	A-INFOMW	LB-15-25-A	MRTSUE06409	N/A	N/A
Waveguide Harmonic Mixer	Keysight	M1970V	MRTSUE06271	N/A	N/A
Waveguide Harmonic Mixer	Keysight	M1970W	MRTSUE06272	N/A	N/A
RF Signal Generator	Keysight	E8257D	MRTSUE06453	N/A	N/A
SA Extension Module	Keysight	N9029AV06	MRTSUE06368	N/A	N/A
SA Extension Module	Keysight	N9029AV05	MRTSUE06367	N/A	N/A
SA Extension Module	Keysight	N9029AV03	MRTSUE06366	N/A	N/A
Millimeter wave signal source frequency expander	Keysight	E8257DV15	MRTSUE06456	N/A	N/A
Thermal Hygrometer	testo	608-H1	MRTSUE06624	1 year	2021/12/29
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2021/12/25

Conducted Emission (SIP-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06621	1 year	2021/12/29

Software	Version	Function
EMI Software	V3	EMI Test Software

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB

6. TEST RESULT

6.1. Summary

FCC Part Section(s)	RSS Section(s)	Test Description	Test Condition	Test Result	Reference
15.256(f)	RSS-211 [5.1(a), (b)]	Fundamental Bandwidth	Radiated	Pass	Section 6.2
15.256(g)	RSS-211 [5.2(b)] RSS-211 [5.3(b)]	Fundamental Emissions		Pass	Section 6.3
15.256(h) 15.209	RSS-211 [5.1(d)]	Unwanted Emissions		Pass	Section 6.4
15.256(i)(B) 15.256(j)	RSS-211 [5.2(a), (c)]	Antenna Requirements	--	Pass	Section 6.5
15.255(f)(2) 15.215©	RSS-211 [5.1(b)]	Frequency stability	Radiated	Pass	Section 6.6
15.207	RSS-Gen [8.8]	AC Conducted Emissions	Line Conducted	N/A	Section 6.7

Notes: “N/A” means that the test item is not applicable, and the detailed information refers to relevant section.

6.2. Fundamental Bandwidth

6.2.1. Test Limit

The fundamental bandwidth of an LPR emission is defined as the width of the signal between two points, one below and one above the center frequency, outside of which all emissions are attenuated by at least 10 dB relative to the maximum transmitter output power when measured in an equivalent resolution bandwidth.

(1) The minimum fundamental emission bandwidth shall be 50 MHz for LPR operation under the provisions of this section.

(2) LPR devices operating under this section must confine their fundamental emission bandwidth within the 75-85 GHz bands under all conditions of operation.

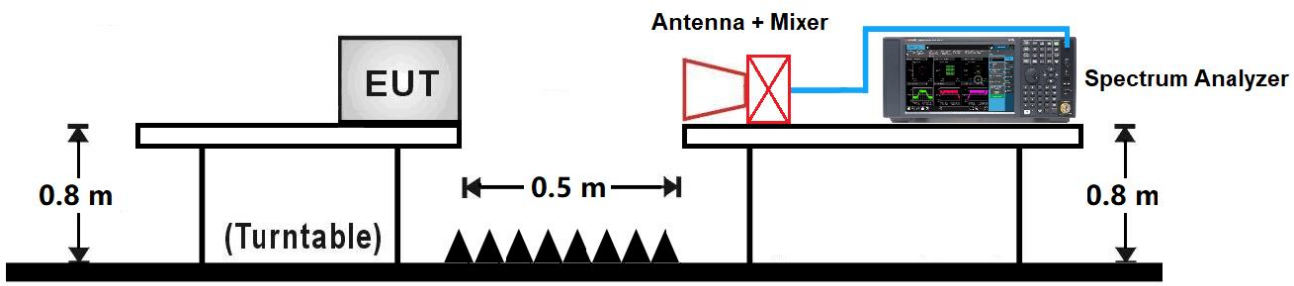
6.2.2. Test Procedure used

KDB890966 D01 Meas level Probing Radars v01r01 Section D.

6.2.3. Test Setting

1. Observe fundamental emission on the spectrum analyzer with a peak detector, 1 MHz RBW and at least 3 MHz VBW.
2. Activate any frequency sweep, step or hop function of the EUT and select “Max Hold” function on the spectrum analyzer.
3. Perform multiple sweeps until the amplitude stabilizes.
4. Determine the 10 dB emission bandwidth and 99% Bandwidth.

6.2.4. Test Setup



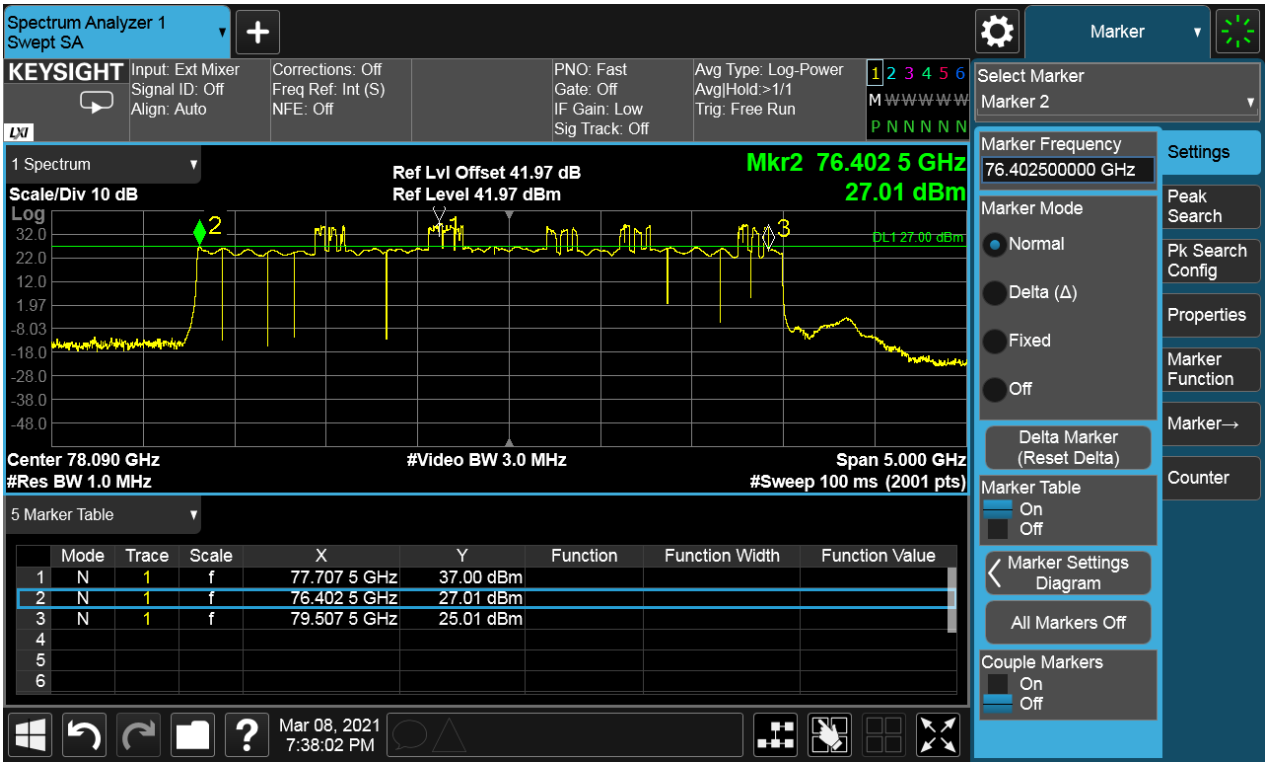
6.2.5. Test Result

Test Site	SIP-AC2	Test Engineer	Andy Zhu
Test Date	2021/03/08	Test Item	10dB Bandwidth

10dB Bandwidth (MHz)		Limit	Result
F_L	76402.5	> 75 GHz	Pass
F_H	79507.5	< 85 GHz	Pass
Bandwidth	3105.0	> 50 MHz	Pass

Note: Bandwidth (MHz) = F_H (MHz) - F_L (MHz).

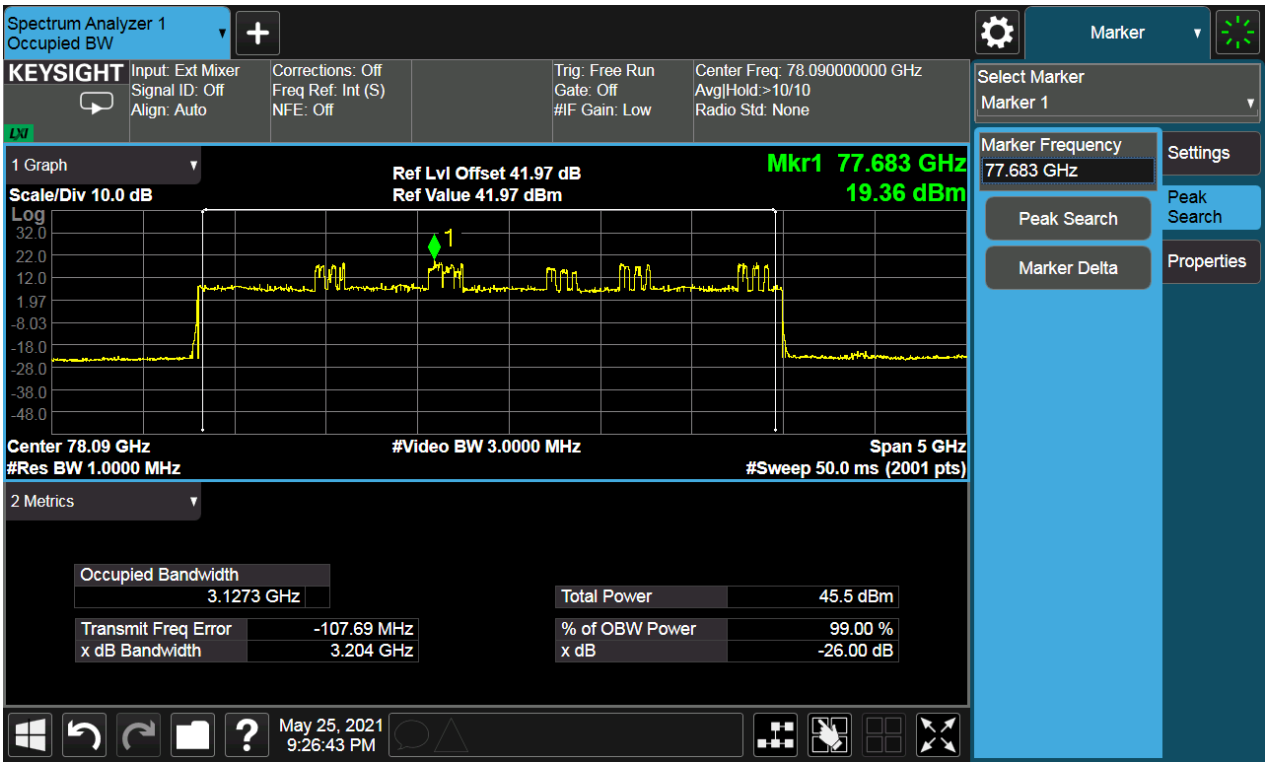
10dB Bandwidth



Test Site	SIP-AC2	Test Engineer	Andy Zhu
Test Date	2021/05/25	Test Item	99% Bandwidth

99% Bandwidth (GHz)	Result
3.127	Pass

99% Bandwidth



6.3. Fundamental Emissions

6.3.1.Test Limit

LPR EIRP Emission Limits		
Frequency band of operation	Average emission limit (EIRP in dBm measured in 1 MHz)	Peak emission limit (EIRP in dBm measured in 50 MHz)
75 ~ 85GHz	-3	34
Note: For a RBW less than 50 MHz, the peak EIRP limit (in dBm) is reduced by 20 log(RBW/50) dB where RBW is the resolution bandwidth in megahertz. For FMCW modulation the correction should not be applied since these signals are narrowband signals with full power within the resolution bandwidth of the SA.		

6.3.2.Test Procedure used

KDB890966 D01 Meas level Probing Radars v01r01 Section F.

TR14-1007 Measurement of FMCW

6.3.3.Test Setting

1. For radiated emission measurements, locate the receive test antenna at a far field distance boresighted on the LPR transmit antenna. Adjust the LPR and the test antenna for maximum main beam coupling.
2. Set the spectrum analyzer frequency span to enable viewing the entire sweep frequency span of the LPR signal.
3. Set the spectrum analyzer frequency span to enable viewing the entire sweep frequency span of the LPR signal.
4. Calculate the dwell time, T_D, of the sweep frequency signal per MHz of the sweep frequency span

   $$T_D = T_S/\Delta F$$

   Where:

   T_S is the signal sweep frequency time in seconds

   ΔF is the signal sweep frequency span in MHz
5. Set the detector to peak mode.
6. Set the RBW to 1 MHz.
7. Perform sufficient multiple scans on the spectrum analyzer in maximum hold with a sweep time suitable for displaying the variation in the signal level over the frequency span.

8. Record the maximum signal level. This is the peak value of the LPR signal.
9. Calculate the average factor

$$\text{Average factor} = (T_D) / \text{cycle time}$$

Where:

Cycle time is the total time for a complete cycle of the signal including retrace and any other latency times.

10. Determine the average by multiplying the maximum signal level obtained in Step 8 by the average factor.

According to the manufacturer's declaration, the parameter of the FMCW modulation as below:

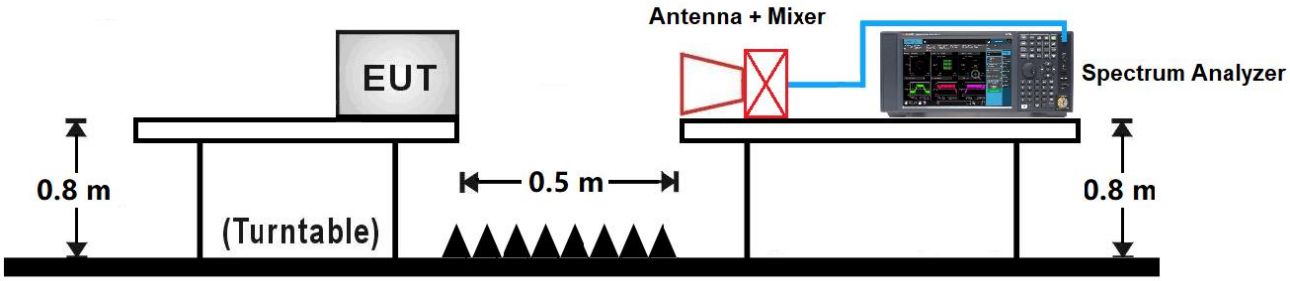
Chirp Bandwidth (ΔF)	Frequency sweep time (T_S)	Cycle time
2GHz	90us	200000us

Therefore:

$T_D = T_S/\Delta F = 0.045$us/MHz

Average factor = $10*\log[(T_D) / \text{cycle time}] = 10*\log(0.045/200000) = -66.48$ (dB)

6.3.4.Test Setup



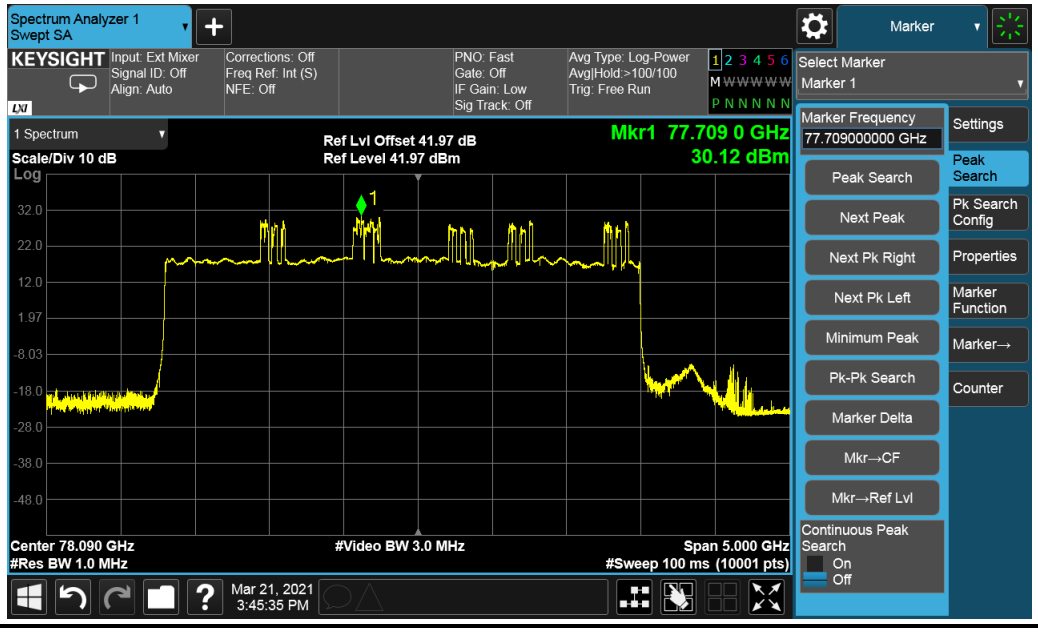
6.3.5.Test Results

Test Site	SIP-AC2	Test Engineer	Andy Zhu
Test Date	2021/03/21		

Frequency (GHz)	Average Factor (dB)	EIRP (dBm)		Limit (dBm)		Result
		Peak	Average	Peak	Average	
76 ~ 80	-66.48	30.12	-36.36	34	-3	Pass

Note: Average EIRP (dBm) = Peak EIRP (dBm) + Average Factor (dB)

Peak EIRP



6.4. Unwanted Emissions

6.4.1.Test Limit

FCC Part 15.209 Limit		
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 80	100**	3
80 ~ 216	150**	3
216 ~ 960	200**	3
Above 960	500	3
Note 1: The lower limit shall apply at the transition frequency. Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system. Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m). Note 4: The provisions in §15.35(b) and (c) of this part that require emissions to be averaged over a 100 millisecond period and that limits the peak power to 20 dB above the average limit do not apply to devices operating under paragraphs (a) through (l) of §15.256.		

RSS-Gen Section 8.9		
Frequency [MHz]	Field Strength [μA/m]	Measured Distance [Meters]
0.009 - 0.490	6.37/F (kHz)	300
0.490 - 1.705	63.7/F (kHz)	30
1.705 - 30	0.08	30
Frequency [MHz]	Field Strength [μV/m]	Measured Distance [Meters]
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3
Note: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.		

RSS-Gen Section 5.3(b)	
Frequency [GHz]	Maximum Average EIRP (in dBm/MHz) Outside Tank Enclosure Structure Inside the Operating
75 ~ 85	-41.3
Note: The device shall be installed inside a closed container or in a still pipe by qualified installers. The leakage of the RF field outside the container at 3 m from the container or still pipe walls shall not exceed the values outlined in table. The levels shall be assessed using the procedures defined in ETSI EN 302 372.	

6.4.2.Test Procedure used

KDB890966 D01 Meas level Probing Radars v01r01 Section G.

ETSI EN 302 372

6.4.3.Test Procedure

Measurement of harmonic and spurious emissions below 40 GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW ≥ 3 x RBW
4. Detector: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
5. Sweep time = auto couple
6. Trace mode = max hold, trace was allowed to stabilize

Measurement of harmonic and spurious emissions above 40 GHz

1. Connect the test antenna covering the appropriate frequency range to a spectrum analyzer via an external mixer.
2. Set spectrum analyzer RBW = 1MHz, VBW = 3MHz, average detector.
3. Maximize all observed emissions. Note the maximum power indicated on the spectrum analyzer. Adjust this reading, if necessary, by the conversion loss of the external mixer used at the frequency under investigation and the external mixer IF cable loss.
4. Calculate the maximum field strength of the emission at the measurement distance
5. Repeat the preceding sequence for every emission observed in the frequency band under

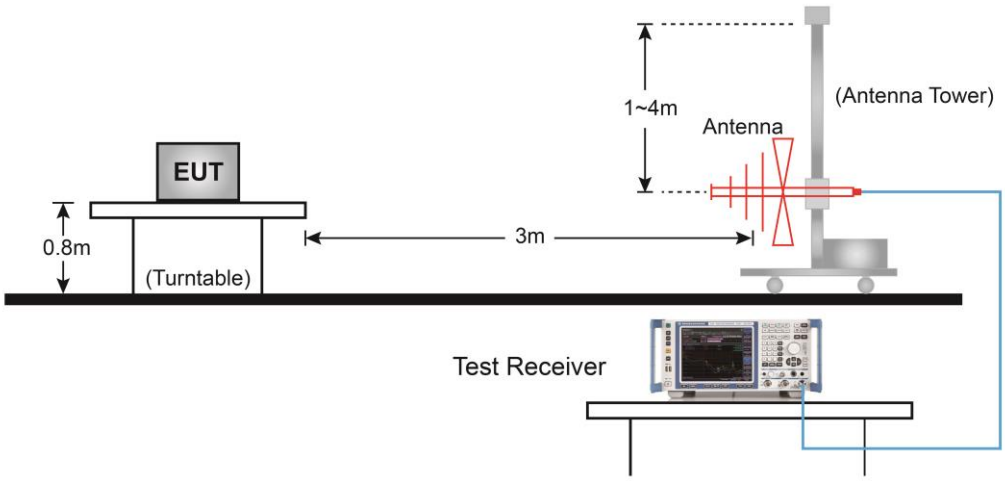
investigation.

Table 1 - RBW as a function of frequency

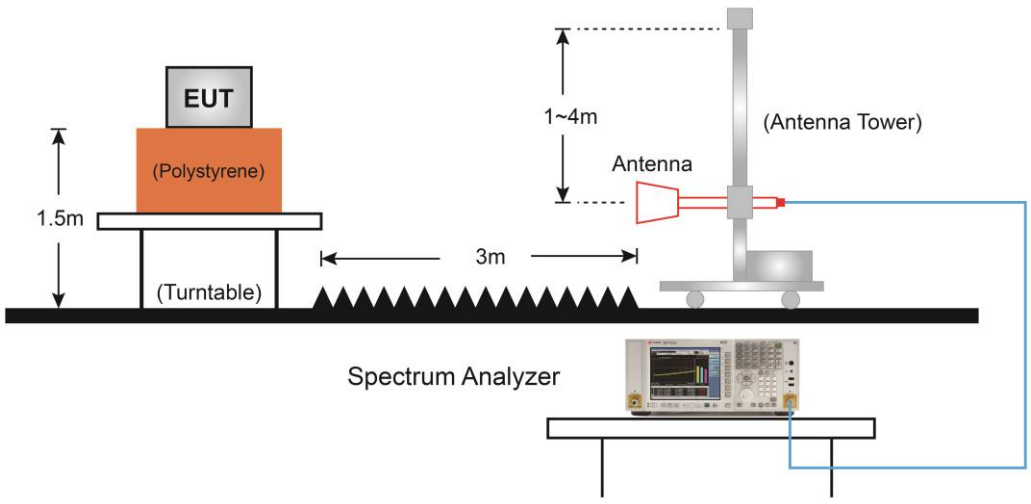
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

6.4.4.Test Setup

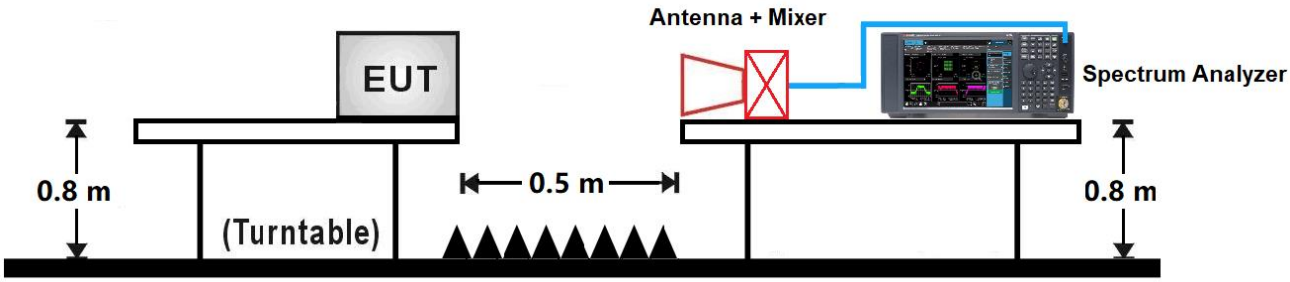
30MHz ~ 1GHz Test Setup:



1GHz ~ 40GHz Test Setup:



Above 40GHz Test Setup:



6.4.5.Test Result

Test Site	SIP-AC2	Test Engineer	Allen Zou
Test Date	2021/03/12		
Remark	Below 40GHz		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
519.9	8.1	23.5	31.6	46.0	-14.4	QP	Horizontal
560.1	16.5	24.1	40.6	46.0	-5.4	QP	Horizontal
720.2	10.2	26.9	37.1	46.0	-8.9	QP	Horizontal
760.4	8.3	27.9	36.2	46.0	-9.8	QP	Horizontal
560.1	17.3	24.1	41.4	46.0	-4.6	QP	Vertical
720.2	18.6	26.9	45.5	46.0	-0.5	QP	Vertical
760.4	17.6	27.9	45.5	46.0	-0.5	QP	Vertical
840.4	15.2	28.4	43.6	46.0	-2.4	QP	Vertical
9959.0	49.2	-1.3	47.9	74.0	-26.1	PK	Horizontal
10316.0	49.4	-1.1	48.3	74.0	-25.7	PK	Horizontal
11174.5	48.6	0.5	49.1	74.0	-24.9	PK	Horizontal
17983.0	32.7	11.0	43.7	54.0	-10.3	AV	Horizontal
9678.5	49.4	-2.1	47.3	74.0	-26.7	PK	Vertical
10401.0	48.6	-1.0	47.6	74.0	-26.4	PK	Vertical
11157.5	48.7	0.6	49.3	74.0	-24.7	PK	Vertical
17983.0	32.9	11.0	43.9	54.0	-10.1	AV	Vertical
19254.0	62.5	-11.5	51.0	74.0	-23.0	PK	Horizontal
33741.0	60.1	-9.2	50.9	74.0	-23.1	PK	Horizontal
35589.0	59.5	-6.3	53.2	74.0	-20.8	PK	Horizontal
39648.0	43.3	0.2	43.5	54.0	-10.5	AV	Horizontal
19595.0	62.5	-11.6	50.9	74.0	-23.1	PK	Vertical
26855.0	56.8	-7.3	49.5	74.0	-24.5	PK	Vertical
28802.0	60.1	-10.0	50.1	74.0	-23.9	PK	Vertical
38504.0	52.3	-3.3	49.0	54.0	-5.0	AV	Vertical

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Note 2: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Test Site	SIP-AC2	Test Engineer	Andy Zhu
Test Date	2021/03/10		
Remark	Above 40GHz		

Frequency (GHz)	Reading Level @0.5m (dBµV)	Factor (dB)	Measure Level @0.5m (dBµV/m)	Measure Level @3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
49.2	14.5	45.8	60.3	44.7	54.0	-9.3	AV	Horizontal
154.0	8.0	61.1	69.1	53.5	54.0	-0.5	AV	Horizontal
171.0	4.6	59.9	64.5	48.9	54.0	-5.1	AV	Horizontal
49.2	14.4	45.8	60.3	44.7	54.0	-9.3	AV	Vertical
154.0	5.8	61.1	66.9	51.3	54.0	-2.7	AV	Vertical
173.0	5.8	60.1	65.9	50.3	54.0	-3.7	AV	Vertical

Note:

1. Measure Level @0.5m = Reading Level @0.5m + Factor
2. Measure Level @3m = Measure Level @0.5m + 20 * log(0.5m / 3m)

Test Site	SIP-AC2	Test Engineer	Andy Zhu
Test Date	2021/03/10		
Remark	60GHz - 90GHz, The leakage of the RF field outside the container		

Frequency (GHz)	Reading Level (dBm)	Factor (dB)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector	Polarization
84.730	-85.22	40.48	-44.74	-41.3	-3.44	RMS	Horizontal
83.876	-85.29	40.49	-44.80	-41.3	-3.50	RMS	Vertical
Note: Measure Level (dBm) = Reading Level (dBm) + Factor (dB)							

6.5. Antenna Requirements

6.5.1. Test Limit

1. Antenna beamwidth: LPR devices operating under the provisions of this section within the 75-85 GHz band must use an antenna with a -3 dB beamwidth no greater than 8 degrees.
2. Antenna side lobe gain: LPR devices operating under the provisions of this section must limit the side lobe antenna gain relative to the main beam gain for off-axis angles from the main beam of greater than 60 degrees to the levels provided in below table.

Antenna Side Lobe Gain Limit	
Frequency range (GHz)	Antenna sidelobe gain limit relative to main beam gain (dB)
75 ~ 85	-38

6.5.2. Test Procedure used

The antenna parameters of the LPR are declared by the manufacturer.

6.5.3. Test Setting

N/A

6.5.4. Test Setup

N/A

6.5.5. Test Result

According to the declaration of manufacturer, the parameter of the antennas is shown as below table:

Antenna Requirements		Limit	Result
Max. Antenna Side lobe gain	-45.2 dB	≤ -38 dB	Pass
Max. Beamwidth	8°	≤ 8°	Pass

Therefore, it complies with the antenna requirement.

6.6. Frequency Stability

6.6.1.Test Limit

1. As specified in Section 15.256(f)(2), LPR devices operating under this section must confine their fundamental emission bandwidth within the 75-85 GHz bands under all conditions of operation.
2. As specified in Section 15.215(c), the bandwidth of the fundamental emission must be contained within the frequency band over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage. Frequency stability is to be measured according to Section 2.1055 at the highest and lowest frequency of operation and with the modulation that produces the widest emission bandwidth.

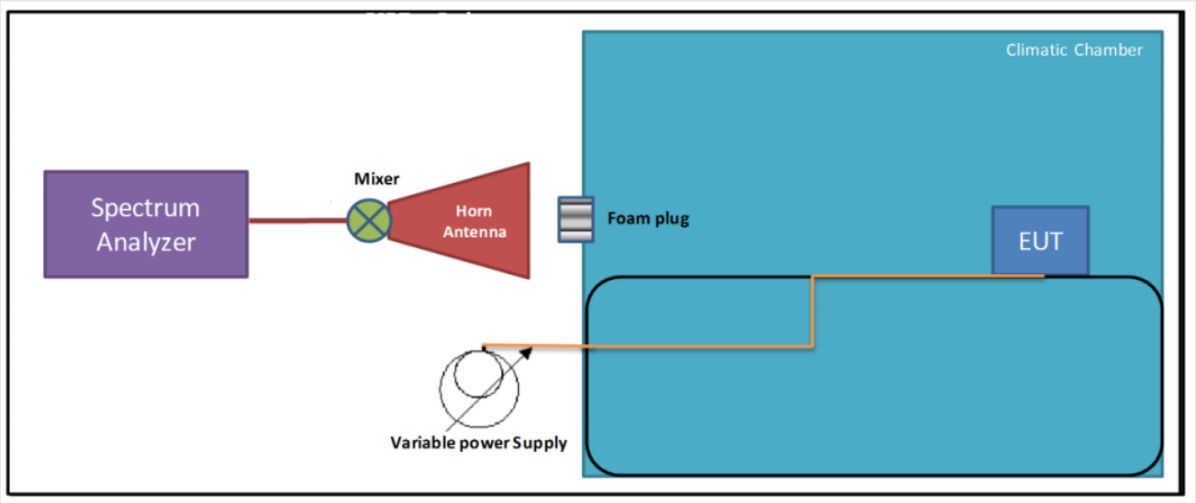
6.6.2.Test Procedure used

KDB890966 D01 Meas level Probing Radars v01r01 Section H.

6.6.3.Test Procedure

1. Arrange EUT and test equipment according Section 6.6.4.
2. With the EUT at ambient temperature (20 °C) and voltage source set to the EUT nominal operating voltage (24VDC, 100%)
3. RBW = 1MHz, VBW = 3MHz
4. Detector = Peak
5. Trace Mode = Max Hold
6. Record the Low and high frequencies (f_L and f_H) of the fundamental frequency emission which is defined as the width of the signal between two points, one below and one above the center frequency, outside of which all emissions are attenuated by at least 10 dB relative to the maximum transmitter output power.
7. Vary EUT power supply between 85% and 115% of nominal, and record the frequency excursion of the EUT emission mask.
8. Set the power supply to 100% nominal setting, and raise EUT operating temperature to 50 °C.
9. Record the f_L and f_H of the fundamental frequency emission.
10. Repeat step 9 at each 10°C increment down to -20 °C.

6.6.4.Test Setup



6.6.5.Test Result

Test Site	SIP-TR1	Test Engineer	Andy Zhu
Test Date	2021/03/11 ~ 2021/03/14		

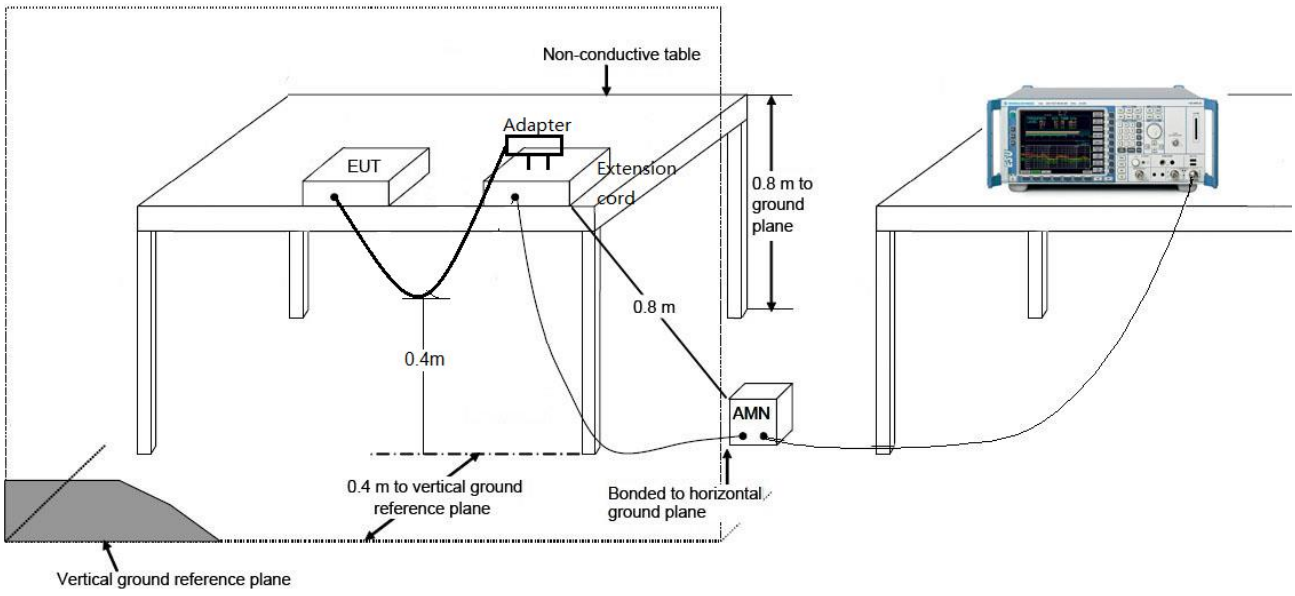
Voltage (%)	Power (VDC)	Temp (℃)	f_L (GHz)	f_H (GHz)	Limit (GHz)	Result
100%	24.0	- 20	76.4025	79.5075	75 ~ 85	Pass
		- 10	76.4022	79.5079	75 ~ 85	Pass
		0	76.4028	79.5076	75 ~ 85	Pass
		+ 10	76.4021	79.5070	75 ~ 85	Pass
		+ 20	76.4024	79.5076	75 ~ 85	Pass
		+ 30	76.4019	79.5081	75 ~ 85	Pass
		+ 40	76.4022	79.5071	75 ~ 85	Pass
		+ 50	76.4030	79.5069	75 ~ 85	Pass
115%	27.6	+ 20	76.4022	79.5072	75 ~ 85	Pass
85%	20.4	+ 20	76.4021	79.5079	75 ~ 85	Pass

6.7. AC Conducted Emissions Measurement

6.7.1.Test Limit

FCC 15.207 / RSS-Gen Paragraph 8.8 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 ~ 0.50	66 ~ 56	56 ~ 46
0.50 ~ 5.0	56	46
5.0 ~ 30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.		

6.7.2.Test Setup



6.7.3.Test Result

The EUT is powered by DC source, so this requirement doesn't apply.

7. CONCLUSION

The data collected relate only the item(s) tested and show that this device is in compliance with Part 15C of the FCC Rules and RS-211 of ISED Rules.

The End

Appendix A - Test Setup Photograph

Refer to “2102RSU015-UT” file.

Appendix B - EUT Photograph

Refer to “ 2102RSU015-UE” file.