RADIO TEST REPORT
FCC ID: 2AAU7-ZMZWUS

Product：	ZipaMicro
Trade Mark：	Zipato
Model Name：	zm.zwus
Serial Model：	zm.zwis, zm.zwau
Report No.：	SER171025869002E

Prepared for

Tri plus grupa d.o.o.

Banjavciceva 11, 10000 Zagreb, Croatia

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

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TEST RESULT CERTIFICATION

Applicant's name	:	Tri plus grupa d.o.o.
Address	:	Banjavciceva 11, 10000 Zagreb, Croatia
Manufacturer's Name	:	Tri plus grupa d.o.o.
Address	:	Banjavciceva 11, 10000 Zagreb, Croatia
Product description		
Product name	:	ZipaMicro
Model and/or type reference	:	zm.zwus
Serial Model：		zm.zwis, zm.zwau
Rating(s)	:	DC 3.7V from battery or DC 5V from Adapter
Standards	:	FCC Part15.249: 2018
Test procedure		ANSI C63.10-2013

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test	:	
Date (s) of performance of tests	:	25 Oct. 2017 ~14 May. 2018
Date of Issue	:	14 May. 2018
Test Result	:	**Pass**

Testing Engineer : (Allen Liu)

Technical Manager : (Jason Chen)

Authorized Signatory : (Sam Chen)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.249)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	Pass	
15.203	Antenna Requirement	Pass	
15.249 15.209	Radiated Spurious Emission	Pass	
15.249(2)	Frequency Tolerance	Pass	
15.249(a)	Fundamental Measurement	Pass	
15.205	Band Edge Emission	Pass	
15.249	Occupied Bandwidth	Pass	

1.1 TEST FACILITY

Shenzhen NTEK Testing Technology Co., Ltd
Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.
FCC FRN Registration No.:463705; IC Registration No.:9270A-1
CNAS Registration No.:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	ZipaMicro
Trade Mark	Zipato
Model Name	zm.zwus
Serial Model	zm.zwis, zm.zwau
Model Difference	All models are the same circuit and RF module, except the model name.
Product Description	The EUT is a ZipaMicro Operation Frequency: 908.4 MHz / 916 MHz Modulation Type: GFSK Antenna Designation: Metal Antenna Antenna Gain(Peak) 2 dBi Based on the application, features, or specification exhibited in User's Manual. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.
Adapter	Model:KA23-0502000DES Input: 100-240V~50/60Hz 0.35A Output: 5V⎓2000mA
Battery	DC 3.7V, 850mAh
Hardware version	1.0
Software version	1.0

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel	Frequency(MHz)
01	908.4
02	916

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Metal Antenna	N/A	2	Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH01
Mode 2	CH02
Mode 3	Normal link

For Radiated Spurious Emission	
Pretest Mode	Description
Mode 1	CH01
Mode 2	CH02

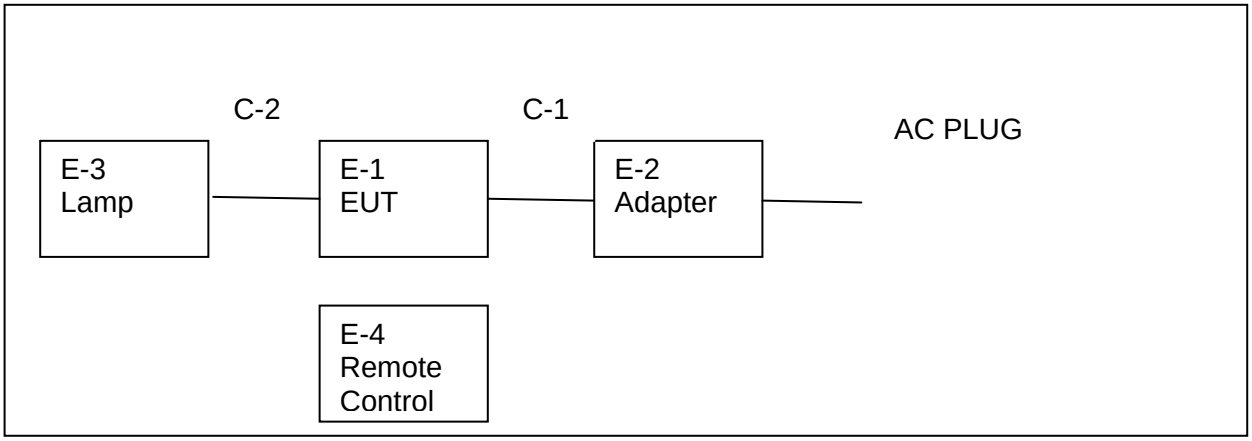
For Conducted Emission	
Final Test Mode	Description
Mode 1	CH01
Mode 2	CH02
Mode 3	Normal link

Note:

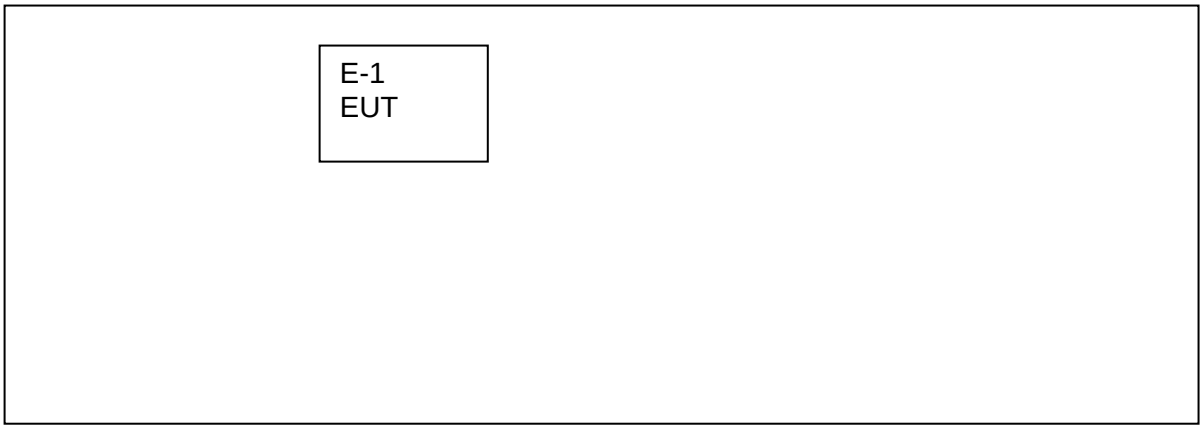
(1) The measurements are performed at the highest, middle, lowest available channels.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Mode



Radiated Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	ZipaMicro	Zipato	zm.zwus	N/A	EUT
E-2	Adapter	N/A	KA23-0502000DES	N/A	
E-3	Lamp	N/A	N/A	N/A	Peripherals
E-4	Remote Control	N/A	N/A	N/A	Peripherals

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-1	Power Cable	NO	NO	1.2m	
C-2	Load Cable	NO	NO	1.0m	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Aglient	E4407B	MY45108040	2017.06.06	2018.06.05	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2017.11.10	2018.11.09	1 year
3	EMI Test Receiver	Agilent	N9038A	MY53227146	2017.06.06	2018.06.05	1 year
4	Test Receiver	R&S	ESPI	101318	2017.06.06	2018.06.05	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2018.04.09	2019.04.08	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2017.06.06	2018.06.05	1 year
7	Horn Antenna	EM	EM-AH-10180	2011071402	2018.04.09	2019.04.08	1 year
8	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2017.07.06	2018.07.05	1 year
9	Amplifier	EMC	EMC051835SE	980246	2017.08.09	2018.08.08	1 year
10	Amplifier	MITEQ	TTA1840-35-HG	177156	2017.06.06	2018.06.05	1 year
11	Loop Antenna	ARA	PLA-1030/B	1029	2017.06.06	2018.06.05	1 year
12	Power Meter	DARE	RPR3006W	15I00041SNO84	2017.08.07	2018.08.06	1 year
13	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2017.04.21	2020.04.20	3 year
14	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2017.04.21	2020.04.20	3 year
15	High Test Cable(1G-40 GHz)	N/A	R-03	N/A	2017.04.21	2020.04.20	3 year
16	High Test Cable(1G-40 GHz)	N/A	R-04	N/A	2017.04.21	2020.04.20	3 year
17	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A

Note:
We will use the temporary antenna connector (soldered on the PCB board) When conducted test
And this temporary antenna connector is listed within the instrument list

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2017.06.06	2018.06.05	1 year
2	LISN	R&S	ENV216	101313	2018.04.19	2019.04.18	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2017.06.06	2018.06.05	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2017.06.06	2018.06.05	1 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2017.04.21	2020.04.20	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2017.04.21	2020.04.20	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2017.04.21	2020.04.20	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable which is scheduled for calibration every 3 years.

3. ANTENNA REQUIREMENT

3.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

3.2 EUT ANTENNA

The EUT antenna is permanent attached Metal antenna(Gain:2dBi). It comply with the standard requirement.

3.3 CONDUCTED EMISSION MEASUREMENT

3.3.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5			66 - 56 *	56 - 46 *	CISPR
0.50 -5.0			56.00	46.00	CISPR
5.0 -30.0			60.00	50.00	CISPR

0.15 -0.5			66 - 56 *	56 - 46 *	LP002.
0.50 -5.0			56.00	46.00	LP002.
5.0 -30.0			60.00	50.00	LP002.

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

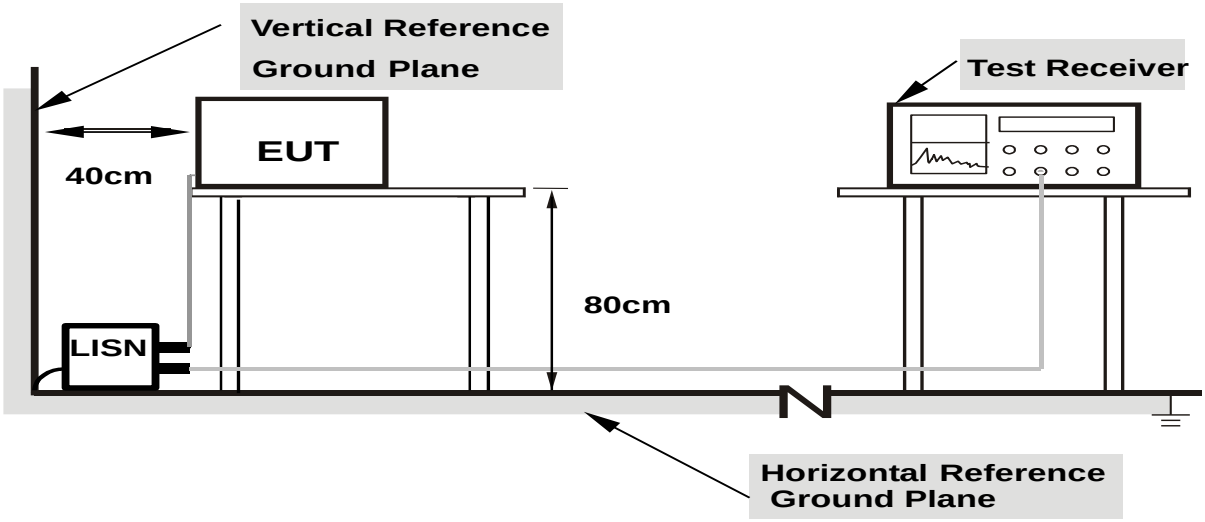
3.3.2 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

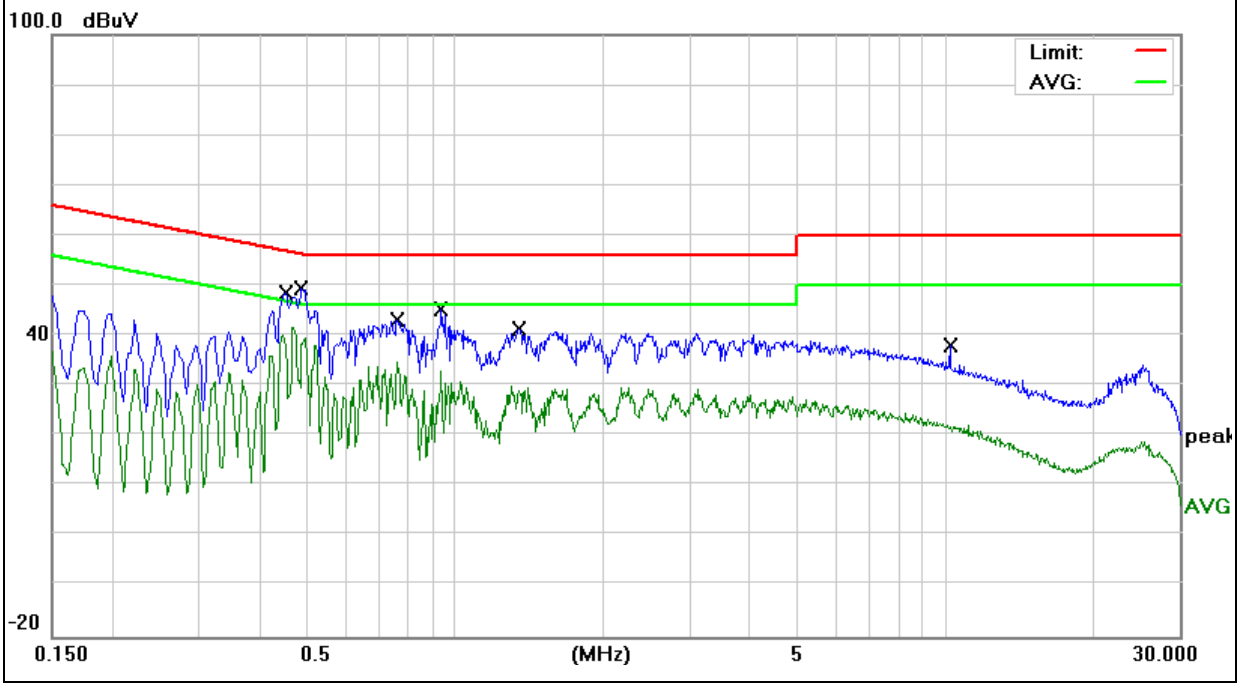
3.2.5 TEST RESULT

EUT：	ZipaMicro	Model Name. ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	55%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from adapter AC 120V/60Hz	Test Mode：	Mode 3

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.4500	38.64	9.83	48.47	56.87	-8.40	QP
0.4500	16.53	9.83	26.36	46.87	-20.51	AVG
0.4860	39.76	9.83	49.59	56.24	-6.65	QP
0.4860	31.88	9.83	41.71	46.24	-4.53	AVG
0.7620	33.35	9.85	43.20	56.00	-12.80	QP
0.7620	18.47	9.85	28.32	46.00	-17.68	AVG
0.9380	35.36	9.91	45.27	56.00	-10.73	QP
0.9380	24.93	9.91	34.84	46.00	-11.16	AVG
1.3460	31.54	9.90	41.44	56.00	-14.56	QP
1.3460	25.68	9.90	35.58	46.00	-10.42	AVG
10.1899	28.10	9.99	38.09	60.00	-21.91	QP
10.1899	20.24	9.99	30.23	50.00	-19.77	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

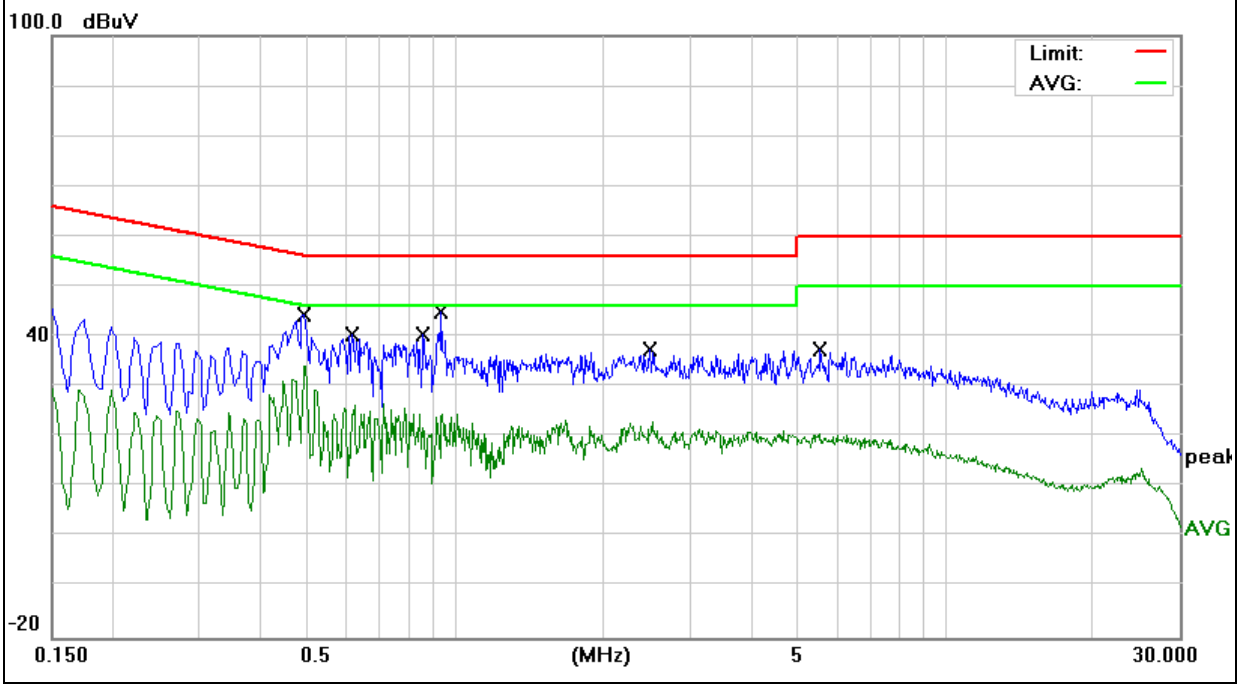


EUT：	ZipaMicro	Model Name. ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	55%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from adapter AC 120V/60Hz	Test Mode：	Mode 3

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.4900	34.48	9.93	44.41	56.17	-11.76	QP
0.4900	24.34	9.93	34.27	46.17	-11.90	AVG
0.6140	30.47	9.93	40.40	56.00	-15.60	QP
0.6140	16.09	9.93	26.02	46.00	-19.98	AVG
0.8580	30.42	9.93	40.35	56.00	-15.65	QP
0.8580	17.18	9.93	27.11	46.00	-18.89	AVG
0.9340	34.96	9.93	44.89	56.00	-11.11	QP
0.9340	16.68	9.93	26.61	46.00	-19.39	AVG
2.4900	27.40	9.94	37.34	56.00	-18.66	QP
2.4900	13.42	9.94	23.36	46.00	-22.64	AVG
5.5460	27.53	9.99	37.52	60.00	-22.48	QP
5.5460	11.25	9.99	21.24	50.00	-28.76	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

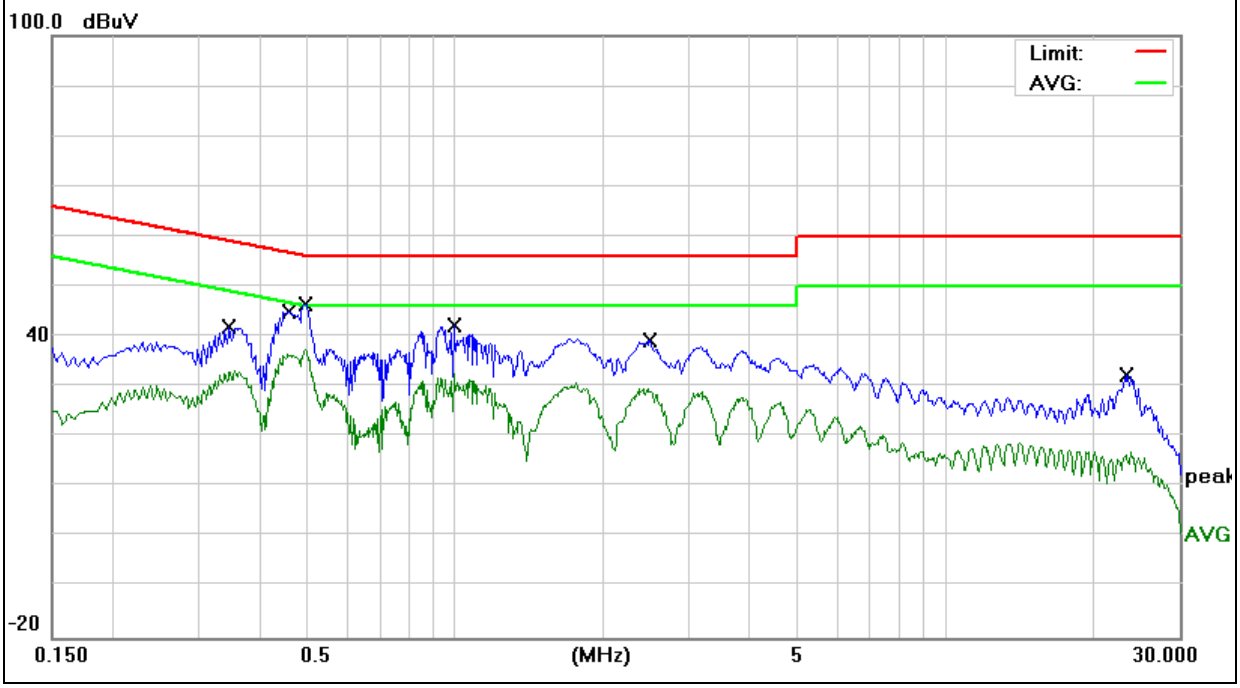


EUT：	ZipaMicro	Model Name. ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	55%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from adapter AC 240V/60Hz	Test Mode：	Mode 3

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3460	32.15	9.82	41.97	59.06	-17.09	QP
0.3460	17.30	9.82	27.12	49.06	-21.94	AVG
0.4580	35.14	9.83	44.97	56.73	-11.76	QP
0.4580	16.86	9.83	26.69	46.73	-20.04	AVG
0.4940	36.75	9.83	46.58	56.10	-9.52	QP
0.4940	27.48	9.83	37.31	46.10	-8.79	AVG
0.9900	32.25	9.93	42.18	56.00	-13.82	QP
0.9900	22.74	9.93	32.67	46.00	-13.33	AVG
2.4900	29.26	9.94	39.20	56.00	-16.80	QP
2.4900	15.64	9.94	25.58	46.00	-20.42	AVG
23.2740	22.16	10.29	32.45	60.00	-27.55	QP
23.2740	6.83	10.29	17.12	50.00	-32.88	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

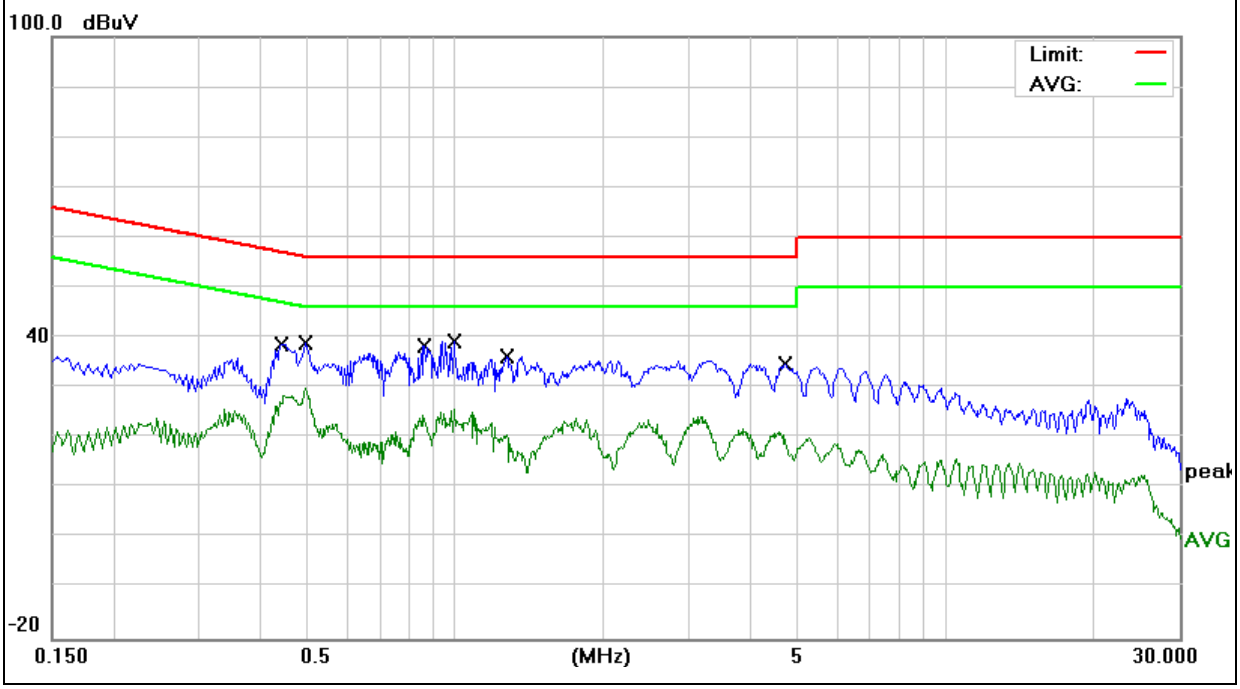


EUT：	ZipaMicro	Model Name. ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	55%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from adapter AC 240V/60Hz	Test Mode：	Mode 3

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.4420	28.85	9.93	38.78	57.02	-18.24	QP
0.4420	16.66	9.93	26.59	47.02	-20.43	AVG
0.4940	29.09	9.93	39.02	56.10	-17.08	QP
0.4940	20.09	9.93	30.02	46.10	-16.08	AVG
0.8620	28.45	9.93	38.38	56.00	-17.62	QP
0.8620	15.62	9.93	25.55	46.00	-20.45	AVG
0.9900	29.24	9.93	39.17	56.00	-16.83	QP
0.9900	15.87	9.93	25.80	46.00	-20.20	AVG
1.2740	26.40	9.93	36.33	56.00	-19.67	QP
1.2740	17.43	9.93	27.36	46.00	-18.64	AVG
4.7060	24.87	9.96	34.83	56.00	-21.17	QP
4.7060	11.97	9.96	21.93	46.00	-24.07	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.4 RADIATED EMISSION MEASUREMENT

3.4.1 Radiated Emission Limits (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
Frequency (MHz)	Limit (dBuV)	
30~88	40	3
88~216	43.5	3
216~960	46	3
960 -10000	54.00	3
*902 - 928	94.00	3

Note:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m)=20log Emission level (uV/m).

(3) *Note: This is the limit for the fundamental frequency.

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.249)

Frequency of Emission (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)
902-928	50	500

Notes:

(1) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.4.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

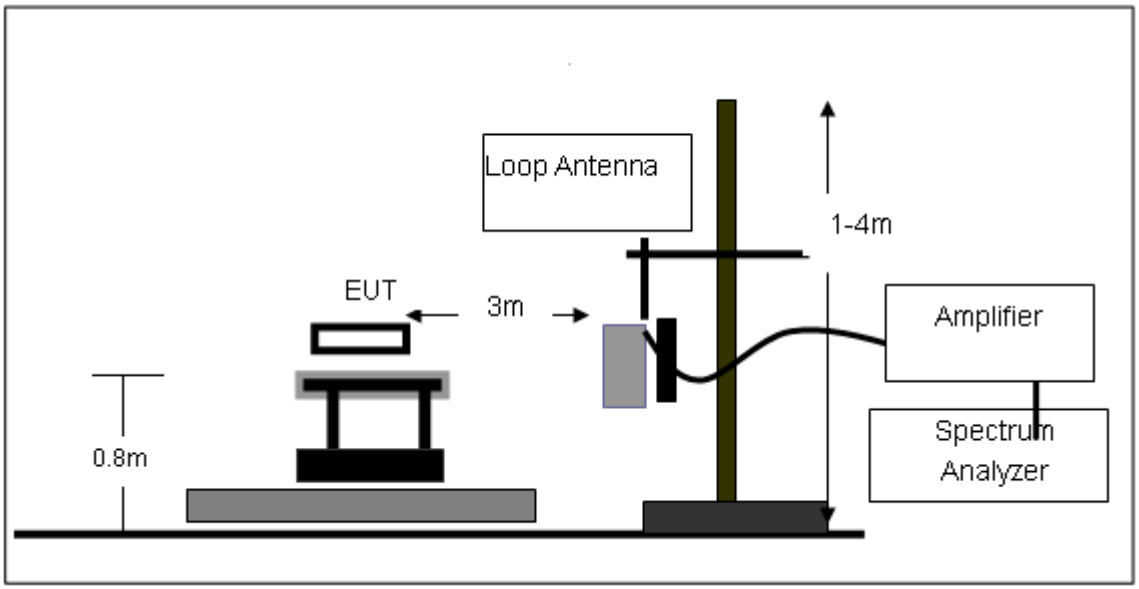
Note:

Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

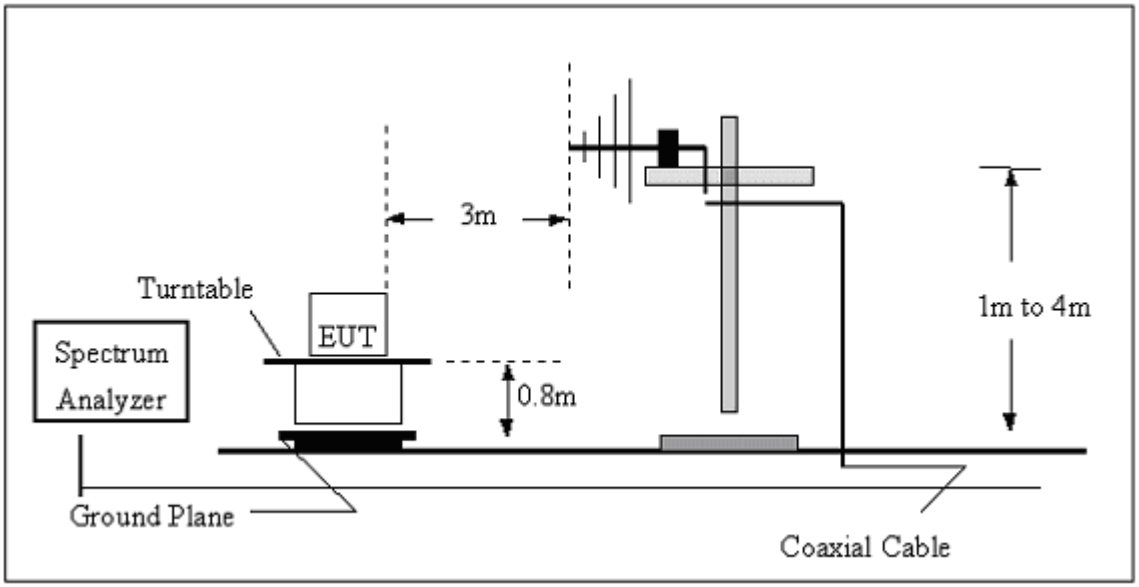
3.4.3 DEVIATION FROM TEST STANDARD

No deviation

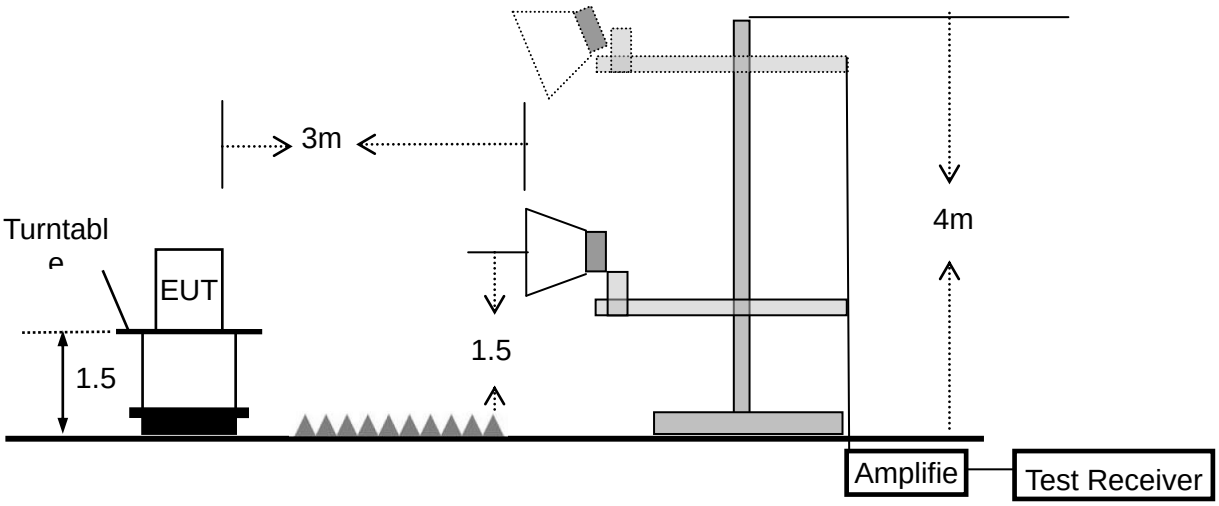
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.4.4 TEST RESULTS (BELOW 30MHz)

EUT：	ZipaMicro	Model Name. ：	zm.zwus
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

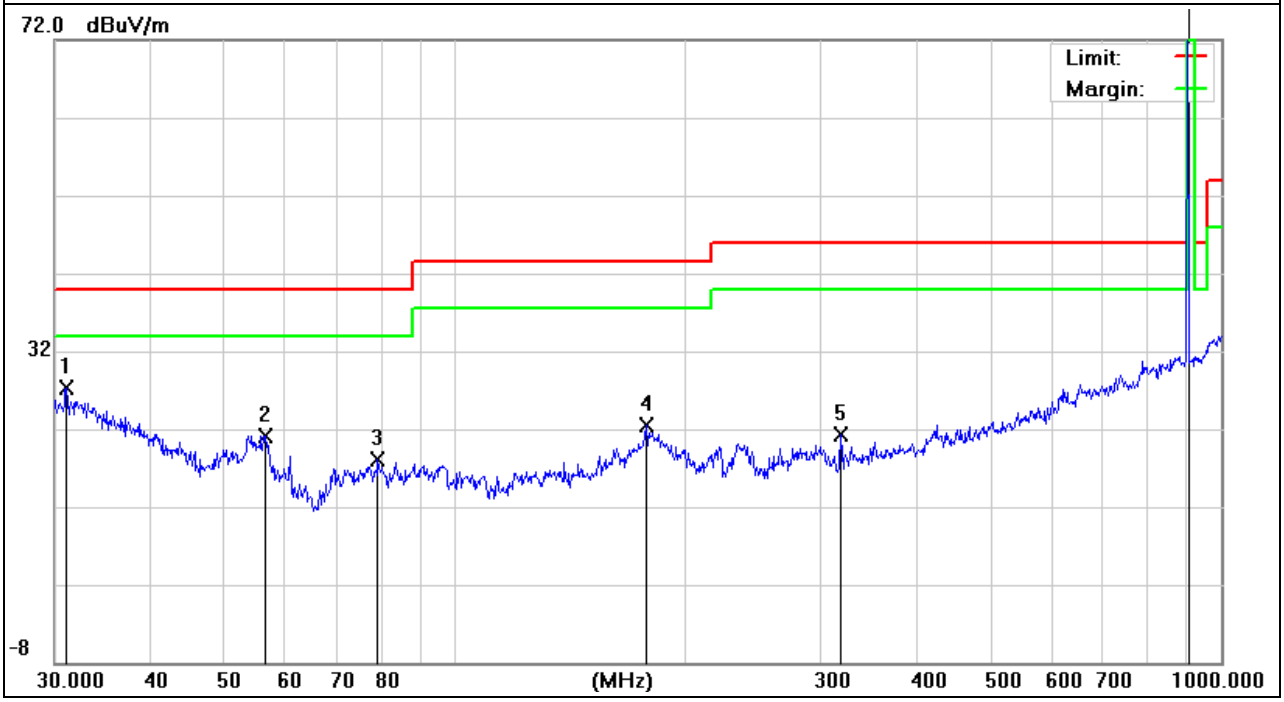
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =20 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.4.5 TEST RESULTS (BELOW 1000 MHz)

EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.7V from battery
Test Mode ：	Mode 1	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
31.0703	6.47	20.74	27.21	40.00	-12.79	QP
56.5929	9.15	12.05	21.20	40.00	-18.80	QP
79.2425	6.53	11.59	18.12	40.00	-21.88	QP
177.5089	9.84	12.69	22.53	43.50	-20.97	QP
318.8170	7.91	13.39	21.30	46.00	-24.70	QP
908.3093	59.48	24.91	84.39	94.00	-9.61	QP

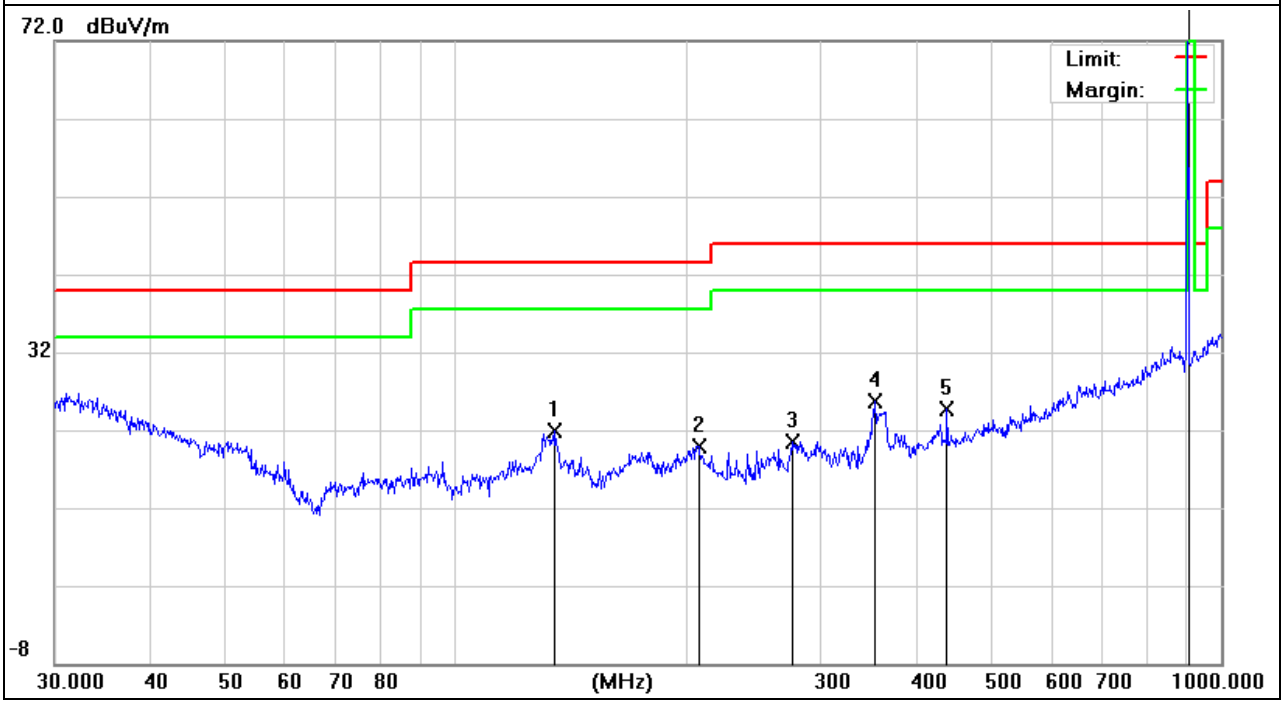
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	Mode 1	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
135.0319	10.12	11.70	21.82	43.50	-21.68	QP
207.8497	6.32	13.54	19.86	43.50	-23.64	QP
275.1569	6.55	13.97	20.52	46.00	-25.48	QP
352.9433	11.23	14.39	25.62	46.00	-20.38	QP
438.6553	8.73	16.05	24.78	46.00	-21.22	QP
908.3093	59.46	24.91	84.37	94.00	-9.63	QP

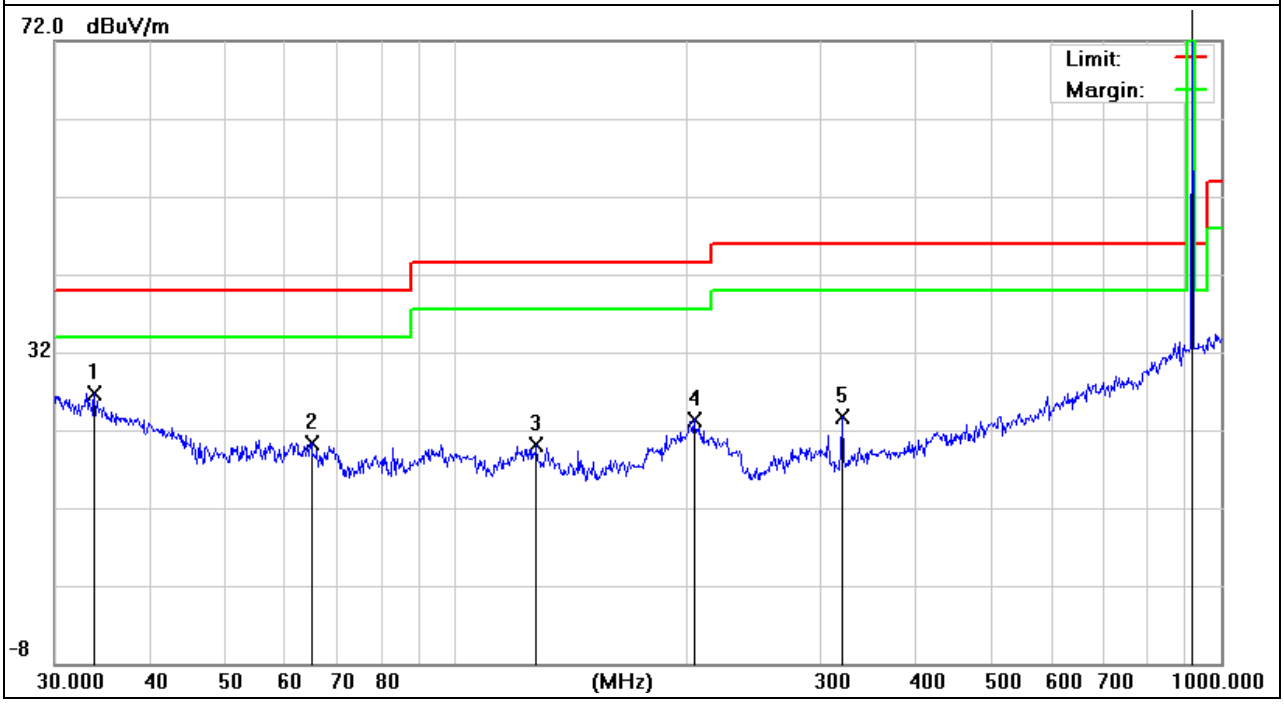
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	Mode 2	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
33.7986	7.20	19.47	26.67	40.00	-13.33	QP
64.8863	12.15	8.24	20.39	40.00	-19.61	QP
127.6645	9.55	10.53	20.08	43.50	-23.42	QP
204.9550	9.51	13.89	23.40	43.50	-20.10	QP
319.9370	10.35	13.41	23.76	46.00	-22.24	QP
916.0687	59.91	25.09	85.00	94.00	-9.00	QP

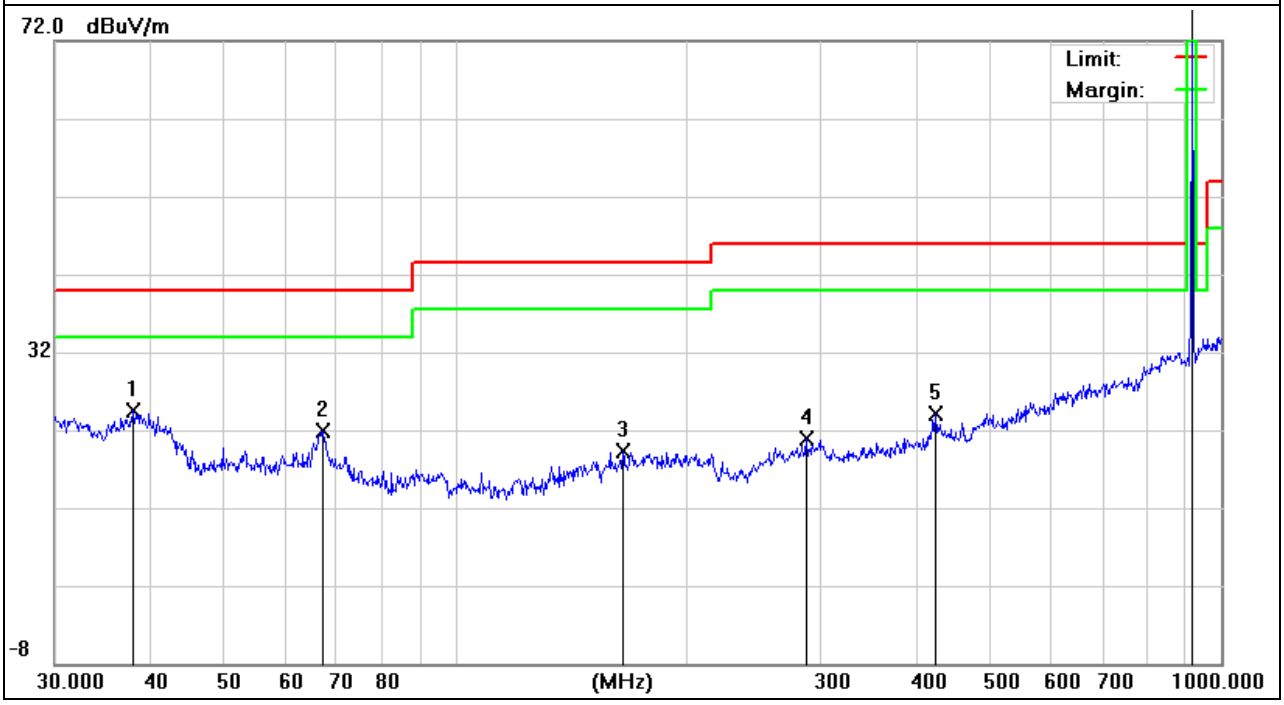
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	Mode 2	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
37.9450	7.07	17.51	24.58	40.00	-15.42	QP
67.2022	13.02	8.89	21.91	40.00	-18.09	QP
165.4866	6.79	12.49	19.28	43.50	-24.22	QP
286.9823	6.81	14.06	20.87	46.00	-25.13	QP
423.5403	7.37	16.71	24.08	46.00	-21.92	QP
916.0687	65.81	25.09	90.81	94.00	-3.19	QP

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

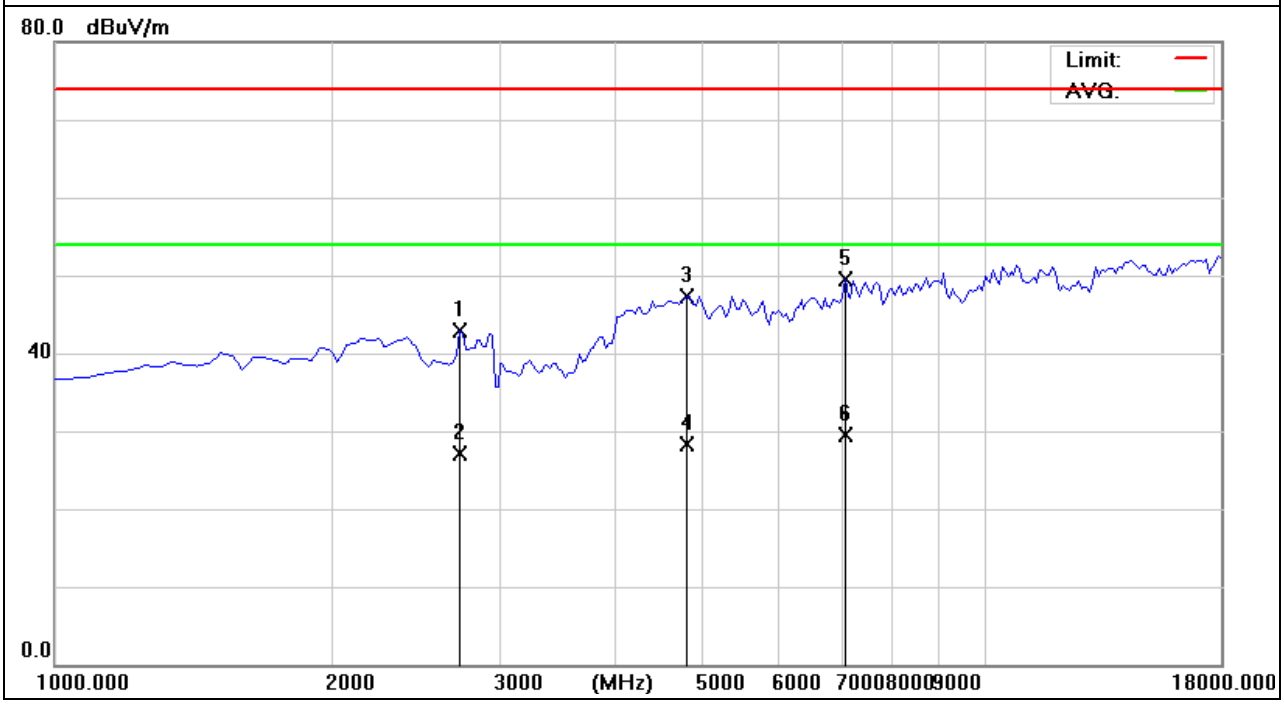


3.4.6 TEST RESULTS (ABOVE 1000 MHZ)

EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	Mode 1	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2742.500	42.56	0.29	42.85	74.00	-31.15	peak
2742.500	26.83	0.29	27.12	54.00	-26.88	AVG
4825.000	35.43	11.97	47.40	74.00	-26.60	peak
4825.000	16.36	11.97	28.33	54.00	-25.67	AVG
7120.000	0.58	48.86	49.44	74.00	-24.56	peak
7120.000	-19.41	48.86	29.45	54.00	-24.55	AVG

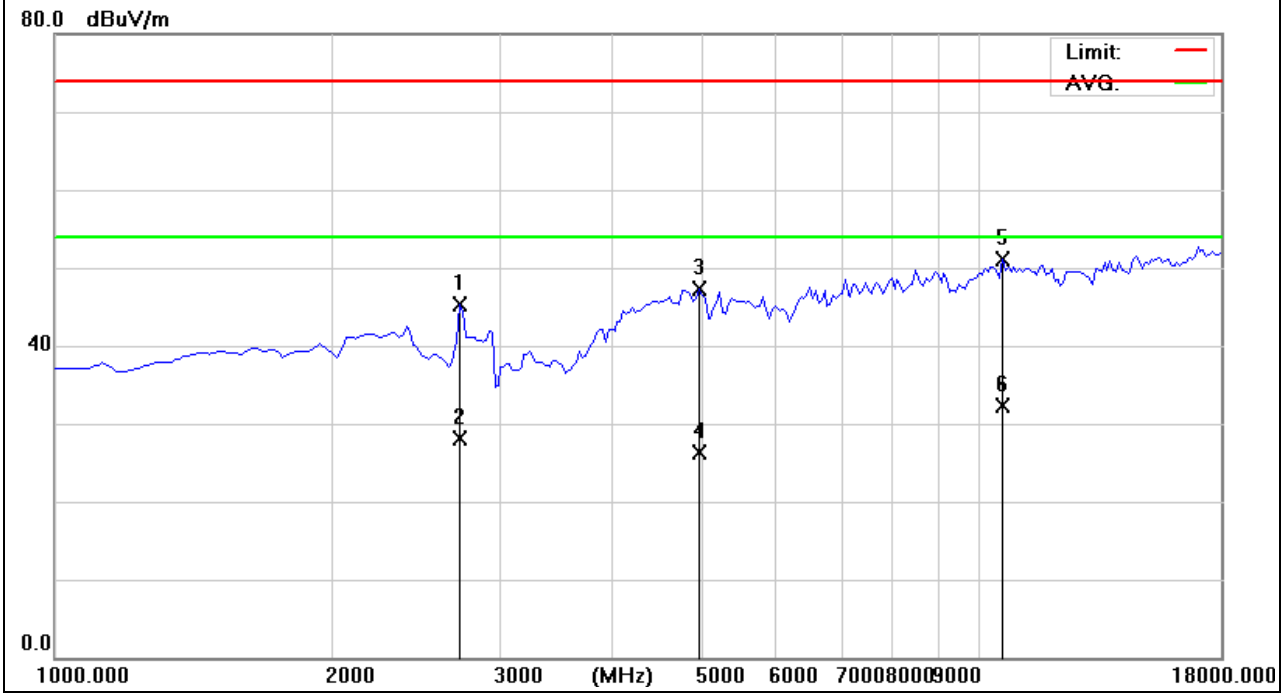
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
No emission above 18GHz.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	Mode 1	Polarization：	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2742.500	44.94	0.29	45.23	74.00	-28.77	peak
2742.500	27.82	0.29	28.11	54.00	-25.89	AVG
4952.500	35.20	12.18	47.38	74.00	-26.62	peak
4952.500	14.18	12.18	26.36	54.00	-27.64	AVG
10477.500	-2.00	53.11	51.11	74.00	-22.89	peak
10477.500	-20.78	53.11	32.33	54.00	-21.67	AVG

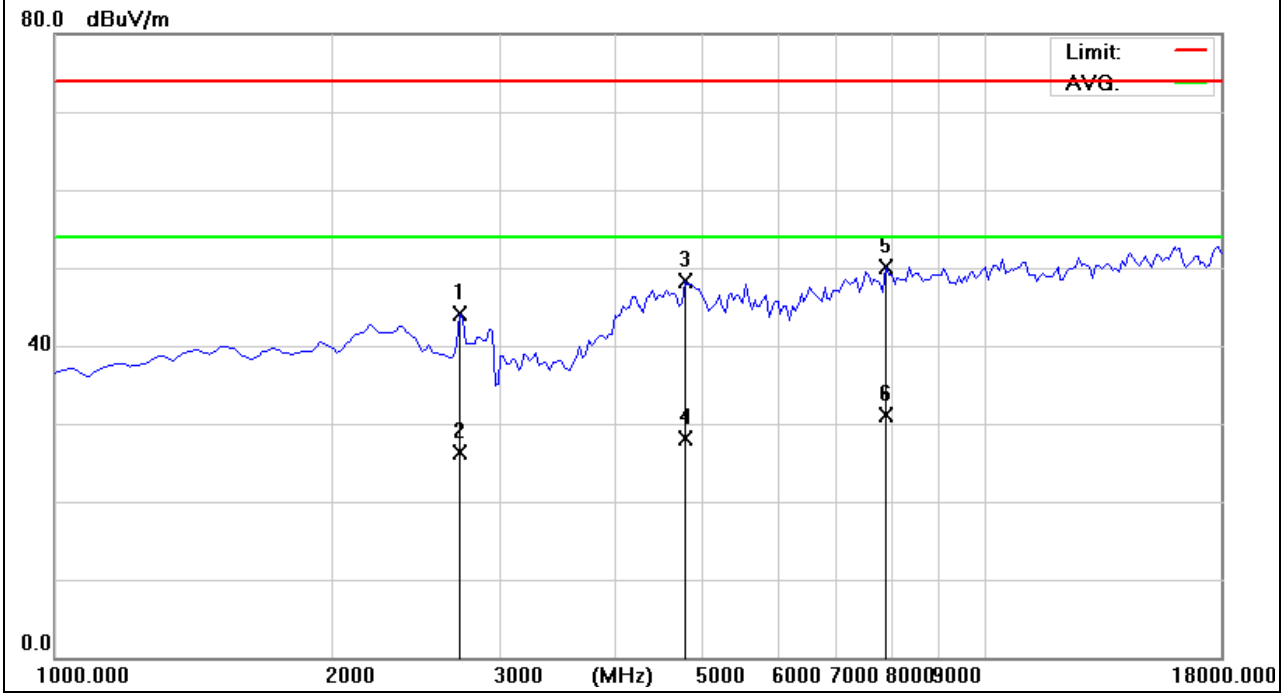
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
No emission above 18GHz.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	Mode 2	Polarization：	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2742.500	43.90	0.29	44.19	74.00	-29.81	peak
2742.500	26.07	0.29	26.36	54.00	-27.64	AVG
4782.500	36.53	11.75	48.28	74.00	-25.72	peak
4782.500	16.37	11.75	28.12	54.00	-25.88	AVG
7885.000	0.83	49.24	50.07	74.00	-23.93	peak
7885.000	-18.21	49.24	31.03	54.00	-22.97	AVG

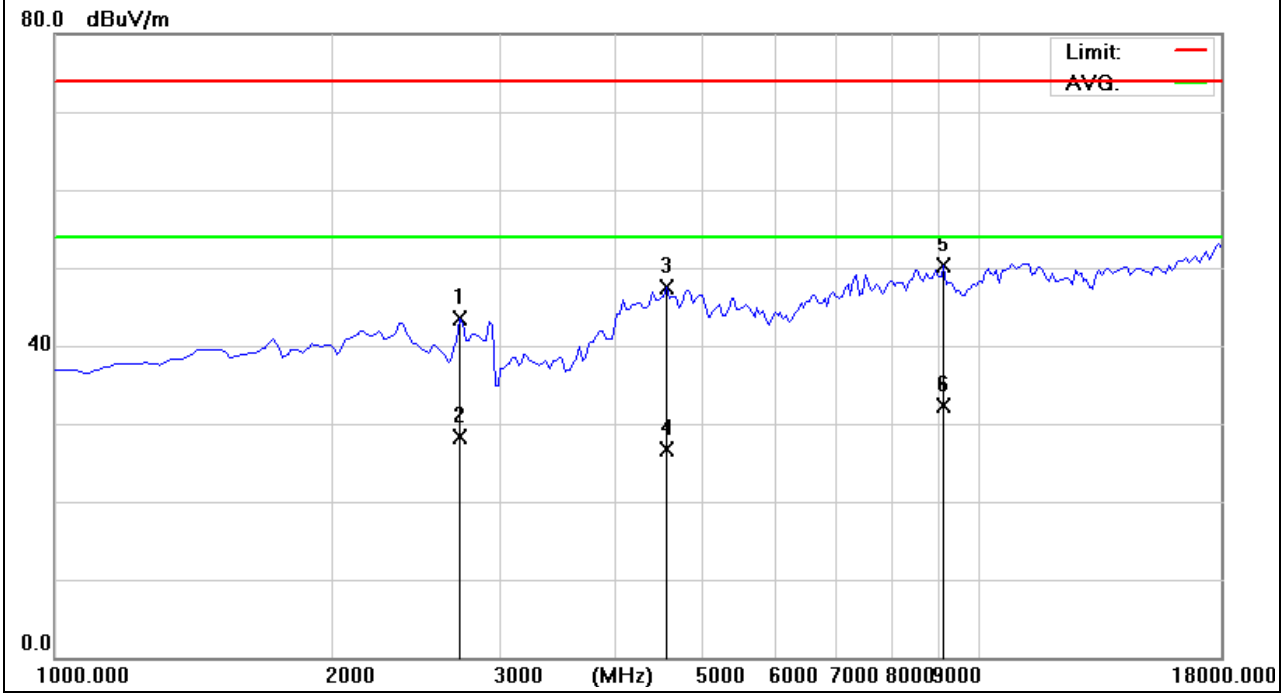
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
No emission above 18GHz.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	Mode 2	Polarization：	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2742.500	43.20	0.29	43.49	74.00	-30.51	peak
2742.500	27.96	0.29	28.25	54.00	-25.75	AVG
4570.000	36.46	11.03	47.49	74.00	-26.51	peak
4570.000	15.62	11.03	26.65	54.00	-27.35	AVG
9117.500	-0.69	50.92	50.23	74.00	-23.77	peak
9117.500	-18.60	50.92	32.32	54.00	-21.68	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
No emission above 18GHz.



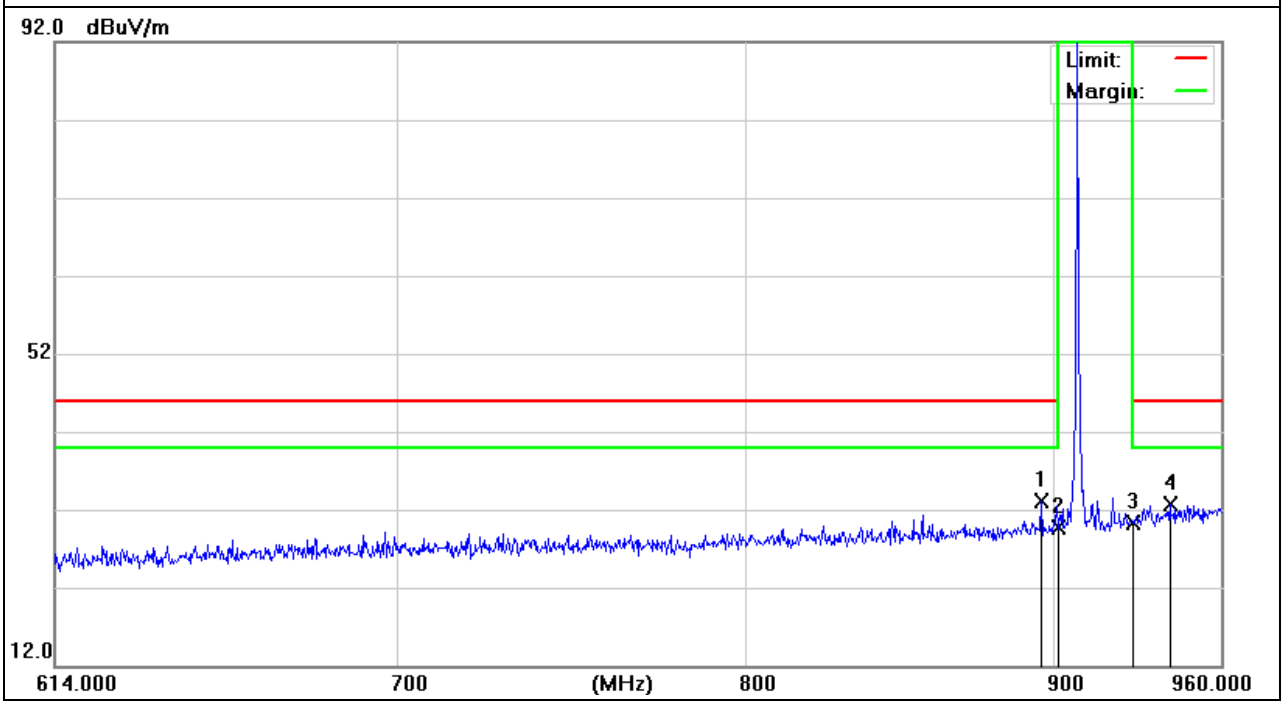
Note: EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report(X orientation).

3.4.7 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	TX-908.4MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
896.1471	9.13	24.06	33.19	46.00	-12.81	QP
902.0000	5.52	24.16	29.68	46.00	-16.32	QP
928.0000	5.01	25.29	30.30	46.00	-15.70	QP
941.3057	6.53	26.09	32.62	46.00	-13.38	QP

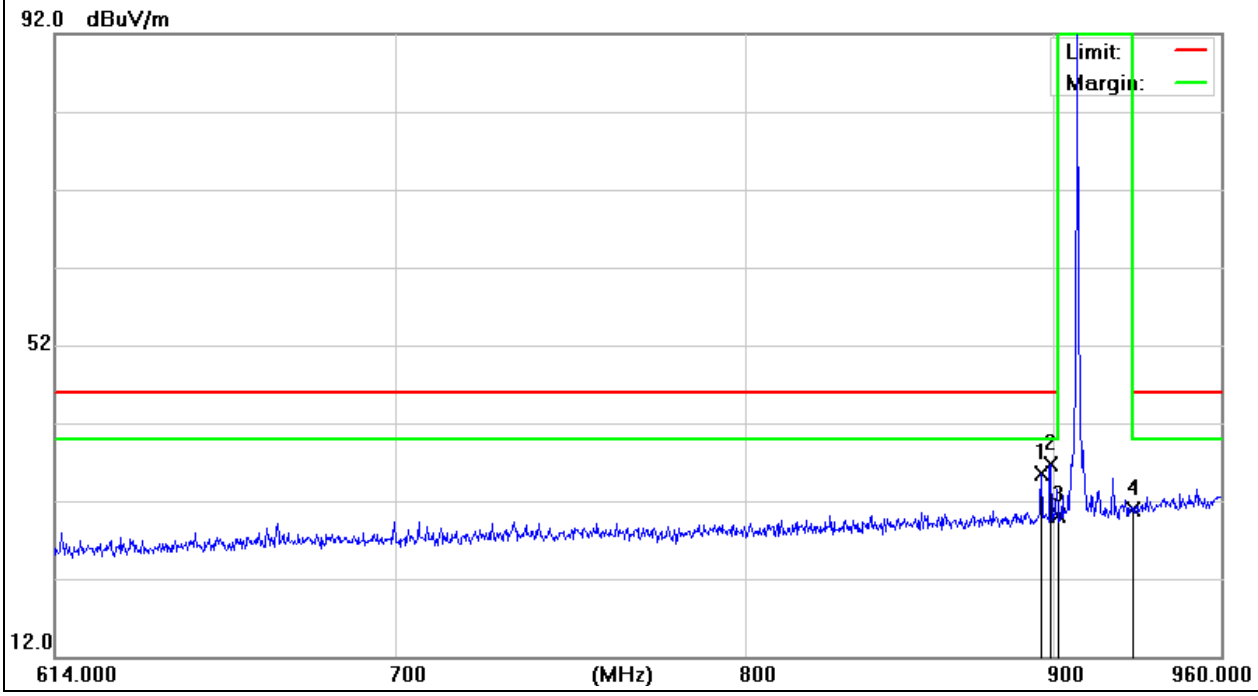
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	TX-908.4MHz	Polarization：	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
896.1472	11.48	24.06	35.54	46.00	-10.46	QP
899.3572	12.66	24.08	36.74	46.00	-9.26	QP
902.0000	6.04	24.16	30.20	46.00	-15.80	QP
928.0000	5.59	25.29	30.88	46.00	-15.12	QP

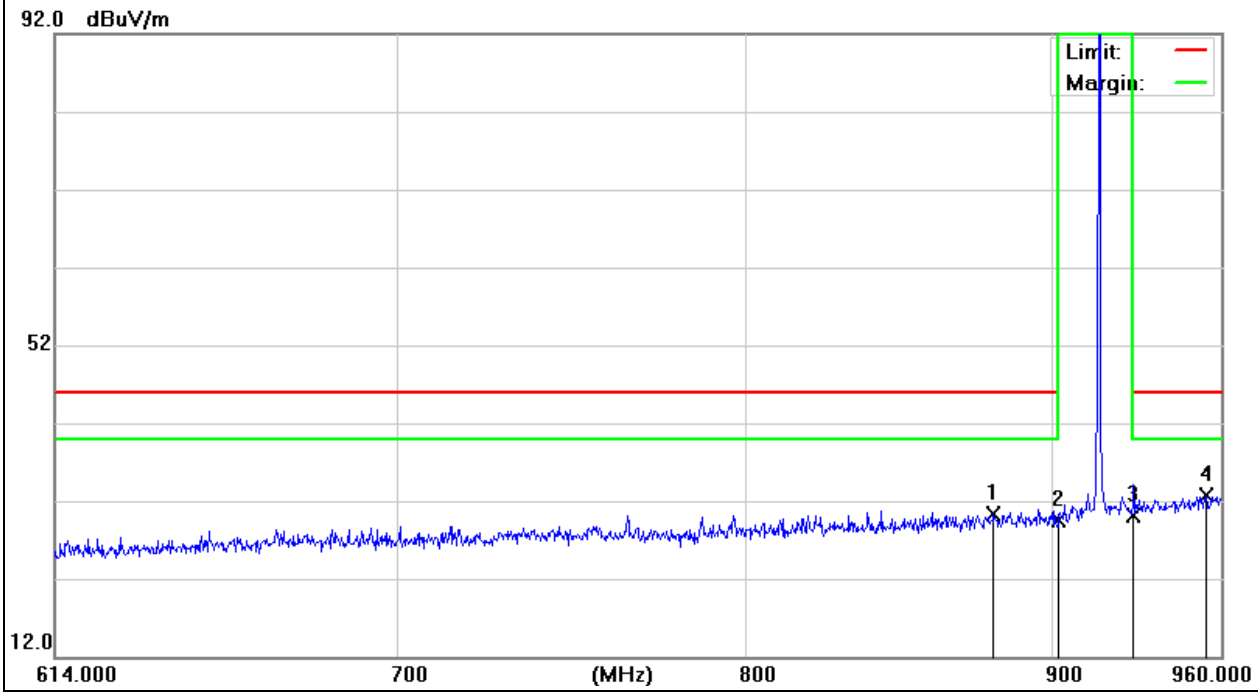
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	TX-916MHz	Polarization：	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
879.8754	6.81	23.52	30.33	46.00	-15.67	QP
902.0000	5.26	24.16	29.42	46.00	-16.58	QP
928.0000	4.91	25.29	30.20	46.00	-15.80	QP
954.4383	6.39	26.36	32.75	46.00	-13.25	QP

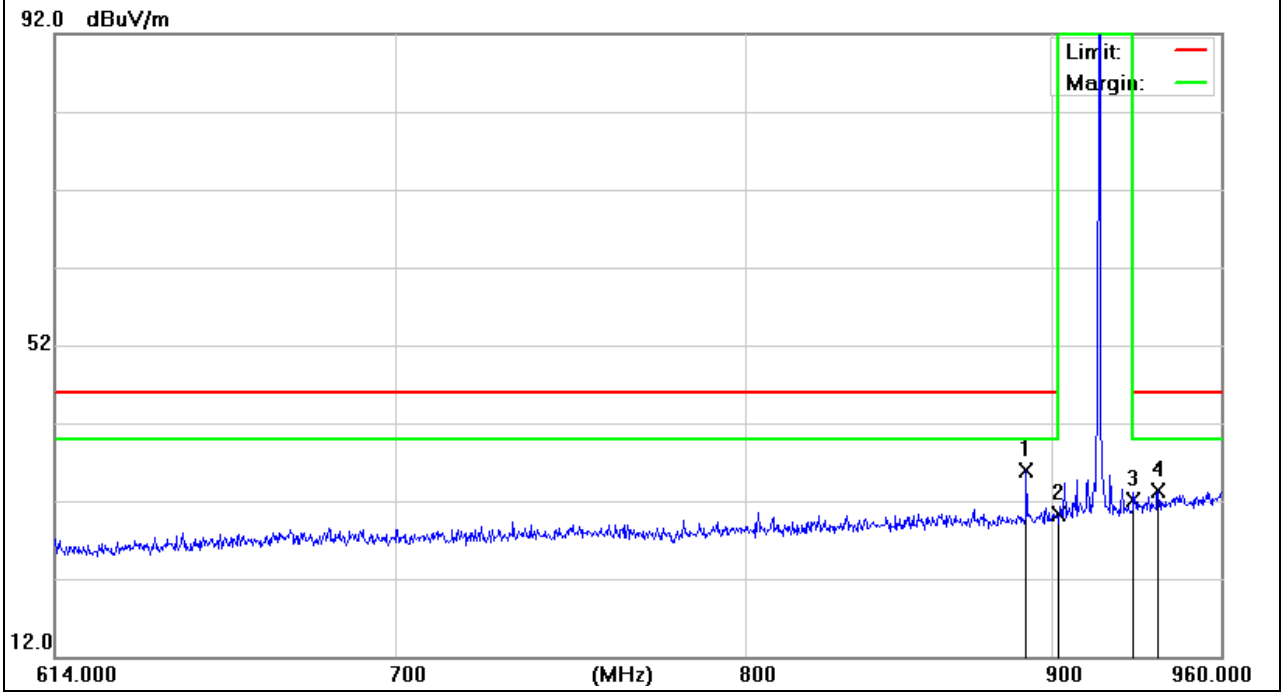
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	25 ℃	Relative Humidity：	51%
Pressure：	1010 hPa	Test Voltage ：	DC 3.6V from battery
Test Mode ：	TX-916MHz	Polarization：	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
890.9556	11.78	24.04	35.82	46.00	-10.18	QP
902.0000	6.15	24.16	30.31	46.00	-15.69	QP
928.0000	6.76	25.29	32.05	46.00	-13.95	QP
937.1079	7.38	25.88	33.26	46.00	-12.74	QP

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.



4. FREQUENCY TOLERANCE

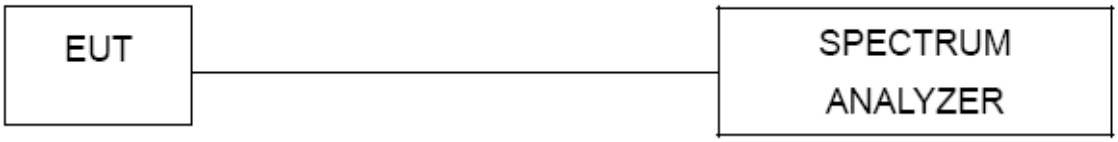
4.1 FREQUENCY TOLERANCE LIMITS

The frequency tolerance of the carrier signal shall be maintained within ±0.001% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.2TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 10KHz, VBW≧RBW, Sweep time = Auto.

4.3 TEST SETUP



4.4 TEST RESULTS

EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1020 hPa	Test Power ：	DC 3.6V from battery
Test Mode ：	Mode 1/2		

908.4MHz

Voltage (V)	Frequency(MHz)	Reading(MHz)	Frequency Tolerance	LIMIT
3.06	908.4	908.4015	0.000165%	±0.001%
3.6	908.4	908.4053	0.000583%	±0.001%
4.14	908.4	908.4072	0.000793%	±0.001%

Temperature (℃)	Frequency(MHz)	Reading(MHz)	Frequency Tolerance	LIMIT
-20	908.4	908.4081	0.000892%	±0.001%
-10	908.4	908.4021	0.000231%	±0.001%
0	908.4	908.4033	0.000363%	±0.001%
10	908.4	908.4013	0.000143%	±0.001%
20	908.4	908.4045	0.000495%	±0.001%
30	908.4	908.4021	0.000231%	±0.001%
40	908.4	908.4036	0.000396%	±0.001%
50	908.4	908.4017	0.000187%	±0.001%

916MHz

Voltage (V)	Frequency(MHz)	Reading(MHz)	Frequency Tolerance	LIMIT
3.06	916	916.003	0.000328%	±0.001%
3.6	916	916.005	0.000546%	±0.001%
4.14	916	916.007	0.000764%	±0.001%

Temperature (℃)	Frequency(MHz)	Reading(MHz)	Frequency Tolerance	LIMIT
-20	916	916.002	0.000218%	±0.001%
-10	916	916.003	0.000328%	±0.001%
0	916	916.004	0.000437%	±0.001%
10	916	916.007	0.000764%	±0.001%
20	916	916.003	0.000328%	±0.001%
30	916	916.002	0.000218%	±0.001%
40	916	916.008	0.000873%	±0.001%
50	916	916.006	0.000655%	±0.001%

5. BANDWIDTH TEST

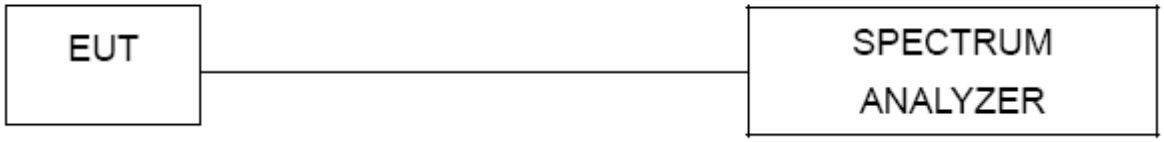
5.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW≧RBW, Sweep time = Auto.

5.1 DEVIATION FROM STANDARD

No deviation.

5.1 TEST SETUP

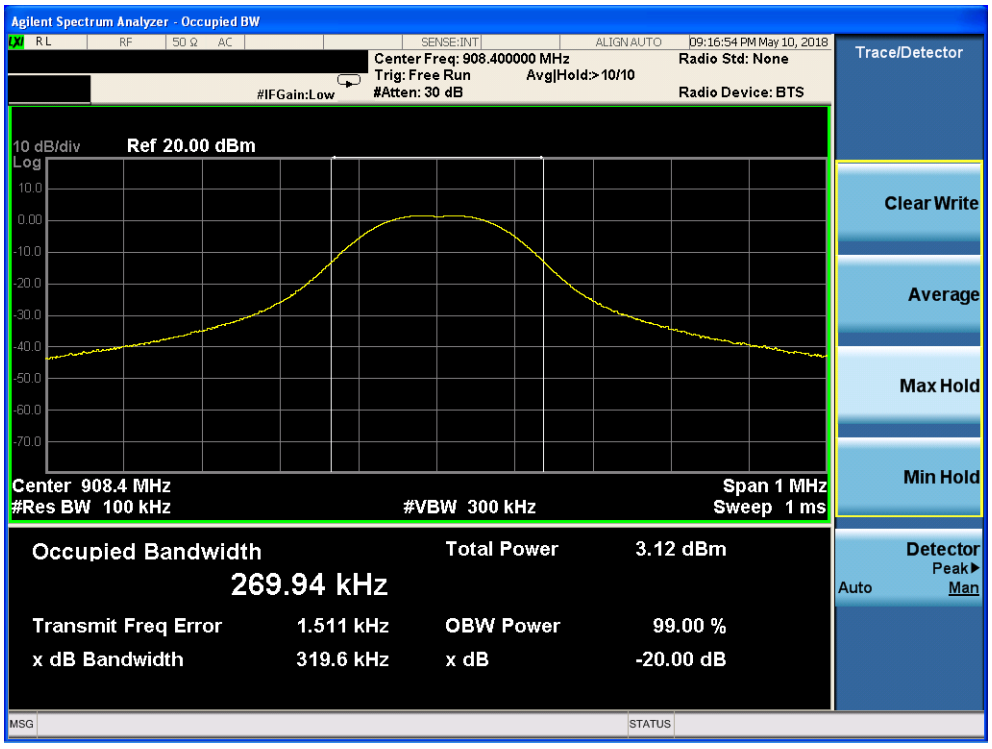


6. TEST RESULTS

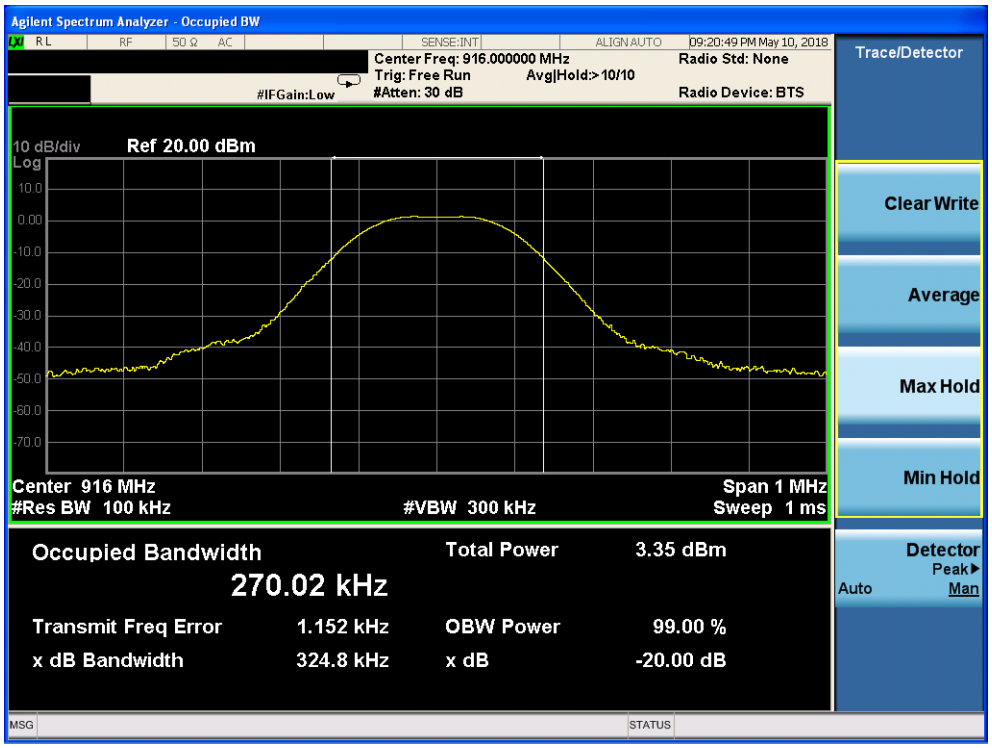
EUT：	ZipaMicro	Model Name ：	zm.zwus
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1020 hPa	Test Power ：	DC 3.6V from battery
Test Mode ：	Mode 1/2		

Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)
CH01	908.4	0.3196
CH02	916	0.3248

908.4 MHz



916 MHz


Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω
AC
SENSE:INT
ALIGN AUTO
09:20:49 PM May 10, 2018
Center Freq: 916.000000 MHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Trace/Detector
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 916 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 1 MHz
Sweep 1 ms
Occupied Bandwidth
270.02 kHz
Total Power
3.35 dBm
Transmit Freq Error
1.152 kHz
OBW Power
99.00 %
x dB Bandwidth
324.8 kHz
x dB
-20.00 dB
Clear Write
Average
Max Hold
Min Hold
Detector
Peak
Auto
Man
MSG
STATUS