



Test Report

Report No.: MTi210713015-04E3

Date of issue: Aug. 17, 2021

Applicant: Guangdong WiiRobot Co., Ltd

Product name: Speedbird mini

Model(s): I20E, I20E Bundle A, I20E Bundle B, I20E Bundle C, I20E Bundle D, I20E Bundle E, I20E Bundle F, I20EA, I20EB, I20EC

FCC ID: 2AZ7PI20E

Shenzhen Microtest Co., Ltd.
<http://www.mtitest.com>



Instructions

1. The report shall not be partially reproduced without the written consent of the laboratory;
2. The test results of this report are only responsible for the samples submitted;
3. This report is invalid without the seal and signature of the laboratory;
4. This report is invalid if transferred, altered or tampered with in any form without authorization;
5. Any objection to this report shall be submitted to the laboratory within 15 days from the date of receipt of the report.



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	FEATURE OF EQUIPMENT UNDER TEST (EUT).....	5
1.2	OPERATION CHANNEL LIST	5
1.3	TEST FREQUENCY CHANNEL.....	6
1.4	EUT OPERATION MODE	6
1.5	ANCILLARY EQUIPMENT LIST.....	6
2	SUMMARY OF TEST RESULT	6
3	TEST FACILITIES AND ACCREDITATIONS	7
3.1	TEST LABORATORY.....	7
3.2	ENVIRONMENTAL CONDITIONS	7
3.3	MEASUREMENT UNCERTAINTY.....	7
3.4	TEST SOFTWARE	7
4	LIST OF TEST EQUIPMENT	8
5	TEST RESULT	9
5.1	ANTENNA REQUIREMENT	9
5.1.1	<i>Standard requirement</i>	9
5.1.2	<i>EUT Antenna</i>	9
5.2	AC POWER LINE CONDUCTED EMISSION	10
5.2.1	<i>Limits</i>	10
5.2.2	<i>Test setup</i>	10
5.2.3	<i>Test procedure</i>	11
5.2.4	<i>Test results</i>	11
5.3	RADIATED SPURIOUS EMISSION	12
5.3.1	<i>Limit</i>	12
5.3.2	<i>Test method</i>	12
5.3.3	<i>Test Result</i>	13
5.3.4	<i>Band edge-radiated</i>	26
5.3.5	<i>Field strength of fundamental</i>	30
5.4	20DB AND 99% BANDWIDTH	32
5.4.1	<i>Limits</i>	32
5.4.2	<i>Test method</i>	32
5.4.3	<i>Test result</i>	33
	PHOTOGRAPHS OF THE TEST SETUP	35
	PHOTOGRAPHS OF THE EUT	36



TEST RESULT CERTIFICATION

Applicant's name	Guangdong WiiRobot Co., Ltd
Address	Room 401, Building 1, No.11 Yinghe 1st Street,Yaoshan, Xiegang Town, Dongguan City, Guangdong Province, China
Manufacturer's Name	Guangdong WiiRobot Co., Ltd
Address	Room 401, Building 1, No.11 Yinghe 1st Street,Yaoshan, Xiegang Town, Dongguan City, Guangdong Province, China

Product description

Product name	Speedbird mini
Trademark	ING
Model Name	I20E
Serial Model	I20E Bundle A, I20E Bundle B, I20E Bundle C, I20E Bundle D, I20E Bundle E, I20E Bundle F, I20EA, I20EB, I20EC
Standards	FCC Part 15.249
Test procedure.....	ANSI C63.10-2013

Date of Test

Date (s) of performance of tests.....	July 30, 2021 ~ Aug. 17, 2021
Test Result.....	Pass

This device described above has been tested by Shenzhen Microtest Co., Ltd. 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.

Testing Engineer

:

Cindy Qin

(Cindy Qin)

Technical Manager

:

Leon Chen

(Leon Chen)

Authorized Signatory

:

Tom Xue

(Tom Xue)



1 General description

1.1 Feature of equipment under test (EUT)

Equipment:	Speedbird mini
Model Name:	I20E
Serial Model:	I20E Bundle A, I20E Bundle B, I20E Bundle C, I20E Bundle D, I20E Bundle E, I20E Bundle F, I20EA, I20EB, I20EC
Model Difference:	All the models are of the same circuit module, except the appearance color and model No..
Operation Frequency:	2452 - 2474MHz
Modulation Type:	GFSK
Antenna Type:	Whip antenna
Antenna Gain:	2dBi
Max. Field Strength:	91.36dBuV/m
Power Source:	DC 7.7V from battery
Battery:	DC 7.7V 1820mAh
Hardware version:	B19-RX V01
Software version:	B19-RX V01

1.2 Operation channel list

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2452	10	2462	20	2472	30	/
1	2453	11	2463	21	2473	31	/
2	2454	12	2464	22	2474	32	/
3	2455	13	2465	23	/	33	/
4	2456	14	2466	24	/	34	/
5	2457	15	2467	25	/	35	/
6	2458	16	2468	26	/	36	/
7	2459	17	2469	27	/	37	/
8	2460	18	2470	28	/	38	/
9	2461	19	2471	29	/	39	/



1.3 Test Frequency Channel

Channel	Frequency(MHz)
Low	2452
Middle	2463
High	2474

1.4 EUT operation mode

During testing, RF test program provided by the manufacture to control the Tx operation followed the test requirement.

1.5 Ancillary equipment list

Equipment	Model	S/N	Manufacturer
/	/	/	/

2 Summary of Test Result

Test procedures according to the technical standards:

Item	FCC Part No.	Description of Test	Result
1	FCC Part15.203	Antenna Requirement	Pass
2	FCC Part15.207	AC power line conducted emission	N/A
3	FCC Part15.249(a)	Field Strength of the Fundamental signal	Pass
5	FCC Part15.249(d)	Radiated spurious emission	Pass
4	FCC Part 15.215	20dB and 99% Bandwidth	Pass



3 Test Facilities and Accreditations

3.1 Test laboratory

Test Laboratory	Shenzhen Microtest Co., Ltd
Location	101, No. 7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao' an District, Shenzhen, Guangdong, China.
FCC Registration No.	448573

3.2 Environmental conditions

Temperature:	15°C~35°C
Humidity	20%~75%
Atmospheric pressure	98kPa~101kPa

3.3 Measurement uncertainty

The reported uncertainty of measurement $y \pm U$, 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 %

RF frequency	1×10^{-7}
RF power, conducted	± 1 dB
Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	± 1 degree
Humidity	± 5 %

3.4 Test software

Software Name	Manufacturer	Model	Version
/	/	/	/



4 List of test equipment

Equipment No.	Equipment Name	Manufacturer	Model	Serial No.	Calibration date	Due date
MTI-E043	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2020/06/04	2021/06/03
MTI-E044	TRILOG Broadband Antenna	schwarzbeck	VULB 9163	9163-1338	2020/06/05	2021/06/04
MTI-E047	Amplifier	Hewlett-Packard	8447F	3113A06150	2020/06/04	2021/06/03
MTI-E089	ESG Vector Signal Generator	Agilent	N5182A	MY49060455	2020/06/03	2021/06/02
MTI-E058	ESG Series Analog Signal Generator	Agilent	E4421B	GB40051240	2020/07/03	2021/07/04
MTI-E062	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2020/06/04	2021/06/03
MTI-E066	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2020/06/04	2021/06/03
MTI-E078	Synthesized Sweeper	Agilent	83752A	3610A01957	2020/06/04	2021/06/03
MTI-E079	DC Power Supply	Agilent	E3632A	MY40027695	2020/06/04	2021/06/03
MTI-E045	Double Ridged Broadband Horn Antenna	schwarzbeck	BBHA 9120D	9120D-2278	2020/06/05	2021/06/04
MTI-E021	EMI Test Receiver	Rohde&schwarz	ESCS30	100210	2020/06/04	2021/06/03
MTI-E022	Pulse Limiter	Schwarzbeck	VSTD 9561-F	00679	2020/06/03	2021/06/02
MTI-E023	Artificial mains network	Schwarzbeck	NSLK 8127	NSLK 8127 #841	2020/06/04	2021/06/03
MTI-E046	Active Loop Antenna	Schwarzbeck	FMZB 1519B	00044	2020/06/05	2021/06/04
MTI-E048	Amplifier	Agilent	8449B	3008A02400	2020/07/03	2021/07/04
MTI-E072	Thermometer Clock Humidity Monitor	-	HTC-1	/	2020/06/07	2021/06/06

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



5 Test Result

5.1 Antenna requirement

5.1.1 Standard requirement

FCC PART 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. 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

5.1.2 EUT Antenna

The antenna is Whip antenna, which was permanently affixed to the device and un-replaced, complies with 15.203. In addition, the maximum antenna gain is 2dBi.



5.2 AC power line conducted emission

5.2.1 Limits

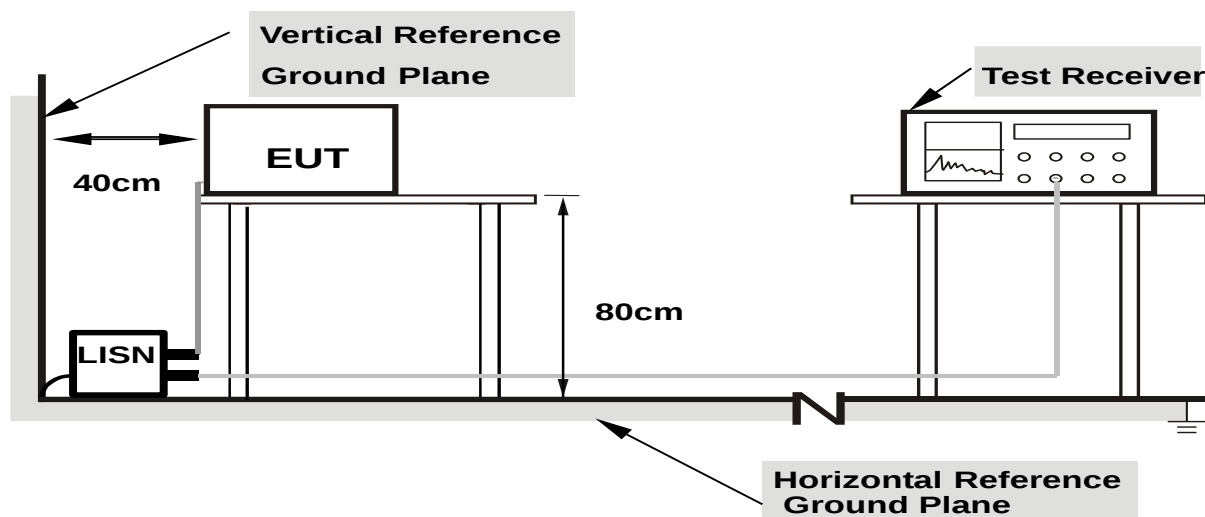
FCC §15.207;

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 ^{note2}	56 - 46 ^{note2}
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note1: The tighter limit applies at the band edges.
Note2: The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

5.2.2 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



5.2.3 Test procedure

a. EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

b. 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

c. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment's powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

d. 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.

e. 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.

f. LISN at least 80 cm from nearest part of EUT chassis.

For the actual test configuration, please refer to the related Item –EUT Test Photos.

5.2.4 Test results

Note: The device is a DC power supply and does not apply to conducted emissions.



5.3 Radiated spurious emission

5.3.1 Limit

FCC PART 15.249(a);

Except as provided in paragraph (a) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μ V/m)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500

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 §15.209, whichever is the lesser attenuation.

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μ V/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 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

5.3.2 Test method

- The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range below 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.
- EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Use the following spectrum analyser settings:
 - Span = wide enough to fully capture the emission being measured
 - RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz
 - VBW $\geq$ RBW, Sweep = auto
 - Detector function = peak
 - Trace = max hold
- Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.



- e) The peak level, once corrected, must comply with the limit specified in Section 15.209. Set the RBW = 1MHz, VBW = 10Hz, Detector = PK for AV value, while maintaining all of the other instrument settings.

5.3.3 Test Result

Below 30MHz

EUT:	Speedbird mini	Model name. :	I20E
Pressure:	1010 hPa	Test voltage:	DC 7.7V from battery
Test mode:	TX	Polarization :	--

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

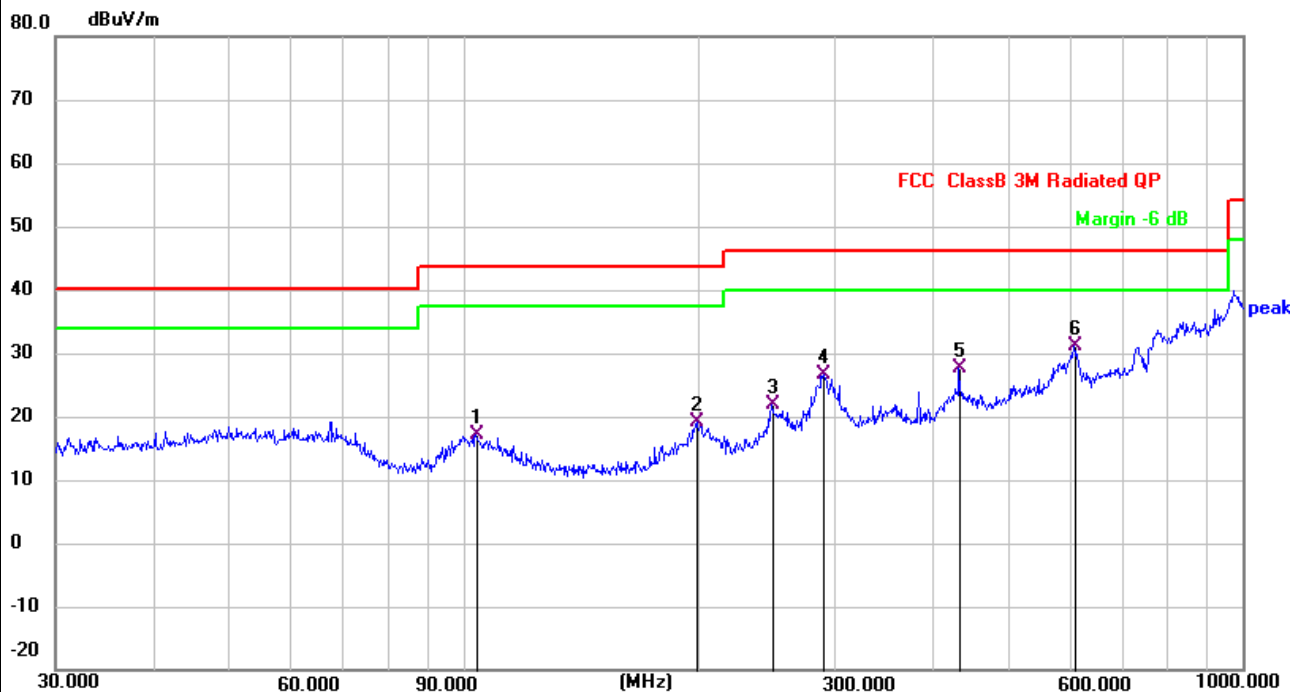
Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})(\text{dB})$;
3. Limit line = specific limits (dBuV) + distance extrapolation factor.



30MHz-1GHz

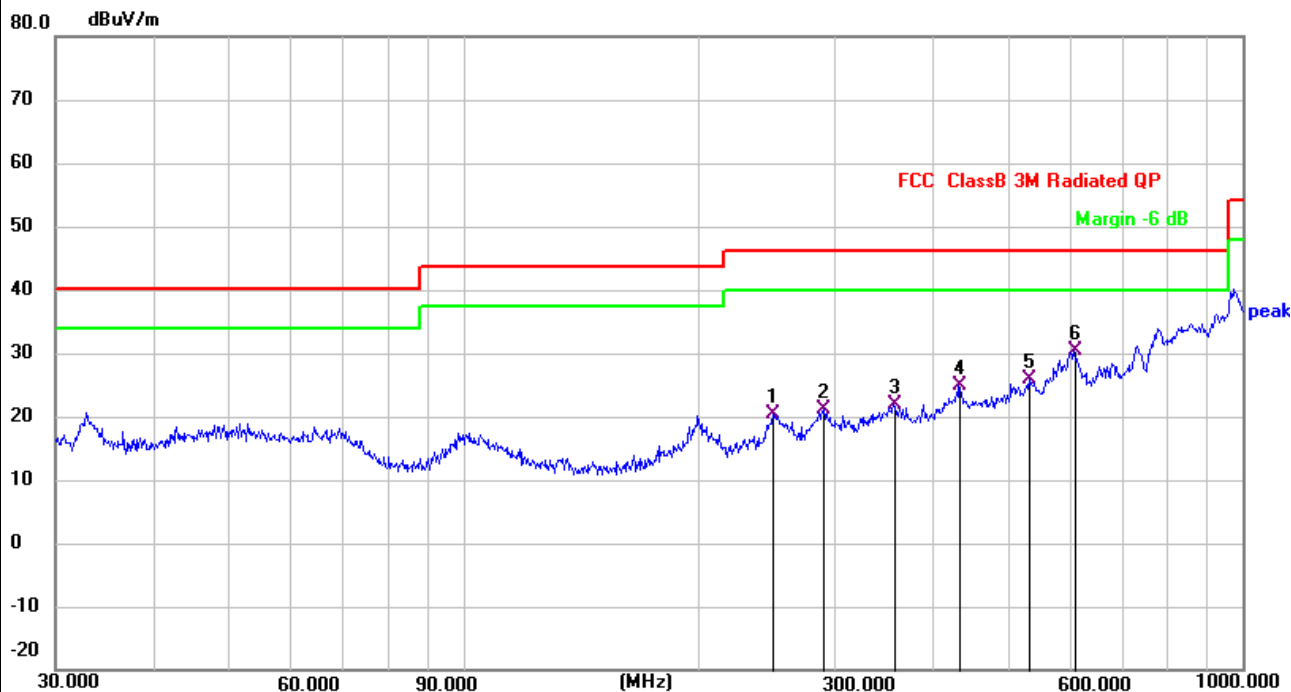
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2452MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		103.8055	31.28	-14.11	17.17	43.50	-26.33	QP
2		199.2855	32.17	-12.96	19.21	43.50	-24.29	QP
3		248.5519	33.15	-11.39	21.76	46.00	-24.24	QP
4		290.0172	37.58	-11.07	26.51	46.00	-19.49	QP
5		432.5457	32.95	-5.29	27.66	46.00	-18.34	QP
6	*	607.7867	35.22	-4.10	31.12	46.00	-14.88	QP



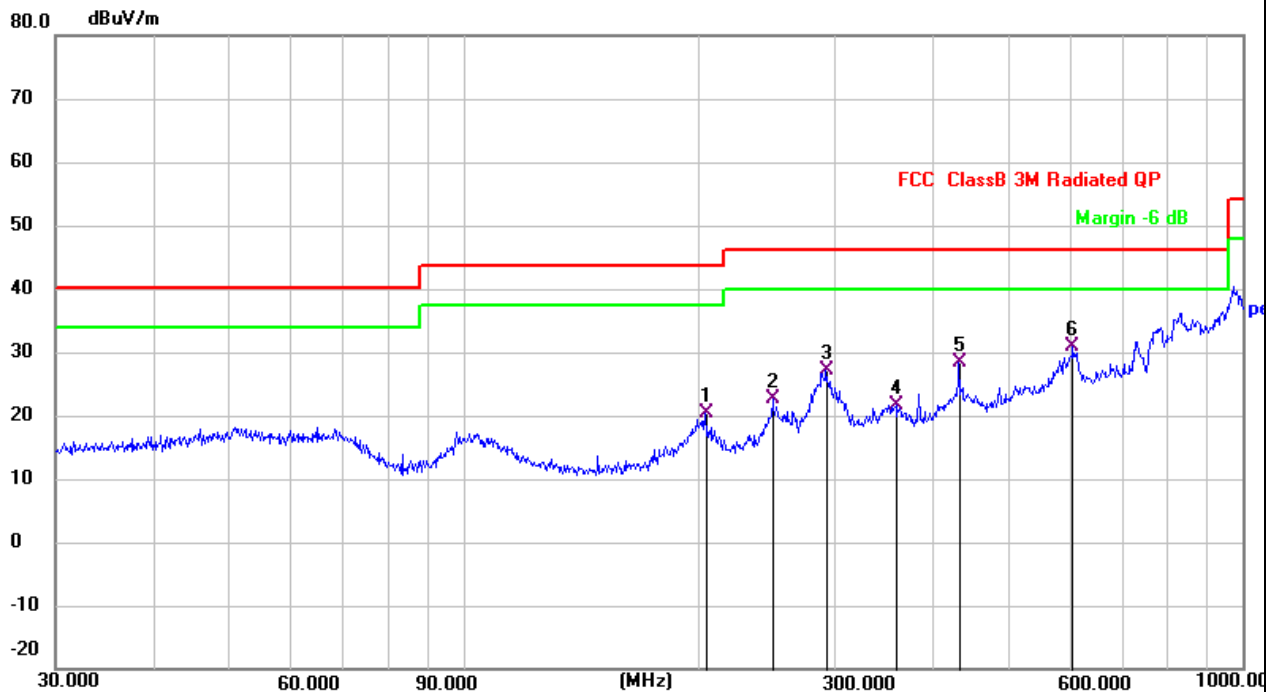
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2452MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		249.4250	29.77	-9.33	20.44	46.00	-25.56	QP
2		290.0172	29.78	-8.67	21.11	46.00	-24.89	QP
3		356.6758	29.87	-7.93	21.94	46.00	-24.06	QP
4		432.5457	31.04	-6.27	24.77	46.00	-21.23	QP
5		531.9635	30.86	-4.91	25.95	46.00	-20.05	QP
6	*	607.7867	30.22	0.11	30.33	46.00	-15.67	QP



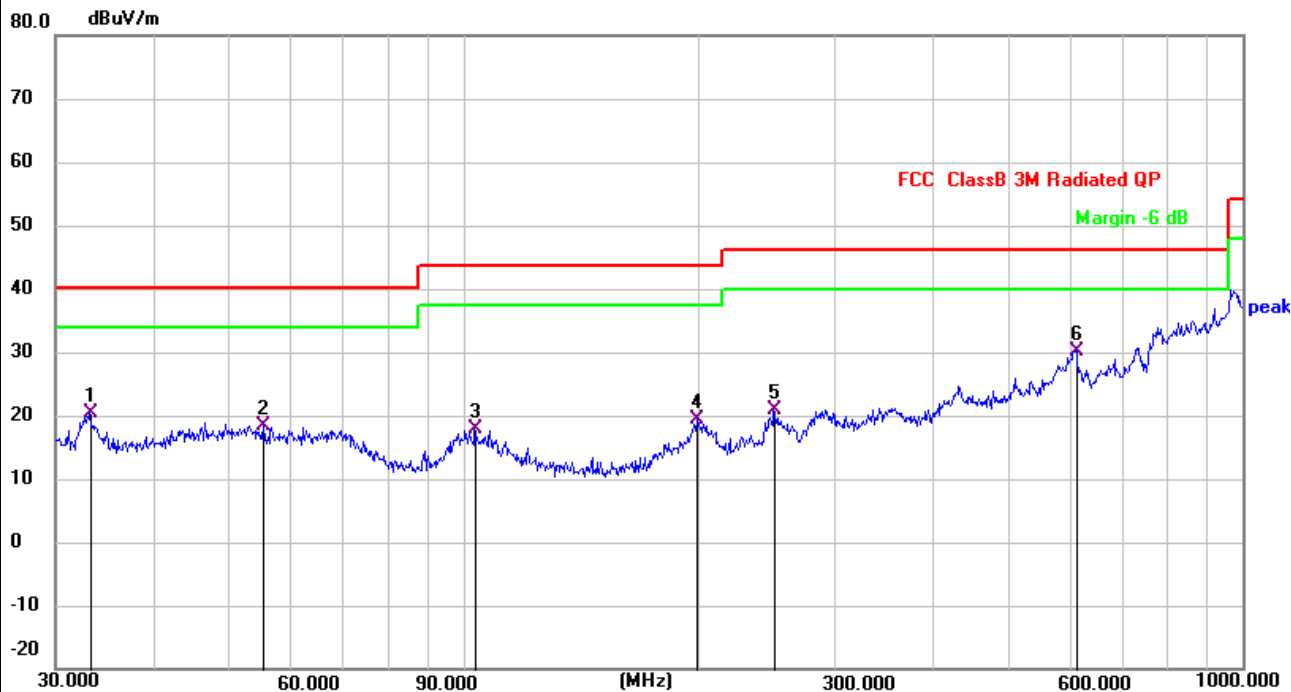
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2463MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		204.2377	33.06	-12.68	20.38	43.50	-23.12	QP
2		249.4250	33.85	-11.30	22.55	46.00	-23.45	QP
3		292.0583	37.83	-10.80	27.03	46.00	-18.97	QP
4		359.1860	30.84	-9.11	21.73	46.00	-24.27	QP
5		432.5457	33.61	-5.29	28.32	46.00	-17.68	QP
6	*	605.6592	34.85	-3.94	30.91	46.00	-15.09	QP



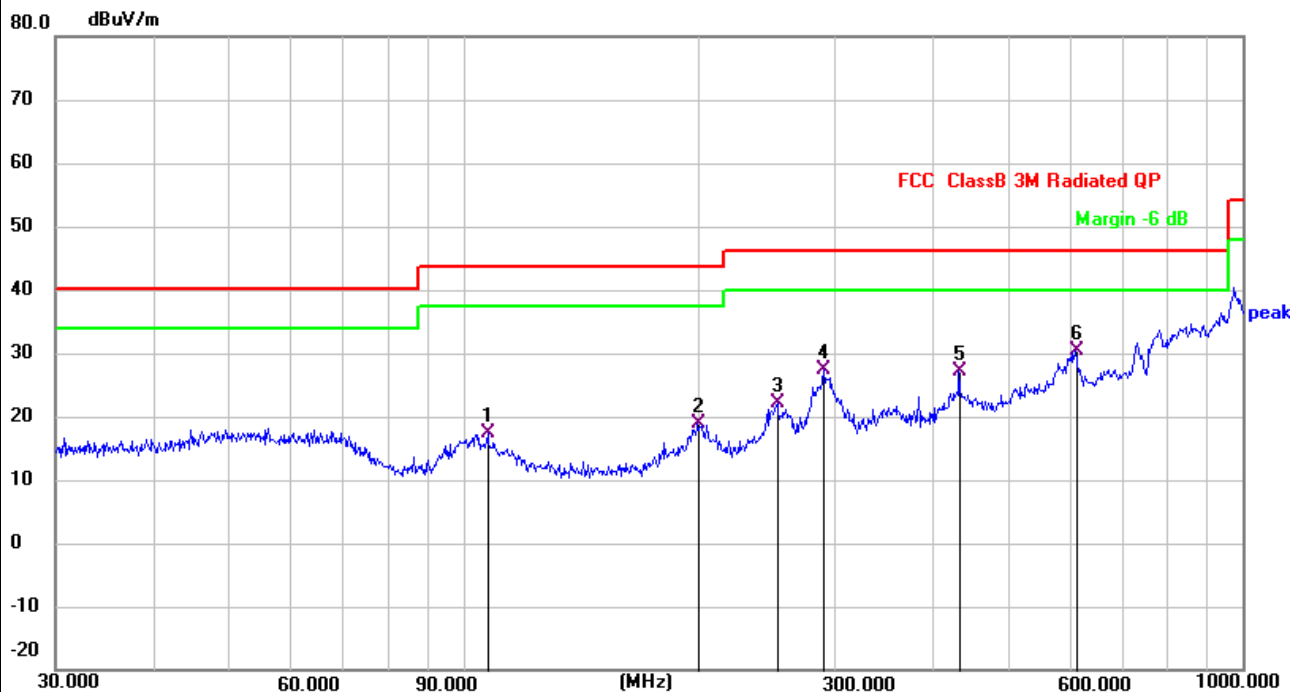
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2463MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		33.2112	34.14	-13.64	20.50	40.00	-19.50	QP
2		55.4147	30.38	-12.10	18.28	40.00	-21.72	QP
3		103.4421	30.67	-12.90	17.77	43.50	-25.73	QP
4		199.2855	29.61	-10.31	19.30	43.50	-24.20	QP
5		250.3012	30.01	-9.17	20.84	46.00	-25.16	QP
6	*	609.9217	29.95	0.23	30.18	46.00	-15.82	QP



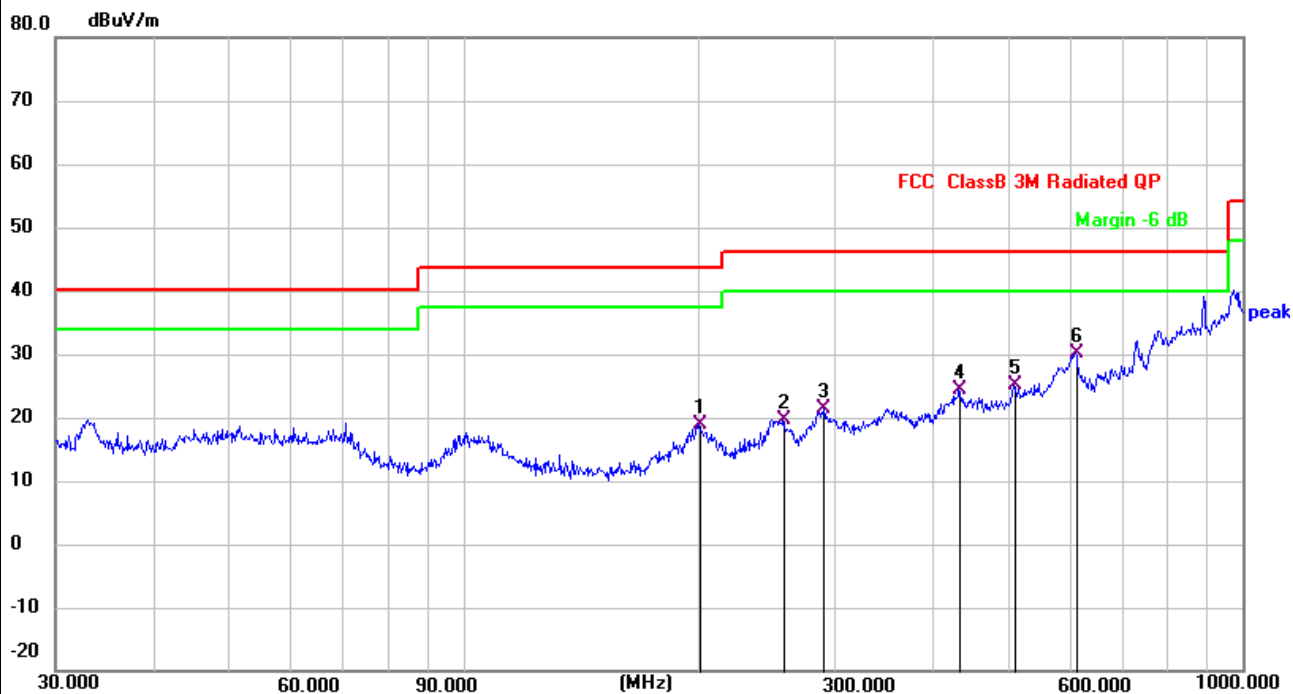
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2474MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		107.5101	32.09	-14.72	17.37	43.50	-26.13	QP
2		199.9856	31.72	-12.87	18.85	43.50	-24.65	QP
3		252.9482	33.04	-11.02	22.02	46.00	-23.98	QP
4		290.0172	38.57	-11.07	27.50	46.00	-18.50	QP
5		432.5457	32.51	-5.29	27.22	46.00	-18.78	QP
6	*	609.9217	34.68	-4.26	30.42	46.00	-15.58	QP



EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2474MHz

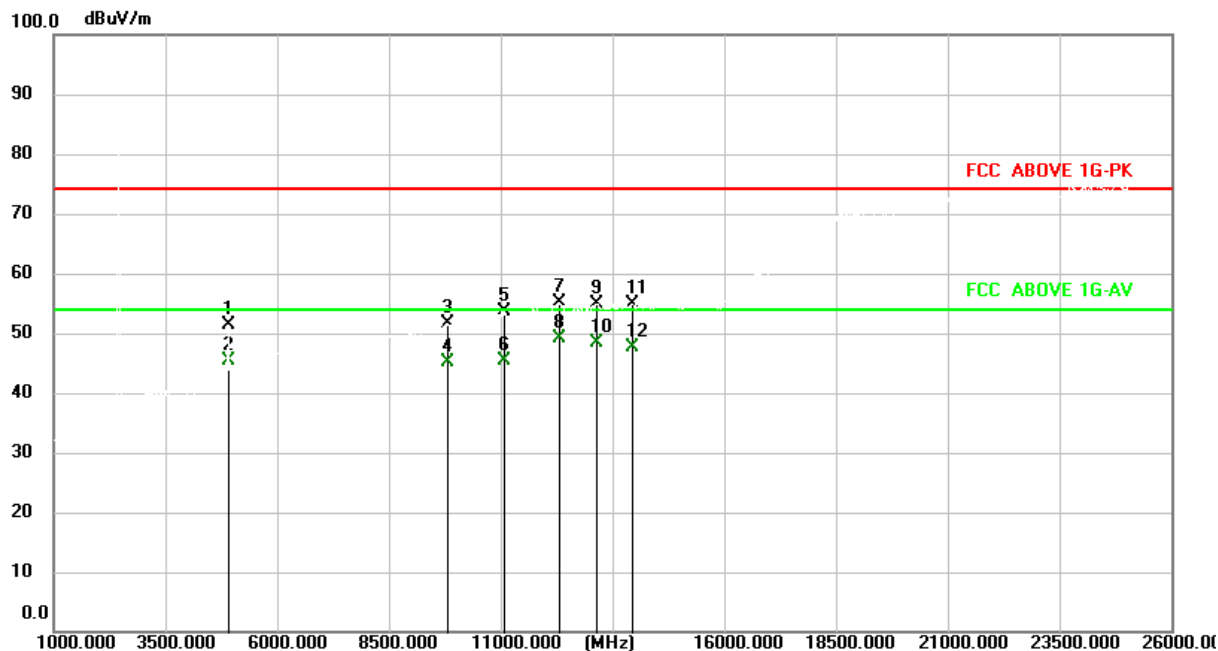


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		200.6881	29.02	-10.22	18.80	43.50	-24.70	QP
2		257.4222	29.72	-10.08	19.64	46.00	-26.36	QP
3		290.0172	30.14	-8.67	21.47	46.00	-24.53	QP
4		432.5457	30.73	-6.27	24.46	46.00	-21.54	QP
5		508.2582	30.35	-5.11	25.24	46.00	-20.76	QP
6	*	609.9217	29.95	0.23	30.18	46.00	-15.82	QP

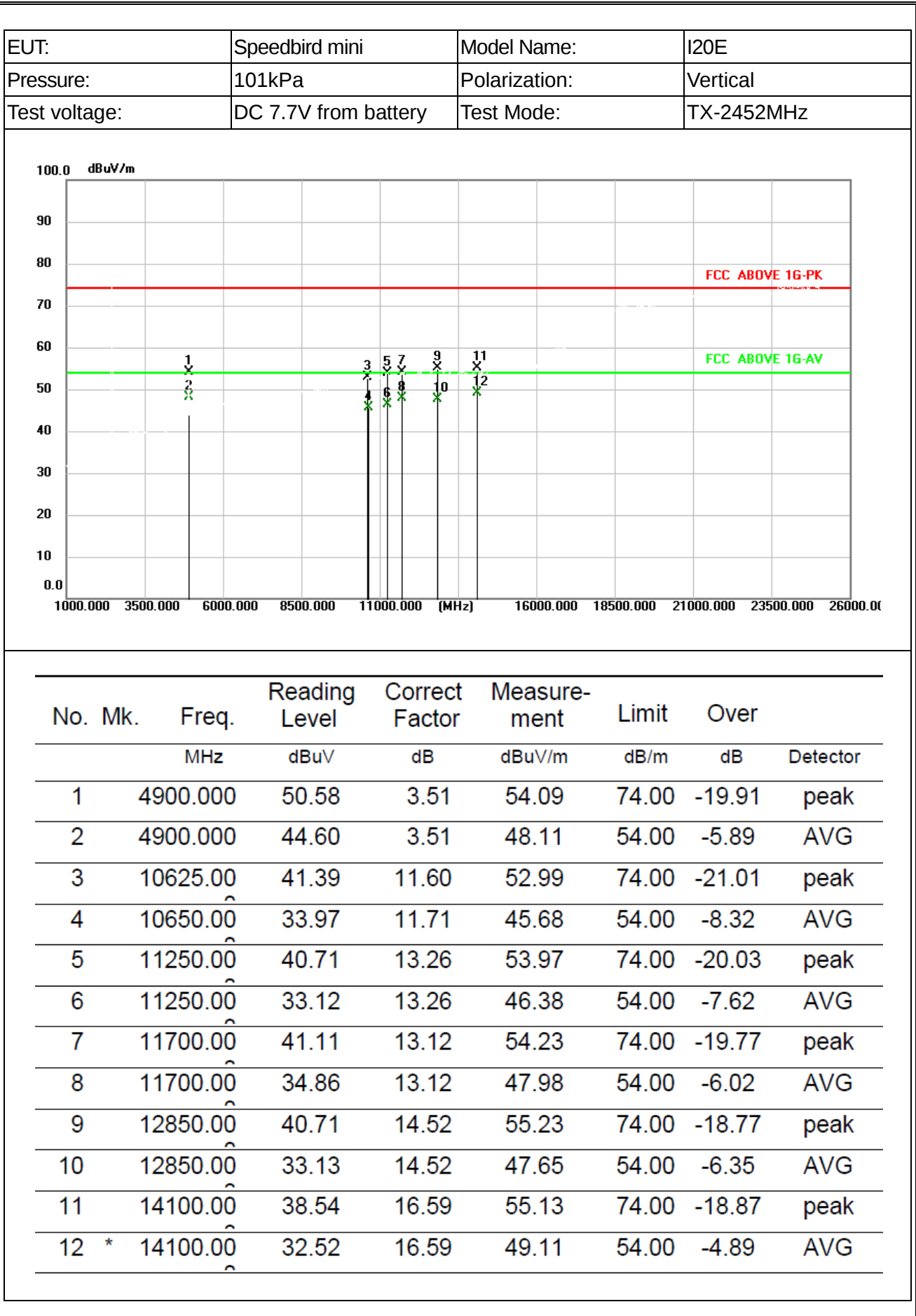


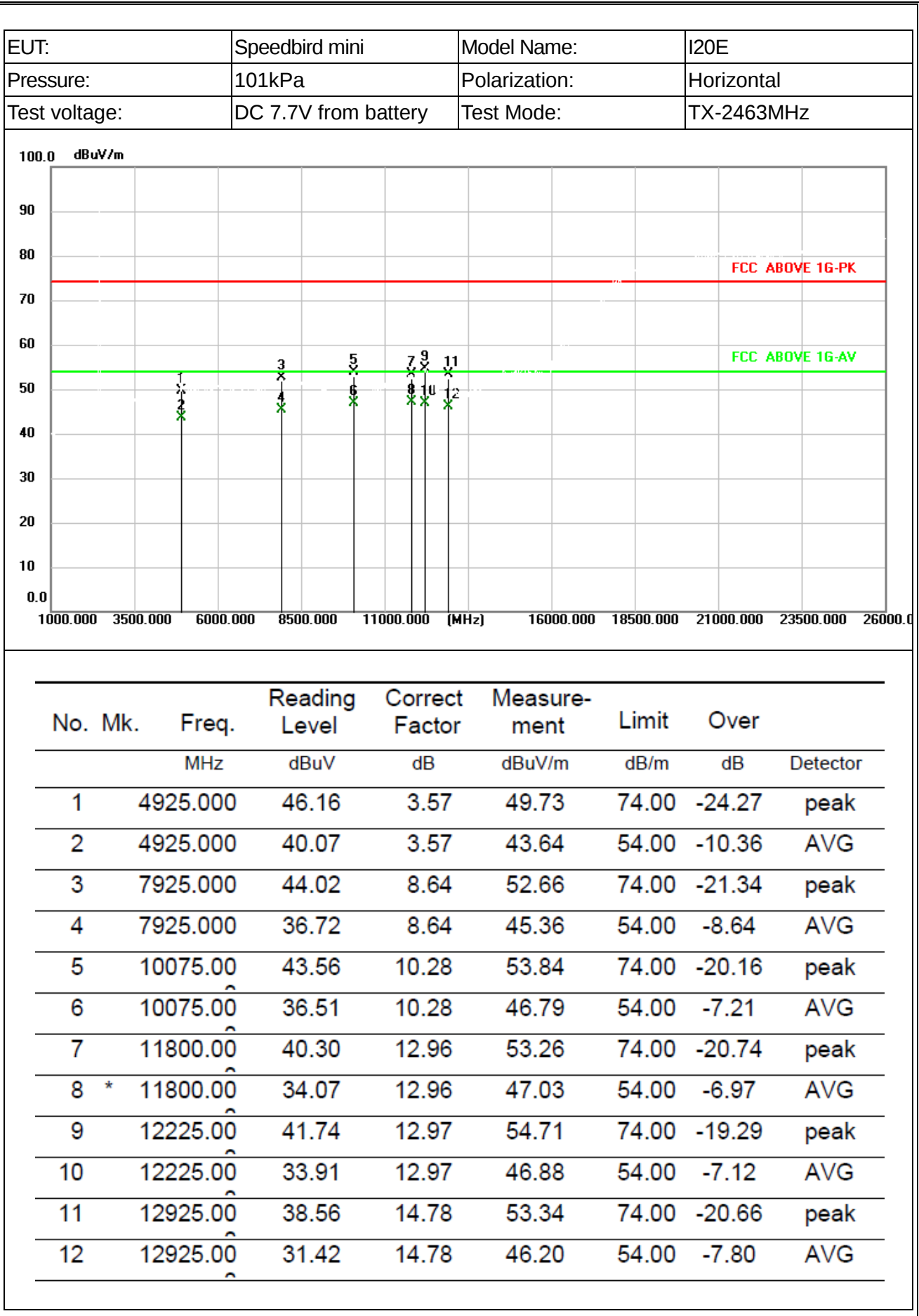
1GHz-26.5GHz:

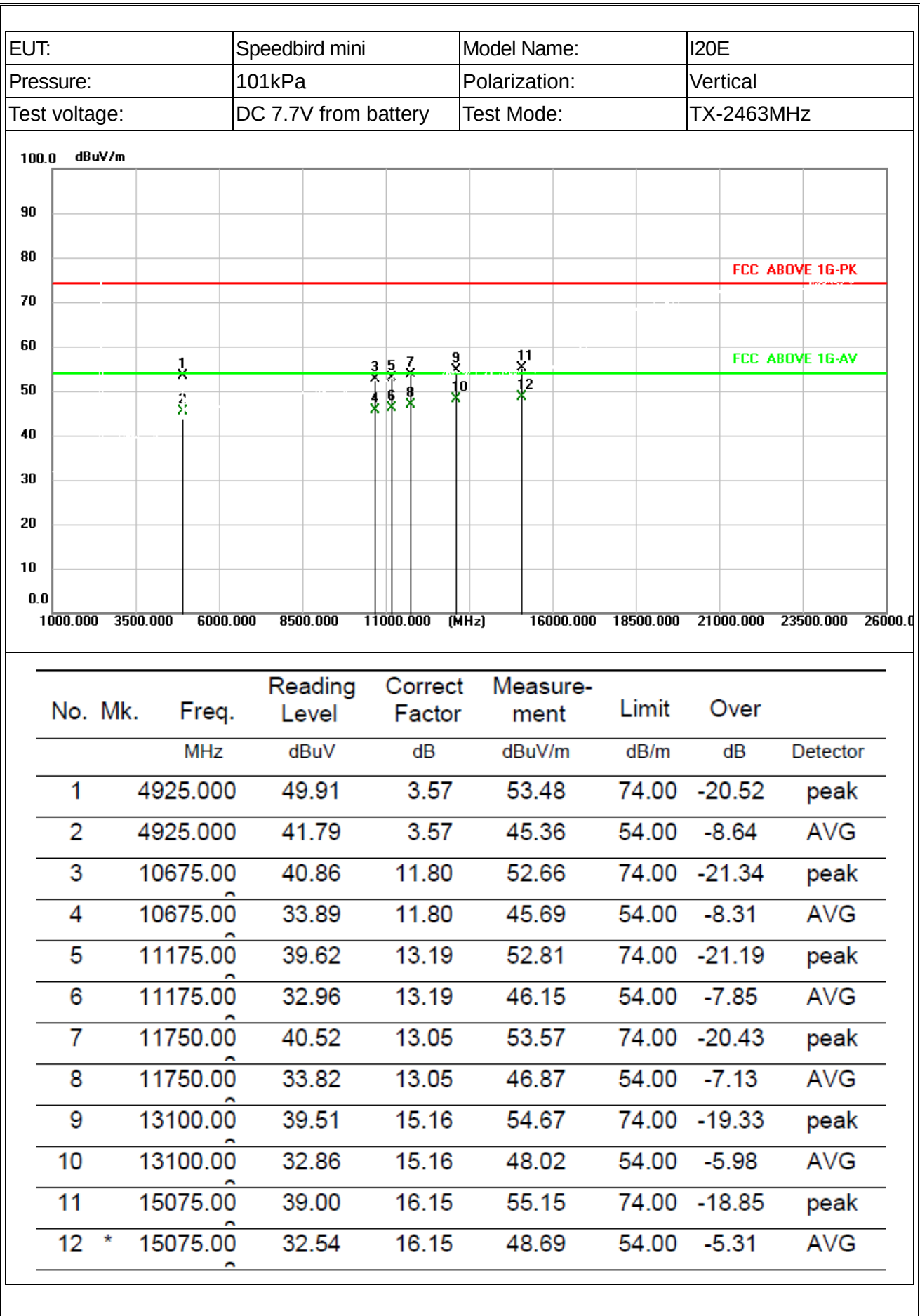
EUT:	Speedbird mini	Model Name. :	I20E
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 7.7V from battery	Test Mode :	TX-2452MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		4900.000	47.96	3.51	51.47	74.00	-22.53	peak
2		4900.000	41.75	3.51	45.26	54.00	-8.74	AVG
3		9825.000	41.49	10.19	51.68	74.00	-22.32	peak
4		9825.000	34.93	10.19	45.12	54.00	-8.88	AVG
5		11075.00	40.56	13.12	53.68	74.00	-20.32	peak
6		11075.00	32.16	13.12	45.28	54.00	-8.72	AVG
7		12325.00	42.04	13.11	55.15	74.00	-18.85	peak
8	*	12325.00	36.14	13.11	49.25	54.00	-4.75	AVG
9		13150.00	39.72	15.22	54.94	74.00	-19.06	peak
10		13150.00	33.25	15.22	48.47	54.00	-5.53	AVG
11		13950.00	38.62	16.35	54.97	74.00	-19.03	peak
12		13950.00	31.34	16.35	47.69	54.00	-6.31	AVG

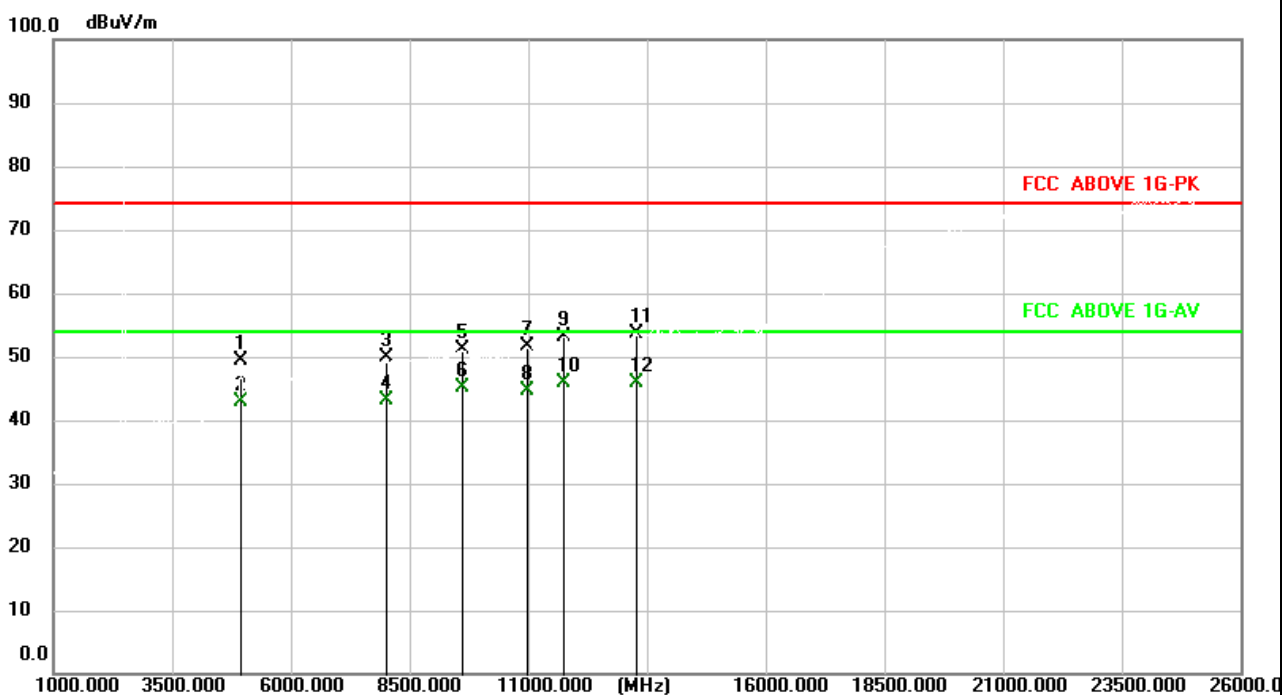








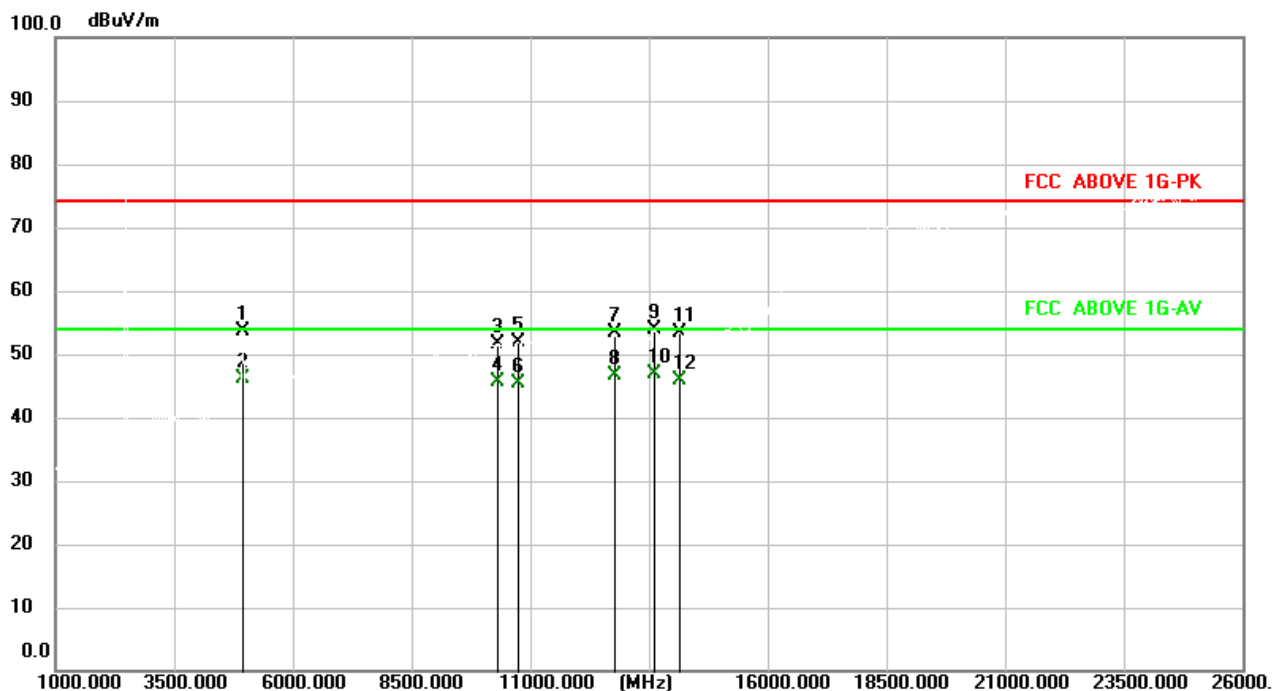
EUT:	Speedbird mini	Model Nam:	I20E
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2474MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		4950.000	45.65	3.62	49.27	74.00	-24.73	peak
2		4950.000	39.36	3.62	42.98	54.00	-11.02	AVG
3		8000.000	41.12	8.78	49.90	74.00	-24.10	peak
4		8000.000	34.47	8.78	43.25	54.00	-10.75	AVG
5		9625.000	40.86	10.25	51.11	74.00	-22.89	peak
6		9625.000	34.89	10.25	45.14	54.00	-8.86	AVG
7		10975.00	38.68	12.98	51.66	74.00	-22.34	peak
8		10975.00	31.68	12.98	44.66	54.00	-9.34	AVG
9		11750.00	40.13	13.05	53.18	74.00	-20.82	peak
10	*	11750.00	32.82	13.05	45.87	54.00	-8.13	AVG
11		13275.00	38.34	15.39	53.73	74.00	-20.27	peak
12		13275.00	30.48	15.39	45.87	54.00	-8.13	AVG



EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2474MHz

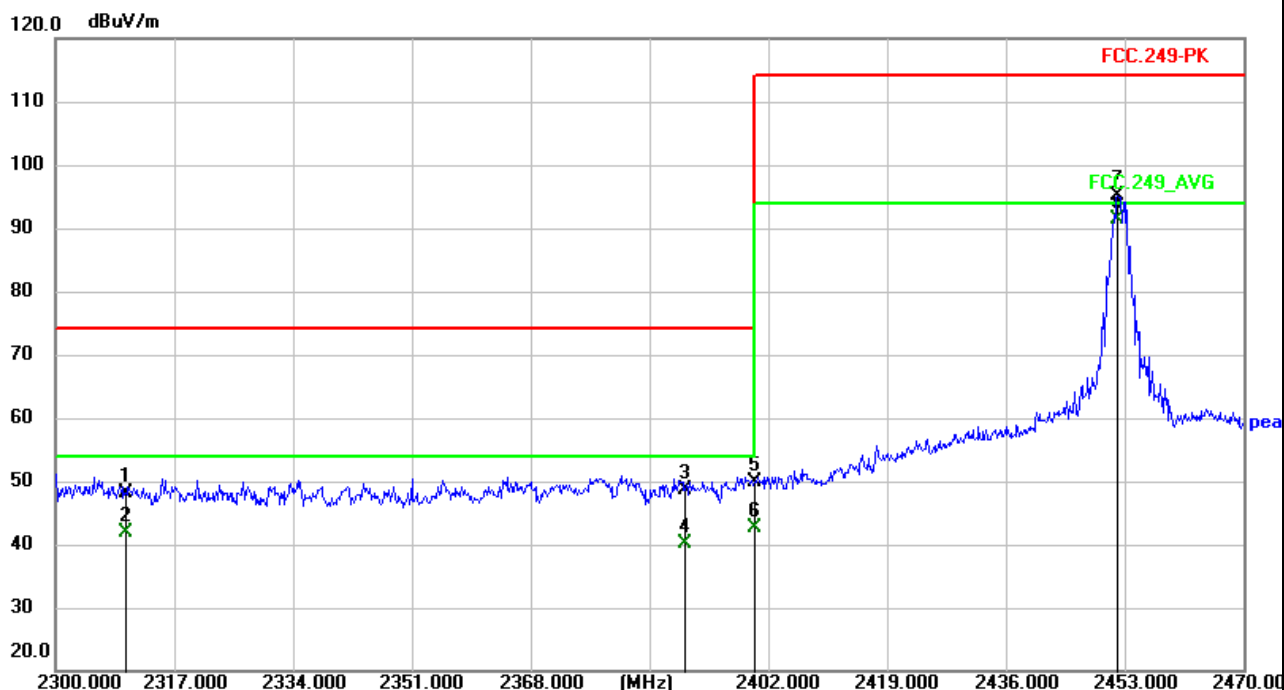


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		4950.000	50.04	3.62	53.66	74.00	-20.34	peak
2		4950.000	42.50	3.62	46.12	54.00	-7.88	AVG
3		10300.00	41.00	10.72	51.72	74.00	-22.28	peak
4		10300.00	34.94	10.72	45.66	54.00	-8.34	AVG
5		10750.00	39.88	12.10	51.98	74.00	-22.02	peak
6		10750.00	33.23	12.10	45.33	54.00	-8.67	AVG
7		12775.00	39.03	14.28	53.31	74.00	-20.69	peak
8		12775.00	32.30	14.28	46.58	54.00	-7.42	AVG
9		13625.00	38.00	15.87	53.87	74.00	-20.13	peak
10	*	13625.00	31.00	15.87	46.87	54.00	-7.13	AVG
11		14150.00	36.76	16.67	53.43	74.00	-20.57	peak
12		14150.00	29.32	16.67	45.99	54.00	-8.01	AVG



5.3.4 Band edge-radiated

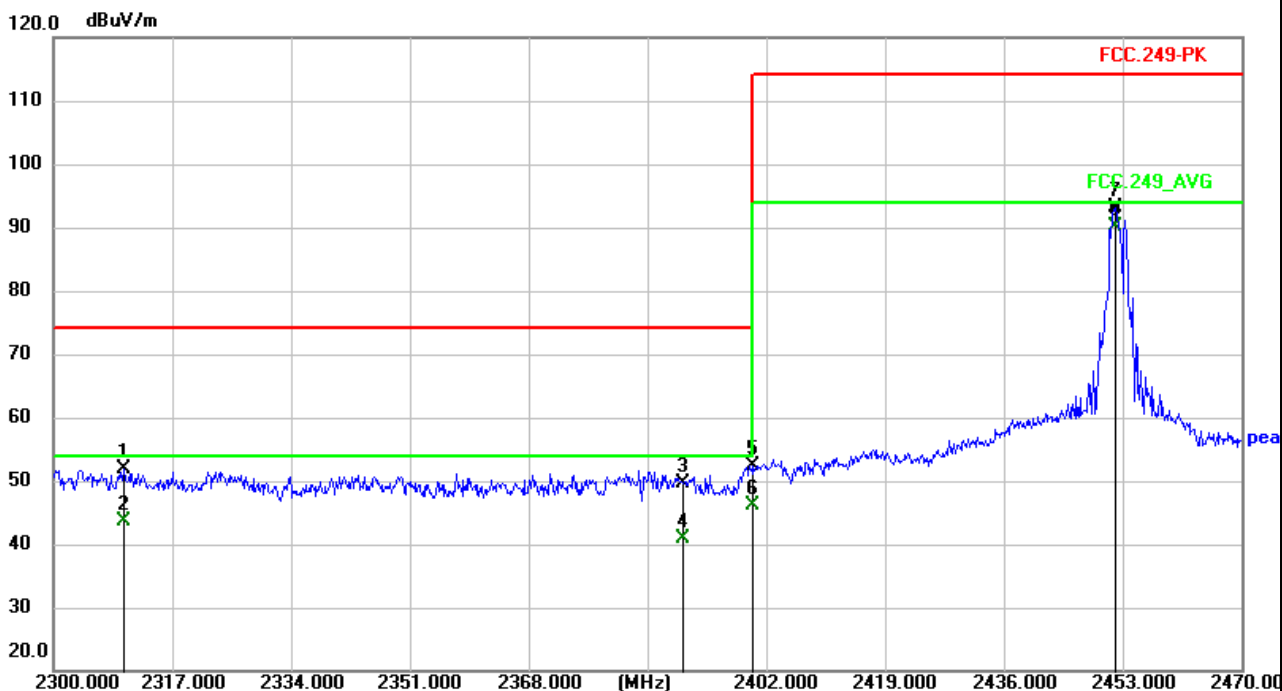
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2452MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		2310.000	51.63	-3.61	48.02	74.00	-25.98	peak
2		2310.000	45.39	-3.61	41.78	54.00	-12.22	AVG
3		2390.000	51.53	-2.93	48.60	74.00	-25.40	peak
4		2390.000	43.18	-2.93	40.25	54.00	-13.75	AVG
5		2400.000	52.63	-2.84	49.79	74.00	-24.21	peak
6		2400.000	45.52	-2.84	42.68	54.00	-11.32	AVG
7		2451.980	97.94	-2.90	95.04	114.0	-18.96	peak
8	*	2451.980	94.26	-2.90	91.36	94.00	-2.64	AVG



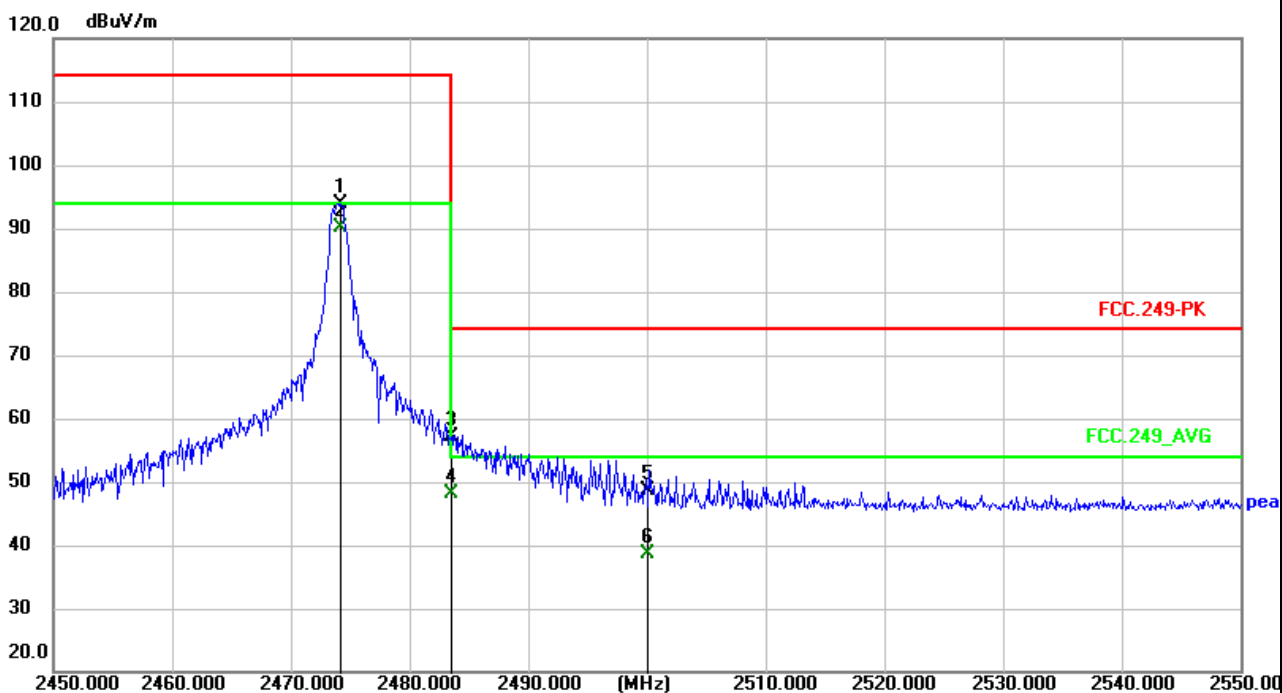
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2452MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		2310.000	55.44	-3.61	51.83	74.00	-22.17	peak
2		2310.000	47.19	-3.61	43.58	54.00	-10.42	AVG
3		2390.000	52.55	-2.93	49.62	74.00	-24.38	peak
4		2390.000	43.92	-2.93	40.99	54.00	-13.01	AVG
5		2400.000	55.15	-2.84	52.31	74.00	-21.69	peak
6		2400.000	48.99	-2.84	46.15	54.00	-7.85	AVG
7		2451.980	96.13	-2.90	93.23	114.0	-20.77	peak
8	*	2451.980	93.01	-2.90	90.11	94.00	-3.89	AVG



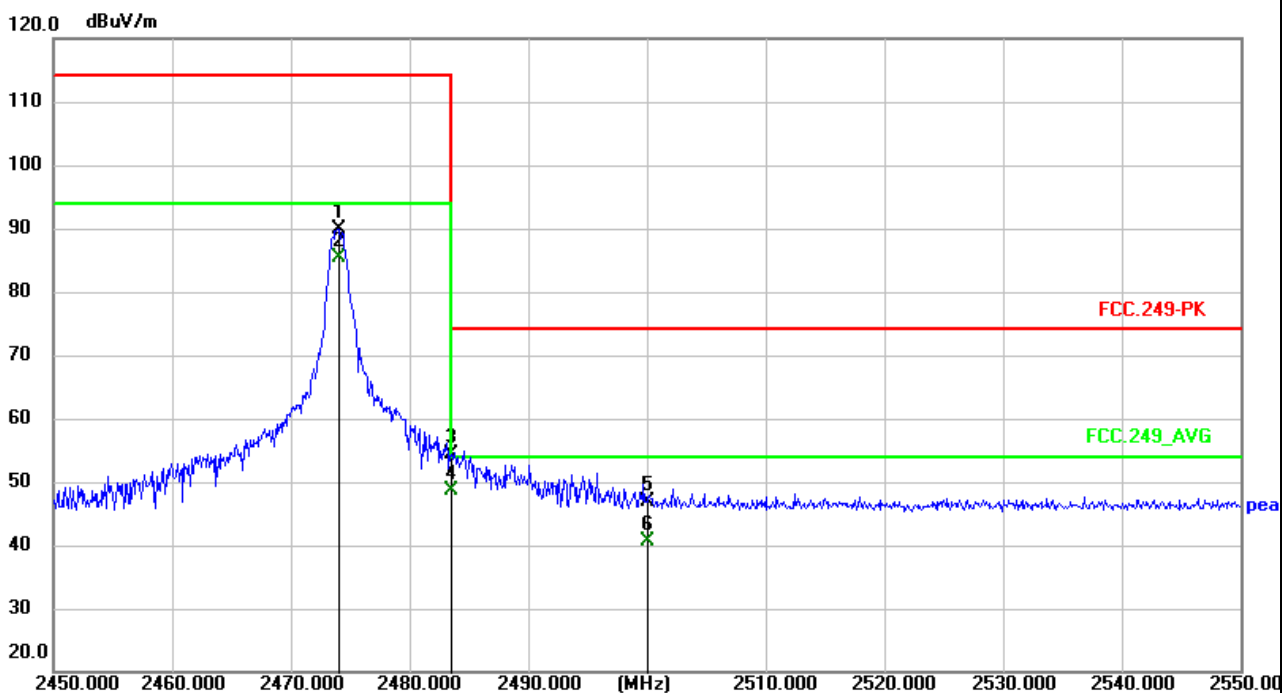
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2474MHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		2474.200	96.86	-2.91	93.95	114.0	-20.05	peak
2	*	2474.200	93.05	-2.91	90.14	94.00	-3.86	AVG
3		2483.500	59.95	-2.93	57.02	74.00	-16.98	peak
4		2483.500	50.94	-2.93	48.01	54.00	-5.99	AVG
5		2500.000	51.68	-2.94	48.74	74.00	-25.26	peak
6		2500.000	41.53	-2.94	38.59	54.00	-15.41	AVG



EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2474MHz

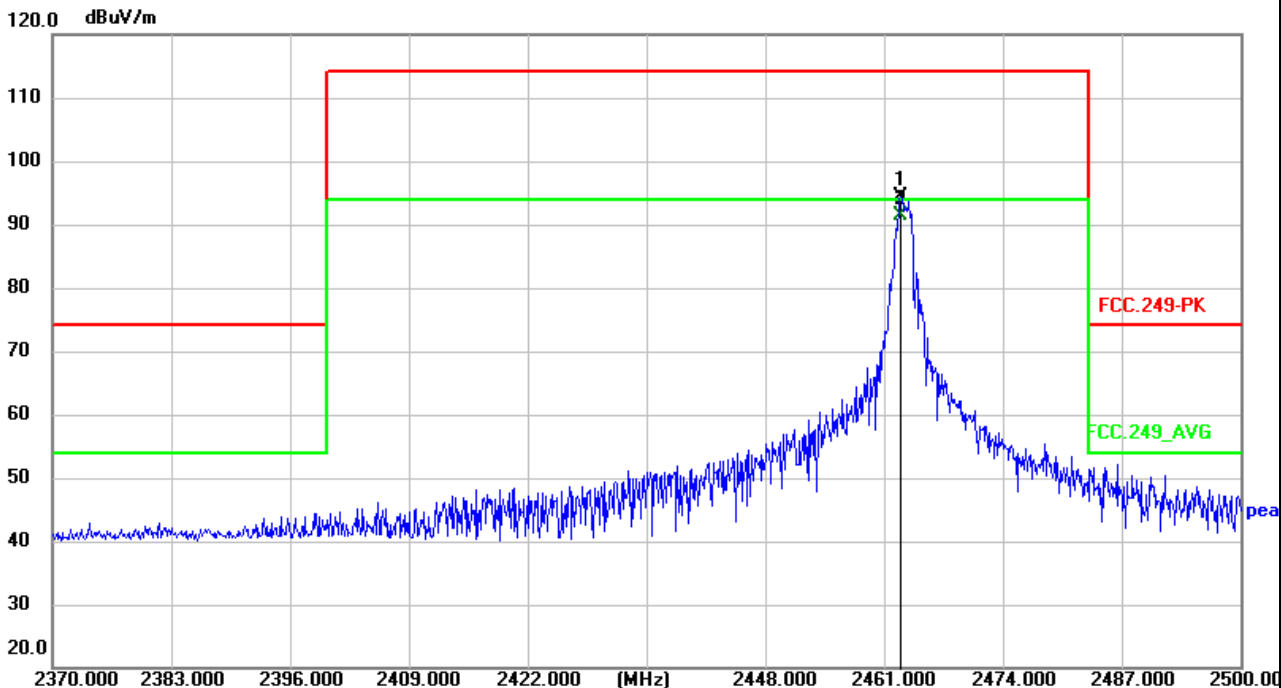


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		2474.000	92.82	-2.91	89.91	114.0	-24.09	peak
2		2474.000	88.17	-2.91	85.26	94.00	-8.74	AVG
3		2483.500	57.24	-2.93	54.31	74.00	-19.69	peak
4	*	2483.500	51.47	-2.93	48.54	54.00	-5.46	AVG
5		2500.000	49.78	-2.94	46.84	74.00	-27.16	peak
6		2500.000	43.60	-2.94	40.66	54.00	-13.34	AVG



5.3.5 Field strength of fundamental

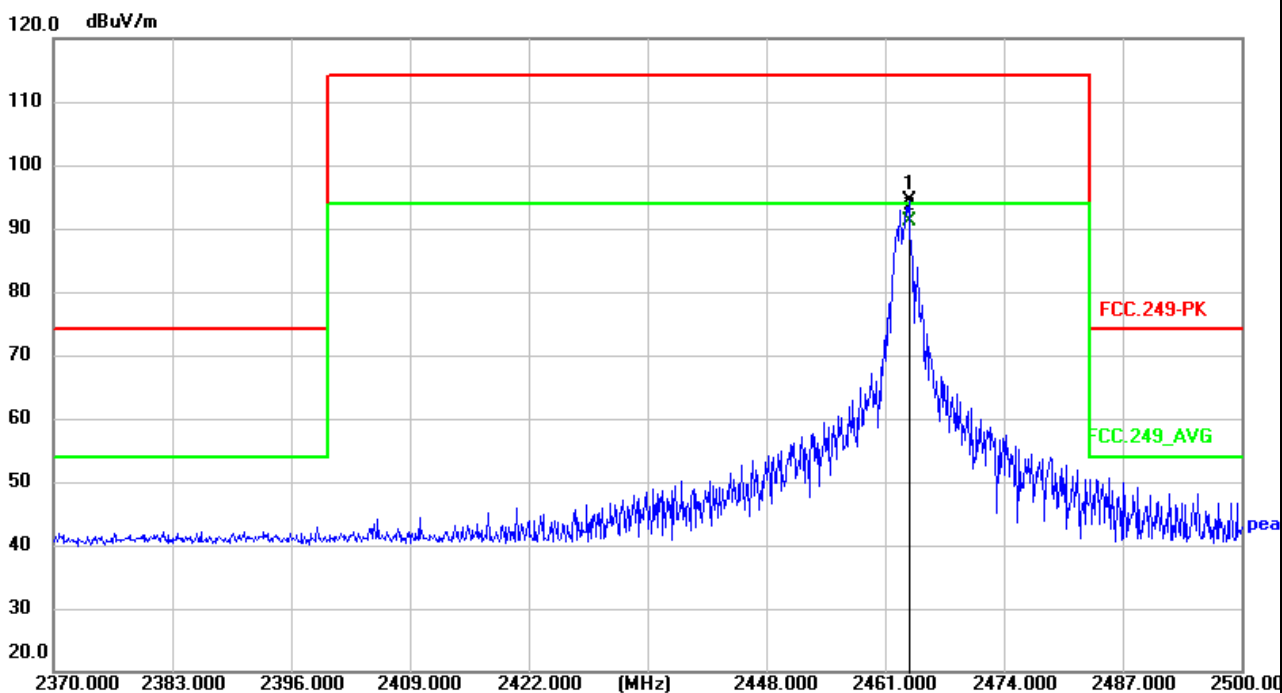
EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Horizontal
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2463MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		2462.820	97.19	-2.90	94.29	114.0	-19.71	peak
2	*	2462.820	94.18	-2.90	91.28	94.00	-2.72	AVG



EUT:	Speedbird mini	Model Name:	I20E
Pressure:	101kPa	Polarization:	Vertical
Test voltage:	DC 7.7V from battery	Test Mode:	TX-2463MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		2463.600	97.36	-2.91	94.45	114.0	-19.55	peak
2	*	2463.600	94.02	-2.91	91.11	94.00	-2.89	AVG

Note:

1. All Readings are Peak Value (VBW=3MHz) and AV Value (VBW=10Hz).
2. Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor.
3. All other emissions more than 20dB below the limit.



5.4 20dB and 99% bandwidth

5.4.1 Limits

FCC §15.215(c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

5.4.2 Test method

Use the following spectrum analyzer settings:

For 20 dB bandwidth

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW $\geq 1\%$ of the 20 dB bandwidth

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth and 99% occupied bandwidth of the emission

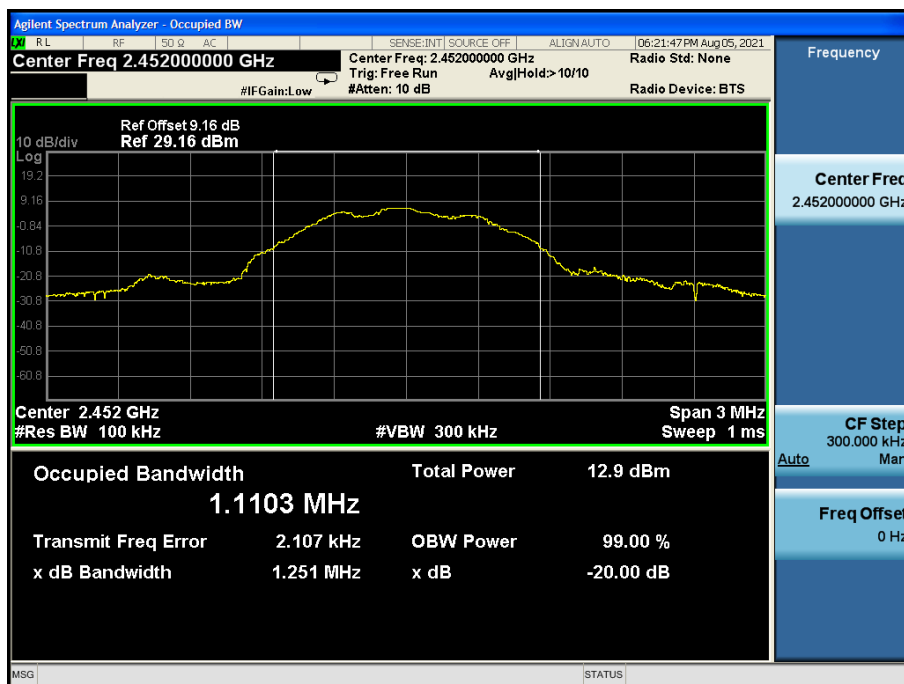


5.4.3 Test result

Frequency (MHz)	20dB bandwidth (MHz)
2452	1.251
2463	1.221
2474	1.222

Test plots

2452MHz





2463MHz



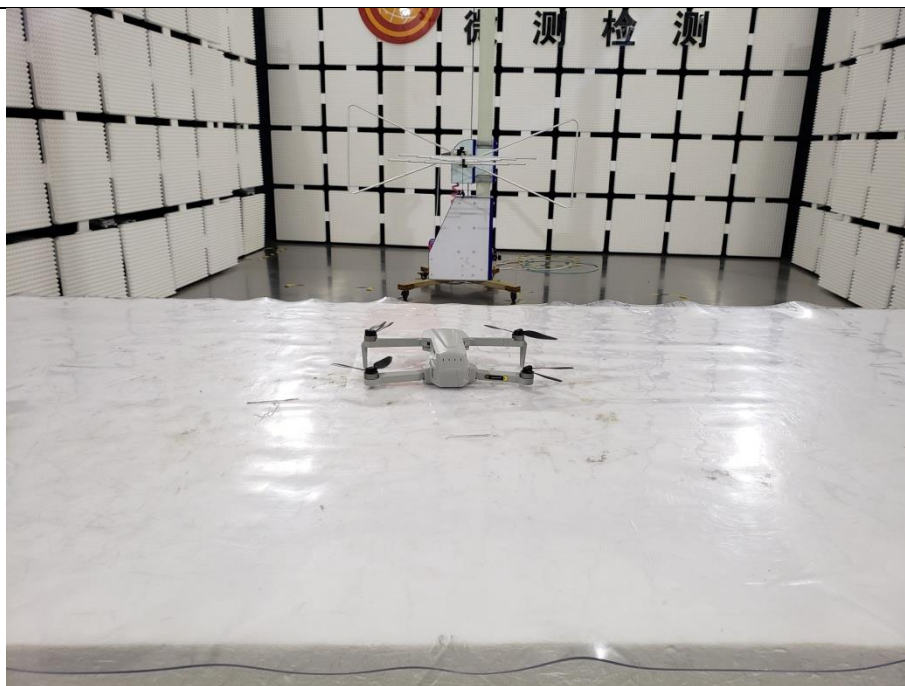
2474MHz





Photographs of the Test Setup

Radiated emission – below 1GHz



Radiated emission – above 1GHz





Photographs of the EUT

See the APPENDIX 1- EUT PHOTO.

----END OF REPORT----