

TEST REPORT

Verified Code: 997804

Report No.:	E20200923215201-6-G3	Application No.:	E20200923215201
Client:	K-Mark Industrial LTD		
Address:	Flat A,7/F.,Mai On Ind.Bldg.,17-21,Kung Yip St.,Kwai Chung,Hong Kong		
Sample Description:	Positive Pet collar		
Model:	UBC-PPD		
Test Specification:	CFR 47 FCC Part 15 Subpart C 10-1-2019 Edition ANSI C63.10:2013		
Receipt Date:	2020-09-25		
Test Date:	2020-09-30 to 2020-10-14		
Issue Date:	2020-12-02		
Test Result:	Pass		
Prepared By: Test Engineer 	Reviewed By: Technical Manager 	Approved By: Manager 	
Other Aspects:			
Note: This report instead the report E20200923215201-6-G2, and from the date of issuance of this report, the report which being replaced become invalid.			
Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable;			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			

DIRECTIONS OF TEST

- 1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.**
- 2. The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.**
- 3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.**

TABLE OF CONTENTS

1. TEST RESULT SUMMARY.....	3
2. GENERAL DESCRIPTION OF EUT	4
2.1. APPLICANT	4
2.2. MANUFACTURER	4
2.3. FACTORY	4
2.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST	4
3. LABORATORY AND ACCREDITATIONS	6
3.1. LABORATORY	6
3.2. ACCREDITATIONS	6
3.3. MEASUREMENT UNCERTAINTY	6
4. LIST OF USED TEST EQUIPMENT AT GRGT	7
5. RADIATED SPURIOUS EMISSIONS	8
5.1 LIMITS	8
5.2 TEST PROCEDURES	8
5.3 TEST SETUP	9
5.4 DATA SAMPLE	10
5.5 TEST RESULTS	11
6. 20DB BANDWIDTH	15
6.1 LIMITS	15
6.2 TEST PROCEDURES	15
6.3 TEST SETUP	15
6.4 TEST RESULTS	15
7. TRANSMISSION TIME	16
7.1 LIMITS	16
7.2 TEST PROCEDURES	16
7.3 TEST SETUP	16
7.4 TEST RESULTS	16
8. APPENDIX: PHOTOGRAPH OF THE TEST ARRANGEMENT	20

1. TEST RESULT SUMMARY

Standard	Item	Limit / Severity	Result
Part 15, Subpart C (15.231)	Conducted Emissions	§15.207	N/A ¹⁾
	Transmission Time	§15.231 §15.231(a) (3)	PASS
	20DB Bandwidth	§15.231 (c)	PASS
	Radiated Spurious Emission	§15.231(b)	PASS

N/A¹⁾: EUT received DC power from button battery

2. GENERAL DESCRIPTION OF EUT

2.1. APPLICANT

Name: K-Mark Industrial LTD
Address: Flat A,7/F.,Mai On Ind.Bldg.,17-21,Kung Yip St.,Kwai Chung,Hong Kong

2.2. MANUFACTURER

Name: Good Life, Inc
Address: 887 Gilman Rd., Medford, OR

2.3. FACTORY

Name : K-Mark Industrial (Shenzhen) LTD
Address : 43 Jinshi Road, niuhu Guangpei community, Guanlan street, Longhua District, Shenzhen

2.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Positive Pet collar
Model No.: UBC-PPD
Adding Model UBC-PPC
Model Differences: All the model "UBC-PPC, UBC-PPD" are the same circuit and RF module, just different from Receiver duty cycle (the software is different) and whether the small motor inside the product is packed with a small sponge different. The 70% duty and no foam for -UBC-PPD, 60% duty cycle with foam inserts for-UBC-PPC.
Trade Name: Goodlife, Inc.
Sample No: 0001
FCC ID: VEPGL-PETCOLLAR
Power Supply: DC3V power from button battery
Battery specification: CR2025
Frequency Range: 433.92MHz
Max Antenna gain: Internal antenna, 1.3dBi (Max)
Sample submitting way : ☒ Provided by customer ☐ Sampling
Type of Modulation: FSK
Temperature: 0 °C ~ +45 °C

Range:

Hardware
Version: DUC253CV4.0

Software
Version: TR1905S73-TX-2

Note: /

3. LABORATORY AND ACCREDITATIONS

3.1. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add.: No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China.
P.C.: 518000
Tel : 0755-61180008
Fax: 0755-61180008

3.2. ACCREDITATIONS

A2LA	Certificate Number 2861.01
------	----------------------------

3.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	30MHz~1000MHz	4.3dB
		1GHz~18GHz	5.6dB
	Vertical	30MHz~1000MHz	4.3dB
		1GHz~18GHz	5.6dB

This uncertainty represents an expanded uncertainty factor of $k=2$.

4. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Conduction Emission				
Test S/W	EZ	CCS-3A1-CE	/	/
EMI Receiver	R&S	ESCI	100783	2020/11/27
LISN(EUT)	R&S	ENV216	101543	2021/03/24
Radiated Spurious Emission				
Receiver	ROHDE&SCHW ARZ	ESCI	100783	2020-11-27
EMI TEST Receiver	R&S	ESU26	EMC26-G260	2021-09-22
LISN	ROHDE&SCHW ARZ	ENV216	101543	2021-03-14
Spectrum Analyzer	Agilent	N9010A	MY52221469	2020-11-18
Bilog Antenna	Schwarzbeck	VULB 9163	01279	2021-03-14
Horn Antenna	Schwarzbeck	BBHA 9120d(1201)	02143	2020-12-28
Amplifier	tonscend	TAP9E6343	AP20E806065	2021-06-28
Amplifier	tonscend	TAP01018048	AP20E806075	2021-06-28
EZ-EMC	EZ	CCS-3A1-CE		
Test SW	tonscend	JS32-RE/2.5.2.4		
20dB bandwidth/Duty cycle/Transmission time				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2020-11-18

5. RADIATED SPURIOUS EMISSIONS

5.1 LIMITS

§15.231(b) In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	¹ 1,250 to 3,750	¹ 125 to 375
174-260	3,750	375
260-470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

1. ** linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

§15.231(b)(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

Frequency (MHz)	Quasi-peak($\mu\text{V/m}$)	Measurement distance(m)	Quasi-peak($\text{dB}\mu\text{V/m}$)@distance 3m
0.009-0.490	$2400/F(\text{kHz})$	300	53.8~88.5
0.490-1.705	$24000/F(\text{kHz})$	30	43~53.8
1.705-30.0	30	30	49.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

NOTE: (1) The lower limit shall apply at the transition frequencies.

5.2 TEST PROCEDURES

- 1) The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) Height of receiving antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

- 4) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 6) If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported.
Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

5.3 TEST SETUP

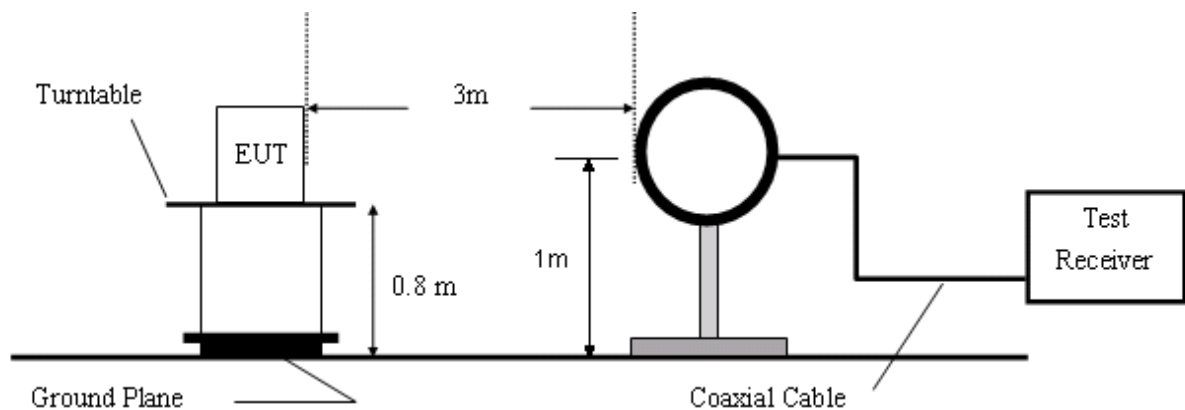


Figure 1. 9KHz to 30MHz radiated emissions test configuration

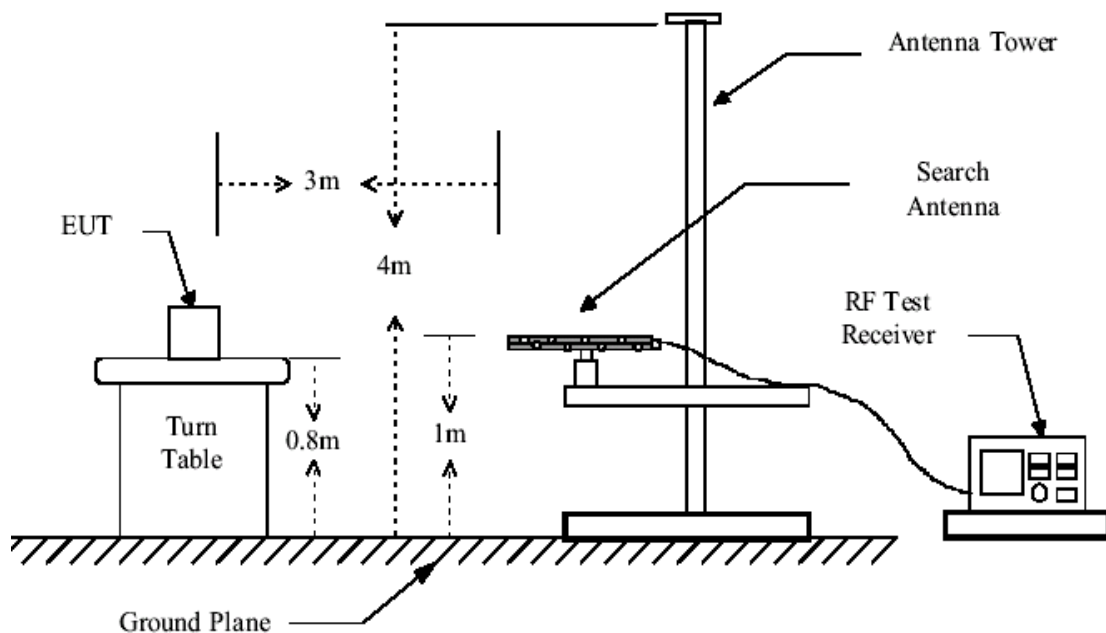


Figure 2. 30MHz to 1GHz radiated emissions test configuration

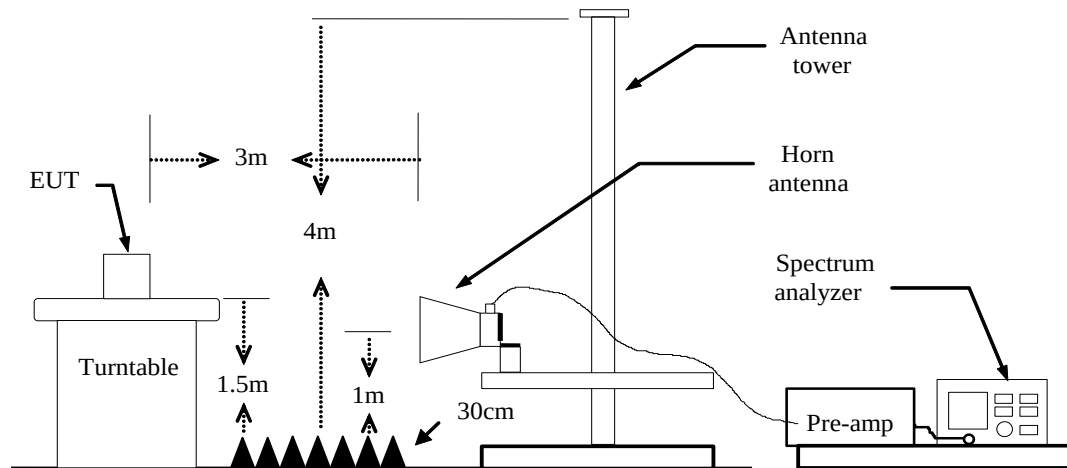


Figure 3. Above 1GHz radiated emissions test configuration

5.4 DATA SAMPLE

Below 1GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXX.XXXX	37.47	-16.41	21.06	40.00	-18.94	V	QP

Above 1GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXXX.XXXX	55.54	4.56	60.10	74.00	-13.90	V	Peak
XXXX.XXXX	29.66	4.56	34.22	54.00	-19.78	V	AVG

Frequency (MHz)

= Emission frequency in MHz

Reading (dBuV)

= Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m)

= Antenna factor + Cable loss – Amplifier gain

Result (dBuV/m)

= Reading (dBuV) + Corr. Factor (dB/m)

Limit (dBuV/m)

= Limit stated in standard

Margin (dB)

= Result (dBuV/m) – Limit (dBuV/m)

Q.P.

= Quasi-peak Reading

Peak

= Peak Reading

AVG

= Average Reading

5.5 TEST RESULTS

Fundamental:

Frequency	Reading	Level	Factor	Limit	Margin	Height	Angle	Antenna Pole	Remark
[MHz]	[dBuV/m]	[dBμV/m]	[dB]	[dBuV/m]	[dB]	[cm]	[°]	(V/H)	
433.92	97.05	73.85	-23.20	100.83	6.98	100	191	V	peak
433.92	85.68	62.61	-23.07	100.83	18.22	100	91	H	peak

Frequency	PK Result	Duty Cycle Correction	Result	Limit	Margin	Antenna Pole(V/H)	Remark
(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)		
433.92	73.85	-3.74	70.11	80.83	-11.32	V	AVG
433.92	62.61	-3.74	58.87	80.83	-22.35	H	AVG

Remark:

1. $AVG = Peak + 20\log(Duty\ Cycle)$
2. Duty Cycle Correction Factor: $20\log(0.65) = -3.74$
3. Duty Cycle = On time/Total time = $47.4ms/72.7ms = 65\%$

Radiated Spurious Emission

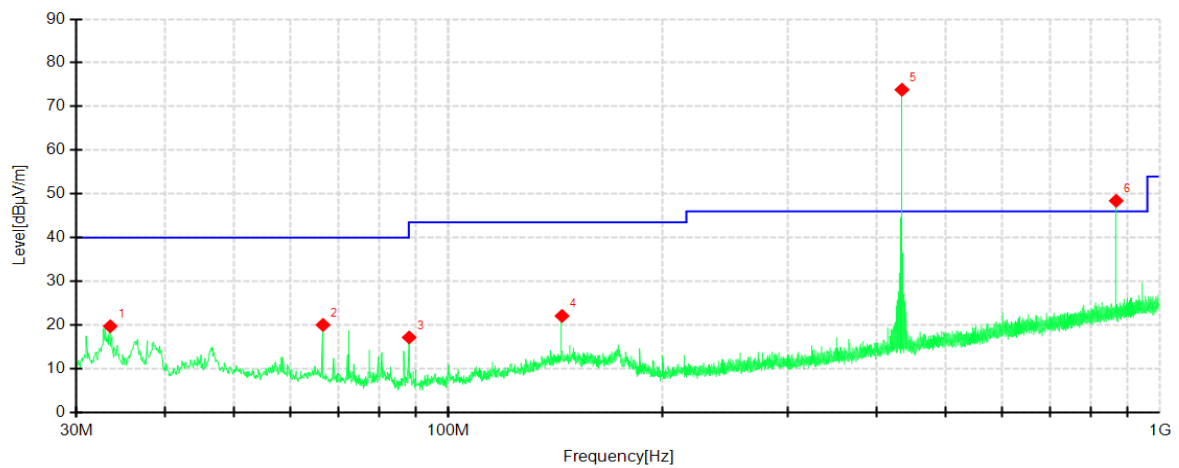
For 9 kHz to 30MHz

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

For 30MHz – 1GHz

Test Voltage:	3.0V dc
Test Mode:	TX
Ambient temperature:	25°C
Relative humidity:	60%

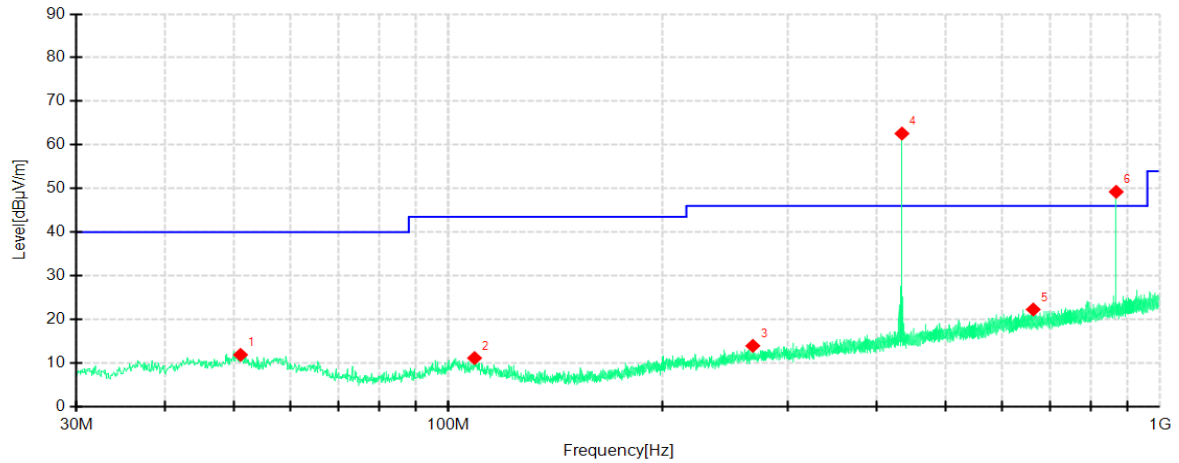
Vertical



Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	33.4920	49.97	19.72	-30.25	40.00	20.28	100	163	Vertical
2	66.6660	51.45	20.03	-31.42	40.00	19.97	100	339	Vertical
3	88.1030	49.60	17.17	-32.43	43.50	26.33	100	198	Vertical
4	144.4600	49.06	22.08	-26.98	43.50	21.42	100	218	Vertical
5	433.9200	97.05	73.85	-23.20	80.83	6.98	100	191	Vertical
6*	867.9830	63.71	48.43	-15.28	60.83	12.4	100	175	Vertical

Horizontal



Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	51.0490	40.71	11.88	-28.83	40.00	28.12	100	19	Horizont
2	108.8610	41.34	11.14	-30.20	43.50	32.36	100	206	Horizont
3	267.8440	41.23	13.94	-27.29	46.00	32.06	100	332	Horizont
4	433.9200	85.68	62.61	-23.07	80.83	18.22	100	91	Horizont
5	663.7010	40.95	22.27	-18.68	46.00	23.73	100	153	Horizont
6*	867.9830	65.22	49.25	-15.97	60.83	11.58	100	203	Horizont

Note: “*” is second harmonic, it is limit is 60.83.

Emission above 1GHz:

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Test Voltage:	3.0V dc
Test Mode:	TX
Ambient temperature:	25°C
Relative humidity:	60%

Frequency (MHz)	Reading (dBuV/m)	Level (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Height [cm]	Angle [°]	Pole
1301.5000	75.10	51.09	-24.01	60.83	20.83	100	135	Vertical
2169.5000	73.54	53.40	-20.14	60.83	18.98	100	170	Vertical
2603.5000	69.60	50.75	-18.85	60.83	13.98	100	204	Vertical
3038.0000	71.27	53.53	-17.74	60.83	5.33	200	30	Vertical
3906.0000	70.12	56.00	-14.12	60.83	5.51	200	3	Vertical
4774.0000	58.66	46.91	-11.75	60.83	13.76	200	283	Vertical
1301.5000	64.01	40.00	-24.01	60.83	9.74	200	114	Horizontal
1736.0000	63.70	41.85	-21.85	60.83	7.43	200	165	Horizontal
2170.0000	66.99	46.85	-20.14	60.83	10.08	100	177	Horizontal
3038.0000	73.24	55.50	-17.74	60.83	7.30	100	138	Horizontal
3906.0000	69.44	55.32	-14.12	60.83	4.83	200	7	Horizontal
4774.0000	58.82	47.07	-11.75	60.83	13.92	100	191	Horizontal

6. 20DB BANDWIDTH

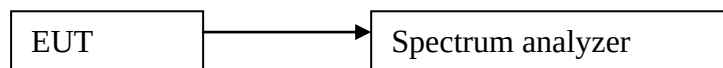
6.1 LIMITS

§15.231 (c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

6.2 TEST PROCEDURES

- 1) Set resolution bandwidth (RBW) = 100 Hz. Set the video bandwidth (VBW) $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold. Sweep = auto couple. Allow the trace to stabilize, record 20dB bandwidth value.
- 2) Repeat above procedures until all frequencies measured were complete.

6.3 TEST SETUP

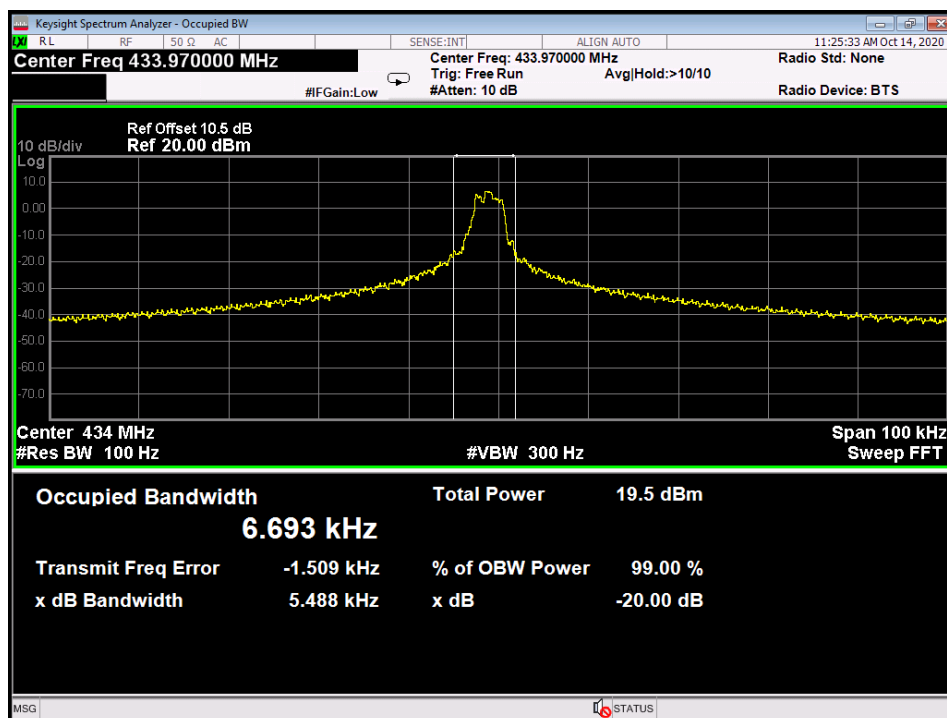


6.4 TEST RESULTS

Test mode:

Channel	Frequency(MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
	433.92	5.488	1084.9	PASS

Test Plot



7. TRANSMISSION TIME

7.1 LIMITS

§15.231 (e) (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

§15.231 (e) devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

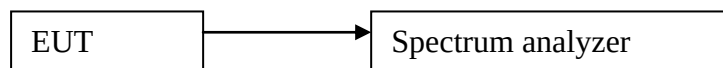
§15.231 (a) for this periodic operation:

- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

7.2 TEST PROCEDURES

- 1) The spectrum analyzer resolution bandwidth that is $\leq$ EBW. So we test the Maximum Conducted Output Power —Integrated band power method.
- 2) Set Set the analyzer span = 0Hz. RBW = 1MHz. Set VBW = 1MHz. Detector = Peak. Sweep = Adjust according to actual conditions.
- 3) Allow the trace to stabilize, record value.

7.3 TEST SETUP

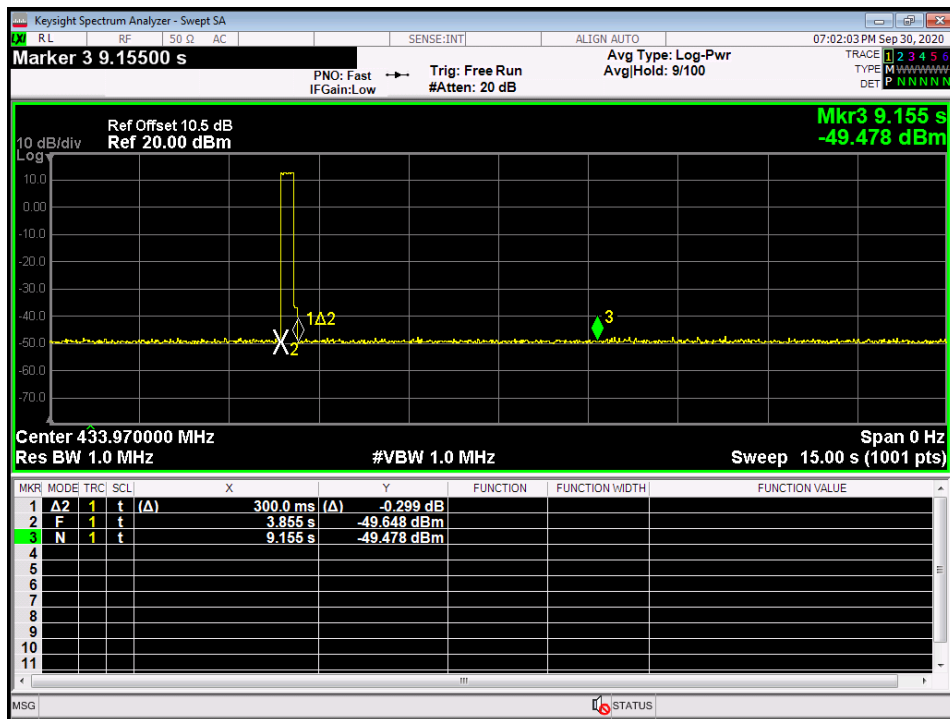


7.4 TEST RESULTS

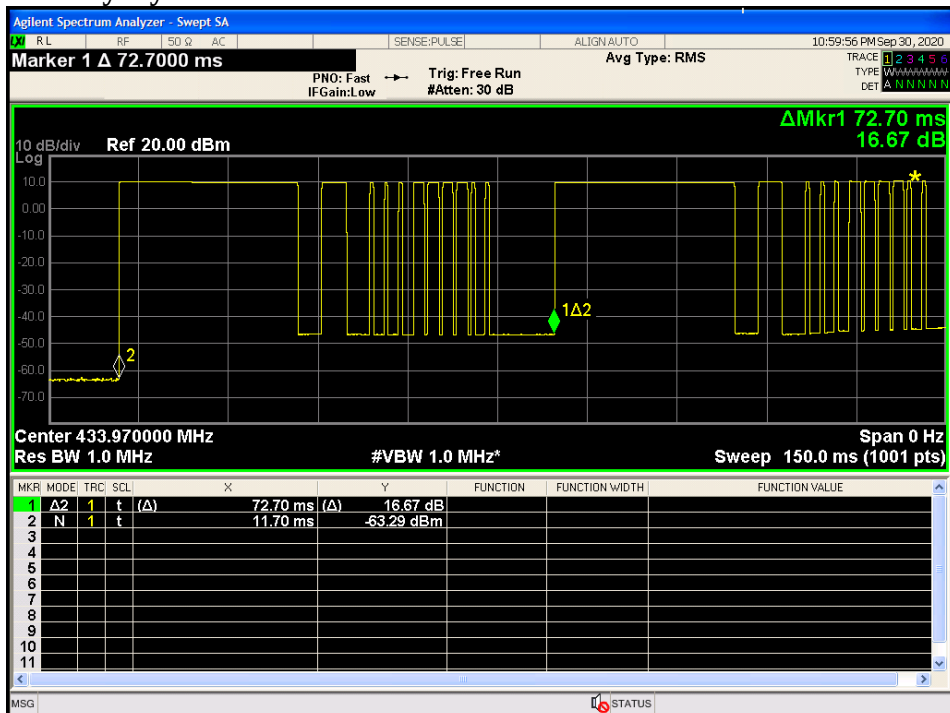
Test Data

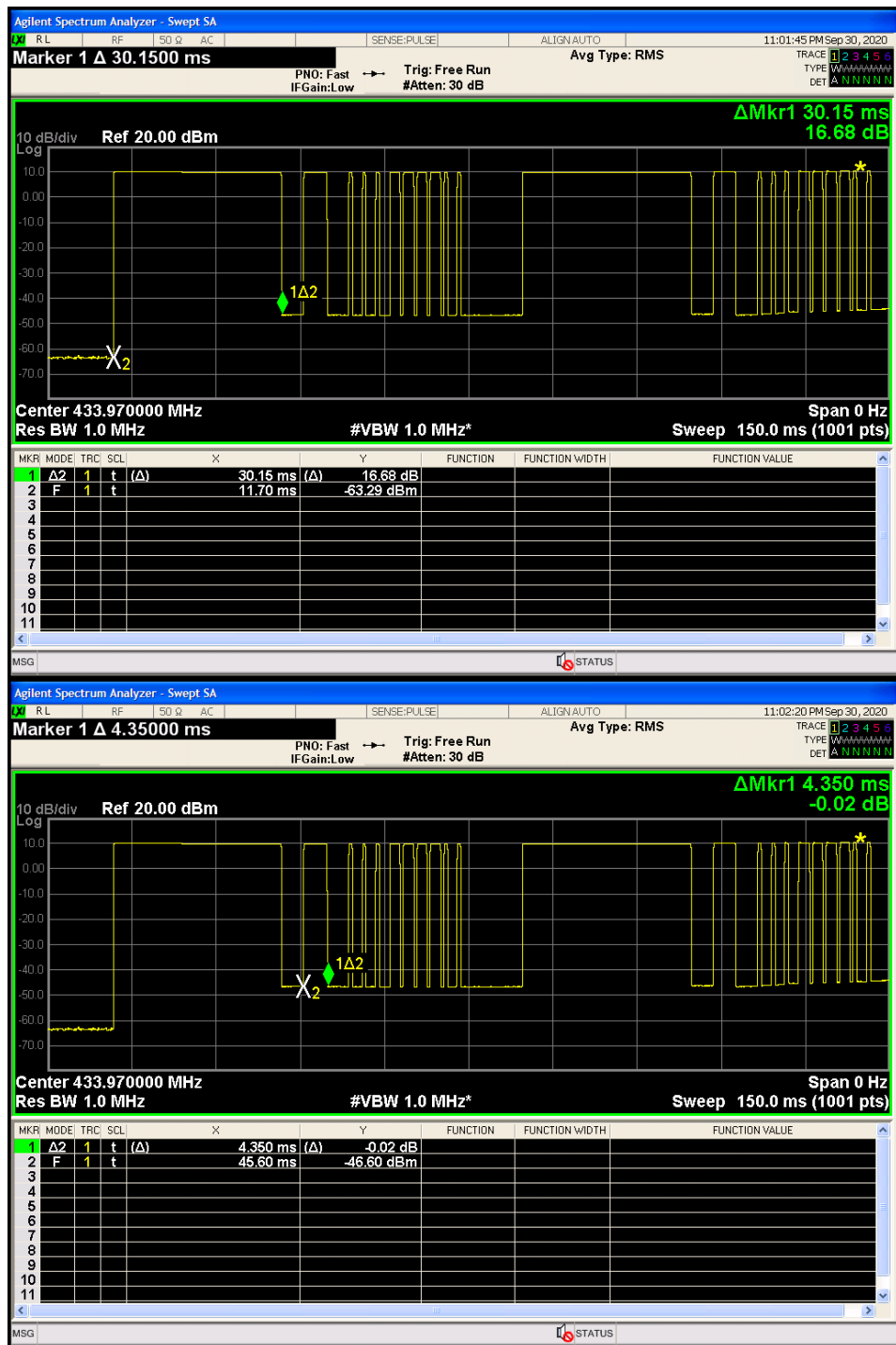
Frequency (MHz)	Transmission Time (s)	Limit (s)	Result
433.92	0.3	5	Pass

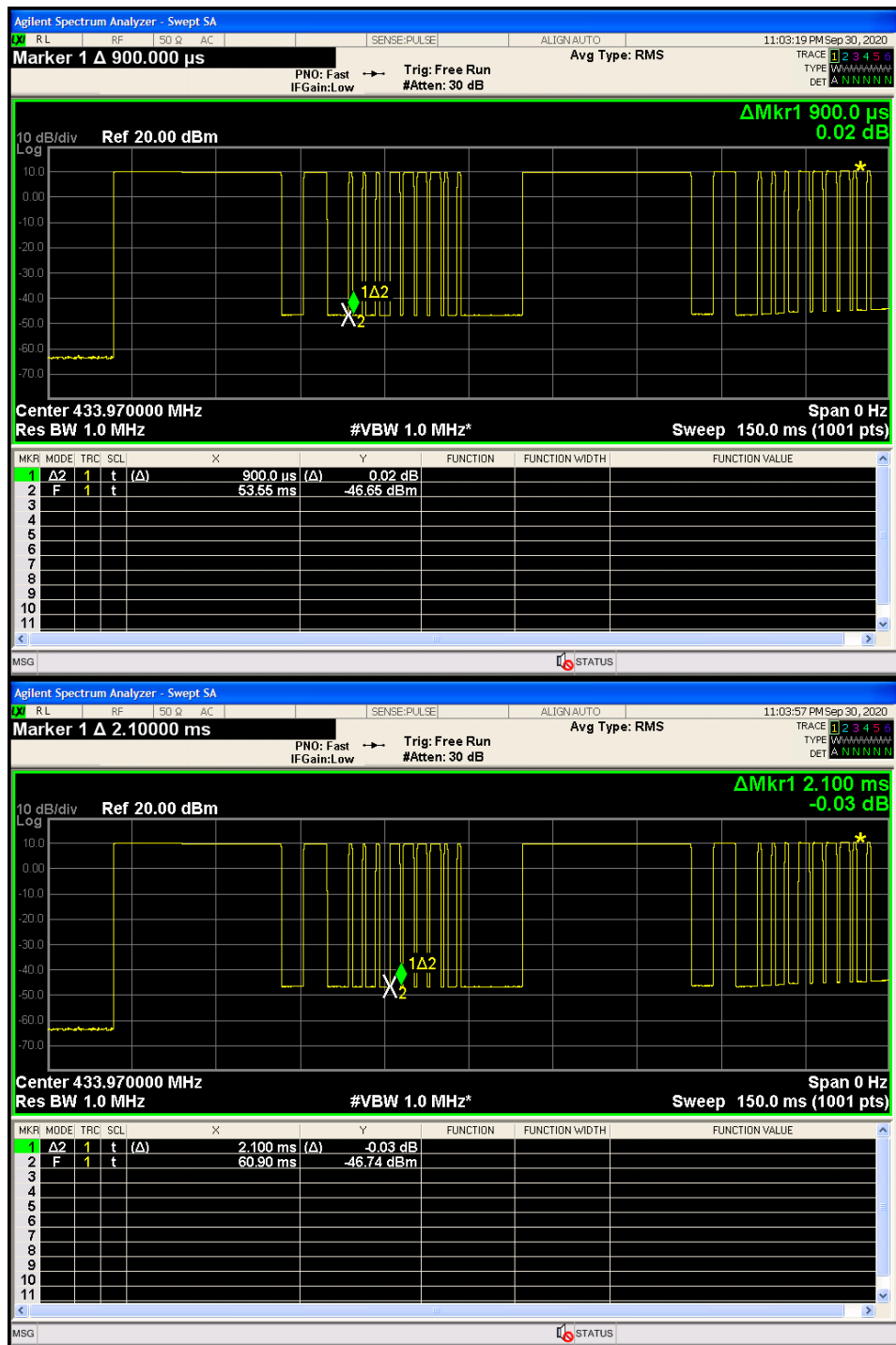
Test Plot



Duty Cycle:





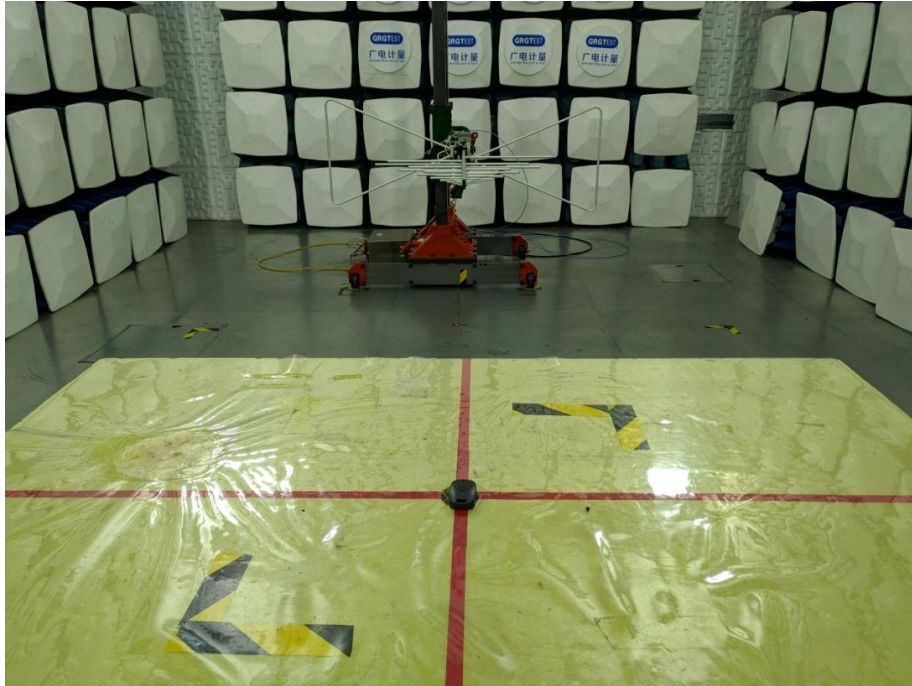


Remark:

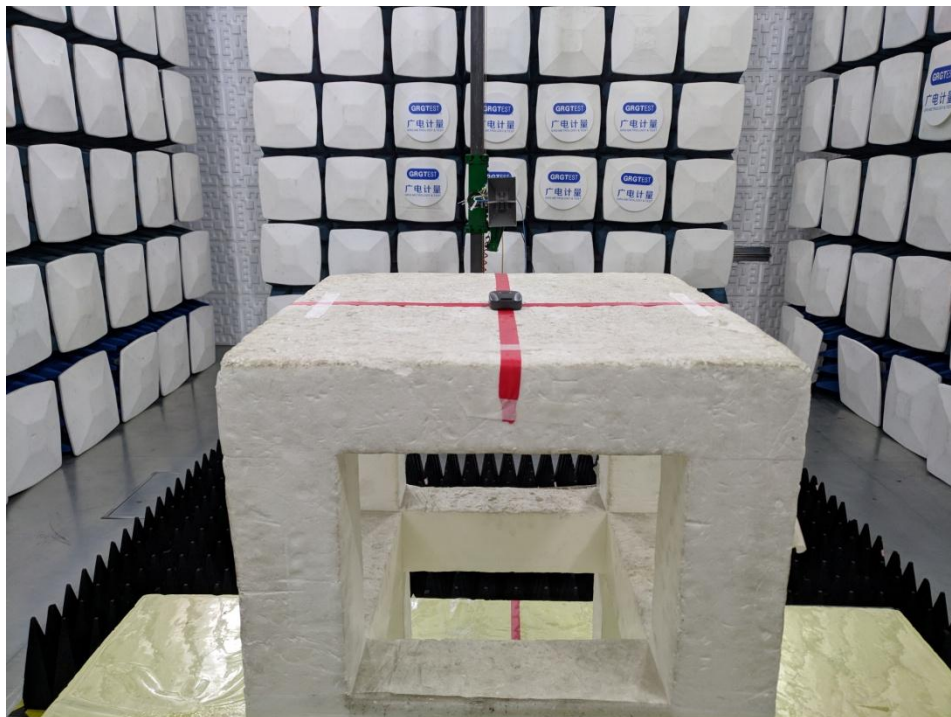
1. On time: 47.4ms
2. Duty Cycle = On time/Total time (47.4ms) = 47.4ms/72.7ms = 66%

8. APPENDIX: PHOTOGRAPH OF THE TEST ARRANGEMENT

RSE (Below 1GHz)



RSE (Above 1GHz)



-----This is the last page of the report. -----