

FCC TEST REPORT

for

Zhejiang Runva Mechanical & Electrical Co.,Ltd.

TRAV WIRELESS CONTROL

Model Number:1078310

Prepared for : Zhejiang Runva Mechanical & Electrical Co.,Ltd.
Address : 10F Int'l Trad Bldg,369 Shuangxi West Road,
Jinhua Zhejiang,China

Prepared by : Keyway Testing Technology Co., Ltd.
Address : Baishun Industrial Zone, Zhangmutou Town,
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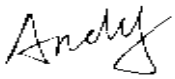
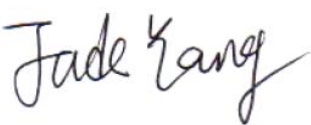
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Report No. : 14KWE041123F
Date of Test : Apr. 27~29 ,2014
Date of Report : Apr. 30,2014

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Keyway Testing Technology Co., Ltd.

Applicant:	Zhejiang Runva Mechanical & Electrical Co.,Ltd.		
Address:	10F Int'l Trad Bldg,369 Shuangxi West Road, Jinhua Zhejiang, China		
Manufacturer:	Zhejiang Runva Mechanical & Electrical Co.,Ltd.		
Address:	10F Int'l Trad Bldg,369 Shuangxi West Road, Jinhua Zhejiang, China		
E.U.T:	TRAV WIRELESS CONTROL		
Model Number:	1078310		
Trade Name:	TRAVELLER	Serial No.:	-----
Date of Receipt:	Apr. 27, 2014	Date of Test:	Apr. 27~29 ,2014
Test Specification:	FCC Part 15 Subpart C Section 15.231:2013 ANSI C63.4:2009		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		
Issue Date: Apr.30, 2014			
Tested by:	Reviewed by:	Approved by:	
 	 	 	
Andy Gao / Engineer	Jade Yang/ Supervisor	Chris Du / Manager	
Other Aspects:			
None.			
<i>Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested</i>			
<i>This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.</i>			

1. GENERAL PRODUCT INFORMATION

1.1. Product Function

Refer to Technical Construction Form and User Manual.

1.2. Description of Device (EUT)

Description	:	TRAV WIRELESS CONTROL
M/N	:	1078310
Power Supply	:	DC 9V
Operation Frequency	:	315MHz
Modulation Technology	:	FSK
Antenna Type	:	PCB Antenna
Antenna Gain	:	0dBi

1.3. Independent Operation Modes

The basic operation modes are:

1.3.1. Keep the EUT in transmitting mode.

1.4. Difference between Model Numbers

None.

2. TEST SITES

2.1. Test Facilities

Lab Qualifications : Certificated by FCC, USA
 Registration No.: 795647
 Date of registration: November 7, 2011

Certificated by Industry Canada
 Registration No.: 9868A
 Date of registration: December 8, 2011

2.2. List of Test and Measurement Instruments

2.2.1. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	May 9,13	May 9,14
Bilog Antenna	ETS-LINDGREEN	3142D	135452	May 20,13	May 20,14
Spectrum Analyzer	Agilent	8593E	3911A04271	May 9,13	May 9,14
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	May 9,13	May 9,14
Signal Amplifier	SONOMA	310	187016	May 9,13	May 9,14
Horn Antenna	DAZE	ZN30701	11003	May 11,13	May 11,14
Signal Amplifier	DAZE	ZN3380C	11001	May 9,13	May 9,14
Signal Amplifier	Agilent	8449B	3008A00251	May 9,13	May 9,14
RF Cable	IMRO	IMRO-400	966 Cable 1#	May 9,13	May 9,14
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A

3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



(EUT: TRAV WIRELESS CONTROL)

Note: 1:By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Y axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report. Test data as below.

Frequency (MHz)	Axis	Field Strength (dBuV/m)	Antenna Polarization
315.00	X	73.11	Vertical
315.00	Y	74.07	Vertical
315.00	Z	72.58	Vertical

2:Used new battery for all test.

3.3. Test Operation Mode and Test Software

Refer to Test Setup in clause 4.

3.4. Special Accessories and Auxiliary Equipment

None.

3.5. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Radiated Emission Test

4.1.1. Limit 15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

4.1.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

4.1.3. Test setup

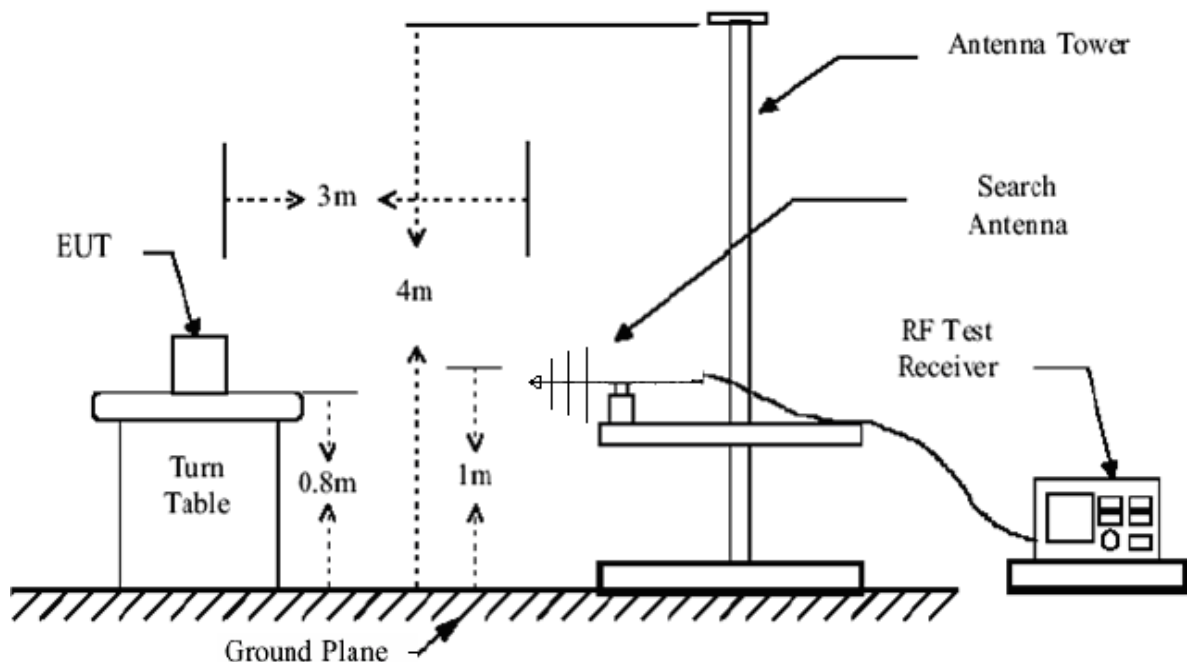
The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz.

The test data of the worst case condition(s) was reported on the following pages.



Test Data for 30MHz~4GHz

Frequency MHz	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Reading dBuV	Antenna Factor dB/m	Cable Loss dB	Preamp Factor dB	Antenna Polarization	Remark
315.00	74.07	87.70	-14.63	87.78	14.23	1.94	30.88	Vertical	Peak
630.00	48.89	67.70	-18.81	54.81	21.32	3.47	30.71	Vertical	Peak
945.00	53.54	67.70	-14.16	53.68	24.62	4.89	29.65	Vertical	Peak
1260.00	52.25	67.70	-15.45	53.44	23.91	5.31	30.41	Vertical	Peak
1575.00	52.67	67.70	-15.03	54.35	22.78	5.43	29.89	Vertical	Peak
1890.00	50.96	67.70	-16.74	52.26	23.64	5.91	30.85	Vertical	Peak
2205.00	51.11	67.70	-16.59	52.01	23.83	6.13	30.86	Vertical	Peak
315.00	73.20	87.70	-14.50	87.91	14.23	1.94	30.88	Horizontal	Peak
630.00	47.32	67.70	-20.38	53.24	21.32	3.47	30.71	Horizontal	Peak
945.00	51.95	67.70	-15.75	52.09	24.62	4.89	29.65	Horizontal	Peak
1260.00	50.18	67.70	-17.52	51.37	23.91	5.31	30.41	Horizontal	Peak
1575.00	49.37	67.70	-18.33	51.05	22.78	5.43	29.89	Horizontal	Peak
1890.00	49.46	67.70	-18.24	50.76	23.64	5.91	30.85	Horizontal	Peak
2205.00	50.21	67.70	-17.49	51.11	23.83	6.13	30.86	Horizontal	Peak

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.
2. Measurement Uncertainty: ± 3.2 dB at a level of confidence of 95%.

For average:

Frequency MHz	Peak Level dBuV/m	Duty cycle factor	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Antenna Polarization	Remark
315.00	73.07	-11.21	61.86	67.70	-5.84	Vertical	average
630.00	48.89	-11.21	37.68	47.70	-10.02	Vertical	average
945.00	53.54	-11.21	42.33	47.70	-5.37	Vertical	average
1260.00	52.25	-11.21	41.04	47.70	-6.66	Vertical	average
1575.00	52.67	-11.21	41.46	47.70	-6.24	Vertical	average
1890.00	50.96	-11.21	39.75	47.70	-7.95	Vertical	average
2205.00	51.11	-11.21	39.90	47.70	-7.80	Vertical	average
315.00	73.20	-11.21	61.99	67.70	-5.71	Horizontal	average
630.00	47.32	-11.21	36.11	47.70	-11.59	Horizontal	average
945.00	51.95	-11.21	40.74	47.70	-6.96	Horizontal	average
1260.00	50.18	-11.21	38.97	47.70	-8.73	Horizontal	average
1575.00	49.37	-11.21	38.16	47.70	-9.54	Horizontal	average
1890.00	49.46	-11.21	38.25	47.70	-9.45	Horizontal	average
2205.00	50.21	-11.21	39.00	47.70	-8.70	Horizontal	average

- Notes: 1. Emission Level = Peak Level + Duty cycle factor
 2. Measurement Uncertainty: ± 3.2 dB at a level of confidence of 95%.
 3. Duty cycle level please see clause 5.
 4. Pulse Desensitization Correction Factor
 Pulse Width (PW) = 17.3ms
 $2/PW = 2/17.3\text{ms} = 0.116\text{kHz}$
 RBW (100 kHz) > 2/PW (0.116kHz)
 Therefore PDCF is not needed

5. CALCULATION OF AVERAGE FACTOR

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

Averaging factor in dB = $20 \log (\text{duty cycle})$

The duration of one cycle = 63ms

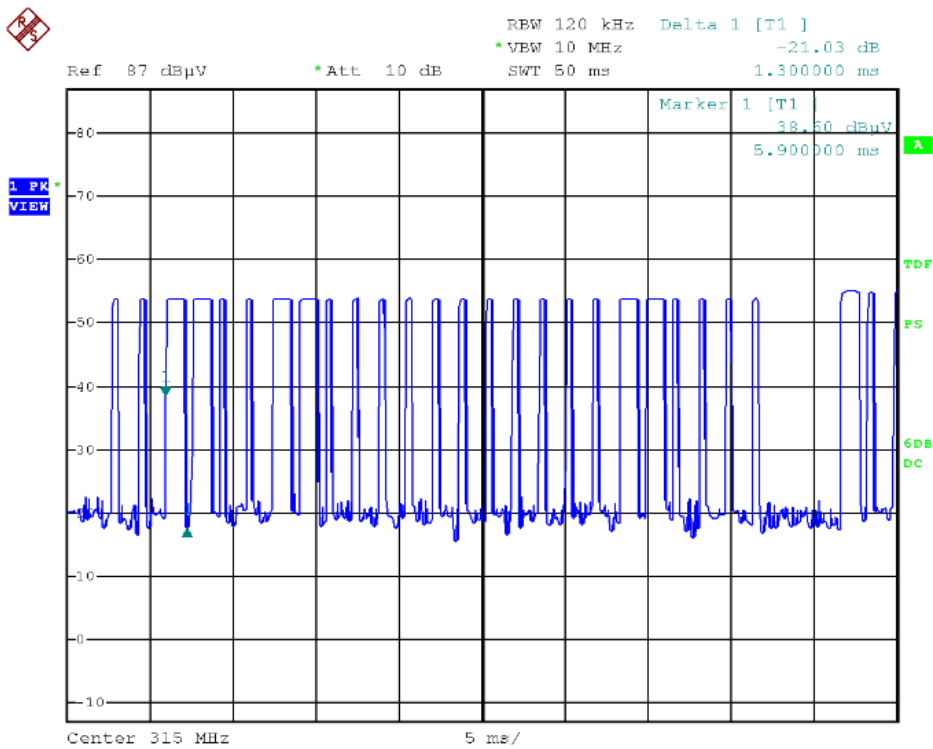
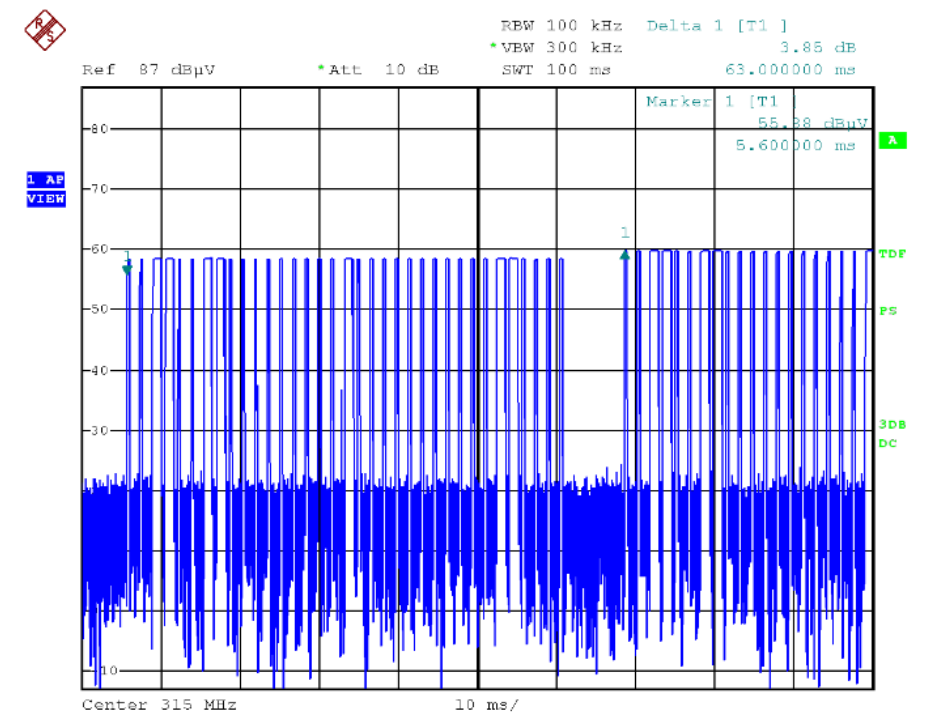
The duty cycle is simply the on-time divided the duration of one cycle

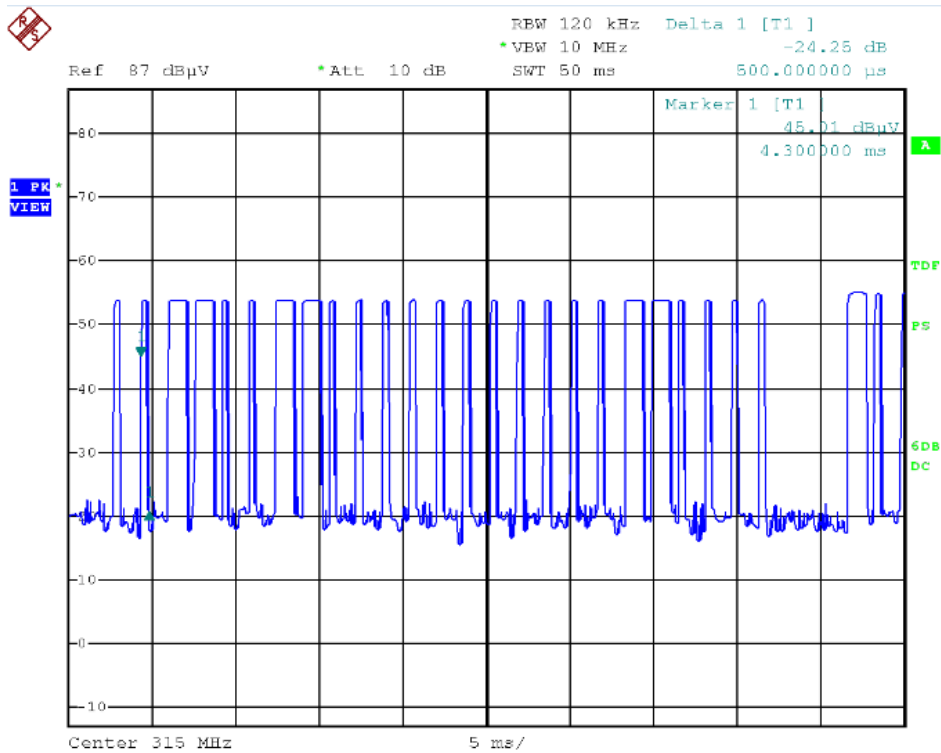
Duty Cycle = $(1.3\text{ms} \times 6 + 0.5\text{ms} \times 19) / 63 = 17.3\text{ms} / 63\text{ms} = 0.275$

Therefore, the averaging factor is found by $20 \log 0.275 = -11.21\text{dB}$

Test plot as follows:

T period





6. 20DB OCCUPY BANDWIDTH

6.1. Limits

According to FCC 15.231(c) requirement:

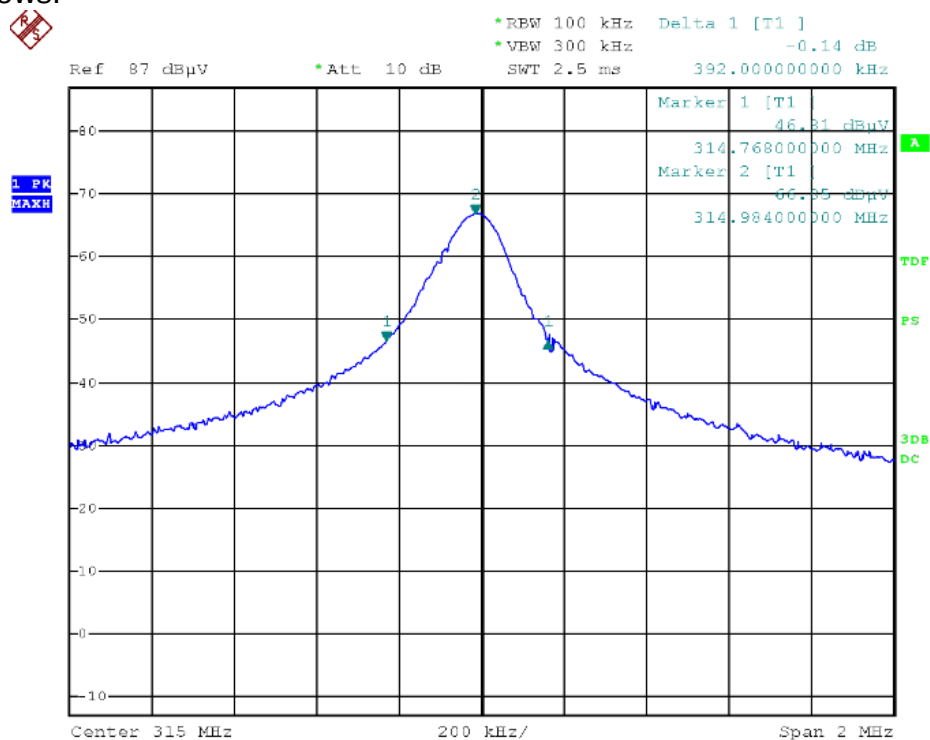
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

$$B.W (20dBc) \text{ Limit} = 0.25\% * f(\text{MHz}) = 0.25\% * 315.00\text{MHz} = 0.7875\text{MHz}$$

Test data:

Channel Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
315.00	392	787.5	Pass

Test plot as follows:



7. DWELL TIME

7.1. Limits

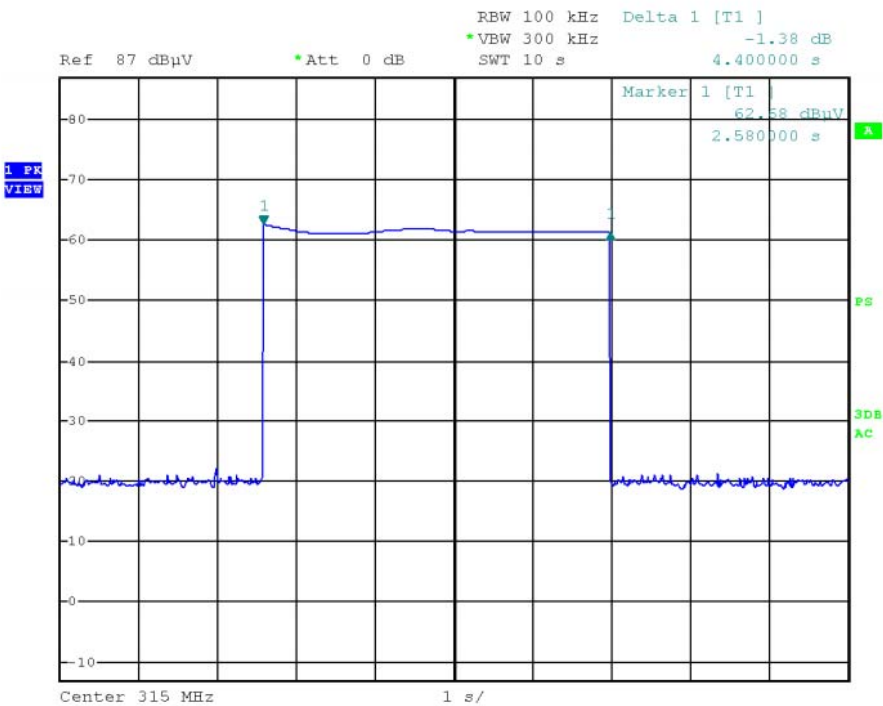
According to FCC 15.231(a) requirement:

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Test Data:

Dwell time (second)	Limit (second)	Result
4.4s	<5s	Pass

Test plot as follows:



8. PHOTOGRAPHS OF TEST SET-UP

Please see annex.

9. PHOTOGRAPHS OF THE EUT

Please see annex.

END.