FCC&ISED RF TEST REPORT

No. 170200232SHA-001

Applicant	:	Cixi City Yidong Electronic Co., Ltd Guanhaiwei Industrial Zone, West Section, Cixi Ningbo, P. R. China
Manufacturing site	:	Cixi City Yidong Electronic Co., Ltd Guanhaiwei Industrial Zone, West Section, Cixi Ningbo, P. R. China
Product Name	:	Wireless remote transmitter
Type/Model	:	RC-11U
TEST RESULT	**:**	**PASS**

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2016): Radio Frequency Devices (Subpart C)

RSS-210 Issue 9 (August 2016): Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

RSS-Gen Issue 4 (November 2014): General Requirements for Compliance of Radio Apparatus

ANSI C63.10 (2013): American National Standard for Testing Unlicensed Wireless Devices

Date of issue: November 23, 2017

Prepared by:

Wade Zhang (Project engineer)

Reviewed by:

Daniel Zhao (Reviewer)

Description of Test Facility

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FCC Designation Number: CN1175
IC Assigned Code: 2042B-1

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Content

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1. General Information

1.1 Description of Client

Applicant	:	Cixi City Yidong Electronic Co., Ltd
		Guanhaiwei Industrial Zone, West Section, Cixi Ningbo, P. R. China
Name of contact	:	Mr. Shen Mengjie
Tel	:	0574-63630755
Fax	:	0574-63630188
Manufacturing site	:	Cixi City Yidong Electronic Co., Ltd
		Guanhaiwei Industrial Zone, West Section, Cixi Ningbo, P. R. China

1.2 Identification of the EUT

Equipment	:	Wireless remote transmitter
Type/model	:	RC-11U
FCC ID	:	S72-RC11U
IC	:	10931A-RC11U

1.3 Technical specification

Operation Frequency Band	:	433.92MHz
Rating	:	DC3V
Modulation	:	ASK
Antenna Designation	:	Integral PCB antenna, non-user removable
Gain of Antenna	:	0dBi
Channel Description	:	There is one channel only, namely 433.92MHz.
Description of EUT	:	There is one model only. The EUT is a transmitter to control the working condition of the corresponding receiver.
Category of EUT	:	Class B
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	October 30, 2017
Sample Identification No	:	*0171030-27-003*
Date of test	:	October 30, 2017 ~ November 20, 2017

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2. Test Specification

2.1 Test Standard

47CFR Part 15 (2016): Radio Frequency Devices (Subpart C)

RSS-210 Issue 9 (August 2016): Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

RSS-Gen Issue 4 (November 2014): General Requirements for Compliance of Radio Apparatus

ANSI C63.10 (2013): American National Standard for Testing Unlicensed Wireless Devices

2.2 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested with modulation and tested under its rating voltage and frequency.

The EUT is a handheld device, so three axes (X, Y, Z) were observed while the test receiver worked as "max hold" continuously and the highest reading among the whole test procedure was recorded. Compare with the test results that X axis is the worst case.

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2.3 Instrument list

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESIB 26	EC 3045	2018-10-18
☑	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2018-05-30
☑	Horn antenna	R&S	HF 906	EC 3049	2018-09-22
☑	Horn antenna	ETS	3117	EC 4792-1	2018-08-23
☑	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2020-07-09
☑	Pre-amplifier	R&S	Pre-amp 18	EC5881	2018-06-19
☑	Semi-anechoic chamber	Albatross project	-	EC 3048	2018-09-08
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2018-09-10
☑	Power sensor	Agilent	U2021XA	EC 5338-1	2018-03-03
☑	Vector Signal Generator	Agilent	N5182B	EC 5175	2018-03-06
☑	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2018-03-03
☑	Mobile Test System	Litepoint	Iqxel	EC 5176	2018-01-11
☑	Test Receiver	R&S	ESCI 7	EC 4501	2018-02-23
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3323	2018-06-14
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3324	2018-04-09
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3325	2018-03-23
☑	Pressure meter	YM3	Shanghai Mengde	EC 3320	2018-06-28

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2.4 Test Summary

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TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Fundamental & spurious emission	15.231(b)	RSS-210 RSS-GEN	Pass
Restrict band radiated emission	15.205	RSS-210 RSS-GEN	Pass
Power line conducted emission	15.207	RSS-GEN	Pass
Emission bandwidth	15.231(c)	RSS-210	Pass
Deactivating time	15.231(a)(1)	RSS-210	Pass

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2.5 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

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3. Fundamental & Spurious Emission & Restrict band radiated emission

Test result: **Pass**

3.1 Test limit

3.1.1 The emission shall test through the 10th harmonic or to 40GHz, whichever is lower. It must comply with the limits below:

Fundamental Frequency (MHz)	Fundamental limit (uV/m)	Spurious limit (uV/m)
☐ 40.66 – 40.70	2250	225
☐ 70 – 130	1250	125
☐ 130 - 174	1250 to 3750	125 to 375
☐ 174 - 260	3750	375
☒ 260 – 470	3750 to 12500	375 to 1250
☐ Above 470	12500	1250

The formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(Frequency) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(Frequency) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

For that the EUT use fundamental frequency of 433.92MHz, after calculation, the limit is:

Fundamental limit = 41.6667 * 433.92 - 7083.3333 = 10996.68 uV/m = 80.80dBuV/m
Spurious limit = 81 – 20 = 60.80dBuV/m

//

3.1.2 The radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

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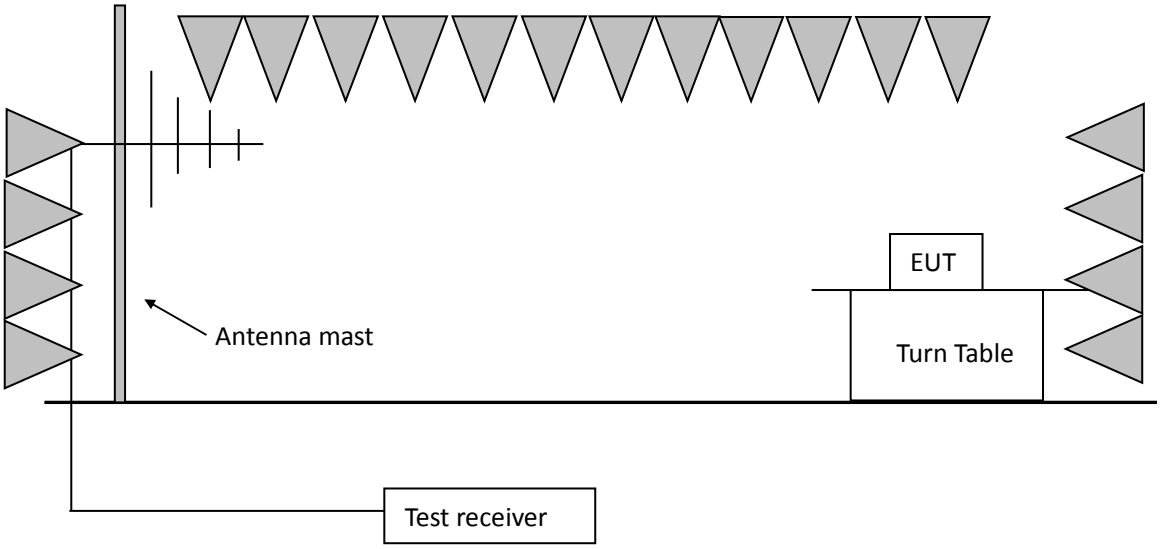
3.2 Test Configuration



3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, the pre-amplifier and high pass filter is equipped just at the output terminal of the antenna. Tabletop devices shall be placed on a non-conducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.
Both horizontal and vertical polarities of the receiving antenna were assessed and the higher reading was listed in this report.
The radiated emission was measured using the test receiver with the resolutions bandwidth set as:
RBW=300 Hz, VBW=1 kHz (9 kHz~150 kHz);
RBW=10kHz, VBW=30kHz (150kHz~30MHz);
RBW = 100kHz, VBW = 300kHz (30MHz~1GHz)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

Remark: 1.Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz)
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = limit - Corrected Reading
4. If PK reading is less than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV, limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m; Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

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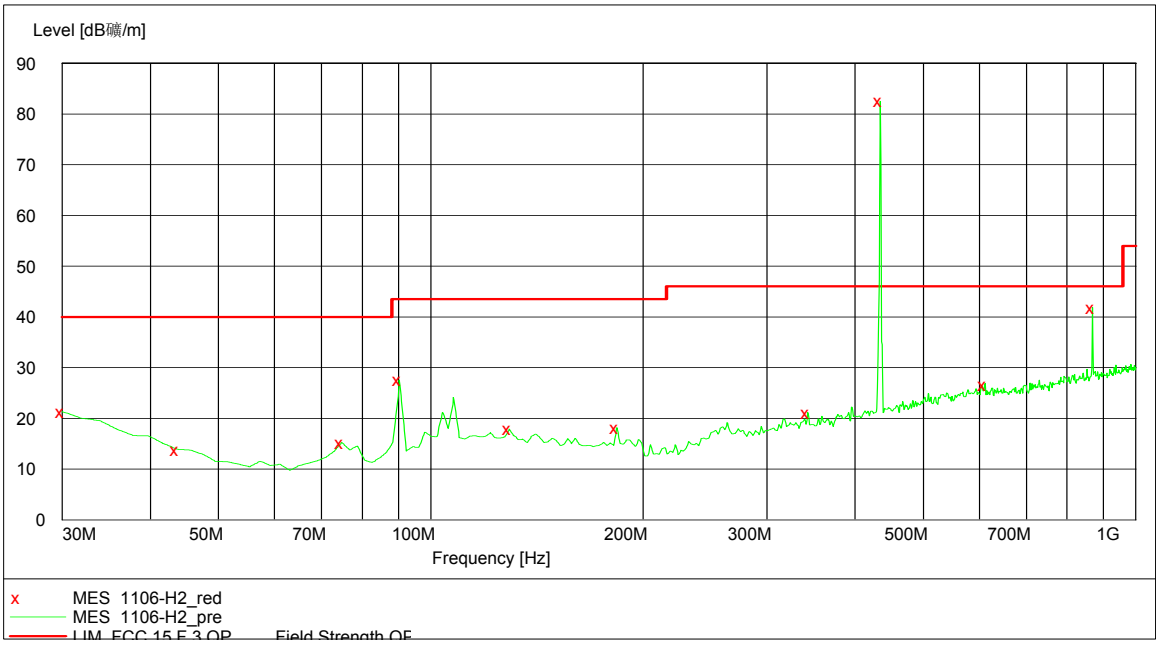
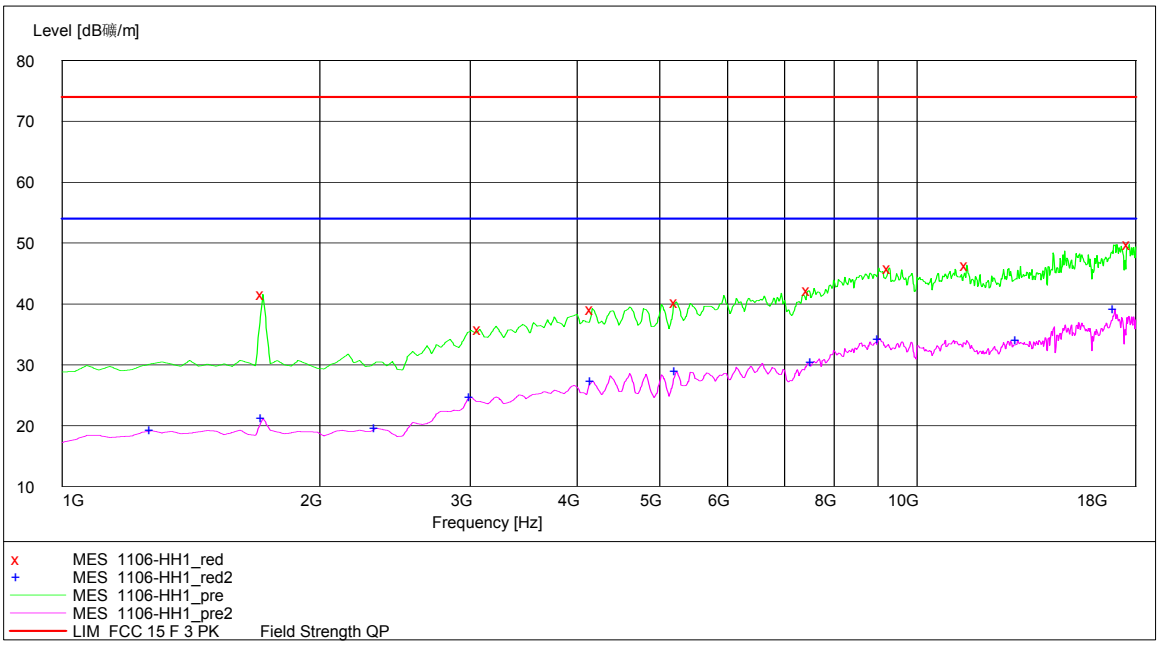
3.4 Test protocol

Temperature: 22°C
Relative humidity: 52%

Horizontal





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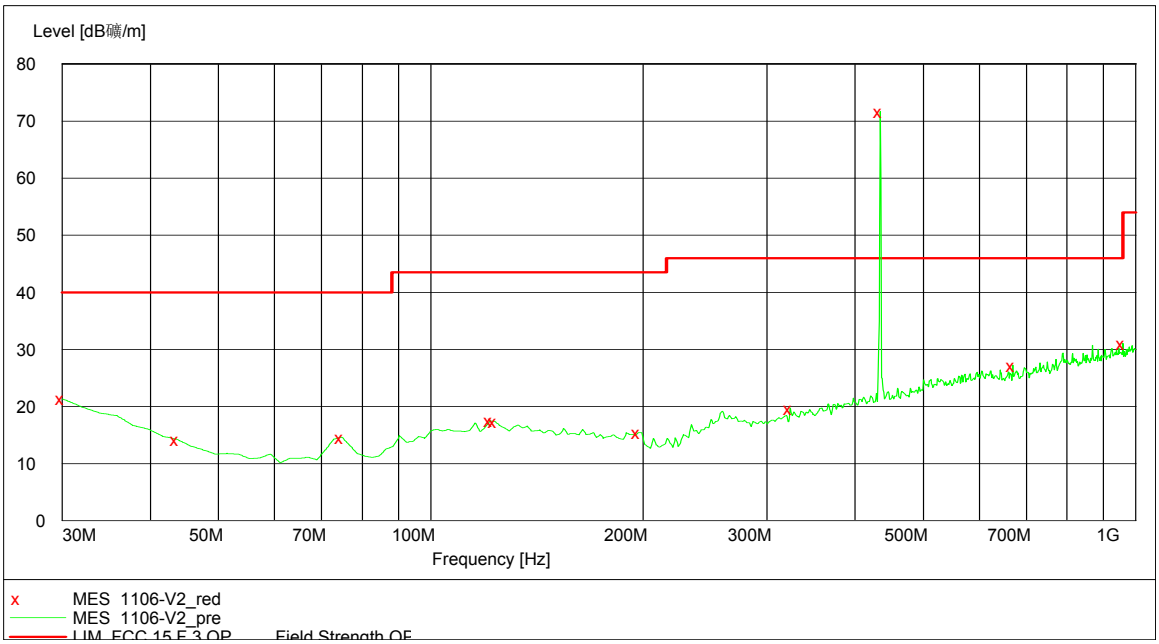
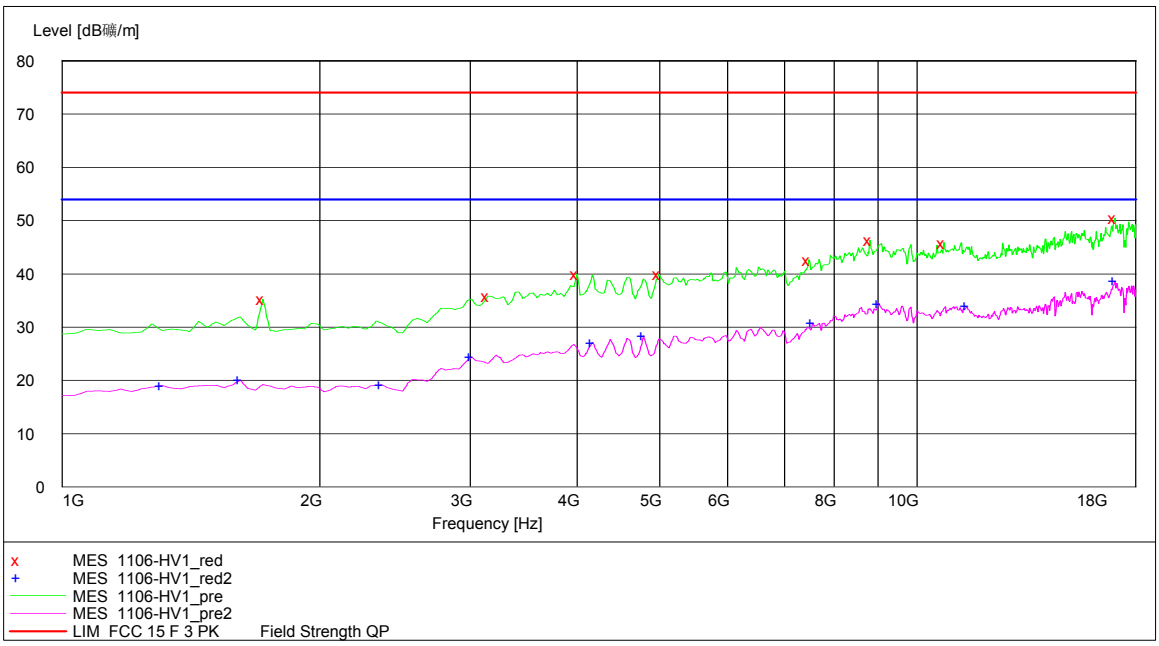
Vertical





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Test data:

Polarization	Frequency (MHz)	Corrected Reading (dBμV/m)	Correct Factor (dB/m)	Limits (dBμV/m)	Margin (dB)	Detector
H	30.00	21.3	19.2	40.0	18.7	PK
	43.61	13.9	11.6	40.0	26.1	PK
	74.71	15.3	7.5	40.0	24.7	PK
	90.26	27.5	9.9	43.5	16.0	PK
	129.14	17.9	12.9	43.5	25.6	PK
	183.57	18.1	10.5	43.5	25.4	PK
	342.97	21.2	15.8	46.0	24.8	PK
	434.33	82.6	18.0	Fundamental	/	PK
	611.22	26.7	20.6	46.0	19.3	PK
	867.82	41.9	22.8	46.0	4.1	PK
	1715.43	41.6	-11.4	74.0	32.4	PK
	3078.16	35.8	-4.8	74.0	38.2	PK
	4168.34	39.2	-1.2	74.0	34.8	PK
	5224.45	40.3	1.1	74.0	33.7	PK
	7472.95	42.2	7.8	74.0	31.8	PK
	9278.56	45.9	13.2	74.0	28.1	PK
	11424.85	46.4	13.9	74.0	27.6	PK
	17693.39	49.8	22.6	74.0	24.2	PK
V	30.00	21.3	19.2	40.0	18.7	PK
	43.61	14.2	11.6	40.0	25.8	PK
	74.71	14.6	7.5	40.0	25.4	PK
	121.36	17.5	13.3	43.5	26.0	PK
	123.31	17.3	13.2	43.5	26.2	PK
	197.17	15.4	10.7	43.5	28.1	PK
	323.53	19.6	15.3	46.0	26.4	PK
	434.33	71.7	18.0	Fundamental	/	PK
	669.54	27.2	20.8	46.0	18.8	PK
	959.18	31.0	23.6	46.0	15.0	PK
	1715.43	35.2	-11.4	74.0	38.8	PK
	3146.29	35.8	-4.6	74.0	38.2	PK
	3998.00	40.0	-1.9	74.0	34.0	PK
	4985.97	39.9	0.6	74.0	34.1	PK
	7472.95	42.6	7.8	74.0	31.4	PK
	8801.60	46.4	12.7	74.0	27.6	PK
	10743.49	45.9	14.2	74.0	28.1	PK
	17012.02	50.5	21.3	74.0	23.5	PK

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Calculating the AV value according to the duty cycle

Antenna	Frequency (MHz)	PK Reading (dBuV/m)	Correct Factor (dB)	AV Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
H	**434.33**	82.6	-10.3	72.3	80.8	8.5
H	867.82	41.9		31.6	60.8	29.2
H	1715.43	41.6		31.3	60.8	29.5
V	**434.33**	71.7		61.4	80.8	19.4
V	1715.43	35.2		24.9	60.8	35.9

Remark: 1. Correct Factor = 20lg (duty cycle) = 20lg (0.305) = -10.3;
2. AV Reading = PK Reading + Correct Factor;
3. Margin = limit - AV Reading.

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4. Deactivating time

Test result: **Pass**

4.1 Test limit

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

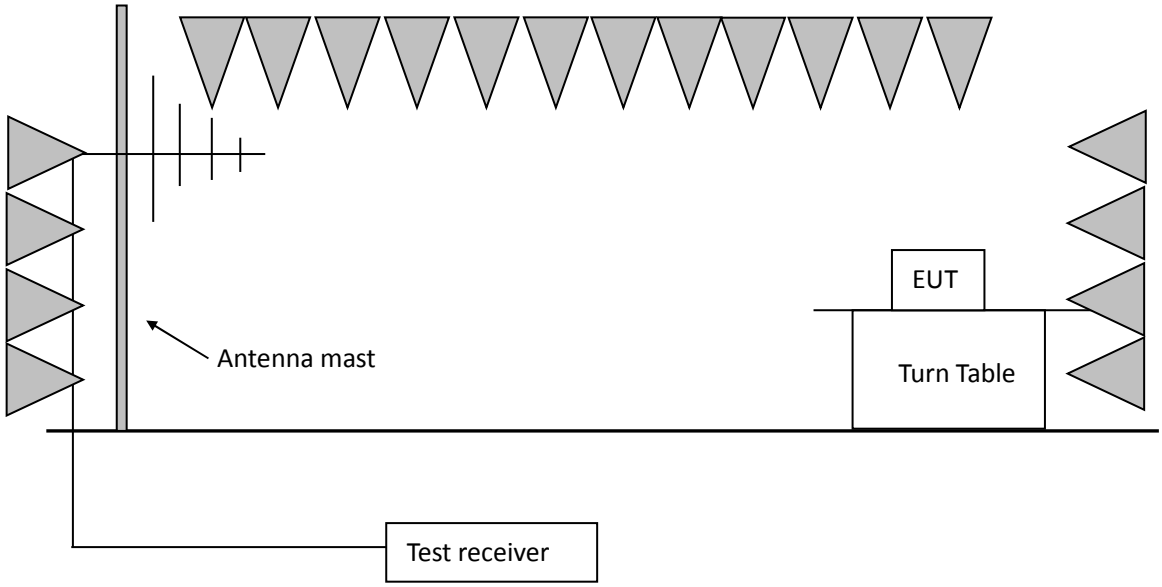
☐ (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

☐ (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.

☐ (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

☐ (5) Transmission of set-up information for security systems may exceed the transmission duration limits in (1) and (2) above, provided such transmission are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

4.2 Test Configuration



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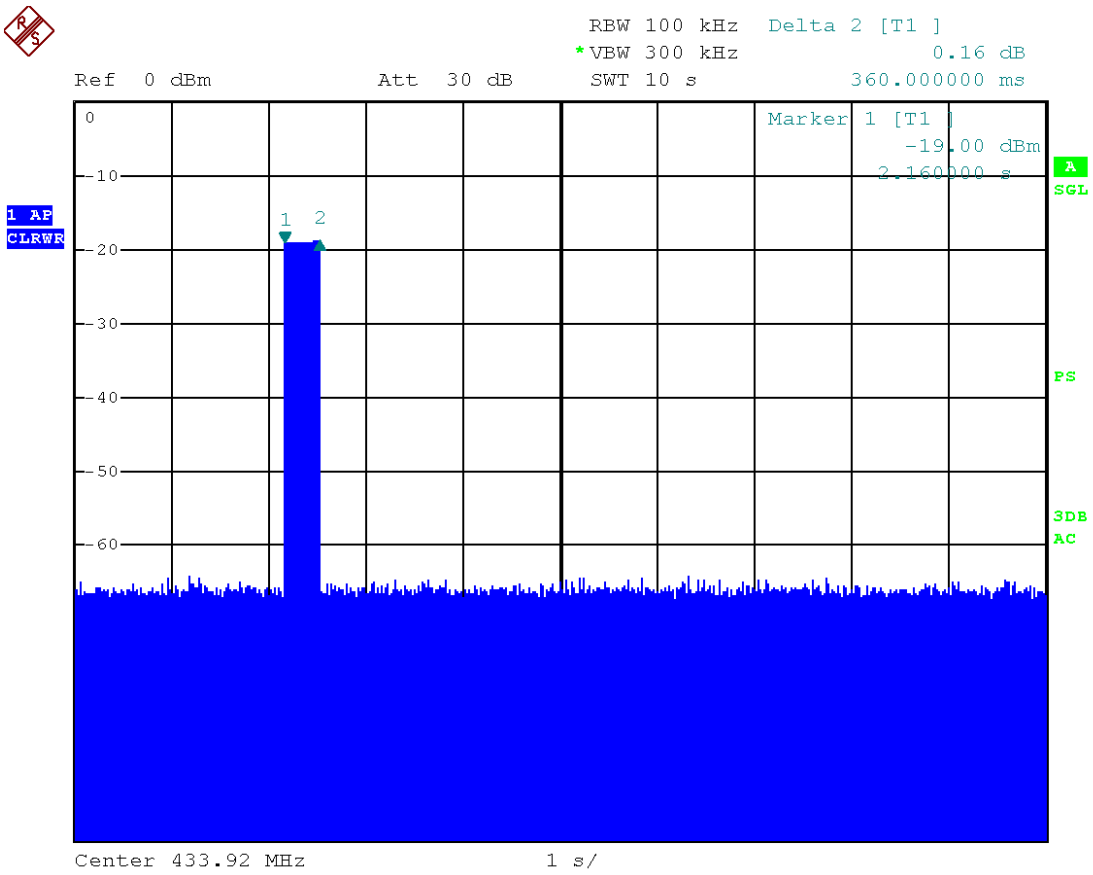
4.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber.
The central frequency of test receiver was set as the operating frequency of EUT and the Span was set as 0.
The EUT was switched once. The test receiver recorded the whole time from the triggered moment to the time of stopping radiating. For manual switching, to avoid uncertainty, the operating above would be repeated five times and the worst data is recorded.

4.4 Test protocol

Whole time from the triggered moment to the time of stopping radiating: 0.360s.
As a result, the EUT complies with the limit of 5s' deactivating time.



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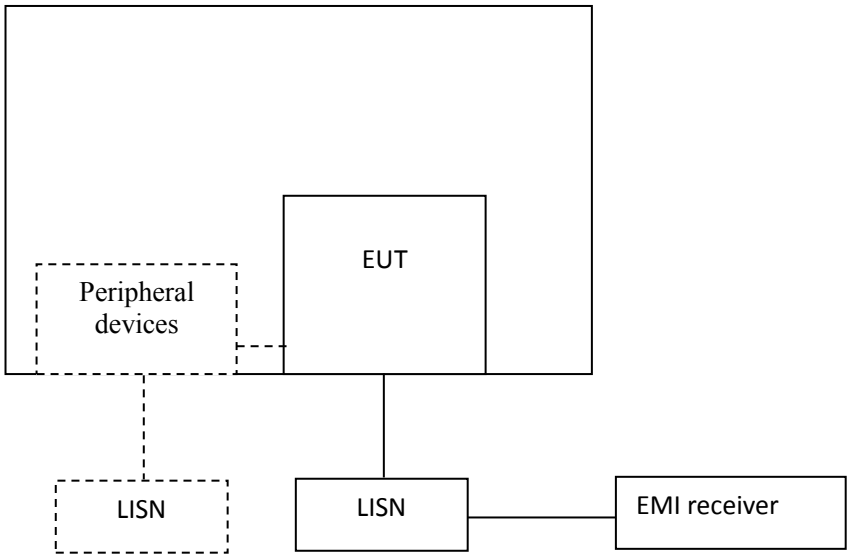
5. Power line conducted emission

Test result: **NA**

5.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

5.2 Test configuration



☐ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

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5.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

5.4 Test protocol

N/A

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6. Emission Bandwidth

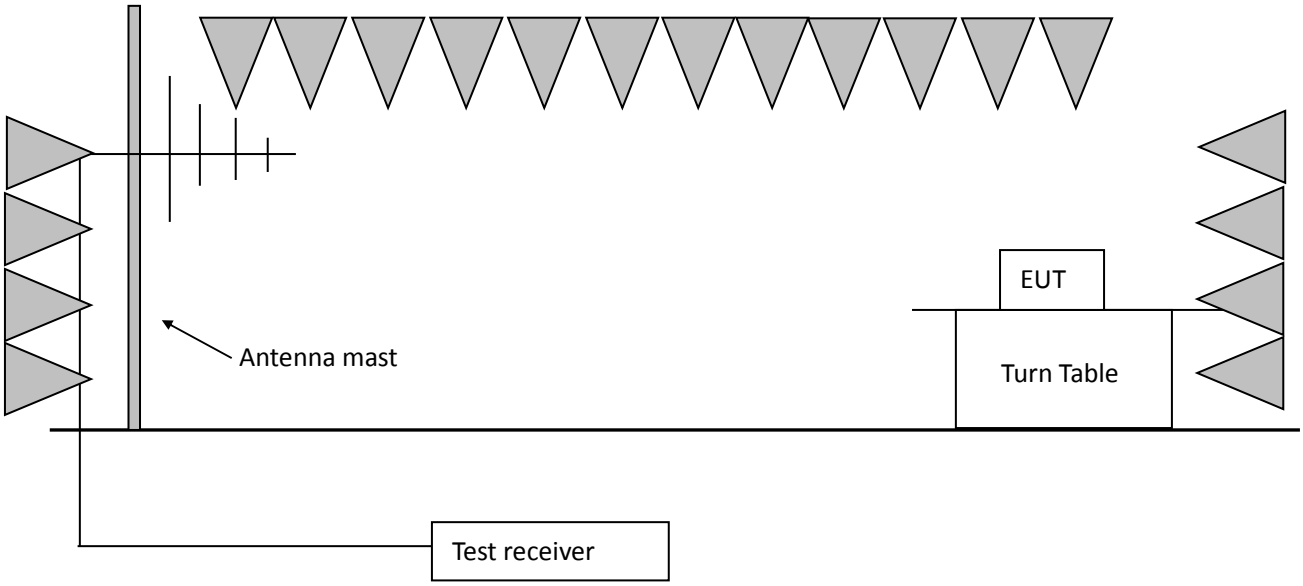
Test result: **Pass**

6.1 Test limit

The 99% bandwidth of momentarily operated devices shall be less or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the 99% bandwidth shall be less or equal to 0.5% of the centre frequency.

The limit for the EUT = 0.25% * 433.92 MHz = 1085 kHz

6.2 Test Configuration



6.3 Test procedure and test setup

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.
The central frequency of test receiver was set near the operating frequency of EUT.
The test was conducted using the Spectrum Analyzer with the resolutions bandwidth set at 10kHz, the video bandwidth set at 30kHz.

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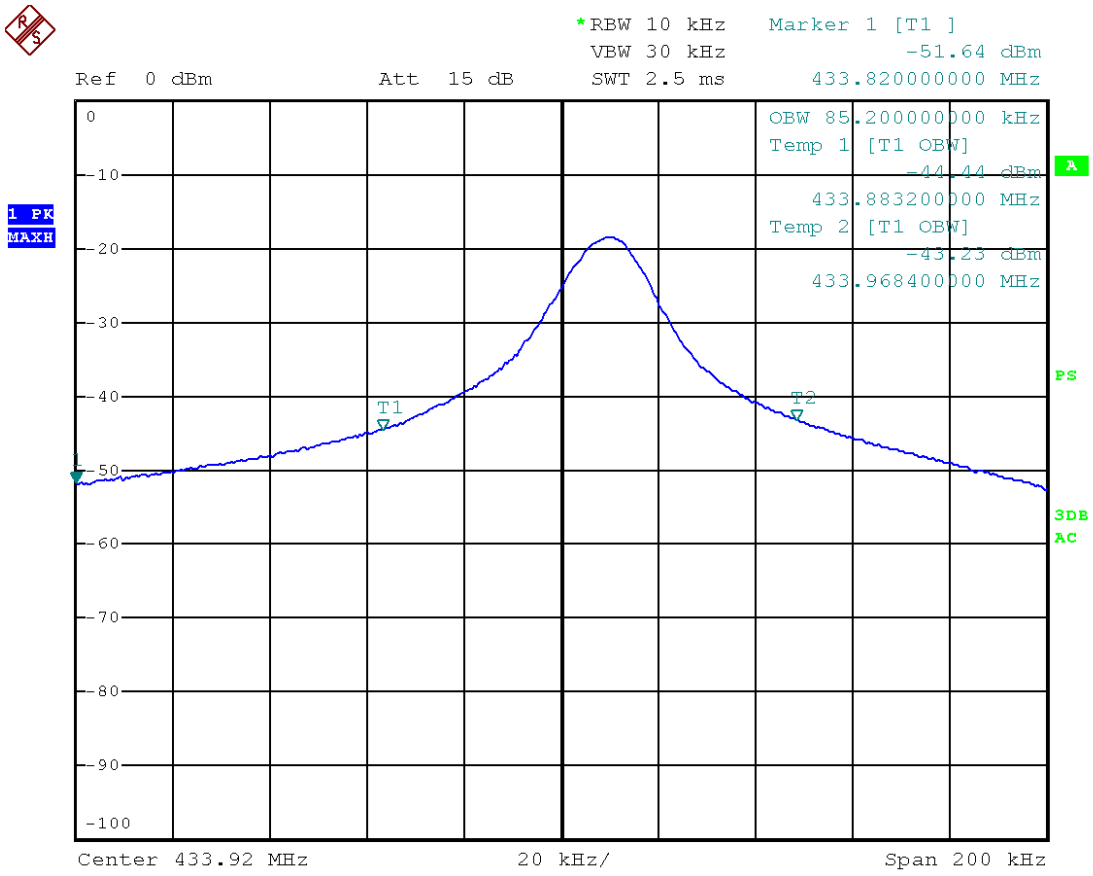
6.4 Test protocol

Temperature : 25 °C

Relative Humidity : 55 %



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Channel	99% bandwidth (kHz)	Limit (kHz)
1	85.2	1085

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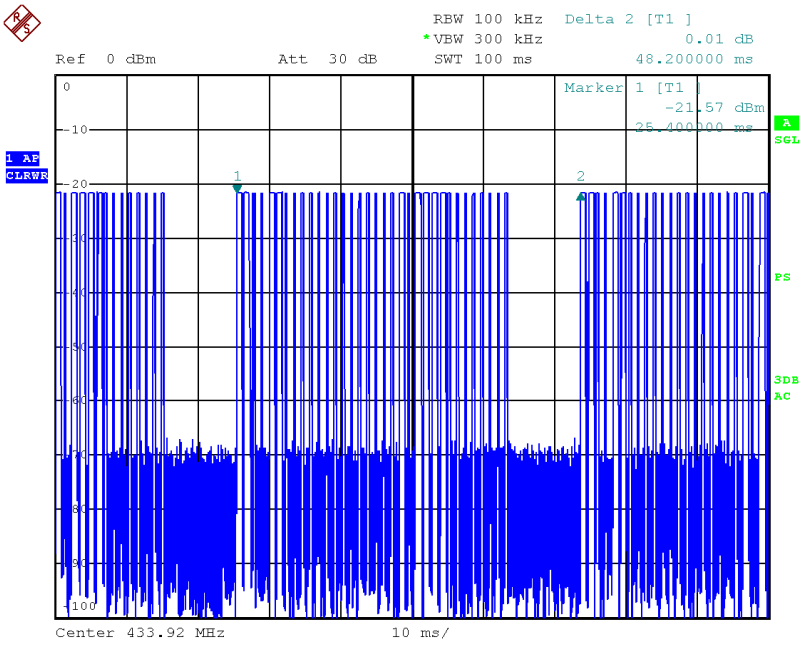
7. Duty Cycle

The test data with maximum duty cycle was listed below.
The worst Duty cycle= (0.8*10+0.28*24) / 48.2 = 14.72/48.2=0.305



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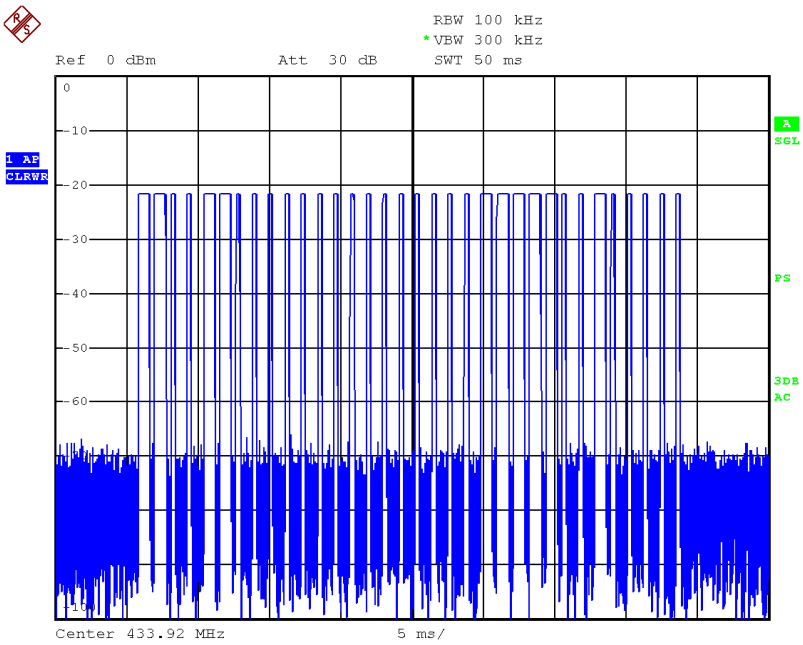

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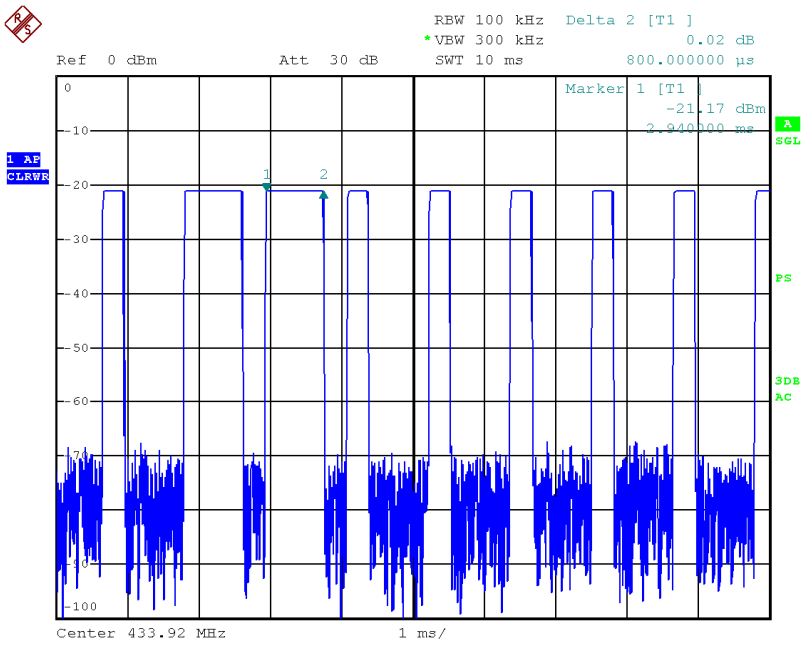

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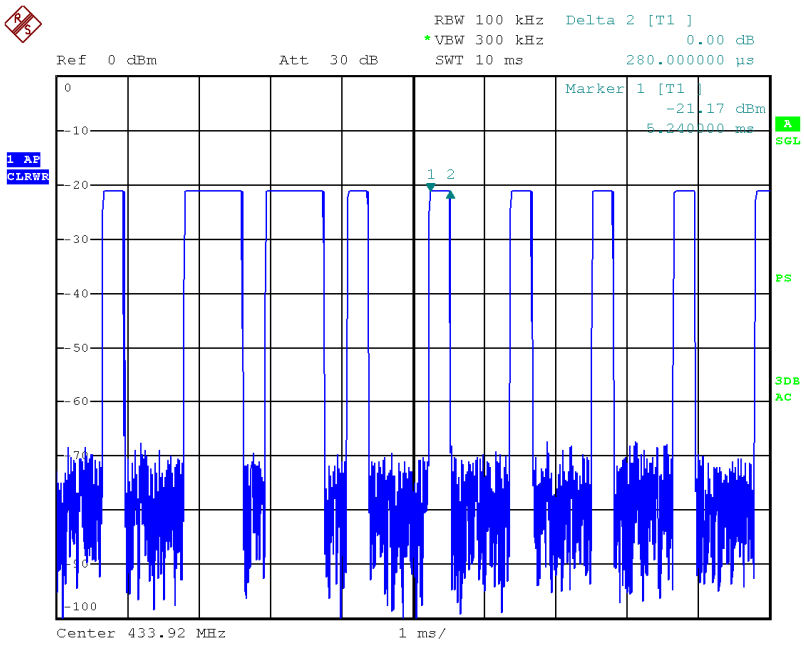

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