FCC TEST REPORT
No. 160503105SHA-001

Applicant	:	NINGBO DOOYA MECHANIC & ELECTRONIC TECHNOLOGY CO., LTD. Loutuo Industrial Area, Zhenhai, Ningbo, Zhejiang,China
Manufacturer	:	NINGBO DOOYA MECHANIC & ELECTRONIC TECHNOLOGY CO., LTD. Loutuo Industrial Area, Zhenhai, Ningbo, Zhejiang,China
Product Name	:	2-channel transmitter
Type/Model	:	DC908B
TEST RESULT	**:**	**PASS**

SUMMARY

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

47CFR Part 15 (2015): Radio Frequency Devices (Subpart C)

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

Date of issue: June 14, 2016

Prepared by:

Nemo Li (*Project Engineer*)

Reviewed by:

Daniel Zhao (*Reviewer*)

Description of Test Facility

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Content

1 GENERAL INFORMATION

1.1 Description of Client

Applicant : NINGBO DOOYA MECHANIC & ELECTRONIC TECHNOLOGY CO., LTD.
Loutuo Industrial Area, Zhenhai, Ningbo, Zhejiang,China

Manufacturer : NINGBO DOOYA MECHANIC & ELECTRONIC TECHNOLOGY CO., LTD.
Loutuo Industrial Area, Zhenhai, Ningbo, Zhejiang,China

1.2 Identification of the EUT

Product Name : 2-channel transmitter

Type/model : DC908B

FCC ID : VYY-DC908B

1.3 Technical Specification

Operation Frequency	:	433.92MHz
Modulation	:	ASK
Antenna Designation	:	PCB antenna, -2 dBi
Description of EUT	:	EUT has only one model.
Rating	:	DC 3V
Category of EUT	:	Class B
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	June 2, 2016
Date of test	:	June 2, 2016 – June 12, 2016

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2015): Radio Frequency Device

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

2.2 Mode of operation during the test

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

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
-	-	-	-

2.5 Instrument list

Selected	Instrument	EC no.	Model	Valid until date
☐	Shielded room	EC 2838	GB88	2017-1-8
☐	EMI test receiver	EC 2107	ESCS 30	2016-10-19
☐	A.M.N.	EC 3119	ESH2-Z5	2016-12-16
☐	A.M.N.	EC 3394	ENV 216	2016-8-1
☒	Semi anechoic chamber	EC 3048	-	2017-5-11
☒	EMI test receiver	EC 3045	ESIB26	2016-10-19
☒	Broadband antenna	EC 4206	CBL 6112D	2017-4-27
☒	Horn antenna	EC 3049	HF906	2017-4-27
☐	Horn antenna	EC 4792-1	3117	2017-4-21
☐	Horn antenna	EC 4792-3	HAP18-26W	2017-6-11
☒	Pre-amplifier	EC 5262	pre-amp 18	2017-5-25
☐	Pre-amplifier	EC 4792-2	TPA0118-40	2017-4-10
☐	Test Receiver	EC 4501	ESCI 7	2017-1-13
☐	PXA Signal Analyzer	EC5338	N9030A	2016-11-17
☐	Power sensor/Power meter	EC4318	N1911A/N1921A	2017-4-8
☐	Power sensor	EC5338-1	U2021XA	2017-3-5
☐	MXG Analog Signal Generator	EC5338-2	N5181A	2017-3-5
☐	MXG Vector Signal Generator	EC5175	N51812B	2017-1-8

2.6 Test Summary

This report applies to tested sample only. The test results have been compared directly with the limits, and the measurement uncertainty is recorded. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	RESULT
Fundamental & spurious emission	15.231(b)	Pass
Restrict band radiated emission	15.205	Pass
Conducted emission	15.207	NA
Emission bandwidth	15.231(c)	Pass
Deactivating time	15.231(a)(1)	Pass

Notes: 1: NA =Not Applicable

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3 Fundamental & Spurious Emission & Restrict band radiated emission

Test result: **Pass**

3.1 Test limit

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:

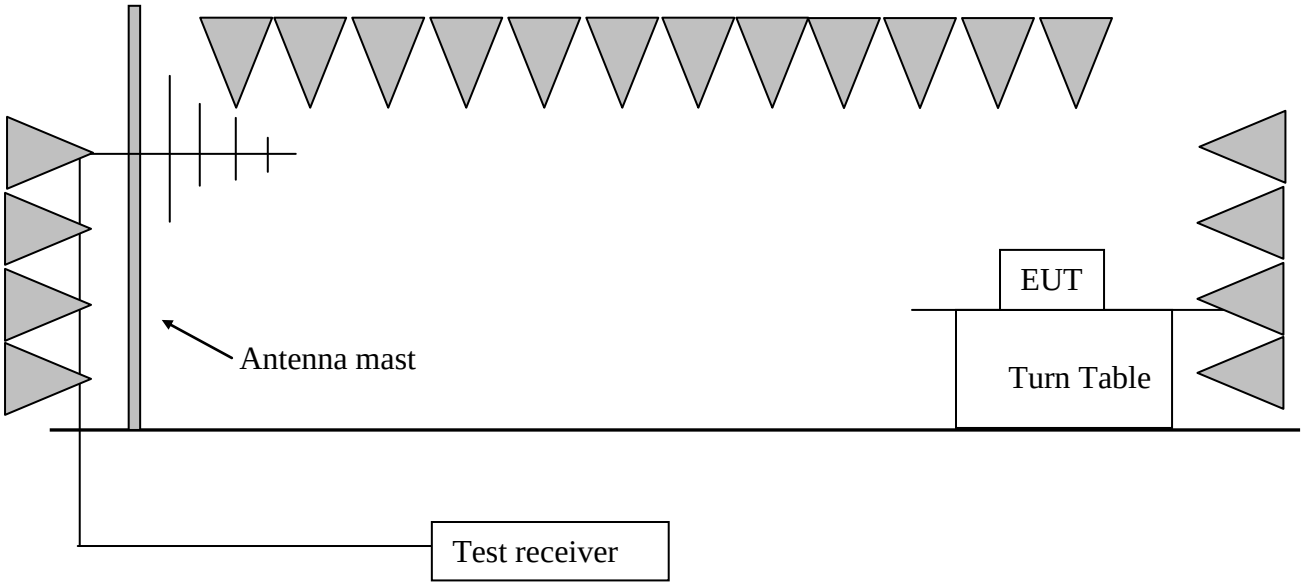
Fundamental limit = 41.6667 * 433.92 - 7083.3333 = 10996.68uV/m =80.83 dBuV/m
Spurious limit = 80.83 – 20 = 60.83dBuV/m

//

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

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 nonconducting 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 turntable 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=10 kHz, VBW=30 kHz (150 kHz~30MHz);
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

3.4 Test protocol

Temperature : 22 °C
Relative Humidity : 54 %

Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Emission Type	Limit (dBuV/m)	Margin	Detector
H	433.92	85.60	18.30	Fundamental	100.83	15.23	PK
H	867.86	48.70	25.10	Spurious	80.83	32.13	PK
H	2172.34	49.40	-12.70	Spurious	80.83	31.43	PK
H	3905.81	45.70	-5.70	Restrict	74.00	28.30	PK
V	433.92	78.70	18.30	Fundamental	100.83	22.13	PK
V	867.86	41.40	25.10	Spurious	80.83	38.43	PK
V	2172.34	49.40	-12.70	Spurious	80.83	31.43	PK
V	3905.81	42.70	-5.70	Restrict	74.00	31.30	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 Corrected reading is less than AV limit, the AV test can be elided.

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

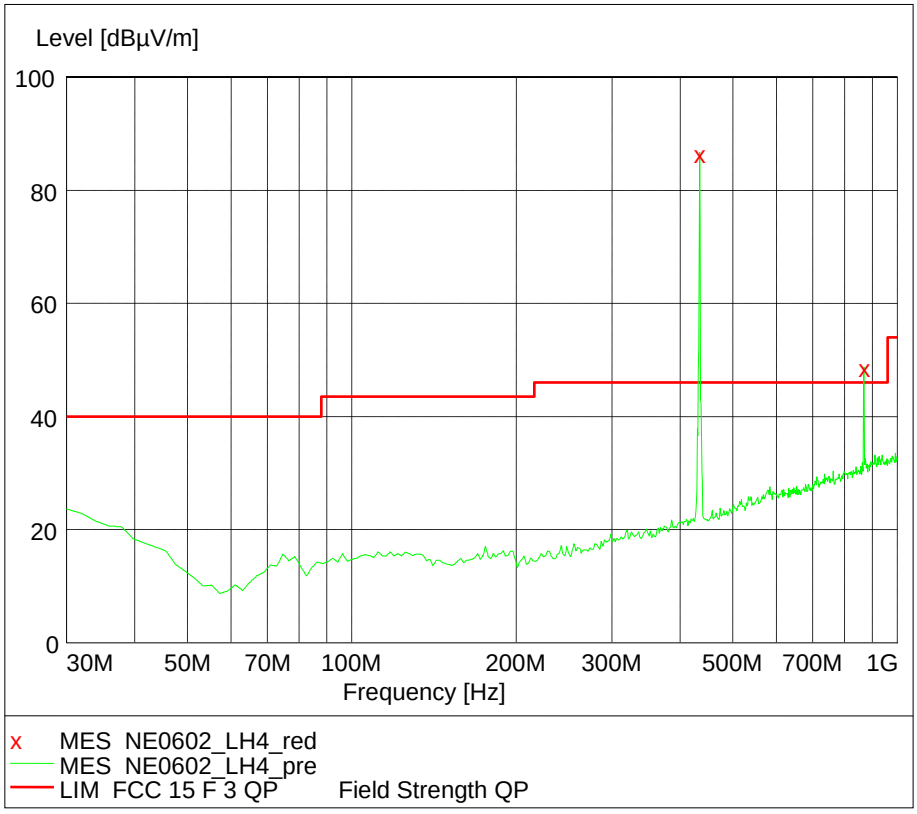
Calculating the AV value according to the duty cycle:

Antenna Polarization	Frequency (MHz)	Corrected PK Reading (dBuV/m)	Duty Cycle Factor (dB)	Corrected AV Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
H	433.92	85.60	-4.91	80.79	80.83	0.14

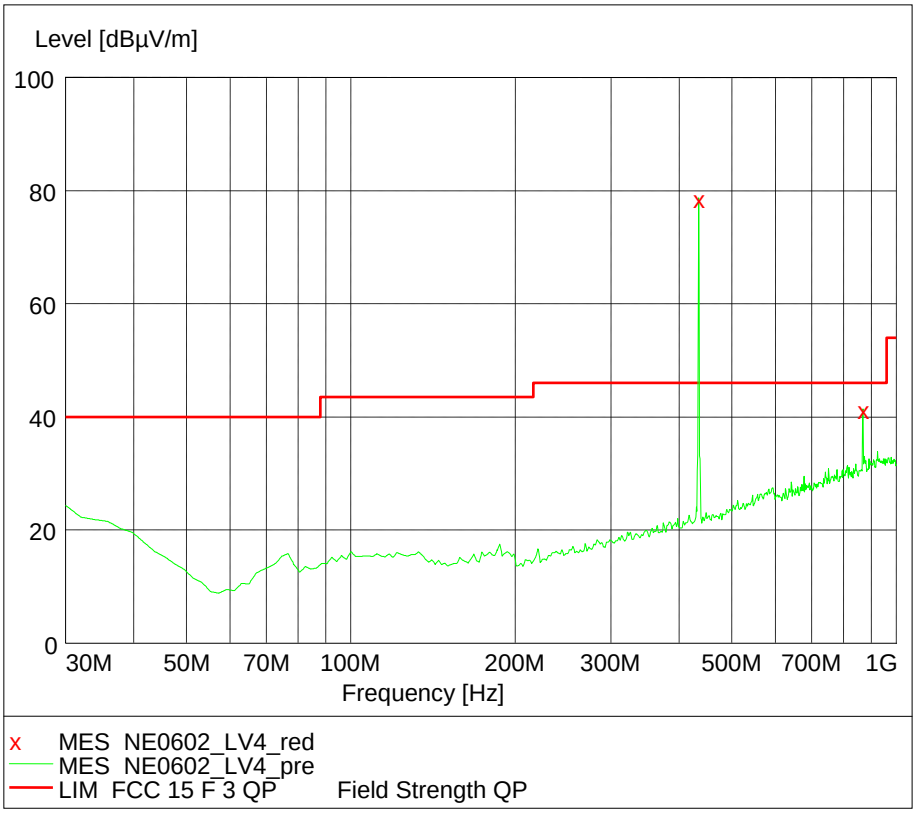
Remark: 1. Duty Cycle Factor = 20lg (duty cycle) = 20lg (0.568) = -4.91dB
2. Corrected AV Reading = Corrected PK Reading + Duty Cycle Factor
3. Margin = limit – Corrected AV Reading

Test wave:

Horizontal:



Vertical:



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.

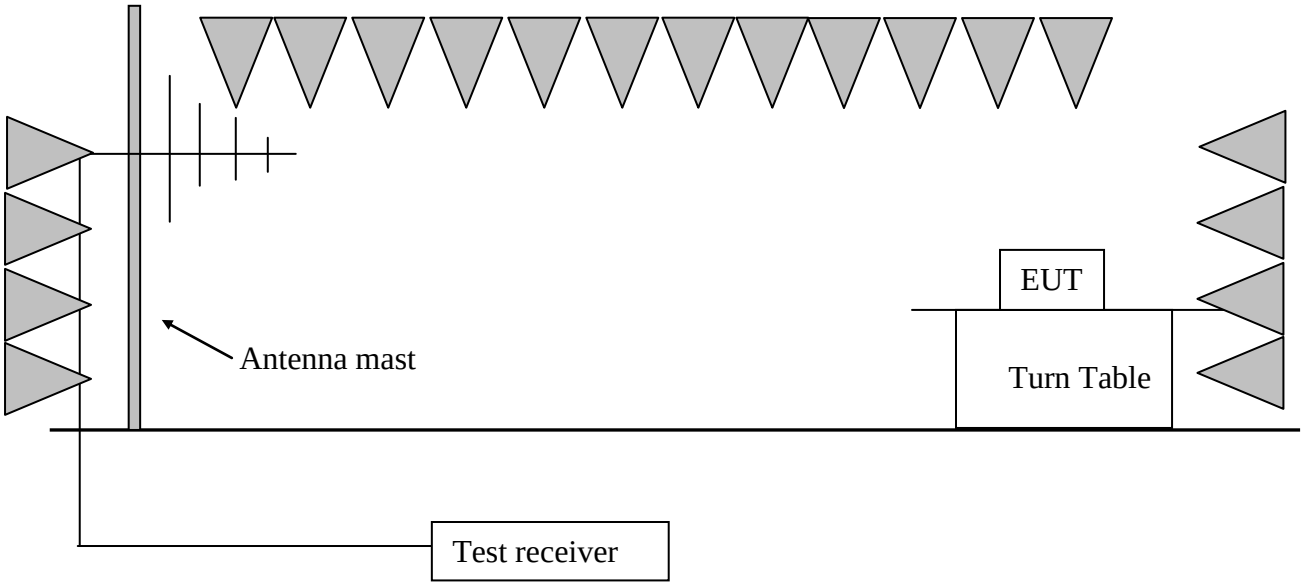
☐ (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

☐ (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



4.3 Test procedure and test setup

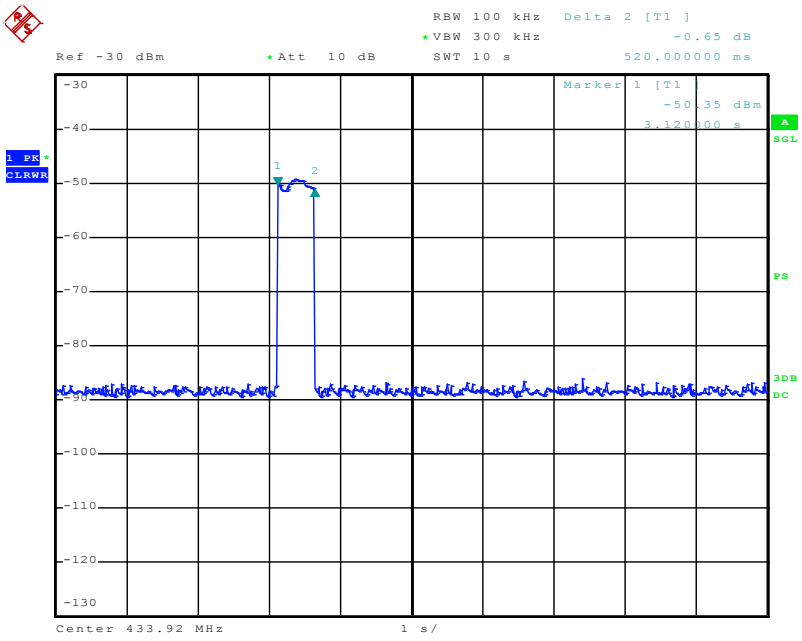
The measurement was applied in a semi-anechoic chamber.
The central frequency of test receiver was set as the operating frequency of EUT and the Span was set as 0.
The EUT was switched once. The test receiver recorded the whole time from the triggered moment to the time of stopping radiating. For manual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

4.4 Test protocol

Temperature	:	22 °C
Relative Humidity	:	54 %

Whole time from the triggered moment to the time of stopping radiating: 0.520s.
As a result, the EUT complies with the limit of 5s' deactivating time.

Test wave:



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5 Emission Bandwidth

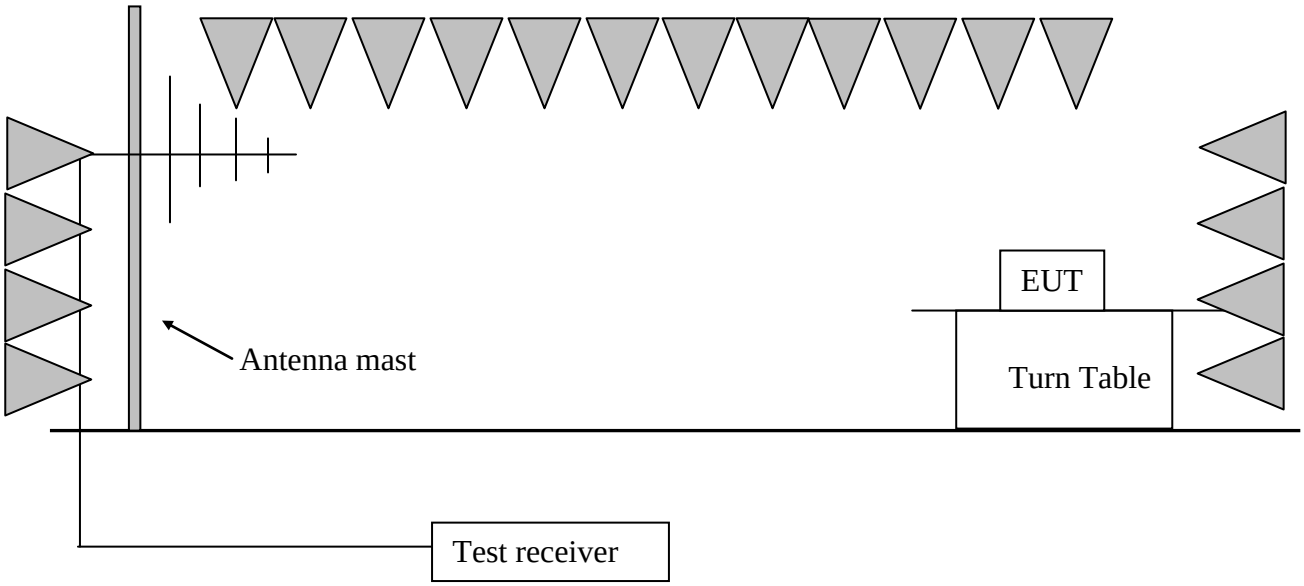
Test Status: Pass

5.1 Test limit

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

The limit for the EUT = 0.25% * 433.92MHz = 1084.8kHz

5.2 Test Configuration



5.3 *Test procedure and test setup

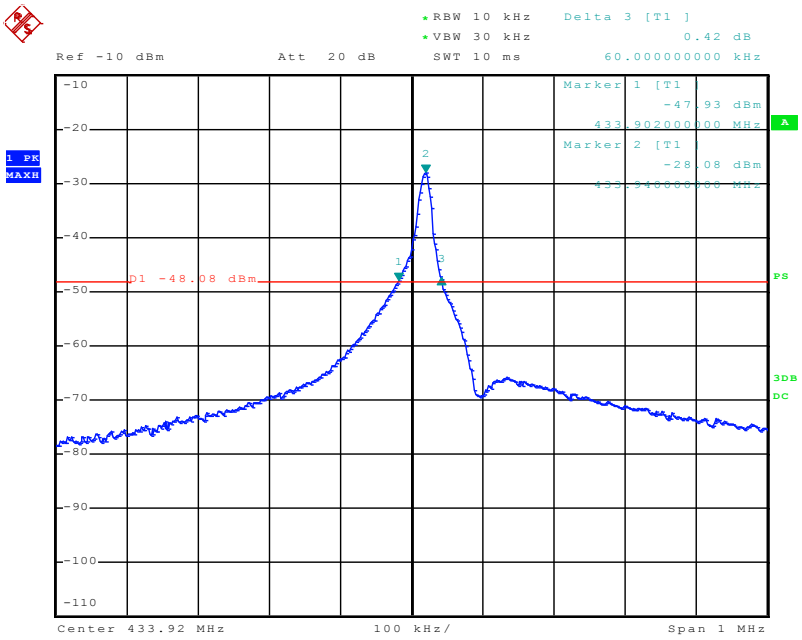
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna 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 below:
RBW = approximately 1% of the emission bandwidth.
VBW > RBW.

5.4 Test protocol

Temperature : 22°C
Relative Humidity : 54%

Channel	Emission Bandwidth (kHz)	Limit (kHz)
-	60.00	1084.8

Test wave:



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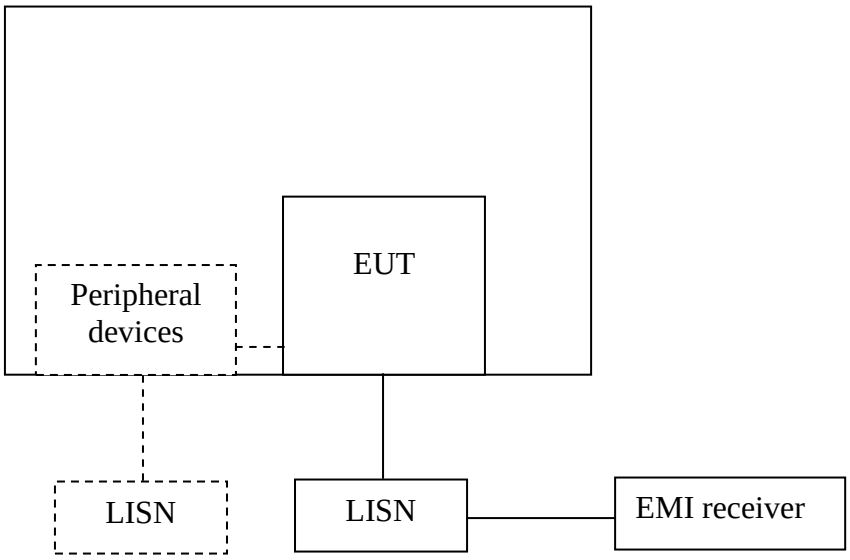
6 Conducted emission

Test result: **NA**

6.1 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.		

6.2 Test configuration



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

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

6.3 Test procedure and test set up

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

6.4 Test protocol

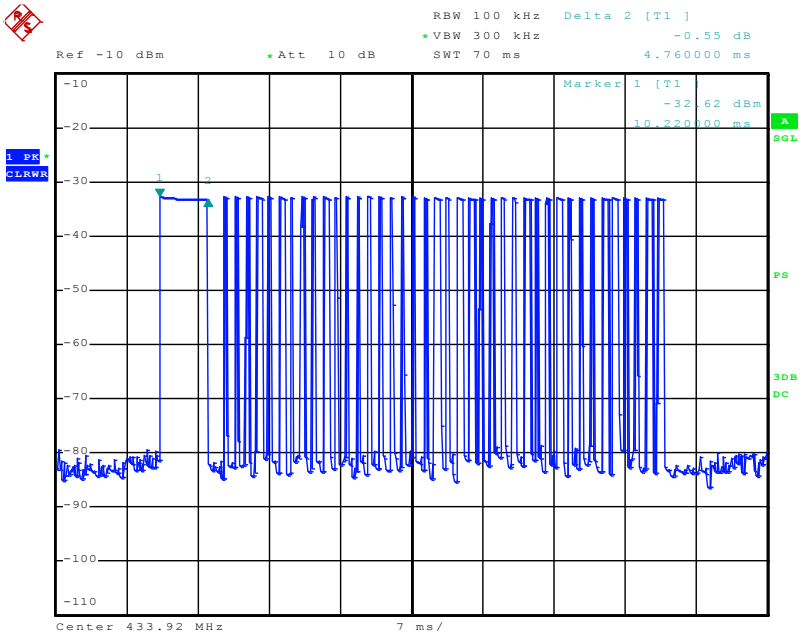
Temperature : °C
Relative Humidity : %

Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)

Appendix I: Duty cycle

Dwell time of one pulse



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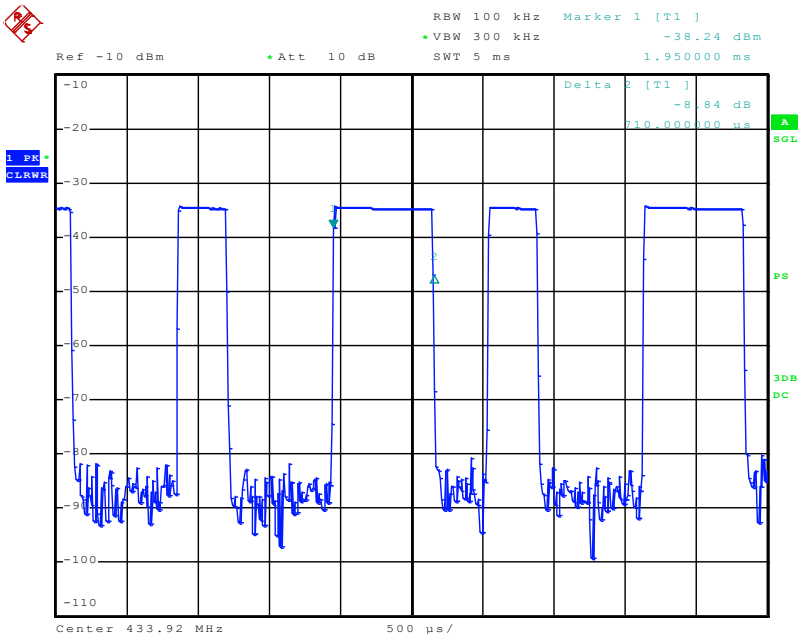

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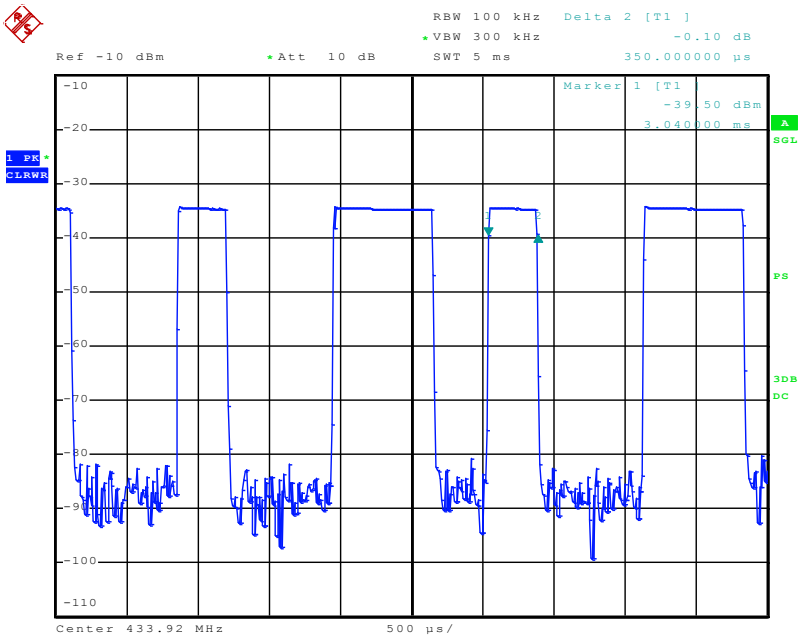

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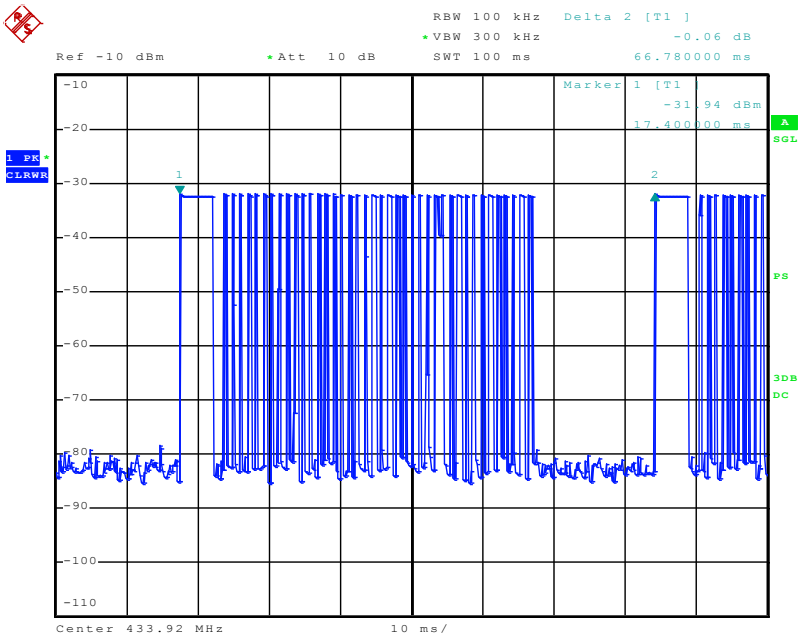
Pulse train with the highest duty cycle



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The highest Duty cycle = (0.35*28+1.95*12+4.76*1) / 66.78 = 0.568