

**TEST REPORT****FCC Part 15 Subpart C****FCC ID**: **L5CW174TX-0****Report Reference No.**.....: **WE10030011**

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Date of issue.....: Jun 15, 2009

Testing Laboratory Name: **Shenzhen Huatongwei International Inspection Co., Ltd**

Address.....: Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China

Applicant's name.....: **Ansen Electronics Co**

Address.....: Rm 78,2/F,Sino Industrial Plaza,9 Kai Cheung Rd,Kowloon Bay

Manufacturer's name: **Ansen Electronics Company**Address.....: Chen Tung Industrial Zone,Ning Tau Administrative District,Qiao
Tau Zhen,Dongguan,Guangdong**Test specification:**Standard: **FCC Part 15 Subpart C 2008 – Intentional Radiators****ANSI C63.4 - 2003**

TRF Originator.....: Shenzhen Huatongwei International Inspection CO., Ltd

Master TRF.....: Dated 2006-06

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Equipment Under Test : **Rain Gauge Transmitter**

Trade Mark: /

Model/Type reference.....: W174-0

Listed Models: /

Result.....: **Complied**

T E S T R E P O R T

Test Report No. :	WE10030011	Mar 15, 2010
		Date of issue

Equipment under Test : Rain Gauge Transmitter

Model /Type : W174-0

Listed Models : /

Applicant : Ansen Electronics Co

Address : Rm 78,2/F,Sino Industrial Plaza,9 Kai Cheung Rd,Kowloon Bay

Manufacturer : Ansen Electronics Company

Address : Chen Tung Industrial Zone,Ning Tau Administrative District,Qiao
Tau Zhen,Dongguan,Guangdong

Test Result	Complied
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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.

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1. TEST STANDARDS AND RESULT SUMMARY

The tests were performed according to following standards:

FCC Rules Part 15 Subpart C (2008) - Intentional Radiators

ANSI C63.4 (2003) – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz

SUMMARY OF STANDARDS AND RUSELT

No.	Test Item	Test Standards and Procedure	Result
1	Radiated Emission	FCC Subpart 15C § 15.231(e) ANSI C63.4-2003 section 13.1.4	PASS
2	Deactivation Time	FCC Subpart 15C § 15.231(e)	PASS
3	20dB Bandwidth	FCC Subpart 15C § 15.231(c) ANSI C63.4-2003 section 13.1.7	PASS
4	Antenna Requirement	FCC Subpart 15C § 15.203	PASS

NOTE: 1), The detailed test result please see section 4.

2), The test report merely corresponds to the test sample.

3), It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

2. EUT SUMMARY

2.1. General Remarks

Date of receipt of test sample : Mar 10, 2010

Testing commenced on : Mar 10, 2010

Testing concluded on : Mar 15, 2010

2.2. Equipment Under Test Power Supply

Power supply voltage : ☐ 120V / 60 Hz ☐ 115V / 60Hz
☐ 12 V DC ☐ 24 V DC
☒ Other (specified in blank below)

DC 3V (2x1.5V AA Battery)

2.3. Short description of the Equipment under Test (EUT)

Product Name : Rain Gauge Transmitter

Model Number : W174-0

Operation Frequency : 433.92MHz

Modulation Technology : ASK

Transmitter Type : Periodic Transmitter

Sample Type : Prototype

For more details, refer to the user's manual.

2.4. EUT operation mode

The EUT has been tested under typical operating mode.

Test Item	Test Mode	Note
Radiated Emission	Tx mode(433.92MHz)	X-axis
Deactivation Time	Tx mode(433.92MHz)	/
20dB Bandwidth	Tx mode(433.92MHz)	/
Duty cycle	Tx mode(433.92MHz)	/

2.5. Configuration of Tested System



Note: For actual sample please see test setup photos and EUT external photos.

The following peripheral devices and interface cables were connected during the measurement:

☐ - supplied by the manufacturer

☐ - supplied by the lab

☐ Sensor Cable/Probe Length : /

☐ AC Adaptor MODEL : /
INPUT : /
OUTPUT : /

☐ Adaptor Cable Length : /
☐ Shield ☐ Unshield
☐ Detachable ☐ Undetachable

2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **L5CW174TX-0** filing to comply with the FCC Part 15 Subpart C 15.231(e) Rules 2008.

2.7. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Huatongwei International Inspection Co., Ltd
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: August 02, 2007. Valid time is until March 29, 2012.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is from Aug 24, 2005 to Sept 30, 2009.

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 662850, Renewal date September, 2009.

IC-Registration No.: 5377

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377 on November 28th, 2005.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

NEMKO-Aut. No.: ELA125

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025:2005 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10, the Authorization is valid through April 25, 2009.

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: December 20, 2006. Valid time is until December 19, 2009.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: December 20, 2006. Valid time is until December 19, 2009.

DNV

Shenzhen Huatongwei International Inspection Co Ltd has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025(2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until 09 July, 2010.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 22 ° C

Humidity: 65 %

Atmospheric pressure: 950-1050mbar

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.24dB	(1)
Radiated Emission	1~18GHz	5.16dB	(1)
20dB Bandwidth	/	0.25dB	(1)
Deactivation Time	/	0.5ms	(1)

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

3.5. Equipments Used during the Test

Radiated Emissions					
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2008/11
2	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2008/11
3	RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	2008/11
4	TURNTABLE	ETS	2088	2149	2008/11
5	ANTENNA MAST	ETS	2075	2346	2008/11
6	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2008/11
7	HORN ANTENNA	ROHDE & SCHWARZ	HF906	N/A	2008/06/

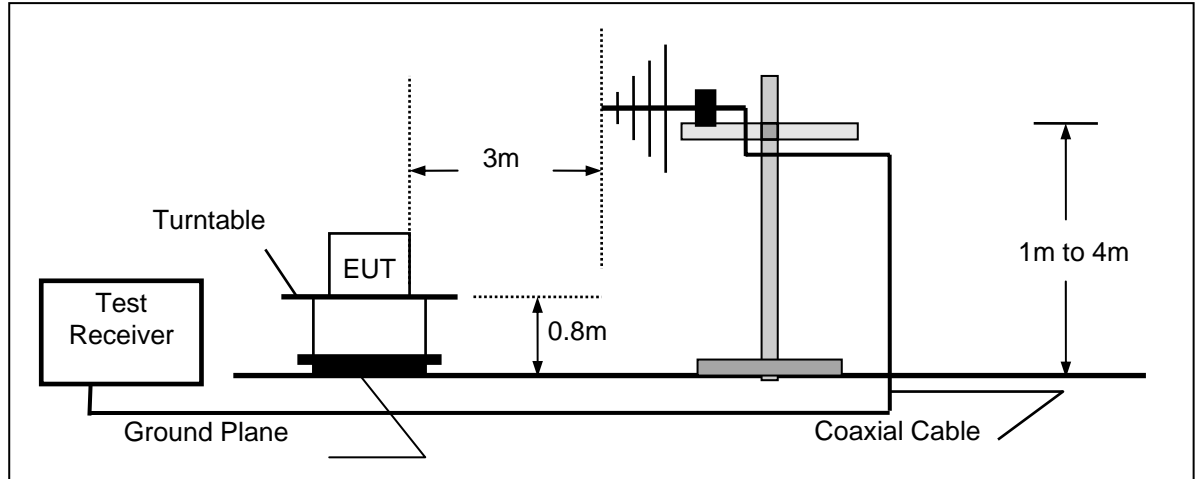
20dB Bandwidth & Deactivation Time & Duty Cycle					
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI	100106	2008/11
2	RECEIVER ANTENNA	/	/	/	/

4. TEST CONDITIONS AND RESULTS

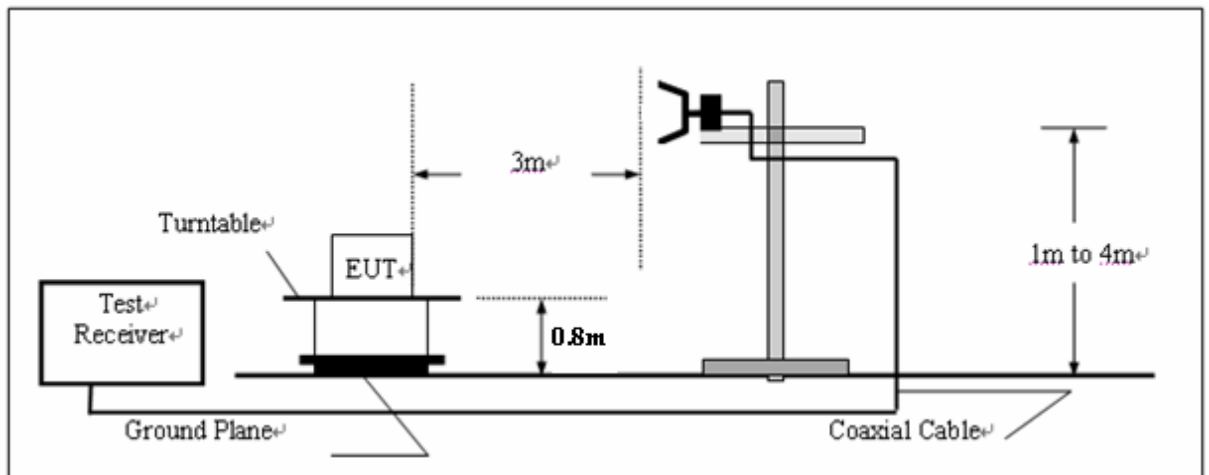
4.1. Radiated Emission

TEST CONFIGURATION

Radiated Emission Test Set-Up, Frequency range 30 - 1000MHz



Radiated Emission Test Set-Up, Frequency range 1GHz - 5GHz



TEST PROCEDURE

- 1, The EUT was placed on a turn table which is 0.8m above ground plane.
- 2, The test was beforehand scan carried out with EUT placement X-axis,Y-axis and Z-axis. X-axis was the worst status. So finally test was be carried out under this X-axis.
- 3, Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
- 4, And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 5, Repeat above procedures until all frequency measurements have been completed.

TEST LIMIT

For periodic transmitter, according to § 15.231(e), the field strength of fundamental from device at a distance of 3 meters shall not exceed the following values:

Fundamental frequency (MHz)	Distance (Meters)	Field strength of fundamental (dBμV/m)	
		AV	Peak
433.92	3	72.87	92.87
Note: For the band 260-470MHz, uV/m at 3 meters = 16.6667(F) – 2833.333 Where F is fundamental frequency 433.92MHz			

For periodic transmitter, according to § 15.231(e), the field strength radiated emissions from device at a distance of 3 meters shall not exceed the following values:

Fundamental frequency (MHz)	Distance (Meters)	Field strength of spurious emission	
		(microvolts/meter)	(dBμV/m)
40.66-40.70	3	100	40
70-130	3	50	34
130-174	3	50 to 150	34 to 43.5
174-260	3	150	43.5
260-470	3	150 to 500	43.5 to 54
Above 470	3	500	54
Note: 1, For other bands limit pls refer 15.209 2, The limit below 1GHz based CISPR quasi-peak detector, the limit above 1GHz based average detector and peak limit is 74dBuV/m.			

TEST RESULTS

The emissions from 1GHz to 5GHz are peak measured and comply with average limit, detailed test data please see the following pages.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

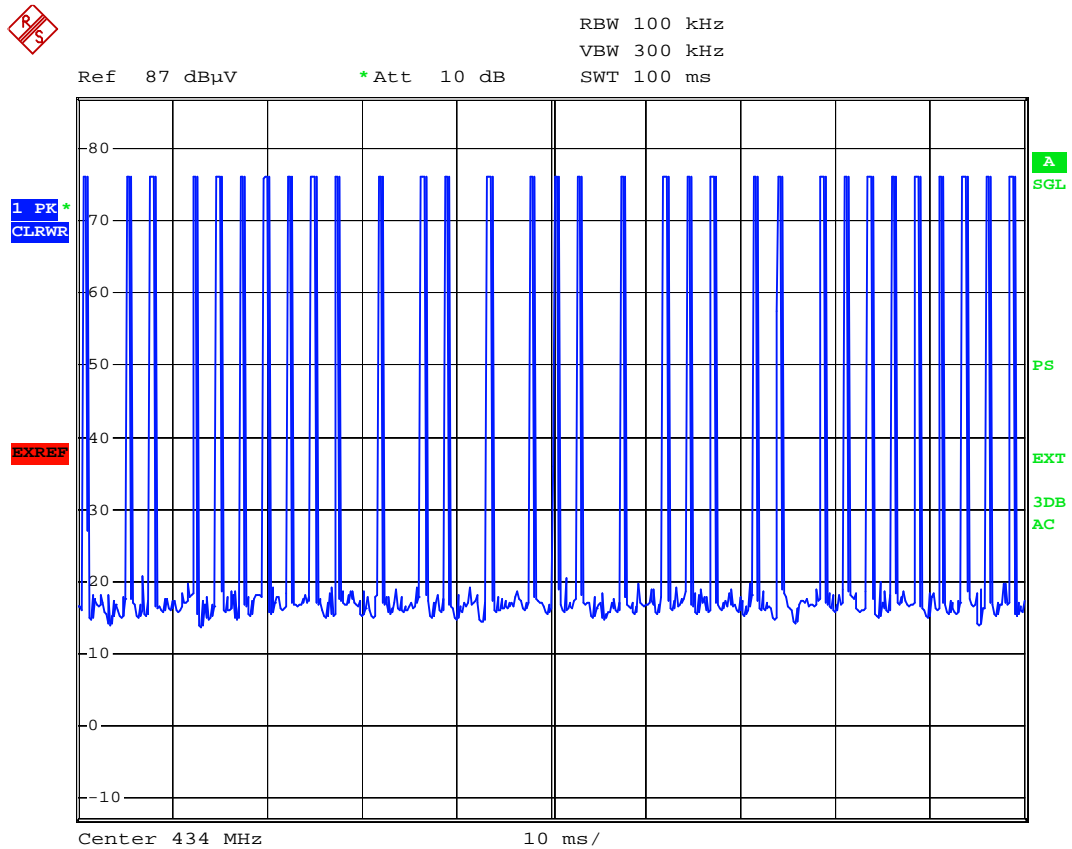
$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

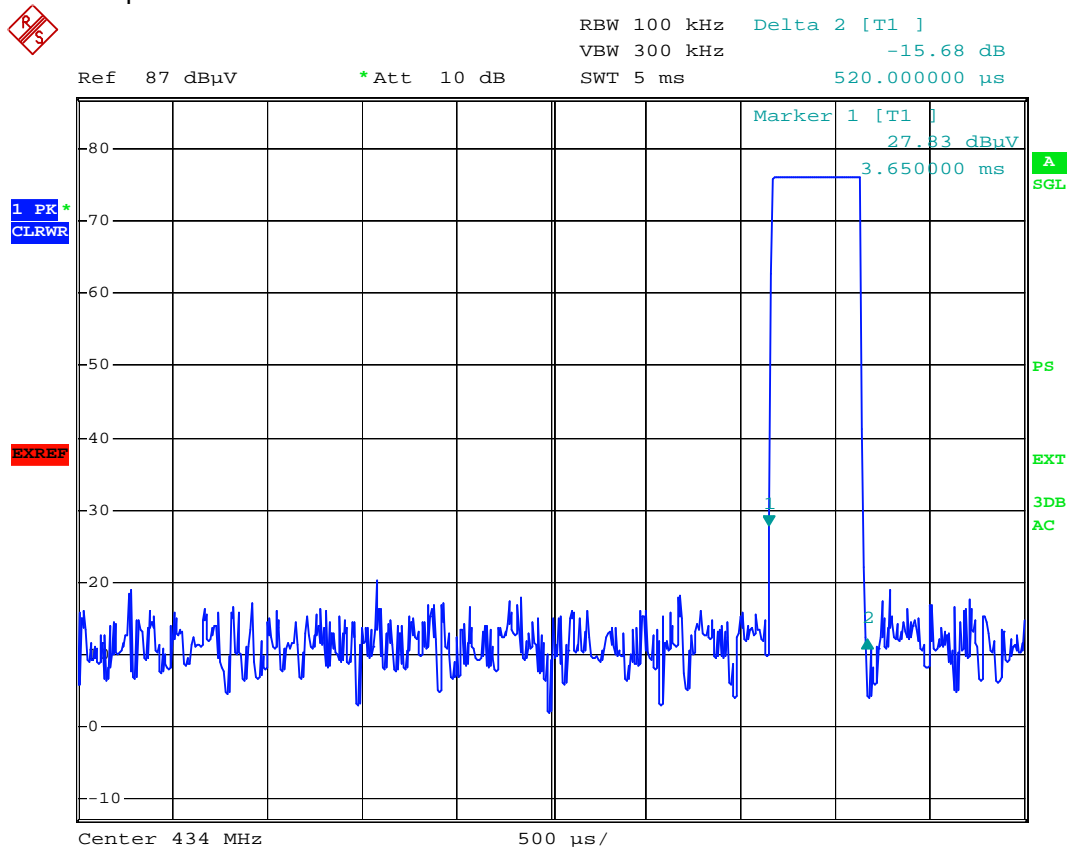
Duty Cycle Correction Factor

Duty Cycle = TX on/100ms X 100% = 32 X 0.52 ms/100ms X 100% = 16.64%

Duty Cycle Correction Factor = $20\log(\text{Duty Cycle}) = -15.6$



The pulses of 100ms = 32 times



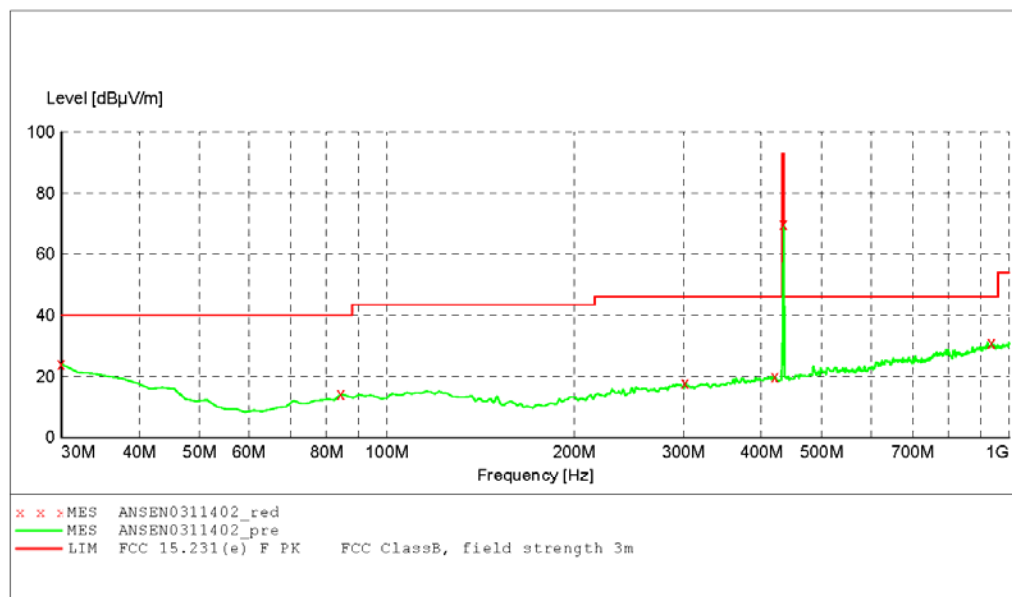
Time of a pulse = 520us = 0.52ms

30MHz to 1GHz Test Data

EUT: Rain Gauge Transmitter
 Manufacturer: ANSEN
 Operating Condition: TX mode
 Test Site: 3M CHAMBER
 Operator: Cary
 Test Specification: DC 3V
 Comment: M/N: W174-0
 Start of Test: 3/11/2010 / 12:51:34PM

SWEEP TABLE: "test (30M-1G)"

Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	HL562 09

**MEASUREMENT RESULT: "ANSEN0311402_red"**

3/11/2010 1:19PM

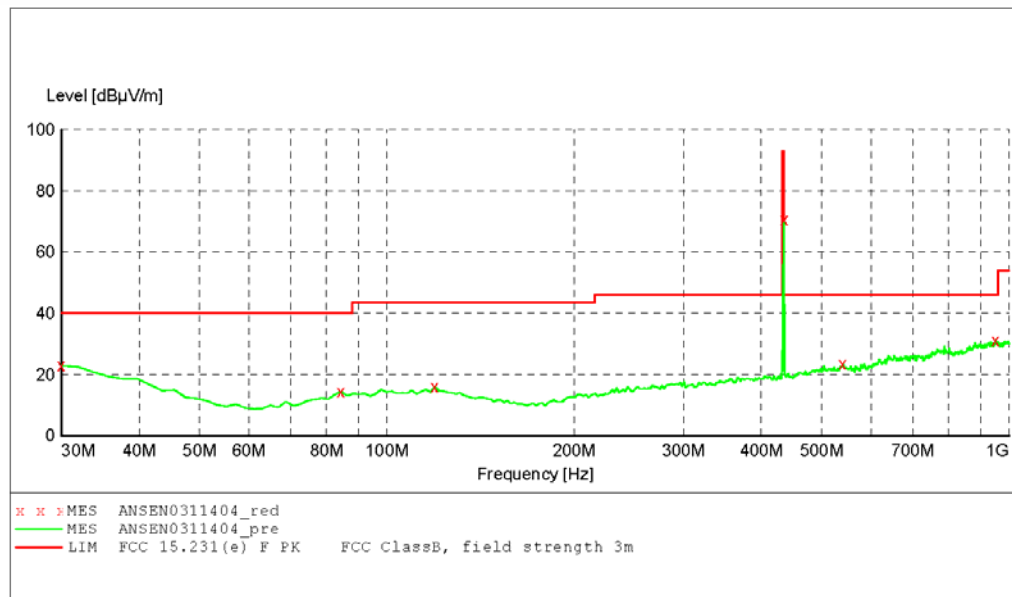
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.00	-4.7	40.0	16.0	QP	100.0	119.00	HORIZONTAL
84.428858	14.20	-14.8	40.0	25.8	QP	100.0	125.00	HORIZONTAL
302.144289	17.90	-10.9	46.0	28.1	QP	100.0	165.00	HORIZONTAL
420.721443	19.90	-8.6	46.0	26.1	QP	100.0	245.00	HORIZONTAL
434.329739	69.75	-7.1	92.9	13.2	Peak	100.0	100.00	HORIZONTAL
937.795591	31.00	2.7	46.0	15.0	QP	100.0	3.00	HORIZONTAL

Frequency (MHz)	Field strength (dBμV/m)	Limit (dBμV/m)	Duty Cycle Correction Factor	Result (dB)	Margin (dB)	Det.
433.92	69.75	72.87	-15.6	54.15	18.72	AV
Note: Result = Field Strength + Duty Cycle Corrcetion Factor						

EUT: Rain Gauge Transmitter
Manufacturer: ANSEN
Operating Condition: TX mode
Test Site: 3M CHAMBER
Operator: Cary
Test Specification: DC 3V
Comment: M/N: W174-0
Start of Test: 3/11/2010 / 12:55:47PM

SWEEP TABLE: "test (30M-1G)"

Short Description:	Field Strength
Start Stop	Detector Meas. IF Transducer
Frequency Frequency	Time Bandw.
30.0 MHz 1.0 GHz	MaxPeak Coupled 100 kHz HL562 09

**MEASUREMENT RESULT: "ANSEN0311404_red"**

3/11/2010 12:57PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	23.00	-4.7	40.0	17.0	QP	100.0	121.00	VERTICAL
84.420000	14.50	-14.8	40.0	25.5	QP	100.0	293.00	VERTICAL
119.420000	16.10	-12.8	43.5	27.4	QP	100.0	26.00	VERTICAL
433.960000	71.80	-7.1	92.9	21.1	Peak	100.0	352.00	VERTICAL
541.240000	23.40	-5.8	46.0	22.6	QP	100.0	19.00	VERTICAL
951.400000	31.20	2.6	46.0	14.8	QP	100.0	26.00	VERTICAL

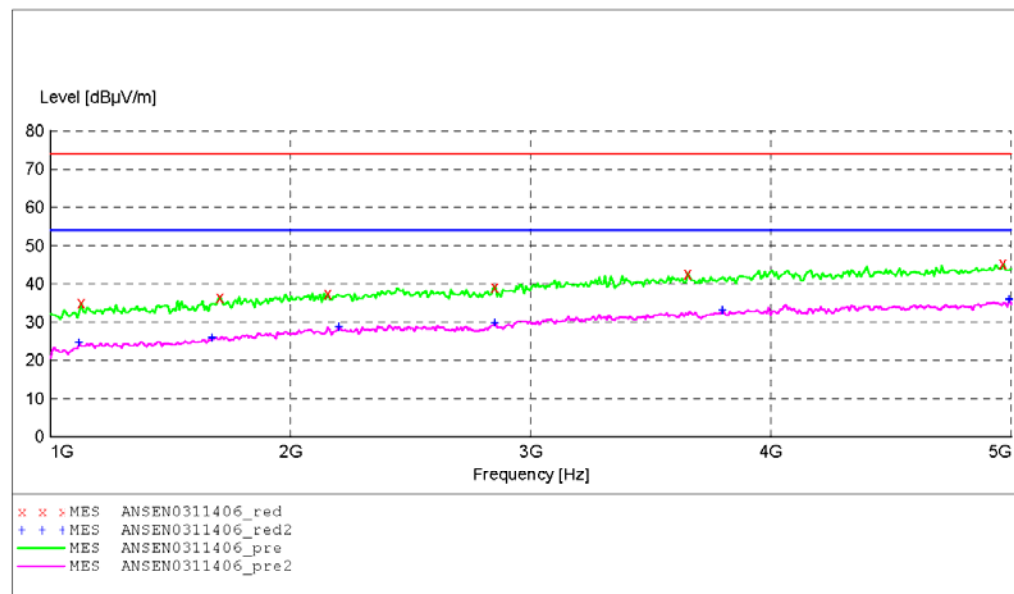
Frequency (MHz)	Field strength (dBµV/m)	Limit (dBµV/m)	Duty Cycle Correction Factor	Result (dB)	Margin (dB)	Det.
433.92	71.8	72.87	-15.6	56.2	16.67	AV
Note: Result = Field Strength + Duty Cycle Corrcetion Factor						

1GHz to 5GHz Test Data

EUT: Rain Gauge Transmitter
Manufacturer: ANSEN
Operating Condition: TX mode
Test Site: 3M CHAMBER
Operator: Cary
Test Specification: DC 3V
Comment: M/N: W174-0
Start of Test: 3/11/2010 / 1:05:19PM

SWEEP TABLE: "test (1G-18G) P"

Short Description: EN 55022 Field Strength
Start Stop Detector Meas. IF Transducer
Frequency Frequency Time Bandw.
1.0 GHz 18.0 GHz MaxPeak Coupled 1 MHz HF906(2009)
Average

**MEASUREMENT RESULT: "ANSEN0311406_red"**

3/11/2010 1:07PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
1128.256513	35.00	-9.0	74.0	39.0	Peak	100.0	334.00	VERTICAL
1705.410822	36.60	-6.6	74.0	37.4	Peak	100.0	35.00	VERTICAL
2154.308617	37.50	-4.4	74.0	36.5	Peak	100.0	156.00	VERTICAL
2851.703407	39.30	-2.8	74.0	34.7	Peak	100.0	7.00	VERTICAL
3653.306613	42.70	0.6	74.0	31.3	Peak	100.0	52.00	VERTICAL
4967.935872	45.30	3.9	74.0	28.7	Peak	100.0	318.00	VERTICAL

MEASUREMENT RESULT: "ANSEN0311406_red2"

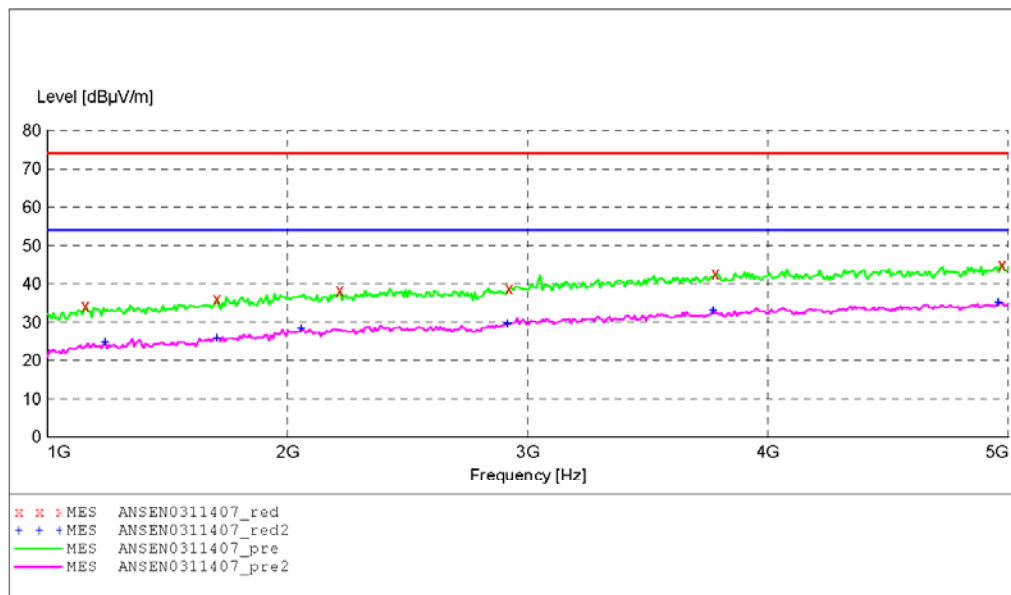
3/11/2010 1:07PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
1120.240481	24.60	-9.0	54.0	29.4	AV	100.0	270.00	VERTICAL
1673.346693	25.90	-6.8	54.0	28.1	AV	100.0	239.00	VERTICAL
2202.404810	28.60	-4.4	54.0	25.4	AV	100.0	27.00	VERTICAL
2851.703407	29.80	-2.8	54.0	24.2	AV	100.0	270.00	VERTICAL
3797.595190	33.00	0.9	54.0	21.0	AV	100.0	35.00	VERTICAL
4991.983968	36.00	4.0	54.0	18.0	AV	100.0	224.00	VERTICAL

EUT: Rain Gauge Transmitter
Manufacturer: ANSEN
Operating Condition: TX mode
Test Site: 3M CHAMBER
Operator: Cary
Test Specification: DC 3V
Comment: M/N: W174-0
Start of Test: 3/11/2010 / 1:09:13PM

SWEEP TABLE: "test (1G-18G) P"

Short Description: EN 55022 Field Strength
Start Stop Detector Meas. IF Transducer
Frequency Frequency Time Bandw.
1.0 GHz 18.0 GHz MaxPeak Coupled 1 MHz HF906(2009)
Average

***MEASUREMENT RESULT: "ANSEN0311407_red"***

3/11/2010 1:11PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
1160.320641	34.30	-8.7	74.0	39.7	Peak	100.0	49.00	HORIZONTAL
1705.410822	36.10	-6.6	74.0	37.9	Peak	100.0	241.00	HORIZONTAL
2218.436874	38.30	-4.3	74.0	35.7	Peak	100.0	49.00	HORIZONTAL
2923.847695	38.90	-2.3	74.0	35.1	Peak	100.0	90.00	HORIZONTAL
3781.563126	42.60	0.8	74.0	31.4	Peak	100.0	360.00	HORIZONTAL
4975.951904	45.00	3.9	74.0	29.0	Peak	100.0	33.00	HORIZONTAL

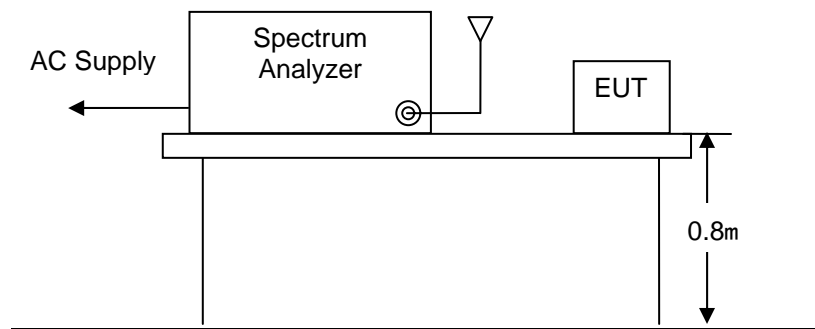
MEASUREMENT RESULT: "ANSEN0311407_red2"

3/11/2010 1:11PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
1240.480962	24.70	-8.2	54.0	29.3	AV	100.0	263.00	HORIZONTAL
1705.410822	25.80	-6.6	54.0	28.2	AV	100.0	341.00	HORIZONTAL
2058.116232	28.30	-4.5	54.0	25.7	AV	100.0	146.00	HORIZONTAL
2915.831663	29.50	-2.3	54.0	24.5	AV	100.0	301.00	HORIZONTAL
3773.547094	33.10	0.8	54.0	20.9	AV	100.0	137.00	HORIZONTAL
4959.919840	35.10	3.9	54.0	18.9	AV	100.0	229.00	HORIZONTAL

4.2. Deactivation Time

TEST CONFIGURATION



TEST PROCEDURE

- 1 The EUT was placed on a wooded table which is 0.8m height and close to receiver antenna of spectrum analyzer.
- 2 The spectrum analyzer resolution bandwidth was set to 100kHz and video bandwidth was set to 300kHz to encompass all significant spectral components during the test. The spectrum analyzer was operated in linear scale and zero span mode after tuning to the transmitter carrier frequency.

TEST LIMIT

For periodic transmitter, according to FCC Part 15C § 15.231(e)

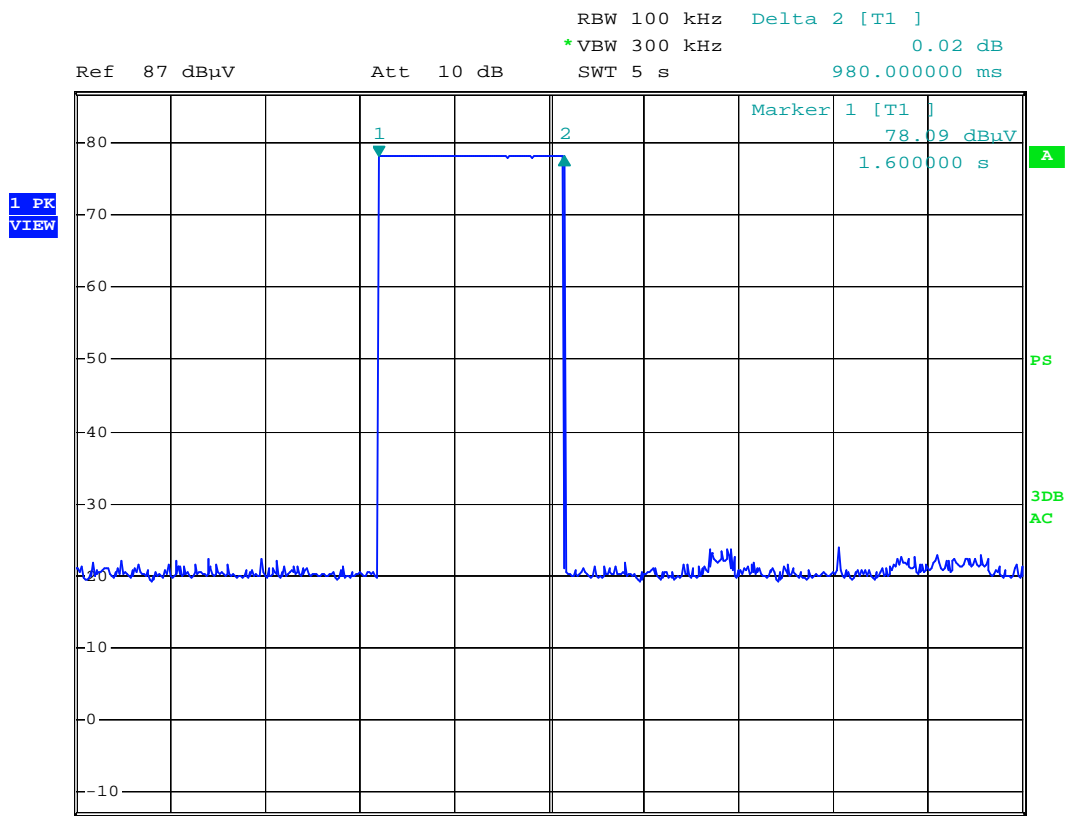
Item	Limit (second)
One transmission time	not greater than 1 second
Transmission period	at least 30 times the duration of the transmsion but in no case less than 10 second

TEST RESULTS

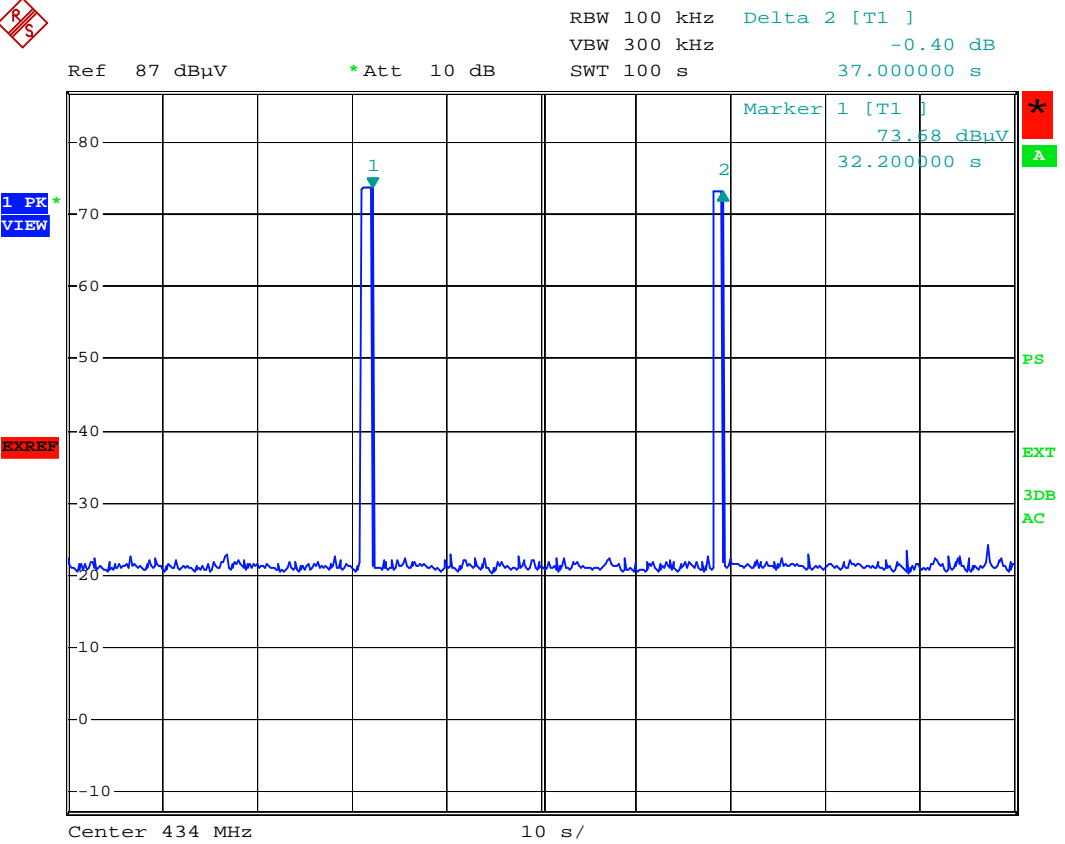
EUT statement: The transmitter was automatically activated, and carrier frequency is 433.92MHz.

Frequency (MHz)	One transmission time (second)	Transmission period (second)	Result
433.92	0.98	37.0	Pass

The time of one transmission

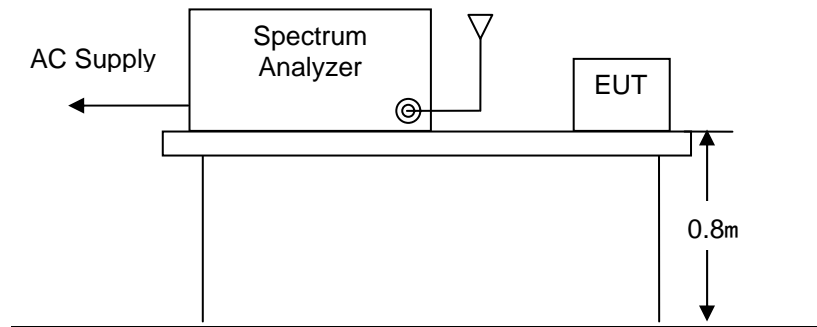


The time of transmission period



4.3. 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

- 1 The EUT was placed on a wooded table which is 0.8m height and close to receiver antenna of spectrum analyzer.
- 2 The spectrum analyzer resolution bandwidth was set to 100kHz and video bandwidth was set to 300kHz to encompass all significant spectral components during the test. The detector was set to peak and hold mode to clearly observe the components.

TEST LIMIT

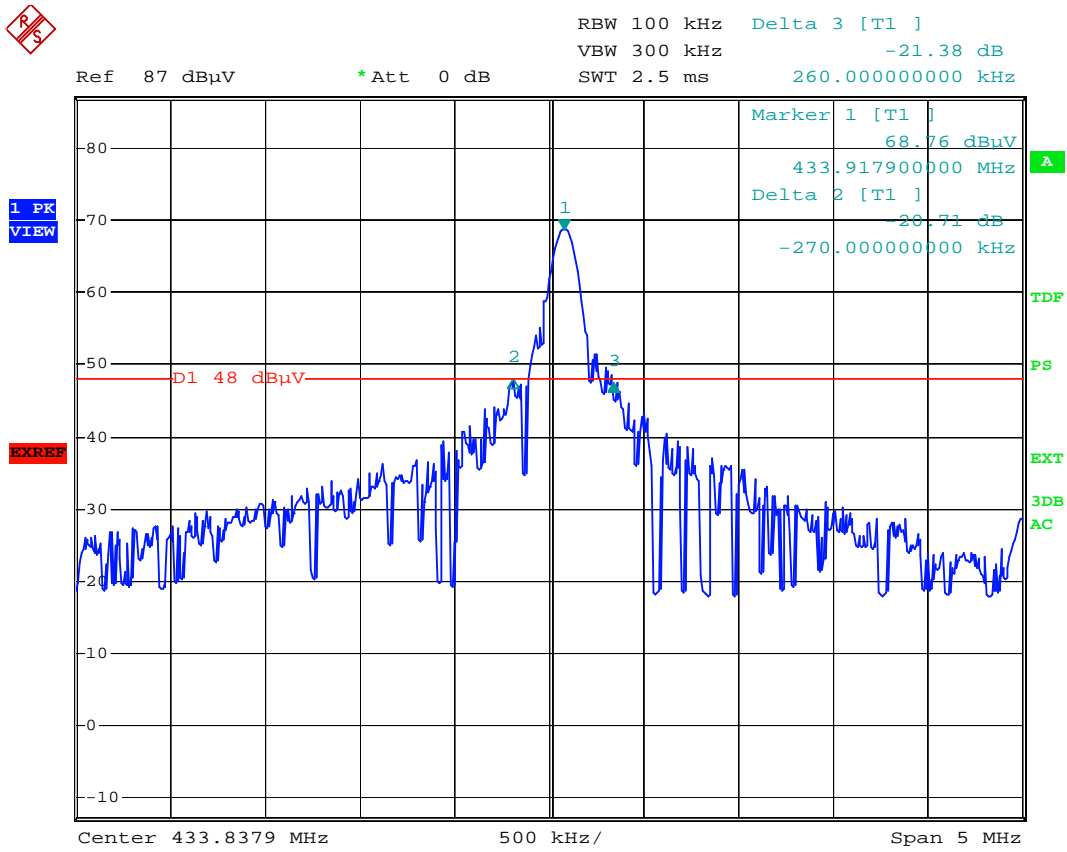
According to FCC Part 15C § 15.231(c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz.

TEST RESULTS

Frequency (MHz)	Measurement Bandwidth (kHz)	Limit (kHz)	Result
433.92	530	1085	Pass

20dB Bandwidth



4.4. Antenna Requirement

According to FCC Part 15C § 15.203,

- a), An intentional radiator shall be de-signed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
- b), 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.

The antenna is permanently attached on the PCB and no consideration of replacement.

The EUT complied the antenna requirement.

