

FCC - TEST REPORT

Report Number : **68.910.16.023.01** Date of Issue: July 18, 2016Model : **DC1187, DD1187, DC1187A, DD1187A**
(A can be H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
stands for difference colors and brands)

Product Type : Transmitter

Applicant : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.

Address : No.168 Shengguang Road, Luotuo, Zhenhai, Ningbo,
Zhejiang province, P.R.China 315202

Production Facility : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.

Address : No.168 Shengguang Road, Luotuo, Zhenhai, Ningbo,
Zhejiang province, P.R.China 315202Test Result : **Positive** **Negative**Total pages including
Appendices : 20

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 502708

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

3 Description of the Equipment Under Test

Product:	Transmitter
Model no.:	DD1187
FCC ID:	VYYDD1187
Options and accessories:	NIL
Rating:	3.0VDC (Supplied by 1*3.0VDC size "CR2032" Battery)
RF Transmission Frequency:	433.925MHz
Modulation:	ASK, FSK
Antenna Type:	PCB
Antenna Gain:	-2.0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Transmitter operated at 433.925MHz

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10.

5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	--	Site 1	Pass
§15.205, §15.209, 15.35 (c)§15.231 (b)	Radiated Emission, 30MHz to 4.5GHz	10	Site 1	Pass
§15.231(c)	Bandwidth Measurement	12	Site 1	Pass
§15.231 (a) (1)	Deactivation Time	13	Site 1	Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a PCB antenna, which gain is -2.0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: VYYDD1187 complies with Section 15.209, 15.231 of the FCC Part 15, Subpart C Rules.

All models are identical with DD1187 except model name, color and brand. Unless otherwise specified the model DD1187 was chosen as the representative model to perform full tests, other models were deemed to fulfill relevant EMC requirements without further testing.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: June 1, 2016

Testing Start Date: June 1, 2016

Testing End Date: June 30, 2016

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:



Phoebe Hu
EMC Project Manager



Prepared by:



Aaron Lai
EMC Project Engineer

7 Systems test configuration

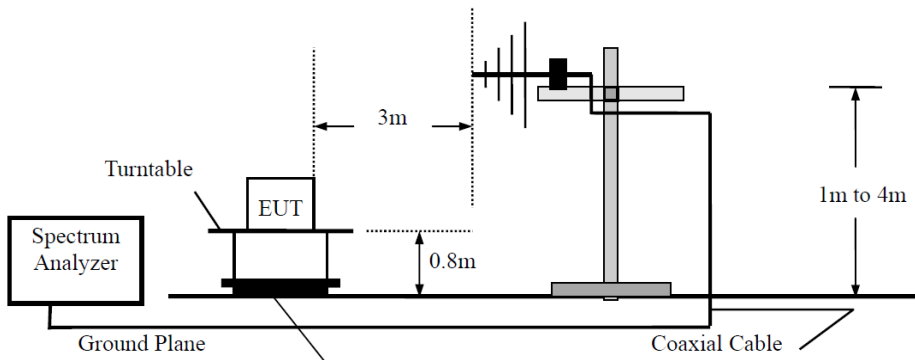
Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
--	--	--	--

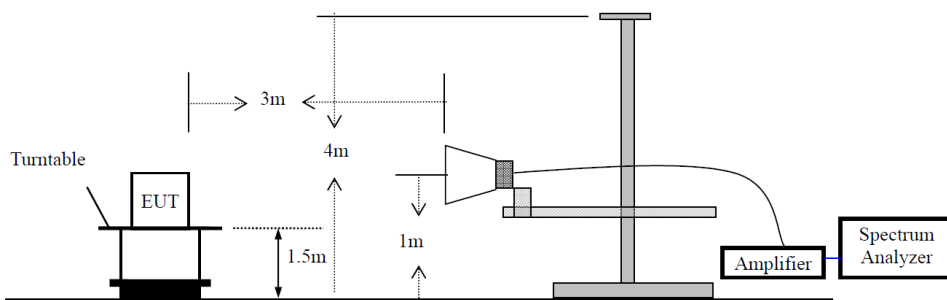
8 Test Setups

7.1 Radiated test setups

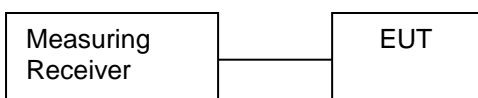
Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



9 Test Methodology

9.1 Radiated Emission

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. 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: The height of 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: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
 RBW = 1MHz, VBW \geq RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
 RBW = 100 KHz, VBW \geq RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Limit

According to §15.231 (b), 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 emissions ((Microvolts /meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,370 *	125 to 375 *
174-260	3,750	375
260-470 \checkmark	3,750 to 12,500*	375 to 1,250*
Above 470	12,500	1,250

Spurious radiated emissions for transmitter

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.

For ASK

Value	Emissions Frequency MHz	E-Field Polarity	Field at 3m dBμV/m	Average Factor dB	Net Field at 3m dBμV/m	Limit dBμV/m	Margin	Emission Type
Below 1GHz								
PK	433.925	H	80.77	0.00	80.77	100.83	20.06	Fundamental
AV	433.925	H	80.77	-7.75	73.02	80.83	7.81	Fundamental
PK	433.925	V	68.89	0.00	68.89	100.83	31.94	Fundamental
AV	433.925	V	68.89	-7.75	61.14	80.83	19.69	Fundamental
PK	867.860	H	38.34	0.00	38.34	80.83	42.49	Spurious
AV	867.860	H	38.34	-7.75	38.34	60.83	22.49	Spurious
PK	867.910	V	33.89	0.00	33.17	80.83	47.66	Spurious
AV	867.910	V	33.89	-7.75	26.14	60.83	34.69	Spurious
Above 1GHz								
PK	1301.8	H	48.01	0.00	48.01	74	25.99	Spurious
AV	1301.8	H	48.01	-7.75	40.26	54	13.74	Spurious
PK	1301.7	V	39.37	0.00	39.37	74	34.63	Spurious
AV	1301.7	V	39.37	-7.75	31.62	54	22.38	Spurious

Remark:

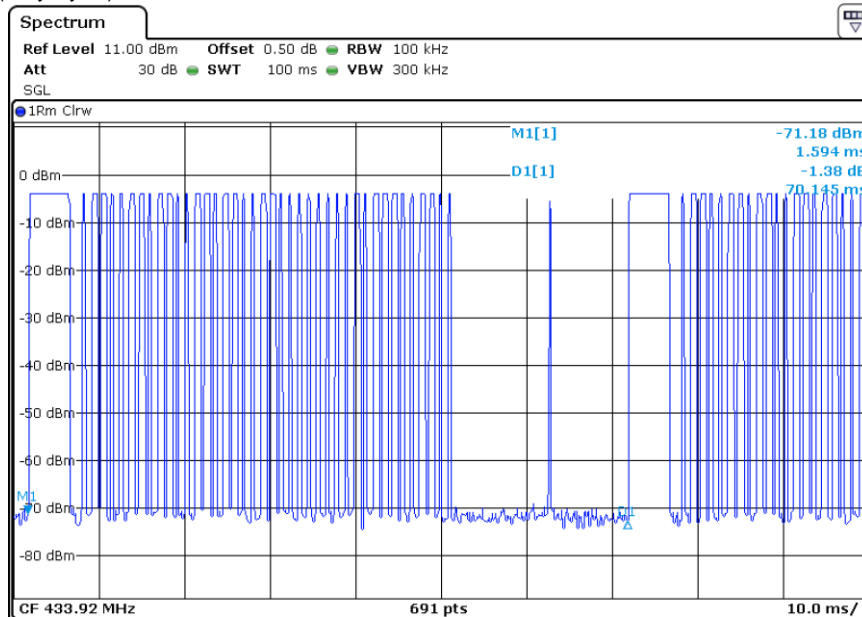
1: AV Emission Level= PK Emission Level+20log(dutycycle)

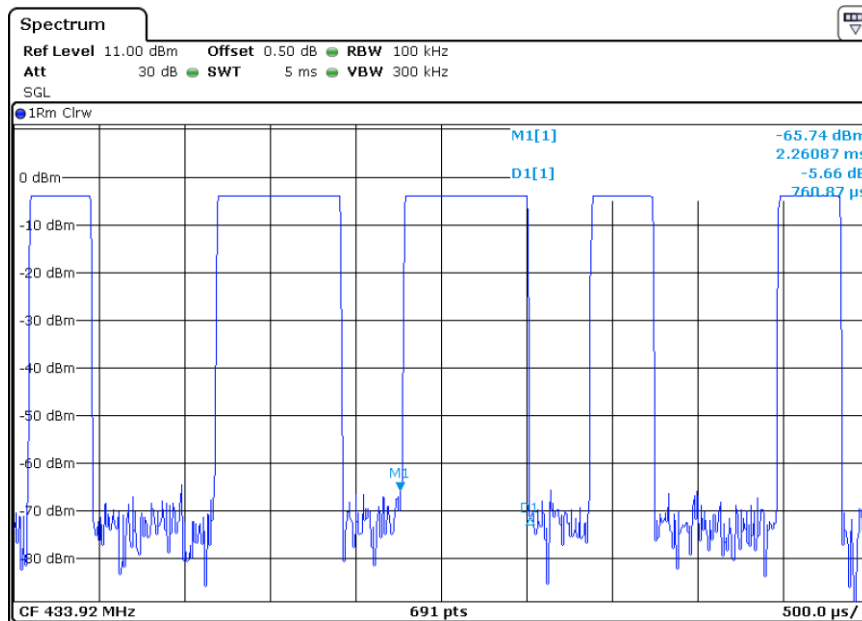
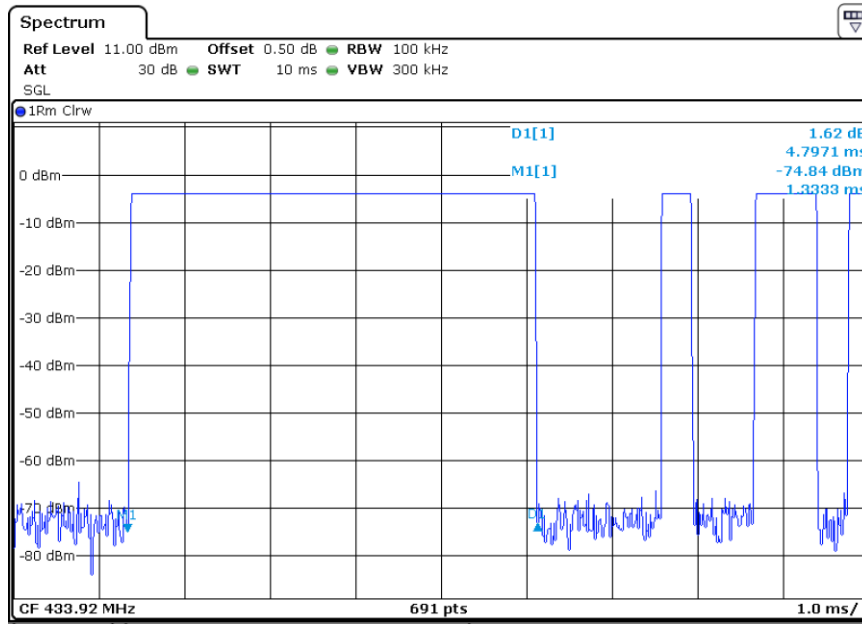
2: Data of measurement within this frequency range shown “/” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

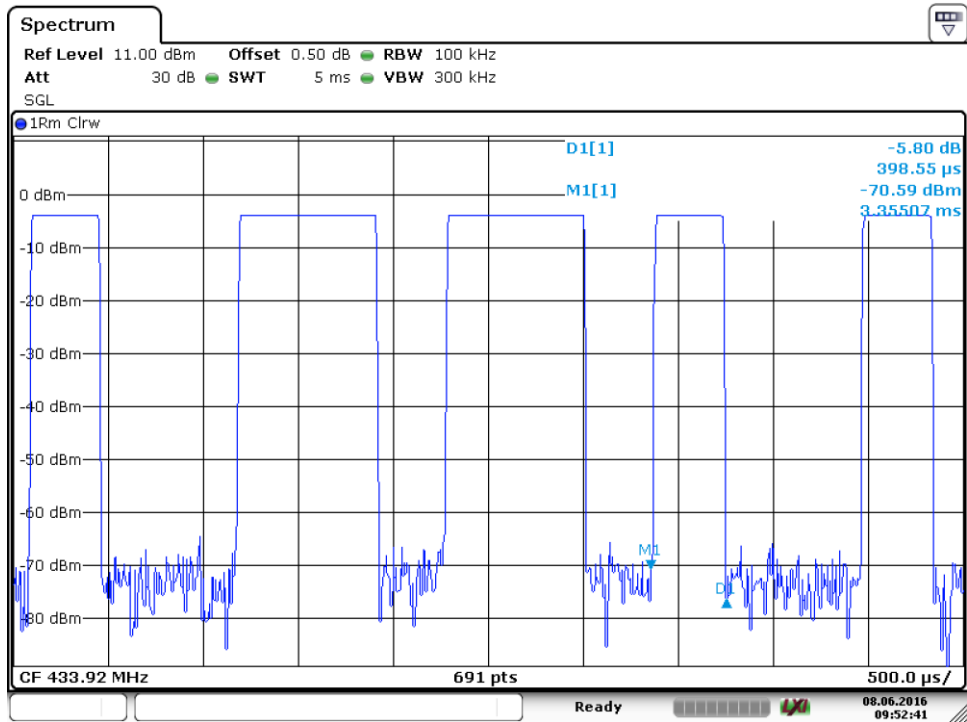
3: “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

Duty Cycle = $4.7971 \times 1 + 0.76087 \times 22 + 0.39855 \times 19 = 28.74872 / 70.145 = 40.98\%$

Duty Cycle Factor = $20 \log(\text{Duty Cycle}) = -7.75$







For FSK

Radiated Emissions								
Value	Emissions Frequency MHz	E-Field Polarity	Field at 3m dBµV/m	Average Factor dB	Net Field at 3m dBµV/m	Limit dBµV/m	Margin	Emission Type
Below 1GHz								
PK	433.925	H	78.60	0.00	78.60	100.83	22.23	Fundamental
AV	433.925	H	78.60	0.00	78.60	80.83	2.23	Fundamental
PK	433.925	V	74.11	0.00	74.11	100.83	26.72	Fundamental
AV	433.925	V	74.11	0.00	74.11	80.83	6.72	Fundamental
PK	867.860	H	41.13	0.00	41.13	80.83	39.70	Spurious
AV	867.860	H	41.13	0.00	41.13	60.83	19.7	Spurious
PK	867.910	V	38.3	0.00	38.3	80.83	42.53	Spurious
AV	867.910	V	38.3	0.00	38.3	60.83	22.53	Spurious
Above 1GHz								
PK	1301.8	H	38.88	0.00	38.88	74	35.12	Spurious
AV	1301.8	H	38.88	0.00	38.88	54	15.12	Spurious
PK	1301.7	V	41.19	0.00	41.19	74	32.81	Spurious

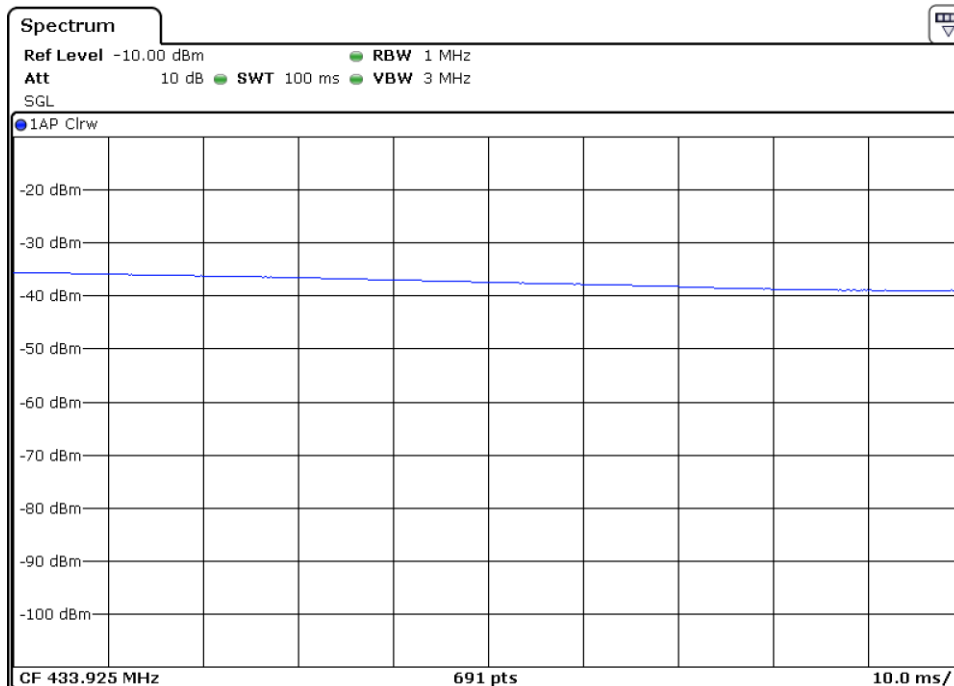
Remark:

1: AV Emission Level= PK Emission Level+20log(dutycycle)

2: Data of measurement within this frequency range shown “/” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

3: “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

Duty Cycle =100%



9.2 Bandwidth Measurement

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Limit

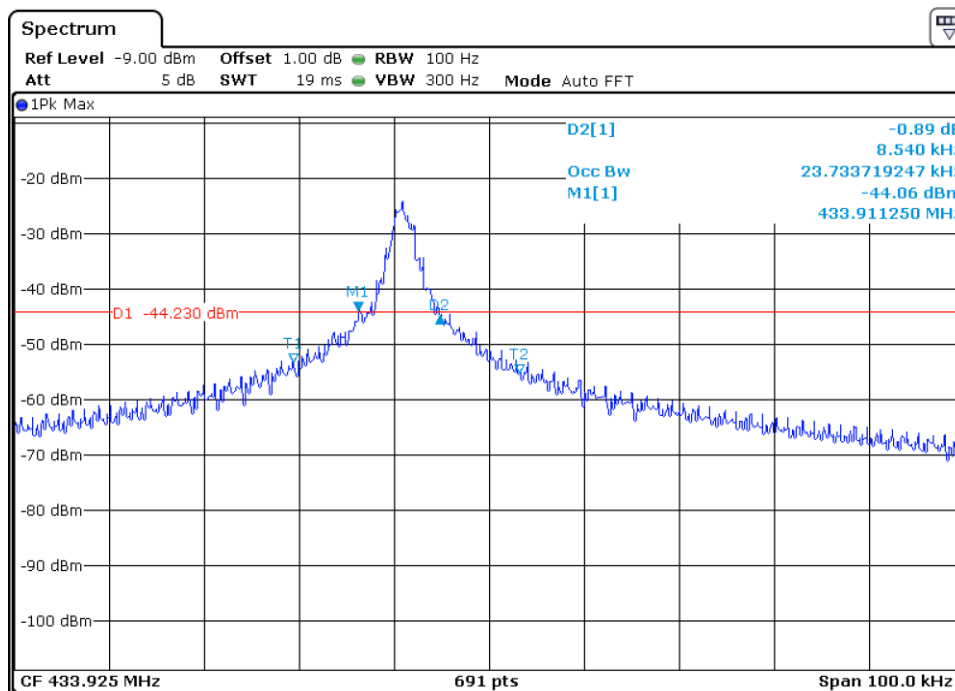
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated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

The limit for the EUT = 0.25% * 433.925 MHz = 1084 kHz

Test Result

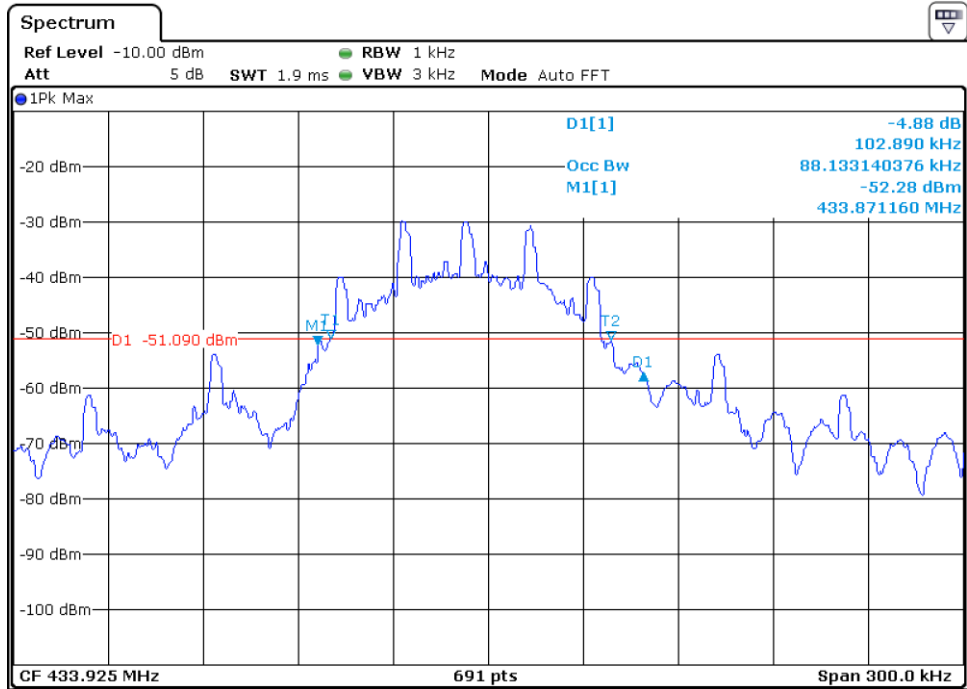
For ASK

Channel	20dB Bandwidth (KHz)	99% bandwidth (KHz)	Limit (KHz)
1	8.540KHz	23.7337KHz	1085KHz



For FSK

Channel	20dB Bandwidth (KHz)	99% bandwidth (KHz)	Limit (KHz)
1	102.89KHz	88.133KHz	1085KHz



9.3 Deactivation Time

Test Method

1. Place the EUT in the chamber and set it in transmitting mode.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=1MHz, VBW=1MHz, Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

Limit

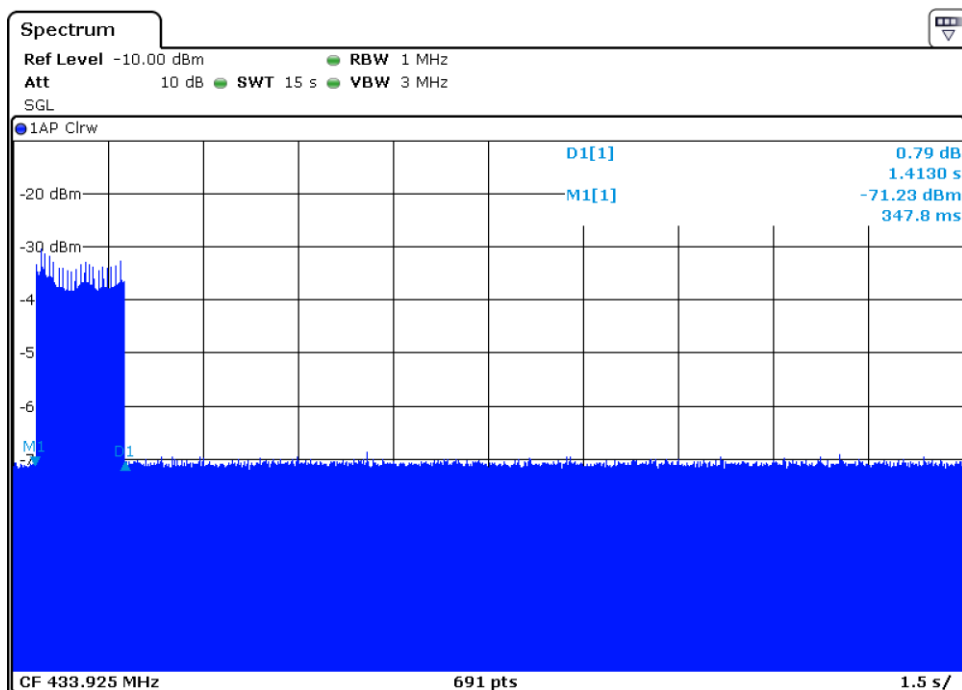
According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:

- (√) (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.

Test Result

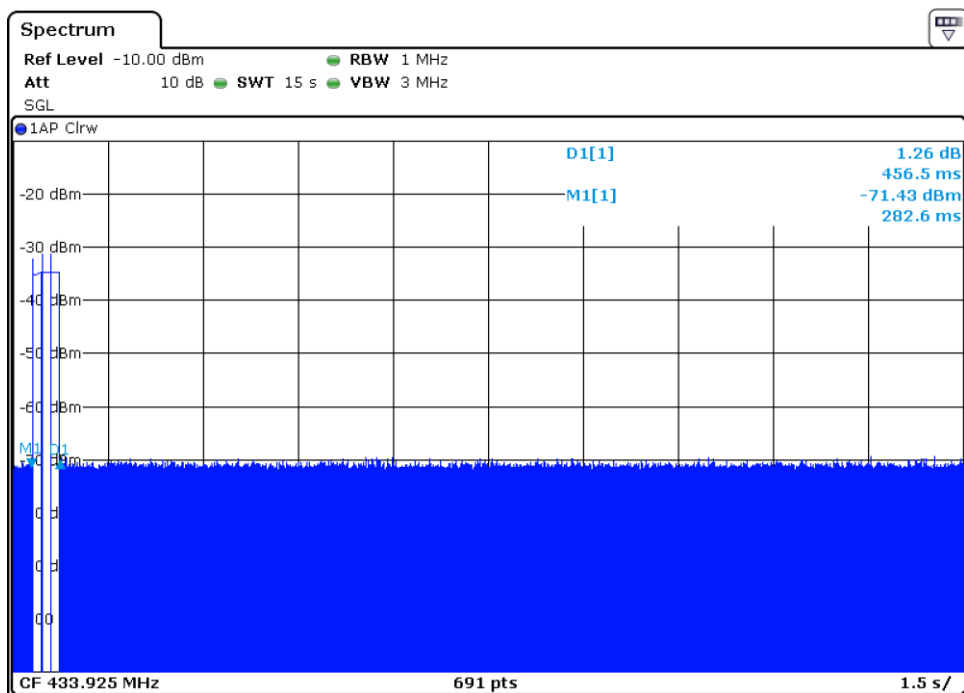
For ASK

Channel	Frequency	Deactivation Time	Result
1	433.925MHz	1.4130S	Pass



For FSK

Channel	Frequency	Deactivation Time	Result
1	433.925MHz	456.5ms	Pass



10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101031	2016-8-17
RE	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2016-7-24
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2016-8-14
	Horn Antenna	Rohde & Schwarz	HF907	102294	2016-7-24
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2016-7-24
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

C - Conducted RF tests

- 20dB bandwidth and 99% bandwidth
- Deactivation Time

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items	Extended Uncertainty
Radiated spurious emission	Horizontal: $U=\pm 4.83\text{dB}$ (30MHz~1GHz) Vertical: $U=\pm 4.91\text{dB}$ (30MHz~1GHz) Horizontal: $U=\pm 4.89\text{dB}$ (1GHz~18GHz) Vertical: $U=\pm 4.88\text{dB}$ (1GHz~18GHz)
Uncertainty for Conducted RF test with TS 8997	2.04dB