

TEST REPORT

of

FCC Part 95 Subpart C

FCC ID: SWN-TD22UT

Equipment Under Test : DOG TRAINING DEVICE

Model Name : TD22UT

Variant Model Name(s) : Refer to the page 4

Applicant : Dogtra Co., Ltd.

Manufacturer : Dogtra Co., Ltd.

Date of Receipt : 2024.05.14

Date of Test(s) : 2024.05.14 ~ 2024.06.13

Date of Issue : 2024.06.13

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

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- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
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We are responsible for all the information of this test report except for the data(※) provided by the customer

Tested by:



Demian Kim

Technical
Manager:



Jinhyoung Cho

SGS Korea Co., Ltd. Gunpo Laboratory



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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

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1.2. Details of Applicant

Applicant : Dogtra Co., Ltd.

Address : 35, Namdongdong-ro 33beon-gil, Namdong-gu, Incheon, South Korea, 21694

Contact Person : Chae, Yong-byeong

Phone No. : +82 32 812 2445

1.3. Details of Manufacturer

Company : Same as Applicant

Address : Same as Applicant

1.4. Description of EUT

Kind of Product	DOG TRAINING DEVICE
Model Name	TD22UT
Variant Model Name(s)	280X 280X 1-DOG UNIT 282X 280x 2-DOG UNIT 283X 280X HANDSFREE 280X HANDSFREE 1-DOG UNIT 282X HANDSFREE 280X HANDSFREE 2-DOG UNIT 283X HANDSFREE X1 ADDITIONAL TRANSMITTER
Serial Number	Conducted: 001 Radiated: 002
Power Supply	DC 3.7 V
Frequency Range	27.195 MHz
Modulation Type	FSK
Number of Channel	1
Antenna Type	Helical Antenna
Antenna Gain*	-27.5 dBi
H/W Version	1.0
S/W Version	1.0
FVIN	N/A

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMBV100A	255834	Dec. 01, 2023	Annual	Dec. 01, 2024
Spectrum Analyzer	R&S	FSW8	101660	May 23, 2024	Annual	May 23, 2025
DC Power Supply	Agilent	U8002A	MY49030063	Jan. 17, 2024	Annual	Jan. 17, 2025
Attenuator	AEROFLEX / INMET	40AH2W-10	40G-1	Jun. 14, 2023	Annual	Jun. 14, 2024
Preamplifier	H.P.	8447F	2944A03909	Aug. 04, 2023	Annual	Aug. 04, 2024
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 21, 2023	Biennial	Aug. 21, 2025
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB 9163	9163-396	Apr. 02, 2024	Biennial	Apr. 02, 2026
Test Receiver	R&S	ESU26	100109	Jan. 16, 2024	Annual	Jan. 16, 2025
Turn Table	Innco systems GmbH	DS 1200 S	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/38 330516/L	N.C.R.	N/A	N.C.R.
Antenna Mast	Innco systems GmbH	MA4640-XP-ET	MA4640/536/38 330516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Apr. 03, 2024	Semi-Annual	Oct. 03, 2024
Coaxial Cable	Qualwave Inc.	QA500-18-NN-10 (10 m)	22200114	Apr. 03, 2024	Semi-Annual	Oct. 03, 2024
Coaxial Cable	RFONE	PL360P-292M292M-1.5M-A	20200324002	Apr. 12, 2024	Semi-Annual	Oct. 12, 2024

Note;

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 95 Subpart C		
Section in FCC	Test Item(s)	Result
95.767 (b)	RF Output Power	Complied
95.773	Occupied Bandwidth	Complied
95.779 (a)(1)(2)	Emission Mask	Complied
95.779 (a)(3)	Unwanted Emissions	Complied
95.765 (b)	Frequency Accuracy	Complied

1.7. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty	
RF Output Power	0.34 dB	
Occupied Bandwidth	0.02 kHz	
Conducted Spurious Emission	0.80 dB	
Frequency Accuracy	0.11 kHz	
Radiated Emission, 9kHz to 30MHz	H	3.60 dB
	V	3.60 dB
Radiated Emission, below 1 GHz	H	4.60 dB
	V	4.90 dB

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence.

1.8. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL005154	2024.06.13	Initial

1.9. Test Procedure

The measurement procedure described in the American National Standard for Procedure for Compliance Testing of Transmitters Used in Licensed Radio Services (ANSI C63.26-2015) were used in the measurement of the DUT.

1.10. Description of Variant model(s)

Model	Model Name	Description
Basic	TD22UT	- It includes one Tx and one Rx.
Variant	280X	- It includes one Tx and one Rx.
	280X 1-DOG UNIT	- It includes one Tx and one Rx.
	282X	- It includes one Tx and two Rx.
	280X 2-DOG UNIT	- It includes one Tx and two Rx.
	283X	- It includes one Tx, three Rx.
	280X HANDSFREE	- It includes one Tx, one Rx, and a holster.
	280X HANDSFREE 1-DOG UNIT	- It includes one Tx, one Rx, and a holster.
	282X HANDSFREE	- It includes one Tx, two Rx, and a holster.
	280X HANDSFREE 2DOG-UNIT	- It includes one Tx, two Rx, and a holster.
	283X HANDSFREE	- It includes one Tx, three Rx, and a holster.
	X1 ADDITIONAL TRANSMITTER	- It includes one Tx.

2. RF Output Power

2.1. Test Setup



2.2. Limit

According to §95.767 (b), 26-28 MHz frequency band. For an RCRS transmitter operating on 26.995, 27.045, 27.095, 27.145, or **27.195** MHz, the mean transmitter output power must not exceed 4 Watts.

2.3. Test Procedure

1. The equipment under test is connected to the spectrum analyzer.
2. The spectrum analyzer is set to the as follow;
 - RBW: 1 % to 5 % of the OBW
 - VBW: 3 x RBW
 - Detector: RMS
 - Trace Average at least 100 traces in power averaging mode.
3. Using the instrument's channel power measurement function.

2.4. Test Result

Ambient temperature : $(23 \pm 1) ^\circ\text{C}$
 Relative humidity : 47 % R.H.

Frequency (MHz)	Mean Transmitter Output Power		Limit (W)
	(dBm)	(W)	
27.195	22.23	0.167	4

- Test plot



3. Occupied Bandwidth

3.1. Test Setup



3.2. Limit

According to §95.773, Each RCRS transmitter type must be designed such that the occupied bandwidth does not exceed 8kHz for any emission type.

3.3. Test Procedure

1. The equipment under test is connected to the spectrum analyzer.
2. The spectrum analyzer is set to the as follow;
RBW: 1 ~ 5 % of 99 % Occupied bandwidth
VBW: 3 x RBW
Detector function: Peak
Trace: Max hold
3. The 99%occupied bandwidth of fundamental frequency was measured and recorded.

3.4. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Frequency (MHz)	99 % Occupied Bandwidth (kHz)	Limit (kHz)	Test result
27.195	5.511	8	Compliance

- Test plot



4. Emission Mask

4.1. Test Setup



4.2. Limit

According to §95.779(a), 26 – 28 MHz frequency band. For an RCRS transmitter operating in the 26-28 MHz frequency band, the power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

- (1) 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency;
- (2) 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency;

4.3. Test Procedure

1. The equipment under test is connected to the spectrum analyzer.
2. The spectrum analyzer is set to the as follow;
 - Span: 40 kHz
 - RBW: 300 Hz
 - VBW: 1 kHz
 - Detector function: Peak
 - Trace: Max hold
3. The fundamental frequency was measured and recorded.

4.4. Test Result

Ambient temperature : $(23 \pm 1) ^\circ\text{C}$
 Relative humidity : 47 % R.H.

- Test plot

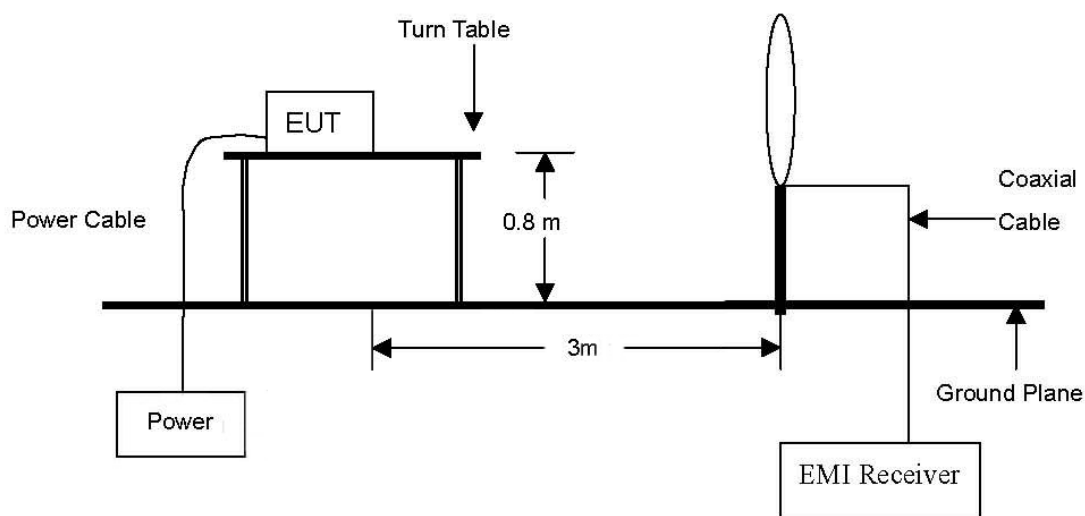


5. Transmitter Unwanted Emissions

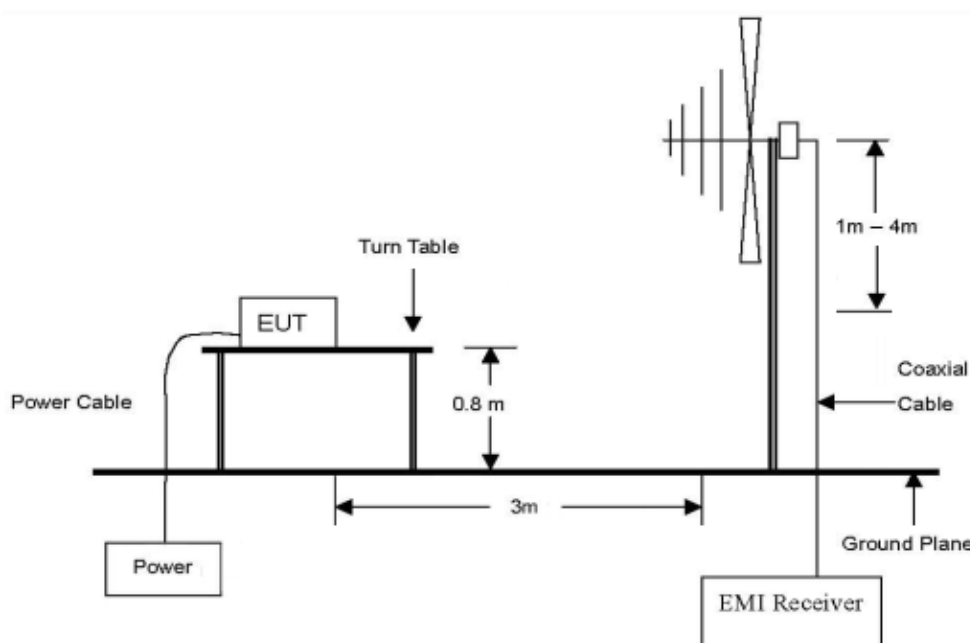
5.1. Test Setup

5.1.1. Radiated

The diagram below shows the test setup that is utilized to make the measurements for emission below 30 MHz.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz.



5.1.2. Conducted



5.2. Limit

According to §95.779(a), 26 – 28 MHz frequency band. For an RCRS transmitter operating in the 26-28 MHz frequency band, the power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

- (3) $43 + 10 \log(P)$ dB in any frequency band removed from the channel center frequency by more than 20 kHz.

5.3. Test Procedure

5.3.1. Radiated

The test based on ANSI C63.26-2015.

5.3.1.1. Test Procedures for emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
- c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- d. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.3.2.1. Test Procedures for emission from 30 MHz to 271.95 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
- c. The antenna is a broadband antenna, and its height 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.
- d. 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 table was turned from 0 degrees to 360 degrees to find the maximum reading.

5.3.2. Conducted

1. The equipment under test is connected to the spectrum analyzer.
2. The spectrum analyzer is set to the as follow;
RBW: 100 kHz
VBW: 300 kHz
Detector function: Peak
Trace: Max hold
3. The trace was measured and recorded.

5.4. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

▪ Conducted

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
54.387	-23.960	-13	10.960
81.620	-34.380	-13	21.380
108.794	-43.740	-13	30.740

- Test plot



▪ Radiated
Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total			Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBμV/m)	CF (dB)	E.R.P. (dBm)	Limit (dBm)	Margin (dB)
1.590	30.20	Quasi - Peak	H	18.52	0.51	49.23	-97.41	-48.18	-13.00	35.18
13.975	9.30	Quasi - Peak	H	18.92	0.28	28.50	-97.41	-68.91	-13.00	55.91

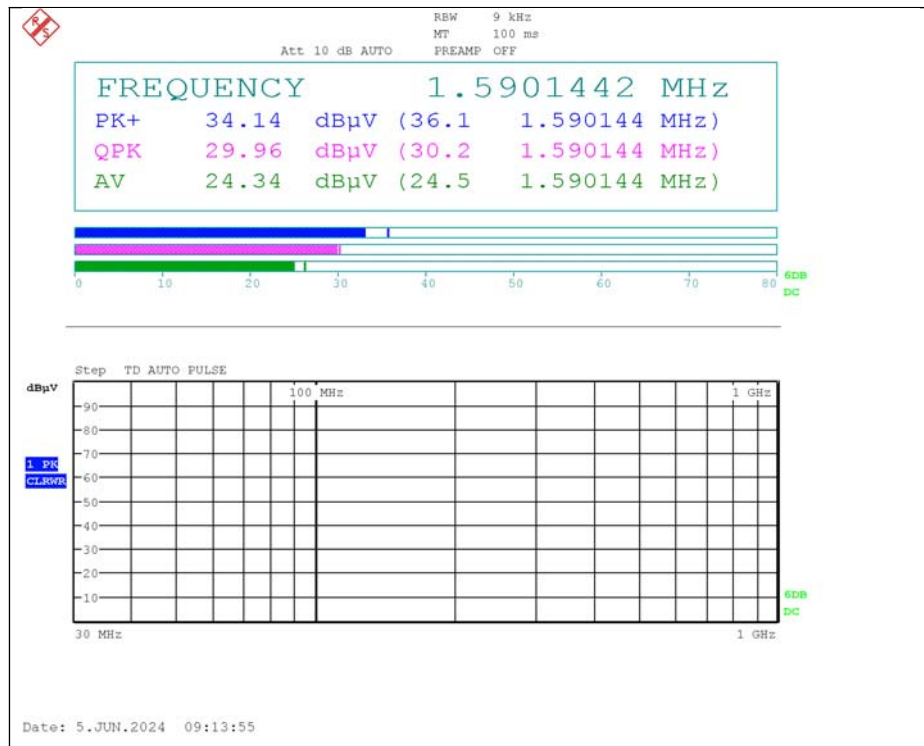
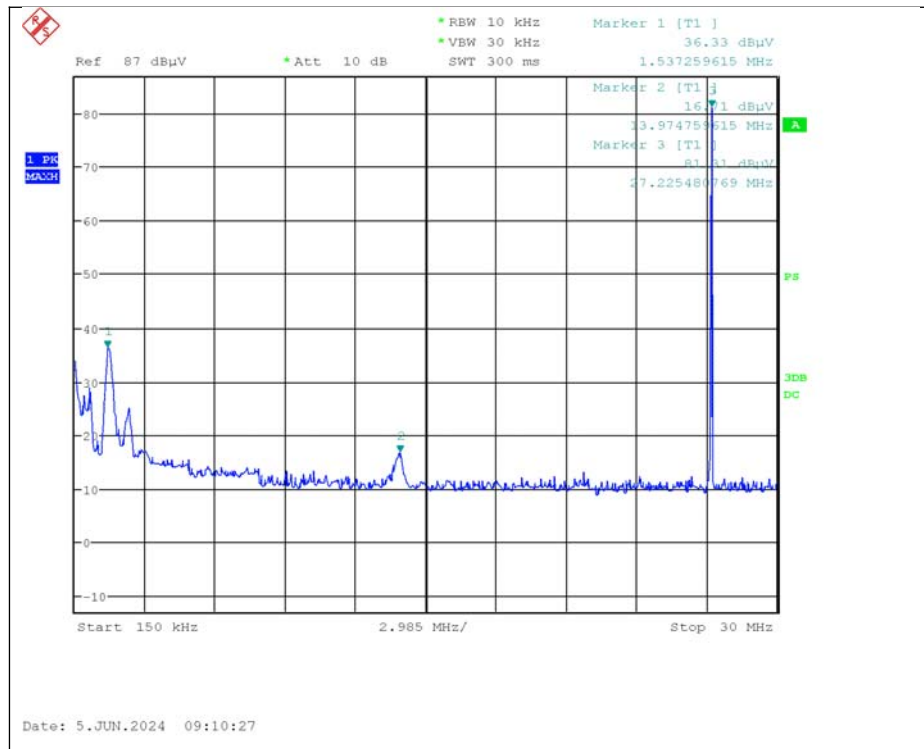
Above 30 MHz

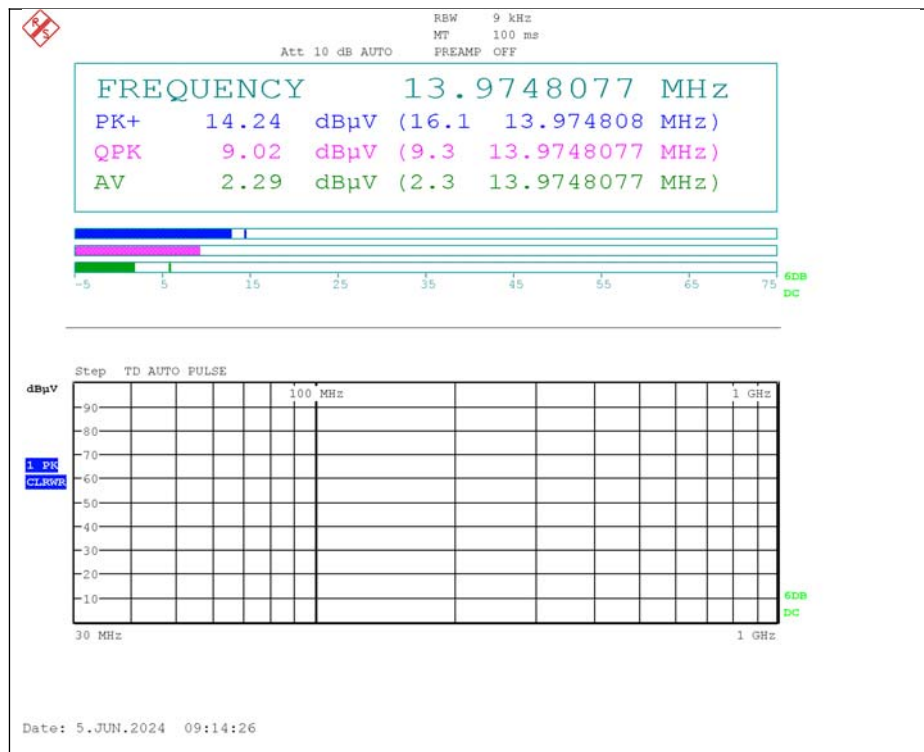
Radiated Emissions			Ant.	Correction (dB/m)	Total			Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.		Actual (dBμV/m)	CF (dB)	E.R.P. (dBm)	Limit (dBm)	Margin (dB)
50.01	22.86	Quasi - Peak	H	-7.85	15.01	-97.41	-82.40	-13.00	69.40
98.51	22.72	Quasi - Peak	V	-10.01	12.71	-97.41	-84.70	-13.00	71.70
104.27	22.68	Quasi - Peak	V	-9.81	12.87	-97.41	-84.54	-13.00	71.54
180.35	22.63	Quasi - Peak	V	-11.59	11.04	-97.41	-86.37	-13.00	73.37

Remark;

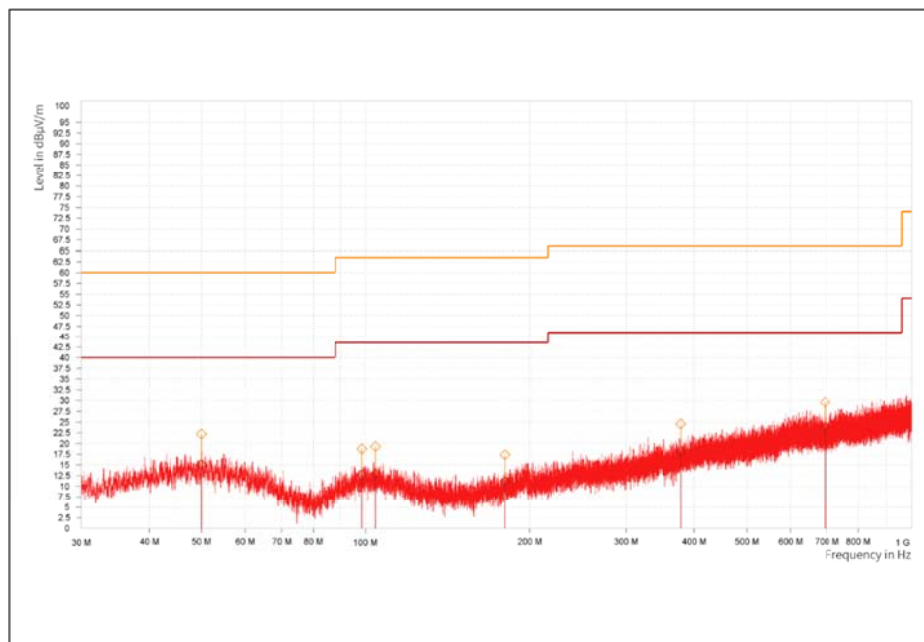
1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor
2. Actual (dBμV/m) = Reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB).
3. E.I.R.P. (dBm) = Actual (dBμV/m) + CF (dB).
4. E.R.P. (dBm) = Actual (dBμV/m) + CF (dB) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.
5. Test from 30 MHz to 271.95 MHz was performed using the software of ELEKTRA(V5.02) from Rohde & Schwarz GmbH & Co. KG.
6. Correction = Antenna Factor (dB/m) + AMP Factor (dB) + Cable Loss (dB).
7. CF (dB) = 20 log D - 104.8; where D is the measurement distance in meters, According to ANSI C63.26-2015
8. The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

**- Test plot
Below 30 MHz**



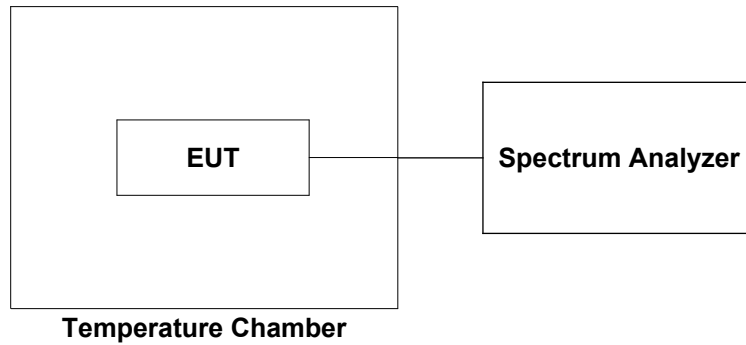


Above 30 MHz



6. Frequency Accuracy

6.1. Test Setup



6.2. Limit

According to §95.765(b), Except as allowed under paragraph (c) of this section, each RCRS transmitter type capable of transmitting in the 26-28 MHz frequency band must be designed such that the carrier frequencies remain within ± 50 ppm of the channel center frequencies listed in § 95.763(a) during normal operating conditions.

6.3. Test Procedure

1. The equipment under test is connected to a spectrum analyzer
2. The EUT is placed inside the temperature chamber.
- 3.. After the temperature stabilized for approximately 20 minutes, the frequency accuracy was recorded.

6.4. Test Results

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Reference Frequency: 27.195 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	3.70	201	6.619
40		164	5.258
30		98	2.831
20(Ref.)		21	-
10		60	1.434
0		118	3.567
-10		142	4.449
-20		109	3.236
-30		12	-0.331
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	4.26 (115 %)	21	0.294
	3.15 (85 %)	26	0.184

- End of the Test Report -