FCC Test Report

Report No: FCS202202052W02

Issued for

Applicant:	DongGuan DeRuiChen Electronics Co., Ltd.
Address:	No.1 Wuxing Road, Changping Town, Dongguan City
Product Name:	FM TRANSMITTER
Brand Name:	N/A
Model Name:	C87B
Series Model:	N/A
FCC ID:	2A4Z2-C87B

Issued By: Flux Compliance Service Laboratory
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TEST REPORT CERTIFICATION

Applicant's name..... :	DongGuan DeRuiChen Electronics Co., Ltd.
Address..... :	No.1 Wuxing Road, Changping Town, Dongguan City
Manufacture's Name..... :	DongGuan DeRuiChen Electronics Co., Ltd.
Address..... :	No.1 Wuxing Road, Changping Town, Dongguan City

Product description

Product Name..... :	FM TRANSMITTER
Brand Name .....:	N/A
Model Name..... :	C87B
Series Model.....:	N/A
Test Standards..... :	FCC Part15.239
Test procedure.....:	ANSI C63.10: 2013,ANSI C63.4: 2014

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Date of Test..... :	
Date (s) of performance of tests.....:	20 Feb. 2022~26 Feb. 2022
Date of Issue..... :	26 Feb. 2022
Test Result..... :	**Pass**

Tested by : Scott shen
(Scott Shen)

Reviewed by : Duke Qian
(Duke Qian)

Approved by : Jack Wang
(Jack Wang)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 15.239			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	--
15.209 15.239(b) (c)	Radiated Emission	PASS	--
15.239(b)	field strength emission	PASS	--
15.203	Antenna Requirement	PASS	--
15.239(a)	20dB Bandwidth	PASS	--

NOTE: (1)" N/A" denotes test is not applicable in this Test Report

(2) All tests are according to ANSI C63.4-2014 and ANSI C63.10-2013

1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.
1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China

CNAS Registration No.: L7649; FCC Registration No.: 625569

IC Registration No.: 12108A; A2LA Certificate No.: 4338.01;

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U** · where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2** · providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission (9KHz-150KHz)	±2.88dB
2	Conducted Emission (150KHz-30MHz)	±2.67dB
3	RF power,conducted	±0.71dB
4	Spurious emissions,conducted	±0.63dB
5	All emissions,radiated (9KHz-30MHz)	±3.02dB
6	All emissions,radiated (30MHz-200MHz)	±3.80dB
7	All emissions,radiated (200MHz-1000MHz)	±3.97dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name	FM TRANSMITTER
Trade Name	N/A
Model Name	C87B
Serial Model	N/A
Model Difference	N/A
Product Description	The EUT is a FM TRANSMITTER Operation Frequency: 88MHz ~108MHz Modulation Type: FM Antenna Designation: Please see Note 3. Antenna Gain (dBi) 1.0dBi
Adapter	DC 12V-24V
Battery	N/A
Hardware version number	V1.0
Software version number	V1.0
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Table for filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	NA	FGDC	Chip Antenna	N/A	1.0	FM Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX Mode(Low channel)
Mode 2	TX Mode(Middle channel)
Mode 3	TX Mode(High channel)

	For Radiated Emission
Final Test Mode	Description
Mode 1	TX Mode(Low channel)
Mode 2	TX Mode(Middle channel)
Mode 3	TX Mode(High channel)

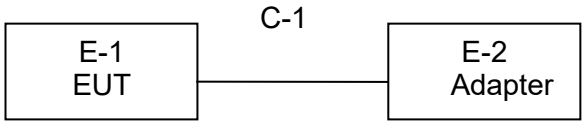
Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

(3) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note

Item	Shielded Type	Ferrite Core	Length	Note
C-1	unshielded	NO	100cm	N/A

Note:

(1)The support equipment was authorized by Declaration of Confirmation.

(2)For detachable type I/O cable should be specified the length in cm in『Length』column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESW	101535	2022.02.10	2023.02.09
Bilog Antenna	TESEQ	CBL6111D	34678	2022.02.10	2023.02.09
Horn Antenna	Schwarzbeck	BBHA 9120D (1201)	9120D-1343	2022.02.10	2023.02.09
Passive Loop (9K--30MHz)	ZHNAN	ZN3090C	16035	2022.02.10	2023.02.09
Pre-mplifier (0.1M-3GHz)	EM	EM330	60538	2022.02.10	2023.02.09
PreAmplifier	Agilent	8449B	60538	2022.02.10	2023.02.09
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2022.02.10	2023.02.09
Semi-anechoic chamber	Changling	966	N/A	2022.02.10	2023.02.09

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2022.02.10	2023.02.09
LISN	R&S	ENV216	101242	2022.02.10	2023.02.09
conduction Cable	EM	C01	N/A	2022.02.10	2023.02.09
Temperature & Humitidy	Mieo	HH660	N/A	2022.02.10	2023.02.09
Signal Analyzer	Agilent	N9020A	MY49100060	2022.02.10	2023.02.09

3. RADIATED EMISSION MEASUREMENT

3.1 RADIATED EMISSION LIMITS

RADIATED EMISSION LIMITS (FCC 15.209)

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

NOTE:

a) Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)].

b) In the emission tables above, the tighter limit applies at the Band edge.

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2 TEST PROCEDURE

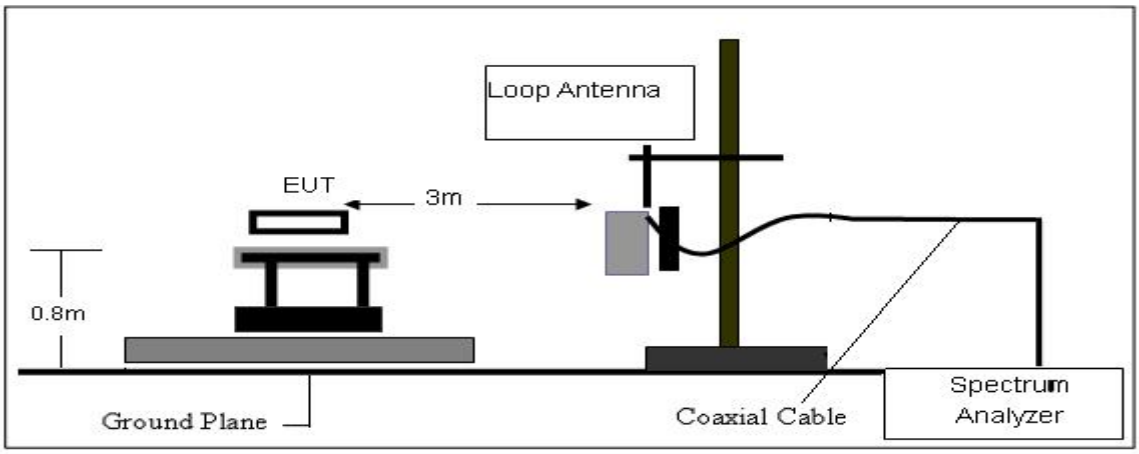
a. The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower. For the test Antenna
b. In the frequency range of 9KHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
c. In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.
f. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
g. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
h. For the actual test configuration, please refer to the related Item –EUT Test Photos.

NOTE:

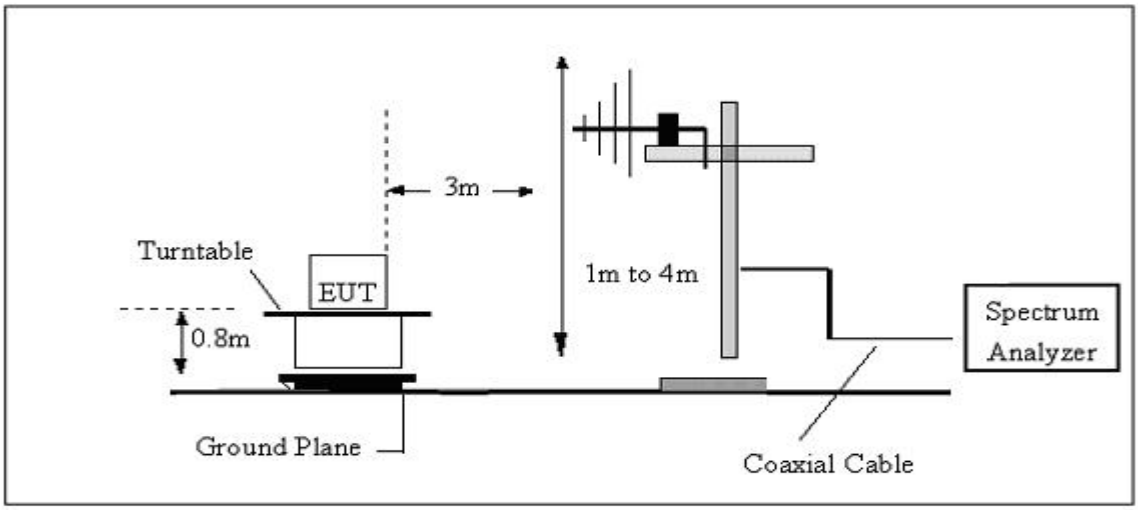
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3 TEST SETUP

（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



3.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.5 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

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

Factor=AF+CL-AG

3.6 TEST RESULTS

(Radiated Emission<30MHz (9KHz-30MHz, H-field))

Temperature:	20 ℃	Relative Humidtity:	48%
Test Voltage:	DC 12V	Polarization:	--
Test Mode:	Mode 1		

Freq.	Reading	Correct factor	Limit	Margin	State
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dB)	P/F
0.1898	60.13	11.97	115.47	-43.37	PASS
0.7867	35.18	11.90	71.16	-24.08	PASS
2.4584	32.25	11.25	69.54	-26.04	PASS
3.5330	30.18	11.18	69.54	-28.18	PASS
13.4432	40.19	11.05	69.54	-18.30	PASS

Temperature:	20 ℃	Relative Humidtity:	48%
Test Voltage:	DC 12V	Polarization:	--
Test Mode:	Mode 2		

Freq.	Reading	Correct factor	Limit	Margin	State
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dB)	P/F
0.1500	60.13	12.02	118.34	-46.19	PASS
0.5480	45.18	11.76	73.28	-16.34	PASS
3.6126	32.25	11.21	69.54	-26.08	PASS
10.8164	34.18	11.18	69.54	-24.18	PASS
13.5120	38.19	11.20	69.54	-20.15	PASS

Temperature:	20 ℃	Relative Humidtity:	48%
Test Voltage:	DC 12V	Polarization:	--
Test Mode:	Mode 3		

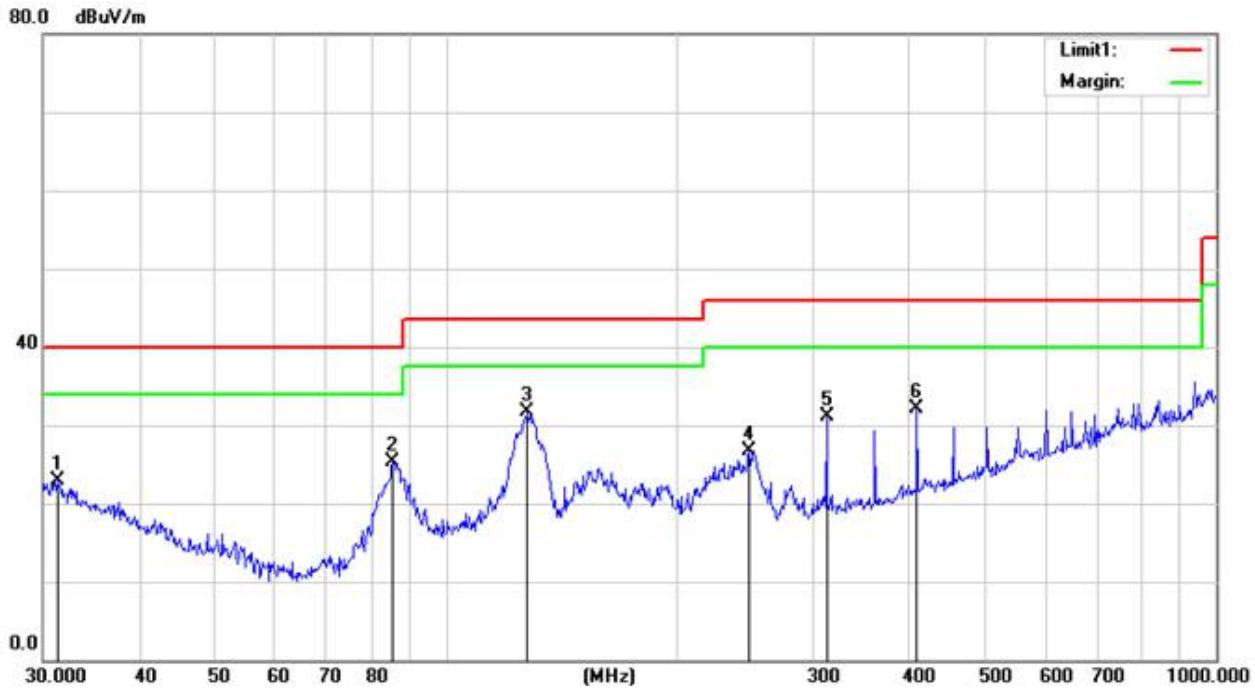
Freq.	Reading	Correct factor	Limit	Margin	State
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dB)	P/F
0.2694	70.13	11.75	109.72	-27.84	PASS
1.0256	45.18	11.95	69.03	-11.90	PASS
2.0206	33.25	11.25	69.54	-25.04	PASS
7.3538	46.18	11.39	69.54	-11.97	PASS
12.8860	43.26	11.18	69.54	-15.10	PASS

Between 30-1000MHz

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	DC 12V	Phase:	Horizontal
Test Mode:	Mode 1		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
31.2893	4.96	18.04	23.00	40.00	-17.00	QP
85.2980	16.36	8.85	25.21	40.00	-14.79	QP
127.6645	19.93	11.71	31.64	43.50	-11.86	QP
247.6820	13.53	13.27	26.80	46.00	-19.20	QP
312.1794	15.98	15.10	31.08	46.00	-14.92	QP
408.9460	13.68	18.42	32.10	46.00	-13.90	QP

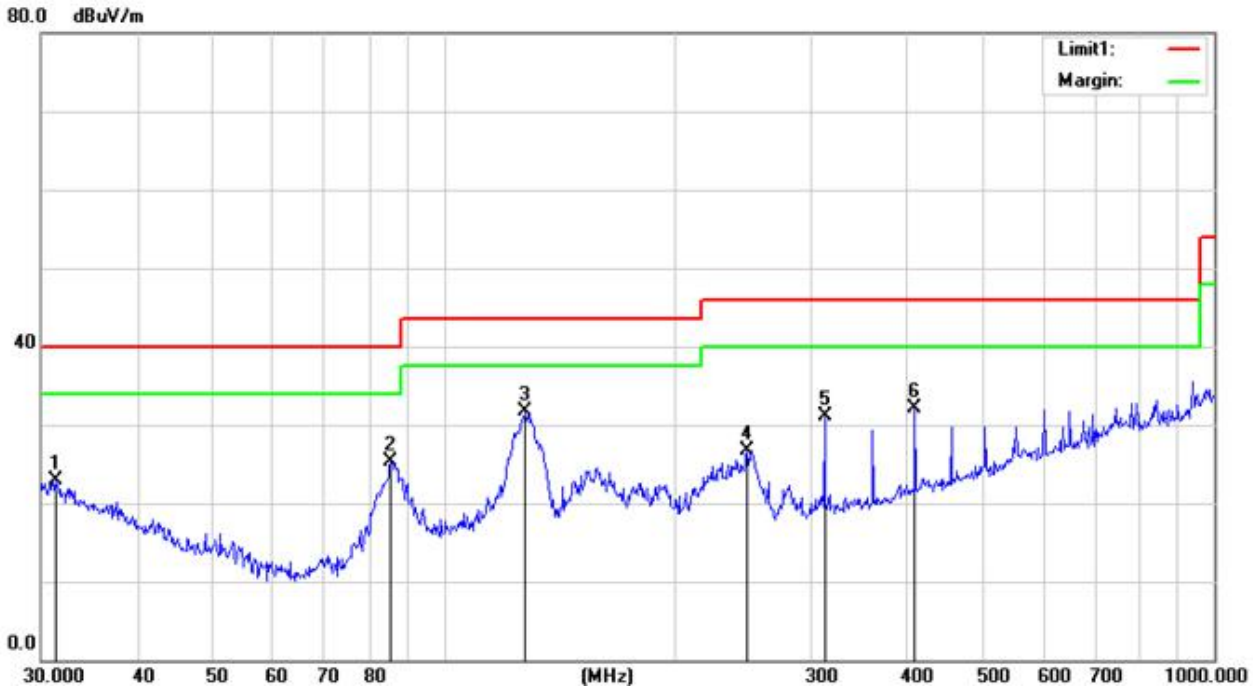
Remark:
1. Margin = Result (Result =Reading + Factor)–Limit



Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	DC 12V	Phase:	Vertical
Test Mode:	Mode 1		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
31.2893	4.96	18.04	23.00	40.00	-17.00	QP
85.2980	16.36	8.85	25.21	40.00	-14.79	QP
127.6645	19.93	11.71	31.64	43.50	-11.86	QP
247.6820	13.53	13.27	26.80	46.00	-19.20	QP
312.1794	15.98	15.10	31.08	46.00	-14.92	QP
408.9460	13.68	18.42	32.10	46.00	-13.90	QP

Remark:
1. Margin = Result (Result =Reading + Factor)–Limit



Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	DC 12V	Phase:	Horizontal
Test Mode:	Mode 2		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
31.2893	4.96	18.04	23.00	40.00	-17.00	QP
85.2980	16.36	8.85	25.21	40.00	-14.79	QP
127.6645	19.93	11.71	31.64	43.50	-11.86	QP
247.6820	13.53	13.27	26.80	46.00	-19.20	QP
312.1794	15.98	15.10	31.08	46.00	-14.92	QP
408.9460	13.68	18.42	32.10	46.00	-13.90	QP

Remark:
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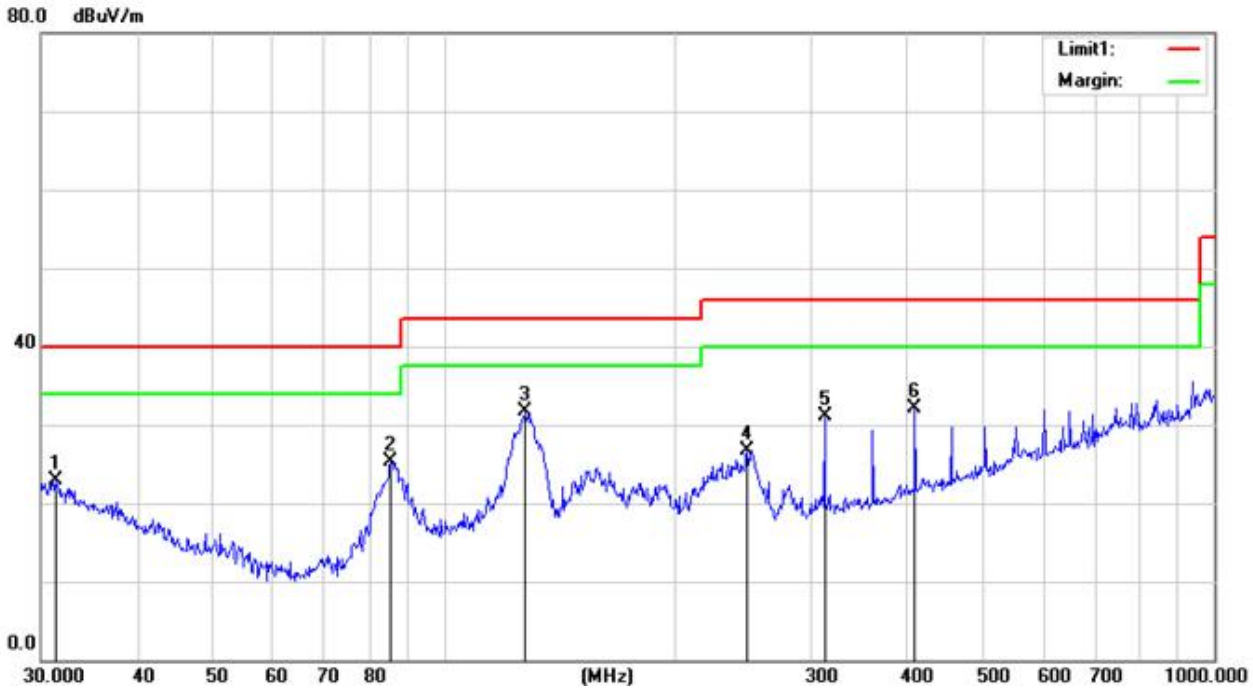

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	DC 12V	Phase:	Vertical
Test Mode:	Mode 2		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
31.2893	4.96	18.04	23.00	40.00	-17.00	QP
85.2980	16.36	8.85	25.21	40.00	-14.79	QP
127.6645	19.93	11.71	31.64	43.50	-11.86	QP
247.6820	13.53	13.27	26.80	46.00	-19.20	QP
312.1794	15.98	15.10	31.08	46.00	-14.92	QP
408.9460	13.68	18.42	32.10	46.00	-13.90	QP

Remark:
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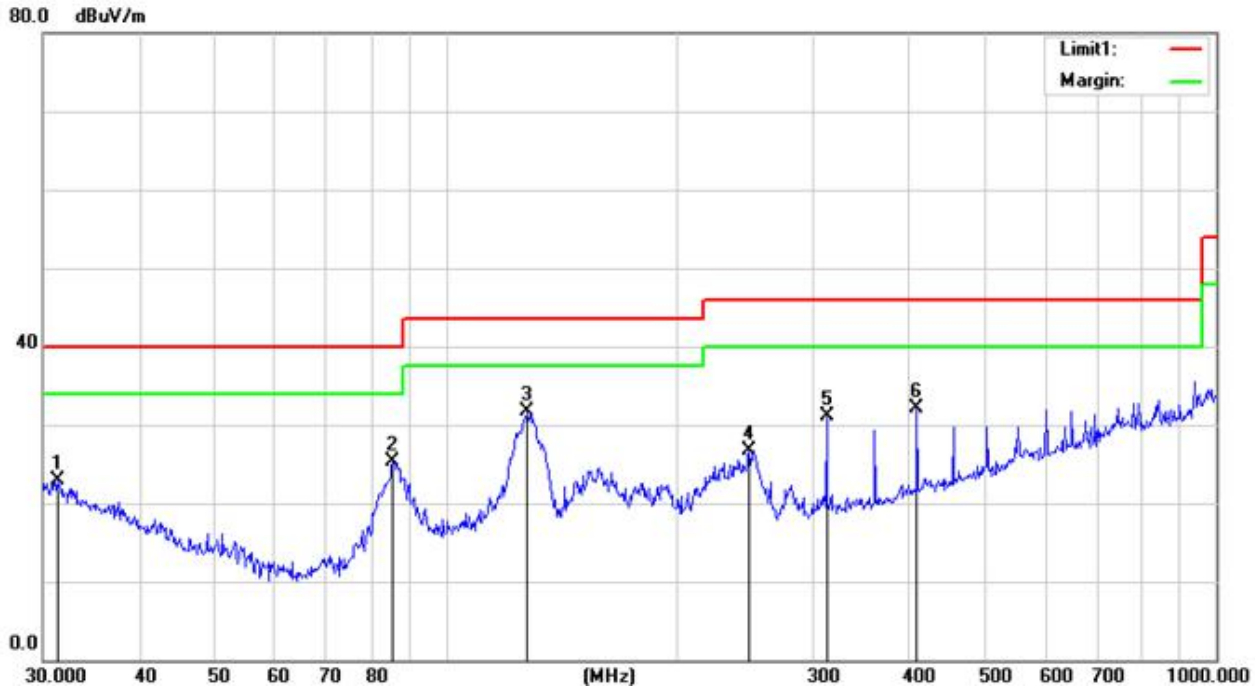

Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	DC 12V	Phase:	Horizontal
Test Mode:	Mode 3		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
31.2893	4.96	18.04	23.00	40.00	-17.00	QP
85.2980	16.36	8.85	25.21	40.00	-14.79	QP
127.6645	19.93	11.71	31.64	43.50	-11.86	QP
247.6820	13.53	13.27	26.80	46.00	-19.20	QP
312.1794	15.98	15.10	31.08	46.00	-14.92	QP
408.9460	13.68	18.42	32.10	46.00	-13.90	QP

Remark:
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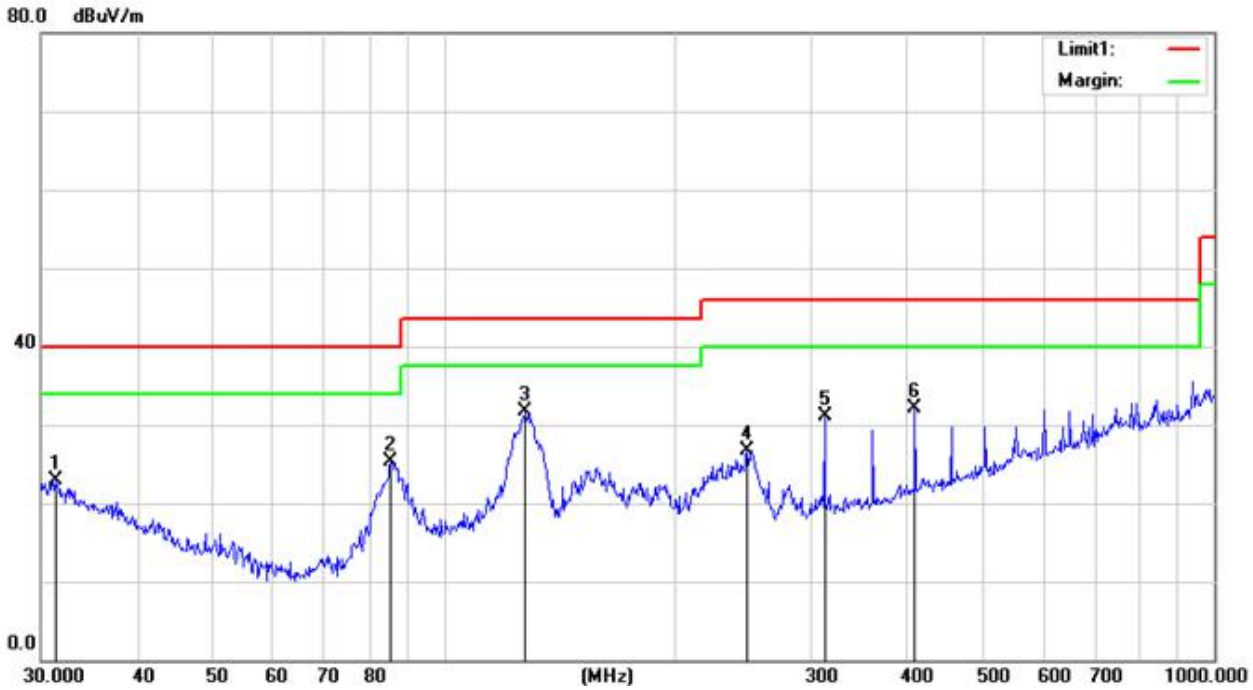
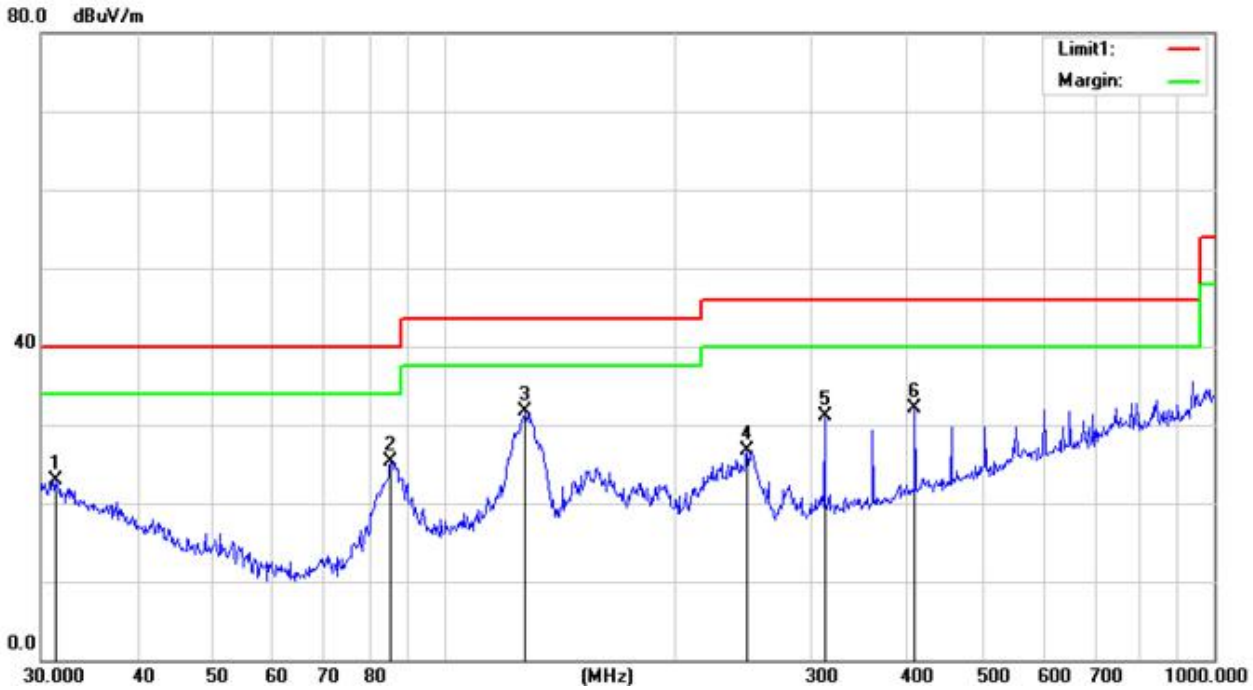


Temperature:	26 ℃	Relative Humidity:	54%
Test Voltage:	DC 12V	Phase:	Vertical
Test Mode:	Mode 3		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
31.2893	4.96	18.04	23.00	40.00	-17.00	QP
85.2980	16.36	8.85	25.21	40.00	-14.79	QP
127.6645	19.93	11.71	31.64	43.50	-11.86	QP
247.6820	13.53	13.27	26.80	46.00	-19.20	QP
312.1794	15.98	15.10	31.08	46.00	-14.92	QP
408.9460	13.68	18.42	32.10	46.00	-13.90	QP

Remark:
1. Margin = Result (Result =Reading + Factor)–Limit

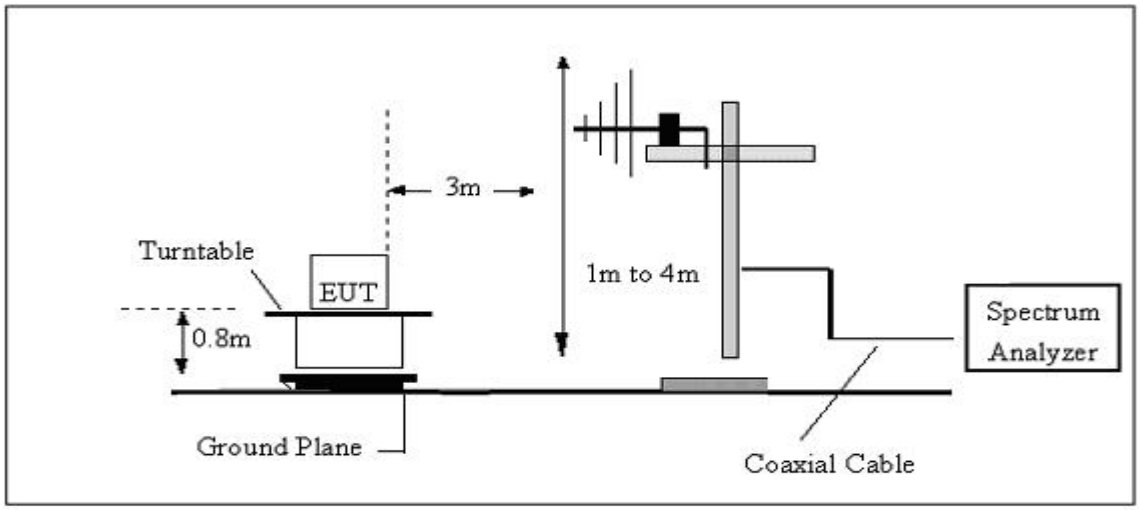


4. FIELD STRENGTH EMISSION

4.1 REQUIREMENT

The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

4.2 TEST SETUP



4.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

4.4 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
Test Voltage:	DC 12V	Test Mode:	TX Mode

3m distance measured

Test frequency	detecter	Reading	factor	Corrected level	Limit	Margin
(MHz)		(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)
88.00	Peak	40.13	5.24	68.00	68.00	-22.63
	Avg	30.26	5.24	48.00	48.00	-12.50
98.00	Peak	45.18	5.36	68.00	68.00	-17.46
	Avg	35.33	5.36	48.00	48.00	-7.31
108.00	Peak	42.25	6.42	68.00	68.00	-19.33
	Avg	32.41	6.42	48.00	48.00	-9.17

5. 20DB BANDWIDTH

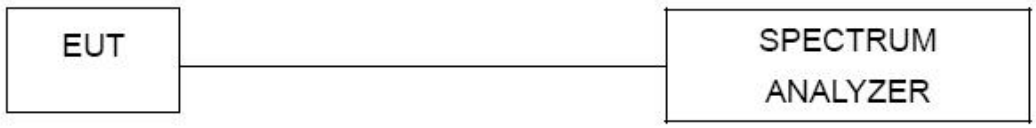
5.1 APPLIED PROCEDURES / LIMIT

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

5.2 TEST PROCEDURE

1. Set RBW = 10kHz.
2. Set the video Mobile Phonewidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7.Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 d B relative to the maximum level measured in the fundamental emission.

5.3 TEST SETUP



5.4 EUT OPERATION CONDITIONS

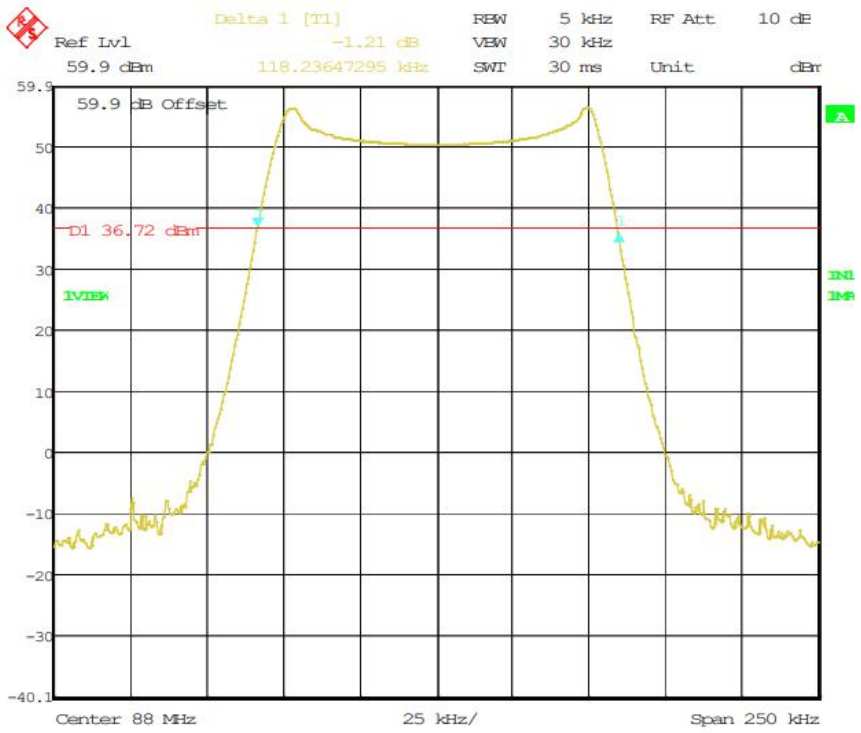
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

5.5 TEST RESULTS

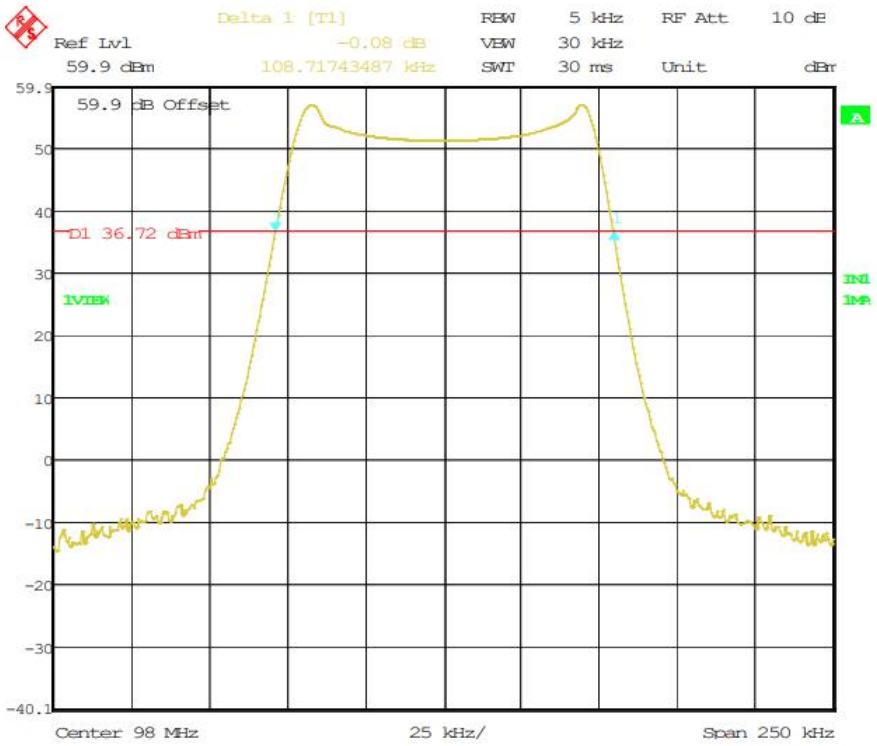
Temperature:	25 ℃	Relative Humidity:	60%
Test Voltage:	DC 12V	Test Mode:	TX Mode

Centre Frequency	Measurement	
	20dB Bandwidth (KHz)	Frequency Range (MHz)
88.00	118.24	88-108
98.00	108.72	88-108
108.00	105.71	88-108

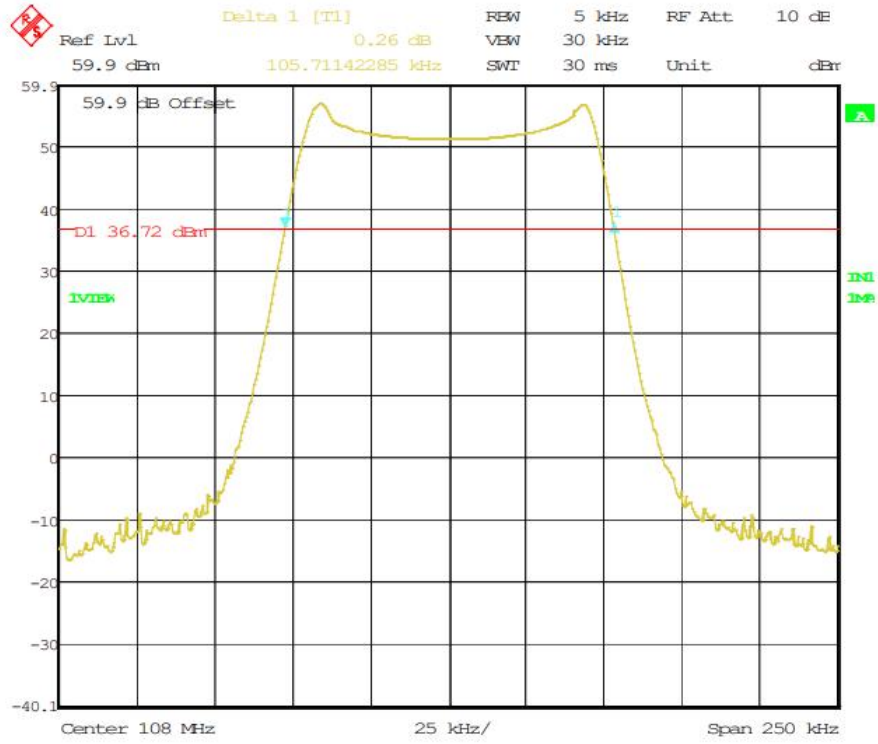
Low channel



Mid channel



High channel



6. ANTENNA REQUIREMENT

6.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

6.2 EUT ANTENNA

The EUT antenna is Chip Antenna. It comply with the standard requirement.

※※※※※END OF THE REPORT※※※※※