FCC 47 CFR PART 15 SUBPART C
TEST REPORT

FOR

RFID Reader

Model : SMC5238
Trade Name: SMC

Issued to

SmartChip Microelectronics Corp.
16F., No. 11, Qiaohe Rd. Zhonghe Dist., New Taipei City 235, Taiwan(R.O.C.)
Taiwan 22101
Issued by
WH Technology Corp.

EMC Test Site	**Xizhi Office and Lab**	**7F., No.262, Sec. 3, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)**
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CONTENTS

1. GENERAL INFORMATION

Applicant	:	**SmartChip Microelectronics Corp.**
Address	:	**16F., No. 11, Qiaohe Rd. Zhonghe Dist., New Taipei City 235, Taiwan(R.O.C.)**
Manufacturer/ Factory	:	**SmartChip Microelectronics Corp.**
Address	:	**16F., No. 11, Qiaohe Rd. Zhonghe Dist., New Taipei City 235, Taiwan(R.O.C.)**
EUT	:	**RFID Reader**
Model Name	:	**SMC5238**
Trade Name	:	**SMC**

Is here with confirmed to comply with the requirements set out in the FCC Rules and Regulations Part 15 Subpart C and the measurement procedures were according to ANSI C63.10. The said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

FCC part 15 Subpart C

Receipt Date : 04/25/2023 Final Test Date :05/30/2023

Tested By:

Aug 29, 2023
Date

Bing Zhang / Project Engineer

Reviewed by:

Aug 29, 2023
Date

Bell Wei / Manager

Designation Number: TW2954
Test Firm Registration Number: 691065

2. REPORT OF MEASUREMENTS AND EXAMINATIONS

2.1 LIST OF MEASUREMENTS AND EXAMINATIONS

Test Result measurement is not including uncertainty.

FCC Rules	Item	Result
§15.203	Antenna Requirement	Compliance
§15.207	Conducted Emission	Compliance
§15.205 §15.209 §15.225	Radiated Emission	Compliance
§15.225(e)	Frequency Stability	Compliance
§15.215(c)	20dB Emission Bandwidth	Compliance

3. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

3.1 DESCRIPTION OF THE TESTED SAMPLES

EUT Name	:	RFID Reader
Model Number	:	SMC5238
FCC ID	:	2BBN4SMC5238
Input Voltage	:	DC 5V
Operate Frequency	:	13.56MHz
Antenna Type	:	Loop Antenna

3.3 TEST MODE AND TEST SOFTWARE

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.10-2013.

b. The complete test system included Adapter and EUT for RF test.

c. only the worst case was recorded in this report

Only radiated measurements are used (carried out) to show compliance with FCC limits for fundamental and spurious emissions.

3.4 TEST METHODOLOGY & GENERAL TEST PROCEDURES

All testing as described bellowed were performed in accordance with ANSI C63.10:2013 and FCC CFR 47 Part 15 Subpart C .

Conducted Emissions

The EUT is placed on a wood table, which is at 0.8 m above ground plane acceding to clause 15.207 and requirements of ANSI C63.10:2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz are using CISPR Quasi-Peak / Average detectors.

Radiated Emissions

The EUT is a placed on a turn table, which is 0.8 m above ground plane. The turntable was rotated through 360 degrees to determine the position of maximum emission level. The EUT is placed at 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

1)Putting the EUT on the platform and turning on the EUT (on/off button on the bottom of the EUT).
2)Setting test channel described as “Channel setting and operating condition”, and testing channel by channel.
3)For the maximum output power measurement, we followed the method of measurement ANSI C63.10.
4)For the spurious emission test based on ANSI C63.10, at the frequency where below 1GHz used quasi-peak detector mode; where above 1GHz used the peak and average detector mode. IF the peak value may be under average limit, the average mode will not be performed.

3.5 MEASUREMENT UNCERTAINTY

Measurement Item	Uncertainty
Conducted emission	±3.54dB
Peak Output Power(conducted)	±1.34dB
Occupied Bandwidth	±7333.3Hz
Radiated emission(3m)	±4.64dB

3.6 DESCRIPTION OF THE SUPPORT EQUIPMENTS

Setup Diagram

See test photographs attached in appendix 1 for the actual connections between EUT and support equipment.

Support Equipment

Peripherals Devices:

Description	Manufacturer	Model No.	Serial No.
Adapter	Mi	AD332	N/A

Note: All the above equipment /cable were placed in worse case position to maximize emission signals during emission test

Grounding: Grounding was in accordance with the manufacturer’ s requirement and conditions for the intended use.

4. TEST AND MEASUREMENT EQUIPMENT

4.1 CALIBRATION

The measuring equipment utilized to perform the tests documented in the report has been calibrated once a year or in accordance with the manufacturer’ s recommendations, and is traceable to recognized national standards.

4.2 EQUIPMENT

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and. Other required standards. Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective.

TABLELIST OF TEST AND MEASUREMENT EQUIPMENT

Conducted emission				
Instrument	Manufacturer	Model No.	Serial No.	Cali Due Date
EMI Test Receiver	R&S	ESHS10	830223/008	2023/11/30
Spectrum Analyzer	R&S	FSP3	833387/010	2024/03/09
Two-Line V-Network	R&S	NNB-2/16z	98062	2023/12/01
Test Cable	N/A	N/A	WH-CON03	2023/12/06
Measurement Software	AUDIX	e3	V6.101222a	N/A
Radiated emission Below 1GHz				
Instrument	Manufacturer	Model No.	Serial No.	Cali Due Date
Bilog antenna	CHASE	CBL 6111A	1546/JB-5-027	2023/12/25
LOOP Antenna	EMCO	6507	9301-1298	2024/03/22
Pre-amplifier	EMCI	EMC9135	980334	2023/08/09
Cable	EMCI	N male on end of both sides (EMI4)	30m	2024/03/20
Receiver	R&S	ESVS30	826006/002	2024/03/09
Spectrum Analyzer	R&S	FSP7	830180/009	2023/12/21
Measurement Software	AUDIX	e3	V6.101222a	N/A
Radiated emission Above 1GHz				
Instrument	Manufacturer	Model No.	Serial No.	Cali Due Date
Horn antenna	ETS LINDGREN	3117	00114397	2023/08/08
Horn antenna	com-power	AH-826	81000	2023/10/05
Horn antenna	Schwarzbeck	BBHA9170	#687	2023/06/15
Pre-amplifier	EMCI	EMC051845	980108	2023/06/01
Pre-amplifier	MITEQ	JS4-18002600-30-5A	808329	2023/10/06
Pre-amplifier	EMC INSTRUMENT	EMC264035SE	980288	2023/05/31
RF CABLE	SUCOFLEX	104PEA	33957/4PEA	2023/09/27
RF CABLE	AGILENT	EMC102-KM-KM-3000	160101	2023/09/27
RF CABLE	AGILENT	EMC102-KM-KM-600	160102	2023/09/27

Spectrum Analyzer	R&S	FSP7	830180/009	2023/12/21
Spectrum Analyzer	AGILENT	N9010A	MY51280195	2023/11/22
Spectrum Analyzer	ADVANTEST	R3182	150900201	2023/08/08
Temperature&Humidity Chamber	JY	JY-S-225L	850140	2024/02/15
Measurement Software	AUDIX	e3	V6.101222a	N/A

***CALIBRATION INTERVAL OF INSTRUMENTS LISTED ABOVE IS ONE YEAR**

5. ANTENNA REQUIREMENTS

5.1 STANDARD APPLICABLE

According to the FCC Part 15 Paragraph 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.

5.2 ANTENNA CONSTRUCTION

The EUT has an integral antenna, which was permanently attached; fulfill the requirement of this section.Please see EUT photo for details.

Only radiated measurements are used (carried out) to show compliance with FCC limits for fundamental and spurious emissions.

6. TEST OF CONDUCTED EMISSION

6.1 TEST LIMIT

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.10-2013 The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure.The specification used was with the FCC Part 15.207 limits

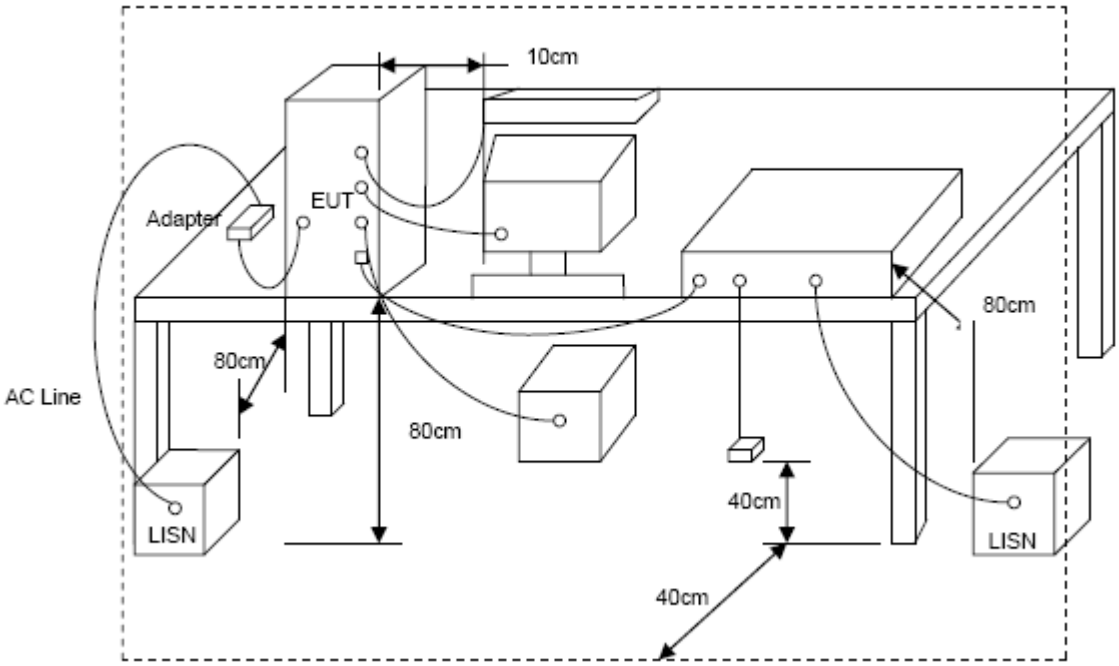
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

6.2 TEST PROCEDURES

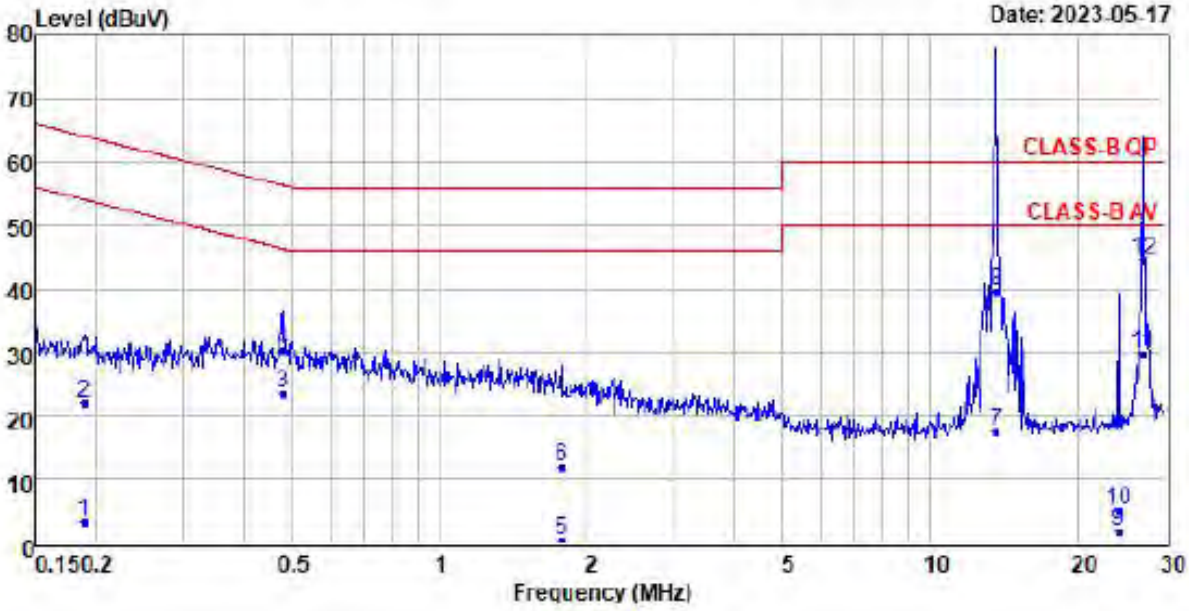
a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 kHz to 30 MHz was searched.
h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

6.3 TYPICAL TEST SETUP



6.4 TEST RESULT AND DATA TEST OF CONDUCTED EMISSION

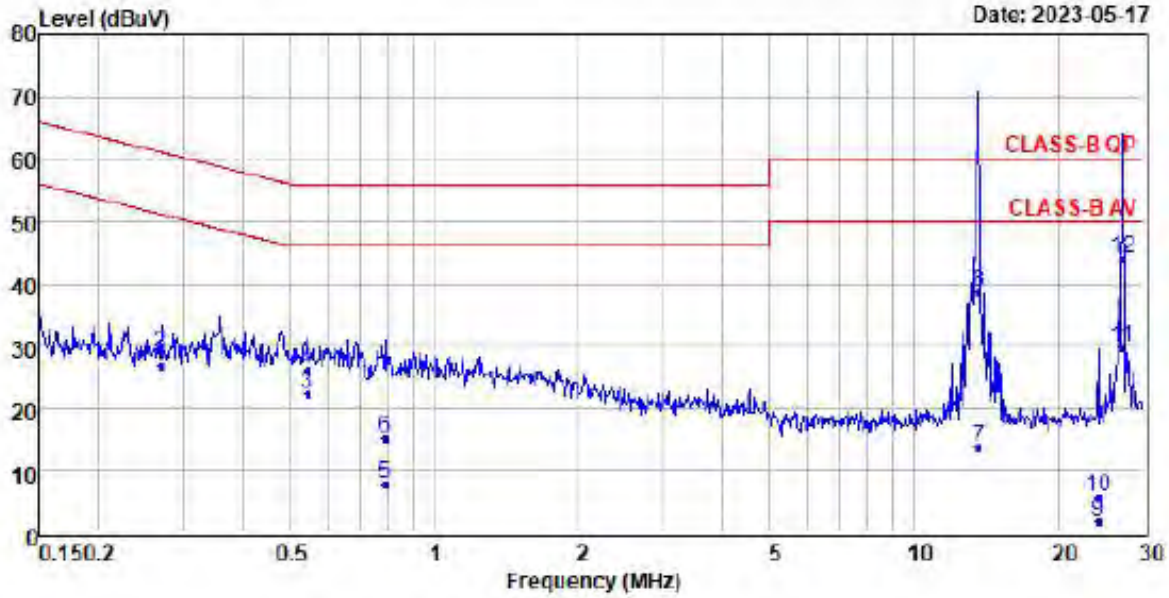
Power	:	DC 5V	Pol/Phase	:	LINE
Test Mode	:	NFC	Temperature	:	24.4 ℃
Memo	:		Humidity	:	55 %



Remarks : Factor=Inserrion loss+Cablc loss

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.19	-6.82	10.11	3.29	54.11	-50.82	Average
2	0.19	11.90	10.11	22.01	64.11	-42.10	QP
3	0.48	13.27	10.12	23.39	46.36	-22.97	Average
4	0.48	20.28	10.12	30.40	56.36	-25.96	QP
5	1.77	-9.89	10.18	0.29	46.00	-45.71	Average
6	1.77	1.64	10.18	11.82	56.00	-44.18	QP
7	13.62	7.20	10.44	17.64	50.00	-32.36	Average
8	13.62	29.02	10.44	39.46	60.00	-20.54	QP
9	24.14	-8.84	10.65	1.81	50.00	-48.19	Average
10	24.14	-5.56	10.65	5.09	60.00	-54.91	QP
11	27.13	18.94	10.72	29.66	50.00	-20.34	Average
12 @	27.13	33.82	10.72	44.54	60.00	-15.46	QP

Power	:	DC 5V	Pol/Phase	:	NEUTRAL
Test Mode	:	NFC	Temperature	:	24.4 ℃
Memo	:		Humidity	:	55 %



Remarks : Factor=Insertion loss+Cable loss

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.27	16.54	10.09	26.63	51.16	-24.53	Average
2	0.27	18.87	10.09	28.96	61.16	-32.20	QP
3	0.54	12.14	10.12	22.26	46.00	-23.74	Average
4	0.54	16.06	10.12	26.18	56.00	-29.82	QP
5	0.79	-2.49	10.13	7.64	46.00	-38.36	Average
6	0.79	5.12	10.13	15.25	56.00	-40.75	QP
7	13.62	3.30	10.40	13.70	50.00	-36.30	Average
8	13.62	28.24	10.40	38.64	60.00	-21.36	QP
9	24.14	-8.85	10.54	1.69	50.00	-48.31	Average
10	24.14	-4.89	10.54	5.65	60.00	-54.35	QP
11	27.13	19.13	10.58	29.71	50.00	-20.29	Average
12 @	27.13	33.43	10.58	44.01	60.00	-15.99	QP

6.5 TEST LIMIT

As per FCC Part 15.225

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/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

6.6 TEST PROCEDURES

a. The EUT was placed on a rotatable table top 0.8 meter above ground.

b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.

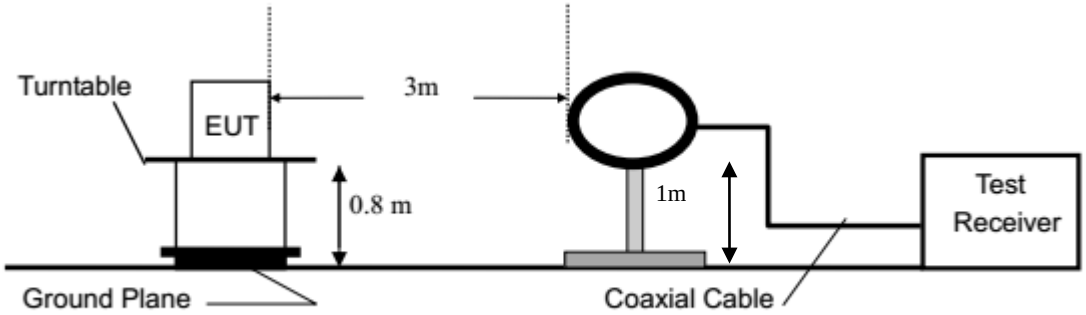
c. The table was rotated 360 degrees to determine the position of the highest radiation.

d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.

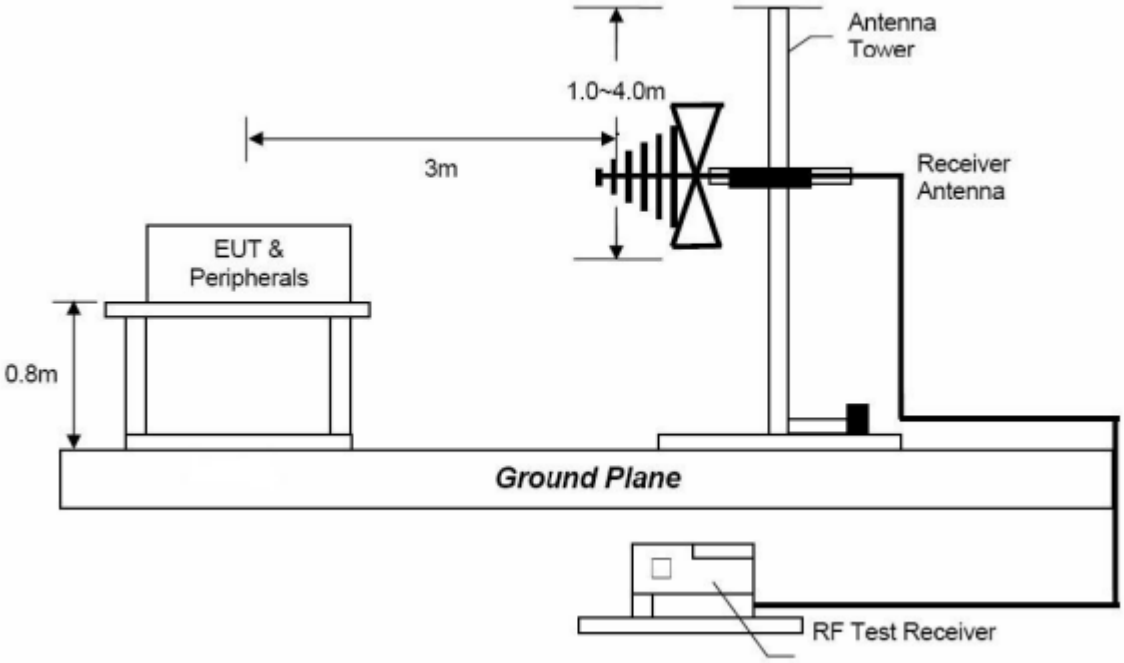
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower thanaverage limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
i. “Cone of radiation” has been considered to be 3dB bandwidth of the measurement antenna.

6.7 TYPICAL TEST SETUP

Radiated Emission Test Set-Up, Frequency Below 30MHz

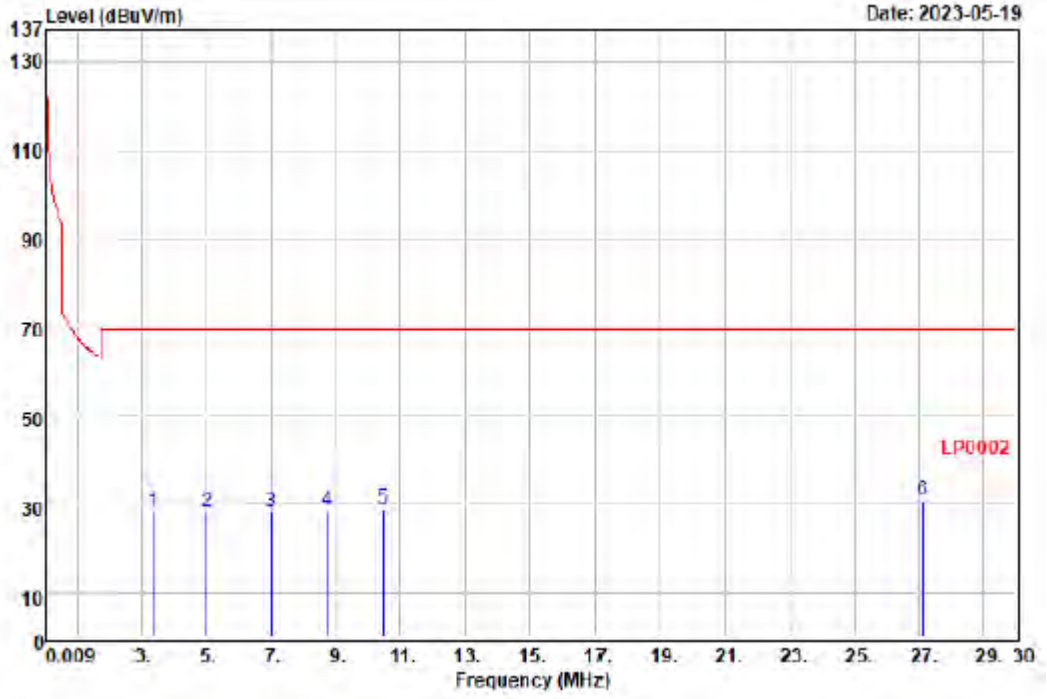


Radiated Emission Test Set-Up, Frequency 30MHz-1000MHz



6.8 TEST RESULT AND DATA (9KHZ ~ 30MHZ)

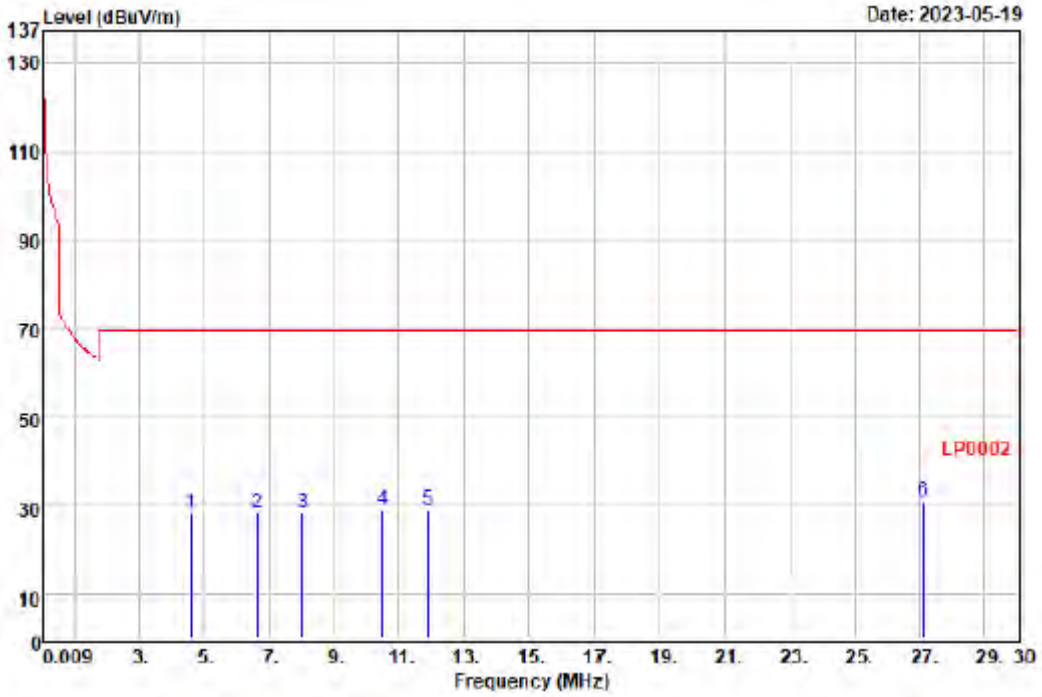
Power	:	DC 5V	Pol/Phase	:	and ground-parallel
Test Mode	:	TX 13.56MHz	Temperature	:	24 ℃
Memo	:		Humidity	:	70 %



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	3.340	42.29	-14.18	28.11	69.50	-41.39	QP
2	5.010	42.75	-14.51	28.24	69.50	-41.26	QP
3	6.990	43.98	-15.63	28.35	69.50	-41.15	QP
4	8.750	44.16	-15.40	28.76	69.50	-40.74	QP
5	10.460	44.86	-15.83	29.03	69.50	-40.47	QP
6 @	27.120	46.95	-16.02	30.93	69.50	-38.57	QP

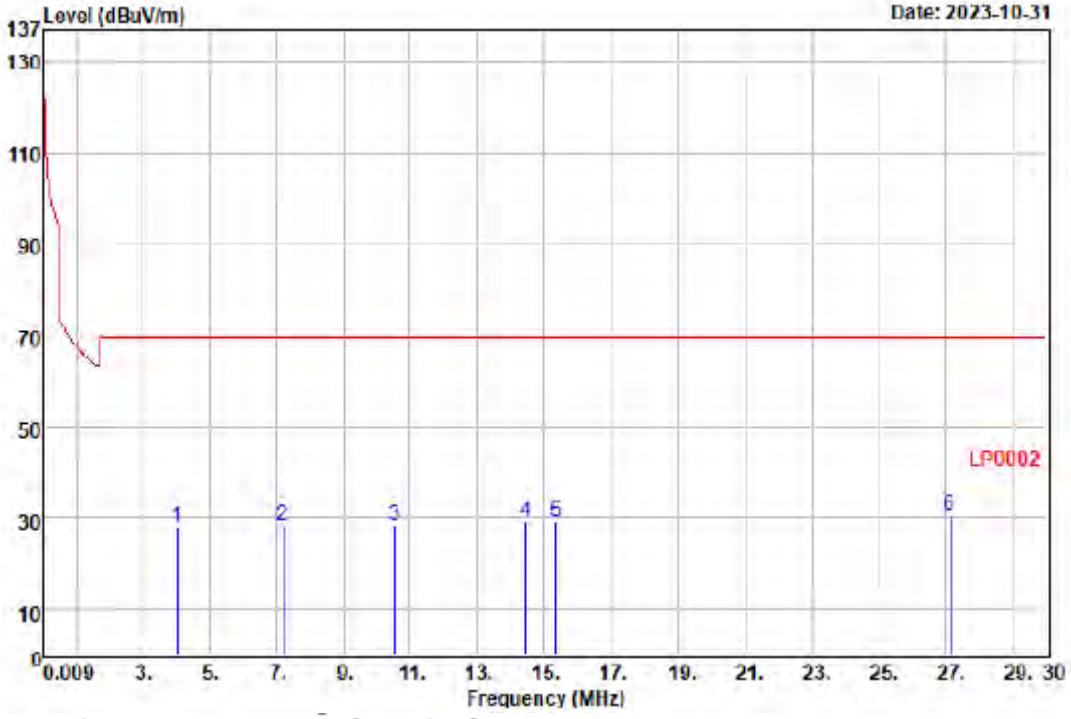
Power	:	DC 5V	Pol/Phase	:	parallel
Test Mode	:	TX 13.56MHz	Temperature	:	24 ℃
Memo	:		Humidity	:	70 %



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor+Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	4.580	42.64	-14.44	28.20	69.50	-41.30	QP
2	6.630	43.99	-15.64	28.35	69.50	-41.15	QP
3	8.020	43.93	-15.50	28.43	69.50	-41.07	QP
4	10.480	44.91	-15.84	29.07	69.50	-40.43	QP
5	11.900	44.91	-15.90	29.01	69.50	-40.49	QP
6 @	27.120	46.71	-16.02	30.69	69.50	-38.81	QP

Power	:	DC 5V	Pol/Phase	:	perpendicular
Test Mode	:	TX 13.56MHz	Temperature	:	24 ℃
Memo	:		Humidity	:	70 %

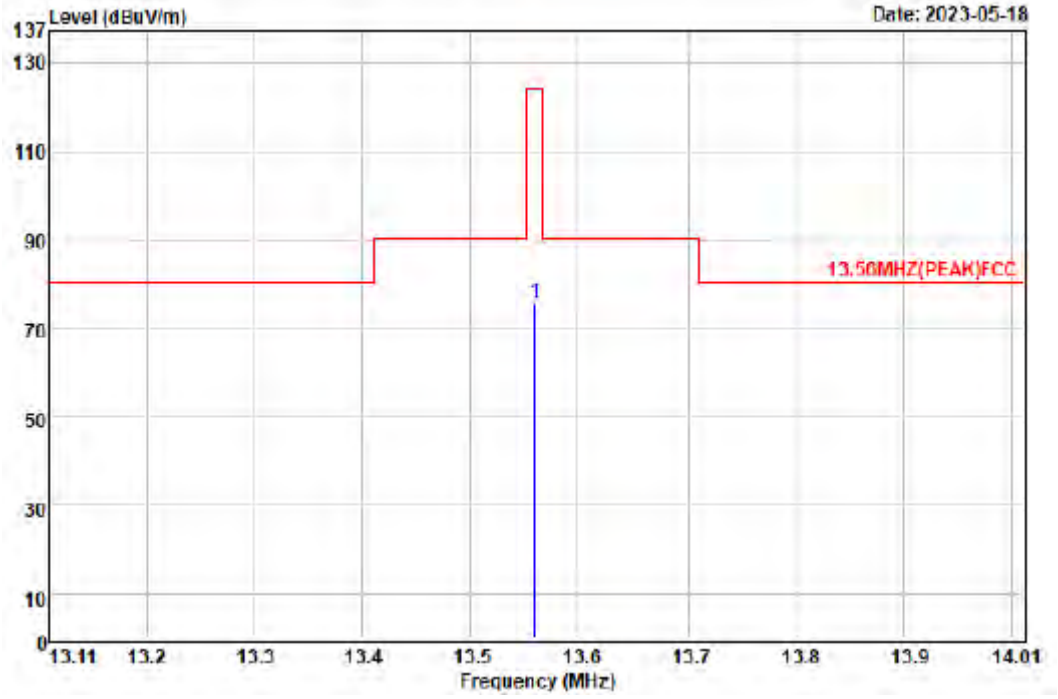


Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	4.020	42.37	-14.34	28.03	69.50	-41.47	QP
2	7.190	43.79	-15.60	28.19	69.50	-41.31	QP
3	10.550	44.20	-15.84	28.36	69.50	-41.14	QP
4	14.470	44.54	-15.54	29.00	69.50	-40.50	QP
5	15.380	44.71	-15.64	29.07	69.50	-40.43	QP
6 @	27.120	46.63	-16.02	30.61	69.50	-38.89	QP

6.9 TEST RESULT AND DATA (FUNDAMENTAL)

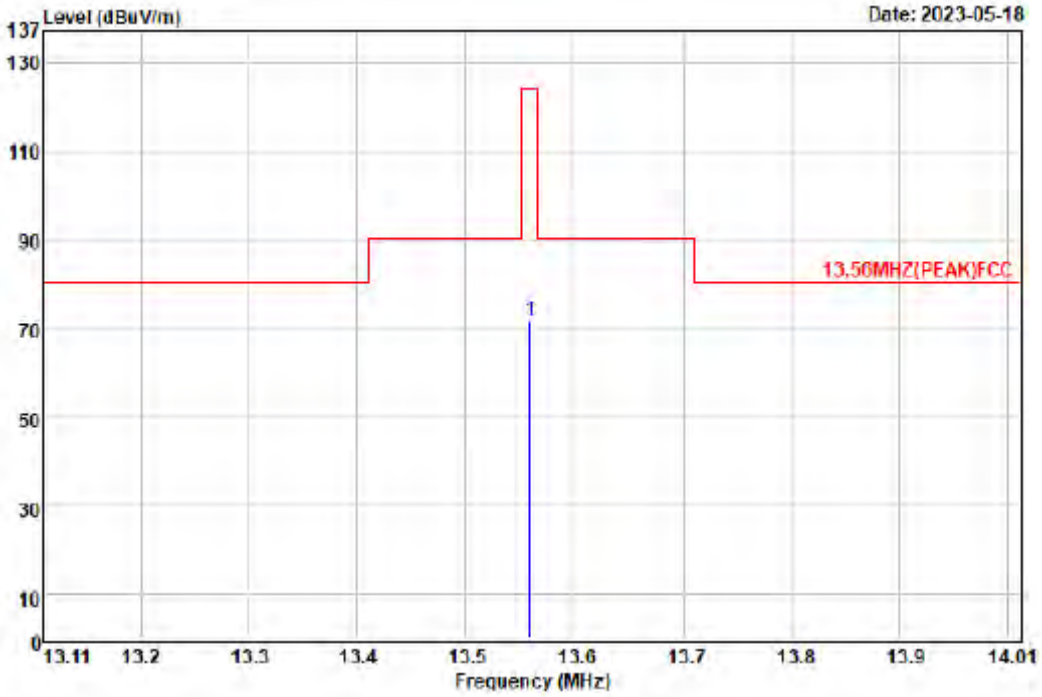
Power	:	DC 5V	Pol/Phase	:	and ground-parallel
Test Mode	:	TX 13.56MHz	Temperature	:	24 ℃
Memo	:		Humidity	:	70 %



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1 @	13.560	91.12	-15.60	75.52	124.00	-48.48	QP

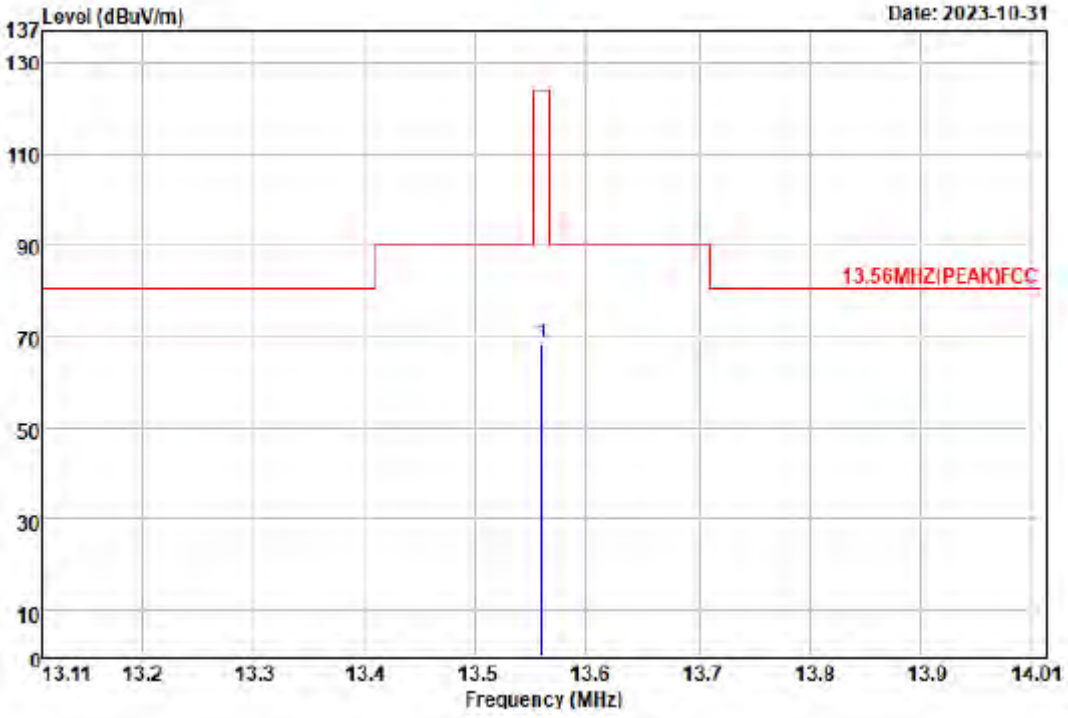
Power	:	DC 5V	Pol/Phase	:	parallel
Test Mode	:	TX 13.56MHz	Temperature	:	24 ℃
Memo	:		Humidity	:	70 %



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor+Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1 @	13.560	87.33	-15.60	71.73	124.00	-52.27	QP

Power	:	DC 5V	Pol/Phase	:	perpendicular
Test Mode	:	TX 13.56MHz	Temperature	:	24 ℃
Memo	:		Humidity	:	70 %

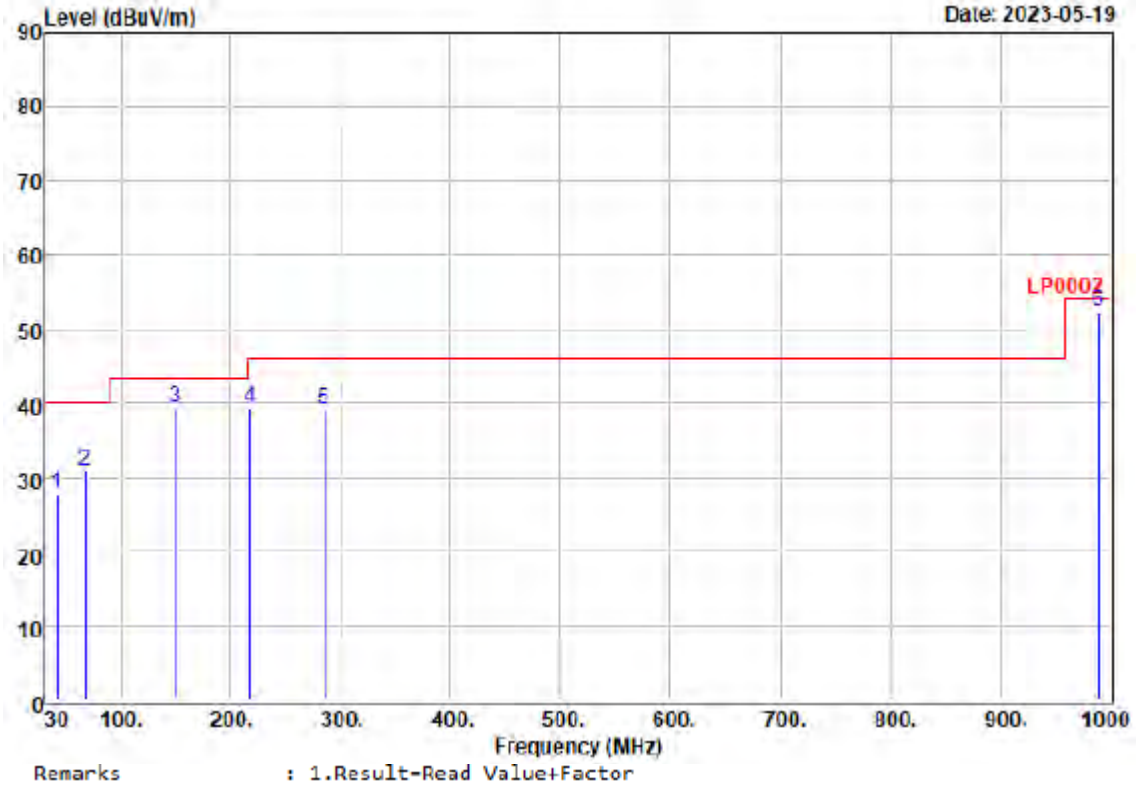


Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1 @	13.560	83.97	-15.60	68.37	124.00	-55.63	QP

6.10 TEST RESULT AND DATA (30MHZ ~ 1GHZ, WORST EMISSIONS FOUND)

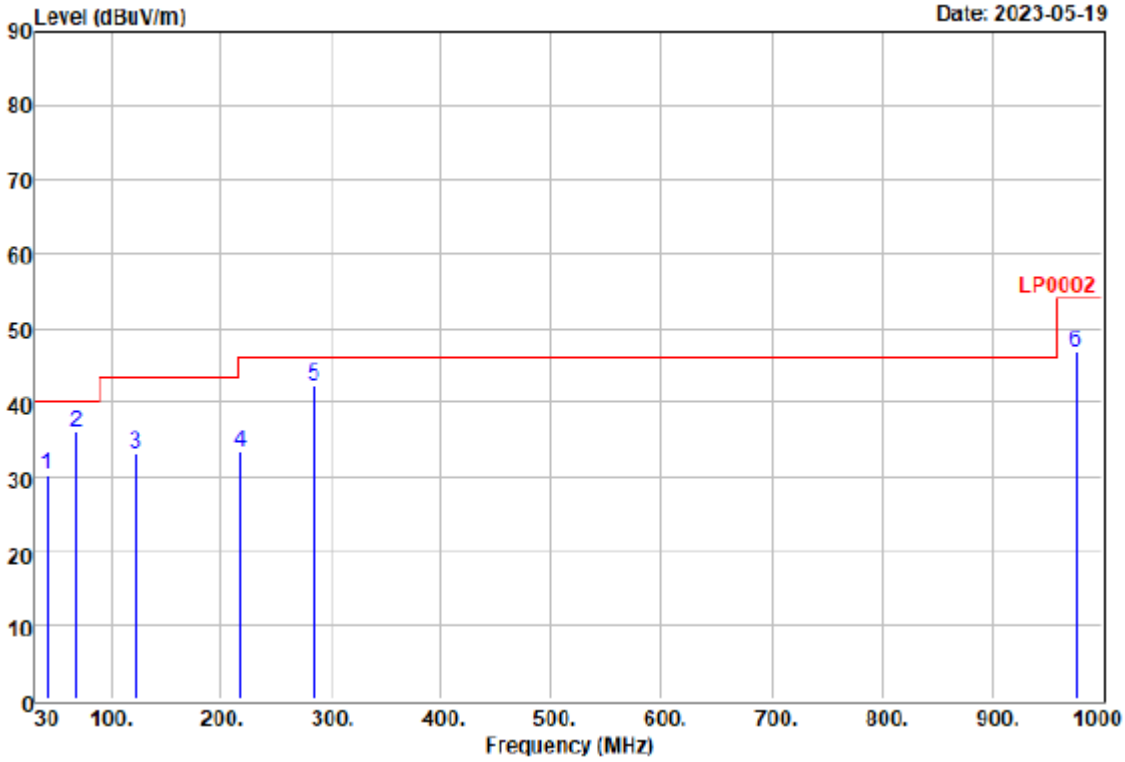
Power	:	DC 5V	Pol/Phase	:	HORIZONTAL
Test Mode	:	TX 13.56MHz	Temperature	:	24 ℃
Memo	:		Humidity	:	70 %



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	40.900	44.92	-17.25	27.67	40.00	-12.33	QP
2	67.430	55.01	-24.18	30.83	40.00	-9.17	QP
3	149.770	56.69	-17.38	39.31	43.50	-4.19	QP
4	217.500	57.40	-18.19	39.21	46.00	-6.79	QP
5	284.830	53.65	-14.51	39.14	46.00	-6.86	QP
6 @	990.030	52.06	0.27	52.33	54.00	-1.67	QP

Power	:	DC 5V	Pol/Phase	:	VERTICAL
Test Mode	:	TX 13.56MHz	Temperature	:	24 ℃
Memo	:		Humidity	:	70 %



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1		40.610	47.18	-16.96	30.22	40.00	-9.78	QP
2		67.510	60.01	-24.16	35.85	40.00	-4.15	QP
3		121.960	50.86	-17.75	33.11	43.50	-10.39	QP
4		217.690	51.39	-18.18	33.21	46.00	-12.79	QP
5	@	284.250	56.72	-14.53	42.19	46.00	-3.81	QP
6		976.900	46.84	-0.10	46.74	54.00	-7.26	QP

7. FREQUENCY STABILITY

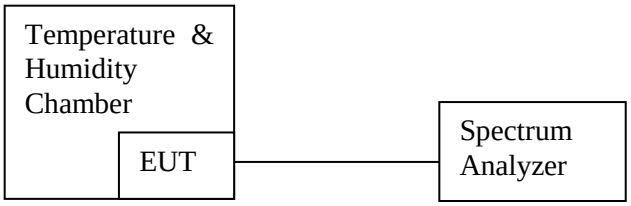
7.1 TEST LIMIT

As per FCC Part 15.225(e)
The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

7.2 TEST PROCEDURE

Frequency Stability vs. Temperature: The equipment under test was powered by new battery and placed inside the temperature chamber. To monitor the variable frequency, loop antenna was connected to a Spectrum Analyzer.
After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.
Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 85% to 115% of the rated supply voltage. The output frequency was recorded for each voltage.

7.3 TEST SETUP



7.4 TEST RESULT AND DATA

Test Date: May 19, 2023 Temperature: 24℃

Atmospheric pressure: 101.0kPa Humidity: 58%

Power Supply(Vdc)	TEMP(℃)	Measured Frequency (MHz)			
		0 min	2 min	5 min	10 min
5	-20	13.56005	13.56005	13.56006	13.56005
	-10	13.56004	13.56005	13.56004	13.56003
	0	13.56005	13.56006	13.56005	13.56004
	10	13.56005	13.56006	13.56005	13.56004
	20	13.56004	13.56005	13.56006	13.56005
	30	13.56003	13.56004	13.56005	13.56004
	40	13.56003	13.56003	13.56004	13.56004
	50	13.56004	13.56005	13.56004	13.56003
4.25	20	13.56005	13.56003	13.56004	13.56003
5.75		13.56003	13.56004	13.56003	13.56002
Maximum Frequency Drift(MHz)		0.000060			
Maximum difference value(ppm)		4.4248			
Limit(ppm)		100			
Test Result		PASS			

8. 20dB EMISSION BANDWIDTH

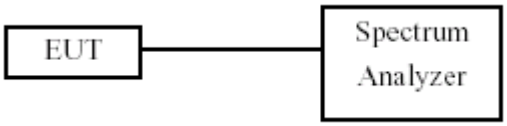
8.1 TEST LIMIT

As Per 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-ofband operation.

8.2 TEST PROCEDURE

a. The transmitter output was connected to the spectrum analyzer.
b. Set RBW of spectrum analyzer to 1k of the emission bandwidth and VBW ≥ 3x RBW.
c. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.
d. The 20dB Bandwidth was measured and recorded.

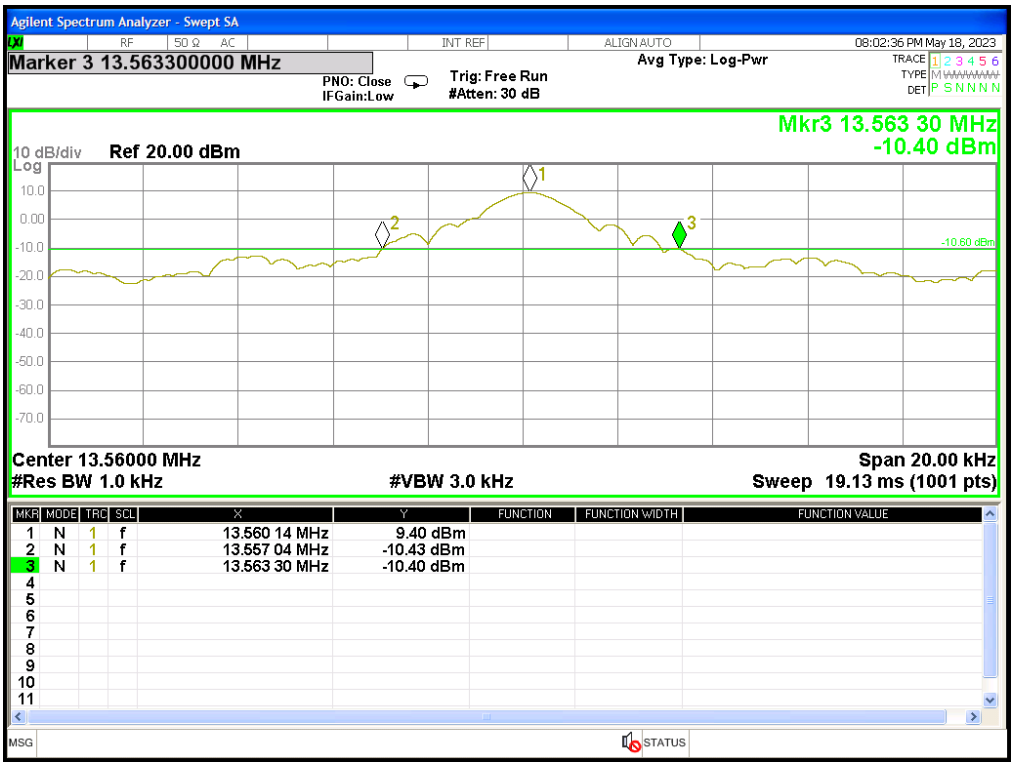
8.3 TEST SETUP



8.4 TEST RESULT AND DATA

Test Date: May 19, 2023 Temperature: 24℃
Atmospheric pressure: 101.0kPa Humidity: 58%

Test result: PASS


Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
INT REF
ALIGN AUTO
08:02:36 PM May 18, 2023
Marker 3 13.563300000 MHz
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE M
DET P S N N N N
Mkr3 13.563 30 MHz
-10.40 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-10.60 dBm
Center 13.56000 MHz
#Res BW 1.0 kHz
#VBW 3.0 kHz
Span 20.00 kHz
Sweep 19.13 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 13.560 14 MHz 9.40 dBm
2 N 1 f 13.557 04 MHz -10.43 dBm
3 N 1 f 13.563 30 MHz -10.40 dBm
4
5
6
7
8
9
10
11
MSG
STATUS

9. RESTRICTED BANDS OF OPERATION

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.150
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

**: Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

9.1 LABELING REQUIREMENT

The device shall bear the following statement in a conspicuous location on the device: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

--END---