

Prüfbericht-Nr.: Test report no.:	CN21A16N 001	Auftrags-Nr.: Order no.:	244368151	Seite 1 von 17 Page 1 of 17
Kunden-Referenz-Nr.: Client reference no.:	2108149	Auftragsdatum: Order date:	2021-10-20	
Auftraggeber: Client:	Beijing Niu Technology Co.,Ltd. Block A, 11F, No.10 Wangjing street, Chaoyang, 100102 Beijing, China			
Prüfgegenstand: Test item:	Remote Controller			
Bezeichnung / Typ-Nr.: Identification / Type no.:	P01 FCC ID: 2AQ95-NIUP01			
Auftrags-Inhalt: Order content:	Complete test			
Prüfgrundlage: Test specification:	FCC CFR47 Part 15, Subpart C Section 15.231 ANSI C63.10: 2013			
Wareneingangsdatum: Date of sample receipt:	2021-10-28			
Prüfmuster-Nr.: Test sample no.:	A003153747-002			
Prüfzeitraum: Testing period:	Refer to test report			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	X <u>Weidong Wang</u> Signed by: Weidong Wang		genehmigt von: authorized by:	X <u>Hongfei Wu</u> Signed by: Hongfei Wu
Datum: Date:	2022-01-18	Ausstellungsdatum: Issue date:	2022-01-18	
Stellung / Position:	PE	Stellung / Position:	Reviewer	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

Prüfbericht - Nr.: CN21A16N 001
Test Report No.

Seite 2 von 17
Page 2 of 17

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 20dB BANDWIDTH

RESULT: Pass

5.1.3 DEACTIVATION TIME

RESULT: Pass

5.1.4 CONDUCTED EMISSION

RESULT: N/A

5.1.5 FIELD STRENGTH OF FUNDAMENTAL AND RADIATED SPURIOUS EMISSION

RESULT: Pass

Contents

1.	GENERAL REMARKS	4
1.1	COMPLEMENTARY MATERIALS.....	4
2.	TEST SITES	4
2.1	TEST FACILITIES	4
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	5
2.3	TRACEABILITY	5
2.4	CALIBRATION	5
2.5	MEASUREMENT UNCERTAINTY	5
3.	GENERAL PRODUCT INFORMATION.....	6
3.1	PRODUCT FUNCTION AND INTENDED USE	6
3.2	RATINGS AND SYSTEM DETAILS.....	6
3.3	INDEPENDENT OPERATION MODES.....	6
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	7
3.5	SUBMITTED DOCUMENTS.....	7
4.	TEST SET-UP AND OPERATION MODES.....	8
4.1	PRINCIPLE OF CONFIGURATION SELECTION	8
4.2	TEST OPERATION AND TEST SOFTWARE.....	8
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	8
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	8
5.	TEST RESULTS	9
5.1	CONDUCTED TESTING AT ANTENNA PORT	9
5.1.1	Antenna Requirement	9
5.1.2	20dB Bandwidth	10
5.1.3	Deactivation Time	11
5.1.4	Conducted Emission	12
5.1.5	Field strength of fundamental and Radiated Spurious Emission	13
6.	LIST OF TABLES	17
7.	LIST OF FIGURES	17

1. General Remarks

1.1 Complementary Materials

Null.

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shanghai) Co., Ltd.
Shanghai TUV Rheinland Building No. 177, 178 Lane 777, West Guangzhong Rd, Jing'an District, Shanghai, China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 958801.

The Innovation, Science and Economic Development Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under chambers filing number 2932F.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
3m modified semi-anechoic chamber	Frankonia	SAC3	G1811378	2022-06-27
Bilog antenna	Teseq	CBL 6112D	G1811425	2023-03-10
EMI test receiver	Rohde & Schwarz	ESCI	G1811402	2022-09-01
Spectrum analyser	Rohde & Schwarz	FSV40	G1822702	2023-11-04
Preamplifier	Taiwan EMCI	EMC184045SE	G1825372	2023-05-14
HF loop antenna	Schaffner	HLA6120	G1822700	2024-02-03
Log periodic antenna	Rohde & Schwarz	HL050	G1811417	2023-03-10
Broadband Horn Antenna	Schwarzbeck	BBHA 9170	9170-305	2023-07-08
Preamplifier	Taiwan EMCI	EMC051845SE	G1825371	2023-05-14
Spectrum Analyzer	Keysight	N9020A	MY54500180	2022-09-08

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Radiated Emission	9kHz – 30MHz	±2.93dB
	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a Remote Controller working on the frequency of 433.92MHz and 125kHz.

The aim of this report is to evaluate 433.92MHz transmitter of the EUT for FCC Part 15C.

For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Description of EUT	
Product Name:	Remote Controller
Model No.:	P01
Operating Voltage:	DC 3V (CR2032)
Technical Specification of Transmitter	
Frequency Range:	433.92MHz
Modulation Type:	FSK
Antenna Type:	PCB Antenna
Antenna Gain:	0dBi (Provided by the Client)
Technical Specification of Receiver	
Frequency Range:	125kHz

3.3 Independent Operation Modes

Table 4: Independent Operation Modes

Test Mode	Channel Frequency [MHz]	Mode
TM1	433.92	Transmitting continually
TM2	433.92	Normal operation

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Circuit Diagram
- Instruction Manual
- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Null.

4.3 Special Accessories and Auxiliary Equipment

Null.

4.4 Countermeasures to achieve EMC Compliance

Null.

5. Test Results

5.1 Conducted Testing at Antenna Port

5.1.1 Antenna Requirement

RESULT:**Pass**

According to the manufacturer declared, the EUT has one PCB antenna, the directional gain of antenna is 0 dBi and the antenna is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Table 5: Antenna Requirement**FCC 15.203 – Antenna Requirement 1**

Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	Antenna type:	PCB Antenna
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2

Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.	
Results:	Only one PCB antenna can be used	
Verdict:	Pass	

5.1.2 20dB Bandwidth

RESULT:

Pass

Date of testing	:	2021-11-30
Ambient temperature	:	21.8°C
Relative humidity	:	51.7%
Atmospheric pressure	:	101kPa
Test requirement	:	FCC Part 15.231(c)
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 3V
Test modes applied	:	TM1

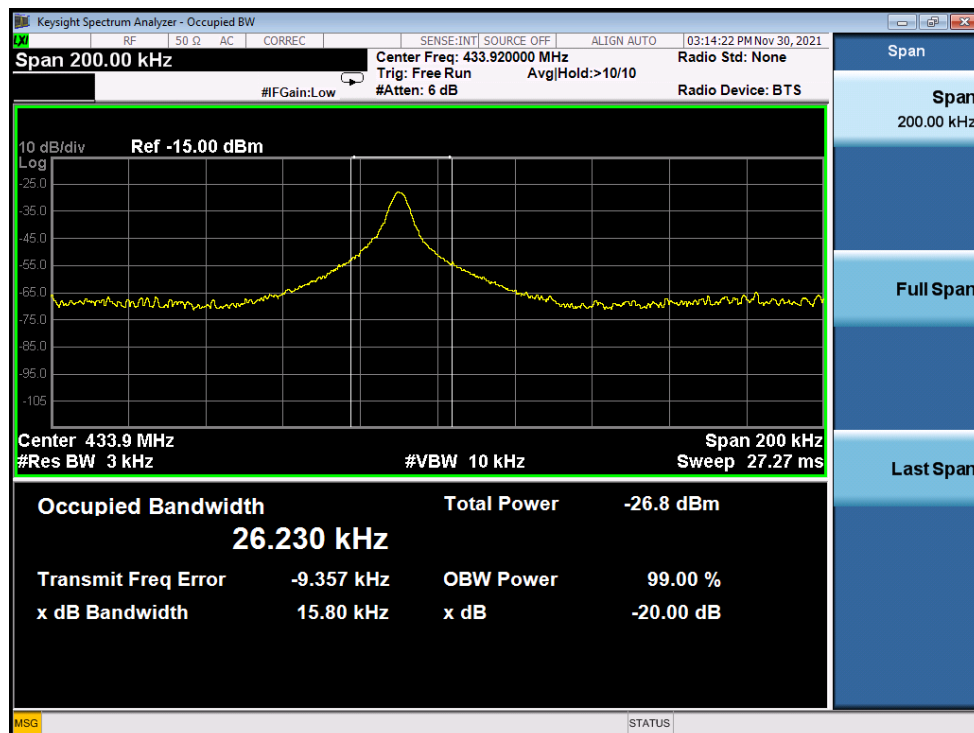
Table 6: 20dB Bandwidth

Channel Frequency [MHz]	20dB Bandwidth [KHz]	Limit [KHz]	Result
433.92	26.23	1084.8	Pass

Note:

$$\text{Limit} = 433920 \text{ KHz} \times 0.25\% = 1084.8 \text{ KHz}$$

Figure 1: 20dB Bandwidth



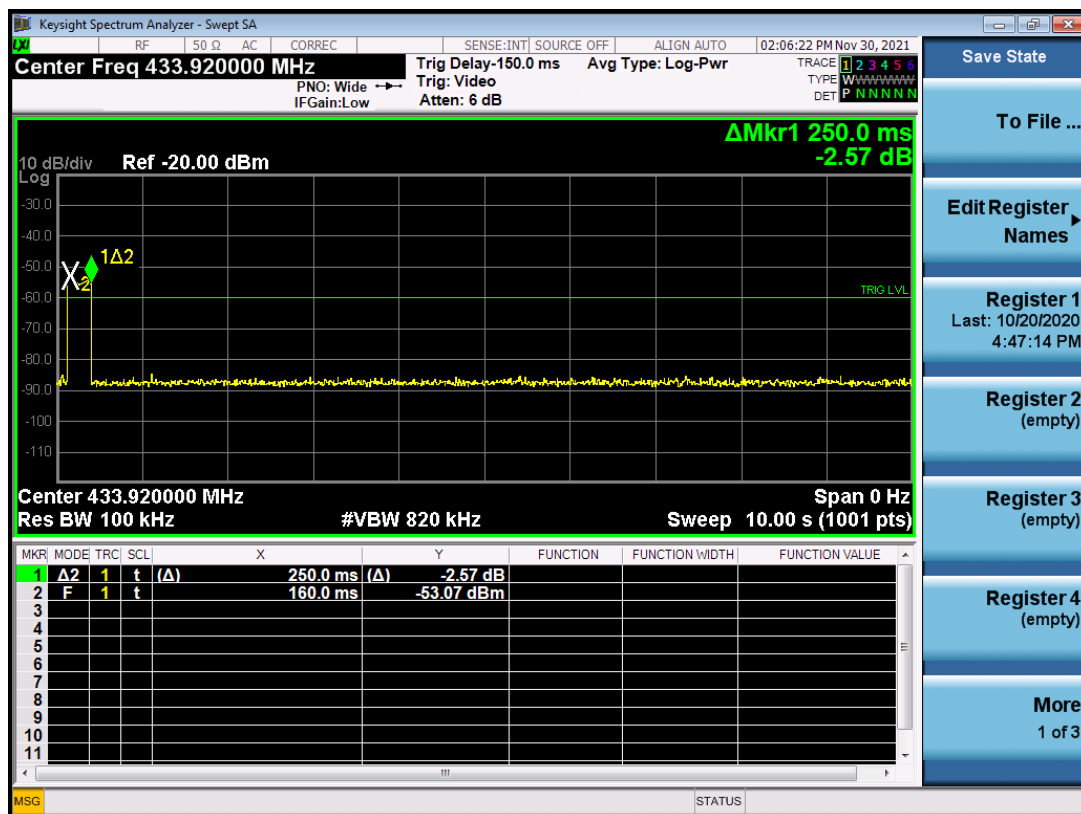
5.1.3 Deactivation Time

RESULT:
Pass

Date of testing : 2021-11-30
 Ambient temperature : 21.8°C
 Relative humidity : 51.7%
 Atmospheric pressure : 101kPa
 Test requirement : FCC Part 15.231(a)(1)
 Test procedure : ANSI C63.10: 2013
 Test voltage : DC 3V
 Test modes applied : TM2

Table 7: Deactivation Time

On Transmission Time [s]	Limit [s]	Result
0.25	< 5	Pass

Figure 2: Deactivation Time


5.1.4 Conducted Emission

RESULT:**N/A**

Test requirement : FCC Part 15.207 (a)

Test procedure : ANSI C63.10: 2013

Note:

This product is power by battery.

So, this test is not applicable

5.1.5 Field strength of fundamental and Radiated Spurious Emission

RESULT:

Pass

Date of testing : 2021-11-30~2021-12-22
 Ambient temperature : 21.8°C
 Relative humidity : 51.7%
 Atmospheric pressure : 101kPa
 Test requirement : FCC Part 15.205
 FCC Part 15.209
 FCC Part 15.231(b)
 Test procedure : ANSI C63.10: 2013
 Test voltage : DC 3V
 Test modes applied : TM1 for Field strength of fundamental and Radiated Spurious Emission
 TM2 for Duty Cycle

Table 8: Duty Cycle

Frequency [MHz]	Total Time (Ton) [ms]	The duration of one cycle [ms]	Duty Cycle	Duty Cycle Factor [dB]
433.92	35.1	100	35.1%	-9.1

Note:

Total Time (Ton)=61*0.3ms+24*0.7ms=35.1ms

Duty Cycle Factor = 20*Log(Duty Cycle)

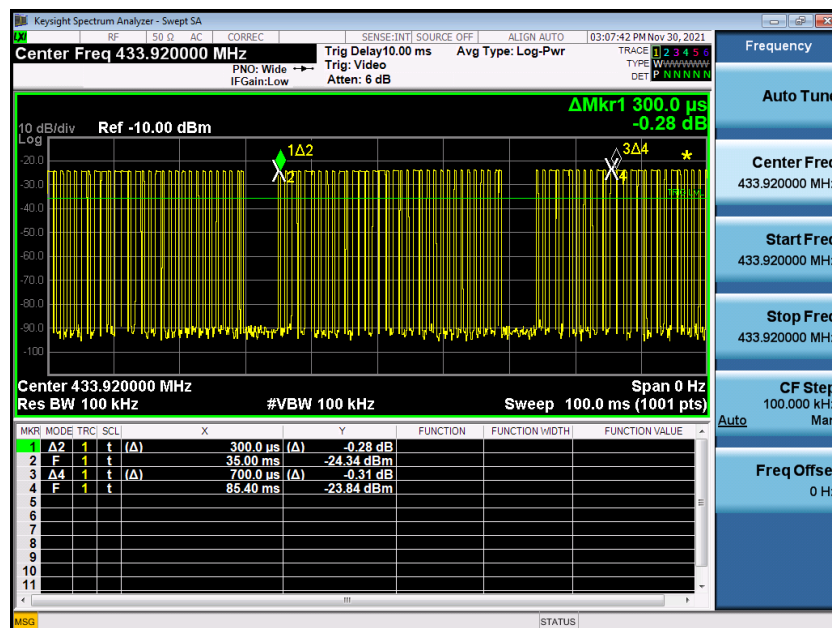
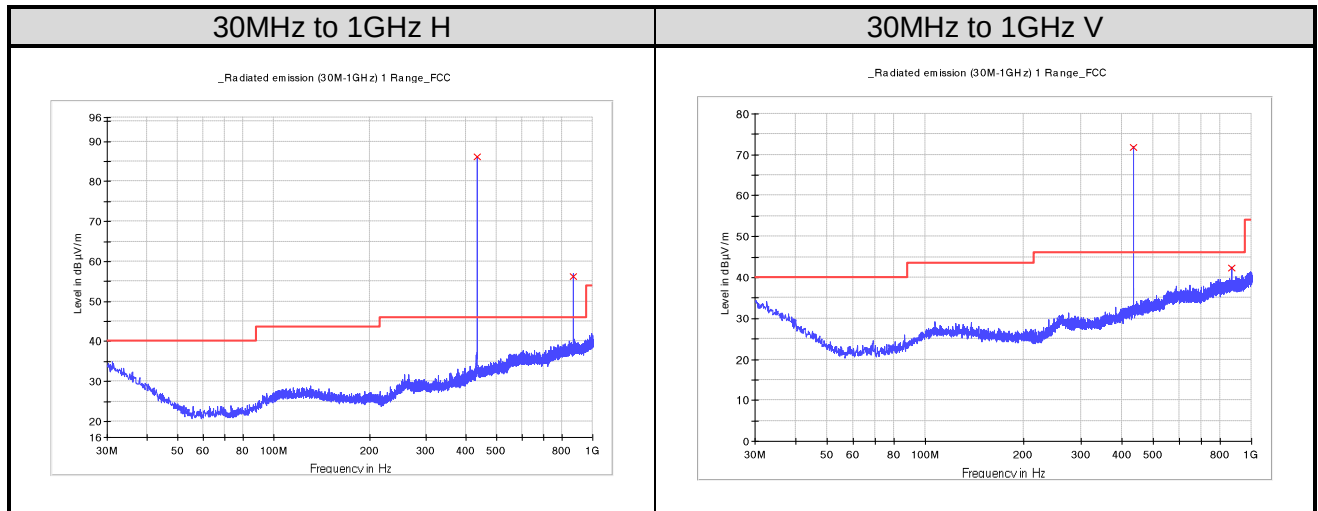
Figure 3: Duty Cycle


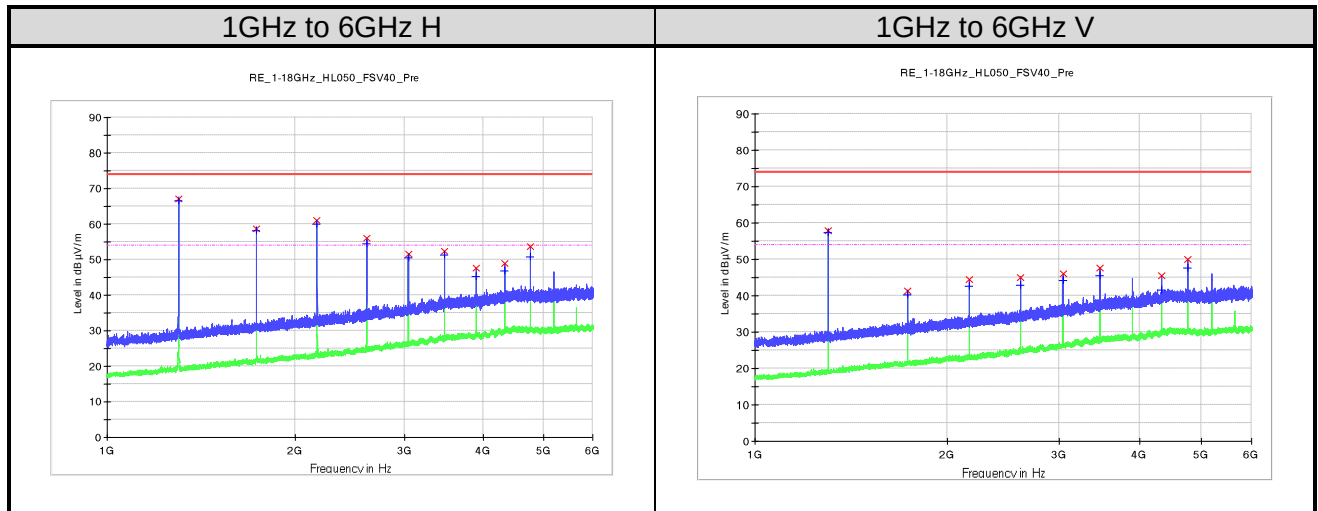
Figure 4: Field strength of fundamental and Radiated Spurious Emission, 30MHz to 1GHz


Limit and Margin

Frequency [MHz]	MaxPeak [dBuV/m]	Duty Cycle Factor [dB]	Average [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
433.883750	86.1	N/A	N/A	100.8	-14.7	PK	H
433.883750	86.1	-9.1	77.0	80.8	-3.8	AV	H
867.837500	56.3	N/A	N/A	80.8	-24.5	PK	H
867.837500	56.3	-9.1	47.2	60.8	-13.6	AV	H

Frequency [MHz]	MaxPeak [dBuV/m]	Duty Cycle Factor [dB]	Average [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
433.883750	71.9	N/A	N/A	100.8	-28.9	PK	V
433.883750	71.9	-9.1	62.8	80.8	-18.0	AV	V
867.837500	42.3	N/A	N/A	80.8	-38.5	PK	V
867.837500	42.3	-9.1	33.2	60.8	-27.6	AV	V

Note: Average Level= MaxPeak Level + Duty Cycle Factor

Figure 5: Field strength of fundamental and Radiated Spurious Emission, 1GHz to 6GHz


Limit and Margin

Frequency [MHz]	MaxPeak [dBuV/m]	Duty Cycle Factor [dB]	Average [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
1301.500000	67.1	N/A	N/A	80.8	-13.7	PK	H
1301.500000	67.1	-9.1	58.0	60.8	-2.8	AV	H
1735.500000	58.6	N/A	N/A	80.8	-22.2	PK	H
1735.500000	58.6	-9.1	49.5	60.8	-11.3	AV	H
2169.500000	61.0	N/A	N/A	80.8	-19.8	PK	H
2169.500000	61.0	-9.1	51.9	60.8	-8.9	AV	H
2603.250000	56.0	N/A	N/A	80.8	-24.8	PK	H
2603.250000	56.0	-9.1	46.9	60.8	-13.9	AV	H
3037.500000	51.5	N/A	N/A	80.8	-29.3	PK	H
3037.500000	51.5	-9.1	42.4	60.8	-18.4	AV	H
3471.250000	52.3	N/A	N/A	80.8	-28.5	PK	H
3471.250000	52.3	-9.1	43.2	60.8	-17.6	AV	H
3905.000000	47.6	N/A	N/A	80.8	-33.2	PK	H
3905.000000	47.6	-9.1	38.5	60.8	-22.3	AV	H
4339.250000	49.1	N/A	N/A	80.8	-31.7	PK	H
4340.250000	49.1	-9.1	40.0	60.8	-20.8	AV	H
4772.750000	53.6	N/A	N/A	80.8	-27.2	PK	H
4773.750000	53.6	-9.1	44.5	60.8	-16.3	AV	H

Note: Average Level= MaxPeak Level + Duty Cycle Factor

Limit and Margin

Frequency [MHz]	MaxPeak [dBuV/m]	Duty Cycle Factor [dB]	Average [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
1301.500000	58.0	N/A	N/A	80.8	-22.8	PK	V
1301.500000	58.0	-9.1	48.9	60.8	-11.9	AV	V
1735.500000	41.4	N/A	N/A	80.8	-39.4	PK	V
1735.500000	41.4	-9.1	32.3	60.8	-28.5	AV	V
2169.500000	44.5	N/A	N/A	80.8	-36.3	PK	V
2169.500000	44.5	-9.1	35.4	60.8	-25.4	AV	V
2603.250000	45.1	N/A	N/A	80.8	-35.7	PK	V
2603.250000	45.1	-9.1	36.0	60.8	-24.8	AV	V
3037.500000	46.1	N/A	N/A	80.8	-34.7	PK	V
3037.500000	46.1	-9.1	37.0	60.8	-23.8	AV	V
3471.250000	47.6	N/A	N/A	80.8	-33.2	PK	V
3471.250000	47.6	-9.1	38.5	60.8	-22.3	AV	V
4339.000000	45.4	N/A	N/A	80.8	-35.4	PK	V
4339.000000	45.4	-9.1	36.3	60.8	-24.5	AV	V
4773.250000	50.1	N/A	N/A	80.8	-30.7	PK	V
4773.250000	50.1	-9.1	41.0	60.8	-19.8	AV	V

Note: Average Level= MaxPeak Level + Duty Cycle Factor

6. List of Tables

Table 1: List of Test and Measurement Equipment	5
Table 2: Measurement Uncertainty	5
Table 3: Technical Specification of EUT	6
Table 4: Independent Operation Modes	6
Table 5: Antenna Requirement	9
Table 6: 20dB Bandwidth	10
Table 7: Deactivation Time	11
Table 8: Duty Cycle	13

7. List of Figures

Figure 1: 20dB Bandwidth	10
Figure 2: Deactivation Time	11
Figure 3: Duty Cycle	13
Figure 4: Field strength of fundamental and Radiated Spurious Emission, 30MHz to 1GHz	14
Figure 5: Field strength of fundamental and Radiated Spurious Emission, 1GHz to 6GHz	15