

47 CFR PART 15 SUBPART C TEST REPORT

for

NFC/BLE

Model No.: NFC-100

FCC ID: 2ASPNFC100A

of

Applicant: Transmitter Solutions

Address: 2480 South 3850 West, Suite B Salt Lake City, UT 84120
United States

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

FCC Registration No.: TW1477, TW0020, TW1072

Industry Canada filed test laboratory Reg. No. 20037

A2LA Accredited No.: 2732.01



Report No.: W6M22005-19877-C-1

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
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1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

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Tester:

May 21, 2020

Leon Chueh

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

May 21, 2020

Kevin Wang

Date

WTS

Name

Signature



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1.2 Testing laboratory

1.2.1 Location

OATS

No.5-1, Lishui, Shuang Sing Village,
Wanli Dist., New Taipei City 207,
Taiwan (R.O.C.)

3 meter semi-anechoic chamber

No.35, Aly. 21, Ln. 228, Ankang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

TEL:886-2-6613-0228

FAX:886-2-2791-5046

Company

Worldwide Testing Services(Taiwan) Co., Ltd.

6F, NO. 58, LANE 188, RUEY-KUANG RD.

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Tel : 886-2-66068877

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1.2.2 Details of accreditation status

Accredited testing laboratory

A2LA accredited number: 2732.01

FCC filed test laboratory Reg. No. TW1477, TW0020, TW1072

Industry Canada filed test laboratory Reg. No. 20037

Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd. :

Name: ./.

Accredited number: ./.

Street: ./.

Town: ./.

Country: ./.

Telephone: ./.

Fax: ./.



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1.3 Details of approval holder

Name:	Transmitter Solutions
Street:	2480 South 3850 West, Suite B
City:	Salt Lake City, UT 84120
Country:	United States
Telephone:	866-975-0101
Fax:	866-975-0404

1.4 Application details

Date of receipt of test item:	May 7, 2020
Date of test:	from May 8, 2020 to May 21, 2020

1.5 General information of Test item

Description of test item:	NFC/BLE
Type identification:	NFC-100
Multi-listing model number:	./.
Transmitting frequency:	13.56 MHz
Operation mode:	Half-duplex
Voltage supply:	12Vd.c.
Antenna type:	Loop antenna
Photos:	see Annex

Manufacturer: (if applicable)

Name:	Lighting Tech Co., Ltd.
Street:	Room 1, 5F., No.530,Sec.2, Jhongshan Rd., Jhonghe Dist,
Town:	New Taipei City 235,
Country:	Taiwan R.O.C.

1.6 Test standards

Technical standard: 47 CFR PART 15 SUBPART C § 15.225 (2019-10)



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2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.



or

The deviations were ascertained in the course of the tests performed.



2.2 Test environment

Relative humidity content: 20 ... 75 %

Air pressure: 86 ... 103 kPa

Details of power supply: 12Vd.c.

Extreme conditions parameters: ./.

Test item Name	Measurement Uncertainty
Estimation Result of Uncertainty of Conducted Emission	Expanded Uncertainty: AMN: 1.06 dB Voltage probe: 1.12 dB
Estimation Result of Uncertainty of Radiated Emission(3M)	Expanded Uncertainty: 0.009-30 MHz: 1.88 dB 30-1000 MHz: 2.79 dB 1-18 GHz: 2.36 dB 18-40 GHz: 1.55 dB
Estimation Result of Uncertainty of Bandwidth Measurement 20 dB Bandwidth, Occupied bandwidth, Channel bandwidth, Necessary Bandwidth	Expanded Uncertainty: 0.45 kHz
Estimation Result of Uncertainty of Frequency Drift Measurement Frequency stability	Expanded Uncertainty: 6.11 Hz

Measurement uncertainty is not included in the calculation of test results.



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2.3 Test Equipment List

No.	Test equipment	Type	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 001	EMI TEST RECEIVER	ESHS10	842121/013	R&S	2019/6/4	2020/6/3
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function Test	
ETSTW-CE 004	ZWEILEITER-V-NETZNACHBILDUNG TWO-LINE V-NETWORK	ESH3-Z5	840731/011	R&S	2019/11/1	2020/10/31
ETSTW-CE 006	IMPULSBEGRENZER PULSE LIMITER	ESH3-Z2	100226	R&S	2019/9/24	2020/9/23
ETSTW-CE 008	HF-EICHLERUNG RF STEP ATTENUATOR 139dB DPSP	334.6010.02	844581/024	R&S	Function Test	
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2019/7/23	2020/7/22
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2019/10/3	2020/10/2
ETSTW-CE 028	MXE EMI Receiver	N9038A	MY53220110	Agilent	2019/7/18	2020/7/17
ETSTW-RE 003	EMI TEST RECEIVER	ESI 26	831438/001	R&S	2019/6/4	2020/6/3
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2019/5/29	2020/5/28
ETSTW-RE 012	TUNABLE BANDREJECT FILTER	D.C 0309	146	K&L	Function Test	
ETSTW-RE 013	TUNABLE BANDREJECT FILTER	D.C 0336	397	K&L	Function Test	
ETSTW-RE 018	MICROWAVE HORN ANTENNA	AT4560	27212	AR	2019/7/25	2020/7/24
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2019/7/22	2020/7/21
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	ETS-Lindgren	2020/4/22	2021/4/21
ETSTW-RE 042	Biconical Antenna	HK116	100172	R&S	2020/2/18	2021/2/17
ETSTW-RE 043	Log-Periodic Dipole Antenna	HL223	100166	R&S	2020/4/22	2021/4/21
ETSTW-RE 044	Log-Periodic Antenna	HL050	100094	R&S	2020/5/8	2021/5/7
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2020/2/20	2021/2/19
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2020/2/20	2021/2/19
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2020/2/20	2021/2/19
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2020/3/6	2021/3/5
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2020/2/20	2021/2/19
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2020/5/8	2021/5/7
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	ETS-Lindgren	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2019/9/23	2020/9/22
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2019/9/18	2020/9/17
ETSTW-RE 091	Match Pad	MDCS1500	None	WOKEN	2020/5/8	2021/5/7
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2020/2/20	2021/2/19
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	T-0A023536	T-Power	Function test	
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2020/1/13	2021/1/12



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ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	
ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2019/6/3	2020/6/2
ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2019/8/8	2020/8/7
ETSTW-RE 126	5GHz Notch filter	5NSL12-5800/E221.3-O/O	1	K&L Microwave	2019/8/8	2020/8/7
ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2020/2/20	2021/2/19
ETSTW-RE 128	5.3GHz Notch filter	N0153001	SN487233	Microwave Circuits	2019/8/8	2020/8/7
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circuits	2019/8/8	2020/8/7
ETSTW-RE 130	Handheld RF Spectrum Analyzer	N9340A	CN0147000204	Agilent	Pre-test Use	
ETSTW-RE 142	Amplifier	8447D	2805A03378	Agilent	2020/5/8	2021/5/7
ETSTW-RE 147	Bi-log Hybrid Antenna	MCTD 2786B	BLB16M04005	ETC	2020/4/9	2021/4/8
ETSTW-RF 002	Electromagnetic field probe	LF-30	K-0007	STT	2019/5/27	2020/5/26
ETSTW-EMI 011	USB Compact Modulator	SFC-U	101689	R&S	2020/5/8	2021/5/7
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2020/3/9	2021/3/8
ETSTW-GSM 003	Radio Communication Analyzer	MT8820C	6201342073	Anritsu	2020/4/20	2021/4/19
ETSTW-GSM 004	Wideband Radio Communication Tester	CMW500	128092	R&S	2019/10/25	2020/10/24
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40 /12+9SS	3	WI	2020/1/13	2021/1/12
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2020/1/13	2021/1/12
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2020/1/13	2021/1/12
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2020/1/13	2021/1/12
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2019/9/12	2020/9/11
ETSTW-GSM 024	Radio Communication Analyzer	MT8821C	None	Anritsu	2020/3/27	2021/3/26
ETSTW-GSM 025	Band Reject Filter	BRM19835	001	Micro-Tronics	2019/8/9	2020/8/8
ETSTW-Cable 011	SMA to N type Cable	RGU-400	None	THERMAX	Pre-test Use NCR	
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2020/2/20	2021/2/19
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2020/2/20	2021/2/19
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2020/2/20	2021/2/19
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2020/2/20	2021/2/19
ETSTW-Cable 020	N TYPE Cable	OATS Cable 1	N30N30-L335-15M	JYE BAO CO.,LTD.	2019/7/2	2020/7/1
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2020/5/8	2021/5/7
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2019/9/18	2020/9/17
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2019/9/18	2020/9/17
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S_Cable 9)	279067	HUBER+SUHNER	2020/2/20	2021/2/19
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2020/5/8	2021/5/7
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2019/6/6	2020/6/5
ETSTW-Cable 064	Microwave Cable	SUCOFLEX 104	MY28891	HUBER+SUHNER	2020/5/8	2021/5/7
ETSTW-Cable 066	SMA type cable	32022	None	ASTROLAB	2019/9/24	2020/9/23
ETSTW-Cable 071	N TYPE CABLE	EMCCFD400-NM-NM-25000	170239	EMCI	2019/6/6	2020/6/5



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ETSTW-Cable 072	SMA type cable (8m)	SUCOFLEX 104	805800/4	HUBER+SUHNER	2020/5/8	2021/5/7
ETSTW-Cable 074	SMA type cable (2m)	SUCOFLEX 104	802563/4	HUBER+SUHNER	2020/5/8	2021/5/7
WTSTW-SW 002	EMI TEST SOFTWARE	EZ EMC	None	Farad	Version ETS-03A1	
WTSTW-SW 006	EMI TEST SOFTWARE	e3	None	AUDIX	Version 9.161014	
WTSTW-SW 008	Signal studio	Agilent	None	AUDIX	Version 2.0.0.1	
ETSTW-TH 001	Thermohygrometer	608-H1	45204316	Testo	2019/9/9	2020/9/8
ETSTW-TH 002	Thermohygrometer	608-H1	45204317	Testo	2019/9/9	2020/9/8



2.4 General Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.10-2013 6.2 using a LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RADIATION INTERFERENCE: The test procedure used was according to ANSI STANDARD C63.10-2013 6.3 employing a spectrum analyzer. For investigated frequency is equal to or below 1GHz, the RBW and VBW of the spectrum analyzer was 100 kHz and 100kHz respectively with an appropriate sweep speed. For investigated frequency is above 1GHz, both of RBW and VBW of the spectrum analyzer were 1 MHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dB μ V) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

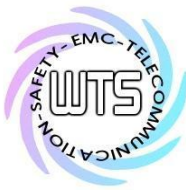
Freq (MHz)	METER READING + ACF + CABLE LOSS (to the receiver) = FS
33	20 dB μ V + 10.36 dB + 6 dB = 36.36 dB μ V/m @3m

The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table) and arranged according to ANSI C63.10-2013 Section 6.2.2. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to the frequency specified as follows:

- (1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
- (2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
- (3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
- (4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1)-(a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this Section, whichever is the higher frequency range of investigation.

For hand-held devices, a exploratory test was performed with three (3) orthogonal planes to determine the highest emissions.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.



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When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

The formula is as follows:

Average = Peak + Duty Factor

Duty Factor = $20 \log (\text{dwell time}/T)$

$T = 100\text{ms}$ when the pulse train period is over 100 ms or the period of the pulse train.

Modified Limits for peak according to 15.35 (b) = Max Permitted average Limits + 20dB

ANSI STANDARD C63.10-2013 B.2.7: Any measurements that utilize special test software shall be indicated and referenced in the test report. During testing, test software 'EZ EMC' was used for setting up different operation modes.



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3 Test results (enclosure)

TEST CASE	Para. Number	Required	Test passed	Test failed
Output Power Field Strength	15.225 (a) (b) (c)	☒	☒	☐
Out of Band Radiated Emissions	15.225 (d)	☒	☒	☐
Band Edge	15.225 (d)	☒	☒	☐
Occupied Bandwidth	2.1049	☒	☒	☐
Frequency Stability	15.225 (e)	☒	☒	☐
Power Line Conducted Emission	15.207 (a)	☐	☐	☐

The following is intentionally left blank.



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3.1 Output Power (Field Strength)

FCC Rules: 15.225 (a) (b) (c), 15.205, 15.209, 15.35

Operation within the band 13.110 - 14.010 MHz

Limit

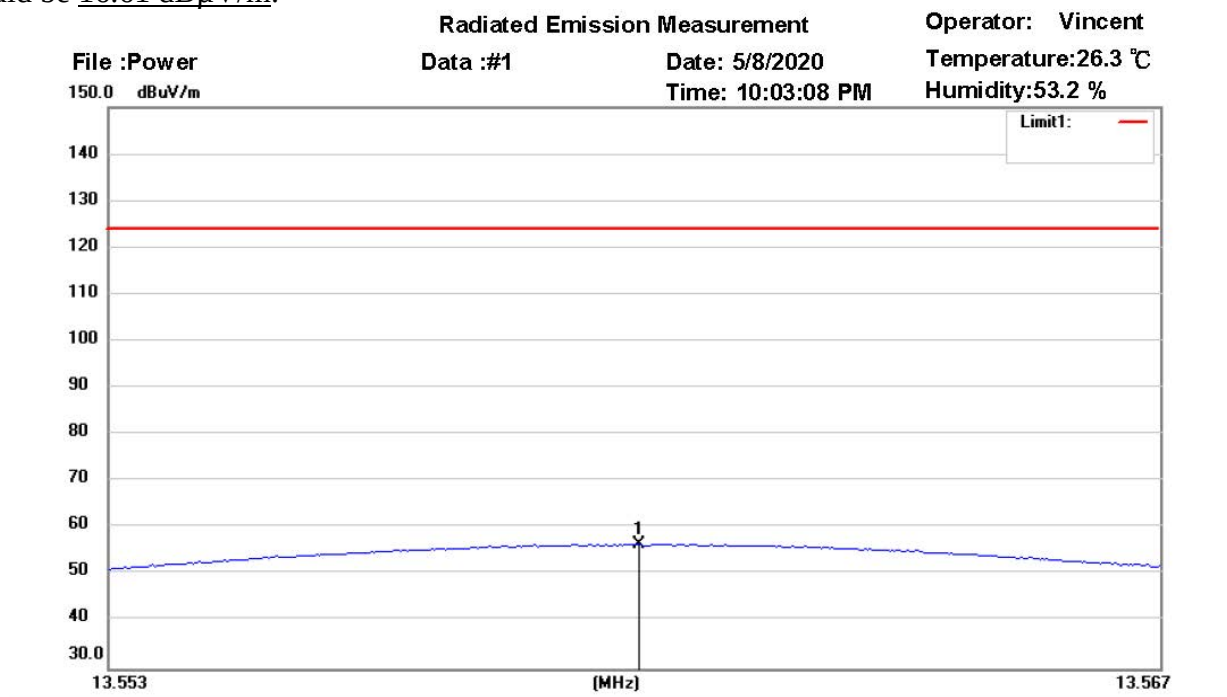
(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(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.

Measurement Results:

The field strength at 3 meter distance as 56.61 dB μ V/m. Extrapolated with 40dB to 30 meter distance it would be 16.61 dB μ V/m.



Site : Chamber

Condition : FCC 15.225 power (3m)

EUT : W6M22005-19877

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	13.5601	22.88	peak	33.73	56.61	124.00	100	360	-67.39	

Test equipment used: ETSTW-RE 027, ETSTW-RE 055



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3.2 Out of Band Radiated Emissions

(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.

Frequency of Emission (MHz)	Limit	Measurement distance
0.009 – 0.490	2400 / f (KHz)	300
0.49 – 1.705	24000 / f (KHz)	30
1.705 – 30	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results. This is done by using validated test software and calibrated test system according the accreditation requirements.

Summary table with radiated data of the test plots

Model: NFC-100 Date: --
Mode: -- Temperature: -- °C Engineer: --
Polarization: Horizontal Humidity: -- %

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Note

1. Correction Factor = Antenna factor + Cable loss - Preamplifier
2. The formula of measured value as: Test Result = Reading + Correction Factor
3. Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average
4. All not in the table noted test results are more than 20 dB below the relevant limits.
5. See attached diagrams in appendix.

All other not noted test plots do not contain significant test results in relation to the limits

Test results: The unit meet the FCC requirements.

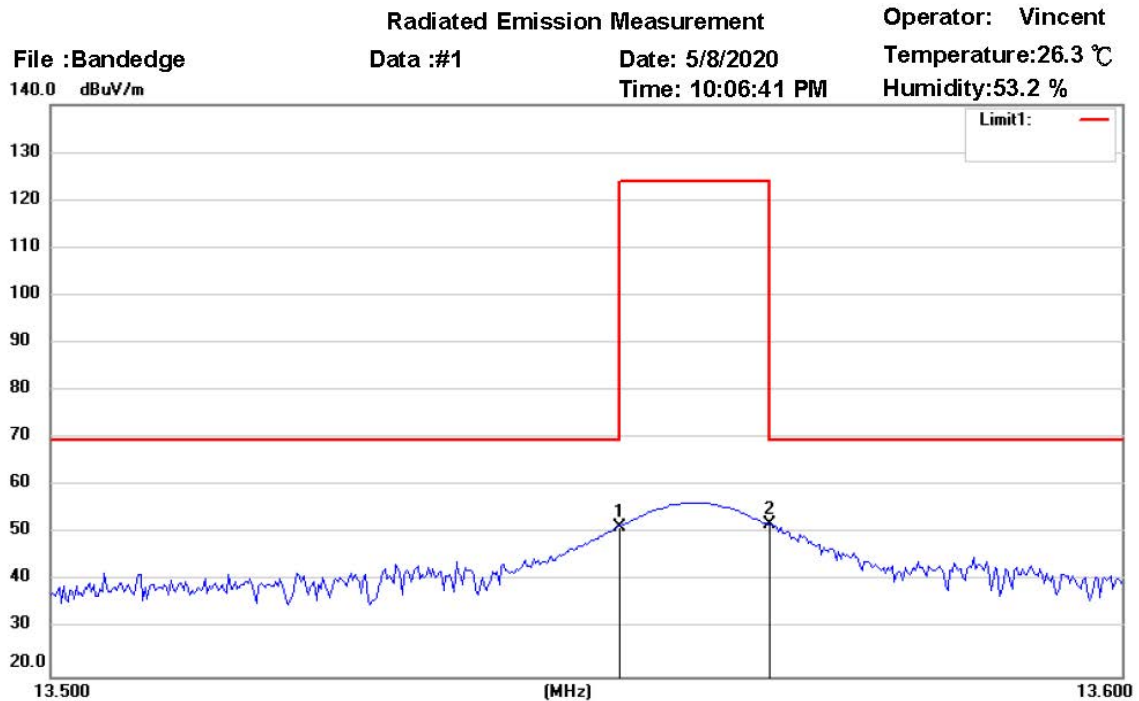
Test equipment used: ETSTW-RE 004, ETSTW-RE 027, ETSTW-RE 142, ETSTW-RE 147, ETSTW-RE 062

Test result of Band Edge



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Site : Chamber

Condition : FCC 15.225 bandedge (3m)

EUT : W6M22005-19877

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	13.5530	17.77	peak	33.73	51.50	69.50	100	360	-18.00	
*	13.5670	18.26	peak	33.73	51.99	69.50	100	360	-17.51	

Test equipment used: ETSTW-RE 055

Registration number: W6M22005-19877-C-1
FCC ID: 2ASPNFC100A

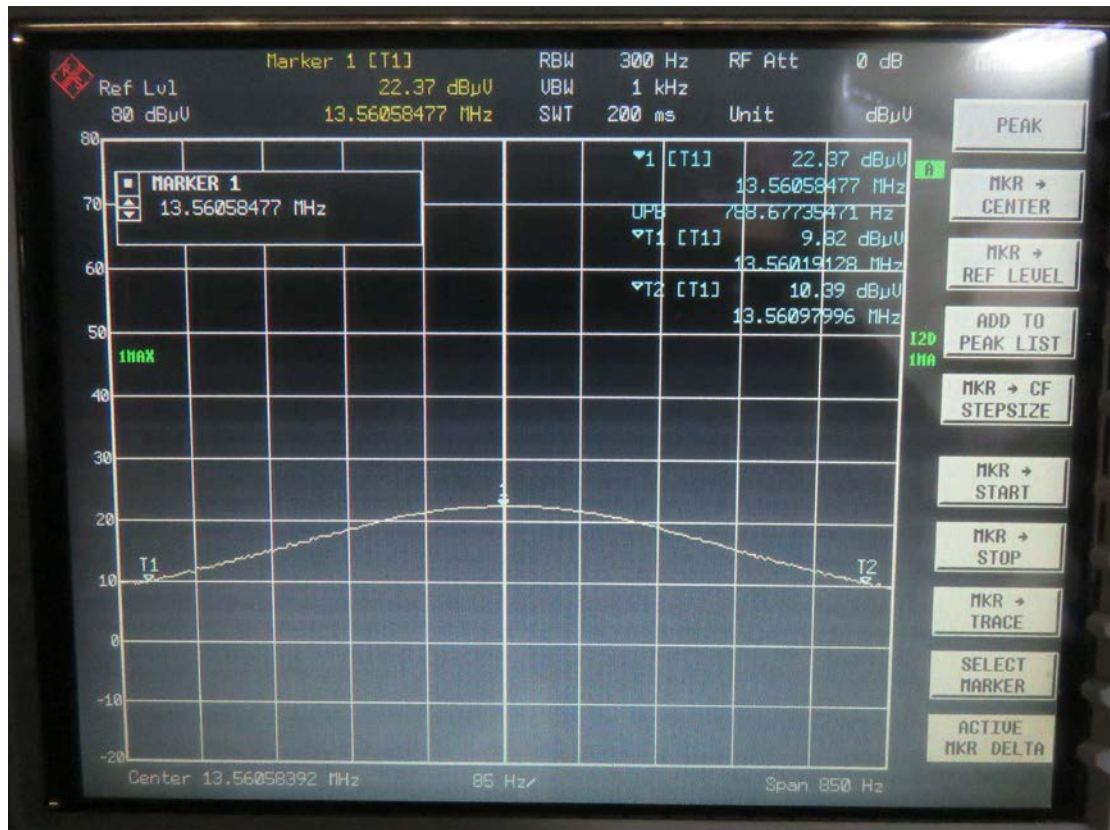
3.3 Occupied Bandwidth

Test date: May 08, 2020

Temperature: 22.8 °C

Humidity: 54.1 %

Tester: Leon



Test equipment used: ETSTW-RE 055, ETSTW-RE 064



Registration number: W6M22005-19877-C-1
FCC ID: 2ASPNFC100A

3.4 Frequency tolerance

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20°C to +50°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°C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test date: May 18, 2020

Temperature: 21.8 °C

Humidity: 54.2 %

Tester: Kent

Measurement Results:

Test Voltage 12V	On time	Carrier Freq.	Deviation	Result
	0 min	13.560015	0.000	0 ppm
	*2min	13.560015	0.000	0 ppm
	5min	13.560015	0.000	0 ppm
	10min	13.560015	0.000	0 ppm
Test Voltage 10.8V	On time	Carrier Freq.	Deviation	Result
	0 min	13.560015	0.000	0 ppm
	2min	13.560015	0.000	0 ppm
	5min	13.560015	0.000	0 ppm
	10min	13.560015	0.000	0 ppm
Test Voltage 13.2V	On time	Carrier Freq.	Deviation	Result
	0 min	13.560013	-0.002	-0.15 ppm
	2min	13.560013	-0.002	-0.15 ppm
	5min	13.560013	-0.002	-0.15 ppm
	10min	13.560013	-0.002	-0.15 ppm

*Represent test standard frequency



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Registration number: W6M22005-19877-C-1
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Test Temp	On time	Carrier Freq.	Deviation	Result
50°C	0 min	13.560015	0.014	1.03 ppm
50°C	2min	13.560013	0.012	0.88 ppm
50°C	5min	13.560019	0.018	1.33 ppm
50°C	10min	13.560019	0.018	1.33 ppm
40°C	0 min	13.560015	0.014	1.03 ppm
40°C	2min	13.560015	0.014	1.03 ppm
40°C	5min	13.560015	0.014	1.03 ppm
40°C	10min	13.560015	0.014	1.03 ppm
30°C	0 min	13.560013	0.012	0.88 ppm
30°C	2min	13.560007	0.006	0.44 ppm
30°C	5min	13.560015	0.014	1.03 ppm
30°C	10min	13.560009	0.008	0.59 ppm
20°C	0 min	13.560001	0.000	0 ppm
*20°C	2min	13.560001	0.000	0 ppm
20°C	5min	13.560001	0.000	0 ppm
20°C	10min	13.560019	0.018	1.33 ppm
10°C	0 min	13.560019	0.018	1.33 ppm
10°C	2min	13.560017	0.016	1.18 ppm
10°C	5min	13.560017	0.016	1.18 ppm
10°C	10min	13.560019	0.018	1.33 ppm
0°C	0 min	13.560015	0.014	1.03 ppm
0°C	2min	13.560021	0.020	1.47 ppm
0°C	5min	13.560019	0.018	1.33 ppm
0°C	10min	13.560017	0.016	1.18 ppm
-10°C	0 min	13.560021	0.020	1.47 ppm
-10°C	2min	13.560017	0.016	1.18 ppm
-10°C	5min	13.560019	0.018	1.33 ppm
-10°C	10min	13.560017	0.016	1.18 ppm
-20°C	0 min	13.560017	0.016	1.18 ppm
-20°C	2min	13.560017	0.016	1.18 ppm
-20°C	5min	13.560021	0.020	1.47 ppm
-20°C	10min	13.560033	0.032	2.36 ppm

*Represent test standard frequency

Test equipment used: ETSTW-RE 055, ETSTW-CE 009



Registration number: W6M22005-19877-C-1

FCC ID: 2ASPNFC100A

3.5 Power Line Conducted Emission

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table bellows with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

Model: NFC-100 Date: --
 Mode: -- Temperature: -- °C Engineer: --
 Polarization: N Humidity: -- %

Frequency (MHz)	Reading (dBuV) QP Ave.		Factor (dB) Corr.	Result (dBuV) QP Ave.		Limit (dBuV) QP Ave.		Margin (dB)
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Polarization: L1

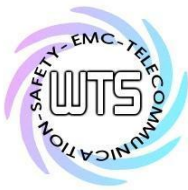
Frequency (MHz)	Reading (dBuV) QP Ave.		Factor (dB) Corr.	Result (dBuV) QP Ave.		Limit (dBuV) QP Ave.		Margin (dB)
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

- Note:**
1. The formula of measured value as: Test Result = Reading + Correction Factor
 2. The Correction Factor = Cable Loss + LISN Insertion Loss + Pulse Limit Loss
 3. Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average
 4. All not in the table noted test results are more than 20 dB below the relevant limits.
 5. Up Line: QP Limit Line, Down Line: Ave Limit Line.
 6. The test is not required because it is supplied by DC power.

Limits:

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Test equipment used: ETSTW-CE 001, ETSTW-CE 016, ETSTW-RE 045.



Appendix

Measurement diagrams

Radiated Emissions



Radiated Emission Measurement

Operator: Vincent

File :1

Data :#1

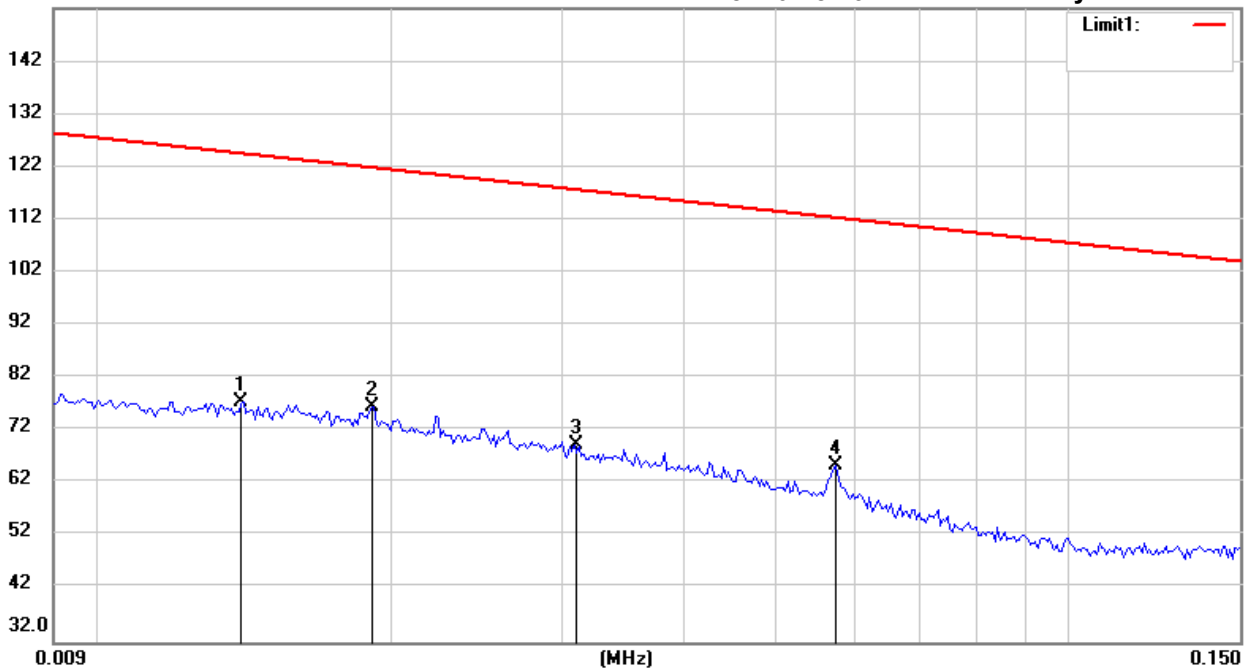
Date: 5/8/2020

Temperature: 26.3 °C

152.0 dBuV/m

Time: 10:18:29 PM

Humidity: 53.2 %



Site : Chamber

Condition : FCC 15.225 (3m)(<30MHz)

EUT : W6M22005-19877

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	0.0141	-5.44	peak	82.77	77.33	124.61	100	110	-47.28	
*	0.0192	-4.14	peak	80.80	76.66	121.93	100	265	-45.27	
	0.0310	-7.06	peak	76.40	69.34	117.77	100	90	-48.43	
	0.0575	-5.84	peak	71.33	65.49	112.41	100	175	-46.92	



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Radiated Emission Measurement

Operator: Vincent

File : 2

Data : #1

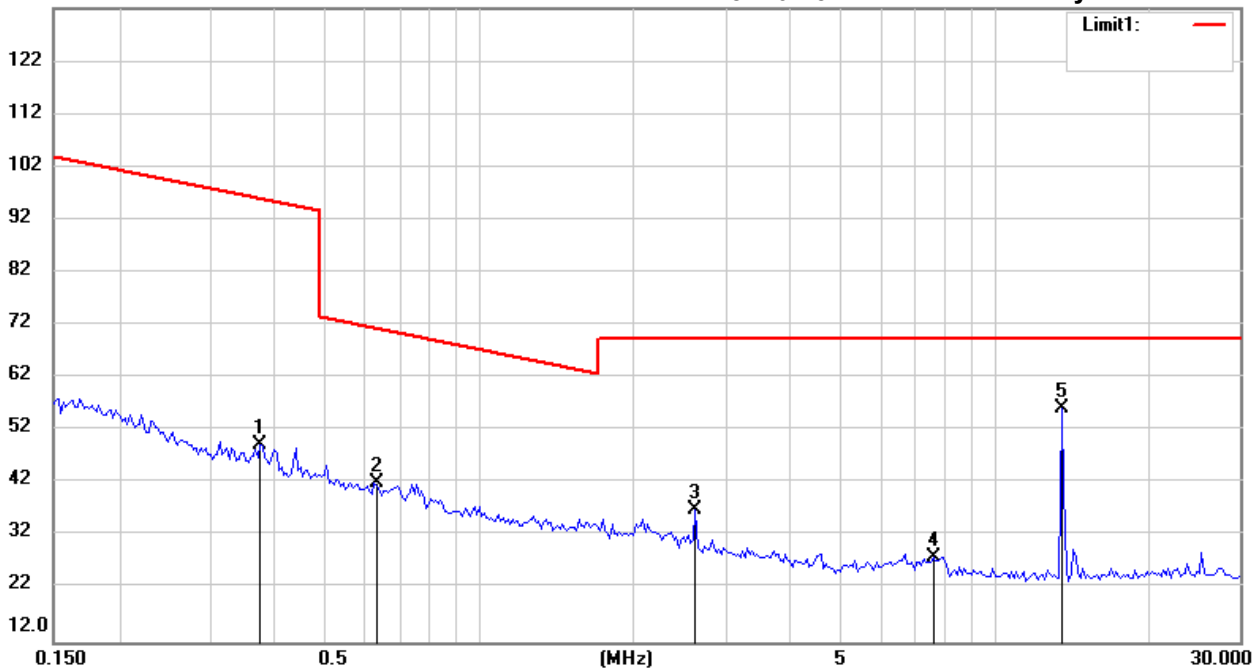
Date: 5/8/2020

Temperature: 26.3 °C

132.0 dBuV/m

Time: 10:25:44 PM

Humidity: 53.2 %



Site : Chamber

Condition : FCC 15.225 (3m)(<30MHz)

EUT : W6M22005-19877

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	0.3778	-6.23	peak	55.65	49.42	96.06	100	195	-46.64	
	0.6290	-9.02	peak	51.07	42.05	71.63	100	55	-29.58	
	2.6371	-2.36	peak	39.52	37.16	69.54	100	270	-32.38	
	7.6255	-6.42	peak	34.42	28.00	69.54	100	110	-41.54	
*	13.5291	22.67	peak	33.73	56.40	69.54			-13.14	RF Power

*:Maximum data x:Over limit !:over margin



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Radiated Emission Measurement

Operator: Vincent

File :3

Data :#1

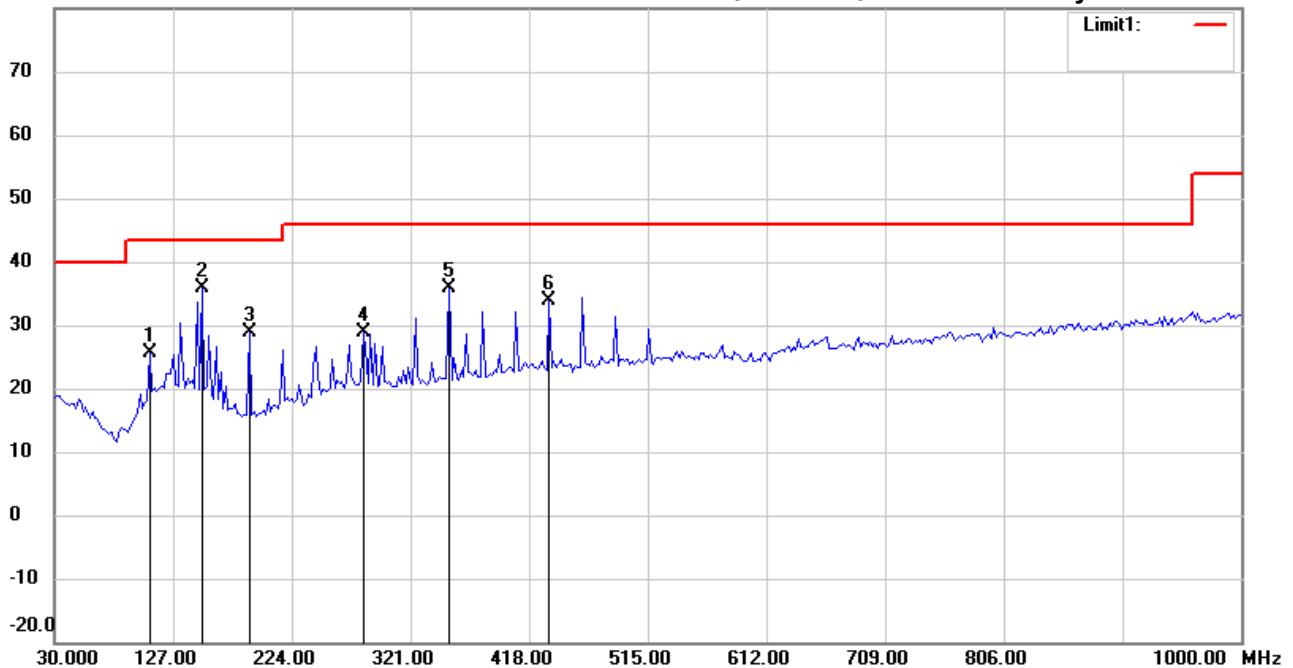
Date: 5/8/2020

Temperature: 26.3 °C

80.0 dBuV/m

Time: 11:41:45 PM

Humidity: 53.2 %



Site : Chamber

Condition : FCC_part 15 RE-Class C_30-1000MHz

EUT : W6M22005-19877

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization: *Horizontal*

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	107.7555	34.42	peak	-8.69	25.73	43.50	100	110	-17.77	
*	150.5210	43.26	peak	-7.41	35.85	43.50	100	30	-7.65	
	189.3988	40.06	peak	-11.13	28.93	43.50	100	5	-14.57	
	282.7054	35.12	peak	-6.25	28.87	46.00	100	90	-17.13	
	352.6854	41.00	peak	-5.08	35.92	46.00	100	255	-10.08	
	434.3287	37.41	peak	-3.42	33.99	46.00	100	70	-12.01	

*:Maximum data x:Over limit !:over margin



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Radiated Emission Measurement

Operator: Vincent

File :3

Data :#2

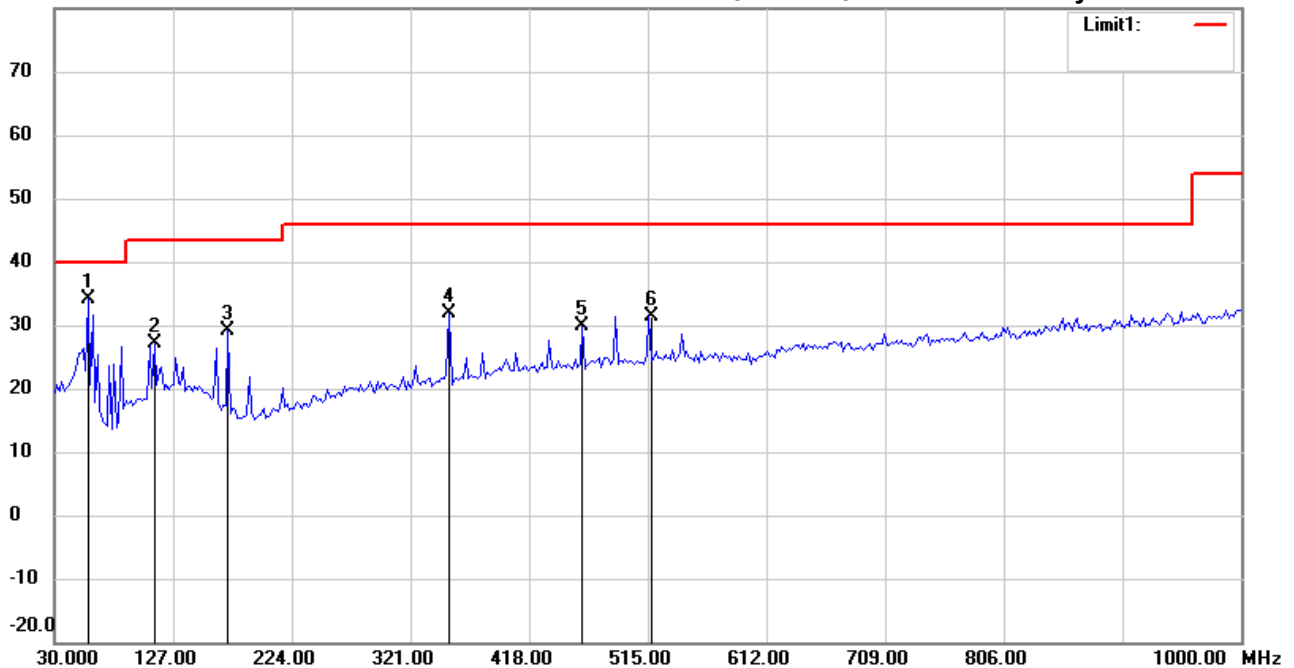
Date: 5/8/2020

Temperature: 26.3 °C

80.0 dBuV/m

Time: 11:42:54 PM

Humidity: 53.2 %



Site : Chamber

Condition : FCC_part 15 RE-Class C_30-1000MHz

EUT : W6M22005-19877

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization: Vertical

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
*	57.2144	45.35	peak	-11.28	34.07	40.00	100	50	-5.93	
	111.6433	35.16	peak	-8.04	27.12	43.50	100	180	-16.38	
	171.9038	39.24	peak	-10.23	29.01	43.50	100	95	-14.49	
	352.6854	37.01	peak	-5.08	31.93	46.00	100	135	-14.07	
	461.5431	32.95	peak	-3.10	29.85	46.00	100	66	-16.15	
	515.9720	33.80	peak	-2.52	31.28	46.00	100	170	-14.72	

*:Maximum data x:Over limit !:over margin



Radiated Emission Measurement

Operator: Vincent

File :1

Data :#1

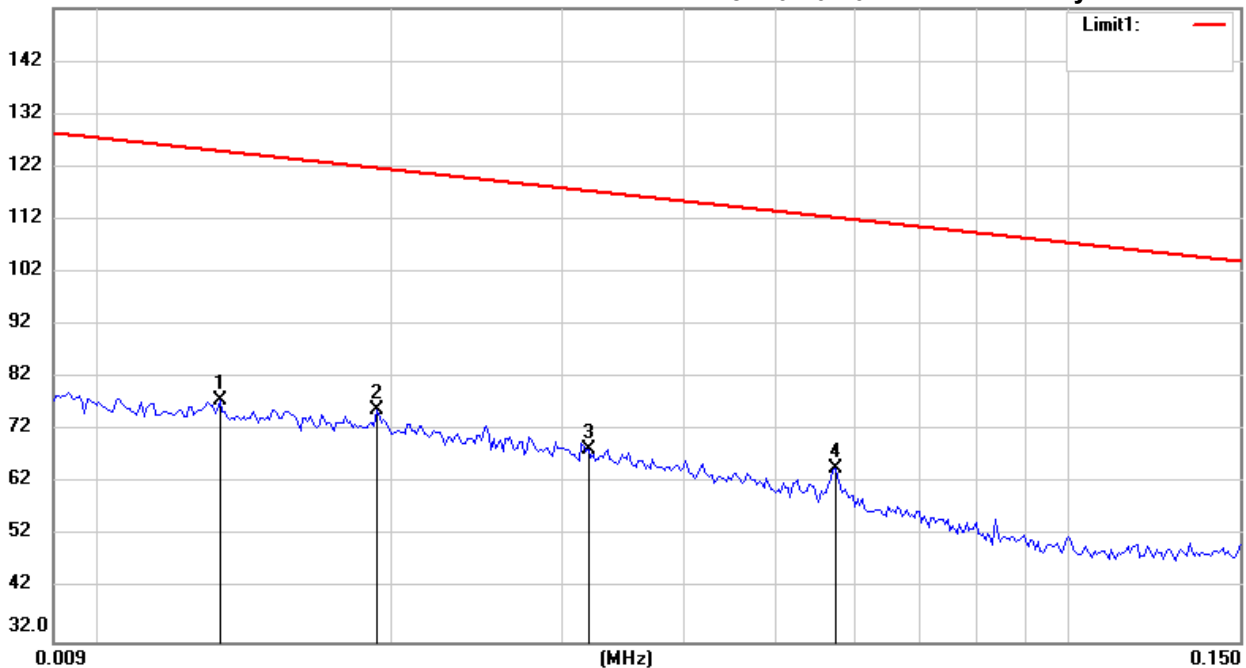
Date: 5/8/2020

Temperature: 26.3 °C

152.0 dBuV/m

Time: 10:20:10 PM

Humidity: 53.2 %



Site : Chamber

Condition : FCC 15.225 (3m)(<30MHz)

EUT : W6M22005-19877

M/N:

Test Mode : RX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	0.0134	-5.28	peak	83.04	77.76	125.05	100	165	-47.29	
*	0.0194	-4.77	peak	80.72	75.95	121.84	100	90	-45.89	
	0.0320	-7.71	peak	76.19	68.48	117.49	100	270	-49.01	
	0.0575	-6.37	peak	71.33	64.96	112.41	100	245	-47.45	



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Radiated Emission Measurement

Operator: Vincent

File : 2

Data : #1

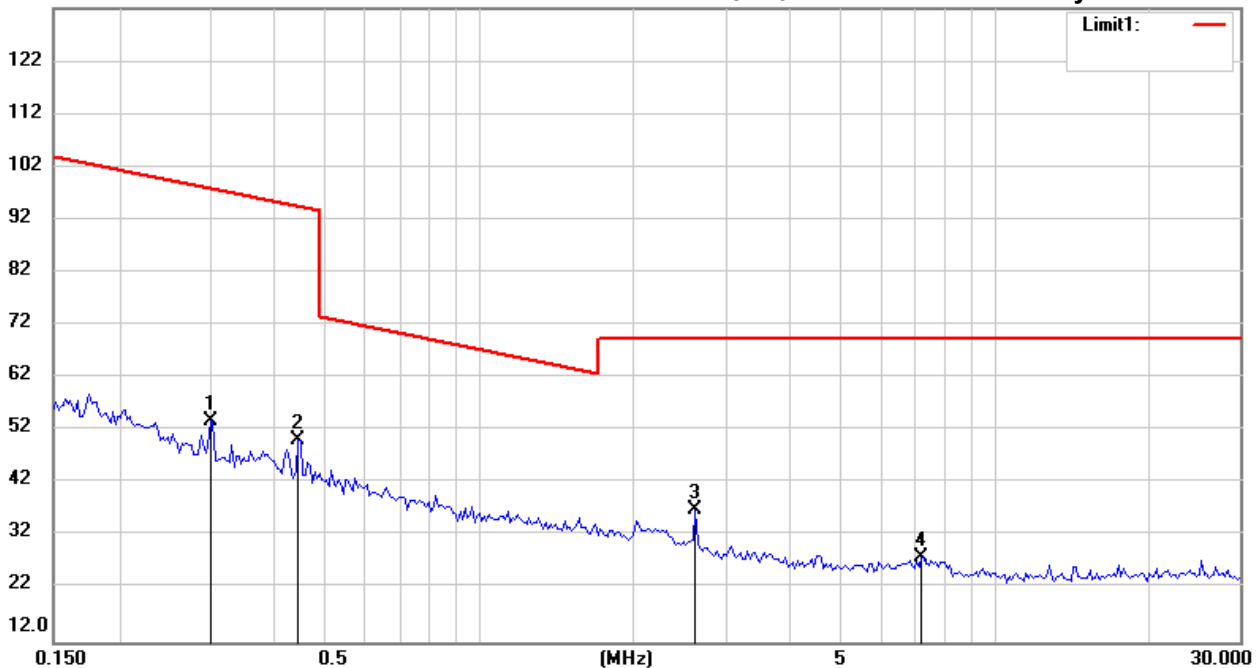
Date: 5/8/2020

Temperature: 26.3 °C

132.0 dBuV/m

Time: 10:22:17 PM

Humidity: 53.2 %



Site : Chamber

Condition : FCC 15.225 (3m)(<30MHz)

EUT : W6M22005-19877

M/N:

Test Mode : RX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	0.3023	-3.76	peak	57.51	53.75	97.99	100	55	-44.24	
	0.4478	-3.54	peak	53.92	50.38	94.58	100	290	-44.20	
*	2.6371	-2.49	peak	39.52	37.03	69.54	100	315	-32.51	
	7.2312	-6.31	peak	34.48	28.17	69.54	100	180	-41.37	

*:Maximum data x:Over limit !:over margin



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Radiated Emission Measurement

Operator: Vincent

File :3

Data :#1

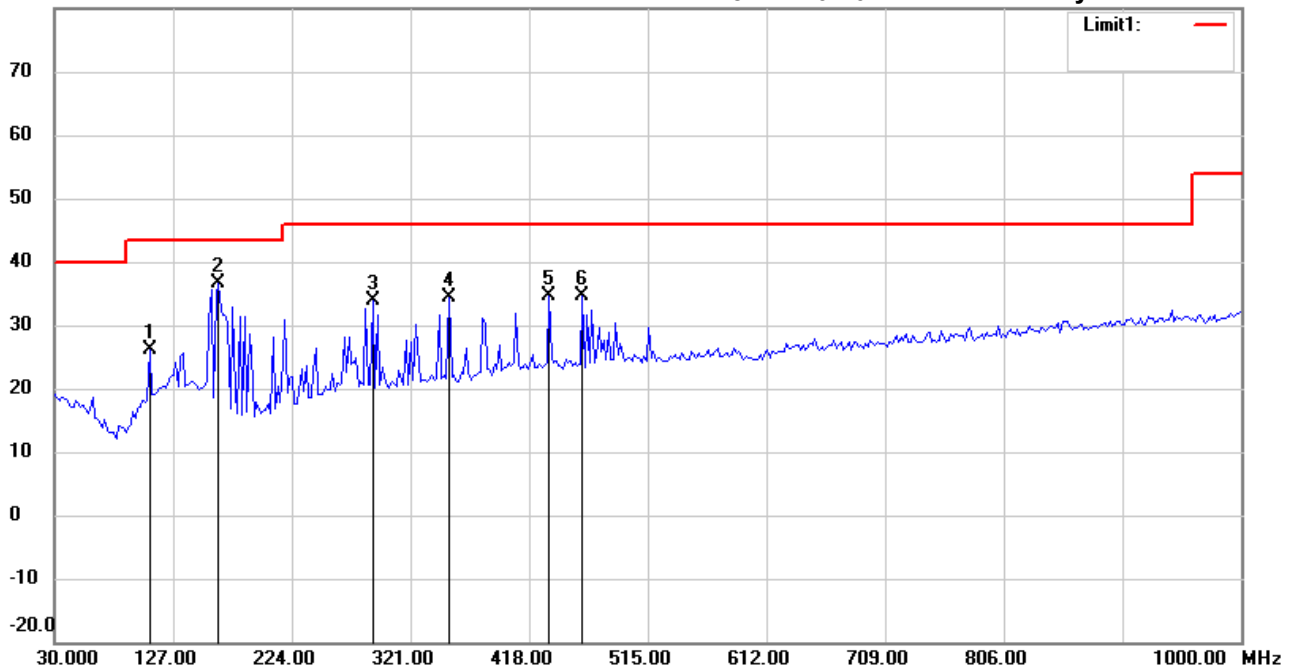
Date: 5/8/2020

Temperature: 26.3 °C

80.0 dBuV/m

Time: 11:46:10 PM

Humidity: 53.2 %



Site : Chamber

Condition : FCC_part 15 RE-Class C_30-1000MHz

EUT : W6M22005-19877

M/N:

Test Mode : RX 13.56MHz

Note :

Polarization: *Horizontal*

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	107.7555	34.90	peak	-8.69	26.21	43.50	100	115	-17.29	
*	164.1283	45.86	peak	-9.31	36.55	43.50	100	90	-6.95	
	290.4810	40.12	peak	-6.31	33.81	46.00	100	355	-12.19	
	352.6854	39.53	peak	-5.08	34.45	46.00	100	60	-11.55	
	434.3287	38.01	peak	-3.42	34.59	46.00	100	87	-11.41	
	461.5431	37.67	peak	-3.10	34.57	46.00	100	178	-11.43	

*:Maximum data x:Over limit !:over margin



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Radiated Emission Measurement

Operator: Vincent

File :3

Data :#2

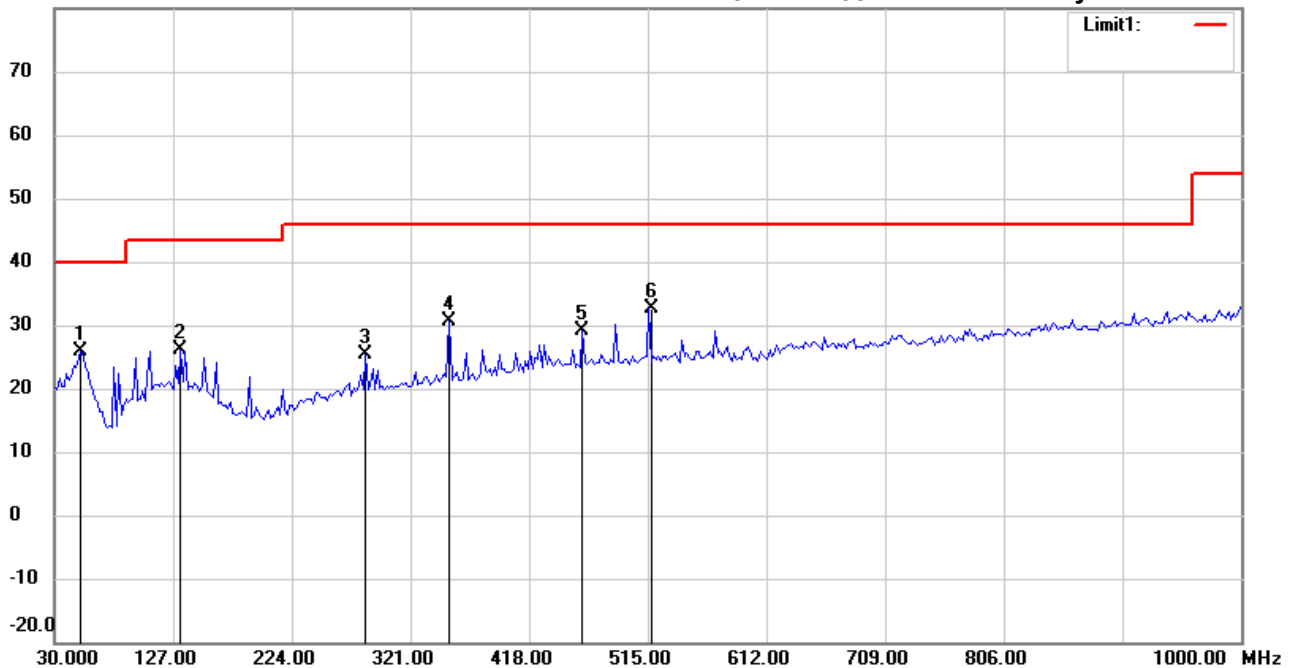
Date: 5/8/2020

Temperature: 26.3 °C

80.0 dBuV/m

Time: 11:47:38 PM

Humidity: 53.2 %



Site : Chamber

Condition : FCC_part 15 RE-Class C_30-1000MHz

EUT : W6M22005-19877

M/N:

Test Mode : RX 13.56MHz

Note :

Polarization: Vertical

Power : 12 Vd.c.

Distance: 3m

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corr. factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Ant.Pos (cm)	Tab.Pos (deg.)	Margin (dB)	Comment
	51.3828	36.44	peak	-10.50	25.94	40.00	100	255	-14.06	
	133.0261	33.05	peak	-6.83	26.22	43.50	100	90	-17.28	
	284.6492	31.77	peak	-6.27	25.50	46.00	100	185	-20.50	
	352.6854	35.73	peak	-5.08	30.65	46.00	100	70	-15.35	
	461.5431	32.20	peak	-3.10	29.10	46.00	100	355	-16.90	
*	515.9720	35.17	peak	-2.52	32.65	46.00	100	65	-13.35	

*:Maximum data x:Over limit !:over margin