



FCC ID: M82-WP7610
Report No.: T200207D01-RP6

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Rev.: 01

FCC 47 CFR PART 90

TEST REPORT

For

Module

Model No.: WP7610

Trade Name: Advantech; Advantech Service-IoT

Issued to

Advantech Co., Ltd.
No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District, Taipei 114,
Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
Wugu Laboratory
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan. (R.O.C.)
Issued Date: December 22, 2020

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 11, 2020	Initial Issue	ALL	Angel Cheng
01	December 22, 2020	1. Revised section 8.1	P.14-15	Angel Cheng

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1. TEST RESULT CERTIFICATION

Applicant: Advantech Co., Ltd.
No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
Taipei 114, Taiwan, R.O.C.

Manufacturer: Advantech Co.Ltd.
No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
Taipei 114, Taiwan, R.O.C.

Equipment Under Test: Module

Trade Name: Advantech; Advantech Service-IoT

Model No.: WP7610

Date of Test: September 16 ~ 21, 2020

APPLICABLE STANDARDS	
Standard	TEST RESULT
FCC 47 CFR PART 90	No non-compliance noted
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:



Kevin Tsai
Deputy Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Module	
Model No.	WP7610	
Model Discrepancy	N/A	
Trade	Advantech; Advantech Service-IoT	
Received Date	February 7, 2020	
Power Supply	Powered from host device.	
Modulation Technology	LTE Band 14	QPSK, 16QAM
Frequency Range	LTE Band 14 Channel Bandwidth: 5MHz	790.5MHz ~ 795.5MHz
	LTE Band 14 Channel Bandwidth: 10MHz	793MHz
Antenna Specification	Part No.: MA231.LBC.002 PIFA Antenna LTE Band 14 Antenna gain: 2.26 dBi	
Host device information	Product : Computer Trade name: ADVANTECH Model: TREK-572	

Note: 1. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

2. **Disclaimer**

Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

3. TEST METHODOLOGY

3.1 DESCRIPTION OF TEST TYPE

The EUT (Model: WP7610) had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

LTE Band 14: 790.5 MHz ~ 795.5 MHz

Three channels had been tested for each channel bandwidth.

Channel Bandwidth	5MHz		10MHz	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)
Low channel (L)	23305	790.5	-	-
Middle channel (M)	23330	793.0	23330	793.0
High channel (H)	23355	795.5	-	-

3.2 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by Adapter
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Worst Position	<input type="checkbox"/> Placed in fixed position. <input checked="" type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by Adapter
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X, Y, Z and two polarity, for radiated measurement. The worst case(X-Plane) were recorded in this report

4. TEST SUMMARY

FCC Standard Section	Report Section	Test Item	Result
-	2	Antenna Requirement	Pass
90.542 (a)	8.1	ERP Measurement	Pass
90.543 (c)	8.2	Spurious Radiation Measurement	Pass

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5. INSTRUMENT CALIBRATION

5.1 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at
No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
Radiation	Jerry Chang	-
RF Conducted	Jane Wang	-

Remark: The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CIPR Publication 22.

5.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

RF Conducted Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Coaxial Cable	Woken	WC12	CC003	06/29/2020	06/28/2021
Coaxial Cable	Woken	WC12	CC001	06/29/2020	06/28/2021
Power Divider	Solvang Technology	STI08-0015	008	08/05/2020	08/04/2021
Signal Analyzer	R&S	FSV 40	101073	09/25/2019	09/24/2020
Wideband Radio Communication Tester	R&S	CMW 500	116875	07/19/2020	07/18/2021
Software			N/A		

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/25/2020	02/24/2021
Bilog Antenna	Sunol Sciences	JB3	A030105	07/24/2020	07/23/2021
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/25/2020	02/24/2021
Coaxial Cable	EMCI	EMC105	190914+25111	09/19/2020	09/18/2021
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/15/2020	01/14/2021
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	10/04/2019	10/03/2020
Loop Ant	COM-POWER	AL-130	121051	03/27/2020	03/26/2021
Pre-Amplifier	EMEC	EM330	060609	02/25/2020	02/24/2021
Pre-Amplifier	HP	8449B	3008A00965	02/25/2020	02/24/2021
Wideband Radio Communication Tester	R&S	CMW 500	116875	07/19/2020	07/18/2021
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	07/24/2020	07/23/2021
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software			e3 6.11-20180413		

5.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 and CISPR Publication 22.

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, ISED#: 2324G.

7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

7.2 SUPPORT EQUIPMENT

No.	Equipment	Brand	Model	Series No.	FCC ID	IC ID
	N/A					

Remark:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

8. TEST PROCEDURE AND RESULT

8.1 ERP & EIRP MEASUREMENT

LIMIT

According to FCC §2.1046

FCC 90.542 (a)(6): Control stations and mobile stations transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 30 watts ERP.

TEST PROCEDURES

CONDUCTED POWER MEASUREMENT:

1. The transmitter output power was connected to the call box.
2. Set EUT at maximum output power via call box.
3. Set Call box at lowest, middle and highest channels for each band and modulation.

TEST RESULTS

No non-compliance noted.

LTE Band 14

Temperature: 24°C

Test Date: September 16, 2020

Humidity: 50 % RH

Tested by: Jane Wang

Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power (dBm)	ERP Power	
Band 14	5M	23305	790.5	QPSK	1	0	0	23.64	23.75	
					1	12	0	23.86	23.97	
					1	24	0	23.63	23.74	
					12	0	1	22.85	22.96	
					12	6	1	22.88	22.99	
					12	11	1	22.64	22.75	
					25	0	1	22.71	22.82	
				16QAM	1	0	1	22.90	23.01	
		23330	793.0		1	12	1	23.05	23.16	
					1	24	1	22.74	22.85	
					12	0	2	21.94	22.05	
					12	6	2	21.98	22.09	
					12	11	2	21.74	21.85	
					25	0	2	21.91	22.02	
			QPSK	1	0	0	23.84	23.95		
		23355		795.5		1	12	0	23.62	23.73
						1	24	0	23.61	23.72
						12	0	1	22.83	22.94
						12	6	1	22.86	22.97
						12	11	1	22.62	22.73
						25	0	1	22.69	22.80
			16QAM	1	0	1	22.88	22.99		
		23330		793.0		1	12	1	23.03	23.14
						1	24	1	22.72	22.83
						12	0	2	21.92	22.03
						12	6	2	21.96	22.07
						12	11	2	21.72	21.83
						25	0	2	21.89	22.00
			QPSK	1	0	0	23.68	23.79		
		23355		795.5		1	12	0	23.90	24.01
						1	24	0	23.67	23.78
						12	0	1	22.89	23.00
						12	6	1	22.92	23.03
						12	11	1	22.68	22.79
						25	0	1	22.75	22.86
			16QAM	1	0	1	22.94	23.05		

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Band	BW (MHz)	Channel	Frequency (MHz)	Mode	UL RB Allocation	UL RB Start	MPR	Average power (dBm)	ERP Power
Band 14	10M	23330	793.0	QPSK	1	0	0	23.70	23.81
					1	24	0	23.92	24.03
					1	49	0	23.69	23.80
					25	0	1	22.91	23.02
					25	12	1	22.94	23.05
					25	24	1	22.70	22.81
					50	0	1	22.77	22.88
				16QAM	1	0	1	22.96	23.07
					1	24	1	23.11	23.22
					1	49	1	22.80	22.91
					25	0	2	22.00	22.11
					25	12	2	22.04	22.15
					25	24	2	21.80	21.91
					50	0	2	21.97	22.08

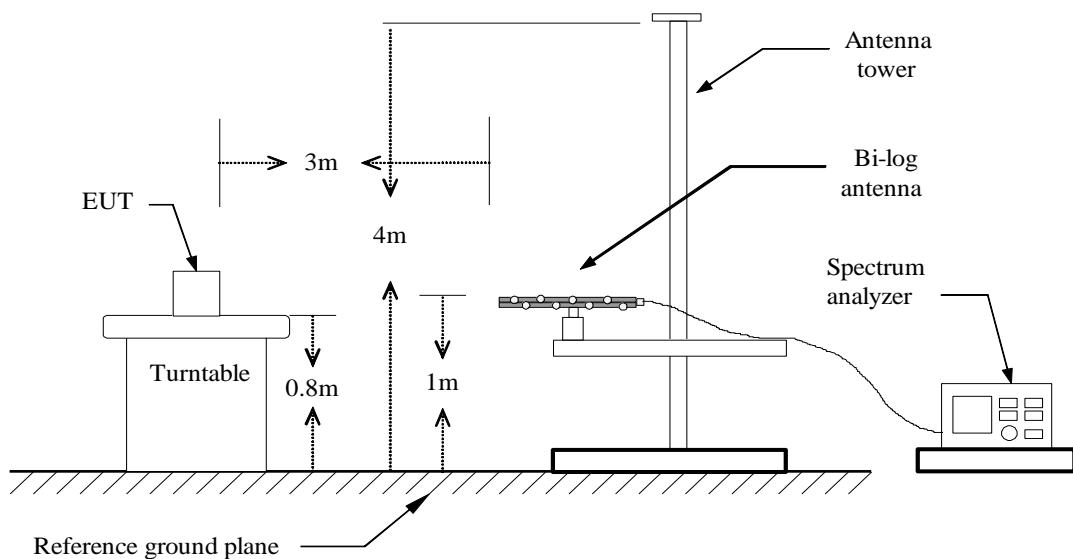
8.2 RADIATED EMISSION MEASUREMENT

LIMITS

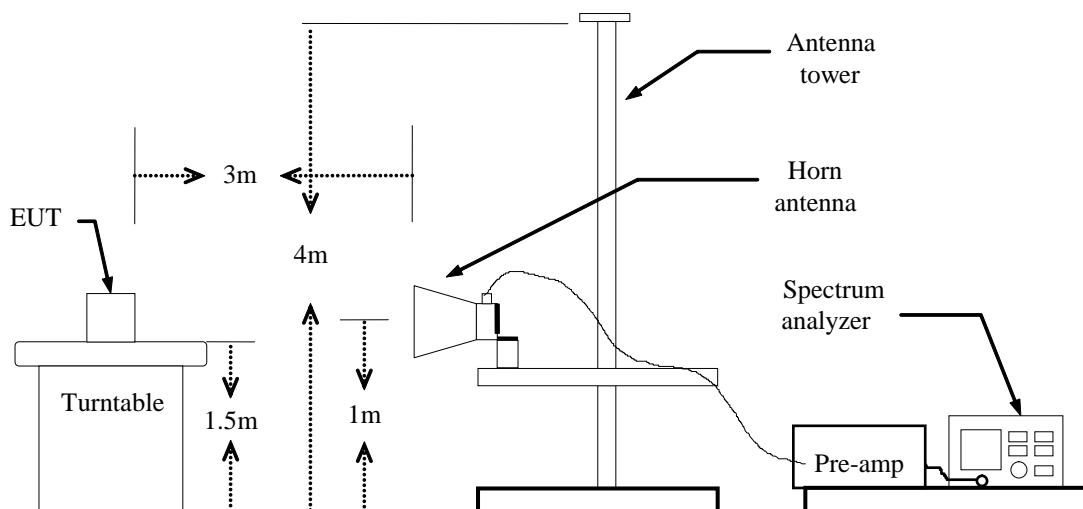
The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

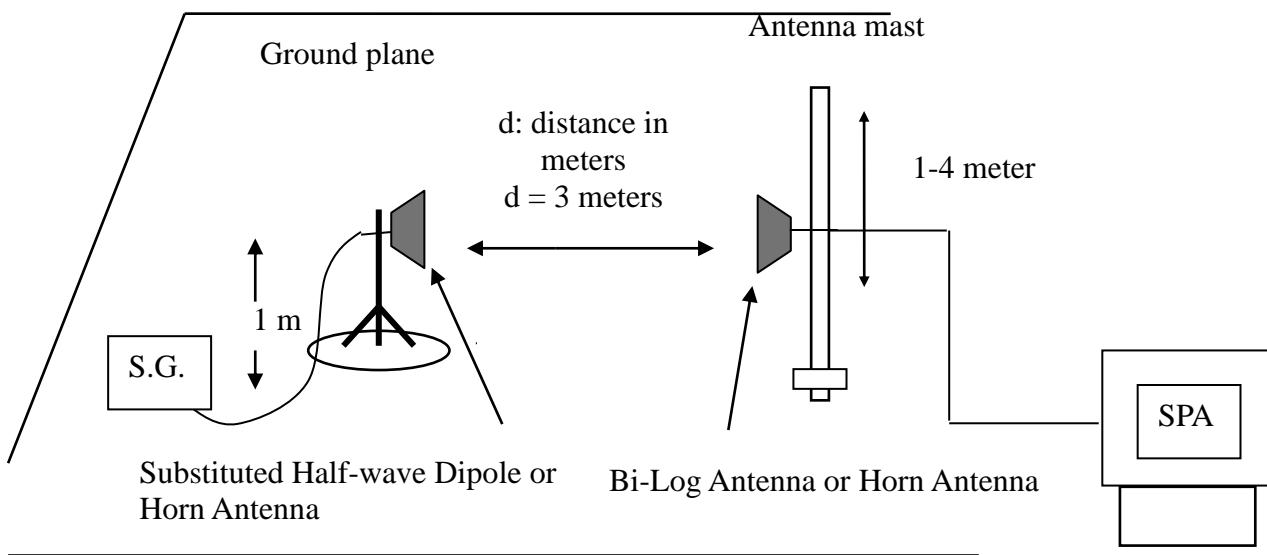
Test Configuration

Below 1 GHz



Above 1 GHz



Substituted Method Test Set-up**TEST PROCEDURES**

1. According to KDB 971168 D01 Power Meas License Digital Systems and TIA-603-E Section 2.2.12.
2. The EUT was placed on a turntable
 - (1) Below 1G : 0.8m
 - (2) Above 1G : 1.5m
 - (3) EUT set 3m from the receiving antenna
 - (4) The table was rotated 360 degrees of the highest spurious emission to determine the position.
3. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
4. A horn antenna was driven by a signal generator.
5. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)} - 2.15$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable (dB)}$$

TEST RESULTS

Refer to the attached tabular data sheets.

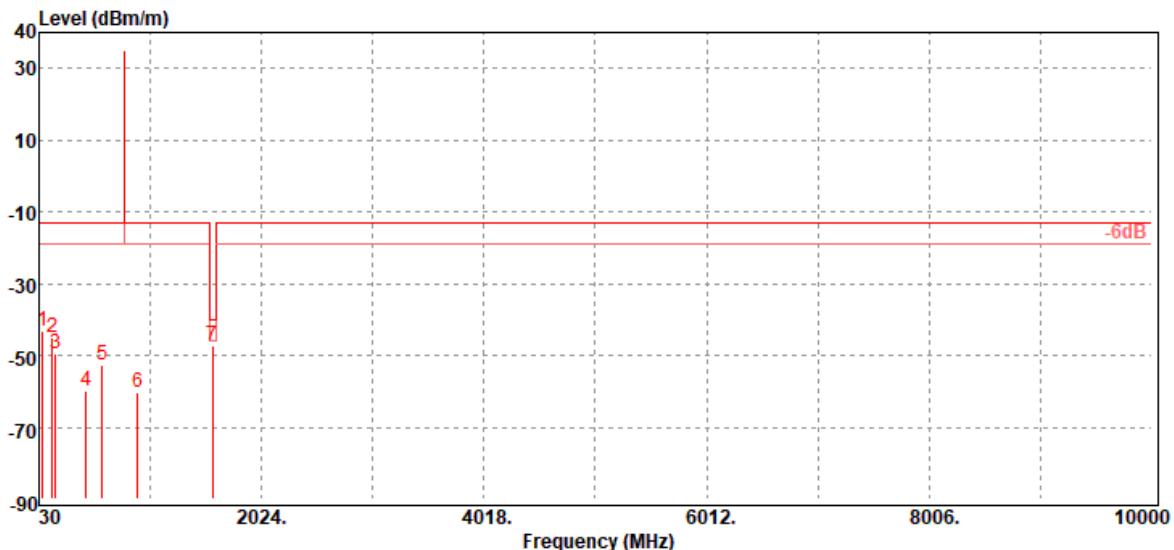
Remark: Above 1GHz

Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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LTE Band 14 / BW: 10MHz / QPSK / RB =1, RB Offset = 0

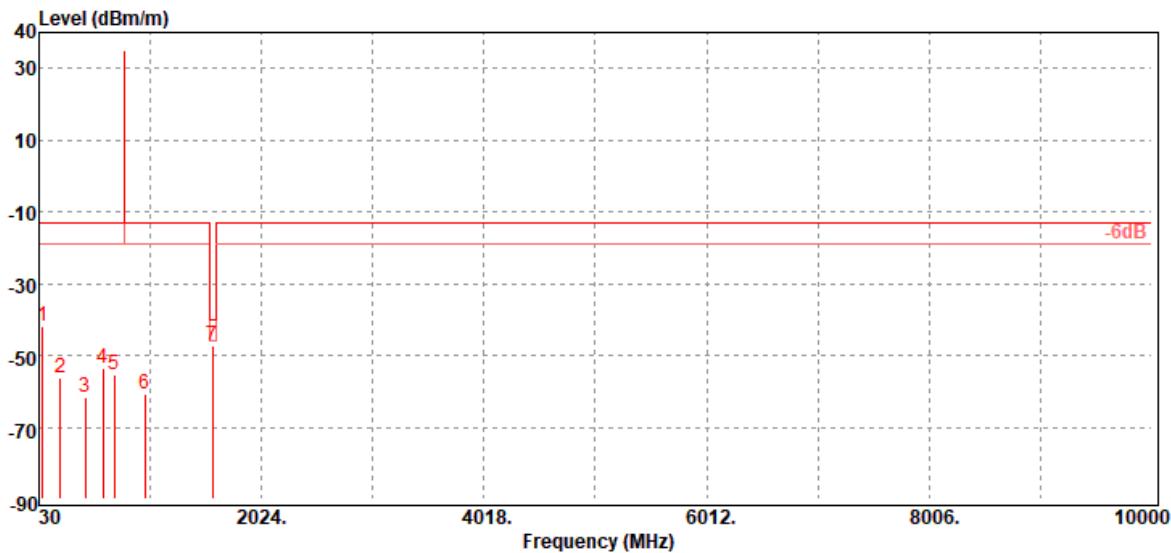
Operation Mode: Tx / Mid CH **Test Date:** September 21, 2020
Temperature: 23.4°C **Tested by:** Jerry Chang
Humidity: 54%RH **Polarity:** Ver.



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB	Antenna Polarization (V/H)
65.89	-43.10	-32.59	-9.84	-0.67	-13.00	-30.10	V
150.28	-44.88	-36.77	-7.10	-1.01	-13.00	-31.88	V
181.32	-49.73	-44.35	-4.27	-1.11	-13.00	-36.73	V
451.95	-59.83	-55.97	-2.10	-1.76	-13.00	-46.83	V
594.54	-52.77	-49.89	-0.82	-2.06	-13.00	-39.77	V
910.76	-60.22	-56.28	-1.38	-2.56	-13.00	-47.22	V
1586.00	-47.13	-53.18	9.52	-3.47	-40.00	-7.13	V

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Operation Mode: Tx / Mid CH **Test Date:** September 21, 2020
Temperature: 23.4°C **Tested by:** Jerry Chang
Humidity: 54%RH **Polarity:** Hor.



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB	Antenna Polarization (V/H)
65.89	-41.79	-31.28	-9.84	-0.67	-13.00	-28.79	H
221.09	-56.33	-53.13	-1.98	-1.22	-13.00	-43.33	H
448.07	-61.57	-57.72	-2.10	-1.75	-13.00	-48.57	H
601.33	-53.72	-50.72	-0.93	-2.07	-13.00	-40.72	H
708.03	-55.17	-51.49	-1.44	-2.24	-13.00	-42.17	H
977.69	-60.86	-56.86	-1.35	-2.65	-13.00	-47.86	H
1586.00	-47.30	-53.35	9.52	-3.47	-40.00	-7.30	H

- End of Test Report -