Partial FCC Test Report

(PART 22)

Report No.:	RFBBNT-WTW-P21040204A
FCC ID:	SLE-UC8200
Test Model:	UC-8220-T-LX
Received Date:	Nov. 30, 2021
Test Date:	Nov. 30, 2021 ~ Apr. 21, 2022
Issued Date:	Jun. 24, 2022
Applicant:	Moxa Inc.
Address:	No. 1111, Heping Rd., Bade Dist., Taoyuan City 334004, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
FCC Registration / Designation Number:	281270 / TW0032

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RFBBNT-WTW-P21040204A	Original Release	Jun. 24, 2022

1 Certificate of Conformity

Product:	Arm-based platform
Brand:	MOXA
Test Model:	UC-8220-T-LX
Sample Status:	Engineering Sample
Applicant:	Moxa Inc.
Test Date:	Nov. 30, 2021 ~ Apr. 21, 2022
Standards:	FCC Part 22, Subpart H

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Gina Liu , **Date:** Jun. 24, 2022

Gina Liu / Specialist

Approved by : Jeremy Lin , **Date:** Jun. 24, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 22.913 (a)	Effective Radiated Power	N/A	Refer to Note
2.1047	Modulation Characteristics	N/A	Refer to Note
22.913 (d)	Peak to Average Ratio	N/A	Refer to Note
2.1055 22.355	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	N/A	Refer to Note
22.917	Band Edge Measurements	N/A	Refer to Note
2.1051 22.917	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -41.53 dB at 53.28 MHz.

Note:

1. This report is a partial report, only test item of Radiated Spurious Emissions below 1GHz test was performed for this report. Other testing data please refer to SGS report no.: T190327W11-RP.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	**Frequency**	**Expanded Uncertainty (k=2) (±)**
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.00 dB
	30 MHz ~ 200 MHz	2.91 dB
	200 MHz ~ 1000 MHz	2.92 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver Rohde & Schwarz	ESR3	102579	Jul. 05, 2021	Jul. 04, 2022
Spectrum Analyzer KEYSIGHT	N9020B	MY60110462	Dec. 18, 2020	Dec. 17, 2021
			Dec. 21, 2021	Dec. 20, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-995	Oct. 28, 2021	Oct. 27, 2022
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	995	Nov. 14, 2021	Nov. 13, 2022
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2021	Sep. 15, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC330N	980783	Jan. 12, 2021	Jan. 11, 2022
			Jan. 17, 2022	Jan. 16, 2023
Preamplifier EMCI	EMC118A45SE	980810	Jan. 12, 2021	Jan. 11, 2022
			Dec. 30, 2021	Dec. 29, 2022
Preamplifier EMCI	EMC184045SE	980787	Jan. 12, 2021	Jan. 11, 2022
			Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC104-SM-SM-(9000+2000+1000)	201230+ 201242+ 210101	Jan. 12, 2021	Jan. 11, 2022
			Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+300+500)	201252+ 201250+ 201245	Jan. 12, 2021	Jan. 11, 2022
			Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+ 201249	Jan. 12, 2021	Jan. 11, 2022
			Jan. 17, 2022	Jan. 16, 2023
Software BV CPS	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Turn Table Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208675	NA	NA
Antenna Tower KaiTuo	NA	NA	NA	NA
Antenna Tower Controller KaiTuo	KT-2000	NA	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	Jul. 12, 2021	Jul. 11, 2022

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in WM Chamber 7.

3 General Information

3.1 General Description of EUT

Product	Arm-based platform	
Brand	MOXA	
Test Model	UC-8220-T-LX	
Status of EUT	Engineering Sample	
Power Supply Rating	12Vdc from AC/DC Adapter	
Modulation Type	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	WCDMA	826.4 ~ 846.6 MHz
	LTE Band 5 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz
	LTE Band 5 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz
	LTE Band 5 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz
	LTE Band 5 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz
Antenna Type	Dipole Antenna with 1 dBi gain	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

1. This report is prepared for FCC class II permissive change. The difference compared with the original report (SGS report no.: T190327W11-RP) are changing duplexer (Band13), PA (Band17) and Firmware/Software update.

   For change in duplexer and PA, it is meet section III. D of KDB 178919 D01 v06 requirements,

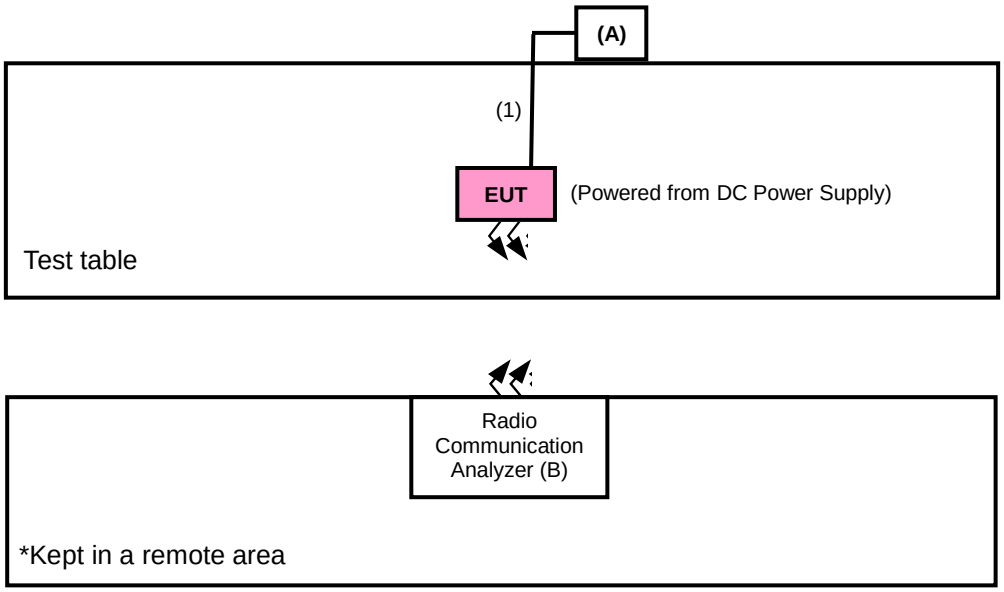
   - The new chip component is pin-for-pin compatible.
   - The new chip has the same basic function as the old chip.
   - No change in radio parameters has occurred.

   For Firmware/Software update, it is not impact in RF characteristics, for more detail please refer to operation description exhibit.

   After engineering judgement, for WCDMA and LTE Band 5, only test item of radiated spurious emissions test was performed for this report. Other testing data please refer to original test report.
2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



3.2.1 Description of Support Units

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.

No.	Product	Brand	Model No.	Serial No.	FCC ID
A	DC Power Supply	Topward	6306D	809760	NA
B	Radio Communication Analyzer	Anritsu	MT8820C	6201010284	NA

No.	Signal Cable Description Of The Above Support Units
1.	Power Cable: 1.8m

Note:

1. All power cords of the above support units are non-shielded (1.8m).

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports. The worst case was found when positioned on X-plane for LTE Band 5 according to original report.

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	Radiated Emission	4132 to 4233	4132,	WCDMA

LTE Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	20407 to 20643	20643	1.4 MHz	QPSK	1 RB / 0 RB Offset

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Radiated Emission	22 deg. C, 67 % RH	120 Vac, 60 Hz	Wade Huang, Luis Lee

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

3.5 General Description of Applied Standards and references

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:
FCC 47 CFR Part 2
FCC 47 CFR Part 22
ANSI 63.26-2015

Note: All test items have been performed and recorded as per the above standards.

References Test Guidance:
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA-603-E 2016

Note: All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit is equal to -13 dBm.

4.1.2 Test Procedure

a. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.

d. Following C63.26 section 5.5 and 5.2.7
   - EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.
   - ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

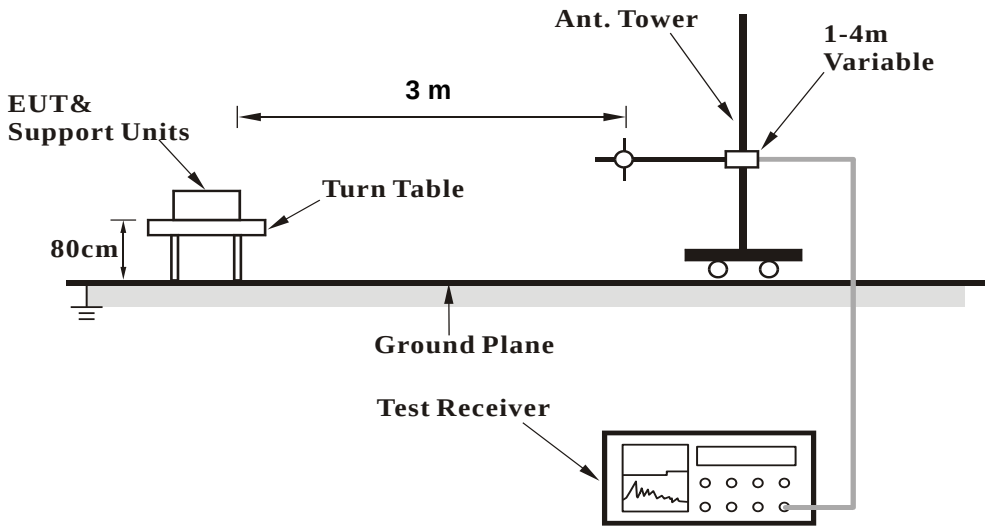
Note:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.1.3 Deviation from Test Standard

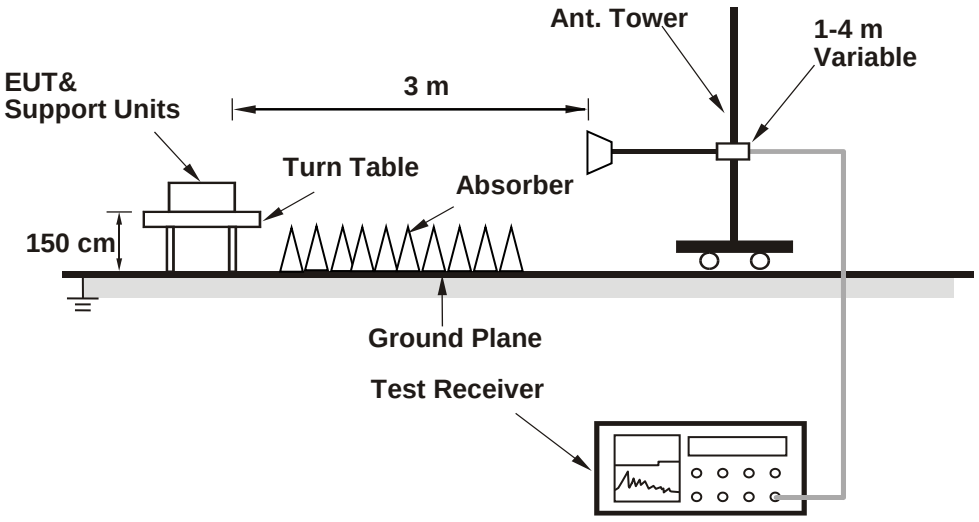
No deviation.

4.1.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.5 Test Results

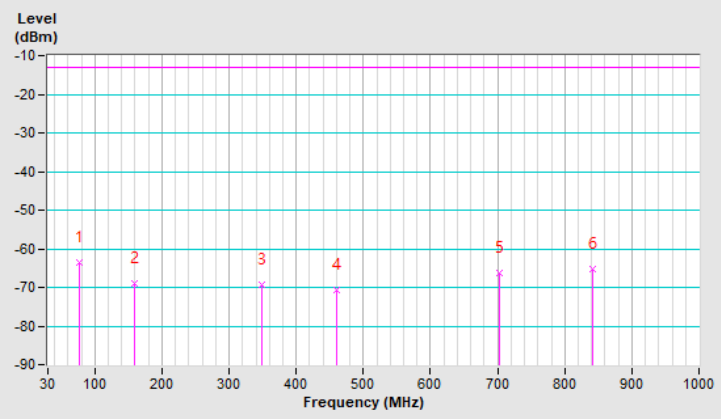
Below 1GHz
WCDMA V

Mode	TX channel 4132 (826.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 67%RH	Input Power	120Vac, 60Hz
Tested By	Luis Lee		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	77.53	-63.40	-13.00	-50.40	1.99 H	175	57.30	-120.70
2	159.01	-68.90	-13.00	-55.90	1.51 H	2	46.80	-115.70
3	349.13	-69.30	-13.00	-56.30	1.01 H	162	45.20	-114.50
4	460.68	-70.80	-13.00	-57.80	1.51 H	215	40.70	-111.50
5	702.21	-66.30	-13.00	-53.30	1.01 H	114	40.80	-107.10
6	840.92	-65.20	-13.00	-52.20	1.51 H	2	39.80	-105.00

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

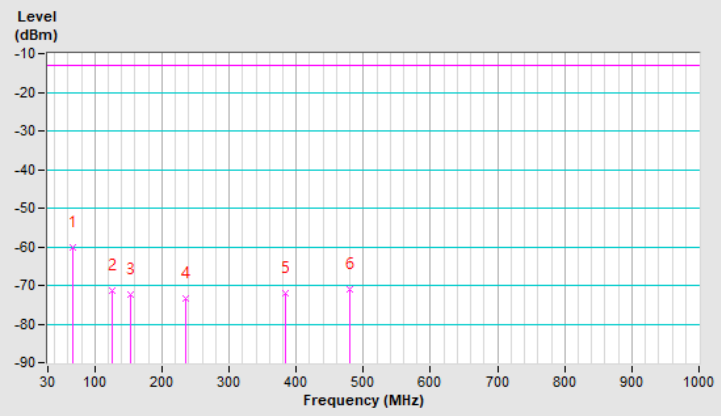


Mode	TX channel 4132 (826.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 67%RH	Input Power	120Vac, 60Hz
Tested By	Luis Lee		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	67.83	-60.00	-13.00	-47.00	1.01 V	284	58.20	-118.20
2	125.06	-71.50	-13.00	-58.50	1.01 V	19	46.00	-117.50
3	153.19	-72.30	-13.00	-59.30	1.49 V	227	43.40	-115.70
4	235.64	-73.40	-13.00	-60.40	1.49 V	267	44.30	-117.80
5	384.05	-72.10	-13.00	-59.10	1.49 V	148	41.30	-113.40
6	479.11	-71.00	-13.00	-58.00	1.99 V	146	40.20	-111.20

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



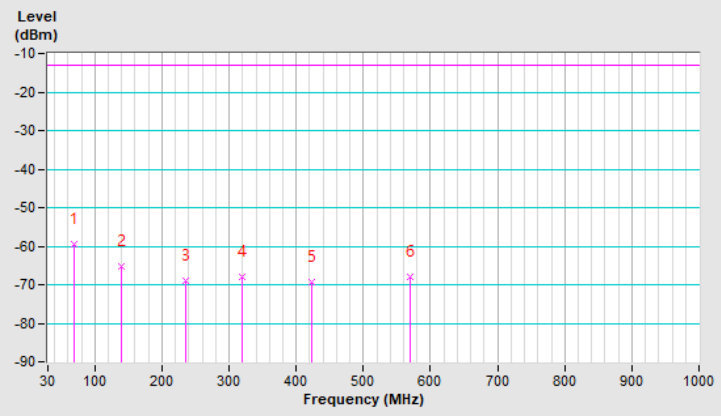
LTE Band 5, Channel Bandwidth: 1.4MHz

Mode	TX channel 20643 (848.3MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 67%RH	Input Power	120Vac, 60Hz
Tested By	Wade Huang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	68.80	-59.35	-13.00	-46.35	1.99 H	167	59.03	-118.38
2	138.64	-65.26	-13.00	-52.26	1.99 H	170	50.83	-116.09
3	235.64	-68.85	-13.00	-55.85	1.01 H	18	48.89	-117.74
4	319.06	-68.02	-13.00	-55.02	1.01 H	332	46.84	-114.86
5	422.85	-69.18	-13.00	-56.18	1.99 H	217	43.13	-112.31
6	569.32	-67.84	-13.00	-54.84	1.51 H	143	41.55	-109.39

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

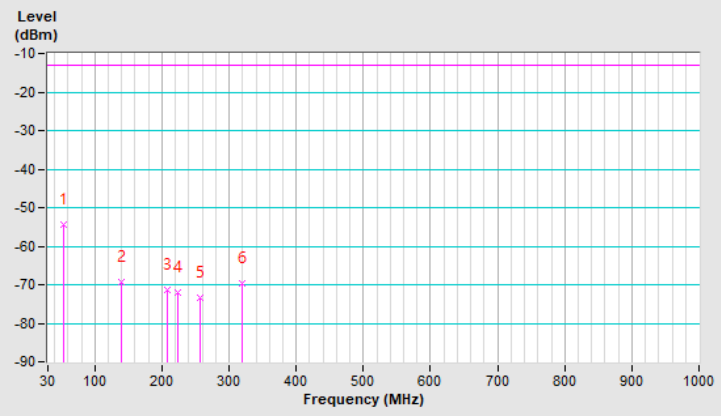


Mode	TX channel 20643 (848.3MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 67%RH	Input Power	120Vac, 60Hz
Tested By	Wade Huang		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**53.28**	**-54.53**	**-13.00**	**-41.53**	**1.01 V**	**16**	**61.68**	**-116.21**
2	138.64	-69.44	-13.00	-56.44	1.99 V	116	46.65	-116.09
3	208.48	-71.42	-13.00	-58.42	1.49 V	18	47.99	-119.41
4	223.03	-72.05	-13.00	-59.05	1.49 V	277	47.21	-119.26
5	256.01	-73.44	-13.00	-60.44	1.01 V	136	43.56	-117.00
6	320.03	-69.82	-13.00	-56.82	1.49 V	212	45.02	-114.84

Remarks:

1. ERP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8 - 2.15
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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