LABCODE: 500069-0

FCC PART 22H, PART 24E

MEASUREMENT AND TEST REPORT

For

Chengdu Vantron Technology, Ltd.

No. 5 GaoPeng Road, Hi-Tech Zone, Chengdu, Sichuan 610045, China

FCC ID: 2AAGEVTM2M-TCVM

Report Type:	Product Type:
Original Report	M2M Gateway

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Report Number:	R2SC131023050-00B
Report Date:	2014-02-11
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Chengdu Vantron Technology, Ltd.*'s product, model number: *VT-M2M-TC VM (FCC ID: 2AAGEVTM2M-TCVM)* (the "EUT") in this report was a *M2M Gateway,* which was measured approximately: 19.1cm (L) x 10.1 cm (W) x 5.2 cm (H), rated input voltage: DC 12V.

** All measurement and test data in this report was gathered from production sample serial number: 131023050 (Assigned by BACL.Dongguan). The EUT was received on 2013-10-29.*

Objective

This report is prepared on behalf of *Chengdu Vantron Technology, Ltd.* in accordance with Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, spurious radiated emission, frequency stability and band edge.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: *2AAGEVTM2M-TCVM*.
FCC Part 15C DSS submissions with FCC ID: *2AAGEVTM2M-TCVM.*
FCC Part 15E NII submissions with FCC ID: *2AAGEVTM2M-TCVM.*
FCC Part 15B JBC submissions with FCC ID: *2AAGEVTM2M-TCVM.*

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services

Applicable Standards: TIA/EIA 603-D-2010, ANSI C63.4-2003.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan), the radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).

The current scope of accreditations can be found at http://ts.nist.gov/standards/scopes/5000690.htm

SYSTEM TEST CONFIGURATION

Justification

The test items were performed with the EUT operating at testing mode.

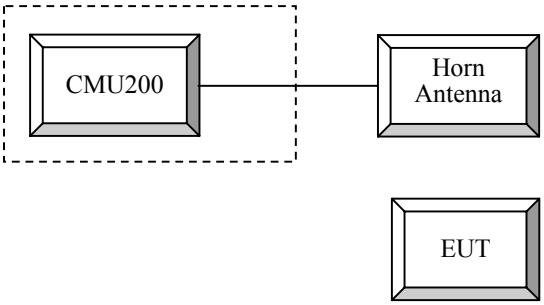
Equipment Modifications

No modification was made to the EUT.

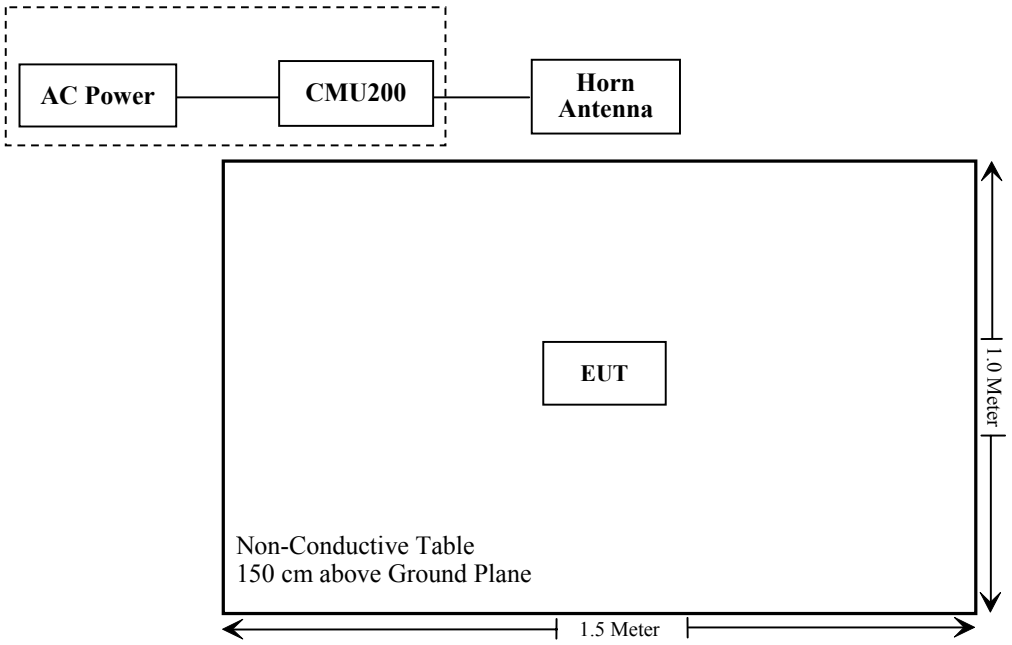
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R & S	Universal Radio Communication Tester	CMU200	109038

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1091	RF Exposure	Compliance
§2.1046; § 22.913 (a); § 24.232 (c)	RF Output Power	Applicable*
§ 2.1047	Modulation Characteristics	Not Applicable**
§ 2.1049; § 22.905 § 22.917; § 24.238	Occupied Bandwidth	Not Applicable**
§ 2.1051, § 22.917 (a); § 24.238 (a)	Spurious Emissions at Antenna Terminal	Not Applicable**
§ 2.1053 § 22.917 (a); § 24.238 (a)	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a)	Out of band emission, Band Edge	Not Applicable**
§ 2.1055 § 22.355; § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Not Applicable**

Note：
* Only test EPR & EIRP.
** Please refer to the certified module with FCC ID: RI7DE910-DUAL.

FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Per 447498 D01 General 25 RF Exposure Guidance v05r01, simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$
S= power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

RF module	Frequency band	Antenna Gain		Conducted Power	Duty cycle	Evaluation	Power Density	MPE Limit	MPE Ratios
	(MHz)	(dBi)	(numeric)	(mW)	(%)	(cm)	(mW/cm^2)	(mW/cm^2)	(%)
WIFI*	2412-2462	2.1	1.62	117	100	20	0.038	1	3.77
	2422-2452	2.1	1.62	32	100	20	0.010	1	1.03
	5475-5825	2.1	1.62	36	100	20	0.012	1	1.16
	5755-5795	2.8	1.91	120	100	20	0.046	1	**4.56**
	5190-5230	3.8	2.40	30	100	20	0.014	1	1.43
	5180-5240	3.8	2.40	32	100	20	0.015	1	1.53
BT	2402-2480	2.5	1.78	4	100	20	0.001	1	**0.13**
CDMA**	824.7-848.31	2.1	1.62	298	100	20	0.096	0.55	**17.48**
	1851.25-1908.75	3.0	2.00	274	100	20	0.109	1	10.86
Total sum of MPE ratios (%)									22.17

Note:
* For WIFI module, 2.4 GHz and 5 GHz band can't transmit simultaneously, the worst case for MPE was chosen to be added up.
* For CDMA module, the worst case for MPE was chosen to be added up.

Result: 22.17 %< 1, the device meet FCC MPE at 20 cm distance.

FCC §2.1046, §22.913 (a) & §24.232 (c) - RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

Test Procedure

Radiated method.

ANSI/TIA 603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI TEST RECEIVER	ESCI	100224	2013-5-6	2014-5-5
Sunol Sciences	Antenna	JB3	A060611-1	2011-9-6	2014-9-5
R&S	Spectrum analyzer	FSEM	DE31388	2013-5-7	2014-5-6
ETS LINDGREN	horn antenna	3115	000 527 35	2012-9-6	2015-9-5
Giga	Signal Generator	1026	320408	2013-5-9	2014-5-8
TDK RF	horn antenna	HRN-0118	130 084	2012-9-6	2015-9-5
EMCO	Adjustable dipole antenna	3121C	9109-753	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	22.9 °C
Relative Humidity:	31 %
ATM Pressure:	102.1 kPa

The testing was performed by Ares Liu on 2013-11-29.

ERP & EIRP

Channel No.	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
CDMA 800, 1x RTT								
1013 (824.7 MHz)	H	87.71	19.0	0.5	0	18.5	38.45	19.95
	V	88.92	20.5	0.5	0	20.0	38.45	18.45
384 (836.52 MHz)	H	82.36	14.0	0.5	0	13.5	38.45	24.95
	V	87.03	18.6	0.5	0	18.1	38.45	20.35
777 (848.31 MHz)	H	84.91	16.3	0.5	0	15.8	38.45	22.65
	V	87.24	18.8	0.5	0	18.3	38.45	20.15
CDMA 800, EV-DO								
1013 (824.7 MHz)	H	87.95	19.2	0.5	0	18.7	38.45	19.71
	V	89.13	20.7	0.5	0	20.2	38.45	18.24
384 (836.52 MHz)	H	82.51	14.2	0.5	0	13.7	38.45	24.8
	V	87.25	18.8	0.5	0	18.3	38.45	20.13
777 (848.31 MHz)	H	85.16	16.6	0.5	0	16.1	38.45	22.4
	V	87.47	19.0	0.5	0	18.5	38.45	19.92
CDMA 1900, 1x RTT								
25 (1851.4MHz)	H	78.85	6.6	1	9.4	15.0	33	18.0
	V	80.65	8.5	1	9.4	16.9	33	16.1
600 (1880.0 MHz)	H	81.59	9.3	1	9.4	17.7	33	15.3
	V	80.5	8.4	1	9.4	16.8	33	16.2
1175 (1908.75 MHz)	H	79.87	7.6	1	9.4	16.0	33	17.0
	V	82.95	10.5	1	9.4	18.9	33	14.1
CDMA 1900, EV-DO								
25 (1851.4MHz)	H	78.97	6.7	1	9.4	15.1	33	17.9
	V	80.73	8.6	1	9.4	17.0	33	16.0
600 (1880.0 MHz)	H	80.71	8.4	1	9.4	16.8	33	16.2
	V	81.62	9.5	1	9.4	17.9	33	15.1
1175 (1908.75 MHz)	H	80.05	7.8	1	9.4	16.2	33	16.8
	V	83.17	10.7	1	9.4	19.1	33	13.9

Note：The cable length form antenna connector to external antenna is 5.1m. The cable mode is CFD200. It may cause several dB attenuation of RF power in above frequency.

FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917 and § 24.238.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI TEST RECEIVER	ESCI	100224	2013-5-6	2014-5-5
Sunol Sciences	Antenna	JB3	A060611-1	2011-9-6	2014-9-5
HP	AMPLIFIER	8447E	2434A02181	N/A	N/A
R&S	Spectrum analyzer	FSEM	DE31388	2013-5-7	2014-5-6
ETS LINDGREN	horn antenna	3115	000 527 35	2012-9-6	2015-9-5
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	N/A	N/A
Ducommun Technolagies	horn antenna	ARH-4223-02	1007726-01	2013-6-16	2014-6-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	N/A	N/A
Giga	Signal Generator	1026	320408	2013-5-9	2014-5-8
Ducommun Technolagies	horn antenna	ARH-4223-02	1007726-01 1302	2013-6-16	2014-6-15
TDK RF	horn antenna	HRN-0118	130 084	2012-9-6	2015-9-5
EMCO	Adjustable dipole antenna	3121C	9109-753	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	22.9 °C
Relative Humidity:	31 %
ATM Pressure:	102.1 kPa

The testing was performed by Ares Liu on 2013-11-29.

EUT Operation Mode: Transmitting

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H	
			Height	Polar	SG Level	Cable	Antenna		Limit	Margin
			(m)	(H/V)	(dBm)	Loss (dB)	Gain (dB)		(dBm)	(dB)
CDMA800, Low Channel										
1649.4	61.05	57	1.3	H	-42.5	0.9	9.4	-34	-13	21
1649.4	57.22	48	1.2	V	-44.8	0.9	9.4	-36.3	-13	23.3
2473.3	47.72	67	1.5	H	-53	1.5	10.7	-43.8	-13	30.8
2473.3	47.8	35	1.4	V	-48.6	1.5	10.7	-39.4	-13	26.4
625	50	153	1.1	H	-46	0.5	0	-46.6	-13	33.6
625	46	124	1	V	-50	0.5	0	-50.5	-13	37.5
CDMA800 , Middle Channel										
1673	63.12	59	1.2	H	-39.9	0.9	9.4	-31.4	-13	18.4
1673	60.41	58	1.5	V	-40	0.9	9.4	-31.5	-13	18.5
2509.6	49	51	1.4	H	-51.7	1.5	10.7	-42.5	-13	29.5
2509.6	48.07	50	1.3	V	-48.3	1.5	10.7	-39.1	-13	26.1
625	48.76	125	1	H	-47.5	0.5	0	-48	-13	35
625	46.21	103	1	V	-48.8	0.5	0	-49.3	-13	36.3
CDMA800 , High Channel										
1696.6	60.53	34	1.5	H	-42	0.9	9.4	-33.5	-13	20.5
1696.6	58.61	76	1.3	V	-43.5	0.9	9.4	-35	-13	22
2545	46.53	81	1.2	H	-52	1.5	10.7	-42.8	-13	29.8
2545	47.02	26	1.4	V	-49.3	1.5	10.7	-40.1	-13	27.1
625	48.5	146	1.1	H	-48	0.5	0	-48.5	-13	35.5
625	46.5	111	1.2	V	-48.5	0.5	0	-49	-13	36

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 24E	
			Height	Polar	SG Level	Cable	Antenna		Limit	Margin
			(m)	(H/V)	(dBm)	Loss (dB)	Gain (dB)		(dBm)	(dB)
CDMA 1900 , Low Channel										
3702.5	43.5	251	1.2	H	-53.7	2.5	12	-44.2	-13	31.2
3702.5	41	145	1.3	V	-55.5	2.5	12	-46	-13	33
5553.7	39.5	360	1.2	H	-53.5	2.8	12.4	-43.9	-13	30.9
5553.7	37.12	102	1.6	V	-54.7	2.8	12.4	-45.1	-13	32.1
625	48.53	0	1	H	-47.7	0.5	0	-48.2	-13	35.2
625	46.01	10	1	V	-49	0.5	0	-49.5	-13	36.5
CDMA 1900 , Middle Channel										
3760	44.35	156	1.3	H	-53.7	2.5	12	-44.2	-13	31.2
3760	40.24	350	1.2	V	-55.5	2.5	12	-46	-13	33
5640	40.12	241	1.3	H	-52.6	2.8	12.4	-43	-13	30
5640	37.65	163	1.2	V	-54.1	2.8	12.4	-44.5	-13	31.5
625	49.85	120	1	H	-46.5	0.5	0	-47	-13	34
625	46.75	155	1	V	-48.2	0.5	0	-48.7	-13	35.7
CDMA 1900 , High channel										
3817.5	45.65	156	1.3	H	-52.3	2.5	12	-42.8	-13	29.8
3817.5	42.53	135	1.2	V	-53	2.5	12	-43.5	-13	30.5
5726.25	38.76	145	1.4	H	-53.5	2.8	12.5	-43.8	-13	30.8
5726.25	37.61	21	1.3	V	-55.6	2.8	12.5	-45.9	-13	32.9
625	47.64	175	1	H	-49	0.5	0	-49.5	-13	36.5
625	46.26	163	1	V	-48.8	0.5	0	-49.3	-13	36.3

Note:
1) Absolute Level = SG Level - Cable loss + Antenna Gain
2) Margin = Limit- Absolute Level

******* END OF REPORT *******