



FCC PART 15.247

TEST REPORT

For

Chengdu Vantron Technology, Ltd.

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

FCC ID: 2AAGEVTM2M-TCVM

Report Type: Original Report	Product Type: M2M Gateway
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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.* accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communications Commission rules.

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: *2AAGEVTM2M-TCVM*.
FCC Part 22H&24E PCB 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 measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

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 Communication 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

Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer. For 2.4G band, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

For 802.11b, 802.11g, and 802.11n20 modes were tested with Channel 1, 6 and 11. For 802.11n40 mode were tested with Channel 3, 6 and 9.

For 5G Band, 9 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5745	6	5795
2	5755	7	5805
3	5765	8	5815
4	5775	9	5825
5	5785	/	/

Channel 1, Channel 5 and Channel 5 was tested for 802.11n20. Channel 2, Channel 6 was tested for 802.11n40.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all date rates bandwidths, and modulations.

EUT Exercise Software

The test was performed under “*DRTU.exe*” which was provided by the manufacturer.

Test Mode	Test Software Version	DRTU.exe		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	12.5	12.5	12.5
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	9	9	9
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting Chain0	9.5	9.5	9.5
802.11n ht40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting Chain1	9	9	9
802.11a	Test Frequency	5475MHz	5785MHz	5825MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	10	10	10
5G 802.11n ht20	Test Frequency	5475MHz	5785MHz	5825MHz
	Data Rate	6.5Mbps	6.5Mbps	6.5Mbps
	Power Level Setting	10.5	10.5	10.5
5G 802.11n ht40	Test Frequency	5755MHz	/	5795MHz
	Data Rate	13Mbps	/	13Mbps
	Power Level Setting	10	/	10

Equipment Modifications

No modification was made to the EUT tested.

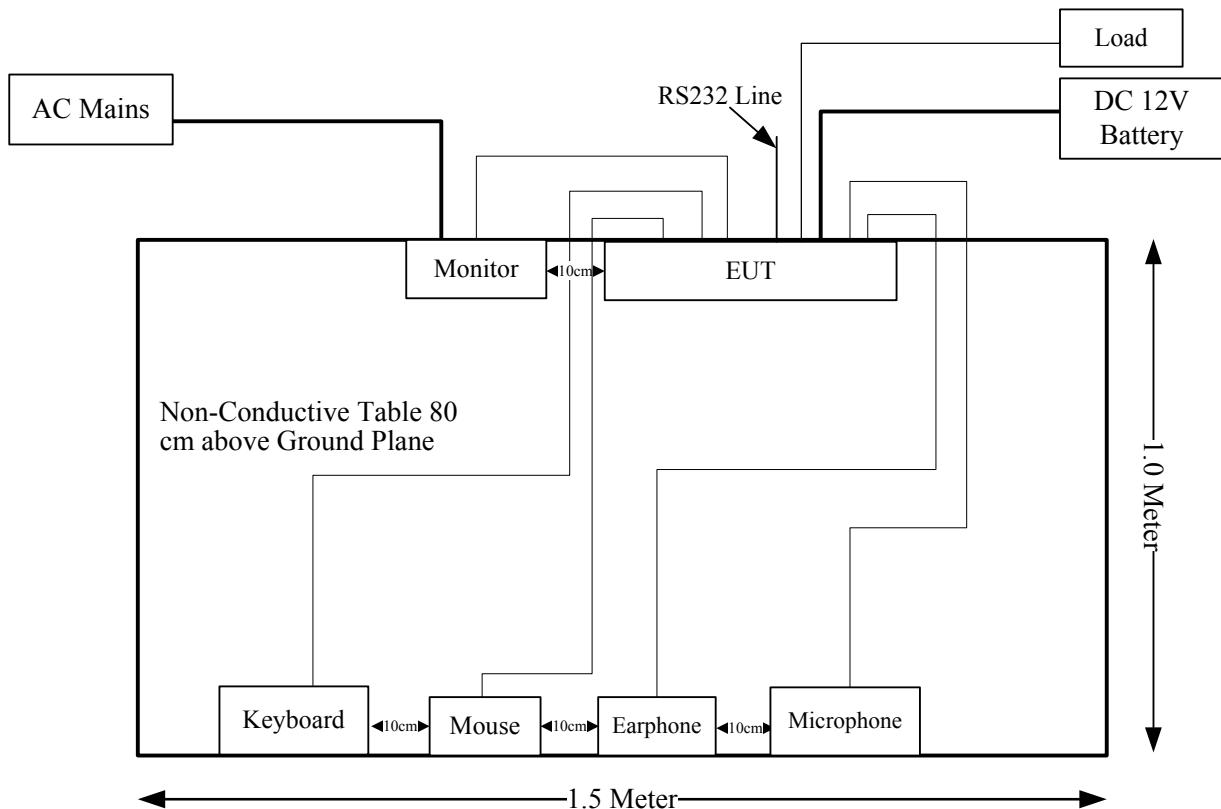
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Dell	Monitor	U3011t	CN-OPH5NY-74445-16T-290L
Keenion	Microphone	KM-206	N/A
Keenion	Earphone	KDM-911	N/A
DELL	Keyboard	SK-8115	CN-0J4628-71616-52H-0RT6
DELL	Mouse	MO56UOA	F0Y02P7Y

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	No	No	10m	EUT RJ45 Port	Internet
DC Power Cable	No	No	5m	EUT	Battery
Antenna	No	No	5.1m	EUT	Antenna
VGA Cable	Yes	Yes	1.8m	EUT VGA Port	Monitor
Audio Cable	No	No	1.5m	EUT Earphone Port	Earphone
Audio Cable	No	No	1.5m	EUT Microphone Port	Microphone
Keyboard Line	Yes	No	2.0	EUT	Keyboard
Mouse Line	Yes	No	1.8	EUT	Mouse

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not applicable*
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Not applicable**
§15.247(b)(3)	Maximum conducted output power	Not applicable**
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Not applicable**
§15.247(e)	Power Spectral Density	Not applicable**

Note:

* EUT is used in vehicle and not connected to public ac mains.

** Please refer to teh certified Wi-Fi module with FCC ID: PD962205ANH.

FCC §15.247 (i) & §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 $\leqslant 1.0$.

Calculated Formulary:

Predication of MPE limit at a given distance

S = PG/4πR² = power density (in appropriate units, e.g. mW/cm²);

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, 2.4GHz and 5GHz 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 §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has three external antennas for transceiver, which are used unique type of connectors to attach to the EUT, and complied with 15.203, please refer to the internal photos and following table:

RF Module	Ant manufacturer	Ant Model Name	Ant Connector Type	Max. Antenna Gain
WIFI	Taoglas	MA600*	SMA(Female)**	2400-2500MHz: 2.1dBi 5150-5250MHz: 3.8dBi 5725-5850MHz: 2.8dBi
3G			SMA(Female)**	CDMA800 : 2.1dBi CDMA1900 : 3.0dBi
BT	Norminson	NW001	SMA(Male)	2402-2480MHz: 2.5dBi

Note:

* MA600 is an external antenna cover frequency band of 2.4 G, 5G WIFI, CDMA800 and CDMA1900.

** WIFI&3G antenna connector type is SMA (Femal), it must to be professionally installed, please refer to user manual.

Result: Compliance.

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cisp}^r of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cisp}^r of Table 2, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{\text{lab}} - U_{\text{cisp}}^r)$, exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by $(U_{\text{lab}} - U_{\text{cisp}}^r)$, exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

30M~200MHz: 5.0 dB

200M~1GHz: 6.2 dB

1G~6GHz: 4.45 dB

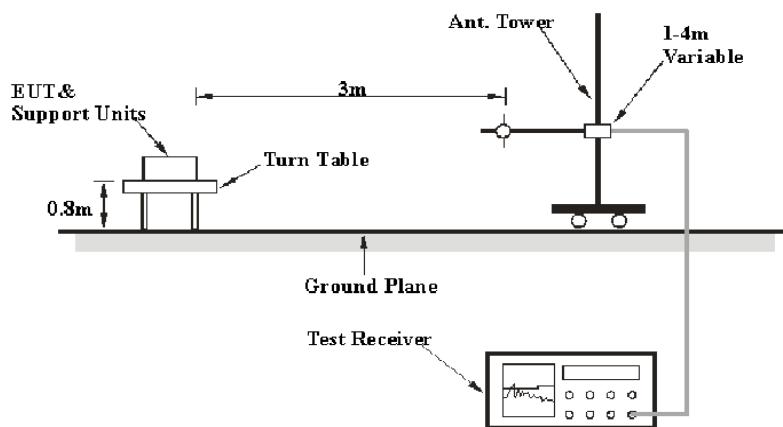
6G~18GHz: 5.23 dB

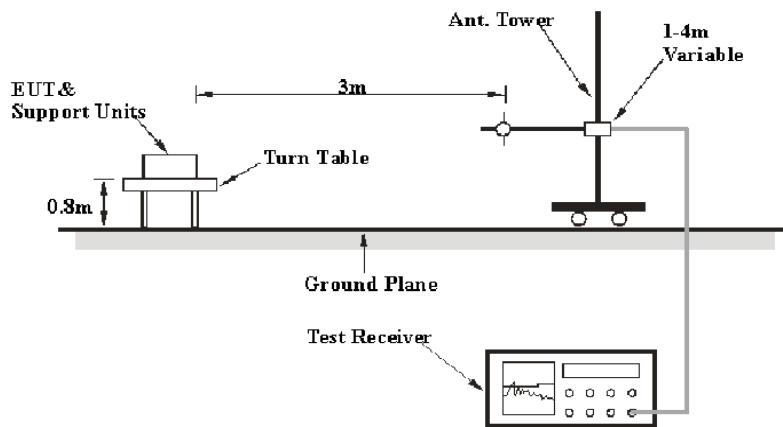
Table 2 – Values of U_{cisp}^r

Measurement	U_{cisp}^r
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209, and FCC 15.247 limits. The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The EUT was connected to a DC12 V battery.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

According to C63.4, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor = $20 \log(3m/1.5m)$ dB

Extrapolation result = Corrected Amplitude (dB μ V/m) -6dB

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Extrapolation result}$$

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
R&S	Spectrum Analyzer	FSP 38	100478	2013-6-16	2014-6-15
Ducommun Technologies	horn antenna	ARH-4223-02	1007726-01 1304	2013-6-16	2014-6-15
Ducommun Technologies	horn antenna	ARH-2823-02	1007726-01 1302	2013-6-16	2014-6-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Section 15.205, 15.209 and 15.247, with the worst margin reading:

3.01 dB at 625.9 MHz in the Vertical polarization for 802.11g Mode

Test Data

Environmental Conditions

Temperature:	26°C
Relative Humidity:	49 %
ATM Pressure:	101.5 kPa

The testing was performed by Ares Liu on 2013-11-15

Mode: Transmitting

2.4G band:
802.11b Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	65.58	PK	H	25.67	3.93	0.00	95.18	N/A	N/A
2412	58.33	AV	H	25.67	3.93	0.00	87.93	N/A	N/A
2412	66.32	PK	V	25.67	3.93	0.00	95.92	N/A	N/A
2412	58.87	AV	V	25.67	3.93	0.00	88.47	N/A	N/A
2390	27.57	PK	V	25.61	3.84	0.00	57.02	74.00	16.98
2390	13.97	AV	V	25.61	3.84	0.00	43.42	54.00	10.58
4824	33.65	PK	V	30.64	4.73	27.26	41.76	74.00	32.24
4824	18.23	AV	V	30.64	4.73	27.26	26.34	54.00	27.66
7236	32.46	PK	V	34.17	6.56	26.36	46.83	74.00	27.17
7236	17.68	AV	V	34.17	6.56	26.36	32.05	54.00	21.95
9648	32.58	PK	V	36.06	8.70	26.06	51.28	74.00	22.72
9648	17.81	AV	V	36.06	8.70	26.06	36.51	54.00	17.49
3002.28	42.61	PK	V	27.21	7.42	27.48	49.76	74.00	24.24
3002.28	39.81	AV	V	27.21	7.42	27.48	46.96	54.00	7.04
624.5	41.2	QP	V	19.85	3.06	22.28	41.83	46.00	4.17*
Middle Channel: 2437 MHz									
2437	65.74	PK	H	25.74	3.98	0.00	95.46	N/A	N/A
2437	57.92	AV	H	25.74	3.98	0.00	87.64	N/A	N/A
2437	66.65	PK	V	25.74	3.98	0.00	96.37	N/A	N/A
2437	58.71	AV	V	25.74	3.98	0.00	88.43	N/A	N/A
4874	33.69	PK	V	30.77	4.76	27.26	41.96	74.00	32.04
4874	18.23	AV	V	30.77	4.76	27.26	26.50	54.00	27.50
7311	33.24	PK	V	34.35	6.70	26.51	47.78	74.00	26.22
7311	18.12	AV	V	34.35	6.70	26.51	32.66	54.00	21.34
9748	32.84	PK	V	36.30	8.60	25.68	52.06	74.00	21.94
9748	17.68	AV	V	36.30	8.60	25.68	36.90	54.00	17.10
1526.35	33.26	PK	V	23.65	3.04	26.98	32.97	74.00	41.03
1526.35	18.47	AV	V	23.65	3.04	26.98	18.18	54.00	35.82
3002.28	42.58	PK	V	27.21	7.42	27.48	49.73	74.00	24.27
3002.28	39.87	AV	V	27.21	7.42	27.48	47.02	54.00	6.98
625.6	42.1	QP	V	19.90	3.06	22.28	42.78	46.00	3.22 *

High Channel: 2462 MHz									
			H	25.80	3.93	0.00	95.04	N/A	N/A
2462	65.31	PK	H	25.80	3.93	0.00	95.04	N/A	N/A
2462	57.88	AV	H	25.80	3.93	0.00	87.61	N/A	N/A
2462	66.42	PK	V	25.80	3.93	0.00	96.15	N/A	N/A
2462	58.63	AV	V	25.80	3.93	0.00	88.36	N/A	N/A
2483.5	28.15	PK	V	25.86	3.80	0.00	57.81	74.00	16.19
2483.5	13.4	AV	V	25.86	3.80	0.00	43.06	54.00	10.94
4924	35.62	PK	V	30.90	4.70	27.27	43.95	74.00	30.05
4924	19.62	AV	V	30.90	4.70	27.27	27.95	54.00	26.05
7386	33.42	PK	V	34.53	6.84	26.66	48.13	74.00	25.87
7386	18.62	AV	V	34.53	6.84	26.66	33.33	54.00	20.67
9848	32.51	PK	V	36.54	8.49	25.49	52.05	74.00	21.95
9848	17.85	AV	V	36.54	8.49	25.49	37.39	54.00	16.61
3002.28	42.96	PK	V	27.21	7.42	27.48	50.11	74.00	23.89
3002.28	39.89	AV	V	27.21	7.42	27.48	47.04	54.00	6.96
624.3	41.9	QP	V	19.84	3.06	22.28	42.52	46.00	3.48*

802.11g Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	61.35	PK	H	25.67	3.93	0.00	90.95	N/A	N/A
2412	53.47	AV	H	25.67	3.93	0.00	83.07	N/A	N/A
2412	62.27	PK	V	25.67	3.93	0.00	91.87	N/A	N/A
2412	54.72	AV	V	25.67	3.93	0.00	84.32	N/A	N/A
2390	28.32	PK	V	25.61	3.84	0.00	57.77	74.00	16.23
2390	13.96	AV	V	25.61	3.84	0.00	43.41	54.00	10.59
4824	33.74	PK	V	30.64	4.73	27.26	41.85	74.00	32.15
4824	18.36	AV	V	30.64	4.73	27.26	26.47	54.00	27.53
7236	32.64	PK	V	34.17	6.56	26.36	47.01	74.00	26.99
7236	18.31	AV	V	34.17	6.56	26.36	32.68	54.00	21.32
9648	32.26	PK	V	36.06	8.70	26.06	50.96	74.00	23.04
9648	17.58	AV	V	36.06	8.70	26.06	36.28	54.00	17.72
3000.28	42.84	PK	V	27.20	7.47	27.48	50.03	74.00	23.97
3000.28	39.61	AV	V	27.20	7.47	27.48	46.80	54.00	7.20
624.2	42.2	QP	V	19.84	3.06	22.28	42.82	46.00	3.18*
Middle Channel: 2437 MHz									
2437	61.42	PK	H	25.74	3.98	0.00	91.14	N/A	N/A
2437	53.51	AV	H	25.74	3.98	0.00	83.23	N/A	N/A
2437	62.47	PK	V	25.74	3.98	0.00	92.19	N/A	N/A
2437	54.82	AV	V	25.74	3.98	0.00	84.54	N/A	N/A
4874	33.68	PK	V	30.77	4.76	27.26	41.95	74.00	32.05
4874	18.46	AV	V	30.77	4.76	27.26	26.73	54.00	27.27
7311	32.63	PK	V	34.35	6.70	26.51	47.17	74.00	26.83
7311	18.21	AV	V	34.35	6.70	26.51	32.75	54.00	21.25
9748	32.26	PK	V	36.30	8.60	25.68	51.48	74.00	22.52
9748	17.36	AV	V	36.30	8.60	25.68	36.58	54.00	17.42
1526.32	33.29	PK	V	23.65	3.04	26.98	33.00	74.00	41.00
1526.32	18.52	AV	V	23.65	3.04	26.98	18.23	54.00	35.77
3002.28	42.68	PK	V	27.21	7.42	27.48	49.83	74.00	24.17
3002.28	39.57	AV	V	27.21	7.42	27.48	46.72	54.00	7.28
625.5	41.8	QP	V	19.89	3.06	22.28	42.47	46.00	3.53 *
High Channel: 2462 MHz									
2462	61.27	PK	H	25.80	3.93	0.00	91.00	N/A	N/A
2462	53.38	AV	H	25.80	3.93	0.00	83.11	N/A	N/A
2462	62.36	PK	V	25.80	3.93	0.00	92.09	N/A	N/A
2462	54.64	AV	V	25.80	3.93	0.00	84.37	N/A	N/A
2483.5	28.53	PK	V	25.86	3.80	0.00	58.19	74.00	15.81
2483.5	14.35	AV	V	25.86	3.80	0.00	44.01	54.00	9.99
4924	33.76	PK	V	30.90	4.70	27.27	42.09	74.00	31.91
4924	18.56	AV	V	30.90	4.70	27.27	26.89	54.00	27.11
7386	32.69	PK	V	34.53	6.84	26.66	47.40	74.00	26.60
7386	18.45	AV	V	34.53	6.84	26.66	33.16	54.00	20.84
9848	32.74	PK	V	36.54	8.49	25.49	52.28	74.00	21.72
9848	18.32	AV	V	36.54	8.49	25.49	37.86	54.00	16.14
3000.28	42.63	PK	V	27.20	7.47	27.48	49.82	74.00	24.18
3000.28	39.26	AV	V	27.20	7.47	27.48	46.45	54.00	7.55
625.9	42.3	QP	V	19.91	3.06	22.28	42.99	46.00	3.01*

*Within measurement uncertainty!

802.11 n20 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	60.63	PK	H	25.67	3.93	0.00	90.23	N/A	N/A
2412	52.45	AV	H	25.67	3.93	0.00	82.05	N/A	N/A
2412	61.58	PK	V	25.67	3.93	0.00	91.18	N/A	N/A
2412	53.74	AV	V	25.67	3.93	0.00	83.34	N/A	N/A
2390	27.85	PK	V	25.61	3.84	0.00	57.30	74.00	16.70
2390	13.57	AV	V	25.61	3.84	0.00	43.02	54.00	10.98
4824	33.68	PK	V	30.64	4.73	27.26	41.79	74.00	32.21
4824	18.65	AV	V	30.64	4.73	27.26	26.76	54.00	27.24
7236	32.62	PK	V	34.17	6.56	26.36	46.99	74.00	27.01
7236	18.34	AV	V	34.17	6.56	26.36	32.71	54.00	21.29
9648	32.85	PK	V	36.06	8.70	26.06	51.55	74.00	22.45
9648	17.32	AV	V	36.06	8.70	26.06	36.02	54.00	17.98
3002.28	42.36	PK	V	27.21	7.42	27.48	49.51	74.00	24.49
3002.28	39.42	AV	V	27.21	7.42	27.48	46.57	54.00	7.43
624.3	42.1	QP	V	19.84	3.06	22.28	42.72	46.00	3.28*
Middle Channel: 2437 MHz									
2437	60.53	PK	H	25.74	3.98	0.00	90.25	N/A	N/A
2437	52.38	AV	H	25.74	3.98	0.00	82.10	N/A	N/A
2437	61.49	PK	V	25.74	3.98	0.00	91.21	N/A	N/A
2437	53.52	AV	V	25.74	3.98	0.00	83.24	N/A	N/A
4874	33.84	PK	V	30.77	4.76	27.26	42.11	74.00	31.89
4874	18.46	AV	V	30.77	4.76	27.26	26.73	54.00	27.27
7311	32.63	PK	V	34.35	6.70	26.51	47.17	74.00	26.83
7311	18.26	AV	V	34.35	6.70	26.51	32.80	54.00	21.20
9748	32.62	PK	V	36.30	8.60	25.68	51.84	74.00	22.16
9748	17.86	AV	V	36.30	8.60	25.68	37.08	54.00	16.92
1526.32	34.26	PK	V	23.65	3.04	26.98	33.97	74.00	40.03
1526.32	18.65	AV	V	23.65	3.04	26.98	18.36	54.00	35.64
3002.28	42.63	PK	V	27.21	7.42	27.48	49.78	74.00	24.22
3002.28	38.96	AV	V	27.21	7.42	27.48	46.11	54.00	7.89
625.3	42.2	QP	V	19.89	3.06	22.28	42.87	46.00	3.13 *
High Channel: 2462 MHz									
2462	60.84	PK	H	25.80	3.93	0.00	90.57	N/A	N/A
2462	51.67	AV	H	25.80	3.93	0.00	81.40	N/A	N/A
2462	61.69	PK	V	25.80	3.93	0.00	91.42	N/A	N/A
2462	53.58	AV	V	25.80	3.93	0.00	83.31	N/A	N/A
2483.5	28.63	PK	V	25.86	3.80	0.00	58.29	74.00	15.71
2483.5	14.21	AV	V	25.86	3.80	0.00	43.87	54.00	10.13
4924	33.62	PK	V	30.90	4.70	27.27	41.95	74.00	32.05
4924	18.52	AV	V	30.90	4.70	27.27	26.85	54.00	27.15
7386	32.47	PK	V	34.53	6.84	26.66	47.18	74.00	26.82
7386	18.26	AV	V	34.53	6.84	26.66	32.97	54.00	21.03
9848	32.74	PK	V	36.54	8.49	25.49	52.28	74.00	21.72
9848	17.68	AV	V	36.54	8.49	25.49	37.22	54.00	16.78
3002.28	42.68	PK	V	27.21	7.42	27.48	49.83	74.00	24.17
3002.28	39.38	AV	V	27.21	7.42	27.48	46.53	54.00	7.47
624.7	41.9	QP	V	19.86	3.06	22.28	42.54	46.00	3.46 *

802.11 n40 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2422 MHz									
2422	58.08	PK	H	25.70	3.95	0.00	87.73	N/A	N/A
2422	47.57	AV	H	25.70	3.95	0.00	77.22	N/A	N/A
2422	59.89	PK	V	25.70	3.95	0.00	89.54	N/A	N/A
2422	48.09	AV	V	25.70	3.95	0.00	77.74	N/A	N/A
2390	28.68	PK	V	25.61	3.84	0.00	58.13	74.00	15.87
2390	14.66	AV	V	25.61	3.84	0.00	44.11	54.00	9.89
4844	33.92	PK	V	30.69	4.78	27.26	42.13	74.00	31.87
4844	18.43	AV	V	30.69	4.78	27.26	26.64	54.00	27.36
7266	32.74	PK	V	34.24	6.62	26.42	47.18	74.00	26.82
7266	18.35	AV	V	34.24	6.62	26.42	32.79	54.00	21.21
9688	32.55	PK	V	36.15	8.66	25.91	51.45	74.00	22.55
9688	17.68	AV	V	36.15	8.66	25.91	36.58	54.00	17.42
3002.28	42.74	PK	V	27.21	7.42	27.48	49.89	74.00	24.11
3002.28	39.35	AV	V	27.21	7.42	27.48	46.50	54.00	7.50
624.5	42	QP	V	19.85	3.06	22.28	42.63	46.00	3.37 *
Middle Channel: 2437 MHz									
2437	58.52	PK	H	25.74	3.98	0.00	88.24	N/A	N/A
2437	47.25	AV	H	25.74	3.98	0.00	76.97	N/A	N/A
2437	59.68	PK	V	25.74	3.98	0.00	89.40	N/A	N/A
2437	48.27	AV	V	25.74	3.98	0.00	77.99	N/A	N/A
4874	33.84	PK	V	30.77	4.76	27.26	42.11	74.00	31.89
4874	18.57	AV	V	30.77	4.76	27.26	26.84	54.00	27.16
7311	32.76	PK	V	34.35	6.70	26.51	47.30	74.00	26.70
7311	18.24	AV	V	34.35	6.70	26.51	32.78	54.00	21.22
9748	32.56	PK	V	36.30	8.60	25.68	51.78	74.00	22.22
9748	17.35	AV	V	36.30	8.60	25.68	36.57	54.00	17.43
1526.32	34.69	PK	V	23.65	3.04	26.98	34.40	74.00	39.60
1526.32	18.52	AV	V	23.65	3.04	26.98	18.23	54.00	35.77
3002.28	42.69	PK	V	27.21	7.42	27.48	49.84	74.00	24.16
3002.28	39.47	AV	V	27.21	7.42	27.48	46.62	54.00	7.38
624.7	42.1	QP	V	19.86	3.06	22.28	42.74	46.00	3.26 *
High Channel: 2452 MHz									
2452	58.67	PK	H	25.78	4.00	0.00	88.44	N/A	N/A
2452	47.36	AV	H	25.78	4.00	0.00	77.13	N/A	N/A
2452	59.86	PK	V	25.78	4.00	0.00	89.63	N/A	N/A
2452	48.36	AV	V	25.78	4.00	0.00	78.13	N/A	N/A
2483.5	27.89	PK	V	25.86	3.80	0.00	57.55	74.00	16.45
2483.5	14.15	AV	V	25.86	3.80	0.00	43.81	54.00	10.19
4904	33.74	PK	V	30.85	4.72	27.27	42.04	74.00	31.96
4904	18.56	AV	V	30.85	4.72	27.27	26.86	54.00	27.14
7356	32.74	PK	V	34.45	6.79	26.60	47.38	74.00	26.62
7356	18.36	AV	V	34.45	6.79	26.60	33.00	54.00	21.00
9808	32.45	PK	V	36.44	8.53	25.48	51.94	74.00	22.06
9808	17.69	AV	V	36.44	8.53	25.48	37.18	54.00	16.82
3002.28	42.69	PK	V	27.21	7.42	27.48	49.84	74.00	24.16
3002.28	39.47	AV	V	27.21	7.42	27.48	46.62	54.00	7.38
625.5	42.3	QP	V	19.89	3.06	22.28	42.97	46.00	3.03 *

*Within measurement uncertainty!

5.8G Band
802.11 a Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Extrapolation result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
Frequency: 5745 MHz										
5745	58.11	PK	H	32.15	5.10	0.00	95.36	89.36	N/A	N/A
5745	47.26	AV	H	32.15	5.10	0.00	84.51	78.51	N/A	N/A
5745	71.22	PK	V	32.15	5.10	0.00	108.47	102.47	N/A	N/A
5745	59.63	AV	V	32.15	5.10	0.00	96.88	90.88	N/A	N/A
5725	37.45	PK	V	32.15	4.83	0.00	74.43	68.43	74.00	5.57
5725	20.1	AV	V	32.15	4.83	0.00	57.08	51.08	54.00	2.92
11490	36.66	PK	V	37.89	7.85	25.92	56.48	50.48	74.00	23.52
11490	21	AV	V	37.89	7.85	25.92	40.82	34.82	54.00	19.18
17235	35.64	PK	V	40.91	12.63	24.94	64.24	58.24	74.00	15.76
17235	20.3	AV	V	40.91	12.63	24.94	48.90	42.90	54.00	11.10
1520	43.69	PK	V	23.64	3.05	26.99	43.39	37.39	74.00	36.61
1520	25.87	AV	V	23.64	3.05	26.99	25.57	19.57	54.00	34.43
2568.5	42.52	PK	V	26.08	3.90	27.33	45.17	39.17	74.00	34.83
2568.5	36.65	AV	V	26.08	3.90	27.33	39.30	33.30	54.00	20.70
652.3	40.5	QP	V	20.14	3.10	22.29	41.45	/	46.00	4.55
Frequency: 5785 MHz										
5785	57.63	PK	H	32.16	5.15	0.00	94.94	88.94	N/A	N/A
5785	46.54	AV	H	32.16	5.15	0.00	83.85	77.85	N/A	N/A
5785	72.31	PK	V	32.16	5.15	0.00	109.62	103.62	N/A	N/A
5785	61.22	AV	V	32.16	5.15	0.00	98.53	92.53	N/A	N/A
11570	42.32	PK	V	37.90	7.97	25.91	62.28	56.28	74.00	17.72
11570	21.63	AV	V	37.90	7.97	25.91	41.59	35.59	54.00	18.41
17355	36.54	PK	V	41.63	12.26	24.68	65.75	59.75	74.00	14.25
17355	21.13	AV	V	41.63	12.26	24.68	50.34	44.34	54.00	9.66
1520	35.23	PK	V	23.64	3.05	26.99	34.93	28.93	74.00	45.07
1520	20.31	AV	V	23.64	3.05	26.99	20.01	14.01	54.00	39.99
2568.5	36.52	PK	V	26.08	3.90	27.33	39.17	33.17	74.00	40.83
2568.5	21.34	AV	V	26.08	3.90	27.33	23.99	17.99	51.00	33.01
3014.2	43.47	PK	V	27.25	7.11	27.48	50.35	44.35	74.00	29.65
3014.2	38.26	AV	V	27.25	7.11	27.48	45.14	39.14	54.00	14.86
652.3	39.7	QP	V	20.14	3.10	22.29	40.65	/	46.00	5.35
Frequency: 5825 MHz										
5825	61.25	PK	H	32.17	5.35	0.00	98.77	92.77	N/A	N/A
5825	48.69	AV	H	32.17	5.35	0.00	86.21	80.21	N/A	N/A
5825	72.63	PK	V	32.17	5.35	0.00	110.15	104.15	N/A	N/A
5825	61.59	AV	V	32.17	5.35	0.00	99.11	93.11	N/A	N/A
5850	37.96	PK	V	32.17	5.56	0.00	75.69	69.69	74.00	4.31
5850	20.2	AV	V	32.17	5.56	0.00	57.93	51.93	54.00	2.07
11650	41.13	PK	V	37.90	8.14	25.78	61.39	55.39	74.00	18.61
11650	23.72	AV	V	37.90	8.14	25.78	43.98	37.98	54.00	16.02
17475	36.52	PK	V	42.35	11.89	24.27	66.49	60.49	74.00	13.51
17475	20.14	AV	V	42.35	11.89	24.27	50.11	44.11	54.00	9.89
1520	34.56	PK	V	23.64	3.05	26.99	34.26	28.26	74.00	45.74
1520	20.69	AV	V	23.64	3.05	26.99	20.39	14.39	51.00	36.61
2568.5	43.25	PK	V	26.08	3.90	27.33	45.90	39.90	74.00	34.10
2568.5	40.11	AV	V	26.08	3.90	27.33	42.76	36.76	54.00	17.24
652.3	39.9	QP	V	20.14	3.10	22.29	40.85	/	46.00	5.15

802.11 n20 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Extrapolation result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Frequency: 5745 MHz										
5745	57.21	PK	H	32.15	5.10	0.00	94.46	88.46	N/A	N/A
5745	46.32	AV	H	32.15	5.10	0.00	83.57	77.57	N/A	N/A
5745	68.63	PK	V	32.15	5.10	0.00	105.88	99.88	N/A	N/A
5745	57.44	AV	V	32.15	5.10	0.00	94.69	88.69	N/A	N/A
5725	38.56	PK	V	32.15	4.83	0.00	75.54	69.54	74.00	4.46
5725	20.14	AV	V	32.15	4.83	0.00	57.12	51.12	54.00	2.88
11490	36.35	PK	V	37.89	7.85	25.92	56.17	50.17	74.00	23.83
11490	20.45	AV	V	37.89	7.85	25.92	40.27	34.27	54.00	19.73
17235	34.63	PK	V	40.91	12.63	24.94	63.23	57.23	74.00	16.77
17235	19.35	AV	V	40.91	12.63	24.94	47.95	41.95	54.00	12.05
1436.98	42.36	PK	V	23.44	2.85	27.09	41.56	35.56	74.00	38.44
1436.98	26.36	AV	V	23.44	2.85	27.09	25.56	19.56	54.00	34.44
3002.25	42.33	PK	V	27.21	7.42	27.48	49.48	43.48	74.00	30.52
3002.25	37.93	AV	V	27.21	7.42	27.48	45.08	39.08	54.00	14.92
625.3	39.6	QP	V	19.89	3.06	22.28	40.27	/	46.00	5.73
Frequency: 5785 MHz										
5785	57.23	PK	H	32.16	5.15	0.00	94.54	88.54	N/A	N/A
5785	46.31	AV	H	32.16	5.15	0.00	83.62	77.62	N/A	N/A
5785	69.36	PK	V	32.16	5.15	0.00	106.67	100.67	N/A	N/A
5785	56.67	AV	V	32.16	5.15	0.00	93.98	87.98	N/A	N/A
11570	41.25	PK	V	37.90	7.97	25.91	61.21	55.21	74.00	18.79
11570	22.1	AV	V	37.90	7.97	25.91	42.06	36.06	54.00	17.94
17355	35.16	PK	V	41.63	12.26	24.68	64.37	58.37	74.00	15.63
17355	20.13	AV	V	41.63	12.26	24.68	49.34	43.34	54.00	10.66
1452.63	33.64	PK	V	23.48	2.88	27.07	32.93	26.93	74.00	47.07
1452.63	19.37	AV	V	23.48	2.88	27.07	18.66	12.66	54.00	41.34
2341.47	34.58	PK	V	25.49	3.70	27.17	36.60	30.60	74.00	43.40
2341.47	20.33	AV	V	25.49	3.70	27.17	22.35	16.35	51.00	34.65
3002.36	42.47	PK	V	27.21	7.42	27.48	49.62	43.62	74.00	30.38
3002.36	37.52	AV	V	27.21	7.42	27.48	44.67	38.67	54.00	15.33
625.3	40.2	QP	V	19.89	3.06	22.28	40.87	/	46.00	5.13
Frequency: 5825 MHz										
5825	60.31	PK	H	32.17	5.35	0.00	97.83	91.83	N/A	N/A
5825	48.69	AV	H	32.17	5.35	0.00	86.21	80.21	N/A	N/A
5825	72.44	PK	V	32.17	5.35	0.00	109.96	103.96	N/A	N/A
5825	62.06	AV	V	32.17	5.35	0.00	99.58	93.58	N/A	N/A
5850	38.04	PK	V	32.17	5.56	0.00	75.77	69.77	74.00	4.23
5850	20.14	AV	V	32.17	5.56	0.00	57.87	51.87	54.00	2.13
11650	40.25	PK	V	37.90	8.14	25.78	60.51	54.51	74.00	19.49
11650	22.71	AV	V	37.90	8.14	25.78	42.97	36.97	54.00	17.03
17475	35.63	PK	V	42.35	11.89	24.27	65.60	59.60	74.00	14.40
17475	19.52	AV	V	42.35	11.89	24.27	49.49	43.49	54.00	10.51
1859.63	33.47	PK	V	24.32	3.60	27.05	34.34	28.34	74.00	45.66
1859.63	20.63	AV	V	24.32	3.60	27.05	21.50	15.50	51.00	35.50
3002.74	42.54	PK	V	27.21	7.41	27.48	49.68	43.68	74.00	30.32
3002.74	39.68	AV	V	27.21	7.41	27.48	46.82	40.82	54.00	13.18
625.3	41	QP	V	19.89	3.06	22.28	41.67	/	46.00	4.33

802.11 n40 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB μ V/m)	Extrapolation result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
Frequency: 5755 MHz										
5755	58.26	PK	H	32.15	5.17	0.00	95.58	89.58	N/A	N/A
5755	46.57	AV	H	32.15	5.17	0.00	83.89	77.89	N/A	N/A
5755	60.32	PK	V	32.15	5.17	0.00	97.64	91.64	N/A	N/A
5755	56.54	AV	V	32.15	5.17	0.00	93.86	87.86	N/A	N/A
5725	40.12	PK	V	32.15	4.83	0.00	77.10	71.10	74.00	2.90
5725	20.11	AV	V	32.15	4.83	0.00	57.09	51.09	54.00	2.91
11510	36.32	PK	V	37.90	7.84	25.92	56.14	50.14	74.00	23.86
11510	20.14	AV	V	37.90	7.84	25.92	39.96	33.96	54.00	20.04
17265	34.51	PK	V	41.09	12.54	24.88	63.26	57.26	74.00	16.74
17265	19.2	AV	V	41.09	12.54	24.88	47.95	41.95	54.00	12.05
1523.63	34.31	PK	V	23.65	3.05	26.99	34.02	28.02	74.00	45.98
1523.63	19.36	AV	V	23.65	3.05	26.99	19.07	13.07	54.00	40.93
2956.5	42.22	PK	V	27.09	6.59	27.45	48.45	42.45	74.00	31.55
2956.5	39.65	AV	V	27.09	6.59	27.45	45.88	39.88	54.00	14.12
651	41.5	QP	V	20.17	3.09	22.29	42.47	/	46.00	3.53
Frequency: 5795 MHz										
5795	60.23	PK	H	32.16	5.14	0.00	97.53	91.53	N/A	N/A
5795	48.69	AV	H	32.16	5.14	0.00	85.99	79.99	N/A	N/A
5795	72.22	PK	V	32.16	5.14	0.00	109.52	103.52	N/A	N/A
5795	61.41	AV	V	32.16	5.14	0.00	98.71	92.71	N/A	N/A
5850	37.14	PK	V	32.17	5.56	0.00	74.87	68.87	74.00	5.13
5850	20.03	AV	V	32.17	5.56	0.00	57.76	51.76	54.00	2.24
11590	39.36	PK	V	37.90	8.01	25.91	59.36	53.36	74.00	20.64
11590	21.47	AV	V	37.90	8.01	25.91	41.47	35.47	54.00	18.53
17385	34.52	PK	V	41.81	12.17	24.61	63.89	57.89	74.00	16.11
17385	19.36	AV	V	41.81	12.17	24.61	48.73	42.73	54.00	11.27
1523.63	33.54	PK	V	23.65	3.05	26.99	33.25	27.25	74.00	46.75
1523.63	23.36	AV	V	23.65	3.05	26.99	23.07	17.07	51.00	33.93
2956.5	42.54	PK	V	27.09	6.59	27.45	48.77	42.77	74.00	31.23
2956.5	37.66	AV	V	27.09	6.59	27.45	43.89	37.89	54.00	16.11
651	40.7	QP	V	20.17	3.09	22.29	41.67	/	46.00	4.33

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