

FCC Part 15B TEST REPORT

Product Name : MobileMapper 20

Model Name : MobileMapper 20

Prepared for:

Trimble Nantes S.A.S.

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Report Number : UL28620131105CE/FCC/IC014-1

Date of Report : 2013-12-16

Date of Test : 2013-11-10~2013-12-10

Notes :

The test results only relate to these samples which have been tested.

Partly using this report will not be admitted unless been allowed by Unilab.

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Applicant: Trimble Nantes S.A.S.
Z.A.C de La Fleuraye CD 60433,44474 Carquefou Cedex France.

Manufacturer: Trimble Nantes S.A.S.
Z.A.C de La Fleuraye CD 60433,44474 Carquefou Cedex France.

Product Name: MobileMapper 20

Brand Name: SPECTRA Precision

Model Name: MobileMapper 20

FCC ID: NZI802168

EUT Voltage: AC input for adapter: AC 100~240V 50/60Hz
Battery: 3.64V~4.2V

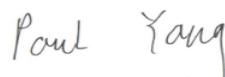
Date of Receipt: 2013-11-05

Date of Test 2013-11-10~2013-12-10

Test Standard: FCC CFR Title 47 Part 15 Subpart B

Test Result: PASS

Prepared by :



(Technical Engineer: Paul Yang)

Reviewed by :



(Senior Engineer: Forest Cao)

Approved by :



(Supervisor Engineer: Eva Wang)

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1. TECHNICAL SUMMARY

1.1 SUMMARY OF STANDARDS AND TEST RESULTS

The EUT have been tested according to the applicable standards as referenced below:

Test Item	FCC	Result
Conducted disturbance	FCC 15.107	P*
Radiated disturbance	FCC 15.109	P

Note: P means pass, F means failure, N/A means not applicable

1.2 TEST UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted disturbance	3.4
Radiated disturbance	4.2

1.3 TEST EQUIPMENT LIST

Shielding Room No. 3 - Conducted disturbance Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	Agilent	N9038A	MY51210142	2014/09/27
LISN	R&S	ENV216	100069	2014/07/28

3m Semi-anechoic Chamber - Radiated disturbance Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
3m Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	CT-0000336	2014/11/26
Receiver	Agilent	N9038A	MY51210142	2014/09/27
Biconilog Antenna	SCHWARZBECK	VULB 9160	3316	2014/09/19
Horn Antenna	SCHWARZBECK	BBHA9120D	942	2014/09/19
Microwave Preamplifier	EM Electronics	EM30180	3008A02425	2014/03/01

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and has been calibrated by accredited calibration laboratories.

1.4 SUPPORT EQUIPMENT

Equipment	Manufacturer	Model	Serial No.	Due Date
PC	DELL	VOSTRO 260	7JXLB3X	/
Displayer	DELL	E1910Hc	CN-0CD1MT-64180-OC7-06TS	/
Mouse	DELL	MS111-P	CN-0MF3JY-71581-2C7-05GB	/
Keyboard	DELL	KB212-B	CN-0Y88XT-65890-22L-01MG-A01	/

1.5 TEST FACILITY

All test facilities used to collect the test data are located at No. 1350, Lianxi Rd. Pudong New District, Shanghai, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4, CISPR 16-1-1 and other equivalent standards. The laboratory is compliance with the requirements of the ISO/IEC/E 17025.

1.6 TEST SETUP CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

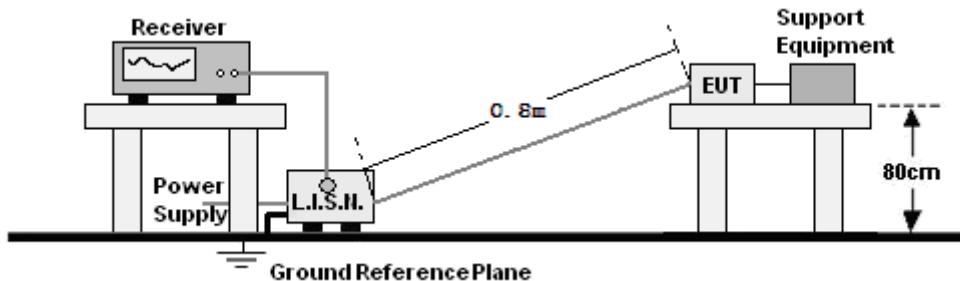
Notes:

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.

2. CONDUCTED DISTURBANCE

2.1 TEST SETUP

For mains port:



2.2 LIMITS

Limits for Class B digital devices

Frequency range (MHz)	Limits dB(μ V)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

2.3 TEST PROCEDURE

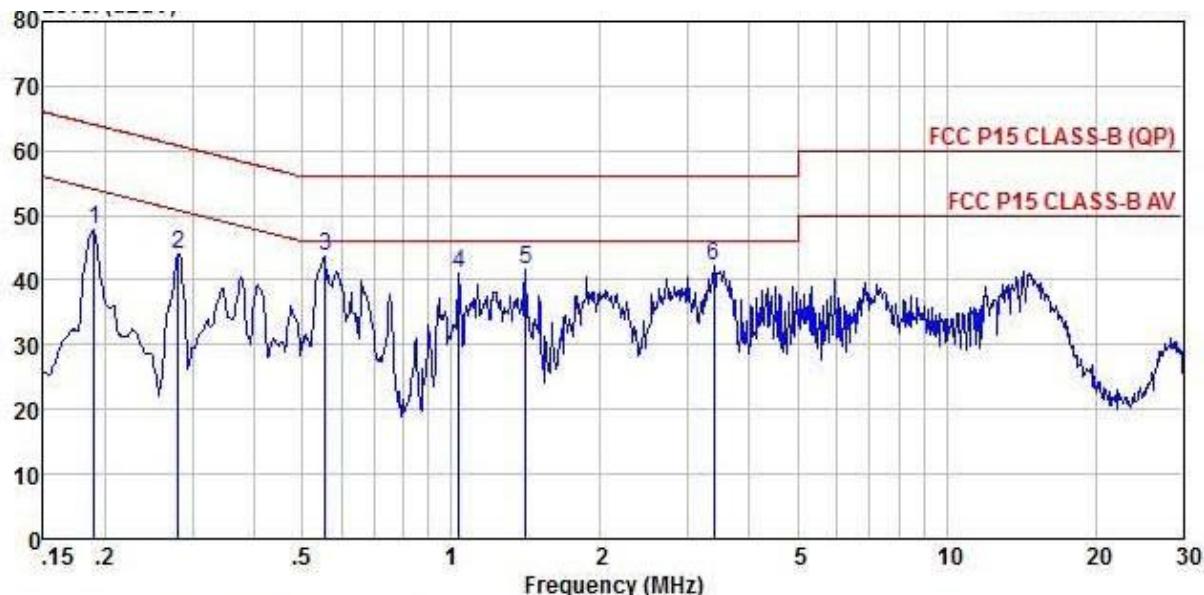
For mains port:

- The EUT and support equipment were placed on a nonconductive table 0.8m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane. The EUT connected to the main through Line Impedance Stability Network (L.I.S.N) to provide a $50 \Omega/50\mu H$ coupling impedance for the measuring equipment. The support equipment is also connected to the main power through a LISN that provides a $50 \Omega/50\mu H$ coupling impedance with 50Ω terminations. Both sides of AC line (Line & Neutral) were checked to find out the maximum conducted emission.
- The RBW of the receiver was set at 9 kHz. The frequency range from 150 kHz to 30 MHz was checked. Run the receiver's pre-scan to record the maximum disturbance generated from EUT in all power lines in the full band.
- For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

2.4 TEST RESULT

For mains port:

Test mode: Data exchange



Site : shielded room 3

Condition : FCC P15 CLASS-B (QP) ENV216(L)-20120730 LINE

EUT : MobileMapper 20

Model Name : MobileMapper 20

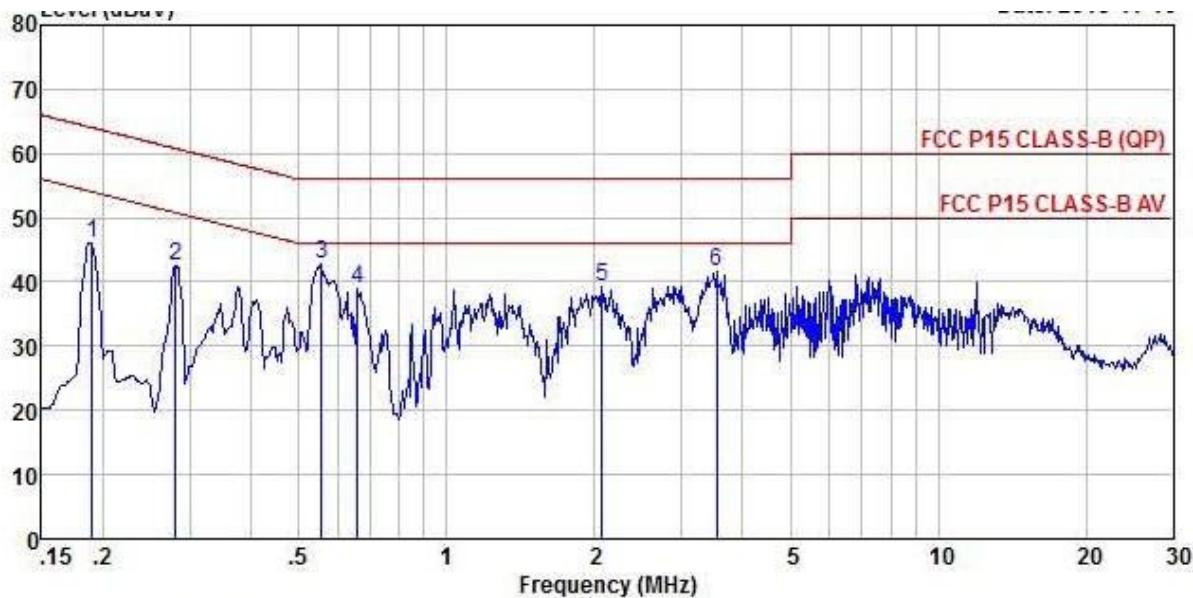
Temp/Humi : 23 °C /52%

Power Rating: AC 120V/60Hz

Mode : data exchange

Memo :

	Freq	Read	LISN	Cable	Preamp	Limit	Over	Limit	Remark
		Level	Factor	Loss	Factor				
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.19	37.07	10.47	0.23	0.00	47.77	64.02	-16.25	Peak
2	0.28	33.44	10.48	0.19	0.00	44.11	60.81	-16.70	Peak
3 pp	0.56	32.92	10.51	0.11	0.00	43.54	56.00	-12.46	Peak
4	1.04	30.34	10.52	0.14	0.00	41.00	56.00	-15.00	Peak
5	1.41	30.86	10.52	0.14	0.00	41.52	56.00	-14.48	Peak
6	3.38	31.52	10.52	0.15	0.00	42.19	56.00	-13.81	Peak



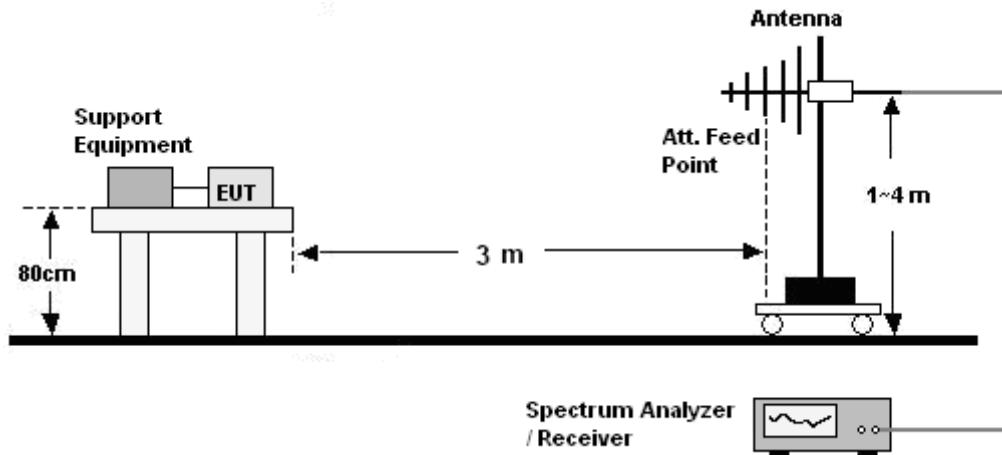
Site : shielded room 3
 Condition : FCC P15 CLASS-B (QP) ENV216(N)-20120730 NEUTRAL
 EUT : MobileMapper 20
 Model Name : MobileMapper 20
 Temp/Humi : 23 °C /52%
 Power Rating: AC 120V/60Hz
 Mode : data exchange
 Memo :

Freq	Read	LISN	Cable	Preamp	Limit	Over	Limit	Remark
	Level	Factor	Loss	Factor				
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.19	35.48	10.33	0.23	0.00	46.04	64.02	-17.98 Peak
2	0.28	31.98	10.43	0.19	0.00	42.60	60.81	-18.21 Peak
3 pp	0.56	32.29	10.38	0.11	0.00	42.78	56.00	-13.22 Peak
4	0.66	28.39	10.32	0.12	0.00	38.83	56.00	-17.17 Peak
5	2.07	28.72	10.31	0.15	0.00	39.18	56.00	-16.82 Peak
6	3.55	31.06	10.32	0.14	0.00	41.52	56.00	-14.48 Peak

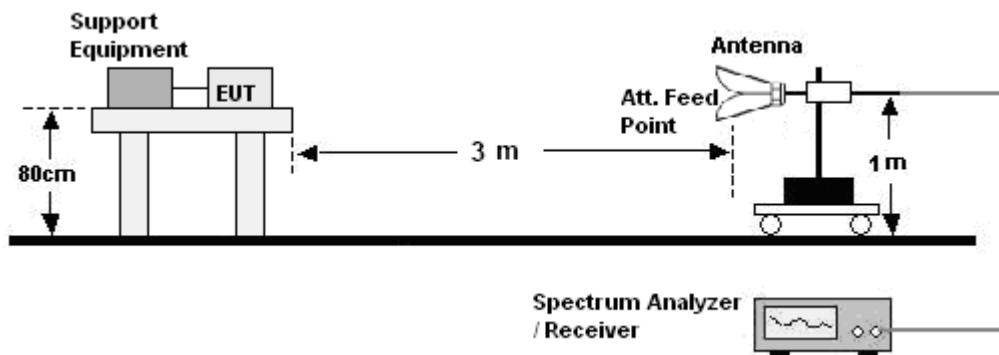
3. RADIATED DISTURBANCE (RE)

3.1 TEST SETUP

30MHz ~ 1GHz:



Above 1GHz:



3.2 LIMITS

Limits for Class B digital devices

Frequency (MHz)	limits at 3m (QP) dB(μ V/m)	
30-88	40.0	
88-216	43.5	
216-960	46.0	
Above 960	54.0	
Above 1000	limits at 3m (PEAK) dB(μ V/m)	limits at 3m (AV) dB(μ V/m)
	74	54

NOTE:

1. The lower limit shall apply at the transition frequency.
2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
3. The limits shown above are based on measuring equipment employing an average detector function for frequencies above 1000MHz.

3.3 TEST PROCEDURE

30MHz ~ 1GHz:

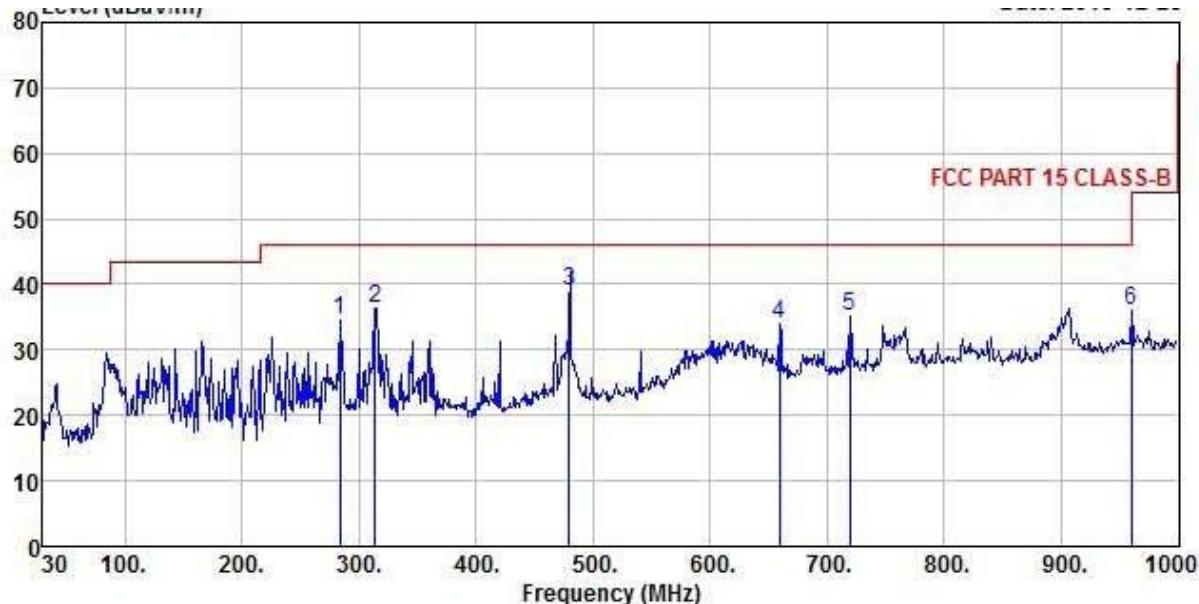
- a. The EUT and support equipment were placed on the non-conductive turntable 0.8m above the horizontal metal ground plane at a chamber. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. Broadband antenna (Calibrated Bilog Antenna) was used as receiving antenna.
- b. The frequency range from 30MHz to 1GHz was checked. The RBW of the receiver was set at 120kHz. Set the receiver in Peak detector, Max Hold mode. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where EUT radiated the maximum emission, then set the test frequency receiver to QP Detector and record the maximum value.

Above 1GHz:

- a. The EUT and support equipment were placed on the non-conductive turntable 0.8m above the ground at a chamber. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. Horn antenna was used as receiving antenna.
- b. The frequency range above 1GHz was checked. The RBW of the receiver was set at 1MHz. Set the receiver in Peak detector, Max Hold mode. Record the maximum field strength of all the pre-scan process in the full band when the antenna is 1m and varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its Average value: rotate the turntable from 0 to 360 degrees to find the degree where EUT radiated the maximum emission, then set the test frequency receiver to EMI Average Detector and record the maximum value.

3.4 TEST RESULT**30MHz ~ 1GHz:**

Test mode: Data exchange



Site : chamber

Condition : FCC PART 15 CLASS-B 3m VULB9160 HORIZONTAL

EUT : MobileMapper 20

Model Name : MobileMapper 20

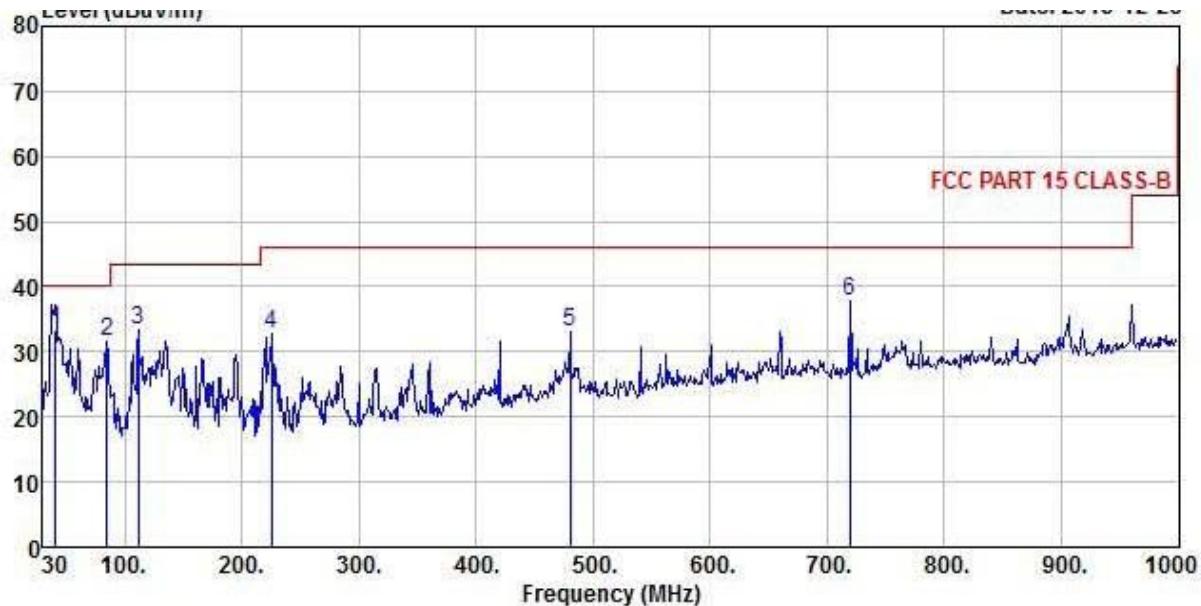
Temp/Humi : 23 °C /52%

Power Rating: AC 120V/60Hz

Mode : data exchange

Memo :

Freq	MHz	ReadAntenna	Cable	Preamp	Limit	Over	Line	Limit	Remark
		Level	Factor	Loss					
1	284.14	19.31	12.89	2.23	0.00	34.43	46.00	-11.57	Peak
2 pk	314.21	20.39	13.51	2.52	0.00	36.42	46.00	-9.58	Peak
3 pp	480.00	18.96	16.89	3.00	0.00	38.85	46.00	-7.15	QP
4	659.53	10.86	19.68	3.46	0.00	34.00	46.00	-12.00	Peak
5	719.67	10.87	20.52	3.70	0.00	35.09	46.00	-10.91	Peak
6	960.23	8.31	23.43	4.20	0.00	35.94	54.00	-18.06	Peak



Site : chamber

Condition : FCC PART 15 CLASS-B 3m VULB9160 VERTICAL

EUT : MobileMapper 20

Model Name : MobileMapper 20

Temp/Humi : 23 °C /52%

Power Rating: AC 120V/60Hz

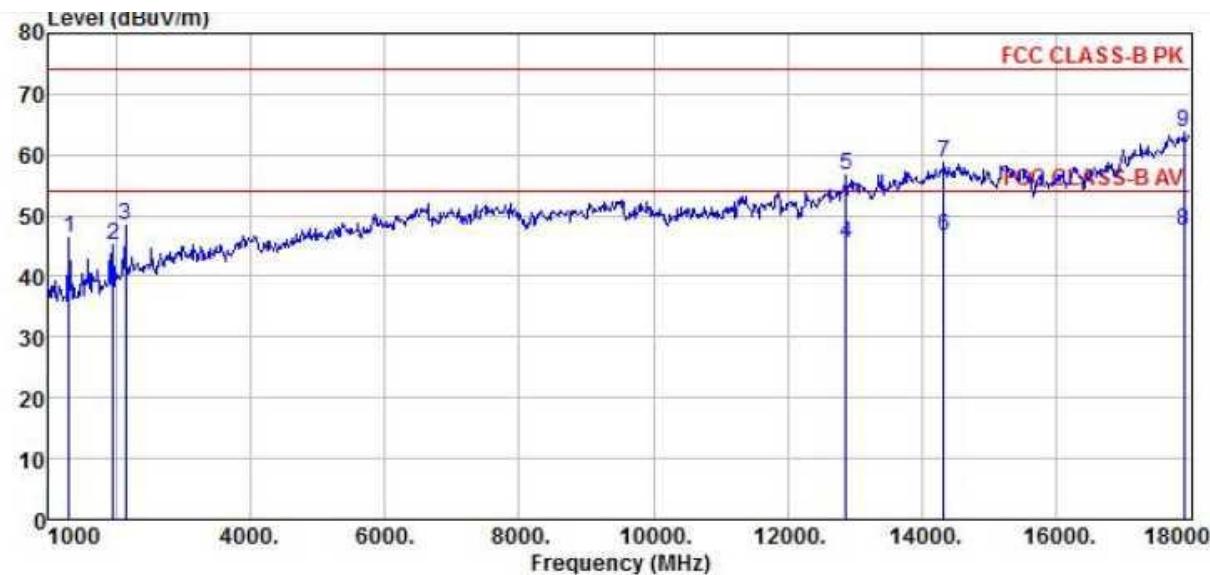
Mode : data exchange

Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 pp	40.67	19.67	12.71	0.83	0.00	33.21	40.00	-6.79 QP
2 pk	84.32	21.90	8.68	1.09	0.00	31.67	40.00	-8.33 Peak
3	111.48	20.65	11.26	1.41	0.00	33.32	43.50	-10.18 Peak
4	224.97	19.78	10.95	2.08	0.00	32.81	46.00	-13.19 Peak
5	480.08	13.13	16.89	3.00	0.00	33.02	46.00	-12.98 Peak
6	719.67	13.43	20.52	3.70	0.00	37.65	46.00	-8.35 Peak

Above 1GHz:

Test mode: Data exchange



Site : SHIELDED ROOM 3

Condition : FCC CLASS-B PK 3m BBHA9120D(942) HORIZONTAL

EUT : MobileMapper 20

Model Name : MobileMapper 20

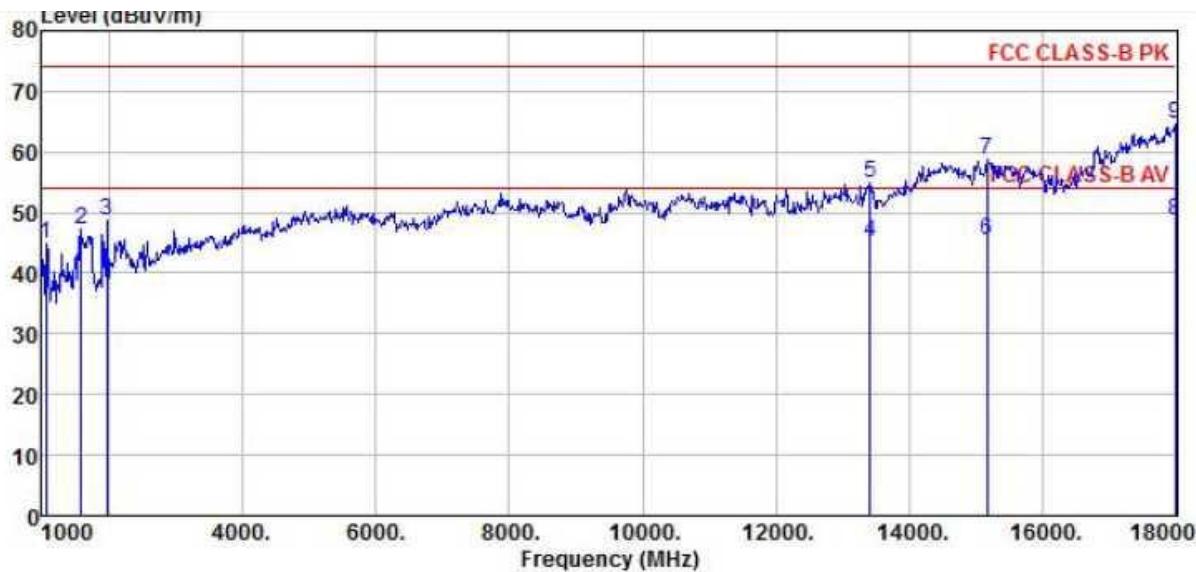
Temp/Humi : 21 °C /53%

Power Rating: AC 120V/60Hz

Mode : data exchange

Memo :

Freq	ReadAntenna MHz	Cable		Preamp Loss Factor	Level dB	Limit dBuV/m	Over Line dBuV/m	Over Limit dB	Remark
		Antenna Level dBuV	Factor dB/m						
1	1306.00	53.96	25.58	5.26	38.43	46.37	74.00	-27.63	Peak
2	1952.00	51.16	25.93	6.49	38.49	45.09	74.00	-28.91	Peak
3	2139.00	52.67	27.52	6.74	38.45	48.48	74.00	-25.52	Peak
4	12866.00	27.38	39.27	17.31	38.54	45.42	54.00	-8.58	Average
5	12866.00	38.59	39.27	17.31	38.54	56.63	74.00	-17.37	Peak
6	14328.00	23.53	42.37	19.05	38.38	46.57	54.00	-7.43	Average
7	14328.00	35.67	42.37	19.05	38.38	58.71	74.00	-15.29	Peak
8 pp	17898.00	18.72	46.54	19.04	36.87	47.43	54.00	-6.57	Average
9 pk	17898.00	35.15	46.54	19.04	36.87	63.86	74.00	-10.14	Peak



Site : SHIELDED ROOM 3

Condition : FCC CLASS-B PK 3m BBHA9120D(942) VERTICAL

EUT : MobileMapper 20

Model Name : MobileMapper 20

Temp/Humi : 21 °C /53%

Power Rating: AC 120V/60Hz

Mode : data exchange

Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over	Remark	
	Freq	Level	Factor	Loss				
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	1068.00	54.25	24.33	4.64	38.41	44.81	74.00	-29.19 Peak
2	1595.00	55.03	24.98	5.71	38.46	47.26	74.00	-26.74 Peak
3	1969.00	54.84	26.00	6.49	38.50	48.83	74.00	-25.17 Peak
4	13410.00	25.37	40.59	17.61	38.52	45.05	54.00	-8.95 Average
5	13410.00	35.12	40.59	17.61	38.52	54.80	74.00	-19.20 Peak
6	15161.00	24.97	40.23	18.13	37.84	45.49	54.00	-8.51 Average
7	15161.00	38.11	40.23	18.13	37.84	58.63	74.00	-15.37 Peak
8 pp	17983.00	18.93	47.82	18.74	36.73	48.76	54.00	-5.24 Average
9 pk	17983.00	34.92	47.82	18.74	36.73	64.75	74.00	-9.25 Peak

APPENDIX 1 PHOTOGRAHPS OF TEST SETUP

Please refer to the file named “NZI802168_Part 15B Setup Photos”.

APPENDIX 2 PHOTOGRAHPS OF EUT

Please refer to the two files named “NZI802168_EUTEternal Photos” and “NZI802168_EUT Internal Photos”.

----End of the report----