



FCC Part 15.247

TEST REPORT

for

Portable GNSS Receiver

Model Name: MobileMapper 10
Brand Name: ASHTECH
Report No.: SH11070015W02
FCC ID: NZI802140
IC: 9288A-802140

prepared for

ASHTECH S.A.S

ZAC LA FLEURIAYE BP 60433 RUE THOMAS EDISON
44474 CARQUEFU CEDEX FRANCE



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Bluetooth®

CTIA Authorized Test Lab

LAB CODE 20081223-00

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1. Test Report Certification

Equipment under Test: Portable GNSS receiver

Brand Name: ASHTECH

Model Name: MobileMapper 10

FCC ID: NZI802140

IC: 9288A-802140

Applicant: ASHTECH S.A.S.

ZAC LA FLEURIAYE BP 60433 RUE THOMAS EDISON 44474
CARQUEFOU CEDEX FRANCE

Manufacturer: Beijing UniStrong Science & Technology Co., Ltd
6F East, A2 Building, #9 Jiuxianqiao East Road, Chaoyang District,
Beijing 100015, China

Test Standards: 47 CFR Part 15, Subpart C

IC RSS-210 Issue 7

Test Date(s): July.27, 2011 – Aug.3, 2011

Test Result: PASS

* We Hereby Certify That:

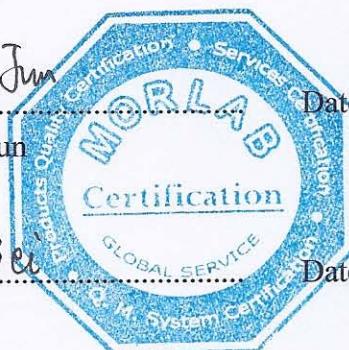
The equipment under test was tested by Shenzhen Electronic Product Quality Testing Center Morlab Laboratory. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related FCC rules.

The test results of this report only apply for the tested sample equipment identified above. The test report shall be invalid without all the signatures of the test engineer, the reviewer and the approver.

Tested by: *Shi Feng* Dated: 2011. 8. 10
Shi Feng

Reviewed by: *Zhang Jun* Dated: 2011. 8. 10
Zhang Jun

Approved by: *Wei Bei* Dated: 2011. 8. 10
Wei Bei



2. General Information

2.1. Description of EUT

Product Feature & Specification	
Equipment	Portable GNSS receiver
Brand Name	ASHTECH
Model Number	MobileMapper 10
Frequency Range	2400MHz~2483.5MHz
Number of Channels	11
Carrier Frequency of Each Channel	2412+(n-1)*5MHz;n=1~11
Channel Spacing	5MHz
Max Transmit Power To antenna	802.11b: 11.61dBm(0.014W) 802.11g: 9.64dBm(0.009W)
Modulation Technique	802.11b: DSSS(BPSK/QPSK/CCK) 802.11g: OFDM(BPSK/QPSK/16QAM/64QAM)
Antenna Information	Chip Antenna with gain 0.94 dBi
Hardware Version	v2.0
Software Version	01.001.1chs
EUT Stage	Production Unit

NOTE:

1. The EUT provides Wi-Fi (802.11b and 802.11g) wireless interface, operating at 2.4GHz ISM band, the channels and transmitter center frequencies are:
 - Channel 1: 2412 MHz (lowest channel)
 - Channel 2: 2417 MHz
 - Channel 3: 2422 MHz
 - Channel 4: 2427 MHz
 - Channel 5: 2432 MHz
 - Channel 6: 2437 MHz (middle channel)
 - Channel 7: 2442 MHz
 - Channel 8: 2447 MHz
 - Channel 9: 2452 MHz
 - Channel 10: 2457 MHz
 - Channel 11: 2462 MHz (highest channel)
2. The above EUT's information was declared by manufacturer.. For a more detailed features description about the EUT, please refer to User's Manual.

2.2. Test Standards and Results

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC Public Notice DA 00-705
- ANSI C63.4-2003
- IC RSS-210 Issue 7

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

Test items and the results are as below:

No.	FCC Rules	IC Rules	Test Type	Limits	Result
1	§15.247(b)	A8.4	Maximum Peak Output Power	≤30dBm	PASS
2	§15.209 §15.247(d)	A8.5	Radiated Emission	§15.209 §15.247(d)	PASS
3	§15.207	Gen 7.2.2	Conducted Emission	15.207(a)	PASS

2.3. Test Facility

Shenzhen Electronic Product Quality Testing Center Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

All measurement facilities used to collect the measurement data are located at Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen 518055 CHINA. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

2.4. Environmental conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	20 - 25
Relative Humidity (%):	40 - 60
Atmospheric Pressure (kPa):	96

2.5. Operation mode of test

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Pre-scanned tests were conducted to determine the final configuration from all possible combinations. The following tables are showing the test modes as the worst cases and recorded in this report.

TEST MODE		
Radiated Mode	Conducted Mode	AC Conducted Emission
1: 802.11b Channel 01_2412 MHz	1: 802.11b Channel 01_2412 MHz	1:GSM 850 Idle + WIFI link + Adapter + BT Earphone
2: 802.11b Channel 06_2437 MHz	2: 802.11b Channel 06_2437 MHz	
3: 802.11b Channel 11_2462 MHz	3: 802.11b Channel 11_2462 MHz	
4: 802.11g Channel 01_2412 MHz	4: 802.11g Channel 01_2412 MHz	
5: 802.11g Channel 06_2437 MHz	5: 802.11g Channel 06_2437 MHz	
6: 802.11g Channel 11_2462 MHz	6: 802.11g Channel 11_2462 MHz	

2.6. Ancillary Equipments List

Equipment	Model	Trade	FCC ID	Data cable	Power cord
Wifi Router	DI-624+A	D-LINK	/	N/A	Unshielded,1.8m
Notebook PC	SL410	IBM	/	N/A	Unshielded,1.8m
BT earphone	BH-105	NOKIA	/	N/A	/

3. Maximum Peak Output Power

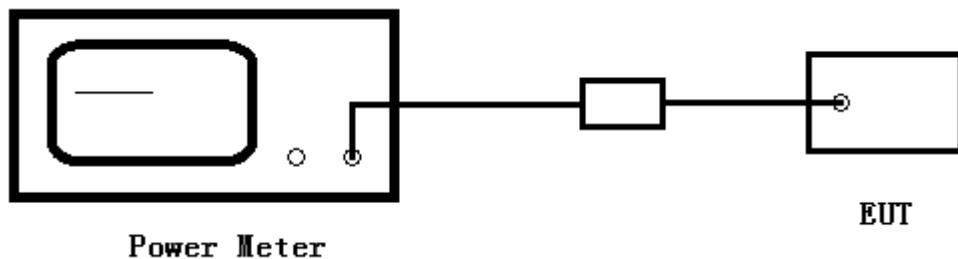
3.1. Requirement of the standard

According to FCC §15.247 (b) (3), the maximum peak output power of systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands is 1 Watt.

3.2. Test Procedure

The EUT temporary antenna port was coupled to the power meter. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.

3.3. Test Setup



3.4. Test Results

Modulation	Operating Frequency (MHz)	Peak Output Power		Limit (W)
		(dBm)	(W)	
DSSS	2412	11.61	0.014	1
	2437	11.46	0.014	1
	2462	11.57	0.014	1
OFDM	2412	9.64	0.009	1
	2437	8.49	0.007	1
	2462	8.93	0.008	1

4. Radiated Emission Test

4.1. Requirement of the standard

According to FCC §15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

According to FCC §15.209 (a), Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

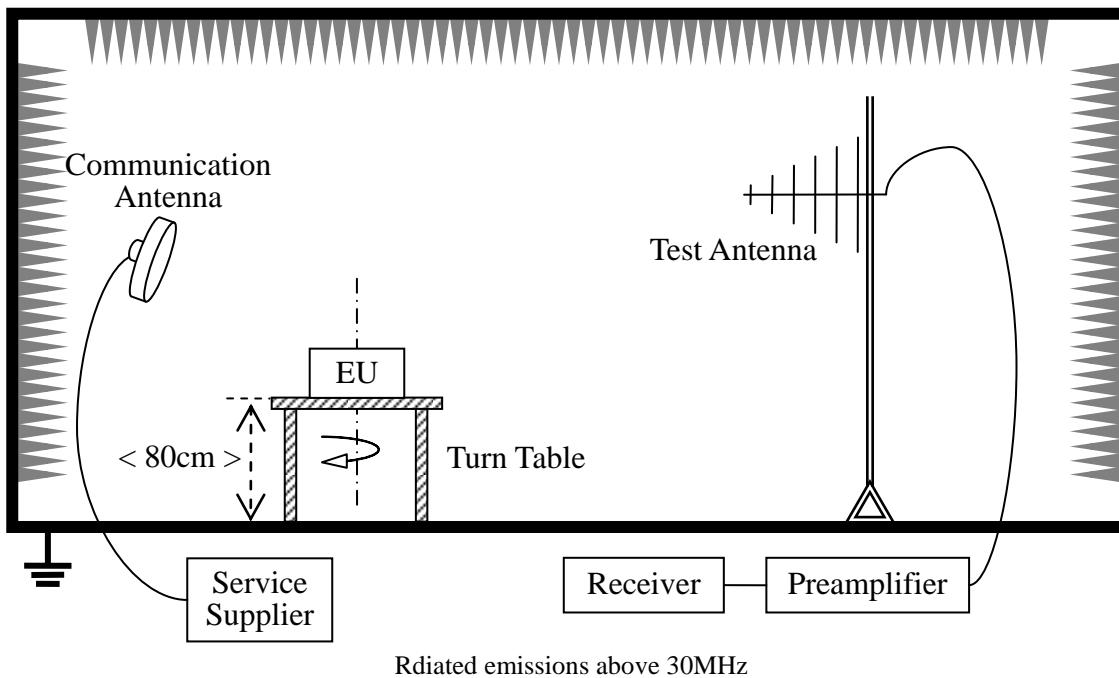
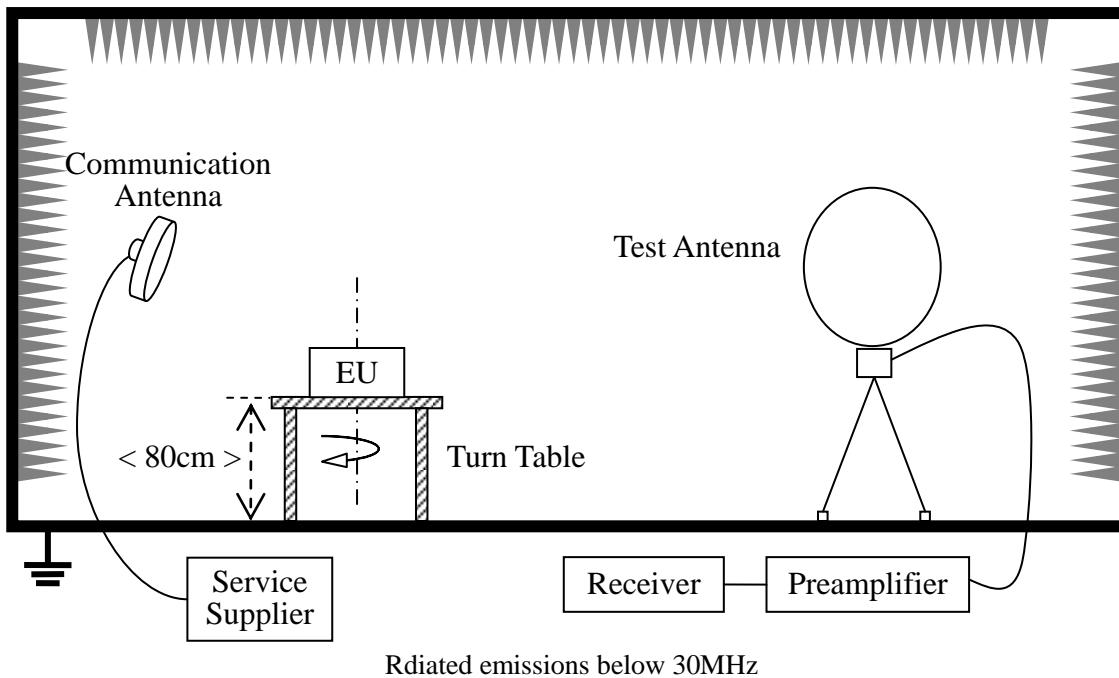
As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules,

4.2. Test Procedure

- 1) The EUT was placed on the top of a ratable 0.8 meters above the ground at a semi-anechoic chamber. In the frequency range of 9 kHz to 30 MHz, magnetic field was measured with loop antenna.
- 2) The antenna was positioned with its plane vertical at 1 m distance from the EUT. The center of the loop was 1 m above the ground. During the measurement the loop antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.
- 3) In the frequency range above 30MHz, ultra-broadband bi-log antenna (30 MHz to 1 GHz) and horn antenna (above 1GHz) were used. Antenna was 3 meters away from the EUT. Antenna height was varied from one meter to four meter 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.

- 4) The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode.
- 5) If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10 dB margins would be retested one by one using the quasi-peak method.

4.3. Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

4.4. Test Results

4.4.1. Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

Frequency(MHz)	Level(dBuV)	Margin(dB)	Limit(dBuV)	Remark
-	-	>10	-	See note

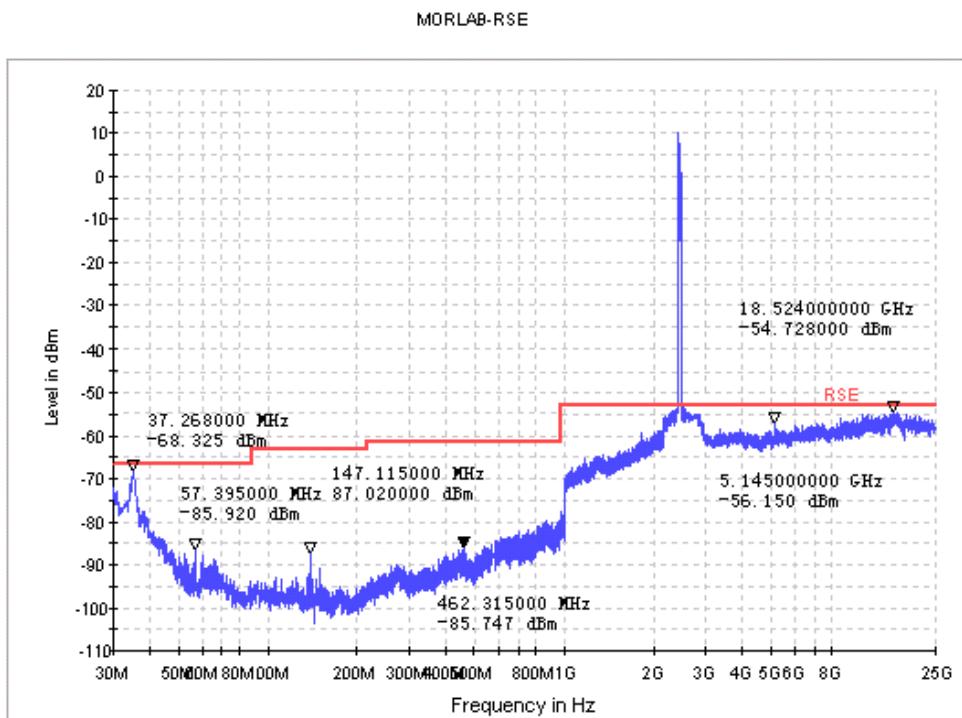
Note:

The amplitude of spurious emissions that are attenuated by more than 10dB below the permissible value has no need to be reported.

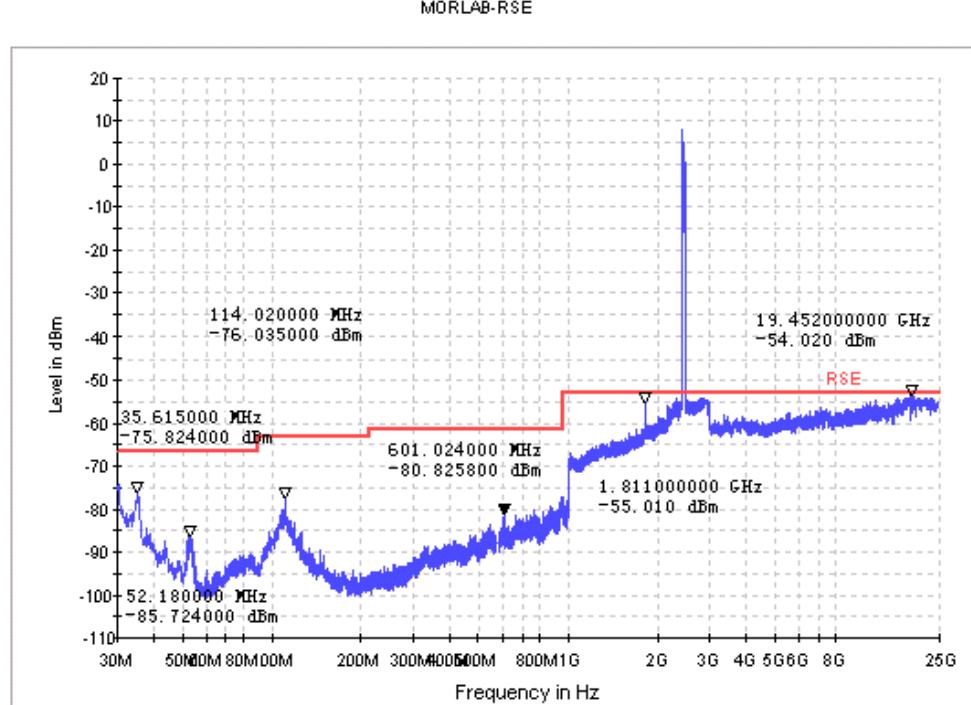
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.4.2. Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)



(Plot A: Antenna Horizontal)



(Plot B: Antenna Vertical)

5. Conducted Emission Test

5.1. Requirement of the standard

According to FCC §15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

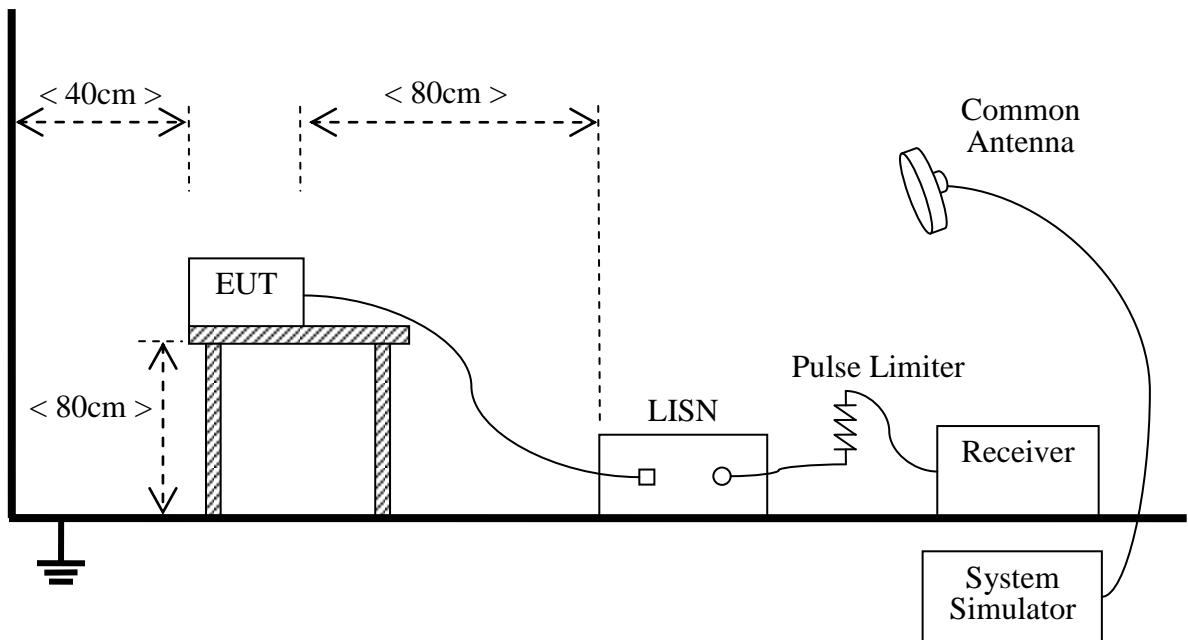
NOTE:

1. The lower limit shall apply at the band edges.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

5.2. Test Procedure

- a) The EUT was placed on a 0.8m high insulating table and kept 0.4 meters from the conducting wall of shielded room.
- b) The EUT was connected to the power mains through a line impedance stabilization network (LISN). The LISN provide $50\Omega/50\mu\text{H}$ of coupling impedance for the measuring instrument.
- c) Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d) The frequency range from 150 kHz to 30 MHz was searched using CISPR Quasi-Peak and Average detector.

5.3. Test Setup



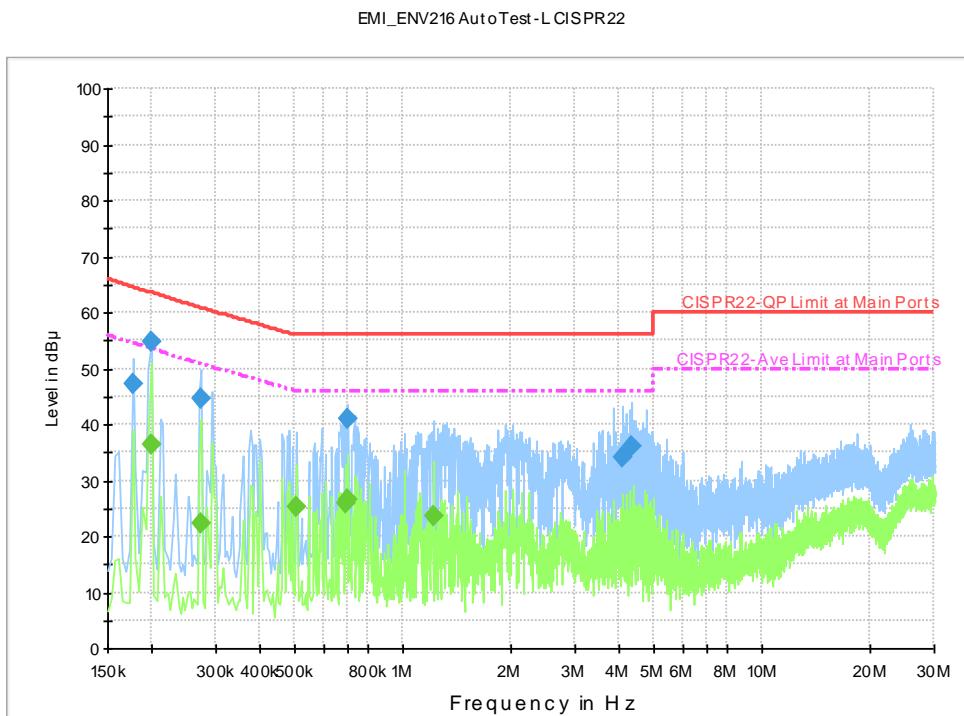
For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

5.4. Test Results

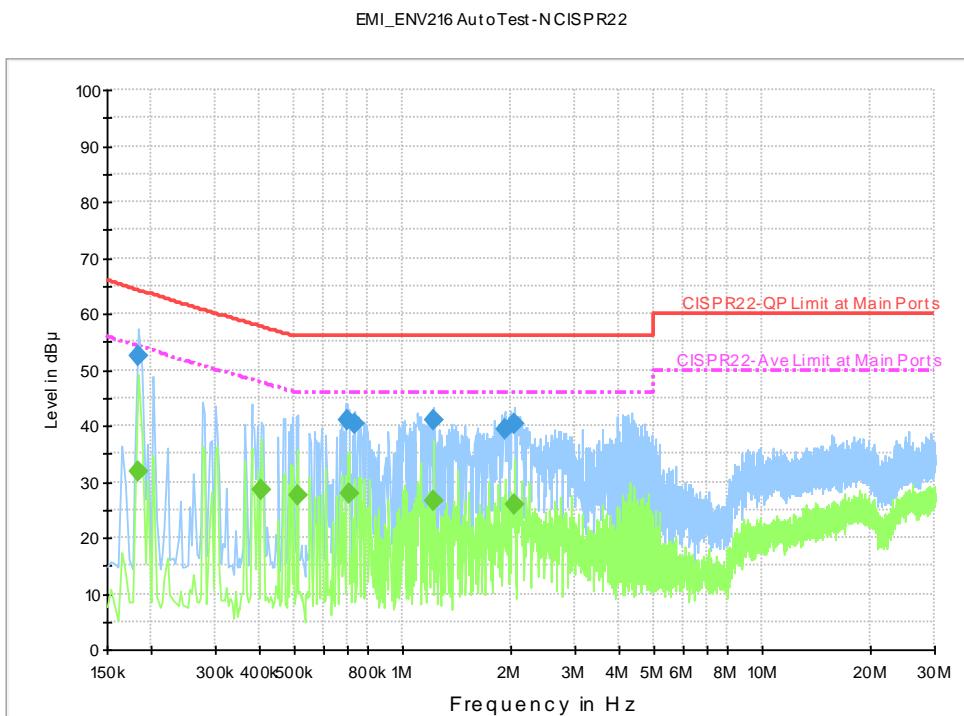
Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.183581	52.6	150.000	9.000	N	9.6	11.6	64.2	PASS	0.183581
0.698494	41.1	150.000	9.000	N	9.7	14.9	56.0	PASS	0.698494
0.728344	40.4	150.000	9.000	N	9.7	15.6	56.0	PASS	0.728344
1.213406	40.9	150.000	9.000	N	9.7	15.1	56.0	PASS	1.213406
1.911150	39.3	150.000	9.000	N	9.7	16.7	56.0	PASS	1.911150
2.034281	40.2	150.000	9.000	N	9.7	15.8	56.0	PASS	2.034281
0.176119	47.2	150.000	9.000	L	9.6	17.4	64.6	PASS	0.176119
0.198506	54.8	150.000	9.000	L	9.6	8.7	63.5	PASS	0.198506
0.273131	44.7	150.000	9.000	L	9.7	16.1	60.8	PASS	0.273131
0.702225	40.8	150.000	9.000	L	9.7	15.2	56.0	PASS	0.702225
4.064081	34.2	150.000	9.000	L	9.9	21.8	56.0	PASS	4.064081
4.302881	35.9	150.000	9.000	L	9.9	20.1	56.0	PASS	4.302881

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.183581	31.9	150.000	9.000	N	9.6	22.3	54.2	PASS	0.183581
0.403725	28.5	150.000	9.000	N	9.7	19.1	47.6	PASS	0.403725
0.508200	27.5	150.000	9.000	N	9.7	18.5	46.0	PASS	0.508200
0.705956	28.0	150.000	9.000	N	9.7	18.0	46.0	PASS	0.705956
1.213406	26.6	150.000	9.000	N	9.7	19.4	46.0	PASS	1.213406
2.034281	25.9	150.000	9.000	N	9.7	20.1	46.0	PASS	2.034281
0.198506	36.5	150.000	9.000	L	9.6	17.0	53.5	PASS	0.198506
0.273131	22.4	150.000	9.000	L	9.7	28.4	50.8	PASS	0.273131
0.500738	25.4	150.000	9.000	L	9.7	20.6	46.0	PASS	0.500738
0.694762	26.0	150.000	9.000	L	9.7	20.0	46.0	PASS	0.694762
0.702225	26.5	150.000	9.000	L	9.7	19.5	46.0	PASS	0.702225
1.213406	23.5	150.000	9.000	L	9.7	22.5	46.0	PASS	1.213406

5.5. Test Plots:



(Plot A: L Phase)



(Plot B: N Phase)

6. List of Equipments Used

Description	Manufacturer	Model No.	Cal. Date	Due Date	Serial No.
Test Receiver	Rohde & Schwarz	ESCI3	2010.9	2011.9	100666
Spectrum Analyzer	Rohde & Schwarz	FSP30	2010.9	2011.9	101020
Spectrum Analyzer	Rohde & Schwarz	FSU26	2010.9	2011.9	200880
System Simulator	Agilent	E5515C	2010.9	2011.9	GB46040102
System Simulator	Rohde & Schwarz	CMU200	2010.9	2011.9	105571
LISN	Rohde & Schwarz	ENV216	2010.9	2011.9	812744
Loop Antenna	Rohde & Schwarz	HFH2-Z2	2010.9	2012.9	A0304220
Ultra Broadband Ant.	Rohde & Schwarz	HL562	2010.9	2012.9	A0304224
Horn Ant.	Rohde & Schwarz	HF906	2010.9	2012.9	100150
DC power supply	HP	66309D	2010.9	2012.9	US39070653
Shield Room	ETS	Site 1	/	/	A0304188
Anechoic Chamber	ETS	EMC9×6×6 (m)	/	/	/

**** END OF REPORT ****