

Prüfbericht - Nr.: 15059910 001

Test Report No.:

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Auftraggeber: Shanghai Huace Navigation Technology LTD.
Client: Floor 2, Building 35, NO. 680 Guiping Road shanghai

Gegenstand der Prüfung: GNSS receiver
Test item:
Bezeichnung: X90 **Serien-Nr.:** N/A
Identification: FCC ID : SY4-A01002 *Serial No.:*
Wareneingangs-Nr.: 153189567 **Eingangsdatum:** 2013-3-10
Receipt No.: *Date of receipt:*
Zustand des Prüfgegenstandes bei Anlieferung: Test sample(s) is/are not damaged and
Condition of test item at delivery: suitable for testing.

Prüfört: • TÜV Rheinland (Shanghai) Co., Ltd.
Testing location: • Quietek Technology(Suzhou)Co., Ltd.
 (Detailed address refer to clause 2.1)

Prüfgrundlage: FCC 47 CFR Part 15 Subpart B
Test specification: ANSI C63.4-2003

Prüfresultat: Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).
Test Result: The test item passed the test specification(s).

Prüflaboratorium: TÜV Rheinland (Shanghai) Co., Ltd.
Testing Laboratory: Building 2, No. 777 Guangzhong Road West, Shanghai 200072, P.R. China

geprüft/ tested by:

kontrolliert/ reviewed by:

 2013-04-09 Shili / Inspector *shili*
 Datum Name/Stellung Unterschrift
 Date Name/Position Signature

 2013-04-09 Jesse Huang / Reviewer *Jesse Huang*
 Datum Name/Stellung Unterschrift
 Date Name/Position Signature
Sonstiges/ Other Aspects:
Abkürzungen: P(ass) = entspricht Prüfgrundlage
 F(fail) = entspricht nicht Prüfgrundlage
 N/A = nicht anwendbar
 N/T = nicht getestet

Abbreviations: P(ass) = passed
 F(fail) = failed
 N/A = not applicable
 N/T = not tested

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report relates to the a. m. test item. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

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TEST SUMMARY

3.2.1 VOLTAGE REQUIREMENTS, FCC 15.31(E)

RESULT: PASS

3.2.2 ANTENNA REQUIREMENTS, FCC 15.203, FCC 15.204 AND RSS-GEN 7.1.4

RESULT: PASS

**4.6.1 RADIATED EMISSION OF RECEIVER, FCC 15.109, RSS-210 2.2, RSS-210 2.6,
RSS-210 A8.5, RSS-GEN 7.2.3.2**

RESULT: PASS

4.7.1 AC POWER LINE CONDUCTED EMISSION, FCC 15.207 AND RSS-GEN7.2.2

RESULT: PASS

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report.

2. Test Sites

2.1 Test Facilities

QuieTek Technology(Suzhou)Co.,Ltd.

No.99 Hongye RD.Suzhou Industnal Park Loufeng Hi-Tech Development
Zone.,Suzhou,China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 800392.

The Industry Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under chambers filing number 4075B.

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2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equipment	Model	Serial no.	Cal. due date
3m modified semi-anechoic chamber	SAC	N/A	10.12.2014
EMI test receiver	ESCI	100280	08.11.2013
broadband antenna	BTA-H	040005H	28.07.2013
Spectrum analyzer	FSP30	100192	21.07.2013
Broadband coaxial preamplifier	BBV 9718	9718-012	04.07.2014
Double ridged broadband horn antenna	BBHA 9120 D	9120D-433	15.05.2013
Rohde & Schwarz LISN	ENV216	812744	15.07.2013

2.3 Measurement Uncertainty

Table 2: Emission Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Radiated Emission	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

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3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a GPS receiver

3.2 System Details

Frequency range:	L1=1575.42Mhz, L2:1227.6Mhz
Max output power:	N/A
Antenna gain:	39dBi(combined gain of antenna and antenna amplifier)
Antenna type:	PCB antenna
Antenna cable length:	N/A
Rated voltage:	3.3V
Test voltage:	3.3V

3.2.1 Voltage Requirements, FCC 15.31(e)

RESULT: **PASS**

All the tests were performed using steady DC 3.3V. Hence it complies with the power supply requirements.

3.2.2 Antenna Requirements, FCC 15.203, FCC 15.204 and RSS-Gen 7.1.4

RESULT: **PASS**

The EUT has an internal antenna which is not user accessible. Hence it complies with the requirements.

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3.3 Independent Operation Modes

The EUT was tested on a stand-alone basis (only attached to the test jig) and the test system was configured in a typical fashion (as a customer would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4:2003.

GPS mode basic operation in :

A. EUT receives (RX mode), continuously.

3.4 Noise Suppressing Parts

Refer to schematics and internal photos.

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4. Test Set-up and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.107, 15.109

4.2 Physical Configuration for Testing

The EUT was designed to get into related working mode with the control of a laptop computer through RS 232 interface.

Notes:

one test sample was available:

For receiver measurements measurements.

more details, refer to section: Photographs of the Test Set-Up.

4.3 Test Operation and Test Software

Software used for testing: HCLoader

This software was running on the laptop computer connected to the EUT. It was used to enable the test operation modes listed in section 3.3 as appropriate.

4.4 Special Accessories and Auxiliary Equipment

RS232 Cable

4.5 Countermeasures to achieve EMC Compliance

No additional measures were employed to achieve compliance.

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4.6 Receiver Parameters

4.6.1 Radiated Emission of Receiver, FCC 15.109, RSS-210 2.2, RSS-210 2.6, RSS-210 A8.5, RSS-Gen 7.2.3.2

RESULT:

PASS

Date of testing:	2013-3-30
Ambient temperature:	23.5°C
Relative humidity:	45%
Atmospheric pressure:	101.5hPa
Frequency range:	30MHz – 8GHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

Requirements:

The emissions from the unintentional radiator shall not exceed the field strength specified in 15.109(a) and RSS-210 Table 2 (and RSS-Gen Table 1).

Test procedure:

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The EUT was pretested in floorstanding condition and in the table position and the worst case condition was table position which was used for the final measurements. The rotation through the three orthogonal axes is normally not needed for equipment that is not hand-held or bodyworn. The spectrum was examined from 30MHz to the 5th harmonic of the highest fundamental operation frequency (8GHz). Final radiated emission measurements were made at 3m distance. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30MHz and 1GHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1GHz, measurements were performed using the following settings: Peak: RBW & VBW = 1MHz, Average: RBW = 1MHz, VBW = 10Hz. The highest emission amplitudes relative to the appropriate limit were recorded in this report. No spurious emission was found in the range 30MHz – 1000MHz.

Table 3: Radiated Emission Horizontal 30M-1GHz Result

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		123.363	26.300	7.681	-17.200	43.500	18.619	PK
2		124.347	21.928	3.305	-21.572	43.500	18.623	QP
3		182.604	37.574	22.122	-5.926	43.500	15.453	QP
4		182.896	38.272	22.823	-5.228	43.500	15.450	PK
5	*	191.990	39.823	24.025	-3.677	43.500	15.798	PK
6		192.062	39.768	23.965	-3.732	43.500	15.803	QP
7		333.125	31.053	9.575	-14.947	46.000	21.478	PK
8		336.008	36.225	14.662	-9.775	46.000	21.562	QP
9		398.014	39.637	16.064	-6.363	46.000	23.573	QP
10		398.236	34.938	11.351	-11.062	46.000	23.586	PK
11		572.708	32.386	5.747	-13.614	46.000	26.640	QP
12		572.715	34.616	7.977	-11.384	46.000	26.640	PK

Figure 1: Radiated Emission Horizontal 30M-1GHz Mode A

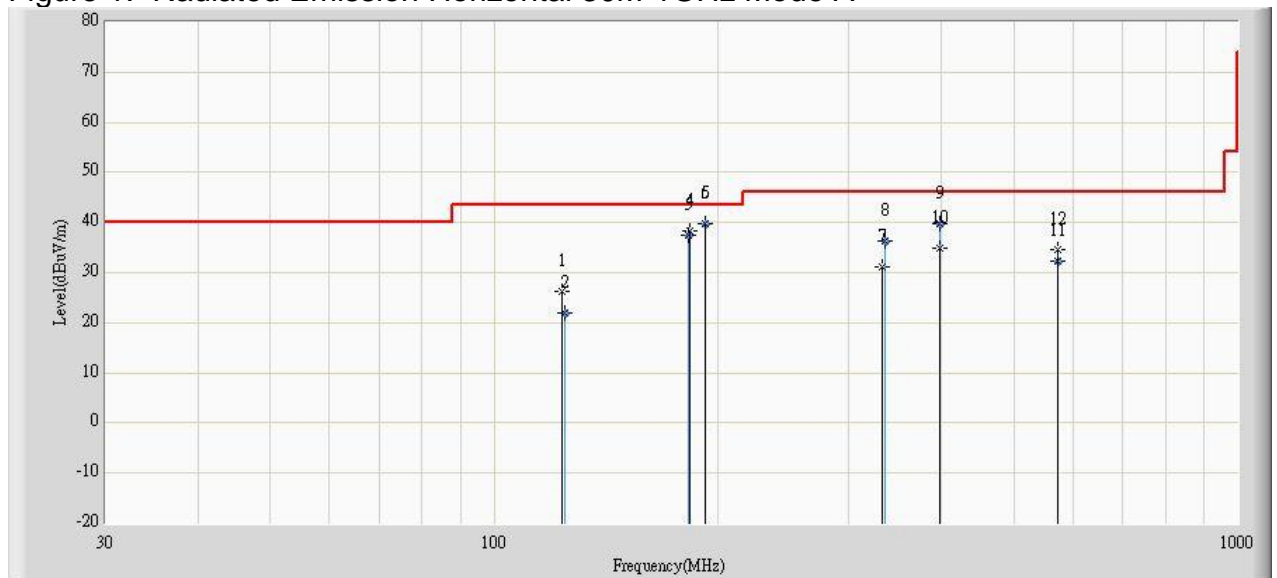


Table 4: Radiated Emission Vertical 30M-1GHz Result

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		107.964	40.222	21.951	-3.278	43.500	18.271	PK
2		108.064	35.257	16.977	-8.243	43.500	18.280	QP
3		142.527	25.350	7.897	-18.150	43.500	17.453	QP
4		142.641	31.952	14.513	-11.548	43.500	17.439	PK
5		180.089	38.991	23.490	-4.509	43.500	15.501	QP
6	*	181.926	41.328	25.867	-2.172	43.500	15.461	PK
7		312.027	31.732	10.820	-14.268	46.000	20.911	PK
8		312.030	31.827	10.915	-14.173	46.000	20.912	QP
9		433.035	33.041	8.842	-12.959	46.000	24.198	PK
10		433.042	30.475	6.277	-15.525	46.000	24.199	QP
11		623.989	35.344	8.093	-10.656	46.000	27.251	QP
12		624.004	35.785	8.534	-10.215	46.000	27.251	PK

Figure 2: Radiated Emission Vertical 30M-1GHz Mode A

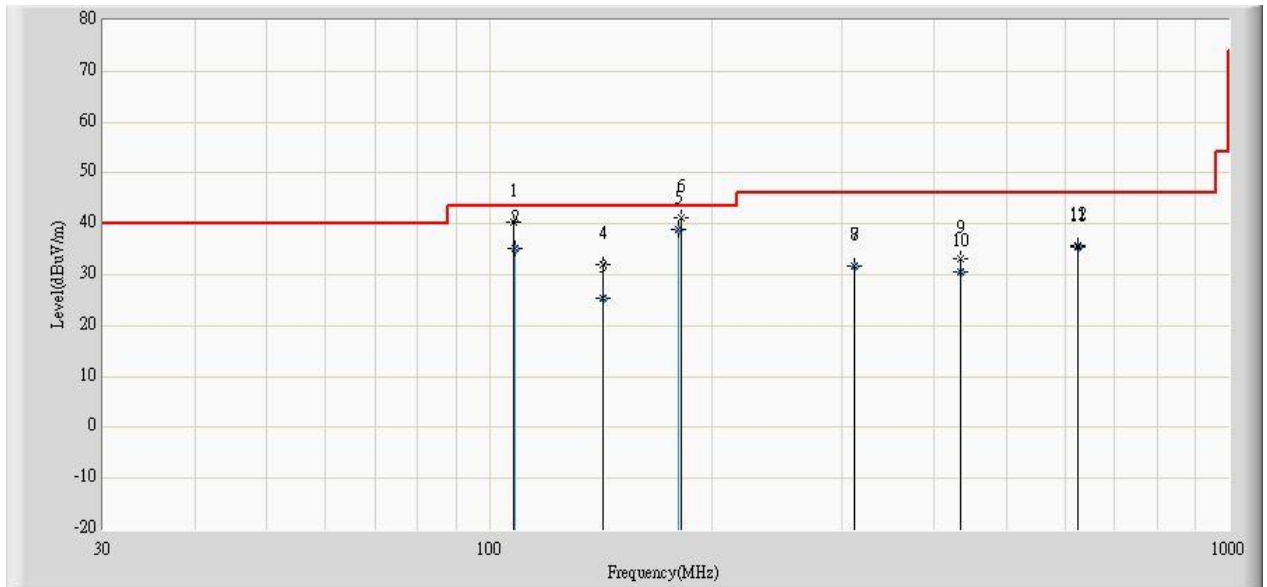


Table 5: Radiated Emission Horizontal 1GHz-8GHz Result

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		1195.500	39.861	58.193	-34.139	74.000	-18.332	PK
2		1195.500	26.821	45.153	-27.179	54.000	-18.332	AV
3		1595.000	41.691	57.987	-32.309	74.000	-16.296	PK
4		1595.100	29.363	45.657	-24.637	54.000	-16.294	AV
5		2802.000	42.605	54.388	-31.395	74.000	-11.783	PK
6	*	2802.200	39.355	51.137	-14.645	54.000	-11.782	AV

Figure 3: Radiated Emission Horizontal 1GHz-8GHz Mode A

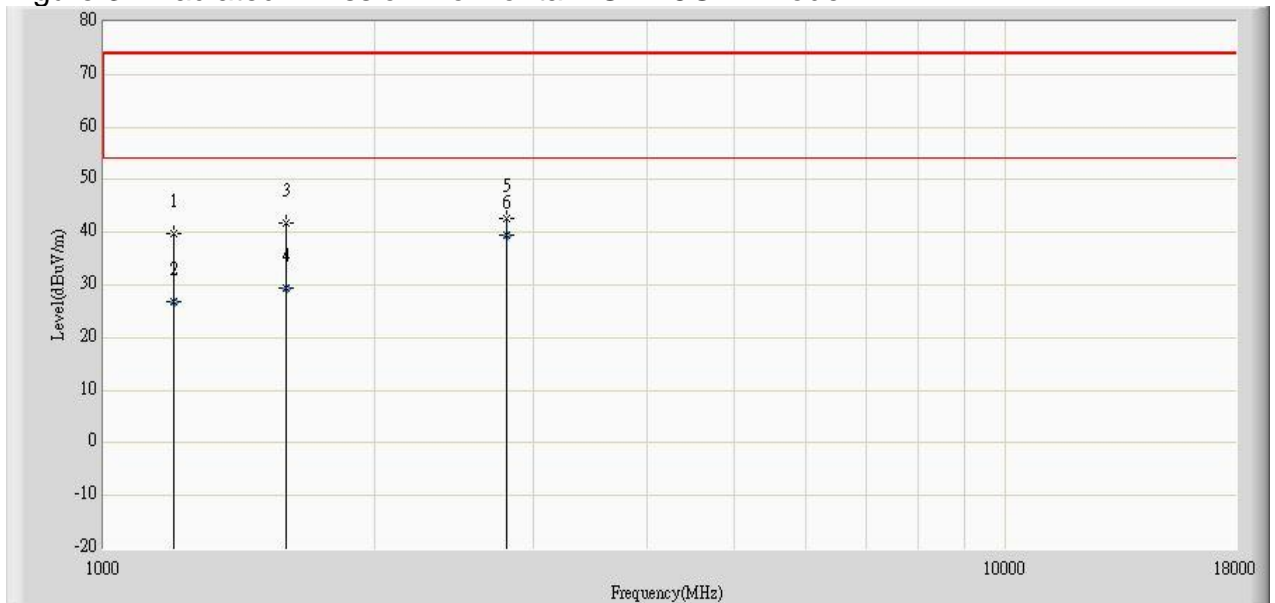
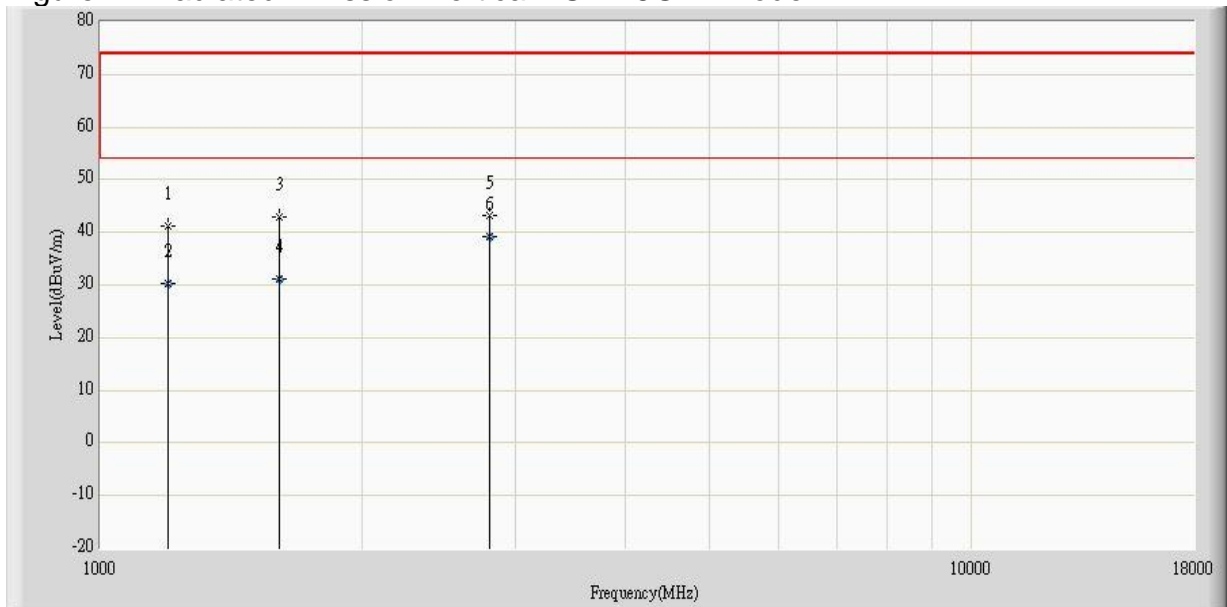


Table 6: Radiated Emission Vertical 1GHz-8GHz Result

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		1195.500	41.079	58.721	-32.921	74.000	-17.642	PK
2		1195.500	30.233	47.874	-23.767	54.000	-17.642	AV
3		1603.500	43.067	60.095	-30.933	74.000	-17.028	PK
4		1603.500	31.186	48.214	-22.814	54.000	-17.028	AV
5		2802.000	43.345	54.577	-30.655	74.000	-11.232	PK
6	*	2802.100	39.092	50.324	-14.908	54.000	-11.232	AV

Figure 4: Radiated Emission Vertical 1GHz-8GHz Mode A



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4.7 Test Results of AC Power Line Conducted Measurements

4.7.1 AC Power Line Conducted Emission, FCC 15.207 and RSS-Gen7.2.2

RESULT: **PASS**

Date of testing: 2013-3-30

Ambient temperature: 23.5°C

Relative humidity: 45%

Atmospheric pressure: 101.5hPa

Frequency range: 0.15MHz –30MHz

Measurement distance: N/A

Kind of test site: Shielded Room

Requirements:

The AC power line conducted emission on any frequency within the band 150 kHz to 30MHz shall not exceed the limits specified in FCC 15.207 and RSS-Gen 7.2.2.

Test procedure:

ANSI C63.4-2003.

The EUT was placed on a wooden table raised 80cm above the reference ground plane. A vertical conducting plane of the screened room was located 40cm to the rear of the EUT. The AC adapter of the EUT was connected to a Line Impedance Stabilization Network (LISN).

The physical arrangement of the test system and associated cabling was varied to determine the effect on the EUT's emissions in amplitude and frequency in order to ensure that maximum emission amplitudes were attained.

The measurements were performed with the receiver operating in the CISPR quasipeak and average detection modes.

No disturbances found or not detectable.

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Table 7: Conducted Emission Result

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line
0.210000	29.30	20.4	63.2	33.9	L1
0.495000	19.50	20.5	56.1	36.5	L1
1.535000	18.40	20.4	56.0	37.6	L1
4.295000	19.90	20.4	56.0	36.1	L1
7.605000	22.10	20.8	60.0	37.9	L1
18.450000	21.40	21.3	60.0	38.6	L1

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line
0.270000	25.30	20.5	51.1	25.8	L1
0.365000	21.80	20.5	48.6	26.8	L1
2.030000	17.10	20.4	46.0	28.9	L1
3.475000	14.90	20.4	46.0	31.1	L1
7.990000	17.60	20.9	50.0	32.4	L1
24.360000	17.90	21.2	50.0	32.1	L1

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line
0.210000	28.80	20.1	63.2	34.4	N
0.495000	19.40	20.3	56.1	36.7	N
1.495000	18.20	20.3	56.0	37.8	N
3.725000	19.30	20.3	56.0	36.7	N
7.610000	21.90	20.6	60.0	38.1	N
29.730000	22.20	21.7	60.0	37.8	N

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line
0.270000	21.80	20.1	51.1	29.3	N
0.425000	21.10	20.2	47.3	26.2	N
2.090000	16.30	20.3	46.0	29.7	N
3.735000	14.70	20.3	46.0	31.3	N
7.045000	16.70	20.6	50.0	33.3	N
24.870000	18.10	21.4	50.0	31.9	N

Figure 5: Conducted Emission L Phase Mode A

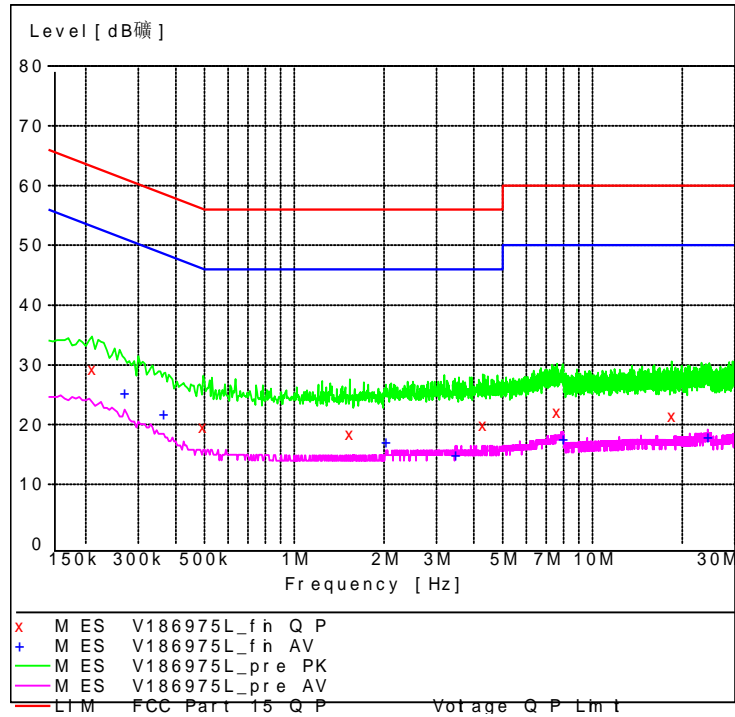
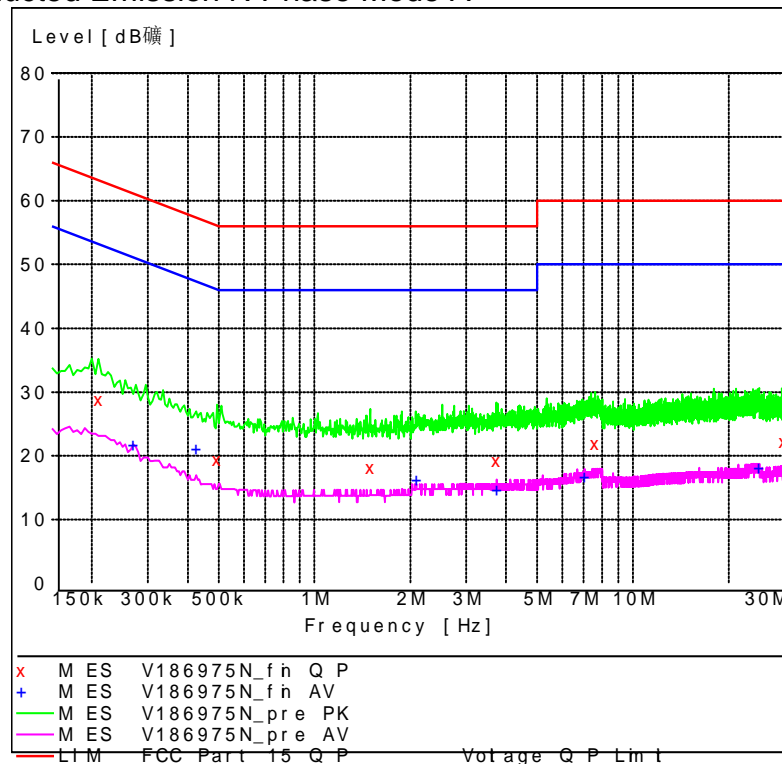
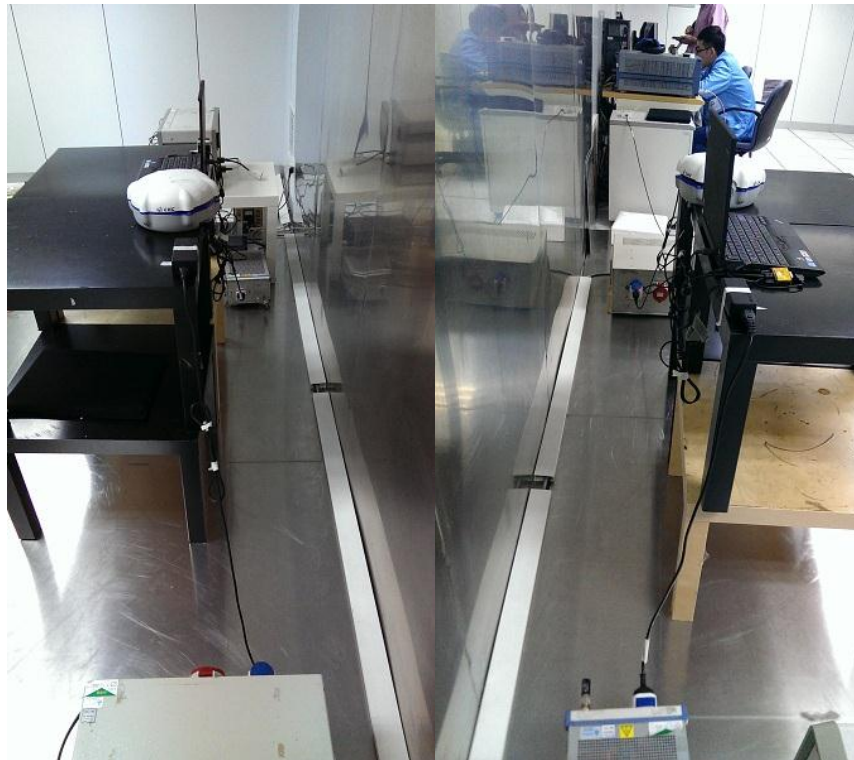


Figure 6: Conducted Emission N Phase Mode A



5. Photographs of the Test Setup

Photograph 1: Set-up for Conducted Emission

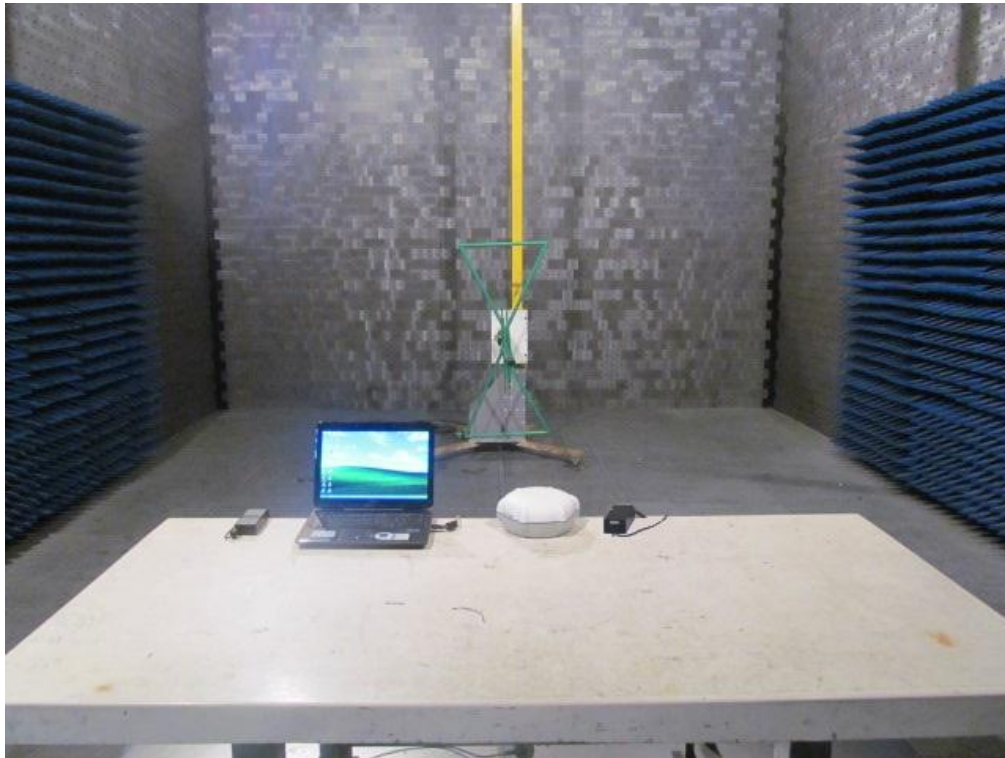


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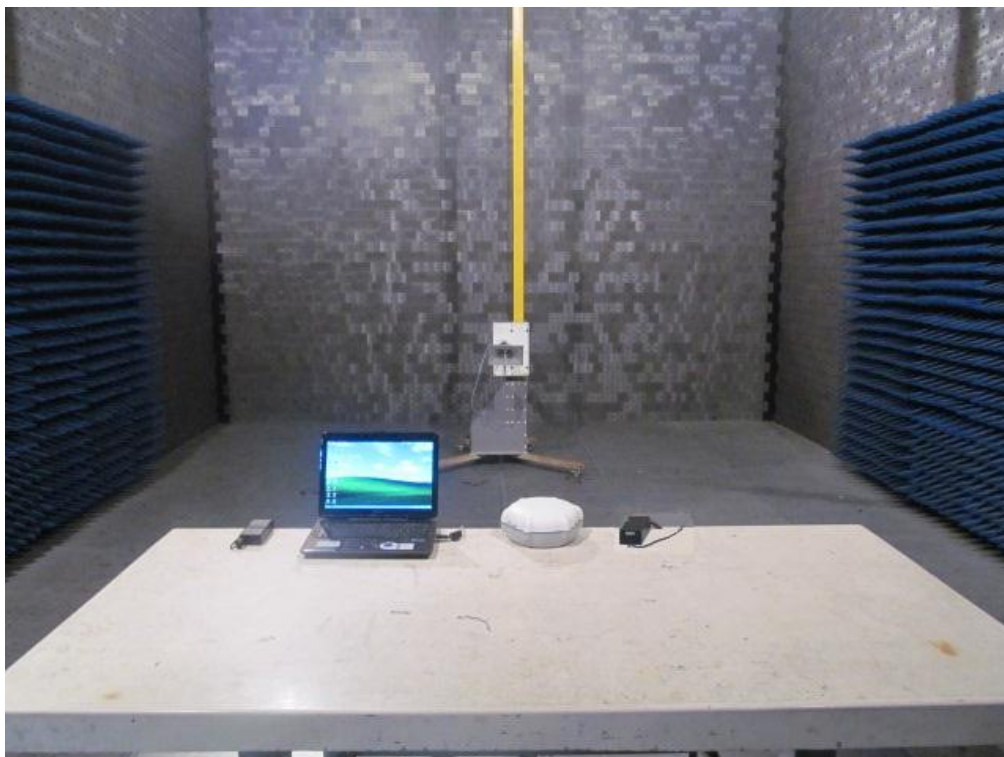
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Photograph 2: Set-up for Radiated Emission, 30MHz-1000MHz



Photograph 3: Set-up for Radiated Emission, 1G-18GHz



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