



**CONFORMANCE TEST REPORT
FOR
EN 301489-1 / -7**

Report No.: 06-04-MAS-045-02

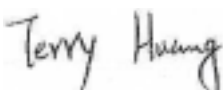


Client: **Systems & Technology Corp.**
Product: **GPS Vehicle Tracking Device**
Model: **X1**
Manufacturer/supplier: **Shuttle Inc.**

Date test item received: 2006/04/06
Date test campaign completed: 2006/06/01
Date of issue: 2006/06/09

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Total number of pages of this test report: 15 pages

Total number of pages of this test photos: 5 pages

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- ③ Filing: FCC, Industry Canada, VCCI
- ④ MRA: Australia, Hong Kong, New Zealand, Singapore, USA, Japan, Korea, China, APLAC through CNLA
- ⑤ FCC Registration Number: 90588, 91094, 91095

CONTENTS

● EMC TEST REPORT	1
● CONTENTS.....	2
1 TEST REPORT CERTIFICATION.....	3
2 SUMMARY OF TEST RESULTS	4
2.1 Emission (EMI):.....	4
2.2 Immunity (EMS):	4
3 GENERAL INFORMATIONS	5
3.1 Description of EUT:	5
3.2 Tested Configuration:.....	5
3.3 Power Supply and Cable Dedicated for EUT:.....	5
3.4 Operating Modes:.....	6
3.5 Performance Criteria:	7
3.6 Deviation Record:	7
3.7 Modification Record:	7
4 TEST DATA & RELATED INFORMATIONS	8
4.1 Emissions:	8
4.1.1 Radiated Emissions Test:	8
4.1.1.1 Radiated Emissions Test Data:	8
4.2 Immunity:.....	12
4.2.1 Electrostatic Discharge:	12
4.2.1.1 Electrostatic Discharge Test Data:	12
4.2.2 Radio Frequency Electromagnetic Field (80~1000MHz and 1400~2000MHz):.....	14
4.2.2.1 Radio Frequency Electromagnetic Field Test Data:.....	14
5 EQUIPMENTS LIST FOR TESTING.....	15
ANNEX A: PHOTOS	A1~A5

2 SUMMARY OF TEST RESULTS

2.1 Emission (EMI):

EMI Phenomenon	Port	Standard	Emission Level (Limit)	Basic Standard	EUT Operating Mode	Result	Applicability
Radiated Interference Field Strength, 30-1000 MHz	Enclosure	ETSI EN 301 489-1/7, Chap. 8.2	Class-B	EN 55022:1998 + A1:2000 + A2:2003	OP1+ OP2+ OP4	Passed	Applicable

2.2 Immunity (EMS):

EMS Phenomenon	Port	Standard	Immunity Level (Category)	Basic Standard	EUT Operating Mode	Result	Applicability
Electrostatic Discharge (ESD)	Enclosure	ETSI EN 301 489-1/7, Chap. 9.3	Contact Discharge: 4kV, Air Discharge: 8kV	EN 61000-4-2:1995 +A1:1998+A2:2001	OP1+ OP2	Passed	Applicable
RF-Electromagnetic Field	Enclosure	ETSI EN 301 489-1/7, Chap. 9.2	80MHz~1000MHz, 1.4GHz~2GHz, 3V/m	EN 61000-4-3:2002 +A1:2002	OP1+ OP2+ OP3+ OP4	Passed	Applicable

3 GENERAL INFORMATIONS

3.1 Description of EUT:

GPS Positioning, Vehicle Real-Time Tracking, Vehicle Fleet Management, Vehicle Security Monitoring System.

3.2 Tested Configuration:

The EUT connected with the following peripheral devices.

Following peripheral devices and interface cables were connected during the measurement:

Product	Manufacturer	Model No.	I/O Cable
N/A	N/A	N/A	N/A

3.3 Power Supply and Cable Dedicated for EUT:

Power Supply : DC 12Vcd

Power Line : Nonshielded Shielded None , length: 1.6 m

Signal Line : Nonshielded Shielded None , length: _____ m

Data Line Nonshielded Shielded None , length: _____ m

* For more detailed features, please refer to User's Manual.

3.4 Operating Modes:

OP. Mode	Description of Operating Modes
OP 1	idle Mode 900 / 1800 + GPRS (GPRS test with R&S CMU-200 which will automatically connect to handset with data transfer)
OP 2	Call Mode 900 / 1800
OP 3	Charging
OP 4	Charging + Linking PC

Remark:

Description of Operating Modes	Remarks
Speech Call GSM900	A speech call is established at TCH 62
idle Mode GSM900	A mode of operation of a receiver or a transceiver, where the Equipment Under Test (EUT) is powered, available for service and available to respond to a request to set up a call.
Speech Call DCS1800	A speech call is established at TCH 698
idle Mode DCS1800	A mode of operation of a receiver or a transceiver, where the Equipment Under Test (EUT) is powered, available for service and available to respond to a request to set up a call.
Data Call GSM900	A data call to the test system is established at TCH 62 and data is sent continuously and bidirectionally between the EUT and the test system.
Data Call DCS1800	A data call to the test system is established at TCH 698 and data is sent continuously and bidirectionally between the EUT and the test system.
GSM900	A communication link is established between the mobile station and the test simulator. The transmitter is operated at its maximum rated output power: 33 dBm (power class 4)
DCS1800	A communication link is established between the mobile station and the test simulator. The transmitter is operated at its maximum rated output power: 30 dBm (power class 1)

3.5 Performance Criteria:

General Criteria

ETSI EN 301 489-1/7 Performance criteria (these criteria are defined within the ETS):

Performance criteria for Continuous phenomena applied to Transmitters (CT)

Performance criteria for Transient phenomena applied to Transmitters (TT)

Performance criteria for Continuous phenomena applied to Receiver (CR)

Performance criteria for Transient phenomena applied to Receiver (TR)

	Observation of the following functions	CT	CR	TT	TR
Call Mode	RXQUAL	X	X	----	----
	Audio breakthrough downlink: 35 dB < Ref.-Lev.	X	X	----	----
	Audio breakthrough uplink: 35 dB < Ref.-Lev.	X	X	----	----
	TCH mode maintained	X	X	X	X
idle Mode	idle mode maintained	X	X	X	X
	no unintended transmission	X	X	X	X
Call and idle Mode	no loss of user control function	X	X	X	X
	no loss of stored data	X	X	X	X

Note: " X " means the test applicable.

3.6 Deviation Record:

(If any deviation from additions to or exclusions from test method must be stated)

N/A

3.7 Modification Record:

No modifications were required. (That is the EUT complied with the requirements as tested.)

4 TEST DATA & RELATED INFORMATIONS

4.1 Emissions:

4.1.1 Radiated Emissions Test:

4.1.1.1 Radiated Emissions Test Data:

A. Operating Conditions of the EUT: OP2 Mode (GSM idle 900)

Test Date: May 19, 2006

Test Result	Passed
Test Specification	EN 55022:1998/A1:2000/A2:2003 (Class B)
Climatic Condition	Ambient Temperature : <u>23</u> °C Relative Humidity : <u>63</u> %RH
Power Supply System	DC Power: <u>12</u> Vdc

Emission Frequency (MHz)	Meter Reading (dBuV)		CORR'd Factor (dB/m)	Results (dBuV/m)		Limit (dBuV/m)	Margins (dB)
	HOR.	VERT.		HOR.	VERT.		
69.515	11.3	***	8.5	19.8	***	30.0	-10.2
71.270	***	13.9	8.5	***	22.4	30.0	-7.6
88.015	18.6	***	9.4	28.0	***	30.0	-2.0
152.660	10.7	***	11.7	22.4	***	30.0	-7.6
154.214	***	8.8	11.7	***	20.5	30.0	-9.5
187.100	6.0	***	13.8	19.8	***	30.0	-10.2
187.117	***	7.1	13.8	***	20.9	30.0	-9.1
277.090	4.6	***	17.1	21.7	***	37.0	-15.3
289.960	***	3.4	18.1	***	21.5	37.0	-15.5
465.110	***	11.0	23.1	***	34.1	37.0	-2.9
465.670	9.6	***	23.1	32.7	***	37.0	-4.3
766.270	***	0.6	29.6	***	30.2	37.0	-6.8

Notes: 1) Place of Measurement: Measuring site of the ETC (3F)

2) Measurement Distance: 10 m

3) Height of table on which the EUT was placed: 0.8 m

4) Height of Receiving Antenna: 1 - 4 m

5) Example Calculation: result for 69.515 MHz: $11.3 + (8.5) = 19.8 \text{ dB } \mu \text{ V/m}$

6) ① If the data table appeared symbol of "****" means the value was too low to be measured.

② If the data table appeared symbol of "#" means the noise was low, so record the peak

7) The estimated measurement uncertainty of the result measurement is

+ 4.5dB / - 4.6dB (30MHz f 300MHz)

+ 4.3dB / - 4.3dB (300MHz f 1GHz)



B. Operating Conditions of the EUT: OP2 Mode (GSM call mode 900+GPS)

Test Date: May 19, 2006

Test Result	Passed
Test Specification	EN 55022:1998/A1:2000/A2:2003 (Class B)
Climatic Condition	Ambient Temperature : <u>23</u> °C Relative Humidity : <u>63</u> %RH
Power Supply System	DC Power: <u>12</u> Vdc

Emission Frequency (MHz)	Meter Reading (dBuV)		CORR'd Factor (dB/m)	Results (dBuV/m)		Limit (dBuV/m)	Margins (dB)
	HOR.	VERT.		HOR.	VERT.		
69.520	11.2	***	8.5	19.7	***	30.0	-10.3
71.310	***	13.5	8.5	***	22.0	30.0	-8.0
88.015	18.7	***	9.4	28.1	***	30.0	-1.9
152.610	10.6	***	11.7	22.3	***	30.0	-7.7
154.370	***	9.2	11.7	***	20.9	30.0	-9.1
187.120	6.1	***	13.8	19.9	***	30.0	-10.1
187.210	***	6.7	13.8	***	20.5	30.0	-9.5
277.120	4.9	***	17.1	22.0	***	37.0	-15.0
289.270	***	3.8	18.1	***	21.9	37.0	-15.1
465.250	9.7	***	23.1	32.8	***	37.0	-4.2
465.370	***	11.1	23.1	***	34.2	37.0	-2.8
766.410	***	0.9	29.6	***	30.5	37.0	-6.5

Notes: 1) Place of Measurement: Measuring site of the ETC (3F)2) Measurement Distance: 10 m3) Height of table on which the EUT was placed: 0.8 m4) Height of Receiving Antenna: 1 - 4 m5) Example Calculation: result for 69.520 MHz: $11.2 + (8.5) = 19.7 \text{ dB } \mu \text{ V/m}$

6) ① If the data table appeared symbol of "***" means the value was too low to be measured.

② If the data table appeared symbol of "#" means the noise was low, so record the peak

7) The estimated measurement uncertainty of the result measurement is

+ 4.5dB / - 4.6dB (30MHz f 300MHz)+ 4.3dB / - 4.3dB (300MHz f 1GHz)



C. Operating Conditions of the EUT: OP2 Mode (GSM Call mode 1800+GPS)

Test Date: May 19, 2006

Test Result	Passed
Test Specification	EN 55022:1998/A1:2000/A2:2003 (Class B)
Climatic Condition	Ambient Temperature : <u>23</u> °C Relative Humidity : <u>63</u> %RH
Power Supply System	DC Power: <u>12</u> Vdc

Emission Frequency (MHz)	Meter Reading (dBuV)		CORR'd Factor (dB/m)	Results (dBuV/m)		Limit (dBuV/m)	Margins (dB)
	HOR.	VERT.		HOR.	VERT.		
69.275	11.7	***	8.5	20.2	***	30.0	-9.8
71.310	***	13.6	8.5	***	22.1	30.0	-7.9
88.240	18.1	***	9.4	27.5	***	30.0	-2.5
152.790	11.2	***	11.7	22.9	***	30.0	-7.1
154.410	***	9.8	11.7	***	21.5	30.0	-8.5
187.170	***	8.1	13.8	***	21.9	30.0	-8.1
187.400	8.0	***	13.8	21.8	***	30.0	-8.2
277.270	5.9	***	17.1	23.0	***	37.0	-14.0
288.910	***	4.4	18.1	***	22.5	37.0	-14.5
465.310	***	11.4	23.1	***	34.5	37.0	-2.5
465.710	9.4	***	23.1	32.5	***	37.0	-4.5
766.410	***	1.1	29.6	***	30.7	37.0	-6.3

Notes: 1) Place of Measurement: Measuring site of the ETC (3F)2) Measurement Distance: 10 m3) Height of table on which the EUT was placed: 0.8 m4) Height of Receiving Antenna: 1 - 4 m5) Example Calculation: result for 69.275 MHz: $11.7 + (8.5) = 20.2 \text{ dB } \mu \text{ V/m}$

6) ① If the data table appeared symbol of "***" means the value was too low to be measured.

② If the data table appeared symbol of "#" means the noise was low, so record the peak

7) The estimated measurement uncertainty of the result measurement is

+ 4.5dB / - 4.6dB (30MHz f 300MHz)+ 4.3dB / - 4.3dB (300MHz f 1GHz)



D. Operating Conditions of the EUT: OP2 Mode (GSM idle 1800)

Test Date: May 19, 2006

Test Result	Passed
Test Specification	EN 55022:1998/A1:2000/A2:2003 (Class B)
Climatic Condition	Ambient Temperature : <u>23</u> °C Relative Humidity : <u>63</u> %RH
Power Supply System	DC Power: <u>12</u> Vdc

Emission Frequency (MHz)	Meter Reading (dBuV)		CORR'd Factor (dB/m)	Results (dBuV/m)		Limit (dBuV/m)	Margins (dB)
	HOR.	VERT.		HOR.	VERT.		
69.540	11.2	***	8.5	19.7	***	30.0	-10.3
71.230	***	13.5	8.5	***	22.0	30.0	-8.0
88.210	18.4	***	9.4	27.8	***	30.0	-2.2
152.670	11.3	***	11.7	23.0	***	30.0	-7.0
154.370	***	9.4	11.7	***	21.1	30.0	-8.9
187.210	***	7.7	13.8	***	21.5	30.0	-8.5
187.410	7.6	***	13.8	21.4	***	30.0	-8.6
277.190	5.3	***	17.1	22.4	***	37.0	-14.6
289.860	***	3.9	18.1	***	22.0	37.0	-15.0
465.215	***	11.2	23.1	***	34.3	37.0	-2.7
465.240	9.8	***	23.1	32.9	***	37.0	-4.1
766.310	***	0.9	29.6	***	30.5	37.0	-6.5

Notes: 1) Place of Measurement: Measuring site of the ETC (3F)2) Measurement Distance: 10 m3) Height of table on which the EUT was placed: 0.8 m4) Height of Receiving Antenna: 1 - 4 m5) Example Calculation: result for 69.540 MHz: $11.2 + (8.5) = 19.7 \text{ dB } \mu \text{ V/m}$

6) ① If the data table appeared symbol of "***" means the value was too low to be measured.

② If the data table appeared symbol of "#" means the noise was low, so record the peak

7) The estimated measurement uncertainty of the result measurement is

+ 4.5dB / - 4.6dB (30MHz f 300MHz)+ 4.3dB / - 4.3dB (300MHz f 1GHz)



4.2 Immunity:

4.2.1 Electrostatic Discharge:

4.2.1.1 Electrostatic Discharge Test Data:

A. Operating Conditions of the EUT: Operation Mode (OP1+OP2)

Test Date: Jun. 01, 2006

Test Result	Passed
Test Specification	EN 61000-4-2:1995/A1:1998/A2:2001
Climatic Condition	Ambient Temperature : <u>23</u> °C Relative Humidity : <u>55%</u> RH
Power Supply System	DC Power: <u>12</u> Vdc.

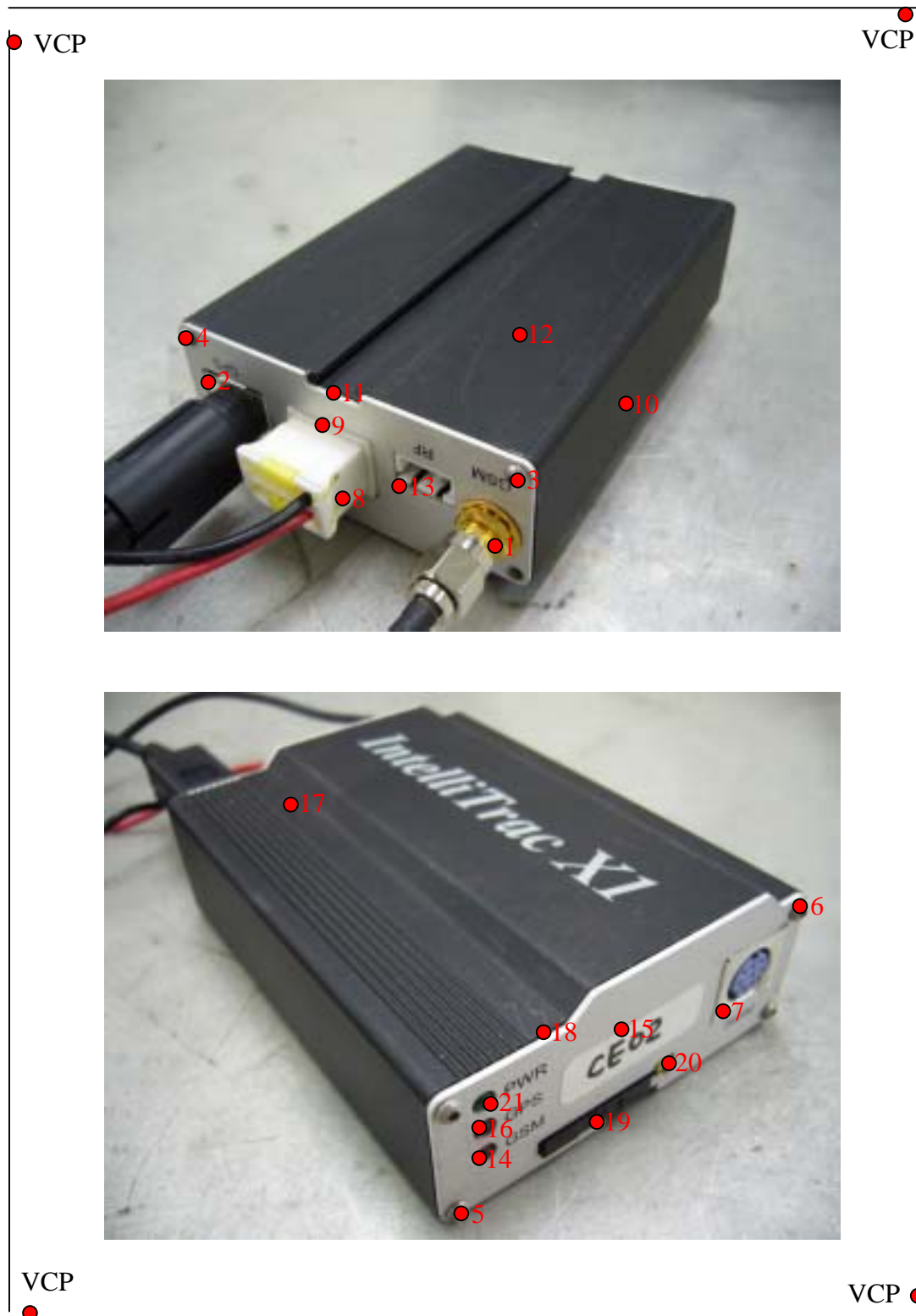
Energy-Storage Capacitor : <u>150</u> pF Discharge Resistor : <u>330</u> Ω Discharge Times : <u>10</u> times/each condition																
\ Discharge Mode	Contact Discharge								Air Discharge							
	<u>2</u> kV		<u>4</u> kV		___ kV		___ kV		<u>2</u> kV		<u>4</u> kV		<u>8</u> kV		___ kV	
\Points\Result\Polarity	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
VCP	A	A	A	A	--	--	--	--	--	--	--	--	--	--	--	--
HCP	A	A	A	A	--	--	--	--	--	--	--	--	--	--	--	--
1~7	A	A	A	A	--	--	--	--	--	--	--	--	--	--	--	--
8~15	--	--	--	--	--	--	--	--	A	A	A	A	A	A	--	--
16~21	--	--	--	--	--	--	--	--	A	A	A	A	B	B	--	--

Note: "A" means the EUT function was correct during the test.

"B" means the EUT function was not correct during the test, which was recovered by itself after test.

"--" means the test could not be carried out.

TEST POINTS





4.2.2 Radio Frequency Electromagnetic Field (80~1000MHz and 1400~2000MHz):

4.2.2.1 Radio Frequency Electromagnetic Field Test Data:

A. Operating Conditions of the EUT: Operation Mode (OP1+OP2)

Test Date: May 12, 2006

Test Result	Passed
Test Specification	EN 61000-4-3:2002/A1:2002
Climatic Condition	Ambient Temperature : <u>18</u> °C Relative Humidity : <u>65</u> %RH
Power Supply System	DC Power: <u>12</u> Vdc

Frequency Range : <u>80</u> MHz ~ <u>1000</u> MHz <u>1400</u> MHz ~ <u>2000</u> MHz	Field Strength : <u>3</u> V/m	Modulation (AM 1kHz 80%)
Sweep Rate : $\leq 1.5 \times 10^{-3}$ decades/s	Step Size : ≤ 1 % of preceding frequency value	Dwell Time : <u>3</u> s
Frequency Range (MHz)	Polarization of Device	Test Result
80~1000	Vertical	A
80~1000	Horizontal	A
1400~2000	Vertical	A
1400~2000	Horizontal	A

Note: "A" means the EUT function was correct during the test.

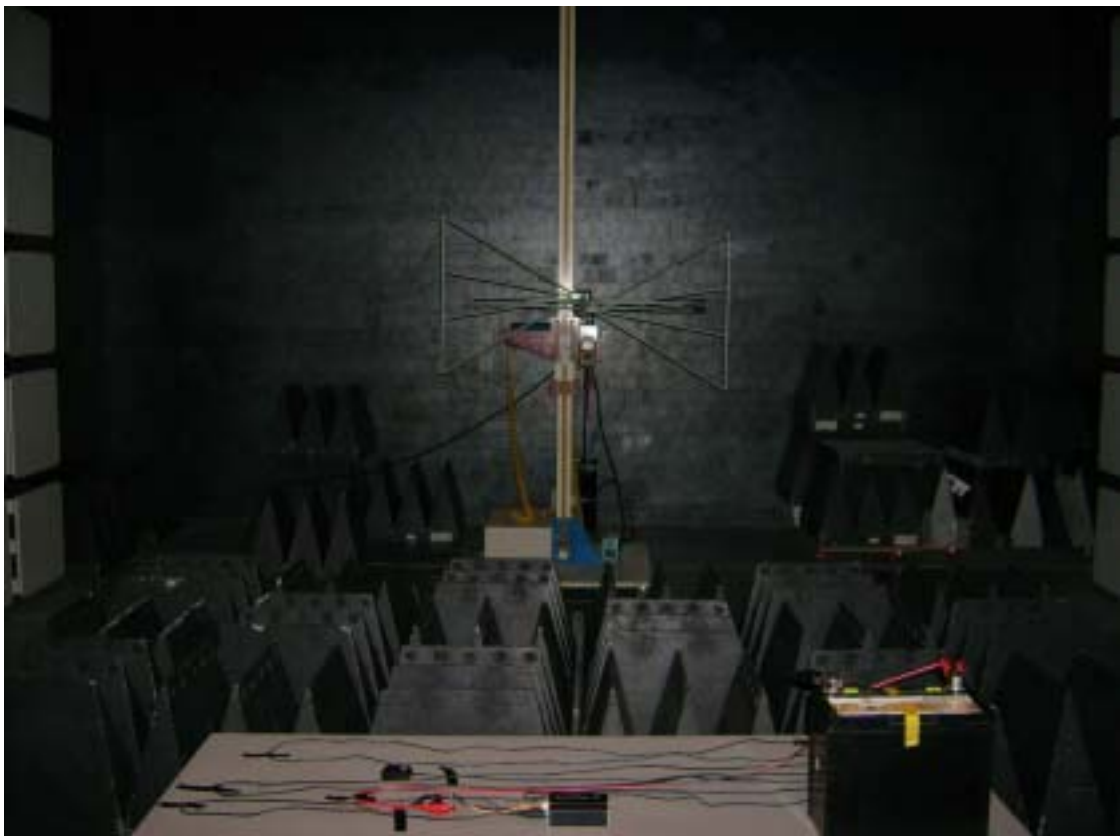
Sound pressures (uplink and downlink direction) and RXQUAL were observed with the audio monitoring system.



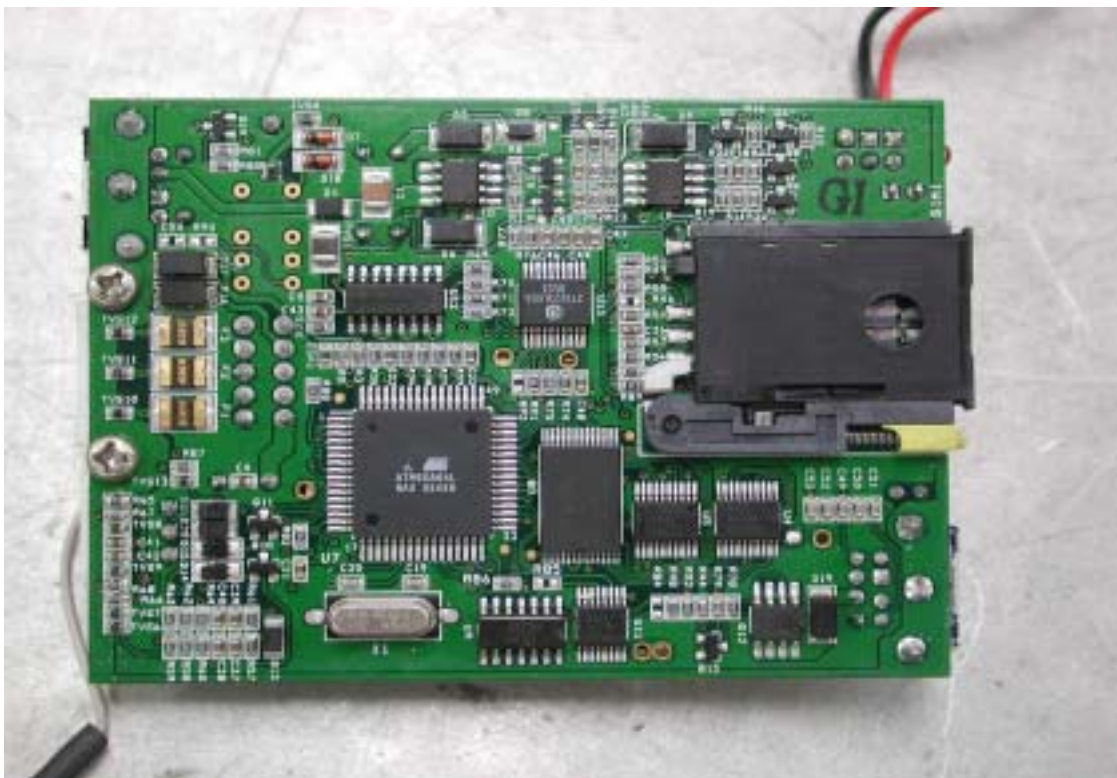
5 EQUIPMENTS LIST FOR TESTING

Item	Name	Manufacturer	Model	Calibration Date	Recommended Recal. Date
1	EMI Test Receiver	HP	8546A	Aug. 06, 2005	Dec. 12, 2006
2	Ant.-LogBicone	EMCO	3142	Mar. 08, 2005	Mar. 29, 2007
3	Electrostatic Discharge Simulator	Noiseken	ESS-2000-G365	Nov. 28, 2005	Nov. 27, 2006
4	Microphone	B&K	4134	Nov. 18, 2005	Nov. 17, 2006
5	Sound Level Calibrator	B&K	4231	Dec. 10, 2005	Dec. 09, 2006
6	Conditioning Amplifier	B&K	type 2690	Nov. 22, 2005	Nov. 21, 2006
7	Audio Analyzer	R&S	UPA	May 25, 2005	May 24, 2007
8	Universal Digital Radio Communication Tester	R&S	CMU 200	Oct. 12, 2005	Oct. 11, 2006
9	Signal Generator	Agilent	8648D	Jun. 09, 2005	Jun. 08, 2007
10	EPM Series Power Meter	Agilent	E4419B	Nov. 18, 2005	Nov. 17, 2006
11	RF Power Amplifier	AR	50S1G4AM1	May 31, 2005	May 30, 2007
12	Wide Band RF Amplifier	KALMUS	7100LC	Nov. 18, 2005	Nov. 17, 2006

ANNEX A: PHOTOS**1. Radiated Emissions Test Setup Photos**

2. Electrostatic Discharge Immunity Test Setup Photo**3. RF Radiated Fields Immunity Test Setup Photo**

4. Outside view 1 of EUT**5. Outside view 2 of EUT**

6. Inside view of EUT**7. Front view of PCB**

8. Rear view of PCB