

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

TPMS diagnostic and service tool MaxiTPMS

FCC ID: WQ83017758521

MODEL No.: TS301

BRAND NAME: Autel

REPORT NO: SCS-SZF080925001

ISSUE DATE: Oct 07, 2008

Prepared for

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Prepared by

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d.b.a.

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VERIFICATION OF COMPLIANCE

Applicant:	Shenzhen Autel Intelligent Tech. Co., Ltd. Rm. 2205, Overseas Chinese Scholars Venture Bldg. Hi-tech Industrial Park Shenzhen
Product Description:	TPMS diagnostic and service tool MaxiTPMS
Brand Name:	Autel
Model Number:	TS301
Listed Model	TS501
Serial Number:	N/A
File Number:	SCS-SZF080925001
Date of Test:	Sep 26, 2008 ~ Sep 30, 2008

We hereby certify that:

The above equipment was tested by Standard Compliance Services (ShenZhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.207, 15.209.

The test results of this report relate only to the tested sample identified in this report.

Approved By



Lisa Chen / Manager

Reviewed By



Fred Qi / Engineer

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1. GENERAL INFORMATION

1.1 Product Description

The EUT is a short range, lower power, 125KHz work frequency (*for more details, refer to the user's manual of the EUT*). It is designed by way of utilizing the FSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 125 KHz
- B). Modulation: FSK Modulation
- C). Antenna Designation: Non-User Replaceable (Integral without external RF Port)
- D). Power Supply: DC 9V Powered by battery

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: WQ83017758521 filing to comply with Section 15.207, 15.209 of the FCC Part 15, Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The fully anechoic chamber test site and conducted measurement facility used to collect the radiated data is located on the address of SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD Huatongwei Building, Keji Rd. 12 S., High-tech Park, Nanshan District, Shenzhen, Guangdong, P.R.China

The fully anechoic chamber Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements.

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

1.7. Laboratory Accreditations and listings

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: August 02, 2007. Valid time is until March 04, 2009.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 1999 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is from Aug 24, 2005 to Sept 30, 2009

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 662850, Renewal date September, 2009.

IC-Registration No.: 5377

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377 on November 28th, 2005.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

NEMKO-Aut. No.: ELA125

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10.

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: December 20, 2006. Valid time is until December 19, 2009.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: December 20, 2006. Valid time is until December 19, 2009.

IECEE CB

Shenzhen Huatongwei International Inspection Co Ltd has been assessed and determined to fully comply with the requirements of ISO/IEC 17025: 2005-05, The Basic Rules, IECEE 01: 2006-10 and Rules of Procedure IECEE 02: 2006-10, and the relevant IECEE CB-Scheme Operational Documents.

It is therefore entitled to operate as a CB Testing Laboratory under the responsibility of Nemko A/S. This certificate remains valid until May 25th 2009 at which time it will be reissued by the IECEE Executive Secretary upon successful completion of the normally scheduled 3-year Reassessment Program administered by the IECEE CB Scheme.

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on support table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

2.4 Limitation

(1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB(uV)	
	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 MHz to 0.50 MHz.

(2) Radiated Emission

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 (microvoltsmeter)	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

Additional Observations:

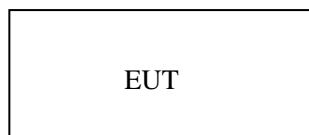
The Spectrum was searched from 9 kHz to 1 GHz.

The EUT was measured on three orthogonal axes.

All measurements were performed using a Peak Detector with 200 kHz RBW below 150 kHz, 10 kHz RBW in 0.15 – 30 MHz range and 100 kHz RBW in 30 – 1000 MHz range at a distance of 3 meters.

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



3. DESCRIPTION OF TEST MODES

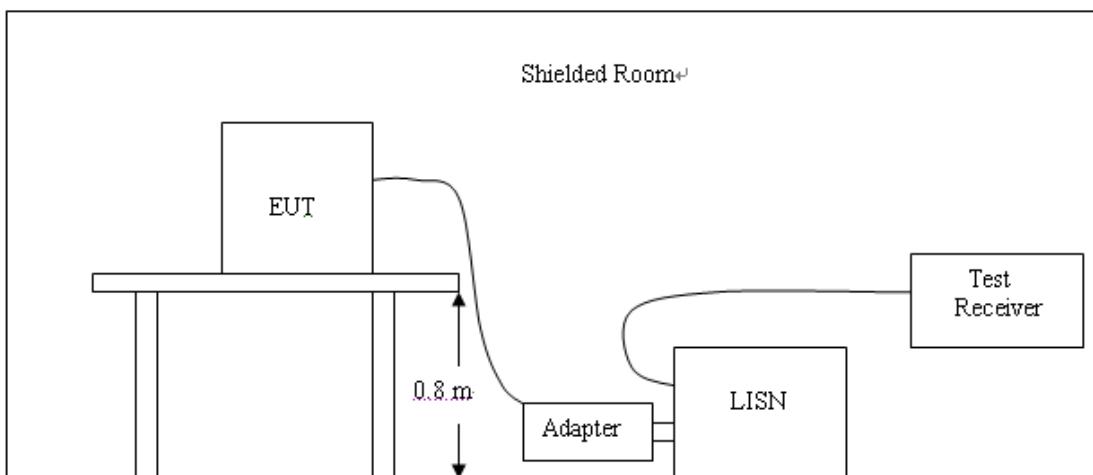
1. The EUT has been tested under normal operating condition.
2. The EUT stay in continuous transmitting mode.

4. CONDUCTED EMISSIONS TEST (NOT APPLICABLE TO THIS DEVICE)

4.1 Measurement Procedure:

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. The EUT received DC9V power from battery.
5. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
6. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
7. During the above scans, the emissions were maximized by cable manipulation.

4.2 Test SET-UP (Block Diagram of Configuration)



4.3 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCS30	100038	2008/10	2009/10
ARTIFICIAL MAINS	ROHDE & SCHWARZ	ESH2-Z5	100028	2008/10	2009/10
PULSE LIMITER	ROHDE & SCHWARZ	ESHSZ2	100044	2008/10	2009/10
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ES-K1 V1.71	N/A	2008/10	2009/10

4.4 Measurement Result:**N/A**

5. RADIATED EMISSION TEST

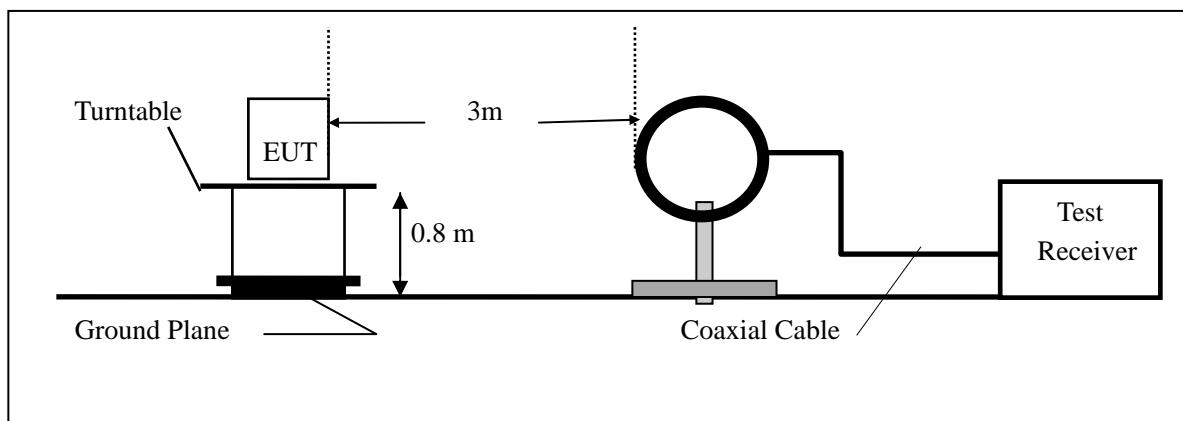
5.1 Measurement Procedure

Radiation Emission Measurement Limits According to FCC Part 15 Section 15.209.

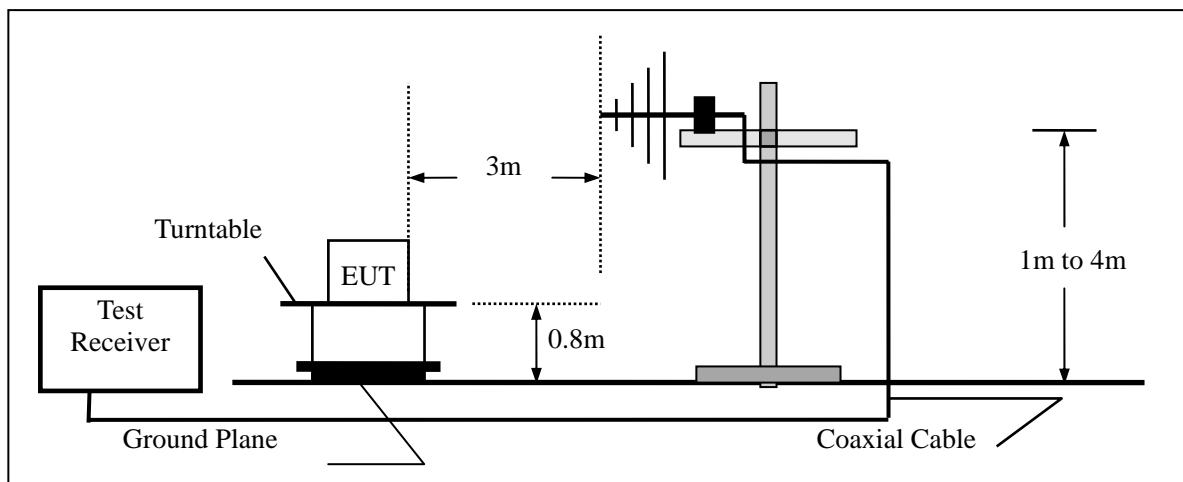
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

5.2 Test SET-UP (Block Diagram of Configuration)

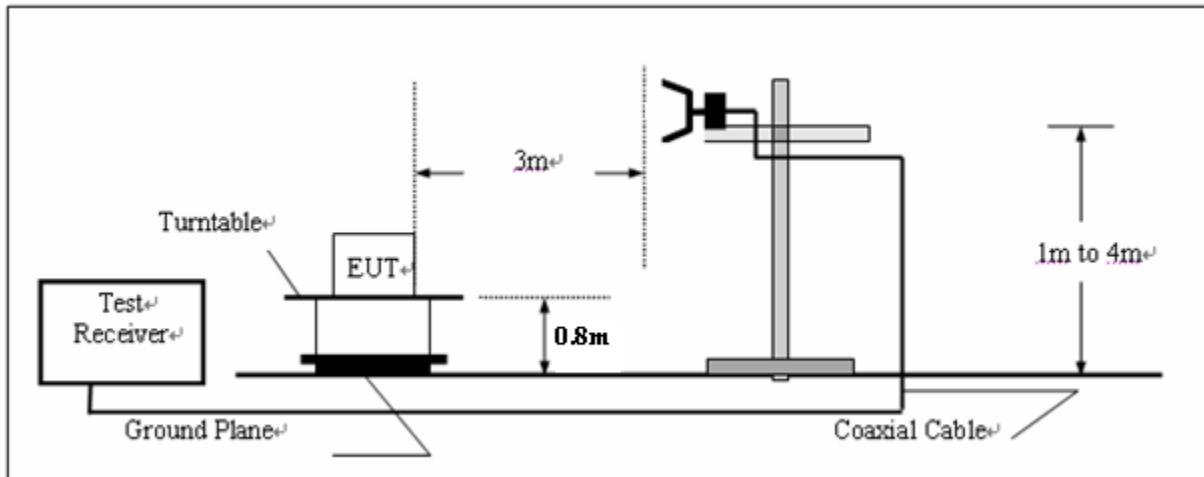
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



5.3 Measurement Equipment Used:

3/5 Anechoic Chamber Radiation Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2008/10	2009/10
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2008/10	2009/10
Double-Ridged-Waveguide Horn Antenna	ROHDE & SCHWARZ	HF906	100039	2008/10	2009/10
Loop Antenna	ROHDE & SCHWARZ	HFH2-Z2	833799/0003	2008/10	2009/10
RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	N/A	N/A
TURNTABLE	ETS	2088	2149	N/A	N/A
ANTENNA MAST	ETS	2075	2346	N/A	N/A
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ES-K1 V1.71	N/A	2008/10	2009/10

5.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude		AG = Amplifier Gain
AF = Antenna Factor		

5.5 Measurement Results

Field Strength:

Limits were extrapolated from 300m to 3m distance:

E-field:

$$\text{Limit}(@ 300\text{m}) = 2400/\text{F} = 2400/125 = 19.2 \mu\text{V/m} = 25.7 \text{ dB}\mu\text{V/m}$$

$$\text{Limit}(@ 3\text{m}) = \text{Limit}(@ 300\text{m}) + 40 * \log_{10}(300/3) = 105.7 \text{ dB}\mu\text{V/m}$$

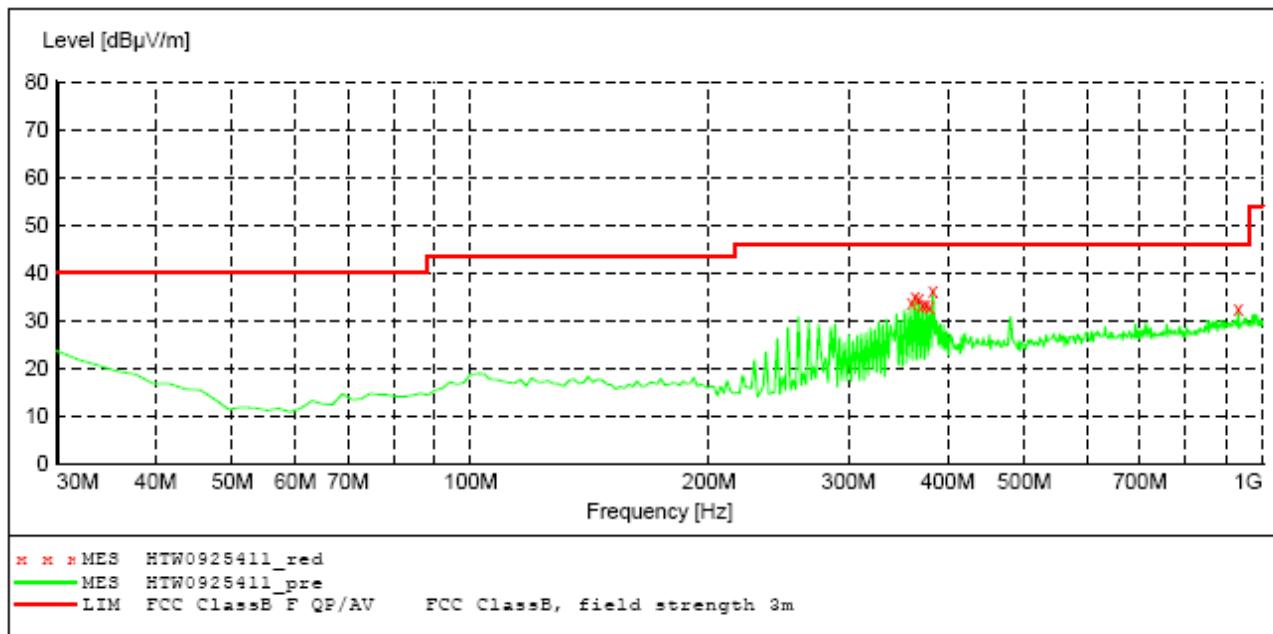
9 KHz- 30 MHz:

Freq. (MHz)	Ant.Pol. LOOP	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
0.125		Peak	86.90	10.60	97.50	105.70	-8.20	F
0.250		Peak	39.30	10.50	49.80	85.70	-35.90	H
0.375		Peak	---	10.50		85.70		H
0.500		Peak	---	10.50		85.70		H
0.625		Peak	---	10.40		85.70		H
0.750		Peak	---	10.40		85.70		H
0.875			---					H
1.000			---					H
Others			---					

Remark:

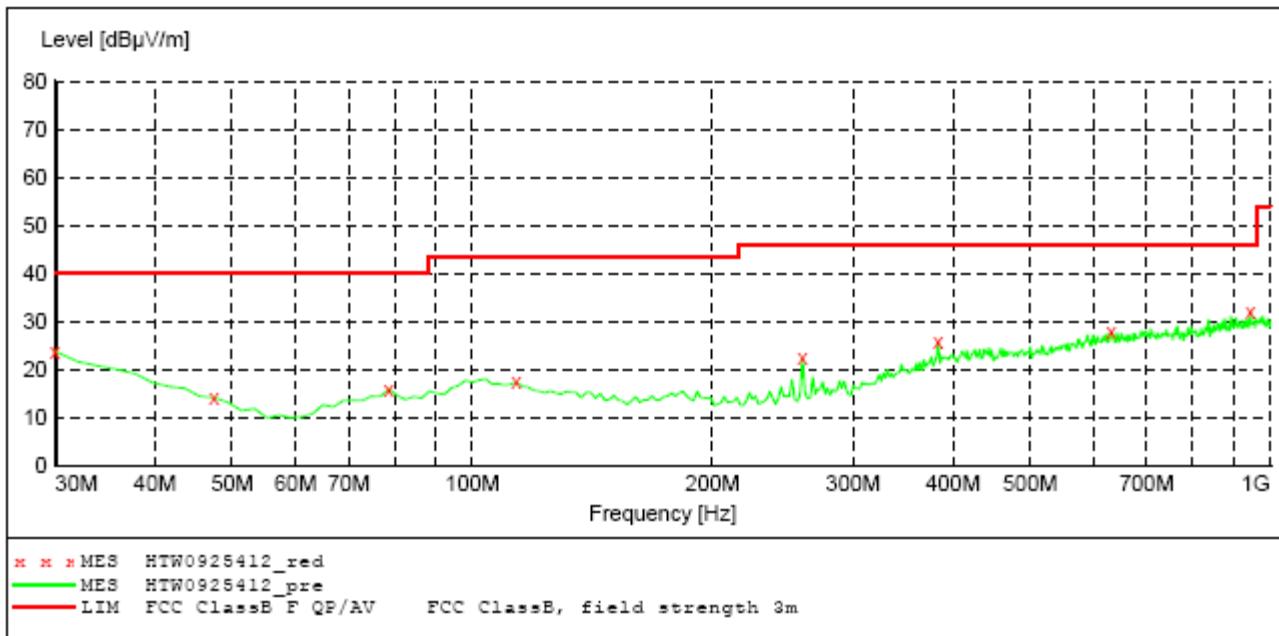
- (1) Measuring frequencies from 9KHz to the 30MHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Spurious radiated emissions of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the 15.209 limit or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz

30 MHz-1GHz:



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Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
360.460922	33.90	17.9	46.0	12.1	100.0	92.00	HORIZONTAL
364.348697	35.20	18.1	46.0	10.8	100.0	282.00	HORIZONTAL
368.236473	34.60	18.4	46.0	11.4	100.0	114.00	HORIZONTAL
372.124248	33.20	18.6	46.0	12.8	100.0	92.00	HORIZONTAL
376.012024	33.30	18.8	46.0	12.7	100.0	114.00	HORIZONTAL
379.899800	32.80	19.1	46.0	13.2	100.0	92.00	HORIZONTAL
383.787575	36.40	19.3	46.0	9.6	100.0	114.00	HORIZONTAL
931.963928	32.40	25.5	46.0	13.6	100.0	326.00	HORIZONTAL



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Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
30.000000	23.90	21.2	40.0	16.1	100.0	242.00	VERTICAL
47.494990	14.20	11.2	40.0	25.8	100.0	114.00	VERTICAL
78.597194	16.00	11.3	40.0	24.0	100.0	221.00	VERTICAL
113.587174	17.40	13.5	43.5	26.1	100.0	52.00	VERTICAL
259.378758	22.50	12.4	46.0	23.5	100.0	158.00	VERTICAL
383.787575	25.70	19.3	46.0	20.3	100.0	180.00	VERTICAL
632.605210	27.80	23.2	46.0	18.2	100.0	242.00	VERTICAL
945.571142	32.10	25.5	46.0	13.9	100.0	286.00	VERTICAL

6. 20 dB OCCUPIED BANDWIDTH

6.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Set SPA Center Frequency = fundamental frequency, RBW=300 Hz, VBW= 1 KHz.
4. Set SPA Max hold. Mark peak, -20dB.

6.2 Test SET-UP (Block Diagram of Configuration)

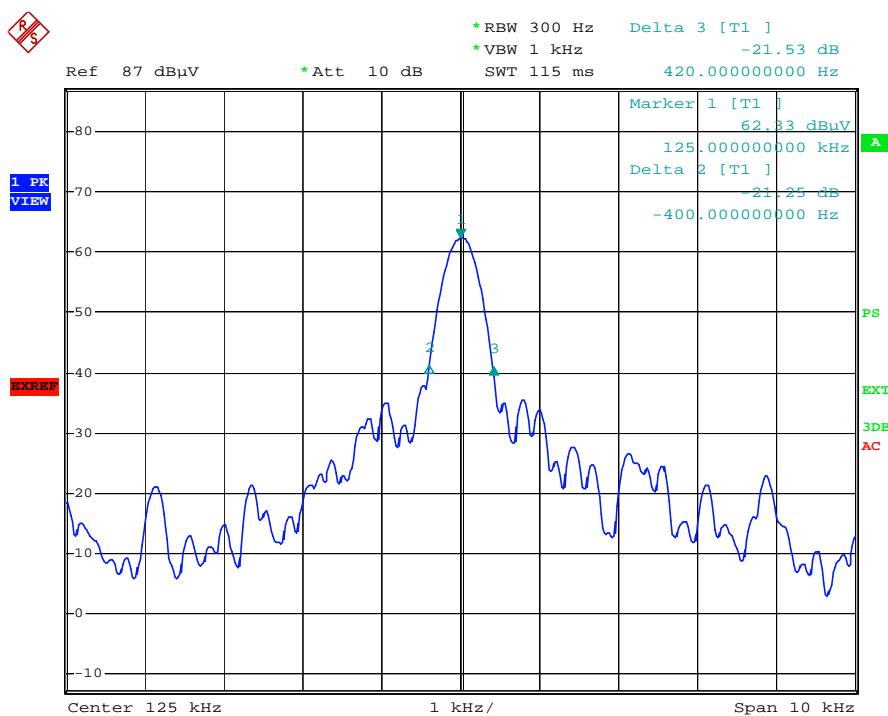
Same as 5.2 Radiated Emission Measurement.

6.3 Measurement Equipment Used:

Same as 5.2 Radiated Emission Measurement.

6.4 Measurement Results:

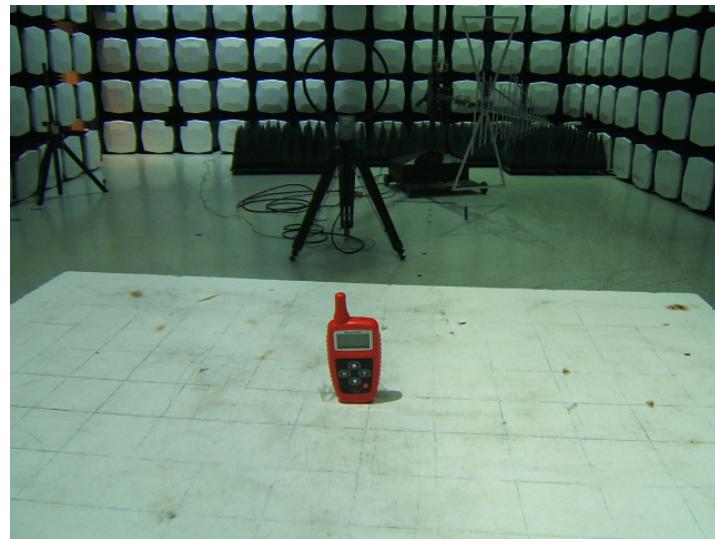
20 dB Bandwidth Test Plot:



APPENDIX 1

PHOTOGRAPHS OF SET UP

Radiated Emission Setup Photo



APPENDIX 2

PHOTOGRAPHS OF EUT

External Photos of EUT





Internal Photos of EUT

