



## HCT CO., LTD.

Product Compliance Division

TEL : +82 31 639 8518 FAX : +82 31 639 8525

### CERTIFICATE OF COMPLIANCE

#### FCC PART 15.231 Certification

Applicant Name:

Hyundai Autonet Co., Ltd.

Address:

723, Mundeok-ri, Munbaek-myeon, Jincheon-gun,  
Chungbuk, Korea

Date of Issue:

May 19, 2009

Test Site/Location:

HCT.CO., LTD., San 136-1 Ami-ri, Bubal-eup, Icheon-si,  
Kyungki-do, Korea

Test Report No.: HCT-RF09-0516

HCT FRN: 0005866421

IC Recognition No.: 5944A-1

FCC ID: PIN25896369

IC: 4018A-25896369

APPLICANT: Hyundai Autonet Co., Ltd.

Model(s): 25896369

EUT Type: TPS

Tx Frequency: 314.9MHz (Tx)

Type of Modulation: ASK

Equipment Class: DSC - Part 15 Security / Remote Control Transmitter

IC Equipment Category: RSS-210 Issue 7: Category I Equipment, annex 1

FCC Rule Part(s): Part 15 subpart C 15.231

IC Rule: RSS-210 Issue 7

IC Registration No. : 5944A

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT.CO., LTD. Certifies that no party to this application has been denied FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S.C. 862

Report prepared by

: Hyo Sun Kwak

Test engineer of RF Team

Approved by

: Sang Jun Lee

Manager of RF Team

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## 1. GENERAL INFORMATION

**Applicant:** Hyundai Autonet Co., Ltd.

**Address:** 723, Mundeok-ri, Munbaek-myeon, Jincheon-gun, Chungbuk, Korea

**FCC ID:** PIN25896369

**IC CODE:** 4018A-25896369

**EUT:** TPS

**Model:** 25896369

**Date of Test:** May 14, 2009 ~ May 19, 2009

**Contact person:**  
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**Place of Tests:**  
HCT Co., Ltd.  
Icheon, Kyounki-Do, Korea (IC Recognition No. : IC 5944A-1)

## 2. EUT DESCRIPTION

<b>Type</b>	TPS
<b>Model Name</b>	25896369
<b>Power Source</b>	DC 3 V (Lithium Battery)
<b>Tx Frequency</b>	314.9 MHz (Tx)
<b>Type of Modulation</b>	ASK
<b>Antenna</b>	Valve Antenna
<b>EUT Description</b>	1. Stationary : The TPS shall provide a Stationary State where sampling occurs every 30 seconds. 2. Rolling : The TPS shall exit Stationary State when it detects a rotational g-force that exceeds 17 G (roughly 40 kph on an 18" wheel.) In this state pressure sampling occurs every 30 seconds and pressure transmission occurs with every 2nd pressure sample.

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### 3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled "Filing and Measurement Guidelines for Transmitter for TPS System" were used in the measurement of the **Hyundai Autonet Co., Ltd. TPS FCC ID: PIN25896369**

#### 3.1 EUT CONFIGURATION

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

#### 3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.205, 15.207, 15.209 and 15.231 under the FCC Rules Part 15 Subpart C.

#### 3.3 GENERAL TEST PROCEDURES

##### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version :2003) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m 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. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version: 2003)

#### 3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

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## 4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, Maekok-Ri, Hobup-Myun, Ichon-Si, Kyoungki-Do, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 6, 2006(Registration Number: 90661)

### 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

## 6. ANTENNA REQUIREMENTS

### According to FCC 47 CFR §15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

\* The antennas of this E.U.T are permanently attached.

\*The E.U.T Complies with the requirement of §15.203

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## 7. LIMITS AND TEST RESULT

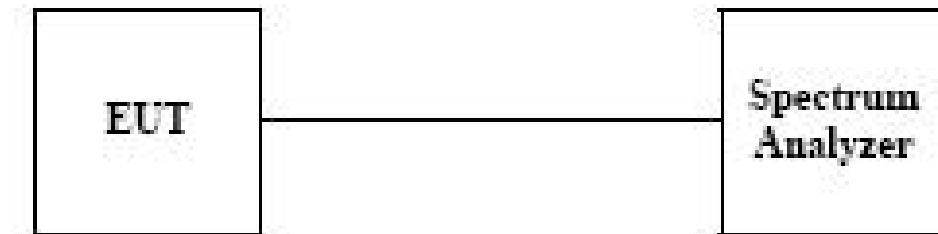
### Summary of Test Results

Report Section	FCC Part Section(s)	RSS-210 Section	Test Description	Test Result
<b>TRANSMITTER MODE (TX)</b>				
7.2	15.231(a)	A1.1.5(2)	Transmission Time / Silent period between transmission	PASS
7.3	15.231(b)	A.1.1.2(1)	Field Strength of Fundamental	PASS
7.3	15.231(b)	A1.1.1.2(1)	Field Strength of harmonics and spurious	PASS
7.1	15.231(c)	A1.1.3	20 dB bandwidth	PASS

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## 7.1 20dB BANDWIDTH

### Test Set-up



### LIMIT

§15.231 (c) & IC RSS-210 Issue 6 A1.1.3

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

### TEST PROCEDURE

1. The transmitter output is connected to the spectrum analyzer.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=10 kHz, VBW=10 kHz and Span=100 KHz.
3. The bandwidth of fundamental frequency was measured and recorded.

### RESULTS

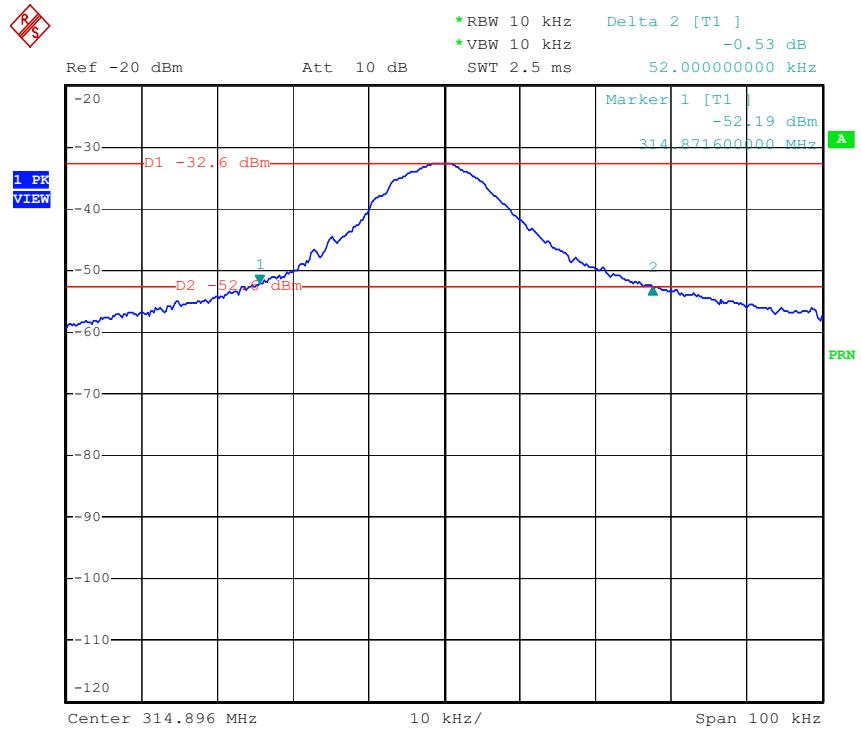
NO non-compliance noted.

Carrier Frequency (MHz)	Bandwidth of the emission(KHz)	Limit (KHz)	Remark
314.9	52.0	787.5	The point 20Bd down from the modulated carrier
Carrier Frequency (MHz)	Occupied Bandwidth (KHz)	Limit (KHz)	Remark
314.9	70.6	-	99 % Occupied bandwidth

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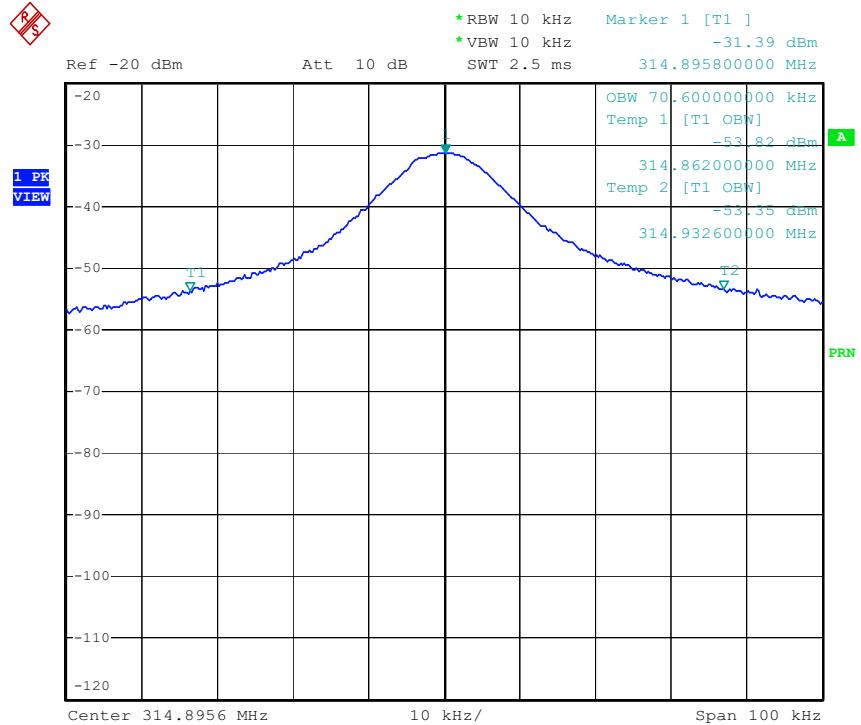
## RESULT PLOTS

### 20dB BANDWIDTH



Date: 14.MAY.2009 11:15:49

### 99 % Bandwidth

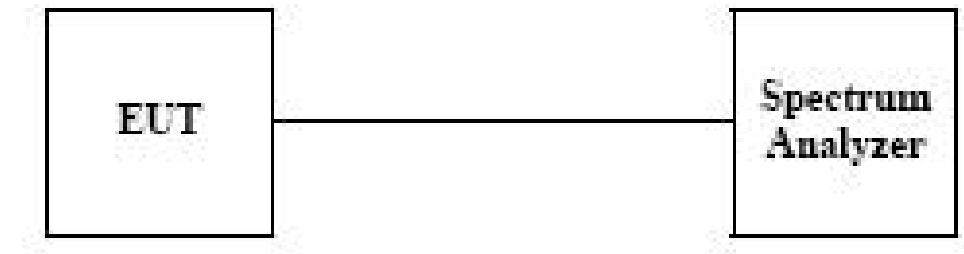


Date: 14.MAY.2009 11:21:42

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## 7.2 TRANSMISSION TIME / SILENT PERIOD BETWEEN TRANSMISSION

### Test Set-up



### LIMIT

#### §15.231 & IC RSS-Gen Issue A1.1.5

Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### TEST PROCEDURE

1. The transmitter output is connected to the spectrum analyzer.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=1 00KHz, VBW=100 KHz, Span=0 Hz, Sweep Time=100 msec
3. The bandwidth of fundamental frequency was measured and recorded.

### TEST RESULTS

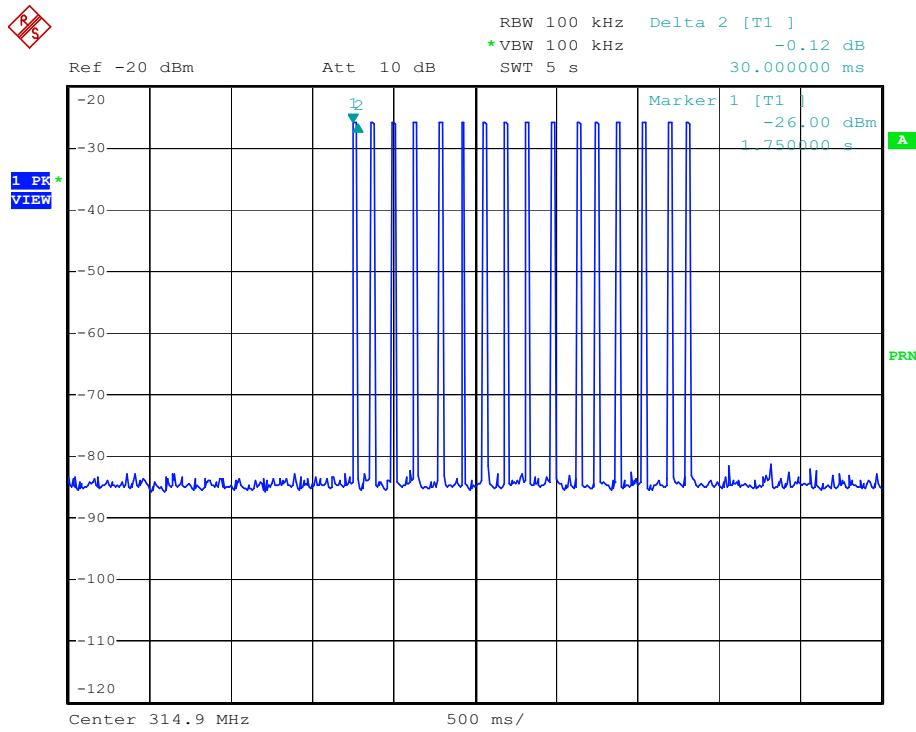
$$30*16 = 480 \text{ (ms)}$$

Carrier Frequency (MHz)	Transmission Time (sec)	Limit (sec)	Result
314.9	0.48	1	Pass
Carrier Frequency (MHz)	Silent period between transmission (sec)	Limit (sec)	Result
314.9	60	10	Pass

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## □ RESULT PLOTS

### (Transmission Time)



Date: 19.MAY.2009 12:47:03

### (Silent period between transmission)

- ※ The EUT transmits once a 60 sec when it defects a rotational g-force that exceeds 17 G (roughly 40 kph on an 18" wheel.) So, it is impossible to test the silent period between transmission. (Refer to operational description.)

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## 7.3 RADIATED EMISSIONS

### 7.3.1 TRANSMITTER RADIATED SPURIOUS EMISSIONS

#### LIMITS

According to 15.231(a), Periodic operation in the band 40.66-40.70 MHz and above 70 MHz, except as shown in paragraph 15.231(e), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Frequency Band (MHz)	Field strength of Fundamental (uV/m)	Field strength of Spurious (uV/m)
40.66-40.70	2250	225
70-130	1250	125
130-174	*1,250 to 3,750	*125 to 375
174-260	3750	375
260-470	*3,750 to 12,500	*375 to 1250
Above 470	12500	1250

\* Linear interpolations.

According to 15.231(e), Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) and may be employed for any type of operation, including operation prohibited in paragraph (a), provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this Section, except the field strength table in paragraph (b) is replaced by the following:

Frequency Band (MHz)	Field strength of Fundamental (uV/m)	Field strength of Spurious (uV/m)
40.66-40.70	1,000	100
70-130	500	50
130-174	*500 to 1,500	*50 to 150
174-260	1,500	150
260-470	*1,500 to 5,000	*150 to 500
Above 470	5,000	500

\* Linear interpolations

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§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 ;

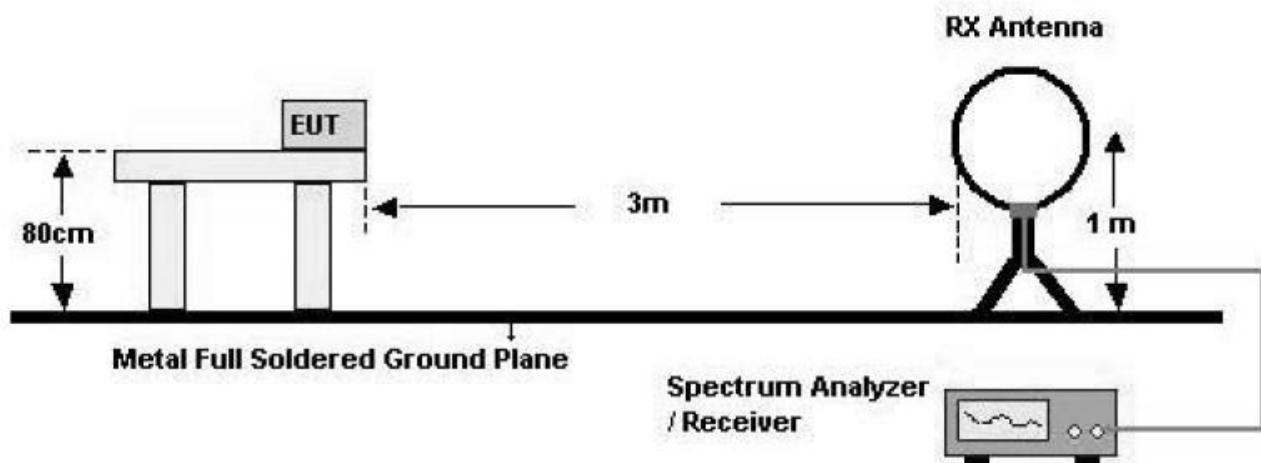
Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

**\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Sections 15.231 and 15.241**

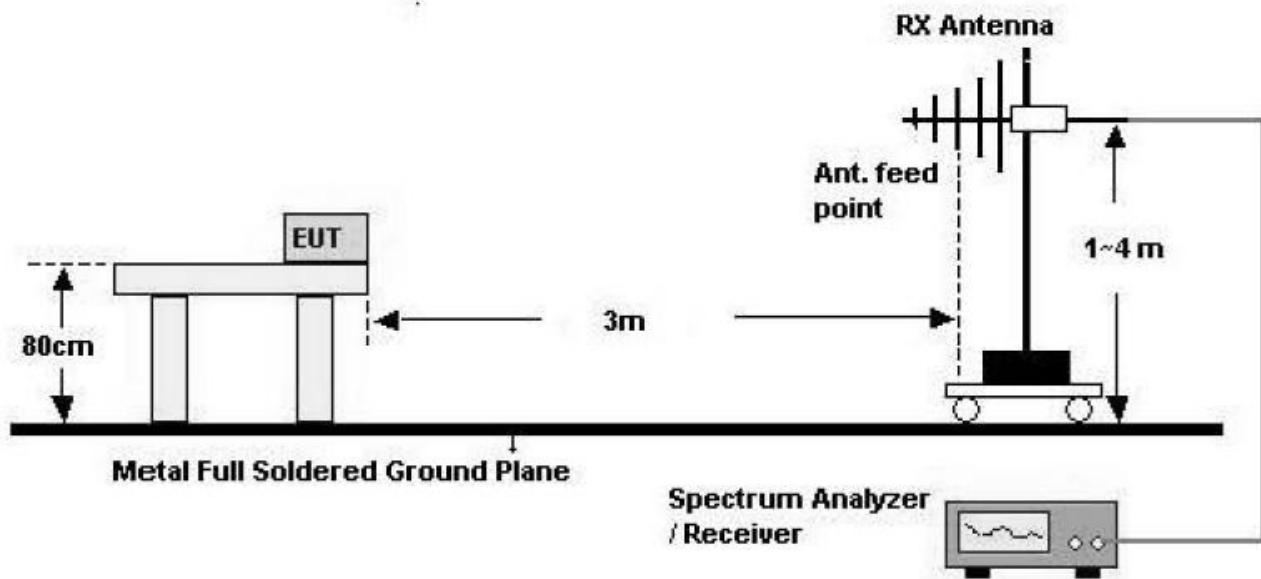
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## Test Configuration

### Below 30 MHz

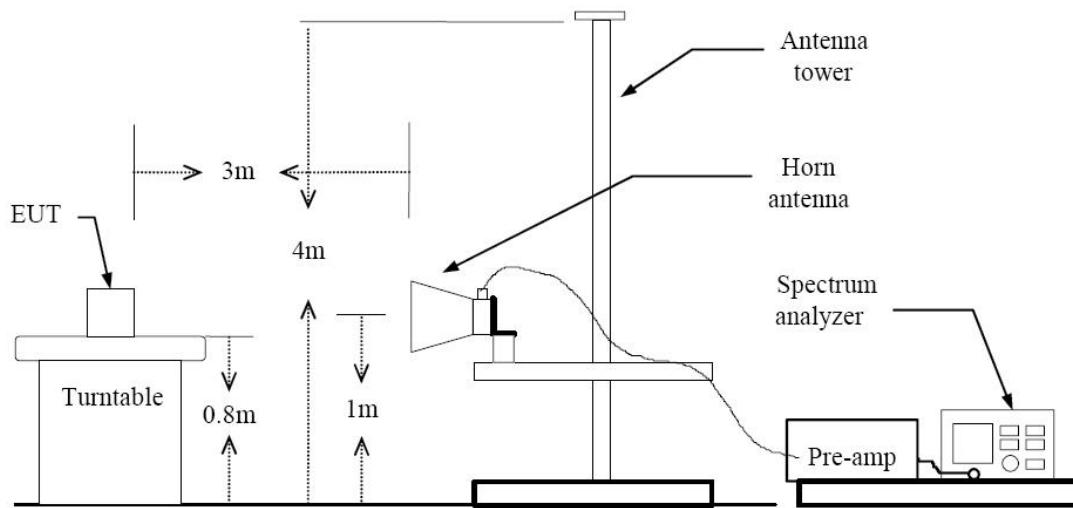


### 30 MHz - 1 GHz



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## Above 1 GHz



## TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

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### 7.3.2 TEST RESULTS: PASS

**Table 1: Measured values of the Field strength**

Frequency [MHz]	Reading dBuV	Ant. Factor dB/m	Cable Loss dB	Pol [H/V]	Height [m]	Azimuth [degrees]	Field Strength [dBuV/m]	Limit dBuV/m	Margin [dB]
<b>AVERAGE data (Vertical)</b>									
314.9	36.68	13.2	4.3	V	119.1	186.1	54.18	67.66	13.48
629.8	17.91	19.5	5.9	V	123.4	335.6	43.31	54.00	10.69
944.7	17.68	23.5	7.6	V	152.8	107.8	48.78	54.00	5.22
<b>AVERAGE data (Horizontal)</b>									
314.9	49.02	13.2	4.3	H	118.8	85.6	66.52	67.66	1.14
629.8	19.14	19.5	5.9	H	147.8	259.0	44.54	54.00	9.46
944.7	17.67	23.5	7.6	H	105.6	217.4	48.77	54.00	5.23

*Note :*

1. The antenna is manipulated through typical positions, polarity and length during the testing.
2. The frequency range was scanned from 25 MHz to 4 GHz with an instrument using AVERAGE detector mode and the worst-case emissions are reported.
3. There is detected level above reference noise floor spectrum analyzer. Except above frequency.

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### 7.3.3 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dBuV is obtained. The Antenna Factor of 7.4 dB/m and a Cable Factor of 1.1 dB is added. The 30 dBuV/m value is mathematically converted to its corresponding level in uV/m.

$$FS = 38.06 + 13.2 + 4.3 = 30 \text{ dBuV/m}$$

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Manufacturer	Model / Equipment	Cal Interval	Calibration Due	Serial No.
Rohde & Schwarz	ESH2-Z5/ LISN	Annual	04/10/2010	861741/013
Rohde & Schwarz	ESH3-Z6/ LISN	Annual	06/13/2009	100329
Rohde & Schwarz	ESCI / EMI TEST RECEIVER	Annual	05/07/2010	100033
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/18/2010	9160-3150
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	ESH3-Z2/ PULSE LIMITER	Annual	10/30/2009	375.8810.352
MITEQ	AMF-60-0010 1800-35-20P/AMP	Annual	05/20/2010	1200937
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	03/26/2010	147
Rohde & Schwarz	6502/Loop Antenna	Biennial	12/26/2009	9009-2536
Rohde & Schwarz	FSP30/Spectrum Analyzer	Annual	07/31/2009	839117/011
Agilent	E4416A /Power Meter	Annual	01/21/2010	GB41291412
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	Annual	06/28/2009	1
Hewlett Packard	11636B/Power Divider	Annual	12/24/2009	11377
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	01/07/2010	3110117

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