



TEST REPORT

Report No. : JP 2009-0409

Page : 10

Date of test : Nov.16,2009 ~ Nov.19,2009

Date of receipt : Nov.06,2009

Address : 209, Suntech City2, 307-2 Sangdaewon-dong, Jungwon-gu, seongnam-si, Korea

Manufacturer(Client) : Ground Co., Ltd

Representative : Woo Jea Wook

Product(rating/model) : Digital Grouning Device(eca 3G) (Model : LM-34-38-90M)

Purpose of use : Quality verification

Test method : IEC 61000-6-1, IEC 61000-6-3

Test Result

Attached

- ※ As a test result of sample which was submitted from the client, this test report does not guarantee the whole product quality.
- ※ This test report should not be used for public relations, advertisement, conduct propaganda and raised for a suit without a written agreement of testing institute, and should not be used for various purpose besides subscribed use, and is valid for 90 days from date of issue.
- ※ The copy of this test report is invalid for use.
- ※ This test report including test result conducted by using the test method which was suggested from a client.

Date Nov.19,2009



KOREA ELECTRIC TESTING INSTITUTE

692-8 Keumjung-dong, Kunpo-city,
Kyungki-do, 435-050, KOREA

TEL : (031) 428-7545

FAX : (031) 455-7657



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1. General Information

1.1 Client Information

Applicant Name : Ground Co., Ltd
Address of Applicant : 209, Suntech City 2, 307-2 Sangdaewon-dong, Jungwon-gu, seongnam-si, kyeonggi-do, Korea

1.2. Equipment Under Test (E.U.T)

Name of E.U.T. : Digital Grounding Device(eca 3G)
Model Name : LM-34-38-90M

1.3. Description of E.U.T

Power Supply : 3N~, 380 V, 60 Hz
Tested Voltage : 3N~, 380 V, 60 Hz

1.4. Purpose of Test

To determine whether the equipment under test fulfils the EMC requirements of the standards.

1.5. Applicable Standards for Testing

Standards	Description
IEC 61000-6-3	Generic standards- Emission standard for residential, commercial and light-industrial environments
IEC 61000-6-1	Generic standards- Immunity for residential, commercial and light-industrial environments

1.6. Additions, deviations or exclusions from standards

No additions, deviations or exclusions have been made from standard.

1.7. Mode of operation during the test

The EUT was tested under normal operation.

1.8. Summary of Test Results

Standard	Test Item	Result
IEC 61000-6-3	Conducted Disturbance at mains terminals	Pass
	Radiated Disturbance	Pass
EN 61000-6-1	Electromagnetic Immunity	Pass



1.9. Performance Criteria for Immunity tests

The performance criteria are based on the general criteria of the standard and specified by The manufacturer.

Criterion A : The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level.

Specified by the manufacturer when the equipment is used as intended.

Criterion B : After the test, the equipment shall continue to operate as intended without Operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, when the equipment is used as intended. During the test, degradation of performance is allowed, however, no change of operating state or stored data is allowed to persist after the test.

Criterion C : Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

2. Electromagnetic Interference

2.1. Mains Terminal Disturbance Voltage

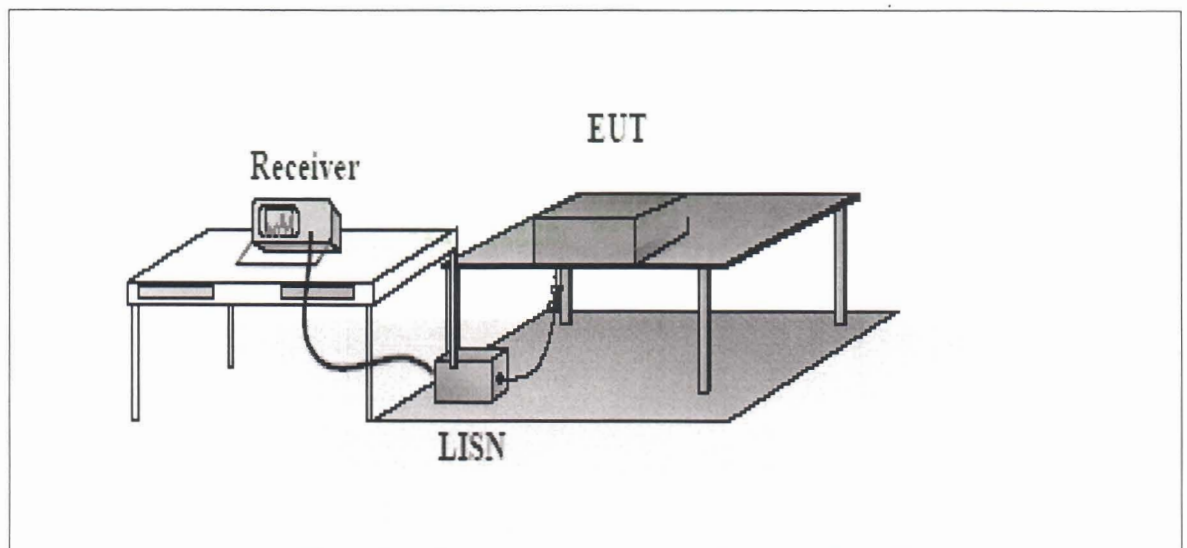
In the Frequency Range 0.15 MHz to 30MHz

2.1.1. Operating Environment

Temperature : 23 °C

Relative Humidity : 43 %

2.1.2. Test set-up



The continuous disturbance voltage on the AC mains in the frequency range from 0.15MHz to 30MHz was measured in accordance with IEC 61000-6-3.

The mains terminal disturbance voltage was measured with the equipment under test(EUT) in the shielded room.



The EUT was connected to a line impedance stabilizing network(LISN) placed on the floor and it was located so that the distance between the boundary of the EUT and closet surface of the LISN is 0.8m. The EUT was placed on a non-metallic table 0.8m above the metallic grounded floor and 0.4m from the reference ground plane (RGP) wall. The distance to other metallic surfaces was at least 0.8m. The used LISN has a rated impedance of 50Ω /50uH as specified in CISPR 16-1-2. Amplitude measurements were performed with a quasi-peak detector and, if required, with an average detector.

2.1.3. Measurement uncertainty

Mains terminal disturbance voltage, quasi-peak detection : +/- 2.0 dB

Mains terminal disturbance voltage, average detection : +/- 2.0 dB

The measurement uncertainty describe the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

2.1.4. Test Instruments

Description / Manufacturer	Model No.	Serial No.	Next Cal. Date
Measurement Receiver / R & S	ESCS30	100037	Aug. 21. 2010
Measurement Receiver / R & S	ESHS30	828144/006	Mar. 13, 2010
Artificial Mains Network / R & S	ESH2- Z5	100046	May. 26, 2010
Test Site	Shield Room	N/A	N/A

2.1.5. Test Result

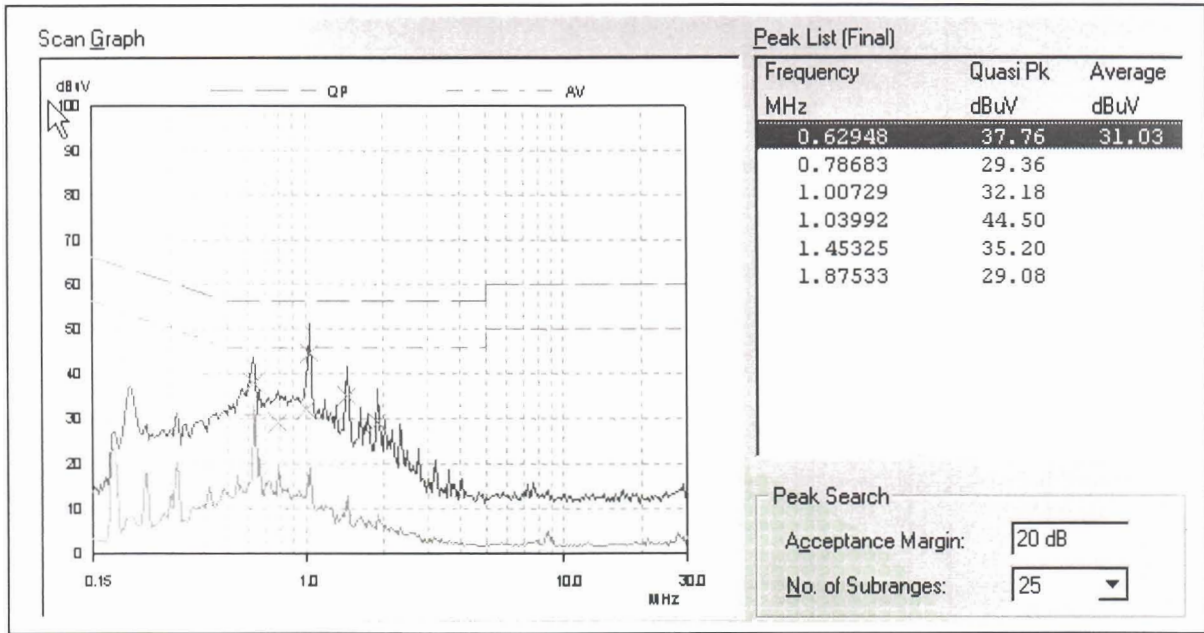
PASS

FAIL

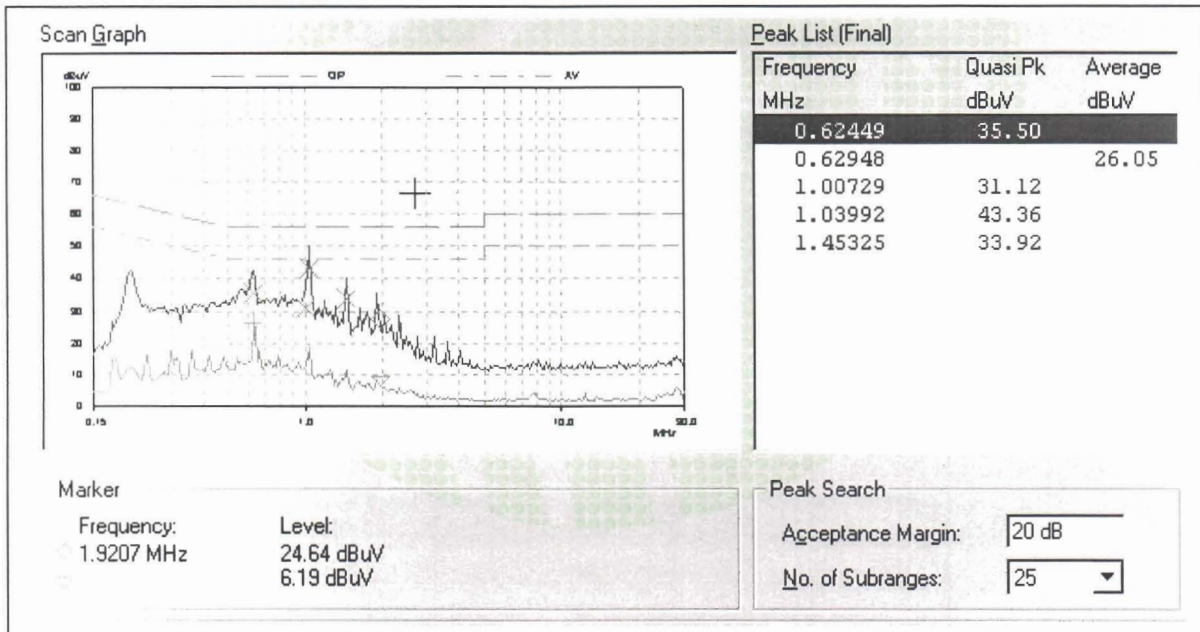
* Refer to the attached graphs and data of test result.



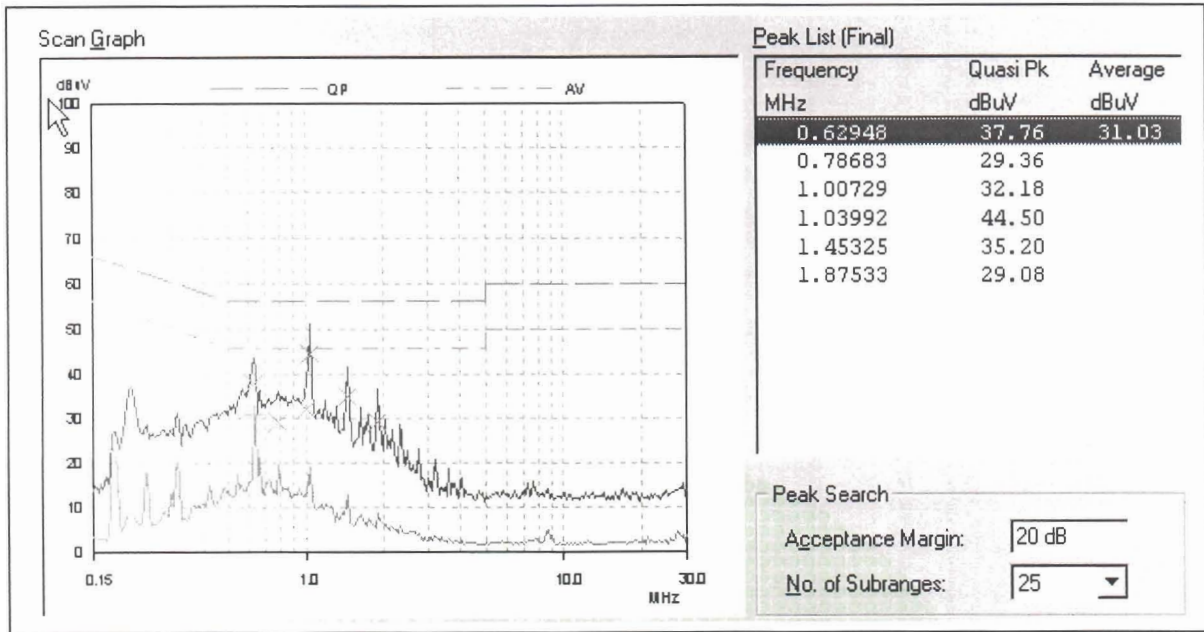
* Test Mode : 3N~, 380 V, 60 Hz(R-Line)



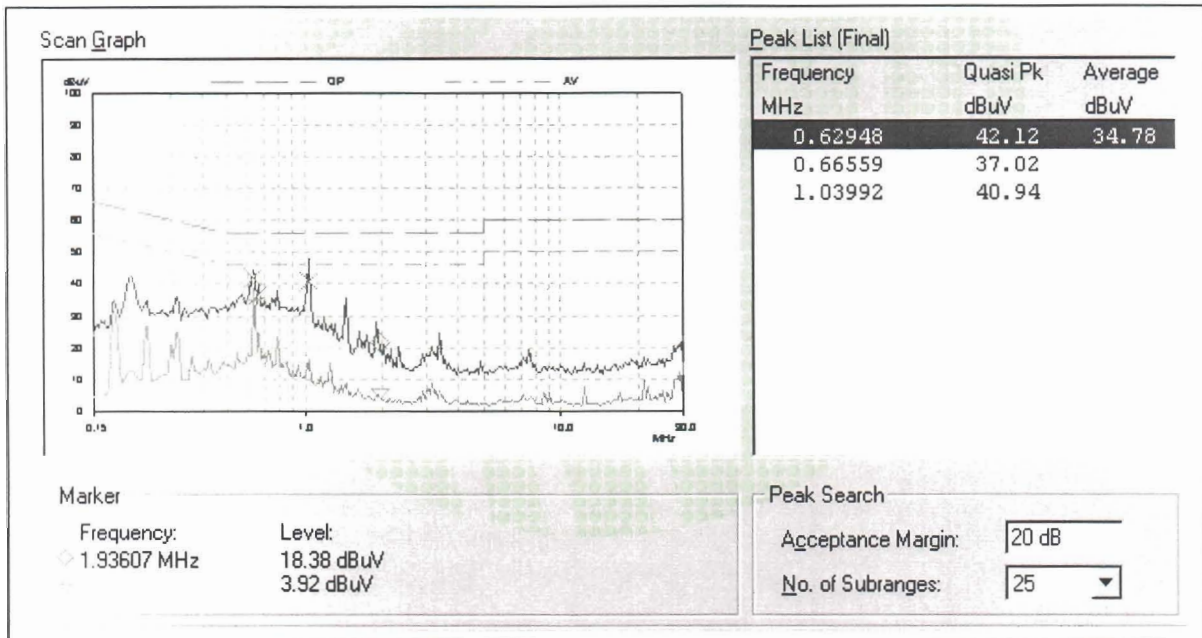
* Test Mode : 3N~, 380 V, 60 Hz(S-Line)



* Test Mode : 3N~, 380 V, 60 Hz(T-Line)



* Test Mode : 3N~, 380 V, 60 Hz(N-Line)



2.2. Radiated Disturbance

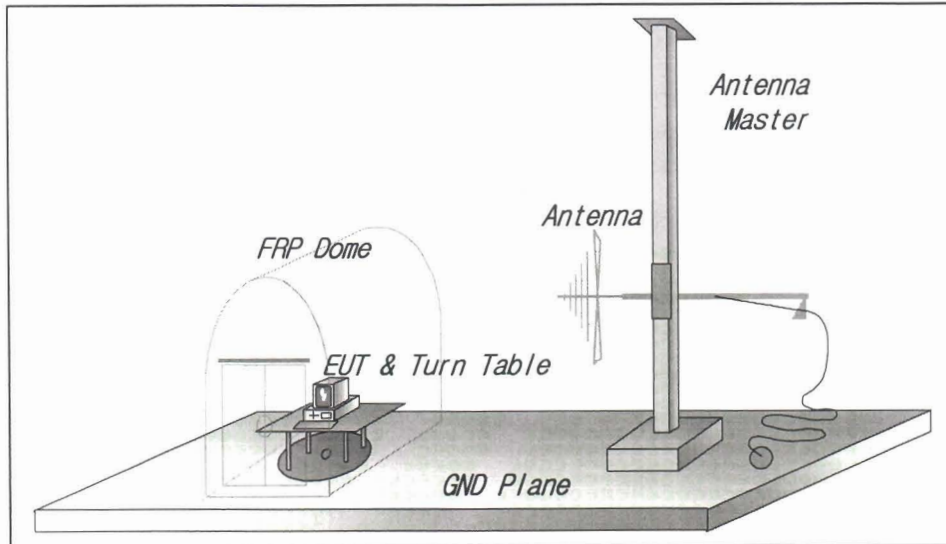
In the Frequency Range 30MHz to 1,000MHz

2.2.1. Operating environment

Temperature : 24 °C

Relative Humidity:51 %

2.2.2. Test Set-up



In the frequency range 30MHz to 1000MHz the radiated emission was measured in accordance with IEC 61000-6-3.

The test was made on an open area test site, which allows to a 10m distance measurement and the EUT was positioned in order to obtain maximum disturbance. The overview sweep was performed with the measurement receiver in max-hold and the height of the measuring antenna was varied between 1 to 4m in both horizontal and vertical polarization. The table was rotated a full revolution in order to obtain maximum values of the electric field intensity and the maximum value is presented in the report. Measurement were performed with a quasi-peak detector.

2.2.3. Measurement uncertainty

Radiated disturbance electric field intensity, 30 ~ 300MHz : ± 3.0 dB

Radiated disturbance electric field intensity, 300 ~ 1000MHz : ± 3.0 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operating of the EUT in the above mentioned way.

2.2.4. Test Instrument

Description / Manufacturer	Model No.	Serial No.	Next Cal. Date
Measurement Receiver / R & S	ESCS30	100037	Aug. 21. 2010
Measurement Receiver / R & S	ESCI	100343	Mar.13, 2010
Bi-conical Antenna / R & S	VHA9103	-	Jun. 13, 2010
Log Periodic Antenna / R & S	SB9107	91071328	Apr. 19, 2010
Antenna Mast / EMCO	11968A	9010A01532	N/A
Turn Table / EMCO	11968D	911A1495	N/A
Test Site	N/A	N/A	N/A



2.2.5. Test Result

PASS

FAIL

Measuring Frequency (MHz)	Disturbance Level (dB μ V/m)		Limits (dB μ V/m)	Margin (dB)	
	HOR	VER		HOR	VER
44.04		14.60	30.0		15.40
100.88	13.30		30.0	16.70	
619.20		24.20	37.0		12.80
685.00		25.30	37.0		11.70
725.05	27.60		37.0	9.40	
863.93	30.20		37.0	6.80	

Note - H : Horizontal, V : Vertical

3. Electromagnetic Immunity

3.1 Radio-frequency electromagnetic fields immunity test

3.1.1 Test Instrument

Type	Maker	Model	Next Cal. Date	Application
Signal generator	R & S	SMR 27	Feb. 17, 2010	<input checked="" type="checkbox"/>
RF power meter	R & S	NRVD	Feb. 16, 2010	<input checked="" type="checkbox"/>
Function generator	H.P	33120A	Feb. 16, 2010	<input checked="" type="checkbox"/>
System interface	EMC Auto.	SI300	-	<input checked="" type="checkbox"/>
System interface	EMC Auto.	SI300	-	<input checked="" type="checkbox"/>
Color video camera	EMC Auto.	VC-04	-	<input checked="" type="checkbox"/>
Switch controller	EMC Auto.	RSM-1	-	<input checked="" type="checkbox"/>
Amplifier 10 kHz – 250 MHz	AR	75A/250M1	Feb. 16, 2010	<input type="checkbox"/>
Amplifier 80 ~ 1000 MHz	AR	250w 1000am3	Feb. 16, 2010	<input checked="" type="checkbox"/>
Power Amplifier (80~3000MHz)	AR	60w,60S1GM3	Feb. 17, 2010	<input checked="" type="checkbox"/>
Antenna 26 ~ 3000 MHz	EMC Auto.	HLP-2603	-	<input checked="" type="checkbox"/>
Computer	Compaq	Pentium II	-	<input checked="" type="checkbox"/>
Anechoic chamber (3M : 3x4x7m)	EM eng.	-	-	<input checked="" type="checkbox"/>

3.1.2 Test Environment

Limit	Measured Value
Ambient Temperature	24 °C
Relative Humidity	51 %
Atmospheric Pressure	101 kPa



3.1.3 Test Set-up

The immunity against radio frequency electromagnetic fields in the frequency range from 80MHz to 2700MHz has been tested in accordance with IEC 61000-6-1.

The test setup was made according to IEC 61000-4-3 in an anechoic chamber.

The EUT was placed on a insulating support about 0.1m thick above the reference ground plane covered with grid ferrite tiles and was operated according to its specified operating mode. The field strength was monitored by 3 isotropic sensors during the complete test. The isotropic sensors were located beside the equipment. The antenna has been oriented for both horizontal and vertical polarization. The distance between antenna and the equipment under facing each of the four sides of the EUT

3.1.4 Test Condition

Field Strength : 3 V/m(80MHz to 1000MHz, 1.4 GHz to 2.0 GHz)

1 V/m(2.0 GHz to 2.7 GHz)

Antenna Distance : 3m

Modulation : AM, 80%, 1kHz, sine wave

Sweep Capability : $\leq 1.5 \times 10^{-3}$ decades/s

Step Size : 1% of fundamental

Dwell time at each frequency : 1s

Polarization of antenna : Horizontal / Vertical

EUT Position : 4side(Front, Right, Left, Back)

EUT Position : Table-top Floor-standing

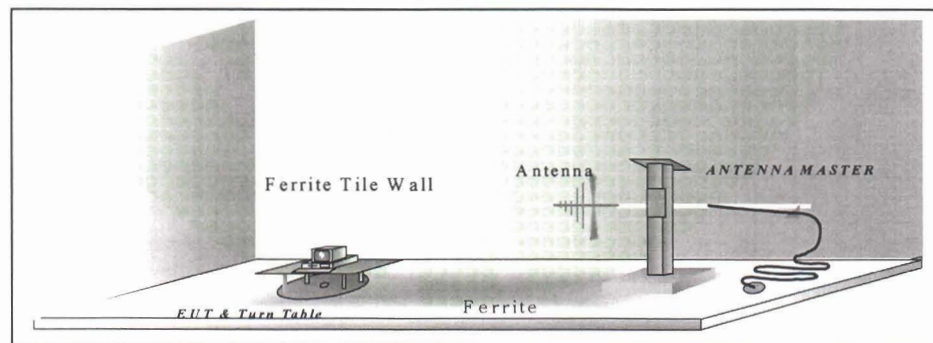
3.1.5 Generation of the electromagnetic field

The electromagnetic field is generated from a computer controlled signal generator.

The output power is amplified and then radiated from broad band bi-log antenna.

For each sweep a pre-recorded empty chamber calibration file is used to establish the required field strength. When using these files the field strength inside an area of 1.5mx1.5m is in accordance with the standard.

3.1.6 Test Set-up Arrangement



3.1.7 Test Result

PASS

FAIL

Application Position	Criterion		Remark
	Horizontal	Vertical	
Front Side	Pass	Pass	
Right Side	Pass	Pass	
Left Side	Pass	Pass	
Back Side	Pass	Pass	

End of Test Report

