

**EMC TEST REPORT****No. 130700024SHA-001**

Applicant : ELMARK INDUSTRIES SC  
2 Dobrudzha blvd., Dobrich, Bulgaria

Manufacturer : ELMARK INDUSTRIES SC  
2 Dobrudzha blvd., Dobrich, Bulgaria

Equipment : RCCB's

Type/Model : JEL1

**TEST RESULT : PASS**

**SUMMARY**

The equipment comply with the requirements according to the following standards:

**EN61543: 1995/+A11: 2003/+A12: 2005/+A2:2006:** Residual current-operated protective devices (RCDs) for household and similar use-Electromagnetic compatibility

Date of issue: October 15, 2013

Prepared by:



Harry Ye (*Project engineer*)

Approved by:



Anthony Shen (*Reviewer*)

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## 1. GENERAL INFORMATION

### 1.1 Description of Equipment Under Test (EUT)

EUT	:	RCCB's
Description of EUT	:	The EUT is a RCCB.
Model number	:	JEL1
Rating	:	Ue= 240V~(1P+N), 415V~(3P+N) In= 10, 16, 20, 25, 32, 40, 63A IΔn= 0,03, 0,1, 0,3A, type AC & type A Inc= IΔc= 6000A
Mains lead	:	None
Data cable	:	None
EUT type	:	<input checked="" type="checkbox"/> Table top <input type="checkbox"/> Floor standing
Sample received date	:	August 12,2013
Sample Identification No.:	:	0130806-15-012, 0130806-15-013,0130806-15-015
Date of test	:	August 12~30, 2013

### 1.2 Description of Client

Applicant	:	ELMARK INDUSTRIES SC 2 Dobrudzha blvd., Dobrich, Bulgaria
Person of contact	:	Miroslav Denkov
Telephone	:	+359 58 500059
Telefax	:	+359 58 500060
Manufacturer	:	ELMARK INDUSTRIES SC 2 Dobrudzha blvd., Dobrich, Bulgaria



### 1.3 Description of Test Facility

Name	Intertek Testing Service Shanghai
Address	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone	86 21 64956565
Telefax	86 21 54262353

Subcontractor :

<input type="checkbox"/>	Name	Shanghai Institute of Measurement Technology
	Address	716 Yishan Road, Shanghai 200233, P.R. China
	Telephone	86 21 64700066

## **2. TEST SPECIFICATIONS**

### **2.1 Standards**

**EN61543: 1995/+A11: 2003/+A12: 2005/+A2:2006:** Residual current-operated protective devices (RCDs) for household and similar use-Electromagnetic compatibility

### **2.2 Additions, deviations and exclusions from standards**

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

### **2.3 Mode of operation during the test**

Within this test report, EUT was tested under all available operation mode and tested under its rating voltage and frequency. Other voltage and frequency is specified if used. The EUT was tested with full load in emission tests. The EUT was tested without load in immunity tests.

## 2.4 Test Instrument List

Selected	Instrument	EC no.	Model	Valid until date
<input type="checkbox"/>	Shielded room	EC 2838	GB88	2014-1-11
<input type="checkbox"/>	EMI test receiver	EC 2107	ESCS 30	2013-10-20
<input type="checkbox"/>	A.M.N.	EC 3119	ESH2-Z5	2014-1-8
<input type="checkbox"/>	A.M.N.	EC 3394	ENV 216	2014-8-10
<input type="checkbox"/>	Absorbing clamp	EC 2108	MDS 21	2014-1-11
<input type="checkbox"/>	Voltage probe	EC 3405	ESH2-Z3	2014-1-11
<input type="checkbox"/>	Voltage probe	EC 4888	TK9420	2014-6-6
<input type="checkbox"/>	Tri-loop	EC 3384	HXYZ 9170	2014-6-18
<input type="checkbox"/>	Click meter	EC 2253	CL55C	2014-8-19
<input type="checkbox"/>	ISN	EC 3754	FCC-TLISN-T2-02	2014-1-8
<input type="checkbox"/>	ISN	EC 3755	FCC-TLISN-T4-02	2014-1-8
<input type="checkbox"/>	ISN	EC 3756	FCC-TLISN-T8-02	2014-1-8
<input type="checkbox"/>	Current probe	EC 3221	EZ-17	2014-1-11
<input type="checkbox"/>	Attenuator	EC 3043-9	68-6-44	2014-1-8
<input type="checkbox"/>	Harmonic/Flicker sys.	EC 2110	5001ix/PACS-1	2014-1-9
<input checked="" type="checkbox"/>	Shielded room	EC 2839	GB88	2014-1-11
<input type="checkbox"/>	ESD Gun	EC 2956	ditto	2014-5-20
<input checked="" type="checkbox"/>	ESD Gun	EC 4792-4	TESEQ	2014-2-21
<input checked="" type="checkbox"/>	Motorise Variac	EC 2957	MV 2616	Not required
<input checked="" type="checkbox"/>	Immunity system	EC 2958	UCS500M6	2014-4-7
<input checked="" type="checkbox"/>	Capacitive clamp	EC 2959	HFK	Not required
<input type="checkbox"/>	Immunity system	EC 2960	TSS500M	2014-9-23
<input type="checkbox"/>	Immunity system	EC 2961	TSS500M4	2014-1-11
<input type="checkbox"/>	DIPs generator	EC 5033	SKS-1130GT	2014-1-6
<input type="checkbox"/>	Ring wave generator	EC 5033-1	SKS-1206GB	2014-1-6
<input type="checkbox"/>	EFT generator	EC 5033-2	SKS-0404IB	2014-1-6
<input checked="" type="checkbox"/>	Surge generator	EC 5033-4	SKS-0506GB-30	2014-2-5
<input checked="" type="checkbox"/>	Signal generator	EC 2338	SML 01	2014-4-11
<input checked="" type="checkbox"/>	Power amplifier	EC 3043-1	75A250	2014-8-16
<input checked="" type="checkbox"/>	Attenuator	EC 3043-3	ATT6/75	2014-1-8
<input checked="" type="checkbox"/>	CDN	EC 2113-1	M216	2014-8-03

<input type="checkbox"/>	CDN	EC 2113-2	M316	2014-8-03
<input type="checkbox"/>	CDN	EC 4970	T2	2013-10-24
<input type="checkbox"/>	CDN	EC 3043-4	T4	2014-1-8
<input type="checkbox"/>	CDN	EC 4792-6	CDN M1/16A	2014-2-18
<input type="checkbox"/>	CDN	EC 4792-7	CDN M1/16A	2014-2-18
<input type="checkbox"/>	CDN	EC 4792-10	CDN M1/32A	2014-2-18
<input type="checkbox"/>	CDN	EC 4792-12	CDN M3N/16A	2014-2-18
<input type="checkbox"/>	CDN	EC 4792-13	CDN M3N/32A	2014-2-18
<input type="checkbox"/>	CDN	EC 4792-15	CDN T8-RJ45	2014-2-18
<input type="checkbox"/>	EM clamp	EC 3043-6	EM 101	2013-10-20
<input checked="" type="checkbox"/>	Fully anechoic chamber	EC 3047	-	2014-5-11
<input checked="" type="checkbox"/>	Signal generator	EC 3044-1	SMR20	2014-8-16
<input checked="" type="checkbox"/>	Log-periodical antenna	EC 3044-7	AT1080	2015-4-27
<input checked="" type="checkbox"/>	Power amplifier	EC 3044-2	150W1000	2014-8-16
<input checked="" type="checkbox"/>	DDC	EC 3044-5	DC6180A	2014-8-03
<input type="checkbox"/>	Horn antenna	EC 3044-8	AT4002	2015-4-27
<input type="checkbox"/>	Power amplifier	EC 3044-4	25S1G4	2014-8-16
<input type="checkbox"/>	DDC	EC 3044-6	DC7144A	2014-1-8
<input checked="" type="checkbox"/>	Power sensor	EC 3043-7	PH 2000	2013-10-18
<input checked="" type="checkbox"/>	Power meter	EC 3043-8	PM 2002	2013-10-18
<input type="checkbox"/>	Field meter	EC 3044-9	FM5004	2013-10-20
<input type="checkbox"/>	Field sensor	EC 3044-3	FP6001	2013-10-20
<input type="checkbox"/>	Semi anechoic chamber	EC 3048	-	2014-5-11
<input type="checkbox"/>	EMI test receiver	EC 3045	ESIB26	2013-10-20
<input type="checkbox"/>	Broadband antenna	EC 4206	CBL 6112D	2015-4-27
<input type="checkbox"/>	Horn antenna	EC 3049	HF906	2015-4-27
<input type="checkbox"/>	Horn antenna	EC 4792-1	3117	2014-4-16
<input type="checkbox"/>	Horn antenna	EC 4792-3	HAP18-26W	2014-4-11
<input type="checkbox"/>	Pre-amplifier	EC 3222	pre-amp 18	2014-4-11
<input type="checkbox"/>	Pre-amplifier	EC 4792-2	TPA0118-40	2014-4-11
<input type="checkbox"/>	DDC	EC 3043-5	DC2600	2014-1-8
<input type="checkbox"/>	Oscilloscope	EC 3515	DPO 4504	2014-1-5
<input type="checkbox"/>	TV generator	EC 3555	TG39	2014-4-17
<input type="checkbox"/>	Lum. Meter	EC 2451	TES 1332	2014-6-4



## 2.5 Test Summary

This report applies to tested samples only. The report can not be replicated without the approval of Intertek Testing Service Shanghai .

2.5.1 Some immunity tests are already included in the relevant product standards:

REFERENCE CONDITION OF IEC 61543	TEST ITEM	REFERENCE CLAUSE OF PRODUCT STANDARDS	RESULT
T 1.1	Harmonics, inter-harmonics	-	NA
T 1.2	Signaling voltages	-	U.C
T 1.3	Voltage fluctuations	9.9.5 and 9.17 of EN61008-1; 9.9.1.5 and 9.17 of EN61009-1	Pass
	Voltage dips	9.17	Pass
	Voltage interruptions	9.17	Pass
T 1.4	Voltage unbalance	Refer to T 1.3	Pass
T 1.5	Power frequency variations	9.2	Pass
T 1.8	Radiated magnetic field	9.11 and 9.18 of EN61008-1; 9.12 and 9.18 of EN61009-1;	Pass
T 2.4	Current oscillatory transients (ring wave)	9.19	Pass

Detail of above test items, refer to safety test report

2.5.2 Other immunity tests of EN 61543 to be applied

REFERENCE CONDITION OF IEC 61543	TEST ITEM	RESULT	TESTED SAMPLE QUANTITIES
T 2.1	Conducted sine-wave form voltages or currents	Pass	3
T 2.2	Fast transients	Pass	3
T 2.3	Surges	Pass	3
T 2.5	Radiated electromagnetic field	Pass	3
T 2.6	Conducted common mode disturbances in the frequency range lower than 150 kHz	Pass	3
T 3.1	Electrostatic discharges	Pass	3

2.5.3 Emission tests of EN 55014 to be applied

TEST ITEM	RESULT	NOTE
Mains terminal continuous disturbance voltage	NA	
Mains terminal discontinuous disturbance voltage/click	NA	
Continuous disturbance power	NA	
Radiated emission	NA	

U.C = Under Consideration according to the standard EN 61543.

NA = Not Applicable.

## Emission Test

### 3. Mains/Load/Control Terminal Continuous Disturbance Voltage

Test result: NA

#### 3.1 Terminal Voltage Limits for the frequency range 148.5kHz to 30MHz

3.1.1 Limits for household appliances, electric power tools and similar devices at mains terminals

For household appliance

Frequency range (MHz)	Limits dB( $\mu$ v)	
	Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	59 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

Note : 1. \* means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz  
2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

For electric power tools

Frequency (MHz)	Rated motor power not exceeding 700W		Rated motor power above 700W and not exceeding 1000W		Rated motor power above 1000W	
	dB( $\mu$ V)		dB( $\mu$ V)		dB( $\mu$ V)	
	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.35	66-59*	59-49*	70-63*	63-53	76-69*	69-59*
0.35-5	59	49	63	53	69	59
5-30	64	54	68	58	74	64

Notes : 1. \* means the limit value decreasing linearly with the logarithm of the frequency.  
2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

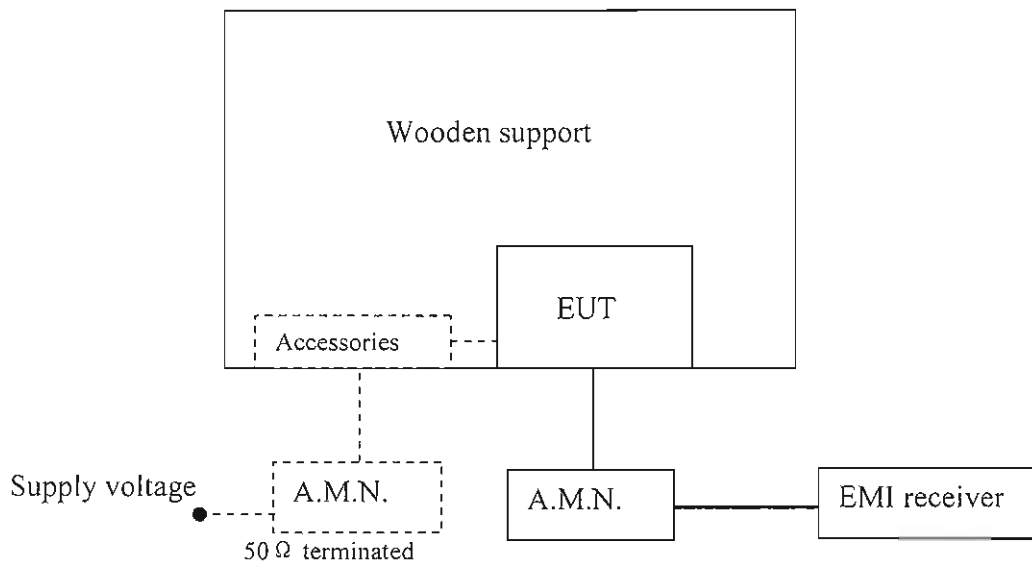
### 3.1.2 Limits for household appliances and similar devices at additional terminals

Frequency range (MHz)	Limits dB( $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	80	70
0.5 ~ 5	74	64
5 ~ 30	74	64

Note: 1. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

### 3.2 Test setup

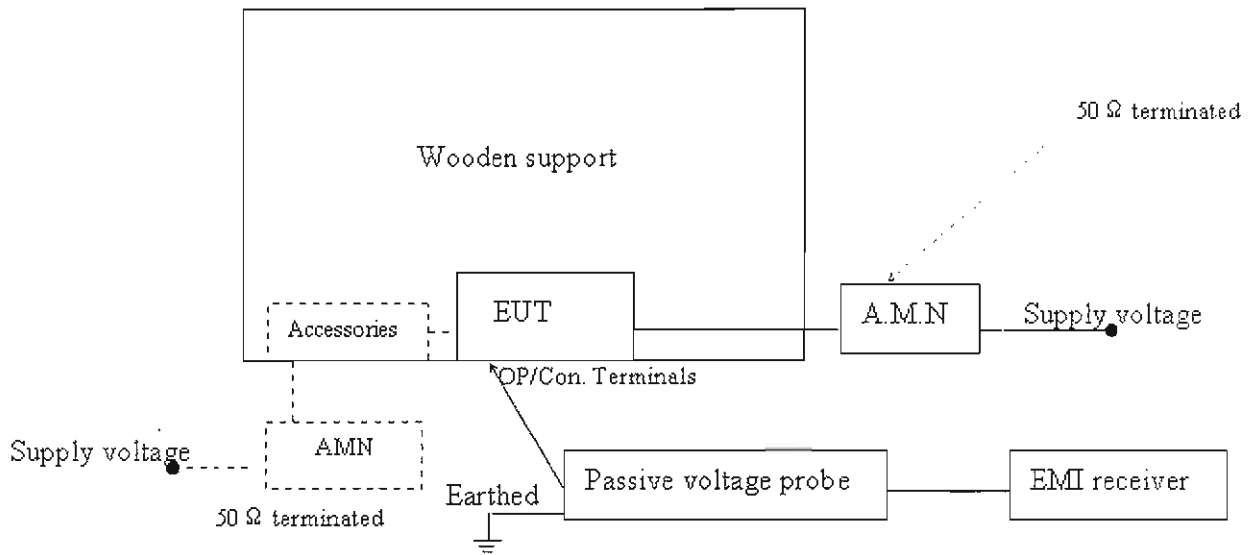
At mains terminal



For table top equipment, wooden support is 0.8m height table

For floor standing equipment, wooden support is 0.1m height rack.

At output and control terminals



Note: ————— : power line  
 ————— : signal line  
 - - - - - : means the test setup while available

### 3.3 Test Setup and Test Procedure

Measurement was performed in shielded room, and instruments used were follow EN 55014-1 clause 5.1, 5.2, 5.3 and 5.4 if applicable.  
 Detailed test procedure and arrangement was follow EN 55014-1 clause 5.2.  
 Measurement methods and operation conditions of EUT was according to EN 55014-1 clause 7.  
 Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9kHz.



### 3.4 Test Protocol

Temperature : °C Relative Humidity : %

#### At mains terminal : Pass

Frequency (MHz)	Quasi-peak		Average	
	Disturbance level dB(μV)	Permitted limit dB(μV)	Disturbance level dB(μV)	Permitted limit dB(μV)
0.16				
0.24				
0.55				
1.00				
1.40				
2.00				
3.50				
6.00				
10.00				
22.00				
30.00				

Note: \* means the emission level 20dB below the relevant limit.

#### At load/control terminal : NA

Frequency (MHz)	Quasi-peak		Average	
	Disturbance level dB(μV)	Permitted limit dB(μV)	Disturbance level dB(μV)	Permitted limit dB(μV)
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

Note: \* means the emission level 20dB below the relevant limit.

### 3.5 Emission waveform

### 3.6 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty at mains terminal:  $\pm 1.99\text{dB}$

Measurement uncertainty at load/control terminal:  $\pm 1.99\text{dB}$

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.

#### 4. Continuous Disturbance Power

Test result: NA

##### 4.1 Disturbance Power Limits for the frequency range 30MHz to 300MHz

###### 4.1.1 Limits for household and similar appliances

Frequency (MHz)	Quasi-peak dB(pW)	Average dB (pW)
30 to 300	45 to 55*	35 to 45*

Note: 1. \* means the limit increasing linearly with the frequency.  
2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement with the receiver with average detector need not be carried out.

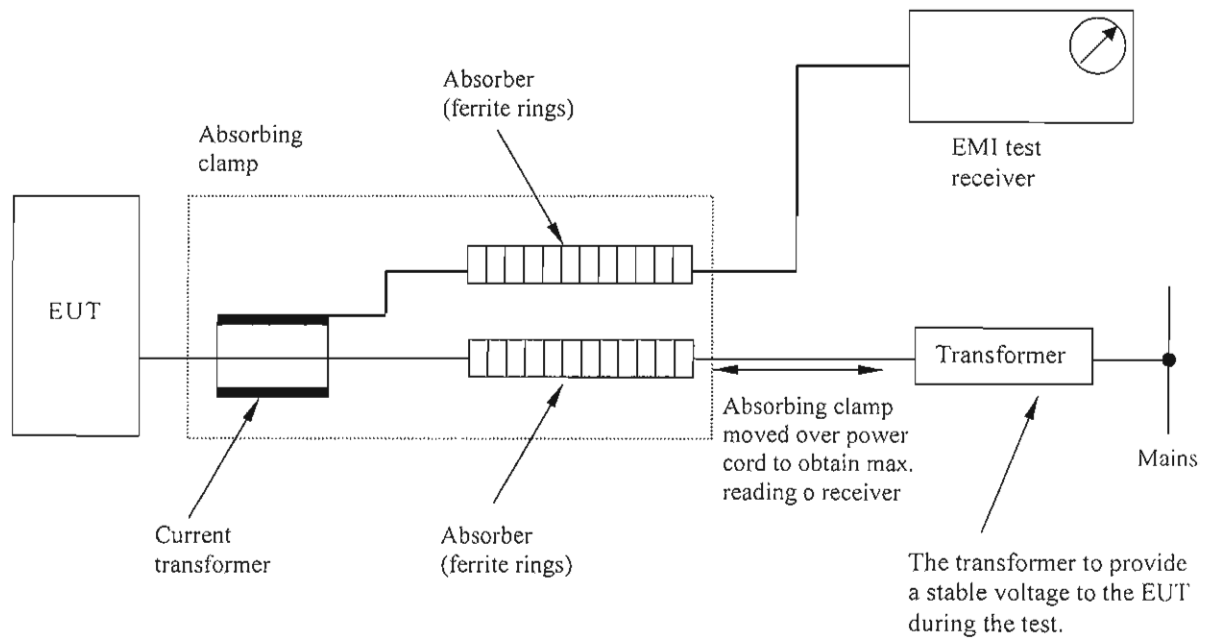
###### 4.1.2 Limits for electric tools

Frequency (MHz)	Rated motor power not exceeding 700W		Rated motor power above 700W and not exceeding 1000W		Rated motor power above 1000W	
	dB(pW)		dB(pW)		dB(pW)	
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
30-300	45-55*	35-45*	49-59*	39-49*	55-65*	45-55*

Notes: 1. \* means the limit increasing linearly with the frequency.  
2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement with the receiver with average detector need not be carried out.



**4.2 Block Diagram of Test Setup**



**4.3 Test Setup and Test Procedure**

Measurement was performed in shielded room.  
 Instruments used were follow EN 55014-1 clause 6.1.  
 Detailed test procedure and arrangement was follow EN 55014-1 clause 6.2 and 6.3.  
 Operation conditions of EUT was according to EN 55014-1 clause 7.

Frequency range 30MHz – 300MHz was checked and EMI receiver measurement bandwidth was set to 120kHz.



#### 4.4 Test Protocol

Temperature : °C      Relative Humidity : %

At mains lead

Frequency (MHz)	Quasi-peak		Average	
	Disturbance level dB(pW)	Permitted limit dB(pW)	Disturbance level dB(pW)	Permitted limit dB(pW)
30.00				
45.00				
65.00				
90.00				
150.00				
180.00				
220.00				
300.00				

Note: \* means the emission level 20dB lower than the relevant limit.

At auxiliary leads

Frequency (MHz)	Quasi-peak		Average	
	Disturbance level dB(pW)	Permitted limit dB(pW)	Disturbance level dB(pW)	Permitted limit dB(pW)
30.00	-	-	-	-
45.00	-	-	-	-
65.00	-	-	-	-
90.00	-	-	-	-
150.00	-	-	-	-
180.00	-	-	-	-
220.00	-	-	-	-
300.00	-	-	-	-

Note: \* means the emission level 20dB lower than the relevant limit.



#### 4.5 Emission waveform

#### 4.6 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of mains lead and auxiliary lead:  $\pm 3.69\text{dB}$

The measurement uncertainty is given with a confidence of 95%,  $k=2$

The measurement uncertainty is traceable to internal procedure TI-036.

## Immunity Test

### Performance criteria

The performance criteria are based on the general criteria of the standard and derived from the product specification

**Criterion A:** During the test marking reference to this performance criterion, the RCD shall remain closed at continuously applied residual current of  $0.3 I_{\Delta n}$  and shall trip at  $1.25 I_{\Delta n}$ .

**Criterion B:** During the test marking reference to this performance criterion, the RCD shall not trip. After the test, compliance with item a) of 9.9.2.3 of IEC 61008-1 at  $I_{\Delta n}$  only shall be checked.

**Criterion C:** During the test marking reference to this performance criterion, the RCD may trip. After each tripping the RCD shall be reclosed. After the test, compliance with item a) of 9.9.2.3 of IEC 61008-1 at  $I_{\Delta n}$  only shall be checked.

**Criterion D:** Other performance criteria are contained in the clauses of the product standards.

### Basic EMC standard for immunity test

EN 61000-4-2: 1995/+A1:1998/+A2:2001: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 2: electrostatic discharge immunity test

EN 61000-4-3: 2002/+A1:2002: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 3: radiated, radio frequency, electromagnetic field immunity test

EN 61000-4-4: 2004: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 4: electric fast transient/burst immunity test

EN 61000-4-5: 1995/+A1: 2001: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 5: surge immunity test

EN 61000-4-6: 1996/+A1:2001/+A2:2006: Electromagnetic Compatibility (EMC) – Part 4: testing and measurement techniques – section 6: immunity to conducted disturbance, induced by radio frequency field

EN 61000-4-12: 2006: Electromagnetic Compatibility (EMC) – Part 12: testing and measurement techniques – Ring wave immunity test

## 5. Electrostatic Discharge (ESD)

Test result                      **PASS**

### 5.1 Severity Level and Performance Criterion

#### 5.1.1 Test level

1a – Contact discharge		1b – Air discharge	
Level	Test voltage kV	Level	Test voltage kV
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
X	Special	X	Special

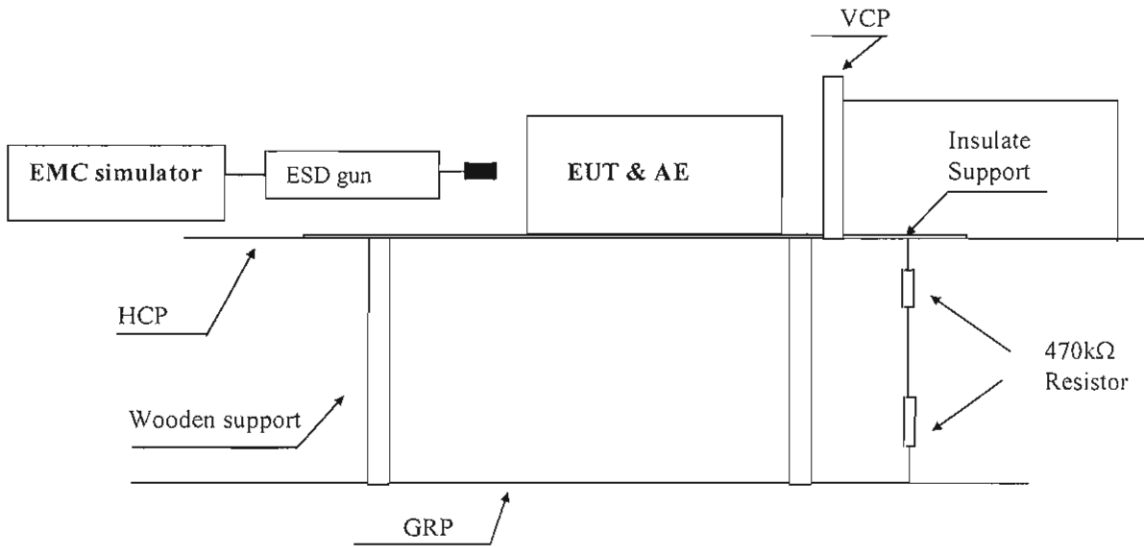
Notes: 1. “X” is an open level. The level has to be specified in the dedicated equipment specification. If higher voltages than those shown are specified, special test equipment may be needed.  
2. The gray rows were the selected test level.

#### 5.1.2 Performance Criterion

Performance criterion: **C**

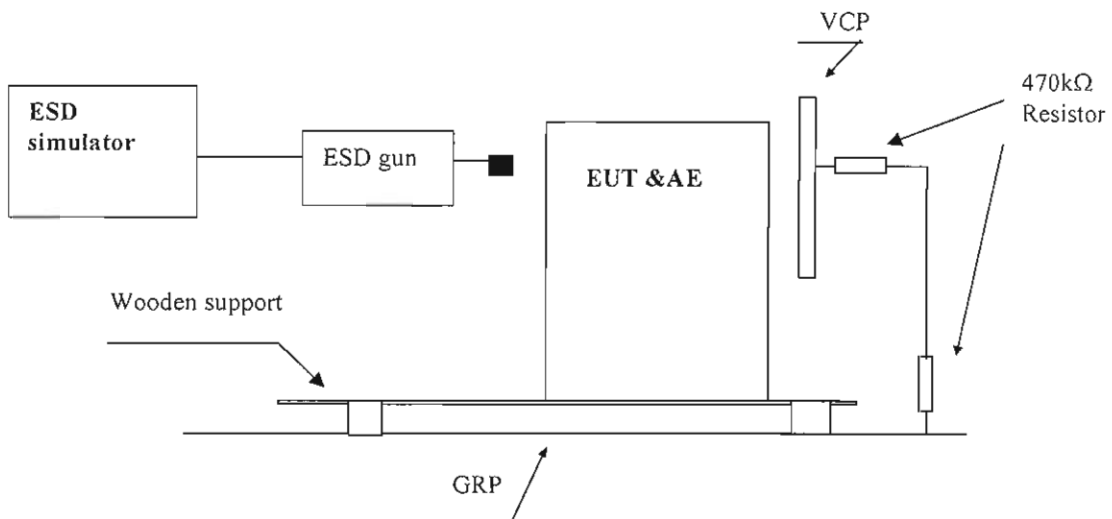
**5.2 Block Diagram of Test Setup**

For table-top equipment



Note: HCP means Horizontal Coupling Plane  
VCP means Vertical Coupling Plane  
GRP means Ground Reference Plane  
Wooden support is a 0.8m height table

For floor standing equipment



Note: VCP means Vertical Coupling Plane  
GRP means Ground Reference Plane

Wooden support is a 0.1m height rack

### 5.3 Test Setup and Test Procedure

Measurement was performed in shielded room.  
Measurement and setting of EUT was applied according to IEC61000-4-2 clause 7.1.  
The test method and equipment was specified by IEC61000-4-2 with additions and modifications by EN61543, Table 6.

### 5.4 Test Protocol

Temperature : 25°C  
Relative Humidity: 52%  
Air Pressure: 101kPa

Direct discharges were applied at the following selected points:

Test point #	Test level [kV]	Air/ Contact	Polarity (+/-)	Pass/ Fail	Comment
A	6	Contact	+/-	Pass	all touchable screws of enclosure
B	6	Contact	+/-	Pass	Accessible metal parts of the EUT
C	6	Air	+/-	Pass	Air gap of the switch, button
D	8	Air	+/-	Pass	The air in-taking opening
E	8	Air	+/-	Pass	Slots around the EUT

Indirect contact discharges were applied to the VCP and the HCP at the following selected points:

For table top equipment

Point	Description	Point	Result
HCP f	0,1m from the front of the EUT	Edge of centre,corner on HCP	Pass
HCP b	0,1m from the back of the EUT	Edge of centre,corner on HCP	Pass
HCP r	0,1m from the right side of the EUT	Edge of centre,corner on HCP	Pass
HCP l	0,1m from the left side of the EUT	Edge of centre,corner on HCP	Pass
VCP f	0,1m from the front of the EUT	Edge of centre,corner on VCP	Pass
VCP b	0,1m from the back of the EUT	Edge of centre,corner on VCP	Pass
VCP r	0,1m from the right of the EUT	Edge of centre,corner on VCP	Pass
VCP l	0,1m from the left of the EUT	Edge of centre,corner on VCP	Pass

For floor standing equipment

Point	Description	Point	Result
VCP f	0,1m from the front of the EUT	Edge of centre,corner on VCP	-
VCP b	0,1m from the back of the EUT	Edge of centre,corner on VCP	-
VCP r	0,1m from the right of the EUT	Edge of centre,corner on VCP	-
VCP l	0,1m from the left of the EUT	Edge of centre,corner on VCP	-

**Any observation of deviated from standard:** None.

**Conclusion:** The EUT met the requirements of Performance Criterion

### 5.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of ESD test is:  $\pm 7.00 \%$

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.





## 6. Electromagnetic field susceptibility

Test result                      PASS

### 6.1 Severity Level and Performance Criterion

#### 6.1.1 Test level

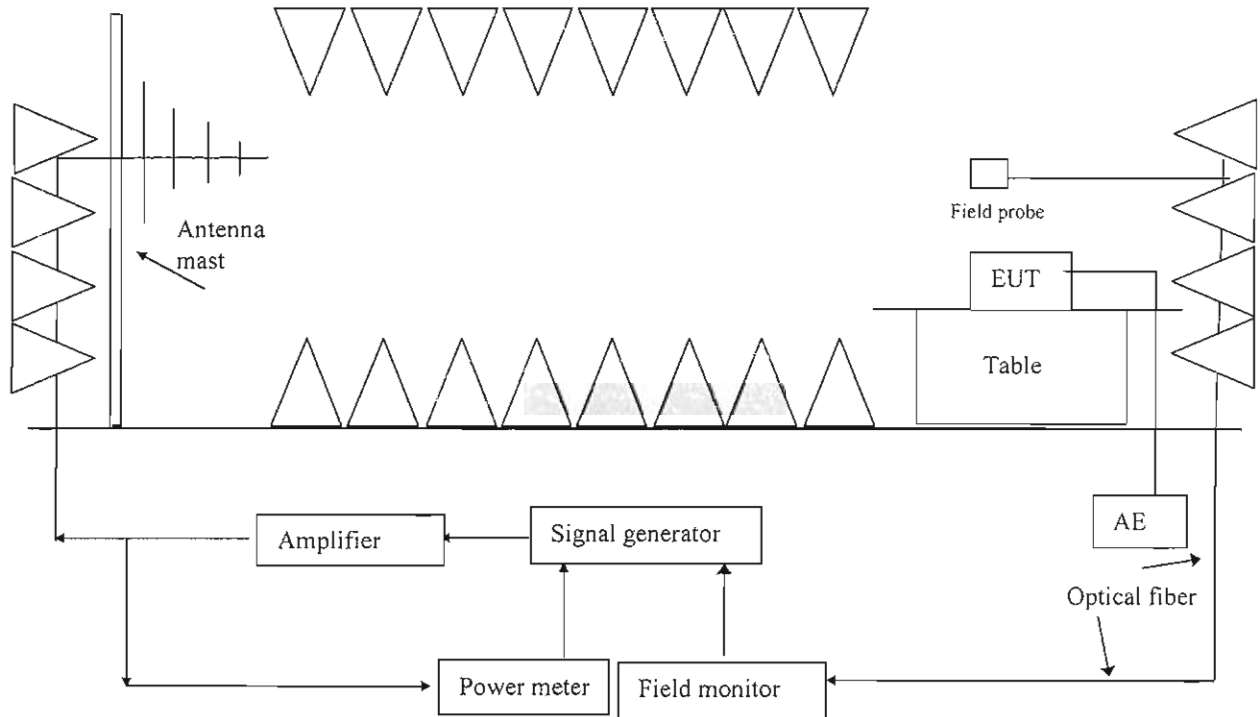
Level	Test field strength V/m
1	1
2	3
3	10
X	Special

Note: 1. X is an open test level. This level may be given in the product specification.  
2. The gray row is the selected test level. Level 2 for PRCDs and SRCDs

#### 6.1.2 Performance Criterion

Performance criterion: A

## 6.2 Block diagram of test setup



## 6.3 Test Setup and Test Procedure

Measurement was performed in full-anechoic chamber.  
Measurement and setting of EUT was applied according to IEC61000-4-3 clause 7.  
The test method and equipment was specified by IEC61000-4-3 with additions and modifications by EN 61543, Table 5.

#### 6.4 Test Protocol

Temperature : 25°C  
Relative Humidity: 52%

Test no.:	Frequency (MHz)	Polarization	Test level V/m	Exposed location	Result	Comment
1	80-1000	H & V	10	All sides	Pass	-
2	80-1000	H & V	3	All sides	NA	-

**Any observation of deviated from standard:** None.

**Conclusion:** The EUT met the requirements of Performance A

#### 6.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of radiated susceptibility test is:  $\pm 4.65\text{dB}$

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.

## 7. Electric Fast Transient/Burst Immunity Test

Test result **Pass**

### 7.1 Severity Level and Performance Criterion

#### 7.1.1 Test level

Open circuit output test voltage (+/-10%) and repetition rate of the impulses (+/- 20%)				
Level	On power supply ports PE		On I/O (input & output) signal, data and control ports	
	Voltage peak kV	Repetition rate kHz	Voltage peak kV	Repetition rate kHz
1	0.5	5	0.25	5
2	1	5	0.5	5
3	2	5	1	5
4	4	2.5	2	5
X	Special	Special	Special	Special

Notes : 1. "X" is a an open level. The level has to be specified in the dedicated equipment specification.  
2. The gray rows were the selected test level.

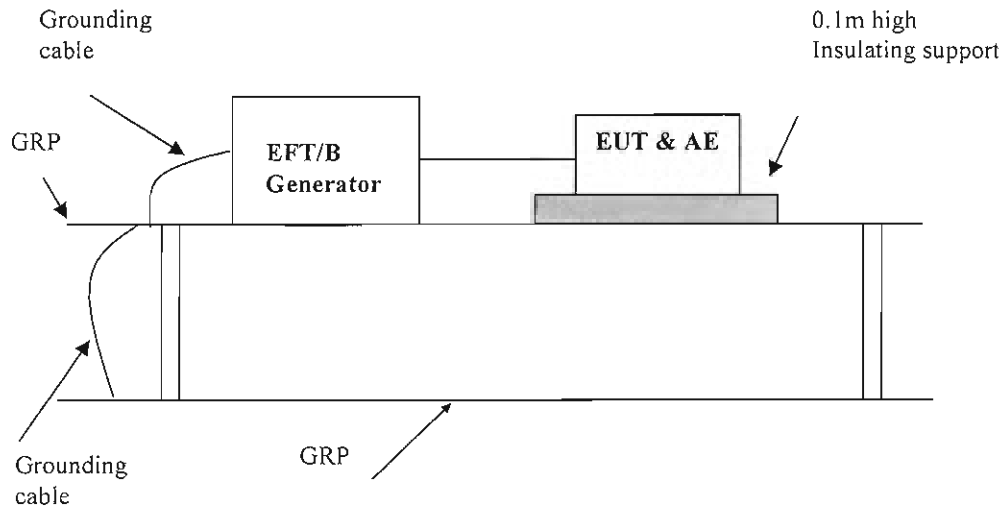
#### 7.1.2 Performance Criterion

Performance criterion **B**

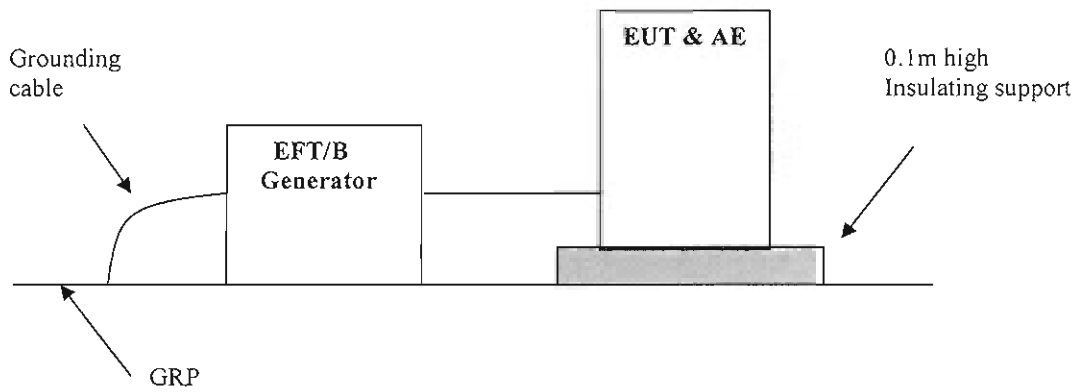
**7.2 Block Diagram of Test Setup**

**7.2.1 Block Diagram for input a.c./d.c. power line**

For table-top equipment

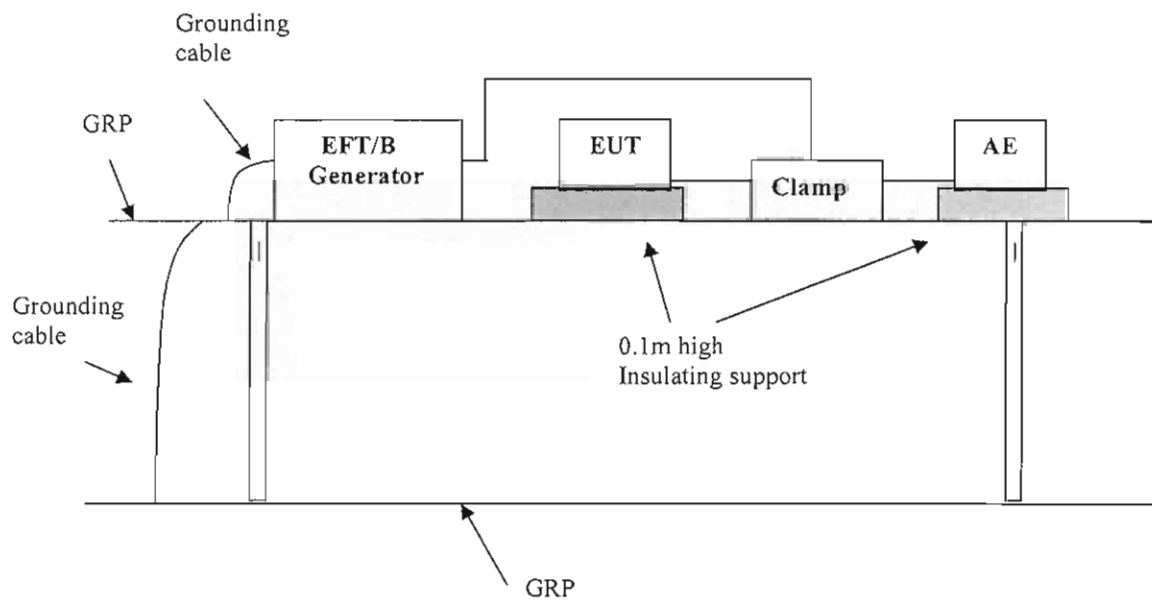


For floor standing equipment

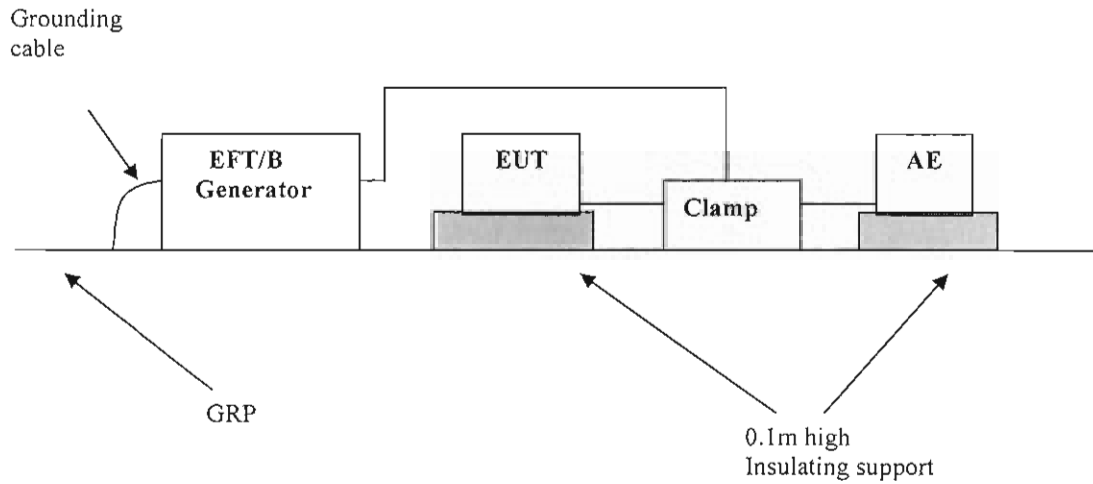


7.2.2 Block Diagram for output a.c./d.c. power line or signal/control lines

For table-top equipment



For floor standing equipment



### 7.3 Test Setup and Test Procedure

Measurement was performed in shielded room.  
Measurement and setting of EUT was applied according to IEC61000-4-4 clause 7.2.  
The test method and equipment was specified by IEC61000-4-4 with additions and modifications by EN 61543, Table 5.

### 7.4 Test Protocol

Temperature : 25°C  
Relative Humidity: 52%

Test No. #	Level [kV]	Polarity +/-	Line for test	Pass/ Fail
1	4	+/-	a.c. Mains	Pass
2	X	+/-	X	NA

Notes: "NA" means not applicable.  
"X" is for other available lines.

**Any observation of deviated from standard:** None.  
**Conclusion:** The EUT met the requirements of Performance B

## 7.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of EFT test at main terminal is:  $\pm 18.00\%$

Measurement uncertainty of EFT test at signal/telecom terminal is:  $\pm 18.00\%$

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.



## 8. Surge Immunity Test

Test result                      Pass

### 8.1 Severity Level and Performance Criterion

#### 8.1.1 Test level

Level	Open-circuit test voltage +/-10% kV
1	0.5
2	1.0
3	2.0
4	4.0
X*	5.0

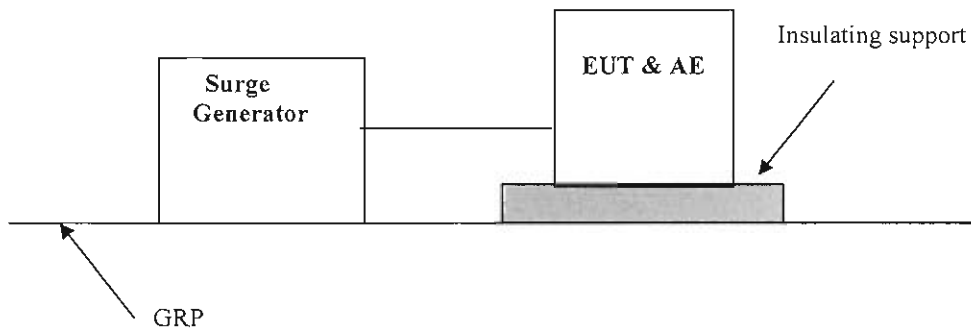
Notes: 1."X" is an open class. This level can be specified in the product Specification  
2. The gray rows are the selected level. Level 4 is applied to Phase to Phase (L-N)  
Level X is applied to Phase to PE (L-PE),(N-PE)  
3. for SRCs and PRCDs: Level 3 and Level 4 applied

#### 8.1.2 Performance Criterion

Performance criterion **B**

## 8.2 Block Diagram of Test Setup

### 8.2.1 Block Diagram for input a.c. power line



## 8.3 Test Setup and Test Procedure

Measurement was performed in shielded room.

Measurement and setting of EUT was applied according to IEC61000-4-5 clause 7.

The test method and equipment was specified by IEC61000-4-5 with modifications by EN 61543, Table 5.

#### 8.4 Test Protocol

Temperature : 25°C  
Relative Humidity: 52%

Test No. #	Level [kV]	Polarity +/-	Line for test	Pass/ Fail
1	4	+/-	a.c. Mains (line to line)	Pass
2	5	+/-	a.c. Mains (line to earth)	NA
3	X	+/-	X	NA

Notes: "NA" means not applicable.  
"X" is for other available lines.

Additionally tests (applicable only while the RCD tripped)

Test No. #	Level [kV]	Polarity +/-	Line for test	Pass/ Fail
1	2	+/-	a.c. Mains (line to line)	NA
2	4	+/-	a.c. Mains (line to earth)	NA

Notes: "NA" means not applicable.

**Any observation of deviated from standard:** None.

**Conclusion:** The EUT met the requirements of Performance B

#### 8.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of surge test at main terminal is:  $\pm 19.00\%$

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.

## 9. Immunity to Conducted Disturbances, Induced by Radio-frequency Fields

Test result                      Pass

### 9.1 Severity Level and Performance Criterion

#### 9.1.1 Test level

Frequency range 150kHz – 80MHz		
Level	Voltage level (e.m.f.)	
	U0 [dB(uV)]	U0 (V)
1	120	1
2	130	3
3	140	10
X	Special	Special

Notes: 1. "X" is an open level  
2. The gray row is the selected test level. Level 2 for RCDs with  $I_{\Delta n} < 30\text{mA}$  and PRCDs/SRCDs, Level 3 for RCDs with  $I_{\Delta n} \geq 30\text{mA}$

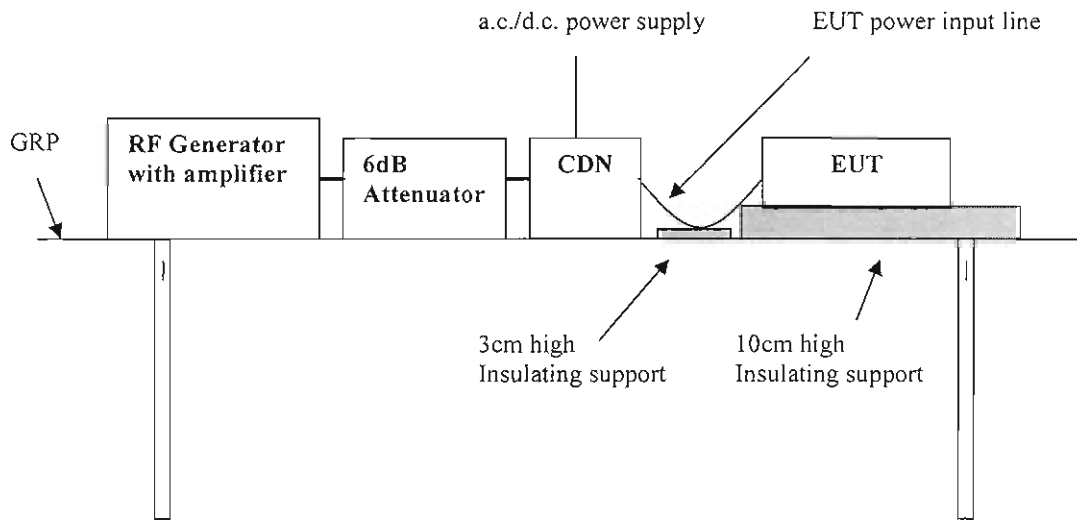
#### 9.1.2 Performance Criterion

Performance criterion **A**

**9.2 Block Diagram of Test Setup**

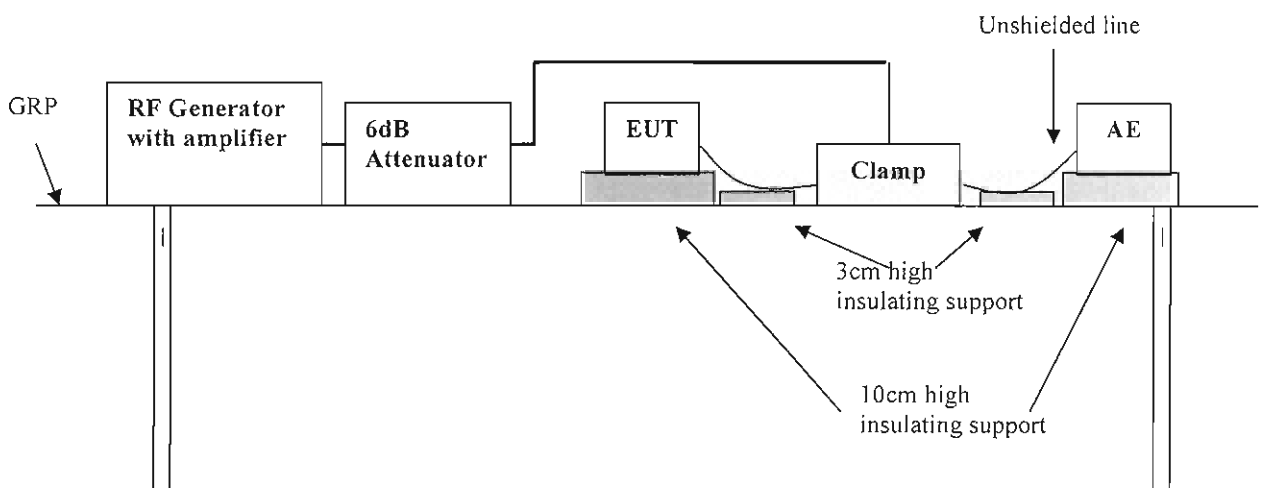
9.2.1 Block Diagram for a.c./d.c input power line

Block Diagram for a.c./d.c input power line

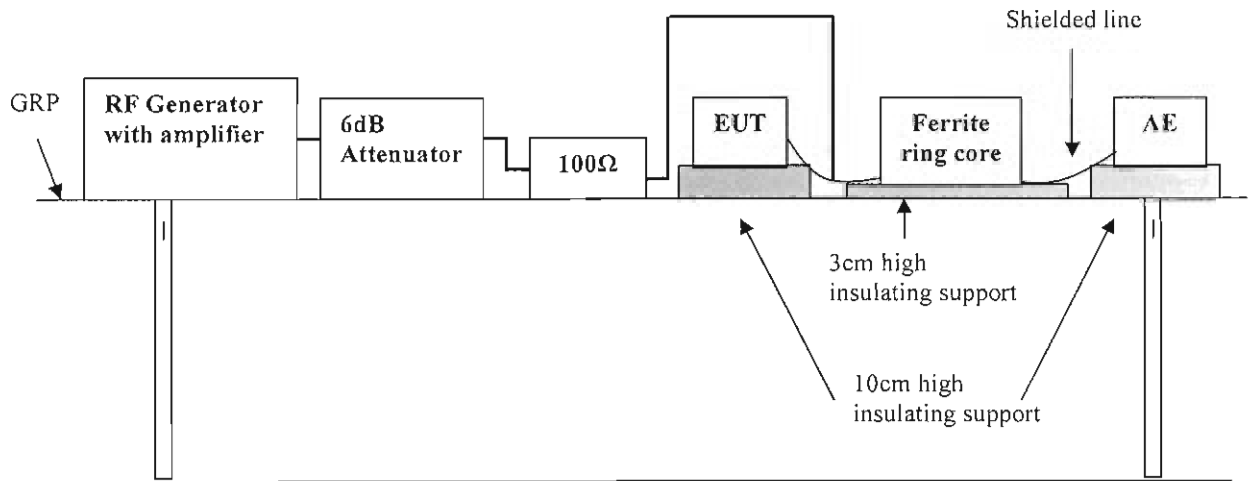


9.2.2 Block Diagram for output a.c./d.c. power line or signal/control lines

Unshielded line



Shielded line



### 9.3 Test Setup and Test Procedure

Measurement and setting of EUT was applied according to IEC61000-4-6 clause 7. The test method and equipment was specified by IEC61000-4-6 with additions and modifications by EN 61543, Table 5.

### 9.4 Test Protocol

Temperature : 25°C  
Relative Humidity: 52%

Test No.	Frequency (MHz)	Level V (e.m.f.)	Amplitude modulation	Injected point	Result
1	0.15~80	10	1kHz 80%	a.c. Mains	Pass
2	0.15~80	3	1kHz 80%	a.c. Mains	NA

**Any observation of deviated from standard:** None.

**Conclusion:** The EUT met the requirements of Performance A

### 9.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of injected current test at main terminal is  $\pm 2.82$ dB.

Measurement uncertainty of injected current test at unshielded signal terminal is  $\pm 2.82$ dB.

Measurement uncertainty of injected current test at shielded signal terminal is under consideration.

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.

## 10. Conducted common mode disturbances in the frequency range lower than 150 kHz

Test result                      Pass

### 10.1 Severity Level and Performance Criterion

#### 10.1.1 Test level

Frequency range	Level 2	Level 3
	RMS current value for $I_{\Delta n}$ < 30 mA	RMS current value for $I_{\Delta n}$ $\geq$ 30 mA
1 kHz to 1,5 kHz	2 mA	6,6 mA
1,5 kHz to 15 kHz	2 mA to 20 mA *	6,6 mA to 66 mA *
15 kHz to 150 kHz	20 mA	66 mA

Notes: 1. "\*" means The current level increases from 1,5 kHz to 15 kHz at 20 dB/decade  
2. Current levels are taking into account a common mode impedance of 150  $\Omega$

#### 10.1.2 Performance Criterion

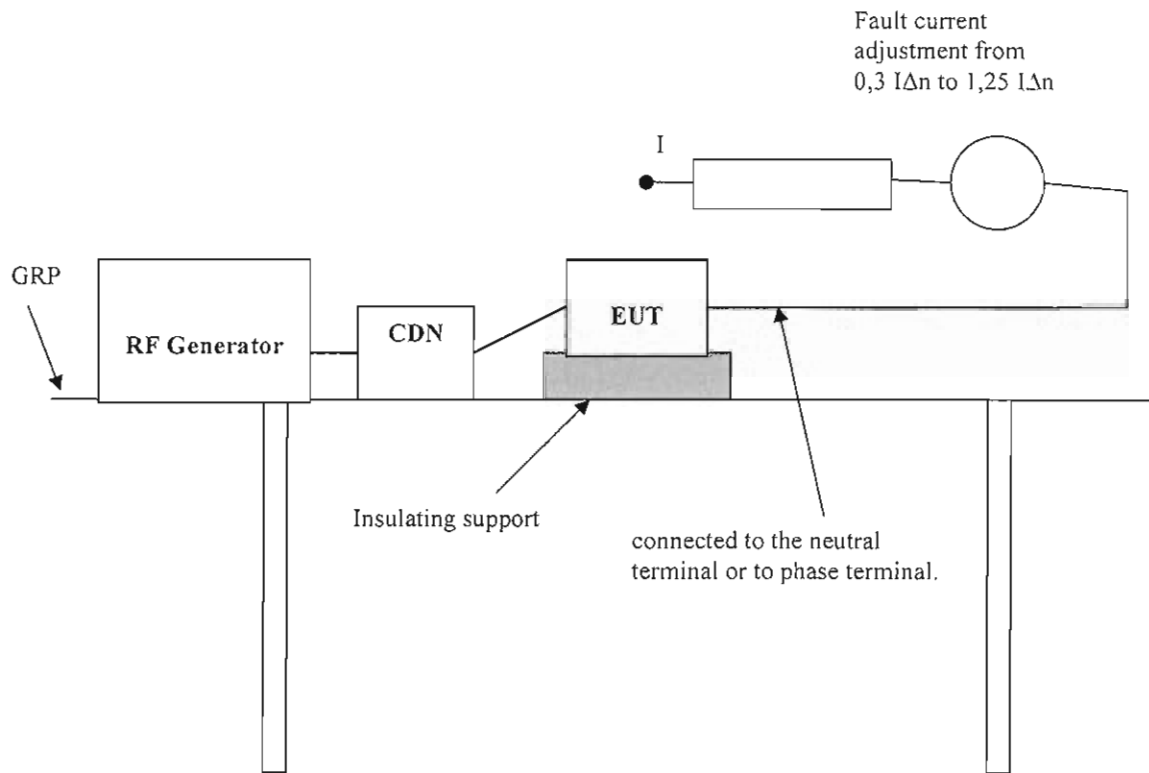
Performance criterion **A**



### 10.2 Block Diagram of Test Setup

#### 10.2.1 Block Diagram for a.c./d.c input power line

Block Diagram for a.c input power line



### 10.3 Test Setup and Test Procedure

Measurement and setting of EUT was applied according to IEC61000-4-16 clause 7 and clause 8 .

The test method and equipment was specified by IEC61000-4-16 with additions and modifications by EN 61543, Table 5 and Table 5a.

### 10.4 Test Protocol

Temperature : 25°C  
Relative Humidity: 52%  
Air Pressure: 101kPa

Test No.	Frequency (kHz)	Test Level	Injected point	Result
1	1 ~ 150	Level 2	a.c. Mains	-
2	1 ~ 150	Level 3	a.c. Mains	Pass

**Any observation of deviated from standard:** None.

**Conclusion:** The EUT met the requirements of Performance A

### 10.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty at main terminal is  $\pm 2.82$ dB.

The measurement uncertainty is given with a confidence of 95%, k=2.

The measurement uncertainty is traceable to internal procedure TI-036.

**Appendix I: Photograph of equipment under test**

