

**TRENDware**  
**TEW-228PI**  
**EMC Test Report**

# Declaration of Conformity

We, the under signed,

<b>Company</b>	TRENDware International, Inc.
<b>Address, City</b>	3135 Kashiwa Street, Torrance, CA 90505,
<b>Country</b>	USA
<b>Phone number</b>	310-891-1100
<b>Fax number</b>	310-891-1111
<b>E-mail</b>	

certify and declare under our sole responsibility that the following equipment:

<b>Product Description / Supplementary Info</b>	802.11b Wireless LAN PCI Adapter
<b>Manufacturer</b>	TRENDware International, Inc.
<b>Brand</b>	TRENDware
<b>Type</b>	TEW-228PI

is tested to and conforms with the essential radio test suites included in the following standards:

<b>Standard</b>	<b>Issue date</b>
ETSI EN 300 328-2	V1.2.1 Dec. 2001
ETSI EN 301 489-1	V1.4.1 Aug. 2002
ETSI EN 301 489-17	V1.2.1 Apr. 2002
EN 60950	2000

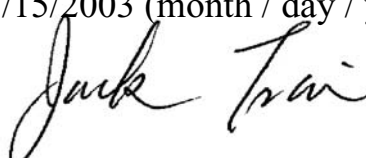
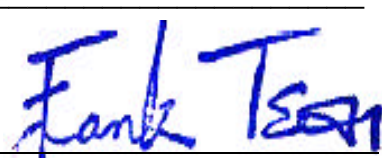
and therefore complies with the essential requirements and provisions of the **R&TTE directive 1999/5/EC** of the European Parliament and of the council of 9 March 1999 on radio equipment and Telecommunications Terminal Equipment and the mutual recognition of their conformity and the requirements of Annex III (conformity Assessment procedure referred to in article 10(4)).

The technical documentation as required by the Conformity Assessment procedure is kept at the following address:

<b>Company</b>	TRENDware International, Inc.
<b>Address, City</b>	3135 Kashiwa Street, Torrance, CA 90505,
<b>Country</b>	USA
<b>Phone number</b>	310-891-1100
<b>Fax number</b>	310-891-1111
<b>E-mail</b>	



<b>Draw up in</b>	USA
<b>Date</b>	2004/02/20
TRENDware International, Inc. 3135 Kashiwa Street, Torrance, CA 90505, USA	
<b>Signature &amp; company stamp</b>	Mr. Pei C. Huang / President

Report No.	C51ET143	
Specifications	ETSI EN 301 489-1 V1.4.1 (August, 2002) ETSI EN 301 489-17 V1.2.1 (August, 2002)	
Applicant	TRENDware International, Inc.	
Applicant address	3135 Kashiwa Street Torrance, CA 90505, USA	
Items tested	802.11b Wireless LAN PCI Adapter	
Model No.	TEW-228PI	
EUT Condition	<input checked="" type="checkbox"/> Engineering sample; <input type="checkbox"/> Pre-production; <input type="checkbox"/> Final production (Sample # C51638)	
Results	<b>Compliance</b> (As detailed within this report)	
Date	04/30/2003 (month / day / year) (Sample received) 05/15/2003 (month / day / year) (Test)	
Prepared by		Project Engineer (Jack Tsai)
Authorized by		General Manager (Frank Tsai)
Issue date	February 21, 2004	(month / day / year)
<b>Modifications</b>	<b>None</b>	
Tested by	Training Research Co., Ltd.	
Office at	No. 255, Nan Yang Street, Shijr City, Taipei Hsien 221, Taiwan	
Laboratory at	1F, No. 255, Nan Yang Street, Shijr City, Taipei Hsien 221, Taiwan	
Open site at	No. 15, Lane 530, Balian Rd., Sec. 1, Shijr City, Taipei Hsien 221, Taiwan	

**Conditions of issue:**

**This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.**

**★ Aut. No. ELA 131**

***Generally Statement:***

**The results appear in the following order:**

Electromagnetic compatibility and radio spectrum matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services;

**Part 1:** Common Technical requirements

**Part 17:** Specific conditions for Wideband data and HIPERLAN equipment.

The results exhibits below only apply to particular samples tested and to the specific tests carried out, as detailed in this Test Report. The issue of this Test Report does not indicate any measure of Approval, Certification, Supervision, Control or Surveillance by Training Research Co., Ltd. of any product. No extract, abridgement or abstraction from a Test Report may be published or used to advertise a product without the written consent of the Director, Training Research Co., Ltd. who reserves the absolute right to agree or reject all or any of the details of any item of publicity for which consent may be sought.

## Contents

<b>CHAPTER 0</b>	<b>EMISSION AND SUSCEPTIBILITY STANDARDS .....</b>	<b>5</b>
	EMISSION STANDARDS .....	5
	SUSCEPTIBILITY STANDARDS .....	5
<b>CHAPTER 1</b>	<b>INTRODUCTION .....</b>	<b>6</b>
	DESCRIPTION OF EUT.....	6
	TEST METHOD .....	6
	LIST OF SUPPORT EQUIPMENT .....	7
<b>CHAPTER 2</b>	<b>EMISSION AND IMMUNITY REQUIREMENTS</b>	
	<b>OVERVIEW .....</b>	<b>10</b>
	EMISSION (ETSI EN 301 489-1).....	10
	IMMUNITY (ETSI EN 301 489-1) .....	11
<b>CHAPTER 3</b>	<b>PERFORMANCE CRITERIA.....</b>	<b>12</b>
	ETSI EN 301 489-17, SUBCLAUSE 6.2 .....	12
<b>CHAPTER 4</b>	<b>ELECTROSTATIC DISCHARGES IMMUNITY TEST ...</b>	<b>18</b>
	ESD TEST INFORMATION:.....	18
	EN 61000-4-2 PHOTO OF TEST SET-UP.....	20
<b>CHAPTER 5</b>	<b>RADIO FREQUENCY IMMUNITY TEST (RS) .....</b>	<b>21</b>
	RS TEST INFORMATION: .....	21
	EN 61000-4-3 PHOTO OF TEST SET-UP.....	23
<b>CHAPTER 6</b>	<b>ELECTRIC FAST TRANSIENT/BURST REQUIREMENTS</b>	
	<b>TEST.....</b>	<b>24</b>
	EFT TEST INFORMATION: .....	24
	EN 61000-4-4 PHOTO OF TEST SET-UP.....	26

<b>CHAPTER 7 SURGE IMMUNITY TEST .....</b>	<b>27</b>
SURGE TEST INFORMATION: .....	27
EN 61000-4-5 PHOTO OF TEST SET-UP.....	29
<b>CHAPTER 8 CONTINUOUS WAVE VOLTAGE IMMUNITY TEST ...</b>	<b>30</b>
CS TEST INFORMATION: .....	30
TEST INSTRUMENTS: .....	32
EN 61000-4-6 PHOTO OF TEST SET-UP.....	33
<b>CHAPTER 9 VOLTAGE DIP / INTERRUPTION TEST.....</b>	<b>34</b>
DIP TEST INFORMATION:.....	34
EN 61000-4-11 PHOTO OF TEST SET-UP.....	35
<b>CHAPTER 10 HARMONICS TEST.....</b>	<b>36</b>
<b>CHAPTER 11 VOLTAGE FLUCTUATION AND FLICKER TEST .....</b>	<b>37</b>
<b>CHAPTER 12 CONDUCTED EMISSION TEST .....</b>	<b>38</b>
TEST CONDITION AND SETUP.....	38
LIST OF TEST INSTRUMENT .....	38
CONDUCTED EMISSION PHOTO OF TEST SET-UP.....	39
TEST RESULT OF CONDUCTED EMISSIONS FOR MAINS POWER .....	40
<b>CHAPTER 13 RADIATED EMISSION TEST.....</b>	<b>42</b>
TEST CONDITION AND SETUP.....	42
LIST OF TEST INSTRUMENT .....	42
TEST RESULT OF SPURIOUS RADIATED EMISSIONS.....	43

## *Chapter 0 Emission and Susceptibility Standards*

### *Emission Standards*

Emission Standard	European Standard	International Standard
( )	EN 61000-6-3/2001	IEC 61000-6-1/1996
( )	EN 61000-6-4/2001	IEC 61000-6-1/1997
( )	EN 50081-1/1992	
( )	EN 50081-1/8.93	
( )	EN 55014/4.93	CISPR 14: 1993
( )	EN 55015/12.93	CISPR 15: 1992
( )	EN 55011/91	CISPR 11: 1990
( X )	EN 55022/98	CISPR 22: 1997
( X )	EN 61000-3-2/2000	IEC 61000-3-2: 2000 (Modified)
( X )	EN 61000-3-3/1995	IEC 61000-3-3: 1994 + A1/2001

### *Susceptibility Standards*

Susceptibility Standard	European Standard	International Standard
( )	EN 61000-6-1/2001	IEC 61000-6-1/1997
( )	EN 61000-6-2/2001	IEC 61000-6-1/1999
( )	EN 50082-1/1997	
( )	EN 50082-2/1994	
( )	EN 55024/1998	CISPR 24/1997
( )	EN 55020/2002	CISPR 20/2002
( X )	EN 61000-4-2:1995	IEC 61000-4-2:1995
( X )	EN 61000-4-3:1996	IEC 61000-4-3:1995
( X )	EN 61000-4-4:1995	IEC 61000-4-4:1995
( X )	EN 61000-4-5:1995	IEC 61000-4-5:1995
( X )	EN 61000-4-6:1996	IEC 61000-4-6:1996
( )	EN 61000-4-8:1993	IEC 61000-4-8:1993
( X )	EN 61000-4-11:1994	IEC 61000-4-11:1994
( )	EN 55014-2:1993	CISPR/F (Sec) 159

## *Chapter 1 Introduction*

### *Description of EUT*

<b>Product Name</b>	:	802.11b Wireless LAN PCI Adapter
<b>Model Name</b>	:	TEW-228PI
<b>Frequency Range</b>	:	2.400GHz ~ 2.4835GHz
<b>Operating Frequency</b>	:	2.412GHz ~ 2.472GHz
<b>Support Channel</b>	:	13 Channels
<b>Modulation Skill</b>	:	DBPSK, DQPSK, CCK
<b>Power Type</b>	:	By the Protocol Control Information interface of computer
<b>Data Cable</b>	:	None

### *Test Method*

1. Put the EUT into a personal computer's PCI bus and screw it.
2. Using the LAN port of computer and software provided by the manufacturer to control the EUT. The test is performed under those specific conditions.
3. Then making EUT to the following mode.
  - (a) EMI testing: making EUT to the linking mode with support equipments
  - (b) EMS testing: same as above



### **List of Support Equipment**

In order to construct the minimum testing, following equipment were used as the support units.

**PC** : **IBM 6840**  
Model No. : 6840MJV  
Serial No. : 96CC 0BT  
FCC ID : DoC Approved  
檢磁 : 3892I279  
Power type : 100 ~ 127/ 200 ~ 240VAC, 4A/2A 50/60 Hz, Switching  
Power cord : Non-shielded, 182cm length, Plastic hood, No ferrite core

**PC** : **ASUSTek Computer Inc.**  
Model No. : Terminator P4 AB-T2 101  
Serial No. : 2CPMA31477  
FCC ID : DoC Approved  
BSMI : R31018  
Power type : 100 ~ 127/ 200 ~ 240VAC, 4A/2A 47/63 Hz, Switching  
Power cord : Non-shielded, 182cm length, Plastic hood, No ferrite core

**Monitor** : **HP 15' Color Monitor**  
Model No. : D2827A  
Serial No. : KR91161716  
FCC ID : C5F7NFCMC1518X  
檢磁 : 3872B039  
Power type : 110 ~ 240 VAC / 50 ~ 60 Hz, Switching  
Power cord : Shielded, 1.83m long, No ferrite core  
Data cable : Shielded, 1.46m long, with two ferrite cores

**Keyboard** : **HP**  
Model No. : 5181  
Serial No. : BE21700405  
FCC ID : Doc Approved  
檢磁 : 3892C981  
Power type : By PC  
Data cable : Shielded, 1.70m length, with ferrite core

**PS/2 Mouse** : **HP**  
Model No. : M-S34  
Serial No. : LZB90714106  
FCC ID : DZL211029  
檢磁 : 4862A011  
Power type : By PC  
Power cord : Non-shielded, 1.88m long, No ferrite core

**Printer** : **HP**  
Model No. : C6464A  
Serial No. : TH16LEB5PK  
FCC ID : N/A, DoC Approved  
檢磁 : 3892H381  
Power type : Switching Adapter  
Power cord : Non-shield, 173cm long, No ferrite core  
(between adaptor and AC source)  
Non-shielded, 180cm long, with ferrite core  
(between printer and adaptor)  
Data cable : Shielded, 1.70m long, No ferrite core

**Fax/Modem** : **Aceex**  
Model No. : DM-1414  
Serial No. : 9010582  
FCC ID : IFAXDM1414  
Power type : 110 VAC / 50 ~ 60 Hz, Switching  
Power Cord : Non-shielded, 1.90m long, Plastic hoods, and no ferrite bead  
Data Cable : RS-232→ Shielded, 1.30m long, Metal hoods , No bead  
RJ-11Cx2→ Non-shielded, 7' long, Plastic hoods, No bead

**USBGamepad** : **Rockfire**  
Model No. : QF-337UV  
Serial No. : KR91379759  
FCC ID : None (CE approval)  
Data cable : Shielded, 1.80m long, No ferrite core

**Notebook** : **ASUSTek Computer**  
Model No. : AB00F  
Serial No. : 24NP016361  
FCC ID : DoC Approved  
BSMI : 41016012  
Power type : 100 ~ 240VAC, 1A 50/60 Hz, Switching

**Adaptor of**

**Notebook** : **LITE-ON Electronics, Inc.**  
Model No. : PA-1530-01  
Serial No. : 00151184  
FCC ID : DoC Approved  
檢磁 : 3882B259  
Power cable : Non-shielded, 1.72m length, Plastic hood, No ferrite core  
(Between power adaptor and AC power source)  
Power cable : Shielded, 1.48m length, Plastic hood, with ferrite core  
(Between power adaptor and notebook)

**WLAN Card** : **Gemtek Technology Co., Ltd.**  
Model No. : C911003  
FCC ID : MXF-C911003

## Chapter 2 Emission and Immunity Requirements Overview

### *Emission (ETSI EN 301 489-1)*

Phenomenon	Application	Equipment test requirement			Reference Subclause in the present document
		Radio and ancillary equipment for fixed use (base station equipment)	Radio and ancillary equipment for vehicular use (mobile equipment)	Radio and ancillary equipment for portable use (portable equipment)	
Radiated emission	Enclosure of ancillary equipment	Applicable for stand alone testing	Applicable for stand alone testing	Applicable for stand alone testing	8.2
Conducted emission	DC power input/output port	Applicable	Applicable	Not applicable	8.3
Conducted emission	AC mains input/output port	Applicable	Not applicable	Not applicable	8.4
Harmonic current emissions	AC mains input port	Applicable	Not applicable	Not applicable	8.5
Voltage fluctuations and flicker	AC mains input port	Applicable	Not applicable	Not applicable	8.6

**Immunity (ETSI EN 301 489-1)**

Phenomenon	Application	Equipment test requirement			Reference Subclause in the present document
		Radio and ancillary equipment for fixed use (base station equipment)	Radio and ancillary equipment for vehicular use (mobile equipment)	Radio and ancillary equipment for portable use (portable equipment)	
RF electromagnetic field ( 80MHz to 1GHz)	Enclosure	Applicable	Applicable	Applicable	9.2
Electrostatic discharge	Enclosure	Applicable	Applicable	Applicable	9.3
Fast transients common mode	Signal, telecommunication and control ports, DC and AC power ports	Applicable	Not applicable	Not applicable	9.4
RF common mode 0.15 MHz to 80MHz	Signal, telecommunication and control ports, DC and AC power ports	Applicable	Applicable	Not applicable	9.5
Transients and surges	DC power input ports	Not applicable	Applicable	Not applicable	9.6
Voltage dips and interruptions	AC mains power input ports	Applicable	Not applicable	Not applicable	9.7
Surges, line to line and line ground	AC mains power input ports, telecommunication ports	Applicable	Not applicable	Not applicable	9.8

### Chapter 3 Performance Criteria

**ETSI EN 301 489-17, Subclause 6.2**

<b>Table 1 Performance criteria</b>		
<b>Criteria</b>	<b>During test</b>	<b>After test</b>
<b>A</b>	Shall operate as intended May show degradation of performance ( <b>NOTE 1</b> ) Shall be no loss of function Shall be no unintentional transmissions	Shall operate as intended Shall be no degradation of performance ( <b>NOTE 2</b> ) Shall be no loss of function Shall be no loss of stored data or user programmable functions
<b>B</b>	May show loss of function (one or more) May show degradation of performance ( <b>NOTE 1</b> ) No unintentional transmissions	Function shall be self-recoverable Shall operate as intended after recovering Shall be no degradation of performance ( <b>NOTE 2</b> ) Shall be no loss of stored data or user programmable functions
<b>C</b>	May be loss of function (one or more)	Functions shall be recoverable by the operator Shall operate as intended after recovering Shall be no degradation of performance ( <b>NOTE 2</b> )

**NOTE 1:**

Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

**NOTE 2:**

No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

## ETSI EN 301 489-1

### Performance criteria for Continuous phenomena applied Transmitters (CT)

If no further details are given in the relevant part of the present document dealing with the particular type of radio equipment, the following *general performance criteria for continuous phenomena* shall apply.

#### **During and after the test:**

The apparatus shall continue to operate as intended. No *degradation of performance* or *loss of function* is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intends. In some cases this permissible performance level may be replaced by a permissible loss of performance.

#### **During the test:**

The EUT shall not unintentionally transmit or change its actual operating state and stored data. If the *minimum performance level* or the *permissible loss* is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect form the apparatus if used as intended.

For ancillary equipment the pass/failure criteria supplied by the manufacturer (see subclause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

### Performance criteria for Transient phenomena applied Transmitters (TT)

If no further details are given in the relevant part of the present document dealing with the particular type of radio equipment, the following *general performance* criteria for transient phenomena shall apply.

#### **After the test:**

The apparatus shall continue to operate as intended. No *degradation of performance* or *loss of function* is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intends. In some cases this permissible performance level may be replaced by a permissible loss of performance.

#### **During the test:**

The EMC exposure to an electromagnetic phenomenon, a *degradation of performance* is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.



If the minimum performance level or the permissible loss is not specified by the manufacturer, Then either of these may be deduced from the product description and documentation and what the user may reasonably expect form the apparatus if used as intended.

For ancillary equipment the pass/failure criteria supplied by the manufacturer (see subclause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

**Performance criteria for Continuous phenomena applied Receivers (CR)**

If no further details are given in the relevant part of the present document dealing with the particular type of radio equipment, the following *general performance* criteria for continuous phenomena shall apply.

**During and after the test:**

The apparatus shall continue to operate as intended. No *degradation of performance* or *loss of function* is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intends. In some cases this permissible performance level may be replaced by a permissible loss of performance.

**During the test:**

The EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level or the permissible loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect form the apparatus if used as intended.

For ancillary equipment the pass/failure criteria supplied by the manufacturer (see subclause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

**Performance criteria for Transient phenomena applied Receivers (TR)**

If no further details are given in the relevant part of the present document dealing with the particular type of radio equipment, the following *general performance* criteria for transient phenomena shall apply.

**After the test:**

The apparatus shall continue to operate as intended. No *degradation of performance* or *loss of function* is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intends. In some cases this permissible performance level may be replaced by a permissible loss of performance.

**During the test:**

The EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect form the apparatus if used as intended.

For ancillary equipment the pass/failure criteria supplied by the manufacturer (see subclause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

## **ETSI EN 301 489-17**

### **Performance criteria for Continuous phenomena applied Transmitters (CT)**

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **Performance criteria for Transient phenomena applied Transmitters (TT)**

The performance criteria B shall apply, except for voltage dips of 100ms and voltage interruptions of 5000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In system using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **Performance criteria for Continuous phenomena applied Receivers (CR)**

The performance criteria A shall apply.

Where the EUT is a *transceiver*, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of test is correctly interpreted.

### **Performance criteria for Transient phenomena applied Receivers (TR)**

The performance criteria B shall apply, except for voltage dips of 100ms and voltage interruptions of 5000 ms duration, for which performance criteria C shall apply.

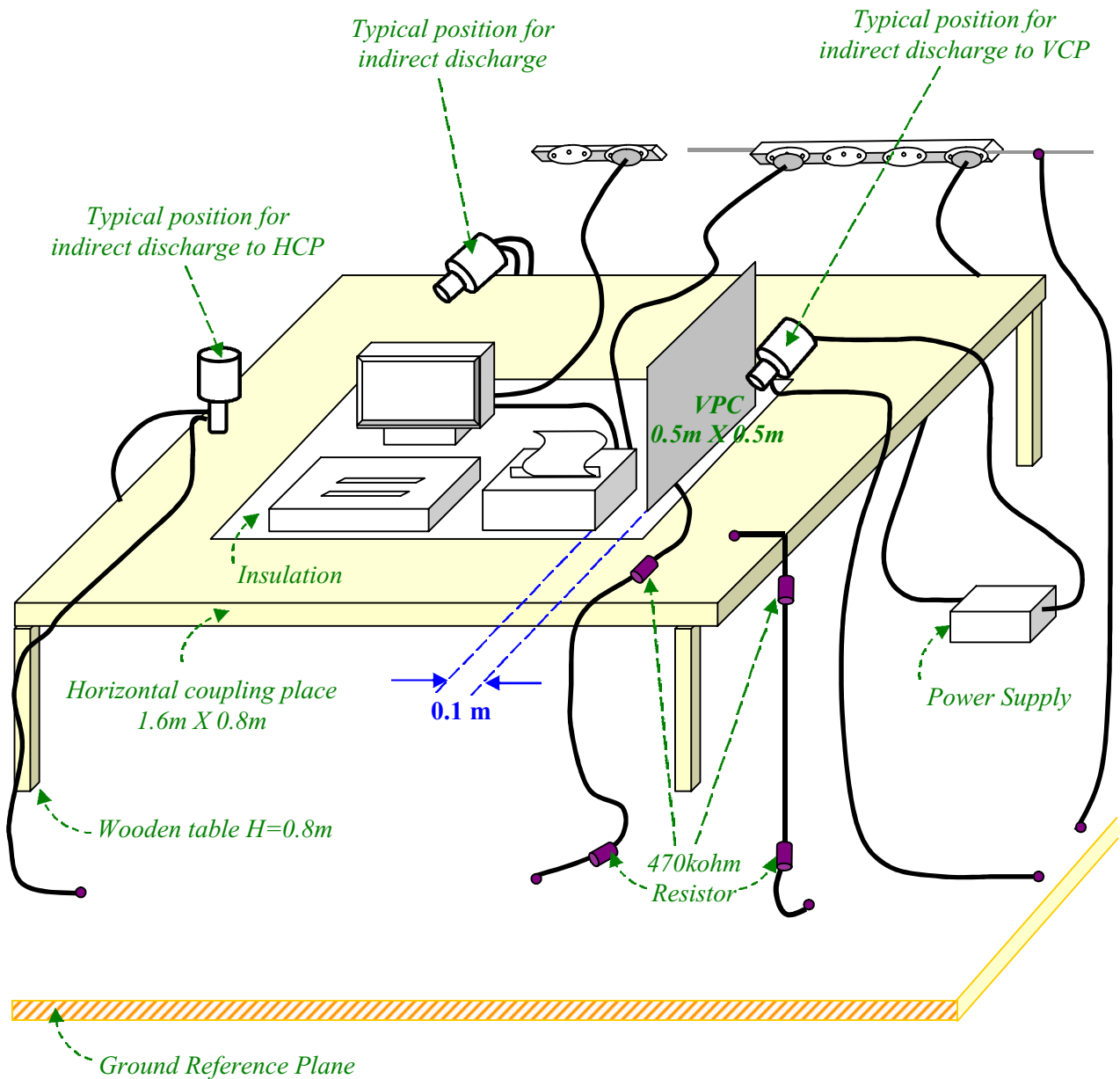
Where the EUT is a *transceiver*, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of test is correctly interpreted.

## Chapter 4 Electrostatic Discharges Immunity Test

### ESD Test information:

Test setup: Shielded room, According to EN 61000-4-2

Test setup for table-top equipment at laboratory tests:



**Test levels: (Apply Level 2 and Level 3)**

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

NOTE: “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.

**Test Voltage:** ( X ) 4KV contact discharge ( X ) 8KV air discharge

**Indirect Discharges:** ( X ) HCP ( X ) VCP

**Polarity:** ( X ) Positive ( X ) Negative

**Test mode:** Ref. Test method of Chapter 1

**Test points:** Each connector and enclosure of EUT.

**Test instruments:**

Name	Model Number	Serial Number	Selected
Best Plus BURST ESD SURGE TRANSIENTS	Best Plus V6.2	199749-019SC	
BEST EMC Test Instrument	BEST EMC V2.3 (-8, -9)	199918-006SC	
KeyTek Instrument ESD Test system	Series 2000	9204303/9204310 9209226/9301395	X
NoiseKen Electrostatic Discharge Simulator	ESS-100L(A)	2100C03605	
NoiseKen Electrostatic Discharge Gun	TC-815P	2100C03566	

**Comment:**

Performance Criteria: **(According to ETSI EN 301 489-1)**

( X ) Enclosure	( ) CT	( X ) TT	( ) CR	( X ) TR
( X ) Signal and control ports	( ) CT	( X ) TT	( ) CR	( X ) TR

***EN 61000-4-2 PHOTO OF TEST SET-UP***

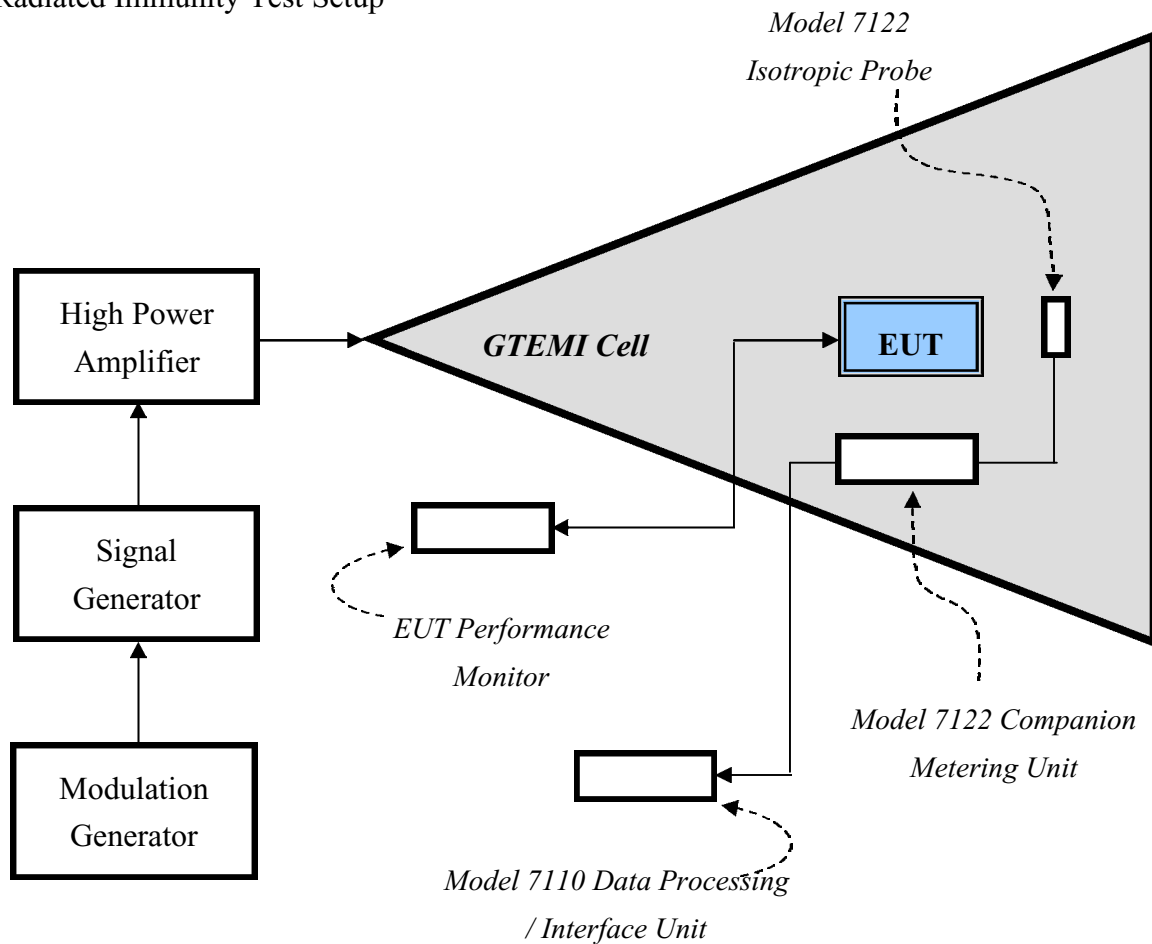


## Chapter 5 Radio Frequency Immunity Test (RS)

**RS Test information:**

Test setup: GTEM cell

Radiated Immunity Test Setup



Test levels: **(Apply Level 2)**

Level	Test Field Strength (V/m)
1	1
2	3
3	10
X	Special

NOTE: the “X” is an open test level. This level may be given in the product specification.

**Field strength:**     3V/m at 80 ~ 800 MHz  
                            10V/m at 800 ~ 960 MHz  
                            3V/m at 960 ~ 1000 MHz  
                            10V/m at 1400 ~ 2000 MHz

**Modulation:**         FM %  
                            80% AM Modulation with 1KHz  
                            80% AM Modulation with 400Hz when signal is modulated at 1kHz  
                            900 KHz± 5 KHz with PM 200 Hz and 100% depth

**Step size:**          1% step size

**Sweep time:**        2.5 Second

**Test mode:**       Ref. Test method of Chapter 1

**Test instruments:**

Name	Model Number	Serial Number	Selected
EMCO GTEM	5317	9411-1123	X
EMCO Probe	7122	9406-1194	X
EMCO METERING UNIT	7122	9406-1194	X
EMCO data interface	7110	9410-1273	X
HP Personal Computer	D3178A	3438S00486	X
HP Signal Generator	8657B	2928U00286	X
HP Signal Generator	83711A	3429A00434	X
IFI Wideband Amplifier	SMX50	467-0795	X
Min-circuit Amplifier	GFL-2500VH	N/A	X
WG radiation meters	EMC-20	BN2244129	X
WG E-filed	2244 / 90.20	Z-0001	X
HP Transmission Test Set	4935A	3115A24046	X
B & K Precision Sound Level Meter	Type 2232	1810564	X

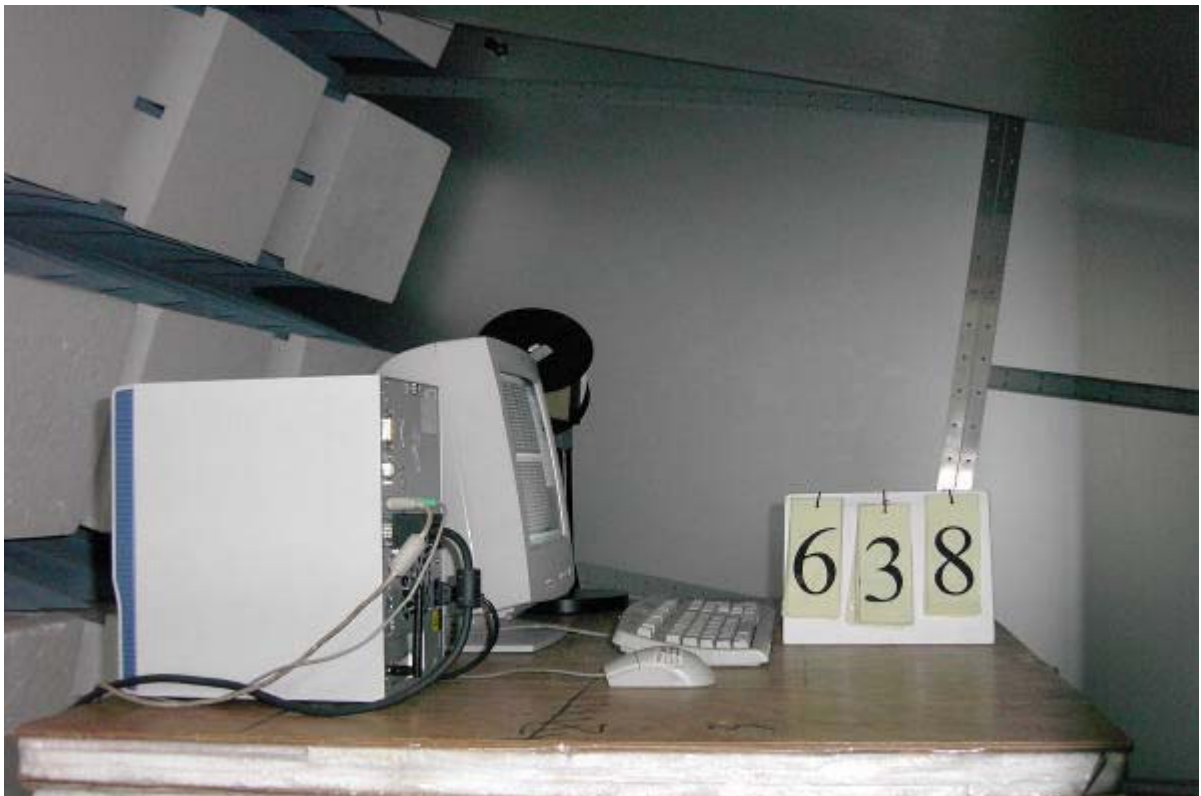
**Comment:**

Performance Criteria: **(According to ETSI EN 301 489-1)**

Enclosure     CT     TT     CR     TR



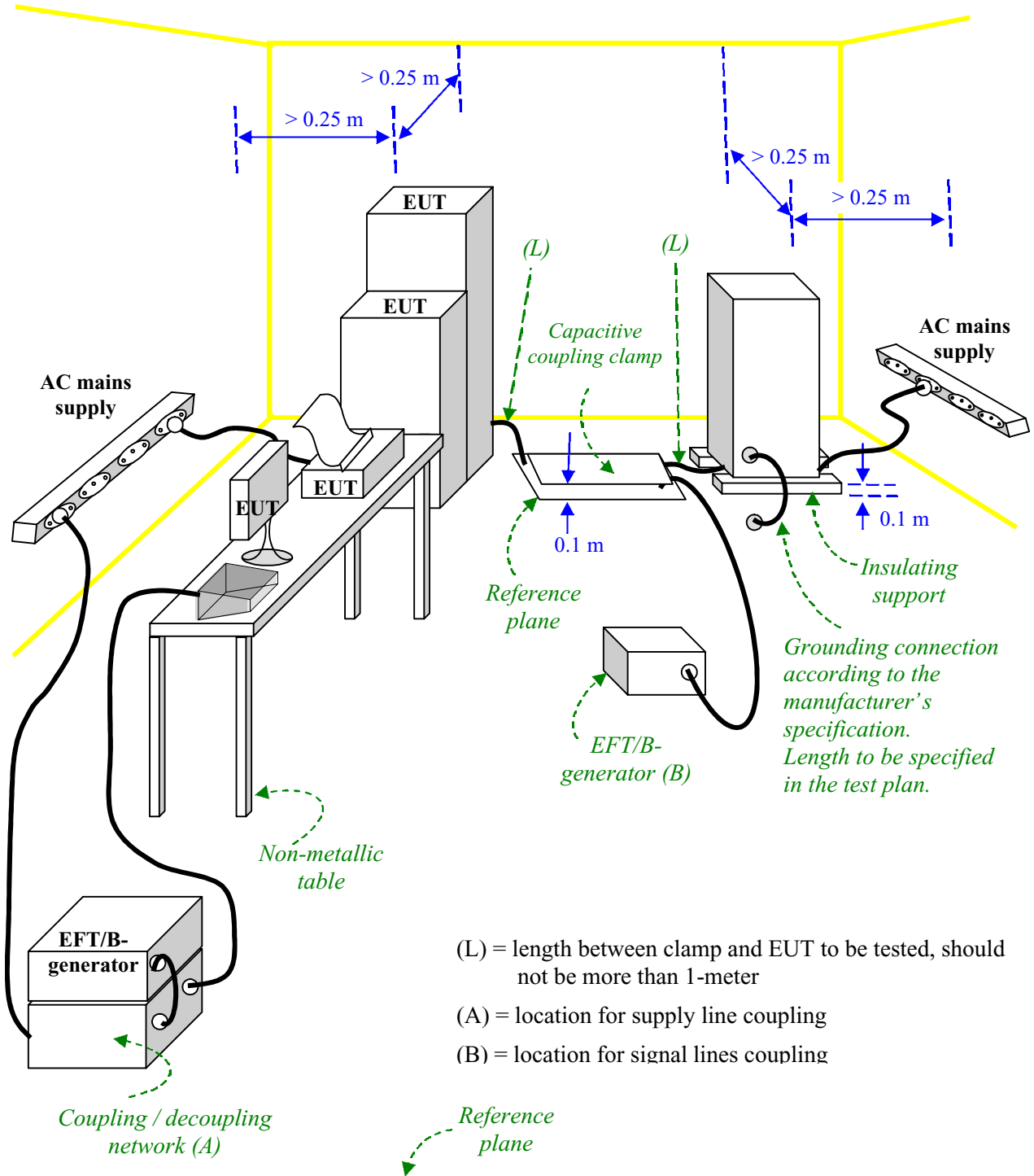
**EN 61000-4-3 PHOTO OF TEST SET-UP**



## Chapter 6 Electric Fast Transient/Burst Requirements Test

### EFT Test information:

General test set-up for laboratory type tests:



**Test levels: (Apply Level 2)**

Open-circuit output test voltage ( $\pm 10\%$ ) and repetition rate of the impulses ( $\pm 20\%$ )				
Level	On power supply port, PE		On 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

NOTE: the "X" is an open level. The level has to be specified in the dedicated equipment specification

**Test setup:** According to EN 61000-4-4

**Test Voltage:** DC Power line ( ) 0.5 KV, 5 KH  
 AC Power line ( X ) 1 KV, 5 KHz  
 Signal & Control line ( ) 0.5 KV, 5 KHz; ( ) 1 KV, 5 KHz

**Polarity:** ( X ) Positive ( X ) Negative

**Test Duration:** ( X ) 1 minute ( ) 3 minutes

**Connected lines:** ( ) Power line shielded ( X ) Power line non-shielded  
 ( ) Signal & Control line non-shielded ( ) Signal & Control line shielded

**Test mode:** Ref. Test method of Chapter 1.

**Test instrument:**

Name	Model Number	Serial Number	Selected
Best Plus BURST ESD SURGE TRANSIENTS	Best Plus V6.2	199749-019SC	
BEST EMC Test Instrument	BEST EMC V2.3 (-8, -9)	199918-006SC	
KeyTek Instrument EFT Test system	E412	9505206/505207	X

**Comment:**

Performance Criteria: **(According to ETSI EN 301 489-1)**

( ) Signal and control ports	( )CT	( )TT	( ) CR	( )TR
( ) DC power input ports	( )CT	( )TT	( ) CR	( )TR
( X ) AC mains input ports	( )CT	( X )TT	( ) CR	( X )TR

***EN 61000-4-4 PHOTO OF TEST SET-UP***





**Test instrument:**

Name	Model Number	Serial Number	Selected
Best Plus BURST ESD SURGE TRANSIENTS	Best Plus V6.2	199749-019SC	
BEST EMC Test Instrument	BEST EMC V2.3 (-8, -9)	199918-006SC	
KeyTek Pulsed-EMI Test System	E103, 501B, E502B, E503, E505A, E4552A	0008260 ~0008264, 0008254	X

**Comment:**

Performance Criteria: **(According to ETSI EN 301 489-1)**

---

<input checked="" type="checkbox"/> AC mains input ports	<input type="checkbox"/> CT	<input checked="" type="checkbox"/> TT	<input type="checkbox"/> CR	<input checked="" type="checkbox"/> TR
<input type="checkbox"/> Signal and control ports	<input type="checkbox"/> CT	<input type="checkbox"/> TT	<input type="checkbox"/> CR	<input type="checkbox"/> TR

---

***EN 61000-4-5 PHOTO OF TEST SET-UP***

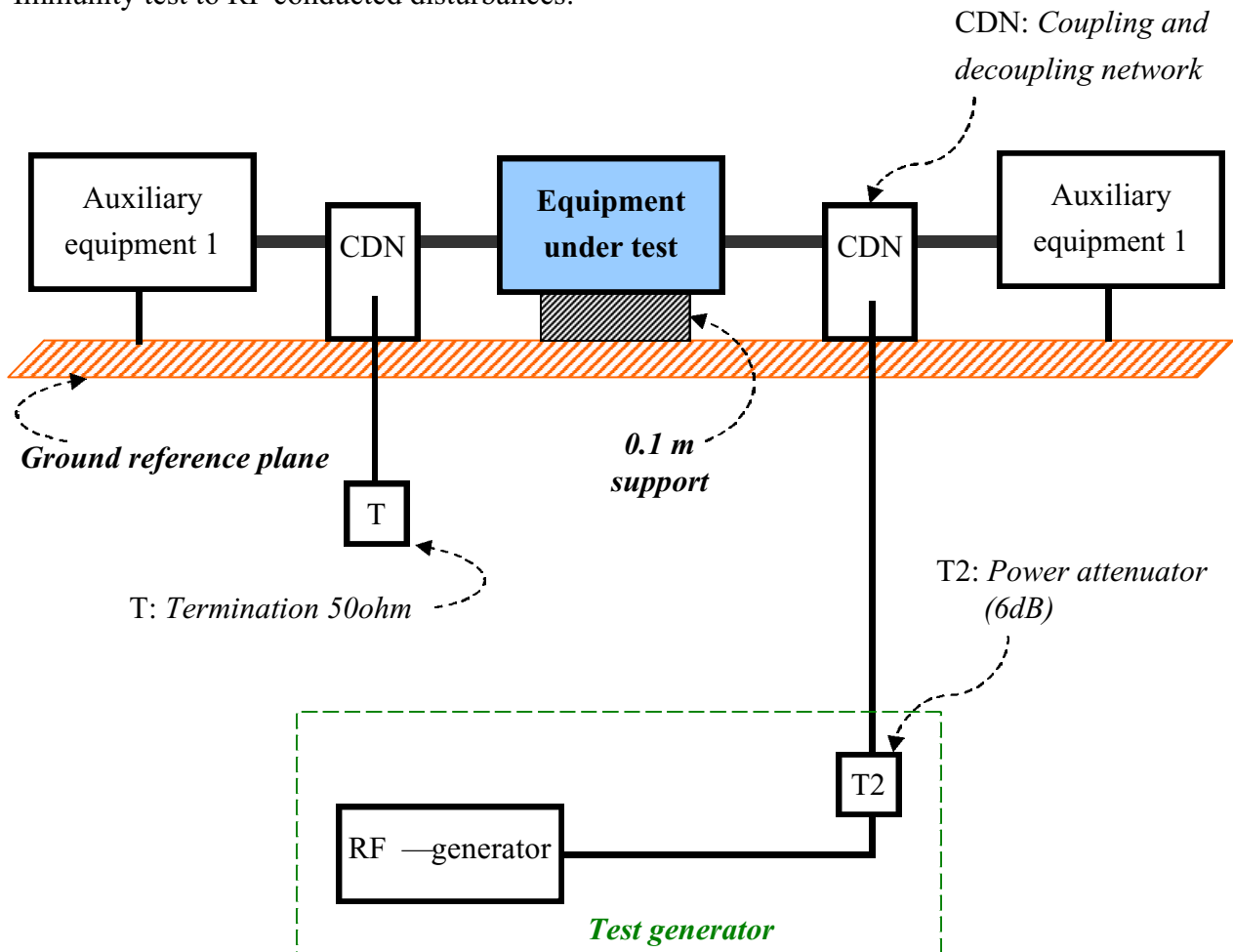


## Chapter 8 Continuous Wave Voltage Immunity Test

**CS Test information:**

**Test setup:** According to EN 61000-4-6

Immunity test to RF conducted disturbances:



**Test levels: (Apply Level 2)**

Frequency range 150kHz to 80MHz		
Level	Voltage level (e.m.f.)	
	$U_0$ [dB(μv)]	$U_0$ [V]
1	120	1
2	130	3
3	140	10
X	Special	

NOTE: the “X” is an open test level.



**Test Frequency:** ( X ) 0.15 ~ 80MHz

**Modulation:** ( ) FM %  
( X ) 80% AM Modulation with 1kHz  
( ) 80% AM Modulation with 400Hz when signal is modulated at 1kHz  
( ) 900 MHz $\pm$  5 MHz with PM 200 Hz and 50% duty cycle

**Step size:** ( X ) 50kHz step size in the frequency range 150kHz to 5MHz and  
1% frequency increment of the momentary frequency in the frequency  
range 5MHz to 80MHz  
( ) 500kHz step size in the frequency range 150kHz to 5MHz and  
10% frequency increment of the momentary frequency in the frequency  
range 5MHz to 80MHz for **non-continuous duty cycle**

**Field strength:** ( ) 1Vrms ( X ) 3Vrms ( ) 10Vrms

**Connected lines:** ( ) Power line shielded  
( X ) Power line non-shielded  
( ) Signal & Control line non-shielded  
( ) Signal & Control line shielded

**Test mode:** Ref. Test method of Chapter 1

**Test instruments:**

Name	Model Number	Serial Number	Selected
FRANKONIA EMV-Mess-System	CIT-10	103A3113	X
FRANKONIA CDN	M2+M3	A3011015	X
FRANKONIA CDN	T2-801	A3010002	
FRANKONIA CDN	T4-801	A3015004	
FRANKONIA CDN	S1-801	A3005002	
SCHAFFNER FM-Koppelzange	KEMZ 801	17045	
SCHAFFNER RF-SYNTHE SIZERIAMP21FIER	NSG 2070-1	1020	
SCHAFFNER CDN	M325	13773	
SCHAFFNER CDN	M216	15604	
SCHAFFNER CDN	T004	15230	
SCHAFFNER CDN	S501	15167	
SCHAFFNER FM-Koppelzange	KEMZ 801	14301	
HP Transmission Test Set	4935A	3115A24046	
B & K Precision Sound Level Meter	Type 2232	1810564	

**Comment:**

**Performance Criteria:** (According to ETSI EN 301 489-1)

<input type="checkbox"/> Antenna port	<input type="checkbox"/> CT	<input type="checkbox"/> TT	<input type="checkbox"/> CR	<input type="checkbox"/> TR
<input type="checkbox"/> Signal and control ports	<input type="checkbox"/> CT	<input type="checkbox"/> TT	<input type="checkbox"/> CR	<input type="checkbox"/> TR
<input type="checkbox"/> DC power input ports	<input type="checkbox"/> CT	<input type="checkbox"/> TT	<input type="checkbox"/> CR	<input type="checkbox"/> TR
<input checked="" type="checkbox"/> AC mains input ports	<input checked="" type="checkbox"/> CT	<input type="checkbox"/> TT	<input checked="" type="checkbox"/> CR	<input type="checkbox"/> TR

***EN 61000-4-6 PHOTO OF TEST SET-UP***



## Chapter 9 Voltage DIP / Interruption Test

**DIP Test information:**

**Test setup:** According to EN 61000-4-11

**Voltage dips:**                    ( X ) 30%, 0.01 Second  
     (   ) 60%, 0.1 Second

**Voltage interruptions:** ( X ) > 95%, 5 Seconds

**Test mode:** Ref. Test method of Chapter 1

**Test instruments:**

Name	Model Number	Serial Number	Selected
Best Plus BURST ESD SURGE TRANSIENTS	Best Plus V6.2	199749-019SC	
BEST EMC Test Instrument	BEST EMC V2.3 (-8, -9)	199918-006SC	
Partner EMS Tester	Transienter-1000	PIO	X

**Comment:**

**Performance Criteria: (According to ETSI EN 301 489-1)**

Dips 30%:                    ( X ) CT                    (   ) TT                    ( X ) CR                    (   ) TR  
 Dips 60%:                    (   ) CT                    (   ) TT                    (   ) CR                    (   ) TR  
 Interruptions >95%: (   ) CT                    (   ) TT                    (   ) CR                    (   ) TR

No unintentional responses shall occur at the end of the test;

(   ) Event of loss of function(s)                    (   ) Event of loss of user stored data

**Performance Criteria: (According to ETSI EN 301 489-17)**

Dips 60%, 100 ms :                    (   ) A                    (   ) B                    ( X ) C  
 Interruptions >95%, 5 000 ms:                    (   ) A                    (   ) B                    ( X ) C

***EN 61000-4-11 PHOTO OF TEST SET-UP***



## **Chapter 10 Harmonics Test**

**Test information:**

**Test setup:** According to EN 61000-3-2

**Test item:** Quasi – stationary & Fluctuating Current Harmonics Test.

**Test mode:** Ref. Test method of Chapter 1

**Test instrument:**

Name	Model Number	Serial Number	Selected
Harmonic/Flicker Test System	HP 6842A	3531A-00102	X

Test Equipment Settings:	Quasi-stationary Current Harmonics Test	Fluctuating Current Harmonics Test
Line Voltage	230VAC	230VAC
Line Frequency	50Hz	50Hz
Device Class	D	D
Test Limit Overrides	None	None
Total Number of Failures:	None	None
Total Number of Errors:	None	None

**Test Result: Pass**

## ***Chapter 11 Voltage Fluctuation and Flicker Test***

**Test information:**

**Test setup:** According to *EN 61000-3-3*

**Test mode:** Ref. Test method of Chapter 1

**Test instrument:**

Name	Model Number	Serial Number	Selected
Harmonic/Flicker Test System	HP 6842A	3531A-00102	X

**Test Equipment Settings:**

Line Voltage	230VAC
Line Frequency	50Hz
Test Limit Overrides	None
Total Number of Failures:	Pst: (0), Plt: (0)
	Dc: (0), Dmax (0), Dt (0)
Total Number of Errors:	None

**Test Result: Pass**

## Chapter 12 Conducted Emission Test

### Test condition and setup

All the equipment is placed and setup according to *EN 55022*.

(1) Mains power:

The EUT is assembled on a wooden table, which is 80 cm high and placed 40 cm from the back-wall, which is a vertical conducting plane. One LISN is for EUT, the other LISN is for support equipment. They are all placed on the conductive ground. The EUT's LISN connect a line switch box for selecting L1 or L2, then connect to a preamplifier and spectrum.

(2) Telecommunication port:

The EUT is place as mains disturbance test. The communication line connected to ISN and then the measuring receiver connected to the ISN to measured the level of voltage disturbance.

The spectrum scans from 150KHz to 30MHz. Conducted emission levels are detected at *maximum peak mode*. But if the maximum peak mode failed or over *average limit*, it will be measured by *average detection mode*.

While testing the worst-emission plot printed in the *peak detection mode*, and there are up to 6 highest emissions to be recorded. The plot is kept as the original data and not included in the test report.

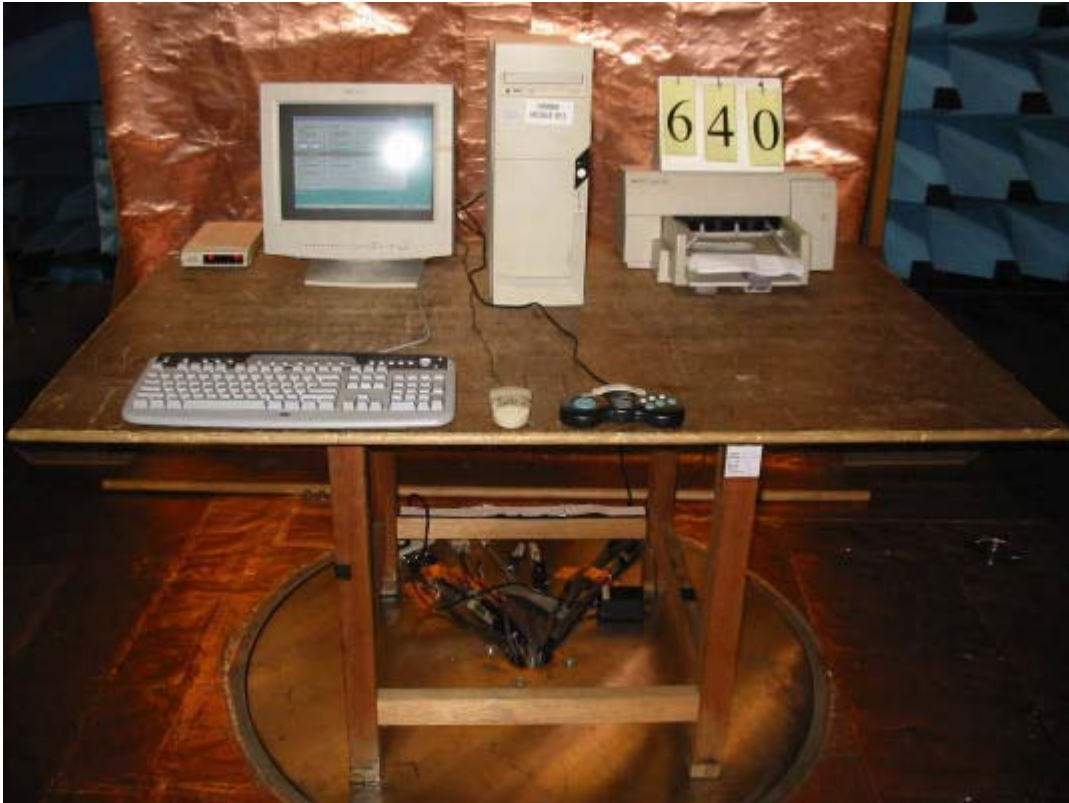
### List of test Instrument

Instrument Name	Model No.	Brand	Serial No.	Calibration Date	
				Last time	Next time
EMI Receiver	8546A	H P	3520A00242	06/28/02	06/28/03
RF Filter Section	85460A	H P	3448A00217	06/28/02	06/28/03
LISN (EUT)	LISN-01	TRC	9912-03,04	06/04/02	06/04/03
LISN (Support E.)	LISN-01	TRC	9912-05	07/15/02	07/15/03
ISN	ISN T400	Schaffner	16596	10/16/02	10/16/03
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	11/20/02	11/20/03

The level of confidence of 95%, the uncertainty of measurement of conducted emission is  $\pm 2.02$  dB.



**CONDUCTED EMISSION PHOTO OF TEST SET-UP**



**Test Result of Conducted Emissions for Mains power**

Test Conditions: Temperature : 23.5 °C Humidity : 60.2 % RH

**Test mode: Operating mode for Detachable antenna of EUT**

<i>Power Connected Emissions</i>					<i>Class B</i>		
<i>Conductor</i>	<i>Frequency (KHz)</i>	<i>Peak (dBμV)</i>	<i>QP (dBμV)</i>	<i>Average (dBμV)</i>	<i>QP-limit (dBμV)</i>	<i>AVG-limit (dBμV)</i>	<i>Margin (dB)</i>
Line 1	205.000	49.29	---	---	64.43	54.43	-5.14
	405.000	40.18	---	---	58.71	48.71	-8.53
	504.000	37.06	---	---	56.00	46.00	-8.94
	587.000	32.65	---	---	56.00	46.00	-13.35
	745.000	29.70	---	---	56.00	46.00	-16.30
	1006.000	31.89	---	---	56.00	46.00	-14.11
	2265.000	29.34	---	---	56.00	46.00	-16.66
	3126.000	29.46	---	---	56.00	46.00	-16.54
Line 2	203.000	48.45	---	---	64.49	54.49	-6.04
	380.000	40.76	---	---	59.43	49.43	-8.67
	409.000	40.02	---	---	58.60	48.60	-8.58
	504.000	37.02	---	---	56.00	46.00	-8.98
	1006.000	34.43	---	---	56.00	46.00	-11.57
	1411.000	29.79	---	---	56.00	46.00	-16.21
	1836.000	29.77	---	---	56.00	46.00	-16.23
	2265.000	29.75	---	---	56.00	46.00	-16.25

**\*The reading amplitudes are all under limit.**

**Test mode: Standby mode for Detachable antenna of EUT**

<i>Power Connected Emissions</i>					<i>Class B</i>		
<i>Conductor</i>	<i>Frequency (KHz)</i>	<i>Peak (dBμV)</i>	<i>QP (dBμV)</i>	<i>Average (dBμV)</i>	<i>QP-limit (dBμV)</i>	<i>AVG-limit (dBμV)</i>	<i>Margin (dB)</i>
Line 1	203.000	47.38	---	---	64.49	54.49	-7.11
	409.000	41.33	---	---	58.60	48.60	-7.27
	504.000	36.36	---	---	56.00	46.00	-9.64
	581.000	31.94	---	---	56.00	46.00	-14.06
	998.000	31.68	---	---	56.00	46.00	-14.32
	1411.000	29.36	---	---	56.00	46.00	-16.64
	1854.000	30.12	---	---	56.00	46.00	-15.88
	3510.000	30.45	---	---	56.00	46.00	-15.55
Line 2	205.000	48.89	---	---	64.43	54.43	-5.54
	373.000	38.65	---	---	59.63	49.63	-10.98
	504.000	36.63	---	---	56.00	46.00	-9.37
	581.000	33.09	---	---	56.00	46.00	-12.91
	738.000	31.11	---	---	56.00	46.00	-14.89
	911.000	32.42	---	---	56.00	46.00	-13.58
	1333.000	30.38	---	---	56.00	46.00	-15.62
	2243.000	29.43	---	---	56.00	46.00	-16.57

**\*The reading amplitudes are all under limit.**

## Chapter 13 Radiated Emission Test

### Test condition and setup

**Pretest:** Prior to the final test (OATS test), the EUT is placed in a shielded enclosure, and scan from 30MHz to 1GHz. This is done to ensure the radiation is exactly emitted from the EUT. **Final test:** Final radiation measurements are made on a **10 – meter, open-field** test site. The EUT is placed on a nonconductive table, which is 0.8m height, the top surface is 1.0 x 1.5 meter. The entire placement is according to EN 55022.

The whole range antenna is used to measure frequency from 30 MHz to 1GHz. The final test is used the spectrum analyzer (EMI Receiver). Measure more than six top marked frequencies generated from pretest by computer step by step at each frequency.

The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meters to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

Appropriated preamplifier which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading. The spectrum analyzer's 6dB bandwidth is set to 120 kHz, and the EUT is measured at quasi-peak (below 1GHz) mode.

If the emission is close to the frequency band of ambient, the tester will recheck the data and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from shielded room will be taken as the final data.

### List of test Instrument

Instrument Name	Model No.	Brand	Serial No.	Calibration Date	
				Last time	Next time
Spectrum analyzer	8568B	H P	3004A18617	06/19/02	06/19/03
Quasi-peak Adapter	85650A	H P	2521A00984	06/20/02	06/20/03
RF Pre-selector	85685A	H P	2947A01011	06/20/02	06/20/03
Antenna	CBL6141A	SCHAFFNER	4188	11/29/02	11/28/03
Open test side (Antenna, Amplify, Cable calibrated together				05/16/02	05/15/03

The level of confidence of 95% , the uncertainty of measurement of radiated emission is  $\pm 3.44$ dB.

**Test Result of Spurious Radiated Emissions**

Test Conditions: Temperature : 23.5 ° C Humidity : 64.2 % RH

**Test mode: 30MHz to 1GHz [Antenna polarity Horizontal]**

<b>Radiated Emission</b>				<b>Correction Factors</b>	<b>Corrected Amplitude</b>	<b>Class B ( 10 m )</b>	
<b>Frequency (MHz)</b>	<b>Amplitude (dBµV)</b>	<b>Ant. H. (m)</b>	<b>Table ( ° )</b>			<b>Limit (dBµV/m)</b>	<b>Margin (dB)</b>
71.22	16.54	1.00	136	1.97	18.51	30.00	-11.49
862.38	14.46	1.00	215	15.82	30.28	37.00	-6.72

**Test mode: 30MHz to 1GHz [Antenna polarity Vertical]**

<b>Radiated Emission</b>				<b>Correction Factors</b>	<b>Corrected Amplitude</b>	<b>Class B ( 10 m )</b>	
<b>Frequency (MHz)</b>	<b>Amplitude (dBµV)</b>	<b>Ant. H. (m)</b>	<b>Table ( ° )</b>			<b>Limit (dBµV/m)</b>	<b>Margin (dB)</b>
71.22	16.09	1.00	199	1.97	18.06	30.00	-11.94
120.33	23.66	1.00	270	-1.27	22.39	30.00	-7.61
197.93	21.95	1.00	278	-2.64	19.31	30.00	-10.69
354.34	19.93	1.00	300	-1.20	18.73	37.00	-18.27

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude + Correction Factors
3. Correction factor = Antenna factor + ( Cable Loss – Amplitude gain)