

# CE Test Report

Product Name : CO2 Sensor with Humidity/Temp sensor  
Model No. : CO2-W

Applicant : TEMCO Controls Ltd  
Address : 3500 Hong Xin Road Shanghai 201101, China

Date of Receipt : Jul. 08, 2013  
Test Date : Jul. 08, 2013 ~ Dec. 03, 2013  
Issued Date : Dec. 06, 2013  
Report No. : 136S039E-IT-CE-P01V01  
Report Version : V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF, CNAS or any agency of the Government.  
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

# Test Report Certification

Issued Date : Dec. 06, 2013  
 Report No. : 136S039E-IT-CE-P01V01



Product Name : CO2 Sensor with Humidity/Temp sensor  
 Applicant : TEMCO Controls Ltd  
 Address : 3500 Hong Xin Road Shanghai 201101, China  
 Manufacturer : TEMCO Controls Ltd  
 Address : 3500 Hong Xin Road Shanghai 201101, China  
 Model No. : CO2-W  
 Brand Name : N/A  
 EUT Voltage : AC 100-240V / 50-60Hz  
 Test Voltage : AC 230V / 50Hz  
 Applicable Standard : EN 60730-1:2011  
 Test Result : Complied  
 Performed Location : Suzhou EMC Laboratory  
 No.99 Hongye Rd., Suzhou Industrial Park Loufeng  
 Hi-Tech Development Zone., Suzhou, China  
 TEL: +86-512-62515088 / FAX: +86-512-62515098

Documented By : Sun Sun  
 ( Engineering ADM: Sun Sun )

Reviewed By : Jerry Pan  
 ( Engineering Supervisor: Jerry Pan )

Approved By : Dream Cao  
 ( Engineering Manager: Dream Cao )

## Laboratory Information

We, **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

<b>Taiwan R.O.C.</b>	<b>:</b>	<b>BSMI, NCC, TAF</b>
<b>Germany</b>	<b>:</b>	<b>TUV Rheinland</b>
<b>Norway</b>	<b>:</b>	<b>Nemko, DNV</b>
<b>USA</b>	<b>:</b>	<b>FCC, NVLAP</b>
<b>Japan</b>	<b>:</b>	<b>VCCI</b>
<b>China</b>	<b>:</b>	<b>CNAS</b>

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site :<http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :  
<http://www.quietek.com/>

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

### **HsinChu Testing Laboratory :**

No.75-2, 3rd Lin, Wangye Keng, Yongxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C.  
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : [service@quietek.com](mailto:service@quietek.com)

### **Linkou Testing Laboratory :**

No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.  
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : [service@quietek.com](mailto:service@quietek.com)

### **Suzhou Testing Laboratory :**

No.99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., SuZhou, China  
TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098 E-Mail : [service@quietek.com](mailto:service@quietek.com)

**TABLE OF CONTENTS**

Description	Page
1. General Information .....	7
1.1. EUT Description.....	7
1.2. Mode of Operation .....	7
1.3. Tested System Details .....	8
1.4. Configuration of Tested System .....	9
1.5. EUT Exercise Software.....	10
2. Technical Test .....	11
2.1. Summary of Test Result.....	11
2.2. List of Test Equipment .....	12
2.3. Measurement Uncertainty.....	16
2.4. Compliance Criteria .....	18
3. Conducted disturbance at mains terminals and telecommunication ports .....	19
3.1. Test Specification .....	19
3.2. Test Setup.....	19
3.3. Limit .....	19
3.4. Test Procedure.....	21
3.5. Deviation from Test Standard.....	21
3.6. Test Result .....	22
3.7. Test Photograph.....	24
4. Radiated disturbance.....	25
4.1. Test Specification .....	25
4.2. Test Setup.....	25
4.3. Limit .....	26
4.4. Test Procedure.....	27
4.5. Deviation from Test Standard.....	29
4.6. Test Result .....	30
4.7. Test Photograph.....	32
5. Harmonic current emissions .....	33
5.1. Test Specification .....	33
5.2. Test Setup.....	33
5.3. Limit .....	33
5.4. Test Procedure.....	35
5.5. Deviation from Test Standard.....	35
5.6. Test Result .....	36
5.7. Test Photograph.....	38
6. Voltage fluctuations and flicker .....	39
6.1. Test Specification .....	39

6.2.	Test Setup.....	39
6.3.	Limit.....	39
6.4.	Test Procedure.....	40
6.5.	Deviation from Test Standard.....	40
6.6.	Test Result.....	41
6.7.	Test Photograph.....	42
7.	Electrostatic discharge.....	43
7.1.	Test Specification.....	43
7.2.	Test Setup.....	43
7.3.	Limit.....	43
7.4.	Test Procedure.....	44
7.5.	Deviation from Test Standard.....	44
7.6.	Test Result.....	45
7.7.	Test Photograph.....	47
8.	Radio-frequency electromagnetic field.....	50
8.1.	Test Specification.....	50
8.2.	Test Setup.....	50
8.3.	Limit.....	51
8.4.	Test Procedure.....	51
8.5.	Deviation from Test Standard.....	51
8.6.	Test Result.....	52
8.7.	Test Photograph.....	53
9.	Electrical fast transients.....	54
9.1.	Test Specification.....	54
9.2.	Test Setup.....	54
9.3.	Limit.....	54
9.4.	Test Procedure.....	55
9.5.	Deviation from Test Standard.....	55
9.6.	Test Result.....	56
9.7.	Test Photograph.....	57
10.	Surges.....	58
10.1.	Test Specification.....	58
10.2.	Test Setup.....	58
10.3.	Limit.....	59
10.4.	Test Procedure.....	60
10.5.	Deviation from Test Standard.....	60
10.6.	Test Result.....	61
10.7.	Test Photograph.....	62
11.	Radio-frequency continuous conducted.....	63

11.1.	Test Specification .....	63
11.2.	Test Setup.....	63
11.3.	Limit.....	64
11.4.	Test Procedure.....	65
11.5.	Deviation from Test Standard .....	65
11.6.	Test Result .....	66
11.7.	Test Photograph.....	67
12.	Power-frequency magnetic field .....	68
12.1.	Test Specification .....	68
12.2.	Test Setup.....	68
12.3.	Limit.....	69
12.4.	Test Procedure.....	69
12.5.	Deviation from Test Standard .....	69
12.6.	Test Result .....	70
12.7.	Test Photograph.....	71
13.	Voltage dips and interruptions.....	72
13.1.	Test Specification .....	72
13.2.	Test Setup.....	72
13.3.	Limit.....	73
13.4.	Test Procedure.....	73
13.5.	Deviation from Test Standard .....	73
13.6.	Test Result .....	74
13.7.	Test Photograph.....	76
14.	Attachment .....	77
	EUT Photograph .....	77

## 1. General Information

### 1.1. EUT Description

Product Name	CO2 Sensor with Humidity/Temp sensor
Model No.	CO2-W
Brand Name	N/A

### 1.2. Mode of Operation

Quietek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode	
Emission	Mode 1: Normal operation
Immunity	Mode 1: Normal operation

Note: The maximum working frequency: 50MHz.

## 1.3. Tested System Details

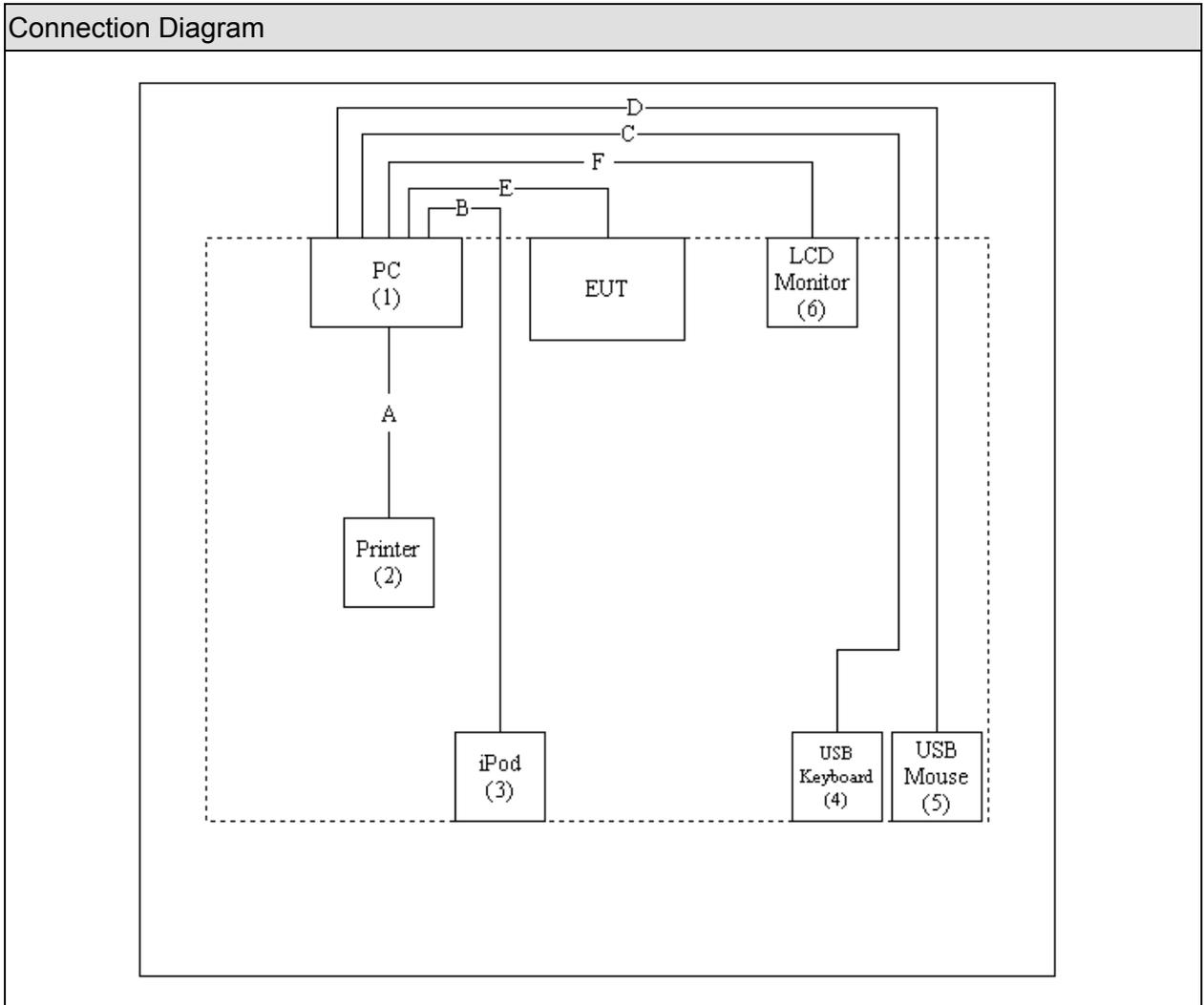
The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	PC	Note	Note	Note	Non-Shielded, 1.5m
2	Printer	HP	1020	CNCK707086	Non-Shielded, 1.8m
3	iPod	Apple	A1199	YM715J43VQ5	Power by PC
4	USB Keyboard	DELL	L100	CN0RH65665890968042R	Power by PC
5	USB Mouse	DELL	MOC5UO	10H03OKU	Power by PC
6	LCD Monitor	DELL	U2410f	CN-082WD-72872-26I-ACRL	Non-Shielded, 1.8m

Note: The PC configuration as show below:

Item	Manufacturer	Model No.	S/N
Motherboard	ASUS	P8Z77-VLX	15060-03SF2000
CPU	Intel	I5-3470 (3.2GHz)	G12108-001
Memory	Samsung	DDR3 1333 4G	120000511416
HDD	Seagate	ST1000DM003-1GH162	S1D67NHK
Graphics	AMD	AMD Radeon HD 6870	181040012796
Power Supply	Cooler MASTER	RS-750-ACAA-D3	RS750ACAAD3112230447

1.4. Configuration of Tested System



Signal Cable Type		Signal Cable Description
A	USB Cable	Shielded, 1.8m, with one ferrite core bonded
B	USB Cable	Shielded, 1.0m
C	USB Keyboard Cable	Shielded, 1.8m, with one ferrite core bonded
D	USB Mouse Cable	Shielded, 1.8m
E	CAT5e LAN Cable	Non-Shielded, >3m
F	HDMI Cable	Shielded, 1.8m

**1.5. EUT Exercise Software**

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of all equipment.
3	Execute the test program of “modbus” so that the EUT can work normally.
4	Start test.

## 2. Technical Test

### 2.1. Summary of Test Result

- No deviations from the test standards  
 Deviations from the test standards as below description:

Emission			
Performed Test Item	Normative References	Test Performed	Deviation
Conducted disturbance at mains terminals and telecommunication ports	EN 60730-1:2011 CISPR 22: 2008 Class B	Yes	No
Radiated disturbance	EN 60730-1:2011 CISPR 22: 2008 Class B	Yes	No
Harmonic current emissions	EN 61000-3-2:2006+A1:2009+A2:2009	Yes	No
Voltage fluctuations and flicker	EN 61000-3-3:2008	Yes	No

Immunity			
Performed Test Item	Normative References	Test Performed	Deviation
Electrostatic discharge	EN 61000-4-2:2009	Yes	No
Radio-frequency electromagnetic field	EN 61000-4-3:2006+A1:2009	Yes	No
Electrical fast transients	EN 61000-4-4:2012	Yes	No
Surges	EN 61000-4-5:2006	Yes	No
Radio-frequency continuous conducted	EN 61000-4-6:2009	Yes	No
Power frequency magnetic field	EN 61000-4-8:2010	Yes	No
Voltage dips and interruptions	EN 61000-4-11:2004	Yes	No

## 2.2. List of Test Equipment

Conducted disturbance at mains terminals and telecommunication ports / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100906	2014.01.07
Two-Line V-Network	R&S	ENV216	101043	2014.03.30
Two-Line V-Network	R&S	ENV216	101044	2014.09.16
Impedance Stabilization Network	Teseq GmbH	ISN T800	30306	2014.02.20
Impedance Stabilization Network	Teseq GmbH	ISN T8-Cat6	29680	2014.02.20
Current Probe	R&S	EZ-17	100255	2014.03.30
50ohm Termination	SHX	TF2	07081401	2014.09.16
50ohm Termination	SHX	TF2	07081402	2014.09.16
50ohm Termination	SHX	TF2	07081403	2014.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2014.03.01
Coaxial Cable	Suhner	RG 223	TR1-C1	2014.03.01
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2014.01.10

Radiated disturbance / AC1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100175	2014.09.16
EMI Test Receiver	R&S	ESCI	100726	2014.03.30
EMI Receiver	Agilent	N9038A	MY51210196	2014.06.09
Preamplifier	Quietek	AP-025C	CHM-0602008	2014.04.11
Preamplifier	Quietek	AP-025C	CHM-0503006	2014.04.11
Bilog Antenna	Schaffner	CBL6112B	2931	2014.10.15
Bilog Antenna	Schaffner	CBL6112B	2933	2014.10.15
DRG Horn	ETS-Lindgren	3117	00123988	2014.01.21
Coaxial Cable	Huber+Suhner	RG 214 U	AC1-L	2014.10.10
Coaxial Cable	Huber+Suhner	RG 214 U	AC1-R	2014.10.10
Temperature/Humidity Meter	zhicheng	ZC1-2	AC1-TH	2014.01.09

Radiated disturbance / AC2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100573	2014.03.30
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2014.10.15
Coaxial Cable	Huber+Suhner	RG 214	AC2-C	2014.03.01
Temperature/Humidity Meter	zhicheng	ZC1-2	AC2-TH	2014.01.09

Radiated disturbance / AC3

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100176	2014.09.16
Bilog Antenna	Teseq GmbH	CBL6112D	27613	2014.10.15
Coaxial Cable	Huber+Suhner	RG 214	AC3-C	2014.03.01
Temperature/Humidity Meter	zhicheng	ZC1-2	AC3-TH	2014.01.11

### Radiated disturbance / AC5

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
EMI Receiver	Agilent	N9038A	MY51210196	2014.06.09
Preamplifier	Miteq	NSP1800-25	1364185	2014.05.03
DRG Horn	ETS-Lindgren	3117	00123988	2014.01.21
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2014.03.01
Temperature/Humidity Meter	zhicheng	ZC1-2	AC5-TH	2014.01.11

### Harmonic current emissions / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Power Analyzer	California	PACS-1	72419	2014.11.08
AC Power Source	California	5001iX-208	56741	2014.11.01
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2014.01.10

### Voltage fluctuation and flicker / TR1

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Power Analyzer	California	PACS-1	72419	2014.11.08
AC Power Source	California	5001iX-208	56741	2014.11.01
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2014.01.10

### Electrostatic discharge / TR3

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
ESD Simulator	EM TEST	Dito	V0616101367	2014.04.28
Barometer	Fengyun	DYM3	0506048	2014.10.07
Temperature/Humidity Meter	zhicheng	ZC1-2	TR3-TH	2014.01.10

### Radio-frequency electromagnetic field / AC4

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Signal Generator	R&S	SML03	102324	2014.09.16
Power Meter	Boonton	4231A	144502	2014.09.16
Power Sensor	Boonton	51011-EMC	33859	2014.09.16
Power Meter	Agilent	E4416A	GB41293844	2014.09.16
Power Sensor	Agilent	E9304A	MY41497198	2014.09.16
RF Switch	MF	SW1072	RFSW980005	N/A
Power Amplifier	Schaffner	CBA9413B	43526	NA
Power Amplifier	Schaffner	CBA9428	43516	NA
Directional Coupler	Schaffner	CHA 9652B	0121	N/A
Directional Coupler	A&R	DC7144A	312249	N/A
E-Field Probe Type 8.3	Narda	2244/90.21	AZ-0030	2014.03.28
EMR-20C Radiation Meter	Narda	BN 2244/70	AW-0074	2014.03.28
Bilog Antenna	Schaffner	CBL6141A	4278	N/A
Horn Antenna	A&R	AT4002A	312312	N/A
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC4-TH	2014.01.11

## Electrical fast transients / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	1384	2014.03.30
Automatic Steptransformer	Teseq GmbH	INA6502-CIB	167	2014.03.30
CDN	Teseq GmbH	CDN 3061	1360	2014.03.30
CDN	Teseq GmbH	CDN 3063	1997	2014.03.30
CDN	Teseq GmbH	CDN 8014	32791	2014.02.20
Burst / EFT pulse verification kit	Teseq GmbH	CAS3025	32093	2014.01.07
Temperature/Humidity Meter	zhicheng	ZC1-2	TR2-TH	2014.01.11

## Surges / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	1384	2014.03.30
Automatic Steptransformer	Teseq GmbH	INA6502-CIB	167	2014.03.30
CDN	Teseq GmbH	CDN 3061	1360	2014.03.30
CDN	Teseq GmbH	CDN 3063	1997	2014.03.30
CDN	Teseq GmbH	CDN 118	37349	2014.02.20
Signal Line Coupling Network	Teseq GmbH	CDN 117	31806	2014.02.20
Temperature/Humidity Meter	zhicheng	ZC1-2	TR2-TH	2014.01.11

## Radio-frequency continuous conducted / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
RF-Generator	Schaffner	NSG2070	1120	2014.11.01
Attenuator	Schaffner	INA2070-1	2120	2014.11.01
Coupling / Decoupling Network	Schaffner	CDN M016	21249	2014.11.01
Coupling / Decoupling Network	Teseq GmbH	CDN M016	24484	2014.09.16
Coupling / Decoupling Network	Schaffner	CDN T400	19083	2014.09.16
Coupling / Decoupling Network	Teseq GmbH	CDN T400	22461	2014.09.16
Coupling / Decoupling Network	Teseq GmbH	CDN T800	26167	2014.01.07
Coupling / Decoupling Network	Teseq GmbH	CDN M525	31021	2014.01.07
EM Clamp	Schaffner	KEMZ 801	21041	2014.09.16
Temperature/Humidity Meter	zhicheng	ZC1-2	TR2-TH	2014.01.11

Power-frequency magnetic field / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	1384	2014.03.30
Automatic Steptransformer	Teseq GmbH	INA6502-CIB	167	2014.03.30
CDN	Teseq GmbH	CDN 3061	1360	2014.03.30
Magnetic field Coil	Teseq GmbH	INA 702	224	2014.01.10
Magnetic Field Generator	Teseq GmbH	MFO 6502	134	2014.01.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR2-TH	2014.01.11

Voltage dips and interruptions / TR2

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	1384	2014.03.30
Automatic Steptransformer	Teseq GmbH	INA6502-CIB	167	2014.03.30
CDN	Teseq GmbH	CDN 3061	1360	2014.03.30
Temperature/Humidity Meter	zhicheng	ZC1-2	TR2-TH	2014.01.11

**2.3. Measurement Uncertainty**

Conducted disturbance at mains terminals and telecommunication ports / TR1
<p>The maximum measurement uncertainty is evaluated as:</p> <p>9kHz~150kHz: 3.35dB</p> <p>150kHz~30MHz:2.91dB</p>
Radiated disturbance / AC1
<p>The maximum measurement uncertainty is evaluated as:</p> <p>Horizontal: 30MHz~300MHz: 4.46 dB</p> <p>                  300MHz~1GHz: 3.61 dB</p> <p>                  1GHz~18GHz: 4.79dB</p> <p>Vertical: 30MHz~300MHz: 4.51 dB</p> <p>                  300MHz~1GHz: 3.76 dB</p> <p>                  1GHz~18GHz: 4.86 dB</p>
Radiated disturbance / AC2
<p>The maximum measurement uncertainty is evaluated as:</p> <p>Horizontal: 30MHz~300MHz: 3.95 dB</p> <p>                  300MHz~1GHz: 3.49 dB</p> <p>Vertical: 30MHz~300MHz: 4.46 dB</p> <p>                  300MHz~1GHz: 3.53 dB</p>
Radiated disturbance / AC3
<p>The maximum measurement uncertainty is evaluated as:</p> <p>Horizontal: 30MHz~300MHz: 3.95 dB</p> <p>                  300MHz~1GHz: 3.41 dB</p> <p>Vertical: 30MHz~300MHz: 4.46 dB</p> <p>                  300MHz~1GHz: 3.43 dB</p>
Radiated disturbance / AC5
<p>The maximum measurement uncertainty is evaluated as:</p> <p>Horizontal: 30MHz~300MHz: 3.82 dB</p> <p>                  300MHz~1GHz: 3.43 dB</p> <p>                  1GHz~18GHz: 4.98 dB</p> <p>Vertical: 30MHz~300MHz: 4.42 dB</p> <p>                  300MHz~1GHz: 3.31 dB</p> <p>                  1GHz~18GHz: 4.55 dB</p>
Harmonic current emissions / TR1
<p>The maximum measurement uncertainty is evaluated as 0.2%.</p>
Voltage fluctuation and flicker / TR1
<p>The maximum measurement uncertainty is evaluated as <math>d_c</math> and <math>d_{max}</math>: 0.095%,  <math>P_{st}</math> and <math>P_{it}</math>: 4%, <math>d_{(t)}</math>: 1.5%.</p>

Electrostatic discharge / TR3
The maximum measurement uncertainty is evaluated as Voltage: 1.63%, Time: 2.76%.
Radio-frequency electromagnetic field / AC4
The maximum measurement uncertainty is evaluated as 2.72dB.
Electrical fast transients / TR2
The maximum measurement uncertainty is evaluated as Voltage: 1.63%, Frequency: $2.8 \times 10^{-10}$ , Time: 2.76%.
Surges / TR2
The maximum measurement uncertainty is evaluated as Voltage: 1.63%, Time: 2.76%.
Radio-frequency continuous conducted / TR2
The maximum measurement uncertainty is evaluated as 3.72dB.
Power-frequency magnetic field / TR2
The maximum measurement uncertainty is evaluated as 2.0%.
Voltage dips and interruptions / TR2
The maximum measurement uncertainty is evaluated as Voltage: 1.63%, Time: 2.76%.

**2.4. Compliance Criteria**

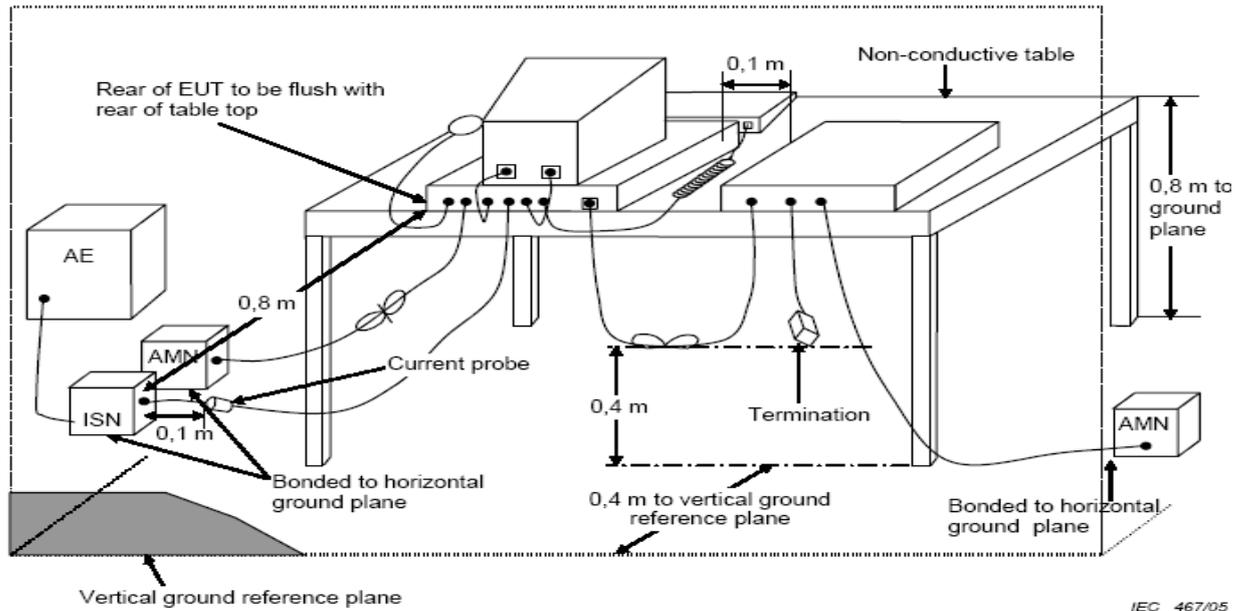
Operating conditions	Compliance Criteria		
	A	B	C
Digital inputs/outputs	No deviation on input readings No deviation on output settings (no change of state)	No deviation on input readings No deviation on output settings (no change of state)	Any error, such as a change of state, destruction of data, and loss of a connection is permitted, provided the initial state is restored automatically after the test - Automatic recovery after the test <sup>b</sup>
Analogue inputs/outputs	Deviation as declared in the final product specification is permitted <sup>a</sup> .	Deviation is permitted during test.	
Display, Monitor	Operation must be possible at reasonable comfort.	Deviation is permitted (e.g. display fault, such as flickering)	
Local operator override / switching	No deviation	Deviation is permitted for analogue values. No change of state for digital values	
Communication ports	No deviation detectable by the user The reduced data transfer rate must be reasonable for the control operation.	Deviation is permitted. Loss of communication during the test Automatic recovery after the test	
<sup>a</sup> The permissible deviation is with respect to the value without electromagnetic interference. This means that any basic deviation is ignored. <sup>b</sup> This compliance criterion is based on the fact that the control operation in the end user application will be unsupervised.			

### 3. Conducted disturbance at mains terminals and telecommunication ports

#### 3.1. Test Specification

According to EMC Standard: EN 60730-1 and CISPR 22 Class B

#### 3.2. Test Setup



#### 3.3. Limit

Limits of mains terminal disturbance voltage

Limits for conducted disturbance at the mains ports of class A ITE		
Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60

NOTE: The lower limit shall apply at the transition frequency.

Limits for conducted disturbance at the mains ports of class B ITE		
Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

NOTE 1: The lower limit shall apply at the transition frequencies.  
 NOTE 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports

Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0.15MHz to 30 MHz for class A equipment				
Frequency range MHz	Voltage Limits dB(μV)		Current limits dB(μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	97 to 87	84 to 74	53 to 43	40 to 30
0.50 to 30	87	74	43	30

NOTE 1: The limits decrease linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.  
 NOTE 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150Ω to the telecommunication port under test (conversion factor is  $20 \log_{10} 150 / I = 44\text{dB}$ ).

Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0.15MHz to 30 MHz for class B equipment				
Frequency range MHz	Voltage Limits dB(μV)		Current limits dB(μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	84 to 74	74 to 64	40 to 30	30 to 20
0.50 to 30	74	64	30	20

NOTE 1: The limits decrease linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.  
 NOTE 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150Ω to the telecommunication port under test (conversion factor is  $20 \log_{10} 150 / I = 44\text{dB}$ ).

### 3.4. Test Procedure

#### **For Main Ports:**

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a  $50\Omega / 50\mu\text{H}$  or  $50\Omega / 50\mu\text{H} + 5\Omega$  coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a  $50\Omega / 50\mu\text{H}$  or  $50\Omega / 50\mu\text{H} + 5\Omega$  coupling impedance with  $50\Omega$  termination.

Both sides of A.C. line are checked for maximum conducted interference.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

#### **For Telecommunication Ports:**

The mains voltage shall be supplied to the EUT via the LISN when the measurement of telecommunication port is performed. The common mode disturbances at the telecommunication port shall be connected to the ISN, which is  $150\Omega$  impedance.

Both alternative cables are tested related to the LCL requested.

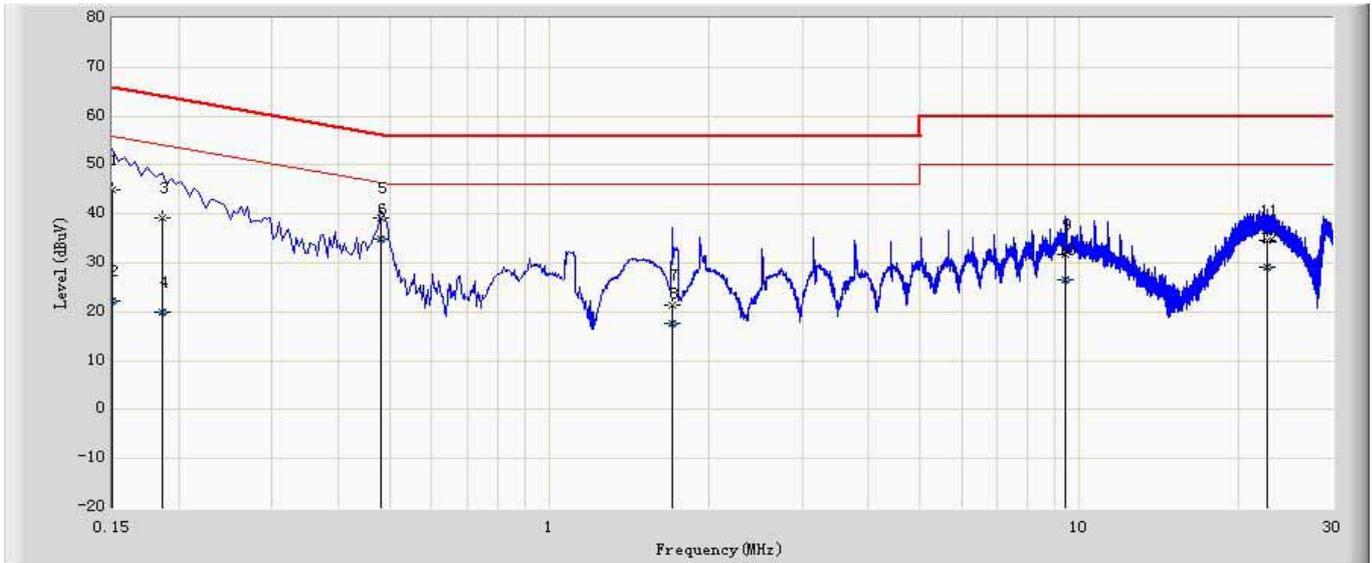
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

### 3.5. Deviation from Test Standard

No deviation.

### 3.6. Test Result

Engineer: Star	
Site: TR1	Time: 2013/08/21 - 04:07
Limit: EN55022_CE_Mains_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Line
EUT: CO2 Sensor with Humidity/Temp sensor	Power: AC 230V/50Hz
Note: Mode 1: Normal operation	

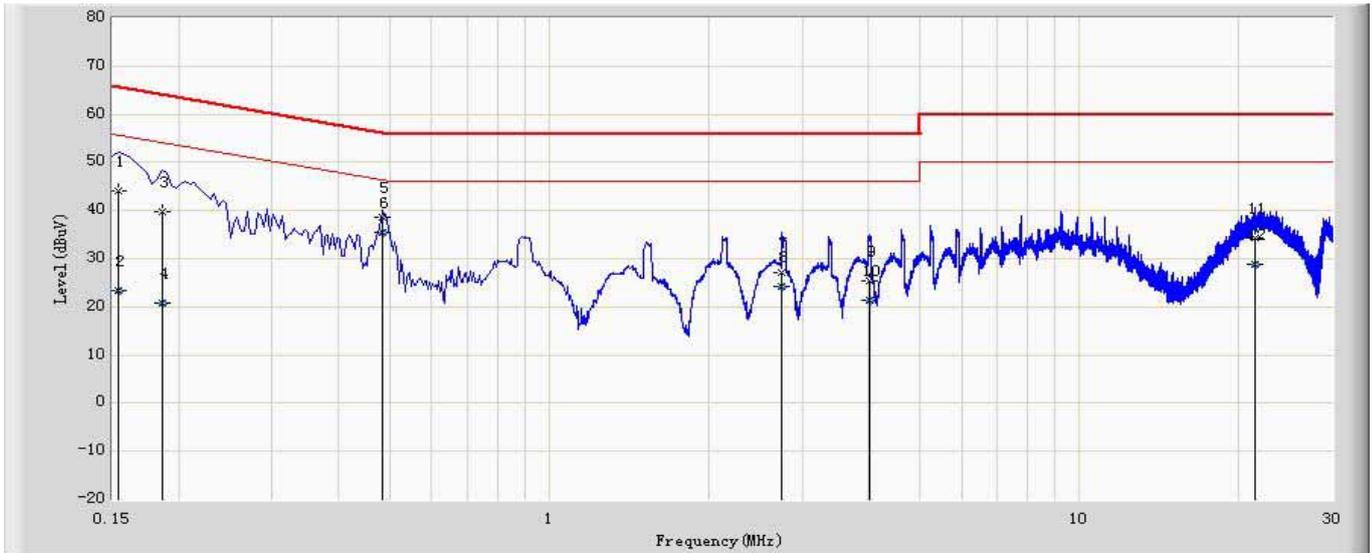


No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.150	44.830	34.982	-21.170	66.000	9.798	0.050	0.000	QP
2		0.150	22.282	12.435	-33.718	56.000	9.798	0.050	0.000	AV
3		0.186	39.116	29.258	-25.098	64.213	9.797	0.060	0.000	QP
4		0.186	19.799	9.941	-34.415	54.213	9.797	0.060	0.000	AV
5		0.482	39.130	29.222	-17.174	56.305	9.838	0.070	0.000	QP
6	*	0.482	34.889	24.981	-11.416	46.305	9.838	0.070	0.000	AV
7		1.702	21.384	11.592	-34.616	56.000	9.702	0.090	0.000	QP
8		1.702	17.542	7.751	-28.458	46.000	9.702	0.090	0.000	AV
9		9.422	31.845	21.865	-28.155	60.000	9.730	0.250	0.000	QP
10		9.422	26.441	16.461	-23.559	50.000	9.730	0.250	0.000	AV
11		22.590	34.488	23.939	-25.512	60.000	10.019	0.530	0.000	QP
12		22.590	29.218	18.669	-20.782	50.000	10.019	0.530	0.000	AV

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable+Amp).

Engineer: Star	
Site: TR1	Time: 2013/08/21 - 04:10
Limit: EN55022_CE_Mains_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Neutral
EUT: CO2 Sensor with Humidity/Temp sensor	Power: AC 230V/50Hz
Note: Mode 1: Normal operation	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.154	44.071	34.089	-21.710	65.781	9.931	0.051	0.000	QP
2		0.154	23.363	13.380	-32.418	55.781	9.931	0.051	0.000	AV
3		0.186	39.704	29.770	-24.509	64.213	9.874	0.060	0.000	QP
4		0.186	20.702	10.767	-33.512	54.213	9.874	0.060	0.000	AV
5		0.486	38.645	28.593	-17.590	56.236	9.983	0.070	0.000	QP
6	*	0.486	35.428	25.376	-10.808	46.236	9.983	0.070	0.000	AV
7		2.742	27.178	17.196	-28.822	56.000	9.872	0.110	0.000	QP
8		2.742	24.282	14.300	-21.718	46.000	9.872	0.110	0.000	AV
9		4.026	25.532	15.481	-30.468	56.000	9.911	0.140	0.000	QP
10		4.026	21.452	11.401	-24.548	46.000	9.911	0.140	0.000	AV
11		21.410	34.214	23.825	-25.786	60.000	9.889	0.500	0.000	QP
12		21.410	28.782	18.393	-21.218	50.000	9.889	0.500	0.000	AV

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

### 3.7. Test Photograph

Test Mode: Mode 1: Normal operation

Description: Front View of Conducted disturbance at mains terminals Test Setup



Test Mode: Mode 1: Normal operation

Description: Side View of Conducted disturbance at mains terminals Test Setup



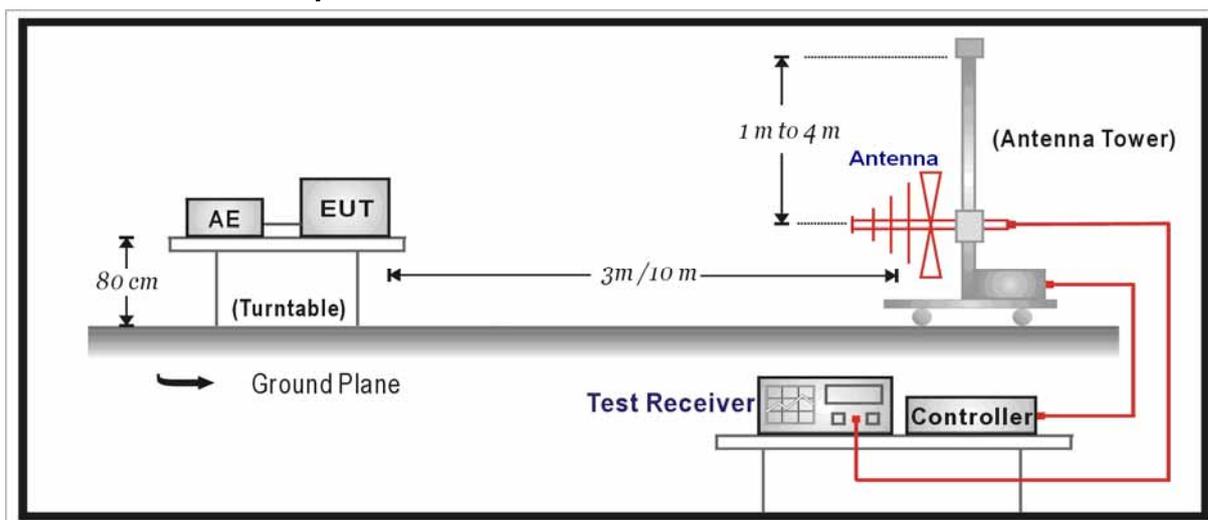
## 4. Radiated disturbance

### 4.1. Test Specification

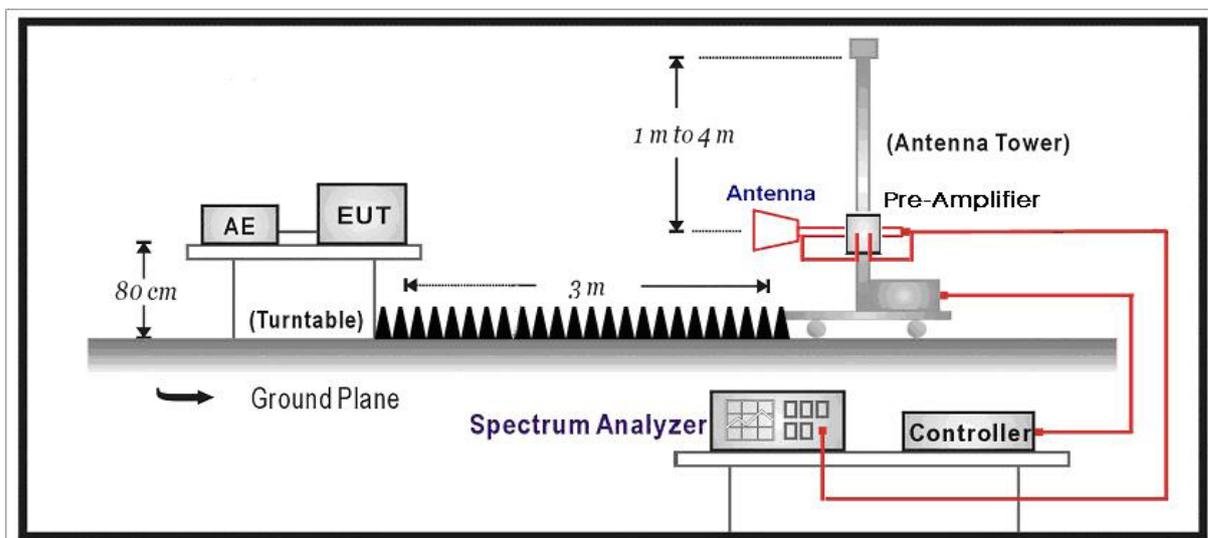
According to EMC Standard: EN 60730-1 and CISPR 22 Class B

### 4.2. Test Setup

#### Below 1GHz Test Setup



#### Above 1GHz Test Setup



**4.3. Limit**

**Limits below 1GHz**

Limits for radiated disturbance of class A ITE at a measuring distance of 10m	
Frequency range MHz	Quasi-peak limits dB(µV/m)
30 to 230	40
230 to 1000	47

NOTE 1: The lower limit shall apply at the transition frequency.  
NOTE 2: Additional provisions may be required for cases where interference occurs.

Limits for radiated disturbance of class B ITE at a measuring distance of 10m	
Frequency range MHz	Quasi-peak limits dB(µV/m)
30 to 230	30
230 to 1000	37

NOTE 1: The lower limit shall apply at the transition frequency.  
NOTE 2: Additional provisions may be required for cases where interference occurs.

**Limits above 1GHz**

Limits for radiated disturbance of class A ITE at a measuring distance of 3m		
Frequency range GHz	Average limit dB(µV/m)	Peak-peak dB(µV/m)
1 to 3	56	76
3 to 6	60	80

NOTE: The lower limit applies at transition frequency.

Limits for radiated disturbance of class B ITE at a measuring distance of 3m		
Frequency range GHz	Average limit dB(µV/m)	Peak-peak dB(µV/m)
1 to 3	50	70
3 to 6	54	74

NOTE: The lower limit applies at transition frequency.

#### 4.4. Test Procedure

The EUT and its simulators are placed on a turntable which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 10 meters for below 1GHz and 3 meters for above 1GHz.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be changed during radiated measurement.

The bandwidth below 1GHz setting on the receiver is 120kHz and above 1GHz is 1MHz.

##### **Conditional testing procedure:**

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes.

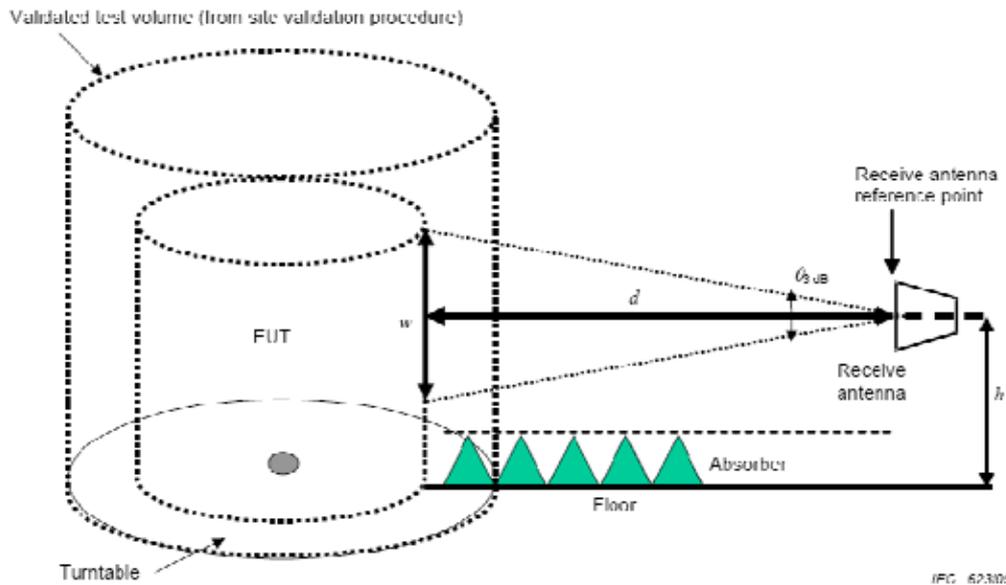
If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.

If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.

If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz.

If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

The radiated field measurement method above 1 GHz is based on measurement of the maximum electric field emitted from the EUT as shown below



Measurement method above 1 GHz, receive antenna in vertical polarization

● Definitions referring to Figure

Validated test volume: The volume validated during the site validation procedure (see 8.3.3 of CISPR 16-1-4:2010). Typically, this is the largest diameter EUT that can be used in the test facility.

EUT: The smallest diameter cylinder that will fully encompass all portions of the actual EUT, including cable racks and a minimum length of 30 cm of cables. The EUT that is located within this cylinder must be capable of rotating about its centre (typically by a remotely controlled turntable). The EUT must be located within the validated test volume. A maximum of 30 cm of  $\omega$  (see definition of  $\omega$  below) may be below the height of absorbers on the floor only when the EUT is floor standing and cannot be raised above the height of the absorbers (see 7.3.3).

3 dB: The minimum 3 dB beamwidth of the receive antenna at each frequency of interest.  $\theta_{3\text{ dB}}$  is the minimum of both the E-plane and H-plane values at each frequency. 3dB may be obtained from manufacturer provided data for the receive antenna.

d: The measurement distance (in meters). This is measured as the horizontal distance between the periphery of the EUT and the reference point of the receive antenna.

$\omega$ : The dimension of the line tangent to the EUT formed by  $\theta_{3\text{ dB}}$  at the measurement distance d. Equation (10) shall be used to calculate  $\omega$  for each actual antenna and measurement distance used. The values of  $\omega$  shall be included in the test report. This calculation may be based on the manufacturer-provided receive-antenna beamwidth specifications :

$$\omega = 2 \times d \times \tan (0,5 \times \theta_{3\text{ dB}})$$

DRG Horn Antenna ( M/N : 3117 ) test dimension of  $\omega$

Frequency GHz	3 dB (min) °	$\omega_m$
1	90	6.00
2	60	3.46
3	75	4.60
4	60	3.46
5	60	3.46
6	50	2.80
7	45	2.49
8	40	2.18
9	35	1.89
10	30	1.61
11	35	1.89
12	40	2.18
13	35	1.89
14	35	1.89
15	35	1.89
16	35	1.89
17	30	1.61
18	20	1.06

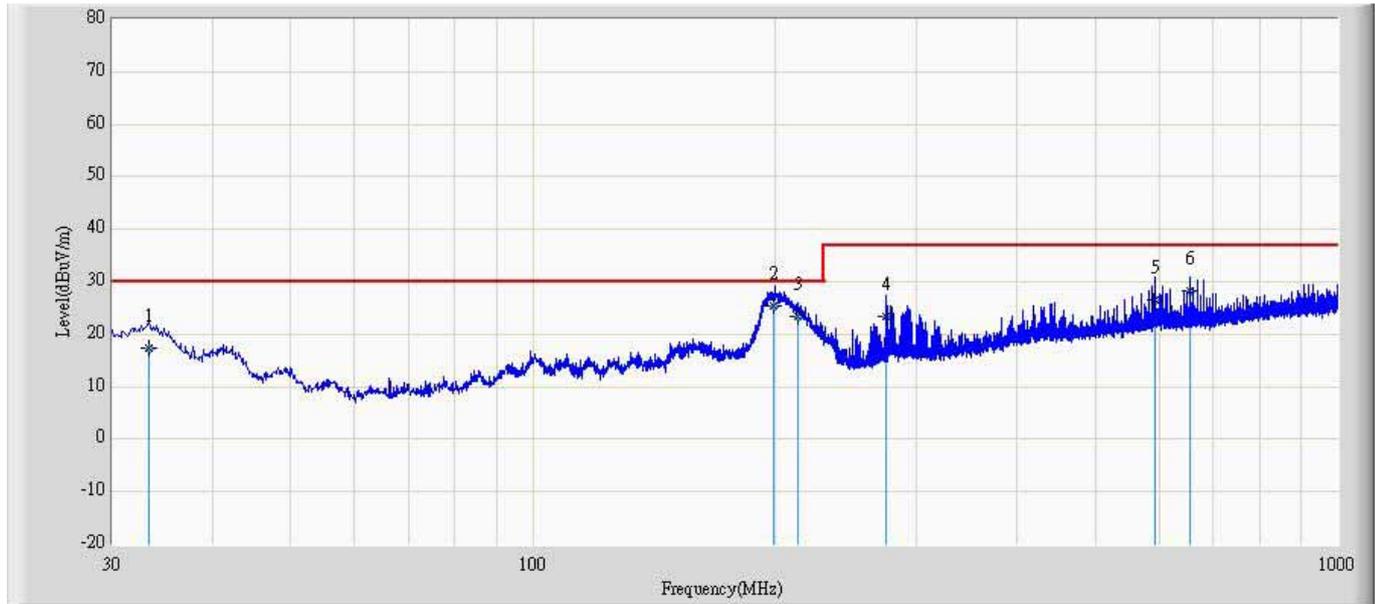
Note : The antenna's moving up and down is determined by  $\omega$  value for above 1GHz, to ensure that the acceptable range of the testing antenna can cover the whole range of EUT.

#### 4.5. Deviation from Test Standard

No deviation.

4.6. Test Result

Engineer: star	
Site: AC1	Time: 2013/11/27 - 08:21
Limit: EN55022_RE(10m)_ClassB	Margin: 0
Probe: CBL6112B_2931(30-1000MHz)	Polarity: Horizontal
EUT: CO2 Sensor with Humidity/Temp sensor	Power: 230V/50Hz
Note: Mode 1: Normal operation	

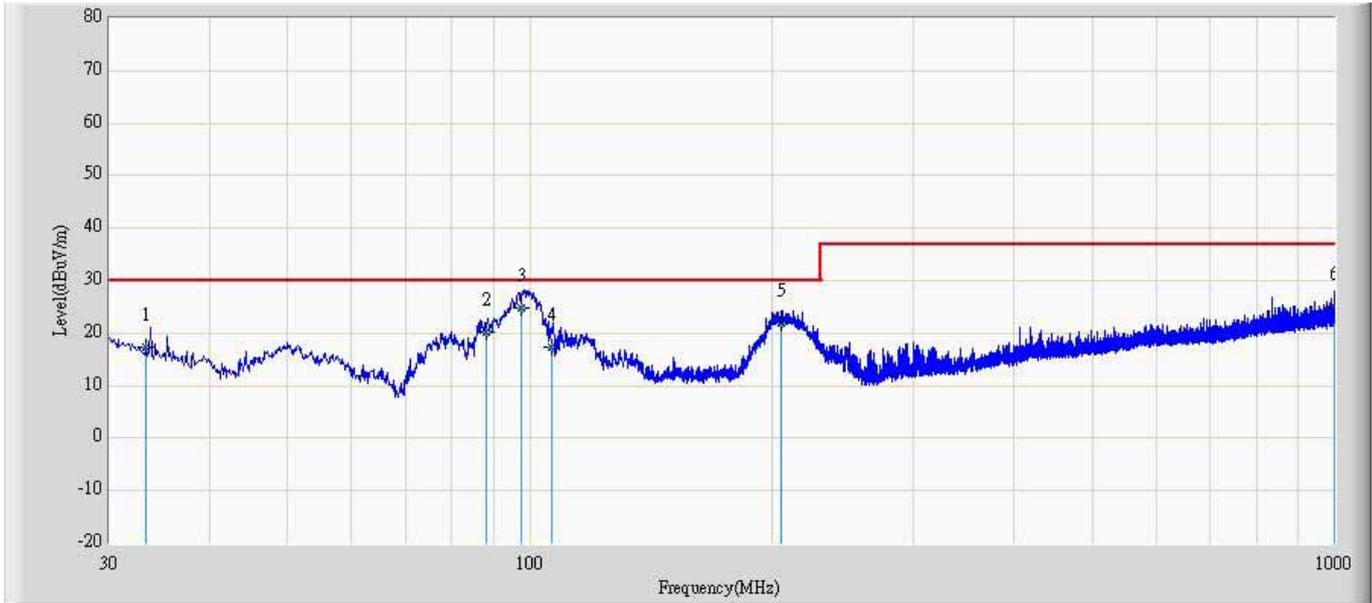


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		33.250	17.235	22.360	-12.765	30.000	16.113	1.009	22.247	100	205	QP
2	*	199.350	25.539	36.250	-4.461	30.000	8.811	2.720	22.242	100	128	QP
3		213.250	23.255	33.250	-6.745	30.000	9.357	2.819	22.170	100	142	QP
4		274.360	23.318	30.250	-13.682	37.000	11.923	3.265	22.119	100	133	QP
5		594.360	26.671	24.260	-10.329	37.000	18.621	5.164	21.375	150	223	QP
6		656.250	28.223	25.120	-8.777	37.000	18.812	5.498	21.207	200	288	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Engineer: star	
Site: AC1	Time: 2013/11/27 - 08:21
Limit: EN55022_RE(10m)_ClassB	Margin: 0
Probe: CBL6112B_2933(30-1000MHz)	Polarity: Vertical
EUT: CO2 Sensor with Humidity/Temp sensor	Power: 230V/50Hz
Note: Mode 1: Normal operation	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		33.250	17.251	23.260	-12.749	30.000	16.213	1.124	23.346	140	360	QP
2		88.260	20.138	33.260	-9.862	30.000	8.369	1.917	23.409	400	0	QP
3	*	97.360	24.902	36.250	-5.098	30.000	10.025	2.026	23.399	400	224	QP
4		106.320	17.383	28.250	-12.617	30.000	10.386	2.129	23.382	150	224	QP
5		205.360	21.886	33.260	-8.114	30.000	8.931	3.075	23.380	400	221	QP
6		999.350	25.047	18.250	-11.953	37.000	21.295	7.937	22.435	100	102	QP

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

## 4.7. Test Photograph

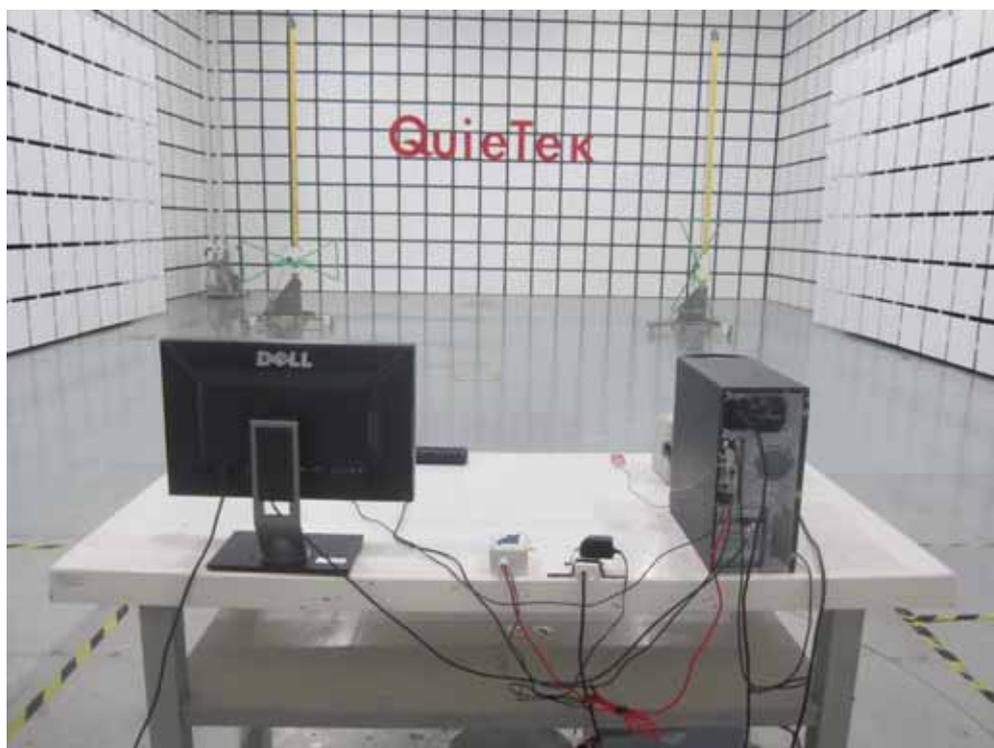
Test Mode: Mode 1: Normal operation

Description: Front View of Radiated disturbance Test Setup (Below 1GHz)



Test Mode: Mode 1: Normal operation

Description: Rear View of Radiated disturbance Test Setup (Below 1GHz)

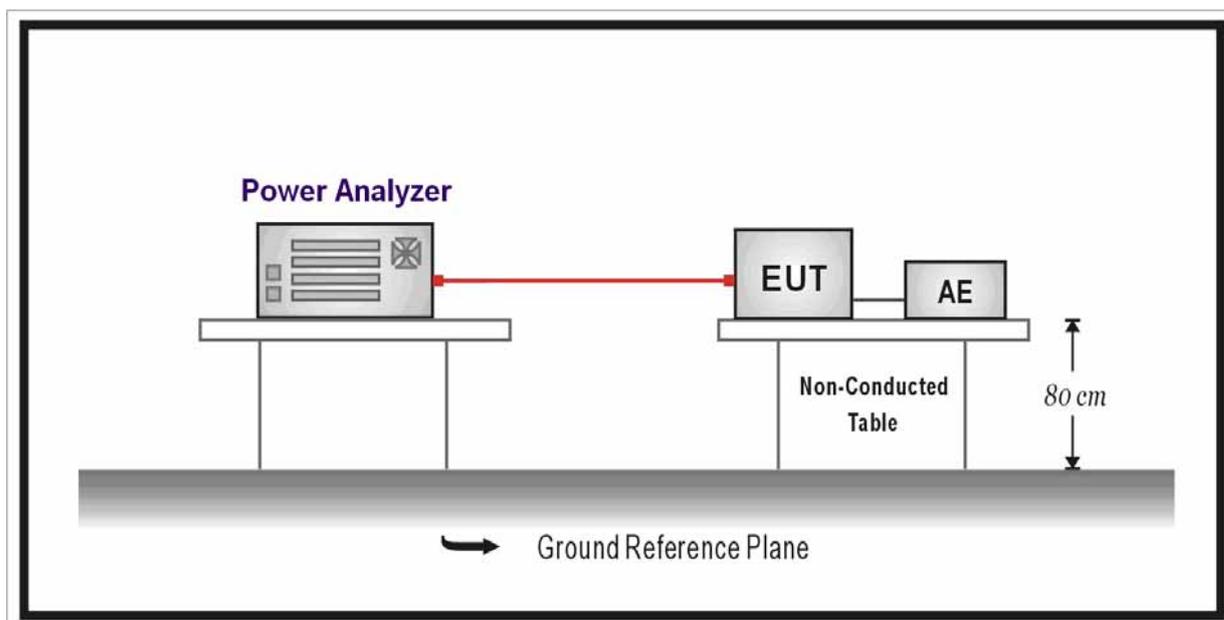


## 5. Harmonic current emissions

### 5.1. Test Specification

According to EMC Standard: EN 61000-3-2

### 5.2. Test Setup



### 5.3. Limit

(a) Limits of Class A Harmonics Currents

Harmonics Order $n$	Maximum Permissible harmonic current A	Harmonics Order $n$	Maximum Permissible harmonic current A
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	$8 \leq n \leq 40$	$0.23 * 8/n$
11	0.33		
13	0.21		
$15 \leq n \leq 39$	$0.15 * 15/n$		

(b) Limits of Class B Harmonics Currents

For Class B equipment, the harmonic of the input current shall not exceed the maximum permissible values given in table that is the limit of Class A multiplied by a factor of 1.5.

(c) Limits of Class C Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current Expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$30 \cdot \lambda^*$
5	10
7	7
9	5
$11 \leq n \leq 39$ (odd harmonics only)	3
* $\lambda$ is the circuit power factor	

(d) Limits of Class D Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current per watt mA/W	Maximum Permissible harmonic current A
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
$11 \leq n \leq 39$ (odd harmonics only)	$3.85/n$	See limit of Class A

**5.4. Test Procedure**

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

**5.5. Deviation from Test Standard**

No deviation.

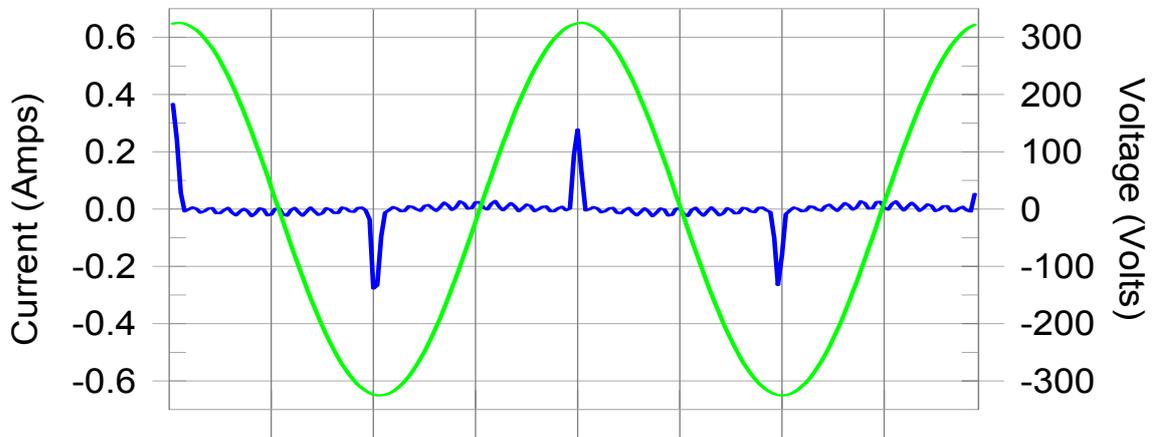
**5.6. Test Result**

Test Site	TR1	Date of Test	2013.08.21
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 230V / 50Hz
Temperature	24°C	Humidity	44%RH
Barometric Pressure	101kPa	Test Engineer	Star
Test Mode	Mode 1: Normal operation		

Test Result: N/L

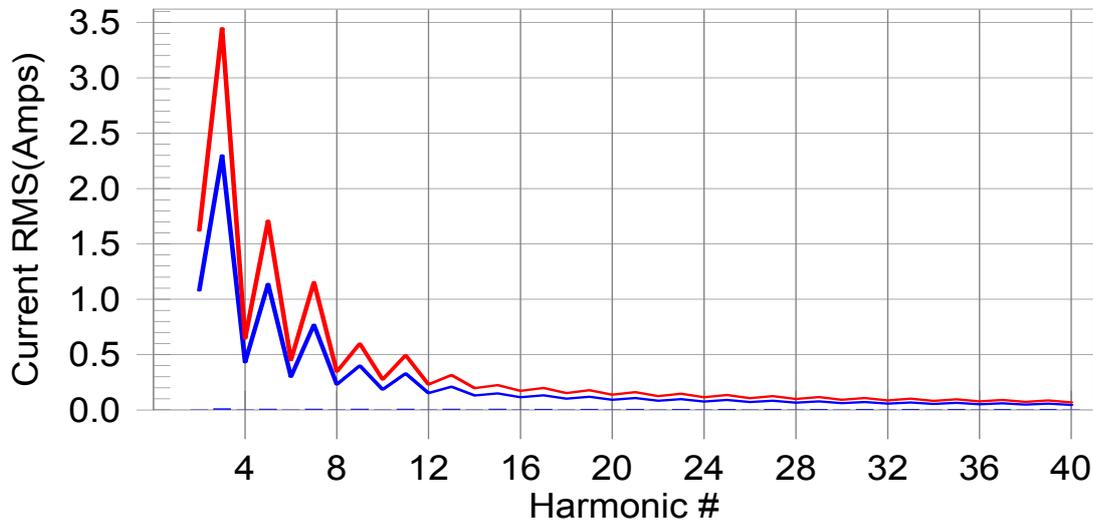
Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: N/L

**Test Result:** N/L                      **Source qualification:** Normal  
**THC(A):** 0.02                      **I-THD(%):** 201.57                      **POHC(A):** 0.008                      **POHC Limit(A):** 0.251  
**Highest parameter values during test:**  
     **V\_RMS (Volts):** 230.04                      **Frequency(Hz):** 50.00  
     **I\_Peak (Amps):** 0.367                      **I\_RMS (Amps):** 0.046  
     **I\_Fund (Amps):** 0.013                      **Crest Factor:** 10.885  
     **Power (Watts):** 2.3                      **Power Factor:** 0.336

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	0.0	0.001	1.620	0.09	N/L
3	0.008	2.300	0.4	0.010	3.450	0.30	N/L
4	0.001	0.430	0.0	0.001	0.645	0.17	N/L
5	0.008	1.140	0.7	0.009	1.710	0.54	N/L
6	0.000	0.300	0.0	0.001	0.450	0.14	N/L
7	0.008	0.770	1.1	0.009	1.155	0.78	N/L
8	0.000	0.230	0.0	0.001	0.345	0.18	N/L
9	0.008	0.400	2.0	0.009	0.600	1.45	N/L
10	0.000	0.184	0.0	0.001	0.276	0.26	N/L
11	0.008	0.330	2.3	0.008	0.495	1.66	N/L
12	0.000	0.153	0.0	0.001	0.230	0.28	N/L
13	0.007	0.210	3.5	0.008	0.315	2.52	N/L
14	0.000	0.131	0.0	0.001	0.197	0.28	N/L
15	0.007	0.150	4.7	0.008	0.225	3.36	N/L
16	0.000	0.115	0.0	0.001	0.173	0.31	N/L
17	0.007	0.132	5.1	0.007	0.199	3.60	N/L
18	0.000	0.102	0.0	0.001	0.153	0.34	N/L
19	0.006	0.118	5.3	0.007	0.178	3.78	N/L
20	0.000	0.092	0.0	0.000	0.138	0.35	N/L
21	0.006	0.107	5.5	0.006	0.161	3.90	N/L
22	0.000	0.084	0.0	0.000	0.125	0.37	N/L
23	0.006	0.098	5.7	0.006	0.147	3.96	N/L
24	0.000	0.077	0.0	0.000	0.115	0.38	N/L
25	0.005	0.090	5.7	0.005	0.135	3.97	N/L
26	0.000	0.071	0.0	0.000	0.106	0.39	N/L
27	0.005	0.083	0.0	0.005	0.125	3.92	N/L
28	0.000	0.066	0.0	0.000	0.099	0.39	N/L
29	0.004	0.078	0.0	0.004	0.116	3.82	N/L
30	0.000	0.061	0.0	0.000	0.092	0.40	N/L
31	0.004	0.073	0.0	0.004	0.109	3.66	N/L
32	0.000	0.058	0.0	0.000	0.086	0.39	N/L
33	0.003	0.068	0.0	0.004	0.102	3.47	N/L
34	0.000	0.054	0.0	0.000	0.081	0.39	N/L
35	0.003	0.064	0.0	0.003	0.096	3.26	N/L
36	0.000	0.051	0.0	0.000	0.077	0.39	N/L
37	0.003	0.061	0.0	0.003	0.091	2.99	N/L
38	0.000	0.048	0.0	0.000	0.073	0.37	N/L
39	0.002	0.058	0.0	0.002	0.087	2.70	N/L
40	0.000	0.046	0.0	0.000	0.069	0.32	N/L

- Dynamic limits were applied for this test. The highest harmonics values in the above table may not occur at the same window as the maximum harmonics/limit ratio.
- According to EN61000-3-2 paragraph 7 the note 1 and 2 are valid for all applications having an active input power >75W. Others the result should be pass.

## 5.7. Test Photograph

Test Mode: Mode 1: Normal operation

Description: Harmonic current emissions Test Setup

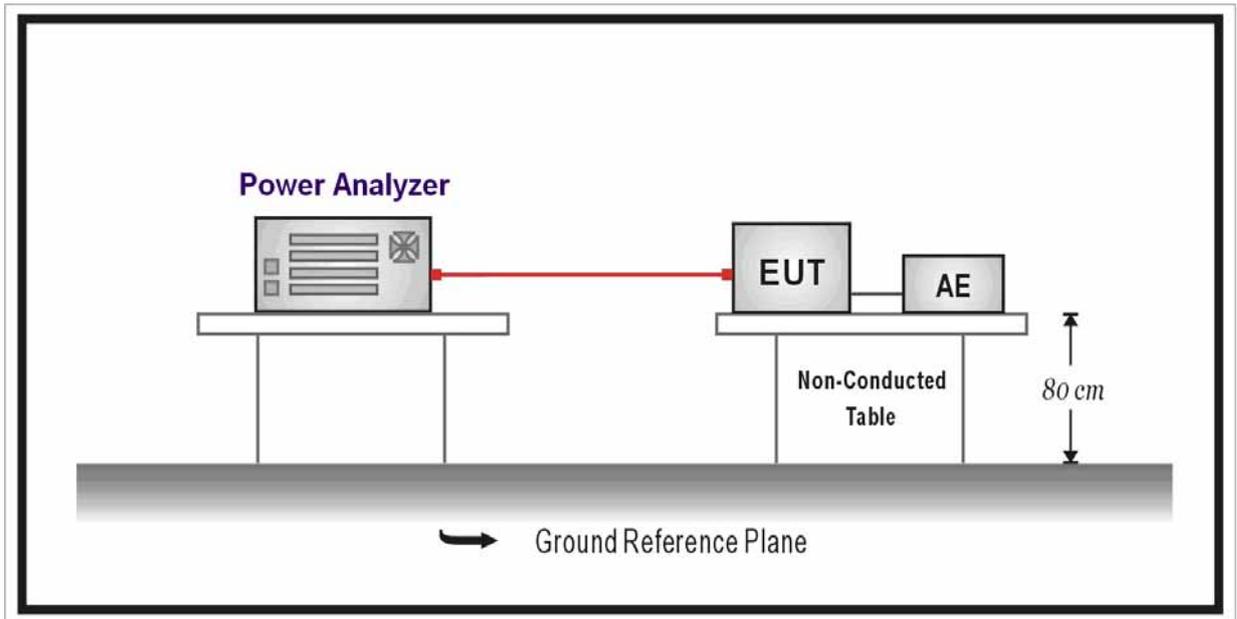


**6. Voltage fluctuations and flicker**

**6.1. Test Specification**

According to EMC Standard: EN 61000-3-3

**6.2. Test Setup**



**6.3. Limit**

The following limits apply:

- the value of  $P_{st}$  shall not be greater than 1.0;
  - the value of  $P_{lt}$  shall not be greater than 0.65;
  - the value of  $d(t)$  during a voltage change shall not exceed 3.3% for more than 500ms;
  - the relative steady-state voltage change,  $d_c$ , shall not exceed 3.3%;
  - the maximum relative voltage change,  $d_{max}$ , shall not exceed;
- a) 4% without additional conditions;
  - b) 6% for equipment which is:
    - switched manually, or
    - switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

NOTE: The cycling frequency will be further limited by the  $P_{st}$  and  $P_{lt}$  limit.

For example: a  $d_{max}$  of 6% producing a rectangular voltage change characteristic twice per hour will give a  $P_{lt}$  of about 0.65.

c) 7% for equipment which is:

- attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
- switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

$P_{st}$  and  $P_{lt}$  requirements shall not be applied to voltage changes caused by manual switching.

#### **6.4. Test Procedure**

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

#### **6.5. Deviation from Test Standard**

No deviation.

## 6.6. Test Result

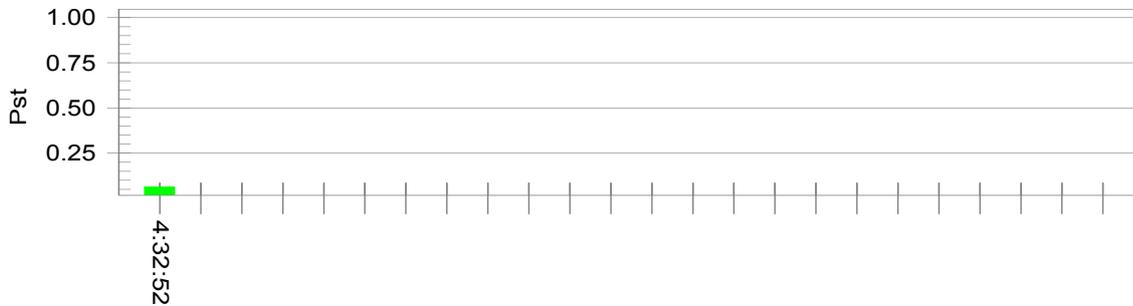
Test Site	TR1	Date of Test	2013.08.21
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 230V / 50Hz
Temperature	25°C	Humidity	44%RH
Barometric Pressure	101kPa	Test Engineer	Star
Test Mode	Mode 1: Normal operation		

**Test Result: Pass**

**Status: Test Completed**

### Pst<sub>i</sub> and limit line

### European Limits



### Plt and limit line



### Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.00		
Highest dt (%):	0.00	Test limit (%):	3.30 Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	0.00	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650 Pass

**6.7. Test Photograph**

Test Mode: Mode 1: Normal operation

Description: Voltage fluctuations and flicker Test Setup

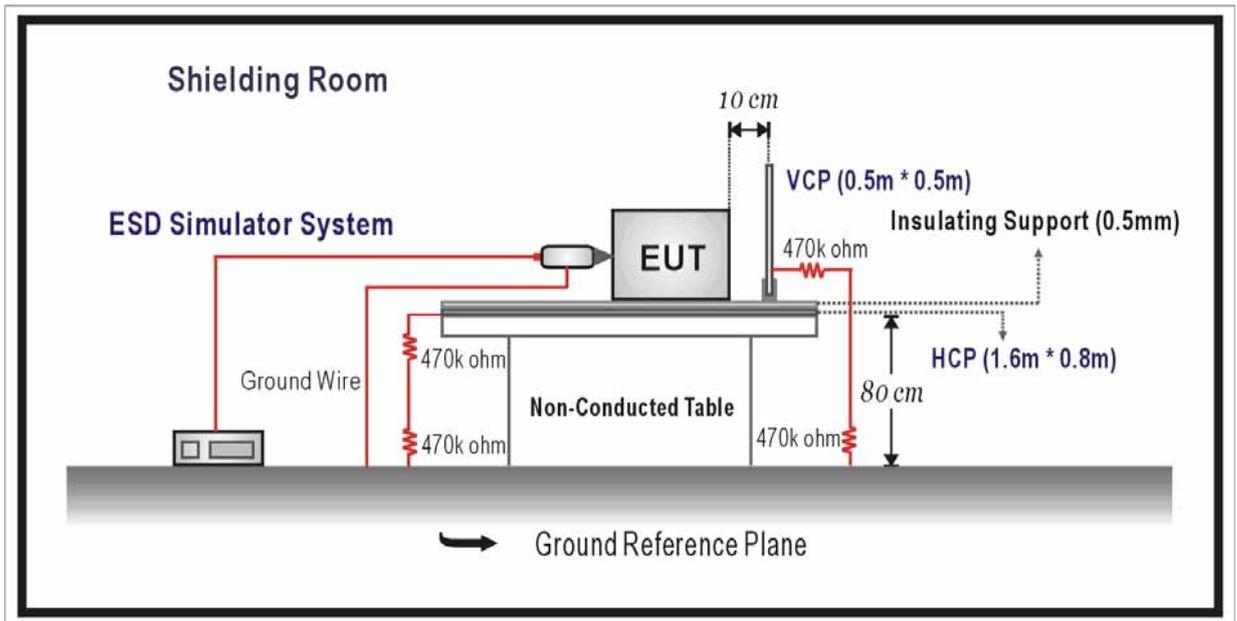


7. Electrostatic discharge

7.1. Test Specification

According to EMC Standard: EN 61000-4-2

7.2. Test Setup



7.3. Limit

Control declaration EMC level		Contact discharge	Air discharge
		Test voltage kV	Test voltage kV
Residential and Industrial	Direct	4	8
	Indirect	4	Not applicable

Compliance Criteria B

**7.4. Test Procedure**

Number of discharges for direct	at least 5 discharges in each polarity (+/-)
Number of discharges for indirect horizontal (Horizontal coupling plane)	at least 5 discharges in each polarity (+/-) for each position opposite the centre point of the horizontal coupling plane
Number of discharges for indirect vertical (Vertical coupling plane)	at least 5 discharges in each polarity (+/-)

**7.5. Deviation from Test Standard**

No deviation.

**7.6. Test Result**

Test Site	TR3	Date of Test	2013.12.03
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 230V / 50Hz
Temperature	23°C	Humidity	44%RH
Barometric Pressure	101kPa	Test Engineer	Make
Test Mode	Mode 1: Normal operation		

Air Discharge								
Test Location	Test Level						Observation	Result
	+2kV	-2kV	+4kV	-4kV	+8kV	-8kV		
1	A	A	A	A	A	A	Note	Pass
2	A	A	A	A	A	A	Note	Pass
3	A	A	A	A	A	A	Note	Pass
4	A	A	A	A	A	A	Note	Pass
5	A	A	A	A	A	A	Note	Pass
6	A	A	A	A	A	A	Note	Pass
7	A	A	A	A	A	A	Note	Pass
10	A	A	A	A	A	A	Note	Pass
11	A	A	A	A	A	A	Note	Pass
12	A	A	A	A	A	A	Note	Pass
13	A	A	A	A	A	A	Note	Pass
14	A	A	A	A	A	A	Note	Pass
15	A	A	A	A	A	A	Note	Pass
16	A	A	A	A	A	A	Note	Pass
17	A	A	A	A	A	A	Note	Pass
18	A	A	A	A	A	A	Note	Pass
19	A	A	A	A	A	A	Note	Pass
20	A	A	A	A	A	A	Note	Pass

Contact Discharge				
Test Location	Test Level		Observation	Result
	+4kV	-4kV		
8	A	A	Note	Pass
9	A	A	Note	Pass

Horizontal Coupling				
Test Location	Test Level		Observation	Result
	+4kV	-4kV		
Front	A	A	Note	Pass
Rear	A	A	Note	Pass
Left	A	A	Note	Pass
Right	A	A	Note	Pass

Vertical Coupling				
Test Location	Test Level		Observation	Result
	+4kV	-4kV		
Front	A	A	Note	Pass
Rear	A	A	Note	Pass
Left	A	A	Note	Pass
Right	A	A	Note	Pass

NOTE: There was no change compared with initial operation during the test.

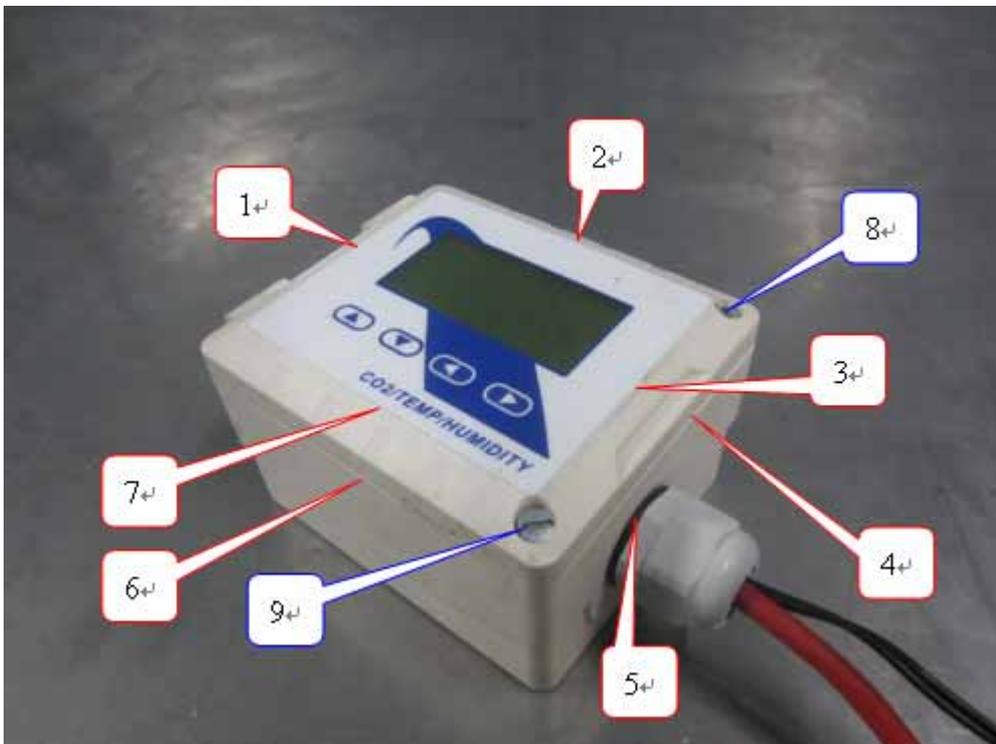
**7.7. Test Photograph**

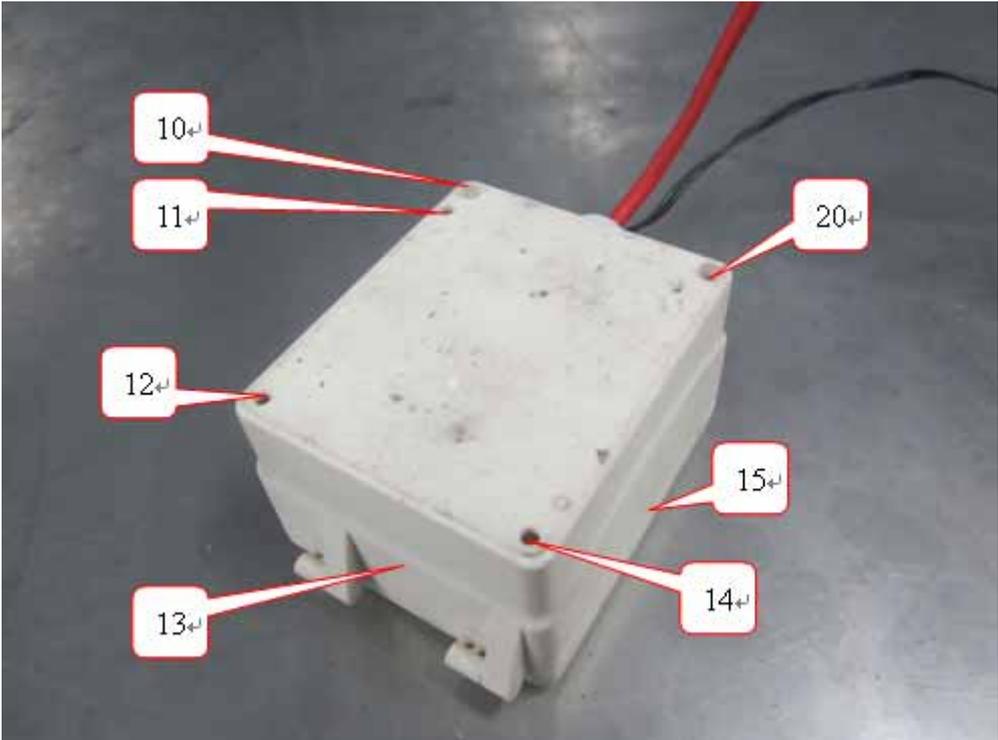
Test Mode: Mode 1: Normal operation

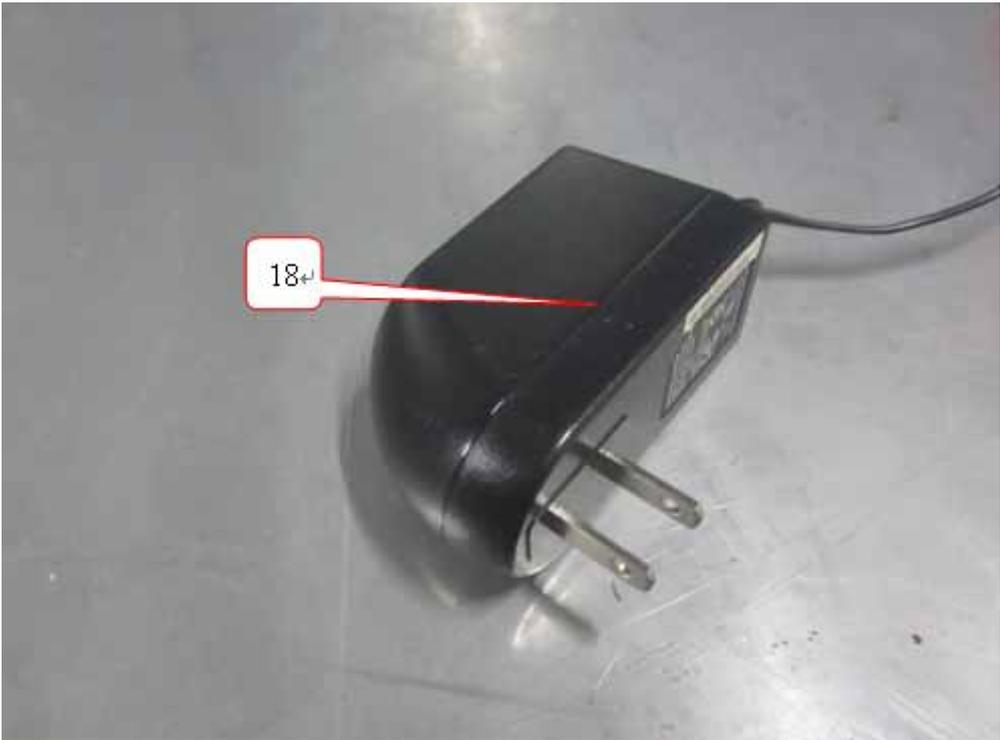
Description: Electrostatic discharge Test Setup



Electrostatic discharge Test Location





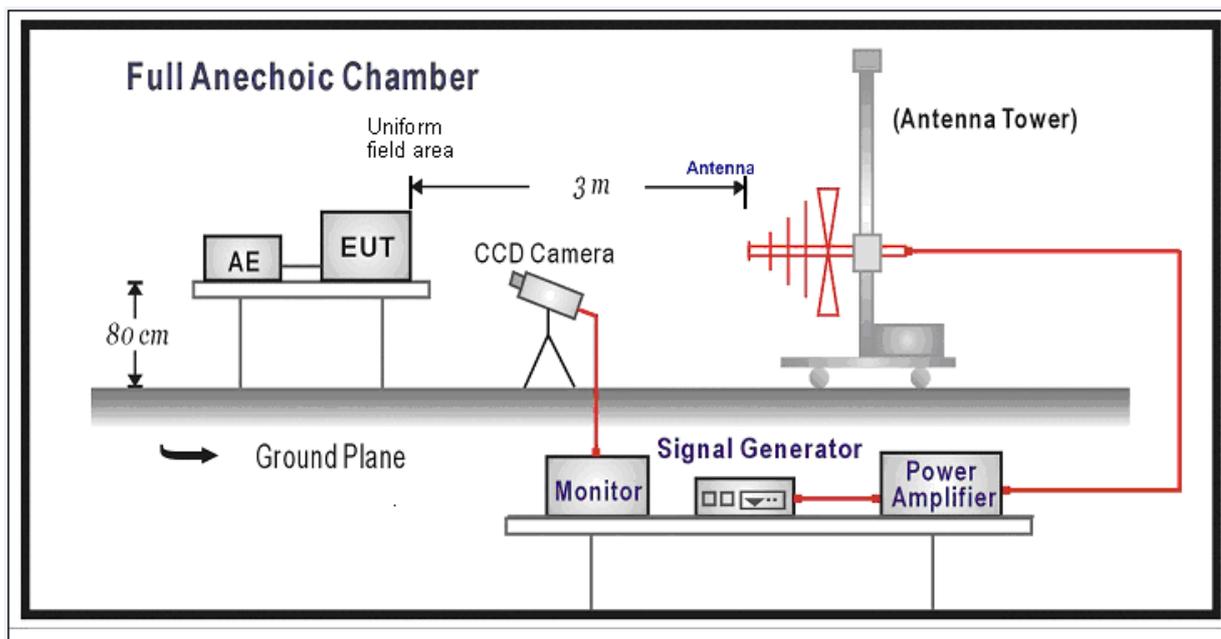


## 8. Radio-frequency electromagnetic field

### 8.1. Test Specification

According to EMC Standard: EN 61000-4-3

### 8.2. Test Setup



**8.3. Limit**

Control declaration EMC level	Frequency ranges		
	80 MHz to 1 GHz	1,4 GHz to 2 GHz	2,0 GHz to 2,7 GHz
	Field strength V/m	Field strength V/m	Field strength V/m
Residential	3	3 <sup>a</sup>	1 <sup>a</sup>
Industrial	10 <sup>b</sup>	3 <sup>a</sup>	1 <sup>a</sup>

<sup>a</sup> The frequency range has been selected to cover the frequencies with the highest potential risk of a disturbance.

<sup>b</sup> Except for the ITU broadcast frequency bands 87 MHz to 108 MHz, 174 MHz to 230 MHz, and 470 MHz to 790 MHz, where the level shall be 3 V/m.

**Compliance Criteria A**

**8.4. Test Procedure**

The EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters.

Both horizontal and vertical polarization of the antenna and four sides of the EUT are set on measurement.

In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Radiated Signal	AM 80% Modulated with 1kHz
2.	Scanning Frequency	80 - 1000MHz
3.	Dwell Time	3 Seconds
4.	Frequency Step Size $\Delta f$	1%

**8.5. Deviation from Test Standard**

No deviation.

**8.6. Test Result**

Test Site	AC4	Date of Test	2013.12.03
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 230V / 50Hz
Temperature	23°C	Humidity	43%RH
Barometric Pressure	101kPa	Test Engineer	Jane
Test Mode	Mode 1: Normal operation		

Frequency (MHz)	Polarity	Position	Field Strength (V/m)	Test Result Criterion	Observation	Result
80-1000	Horizontal	Front	3	A	Note	Pass
80-1000	Vertical	Front	3	A	Note	Pass
80-1000	Horizontal	Rear	3	A	Note	Pass
80-1000	Vertical	Rear	3	A	Note	Pass
80-1000	Horizontal	Left	3	A	Note	Pass
80-1000	Vertical	Left	3	A	Note	Pass
80-1000	Horizontal	Right	3	A	Note	Pass
80-1000	Vertical	Right	3	A	Note	Pass
1400-2000	Horizontal	Front	3	A	Note	Pass
1400-2000	Vertical	Front	3	A	Note	Pass
1400-2000	Horizontal	Rear	3	A	Note	Pass
1400-2000	Vertical	Rear	3	A	Note	Pass
1400-2000	Horizontal	Left	3	A	Note	Pass
1400-2000	Vertical	Left	3	A	Note	Pass
1400-2000	Horizontal	Right	3	A	Note	Pass
1400-2000	Vertical	Right	3	A	Note	Pass
2000-2700	Horizontal	Front	1	A	Note	Pass
2000-2700	Vertical	Front	1	A	Note	Pass
2000-2700	Horizontal	Rear	1	A	Note	Pass
2000-2700	Vertical	Rear	1	A	Note	Pass
2000-2700	Horizontal	Left	1	A	Note	Pass
2000-2700	Vertical	Left	1	A	Note	Pass
2000-2700	Horizontal	Right	1	A	Note	Pass
2000-2700	Vertical	Right	1	A	Note	Pass

NOTE: There was no change compared with initial operation during the test.

## 8.7. Test Photograph

Test Mode: Mode 1: Normal operation

Description: Radio-frequency electromagnetic field Test Setup



Test Mode: Mode 1: Normal operation

Description: Radio-frequency electromagnetic field Test Setup (High frequency)

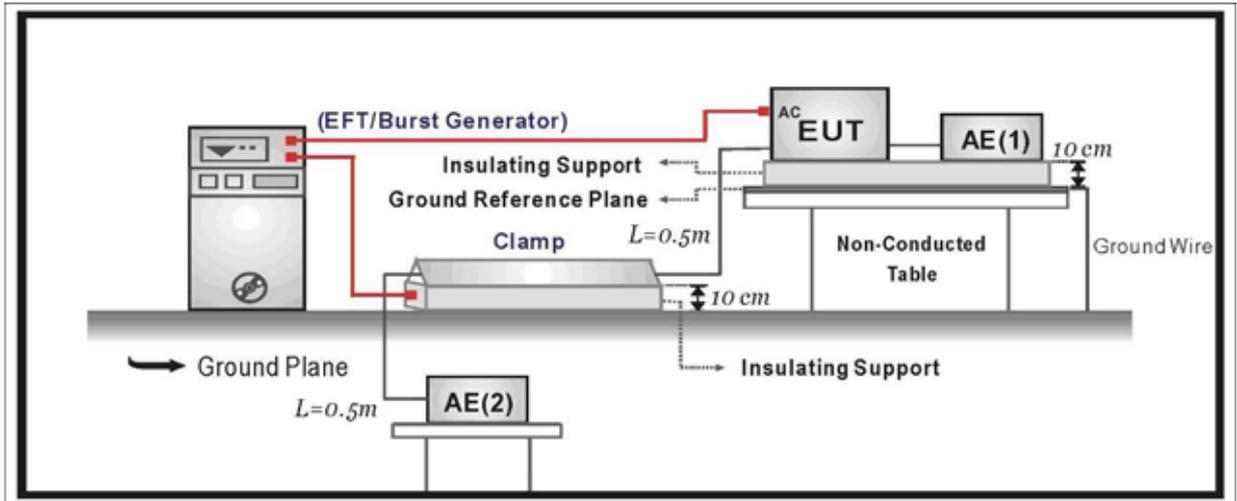


9. Electrical fast transients

9.1. Test Specification

According to EMC Standard: EN 61000-4-4

9.2. Test Setup



9.3. Limit

Control declaration	Open circuit output test voltage and repetition rate of the impulses			
EMC level	On power port, PE		On I/O (input/output) signal, data and control ports	
	Voltage peak kV	Repetition rate kHz	Voltage peak kV	Repetition rate kHz
Residential	1	5	0,5	5
Industrial	2	5	1	5

Compliance Criteria B

**9.4. Test Procedure**

AC power supply and control output for direct connection to the supply		DC power supply and control outputs for direct connection to the supply	Data lines <sup>a</sup>
Direct application via CDN according to EN 61000-4-4 between the reference ground plane and ...	each power supply line, individually	Capacitive clamp <sup>b</sup>	Capacitive clamp
	the nearest protective earth terminal		
	to all multiple combinations of power supply lines and also earth line		
<sup>a</sup> Applicable only to lines longer than 3 m, according to the manufacturer's declaration (Clause ZD.3, requirement 608). <sup>b</sup> Not applicable to lines connected to dedicated non-rechargeable power supplies.			

Polarity	positive (+) and negative (-)
Duration	one minute for each polarity

**9.5. Deviation from Test Standard**

No deviation.

**9.6. Test Result**

Test Site	TR2	Date of Test	2013.12.03
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 230V / 50Hz
Temperature	24°C	Humidity	43%RH
Barometric Pressure	101kPa	Test Engineer	Jane
Test Mode	Mode 1: Normal operation		

Input a.c. power ports (Tr/Th: 5/50ns, Repetition Frequency: 5kHz)							
Inject Line	Polarity	Test Level (kV)	Test Duration (second)	Inject Method	Test Result Criterion	Observation	Result
L	+	1	60	Direct	A	Note	Pass
L	-	1	60	Direct	A	Note	Pass
N	+	1	60	Direct	A	Note	Pass
N	-	1	60	Direct	A	Note	Pass
L+N	+	1	60	Direct	A	Note	Pass
L+N	-	1	60	Direct	A	Note	Pass
Signal ports and telecommunication ports (Tr/Th: 5/50ns, Repetition Frequency: 5kHz)							
Inject Line	Polarity	Test Level (kV)	Test Duration (second)	Inject Method	Test Result Criterion	Observation	Result
LAN	+	0.5	60	Clamp	A	Note	Pass
LAN	-	0.5	60	Clamp	A	Note	Pass

NOTE: There was no change compared with initial operation during the test.

**9.7. Test Photograph**

Test Mode: Mode 1: Normal operation

Description: Electrical fast transients Test Setup (Input a.c. power ports)



Test Mode: Mode 1: Normal operation

Description: Electrical fast transients Test Setup (LAN)

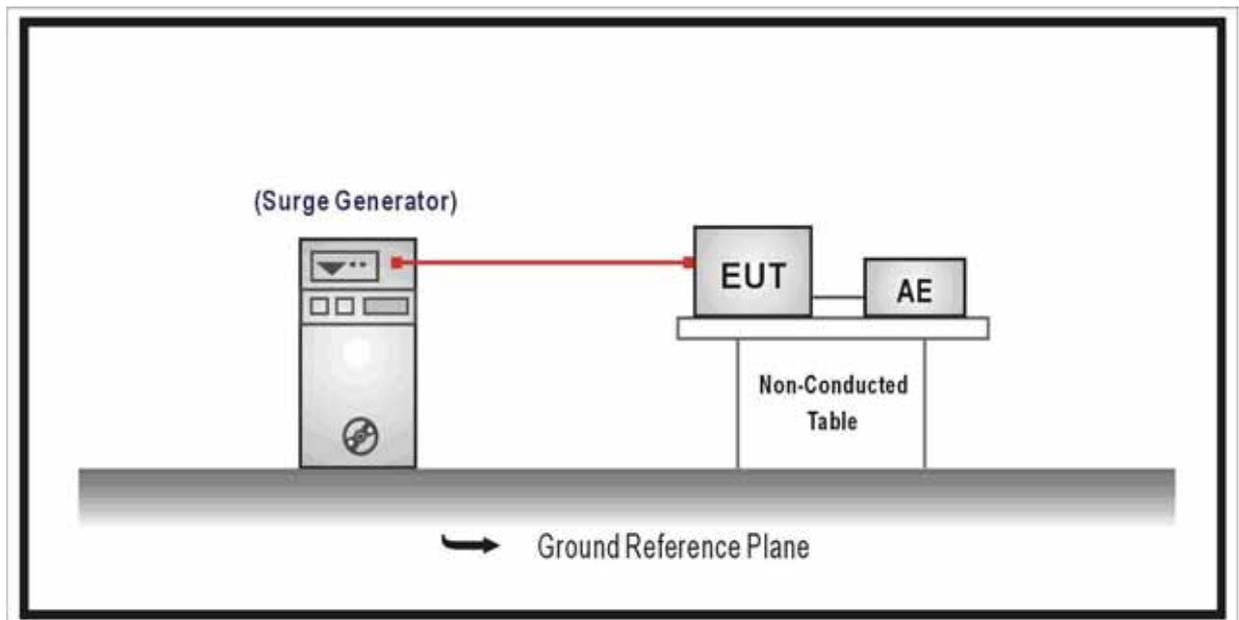


## 10. Surges

### 10.1. Test Specification

According to EMC Standard: EN 61000-4-5

### 10.2. Test Setup



10.3. Limit

Control declaration	Test levels kV											
	AC power supply and AC I/O directly connected to mains network		AC power supply and AC I/O not directly connected to mains network		DC power supply and DC I/O directly connected thereto		Unsymmetrical operated circuits/lines <sup>c</sup>		Symmetrical operated circuits/lines <sup>c</sup>		Shielded I/O and shielded communication lines	
	Coupling mode		Coupling mode		Coupling mode		Coupling mode		Coupling mode		Coupling mode	
EMC Level	line to line	line to earth	line to line	line to earth	line to line	line to earth	line to line	line to earth	line to line	line to earth	line to line	line to earth
Residential	0,5	1,0	NA	NA	NA	NA	0,5	1,0	NA	1,0	NA	0,5
Industrial	1,0	2,0	1,0 <sup>d</sup>	2,0 <sup>a d</sup>	0,5 <sup>e</sup>	0,5 <sup>e</sup>	1,0 <sup>b</sup>	2,0 <sup>a b</sup>	NA	2,0 <sup>a b</sup>	NA	2,0 <sup>b</sup>

<sup>a</sup> Normally tested with primary protection unless declared otherwise by the manufacturer (Clause ZD.3, requirement 604).

<sup>b</sup> The test level shall be lowered to the next lower one if the cable length is shorter or equal to 30 m (Clause ZD.3, requirement 605).

<sup>c</sup> This test is not applicable to interconnection cables used as data lines and a length of up to 10 m (Clause ZD.3, requirement 606).

<sup>d</sup> If protection is specified upstream from the EUT, the test level should correspond to the protection level when the protection is not in place (Clause ZD.3, requirement 607).

<sup>e</sup> Not applicable to input ports intended for connection to a battery or a rechargeable battery which must be removed or disconnected from the apparatus for recharging. Apparatus with a DC power input port intended for use with an AC–DC power adaptor shall be tested on the AC power input of the AC–DC power adaptor specified by the manufacturer or, where none is so specified, using a typical AC–DC power adaptor. DC ports, which are not intended to be connected to a DC distribution network are treated as signal ports.

**Compliance Criteria B**

**10.4. Test Procedure**

The EUT is placed on a table that is 0.8 meter above a metal ground plane measured 1m\*1m minimum and 0.65mm thick minimum and projected beyond the EUT by at least 0.1m on all sides. The length of power cord between the coupling device and the EUT shall be 2m or less.

Repetition rate	maximum 1/min
Polarity	positive (+) and negative (-)
Number of pulses	at least five pulses for each polarity are applied at selected points
Phase angle	0°, 90°, 180° and 270° versus the phase angle of the ac line voltage to the equipment under test, with a tolerance of $\pm 10^\circ$

**10.5. Deviation from Test Standard**

No deviation.

**10.6. Test Result**

Test Site	TR2	Date of Test	2013.12.03
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 230V / 50Hz
Temperature	24°C	Humidity	44%RH
Barometric Pressure	101kPa	Test Engineer	Jane
Test Mode	Mode 1: Normal operation		

Inject Line	Polarity	Angle (degree)	Test Level (kV)	Test Interval (second)	Test Result Criterion	Observation	Result
L+N	+	0	0.5	60	A	Note	Pass
L+N	-	0	0.5	60	A	Note	Pass
L+N	+	90	0.5	60	A	Note	Pass
L+N	-	90	0.5	60	A	Note	Pass
L+N	+	180	0.5	60	A	Note	Pass
L+N	-	180	0.5	60	A	Note	Pass
L+N	+	270	0.5	60	A	Note	Pass
L+N	-	270	0.5	60	A	Note	Pass

NOTE: There was no change compared with initial operation during the test.

## 10.7. Test Photograph

Test Mode: Mode 1: Normal operation

Description: Surges Test Setup (Input a.c. power ports)



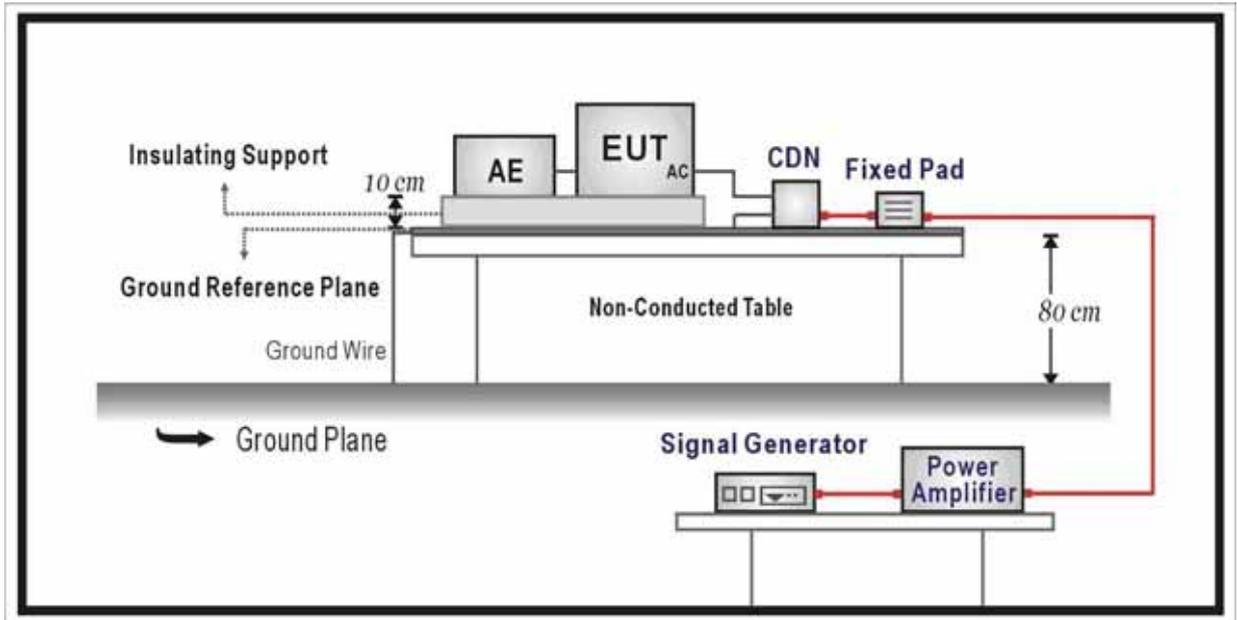
## 11. Radio-frequency continuous conducted

### 11.1. Test Specification

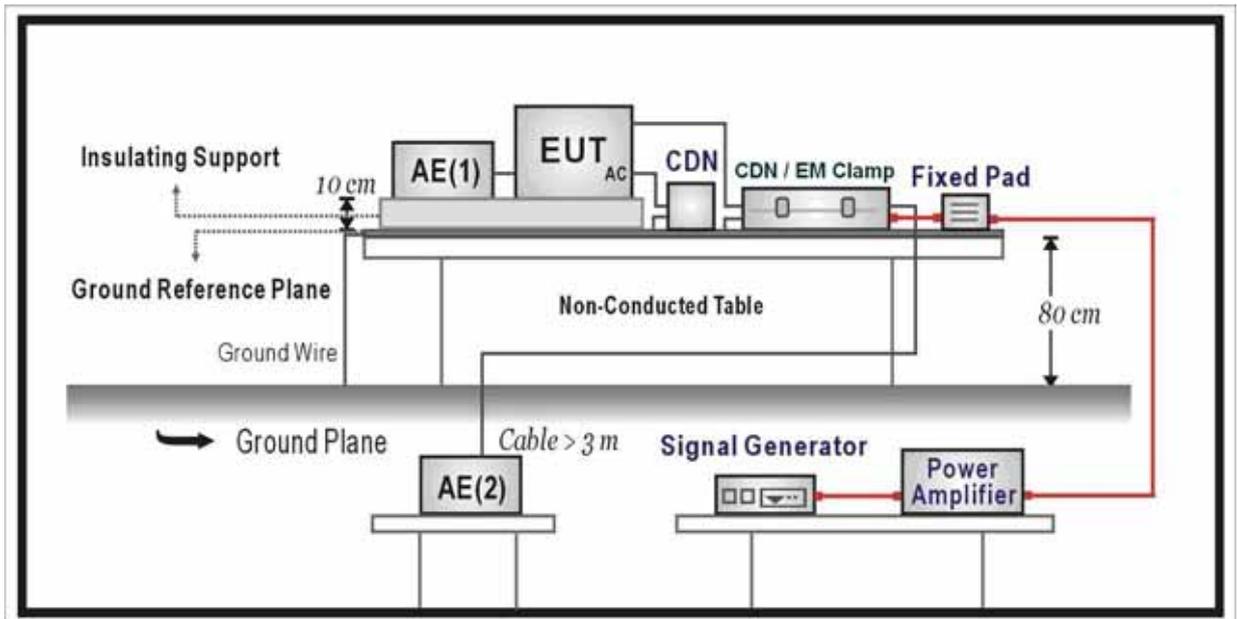
According to EMC Standard: EN 61000-4-6

### 11.2. Test Setup

#### CDN Test Setup



#### EM Clamp Test Setup



11.3. Limit

Control declaration EMC level	Frequency ranges: 150 kHz – 80 MHz	
	Voltage level (EMF)	
	$U_0$ dB $\mu$ V	$U_0$ V
Residential	130 <sup>a c d</sup>	3 <sup>a c d</sup>
Industrial	140 <sup>a b c</sup>	10 <sup>a b c</sup>

<sup>a</sup> The test level can also be defined as the equivalent current into a 150  $\Omega$  load.  
<sup>b</sup> Except for the ITU broadcast frequency band 47 MHz to 68 MHz, where the level shall be 3 V.  
<sup>c</sup> For I/O lines only applicable if the total cable length according to the manufacturer's functional specification may exceed 3 m.  
<sup>d</sup> For input and output DC power port lines only applicable if the total cable length according to the manufacturer's functional specification may exceed 3 m.

**Compliance Criteria A**

**11.4. Test Procedure**

The EUT is placed on a table that is 0.8 meter height, and a ground reference plane on the table, EUT is placed upon table and use a 0.1m insulation between the EUT and ground reference plane.

**For input a.c. and d.c. power ports:**

The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. And directly couples the disturbances signal into EUT.

Used CDN-M2 for two wires or CDN-M3 for three wires.

**For signal and telecommunication ports:**

The disturbance signal is through a coupling and decoupling networks (CDN) or EM-clamp device couples to the signal and telecommunication lines of the EUT.

	Condition of Test	Remarks
1.	Field Strength	3V
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	0.15 - 80MHz
4.	Dwell Time	3 Seconds
5.	Frequency Step Size $\Delta f$	1%

**11.5. Deviation from Test Standard**

No deviation.

**11.6. Test Result**

Test Site	TR2	Date of Test	2013.12.03
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 230V / 50Hz
Temperature	22°C	Humidity	44%RH
Barometric Pressure	101kPa	Test Engineer	Jane
Test Mode	Mode 1: Normal operation		

Frequency (MHz)	Inject Voltage (V)	Inject Ports	Inject Method	Test Result Criterion	Observation	Result
0.15-80	3	AC Mains	CDN	A	Note	Pass
0.15-80	3	LAN	CDN	A	Note	Pass

NOTE: There was no change compared with initial operation during the test.

**11.7. Test Photograph**

Test Mode: Mode 1: Normal operation

Description: Radio-frequency continuous conducted Test Setup (Input a.c. power ports)



Test Mode: Mode 1: Normal operation

Description: Radio-frequency continuous conducted Test Setup (LAN)

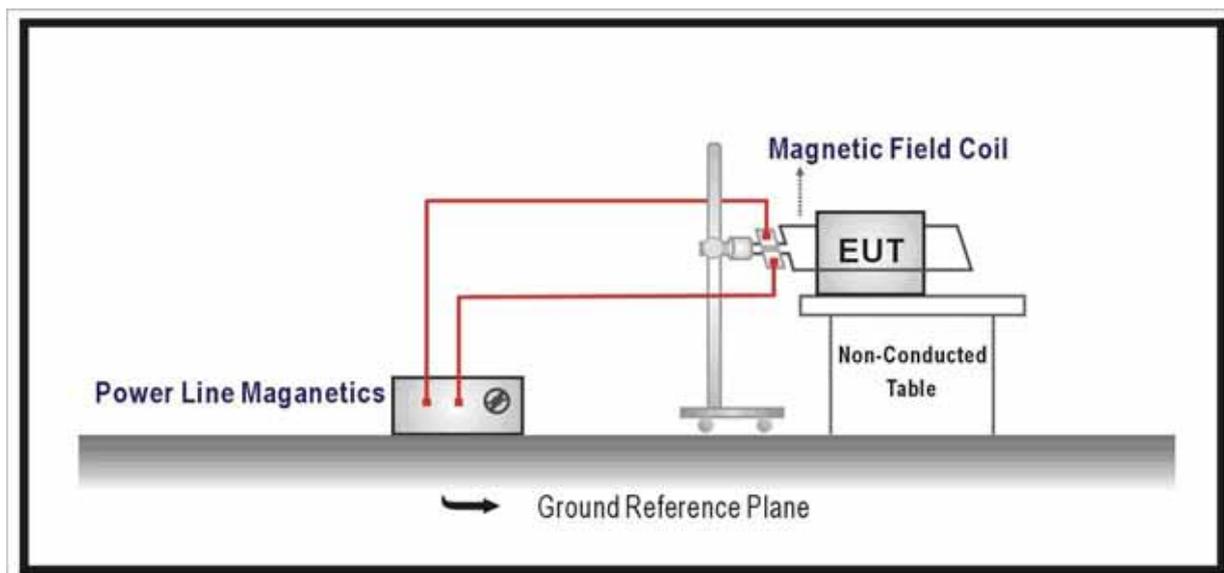


## 12. Power-frequency magnetic field

### 12.1. Test Specification

According to EMC Standard: EN 61000-4-8

### 12.2. Test Setup



**12.3. Limit**

Control declaration EMC level	Power A/m	Frequency Hz
Residential	3	50 / 60 <sup>a</sup>
Industrial	30	50 / 60 <sup>a</sup>
<sup>a</sup> The test shall be carried out at the frequencies appropriate to the power supply frequency. Equipment intended for use in areas supplied only at one of these frequencies need only be tested at that frequency (Clause ZD.3, requirement 609).		

**Compliance Criteria A**

**12.4. Test Procedure**

The EUT is placed on a table which is 0.8 meter above a metal ground plane measured at least 1m\*1m minimum. The test magnetic field shall be placed at central of the induction coil. The test magnetic Field shall be applied 10 minutes by the immersion method to the EUT, and the induction coil shall be rotated by 90° in order to expose the EUT to the test field with different orientation (X, Y, Z Orientations).

**12.5. Deviation from Test Standard**

No deviation.

**12.6. Test Result**

Test Site	TR2	Date of Test	2013.12.03
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 230V / 50Hz
Temperature	23°C	Humidity	42%RH
Barometric Pressure	101kPa	Test Engineer	Jane
Test Mode	Mode 1: Normal operation		

Test Coil Position	Frequency (Hz)	Magnetic Strength (A/m)	Test Result Criterion	Observation	Result
X Axis	50	3	A	Note	Pass
Y Axis	50	3	A	Note	Pass
Z Axis	50	3	A	Note	Pass

NOTE: There was no change compared with initial operation during the test.

## 12.7. Test Photograph

Test Mode: Mode 1: Normal operation

Description: Power-frequency magnetic field Test Setup

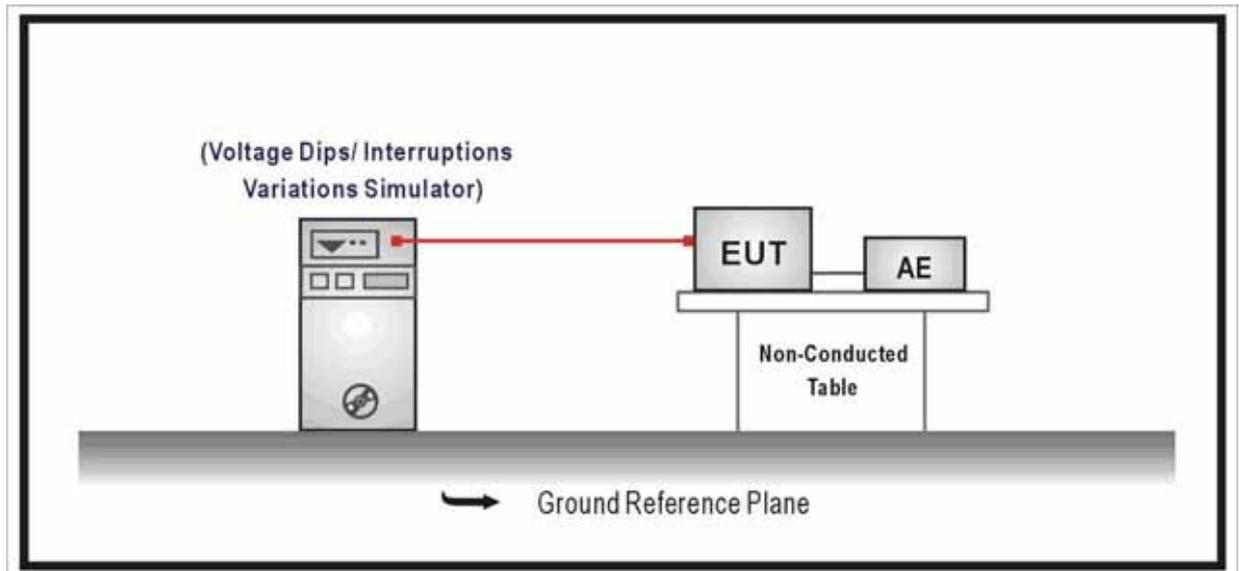


### 13. Voltage dips and interruptions

#### 13.1. Test Specification

According to EMC Standard: EN 61000-4-11

#### 13.2. Test Setup



**13.3. Limit**

Voltage dips (50 Hz / 60 Hz)			
Control declaration EMC level	Voltage $\Delta U$ reduction	Duration in periods 50 Hz/60 Hz	Compliance Criteria (see Table ZD.2)
Residential and industrial	30 %	25/30	C
Industrial	60 %	10/12	C

NOTE: Voltage shift at zero crossing.

Voltage interruption (50 Hz / 60 Hz)			
Control declaration EMC level	Voltage $\Delta U$ reduction	Duration in periods	Compliance Criteria (see Table ZD.2)
Residential	100 %	0,5	B
Residential and industrial	100 %	1	B
Residential and industrial	100 %	250/300	C

The test is only applicable to AC power input ports

**13.4. Test Procedure**

The EUT is placed on a table which is 0.8 meter above a metal ground plane measured 1m\*1m minimum, and 0.65mm thick minimum, and projected beyond the EUT by at least 0.1m on all sides. The power cord shall be used the shortest power cord as specified by the manufacturer.

For Voltage dips and interruptions test:

The selection of test voltage is based on the rated power range. If the operation range is large than 20% of lower power range, both end of specified voltage shall be tested. Otherwise, the typical voltage specification is selected as test voltage.

The EUT is connected to the power mains through a coupling device that directly couples to the voltage dips and interruption generator.

**13.5. Deviation from Test Standard**

No deviation.

**13.6. Test Result**

Test Site	TR2	Date of Test	2013.12.03
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 100V / 50Hz
Temperature	23°C	Humidity	43%RH
Barometric Pressure	101kPa	Test Engineer	Jane
Test Mode	Mode 1: Normal operation		

Voltage % Reduction	Test Duration (period)	Test Result Criterion	Observation	Result
30(Dips)	25	A	Note 1	Pass
60(Dips)	10	A	Note 1	Pass
100(Interruptions)	0.5	A	Note 1	Pass
100(Interruptions)	1	A	Note 1	Pass
100(Interruptions)	250	C	Note 2	Pass

NOTE 1: There was no change compared with initial operation during the test.

NOTE 2: The system shut down during the test, but can be restored by the user.

Test Site	TR2	Date of Test	2013.12.03
EUT	CO2 Sensor with Humidity/Temp sensor	Test Voltage	AC 240V / 50Hz
Temperature	23°C	Humidity	43%RH
Barometric Pressure	101kPa	Test Engineer	Jane
Test Mode	Mode 1: Normal operation		

Voltage % Reduction	Test Duration (period)	Test Result Criterion	Observation	Result
30(Dips)	25	A	Note 1	Pass
60(Dips)	10	A	Note 1	Pass
100(Interruptions)	0.5	A	Note 1	Pass
100(Interruptions)	1	A	Note 1	Pass
100(Interruptions)	250	C	Note 2	Pass

NOTE 1: There was no change compared with initial operation during the test.

NOTE 2: The system shut down during the test, but can be restored by the user.

## 13.7. Test Photograph

Test Mode: Mode 1: Normal operation

Description: Voltage dips and interruptions Test Setup



14. Attachment

EUT Photograph

(1) EUT Photo



(2) EUT Photo



(3) EUT Photo



(4) EUT Photo



(5) EUT Photo



(6) EUT Photo



---

The End