



Test Report

EN 61000-6-1:2007

Electromagnetic Compatibility (EMC) - Part 6 - 1:Genetic Standards- Immunity for resident, commercial and light- industrial environments.

EN 61000-6-3:2007+A1:2011

Electromagnetic Compatibility (EMC) - Part 6 - 3 : Generic Standards – Emission standard for residential, commercial and light – industrial environments.

Report Reference No. : CTL1310181593-E

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Date of issue : October 23, 2013

Testing Laboratory Name : **Shenzhen CTL Electromagnetic Technology Co., Ltd.**

Address : Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

Testing location/ procedure : Full application of Harmonised standards
 Partial application of Harmonised standards
 Other standard testing methods

Applicant's name : Acrel Co., Ltd.

Address : No.253, YuLv Road, Jiading District, Shanghai, China

Test specification:

Standard : **EN 61000-6-1:2007 EN 61000-6-3:2007+A1:2011**
EN 61000-3-12: 2011 EN 61000-3-3: 2013

Non-standard test method : /

Test Report Form No. :

TRF Originator : Shenzhen CTL Electromagnetic Technology Co., Ltd

Master TRF : Dated 2013-06

Shenzhen CTL Electromagnetic Technology Co., Ltd.

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Test item description..... : **Electrical board for small and medium size cold storage**

Manufacturer : Jiangsu Acrel Electric MFG.Co., Ltd.

Model No..... : ADL3000

Listed Models..... : DTSD1352, DTSF1352, ADL300

Trade Mark..... : /

Ratings..... : AC 380V

Result..... : **Positive**

EMC -- Test Report

Test Report No. : CTL1310181593-E	October 23, 2013
	Date of issue

Equipment under Test : Three-phase Electronic Meter

Type / Model : ADL3000

Listed Models : DTSD1352, DTSF1352, ADL300

Applicant : Acrel Co., Ltd.

Address : No.253, YuLv Road, Jiading District, Shanghai, China

Manufacturer : Jiangsu Acrel Electric MFG.Co., Ltd.

Address : No.5 Dongmeng Road, Jiangyin City, Jiangsu Province, China

Test Result according to the standards on page 4:	Positive
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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1. TEST STANDARDS

The tests were performed according to following standards:

[EN 61000-6-1:2007](#) Electromagnetic Compatibility (EMC) - Part 6 - 1:Generic Standards- Immunity for resident, commercial and light- industrial environments.

[EN 61000-6-3:2007+A1:2011](#) Electromagnetic Compatibility (EMC) - Part 6 - 3 : Generic Standards – Emission standard for residential, commercial and light – industrial environments.

[EN 61000-3-12: 2011](#) Electromagnetic compatibility (EMC) -- Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤ 75 A per phase.

[EN 61000-3-3:2013](#) Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection



2. SUMMARY

2.1. General Remarks:

Date of receipt of test sample : October 21, 2013

Testing commenced on : October 21, 2013

Testing concluded on : October 23, 2013

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage : 380V / 50 Hz 115V / 60Hz
 12 V DC 24 V DC
 Other (specified in blank below)

2.3. Short description of the Equipment under Test (EUT)

The EUT is a Power Energy Feedback Unit.

Series number: prototype

2.4. EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

The tests are carried out with surge protective devices disconnected.

Test program (customer specific)

Emissions tests.....: According to EN61000-6-3, searching for the highest disturbance.

Immunity tests.....: According to EN61000-6-1, searching for the highest susceptibility.

Harmonics current..... : According to EN 61000-3-2, searching for the highest disturbance.

Voltage fluctuation..... : According to EN 61000-3-3, searching for the highest disturbance.

2.5. EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurement:

n- supplied by the manufacturer

o - supplied by the lab

2.6. Performance Criteria

Definition related to the performance level:

- based on the used product standard
 based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

Definition: normal performance within limits specified by the manufacturer, requestor or purchaser:

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion B:

Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention:

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion C:

Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Electromagnetic Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 9618A

The 3m alternate test site of Shenzhen CTL Electromagnetic Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9618A on May, 2011.

FCC-Registration No.: 807767

Shenzhen CTL Electromagnetic Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 807767, June 27, 2011.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	<u>22-25 °C</u>
Humidity:	<u>40-54 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

3.4. Test Description

Emission Measurement		
Radiated Emission	EN 61000-6-3:2007+A1:2011	PASS
Conduction Emission	EN 61000-6-3:2007+A1:2011	PASS
Harmonic Current	EN 61000-3-2: 2006+A2:2009	PASS
Voltage Fluctuation and Flicker	EN 61000-3-3: 2013	PASS
Immunity Measurement		
Electrostatic Discharge	EN 61000-6-1:2007 IEC 61000-4-2: 2008	PASS
RF Field Strength Susceptibility	EN 61000-6-1:2007 IEC 61000-4-3: 2006	PASS
Electrical Fast Transient/Burst Test	EN 61000-6-1:2007 IEC 61000-4-4: 2012	PASS
Surge Test	EN 61000-6-1:2007 IEC 61000-4-5: 2005	PASS
Conducted Susceptibility Test	EN 61000-6-1:2007 IEC 61000-4-6: 2008	PASS
Power Frequency Magnetic Field Susceptibility Test	EN 61000-6-1:2007 IEC 61000-4-8: 2009	PASS
Voltage Dips and Interruptions Test	EN 61000-6-1:2007 IEC 61000-4-11: 2004	PASS

Remark: The test result PASS and /or FAIL has no relationship with the measurement uncertainty.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Bontek Compliance Testing Laboratory Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	±4.10dB	(1)
Radiated Emission	1~12.75GHz	±4.32dB	(1)
Conducted Emission	0.15~30MHz	±3.22dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6. Equipments Used during the Test

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Sunol Sciences Corp.	JB1 Antenna	A061713	2013/04
2	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESPI	1164.6407.07	2013/04
3	RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	2013/04
4	Controller	EM Electronics	Controller EM 1000	N/A	2013/04
5	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2013/04

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2013/04
2	LISN	ROHDE & SCHWARZ	ENV216	101034	2013/04
4	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2013/04

Harmonic Current/ Voltage Fluctuation and Flicker					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Purified Power Source	MToni	PHF 5010	N/A	2013/04
2	Harmonic And Flicker Analyzer	Voltech	PM6000	N/A	2013/04

Electrostatic Discharge					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	SKYLARK	ESD-2000	0220K10251	2013/04

RF Field Strength Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	SIGNAL GENERATOR	IFR	2032	203002/100	2013/04
2	AMPLIFIER	AR	150W1000	301584	2013/04
3	DUAL DIRECTIONAL COUPLER	AR	DC6080	301508	2013/04
4	POWER HEAD	AR	PH2000	301193	2013/04
5	POWER METER	AR	PM2002	302799	2013/04

Electrical Fast Transient/Surge/Dips					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Ultra Compact Simulator	HAEFELY	ECOMPACT4	174887	2013/04

Conducted Susceptibility (CS) :					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Conducted Disturbances test system	SCHLODER	CDG 6000	N/A	2013/04
2	Amplifier	SCHLODER	4N100W-6DB	N/A	2013/04
3	Dual Directional Coupler	AR	DC2600	302389	2013/04
4	6db Attenuator	EMTEST	ATT6/75	0010230A	2013/04
5	EM CLAMP	LÜTHI	EM101	335625	2013/04
6	CDN	SCHLODER	CDN M2+M3	A2210225/2013	2013/04

Power Frequency Magnetic Field Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA COMPACT SIMULATOR	EM TEST	UCS500M6	202304/060	2013/04
2	MOTOR DRIVEN VOLTAGE TRANSFORMER	EM TEST	MV2616	302205	2013/04
3	CURRENT TRANSFORMER	EM TEST	MC2630	302389	2013/04
4	MAGNETIC COIL	EM TEST	MS100	0010230A	2013/04

4. TEST CONDITIONS AND RESULTS

4.1. Radiated Emission

For test instruments and accessories used see section 3.6.

4.1.1. Description of the test location

Test location: Shielded room No. 2

4.1.2. Limits of disturbance (EN61000-6-3)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dBmV/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

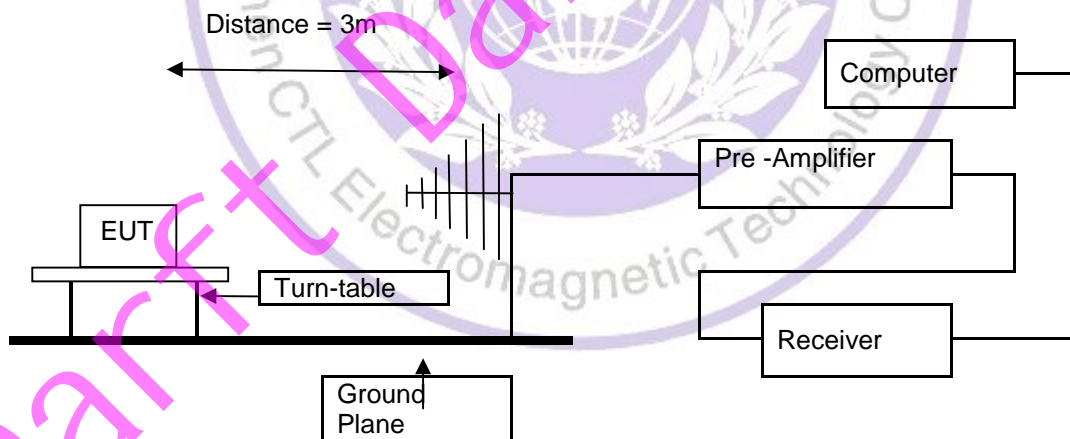
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

4.1.3. Description of the test set-up

4.1.3.1. Operating Condition

The EUT is set to work shall be carried out with full load mode during the test, and the maximum emanating results are recorded.

4.1.3.2. Configuration of test setup



4.1.4. Test result

The requirements are **Fulfilled**

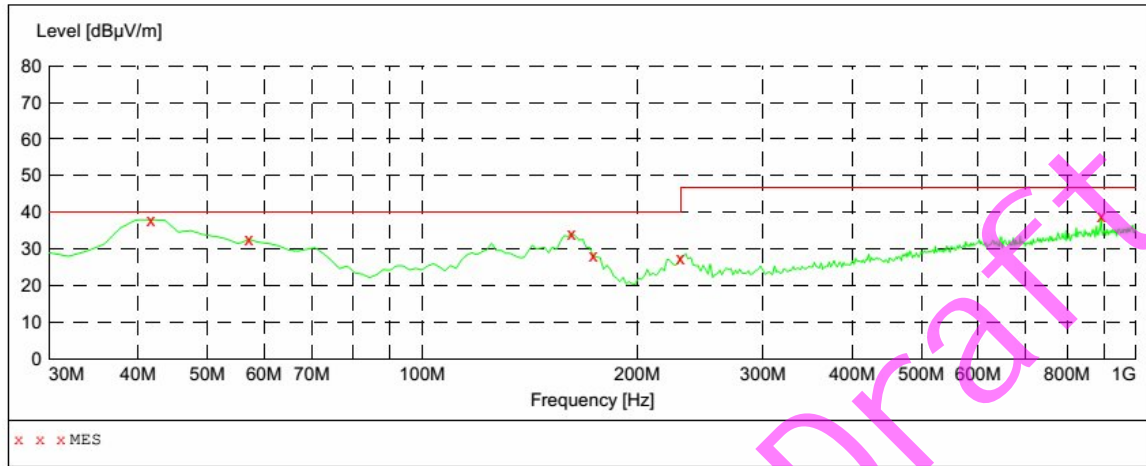
Band Width: 120KHz

Frequency Range: 30MHz to 1000MHz

Remarks: The limits are kept. For detailed results, please see the following page(s).

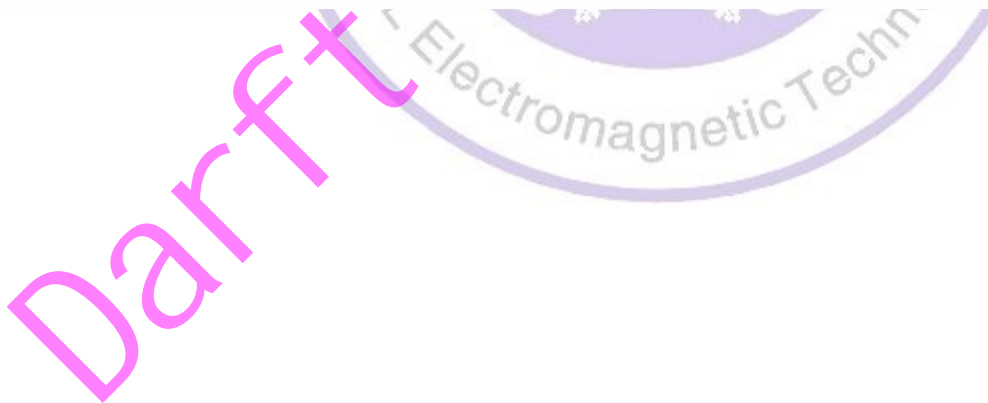
SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	MaxPeak	Coupled	100 kHz	VULB9163 NEW
30.0 MHz	1.0 GHz				



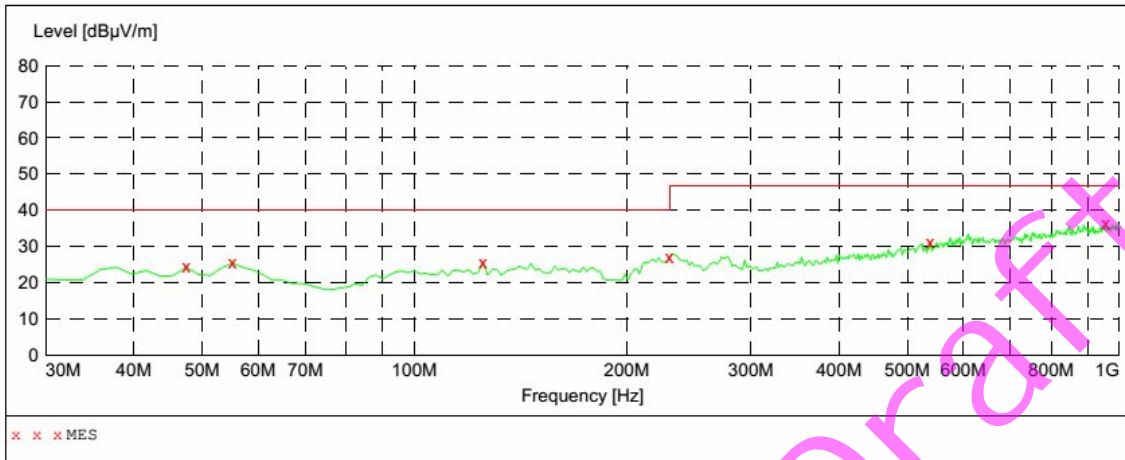
MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
41.640000	38.10	15.9	40.0	1.9	---	100.0	0.00	---
57.160000	32.60	15.1	40.0	7.4	---	100.0	0.00	---
161.920000	34.20	12.8	40.0	5.8	---	100.0	0.00	---
173.560000	28.10	13.4	40.0	11.9	---	100.0	0.00	---
229.820000	27.70	16.1	40.0	12.3	---	100.0	0.00	---
893.300000	39.00	29.1	47.0	8.0	---	100.0	0.00	---



SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW



MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	24.40	15.8	40.0	15.6	---	100.0	0.00	---
55.220000	25.40	15.6	40.0	14.6	---	100.0	0.00	---
125.060000	25.60	13.8	40.0	14.4	---	100.0	0.00	---
229.820000	26.90	16.1	40.0	13.1	---	100.0	0.00	---
538.280000	31.30	24.7	47.0	15.7	---	100.0	0.00	---
955.380000	36.30	29.6	47.0	10.7	---	100.0	0.00	---



4.2. Conducted disturbance

For test instruments and accessories used see section 3.6.

4.2.1. Description of the test location

Test location: Shielded room No. 1

4.2.2. Limits of disturbance

Limit of disturbance voltage at the mains terminals

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150~0.500	66~56	56~46
0.500~5.000	56	46
5.000~30.00	60	50

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

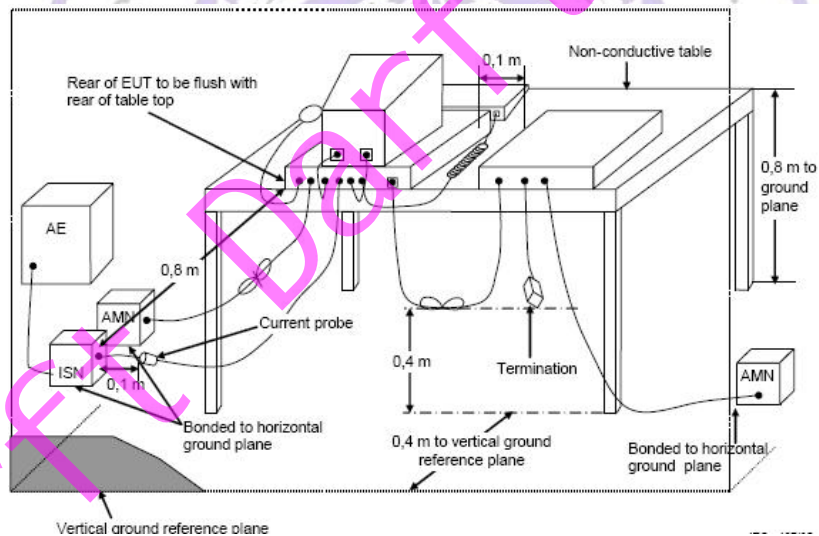
4.2.3. Description of the test set-up

4.2.3.1. Operating Condition

The EUT is set to work shall be carried out full load mode during the test, and the maximum emanating results are recorded.

4.2.3.2. Configuration of test setup

Mains terminals:



4.2.4. Test result

The requirements are **Fulfilled**

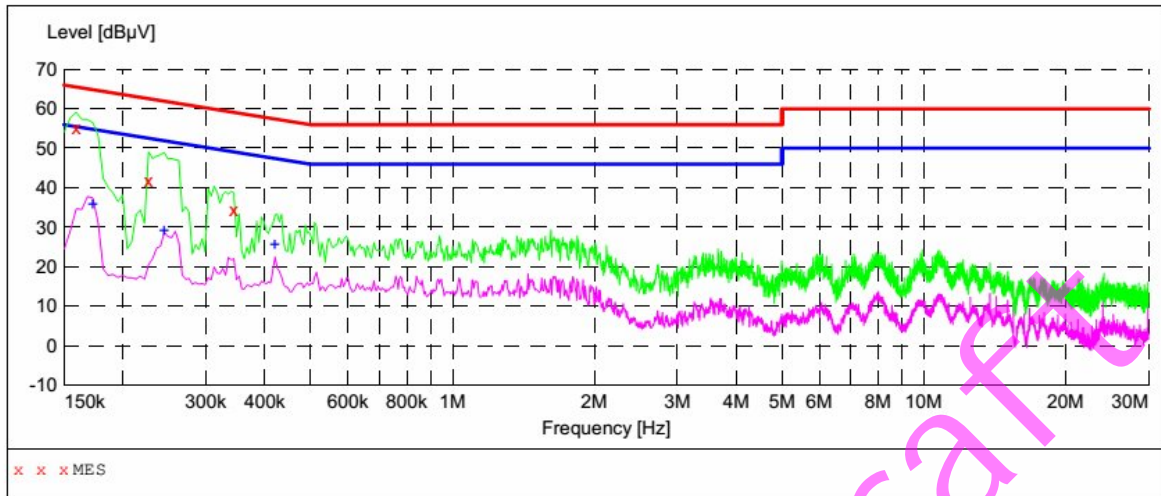
Band Width: 9KHz

Frequency Range: 150KHz to 30MHz

Remarks: The limits are kept. For detailed results, please see the following page(s).

SCAN TABLE: "Voltage (9K-30M) FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

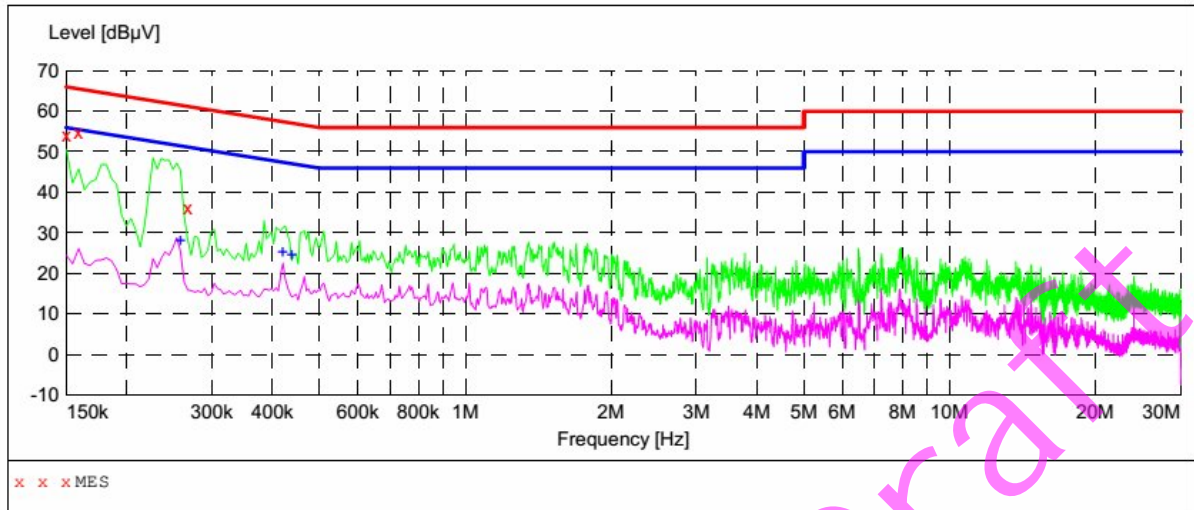
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.159000	55.10	9.8	66	10.4	QP	L1	GND
0.226500	41.70	9.8	63	20.9	QP	L1	GND
0.343500	34.30	9.8	59	24.8	QP	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.172500	35.70	9.8	55	19.1	AV	L1	GND
0.244500	29.20	9.8	52	22.7	AV	L1	GND
0.420000	25.60	9.8	47	21.8	AV	L1	GND

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

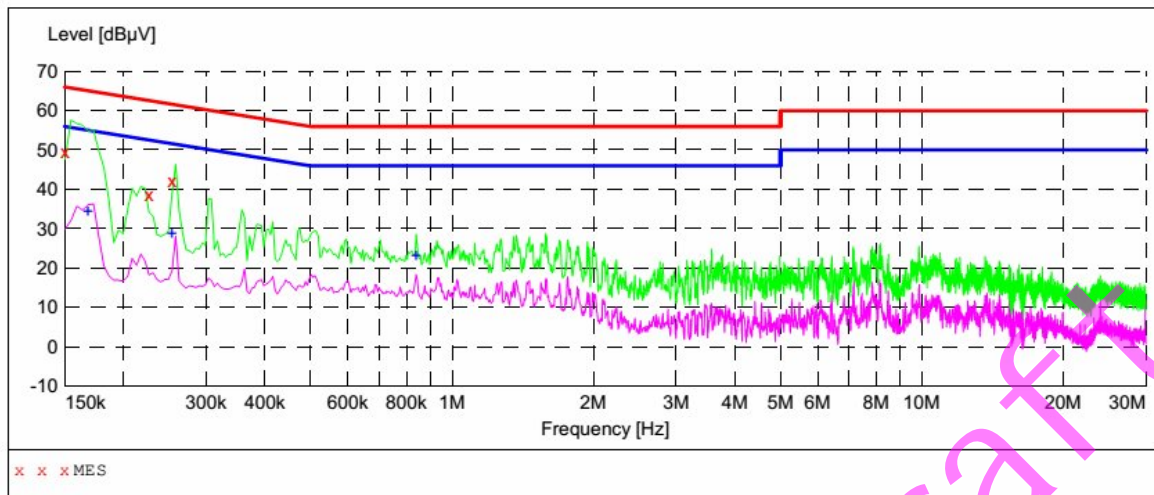
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	54.20	9.8	66	11.8	QP	L2	GND
0.159000	54.80	9.8	66	10.7	QP	L2	GND
0.267000	36.10	9.8	61	25.1	QP	L2	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.258000	28.10	9.8	52	23.4	AV	L2	GND
0.420000	25.30	9.8	47	22.1	AV	L2	GND
0.438000	24.40	9.8	47	22.7	AV	L2	GND

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



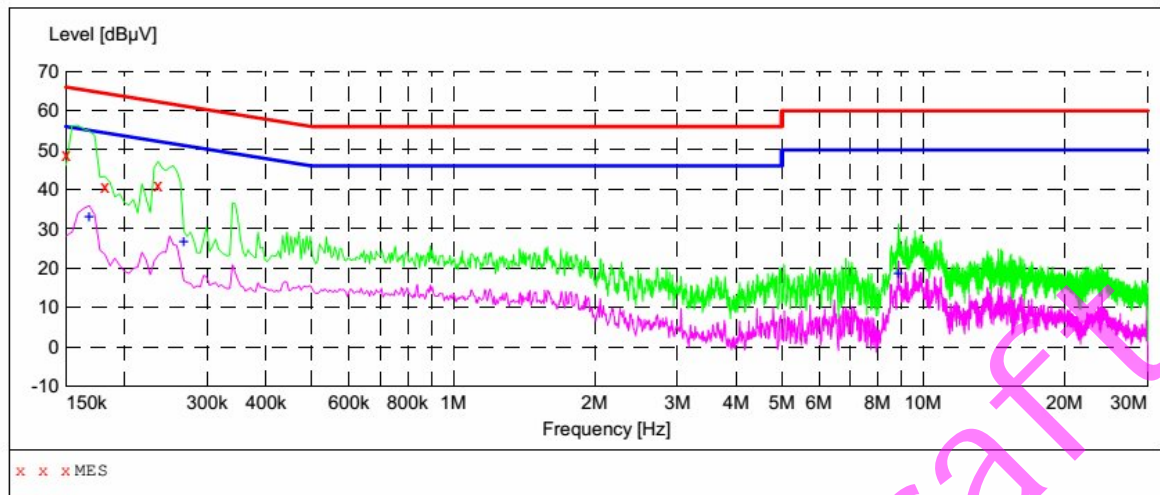
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	49.40	9.8	66	16.6	QP	L3	GND
0.226500	38.70	9.8	63	23.9	QP	L3	GND
0.253500	42.00	9.8	62	19.6	QP	L3	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.168000	34.50	9.8	55	20.6	AV	L3	GND
0.253500	28.70	9.8	52	22.9	AV	L3	GND
0.838500	23.10	9.8	46	22.9	AV	L3	GND

SCAN TABLE: "Voltage (9K-30M) FIN"
 Short Description: 150K-30M Voltage



MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	48.80	9.8	66	17.2	QP	N	GND
0.181500	40.80	9.8	64	23.6	QP	N	GND
0.235500	41.10	9.8	62	21.2	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.168000	33.10	9.8	55	22.0	AV	N	GND
0.267000	26.50	9.8	51	24.7	AV	N	GND
8.862000	18.70	10.1	50	31.3	AV	N	GND

4.3. Harmonic current

For test instruments and accessories used see section 3.6.

4.3.1. Description of the test location

Test location: Shielded room No. 3

4.3.1. Limits of Harmonic Current

Test configuration and procedure see clause 7.1 of standard EN 61000-3-12: 2011.

4.3.2. Description of the test set-up

4.3.2.1. Operating Condition

The EUT is normal working mode during the test, and the maximum emanating results are recorded.

4.3.2.2. Test Configuration and Procedure

Test configuration and procedure see clause 6.2.2 and Appendix C of standard EN 61000-3-12:2011.

4.3.3. Test result

E. U. T. Result

Check harmonics 2..40 [exception odd 21..39]:

Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 100%:	
Order (n):	None

Check odd harmonics 21..39:

All Partial Odd Harmonics below partial limits.	
Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 150%:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

Hn	I _{eff} [A]	I _{eff} [%]	Limit [A]	Result
1	97.235E-3	100.000		
2	613.734E-6	0.631	1.08	PASS
3	90.391E-3	92.962	2.30	PASS
4	822.002E-6	0.845	430.00E-3	PASS
5	84.508E-3	86.911	1.14	PASS
6	952.807E-6	0.980	300.00E-3	PASS
7	76.510E-3	78.685	770.00E-3	PASS
8	914.915E-6	0.941	230.00E-3	PASS
9	66.165E-3	68.047	400.00E-3	PASS
10	879.388E-6	0.904	184.00E-3	PASS
11	55.560E-3	57.140	330.00E-3	PASS
12	0.999E-3	1.027	153.33E-3	PASS
13	44.550E-3	45.817	210.00E-3	PASS
14	828.194E-6	0.852	131.43E-3	PASS
15	34.293E-3	35.268	150.00E-3	PASS
16	808.849E-6	0.832	115.00E-3	PASS
17	25.890E-3	26.626	132.35E-3	PASS
18	745.439E-6	0.767	102.22E-3	PASS
19	19.499E-3	20.054	118.42E-3	PASS
20	656.168E-6	0.675	92.00E-3	PASS
21	15.825E-3	16.275	160.71E-3	PASS
22	627.548E-6	0.645	83.64E-3	PASS
23	14.334E-3	14.741	146.74E-3	PASS
24	687.863E-6	0.707	76.66E-3	PASS
25	13.735E-3	14.125	135.00E-3	PASS
26	721.182E-6	0.742	70.77E-3	PASS
27	12.925E-3	13.292	124.99E-3	PASS
28	668.346E-6	0.687	65.71E-3	PASS
29	11.532E-3	11.860	116.39E-3	PASS
30	593.111E-6	0.610	61.33E-3	PASS
31	9.818E-3	10.097	108.87E-3	PASS
32	535.609E-6	0.551	57.50E-3	PASS
33	7.923E-3	8.148	102.27E-3	PASS
34	482.174E-6	0.496	54.12E-3	PASS
35	6.194E-3	6.370	96.44E-3	PASS
36	438.425E-6	0.451	51.11E-3	PASS
37	5.026E-3	5.169	91.21E-3	PASS
38	434.223E-6	0.447	48.42E-3	PASS
39	4.502E-3	4.630	86.53E-3	PASS
40	405.491E-6	0.417	46.00E-3	PASS

Maximum harmonic current results

Hn	I _{eff} [A]	I _{eff} [%]	Limit [A]	Result
1	97.381E-3	100.000		
2	1.414E-3	1.452	1.62	PASS
3	90.509E-3	92.943	3.45	PASS
4	1.727E-3	1.774	645.00E-3	PASS
5	84.591E-3	86.867	1.71	PASS
6	1.860E-3	1.910	450.00E-3	PASS
7	76.580E-3	78.640	1.15	PASS
8	1.739E-3	1.785	345.00E-3	PASS
9	66.370E-3	68.155	600.00E-3	PASS
10	1.634E-3	1.678	276.00E-3	PASS
11	55.685E-3	57.182	495.00E-3	PASS
12	1.873E-3	1.924	229.99E-3	PASS
13	44.710E-3	45.913	315.00E-3	PASS
14	1.491E-3	1.531	197.15E-3	PASS
15	34.527E-3	35.456	225.00E-3	PASS
16	1.413E-3	1.451	172.50E-3	PASS
17	26.127E-3	26.830	198.52E-3	PASS
18	1.327E-3	1.363	153.33E-3	PASS
19	19.693E-3	20.223	177.63E-3	PASS
20	1.143E-3	1.174	138.00E-3	PASS
21	15.958E-3	16.387	160.71E-3	PASS
22	1.088E-3	1.118	125.46E-3	PASS
23	14.413E-3	14.801	146.74E-3	PASS
24	1.126E-3	1.156	114.99E-3	PASS
25	13.821E-3	14.193	135.00E-3	PASS
26	1.209E-3	1.242	106.16E-3	PASS
27	13.006E-3	13.356	124.99E-3	PASS
28	1.117E-3	1.147	98.57E-3	PASS
29	11.632E-3	11.945	116.39E-3	PASS
30	1.022E-3	1.049	92.00E-3	PASS
31	9.937E-3	10.204	108.87E-3	PASS
32	936.810E-6	0.962	86.25E-3	PASS
33	8.029E-3	8.245	102.27E-3	PASS
34	799.801E-6	0.821	81.18E-3	PASS
35	6.274E-3	6.443	96.44E-3	PASS
36	748.096E-6	0.768	76.66E-3	PASS
37	5.078E-3	5.214	91.21E-3	PASS
38	715.027E-6	0.734	72.63E-3	PASS
39	4.543E-3	4.665	86.53E-3	PASS
40	680.573E-6	0.699	69.00E-3	PASS

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	230.01	100.003		
2	166.78E-3	0.073	0.2	PASS
3	406.69E-3	0.177	0.9	PASS
4	60.20E-3	0.026	0.2	PASS
5	21.69E-3	0.009	0.4	PASS
6	60.88E-3	0.026	0.2	PASS
7	48.87E-3	0.021	0.3	PASS
8	26.27E-3	0.011	0.2	PASS
9	38.96E-3	0.017	0.2	PASS
10	23.78E-3	0.010	0.2	PASS
11	45.47E-3	0.020	0.1	PASS
12	16.98E-3	0.007	0.1	PASS
13	26.50E-3	0.012	0.1	PASS
14	14.30E-3	0.006	0.1	PASS
15	38.55E-3	0.017	0.1	PASS
16	21.04E-3	0.009	0.1	PASS
17	27.44E-3	0.012	0.1	PASS
18	16.78E-3	0.007	0.1	PASS
19	26.02E-3	0.011	0.1	PASS
20	18.34E-3	0.008	0.1	PASS
21	27.70E-3	0.012	0.1	PASS
22	13.69E-3	0.006	0.1	PASS
23	17.99E-3	0.008	0.1	PASS
24	11.52E-3	0.005	0.1	PASS
25	26.07E-3	0.011	0.1	PASS
26	11.79E-3	0.005	0.1	PASS
27	23.94E-3	0.010	0.1	PASS
28	12.35E-3	0.005	0.1	PASS
29	21.95E-3	0.010	0.1	PASS
30	17.36E-3	0.008	0.1	PASS
31	20.04E-3	0.009	0.1	PASS
32	11.99E-3	0.005	0.1	PASS
33	14.28E-3	0.006	0.1	PASS
34	10.83E-3	0.005	0.1	PASS
35	16.54E-3	0.007	0.1	PASS
36	9.80E-3	0.004	0.1	PASS
37	17.26E-3	0.008	0.1	PASS
38	8.89E-3	0.004	0.1	PASS
39	16.57E-3	0.007	0.1	PASS
40	11.26E-3	0.005	0.1	PASS

4.4. Voltage Fluctuation and Flicker

For test instruments and accessories used see section 3.6.

4.4.1. Description of the test location

Test location: Shielded room No. 3

4.4.2. Limits of Voltage Fluctuation and Flicker

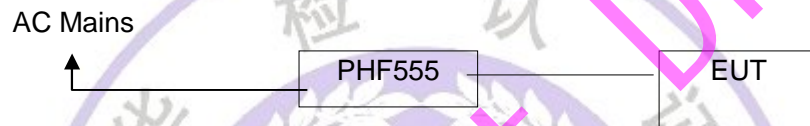
Test configuration and procedure see clause 5 of standard EN 61000-3-3: 2013.

4.4.3. Description of the test set-up

4.4.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the maximum emanating results are recorded.

4.4.3.2. Configuration of test setup



4.4.4. Test result

The requirements are

Fulfilled

Remarks: The limits are kept. For detailed results, please see the following page(s).

Standard used:	EN/IEC 61000-3-3 Flicker
Short time (Pst):	10 min
Observation time:	120 min (12 Flicker measurements)
Customer:	Jiangsu Acrel Electric MFG.Co.,Ltd.
Mains supply voltage:	AC 380V/ 50Hz
Ambient Temperature:	23°C
Humidity:	51%
E. U. T.:	Three-phase Electronic Meter M/N: ADL3000
Date of test:	October 22, 2013
Tester:	Tony

Test Result	PASS
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Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.127	4.00	PASS
dt [s]	0.000	0.50	PASS

Detail Flicker data

Flicker measurement 1	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.127	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 2	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.093	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 3	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.093	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 4	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.091	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 5	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.092	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 6	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.095	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 7	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.091	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 8	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.094	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 9	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.093	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 10	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.094	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 11	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.095	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 12	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.093	4.00	PASS
dt [s]	0.000	0.50	PASS

4.5. Electrostatic discharge

For test instruments and accessories used see section 3.6.

4.5.1. Description of the test location and date

Test location: Shielded room No. 3

Date of test: October 22, 2013

Operator: NADA

4.5.2. Severity levels of electrostatic discharge

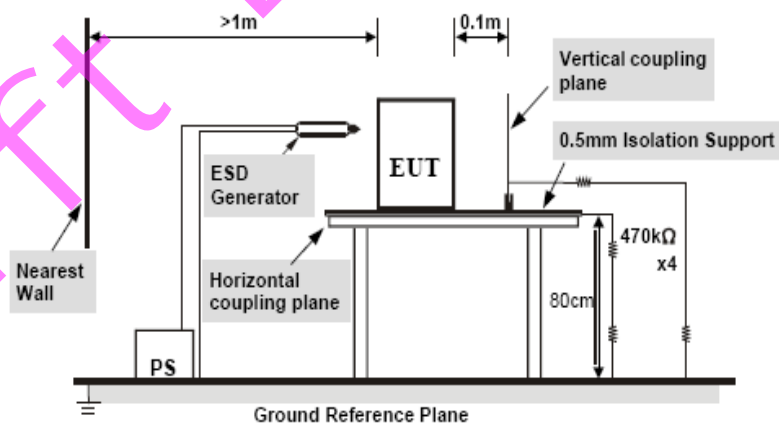
Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	2	2
2	4	4
3	6	8
4	8	15
X	Special	Special

4.5.3. Description of the test set-up

4.5.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the maximum emanating results are recorded.

4.5.3.2. Configuration of test setup



4.5.4. Test specification:

<u>Contact discharge voltage:</u>	<input type="checkbox"/> 2 kV	<input type="checkbox"/> 4 kV	
<u>Air discharge voltage:</u>	<input type="checkbox"/> 2 kV	<input type="checkbox"/> 4 kV	<input type="checkbox"/> 8 kV
<u>Number of discharges:</u>	<input type="checkbox"/> ≥ 10	<input type="checkbox"/> ≥ 25	
<u>Type of discharge:</u>	Direct discharge	<input type="checkbox"/> Air discharge	<input type="checkbox"/> Contact discharge
	Indirect discharge	<input type="checkbox"/> Contact discharge	<input type="checkbox"/> Contact discharge
<u>Polarity:</u>	<input type="checkbox"/> Positive	<input type="checkbox"/> Negative	
<u>Discharge location:</u>	<input type="checkbox"/> see photo documentation of the test set-up		
	<input type="checkbox"/> all external locations accessible by hand		
	<input type="checkbox"/> horizontal plate (HCP)		
	<input type="checkbox"/> vertical coupling plate (VCP)		

4.5.5. Test result

The requirements are **Fulfilled** Performance Criterion: **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).



4.6. Radiated, radio-frequency, electromagnetic field

For test instruments and accessories used see section 3.6.

4.6.1. Description of the test location and date

Test location: Shielded room No. 2

Date of test: October 22, 2013

Operator: Bove

4.6.2. Severity levels of radiated, radio-frequency, electromagnetic field

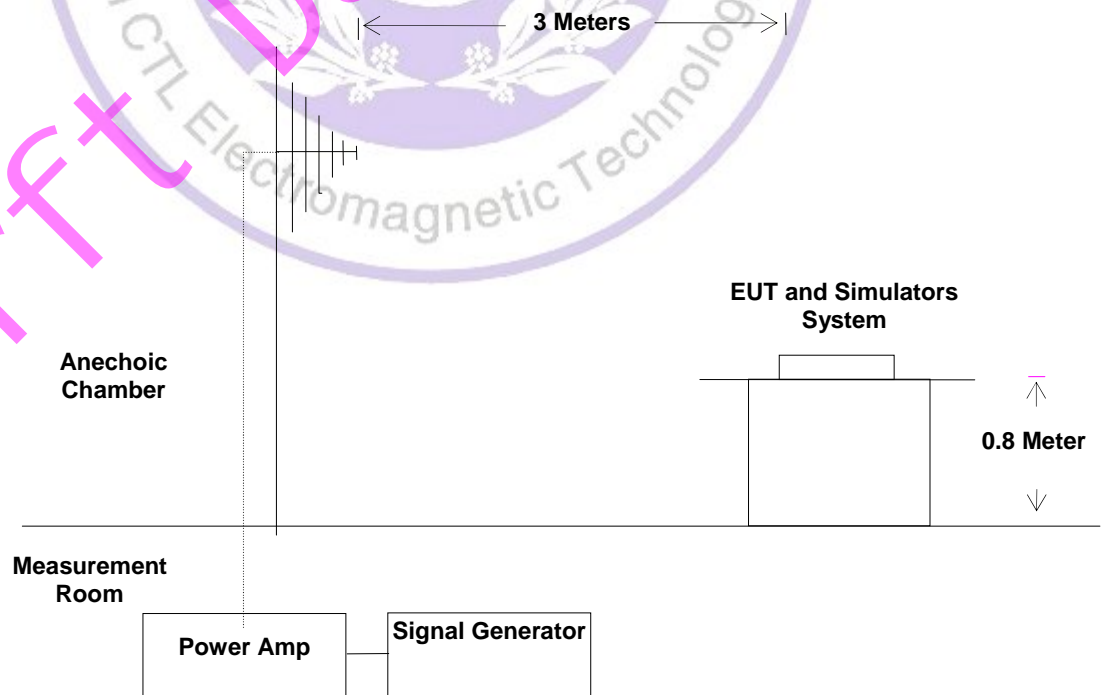
Level	Field Strength (V/m)
1.	1
2.	3
3.	10
X	Special

4.6.3. Description of the test set-up

4.6.3.1. Operating Condition

The EUT is set to work shall be carried out normal working mode during the test, and the maximum emanating results are recorded.

4.6.3.2. Configuration of test setup



4.6.4. Test specification:

<u>Frequency range:</u>	n 80 MHz to 1000 MHz
<u>Field strength:</u>	n 3 V/m
<u>EUT - antenna separation:</u>	n 3 m
<u>Modulation:</u>	n AM: 80 % n sinusoidal 1000Hz
<u>Frequency step:</u>	n 1 % with 3 s dwell time
<u>Antenna polarisation:</u>	n horizontal n vertical

4.6.5. Test resultThe requirements are **Fulfilled**Performance Criterion: **A****Remarks:** During the test no deviation was detected to the selected operation mode(s).

4.7. Electrical fast transients / Burst

For test instruments and accessories used see section 3.6.

4.7.1. Description of the test location

Test location: Shielded room No. 3

Date of test: October 22, 2013

Operator: Tony

4.7.2. Severity levels of electrical fast transients / Burst

Severity level: $\pm 1000V$ for AC power supply lines

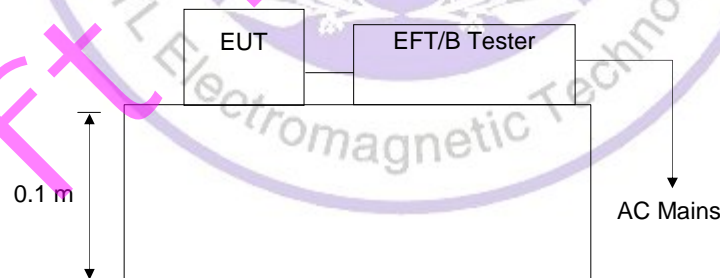
Open Circuit Output Test Voltage $\pm 10\%$				
Level	For Power Supply Lines		For I / O (Input / Output) Signal Data and Control Lines	
	V peak(KV)	Repetition Frequency (KHz)	V peak(KV)	Repetition Frequency (KHz)
1	0.5	5 or 100	0.25	5 or 100
2	1	5 or 100	0.5	5 or 100
3	2	5 or 100	1	5 or 100
4	4	5 or 100	2	5 or 100
X	Special	Special	Special	Special

4.7.3. Description of the test set-up

4.7.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the maximum emanating results are recorded.

4.7.3.2. Configuration of test setup



4.7.4. Test specification:

Coupling network: 0.5 kV 1 kV 2 kV

Coupling clamp: 0.5 kV 1 kV 2 kV

Burst frequency: 5.0 kHz

Coupling duration: ≥ 60 s

Polarity: positive negative

4.7.5. Coupling points

Cable description: AC power line

Screening:	<input type="radio"/> screened	<input checked="" type="radio"/> unscreened
Status:	<input type="radio"/> passive	<input checked="" type="radio"/> active
Signal transmission:	<input checked="" type="radio"/> analogue	<input type="radio"/> digital
Length:	<input checked="" type="radio"/> 1.5 m	

4.7.6. Test result

The requirements are **Fulfilled**

Performance Criterion: **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).



4.8. Surge

For test instruments and accessories used see section 3.6.

4.8.1. Description of the test location

Test location: Test location No. 3

Date of test: October 22, 2013

Operator: Andy

4.8.2. Severity levels of surge

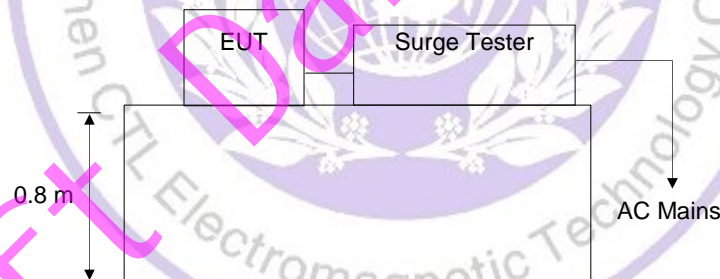
Level	Test Voltage (KV)
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

4.8.3. Description of the test set-up

4.8.3.1. Operating Condition

The EUT is set to work shall be carried out normal working mode during the test, and the maximum emanating results are recorded.

4.8.3.2. Configuration of test setup



4.8.4. Test specification:

Pulse amplitude-Power line sym.: 0.5 kV 1 kV 2 kV 4 kV
Source impedance: 2 Ω + 18 μ F

Pulse amplitude-Power line un sym.: 0.5 kV 1 kV 2 kV 4 kV
Source impedance: 12 Ω + 9 μ F

Signal line: 0.5 kV 1 kV 2 kV 4 kV

Number of surges: 5 Surges/Phase angle

Phase angle: 0° 90° 180° 270°

Repetition rate: 60 s

Polarity: positive negative

4.8.5. Coupling points

Cable description: AC power line

Screening:	<input type="radio"/> screened	<input checked="" type="radio"/> unscreened
Status:	<input type="radio"/> passive	<input checked="" type="radio"/> active
Signal transmission:	<input checked="" type="radio"/> analogue	<input type="radio"/> digital
Length:	<input checked="" type="radio"/> 1.5 m	

4.8.6. Test result

The requirements are **Fulfilled**

Performance Criterion: **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).



4.9. Conducted disturbances induced by radio-frequency fields

For test instruments and accessories used see section 3.6.

4.9.1. Description of the test location

Test location: Shielded room No. 3

Date of test: October 22, 2013

Operator: Andy

4.9.2. Severity levels of conducted disturbances

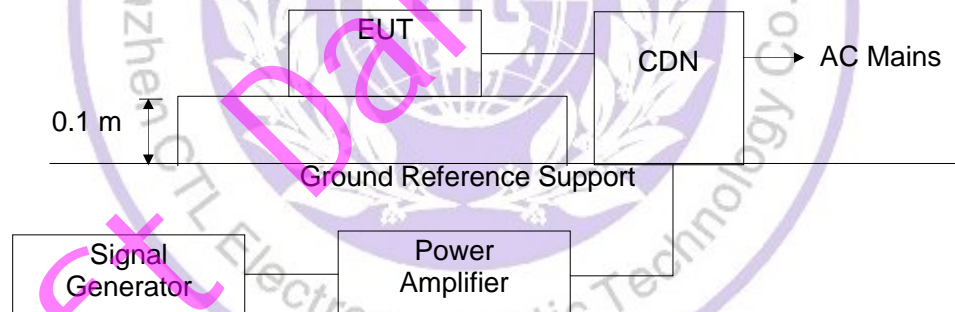
Level	Field Strength (V)
1.	1
2.	3
3.	10
X	Special

4.9.3. Description of the test set-up

4.9.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the maximum emanating results are recorded.

4.9.3.2. Configuration of test setup



4.9.4. Test specification:

<u>Frequency range:</u>	n 0.15 MHz to 80 MHz
<u>Test voltage:</u>	n 3 V
<u>Modulation:</u>	n AM: 80 % n sinusoidal 1000Hz
<u>Frequency step:</u>	n 1 % with 3 s dwell time

4.9.5. Coupling points

Cable description	AC power line	
Screening:	<input type="radio"/> screened	<input checked="" type="radio"/> unscreened
Status:	<input type="radio"/> passive	<input checked="" type="radio"/> active
Signal transmission:	<input checked="" type="radio"/> analogue	<input type="radio"/> digital
Length:	<input checked="" type="radio"/> 1.5 m	

4.9.6. Test result

The requirements are **Fulfilled**

Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).



4.10. Magnetic Field Immunity

For test instruments and accessories used see section 3.6.

4.10.1. Description of the test location

Test location: Shielded room No.3

Date of test: October 22, 2013

Operator: Andy

4.10.2. Severity levels of magnetic field immunity

Level	Magnetic Field Strength (A/m)
1	1
2	3
3	10
4	30
5	100
X.	Special

4.10.3. Description of the test set-up

4.10.3.1. Operating Condition

The EUT is set to work shall be carried out normal working mode during the test, and the maximum emanating results are recorded.

4.10.4. Test specification:

Test frequency: n 50 Hz

Continuous field: n 1 A/m

Test duration: n 5 m

Antenna factor: 0.917 A/m

Axis: n x-axis n y-axis n z-axis

4.10.5. Test result

The requirements are **Fulfilled**

Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

4.11. Voltage Dips and Interruptions

For test instruments and accessories used see section 3.6.

4.11.1. Description of the test location

Test location: Test location No. 3

Date of test: October 22, 2013

Operator: NADA

4.11.2. Severity levels of electrostatic discharge

Test Level (%Ut)	Voltage Dip And Short Interruptions (%Ut)	Performance Criterion	Duration (in Period)
0	100	B	0.5
0	100	C	250
70	30	C	25

4.11.3. Description of the test set-up

4.11.3.1. Operating Condition

The EUT is set to work shall be carried out normal working mode during the test, and the maximum emanating results are recorded.

4.11.3.2. Configuration of test setup



4.11.4. Test specification:

<u>Nominal Mains Voltage (V_N):</u>	n 380 V AC
<u>Number of voltage fluctuations:</u>	n 3
<u>Level of reduction(dip) / duration:</u>	n 100 % / 10ms n 30 % / 500ms
<u>Nominal Mains Voltage (V_N):</u>	n 380 V AC
<u>Number of Interruptions:</u>	n 3
<u>Duration of the Interruption:</u>	n 5000 ms

4.11.5. Test result

The requirements are **Fulfilled**
Performance Criterion **See section 4.11.2**

Remarks: During the test no deviation was detected to the selected operation mode(s).