

Electromagnetic Compatibility (EMC) SECTOR

Product description:	Cylindrical Linear Motor		
Tested models:	Sample 01:ML25300X6 (with sensor SEA9ABZ1) Sample 02:ML2570X6 (with sensor SEA9ABZ1)		
HW revision:	N/D	SW/FW revision:	N/A
Test specification:	EN 61000-6-2:2005 EN 61000-6-4:2007		
Application:	<input checked="" type="checkbox"/> Full	<input type="checkbox"/> Partial (See par. 5)	
Result:	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	
Manufacturer:	Gimatic S.p.A. Via Enzo Ferrari, 2/4 - 25030 Roncadelle (BS) - Italy Tel. +39.030.2584655 Fax +39.030.2583886 url: http://www.gimatic.com		
Manufacturing Plant:	Same as Manufacturer		
Applicant:	Same as Manufacturer		
Customer:	Same as Manufacturer		
Purchase Order:	ODA-P02683	dated:	2011-07-18
Order Confirmation:	CO 2011-0229-00	dated:	2011-07-25
Samples receiving date:	2011-09-12		
Tests date:	from:	2011-09-12	to: 2011-09-14

Test Laboratory:	Test site:
INTEK S.p.A. - Test and Measurement Division Via Mazzini, 75 25086 Rezzato (BS) - Italy Tel. +39.030.2591 857 Fax +39.030.2594 351 url: http://www.intek.it e-mail: info@intek.it	INTEK S.p.A. - Test and Measurement Division Via Breve - 25086 Rezzato (BS) - Italy

Written by:

Luigi Sala
Test Engineer

Verified by

Alberto Amistani
EMC Sector Manager

Approved by:

Ivo Meroni
Test and Measurement Division Manager

00	2012-01-30	Formal issue
Rev.	Date	Description

*Results of tests and controls reported in this document refer only to samples as tested and described.**It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.**Partial reproductions of this document are absolutely forbidden, except with written authorization by INTEK S.p.A.**Cap. Soc. € 875'000,00 – Registry of companies of Brescia, VAT and FC N. IT03268280173 – R.E.A. BS N. 350460*

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1. PURPOSE

Purpose of this document is to contain results of the tests performed to verify correspondence of test sample, as identified and described in paragraph 3, to requirements of standards listed in paragraph 2.

2. APPLICABLE DOCUMENTS

In agreement with the manufacturer were been applied the latest EN available edition.

In the following of this test report, the “applicable documents” will be indicated without date and/or edition number and/or amendments.

2.1 REFERENCE STANDARDS

The reference standards are the harmonized product standards, or the generic standards, that specify which tests must be performed on the test sample, the applicable levels and limits and, sometimes, the operative condition of the sample during tests. The product standards are always prevalent on the generic standards.

After the analysis of main characteristics of the test sample as, for example, typology, destination of use, main functions implemented, characteristics given by manufacturer, the here below listed harmonized product/generic standards were identified:

Standard	Date	ed.	Title
EN 61000-6-2 + EC + IS1	2005-08 2005-09 2005-11	/	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4	2007-01	/	Electromagnetic compatibility (EMC) Part 6-4: Generic standards - Emission standard for industrial environments

and basic standards listed on chapter 2.2.

2.2 BASIC STANDARDS

Basic standard are standards that specify how the tests must be executed, specify the lay-out for testing and specify the instruments that must be used for execution of tests required by product standards.

Standard	Date	ed.	Title
EN 55016-2-3	2006-12	/	Specification for radio disturbance and immunity measuring apparatus and methods Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements
EN 61000-4-2	2009-03	/	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques Section 2: Electrostatic discharge immunity test - Basic EMC publication
EN 61000-4-3 + A1 + IS1	2006-05 2008-02 2009-02	/	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4	2004-12	/	Electromagnetic compatibility (EMC) -Part 4: Testing and measurement techniques Section 4: Fast transients / burst immunity test
EN 61000-4-6 + A1 + IS1	1996-07 2001-12 2004-07	/	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques Section 6: Immunity to conducted disturbances, induced by radio-frequency fields

2.3 OTHERS DOCUMENTS

Document	Date	Rev.	Title
INTEK 05 04 MP 001 PRE	2009-01-12	00	Procedure for electrostatic discharge immunity test
INTEK 05 04 MP 003 PRE	2009-01-12	00	Procedure for radiated disturbances measurement
INTEK 05 04 MP 005 PRE	2009-01-12	00	Procedure for radiated, radio-frequency, electromagnetic field immunity test
INTEK 05 04 MP 010 PRE	2009-01-12	00	Procedure for fast transients / burst immunity test
INTEK 05 04 MP 012 PRE	2009-01-12	00	Procedure for immunity to conducted disturbances, induced by radio-frequency field

3. TEST SAMPLE IDENTIFICATION

3.1 DESCRIPTION

Identification data of test samples are reported in the first page of this document.



Sample identification

Not available

Copy of marking plate

Country of manufacturer:	Italy
Type of unit:	<input checked="" type="checkbox"/> Fixed equipment <input type="checkbox"/> Portable equipment <input type="checkbox"/> Panel mounting <input checked="" type="checkbox"/> Prototype / Pre-series <input type="checkbox"/> Series
Serial number:	Not present

3.1.1 TECHNICAL DATA

Power source:	Driver
Power supply nominal voltage:	Sample 01: <input type="checkbox"/> 230 V / 50 Hz / 1Φ <input type="checkbox"/> 115 V / 60 Hz / 1Φ <input type="checkbox"/> 400 V / 50 Hz 3P+PE <input type="checkbox"/> 400 V / 50 Hz 3P+N+PE <input type="checkbox"/> 12 V DC <input type="checkbox"/> 24 V DC <input checked="" type="checkbox"/> Other : 325 Vdc Sample 02: <input type="checkbox"/> 230 V / 50 Hz / 1Φ <input type="checkbox"/> 115 V / 60 Hz / 1Φ <input type="checkbox"/> 400 V / 50 Hz 3P+PE <input type="checkbox"/> 400 V / 50 Hz 3P+N+PE <input type="checkbox"/> 12 V DC <input type="checkbox"/> 24 V DC <input checked="" type="checkbox"/> Other : 75 Vdc
Nominal power or absorbing current:	Not declared
Dimensions:	/
Internal operating frequencies:	N/D

3.1.2 CLASSIFICATION

On the basis of the definition given by the applicable standard the test sample is classified as:	<input type="checkbox"/> Equipment intended for use in residential locations <input checked="" type="checkbox"/> Equipment intended for use in industrial locations
As far as tests are concerned, test sample is considered as:	<input type="checkbox"/> Floor standing equipment <input checked="" type="checkbox"/> Table top equipment
Other information:	/

3.1.3 ADDITIONAL INFORMATION

None

3.2 SAMPLES ORIGIN

The test samples were furnished by:			
<input checked="" type="checkbox"/> Manufacturer	<input type="checkbox"/> Customer	<input type="checkbox"/> Applicant	<input type="checkbox"/> Other
The beginning sampling was carried out by:			
<input checked="" type="checkbox"/> Manufacturer	<input type="checkbox"/> Customer	<input type="checkbox"/> Applicant	<input type="checkbox"/> Other
Received samples:	1	Tested samples:	1
Selection method:	<input type="checkbox"/> Random taking <input checked="" type="checkbox"/> None		

3.3 PORTS DESCRIPTION

Sample 01

ID	Name	Type	Cable Length [m]	Cable Shielded	Comments
01	Enclosure	N/E	/	/	Type: <input type="checkbox"/> Metal <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Other (See Notes)
02	Motor	DC	<input type="checkbox"/> L < 3 <input type="checkbox"/> L > 30 <input checked="" type="checkbox"/> 3 < L < 30	NO	325 Vdc
03	Sensor	I/O	<input type="checkbox"/> L < 3 <input type="checkbox"/> L > 30 <input checked="" type="checkbox"/> 3 < L < 30	NO	/

Sample 02

ID	Name	Type	Cable Length [m]	Cable Shielded	Comments
04	Enclosure	N/E	/	/	Type: <input type="checkbox"/> Metal <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Other (See Notes)
05	Motor	DC	<input type="checkbox"/> L < 3 <input type="checkbox"/> L > 30 <input checked="" type="checkbox"/> 3 < L < 30	NO	75 Vdc
06	Sensor	I/O	<input type="checkbox"/> L < 3 <input type="checkbox"/> L > 30 <input checked="" type="checkbox"/> 3 < L < 30	NO	/

Caption:

ID:	Number assigned to tested line
Name:	Name given by manufacturer
Type:	AC = AC Power Port AC Mains = AC Mains Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port TP = Telecommunication Ports
Comments:	For instance type of cable used during tests; 2Pdc : Two lines (positive and negative) 2Pac : Two lines (phase and neutral) 3Pdc : Three lines (positive, negative and ground) 3Pac : Three lines (phase, neutral and ground) PE : Protection Earth FE : Functional Earth nP : n lines SW : Single wire(s) TW : Twisted pair

4. TEST INFORMATION

Unless otherwise specified, during the tests the sample/s was/were been configured following the methods and procedure specified in the reference standard.

4.1 CONDITIONS DURING THE TESTS

4.1.1 PERSONNEL PRESENT TO THE TESTS

Test performed by:	<i>Luigi Sala (Intek S.p.A.)</i>
Other people present:	<i>Guerino Rosso (Gimatic S.p.A.)</i>

4.1.2 MODIFICATIONS TO SAMPLES

Test samples were not modified during the tests.

4.1.3 ENVIRONMENTAL CONDITIONS

Laboratory environmental conditions are recorded during tests and they are shown on relevant chapters.
The measurement uncertainties are given with expanded uncertainty with a level of confidence of 95% (k=2)

4.1.4 CONVENTIONS

If applicable, on the right of each chapter or paragraph is written the number of the chapter or paragraph of reference Standard in the form: § number

4.1.5 ABBREVIATIONS

N/A = Not Applicable
N/R = Not Required by the customer
N/D = Not Declared
N/T = Not Tested
TR = Test Report
EUT = Equipment Under Test
U_{LAB} = Laboratory Measurement Uncertainty
U_{CISPR} = Instrumentation Measurement Uncertainty
EMI = ElectroMagnetic Interference
EMS = ElectroMagnetic Susceptibility

4.2 CONFIGURATION MODES

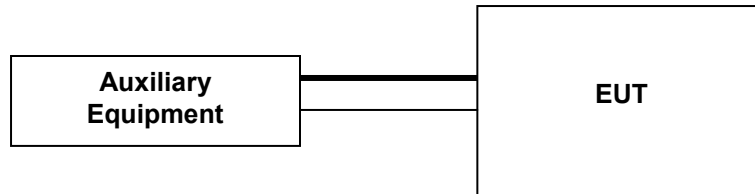
In agreement with the	<input checked="" type="checkbox"/> Manufacturer <input type="checkbox"/> Customer <input type="checkbox"/> Applicant	during tests the sample was connected to a power supply able to generate voltage and current required for sample operation.
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Emission: the EUT was configured to measure its highest possible radiation level. The test modes selected are according to EUT instruction manual and/or manufacturer information.

Immunity: the EUT was configured to have its highest possible susceptibility against tested phenomena. The configuration modes are according to EUT instruction manual and/or manufacturer information.

Configuration mode	Description	Notes
CM1	Normal conditions	/

Connections of sample are shown on following figure:



Caption:

———— Power Supply lines

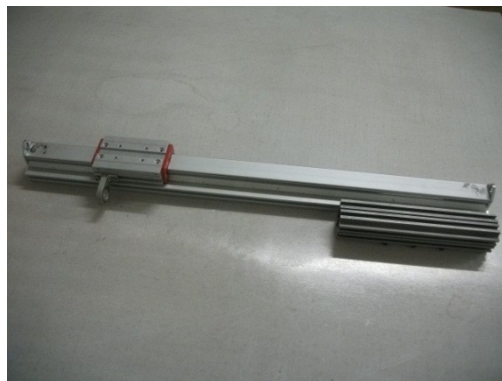
———— Signal lines

==== Data lines

4.2.1 AUXILIARY EQUIPMENT DESCRIPTION



Driver



Metal driving

4.3 OPERATION MODES

The Operation mode adopted during the tests in agreement with the

<input checked="" type="checkbox"/> Manufacturer	<input type="checkbox"/> Customer	<input type="checkbox"/> Applicant
--	-----------------------------------	------------------------------------

are listed in the following table and identified by "OM" at which has been referred the item "Operation mode" of all paragraphs of the tests result.

Operation mode	Description	Notes
OM1	EUT Working: Active, static position	/
OM2	EUT Working: Cylindrical piston moves left and right	/

4.4 PERFORMANCE CRITERIA

Emission tests:

"Quasi peak" emissions, and "average" emissions if any, shall be lower than relevant limits.

Measured values are identified on plots as here below described:

- Red line: "quasi peak" emission limit
- Blue line: "average" emission limit
- x [symbol] red: "quasi peak" measured value
- + [symbol] blue: "average" measured value

Immunity tests:

According to requirements of standard EN 61000-6-2 here below reported:

"The general principles (performance criteria) for the evaluation of the immunity test results are the following:

Performance criterion A:

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

Performance criterion B:

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 specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

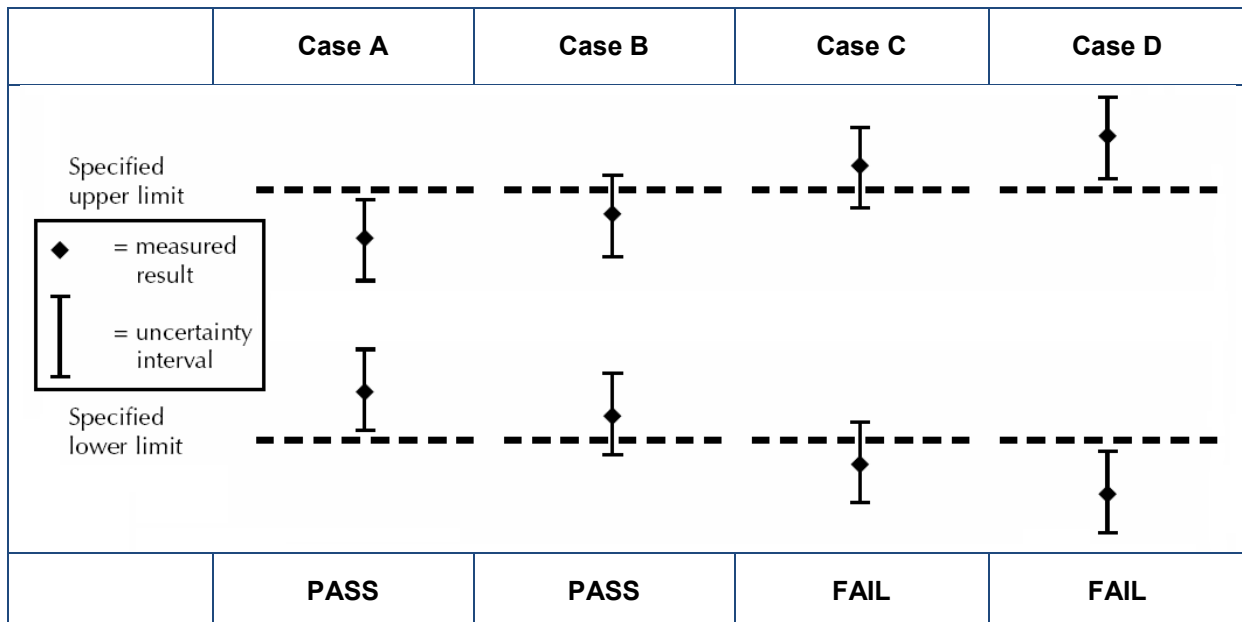
4.5 PERFORMANCE EVALUATION METHOD

The here above listed performance criteria were applied to the sample by means of the verification the correct duty cycle.

4.6 CRITERIA ADOPTED FOR COMPLIANCE EVALUATION

If applicable for compliance evaluation of test results, the Laboratory adopts the following criteria:

- Reference standard specifies uncertainty for measurements:
 - measurements uncertainty permitted;
 - instruments accuracy;
 - application of measurements uncertainty to the measured values;
 in this case the measurement complies with the requirement if the measured value is within the limits, or with the correction due to the Laboratory uncertainty.
- Reference standard doesn't specify uncertainty for measurements:
 Calculate uncertainty for measurement and compare the measured result with uncertainty band to defined acceptable limit. The measurement complies with the requirement if the probability it being within the limit is at least 50 % (see following figure):



5. TESTS RESULT**5.1 EMISSION TEST**

§ TR	Test	Reference	Result	Annex	Notes
6.1	Emission enclosure port	EN 61000-6-4 Tab 1.1	PASS	/	/

5.2 IMMUNITY TEST

§ TR	Test	Reference	Result	Annex	Notes
/	Power-frequency magnetic field	EN 61000-6-2 Tab 1.1	N/A	/	#1
6.2	Radio-frequency electromagnetic field Amplitude modulated	EN 61000-6-2 Tab 1.2	PASS	/	/
6.5	Electrostatic discharge	EN 61000-6-2 Tab 1.5	PASS	/	/
6.3	Radio-frequency common mode	EN 61000-6-2 Tab 2.1 and 3.1	PASS	/	/
6.4	Fast transients	EN 61000-6-2 Tab 2.2 and 3.3	PASS	/	/
/	Surges	EN 61000-6-2 Tab 2.3 and 3.2	N/A	/	#2

Notes:

- #1 - Applicable only to apparatus containing devices susceptible to magnetic fields
- #2 - Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 30 m.

5.3 SAMPLES CORRELATION / TEST SEQUENCE

The samples were sequentially subjected to the tests described in the following table:

Seq.	Test	Sample 1	Sample 2
1	Emission enclosure port	X	
2	Radio-frequency electromagnetic field Amplitude modulated	X	
3	Radio-frequency common mode	X	
4	Fast transients	X	
5	Electrostatic discharge	X	X

6. TEST PERFORMED

6.1 EMISSION ENCLOSURE PORT

Test was performed according to requirements of standards listed on chapter 2.
The test method is compliant to requirements of the standard:

EN 55016-2-3.

6.1.1 TEST SET-UP

Test site: Fully anechoic room (FAR) - Room N. 26
Antenna height above the floor: 169 cm (half height of anechoic room)
Distance from the point of antenna to the EUT: 3 m
Antenna polarity: Horizontal and vertical

6.1.2 TEST PARAMETERS

Preliminary scan: 0° to 180° (45° step) with peak detector
Final measurement: 0° to 315° (45° step) with quasi peak detector
Frequency measurement range: 30 ÷ 1 000 MHz
Limits: As standard requirement

6.1.3 ENVIRONMENTAL CONDITIONS

Temperature: 25 °C ± 2 °C Relative humidity: 48 % ± 5 % Atmospheric pressure: 1000 mBar ± 20 mBar

6.1.4 SUMMARY OF RESULTS

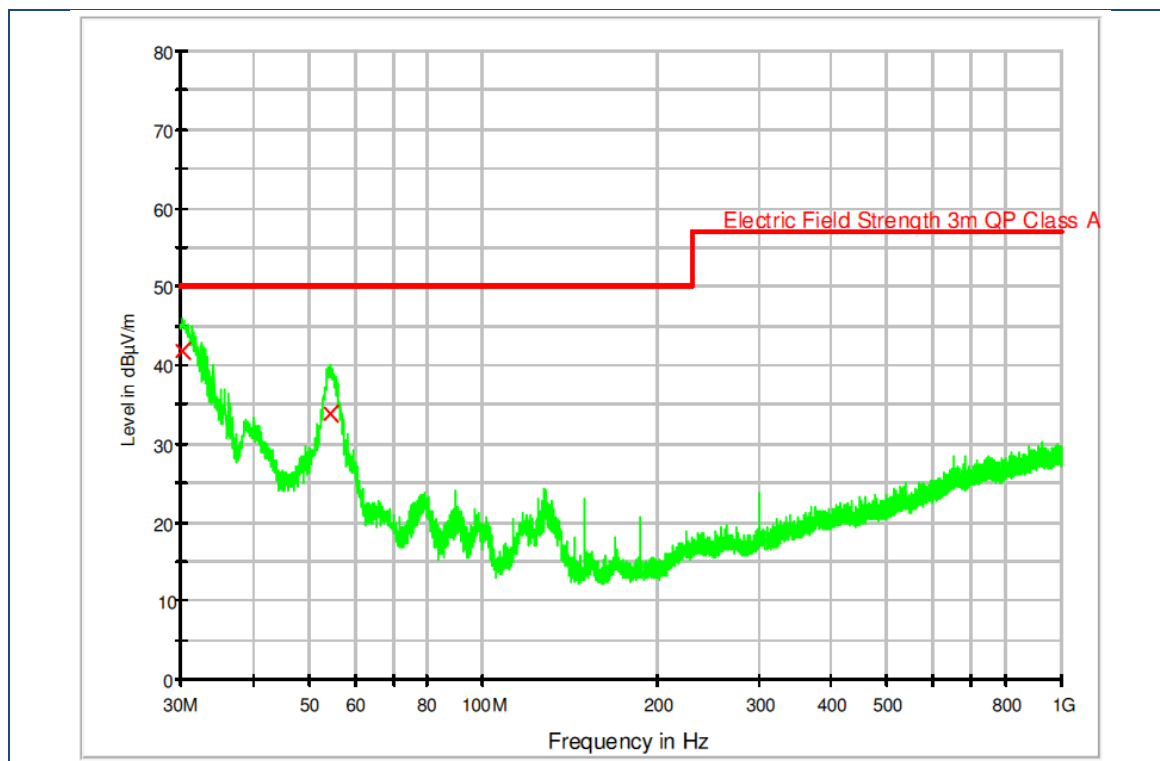
Configuration mode: **CM1**

Port under test	Polarity	Operative mode (#1)	Result	Notes
Enclosure sample 01	Horizontal	OM1	PASS	/
Enclosure sample 01	Vertical	OM1	PASS	/

Notes:

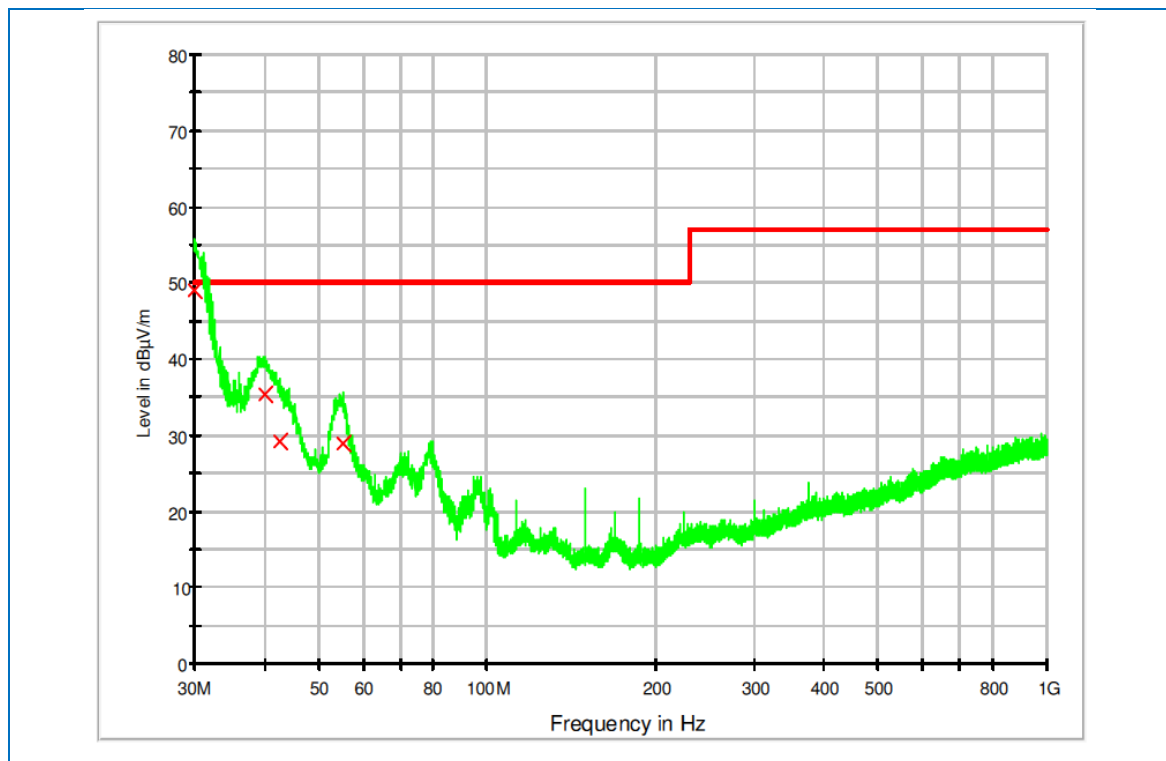
#1 - Operation mode as described in paragraph 4.3

ANTENNA POLARIZATION: HORIZONTAL



Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.280000	41.7	1000.0	120.000	H	180.0	19.7	8.3	50.0
54.560000	33.9	1000.0	120.000	H	180.0	15.9	16.1	50.0

ANTENNA POLARIZATION: VERTICAL



Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.080000	48.9	1000.0	120.000	V	270.0	19.8	1.1	50.0
40.000000	35.3	1000.0	120.000	V	180.0	17.7	14.7	50.0
42.640000	29.1	1000.0	120.000	V	90.0	17.6	20.9	50.0
55.360000	28.9	1000.0	120.000	V	0.0	15.7	21.1	50.0



Test set-up

6.1.5 TEST INSTRUMENTATION

Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
EMI Receiver	Rohde & Schwarz	ESU26	0692 P	2010-10	2012-01
Bilog-periodic antenna	Antenna Research Ass.	LPB-2513	0308 P	2009-05	2012-05
Measurement Software	Rohde & Schwarz	EMC32 PLUS	0686 SW	/	/
Full Anechoic Chamber	SIDT Europe	/	0309 P	/	/
Turntable	HD	DS 415	0302 P	/	/
Thermometer / hygrometer	Filotechnica Salmoiraghi	1750-2/QM	0222 P	2010-02	2012-02
Barometer	Fischer	/	0224 P	2010-11	2014-11

6.1.6 TEST MEASUREMENTS UNCERTAINTY

Values of expanded uncertainty are given with a level of confidence of 95 % ($k = 2$) and with $n = 9$ degrees of freedom:

- $U_{LAB} = 2,68$ dB except for the frequency range from 410 MHz to 450 MHz where $U_{LAB} = 4,33$ dB,
and $U_{LAB} < U_{CISPR} = 5,2$ dB (measurement instrumentation uncertainty) in according to standards CISPR 16-4-1 and CISPR 16-4-2.

6.2 RADIO-FREQUENCY ELECTROMAGNETIC FIELD AMPLITUDE MODULATED

Test was performed according to requirements of standards listed on chapter 2.

The test method is compliant to requirements of the standard:

EN 61000-4-3.

6.2.1 TEST SET-UP

According to reference standard with:

Test site: Fully anechoic room (FAR) - Room N. 26
Distance from the point of antenna to the EUT: 3 m (80 ÷ 1 000 MHz) - 4,7 m (1,4 ÷ 2,7 GHz)
Antenna height above the floor: 155 cm respect to reference plane

6.2.2 TEST PARAMETERS

Frequency range: 80 ÷ 1 000 MHz
1,4 ÷ 2,7 GHz
Frequency step: 1 % of previous frequency
Modulation: Sine wave - 1 kHz – 80 % - AM
Dwell time: 4 seconds at each frequency
Antenna polarity: Horizontal and vertical
Degrees of rotation of test sample, with clockwise motion, respect to transmitting antenna: 0° / 90° / 180° / 270°

6.2.3 ENVIRONMENTAL CONDITIONS

Temperature: 25 °C ± 2 °C Relative humidity: 48 % ± 5 % Atmospheric pressure: 1000 mBar ± 20 mBar

6.2.4 SUMMARY OF RESULTS

Port under test: Enclosure sample 01
Configuration mode: CM1

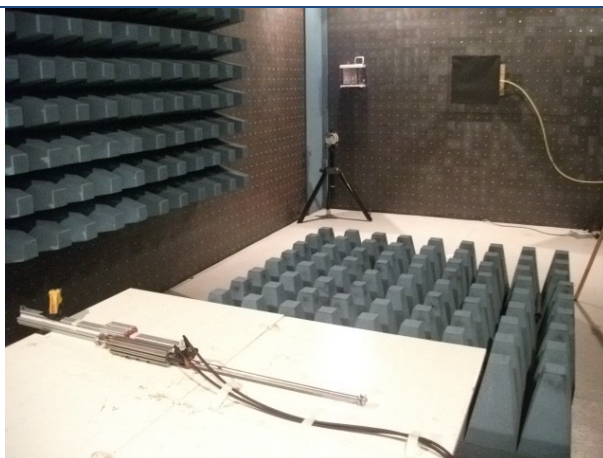
Test level (#1)	Frequency range	Polarity	Performance criteria (#2)		Operation mode (#3)	Result	Notes
			Required	Obtained			
10 V/m	80 ÷ 1 000 MHz	Horizontal	A	A	OM2	PASS	/
10 V/m	80 ÷ 1 000 MHz	Vertical	A	A	OM2	PASS	/
3 V/m	1,4 ÷ 2,7 GHz	Horizontal	A	A	OM2	PASS	/
3 V/m	1,4 ÷ 2,7 GHz	Vertical	A	A	OM2	PASS	/

Notes:

- #1 - V/m (rms) unmodulated
- #2 - Performance criteria, given by applicable documents, as described in paragraph 4.4
- #3 - Operation mode as described in paragraph 4.3



Test set-up for frequency up to 1 GHz



Test set-up for frequency above 1 GHz

6.2.5 TEST INSTRUMENTATION

Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
Anechoic chamber	SIDT	/	0309 P	2010-12	2012-04
Signal generator	Rhode & Schwarz	SML 03	0431 P	2010-10	2012-04
Amplifier 80÷1000 MHz	Amplifier Research	100W1000M1	0307 P	2010-12	2012-04
Amplifier 0,8÷4,2 GHz	Amplifier Research	50S1G4A	0430 P	2010-12	2012-04
Log-periodic Antenna	Amplifier Research	AT 1080	0304 P	2010-12	2012-04
Horn Antenna	Amplifier Research	AT 4200 A	0432 P	2010-12	2012-04
Directional coupler	Amplifier Research	DC 6180	0303 P	2010-12	2012-04
Directional coupler	Amplifier Research	DC 7144	0438 P	2010-12	2012-04
Power meter	Amplifier Research	PM 2002	0433 P	2010-09	2012-03
Probe for power meter	Amplifier Research	PH 2004	0434 P	2010-09	2012-03
Test software	Dare	Radimation v.5.4.15	0641 SW	/	/
Thermometer / hygrometer	Filotecnica Salmoiraghi	1750-2/QM	0222 P	2010-02	2012-02
Barometer	Fischer	/	0224 P	2010-11	2014-11

6.2.6 TEST MEASUREMENTS UNCERTAINTY

Values of expanded uncertainty are given with a level of confidence of 95 % ($k = 2$) and with $n = 9$ degrees of freedom:

- $U_{LAB} = 0,90$ dB for frequencies lower than 200 MHz;
- $U_{LAB} = 1,63$ dB for frequencies greater than 200 MHz.

6.3 RADIO-FREQUENCY COMMON MODE

Test was performed according to requirements of standards listed on chapter 2.
The test method is compliant to requirements of the standard:

EN 61000-4-6.

6.3.1 TEST SET-UP

Test site: Laboratory - Room N. 27

6.3.2 TEST PARAMETERS

Frequency range: 150 kHz ÷ 80 MHz
Frequency step: 1 % of previous frequency
Modulation: Sine wave - 1 kHz – 80 % - AM
Dwell time: 4 seconds at each frequency

6.3.3 ENVIRONMENTAL CONDITIONS

Temperature: 24 °C ± 2 °C Relative humidity: 51 % ± 5 % Atmospheric pressure: 1000 mBar ± 20 mBar

6.3.4 SUMMARY OF RESULTS

Configuration mode: CM1

Test voltage (#1)	Port under test	Coupling device	Performance criteria (#2)		Operation mode (#3)	Result	Notes
			Required	Obtained			
10 Vrms	Motor Sample 01	EM CLAMP	A	A	OM2	PASS	/
10 Vrms	Sensor Sample 01	EM CLAMP	A	A	OM2	PASS	/

Notes:

- #1 - V (rms) unmodulated
- #2 - Performance criteria, given by applicable documents, as described in paragraphs 4.4
- #3 - Operation mode as described in paragraph 4.3



Test set-up

6.3.5 TEST INSTRUMENTATION

Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
Signal generator	Rohde & Schwarz	SMY 01	0221 P	2010-10	2012-04
Amplifier 10 kHz÷250 MHz	Amplifier Research	75A250	0249 P	2010-10	2012-04
Test software	Dare	Radimation v.5.4.15	0642 SW	/	/
Coupling Clamp	FCC	F-2031	0240 P	2010-10	2012-04
RF Cable+att.6dB (SG-PA)	Pasternack	/	0292 P	2010-10	2012-04
Attenuator 6dB (OUT PA)	Pasternack	PE7021-6	0244 P	2010-10	2012-04
Thermometer / hygrometer	Deltaohm	HD206-1	0689 P	2010-02	2012-02
Barometer	Fischer	/	0224 P	2010-11	2014-11

6.3.6 TEST MEASUREMENTS UNCERTAINTY

Values of expanded uncertainty are given with a level of confidence of 95 % ($k = 2$) and with $n = 9$ degrees of freedom:

- $U_{LAB} = \pm 2,00$ dB.

6.4 FAST TRANSIENTS

Test was performed according to requirements of standards listed on chapter 2.
The test method is compliant to requirements of the standard:

EN 61000-4-4.

6.4.1 TEST SET-UP

Test site: Laboratory - Room N. 27

6.4.2 TEST PARAMETERS

Impulse frequency: 5 kHz
Burst duration: 15 ms
Burst repetition: 300 ms
Coupling: Asynchronous
Test duration: 4 minute for each application
Pause between test: 10 seconds
Polarity: Positive and negative

6.4.3 ENVIRONMENTAL CONDITIONS

Temperature: 25 °C ± 2 °C Relative humidity: 51 % ± 5 % Atmospheric pressure: 1000 mBar ± 20 mBar

6.4.4 SUMMARY OF RESULTS

Configuration mode: **CM1**

Test voltage	Port under test	Line under test	Coupling device	Performance criteria (#1)		Operation mode (#2)	Result	Notes
				Required	Obtained			
1 kV	Motor Sample 01	All	Capacitive clamp	B	A	OM2	PASS	/
1 kV	Sensor Sample 01	All	Capacitive clamp	B	A	OM2	PASS	/

Notes:

- #1 - Performance criteria, given by applicable documents, as described in paragraph 4.4
#2 - Operation mode as described in paragraph 4.3



Test set-up

6.4.5 TEST INSTRUMENTATION

Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
Fast transient generator with CDN	EM Test	EFT 500	0481 P	2011-08	2013-08
Coupling Clamp	EM Test	EFK	0037 P	2011-08	2013-08
Cable generator / clamp	EM Test	/	0803 P	2011-08	2013-08
Test software	EM TEST	ISMIEC ver. 4.11	0685 SW	/	/
Thermometer / hygrometer	Deltaohm	HD206-1	0689 P	2010-02	2012-02
Barometer	Fischer	/	0224 P	2010-11	2014-11

6.4.6 TEST MEASUREMENTS UNCERTAINTY

Values of expanded uncertainty are given with a level of confidence of 95 % ($k = 2$) and with $n = 9$ degrees of freedom:

- $U_{LAB} = \pm 20$ % for amplitude.

6.5 ELECTROSTATIC DISCHARGE

Test was performed according to requirements of standards listed on chapter 2.
The test method is compliant to requirements of the standard:

EN 61000-4-2.

6.5.1 TEST SET-UP

Test site: Laboratory - Room N. 27

6.5.2 TEST PARAMETERS

Repetition rate: 1 discharge every 1 second for contact method
Number of discharges for contact discharge type: 10 discharges
Number of discharges for air discharge type: 10 discharges
Polarity: Positive and negative

6.5.3 ENVIRONMENTAL CONDITIONS

Temperature: 24 °C ± 2 °C Relative humidity: 51 % ± 5 % Atmospheric pressure: 1000 mBar ± 20 mBar

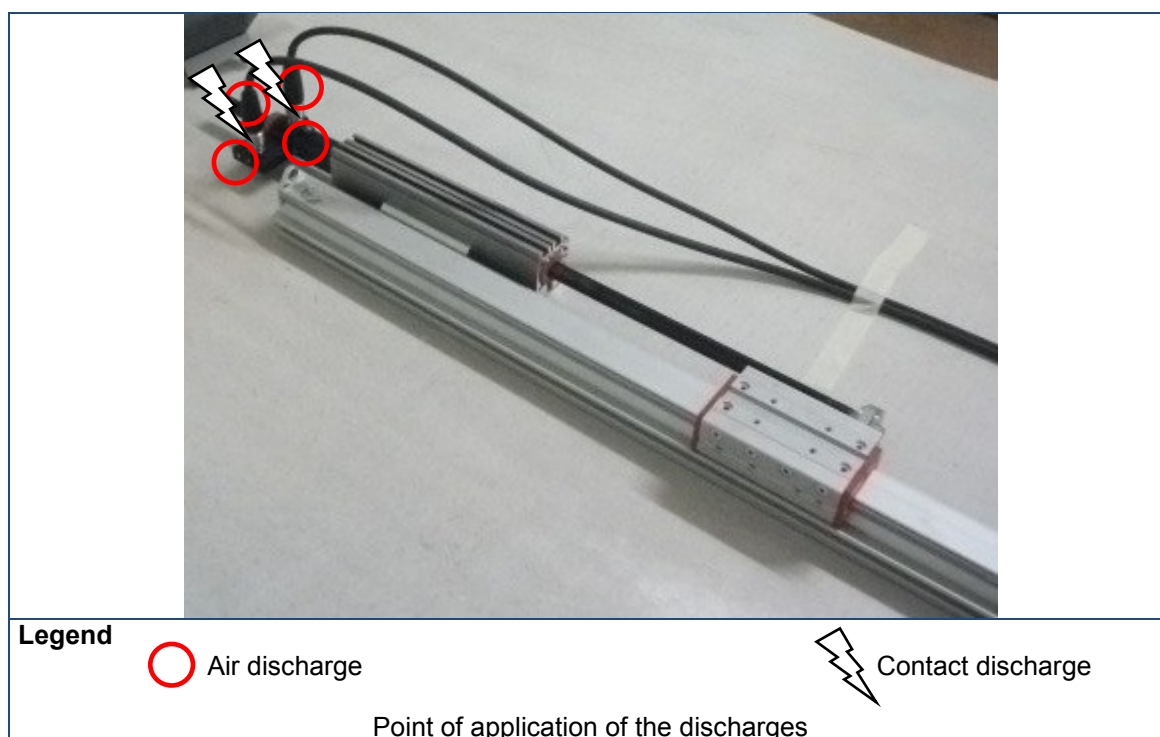
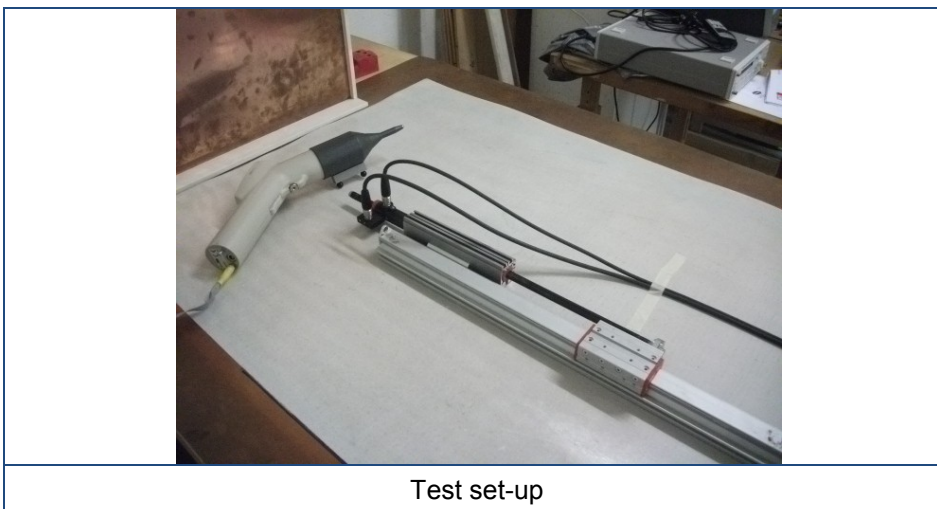
6.5.4 SUMMARY OF RESULTS

Port under test: Enclosure sample 01
Enclosure sample 02
Configuration mode: CM1

Test voltage	Coupling method	Discharge point	Performance criteria (#1)		Operation mode (#2)	Result	Notes
			Required	Obtained			
2 kV 4 kV 8 kV	Air	Non conductive parts	B	A	OM1	PASS	#3
2 kV 4 kV	Direct discharge	Conductive parts	B	A	OM1	PASS	/
2 kV 4 kV	Indirect discharge	VCP	B	A	OM1	PASS	/
2 kV 4 kV	Indirect discharge	HCP	B	A	OM1	PASS	/

Notes:

- #1 - Performance criteria, given by applicable documents, as described in paragraph 4.4
- #2 - Operation mode as described in paragraph 4.3
- #3 - No discharge detected.



6.5.5 TEST INSTRUMENTATION

Description	Manufacturer	Model	Intek ID	Last Calibration	Calibration due
ESD Generator	EMC-Partner	ESD-3000	0764 P	2010-10	2012-10
RC filter 150 pF – 330 Ω	EMC-Partner	ESD3000DN1	0765 P	2010-10	2012-10
High-voltage relay module	EMC-Partner	ESD3000RM32	0769 P	2010-10	2012-10
Grounding cable	EMC-Partner	/	0807 A	2010-10	2012-10
HCP + 2x470 kΩ bleeder	INTEK	/	0808 A	/	/
VCP + 2x470 kΩ bleeder	INTEK	/	0808 A	/	/
Thermometer / hygrometer	Deltaohm	HD206-1	0689 P	2010-02	2012-02
Barometer	Fischer	/	0224 P	2010-11	2014-11

6.5.6 TEST MEASUREMENTS UNCERTAINTY

Values of expanded uncertainty are given with a level of confidence of 95 % ($k = 2$) and with $n = 9$ degrees of freedom:

- $U_{LAB} = \pm 5,00$ % for voltage.

7. TEST INSTRUMENTATION

The list of instruments is given in the relative paragraph of every test.

8. EUT DOCUMENTATION

Not available.

9. ANNEXES LIST

None.

End of test report.