LEITC

Latvian Electronic Equipment Testing Centre

LATAK-T-397

Report No.: LEITC-TR-18-01

EMC TEST REPORT

Type of equipment:	**Imobilizer**
Model:	**Author**
Sub Model:	Igla
Serial number:	030417-5225017 *ID_382.1 (assigned by LEITC)*
Applicant:	**AUTHOR**
Manufacturer:	**AUTHOR**
Test standards:	**ETSI EN 301 489-1 V2.1.1 (2017-02)** *ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU* **ETSI EN 301 489-3 V1.6.1 (2013-08)** *Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz*
Test report no.:	LEITC-TR-18-01
Testing laboratory:	LEITC
Test result:	**PASS**

Test responsible:	Aivis Ašmanis
Laboratory responsible:	Uldis Stūre
Date of issue	04.01.2018

Contents

1. REVISION HISTORY

Revision No.	Description	Date	File name	Pages revised
00	None	-	-	-

2. LABORATORY INFORMATION

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Accreditation No: LATAK-T-397-07-2009

3. CLIENT INFORMATION

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Facsimile number:	N/A
Contact Person:	Dmitry Shvetsov
E-mail:	Shvetsov@author.spb.ru
Web:	https://author-alarm.ru

4. SUMMARY OF TEST RESULTS

Standard:	**ETSI EN 301 489-1 V2.1.1 (2017-02)**
Title:	*ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU*
Reference standard:	**ETSI EN 301 489-3 V1.6.1 (2013-08)** *Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz*

Emissions

	Measurement type	Reference standard	Applicability	Result
1.	Radiated emissions (30MHz to 1GHz)	LVS EN 55032:2015 (Class B)	Y	**Pass**
2.	Radiated emissions (1GHz to 6GHz)	LVS EN 55032:2015 (Class B)	Y	**Pass**
3.	Conducted emissions (DC port)	LVS EN 55032:2015 (Class B)	Y	**Pass**

Notes: Y- applied

Deviations from standard specification

Standard:	**ETSI EN 301 489-1 V2.1.1 (2017-02)**
Title:	*ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU*
Reference standard:	**ETSI EN 301 489-3 V1.6.1 (2013-08)** *Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz*

Immunity

	Measurement type	Reference standard	Applicability	Result
1.	Radio frequency radiated electromagnetic field immunity	LVS EN 61000-4-3:2006+A1:2008+ A2:2010	Y	**Pass**
2.	Radio frequency common mode immunity	LVS EN 61000-4-6:2014	Y	**Pass**
3.	Electric fast transients/Burst	LVS EN 61000-4-4:2013	Y	**Pass**
4.	Voltage dips/ interruptions	LVS EN 61000-4-11:2004	Y	**N/A**
5.	Surge	LVS EN 61000-4-5:2014	Y	**Pass**
6.	Electrostatic discharge	LVS EN 61000-4-2:2009	Y	**Pass**
7.	Power frequency magnetic fields	LVS EN 61000-4-8:2010	N/A	**N/A**

Notes: Y- applied; N/A- not applicable

Deviations from standard specification

Evaluation of immunity test results

The test results are classified in terms of loss of the function or degradation of performance of the EUT:

A	normal performance within limits specified by manufacturer, requestor or purchaser
B	temporary loss of function or degradation of performance, which ceases after the disturbance ceases, and from which the EUT recovers its normal performance, without operator intervention
C	temporary loss of function or degradation of performance, the correction which requires operator intervention
D	temporary loss of function or degradation of performance which is not recoverable, owing damage to hardware or software, or loss of data

5. DESCRIPTION OF EQUIPMENT UNDER TEST

5.1 Description of EUT

Anti theft solution which is equipped with two wireless transmitters.

No.	Description	Model	Serial No.	Manufacturer
1.	Immobilizer	Author Igla	030417-5225017	AUTHOR

5.2 Peripherals and associated equipment

No.	Description	Model	Serial No.	Manufacturer
1.	TRUE RMS MULTIMETER	189	N/A	FLUKE
2.	Battery	CSB battery GP 1272 F2	N/A	CSB Battery(Vietnam) CO., LTD.

5.3 Cables used during the testing

No.	Cable type	Shield	Ferrite	Length	Connection1	Connection2
1.	Safety test leads (2pcs)	no	yes	1m	EUT	Multimeter
1.	Safety test leads (2pcs)	no	no	1m	EUT	Battery

5.4 EUT configuration

The equipment under test (EUT) was functioning correctly during all tests, according to user's manual. The EUT was installed within the test site and was configured to simulate a typical user installation.

5.4.1 Operating modes/load

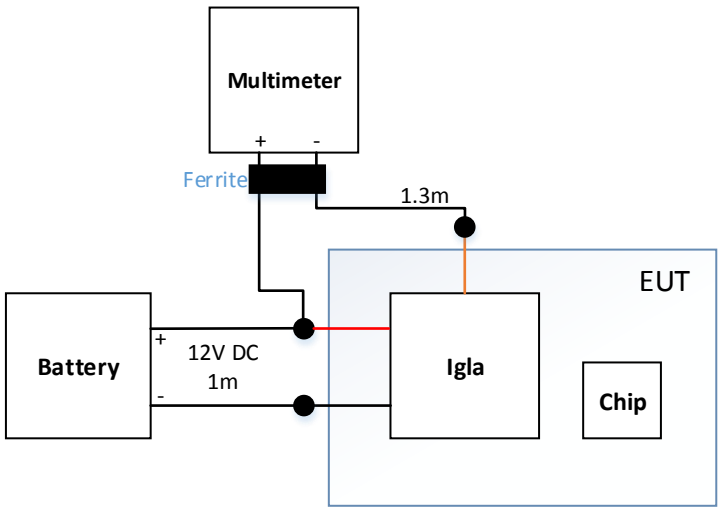
1.	Turned ON in monitoring mode.

5.4.2 Modification state

1.	No modification made.

Block diagram 1:

Mode 1:



6. INSTRUMENTATION AND CALIBRATION

Equipment and EUT during the tests are operated in temperature range of 21^0 to 25^0C, humidity range of 40% to 60%, if not mentioned more precisely next to measurement data.

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with manufacturer's recommendations or quality manager deliverance and it is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

The following list contains measurement equipment used for testing. The equipment conforms to the requirements of CISPR 16-1 and other standard requirements.

Radiated emissions				
Device	**Manufacturer**	**Model**	**Serial number**	**Notes**
Antenna	R&S	HL562	4041.3000.02	Certificate of calibration No. 201404738.00; 06.01.2015
Antenna	R&S	HF906	100448	Certificate of calibration No. 201404739.00; 18.12.2014
Preamplifier	Bonn	BLMA 0118-1M	066396D	Test report No. 160701; 01.07.2016
Receiver	R&S	ESIB26	1088.7490K26	Certificate of calibration No. 420639-D-K-15012-01-00; 05.04.2017
Antenna mast	Franconia	FCTAM03	-	-
Turntable	Franconia	FCTAM01	-	-
Test site	Franconia	SAC3	-	-
Software for EMC measurements EMC32	R&S	Version 8.53.0	-	-

Conducted emissions				
Device	**Manufacturer**	**Model**	**Serial number**	**Notes**
LISN	R&S	ESH2Z5	100163	Certificate of calibration No. 420637-D-K-15012-01-00; 03.04.2017
AMN	R&S	ENV216	100266	Certificate of calibration No. 420639-D-K-15012-01-00; 12.04.2017
ISN	R&S	ENY81	100066	Certificate of calibration No. 10-300372397; 01.03.2016
Receiver	R&S	ESIB26	1088.7490K26	Certificate of calibration No. 420639-D-K-15012-01-00; 05.04.2017
Test site	Franconia	SAC3	-	-
Software for EMC measurements EMC32	R&S	Version 8.53.0	-	-

Radio frequency radiated electromagnetic field immunity				
Device	**Manufacturer**	**Model**	**Serial number**	**Notes**
Generator	R&S	IMS	1502.0009.02	Certificate of calibration No. 0378 / D-K-15195-01-00; 26.11.2015
Amplifier	Bonn	BLMA 1040-60/3D	066396C	Field uniformity calibration No. 160703; 01.07.2016
Amplifier	Bonn	BSA 0125-25I	066396B	Field uniformity calibration No. 160703; 01.07.2016
Antenna	R&S	HL046E	4065.5960.02	Field uniformity calibration No. 160703; 01.07.2016
Power meter	R&S	NRP-Z91	1000015	Certificate of calibration No. 420636-D-K-15195-01-00; 28.03.2017
Field Sensor	ETS-LINDGREN	HI 6005	00074579	Certificate of calibration No. 201700210.00; 30.03.2017
Test site	Franconia	SAC3	-	-
Software for EMC measurements EMC32	R&S	Version 5.20.2	-	-

Radio frequency common mode immunity				
Device	**Manufacturer**	**Model**	**Serial number**	**Notes**
Generator	R&S	IMS	1502.0009.02	Certificate of calibration No. 0378 / D-K-15195-01-00; 26.11.2015
Amplifier	Bonn	BSA 0125-150	066396A	Test report No. 160704; 01.07.2016
Power meter	R&S	NRP-Z91	1000015	Certificate of calibration No. 420636-D-K-15195-01-00; 28.03.2017
CDN	Liithi	L-801 M2/3	2241	Certificate of calibration No. 201701236.00; 30.03.2017
CDN	Liithi	L-801 T8	2248	Certificate of calibration No. 201701237.00; 30.03.2017
CDN	Liithi	L-801 S1	2242	Certificate of calibration No. 201701269.00; 30.03.2017
BCI probe	FCC	F-120-9A	474	Certificate of calibration No. 420640-D-K-15012-01-00; 05.05.2017
Test site	Franconia	SAC3	-	-
Software for EMC measurements EMC32	R&S	Version 5.20.2	-	-

Electric fast transients EFT/Burst				
Device	**Manufacturer**	**Model**	**Serial number**	**Notes**
Burst/Surge generator	EM TEST	UCS500-M	V0629101638	Certificate of calibration No. CE-D19702-UCS500M4-170410; 10.04.2017
Motor variac	EM TEST	MV 2616	V0629101639	-
Capacitive coupling clamp	EM TEST	HFK	0906-06	Certificate of calibration No. CE-D19702-UCS500M4-170410; 10.04.2017
ISMIEC for Windows software	EM TEST	Version 4.08	-	-

Surge				
Device	**Manufacturer**	**Model**	**Serial number**	**Notes**
Burst/Surge generator	EM TEST	UCS500-M	V0629101638	Certificate of calibration No. CE-D19702-UCS500M4-170410; 10.04.2017
Motor variac	EM TEST	MV 2616	V0629101639	-
CDN	EM TEST	CNV 504A	V0629101640	Certificate of calibration No. CE-D19 702-CNV504A-170410; 10.04.2017
ISMIEC for Windows software	EM TEST	Version 4.08	-	-

Electrostatic discharge				
Device	**Manufacturer**	**Model**	**Serial number**	**Notes**
ESD simulator	EM TEST	DITO	V0629101637	Certificate of calibration No. CE-D19702-DITO-170407; 07.04.2017
Vertical coupling plane	EM TEST	DITO	-	Certificate of calibration No. CE-D19702-DITO-170407; 07.04.2017

7. STATEMENT OF THE MEASUREMENT UNCERTAINLY

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 uncertainties were calculated according to guidelines given in EN 55016-4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4 Uncertainly in EMC Measurements" and LAB 34, and is documented in the SIA "LEITC" quality system according to ISO/IEC 17025. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective manuals.

Measurement uncertainty			
Procedure	**Designation**	**Uncertainty**	**Device**
Conducted emissions 9kHz to 30MHz	U_{lab}	2.35dB	LISN: ESH2-Z5
Radiated emissions 30MHz to 1GHz	U_{lab}	4.71dB	Antenna: HL562
Radiated emissions 1GHz to 6GHz	U_{lab}	4.87dB	Antenna: HF906
RF radiated electromagnetic field immunity 80MHz to 4GHz	U_{lab}	2.01dB	Antenna: HL046E
RF common mode immunity 150kHz to 80MHz	U_{lab}	1.83dB	CDNs: CDN L-801 M2/M3; CDN L-801 T8; CDN L-801 S1
Electrostatic discharge immunity	U_{lab}	According to EN 61000-4-2	Dito
Electric fast transients/Burst immunity	U_{lab}	According to EN 61000-4-4	UCS 500 M4
Surge immunity	U_{lab}	According to EN 61000-4-5	UCS 500 M4

8. TEST PROCEDURES

Radiated emissions

The equipment was set up as per the test configuration to simulate typical usage per user's manual. When the EUT is a table top equipment, a wooden turntable with a height of 0,8m is used which is placed on the ground plane. When EUT is floor standing equipment, it is placed on the 0,1m insulation support.

Auxiliary equipment and/or support equipment, if needed was placed as per EN 55032 recommendations.

All input/output cables were positioned to simulate typical usage as per EN 55032.

The EUT was connected to AC mains 230V/50Hz under the turntable shucko type socket, all other equipment was connected to the other shucko type socket under the turntable.

The antenna was placed at 3m away from EUT. Antenna height was changed in range 1-4m and EUT rotation angle in range of -180^0 to 180^0 maximize measured emissions.

Conducted emissions

The equipment was set up as per the test configuration to simulate typical usage per user's manual. When the EUT is a table top equipment, a wooden turntable with a height of 0,8m is used which is placed in a distance of 0,4m from vertical conductive plane. When EUT is floor standing equipment, it is placed on the 0,1m insulation support in a distance of 0,4m from vertical conductive plane.

Auxiliary equipment and/or support equipment, if needed was placed as per EN 55032 recommendations.

All input/output cables were positioned to simulate typical usage as per EN 55032.

EUT mains power port was connected to LISN/AMN which is placed in a distance of 0,8m. Each EUT power lead, except ground (safety), was connected through a LISN/AMN to power source. All lines and neutral of power cord where measured.

All telecommunication and signal cables are connected through ISN which is located in distance of 0,8m. Each cable lead is measured according to used connection type.

Radio frequency radiated electromagnetic field immunity

The equipment was set up as per the test configuration to simulate typical usage per user's manual. When the EUT is a table top equipment, a wooden table with a height of 0,8m is used. When EUT is floor standing equipment, it is placed on the 0,1m insulation support.

Radio frequency common mode immunity

The equipment was set up as per the test configuration to simulate typical usage per user's manual. When the EUT is table top equipment, it is placed on table 0,1m above ground reference plane. When EUT is floor standing equipment, it is placed on the 0,1m insulation above the ground reference plane.

Coupling decoupling devices specified in test results.

The frequency range is swept, using the signal levels defined in test data with in disturbance signal 80% amplitude modulation within a 1kHz sine wave, pausing to adjust the RF signal level or to switch coupling devices as necessary. The rate of sweep shall not exceed 1,5e-3 decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value. The dwell time at each frequency is not less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequencies and harmonics or frequencies of dominant interest shall be analyzed separately.

Electric fast transients EFT/Burst immunity

The equipment was set up as per the test configuration to simulate typical usage per user's manual. When the EUT is table top equipment, it is placed on table 0,1m above ground reference plane. When EUT is floor standing equipment, it is placed on the 0,1m insulation above the ground reference plane.

On AC mains power ports built-in coupling decoupling network is used to couple EFT/Burst disturbance voltage. For DC/telecommunication/signal ports capacitive clamp is used. Polarity of EFT/Burst disturbance voltage is changed during the test. Duration of test is not less than 1min, however, to avoid synchronization, the test time may be broken down into six 10s burst separated by a 10s pause. It is not intended that the burst is synchronized with EUT signals.

Surge immunity

The equipment was set up as per the test configuration to simulate typical usage per user's manual. When the EUT is table top equipment, it is placed on table 0,1m above ground reference plane. When EUT is floor standing equipment, it is placed on the 0,1m insulation above the ground reference plane.

Surge generator was connected to reference ground plane via low impedance connection. If not mentioned, for DC power ports and interconnection lines and signal/telecommunication lines five positive and five negative surge pulses applied, for AC power line ports five negative and five positive pulses applied each at 0^0, 90^0, 180^0, 270^0 phase angle. Time between successive pulses was 1min or less if not otherwise specified.

Electrostatic discharge immunity

The equipment was set up as per the test configuration to simulate typical usage per user's manual. When the EUT is table top equipment, it is placed on table 0,1m above ground reference plane. When EUT is floor standing equipment, it is placed on the 0,1m insulation above the ground reference plane.

Electrostatic discharges are applied as contact discharge and air discharge, discharge to vertical and horizontal coupling plane. The discharges are applied only to such points and surfaces of the EUT which are accessible to personnel during normal usage.

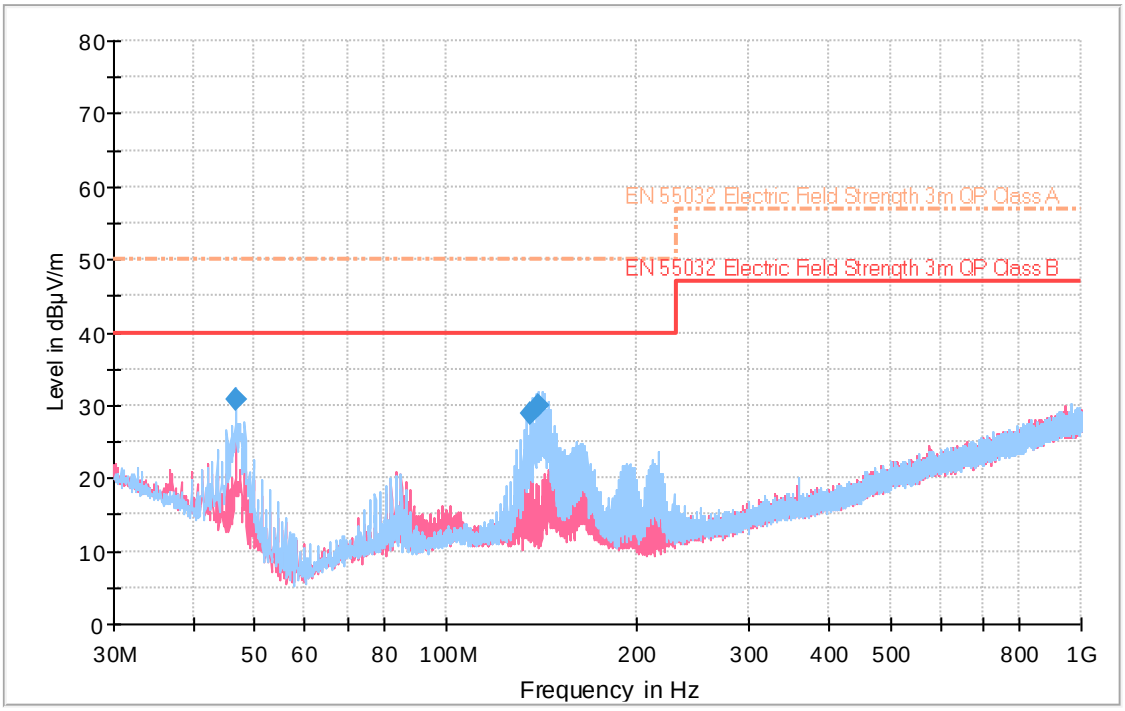
Test is performed as single discharges on preselected points at least ten single discharges on both polarities. Between successive discharges a time interval of 1s is used. In case of contact discharge the tip of discharge electrode touch the EUT before the discharge switch is operated. In case of air discharge, the round tip of the discharge electrode is approached as fast as possible (without causing mechanical damage) to touch the EUT discharge switch is operated before the tip is approached.

At least ten single contact discharges are applied to horizontal and vertical coupling plate.

9. TEST RESULTS

	9.1 Radiated emissions (30MHz to 1GHz)	Plot	

HL562



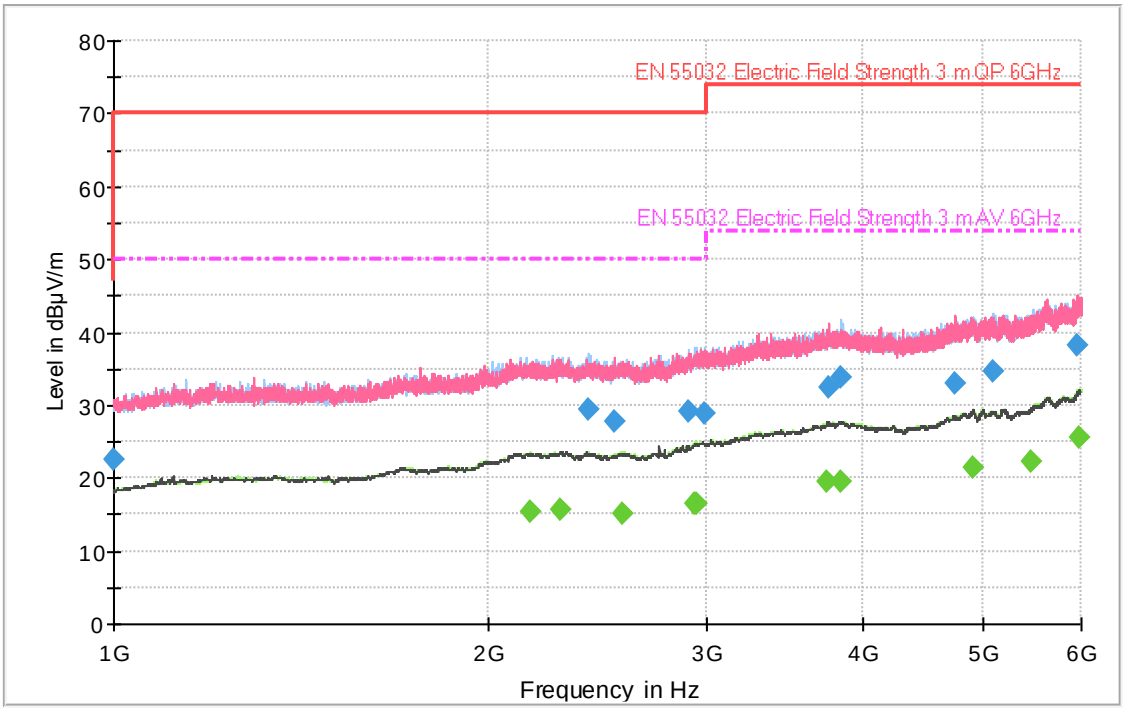
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit (dBµV/m)	Comment
46.740000	30.7	5000.0	120.000	100.0	H	180.0	10.8	9.3	40.0	
135.540000	28.9	5000.0	120.000	100.0	H	180.0	9.7	11.1	40.0	
140.160000	29.9	5000.0	120.000	100.0	H	180.0	9.4	10.1	40.0	

Peak detector (H); Peak detector (V); QP detector; Limit line (Class B); Limit line (Class A)

Date:	02.01.2018	**Test engineer:**	Aivis Ašmanis		
Method:	LVS EN 55032:2015 (Class B)	**Port:**	Enclosure		
Notes:					
Chamber:	SAC3	**Height:**	1-4m	**Mode:**	1
Distance:	3m	**Polarization:**	V+H	**Mod. State:**	1
Angle:	$-180^0..+180^0$	**File:**			

	9.2 Radiated emissions (1GHz to 6GHz)	Plot	

HF906



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1000.000000	22.6	10000.0	120.000	100.0	V	0.0	-14.4	24.4	47.0	
2405.200000	29.5	10000.0	120.000	100.0	H	0.0	-9.3	40.5	70.0	
2526.800000	27.9	10000.0	120.000	100.0	V	0.0	-9.3	42.1	70.0	
2900.800000	29.0	10000.0	120.000	100.0	H	0.0	-7.4	41.0	70.0	
2986.400000	29.0	10000.0	120.000	100.0	H	0.0	-6.8	41.0	70.0	
3761.200000	32.5	10000.0	120.000	100.0	V	0.0	-3.9	41.5	74.0	
3848.000000	33.7	10000.0	120.000	100.0	H	0.0	-3.8	40.3	74.0	
4750.400000	33.0	10000.0	120.000	100.0	V	0.0	-2.8	41.0	74.0	
5091.600000	34.7	10000.0	120.000	100.0	H	0.0	-2.5	39.3	74.0	
5959.600000	38.2	10000.0	120.000	100.0	V	0.0	-0.9	35.8	74.0	

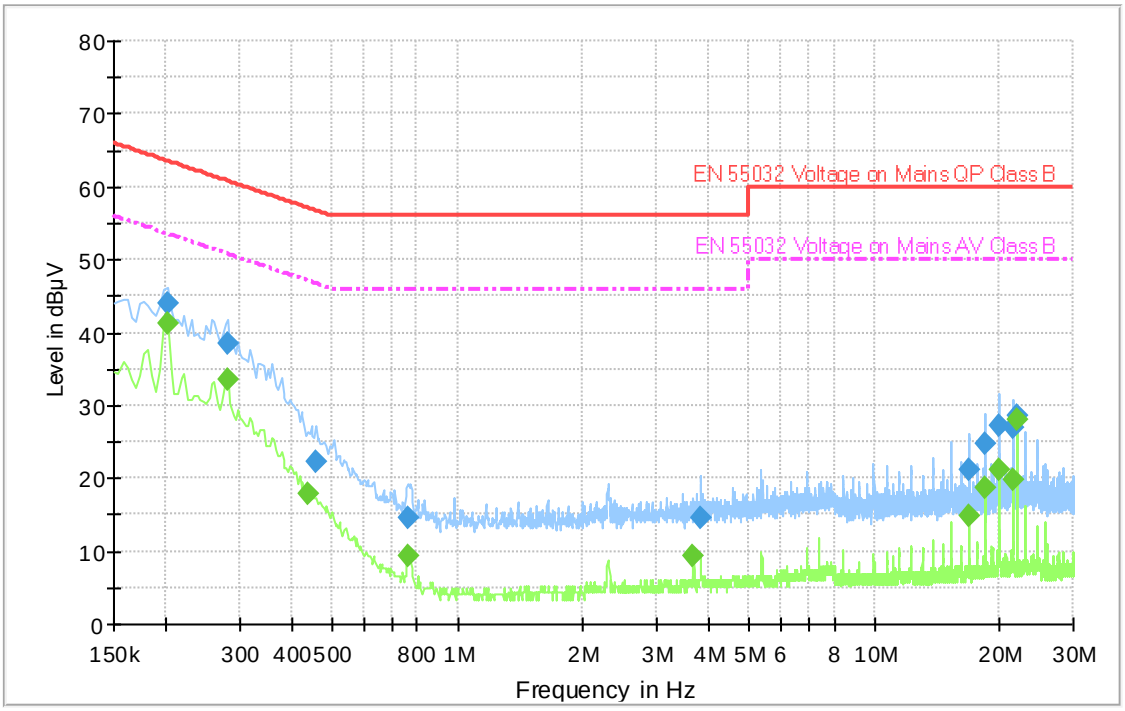
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2162.400000	15.5	10000.0	120.000	100.0	H	0.0	-9.7	34.5	50.0	
2287.200000	15.7	10000.0	120.000	100.0	H	0.0	-9.4	34.3	50.0	
2568.400000	15.2	10000.0	120.000	100.0	H	0.0	-9.0	34.8	50.0	
2929.600000	16.4	10000.0	120.000	100.0	H	0.0	-7.1	33.6	50.0	
2943.200000	16.6	10000.0	120.000	100.0	H	0.0	-6.9	33.4	50.0	
3749.600000	19.6	10000.0	120.000	100.0	H	0.0	-3.7	34.4	54.0	
3844.000000	19.5	10000.0	120.000	100.0	H	0.0	-3.7	34.5	54.0	
4908.400000	21.3	10000.0	120.000	100.0	H	0.0	-2.0	32.7	54.0	
5478.000000	22.4	10000.0	120.000	100.0	H	0.0	-2.5	31.6	54.0	
5971.200000	25.7	10000.0	120.000	100.0	H	0.0	-0.9	28.3	54.0	

Peak detector (H); Peak detector (V); AV detector (H); AV detector (V); QP Limit line; AV Limit line; QP detector; AV detector

Date:	02.01.2018		**Test engineer:**	Aivis Ašmanis			
Method:	LVS EN 55032:2015 (Class B)		**Port:**	Enclosure			
Notes:							
Chamber:	SAC3		**Height:**	1-4m	**Mode:**	1	
Distance:	3m		**Polarization:**	V+H	**Mod. State:**	1	
Angle:	$-180^0..+180^0$		**File:**				

	9.3 Conducted emissions	Plot

ENV216



Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.202000	44.1	10.0	9.000	On	N	9.7	19.4	63.5	
0.282000	38.4	10.0	9.000	On	L1	9.7	22.3	60.8	
0.458000	22.4	10.0	9.000	On	L1	9.7	34.4	56.7	
0.762000	14.6	10.0	9.000	On	L1	9.8	41.4	56.0	
3.834000	14.5	10.0	9.000	On	N	10.0	41.5	56.0	
16.874000	21.2	10.0	9.000	On	N	10.5	38.8	60.0	
18.402000	24.7	10.0	9.000	On	N	10.6	35.3	60.0	
19.946000	27.2	10.0	9.000	On	N	10.6	32.8	60.0	
21.474000	27.0	10.0	9.000	On	N	10.7	33.0	60.0	
22.118000	28.7	10.0	9.000	On	L1	10.5	31.3	60.0	

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.202000	41.4	10.0	9.000	On	N	9.7	12.2	53.5	
0.282000	33.5	10.0	9.000	On	L1	9.7	17.3	50.8	
0.438000	17.9	10.0	9.000	On	L1	9.7	29.2	47.1	
0.766000	9.4	10.0	9.000	On	L1	9.8	36.6	46.0	
3.686000	9.4	10.0	9.000	On	N	9.9	36.6	46.0	
16.866000	14.9	10.0	9.000	On	N	10.5	35.1	50.0	
18.430000	18.7	10.0	9.000	On	N	10.6	31.3	50.0	
19.934000	21.2	10.0	9.000	On	N	10.6	28.8	50.0	
21.474000	19.9	10.0	9.000	On	L1	10.5	30.1	50.0	
22.118000	28.0	10.0	9.000	On	L1	10.5	22.0	50.0	

Peak detector; QP detector; AV detector; AV detector; QP Limit line; AV Limit line; L- Live, N-Neutral; PE- Earth

Date:	02.01.2018	**Test engineer:**	Aivis Ašmanis		
Method:	LVS EN 55032:2015 (Class B)	**Port:**	DC port		
Notes:					
Chamber:	SAC3	**Attenuator:**	0dB	**Mode:**	1
LISN:	ENV216			**Mod. State:**	1
		File:			

9.4 Radio frequency radiated electromagnetic field immunity

Date:	03.01.2018			
				RESULT
Ports:	Enclosure		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-3:2006+ A1:2008+A2:2010		A	A
Ports:				
Method:				

Oper. mode	Mod. State	EUT orientation	Antenna	Step size (%)	Frequency (MHz)	Sweep time (s)	Polarization	Field strength (V/m)	Modulation (%AM//kHz)	Notes
1	1	Front	HL046E	1	80-3000	5	V	3	80% 1kHz	#1
1	1	Front	HL046E	1	80-3000	5	H	3	80% 1kHz	#1

#1, 2, 3... see Observations Table below

Notes	Comments and Observations
#1	No effect observed.

9.5 Radio frequency common mode immunity

Date:	03.01.2018			
				RESULT
Ports:	AC mains		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-6:2014		N/A	N/A
Ports:	DC power		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-6:2014		A	A
Ports:	I/O communication		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-6:2014		N/A	N/A
Ports:	Signal		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-6:2014		N/A	N/A

Oper. mode	Mod. State	Port	Coupler	Frequency (MHz)	Sweep time (s)	Step size (%)	Level (V_{rms})	Modulation (%AM//kHz)	Notes
1	1	DC power port	CDN L-801 M2/3	0.15-80	3	1	3	80% 1kHz	#1

#1, 2, 3… see Observations Table below

Notes	Comments and Observations
#1	No effect observed.

9.6 Electric fast transients EFT/Burst immunity

Date:	03.01.2018			
				RESULT
Ports:	AC power		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-4:2013		N/A	N/A
Ports:	DC power		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-4:2013		B	A
Ports:	I/O communication		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-4:2013		N/A	N/A
Ports:	Signal		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-4:2013		N/A	N/A

Oper. mode	Mod. State	Port	Level (kV)	Polarity	Frequency (kHz)	Burst duration/period (ms)	Test duration (min)	Notes
1	1	DC power	0.5	+	5	15/300	5	#1
1	1	DC power	0.5	-	5	15/300	5	#1

#1, 2, 3... see Observations Table below

Notes	Comments and Observations
#1	No effect observed.

9.7 Surge immunity

Date:	03.01.2018			
				RESULT
Ports:	AC power		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-5:2014		N/A	N/A
Ports:	DC power		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-5:2014		B	A
Ports:	I/O communication		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-5:2014		N/A	N/A
Ports:	Signal		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-5:2014		N/A	N/A

Oper. mode	Mod. State	Port	Level (kV)	Polarity	Angle applied (deg)	Number of pulses applied	Interval between pulses (s)	Notes
1	1	DC power port (+/-)	0.5	-	0, 90,270	30	10	#1
1	1	DC power port (+/-)	0.5	+	0, 90,270	30	10	#1

#1, 2, 3... see Observations Table below

Notes	Comments and Observations
#1	No effect observed.

9.8 Electrostatic discharge

Date:	03.01.2018			
				RESULT
Ports:	Enclosure		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-2:2009	Air discharge	B	A
Ports:	Enclosure		**Recm'd Crit**	**Ach'd Crit**
Method:	LVS EN 61000-4-2:2009	Contact discharge	B	A

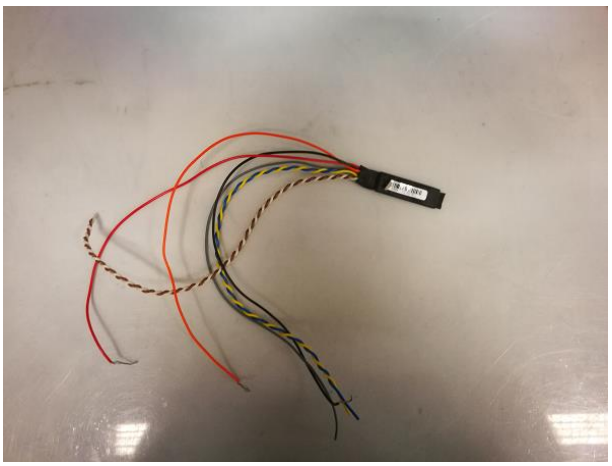
Oper. mode	Mod. State	Applied to:	+4kV cont.	-4kV cont.	+2kV air	-2kV air	+4kV air	-4kV air	+8kV air	-8kV air
1	1	Vertical coupling plane	#1	#1						
1	1	Horizontal coupling plane	#1	#1						
1	1	Enclosure Igla							#1	#1
1	1	Enclosure Chip							#1	#1

#1, 2, 3... see Observations Table below

Notes	Comments and Observations
#1	No effect observed.

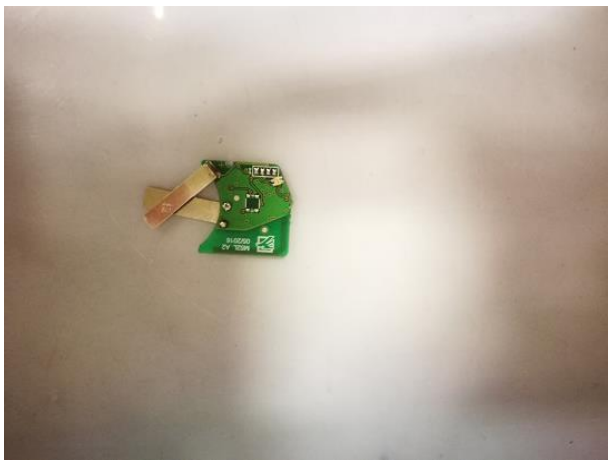
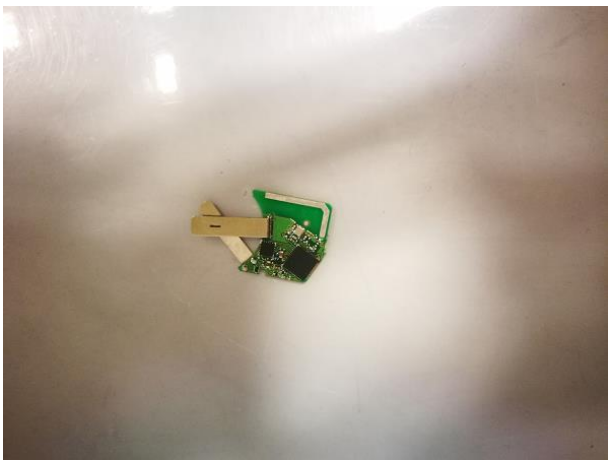
10. TEST PHOTOGRAPHS

EUT-equipment under test:

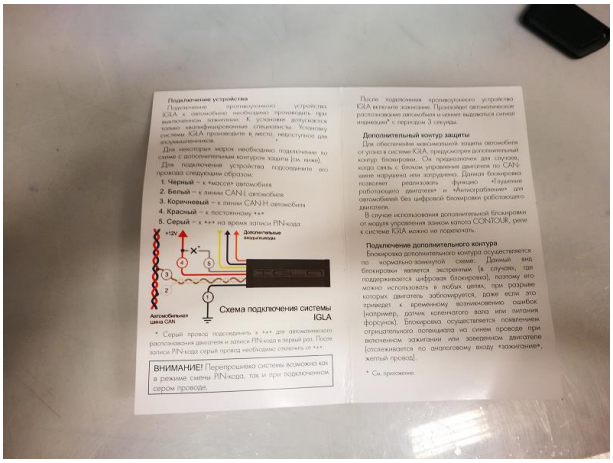


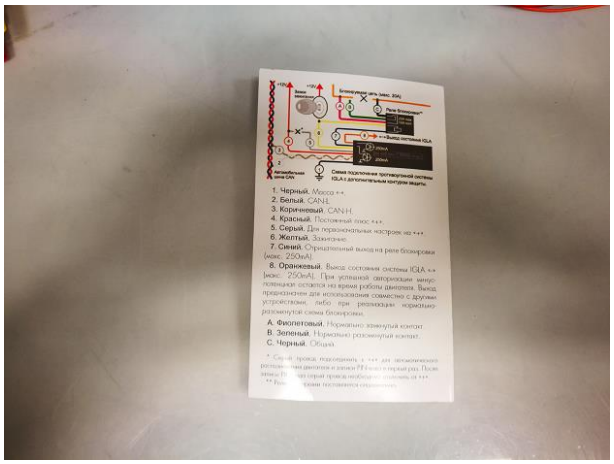

Chip:



User Manual:

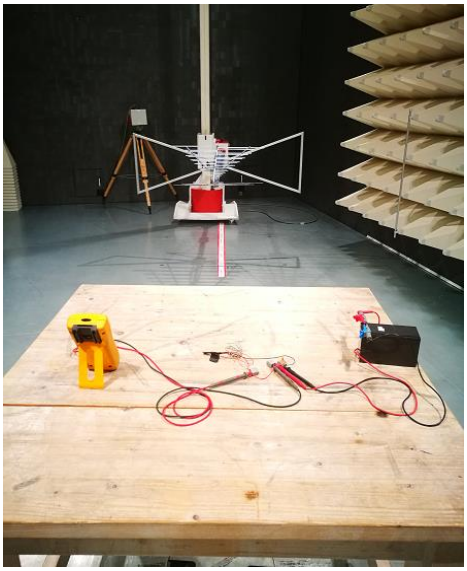




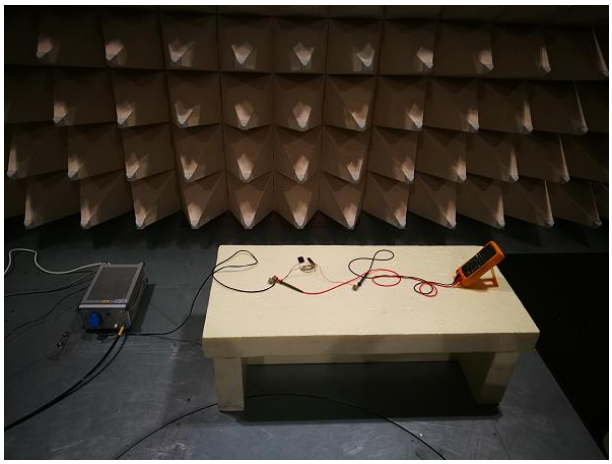
Battery:

Multimeter:

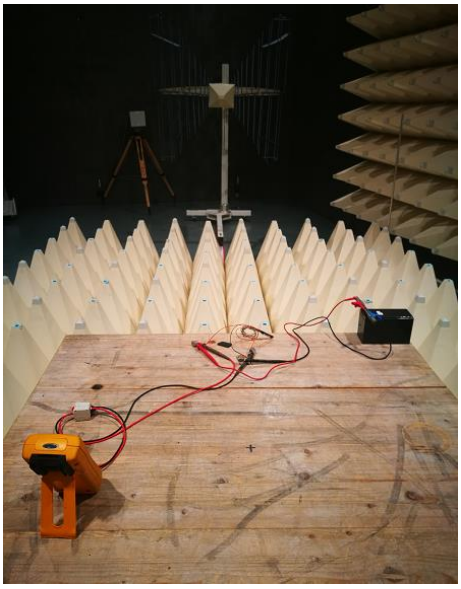
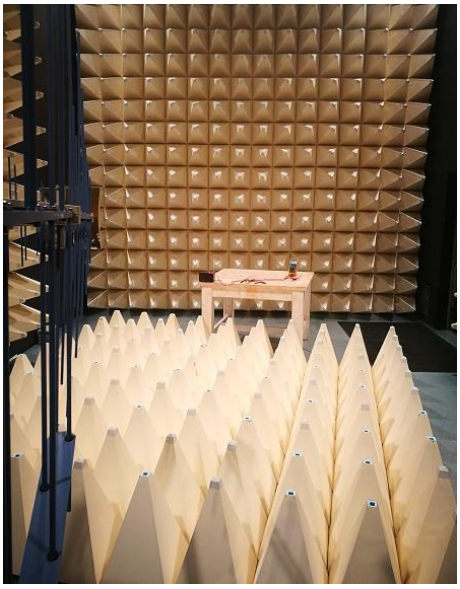
Radiated emissions:



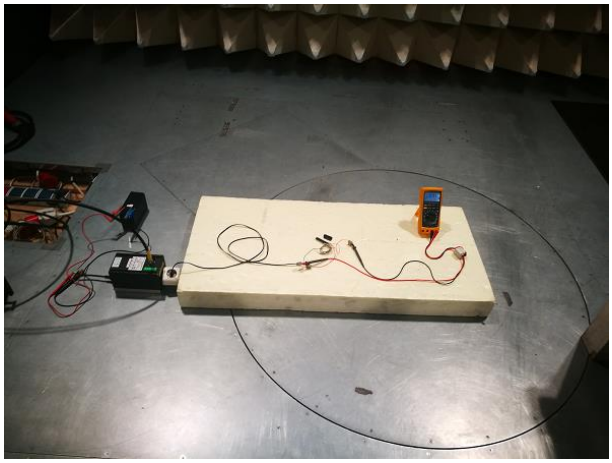
Conducted emissions:



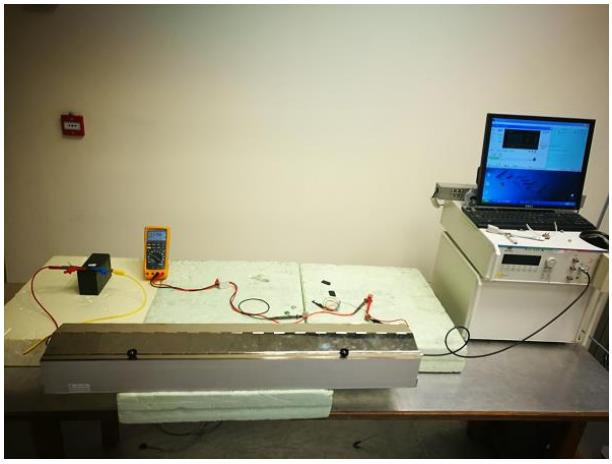
Radio frequency radiated electromagnetic field immunity:

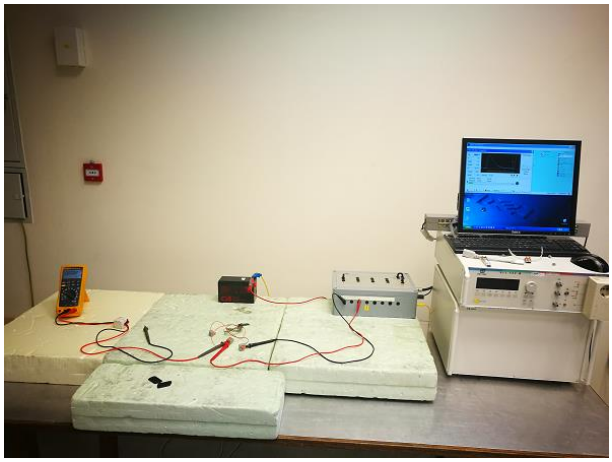
Radio frequency common mode immunity:



Burst immunity:



Surge immunity (DC):



ESD: