

EMC TEST REPORT #

55-2

Date of the report

17.04.2014.

Date of testing

16.04.2014. - 17.04.2014.

Job #

55



Customer

TRK Inovacije DOO, Trg Prvog Maja 3, Novi Sad, Serbia

Manufacturer

TRK Inovacije DOO, Trg Prvog Maja 3, Novi Sad, Serbia

EUT

Tasterključ

Model/Serial No.

AC3 / 06A

Test result

(according to methods and criteria reported in Clause 4 only)

PASS

Remarks:

Tested by:

LAB engineer Dušan Stanišić

LAB engineer Marko Radić

LAB engineer Ivana Marković

Verified by:

LAB engineer Dušan Stanišić

LAB engineer Marko Radić

LAB engineer Ivana Marković

Approved by:

L.S.

Technical Manager Saša Jorgovanović

The electromagnetic compatibility (EMC) tests and the test results are valid for the tested product (EUT) sample only.

1. CONTENTS

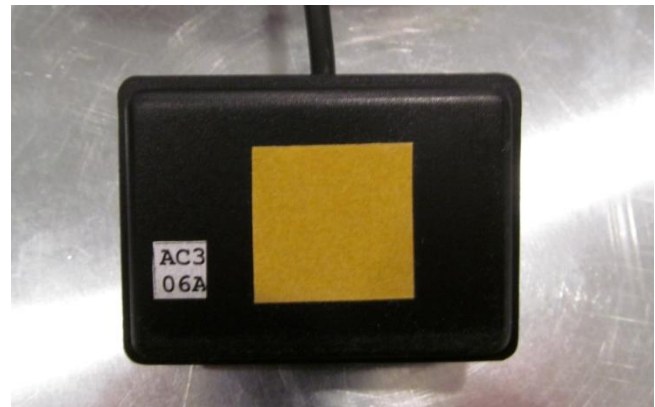
0. Front page
1. Contents
2. Product identification
 - 2.1. Data
 - 2.2. Photographs/schematics
 - 2.3. Operation modes
 - 2.4. Associated/auxiliary equipment
 - 2.5. Performance criteria
 - 2.6. Product related notes
3. Test conditions
4. Test methods and short overview of the results
5. Test results
 - 5.1. Radiated Emissions Test
 - 5.2. Radiated RF field immunity Test
 - 5.3. Electrostatic Discharge (ESD) Immunity Test
6. Test equipment data
7. Measurement uncertainty
8. General remarks
9. Appendixes

2. Product identification

2.1. Data

Tasterključ is device used for unlocking intercom door when the right ringing sequence is achieved. For all other sequences other than the right one, door remains locked. The sequence is user programmable and it can be changed as many times as wanted. Tasterključ connects directly to intercom.

2.2. Photographs/schematics

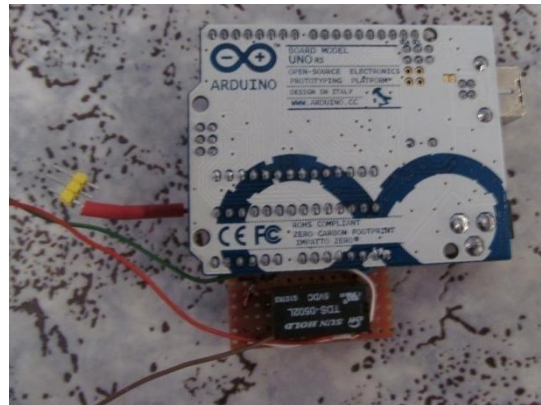
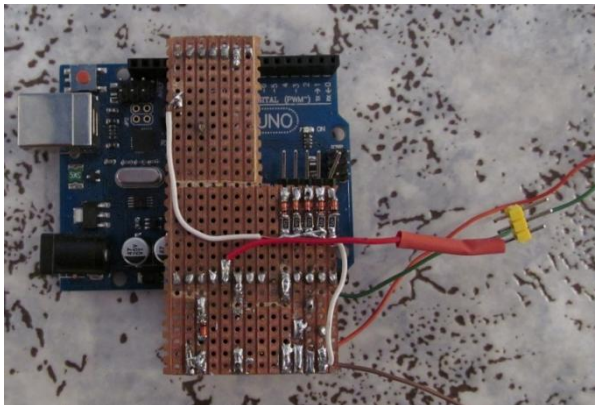
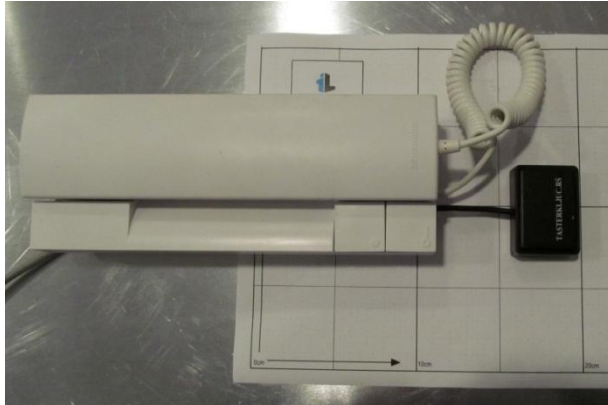


2.3. Operation modes

Operation mode	Description of operation mode and exercise method
active	EUT is monitoring intercom's ring and unlocks door if ringing sequence is as set.

2.4. Associated/auxiliary equipment

Mark	Name/type/purpose	Number of the items delivered
FT&A Industrial Design, 132655	Intercom handset	1
Acer – Aspire 5610Z	Notebook computer	1
Arduino - Board Model UNO R3	Test setup hardware	1
/	handmade environment set up (intercom handset, speaker, lock, 4-wire shielded cable)	1
YAMAHA – model PA-3C	AC Power Adapter	1



2.5. Performance criteria

2.5.1. Emission criteria

Radiated RF emissions 30 MHz – 1 GHz: Required emission limits are according to the customer's request and also in accordance with clause 6.1 (30 MHz – 1 GHz) of the EN 55022:2010 for class B equipment.

2.5.2. Immunity criteria

Performance criteria:		
Criteria	Description of normal operation or performance degradation	Operating mode
A	Without noticeable deviations from normal operation during application of test disturbance. If the ring sequence is not met EUT shall not unlock the lock. If the ring sequence is correct the lock shall be unlocked.	active
B	During the test, degradation of performance is allowed, and it ceases after the disturbance ceases (without operator intervention). However, no change of operating state or stored data is allowed to persist after the test (e.g. changes in correct ringing sequence).	active
C	Loss of function or degradation of performance, the correction of which requires operator intervention. Equipment documentation needs to contain explanation of steps to be taken by operator in order to recover normal operation.	active
D	Non recoverable loss of function or degradation of performance owing to damage of hardware or software, or loss of data.	active

Performance acceptance criteria are defined by customer's request. Exercising EUT and monitoring of its operation is determined by test hardware and test software which is preloaded to (and submitted for testing with) EUT.

2.6. Product related notes

None.

3. Test conditions

Temperature: 19,9 – 21,5 °C
Relative humidity: 55,2 – 56,0 %

4. Test methods and short overview of the results

According to criteria from Clause 2.5 of the report and the test plan by customer's request:

METHOD / STANDARD	PORT	TEST LEVEL (STANDARD)	OPERATING MODE	CRITERIA REQUESTED	RESULT
EN 55022:2010	Enclosure	Clause 6.1 (30 MHz – 1 GHz) of the EN 55022:2010 for class B equipment	active		PASS
EN 61000-4-3: 2006 + A1:2008 + A2:2010	Enclosure	3 V/m AM 80% 1 kHz 80 MHz – 1000 MHz According to the level from Table 1 from EN 55024:2010	active	A	PASS
EN 61000-4-2:2009	Enclosure	4 kV contact discharge / 8 kV air discharge According to the level from Table 1 from EN 55024:2010	active	B	PASS

5. Test results

5.1. Radiated Emissions Test

Date: 16.04.2014.
Test standard: EN 55022:2010
Tested by: Dušan Stanišić

5.1.1. Set up

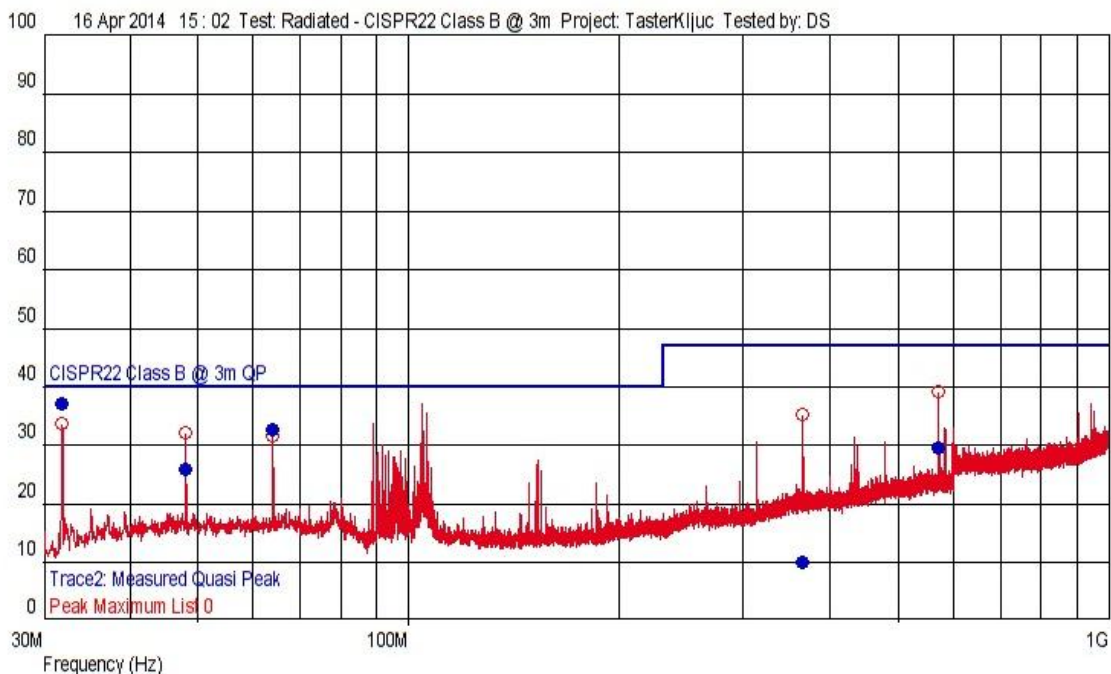


Test location: semi anechoic chamber
EUT to antenna distance: 3 m
Operation mode: active
Limits:

Frequency range MHz	Quasi-peak limit dB(μ V/m)
	Class B
30 – 230	40
230 – 1000	47

5.1.2.Results

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB μ V/m)	Polarization	Azimuth (Deg)	Antenna height (m)	Detector
31.9807750	36,79	40,000	-3,21	--	208	1,00	QP
48.0006250	25,71	40,000	-14,29	--	354	1,06	QP
64.0193000	32,53	40,000	-7,47	--	222	1,01	QP
365.8805750	9,68	47,000	-37,32	--	298	1,11	QP
570.0595250	29,39	47,000	-17,61	--	61	2,48	QP



Test results are in conformance with limits for class B products according to the standard EN 55022:2010.

Test results: **PASS**

5.1.3.Deviations

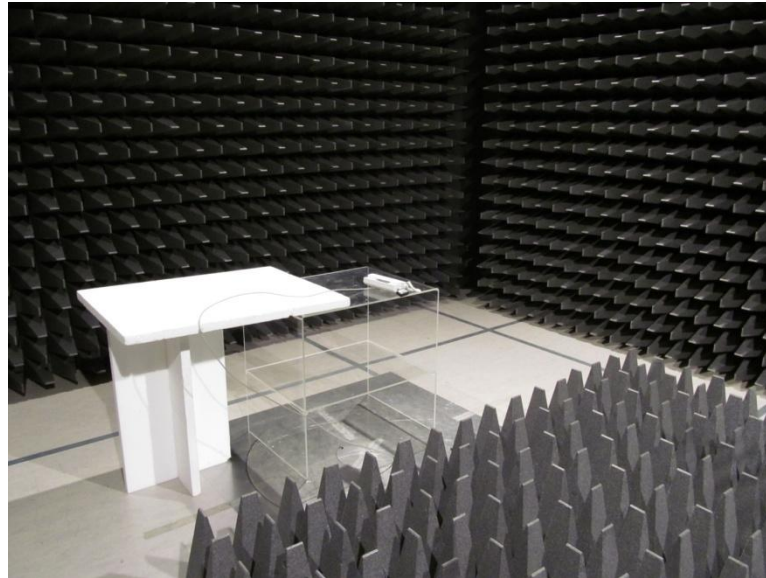
None.

5.1.4.Comments

It is determined that disturbances in the frequency range 85 MHz – 110 MHz are from the ambient signal inside of the SAC – coming from the EUT external cable whose shield was not connected to ground. Highest frequency in EUT is lower than 108 MHz (stated by manufacturer) and therefore testing is conducted up to 1 GHz.

5.2. Radiated RF Field immunity Test

Date: 17.04.2014.
Tested by: Marko Radić
5.2.1. Set up



Frequency range: 80 – 1000 MHz
Frequency step: 1 %
Dwell time: 5 s
Level: 3 V/m
Polarisation: HOR and VER
Modulation: 80 % AM; sinewave 1 kHz
UFA: 1,5 x 1,5 m at 0,8 m height; at 2,3 m distance from antenna
EUT operation mode: active

5.2.2. Results

3 V/m	80 MHz – 1000 MHz HOR	80 MHz – 1000 MHz VER
Left	A*	A
Right	A*	A
Front	A*	A
Rear	A*	A
Up	A*	A
Down	A*	A

* 1 kHz audio signal disturbance appears in the 100 – 200 MHz range. It isn't related to EUT but to used intercom auxiliary system.

Required performance criterion: **A**

Test result: **PASS**

5.2.3. Deviations

None.

5.2.4. Comments

None.

5.3. Electrostatic Discharge Immunity Test

Date: 17.04.2014.
 Atmospheric pressure: 985 hPa
 Air humidity: 55,2 %RH
 Temperature: 21,5 °C
 Operation mode: active
 Tested by: Ivana Marković, Dušan Stanišić and Marko Radić

5.3.1. Set up



5.3.2. Results

Discharge type – Contact discharge			
<i>(A, B, C, D – performance criteria, X – not tested)</i>			
Test level [kV]	+4	-4	Notes
Place of discharge			
HCP	A	A	No deviations observed.
VCP	A	A	No deviations observed.

Discharge type – Air discharge							
<i>(A, B, C, D – performance criteria, X – not tested)</i>							
Test level [kV]	+2	-2	+4	-4	+8	-8	Notes
Place of discharge							
housing - topline	A	A	A	A	A	A	No deviations observed.
housing - overside	A	A	A	A	A	A	No deviations observed.
housing - bottom	A	A	A	A	A	A	No deviations observed.

Required performance criterion: **B**

Test result: **PASS**

5.3.3. Deviations

None.

5.3.4. Comments

None.

6. Measurement equipment data

The following test equipment is used for tests:

Type	Manufacturer	Model	Ser.No.	IN number	Testing numbered as:
signal generator	Rohde&Schwarz	SML03	103309	L-0045	5.2
EMI test receiver	Rohde&Schwarz	ESPI7	101163	L-0044	5.1
ESD gun set	Haefely	PESD3010	H707203	L-0052	5.3
Antenna	Teseq	CBL6144	35349	0115	5.1
Amplifier	Teseq	CBA 1G-150	T44175	0116	5.2
Directional coupler	Bonn	BDC 0810-40/500	129058-02	0121	5.2
power meter	Teseq	PMU6006	73368	0123	5.2
Field strength sensor	Narda (PMM)	EP601	501WX20456	0124	5.2
software	Teseq	Compliance 5 E/I v5.26.4		0125	5.1 and 5.2
EMI receiver	Schaffner	SMR4503	81	0138	5.1
Environmental monitor	Kimo	AQ200	12115072	0144	5.2 and 5.3
Semi anechoic chamber + antenna mast + controller	Comtest	3m			5.1 and 5.2
FU absorbers + ferrite tiles	DMAS HT45 + Comtest CAT-6				5.1 and 5.2

7. Measurement uncertainty

For 5.1 test: 4,9 dB (HOR 30 MHz – 300 MHz)
5 dB (VER 30 MHz – 300 MHz)
5,2 dB (HOR and VER 300 MHz – 2700 MHz)

- expanded uncertainty of measurement, expressed as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for normal distribution corresponds to a coverage probability of approximately 95 %. Measurement uncertainty is according to EN 55016-4-2:2004.

Test equipment used for immunity tests (5.2 and 5.3) has been demonstrated during calibration to comply with the requirements of test standards having the calibration uncertainty taken into account.

8. General remarks

Testing is conducted with hardware and software environment designed especially for testing. Correct ringing sequence is repeated every 5 seconds afterwards the lock is getting unlocked. Source code of used test software is recorded and stored at Idvorsky Laboratories.

9. Appendixes

None.

END OF THE REPORT