EMC - R e p o r t

Emission and Immunity Tests

Test Item :

Radiation meter
RADEX ONE

Manufacturer:

OOO Quarta-Rad

Report No.:	**PLE150309**
Test Item:	**Radiation meter**
Type or Model:	**RADEX ONE**
Manufacturer:	**OOO Quarta-Rad** **117545 Москва** **ул. Подольских Курсантов, д.3, стр.2**
Arrival Date:	**25. March 2015**
Place of Testing:	**PRO EMV Labor Strausberg GmbH** **Garzauer Chaussee** **Phone: +493341 - 335255** **15344 Strausberg** **Fax: +493341 - 335368** **e-mail: proemv@proemv.de** **www.proemv.de**
Standards:	**EN 61326-1 /2013** Emission: class B Immunity: table 1
Date of Testing:	**25. March and 01. April 2015**
Procedure:	**The device under test was tested for compliance with the referenced standards.**
Test Result:	**The test item meets the requirements.**

Tested by: **T. Haugk**
Test Engineer

2015-04-01
Date, Signature

Inspected : **R. Erxleben**
General Manager

2015-04-01
Date, Signature

Contents

1. Instruments And Equipment Used

Radiated disturbance:

	Type	Make	Ser. / Inv. No.
EMI test receiver	ESIB 26	Rohde&Schwarz	SN 100172
EMI test software	ES-K1 V1.60	Rohde&Schwarz	
Bilog antenna	CBL 6111D	Chase	SN 832769/008

Immunity test (RF field):

	Type	Make	Ser. / Inv. No.
Power amplifier	KAW3020	amplifier research	SN 10479-1
Power amplifier	30S1G3	amplifier research	SN 30778
Signal generator	SML03	Rohde&Schwarz	SN 100097
Test software (RF field)	OATS-sX V6.0.9	CONFORMITAS	
Power meter	NRVD	Rohde&Schwarz	SN 836519/011
Direction coupler	DC-6180	amplifier research	SN 14375
Thermal power head	NRV-Z 51	Rohde&Schwarz	SN 834519/023
Field strength meter	PMM 8051	PMM	SN 0106
Probe	BA 01	PMM	SN 059
Broadband antenna	BTA-L	Frankonia	SN 97061002
Horn antenna	BBHA 9120 E	Schwarzbeck	SN 0899

Immunity test (ESD):

	Type	Make	Ser. / Inv. No.
ESD simulator	NSG 435	Schaffner	SN 00000599

Measuring equipment:

	Type	Make	Ser. / Inv. No.
Absorbing chamber	8,4 x 7,2 x 5,3 [m]	Frankonia	
Antenna mast	MA 240	Deisel	
Rotary disk	DS 415	Deisel	
Controller (turn table)	HD 100	Deisel	
Controller (mast)	CO3000	INNCO systems	

2. Equipment under Test (EUT) Description

The radiation meter is for measuring the level of radiation of the environment, materials and products as well as the received radiant power of nuclear radiation.

Classification of the EUT into group and class based on CISPR 11:

The radiation meter is an equipment of group1, class B.

Technical Data:

Identifier:	Radiation meter
Type:	Radex ONE
Serial no. :	without
Manufacturer:	Quarta-Rad
Housing:	Plastic
Dimensions:	97mm x 68 mm x 24mm (L x B x H)
Weight:	0,08 kg
Power supply:	1,5 V DC (1 x AAA Battery)
Interface:	Micro USB

Range of radiant power	0,05 - 999 µSv/h
Energy range of registered:	
Gamma radiation:	0,1 - 1,25 µSv
X-ray	0,03 - 3,0 µSv
Beta-radiation	0,4 - 3,5 µSv

For any further information see the applicant's system documentation.

3. Test Set-up and Mode of Operation During the Tests

The measurements were performed in a typical test configuration providing a maximum interference capability.

The test set up was done according to the named EMC base standards.

Mode at the tests	:	Normal operation i.e. measurement of radiation power
Power supply	:	1,5 V DC 1x AAA Battery
Set up	:	The test item was placed and driven in a manner that agrees with its conventional use.
Indicators for the evaluation of the EUT behaviour	:	Display
Tolerance	:	Allowable Tolerance: ± (15+6/P) P – radiation power in µSv/h

The test item was tested as a table top equipment.

Climatic conditions:

	Required	Actual
Ambient temperature	15 to 35°C	√
Relative humidity	30 to 60 %	√
Atmospheric pressure	86 to 106 kPa	√

Unless otherwise noted these conditions are valid for all following measurements.

Details of device settings and test arrangements may also be seen in the photo documentation.

4. Test Program / Summary and Test Results

The device presented for testing was tested for compliance with the mentioned standards. The following tests (measurements) have been performed on the test item:

Test	Test level	Result
Radiated disturbance	**class B**	**passed**
Immunity to radiated electromagnetic fields	**1 / 3 V/m**	**passed**
Immunity to electrostatic discharge	**4 / 8 kV**	**passed**

5. Performance Criteria

The following performance criteria were utilized to evaluate the performance of the EUT during testing.

Criterion	Abridged version
A	If the equipment is used properly, the operating behaviour shall not be impaired and no failure shall occur below a manufacturer-defined minimum operating quality.
B	If the equipment is used properly, the operating behaviour shall not be impaired and no failure shall occur below a manufacturer-defined minimum operating quality. In certain cases the minimum operating quality may be replaced by a tolerable loss of operating quality. During the test, however, an impairment of the operating behaviour may be tolerated, but no modification in the selected mode and no loss of stored data.
C	A temporary failure is tolerated. The function must restore itself, or it must be restorable using the control elements.

6. Measurements

Note:
The test results shall apply exclusively to the device under test. They shall not represent a generally valid opinion on the properties of the respective products from the running production process.

6.1. Radiated Disturbance

6.1.1. Standards

EN 61326-1 /2013 CISPR 11 /2009, modified group 1 class B

6.1.2. Test Description

The radiated disturbance was tested. It was measured in the frequency range from 30 MHz to 1000 MHz at a measuring distance of 3 m with Quasipeak-Detector (QP).

6.1.3. Limits

The QP limiting values are:

Frequency range	class A
30 - 230 MHz	40 dBµV/m
230 - 1000 MHz	47 dBµV/m

6.1.4. Set-up and Operating Conditions During the Measurements

The measurement diagrams with QP verification (decisive for the rating) represent the maximum which could be reached by turning the test item, by variations in the height of the antenna (1 - 4 m), and by changing the antenna polarisation.
The correction values: test assembly attenuation, antenna factor, and cable attenuation, are taken into consideration in the measurement result.

6.1.5. Measured Values

6.1.5.1. Measured values of the pre-measurements

Antenna height 2.0 m; horizontal and vertical polarization; antenna-to-EUT azimuth 0, 90, 180, 270 [dg]; MaxHold scan

Measurement	Diagram	Detector	Remark
1	page 12	PK	horizontal antenna
2	page 13	PK	vertical antenna

6.1.5.2. Measured values of the final measurement

The levels of the preview measurements were in the detectable limits of the measurement configuration. Therefore a final measurement was not necessary.

6.1.6. Test Result

The test item meets the requirements.

Note: No exceeding of the limits was observed.

6.2. Immunity to Radiated Electromagnetic Fields

6.2.1. Standards

EN 61326-1 /2013 Tab. 1

6.2.2. Set-up and Operating Conditions During the Measurements

The EUT was placed on a wooden rotation desk so that it was positioned in a 0.8 m distance from the chamber's floor and in a 3 m distance in front of the antenna.

The EUT was exposed to radiation from the front, from the right side, from the left side, and from behind.

The frequency range was passed through once in each polarisation.

6.2.3. Test Description

Basic standard	IEC 61000-4-3	IEC 61000-4-3	IEC 61000-4-3
Frequency range	80 - 1000 MHz	1,4 - 2,0 GHz *	2,0 - 2,7 GHz *
Step size	1 %	1 %	1 %
Modulation	AM 80%, 1 kHz Sinus	AM 80%, 1 kHz Sinus	AM 80%, 1 kHz Sinus
Field strength	3 V/m	3 V/m	1 V/m
Polarisation	horizontal and vertical	horizontal and vertical	horizontal and vertical
Perform. criteria	A	A	A
Dwell time	2 s for each frequency step	2 s for each frequency step	2 s for each frequency step

6.2.4. Test Result

The "A" rating criteria is complied with.

Test item reactions: No unacceptable loss of performance or loss of data was observed.

During and after the influence of the disturbance the test item fulfilled his normal function properly.

6.3. Immunity to Electrostatic Discharge (ESD)

6.3.1. Standard

EN 61326-1 /2013 Tab. 1

6.3.2. Test Description

Basic standard	IEC 61000-4-2
Air discharge	8 kV
Contact discharge	4 kV
Discharges per pole	> 10
Discharge-R	330 R
Discharge-C	150 pF
Perform. criteria	B

The test item was subjected to 300 discharges.

Test points:	The direct air discharge was applied to all isolated touchable parts.
	The direct contact discharge was applied to all touchable metal parts.
	The indirect contact discharge was applied to the horizontal / vertical coupling area.

The test voltage was increased in steps from the lowest up to the selected test level.

6.3.3. Test Result

The "B" rating criteria is complied with.

Test item reactions:

Polarity Test voltage	Test point	Reaction
± 8 kV (Air)	User interface	“Snd” is shown on the display. After a short period the measurement values return to the display.

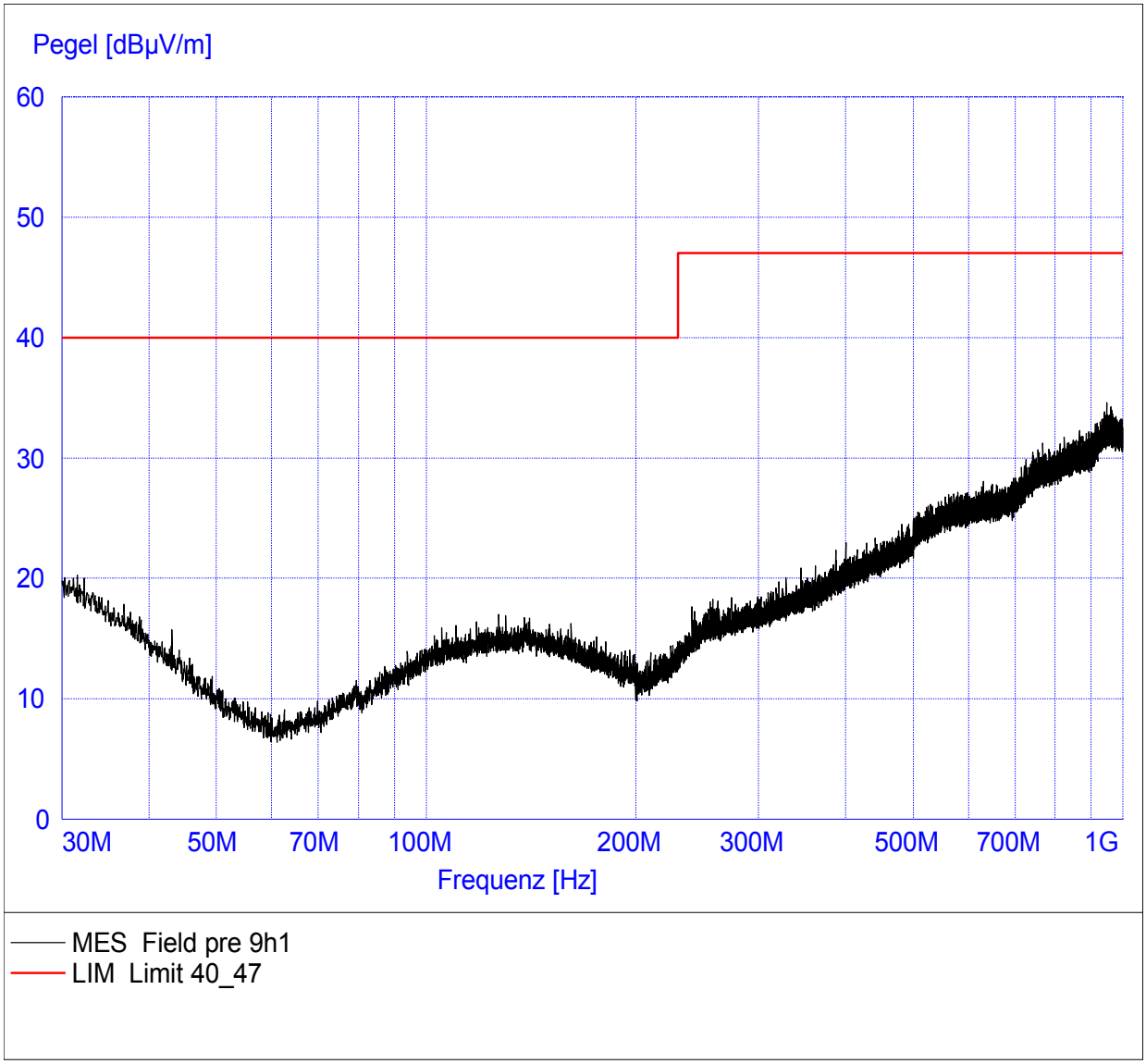
After the influence of the disturbance the test item fulfilled his normal function properly.

PRO EMV Labor Strausberg GmbH

EUT: RADEX ONE
Hersteller: Quarta-Rad
Prüfgrundlage: EN 61326-1 /2006 (CISPR 11, Klasse A)
Messentfernung - 3 m: Antenne horizontal
Kommentar: Dauermessbetrieb Dosisleistung

SCANTABELLE: "Field (30-1000 MHz)"

Start-Frequenz	Stop-Frequenz	Schritt-weite	Detektor	Meß-zeit	ZF-Bandbr.	Transducer
30.0 MHz	1.0 GHz	50.0 kHz	MaxPeak	10.0 ms	120 kHz	Bilog 6111D



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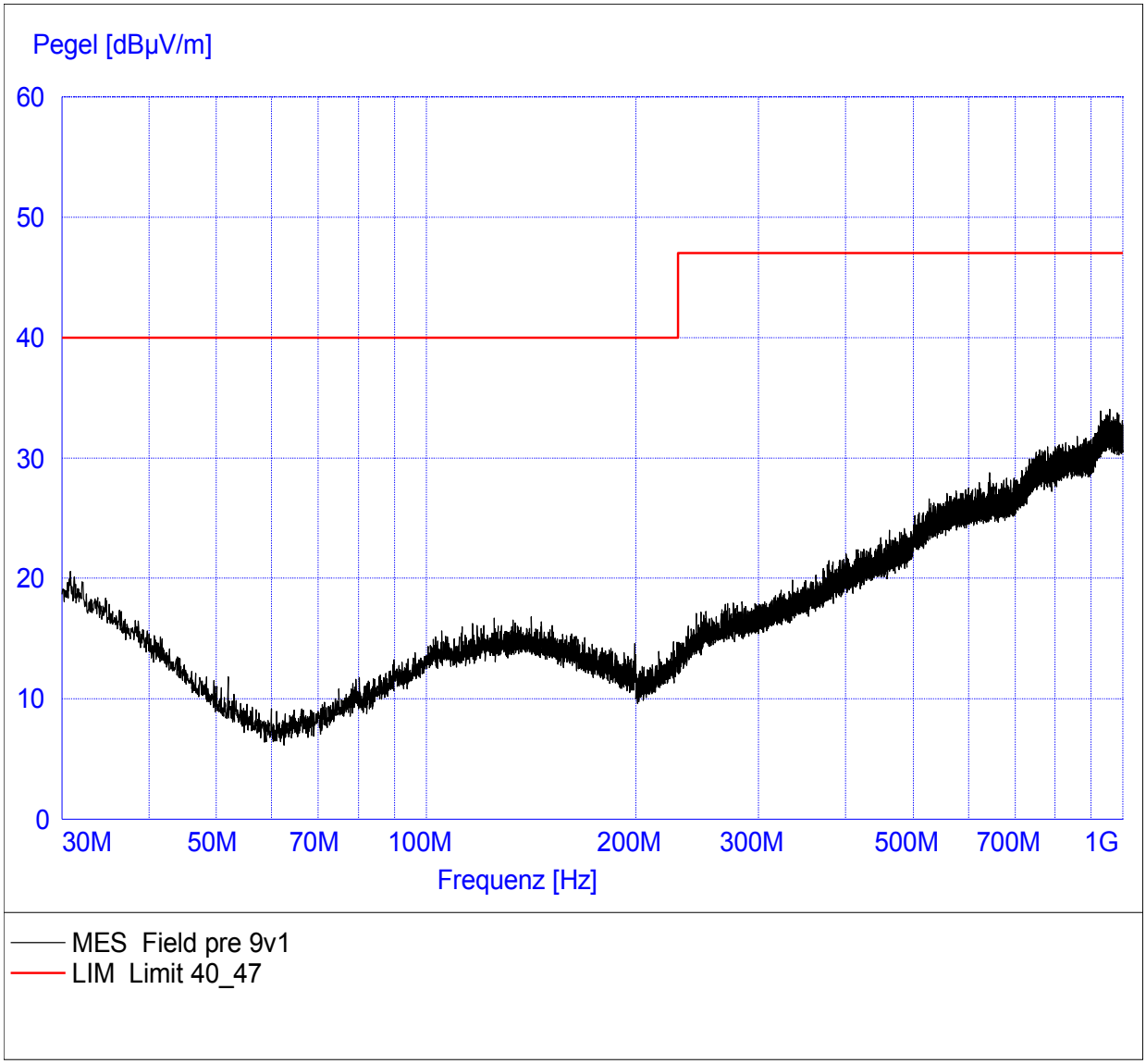

7. Photo documentation

Figure 1 : Test Set-up "Radiated electromagnetic fields and immunity to radiated electromagnetic fields"

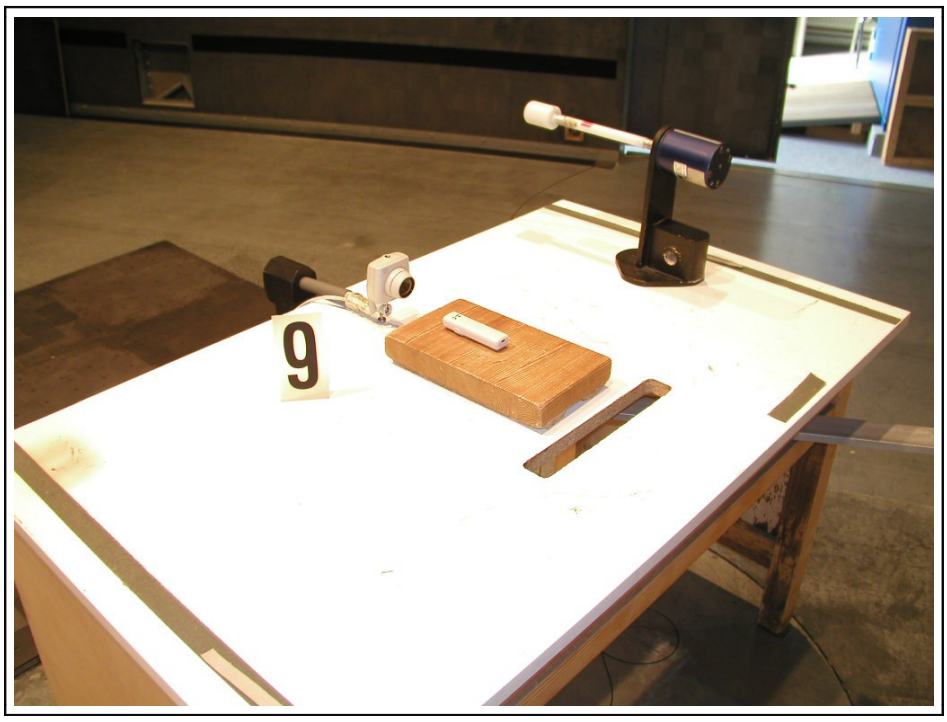

Figure 2 : Test Set-up "Radiated electromagnetic fields and immunity to radiated electromagnetic fields"

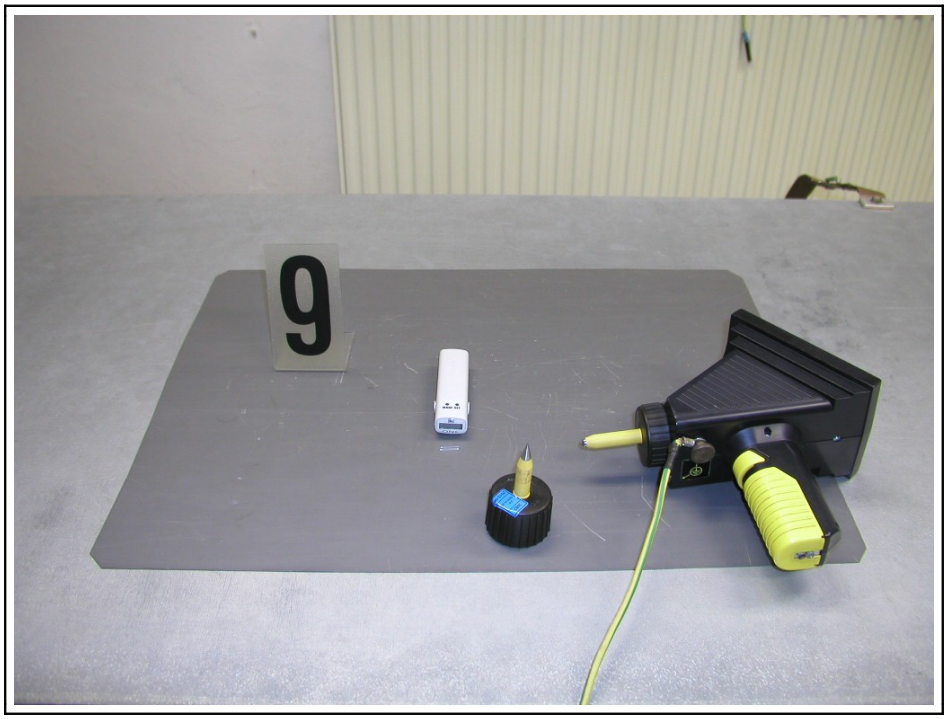

Figure 3 : Test Set-up "Immunity to electrostatic discharge (ESD)"