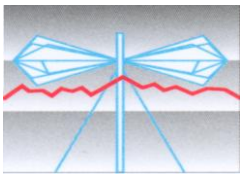

TEST OBJECT: **i-PAN X7 LC**

tested on

Electromagnetic Compatibility

EMC REQUIREMENTS		FULFILLED
EN 55022 cl. A:2010	Emission	YES
EN 61000-6-2:2005	Immunity	YES

CUSTOMER

Keith & Koep GmbH

Mr. Charalampos Tzintziras

Uellendahler Str. 199

42109 Wuppertal

EMC Test laboratory accredited acc. ISO/IEC 17025
The accreditation covers exclusive these standards, which are listed into amendment of the certificate, which is available on demand.

Tel: 49(0)271 382702
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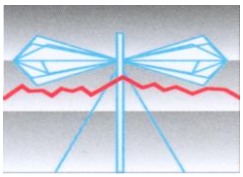
Tested by:

Anass El Hachimi
responsible for testing

Approved by:

Dipl.-Ing. Christoph Haubrich
General Manager, Head of laboratory

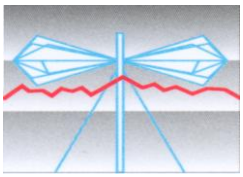
Date of receipt: February 19th, 2015
Test finished: April 10th, 2015
Date of Distribution: May 27th, 2015



TEST OBJECT: **i-PAN X7 LC**

TABLE OF CONTENTS / SURVEY OF TESTS

Test passed:



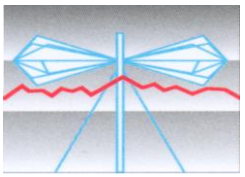
TEST OBJECT: **i-PAN X7 LC**

Test plan

Applied harmonized European Standards under EMC Directive 2004/108/EC:

EN 55022:2010
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
Class A: for industrial application
Class B: for use in home / residential area.

EN 61000-6-2:2005
Electromagnetic compatibility (EMC) - Part 6-2: Immunity Generic standard for industrial environment



TEST OBJECT: **i-PAN X7 LC**

Test plan

Subject of test and test conditions:

The unit under test is a Touch-Panel Computer.

The highest clock rate of the unit under test is 1 GHz.

Emission:

Condition under test: Normal operating condition

Test Software: KukTest

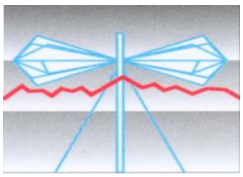
Immunity:

Condition under test: Normal operating condition

Test Software: KukTest

During the tests following is monitored visually by test software:

- SDMMC Card
- Hard Disc
- uSD →RAM
- RAM →uSD
- RAM = uSD
- Ethernet Ping
- Serial
- RAM →USB
- RAM = USB



TEST OBJECT: **i-PAN X7 LC**

Performance criteria concerning immunity testing

Criterion A – continuous mode

During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer, when the EUT 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, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Specification of manufacturer:

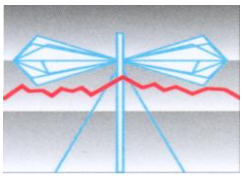
No error messages are allowed.

Criterion B – discontinuous mode

After the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. 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 by what the user may reasonably expect from the EUT if used as intended.

Specification of manufacturer:

During the test, error messages may occur, but must recover itself within 10 s after the test without user intervention.



TEST OBJECT: **i-PAN X7 LC**

Criterion C – supply interruption mode

During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Specification of manufacturer:

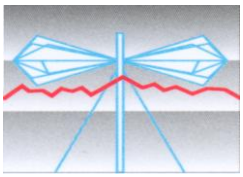
No damage is allowed. Error messages may occur.

Test equipment:

The used devices are maintained and calibrated according handbook of quality system of EMC TestHaus.

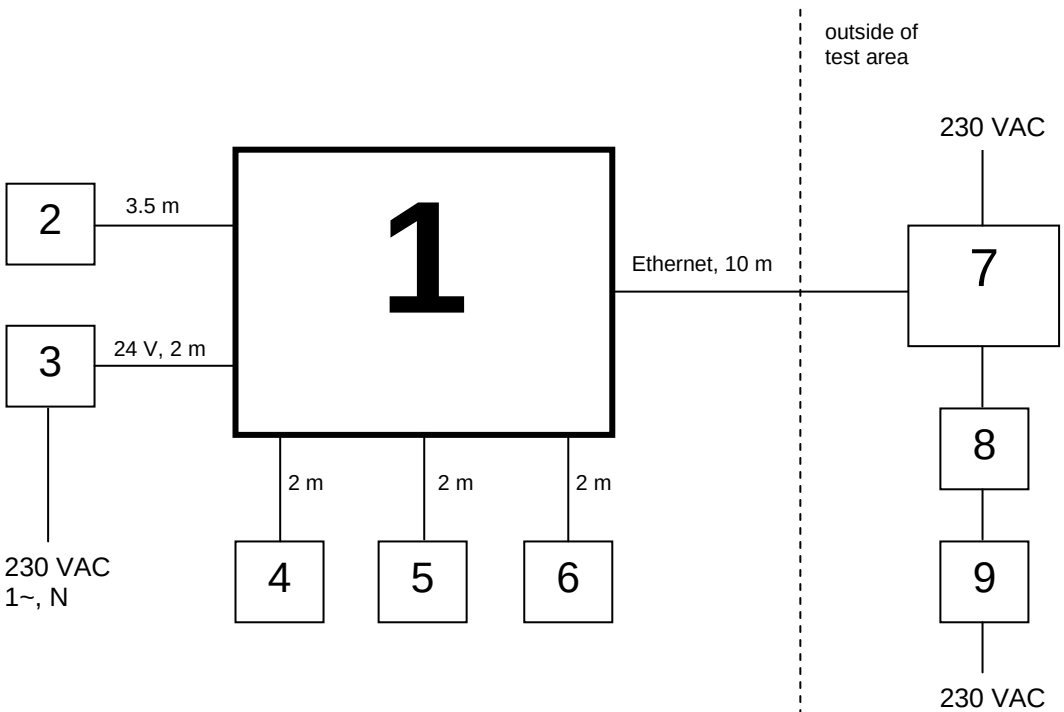
About the results:

The results are valid only for the sample tested. The manufacturer is responsible for the documentation of the tested configuration.



TEST OBJECT: **i-PAN X7 LC**

Configuration



1: EUT: i-PAN X7 LC, Prototype
2: Termination serial
3: AC/DC Adapter Ansmann, Model: 0055A-H (only during Surge)
4: Headset Hama CS-188
5: Mouse Microsoft, #3902C693
6: USB-stick
7: D-Link, Model: DGS-1016D, S/N: S32D1E7002515
8: pConXS
9: AC/DC Adapter MW, Model: NK120P100PGS

Dimension of sample under test: < 23 cm x 15 cm x 6 cm

TEST OBJECT: **i-PAN X7 LC**

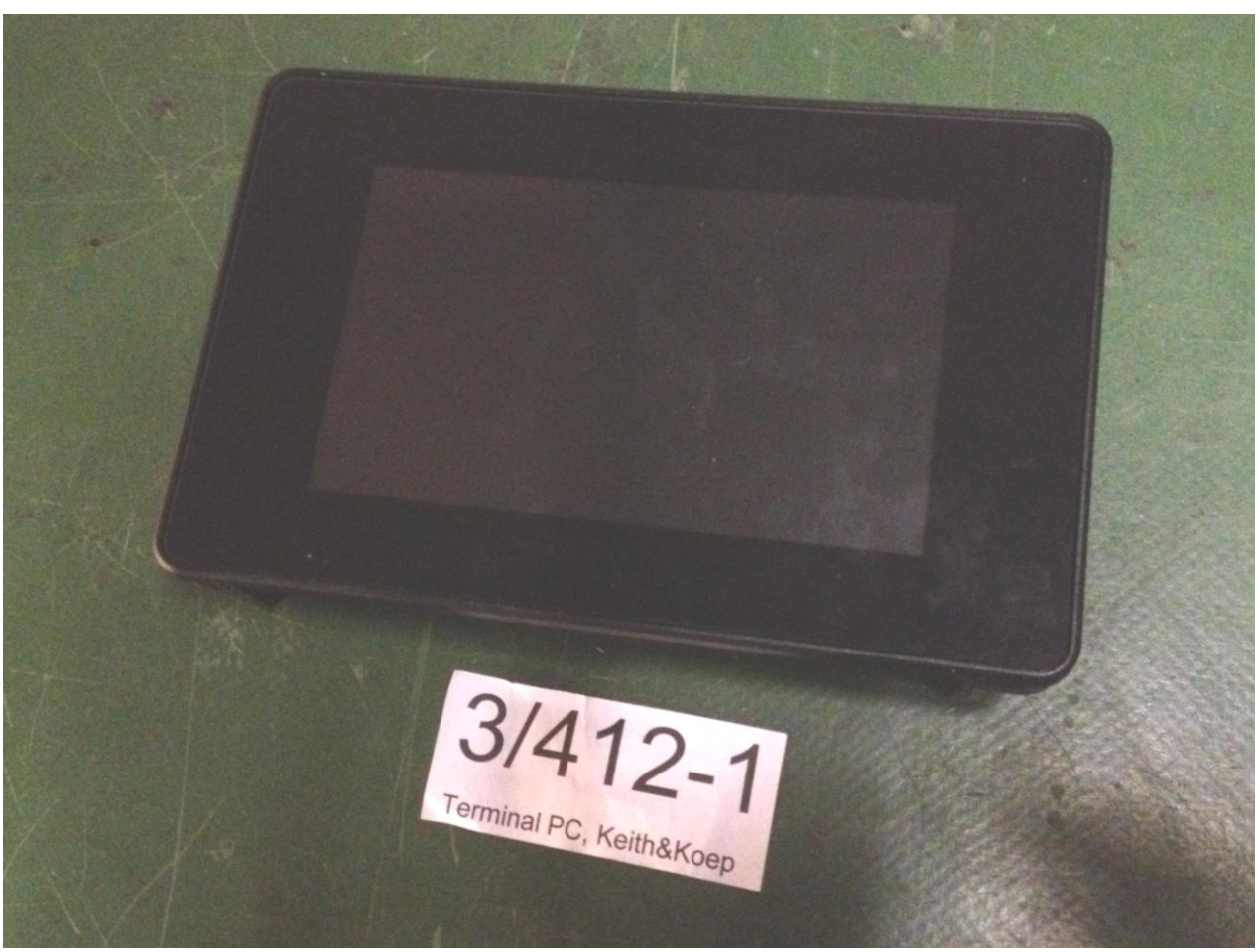
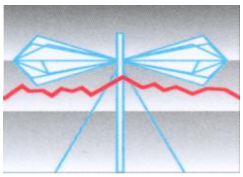


Photo of EUT/Type Plate



TEST OBJECT: **i-PAN X7 LC**

Immunity to Electrostatic Discharge

Test procedure according IEC 61000-4-2

The unit under test is placed on an isolated support on a grounded metal plate. The unit under test is configured and connected according to product specification or operator manual.

Components of the system, which are not subject to the test, must not be influenced by the field of the discharge, to be sure, that errors, if they occur, are caused by the unit under test. If the auxiliary devices are not decoupled from the unit under test, in case of errors it has to be investigated by special tests, whether the unit under test or the auxiliary devices are causing the negative result.

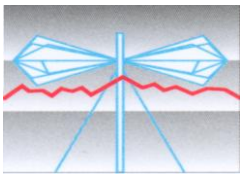
Every by the user accessable point of the unit under test has to be checked. Parts of isolating material are tested with the air discharge module, parts of conductive material have to be tested with the contact discharge module.

At every essential point the test has to be repeated with 10 discharges (positive and negative) in single mode. The test of one special point is considered to be passed, if those single discharges produce no irrecoverable error.

Lower levels of air discharge voltage have to be included.

Used equipment

Inv.No.	EMC test device	Manufacturer
I1.4.1	ESD DITO	EM-Test
X3	Faraday Cabin	Siemens



TEST OBJECT: **i-PAN X7 LC**

Immunity - ESD

Requirements acc. EN 61000-6-2:

Test level air discharge: up to 8 kV

Test level contact discharge: 4 kV

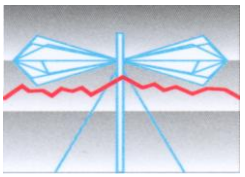
Criterion B – discontinuous mode

After the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. 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 by what the user may reasonably expect from the EUT if used as intended.

Specification of manufacturer:

During the test, error messages may occur, but must recover itself within 10 s after the test without user intervention.

Test conditions	Date:	March 12th, 2015
	Temperature:	21 °C
	Air pressure:	1030 hPa
	Relative Humidity:	31 %
	Operator:	A.E.
Test mode	see test plan	



TEST OBJECT: **i-PAN X7 LC**

Immunity - ESD

A decoupling of auxiliary devices is not performed.

Results

Photo Item	Placement of discharge	Pol.	Voltage in kV	Type of discharge	Reaction	Crit. req.	Crit. met	Test passed
1	Vertical coupling plate	+/-	4	contact	no reaction	B	A	Yes
2	Surface	+/-	2, 4, 8	air	no reaction	B	A	Yes

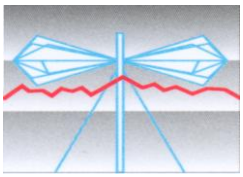
No performance degradation is seen after the impact.

Final result:

ESD test according EN 61000-6-2:	PASSED

TEST OBJECT: **i-PAN X7 LC**

Specimen during ESD, points of discharge



TEST OBJECT: **i-PAN X7 LC**

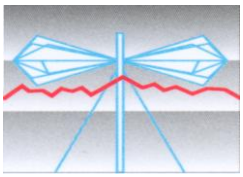
Immunity to Radiated Electromagnetic Fields

Test procedure according IEC 61000-4-3

The unit under test is placed on a wooden support.
The unit under test is configured and connected according to product specification or operator manual. Components of the system, which are not subject to the test, must not be influenced by the field, to be sure, that errors, if they occur, are caused by the unit under test.
The antenna distance is usually 1 m, depending on dimensions of EUT appropriate 2 m.
If the auxiliary devices are not decoupled from the unit under test, in case of errors it has to be investigated by special tests, whether the unit under test or the auxiliary devices are causing the negative result.
The antenna has to be directed at least to each of the 4 sides of the unit under test.
The field is not measured during the test. The antenna power is controlled; the frequency dependend power level is determined in advance without the presence of the unit under test.
The dwell time is set to 1.5 s, if the reaction time of the unit under test does not require a longer time. The clockrate is under consideration separately if it is included in the range of radiated immunity test.

Used equipment

Inv.No.	EMC test device	Manufacturer
G3 / G4	SMY / ESG D3000A - Generator	R & S / HP Agilent
I37 / I39	5127FE 200 W / RUP15050-12 50 W amplifier	Ophir / RFHIC
Kal 10	HI6005 Fielddetector	Holaday
E15	URV55 Millivoltmeter	R & S
E14.2 / E15.5	URV Z2 / NRVZ5 - probe	R & S / R & S
E22 / E15.2	DC3001M2 / 30611 – directional coupler	Ampl. Res. / Narda
X2 / X5	Absorber cab. 1/ cab. 2	MPE
I5.4 / E53	VULP 9118E / BBHA9120E /Antenna	Schwarzbeck / dto.



TEST OBJECT: **i-PAN X7 LC**

Immunity - Radiated Immunity

Requirements acc. EN 61000-6-2:

Range: 80 MHz - 1000 MHz; 1.4 - 2 GHz; 2 - 2.7 GHz

Level: 10 V/m; 3 V/m; 1 V/m

Exeption range: 87 - 108, 174 - 230 and 470 - 790 MHz:

Level: 3 V/m

80 % Ampl.Mod. / 1 % frequency steps

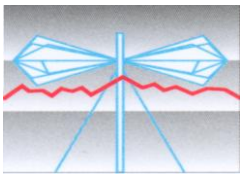
Criterion A – continuous mode

During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer, when the EUT 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, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Specification of manufacturer:

No error messages are allowed.

Test conditions	Date:	February 19th, 2015
	Temperature:	21 °C
	Air pressure:	1020 hPa
	Relative Humidity:	33 %
	Operator:	A.E.
Test mode	see test plan	



TEST OBJECT: **i-PAN X7 LC**

Immunity - Radiated Immunity

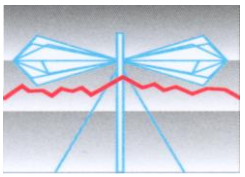
A decoupling of auxiliary devices is performed. They are placed outside the chamber.

Results

The test is done with vertical and horizontal antenna orientation and in 4 directions of the device. The antenna distance is 1 m. The dwell time is 1.5 s.

Frequency in MHz	Step	Antenna-Polarisation	Direction of radiation	Level in V/m	Reaction of unit under test	Test passed, Crit. A
80 - 1000	1 %	horizontal	0°	10	no reaction	Yes
80 - 1000	1 %	vertikal	0°	10	no reaction	Yes
80 - 1000	1 %	horizontal	90°	10	no reaction	Yes
80 - 1000	1 %	vertikal	90°	10	no reaction	Yes
80 - 1000	1 %	horizontal	180°	10	no reaction	Yes
80 - 1000	1 %	vertikal	180°	10	no reaction	Yes
80 - 1000	1 %	horizontal	270°	10	no reaction	Yes
80 - 1000	1 %	vertikal	270°	10	no reaction	Yes

No performance degradation is seen after the impact.



TEST OBJECT: **i-PAN X7 LC**

Immunity - Radiated Immunity

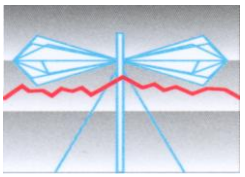
A decoupling of auxiliary devices is performed. They are placed outside the chamber.

Results

The test is done with vertical and horizontal antenna orientation and in 4 directions of the device. The antenna distance is 1 m. The dwell time is 1.5 s.

Frequency in GHz	Step	Antenna-Polarisation	Direction of radiation	Level in V/m	Reaction of unit under test	Test passed, Crit. A
1.4 - 2	1 %	horizontal	0°	3	no reaction	Yes
1.4 - 2	1 %	vertikal	0°	3	no reaction	Yes
1.4 - 2	1 %	horizontal	90°	3	no reaction	Yes
1.4 - 2	1 %	vertikal	90°	3	no reaction	Yes
1.4 - 2	1 %	horizontal	180°	3	no reaction	Yes
1.4 - 2	1 %	vertikal	180°	3	no reaction	Yes
1.4 - 2	1 %	horizontal	270°	3	no reaction	Yes
1.4 - 2	1 %	vertikal	270°	3	no reaction	Yes

No performance degradation is seen after the impact.



TEST OBJECT: **i-PAN X7 LC**

Immunity - Radiated Immunity

A decoupling of auxiliary devices is performed. They are placed outside the chamber.

Results

The test is done with vertical and horizontal antenna orientation and in 4 directions of the device. The antenna distance is 1 m. The dwell time is 1.5 s.

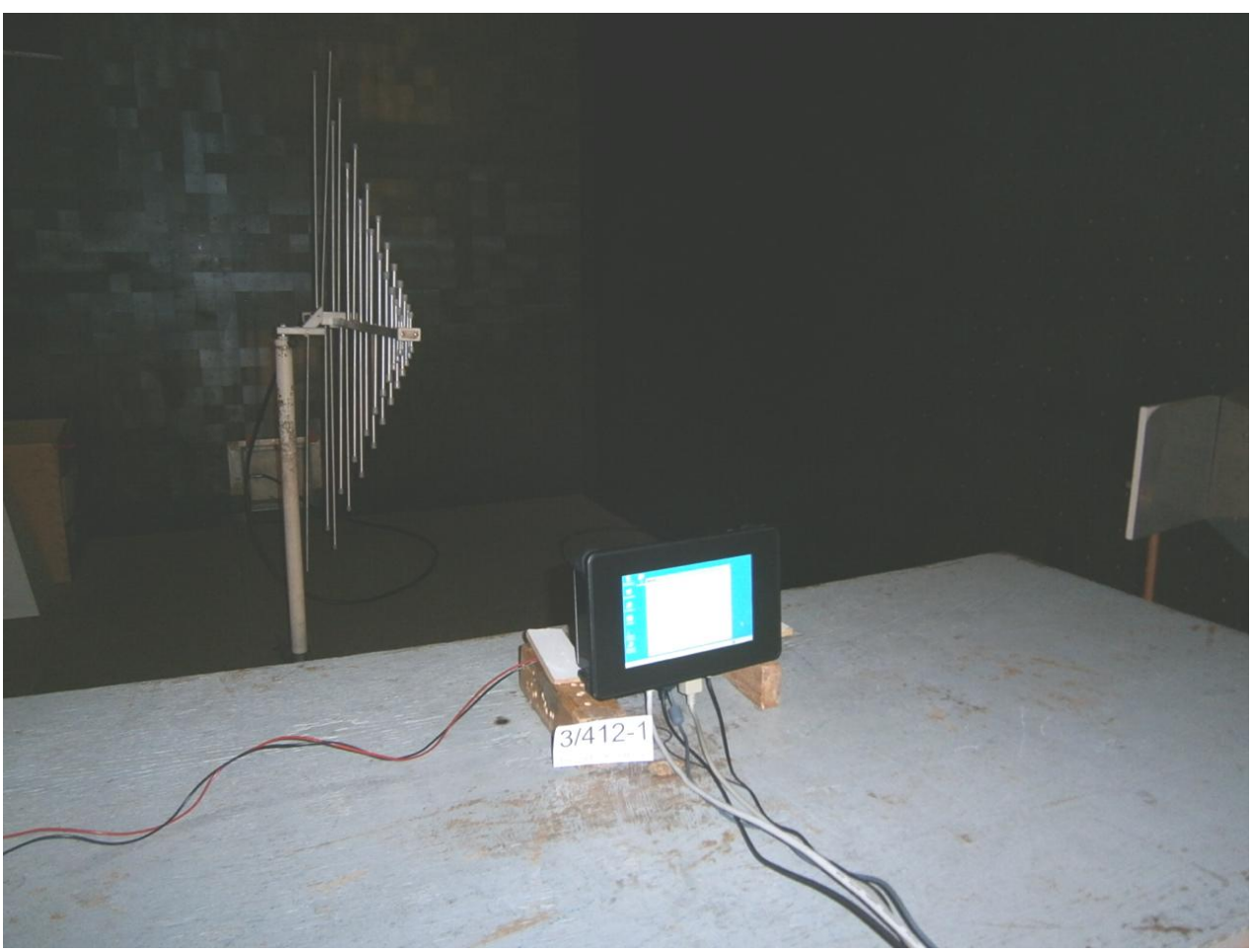
Frequency in GHz	Step	Antenna-Polarisation	Direction of radiation	Level in V/m	Reaction of unit under test	Test passed, Crit. A
2 - 2.7	1 %	horizontal	0°	1	no reaction	Yes
2 - 2.7	1 %	vertikal	0°	1	no reaction	Yes
2 - 2.7	1 %	horizontal	90°	1	no reaction	Yes
2 - 2.7	1 %	vertikal	90°	1	no reaction	Yes
2 - 2.7	1 %	horizontal	180°	1	no reaction	Yes
2 - 2.7	1 %	vertikal	180°	1	no reaction	Yes
2 - 2.7	1 %	horizontal	270°	1	no reaction	Yes
2 - 2.7	1 %	vertikal	270°	1	no reaction	Yes

No performance degradation is seen after the impact.

Final result:

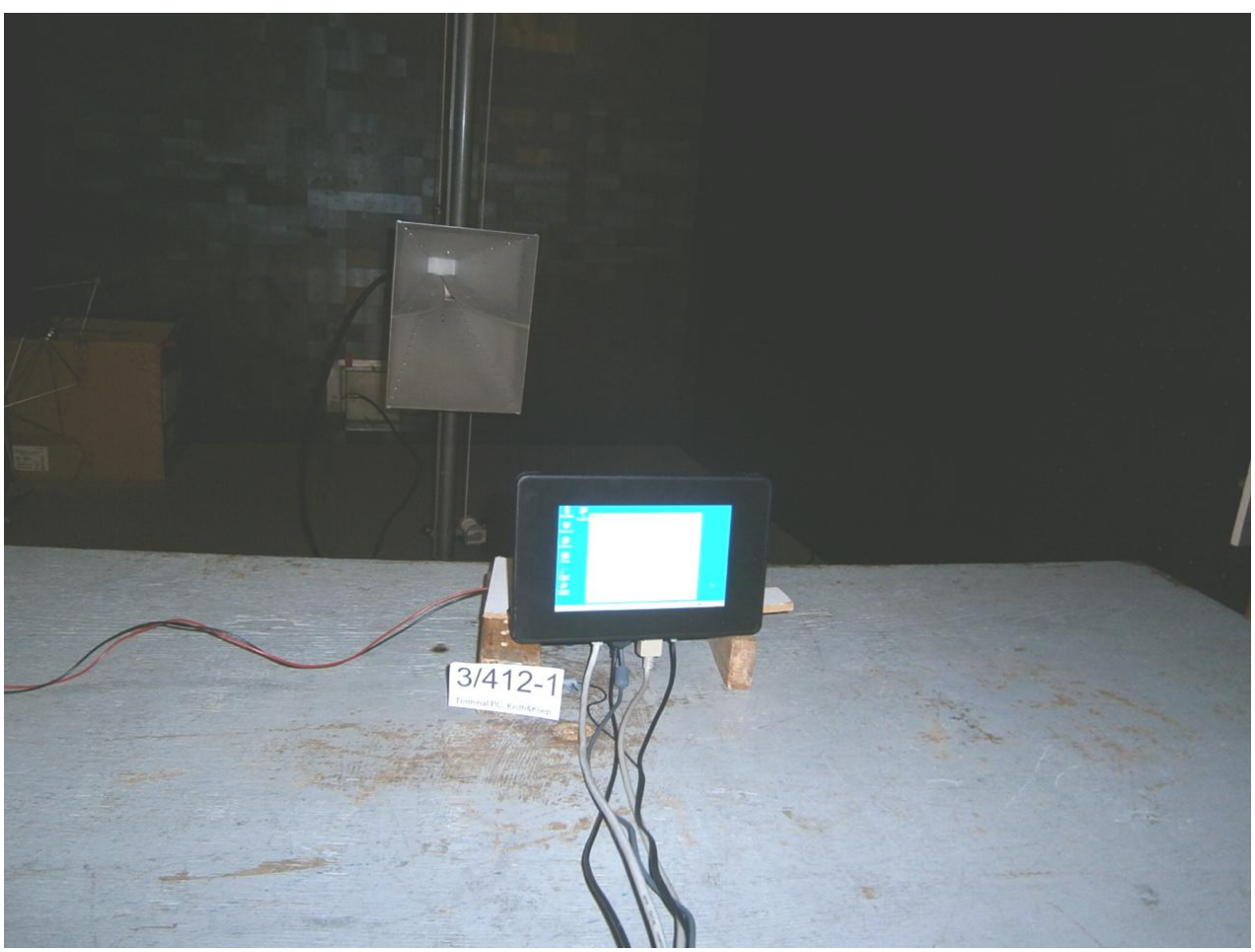
Radiated Immunity according EN 61000-6-2:	PASSED

TEST OBJECT: **i-PAN X7 LC**

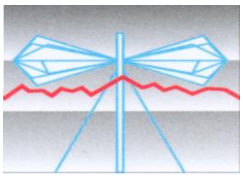


Specimen during Radiated immunity < 1 GHz

TEST OBJECT: **i-PAN X7 LC**



Specimen during Radiated immunity > 1 GHz



TEST OBJECT: **i-PAN X7 LC**

Immunity to Burst

Test procedure according IEC 61000-4-4

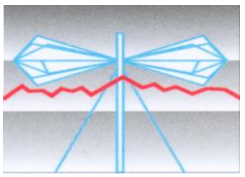
The unit under test is placed on a 10 cm thick isolated support over the Faraday cabin ground. The unit under test is configured and connected according to product specification or operator manual.

Components of the system, which are not subject to the test, must not be influenced by the pulses and the field, to be sure, that errors, if they occur, are caused by the unit under test
If the auxiliary devices are not decoupled from the unit under test, in case of errors it has to be investigated by special tests, whether the unit under test or the auxiliary devices are causing the negative result.

For the test of the supply lines a coupling network is used.
A clamp is used for the test of the interface lines.
With positive and negative polarity has to be tested.

Used equipment

Inv.No.	EMC test device	Manufacturer
I32	PEFT 4010	Haefely
I2.4	IP4 clamp	Haefely
X3	Faraday Cabin	Siemens



TEST OBJECT: **i-PAN X7 LC**

Immunity to Burst

Requirements acc. EN 61000-6-2:

Test level:

AC / DC Supply lines 2 kV

Signal lines > 3 m 1 kV

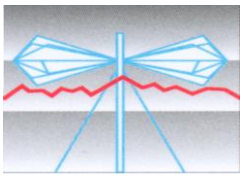
Criterion B – discontinuous mode

After the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. 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 by what the user may reasonably expect from the EUT if used as intended.

Specification of manufacturer:

During the test, error messages may occur, but must recover itself within 10 s after the test without user intervention.

Test conditions	Date:	March 11th, 2015
	Temperature:	20 °C
	Air pressure:	1010 hPa
	Relative Humidity:	36 %
	Operator:	A.E.
Test mode	see test plan	



TEST OBJECT: **i-PAN X7 LC**

Immunity to Burst

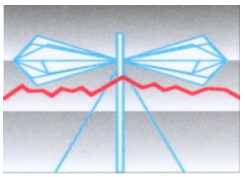
A decoupling of auxiliary devices is not performed.

Results

Burst to DC supply lines (Coupling network)

Line	Voltage kV	Pol.	Burst-Freq.	Reaction	Crit. req.	Crit. met	Test passed
+24 V	2	+/-	5 kHz	no reaction	B	A	Yes
GND	2	+/-	5 kHz	no reaction	B	A	Yes
+24 V & GND	2	+/-	5 kHz	no reaction	B	A	Yes

No performance degradation is seen after the impact.



TEST OBJECT: **i-PAN X7 LC**

Immunity to Burst

A decoupling of auxiliary devices is not performed.

Results

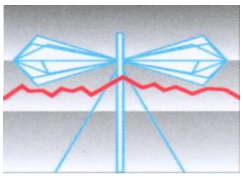
Burst to signal lines (Coupling clamp)

Line	Voltage kV	Pol.	Burst-Freq.	Reaction	Crit. req.	Crit. met	Test passed
Ethernet	1	+/-	5 kHz	no reaction	B	A	Yes
USB (Mouse)	1	+/-	5 kHz	no reaction	B	A	Yes
Serial	1	+/-	5 kHz	no reaction	B	A	Yes

No performance degradation is seen after the impact.

Final result:

Burst according EN 61000-6-2:	**PASSED**



TEST OBJECT: **i-PAN X7 LC**

Immunity to Surge

Test procedure according IEC 61000-4-5

The unit under test is placed on a 10 cm thick isolated support over the Faraday cabin ground. The unit under test is configured and connected according to product specification or operator manual.

Components of the system, which are not subject to the test, must not be influenced by the pulses and the field, to be sure, that errors, if they occur, are caused by the unit under test If the auxiliary devices are not decoupled from the unit under test, in case of errors it has to be investigated by special tests, whether the unit under test or the auxiliary devices are causing the negative result.

Supply lines are tested by a coupling network in differential mode (L ↔ N) also in common mode (L or N ↔ Pe)

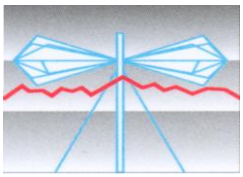
In case of testing unshielded interface lines a special coupling network is used in differential mode (line ↔ line) also in common mode (line ↔ Pe).

In case of testing shielded interface lines the surge pulses are feeded in directly to the shield in common mode (line ↔ Pe).

Positive and negative polarity has to be considered. Lower levels have to be included.

Used equipment

Inv.No.	EMC test device	Manufacturer
I12	CWG 500 Generator, coupling network	Schlöder
I3.1 I3.3	PHV1.1 Generator + coupling network FP20 3/1	Haefely
X3	Faraday Cabin	Siemens



TEST OBJECT: **i-PAN X7 LC**

Immunity to Surge

Requirements acc. EN 61000-6-2:

Test level:

AC Supply lines common mode: up to 2 kV

AC Supply lines differential mode: up to 1 kV

Signal lines > 30 m common mode: up to 1 kV

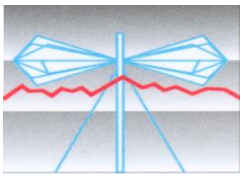
Criterion B – discontinuous mode

After the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. 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 by what the user may reasonably expect from the EUT if used as intended.

Specification of manufacturer:

During the test, error messages may occur, but must recover itself within 10 s after the test without user intervention.

Test conditions	Date:	April 10th, 2015
	Temperature:	23 °C
	Air pressure:	1035 hPa
	Relative Humidity:	34 %
	Operator:	A.E.
Test mode	see test plan	



TEST OBJECT: **i-PAN X7 LC**

Immunity to Surge

A decoupling of auxiliary devices is not performed.

Results

For each setting (level, coupling, phase angle, polarity) 5 test pulses are carried out.
The time interval between successive pulses is 30 s.

Surge to AC supply lines with coupling network

common mode relative to Pe

Line	Voltage kV	Pol.	Phase Angle	Reaction	Crit. req.	Crit. met	Test passed
L - Pe	0.5, 1, 2	+/-	0°, 90°, 180°, 270°	no reaction	B	A	Yes

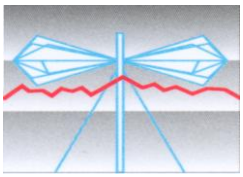
differential mode

Line	Voltage kV	Pol.	Phase Angle	Reaction	Crit. req.	Crit. met	Test passed
L - N	0.5, 1	+/-	0°, 90°, 180°, 270°	no reaction	B	A	Yes

No performance degradation of function is seen after the impact.

Final result:

Surge according EN 61000-6-2:	**PASSED**



TEST OBJECT: **i-PAN X7 LC**

Immunity to Conducted RF

Test procedure according IEC 61000-4-6

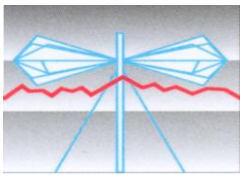
The unit under test is placed on a 10 cm thick isolated support over a grounded metal sheet. The unit under test is configured and connected according to product specification or operator manual.

Components of the system, which are not subject to the test, must not be influenced by the field of the induced current, to be sure, that errors, if they occur, are caused by the unit under test. If the auxiliary devices are not decoupled from the unit under test, in case of errors it has to be investigated by special tests, whether the unit under test or the auxiliary devices are causing the negative result.

The coupling to the supply lines is done via the CDN M3. The frequency dependent power level is determined in advance without the presence of the unit under test. Instead of the unit under test a 150 Ω load is used.
When coupling to the shield of interface cables, the level is measured and controlled during the test.
The dwell time is minimum 1.5 s, unless the reaction time of the tested device takes more.
The clockrate is under consideration separately if it is included in the range of conducted immunity test.

Used equipment

Inv.No.	EMC test device	Manufacturer
G17	SMG Generator	R & S
E14	URV Millivoltmeter	R & S
E14.1	URV-Z4 probe	R & S
I4.10	Hubert A1020	Hubert
I6.1	M3 CDN coupling network 16 A	EMV Taufkirchen
I6.4	S1 CDN coupling network	EMC TestHaus
I7	KEMZ801 coupling clamp	MEB
X6	Faraday Cabin	Siemens



TEST OBJECT: **i-PAN X7 LC**

Immunity to Conducted RF

Requirements acc. EN 61000-6-2:

Range 150 kHz - 80 MHz

Level Supply lines: 10 V

Level Signal lines > 3m: 10 V

Exeption range 47 - 68 MHz

Level Supply lines: 3 V

Level Signal lines > 3m: 3 V

AM 80 %, 1 kHz / 1 % frequency steps

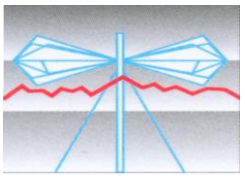
Criterion A – continuous mode

During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer, when the EUT 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, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.

Specification of manufacturer:

No error messages are allowed.

Test conditions	Date:	February 23rd, 2015
	Temperature:	21 °C
	Air pressure:	1010 hPa
	Relative Humidity:	31 %
	Operator:	A.E.
Test mode	see test plan	



TEST OBJECT: **i-PAN X7 LC**

Immunity to Conducted RF

A decoupling of auxiliary devices is performed. They are placed outside the cabin.

Results

The dwell time is 1.5 s.

Frequency in Hz	Step	Coupling	Line	Reaction at 10 V	Test passed, Crit. A
150 k – 80 M	1 %	CDN M3	24 VDC Supply	no reaction	Yes
150 k – 80 M	1 %	by S1 to shield	Ethernet	no reaction	Yes
150 k – 80 M	1 %	by clamp	USB (Mouse)	no reaction	Yes
150 k – 80 M	1 %	by S1 to shield	Serial	no reaction	Yes

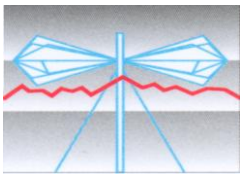
No performance degradation is seen after the impact.

Final result:

Conducted RF according EN 61000-6-2:	PASSED

TEST OBJECT: **i-PAN X7 LC**

Unit under test during Conducted Immunity



TEST OBJECT: **i-PAN X7 LC**

Emission

Conducted Emission acc. EN 55022 cl. A

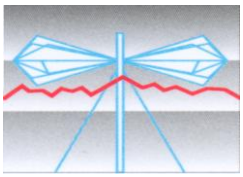
Measuring procedure according EN 55016-2-1

The frequency range is 150 kHz to 30 MHz. The measurement is done first in Peak Mode. If the result is higher than the Quasi Peak limit minus single unit qualification margin (recommended 2 to 4 dB), those frequencies are remeasured in quasi peak mode (marked with **+** in the diagram).

Average values, which are not below the average limit, are remeasured in CAV mode (marked with **x** or mentioned in the text).

Used equipment:

Inv.No.	EMC measurement device	Manufacturer
E55	ESCI	R & S
E7.1	V NNB Nr. 1 NSLK8127	Schwarzbeck
E21.1	100.1050.02 current clamp	R & S
X4	Faraday cabin	EMC
	Measurement uncertainty cumulative	3.8 dB

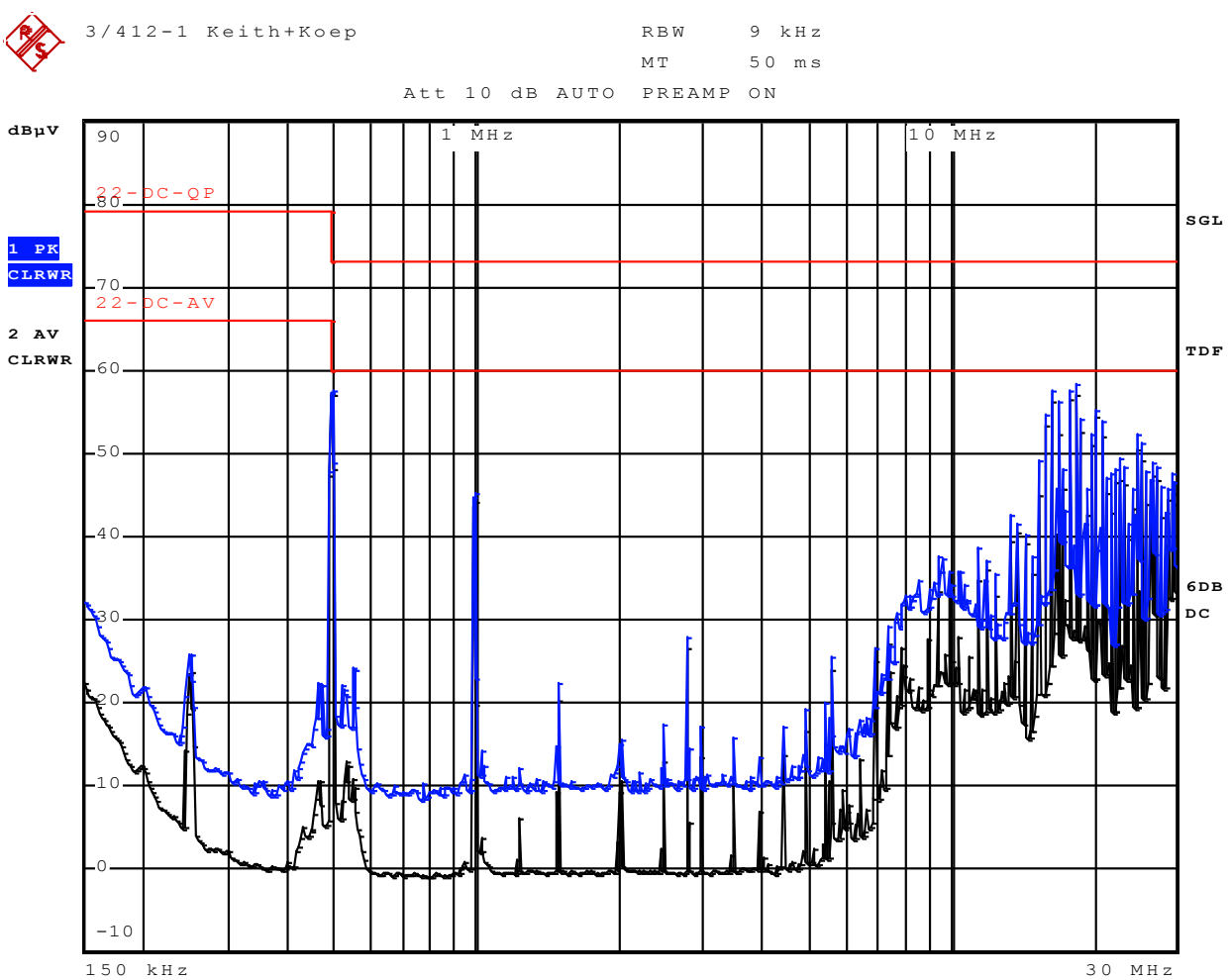


TEST OBJECT: **i-PAN X7 LC**

Conducted Emission acc. EN 55022 cl. A

Range: 150 kHz - 30 MHz
Operator: A.E. - Date: April 02nd, 2015

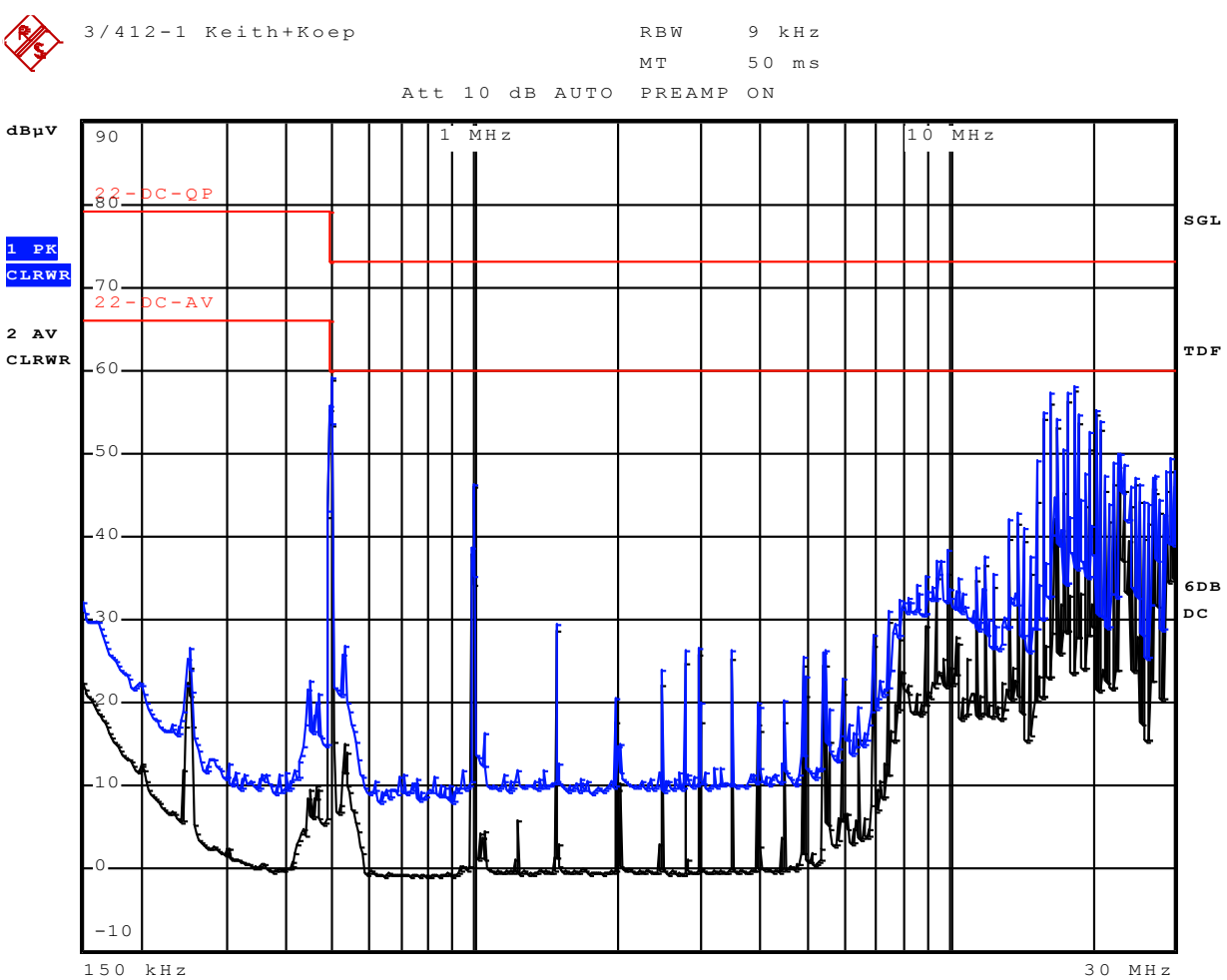
24 VDC EUT, Line +24 V	Limits kept	Measurement Frequency in MHz	Result in dBµV
Quasi Peak upper limit	YES	-	-
Average AV lower limit	YES	-	-



TEST OBJECT: **i-PAN X7 LC**

Conducted Emission acc. EN 55022 cl. A
Range: 150 kHz - 30 MHz
Operator: A.E. - Date: April 02nd, 2015

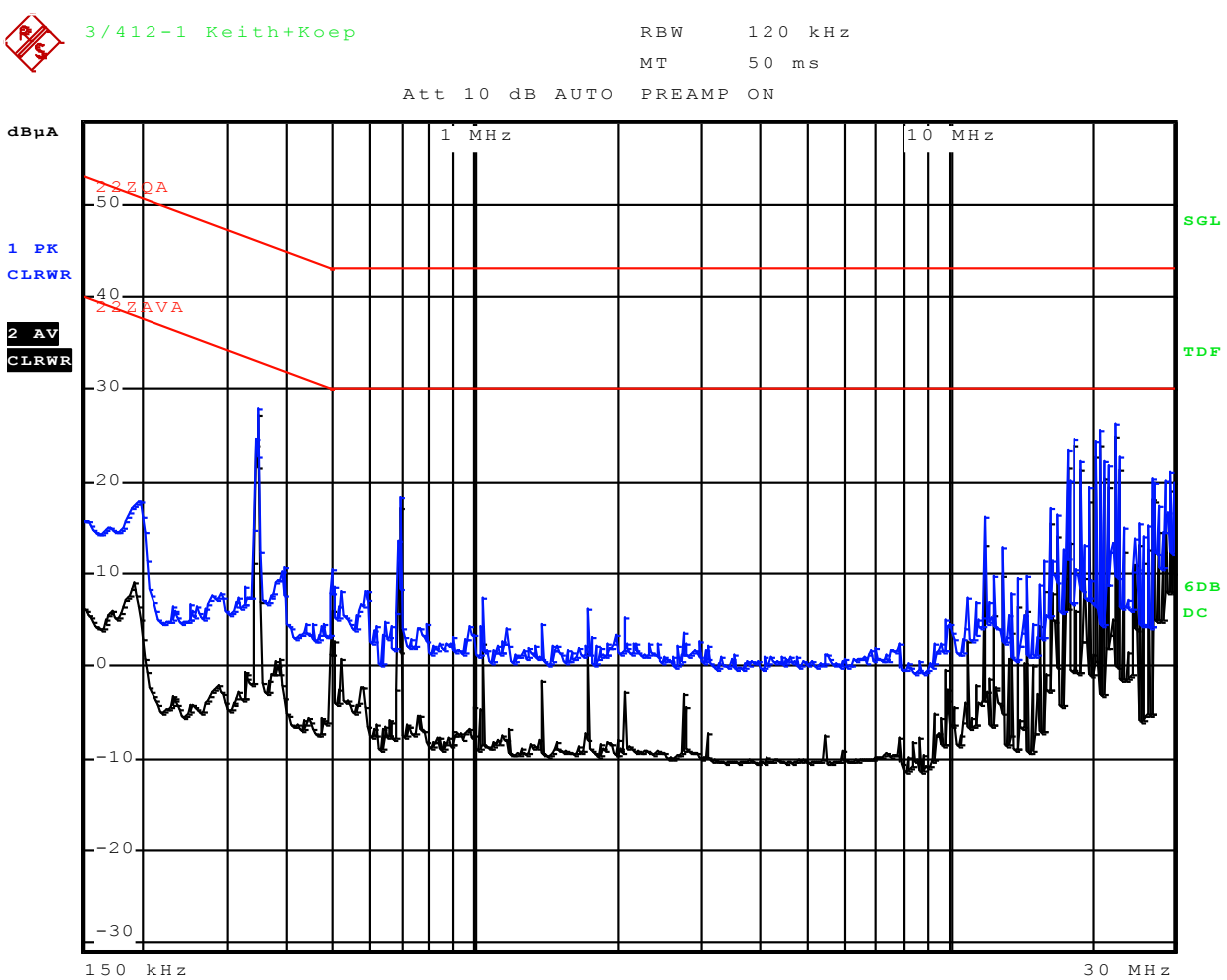
24 VDC EUT, Line GND	Limits kept	Measurement Frequency in MHz	Result in dBµV
Quasi Peak upper limit	YES	-	-
Average AV lower limit	YES	-	-



TEST OBJECT: **i-PAN X7 LC**

Conducted Emission acc. EN 55022 cl. A
Range: 150 kHz - 30 MHz
Operator: A.E. - Date: April 02nd, 2015

EUT, Line Ethernet	Limits kept	Measurement Frequency in MHz	Result in dBµV
Quasi Peak upper limit	YES	-	-
Average AV lower limit	YES	-	-

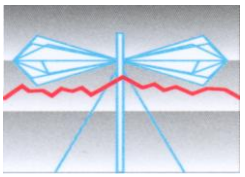


Final result:

Conducted Emission according EN 55022 cl. A:	**PASSED**

TEST OBJECT: **i-PAN X7 LC**

Unit under test during conducted emission measurement



TEST OBJECT: **i-PAN X7 LC**

Emission

Radiated Emission E-Field acc. EN 55022 cl. A

Measuring procedure according EN 55016-2-3 below 1 GHz

The frequency range is 30 MHz to 1GHz.
A premeasurement is done in the absorber cabin with an antenna distance of 3 m; the unit under test is rotated during that measurement. Emissions, which are 6 dB above the noise are documented and investigated in the open area test site.
The measurement distance is 10 m in the open area test site. The object under test is rotated by 360° at each relevant frequency during final E-Field measurement. Antenna polarisation is changed (vertical/horizontal). Antenna height is varied (at the angle of maximum output) between 1 and 4 m for searching a further maximum value. The listed values are Quasi-Peak values.

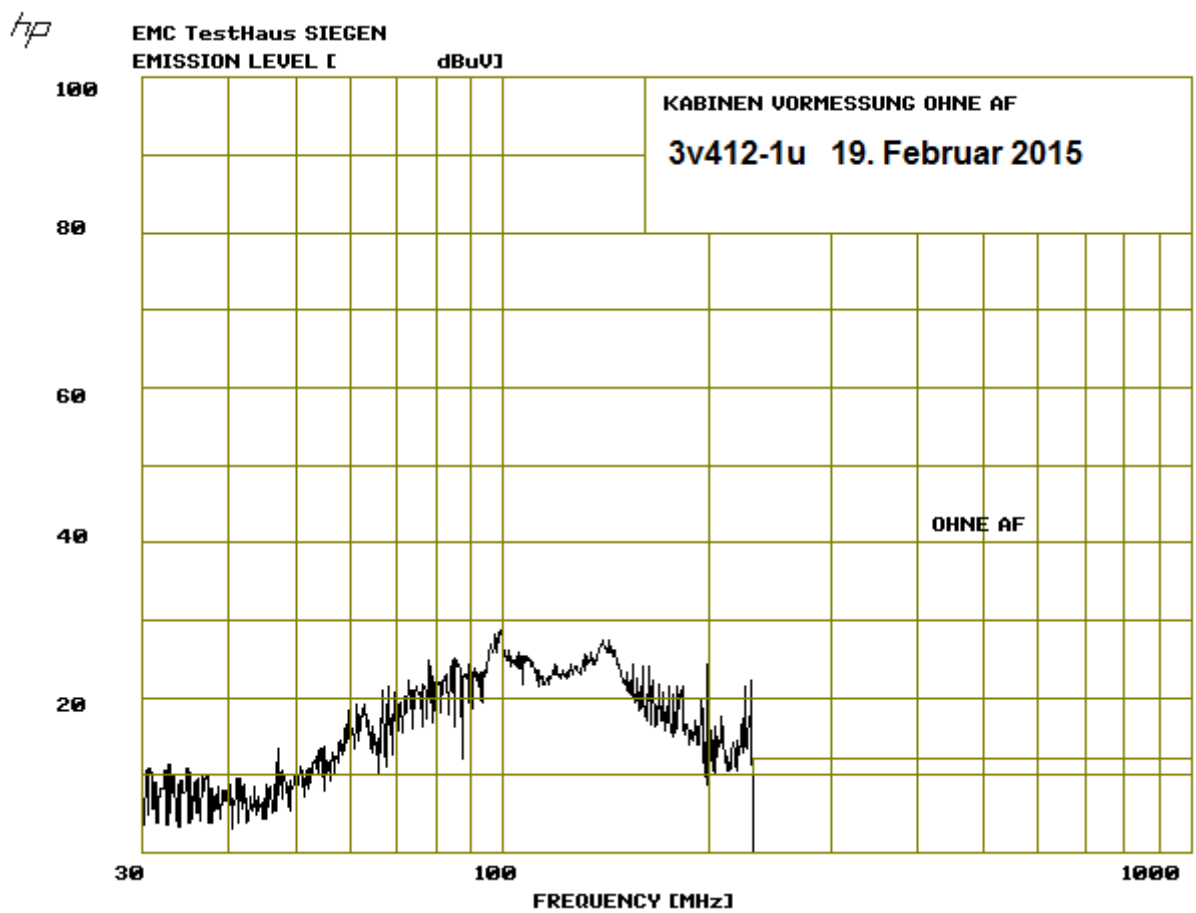
Used Equipment

Inv.No.	EMC Measurement Device	Manufacturer
E49	ESVD receiver	R & S
E3.1	8568B Spectrum Analyser	HP
E3.2	85685A Preselector	HP
E3.4	8569B Spectrum Analyzer	HP
E11.2	VHA9103+ BBA9106, 9023 Bikoni Ant. shortn. 7/16“ 30 - 300 MHz	Schwarzbeck
E11.3	VHA9103 + BBA9106, SN 9051 Bikoni Antenna N	Schwarzbeck
E12.1	UHALP9107 Log per Antenna N	Schwarzbeck
E12.3	UHALP 9108A shortn. 7/16“ FF	Schwarzbeck
X1	open site	
X2	anechoic chamber	MPE
	Measurement uncertainty cumulative	5.5 dB

TEST OBJECT: **i-PAN X7 LC**

EMISSION, E-Field premeasurement, 3 m antenna distance absorber cabin

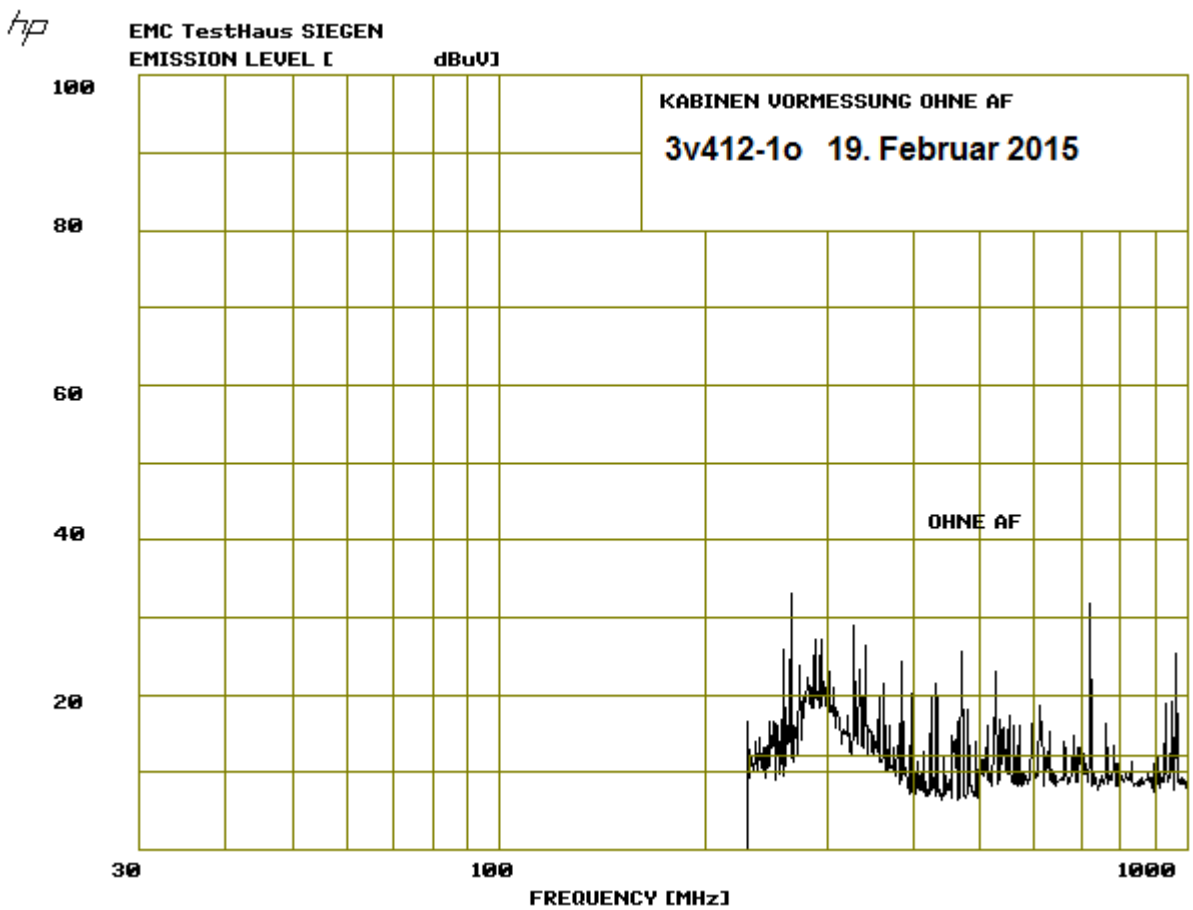
Operator: A.E.
Result range: 30 - 230 MHz

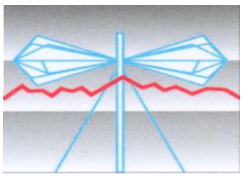


TEST OBJECT: **i-PAN X7 LC**

EMISSION, E-Field premeasurement, 3 m antenna distance absorber cabin

Operator: A.E.
Result range: 230 - 1000 MHz





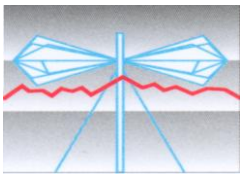
TEST OBJECT: **i-PAN X7 LC**

EMISSION - measurement with 10 m antenna distance, results open site

Limits of EN 55022 class A

Frequency in MHz	Emission in dBµV/m	Limit in dBµV/m	Margin in dB	Antenna-height in m	Angle	Antenna-polarisation
30.92	< 25	40	15	1.5	0	v
33.33	< 23	40	17	1.5	0	v
36.27	< 23.6	40	16.4	1.5	0	v
47.46	< 24.2	40	15.8	1.5	0	v
50.97	< 25	40	15	1.5	0	v
54.03	25.6	40	14.4	1.5	81	v
56.93	20.8	40	19.2	1.5	235	v
60.23	25.2	40	14.8	1.5	145	v
61.7	20.2	40	19.8	1.5	100	v
63.32	< 20	40	20	1.5	0	v
65.22	< 20	40	20	1.5	0	v
66.92	20	40	20	1.5	120	v
69.8	21.6	40	18.4	1.5	60	v
72.57	24.5	40	15.5	1.5	115	v
75.11	28.8	40	11.2	1.5	115	v
77.09	29.2	40	10.8	1.5	310	v
80.98	< 32.9	40	7.1	1.5	0	v
83.46	35	40	5	1.5	293	v
84.9	35	40	5	1.5	270	v
89.34	28.4	40	11.6	1.5	275	v
90.9	29.9	40	10.1	1.5	233	v
139.37	29.5	40	10.5	1.5	162	v
142.35	30	40	10	1.5	150	v
150.69	28	40	12	1.5	283	v
156.3	34.4	40	5.6	1.5	280	v
159.12	32.5	40	7.5	1.5	300	v
161.88	32	40	8	1.5	300	v
164.72	35	40	5	1.5	360	v
167.51	34.3	40	5.7	1.5	180	v
170.31	35	40	5	1.5	45	v

File: 3W412-1



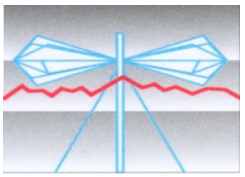
TEST OBJECT: **i-PAN X7 LC**

EMISSION - measurement with 10 m antenna distance, results open site

Limits of EN 55022 class A

Frequency in MHz	Emission in dBµV/m	Limit in dBµV/m	Margin in dB	Antenna-height in m	Angle	Antenna-polarisation
175.29	24.5	40	15.5	1.5	175	v
177.23	21	40	19	1.5	170	v
179.76	21	40	19	1.5	170	v
181.19	26.5	40	13.5	1.5	180	v
193.05	23.5	40	16.5	1.5	290	v
198.	31.6	40	8.4	1.5	290	v
200.01	24.8	40	15.2	1.5	169	v
202.82	21.2	40	18.8	1.5	155	v
214.92	30.3	40	9.7	1.5	232	v
218.01	21.6	40	18.4	1.5	232	v
220.62	23.5	40	16.5	1.5	238	v
223.38	22.7	40	17.3	1.5	255	v
226.2	23.5	40	16.5	1.5	222	v
228.96	23	40	17	1.5	230	v
232.07	29.8	47	17.2	1.5	188	v
249.14	28.8	47	18.2	1.5	187	v
253.33	29.5	47	17.5	1.5	181	v
259.75	38.2	47	8.8	1.5	145	v
266.14	46.2	47	0.8	1.5	145	v
272.51	30	47	17	1.5	138	v
281.03	29.2	47	17.8	1.5	162	v
287.47	31.3	47	15.7	1.5	153	v
293.83	34.7	47	12.3	1.5	149	v
300.21	39	47	8	3	292	h
306.59	32	47	15	3	290	h
321.01	21	47	26	3	290	h
327.89	39.7	47	7.3	3	300	h
334.27	37.1	47	9.9	3	296	h
340.63	30.4	47	16.6	3	288	h
342.77	26.4	47	20.6	3	292	h

File: 3W412-1



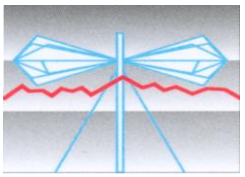
TEST OBJECT: **i-PAN X7 LC**

EMISSION - measurement with 10 m antenna distance, results open site

Limits of EN 55022 class A

Frequency in MHz	Emission in dBµV/m	Limit in dBµV/m	Margin in dB	Antenna-height in m	Angle	Antenna-polarisation
356.36	28.6	47	18.4	3	306	h
361.94	35.2	47	11.8	3	303	h
368.3	30.2	47	16.8	1.5	310	h
381.11	22.8	47	24.2	1.5	258	h
383.2	22.4	47	24.6	3	248	h
389.59	20.7	47	26.3	3	220	h
396.01	32.5	47	14.5	3	285	h
412.99	22	47	25	3	280	h
423.69	26.8	47	20.2	3	235	h
430.08	35.4	47	11.6	1.5	342	h
454.19	20	47	27	3	300	h
464.14	27.3	47	19.7	3	268	h
480.05	38.6	47	8.4	3	158	h
491.82	27	47	20	1.5	260	h
498.17	25	47	22	1.5	110	h
512.49	19	47	28	1.5	220	h
525.87	33.1	47	13.9	3	228	h
559.97	26	47	21	3	264	h
568.38	24.5	47	22.5	1.5	233	h
593.97	23.6	47	23.4	3	360	h
613.92	23.7	47	23.3	3	267	h
628.07	26.5	47	20.5	3	127	h
659.37	26.5	47	20.5	3	265	h
689.81	27	47	20	1.5	360	h
723.89	27.3	47	19.7	3	306	h

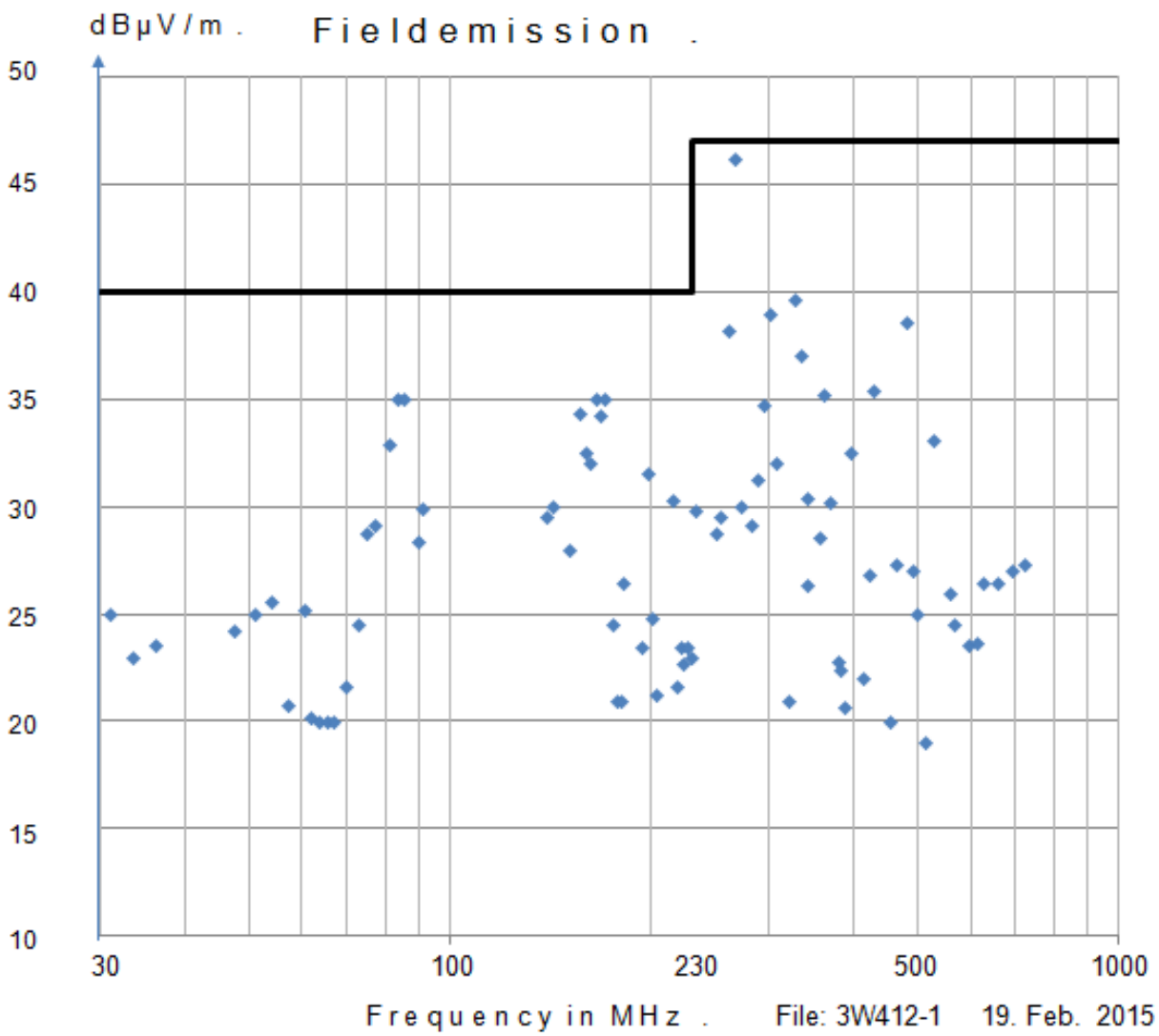
File: 3W412-1

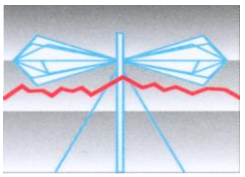


TEST OBJECT: **i-PAN X7 LC**

EMISSION - measurement with 10 m antenna distance **Graphic**

Limits of EN 55022 class A





TEST OBJECT: **i-PAN X7 LC**

Emission

Radiated Emission E-Field acc. EN 55022 cl. A

Measuring procedure according EN 55016-2-3 above 1 GHz

A premeasurement is done in the absorber cabin with an antenna distance of 3 m; the unit under test is rotated during that measurement. Emissions, which are within the noise are not investigated in the open area test site.
The measurement distance is 3 m in the open area test site. The object under test is rotated by 360° at each relevant frequency during final E-Field measurement. Antenna polarisation is changed (vertical/horizontal) for searching a further maximum value. The values are Peak and average values.

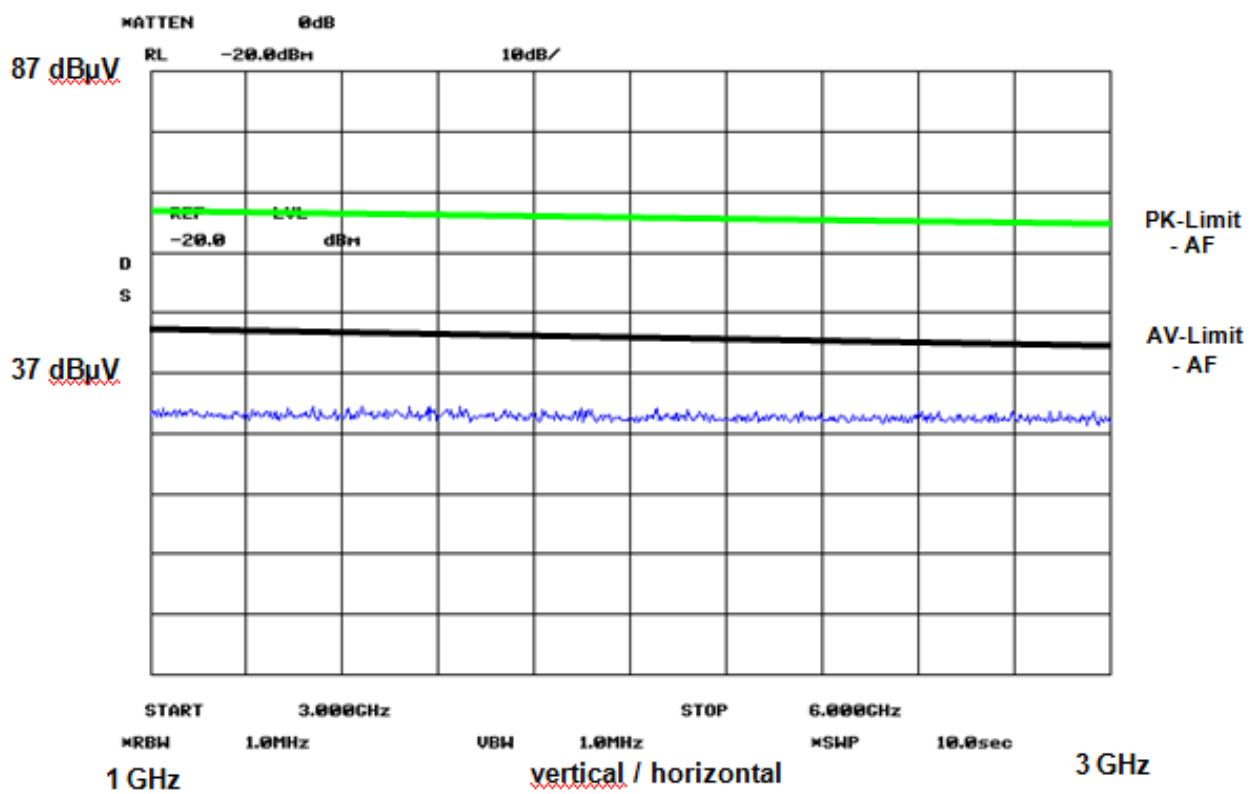
Used Equipment

Inv.No.	EMC Measurement Device	Hersteller
E3.6	HP8563E Spectrum Analyzer	HP
E53	BBHA 9120E Hornantenna	Schwarzbeck
X1.2	open site	
X2/X5	anechoic chamber 1/2	MPE
	Measurement uncertainty cumulative	5 dB

TEST OBJECT: **i-PAN X7 LC**

E-Field Premeasurement with 3 m antenna distance **Absorber cabin**

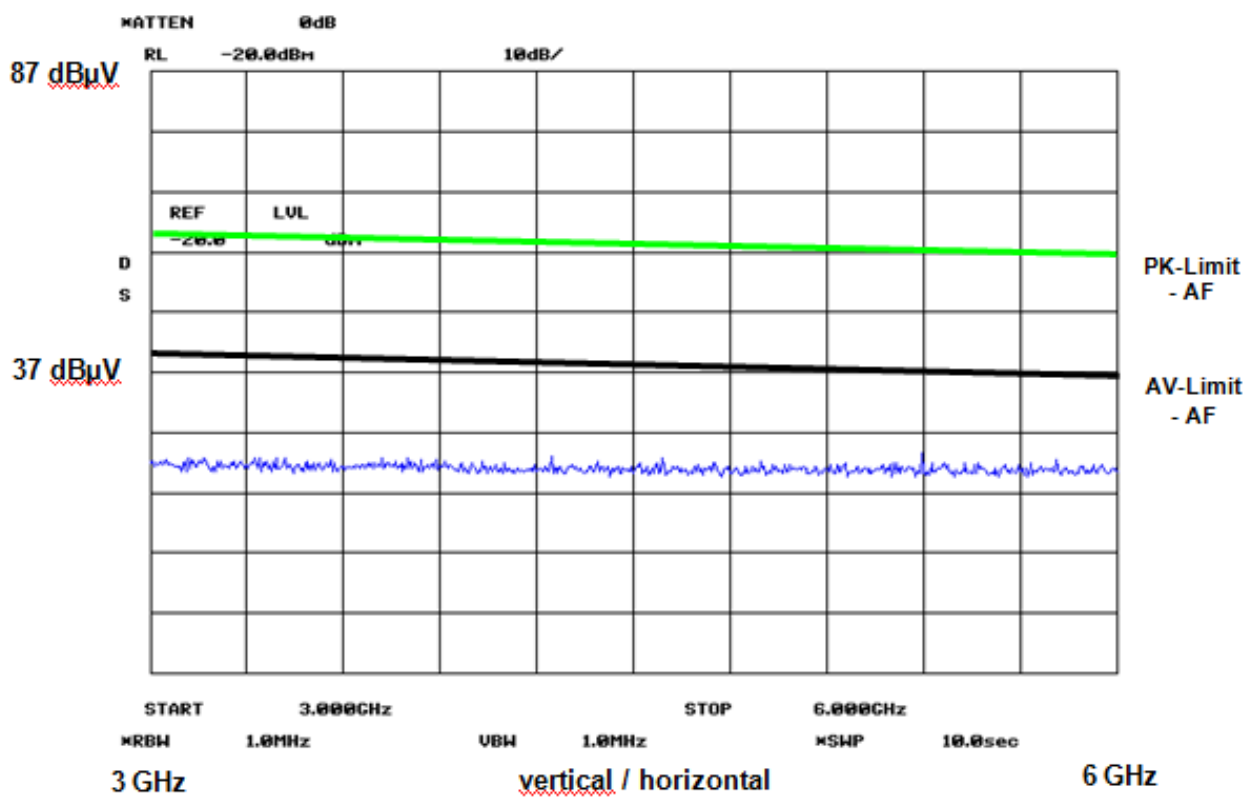
Operator: A.E.
Date: March 12th, 2015
Range: 1000 - 3000 MHz



TEST OBJECT: **i-PAN X7 LC**

E-Field Premeasurement with 3 m antenna distance **Absorber cabin**

Operator: A.E.
Date: March 12th, 2015
Range: 3000 - 6000 MHz



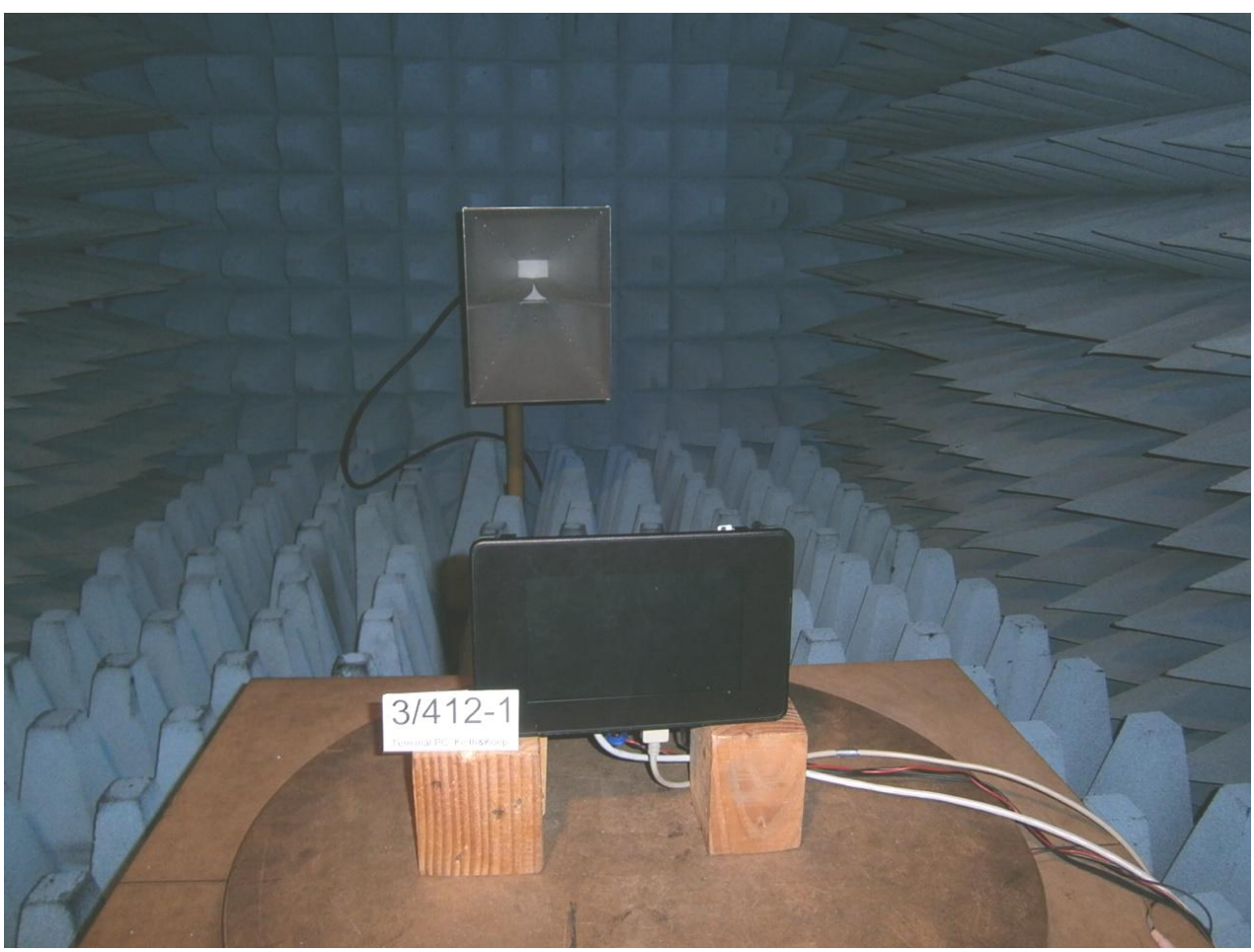
Ergebnis:

Emission E-Field acc. EN 55022 cl. A:	**PASSED**

TEST OBJECT: **i-PAN X7 LC**

EUT during Emission E-Field measurement < 1 GHz

TEST OBJECT: **i-PAN X7 LC**



EUT during Emission E-Field measurement > 1 GHz