EMC – TEST REPORT

Test Report No. : E34349-00-00MU	25. October 2010 Date of issue

Type / Model Name : KISS 4U MIL 760-A

Product Description : 19” Industrial Computer

Applicant : Kontron Embedded Computers GmbH

Address : Oskar-von-Miller-Straße 1

85386 Eching

Manufacturer : Kontron Embedded Computers GmbH

Address : Oskar-von-Miller-Straße 1

85386 Eching

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test
results without the written permission of the test laboratory.

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

☒ MIL-STD-461E : 20 August 1999

The following sections of the above mentioned test standard have been applied:

Emission:

☐ CE 101 conducted emissions; interference current on power leads 30 Hz to 10 kHz

☒ CE 102 conducted emissions; interference voltage on power leads 10 kHz to 10 MHz

☐ RE 101 radiated emissions, magnetic field, 30Hz to 100 kHz

☒ RE 102 radiated emissions, electric field, 10 kHz to 18 GHz

Immunity:

☒ CS 101 conducted susceptibility; power leads, 30 Hz to 150 kHz

☐ CS 109 conducted susceptibility; structure current, 60 Hz to 100 kHz

☒ CS 114 conducted susceptibility, bulk cable injection, 10 kHz to 200 MHz

☐ CS 115 conducted susceptibility, bulk cable injection, impulse excitation

☒ CS 116 conducted suscepibility, damped sinusoidal transients, cables and power leads, 10 kHz to 100 MHz

☐ RS 101 radiated susceptibility, magnetic field 30 Hz to 100 kHz

☒ RS 103 radiated susceptibility, electric field, 2 MHz to 40 GHz

2 SUMMARY

2.1 General remarks

None

2.2 Summary for all EMC tests

Type of test		Test result	
EMC emission:			
CE 101	interference current on power leads 30 Hz to 10 kHz	Not tested	
CE 102	interference voltage on power leads 10 kHz to 10 MHz	Fulfilled	
RE 101	magnetic field, 30Hz to 100 kHz	Not tested	
RE 102	electric field, 10 kHz to 18 GHz	Fulfilled	
Immunity:			Performance criteria
CS 101	power leads, 30 Hz to 150 kHz		Fulfilled
CS 109	structure current, 60 Hz to 100 kHz		Not tested
CS 114	bulk cable injection, 10 kHz to 200 MHz		Fulfilled
CS 115	bulk cable injection, impulse excitation		Not tested
CS 116	damped sinusoidal transients, 10 kHz to 100 MHz		Fulfilled
RS 101	magnetic field 30 Hz to 100 kHz		Not tested
RS 103	electric field, 2 MHz to 40 GHz		Fulfilled

2.3 Final assessment

The equipment under test **fulfills** the EMC requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 20. July 2010

Testing concluded on : 23. September 2010

Checked by:

Harald Buchwald
I confirm the correctness and integrity of this document
2010.10.27 15:34:30 +02'00'

Harald Buchwald
Dipl. Ing.(FH)
Manager: EMC

Tested by:

I am the author of this document

Seamus Murray
EMC Manager

3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

Power supply voltage : 230 V / 50 Hz / 1ϕ

3.2 Short description of the Equipment under Test (EuT)

PC for primarily industrial applications

Number of tested samples: 1
Serial number: 123456789
Project number Kontron: E KS001-W
Article-Number: 2-A0EK-xxxx

EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- Burn-in stress test

EuT monitoring:

The equipment under test was monitored during the measurement by following method:

The performance of the EuTwas monitored using an LCD display and the response of the burn-in stress test software.

EuT configuration:

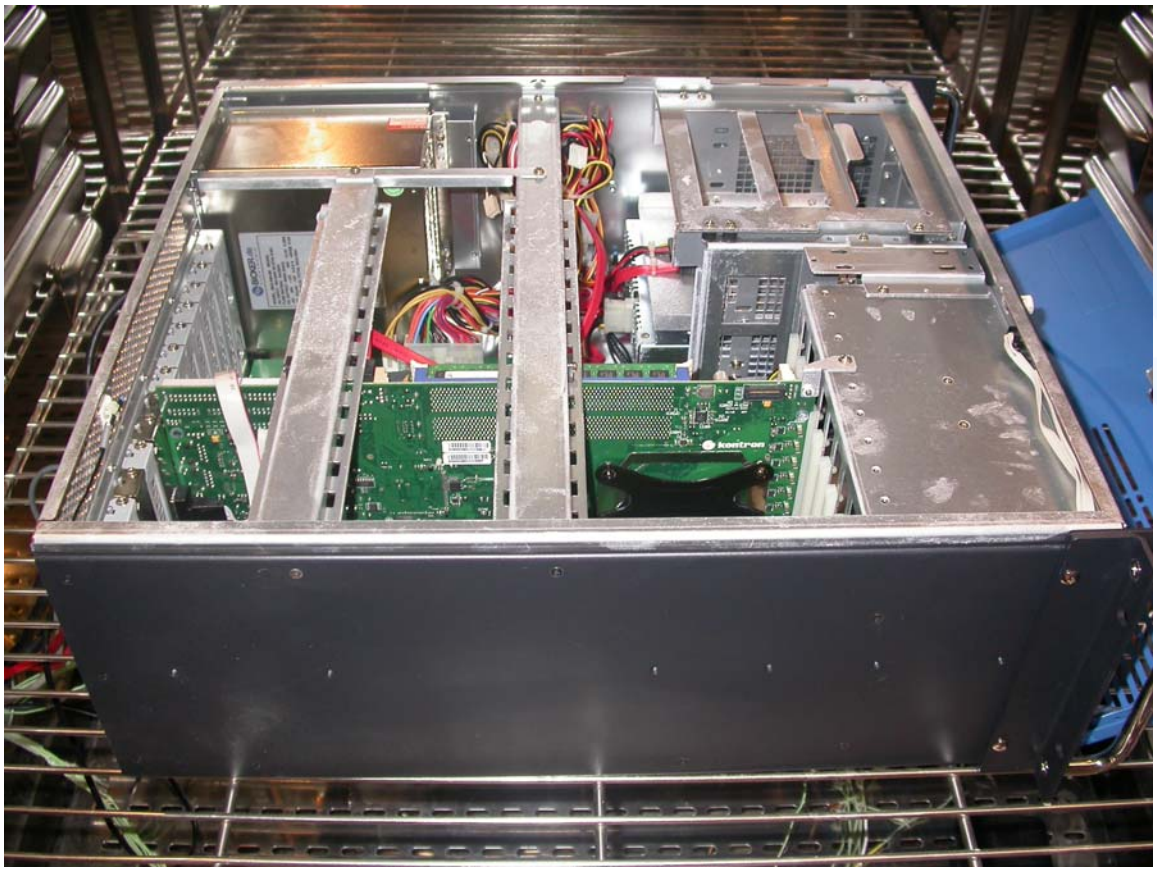
(The device passport filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

Components	*Name / Manufacturer*	*Article-Number*	*Serial-Nr. / Version*
MB / Baseboard	LF PCI-760 PICMG1.3 Q35 Full Version	9-1501-3600	**148276024 R15B**
BP	LF KISS 4U PCIE Backplane xBP13E9P3	9-1201-3606	**146498010 R12A**
CPU	ICMP Core2 Duo E6400/2,13GHz/2MB LGA775	0-0044-1830	**XXXX**
Memory	DIMM DDR2 1GB PC2-6400 Samsung	1031-8876	**XXXX 2x**
Hard disk SSD	Samsung MMCRE64G5MXP 64 Gb	xxxxxxxx	**XXXX**
Hard disk	HDD_SATA300_3,5"_250GB_DESKSTAR7K1000.	1035-8459	**XXXX**

Components	*Name / Manufacturer*	*Article-Number*	*Serial-Nr. / Version*
Harddisk	HDD_SATA300_3,5"_500GB_WD RE3 24/7	1036-5378	**WCASYA847355**
Swappable frame	1-fach SATA 3,5" HDD Rack 1x 5,25"	1037-8452	**XXXX**
Power Supply	BGNT ATX, PS2 -Netzteil 400W BEA-640-B5	1022-9353	**T83702029**
LAN	NET PCIe(x4) INTEL PRO DUAL PORT 1000PT	0-0074-3993	**XXXX**
Mechanics-Rev.		1035-7344	**10063-001-00 D**

Picture of the EuT:



Modifications during the EMC test: **None**

3.3 Performance level

The test results shall be classified in terms of the loss of function or degradation of performance of the Equipment under Test, relative to a performance level defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product.

Definition related to the performance level:

☐ based on the used product standard
☒ based on the declaration of the manufacturer, requestor or purchaser

Criterion A:
Definition: normal performance within limits specified by the manufacturer, requestor or purchaser:

The EUT shall not exhibit any malfunction, degradation of performance, or deviation from specified indications beyond the tolerances indicated in the individual equipment or subsystem specification.

Criterion B:
Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention:

Criterion C:
Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention:

Criterion D:
Definition: loss of function or degradation of performance, which is not recoverable, owing to damage to hardware or software, or loss of data:

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

mikes-testingpartners gmbh
Ohmstrasse 2-4
94342 STRASSKIRCHEN
GERMANY

The CS 116 test was performed at:
Serco GmbH
EMV Zentrum Ottobrunn
Lise-Meitner-Straße 6
85521 Ottobrunn
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

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 uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners gmbh, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR.
Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

5 TEST CONDITIONS AND RESULTS

5.1 CE 102 Conducted Emissions (interference voltage)

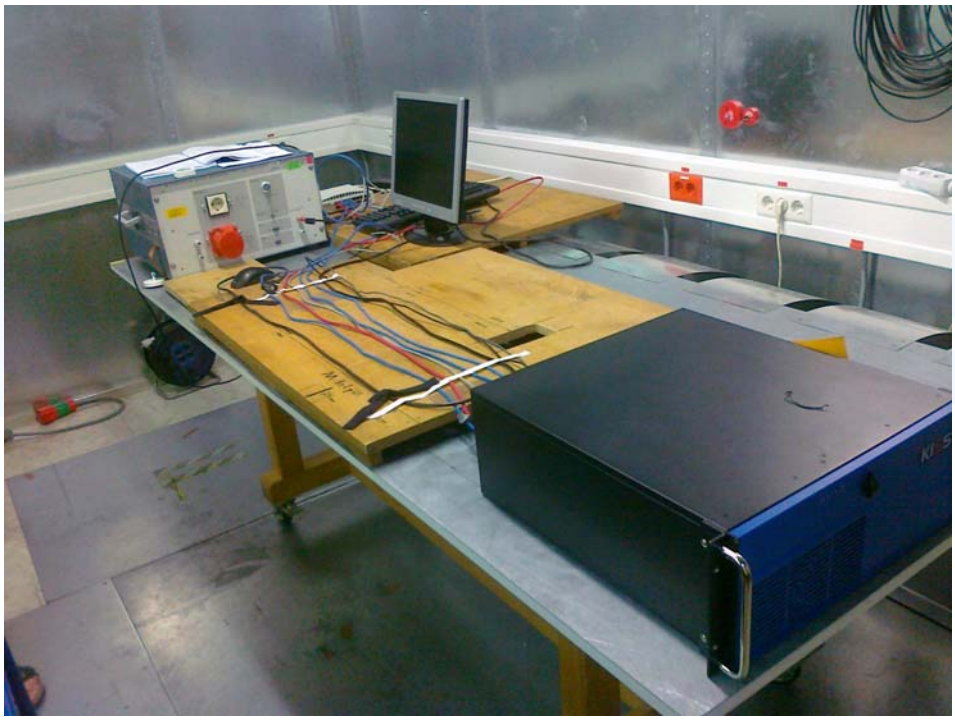
For test instruments and accessories used see section 6 Part **CS 102**.

5.1.1 Description of the test location

Test location: Shielded Room S2

Applied limit CE102-1 Basic Curve with 9 dB relaxation (220 V system)

5.1.2 Photo documentation of the test set-up



5.1.3 Test result

Frequency range: 10 kHz - 10 MHz

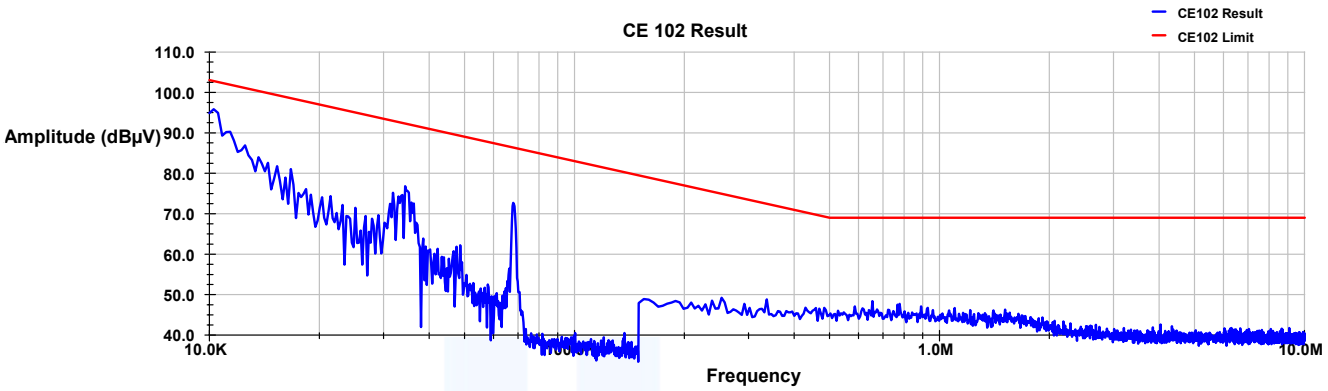
Min. limit margin 6 dB at 10 kHz

The requirements are **FULFILLED.**

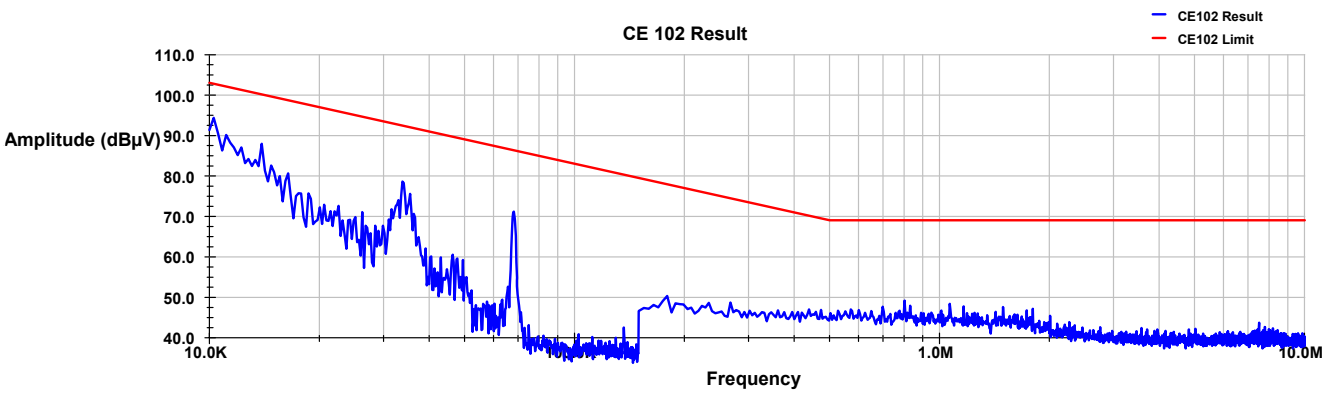
Remarks: None

5.1.4 Test protocol

Test point: L1 Result: passed
Operation mode: Burn-in stress test
Remarks: CE102 basic curve with 9 dB relaxation
Date: 21.07.2010
Tested by: Seamus Murray

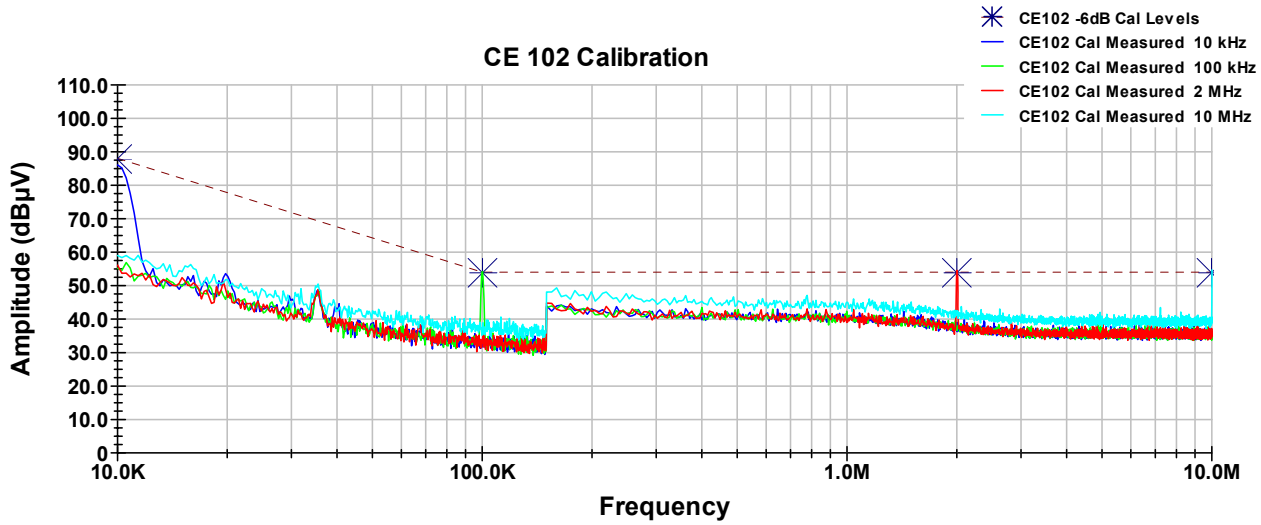


Test point: N Result: passed
Operation mode: Burn-in stress test
Remarks: CE102 basic curve with 9 dB relaxation
Date: 21.07.2010
Tested by: Seamus Murray



5.1.5 CE 102 System Check

Target values have been selected at 6 dB unter the lowest applicable limit.
Scanned frequencies are within ±3 dB of target levels



Target values are displayed with *

5.2 RE 102 Radiated Emissions (electric field)

For test instruments and accessories used see section 6 Part **RE 102**.

5.2.1 Description of the test location

Test location: Anechoic Chamber A1

Test distance: 1 metre

5.2.2 Photo documentation of the test set-up

5.2.3 Test result

Frequency range: 2 MHz - 18 GHz

Min. limit margin minimum limit margin reached in the frequency band 1-2 GHz

The requirements are **FULFILLED**

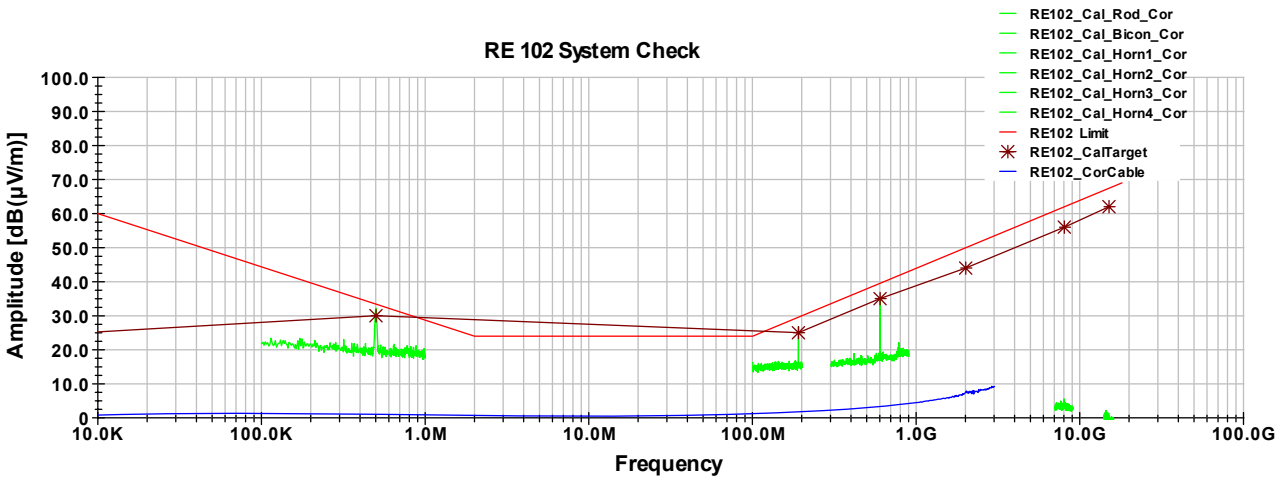
Remarks: None

The electrical continuity of the measurement antennas was determinded as described unter 5.17.3.4d.

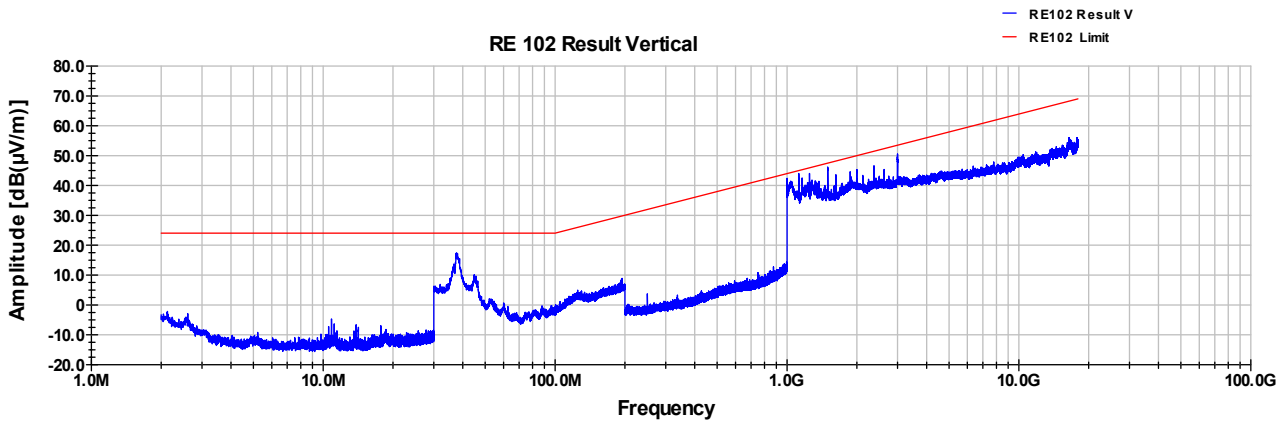
5.2.4 Test protocol

Operation mode:	Burn-in stress test	Result: Pass
Remarks:	The limits are met	
Date:	23.09.2010	
Tested by:	Seamus Murray	

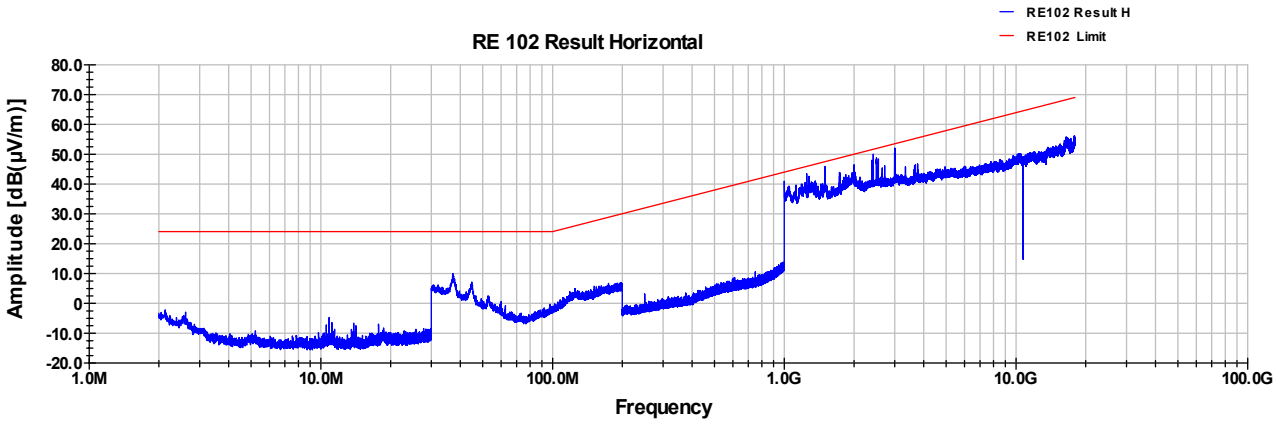
5.2.4.1 Plot System Check



5.2.4.2 Plot Test result Vertical polarisation



5.2.4.3 Plot Test result horizontal polarisation



5.3 CS 101 Conducted Susceptibility (power leads)

For test instruments and accessories used see section 6 Part **CS 101**.

5.3.1 Description of the test location

Test location: Shielded Room S7

5.3.2 Photo documentation of the test set-up

5.3.3 Test specification

Frequency range:	100 Hz – 150 kHz
Test voltage:	MIL-STD 461E, CS 101 Curve #1,
Generator output:	800 mVpp from 100 Hz – 10 kHz
Generator power:	1000 W from 10 kHz to 150 kHz
Frequency step:	1 % with 3 s dwell time

5.3.4 Test result

The requirements are **FULFILLED.** Performance Criterion: **A**

Remarks: None

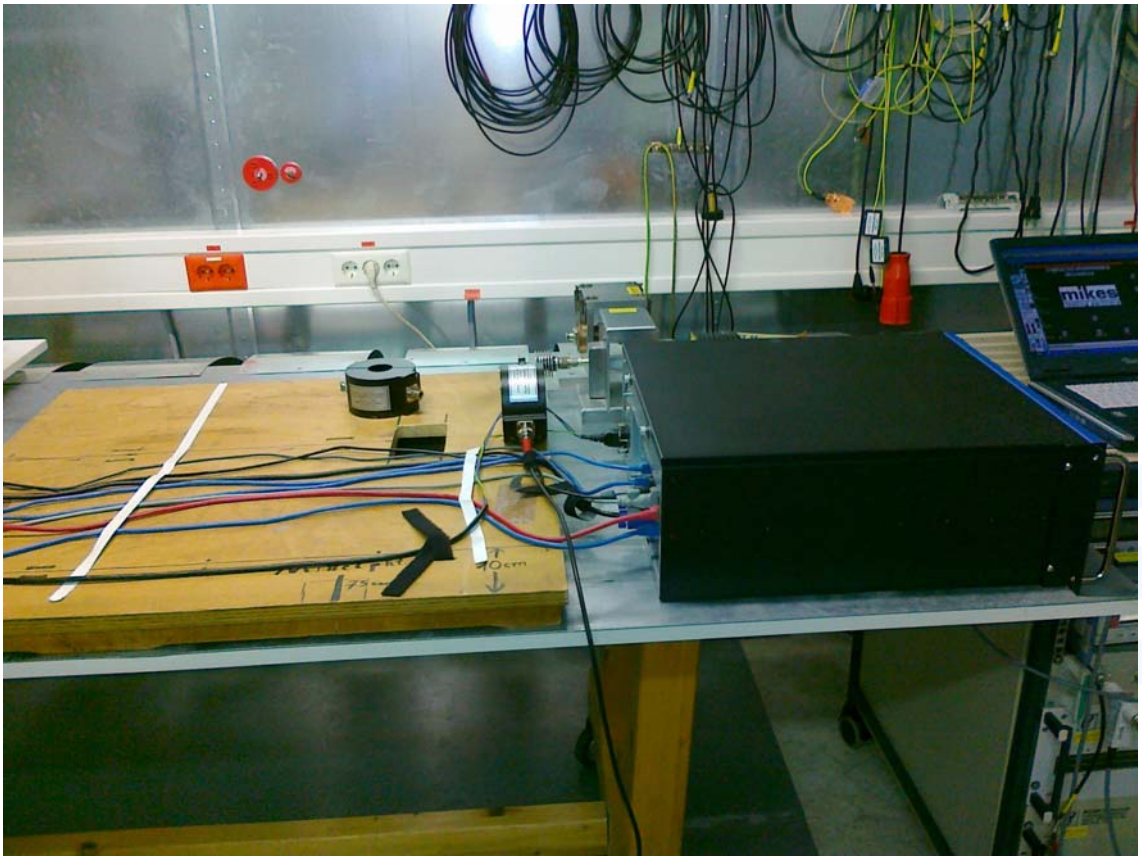
5.4 CS 114 Conducted Susceptibility (bulk cable injection)

For test instruments and accessories used see section 6 Part **CS 114**.

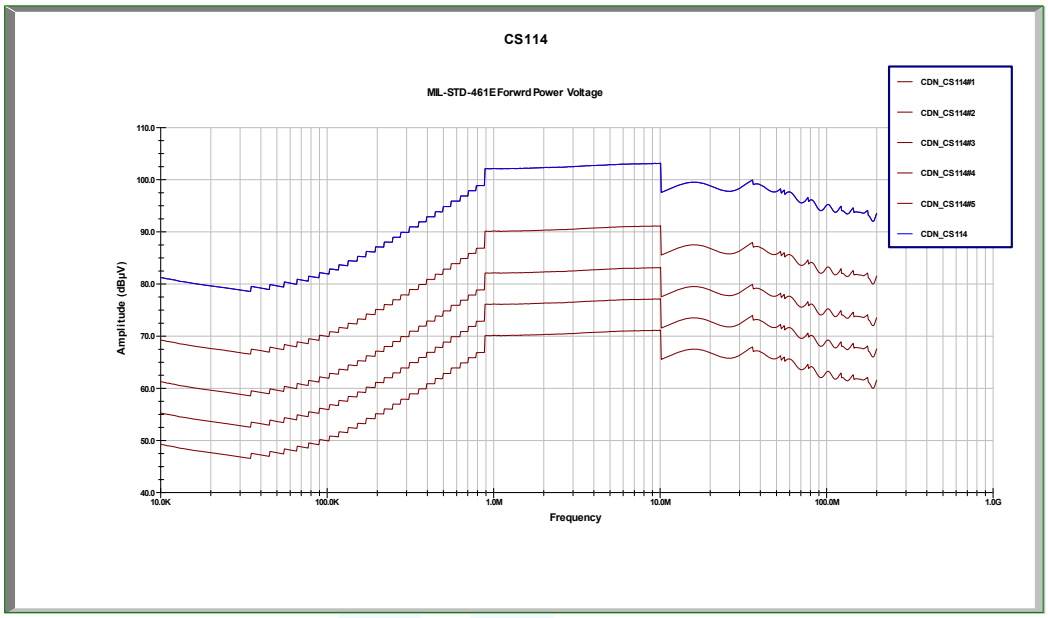
5.4.1 Description of the test location

Test location: Shielded Room S3

5.4.2 Photo documentation of the test set-up



5.4.3 Plot of the forward power



5.4.4 Test specification

Frequency range:	10 kHz – 200 MHz
Test voltage:	Curve #4
Injection clamp EUT distance:	5 cm
Modulation:	PM: 1000 Hz, 50% duty cycle
Frequency step:	1 % with 3 s dwell time

5.4.5 Coupling points

Cable description (Port1):	AC power line
Screening:	unscreened
Status:	active
Signal transmission:	analogue
Length:	2 m
Cable description (Port2):	On-board Lan port
Screening:	screened
Status:	passive
Signal transmission:	digital
Length:	2.0 m
Cable description (Port3):	LAN card port
Screening:	screened
Status:	active
Signal transmission:	digital
Length:	2.0 m
Cable description (Port4):	USB Mouse
Screening:	screened
Status:	active
Signal transmission:	digital
Length:	1.5 m
Cable description (Port5):	USB Keyboard
Screening:	screened
Status:	active
Signal transmission:	digital
Length:	1.5 m
Cable description (Port6):	Serial port
Screening:	screened
Status:	passive
Signal transmission:	digital
Length:	2.0 m

5.4.6 Test result

The requirements are **FULFILLED.** Performance Criterion: **A**

Remarks: None

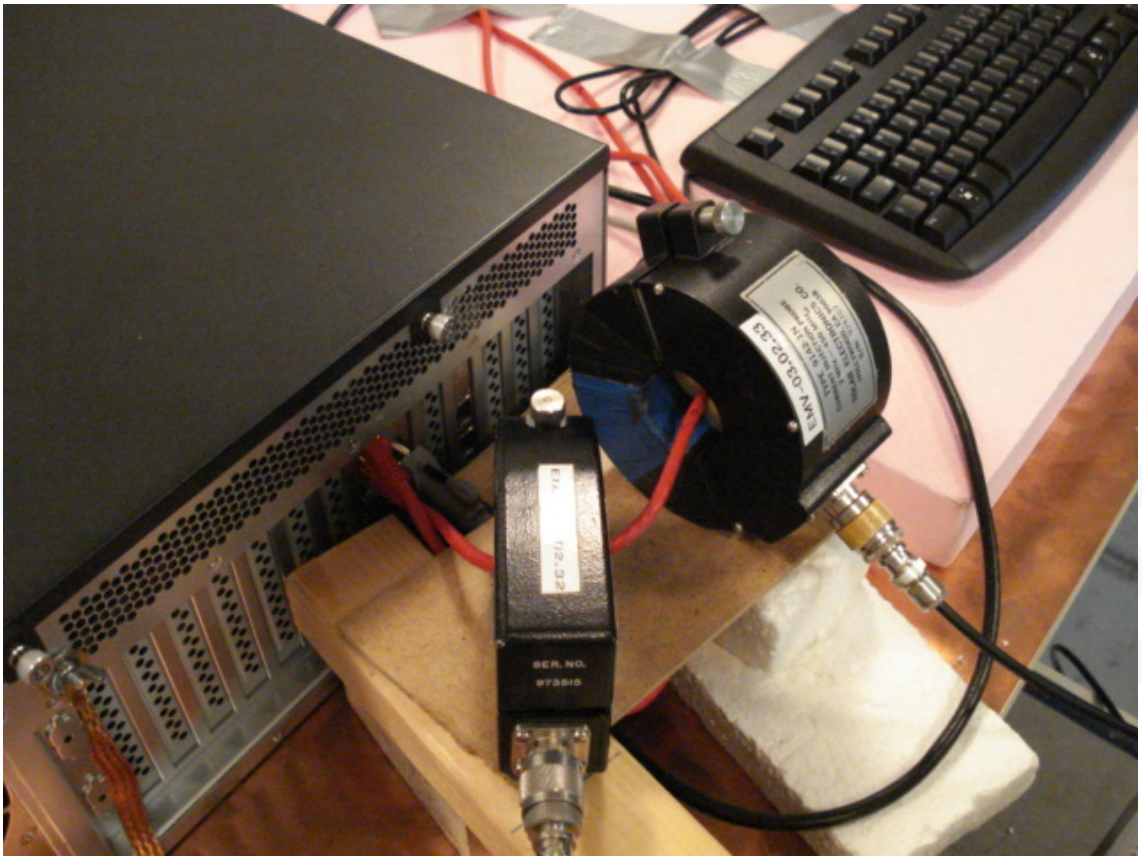
5.5 CS 116 Conducted Susceptibility (damped sinusoidal transients)

For test instruments and accessories used see section 6 Part **CS 116**.

5.5.1 Description of the test location

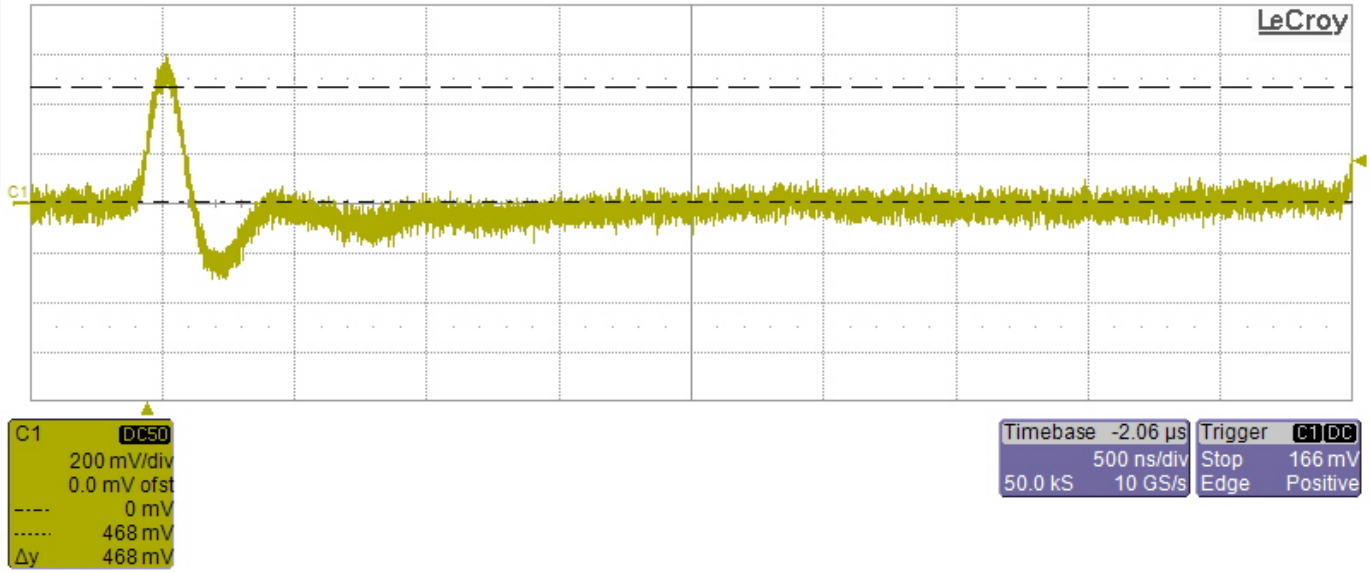
Test location: SERCO

5.5.2 Photo documentation of the test set-up

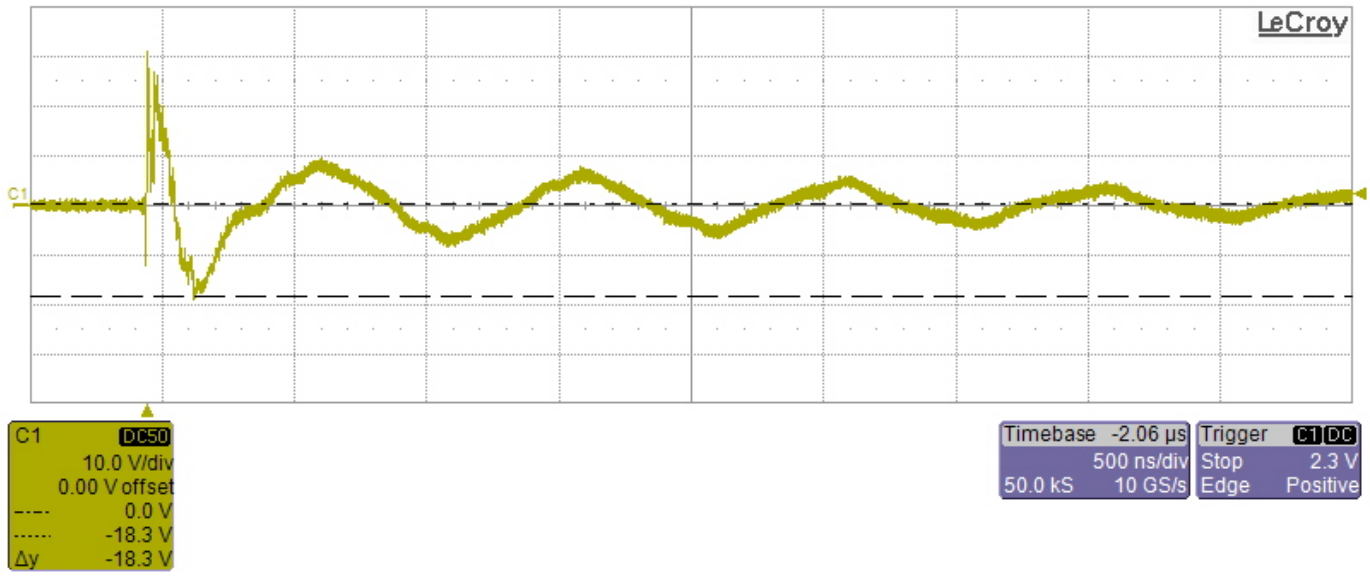


5.5.3 Oscilloscope plotout of injected waveform at 10 kHz

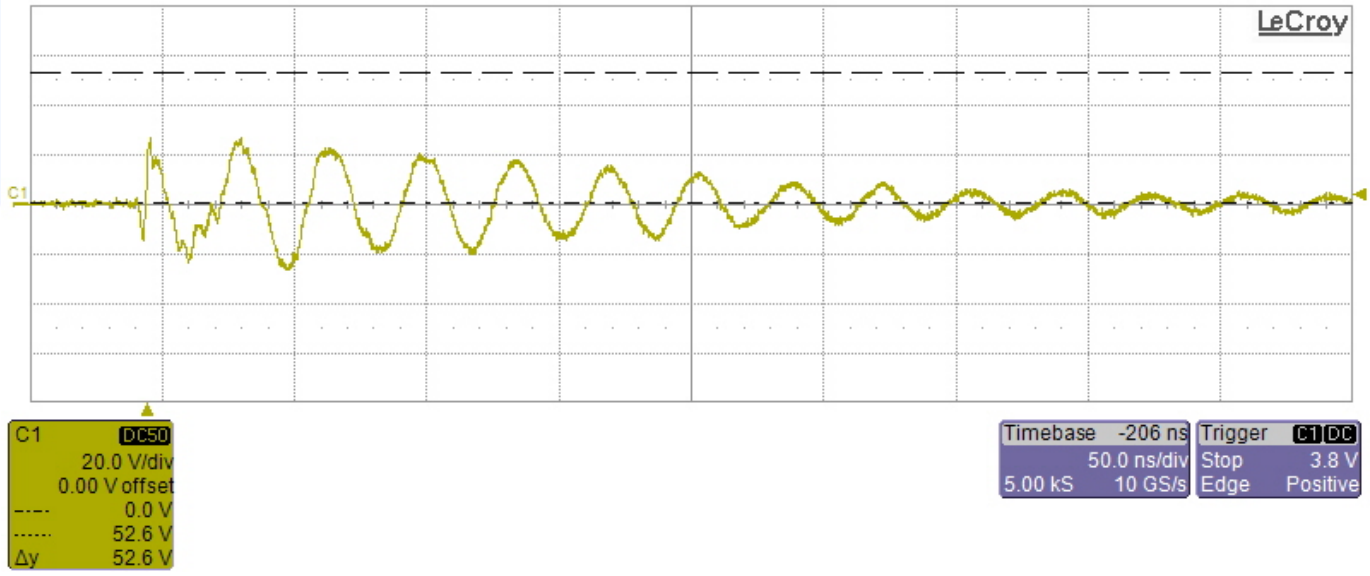
5.5.4 Oscilloscope plotout of injected waveform at 10 kHz



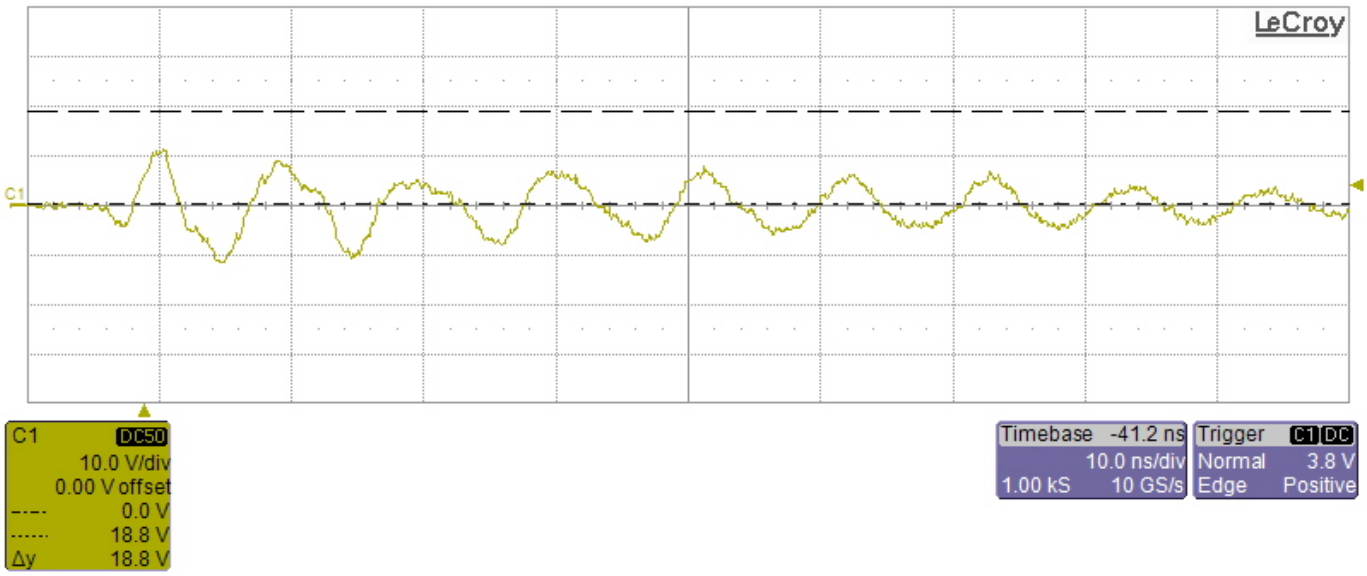
5.5.5 Oscilloscope plotout of injected waveform at 1 MHz



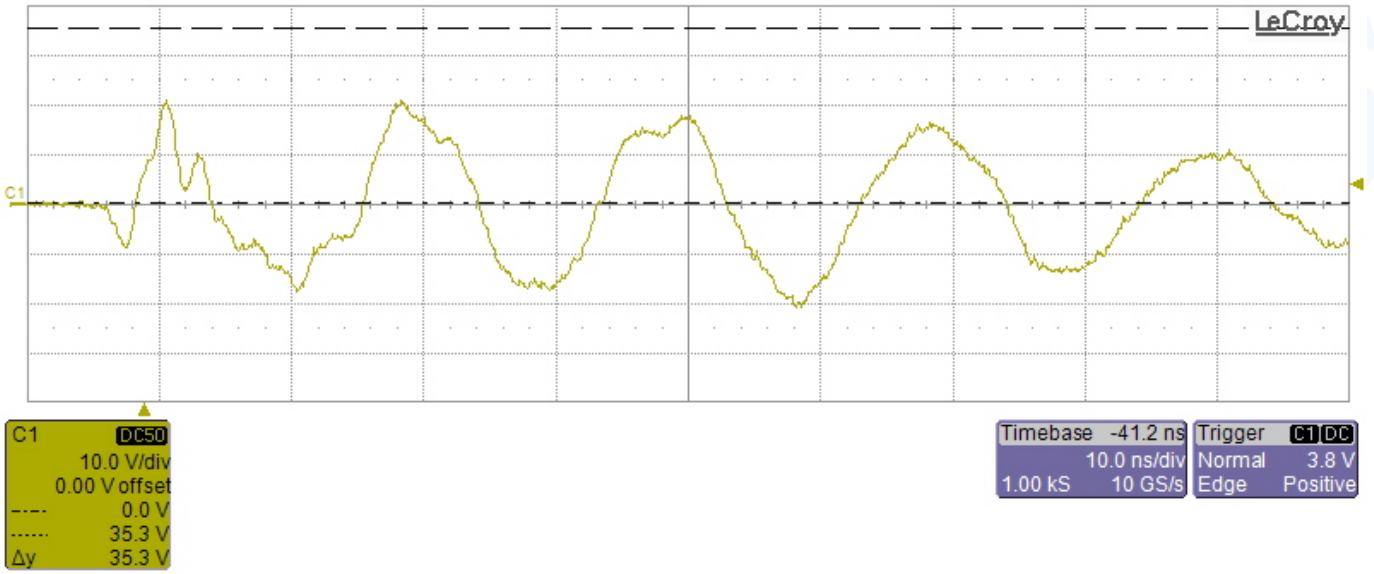
5.5.6 Oscilloscope plotout of injected waveform at 30 MHz



5.5.7 Oscilloscope plotout of injected waveform at 50 MHz



5.5.8 Oscilloscope plotout of injected waveform at 100 MHz



5.5.9 Test specification

Pulse:	MIL 461-STD Figure CS116-1
Pulse frequency:	10 kHz, 100 kHz, 1 MHz, 10 MHz, 30 MHz, 50 MHz, 100 MHz
Repitionon rate:	30 Hz
Coupling duration:	≥ 60 sec.

5.5.10 Coupling points

Cable description:	AC power line
Screening:	unscreened
Status:	active
Signal transmission:	analogue
Length:	2.0 m
Cable description:	On-board Lan port
Screening:	screened
Status:	passive
Signal transmission:	digital
Length:	2.0 m
Cable description:	LAN card port
Screening:	screened
Status:	active
Signal transmission:	digital
Length:	2.0 m
Cable description:	USB Mouse
Screening:	screened
Status:	active
Signal transmission:	digital
Length:	1.5 m
Cable description:	USB Keyboard
Screening:	screened
Status:	active
Signal transmission:	digital
Length:	1.5 m
Cable description:	Serial port
Screening:	screened
Status:	passive
Signal transmission:	digital
Length:	2.0 m

5.5.11 Test result

The requirements are **FULFILLED.**

Remarks: The device stops working (Category C) when the 30 MHz pulse was injected into the on-board LAN-port. Based on the decision of the manufacturer, the on-board LAN port was excluded from further testing. At the other ports including external LAN ports, no reaction was observed.

5.6 RS 103 Radiated Susceptibility (electric field)

For test instruments and accessories used see section 6 Part **RS 103**.

5.6.1 Description of the test location

Test location: Anechoic Chamber A1

5.6.2 Photo documentation of the test set-up

5.6.3 Test specification

Frequency range:	2 MHz – 18 GHz
Field strength:	50 V/m
EuT - antenna distance:	1 m
Modulation:	PM: 1000 Hz, 50% duty cycle
Frequency step:	2 MHz – 30 MHz 1 % 30 MHz – 1 GHz 0.5 % 1 GHz – 8 GHz 0.1 % 8 GHz – 40 GHz 0.05 %
Dwell time	3 s
Antenna polarisation:	- horizontal - vertical

5.6.4 Test result

The requirements are **FULFILLED.**

Remarks: None

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model / Type	Kind of Equipment	Manufacturer	Equipment No.
CE102	33120A	Function/Arbitrary Wave G	HP Hewelett-Packard	02-02/05-05-007
	FSP 30	Spectrum Analyser	Rohde & Schwarz München	02-02/11-05-001
	THS730A	Handheld Scope	Tektronix GmbH	02-02/13-05-001
	ESH 2 - Z 5	LISN	Rohde & Schwarz München	02-02/20-05-004
	N-4000-BNC	RF Cable	mikes-testingpartners gmbh	02-02/50-05-138
	N-1500-N	RF Cable	mikes-testingpartners gmbh	02-02/50-05-140
	DPSP	RF Step Attenuator	Rohde & Schwarz München	02-02/50-05-176
	18N50W-20 dB	Attenuator	Tactron Elektronik	02-02/50-09-017
RE102	SMR 20	Signal Generator	Rohde & Schwarz München	01-02/05-05-002
	SME 03	Signal Generator	Rohde & Schwarz München	02-02/05-05-010
	FSP 30	Spectrum Analyser	Rohde & Schwarz München	02-02/11-05-001
	AFS4-01000400-10-10P-4	RF Amplifier 1 - 4 GHz	PARZICH GMBH	02-02/17-05-003
	AMF-4F-04001200-15-10P	RF Amplifier 4 - 12 GHz	PARZICH GMBH	02-02/17-05-004
	AFS5-12001800-18-10P-6	RF Amplifier 12 - 18 GHz	PARZICH GMBH	02-02/17-05-005
	BBA 9106 / VHA 9103	Biconical Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-001
	3117	Horn Antenna 1 - 18 GHz	EMCO Elektronik GmbH	02-02/24-05-009
	3301B	Active Monopole Antenna	EMCO Elektronik GmbH	02-02/24-05-028
	3106B	Waveguide Horn	ETS Lindgren	02-02/24-09-001
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeitung	02-02/50-05-088
	N-3000-N	RF Cable	mikes-testingpartners gmbh	02-02/50-05-192
	RSM 010-4	Antenna Mast	euro EMC GmbH	02-02/50-05-237
	Sucofeed 1/2	RF Cable	Huber + Suhner	02-02/50-06-005
	EF393-21N-20 m	RF Cable	Huber + Suhner	02-02/50-06-007
RS103	SMR 20	Signal Generator	Rohde & Schwarz München	01-02/05-05-002
	NRVD	Dual Channel Power Meter	Rohde & Schwarz München	01-02/07-05-002
	NRV-Z1	Diode Power Sensor	Rohde & Schwarz München	01-02/07-05-003
	NRV-Z1	Diode Power Sensor	Rohde & Schwarz München	01-02/07-05-004
	BLMA 1020-240	RF Amplifier	Bonn Elektronik GmbH	01-02/17-05-003
	TWAL 0208-300	RF Amplifier	Bonn Elektronik GmbH	01-02/17-05-004
	TWAL 0818-50/35	RF Amplifier 8 - 18 GHz	Bonn Elektronik GmbH	01-02/17-05-005
	N-2000-N	RF Cable RG393	mikes-testingpartners gmbh	01-02/50-06-072
	SMT 03	Signal Generator	Rohde & Schwarz München	02-02/05-05-009
	SML 01	Signal Generator	Rohde & Schwarz München	02-02/05-05-013
	NRVD	Dual Channel Power Meter	Rohde & Schwarz München	02-02/07-05-004
	NRV-Z1	Diode Power Sensor	Rohde & Schwarz München	02-02/07-05-017
	NRV-Z1	Diode Power Sensor	Rohde & Schwarz München	02-02/07-05-018
	NRVD	Dual Channel Power Meter	Rohde & Schwarz München	02-02/07-05-019
	URV 5 - Z 2	RF Probe 10 V	Rohde & Schwarz München	02-02/07-05-021
	URV 5 - Z 2	RF Probe 10 V	Rohde & Schwarz München	02-02/07-05-022
	500W1000A	RF Amplifier	Amplifier Research	02-02/17-05-010
	1000W1000C	RF Amplifier	Amplifier Research	02-02/17-05-011
	BTA 0122-2000	RF Amplifier	Bonn Elektronik GmbH	02-02/17-05-014
	CBL6140A	Bilog Antenna	Schaffner Elektrotest GmbH	02-02/24-05-018
	S 12014/54f	LPD Antenna	FS Antennentechnik GmbH	02-02/24-05-033
	EFG-3B	E-Field Generator	Pötschke GmbH & Co. KG	02-02/24-05-037
	AT4510	Horn Antenna	Amplifier Research	02-02/24-07-001
	WBH2-18NHG	Broadband Horn Antenna	Q-par Angus Ltd	02-02/24-08-002
	3106B	Waveguide Horn	ETS Lindgren	02-02/24-09-001
	10 dB / 50 Ohm	Attenuator	Huber + Suhner	02-02/50-05-064
	N-5000-N	RF Cable	Rosenberger HF-Technik	02-02/50-05-104

	DC6180A	Coupler	Amplifier Research	02-02/50-05-107
	N-2000-N	RF Cable	mikes-testingpartners gmbh	02-02/50-05-108
	N-2000-N	RF Cable	mikes-testingpartners gmbh	02-02/50-06-045
	UFB311A-1-Nm-Nm_5.4 m	RF Cable	Rosenberger MICRO-COAX	02-02/50-09-005
	UFB311A-1-Nm-Nm_3.0 m	RF Cable	Rosenberger MICRO-COAX	02-02/50-09-008
CS101	SML 01	Signal Generator	Rohde & Schwarz München	02-02/05-05-013
	NRVS	Single Channel Power Mete	Rohde & Schwarz München	02-02/07-05-005
	URV 5 - Z 2	RF Probe 10 V	Rohde & Schwarz München	02-02/07-05-025
	9450	Storage Oscilloscope	LeCroy Europe GmbH	02-02/13-05-006
	EMV D 30000/PAS	Testsystem	Spitzenberger + Spies	02-02/30-05-006
	6620-2_100A	Audio Isolation Transforme	pischzan technologies	02-02/50-08-023
	L1000	Amplifier 2 x 500 W	Dynacord	02-03/17-05-001
	6 x 4 Ohm / 6 x 8 Ohm	Lastwiderstand	Natural Audio Lautsprecher	02-03/50-07-009
CS114	SML 01	Signal Generator	Rohde & Schwarz München	02-02/05-05-008
	NRVS	Single Channel Power Mete	Rohde & Schwarz München	02-02/07-05-005
	URV 5 - Z 4	RF Probe 100 V	Rohde & Schwarz München	02-02/07-05-023
	75A250	RF Amplifier	Amplifier Research	02-02/17-05-007
	9144-1N_10 kHz-100 MHz	Current Injection Probe	SOLAR ELECTRONICS CO	02-02/22-08-006
	JFW 50FH-006-100-2	RF Attenuator 6 dB / 100	jfw	02-02/50-05-060
	N-500-N	RF Cable	mikes-testingpartners gmbh	02-02/50-05-063
	10 dB / 50 Ohm / 18 GHz	Attenuator	Huber + Suhner	02-02/50-05-065
	N-3000-N	RF Cable	mikes-testingpartners gmbh	02-02/50-05-225
	N-140-BNC	RF Cable	mikes-testingpartners gmbh	02-02/50-06-036

CS116 (test equipment from Serco)

HPA-250/30	30 dB 50 Ohm termination	BEKO	218
33-20-34	Attenuator 20dB, 25W	Weinschel	223
NNB-2/16	LISN 1 (for EUT)	Heine	553
NNB-2/16	LISN 2 (for TFT display)	Heine	554
PNM 50 MHz	High voltage slide-in	Haefely	1046
PNM 100MHz	High voltage slide-in	Haefely	1047
18107	Isolation transformer	Voltcraft	1218
WR104XI	Storage scope	LeCroy	1311
FTC 101	Absorber clamp	Lüthi	1627
9125-1	Calibration Jig	Solar	EMV-03.02.27
9410-1	High Voltage Attenuator 100:1	Solar	EMV-03.05.43
9123-1N	RF Current Probe	Solar	EMV-03.02.32
9142-1N	RF Current Injection Probe	Solar	EMV-02.03.33
9354-1	Transient Pulse Generator	Solar	EMV-02.01.24