

FCC TEST REPORT

APPLICANT

Company: **Kaba GmbH**
Address: **Mollenbachstr. 19
D-71229 Leonberg**
Witness(es) at tests: **-**

EQUIPMENT UNDER TEST (EUT)

Equipment: **Time recording terminal with RFID reader**
Model/Type: **TT1100 ICL**
Serial No.: **none**

TEST

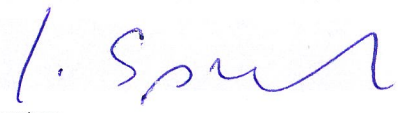
Arrival of EUT: **2013-02-21**
Date of measurement: **2013-02-21; 02-27; 03-14; 03-19; 03-20; 08-19**
Standards: **47 CFR Part 15, Subpart C (15.225)
RSS-210 Issue 8**
Results: **Passed - Details see test result summary**
Performed by: **Dipl.-Ing. J. Szipanski**

LABORATORY

Test site: **Nemko GmbH & Co. KG, Pfinztal, Germany**
FCC Reg. No.: **989327 (2012-12-21)**
IC File No.: **10921A-1 (2013-02-27)**

TEST REPORT

Identification No.: **FC-1211-225531-002**
Date of Report: **2013-08-19**
Provided by: **Dipl.-Ing. J. Szipanski**
Person responsible
Approved by: **Dipl.-Ing. P. Lukas**
Person responsible


Signature


Signature

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1 General information

1.1 Description of Equipment under test (EUT)

The EuT is a time recording terminal with RFID reader 13.56 MHz.

1.2 Technical data

Operating frequency	13.56 MHz
Channels	1
Antenna	integral
Maximum internal frequency	600 MHz
Power supply	115 V / 60 Hz via external plug-in supply – or – PoE (power over ethernet)

1.3 Equipment configuration

The equipment was tested in two configurations.

Configuration 1:

EuT: Time recording terminal TT 1100 ICL with RFID reader 13.56 MHz
AC/DC adapter SYS1308-2412-W2, S/N G101007063438, output: 12 VDC

Peripherals: RFID tag 13.56 MHz
Barcode reader Symbol Technologies LS2208-SR20007R, S/N YAJTCA
LAN / PoE switch Allnet ALL8085 V1 S/N P084010028C14176

Cables: AC/DC adapter <-> EuT (DC cable, unshielded, length 1.8 m)
Barcode reader <-> EuT (USB cable, shielded, length 2 m)
RS-485 termination <-> EuT (signal cable, shielded, length 2 m)
External LAN switch <-> EuT (ethernet cable, shielded, 3 m to CMAD)

Power supply: 115 V / 60 Hz to AC/DC adapter

Configuration 2:

EuT: Time recording terminal TT 1100 ICL with RFID reader 13.56 MHz

Peripherals: RFID tag 13.56 MHz
Barcode reader Symbol Technologies LS2208-SR20007R, S/N YAJTCA
LAN / PoE switch Allnet ALL8085 V1 S/N P084010028C14176

Cables: Barcode reader <-> EuT (USB cable, shielded, length 2 m)
RS-485 termination <-> EuT (signal cable, shielded, length 2 m)
External PoE switch <-> EuT (ethernet cable, shielded, 3 m to CMAD)

Power supply: 115 V / 60 Hz to PoE switch

1.4 Climatic conditions

parameter	actual range
Ambient temperature	21 - 23 °C
Relative humidity	26 - 31 %
Atmospheric pressure	985 - 1010 mbar

1.5 Other comments

-

1.6 Test equipment

See list of test equipment in clause 4.

1.7 Project history

test report (Ident.-No.)	date of report	modification of the EuT	Change in standard in clause:
FC-1211-225531-002	2013-08-19	-	clause 3.1: measurement bandwidth corrected
FC-1211-225531-001	2013-08-01	-	(minor editorial changes)
FC-1211-225531	2013-04-29	delivery status	initial test report

2 Test Report Summary

2.1 General

The tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with:

47 CFR Part 15, Subpart C (15.225)
RSS-210 Issue 8

The test methods have been in accordance with 47 CFR Part 15 and RSS where applicable.

- ☒ Production Unit
☐ Pre-production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.
Deviations from, additions to, or exclusions from the test specifications
are described in "Test results".



TEST REPORT NO.: 225531002TRFFCC

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2.2 Test Summary

Section in CFR 47		Result
15.209	Spurious radiated emissions	PASS
15.207	AC power line conducted emissions	PASS
15.225	Fundamental output power	PASS
15.225	Frequency stability	PASS
15.215	Occupied bandwidth & band-edge	PASS

Section in RSS		Result
RSS-Gen 7.2.5	Spurious radiated emissions	PASS
RSS-Gen 7.2.4	AC power line conducted emissions	PASS
RSS-210 A2.6	Fundamental output power	PASS
RSS-210 A2.6	Frequency stability	PASS
NA	Occupied bandwidth & band-edge	-

Explanations:

PASS The EUT passed that particular test.

FAIL The EUT failed that particular test.

X The measurement was done, but there is no applicable performance criteria.

3 Test Results

3.1 Fundamental output power

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Frequency range	13.56 MHz +/- 2 MHz
Limits FCC	§15.225
Limits IC	RSS-210 A2.6
Test uncertainty U95	3.48 dB

Test method and limits

The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable (see photograph 1). During the test distance from the EUT to the measuring antenna was 3.0 m. Measurements were made using a magnetic loop antenna and a receiver with a peak detector and a 10 kHz bandwidth.

As allowed by section 15.31(f)(2) measurements were made at 3 meter with the 30 meter limit being extrapolated by a factor of 40 dB.

FCC Part 15.225 Limit values

Frequency band MHz	Quasi-peak $\mu\text{V/m}$ @30m	Quasi-peak $\text{dB}(\mu\text{V/m})$ @3m
below 13.110	30	69.54
13.110 – 13.410	106	80.51
13.410 – 13.553	334	90.47
13.553 – 13.567	15848	124
13.567 – 13.710	334	90.47
13.710 – 14.010	106	80.51
above 14.010	30	69.54

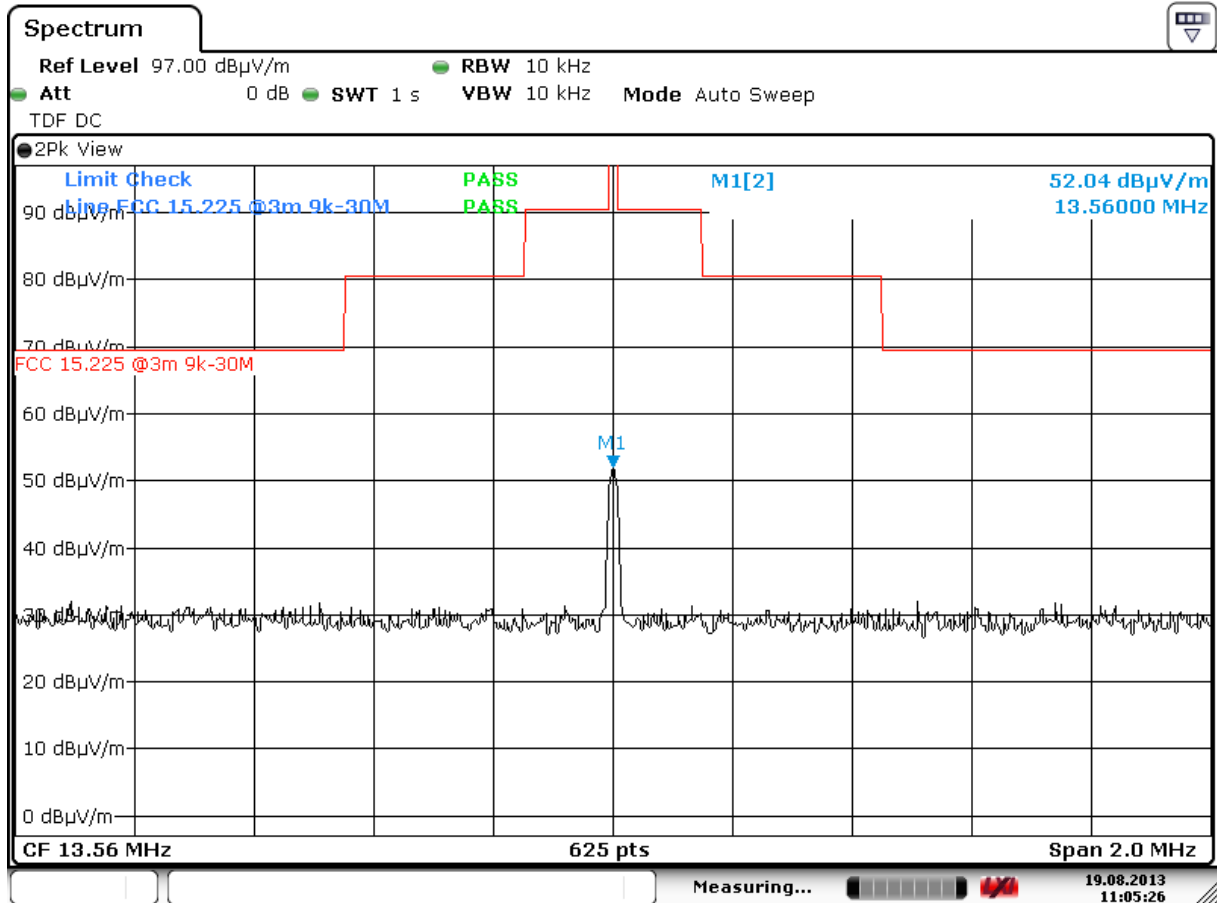
Test result configuration 1: Passed.

Test result configuration 2: Passed.

Test Equipment Used: 9, 45, 46

Measurement results of configuration 1

Diagram 228893-60



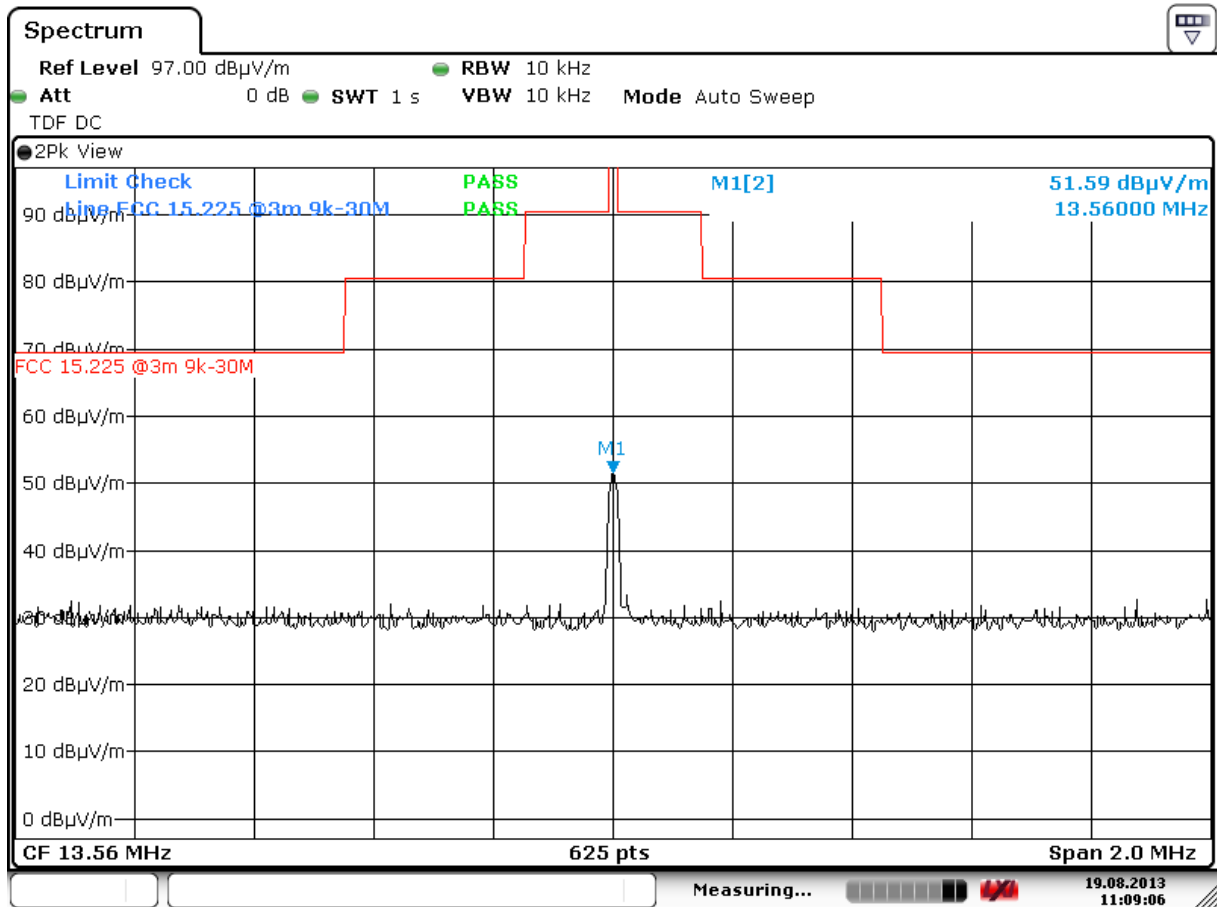
Date: 19.AUG.2013 11:05:25

Frequency MHz	Peak level dBμV/m	Bandwidth kHz	Limit dBμV/m	Margin dB	Polarization	Azimuth deg
13.56	52.04	10	124.00	71.96	-	0

Other frequencies in range 13.56 MHz +/- 2 MHz: No signal > 35 dBμV/m detectable.

Measurement results of configuration 2

Diagram 225531-60



Date: 19.AUG.2013 11:09:05

Frequency MHz	Peak level dB μ V/m	Bandwidth kHz	Limit dB μ V/m	Margin dB	Polarization	Azimuth deg
13.56	51.59	10	124.00	72.41	-	0

Other frequencies in range 13.56 MHz +/- 2 MHz: No signal > 35 dB μ V/m detectable.

3.2 Spurious radiated emissions

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Frequency range	0.009 – 5000 MHz
Limits FCC	§15.209
Limits IC	RSS-Gen 7.2.5
Test uncertainty U95	5.14 dB

Test method and limits

The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable (see photograph 1). In frequency range 9kHz-30 MHz measurements were made using a magnetic loop antenna.

In order to find the maximum levels of the disturbance radiation the angle of the turntable, the height of the measuring antenna and the lay-out of the EUT cables were varied during the tests. The test was performed separately with the measuring antenna being both in horizontal and vertical polarizations.

Receiver bandwidth and measuring distance:

Frequency band MHz	Receiver bandwidth kHz	Measuring distance m
0.009–0.150	0.2	3
0.150–30	9	3
30-1000	120	3
1000-6000	1000	3

As allowed by section 15.31(f)(2) measurements were made at 3 meter with the 300 meter limit 9-490kHz being extrapolated by a factor of 80 dB (40dB per decade) and 0.490-30MHz with the 30 meter limit being extrapolated by a factor of 40 dB

FCC Part 15.209 Limit values

Frequency band MHz	Quasi-peak $\mu\text{V/m}$	Quasi-peak $\text{dB}(\mu\text{V/m}) @3\text{m}$	Average $\text{dB}(\mu\text{V/m}) @3\text{m}$
0.009–0.490	2400/F (kHz)@300m	128.5-93.8@3m	-
0.490–1.705	24000/F (kHz)@30m	73.8-63.0@3m	-
1.705–30	30@30m	69.5@3m	-
30 - 88	100@3m	40.0@3m	-
88 - 216	150@3m	43.5@3m	-
216-960	200@3m	46.0@3m	-
960-1000	500@3m	54.0@3m	-
1000-6000	-	74.0@3m *)	54.0@3m

*) Peak

Test result configuration 1: Passed.

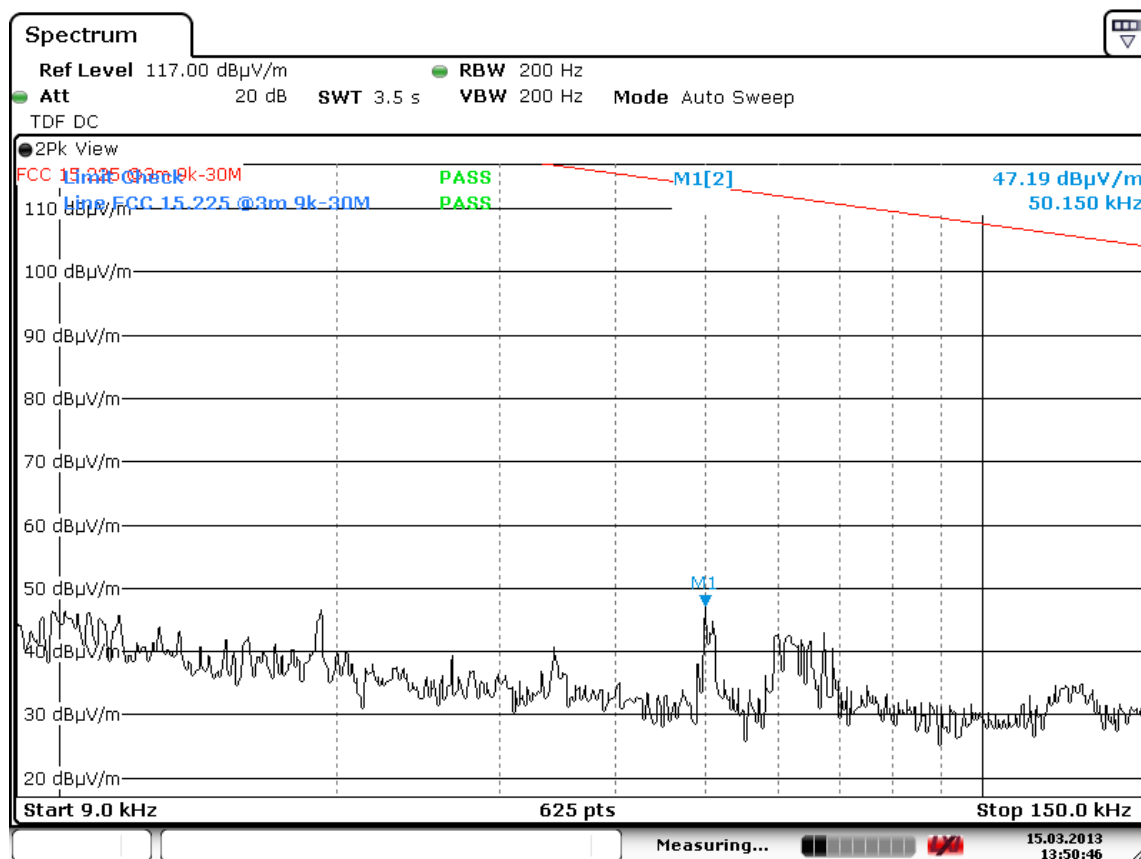
Test result configuration 2: Passed.

Test Equipment Used ($f < 30$ MHz): 9, 45, 46

Test Equipment Used ($f > 30$ MHz): 9, 51, 52, 53, 47, 7, 55, 56

Measurement results of configuration 1

Diagram 228893-5 (9 kHz – 150 kHz)

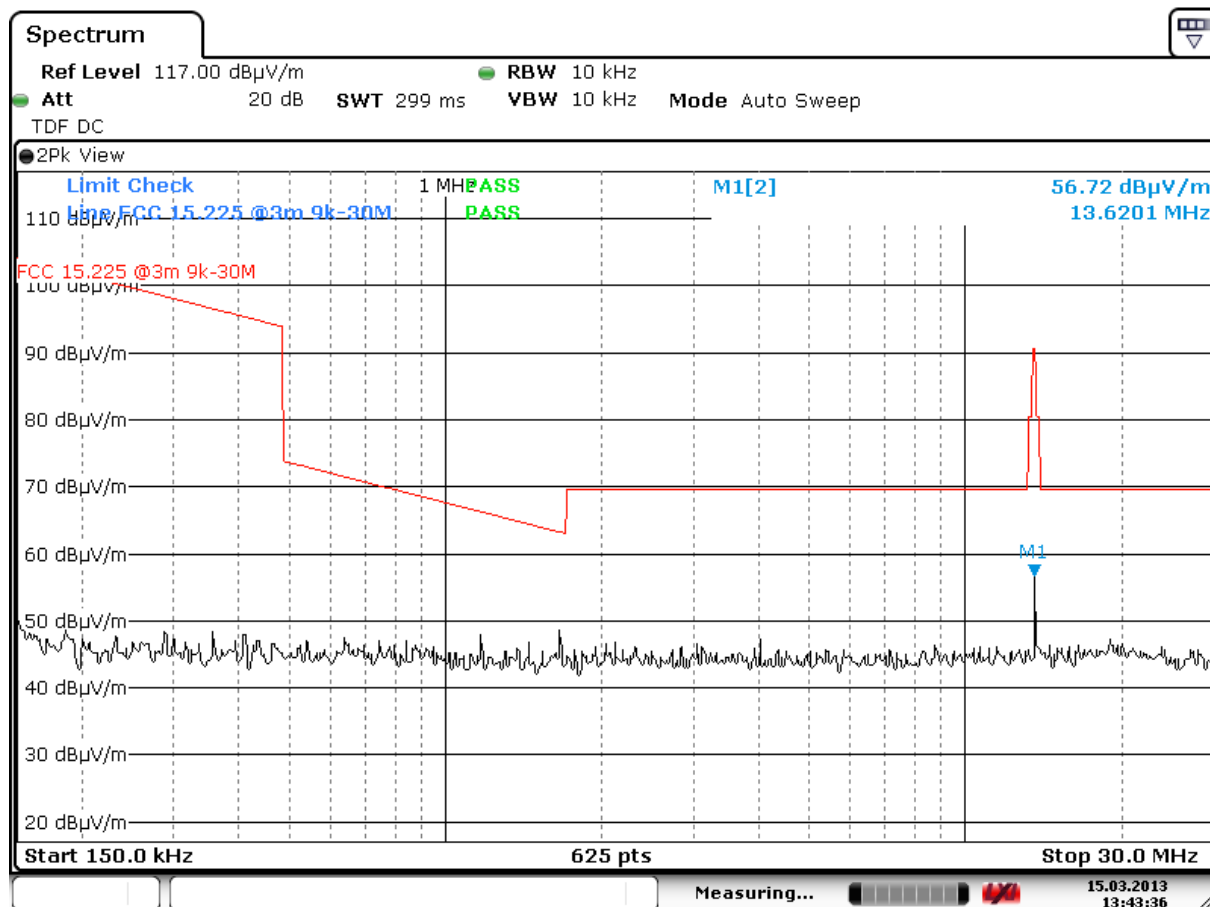


Date: 15.MAR.2013 13:50:46

Frequency MHz	Peak level dBμV/m	Bandwith kHz	Limit dBμV/m	Margin dB	Polarization	Azimuth deg
0.05015	47.19	0.2	113.60	66.41	-	0

Other frequencies in range 9 kHz – 150 kHz: No signal > 50 dBμV/m detectable.

Diagram 228893-4 (150 kHz – 30 MHz)



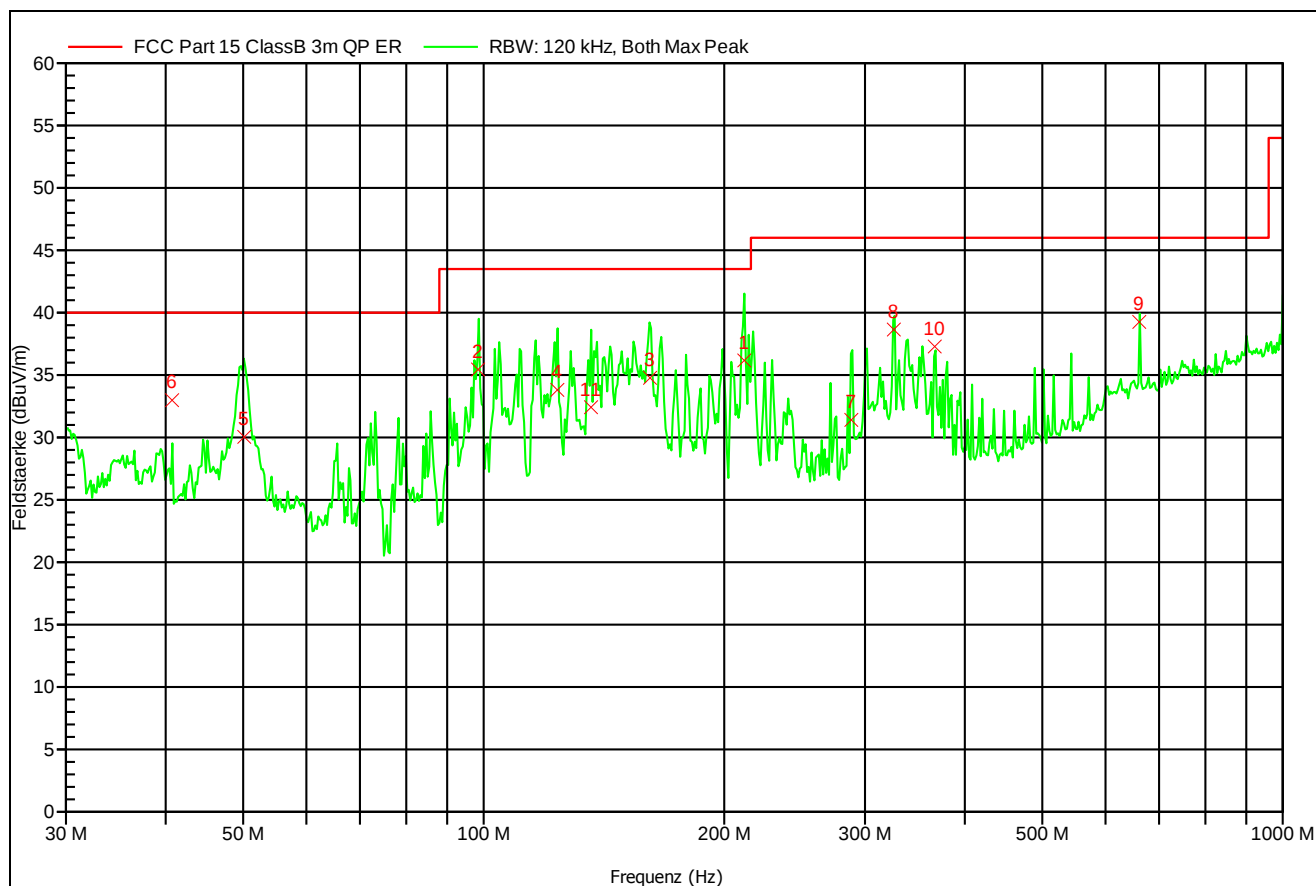
Date: 15.MAR.2013 13:43:37

Frequency MHz	Peak level dB μ V/m	Bandwidth kHz	Limit dB μ V/m	Margin dB	Polarization	Azimuth deg
-	-	10	-	-	-	-

Signal in 13.56 MHz range: Intentionally radiated signal, see clause 3.1

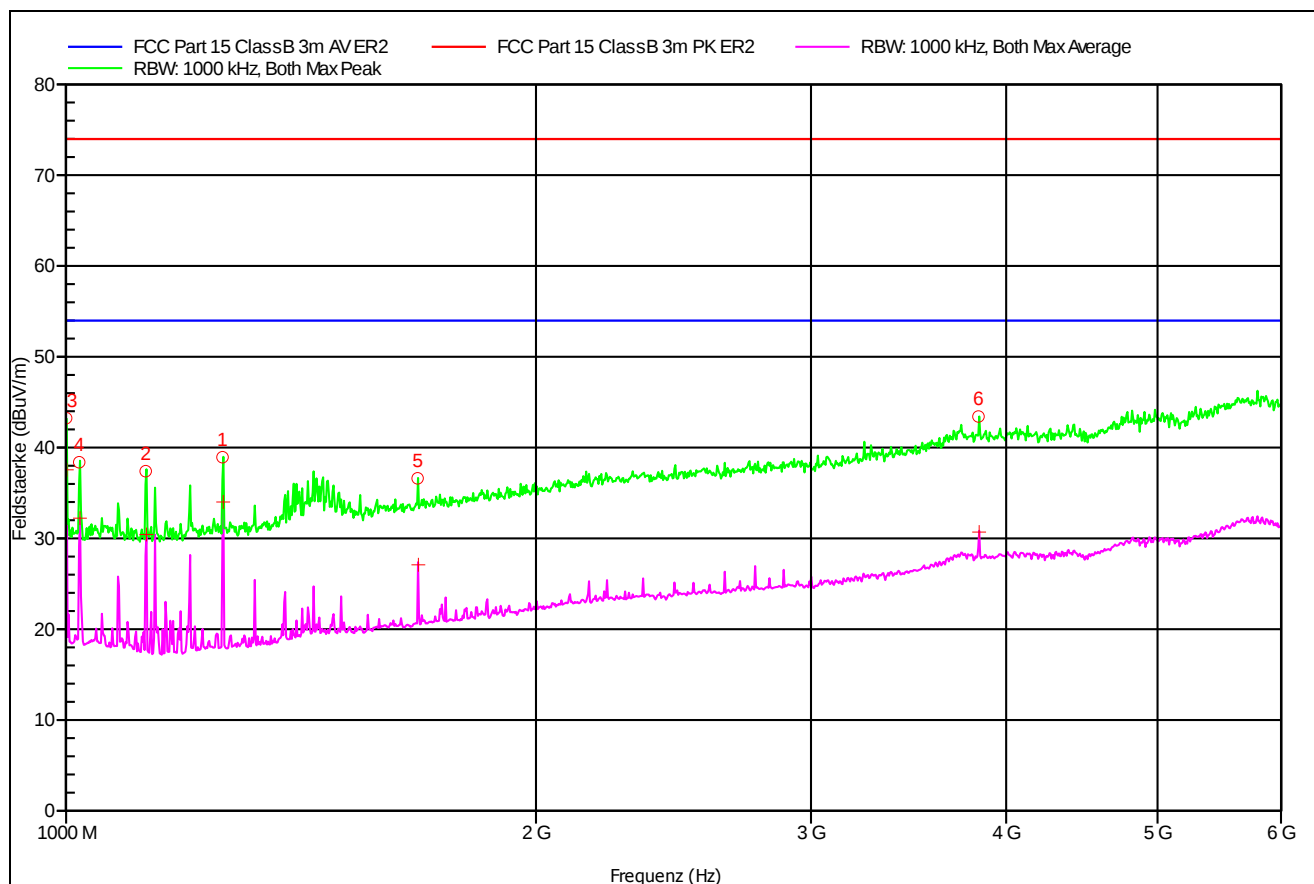
Other frequencies in range 150 kHz – 30 MHz: No signal > 50 dB μ V/m detectable.

Diagram 225531-9ER (30 MHz – 1000 MHz)



Frequency MHz	Level QP dB(μV/m)	QP Limit dB(μV/m)	Margin dB	Angle deg	Height m	Polarization
40,680	33,03	40,00	6,97	105,00	1,00	Vertical
50,070	30,09	40,00	9,91	220,00	1,00	Vertical
98,220	35,49	43,50	8,01	330,00	1,00	Vertical
123,420	33,86	43,50	9,64	279,00	3,00	Horizontal
135,990	32,47	43,50	11,03	284,00	2,29	Horizontal
161,190	34,82	43,50	8,68	64,00	1,89	Horizontal
211,530	36,22	43,50	7,28	259,00	1,69	Horizontal
287,910	31,45	46,00	14,55	335,00	1,70	Vertical
325,440	38,70	46,00	7,3	29,00	1,70	Vertical
366,120	37,34	46,00	8,66	175,00	1,10	Vertical
660,030	39,31	46,00	6,69	359,00	1,20	Horizontal

Diagram 225531-10ER2 (1000 MHz – 6000 MHz)

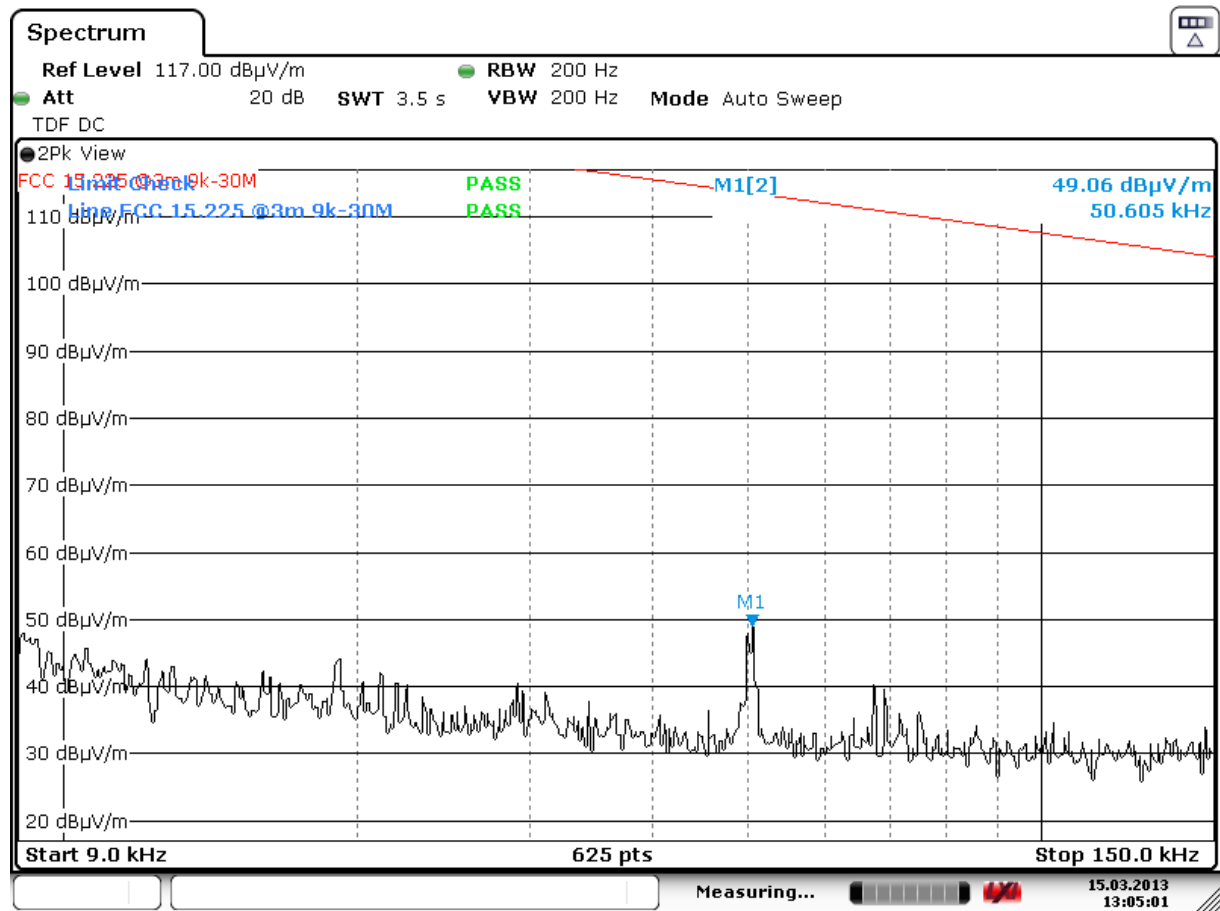


Frequency GHz	Level PK dB(μV/m)	PK Limit dB(μV/m)	Margin dB	Angle deg	Height m	Polarization
1.000	43.24	73.98	30.74	35	1.10	Horizontal
1.020	38.39	73.98	35.59	350	1.20	Horizontal
1.125	37.40	73.98	36.58	360	1.10	Horizontal
1.260	38.94	73.98	35.04	21	1.20	Horizontal
1.680	36.62	73.98	37.36	10	1.00	Vertical
3.840	43.42	73.98	30.56	305	1.10	Horizontal

Frequency GHz	Level AV dB(μV/m)	AV Limit dB(μV/m)	Margin dB	Angle deg	Height m	Polarization
1.000	37.64	53.98	16.34	35	1.10	Horizontal
1.020	32.31	53.98	21.67	350	1.20	Horizontal
1.125	30.51	53.98	23.47	360	1.10	Horizontal
1.260	34.09	53.98	19.89	21	1.20	Horizontal
1.680	27.16	53.98	26.82	10	1.00	Vertical
3.840	30.77	53.98	23.21	305	1.10	Horizontal

Measurement results of configuration 2

Diagram 225531-5 (9 kHz – 150 kHz)

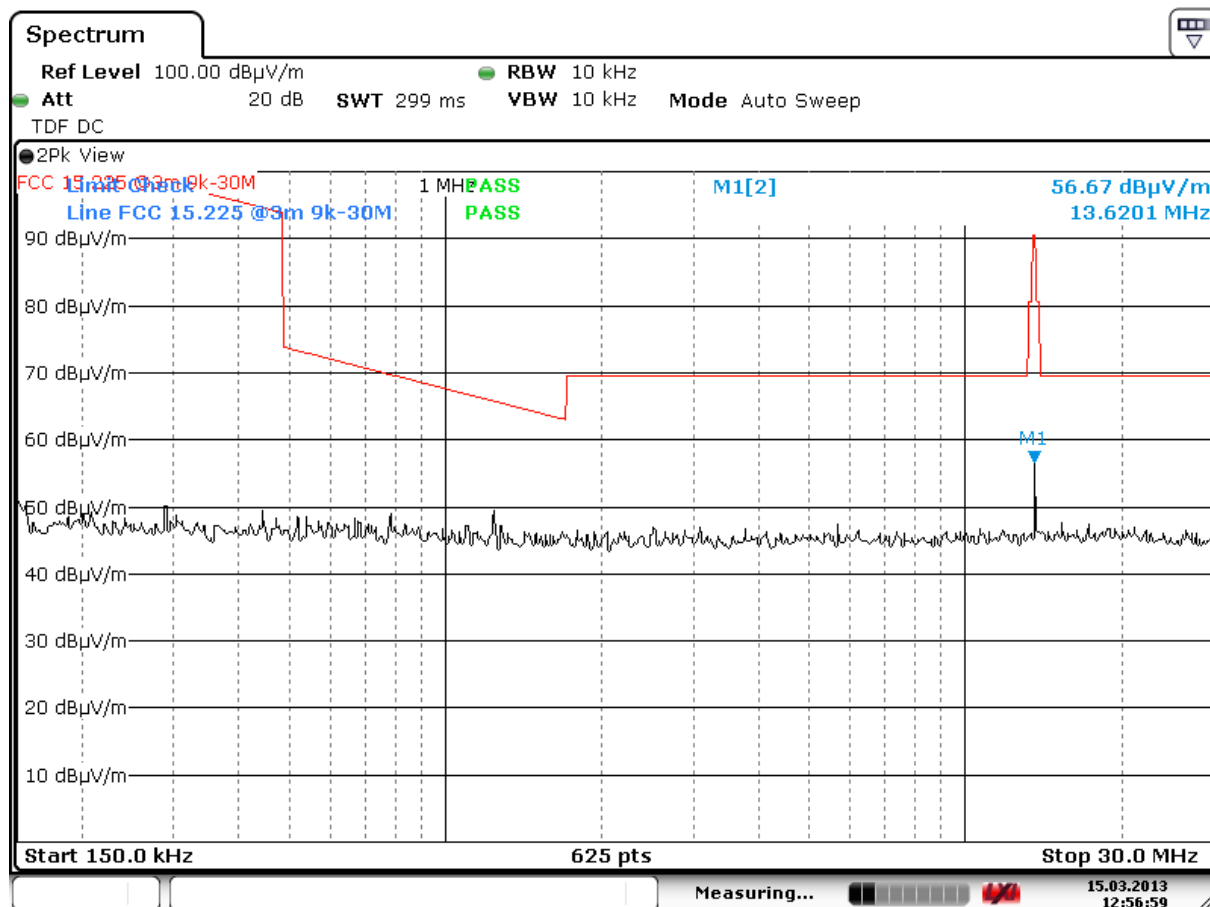


Date: 15.MAR.2013 13:05:02

Frequency MHz	Peak level dBμV/m	Bandwidth kHz	Limit dBμV/m	Margin dB	Polarization	Azimuth deg
0.050605	49.06	0.2	113.52	64.46	-	0

Other frequencies in range 9 kHz – 150 kHz: No signal > 50 dBμV/m detectable.

Diagram 225531-4 (150 kHz – 30 MHz)



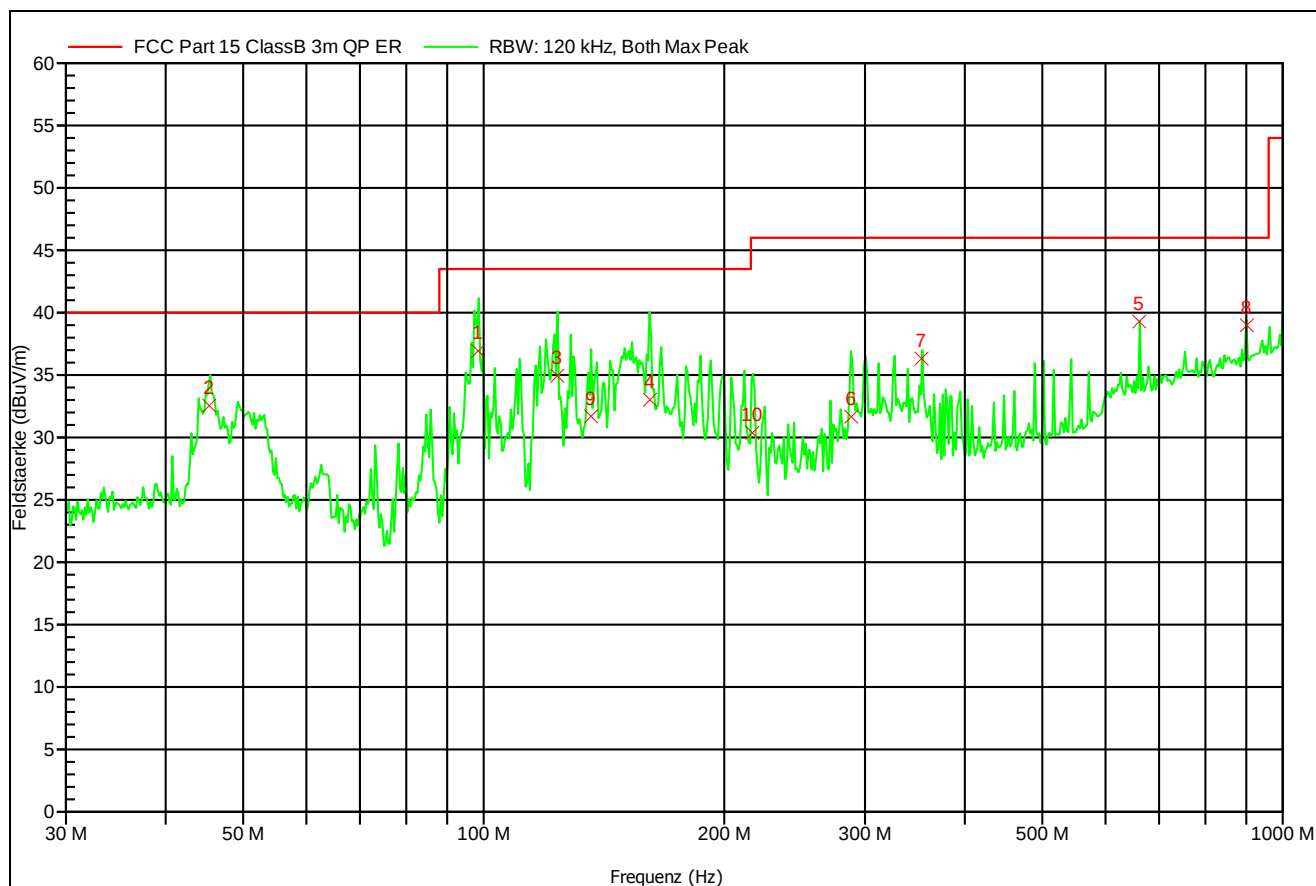
Date: 15.MAR.2013 12:56:59

Frequency MHz	Peak level dBμV/m	Bandwidth kHz	Limit dBμV/m	Margin dB	Polarization	Azimuth deg
-	-	10	-	-	-	-

Signal in 13.56 MHz range: Intentionally radiated signal, see clause 3.1

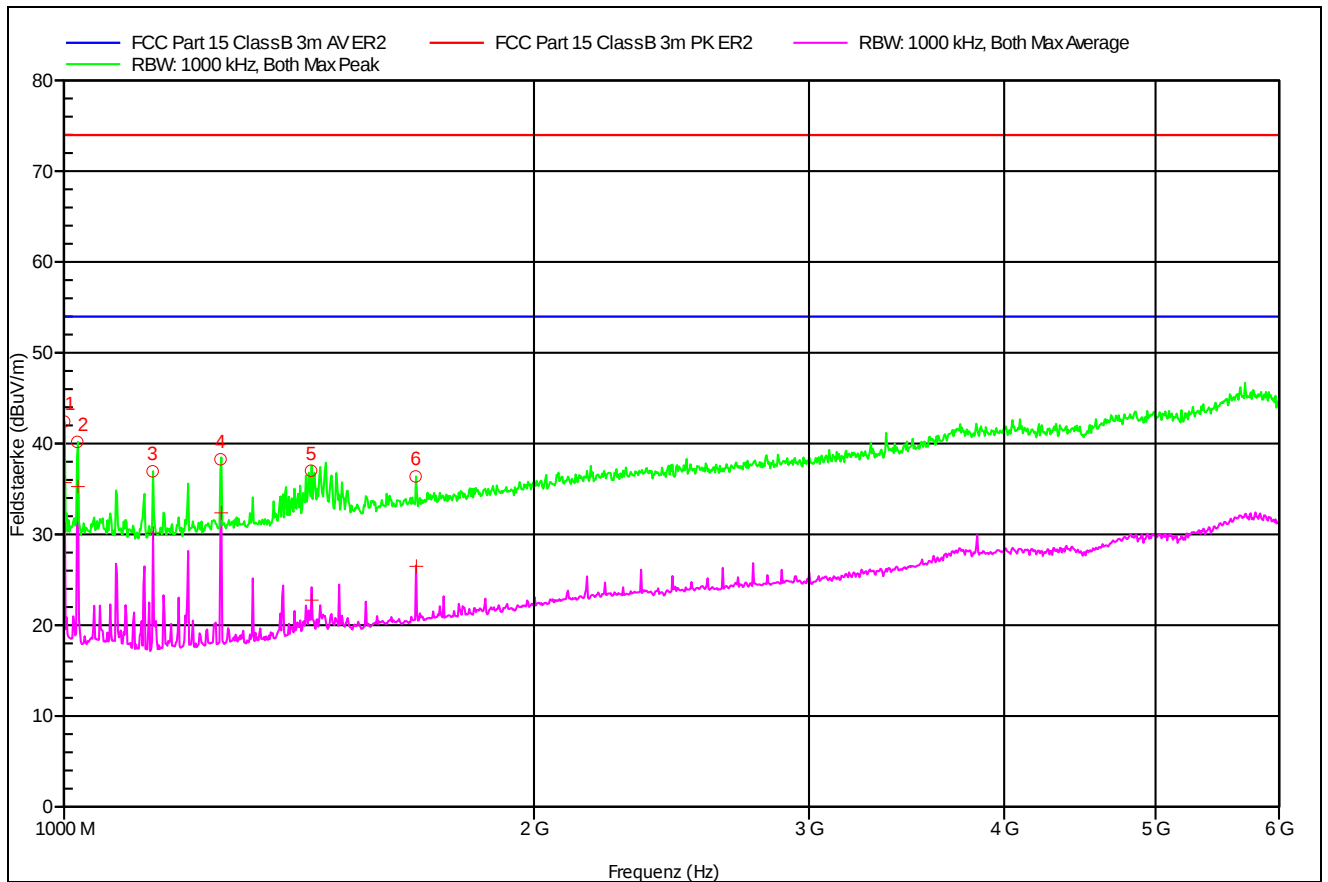
Other frequencies in range 150 kHz – 30 MHz: No signal > 50 dBμV/m detectable.

Diagram 225531-8ER (30 MHz – 1000 MHz)



Frequency MHz	Level QP dB(μV/m)	QP Limit dB(μV/m)	Margin dB	Angle deg	Height m	Polarization
45.270	32.60	40.00	7.4	11	1.10	Vertical
98.250	36.98	43.50	6.52	344	1.10	Vertical
123.420	34.99	43.50	8.51	290	1.89	Horizontal
135.990	31.74	43.50	11.76	279	2.09	Horizontal
161.190	33.07	43.50	10.43	94	2.70	Horizontal
216.480	30.42	46.00	15.58	95	1.70	Horizontal
287.910	31.71	46.00	14.29	300	1.89	Vertical
352.560	36.37	46.00	9.63	15	1.50	Vertical
660.030	39.33	46.00	6.67	20	1.20	Horizontal
900.000	39.03	46.00	6.97	355	1.39	Horizontal

Diagram 225531-11ER2 (1000 MHz – 6000 MHz)



Frequency GHz	Level PK dB(μV/m)	PK Limit dB(μV/m)	Margin dB	Angle deg	Height m	Polarization
1.000	42.44	73.98	31.54	360	1.20	Horizontal
1.020	40.19	73.98	33.79	349	1.10	Horizontal
1.140	36.95	73.98	37.03	13	1.00	Horizontal
1.260	38.27	73.98	35.71	335	1.10	Horizontal
1.440	37.01	73.98	36.97	337	1.10	Horizontal
1.680	36.38	73.98	37.6	360	1.00	Vertical

Frequency GHz	Level AV dB(μV/m)	AV Limit dB(μV/m)	Margin dB	Angle deg	Height m	Polarization
1.000	35.78	53.98	18.2	360	1.20	Horizontal
1.020	35.35	53.98	18.63	349	1.10	Horizontal
1.140	30.20	53.98	23.78	13	1.00	Horizontal
1.260	32.46	53.98	21.52	335	1.10	Horizontal
1.440	22.84	53.98	31.14	337	1.10	Horizontal
1.680	26.56	53.98	27.42	360	1.00	Vertical

3.3 AC power line conducted emissions

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Frequency range	0.15 – 30 MHz
Limits FCC	§15.207
Limits IC	RSS-Gen 7.2.4
Test uncertainty U95	3.46 dB

Test method and limits

The test was performed according to ANSI C63.4-2003 inside a shielded room where the floor and one of the walls of the test site comprised the reference ground plane (RGP). For the duration of the test the EUT was placed on a non-conductive table 0.8 m high 0.4 m apart from the vertical RGP (see photograph 2). The excess lengths of the cables of the EUT were made into bundles 30 -40 cm in length. The power input cable of the EUT was connected to an artificial mains network. The test was performed separately on each phase and also on the neutral wire.

The disturbances were first examined by performing a spectrum scan by using a peak detector. The general procedure in the conducted disturbance emission test is that no further measurements are necessary if the disturbance levels measured by using the peak detector are below the limit value defined for the measurement performed by using an average detector. If not, then at the test frequencies concerned the measurement is performed also by using a quasi -peak detector. If the disturbance levels measured by using the quasi-peak detector are below the limit value defined for the measurement performed by using an average detector, then measurements by using the average detector are not necessary.

FCC Part 15.207 Limit values

Frequency MHz	Quasi-peak dB μ V	Average dB μ V
0.15 – 0.5	66 to 56	56 to 46
0.5 – 5	56	46
5 - 30	60	50

Test result configuration 1: Passed.

Test result configuration 2: Passed.

Test Equipment Used: 36, 38, 39, 40, 41, 9

Measurement results of configuration 1

Diagram 225531-20EC

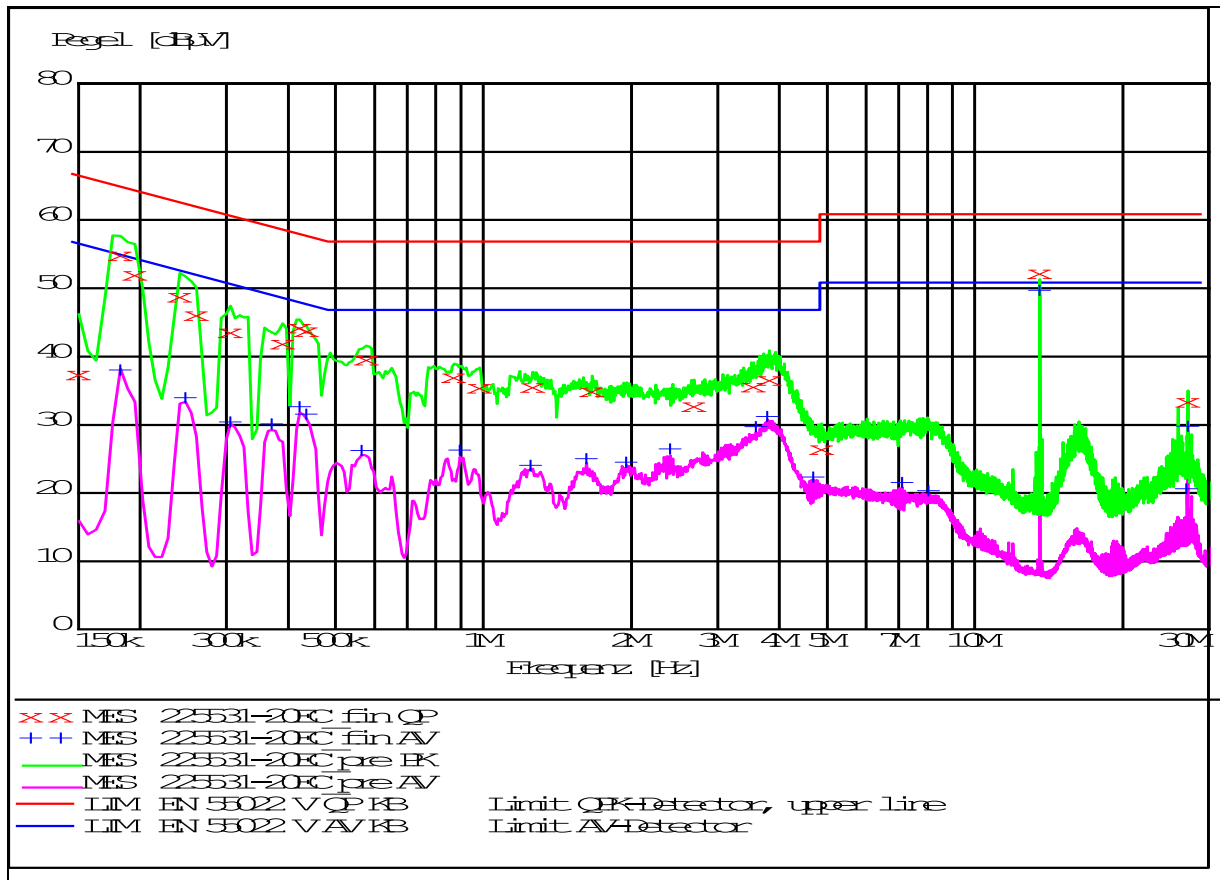


Table Final measurements 225531-20EC _fin QP

Frequenz MHz	Pegel dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150000	36.60	10.10	66.00	29.40	N	FLO
0.182500	54.10	10.10	64.40	10.30	N	FLO
0.195500	51.20	10.10	63.80	12.60	N	FLO
0.241000	48.00	10.10	62.10	14.10	N	FLO
0.260500	45.30	10.10	61.40	16.10	L1	FLO
0.306000	42.80	10.10	60.10	17.30	L1	FLO
0.390500	41.20	10.10	58.10	16.90	N	FLO
0.423000	43.50	10.10	57.40	13.90	N	FLO
0.436000	43.00	10.10	57.10	14.10	N	FLO
0.579000	38.80	10.10	56.00	17.20	L1	FLO
0.871500	36.20	10.10	56.00	19.80	N	FLO
0.982000	34.70	10.20	56.00	21.30	N	FLO
1.261500	34.80	10.20	56.00	21.20	N	FLO
1.664500	34.10	10.20	56.00	21.90	L1	FLO
2.685000	32.00	10.20	56.00	24.00	N	FLO
3.549500	34.90	10.30	56.00	21.10	N	FLO
3.816000	35.80	10.30	56.00	20.20	N	FLO
4.875500	25.70	10.40	56.00	30.30	N	FLO
13.559500	51.40	10.80	60.00	8.60	L1	FLO
27.118500	32.60	11.00	60.00	27.40	N	FLO

Table Final measurements 225531-20EC_fin AV

Frequenz	Pegel	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.182500	37.20	10.10	54.40	17.10	N	FLO
0.247500	33.10	10.10	51.80	18.70	L1	FLO
0.306000	29.60	10.10	50.10	20.50	N	FLO
0.371000	29.30	10.10	48.50	19.10	N	FLO
0.423000	31.80	10.10	47.40	15.60	L1	FLO
0.436000	30.70	10.10	47.10	16.40	L1	FLO
0.566000	25.40	10.10	46.00	20.60	N	FLO
0.897500	25.50	10.20	46.00	20.50	L1	FLO
1.248500	23.20	10.20	46.00	22.80	N	FLO
1.619000	24.20	10.20	46.00	21.80	L1	FLO
1.957000	23.70	10.20	46.00	22.30	N	FLO
2.399000	25.60	10.20	46.00	20.40	N	FLO
3.588500	28.90	10.30	46.00	17.10	N	FLO
3.790000	30.40	10.30	46.00	15.60	N	FLO
4.706500	21.50	10.30	46.00	24.50	N	FLO
7.118000	20.70	10.50	50.00	29.30	L1	FLO
8.054000	19.50	10.50	50.00	30.50	L1	FLO
13.559500	48.90	10.80	50.00	1.10	L1	FLO
27.001500	19.80	11.00	50.00	30.20	N	FLO
27.118500	29.00	11.00	50.00	21.00	L1	FLO

Measurement results of configuration 2

Diagram 225531-21EC

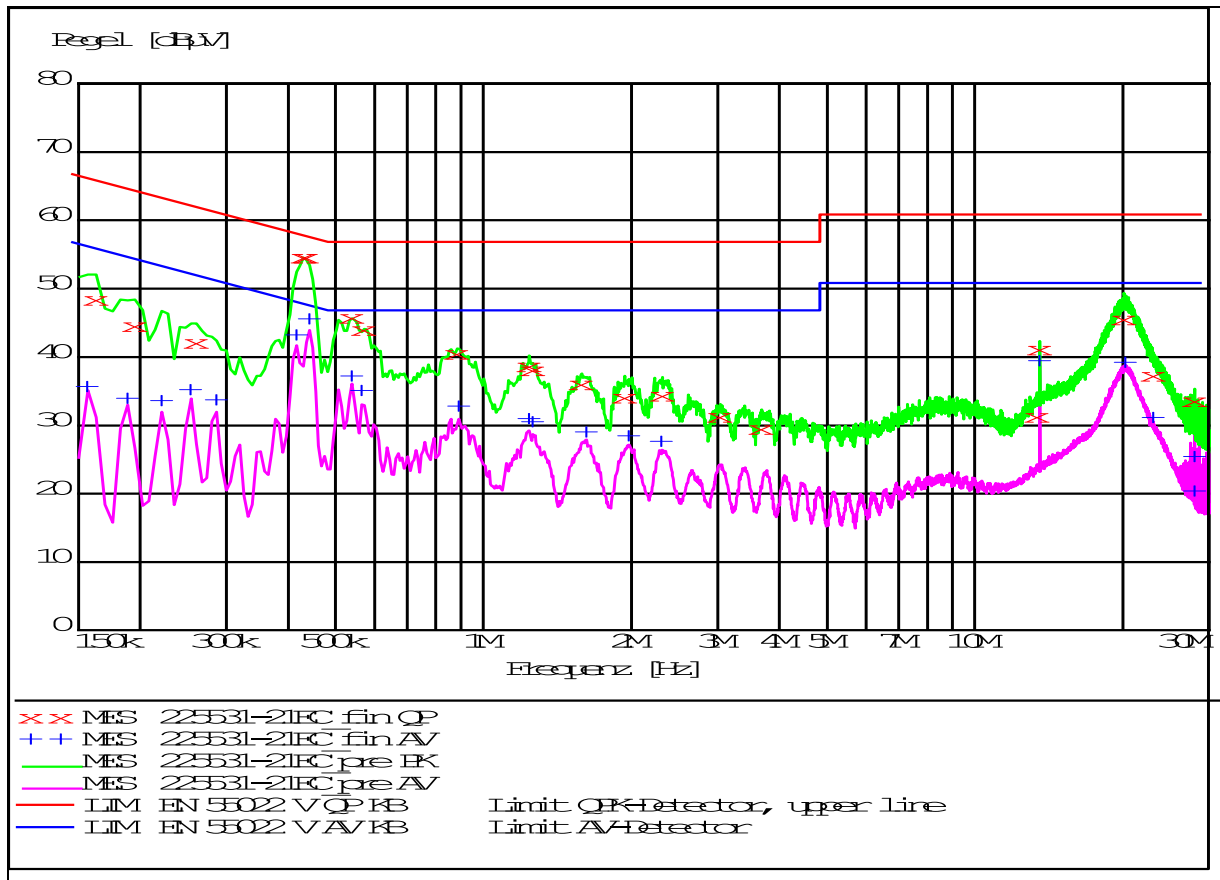


Table Final measurements 225531-21EC _fin QP

Frequenz MHz	Pegel dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.163000	47.60	10.10	65.30	17.70	N	GND
0.195500	43.80	10.10	63.80	20.00	N	GND
0.260500	41.30	10.10	61.40	20.10	N	GND
0.429500	53.80	10.10	57.30	3.50	L1	GND
0.436000	53.80	10.10	57.10	3.40	L1	GND
0.540000	45.00	10.10	56.00	11.00	L1	GND
0.572500	43.20	10.10	56.00	12.80	L1	GND
0.884500	39.70	10.10	56.00	16.30	L1	GND
1.242000	37.90	10.20	56.00	18.10	N	GND
1.261500	37.30	10.20	56.00	18.70	N	GND
1.586500	35.30	10.20	56.00	20.70	N	GND
1.937500	33.30	10.20	56.00	22.70	L1	GND
2.314500	33.60	10.20	56.00	22.40	N	GND
3.029500	30.50	10.30	56.00	25.50	N	GND
3.679500	28.70	10.30	56.00	27.30	N	GND
13.403500	30.50	10.80	60.00	29.50	N	GND
13.559500	40.40	10.80	60.00	19.60	L1	GND
20.163500	44.70	11.20	60.00	15.30	L1	GND
23.108000	36.50	11.10	60.00	23.50	L1	GND
28.054500	32.80	11.00	60.00	27.20	L1	GND

Table Final measurements 225531-21EC_fin AV

Frequenz	Pegel	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.156500	34.90	10.10	55.60	20.80	N	GND
0.189000	33.10	10.10	54.10	21.00	N	GND
0.221500	32.80	10.10	52.80	20.00	L1	GND
0.254000	34.40	10.10	51.60	17.20	N	GND
0.286500	32.90	10.10	50.60	17.70	N	GND
0.416500	42.40	10.10	47.50	5.20	L1	GND
0.442500	44.70	10.10	47.00	2.30	L1	GND
0.540000	36.40	10.10	46.00	9.60	N	GND
0.566000	34.30	10.10	46.00	11.70	N	GND
0.891000	32.00	10.10	46.00	14.00	N	GND
1.242000	30.20	10.20	46.00	15.80	N	GND
1.261500	29.70	10.20	46.00	16.30	N	GND
1.619000	28.20	10.20	46.00	17.80	L1	GND
1.976500	27.60	10.20	46.00	18.40	N	GND
2.308000	26.80	10.20	46.00	19.20	N	GND
13.559500	38.60	10.80	50.00	11.40	N	GND
20.274000	38.40	11.20	50.00	11.60	L1	GND
23.069000	30.30	11.10	50.00	19.70	L1	GND
28.035000	19.60	11.00	50.00	30.40	N	GND
28.048000	24.60	11.00	50.00	25.40	L1	GND

3.4 Frequency stability

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Operating frequency	13.560000 MHz
Limits FCC	§15.225
Limits IC	RSS-210 A2.6
Test uncertainty U95	134 Hz

Test method and limits

The test was performed inside a climate chamber. The EuT's carrier signal was measured using a spectrum analyzer and a miniature loop antenna. In configuration 1, the AC/DC plug-in converter was placed inside the chamber. The PoE switch (configuration 2) was placed outside the climate chamber.

FCC Part 15.225 Limit values

Frequency MHz	Deviation limit	Deviation limit Hz
13.56	$\pm 0.01\%$	± 1356

Test result configuration 1: Passed.

Test result configuration 2: Passed.

Test Equipment Used: 46, 48, 49, 50

Measurement results of configuration 1

Voltage (%)	Voltage V	Temperature °C	Frequency Hz	Frq. Deviation Hz	Frq. Deviation (%)
100	115	+20 (Ref.)	13.56009516	+95	+0.0007
		-20	13.560016	+16	+0.0001
		-10	13.5600512	+51	+0.0004
		0	13.5600736	+74	+0.0005
		+10	13.5600864	+86	+0.0006
		+20	13.5600896	+90	+0.0007
		+30	13.5600928	+93	+0.0007
		+40	13.5601024	+102	+0.0008
		+50	13.5601408	+141	+0.0010
85	97.7	+20	13.56009516	+95.16	+0.0007
115	132.3	+20	13.56009516	+95.16	+0.0007

Measurement results of configuration 2

Voltage (%)	Voltage V	Temperature °C	Frequency Hz	Frq. Deviation Hz	Frq. Deviation (%)
100	115	+20 (Ref.)	13.56009516	+95	+0.0007
		-20	13.560016	+16	+0.0001
		-10	13.560048	+48	+0.0004
		0	13.5600736	+74	+0.0005
		+10	13.5600864	+86	+0.0006
		+20	13.5600896	+90	+0.0007
		+30	13.5600928	+93	+0.0007
		+40	13.5601024	+102	+0.0008
		+50	13.5601408	+141	+0.0010
85	97.7	+20	13.56009516	+95.16	+0.0007
115	132.3	+20	13.56009516	+95.16	+0.0007

3.5 Occupied Bandwidth

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Operating frequency	13.560000 MHz
Requirement FCC	§15.215
Requirement IC	RSS-Gen 4.6

Test method and limits

The 20 dB bandwidth is measured with a spectrum analyzer connected to a receive antenna placed near the EuT.

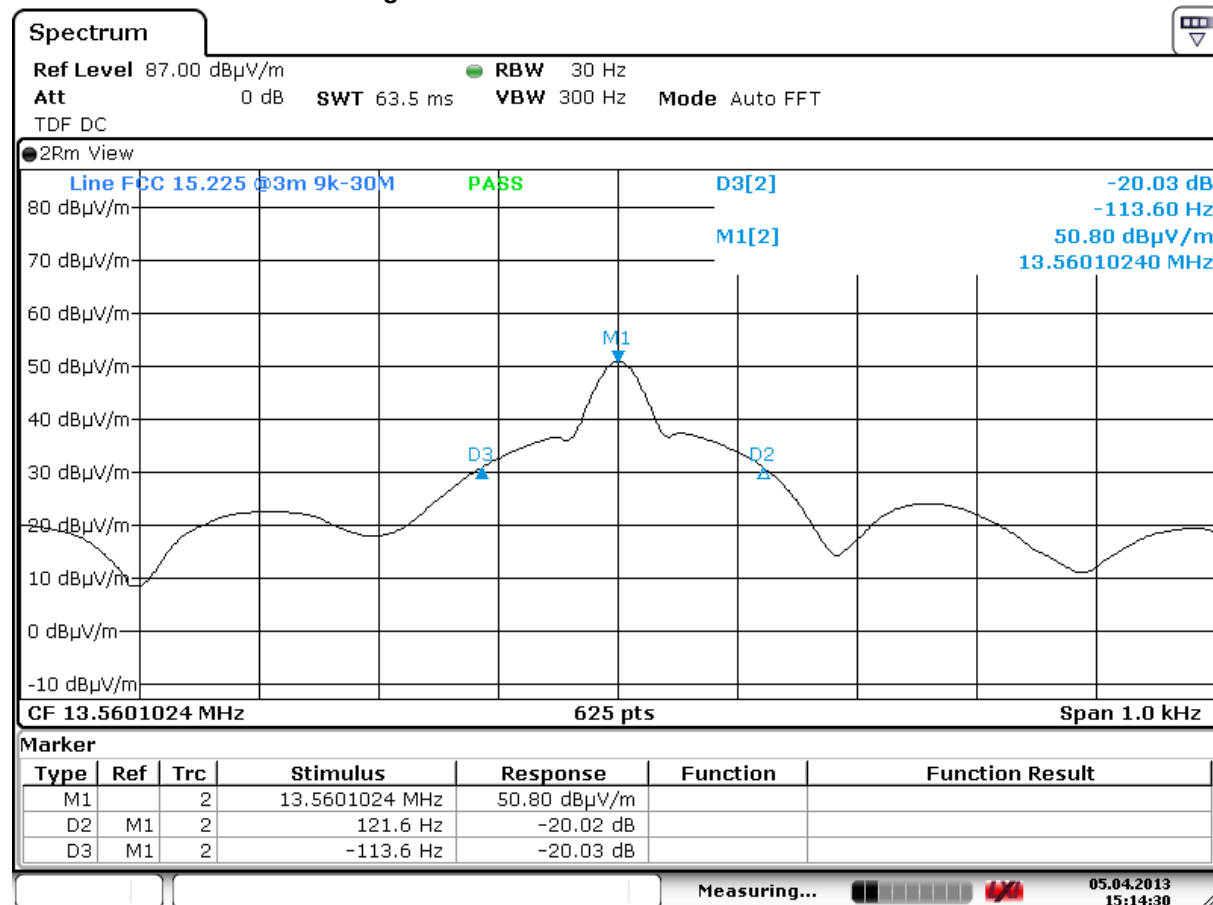
Frequency deviations summarized from carrier frequency drift (see clause 3.4) and occupied bandwidth must not exceed frequency band limits from clause 3.1.

Test result configuration 1: Passed.

Test result configuration 2: Passed.

Test Equipment Used: 45, 46

Measurement results of configuration 1

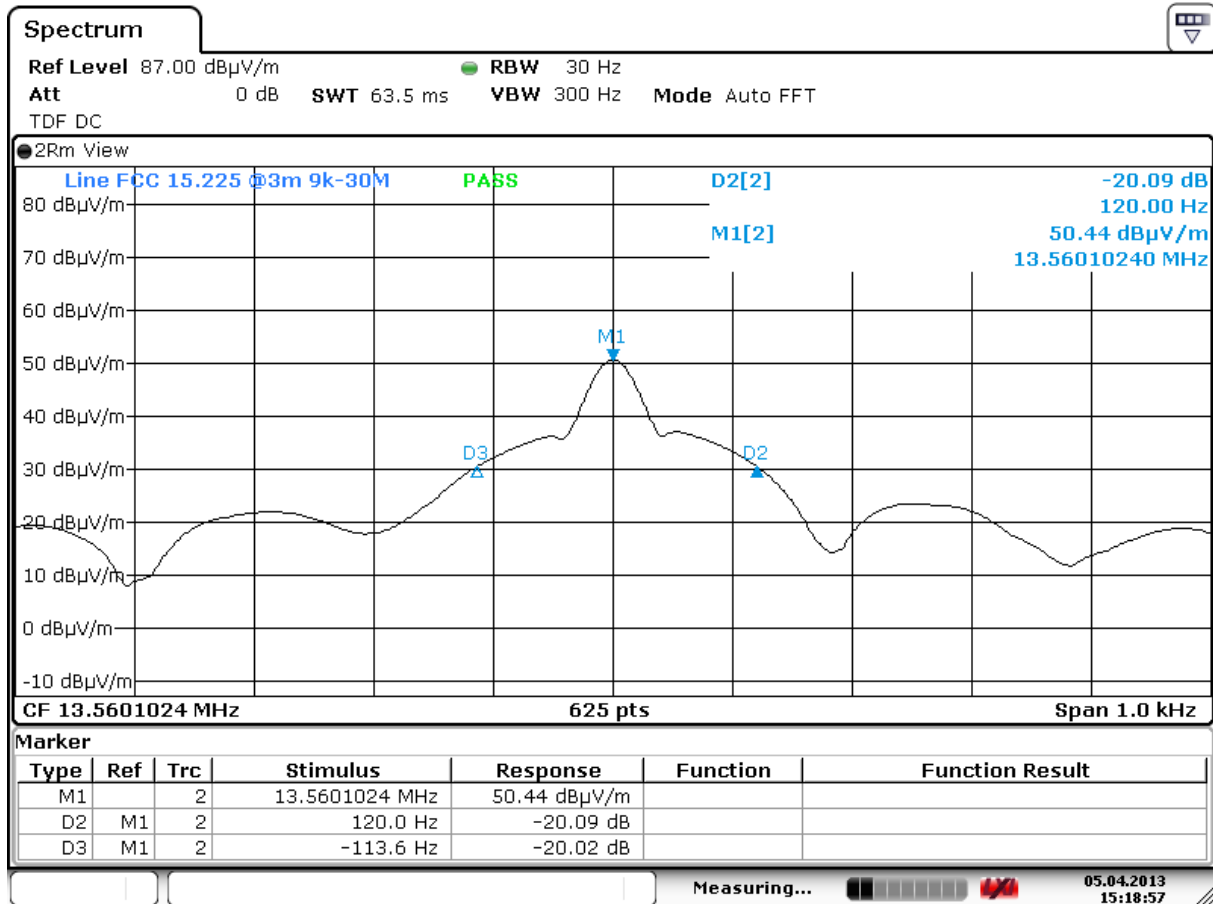


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Center Frequency MHz	lower -20 dBc point Hz	upper -20 dBc point Hz	-20 dB bandwidth Hz
13.56010	-113.6	121.6	235.2

worst case carrier frequency MHz	-20 dBc point Hz	worst case frequency Mhz	Limit MHz
13.560016	-113.6	13.5599024	13.553
13.5601408	121.6	13.5602624	13.567

Measurement results of configuration 2



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Center Frequency MHz	lower -20 dBc point Hz	upper -20 dBc point Hz	-20 dB bandwidth Hz
13.56010	-113.6	120.0	233.6

worst case carrier frequency MHz	-20 dBc point Hz	worst case frequency Mhz	Limit MHz
13.560016	-113.6	13.5599024	13.553
13.5601408	120.0	13.5602608	13.567

4 Test equipment used

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the test house.

No.	Instrument/ ancillary	Type of instrument/ ancillary	Manufacturer	Ref. no.	Cal. Date	Cal. Due
1	PSG 1000 B	RF signal generator	Farnell	1-0074	2012-06-21	2013-06-20
2	RG 213	Coaxial cable (gen. to PA)	-	1-0369	2011-10-21	2013-10-20
3	200W1000M7A	Power amplifier	Amplifier Research	1-0390	-	-
4	URV5	RF-Voltmeter	Rohde & Schwarz	1-0086	2011-11-04	2013-11-03
5	URV5-Z4	Probe for RF-Voltmeter	Rohde & Schwarz	1-0249	2012-10-25	2013-10-24
6	RG 213	Coaxial cable (PA to FAC)	Rohde & Schwarz	1-0371	2011-10-21	2013-10-20
7	RF 214-N/7	Antenna cable 2	Kabelwerk Eupen	1-0364	2011-10-21	2013-10-20
8	EM 6954	Log.-per. antenna	Electro-Metrics	1-0082	-	-
9	-	Semi anechoic chamber	R&M München	1-0361	2011-10-19	2013-10-18
10	EMC	Isotropic field sensor	Narda	1-0251	2012-04-25	2014-04-24
11	EMC	Field monitoring system	Narda	1-0252	2012-04-25	2014-04-24
12	RSUS	EMS Software	NeWeTec	1-0078	-	-
13	SML03	RF signal generator	Rohde & Schwarz	1-0250	2012-10-24	2013-10-23
14	ecoflex 10	Coaxial cable (gen. to PA)	SSB electronic	1-0370	2011-10-21	2013-10-20
15	30S1G3	Power amplifier	Amplifier Research	1-0254	-	-
16	ecoflex 15	Antenna cable (horn ant.)	SSB electronic	1-0368	2011-10-21	2013-10-20
17	BBHA 9120	Horn antenna	Schwarzbeck	1-0256	-	-
18	ESD 30	ESD generator	EM-Test	1-0056	2012-11-13	2013-11-12
19	HCP	Horizontal coupling plane	Nemko	1-0201	-	-
20	VCP	Vertical coupling plane	Nemko	1-0202	-	-
21	STLP 9128D	Log.-per. antenna	Schwarzbeck	1-0626	-	-
22	EFT 500	BURST generator	EM-Test	1-0058	2012-06-25	2013-06-24
23	CNI 503	Coupling/Decoupling network	EM-Test	1-0059	2012-06-25	2013-06-24
24	-	EM-Test software	EM-Test	1-0060	-	-
25	HFK	Capacitive coupling clamp	EM-Test	1-0093	-	-
26	ALPHA 250/75 A	Power amplifier	ALPHA	1-0085	-	-
27	50 FH-006-100-N	Attenuator	JFW	1-0089	-	-
28	FCC-801-M2-16	M2 - CDN	FCC	1-0094	2012-05-03	2013-05-02
29	FCC-801-M3-16	M3 - CDN	FCC	1-0083	2012-05-03	2013-05-02
30	L-801 M5	M5 - CDN	Lüthi	1-0374	2012-05-03	2013-05-02
31	F-203I-23mm	EM-injection clamp	FCC	1-0196	2012-05-03	2013-05-02
32	CWG 1500	SURGE generator	Schlöder EMV-Systeme	1-0785	2012-06-25	2013-06-24
33	CWG 523	Coupling/Decoupling network	Schlöder EMV-Systeme	1-0784	2012-06-25	2013-06-24
34	EMV-Soft 8.0	Test software	Schlöder EMV-Systeme	1-0786	-	-
35	MegaPulse 10 x 700 - 7	SURGE generator	Compliance West	1-0654	2012-06-27	2013-06-26

No.	Instrument/ ancillary	Type of instrument/ ancillary	Manufacturer	Ref. no.	Cal. Date	Cal. Due
36	ESH3-Z5	Artificial mains network, 1ph	Rohde & Schwarz	1-0072	2012-10-23	2013-10-22
37	ESH2-Z5	Artificial mains network, 3ph	Rohde & Schwarz	1-0037	2012-10-25	2013-10-24
38	ESH3-Z2	Pulse limiter	Rohde & Schwarz	1-0054	2012-10-23	2013-10-22
39	RG 213	Coaxial cable (to chamber)	-	1-0362	2011-10-21	2013-10-20
40	ESHS 10	Measuring receiver	Rohde & Schwarz	1-0069	2012-10-23	2013-10-22
41	ES-K1	EMI-Software ES-K1	Rohde & Schwarz	1-0071	-	-
42	EZ-17	Current clamp	Rohde & Schwarz	1-0353	2012-10-23	2014-10-22
43	FG33X15	Absorber	Lüthi	1-0090	-	-
44	-	Shielded chamber	Euroshield	1-0359	-	-
45	HFH2-Z2	Loop antenna	Rohde & Schwarz	1-0039	2013-07-25	2014-07-24
46	FSV40	Signal analyzer	Rohde & Schwarz	1-0611	2012-12-18	2013-12-17
47	ESU8	EMI test receiver	Rohde & Schwarz	1-0604	2013-01-29	2014-01-28
48	1000SB	Climate chamber	Weiss Technik	1-0334	2012-06-21	2013-06-20
49	SyCore	Control unit	Spitzenberger + Spies	1-0506	2012-10	2013-10
50	PAS-10000	Power amplifier	Spitzenberger + Spies	1-0503	2012-10	2013-10
51	VULB 9163	Trilog antenna	Schwarzbeck	1-0200	2012-11-27	2015-11-26
52	STLP9148	Log.-per. antenna	Schwarzbeck	1-0614	2010-07-26	2013-07-25
53	BBV 9718	Pre amplifier	Schwarzbeck	1-0615	2010-07-23	2013-07-22
54	ARS 16/3	Analyzer reference system	Spitzenberger + Spies	1-0507	2012-10	2013-10
55	SF106	Antenna cable 3	Huber & Suhner	1-0620	2010-07-24	2013-07-23
56	SF106	Coaxial cable (to SAC)	Huber & Suhner	1-0619	2010-07-24	2013-07-23

5 Photos of the EuT

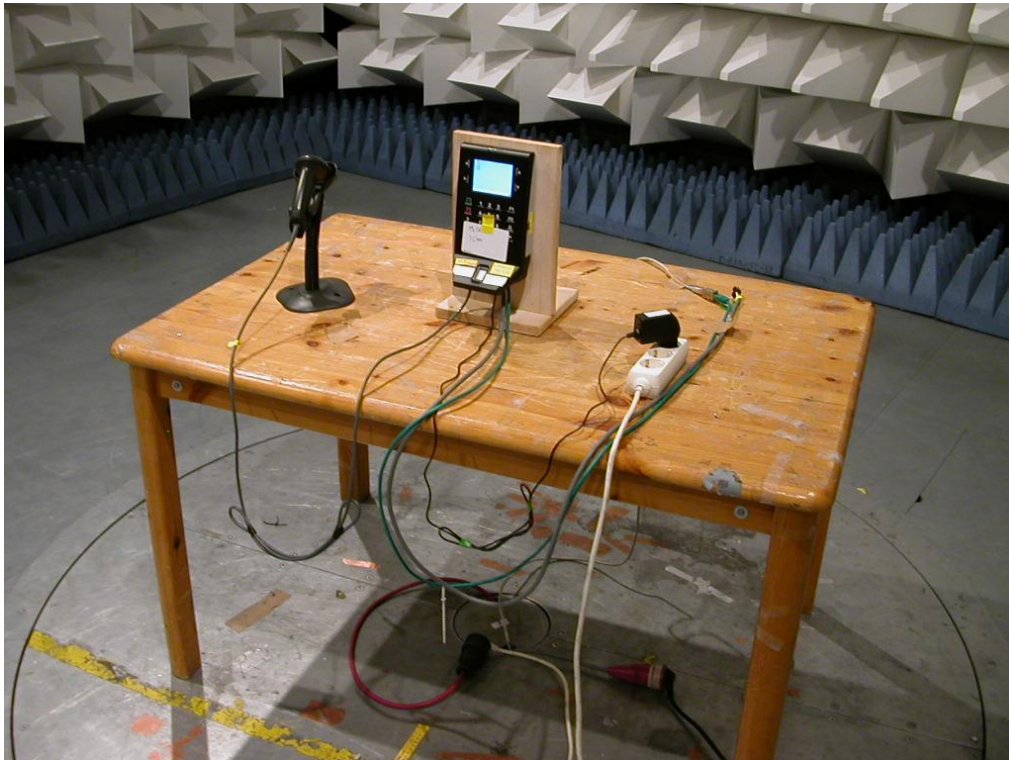


Figure 1 EUT / test set up - spurious radiated emissions

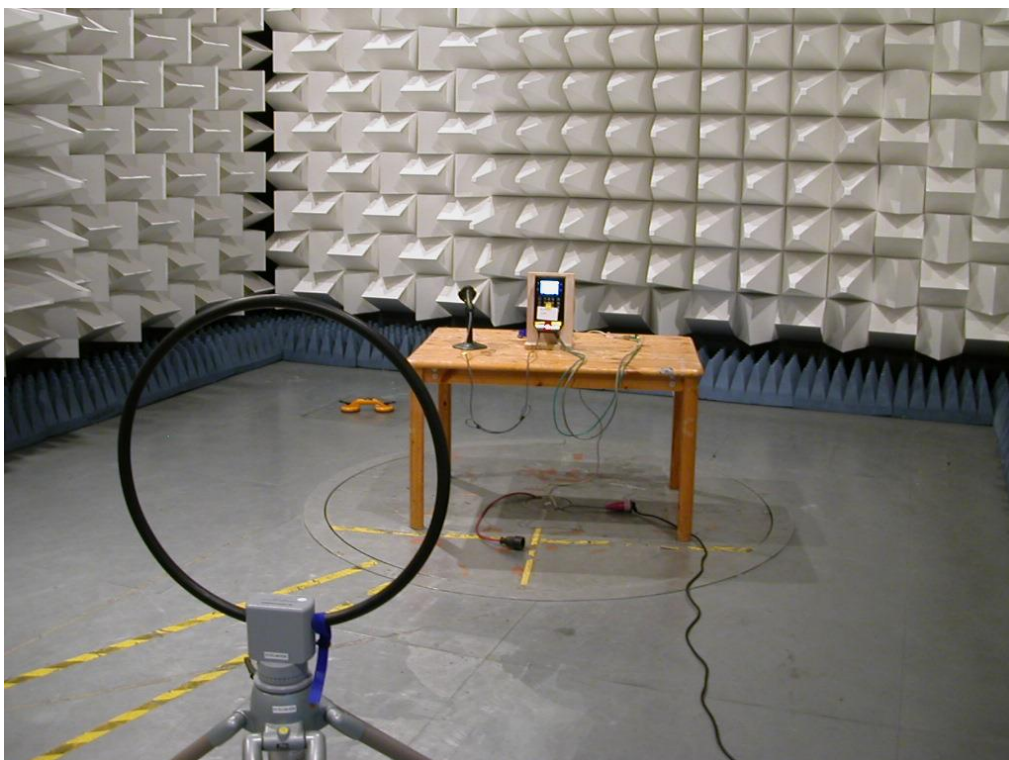


Figure 2 EUT / test set up - spurious radiated emissions



Figure 3 EUT / test set up - spurious conducted emissions



Figure 4 EUT / test set up - spurious conducted emissions



Figure 5 EUT / AC/DC converter



Figure 6 PoE switch



Figure 7 EUT / front view



Figure 8 EUT / rear view