RADIO TEST REPORT

No. 1211232, Ed. 3

RF Performance

EQUIPMENT UNDER TEST

Equipment :	Radio communication equipment
Type / model :	QP100ex
Manufacturer :	Nacre AS
Tested by request of :	Sperian Protection Sweden AB

SUMMARY

All selected test cases specified in this report comply with the requirements according to the following standard:

FCC, Part 15 (2011), Subpart C section 15.249

RSS-210, Issue 8 (Dec 2010)

Test methods according to ANSI C63.10-2009

Date of issue: 2012-07-19

Tested by: Farzad Farzaneh
on behalf of Åke Carlson

Approved by: Stefan Andersson

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REVISION HISTORY

Edition	Date	Description
1	2012-03-27	First release
2	2012-07-12	Test report updated with; • equipment list, • date for receiving test sample • polarization for radiated emission • plots for delta marker method
3	2012-07-19	Calibration dates changed from year/month to year/month/day

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CLIENT INFORMATION

The EUT has been tested by request of

Company:	Sperian Protection Sweden AB
Name of contact:	Marie Persson

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT according to the manufacturer/client declaration

Equipment:	Radio communications equipment
Type / Model:	QP100ex
Brand name:	QP100ex
Manufacturer:	Nacre AS
Rating/Supplying voltage:	4 V (battery)
Rating RF output power:	91.4 dBµV/m at 3 m (measured)
Antenna gain:	2,5 dBi
External antenna connector:	No
Operating temperature range:	-20 to + 55 ˚C
Frequency range:	2402 – 2482 MHz
Number of channels:	79
Modulation characteristics:	GFSK

2.2 Receiving date for test sample

Test samples were received at 2012-03-21.

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3. TEST SPECIFICATIONS

3.1 Standards

FCC 47 CFR part 15 (2011) Subpart C – Intentional radiators

Measurements methods according to ANSI C63.4-2009 and ANSI C63.10-2009

3.2 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standard.

3.3 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913
Intertek Semko AB is a Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
STORA HALLEN a.k.a. BIG CHAMBER	Semi-anechoic 10m and 3m	2042G-2
RADIOHALLEN	Fully-anechoic 3m	--

3.4 Test set-up

Measurement set-up for all tests is described in the radiated spurious emissions section.

3.5 Test conditions

If not additionally specified, the tests were performed under the following environmental conditions:

Parameter	Normal
Supplying voltage, V	4 V DC
Air temperature, °C	20-24°C

4. TEST SUMMARY

The results in this report apply only to the sample tested.

Test	FCC Reference	IC Reference	Result	Comment
Radiated output power	15.249	RSS-210 A8.4	PASS	
Band Edge Compliance	15.249	RSS-210 A8.5	PASS	
Out of band spurious emission, radiated	15.249	RSS-210 A8.5	PASS	
Conducted AC powerline emission	15.207	-	NA	Note 1

NT = Not Tested
NA = Not Applicable

Note 1. Not possible to transmit while connected to battery charger

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5. RADIATED SPURIOUS EMISSIONS

5.1 Measurement set-up

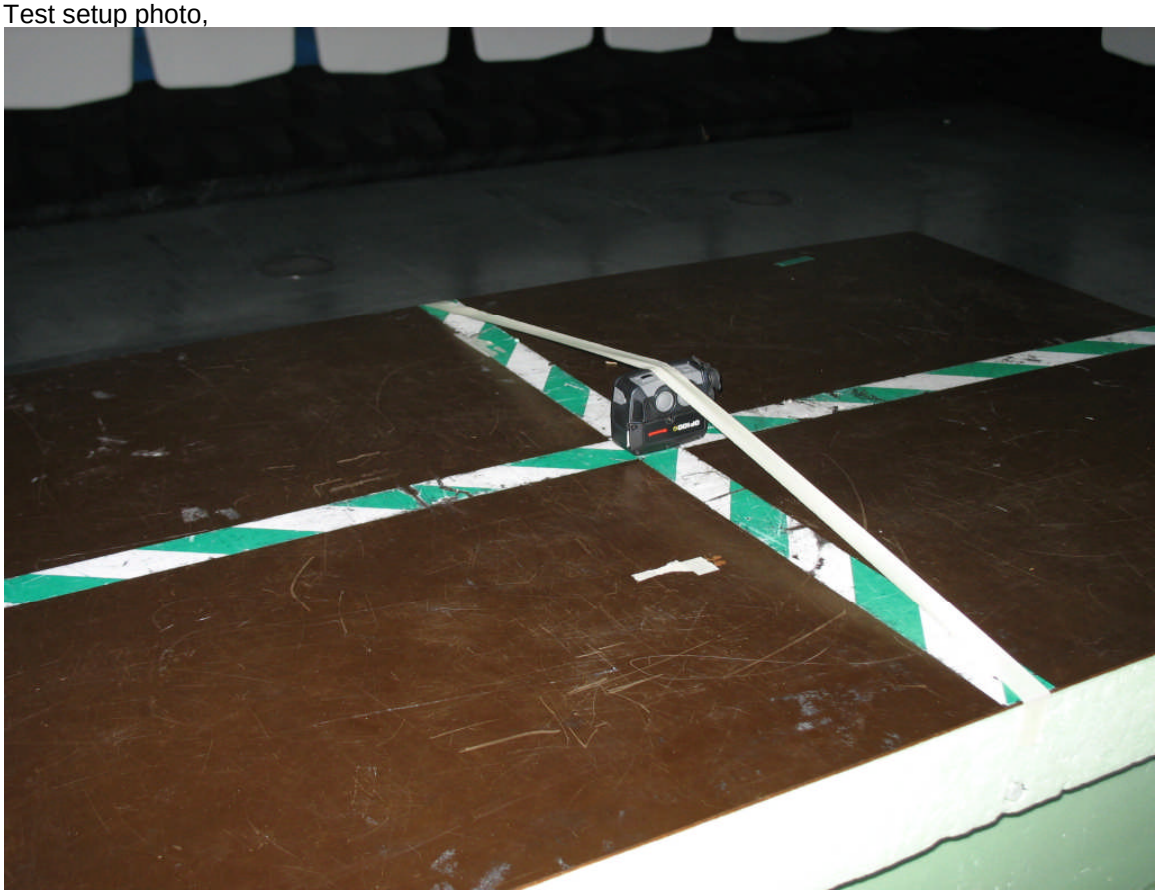
The EUT was investigated by overview sweep with peak detection in 3 orthogonal axes during the radiated tests. The worst case axes are presented in the report.

Test site: Big semi anechoic shielded chamber (30 – 1000 MHz)

The EUT was placed on a non-metallic table, 0.8 m above the floor. The radiated power was measured at a distance of 3 m. An overview sweep with peak detection was performed with the measurement receiver in max-hold and with the antenna placed 1.5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps. The specified test mode was enabled.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed in a semi anechoic chamber. With the EUT and antenna in the worst-case configuration new peak measurements were carried out.

Test setup photo,



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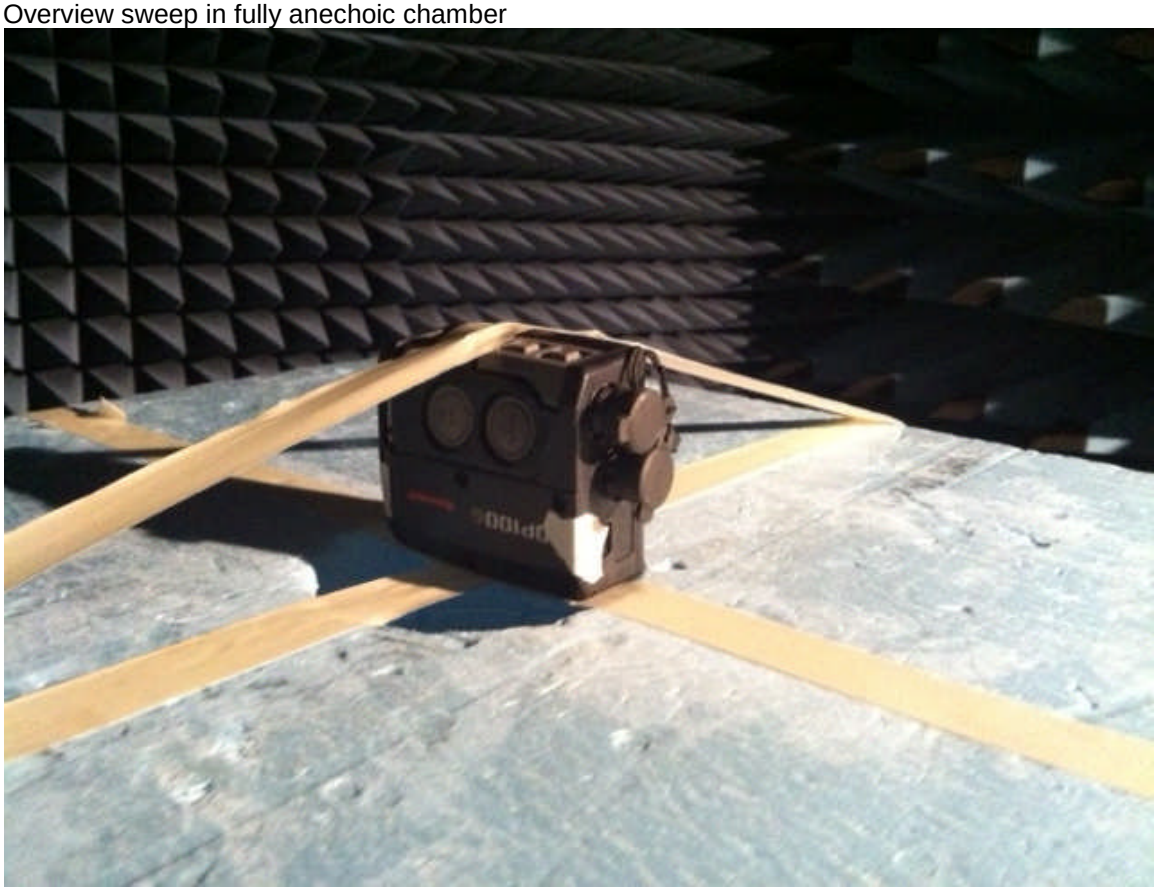
Test site: Big anechoic shielded chamber (1 – 10 GHz)

The overview sweep where made in a fully anechoic shielded chamber. In the fully anechoic shielded chamber the EUT was placed on a non-metallic table, 0.8 m above the floor. The radiated power was measured at a distance of 3 m. An overview sweep with peak detection was performed with the measurement receiver in max-hold and with the antenna placed 1.5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps. The specified test mode was enabled.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new peak measurements were carried out in a semi anechoic chamber

Test set-up photo,
Overview sweep in fully anechoic chamber



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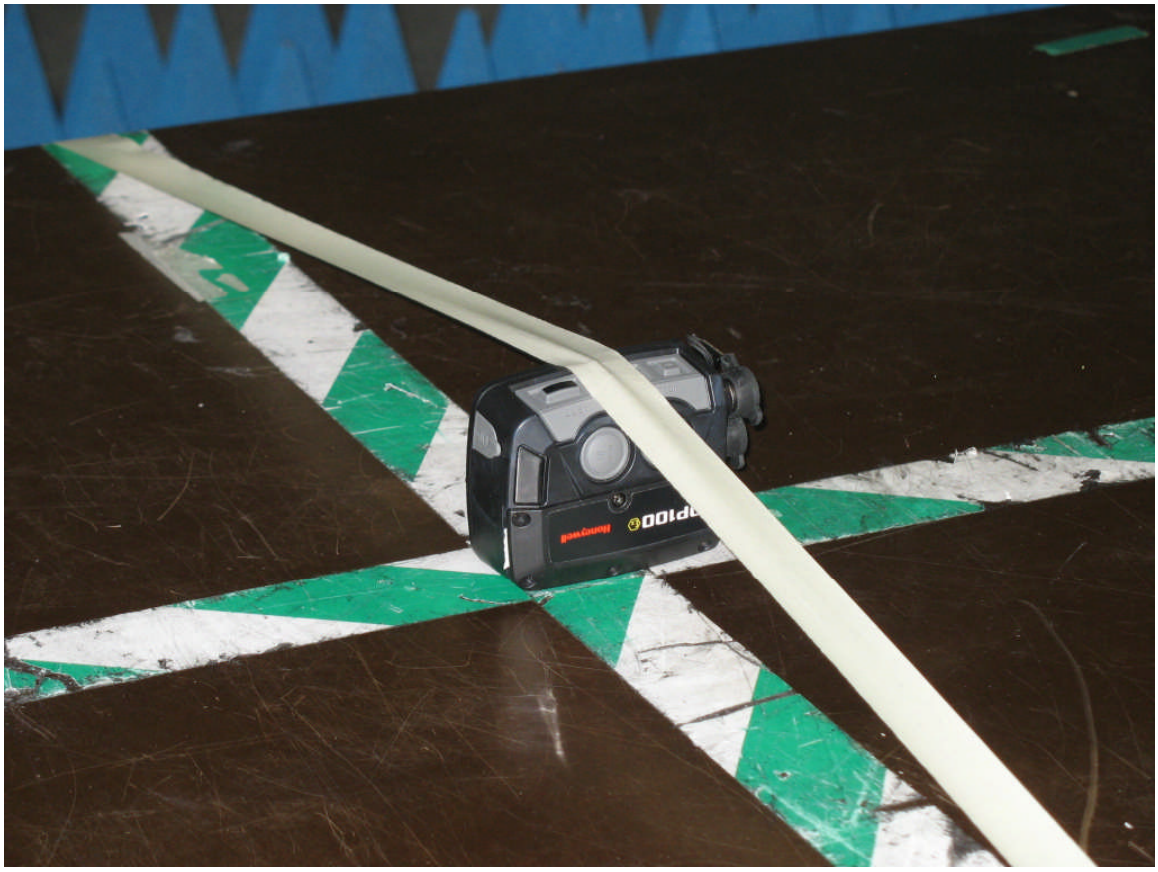
Test setup
Big anechoic chamber



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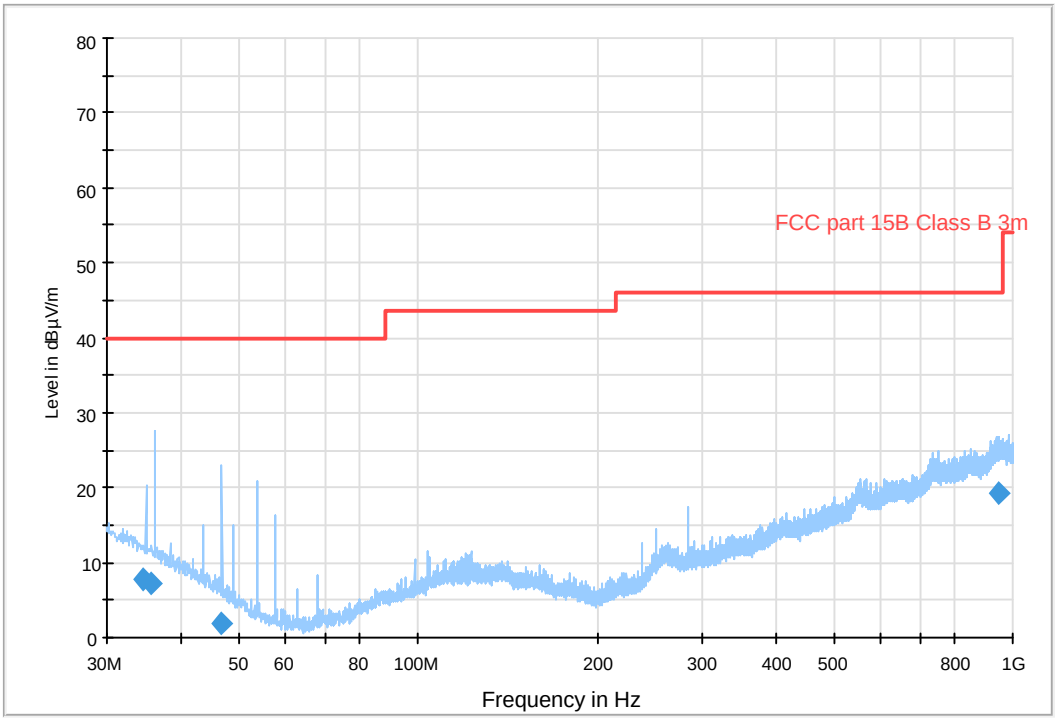
5.2 Test protocol

Big semi anechoic shielded chamber

Date of test: 2012-03-26

30 – 1000 MHz, quasi peak at a distance of 3 m, TX low channel

FCC 30 - 1000 MHz FCC class B 3m



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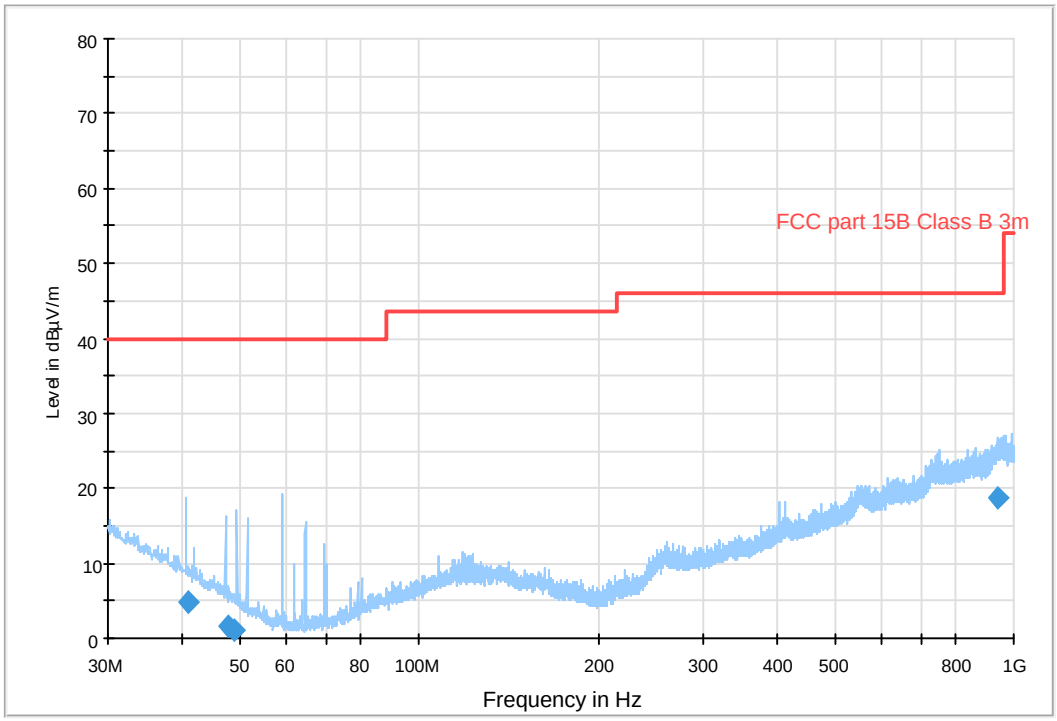
30 – 1000 MHz, quasi peak at a distance of 3 m, TX middle channel.

FCC 30 - 1000 MHz FCC class B 3m



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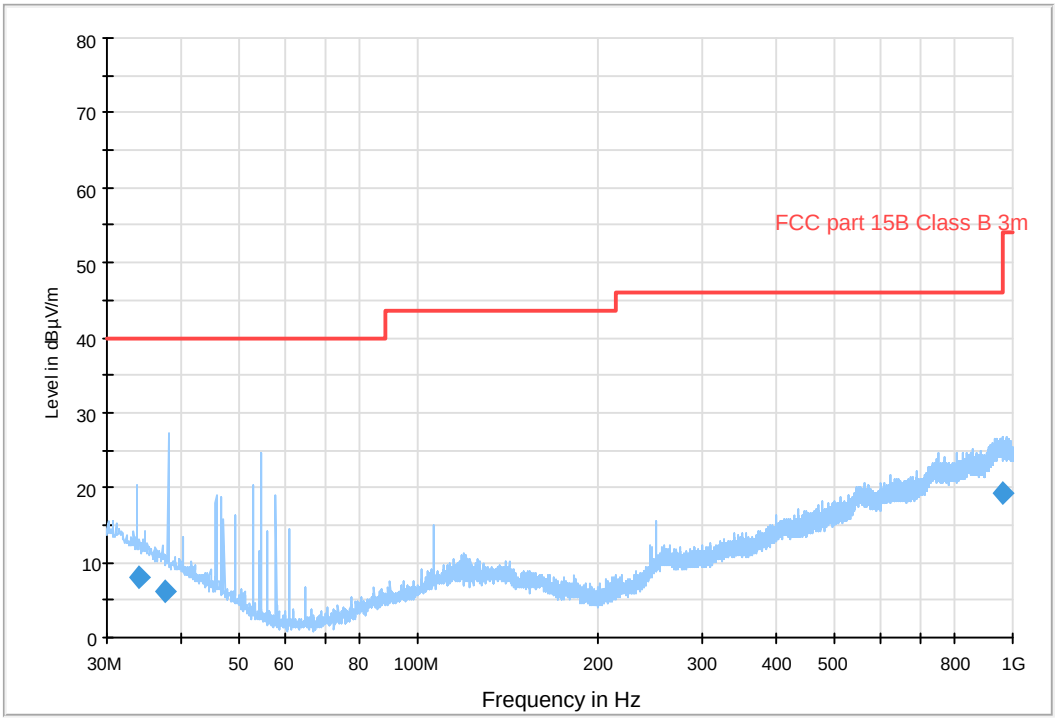
30 – 1000 MHz, quasi peak at a distance of 3 m, TX high channel.

FCC 30 - 1000 MHz FCC class B 3m



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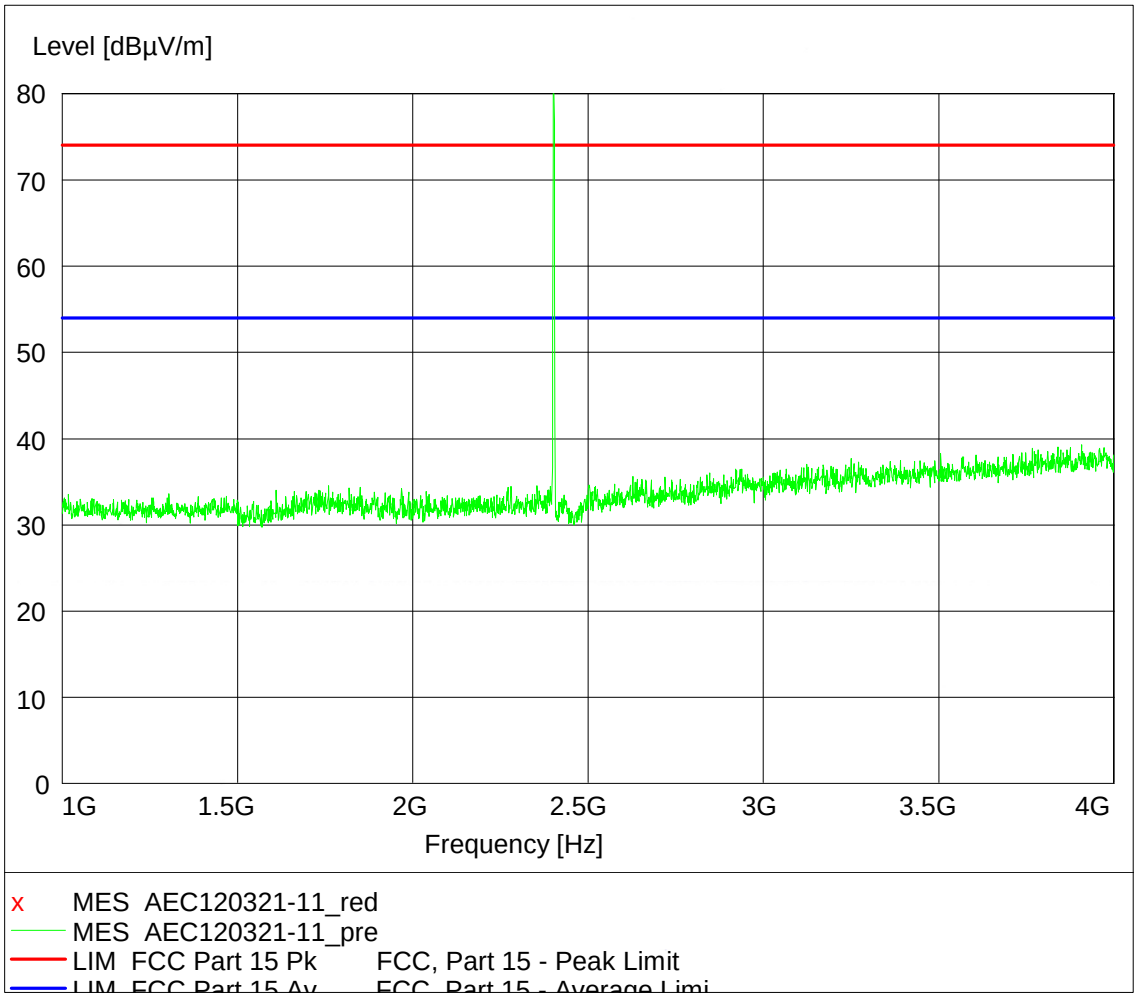
Overview sweep fully anechoic shielded chamber

Date of test: 2012-03-21

1000 – 4000 MHz, max peak at a distance of 3 m on the lower TX channel, Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



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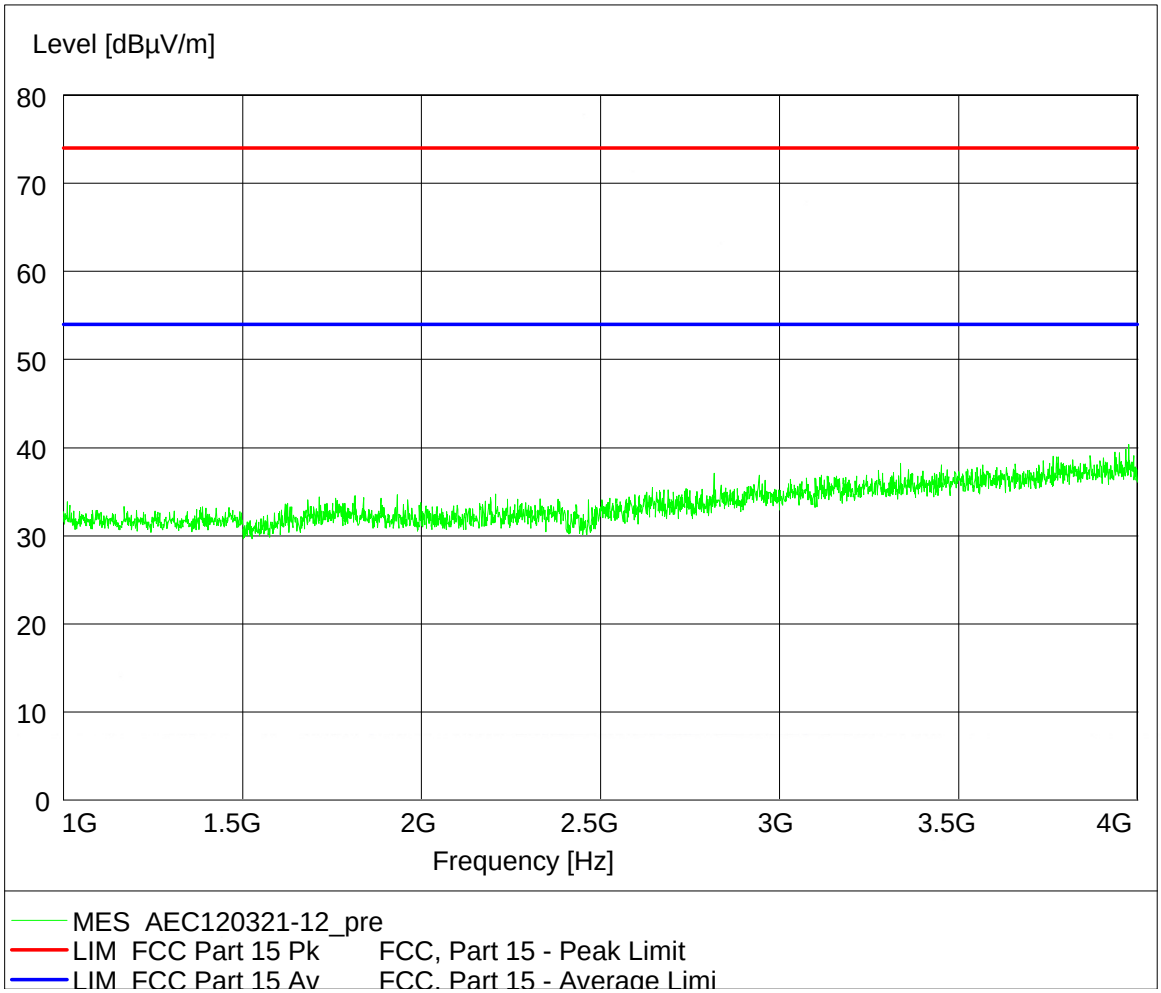
1000 – 4000 MHz, max peak at a distance of 3 m on the middle TX channel, Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



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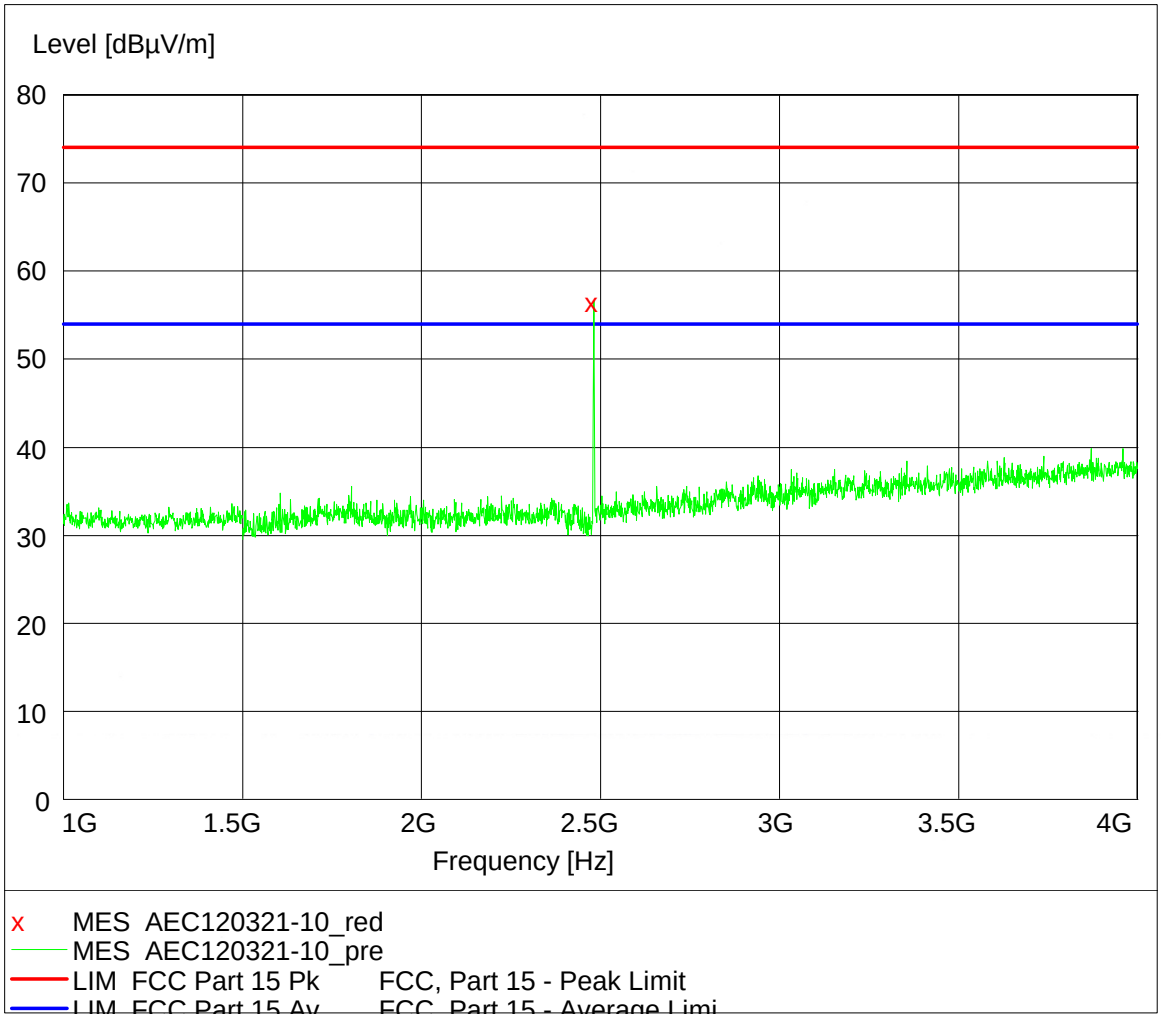
1000 – 4000 MHz, max peak at a distance of 3 m on the higher TX channel, Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0



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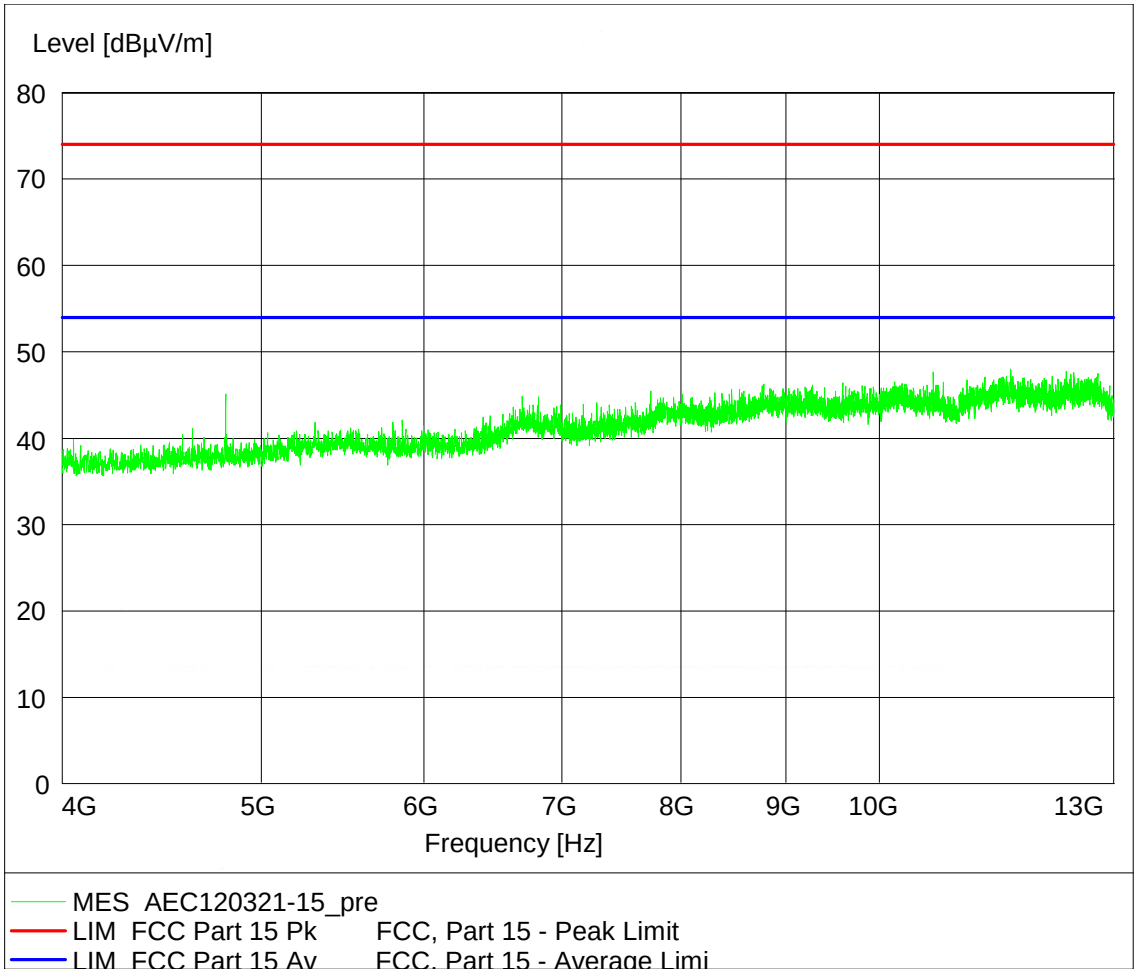
4000 – 13000 MHz, max peak at a distance of 3 m on the TX low channel
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



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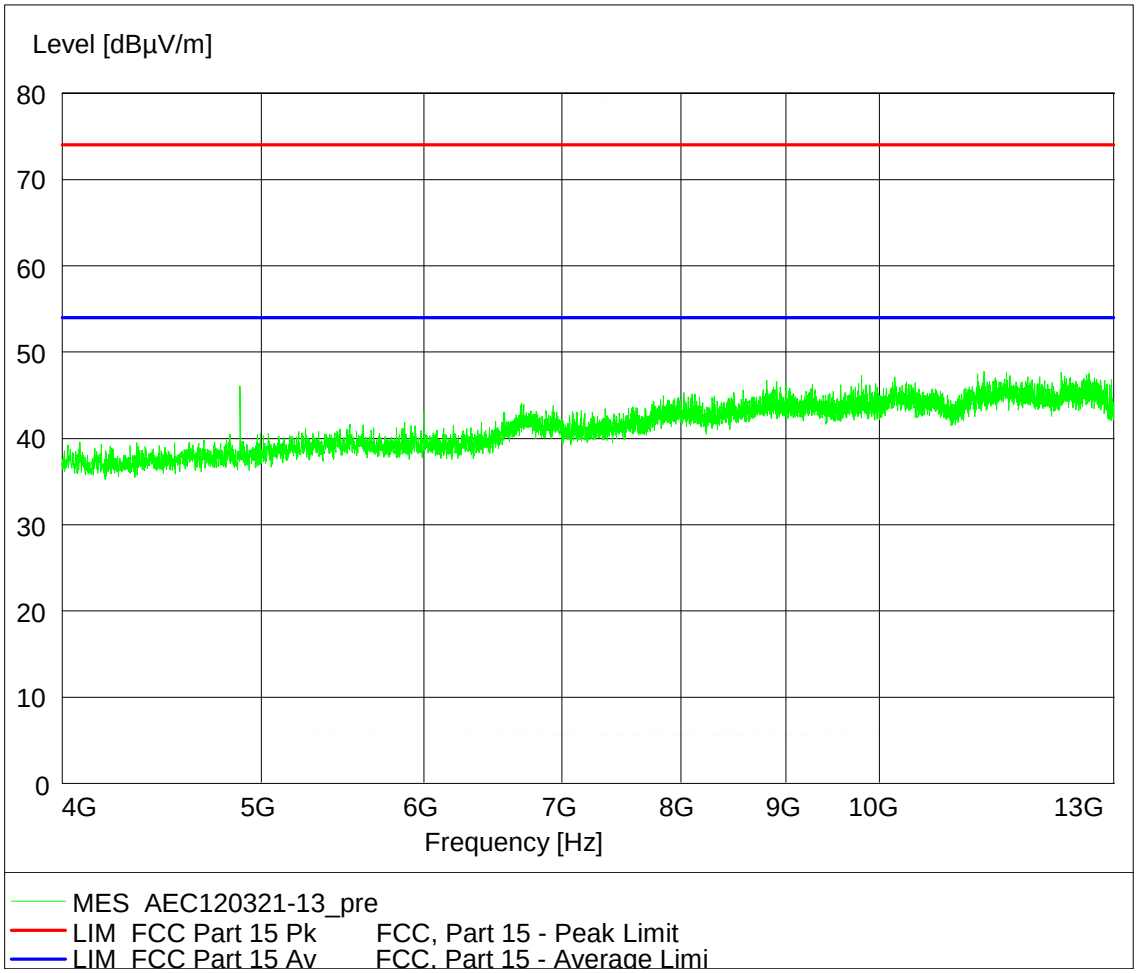
4000 – 13000 MHz, max peak at a distance of 3 m on the TX middle channel
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



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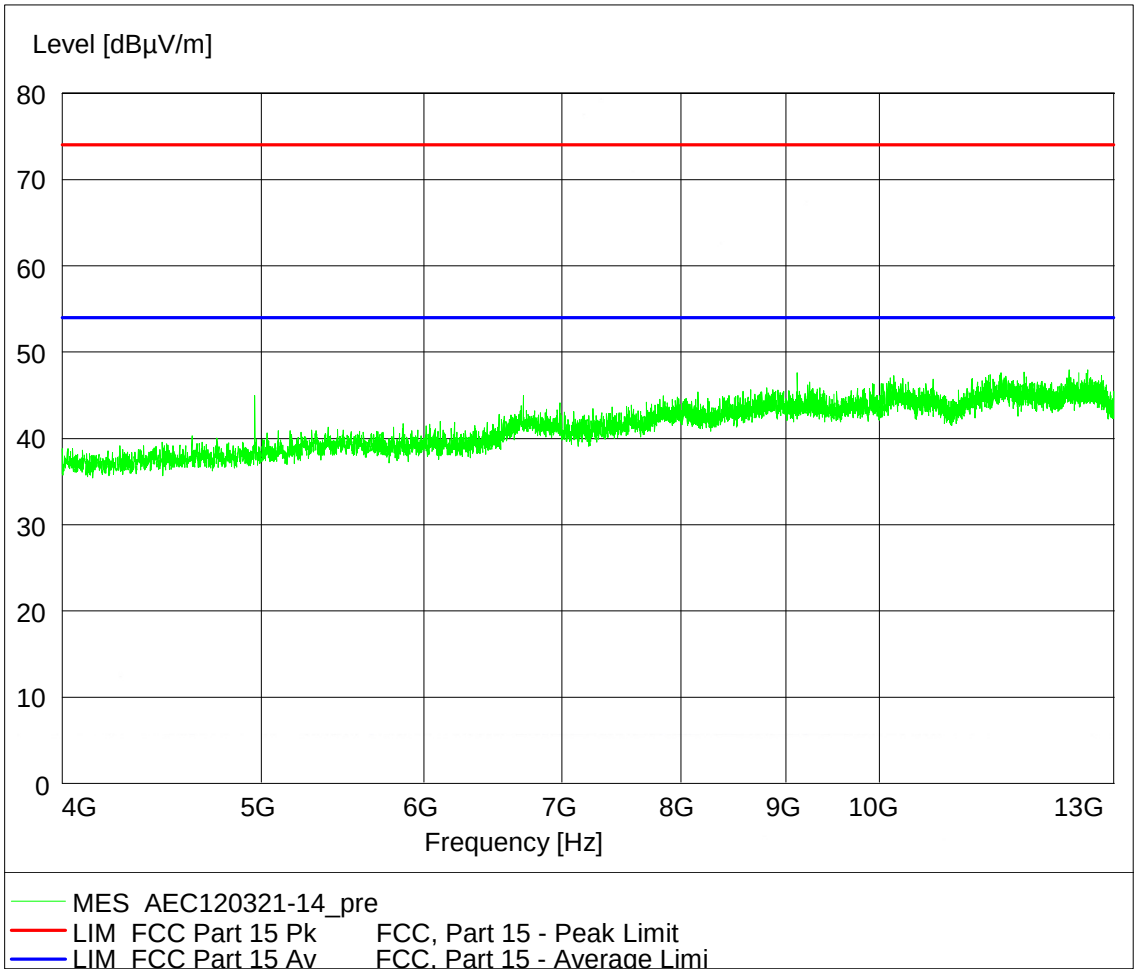
4000 – 13000 MHz, max peak at a distance of 3 m on the TX high channel
Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0



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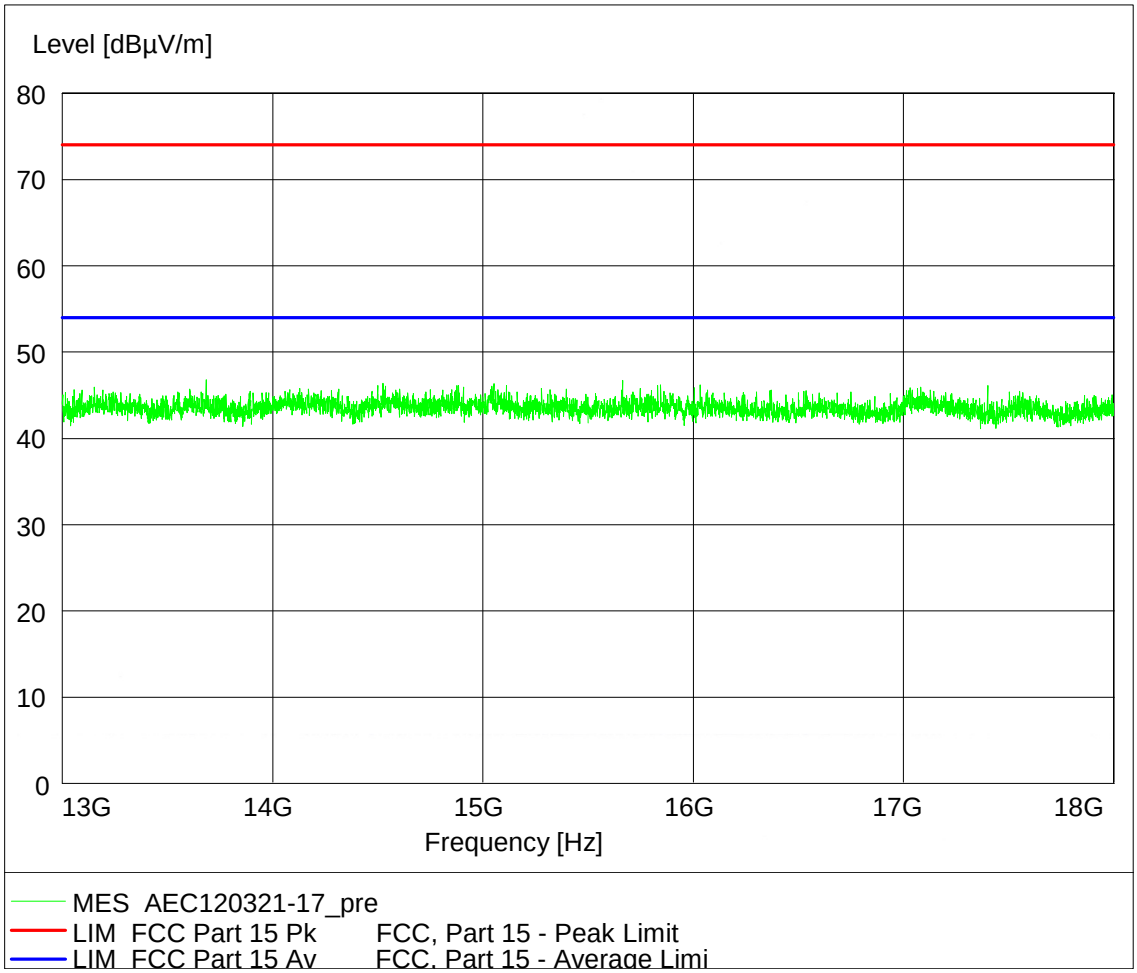
13000 – 18000 MHz, max peak at a distance of 3 m on the TX low channel



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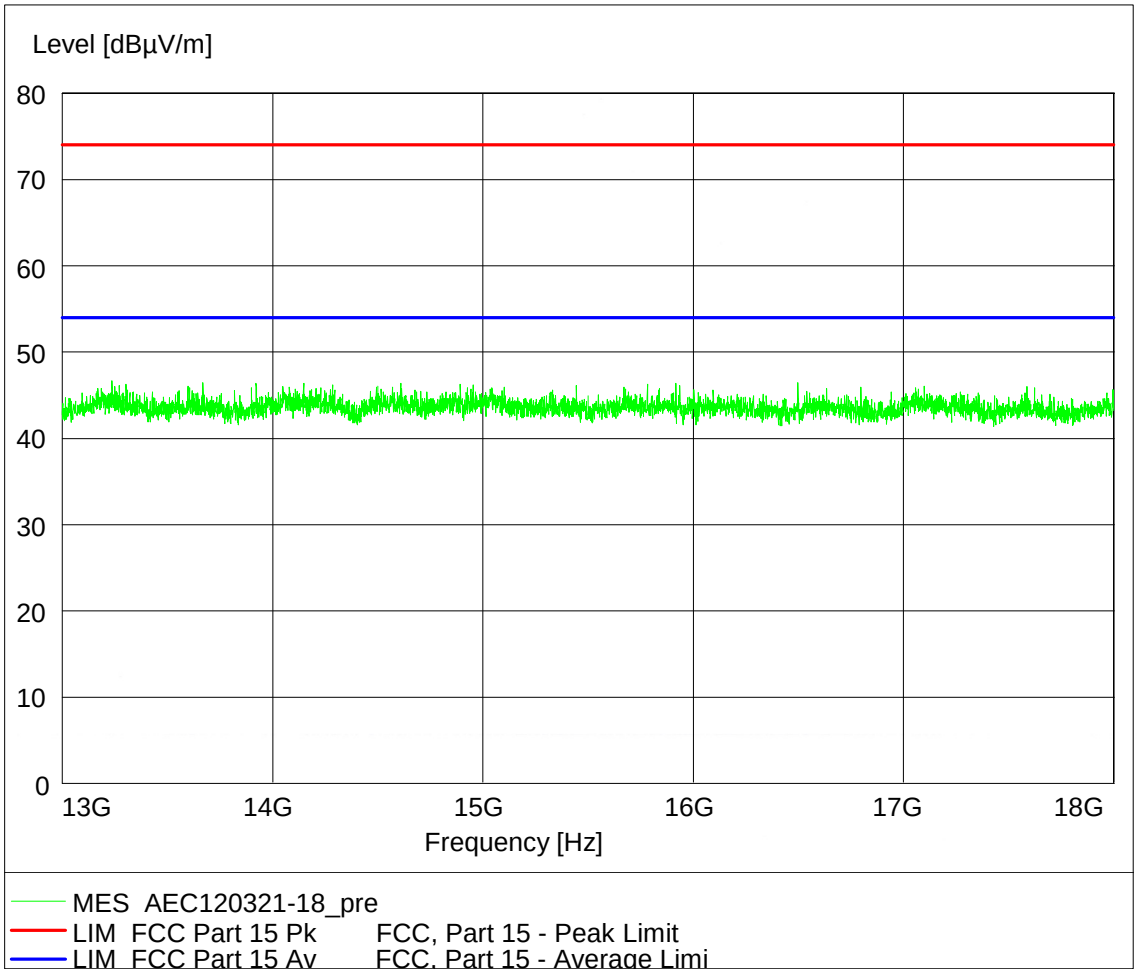
13000 – 18000 MHz, max peak at a distance of 3 m on the TX middle channel



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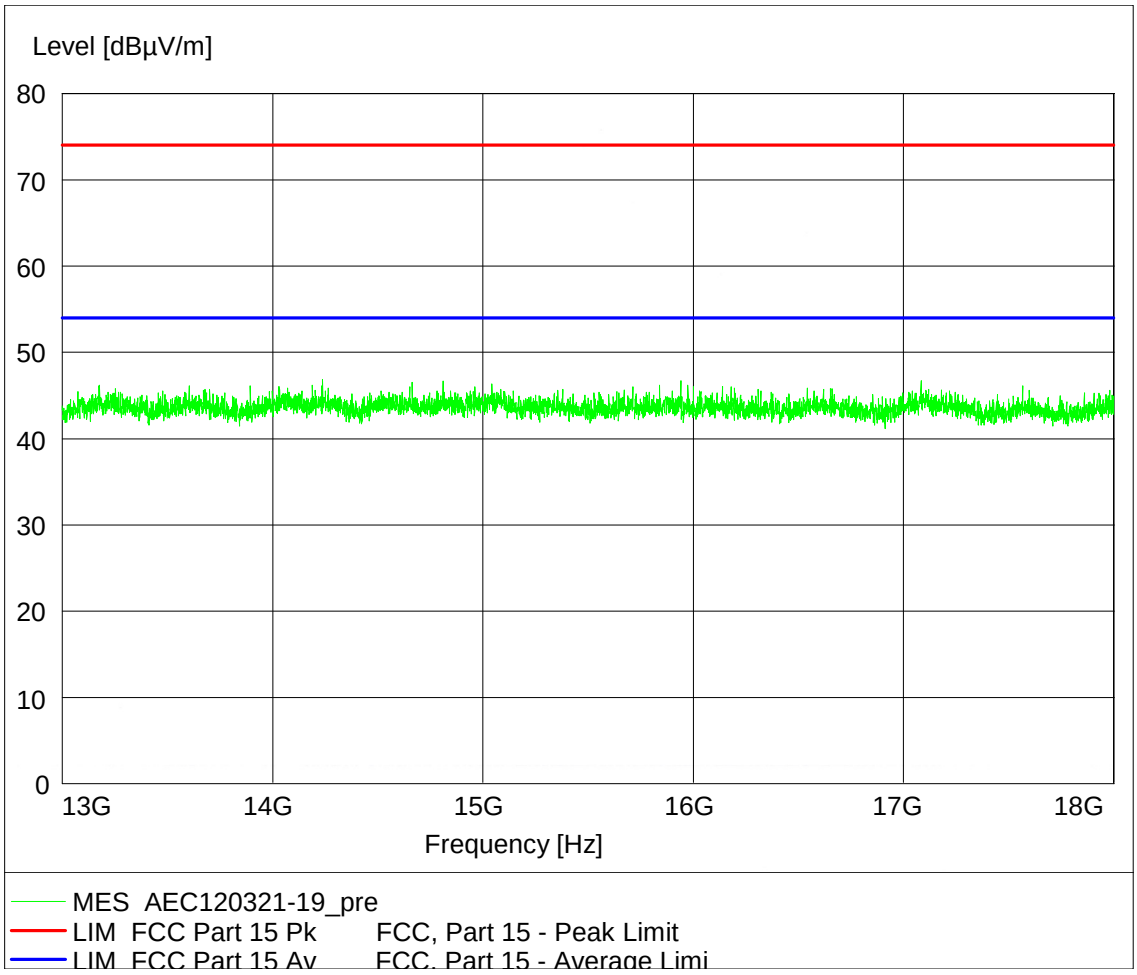
13000 – 18000 MHz, max peak at a distance of 3 m on the TX high channel



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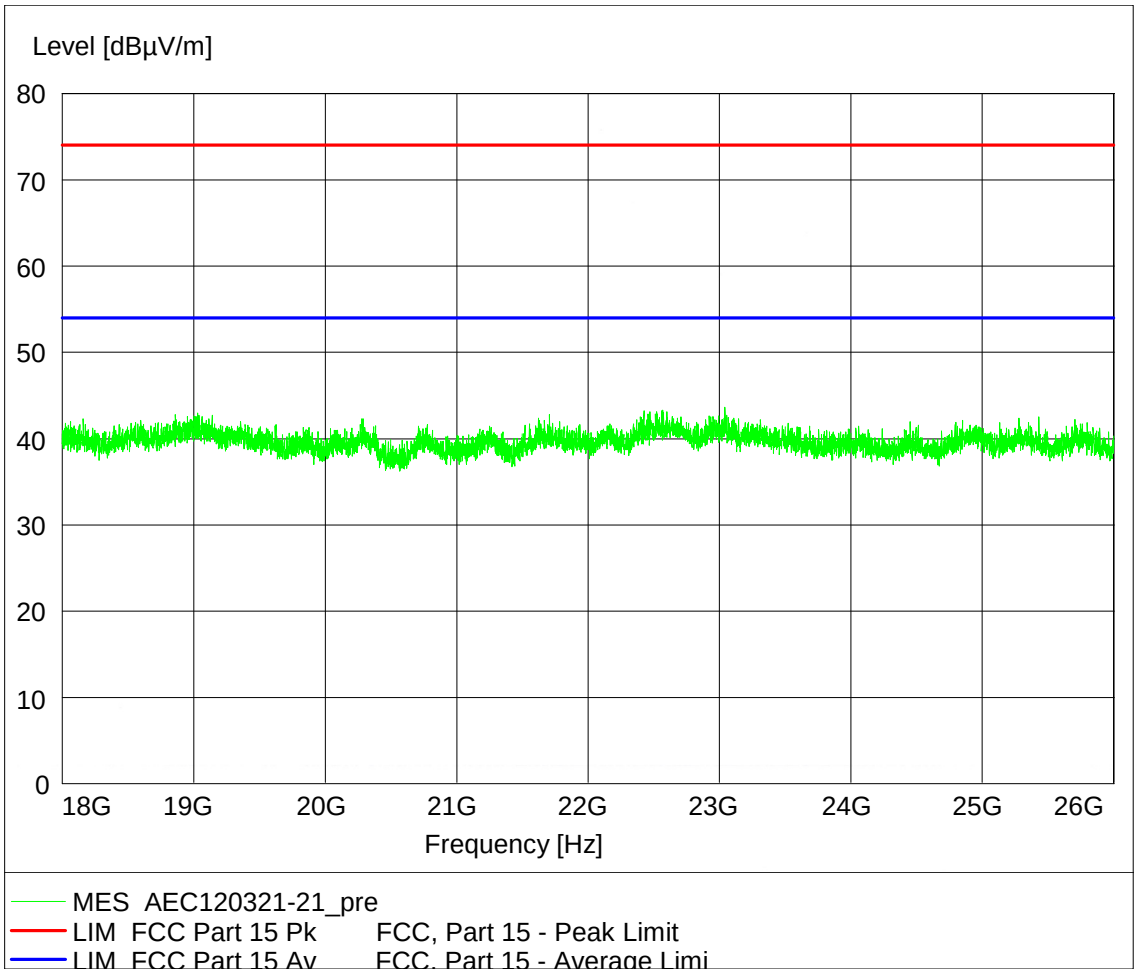
18000 – 26000 MHz, max peak at a distance of 3 m on the TX low channel



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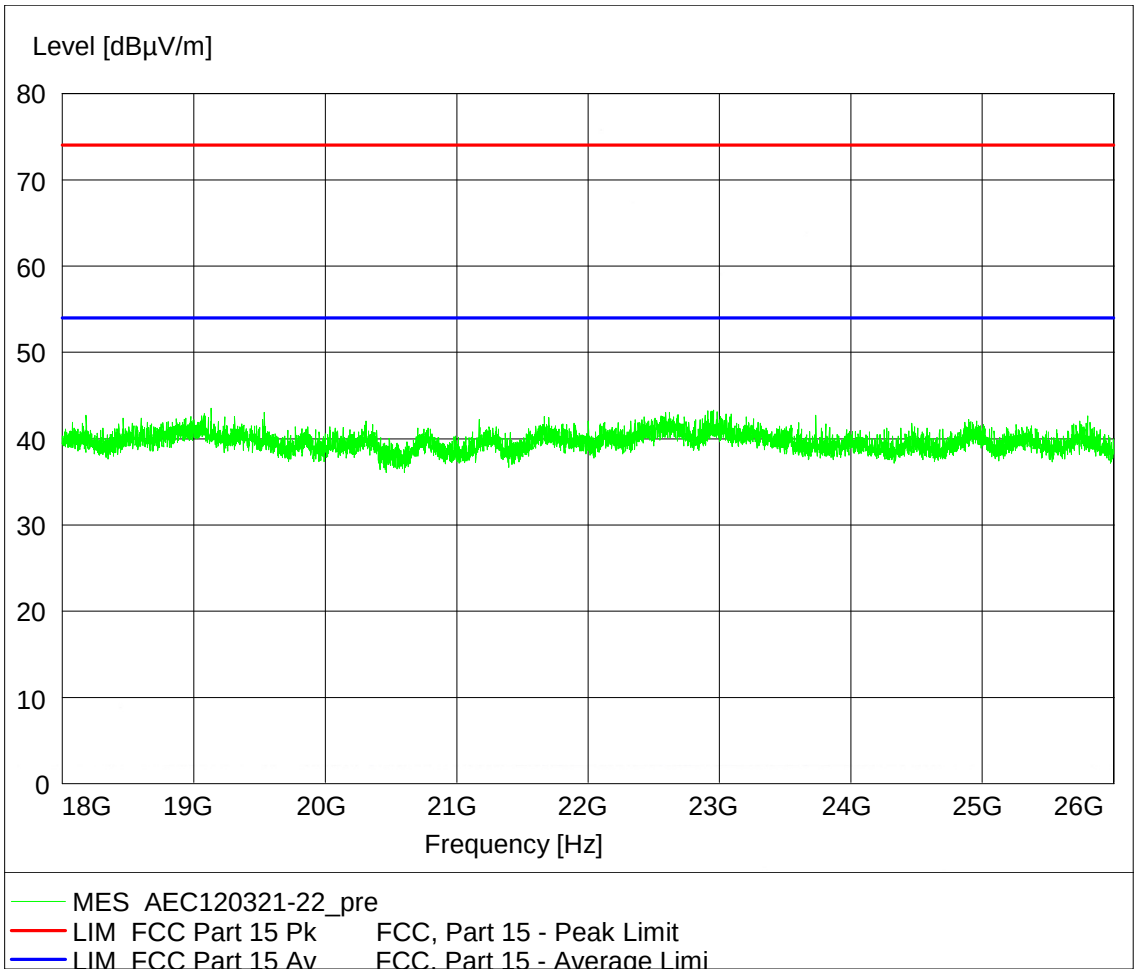
18000 – 26000 MHz, max peak at a distance of 3 m on the TX middle channel



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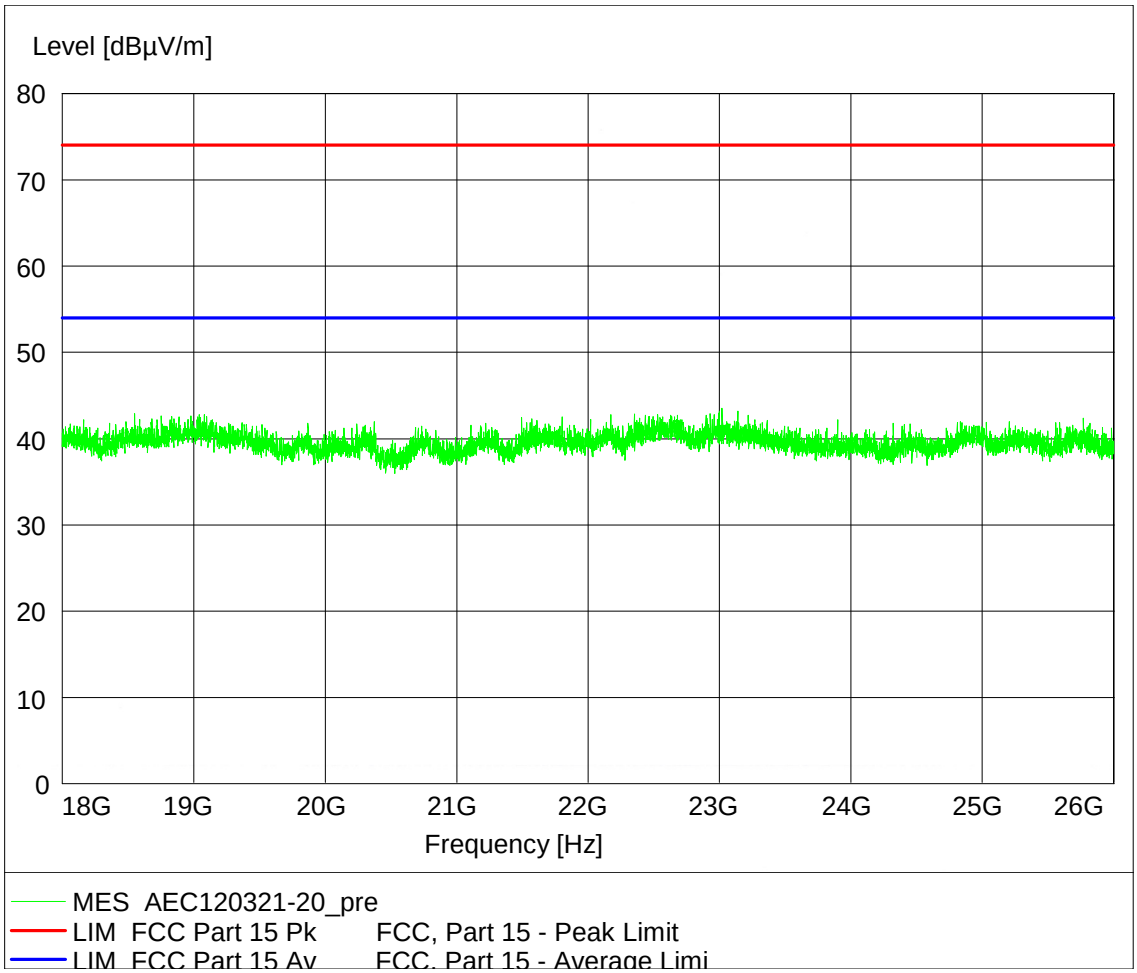
18000 – 26000 MHz, max peak at a distance of 3 m on the TX high channel



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Data summary

Spurious emissions, TX low channel						
Frequency [MHz]	Measured level		Limit		PASS /FAIL	Comment
	Average [dBuV/m]	Peak [dBuV/m]	Average [dBuV/m]	Peak [dBuV/m]		
30-1000	-	-	-	-	PASS	No peaks above 20 dB below the limit
4805.611	--	43.2	54.0	74.0	PASS	Vertical polarization
4000-13000	--	-	54.0	74.0	PASS	No peaks above 20 dB below the limit
13000 - 18000	--	-	54.0	74.0	PASS	No peaks above noise floor
18000-26000	--	-	54.0	74.0	PASS	No peaks above noise floor

Spurious emissions, TX middle channel						
Frequency [MHz]	Measured level		Limit		PASS /FAIL	Comment
	Average [dBuV/m]	Peak [dBuV/m]	Average [dBuV/m]	Peak [dBuV/m]		
30-1000	-	-	-	-	PASS	No peaks above 20 dB below the limit
4880.000	--	42.6	54.0	74.0	PASS	Vertical polarization
4000-13000	--	-	54.0	74.0	PASS	No peaks above 20 dB below the limit
13000 - 18000	--	-	54.0	74.0	PASS	No peaks above noise floor
18000-26000	--	-	54.0	74.0	PASS	No peaks above noise floor

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Spurious emissions, TX high channel						
Frequency [MHz]	Measured level		Limit		PASS /FAIL	Comment
	Average [dBuV/m]	Peak [dBuV/m]	Average [dBuV/m]	Peak [dBuV/m]		
30-1000	-	-	-	-	PASS	No peaks above 20 dB below the limit
4963.928	--	45.8	54.0	74.0	PASS	Vertical polarization
4000-13000	--	-	54.0	74.0	PASS	No peaks above 20 dB below the limit
13000 - 18000	--	-	54.0	74.0	PASS	No peaks above noise floor
18000-26000	--	-	54.0	74.0	PASS	No peaks above noise floor

Measurement results are corrected for attenuation in the set-up configuration.

Example calculation:
Measured level [dBuV/m] = Analyser reading [dBuV] + cable loss [dB] + attenuator loss [dB]+antenna factor [dB/m]

Fulfil requirements: **Yes**

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6. RADIATED OUTPUT POWER

6.1 Test protocol

Date of test: 2012-03-26

Detector	Radiated field strength, [dBuV/m]
Average	91.4

Measurement results are corrected for attenuation in the set-up configuration.

Example calculation:

Measured level [dBuV/m] = Analyser reading [dBuV] + cable loss [dB] + attenuator loss [dB]+antenna factor [dB/m]

6.2 Limit

The equivalent isotropic radiated power shall be equal to or below 94.0 dBuV/m.

Fulfil requirements: **Yes**

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7. BAND EDGE COMPLIANCE

7.1 Test protocol

Date of test: 2012-03-22 & 2012-07-13

EUT mode of operation: continuous TX. Modulation on

Spectrum analyzer settings:

Span: 80 MHz
RBW: 100 kHz
VBW: 300 kHz
Sweep time: Auto
Detector: Peak
Trace: Max Hold

Channel	Measured	Results	Limit value (dBc)
Low	plot P7.1	PASS	50
High	Band 2483.5 – 2485.3 ; Peak: ≤ 46.2 dB(µV/m) plot 7.2, Note 1 AV: ≤ 34.6 dB(µV/m) Plot 7.3, Note 2	PASS	Peak: 74.0 dB(µV/m) AV: 54 dB(µV/m)

Note 1
Measured according to ANSI C63.10-2009 paragraph 6.9.3.

a) Measured output level = 91.4 dBµV/m
b) Δ = 45.2 dB
c) Peak level = measured output level – Δ, (91.4 – 45.2 = 46.2 dBµV/m)

Note 2
Measured according to ANSI C63.10-2009 paragraph 6.9.3.

d) Measured output level = 91.4 dBµV/m
e) Δ = 56.8 dB
f) Peak level = measured output level – Δ, (91.4 – 56.8 = 34.6 dBµV/m)

Measurement results are corrected for attenuation in the set-up configuration and antenna gain declared by the manufacturer.

Example calculation:

Peak output power [dB(µV/m)] = Analyser reading [dB(µV/m)] + cable loss [dB] + EUT antenna gain [dBi]

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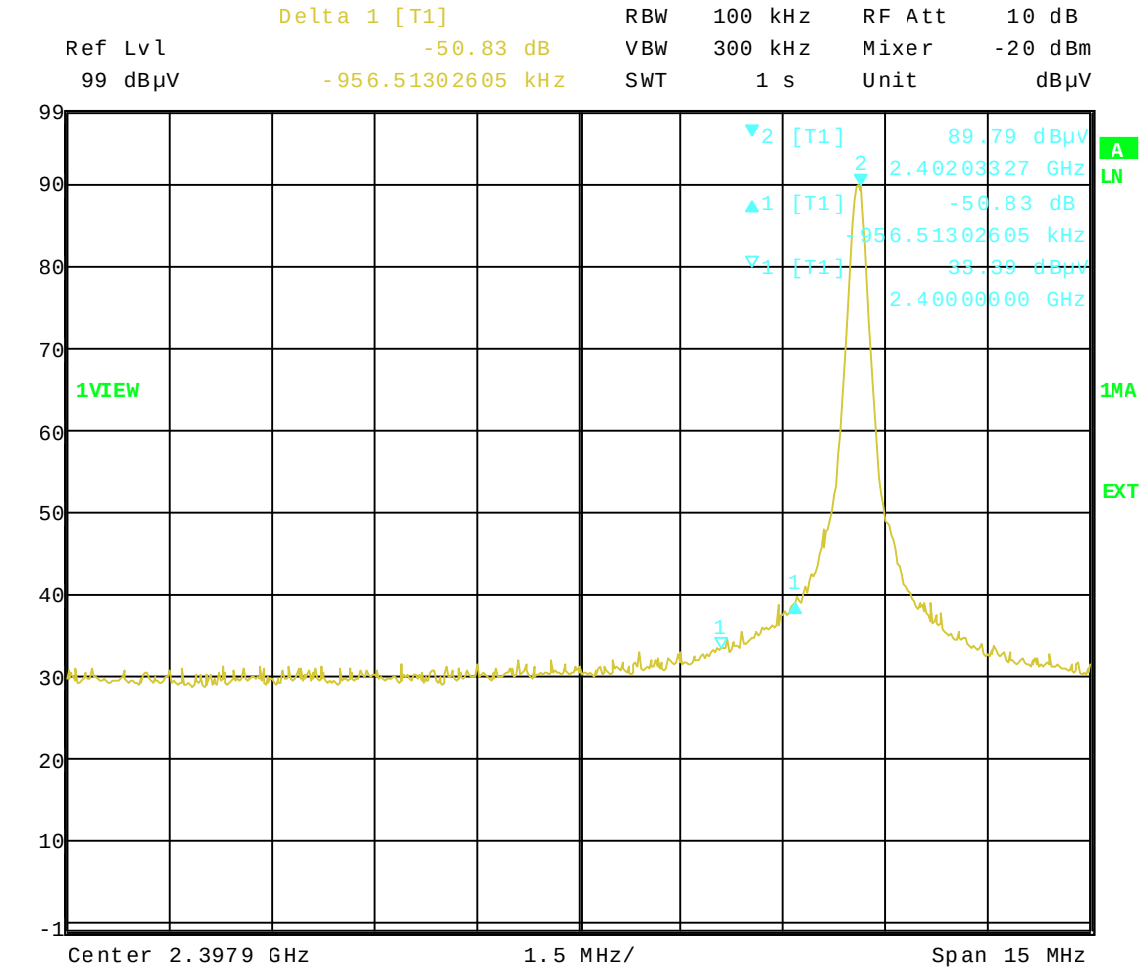
Plot 7.1



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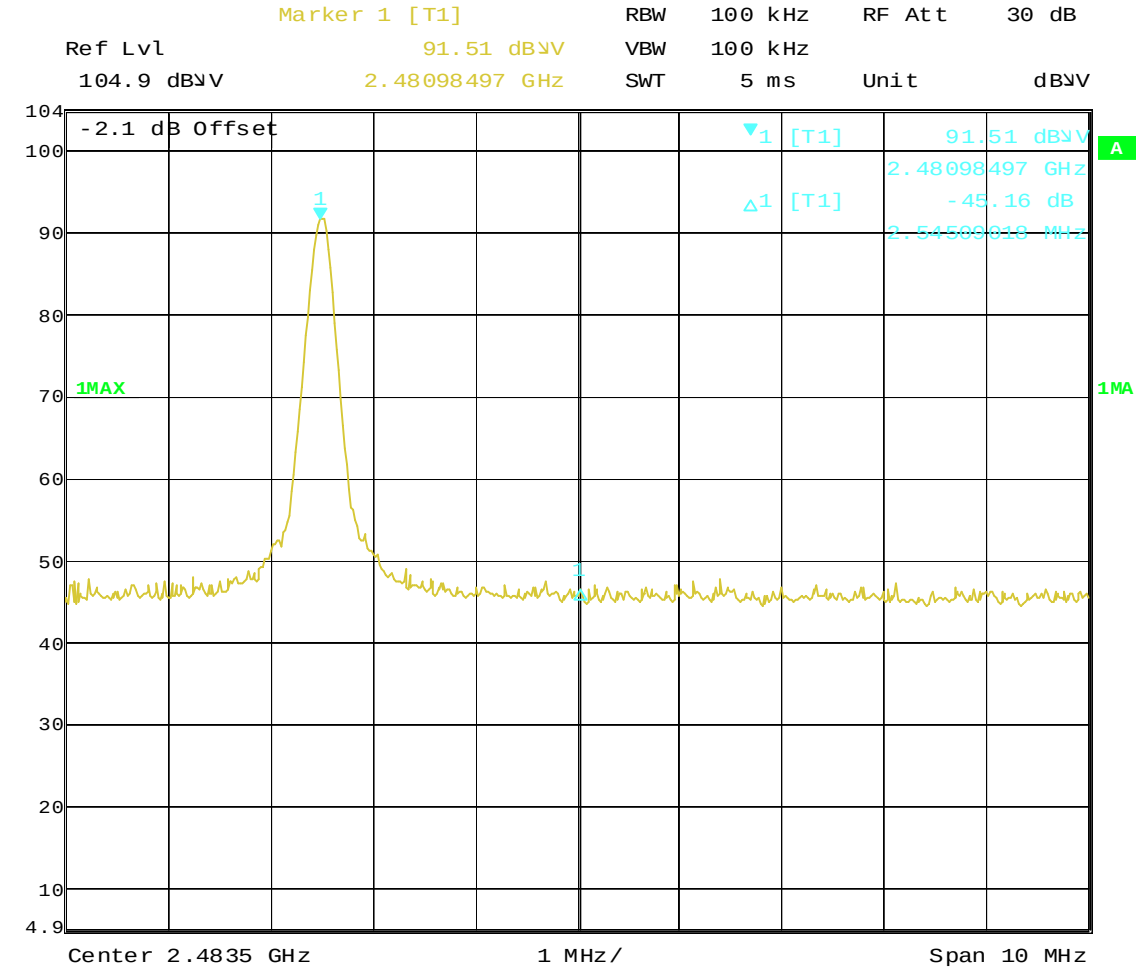
Plot 7.2



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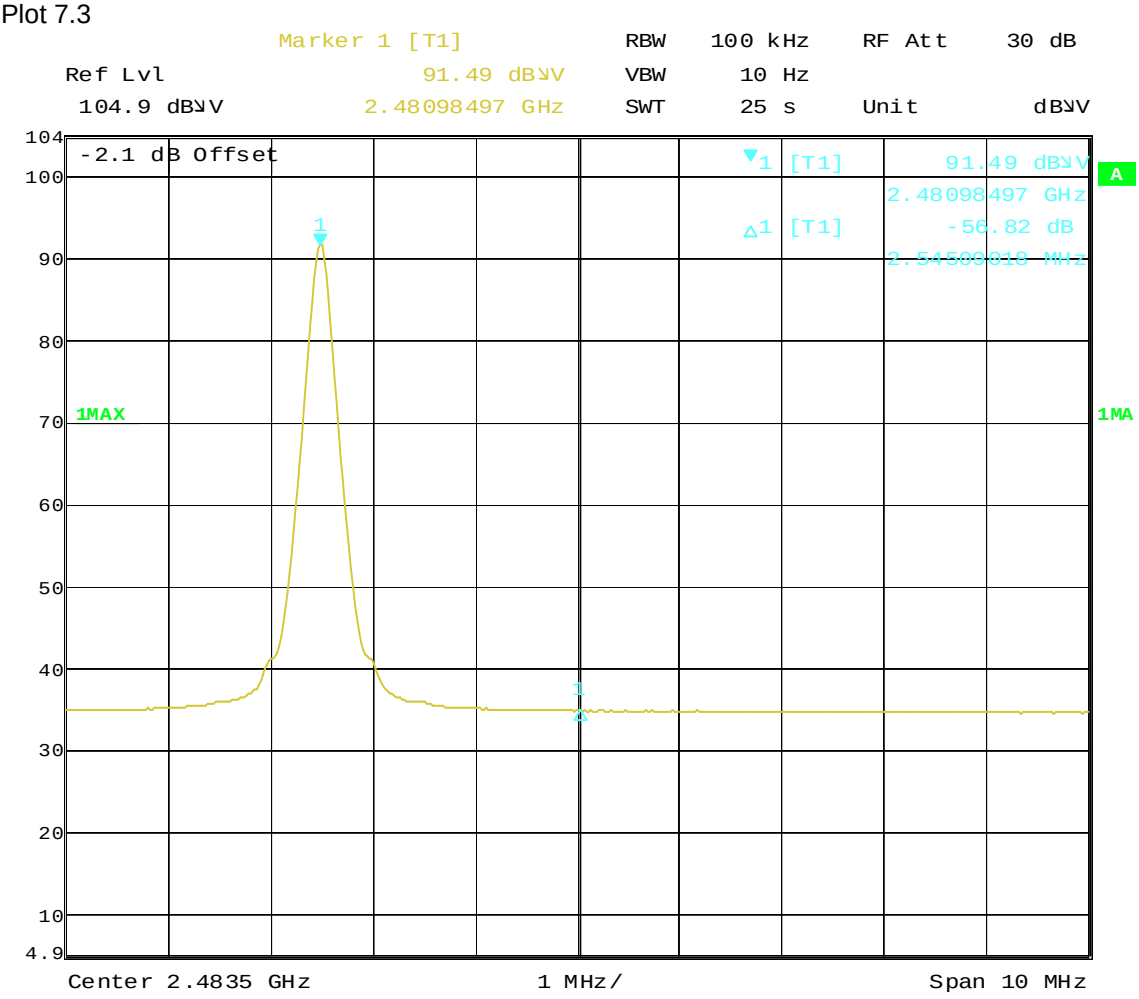
Plot 7.3



Date: 13.JUL.2012 12:42:43

Fulfil requirements: **Yes**

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8. TEST EQUIPMENT

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date	Calibration interval
Measurement software	Rohde & Schwarz	EMC 32	--	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	2012-07-31	1 year
Receiver	Rohde & Schwarz	FSIQ 40	4936	2012-07-31	1 year
Receiver	Rohde & Schwarz	ESU 40	13178	2012-07-31	1 year
Amplifier	Sangus	AFS	12335	2012-07-31	1 year
Amplifier	SEMKO	AM1331	7992	2012-07-31	1 year
Power meter	Rohde & Schwarz	NRVD	31741	2012-07-31	1 year
Power sensor	Rohde & Schwarz	NRV Z51	7861	2012-07-31	1 year
Attenuator	Rohde & Schwarz	10 dB	30088	2012-07-31	1 year
Horn antenna 1-18	BONN Elektronik	BLMA 1826-5A	31247	2013-07-31	3 year
Horn antenna 18-26	BONN Elektronik	BLMA 2640-5A	31248	2013-12-31	3 year
Antenna	CHASE Electr. Ltd	CBL 6111A	971	2012-07-31	3 year

9. UNCERTAINTIES SUMMARY

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT. Measurement uncertainty is calculated in accordance with EA-4/02-1997. All uncertainties are given with a level of confidence of approximately 95% (k=2).

Measurement uncertainty for radiated disturbance, 30 - 1000 MHz ± 4,8 dB

Measurement uncertainty for radiated disturbance, 1 - 10 GHz ± 5,2 dB

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9. PHOTO OF THE EUT

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