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Registration number
Numéro d'accréditation
Akkreditierungsnummer **STS 024**

Schweizerischer Prüfstellendienst
Service suisse d'essai
Swiss testing service

Report:	***Electromagnetic compatibility and Radio spectrum Matters***	Report no:	***17062***
Product name:	***FVD Expert 9100 US***	Mandate no:	***20120829***
Serial no:	***3030560562 S***	Model number:	***800 0076/01I***
Customer:	***ACS Solutions Switzerland Ltd Frankenstrasse 70 3018 Bern Switzerland***	Date of test:	***November 28, 2012 until March 13, 2013***

Standards		**Result**
47 CFR, Part 15	Part 15 – Radio Frequency Deivices; Subpart C, Intentional radiator: § 15.207/209/225)	***PASS***

Test performed by
Mr J. Biner
EMC test engineer

Report prepared by
Mr J. Biner
EMC test engineer

Report controlled and approved by
Mr E. de Raemy
EMC test engineer

Rossens, April 9, 2013 (Issue Date) 20121101rev01

Main language : *English*

The present document results from tests on one specimen and does not prejudge to the conformity of all the manufactured products.

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Contents

1. Summary of test results (FCC)

§	Test Type		Result
7	**Emission**		**47 CFR 15**
7.1	Conducted emission	CFR 47 § 15.207	***Pass***
7.2	Radiated emission – H-field	CFR 47 § 15.209	***Pass***
7.3	Radiated emission – EM-field	CFR 47 § 15.209	***Pass***
7.4	Additional Provisions 20 dB Bandwidth	CFR 47 § 15.225 c)	***Pass***
7.5	Additional Provisions 13.110 MHz up to 14.010 MHz	CFR 47 § 15.225 a) – c)	***Pass***
7.6	Stability of the carrier frequency	CFR 47 § 15.225 e)	***Pass***

2. Applied standards

47 CFR Part 15	Code of Federal Regulations - Title 47 - Telecommunication, Part 15 - Radio frequency devices
47 CFR Part 15 Subpart C	Code of Federal Regulations - Title 47 - Telecommunication, Part 15, Subpart C: "Intentional Radiators"

3. Abbreviations

Electromagnetic compatibility and radio spectrum matters:

AC	Alternating current
AFA	Adaptive Frequency Agility
AM	Amplitude Modulation
AV	Average
BW	Bandwidth
CDN	Coupling Decoupling Network
CW	Continuous Wave
dB	Decibel
dBi	gain in decibels relative to an isotropic antenna
DC	Direct current
DL	Downlink
dmax	Maximum relative voltage change
e.i.r.p.	equivalent isotropic radiated power
EMC	ElectroMagnetic Compatibility
ERC	European Radiocommunication Committee
EUT	Equipment under Test
FHSS	Frequency Hopping Spread Spectrum
GBSAR	Ground Based Synthetic Aperture Radar
GRP	Ground reference plane
ICNIRP	International Commission on Non-Ionizing Radiation Protection
LISN	Line impedance substitution network
N	Neutral
PE	Protective earth
PK	Peak
Tx	Transmitter
UL	Uplink
UWB	Ultra Wide Band
VSWR	Voltage Standing Wave Ratio

General vocabulary: http://www.electropedia.com

4. Client

Client name and address	*ACS Solutions Switzerland Ltd* *Frankenstrasse 70* *3018 Bern* *Switzerland*
Contact Person	*Mr M. Brunner*
Telephone	*+41 58 344 1560*
E-mail	Markus.Brunner@acs-inc.com
Mandate no	*20120829*

5. Equipment under test

5.1 Identification

Manufacturer name and address	*ACS Solutions Switzerland Ltd* *Frankenstrasse 70* *3018 Bern* *Switzerland*
Production country	*Switzerland*
Brand name	*ACS Solutions Switzerland Ltd*
Product name	*FVD Expert 9100 US*
Product description	*The EUT is a Ticket Vending Machine to be used for public transportation ticketing.* *The EUT contains a RFID-module close to the dispensing module for RFID tickets in order to read the serial number of dispended ticket. The module works on the frequency of 13.56 MHz.*
Model number	*800 0076/01I*
Serial no	*3030560562 S*
Software version	*1.6.2*
Highest frequency	*1.6 GHz (CPU of the MCU)*
Supply	*U = 115 VAC / f = 60 Hz*
Dimension	*~ 90 cm x 50 cm x 142.3 cm (l x w x h)*
Weight	*~ 370 kg*
Technical documentation	*None. The equipment is completely identified by the above-mentioned information. ACS Solutions Switzerland Ltd assures the traceability of the documentation and is responsible for the product identification.*

5.2 Identification of the included Subsystems

Description	Identification	Serial-No
ACDC Converter DRA480	701.1070/03	3030548920
AP4200 Printer	851.2814	3030535122S
Coin Handling System RS28.7-1 USD	560.0689PROTO	-
Coin Verifier	560.2093/53	3030558649
Coin Insertion Unit RS2x	560.2032/11	3030557543
Coin Drum Block	560.2103/26	3030561966
Coin Vault	560.2202/10	3030225573S
Coin Drum Unit	560.2103/26	3030561966
1. BUCO	813.2952/62 ACS	
2. BUCO	813.2951/149 ACS	
3. BUCO	813.2953/74 ACS	
Display-touch-module 15" Firmware 2.05A(R20)	701.0970/02	3030565274
MCU 4.0 HD 2GB for Expert9200 BIOS Version: 1.6.1.100	849.2180/10	3030558964S
NetModul NB1600	-	0011260039a1
Card Reader VeriFone VX700 Firmware: n/a	-	7639508
2 Heater Modules CSL 028	-	-
Printer AP5200	701.1148/10	3030560660
Printer AP4200	851.2814	3030535122S
Bank Note Recycler Bill-to-Bill 300XE	956.2500/02	14KC20BB0908
Bank Note Vault	956.2500/02	001205BD5047
Power Manager	701.1251/01	3030556245
Power LED	610.1759/02	-
Line Filter	924.0295	-
Service Terminal 7”	701.1244/01	3030514747
Loudspeaker	701.1151/01	-

5.3 Classification

47 CFR Part 15	☐ Unintentional radiator (Subpart B) ☐ Class A digital device ☐ Class B digital device ☐ The highest frequency of the internal sources of the EUT is less than 108 MHz (measurement shall be made up to 1 GHz). ☐ The highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz (measurement shall be made up to 2 GHz). ☐ The highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz (measurement shall be made up to 5 GHz). ☐ The highest frequency of the internal sources of the EUT is above 1 GHz (measurement shall be made up to 5 times the highest frequency or 40 GHz, whichever is lower). ☒ Intentional radiator (Subpart C) ☒ The highest fundamental frequency of the EUT is less than 10 GHz (measurement shall be made up to the tenth harmonic or 40 GHz, whichever is lower). ☐ The highest fundamental frequency of the EUT is between 10 GHz and 30 GHz (measurement shall be made up to the fifth harmonic or 100 GHz, whichever is lower). ☐ The highest fundamental frequency of the EUT is above 30 GHz (measurement shall be made up to the fifth harmonic or 200 GHz, whichever is lower).

5.4 Ports

Port /	**Cable**			**Remark**
	Max. length	**Type**	**Screen**	
Mains *115 V, 60 Hz*	*Not defined*	*L, N, PE* *3x 0.75mm2*	*None*	---
LAN port	*< 100 m*	*Cat 5e*	*Yes*	*connected to a network*

6. Test conditions

6.1 Climatic conditions, location and date

Location:	Date:	Temp	Pressure [QFF]:	Rel. humidity:
montena emc sa 3072 Ostermundigen Switzerland	*November 28, 2012 until March 13, 2013*	*23°C*	*1011 hPa*	*44%*

6.2 Test facility and methodology

The alternate test site (ferrite chamber) is accepted by FCC (Reg. No. 297668).
Conducted and radiated measurements are performed according to the ANSI C63.4 (2003) procedure.

6.3 Attendant persons

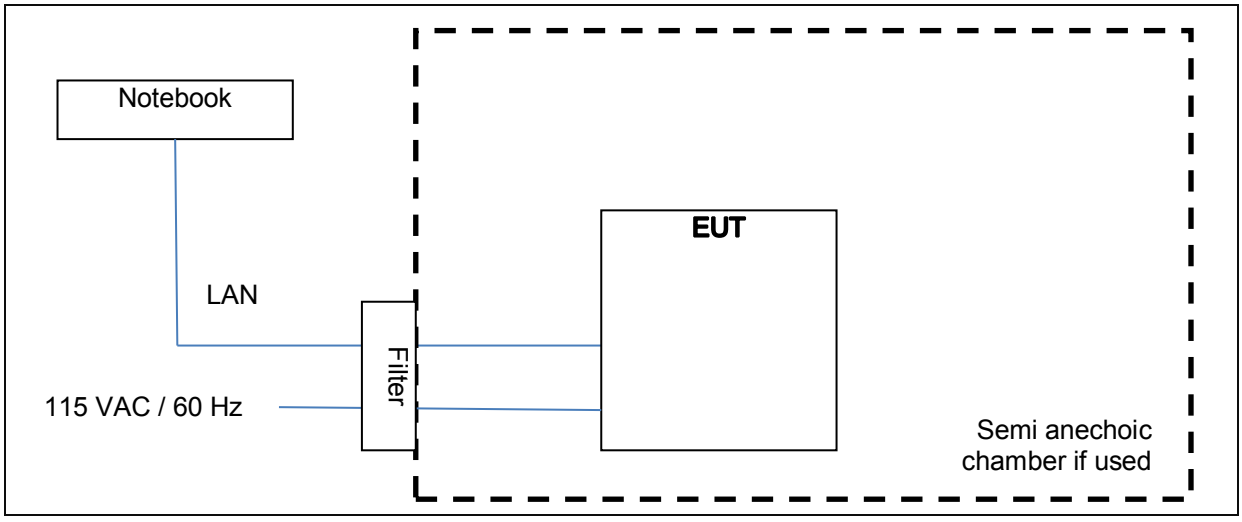
Test Engineer(s):

Mr J. Biner

Other(s):

Name	Company
Mr M. Brunner	*ACS Solutions Switzerland Ltd*
Mr A. Martinez	*ACS Solutions Switzerland Ltd*

6.4 Test configuration



6.5 Operating conditions

Power supply during tests if not stated otherwise in § 7 : 115 VAC / 60 Hz.
Generally the EUT was in "ready-to-operate" mode, however when appropriate typical vending functions have been executed by the operator.

6.6 Auxiliary equipment

The following pieces of equipment are used for the monitoring of the EUT or are necessary for the EUT but they are not part of the EUT.

Product	Brand	Model No.	ID	Remark
Notebook	*Dell*	*Latitude D610*	--	--

7. Emission tests

7.1 Interference voltage

Test site: semi-anechoic chamber (hybrid)

Meas. uncertainty: ± 3.6 dB

Basic standard: ANSI C 63-4:2003

Measuring method: The conducted disturbance is measured using a spectrum analyser and a line impedance substitution network (LISN). The measurement of the voltage against the earth is carried out successively. The peak values are recorded continuously on the graph. The values that exceed the limit are re-measured with a measuring receiver.

Limit: 47 CFR 15.207

Frequency Range [MHz]	Limit Quasi-Peak [dBµV]	Limit Average [dBµV]
0.15 – 0.5	66 to 56 (Log. Freq.)	56 to 46 (Log. Freq.)
0.5 – 5	56	46
5 – 30	60	50

Test set-up:

Photos of the test set-up: See Annex 3, photos 1

Remarks: *.None.*

Test equipment:

Spectrum analyser	☐ 25201	☐ 16917	☒ 168593			
Receiver	☐ 06-29	☒ 168593				
LISN (=VNNB)	☒ 182186	☐ 10540	☐ 15840	☐ 25203	☐ 168517	☐ 168560
Current clamp	☐ 7525					
Cables	☒ 16140					
Power source	☒ 17525					
Signal Generator	☒ 168592					
Artificial hand	☐ 184450					

Result: ☒ **pass** ☐ **fail** ☐ **not applicable** ☐ **partly tested**

Measurement Type : Voltage Interference
Supply : Neutral
Other :

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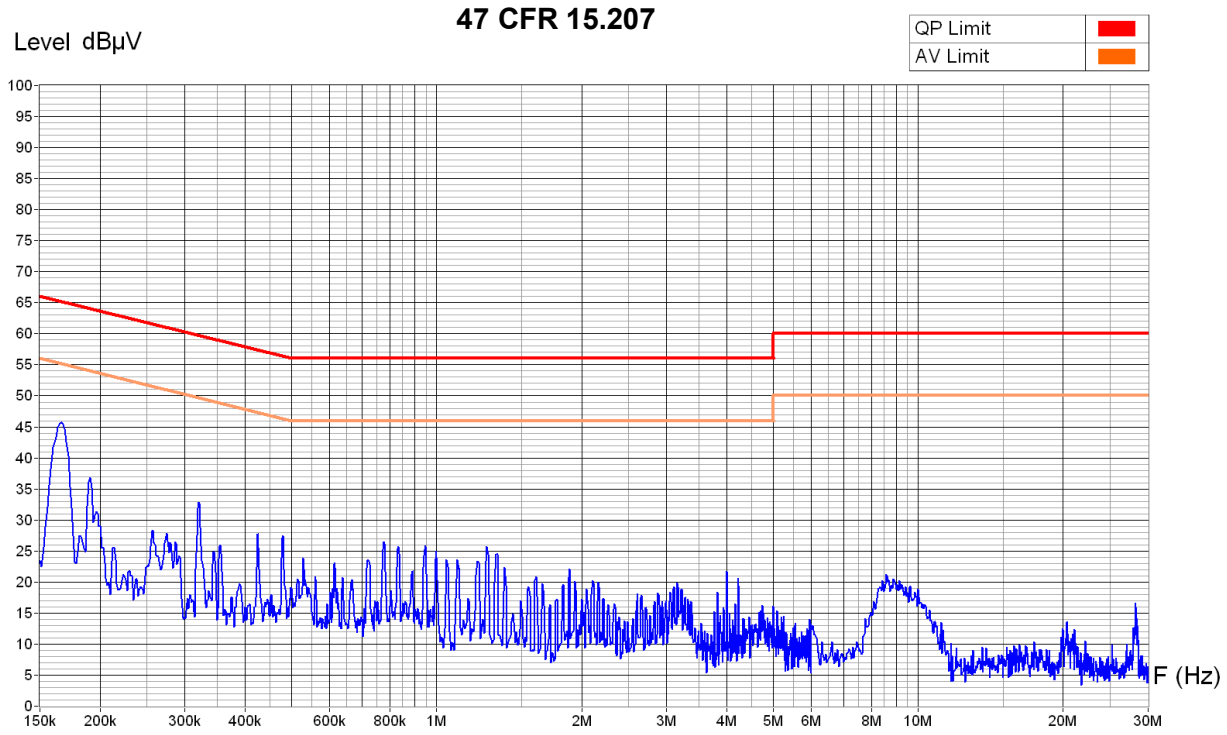
Equipment Under Test : FVD Expert 9100 US
Set-Up : Floor standing
Operating Conditions : Ready to operate and selling tickets
Remarks :



Zone	150 KHz - 1 MHz	1 MHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	30 KHz	30 KHz	30 KHz
Resol Bandwidth	9 KHz	9 KHz	9 KHz

Operator: J. Biner
Date/Time: 28.11.2012 11:17
Filename:
Me 2 Neut Power Fcc Septa.png/
.txt

Measurement Type : Voltage Interference
Supply : Line 1
Other :

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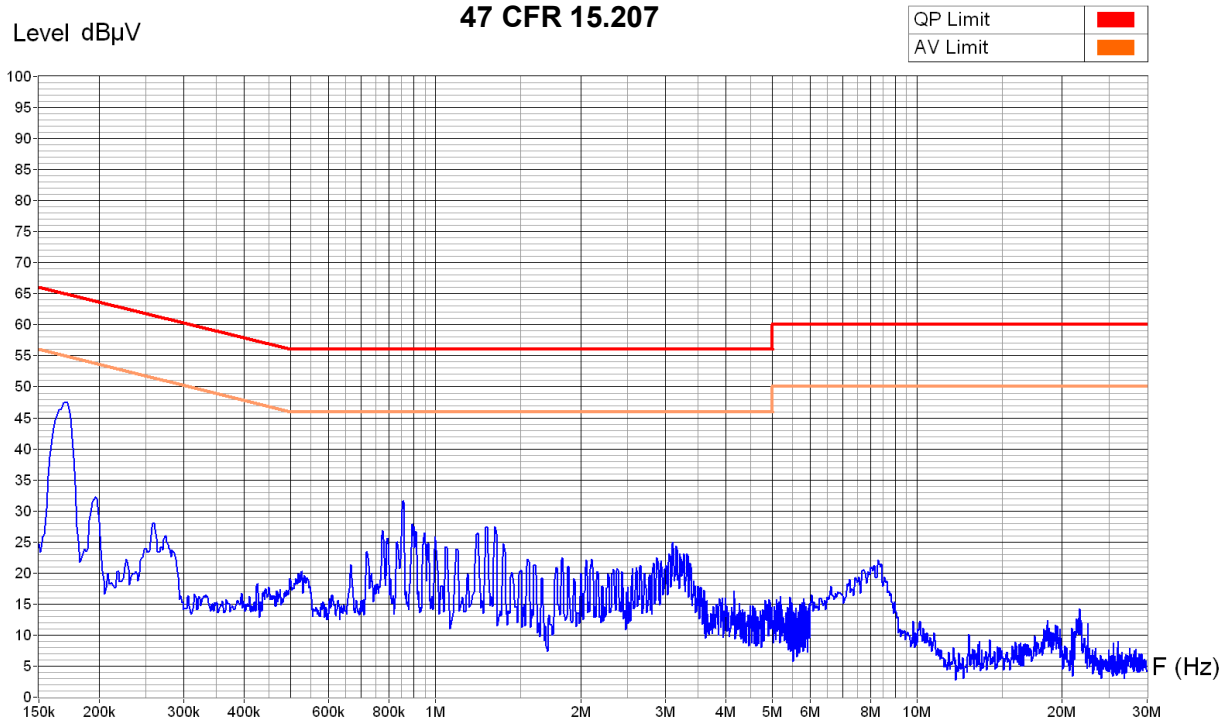
montena emc sa

Equipment Under Test : FVD Expert 9100 US
Set-Up : Floor standing
Operating Conditions : Ready to operate and selling tickets
Remarks :



Zone	150 KHz - 1 MHz	1 MHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	30 KHz	30 KHz	30 KHz
Resol Bandwidth	9 KHz	9 KHz	9 KHz

Operator: J. Biner
Date/Time: 28.11.2012 11:46
Filename:
Me 3 L1 Power Fcc Septa.png/ .txt

7.2 Radiated magnetic field

Test site: semi-anechoic chamber (hybrid)

Meas. distance: 3 m

Meas. uncertainty: ± 2.8 dB (10 m)

Basic standard: ANSI C 63-4:2003

Measuring method: The magnetic disturbance radiated by the equipment under test is measured using a spectrum analyser and a wide band magnetic antenna. The bottom of the antenna is placed at 1 m height, first in the direction of the apparatus under test and then at 90° to the apparatus. If possible the turning table is operated through 360° during the measurement. The recording is carried out taking into account the maximum value of the disturbance appearing during the functioning of the apparatus under test. The peak values are recorded continuously on a graph. The values exceeding the limits are remeasured using a measuring receiver.

Limit 47 CFR 15.209

Frequency Range [MHz]	Limit [µV/m]	Measurment Distance [m]
0.009 – 0.490	2400/F(kHz)	300
0.49 – 1.705	2400/F(kHz	30
1.705 – 30.0	30	30

Test set-up:

Photos of the test set-up: See Annex 3, photo 2

Remarks: *None*

Test equipment:

Spectrum analyser	☒ 168593	☐ 25953
Antenna (loop)	☒ 168599	
Cables	☒ 16140	
Power source	☒ 17525	
Signal Generator	☒ 168592	

Settings of the measurement equipment

Frequency Range [MHz]	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]	Sweep time [s]
0.009 – 0.15	0.2	0.5	3.6
0.15 - 30	10	30	0.3

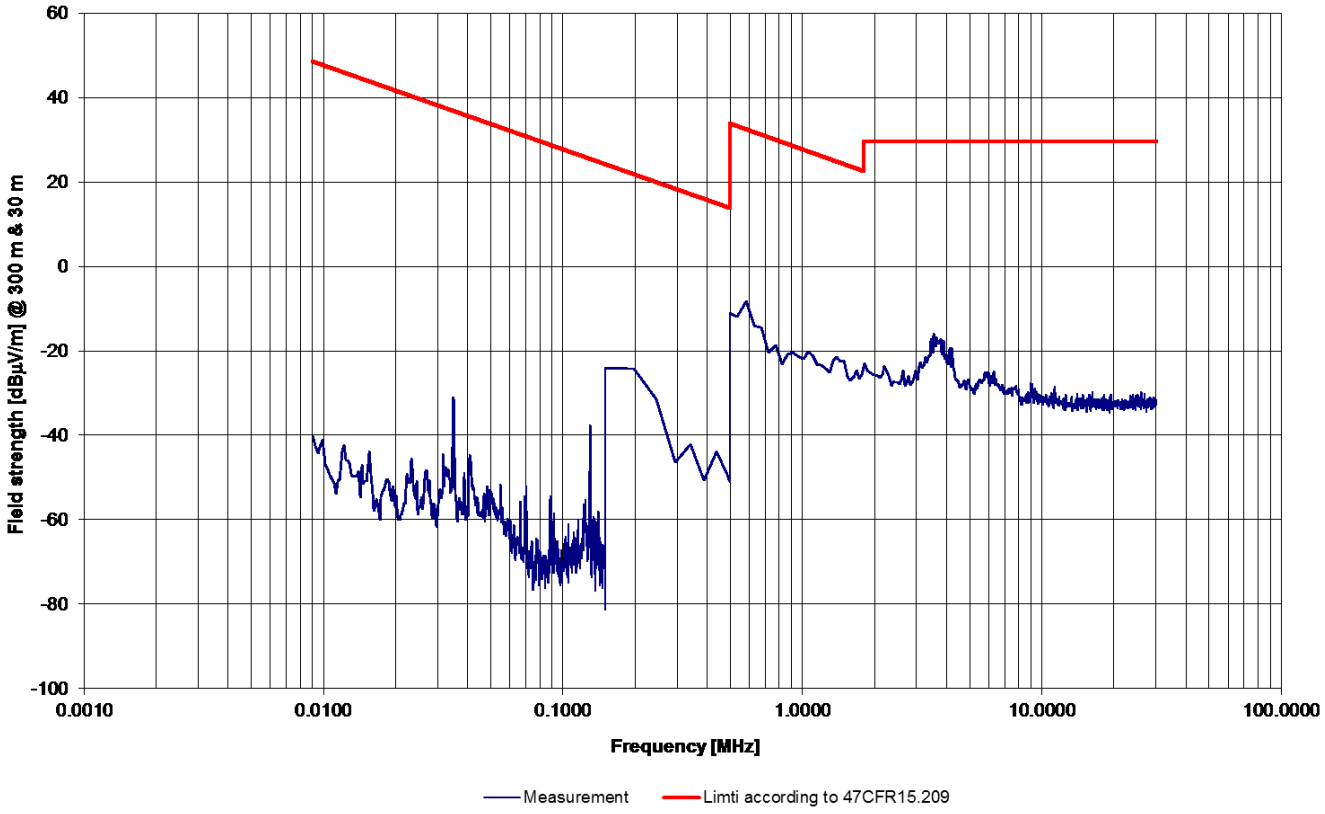
Correction of the measurement result according to the distance

Frequency Range [MHz]	Required Distance	Measurement Distance	Correction
0.009 – 0.5	300	3	80 dB
0.5 - 30	30	3	40 dB

Result:	**☒ pass**	**☐ fail**	**☐ not applicable**	**☐ partly tested**

Measurements 1: Door closed

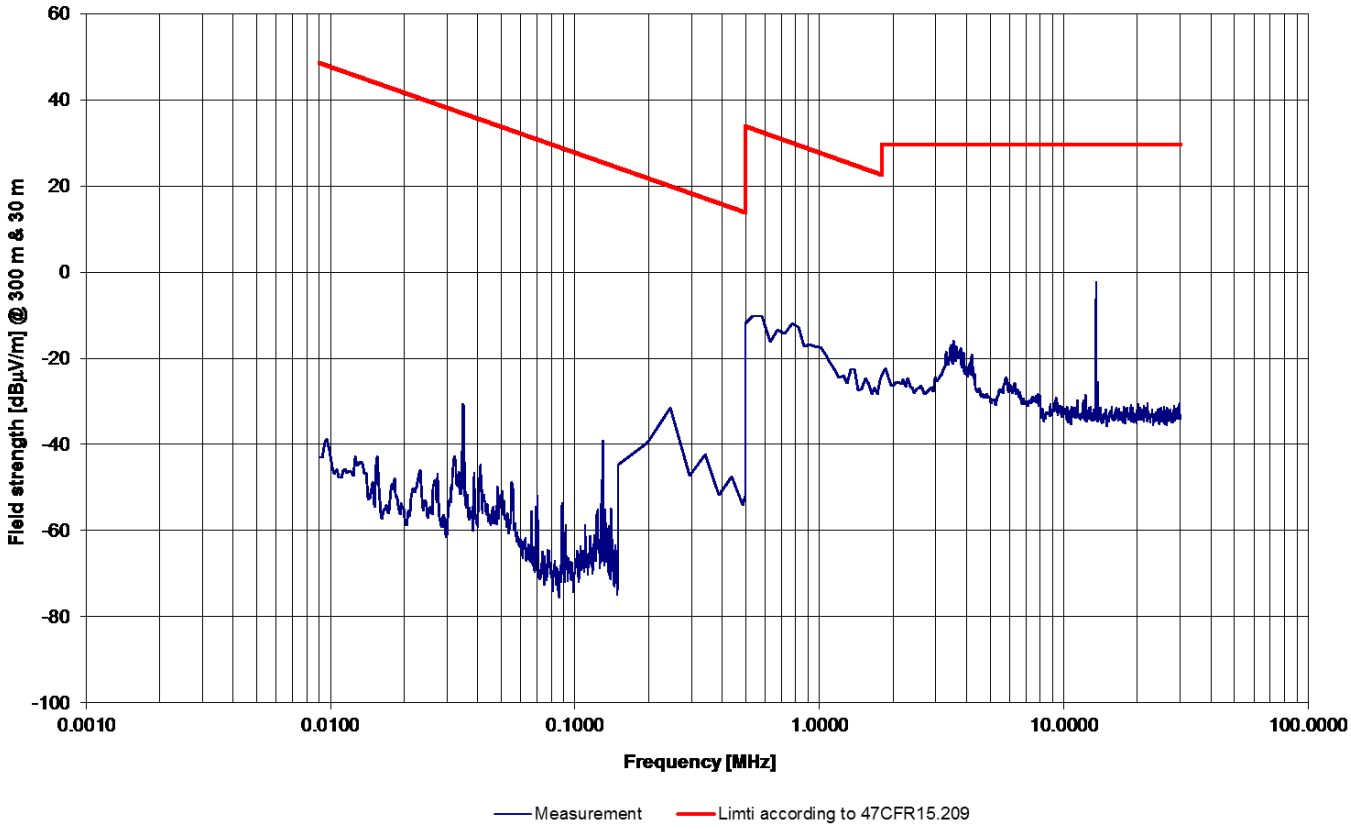
Client:	*ACS Solutions Switzerland Ltd*
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator*
Cables connected:	*Power and LAN*
Remarks:	*The measurement result is corrected according the distance (see table above).*



Date of test: *Bern, January 9, 2013*
Operator: *J. Biner*

Measurements 2: Door open (informative)

Client:	*ACS Solutions Switzerland Ltd*
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator*
Cables connected:	*Power and LAN*
Remarks:	*The measurement result is corrected according the distance (see table above).*



Date of test: *Bern, January 9, 2013*
Operator: *J. Biner*

7.3 Radiated electromagnetic field

Test site: semi-anechoic chamber (hybrid)

Distance: 3 m

Meas. uncertainty: ± 4.6 dB (30 - 300 MHz) / ± 3.7 dB (300 - 1000 MHz) / ± 4.7 dB (1 - 18 GHz)

Basic standard ANSI C 63-4:2003

Measuring method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbances appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding a limit are remeasured manually using a receiver.

Limit: 47 CFR 15.209

Frequency Range [MHz]	Limit [µV/m] @ 3 m	Limit [dBµV/m] @ 3 m
30 – 88	100	40
88 – 216	150	43.5
216 – 960	200	46
Above 960	500	54

Test set-up:

Photos of the test set-up: See Annex 3, photo 3

Remarks: *None*

Test equipment:

Spectrum analyser	☒ 168593	☐ 25953
Preamplifier	☒ 184451	☐ 168520
Antenna, (log-per)	☐ 168585	☐ 26021
Antenna, (bi-con-log)	☒ 181955	
Antenna, (bi-log)	☐ 26933	
Antenna, (log-per dir)	☒ 168591	
Power source	☒ 17525	
Signal Generator	☒ 168592	
Cables	☒ 184452	☐ 168547

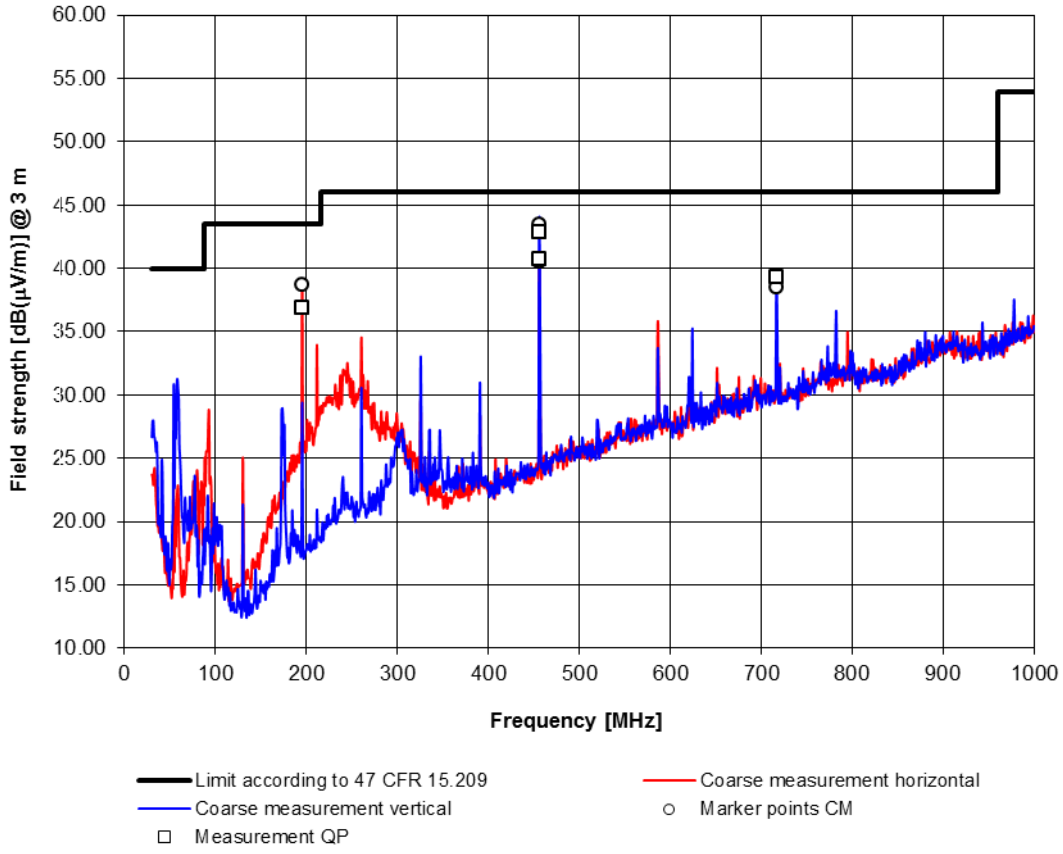
Result:	**☒ pass**	**☐ fail**	**☐ not applicable**	**☐ partly tested**

Test results: *Measurement 1:*

Client:	ACS Solutions Switzerland Ltd
Equipment:	*FVD Expert 9100 US*
Operating mode:	*Ready to operate*
Cables connected:	*Power and LAN*
Remarks:	*None.*

Settings of the measurement equipment

Limits	*47 CFR 15.209*	Frequency range	*30 MHz ... 1000 MHz*
VBW	*300 kHz*	Res-Bandwidth	*100 kHz*
Coarse measurements at	*1, 2, 3 m –with azimuth scan*	Receiver measurement	*1 .. 4 m –with 9 azimuth steps*
Detector:	*Quasi-Peak*	Meas. Time Quasi-Peak	*1 s*



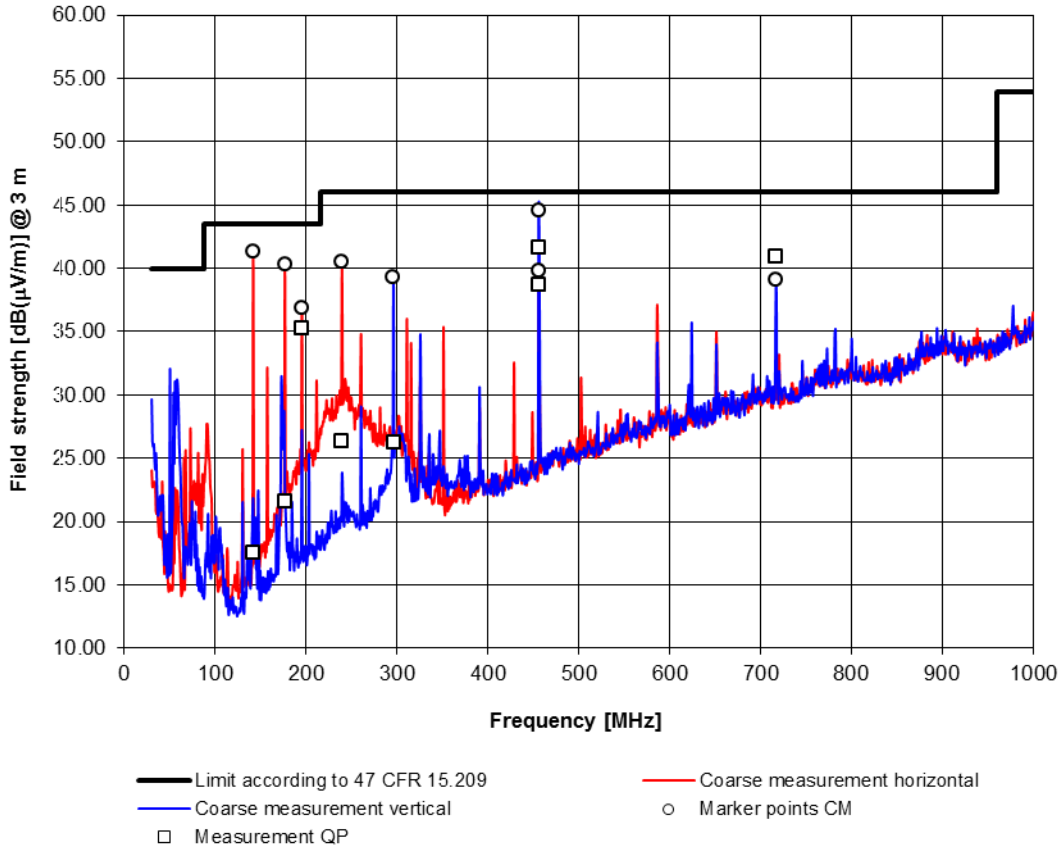
Marker points from coarse measurement			Measurement with test receiver					
Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Polarisation	Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Limits [dBuV/m]	Margin [dB]	Antenna position [cm]	Turntable position [Degrees]
195.29	*38.67*	*Horizontal*	*195.5*	*36.9*	*43.5*	*3.5*	*100*	*0*
456.02	*40.54*	*Horizontal*	*456.16*	*42.8*	*46*	*3.2*	*100*	*30*
456.02	*43.49*	*Vertical*	*456.17*	*40.7*	*46*	*5.3*	*200*	*60*
716.76	*38.48*	*Vertical*	*716.84*	*39.3*	*46*	*6.7*	*150*	*360*

Test results: *Measurement 2:*

Client:	ACS Solutions Switzerland Ltd
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator*
Cables connected:	*Power and LAN*
Remarks:	*None.*

Settings of the measurement equipment

Limits	*47 CFR 15.209*	Frequency range	*30 MHz ... 1000 MHz*
VBW	*300 kHz*	Res-Bandwidth	*100 kHz*
Coarse measurements at	*1, 2, 3 m –with azimuth scan*	Receiver measurement	*1 .. 4 m –with 9 azimuth steps*
Detector:	*Quasi-Peak*	Meas. Time Quasi-Peak	*1 s*



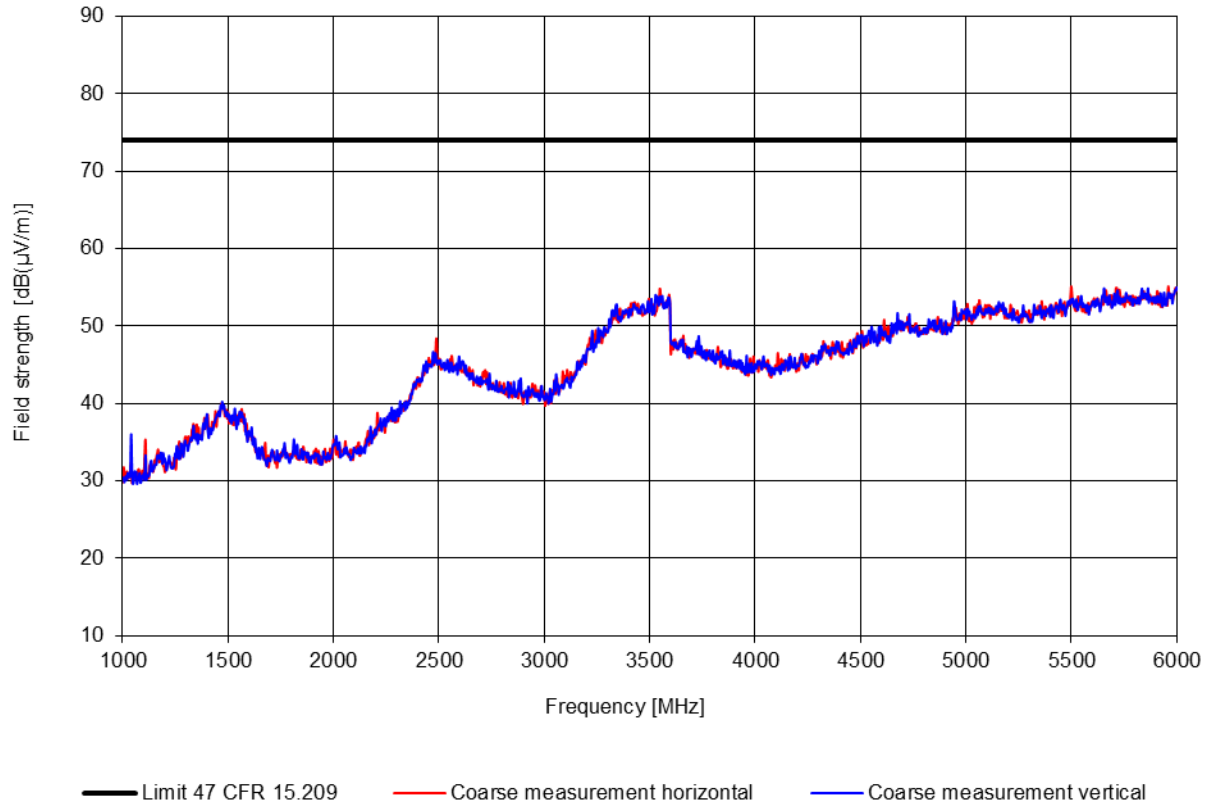
Marker points from coarse measurement			Measurement with test receiver					
Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Polarisation	Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Limits [dBuV/m]	Margin [dB]	Antenna position [cm]	Turntable position [Degrees]
141.74	*41.37*	*Horizontal*	*142*	*17.5*	*43.52*	*26.02*	*150*	*0*
176.66	*40.36*	*Horizontal*	*177.82*	*21.6*	*43.52*	*21.92*	*100*	*0*
195.29	*36.91*	*Horizontal*	*195.5*	*35.2*	*43.52*	*8.32*	*100*	*360*
239.52	*40.47*	*Horizontal*	*239.52*	*26.3*	*46*	*19.7*	*100*	*360*
296.17	*39.31*	*Vertical*	*297.68*	*26.2*	*46*	*19.8*	*150*	*330*
456.02	*39.82*	*Horizontal*	*456.17*	*38.7*	*46*	*7.3*	*150*	*330*
456.02	*44.56*	*Vertical*	*456.17*	*41.6*	*46*	*4.4*	*100*	*30*
717.54	*39.06*	*Vertical*	*716.83*	*40.9*	*46*	*5.1*	*150*	*360*

Test results: *Measurement 3:*

Client:	ACS Solutions Switzerland Ltd
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator*
Cables connected:	*Power and LAN*
Remarks:	*None*

Settings of the measurement equipment

Limits	*47 CFR 15.209*	Frequency range	*1 GHz ... 6 GHz*
VBW	*300 kHz*	Res-Bandwidth	*100 kHz*
Coarse measurements at	*1, 2, 3 m –with azimuth scan*	Detector:	*Peak*



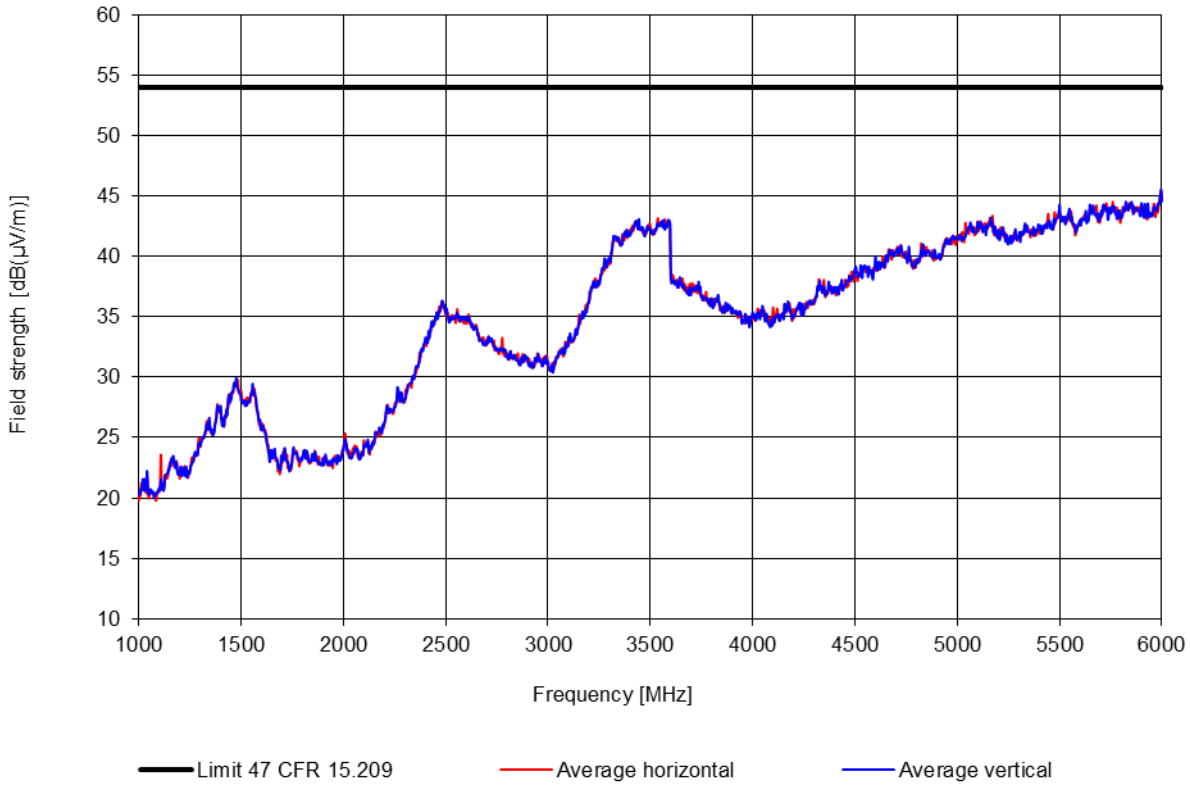
Marker points from coarse measurement			Measurement with test receiver					
Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Polarisation	Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Limits [dBuV/m]	Margin [dB]	Antenna position [cm]	Turntable position [Degrees]
-	-	-	-	-	-	-	-	-

Test results: *Measurement 4:*

Client:	ACS Solutions Switzerland Ltd
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator*
Cables connected:	*Power and LAN*
Remarks:	*None*

Settings of the measurement equipment

Limits	*47 CFR 15.209*	Frequency range	*1 GHz ... 6 GHz*
VBW	*300 kHz*	Res-Bandwidth	*100 kHz*
Coarse measurements at	*1, 2, 3 m –with azimuth scan*	Detector:	*Average*



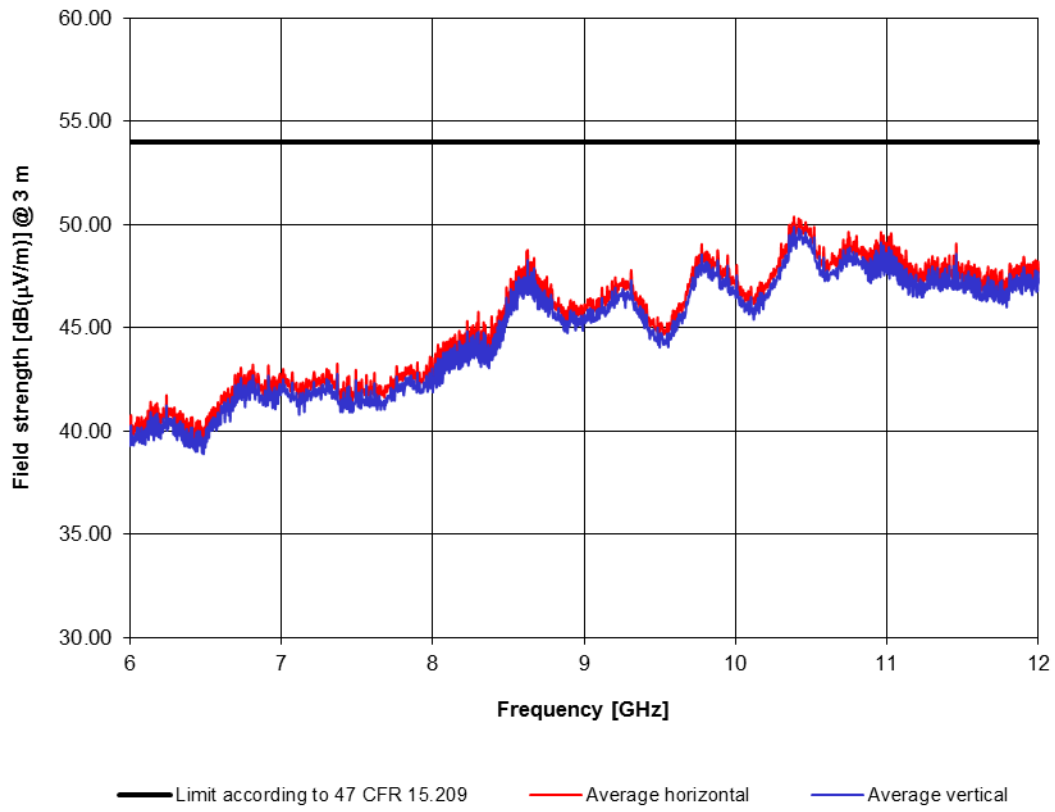
Marker points from coarse measurement			Measurement with test receiver					
Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Polarisation	Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Limits [dBuV/m]	Margin [dB]	Antenna position [cm]	Turntable position [Degrees]
-	-	-	-	-	-	-	-	-

Test results: *Measurement 5:*

Client:	ACS Solutions Switzerland Ltd
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator o*
Cables connected:	*Power and LAN*
Remarks:	*None*

Settings of the measurement equipment

Limits	*47 CFR 15.209*	Frequency range	*6 GHz …. 12 GHz*
VBW	*300 kHz*	Res-Bandwidth	*100 kHz*
Coarse measurements at	*1, 2, 3 m –with azimuth scan*	Detector:	*Average*



Marker points from coarse measurement			Measurement with test receiver					
Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Polarisation	Frequency [MHz]	Field strength (at 3m distance) [dBuV/m]	Limits [dBuV/m]	Margin [dB]	Antenna position [cm]	Turntable position [Degrees]
-	-	-	-	-	-	-	-	-

Place and date of test: *Bern, December 13, 2012*
Operator: *J. Biner*

7.4 Radiated Emission Additional Provisions: 20 dB Bandwidth

Test site: climatic chamber
Meas. distance: 1.5 m
Meas. uncertainty: ± 2.8 dB (10 m)
Basic standard: ANSI C 63-4:2003
Measuring method: The carrier of the radio link is measured using a spectrum analyser and a wide band magnetic antenna. The bottom of the antenna is placed at 1 m height.
Limit 47 CFR 15.215 c)

Paragraph	Frequency of the bandwith [MHz]	Limit [MHz]
c)	Lower value	15.553
c)	Upper value	15.567

Test set-up:

Photos of the test set-up: See Annex 3, photo 4

Remarks: *None*
Test equipment:

Spectrum analyser	☒ 168593 ☐ 25953
Antenna (loop)	☒ 168599
Cables	☒ 16140
Power source	☒ 17525
Signal Generator	☒ 168592

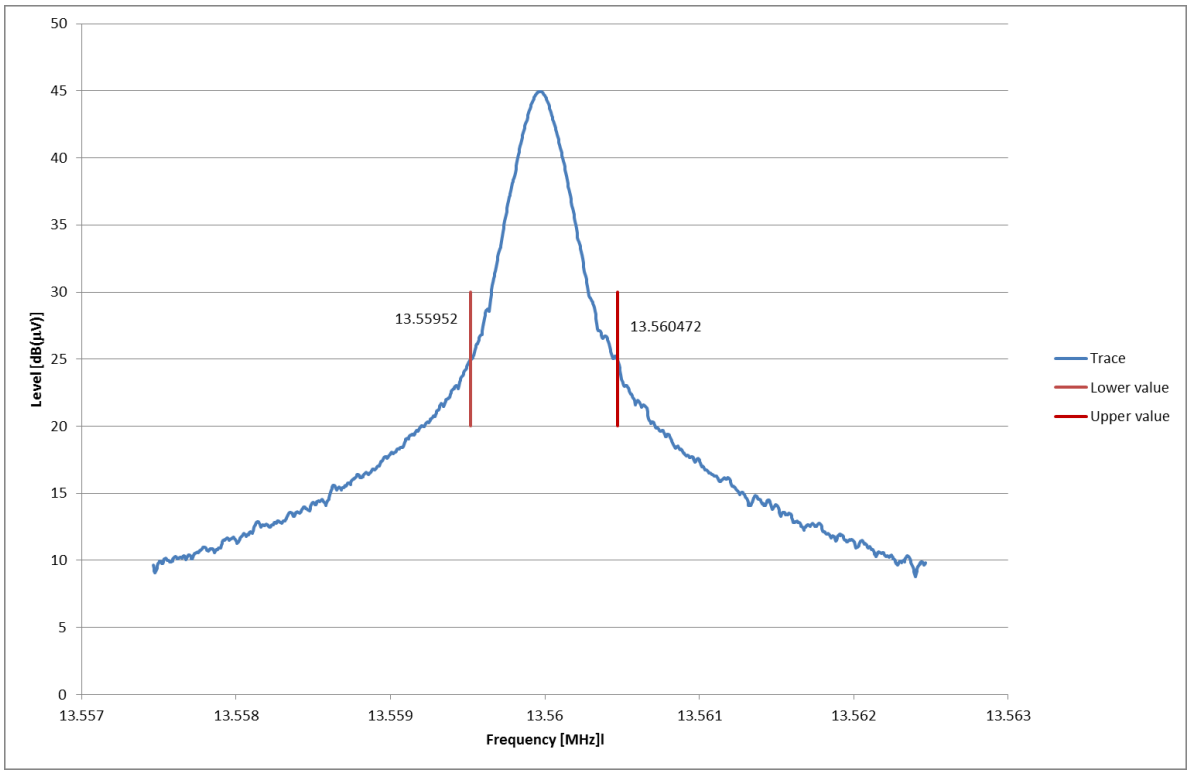
Settings of the measurement equipment

Centre frequency [MHz]	Span [kHz]	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]	Sweep time [s]
13.559 964 MHz	0.5	0.2	0.5	0.125

Result:	**☒ pass**	**☐ fail**	**☐ not applicable**	**☐ partly tested**

Measurements

Client:	*ACS Solutions Switzerland Ltd*
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator*
Cables connected:	*Power and LAN*
Remarks:	*None*



Paragraph	Frequency of the bandwidth [MHz]	Measurement [MHz]	Limit [MHz]	Result
15.215 c)	*Lower value*	*13.559 520*	15.553	*Pass*
15.215 c)	*Upper value*	*13.560 472*	15.567	*Pass*

Date of test: *Bern, March 13, 2013*
Operator: *J. Biner*

7.5 Radiated Emission Additional Provisions 13.110 MHz up to 14.010 MHz

Test site: semi-anechoic chamber (hybrid)
Meas. distance: 3 m
Meas. uncertainty: ± 2.8 dB (10 m)
Basic standard: ANSI C 63-4:2003
Measuring method: The carrier of the radio link is measured using a spectrum analyser and a wide band magnetic antenna. The bottom of the antenna is placed at 1 m height.
Limit 47 CFR 15.225 a) – c)

Paragraph	Frequency Range [MHz]	Limit [µV/m] @ 30 m	Limit [dBµV/m] @ 30 m
a)	13.553 – 13.567	15'848	84
b)	13.410 – 13.553 & 13.567 – 13.710	334	50.5
c)	13.110 – 13.410 & 13.710 – 14.010	106	40.5

Test set-up:

Photos of the test set-up: See Annex 3, photo 2

Remarks: *None*
Test equipment:

Spectrum analyser	☒ 168593	☐ 25953
Antenna (loop)	☒ 168599	
Cables	☒ 16140	
Power source	☒ 17525	
Signal Generator	☒ 168592	

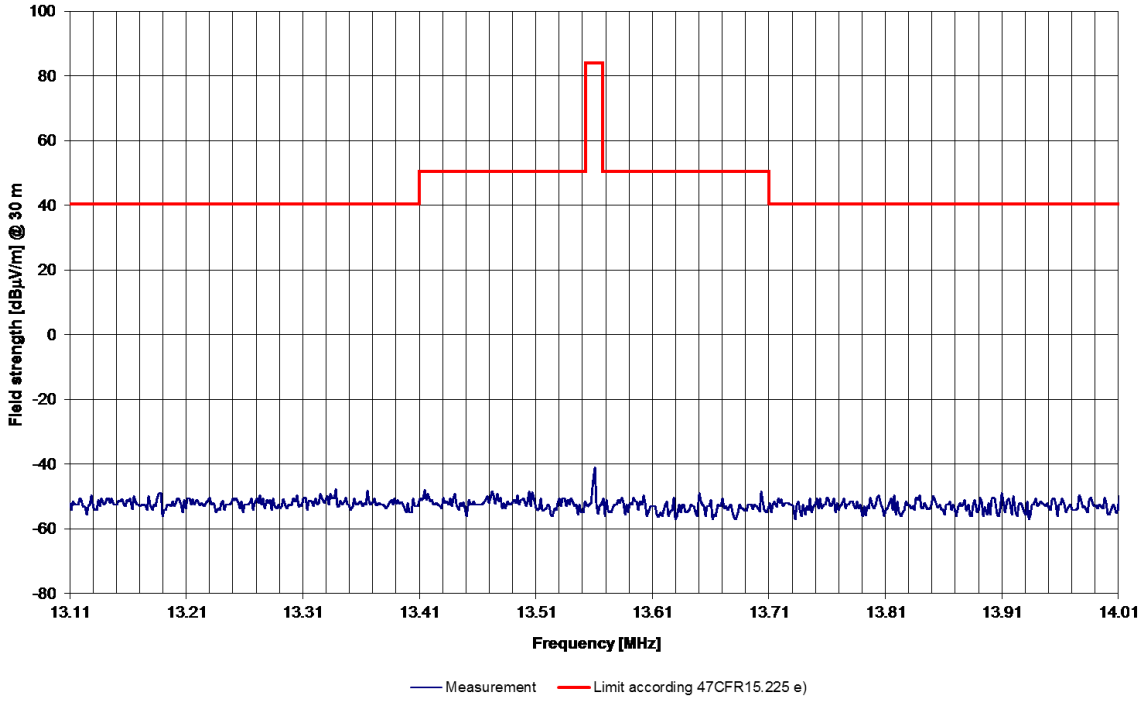
Settings of the measurement equipment

Frequency Range [MHz]	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]	Sweep time [s]
13.110 – 14.011	0.2	0.5	2.3

Result:	**☒ pass**	**☐ fail**	**☐ not applicable**	**☐ partly tested**

Measurements 1: Door closed

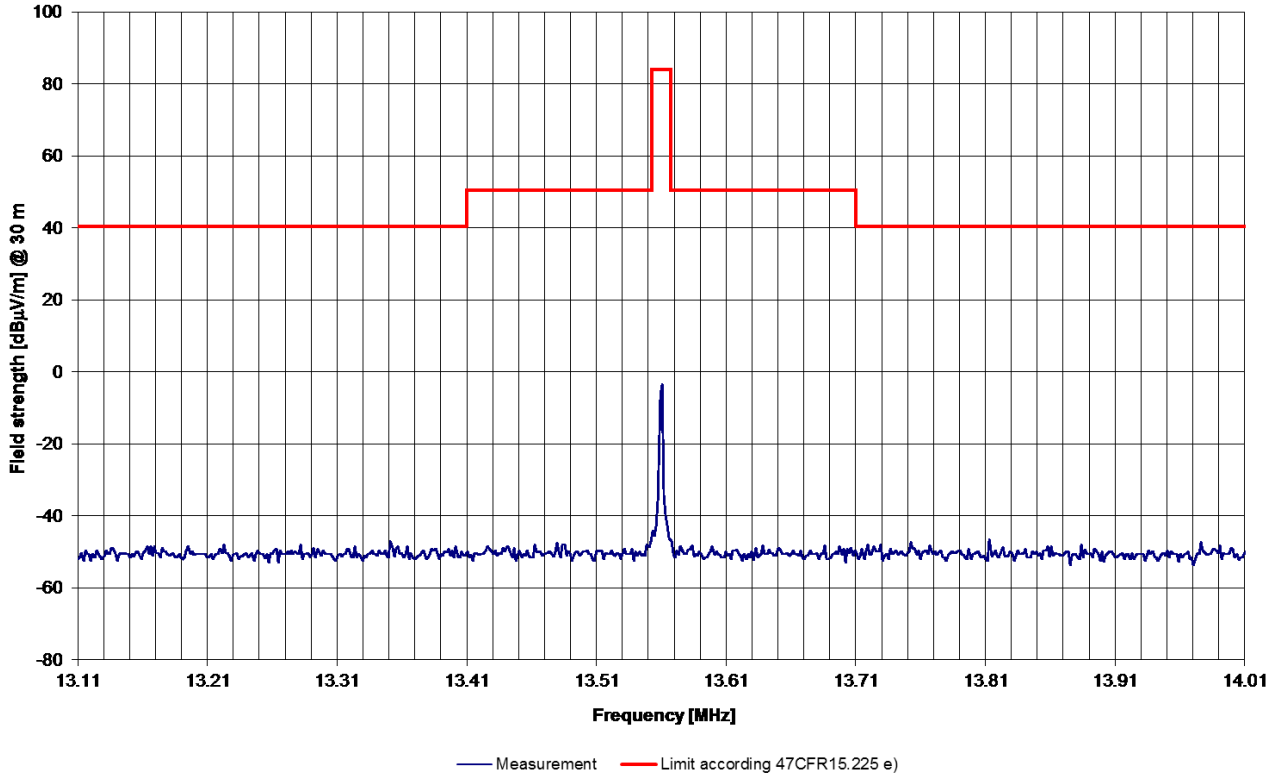
Client:	*ACS Solutions Switzerland Ltd*
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator*
Cables connected:	*Power and LAN*
Remarks:	*None*



Date of test: *Bern, January 9, 2013*
Operator: *J. Biner*

Measurements 2: Door open (informative)

Client:	*ACS Solutions Switzerland Ltd*
Equipment:	*FVD Expert 9100 US*
Operating mode:	*EUT is activated by the operator*
Cables connected:	*Power and LAN*
Remarks:	*None*



Date of test: *Bern, January 9, 2013*
Operator: *J. Biner*

7.6 Stability of the carrier frequency

Test site: climatic chamber
Meas. distance: 1 m
Meas. uncertainty: ± 2.8 dB (10 m)
Basic standard: ANSI C 63-4:2003
Measuring method: The carrier of the radio link is measured using a spectrum analyser and a wide band magnetic antenna. The bottom of the antenna is placed at 1 m height.
Limit 47 CFR 15.225 e)

What	Range or variation	Allowed variation
Supply voltage	97.75 V (85%) – 132.25 (115%)	0.01%
Temperature	-20° - 50° C	0.01%

Test set-up:

Photos of the test set-up: See Annex 3, photo 4

Remarks: *None*

Test equipment:

Spectrum analyser	☒ 168593	☐ 25953
Antenna (loop)	☒ 168599	
Cables	☒ 16140	
Power source	☒ 17525	
Signal Generator	☒ 168592	

Settings of the measurement equipment

Center Frequency [MHz]	Span [kHz]	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]	Sweep time
13.56	1.35	0.2	3	coupled

Result:	**☒ pass**	**☐ fail**	**☐ not applicable**	**☐ partly tested**

Results

Client: *ACS Solutions Switzerland Ltd*
Equipment: *FVD Expert 9100 US*
Operating mode: *EUT is activated by the operator*
Cables connected: *Power and LAN*
Remarks: *None*

Measurement of the carrier at supply voltage variation

Supply voltage [V]	Supply voltage [%]	Measurement [MHz]	Variation [Hz]	Limit [Hz]	Fulfilment
97.75	85	13.559852	17	±1356	PASS
115	100	13.559835	--	--	--
132.25	115	13.559857	22	±1356	PASS

Measurement of the carrier at temperature variation

Temperature [° C]	Measurement [MHz]	Variation [Hz]	Limit [Hz]	Fulfilment
-20	13.559935	100	±1356	PASS
0	13.559915	80	±1356	PASS
20	13.559835	--	--	--
35	13.559826	-9	±1356	PASS
50	13.559805	-30	±1356	PASS

Date of test: *Bern, January 9 & 10, 2013*
Operator: *J. Biner*

7.7 Information of the test equipment

Equipment	Inventory number	Manufacturer	Type	Date of last calibration
Spectrum analyser / Receiver	168593	Rohde & Schwarz	ESU 26	28.09.2011
Cables for conducted measurements	16140	Huber & Suhner	RG 232	22.02.2011
LISN	182186	Rohde & Schwarz	ESH2-Z5	20.12.2011
Preamplifier	184451	Miteq	JS4-001018000-33—5A	16.08.2011
Cables for radiated measurements	184452	Huber & Suhner	Sucoflex	16.08.2011
Antenna (bi-con-log)	181955	ETS Lindgren	3142D	11.04.2012
Antenna (log-per dir)	168591	Rohde & Schwarz	HA 226/582/50	30.11.2011
Antenna (loop)	168599	Rohde & Schwarz	HFH2-Z2	30.10.2012