



Inter**Lab**<sup>®</sup>

Final Report on

Datalogic Joya X2

BASIC Wifi with DE2011 reader

FCC ID: U4GJX2W

IC: 3862E-JX2W

**Report Reference:** MDE\_DATA\_1408\_FCCb

acc. Title 47 CFR chapter I part 15 subpart B, Class B

**Date:** September 22, 2014

**Test Laboratory:**

7Layers AG  
Borsigstr. 11  
40880 Ratingen  
Germany



**Note:**

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

7Layers AG  
Borsigstrasse 11  
40880 Ratingen, Germany  
Phone: +49 (0) 2102 749 0  
Fax: +49 (0) 2102 749 350  
www.7Layers.com

Aufsichtsratsvorsitzender •  
Chairman of the Supervisory Board:  
Peter Mertel  
Vorstand • Board:  
Dr. H.-J. Meckelburg  
Dr. H. Ansorge

Registergericht • registered in:  
Düsseldorf, HRB 44096  
USt-IdNr • VAT No.:  
DE 203159652  
TAX No. 147/5869/0385

## 1 Administrative Data

### 1.1 Project Data

*Project Responsible:* Patrick Menge  
*Date Of Test Report:* 2014/09/22  
*Date of first test:* 2014/06/02  
*Date of last test:* 2014/07/28

### 1.2 Applicant Data

*Company Name:* Datalogic ADC S.r.l.  
*Street:* Via S. Vitalino, 13  
Lippo di Calderara di Reno  
*City:* 40012 Bologna  
*Contact Person:* Mr. Davide E. Vaccaneo  
*Function:* Regulatory Engineer  
*Department:* Regulatory & Reliability  
*Phone:* +39 051 314 72 16  
*Fax:* +39 051 314 75 61  
*E-Mail:* davide.vaccaneo@datalogic.com

### 1.3 Test Laboratory Data

The following list shows all places and laboratories involved for test result generation:

#### 7 layers DE


---

*Company Name :* 7 layers AG  
*Street :* Borsigstrasse 11  
*City :* 40880 Ratingen  
*Country :* Germany  
*Contact Person :* Mr. Michael Albert  
*Phone :* +49 2102 749 201  
*Fax :* +49 2102 749 444  
*E Mail :* Michael.Albert@7Layers.com

#### Laboratory Details

<i>Lab ID</i>	<i>Identification</i>	<i>Responsible</i>	<i>Accreditation Info</i>
Lab 1	Conducted Emissions	Mr. Andreas Petz Mr. Wolfgang Richter	DAkKS-Registration no. D-PL-12140-01-01
Lab 2	Radiated Emissions	Mr. Marco Kullik Mr. Robert Machulec	DAkKS-Registration no. D-PL-12140-01-01

**1.4 Signature of the Testing Responsible**



Patrick Lomax  
responsible for tests performed in: Lab 1, Lab 2

**1.5 Signature of the Accreditation Responsible**



Accreditation scope responsible person  
responsible for Lab 1, Lab 2

**2 Test Object Data**

**2.1 General OUT Description**

The following section lists all OUTs (Object's Under Test) involved during testing.

**OUT: Datalogic Joya X2**

<i>Type / Model / Family:</i>	Datalogic Joya X2 BASIC Wifi with DE2011 reader
<b>Manufacturer:</b>	
<i>Company Name:</i>	See applicant data:
<i>Contact Person:</i>	-

**2.2 Detailed Description of OUT Samples**

**Sample : be01**

<i>OUT Identifier</i>	Datalogic Joya X2		
<i>Sample Description</i>	BASIC WIFI with DE2011 reader		
<i>Serial No.</i>	Z14P00026		
<i>HW Status</i>	P/N 911300120		
<i>SW Status</i>	1.80.024.04-SS000		
<i>Low Voltage</i>	3.5 V	<i>Low Temp.</i>	0 °C
<i>High Voltage</i>	4.2 V	<i>High Temp.</i>	+40 °C
<i>Nominal Voltage</i>	3.7 V	<i>Normal Temp.</i>	+20 °C

## 2.3 OUT Features

### Features for OUT: Datalogic Joya X2

<i>Designation</i>	<i>Description</i>	<i>Allowed Values</i>	<i>Supported Value(s)</i>
<b>Features for scope: FCC_v2</b>			
BT	EUT supports Bluetooth data rate of 1 Mbps with GFSK modulation in the band 2400 MHz - 2483.5 MHz		
DC	The OUT is powered by or connected to DC		
EDR2	EUT supports Bluetooth using data rate of 2 Mbps with PI/4 DQPSK modulation in the band 2400 MHz - 2483.5 MHz		
EDR3	EUT supports Bluetooth using data rate of 3 Mbps with 8DPSK modulation in the band 2400 MHz - 2483.5 MHz		
Iant	Integral Antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment		
Wb	EUT supports WLAN in mode b in the band 2400 MHz - 2483.5 MHz		
Wg	EUT supports WLAN in mode g in the band 2400 MHz - 2483.5 MHz		

## 2.4 Auxiliary Equipment

<i>AE No.</i>	<i>Type Designation</i>	<i>Serial No.</i>	<i>HW Status</i>	<i>SW Status</i>	<i>Description</i>
AE AE12	007100100				USB-Cable
AE AE01	BT-17	14023956			Battery
AE AE94	Cherry RS6000	G 0000273 2P28			Keyboard
AE AE92	Fujitsu Siemens 0335C2065	A30638114250			AC Adapter laptop
AE AE91	Fujitsu Siemens Amilo Pro V3205	YK2H014267			Laptop
AE AE93	Logitech MBB48	LZC90505478			Mouse

## 2.5 Operating Mode(s)

<i>Ref.-No.</i>	<i>Description</i>
04	WLAN TX @2437; Barcodereader continusly active.

### 2.6 Setups used for Testing

For each setup a relation is given to determine if and which samples and auxiliary equipment is used. The left side list all OUT samples and the right side lists all auxiliary equipment for the given setup.

<i>Setup No.</i>	<i>List of OUT samples</i>	<i>List of auxiliary equipment</i>	
<i>Sample No.</i>	<i>Sample Description</i>	<i>AE No.</i>	<i>AE Description</i>
<b>CA01 (Single Setup M8)</b>			
<i>Sample: be01</i>	BASIC WIFI with DE2011 reader	AE AE12	USB-Cable
		AE AE01	Battery
		AE AE94	Keyboard
		AE AE92	AC Adapter laptop
		AE AE91	Laptop
		AE AE93	Mouse

## 3 Results

### 3.1 General

**Documentation of tested devices:**

Available at the test laboratory.

**Interpretation of the test results:**

The results of the inspection are described on the following pages, where 'Conformity' or 'Passed' means that the certification criteria were verified and that the tested device is conform to the applied standard.

In cases where 'Declaration' is printed, the required documents are available in the manufacturers product documentation.

In cases where 'not applicable' is printed, the test case requirements are not relevant to the specific equipment implementation.

**Note:**

The environmental conditions are recorded and available in the InterLab system for each performed test.

### 3.2 List of Test Specification

<i>Test Specification:</i>	<b>FCC part 2 and 15</b>
<i>Version</i>	10-1-13 Edition
<i>Title:</i>	PART 2 - GENERAL RULES AND REGULATIONS PART 15 - RADIO FREQUENCY DEVICES



### 3.3 Summary

<i>Test Case Identifier / Name</i> <i>Test (condition)</i>	<i>Result</i>	<i>Date of Test</i>	<i>Lab</i> <i>Ref.</i>	<i>Setup</i>
<b>15b.1 Conducted Emissions (AC Power Line) §15.107</b>				
15b.1; Mode = generating a high power consumption	Passed	2014/07/28	Lab 1	CA01
	operating mode: 04			
<b>15b.2 Spurious Radiated Emissions §15.109</b>				
15b.2; Mode = generating a high power consumption	Passed	2014/06/02	Lab 2	CA01
	operating mode: 04			



### **3.4 Detailed Results**

#### **3.4.1 15b.1 Conducted Emissions (AC Power Line) §15.107**

**Test: 15b.1; Mode = generating a high power consumption**

<i>Result:</i>	Passed
<i>Setup No.:</i>	CA01
<i>Date of Test:</i>	2014/07/28 22:22
<i>Body:</i>	NO BODY
<i>Test Specification:</i>	FCC part 2 and 15

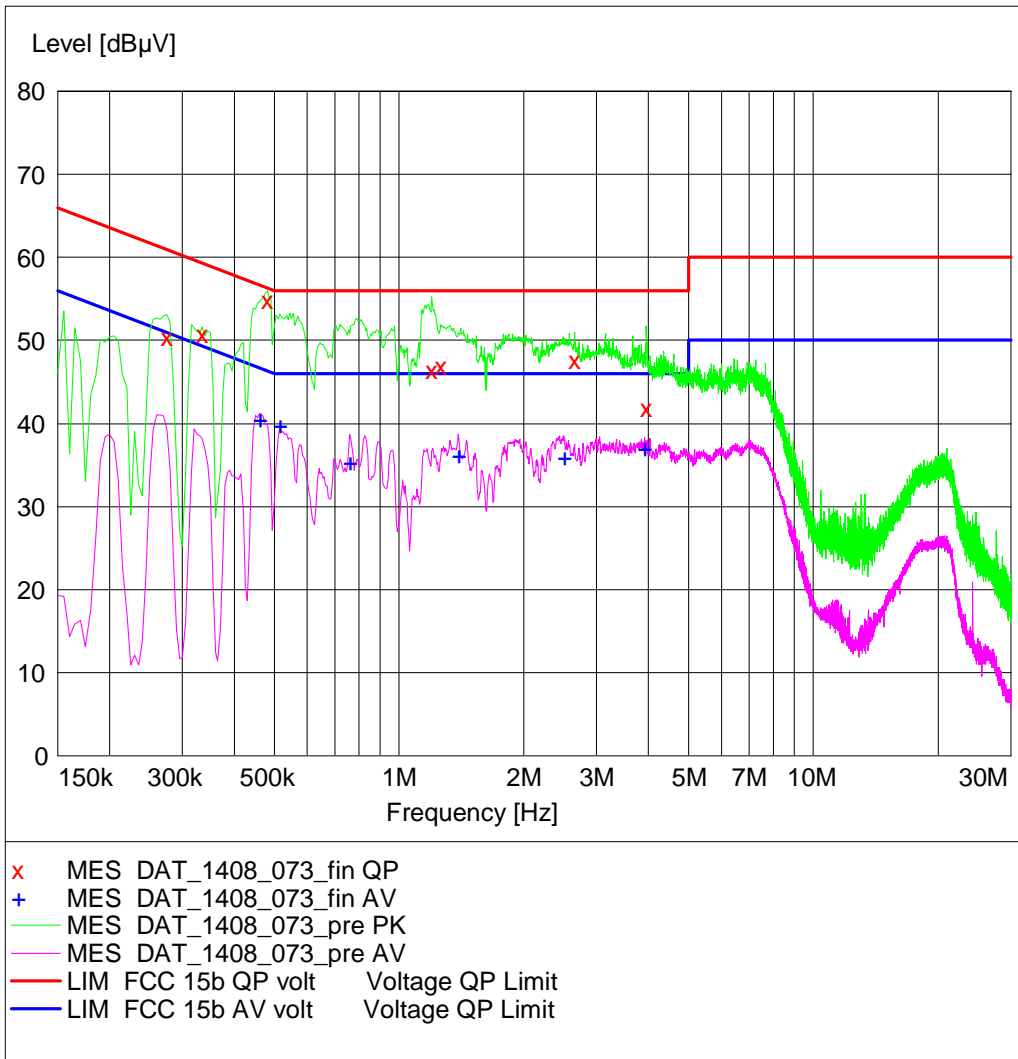
**Detailed Results:**

**AC MAINS CONDUCTED**

EUT: (DE1006006da01)  
 Manufacturer: Datalogic  
 Operating Condition: WLAN b-mode local TX on 2437MHz, USB-traffic; Barcodereader active  
 Test Site: 7 layers Ratingen  
 Operator: Doe  
 Test Specification: ANSI C63.4; FCC 15.107 / 15.207 Class B  
 Comment: 120V/60Hz  
 Start of Test: 28.07.2014 / 22:22:58

**SCAN TABLE: "FCC Voltage"**

Short Description:			FCC Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width	MaxPeak	Average		
150.0 kHz	30.0 MHz	5.0 kHz		20.0 ms	9 kHz	ESH3-Z5







**MEASUREMENT RESULT: "DAT\_1408\_073\_fin QP"**

28.07.2014 22:28

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.275000	50.40	10.1	61	10.5	L1	GND
0.335000	50.80	10.1	59	8.5	L1	GND
0.480000	54.90	10.1	56	1.4	N	GND
1.200000	46.50	10.1	56	9.5	N	GND
1.260000	47.00	10.1	56	9.0	L1	FLO
2.650000	47.70	10.2	56	8.3	N	FLO
3.955000	41.90	10.3	56	14.1	N	FLO

**MEASUREMENT RESULT: "DAT\_1408\_073\_fin AV"**

28.07.2014 22:29

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.460000	40.60	10.1	47	6.1	L1	FLO
0.515000	39.90	10.1	46	6.1	L1	GND
0.760000	35.40	10.1	46	10.6	L1	GND
1.390000	36.30	10.1	46	9.7	N	FLO
2.500000	36.00	10.2	46	10.0	N	GND
3.910000	37.10	10.3	46	8.9	L1	GND



### **3.4.2 15b.2 Spurious Radiated Emissions §15.109**

**Test: 15b.2; Mode = generating a high power consumption**

<i>Result:</i>	Passed
<i>Setup No.:</i>	CA01
<i>Date of Test:</i>	2014/06/02 15:18
<i>Body:</i>	NO BODY
<i>Test Specification:</i>	FCC part 2 and 15

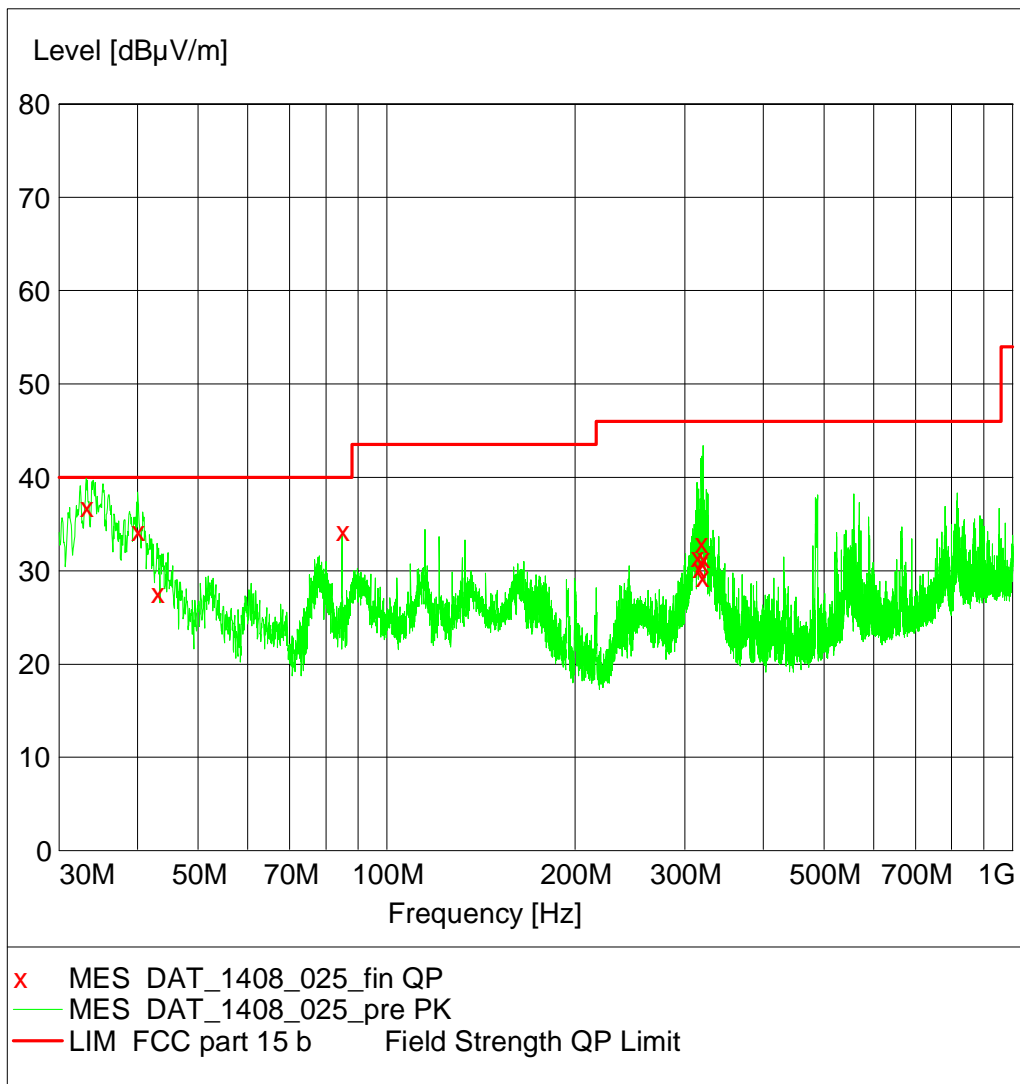
**Detailed Results:**

**EMI RADIATED TEST**

EUT: (DE1006006da01)  
 Manufacturer: Datalogic  
 Operating Condition: USB traffic + Barcode scanner active + WLAN RX  
 Test Site: 7 layers, Ratingen  
 Operator: Mit  
 Test Specification: FCC part 15 b Class B  
 Comment: Horizontal EUT position, 120V/60Hz, comp. peri.  
 Start of Test: 02.06.2014 / 15:18:38

**SCAN TABLE: "FCC part 15 b"**

Short Description:		FCC part 15 b				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width	MaxPeak			
30.0 MHz	1.0 GHz	60.0 kHz		1.0 ms	120 kHz	HL562





**MEASUREMENT RESULT: "DAT\_1408\_025\_fin QP"**

02.06.2014 16:14

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
33.120000	36.80	18.9	40.0	3.2	100.0	67.00	VERTICAL
40.020000	34.20	15.0	40.0	5.8	101.0	67.00	VERTICAL
42.960000	27.60	13.3	40.0	12.4	101.0	157.00	VERTICAL
84.900000	34.20	9.8	40.0	5.8	392.0	157.00	HORIZONTAL
313.740000	31.50	13.5	46.0	14.5	126.0	338.00	HORIZONTAL
315.180000	30.30	13.5	46.0	15.7	100.0	328.00	HORIZONTAL
318.060000	33.00	13.6	46.0	13.0	101.0	345.00	HORIZONTAL
318.600000	30.90	13.7	46.0	15.1	101.0	5.00	HORIZONTAL
319.260000	29.30	13.7	46.0	16.7	126.0	245.00	HORIZONTAL
320.160000	31.30	13.8	46.0	14.7	104.0	0.00	HORIZONTAL

## 4 Test Equipment Details

### 4.1 List of Used Test Equipment

The calibration, hardware and software states are shown for the testing period.

#### Test Equipment Anechoic Chamber

<b>Lab ID:</b>	<b>Lab 2</b>		
<b>Manufacturer:</b>	Frankonia		
<b>Description:</b>	Anechoic Chamber for radiated testing		
<b>Type:</b>	10.58x6.38x6.00 m <sup>3</sup>		
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	NSA (FCC)		2014/01/09 2017/01/09

#### Single Devices for Anechoic Chamber

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Air compressor	none	-	Atlas Copco
Anechoic Chamber	10.58 x 6.38 x 6.00 m <sup>3</sup>	none	Frankonia
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	FCC listing 96716 3m Part15/18		2014/01/09 2017/01/08
Controller Maturo	MCU	961208	Maturo GmbH
EMC camera	CE-CAM/1	-	CE-SYS
EMC camera Nr.2	CCD-400E	0005033	Mitsubishi
Filter ISDN	B84312-C110-E1		Siemens&Matsushita
Filter Universal 1A	BB4312-C30-H3	-	Siemens&Matsushita

**Test Equipment Auxiliary Equipment for Conducted emissions**

**Lab ID:** Lab 1  
**Manufacturer:** Rohde & Schwarz GmbH & Co.KG  
**Description:** EMI Conducted Auxiliary Equipment

**Single Devices for Auxiliary Equipment for Conducted emissions**

Single Device Name	Type	Serial Number	Manufacturer
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber&Suhner
Impedance Stabilization Network	ISN T800	36159	Teseq GmbH
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	Standard Calibration		2014/02/06 2016/02/28
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN ENY41	100002	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	Standard calibration		2013/03/01 2015/03/31
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN ST08	36292	Teseq GmbH
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	Standard calibration		2014/01/10 2016/01/31
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN T8-Cat6	32187	Teseq GmbH
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	Standard Calibration		2014/01/08 2016/01/31
One-Line V-Network	ESH 3-Z6	100489	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	standard calibration		2014/06/18 2017/11/30
One-Line V-Network	ESH 3-Z6	100570	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	Standard Calibration		2013/11/25 2016/11/24
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	Standart Calibration		2013/03/01 2015/02/28
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	Standard Calibration		2013/03/01 2015/02/28

**Test Equipment Auxiliary Equipment for Radiated emissions**

**Lab ID:** Lab 2  
**Description:** Equipment for emission measurements  
**Serial Number:** see single devices

**Single Devices for Auxiliary Equipment for Radiated emissions**

Single Device Name	Type	Serial Number	Manufacturer
Antenna mast	AM 4.0	AM4.0/180/11920 513	Maturo GmbH
Biconical dipole	VUBA 9117 <i>Calibration Details</i> Standard Calibration	9117-108	Schwarzbeck <i>Last Execution</i> <i>Next Exec.</i> 2012/01/18 2015/01/17
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P	849785	Miteq
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4	-	Miteq
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P	896037	Miteq
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01- 2+W38.01-2	Kabel Kusch
Cable "ESI to Horn Antenna"	UFB311A+UFB293C	W18.02- 2+W38.02-2	Rosenberger Micro-Coax
Double-ridged horn	HF 906 <i>Calibration Details</i> Standard Calibration	357357/001	Rohde & Schwarz GmbH & Co. KG <i>Last Execution</i> <i>Next Exec.</i> 2012/05/18 2015/05/17
Double-ridged horn	HF 906 <i>Calibration Details</i> Standard Calibration	357357/002	Rohde & Schwarz GmbH & Co. KG <i>Last Execution</i> <i>Next Exec.</i> 2012/06/26 2015/06/25
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic
High Pass Filter	WHKX 7.0/18G-8SS	09	Wainwright
Horn Antenna Schwarzbeck 15-26 GHz BBHA 9170	BBHA 9170		
Log.-per. Antenna	HL 562 Ultralog <i>Calibration Details</i> Standard Calibration	100609	Rohde & Schwarz GmbH & Co. KG <i>Last Execution</i> <i>Next Exec.</i> 2012/12/18 2015/12/17
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG
Loop Antenna	HFH2-Z2 <i>Calibration Details</i> Standard calibration	829324/006	Rohde & Schwarz GmbH & Co. KG <i>Last Execution</i> <i>Next Exec.</i> 2011/10/27 2014/10/26

**Single Devices for Auxiliary Equipment for Radiated emissions (continued)**

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Pyramidal Horn Antenna 26,5 GHz	3160-09	00083069	EMCO Elektronik GmbH
Pyramidal Horn Antenna 40 GHz	3160-10	00086675	EMCO Elektronik GmbH
Tilt device Maturo (Rohacell)	Antrieb TD1.5-10kg	TD1.5-10kg/024/3790709	Maturo GmbH

**Test Equipment Auxiliary Test Equipment**

<b>Lab ID:</b>	<b>Lab 2</b>
<b>Manufacturer:</b>	see single devices
<b>Description:</b>	Single Devices for various Test Equipment
<b>Type:</b>	various
<b>Serial Number:</b>	none

**Single Devices for Auxiliary Test Equipment**

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Broadband Power Divider N (Aux)	1506A / 93459	LM390	Weinschel Associates
Broadband Power Divider SMA	WA1515	A855	Weinschel Associates
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Customized calibration		2013/12/04 2015/12/03
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	Pontis
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	Pontis
Isolating Transformer	LTS 604	1888	Thalheimer Transformatorenwerke GmbH
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	Wainwright
Signal Analyzer	FSV30	103005	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard		2014/02/10 2016/02/09
Spectrum Analyser	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard		2012/06/13 2015/06/12
Spectrum Analyser	FSU26	200418	Rohde & Schwarz GmbH & Co.KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2013/07/29 2014/07/28
Vector Signal Generator	SMIQ 03B	832492/061	Rohde & Schwarz GmbH & Co.KG



**Test Equipment Digital Signalling Devices**

**Lab ID:** Lab 1, Lab 2  
**Description:** Signalling equipment for various wireless technologies.

**Single Devices for Digital Signalling Devices**

Single Device Name	Type	Serial Number	Manufacturer
Bluetooth Signalling Unit CBT	CBT	100589	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2011/11/24   2014/11/23
CMW500	CMW500	107500	Rohde & Schwarz GmbH & Co.KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2014/01/27   2016/01/26
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2011/11/28   2014/11/27
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz GmbH & Co. KG
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	Hardware: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B56V14, B68 3v04, PCMCIA, U65V04 Software: K21 4v21, K22 4v21, K23 4v21, K24 4v21, K42 4v21, K43 4v21, K53 4v21, K56 4v22, K57 4v22, K58 4v22, K59 4v22, K61 4v22, K62 4v22, K63 4v22, K64 4v22, K65 4v22, K66 4v22, K67 4v22, K68 4v22, K69 4v22 Firmware: µP1 8v50 02.05.06 ---		2007/07/16
Universal Radio Communication Tester	CMU 200	837983/052	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2011/12/07   2014/12/06
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	HW options: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B54V14, B56V14, B68 3v04, B95, PCMCIA, U65V02 SW options: K21 4v11, K22 4v11, K23 4v11, K24 4v11, K27 4v10, K28 4v10, K42 4v11, K43 4v11, K53 4v10, K65 4v10, K66 4v10, K68 4v10, Firmware: µP1 8v40 01.12.05 ---		2007/01/02
	SW: K62, K69		2008/11/03
Vector Signal Generator	SMU200A	100912	Rohde & Schwarz GmbH & Co. KG

**Test Equipment Emission measurement devices**

**Lab ID:** Lab 1, Lab 2  
**Description:** Equipment for emission measurements  
**Serial Number:** see single devices

**Single Devices for Emission measurement devices**

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Personal Computer	Dell	30304832059	Dell
Power Meter	NRVD	828110/016	Rohde & Schwarz GmbH & Co.KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard calibration			2014/05/13 2015/05/12
Sensor Head A	NRV-Z1	827753/005	Rohde & Schwarz GmbH & Co.KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard calibration			2014/05/13 2015/05/12
Signal Generator	SMR 20	846834/008	Rohde & Schwarz GmbH & Co. KG
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard Calibration			2014/01/07 2016/01/31
<i>HW/SW Status</i>			<i>Date of Start</i> <i>Date of End</i>
Firmware-Update 4.34.4 from 3.45 during calibration			2009/12/03

**Test Equipment Shielded Room 02**

**Lab ID:** Lab 1  
**Manufacturer:** Frankonia  
**Description:** Shielded Room for conducted testing  
**Type:** 12 qm  
**Serial Number:** none

**Test Equipment T/A Logger 13**

**Lab ID:** Lab 1, Lab 2  
**Description:** Lufft Opus10 TPR  
**Type:** Opus10 TPR  
**Serial Number:** 13936

**Single Devices for T/A Logger 13**

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
ThermoAirpressure Datalogger 13 (Environ)	Opus10 TPR (8253.00)	13936	Lufft Mess- und Regeltechnik GmbH
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Customized calibration			2013/02/07 2015/02/06



**Test Equipment T/H Logger 02**

**Lab ID:** Lab 1  
*Description:* Lufft Opus10  
*Serial Number:* 7489

**Single Devices for T/H Logger 02**

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
ThermoHygro Datalogger 02 (Environ)	Opus10 THI (8152.00)	7489	Lufft Mess- und Regeltechnik GmbH
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Customized calibration		2013/02/07 2015/02/06

**Test Equipment T/H Logger 12**

**Lab ID:** Lab 2  
*Description:* Lufft Opus10  
*Serial Number:* 12482

**Single Devices for T/H Logger 12**

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
ThermoHygro Datalogger 12 (Environ)	Opus10 THI (8152.00)	12482	Lufft Mess- und Regeltechnik GmbH
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Customized calibration		2013/01/07 2015/01/06



---

Reference: MDE\_DATA\_1408\_FCCb

acc. Title 47 CFR chapter I part 15 subpart B, Class B

**5 Annex**

**5.1 Additional Information for Report**

acc. Title 47 CFR chapter I part 15 subpart B, Class B

---

---

### Test Description

---

---

---

Conducted emissions (AC power line)

---

Standard FCC Part 15 Subpart B

The test was performed according to: ANSI C 63.4, 2009

### Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2009. The Equipment Under Test (EUT) was setup in a shielded room to perform the conducted emissions measurements in a typical installation configuration. The EUT was powered from 50 $\mu$ H || 50 Ohm Line Impedance Stabilization Network (LISN) which meets the requirements of ANSI C63.4-2009, Annex B, in the frequency range of the measurements. The LISN's unused connections were terminated with 50 Ohm loads.

The measurement procedure consists of two steps. It is implemented into the EMI test software ES-K1 from R&S.

#### Step 1: Preliminary scan

Intention of this step is, to determine the conducted EMI-profile of the EUT.

EMI receiver settings:

- Detector: Peak - Maxhold
- Frequency range: 150 kHz – 30 MHz
- Frequency steps: 5 kHz
- IF-Bandwidth: 9 kHz
- Measuring time / Frequency step: 20 ms
- Measurement on phase + neutral lines of the power cords

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

#### Step 2: Final measurement

Intention of this step is, to determine the highest emissions with the settings defined in the test specification for the frequencies identified in step 1.

EMI receiver settings:

- Detector: Quasi-Peak
- IF - Bandwidth: 9 kHz
- Measuring time: 1 s / frequency

At each frequency determined in step 1, four measurements are performed in the following combinations:

- 1) Neutral lead - reference ground (PE grounded)
- 2) Phase lead - reference ground (PE grounded)
- 3) Neutral lead - reference ground (PE floating)
- 4) Phase lead - reference ground (PE floating)

The highest value is reported.

### Test Requirements / Limits

If not stated within the measurement plot and/or test result, class B limits are applied.

FCC Part 15, Subpart B, §15.107, Class B Limit

Frequency Range (MHz)	QP Limit (dB $\mu$ V)	AV Limit (dB $\mu$ V)
0.15 – 0.5	66 to 56	56 to 46
0.5 – 5	56	46
5 – 30	60	50

## FCC Part 15, Subpart B, §15.107, Class A Limit

Frequency Range (MHz)	QP Limit (dBµV)	AV Limit (dBµV)
0.15 - 0.5	79	66
0.5 - 30	73	60

Used conversion factor: Limit (dBµV) = 20 log (Limit (µV)/1µV).

## NOTES:

A missing result table in the corresponding test report section means, that no final measurement was performed because no relevant frequencies (peaks) were found in the preliminary scan. The chosen operating mode is selected as representative mode to generate "worst-case" conditions, i.e. high power consumption.

---

Spurious radiated emissions

---

Standard FCC Part 15, Subpart B

The test was performed according to: ANSI C 63.4, 2009

## Test Description

## Measurement below 1 GHz:

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2009. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The measurement procedure is implemented into the EMI test software ES-K1 from R&S. The radiated emissions measurements were made in a typical installation configuration. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is performed at 2 axes. A pre-check is also performed while the EUT is powered from both AC and DC (battery) power in order to find the worst-case operating condition.

Step 1: Preliminary scan (test to identify the highest amplitudes relative to the limit)

Intention of this step is, to determine the radiated EMI-profile of the EUT.

Settings for step 1:

- Detector: Peak-Maxhold
- Frequency range: 30 – 1000 MHz
- Frequency steps: 60 kHz
- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 µs
- Turntable angle range: -180° to +180°
- Turntable step size: 90°
- Height variation range: 1 – 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

## Step 2:

A further measurement will be performed on the frequencies determined in step 1. Intention of this step is, to find out the approximate turntable angle and antenna height for each frequency.

Settings for step 2:

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: -180° to +180°
- Turntable step size: 45°
- Height variation range: 1 – 4 m

acc. Title 47 CFR chapter I part 15 subpart B, Class B

- Height variation step size: 0.5 m
- Polarisation: horizontal + vertical

After this step the EMI test system has determined the following values for each frequency (of step 1):

- Frequency
- Azimuth value (of turntable)
- Antenna height

The last two values have now the following accuracy:

- Azimuth value (of turntable): 45°
- Antenna height: 0.5 m

#### Step 3: final measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will be slowly varied by +/- 22.5° around this value. During this action the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position the antenna height is also slowly varied by +/- 25 cm around the antenna height determined. During this action the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100ms
- Turntable angle range: -22.5° to +22.5° around the determined value
- Height variation range: -0.25 m to +0.25 m around the determined value

#### Step 4: Final measurement (with QP detector)

With the settings determined in step 3, the final measurement will be performed:

EMI receiver settings for step 4:

- Detector: Quasi-Peak(< 1GHz)
- Measured frequencies: in step 3 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

#### Measurement above 1 GHz:

The following modifications apply to the measurement procedure for the frequency range above 1 GHz: The measurement distance was reduced to 1 m. The results were extrapolated by the extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements, inverse-linear-distance-squared for the power density measurements). Due to the fact that in this frequency range a double ridged wave guided horn antenna (up to 18 GHz) and a horn antenna (18–25 GHz) are used, the steps 2-4 as described before, are omitted. Step 1 was performed at one height of the receiving antenna only.

Detector: Peak, Average (simultaneously)  
 RBW = VBW = 1 MHz; above 7 GHz 100 kHz

#### Test Requirements / Limits

If not stated within the measurement plot and/or test result, class B limits are applied.

FCC Part 15, Subpart B, §15.109, Radiated Emission Limits

Frequency Range (MHz): Class B Limit (dBµV/m)

Frequency Range (MHz)	Class B Limit (dBµV/m)
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
above 960	54.0

Frequency Range (MHz) Class A Limit (dBµV/m) / @ 3m !

30 - 88	49.5
88 - 216	54.0
216 - 960	56.9
above 960	60.0

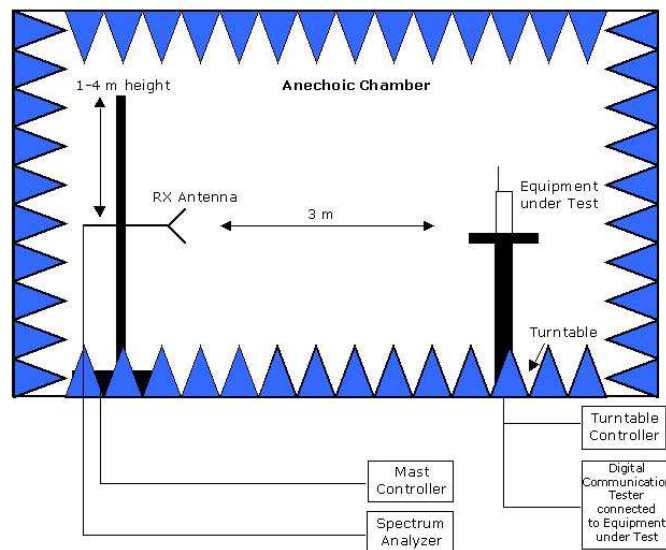
#### §15.35(b)

..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

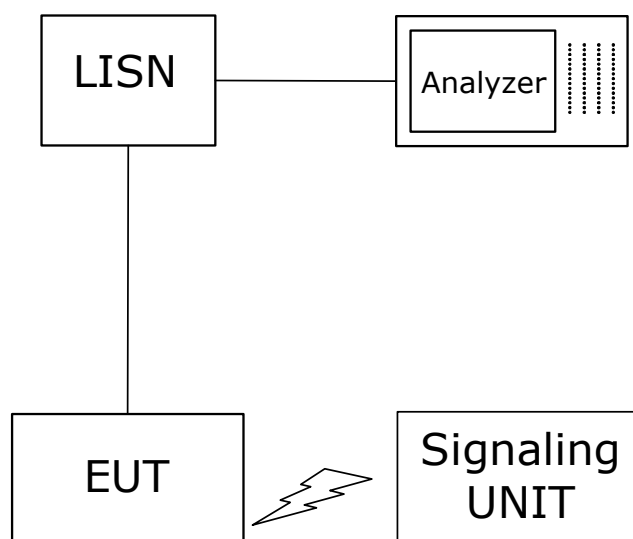
NOTE: A missing result table in the corresponding test report section means, that no final measurement was performed because no relevant frequencies (peaks) were found in the preliminary scan.

Setup Drawings



Remark: Depending on the frequency range suitable antenna types, attenuators or preamplifiers are used.

Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting ground plane.



Setup in the shielded room for conducted measurements at AC mains port



---

**Correlation of measurement requirements from FCC and IC**

---

<b>Measurement</b>	<b>FCC reference</b>	<b>IC reference</b>
Conducted Emissions (AC Power Line)	§15.107	ICES-003 Issue 5
Radiated Spurious Emissions	§15.109	ICES-003 Issue 5

**Remarks:**

1. FCC Part 15 subpart B, ICES 003 and CISPR 22 contain different definitions of Class A and Class B limits, i.e. which class is applicable to which kind of EUT. ICES 003 and CISPR 22 distinguish between the location where the EUT is intended to operate whilst FCC refers to the method of commercial distribution (distributive trades).
2. The correct assignment of the appropriate class to the concrete EUT is not scope of this test report!
3. A radio apparatus that is specifically subject to an Industry Canada Radio Standard Specification (RSS) and which contains an ITE is not subject to ICES-003 provided the ITE is used only to enable operation of the radio apparatus and the ITE does not control additional functions or capabilities.
4. ISM (Industrial, Scientific or Medical) radio frequency generators, though they may contain ITE, are excluded from the definition of ITE and are not subject to ICES-003. They are instead subject to the Interference-Causing Equipment Standard ICES-001, which specifically addresses ISM radio frequency generators.
5. The kind of EUT (ITE, ISM, Radio) determines which IC Standard is applicable.



## 6 Index

1	Administrative Data	2
1.1	Project Data	2
1.2	Applicant Data	2
1.3	Test Laboratory Data	2
1.4	Signature of the Testing Responsible	3
1.5	Signature of the Accreditation Responsible	3
2	Test Object Data	3
2.1	General OUT Description	3
2.2	Detailed Description of OUT Samples	3
2.3	OUT Features	4
2.4	Auxiliary Equipment	4
2.5	Operating Mode(s)	4
2.6	Setups used for Testing	5
3	Results	5
3.1	General	5
3.2	List of Test Specification	5
3.3	Summary	6
3.4	Detailed Results	7
3.4.1	15b.1 Conducted Emissions (AC Power Line) §15.107	7
3.4.2	15b.2 Spurious Radiated Emissions §15.109	10
4	Test Equipment Details	13
4.1	List of Used Test Equipment	13
5	Annex	20
5.1	Additional Information for Report	20
6	Index	26