InterLab®

Final Report on

SKORPIOX3

Report Reference: MDE_DATAL_1111_FCCf

acc. Title 47 CFR chapter I part 15 subpart B

Date: June 01, 2012

Test Laboratory:
7Layers AG
Borsigstr. 11
40880 Ratingen
Germany

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-12140-01-01

1 Administrative Data

1.1 Project Data

Project Responsible:	Carsten Steinröder
Date Of Test Report:	2012/06/01
Date of first test:	2011/10/24
Date of last test:	2012/05/23

1.2 Applicant Data

Company Name: Datalogic Mobile s.r.l.

Street:	Via S. Vitalino, 13 Lippo di Calderara di Reno
City:	40012 Bologna
Country:	Italy

Contact Person: Mr. Eucarpio Guarisco

Phone:	+39 051 3147 285
Fax:	+39 051 3147561
E-Mail:	eucarpio.guarisco@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.de

Laboratory Details

Lab ID	*Identification*	*Responsible*	*Accreditation Info*
Lab 1	Conducted Emissions	Mr. Robert Machulec Mr. Andreas Petz	DAkkS-Registration no. D-PL-12140-01-01
Lab 2	Radiated Emissions	Mr. Robert Machulec Mr. Andreas Petz	DAkkS-Registration no. D-PL-12140-01-01

1.4 Signature of the Testing Responsible

Carsten Steinröder
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: SKORPIOX3 (Model 3)

Parameter List:

Parameter name	*Value*
Parameter for Scope FCC_v2:	
AC Power Supply	120 (V)
DC Power Supply	5 (V)

OUT: SKORPIOX3 (Model 6)

Type / Model / Family: SKORPIOX3

Parameter List:

Parameter name	*Value*
Parameter for Scope FCC_v2:	
AC Power Supply	120 (V)
Antenna Gain - Bluetooth Antenna	2.0 (dBi)
Antenna Gain - WLAN Antenna	2.59 (@2.4G) / 3.95 (@5G) (dBi)
DC Power Supply	5 (V)

Ancillary Equipment: AC Adapter for Multi Slot Dock and Multi Battery charger

Manufacturer:
Company Name: ONTOP Elec Co.Ltd.

Contact Person: -

Ancillary Equipment: AC Adapter for Single Slot Dock

Manufacturer:
Company Name: Phihong USA Inc.

Contact Person: n/a

Ancillary Equipment: Extended Battery (5200 mAh)

Ancillary Equipment: Multi Battery Charger

Manufacturer:
Company Name: Please see applicant data

Contact Person: Please see applicant data

Ancillary Equipment: Multi Slot Dock

Manufacturer:
Company Name: Please see applicant data

Contact Person: Please see applicant data

Ancillary Equipment: RS232 Cable (Null Modem)

Ancillary Equipment: Single Slot Dock

Manufacturer:
Company Name: Please see applicant data

Contact Person: Please see applicant data

Ancillary Equipment: Standard Battery (3000 mAh)

Ancillary Equipment: Switching Power Supply (Mini USB connector)

Manufacturer:

Company Name:	Phihong USA Inc.
Contact Person:	n/a

Ancillary Equipment: USB Cable

2.2 Detailed Description of OUT Samples

Sample : c02

OUT Identifier	SKORPIOX3 (Model 3)		
Sample Description	Model 3 sample#27		
Serial No.	A12P00012		
HW Status	SB		
SW Status	1.70.121.11		
Date of Receipt	2011/10/21		
Nominal Voltage	5 V	*Normal Temp.*	20 °C

Parameter List:

Parameter Description	*Value*	
Parameter for Scope FCC_v2		
Frequency_high	2480	(MHz)
Frequency_low	2402	(MHz)
Frequency_mid	2441	(MHz)

Sample : d02

OUT Identifier	SKORPIOX3 (Model 3)		
Sample Description	Model 3 sample#31		
Serial No.	A12P00011		
HW Status	SB		
SW Status	1.70.121.11		
Date of Receipt	2011/10/21		
Nominal Voltage	5 V	*Normal Temp.*	20 °C

Parameter List:

Parameter Description	*Value*	
Parameter for Scope FCC_v2		
Frequency_high	2480	(MHz)
Frequency_low	2402	(MHz)
Frequency_mid	2441	(MHz)

Sample : w02

OUT Identifier	SKORPIOX3 (Model 6)		
Sample Description	Model 6 sample#39		
Serial No.	A12P00055		
HW Status	SB		
SW Status	1.70.121.11		
Date of Receipt	2011/10/21		
Low Voltage	4.75 V	*Low Temp.*	-10 °C
High Voltage	5.25 V	*High Temp.*	+55 °C
Nominal Voltage	5.0 V	*Normal Temp.*	+20 °C

Parameter List:

Parameter Description	*Value*	
Parameter for Scope FCC_v2		
Frequency_high	2480	(MHz)
Frequency_low	2402	(MHz)
Frequency_mid	2441	(MHz)

Sample : y02

OUT Identifier	SKORPIOX3 (Model 6)		
Sample Description	Model 6 sample#1		
HW Status	SB		
SW Status	1.70.121.11		
Date of Receipt	2011/10/21		
Low Voltage	4.75 V	*Low Temp.*	-10 °C
High Voltage	5.25 V	*High Temp.*	+55 °C
Nominal Voltage	5 V	*Normal Temp.*	+20 °C

Parameter List:

Parameter Description	*Value*	
Parameter for Scope FCC_v2		
Frequency_high	2480	(MHz)
Frequency_low	2402	(MHz)
Frequency_mid	2441	(MHz)

Sample : 01

OUT Identifier	AC Adapter for Single Slot Dock
Sample Description	Model: PSA15R-050P

Sample : ANC1

OUT Identifier	Standard Battery (3000 mAh)
Sample Description	Model: BT-0015
Date of Receipt	2011/10/21

Sample : ANC2

OUT Identifier	Extended Battery (5200 mAh)
Sample Description	Model: BT-0016
Date of Receipt	2011/10/21

Sample : ANC3

OUT Identifier	Single Slot Dock
Sample Description	SingleSlot Charging Dock Station
Date of Receipt	2011/10/21

Sample : ANC4

OUT Identifier	Multi Slot Dock
Sample Description	MultiSlot Charging Dock Station
Date of Receipt	2011/10/21

Sample : ANC5

OUT Identifier	USB Cable
Sample Description	Mini USB cable
Date of Receipt	2011/10/21

Sample : ANC6

OUT Identifier	AC Adapter for Multi Slot Dock and Multi Battery charger
Sample Description	Model: A2-60S12R-V (100-240V)
Date of Receipt	2011/10/21

Sample : ANC7

OUT Identifier	Switching Power Supply (Mini USB connector)
Sample Description	Model: PSM08R-050 (100-240V)
Date of Receipt	2011/10/21

Sample : ANC8

OUT Identifier	RS232 Cable (Null Modem)
Sample Description	RS232 Null Modem Cable

Sample : ANC9b

OUT Identifier	Multi Battery Charger
Sample Description	Charger 4-Slot Battery SKORPIOX3
Serial No.	A12P00356

2.3 OUT Features

Features for OUT: SKORPIOX3 (Model 3)

Designation	*Description*	*Allowed Values*	*Supported Value(s)*
Features for scope: FCC_v2			
AC	The OUT is powered by or connected to AC Mains		
BT	EUT supports Bluetooth data rate of 1 Mbps with GFSK modulation in the band 2400 MHz - 2483.5 MHz		
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		
Wa1	EUT supports WLAN in mode a in the band 5150 MHz - 5250 MHz		
Wa2	EUT supports WLAN in mode a in the band 5250 MHz - 5350 MHz		
Wa3	EUT supports WLAN in mode a in the band 5470 MHz - 5725 MHz		
Wa4	EUT supports WLAN in mode a in the band 5725 MHz - 5825 MHz		
Wa5	EUT supports WLAN in mode a in the band 5725 MHz - 5850 MHz		
Wa6	EUT supports WLAN in mode a in the band 5745 MHz - 5805 MHz		
Wa7	EUT supports WLAN in mode a in the band 5180 MHz - 5240 MHz		
Wa8	EUT supports WLAN in mode a in the band 5260 MHz - 5320 MHz		
Wa9	EUT supports WLAN in mode a in the band 5500 MHz - 5600 MHz		
Wa10	EUT supports WLAN in mode a in the band 5650 MHz - 5700 MHz		
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		
WLAN	EUT supports WLAN channels 2412 MHz - 2462 MHz.		

Features for OUT: SKORPIOX3 (Model 6)

Designation	*Description*	*Allowed Values*	*Supported Value(s)*
Features for scope: FCC_v2			
AC	The OUT is powered by or connected to AC Mains		
BT	EUT supports Bluetooth data rate of 1 Mbps with GFSK modulation in the band 2400 MHz - 2483.5 MHz		
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		

Features for OUT: SKORPIOX3 (Model 6)

Designation	*Description*	*Allowed Values*	*Supported Value(s)*
Iant	Integral Antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment		
Wa1	EUT supports WLAN in mode a in the band 5150 MHz - 5250 MHz		
Wa2	EUT supports WLAN in mode a in the band 5250 MHz - 5350 MHz		
Wa3	EUT supports WLAN in mode a in the band 5470 MHz - 5725 MHz		
Wa4	EUT supports WLAN in mode a in the band 5725 MHz - 5825 MHz		
Wa5	EUT supports WLAN in mode a in the band 5725 MHz - 5850 MHz		
Wa6	EUT supports WLAN in mode a in the band 5745 MHz - 5805 MHz		
Wa7	EUT supports WLAN in mode a in the band 5180 MHz - 5240 MHz		
Wa8	EUT supports WLAN in mode a in the band 5260 MHz - 5320 MHz		
Wa9	EUT supports WLAN in mode a in the band 5500 MHz - 5600 MHz		
Wa10	EUT supports WLAN in mode a in the band 5650 MHz - 5700 MHz		
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		
WLAN	EUT supports WLAN channels 2412 MHz - 2462 MHz.		

2.4 Auxiliary Equipment

AE No.	*Type Designation*	*Serial No.*	*HW Status*	*SW Status*	*Description*
AE 1	Netgear WNDR3300				Wireless-N 300 Router

2.5 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.

Setup No.	*List of OUT samples*		*List of auxiliary equipment*	
	Sample No.	*Sample Description*	*AE No.*	*AE Description*
15b_MBC	**(Multi Battery Charger (2x Std, 2x Ext Battery))**			
	Sample: ANC1	Model: BT-0015		
	Sample: ANC2	Model: BT-0016		
	Sample: ANC9b	Charger 4-Slot Battery SKORPIOX3		
15b_MSD_LAN1	**(MultiSlotDock(4Units)/LAN con.to PC(via Router)/Ext.&Std.Bat)**			
	Sample: ANC1	Model: BT-0015	AE 1	Wireless-N 300 Router
	Sample: ANC2	Model: BT-0016		
	Sample: ANC4	MultiSlot Charging Dock Station		
	Sample: ANC6	Model: A2-60S12R-V (100-240V)		
	Sample: c02	Model 3 sample#27		
	Sample: d02	Model 3 sample#31		
	Sample: w02	Model 6 sample#39		
	Sample: y02	Model 6 sample#1		
15b_SSD_PC_EXT	**(Single Slot Dock / RS232+USB connection to PC / Ext.Battery)**			
	Sample: 01	Model: PSA15R-050P		
	Sample: ANC2	Model: BT-0016		
	Sample: ANC3	SingleSlot Charging Dock Station		
	Sample: ANC5	Mini USB cable		
	Sample: ANC8	RS232 Null Modem Cable		
	Sample: w02	Model 6 sample#39		
15b_USB_EXT_AC	**(USB direct charging (via AC Adapter) / Ext.Battery)**			
	Sample: ANC2	Model: BT-0016		
	Sample: ANC5	Mini USB cable		
	Sample: ANC7	Model: PSM08R-050 (100-240V)		
	Sample: w02	Model 6 sample#39		
15b_USB_EXT_PC	**(USB data exchange (via PC, Handylink) / Ext.Battery)**			
	Sample: ANC2	Model: BT-0016		
	Sample: ANC5	Mini USB cable		
	Sample: w02	Model 6 sample#39		

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: 1) The laboratory environmental conditions are available and recorded in the Interlab System.

2) Model 3 and Model 6 are the selected samples for product certifciation testing, as they considered to be the most representative for the complete set of models. The Model 6 in combination with the extended battery has beed identified as worst case setup. In this test report, the Model 3 has been tested only in combination with the Multi-Slot Docking station. The measurement results of the worst case identification are reported in a seperate test report. An overview of all available models is listed in the Annex.

3) This test reports replaces the test report "MDE_DATAL_1111_FCCc"

3.2 List of the Applicable Body

(Body for Scope: FCC_v2)

Designation	*Description*
FCC47CFRChIPART15bRADIO FREQUENCY DEVICES	Part 15, Subpart B - Unintentional Radiators

3.3 List of Test Specification

Test Specification:	**FCC part 2 and 15**
Version	10-1-11 Edition
Title:	PART 2 - GENERAL RULES AND REGULATIONS PART 15 - RADIO FREQUENCY DEVICES

3.4 Summary

Test Case Identifier / Name *Test (condition)*	*Result*	*Date of Test*	*Lab Ref.*	*Setup*
15b.1 Conducted Emissions (AC Power Line) §15.107				
15b.1; Mode = transmit	Passed	2012/05/23	Lab 1	15b_MBC
	Passed	2012/04/20	Lab 1	15b_USB_EXT_AC
	Passed	2012/04/20	Lab 1	15b_SSD_PC_EXT
	Passed	2012/04/20	Lab 1	15b_MSD_LAN1
	Passed	2011/11/08	Lab 1	15b_USB_EXT_PC
15b.2 Spurious Radiated Emissions §15.109				
15b.2; Mode = transmit	Passed	2012/05/23	Lab 2	15b_MBC
	Passed	2012/04/11	Lab 2	15b_MSD_LAN1
	Passed	2012/04/11	Lab 2	15b_USB_EXT_AC
	Passed	2012/04/11	Lab 2	15b_SSD_PC_EXT
	Passed	2011/10/24	Lab 2	15b_USB_EXT_PC

3.5 Detailed Results

3.5.1 15b.1 Conducted Emissions (AC Power Line) §15.107

Test1: 15b.1; Mode = transmit

Result:	Passed
Setup No.:	15b_USB_EXT_PC
Date of Test:	2011/11/08 14:52
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

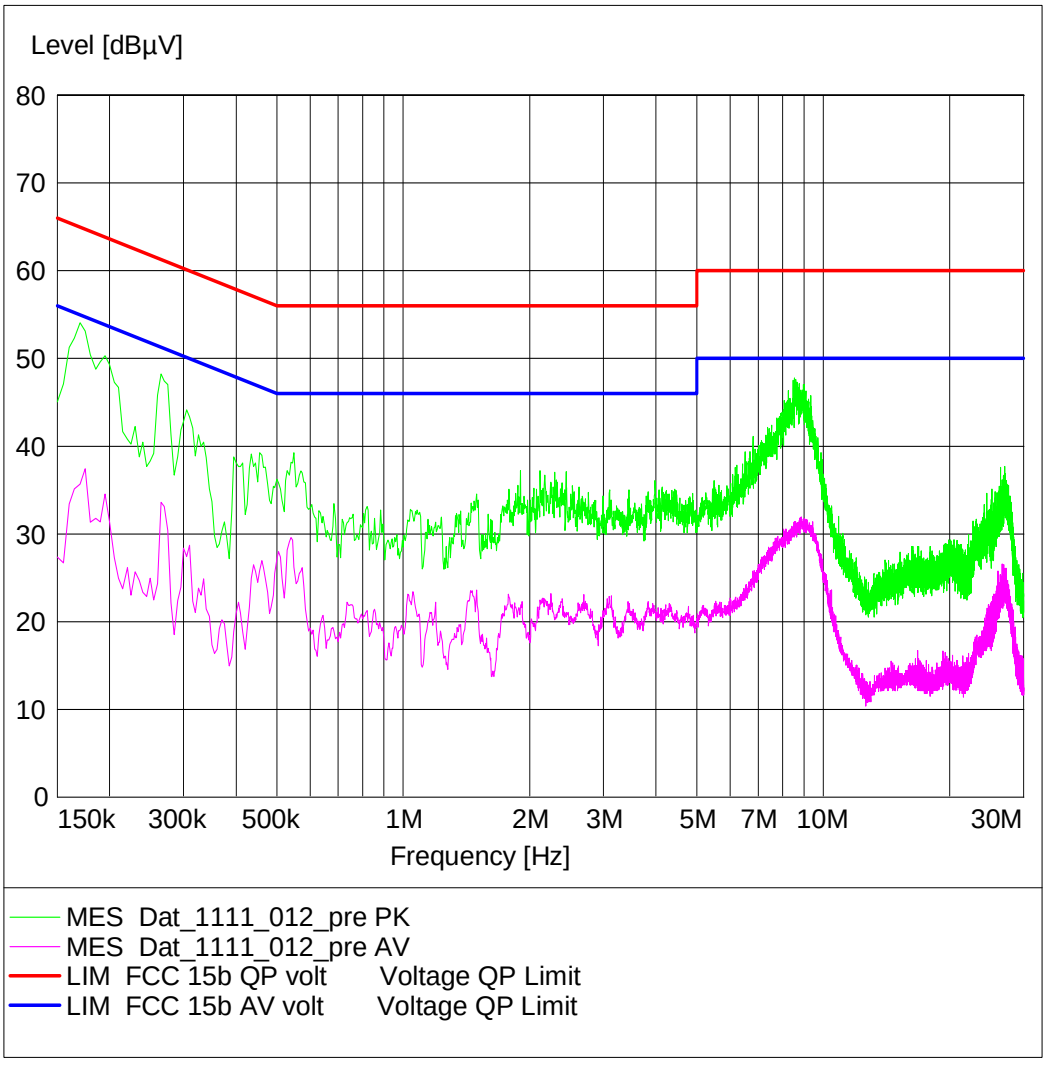
Detailed Results:

AC MAINS CONDUCTED

```
EUT:              (EX020w02 + EX02xSTDANC1 + EX02xACUANC7 + USB-Data-cable)
Manufacturer:      Datalogic
Operating Condition: BT local TX on 2441MHz, WLAN local TX on 2437MHz
Test Site:         7 layers Ratingen
Operator:          Doe
Test Specification:  ANSI C63.4; FCC 15.107 / 15.207
Comment:
Start of Test:      20.04.2012 / 08:55:58
```

SCAN TABLE: "FCC Voltage"

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



Test1: 15b.1; Mode = transmit

Result:	Passed
Setup No.:	15b_MSD_LAN1
Date of Test:	2012/04/20 13:55
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

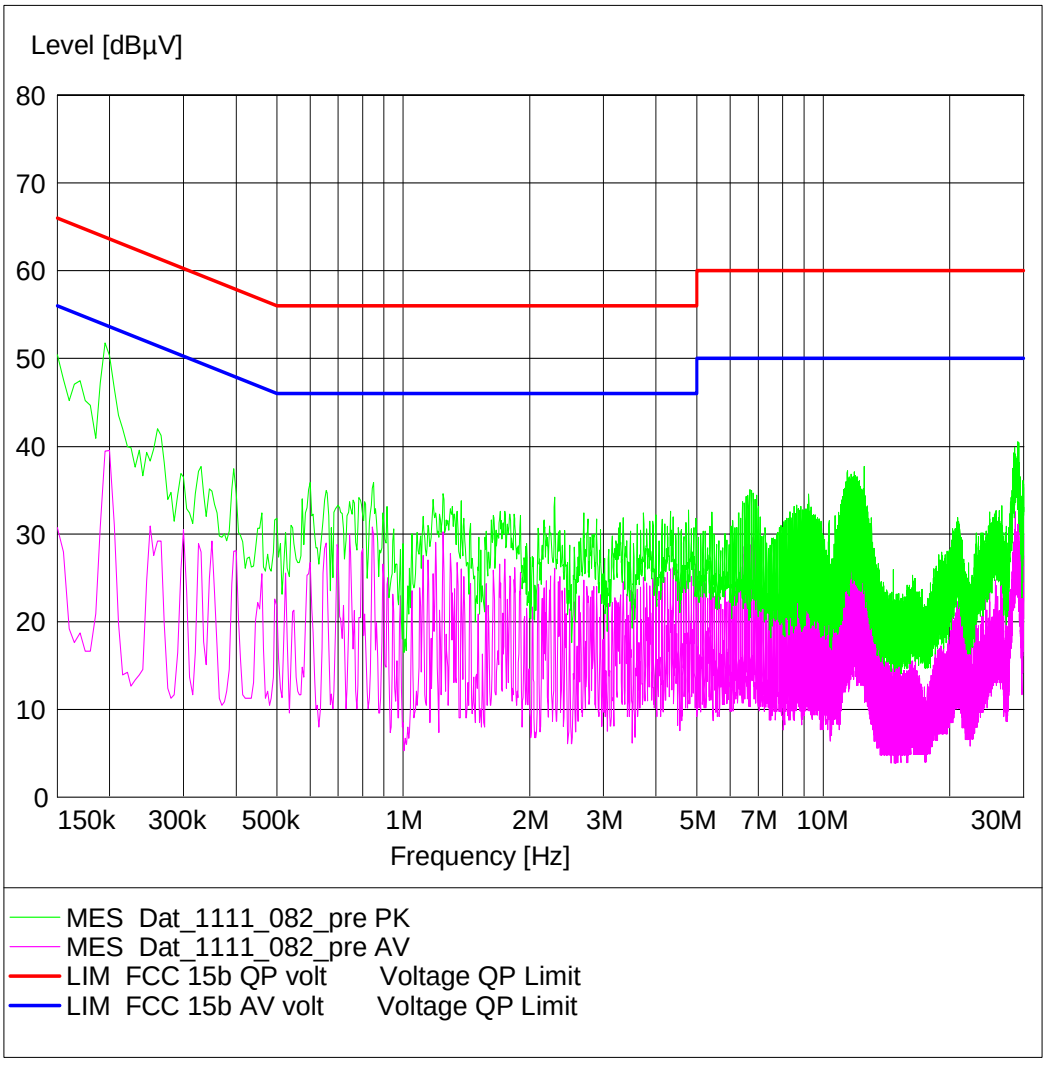
Detailed Results:

AC MAINS CONDUCTED

```
EUT:                  Multi Slot Dockingstation (EX021w02)
Manufacturer:         Datalogic
Operating Condition:  WLAN TX on 2437 MHz 6Mbps, Barcode Reader active, LAN ping
Test Site:            7 layers Ratingen
Operator:             Doe
Test Specification:   ANSI C63.4; FCC 15.107 / 15.207
Comment:
Start of Test:        20.04.2012 / 13:46:14
```

SCAN TABLE: "FCC Voltage"

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



Test1: 15b.1; Mode = transmit

Result:	Passed
Setup No.:	15b_SSD_PC_EXT
Date of Test:	2012/04/20 14:55
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

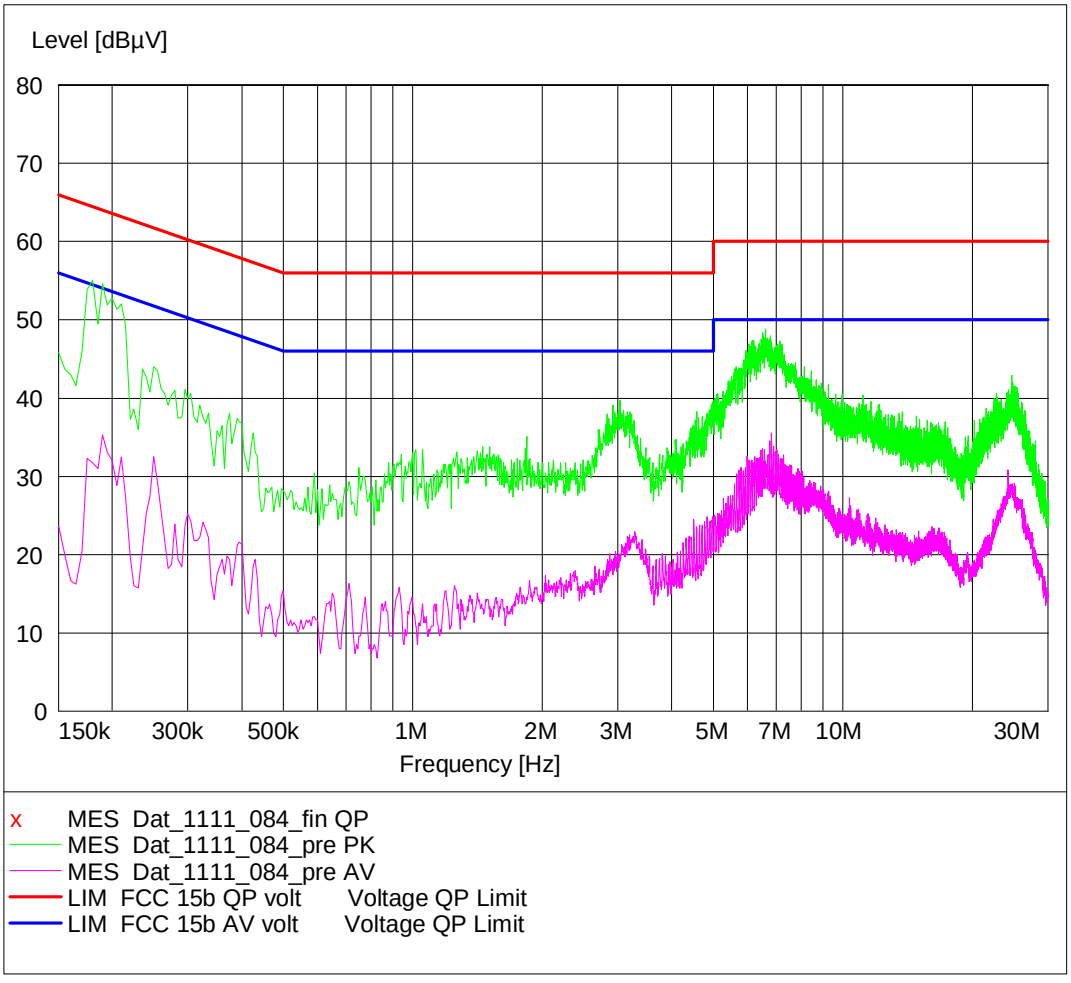
Detailed Results:

AC MAINS CONDUCTED

```
EUT:                  Single Slot Dockingstation (EX021w02)
Manufacturer:         Datalogic
Operating Condition:  WLAN TX on 2437 MHz 6Mbps, Barcode Reader active, Data trans
Test Site:            7 layers Ratingen
Operator:             Doe
Test Specification:   ANSI C63.4; FCC 15.107 / 15.207
Comment:
Start of Test:        20.04.2012 / 14:11:24
```

SCAN TABLE: "FCC Voltage"

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



MEASUREMENT RESULT: "Dat_1111_084_fin QP"

Test1: 15b.1; Mode = transmit

Result:	Passed
Setup No.:	15b_USB_EXT_AC
Date of Test:	2012/04/20 14:55
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

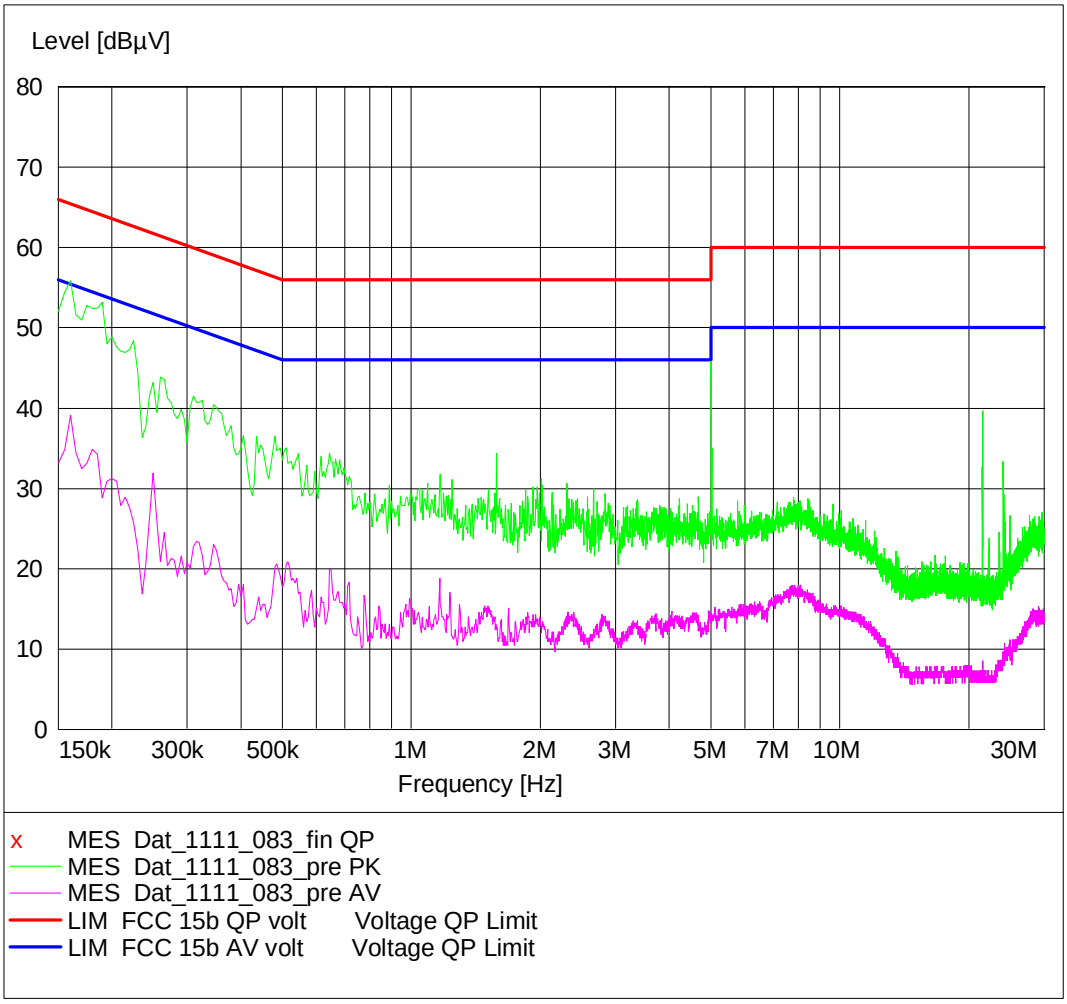
Detailed Results:

AC MAINS CONDUCTED

```
EUT:                  AC/DC Adapter (EX021w02)
Manufacturer:         Datalogic
Operating Condition:  WLAN TX on 2437 MHz 6Mbps, Barcode Reader active
Test Site:            7 layers Ratingen
Operator:             Doe
Test Specification:   ANSI C63.4; FCC 15.107 / 15.207
Comment:
Start of Test:        20.04.2012 / 13:55:28
```

SCAN TABLE: "FCC Voltage"

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



MEASUREMENT RESULT: "Dat_1111_083_fin QP"

Test1: 15b.1; Mode = transmit

Result:	Passed
Setup No.:	15b_MBC
Date of Test:	2012/05/23 13:17
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

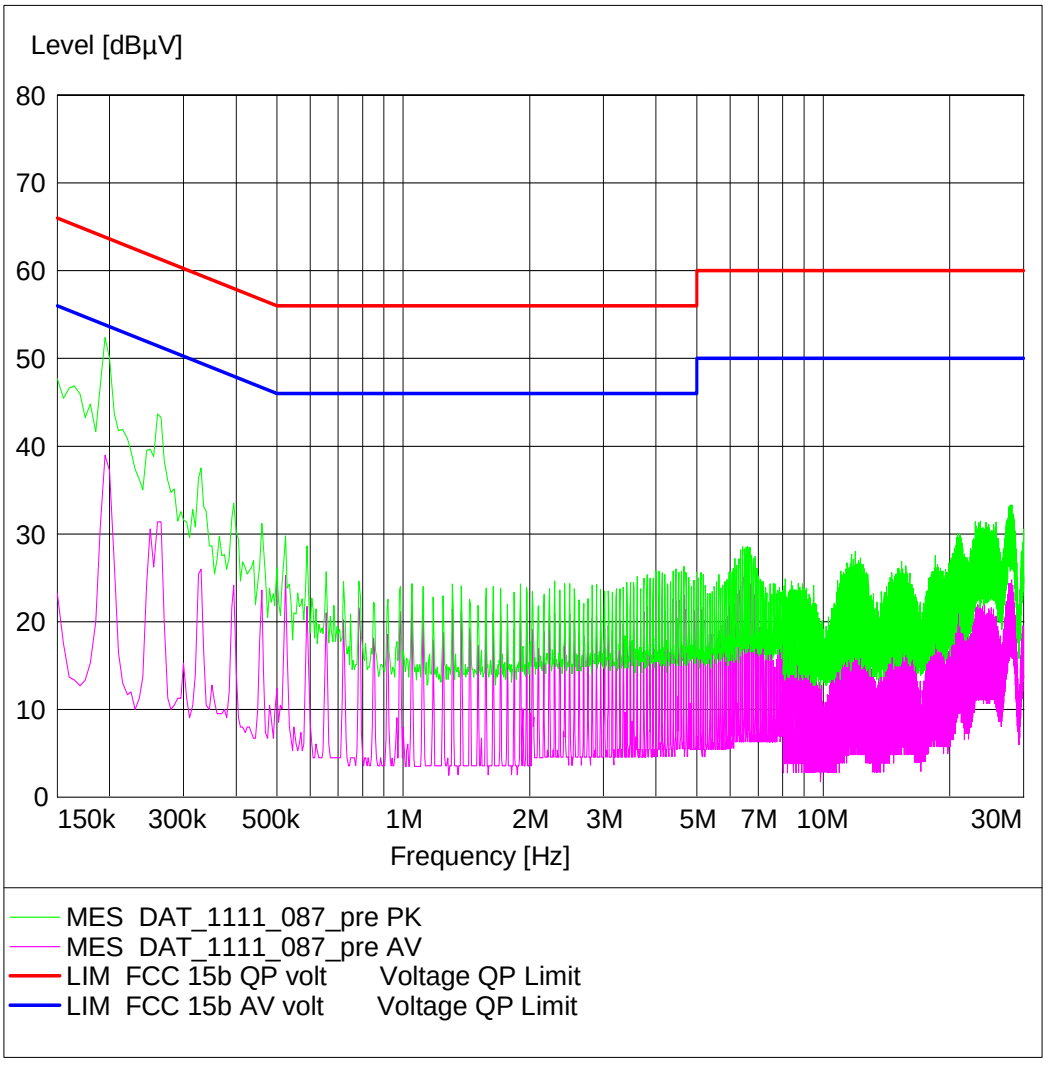
Detailed Results:

AC MAINS CONDUCTED

```
EUT:              (EXo2xMBC)
Manufacturer:      Datalogic
Operating Condition: Tx on, hopping
Test Site:         7 layers Ratingen
Operator:          Giz/Kul
Test Specification:  ANSI C63.4; FCC 15.107 / 15.207
Comment:           Battery Charging
Start of Test:      18.05.2012 / 13:48:29
```

SCAN TABLE: "FCC Voltage"

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



3.5.2 15b.2 Spurious Radiated Emissions §15.109

Test1: 15b.2; Mode = transmit

Result:	Passed
Setup No.:	15b_USB_EXT_PC
Date of Test:	2011/10/24 14:50
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

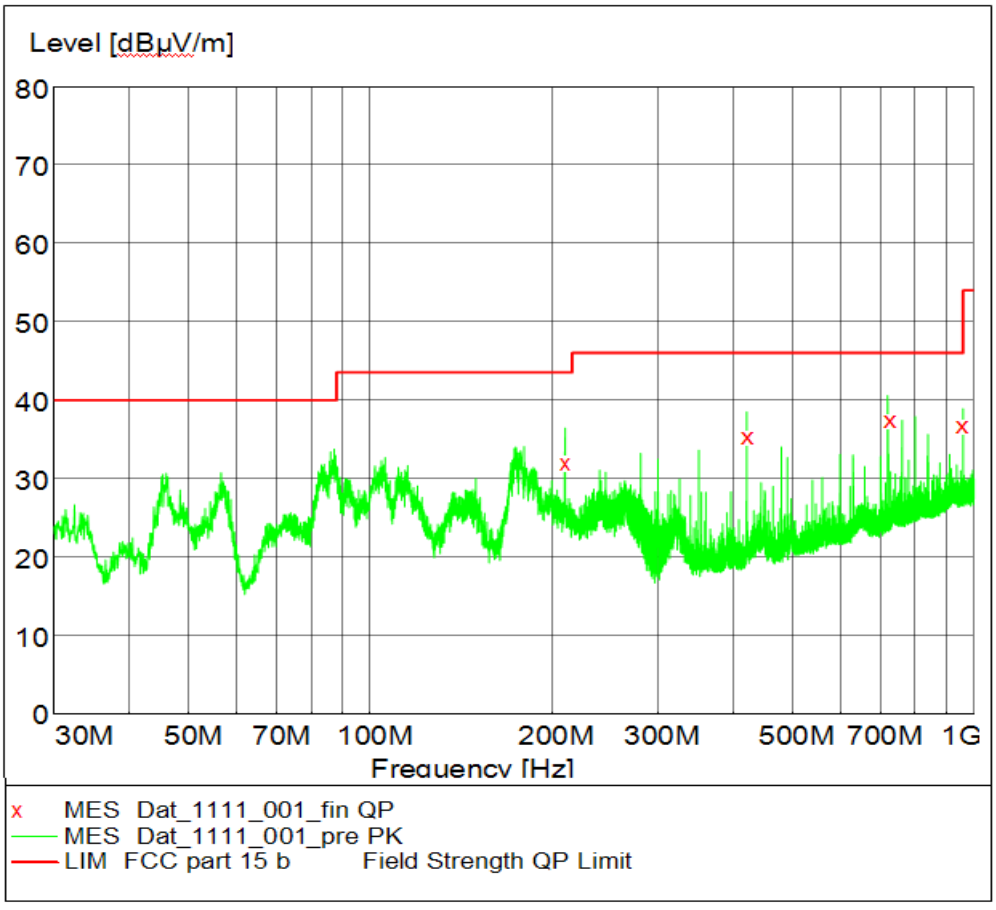
Detailed Results:

EMI RADIATED TEST

```
EUT:              (EX020w02 + EX02xACU+ EX02xUSB + EX02xSTD)
Manufacturer:      Datalogic
Operating Condition: BT GFSK 2441MHz, WLAN b 2437 MHz
Test Site:         7 layers, Ratingen
Operator:          Gal
Test Specification:  FCC part 15 b
Comment:           Horizontal EUT position
Start of Test:      11.04.2012 / 21:10:10
```

SCAN TABLE: "FCC part 15 b"

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



MEASUREMENT RESULT: "Par_0917_020_fin QP"

```
11.01.2010  15:52
   Frequency    Level  Transd   Limit  Margin  Height  Azimuth  Polarisation
        MHz   dBµV/m     dB  dBµV/m     dB      cm      deg

  210.360000    32.80    10.9    43.5    10.7   101.0   317.00  VERTICAL
  308.440000    35.10    10.3    46.0    10.9   227.0   186.00  HORIZONTAL
  711.920000    37.90     9.2    46.0     8.1   225.0   158.00  HORIZONTAL
  952.280000    36.80     9.2    46.0     9.2   206.0   157.00  HORIZONTAL
```

Test1: 15b.2; Mode = transmit

Result:	Passed
Setup No.:	15b_MSD_LAN1
Date of Test:	2012/04/11 13:55
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

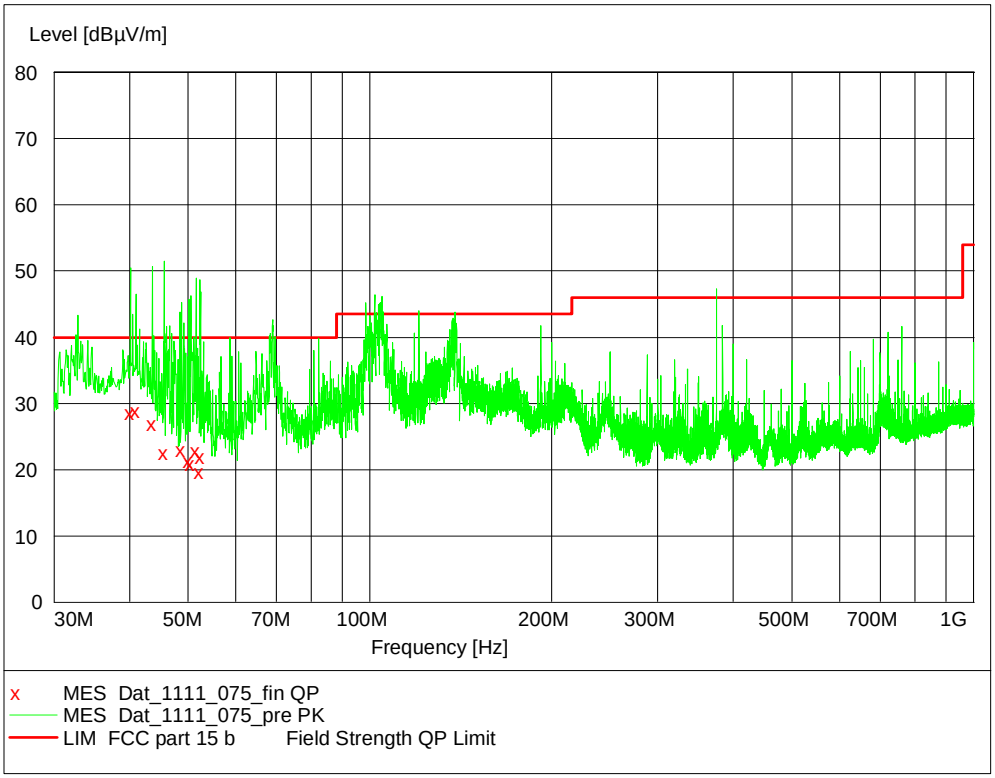
Detailed Results:

EMI RADIATED TEST

```
EUT:              Multi Slot Dockingstation (EX021w02)
Manufacturer:      Datalogic
Operating Condition: WLAN TX on 2437 MHz 6Mbps, Barcode Reader active, LAN ping
Test Site:         7 layers, Ratingen
Operator:          Doe
Test Specification:  FCC part 15 b
Comment:           Horizontal EUT position
Start of Test:      11.04.2012 / 13:42:05
```

SCAN TABLE: "FCC part 15 b"

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



MEASUREMENT RESULT: "Dat_1111_075_fin QP"

```
11.04.2012  14:47
   Frequency    Level  Transd   Limit  Margin  Height  Azimuth  Polarisation
        MHz   dBµV/m     dB  dBµV/m     dB      cm      deg

   40.140000    28.60    14.9    40.0    11.4   175.0    23.00  VERTICAL
   40.980000    29.00    14.4    40.0    11.0   233.0   340.00  VERTICAL
   43.620000    27.00    12.8    40.0    13.0   110.0   152.00  VERTICAL
   45.660000    22.50    11.6    40.0    17.5   139.0   313.00  VERTICAL
   48.780000    23.10     9.6    40.0    16.9   100.0    67.00  VERTICAL
   50.160000    21.40     8.7    40.0    18.6   113.0   248.00  VERTICAL
   50.520000    21.00     8.4    40.0    19.0   264.0   176.00  VERTICAL
   51.540000    22.90     7.7    40.0    17.1   145.0   158.00  VERTICAL
   52.320000    19.80     7.2    40.0    20.2   332.0   157.00  VERTICAL
   52.440000    21.90     7.1    40.0    18.1   100.0    22.00  VERTICAL
```

Test1: 15b.2; Mode = transmit

Result:	Passed
Setup No.:	15b_SSD_PC_EXT
Date of Test:	2012/04/11 13:45
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

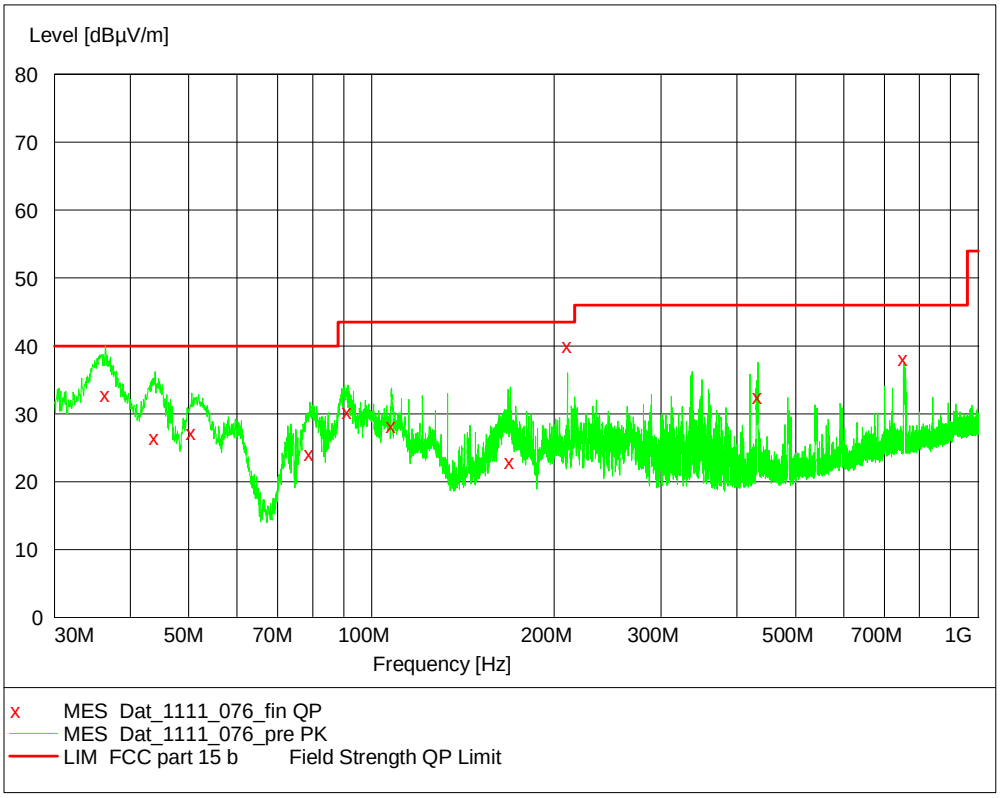
Detailed Results:

EMI RADIATED TEST

```
EUT:              Single Slot Dockingstation (EX021w02)
Manufacturer:      Datalogic
Operating Condition: WLAN TX on 2437 MHz 6Mbps, Barcode Reader active, Data trans
Test Site:         7 layers, Ratingen
Operator:          Doe
Test Specification:  FCC part 15 b
Comment:           Horizontal EUT position
Start of Test:      11.04.2012 / 15:24:05
```

SCAN TABLE: "FCC part 15 b"

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



MEASUREMENT RESULT: "Dat_1111_076_fin QP"

```
11.04.2012  16:26
   Frequency    Level  Transd   Limit  Margin  Height  Azimuth  Polarisation
        MHz   dBµV/m     dB  dBµV/m     dB      cm      deg

   36.420000    32.80    17.0    40.0     7.2   102.0   292.00  VERTICAL
   43.980000    26.50    12.6    40.0    13.5   100.0   157.00  VERTICAL
   50.520000    27.30     8.4    40.0    12.7   103.0   354.00  VERTICAL
   79.140000    24.20     9.3    40.0    15.8   125.0   157.00  VERTICAL
   91.440000    30.40     9.9    43.5    13.1   112.0    67.00  VERTICAL
  107.820000    28.20    10.5    43.5    15.3   104.0    46.00  VERTICAL
  169.200000    23.00     8.6    43.5    20.5   200.0    69.00  HORIZONTAL
  210.360000    40.10     9.3    43.5     3.4   154.0    22.00  HORIZONTAL
  433.680000    32.60    16.4    46.0    13.4   108.0   248.00  HORIZONTAL
  753.360000    38.20    22.1    46.0     7.8   185.0   202.00  VERTICAL
```

Test1: 15b.2; Mode = transmit

Result:	Passed
Setup No.:	15b_USB_EXT_AC
Date of Test:	2012/04/11 13:45
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

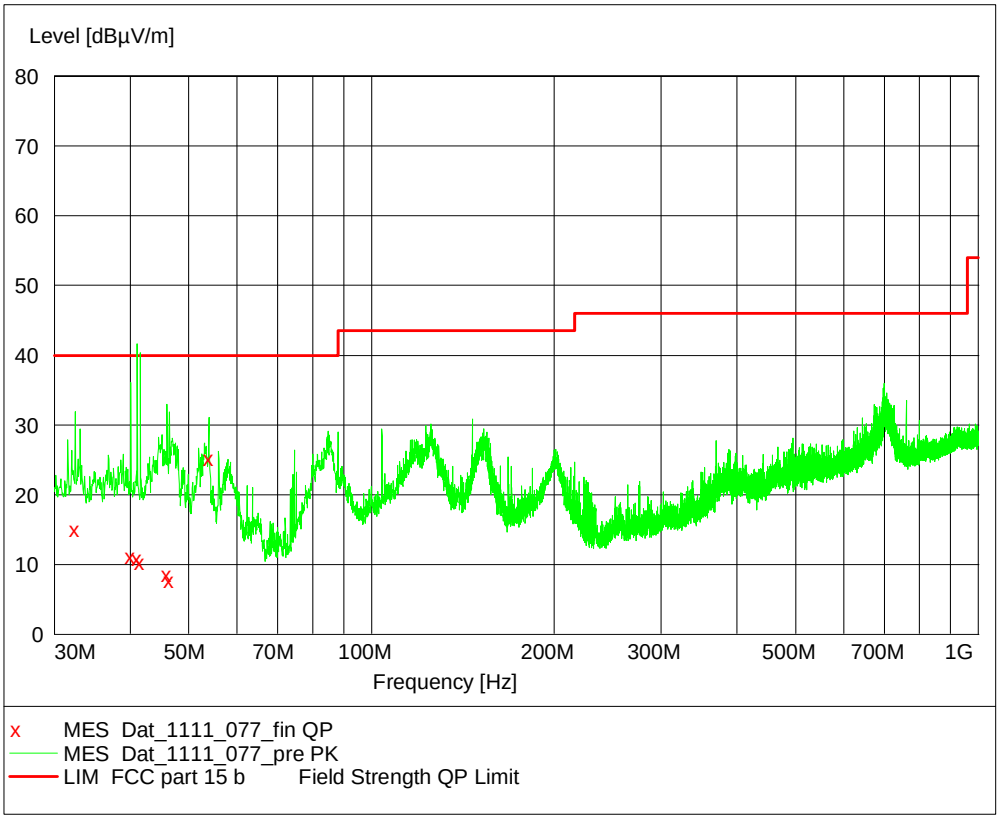
Detailed Results:

EMI RADIATED TEST

```
EUT:              AC/DC Adapter (EX021w02)
Manufacturer:      Datalogic
Operating Condition: WLAN TX on 2437 MHz 6Mbps, Barcode Reader active
Test Site:         7 layers, Ratingen
Operator:          Doe
Test Specification:  FCC part 15 b
Comment:           Horizontal EUT position
Start of Test:      11.04.2012 / 16:38:13
```

SCAN TABLE: "FCC part 15 b"

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



MEASUREMENT RESULT: "Dat_1111_077_fin QP"

```
11.04.2012  17:34
   Frequency    Level  Transd   Limit  Margin  Height  Azimuth  Polarisation
        MHz   dBµV/m     dB  dBµV/m     dB      cm      deg

   32.460000    15.00    19.2    40.0    25.0   275.0   278.00  HORIZONTAL
   40.080000    11.10    14.9    40.0    28.9   102.0   284.00  HORIZONTAL
   41.100000    10.90    14.4    40.0    29.1   375.0   292.00  HORIZONTAL
   41.580000    10.30    14.1    40.0    29.7   227.0   261.00  HORIZONTAL
   46.020000     8.60    11.4    40.0    31.4   125.0   202.00  HORIZONTAL
   46.440000     7.70    11.1    40.0    32.3   162.0   247.00  HORIZONTAL
   53.940000    25.30     6.3    40.0    14.7   111.0   292.00  VERTICAL
```

Test1: 15b.2; Mode = transmit

Result:	Passed
Setup No.:	15b_MBC
Date of Test:	2012/05/23 13:14
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

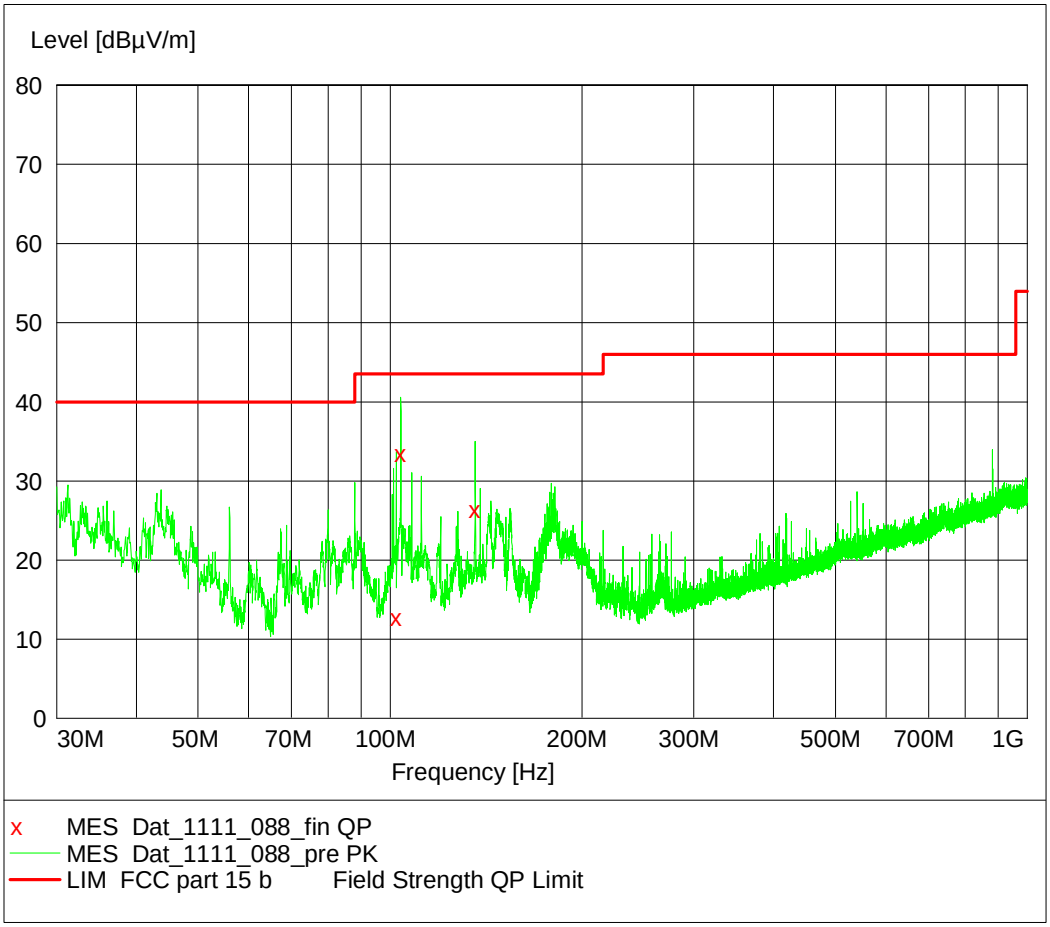
Detailed Results:

EMI RADIATED TEST

```
EUT:                  Battery Charger (EX02xMBC) + AC/DC adapter
Manufacturer:         Datalogic
Operating Condition:  Charging 4 batteries from AC Mains
Test Site:            7 layers, Ratingen
Operator:             Doe
Test Specification:   FCC part 15 b class B
Comment:              Horizontal EUT position
Start of Test:        21.05.2012 / 10:28:26
```

SCAN TABLE: "FCC part 15 b"

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



MEASUREMENT RESULT: "Dat_1111_088_fin QP"

```
21.05.2012  11:15
   Frequency     Level  Transd   Limit  Margin  Height  Azimuth  Polarisation
         MHz    dBµV/m      dB  dBµV/m      dB      cm      deg

  102.300000    12.80    10.7    43.5    30.7   100.0    22.00  VERTICAL
  103.980000    33.50    10.7    43.5    10.0   101.0   157.00  VERTICAL
  136.020000    26.40     9.7    43.5    17.1   390.0    22.00  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

Lab ID:	**Lab 2**
Manufacturer:	Frankonia
Description:	Anechoic Chamber for radiated testing
Type:	10.58x6.38x6.00 m³

Single Devices for Anechoic Chamber

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Air compressor	none	-	Atlas Copco	
Anechoic Chamber	10.58 x 6.38 x 6.00 m³	none	Frankonia	
	Calibration Details		*Last Execution*	*Next Exec.*
	FCC listing 96716 3m Part15/18		2011/01/11	2014/01/10
	IC listing 3699A-1 3m		2011/02/07	2014/02/06
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	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2010/11/06	2011/11/05
	Path Calibration		2011/11/11	2012/11/10
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz GmbH & Co. KG	
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	DKD calibration		2011/01/20	2013/01/19

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	AS 620 P	620/37	HD GmbH	
Biconical dipole	VUBA 9117	9117-108	Schwarzbeck	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2008/10/27	2013/10/26
	Standard Calibration		2012/01/18	2015/01/17
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P	849785	Miteq	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10
	Path Calibration		2011/11/15	2012/05/14
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4	-	Miteq	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10
	Path Calibration		2011/11/15	2012/05/14
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P	896037	Miteq	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10
	Path Calibration		2011/11/15	2012/05/14
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2+W38.01-2	Kabel Kusch	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10
	Path Calibration		2011/11/15	2012/05/14
Cable "ESI to Horn Antenna"	UFB311A+UFB293C	W18.02-2+W38.02-2	Rosenberger Micro-Coax	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10
	Path Calibration		2011/11/15	2012/05/14
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2009/04/16	2012/04/15
	Standard Calibration		2012/05/18	2015/05/17
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2009/04/28	2012/04/27
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10
	Path Calibration		2011/11/15	2012/05/14
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10

Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
	Path Calibration		2011/11/15	2012/05/14
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10
	Path Calibration		2011/11/15	2012/05/14
High Pass Filter	WHKX 7.0/18G-8SS	09	Wainwright	
	Calibration Details		*Last Execution*	*Next Exec.*
	Path Calibration		2011/05/11	2011/11/10
	Path Calibration		2011/11/15	2012/05/14
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2009/05/27	2012/05/26
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2011/10/27	2014/10/26
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

Lab ID:	**Lab 2**
Manufacturer:	see single devices
Description:	Single Devices for various Test Equipment
Type:	various
Serial Number:	none

Single Devices for Auxiliary Test Equipment

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
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.
	Calibration Details		*Last Execution* *Next Exec.*
	Customized calibration		2011/10/19 2013/10/18
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
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
	Calibration Details		*Last Execution* *Next Exec.*
	Standard calibration		2011/11/24 2014/11/23
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	Standard calibration		2011/05/26 2013/05/25
	HW/SW Status		*Date of Start* *Date of End*
	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
	Calibration Details		*Last Execution* *Next Exec.*
	Standard calibration		2008/12/01 2011/11/30
	Standard calibration		2011/12/07 2014/12/06
	HW/SW Status		*Date of Start* *Date of End*
	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

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

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Personal Computer	Dell	30304832059	Dell	
Power Meter	NRVD	828110/016	Rohde & Schwarz GmbH & Co.KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2011/05/03	2012/05/02
Power Sensor	NRV-Z1	836219/005	Rohde & Schwarz GmbH & Co. KG	
Powermeter	NRVS	836333/064	Rohde & Schwarz GmbH & Co. KG	
Sensor Head A	NRV-Z1	827753/005	Rohde & Schwarz GmbH & Co.KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2011/05/02	2012/05/01
Signal Generator	SMR 20	846834/008	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	standard calibration		2011/05/12	2014/05/11
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2009/12/03	2011/12/02
	Standard Calibration		2011/12/05	2013/12/04
	HW/SW Status		*Date of Start*	*Date of End*
	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

5 Annex

5.1 Additional Information for Report

SKORPIOX3 Model Overview

Model: SKORPIO X3
Type: ABCDEE-FGH-IJJK SLMMMM

Below is the list of the available models with a brief description of the different features.

Model No.	Description
1	SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, Batch, Laser, WinCE, Numeric)
2	SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, WiFi+BT, Laser, WinCE, Numeric)
3	SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, WiFi+BT, Laser, WinCE, Full Alpha Numeric)
4	SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, WiFi+BT, Laser, WinMobile, Numeric)
5	SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, WiFi+BT, Laser, WinMobile, Full Alpha Numeric)
6	**SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, WiFi+BT, Imager, WinCE, Numeric)**
7	SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, WiFi+BT, Imager, WinCE, Full Alpha Numeric)
8	SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, WiFi+BT, Imager, WinMobile, Numeric)
9	SKORPIOX3 ABCDEE-FGH-IJJK (HandHeld, WiFi+BT, Imager, WinMobile, Full Alpha Numeric)
10	SKORPIOX3 ABCDEE-FGH-IJJK (PistolGrip, WiFi+BT, Laser, WinCE, Numeric)
11	SKORPIOX3 ABCDEE-FGH-IJJK (PistolGrip, WiFi+BT, Laser, WinCE, Full Alpha Numeric)
12	SKORPIOX3 ABCDEE-FGH-IJJK SLMMMM (HandHeld, Batch, Laser, WinCE, Alpha Numeric)
13	SKORPIOX3 ABCDEE-FGH-IJJK SLMMMM (HandHeld, WiFi+BT, Laser, WinCE, Alpha Numeric)
14	SKORPIOX3 ABCDEE-FGH-IJJK SLMMMM (PistolGrip, WiFi+BT, Laser, WinCE, Alpha Numeric)

Note: model 3 and model 6 are selected samples for product certifciation testing (additional Handle can be mounted on both models), as they considered to be the most representative for the complete set of models.

POWER SUPPLY	- Removable battery pack. Li-Ion rechargeable batteries: 1) Standard capacity: 3,7V; 3000mAh (Standard Battery) 2) Large capacity: 3,7V; 5200mAh (Extended Battery) - Backup battery Li-Ion or NiMH.

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 50µH || 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 (dBµV)	AV Limit (dBµV)
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

- 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)

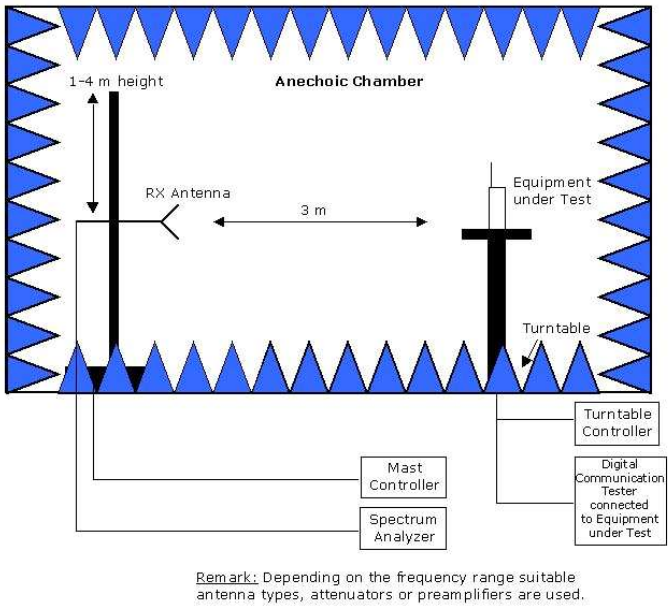
Frequency Range (MHz)	Class B Limit (dBµV/m)
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
above 960	54.0

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)

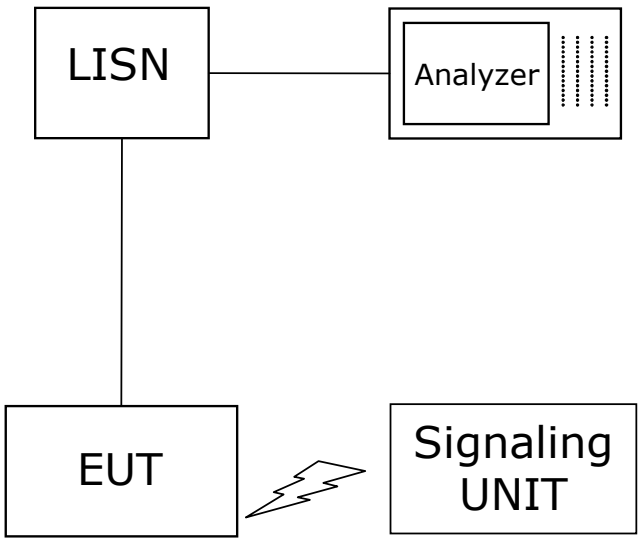
NOTE: A missing result table in the corresponding test report section means, that no final measurement was performed because no relevant frequencies (peaks) were found in the preliminary scan.

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

6 Index