



Inter**Lab**[®]

Final Report on Bluetooth/IRDA printer testo 0554 0621

Report Reference: MDE_TESTO_1507_FCCb
According to:
FCC 47 CFR Ch.1 Part 15 Subpart B, Class B

Date: April 05, 2016

Test Laboratory:

7layers GmbH
Borsigstraße 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.

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A Bureau Veritas Group Company

1 Administrative Data

1.1 Project Data

Project Responsible: Abdellah Ahakki
Date Of Test Report: 2016/04/05
Date of first test: 2016/01/21
Date of last test: 2016/01/21

1.2 Applicant Data

Company Name: Testo AG
Street: Celsiusstraße 2
City: 79822 Titisee-Neustadt
Country: Germany
Contact Person: Udo Spiwoks
Department: Qualification & Test
Phone: +49 (0) 7653 681 - 7492
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E-Mail: uspiwoks@testo.de

1.3 Test Laboratory Data

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

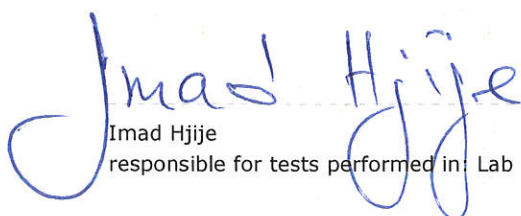
7 layers DE

Company Name : 7layers GmbH
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

Lab ID	Identification	Responsible	Accreditation Info
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. Jens Dörwald	DAkkS-Registration no. D-PL-12140-01-01

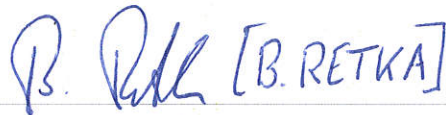
1.4 Signature of the Testing Responsible



Imad Hjije
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: IRDA printer

Type / Model / Family:	Bluetooth/IRDA printer testo 0554 0621
Manufacturer:	
Company Name:	Testo AG
Street:	Celsiusstraße 2
City:	79822 Titisee-Neustadt
Country:	Germany
Company URL:	http://www.testo.de/
Contact Person:	Mr. Udo Spiwoks
Department:	Qualification & Test
Phone:	+49 (0) 7653 681 - 7492
Fax:	+49 (0) 7653 681 - 97492
E-Mail:	uspiwoks@testo.de

Parameter List:

Parameter name	Value
AC Power Supply	100-240 (V)
DC Power Supply	5 (V)

Ancillary Equipment: AC/DC Adapter

Type / Model / Family: SSC-5W-05 050100

Parameter List:

Parameter name	Value
AC Power Supply	primary: 120 V AC
DC Power Supply	secondary: 5 V DC

2.2 Detailed Description of OUT Samples

Sample : ac01

<i>OUT Identifier</i>	IRDA printer
<i>Sample Description</i>	FCC 15B sample
<i>Serial No.</i>	45101382
<i>HW Status</i>	05540621
<i>SW Status</i>	2.0

Parameter List:

<i>Parameter Description</i>	<i>Value</i>
Parameter for Scope FCC_v2	
Antenna Gain	2 (dBi)
Frequency_high	2480 (MHz)
Frequency_low	2402 (MHz)
Frequency_mid	2441 (MHz)

Sample : ACDC

<i>OUT Identifier</i>	AC/DC Adapter
<i>Sample Description</i>	SIL Switching Adapter
<i>Serial No.</i>	05541104
<i>Nominal Voltage</i>	120 V

2.3 OUT Features

Features for OUT: AC/DC Adapter

<i>Designation</i>	<i>Description</i>	<i>Allowed Values</i>	<i>Supported Value(s)</i>
Features for scope: FCC_v2			
AC	The OUT is powered by or connected to AC Mains		
DC	The OUT is powered by or connected to DC		

Features for OUT: IRDA printer

<i>Designation</i>	<i>Description</i>	<i>Allowed Values</i>	<i>Supported Value(s)</i>
Features for scope: FCC_v2			
AC	The OUT is powered by or connected to AC Mains		
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		

2.4 Auxiliary Equipment

AE No.	Type Designation	Serial No.	HW Status	SW Status	Description
AE AUX1	Sony	-	-	-	Android Tablet

2.5 Operating Mode(s)

Ref.-No.	Description
charge	Charging: The EUT is connected to AC Mains (120 V / 60 Hz) and its internal rechargeable battery is charged. During charging, the normal operation of the EUT is suspended.
print	Printing: The EUT is linked via Bluetooth wireless technology to another device in normal operating (hopping) mode. It continuously prints text but is NOT connected to AC Mains.

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.

Setup No.	List of OUT samples	List of auxiliary equipment	
Sample No.	Sample Description	AE No.	AE Description
AC01_charge (Setup with ACDC Charger)			
Sample: ACDC	SIL Switching Adapter		
Sample: ac01	FCC 15B sample		
AC01_print (Printing Setup)			
Sample: ac01	FCC 15B sample	AE AUX1	Android Tablet

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. All tests are performed under environmental conditions within the requirements of the specifications. Environmental conditions are available at the laboratory.

2. The device is a hands-free kit containing a BT Transceiver operating in the 2.4 GHz ISM band. The EUT was controlled by the CBT via Bluetooth test mode.



Reference: MDE_TESTO_1507_FCCb
According to:
FCC 47 CFR Ch.1 Part 15 Subpart B, Class B

3.2 List of the Applicable Body

(Body for Scope: FCC_v2)

<i>Designation</i>	<i>Description</i>
FCC47CFRChIPART15bRADIO FREQUENCY DEVICES	Part 15, Subpart B - Unintentional Radiators

3.3 List of Test Specification

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

Test Specification: FCC part 2 and 15
Version 10-1-15 Edition
Title: PART 2 - GENERAL RULES AND REGULATIONS
PART 15 - RADIO FREQUENCY DEVICES
ANSI C63.4-2014



Reference: MDE_TESTO_1507_FCCb
According to:
FCC 47 CFR Ch.1 Part 15 Subpart B, Class B

3.4 Summary

Test Case Identifier / Name			Lab	
Test (condition)	Result	Date of Test	Ref.	Setup
15b.1 Conducted Emissions (AC Power Line) §15.107				
15b.1; Mode = generating a high power consumption	Passed	2016/01/21	Lab 1	AC01_charge
	operating mode: charge			
15b.2 Spurious Radiated Emissions §15.109				
15b.2; Mode = generating a high power consumption	Passed	2016/01/21	Lab 2	AC01_print
	operating mode: print			
	Passed	2016/01/21	Lab 2	AC01_charge
	operating mode: charge			



3.5 Detailed Results

3.5.1 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>	AC01_charge
<i>Date of Test:</i>	2016/01/21 11:02
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15

Detailed Results:

Test Report

Common Information

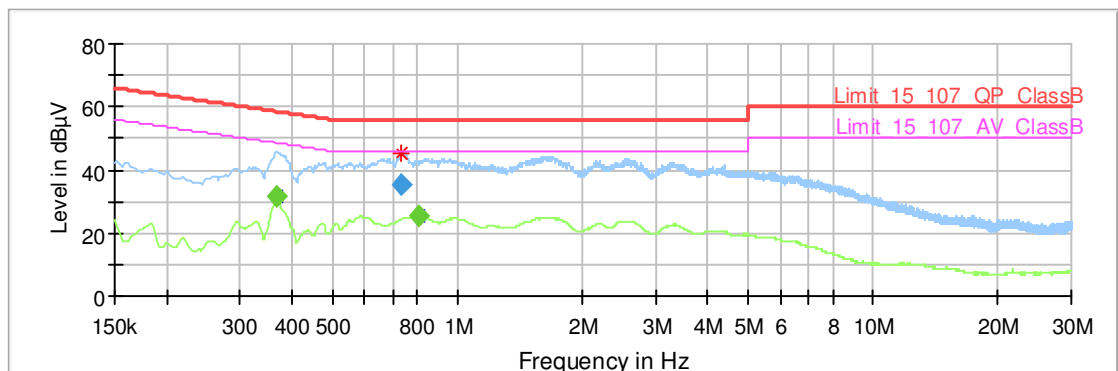
Test Description: Conducted Emissions at AC Mains terminal, 120 V / 60 Hz
Test Standard: ANSI C63.4 / FCC §15.107
Operating Conditions: charging
Operator Name: Mit
Comment: when connected to AC Mains, the EUT stops normal operation

EMI Auto Test Template: FCC15b_15-107_VOLTAGE_ClassB

Hardware Setup: EMI_Conducted_EN_FCC_ESH3-Z5
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBμV - 80 dBμV

Preview Measurements:
Scan Test Template: FCC_Part107_Pre_ESH3-Z5

Final Measurements:
Template for Single Meas.: FCC_Part107_Final_ESH3-Z5



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.368250	---	31.63	48.54	16.91	1000.0	9.000	L1	FL	10.1
0.730500	35.39	---	56.00	20.61	1000.0	9.000	L1	FL	10.1
0.811500	---	25.54	46.00	20.46	1000.0	9.000	L1	FL	10.1



Reference: MDE_TESTO_1507_FCCb
According to:
FCC 47 CFR Ch.1 Part 15 Subpart B, Class B

3.5.2 15b.2 Spurious Radiated Emissions §15.109

Test1: 15b.2; Mode = generating a high power consumption

<i>Result:</i>	Passed
<i>Setup No.:</i>	AC01_charge
<i>Date of Test:</i>	2016/01/21 11:21
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15

Detailed Results:

Test Report

Common Information

Test Description: Radiated Emissions of unintentional transmitter, 120 V / 60 Hz
Test Standard: ANSI C63.4 / FCC §15.109
Operating Conditions: charging
Operator Name: Mit
Comment: when connected to AC Mains, the EUT stops normal operation

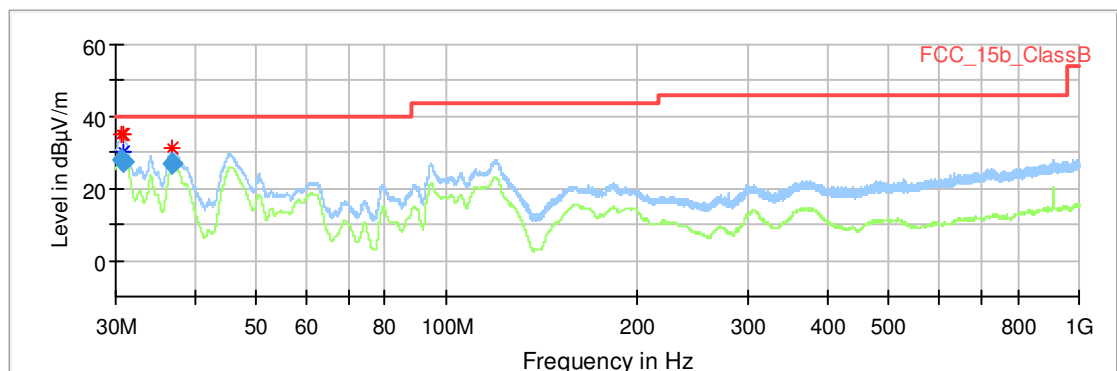
EMI Auto Test Template: FCC_15b_ClassB_30M-1G

Hardware Setup: EN_FCC_FieldStrength_30M-1G_withoutDistanceCorrection_SAC
Measurement Type: Open-Area-Test-Site
Frequency Range: 30 MHz - 1 GHz
Graphics Level Range: -10 dBμV/m - 60 dBμV/m

Preview Measurements:
Scan Test Template: FCC_15b_3m_PRE

Adjustment:
Template for Single Meas.: FCC_15b_3m_ADJUSTMENT

Final Measurements:
Template for Single Meas.: FCC_15b_3m_FINAL



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Comment
30.690000	28.21	40.00	11.79	1000.0	120.000	110.0	V	-135.0	12:13:02 - 21/01/2016
30.780000	27.30	40.00	12.70	1000.0	120.000	111.0	V	-112.0	12:20:59 - 21/01/2016
36.930000	27.05	40.00	12.95	1000.0	120.000	107.0	V	-199.0	12:15:54 - 21/01/2016



Reference: MDE_TESTO_1507_FCCb
According to:
FCC 47 CFR Ch.1 Part 15 Subpart B, Class B

Test1: 15b.2; Mode = generating a high power consumption

<i>Result:</i>	Passed
<i>Setup No.:</i>	AC01_print
<i>Date of Test:</i>	2016/01/21 11:23
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15

Detailed Results:

Test Report

Common Information

Test Description: Radiated Emissions of unintentional transmitter, internal battery
Test Standard: ANSI C63.4 / FCC §15.109
Operating Conditions: printing and Bluetooth link in hopping mode to Sony Tablet
Operator Name: Mit
Comment: not connected to AC Mains

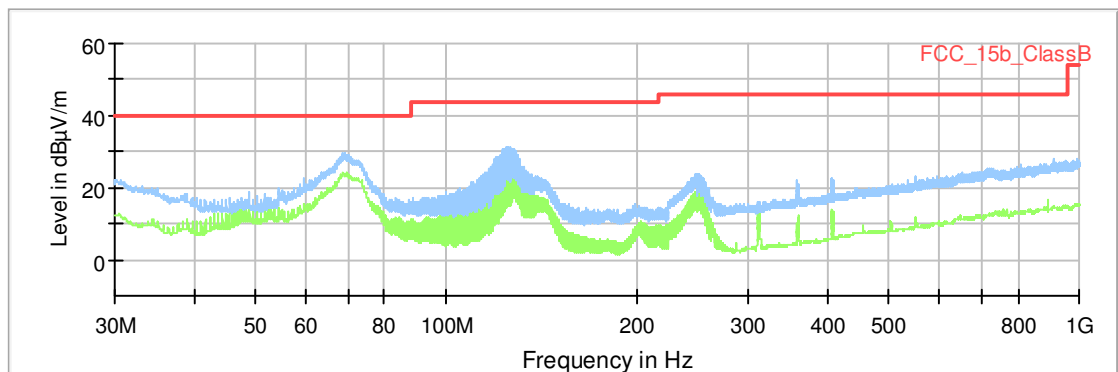
EMI Auto Test Template: FCC_15b_ClassB_30M-1G

Hardware Setup: EN_FCC_FieldStrength_30M-1G_withoutDistanceCorrection_SAC
Measurement Type: Open-Area-Test-Site
Frequency Range: 30 MHz - 1 GHz
Graphics Level Range: -10 dBμV/m - 60 dBμV/m

Preview Measurements:
Scan Test Template: FCC_15b_3m_PRE

Adjustment:
Template for Single Meas.: FCC_15b_3m_ADJUSTMENT

Final Measurements:
Template for Single Meas.: FCC_15b_3m_FINAL



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Comment
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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
Description:	Anechoic Chamber for radiated testing
Type:	10.58x6.38x6.00 m ³
	<i>Calibration Details</i>
	NSA (FCC)
	<i>Last Execution</i>
	2014/01/09
	<i>Next Exec.</i>
	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	-	
Anechoic Chamber	10.58 x 6.38 x 6.00 m ³	none	
	<i>Calibration Details</i>		<i>Last Execution</i> <i>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	-	
EMC camera Nr.2	CCD-400E	0005033	
Filter ISDN	B84312-C110-E1		
Filter Universal 1A	BB4312-C30-H3	-	

Test Equipment Auxiliary Equipment for Conducted emissions

Lab ID:	Lab 1
Description:	EMI Conducted Auxiliary Equipment

Single Devices for Auxiliary Equipment for Conducted emissions

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
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</i> <i>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
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN ST08	36292	Teseq GmbH
	<i>Calibration Details</i>		<i>Last Execution</i> <i>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</i> <i>Next Exec.</i>
	Standard Calibration		2014/01/08 2016/01/31



Reference: MDE_TESTO_1507_FCCb
According to:
FCC 47 CFR Ch.1 Part 15 Subpart B, Class B

Single Devices for Auxiliary Equipment for Conducted emissions (continued)

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>	
One-Line V-Network	ESH 3-Z6	100489	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>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</i>	<i>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</i>	<i>Next Exec.</i>
	DAkKS Calibration		2015/03/30	2017/03/31
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	DAkKS Calibration		2015/03/30	2017/03/31

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 Broadband Antenna	SBA 9119	9119-005	
Biconical dipole	VUBA 9117	9117-108	
Broadband Amplifier 1 GHz - 4 GHz	AFS4-01000400-1Q-10P-4	-	
Broadband Amplifier 18 GHz - 26 GHz	JS4-18002600-32-5P	849785	
Broadband Amplifier 30 MHz - 18 GHz	JS4-00101800-35-5P	896037	
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2+W38.01-2	
Cable "ESI to Horn Antenna"	SucoFlex	W18.02-2+W38.02-2	
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution Next Exec.</i>
Standard Calibration			2015/06/23 2018/06/22
Double-ridged horn	HF 907	102444	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution Next Exec.</i>
Standard Calibration			2015/05/11 2018/05/10
Double-ridged horn-duplicated 2015-07-15 10:47:55	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG
High Pass Filter	4HC1600/12750-1.5-KK	9942011	
High Pass Filter	5HC2700/12750-1.5-KK	9942012	
High Pass Filter	5HC3500/18000-1.2-KK	200035008	
High Pass Filter	WHKX 7.0/18G-8SS	09	
Horn Antenna Schwarzbeck 15-26.5 GHz BBHA 9170	BBHA 9170	BBHA9170262	
Log.-per. Antenna	HL 562 Ultralog	100609	Rohde & Schwarz GmbH & Co. KG
Log.-per. Antenna (upgraded)	HL 562 Ultralog new biconicals	830547/003	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution Next Exec.</i>
Standard Calibration			2015/06/30 2018/06/29
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution Next Exec.</i>
DKD Calibration			2014/11/27 2017/11/27

Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	Type	Serial Number	Manufacturer
Standard Gain / Pyramidal Horn Antenna 40 GHz	3160-10	00086675	
Tilt device Maturo (Rohacell)	Antrieb TD1.5-10kg	TD1.5- 10kg/024/379070 9	Maturo GmbH

Test Equipment Auxiliary Test Equipment

Lab ID:	Lab 2
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	
Broadband Power Divider SMA	WA1515	A855	
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	
Digital Multimeter 13 (Clamp Meter)	Fluke 325	31270091WS	FLUKE
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	
Isolating Transformer	LTS 604	1888	
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	
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	FSU26	200418	
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2015/10/20 2016/10/19
Spectrum Analyzer	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	DKD calibration		2015/06/23 2018/06/22
Vector Signal Generator	SMIQ 03B	832492/061	

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
CMW500	CMW500	107500	
	Calibration Details		Last Execution Next Exec.
	Standard calibration		2014/01/27 2016/01/26
Digital Radio Communication Tester	CMD 55	831050/020	
	Calibration Details		Last Execution Next Exec.
	DKD calibration		2014/12/02 2017/12/01
Universal Radio Communication Tester	CMU 200	837983/052	
	Calibration Details		Last Execution Next Exec.
	DKD calibration		2014/12/03 2017/12/02
	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		2007/01/02
	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 --- 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

Single Device Name	Type	Serial Number	Manufacturer
EMI Receiver / Spectrum Analyzer	ESR 7	101424	
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Initial Factory Calibration		2014/11/13 2016/11/12
Personal Computer	Dell	30304832059	
Power Meter	NRVD	828110/016	
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2015/05/11 2016/05/10
Sensor Head A	NRV-Z1	827753/005	
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2015/05/11 2016/05/10
Signal Generator	SMR 20	846834/008	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard Calibration		2014/06/24 2017/06/23
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
	DAkKS Calibration (DK)		2015/12/09 2017/12/08
	<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
Spectrum Analyzer	FSW 43	103779	
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Initial Factory Calibration		2014/11/17 2016/11/16

Test Equipment Harmonic & Flicker measurement system and AC Source

Lab ID:	Lab 1
Manufacturer:	Spitzenberger & Spieß GmbH & Co. KG
Description:	EN61000-3-2&3 test system,source for magnetic field EN61000-4-8
Type:	PHE 1200/B Spitzenberger&Spies
Serial Number:	B6280

Single Devices for Harmonic & Flicker measurement system and AC Source

Single Device Name	Type	Serial Number	Manufacturer		
Amplifier with integrated variable Oscillator	EP 1200/B, NA/B1	B6278	Spitzenberger & Spieß GmbH & Co. KG		
	Calibration Details			Last Execution	Next Exec.
	Standard Calibration			2015/07/23	2018/07/30
Flickermeter / Harmonic Analyzer	B10	M70579	Spitzenberger & Spieß GmbH & Co. KG		
	Calibration Details			Last Execution	Next Exec.
	Standard Calibration			2015/07/23	2018/07/30
Line impedance simulation system	1-pase 16A	B6279	Spitzenberger & Spieß GmbH & Co. KG		
	Calibration Details			Last Execution	Next Exec.
	Standard Calibration			2015/07/22	2018/07/30

Test Equipment Multimeter 03

Lab ID:	Lab 2
Description:	Fluke 177
Serial Number:	86670383

Single Devices for Multimeter 03

Single Device Name	Type	Serial Number	Manufacturer
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	

Test Equipment Shielded Room 02

Lab ID:	Lab 1
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

Single Device Name	Type	Serial Number	Manufacturer		
ThermoAirpressure Datalogger 13 (Environ)	Opus10 TPR (8253.00)	13936			
	Calibration Details			Last Execution	Next Exec.
	Customized calibration			2015/02/27	2017/02/26



Reference: MDE_TESTO_1507_FCCb
According to:
FCC 47 CFR Ch.1 Part 15 Subpart B, Class B

Test Equipment T/H Logger 02

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

Single Devices for T/H Logger 02

Single Device Name	Type	Serial Number	Manufacturer
ThermoHygro Datalogger 02 (Environ)	Opus10 THI (8152.00)	7489	
Calibration Details		Last Execution	Next Exec.
Customized calibration		2015/02/27	2017/02/26

Test Equipment T/H Logger 12

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

Single Devices for T/H Logger 12

Single Device Name	Type	Serial Number	Manufacturer
ThermoHygro Datalogger 12 (Environ)	Opus10 THI (8152.00)	12482	
Calibration Details		Last Execution	Next Exec.
Customized calibration		2015/03/10	2017/03/09



Reference: MDE_TESTO_1507_FCCb
According to:
FCC 47 CFR Ch.1 Part 15 Subpart B, Class B

5 Annex

5.1 Additional Information for Report

Test Description

Conducted emissions (AC power line)

Standard FCC Part 15 Subpart B

The test was performed according to: ANSI C 63.4

Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4.

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 connected to a 50 μ H || 50 Ohm Line Impedance Stabilization Network (LISN), which meets the requirements of ANSI C63.4, Annex B, in the frequency range of the measurements. The LISN's unused connections were terminated with 50 Ohm loads. AC Power supply voltage for EUT: 120 V / 60 Hz (if not stated within the measurement plot and/or test result).

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: 100 ms (FFT-based)
- 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 μ V)	AV Limit (dB μ 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

Test Description

Measurement below 1 GHz:

The test set-up was made in accordance to the general provisions of ANSI C 63.4.

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. AC Power supply voltage for EUT: 120 V 60 Hz (if not stated within the measurement plot and/or test result).

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:

- Antenna distance: 3 m
- Detector: Peak-Maxhold / quasipeak (FFT-based)
- Frequency range: 30 – 1000 MHz
- Frequency steps: 30 kHz
- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range: -180° to +90°
- Turntable step size: 90°
- Height variation range: 1 – 3 m
- Height variation step size: 2 m
- Polarization: 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:

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 slowly vary by $\pm 45^\circ$ 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 will also slowly vary by ± 100 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.

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: $\pm 45^\circ$ around the determined value
- Height variation range: ± 100 cm around the determined value
- Polarizations: max. value determined in step 1

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

Step 3: 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 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

3. Measurement above 1 GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz:

Step 1:

All steps were performed with one height of the receiving antenna only.

The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90° .

The turn table step size (azimuth angle) for the preliminary measurement is 45° .

Step 2:

Due to the fact, that in this frequency range the test is performed in a fully anechoic room, the height scan of the receiving antenna instep 2 is omitted. Instead of this, a maximum search with a step size $\pm 45^\circ$ for the elevation axis is performed.

The turn table azimuth will slowly vary by $\pm 22.5^\circ$.

The elevation angle will slowly vary by $\pm 45^\circ$

EMI receiver settings (for all steps):

- Detector: Peak, Average
- IF Bandwidth = 1 MHz

Step 3:

Spectrum analyser settings for step 3:

- Detector: Peak / Average
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 1 MHz
- Measuring time: 1 s

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 (dB μ V/m)
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
above 960	54.0

Frequency Range (MHz)	Class A Limit (dB μ V/m) / @ 3 m!
30 – 88	49.5
88 – 216	54.0
216 – 960	56.9
above 960	60.0

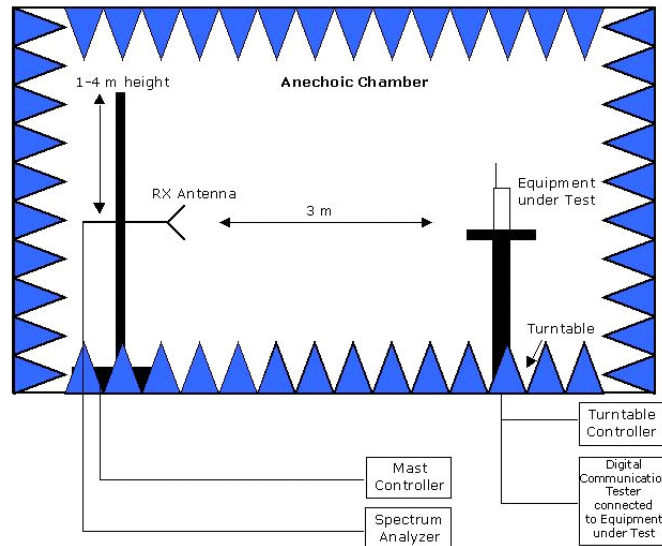
§15.35(b)

..., 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 (dB μ V/m) = $20 \log (\text{Limit } (\mu\text{V/m})/1\mu\text{V/m})$

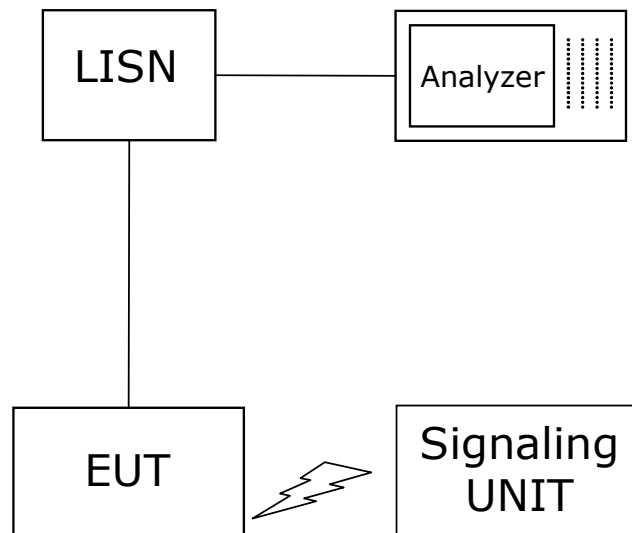
NOTE: A missing result table in the corresponding test report section means, that no final measurement was performed because no relevant frequencies (peaks) were found in the preliminary scan.

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

Measurement	FCC reference	IC reference
Conducted Emissions (AC Power Line)	§15.107	ICES-001 Issue 4 or ICES-003 Issue 6
Radiated Spurious Emissions	§15.109	ICES-001 Issue 4 or ICES-003 Issue 6

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.



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