Test report

AXK45b03

Product / EUT:	Smart sporting gun
Type designation:	iP1 SmartSystem
Tested type:	iP1 SmartSystem – USB-Stick
FCC-ID:	ZYXSMARTIS1A (pending)
EUT authorization:	☒ Certification ☐ Declaration of Conformity ☐ Verification ☐ Class II Permissive Change
Production level:	10/2013
S/N:	n/a
Manufacturer:	Armatix GmbH Feringastraße 4 85774 Unterföhring
Test remit:	FCC Rules 47 CFR Part 15 – Subpart C – Intentional radiators in accordance with the procedures given in §15.207; 15.209; 15.249(a) ANSI C63.4-2003 – 01/2004
The standards were:	☒ kept* ☐ not kept*
***Remark:**	☒ Validation covered by the accredited scope ☐ Validation not covered by the accredited scope according:_____ ☐ Validation of the EMC-requirements partly proceeded
Applicant:	Armatix GmbH Feringastraße 4 85774 Unterföhring
EUT-	
Date of arrival:	2013-10-21
Test ID:	PRK43_05
Date(s) of test:	2013-10-21 to 2013-10-23

Burgrieden, 2014-05-23

Released by:

Principal engineer - Christian Vogelmann

Test laboratory:	☒ EMCE GmbH Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung Untere Wiesen 1 / 88483 Burgrieden / Germany DAkkS-Registration No.: D-PL-12122-01-01 CAB-Registration No.: BnetzA-CAB-02/21-01/1 FCC-Registration No.: 219415
Responsible inspector:	Mr. Hauser EMCE GmbH Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung
Contact person:	Manfred Weinzierl / Armatix GmbH
EUT-	
Description:	The iP1 SmartSystem consists of a sporting gun enabled with a RF ID signal generated by a dedicated watch and an USB stick provided for data transfer between sportive gun and a PC system.
Voltage supply:	Stick - 5VDC (via USB) Laptop – 120V/60Hz
Frequency list:	32.768kHz; 916.50MHz
Temperature range:	-20°C to +70°C
Approximate size:	(LxWxH) / mm - 70x14x9

Supplied / used equipment:

Designation	Type	Manufacturer	S/N
Laptop	Lifebook A Series	Fujitsu	YL9Q209984
Laptop	Inspiron 5150	Dell	CN-0W0941-12961-36J-2083

Configuration: ☒ As-delivered condition*
☐ Modified*
* _____

Cable designation	Type	Length	Remarks
AC power cord	3-wire	1.7m	n/a
USB cable	Shielded	1.8m	n/a

Antenna: Antenna requirement according 47CFR Part 15 - Section 15.203
☒ Internal antenna
☐ Permanently attached antenna
☐ Antenna with unique coupling to the intentional radiator

Remarks: n/a

State of revision:

Source document	New Document	Date / Reviser	Modifications
AXK45_03	AXK45a03	2014-04-15	Change of the FCC ID Bandwidth plot inserted (pages 27 and 28)
AXK45a03	AXK45b03	2014-05-21	Bandwidth plot extended by -20dB bandwidth corner frequencies. Power supply general stated for the stick.

Test equipment list of EMCE GmbH:

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
001	Test receiver	ESS 5Hz - 1000MHz	Rohde & Schwarz	833776/008 Firmware: Main: 1.21 OTP: 02.01	1 Year(s)/ 2013-11-26
003	LISN 1	ESH3-Z5	Rohde & Schwarz	835268/007	1 Year(s)/ 2014-02-14
004	LISN 2	ESH3-Z5	Rohde & Schwarz	835268/003	1 Year(s)/ 2014-02-14
006	LISN	NNBM 8125	Schwarzbeck	8125371	1 Year(s)/ 2014-04-16
007	Absorbing clamp	MDS 21	Schwarzbeck	942436	1 Year(s)/ 2014-07-04
008	Loop antenna 9kHz-30MHz	HFH2-Z2	Rohde & Schwarz	835776/0002	3 Year(s)/ 2013-11-03
009	Antenna 30-300MHz	VHBA9123 / BBA9106	Schwarzbeck	435	3 Year(s)/ 2015-08-28
010	Antenna 250-1200MHz	UHALP 9108A	Schwarzbeck	108	2 Year(s)/ 2014-07-24
011	Antenna 30-300MHz	VHBA9123 / BBA9106	Schwarzbeck	0403/94	2 Year(s)/ 2014-07-23
012	Antenna 250-1200MHz	UHALP 9108A	Schwarzbeck	166	3 Year(s)/ 2015-08-29
013	Antenna 9kHz-30MHz	Ø 1.5m	EMCE GmbH		1 Year(s)/ 2014-08-31
014	OATS	3m	EMCE GmbH		3 Year(s)/ 2014-09-30
015	OATS	10m	EMCE GmbH		3 Year(s)/ 2014-09-30
020	Coupling clamp	IP4A	Haefely	082672-13	1 Year(s)/ 2014-08-31
022	ESD-Gun	NSG 435	Schaffner	577	1 Year(s)/ 2014-06-18
024	RF-Generator	SMY01	Rohde & Schwarz	844146/046	2 Year(s)/ 2015-10-07
025	Current clamp BCI	F-120-2	FCC	47	1 Year(s)/ 2014-08-31
026	Coupling device network	CDN 801-M3-25	FCC	92	1 Year(s)/ 2014-08-31
030	Coupling device network	CDN 801-S1/ 9pol. DSUB	EMCE GmbH		1 Year(s)/ 2014-08-31

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
031	Coupling device network	CDN 801-S1/ 9pol. DSUB	EMCE GmbH		1 Year(s)/ 2014-08-31
032	RF Power Amplifier	75A250	Amplifier Research	22789	1 Year(s)/ 2014-08-31
033	Coupling device network	CDN-AF2	EMCE GmbH		1 Year(s)/ 2014-08-31
034	Coupling device network	CDN-AF2	EMCE GmbH		1 Year(s)/ 2014-08-31
035	3-phase coupling device network	CDN-1000-45	EMC-Partner	086	3 Year(s)/ 2015-12-06
036	Coupling device network	CDN 801-M5-25	EMCE GmbH		1 Year(s)/ 2014-08-31
037	Coupling device network	CDN 801-S1	EMCE GmbH		1 Year(s)/ 2014-08-31
038	Helmholtz coil	1 m x 1 m	EMCE GmbH		1 Year(s)/ 2014-08-31
039	Helmholtz coil	1 m x 1 m	EMCE GmbH		1 Year(s)/ 2014-08-31
040	Current transformer		EMCE GmbH		1 Year(s)/ 2014-08-31
041	Loop antenna shielded	HZ-10 0816.2511.02	Rohde & Schwarz	849788/0020	3 Year(s)/ 2013-11-02
042	AC-Source/ Analyser/ Norm impedance	EMV D 5000/PAS	Spitzenberger+ Spies	A2747 00/0 0501 A2747 07/00501 (ARS16/3)	2 Year(s)/ 2015-04-22
043	Receiver	3DH/E Fieldmeter ESM-100	Maschek	971521	3 Year(s)/ 2014-01-28
044	CDN	CN-U	EMC-Partner	86	1 Year(s)/ 2014-08-31
045	CDN	DN-HF	EMC-Partner	86	1 Year(s)/ 2014-08-31
046	CDN	DN-LF2	EMC-Partner	86	1 Year(s)/ 2014-08-31
047	CDN	DN-LF1	EMC-Partner	86	1 Year(s)/ 2014-08-31
050	Data Acquisition/ Switch Unit	Agilent 34970A	Agilent Technologies	MY41019453	3 Year(s)/ 2016-02-25
051	20 Channel Multiplexer	Agilent 34901A	Agilent Technologies	MY41013531	3 Year(s)/ 2016-02-23

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
054	Helmholtz coil	1.25 m x 1.25 m	EMCE GmbH		1 Year(s)/ 2014-08-31
055	Helmholtz coil	1.25 m x 1.25 m	EMCE GmbH		1 Year(s)/ 2014-08-31
057	Field probe	HI-6005	Holaday	34274	1 Year(s)/ 2013-12-12
058	Receiver	ESIB 40	Rohde & Schwarz	100200/ Firmware 4.35	1 Year(s)/ 2014-08-08
059	Log.-per. antenna	HL050	Rohde & Schwarz	100006	2 Year(s)/ 2015-01-15
062	Semi anechoic chamber #2	13.0m x 7.0m x 5.0m	EMC-Technik & Consulting GmbH		1 Year(s)/ 2014-06-30
067	LISN	ESH2-Z5	Rohde&Schwarz	872460/043	1 Year(s)/ 2014-03-13
068	LISN	ESH2-Z5	Rohde&Schwarz	872460/042	1 Year(s)/ 2014-04-05
070	Pulse limiter + 10dB Attenuator	ESH3-Z2	Rohde&Schwarz	357.8810.52	1 Year(s)/ 2014-08-31
073	Absorbing clamp	MDS21	Schwarzbeck	881757	1 Year(s)/ 2014-05-13
074	Synthesizer signal generator	SMX	Rohde&Schwarz	5SM02675	2 Year(s)/ 2015-04-15
107	Distortion generator	CAR-TESTER II	HILO-TEST	20073238	1 Year(s)/ 2014-08-31
115	Strip line 50 Ohm		EMCE GmbH		1 Year(s)/ 2014-08-31
116	Vertical rod antenna	VAMP 9243	Schwarzbeck	9243-205	1 Year(s)/ 2013-11-09
117	LISN	ESH3-Z6	Rohde & Schwarz	100521	1 Year(s)/ 2014-04-16
118	Current Probe	F-52	Fischer Customs Communication, Inc.	08398	1 Year(s)/ 2014-08-31
119	10V Insertion Unit 50 Ohm	URV5-Z2	Rohde & Schwarz	100911	2 Year(s)/ 2015-06-17
122	Power Meter	NRVS	Rohde & Schwarz	833430 / 0017	2 Year(s)/ 2015-06-12
123	Directional coupler	BDC 0100-50/500	BONN Elektronik	087261	1 Year(s)/ 2014-08-31
127	Function/ Arbitrary Waveform Generator	Agilent 33220A	Agilent Technologies	MY44026679	3 Year(s)/ 2015-12-18
128	Signal Generator	SMF100A	Rohde & Schwarz	100137	2 Year(s)/ 2014-08-21

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
129	ESD-Gun	P 30N	EM TEST GmbH	V1012106114	3 Year(s)/ 2016-07-03
130	Microwave-Log.-Per- Antenna	STLP 9149	Schwarzbeck Mess-Elektronik		5 Year(s)/ 2015-06-29
131	Coupling network	M3/AC	Dr. Hubert GmbH	A3052006	1 Year(s)/ 2014-08-31
132	LF-Amplifier	A1110-05	Dr. Hubert GmbH	111A1110	1 Year(s)/ 2014-08-31
134	10 V Insertion Unit 50 Ohm	URV5-Z2	Rohde & Schwarz	101025	1 Year(s)/ 2014-07-03
136	Directional coupler	BDC 0842-40/200	Bonn Elektronik	108082	1 Year(s)/ 2014-08-31
138	Microwave Biconical Broadband Antenna	SBA 9119	Schwarzbeck Mess-Elektronik	9119-058	3 Year(s)/ 2014-01-26
140	Burst/Surge-Generator	Transient 3000	EMC-Partner	TRA3000 F-S 1277	1 Year(s)/ 2013-12-06
142	Coupling / Decoupling Network for Burst and Surge	CNI 503 B7.4	EM TEST GmbH	V1125109869	1 Year(s)/ 2014-01-25
143	Ultra-Compact Simulator	UCS 500 N7	EM TEST AG	V1125109868	1 Year(s)/ 2014-01-23
147	10-V-insertion unit 50 Ohm	URV5-Z2	Rohde & Schwarz	101049	1 Year(s)/ 2013-12-13
151	DSO Infiniium 600 MHz	DSO9064A	Agilent Technologies	MY52090137	2 Year(s)/ 2014-09-19
154	Capacitive voltage clamp	CDN 500	Teseq GmbH	656	3 Year(s)/ 2015-03-08
155	ISN T400A	ISN T400A	Teseq GmbH	26541	3 Year(s)/ 2015-07-19
157	Power Amplifier	CBA1G-1000	Teseq	T44166	1 Year(s)/ 2014-08-14
159	Function/Arbitrary Waveform Generator	Agilent 33220A	Agilent Technologies	MY44058563	3 Year(s)/ 2015-12-19
163	Power Sensor	NRV-Z4	Rohde&Schwarz	100575	1 Year(s)/ 2014-02-25
174	LISN	ESH3-Z6	Rohde & Schwarz	101003	3 Year(s)/ 2016-05-15
175	EMI TestReceiver	ESR7	Rohde & Schwarz	101108	2 Year(s)/ 2014-06-17
997	EMC Software	EMC32 Vers. 8.53.0	Rohde& Schwarz	n/a	

Scope:

1 EMC-Test(s)

1.1 Emission according 47 CFR Part 15 Subpart C - 10/2013

1.1.1 Terminal voltage according 47 CFR Part 15 Subpart C - 10/2013

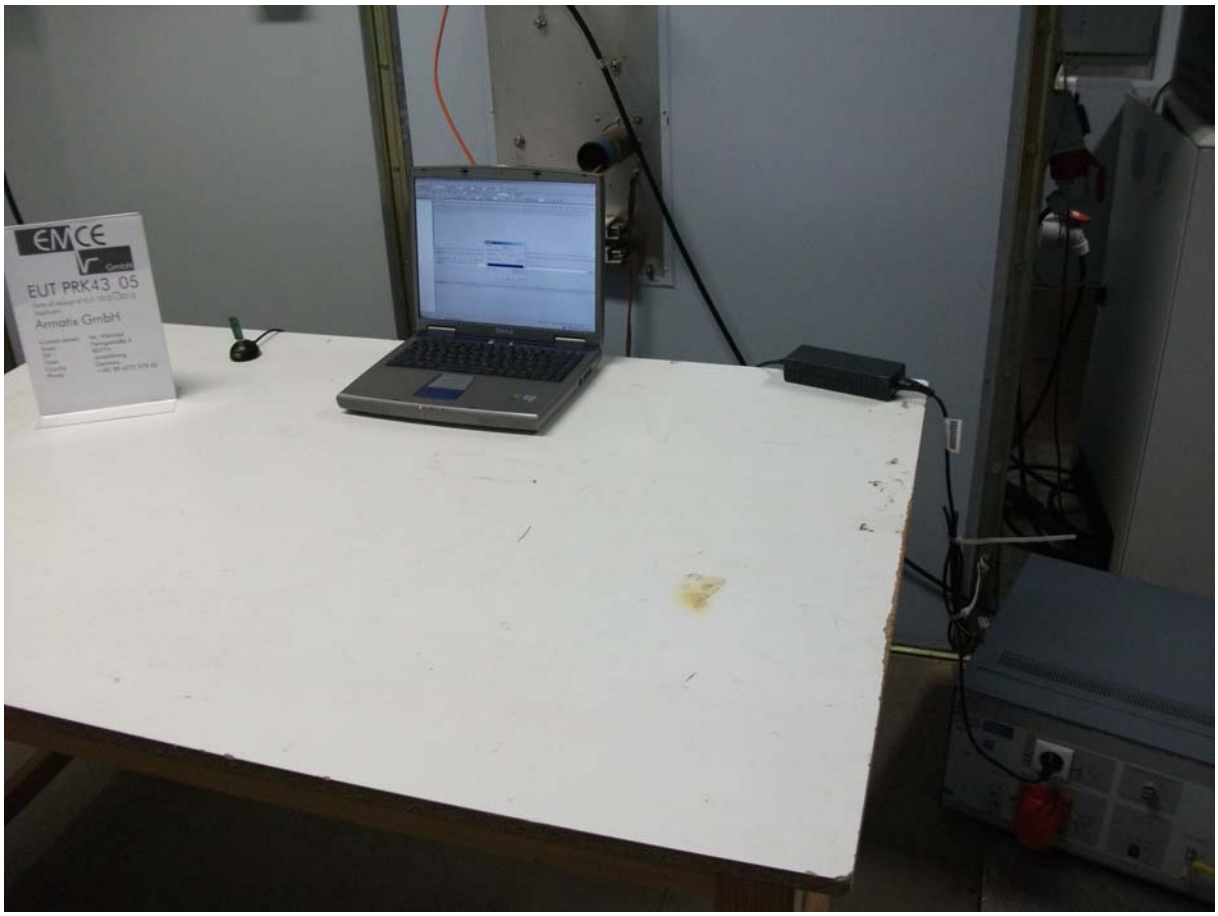
☒ Full compliance
☐ Precompliance
☐ Test not requested*
☐ Test not carried out*
*

Test location

☒	Inv.-No.	Designation	Type (LxWxH)	Manufacturer	Location
	504	Shielded room #1	6.4 x 4.0 x 2.3m	Frankonia EMV-Messsysteme GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
☒	588	Shielded room #2	8.3/5.8 x 5.5/2.9 x 3.4m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
	584	Shielded room #3	3.6 x 3.6 x 2.5m	Siemens AG	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
	061	Semi anechoic chamber #1	4.0 x 4.0 x 3.5m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
	062	Semi anechoic chamber #2	13.5 x 6.1 x 5.5m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
		Alternative test site			

1.1.1.1 Test set up

According ANSI C63.4-2003



Used test equipment

☒	Inv.-No.	Designation	Type	Manufacturer	S/N
☒	001	Test receiver	ESS 5Hz - 1000 MHz	Rohde & Schwarz	833776/008
	002	Probe	ESH2-Z3	Rohde & Schwarz	
	003	LISN 1	ESH3-Z5	Rohde & Schwarz	835268/007
	004	LISN 2	ESH3-Z5	Rohde & Schwarz	835268/003
	005	LISN 3	NNB 4/32T	Rolf Heine HF-Technik	4/32T-96015
	006	LISN	NNBM 8125	Schwarzbeck	8125371
	007	Absorbing clamp	MDS 21	Schwarzbeck	942436
	025	Current clamp BCI	F-120-2	FCC	47
	026	Coupling device network	CDN 801-M3-25	FCC	92
	030	Coupling device network	CDN-S9	EMCE GmbH	
	031	Coupling device network	CDN-S9	EMCE GmbH	
	036	Coupling device network	CDN-M5-25	EMCE GmbH	
	037	Coupling device network	CDN-S1	EMCE GmbH	
☒	042	AC-Source / Analyser / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
	058	Test receiver	ESIB 40	Rohde & Schwarz	100200
	060	HF-coupling clamp	KEMA 801	Schaffner	20808
	067	LISN 5	ESH2-Z5	Rohde & Schwarz	0872460/043
☒	068	LISN 4	ESH2-Z5	Rohde & Schwarz	0872460/042
	073	Absorbing clamp	MDS 21	Schwarzbeck	881757

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements

Test / Measurement uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the terminal voltage with an extended coverage factor of k=2:

Frequency	Measurement uncertainty
9kHz – 150kHz	4.0dB
150kHz – 30MHz	3.6dB

1.1.1.2 Test

Regulation

47 CFR Part 15 Subpart C - 10/2013

☐ 9kHz - 30MHz ☒ 150kHz - 30MHz

Mains supply
Limits: ☒ Section 15.207 ☐ __

Operation mode

EUT arrangement: ☒ Tabletop ☐ Floor standing
Power supply: ☒ 5VDC (via USB) ☐ 240V/60Hz
Rated voltage variation: ☐ 85% ☐ 115%

Port #	Designation	Remarks
#1	AC power line - laptop	L1/N/PE
#2		
#3		

Continuous operation with active transmission. A data packet was transmitted every 300ms generated by a test software.

Environmental conditions

Temperature: 15 - 35 °C
Humidity: 30 - 60 %
Air pressure: 860 - 1060 hPa

Environmental conditions during the test: ☒ kept ☐ not kept

Test - / Measurement procedure

Measurements are made with a receiver according CISPR guidelines. The required frequency range is scanned in an automatically operation. If the emanation is closer than 6dB to the limits or more, the receiver will stop and measure the exact value with quasipeak or average detector. The frequency, the maximum reading and the limit will be printed out.

Test result

Limits for continuous disturbances: ☒ kept ☐ not kept

Remarks: n/a

Protocol scope

☒ Readings - continuous emanation
☒ Diagram - continuous emanation

EMCE GmbH Ing_buero fuer EMV_Pruefungen

22. Oct 13 16:24

Terminal voltage

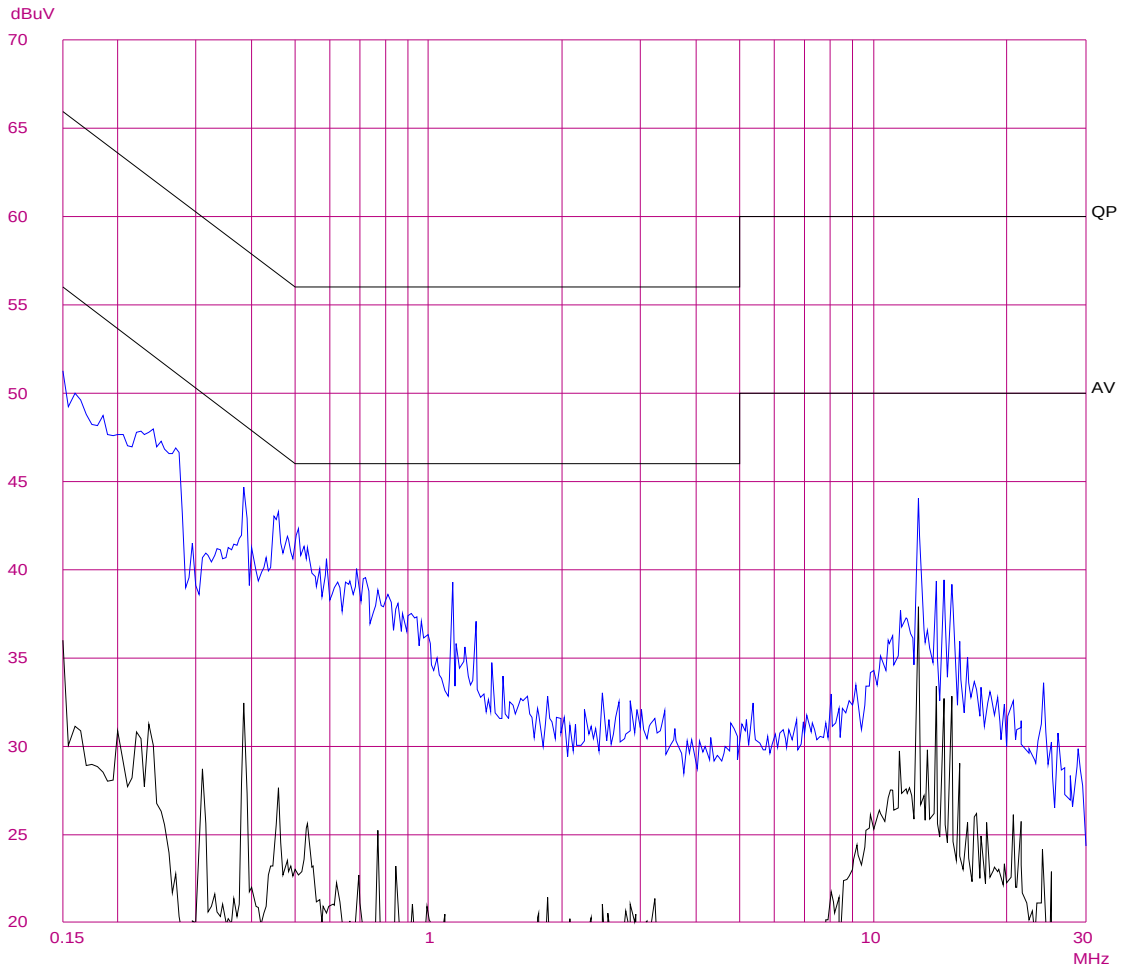
EUT: iS 915MHz
Manuf: Armatix GmbH
Op Cond: Transmission every 300ms
Operator: P. Hauser
Test Spec: 47 CFR part 15 class B
Comment: Test_ID EUT PRK43_05
AXK43_11, Port L1

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	20ms	AUTO	LN OFF	60dB

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB

Transducer No.	Start	Stop	Name
3	2	1Hz	1000M	Ca_#1006
	20	9k	30M	Lim_#070



EMCE GmbH Ing_buero fuer EMV_Pruefungen 22. Oct 13 16:24

Terminal voltage

EUT:	iS 915MHz
Manuf:	Armatix GmbH
Op Cond:	Transmission every 300ms
Operator:	P. Hauser
Test Spec:	47 CFR part 15 class B
Comment:	Test_ID EUT PRK43_05
	AXK43_11, Port L1

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	20ms	AUTO	LN OFF	60dB

Final Measurement Results:

no Results

EMCE GmbH Ing_buero fuer EMV_Pruefungen

22. Oct 13 16:36

Terminal voltage

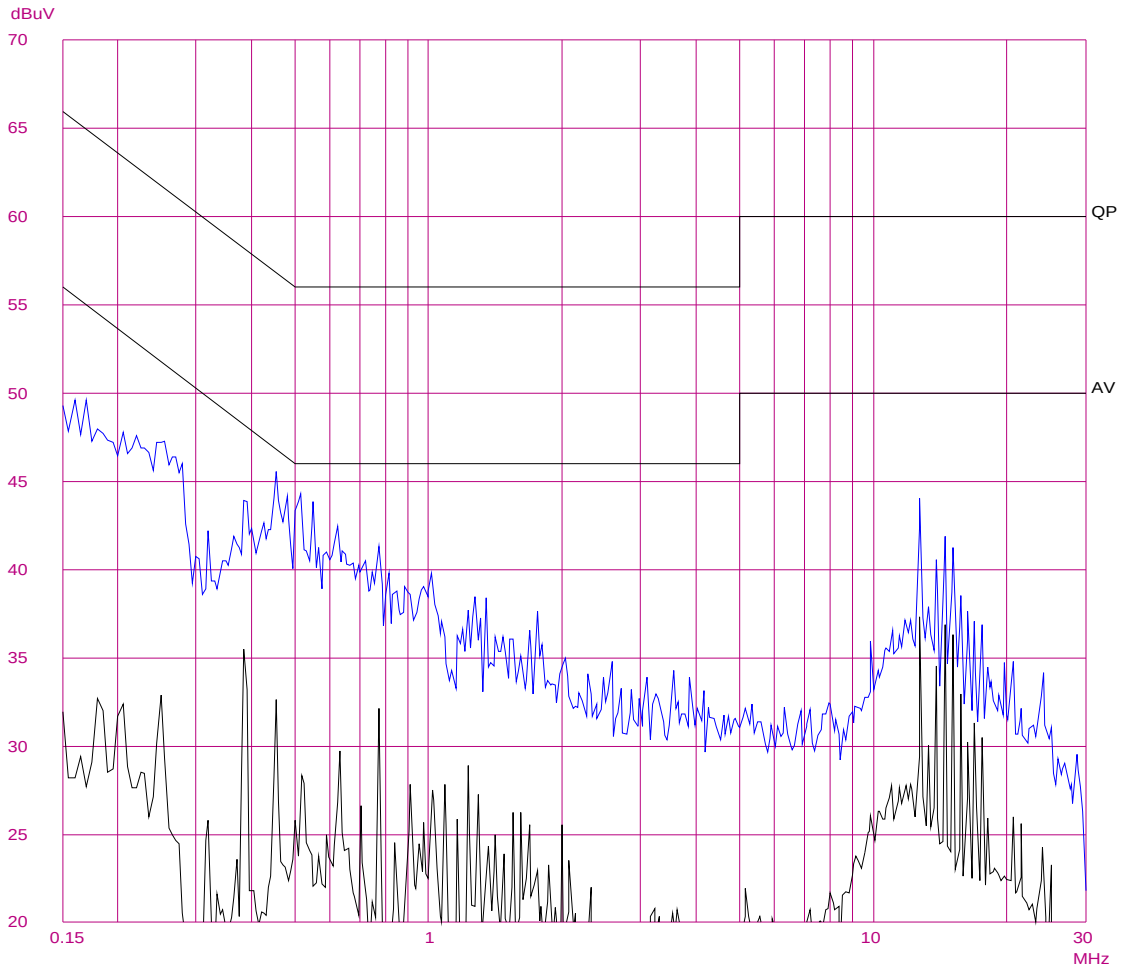
EUT: iS 915MHz
Manuf: Armatix GmbH
Op Cond: Transmission every 300ms
Operator: P. Hauser
Test Spec: 47 CFR part 15 class B
Comment: Test_ID EUT PRK43_05
AXK43_12, Port N

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	5k	10k	PK+AV	20ms AUTO LN OFF	60dB	OpRge

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB

Transducer No.	Start	Stop	Name
3	2	1Hz	1000M	Ca_#1006
	20	9k	30M	Lim_#070



EMCE GmbH Ing_buero fuer EMV_Pruefungen 22. Oct 13 16:36

Terminal voltage

EUT:	iS 915MHz
Manuf:	Armatix GmbH
Op Cond:	Transmission every 300ms
Operator:	P. Hauser
Test Spec:	47 CFR part 15 class B
Comment:	Test_ID EUT PRK43_05
	AXK43_12, Port N

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	20ms	AUTO	LN OFF	60dB

Final Measurement Results:

no Results

1.1.2 Radio disturbances according 47 CFR Part 15 Subpart C - 10/2013

☒ Full compliance
☐ Precompliance
☐ Test not requested*
☐ Test not carried out*

*

Test location

☒	Inv.-No.	Designation	Type (LxWxH)	Manufacturer	Location
	504	Shielded room #1	6.4 x 4.0 x 2.3m	Frankonia EMV-Messsysteme GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
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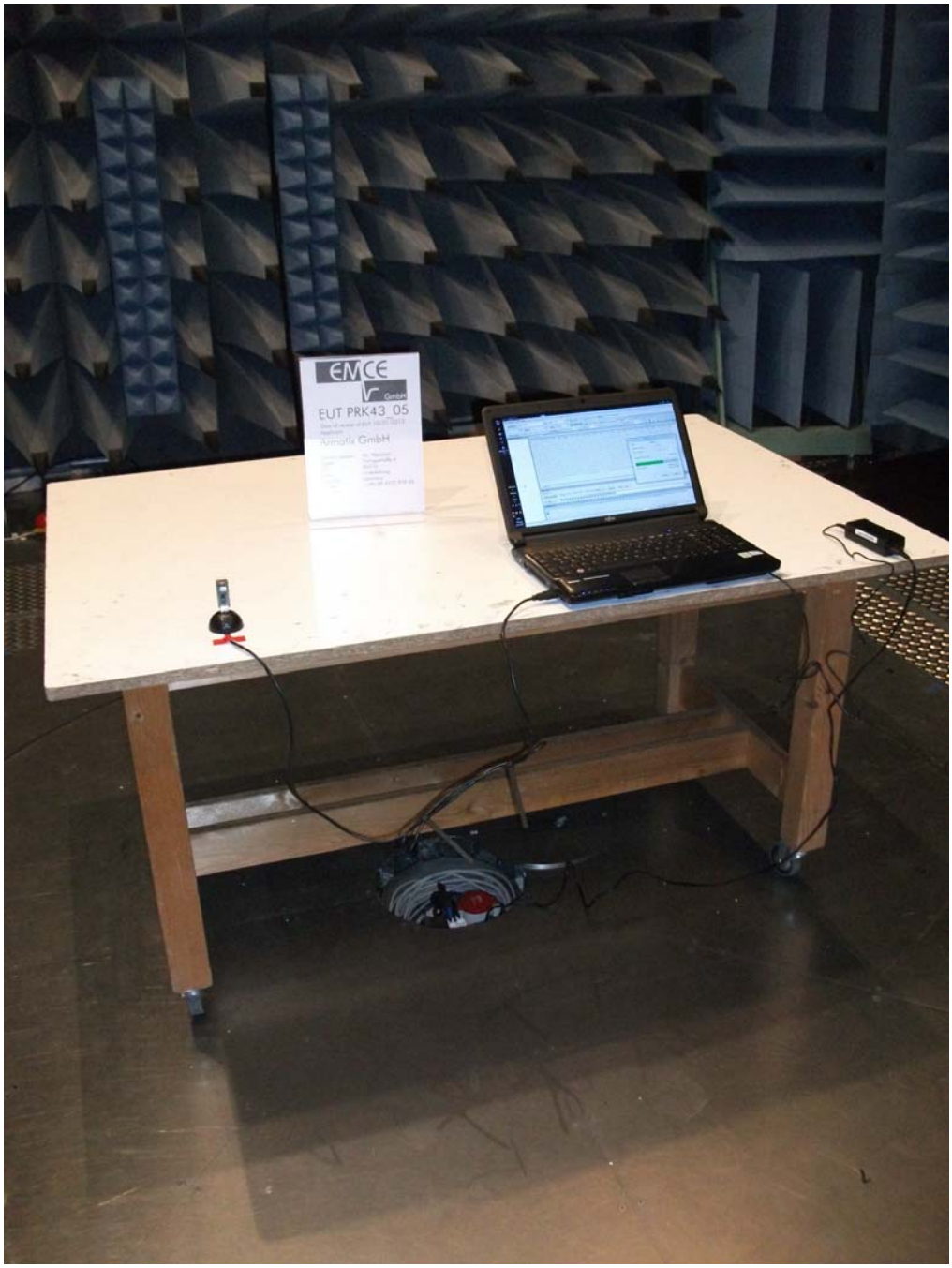
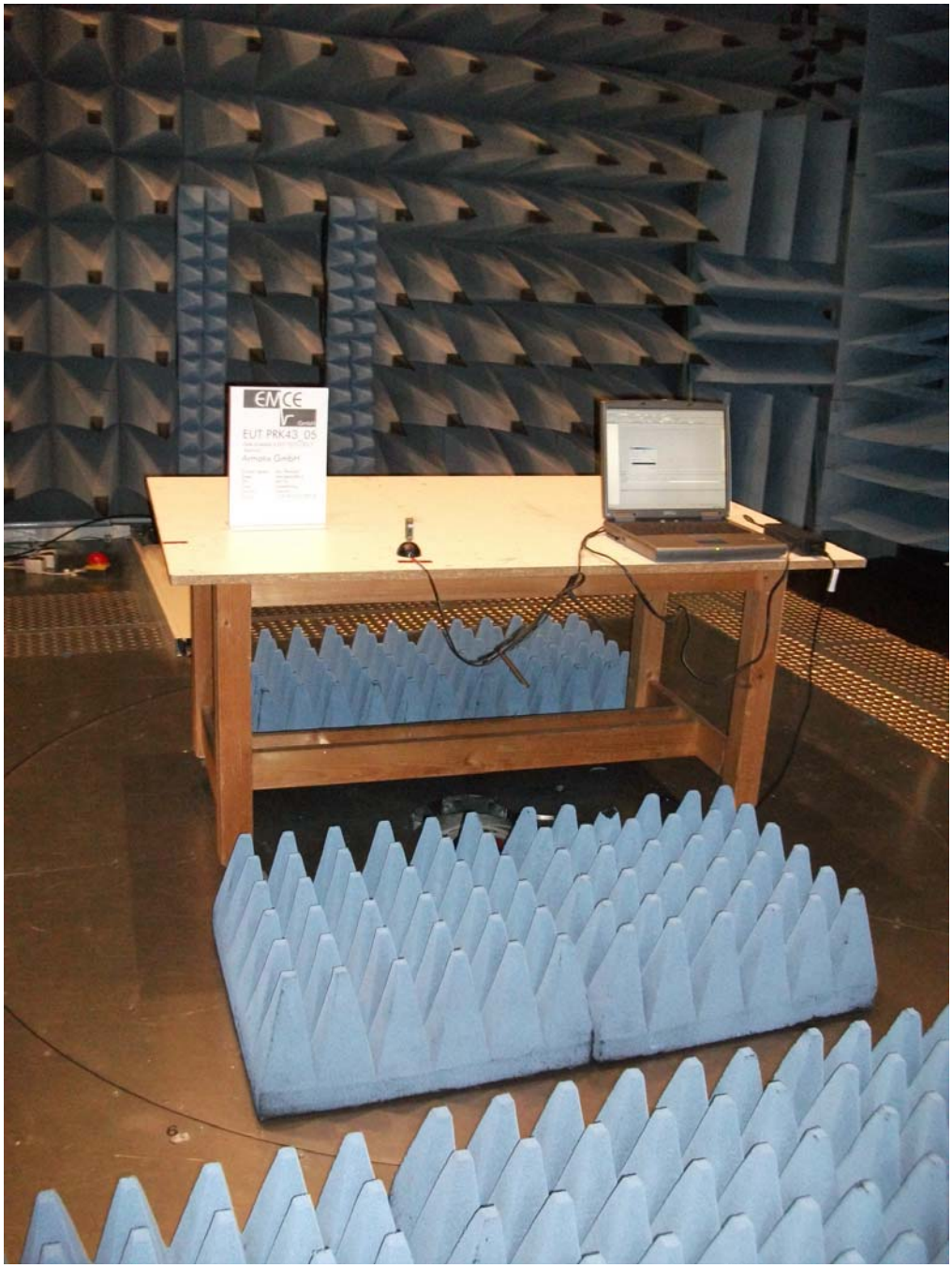
	584	Shielded room #3	3.6 x 3.6 x 2.5m	Siemens AG	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
	061	Semi anechoic chamber #1	4.0 x 4.0 x 3.5m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
☒	062	Semi anechoic chamber #2	13.5 x 6.1 x 5.5m	EMC-Technik & Consulting GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
☒	014	OATS	3m – Test distance	EMCE GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
	015	OATS	10m – Test distance	EMCE GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
	066	OATS	30m – Test distance	EMCE GmbH	EMCE GmbH Untere Wiesen 1 88483 Burgrieden
		Alternative test site			

1.1.2.1 Test set up

According ANSI C63.4-2003


EMCE
EUT PRK43_05


EMCE
EUT PRK43_05

Used test equipment

☒	Inv.-No.	Designation	Type	Manufacturer	S/N
☒	001	Test receiver	ESS 5Hz - 1000 MHz	Rohde & Schwarz	833776/008
	003	LISN 1	ESH3-Z5	Rohde & Schwarz	835268/007
	004	LISN 2	ESH3-Z5	Rohde & Schwarz	835268/003
	005	LISN 3	NNB 4/32T	Rolf Heine HF-Technik	4/32T-96015
	006	LISN	NNBM 8125	Schwarzbeck	8125371
	007	Absorbing clamp	MDS 21	Schwarzbeck	942436
☒	008	Antenna 9kHz – 30MHz	HFH2-Z2	Rohde & Schwarz	835776/0002
☒	009	Antenna 30 – 300MHz	VHBA9123 / BBA9106	Schwarzbeck	435
☒	010	Antenna 250 -1200MHz	UHALP 9108A	Schwarzbeck	108
☒	011	Antenna 30 – 300MHz	VHBA9123 / BBA9106	Schwarzbeck	0408/94
☒	012	Antenna 250 -1200MHz	UHALP 9108A	Schwarzbeck	166
	013	Antenna 9kHz – 30 MHz	Loop antenna 1.5m ∅	EMCE GmbH	
	025	Current clamp BCI	F-120-2	FCC	47
	041	HZ-10	Shielded coil	Rohde & Schwarz	849788/020
	042	AC-Source / Analyser / Norm impedance	EMV D5000/PAS	Spitzenberger + Spies	A274700/ 0 0501
☒	058	Test receiver	ESIB 40	Rohde & Schwarz	100200
☒	059	Logper. Antenna	HL050	Rohde & Schwarz	100006
	060	HF coupling clamp	KEMA 801	Schaffner	20808
	063	Logper. Antenna	HL023 A2	Rohde & Schwarz	
	067	LISN 5	ESH2-Z5	Rohde & Schwarz	0872460/043
	068	LISN 4	ESH2-Z5	Rohde & Schwarz	0872460/042
	073	Absorbing clamp	MDS 21	Schwarzbeck	881757
	116	Vertical rod antenna	VAMP 9243	Schwarzbeck	9243-205

All used test equipment are checked resp. calibrated periodically.

☒ Test equipment was checked and complied to the requirements

Test / Measurement uncertainty

The measurement uncertainty in the test met the guideline of CISPR16-4-2 or better.

Measurement uncertainty of the radiated emission with an extended coverage factor of k=2:

Frequency	Measurement uncertainty
9kHz – 30MHz	on request
30MHz – 300MHz	4.4dB
300MHz – 1GHz	3.4dB
1GHz – 18GHz	on request

1.1.2.2 Test – intentional radiation

Regulation

47 CFR Part 15 Subpart C - 10/2013

	☐ 9kHz - 30MHz	☐ 150kHz – 1GHz
	☐ 30MHz - 1000MHz	☐ 1 – 18GHz
	☒ Section 15.249 – Fundamental frequency and harmonics	
Limits:	☐ Section 15.209	☒ Section 15.249
Test distance:	☒ 3m	☐ 5m
	☐ 10m	☐ 30m

Operation mode

EUT arrangement:	☒ Tabletop	☐ Floor standing
Power supply:	☒ 5VDC (via USB)	☐ 240V/60Hz
Rated voltage variation:	☐ 85%	☐ 115%
ISM-Frequencies:	☐ __MHz	☐ __MHz
Fundamental frequency:	916.50 MHz	☐ __MHz

Continuous operation with active transmission. A data packet was transmitted every 300ms with a test software.

Environmental conditions

Temperature:	15 - 35 °C
Humidity:	30 - 60 %
Air pressure:	860 - 1060 hPa

Environmental conditions during the test: ☒ kept ☐ not kept

Test - / Measurement procedure

Measurements are made with a receiver according CISPR guidelines. At a pre-test in the shielded room the required frequency range is scanned in an automatically operation. If the emanation is closer than 6dB to the limits or more, the receiver will stop and measure the exact value with quasipeak detector. The frequency, the maximum reading and the limit will be printed out. The determined, disturbing frequencies are re-tested in an OATS measurement.

Test result

Limit for radiated fundamental:

- ☒ kept
- ☐ not kept

Limit for radiated harmonics:

- ☒ kept
- ☐ not kept

Limits for radiated frequencies outside the frequency bands others than harmonics:

- ☐ kept
- ☐ not kept
- ☒ kept according Section 15.209
- ☐ not kept according Section 15.209

Remarks: Harmonics below the limit with a margin >20dB to the limit are generally not listed.
For frequencies outside the frequency bands see radiated emissions – general requirements.

Protocol scope

- ☒ Readings - Antenna horizontal polarized.
- ☐ Diagram - Antenna horizontal polarized.
- ☒ Readings - Antenna vertical polarized.
- ☐ Diagram - Antenna vertical polarized.
- ☐ Bandwidth plot – Frequency response vs. supply voltage
- ☐ Precompliance measurement(s).

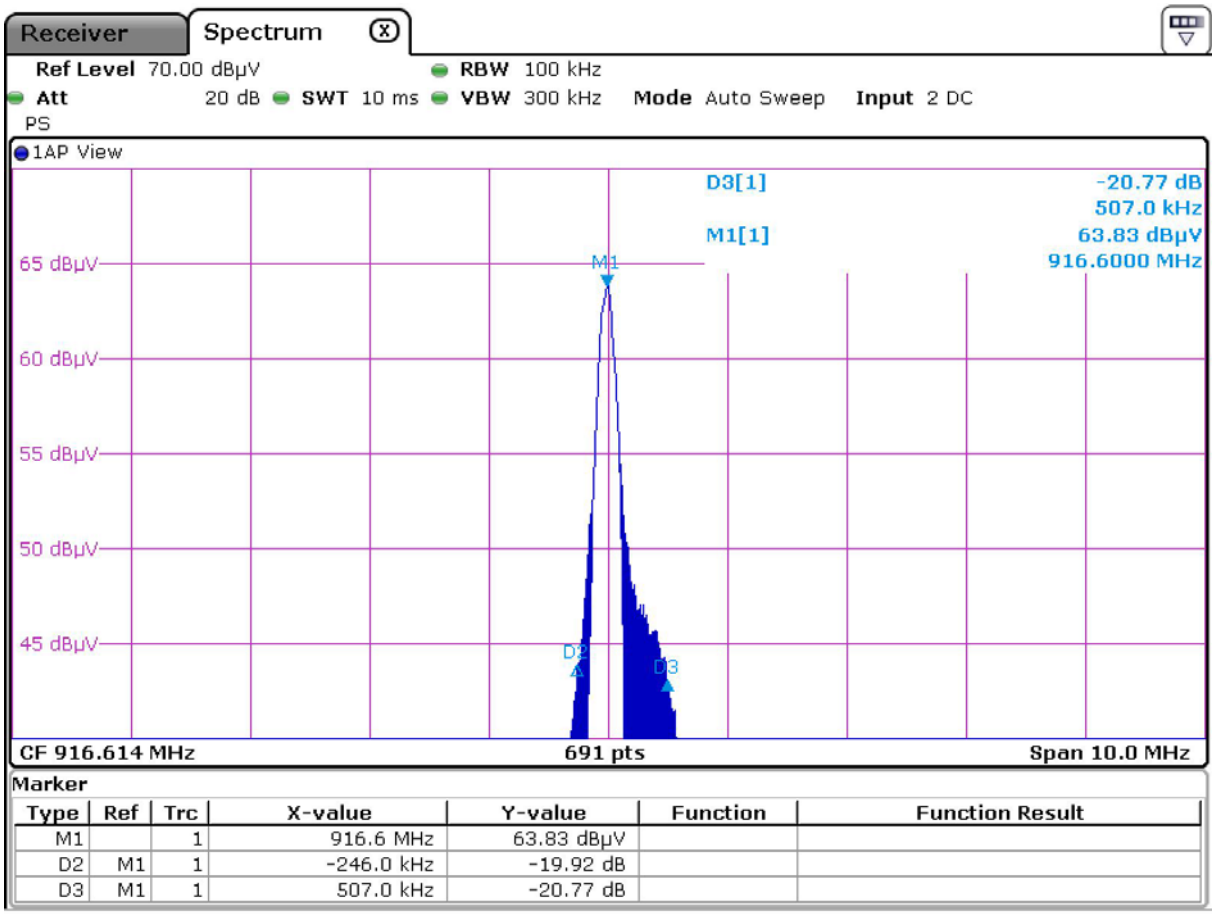
Field strength - Fundamental

Frequency / MHz	Max. field strength – Peak / dBµV/m	Max. field strength – QP / dBµV/m	Limit – QP / dBµV/m	Margin – QP / dB	Antenna polarization
916.607	81.8	80.6	94.0	13.4	Horizontal
916.607	87.5	86.6	94.0	7.4	Vertical

Field strength - Harmonics

Frequency / MHz	Max. field strength – Peak / dBµV/m	Max. field strength – AV / dBµV/m	Limit – AV / dBµV/m	Margin – AV / dB	Antenna polarization
1833.0	61.5	42.7	54.0	11.3	Vertical
2749.5	49.8	38.0	54.0	16.0	Vertical
3666.0	51.6	40.1	54.0	13.9	Vertical
4582.5	56.3	44.0	54.0	10.0	Vertical
5499.0	59.1	47.9	54.0	6.1	Vertical

Bandwidth – informative



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	916.6 MHz	63.83 dBµV		
D2	M1	1	-246.0 kHz	-19.92 dB		
D3	M1	1	507.0 kHz	-20.77 dB		

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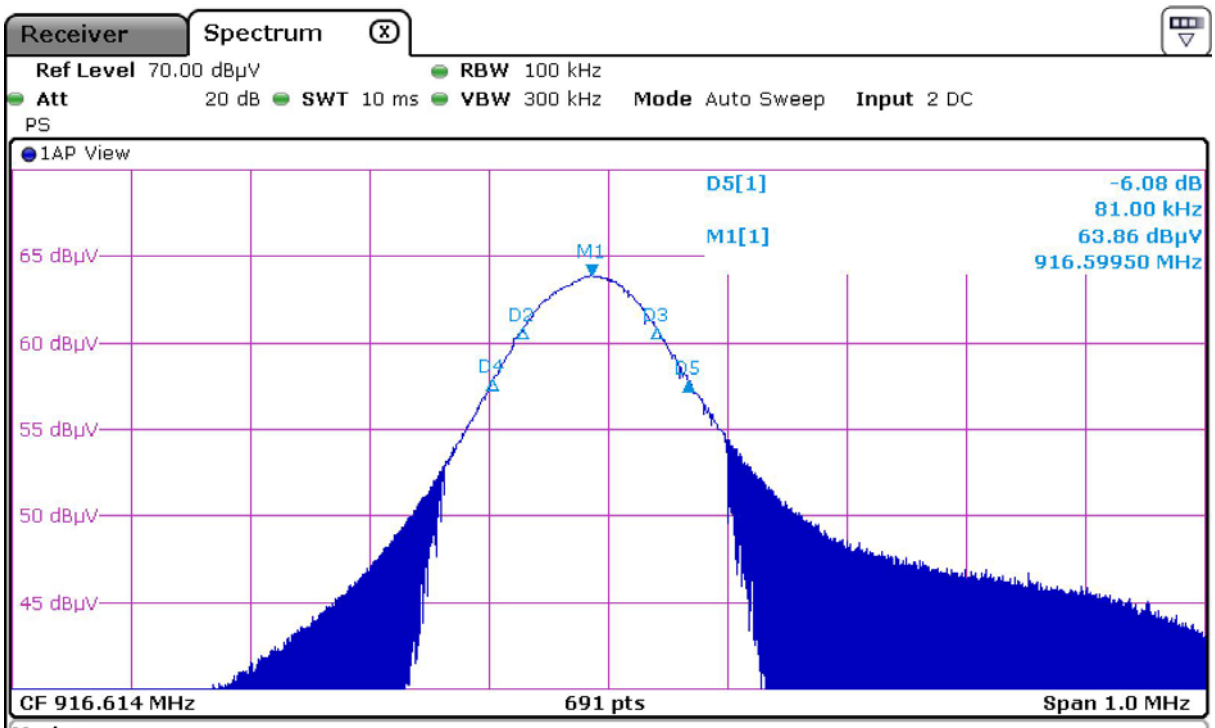
Applicant:Armatix GmbH

EUT:PRK43_05; Smart Stick

Occupied BW file: AXL16_05



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	916.5995 MHz	63.86 dBµV		
D2	M1	1	-57.9 kHz	-2.99 dB		
D3	M1	1	55.0 kHz	-3.06 dB		
D4	M1	1	-82.5 kHz	-5.98 dB		
D5	M1	1	81.0 kHz	-6.08 dB		

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Applicant:Armatix GmbH

EUT:PRK43_05; Smart Stick

Occupied BW file: AXL16_05

1.1.2.3 Test – radiated emission general requirements

Regulation

47 CFR Part 15 Subpart C - 10/2013

☒ Section 15.205 [9kHz – 10GHz]
☒ Section 15.209 [9kHz – 10GHz]

Exception bands
☒ Section 15.249 –
Fundamental frequency and harmonics

Limits:	☒ Section 15.209*	☐ __
Test distance:	☒ 3m	☐ 5m
	☐ 10m	☐ 30m

* The limits for frequencies below 30MHz were corrected for a closer measuring distance by using an extrapolation factor of 40 dB/decade - (+40*log(measurement distance / test distance)).

Operation mode

EUT arrangement:	☒ Tabletop	☐ Floor standing
Power supply:	☒ 5VDC (via USB)	☐ Internal
Rated voltage variation:	☐ 85%	☐ 115%
ISM-Frequencies:	☐ __MHz	☐ __MHz
Fundamental frequency:	☒ 916.50MHz	☐ __MHz

Continuous operation with active transmission. A data packet was transmitted every 300ms generated by a test software.

Environmental conditions

Temperature:	15 - 35 °C
Humidity:	30 - 60 %
Air pressure:	860 - 1060 hPa

Environmental conditions during the test: ☒ kept ☐ not kept

Test - / Measurement procedure

Measurements are made with a receiver according CISPR guidelines. Frequencies equal or below 1000MHz are tested with quasi-peak detector and related bandwidths. Except for the frequency bands 9-90kHz and 110-490kHz an average detector is employed. Average detector is also used for frequencies above 1000MHz with a related bandwidth of 1MHz. At a pre-test in the shielded room the required frequency range is scanned in an automatically operation with peak detector. If the emanation is closer than 6dB to the limits or more, the receiver will retest the exact value with quasipeak or average detector. The determined frequencies are re-tested in an OATS measurement.

Test result

Limits for radiated disturbances: ☒ kept ☐ not kept

Remarks: Radio disturbances below the limit line with a margin >10dB to the limit are generally not listed.

Protocol scope

☒ Readings - Antenna horizontal polarized.
☐ Diagram - Antenna horizontal polarized.
☒ Readings - Antenna vertical polarized.
☐ Diagram - Antenna vertical polarized.
☐ Precompliance measurement(s).

USB-Stick

Readings - Antenna horizontal polarized [0.09-1000MHz]

Frequency	Readings	+ AF Antenna correction factor	+ KF Cable correction factor	Field strength	Limit	Margin	Antenna-Height	Antenna-Polarization	Turn Table - Position
MHz	dBµV	dB/m	dB	dBµV/m	dBµV/m	dB	m	hor./ver.	deg
131.830	24.4	10.9	1.8	37.1	43.5	6.4	2.6	H	204
278.840	25.2	14.2	2.7	42.1	46.0	3.9	1.2	H	82
311.850	20.7	13.8	2.9	37.3	46.0	8.7	1.0	H	352
359.745	22.7	14.4	3.1	40.2	46.0	5.8	1.0	H	5

Readings - Antenna vertical polarized [0.09-1000MHz]

Frequency	Readings	+ AF Antenna correction factor	+ KF Cable correction factor	Field strength	Limit	Margin	Antenna-Height	Antenna-Polarization	Turn Table - Position
MHz	dBµV	dB/m	dB	dBµV/m	dBµV/m	dB	m	hor./ver.	deg
59.926	21.8	8.2	1.2	31.2	40.0	8.8	2.6	V	323
71.942	19.9	8.3	1.3	29.5	40.0	10.5	1.2	V	120

Readings - Antenna vertical polarized [1-10 GHz]

Frequency	Field strength - PK	Field strength - AV	Limit AV	Margin	Antenna-Height	Antenna-Polarization	Turn Table-Position
GHz	dBµV/m	dBµV/m	dBµV/m	dB	m	hor./ver.	Degree
1.833	61.5	42.7	54.0	11.3	1.3	V	296

Readings - Antenna horizontal polarized [1-10 GHz]

No results

2 Summary

Regulation	Class / Test level	Result	Remark(s)
FCC Rules CFR 47 Part 15 Subpart C			
Terminal voltage [0.15-30MHz]	Section 15.207	Limits kept	
Radiated emissions – general requirements [0.009-30MHz] [30-1000MHz] [1-10GHz]	Section 15.209	Limits kept	
Radiated emissions – intentional radiators Fundamental frequency [902-928MHz] Harmonics N* fundamental frequency [N= 2....11]	Section 15.249	Limits kept	

n. r. – not relevant

Burgrieden, 2014-05-23

Report generated by:

Acceptance inspector – Peter Hauser