Recognised by Bundesnetzagentur

BNetzA-CAB-02/21-01

Test report

TLH26c01

Product / EUT:	RFID device
Type designation:	AR402-75
Tested type:	AR402-75
EUT authorization:	☒ Certification ☐ Declaration of Conformity ☐ Verification
Production level:	06/2011
S/N:	n/a
Manufacturer:	e-data GmbH Mollenbachstraße 19 71229 Leonberg / Germany
Test remit:	FCC Rules 47 CFR Part 15 – Subpart C – Intentional radiators in accordance with the procedures given in §15.207; §15.209; §15.215, §15.225 ANSI C63.4-2003
The standards were:	☒ kept* ☐ not kept*
***Remark:**	☒ Validation covered by the accredited scope ☐ Validation not covered by the accredited scope according:_____
Applicant:	e-data GmbH Mollenbachstraße 19 71229 Leonberg / Germany
EUT-	
Date of arrival:	2011-05-02
Test ID:	PRH18_10
Date(s) of test:	2011-05-13; 2011-06-09

Burgrieden, 2012-01-18

Released by:

Principal engineer - Christian Vogelmann

Test laboratory:	☒ EMCE GmbH Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung Untere Wiesen 1 / 88483 Burgrieden / Germany DAR-Registration No.: DGA-PL-153/98-02 – New CAB-Registration No.: BnetzA-CAB-02/21-01/1 FCC-Registration No.: 90568 – old FCC-Registration No.: 219415 – new
Additional test site:	☐ University of Applied Sciences Eberhard-Finckh-Str. 11 / 89075 Ulm / Germany The susceptibility test according EN 61000-4-3 performed in the EMC-testing laboratory of the University of Applied Sciences
Responsible inspector:	P. Hauser EMCE GmbH Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung
Contact person:	Mr. Titze
EUT-	
Description:	RFID device operating at 13.56MHz. The device use an integrated antenna and is supplied via the door unit - a separate device connected to the mains supply with a wall plug power supply
Voltage supply:	120V/60Hz
Frequency list:	13.56MHz
Temperature range:	n/a
Approximate Size:	(LxWxH) / mm - 115x65x55

Supplied /
used equipment:

Designation	Type	Manufacturer	S/N
Power supply	SYS1308-2412-W2E	Sunny	G090702018890
Door unit	AD102	e-data GmbH	n/a

Configuration:

☒ As-delivered condition*
☐ Modified*
* _____

Cable designation	Type	Length	Remarks
Supply and I/O cable	unshielded	>3m	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
TLH26_01	TLH26a01	2011-07-12 Chr. Vogelmann	Document layout changed
TLH26a01	TLH26b01	2011-07-12 Chr. Vogelmann	Supplement of transmitter frequency drift vs. temperature and voltage
TLH26b01	TLH2cb01	2012-01-16 Chr. Vogelmann	FCC-Registration number updated Amendment of §15.215 (c); §15.225 spectrum envelope

Test equipment list of EMCE GmbH:

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
001	Test receiver	ESS 5Hz - 1000 MHz	Rohde & Schwarz	833776/008	1 Year(s)/ 2011-10-15
002	Probe	ESH2-Z3	Rohde & Schwarz		1 Year(s)/ 2011-08-31
003	LISN 1	ESH3-Z5	Rohde & Schwarz	835268/007	1 Year(s)/ 2012-02-16
004	LISN 2	ESH3-Z5	Rohde & Schwarz	835268/003	1 Year(s)/ 2011-12-27
006	LISN	NNBM 8125	Schwarzbeck	8125371	1 Year(s)/ 2011-12-21
007	Absorbing clamp	MDS 21	Schwarzbeck	942436	1 Year(s)/ 2012-04-08
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	2 Year(s)/ 2011-08-31
010	Antenna 250-1200MHz	UHALP 9108A	Schwarzbeck	108	3 Year(s)/ 2012-06-19
011	Antenna 30-300MHz	VHBA9123 / BBA9106	Schwarzbeck	0408/94	3 Year(s)/ 2012-06-19
012	Antenna 250-1200MHz	UHALP 9108A	Schwarzbeck	166	2 Year(s)/ 2011-08-31
013	Antenna 9kHz-30MHz	Ø 1.5m	EMCE GmbH		1 Year(s)/ 2011-08-31
014	OATS	3m	EMCE GmbH		1 Year(s)/ 2012-06-30
015	OATS	10m	EMCE GmbH		1 Year(s)/ 2011-08-30
020	Coupling clamp	IP4A	Haefely	082672-13	1 Year(s)/ 2011-08-31
022	ESD-Gun	NSG 435	Schaffner	577	1 Year(s)/ 2012-06-10
024	RF-Generator	SMY01	Rohde & Schwarz	844146/046	1 Year(s)/ 2011-08-31
025	Current clamp BCI	F-120-2	FCC	47	1 Year(s)/ 2011-08-31
026	Coupling device network	CDN 801-M3-25	FCC	92	1 Year(s)/ 2011-08-31
030	Coupling device network	CDN 801-S1/9pol.DSUB	EMCE GmbH		1 Year(s)/ 2011-08-31

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)/ 2011-08-31
032	RF Power Amplifier	75A250	Amplifier Research	22789	1 Year(s)/ 2011-08-31
033	Coupling device network	CDN-AF2	EMCE GmbH		1 Year(s)/ 2011-08-31
034	Coupling device network	CDN-AF2	EMCE GmbH		1 Year(s)/ 2011-08-31
035	3-phase coupling device network	086	EMC-Partner	CDN-1000-45	3 Year(s)/ 2012-07-21
036	Coupling device network	CDN 801-M5-25	EMCE GmbH		1 Year(s)/ 2011-08-31
037	Coupling device network	CDN 801-S1	EMCE GmbH		1 Year(s)/ 2011-08-31
038	Helmholtz coil	1 m x 1 m	EMCE GmbH		1 Year(s)/ 2011-08-31
039	Helmholtz coil	1 m x 1 m	EMCE GmbH		1 Year(s)/ 2011-08-31
040	Current transformer		EMCE GmbH		1 Year(s)/ 2011-08-31
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)/ 2011-08-31
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)/ 2011-08-31
045	CDN	DN-HF	EMC-Partner	86	1 Year(s)/ 2011-08-31
046	CDN	DN-LF2	EMC-Partner	86	1 Year(s)/ 2011-08-31
047	CDN	DN-LF1	EMC-Partner	86	1 Year(s)/ 2011-08-31
048	ESD/Burst/Surge-Generator	Transient 2000	EMC-Partner	561	1 Year(s)/ 2012-06-08
050	Data Acquisition/Switch Unit	Agilent 34970A	Agilent Technologies Inc.	MY41019453	3 Year(s)/ 2013-02-02
051	20 Channel Multiplexer	Agilent 34901A	Agilent Technologies Inc.	MY41013531	3 Year(s)/ 2013-02-02

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)/ 2011-08-31
055	Helmholtz coil	1.25 m x 1.25 m	EMCE GmbH		1 Year(s)/ 2011-08-31
057	Field probe	HI-6005	Holaday	34274	1 Year(s)/ 2011-11-23
058	Receiver	ESIB 40	Rohde & Schwarz	100200	1 Year(s)/ 2012-06-16
059	Log.-per. antenna	HL050	Rohde & Schwarz	100006	1 Year(s)/ 2011-11-08
062	Semi anechoic chamber #2	13,0m x 7,0m x 5,0m	EMC-Techik & Consulting GmbH		1 Year(s)/ 2012-06-30
067	LISN	ESH2-Z5	Rohde&Schwarz	872460/043	1 Year(s)/ 2012-01-04
068	LISN	ESH2-Z5	Rohde&Schwarz	872460/042	1 Year(s)/ 2011-12-13
070	Pulse Limiter for ESH3	ESH3-Z2	Rohde&Schwarz	357.8810.52	1 Year(s)/ 2012-03-14
073	Absorbing clamp	MDS21	Schwarzbeck	881757	1 Year(s)/ 2011-11-08
087	DSO	HP54502A 400MHz	Hewlett Packard	2934A03381	2 Year(s)/ 2013-04-26
107	Distortion generator	CAR-TESTER II	HILO-TEST	20073238	1 Year(s)/ 2011-07-29
115	Strip line 50 Ohm		EMCE GmbH		1 Year(s)/ 2012-08-31
116	Vertikal rod antenna	VAMP 9243	Schwarzbeck	9243-205	1 Year(s)/ 2011-11-09
117	LISN	ESH3-Z6	Rohde & Schwarz	100521	1 Year(s)/ 2011-11-04
118	Current Probe	F-52	Fischer Custom Communications Inc.	08398	1 Year(s)/ 2012-01-31
119	10V Insertion Unit 50 Ohm	URV5-Z2	Rohde & Schwarz	100911	2 Year(s)/ 2013-05-27
122	Power Meter	NRVS	Rohde & Schwarz	833430 / 0017	2 Year(s)/ 2013-05-17
123	Directional coupler	BDC 0100-50/500	BONN Elektronik	087261	1 Year(s)/ 2011-08-31
127	Function / Arbitrary Waveform Generator	Agilent 33220A	Agilent Technologies Inc.		3 Year(s)/ 2012-09-08
128	Signal Generator	SMF100A	Rohde & Schwarz	100137	2 Year(s)/ 2012-02-24

Inv.-No.	Designation	Type	Manufacturer	S/N	Calibration: Interval /valid until
129	ESD-Gun	P 30N	EM TEST GmbH	V1012106114	3 Year(s)/ 2013-05-06
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)/ 2011-08-20
132	LF-Amplifier	A1110-05	Dr. Hubert GmbH	111A1110	1 Year(s)/ 2011-07-20
134	10 V Insertion Unit 50 Ohm	URV5-Z2	Rohde & Schwarz	101025	1 Year(s)/ 2011-11-09
136	Directional coupler	BDC 0842-40/200	Bonn Elektronik	108082	1 Year(s)/ 2011-08-31
137	Power Amplifier	CBA3G-100	Teseq	T43943	1 Year(s)/ 2011-08-31
138	Microwave Biconical Broadband Antenna	SBA 9119	Schwarzbeck Mess-Elektronik	9119-058	3 Year(s)/ 2014-01-26

Scope:

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1 EMC-Test(s)

1.1 Emission according 47 CFR Part 15 Subpart C - 10/2010

1.1.1 Terminal voltage according 47 CFR Part 15 Subpart C - 10/2010

☒ 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
	807	Full anechoic chamber #3	7.6 x 4.6 x 3.6m	Siemens AG	University of Applied Sciences Eberhard-Finckh-Str. 11 89075 Ulm
		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 - 10/2010

☐ 9kHz - 30MHz ☒ 150kHz - 30MHz

Mains supply
Limits: ☒ Section 15.207 ☐ __

Operation mode

EUT arrangement: ☒ Tabletop ☐ Floor standing
Power supply: ☒ 120V/60Hz ☐ 240V/60Hz
Rated voltage variation: ☐ 85% ☐ 115%

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

Continuous operation of the system. The AR402-75 was supplied via the door unit AD102 with the associated power supply. The RFID field was active during the test, tag inside the RF field.

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: xx

Protocol scope

☒ Readings - continuous emanation
☒ Diagram - continuous emanation

EMCE GmbH Ing_buero fuer EMV_Pruefungen 13. May 11 09:57

Conducted emission - Terminal voltage

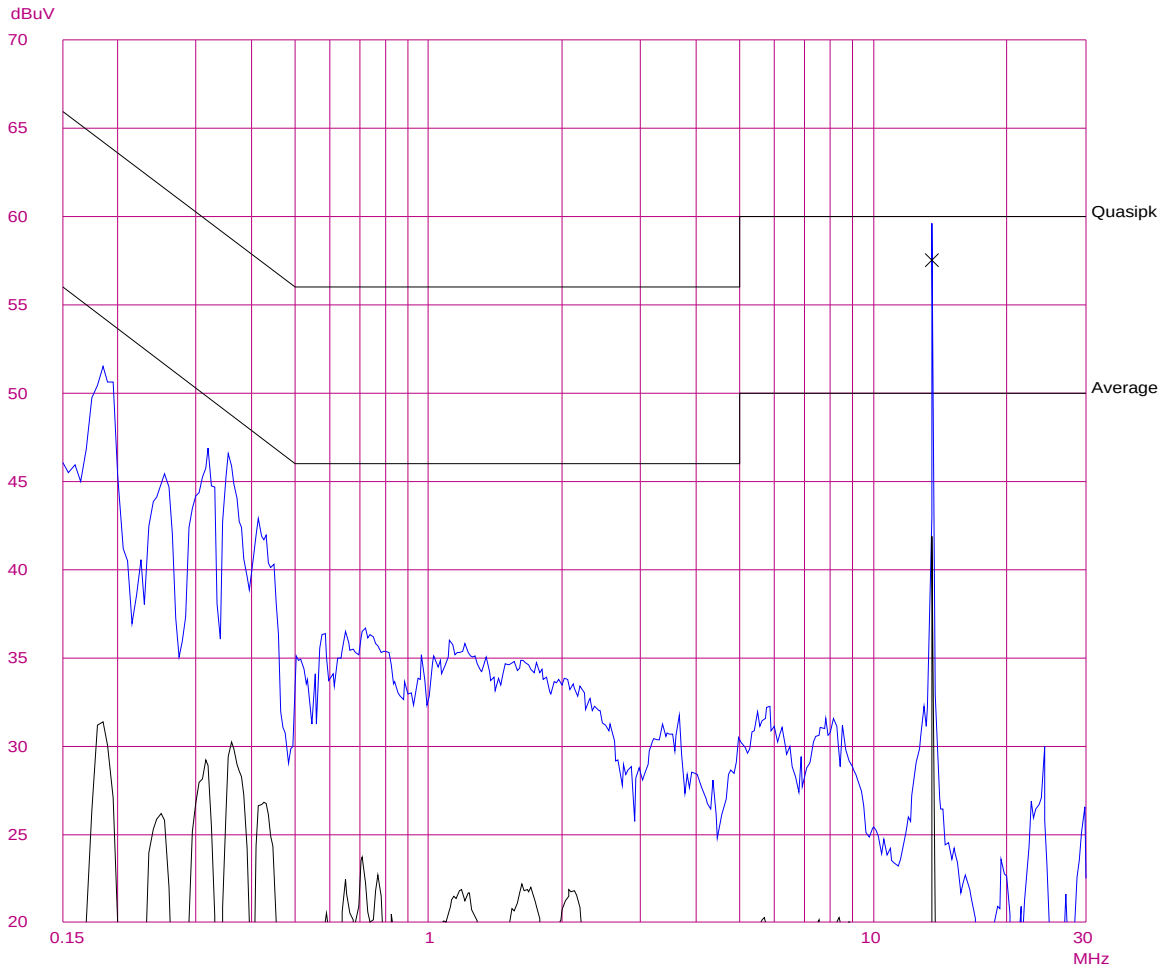
EUT:	AR402-75
Manuf:	e-Data GmbH
Op Cond:	Operational, 120V/60Hz supply
Operator:	P. Hauser
Test Spec:	47 CFR Part 15 Subpart C
Comment:	Test_ID EUT PRH18_10
	TLH19_01, Port L1

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	Kabel_6m
	20	9k	1000M	10dB



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Conducted emission - Terminal voltage

EUT:	AR402-75
Manuf:	e-Data GmbH
Op Cond:	Operational, 120V/60Hz supply
Operator:	P. Hauser
Test Spec:	47 CFR Part 15 Subpart C
Comment:	Test_ID EUT PRH18_10
	TLH19_01, 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:

Frequency MHz	QP Level dBuV	QP Limit dBuV
13.56000	57.5	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV

no Results

* limit exceeded

EMCE GmbH Ing_buero fuer EMV_Pruefungen 13. May 11 10:09

Conducted emission - Terminal voltage

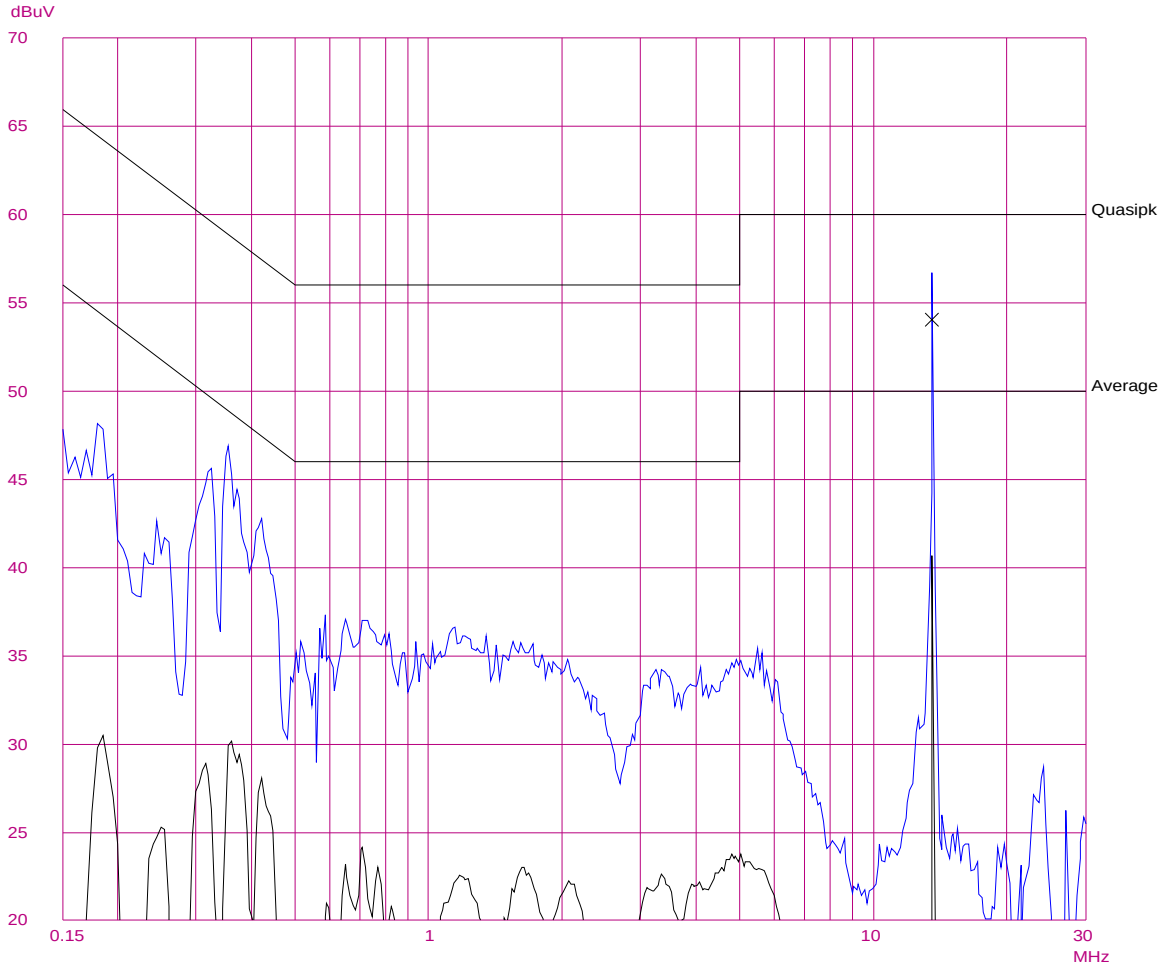
EUT:	AR402-75
Manuf:	e-Data GmbH
Op Cond:	Operational, 120V/60Hz supply
Operator:	P. Hauser
Test Spec:	47 CFR Part 15 Subpart C
Comment:	Test_ID EUT PRH18_10
	TLH19_02, Port N

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

Transducer No.	Start	Stop	Name
3	2	1Hz	1000M Kabel_6m
	20	9k	1000M 10dB



EMCE GmbH Ing_buero fuer EMV_Pruefungen 13. May 11 10:09

Conducted emission - Terminal voltage

EUT:	AR402-75
Manuf:	e-Data GmbH
Op Cond:	Operational, 120V/60Hz supply
Operator:	P. Hauser
Test Spec:	47 CFR Part 15 Subpart C
Comment:	Test_ID EUT PRH18_10
	TLH19_02, 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:

Frequency MHz	QP Level dBuV	QP Limit dBuV
13.55500	54.0	60.0

Frequency MHz	AV Level dBuV	AV Limit dBuV

no Results

* limit exceeded

1.1.2 Radio disturbances according 47 CFR Part 15 Subpart C - 10/2010

☒ 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
	807	Full anechoic chamber #3	7.6 x 4.6 x 3.6m	Siemens AG	University of Applied Sciences Eberhard-Finckh-Str. 11 89075 Ulm
	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

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 – frequency tolerance

Regulation

47 CFR Part 15 Subpart C - 10/2010

	☐ 9kHz - 30MHz	☐ 150kHz – 1GHz
	☐ 30MHz - 1000MHz	☐ 1 – 18GHz
	☒ Section 15.225 (e)	
Limits:	☐ Section 15.209*	☒ Section 15.225*

* 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)).

Test distance:	☐ 3m	☐ 5m
	☒ 10m	☐ 30m

Operation mode

EUT arrangement:	☒ Tabletop	☐ Floor standing
Power supply:	☒ 120V/60Hz	☐ 240V/60Hz
Rated voltage variation:	☒ 85%	☒ 115%
ISM-Frequency:	☐ __MHz	☐ __MHz
Fundamental frequency:	☒ 13.56MHz	☐ __MHz

Continuous operation of the system. The AR402-75 was supplied via the door unit AD102 with the associated power supply. The RFID field was active during the test, tag inside the RF field.

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. At a pre-test in the shielded room the required frequency range is scanned in an automatically operation with peak detector. The determined frequencies are re-tested in an OATS measurement.

Test result

Limit for radiated fundamental:
☒ kept
☐ not kept

Limits for frequency tolerance of carrier signal
- in the temperature range –20 - +50°C:
☒ kept
☐ not kept

- in the supply voltage range of ±15% of the rated voltage at +20°C:
☒ kept
☐ not kept

Remarks: There was no deviation of the fundamental frequency when the supply voltage was varied in the range of 120V ±15%, there was no deviation of the fundamental frequency when the temperature was varied from +50°C to –20°C – see plots in the protocol.
A closer test distance was used for the frequency deviation tests.

Protocol scope

☐ Readings - Antenna horizontal polarized.
☐ Diagram - Antenna horizontal polarized.
☒ Readings - Antenna vertical polarized.
☐ Diagram - Antenna vertical polarized.
☒ Frequency shift vs. temperature
☒ Frequency shift vs. supply voltage
☐ Precompliance measurement(s).

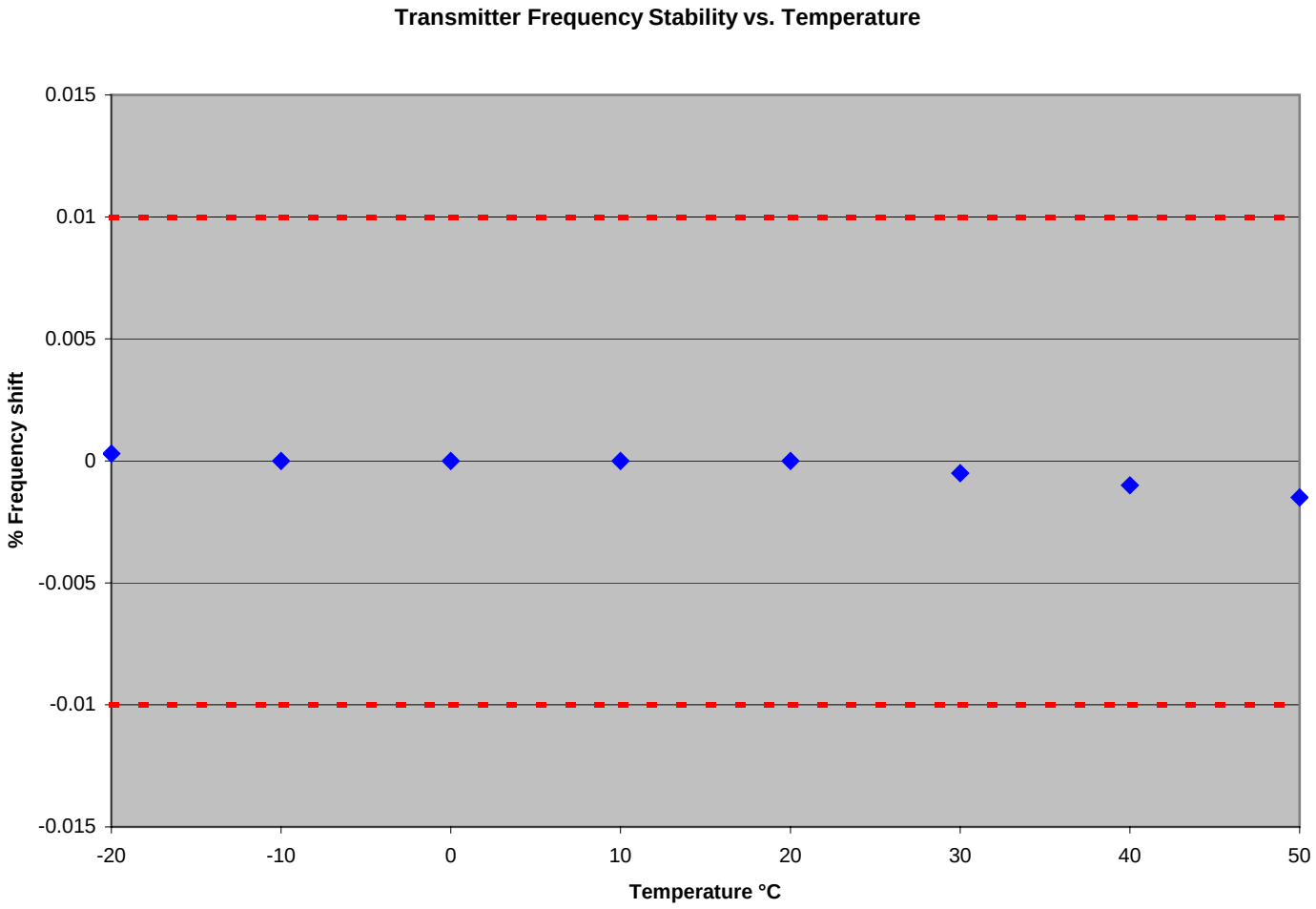
Readings - Antenna vertical polarized

Frequency	Reading*	Limit*	Margin	Ant.-	Ant.-	Detector	Receiver
f	U	U		Distance	Polar.	Peak /	6dB BW
/ MHz	/ dBµV/m	/ dBµV/m	/ dB	/ m	H/V	QP / AV	/ kHz
13.56	38.4	103.0	64.6	10.0	V	QP	10

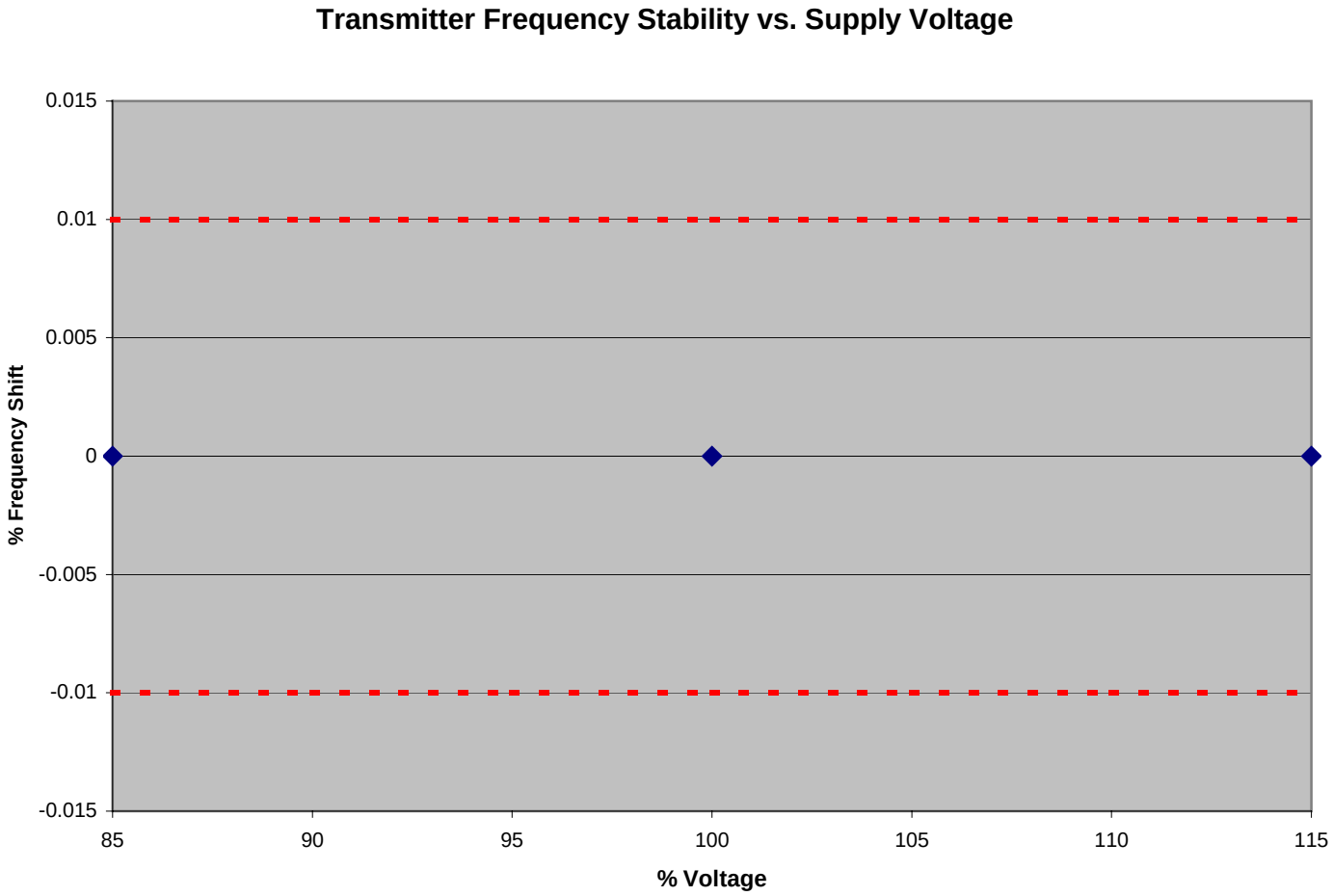
*All values are related to a test distance of 10m.

Example for the Limit:
Test distance reduced from 30m to 10m – Correction =40*log(30/10)= 19dB
Limit at 30m test distance 84dBµV/m
Corrected limit at 10m test distance 84dBµV/m + 19dB = 103dBµV/m

Frequency tolerance of the carrier signal vs. temperature at normal supply voltage



Frequency tolerance of the carrier signal vs. supply voltage variations at 20°C ambient temperature



1.1.2.3 Test – intentional radiation – spectrum envelope

Regulation

47 CFR Part 15 Subpart C - 10/2010

	☐ 9kHz - 30MHz	☐ 150kHz – 1GHz
	☐ 30MHz - 1000MHz	☐ 1 – 18GHz
	☒ Section 15.225 (a); (b); (c)	
Limits:	☐ Section 15.209*	☒ Section 15.225*

* 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)).

Test distance:	☐ 3m	☐ 5m
	☒ 10m	☐ 30m

Operation mode

EUT arrangement:	☒ Tabletop	☐ Floor standing
Power supply:	☒ 120V/60Hz	☐ 240V/60Hz
Rated voltage variation:	☐ 85%	☐ 115%
ISM-Frequency:	☐ __MHz	☐ __MHz
Fundamental frequency:	☒ 13.56MHz	☐ __MHz

Continuous operation of the system. The AR402-75 was supplied via the door unit AD102 with the associated power supply. The RFID field was active during the test, tag inside the RF field.

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 as not other stated are tested with quasi-peak detector and related bandwidths.

Test result

Limits for radiated emission:

☒ kept
☐ not kept

Remarks: The maximum field strength at the fundamental frequency is below the general radiated limits.

Protocol scope

☒ Diagram – Spectrum envelope [13.11 – 14.01MHz]
☒ Readings – Spectrum envelope [13.11 – 14.01MHz]

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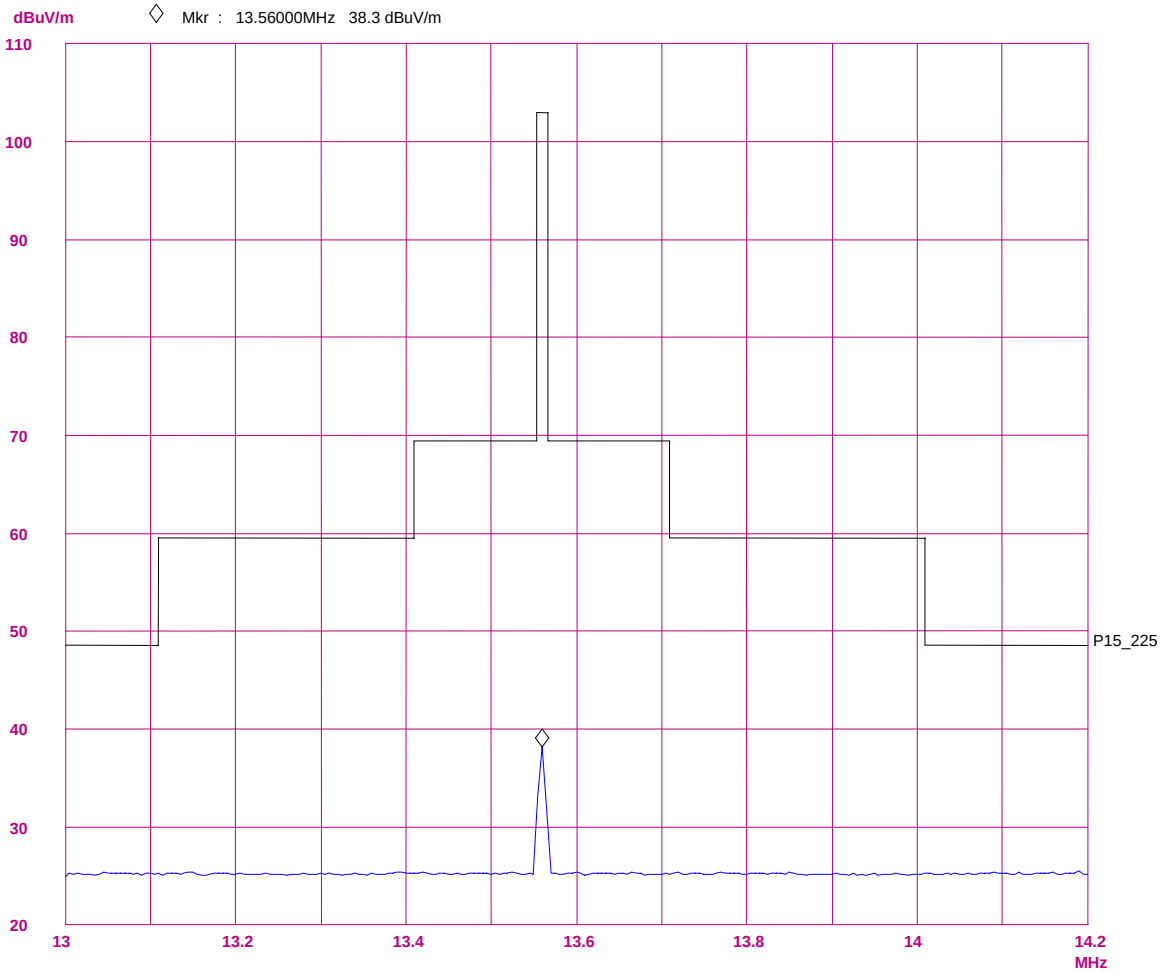
Field strength

EUT:	AR402-75
Manuf:	e-Data GmbH
Op Cond:	Operational, tag inside the field
Operator:	P. Hauser
Test Spec:	47 CFR Part 15 Subpart C / 15.225(a-c)
Comment:	Test_ID EUT PRH18_10
	TLH23_12, Distance antenna - EUT 10.0m

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
13M	14.2M	5k	10k	QP	20ms	AUTO	LN ON	60dB



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09. Jun 11 14:53

Field strength

EUT:	AR402-75
Manuf:	e-Data GmbH
Op Cond:	Operational, tag inside the field
Operator:	P. Hauser
Test Spec:	47 CFR Part 15 Subpart C / 15.225(a-c)
Comment:	Test_ID EUT PRH18_10
	TLH23_12, Distance antenna - EUT 10.0m

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
13M	14.2M	5k	10k	QP	20ms	AUTO	LN ON	60dB

Final Measurement Results:

no Results

1.1.2.4 Test – radiated emission – general requirements

Regulation

47 CFR Part 15 Subpart C - 10/2010

☒ Section 15.205 [9kHz – 1GHz]
☒ Section 15.209 [9kHz – 1GHz]

Exception bands
☒ Section 15.225 – Fundamental frequency

Limits:	☒ Section 15.209*	☒ Section 15.215 (c)
Test distance:	☒ 3m [30-1000MHz]	☐ 5m
	☒ 10m [9kHz–30MHz]	☐ 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:	☒ 120V/60Hz	☐ 240V/60Hz
Rated voltage variation:	☐ 85%	☐ 115%
ISM-Frequency:	☐ __MHz	☐ __MHz
Fundamental frequency:	☒ 13.56MHz	☐ __MHz

Continuous operation of the system. The AR402-75 was supplied via the door unit AD102 with the associated power supply. The RFID field was active during the test, tag inside the RF field.

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

Limits for radiated disturbances:

☒ kept
☐ not kept

20dB Bandwidth is contained within the designated frequency band according §15.225

☒ kept
☐ not kept

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

Protocol scope

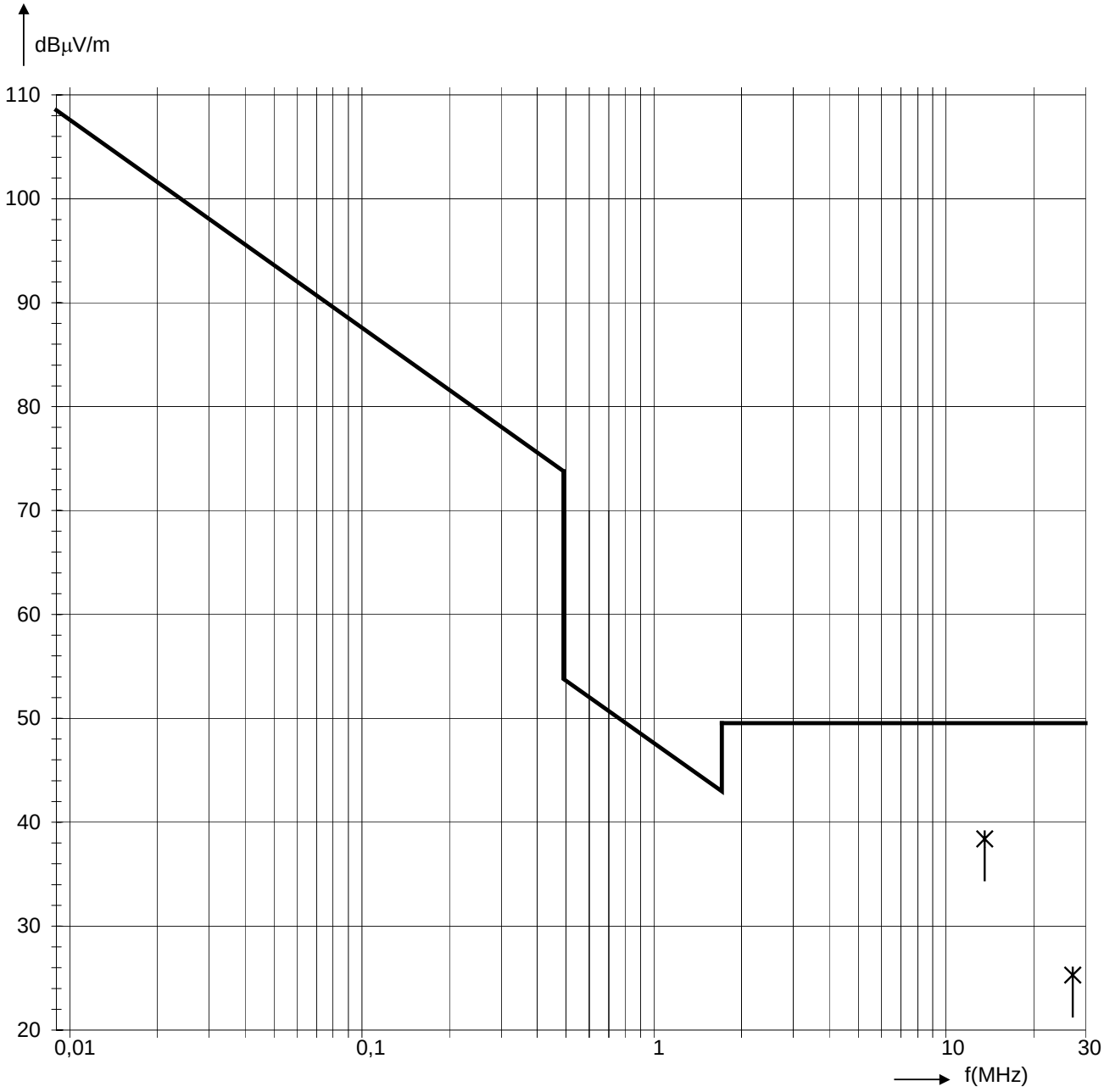
☒ Readings - Antenna vertical polarized [9kHz – 30MHz].
☒ Diagram - Antenna vertical polarized [9kHz – 30MHz].
☒ Readings - Antenna horizontal polarized [30MHz – 1000MHz].
☒ Diagram - Antenna horizontal polarized [30MHz – 1000MHz].
☒ Readings - Antenna vertical polarized [30MHz – 1000MHz].
☒ Diagram - Antenna vertical polarized [30MHz – 1000MHz].
☒ Bandwidth plot

Readings - Antenna vertical polarized

Frequency	Reading	Limit	Margin	Ant.-	Ant.-	Detector	Receiver
	U			Distance	Polar.	Peak /	6dB BW
MHz	dBµV/m	dBµV/m	dB	m	H/V	QP / AV	kHz
13.56	38.4	103.0	64.6	10.0	V	QP	10
27.12	25.3	48.5	23.2	10.0	V	QP	10

Diagram - Antenna vertical polarized
Limits according FCC Rules CFR 47 Part 15 – Subpart C

☒ Section 15.209 – Corrected to 10m distance EUT-Antenna

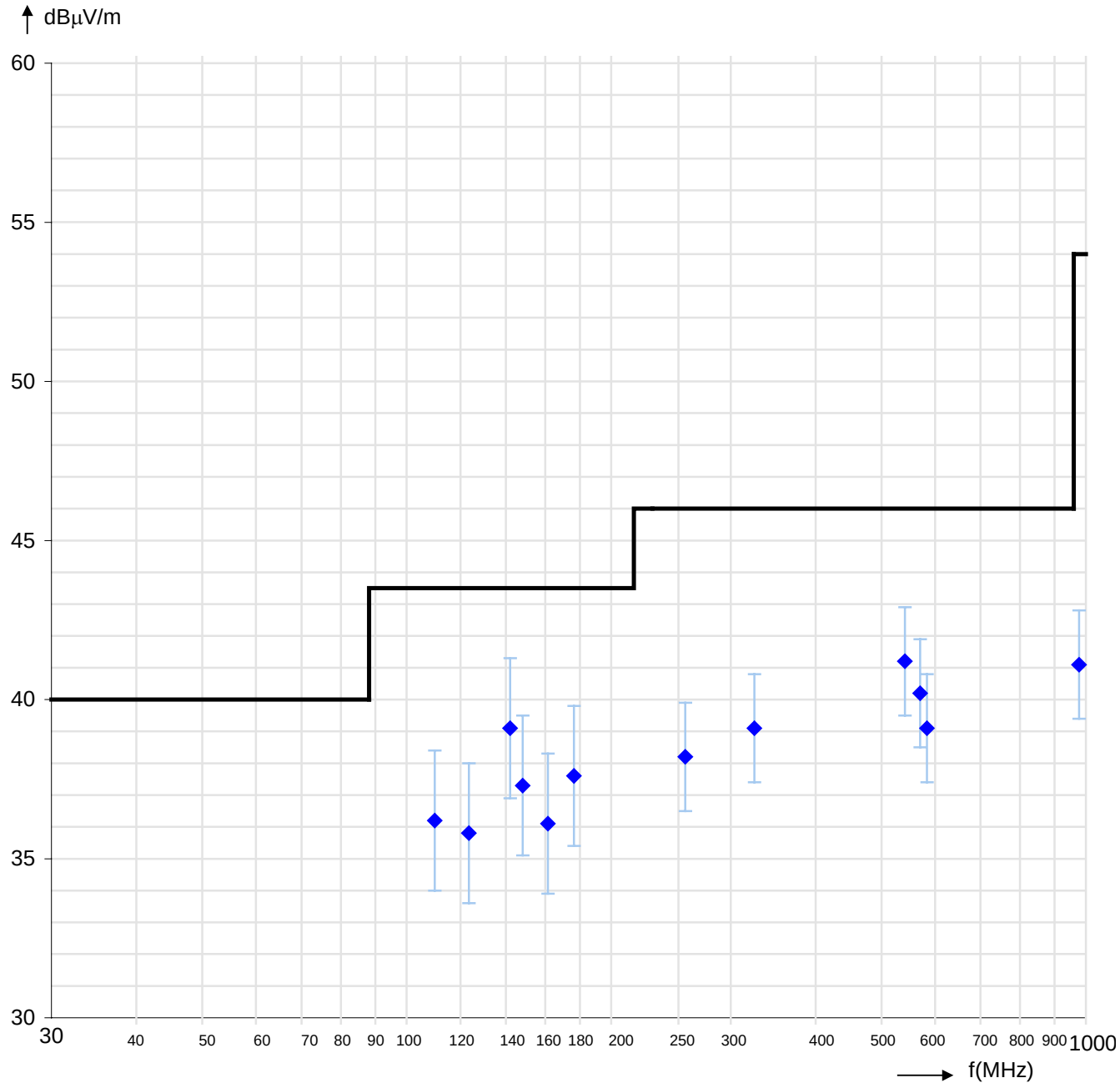


Readings - Antenna horizontal polarized

Frequency	Readings	+ AF Antenna correction factor	+ KF Cable correction factor	Field strength	Limit	Margin	Antenna-Height	Antenna-Polarization
MHz	dBµV	dB/m	dB	dBµV/m	dBµV/m	dB	m	hor./ver.
110.000	24.7	9.9	1.7	36.2	43.5	7.3	2.6	H
123.460	23.2	10.9	1.8	35.8	43.5	7.7	2.6	H
141.980	25.1	12.1	1.9	39.1	43.5	4.4	2.2	H
148.150	23.1	12.3	1.9	37.3	43.5	6.2	2.2	H
161.380	21.5	12.6	2.0	36.1	43.5	7.4	2.0	H
176.370	21.9	13.6	2.1	37.6	43.5	5.9	1.5	H
257.150	19.5	16.1	2.6	38.2	46.0	7.8	1.5	H
325.150	21.7	14.5	2.9	39.1	46.0	6.9	1.5	H
541.580	17.8	19.6	3.8	41.2	46.0	4.8	1.0	H
570.140	16.7	19.5	3.9	40.2	46.0	5.8	1.0	H
583.660	15.4	19.7	4.0	39.1	46.0	6.9	1.0	H

Diagram radio disturbances – Antenna horizontal polarized

Limits: ☒ Section 15.209 ☐ __

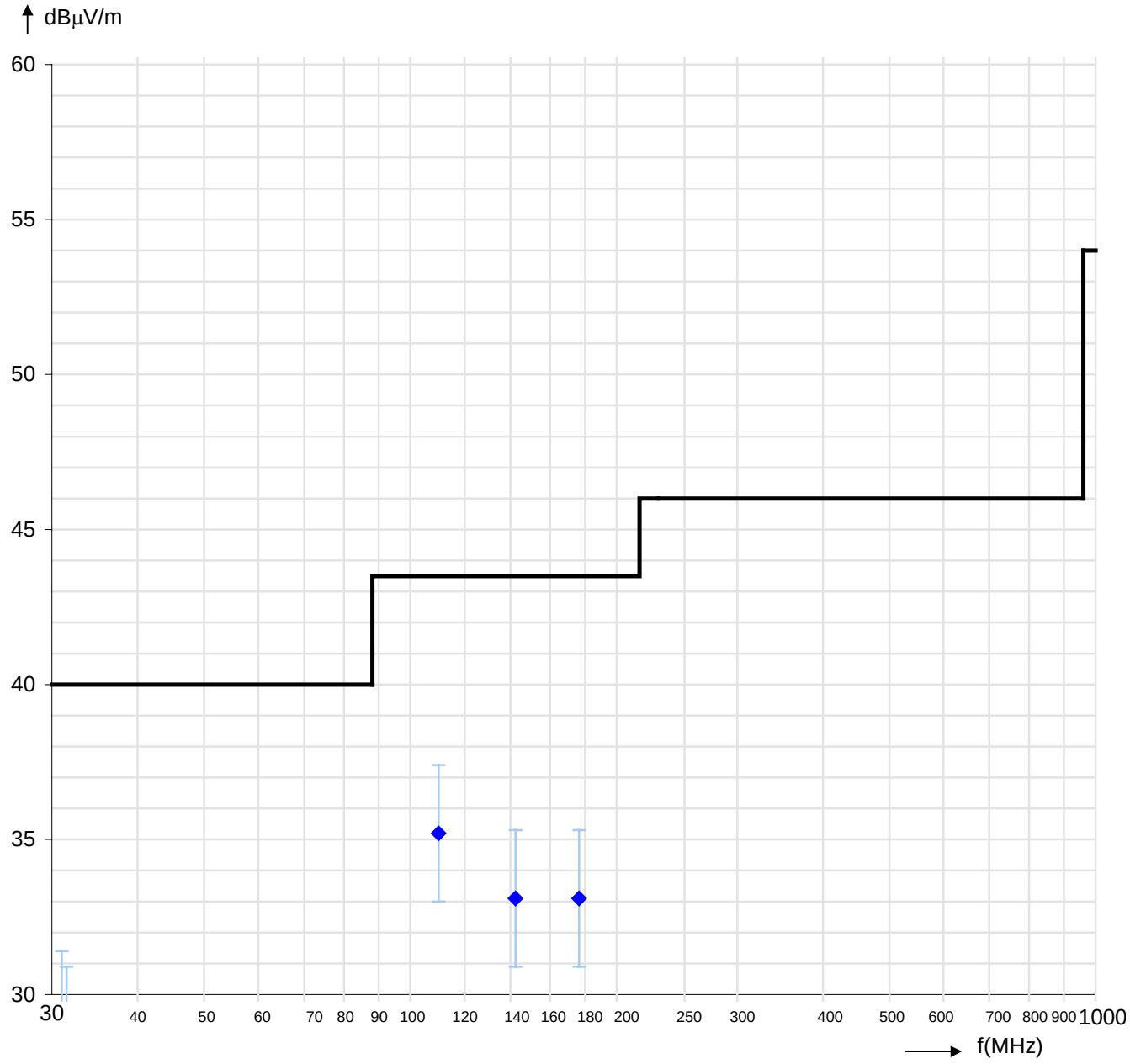


Readings - Antenna vertical polarized

Frequency	Readings	+ AF Antenna correction factor	+ KF Cable correction factor	Field strength	Limit	Margin	Antenna-Height	Antenna-Polarization
MHz	dBµV	dB/m	dB	dBµV/m	dBµV/m	dB	m	hor./ver.
110.000	22.8	10.8	1.7	35.2	43.5	8.3	1.2	V

Diagram radio disturbances – Antenna vertical polarized

Limits: ☒ Section 15.209 ☐ __



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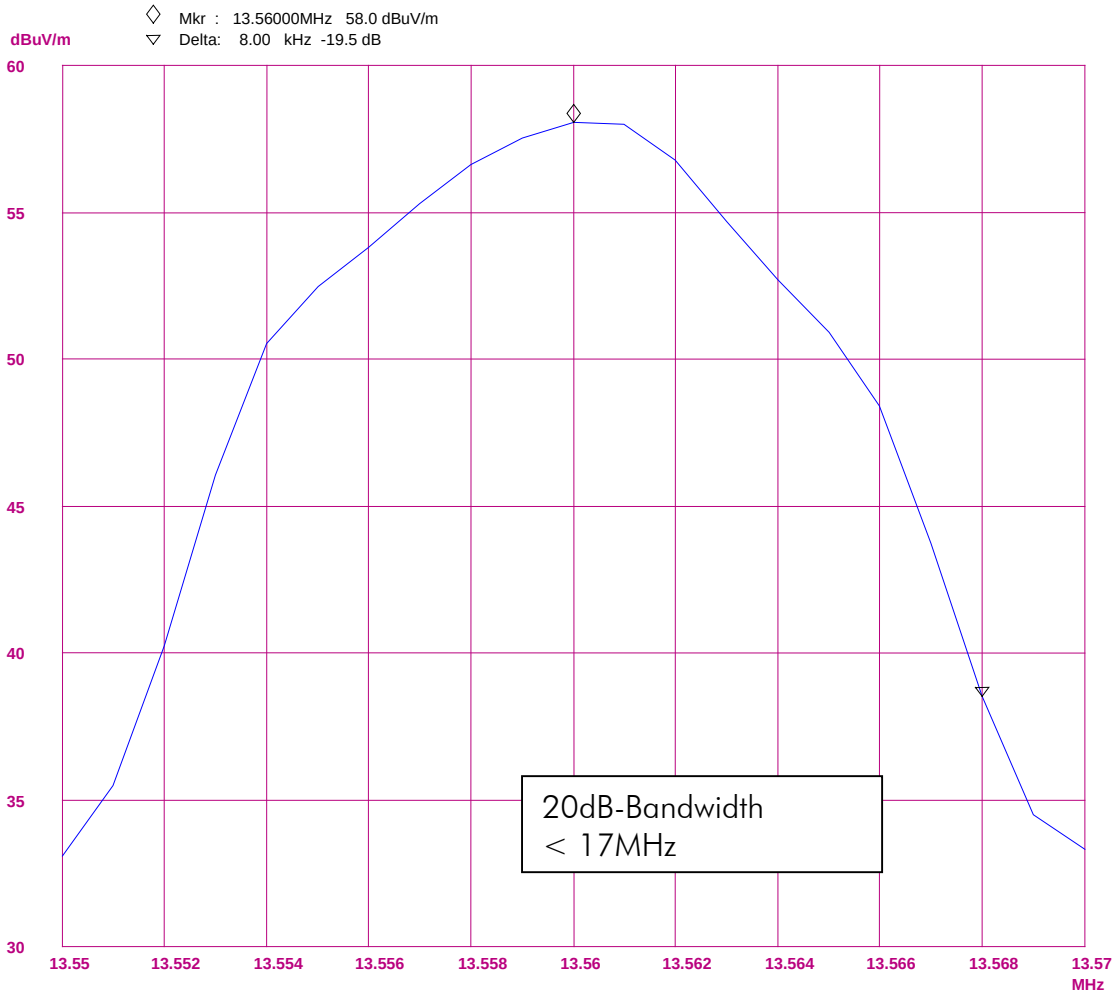
09. Jun 11 15:02

Bandwidth

EUT:	AR402-75
Manuf:	e-Data GmbH
Op Cond:	Operational, no tag inside the field
Operator:	P. Hauser
Test Spec:	47 CFR Part 15 Subpart C / 20dB BW
Comment:	Test_ID EUT PRH18_10
	TLH23_13, Distance antenna - EUT 3.0m

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp OpRge
13.55M	13.57M	1k	10k	QP	20ms	AUTO	LN ON 60dB



2 Summary

Regulation	Class / Test level	Result	Remark(s)
FCC Rules 47 CFR Part 15 Subpart C			
Terminal voltage [0.15-30MHz]	Section 15.207	Limits kept	
Radiated emissions – general requirements [0.009-30MHz] [30-1000MHz]	Section 15.209 15.215 (c)	Limits kept	
Radiated emissions – intentional radiators Fundamental frequency [13.553-13.567MHz]	Section 15.225	Limit kept	

Burgrieden, 2012-01-18

Report generated by:

Acceptance inspector – Peter Hauser