

RADIO REPORT FCC 47 CFR Part 90I ISED Canada RSS-119 Issue 12	
Report Reference No	G0M-2002-8868-TFC090PMR-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Kamstrup A/S
Address	Industrivej 28 8660 Skanderborg DENMARK
Test Specification	47 CFR Part 90I ISED RSS-119, Issue 12: 2015-05
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Meter Transmit Unit
Model(s)	Ready MTU
Additional Model(s)	None
Brand Name(s)	Kamstrup
Hardware Version(s)	Assembly: 5915611, rev 00; PCB BOM: 55501820, rev E1
Software Version(s)	Software: 50981561, rev B1; Initiation file: 55141891, rev A1
FCC-ID	OUI-READYMTU
IC	22376-READYMTU
Test Result	PASSED

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 °C – 23 °C	
Test Lab Humidity	32 % – 38 %	
Date of receipt of test item	2020-04-07	
Report:		
Compiled by	Toralf Jahn	
Tested by (+ signature) (Responsible for Test)	Toralf Jahn	
Approved by (+ signature) (Head of Lab)	Christian Weber	
Date of Issue	2020-05-27	
Total number of pages	98	
General Remarks:		
The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2020-05-27	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V _{NOM}	Nominal supply voltage
V _{MIN}	Miminal supply voltage
V _{MAX}	Maximal supply voltage
T _{NOM}	Nominal temperature
T _{MIN}	Miminal temperature
T _{MAX}	Maximal temperature
N/A	Not Applicable

REPORT INDEX

1	Equipment (Test Item) Under Test.....	6
1.1	Photos – Equipment External	8
1.2	Photos – Equipment Internal	12
1.3	Photos – Test Setup.....	14
1.4	Support Equipment.....	17
1.5	Test Modes	18
1.6	Test Frequencies.....	19
1.7	Sample emission level calculation.....	20
2	Result Summary.....	21
3	Test Conditions and Results.....	22
3.1	Test Conditions and Results - Power	22
3.2	Test Conditions and Results - Emission mask and authorized bandwidth	24
3.3	Test Conditions and Results - Spurious emissions at antenna terminal.....	32
3.4	Test Conditions and Results - Transmitter radiated emissions	34
3.5	Test Conditions and Results - Receiver spurious emissions.....	37
3.6	Test Conditions and Results - Frequency stability.....	40
3.7	Test Conditions and Results - Transient frequency behavior	43
ANNEX A	Transmitter conducted emissions.....	51
ANNEX B	Transmitter radiated emissions	57
ANNEX C	Receiver radiated emissions	81

1 Equipment (Test Item) Under Test

Description	Meter Transmit Unit	
Model	Ready MTU	
Additional Model(s)	None	
Brand Name(s)	Kamstrup	
Serial Number(s)	73600014 (sample ID 28930)	
Hardware Version(s)	Assembly: 5915611, rev 00; PCB BOM: 55501820, rev E1	
Software Version(s)	Software: 50981561, rev B1; Initiation file: 55141891, rev A1	
PMN	REAdy MTU	
HVIN	66962201D00820	
FVIN	50981561, rev B1, 55141891, rev A1	
HMN	N/A	
IC	22376-READYMTU	
FCC-ID	OUY-READYMTU	
Equipment type	End Product	
Radio type	Transceiver	
Radio technologies	PMR	
Assigned frequency band	421 - 512 MHz	
Operating frequency range	450.25 - 469.9875 MHz	
Channels	Low: : Frequency 450.25 MHz Mid: : Frequency 460.11875 MHz High: : Frequency 469.9875 MHz	
Modulation(s)	4-GFSK, 4.8 ksps	
Emission designator	F1D	
Channel bandwidth	12.5 kHz	
Authorized bandwidth	11.25 kHz	
Channel spacing	11.25 kHz	
Number of modules	1	
Radio Module	Type	N/A
	Model	N/A
	Manufacturer	N/A
	HW Version	N/A
	SW Version	N/A
	FCC-ID	N/A
	IC	N/A
Number of antennas	1	
Antenna 1	Type	external, rod antenna
	Model	1653094
	Manufacturer	Kamstrup A/S
	Gain	-0.6 dBi
Antenna 2	Type	external, wall antenna 2 meters cable length
	Model	6699490
	Manufacturer	Kamstrup A/S
	Gain	0.5 dBi
Antenna 3	Type	external, pit antenna 0.6 meters cable length
	Model	6697916
	Manufacturer	Kamstrup A/S
	Gain	-5.3 dBi

Supply Voltage	V _{NOM}	3.66 V
	V _{MIN}	3.5 V
	V _{MAX}	3.66 V
Operating Temperature	T _{NOM}	25 °C
	T _{MIN}	-30 °C
	T _{MAX}	65 °C
Battery supply	Yes	
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A
Manufacturer	Kamstrup A/S Industrivej 28 8660 Skanderborg DENMARK	

1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Honeywell meter	Honeywell + Kamstrup	VS2820181 + 5000-491	Typical load for 3 wire interface
AE	Laboratory power supply	KORAD	KD6005P	The EUT battery does not last to perform the tests. Therefore an external power supply was necessary.
CBL	Auxillary cable			To connect EUT and power supply.
SFT	Device Control Tool	Kamstrup	ver. 0.05	Tool for controlling RF modules and meters
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.5 Test Modes

Mode	Description
Unmodulated	Mode = Transmit Modulation = None
Transmit	Mode = Transmit Modulation = 4-GFSK, 4.8 kbps Duty cycle = 100 %
Receive	Mode = Receive Modulation = 4-GFSK, 4.8 kbps

1.6 Test Frequencies

Designator	Mode	Frequency [MHz]
F1	Tx / Rx	450.25
F2	Tx / Rx	460.11875
F3	Tx / Rx	469.9875

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBμV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBμV/m). The FCC limits are given in units of μV/m. The following formula is used to convert the units of μV/m to dBμV/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log (\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading	- FCC limit	= Margin
+21.5 dBμV	+ 26 dB = 47.5 dBμV/m	:	47.5 dBμV/m	- 57.0 dBμV/m	= -9.5 dB

2 Result Summary

Test Summary				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
FCC 90.205 FCC 2.1046 RSS-119 5.4	Power	ANSI C63.26:2015 5.2	PASS	
FCC 90.209 FCC 90.210 FCC 2.1049 RSS-119 4.2,5,5,5.8	Authorized bandwidth Emission masks Occupied bandwidth	FCC 90.210 ANSI C63.26:2015 5.4	PASS	
FCC 90.210 FCC 2.1051 RSS-119 4.2,6.13	Spurious emissions at antenna terminal	FCC 90.210 ANSI C63.26:2015 5.7	PASS	
FCC 90.210 FCC 2.1053 RSS-119 4.2,6.13	Spurious emissions radiated	FCC 90.210 ANSI C63.26:2015 5.7	PASS	
RSS-Gen 7.1	Receiver spurious emissions	ANSI C63.26:2015 5.7	PASS	
FCC 90.213 FCC 2.1055 RSS-119 5.3	Frequency Stability	ANSI C63.26:2015 5.6	PASS	
FCC 90.214 RSS-119 5.9	Transient Frequency behavior	ANSI C63.26:2015 6.5	PASS	
Comment:				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

3 Test Conditions and Results

3.1 Test Conditions and Results - Power

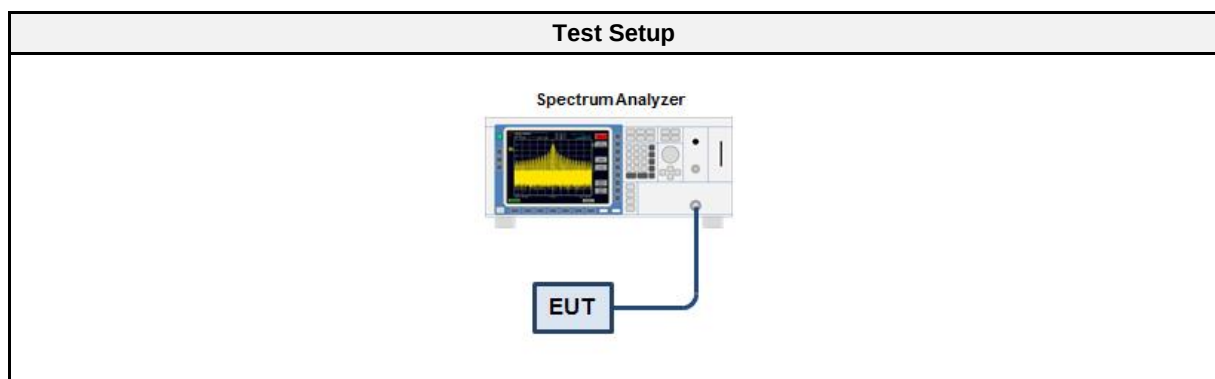
3.1.1 Information

Test Information	
Reference	FCC 90.205, FCC 90.2.1046 ISED RSS-119, Issue 12 (Section 5.4)
Measurement Method	ANSI C63.26:2015 5.2
Test Method	Conducted
Test Mode	Unmodulated
Maximum antenna gain	0.5 dBi (-1.65 dBd)
Operator	Toralf Jahn
Date	2020-04-22

3.1.2 Limits

Limits	
Device	Power [W ERP]
Base / Fixed	110 (50.41 dBm)
Mobile	60 (47.78 dBm)

3.1.3 Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2019-07	2020-07

3.1.5 Procedure

Test Procedure	
1.	EUT transmitter is activated in test mode under normal conditions
2.	The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum
3.	The resolution bandwidth is set to 3 MHz
4.	Peak power is determined from peak of spectrum envelope
5.	EIRP power is calculated by adding the antenna gain in dBi
6.	ERP power is calculated by subtracting 2.15 from EIRP power

3.1.6 Results

Test Results					
Channel [MHz]	Conducted Power [dBm]	ERP Peak Power [dBm]	ERP Peak Power [W]	ERP Power Limit [dBm]	Margin [dB]
450.25	29.21	27.56	0.570	47.78	-20.22
460.11875	29.32	27.67	0.585	47.78	-20.11
469.9875	29.33	27.68	0.586	47.78	-20.10

3.2 Test Conditions and Results - Emission mask and authorized bandwidth

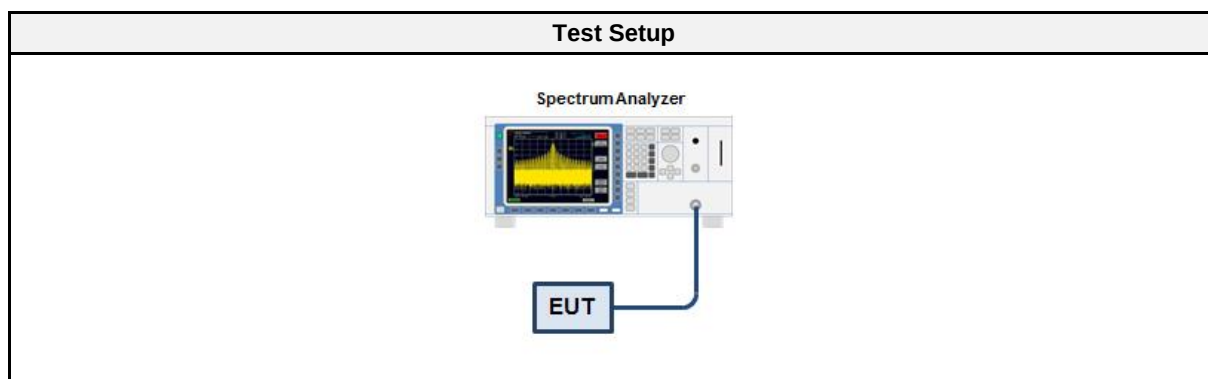
3.2.1 Information

Test Information	
Reference	FCC 90.209, FCC 90.210, FCC 2.1049 ISED RSS-119, Issue 12 (Sections 4.2,5.5,5.8)
Measurement Method	FCC 90.210, ANSI C63.26:2015 5.4
Test Method	Conducted
Test Mode	Modulated
Operator	Toralf Jahn
Date	2020-04-22

3.2.2 Limits

Limits
Emission Mask D
Necessary bandwidth (Occupied bandwidth) < 11.25 kHz (Authorized bandwidth)

3.2.3 Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2019-07	2020-07

3.2.5 Procedure

Test Procedure
1. EUT set to test mode 2. Span set in order to cover the emission spectrum and emission mask 3. Resolution bandwidth set to 100 Hz and VBW to 300 Hz 4. Detector is set to peak max hold

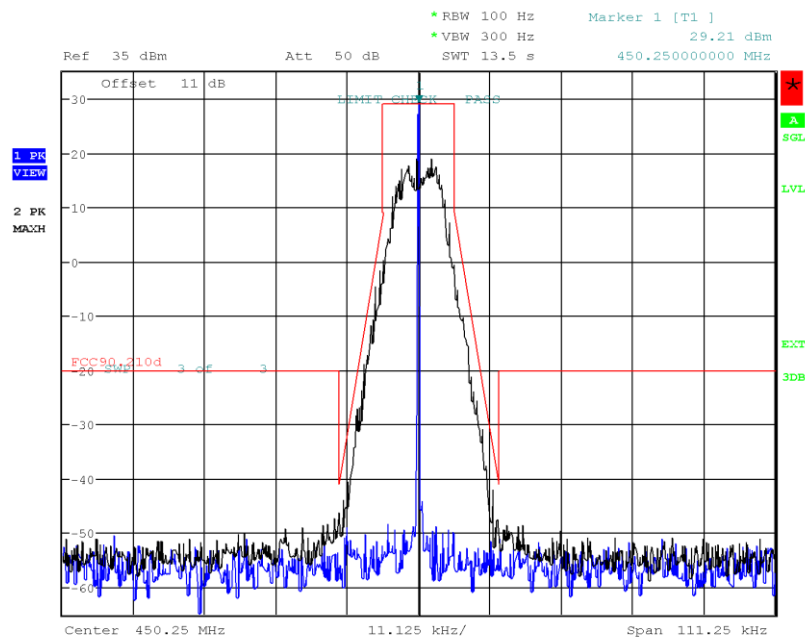
3.2.6 Results

Test Results - Emission Mask	
Channel [MHz]	Verdict
450.25	PASS
460.11875	PASS
469.9875	PASS

Test Results - Authorized bandwidth			
Channel [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
450.25	9.75	11.25	PASS
460.11875	9.65	11.25	PASS
469.9875	9.67	11.25	PASS

Emission mask

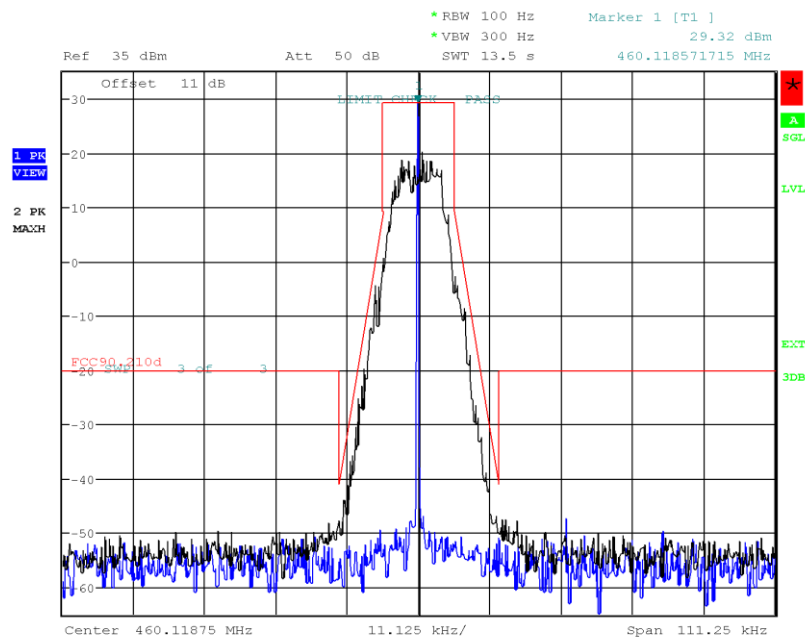
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 450.25 MHz



Date: 22.APR.2020 14:27:11

Emission mask

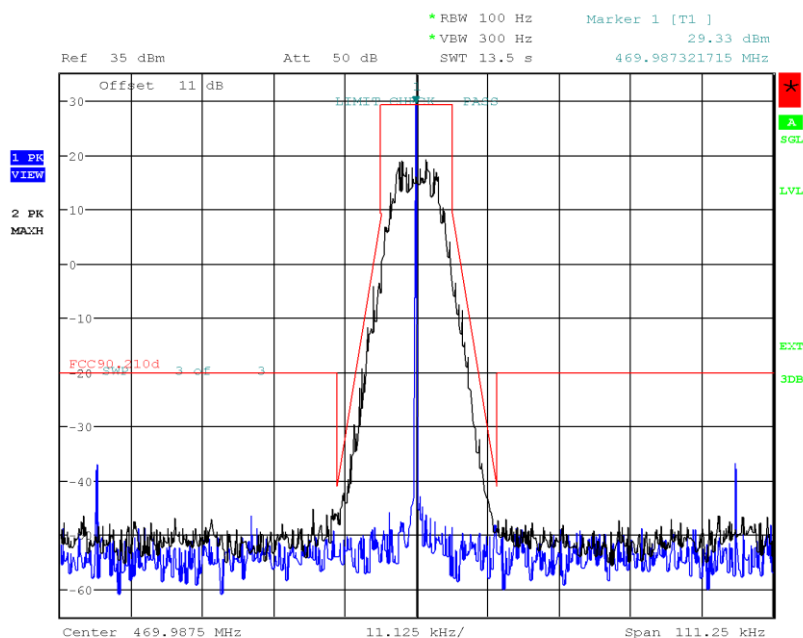
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 460.11875 MHz



Date: 22.APR.2020 14:33:01

Emission mask

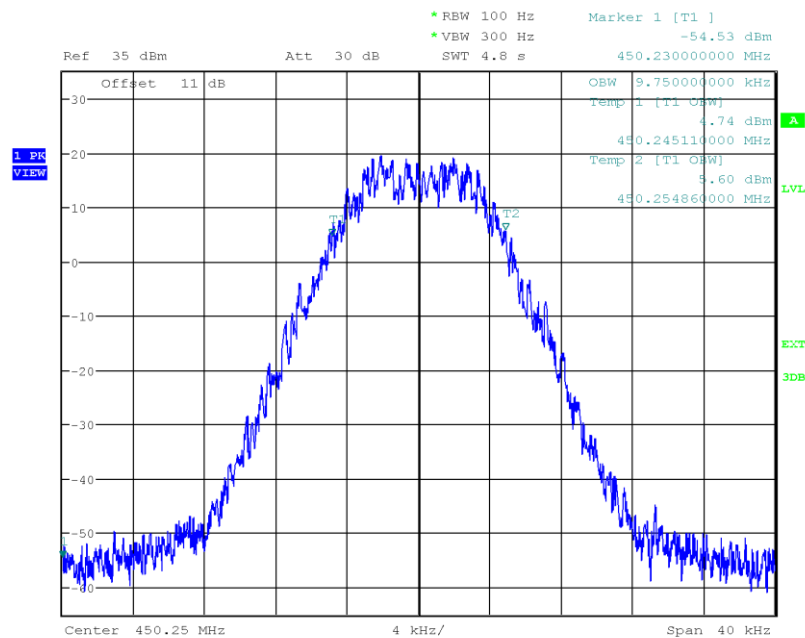
Project Number:	G0M-2002-8868
Applicant:	Kamstrup A/S
Model Description:	Meter Transmit Unit
Model:	Ready MTU
Test Sample ID:	28930
Operator:	Toralf Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2020-04-22
Operating Conditions:	Tnom/Vnom
Mode:	469.9875 MHz



Date: 22.APR.2020 14:39:24

Authorized bandwidth

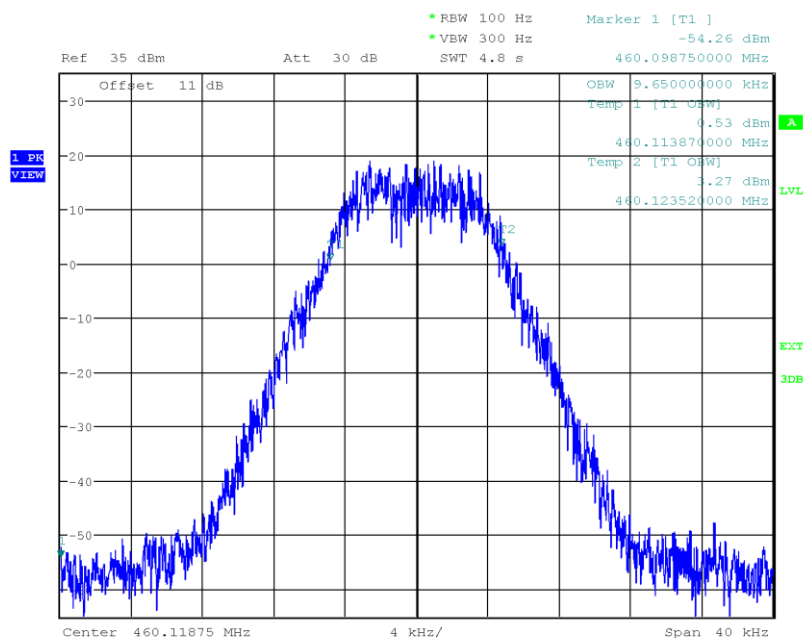
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 450.25 MHz



Date: 22.APR.2020 15:27:59

Authorized bandwidth

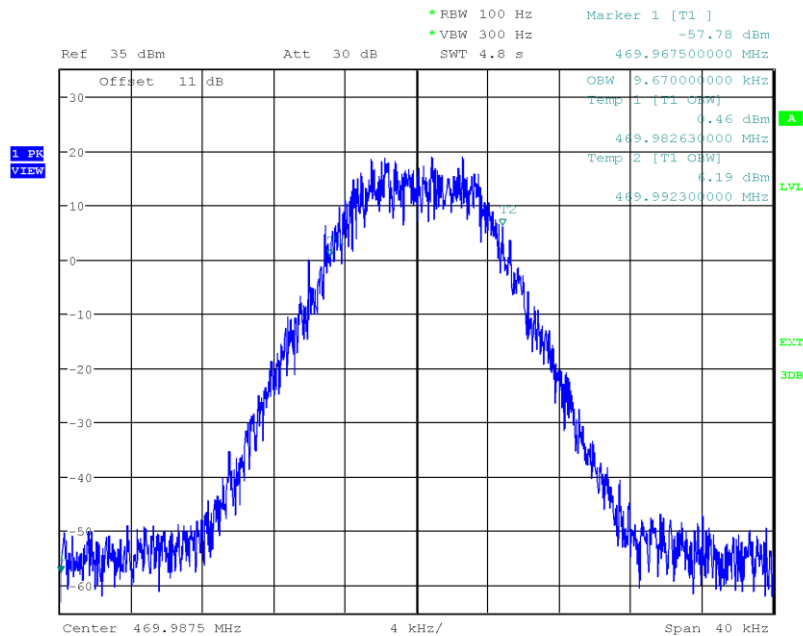
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 460.11875 MHz



Date: 22.APR.2020 15:30:39

Authorized bandwidth

Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 469.9875 MHz



Date: 22.APR.2020 15:32:13

3.3 Test Conditions and Results - Spurious emissions at antenna terminal

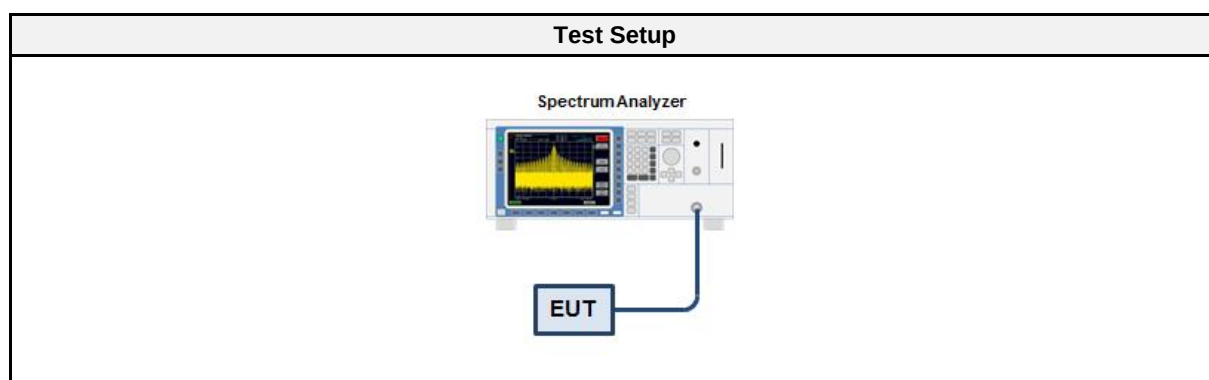
3.3.1 Information

Test Information	
Reference	FCC 90.210, FCC 2.1051 ISED RSS-119, Issue 12 (Sections 4.2,6.13)
Measurement Method	FCC 90.210 ANSI C63.26:2015 5.7
Test Method	Conducted
Test Mode	Unmodulated
Test Range	10 MHz to 10th Harmonic
Operator	Toralf Jahn
Date	2020-04-22

3.3.2 Limits

Limits
-20 dBm

3.3.3 Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2019-07	2020-07

3.3.5 Procedure

Test Procedure
1. EUT set to test mode 2. Span is set according to measurement range 3. Resolution bandwidth is set to 100 kHz below 1 GHz and 1 MHz above 1 GHz 4. Detector is set to peak and trace mode to max hold

3.3.6 Results

Test Results	
Channel [MHz]	Verdict
450.25	PASS
460.11875	PASS
469.9875	PASS

3.4 Test Conditions and Results - Transmitter radiated emissions

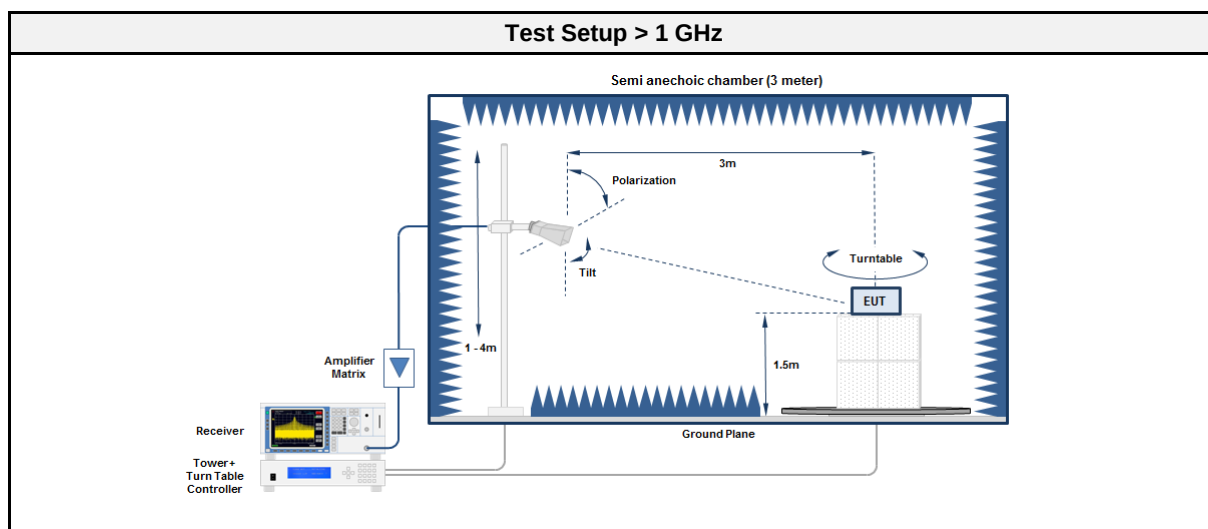
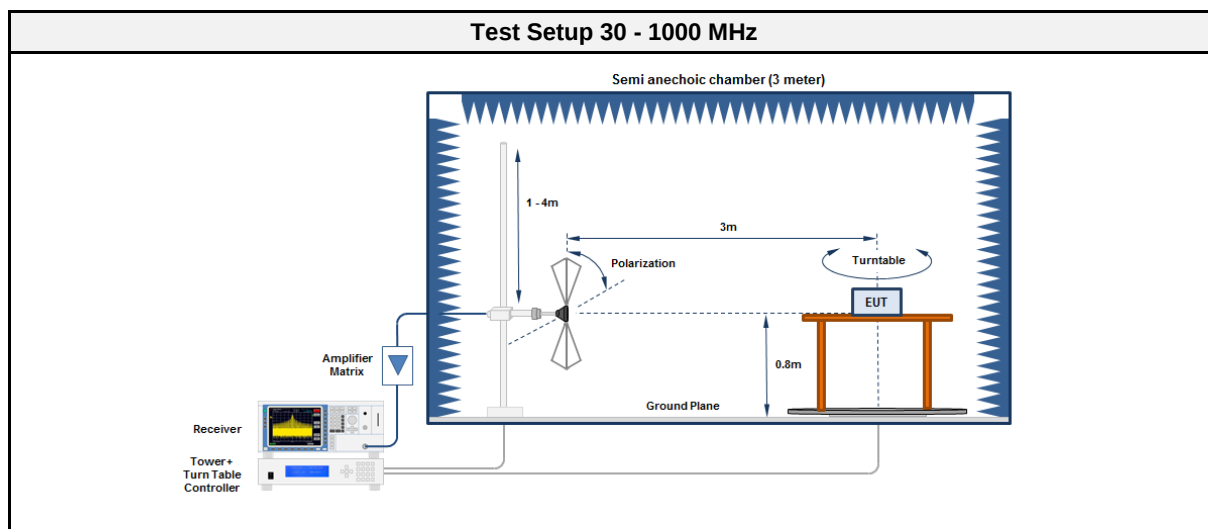
3.4.1 Information

Test Information	
Reference	FCC 90.210 FCC 2.1053 ISED RSS-119, Issue 12 (Sections 4.2,6.13)
Measurement Method	FCC 90.210 ANSI C63.26:2015 5.7
Test Method	Radiated
Test Mode	Unmodulated
Test Range	30 MHz to 10th Harmonic
Operator	Toralf Jahn
Date	2020-04-17

3.4.2 Limits

Limits
-20 dBm

3.4.3 Setup



Test Report No.: G0M-2002-8868-TFC090PMR-V01

Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3.4.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2016.1.1

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2019-09	2020-09
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2019-09	2020-09
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10

3.4.5 Procedure

Test Procedure 30 - 1000 MHz	
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector	

Test Procedure > 1 GHz	
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector	

3.4.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
450.25	899.9	-61.60	pk	hor	-20.00	-41.62
450.25	900.2	-59.90	pk	ver	-20.00	-39.90
450.25	1351	-61.30	pk	hor	-20.00	-41.28
460.11875	920.2	-59.10	pk	hor	-20.00	-39.09
460.11875	920.2	-60.80	pk	ver	-20.00	-40.83
460.11875	1380	-59.30	pk	hor	-20.00	-39.32
469.9875	940	-59.40	pk	hor	-20.00	-39.40
469.9875	940.7	-60.50	pk	ver	-20.00	-40.48
469.9875	1409	-58.40	pk	hor	-20.00	-38.40

3.5 Test Conditions and Results - Receiver spurious emissions

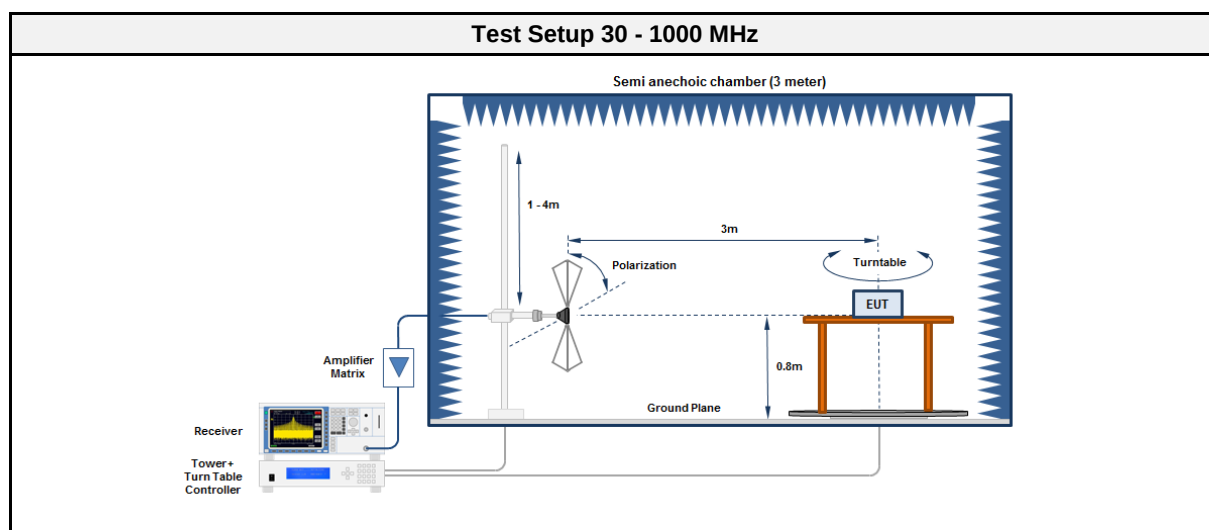
3.5.1 Information

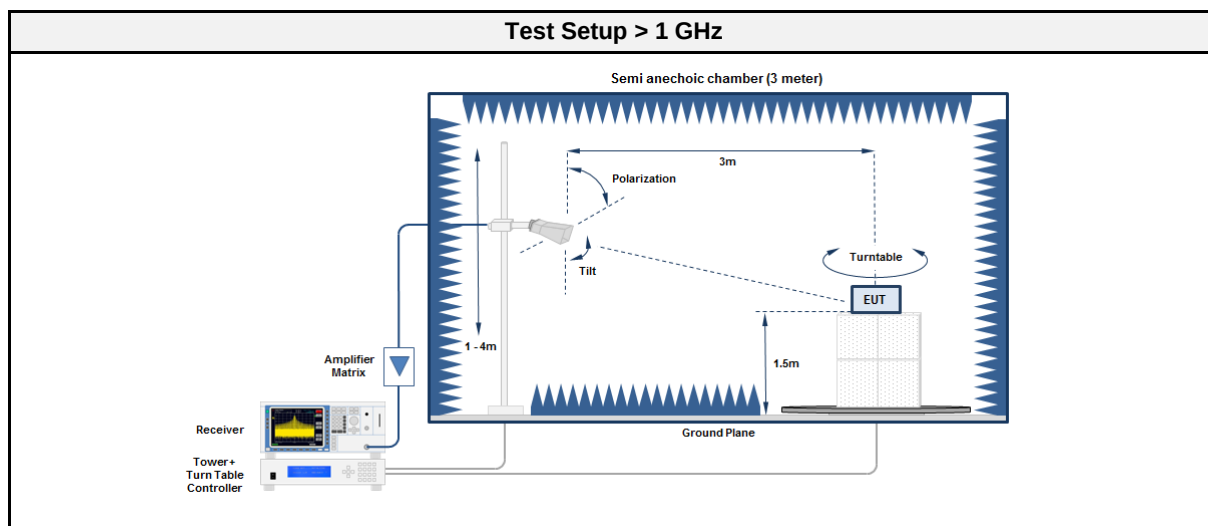
Test Information	
Reference	ISED RSS-Gen, Issue 5 (Sections 7.1)
Measurement Method	ANSI C63.26:2015 5.7
Test Method	Radiated
Test Mode	Receive
Test Range	30 MHz to 5th Harmonic
Operator	Toralf Jahn
Date	2020-04-17

3.5.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [$\mu\text{V/m}$]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.5.3 Setup





3.5.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2016.1.1

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2019-09	2020-09
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2019-09	2020-09
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10

3.5.5 Procedure

Test Procedure 30 - 1000 MHz	
1.	EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2.	EUT set to test mode
3.	The receiver is set to peak detection with max hold
4.	The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5.	All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz	
1.	EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground
2.	EUT set to test mode
3.	The receiver is set to peak detection with max hold
4.	The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5.	All significant emissions are measured again using the corresponding final detector

3.5.6 Results

Test Results pit antenna						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
460.11875	724.9475	33.70	pk	ver	46.00	-12.29
460.11875	744.4611	33.10	pk	hor	46.00	-12.89
460.11875	2404	31.05	pk	ver	53.98	-22.93

Test Results rod antenna						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
460.11875	898.7691	40.80	pk	ver	46.00	-05.21
460.11875	931.5521	36.10	pk	hor	46.00	-09.95
460.11875	2428	31.52	pk	ver	53.98	-22.46

Test Results wall antenna						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
460.11875	660.8826	33.80	pk	hor	46.00	-12.16
460.11875	848.6341	34.30	pk	ver	46.00	-11.66

3.6 Test Conditions and Results - Frequency stability

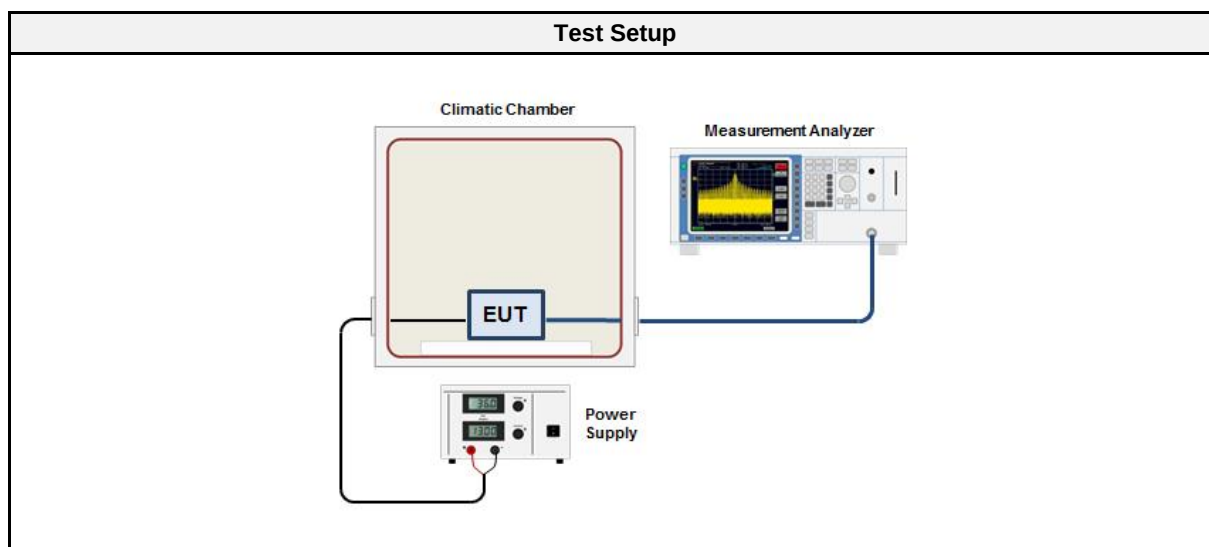
3.6.1 Information

Test Information	
Reference	FCC 90.213, FCC 2.1055 ISED RSS-119, Issue 12 (Sections 5.3)
Measurement Method	ANSI C63.26:2015 5.6
Test Method	Conducted
Test Mode	Unmodulated
Operator	Toralf Jahn
Date	2020-04-23

3.6.2 Limits

Limits		
Device Type	Channel bandwidth	Limit
Base / Fixed	12.5	1.5 ppm
Base / Fixed	6.25	0.5 ppm
Mobile	12.5	2.5 ppm
Mobile	6.25	1.0 ppm

3.6.3 Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2019-07	2020-07
Climatic chamber	Vötsch	VT 4010	EF00134	2019-08	2020-08

3.6.5 Procedure

Test Procedure with respect to ambient temperature	
1.	The EUT is turned off and placed inside the temperature chamber
2.	The temperature chamber is set to the highest operating temperature
3.	The EUT is turned on at nominal supply voltage and the carrier frequency is measured at startup, at 2 minutes, 5 minutes and 10 minutes after EUT is energized
4.	The EUT is turned off again
5.	The temperature of the chamber is lowered by 10 °C
6.	The carrier frequency measurement is repeated after temperature has stabilized
7.	The procedure is repeated until the lowest operating frequency is reached

Test Procedure when varying supply voltage	
1.	The EUT is supplied with nominal supply voltage or a fully charged battery at room temperature (15 to 25 °C)
2.	The carrier frequency is measured
3.	The procedure is repeated at 85 % and 115 % of the nominal supply voltage or at the battery endpoint for battery operated equipment

Test Procedure of carrier frequency measurement	
1.	The emission spectrum is measured using a resolution band width of 100 kHz with peak detection and maximum hold
2.	The peak of the emission spectrum is determined
3.	The left most frequency f_1 10 dB below the peak emission is searched
4.	The right most frequency f_2 10 dB below the peak emission is searched
5.	The center frequency is calculated from $f_c = (f_1 + f_2) / 2$
6.	The center frequency and the deviation from the nominal center frequency are recorded

3.6.6 Results

Test Results - Variation of temperature						
Channel [MHz]	Voltage [V]	Temperature [°C]	Time after activation	Frequency [MHz]	Deviation [kHz]	Deviation [ppm]
460.11875	3.66	65	0	460.118579	-0.157	-0.34
460.11875	3.66	60	0	460.118564	-0.172	-0.37
460.11875	3.66	50	0	460.118553	-0.183	-0.40
460.11875	3.66	40	0	460.118583	-0.153	-0.33
460.11875	3.66	30	0	460.118686	-0.050	-0.11
460.11875	3.66	20	0	460.118736	reference	reference
460.11875	3.66	10	0	460.118607	-0.129	-0.28
460.11875	3.66	0	0	460.118652	-0.084	-0.18
460.11875	3.66	-10	0	460.118690	-0.046	-0.10
460.11875	3.66	-20	0	460.118604	-0.132	-0.29
460.11875	3.66	-30	0	460.118538	-0.198	-0.43
Comment: The EUT transmits in normal operation mode only for a milli seconds.						

Test Results - Variation of supply voltage					
Channel [MHz]	Voltage [V]	Temperature [°C]	Frequency [MHz]	Deviation [kHz]	Deviation [ppm]
460.11875	3.66	20	460.118736	reference	reference
460.11875	3.5	20	460.118682	-0.054	-0.12

3.7 Test Conditions and Results - Transient frequency behavior

3.7.1 Information

Test Information	
Reference	FCC 90.214 ISED RSS-119, Issue 12 (Sections 5.9)
Measurement Method	ANSI C63.26:2015 6.5
Test Method	Conducted
Test Mode	Unmodulated
Operator	Toralf Jahn
Date	2020-04-30

3.7.2 Limits

Limits

Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals ^{1 2}	Maximum frequency difference ³	All equipment	
		150 to 174 MHz	421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t_1 ⁴	±25.0 kHz	5.0 ms	10.0 ms
t_2	±12.5 kHz	20.0 ms	25.0 ms
t_3 ⁴	±25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t_1 ⁴	±12.5 kHz	5.0 ms	10.0 ms
t_2	±6.25 kHz	20.0 ms	25.0 ms
t_3 ⁴	±12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t_1 ⁴	±6.25 kHz	5.0 ms	10.0 ms
t_2	±3.125 kHz	20.0 ms	25.0 ms
t_3 ⁴	±6.25 kHz	5.0 ms	10.0 ms

¹ t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.

t_1 is the time period immediately following t_{on} .

t_2 is the time period immediately following t_1 .

t_3 is the time period from the instant when the transmitter is turned off until t_{off} .

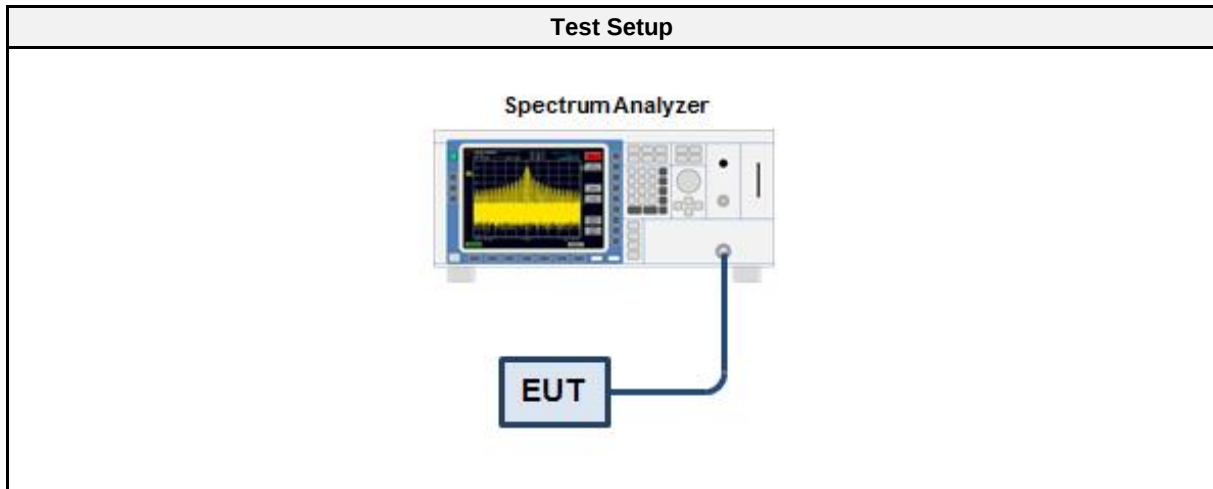
t_{off} is the instant when the 1 kHz test signal starts to rise.

² During the time from the end of t_2 to the beginning of t_3 , the frequency difference must not exceed the limits specified in §90.213.

³ Difference between the actual transmitter frequency and the assigned transmitter frequency.

⁴ If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

3.7.3 Setup



3.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2019-07	2020-07

3.7.5 Procedure

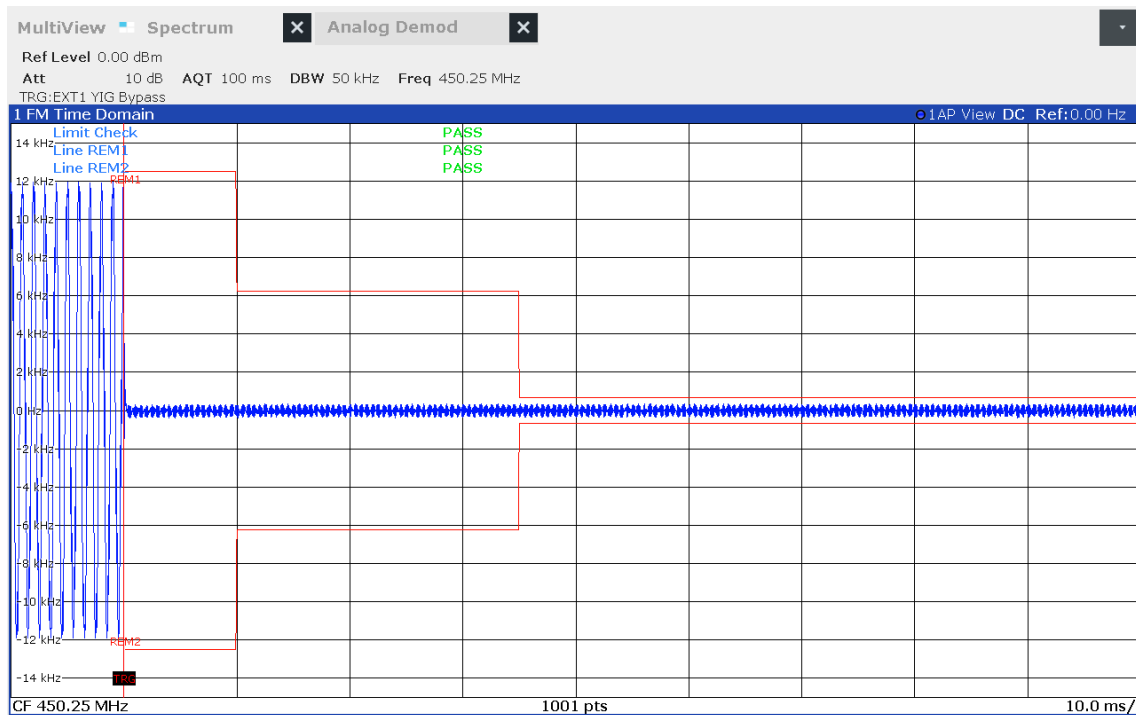
Test Procedure
1. The EUT is set to test frequency 2. The EUT is connected to modulation analyzer 3. The EUT is switched on and off in order to determine the transient switching behavior

3.7.6 Results

Test Results		
Channel [MHz]	State	Verdict
450.25	Tx Off	PASS
460.11875	Tx Off	PASS
469.9875	Tx Off	PASS
450.25	Tx On	PASS
460.11875	Tx On	PASS
469.9875	Tx On	PASS

Transient frequency behavior

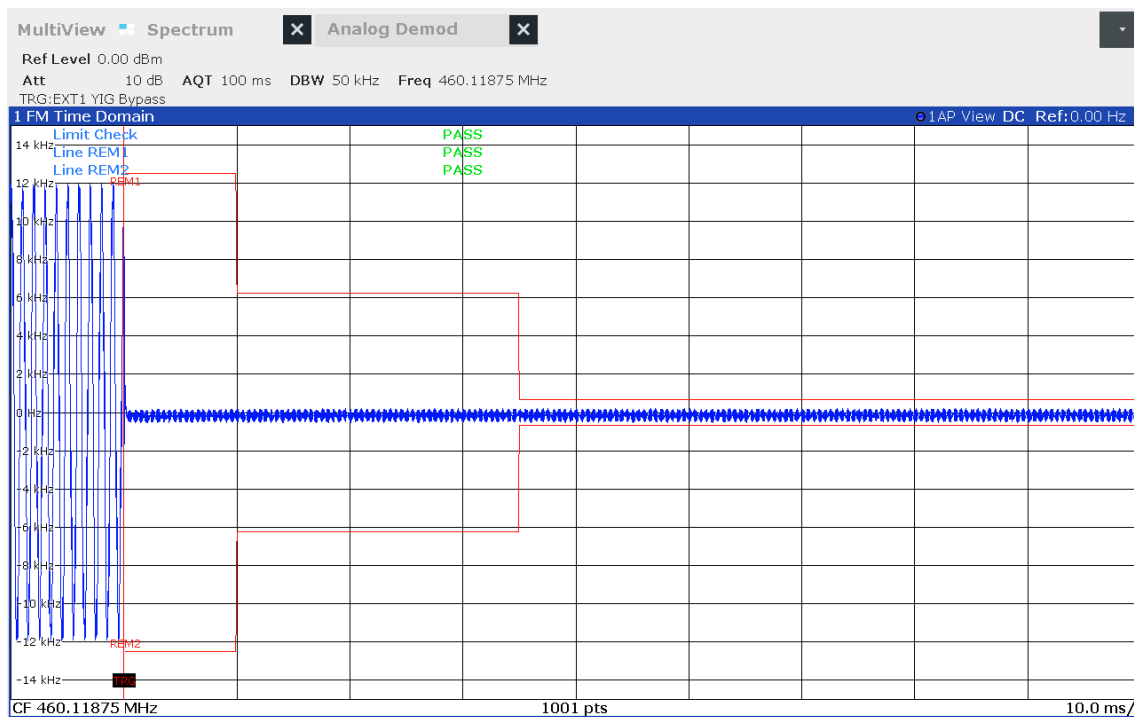
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-30
 Operating Conditions: Tnom/Vnom
 Mode: Ton 450.25 MHz



11:10:32 30.04.2020

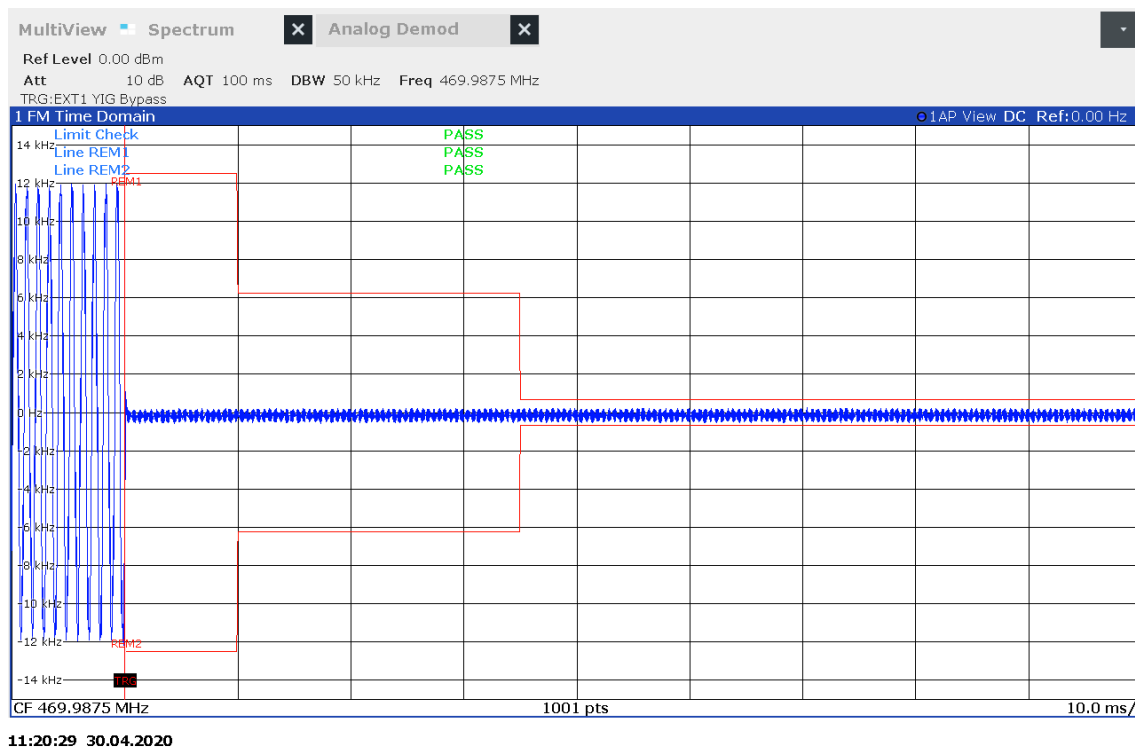
Transient frequency behavior

Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-30
 Operating Conditions: Tnom/Vnom
 Mode: Ton 460.11875 MHz



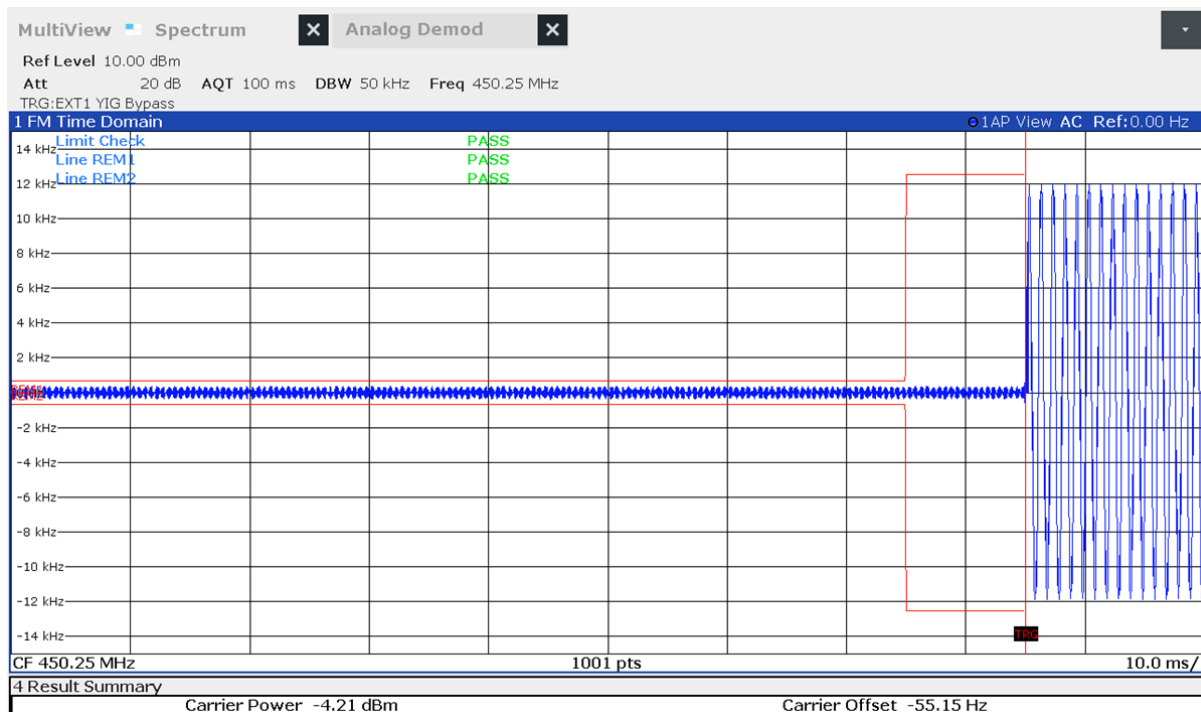
Transient frequency behavior

Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-30
 Operating Conditions: Tnom/Vnom
 Mode: Ton 469.9875 MHz



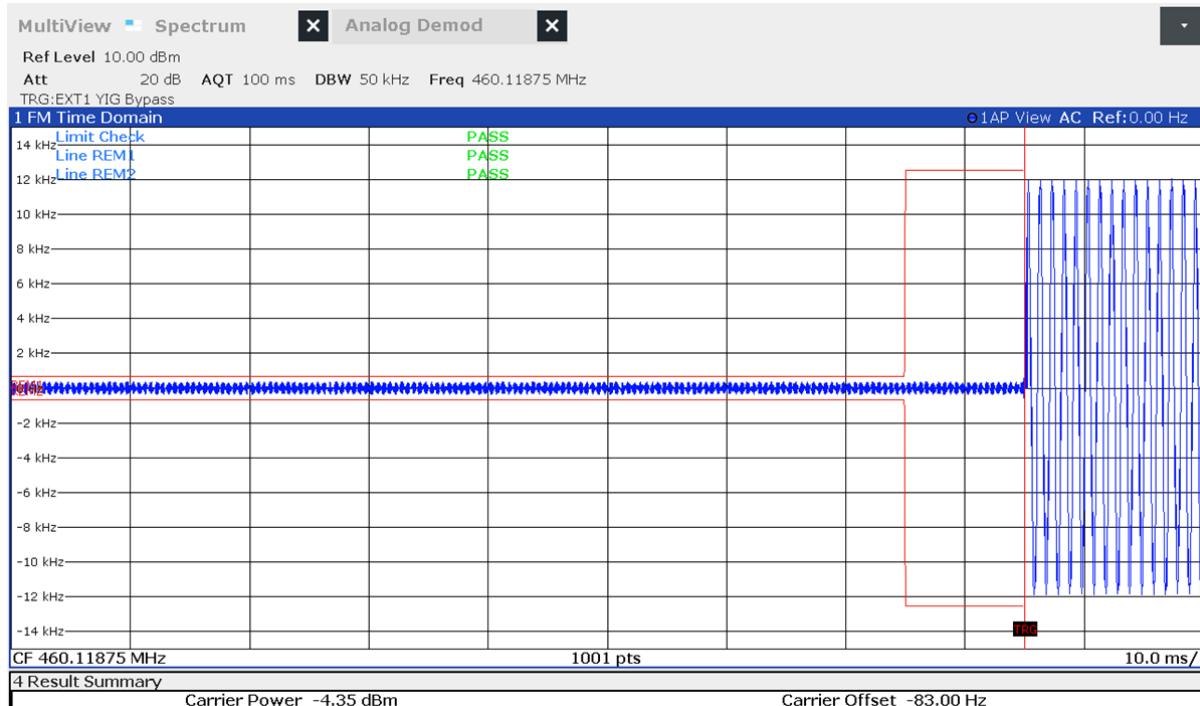
Transient frequency behavior

Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-30
 Operating Conditions: Tnom/Vnom
 Mode: Toff 450.25 MHz



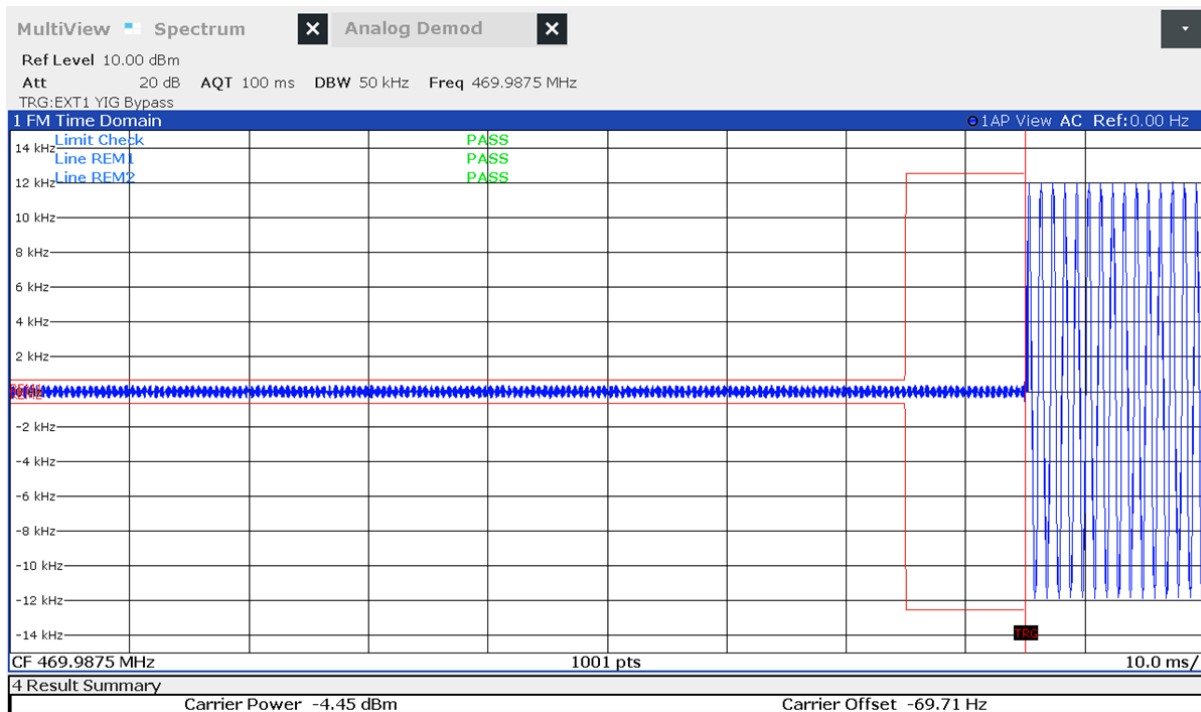
Transient frequency behavior

Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-30
 Operating Conditions: Tnom/Vnom
 Mode: Toff 460.11875 MHz



Transient frequency behavior

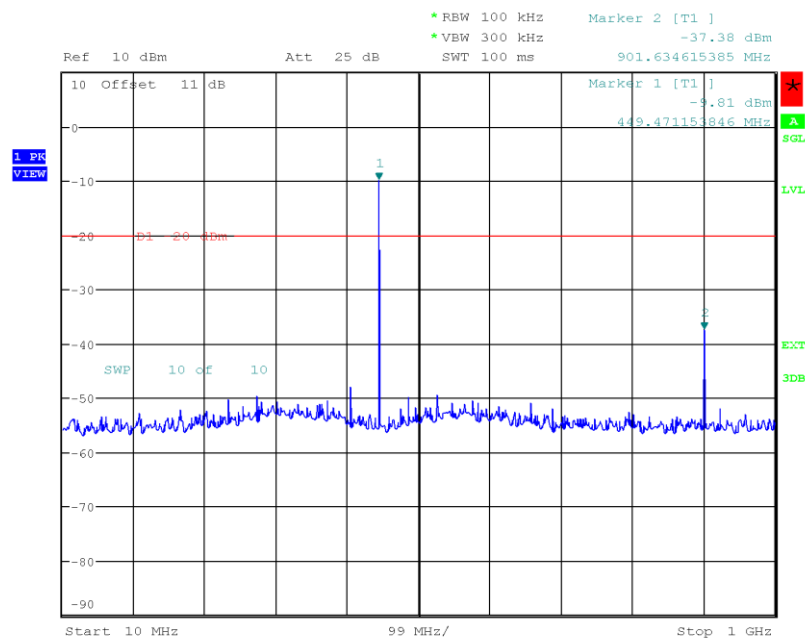
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-30
 Operating Conditions: Tnom/Vnom
 Mode: Toff 469.9875 MHz



ANNEX A Transmitter conducted emissions

Conducted Spurious Emissions

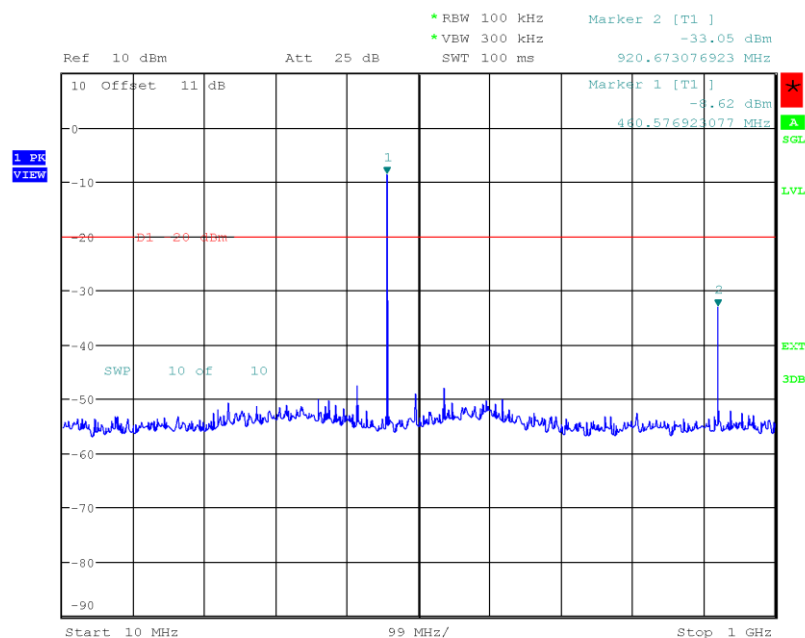
Project Number:	G0M-2002-8868
Applicant:	Kamstrup A/S
Model Description:	Meter Transmit Unit
Model:	Ready MTU
Test Sample ID:	28930
Operator:	Toralf Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2020-04-22
Operating Conditions:	Tnom/Vnom
Mode:	450.25 MHz
Note 1:	notch filter



Date: 22.APR.2020 15:54:07

Conducted Spurious Emissions

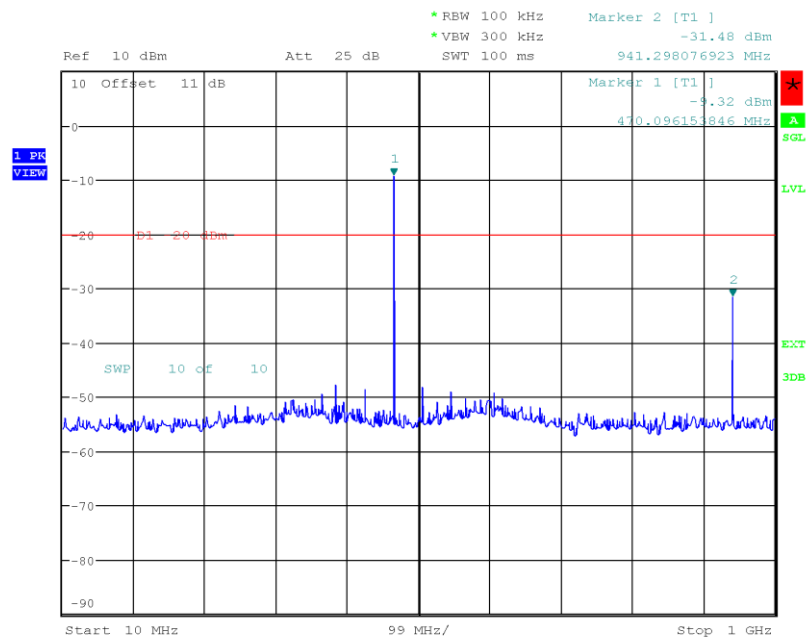
Project Number:	G0M-2002-8868
Applicant:	Kamstrup A/S
Model Description:	Meter Transmit Unit
Model:	Ready MTU
Test Sample ID:	28930
Operator:	Toralf Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2020-04-22
Operating Conditions:	Tnom/Vnom
Mode:	460.11875 MHz
Note 1:	notch filter



Date: 22.APR.2020 15:57:10

Conducted Spurious Emissions

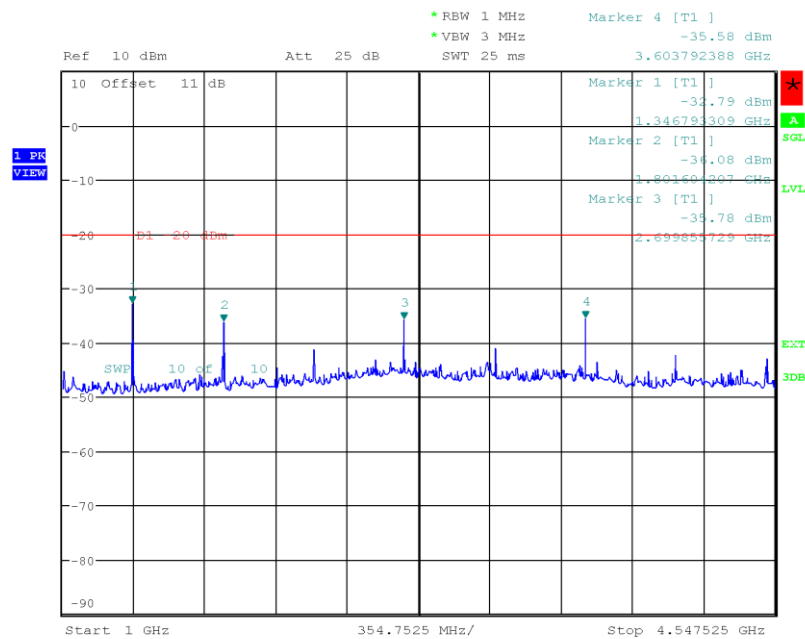
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 469.9875 MHz
 Note 1: notch filter



Date: 22.APR.2020 15:59:35

Conducted Spurious Emissions

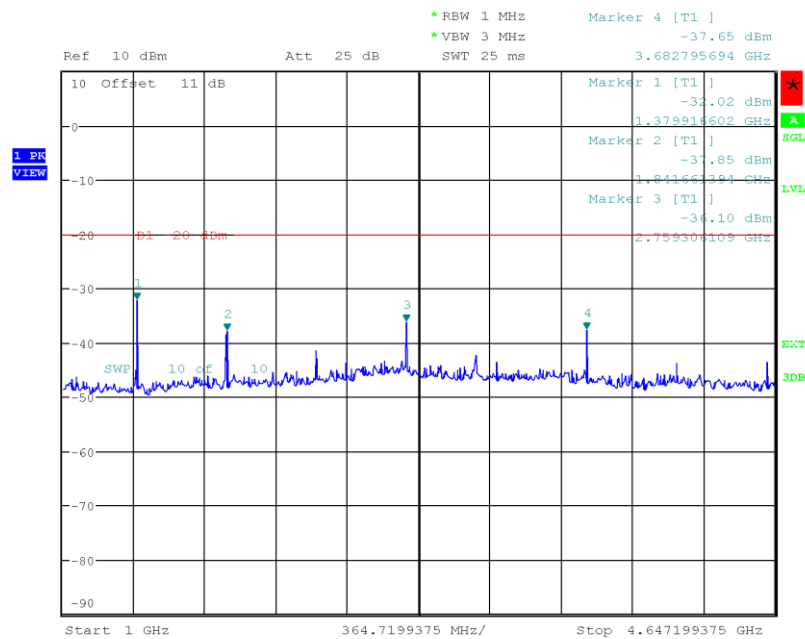
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 450.25 MHz
 Note 1: high pass



Date: 22.APR.2020 16:05:41

Conducted Spurious Emissions

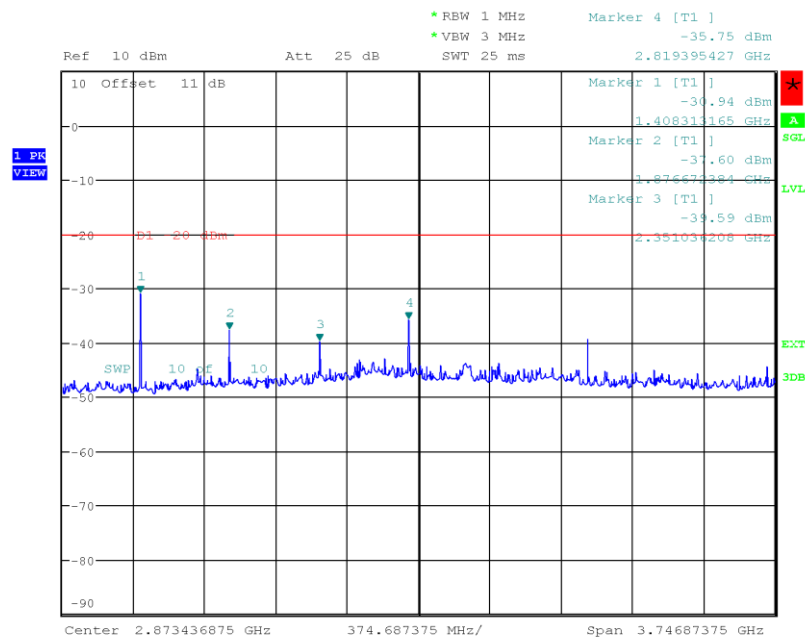
Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 460.11875 MHz
 Note 1: high pass



Date: 22.APR.2020 16:08:22

Conducted Spurious Emissions

Project Number: G0M-2002-8868
 Applicant: Kamstrup A/S
 Model Description: Meter Transmit Unit
 Model: Ready MTU
 Test Sample ID: 28930
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2020-04-22
 Operating Conditions: Tnom/Vnom
 Mode: 469.9875 MHz
 Note 1: high pass



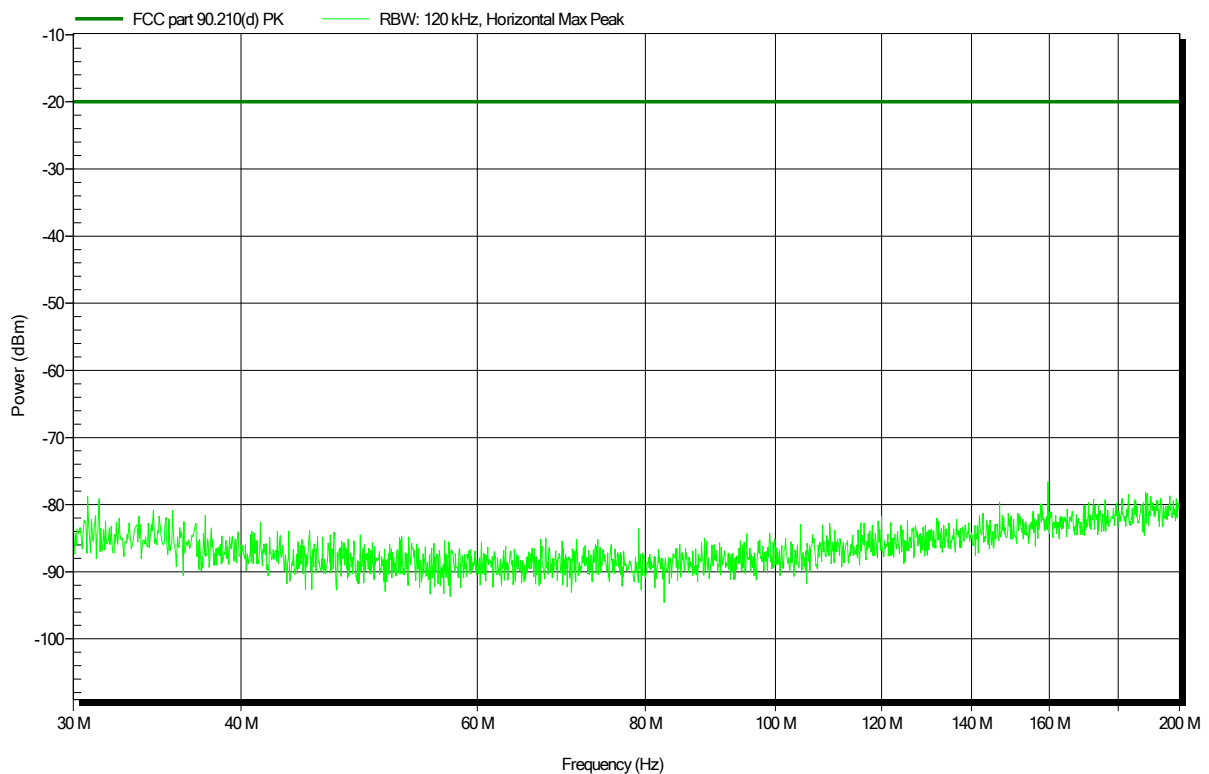
ANNEX B Transmitter radiated emissions

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HK 116, Horizontal
Measurement distance: 3 m
Mode: TX; 450.25 MHz
Test Date: 2020-04-17
Note:

Index 1

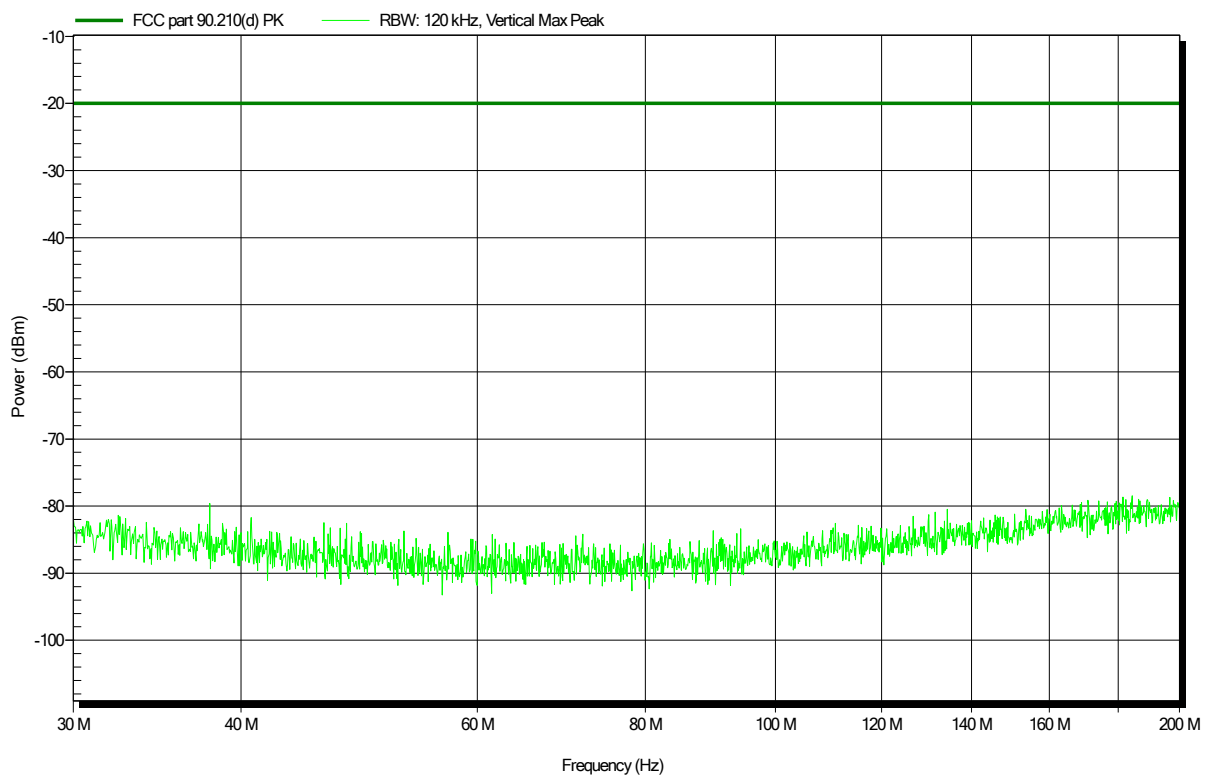


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; 450.25 MHz
 Test Date: 2020-04-17
 Note:

Index 2

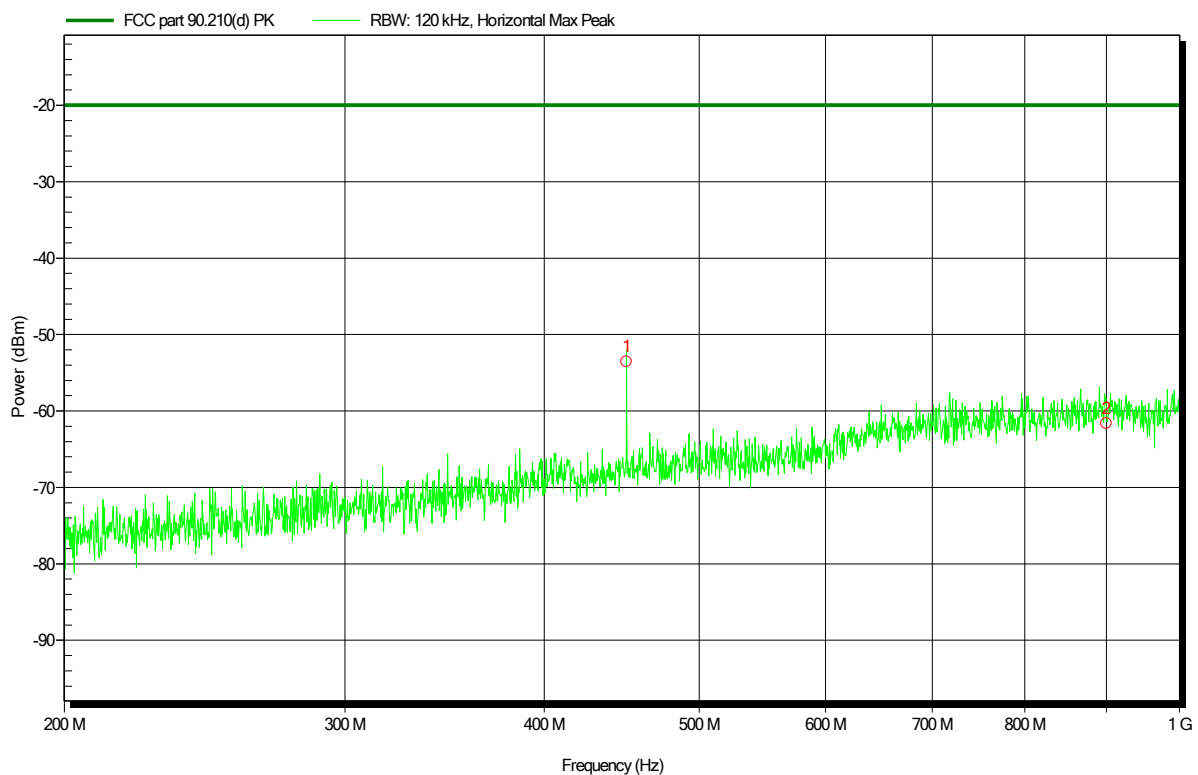


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; 450.25 MHz
Test Date: 2020-04-17
Note: with notch filter

Index 7



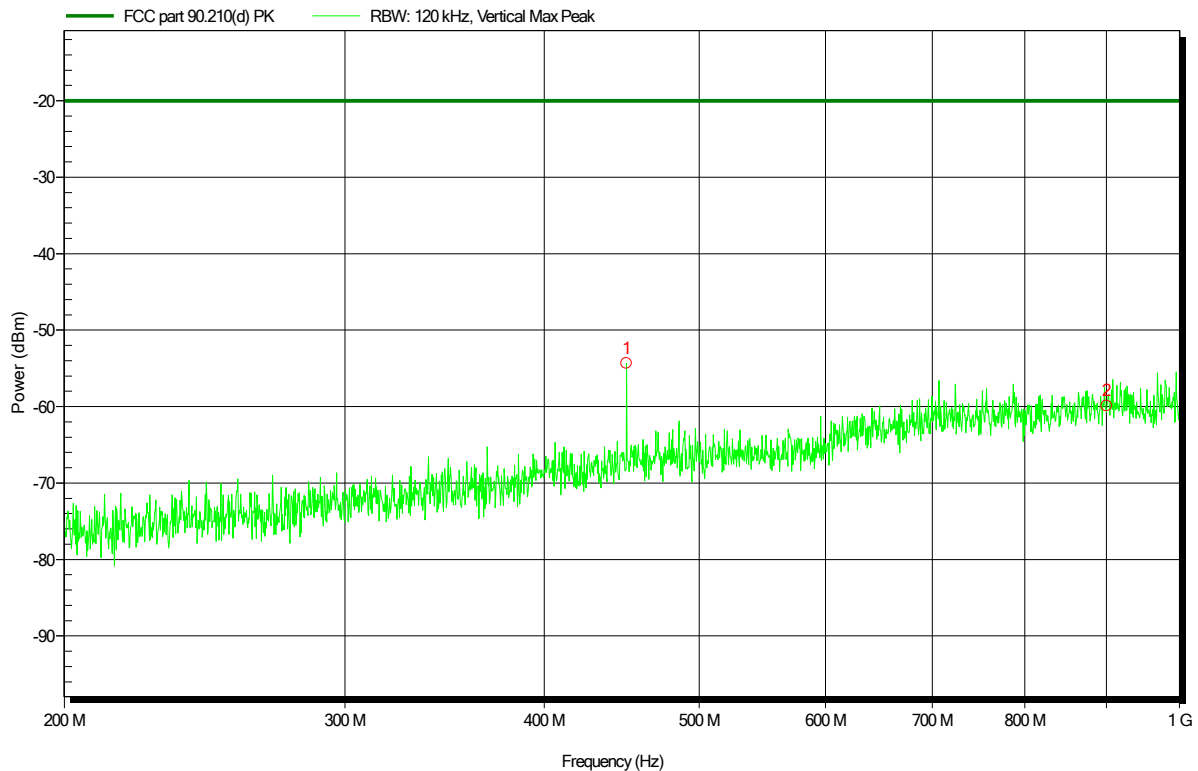
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
450.3 MHz	-53.5 dBm	-20 dBm	-33.54 dB	Pass
899.9 MHz	-61.6 dBm	-20 dBm	-41.62 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; 450.25 MHz
Test Date: 2020-04-17
Note: with notch filter

Index 8



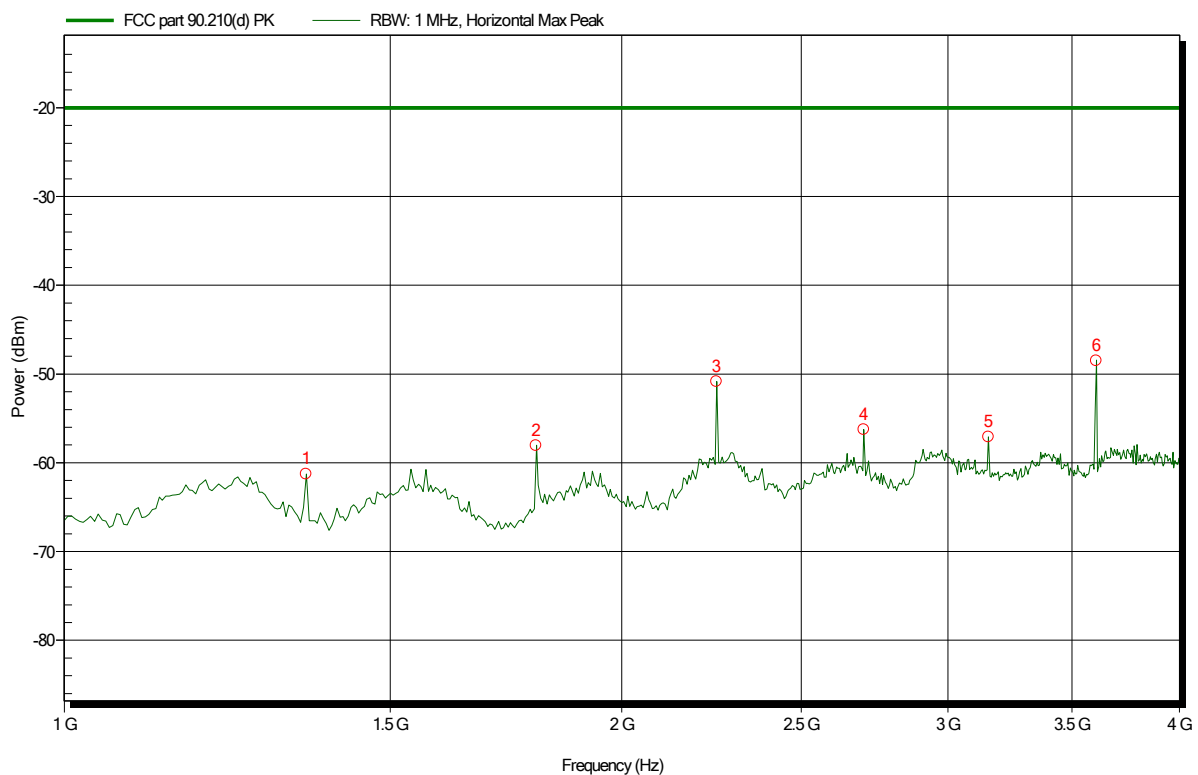
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
450.25 MHz	-54.3 dBm	-20 dBm	-34.35 dB	Pass
900.2 MHz	-59.9 dBm	-20 dBm	-39.9 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Toralf Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 3 m
Mode: TX; 450.25 MHz
Test Date: 2020-04-21
Note:

Index 13



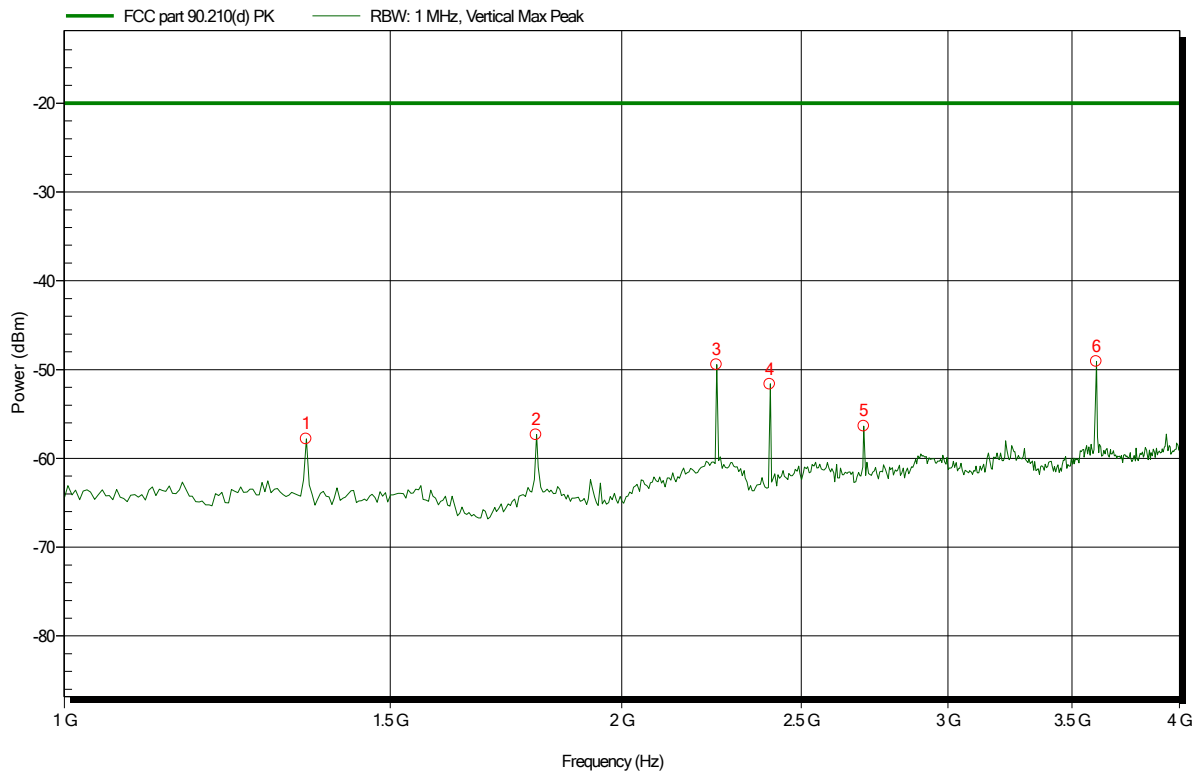
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.351 GHz	-61.3 dBm	-20 dBm	-41.28 dB	Pass
1.798 GHz	-58.1 dBm	-20 dBm	-38.07 dB	Pass
2.25 GHz	-50.9 dBm	-20 dBm	-30.86 dB	Pass
2.702 GHz	-56.3 dBm	-20 dBm	-36.26 dB	Pass
3.154 GHz	-57.1 dBm	-20 dBm	-37.07 dB	Pass
3.606 GHz	-48.5 dBm	-20 dBm	-28.49 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Toralf Jahn
Measurement software: RadiMation, version 2016.1.10
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 3 m
Mode: TX; 450.25 MHz
Test Date: 2020-04-21
Note:

Index 15



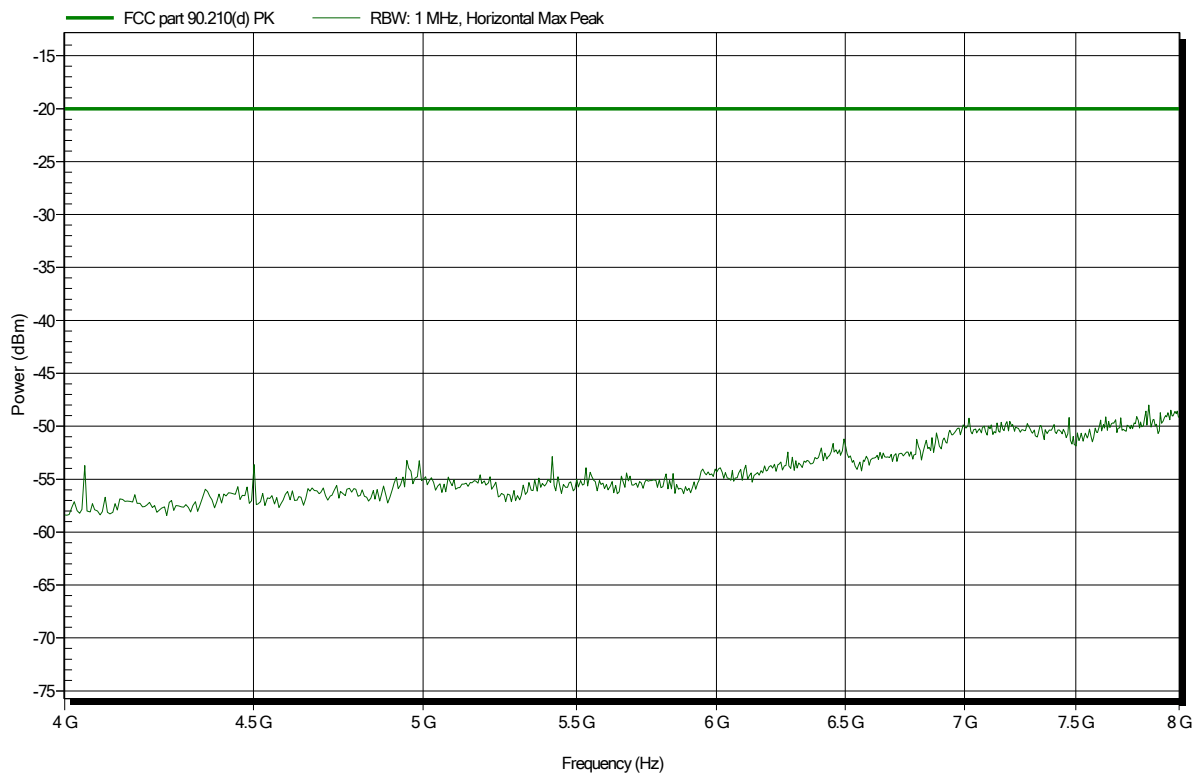
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.351 GHz	-57.8 dBm	-20 dBm	-37.81 dB	Pass
1.798 GHz	-57.3 dBm	-20 dBm	-37.33 dB	Pass
2.25 GHz	-49.4 dBm	-20 dBm	-29.44 dB	Pass
2.404 GHz	-51.6 dBm	-20 dBm	-31.64 dB	Pass
2.702 GHz	-56.4 dBm	-20 dBm	-36.35 dB	Pass
3.606 GHz	-49.1 dBm	-20 dBm	-29.08 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; 450.25 MHz
 Test Date: 2020-04-21
 Note:

Index 14

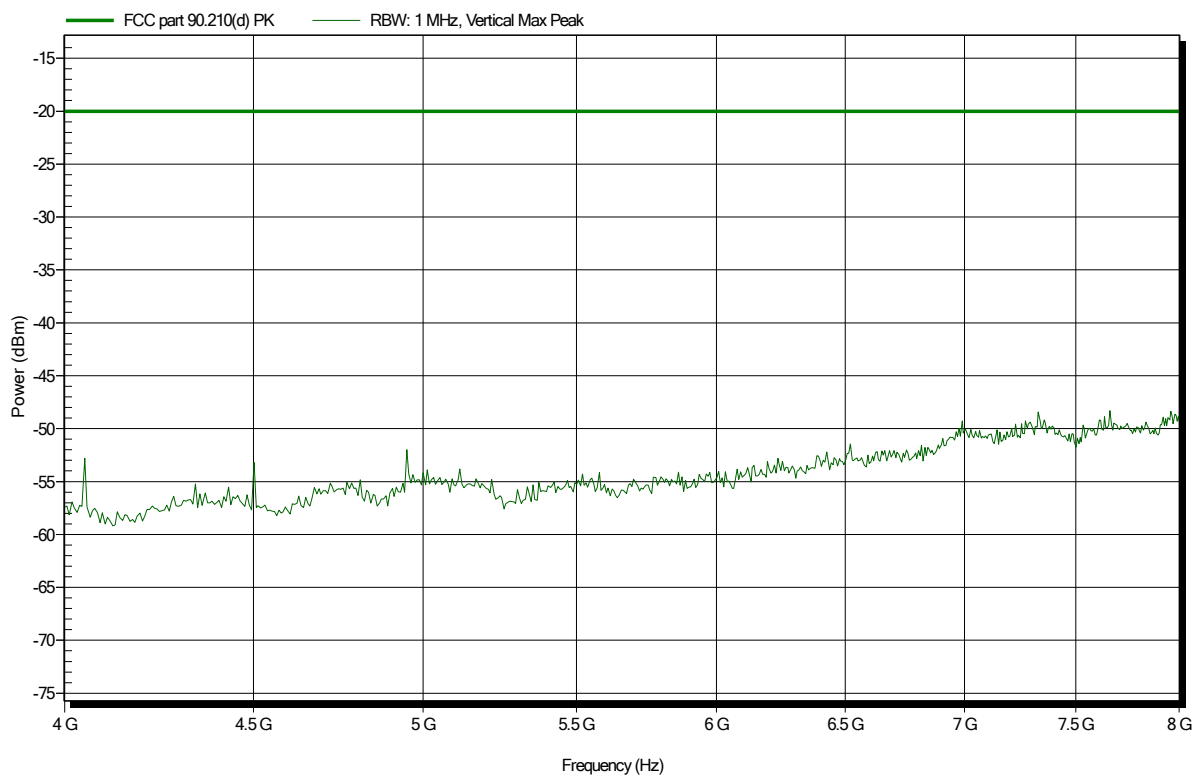


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Toralf Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 3 m
Mode: TX; 450.25 MHz
Test Date: 2020-04-21
Note:

Index 16

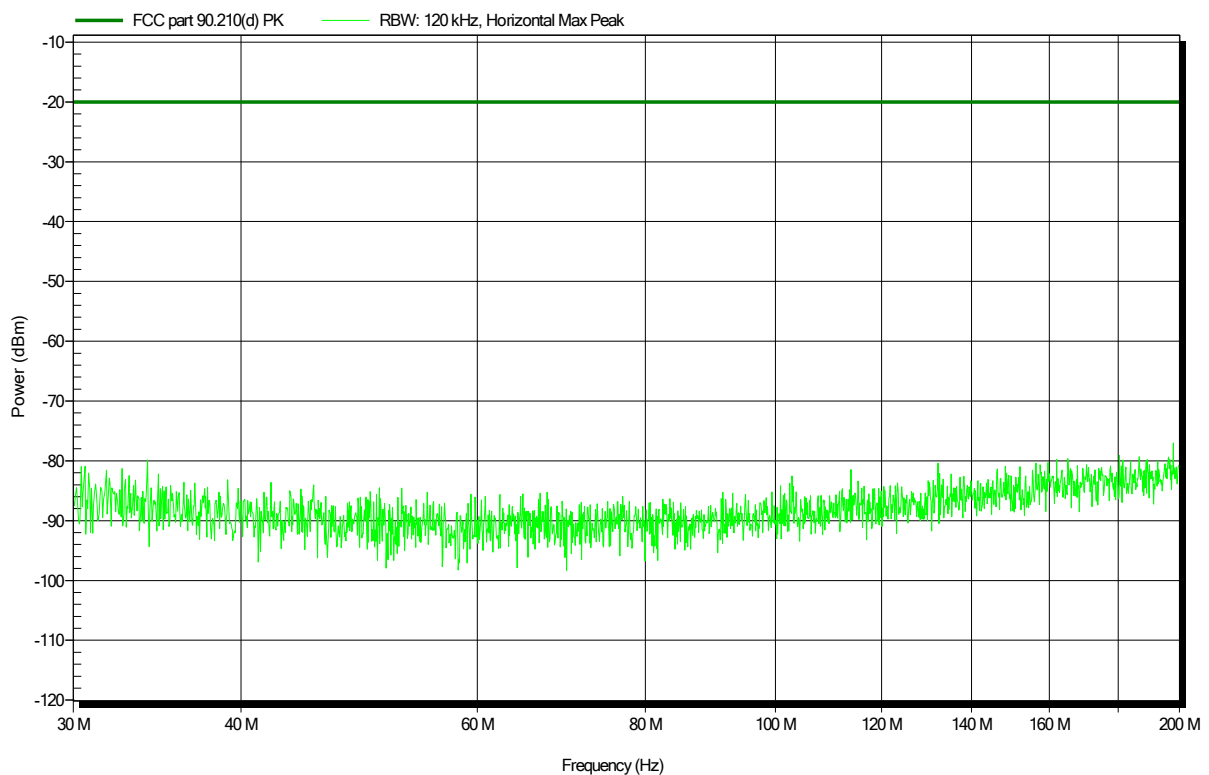


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; 460.11875 MHz
 Test Date: 2020-04-17
 Note:

Index 4

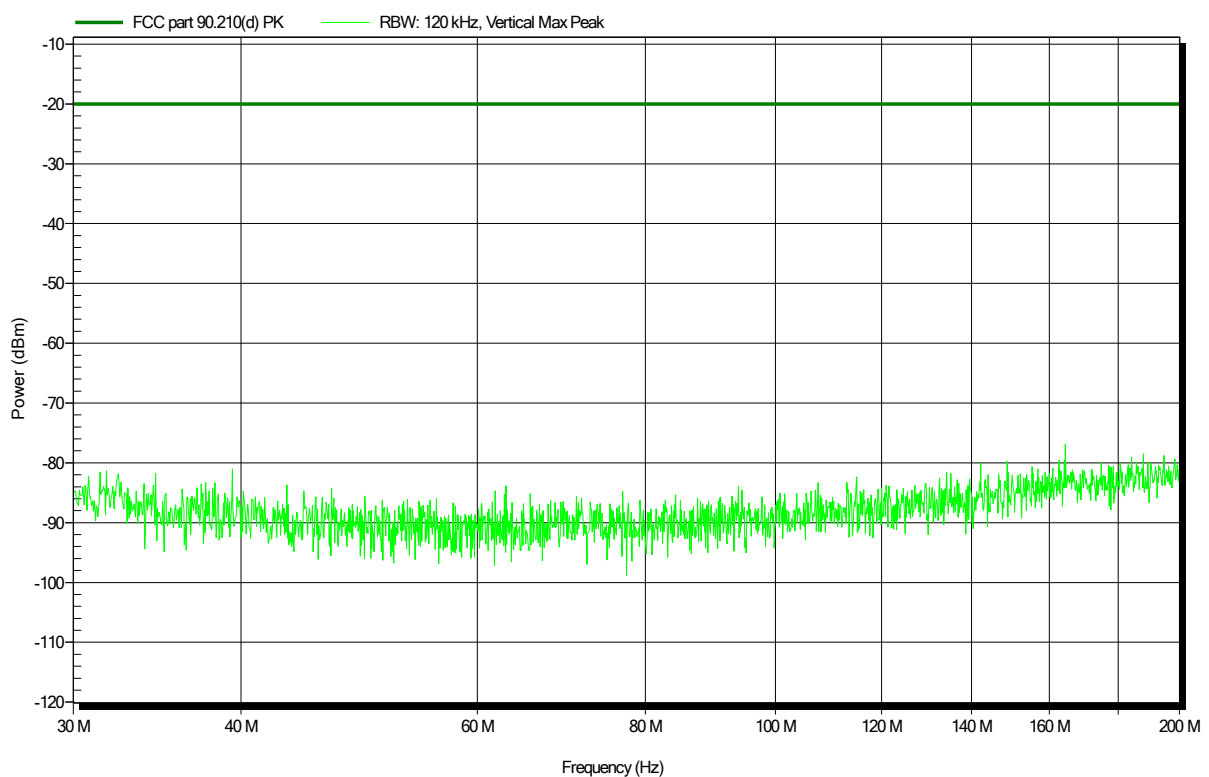


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; 460.11875 MHz
 Test Date: 2020-04-17
 Note:

Index 3

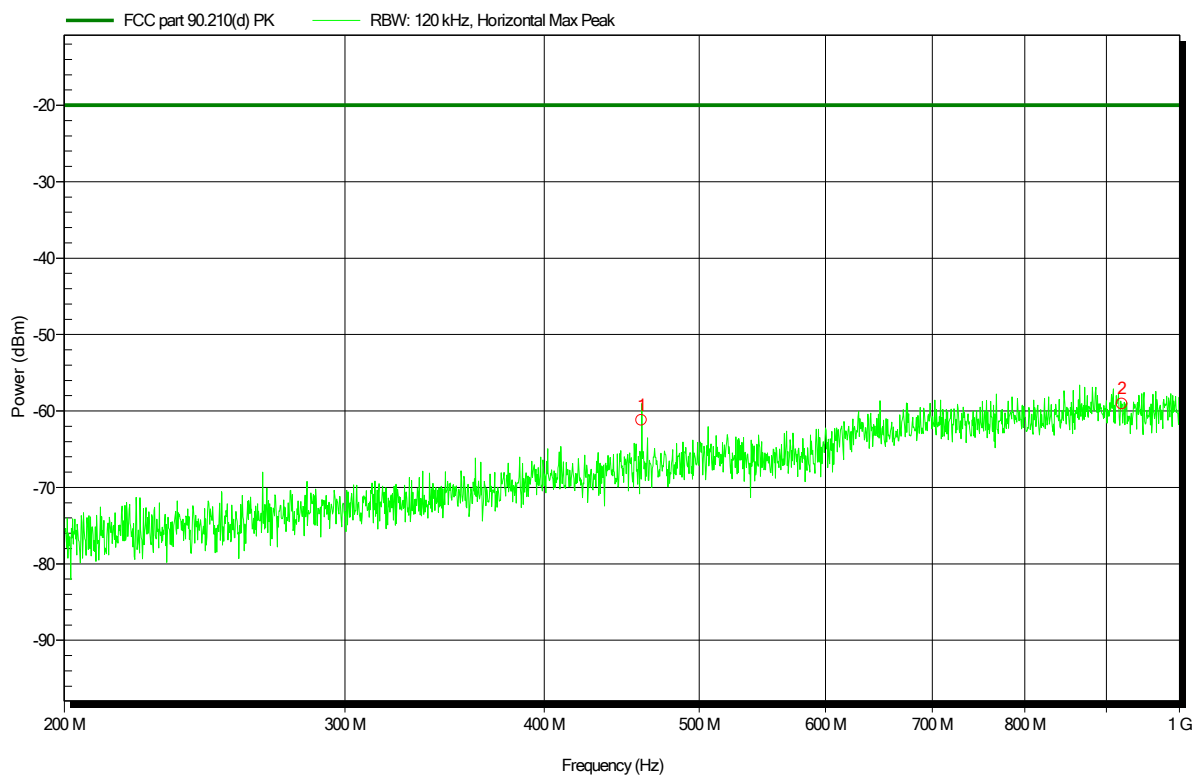


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: TX; 460.11875 MHz
Test Date: 2020-04-17
Note: with notch filter

Index 10



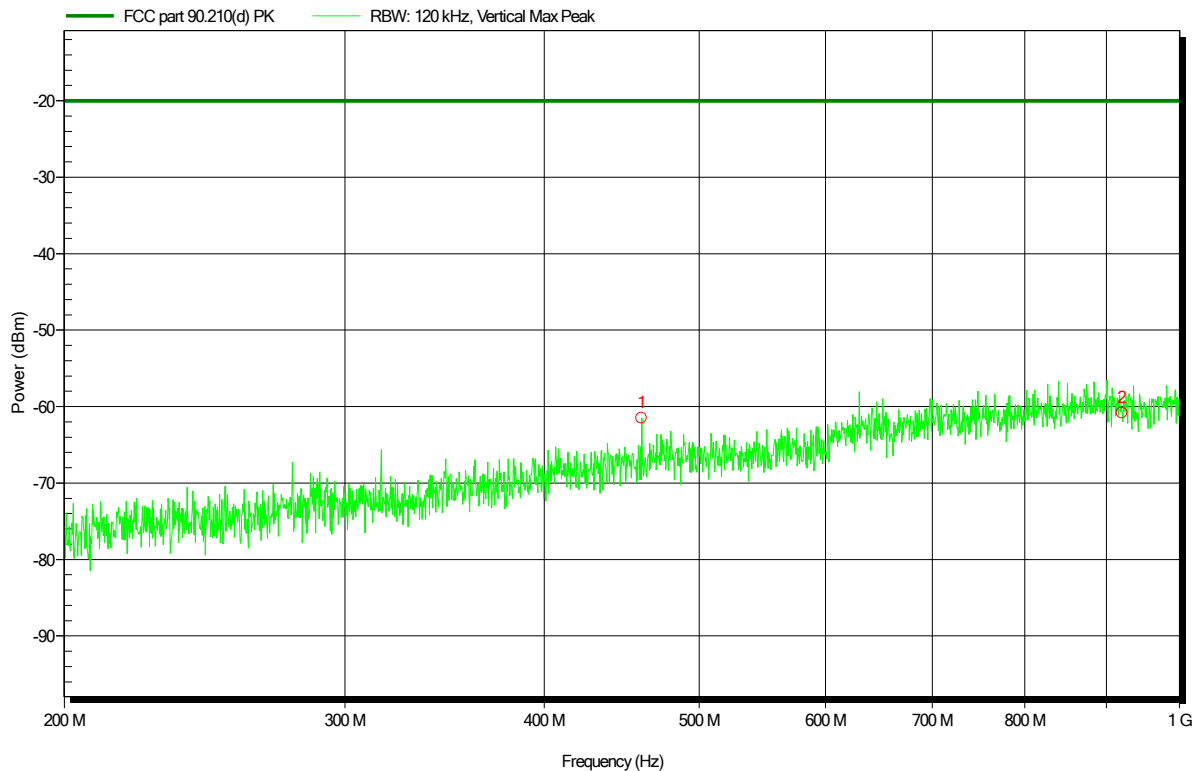
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
460.15 MHz	-61.2 dBm	-20 dBm	-41.21 dB	Pass
920.2 MHz	-59.1 dBm	-20 dBm	-39.09 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; 460.11875 MHz
Test Date: 2020-04-17
Note: with notch filter

Index 9

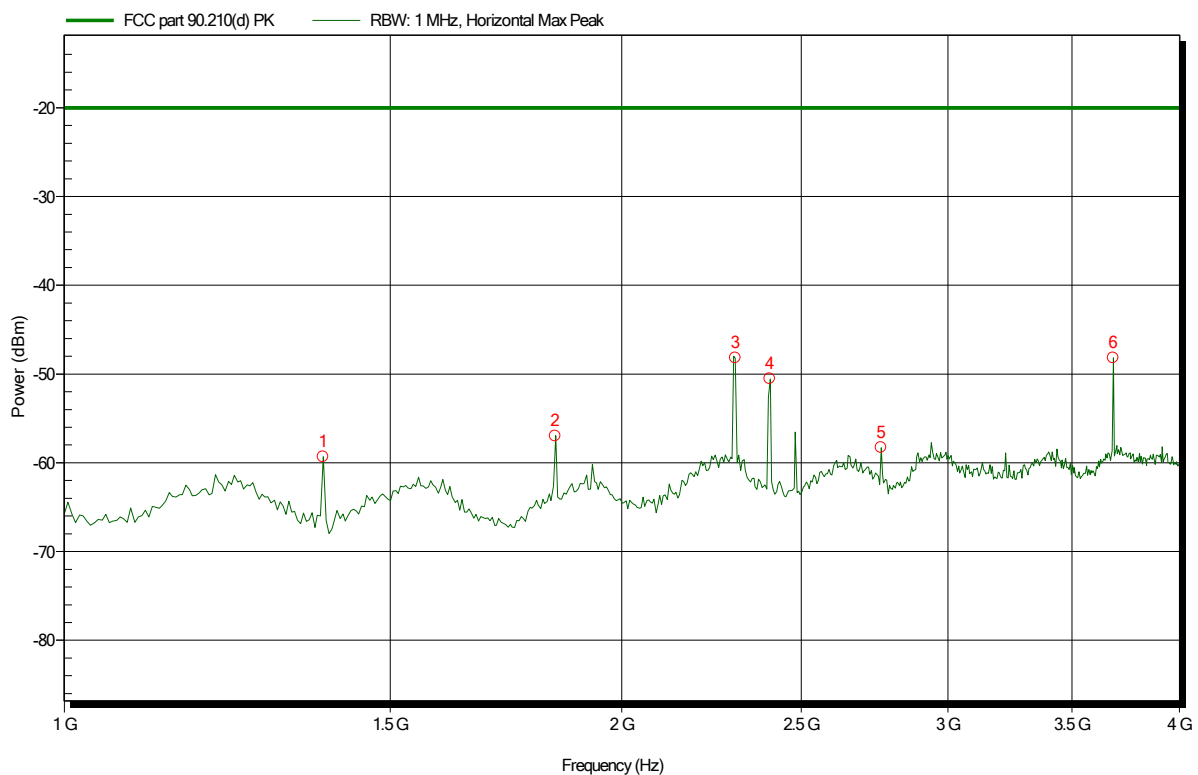


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
460.15 MHz	-61.5 dBm	-20 dBm	-41.51 dB	Pass
920.2 MHz	-60.8 dBm	-20 dBm	-40.83 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; 460.11875 MHz
 Test Date: 2020-04-21
 Note:

Index 19

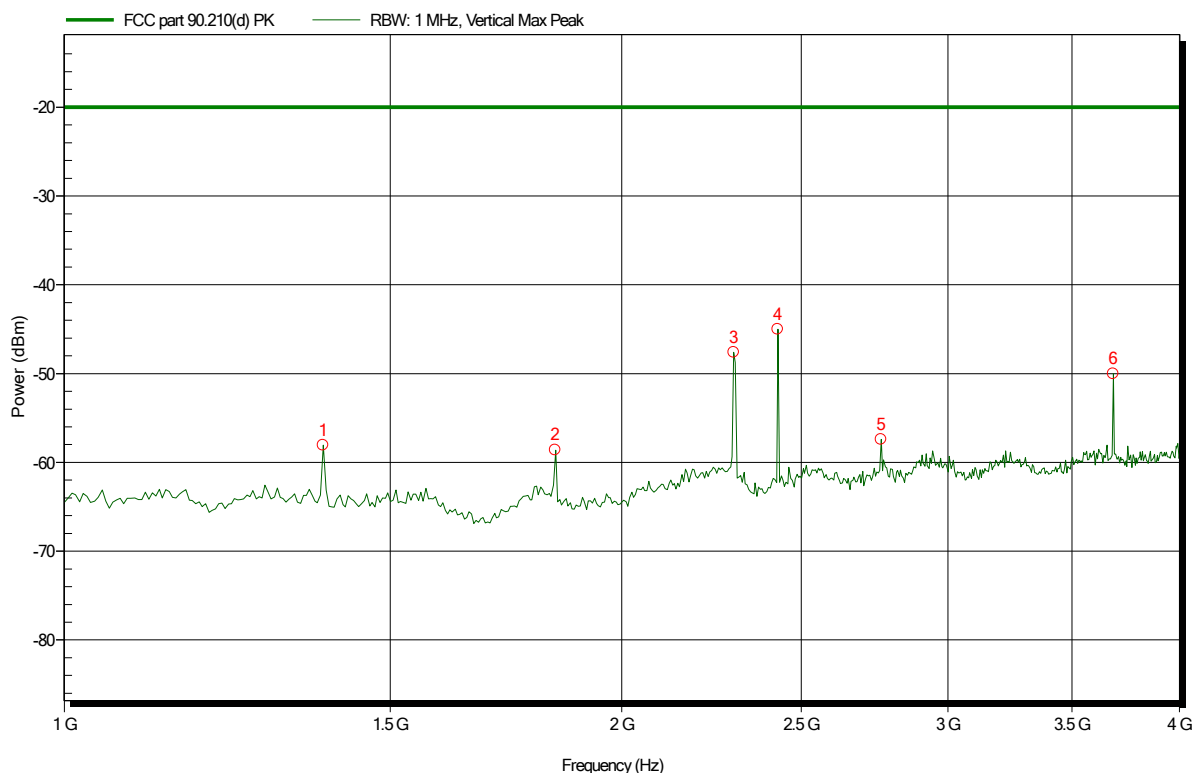


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.38 GHz	-59.3 dBm	-20 dBm	-39.32 dB	Pass
1.841 GHz	-57 dBm	-20 dBm	-36.96 dB	Pass
2.303 GHz	-48.2 dBm	-20 dBm	-28.18 dB	Pass
2.404 GHz	-50.5 dBm	-20 dBm	-30.52 dB	Pass
2.76 GHz	-58.3 dBm	-20 dBm	-38.28 dB	Pass
3.683 GHz	-48.2 dBm	-20 dBm	-28.17 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; 460.11875 MHz
 Test Date: 2020-04-21
 Note:

Index 17



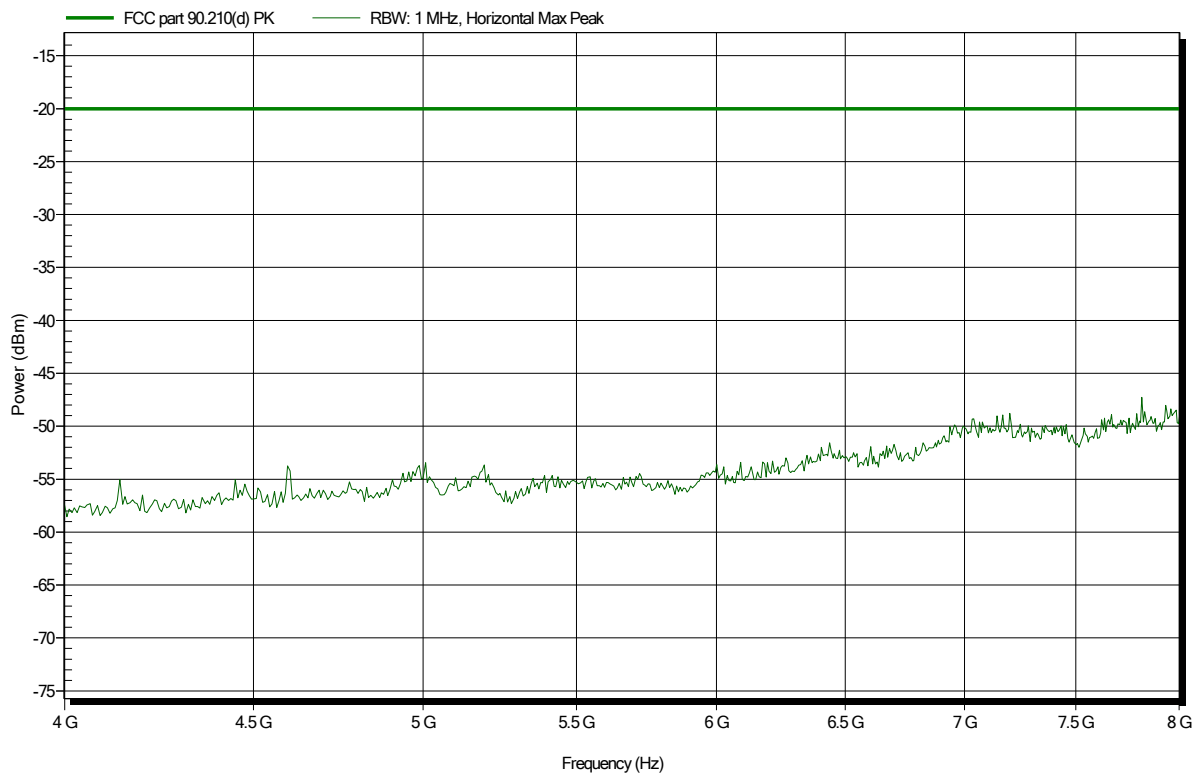
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.38 GHz	-58.1 dBm	-20 dBm	-38.06 dB	Pass
1.841 GHz	-58.6 dBm	-20 dBm	-38.59 dB	Pass
2.298 GHz	-47.6 dBm	-20 dBm	-27.61 dB	Pass
2.428 GHz	-45 dBm	-20 dBm	-25.01 dB	Pass
2.76 GHz	-57.4 dBm	-20 dBm	-37.41 dB	Pass
3.683 GHz	-50 dBm	-20 dBm	-30.01 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Toralf Jahn
Measurement software: RadiMation, version 2016.1.10
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 3 m
Mode: TX; 460.11875 MHz
Test Date: 2020-04-21
Note:

Index 20

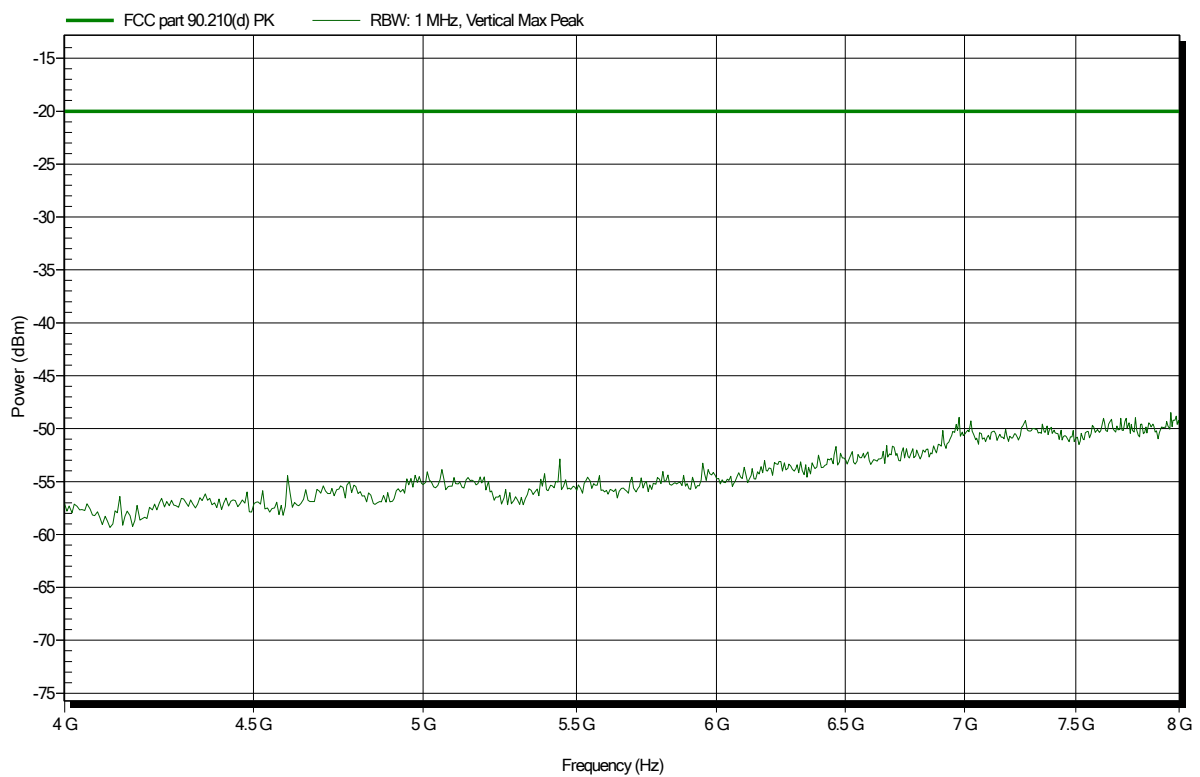


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Toralf Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 3 m
Mode: TX; 460.11875 MHz
Test Date: 2020-04-21
Note:

Index 18

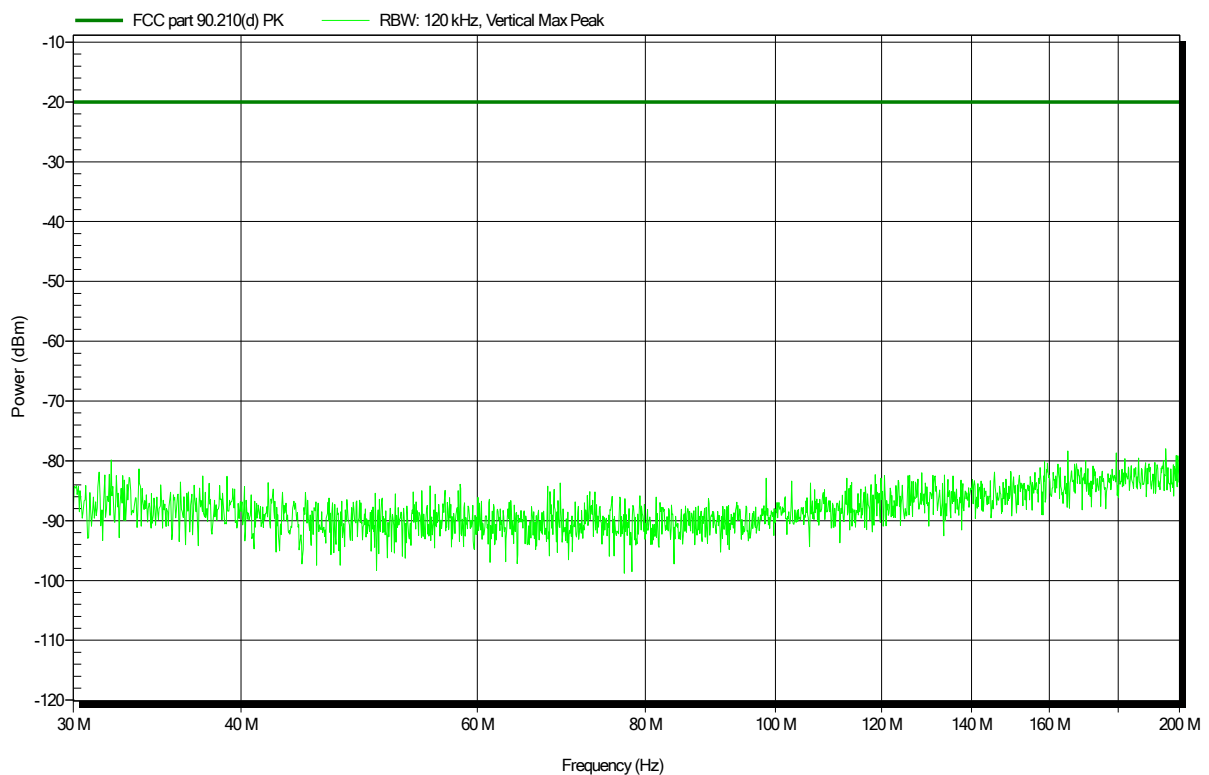


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; 469.9875 MHz
 Test Date: 2020-04-17
 Note:

Index 6

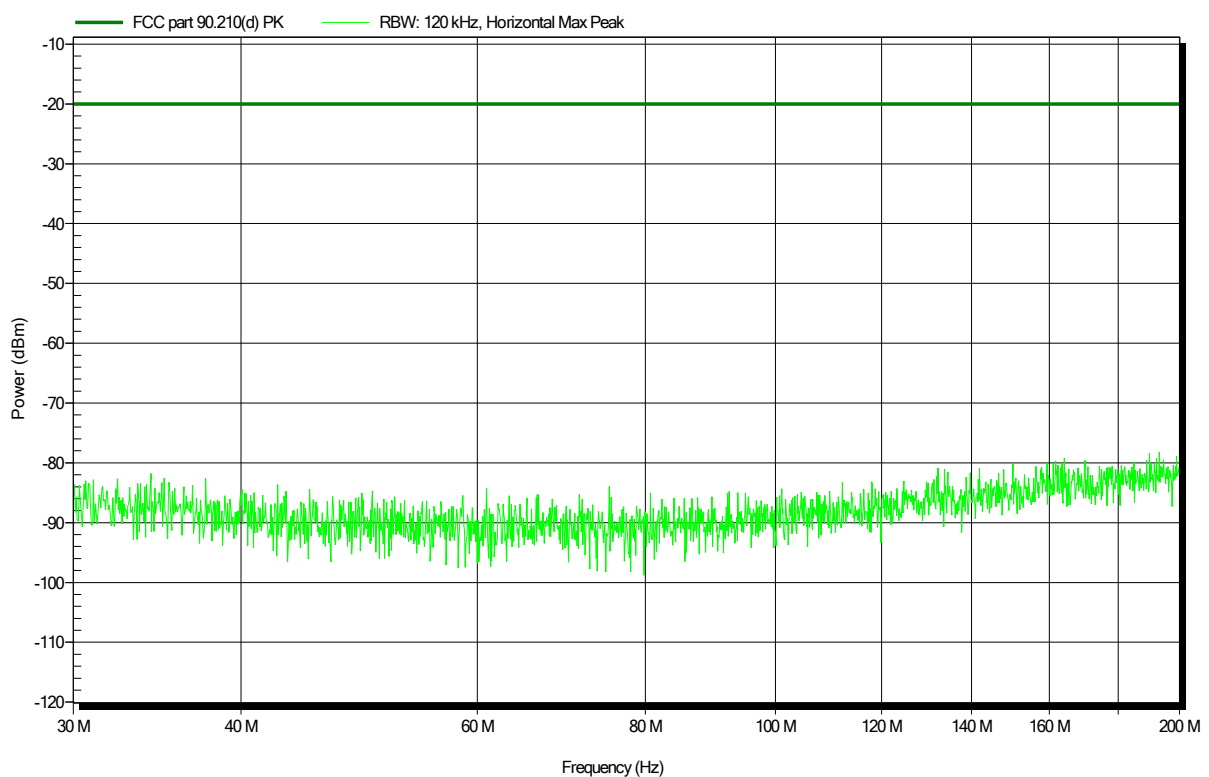


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; 469.9875 MHz
 Test Date: 2020-04-17
 Note:

Index 5

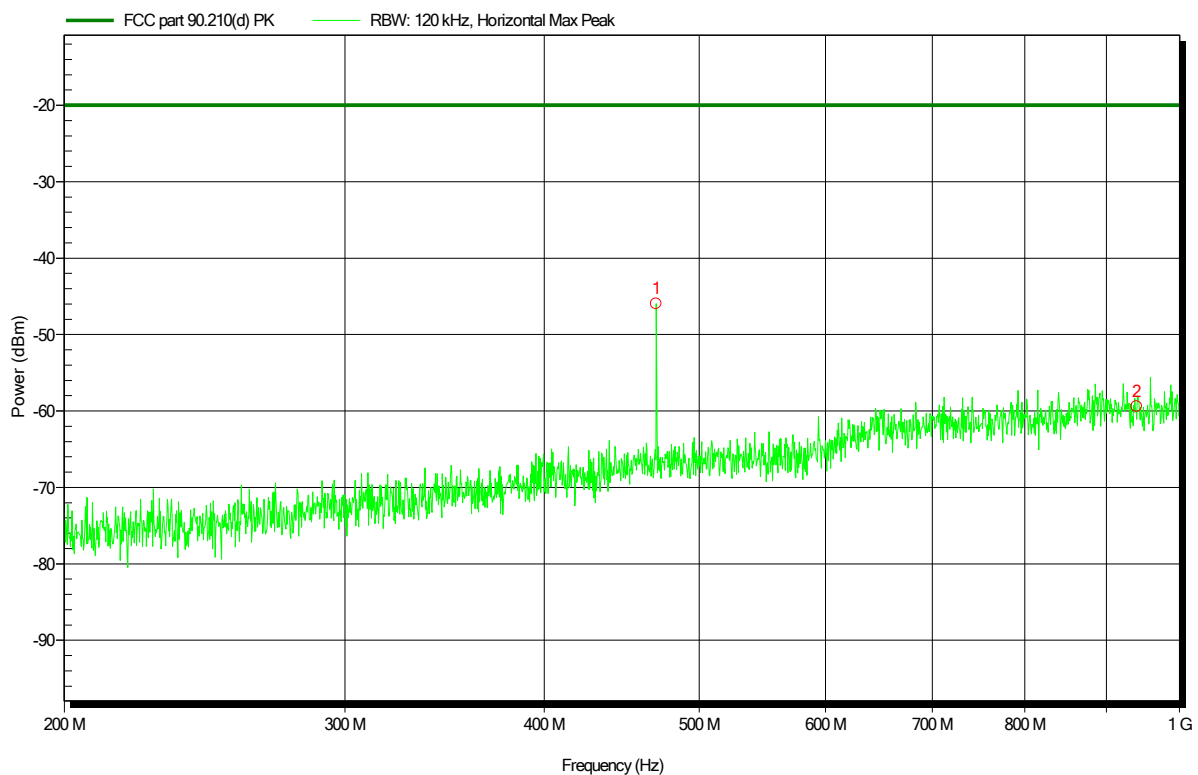


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; 469.9875 MHz
 Test Date: 2020-04-17
 Note: with notch filter

Index 11



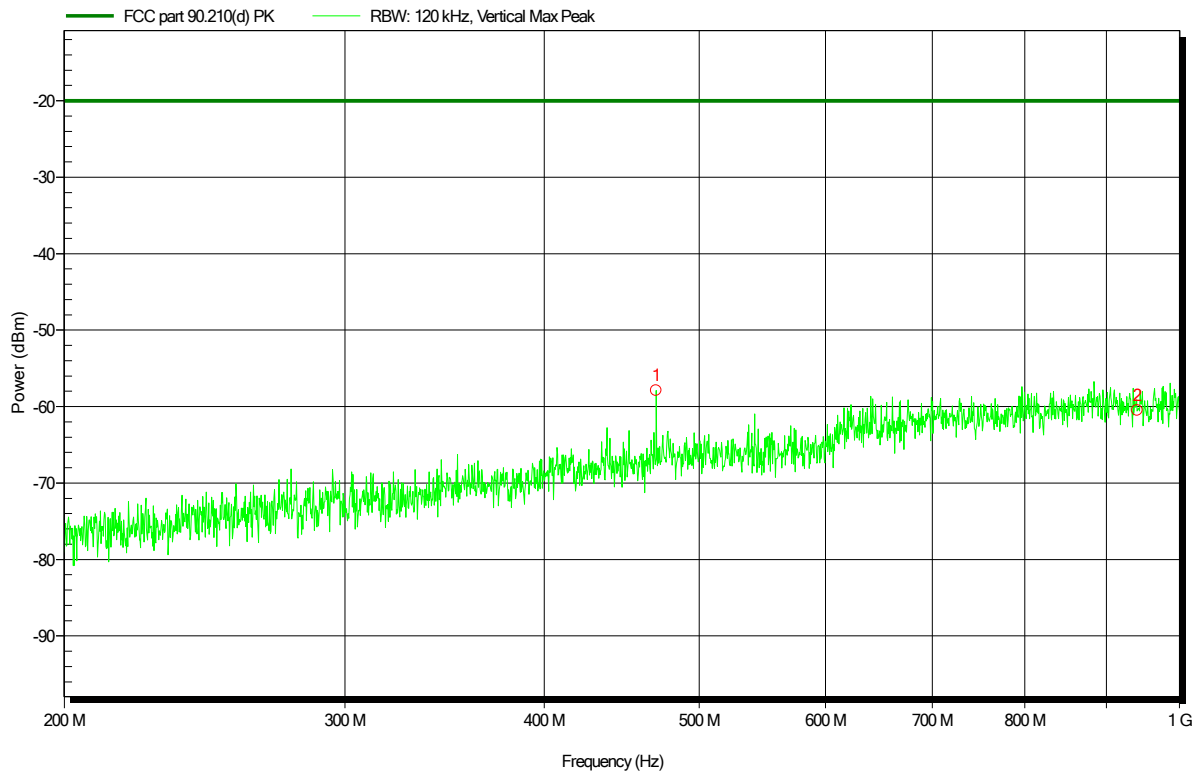
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
470 MHz	-46 dBm	-20 dBm	-25.98 dB	Pass
940 MHz	-59.4 dBm	-20 dBm	-39.4 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3 m
Mode: TX; 469.9875 MHz
Test Date: 2020-04-17
Note: with notch filter

Index 12



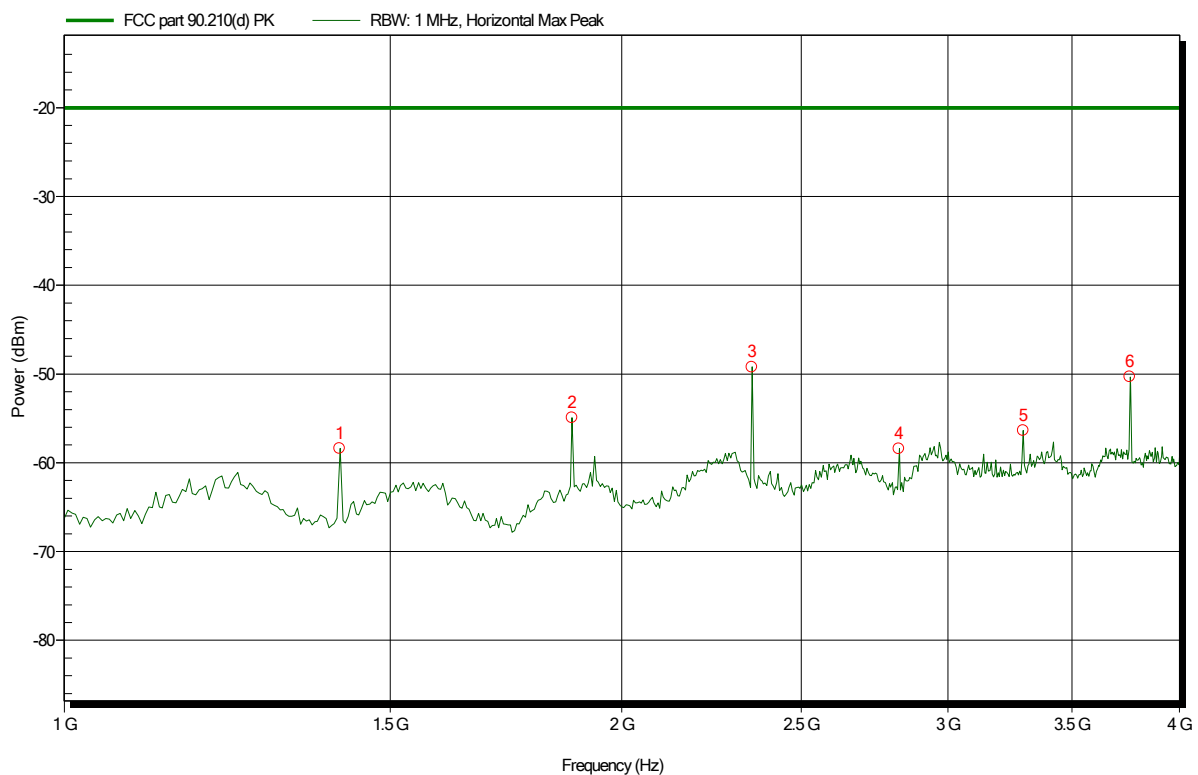
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
470 MHz	-57.9 dBm	-20 dBm	-37.91 dB	Pass
940.7 MHz	-60.5 dBm	-20 dBm	-40.48 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Toralf Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 3 m
Mode: TX; 469.9875 MHz
Test Date: 2020-04-21
Note:

Index 21

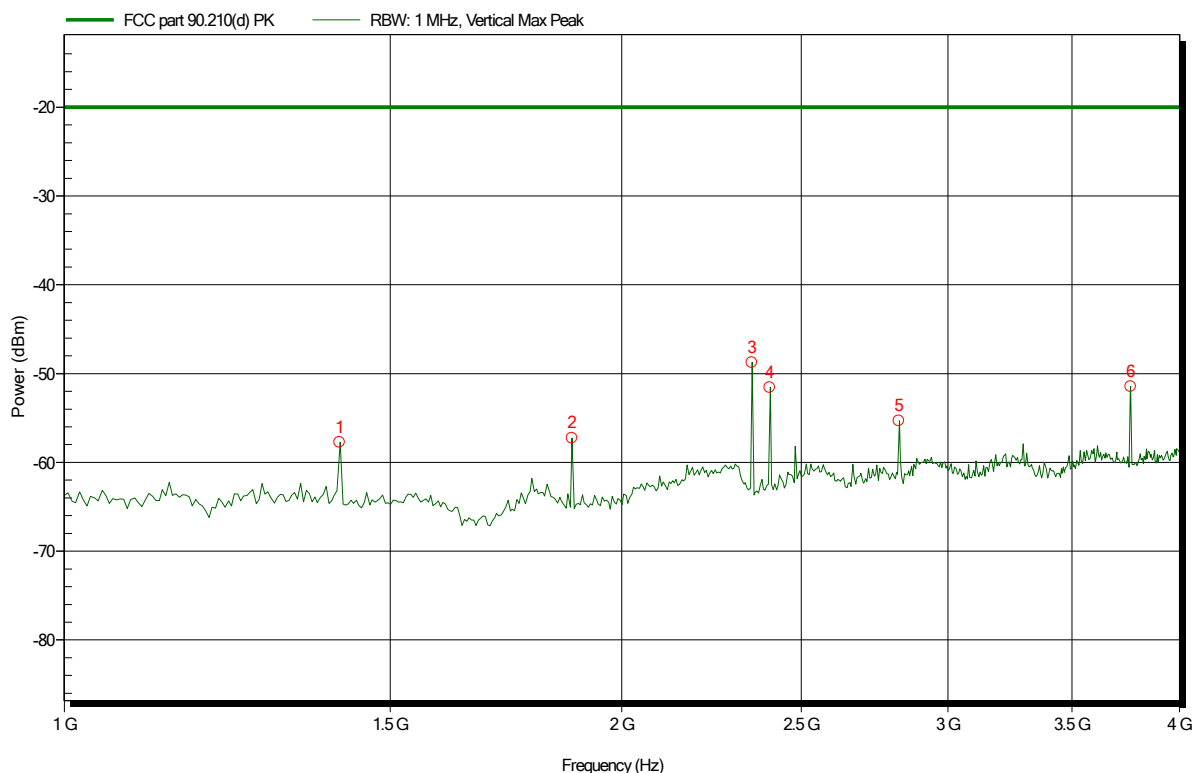


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.409 GHz	-58.4 dBm	-20 dBm	-38.4 dB	Pass
1.88 GHz	-54.9 dBm	-20 dBm	-34.93 dB	Pass
2.351 GHz	-49.2 dBm	-20 dBm	-29.21 dB	Pass
2.822 GHz	-58.4 dBm	-20 dBm	-38.4 dB	Pass
3.293 GHz	-56.4 dBm	-20 dBm	-36.37 dB	Pass
3.76 GHz	-50.3 dBm	-20 dBm	-30.31 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; 469.9875 MHz
 Test Date: 2020-04-21
 Note:

Index 23

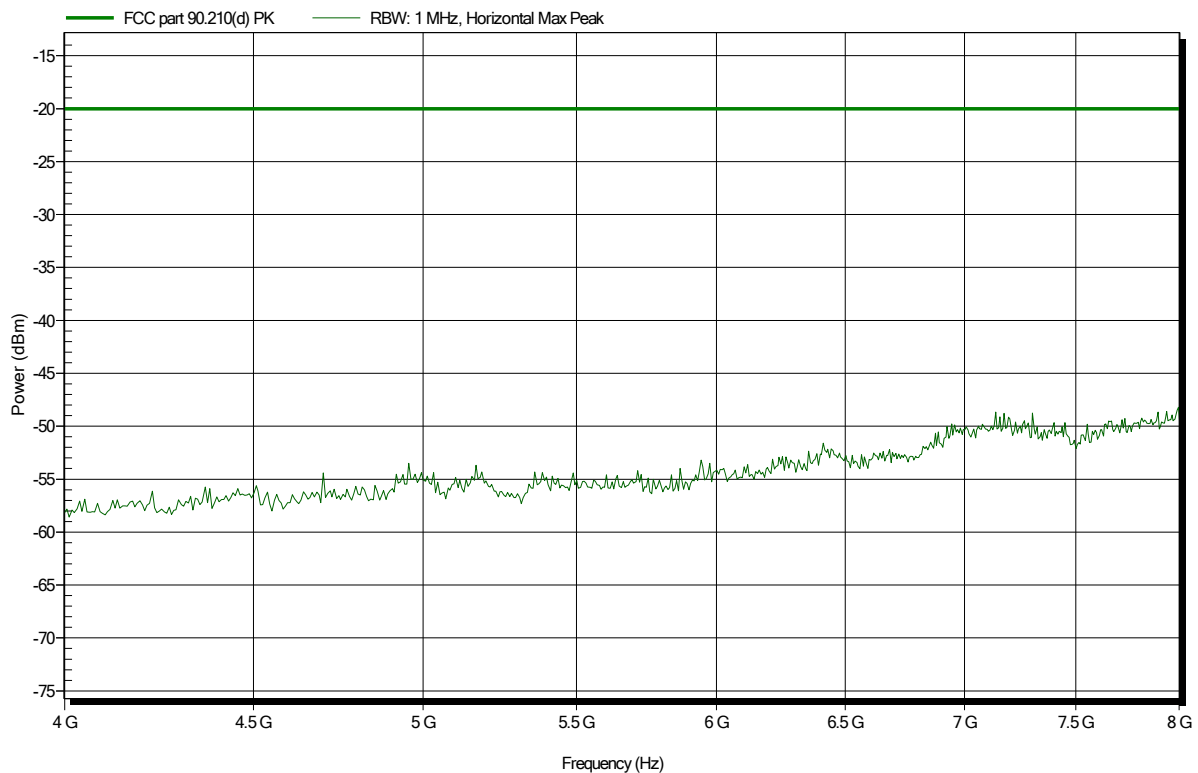


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.409 GHz	-57.7 dBm	-20 dBm	-37.73 dB	Pass
1.88 GHz	-57.3 dBm	-20 dBm	-37.25 dB	Pass
2.351 GHz	-48.7 dBm	-20 dBm	-28.74 dB	Pass
2.404 GHz	-51.6 dBm	-20 dBm	-31.55 dB	Pass
2.822 GHz	-55.3 dBm	-20 dBm	-35.32 dB	Pass
3.764 GHz	-51.4 dBm	-20 dBm	-31.45 dB	Pass

Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; 469.9875 MHz
 Test Date: 2020-04-21
 Note:

Index 22

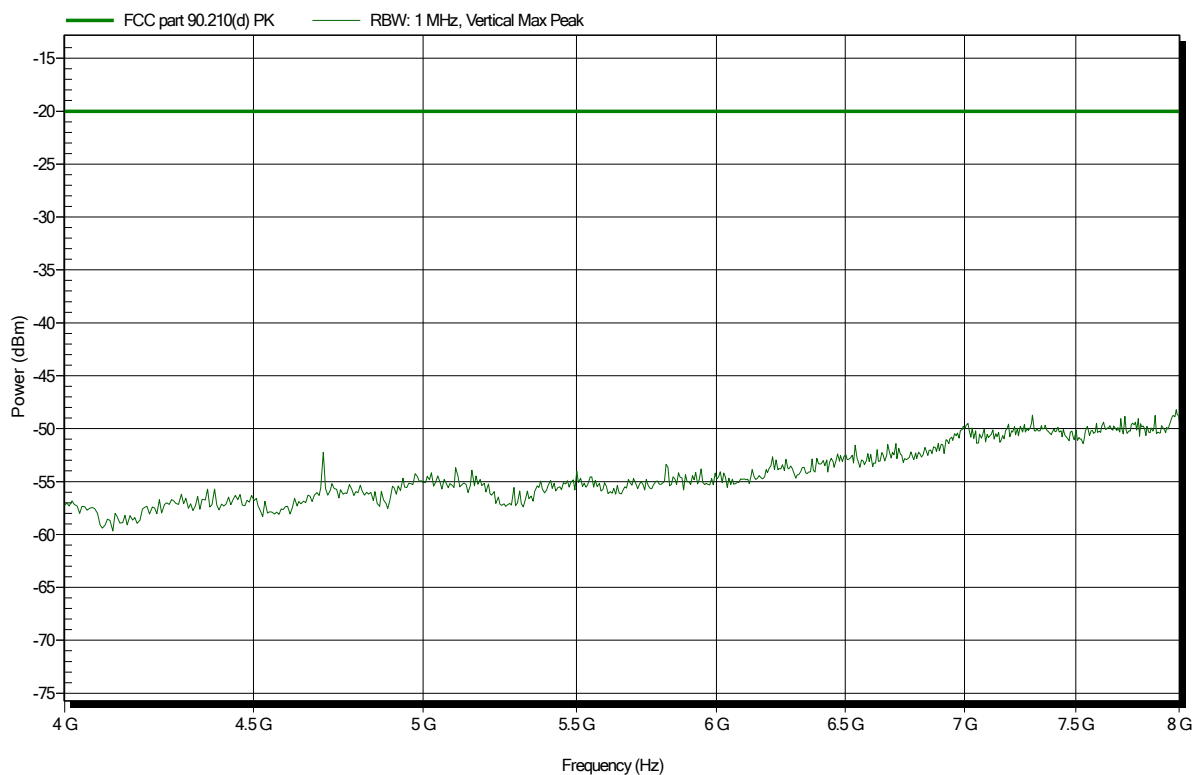


Spurious emissions according to FCC Part 90

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Toralf Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 3 m
Mode: TX; 469.9875 MHz
Test Date: 2020-04-21
Note:

Index 24



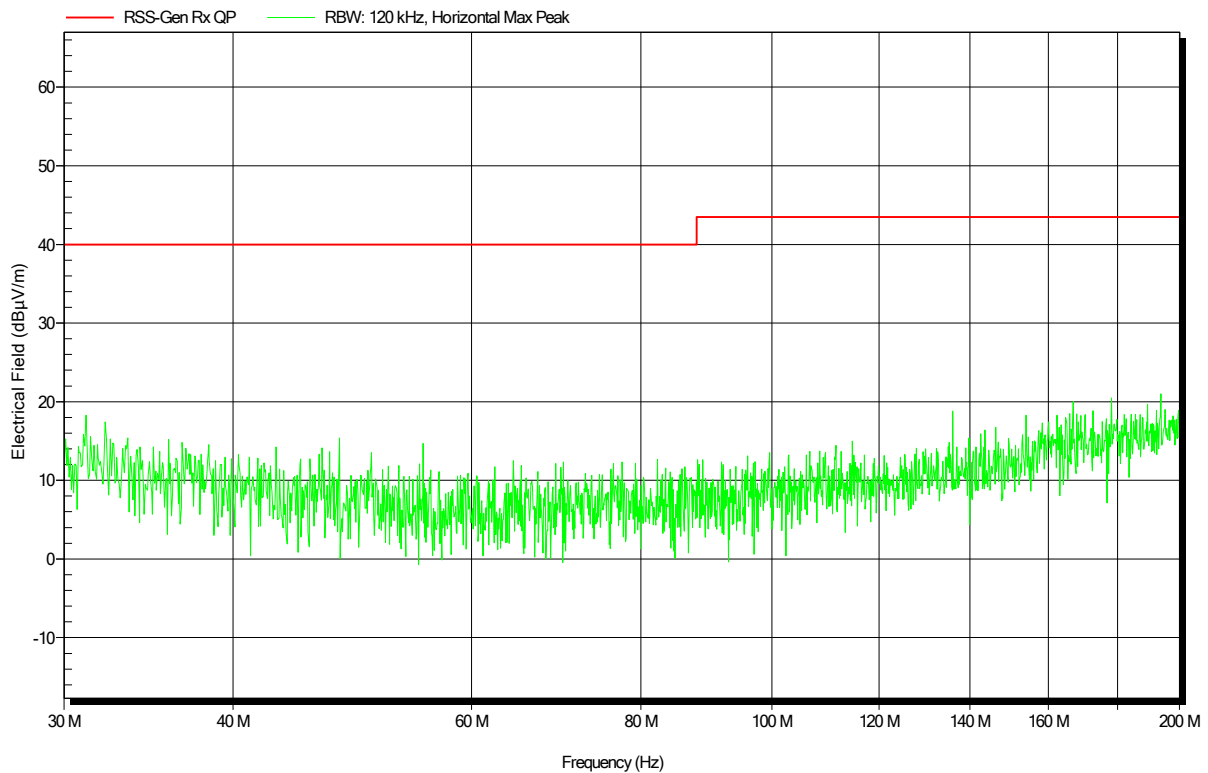
ANNEX C Receiver radiated emissions

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Measurement software: RadiMation, version 2016.1.10
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HK 116, Horizontal
Measurement distance: 3 m
Mode: RX; 460.11875 MHz; pit antenna
Test Date: 2020-04-17
Note:

Index 24

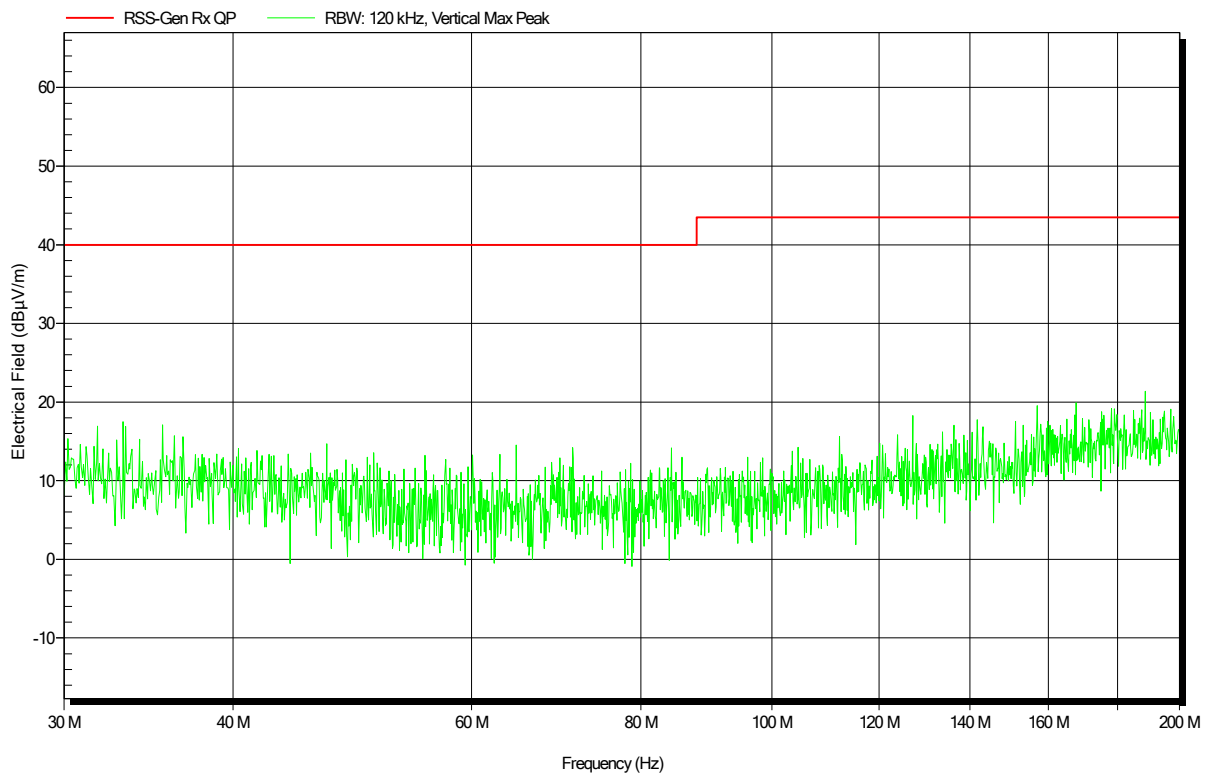


Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; pit antenna
 Test Date: 2020-04-17
 Note:

Index 23

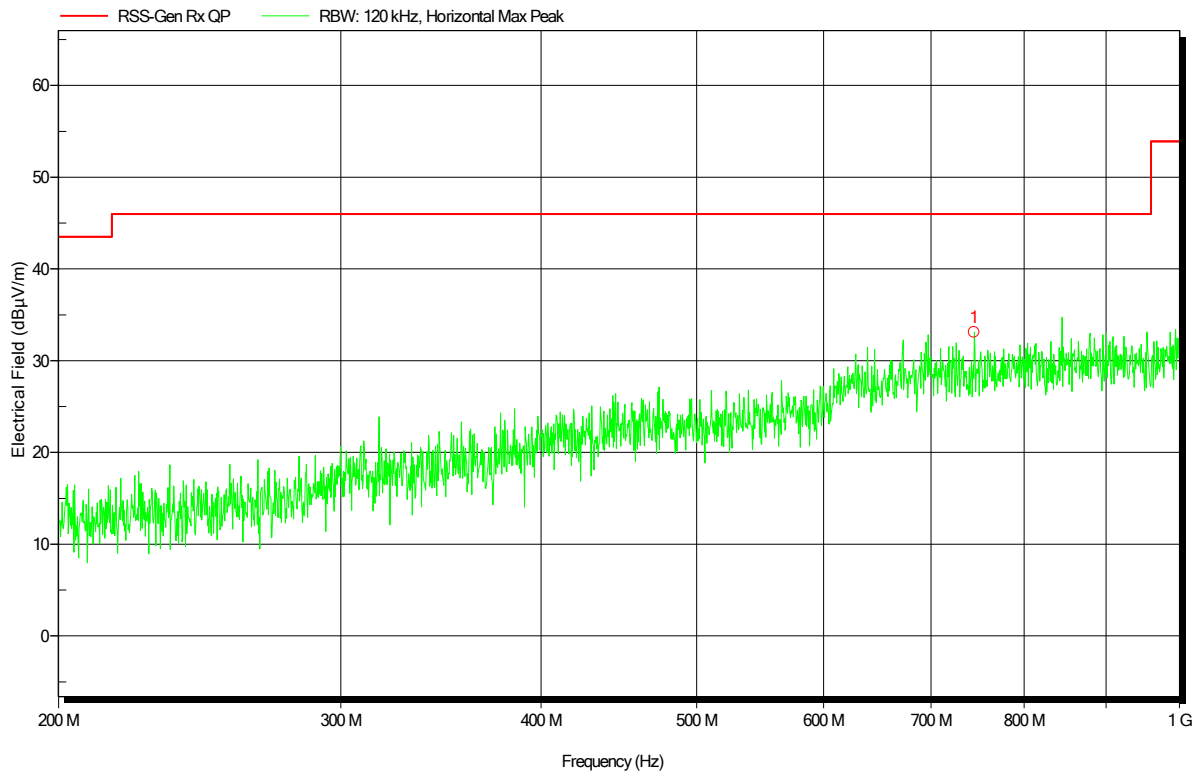


Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; pit antenna
 Test Date: 2020-04-17
 Note:

Index 21



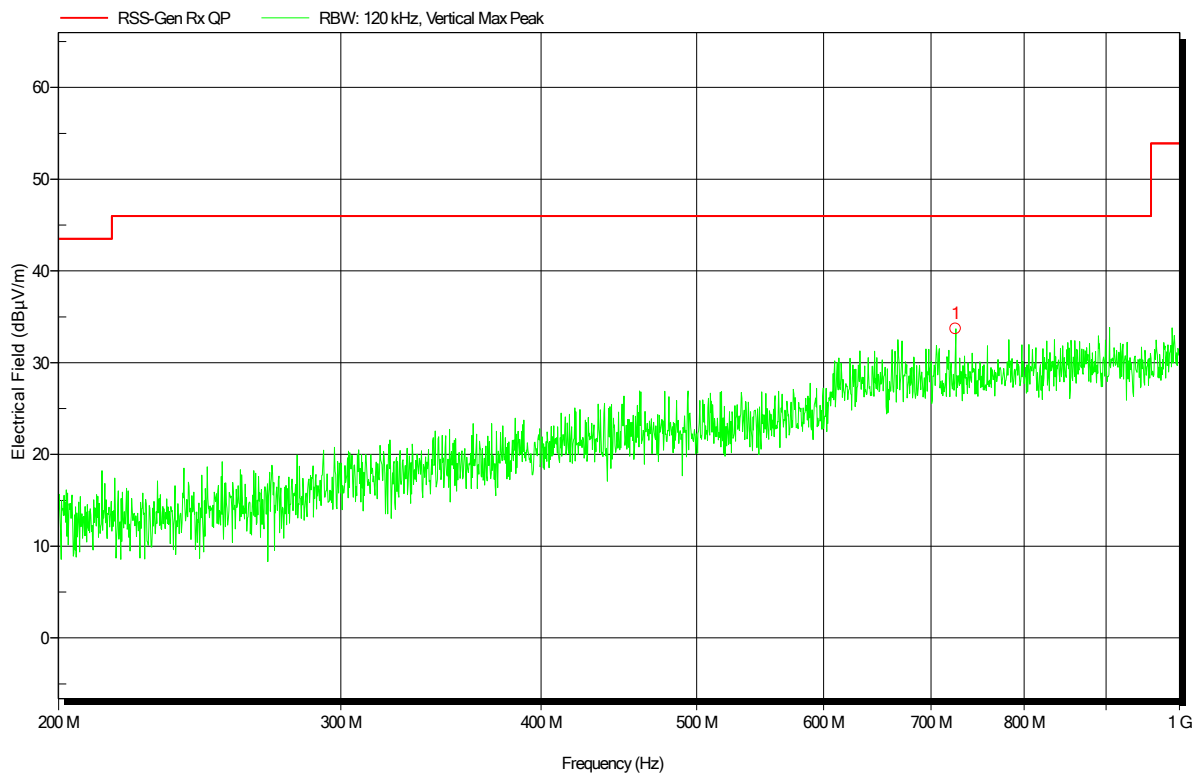
Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
744.4611 MHz	33.1 dBµV/m	46 dBµV/m	-12.89 dB	Pass	0 Degree	1 m

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; pit antenna
 Test Date: 2020-04-17
 Note:

Index 22



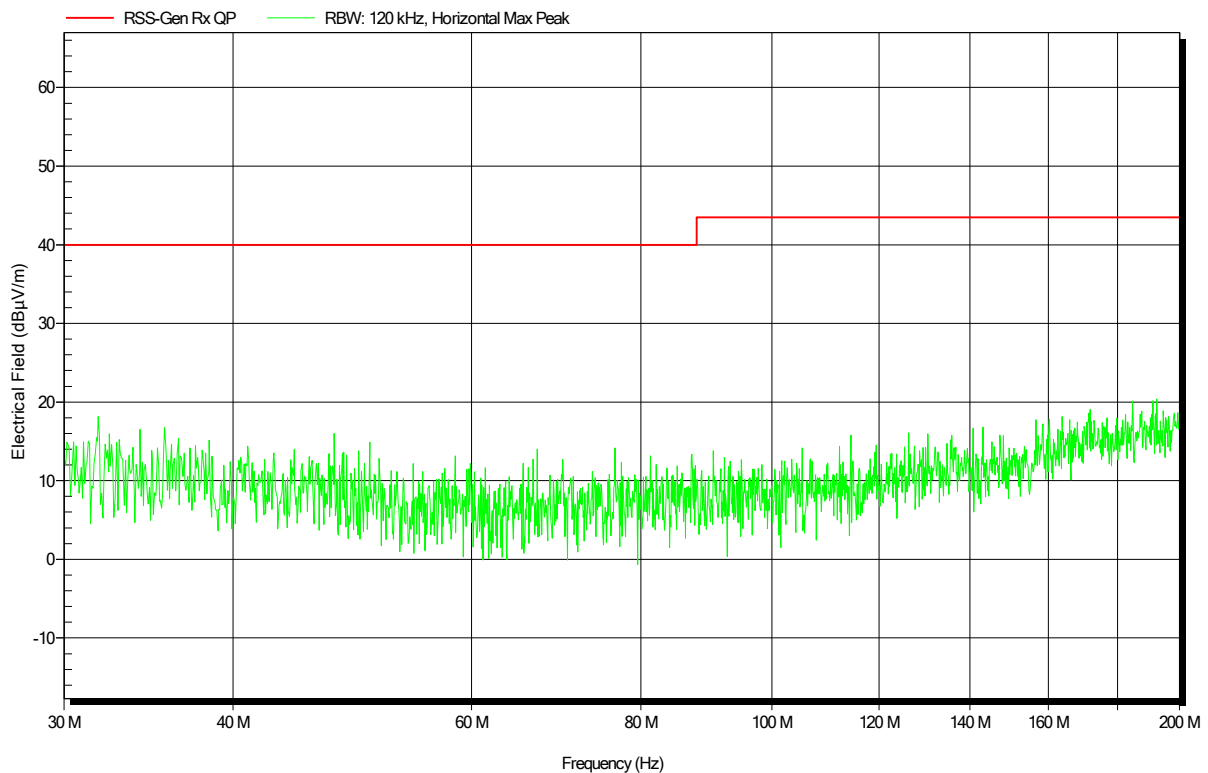
Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
724.9475 MHz	33.7 dBµV/m	46 dBµV/m	-12.29 dB	Pass	0 Degree	1 m

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Measurement software: RadiMation, version 2016.1.10
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HK 116, Horizontal
Measurement distance: 3 m
Mode: RX; 460.11875 MHz; rod antenna
Test Date: 2020-04-17
Note:

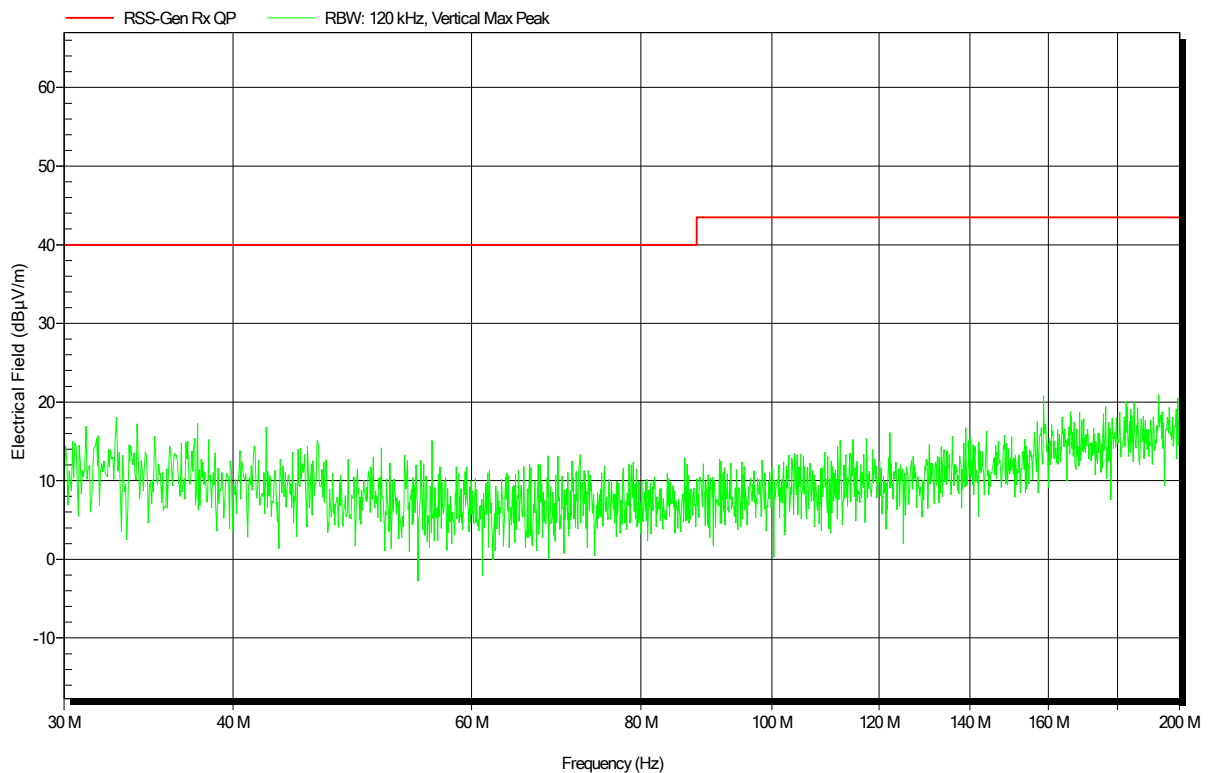
Index 15



Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; rod antenna
 Test Date: 2020-04-17
 Note:

Index 16

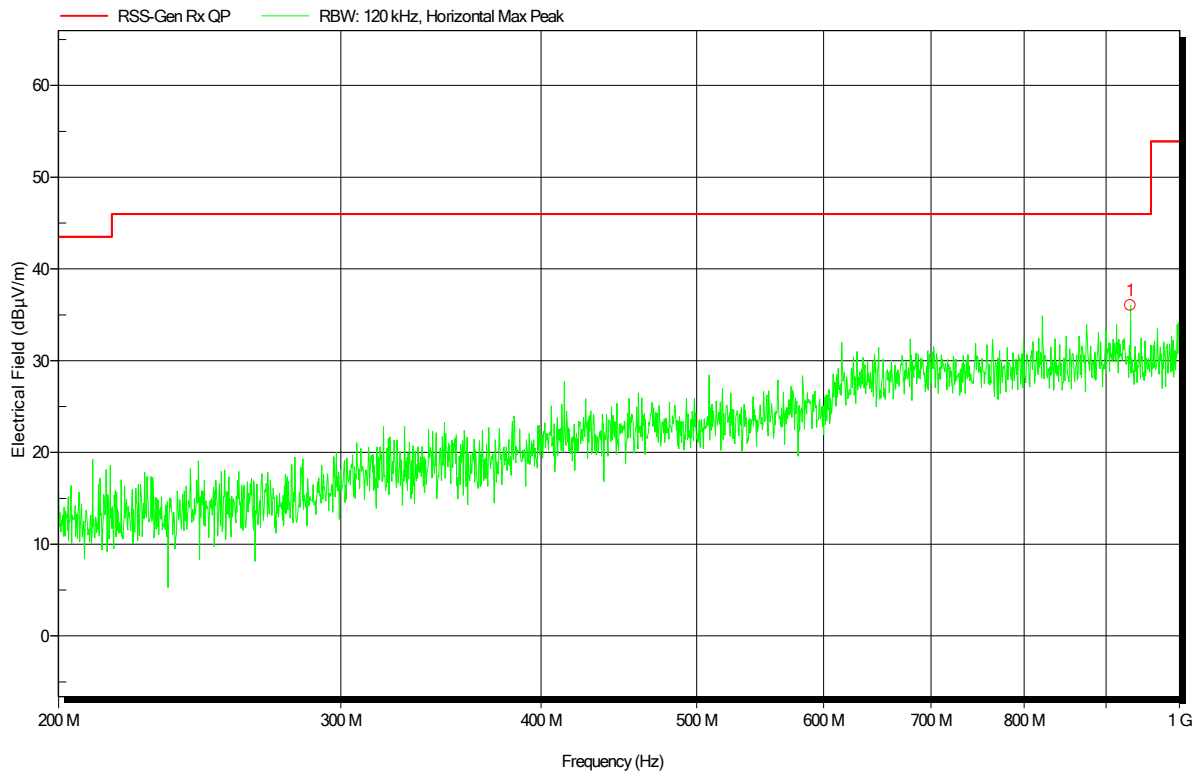


Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; rod antenna
 Test Date: 2020-04-17
 Note:

Index 14

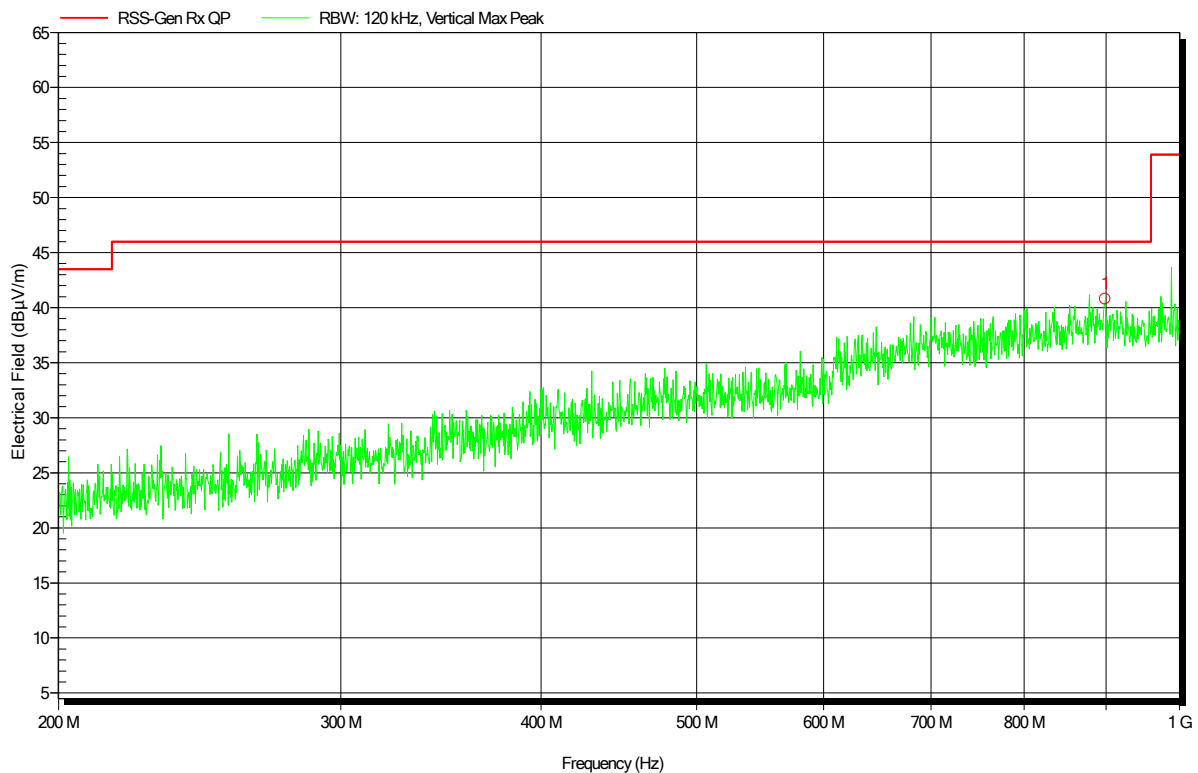


Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
931.5521 MHz	36.1 dBµV/m	46 dBµV/m	-9.95 dB	Pass	0 Degree	1 m

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; rod antenna
 Test Date: 2020-04-17
 Note:

Index 13

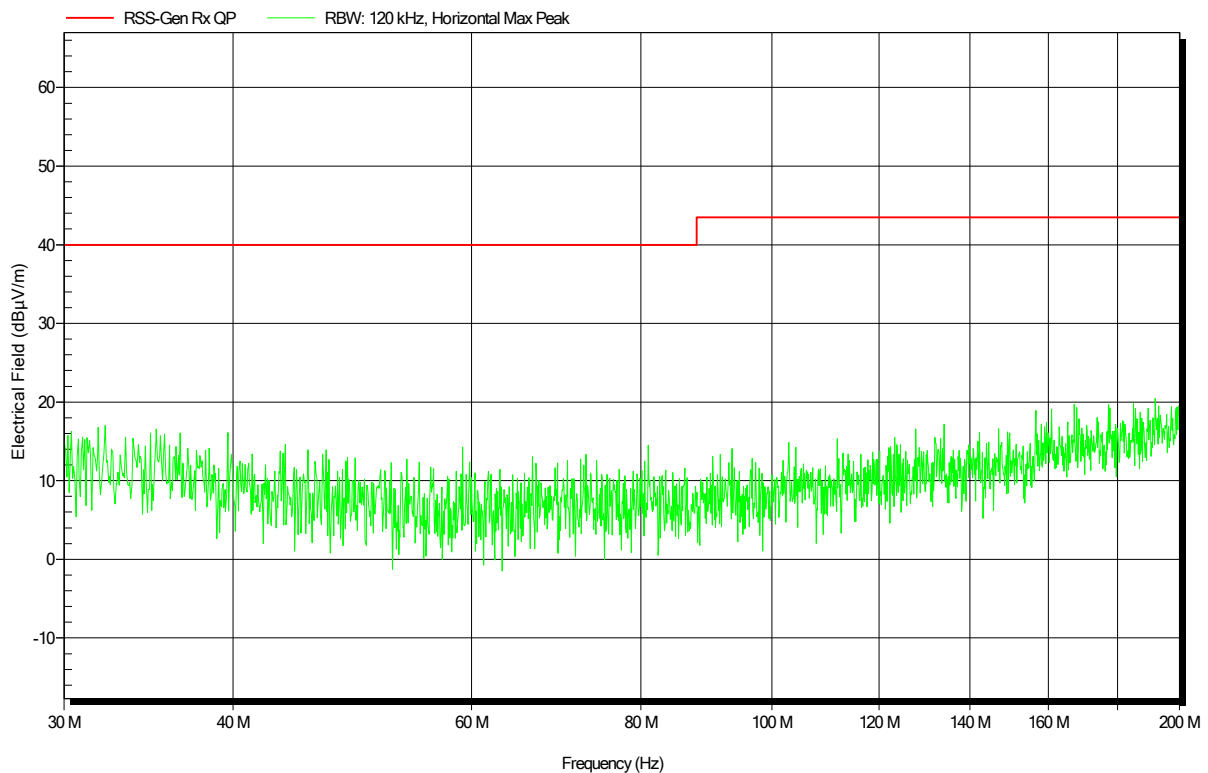


Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
898.7691 MHz	40.8 dBµV/m	46 dBµV/m	-5.21 dB	Pass	0 Degree	1 m

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; wall antenna
 Test Date: 2020-04-17
 Note:

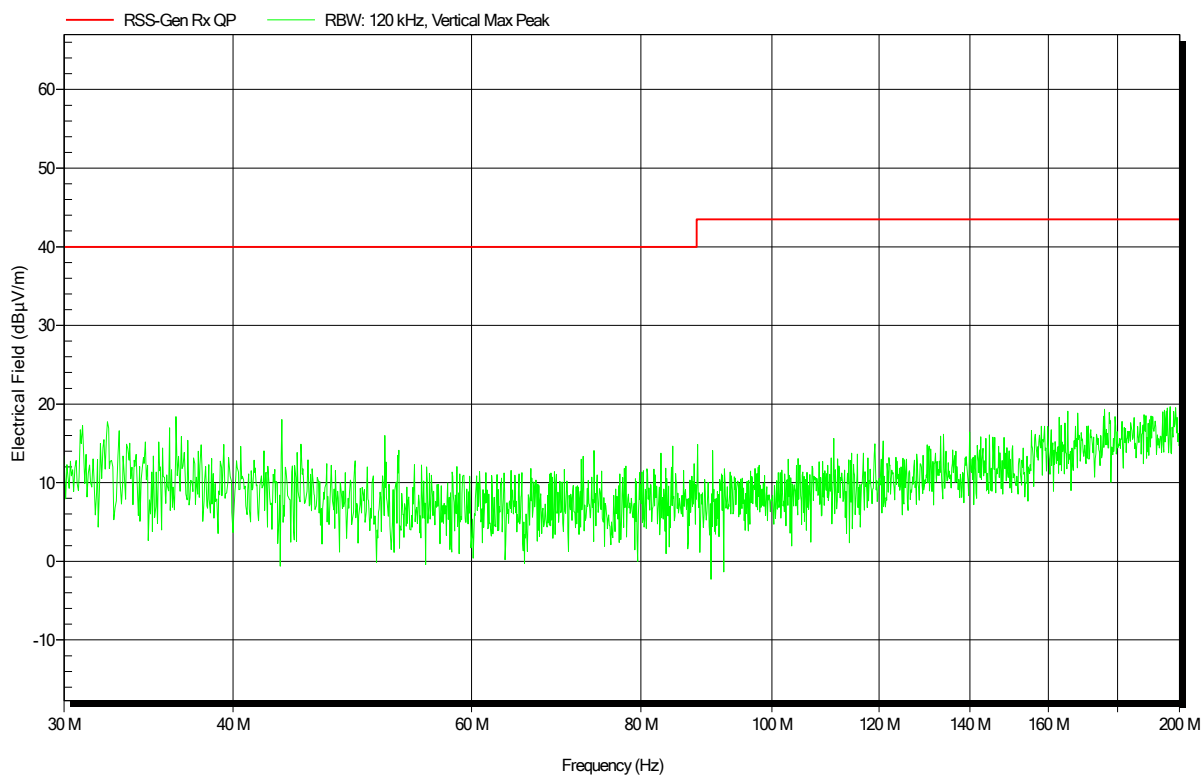
Index 17



Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; wall antenna
 Test Date: 2020-04-17
 Note:

Index 18

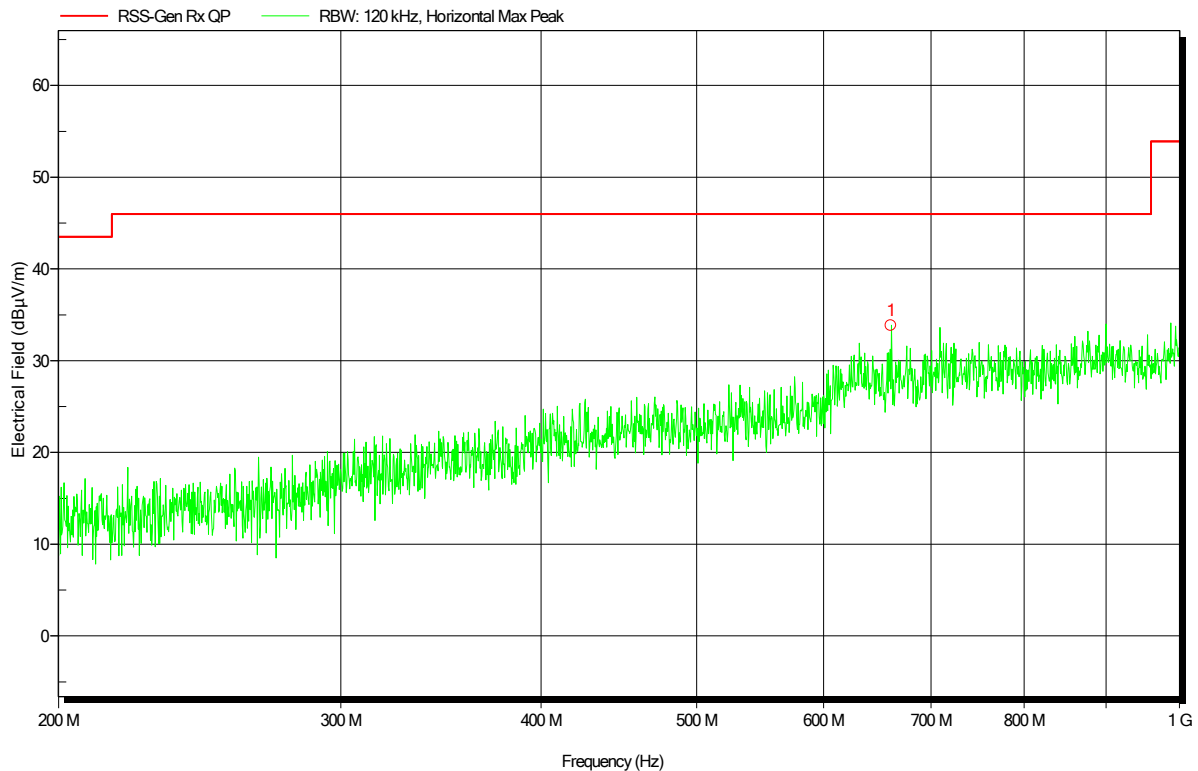


Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Mr. Jahn
Measurement software: RadiMation, version 2016.1.10
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3 m
Mode: RX; 460.11875 MHz; wall antenna
Test Date: 2020-04-17
Note:

Index 20

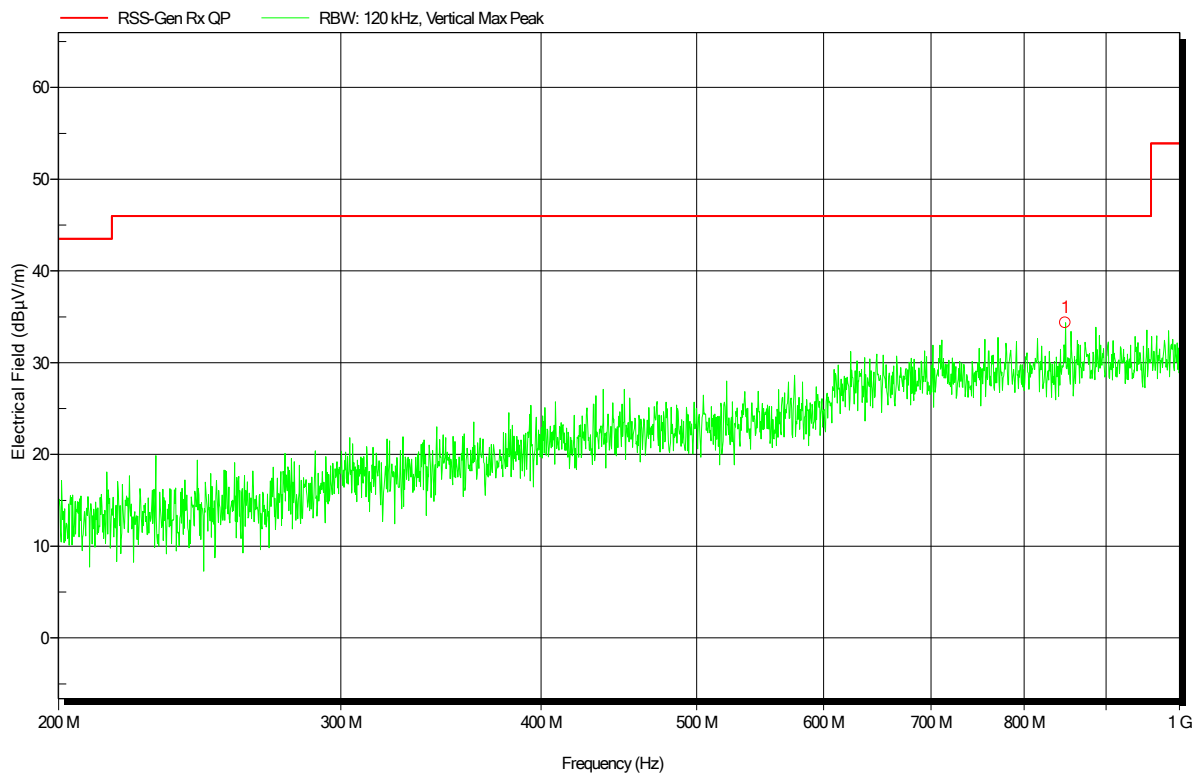


Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
660.8826 MHz	33.8 dBµV/m	46 dBµV/m	-12.16 dB	Pass	0 Degree	1 m

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2016.1.10
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: RX; 460.11875 MHz; wall antenna
 Test Date: 2020-04-17
 Note:

Index 19



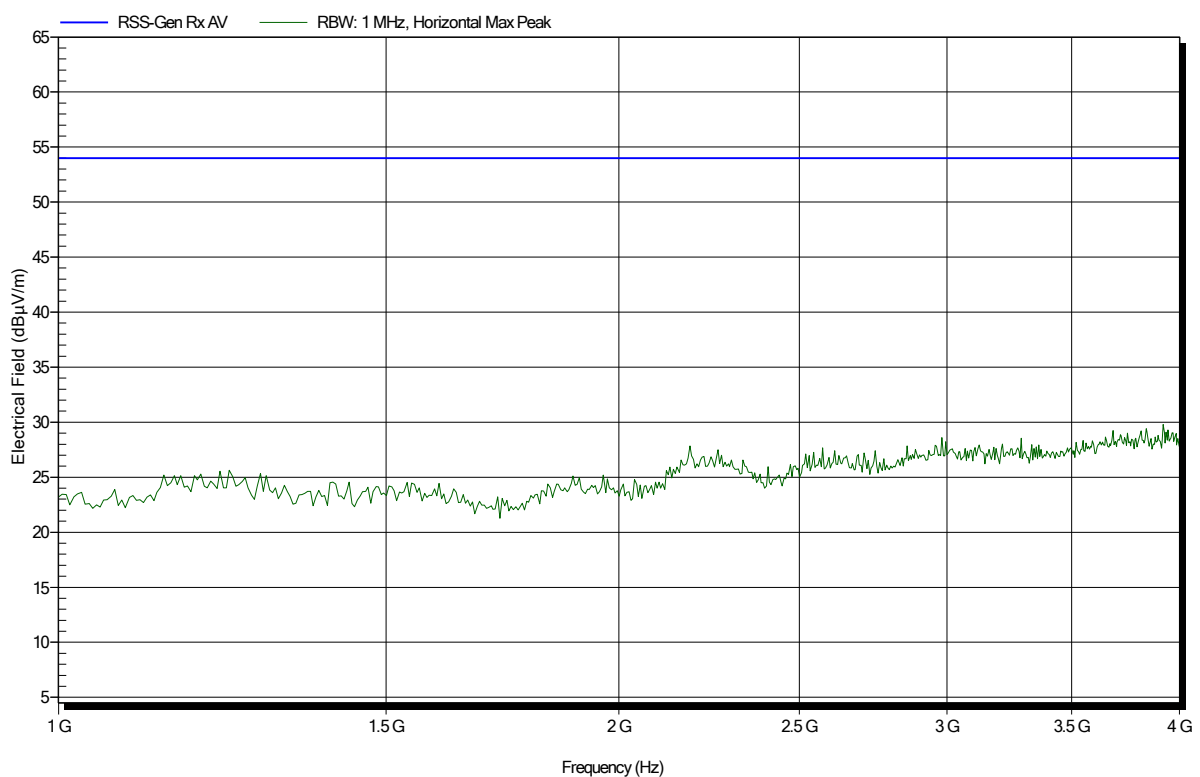
Frequency	Peak	Peak Limit	Peak Difference	Status	Angle	Height
848.6341 MHz	34.3 dBµV/m	46 dBµV/m	-11.66 dB	Pass	0 Degree	1 m

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; 460.11875 MHz; pit antenna
 Test Date: 2020-04-21
 Note:

Index 28

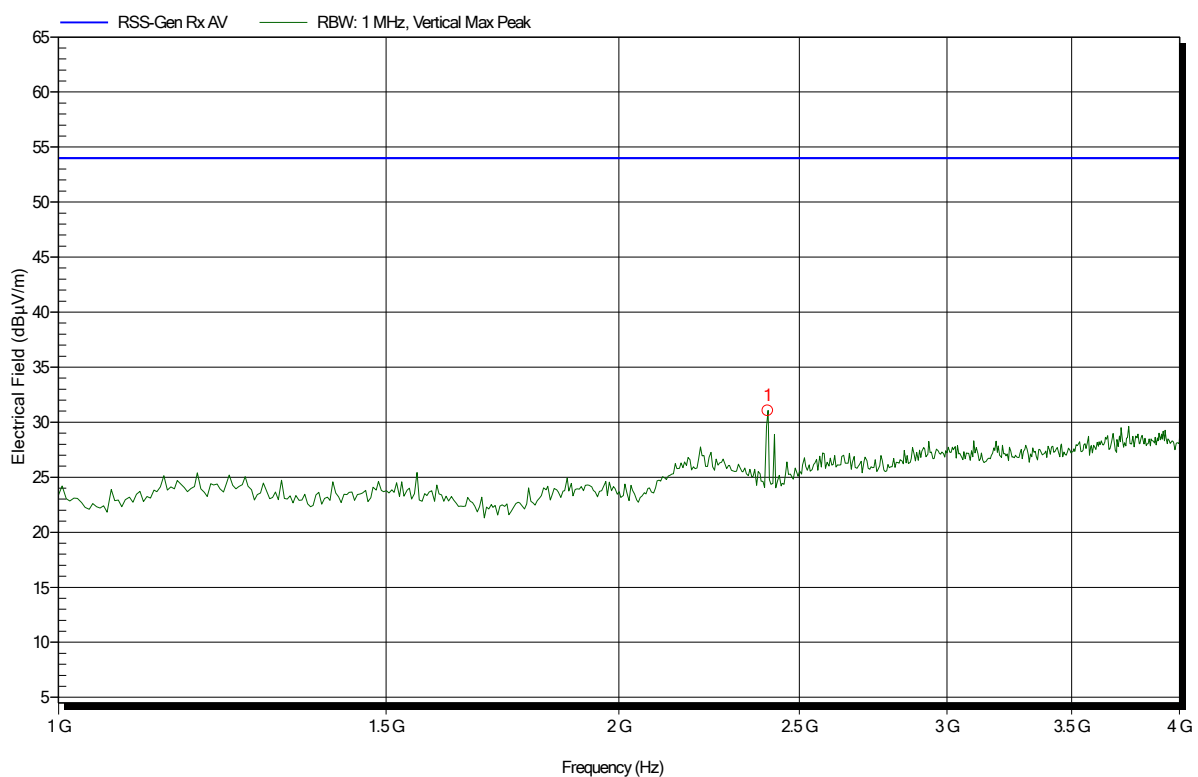


Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
EUT Name: Meter Transmit Unit
Model: Ready MTU
Test Site: Eurofins Product Service Germany
Operator: Toralf Jahn
Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
Antenna: Schwarzbeck BBHA 9120D, Vertical
Measurement distance: 1 m converted to 3m
Mode: TX; 460.11875 MHz; pit antenna
Test Date: 2020-04-21
Note:

Index 27



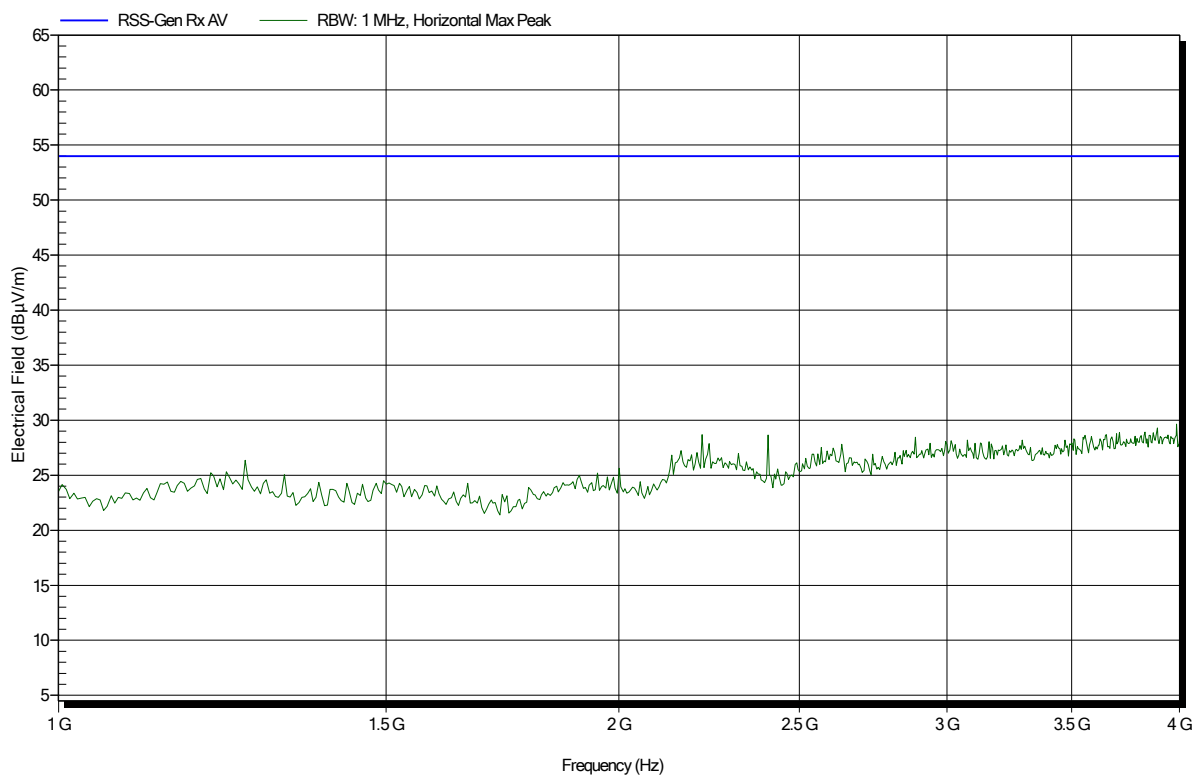
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.404 GHz	31.05 dBµV/m	53.98 dBµV/m	-22.93 dB	Pass

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; 460.11875 MHz; rod antenna
 Test Date: 2020-04-21
 Note:

Index 25

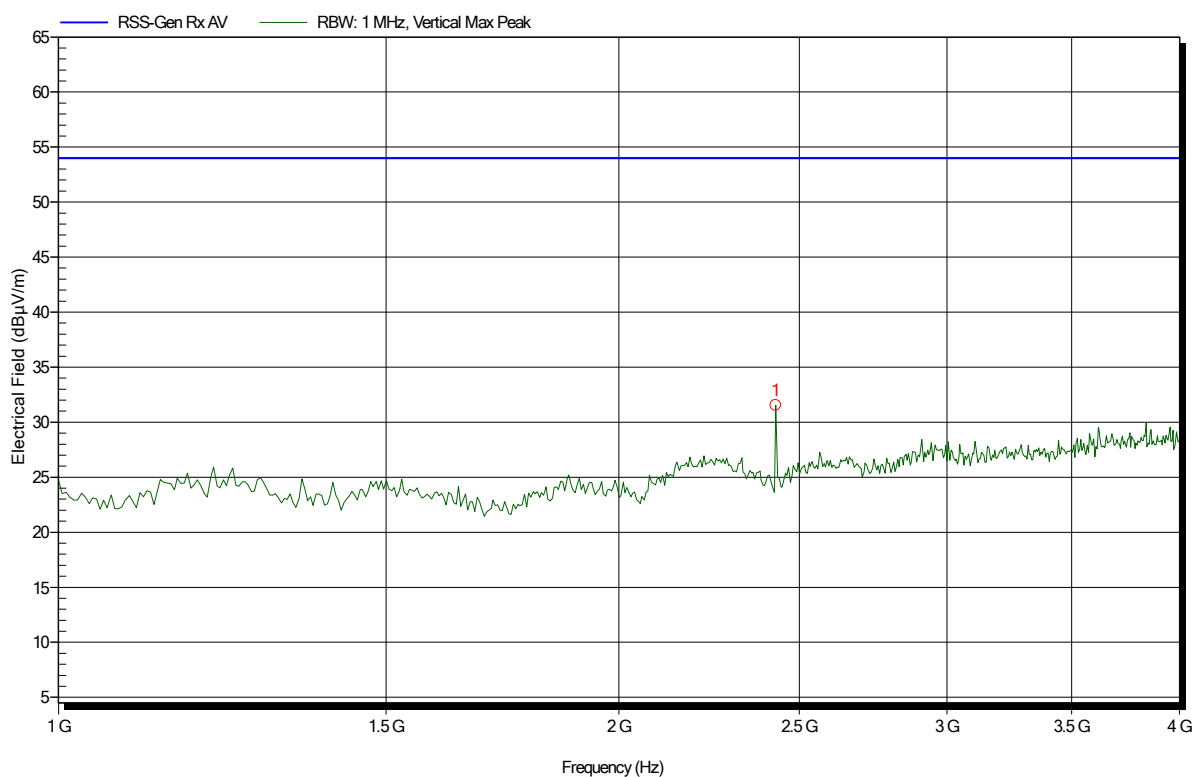


Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; 460.11875 MHz; rod antenna
 Test Date: 2020-04-21
 Note:

Index 26

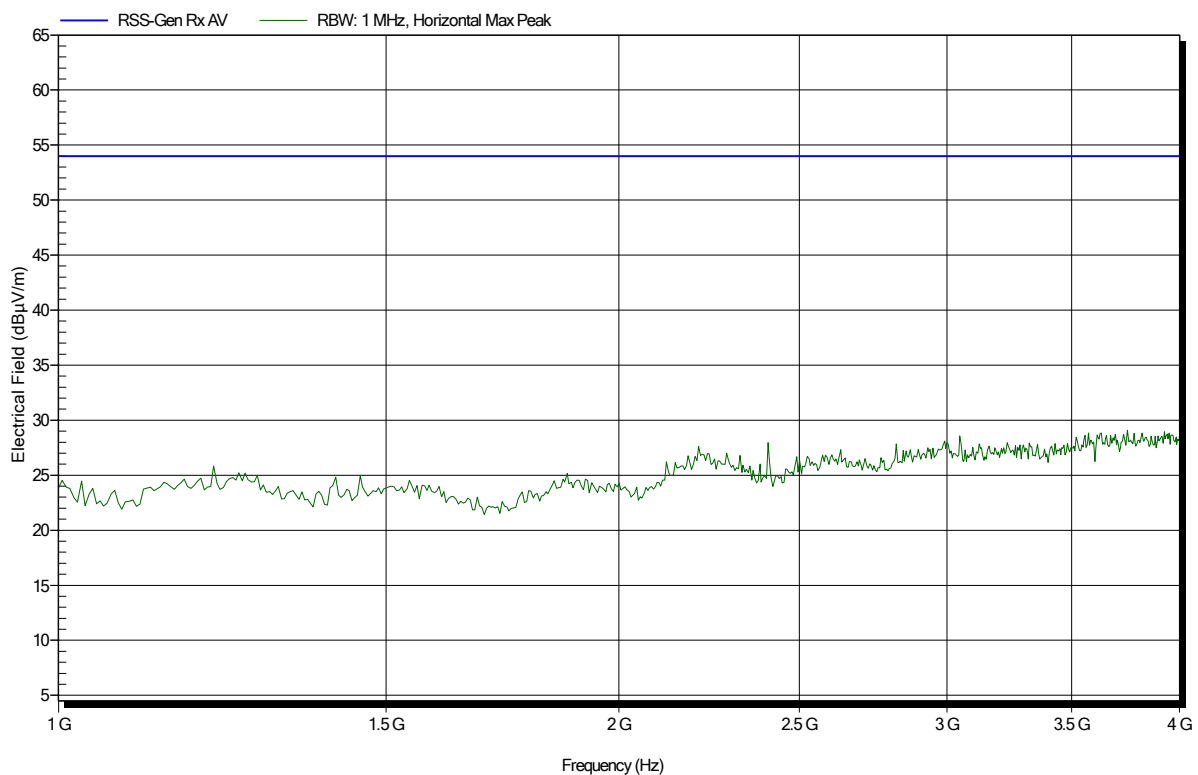


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.428 GHz	31.52 dBµV/m	53.98 dBµV/m	-22.46 dB	Pass

Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868
 Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; 460.11875 MHz; wall antenna
 Test Date: 2020-04-21
 Note:

Index 29



Spurious emissions according to RSS-Gen

Project number: G0M-2002-8868

Applicant: Kamstrup A/S
 EUT Name: Meter Transmit Unit
 Model: Ready MTU
 Test Site: Eurofins Product Service Germany
 Operator: Toralf Jahn
 Test Conditions: Tnom: 24°C, Vnom: 3.6 VDC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; 460.11875 MHz; wall antenna
 Test Date: 2020-04-21
 Note:

Index 30

