Gantner Electronic GmbH

TEST REPORT

SCOPE OF WORK
RADIO TESTING – GAT NET.Controller S 7020 BA

REPORT NUMBER
2236260KAU-001

ISSUE DATE

04-June-2019

PAGES
68

DOCUMENT CONTROL NUMBER
R_FCC 15-225_18-01 (25-January-2018)

TYPE:	GAT NET.Controller S 7020 BA
DESCRIPTION:	SUB-Control unit for electronic locker locks
SERIAL NO:	1908000001

All measurement results refer to the equipment which was tested

MANUFACTURER:	Gantner Electronic GmbH
CUSTOMER NAME:	Gantner Electronic GmbH
ADDRESS (CUSTOMER):	Montafonerstraße 8 AT-6780 Schruns Österreich
REPORT NO:	2236260KAU-001
TEST RESULT:	The equipment complies to 47 CFR Part 15, Subpart C, Intentional radiators, section 15.225 / RSS-210, Issue 9 and RSS-GEN, Issue 5 (Referring to the operating modes specified in this report).
TEST LABORATORY:	Intertek Deutschland GmbH Innovapark 20, 87600 Kaufbeuren Germany
FCC DESIGNATION NUMBER:	DE0014
FCC TEST FIRM REGISTRATION NUMBER:	359260
ISED CAB IDENTIFIER:	DE0014
ISED #:	24854
TEST ENGINEER:	R. Dressler Technical Manager EMC/ Radio
REVIEWER:	U. Gronert Senior Project Engineer

Details about Accreditations/Acceptances

EMC / Radio National

DAkkS Deutsche Akkreditierungsstelle D-PL-12085-01-01	The Intertek Deutschland EMC-Lab is accredited by the Deutsche Akkreditierungsstelle GmbH (DAkkS) Registration Number (EMC general): **D-PL-12085-01-01** Registration Number (EMC Med): **D-PL-12085-01-03**

International

IECEE CB SCHEME	The Intertek Deutschland EMC-Lab is accepted to participate in the IECEE (IEC Conformity assessment for Electrotechnical Equipment and Components) CB-Scheme CB Test Laboratory: **TL118**
FCC Federal Communications Commission	The Intertek Deutschland EMC-Lab is accredited for the Federal Communications Commission (FCC) Designation Number: **DE0014** Test Firm Registration Number: **359260**
Bundesnetzagentur BNetzA-CAB-16/21-10	The *Bundesnetzagentur* recognizes Intertek Deutschland GmbH as Conformity Assessment Body in the sector electromagnetic compatibility (EMC).
Innovation, Science and Economic Development Canada	The Intertek Deutschland EMC-Lab is accredited for Innovation, Science and Economic Development Canada (ISED) ISED CAB IDENTIFIER: **DE0014** ISED #: **24854**

Automotive

KBA Anerkennungsstelle Anerkannt unter KBA-P 00046-03	The Intertek Deutschland EMC-Lab is recognized as technical service of the Kraftfahrt-Bundesamt (KBA) Registration Number: **KBA-P 00046-03**

SECTION 1
CONTENTS

SECTION 2
MEASUREMENT AND TEST SPECIFICATION

47 CFR Part 15, Subpart C, Intentional radiators, section 15.207 and section 15.225 / RSS-210, Issue 9 and RSS-GEN, Issue 5

Test methods in:
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

No additions, deviations or exclusions have been made from standards and accreditation.

The test results detailed in this report apply only to the GAT NET.Controller S 7020 BA with the test setup described. Any modification such as a change, addition to or inclusion of another device into this product will require an additional evaluation.
The support equipment listed as part of the emission tests is required to properly exercise and test the device under test.

SECTION 3
GENERAL INFORMATION

Possible test case verdicts:		
Test case does not apply to the test object:	N/A (Not Applicable)	
Test object does meet the requirement:	P (Pass)	
Test object does not meet the requirements:	F (Fail)	
Samples arrived:	2019-04-18	
Testing:	2019-04-26 to 2019-06-04	
Decimal separator:	☒ Point	☐ Comma
Environmental conditions during testing:	Temperature:	15 °C - 35 °C
	Humidity:	20 % - 60 %
	Atmospheric pressure:	900 mbar - 1000 mbar
	If explicitly required by a basic standard the measured climatic conditions are documented in the corresponding test section.	

SECTION 4
SUMMARY OF TESTING

4.1 General annotation

The tests were performed in the order of the right column in the “Test Results – Overview” table.

At least at one emission test the margin to the limit is less than 3 dB. A minimum margin of 3 - 6 dB is recommended for a serial production.

4.2 Measurement uncertainty

For each test method, an uncertainty evaluation was carried out. The results of the evaluation can be provided upon request from Intertek Deutschland GmbH.

4.3 Document History

REVISION	DATE	REPORT	CHANGES	AUTHOR
Initial release	2019-06-04	2236260KAU-001	Initial issue	RDR

SECTION 5
TEST RESULTS – OVERVIEW

EMISSION	REQUESTED	VERDICT	DATE	NO
Conducted emissions (AC power-line, 0.15 MHz - 30 MHz)	see 7.1	P	2019-05-13	4
Field strength (13.110 MHz – 14.010 MHz)	see 7.2	P	2019-05-08	2
Radiated emissions (< 30 MHz)	see 7.3	P	2019-05-08	3
Radiated emissions (30 MHz - 1 GHz)	see 7.4	P	2019-04-26 2019-04-30	1
Frequency Stability Test	see 7.5	P	2019-05-23	5
Occupied bandwidth test	see 7.6	P	2019-06-04	6

SECTION 6
INFORMATION ABOUT THE EUT

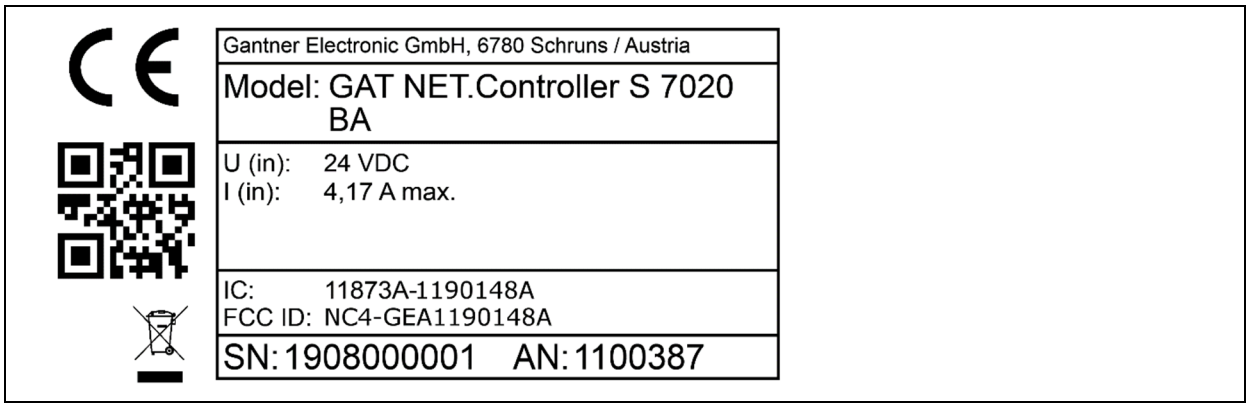
6.1 Description of the EUT

☒ table-top EUT		☐ floor-standing EUT	
Dimensions:	Height:	Width:	Length:
	42 mm	133 mm	310 mm
Hardware version:	Locks: 3.0 1.5	Master Controller: 1.0	SUB Controller BA:

Description:
The GAT NET.Controller S 7020 BA (sub controller) unit is used to connect and control GANTNER's latest generation of innovative electronic locker locks - the GAT NET.Lock 7020. The controllers can operate in online or standalone mode. In online mode, the controllers communicate with a host PC/server. The master controller serves as the communication bridge between the host PC/server and the sub controllers. In standalone mode, a master controller is not needed; the sub controller and connected locks operate autonomously according to their configuration.

Transmitter frequency range:	13.56 MHz	
Frequency agile or hopping:	☐ Yes	☒ No
Antenna:	☒ Internal antenna	☐ External antenna
Antenna connector:	☒ None	☐ Yes, type
Type of modulation:		
Type of used TAG:	GAT Chip Card 210 ISO (Test Card ISO)	
Temperature range:	☒ FCC requirement: -20°C to +50°C ☒ Customers specification of EUT: 0°C to +60°C ☒ Testing range: -20°C to +60°C	
Transmitter stand by mode supported:	☒ Yes	☐ No

6.1.1 Photo of the rating plate



6.2 Power interface

MODE	VOLTAGE (V)	FREQUENCY (Hz)	COMMENT
1	120	60	Power supply: Dongguan Dongsong Electronic
2	120	60	Power supply: Adapter Tech.

Power sources/associated test equipment

DEVICE	MANUFACTURER	TYPE	SN	ASSET NO.
4 quadrant amplifier	Spitzenberger & Spies	PAS 5000	826149/005	PM KF 2555
Power supply	Dongguan Dongsong Electronic	DYS404-240166W	-	-
Power supply	Adapter Tech.	ATS090-P240	-	-

6.3 Configuration mode

MODE	DESCRIPTION
1	Three locks were connected to the sub controller unit (sockets: 1, 12, 24)
2	One lock was connected to the controller
3	One lock (GAT NET.Lock 7020 USB P) was connected to the controller

6.4 Operation mode

MODE	DESCRIPTION
	General: Pulse transmission with an interval of 250 ms. In 250 ms each lock was transmitting after each other first with 13.56 MHz and secondly with 125 kHz (at the lock versions with “P”). The locks are closed and locked. With a different card (other card number) it was tried to open the lock continuously with the card placed in front of the lock. This way the RFID part is transmitting continuously.
1	Pulse transmission (normal mode) with an interval of 250ms; 13.56 MHz Card
2	Pulse transmission (normal mode) with an interval of 250ms; Dummy load in lieu of the antenna
3	Pulse transmission (normal mode) with an interval of 250ms

6.5 Peripheral devices used for testing

See power supplies under 6.2

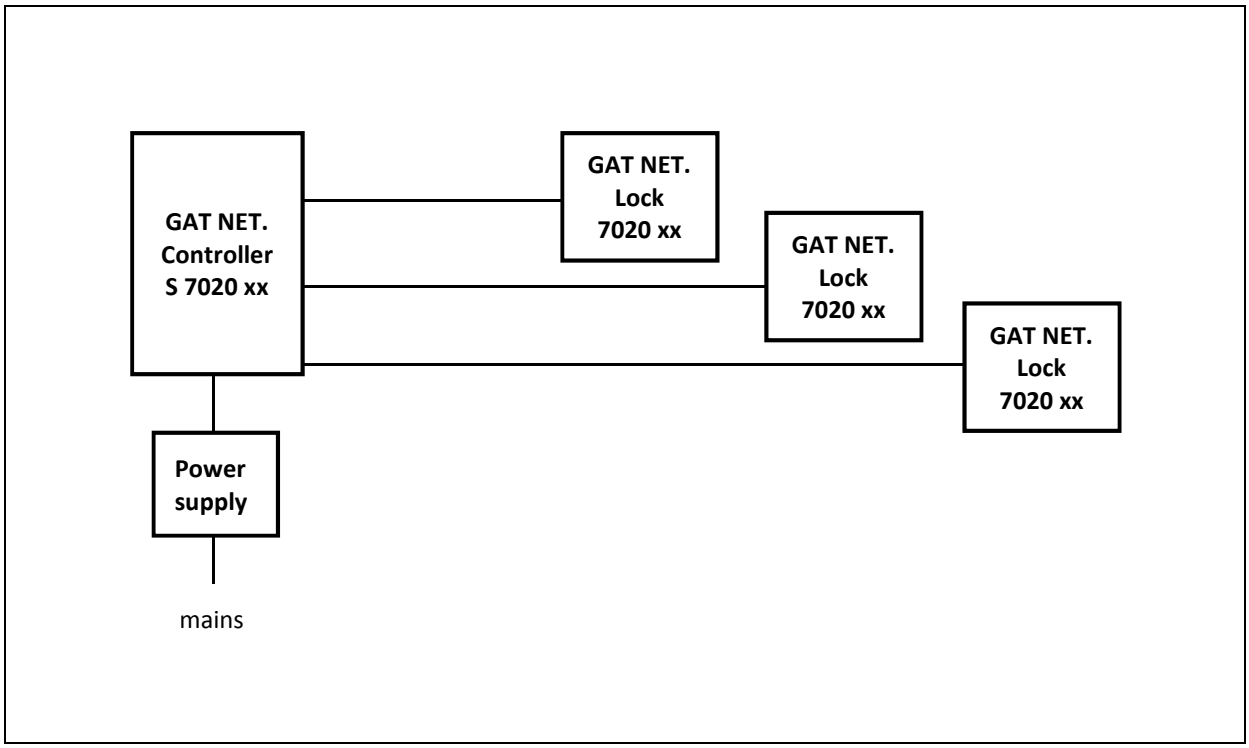
6.6 Supply and interconnecting cables used for testing

LINE	LENGTH (cm)	SHIELDING
Cable between controller and lock	500	Y
Cable between power supply (Type: ATS090-P240) and controller	100	N
Cable between power supply (Type: DYS404-240166W) and controller	35	N
Mains cable	150	N

6.7 Clock frequencies of the EUT

SOURCE	FREQUENCY (MHz)
Processor	24

6.8 Block diagram of the test setup at the radio tests



SECTION 7
CONFORMANCE REQUIREMENTS

7.1 Conducted emissions

NORMATIVE REFERENCES			RESULT
Limits according to:	**FCC §15.207** **RSS-Gen, Section 8.8**		**P**
Methods of measurement according to:	**ANSI C63.4**		
Equipment mode	Power interface	1	
	EUT configuration mode	2	
	Operation mode	1, 2	
Test requirements	Frequency range	150 kHz - 30 MHz	

Test equipment

DESCRIPTION	MANUFACTURER	TYPE	SN	ASSET NO.	CALIBRATION
Shielded cabin	ETS LINDGREN	RFSD 100	3598	PM KF 2955-2	-
Pulse Limiter 10 dB 9 kHz - 200 MHz	Schwarzbeck	VTSD 9561-F N	9561-F N242	PM KF 3059	2019-01 (1 year)
Receiver 9 kHz - 7 GHz	Rohde & Schwarz	ESR7	101095	PM KF 2441	2018-10 (1 year)
V-Artificial mains-network, 2 Line	Rohde & Schwarz	ESH3-Z5	863367/018	PM KF 0142	2017-10 (2 years)
RF-Cable	Schwarzbeck	AK 9513	95956	PM-KF-2056	2018-10 (2 years)
RF-Cable	Schwarzbeck	RG 58 C/U	-	PM-KF-1103	2018-07 (2 years)
Test software	Rohde & Schwarz	EMC 32 V.8.54	-	PM KF 2983	-

Comment

The conducted emission tests were performed in all different lock combinations according to the table in section 8 with the hereon following measurement diagrams (8.2 and 8.3).

In the conducted emission diagrams, the N and L line are merged.

According to KDB 174176 D01 the conducted emission tests were done in two modes:

1. within the transmitter's fundamental emission band with a dummy load in lieu of the antenna (according to the e-mail of 2019-05-06) and 2. outside the transmitter's fundamental emission band.

The two additional controller were added to terminate the interfaces of the EUT for the EMC tests according to FCC, Part 15 B and is described in detail in the appropriate EMC test report.

7.2 Field strength 13.110 MHz – 14.010 MHz (Emission Mask)

NORMATIVE REFERENCES			RESULT
Limits according to:	**FCC §15.225 (a) – (c)** **RSS-210, Issue 9, section B6**		**P**
Methods of measurement according to:	**ANSI C63.10, section 6.3, 6.4** **RSS-Gen 6.13, 8.9**		
Equipment mode	Power interface	2	
	EUT configuration mode	1	
	Operation mode	1	
Test requirements	Frequency range	13.110 MHz – 14.010 MHz	
	Measurement time	1 s	
	Antenna height	1 m	

Limits

The limits below 30 MHz are given for different measurement distances. The limits below 30 MHz are converted to 3 m by using the extrapolation factor 40 dB/decade (according to §15.31).

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)	Field strength (dBµV/m)	Measurement distance (m)
13.110 - 13.410	106	40.5	30	80.5	3
13.410 - 13.553	334	50.5	30	90.5	3
13.553 - 13.567	15848	84.0	30	124.0	3
13.567 - 13.710	334	50.5	30	90.5	3
13.710 - 14.010	106	40.5	30	80.5	3

Test setup details

Compliance with the spectrum mask is tested using a spectrum analyzer with resolution bandwidth set to 10 kHz or 9 kHz CISPR. The video bandwidth shall be at least three times greater than the resolution bandwidth.
The test was carried out automatically by the test receiver.
The EUT is a table-top EUT and was standing on a table made of Styrodur with a Pertinax plate on top and the dimensions 1.6 m x 1.0 m x 0.8 m (Length x Width x Height).
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector.

Test equipment

DESCRIPTION	MANUFACTURER	TYPE	SN	ASSET NO.	CALIBRATION
Semi-Anechoic chamber	Siepel	REF W460SLB	-	PM KF 1150-01	2016-12 (3 years)
Turntable	Inn-Co	-	-	PM KF 2949-04	-
Tower	Inn-Co	MA4484-XPET	-	PM KF 2949-03	-
Controller	Inn-Co	CO 3000	4970815	PM KF 2949	-
Receiver 9 kHz- 7 GHz	Rohde & Schwarz	ESR7	101757	PM KF 3371	2019-04 (1 year)
Loop antenna 9 kHz- 30 MHz	Rohde & Schwarz	HFH2-Z2	881058/48	PM KF 1401	2017-10 (2 years)
RF-cable	Rohde & Schwarz	HFU2-Z5	11673862	PM KF 1646	2018-12 (1 year)
DC power supply for HFH2-Z2	Rohde & Schwarz	HZ-9	101865	PM KF 3455	-
RF-cable Kabel Micro-Coax UTIFLEX	Rosenberger	LA3-020-5500	010-1788635	PM-KF-3187	2018-06 (1 years)
RF-cable Kabel Micro-Coax UTIFLEX	Rosenberger	LA2-001-7200	010-1786350	PM-KF-3188	2019-03 (1 years)
Test software	Rohde & Schwarz	EMC 32 V.10.01.00	-	PM KF 2983-2	-

Comment

The field strength tests were performed in all different lock combinations according to the table in section 8 with the hereon following measurement diagrams (8.4).

For photos of the test setup see section 7.3 of this test report.

7.3 Radiated emissions < 30 MHz

NORMATIVE REFERENCES			**RESULT**
Limits according to:	**FCC §15.225 (d), §15.209** **RSS-210, Issue 9, section B6**		**P**
Methods of measurement according to:	**ANSI C63.10, section 6.3, 6.4** **RSS-Gen 6.13, 8.9**		
Equipment mode	Power interface	2	
	EUT configuration mode	1	
	Operation mode	1	
Test requirements	Frequency range	9 kHz - 30 MHz	
	Antenna height	1 m	

Limits

The limits below 30 MHz are given for different measurement distances. The limits below 30 MHz are converted to 3 m by using the extrapolation factor 40 dB/decade (according to §15.31).

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	67.6 - 20 · log(F(kHz))	300
0.490 - 1.705	24000/F(kHz)	87.6 - 20 ·log(F(kHz))	30
1.705 - 13.110	30	29.5	30
14.010 - 30.000	30	29.5	30
Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.			

Test setup details

Compliance with the spectrum mask is tested using a spectrum analyzer with resolution bandwidth set to 10 kHz or 9 kHz CISPR. The video bandwidth shall be at least three times greater than the resolution bandwidth.
The test was carried out automatically by the test receiver.
The EUT is a table-top EUT and was standing on a table made of Styrodur with a Pertinax plate on top and the dimensions 1.6 m x 1.0 m x 0.8 m (Length x Width x Height).
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test equipment

DESCRIPTION	MANUFACTURER	TYPE	SN	ASSET NO.	CALIBRATION
Semi-Anechoic chamber	Siepel	REF W460SLB	-	PM KF 1150-01	2016-12 (3 years)
Turntable	Inn-Co	-	-	PM KF 2949-04	-
Tower	Inn-Co	MA4484-XPET	-	PM KF 2949-03	-
Controller	Inn-Co	CO 3000	4970815	PM KF 2949	-
Receiver 9 kHz- 7 GHz	Rohde & Schwarz	ESR7	101757	PM KF 3371	2019-04 (1 year)
Loop antenna 9 kHz- 30 MHz	Rohde & Schwarz	HFH2-Z2	881058/48	PM KF 1401	2017-10 (2 years)
DC power supply for HFH2-Z2	Rohde & Schwarz	HZ-9	101865	PM KF 3455	-
RF-cable	Rohde & Schwarz	HFU2-Z5	11673862	PM KF 1646	2018-12 (1 year)
RF-cable Kabel Micro-Coax UTIFLEX	Rosenberger	LA3-020-5500	010-1788635	PM-KF-3187	2018-06 (1 years)
RF-cable Kabel Micro-Coax UTIFLEX	Rosenberger	LA2-001-7200	010-1786350	PM-KF-3188	2019-03 (1 years)
Test software	Rohde & Schwarz	EMC 32 V.10.01.00	-	PM KF 2983-2	-

Comment

The radiated emission tests < 30 MHz were performed in all different lock combinations as according to the table in section 8 with the hereon following measurement diagrams (8.5).

Anechoic chamber

Test procedure

The test site is an anechoic chamber suitable for radiated emission measurements in the frequency range of 9 kHz – 30 MHz It includes automatic turntable of radius 2 m. It enables manual and fully automatic measurements.
To find the highest level of radiation

- the height of the antenna is 1m with antenna in horizontal and vertical polarization;
- the turntable is rotated in range from 0° to 360°.

The system was configured for testing in a typical worst case fashion (as a customer may use it). All interface cables were moved to determine the position which resulted in the highest emission levels.

Correction factors

The field strength is calculated by adding the antenna factor and cable attenuation.
The calculations are performed automatically by the measurement software EMC 32.
As example consider the following input values and result:

FREQUENCY (MHZ)	RECEIVER READING U (dBµV)	ANTENNA FACTOR AF (dB/m)	CABLE ATTENUATION A (dB)	CORRECTION ANTENNA + CABLE (dB)	RADIATED FIELD STRENGTH E (dBµV/m)
30.0	20	20.6	0.8	21.4	41.4

E = U + AF + A

7.4 Radiated emissions 30 MHz to 1 GHz

NORMATIVE REFERENCES			**RESULT**
Limits according to:	**FCC §15.225 (d), §15.209 RSS-210, Issue 9, section B6**		**P**
Methods of measurement according to:	**ANSI C63.10, section 6.3, 6.5 RSS-Gen 6.13, 8.9**		
Equipment mode	Power interface	2	
	EUT configuration mode	1	
	Operation mode	1	
Test requirements	Frequency range	30 MHz - 1 GHz	

Limits

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
30 – 88	100	40.0	3
88 – 216	150	43.5	3
216 – 960	200	46.0	3
Above 960	500	54.0	3

Test setup details

The EUT is a table-top EUT and was standing on a table made of Styrodur with a Pertinax plate on top and the dimensions 1.6 m x 1.0 m x 0.8 m (Length x Width x Height).
Overview sweeps performed with peak detectors and final measurement with quasi-peak detectors.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector.

Test equipment

DESCRIPTION	MANUFACTURER	TYPE	SN	ASSET NO.	CALIBRATION
Semi-Anechoic chamber	Siepel	REF W460SLB	-	PM KF 1150-01	2016-12 (3 years)
Turntable	Inn-Co	-	-	PM KF 2949-04	-
Tower	Inn-Co	MA4484-XPET	-	PM KF 2949-03	-
Controller	Inn-Co	CO 3000	4970815	PM KF 2949	-
Receiver 9 kHz- 7 GHz	Rohde & Schwarz	ESR7	101757	PM KF 3371	2019-04 (1 year)
Antenna 30 MHz - 3GHz	Rohde & Schwarz	HL 562	100354	PM KF 1123	2018-03 (2 years)
RF-cable	Rohde & Schwarz	HFU2-Z5	11673862	PM KF 1646	2018-12 (1 year)
RF-cable Kabel Micro-Coax UTIFLEX	Rosenberger	LA3-020-5500	010-1788635	PM-KF-3187	2018-06 (1 years)
RF-cable Kabel Micro-Coax UTIFLEX	Rosenberger	LA2-001-7200	010-1786350	PM-KF-3188	2019-03 (1 years)
Test software	Rohde & Schwarz	EMC 32 V.10.01.00	-	PM KF 2983-2	-

Comment

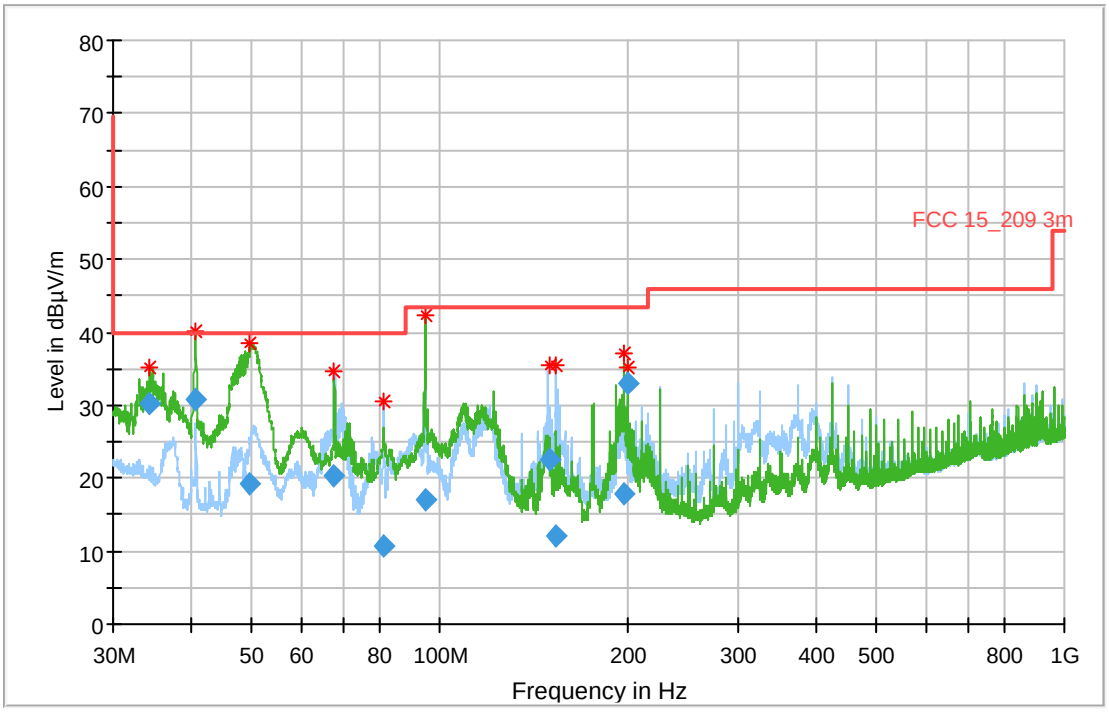
The radiated emission test from 30 MHz to 1 GHz was performed in all different lock combinations as peak pre-measurements according to the table in section 8 with the hereon following measurement diagrams (8.6).

The complete final measurement was done with the lock GAT NET.Lock 7020 USB P with the diagram on the following page as the worst case result.

Measurement results – Radiated emissions 30 MHz to 1 GHz:

Overview sweeps performed with peak detectors and final measurement with quasi-peak detectors.

EUT:	GAT NET.Controller S 7020 BA with 3x Lock 7020 USB P
Test Verdict:	Pass
Test Description:	FCC Part 15 Subpart C
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	2019-05-02



Preview Result 1H-PK+ [Preview Result 1H.Result:2]
Preview Result 1V-PK+ [Preview Result 1V.Result:2]
Critical_Freqs PK+ [Critical_Freqs.Result:4]
FCC 15_209 3m [..\EMI radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
34.380000	30.21	40.00	9.79	1000.0	120.000	100.0	V	53.0
40.650000	30.77	40.00	9.23	1000.0	120.000	100.0	V	52.0
49.560000	19.13	40.00	20.87	1000.0	120.000	110.0	V	81.0
67.770000	20.23	40.00	19.77	1000.0	120.000	230.0	H	147.0
81.360000	10.84	40.00	29.16	1000.0	120.000	247.0	H	103.0
94.890000	17.06	43.52	26.46	1000.0	120.000	104.0	V	103.0
149.970000	22.60	43.52	20.92	1000.0	120.000	162.0	H	294.0
153.000000	12.10	43.52	31.42	1000.0	120.000	123.0	H	285.0
196.770000	18.00	43.52	25.52	1000.0	120.000	145.0	V	32.0
199.980000	32.99	43.52	10.53	1000.0	120.000	110.0	V	222.0

(continuation of the "Final_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
34.380000	17	07:17:06 - 02.05.2019
40.650000	14	07:18:30 - 02.05.2019
49.560000	8	07:19:44 - 02.05.2019
67.770000	9	07:09:57 - 02.05.2019
81.360000	11	07:13:48 - 02.05.2019
94.890000	11	07:21:01 - 02.05.2019
149.970000	10	07:11:51 - 02.05.2019
153.000000	10	07:08:18 - 02.05.2019
196.770000	10	07:15:35 - 02.05.2019
199.980000	10	07:22:37 - 02.05.2019

EMI Auto Test Template: FCC-RE-R17-AN08

Hardware Setup: EN-RE-R12-AN08
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 30 MHz - 1 GHz
Graphics Level Range: 0 dBµV/m - 80 dBµV/m

Preview Measurements:
- Antenna height: 100 - 355 cm , Step Size = 85 cm , Positioning Speed = 8
- Polarization: H + V
- Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
- Graphics Display: Show separate traces for horizontal and vertical polarization
- Scan Test Template: EN-RE-R12-AN08_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	30 kHz	PK+	120 kHz	0,3 s	20 dB
1 GHz - 3 GHz	250 kHz	PK+	1 MHz	0,1 s	20 dB

Frequency Zoom:
- Zoom Scan Template: EN-RE-R12-AN08_ZOOM

Adjustment:
- Antenna height: Range = 90 cm , Measuring Speed = 3
- Turntable position: Range = 30 deg , Measuring Speed = 3
- Template for Single Meas.: EN-RE-R12-AN08_MAX

Final Measurements:
- Template for Single Meas.: EN-RE-R12-AN08_FIN

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	40 kHz	QPK	120 kHz	1 s	20 dB
1 GHz - 3 GHz	40 kHz	QPK	1 MHz	1 s	20 dB

Anechoic chamber

Test procedure

The test site is an anechoic chamber suitable for radiated emission measurements in the frequency range of 30 MHz – 18 GHz (40 GHz). It includes automatic antenna mast of height 4 m and turntable of radius 2 m. It enables both manual and fully automatic measurements. To find the highest level of radiation

- the height of the antenna is scanned in range 1m to 4 m with antenna in horizontal and vertical polarization;
- the turntable is rotated in range from 0° to 360°.

The system was configured for testing in a typical worst case fashion (as a customer may use it). All interface cables were moved to determine the position which resulted in the highest emission levels.

Correction factors

The field strength is calculated by adding the antenna factor and cable attenuation.
The calculations are performed automatically by the measurement software EMC 32.
As example consider the following input values and result:

FREQUENCY (MHZ)	RECEIVER READING U (dBµV)	ANTENNA FACTOR AF (dB/m)	CABLE ATTENUATION A (dB)	CORRECTION ANTENNA + CABLE (dB)	RADIATED FIELD STRENGTH E (dBµV/m)
30.0	20	20.6	0.8	21.4	41.4

E = U + AF + A

7.5 Frequency stability measurement

NORMATIVE REFERENCES			RESULT
Limits according to:	**FCC §15.225 (e)** **RSS-210, Issue 9, section B6** **RSS-Gen Issue 4, section 6.11**		**P**
Methods of measurement according to:	**ANSI C63.10, section 9.14**		
Equipment mode	Power interface	2	
	EUT configuration mode	2	
	Operation mode	1	

Limits

Limit:	The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % (±100 ppm) of the carrier frequency under nominal conditions.
Temperature range:	-20 degree to +60 degree
Voltage range:	0,85 x 120 V
	1,15 x 120 V

Test equipment

DESCRIPTION	MANUFACTURER	TYPE	SN	ASSET NO.	CALIBRATION
Temperature chamber	Heraeus-Vötsch	HT4010	45021	PM KF 1402	2019-03 (1 year)
Spectrum analyser	Rohde & Schwarz	FSL6	100463	PM KF 3027	2018-02 (2 years)
Loop antenna	Rohde & Schwarz	HZ-10	100055	PM KF 0965	2017-04 (3 year)

Measurement results – Frequency stability measurement:

Temperature °C	Carrier at 20°C MHz	Upper limit: 13.561106 MHz
		Lower limit: 13.558394 MHz
		Measured frequency under temperature influence:
+60	13.55975	13.5597967
+50		13.5598033
+40		13.5598033
+30		13.55999
+20		13.55975
+10		13.5599367
0		13.5599367
-10		13.5599633
-20		13.5598833

Comment

The frequency stability under temperature influence remains in the tolerance of ± 0.01 % (±100 ppm).
The DC voltage variation from 102 V to 138 V had no influence on the frequency and the level of the carrier. Frequency stability tests at the 125 kHz RFID reader are not required for FCC or ISED.
The test was just done with one lock type (GAT NET.Lock 7020 USB P), because the lock type has no influence on the results. It's a matter of the RFID part inside of the controller.

7.6 Occupied bandwidth

NORMATIVE REFERENCES			RESULT
Limits according to:	**RSS-Gen, Issue 5, 6.7**		**P**
Methods of measurement according to:	**RSS-Gen, Issue 5, 6.7**		
Equipment mode	Power interface	1	
	EUT configuration mode	2	
	Operation mode	3	

Test equipment

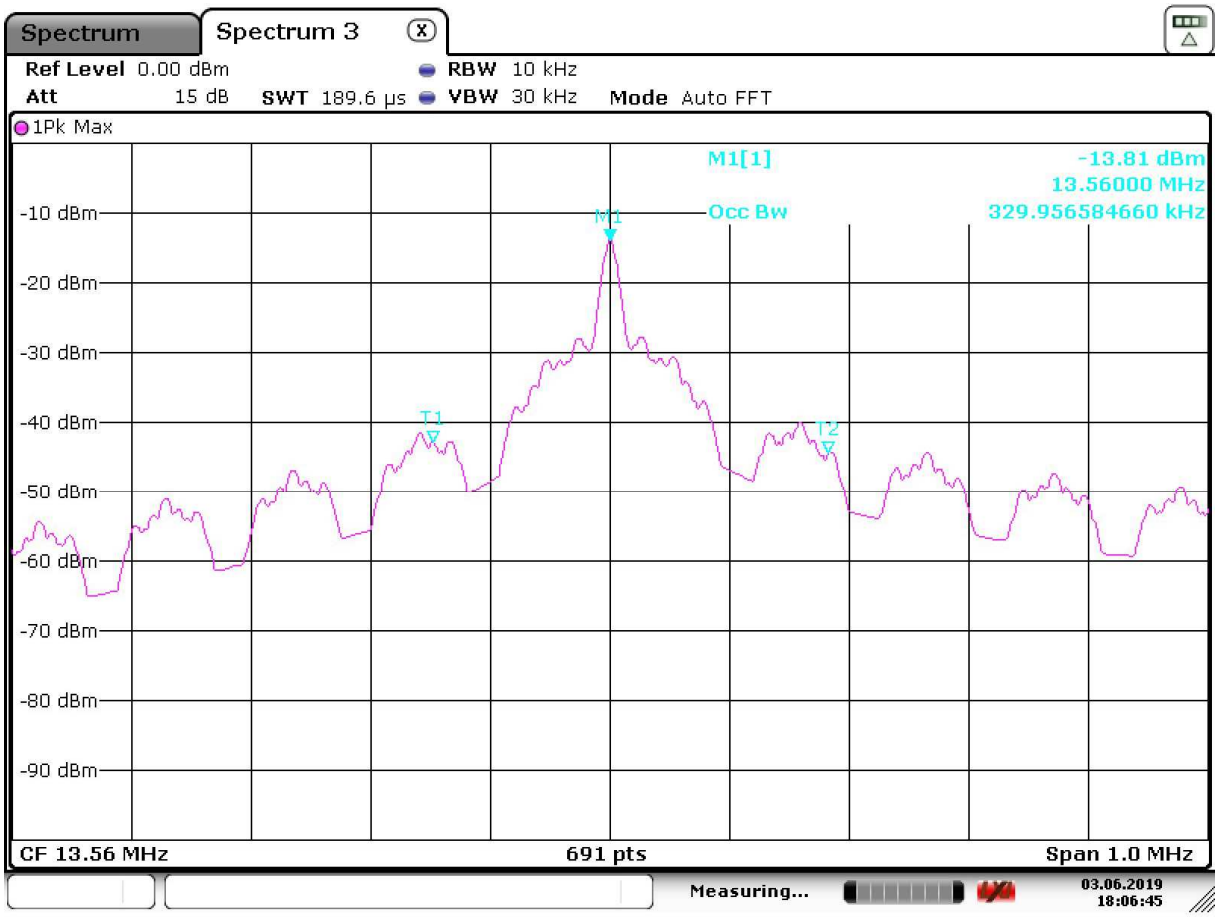
DESCRIPTION	MANUFACTURER	TYPE	SN	ASSET NO.	CALIBRATION
Spectrum analyser	Rohde & Schwarz	FSV40	837356/012	PM KF 2783	2018-09 (1 year)
Loop antenna	Rohde & Schwarz	HZ-10	100055	PM KF 0965	2017-04 (3 year)

Comment

The 99% occupied bandwidth is 329.957 kHz at the 13.56 MHz RFID.

The test was just done with one lock type (GAT NET.Lock 7020 USB P), because the lock type has no influence on the results. It's a matter of the RFID part inside of the controller.

Measurement results - 99% occupied bandwidth:



Date: 3.JUN.2019 18:06:45

SECTION 8
SELECTION OF THE LOCK TYPE FOR FINAL TESTING

8.1 Emission tests with all different lock combinations and test diagram No.

Sub Controller Unit: GAT NET.Controller S 7020 BA	Frequency Range				
	CE 150 kHz- 30 MHz		Field Strength	RE 9 kHz- 30 MHz	RE 30 MHz- 1 GHz Pre-tests (Pk)
	out***	in**			
GAT NET.Lock 7020 Serial No.: 1913000003, 1913000004, 1913000006	(1)	5	(9)	A) (13)	17
GAT NET.Lock 7020 USB Serial No.: 1913000003, 1913000004, 1913000006	2	6	10	14	18
GAT NET.Lock 7020 P* Serial No.: 1913100001, 1913100002, 1913100003	3	(7)	11	B) (15)	19
GAT NET.Lock 7020 USB P* Serial No.: 1913100001, 1913100002, 1913100003	4	8	12	16	C) (20)

( ) Worst case result of four different lock combinations

A) Worst case result at 13.56 MHz

B) Worst case result at 125 kHz

C) Worst case result at 40.68 MHz -> for final measurement of this combination see chapter 7.4

* Comment:
Comparison measurements between the 13.56 MHz tag card and the 125 kHz tag card in front of the lock showed the 13.56 MHz card to be the worst case situation. Therefore all measurements were done with the 13.56 MHz card. At the CE tests no difference between the card frequencies were detectable.

** within the transmitter's fundamental emission band

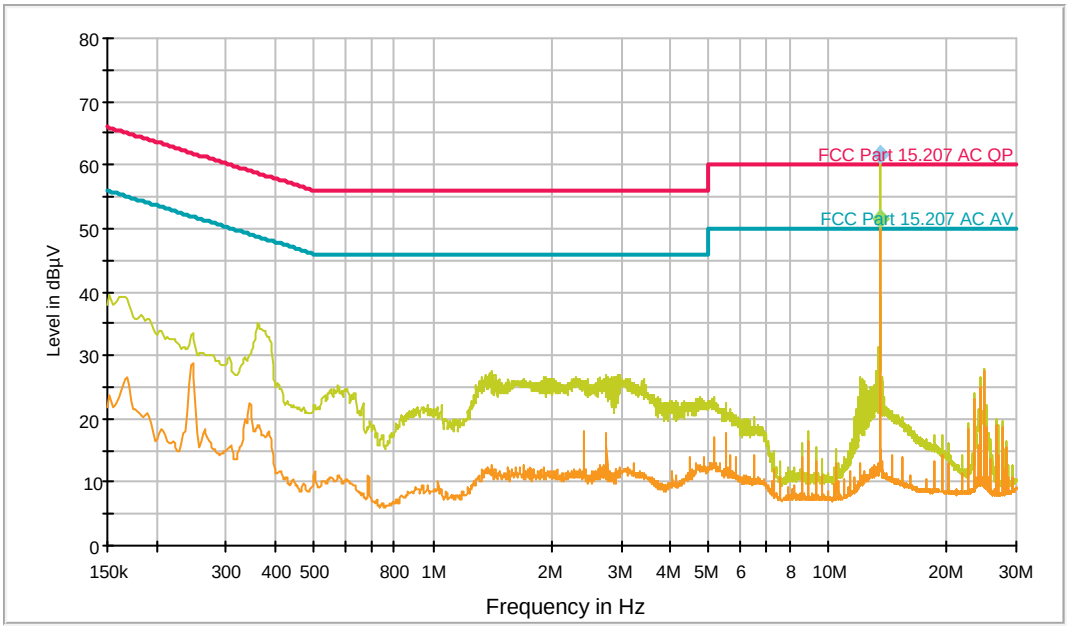
*** outside the transmitter's fundamental emission band (spurious emissions)

The USB unit can be connected or disconnected. Therefore the Lock has the same serial number if a USB unit is connected or not.

8.3 Diagrams conducted spurious emission tests

1 EUT:	GAT NET.Controller S 7020 BA with **Lock 7020**
Project No.:	36260
Test description:	Conducted Emissions, **outside the transmitter's fundamental emission band**
Test standard:	FCC Part 15 Subpart B, § 15.207
Tested port:	Mains, 120 V/ 60 Hz
Test verdict:	Pass
Operating conditions:	Pulse transmission (normal mode) with an interval of 250ms; 13.56 MHz Card
Operator name:	RDR
Date of testing:	2019-05-13

EN-CE-R32-LN01



FCC Part 15.207 AC QP [..\EMI conducted\FCC Part 15 Subpart C\]
FCC Part 15.207 AC AV [..\EMI conducted\FCC Part 15 Subpart C\]
Preview Result 1-QPK [Preview Result 1.Result:1]
Preview Result 2-CAV [Preview Result 2.Result:2]
Final Result 1-QPK [Final Result 1.Result:1]
Final Result 2-CAV [Final Result 2.Result:1]

Final Result 1

Frequency (MHz)	QuasiPeak-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Comment
13.560000	61.6	GND	L1	11.0	Result not relevant, because it's the transmitter's fundamental emission band

Final Result 2

Frequency (MHz)	CAverage-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Comment
13.560000	51.4	GND	L1	11.0	Result not relevant, because it's the transmitter's fundamental emission band

EMI Auto Test Template: EN-CE-R32-LN01

Hardware Setup: EN-CE-R32-LN01
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: EN-CE-R32-LN01_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	50 Hz	QPK; CAV	200 Hz	1 s	20 dB
150 kHz - 30 MHz	2.25 kHz	QPK; CAV	9 kHz	1 s	0 dB

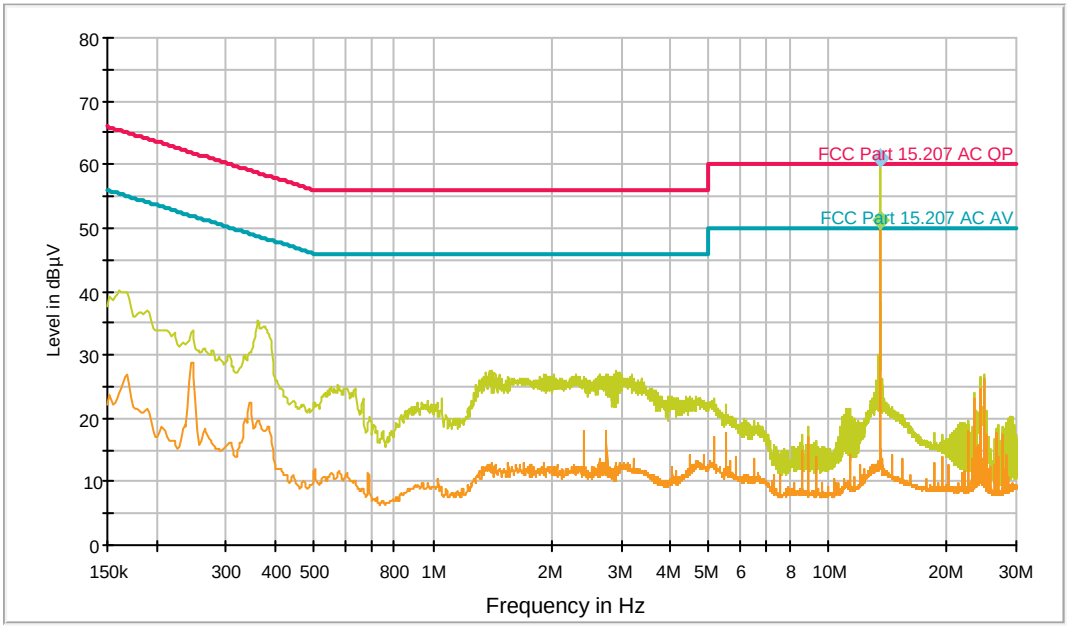
Receiver: [ESR 7]

Data Reduction:
Limit Line #1: FCC Part 15.207 AC QP
Limit Line #2: FCC Part 15.207 AC AV
Peak Search: 6 dB , Maximum Results: 10
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -10 dB
Maximum Number of Results: 20
After Data Reduction: Interactive data reduction

Report Settings:
Report Template: Standard Report_EMC KF_Conducted Emission

2 EUT:	GAT NET.Controller S 7020 BA with **Lock 7020 USB**
Project No.:	36260
Test description:	Conducted Emissions, **outside the transmitter's fundamental emission band**
Test standard:	FCC Part 15 Subpart B, § 15.207
Tested port:	Mains, 120 V/ 60 Hz
Test verdict:	Pass
Operating conditions:	Pulse transmission (normal mode) with an interval of 250ms; 13.56 MHz Card
Operator name:	RDR
Date of testing:	2019-05-13

EN-CE-R32-LN01



FCC Part 15.207 AC QP [..\EMI conducted\FCC Part 15 Subpart C\]
FCC Part 15.207 AC AV [..\EMI conducted\FCC Part 15 Subpart C\]
Preview Result 1-QPK [Preview Result 1.Result:1]
Preview Result 2-CAV [Preview Result 2.Result:2]
Final Result 1-QPK [Final Result 1.Result:1]
Final Result 2-CAV [Final Result 2.Result:1]

Final Result 1

Frequency (MHz)	QuasiPeak-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Comment
13.560000	**60.9**	**GND**	**L1**	**11.0**	**Result not relevant, because it's the transmitter's fundamental emission band**

Final Result 2

Frequency (MHz)	CAverage-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Comment
13.560000	**51.1**	**GND**	**L1**	**11.0**	**Result not relevant, because it's the transmitter's fundamental emission band**

EMI Auto Test Template: EN-CE-R32-LN01

Hardware Setup: EN-CE-R32-LN01
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: EN-CE-R32-LN01_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	50 Hz	QPK; CAV	200 Hz	1 s	20 dB
150 kHz - 30 MHz	2.25 kHz	QPK; CAV	9 kHz	1 s	0 dB

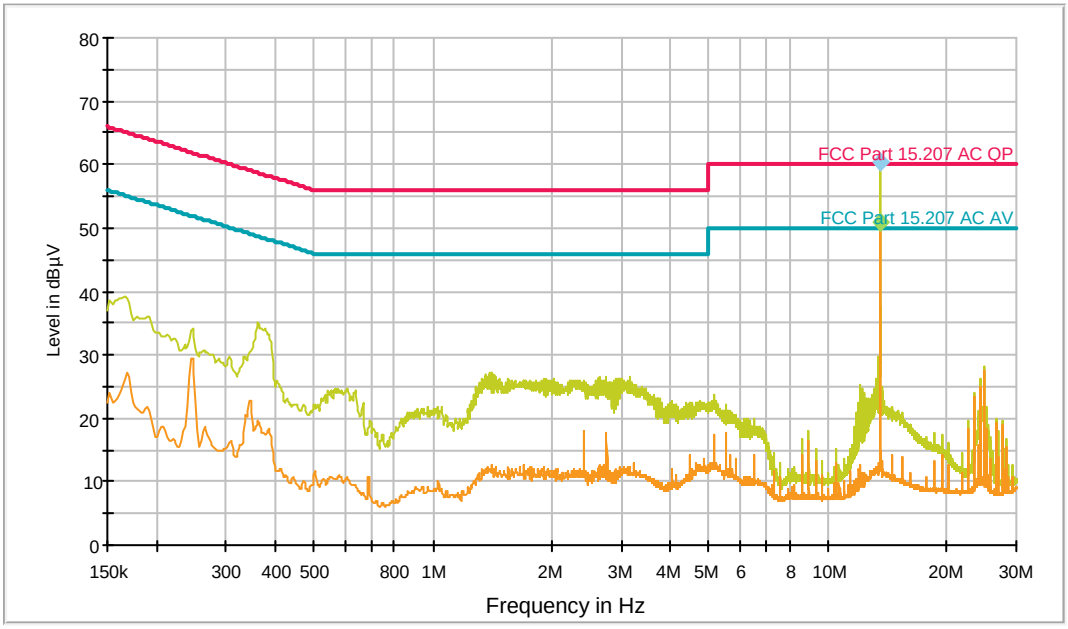
Receiver: [ESR 7]

Data Reduction:
Limit Line #1: FCC Part 15.207 AC QP
Limit Line #2: FCC Part 15.207 AC AV
Peak Search: 6 dB , Maximum Results: 10
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -10 dB
Maximum Number of Results: 20
After Data Reduction: Interactive data reduction

Report Settings:
Report Template: Standard Report_EMC KF_Conducted Emission

3 EUT:	GAT NET.Controller S 7020 BA with **Lock 7020 P**
Project No.:	36260
Test description:	Conducted Emissions, **outside the transmitter's fundamental emission band**
Test standard:	FCC Part 15 Subpart B, § 15.207
Tested port:	Mains, 120 V/ 60 Hz
Test verdict:	Pass
Operating conditions:	Pulse transmission (normal mode) with an interval of 250ms; 13.56 MHz Card
Operator name:	RDR
Date of testing:	2019-05-13

EN-CE-R32-LN01



FCC Part 15.207 AC QP [..\EMI conducted\FCC Part 15 Subpart C\]
FCC Part 15.207 AC AV [..\EMI conducted\FCC Part 15 Subpart C\]
Preview Result 1-QPK [Preview Result 1.Result:1]
Preview Result 2-CAV [Preview Result 2.Result:2]
Final Result 1-QPK [Final Result 1.Result:1]
Final Result 2-CAV [Final Result 2.Result:1]

Final Result 1

Frequency (MHz)	QuasiPeak-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Comment
13.560000	60.3	GND	L1	11.0	Result not relevant, because it's the transmitter's fundamental emission band

Final Result 2

Frequency (MHz)	CAverage-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Comment
13.560000	50.9	GND	L1	11.0	Result not relevant, because it's the transmitter's fundamental emission band

EMI Auto Test Template: EN-CE-R32-LN01

Hardware Setup: EN-CE-R32-LN01
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: EN-CE-R32-LN01_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	50 Hz	QPK; CAV	200 Hz	1 s	20 dB
150 kHz - 30 MHz	2.25 kHz	QPK; CAV	9 kHz	1 s	0 dB

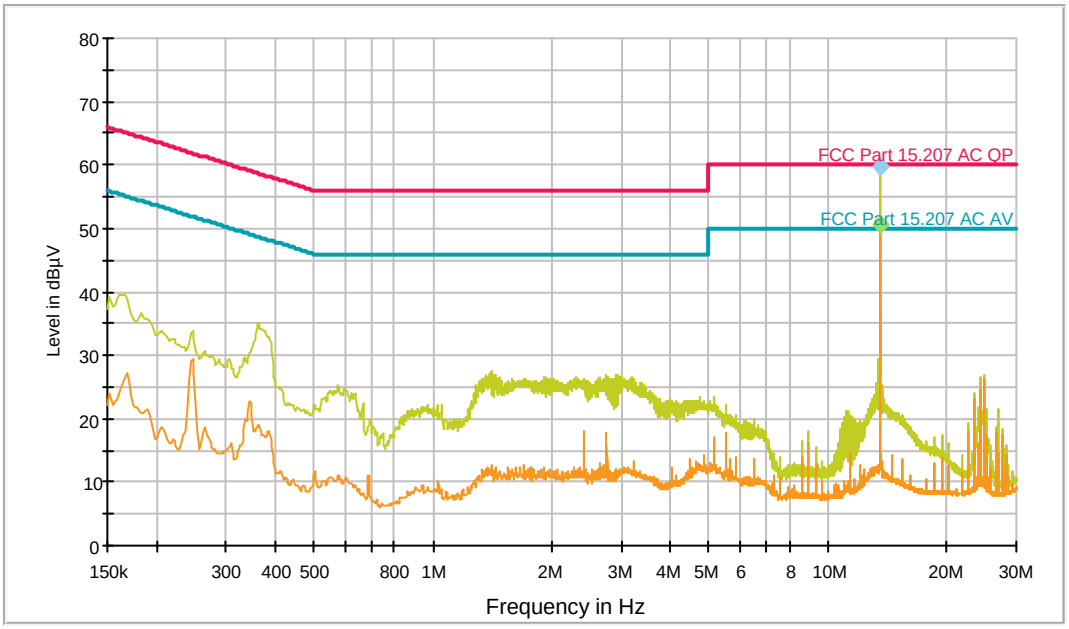
Receiver: [ESR 7]

Data Reduction:
Limit Line #1: FCC Part 15.207 AC QP
Limit Line #2: FCC Part 15.207 AC AV
Peak Search: 6 dB , Maximum Results: 10
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -10 dB
Maximum Number of Results: 20
After Data Reduction: Interactive data reduction

Report Settings:
Report Template: Standard Report_EMC KF_Conducted Emission

4 EUT:	GAT NET.Controller S 7020 BA with **Lock 7020 USB P**
Project No.:	36260
Test description:	Conducted Emissions, **outside the transmitter's fundamental emission band**
Test standard:	FCC Part 15 Subpart B, § 15.207
Tested port:	Mains, 120 V/ 60 Hz
Test verdict:	Pass
Operating conditions:	Pulse transmission (normal mode) with an interval of 250ms; 13.56 MHz Card
Operator name:	RDR
Date of testing:	2019-05-13

EN-CE-R32-LN01



FCC Part 15.207 AC QP [..\EMI conducted\FCC Part 15 Subpart C\]
FCC Part 15.207 AC AV [..\EMI conducted\FCC Part 15 Subpart C\]
Preview Result 1-QPK [Preview Result 1.Result:1]
Preview Result 2-CAV [Preview Result 2.Result:2]
Final Result 1-QPK [Final Result 1.Result:1]
Final Result 2-CAV [Final Result 2.Result:1]

Final Result 1

Frequency (MHz)	QuasiPeak-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Comment
13.560000	**59.7**	**GND**	**L1**	**11.0**	**Result not relevant, because it's the transmitter's fundamental emission band**

Final Result 2

Frequency (MHz)	CAverage-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Comment
13.560000	**50.6**	**GND**	**N**	**10.8**	**Result not relevant, because it's the transmitter's fundamental emission band**

EMI Auto Test Template: EN-CE-R32-LN01

Hardware Setup: EN-CE-R32-LN01
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: EN-CE-R32-LN01_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	50 Hz	QPK; CAV	200 Hz	1 s	20 dB
150 kHz - 30 MHz	2.25 kHz	QPK; CAV	9 kHz	1 s	0 dB

Receiver: [ESR 7]

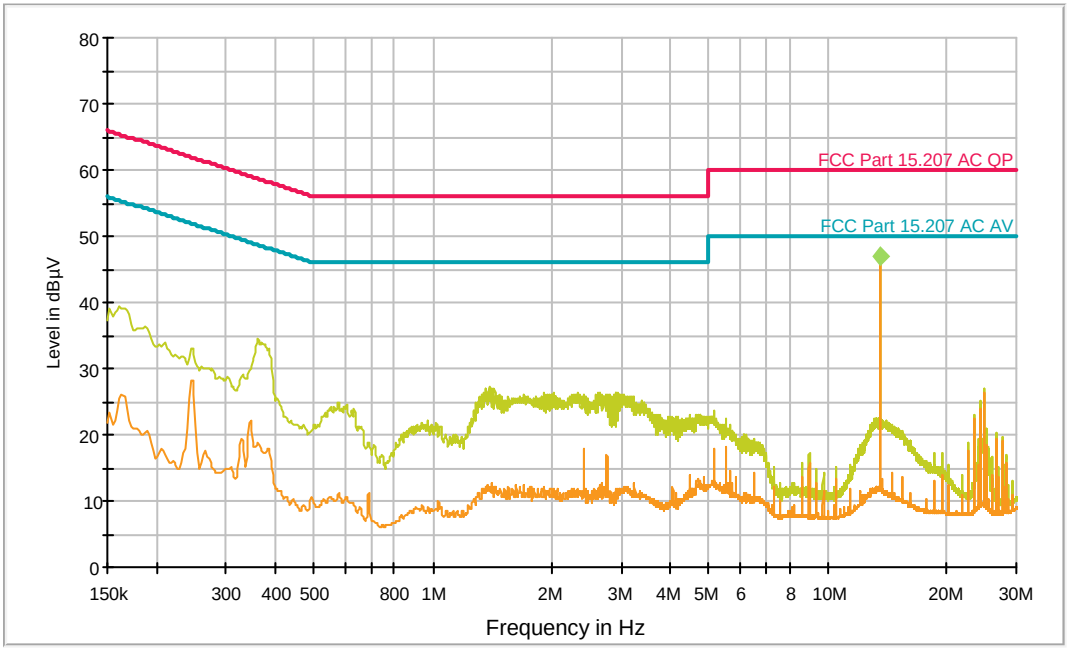
Data Reduction:
Limit Line #1: FCC Part 15.207 AC QP
Limit Line #2: FCC Part 15.207 AC AV
Peak Search: 6 dB , Maximum Results: 10
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -10 dB
Maximum Number of Results: 20
After Data Reduction: Interactive data reduction

Report Settings:
Report Template: Standard Report_EMC KF_Conducted Emission

8.4 Diagrams conducted tests with a dummy load

5 EUT:	GAT NET.Controller S 7020 BA with **Lock 7020**
Project No.:	36260
Test description:	Conducted Emissions, **within the transmitter's fundamental emission band**
Test standard:	FCC Part 15 Subpart B, § 15.207
Tested port:	Mains, 120 V/ 60 Hz
Test verdict:	Passed
Operating conditions:	Pulse transmission (normal mode) with an interval of 250ms **Dummy load in lieu of the antenna**
Operator name:	RDR
Date of testing:	2019-05-13

EN-CE-R32-LN01



FCC Part 15.207 AC QP [..\EMI conducted\FCC Part 15 Subpart C\]
FCC Part 15.207 AC AV [..\EMI conducted\FCC Part 15 Subpart C\]
Preview Result 1-QPK [Preview Result 1.Result:1]
Preview Result 2-CAV [Preview Result 2.Result:2]
Final Result 2-CAV [Final Result 2.Result:1]

Final Result 2

Frequency (MHz)	CAverage-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
13.560000	**47.1**	**GN**	**N**	**10.8**	**2.9**	**50.0**	

EMI Auto Test Template: EN-CE-R32-LN01

Hardware Setup: EN-CE-R32-LN01
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: EN-CE-R32-LN01_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	50 Hz	QPK; CAV	200 Hz	1 s	20 dB
150 kHz - 30 MHz	2.25 kHz	QPK; CAV	9 kHz	1 s	0 dB

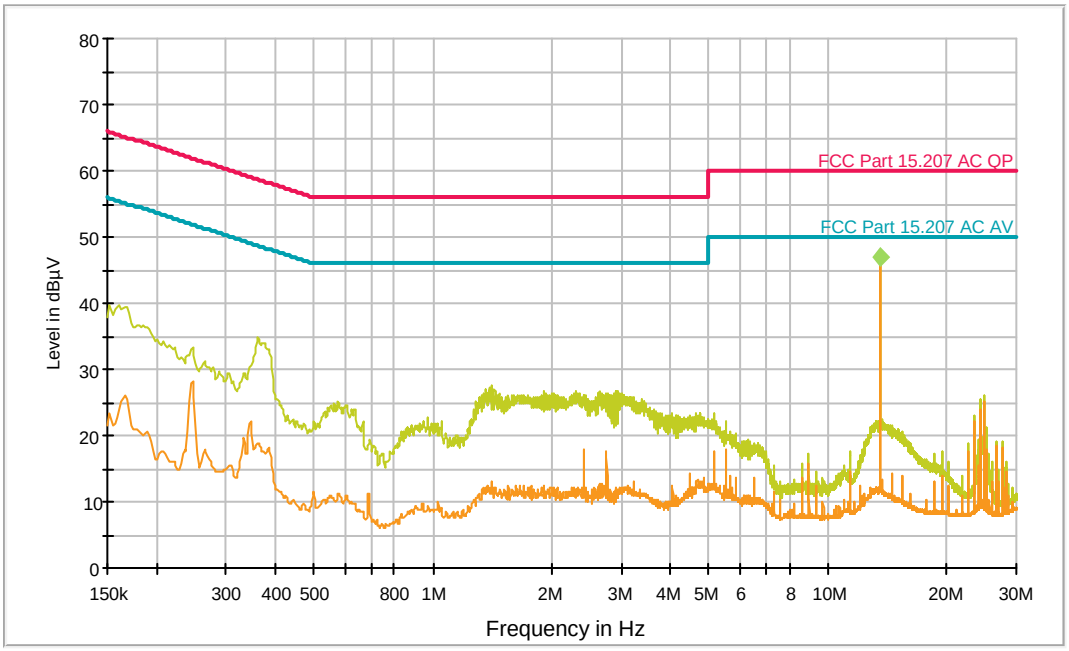
Receiver: [ESR 7]

Data Reduction:
Limit Line #1: FCC Part 15.207 AC QP
Limit Line #2: FCC Part 15.207 AC AV
Peak Search: 6 dB , Maximum Results: 10
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -10 dB
Maximum Number of Results: 20
After Data Reduction: Interactive data reduction

Report Settings:
Report Template: Standard Report_EMC KF_Conducted Emission

6 EUT:	GAT NET.Controller S 7020 BA with **Lock 7020 USB**
Project No.:	36260
Test description:	Conducted Emissions, **within the transmitter's fundamental emission band**
Test standard:	FCC Part 15 Subpart B, § 15.207
Tested port:	Mains, 120 V/ 60 Hz
Test verdict:	Passed
Operating conditions:	Pulse transmission (normal mode) with an interval of 250ms **Dummy load in lieu of the antenna**
Operator name:	RDR
Date of testing:	2019-05-13

EN-CE-R32-LN01



FCC Part 15.207 AC QP [..\EMI conducted\FCC Part 15 Subpart C\]
FCC Part 15.207 AC AV [..\EMI conducted\FCC Part 15 Subpart C\]
Preview Result 1-QPK [Preview Result 1.Result:1]
Preview Result 2-CAV [Preview Result 2.Result:2]
Final Result 2-CAV [Final Result 2.Result:1]

Final Result 2

Frequency (MHz)	CAverage-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
13.560000	**47.1**	**GN**	**N**	**10.8**	**2.9**	**50.0**	

EMI Auto Test Template: EN-CE-R32-LN01

Hardware Setup: EN-CE-R32-LN01
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: EN-CE-R32-LN01_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	50 Hz	QPK; CAV	200 Hz	1 s	20 dB
150 kHz - 30 MHz	2.25 kHz	QPK; CAV	9 kHz	1 s	0 dB

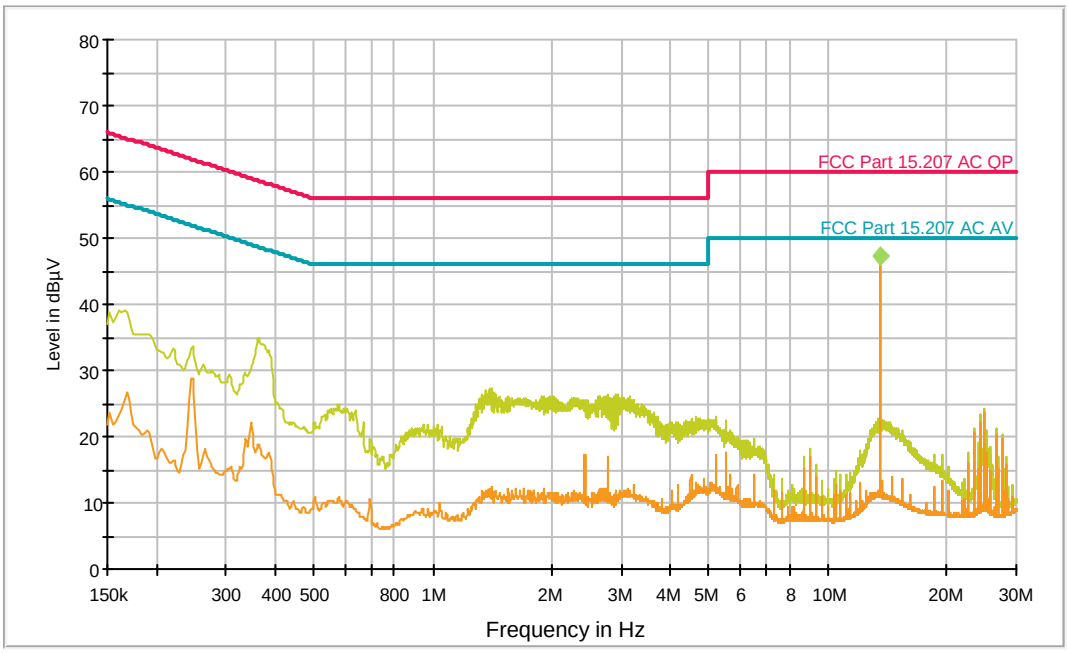
Receiver: [ESR 7]

Data Reduction:
Limit Line #1: FCC Part 15.207 AC QP
Limit Line #2: FCC Part 15.207 AC AV
Peak Search: 6 dB , Maximum Results: 10
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -10 dB
Maximum Number of Results: 20
After Data Reduction: Interactive data reduction

Report Settings:
Report Template: Standard Report_EMC KF_Conducted Emission

7 EUT:	GAT NET.Controller S 7020 BA with **Lock 7020 P**
Project No.:	36260
Test description:	Conducted Emissions, **within the transmitter's fundamental emission band**
Test standard:	FCC Part 15 Subpart B, § 15.207
Tested port:	Mains, 120 V/ 60 Hz
Test verdict:	Passed
Operating conditions:	Pulse transmission (normal mode) with an interval of 250ms **Dummy load in lieu of the antenna**
Operator name:	RDR
Date of testing:	2019-05-13

EN-CE-R32-LN01



FCC Part 15.207 AC QP [..\EMI conducted\FCC Part 15 Subpart C\]
FCC Part 15.207 AC AV [..\EMI conducted\FCC Part 15 Subpart C\]
Preview Result 1-QPK [Preview Result 1.Result:1]
Preview Result 2-CAV [Preview Result 2.Result:2]
Final Result 2-CAV [Final Result 2.Result:1]

Final Result 2

Frequency (MHz)	CAverage-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
13.560000	**47.2**	**GN**	**N**	**10.8**	**2.8**	**50.0**	

EMI Auto Test Template: EN-CE-R32-LN01

Hardware Setup: EN-CE-R32-LN01
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: EN-CE-R32-LN01_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	50 Hz	QPK; CAV	200 Hz	1 s	20 dB
150 kHz - 30 MHz	2.25 kHz	QPK; CAV	9 kHz	1 s	0 dB

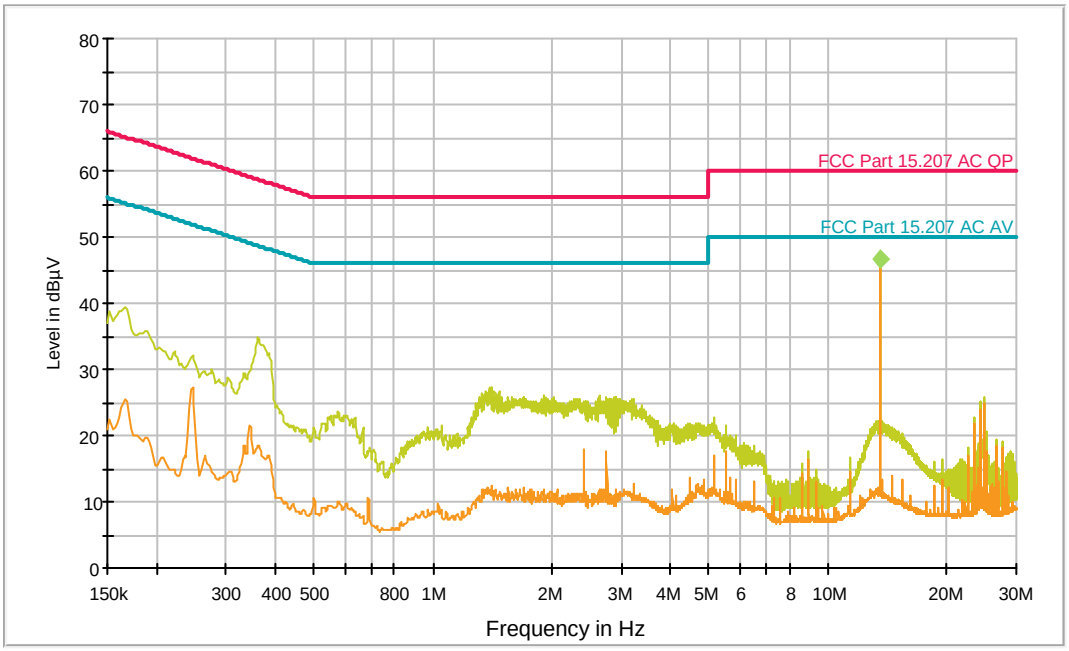
Receiver: [ESR 7]

Data Reduction:
Limit Line #1: FCC Part 15.207 AC QP
Limit Line #2: FCC Part 15.207 AC AV
Peak Search: 6 dB , Maximum Results: 10
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -10 dB
Maximum Number of Results: 20
After Data Reduction: Interactive data reduction

Report Settings:
Report Template: Standard Report_EMC KF_Conducted Emission

8 EUT:	GAT NET.Controller S 7020 BA with **Lock 7020 USB P**
Project No.:	36260
Test description:	Conducted Emissions, **within the transmitter's fundamental emission band**
Test standard:	EN 55011, Group 1, Class B
Tested port:	Mains, 120 V/ 60 Hz
Test verdict:	Passed
Operating conditions:	Pulse transmission (normal mode) with an interval of 250ms **Dummy load in lieu of the antenna**
Operator name:	RDR
Date of testing:	2019-05-13

EN-CE-R32-LN01



FCC Part 15.207 AC QP [..\EMI conducted\FCC Part 15 Subpart C\]
FCC Part 15.207 AC AV [..\EMI conducted\FCC Part 15 Subpart C\]
Preview Result 1-QPK [Preview Result 1.Result:1]
Preview Result 2-CAV [Preview Result 2.Result:2]
Final Result 2-CAV [Final Result 2.Result:1]

Final Result 2

Frequency (MHz)	CAverage-ClearWrite (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
13.560000	**46.6**	**GN**	**L1**	**11.0**	**3.4**	**50.0**	

EMI Auto Test Template: EN-CE-R32-LN01

Hardware Setup: EN-CE-R32-LN01
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 80 dBµV

Preview Measurements:
Scan Test Template: EN-CE-R32-LN01_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	50 Hz	QPK; CAV	200 Hz	1 s	20 dB
150 kHz - 30 MHz	2.25 kHz	QPK; CAV	9 kHz	1 s	0 dB

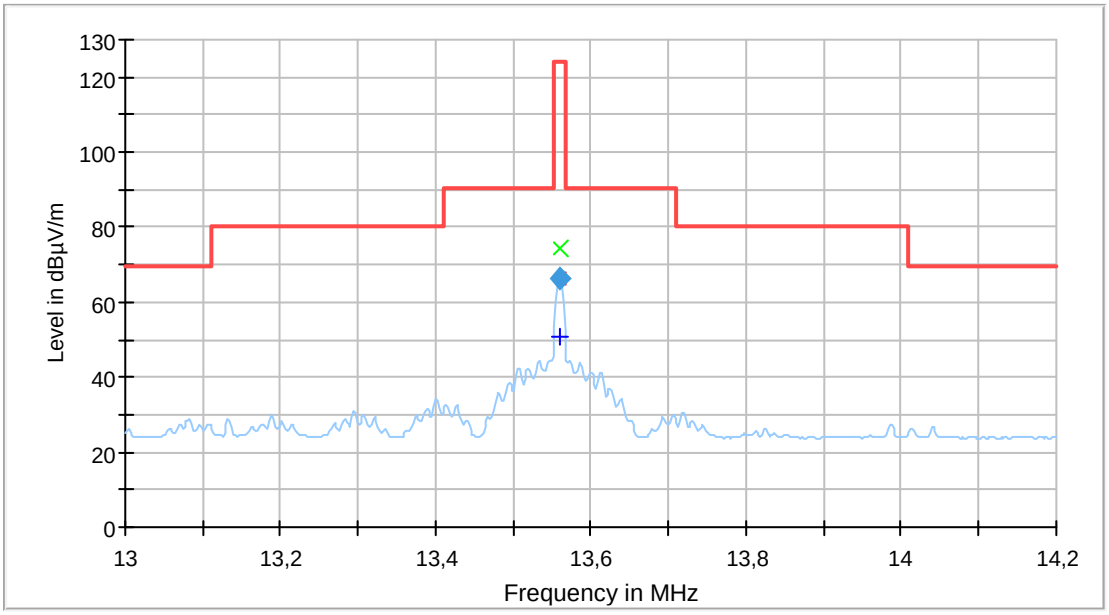
Receiver: [ESR 7]

Data Reduction:
Limit Line #1: FCC Part 15.207 AC QP
Limit Line #2: FCC Part 15.207 AC AV
Peak Search: 6 dB , Maximum Results: 10
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -10 dB
Maximum Number of Results: 20
After Data Reduction: Interactive data reduction

Report Settings:
Report Template: Standard Report_EMC KF_Conducted Emission

8.5 Field strength 13.110 MHz – 14.010 MHz

9 EUT:	GAT NET.Controller S 7020 BA with 3x Lock 7020
Test Verdict:	pass
Test Description:	Field Strength, 13 MHz- 14.2 MHz
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	08.05.2019
Comment:	Card 13.56 MHz



Preview Result 1-QPK [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs QPK [Critical_Freqs.Result:4]
FCC 15_225_9kHz_to_30MHz_d=3m [..\zF radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]
QuasiPeak-QPK (Single) [Result Table_Single.Result:2]
Average-AVG (Single) [Result Table_Single.Result:3]
MaxPeak-PK+ (Single) [Result Table_Single.Result:1]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
13.560000	66.22	---	124.00	57.78	1000.0	9.000	V	242.0

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
13.560000	20	Pk: 74,57

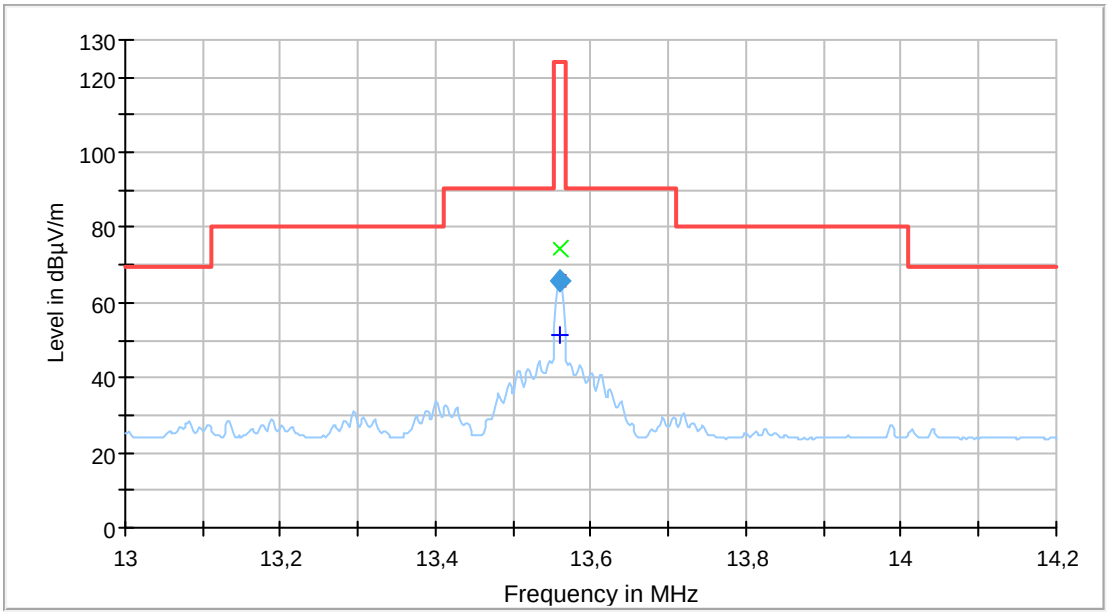
EMI Auto Test Template: FCC-RE-R17-AN23

Hardware Setup: EN-RE-R12-AN23
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 9 kHz - 30 MHz
Graphics Level Range: 0 dBµV/m - 130 dBµV/m

Preview Measurements:
Antenna height: 0 - 1000 cm , Step Size = 0 cm , Positioning Speed = 1
Polarization: H + V
Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN23_PRE

Subrange	**Step Size**	**Detectors**	**IF BW**	**Meas. Time**	**Preamp**
Receiver: [ESR 7]					
9 kHz - 150 kHz	50 Hz	QPK	200 Hz	1 s	0 dB
150 kHz - 30 MHz	2,25 kHz	QPK	9 kHz	1 s	0 dB

10 EUT:	GAT NET.Controller S 7020 BA with 3x Lock 7020 USB
Test Verdict:	pass
Test Description:	Field Strength, 13 MHz- 14.2 MHz
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	08.05.2019
Comment:	Card 13.56 MHz



Preview Result 1-QPK [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs QPK [Critical_Freqs.Result:4]
FCC 15_225_9kHz_to_30MHz_d=3m [..\zF radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]
QuasiPeak-QPK (Single) [Result Table_Single.Result:2]
Average-AVG (Single) [Result Table_Single.Result:3]
MaxPeak-PK+ (Single) [Result Table_Single.Result:1]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
13.560000	65.78	---	124.00	58.22	1000.0	9.000	V	242.0

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
13.560000	20	Pk: 74,25

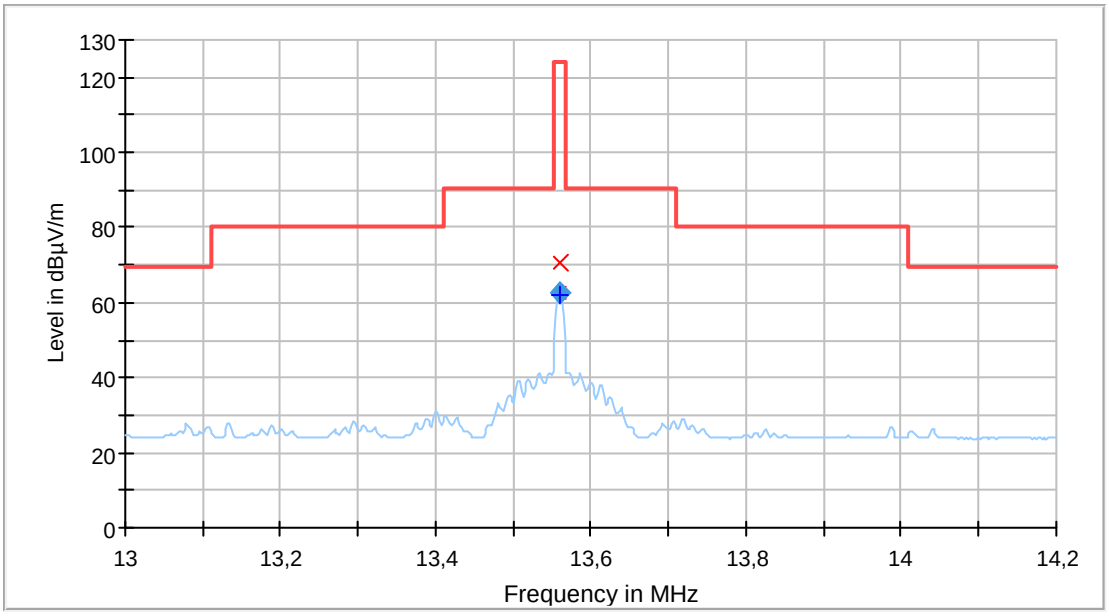
EMI Auto Test Template: FCC-RE-R17-AN23

Hardware Setup: EN-RE-R12-AN23
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 9 kHz - 30 MHz
Graphics Level Range: 0 dBµV/m - 130 dBµV/m

Preview Measurements:
Antenna height: 0 - 1000 cm , Step Size = 0 cm , Positioning Speed = 1
Polarization: H + V
Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN23_PRE

Subrange	**Step Size**	**Detectors**	**IF BW**	**Meas. Time**	**Preamp**
Receiver: [ESR 7]					
9 kHz - 150 kHz	50 Hz	QPK	200 Hz	1 s	0 dB
150 kHz - 30 MHz	2,25 kHz	QPK	9 kHz	1 s	0 dB

11 EUT:	GAT NET.Controller S 7020 BA with 3x Lock 7020 P
Test Verdict:	pass
Test Description:	Field Strength, 13 MHz- 14.2 MHz
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	08.05.2019
Comment:	Card 13.56 MHz



Preview Result 1-QPK [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs QPK [Critical_Freqs.Result:4]
FCC 15_225_9kHz_to_30MHz_d=3m [..\zF radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]
MaxPeak-PK+ (Single) [Result Table_Single.Result:1]
QuasiPeak-QPK (Single) [Result Table_Single.Result:2]
Average-AVG (Single) [Result Table_Single.Result:3]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
13.560000	62.82	---	124.00	61.18	1000.0	9.000	V	220.0

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
13.560000	20	Pk: 71,22

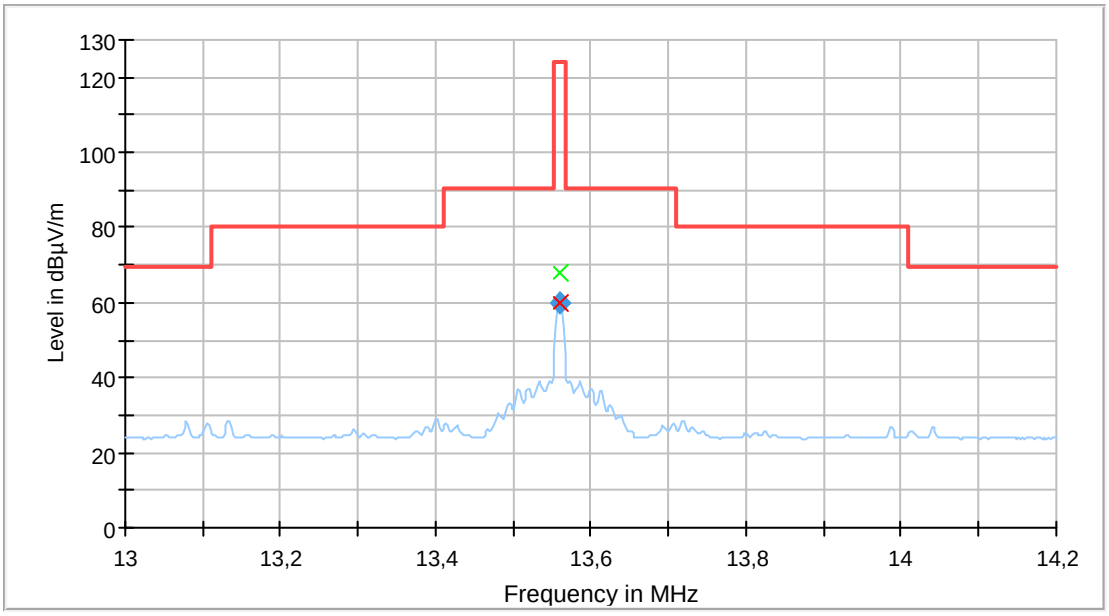
EMI Auto Test Template: FCC-RE-R17-AN23

Hardware Setup: EN-RE-R12-AN23
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 9 kHz - 30 MHz
Graphics Level Range: 0 dBµV/m - 130 dBµV/m

Preview Measurements:
Antenna height: 0 - 1000 cm , Step Size = 0 cm , Positioning Speed = 1
Polarization: H + V
Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN23_PRE

Subrange	**Step Size**	**Detectors**	**IF BW**	**Meas. Time**	**Preamp**
Receiver: [ESR 7]					
9 kHz - 150 kHz	50 Hz	QPK	200 Hz	1 s	0 dB
150 kHz - 30 MHz	2,25 kHz	QPK	9 kHz	1 s	0 dB

12 EUT:	GAT NET.Controller S 7020 BA with 3x Lock 7020 USB P
Test Verdict:	pass
Test Description:	Field Strength, 13 MHz- 14.2 MHz
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	08.05.2019
Comment:	Card 13.56 MHz



Preview Result 1-QPK [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs QPK [Critical_Freqs.Result:4]
FCC 15_225_9kHz_to_30MHz_d=3m [..\zF radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]
QuasiPeak-QPK (Single) [Result Table_Single.Result:2]
Average-AVG (Single) [Result Table_Single.Result:3]
MaxPeak-PK+ (Single) [Result Table_Single.Result:1]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
13.560000	59.96	---	124.00	64.04	1000.0	9.000	V	110.0

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
13.560000	20	Pk: 67,85

EMI Auto Test Template: FCC-RE-R17-AN23

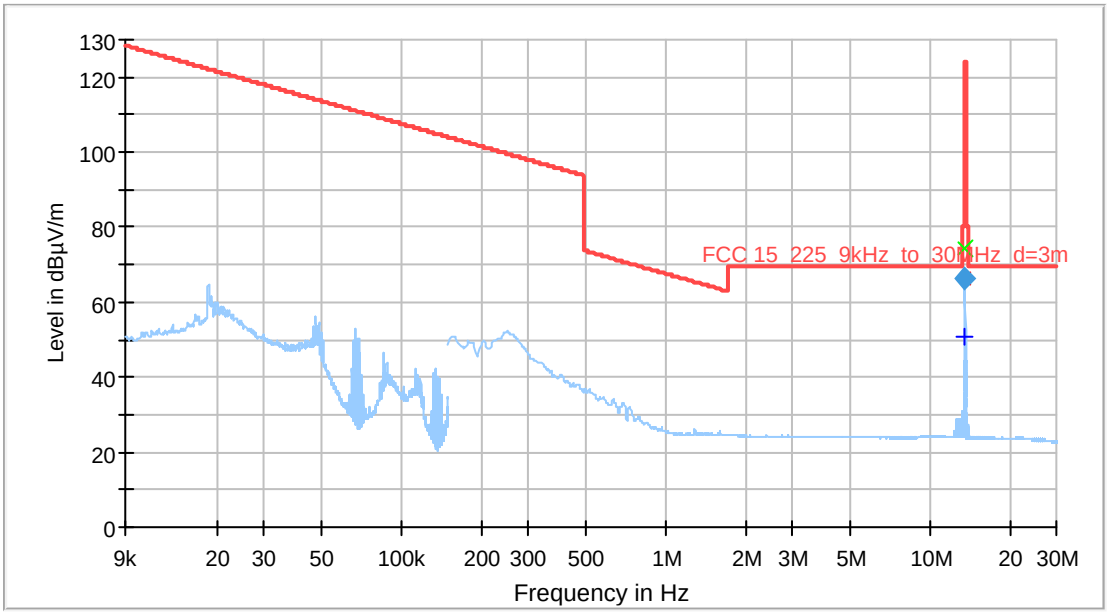
Hardware Setup: EN-RE-R12-AN23
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 9 kHz - 30 MHz
Graphics Level Range: 0 dBµV/m - 130 dBµV/m

Preview Measurements:
Antenna height: 0 - 1000 cm , Step Size = 0 cm , Positioning Speed = 1
Polarization: H + V
Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN23_PRE

Subrange	**Step Size**	**Detectors**	**IF BW**	**Meas. Time**	**Preamp**
Receiver: [ESR 7]					
9 kHz - 150 kHz	50 Hz	QPK	200 Hz	1 s	0 dB
150 kHz - 30 MHz	2,25 kHz	QPK	9 kHz	1 s	0 dB

8.6 Diagrams radiated emissions < 30 MHz

13 EUT:	GAT NET.Controller S 7020 BA with **3x Lock 7020**
Test Verdict:	pass
Test Description:	Spurious Emissions, 9kHz-30MHz
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	08.05.2019
Comment:	Card 13.56 MHz



Preview Result 1-QPK [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs QPK [Critical_Freqs.Result:4]
FCC 15_225_9kHz_to_30MHz_d=3m [..\zF radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]
QuasiPeak-QPK (Single) [Result Table_Single.Result:2]
Average-AVG (Single) [Result Table_Single.Result:3]
MaxPeak-PK+ (Single) [Result Table_Single.Result:1]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
13.560000	66.22	---	124.00	57.78	1000.0	9.000	V	242.0

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
13.560000	20	Pk: 74,57

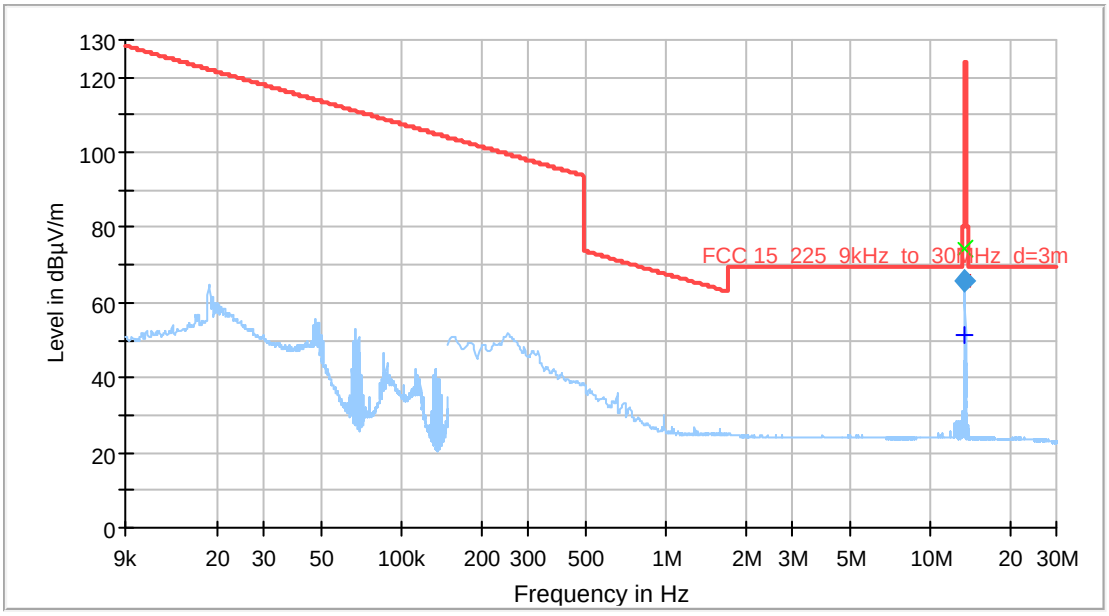
EMI Auto Test Template: FCC-RE-R17-AN23

Hardware Setup: EN-RE-R12-AN23
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 9 kHz - 30 MHz
Graphics Level Range: 0 dBµV/m - 130 dBµV/m

Preview Measurements:
Antenna height: 0 - 1000 cm , Step Size = 0 cm , Positioning Speed = 1
Polarization: H + V
Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN23_PRE

Subrange	**Step Size**	**Detectors**	**IF BW**	**Meas. Time**	**Preamp**
Receiver: [ESR 7]					
9 kHz - 150 kHz	50 Hz	QPK	200 Hz	1 s	0 dB
150 kHz - 30 MHz	2,25 kHz	QPK	9 kHz	1 s	0 dB

14 EUT:	GAT NET.Controller S 7020 BA with **3x Lock 7020 USB**
Test Verdict:	pass
Test Description:	Spurious Emissions, 9kHz-30MHz
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	08.05.2019
Comment:	Card 13.56 MHz



Preview Result 1-QPK [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs QPK [Critical_Freqs.Result:4]
FCC 15_225_9kHz_to_30MHz_d=3m [..\zF radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]
QuasiPeak-QPK (Single) [Result Table_Single.Result:2]
Average-AVG (Single) [Result Table_Single.Result:3]
MaxPeak-PK+ (Single) [Result Table_Single.Result:1]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
13.560000	65.78	---	124.00	58.22	1000.0	9.000	V	242.0

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
13.560000	20	Pk: 74,25

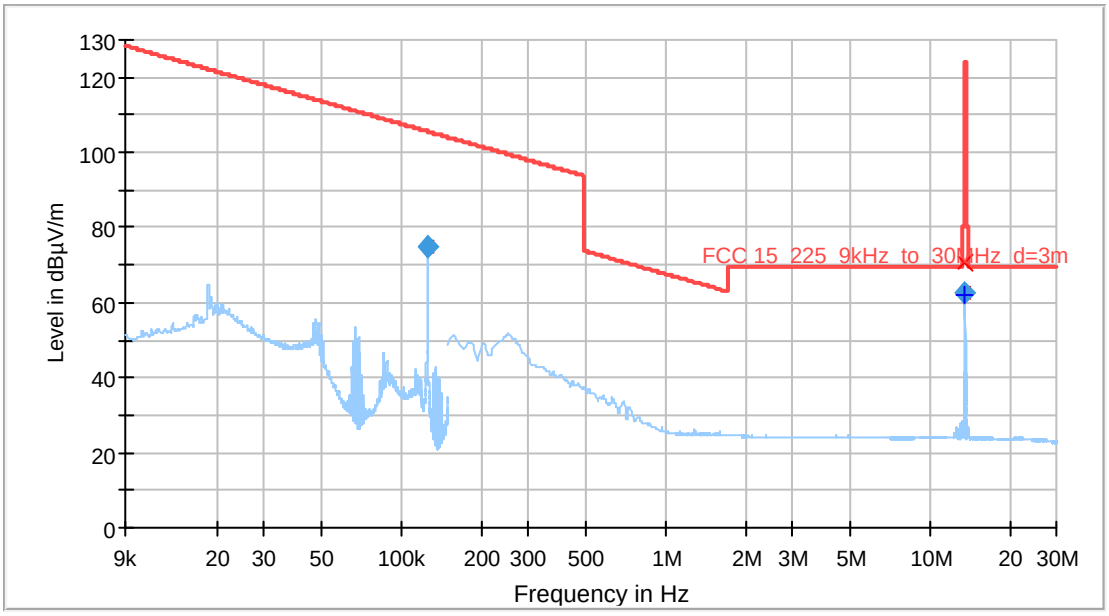
EMI Auto Test Template: FCC-RE-R17-AN23

Hardware Setup: EN-RE-R12-AN23
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 9 kHz - 30 MHz
Graphics Level Range: 0 dBµV/m - 130 dBµV/m

Preview Measurements:
Antenna height: 0 - 1000 cm , Step Size = 0 cm , Positioning Speed = 1
Polarization: H + V
Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN23_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [ESR 7]					
9 kHz - 150 kHz	50 Hz	QPK	200 Hz	1 s	0 dB
150 kHz - 30 MHz	2,25 kHz	QPK	9 kHz	1 s	0 dB

15 EUT:	GAT NET.Controller S 7020 BA with **3x Lock 7020 P**
Test Verdict:	pass
Test Description:	Spurious Emissions, 9kHz-30MHz
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	08.05.2019
Comment:	Card 13.56 MHz



Preview Result 1-QPK [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs QPK [Critical_Freqs.Result:4]
FCC 15_225_9kHz_to_30MHz_d=3m [..\zF radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]
MaxPeak-PK+ (Single) [Result Table_Single.Result:1]
QuasiPeak-QPK (Single) [Result Table_Single.Result:2]
Average-AVG (Single) [Result Table_Single.Result:3]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
0.125000	75.01	---	105.66	30.65	1000.0	0.200	V	88.0
13.560000	62.82	---	124.00	61.18	1000.0	9.000	V	220.0

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
0.125000	20	18:37:02 - 08.05.2019
13.560000	20	Pk: 71,22

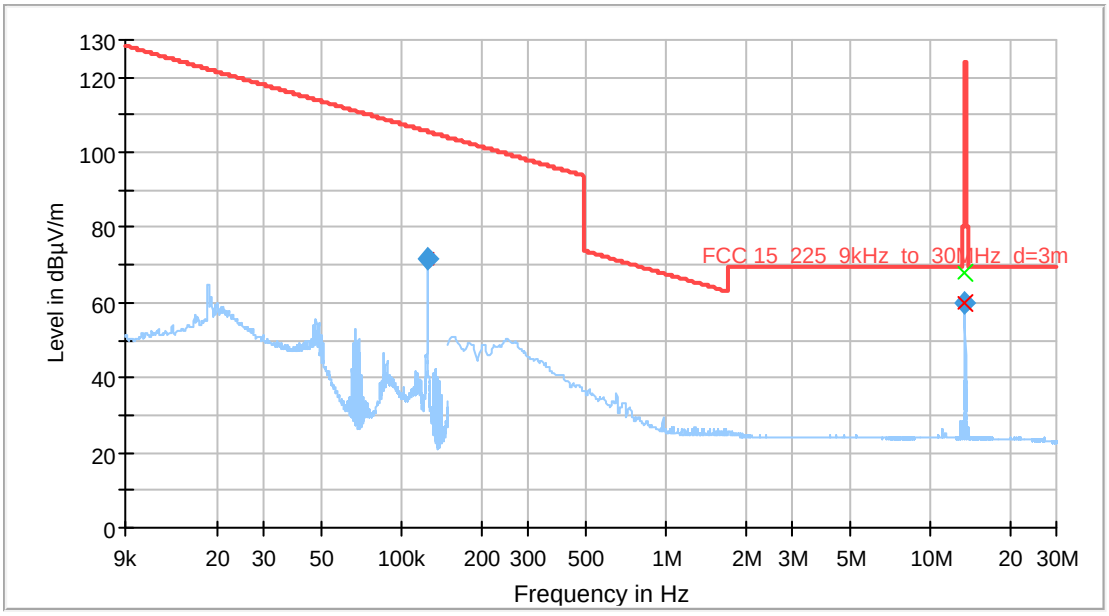
EMI Auto Test Template: FCC-RE-R17-AN23

Hardware Setup: EN-RE-R12-AN23
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 9 kHz - 30 MHz
Graphics Level Range: 0 dBµV/m - 130 dBµV/m

Preview Measurements:
Antenna height: 0 - 1000 cm , Step Size = 0 cm , Positioning Speed = 1
Polarization: H + V
Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN23_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [ESR 7]					
9 kHz - 150 kHz	50 Hz	QPK	200 Hz	1 s	0 dB
150 kHz - 30 MHz	2,25 kHz	QPK	9 kHz	1 s	0 dB

16 EUT:	GAT NET.Controller S 7020 BA with **3x Lock 7020 USB P**
Test Verdict:	pass
Test Description:	Spurious Emissions, 9kHz-30MHz
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	08.05.2019
Comment:	Card 13.56 MHz



Preview Result 1-QPK [Preview Result 1.Result:1]
Critical_Freqs AVG [Critical_Freqs.Result:5]
Critical_Freqs QPK [Critical_Freqs.Result:4]
FCC 15_225_9kHz_to_30MHz_d=3m [..\zF radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]
Final_Result AVG [Final_Result.Result:5]
QuasiPeak-QPK (Single) [Result Table_Single.Result:2]
Average-AVG (Single) [Result Table_Single.Result:3]
MaxPeak-PK+ (Single) [Result Table_Single.Result:1]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
0.125000	71.61	---	105.66	34.05	1000.0	0.200	H	176.0
13.560000	59.96	---	124.00	64.04	1000.0	9.000	V	110.0

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
0.125000	20	Pk: 81,96
13.560000	20	Pk: 67,85

EMI Auto Test Template: FCC-RE-R17-AN23

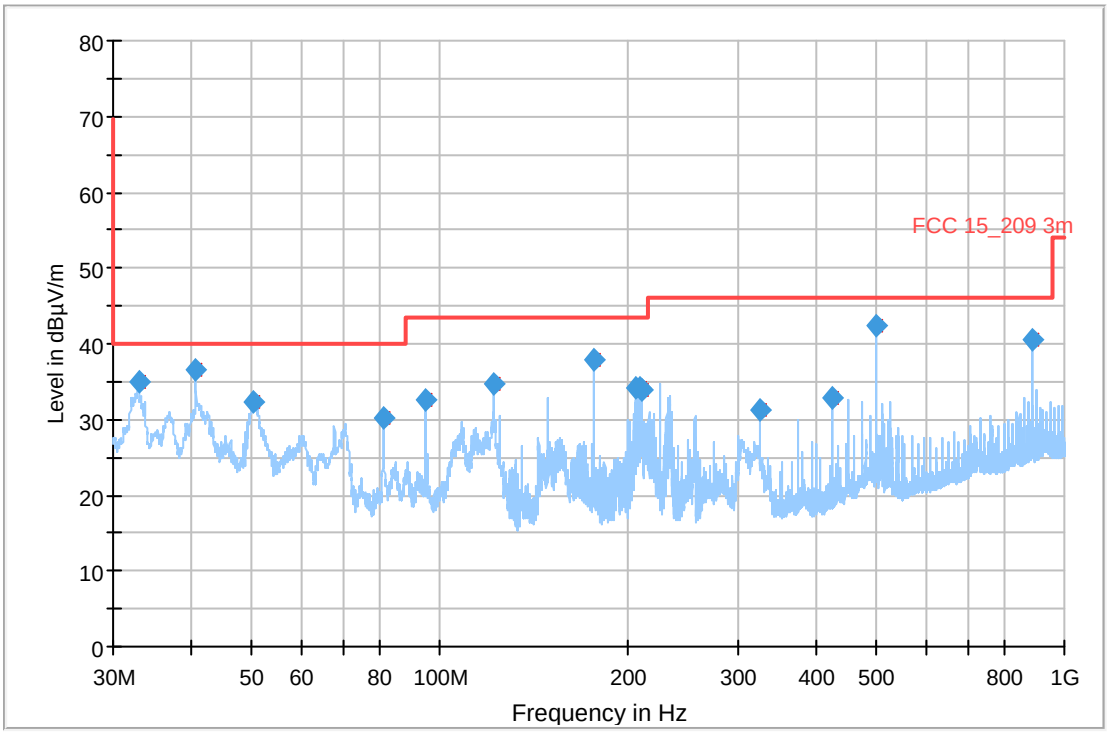
Hardware Setup: EN-RE-R12-AN23
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 9 kHz - 30 MHz
Graphics Level Range: 0 dBµV/m - 130 dBµV/m

Preview Measurements:
Antenna height: 0 - 1000 cm , Step Size = 0 cm , Positioning Speed = 1
Polarization: H + V
Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN23_PRE

Subrange	**Step Size**	**Detectors**	**IF BW**	**Meas. Time**	**Preamp**
Receiver: [ESR 7]					
9 kHz - 150 kHz	50 Hz	QPK	200 Hz	1 s	0 dB
150 kHz - 30 MHz	2,25 kHz	QPK	9 kHz	1 s	0 dB

8.7 Diagrams radiated emissions 30 MHz to 1 GHz (Pk, Pre-tests)

17 EUT:	GAT NET.Controller S 7020 BA with 3x Lock 7020
Test Verdict:	Pass
Test Description:	FCC Part 15 Subpart C
Operating Conditions:	Pulse transmission (normal mode) with an interval of 100 ms
Operator Name:	RDR
Project Number:	36260
Date	2019-04-30
Comment:	Because it is a Pre-test this measurement was done with Pk detector. The limit is for QP, therefore it's not relevant if the Pk values are over the limit line in this diagram.



Preview Result 1-PK+ [Preview Result 1.Result:2]
Critical_Freqs PK+ [Critical_Freqs.Result:4]
FCC 15_209 3m [..\EMI radiated\FCC Part 15C\]
Final_Result PK+ [Final_Result.Result:4]

EMI Auto Test Template: zF-EN-RE-R17-AN08

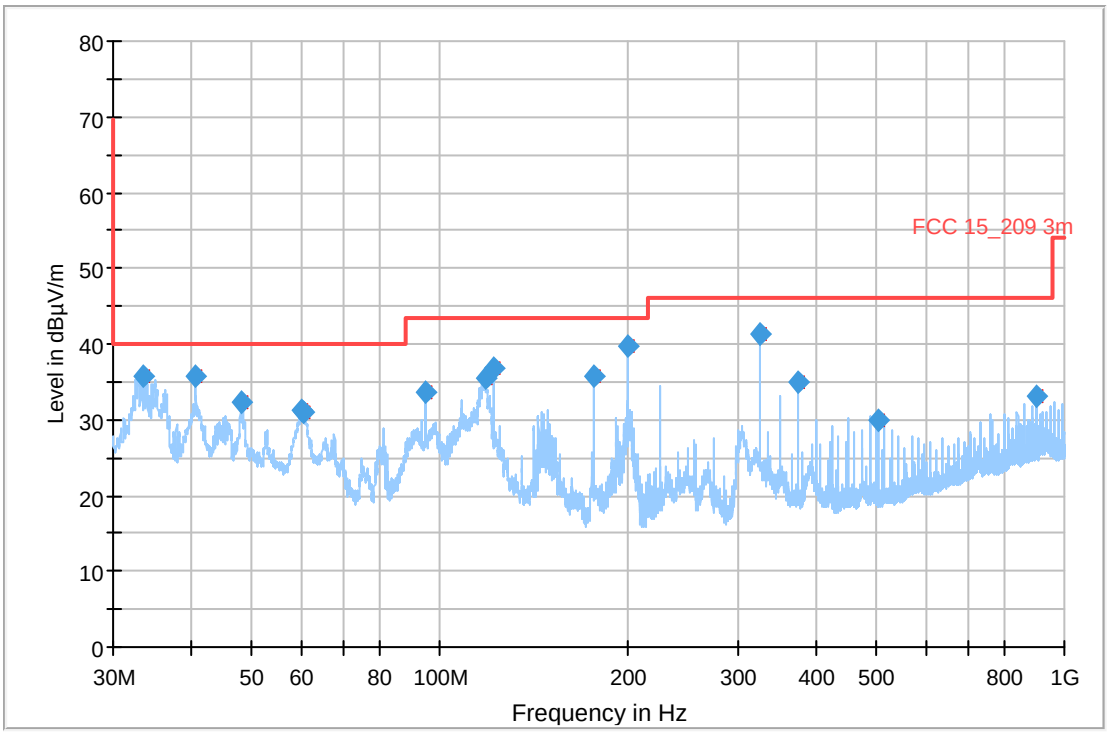
Hardware Setup: EN-RE-R12-AN08
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 30 MHz - 1 GHz
Graphics Level Range: 0 dBµV/m - 80 dBµV/m

Preview Measurements:
Antenna height: 0 - 0 cm , Step Size = 0 cm , Positioning Speed = 8
Turntable position: 0 - 315 deg , Step Size = 45 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN08_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	30 kHz	PK+	120 kHz	0,15 s	20 dB
1 GHz - 3 GHz	250 kHz	PK+	1 MHz	0,1 s	20 dB

Frequency Zoom:
Zoom Scan Template: EN-RE-R12-AN08_ZOOM

18 EUT:	GAT NET.Controller S 7020 BA with 3x Lock 7020 USB
Test Verdict:	Pass
Test Description:	FCC Part 15 Subpart C
Operating Conditions:	Pulse transmission (normal mode) with an interval of 100 ms
Operator Name:	RDR
Project Number:	36260
Date	2019-04-30
Comment:	Because it is a Pre-test this measurement was done with Pk detector. The limit is for QP, therefore it's not relevant if the Pk values are over the limit line in this diagram.



Preview Result 1-PK+ [Preview Result 1.Result:2]
Critical_Freqs PK+ [Critical_Freqs.Result:4]
FCC 15_209 3m [..\EMI radiated\FCC Part 15C\]
Final_Result PK+ [Final_Result.Result:4]

EMI Auto Test Template: zF-EN-RE-R17-AN08

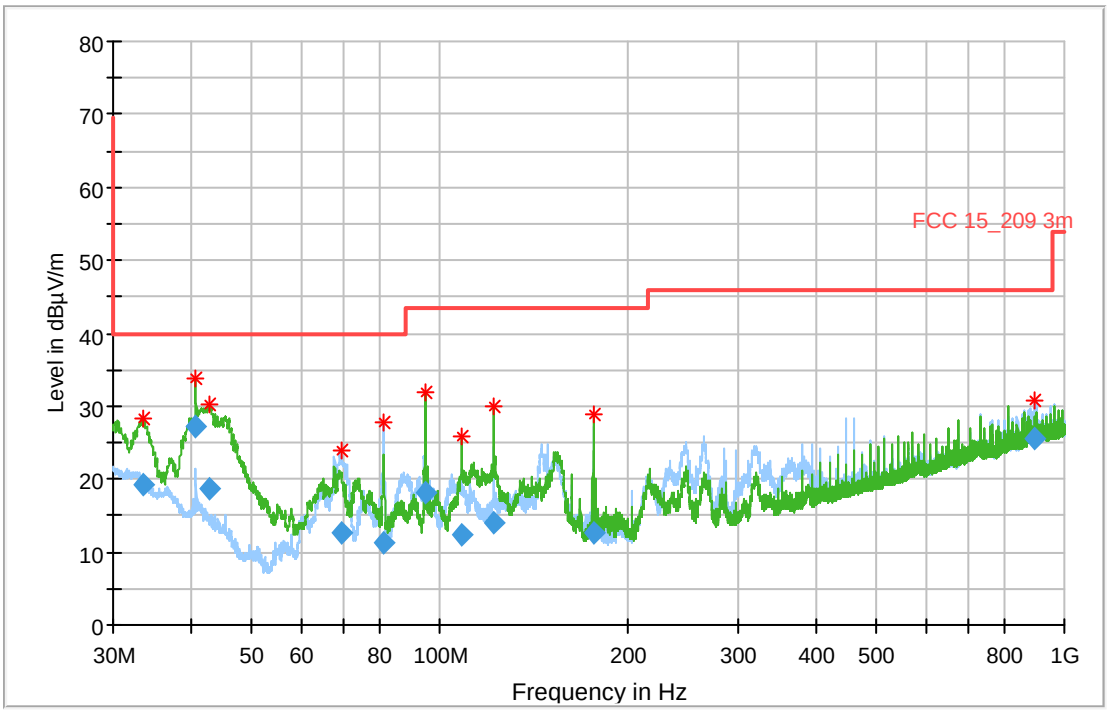
Hardware Setup: EN-RE-R12-AN08
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 30 MHz - 1 GHz
Graphics Level Range: 0 dBµV/m - 80 dBµV/m

Preview Measurements:
Antenna height: 0 - 0 cm , Step Size = 0 cm , Positioning Speed = 8
Turntable position: 0 - 315 deg , Step Size = 45 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN08_PRE

Subrange	**Step Size**	**Detectors**	**IF BW**	**Meas. Time**	**Preamp**
Receiver: [ESR 7]					
30 MHz - 1 GHz	30 kHz	PK+	120 kHz	0,15 s	20 dB
1 GHz - 3 GHz	250 kHz	PK+	1 MHz	0,1 s	20 dB

Frequency Zoom:
Zoom Scan Template: EN-RE-R12-AN08_ZOOM

19 EUT: GAT NET.Controller S 7020 BA with 3x Lock 7020 P
Test Verdict: Pass
Test Description: Spurious Emissions, 30-1000MHz
Operating Conditions: Pulse transmission (normal mode) with an interval of 250 ms
Operator Name: RDR MBE
Project Number: 34993 / 36260
Date 2019-04-26



Preview Result 1H-PK+ [Preview Result 1H.Result:2]
Preview Result 1V-PK+ [Preview Result 1V.Result:2]
Critical_Freqs PK+ [Critical_Freqs.Result:4]
FCC 15_209 3m [..\EMI radiated\FCC Part 15C\]
Final_Result QPK [Final_Result.Result:4]

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
33.390000	19.30	40.00	20.70	1000.0	120.000	105.0	V	151.0
40.680000	27.09	40.00	12.91	1000.0	120.000	100.0	V	97.0
42.840000	18.70	40.00	21.30	1000.0	120.000	100.0	V	82.0
69.420000	12.57	40.00	27.43	1000.0	120.000	213.0	H	191.0
81.360000	11.28	40.00	28.72	1000.0	120.000	315.0	H	185.0
94.890000	18.10	43.52	25.42	1000.0	120.000	315.0	H	-15.0
108.450000	12.44	43.52	31.08	1000.0	120.000	100.0	V	118.0
122.010000	13.91	43.52	29.62	1000.0	120.000	137.0	V	306.0
176.250000	12.61	43.52	30.91	1000.0	120.000	105.0	V	288.0
894.930000	25.45	46.02	20.57	1000.0	120.000	100.0	H	42.0

(continuation of the "Final_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
33.390000	18	13:37:30 - 26.04.2019
40.680000	14	13:34:45 - 26.04.2019
42.840000	12	13:33:19 - 26.04.2019
69.420000	9	13:27:31 - 26.04.2019
81.360000	11	13:31:13 - 26.04.2019
94.890000	12	13:29:26 - 26.04.2019
108.450000	12	13:36:06 - 26.04.2019
122.010000	12	13:40:36 - 26.04.2019
176.250000	11	13:39:08 - 26.04.2019
894.930000	23	13:25:41 - 26.04.2019

EMI Auto Test Template: FCC-RE-R17-AN08

Hardware Setup: EN-RE-R12-AN08
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 30 MHz - 1 GHz
Graphics Level Range: 0 dBµV/m - 80 dBµV/m

Preview Measurements:
- Antenna height: 100 - 355 cm , Step Size = 85 cm , Positioning Speed = 8
- Polarization: H + V
- Turntable position: 0 - 352 deg , Step Size = 22 deg , Positioning Speed = 8
- Graphics Display: Show separate traces for horizontal and vertical polarization
- Scan Test Template: EN-RE-R12-AN08_PRE

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	30 kHz	PK+	120 kHz	0,3 s	20 dB
1 GHz - 3 GHz	250 kHz	PK+	1 MHz	0,1 s	20 dB

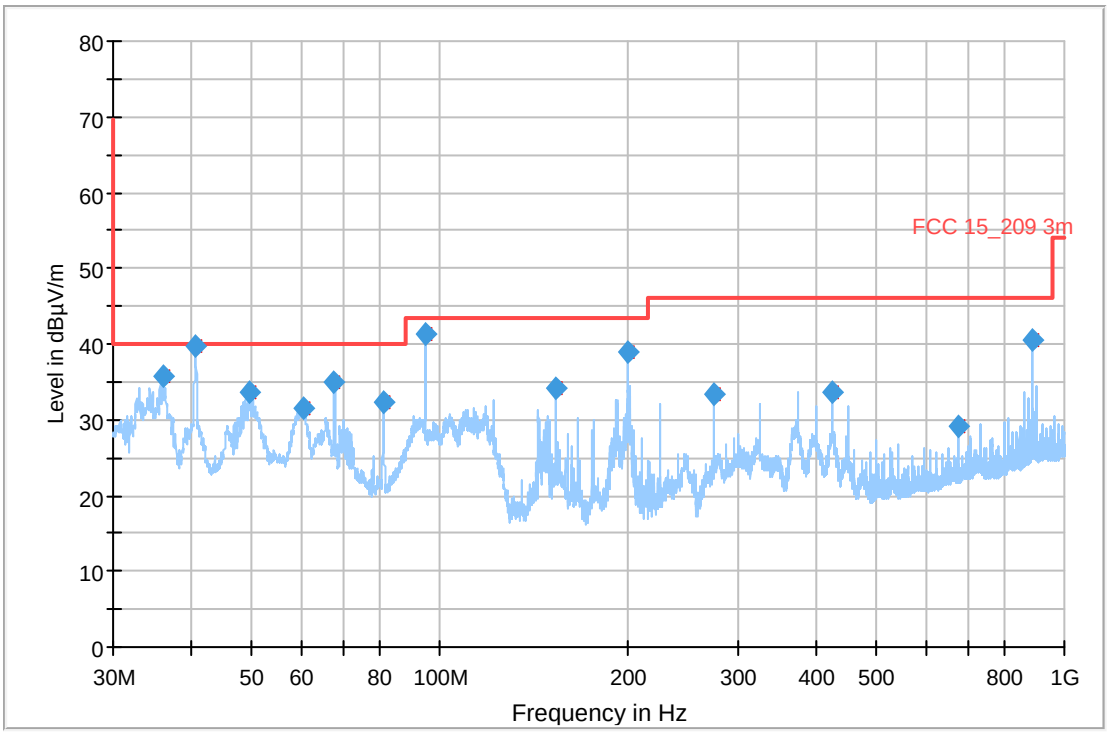
Frequency Zoom:
- Zoom Scan Template: EN-RE-R12-AN08_ZOOM

Adjustment:
- Antenna height: Range = 90 cm , Measuring Speed = 3
- Turntable position: Range = 30 deg , Measuring Speed = 3
- Template for Single Meas.: EN-RE-R12-AN08_MAX

Final Measurements:
- Template for Single Meas.: EN-RE-R12-AN08_FIN

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	40 kHz	QPK	120 kHz	1 s	20 dB
1 GHz - 3 GHz	40 kHz	QPK	1 MHz	1 s	20 dB

20 EUT:	GAT NET.Controller S 7020 BA with 3x Lock 7020 USB P
Test Verdict:	Pass
Test Description:	FCC Part 15 Subpart C
Operating Conditions:	Pulse transmission (normal mode) with an interval of 250ms
Operator Name:	RDR
Project Number:	36260
Date	2019-04-30
Comment:	Because it is a Pre-test this measurement was done with Pk detector. The limit is for QP, therefore it's not relevant if the Pk values are over the limit line in this diagram.



Preview Result 1-PK+ [Preview Result 1.Result:2]
Critical_Freqs PK+ [Critical_Freqs.Result:4]
FCC 15_209 3m [..\EMI radiated\FCC Part 15C\]
Final_Result PK+ [Final_Result.Result:4]

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)

(continuation of the "Final_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB/m)	Comment
36.030000	16	15:07:55 - 30.04.2019
40.680000	14	15:07:55 - 30.04.2019
49.500000	8	15:07:55 - 30.04.2019
60.330000	5	15:07:55 - 30.04.2019
67.770000	8	15:07:55 - 30.04.2019
81.360000	11	15:07:55 - 30.04.2019
94.920000	11	15:07:55 - 30.04.2019
153.330000	10	15:07:55 - 30.04.2019
200.010000	10	15:07:55 - 30.04.2019
275.010000	12	15:07:55 - 30.04.2019
424.980000	16	15:07:55 - 30.04.2019
678.000000	20	15:07:55 - 30.04.2019
890.460000	23	15:07:55 - 30.04.2019

EMI Auto Test Template: zF-EN-RE-R17-AN08

Hardware Setup: EN-RE-R12-AN08
Measurement Type: Open-Area-Test-Site (SAC/FAR)
Frequency Range: 30 MHz - 1 GHz
Graphics Level Range: 0 dBµV/m - 80 dBµV/m

Preview Measurements:
Antenna height: 0 - 0 cm , Step Size = 0 cm , Positioning Speed = 8
Turntable position: 0 - 315 deg , Step Size = 45 deg , Positioning Speed = 8
Scan Test Template: EN-RE-R12-AN08_PRE

Subrange	**Step Size**	**Detectors**	**IF BW**	**Meas. Time**	**Preamp**
Receiver: [ESR 7]					
30 MHz - 1 GHz	30 kHz	PK+	120 kHz	0,3 s	20 dB
1 GHz - 3 GHz	250 kHz	PK+	1 MHz	0,1 s	20 dB

Frequency Zoom:
Zoom Scan Template: EN-RE-R12-AN08_ZOOM

SECTION 9
MEASUREMENT UNCERTAINTY EVALUATION

Measurement uncertainty for radiated magnetic field, 9 kHz – 30 MHz	± 3.2 dB
Measurement uncertainty for radiated emission, 30 MHz - 1000 MHz	
Uncertainty for the frequency range 30 to 300 MHz using a biconical or a combination antenna at 3 m	± 4.9 dB
Uncertainty for the frequency range 300 to 1000 MHz using a logperiodic or a combination antenna at 3 m	± 4.7 dB
Measurement uncertainty for radiated emission 1 to 26 GHz	
Uncertainty for the frequency range 1 to 18 GHz	± 6.1 dB
Uncertainty for the frequency range 18 to 26,5 GHz	± 6.5 dB
Measurement uncertainty for conducted disturbances at the antenna port on radio equipment	
Frequency range 9 kHz - 1 GHz	± 1.9 dB
Frequency range 1 GHz - 18 GHz	± 3.0 dB
Frequency range 18 GHz -26,5 GHz	± 3.6 dB
Measurement uncertainty for Frequency error	± 1 x 10^{-8}
Measurement uncertainty for Output power (Conducted), 9 kHz - 18 GHz	± 1.0 dB
Measurement uncertainty for RF Power density	
Frequency range 9 kHz - 1 GHz	± 1.9 dB
Frequency range 1 GHz - 18 GHz	± 3.0 dB
Frequency range 18 GHz -26,5 GHz	± 3.6 dB
Measurement uncertainty for humidity	± 4 %
Measurement uncertainty for temperature	± 0.5 ^{0}C
Measurement uncertainty for voltage	
DC	± 0.1 %
AC up to 10 kHz	± 1.8 %
Measurement uncertainty for time	± 0.058 %
Measurement uncertainty for conducted emissions, LISN, 150 kHz -30 MHz	± 2.3 dB
Measurement uncertainty for OBW	± 4.3 %
601 points resolution (Spectrum analyzer)	± 0.83 %
30000 points resolution (Spectrum analyzer)	± 0.016 %

End of test report