FCC TEST REPORT

FCC 47 CFR Part 15C
ISED RSS-247

Frequency hopping systems operating within the 902 – 928 MHz band

Report Reference No. ..... :	G0M-1708-6813-TFC247HOP-V02
Testing Laboratory ..... :	Eurofins Product Service GmbH
Address ..... :	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation ..... :	A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-2
Applicant's name ..... :	MSA Europe GmbH
Address ..... :	Schlüsselstr. 12 8645 Rapperswil - Jona SWITZERLAND
Test specification:	
Standard..... :	47 CFR Part 15C RSS-247, Issue 2, 2017-02
Test scope…….. ..... :	complete Radio compliance test
Equipment under test (EUT):	
Product description	LRR SG
Model No.	915MHz
Additional Model(s)	None
Brand Name(s)	None
Hardware version	HW Rev. A
Firmware / Software version	FW Rev. 1.5
	FCC-ID: RPN-10184341 IC: N/A
Test result	**Passed**

Possible test case verdicts:	
- neither assessed nor tested ..... :	N/N
- required by standard but not appl. to test object ..... :	N/A
- required by standard but not tested ..... :	N/T
- not required by standard for the test object ..... :	N/R
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)

Testing:		
Test Lab Temperature ..... :	20 – 23 °C	
Test Lab Humidity ..... :	32 – 38 %	
Date of receipt of test item ..... :	2018-03-07	
Date (s) of performance of tests ..... :	2018-03-07 – 2018-03-08	
Compiled by ..... :	Wilfried Treffke	
Tested by (+ signature) ..... : (Responsible for Test)	Wilfried Treffke	W. Treffke
Approved by (+ signature) ..... : (Head of Lab)	Christian Weber	C. Weber
Date of issue ..... :	2018-04-13	
Total number of pages ..... :	113	

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.

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
01	2018-03-26	Initial Release	
02	2018-04-13	Replaced document: G0M-1708-6813-TFC247HOP-V01 Replaced by: G0M-1708-6813-TFC247HOP-V02 Reason: Typo because of V_{NOM}	Wilfried Treffke

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

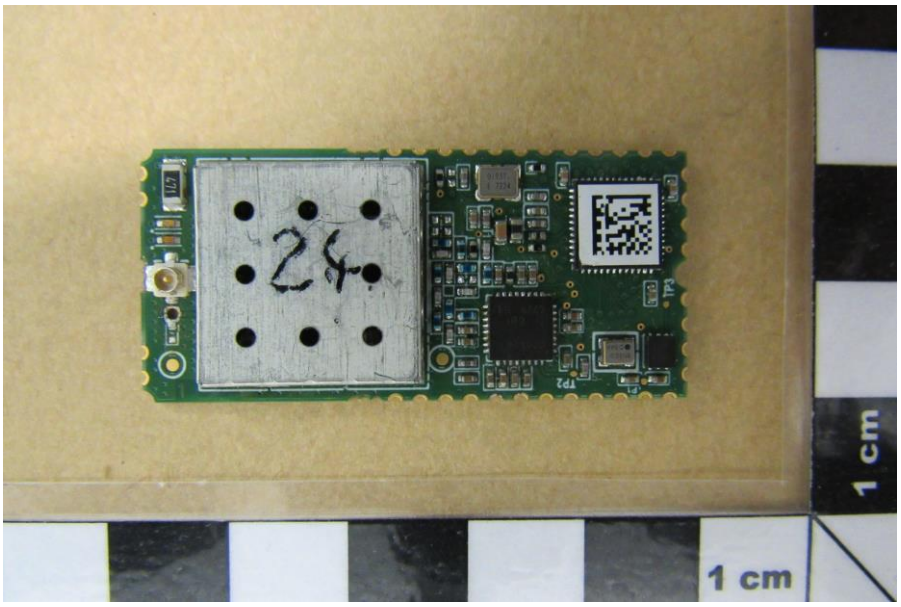
REPORT INDEX

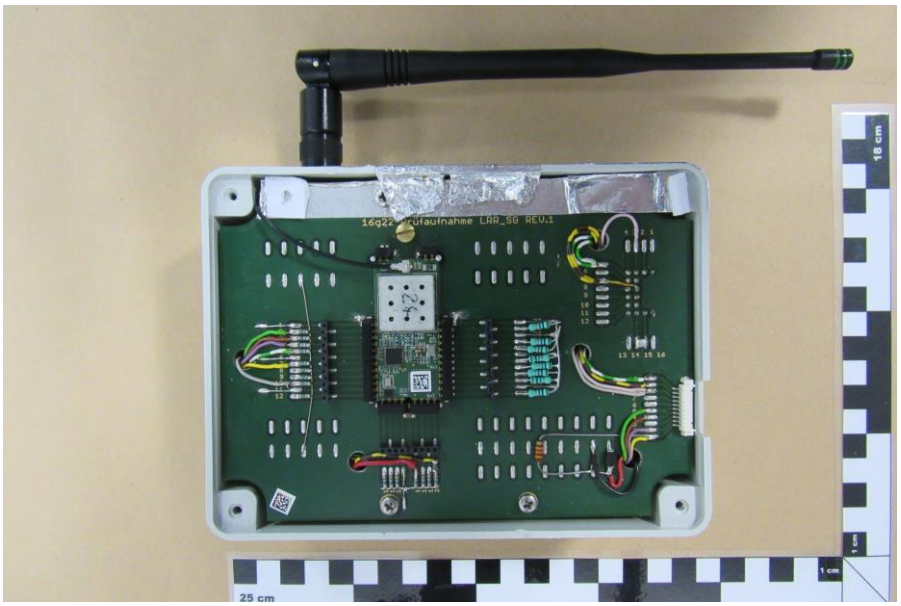
1 Equipment (Test item) Description

Description	LRR SG	
Model	915MHz	
Additional Model(s)	None	
Brand Name(s)	None	
Serial number	None	
Hardware version	HW Rev. A	
Software / Firmware version	FW Rev. 1.5	
PMN	N/A	
HVIN	N/A	
FVIN	N/A	
HMN	N/A	
FCC-ID	RPN-10184341	
IC	N/A	
Equipment type	Radio module	
Radio type	Transceiver	
Radio technology	custom	
Assigned frequency band	902 - 928 MHz	
Main test frequencies	F_{LOW}	902.4245239 MHz
	F_{MID}	914.974854 MHz
	F_{HIGH}	927.704468 MHz
Spreading	FHSS	
Modulations	2-FSK	
Number of channels	53 hopping channels	
Channel spacing	489 kHz	
Number of antennas	2	
Antenna 1	Type	external dedicated
	Model	whip antenna
	Manufacturer	various
	Gain	4 dBi (declared by manufacturer)
Antenna 2	Type	external dedicated
	Model	Antenna PC23
	Manufacturer	Taoglas
	Gain	0 dBi (declared by manufacturer)

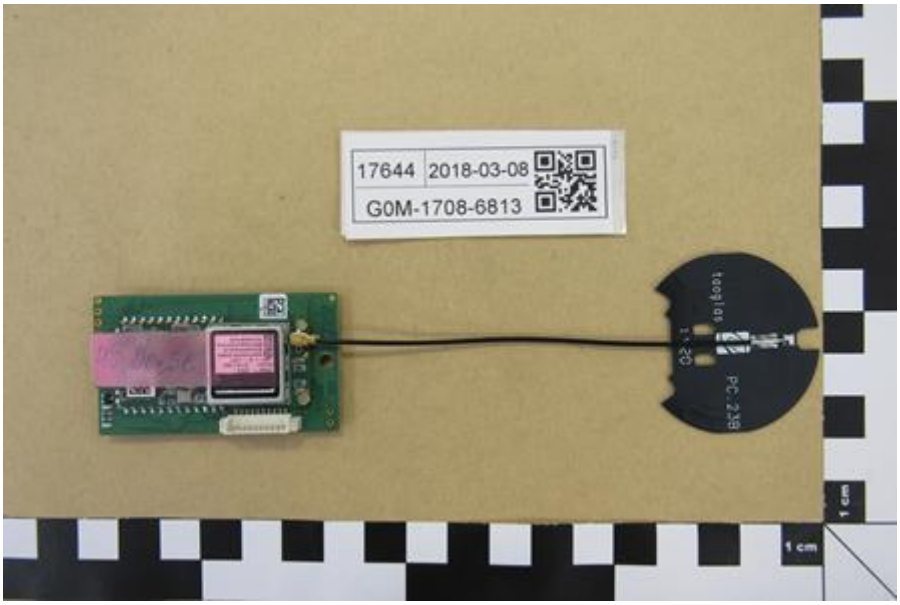
Manufacturer	MSA Europe GmbH Schlüsselstr. 12 8645 Rapperswil - Jona SWITZERLAND	
Power supply	V_{NOM}	3.3 VDC
AC/DC-Adaptor	Model	None
	Vendor	None
	Input	None
	Output	None

1.1 Photos – Equipment External

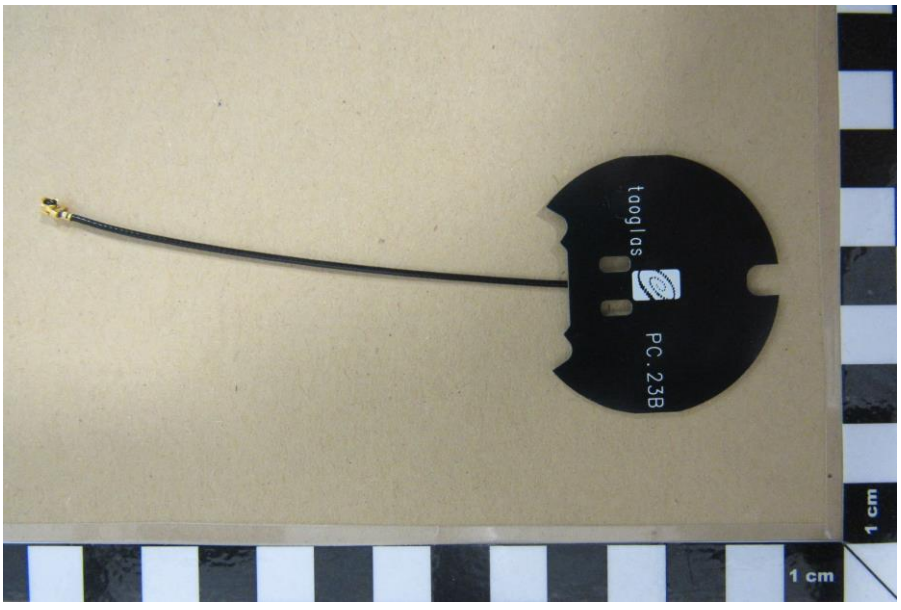
EUT LRR SG 915MHz


AE1 adapter interface 1 Top


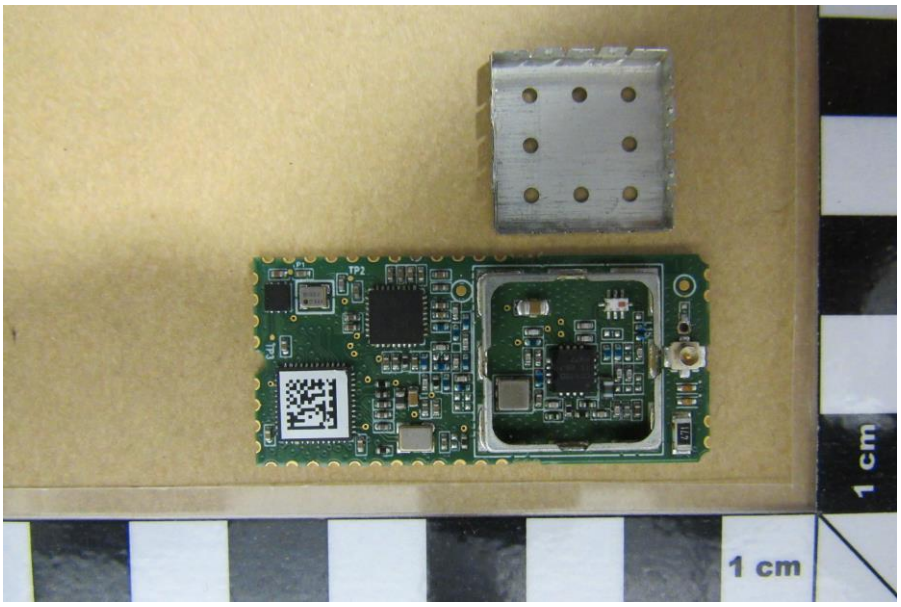
AE1 adapter interface 1 Connector Side

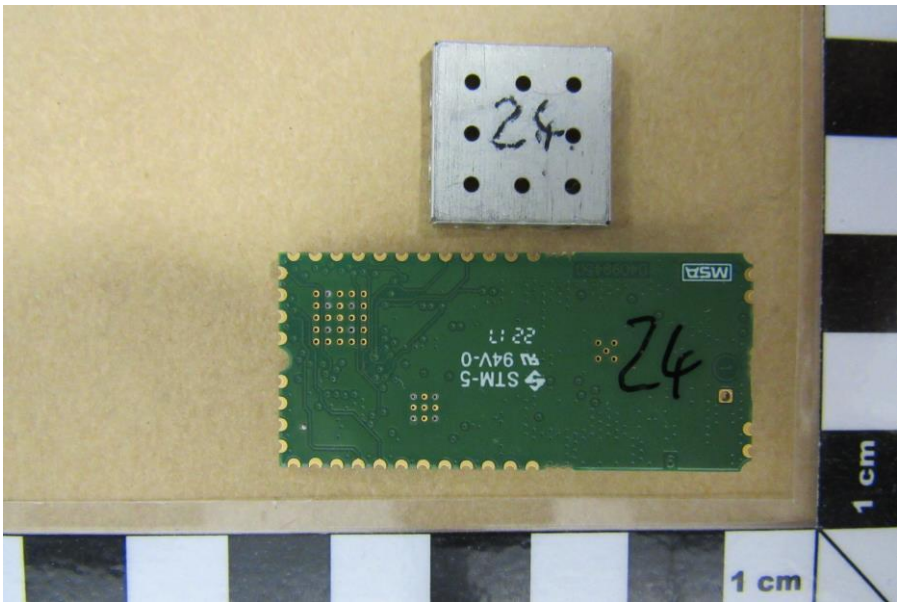

AE2 adapter interface 2


Antenna whip antenna 4 dBi

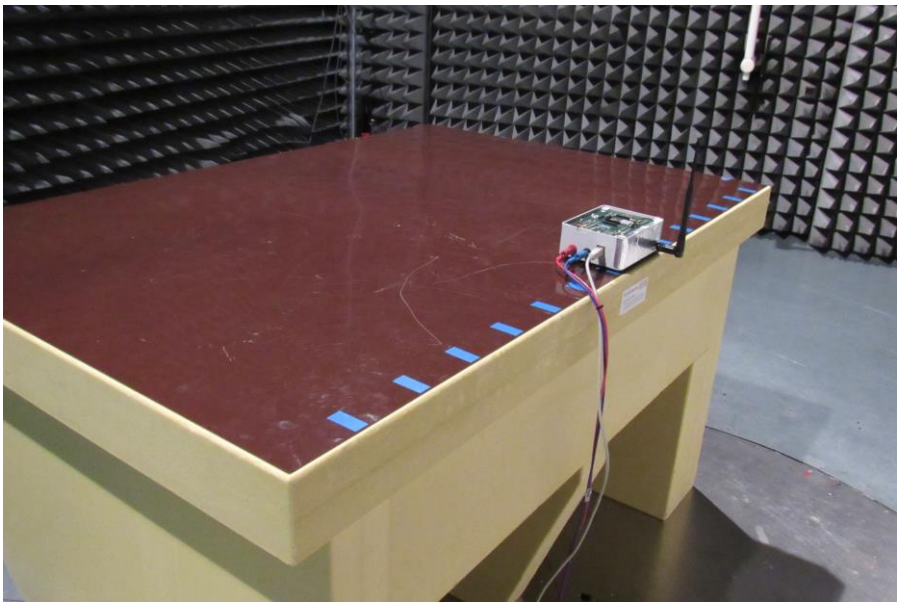

Antenna PC23 0 dBi


1.2 Photos – Equipment internal

EUT without Shielding Top


EUT without Shielding Bottom


1.3 Photos – Test setup

Radiated Setup


Conducted Setup


1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE 1	adapter interface 1	MSA	internal only - not for sale	provides power and data interface
AE 2	adapter interface 2	MSA	internal only - not for sale	provides power and data interface
AE 3	USB AC-Adapter	Ktec	KSAS006050100D 5U	100-240VAC 50/60Hz

***Note:** Use the following abbreviations:

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

1.5 Test Modes

Mode #	Description	
Single 1	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = 2-FSK Duty cycle = 100 % Power level = Maximum
Single 2	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = 2-FSK Duty cycle = 16 % Power level = Maximum
Hopping	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping Modulation = 2-FSK Duty cycle = 32 % Power level = Maximum
Receive	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone receive Spreading = Hopping stopped (single hopping channel Modulation = 2-FSK
AC-Powerline	General conditions:	EUT powered by commercial AC/DC-Adapter
	Radio conditions:	Mode = standalone transmit Spreading = Hopping Modulation = 2-FSK Duty cycle = 32 % Power level = Maximum

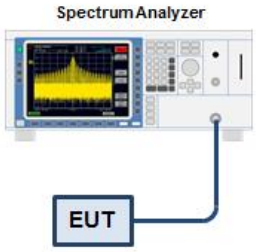
1.6 Test mode duty cycle

Information

Test Information	
Measurement Method	ANSI C63.10 7.5

Setup

Test Setup



Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

Procedure

Test Procedure

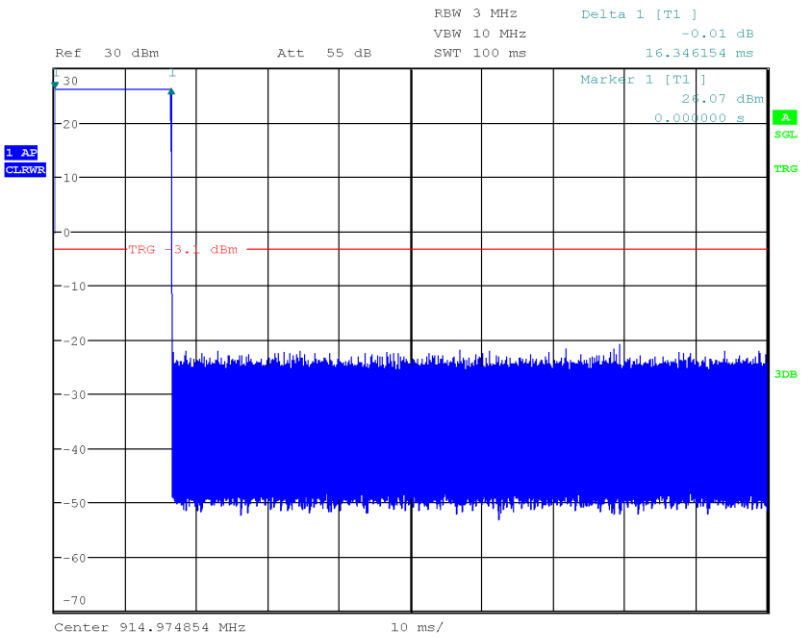
1. EUT set to test mode
2. Span is set to zero span
3. Detector set to peak
4. Sweep time is set long enough to capture at least 5 bursts
5. Envelope peak value of emission spectrum is selected
6. The maximum burst duration T_{ON} is measured using two markers set to the start and the end of the longest burst
7. The minimum idle duration T_{OFF} is measured using two markers set to the start and the end of the shortest idle period
8. The duty cycle is calculated by DC = T_{ON} / (T_{ON} + T_{OFF}) for 100ms
9. The duty cycle correction is calculated by DC = 20 x Log_{10}(T_{ON} / (T_{ON} + T_{OFF}))

Results

Duty Cycle Results for Average calculation		
Mode	Duty Cycle	Correction Factor [dB]
Single 2	0.1635	-15.7

Duty Cycle

Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Reference Method:	ANSI C63.10:2013, Section 7.5
Duty Cycle Period:	100 ms
Maximum Duty Cycle [%]:	16.35
Duty Cycle Correction [dB]:	-15.7



1.7 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2015.2.4

20dB Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

Number of hopping frequencies					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

Time of occupancy					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

Maximum peak conducted power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

Band edge compliance					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

Conducted spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2017-07	2018-07

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	2017-02	2020-02
MXE EMI Receiver	Keysight Technologies	N9038A-526/WXP	EF01070	2017-08	2018-08
Biconical antenna	R&S	HK116	EF00030	2016-04	2019-04
LPD Antenna	R&S	HL 223	EF00187	2016-05	2019-05
LPD Antenna	R&S	HL 025	EF00327	2015-10	2018-10

AC powerline conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2017-01	2019-01
EMI Test Receiver	R&S	ESCS 30	EF00295	2017-07	2018-07

1.8 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:

Reading on Analyzer (dBµV) + A.F. (dB) = Net field strength (dBµV/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:

Limit (dBµV/m) = 20*log (µV/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

FCC 47 CFR Part 15C, IC RSS-247				
Product Specific Standard Section	**Requirement – Test**	**Reference Method**	**Result**	**Remarks**
RSS-Gen 6.6	Occupied Bandwidth	ANSI C63.10	N/R	Informational only
FCC § 15.247(a)(1) IC RSS-247 § 5.1	20 dB Bandwidth	ANSI C63.10	PASS	
FCC § 15.247(a)(1)(iii) IC RSS-247 § 5.1	Number of hopping frequencies	ANSI C63.10	PASS	
FCC § 15.247(a)(1) IC RSS-247 § 5.1	Frequency hopping channel separation	ANSI C63.10	PASS	
FCC § 15.247(a)(1)(iii) IC RSS-247 § 5.1	Time of occupancy (Dwell time)	ANSI C63.10	PASS	
FCC § 15.247(b)(1) IC RSS-247 § 5.4	Maximum peak conducted power	ANSI C63.10	PASS	
47 CFR 15.207 IC RSS-247 § 3.1	AC power line conducted emissions	ANSI C63.10	PASS	
FCC § 15.247(d) IC RSS-247 § 5.5	Band edge compliance	ANSI C63.10	PASS	
FCC § 15.247(d) IC RSS-247 § 5.5	Conducted spurious emissions	ANSI C63.10	PASS	
FCC § 15.247(d) FCC § 15.209 IC RSS-247 § 5.5	Transmitter radiated spurious emissions	ANSI C63.10	PASS	
IC RSS-247 § 3.1	Receiver radiated spurious emissions	ANSI C63.10	PASS	
Remarks:				

3 Test Conditions and Results

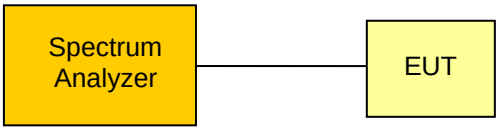
3.1 Test Conditions and Results – Occupied Bandwidth

Occupied Bandwidth acc. to ISED RSS-Gen	**Verdict: PASS**
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
EUT test mode	Single 1

Limits

None (Informational only)

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set to at least twice the emission spectrum
3. Resolution bandwidth set to 1 % of span
4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function

Test results

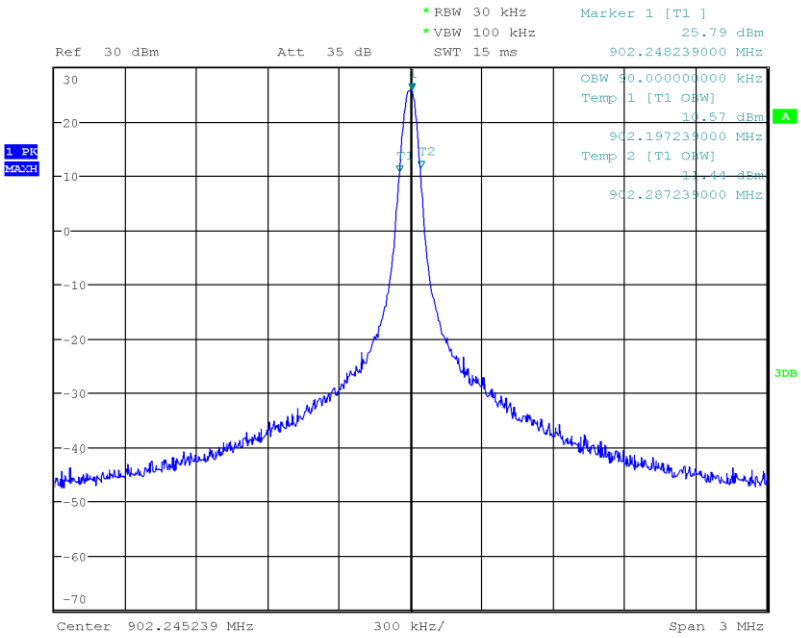
Channel	Frequency [MHz]	Occupied Bandwidth [kHz]
F_{LOW}	902.245239	90.0
F_{MID}	914.974854	90.0
F_{HIGH}	927.704468	90.0

Comments:

Occupied Bandwidth - F_{LOW}

Occupied Bandwidth

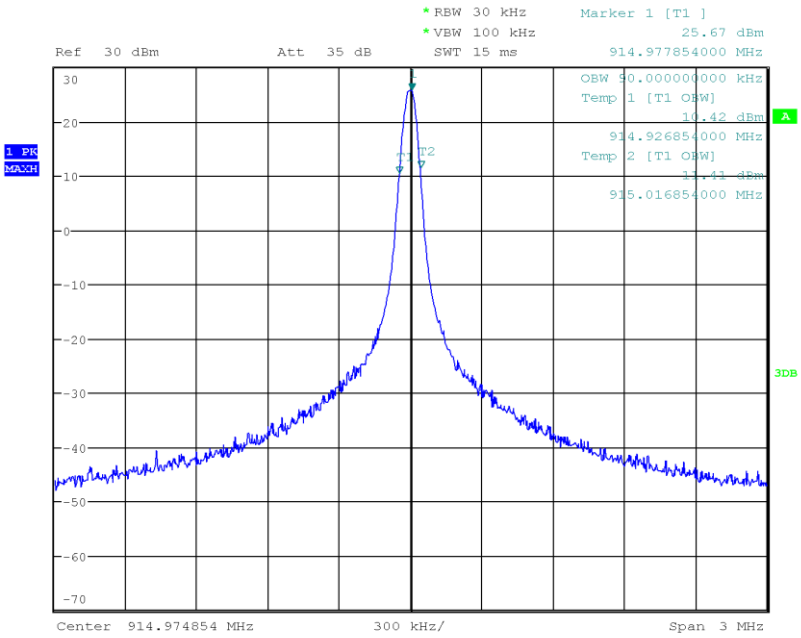
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	2-FSK, Channel: 902.245239 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Occupied Bandwidth [MHz]:	0.090



Occupied Bandwidth - F_{MID}

Occupied Bandwidth

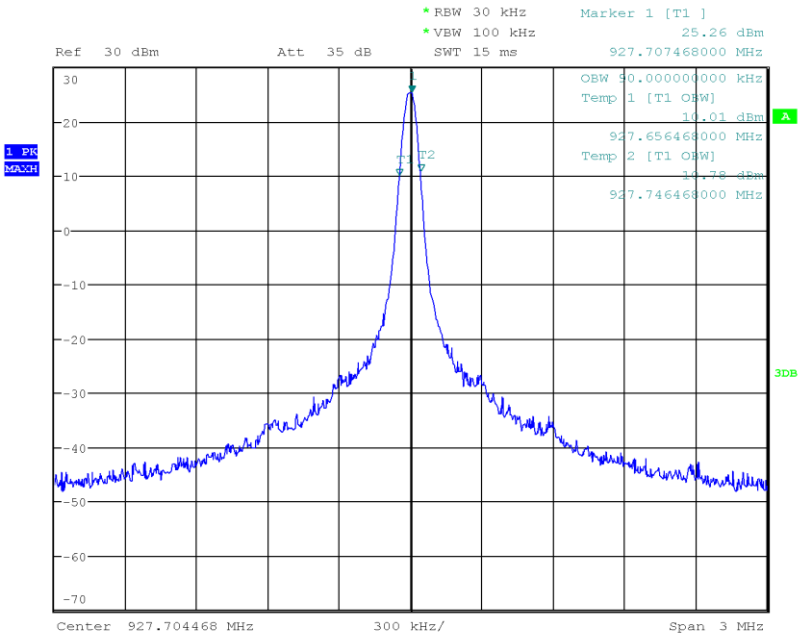
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	2-FSK, Channel: 914.974854 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Occupied Bandwidth [MHz]:	0.090



Occupied Bandwidth - F_{HIGH}

Occupied Bandwidth

Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	2-FSK, Channel: 927.704468 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Occupied Bandwidth [MHz]:	0.090



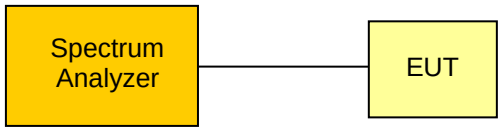
3.2 Test Conditions and Results – 20 dB Bandwidth

20 dB Bandwidth acc. to FCC 15.247 / ISED RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(a)(1)(i) / ISED RSS-247 5.1
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
EUT test mode	Single 1

Limits

Limit	Condition
20 dB BW < 250 kHz	Number of hopping channels ≥ 50 Time of occupancy ≤ 0.4 s within 20 s
250 kHz ≤ 20 dB BW < 500 kHz	Number of hopping channels ≥ 25 Time of occupancy ≤ 0.4 s within 10 s

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set to at least twice the emission spectrum
3. Detector set to peak and max hold
4. Envelope peak value of emission spectrum is selected
5. Marker on envelope of spectrum is set to level of -20dB to the left of the peak
6. Marker on envelope of spectrum is set to level of -20dB to the right of the peak
7. 20dB Bandwidth is determined by marker frequency separation

Test results

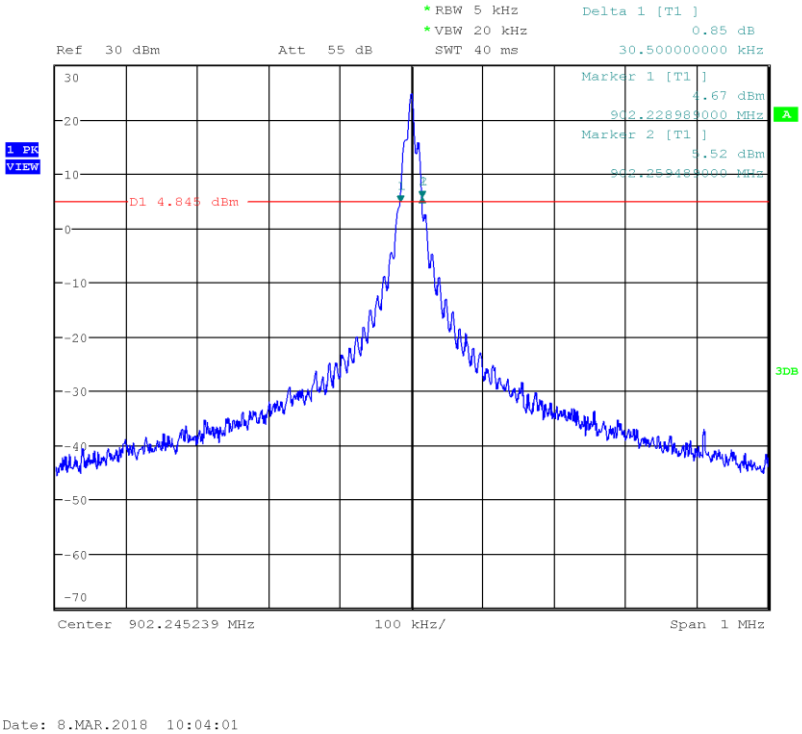
Channel	Frequency [MHz]	20 dB Bandwidth [kHz]	Limit [kHz]	Result
F_{LOW}	902.245239	31.0	< 250	PASS
F_{MID}	914.974854	30.0	< 250	PASS
F_{HIGH}	927.704468	30.0	< 250	PASS

Comments: Number of hopping channels ≥ 50

20 dB Bandwidth - F_{LOW}

20 dB Bandwidth

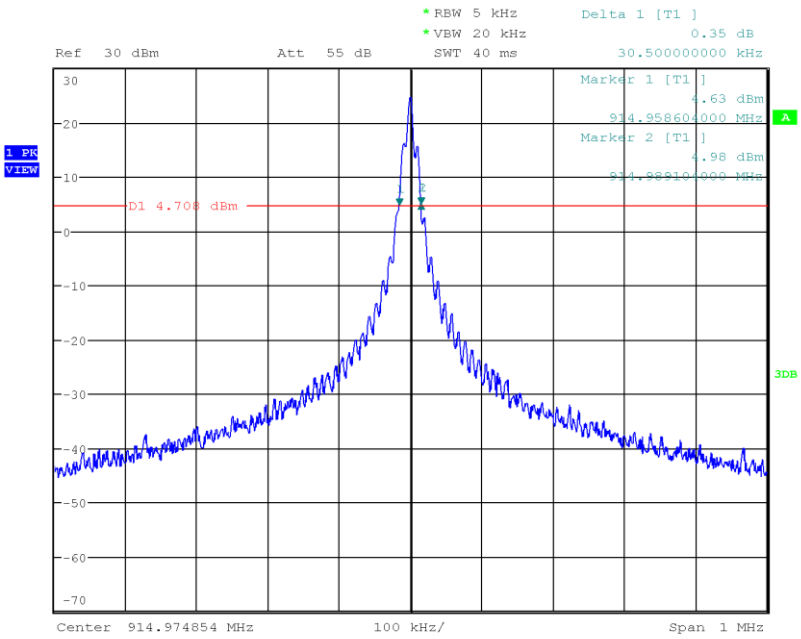
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	single, Channel: 0, 902.245239 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Lower Frequency [MHz]:	902.229
Upper Frequency [MHz]:	902.259
20 dB Bandwidth [kHz]:	31



20 dB Bandwidth - F_{MID}

20 dB Bandwidth

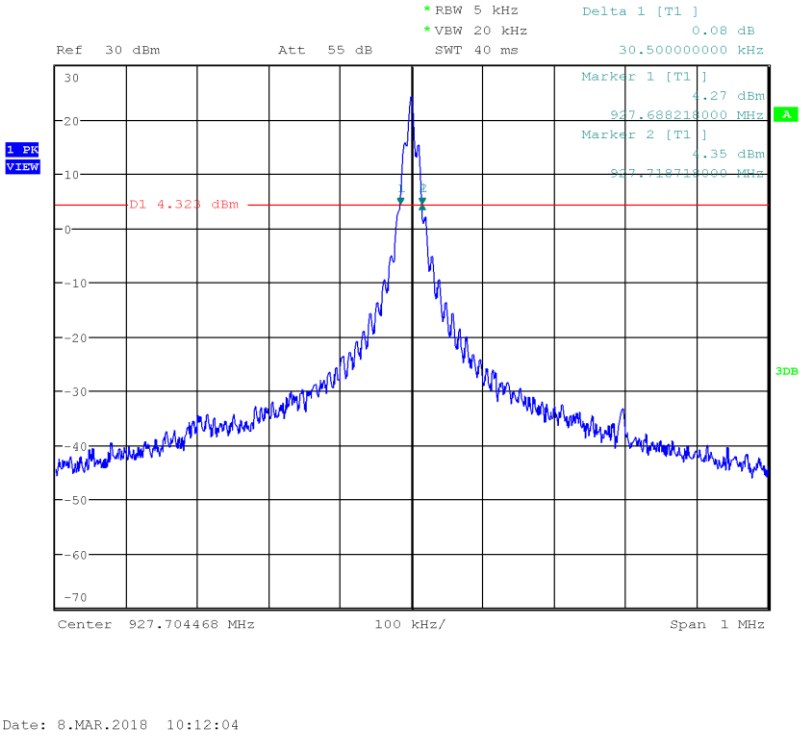
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	single, Channel: 27, 914.974854 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Lower Frequency [MHz]:	914.959
Upper Frequency [MHz]:	914.989
20 dB Bandwidth [kHz]:	30



20 dB Bandwidth - F_{HIGH}

20 dB Bandwidth

Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.2
Operational Mode:	single, Channel: 53, 927.704468 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Lower Frequency [MHz]:	927.688
Upper Frequency [MHz]:	927.719
20 dB Bandwidth [kHz]:	30



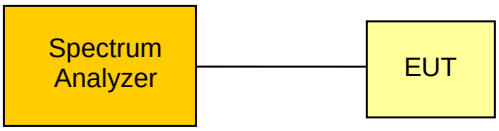
3.3 Test Conditions and Results – Number of hopping frequencies

Number of hopping frequencies acc. to FCC 15.247 / ISED RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(a)(1)(i) / ISED RSS-247 5.1
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} - F_{HIGH}
EUT test mode	Hopping

Limits

Limit	Condition
Number of hopping channels ≥ 50	20 dB BW < 250 kHz Time of occupancy ≤ 0.4 s within 20 s
Number of hopping channels ≥ 25	250 kHz ≤ 20 dB BW < 500 kHz Time of occupancy ≤ 0.4 s within 10 s

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set to measurement frequency range
3. Detector set to peak and max hold
4. Resolution bandwidth is set small enough to resolve hopping channel emission spectra
5. The number of peaks is counted to determine number of hopping frequencies

Test results

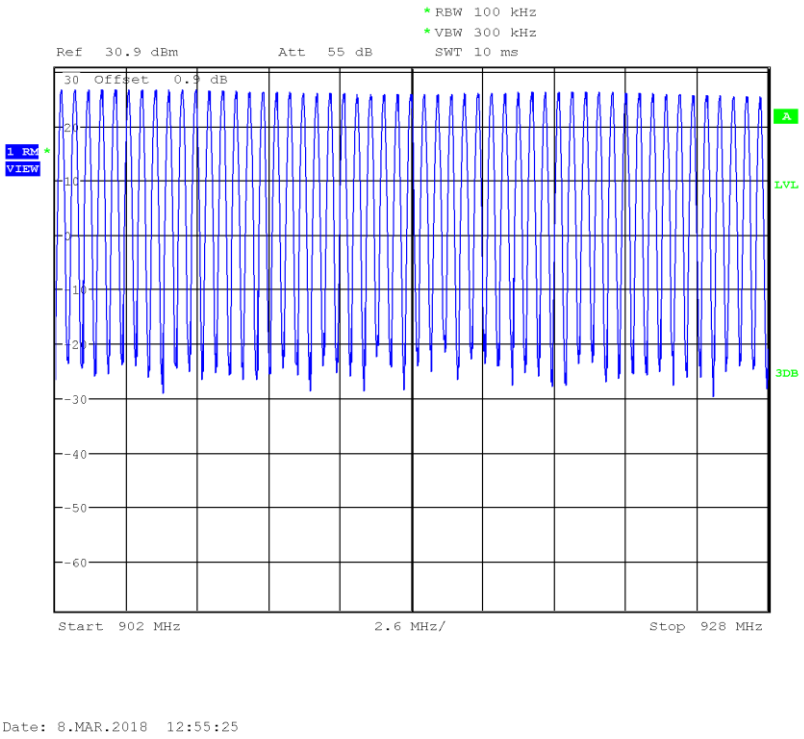
Number of hopping frequencies	Limit	Result
53	≥ 50	PASS

Comments.

Number of hopping frequencies

Number of hopping frequencies

Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.27 (a)(1)(iii)
Reference Method:	ANSI C63.10:2013 7.8.3
Operational Mode:	other, 2-FSK, Hopping Mode
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Number of Hopping Channels:	53



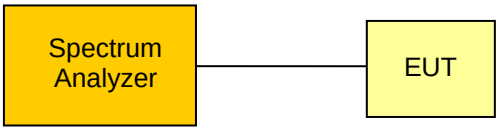
3.4 Test Conditions and Results – Frequency hopping channel separation

Frequency hopping channel separation acc. to FCC 15.247 / ISED RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(a)(1)(i) / ISED RSS-247 5.1
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	914.974854 + 915.464478 MHz
EUT test mode	Single 1

Limits

25 kHz or 20 dB Bandwidth, whichever is greater

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set to measurement frequency range
3. Detector set to peak and max hold
4. Resolution bandwidth is set small enough to resolve hopping channel emission spectra
5. The two adjacent channel peaks are marked
6. Channel separation is determined from frequency separation of markers

Test results

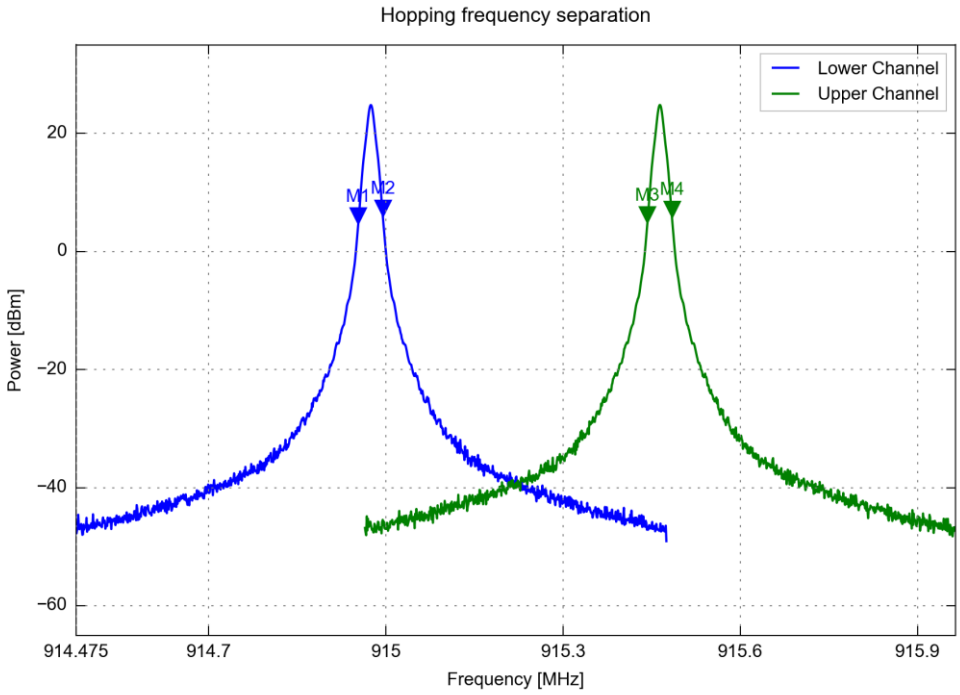
Channel separation [kHz]	Limit [kHz]	Result
490	≥ 30	PASS

Comments:

Frequency hopping channel separation

Hopping frequency separation

Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247(a)(1)
Reference Method:	ANSI C63.10:2013 7.8.2
Operational Mode:	other, 2-FSK, Channels: 914.974854 + 915.464478 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Lower Frequency (M1) [MHz]:	914.953
Upper Frequency (M2) [MHz]:	914.995
Lower Frequency (M3) [MHz]:	915.442
Upper Frequency (M4) [MHz]:	915.484
Lower center Frequency [MHz]:	914.974
Upper center Frequency [MHz]:	915.463
Hopping Frequency Separation [MHz]:	0.490



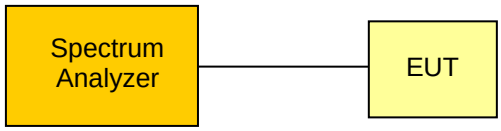
3.5 Test Conditions and Results – Time of occupancy (Dwell Time)

Time of occupancy (Dwell time) acc. to FCC 15.247 / ISED RSS-247	Verdict: PASS
EUT requirement rule parts and clause	Reference
	FCC 15.247(a)(1)(i) / ISED RSS-247 5.1
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	915.2 MHz
EUT test mode	Hopping

Limits

Limit	Condition
Time of occupancy ≤ 0.4 s within 20 s	20 dB BW < 250 kHz Number of hopping channels ≥ 50
Time of occupancy ≤ 0.4 s within 10 s	250 kHz ≤ 20 dB BW < 500 kHz Number of hopping channels ≥ 25

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Center frequency set to test channel center frequency
3. Span set to zero span and detector to peak and max hold
4. Resolution bandwidth is set to 100 kHz and sweep time to observation period
5. Time of occupancy determined from number of peaks multiplied by single hop dwell time

Test results

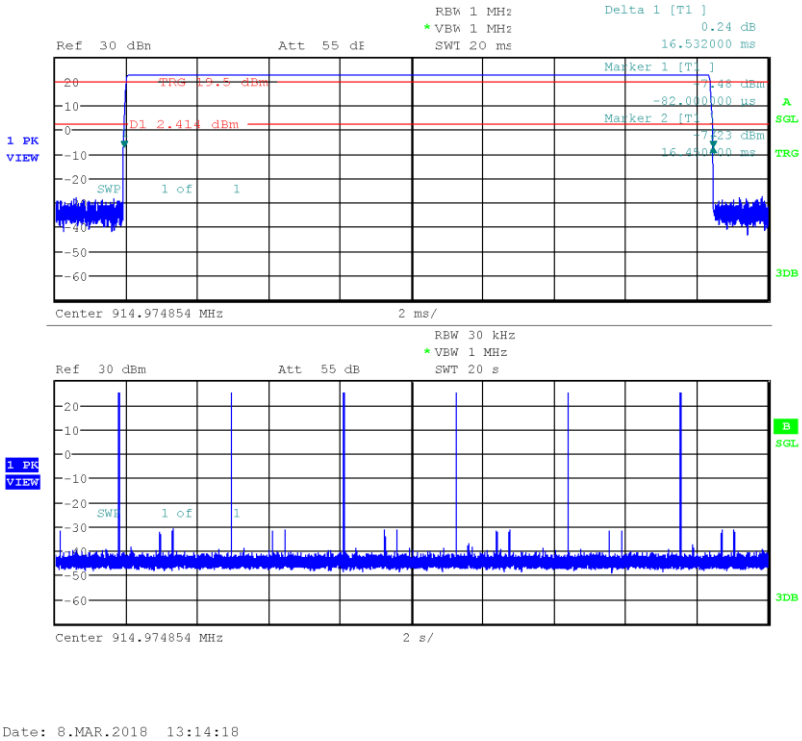
Observation period [s]	No. of hops	Dwell time/hop [s]	Time of occupancy [s]	Limit [s]	Result
20	6	0.016532	0.099	≤ 0.4	PASS

Comments:

Time of occupancy

Time of occupancy

Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Method:	ANSI C63.10:2013 7.8.4
Operational Mode:	2-FSK, Hopping mode
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Dwell Time per Hop [ms]:	16.532
Number of Hops:	6
Time of occupancy [s]:	0.099



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3.6 Test Conditions and Results – Maximum peak conducted power

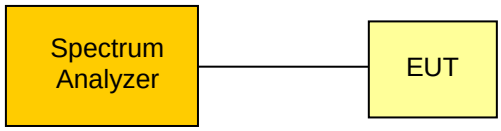
Maximum peak conducted power acc. to FCC 15.247 / ISED RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(b)(2) / ISED RSS-247 5.4
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
EUT test mode	Single 1
Measurement mode	Peak
Maximum antenna gain	4 dBi ⇒ Limit correction = 0 dB

Limits

Limit	Condition
1 W (30 dBm)	Number of hopping channels ≥ 50
0.25 W (24 dBm)	50 > Number of hopping channels ≥ 25

The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Center frequency set to test channel center frequency
3. Span set to twice the 20 dB bandwidth and detector to peak and max hold
4. Resolution bandwidth is set to 3 MHz
5. Peak conducted power is determined from peak of spectrum envelope

Test results							
Channel	Frequency [MHz]	Voltage	Peak power [dbm]	Peak power [W]	Limit [dBm]	Margin [dB]	Result
F_{LOW}	902.245239	3.3 VDC	26.886	0.4882	30	-03.11	PASS
F_{MID}	914.974854	3.3 VDC	26.765	0.4748	30	-03.24	PASS
F_{HIGH}	927.704468	3.3 VDC	26.355	0.4320	30	-03.65	PASS
Comments:							

3.7 Test Conditions and Results – AC power line conducted emissions

Power line conducted emissions acc. to FCC 47 CFR 15.207 / ISED RSS-Gen				**Verdict: PASS**
Test according referenced standards	Reference Method			
	ANSI C63.10			
Fully configured sample scanned over the following frequency range	Frequency range			
	0.15 MHz to 30 MHz			
Points of Application	Application Interface			
AC Mains	LISN			
EUT test mode	AC-Powerline			
Limits and results				
Frequency [MHz]	Quasi-Peak [dBµV]	Result	Average [dBµV]	Result
0.15 to 5	66 to 56*	PASS	56 to 46*	PASS
0.5 to 5	56	PASS	46	PASS
5 to 30	60	PASS	50	PASS
Comments: * Limit decreases linearly with the logarithm of the frequency.				

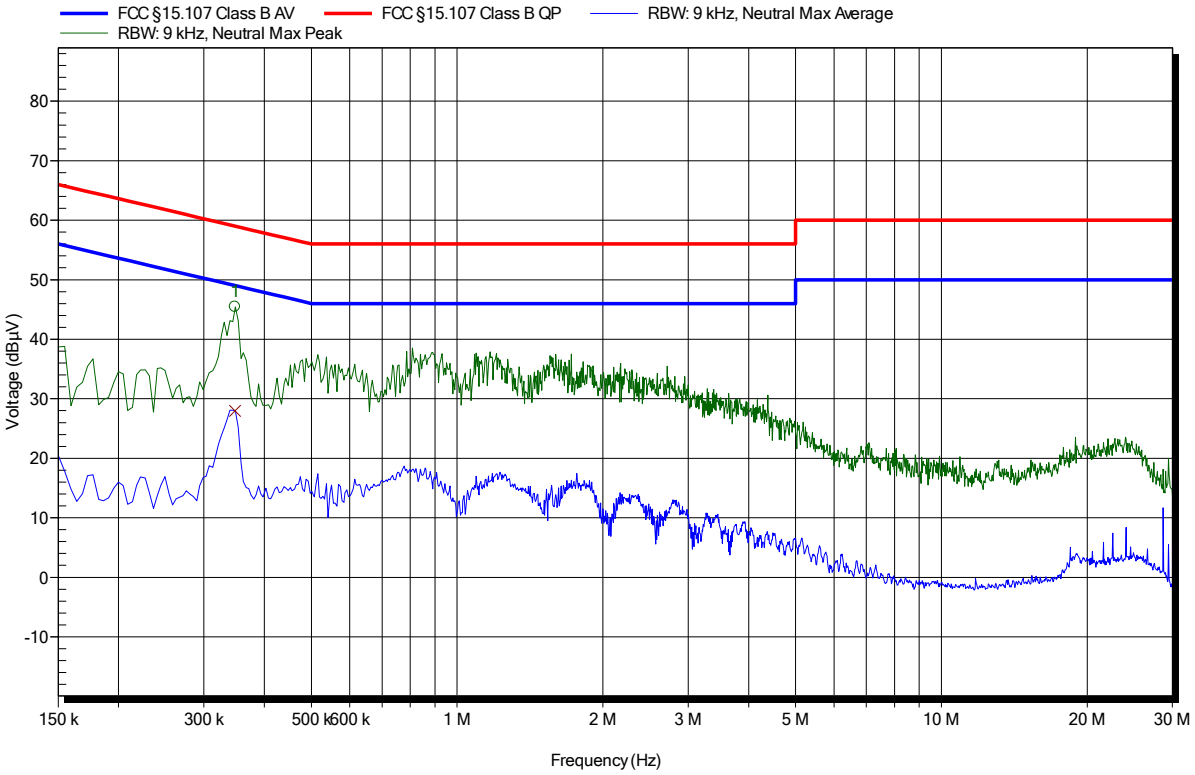
Conducted Emissions

EMI voltage test in the ac-mains according to FCC Part C § 15.207

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 22°C, Unom: 120 VAC
LISN:	ESH2-Z5 N
Mode:	Hopping; 2-FSK; 915 MHz
Test Date:	2018-03-09
Note:	

Index 1



Peak Number	Frequency
1	348 kHz

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	348 kHz	27.99 dBµV	49.01 dBµV	-21.02 dB	Pass

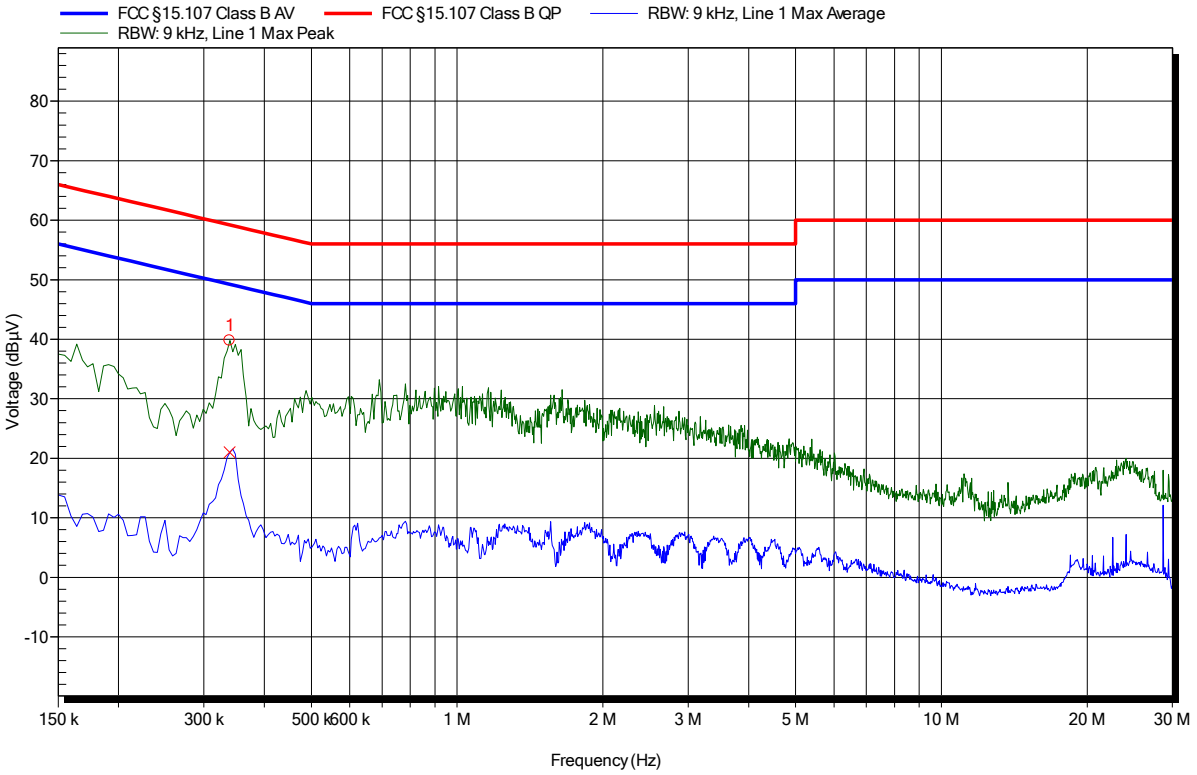
Conducted Emissions

EMI voltage test in the ac-mains according to FCC Part C § 15.207

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 22°C, Unom: 120 VAC
LISN:	ESH2-Z5 L
Mode:	Hopping; 2-FSK; 915 MHz
Test Date:	2018-03-09
Note:	

Index 2



Peak Number	Frequency
1	339 kHz

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	339 kHz	21.03 dBµV	49.23 dBµV	-28.2 dB	Pass

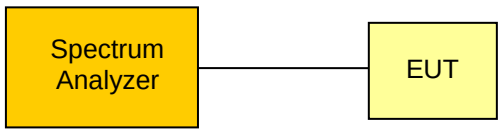
3.8 Test Conditions and Results – Band edge compliance

Band-edge compliance acc. to FCC 15.247 / ISED RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(d) / ISED RSS-247 5.5
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
EUT test mode	Single 1 / Hopping
Measurement mode	Peak

Limits

Limit	Condition
≤ -20 dB/100 kHz	Peak power measurement detector = Peak
≤ -30 dB/100 kHz	Peak power measurement detector = RMS

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is determined from level difference

Test results

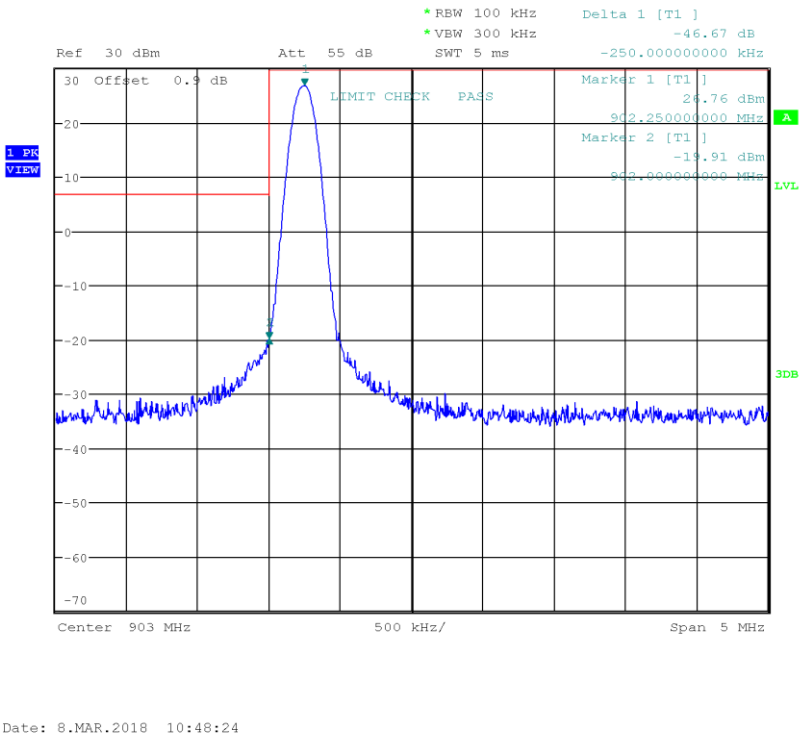
Channel	Frequency [MHz]	Mode	Level [dBc]	Limit [dBc]	Margin [dB]	Result
F_{LOW}	902.245239	Single	-46.67	-20	-26.67	PASS
F_{HIGH}	927.704468	Single	-48.06	-20	-28.06	PASS
F_{LOW}	902.245239	Hopping	-48.32	-20	-28.32	PASS
F_{HIGH}	927.704468	Hopping	-47.58	-20	-27.58	PASS

Comments:

Band-edge compliance – F_{LOW} single

Band-edge Compliance

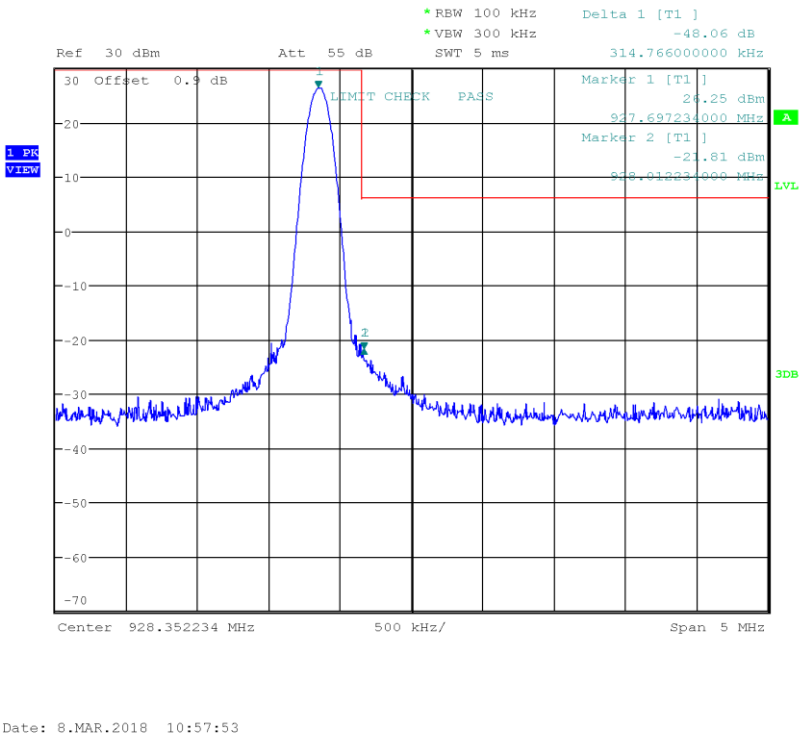
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	single frequency, Channel: 902.245239 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Band-edge	Lower
In-band Frequency [MHz]:	902.25
Max. in-band Level [dBm/100 kHz]:	26.759
Out-of-band Frequency [MHz]:	902.0
Max. out-of-band Level [dBm/100 kHz]:	-19.91
Attenuation [dB]:	-46.67



Band-edge compliance – F_{HIGH} single

Band-edge Compliance

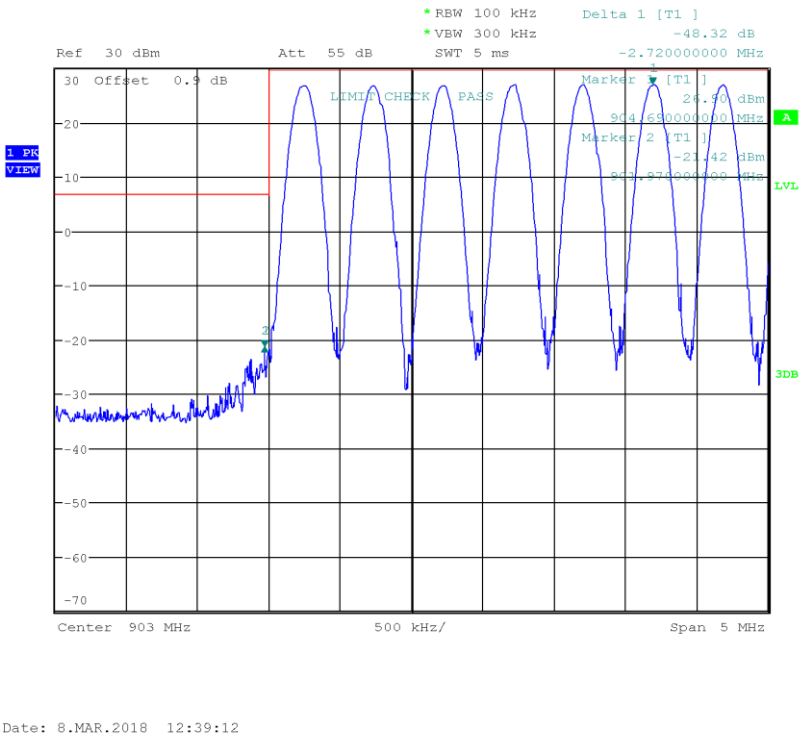
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	single frequency, Channel: 927.704468 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Band-edge	Upper
In-band Frequency [MHz]:	927.697
Max. in-band Level [dBm/100 kHz]:	26.252
Out-of-band Frequency [MHz]:	928.012
Max. out-of-band Level [dBm/100 kHz]:	-21.812
Attenuation [dB]:	-48.06



Band-edge compliance – F_{LOW} hopping

Band-edge Compliance

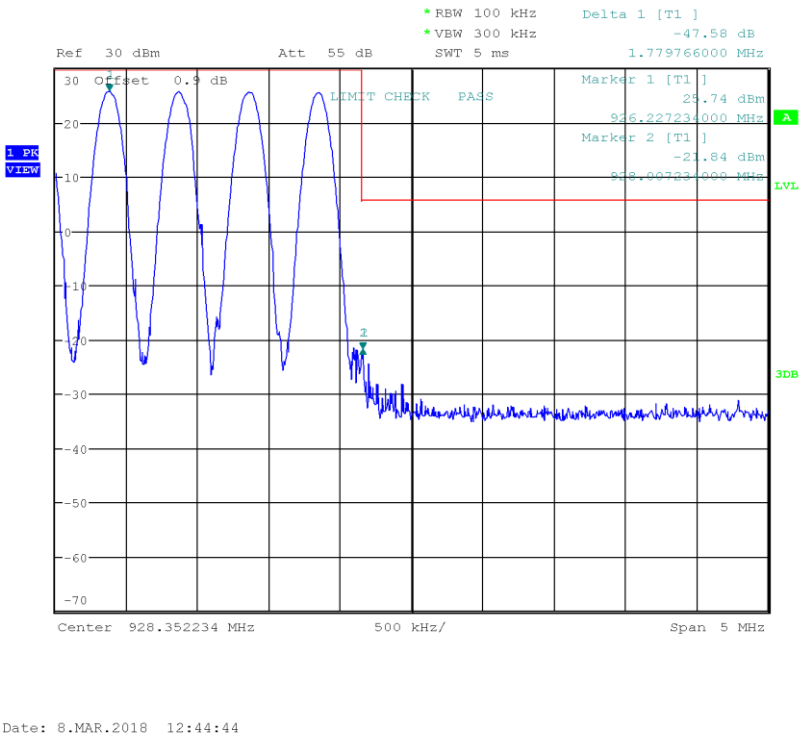
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	hopping mode, Channel: 902.245239 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Band-edge	Lower
In-band Frequency [MHz]:	904.69
Max. in-band Level [dBm/100 kHz]:	26.9
Out-of-band Frequency [MHz]:	901.97
Max. out-of-band Level [dBm/100 kHz]:	-21.423
Attenuation [dB]:	-48.32



Band-edge compliance – F_{HIGH} hopping

Band-edge Compliance

Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	hopping mode, Channel: 927.704468 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Band-edge	Upper
In-band Frequency [MHz]:	926.227
Max. in-band Level [dBm/100 kHz]:	25.737
Out-of-band Frequency [MHz]:	928.007
Max. out-of-band Level [dBm/100 kHz]:	-21.838
Attenuation [dB]:	-47.58



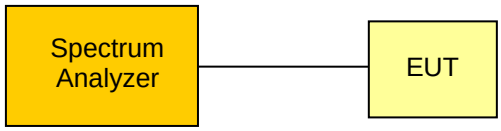
3.9 Test Conditions and Results – Conducted spurious emissions

Conducted spurious emissions acc. to FCC 15.247 / ISED RSS-247	Verdict: PASS
EUT requirement rule parts and clause	Reference
	FCC 15.247(d) / ISED RSS-247 5.5
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	10 MHz – 10th Harmonic
EUT test mode	Single 1
Measurement mode	Peak

Limits

Limit	Condition
≤ -20 dB/100 kHz	Peak power measurement detector = Peak
≤ -30 dB/100 kHz	Peak power measurement detector = RMS

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span it set according to measurement range
3. Resolution bandwidth is set to 100 kHz and detector to peak and max hold
4. Markers are set to peak emission levels within frequency band
5. Emission level is determined by second marker on emission peak
6. Attenuation is determined from level difference

Test results

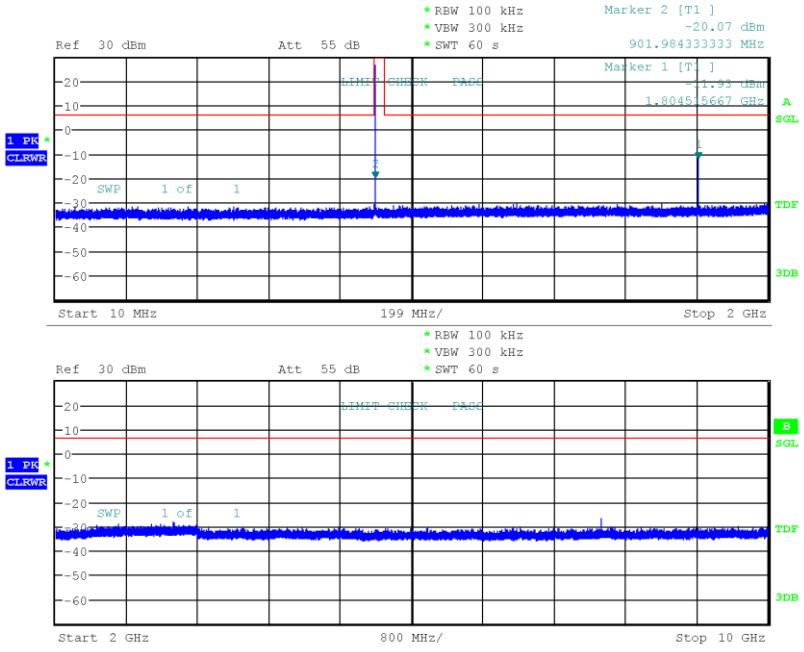
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dBm]	Peak power [dBm]	Limit [dBm]	Margin [dB]	Result
F_{LOW}	902.245239	1804.516	-11.9	26.4	6.4	-18.30	PASS
F_{MID}	914.974854	1829.988	-12.6	26.2	6.2	-18.80	PASS
F_{HIGH}	927.704468	1855.459	-13.7	25.8	5.8	-19.50	PASS

Comments:

Conducted spurious emissions – F_{LOW}

Conducted Spurious Emissions

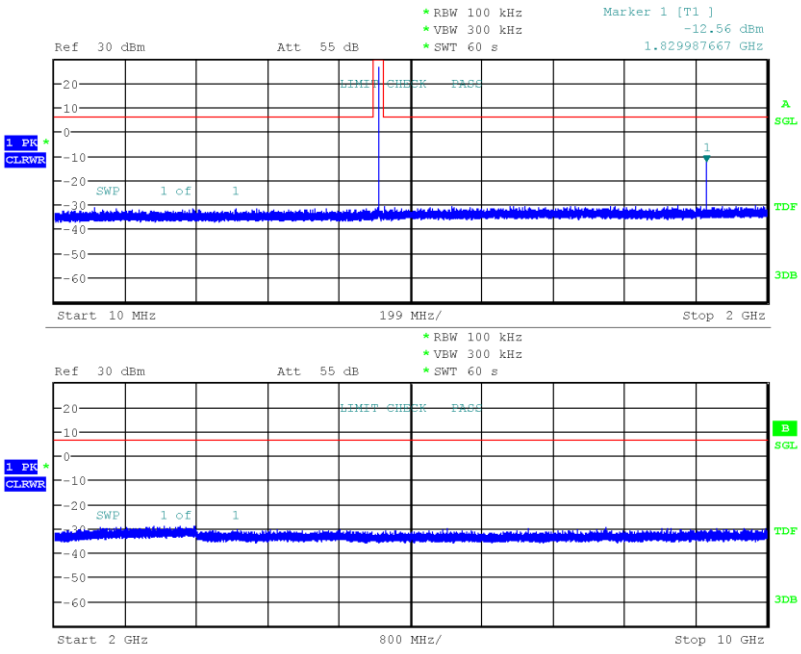
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	2-FSK, Channel: 902.245239 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Max. in-band Frequency [MHz]:	902.2
Max. in-band Level [dBm/100 kHz]:	26.4
Out-of-band Limit [dBm/100 kHz]:	6.4



Conducted spurious emissions – F_{MID}

Conducted Spurious Emissions

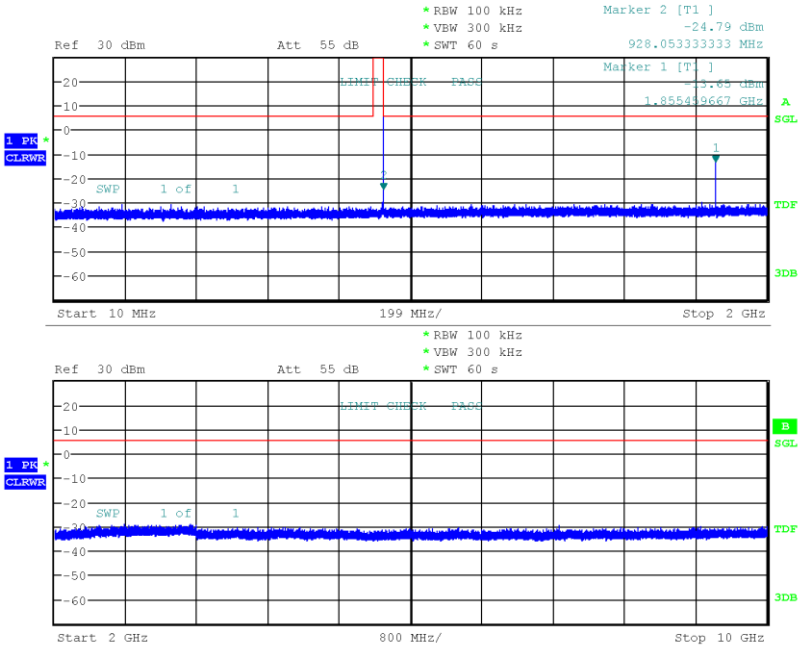
Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	2-FSK, Channel: 914.974854 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Max. in-band Frequency [MHz]:	915.0
Max. in-band Level [dBm/100 kHz]:	26.2
Out-of-band Limit [dBm/100 kHz]:	6.2



Conducted spurious emissions – F_{HIGH}

Conducted Spurious Emissions

Project Number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
Model Description:	LRR SG
Model:	915MHz
Test Sample ID:	17642
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	2-FSK, Channel: 927.704468 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2018-03-08
Max. in-band Frequency [MHz]:	927.7
Max. in-band Level [dBm/100 kHz]:	25.8
Out-of-band Limit [dBm/100 kHz]:	5.8



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3.10 Test Conditions and Results – Transmitter radiated emissions

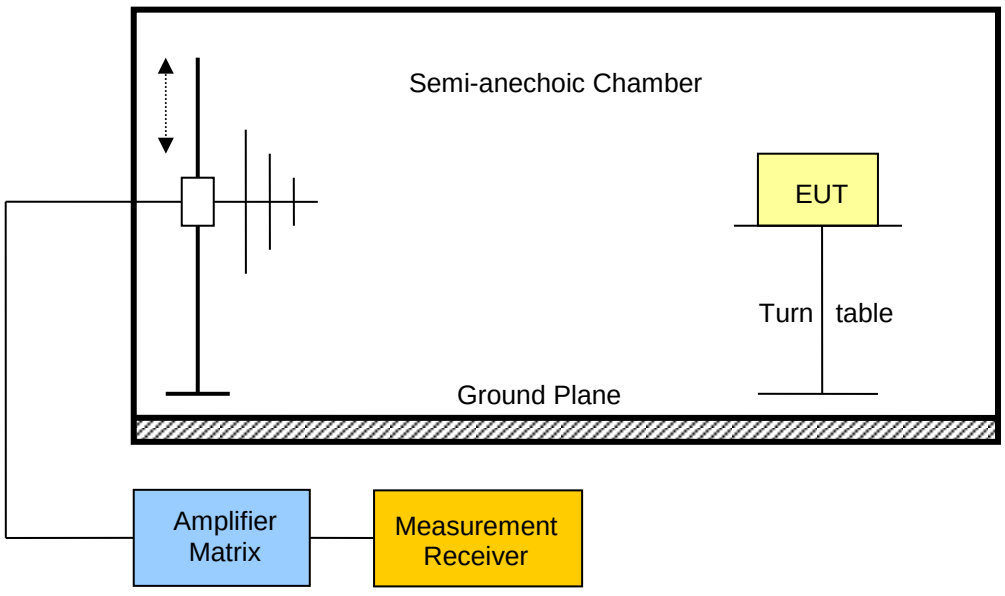
Transmitter radiated emissions acc. to FCC 47 CFR 15.247 / ISED RSS-247	**Verdict: PASS**
Test according referenced standards	Reference Method
	FCC 15.247(d) / ISED RSS-247 5.5
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	30 MHz – 10th Harmonic
EUT test mode	Single 1

Limits

Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
When average radiated emission measurements are specified, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Test setup



Test procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1MHz with peak/average detector is used above 1 GHz 4. Markers are set to peak emission levels within restricted bands

Test results – Antenna 1 Whip

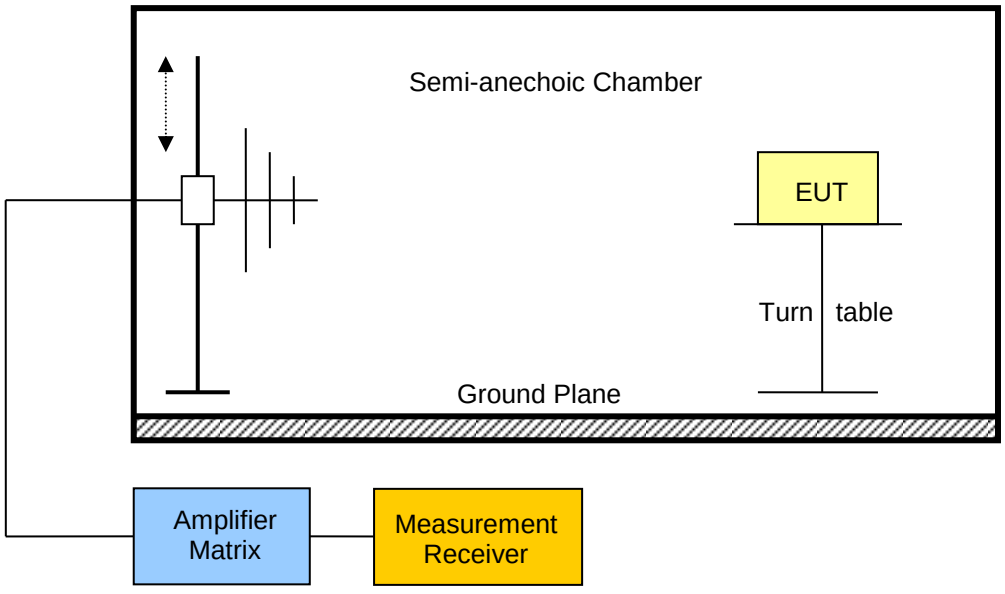
Channel	Frequency [MHz]	Emission [MHz]	Level [dbµV/m]	Detector	Pol.	Limit [dbµV/m]	Limit distance [m]	Margin [dB]
F_{LOW}	902.245239	38.16	30.50	pk	ver	40.00	3	-09.50
F_{LOW}	902.245239	2707	54.26	pk	hor	74.00	3	-19.74
F_{LOW}	902.245239	2707	56.50	pk	ver	74.00	3	-17.50
F_{LOW}	902.245239	2707	40.80	av	ver	54.00	3	-13.20
F_{LOW}	902.245239	4504	51.15	pk	hor	74.00	1	-22.85
F_{LOW}	902.245239	8120	60.46	pk	ver	74.00	1	-13.54
F_{LOW}	902.245239	8120	44.76	av	ver	54.00	1	-09.24
F_{LOW}	902.245239	8120	53.15	pk	ver	74.00	1	-20.85
F_{LOW}	902.245239	8120	40.44	pk	ver	74.00	1	-33.56
F_{MID}	914.974854	2740	52.72	pk	hor	74.00	3	-21.28
F_{MID}	914.974854	2740	53.03	pk	ver	74.00	3	-20.97
F_{MID}	914.974854	3658	49.14	pk	hor	74.00	3	-24.86
F_{MID}	914.974854	3658	48.41	pk	ver	74.00	3	-25.59
F_{MID}	914.974854	4568	48.70	pk	hor	74.00	1	-25.30
F_{MID}	914.974854	7320	48.92	pk	hor	74.00	1	-25.08
F_{MID}	914.974854	7320	58.33	pk	ver	74.00	1	-15.67
F_{MID}	914.974854	7320	42.63	av	ver	54.00	1	-11.37
F_{MID}	914.974854	8232	52.98	pk	ver	74.00	1	-21.02
F_{HIGH}	927.704468	2782	48.99	pk	hor	74.00	3	-25.01
F_{HIGH}	927.704468	2782	66.16	pk	ver	74.00	3	-07.84
F_{HIGH}	927.704468	2782	50.46	av	ver	54.00	3	-03.54
F_{HIGH}	927.704468	3706	47.00	pk	hor	74.00	3	-27.00
F_{HIGH}	927.704468	3706	54.74	pk	ver	74.00	3	-19.26
F_{HIGH}	927.704468	7416	55.12	pk	ver	74.00	1	-18.88
F_{HIGH}	927.704468	7416	39.42	av	ver	54.00	1	-14.58

Comments: Average Values are calculated by duty cycle correction factor according to ANSI C63.10 7.5. (See 1.6)

Test results – Antenna 2 PC23								
Channel	Frequency [MHz]	Emission [MHz]	Level [dbµV/m]	Detector	Pol.	Limit [dbµV/m]	Limit distance [m]	Margin [dB]
F_{LOW}	902.245239	2704	53.58	pk	hor	74.00	3	-20.42
F_{LOW}	902.245239	2704	50.54	pk	ver	74.00	3	-23.46
F_{LOW}	902.245239	3604	49.77	pk	hor	74.00	3	-24.23
F_{LOW}	902.245239	3604	51.60	pk	ver	74.00	3	-22.40
F_{LOW}	902.245239	4504	53.16	pk	hor	74.00	1	-20.84
F_{LOW}	902.245239	4504	51.05	pk	ver	74.00	1	-22.95
F_{LOW}	902.245239	5408	50.78	pk	ver	74.00	1	-23.22
F_{LOW}	902.245239	8120	58.80	pk	hor	74.00	1	-15.20
F_{LOW}	902.245239	8120	43.40	av	hor	54.00	1	-10.60
F_{LOW}	902.245239	8120	57.22	pk	ver	74.00	1	-16.78
F_{LOW}	902.245239	8120	41.50	av	ver	54.00	1	-12.50
F_{MID}	914.974854	2740	53.76	pk	hor	74.00	3	-20.24
F_{MID}	914.974854	2740	53.27	pk	ver	74.00	3	-20.73
F_{MID}	914.974854	3658	48.00	pk	hor	74.00	3	-26.00
F_{MID}	914.974854	3658	50.01	pk	ver	74.00	3	-23.99
F_{MID}	914.974854	4568	51.05	pk	hor	74.00	1	-22.95
F_{MID}	914.974854	4568	47.91	pk	ver	74.00	1	-26.09
F_{MID}	914.974854	7320	56.50	pk	hor	74.00	1	-17.50
F_{MID}	914.974854	7320	40.80	av	hor	54.00	1	-13.20
F_{MID}	914.974854	7320	53.76	pk	ver	74.00	1	-20.24
F_{MID}	914.974854	8232	56.43	pk	hor	74.00	1	-17.57
F_{MID}	914.974854	8232	40.73	av	hor	54.00	1	-13.27
F_{MID}	914.974854	8232	53.07	pk	ver	74.00	1	-20.93
F_{HIGH}	927.704468	2782	58.14	pk	hor	74.00	3	-15.86
F_{HIGH}	927.704468	2782	60.38	pk	ver	74.00	3	-13.62
F_{HIGH}	927.704468	3706	52.71	pk	ver	74.00	3	-21.29
F_{HIGH}	927.704468	7416	54.99	pk	hor	74.00	1	-19.01
F_{HIGH}	927.704468	7416	39.29	av	hor	54.00	1	-14.71
F_{HIGH}	927.704468	7416	52.54	pk	ver	74.00	1	-21.46
F_{HIGH}	927.704468	8348	50.41	pk	hor	74.00	1	-23.59
F_{HIGH}	927.704468	8348	51.03	pk	ver	74.00	1	-22.97
Comments: Average Values are calculated by duty cycle correction factor according to ANSI C63.10 7.5. (See 1.6)								

3.11 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. to ISED RSS-247				**Verdict: PASS**
Test according referenced standards	Reference Method			
	ISED RSS-247 3.1			
Test according to measurement reference	Reference Method			
	ANSI C63.10			
Test frequency range	Tested frequencies			
	30 MHz – 5th Harmonic			
EUT test mode	Receive			
Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
Test setup				



Test procedure
1. EUT set to receive mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Markers are set to peak emission levels

Test results

Channel	Frequency [MHz]	Emission [MHz]	Level [dbµV/m]	Detector	Pol.	Limit [dbµV/m]	Margin [µV/m]
F_{MID}	914.974854	203.2	23.45	pk	ver	43.50	-20.05 dB
F_{MID}	914.974854	208	24.49	pk	hor	43.50	-19.01 dB
F_{MID}	914.974854	3658	44.30	pk	hor	53.98	-9.68 dB
F_{MID}	914.974854	3658	43.70	pk	ver	53.98	-10.28 dB
F_{MID}	914.974854	4816	43.02	pk	hor	53.98	-10.96 dB

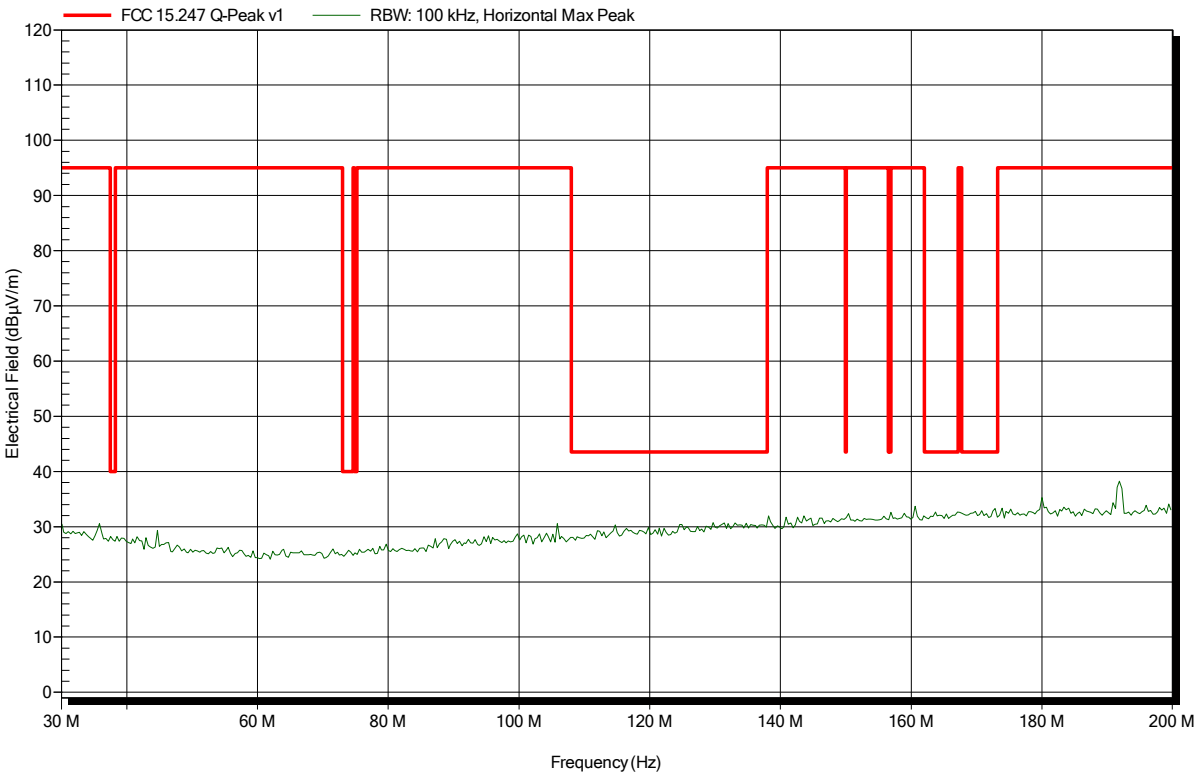
Comments:

ANNEX A Transmitter radiated spurious emissions Whip antenna

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

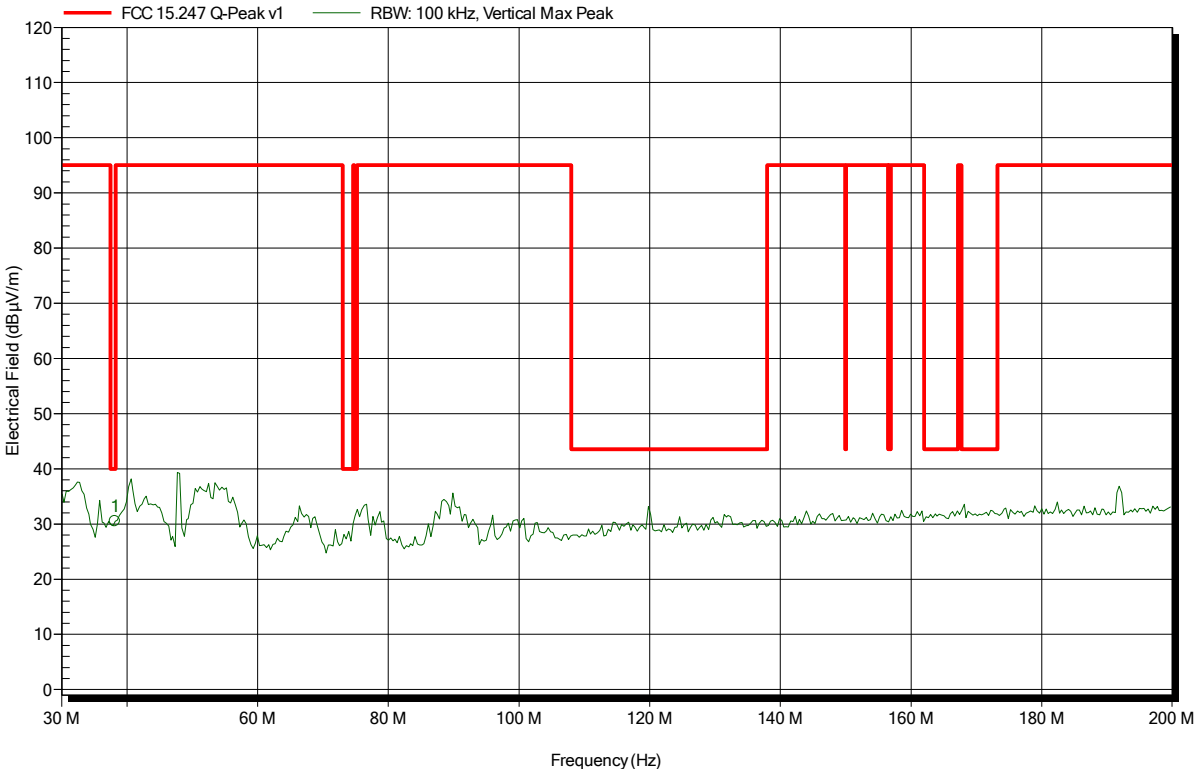
Index 22



Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 23

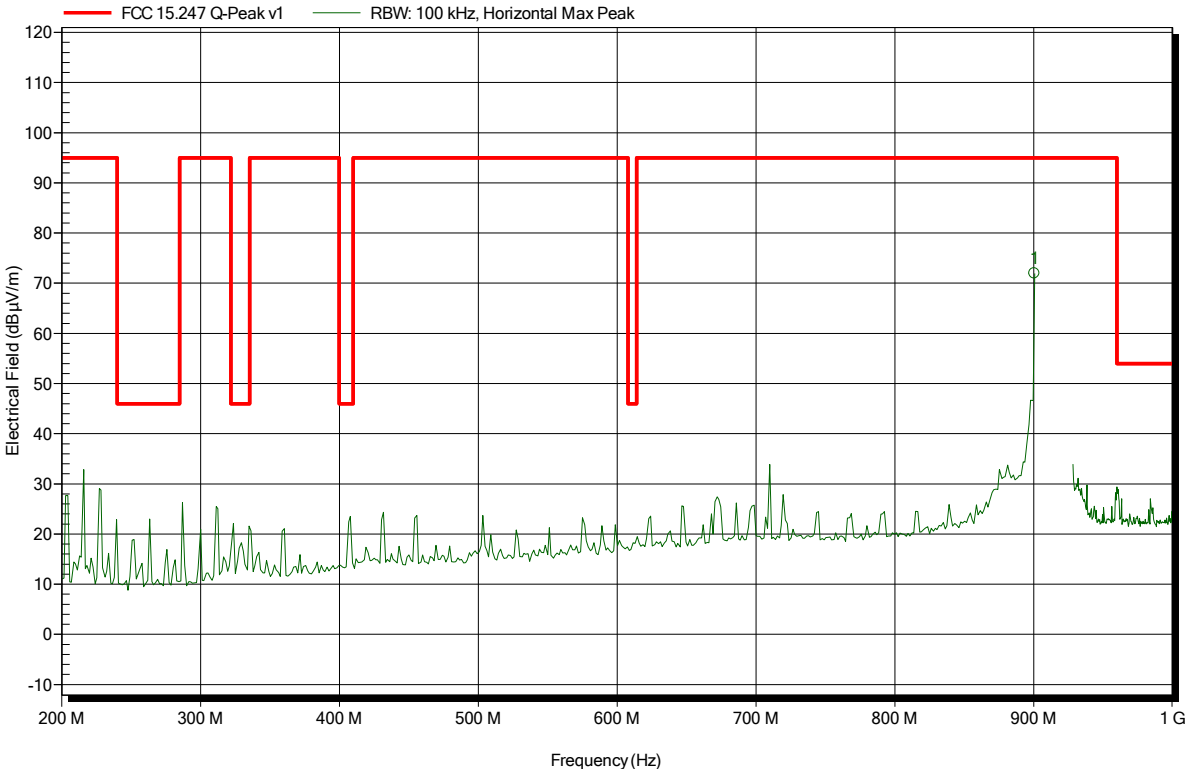


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
38.16 MHz	30.5 dBµV/m	40 dBµV/m	-9.5 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 16

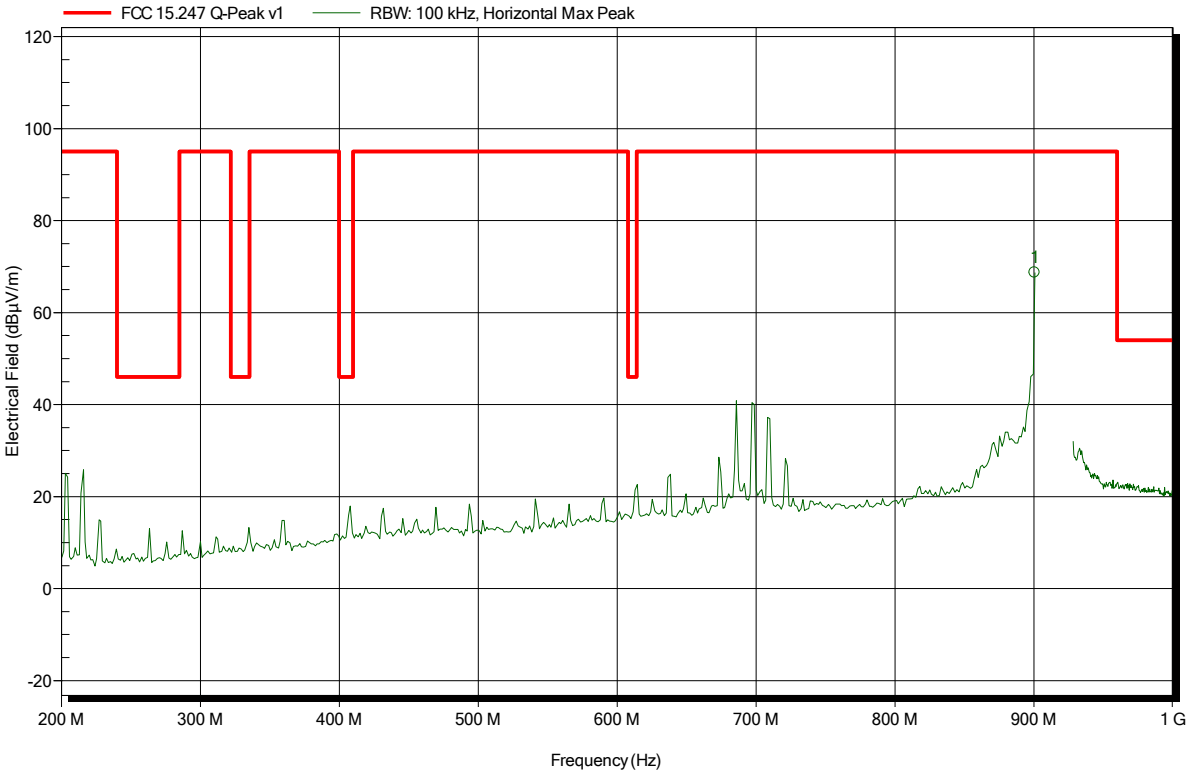


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
900.596 MHz	71.93 dBµV/m	95 dBµV/m	-23.07 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 17



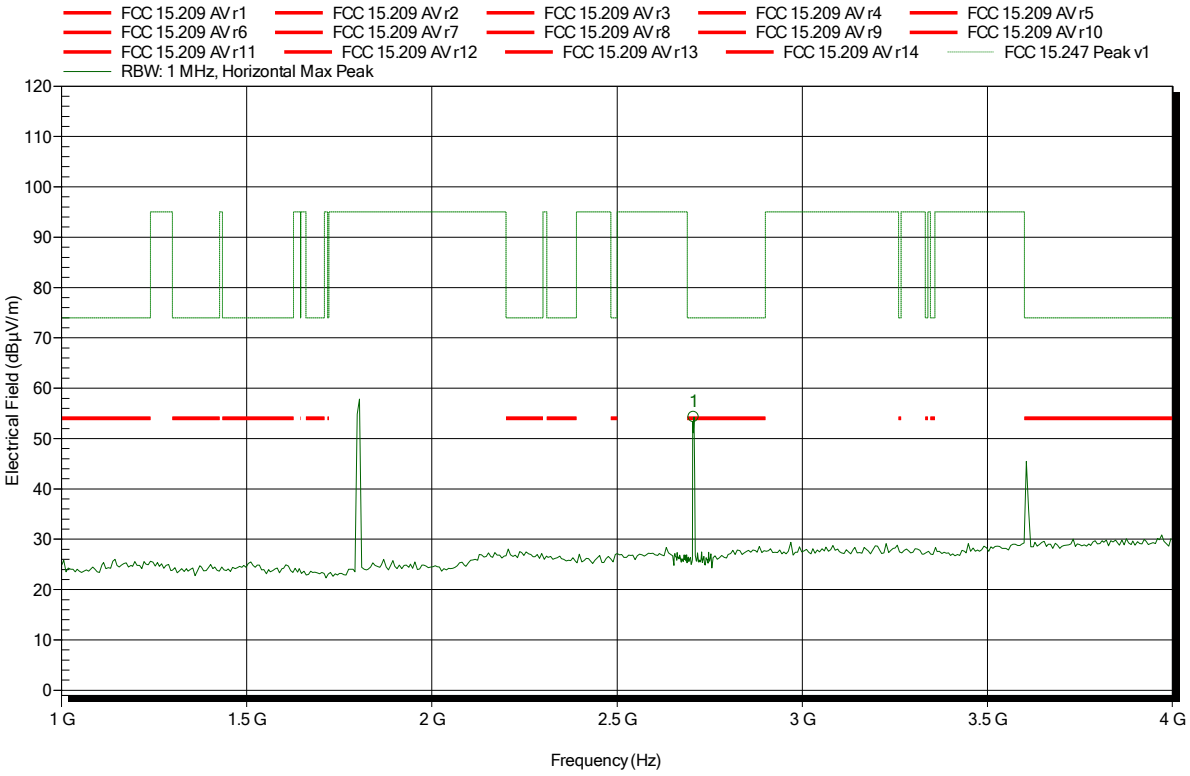
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
900.596 MHz	68.73 dBµV/m	95 dBµV/m	-26.27 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 24



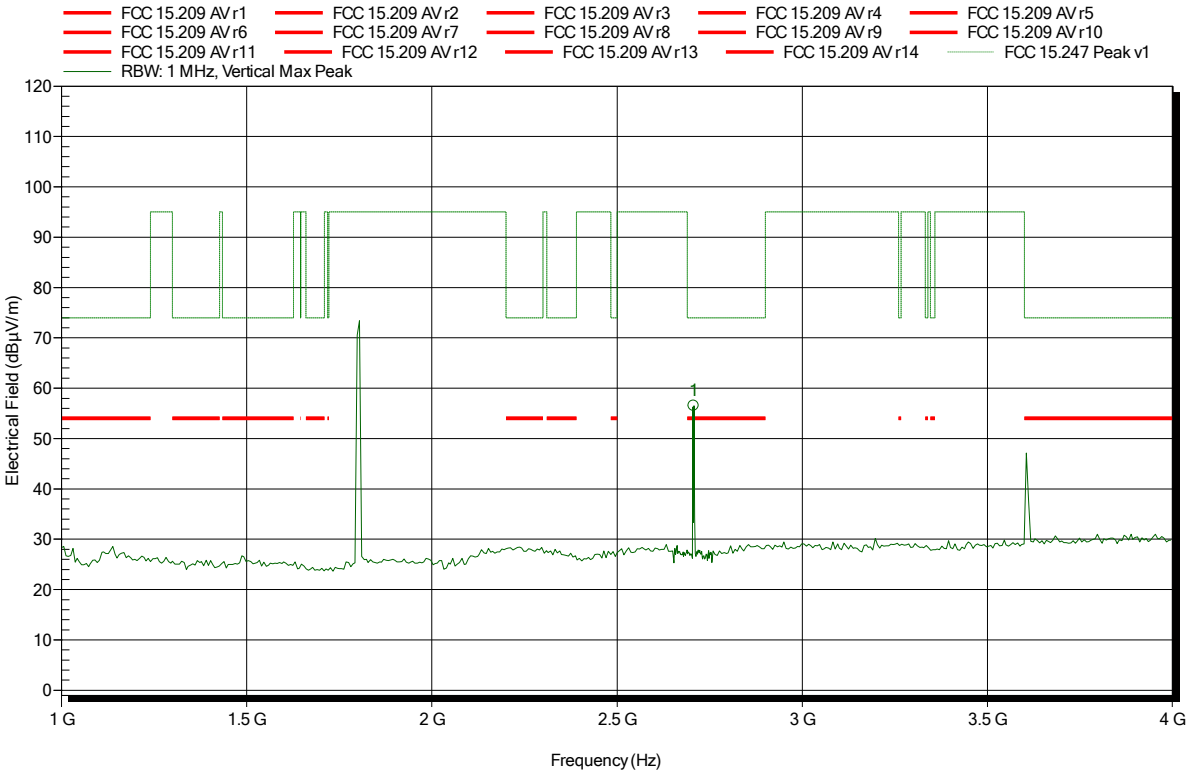
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.707 GHz	54.26 dBµV/m	74 dBµV/m	-19.74 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 28



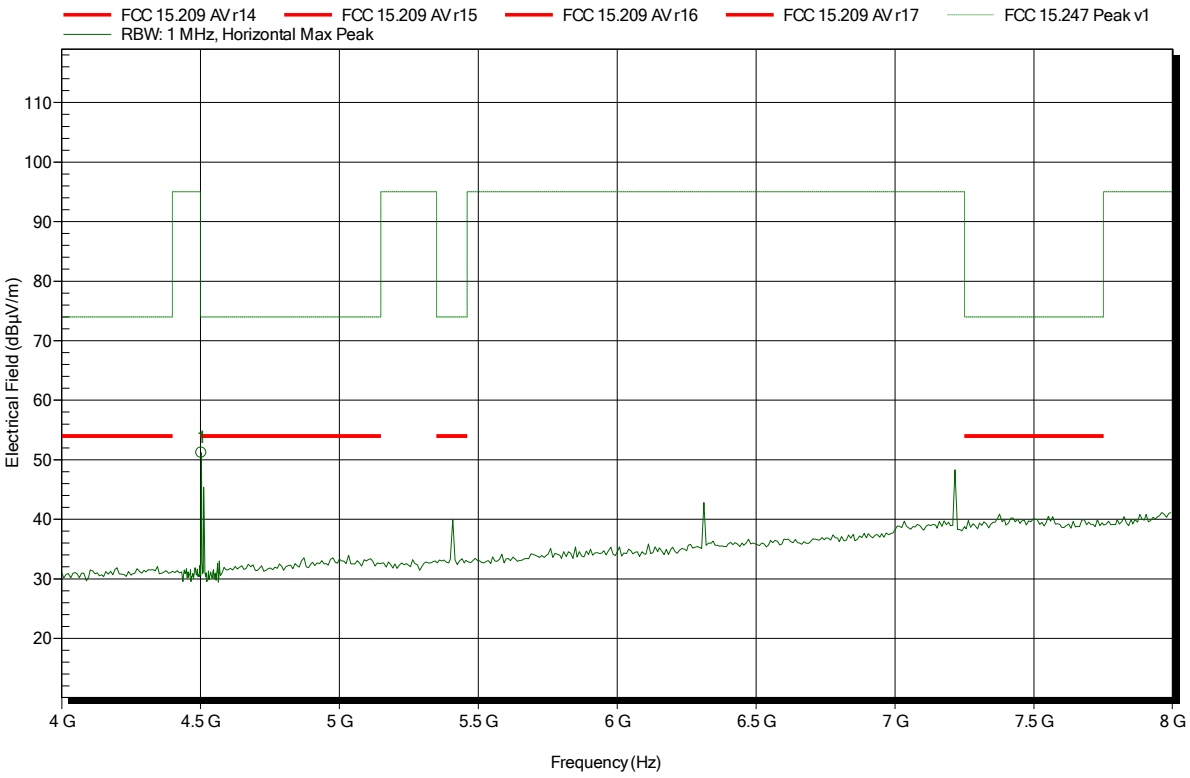
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.707 GHz	56.5 dBµV/m	74 dBµV/m	-17.5 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 25



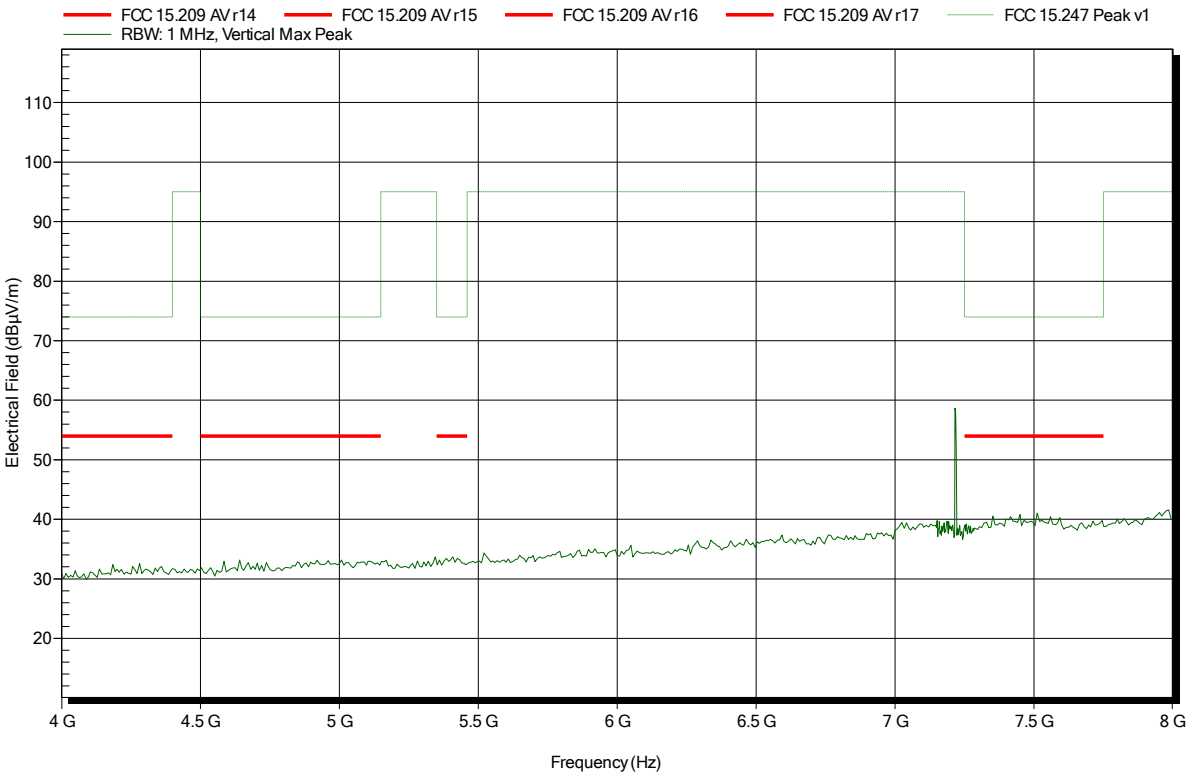
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.504 GHz	51.15 dBµV/m	74 dBµV/m	-22.85 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 29

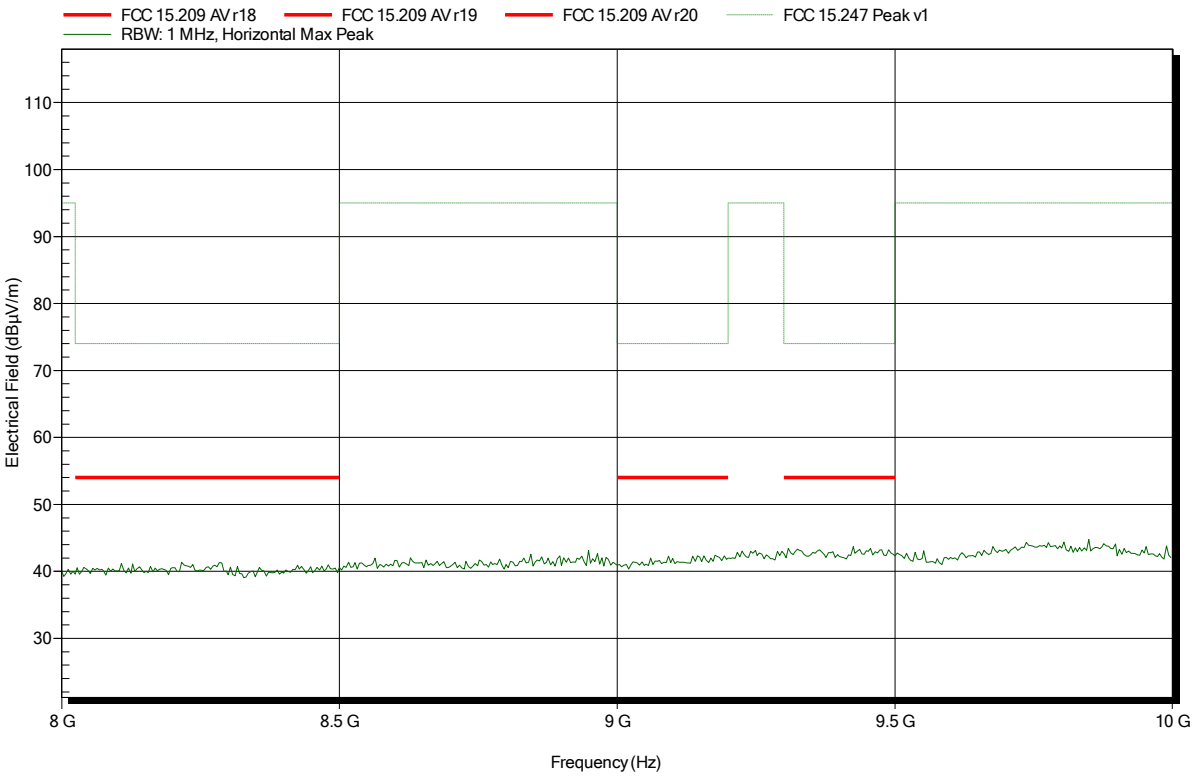


Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 26

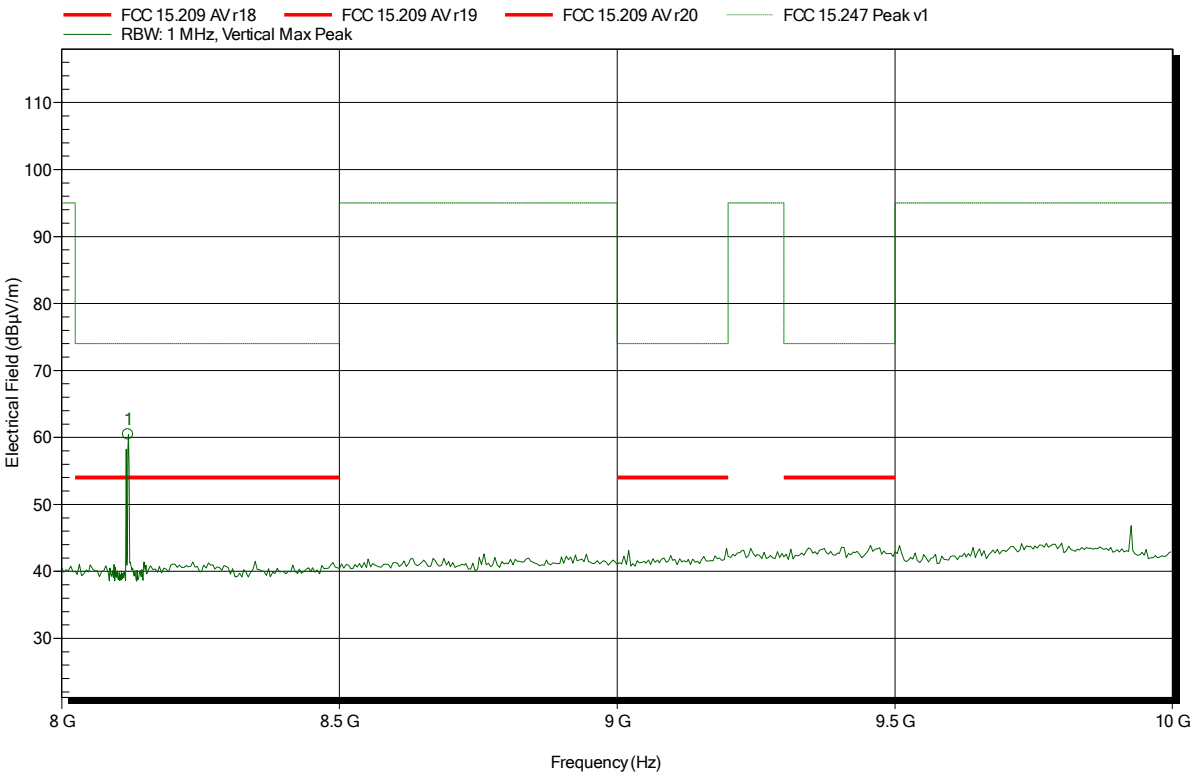


Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 30



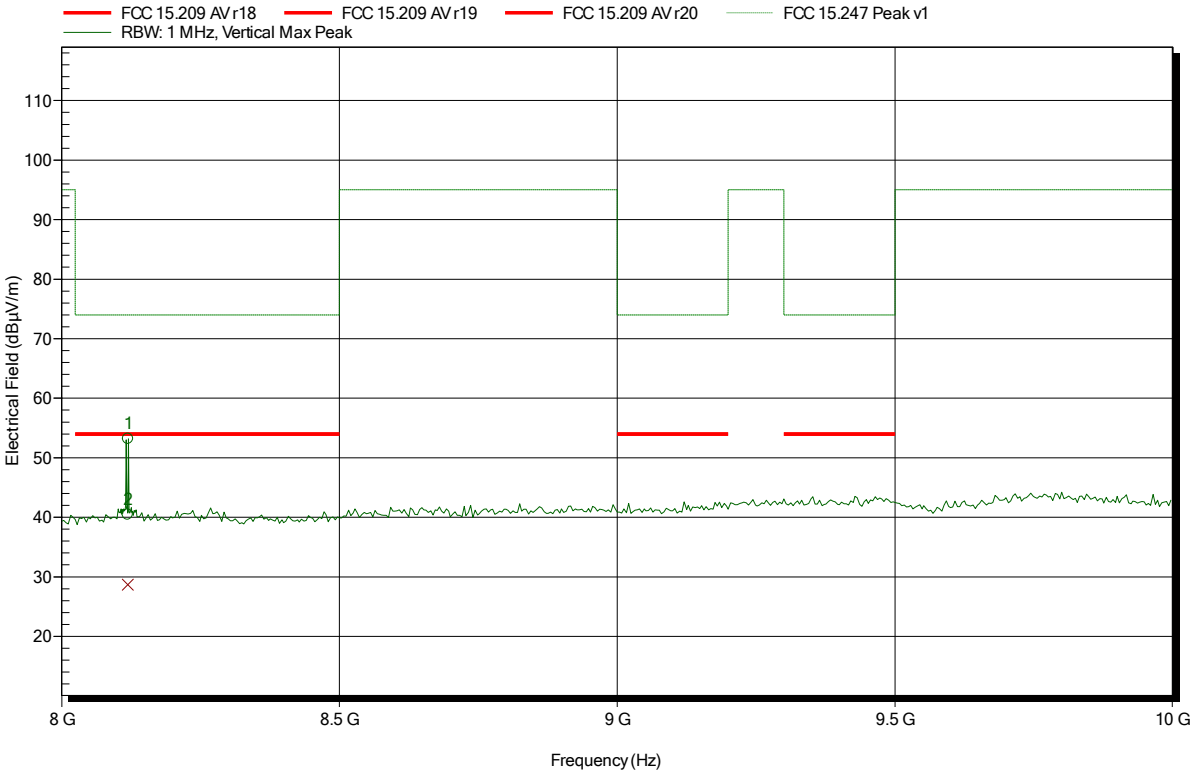
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.12 GHz	60.46 dBµV/m	74 dBµV/m	-13.54 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 31

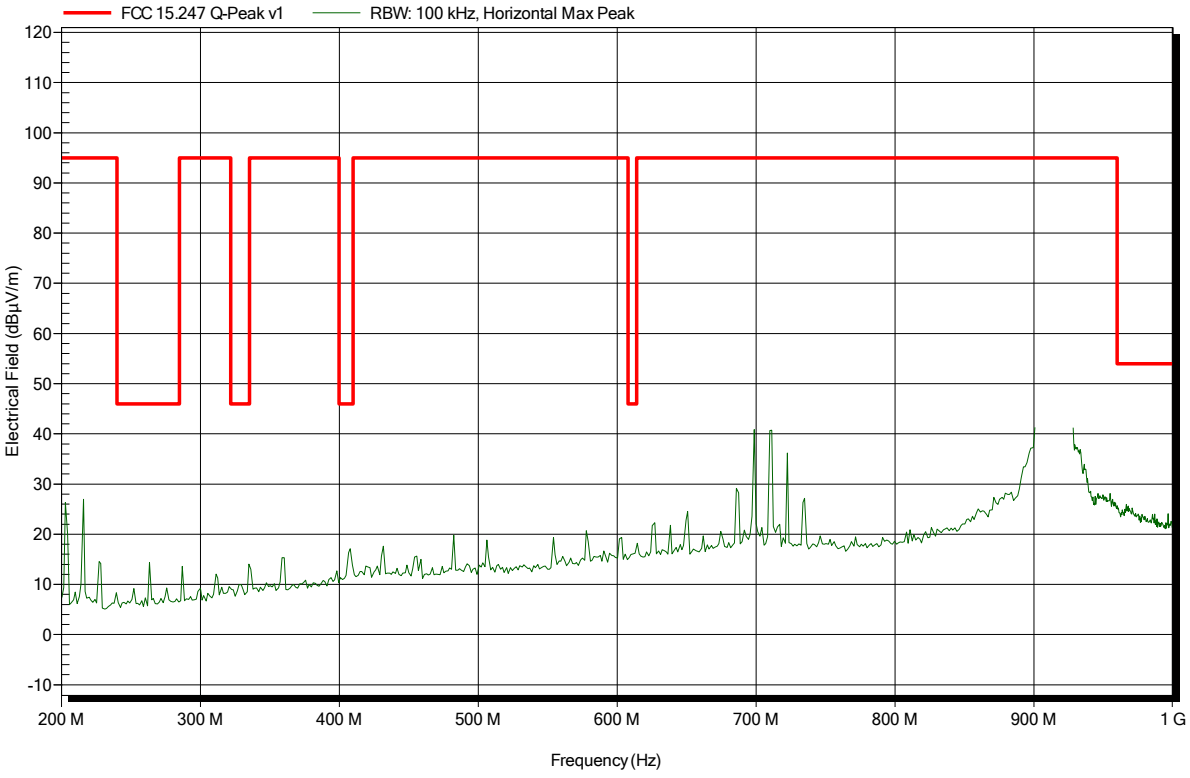


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.12 GHz	53.15 dBµV/m	74 dBµV/m	-20.85 dB	Pass
8.12 GHz	40.44 dBµV/m	74 dBµV/m	-33.56 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 9014.95 MHz
Test Date:	2018-03-07
Note:	

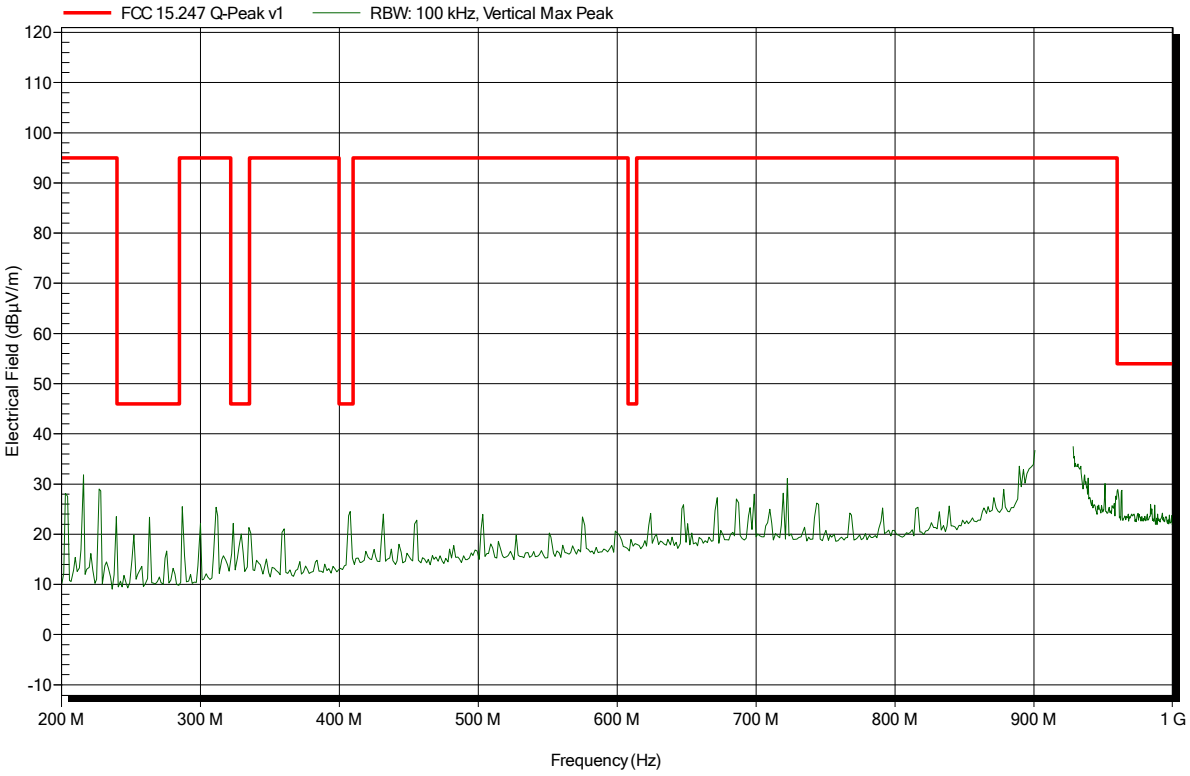
Index 18



Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 9014.95 MHz
Test Date:	2018-03-07
Note:	

Index 19

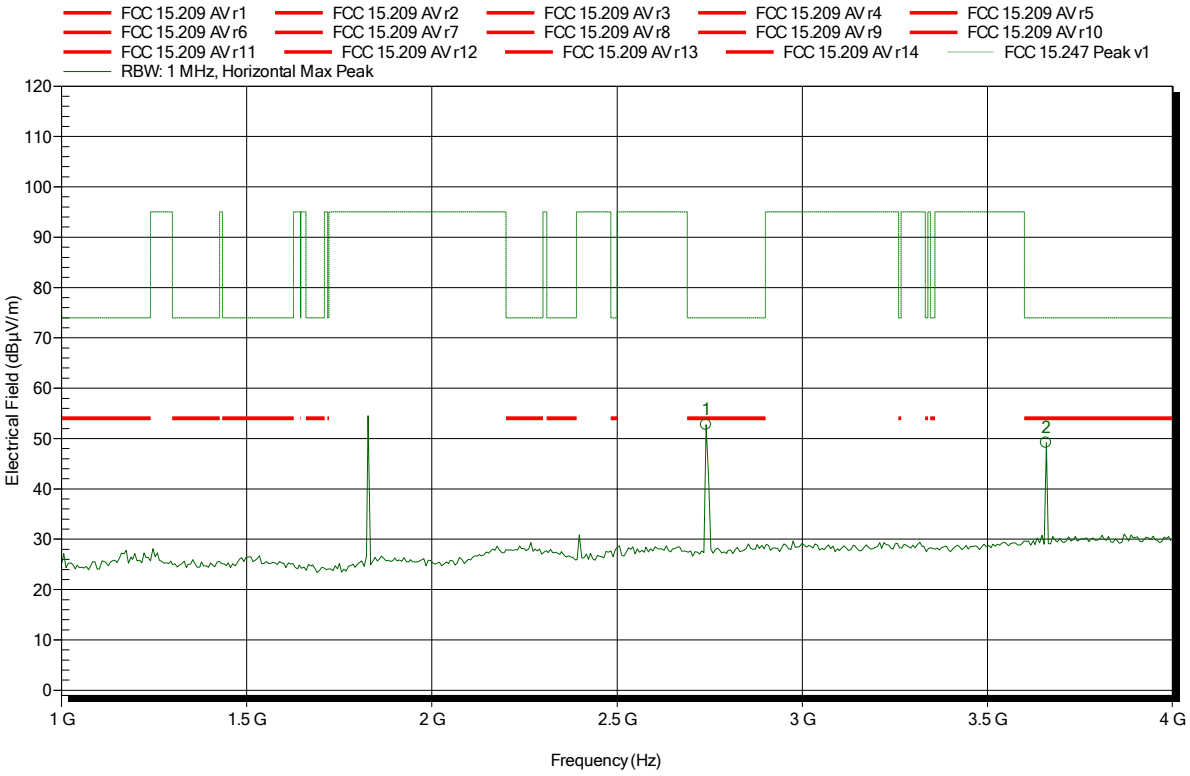


Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 32



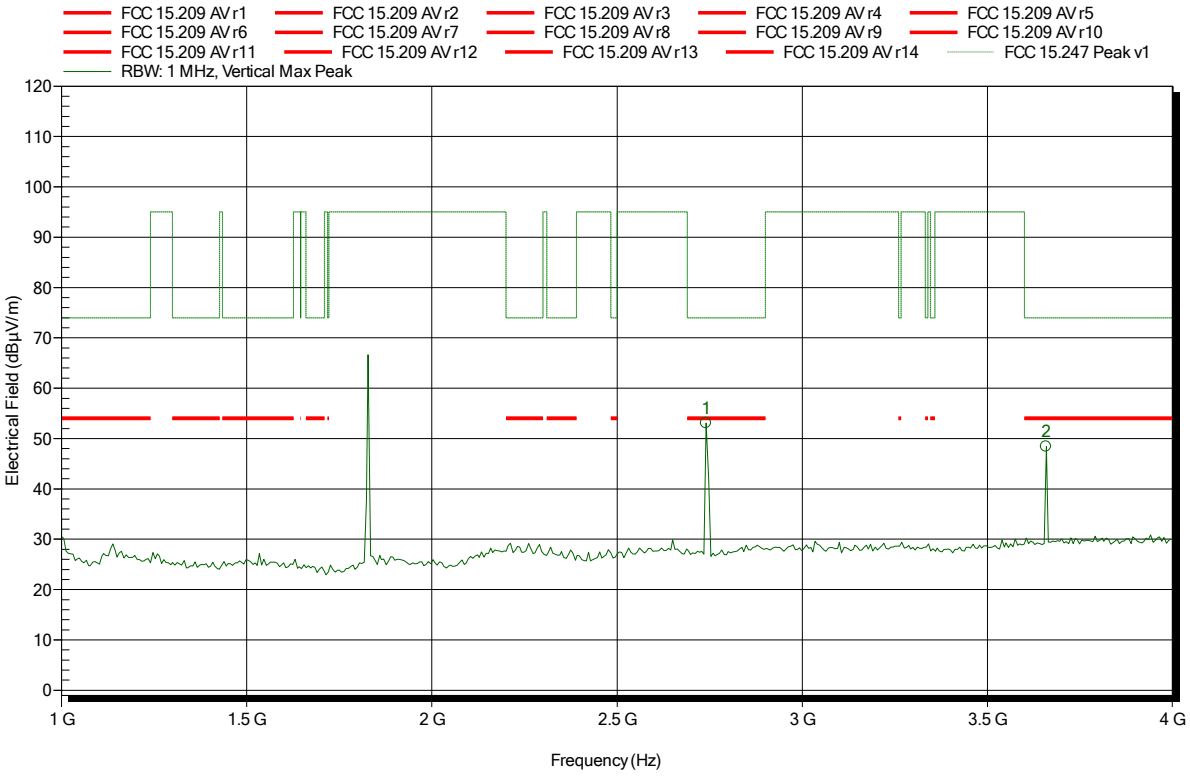
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.74 GHz	52.72 dBµV/m	74 dBµV/m	-21.28 dB	Pass
3.658 GHz	49.14 dBµV/m	74 dBµV/m	-24.86 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 37



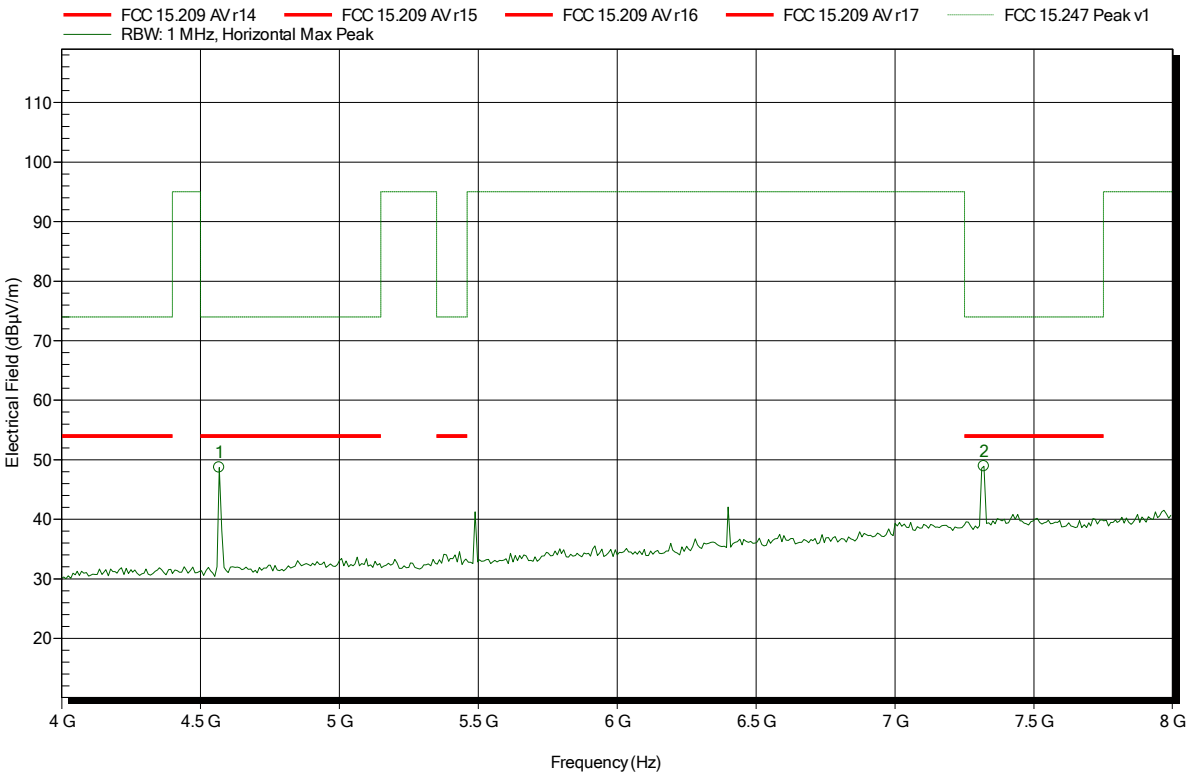
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.74 GHz	53.03 dBµV/m	74 dBµV/m	-20.97 dB	Pass
3.658 GHz	48.41 dBµV/m	74 dBµV/m	-25.59 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 35



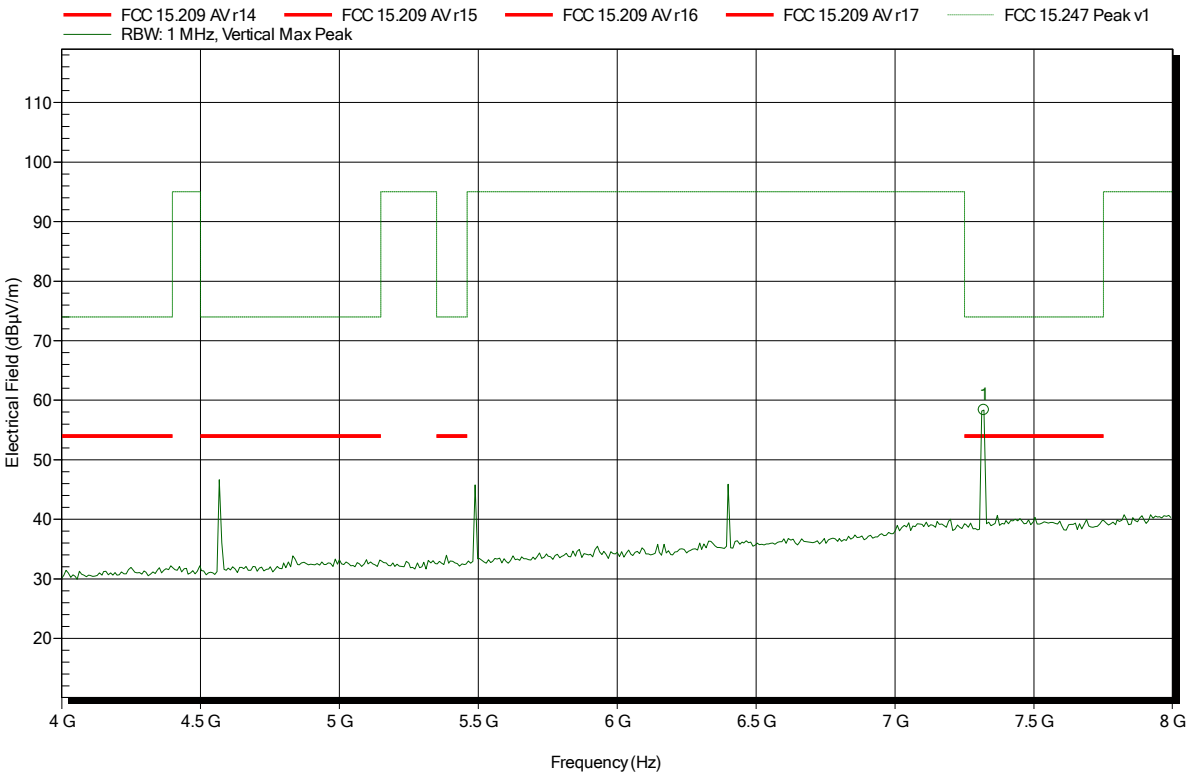
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.568 GHz	48.7 dBµV/m	74 dBµV/m	-25.3 dB	Pass
7.32 GHz	48.92 dBµV/m	74 dBµV/m	-25.08 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 38



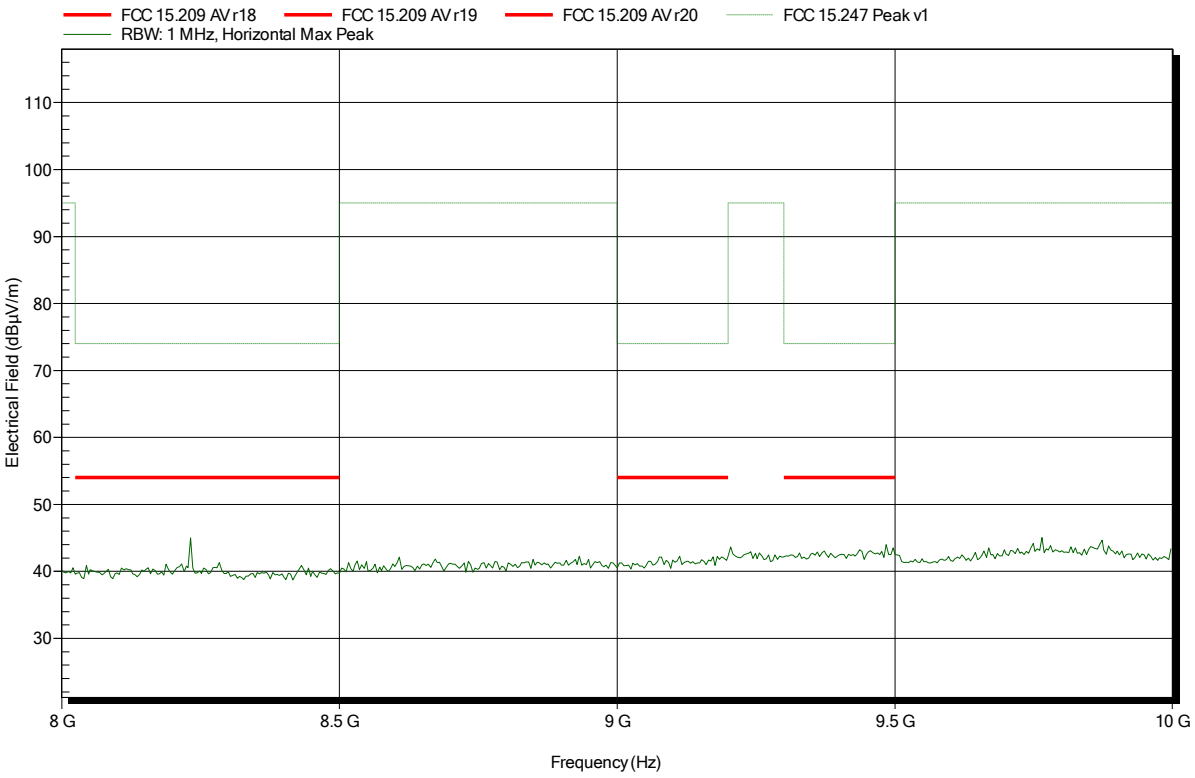
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.32 GHz	58.33 dBµV/m	74 dBµV/m	-15.67 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 34

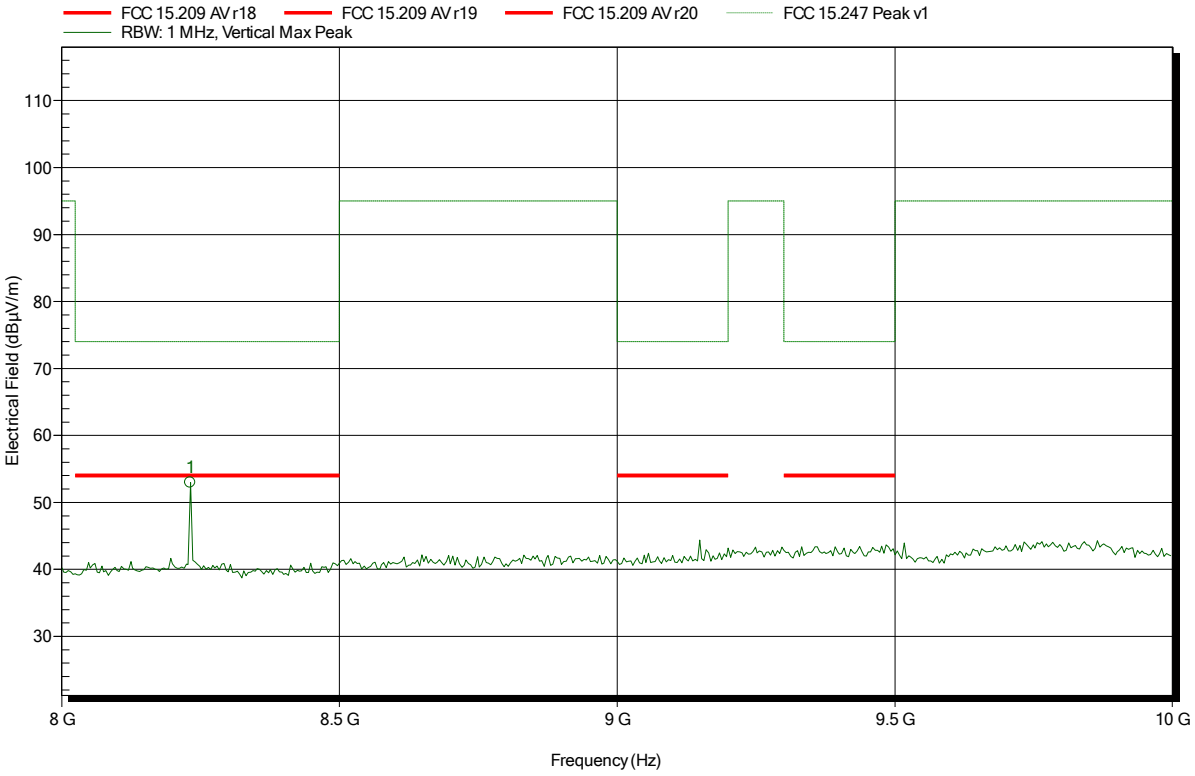


Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 39

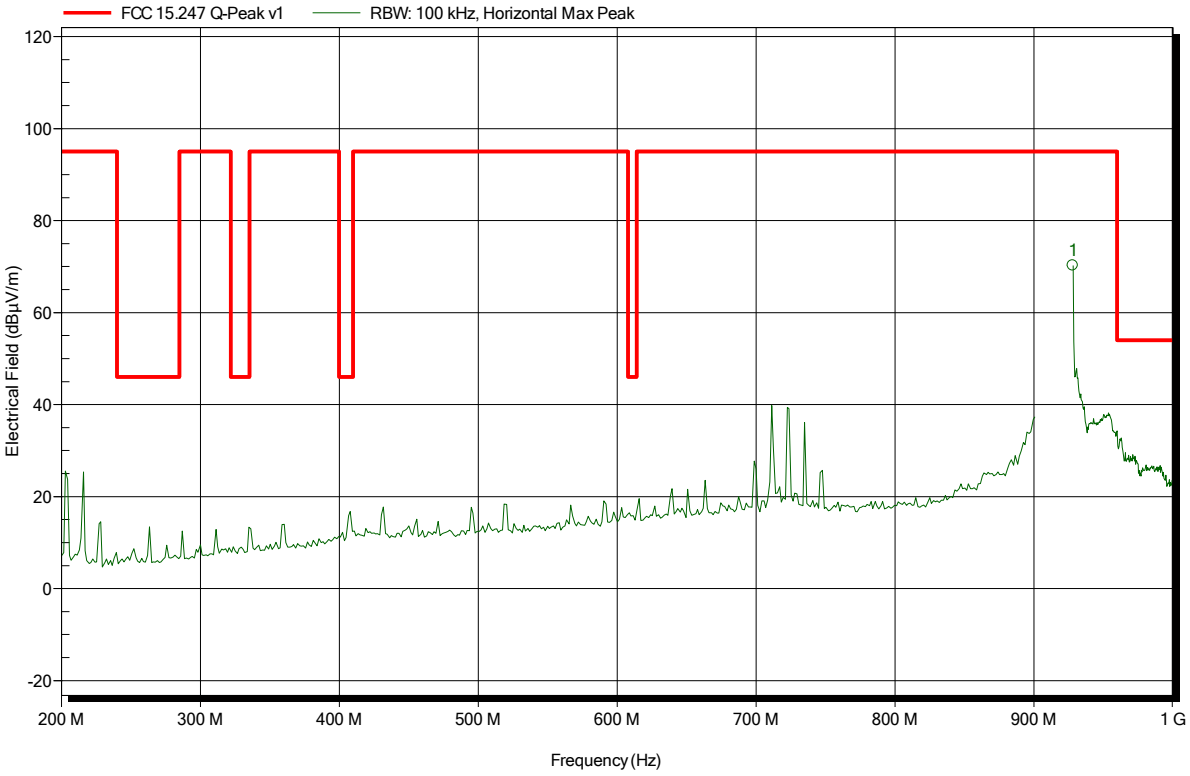


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.232 GHz	52.98 dBµV/m	74 dBµV/m	-21.02 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 21

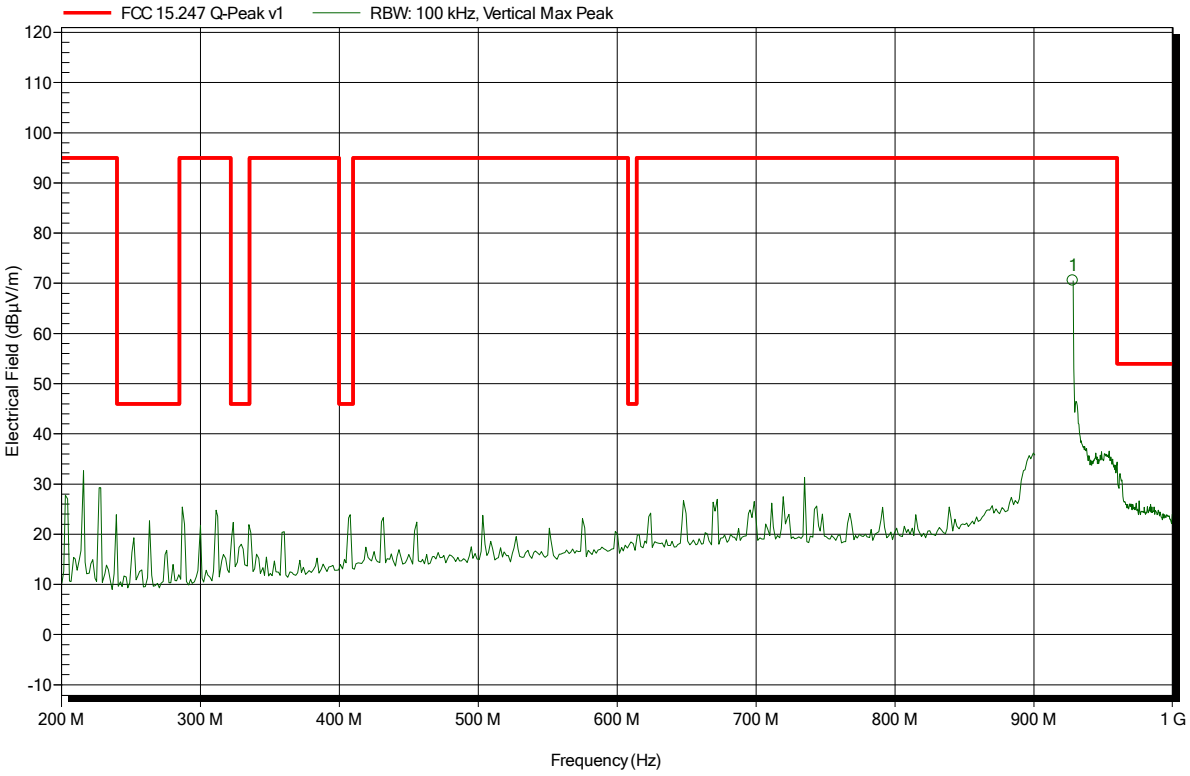


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
928 MHz	70.26 dBµV/m	95 dBµV/m	-24.74 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 20



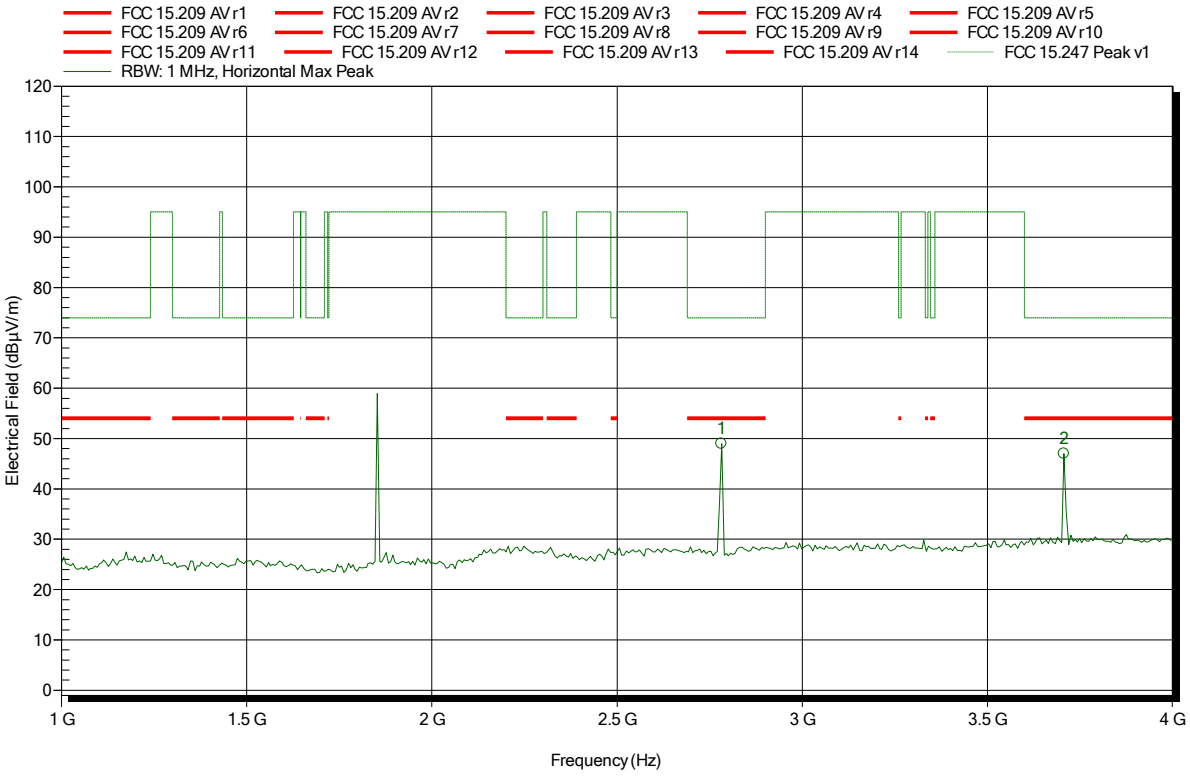
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
928 MHz	70.57 dBµV/m	95 dBµV/m	-24.43 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 40



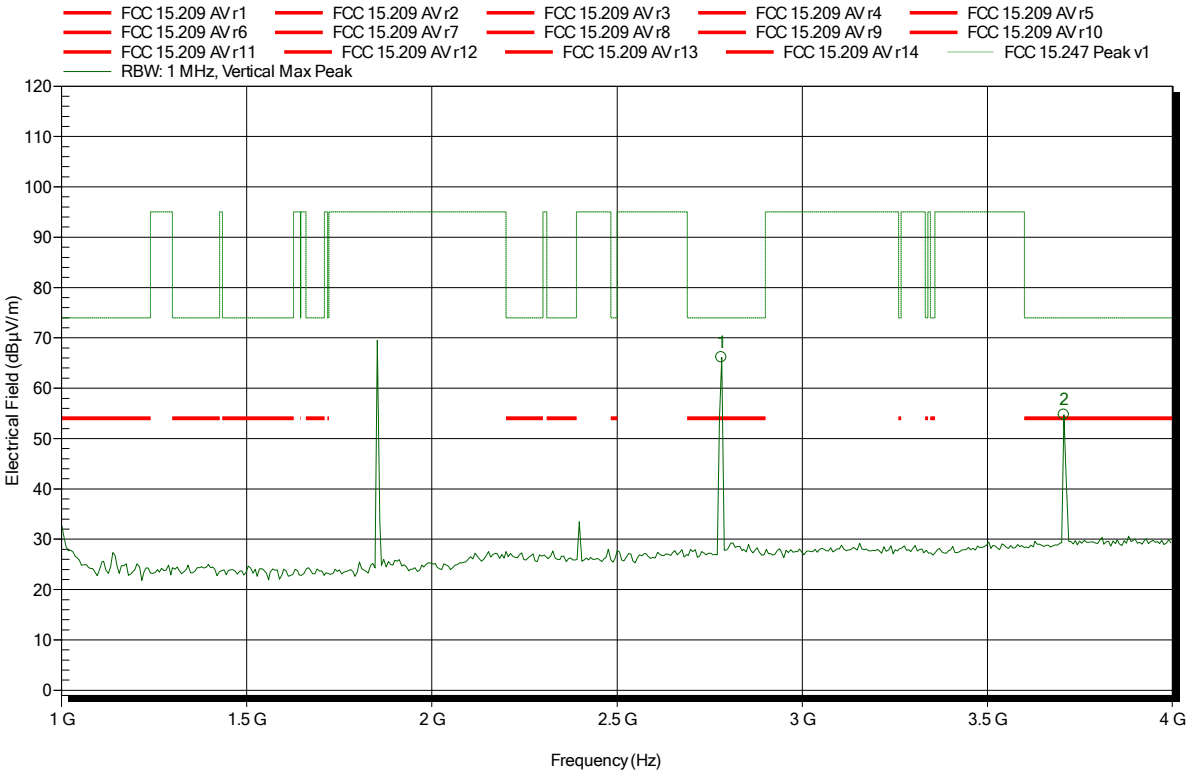
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.782 GHz	48.99 dBµV/m	74 dBµV/m	-25.01 dB	Pass
3.706 GHz	47 dBµV/m	74 dBµV/m	-27 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 43



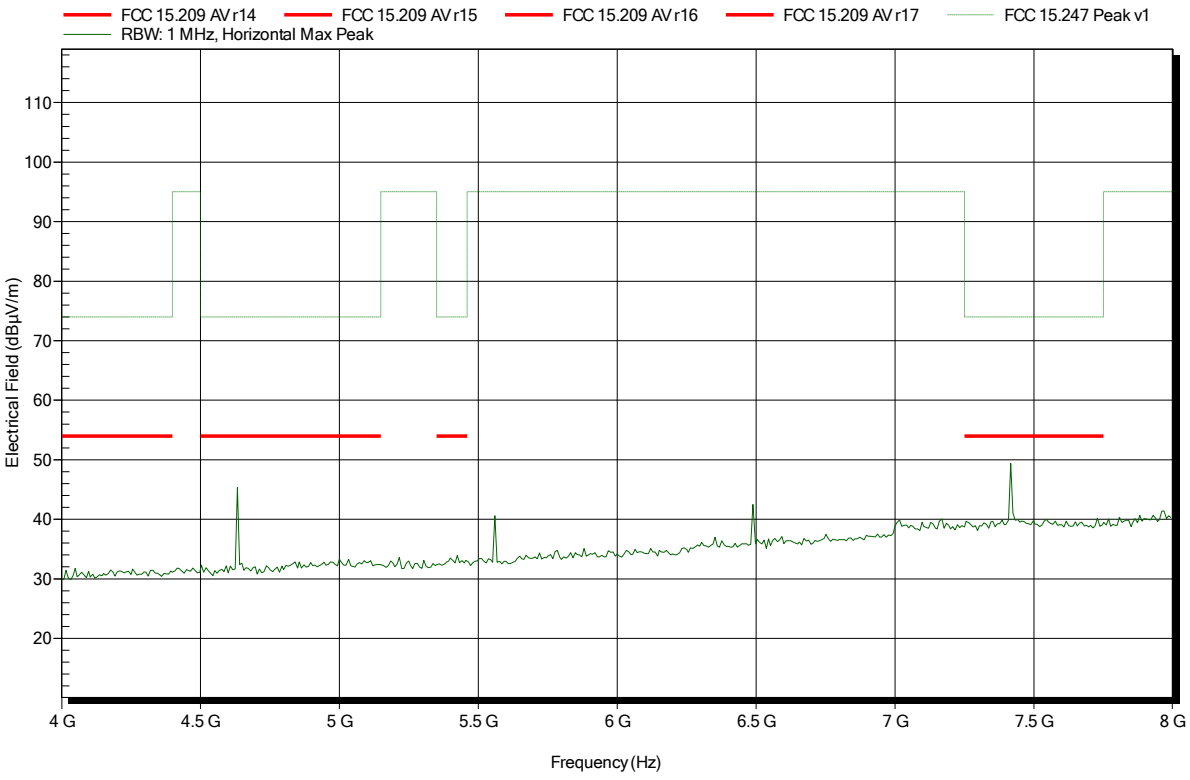
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.782 GHz	66.16 dBµV/m	74 dBµV/m	-7.84 dB	Pass
3.706 GHz	54.74 dBµV/m	74 dBµV/m	-19.26 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 41

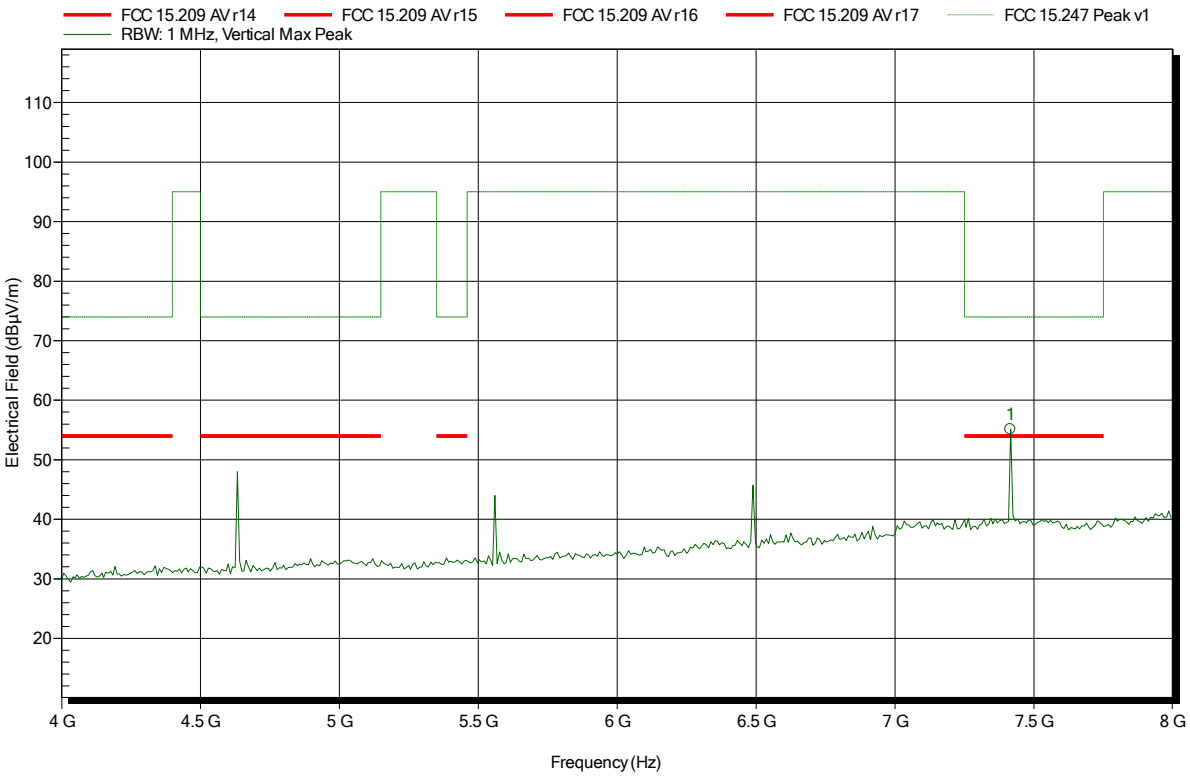


Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 44



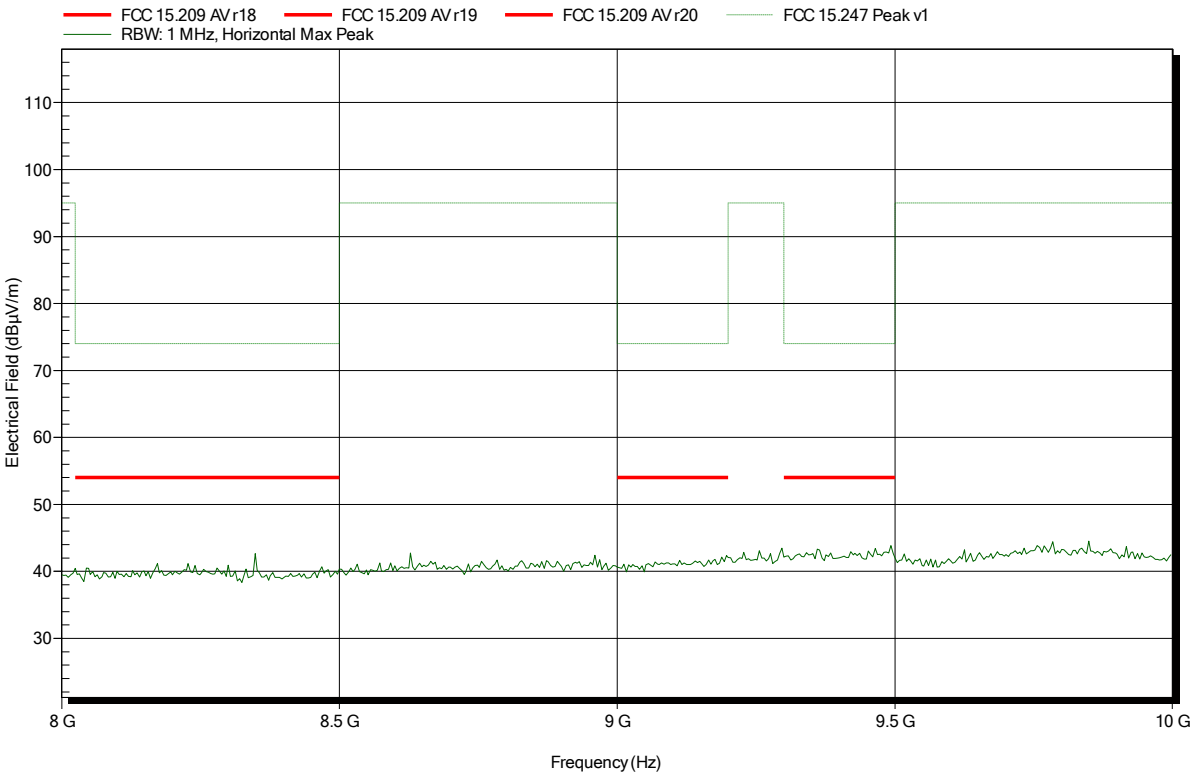
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.416 GHz	55.12 dBµV/m	74 dBµV/m	-18.88 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 42

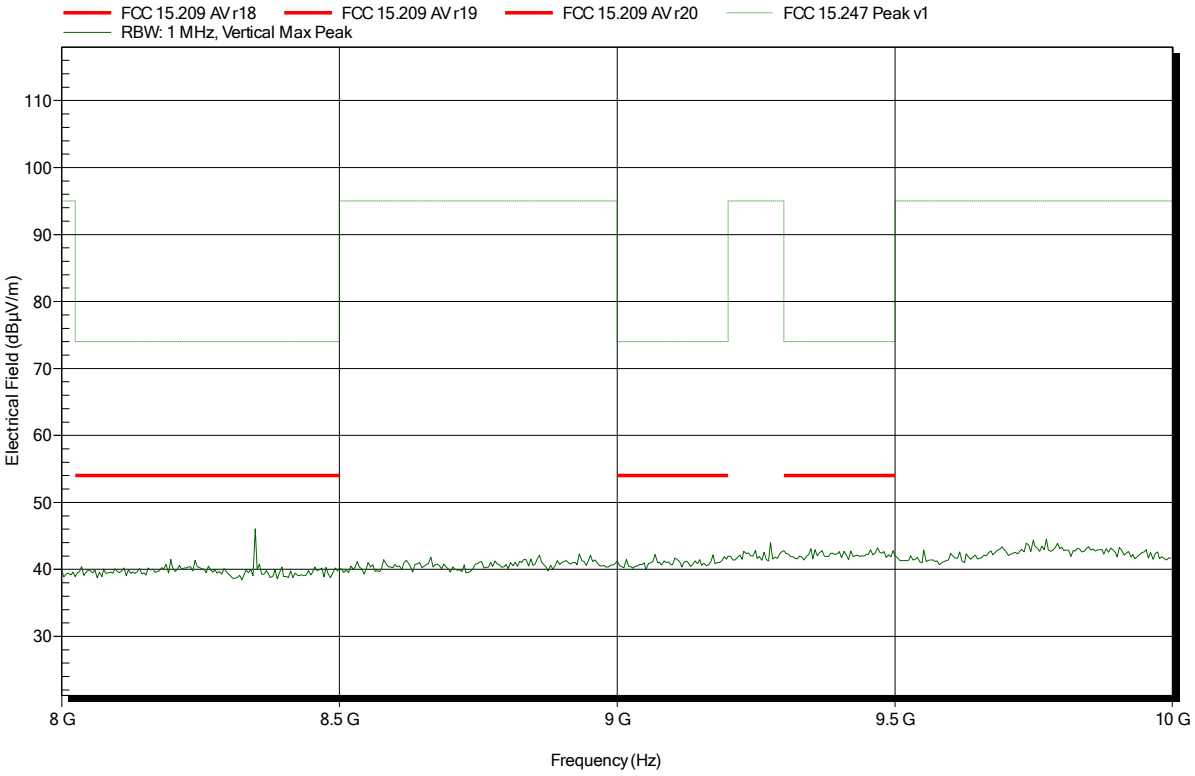


Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 45

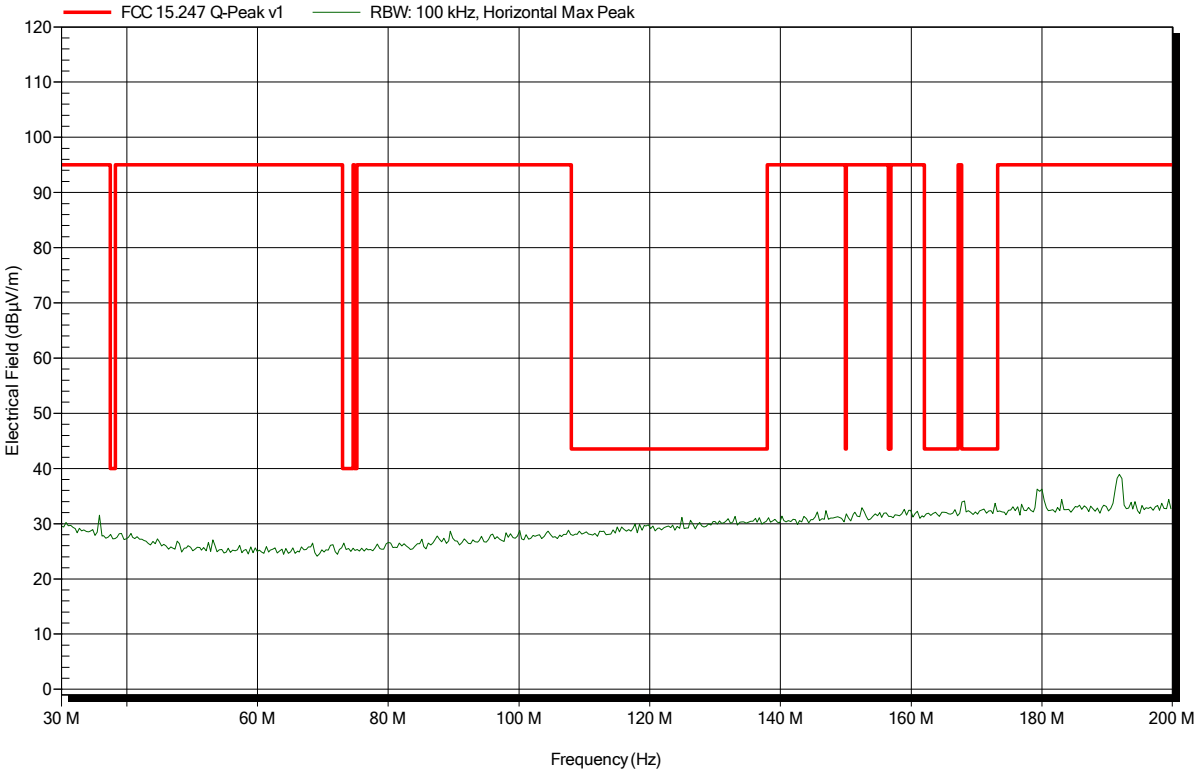


ANNEX B Transmitter radiated spurious emissions PC23 antenna

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

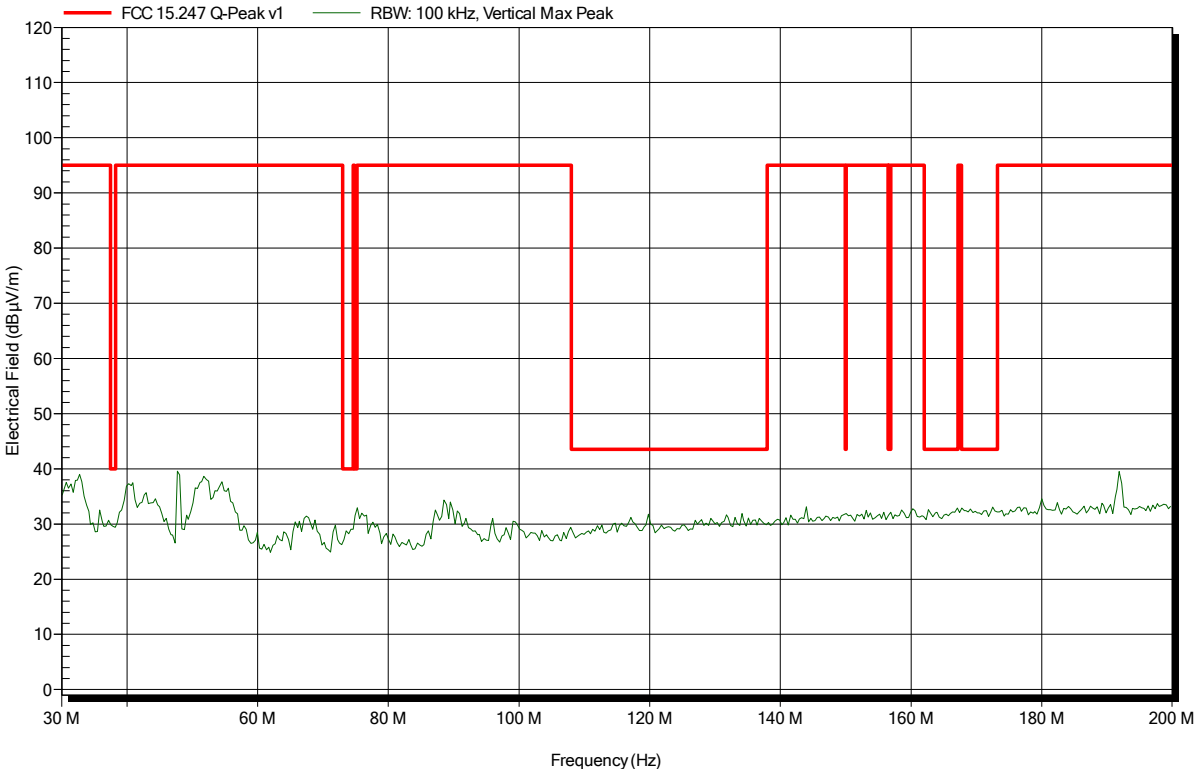
Index 76



Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

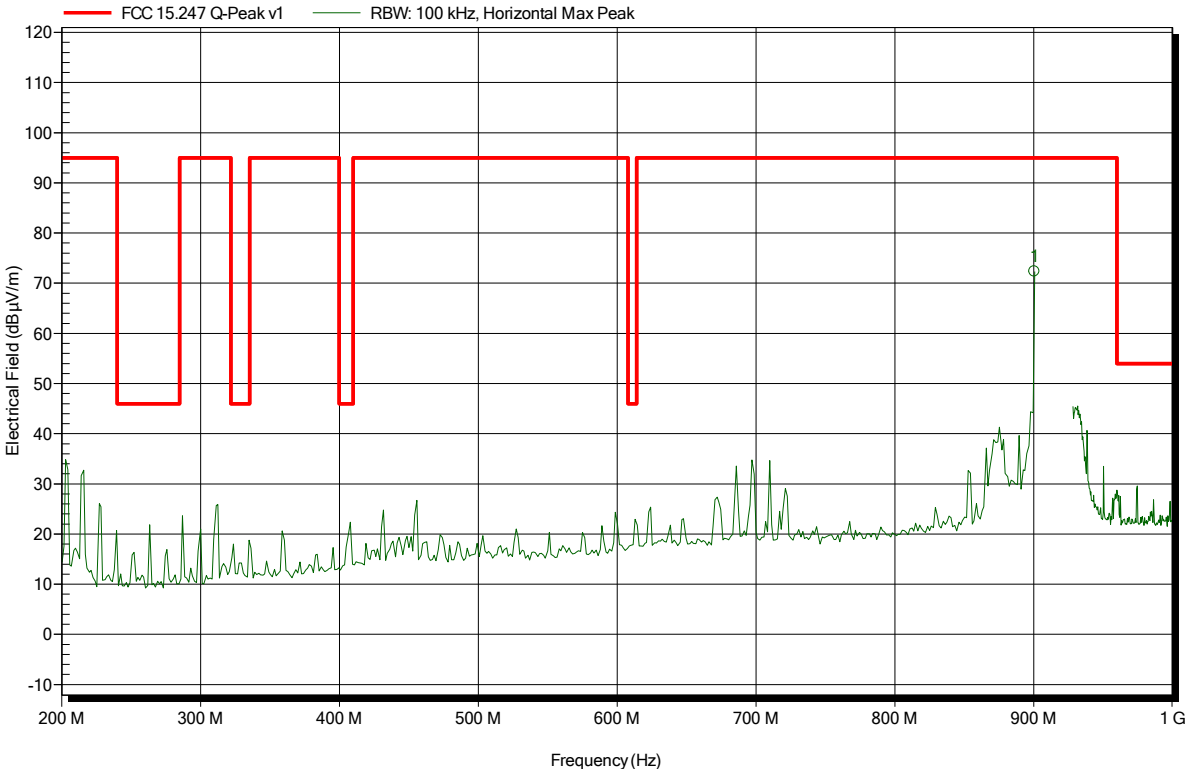
Index 77



Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 70

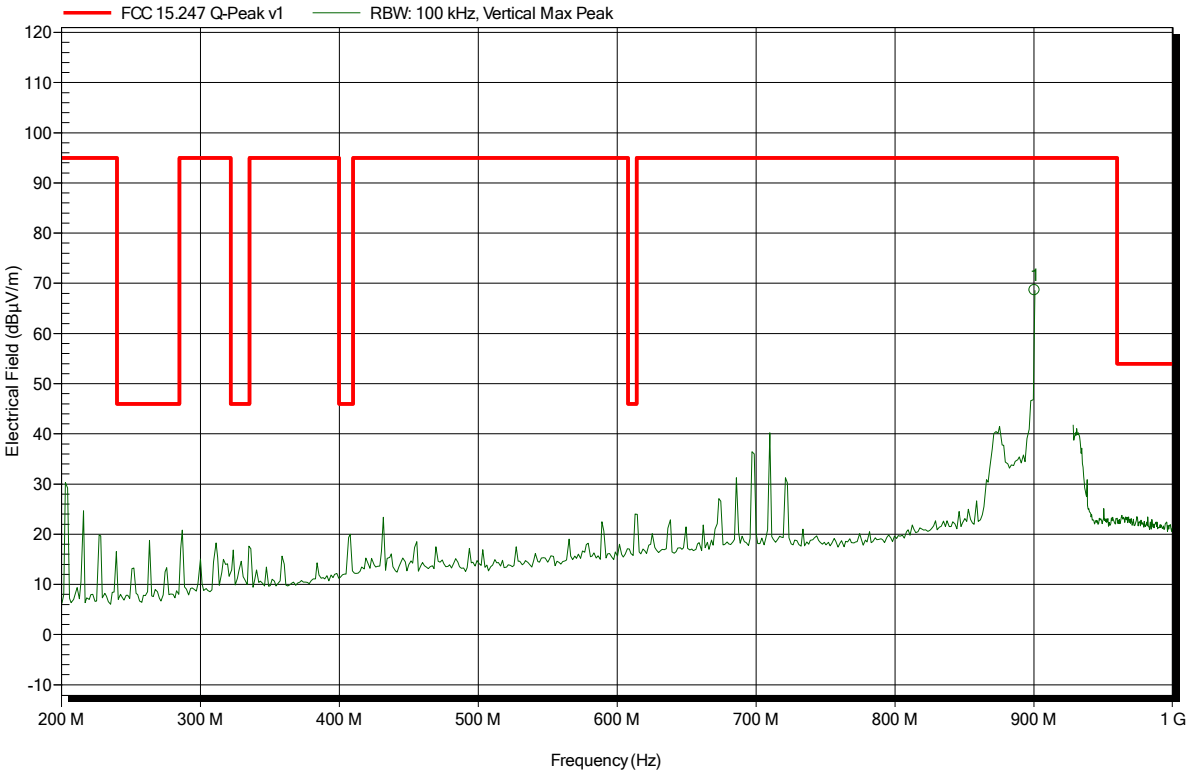


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
900.596 MHz	72.31 dBµV/m	95 dBµV/m	-22.69 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 71



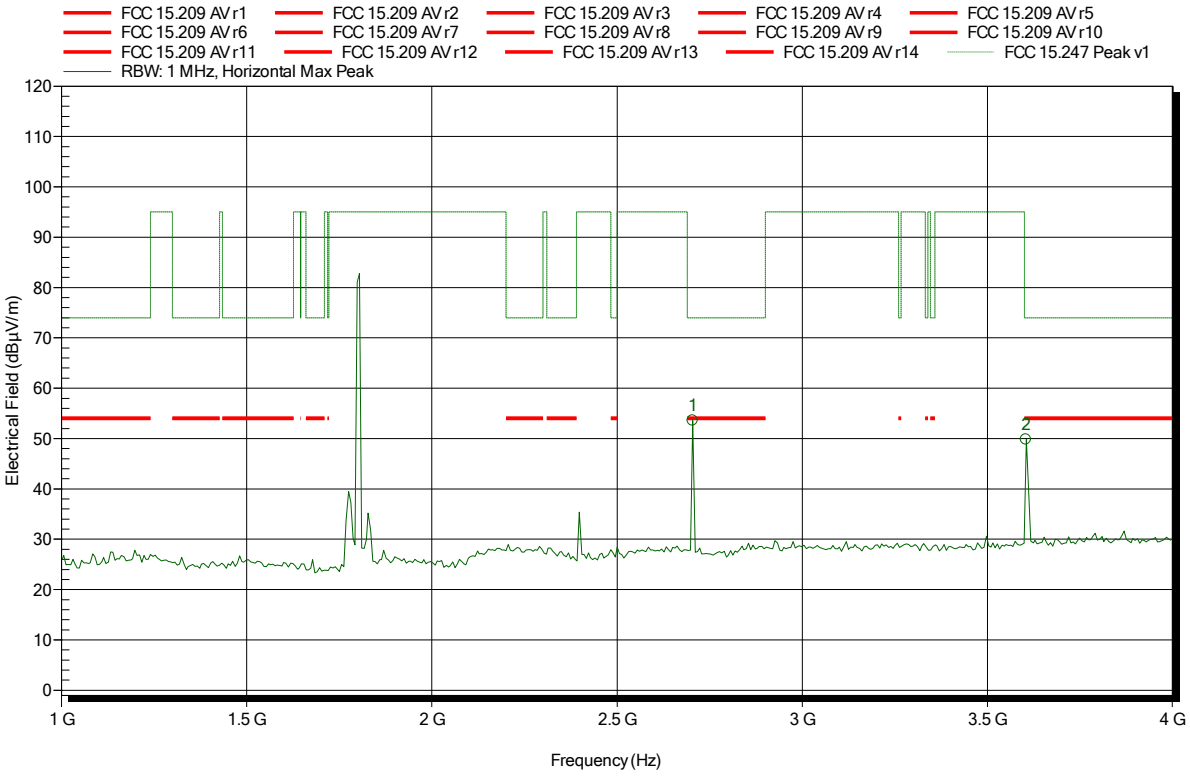
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
900.596 MHz	68.62 dBµV/m	95 dBµV/m	-26.38 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 49



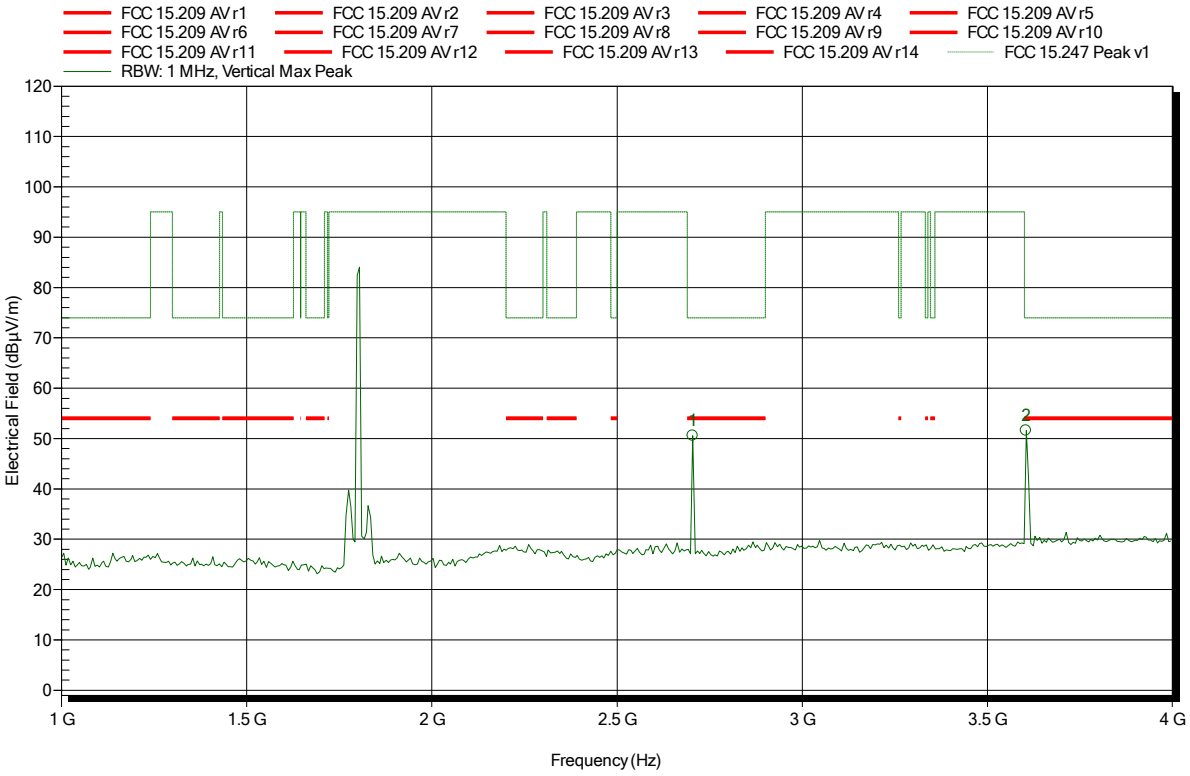
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.704 GHz	53.58 dBµV/m	74 dBµV/m	-20.42 dB	Pass
3.604 GHz	49.77 dBµV/m	74 dBµV/m	-24.23 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 52



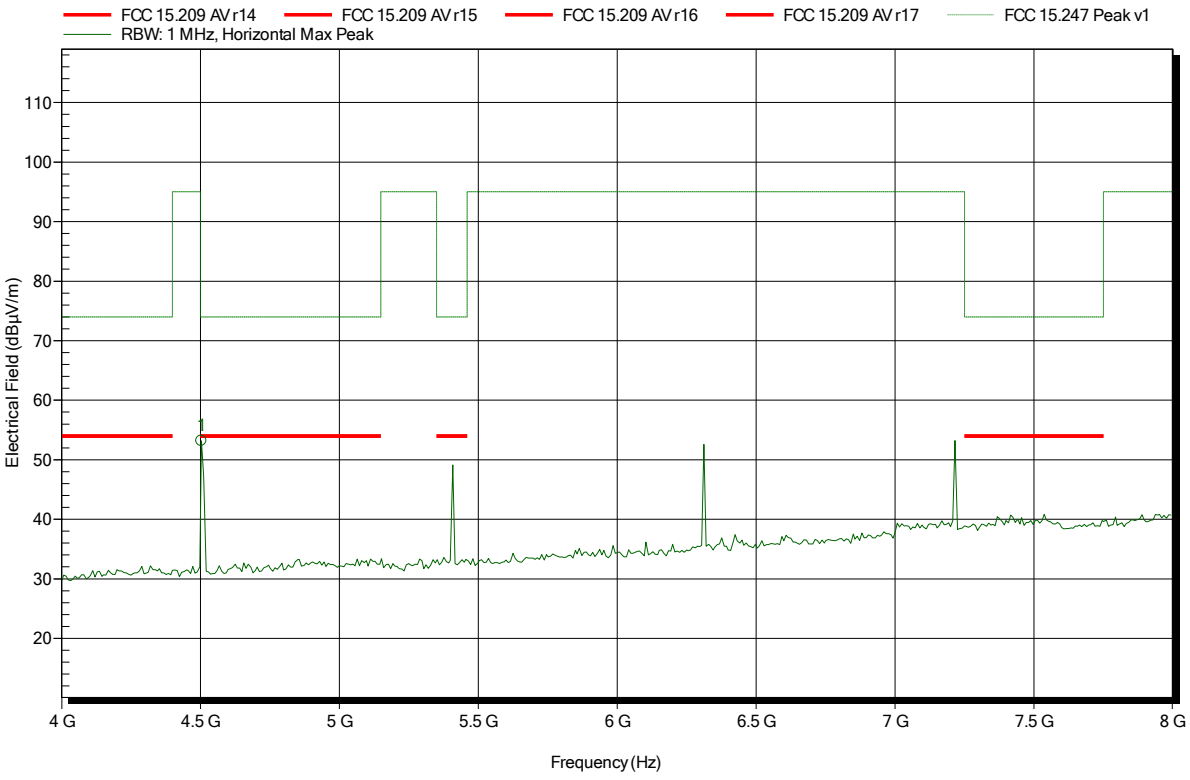
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.704 GHz	50.54 dBµV/m	74 dBµV/m	-23.46 dB	Pass
3.604 GHz	51.6 dBµV/m	74 dBµV/m	-22.4 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 50



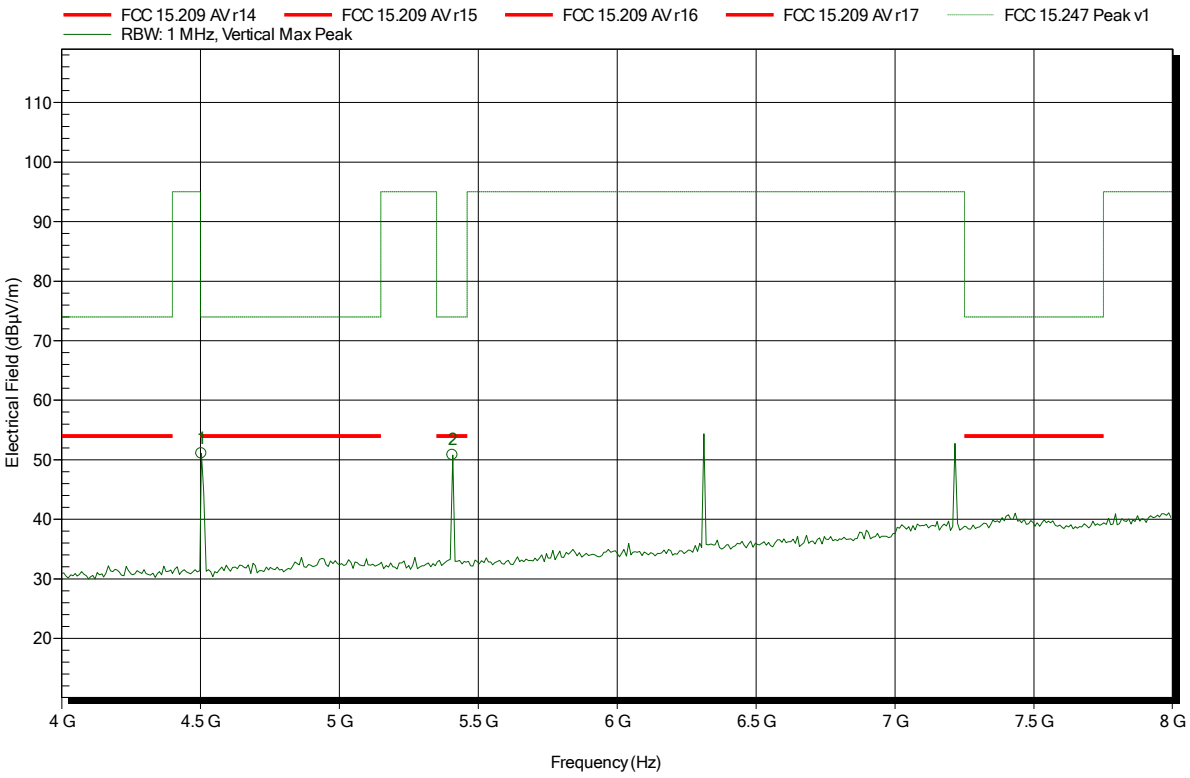
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.504 GHz	53.16 dBµV/m	74 dBµV/m	-20.84 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 53



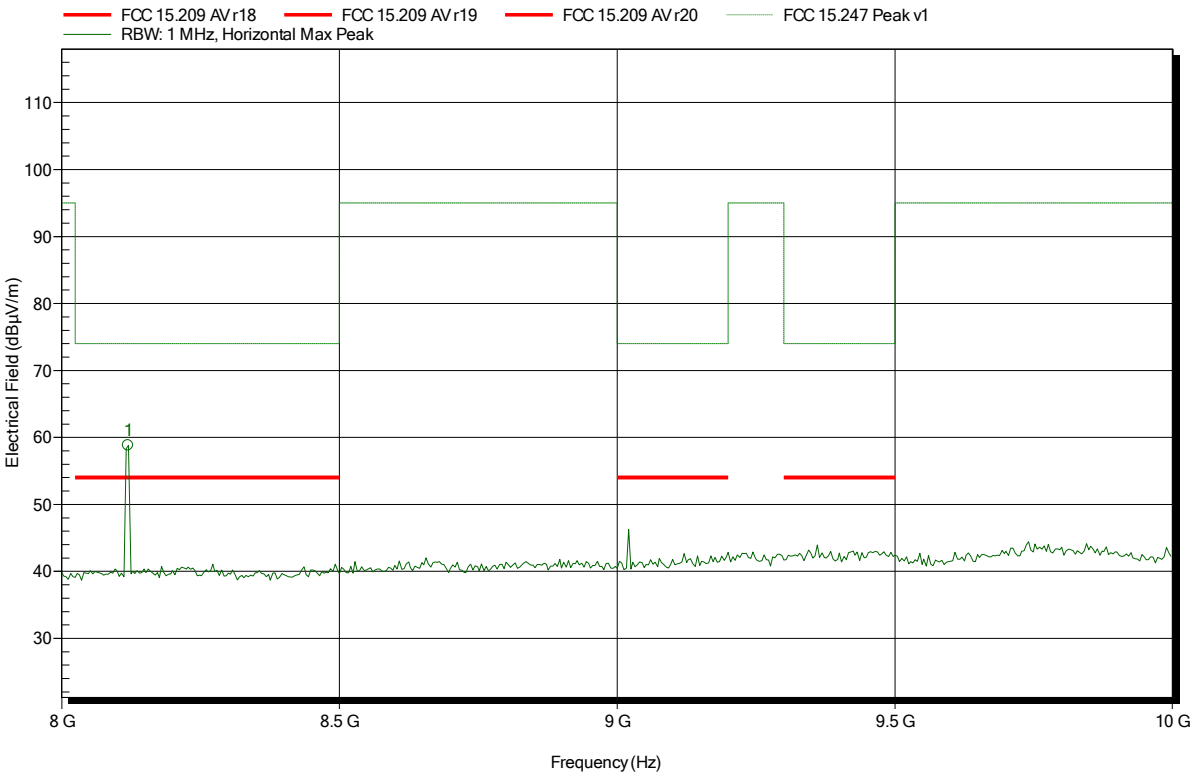
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.504 GHz	51.05 dBµV/m	74 dBµV/m	-22.95 dB	Pass
5.408 GHz	50.78 dBµV/m	74 dBµV/m	-23.22 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 51



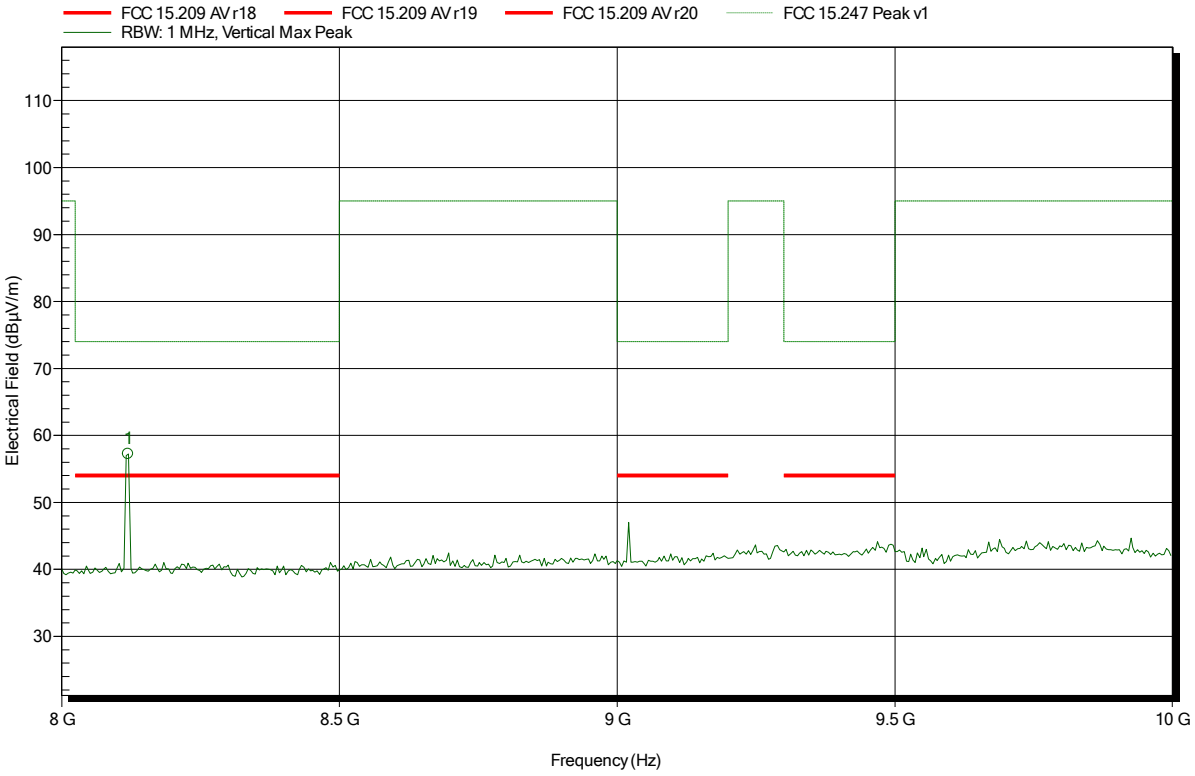
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.12 GHz	58.8 dBµV/m	74 dBµV/m	-15.2 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 902.245 MHz
Test Date:	2018-03-07
Note:	

Index 54

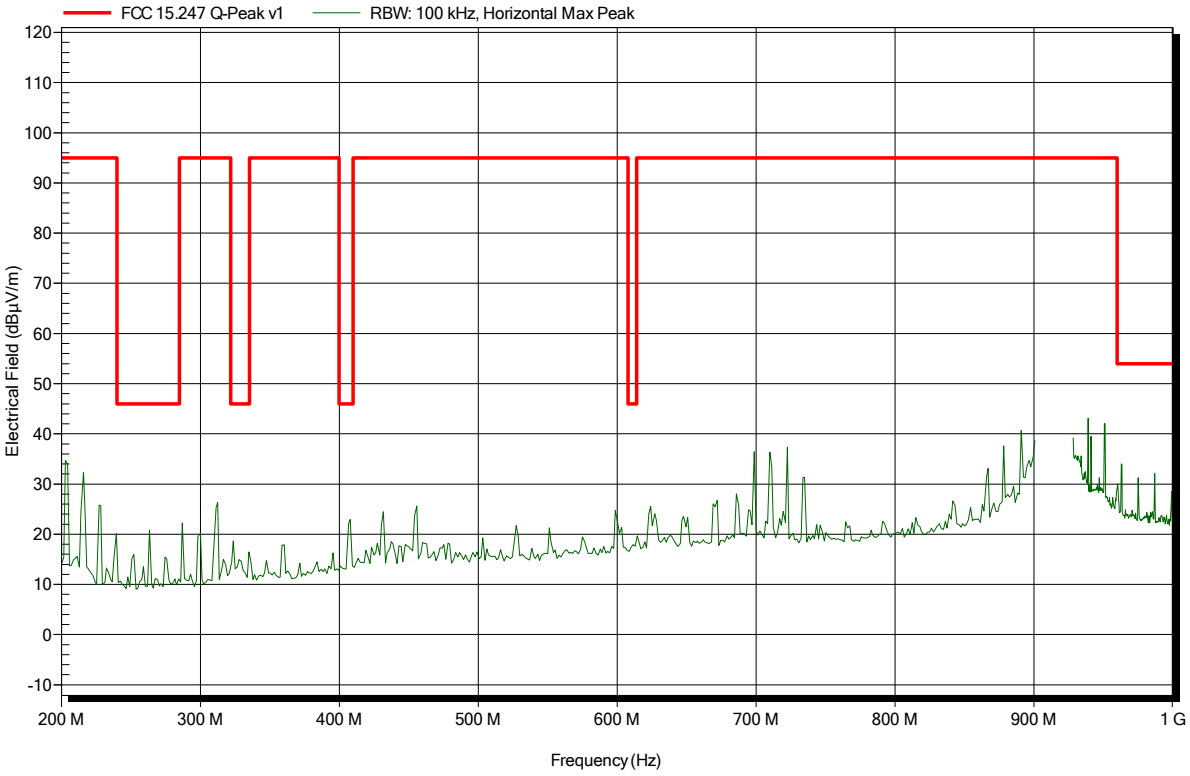


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.12 GHz	57.22 dBµV/m	74 dBµV/m	-16.78 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

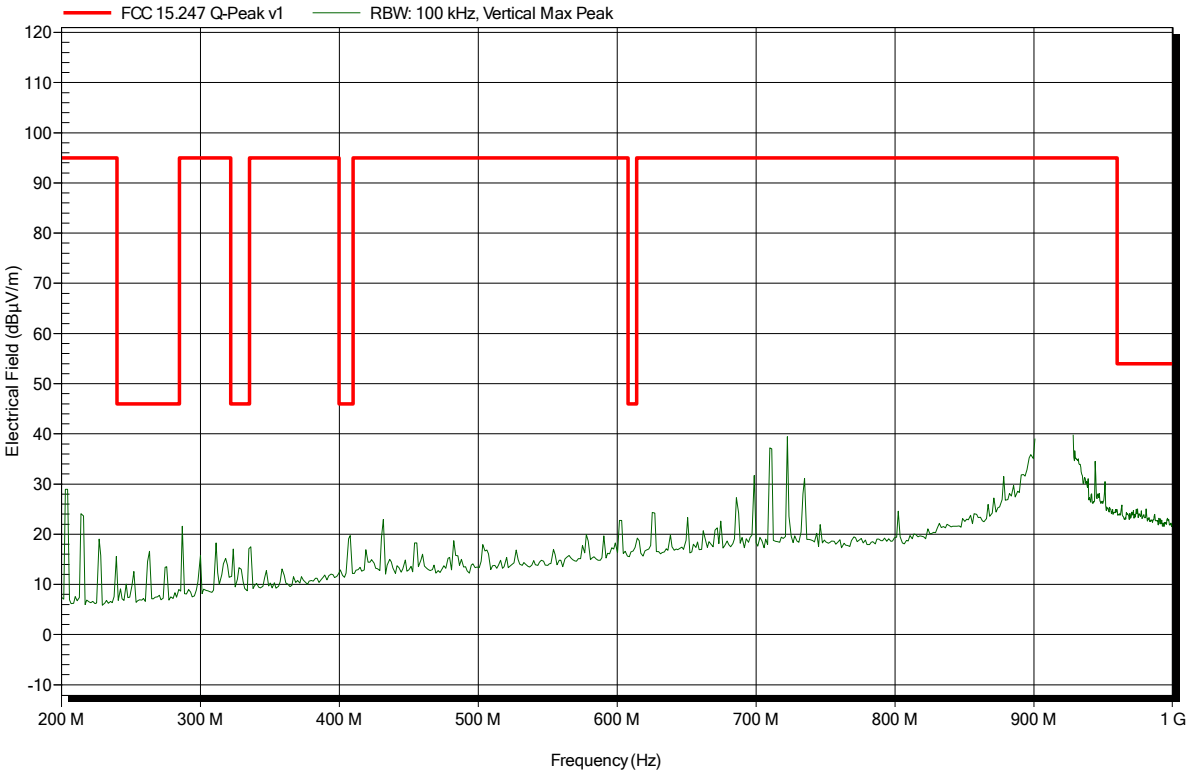
Index 72



Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 73

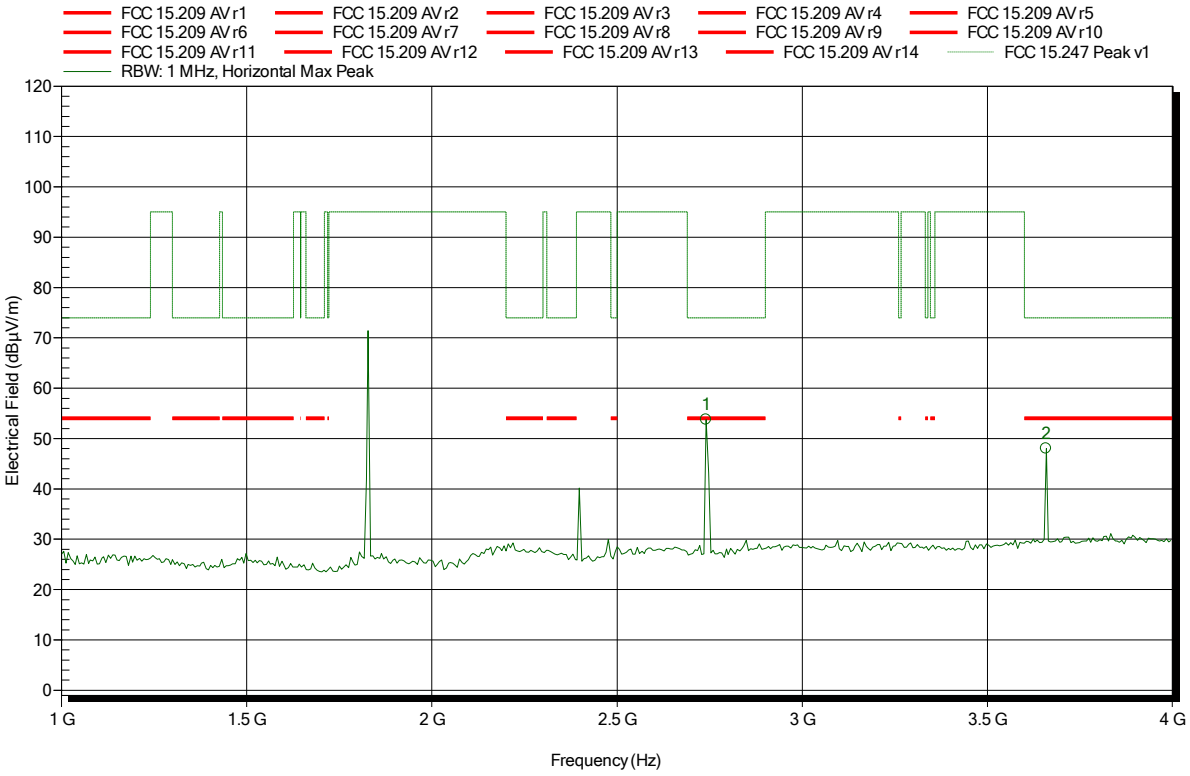


Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 55



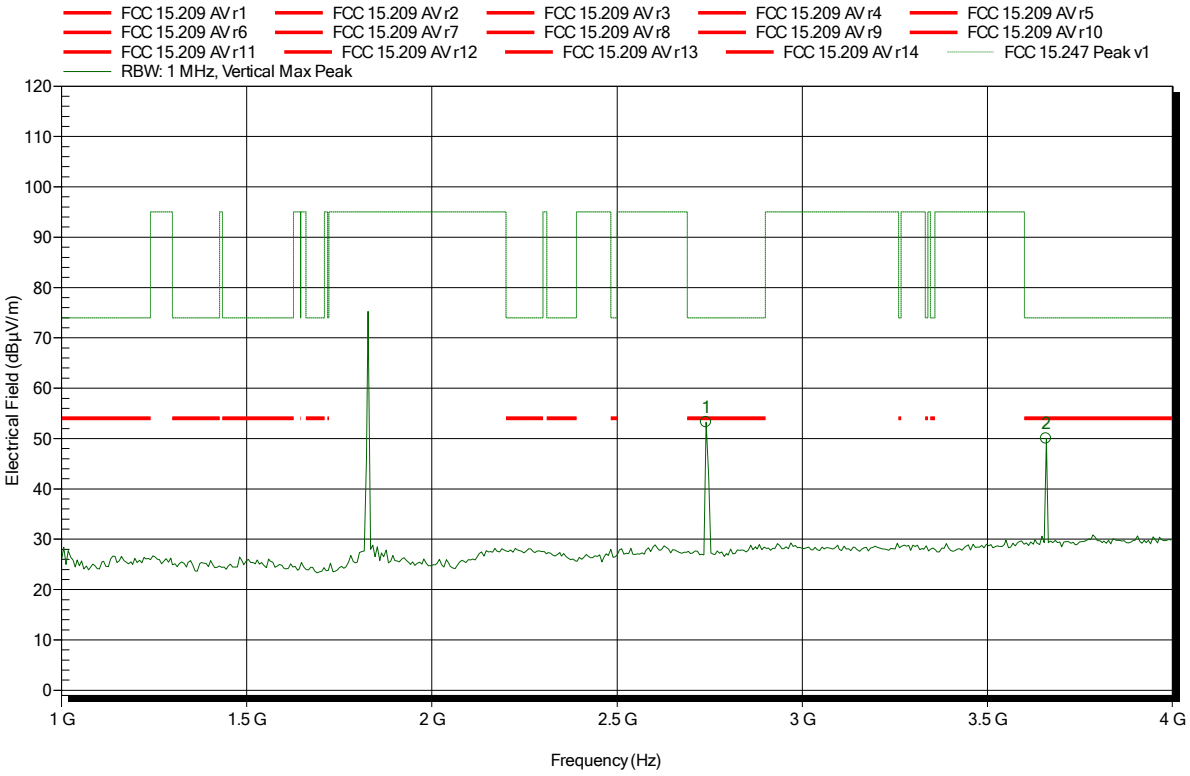
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.74 GHz	53.76 dBµV/m	74 dBµV/m	-20.24 dB	Pass
3.658 GHz	48 dBµV/m	74 dBµV/m	-26 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 58



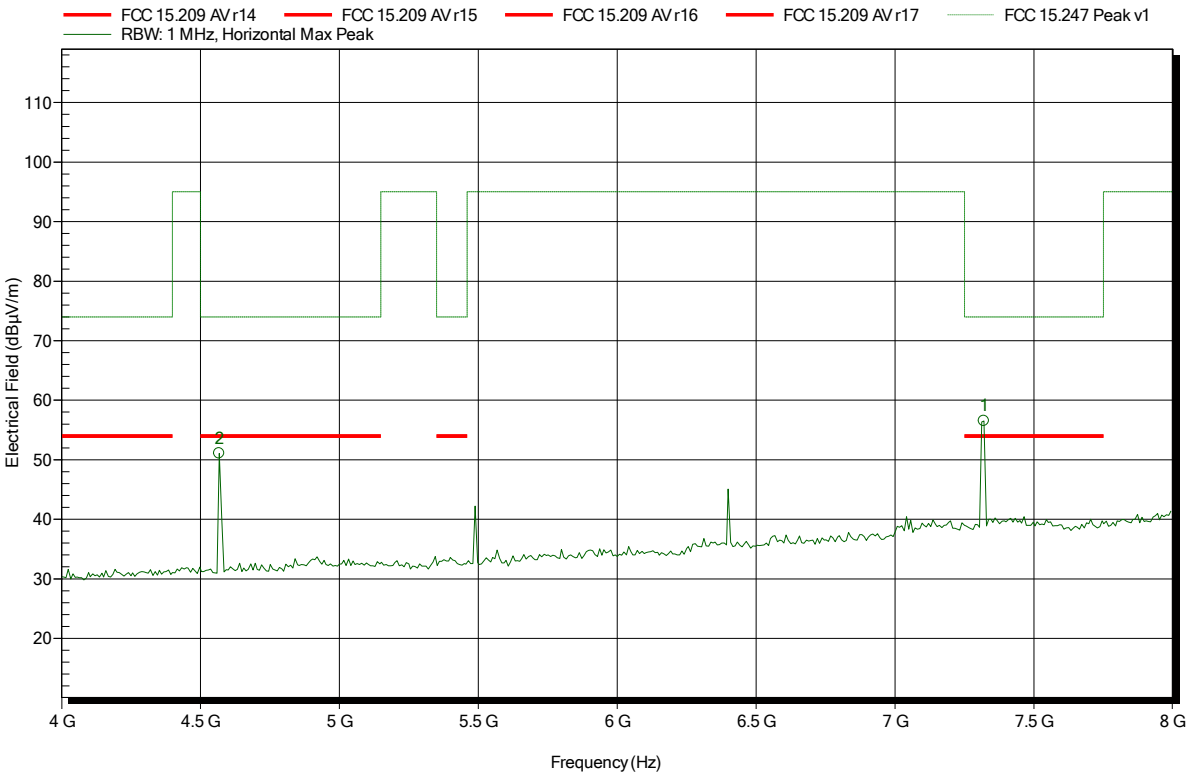
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.74 GHz	53.27 dBµV/m	74 dBµV/m	-20.73 dB	Pass
3.658 GHz	50.01 dBµV/m	74 dBµV/m	-23.99 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 56



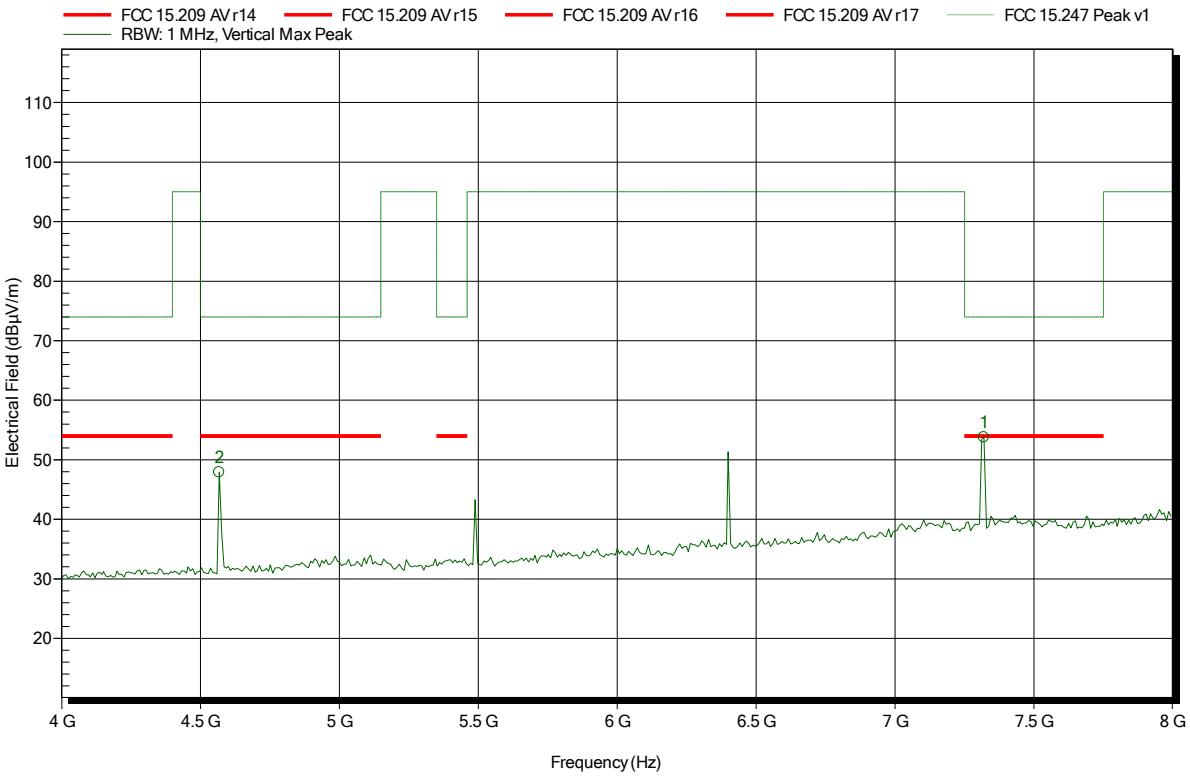
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.568 GHz	51.05 dBµV/m	74 dBµV/m	-22.95 dB	Pass
7.32 GHz	56.5 dBµV/m	74 dBµV/m	-17.5 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 59



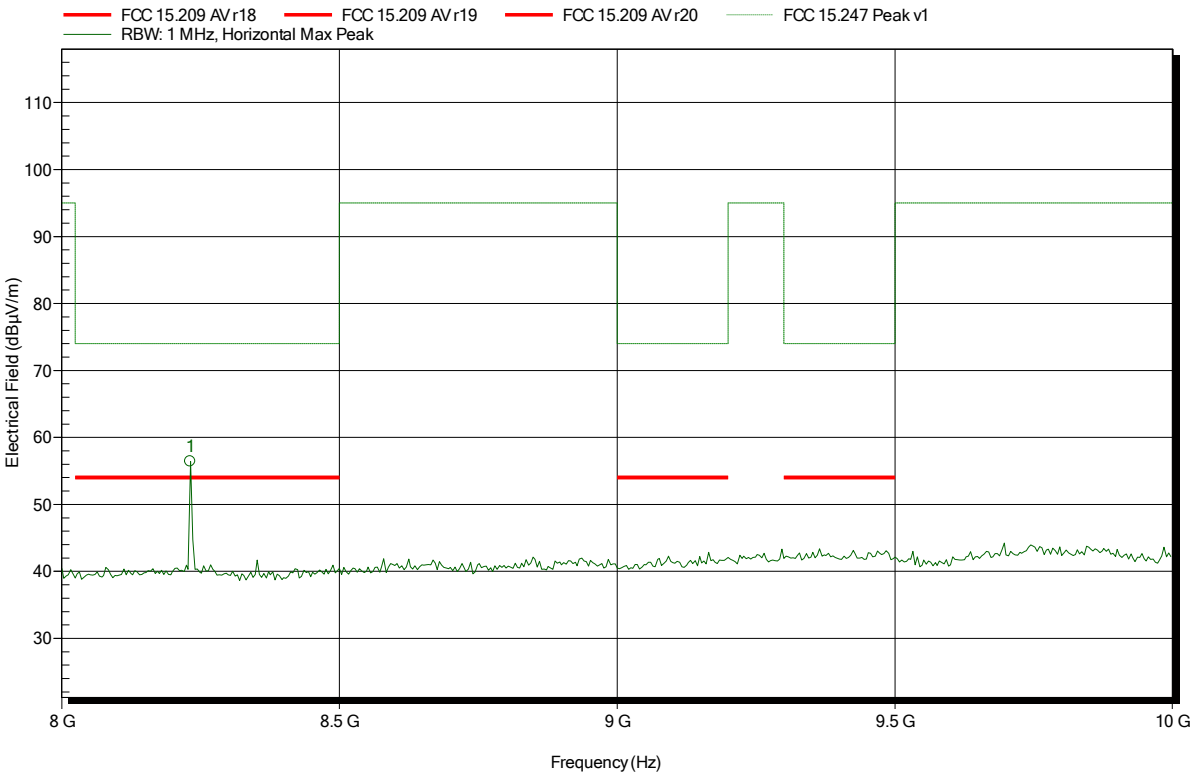
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.568 GHz	47.91 dBµV/m	74 dBµV/m	-26.09 dB	Pass
7.32 GHz	53.76 dBµV/m	74 dBµV/m	-20.24 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 57



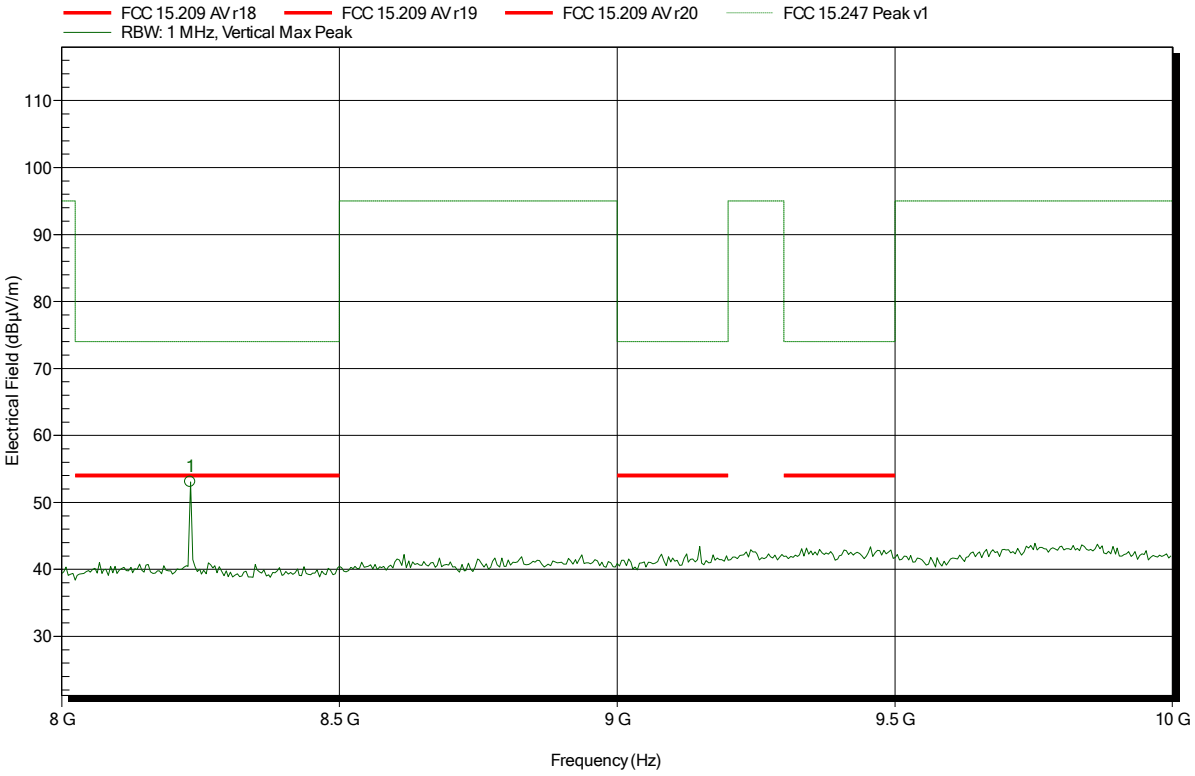
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.232 GHz	56.43 dBµV/m	74 dBµV/m	-17.57 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 60

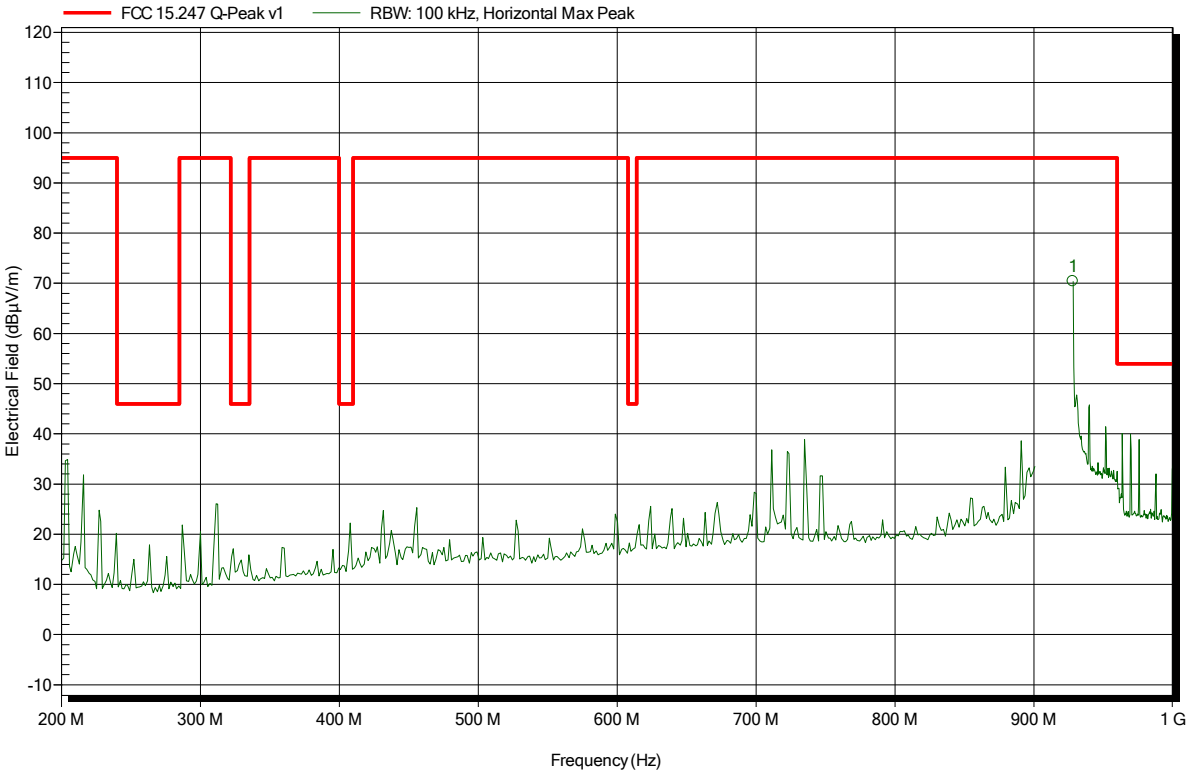


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.232 GHz	53.07 dBµV/m	74 dBµV/m	-20.93 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 74

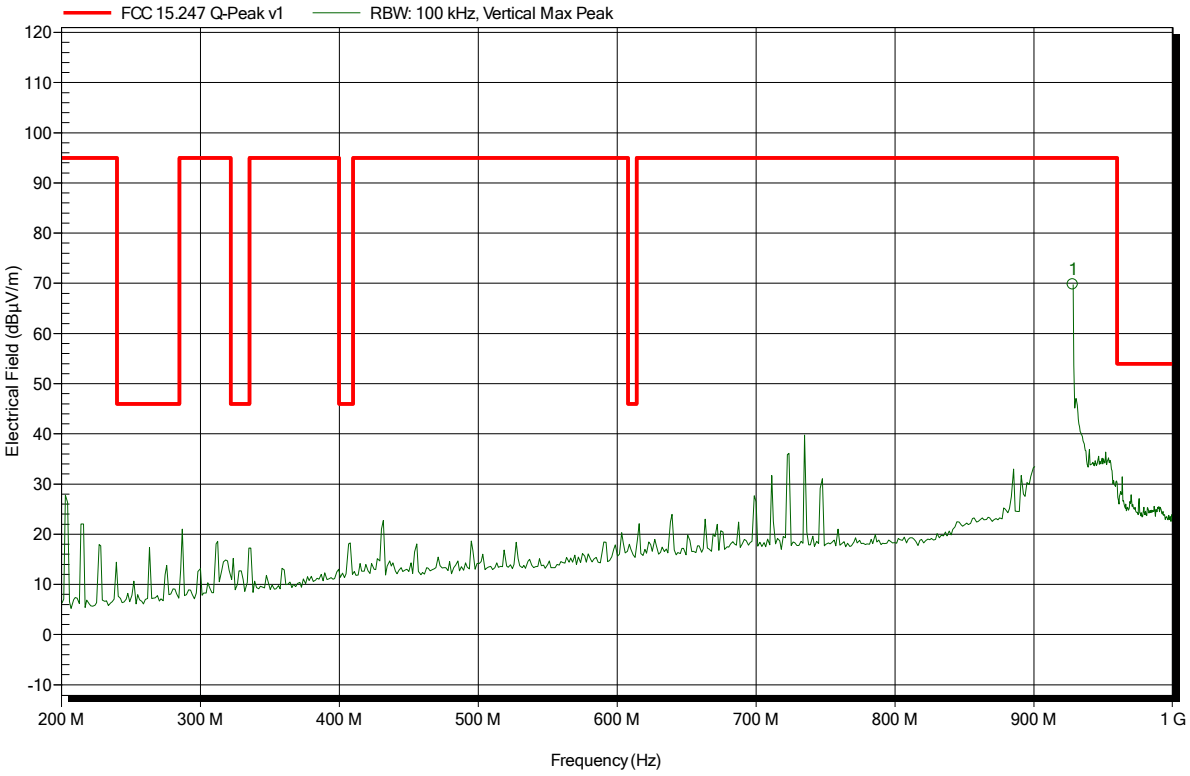


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
928 MHz	70.43 dBµV/m	95 dBµV/m	-24.57 dB	Pass

Spurious emissions according to FCC 15.247

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 75



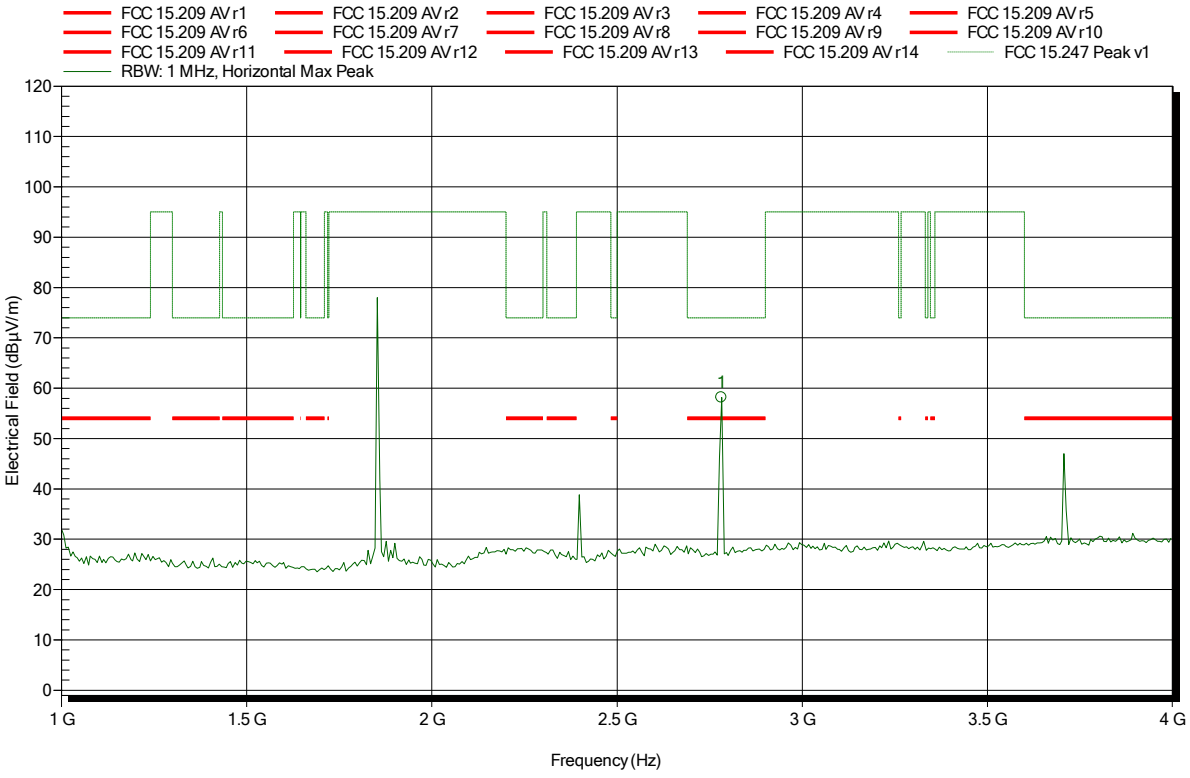
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
928 MHz	69.78 dBµV/m	95 dBµV/m	-25.22 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 61



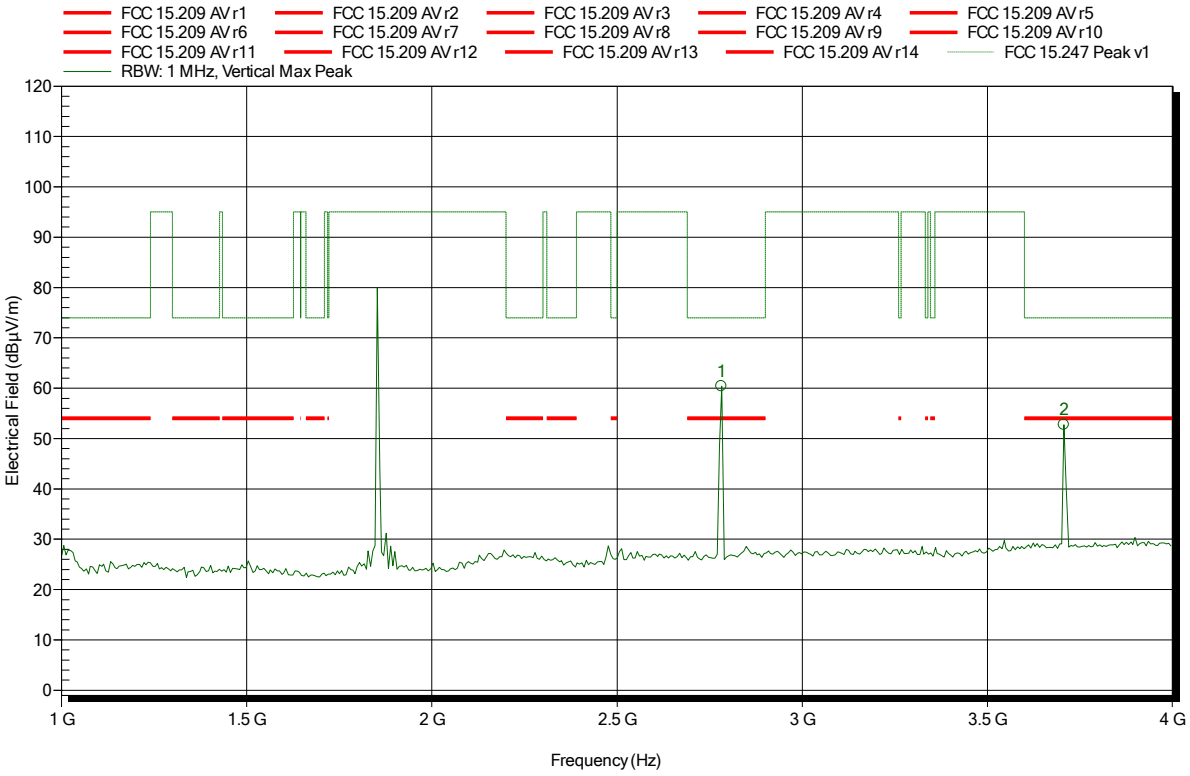
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.782 GHz	58.14 dBµV/m	74 dBµV/m	-15.86 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 65



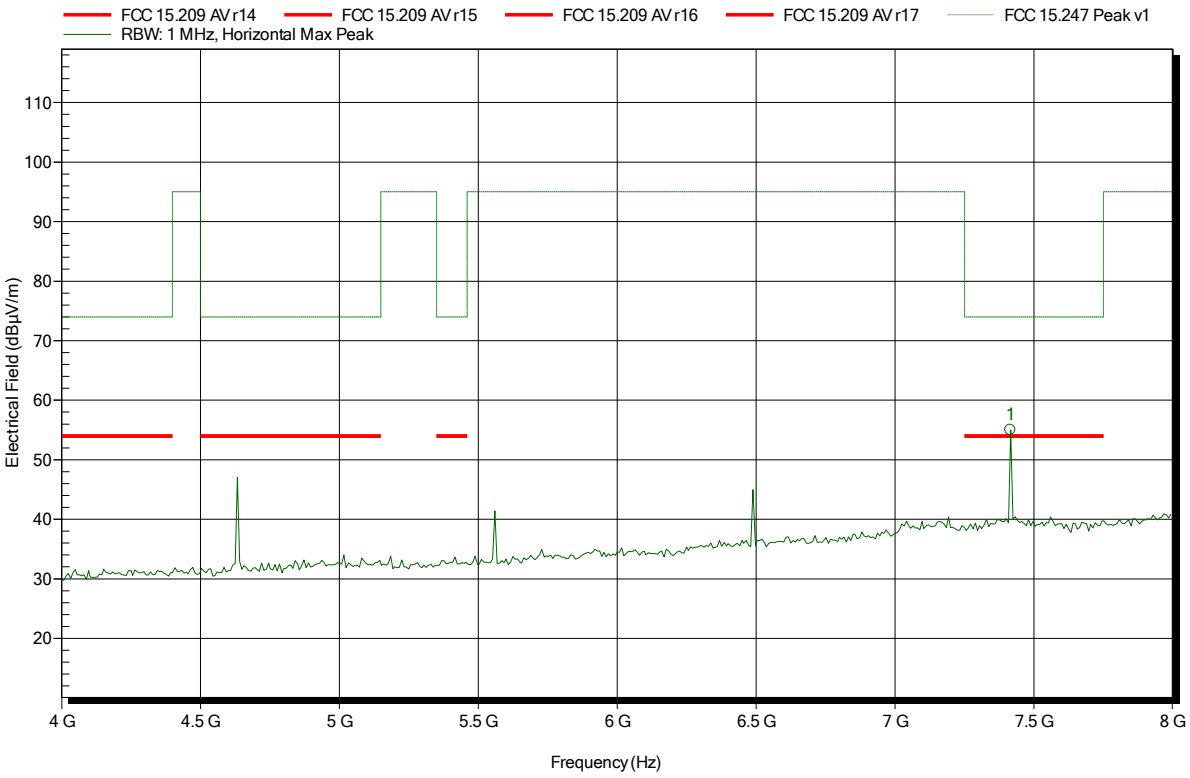
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.782 GHz	60.38 dBµV/m	74 dBµV/m	-13.62 dB	Pass
3.706 GHz	52.71 dBµV/m	74 dBµV/m	-21.29 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 62



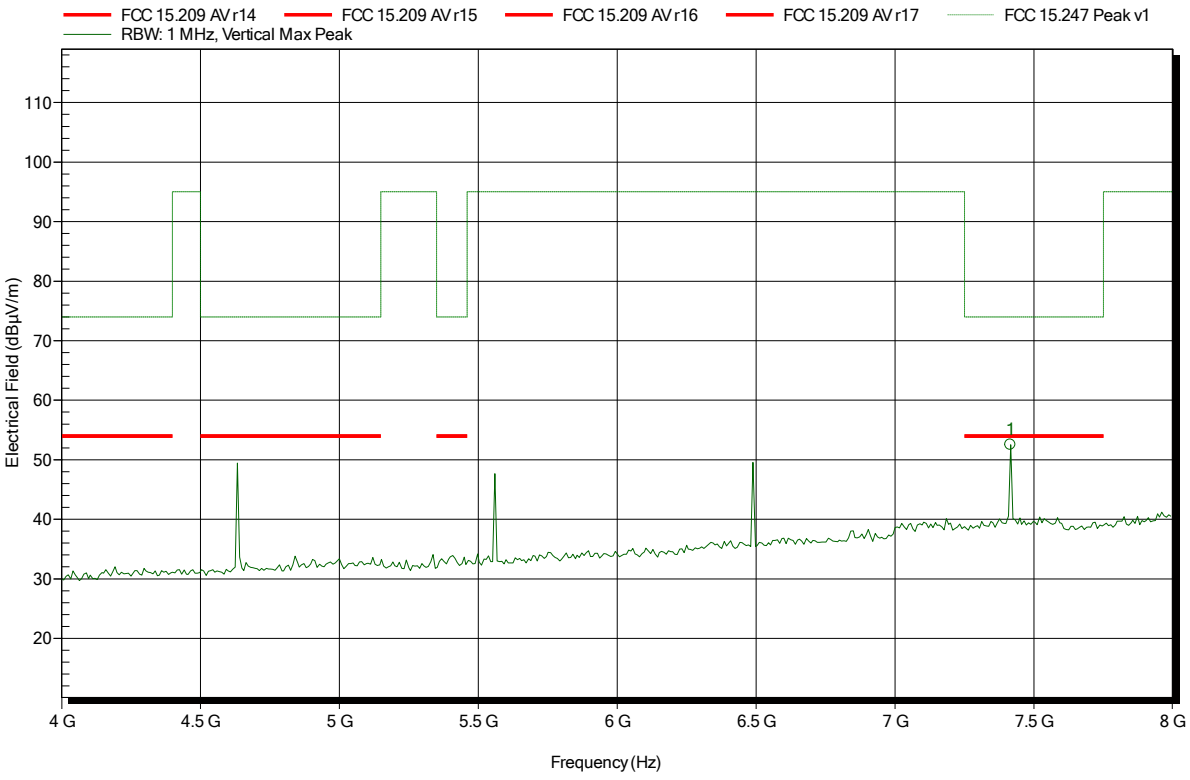
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.416 GHz	54.99 dBµV/m	74 dBµV/m	-19.01 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 66



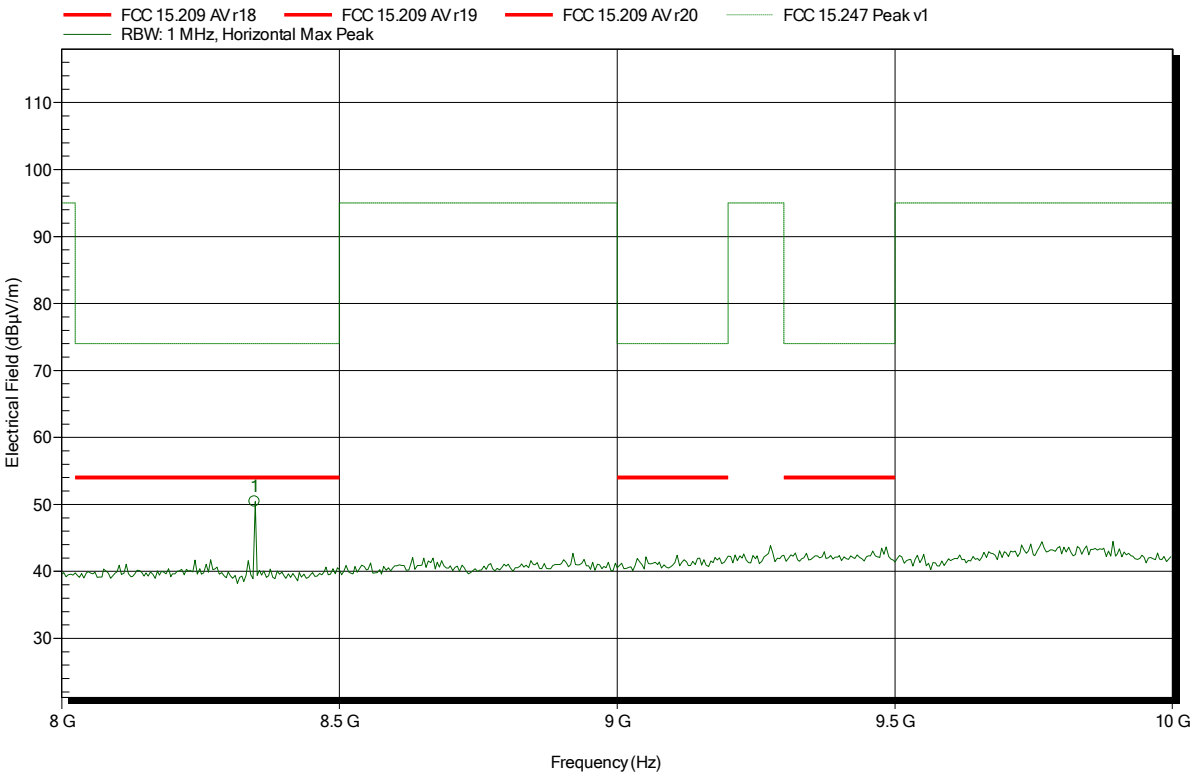
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.416 GHz	52.54 dBµV/m	74 dBµV/m	-21.46 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 63



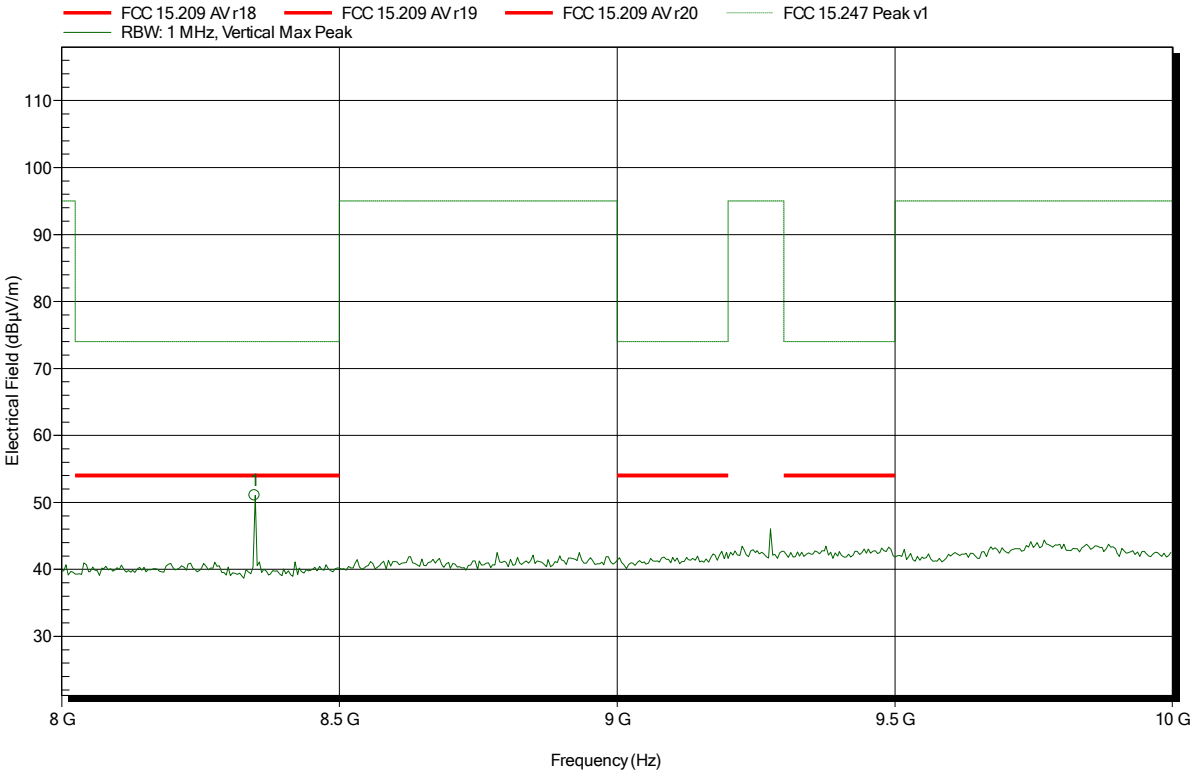
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.348 GHz	50.41 dBµV/m	74 dBµV/m	-23.59 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1708-6813

Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; Single Frequ.; 2-FSK, 927.704 MHz
Test Date:	2018-03-07
Note:	

Index 67



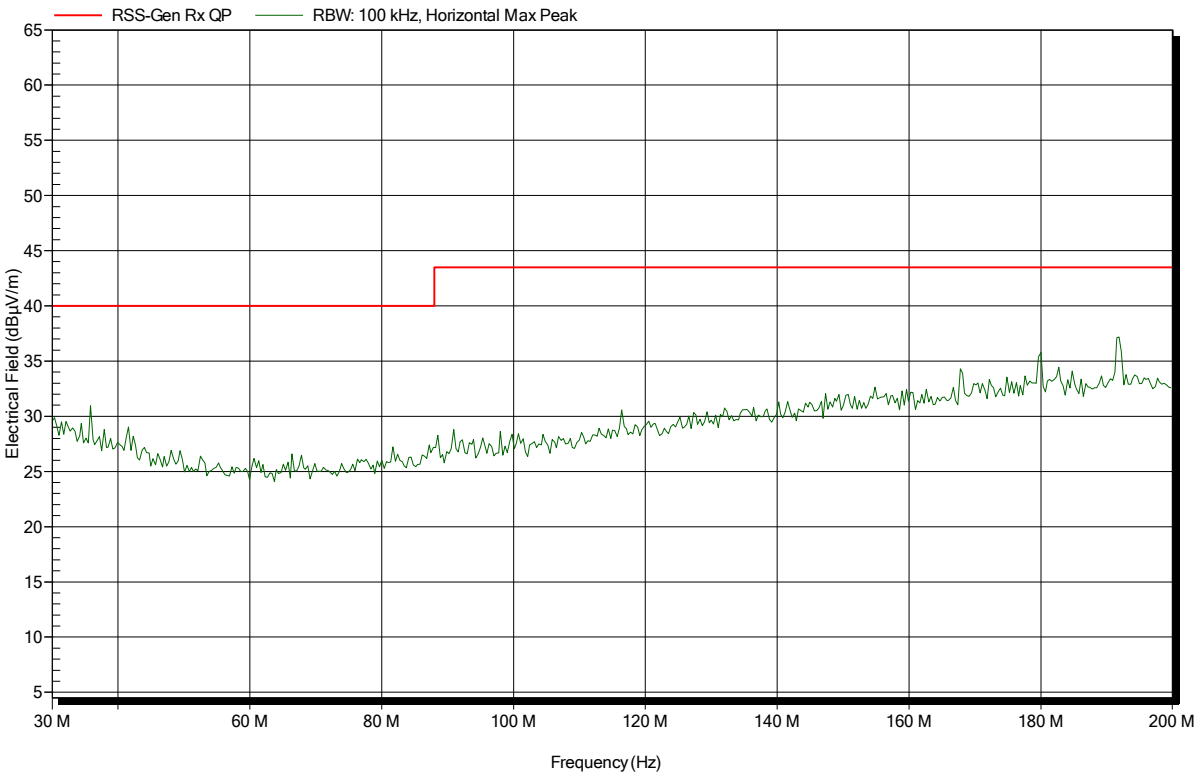
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
8.348 GHz	51.03 dBµV/m	74 dBµV/m	-22.97 dB	Pass

ANNEX C Receiver radiated spurious emissions

Spurious emissions according to RSS-247 Issue 2

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	RX; Single Frequ.; 914.975 MHz
Test Date:	2018-03-07
Note:	

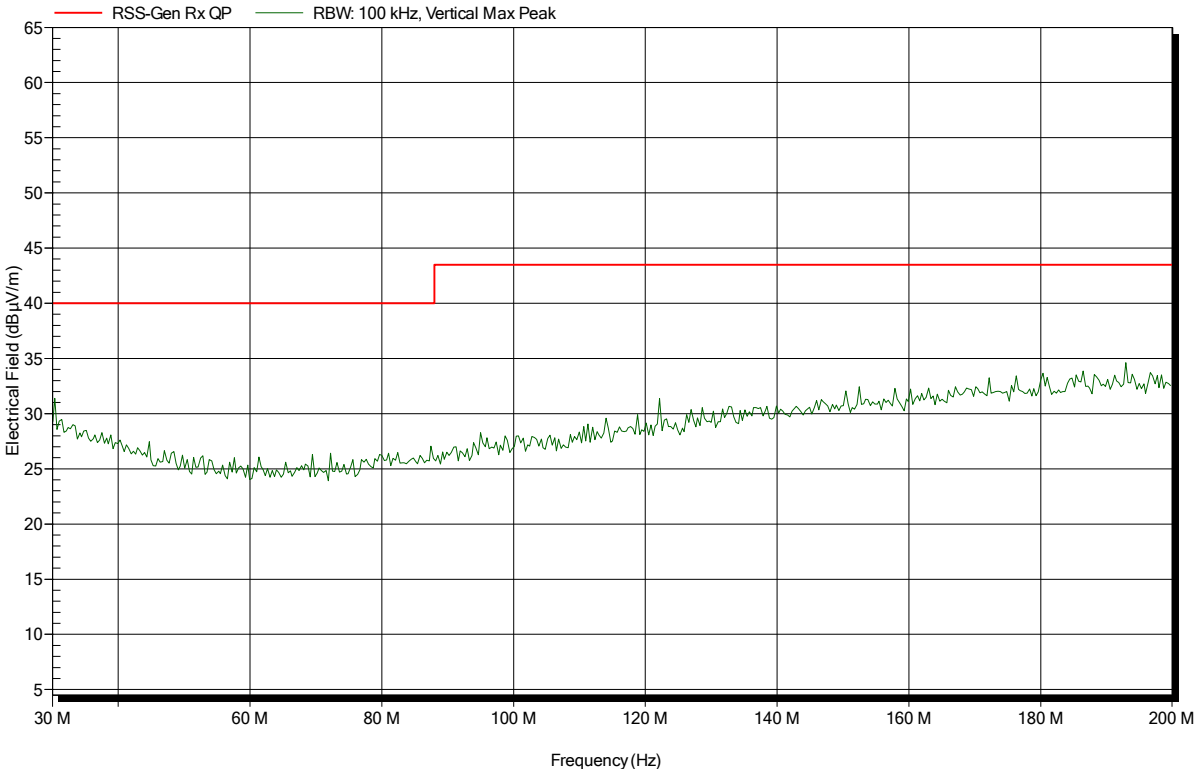
Index 78



Spurious emissions according to RSS-247 Issue 2

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	RX; Single Frequ.; 914.975 MHz
Test Date:	2018-03-07
Note:	

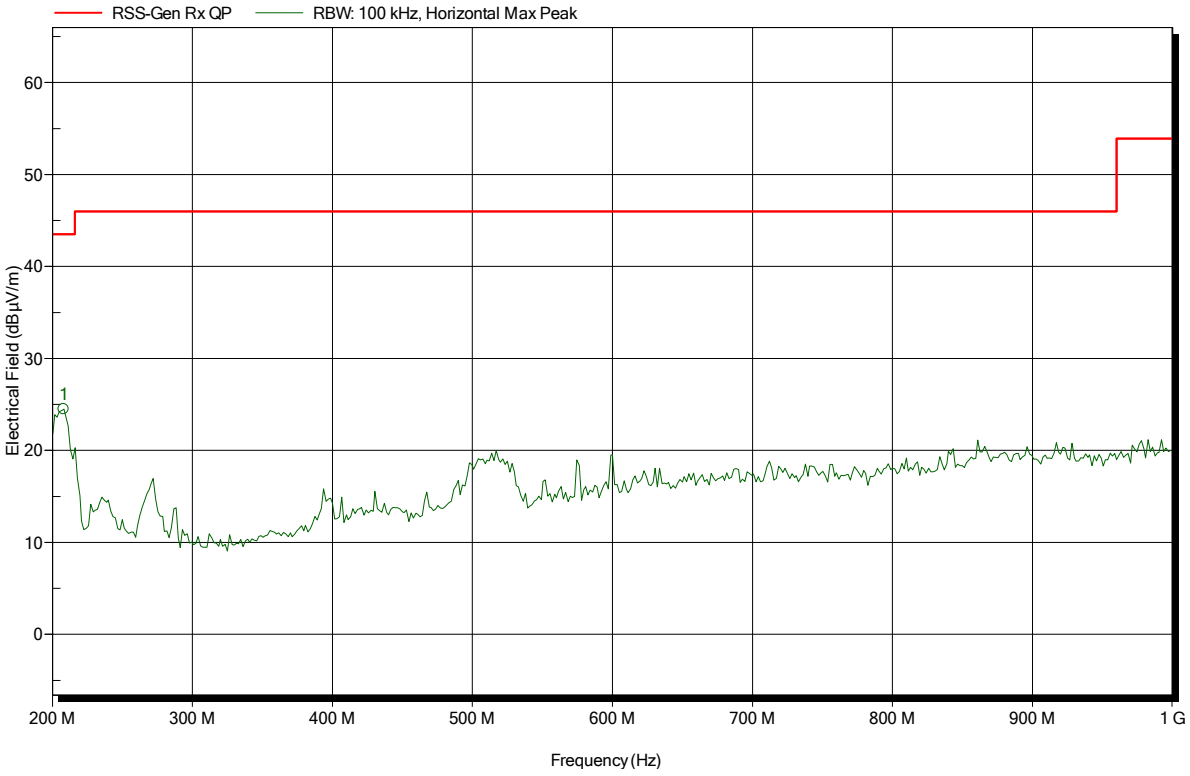
Index 79



Spurious emissions according to RSS-247 Issue 2

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	RX; Single Frequ.; 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 80

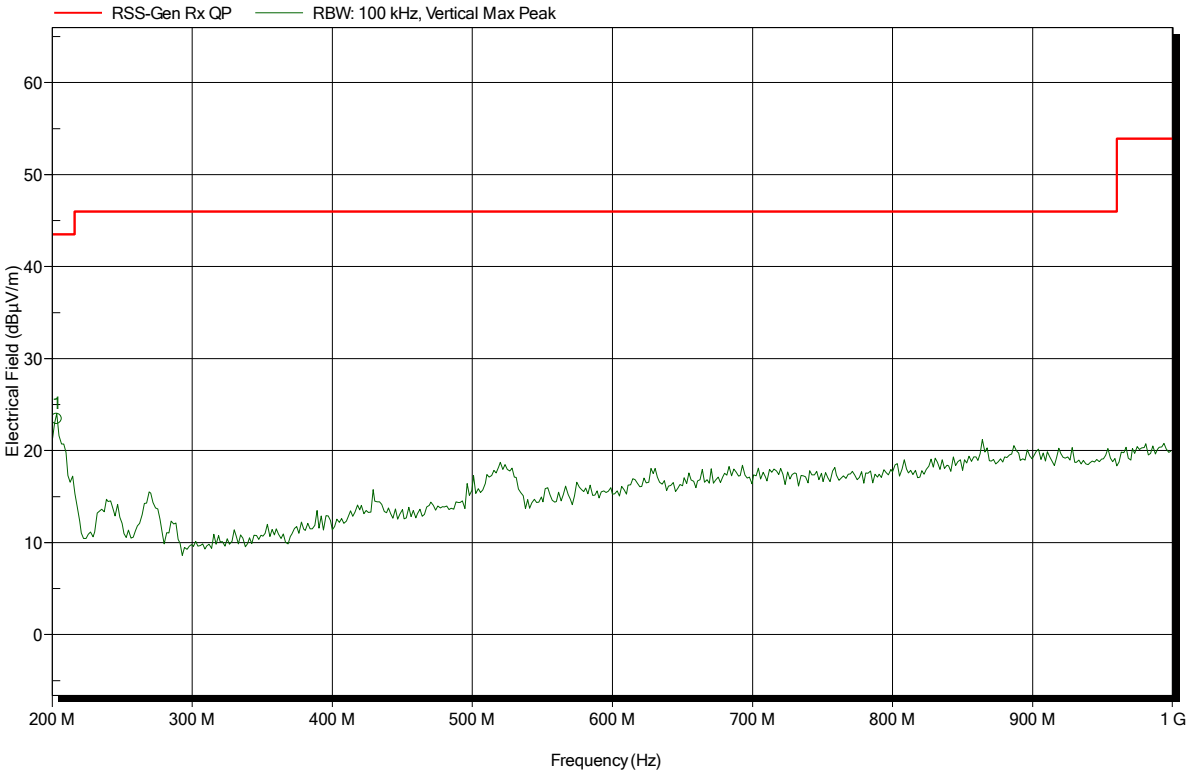


Frequency	Peak	Peak Limit	Peak Difference	Status
208 MHz	24.49 dBµV/m	43.5 dBµV/m	-19.01 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	RX; Single Frequ.; 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 81

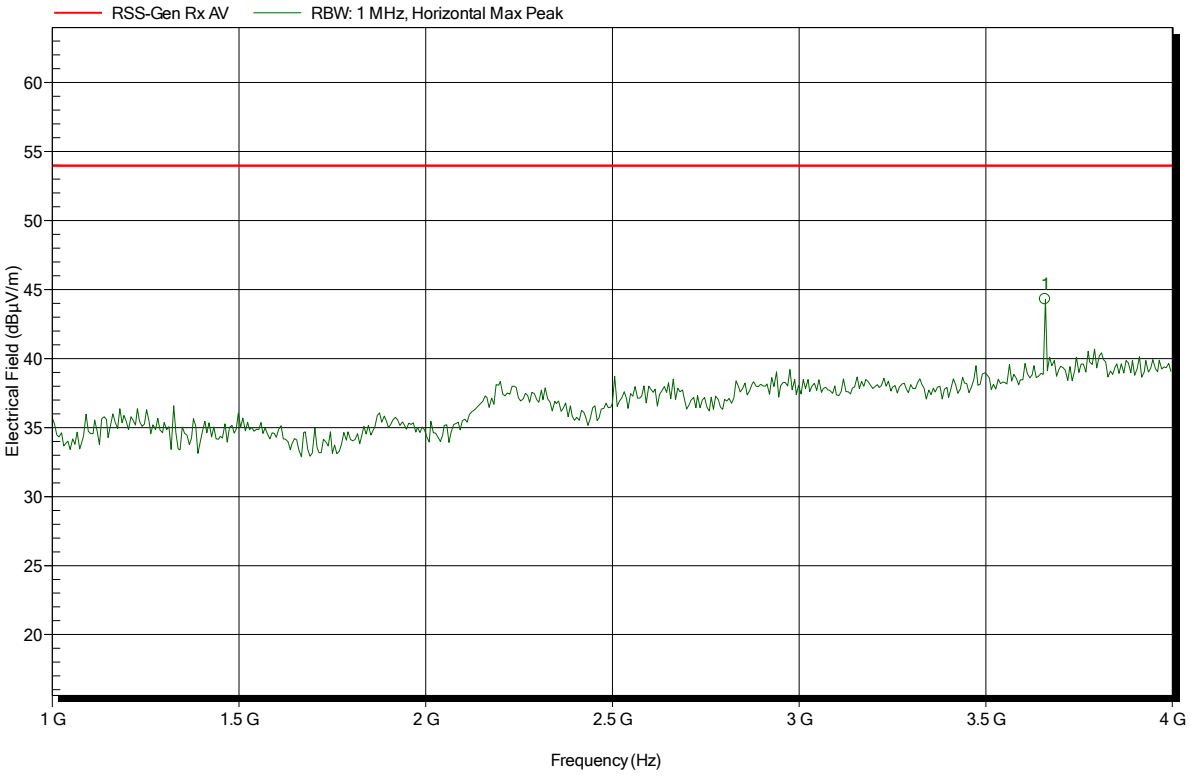


Frequency	Peak	Peak Limit	Peak Difference	Status
203.2 MHz	23.45 dBµV/m	43.5 dBµV/m	-20.05 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; Single Frequ.; 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 82

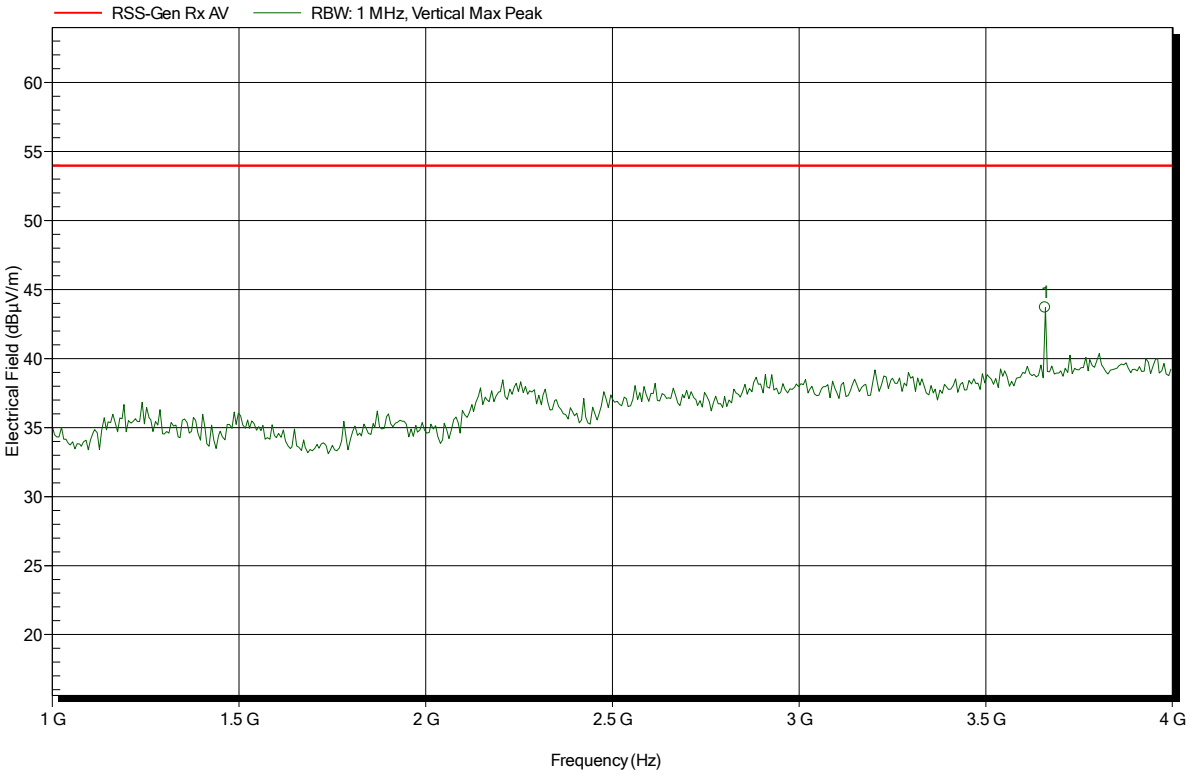


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
3.658 GHz	44.3 dBµV/m	53.98 dBµV/m	-9.68 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; Single Frequ.; 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 84

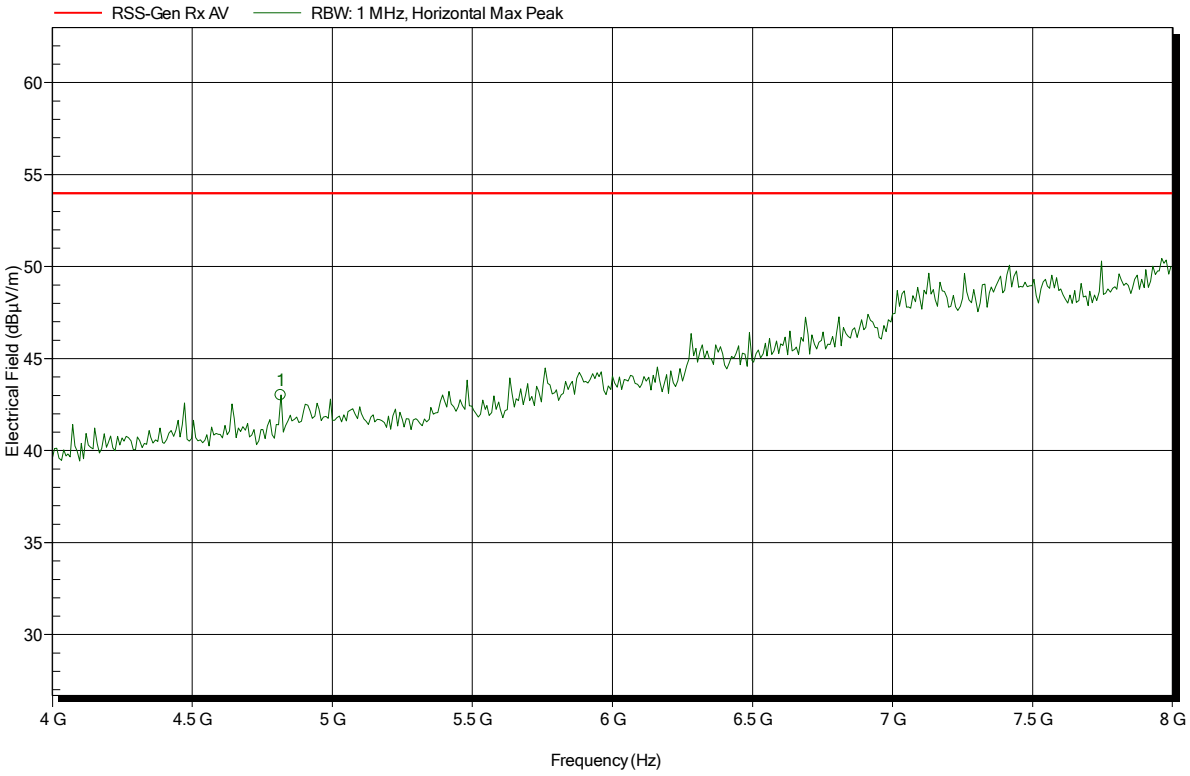


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
3.658 GHz	43.7 dBµV/m	53.98 dBµV/m	-10.28 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; Single Frequ.; 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 83



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.816 GHz	43.02 dBµV/m	53.98 dBµV/m	-10.96 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number:	G0M-1708-6813
Applicant:	MSA Europe GmbH
EUT Name:	LRR SG
Model:	915 MHz
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; Single Frequ.; 914.975 MHz
Test Date:	2018-03-07
Note:	

Index 85