

RF Test Report

Project Number: 4456422 / 8427

Report Number: 4456422EMC01

Revision Level: 0

Client: Certified Safety, Inc

Equipment Under Test: Smart Badge

Model: SMC-T3

FCC ID: 2AS3XSMCT3

Applicable Standards: ANSI C63.10: 2013 (FCC Part 15 Subpart C, § 15.247)


RSS-247, Issue 2

RSS-Gen Issue 5

Report issued on: 6 June 2019

Test Result: Compliant

Tested by:



Aaron S. Froehlich, EMC Test Engineer

Reviewed by:



Martin Taylor, Project Engineer

Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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Table of Contents

1	SUMMARY OF TEST RESULTS	4
1.1	MODIFICATIONS REQUIRED FOR COMPLIANCE	4
2	GENERAL INFORMATION	5
2.1	CLIENT INFORMATION	5
2.2	TEST LABORATORY	5
2.3	GENERAL INFORMATION OF EUT	5
2.4	OPERATING MODES AND CONDITIONS	5
2.5	EUT CONNECTION BLOCK DIAGRAM – CONDUCTED MEASUREMENTS.....	6
2.6	EUT CONNECTION BLOCK DIAGRAM – RADIATED MEASUREMENTS	6
2.7	SYSTEM CONFIGURATIONS	7
3	BANDWIDTH	8
3.1	TEST RESULT.....	8
3.2	TEST METHOD.....	8
3.3	TEST SITE.....	8
3.4	TEST EQUIPMENT	8
3.5	TEST DATA.....	9
4	FUNDAMENTAL OUTPUT POWER	11
4.1	TEST RESULT.....	11
4.2	TEST METHOD.....	11
4.3	TEST SITE.....	11
4.4	TEST EQUIPMENT	11
4.5	TEST DATA.....	12
5	POWER SPECTRAL DENSITY	13
5.1	TEST RESULT.....	13
5.2	TEST METHOD.....	13
5.3	TEST SITE.....	13
5.4	TEST EQUIPMENT	13
5.5	TEST DATA.....	14
6	CONDUCTED SPURIOUS EMISSIONS / BAND EDGE	16
6.1	TEST RESULT.....	16
6.2	TEST METHOD.....	16
6.3	TEST SITE.....	16
6.4	TEST EQUIPMENT	16
6.5	TEST DATA – DTS BAND EDGE.....	17
6.6	TEST DATA – CONDUCTED SPURIOUS EMISSIONS	18
7	EMISSIONS IN RESTRICTED FREQUENCY BANDS	19
7.1	TEST RESULT.....	19
7.2	TEST METHOD.....	19
7.3	TEST SITE.....	19
7.4	TEST EQUIPMENT	20
7.5	TEST DATA.....	21
8	CONDUCTED EMISSIONS	36
8.1	TEST RESULT.....	36
8.2	TEST METHOD.....	36
8.3	TEST SITE.....	36
8.4	TEST EQUIPMENT	36
8.6	TEST DATA.....	37



9 REVISION HISTORY 39

1 Summary of Test Results

Test Description	Test Specification		Test Result
Bandwidth	15.247(a)(2)	RSS-247 S5.2 (a) RSS-GEN S6.7	Compliant
Fundamental Output Power	15.247(b)(3)	RSS-247 S5.4 (d)	Compliant
Power Spectral Density	15.247(e)	RSS-247 S5.2 (b)	Compliant
Conducted Spurious Emissions / Band Edge	15.247(d)	RSS-247 S5.5	Compliant
Emissions in Restricted Frequency Bands	15.205, 15.209	RSS-GEN S8.9, S8.10	Compliant
Antenna Requirement	15.203	RSS-GEN S6.8	Compliant ¹
AC Powerline Conducted Emissions	15.107, 15.207	RSS-GEN S8.8	Compliant

Note:

1. DUT has an internal antenna with a unique (U.FL) connector type.

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: Certified Safety, Inc
Address: 1177 Butler Road
City, State, Zip, Country: League City, Tx 77573, USA

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01

2.3 General Information of EUT

Product Marketing Name (PMN): Smart Badge
Model Number (HVIN): SMC-T3
Host Serial Number: NSN
E22 900M22S Module SN: 18051100051
Frequency Range: 903.9-926.1 MHz
Data Modes: BW (Bandwidth) 500 kHz
SF (Spread Factors) 8 - 11
Antenna: Flex Dipole, 1.2 dBi, (MOLEX 206764-0100)

Rated Voltage: 3.7 Vdc
Test Voltage: 3.7 Vdc (Battery)

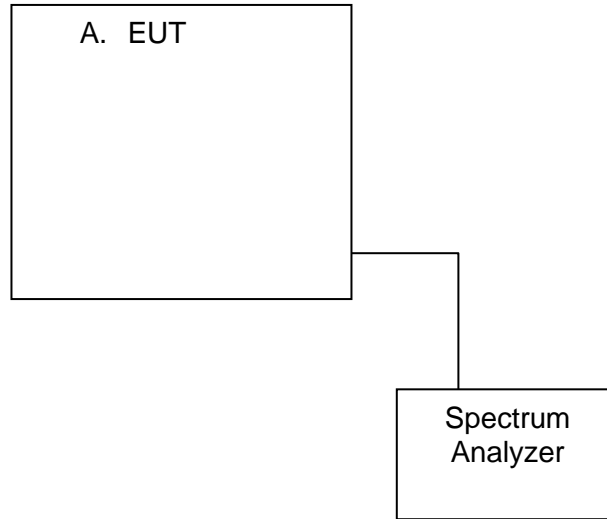
Sample Received Date: 4/24/2019
Dates of testing: 5/6/2019-5/28/2019

2.4 Operating Modes and Conditions

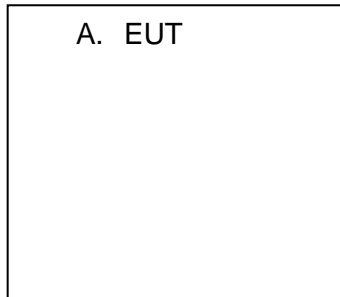
The EUT was programmed by the manufacturer to transmit on low, mid and high channels in all necessary modulation and modes of operation.

Preliminary Investigation of the DUT revealed SF 10 to be the “worst case” test mode to demonstrate compliance.

2.5 EUT Connection Block Diagram – Conducted Measurements



2.6 EUT Connection Block Diagram – Radiated Measurements



Inside Chamber

.....
Outside Chamber

2.7 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Certified Safety, Inc	EUT	SMC-T3	NSN

3 Bandwidth

3.1 Test Result

Test Description	Test Specification		Test Result
DTS bandwidth	15.247(a)(2)	RSS-247 S5.2 (a)	Compliant
Occupied Bandwidth	-	RSS-GEN S6.7	Reported

3.2 Test Method

The procedures from ANSI C63.10: 2013 clause 11.8.2 and 558074 D01 DTS Meas Guidance v05r02 were used to determine the DTS bandwidth.

The Occupied Bandwidth (99% emission bandwidth) was measured using the methods of ANSI C63.10 Clause 6.9.3.

Limit

The minimum 6 dB bandwidth shall be at least 500 kHz

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.2 °C

Relative Humidity: 49.0 %

Atmospheric Pressure: 97.3 kPa

3.4 Test Equipment

Test End Date: 13-May-2019

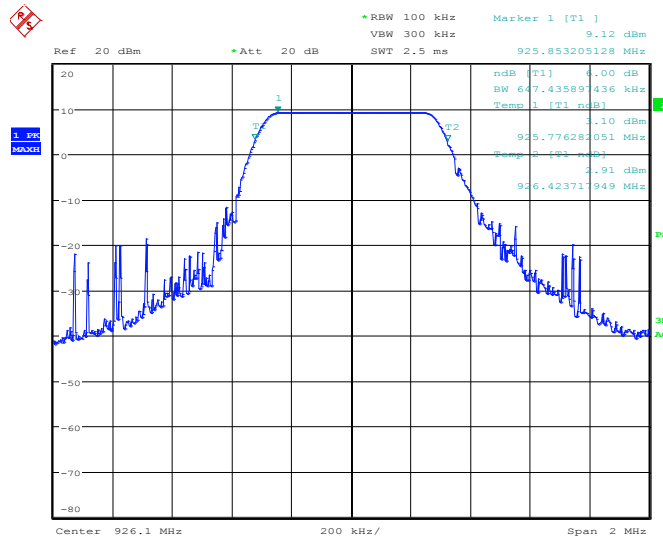
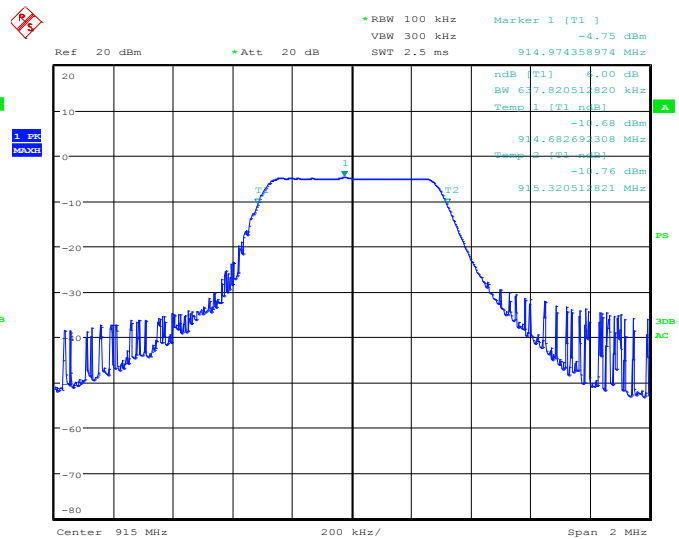
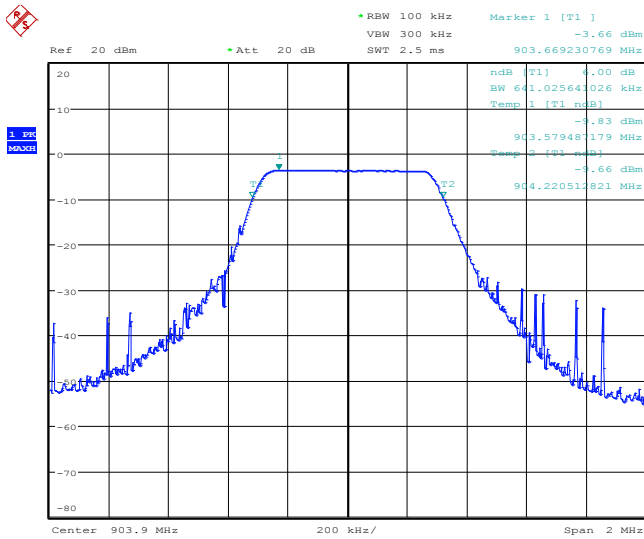
Tester: ASF

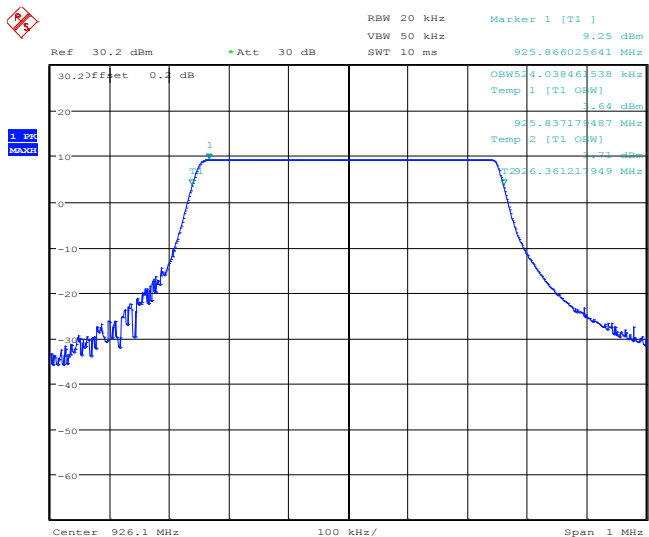
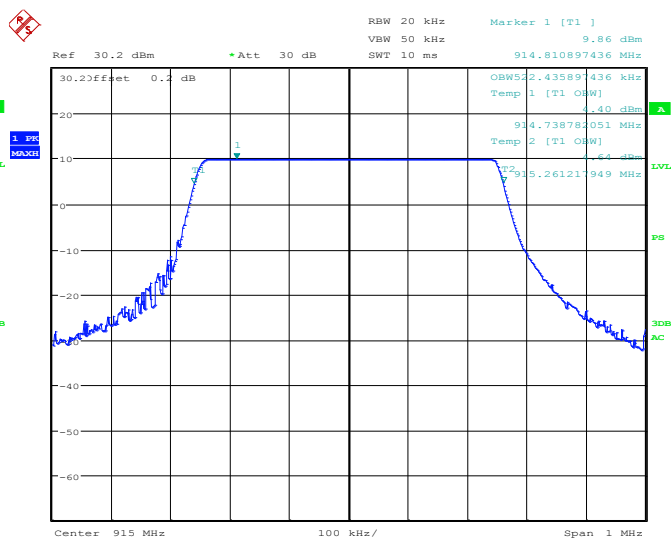
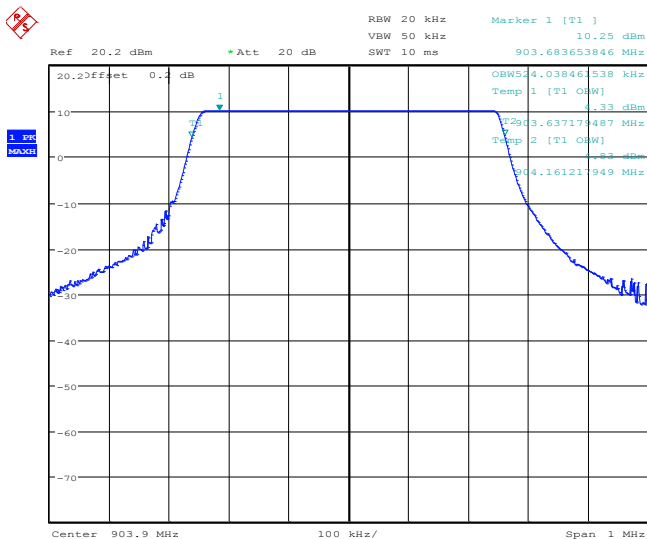
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
RF CABLE	SF102	HUBER & SUHNER	B079823	25-Jul-2019
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	2-Jul-2019

Note: The equipment calibration period is 1 year.

3.5 Test Data

DUT Frequency (MHz)	DTS BW (kHz)	Min Limit (kHz)	Margin (kHz)	99% OBW (kHz)
903.9	641.0	500	-141.0	524.0
915.0	637.8	500	-137.8	522.0
926.1	647.4	500	-147.4	524.0





4 Fundamental Output Power

4.1 Test Result

Test Description	Test Specification		Test Result
Fundamental Output Power	15.247(b)(3)	RSS-247 S5.4 (d)	Compliant

4.2 Test Method

Fundamental Output Power measurements were recorded using the procedures from ANSI C63.10: 2013 clause 11.9.2.2.2 and KDB 558074 D01 Measurement Guidance v05r02.

Limit

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. For using antennas with greater than 6dBi of gain, the limit is reduced in dB by the amount the gain exceeds 6dBi (e.g. for a 7.4dBi antenna, the limit is reduced from 30dBm to 28.6dBm)

(d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W (30 dBm). The e.i.r.p. shall not exceed 4 W (36 dBm).

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.2 °C
 Relative Humidity: 49.0 %
 Atmospheric Pressure: 97.3 kPa

4.4 Test Equipment

Test End Date: 13-May-2019

Tester: ASF

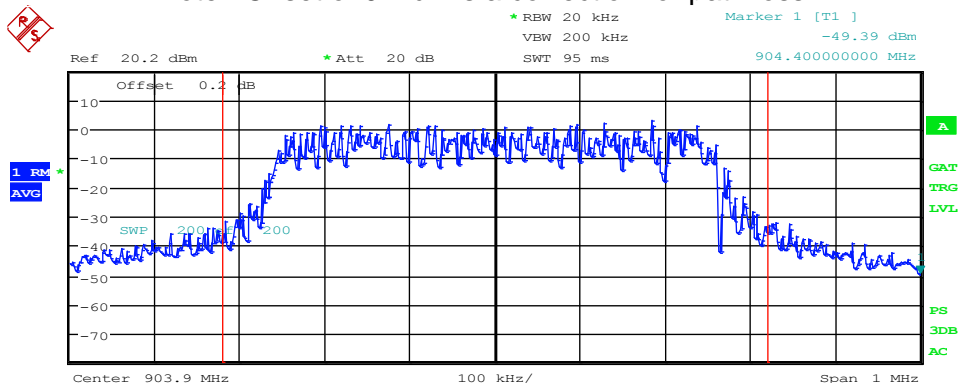
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
RF CABLE	SF102	HUBER & SUHNER	B079823	25-Jul-2019
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	2-Jul-2019

Note: The equipment calibration period is 1 year.

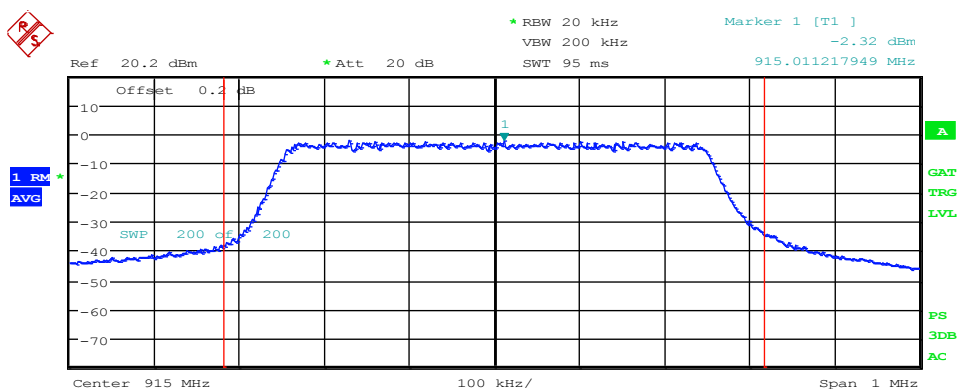
4.5 Test Data

Frequency (MHz)	Gated RMS (dBm)	Limit (dBm)	Margin (dB)	e.i.r.p. (dBm)	Limit (dBm)	Margin (dB)
903.9	10.2	30.0	-19.8	11.4	36.0	-24.6
915.0	9.7	30.0	-20.3	10.9	36.0	-25.1
926.1	9.3	30.0	-20.7	10.5	36.0	-25.5

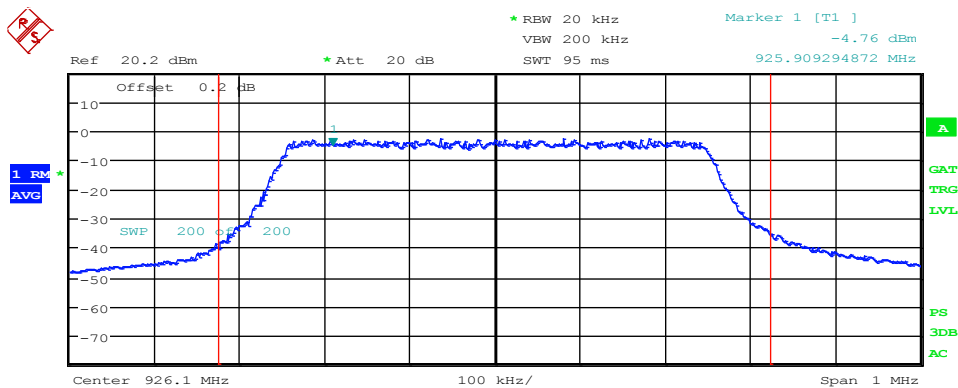
Note: Offset of 0.2 dB is a correction for path loss.



Tx Channel
Bandwidth 641 kHz Power 10.18 dBm



Tx Channel
Bandwidth 637.8 kHz Power 9.71 dBm



Tx Channel
Bandwidth 647.4 kHz Power 9.29 dBm

5 Power Spectral Density

5.1 Test Result

Test Description	Test Specification		Test Result
Power Spectral Density	15.247(e)	RSS-247 S5.2 (b)	Compliant

5.2 Test Method

Power spectral density measurements were recorded using the procedures from ANSI C63.10: 2013 clause 11.10.3 and KDB 558074 D01 Measurement Guidance v05r02. The same method of determining the conducted output power was used to determine the power spectral density.

Limit

The limit is 8 dBm.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.2 °C
 Relative Humidity: 49.0 %
 Atmospheric Pressure: 97.3 kPa

5.4 Test Equipment

Test End Date: 13-May-2019

Tester: ASF

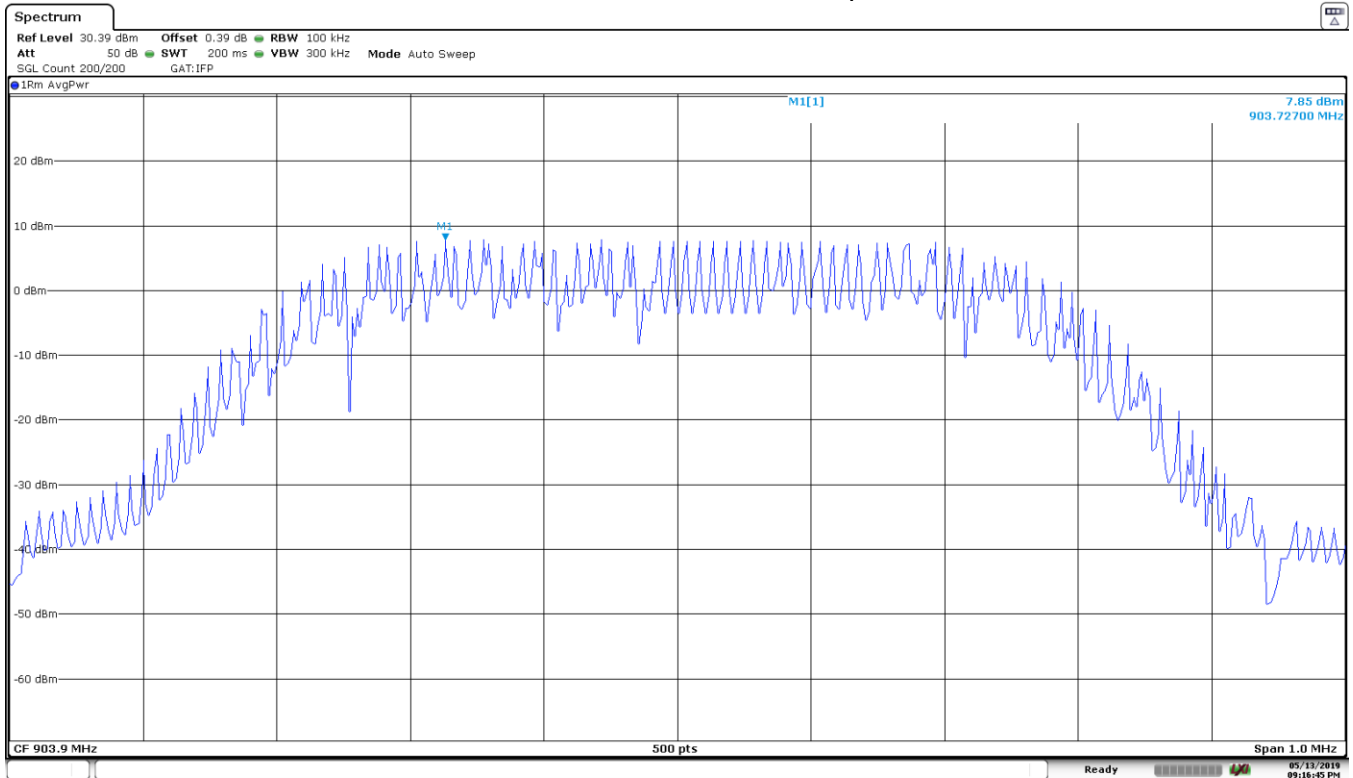
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
RF CABLE (TS8997)	141	HUBER & SUHNER	B095585	25-Jul-2019
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019

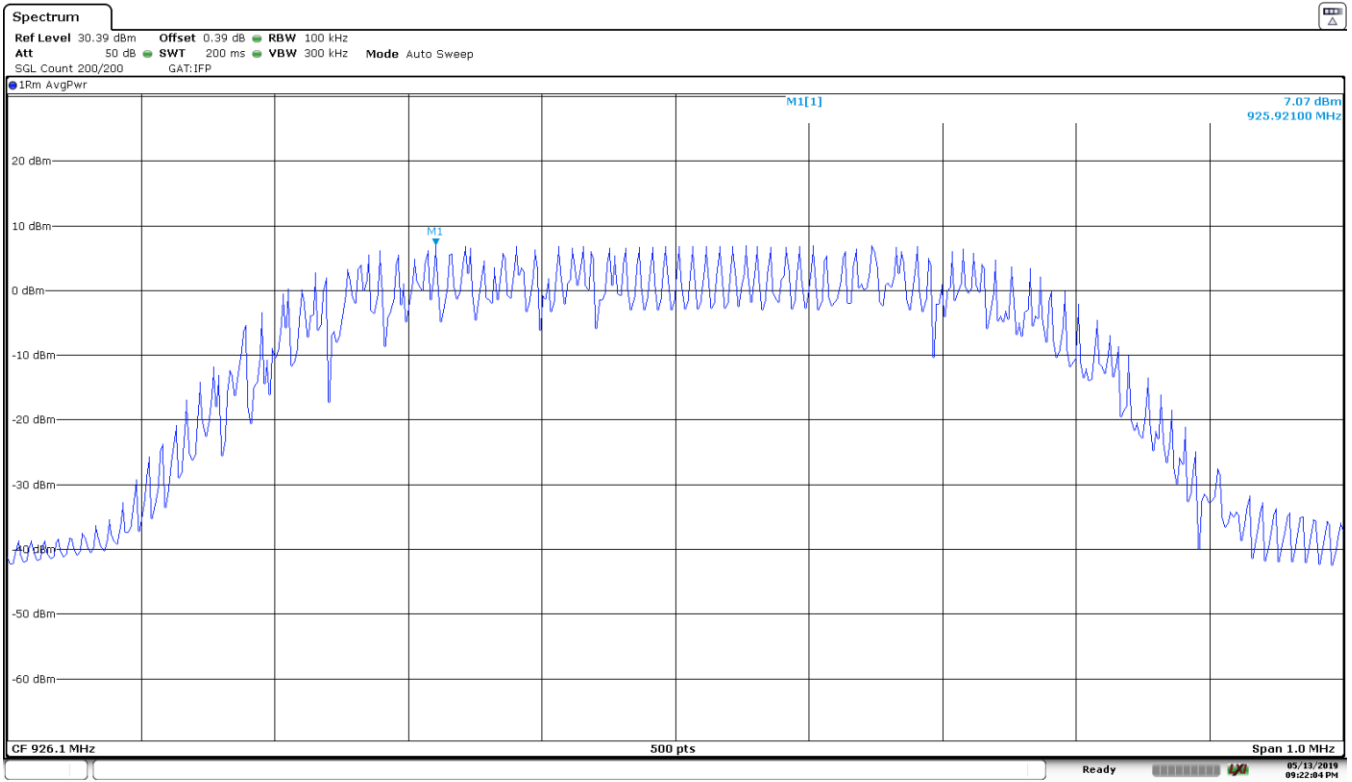
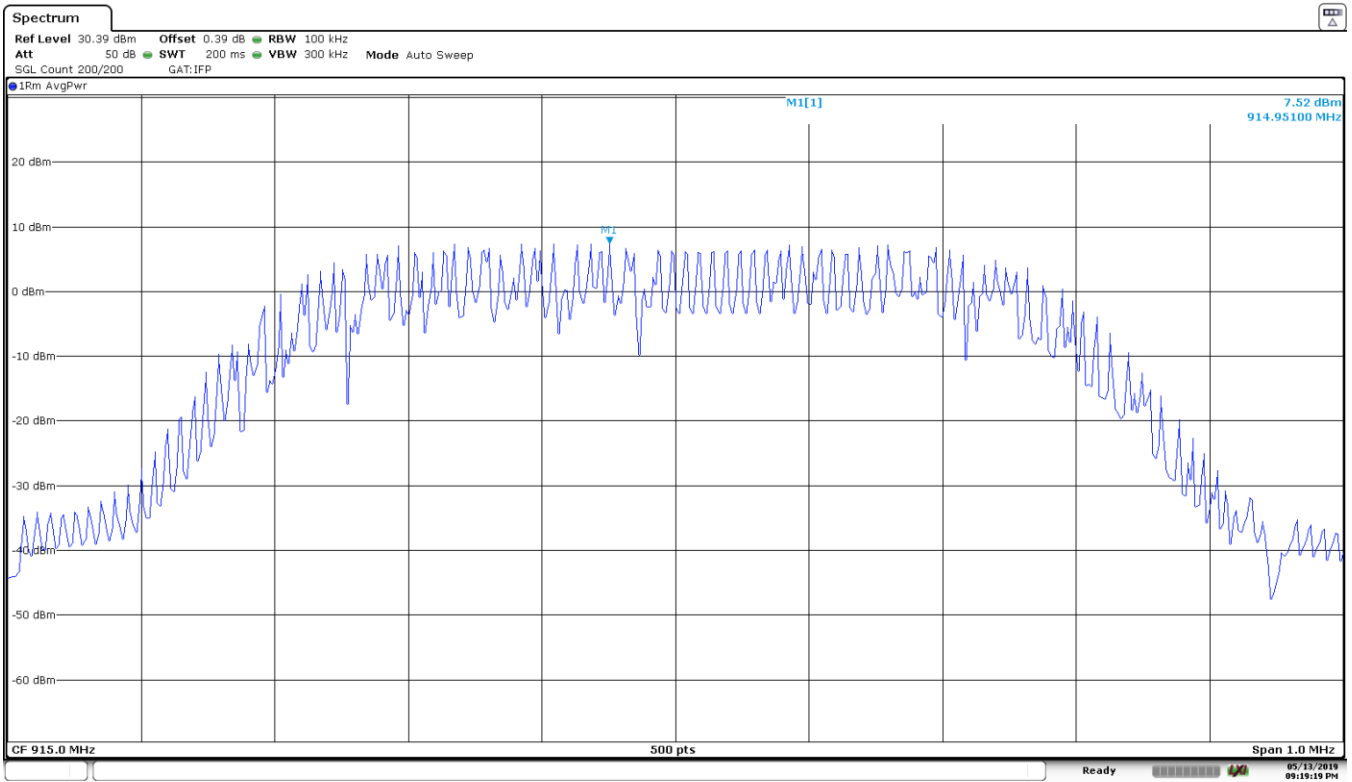
Note: The equipment calibration period is 1 year.

5.5 Test Data

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
903.9	903.7	7.9	8.0	-0.1
915.0	915.0	7.5	8.0	-0.5
926.1	925.9	7.1	8.0	-0.9

Note: Offset of 0.39 dB corrects for path loss.





6 Conducted Spurious Emissions / Band Edge

6.1 Test Result

Test Description	Test Specification		Test Result
Conducted Spurious Emissions	15.247(d)	RSS-247 S5.5	Compliant

6.2 Test Method

Spurious emissions in non-restricted frequency bands were recorded using the methods defined in ANSI C63.10: 2013 clause 11.11 and KDB 558074 D01 Measurement Guidance v05r02.

Lowest, middle, and highest channels were investigated.

Because RMS averaging of the conducted fundamental output power was used to determine compliance with the output power limits, the limit in any 100 kHz band outside of the authorized band is 30 dB below the maximum in-band peak level. Attenuation below the general limits specified in §15.209(a) and RSS Gen is not required.

The Band Edge method of ANSI C63.10 Clause 6.10.4 (conducted) was used to demonstrate compliance.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.9 °C

Relative Humidity: 49.7 %

Atmospheric Pressure: 97.7 kPa

6.4 Test Equipment

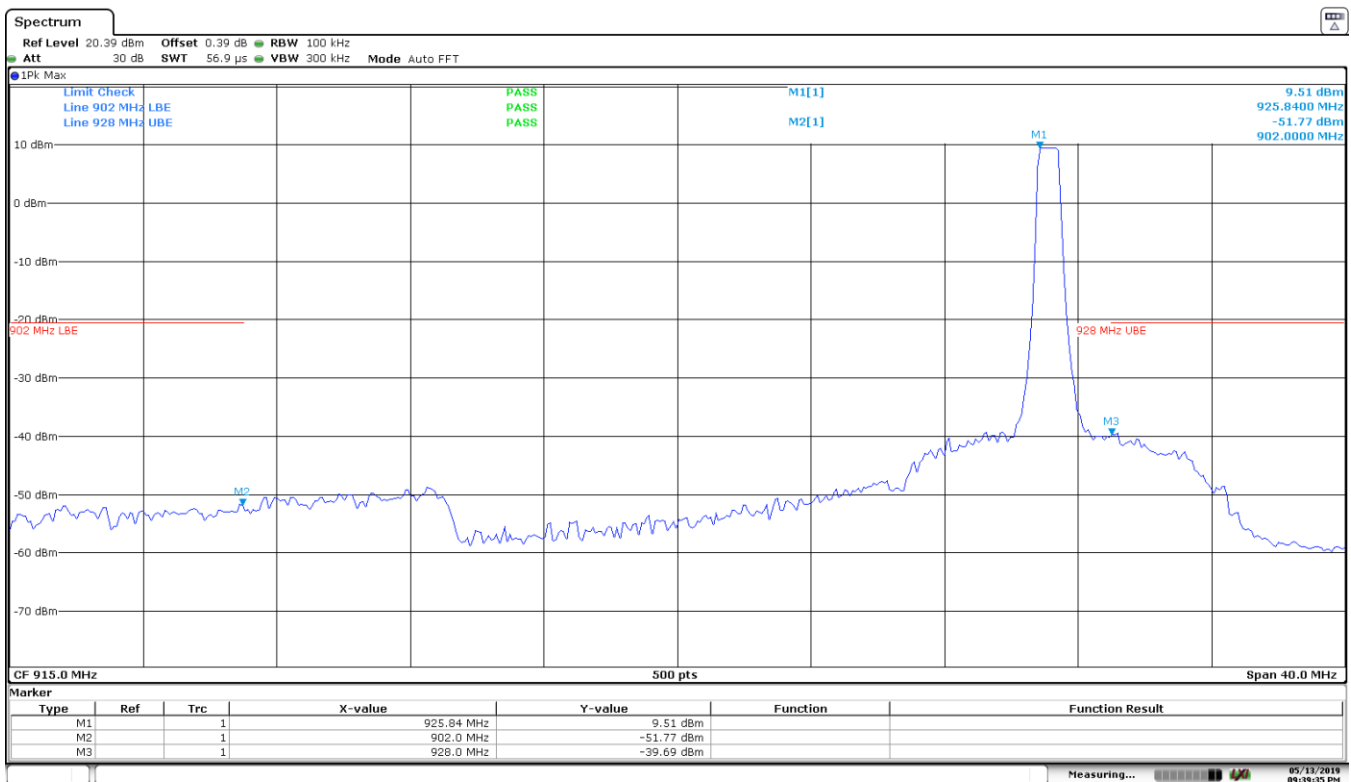
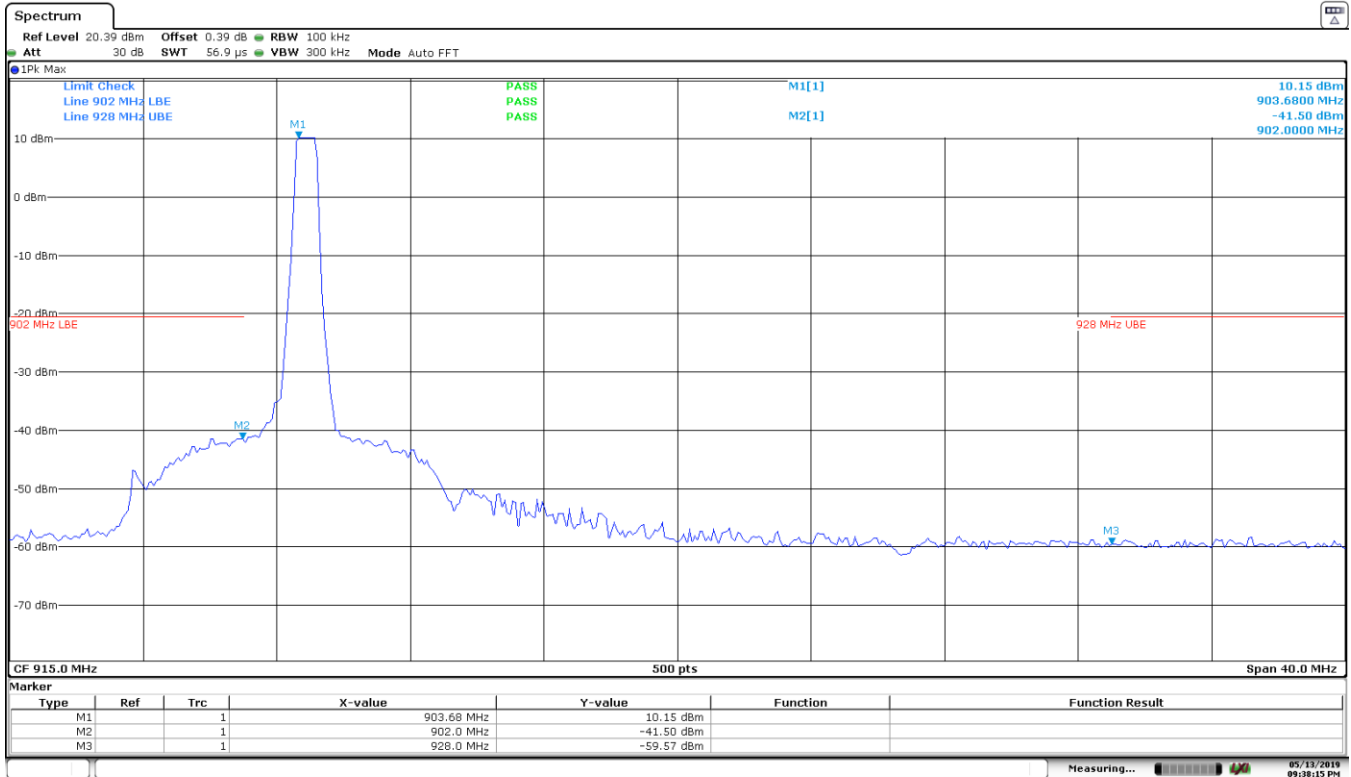
Test End Date: 17-May-2019

Tester: ASF

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
RF CABLE (TS8997)	141	HUBER & SUHNER	B095585	25-Jul-2019
ATTENUATOR, 10DB (TS8997)	10DB	ROHDE & SCHWARZ	B095591	25-Jul-2019
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079824	25-Jul-2019
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	2-Jul-2019

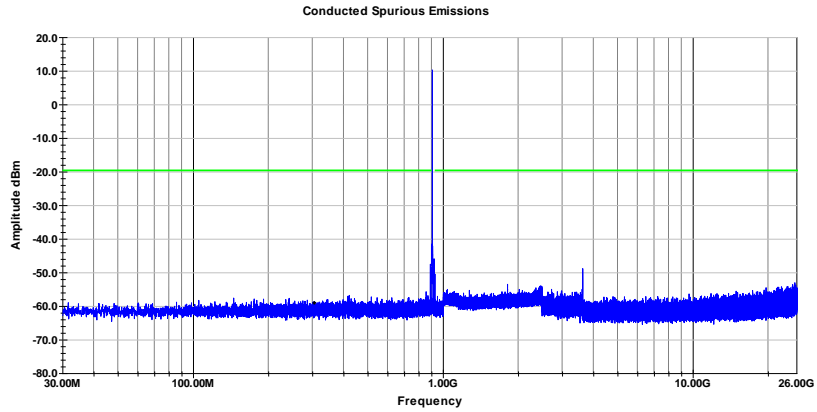
Note: The equipment calibration period is 1 year.

6.5 Test Data – DTS Band Edge

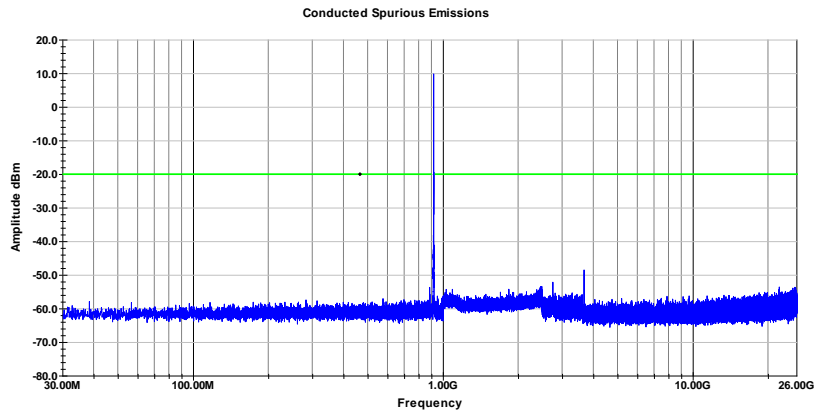


6.6 Test Data – Conducted Spurious Emissions

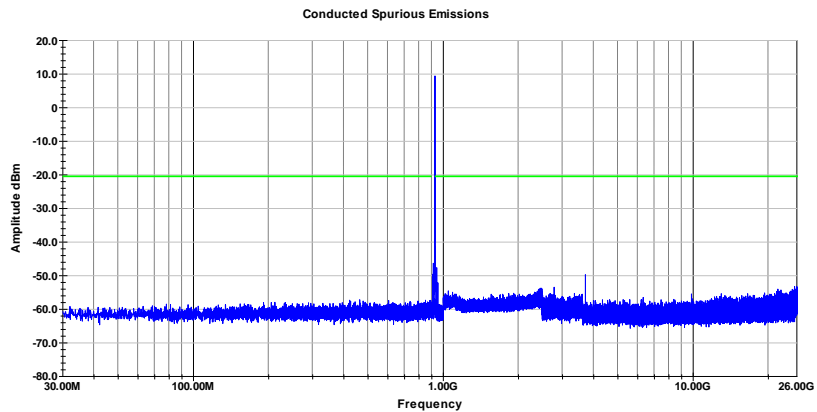
903.9 MHz



915 MHz



926.1 MHz



7 Emissions in Restricted Frequency Bands

7.1 Test Result

Test Description	Test Specification		Test Result
Restricted Band Emissions	15.205 / 15.209	RSS-GEN S8.9 / 8.10	Compliant

7.2 Test Method

The measurement methods defined in ANSI C63.10: 2013 were used. Clause 6.7 directs the test methods of 11.12.2 be employed for Antenna Port Conducted Emissions. The option under Clause 11.12.2.1 to perform Antenna Port Conducted Emissions in conjunction with Cabinet/Case Emissions has been used to demonstrate compliance.

As directed by Clause 11.12.2.7 Test methods in Clauses 6.3, 6.5, and 6.6 were used to perform the Cabinet Emissions with the antenna port terminated in 50 Ω. Three orthogonal axis of the DUT were investigated and the worst-case data has been reported.

During Antenna port conducted final measurements the use of a band reject filter was used to suppress the fundamental when measuring above 1 GHz. Peak measurements were made utilizing the method of Clause 11.12.2.4. Average measurements were made using Clause 11.12.2.5.2. Data was converted from a conducted output power measurement to an equivalent field strength using the methods of Clause 11.12.2.2.

Test distance:

- 9k to 30 MHz – Near field prescan to determine if there were any emissions.
- 30 to 1000 MHz - The EUT to measurement antenna distance was 3 meters
- 1 to 18 GHz - The EUT to measurement antenna distance was 3 meters
- 18 to 26 GHz - The EUT to measurement antenna distance was 3 meter

Limits within restricted bands of operation:

Frequency	Limits ⁽¹⁾		Peak Limits dBuV/m
	Microvolts/m	dBuV/m	
30 - 88 MHz	100	40 ⁽²⁾	--
88 - 216 MHz	150	43.5 ⁽²⁾	--
216 - 960 MHz	200	46 ⁽²⁾	--
960 - 1000 MHz	500	54 ⁽²⁾	--
1 - 40 GHz	500	54 ⁽³⁾	74

(1) These limits are applicable to emissions outside of the intentional transmit frequency band.

(2) Quasi-peak limit

(3) Average limit

7.3 Test Site

SGS EMC Laboratory, Suwanee, GA
10m ALSE (Absorber Lined Shielded Enclosure)

Environmental Conditions

Temperature: 22.9 °C

Relative Humidity: 49.7 %

Atmospheric Pressure: 97.7 kPa

7.4 Test Equipment

7.4.1 Antenna Port Conducted Measurements

Test End Date: 17-May-2019

Tester: ASF

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	2-Jul-2019
RF CABLE	SF102	HUBER & SUHNER	B079824	25-Jul-2019

7.4.2 Cabinet/Case Radiated Emissions

Test End Date: 22-May-2019

Tester: ASF

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	2-Jul-2020
RF CABLE	SF102	HUBER & SUHNER	B079822	25-Jul-2019
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	24-Jan-2020
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	24-Jul-2019
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	2-Jul-2019
ANTENNA, HORN (SMALL)	LB-180400-20-C-KF	A-INFO	15007	30-Mar-2020
RF CABLE	SF102	HUBER & SUHNER	B079823	25-Jul-2019
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	27-Jul-2019
ANTENNA, BILOG	JB6	SUNOL	B079690	11-Dec-2019
RF CABLE	SF106	HUBER & SUHNER	B079712	24-Jul-2019
RF CABLE	SF106	HUBER & SUHNER	B079713	24-Jul-2019
RF CABLE	SF106	HUBER & SUHNER	B079659	23-Jul-2019
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	2-May-2020
RF CABLE	104PE	HUBER & SUHNER	B079793	24-Jul-2019
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	17-Aug-2019

Note: The equipment calibration period is 1 year, except for asset B079699 which has a 2 year cal cycle.

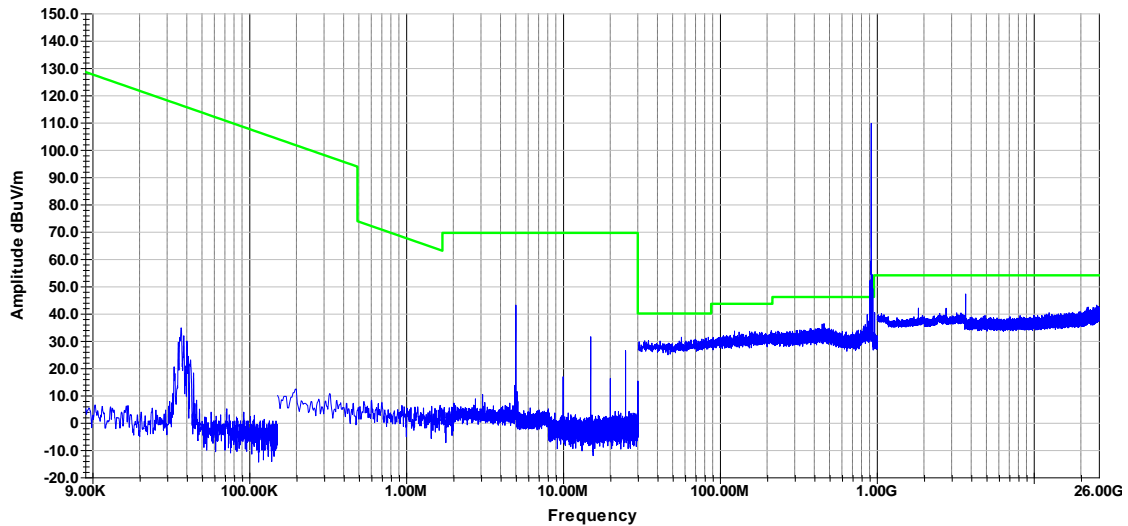
7.5 Test Data

7.5.1 Antenna Port Conducted Measurements

DUT Frequency (MHz)	Frequency (MHz)	Raw Value (dBm)	Path Loss (dB)	3m FS Conversion	Ant Gain (dBi)	Final Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (Pk/RMS)	Limit (Pk/Avg)
903.9	1827.68	-49.24	0.33	95.26	2.00	48.35	54.00	-5.65	Pk	Avg
903.9	2742.75	-57.88	0.40	95.26	2.00	39.78	54.00	-14.22	Pk	Avg
903.9	3655.44	-50.40	0.46	95.26	2.00	47.32	54.00	-6.68	Pk	Avg
915	1830.31	-49.42	0.33	95.26	2.00	48.17	54.00	-5.83	Pk	Avg
915	2744.65	-57.42	0.40	95.26	2.00	40.24	54.00	-13.76	Pk	Avg
915	3660.57	-50.51	0.46	95.26	2.00	47.21	54.00	-6.79	Pk	Avg
926.1	1852.26	-50.72	0.33	95.26	2.00	46.87	54.00	-7.13	Pk	Avg
926.1	2778.88	-56.87	0.40	95.26	2.00	40.79	54.00	-13.21	Pk	Avg
926.1	3703.66	-51.09	0.47	95.26	2.00	46.64	54.00	-7.36	Pk	Avg

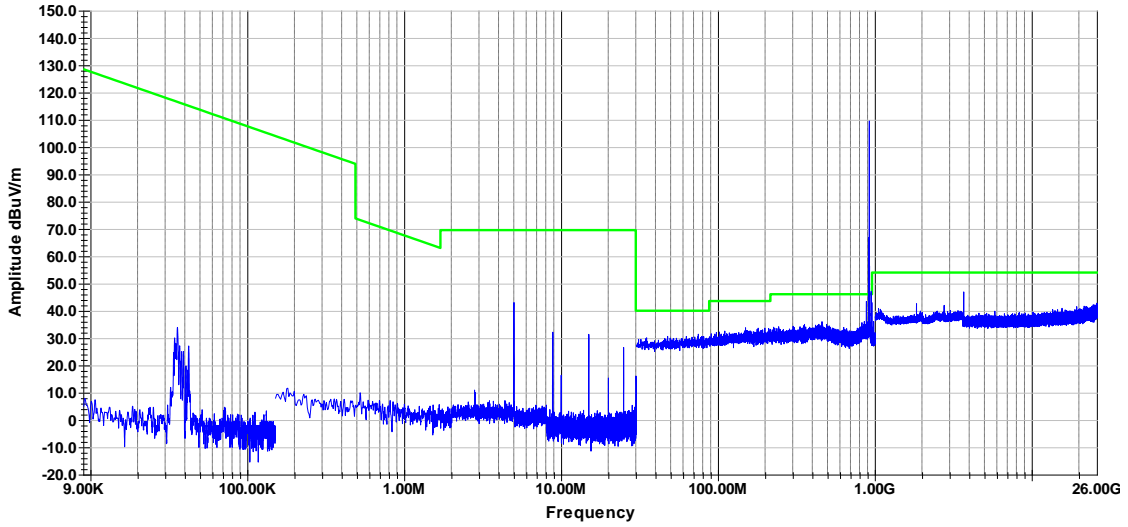
903.9 Mhz

Conducted Spurious Emissions



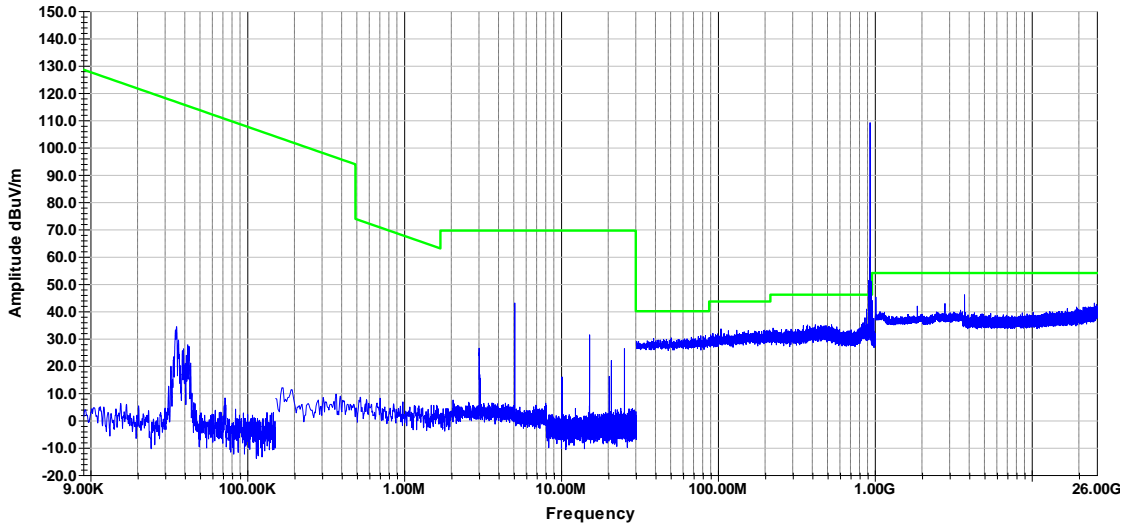
915 MHz

Conducted Spurious Emissions



926.1 MHz

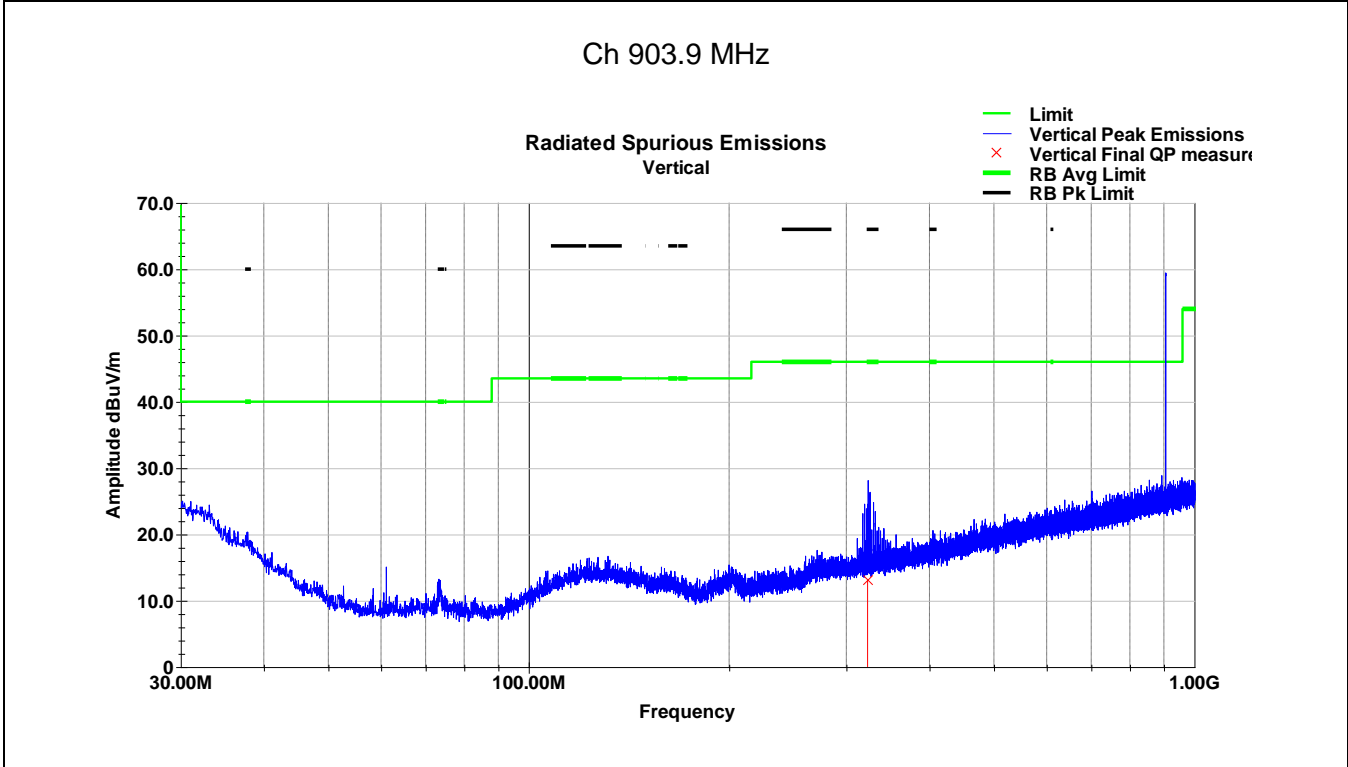
Conducted Spurious Emissions



7.5.2 Cabinet/Case Radiated Emissions

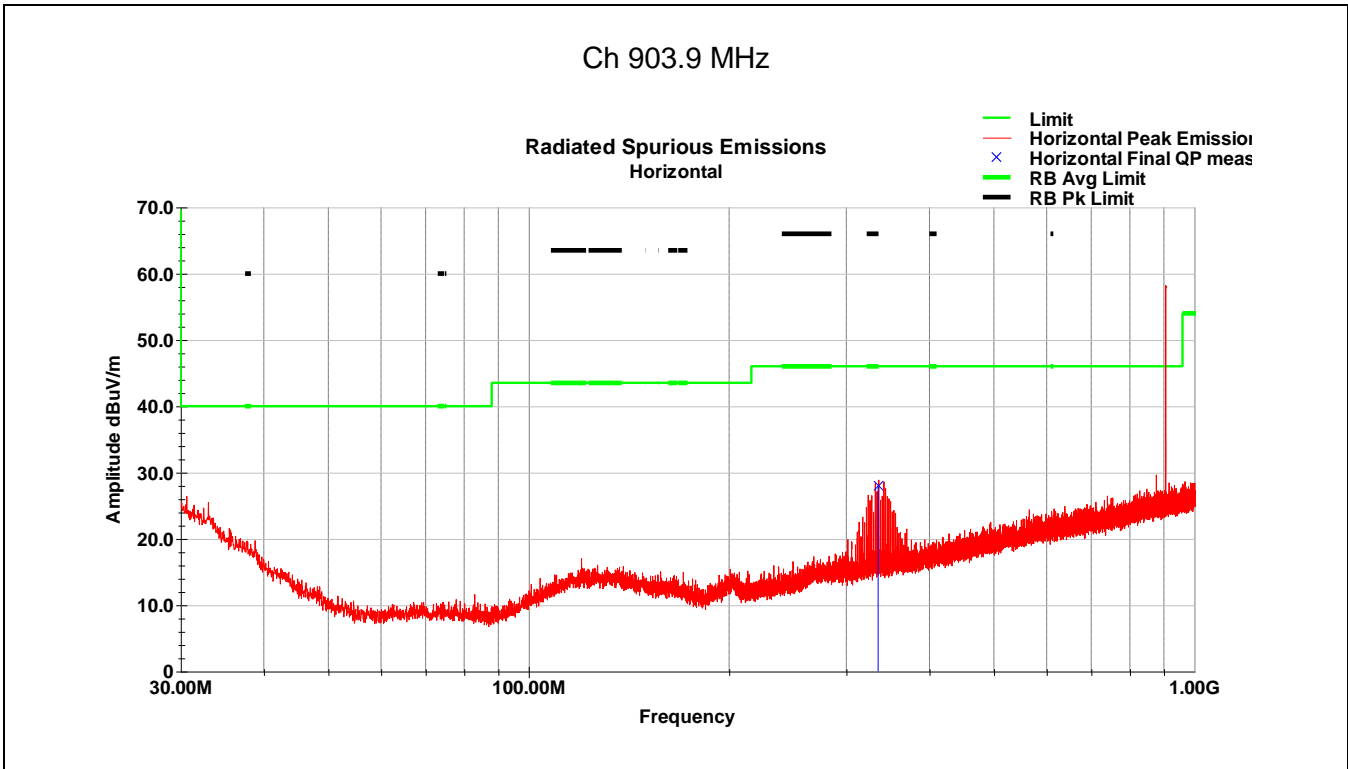
No emissions associated with the radio were detected in the range 9kHz to 30MHz.

7.5.2.1 30-1000 MHz



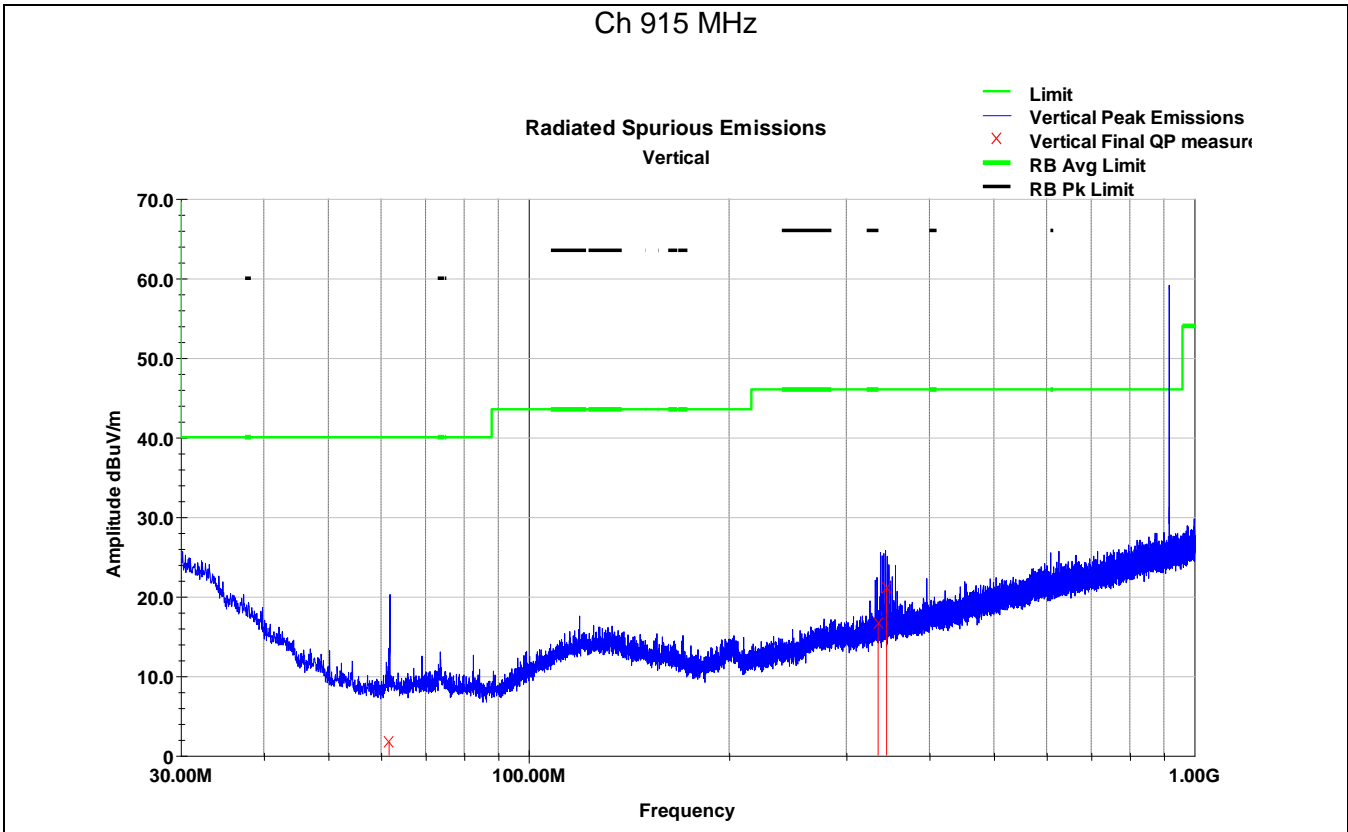
Ch 903.9 MHz

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
322.93	30.0	V	268.0	161.0	14.8	1.9	33.6	13.1	46.0	-32.9
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										



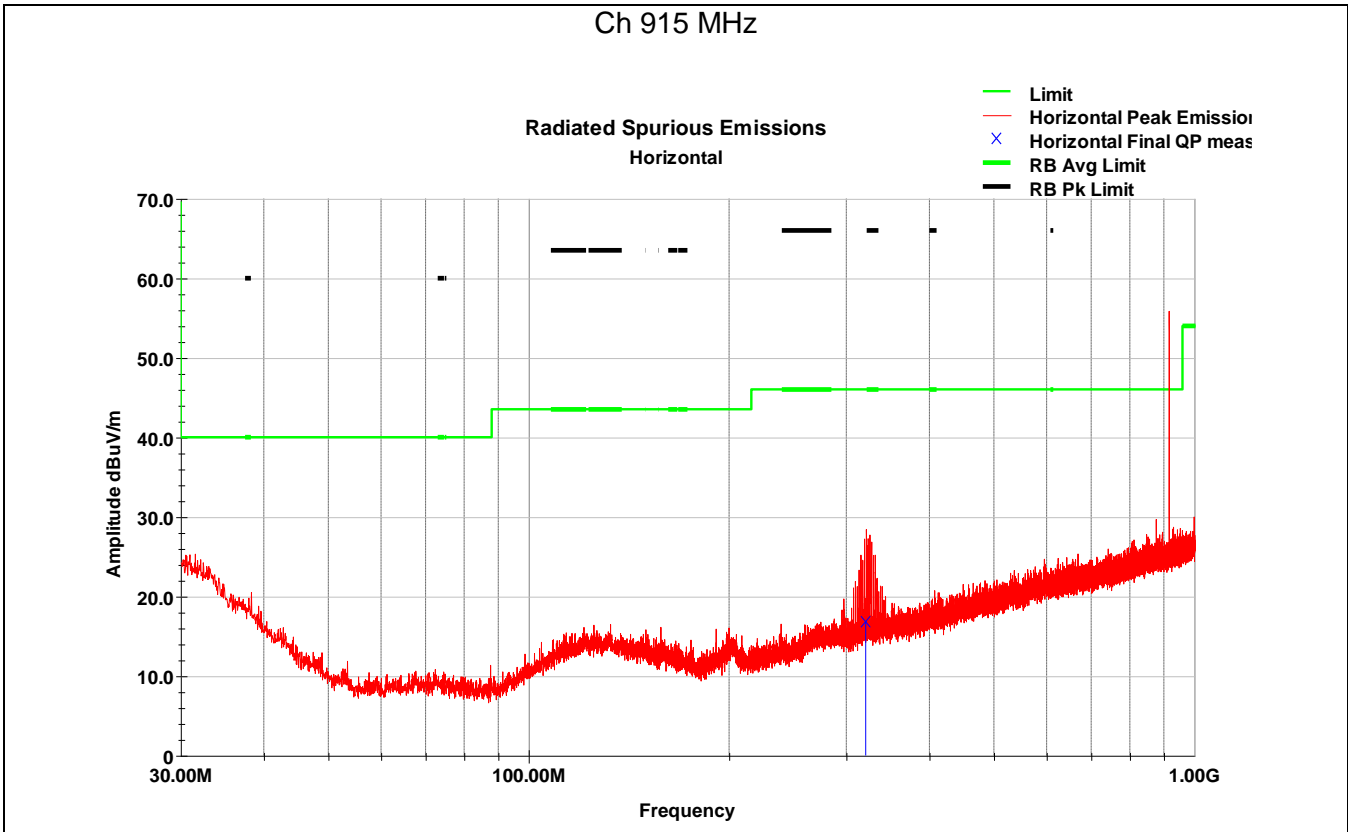
Ch 903.9 MHz

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
334.98	44.7	H	318.0	145.0	14.9	2.0	33.5	28.0	46.0	-18.0
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										



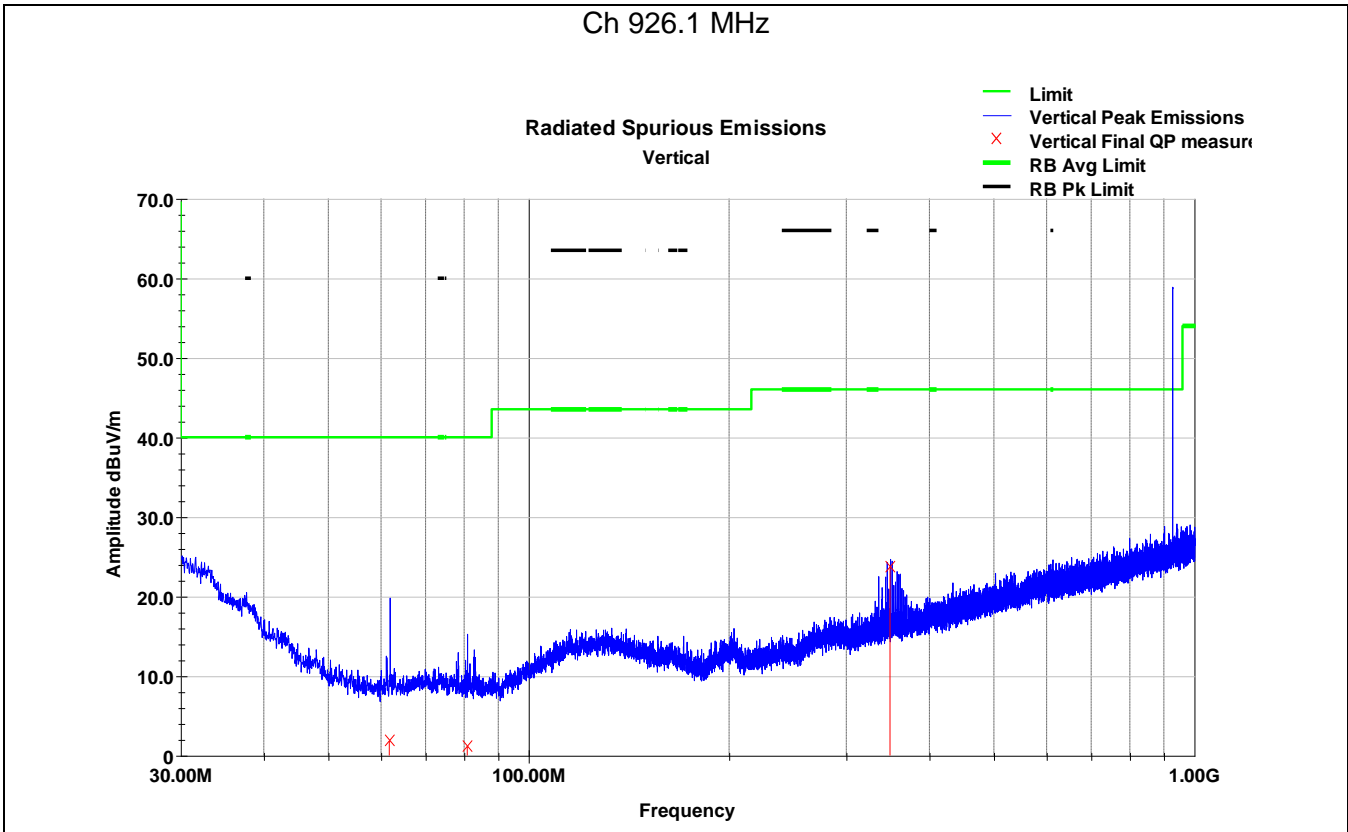
Ch 915 MHz

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
61.70	27.1	V	23.0	187.0	7.5	0.8	33.7	1.7	40.0	-38.3
344.93	37.3	V	39.0	100.0	15.2	2.0	33.5	21.0	46.0	-25.0
QP Value = Level + AF + CL - Amp										
n = QP Value - Limit										



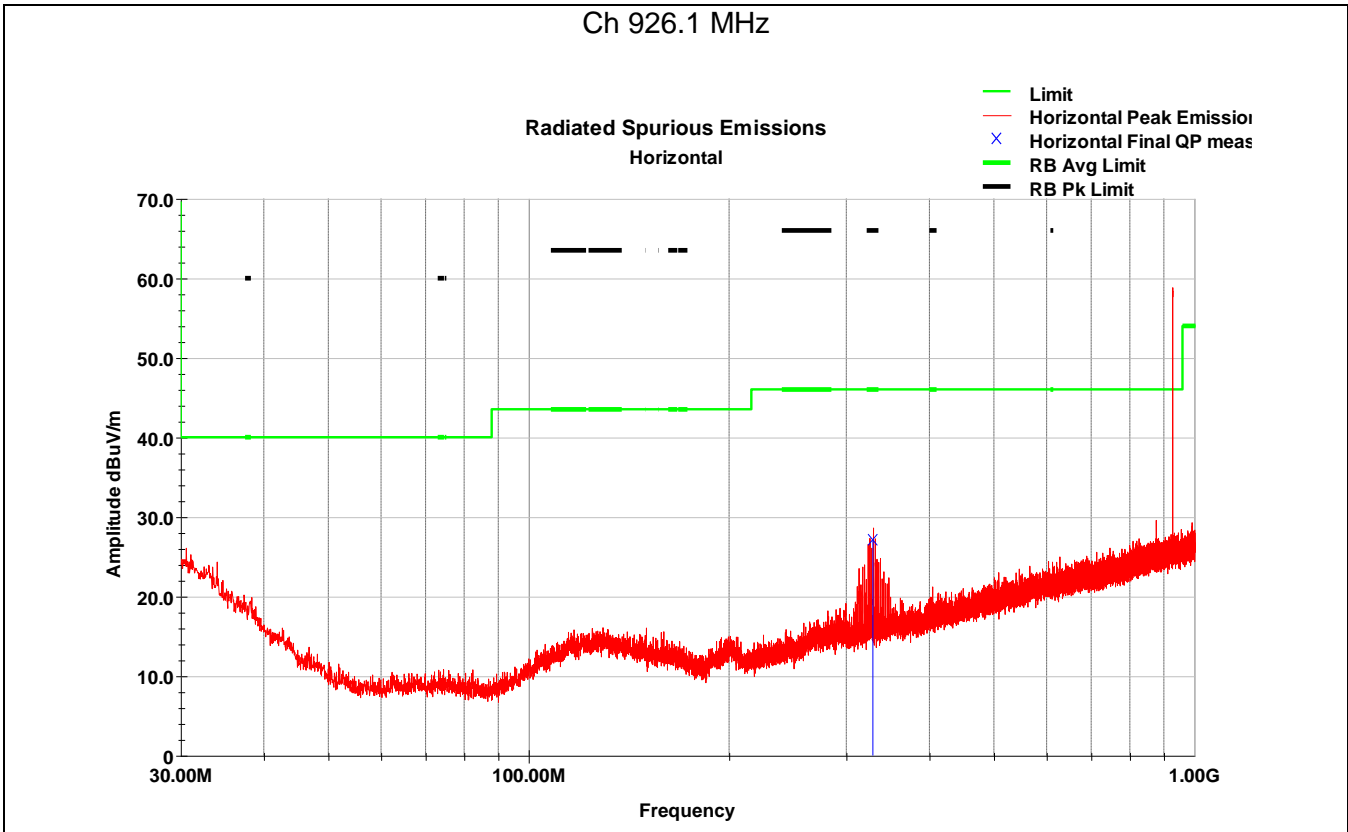
Ch 915 MHz

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
320.88	33.8	H	153.0	149.0	14.7	1.9	33.6	16.9	46.0	-29.2
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										



Ch 926.1 MHz

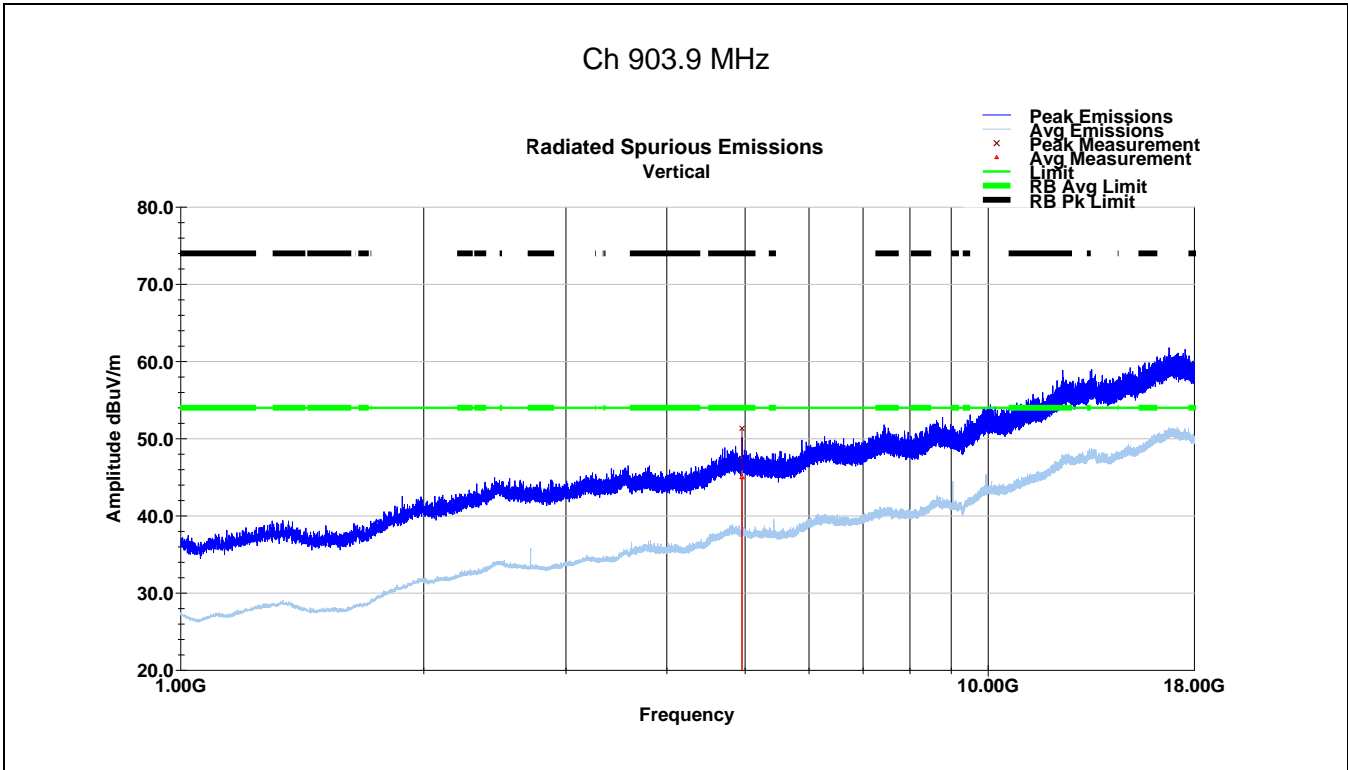
Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
61.75	27.2	V	0.0	248.0	7.5	0.8	33.7	1.8	40.0	-38.2
80.86	26.4	V	0.0	127.0	7.8	0.9	34.0	1.1	40.0	-38.9
349.03	39.9	V	59.0	100.0	15.3	2.0	33.5	23.7	46.0	-22.3
= Level + AF + CL - Amp										
Margin = QP Value - Limit										



Ch 926.1 MHz

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
328.98	43.8	H	316.0	153.0	14.9	1.9	33.5	27.1	46.0	-18.9
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

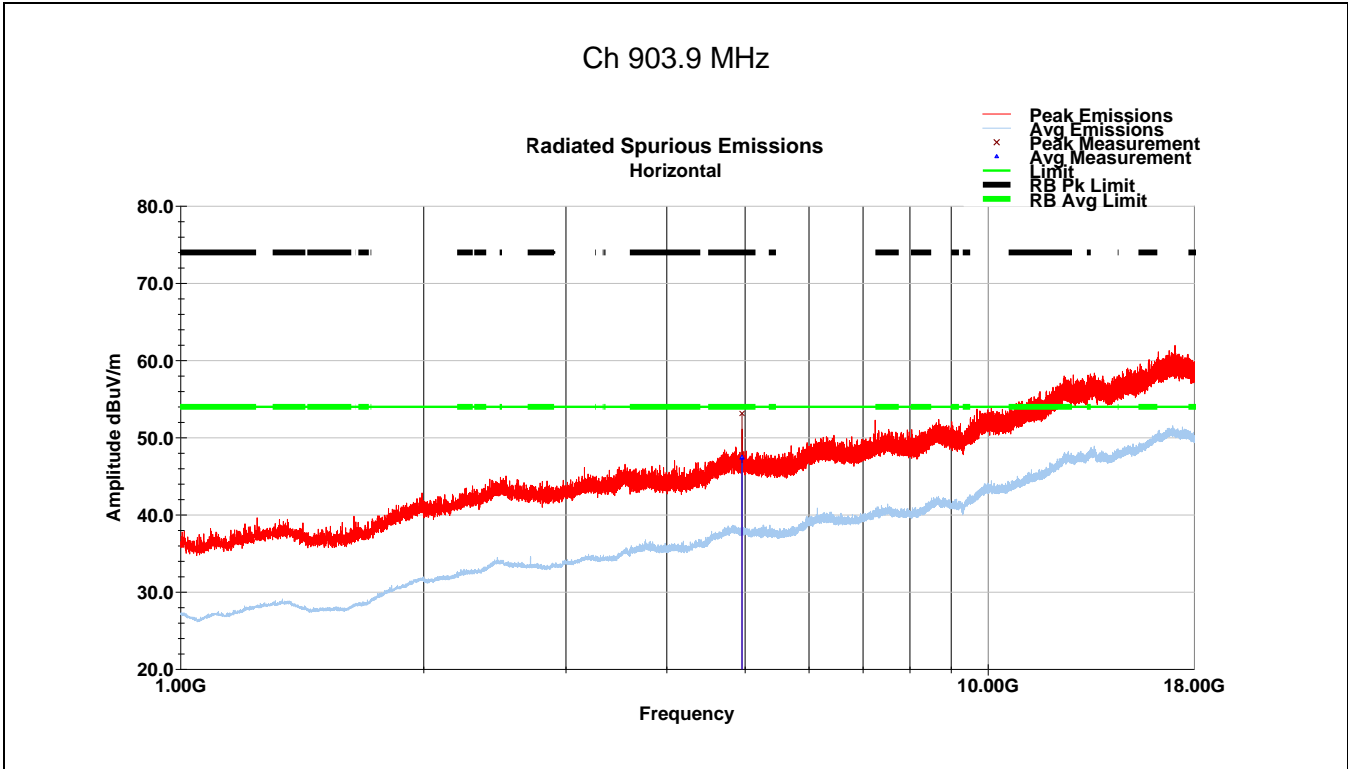
7.5.2.2 1-18 GHz



Ch 903.9 MHz

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
4956.85	47.7	V	110.0	183.0	34.4	3.6	34.3	51.3	74.0	-22.7
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

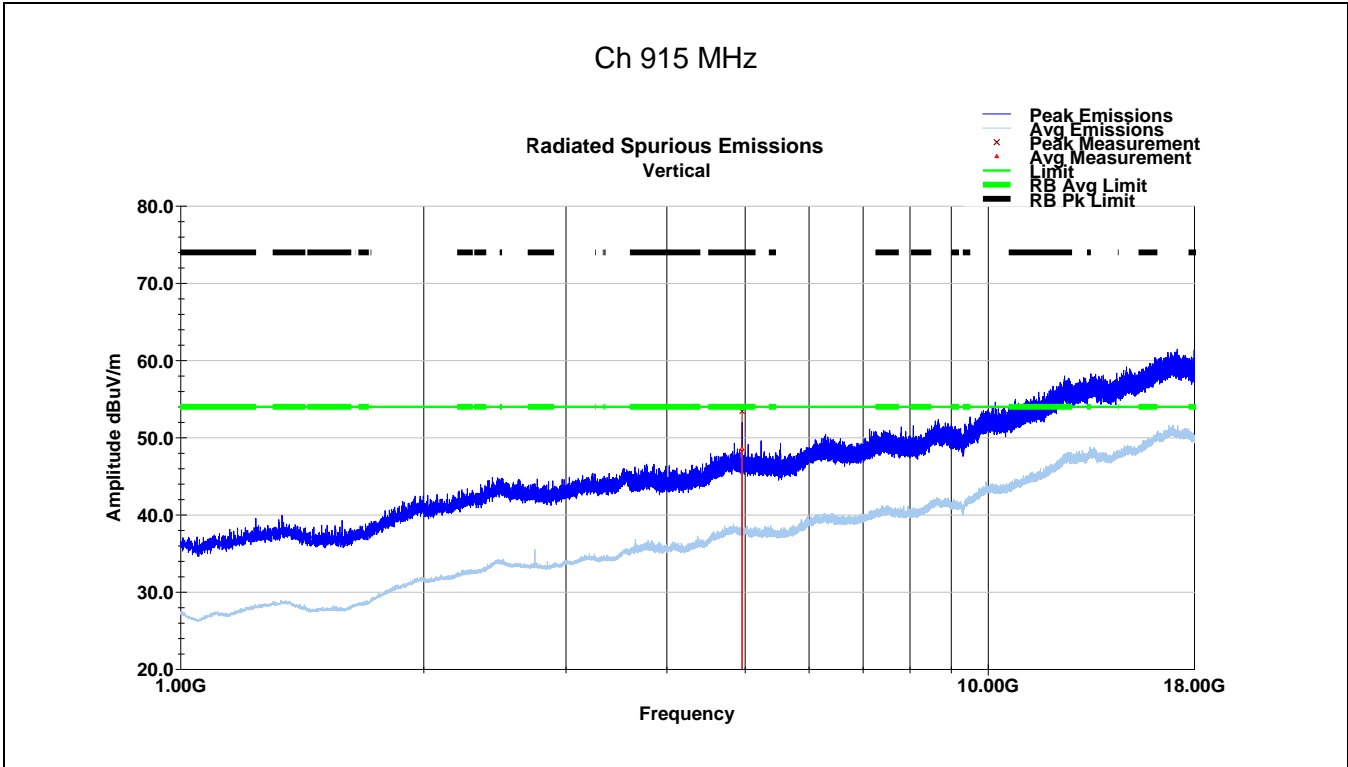
Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Avg dBuV/m	Limit (dBuV/m)	Margin (dB)
4956.85	41.3	V	110.0	183.0	34.4	3.6	34.3	45.0	54.0	-9.0
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										



Ch 903.9 MHz

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
4956.73	49.5	H	145.0	120.0	34.4	3.6	34.3	53.1	74.0	-20.9
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

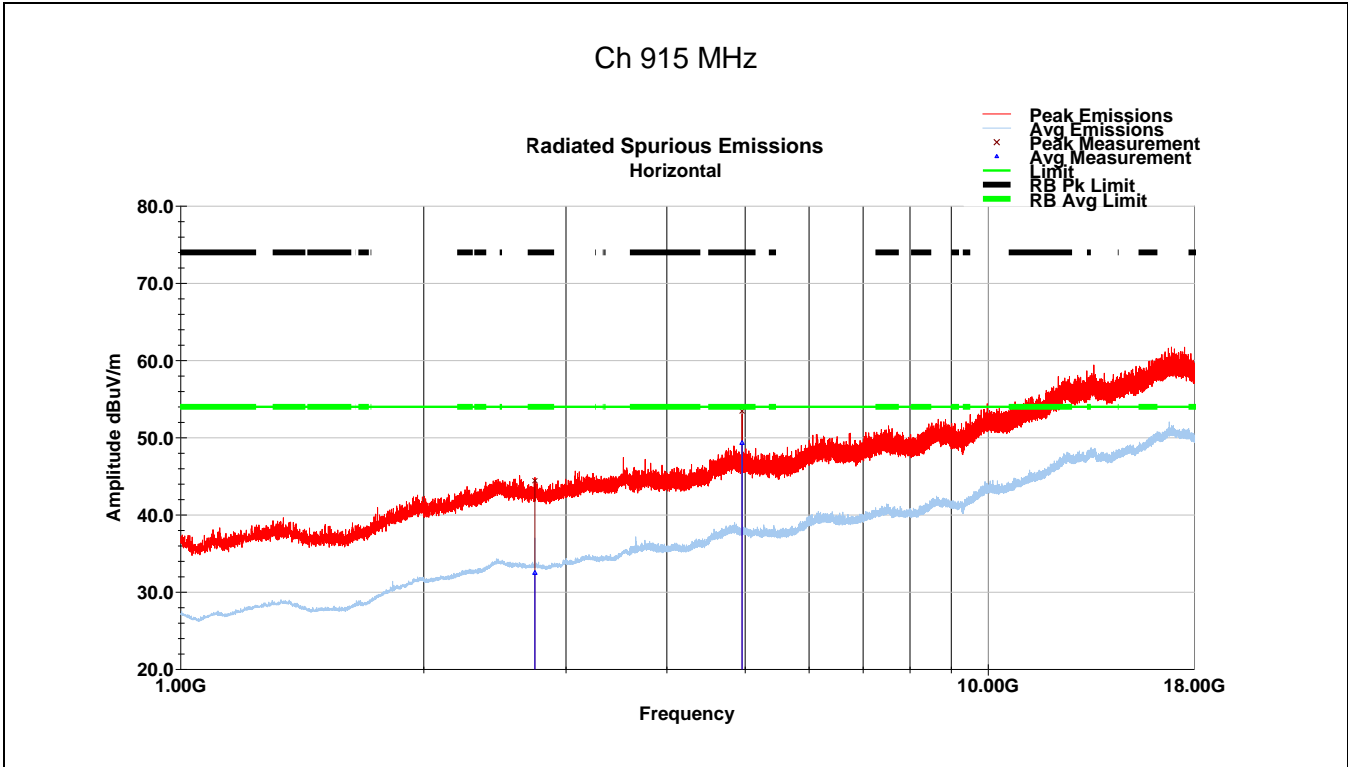
Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
4956.73	43.8	H	145.0	120.0	34.4	3.6	34.3	47.5	54.0	-6.5
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										



Ch 915 MHz

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
4956.60	49.8	V	338.0	100.0	34.4	3.6	34.3	53.4	74.0	-20.6
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

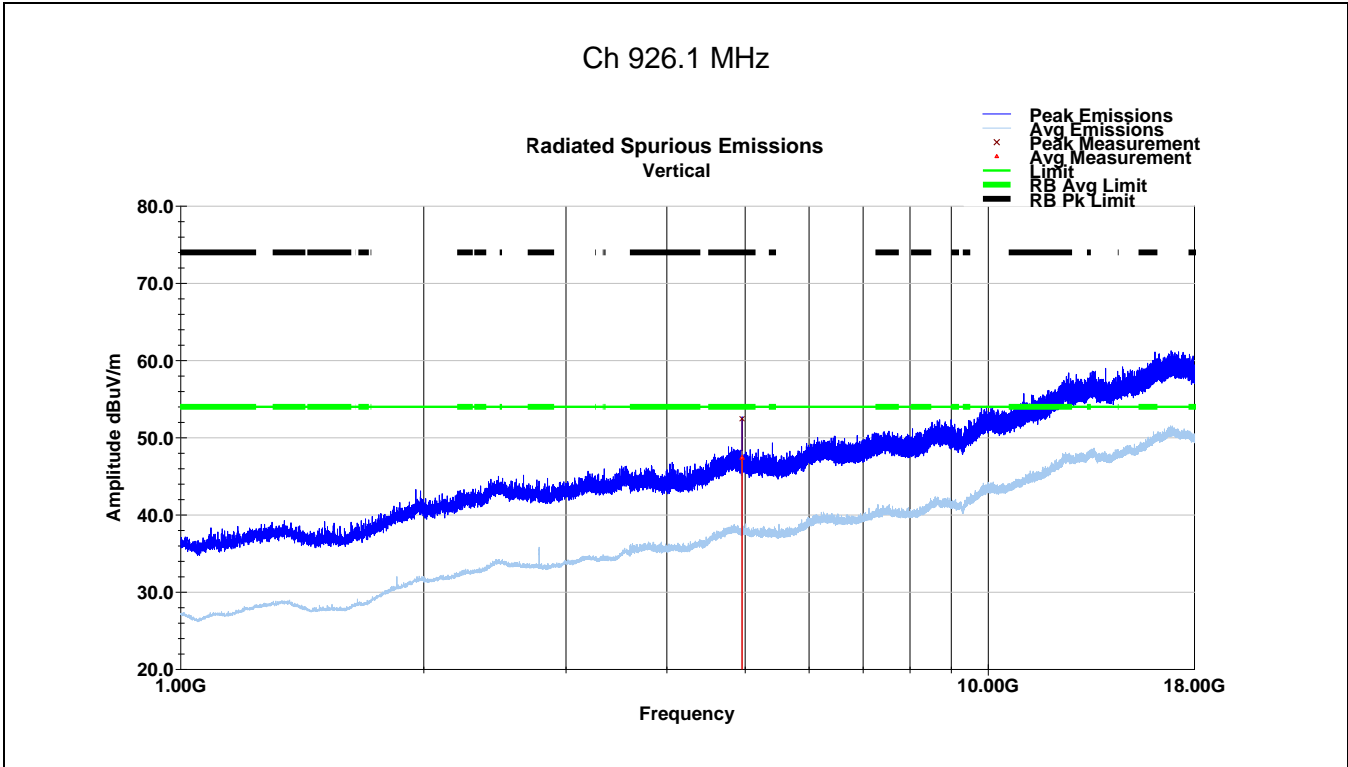
Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Avg dBuV/m	Limit (dBuV/m)	Margin (dB)
4956.60	44.9	V	338.0	100.0	34.4	3.6	34.3	48.6	54.0	-5.4
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										



Ch 915 MHz

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
2745.88	43.9	H	228.0	123.0	32.2	2.6	34.3	44.4	74.0	-29.6
4956.85	49.8	H	30.0	250.0	34.4	3.6	34.3	53.5	74.0	-20.5
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
2745.88	32.0	H	228.0	123.0	32.2	2.6	34.3	32.5	54.0	-21.5
4956.85	45.7	H	30.0	250.0	34.4	3.6	34.3	49.3	54.0	-4.7
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

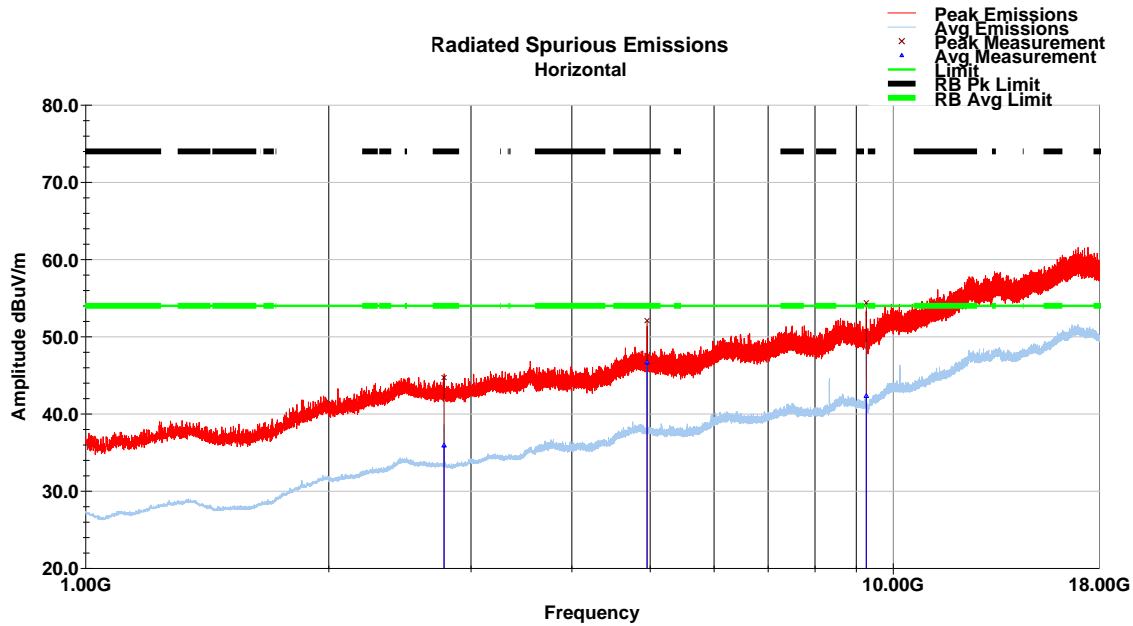


Ch 926.1 MHz

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
4956.44	48.8	V	333.0	105.0	34.4	3.6	34.3	52.5	74.0	-21.5
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Avg dBuV/m	Limit (dBuV/m)	Margin (dB)
4956.44	43.8	V	333.0	105.0	34.4	3.6	34.3	47.4	54.0	-6.6
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

Ch 926.1 MHz

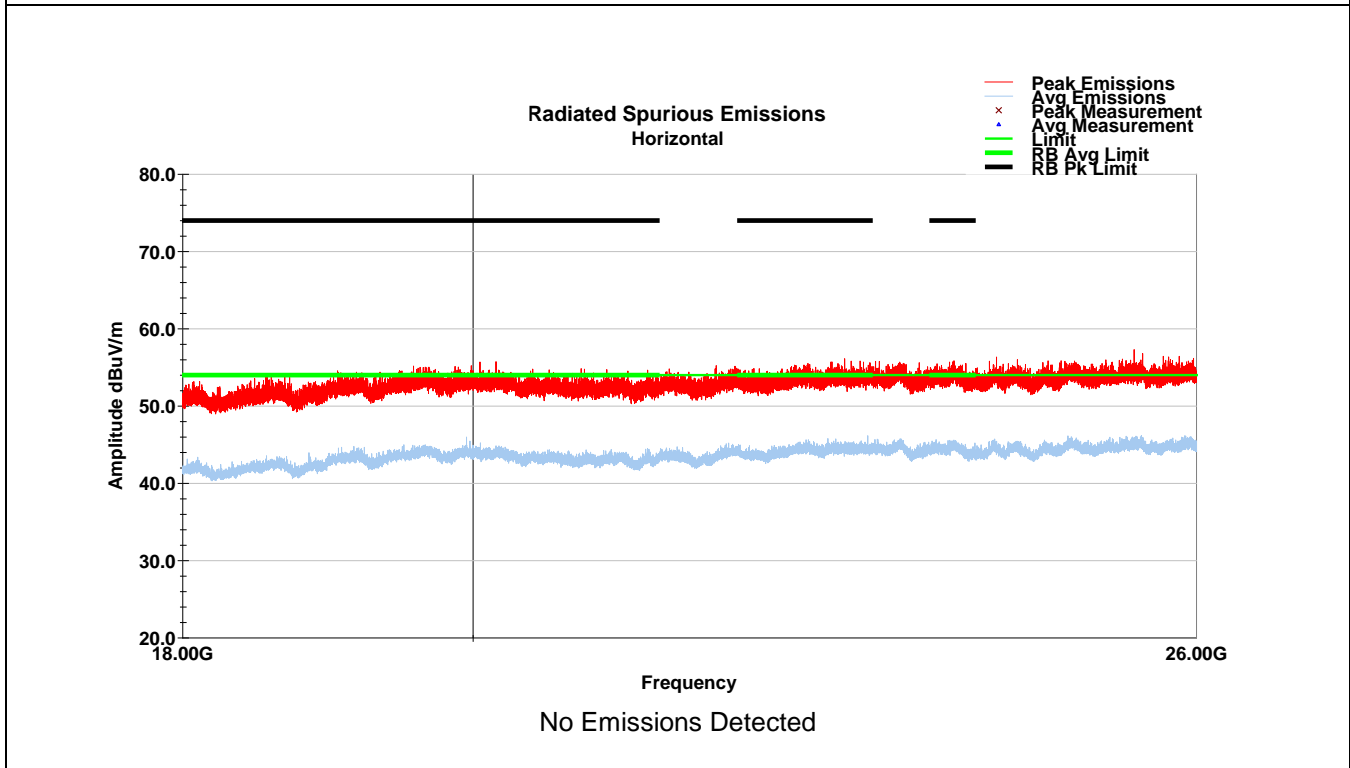
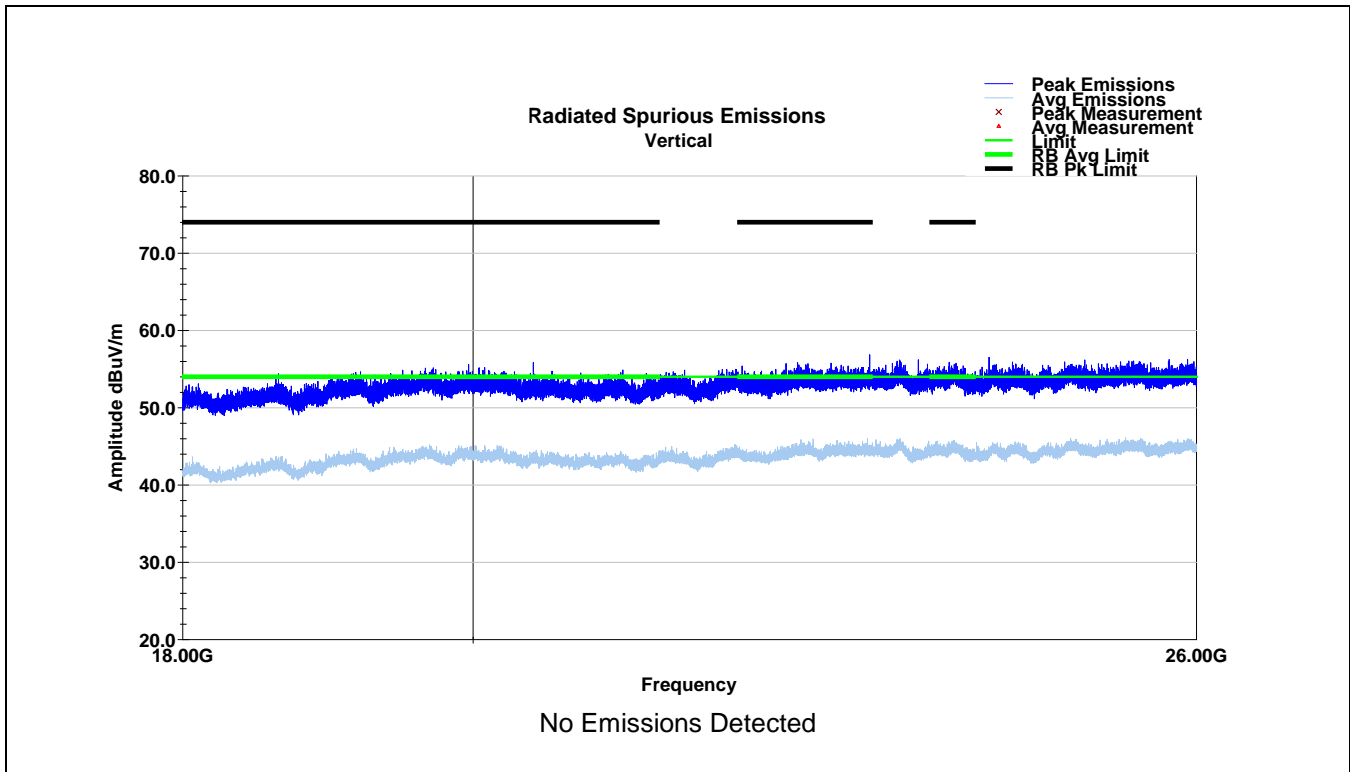


Ch 926.1 MHz

Frequency MHz	Raw Pk dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Final Pk dBuV/m	Limit dBuV/m	Margin dB
2778.11	44.2	H	241.0	234.0	32.3	2.6	34.4	44.7	74.0	-29.3
4956.80	48.4	H	61.0	229.0	34.4	3.6	34.3	52.1	74.0	-21.9
9261.24	46.3	H	213.0	175.0	36.4	4.9	33.2	54.4	74.0	-19.6
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

Frequency MHz	Raw Avg dBuV	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	Avg Value dBuV/m	Limit (dBuV/m)	Margin (dB)
2778.11	35.4	H	241.0	234.0	32.3	2.6	34.4	35.9	54.0	-18.1
4956.80	43.0	H	61.0	229.0	34.4	3.6	34.3	46.7	54.0	-7.3
9261.24	34.2	H	213.0	175.0	36.4	4.9	33.2	42.3	54.0	-11.7
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

7.5.2.3 18-26 GHz



8 Conducted Emissions

8.1 Test Result

Test Description	Basic Standards	Test Result
Conducted Emissions	ANSI C63.10	Compliant

8.2 Test Method

With the receiver's resolution bandwidth was set to 9 kHz, exploratory scans were performed over the measuring frequency range (0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and Average detector and using the TILE! software. The final test data was measured using a Quasi-Peak detector and Average detector and compared against the limits indicated in the table below.

Frequency Range	Limits (dBuV)
0.15 to 0.5 MHz	Avg 56 to 46 QP 66 to 56
0.5 to 5 MHz	Avg 46 Pk 56
5 to 30 MHz	Avg 50 Pk 60

8.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions:

Temperature: 23.1 °C

Relative Humidity: 47.4 %

Atmospheric Pressure 97.5 kpa

8.4 Test Equipment

Test End Date: 28-May-2019

Tester: ASF

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
CONDUCTED COMB GENERATOR	CGC-255	COM-POWER	B079696	CNR
RF CABLE	SF106	HUBER & SUHNER	B079659	23-Jul-2019
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	17-Aug-2019
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B087573	3-Dec-2019

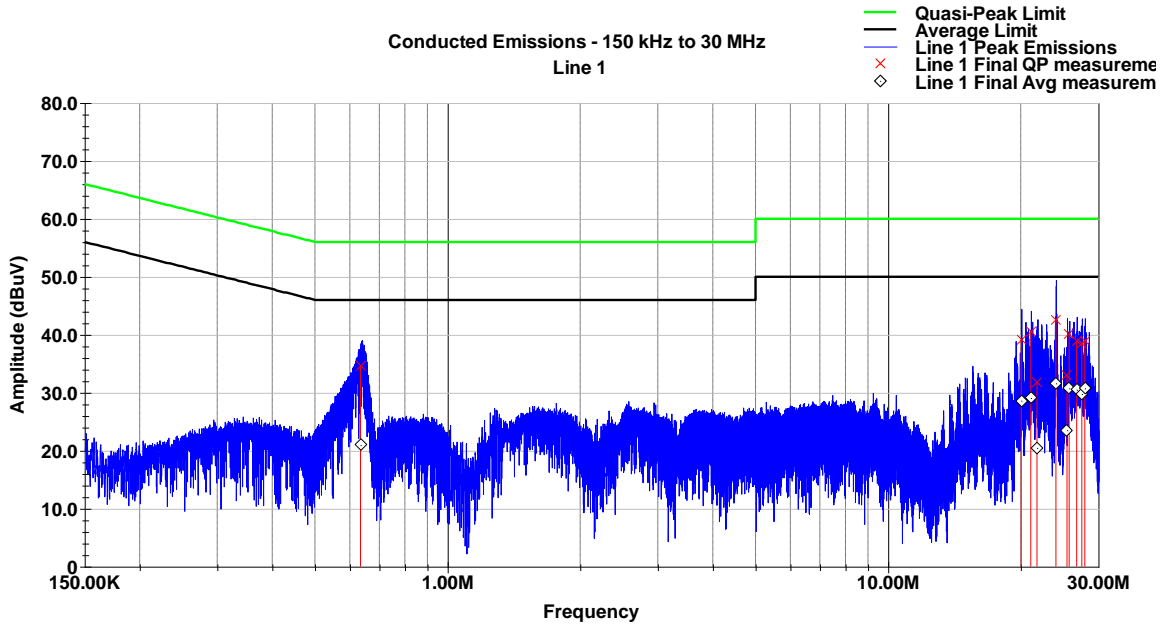
Notes:

The calibration period equipment is 1 year.

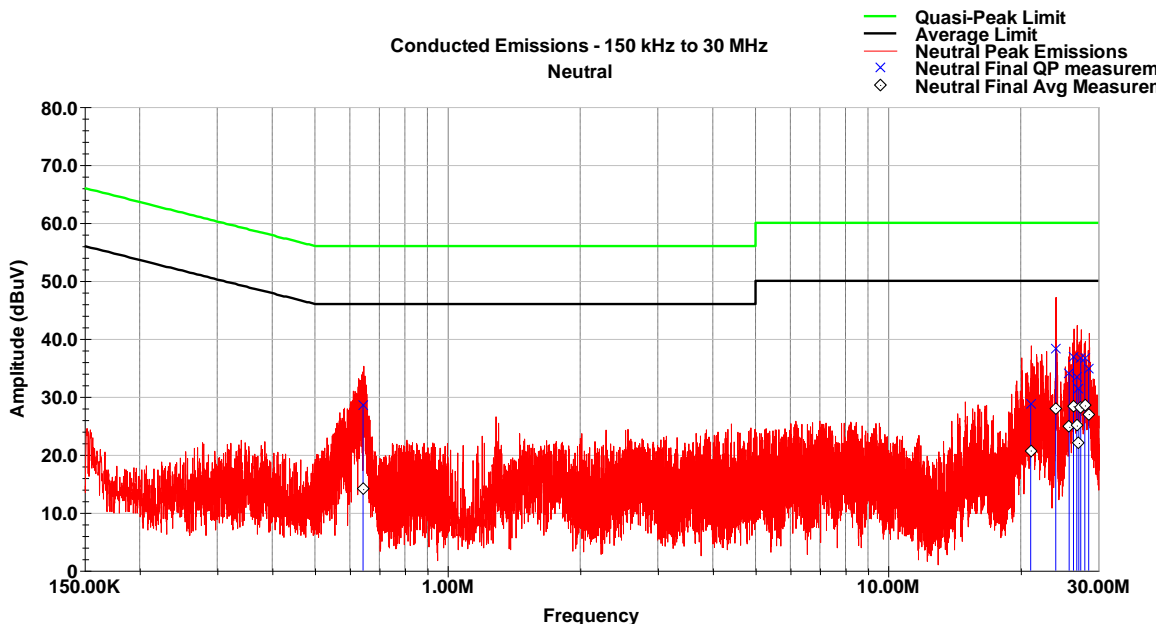
CNR – Calibration Not Required

Software: "181112 Conducted Emissions TILE7" TILE! profile dated 12 Nov 2018

8.6 Test Data



Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.634	34.7	56.0	-21.3	21.0	46.0	-25.0
20.047	39.1	60.0	-20.9	28.6	50.0	-21.4
21.070	40.5	60.0	-19.5	29.1	50.0	-20.9
21.767	31.8	60.0	-28.2	20.5	50.0	-29.5
24.035	42.7	60.0	-17.3	31.6	50.0	-18.4
25.471	32.9	60.0	-27.1	23.6	50.0	-26.4
25.756	40.1	60.0	-19.9	30.8	50.0	-19.2
26.793	38.8	60.0	-21.2	30.5	50.0	-19.5
27.512	38.4	60.0	-21.6	29.8	50.0	-20.2
27.956	38.9	60.0	-21.1	30.8	50.0	-19.2



Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.643	28.6	56.0	-27.4	14.1	46.0	-31.9
21.063	28.8	60.0	-31.2	20.7	50.0	-29.3
24.011	38.3	60.0	-21.7	28.0	50.0	-22.0
25.753	34.0	60.0	-26.0	24.8	50.0	-25.2
26.343	36.9	60.0	-23.1	28.4	50.0	-21.6
26.800	33.4	60.0	-26.6	25.0	50.0	-25.0
27.084	31.4	60.0	-28.6	22.0	50.0	-28.0
27.362	36.6	60.0	-23.4	28.2	50.0	-21.8
27.956	36.7	60.0	-23.3	28.5	50.0	-21.5
28.530	34.9	60.0	-25.1	27.0	50.0	-23.0

9 Revision History

Revision Level	Description of changes	Revision Date
	--	
0	Initial release	June 6, 2019