Electromagnetic Compatibility
Test Report

Test Report No: ART 070817 Rev.3
Issued on: February 12, 2018

Product Name
ReadMaster 5.1

Tested According to
FCC 47 CFR, Part 15.247, Subparts C
IC Canada RSS -247 Issue 2

Tests Performed for
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Test Report details:

Test commencement date: 09.07.2017

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Customer's Representative: Gabi Ben-Yaakov

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Revision details:

Version	Date	Details/Reasons
Rev. 1	07.08.2017	-
Rev.2	01.02.2018	Test report update according to TCB Comments
Rev.3	12.02.2018	Test report update according to TCB Comments

Assessment information:

This report contains an assessment of the EUT against Electromagnetic Compatibility based upon tests carried out on the samples submitted. The results contained in this report relate only to the items tested. Manufactured products will not necessarily give identical results due to production and measurement tolerances. QualiTech, EMC Lab does not assume responsibility for any conclusion and generalization drawn from the test results with regards to other specimens or samples of type of the equipment represented by test item.

The EUT was set up and exercised using the configuration, modes of operation and arrangements defined in this report only.

Modifications:

Modifications made to the EUT

None

Modifications made to the Test Standard

None

Summary of Compliance Status

Test Spec. Clause	Test Case	Result
47 CFR §15.247 (a) (2) & RSS 247 ,section 5.2 (a)	DTS Bandwidth	Pass
47 CFR §15.247 (a) (1),DA 00-705, RSS-247 5.1(c)	20dB Bandwidth	Pass
47 CFR §15.247 (a) (1), DA 00-705, RSS-247 5.1(b)	Carrier Frequency Separation	Pass
47 CFR §15.247 (a) (1) (iii), DA 00-705, RSS-247 5.3(a)	Average Time of Occupancy (Dwell Time)	Pass
47 CFR §15.247 (b) (3) (4) & RSS 247, RSS 247 5.4 (a)(d)	Fundamental Emission Output Power	Pass
47 CFR §15.247 (e) & RSS 247 5.2 (b)	Maximum Power Spectral Density Level in the Fundamental Emission	Pass
47 CFR §15.247 (d) & RSS 247 5.5	Emissions in Non-Restricted Frequency Bands	Pass
47 CFR §15.247 (d), & §15.205, & §15.209(a) & RSS-Gen Issue 4,section 8.11	Emissions in Restricted Frequency Bands	Pass
47 CFR §15.247 (d) , §15.209(a) & DA 00-705, RSS-247 6.2	Spurious Emissions - Radiated	Pass
47 CFR §15.247 (d) & RSS 247 5.5	Band-edge Measurements	Pass
47 CFR §15.203 & RSS-Gen Issue 4	Antenna Connector Requirements	NA

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1. General

1.1. Referenced documents:

ANSI C63.4-2014	Limits and Methods of Measurement for Conducted and Radiated Emissions of Information Technology Equipment
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
RSS-247	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
FCC	FCC OET Publication Number 453039

1.2. Description of the EUT system/test Item:

Description of the EUT system/test Item:

The product is water meter register that count the water flow and wirless transmiting the counting data using integrated radio .

Product name: ReadMaster

FCC ID: 2AIAY-RMAST1

IC ID: 21466-RMAST1

Maximum Peak Output Power: 102.32 mW

Frequency range: 902.3-916.3 MHz

Type of Modulation: LoRa

Antenna Specification:

Type: shorted Inverted L Antenna

Antenna Gain: Max gain -0 dBi,902-928 MHz

1.3. Worst Case Results:

In order to determine the worst-case emissions for all modes/data rates/tests and EUT's position(three axis- x,y,z), all modes/data rates and position were investigated for each required test to determine which produces the worst- case data and then full testing was performed in that mode/data rate and position,

2. Test Facility & Uncertainty of Measurement

2.1. Accreditation/ Registration reference:

- *A2LA Certificate Number: 1633.01*
- *Industry Canada File Number: IC4808A-1*

2.2. Test Facility description

The tests were performed at the EMC Laboratory, QualiTech Division, ECI Telecom Group

Address: 30, Hasivim St., Petah Tikva, Israel.

3m Anechoic Chamber:

The 3m-screened chamber is used in two configurations: the semi-anechoic configuration for Radiated Emission measurements and the full-anechoic configuration for Radiated Immunity tests.

Semi Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	9.5m x 6.5m x 5.2m
Antenna height	1 - 4m
Shielding Effectiveness	Magnetic field ≥80dB at 15 kHz ≥90dB at 100 kHz Electric field >120dB from 1MHz to 1GHz >110dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Emerson and Cuming absorbing material in selected positions on the walls
Normalized Site Attenuation measured at 5 positions	±3.9dB, 30MHz to 200MHz ±3dB, 200MHz to 1000MHz
Transmission Loss measured at 5 positions, at 1.5m height	±3dB, 1GHz to 18GHz

2.3. Uncertainty of Measurement:

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements ". Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Test Name	Test Method & Range	Uncertainty	
		Combined std. Uc(y)	Expanded U
Radiated Emission	30MHz÷230MHz, Horiz. polar. 30MHz÷230MHz, Ver. polar. 230MHz÷1000MHz, Horiz. polar. 230MHz÷1000MHz, Vert. polar.	[dB] 1.8 1.967 1.487 1.499	[dB] 3.6 3.934 2.973 2.998
Conducted Emission	9 kHz÷150 kHz 150 kHz÷30MHz	[dB] 1.378 1.095	[dB] 2.756 2.190
Radio frequency	Up to 18 GHz	$\pm 1*10^{-6}$	$< \pm 1*10^{-5}$
Total Conducted RF Power	Up to 18 GHz	±1.378 dB	< ±1.5dB
Conducted Power density	Up to 18 GHz	±1.378 dB	< ±3dB
Temperature	23.6 °C	±0.6°C	< ±2°C
Humidity	54.9%	±3.1%	< ±5%
DC Voltage	0-60 VDC	±0.3%	< ±3%

Note: QualiTech EMC labs expanded measurement instrumentation has less uncertainty than the industry norm and compliance is deemed to occur as no measured disturbance exceeds the disturbance limit.

Note: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

3. Report of Measurements and Examinations

3.1. Bandwidth Measurement- 20 dB for FHSS and 6dB for DTS

Reference document:	**47 CFR §15.247 (a)(1), (a)(2) ,RSS 247 5.1 (c), RSS 247 5.2 (a), DA 00-705**		
Test Requirements:	Systems using digital modulation techniques may operate in the 902-928 MHz band. The maximum 20dB bandwidth shall be no more than 500 kHz. The minimum 6dB bandwidth shall be at least 500 kHz.		
Method of testing:	-KDB 558074 D01 v04, Sec.8.1, 8.2 -DA 00-705 20 dB Bandwith RSS 247 5.1 (c), RSS 247 5.2 (a) -Conducted Measurement	**Pass**	
Operating conditions:	Under normal test conditions Modulation: LoRa		
Environment conditions:	Ambient Temperature: 23.4°C	Relative Humidity: 59.6%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below		

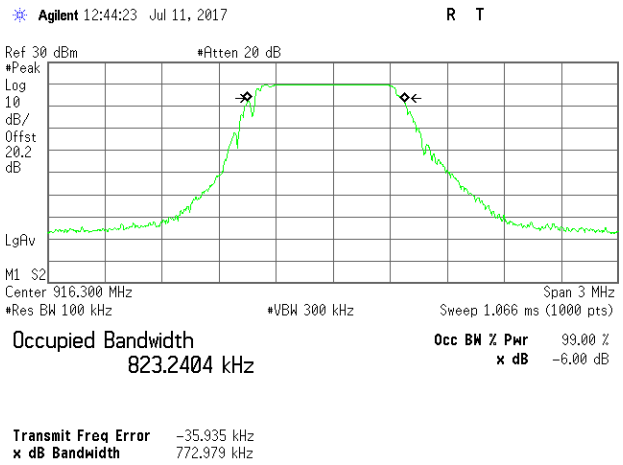
Test results for DTS:

Fundamental Frequency, [MHz]	Bandwidth [kHz]	SF	99% DTS Bandwidth, [kHz]	6 dB DTS Bandwidth, [kHz]	Minimum Bandwidth, [kHz]	6 dB Margin [kHz]	Result
916.300	500.000	7	823.240	772.979	500.000	272.979	Pass
903.000	500.000	8	803.073	792.435	500.000	292.435	Pass
908.600	500.000	8	845.702	820.416	500.000	320.416	Pass
914.200	500.000	8	838.748	819.644	500.000	319.644	Pass

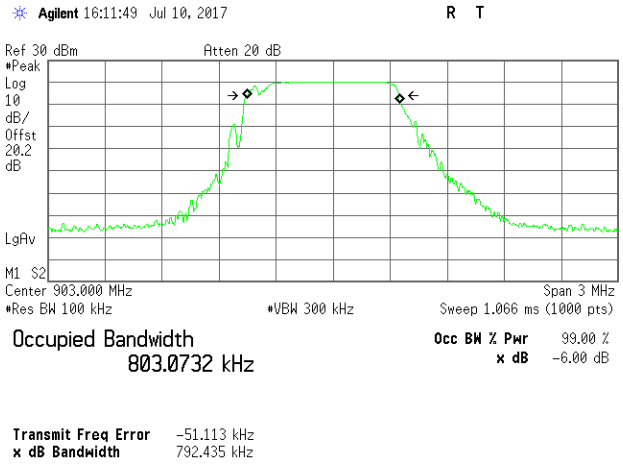
Test results for FHSS:

Fundamental Frequency, [MHz]	Bandwidth [kHz]	SF	20 dB FHSS Bandwidth, [kHz]	99% DTS Bandwidth, [kHz]	Maximum Bandwidth, [kHz]	Margin, [kHz]	Result
902.300	125.000	7	148.957	129.362	500.000	351.043	Pass
908.600	125.000	7	145.742	128.510	500.000	354.258	Pass
914.900	125.000	7	148.967	130.294	500.000	351.033	Pass
902.300	125.000	10	143.805	128.382	500.000	356.195	Pass
908.600	125.000	10	144.133	129.500	500.000	355.867	Pass
914.900	125.000	10	143.889	130.562	500.000	356.111	Pass

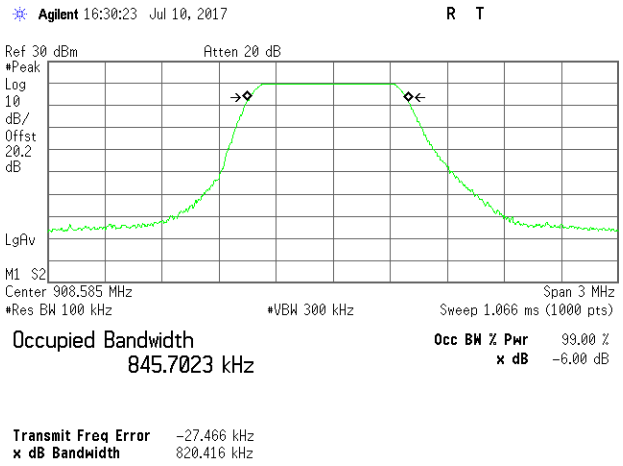
Plot 3.1.1: 6 dB DTS Bandwidth, Fc= 916.3 MHz BW=500 kHz SF=7



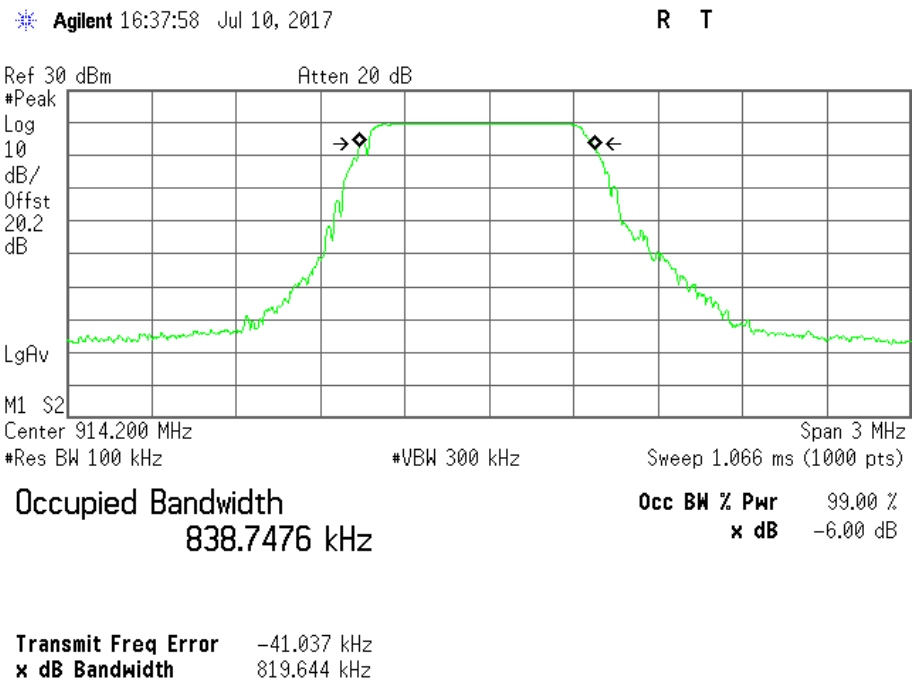
Plot 3.1.2:DTS Bandwidth, Fc = 903.0MHz BW=500 kHz SF=8



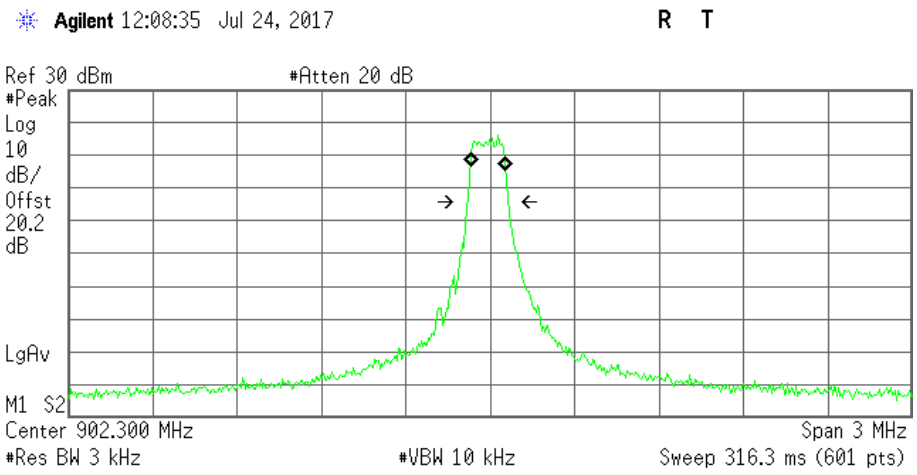
Plot 3.1.3: DTS Bandwidth, Fc = 908.6MHz BW=500 kHz SF=8



Plot 3.1.4: DTS Bandwidth, Fc = 914.2MHz BW=500 kHz SF=8

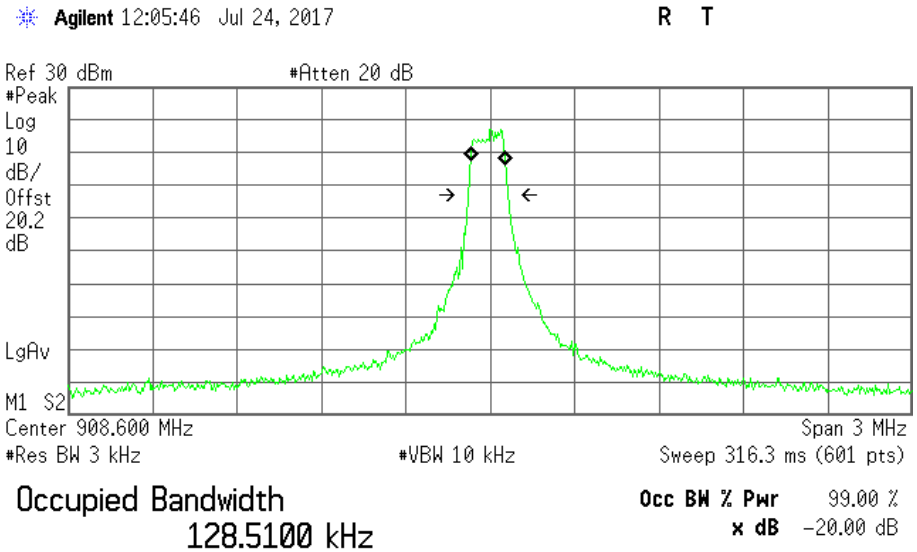


Plot 3.1.5: 20 dB FHSS Bandwidth, Fc = 902.3 MHz, BW 125 kHz, SF 7



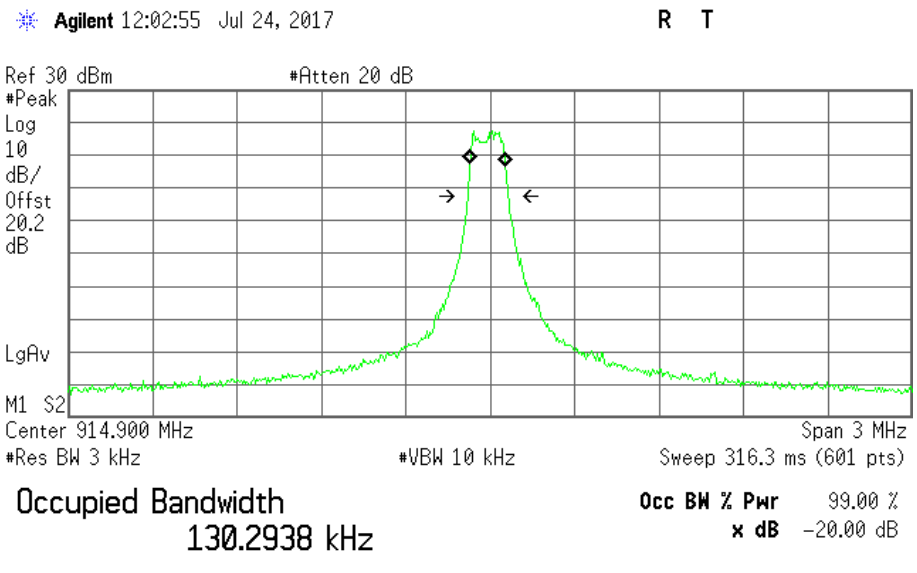
Transmit Freq Error −7.770 kHz
x dB Bandwidth 148.957 kHz

Plot 3.1.6: 20 dB FHSS Bandwidth, Fc = 908.6 MHz, BW 125 kHz, SF 7

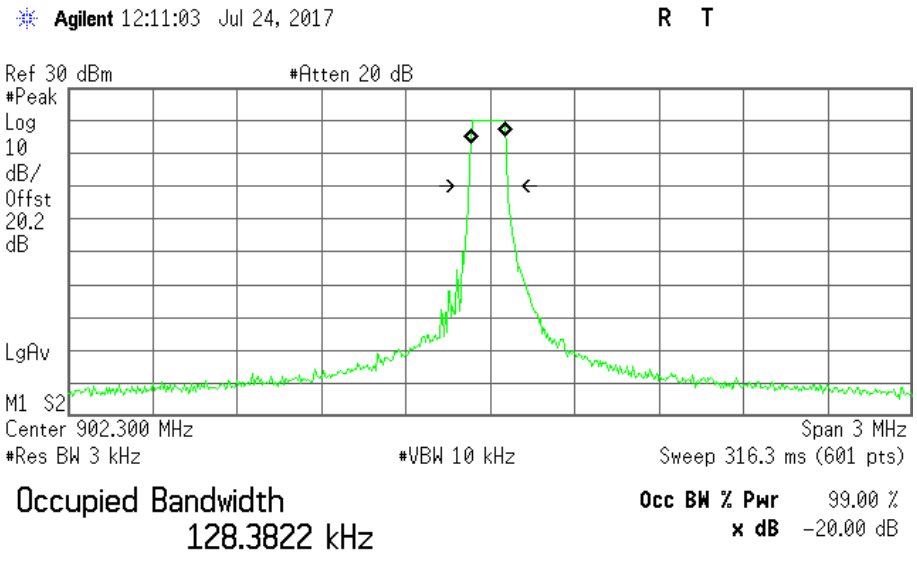


Transmit Freq Error −7.613 kHz
x dB Bandwidth 145.742 kHz

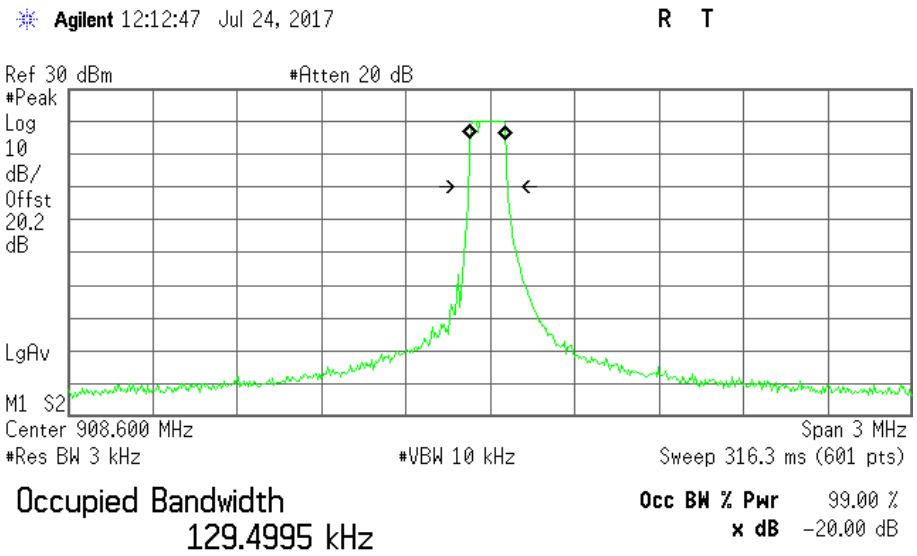
Plot 3.1.7: 20 dB FHSS Bandwidth, Fc = 914.9 MHz, BW 125 kHz, SF 7



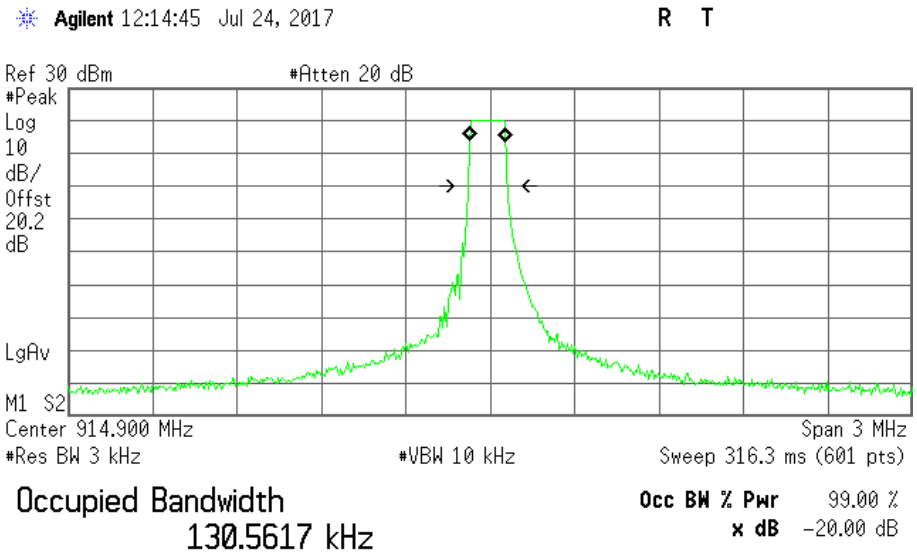
Plot 3.1.8: 20 dB FHSS Bandwidth, Fc = 902.3 MHz, BW 125 kHz, SF 10



Plot 3.1.9: 20 dB FHSS Bandwidth, Fc = 908.6 MHz, BW 125 kHz, SF 10



Plot 3.1.10: 20 dB FHSS Bandwidth, Fc = 914.9 MHz, BW 125 kHz, SF 10



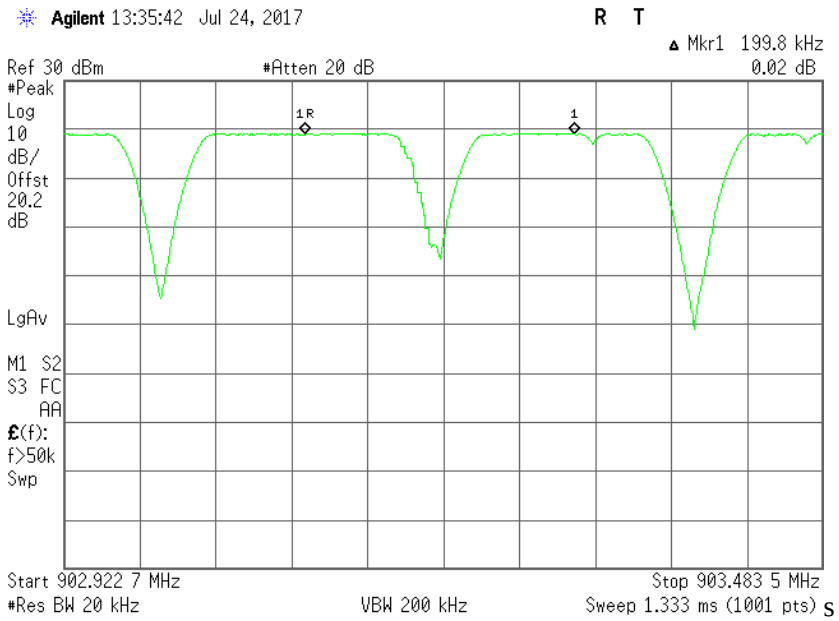
3.2. Carrier Frequency Separation

Reference document:	**47 CFR §15.247 (a) (1), RSS-247 5.1(b),DA 00-705**		
Test Requirements:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.		
Test setup:	See Sec. 2.1	Pass	
Operating conditions:	Under normal test conditions		
Method of testing:	Carrier frequency separation Conducted		
S.A. Settings:	RBW: 20kHz, VBW: 200kHz		
Hopping function:	Enabled		
Environment conditions:	Ambient Temperature: 23.7 °c	Relative Humidity: 59.8 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below		

Test results:

Type of Modulation	Frequency, MHz	20dB BW [kHz]	Measured Carrier separation [kHz]	Limit, [kHz]	Pass/Fail
Hybrid Mode	902.922	148.9	199.8	148.9	Pass

Plot 3.2.1 Carrier Frequency Separation test results



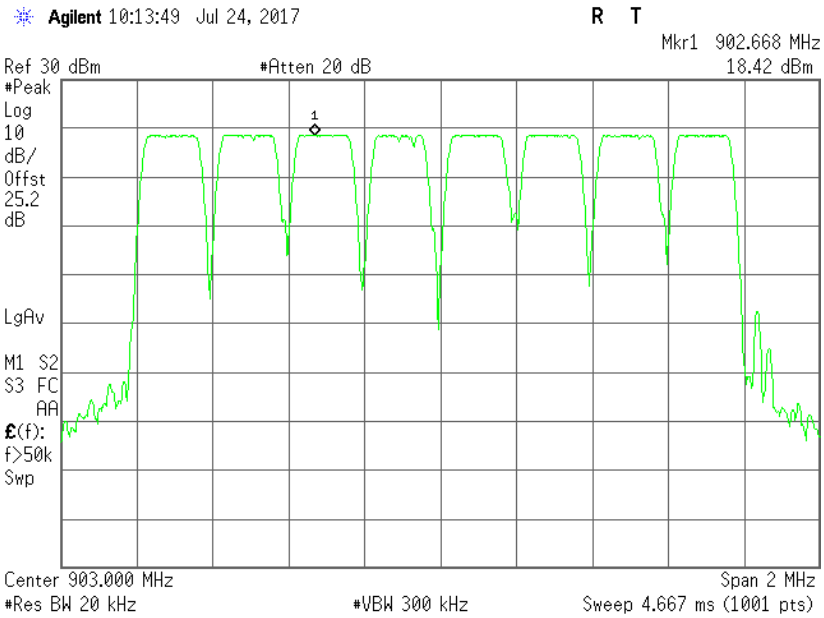
3.3. Average Time of Occupancy (Dwell Time)

Reference document:	**47 CFR §15.247 (f) , RSS-247 5.3(a), DA 00-705**		
Test Requirements:	The average time of occupancy on any channel shall not be greater than 400 msec within a period of 400 msec multiplied by the number of hopping channels employed.		
Test setup:	See Sec. 2.1	Pass	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 1MHz, VBW: 8MHz, Span:0 centered on hopping channel		
Hopping function:	Enabled		
Environment conditions:	Ambient Temperature: 23.2 °C	Relative Humidity: 59.8%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below		

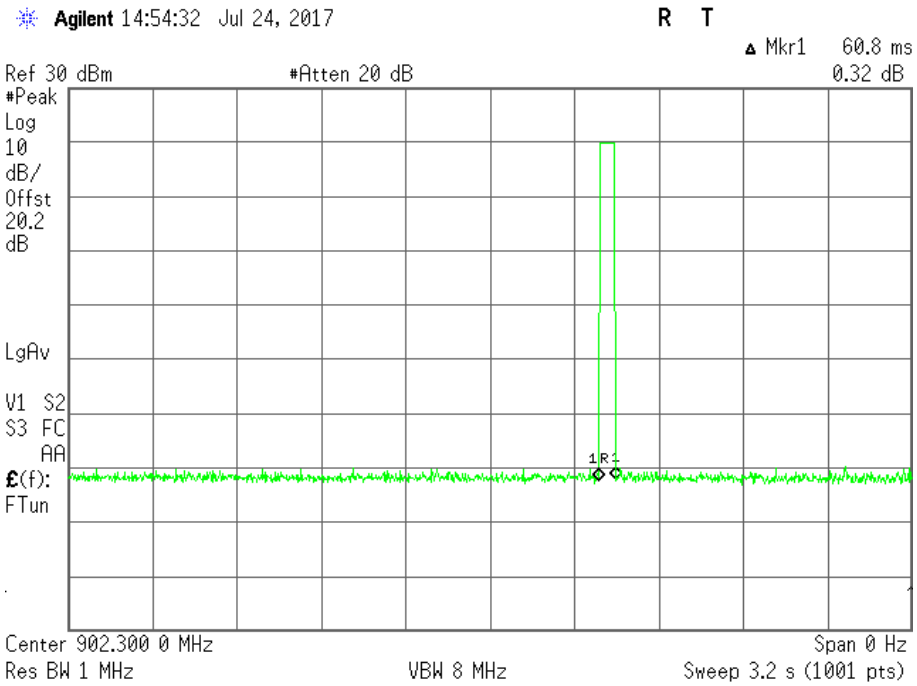
Test results:

Type of Modulation	Frequency, MHz	Pulse length Time, msec	Number of Hopping Channels	Period Time, s	Limit, [msec]	Margin, msec	Pass/Fail
SF 7	902.3	60.8	8	3.2	400.0	-339.2	Pass
SF 10	902.3	352.0	8		400.0	-48.0	Pass

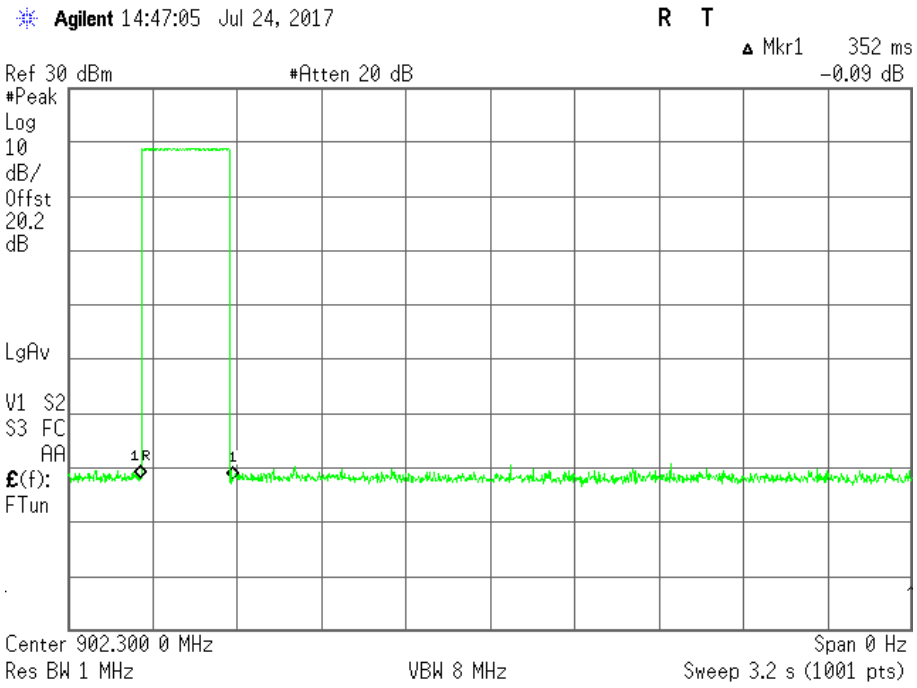
Plot 3.3.1: Number of Hopping Channels test results, LoRa



Plot 3.3.2: Average Time of Occupancy (Dwell Time) test results, Time slot length, Fc=902.3, SF=7



Plot 3.3.3: Average Time of Occupancy (Dwell Time) test results, Time slot length, Fc=902.3, SF=10



3.4. Fundamental Emission Output Power

Reference document:	**47 CFR §15.247 (b)(2)(3), RSS 247 5.4 (a)(d)**		
Test Requirements:	The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands shall not exceed 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted (average) output power. The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.		
Method of testing:	KDB 558074 D01 v04, Sec.9.2.3.1, Conducted AVGPM	**Pass**	
Operating conditions:	Under normal test conditions Modulation: DTS		
Settings:	Triggered/signal-gated broadband power meter		
Environment conditions:	Ambient Temperature: 23.2°C	Relative Humidity:59.5 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below		

Test Results:

Fundamental Frequency, [MHz]	Transmission Type	SF	Fundamental Emission Output Power		Limit, [mW]	Delta*, [mW]	Pass/Fail
			dBm	mW			
903.0	DTS	8	20.05	101.16	1000.0	-898.84	Pass
908.6	DTS	8	20.05	101.16	1000.0	-898.84	Pass
914.2	DTS	8	20.06	101.39	1000.0	-898.61	Pass
916.3	DTS	7	20.10	102.32	1000.0	-897.78	Pass
902.3	FHSS	7	20.02	100.46	1000.0	-899.54	Pass
908.6	FHSS	7	19.99	99.77	1000.0	-900.23	Pass
914.9	FHSS	7	19.97	99.31	1000.0	-900.69	Pass
902.3	FHSS	10	20.03	100.69	1000.0	-899.31	Pass
908.6	FHSS	10	20.00	100.00	1000.0	-900.00	Pass
914.9	FHSS	10	19.96	99.08	1000.0	-900.02	Pass

*Delta = Fundamental Emission Output Power [mW] – Limit [mW]

3.5. Maximum Power Spectral Density Level in the Fundamental Emissions

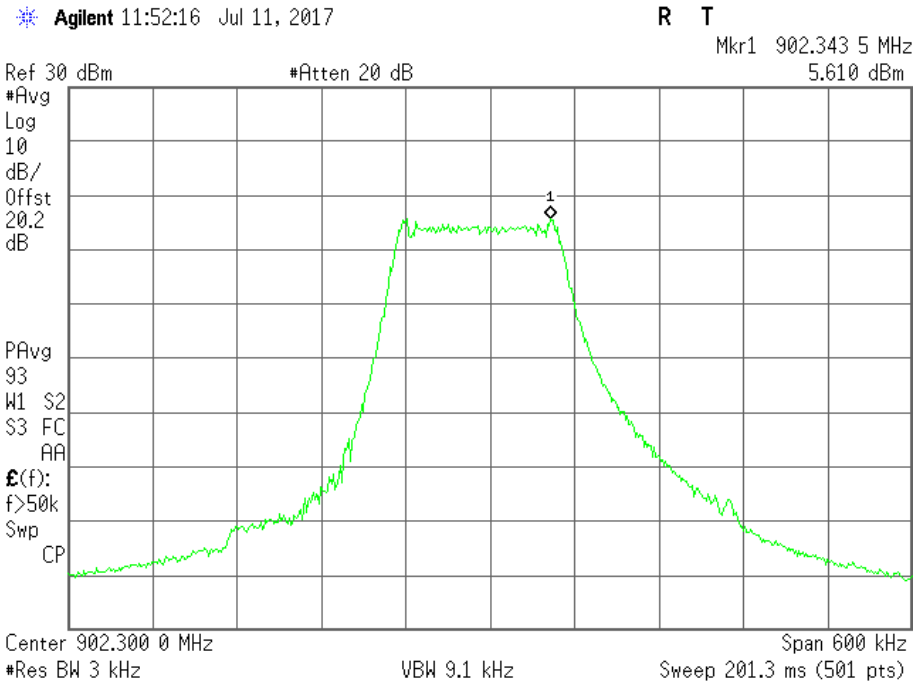
Reference document:	**47 CFR §15.247 (e) & RSS 247 5.2(b)**		
Test Requirements:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.		
Method of testing:	KDB 558074 D01 v04, Sec.10.2 Conducted, AVGPSD-1 method	**Pass**	
Operating conditions:	Under normal test conditions Modulation: DTS, LoRa		
S.A. Settings:	RBW: 3 kHz, VBW: 9.1 kHz		
Environment conditions:	Ambient Temperature: 23.2 °C	Relative Humidity: 59.7%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 3.3.1 - Plot 3.3.3	

Test Results:

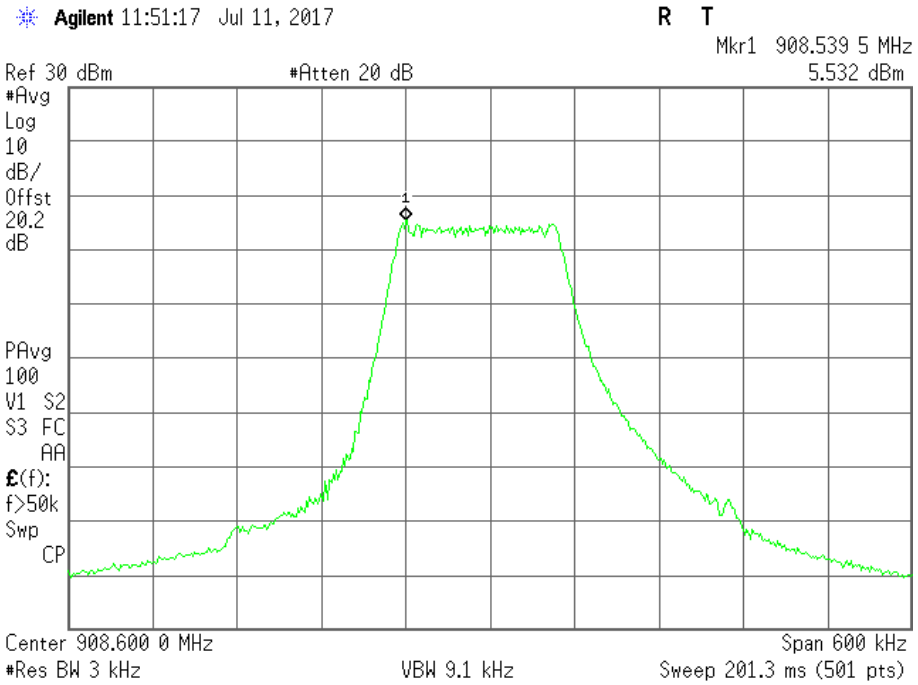
Fundamental Frequency, [MHz]	SF	BW, [kHz]	PSD Measured, [dBm/3kHz]	PSD Limit, [dBm/3kHz]	Delta*, [dB]	Pass/Fail
902.300	7	125.000	5.610	8.00	2.390	Pass
908.600	7	125.000	5.532	8.00	2.468	Pass
914.900	7	125.000	5.642	8.00	2.358	Pass
916.300	7	500.000	-1.182	8.00	9.182	Pass
903.000	8	500.000	-0.597	8.00	8.597	Pass
908.600	8	500.000	-0.262	8.00	8.262	Pass
914.200	8	500.000	-0.769	8.00	8.769	Pass
902.300	10	125.000	6.313	8.00	1.687	Pass
908.600	10	125.000	5.882	8.00	2.118	Pass
914.900	10	125.000	5.823	8.00	2.177	Pass

*Delta = PSD Measured – PSD Limit

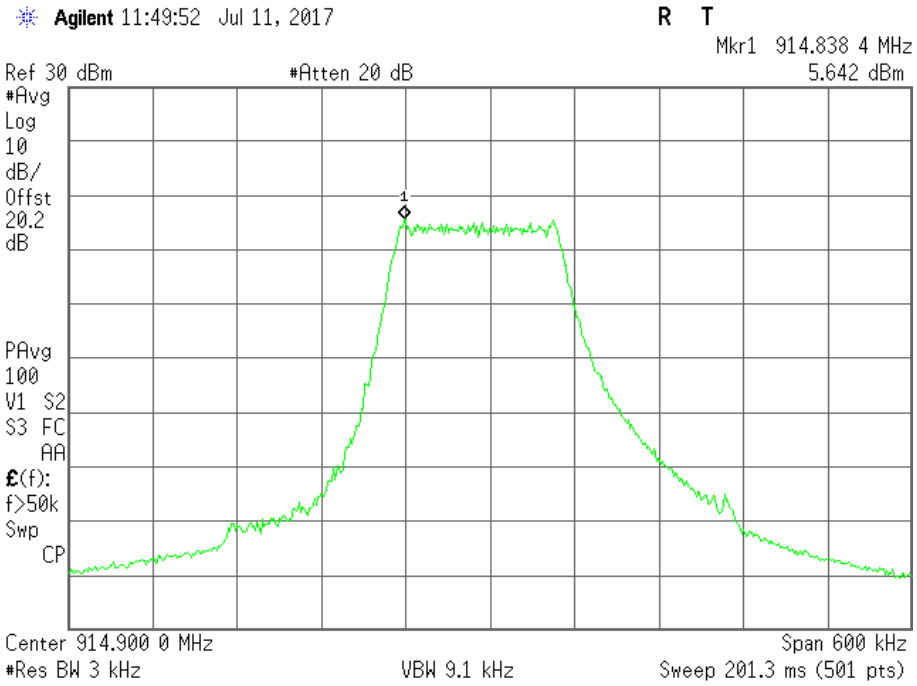
Plot 3.5.1: Maximum Power Spectral Density test results, Fc = 902.3 MHz, BW=125 kHz, SF=7



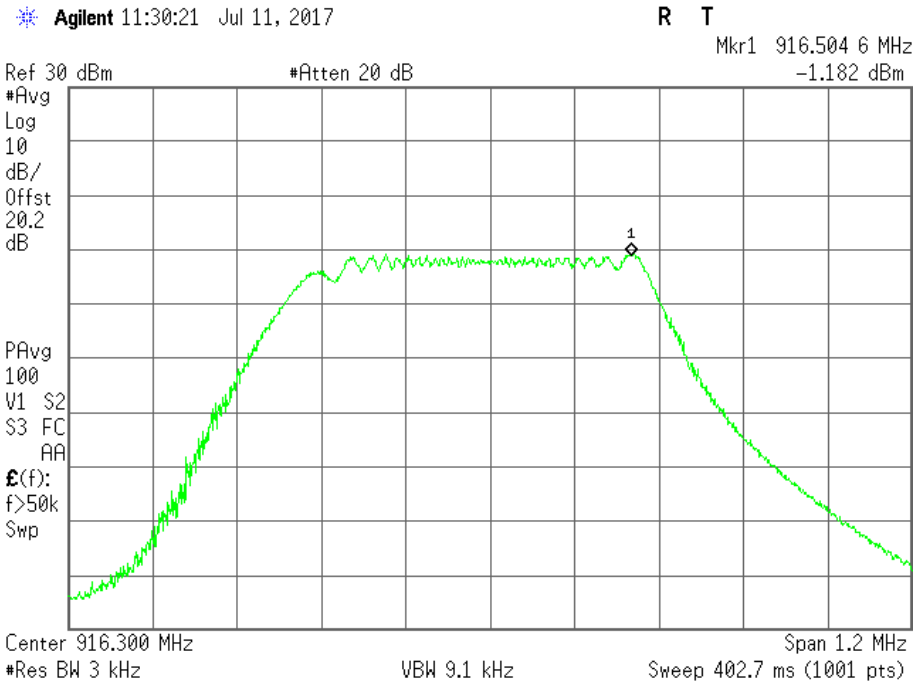
Plot 3.5.2: Maximum Power Spectral Density test results, Fc = 908.6 MHz, BW=125 kHz, SF=7



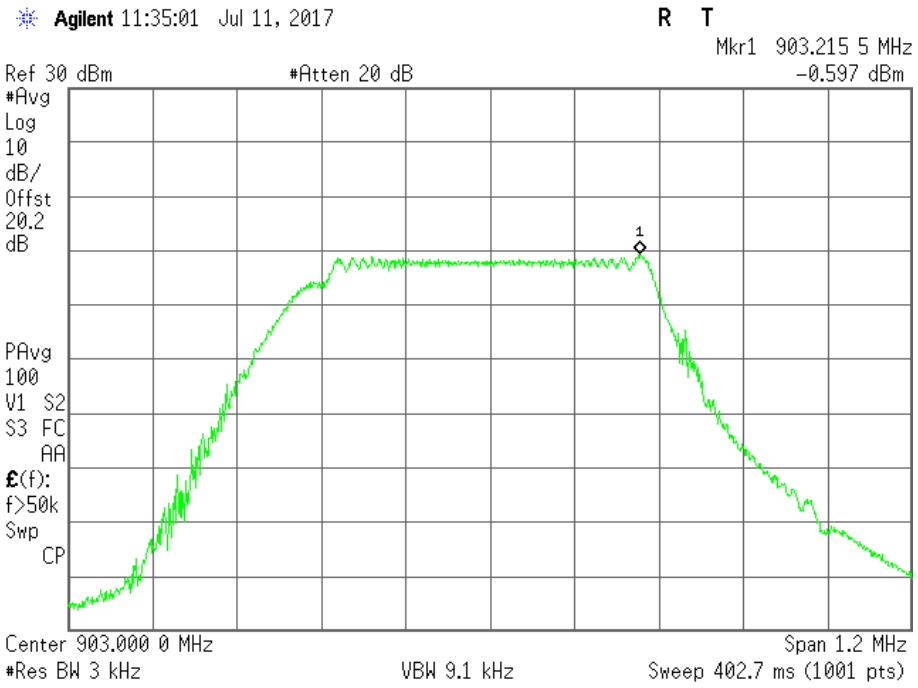
Plot 3.5.3: Maximum Power Spectral Density test results, Fc = 914.9 MHz, BW=125 kHz, SF=7



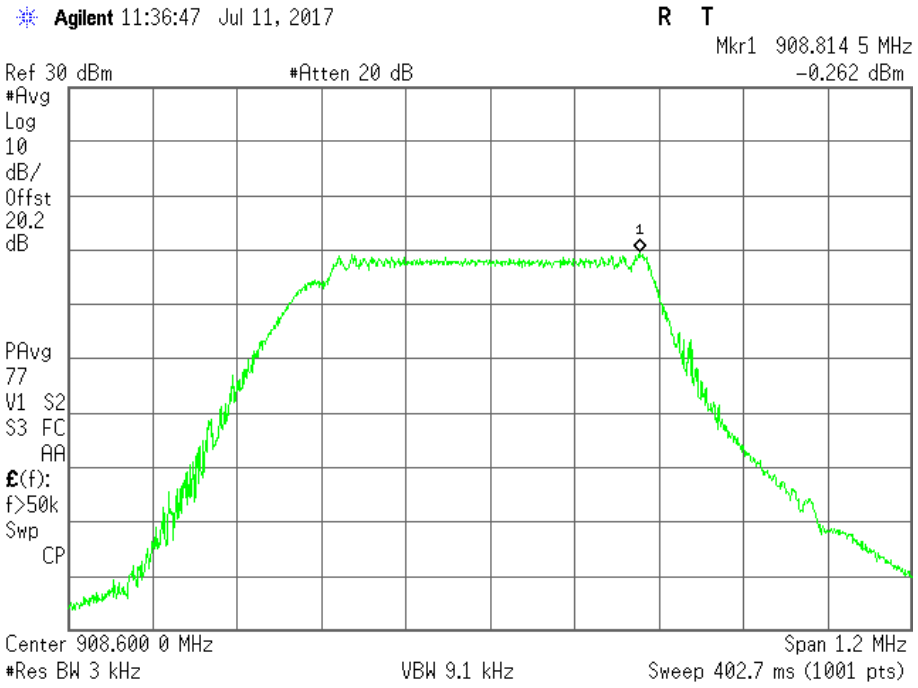
Plot 3.5.4: Maximum Power Spectral Density test results, Fc = 916.3 MHz, BW=500 kHz, SF=7



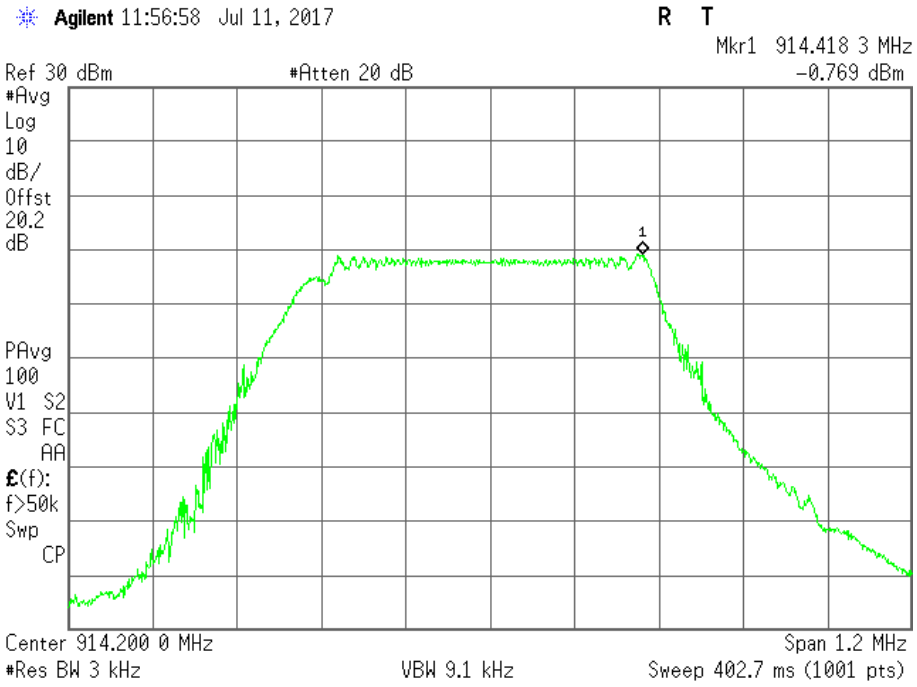
Plot 3.5.5: Maximum Power Spectral Density test results, Fc = 903.0 MHz, BW=500 kHz, SF=8



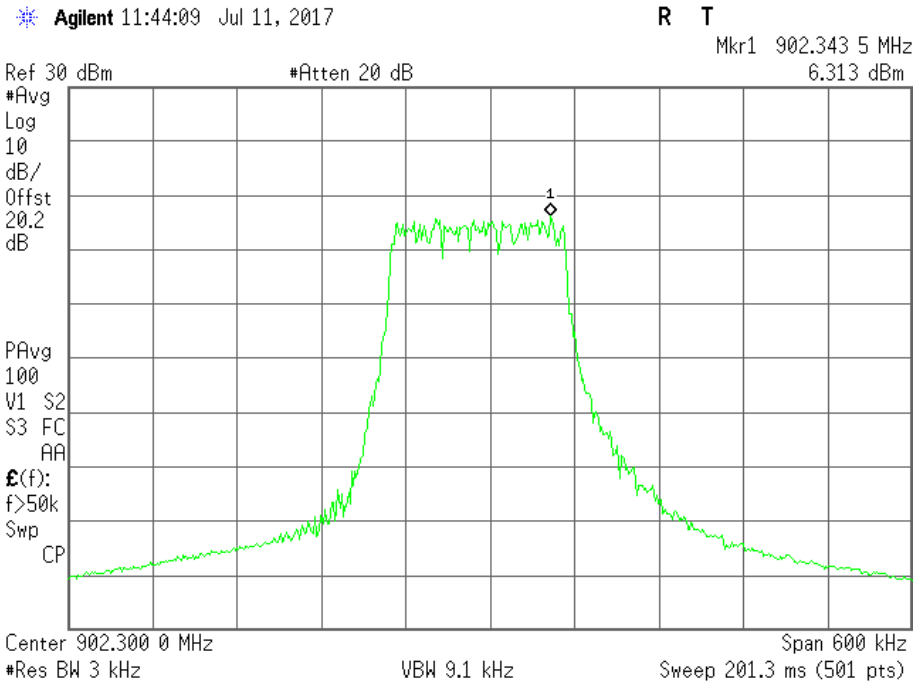
Plot 3.5.6: Maximum Power Spectral Density test results, Fc = 908.6 MHz, BW=500 kHz, SF=8



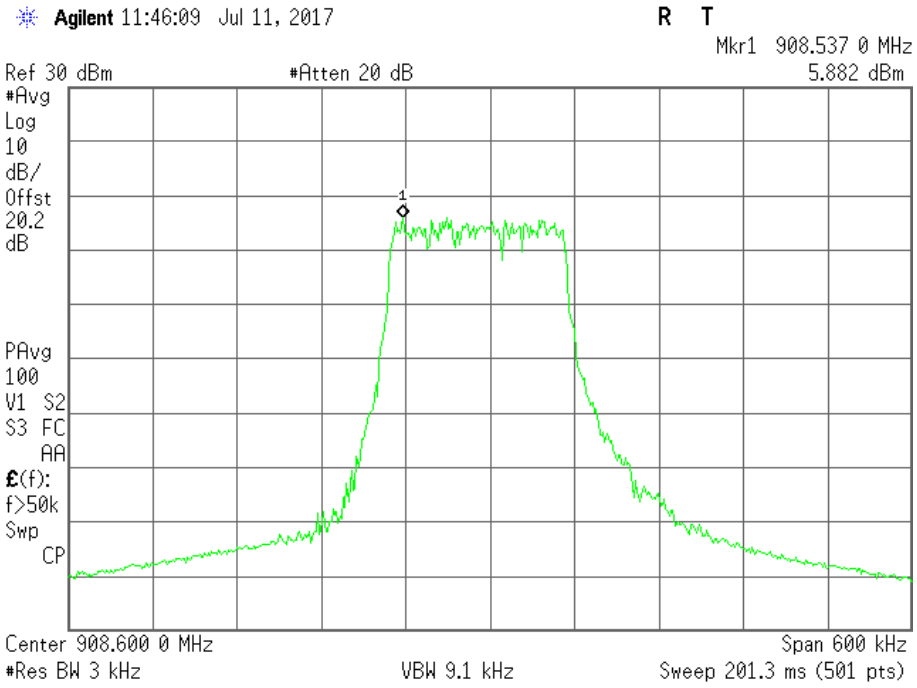
Plot 3.5.7: Maximum Power Spectral Density test results, Fc = 914.2 MHz, BW=500 kHz, SF=8



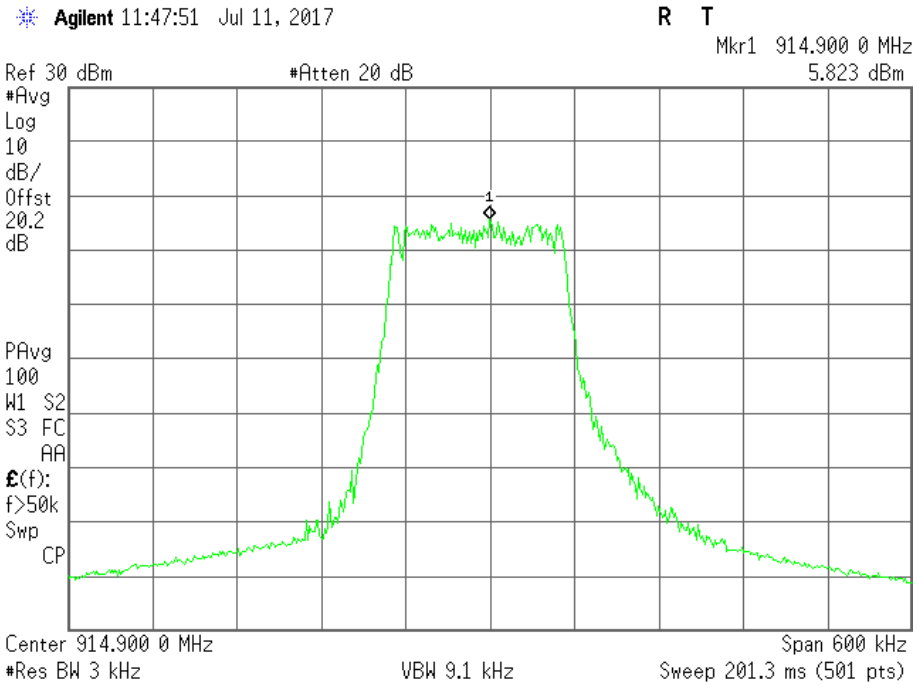
Plot 3.5.8: Maximum Power Spectral Density test results, Fc = 902.3 MHz, BW=125 kHz, SF=10



Plot 3.5.9: Maximum Power Spectral Density test results, Fc = 908.6 MHz, BW=125 kHz, SF=10



Plot 3.5.10: Maximum Power Spectral Density test results, Fc = 914.9 MHz, BW=125 kHz, SF=10



3.6. Emissions in Non-Restricted Frequency Bands

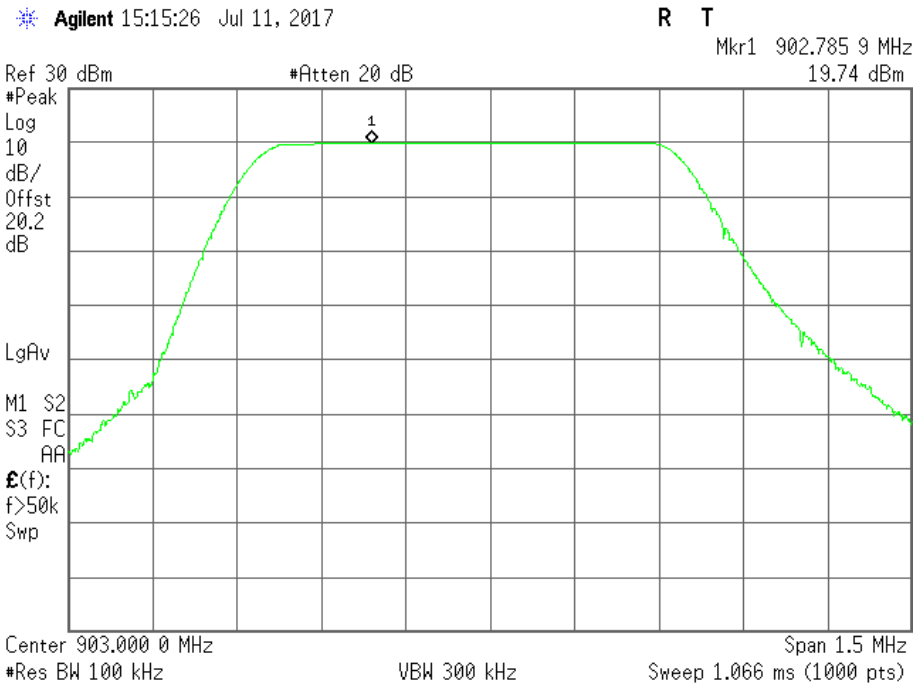
Reference document:	**47 CFR §15.247 (d) & RSS 247 5.5**		
Test Requirements:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (See §15.205(c)).		
Method of testing:	KDB 558074 D01 v04 Sec.11.1, b) Conducted	Pass	
Operating conditions:	Under normal test conditions Modulation: DTS, FHSS		
S.A. Settings:	RBW: 100 kHz, VBW:3 MHz		
Environment conditions:	Ambient Temperature: 23.4°C	Relative Humidity: 59.6%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below		

Test results:

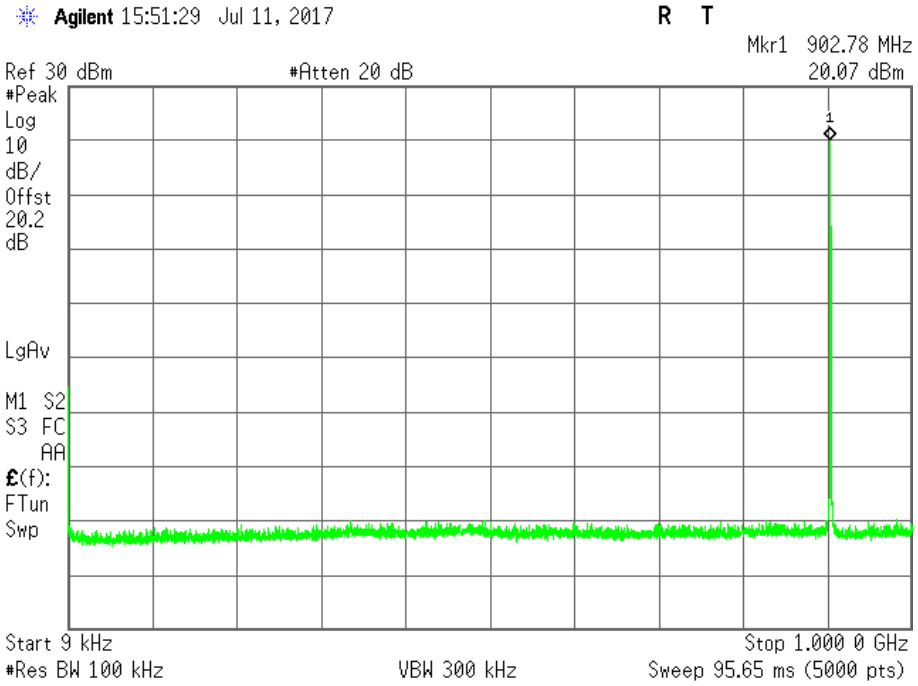
Fundamental Frequency, [MHz]	Fundamental Emission Reference Level, [dBm]	SF	Unwanted Emissions Frequency, [MHz]	Unwanted Emissions Level, [dBm]	Attenuation Below Fundamental, [dB]	Minimum Attenuation Below Fundamental, [dB]	Margin, [dB]	Pass/Fail
903.000	19.74	8	1806.600	-50.77	70.51	≥ 30.00	-40.51	Pass
		8	3187.400	-50.92	70.37	≥ 30.00	-40.37	Pass
		8	7708.100	-49.59	69.33	≥ 30.00	-39.33	Pass
908.600	19.73	8	1817.400	-52.06	71.79	≥ 30.00	-41.79	Pass
		8	3196.400	-52.89	72.62	≥ 30.00	-42.62	Pass
		8	7353.500	-50.26	69.99	≥ 30.00	-39.99	Pass
914.200	19.70	8	1828.200	-51.29	70.99	≥ 30.00	-40.99	Pass
		8	3142.400	-51.72	71.42	≥ 30.00	-41.42	Pass
		8	7601.900	-49.97	69.67	≥ 30.00	-39.67	Pass
916.300	19.69	7	1833.600	-52.02	71.71	≥ 30.00	-41.71	Pass
		7	3081.200	-53.06	72.75	≥ 30.00	-42.75	Pass
		7	7389.500	-49.18	68.87	≥ 30.00	-38.87	Pass

Fundamental Frequency, [MHz]	Fundamental Emission Reference Level, [dBm]	SF	Unwanted Emissions Frequency, [MHz]	Unwanted Emissions Level, [dBm]	Attenuation Below Fundamental, [dB]	Minimum Attenuation Below Fundamental, [dB]	Margin, [dB]	Pass/Fail
902.300	19.72	7	1803.000	-50.10	69.82	≥ 30.00	-39.82	Pass
		7	3143.000	-52.07	71.79	≥ 30.00	-41.79	Pass
		7	7745.000	-51.01	70.73	≥ 30.00	-40.73	Pass
908.600	19.69	7	1818.000	-50.78	70.47	≥ 30.00	-40.47	Pass
		7	3197.000	-52.72	72.41	≥ 30.00	-42.41	Pass
		7	7191.000	-50.32	70.01	≥ 30.00	-40.01	Pass
914.900	19.67	7	1828.000	-51.77	71.44	≥ 30.00	-41.44	Pass
		7	3215.000	-52.97	72.64	≥ 30.00	-42.64	Pass
		7	7267.000	-50.60	70.27	≥ 30.00	-40.27	Pass
902.300	19.73	10	1803.000	-51.45	71.18	≥ 30.00	-41.18	Pass
		10	3222.000	-53.09	72.82	≥ 30.00	-42.82	Pass
		10	7259.000	-49.79	69.52	≥ 30.00	-39.52	Pass
908.600	19.70	10	1818.000	-51.05	70.75	≥ 30.00	-40.75	Pass
		10	3190.000	-52.26	71.96	≥ 30.00	-41.96	Pass
		10	7547.000	-51.35	71.05	≥ 30.00	-41.05	Pass
914.900	19.66	10	1828.000	-52.20	71.68	≥ 30.00	-41.68	Pass
		10	3193.000	-52.40	72.06	≥ 30.00	-42.06	Pass
		10	7353.000	-50.13	69.79	≥ 30.00	-39.79	Pass

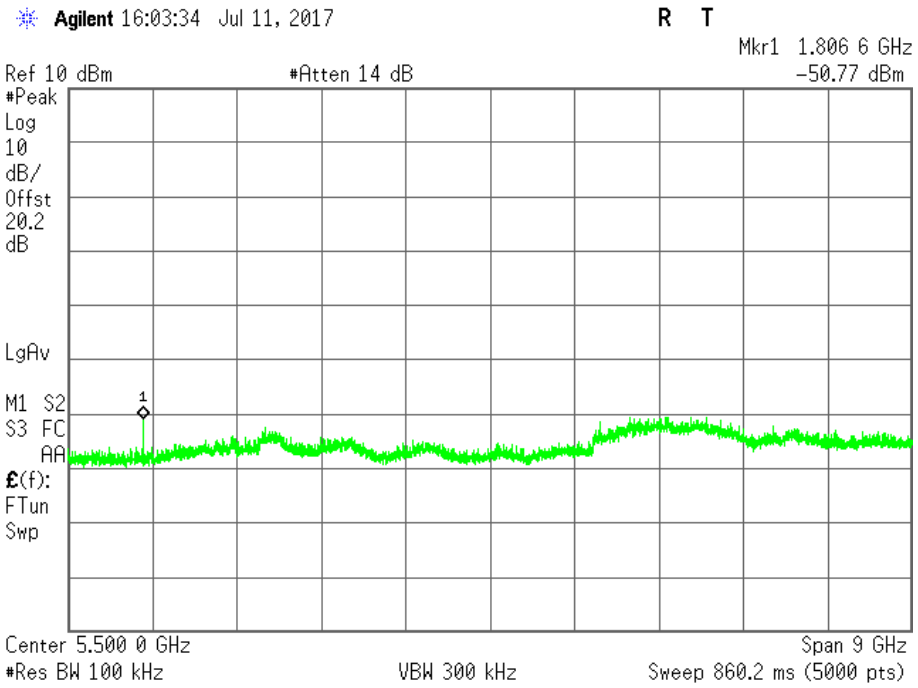
Plot 3.6.1 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 903.0 MHz, BW=500 kHz, SF 8



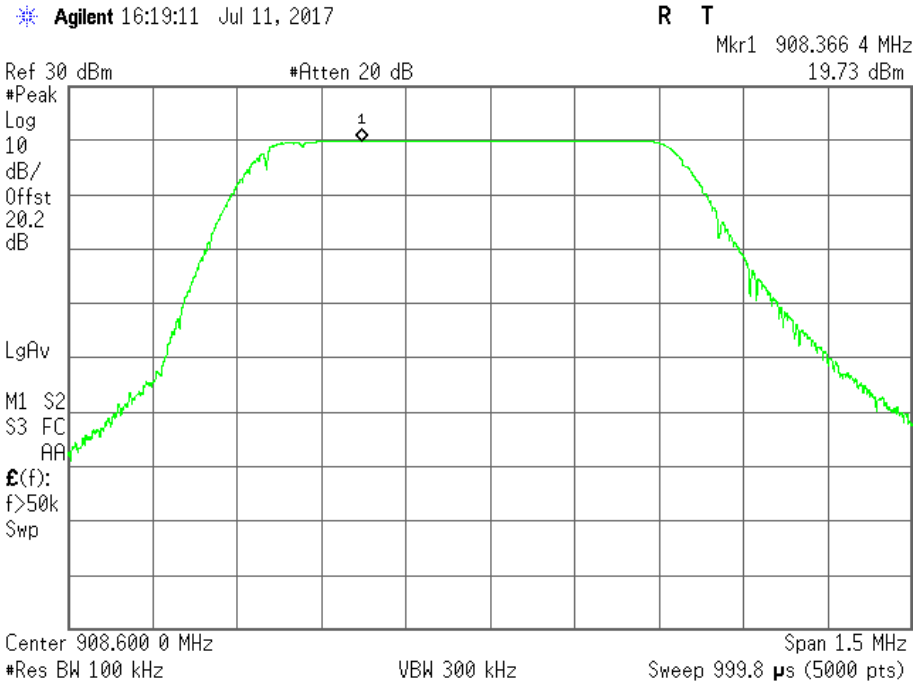
Plot 3.6.2 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 903.0 MHz, BW=500 kHz, SF 8



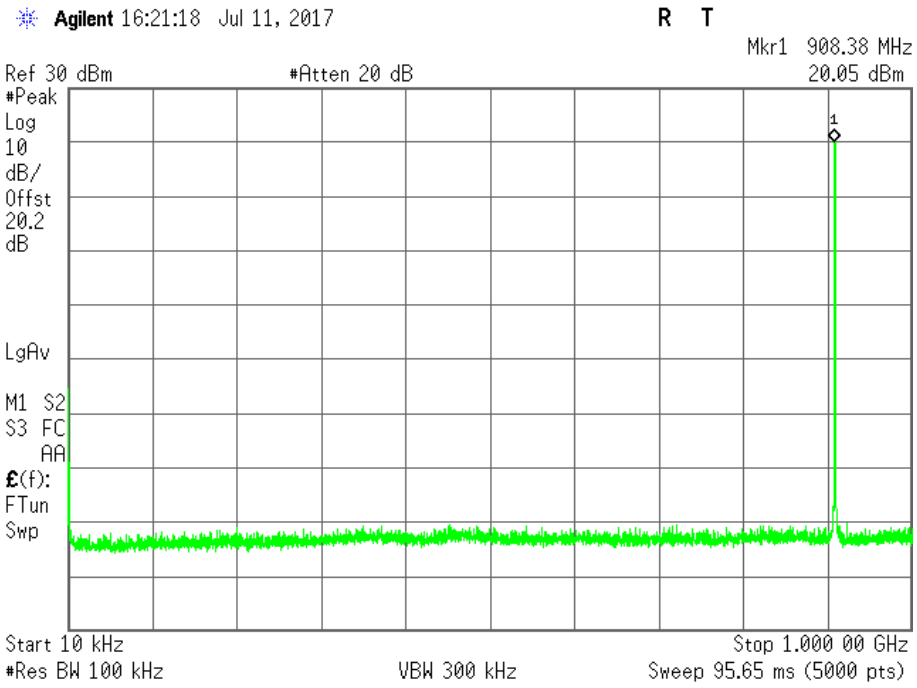
Plot 3.6.3 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 903.0 MHz, BW=500 kHz, SF 8



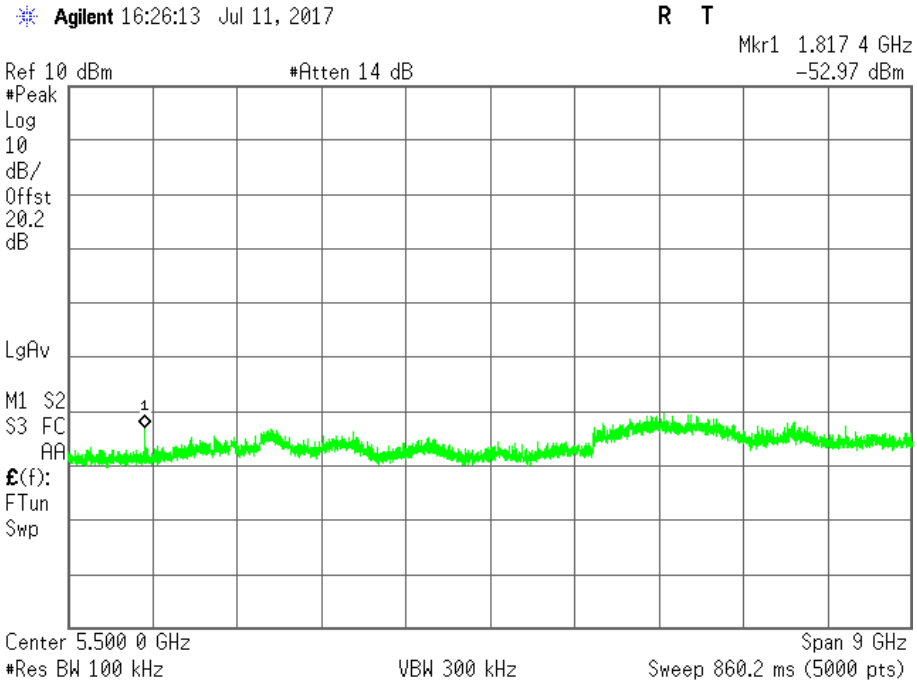
Plot 3.6.4 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 908.6 MHz, BW=500 kHz, SF 8



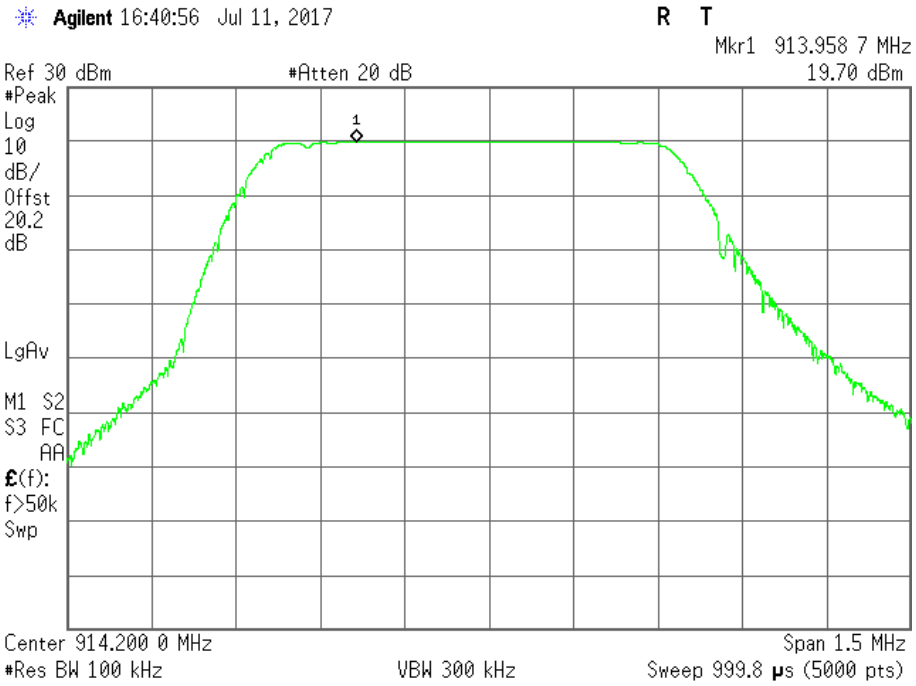
Plot 3.6.5 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 908.6 MHz, BW=500 kHz, SF 8



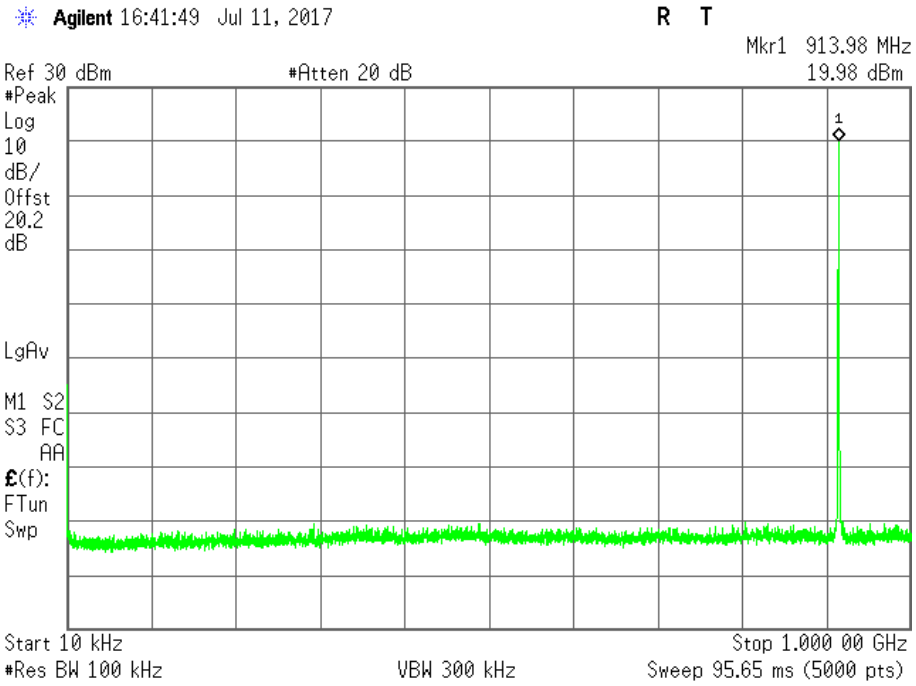
Plot 3.6.6 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 908.6 MHz, BW=500 kHz, SF 8



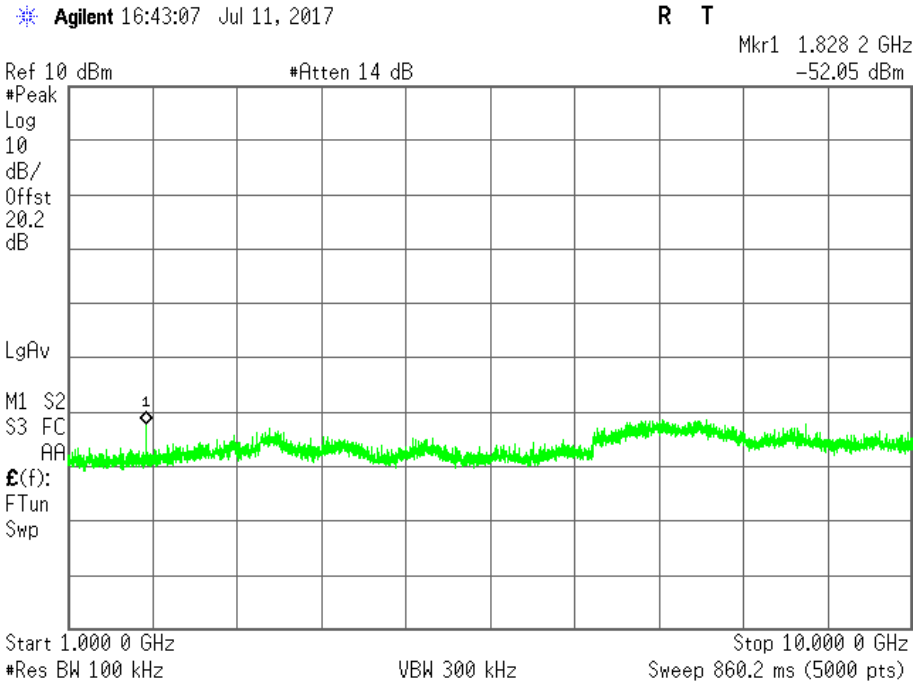
Plot 3.6.7 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 914.2 MHz, BW=500 kHz, SF 8



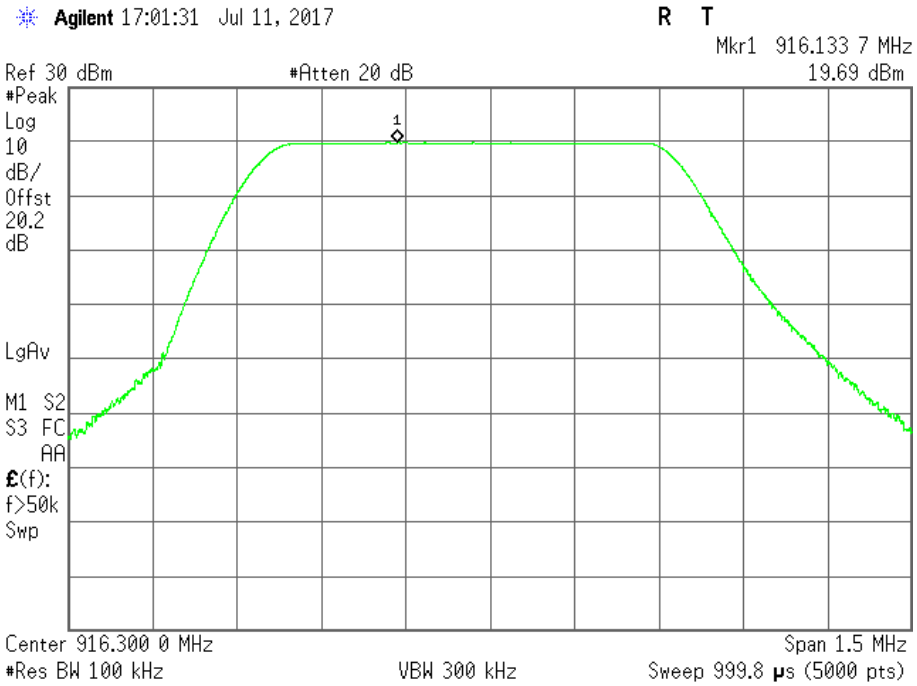
Plot 3.6.8 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 914.2 MHz, BW=500 kHz, SF 8



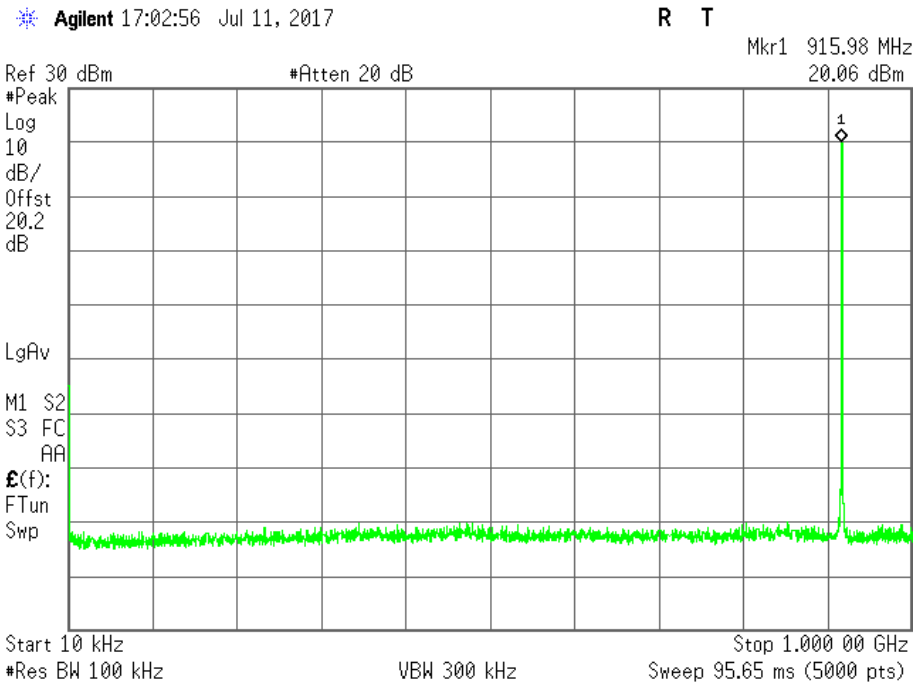
Plot 3.6.9 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 914.2 MHz, BW=500 kHz, SF 8



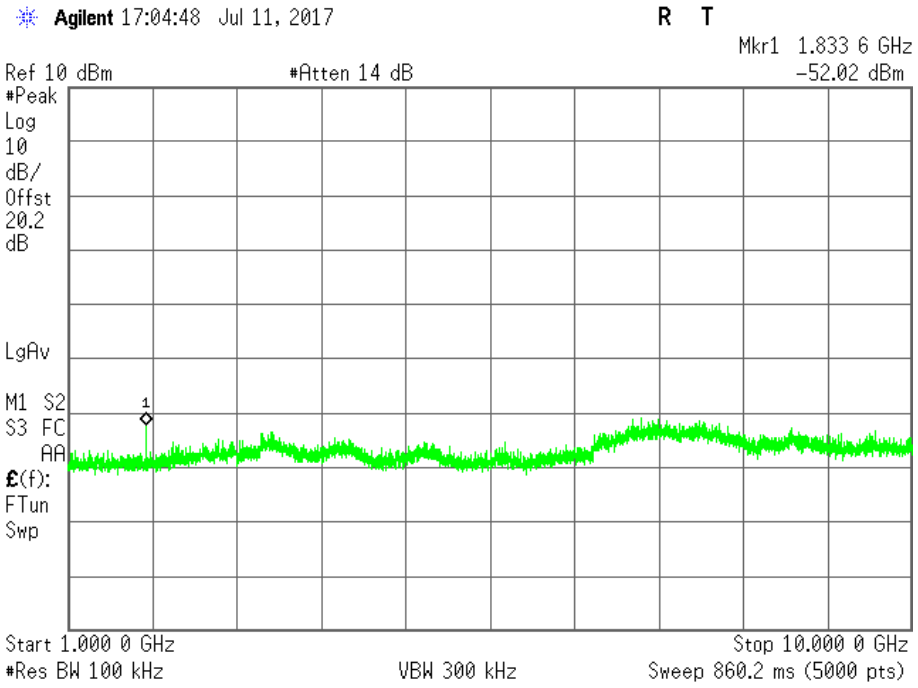
Plot 3.6.10: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 916.3 MHz, BW=500 kHz, SF 7



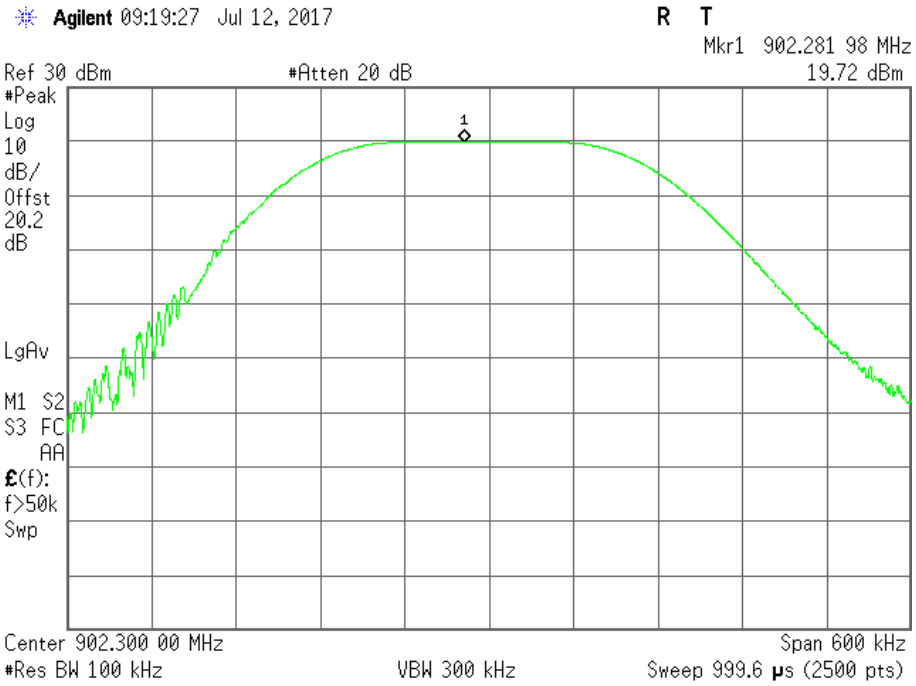
Plot 3.6.11: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 916.3 MHz, BW=500 kHz, SF 7



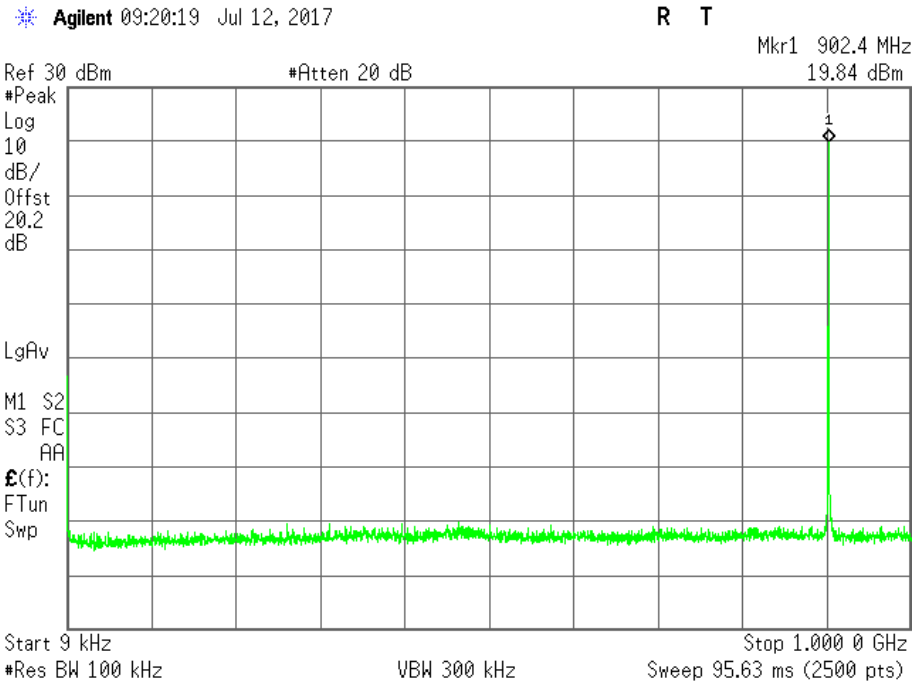
Plot 3.6.12: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 916.3 MHz, BW=500 kHz, SF 7



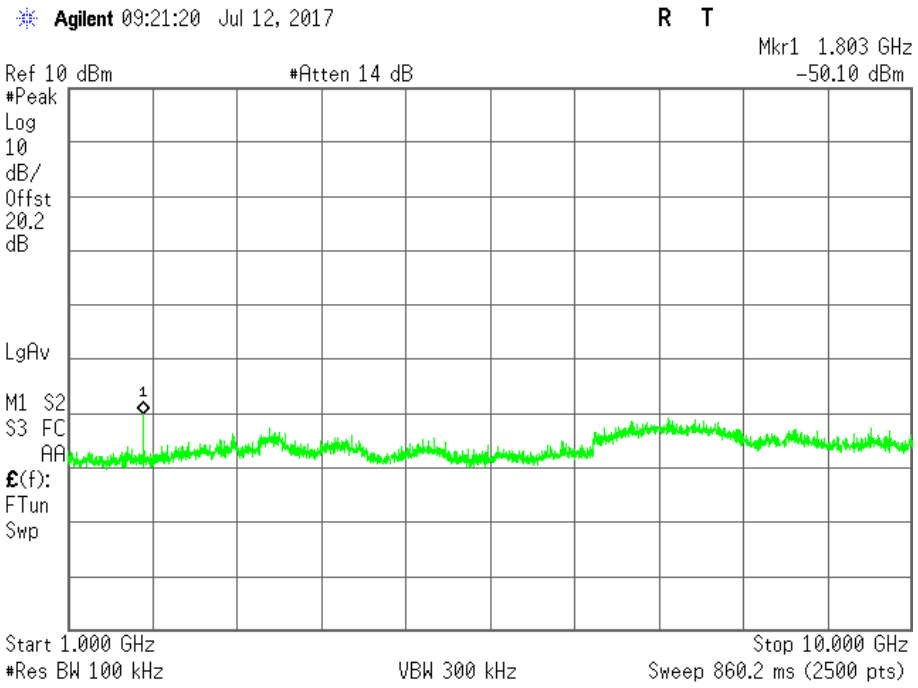
Plot 3.6.13: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 902.3 MHz, BW=125 kHz, SF 7



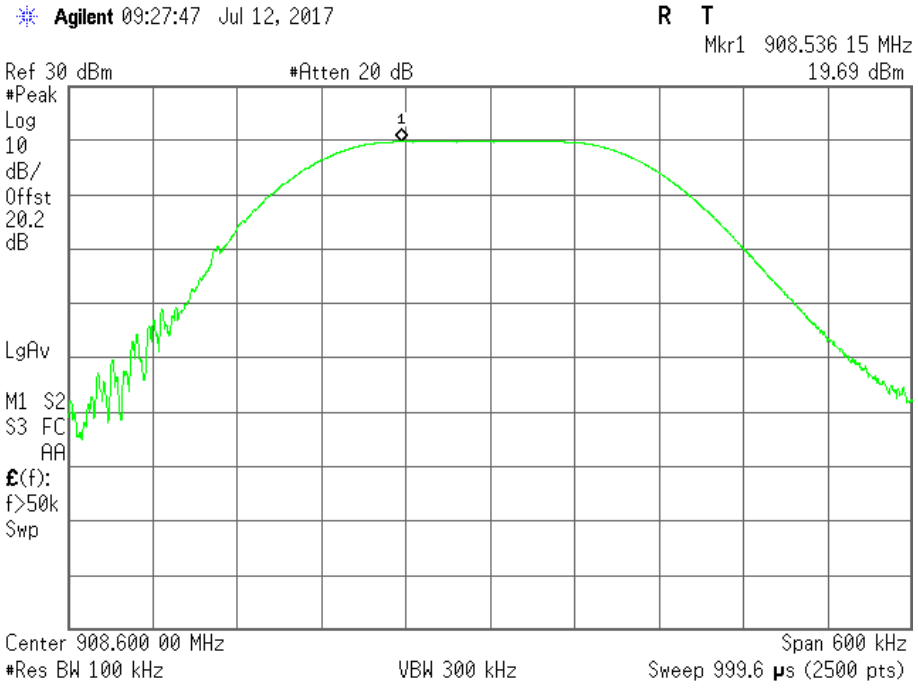
Plot 3.6.14: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 902.3 MHz, BW=125 kHz, SF 7



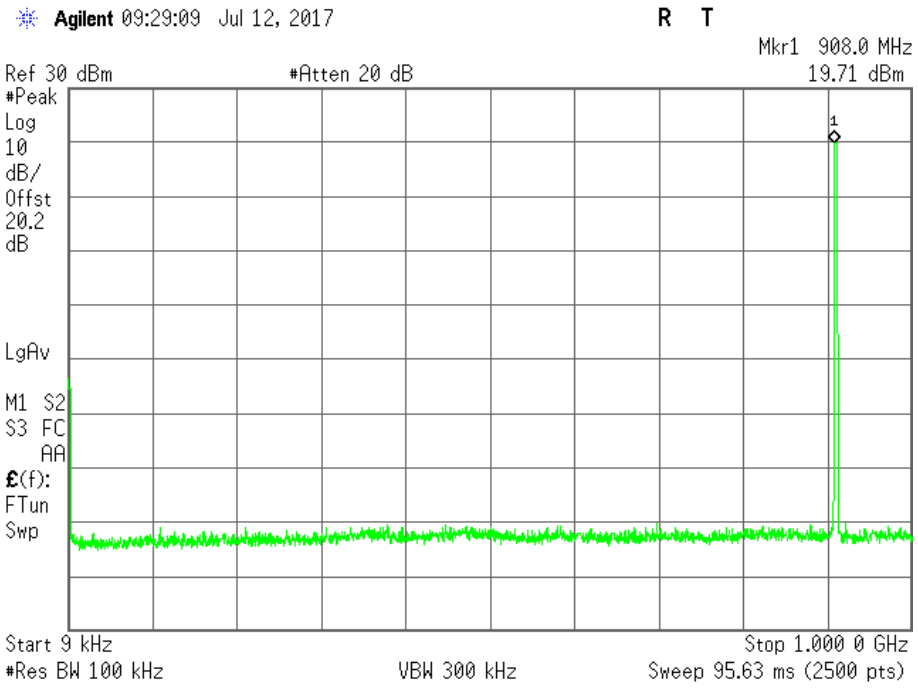
Plot 3.6.15: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 902.3 MHz, BW=125 kHz, SF 7



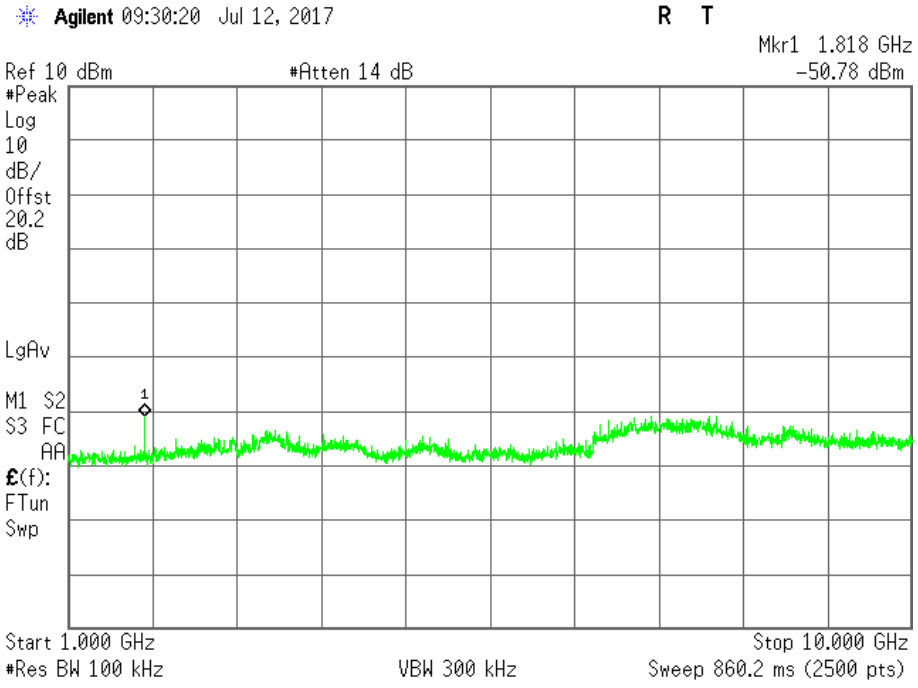
Plot 3.6.16: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 908.6 MHz, BW=125 kHz, SF 7



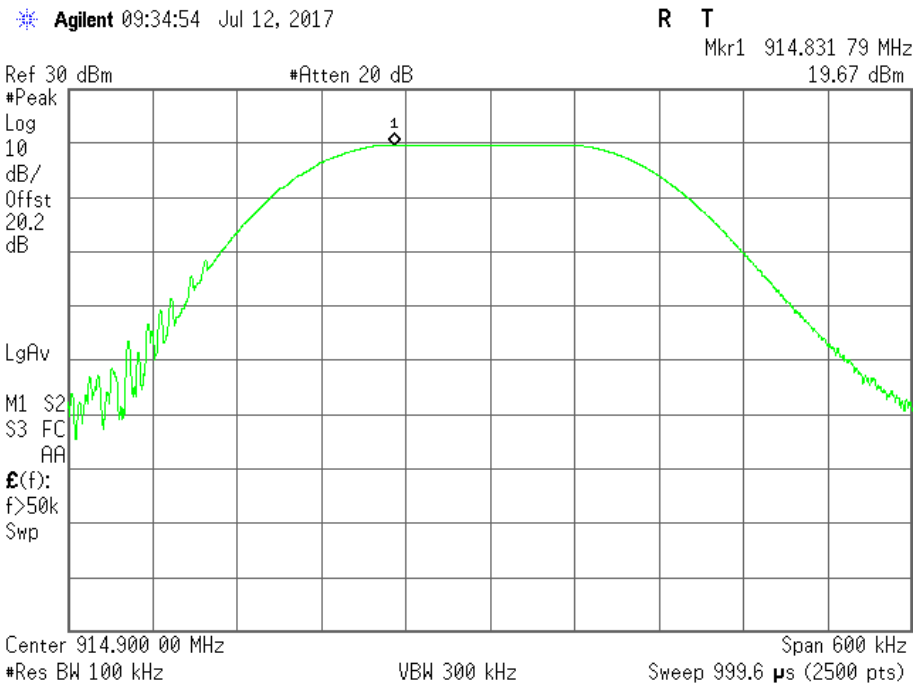
Plot 3.6.17: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 908.6 MHz, BW= 125 kHz, SF 7



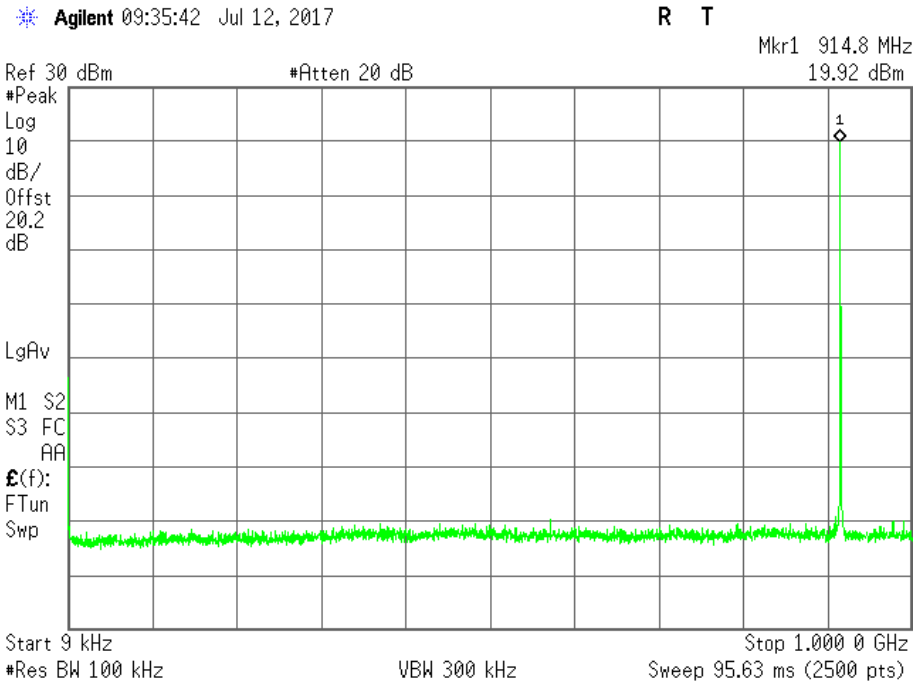
Plot 3.6.18: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 908.6 MHz, BW= 125 kHz, SF 7



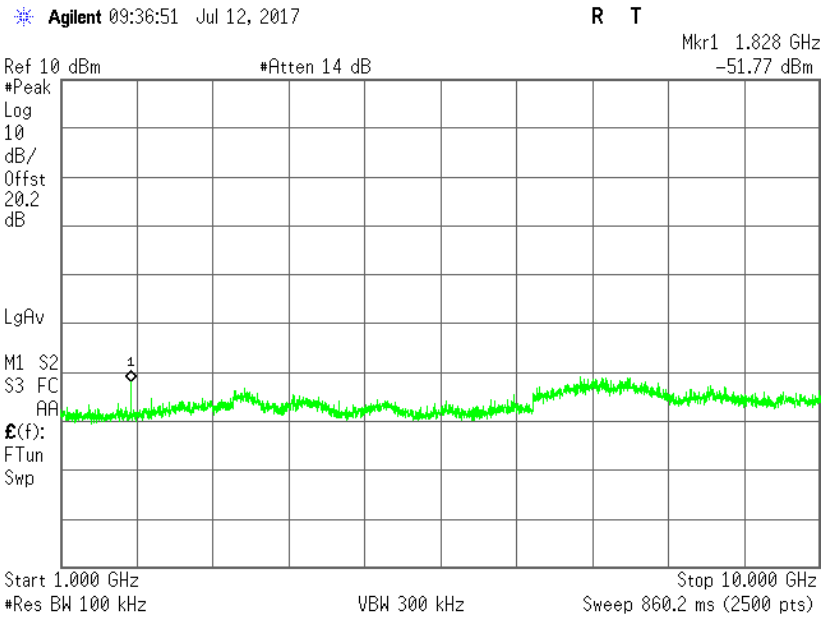
Plot 3.6.19: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 914.9 MHz, BW=125 kHz, SF 7



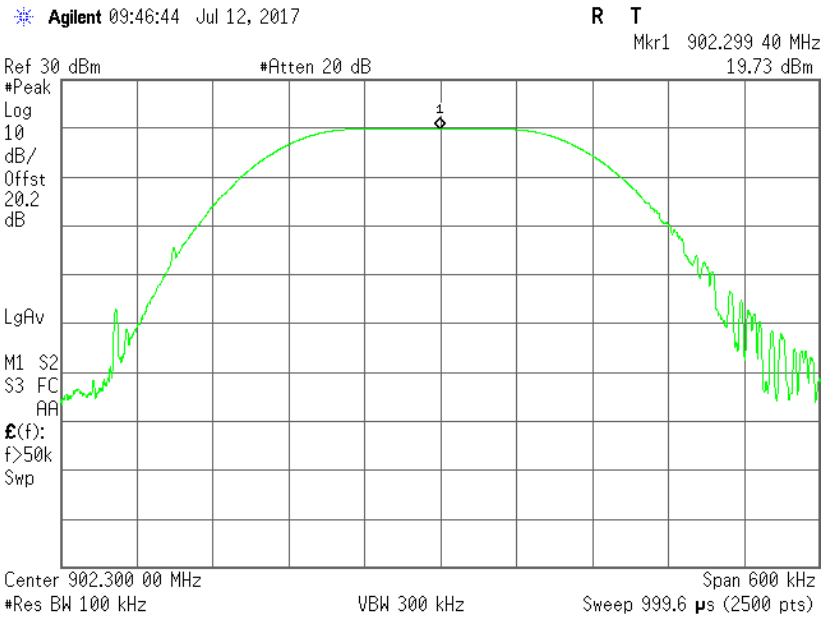
Plot 3.6.20: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 914.9 MHz, BW=125 kHz, SF 7



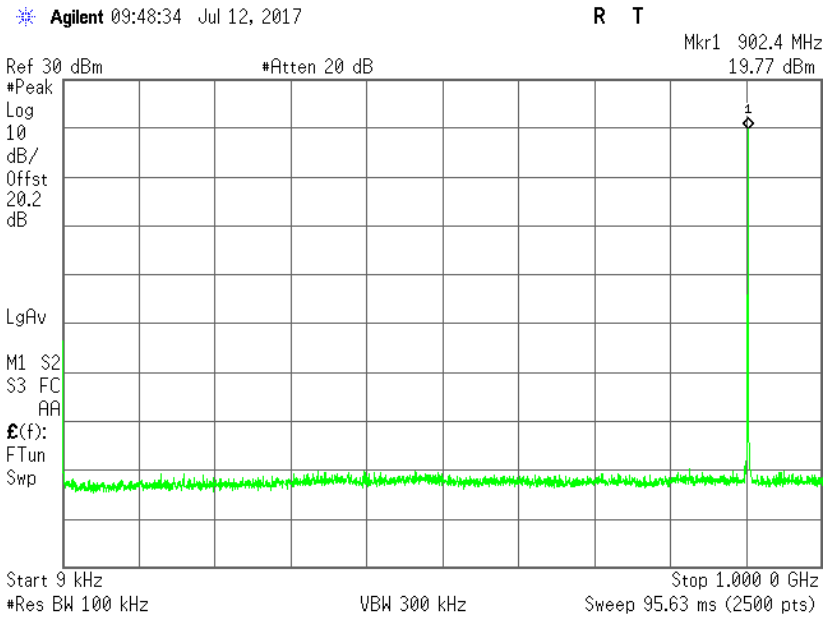
Plot 3.6.21: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 914.9 MHz, BW=125 kHz, SF 7



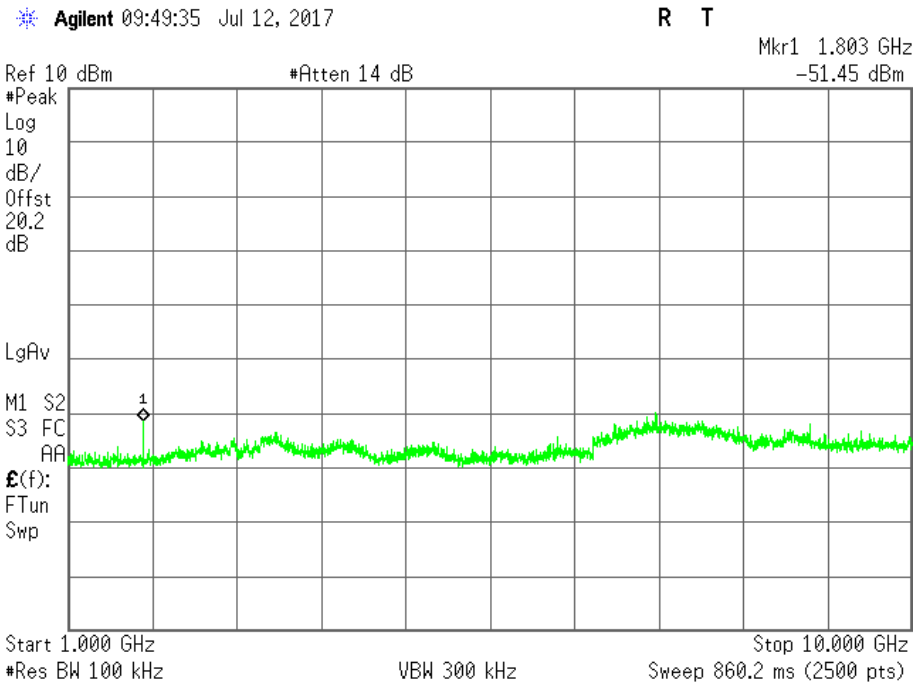
Plot 3.6.22: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 902.3 MHz, BW=125 kHz, SF 10



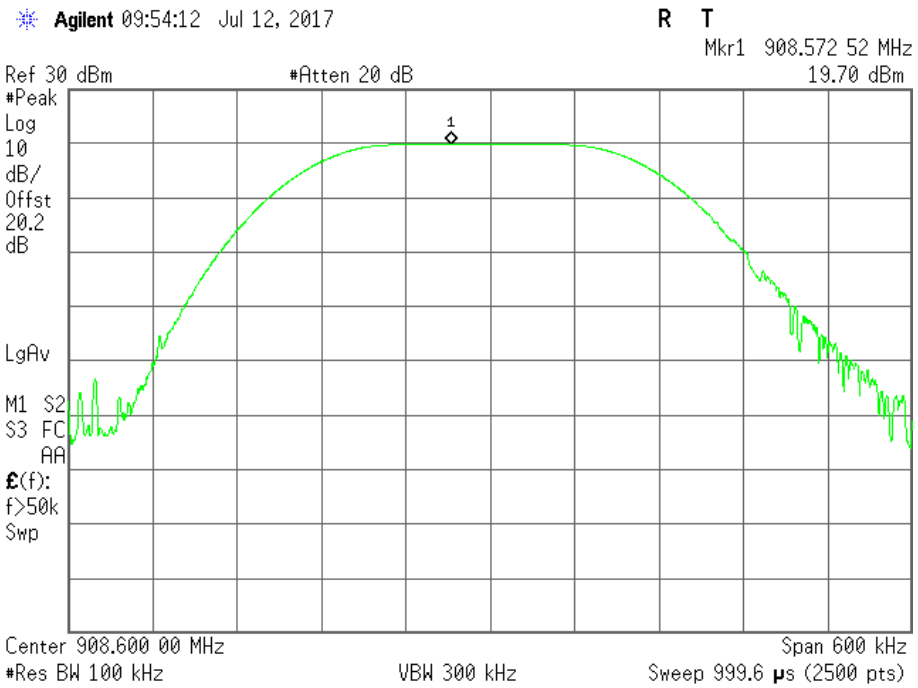
Plot 3.6.23: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 902.3 MHz, BW=125 kHz, SF 10



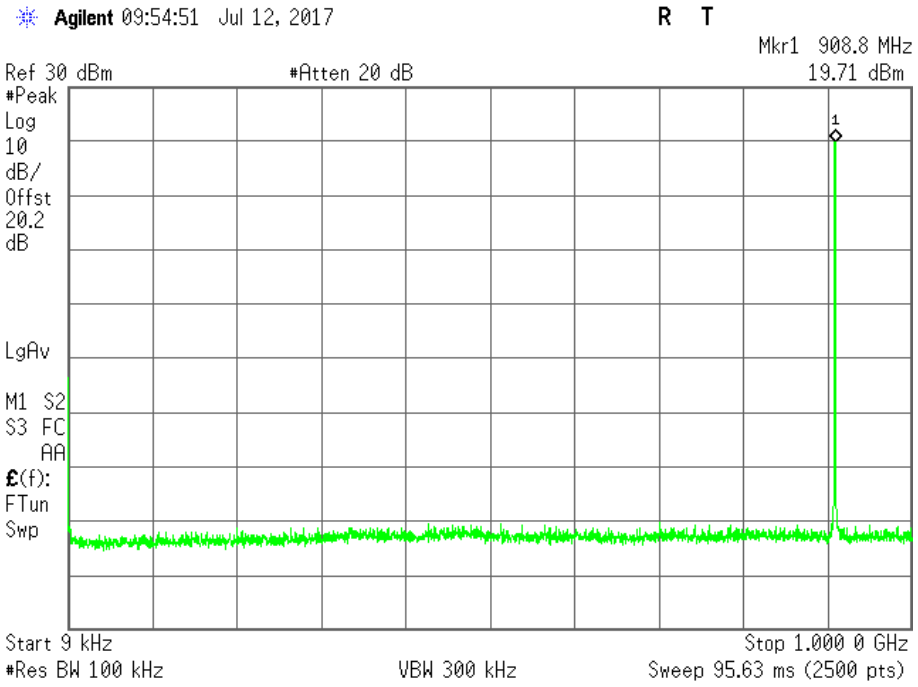
Plot 3.6.24: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 902.3 MHz, BW=125 kHz, SF 10



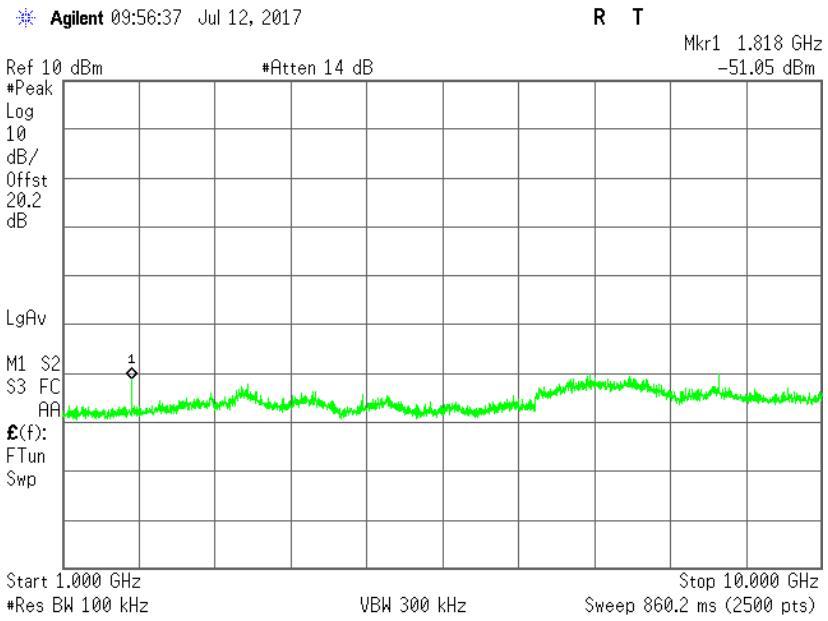
Plot 3.6.25: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 908.6 MHz, BW=125 kHz, SF 10



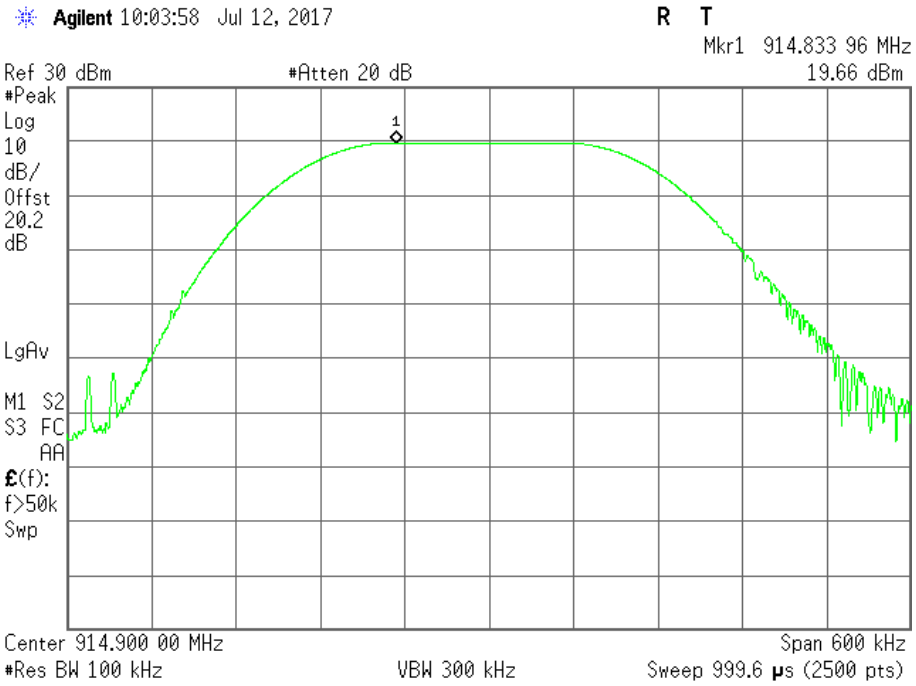
Plot 3.6.26: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 908.6 MHz, BW=125 kHz, SF 10



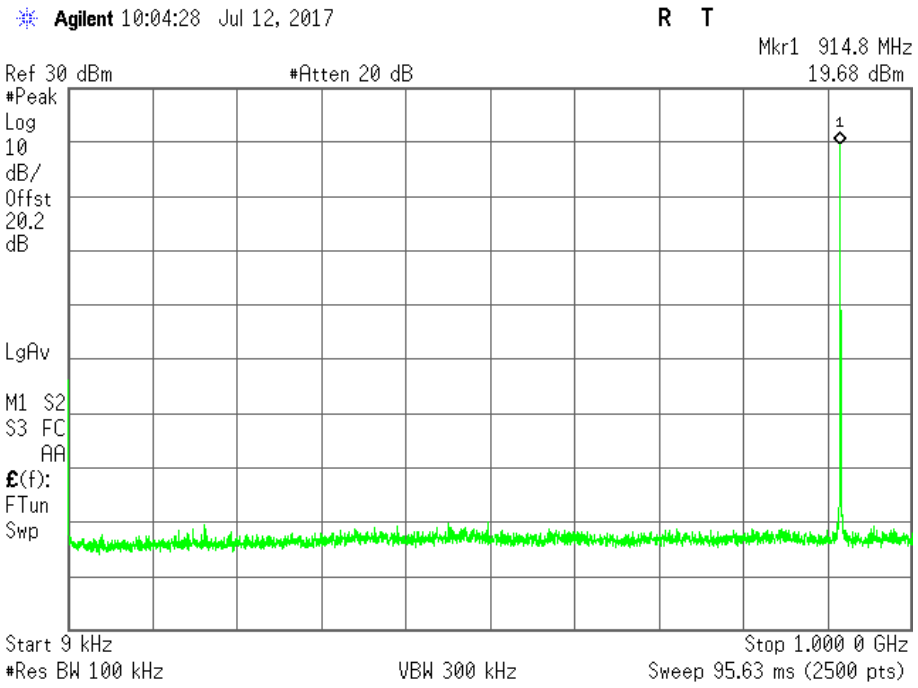
Plot 3.6.27 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 908.6 MHz, BW=125 kHz, SF 10



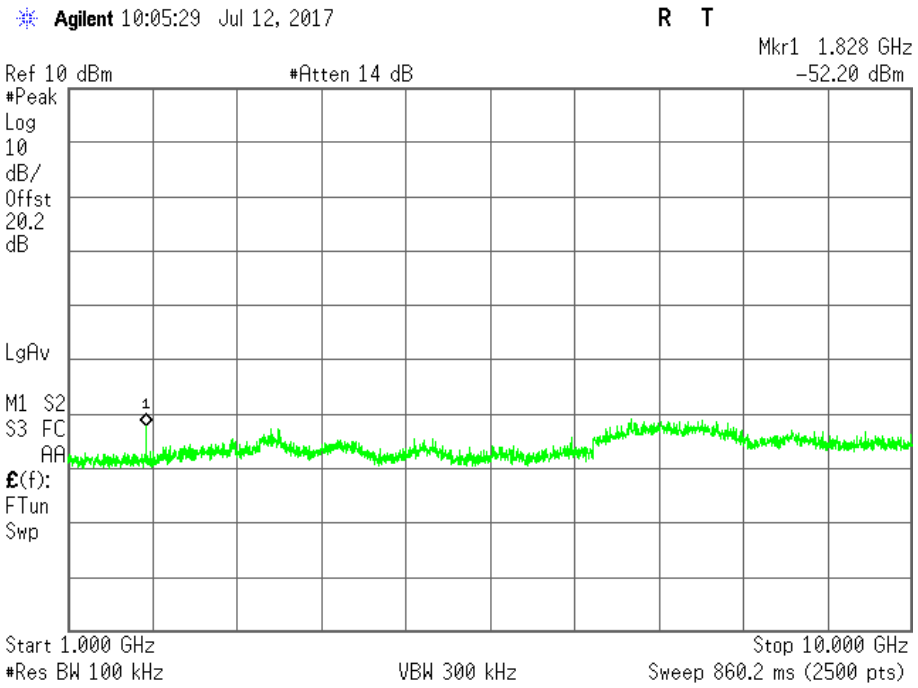
Plot 3.6.28 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 914.9 MHz, BW=125 kHz, SF 10



Plot 3.6.29: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 1 GHz frequency range, Fc = 914.9 MHz, BW=125 kHz, SF 10



Plot 3.6.30: Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 1 GHz – 10 GHz frequency range, Fc = 914.9 MHz, BW=125 kHz, SF 10



3.7. Spurious Emissions and Emissions in restricted frequency bands, Radiated Measurements

Reference document:	**47 CFR §15.247 (d) & §15.209(a) & DA 00-705 & & §15.205, & §15.209(a) & RSS-247 6.2**		
Test Requirements:	The emissions from an intentional radiator shall not exceed the field strength levels specified in §15.209(a).		
Test setup:	See Sec. 2.2	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Radiated		
S.A. Settings:	f >1GHz: Peak: RBW= 1MHz, VBW= 3MHz, Average: VBW= 10 Hz f<1GHz: RBW: 120kHz,VBW**:** 300kHz		
Hopping function:	Disabled (lowest, middle, and highest channels to be investigated)		
Environment conditions:	Ambient Temperature: 23.7 °C	Relative Humidity: 58.9%	Atmospheric Pressure: 1017hPa
Test Result:	See below		
All measurements were done in horizontal and vertical polarizations; the results show the worst case.			

Test results below 1GHz:

Emission Frequency, [MHz]	Detector Type	Antenna Polarization	Emission Level, [dBµV/m]	Limit, [dBµV/m]	Delta, [dB]	Pass/Fail
Lowest Frequency, 902.3 MHz, BW=125 kHz ,SF 7						
245.0	QP	H	28.1	47.0	-18.9	Pass
Middle Frequency, 908.6 MHz, BW=125 kHz ,SF 7						
125.0	QP	V	32.2	44.0	-11.8	Pass
245.0	QP	V	29.2	47.0	-17.8	Pass
Highest Frequency, 914.9 MHz, BW=125 kHz ,SF 7						
245.0	QP	V	26.4	47.0	-20.4	Pass
Lowest Frequency, 902.3 MHz, BW=125 kHz ,SF 10						
125.0	QP	V	31.9	44.0	-12.1	Pass
245.0	QP	H	27.3	47.0	-19.7	Pass
Middle Frequency, 908.6 MHz, BW=125 kHz ,SF 10						
125.0	QP	V	32.9	44.0	-11.1	Pass
245.0	QP	V	28.4	47.0	-18.6	Pass
Highest Frequency, 914.9 MHz, BW=125 kHz ,SF 10						
125.0	QP	V	33.1	44.0	-10.9	Pass
245.0	QP	V	29.9	47.0	-17.1	Pass
Lowest Frequency, 903.0 MHz, BW=500 kHz ,SF 8						
125.0	QP	V	32.1	44.0	-11.9	Pass
245.0	QP	V	26.1	47.0	-20.9	Pass

Middle Frequency, 908.6 MHz, BW=500 kHz ,SF 8						
125.0	QP	V	31.8	44.0	-12.2	Pass
245.0	QP	V	25.8	47.0	-21.2	Pass
Highest Frequency, 914.2 MHz, BW=500 kHz ,SF 8						
125.0	QP	V	32.3	44.0	-11.7	Pass
245.0	QP	V	29.4	47.0	-17.6	Pass
Highest Frequency, 916.3 MHz, BW=500 kHz ,SF 7						
125.0	QP	V	31.3	44.0	-12.7	Pass
150.0	QP	V	26.1	44.0	-17.9	Pass
245.0	QP	V	28.4	47.0	-18.6	Pass

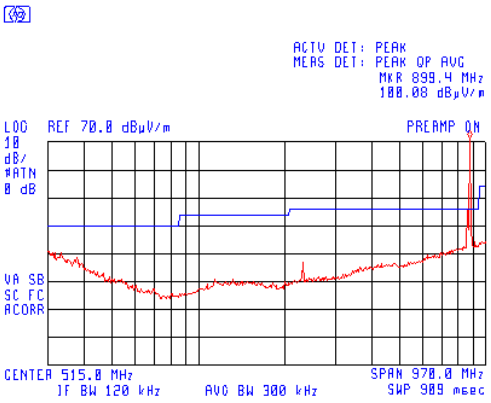
Test results above 1GHz:

Emission Frequency, [MHz]	Detector Type	Antenna Polarization	Emission Level, [dBµV/m]	Limit, [dBµV/m] [AVG]	Delta, [dB]	Pass/Fail
Lowest Frequency, 902.3 MHz, BW=125 kHz ,SF 7						
1804.6	Avg	V	39.970	54	-14.030	Pass
Middle Frequency, 908.6 MHz, BW=125 kHz ,SF 7						
1817.2	Avg	H	39.176	54	-14.824	Pass
Highest Frequency, 914.9 MHz, BW=125 kHz ,SF 7						
1943.7	Avg	V	38.802	54	-15.198	Pass
Lowest Frequency, 902.3 MHz, BW=125 kHz ,SF 10						
1804.6	Avg	H	39.321	54	-14.679	Pass
Middle Frequency, 908.6 MHz, BW=125 kHz ,SF 10						
1817.2	Avg	H	39.604	54	-14.396	Pass
Highest Frequency, 914.9 MHz, BW=125 kHz ,SF 10						
1804.6	Avg	H	38.970	54	-15.030	Pass
Lowest Frequency, 903.0 MHz, BW=500 kHz ,SF 8						
1805.6	Avg	V	37.166	54	-16.834	Pass
1806.6	Avg	H	36.455	54	-17.545	Pass
Middle Frequency, 908.6 MHz, BW=500 kHz ,SF 8						
1817.2	Avg	H	35.694	54	-18.306	Pass
Highest Frequency, 914.2 MHz, BW=500 kHz ,SF 8						
2742.4	Avg	V	34.735	54	-19.265	Pass
1828.4	Avg	H	34.440	54	-19.560	Pass
Highest Frequency, 916.3 MHz, BW=500 kHz ,SF 7						
1833.2	Avg	H	34.222	54	-19.778	Pass

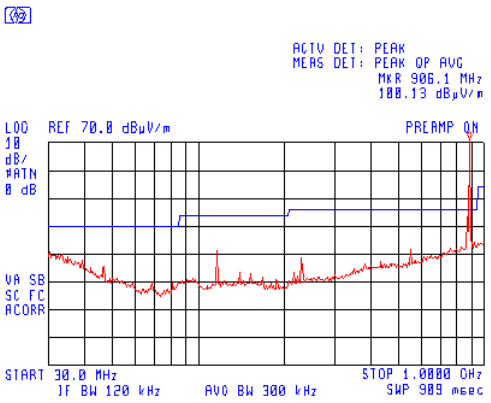
Note: Emission Level [dBµV/m] = Measured Emission [dBµV] + Correction-factor [dB (1/m)]

Correction Factor = Antenna factor + Cable Loss + Filter I/L

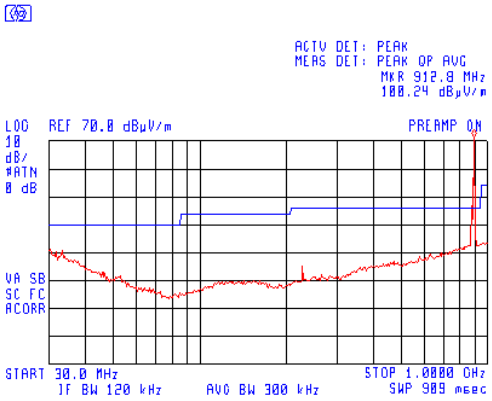
Plot 3.8.1: Radiated Spurious Emission in 30 MHz – 1 GHz range,- Vertical



With TX Fc=902.3 BW=125 kHz Power = 20dBm SF 7

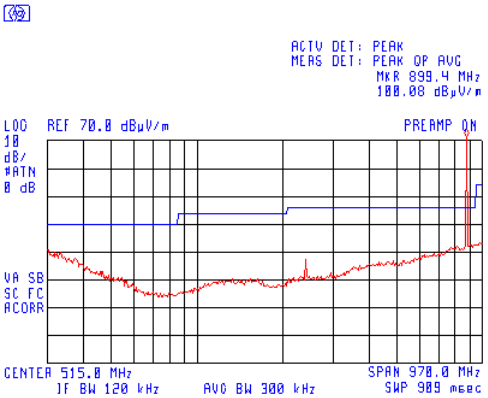


With TX Fc=908.6 BW=125 kHz Power = 20dBm SF 7

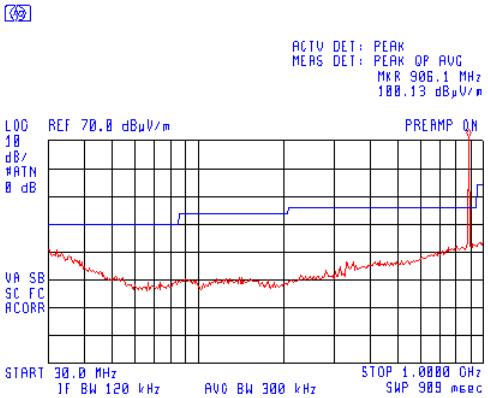


With TX Fc=914.9 BW=125 kHz Power =20dBm SF 7

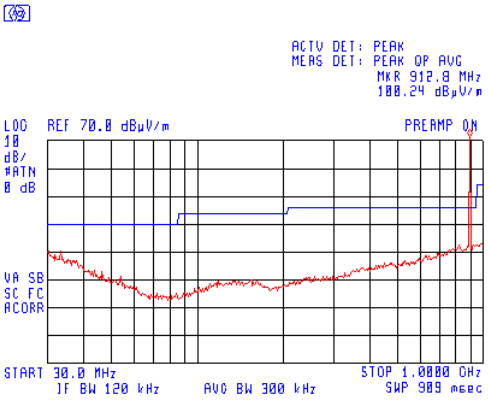
Plot 3.8.2: Radiated Spurious Emission in 30 MHz – 1 GHz range, Horizontal



With TX Fc=902.3 BW=125 kHz Power =20dBm SF 7

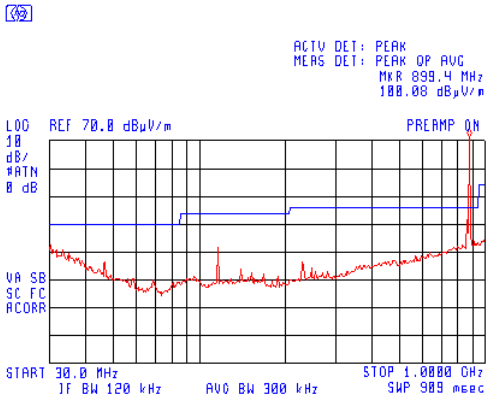


With TX Fc=908.6 BW=125 kHz Power =20dBm SF 7

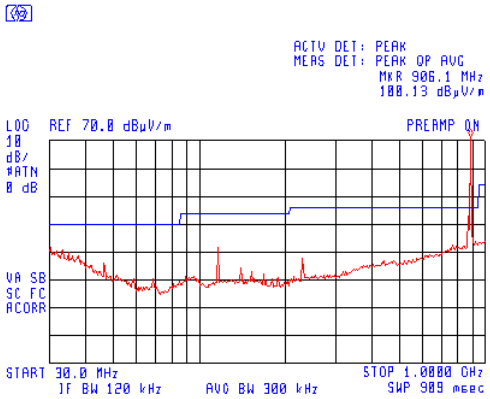


With TX Fc=914.9 BW=125 kHz Power =20dBm SF 7

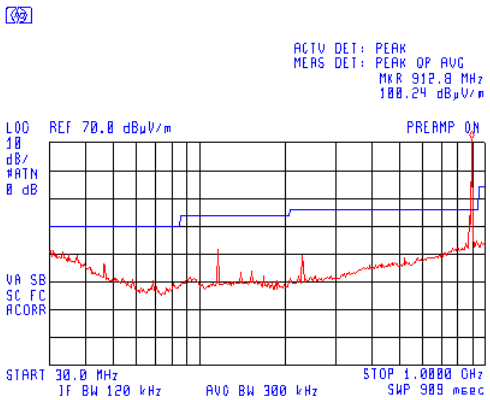
Plot 3.8.3: Radiated Spurious Emission in 30 MHz – 1 GHz range, Vertical



With TX Fc=902.3 BW=125 kHz Power = 20dBm SF 10

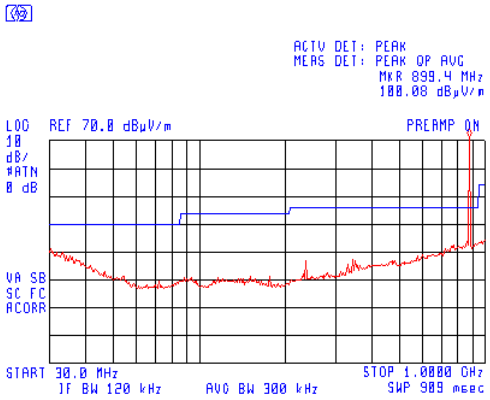


With TX Fc=908.6 BW=125 kHz Power = 20dBm SF 10

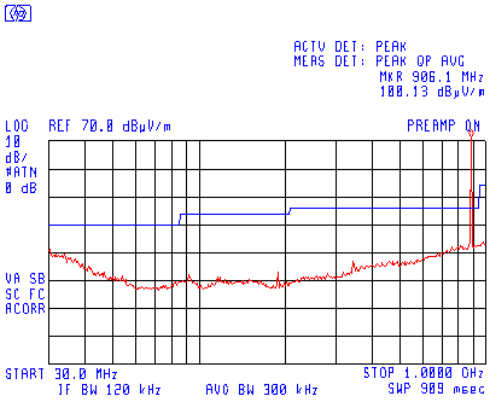


With TX Fc=914.9 BW=125 kHz Power =20dBm SF 10

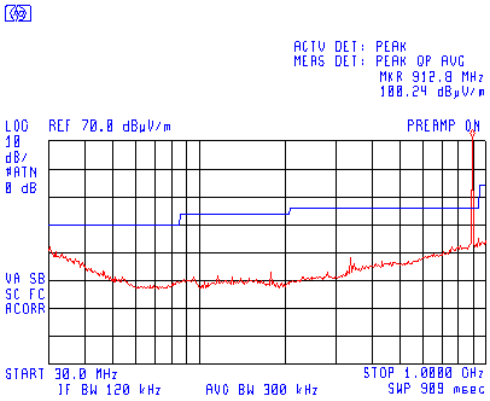
Plot 3.8.4: Radiated Spurious Emission in 30 MHz – 1 GHz range, Horizontal



With TX Fc=902.3 BW=125 kHz Power =20dBm SF 10

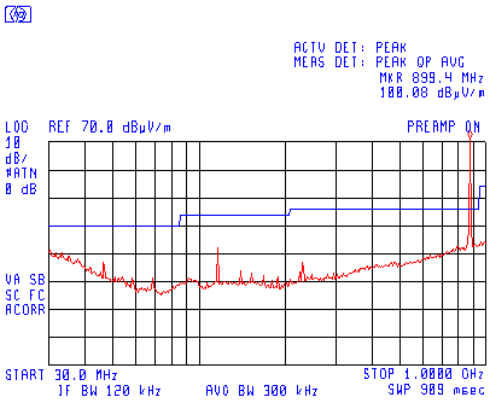


With TX Fc=908.6 BW=125 kHz Power =20dBm SF 10

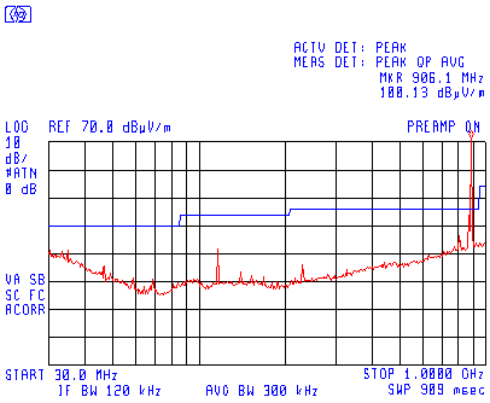


With TX Fc=914.9 BW=125 kHz Power =20dBm SF 10

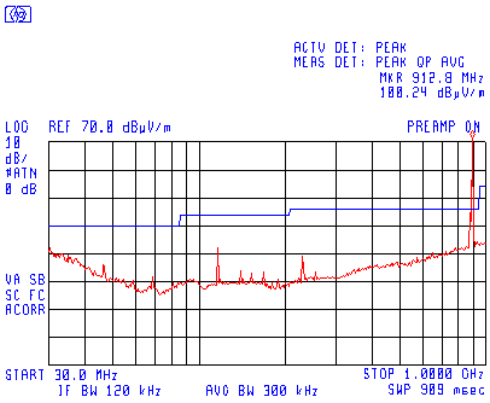
Plot 3.8.5: Radiated Spurious Emission in 30 MHz – 1 GHz range, Vertical



With TX Fc=903.0 BW=500 kHz Power = 20dBm SF 8

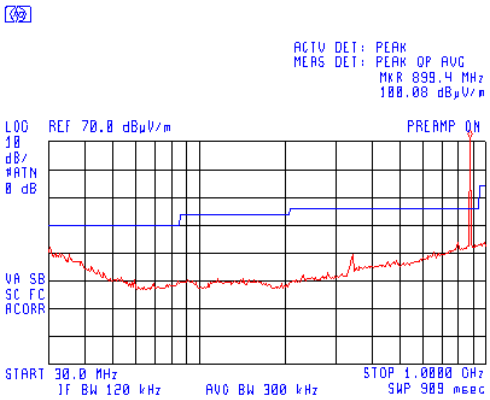


With TX Fc=908.6 BW=500 kHz Power = 20dBm SF 8

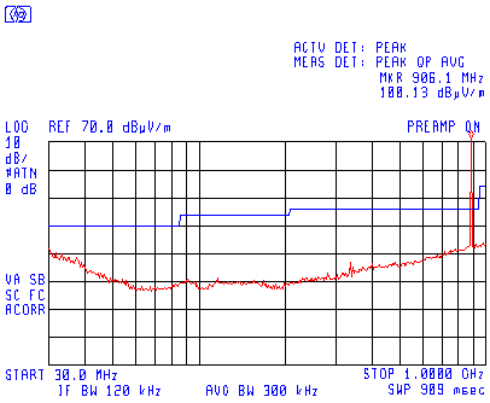


With TX Fc=914.2 BW=500 kHz Power =20dBm SF 8

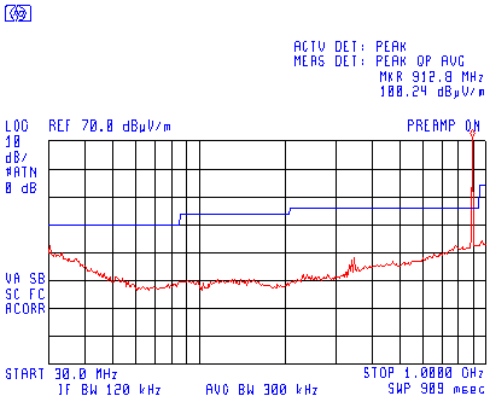
Plot 3.8.6 Radiated Spurious Emission in 30 MHz – 1 GHz range, Horizontal



With TX Fc=903.0 BW=500 kHz Power =20dBm SF 8

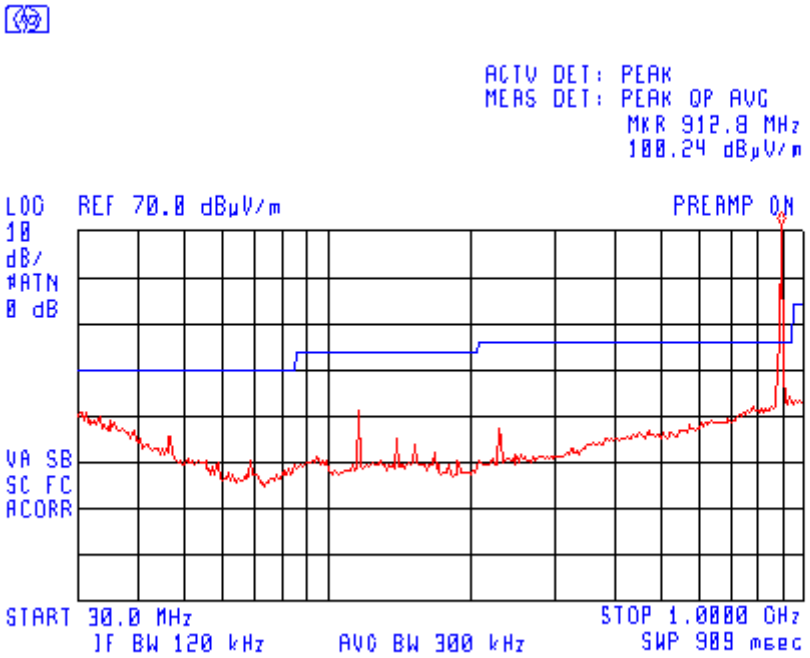


With TX Fc=908.6 BW=500 kHz Power =20dBm SF 8



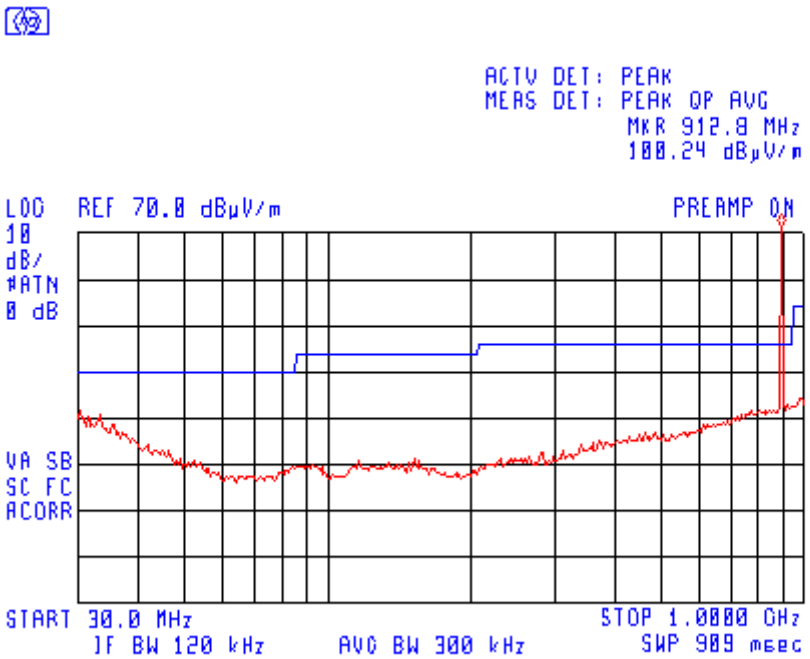
With TX Fc=914.2 BW=500 kHz Power =20dBm SF 8

Plot 3.8.7: Radiated Spurious Emission in 30 MHz – 1 GHz range, Vertical



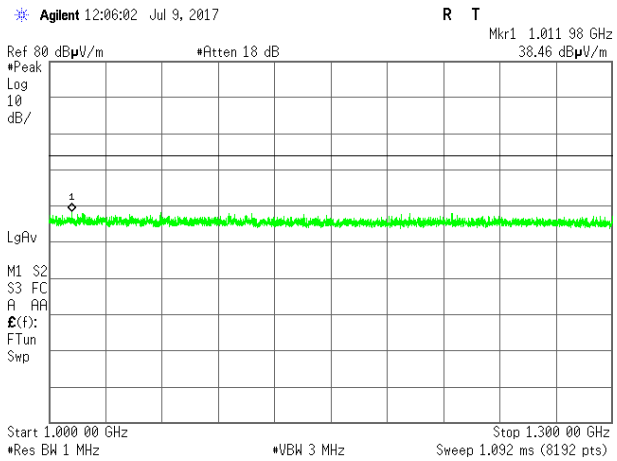
With TX Fc=916.3 BW=500 kHz Power =20dBm SF 7

Plot 3.8.8: Radiated Spurious Emission in 30 MHz – 1 GHz range,, Horizontal



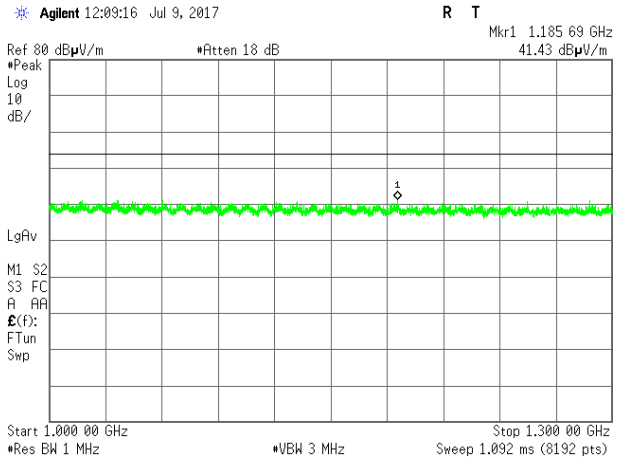
With TX Fc=916.3 BW=500 kHz Power =20dBm SF 7

Plot 3.8.9: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =902.3 MHz, BW = 125 kHz SF 7, Vertical



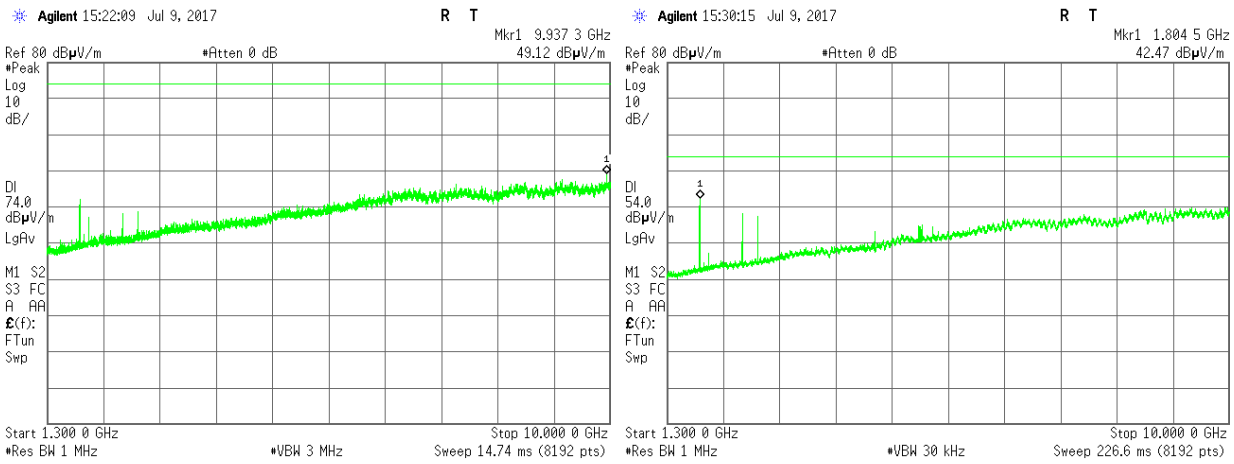
Peak

Plot 3.8.10: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =902.3 MHz, BW = 125 kHz SF 7, Horizontal



Peak

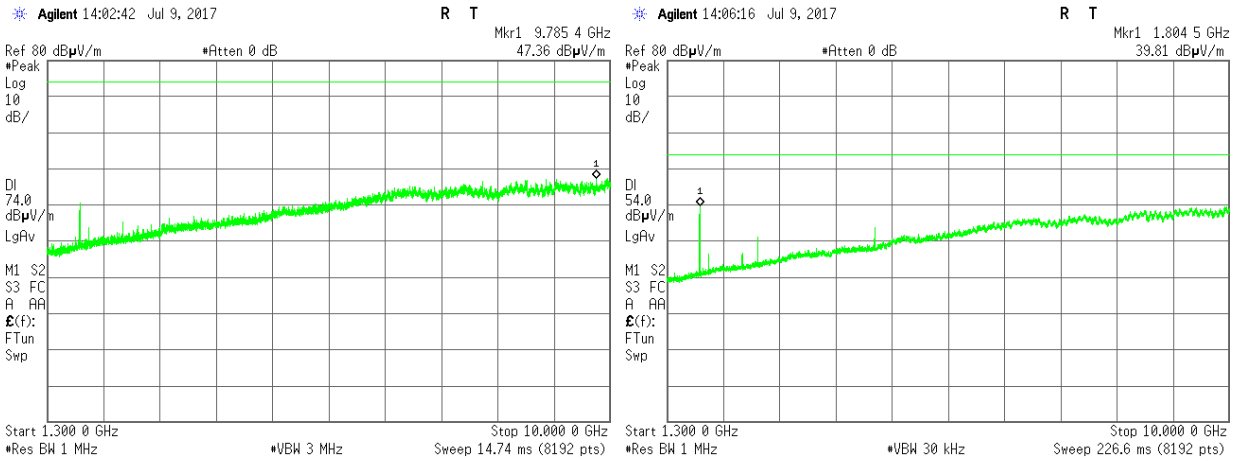
Plot 3.8.11: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =902.3 MHz, BW = 125 kHz SF 7, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

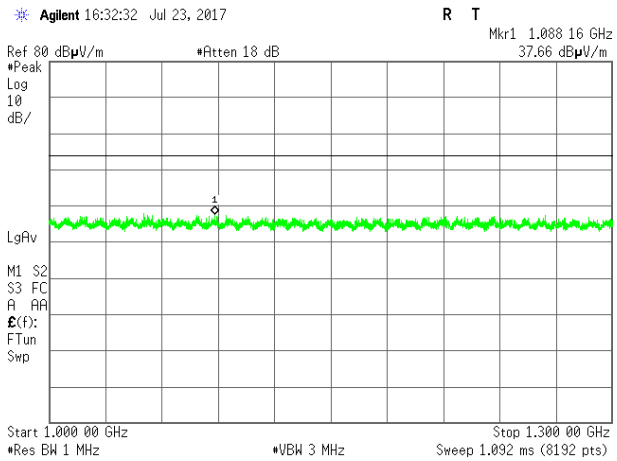
Plot 3.8.12: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =902.3 MHz, BW = 125 kHz SF 7, Horizontal



Peak Average

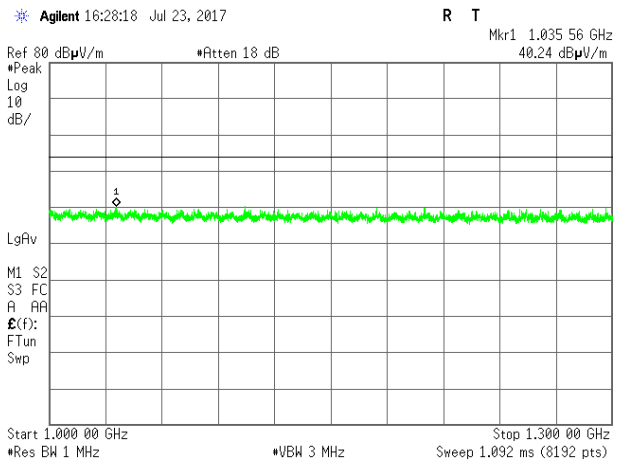
With high pass filter WHK1.2/15G-10EF

Plot 3.8.13: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =908.6 MHz, BW = 125 kHz SF 7, Vertical



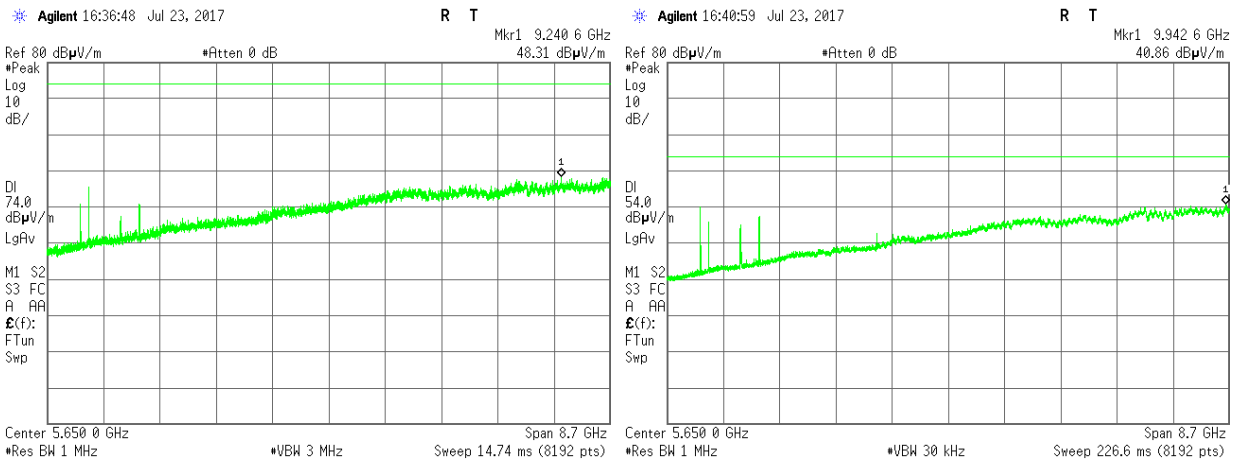
Peak

Plot 3.8.14: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =908.6 MHz, BW = 125 kHz , SF 7, Horizontal



Peak

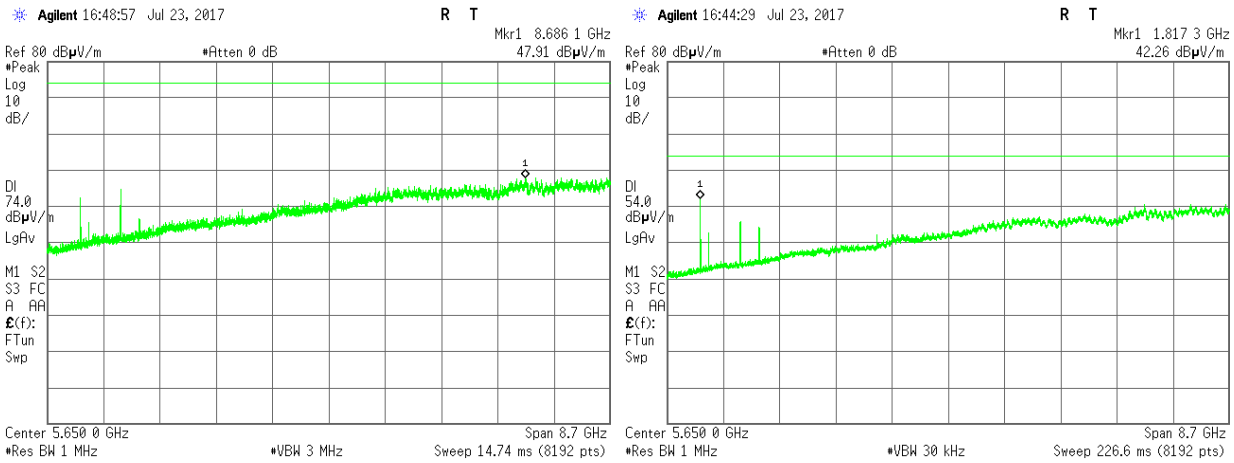
Plot 3.8.15: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =908.6 MHz, BW = 125 kHz SF 7, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

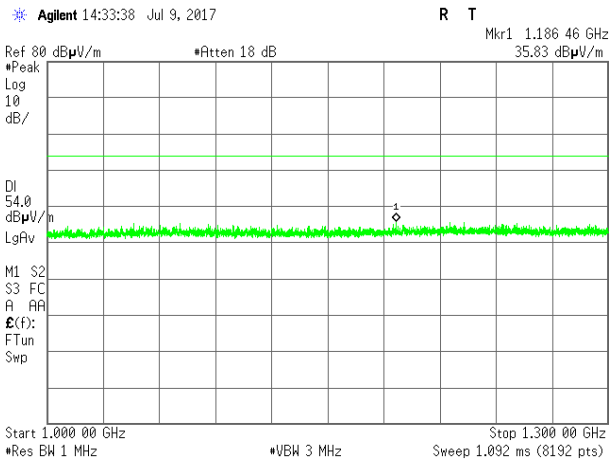
Plot 3.8.16: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =908.6 MHz, BW = 125 kHz SF 7, Horizontal



Peak Average

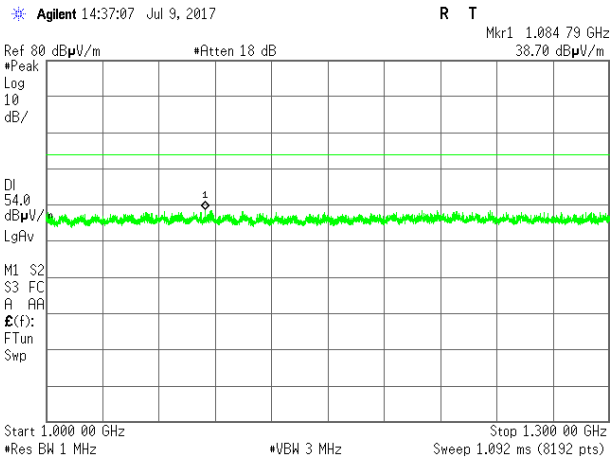
With high pass filter WHK1.2/15G-10EF

Plot 3.8.17: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =914.9 MHz, BW = 125 kHz SF 7, Vertical



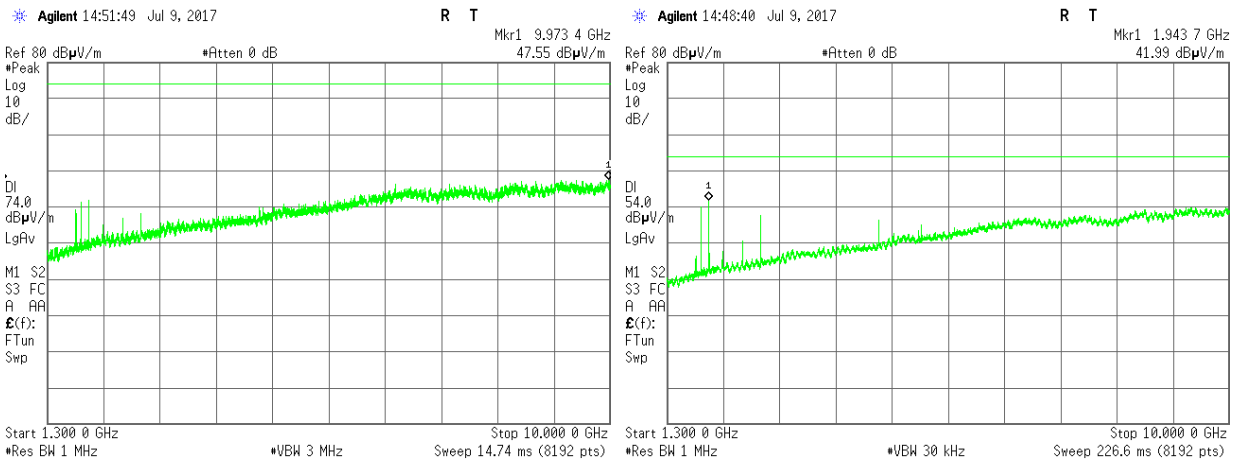
Peak

Plot 3.8.18: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =914.9 MHz, BW = 125 kHz SF 7, Horizontal



Peak

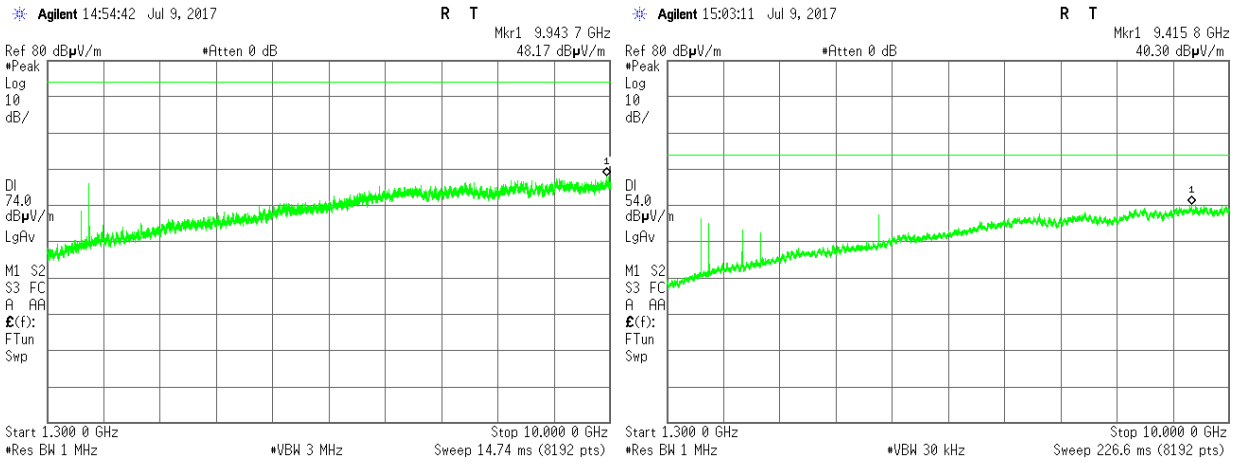
Plot 3.8.19: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =914.9 MHz, BW = 125 kHz SF 7, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

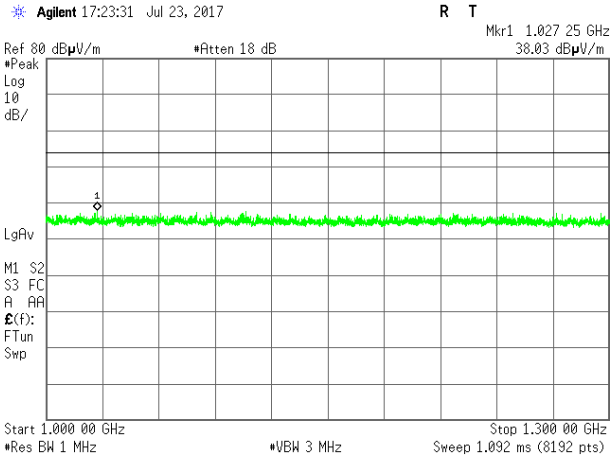
Plot 3.8.20: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =914.9 MHz, BW = 125 kHz SF7, Horizontal



Peak Average

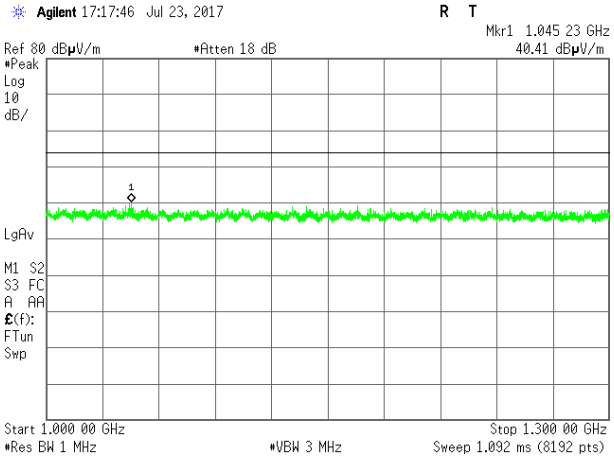
With high pass filter WHK1.2/15G-10EF

Plot 3.8.21: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =902.3 MHz, BW = 125 kHz SF 10, Vertical



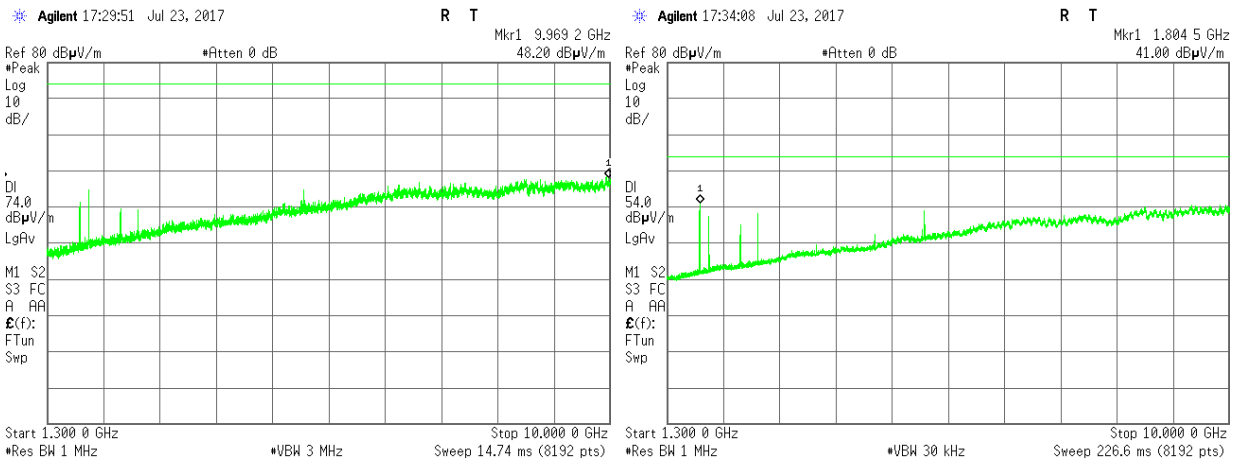
Peak

Plot 3.8.22: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =902.3 MHz, BW = 125 kHz SF 10, Horizontal



Peak

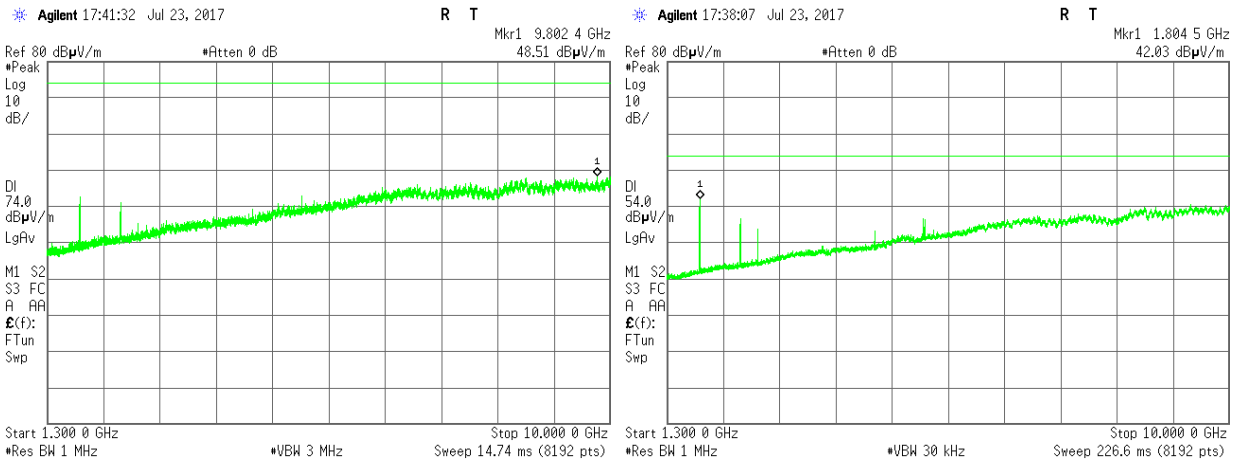
Plot 3.8.23: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =902.3 MHz, BW = 125 kHz SF 10, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

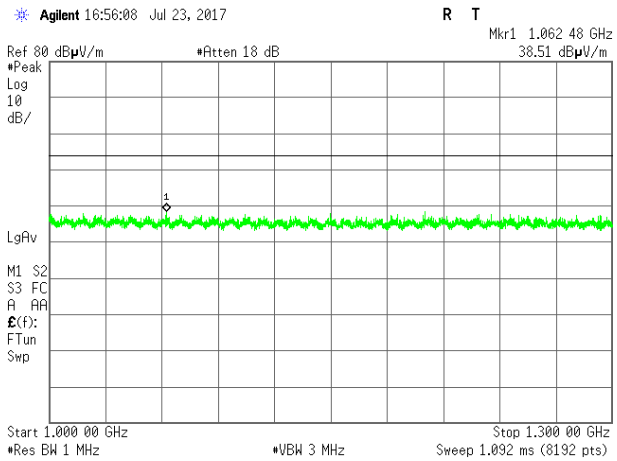
Plot 3.8.24: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =902.3 MHz, BW = 125 kHz SF 10, Horizontal



Peak Average

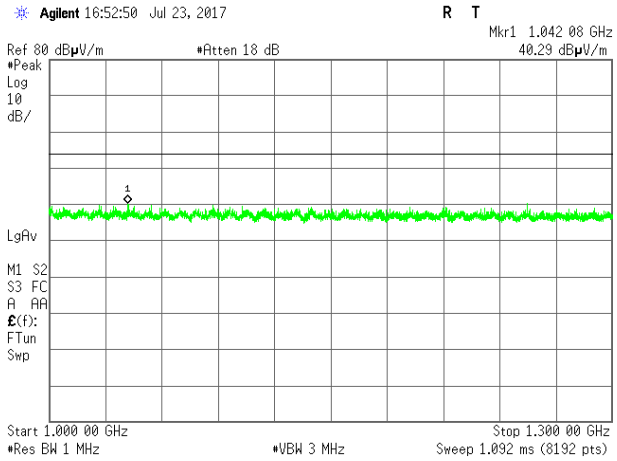
With high pass filter WHK1.2/15G-10EF

Plot 3.8.25: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =908.6 MHz, BW = 125 kHz SF 10, Vertical



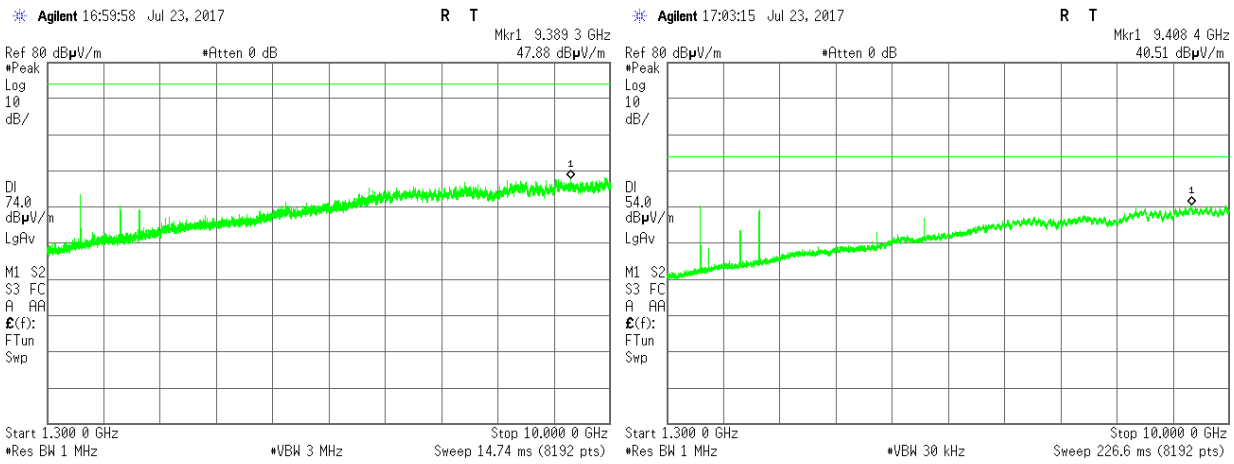
Peak

Plot 3.8.26: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =908.6 MHz, BW = 125 kHz SF 10, Horizontal



Peak

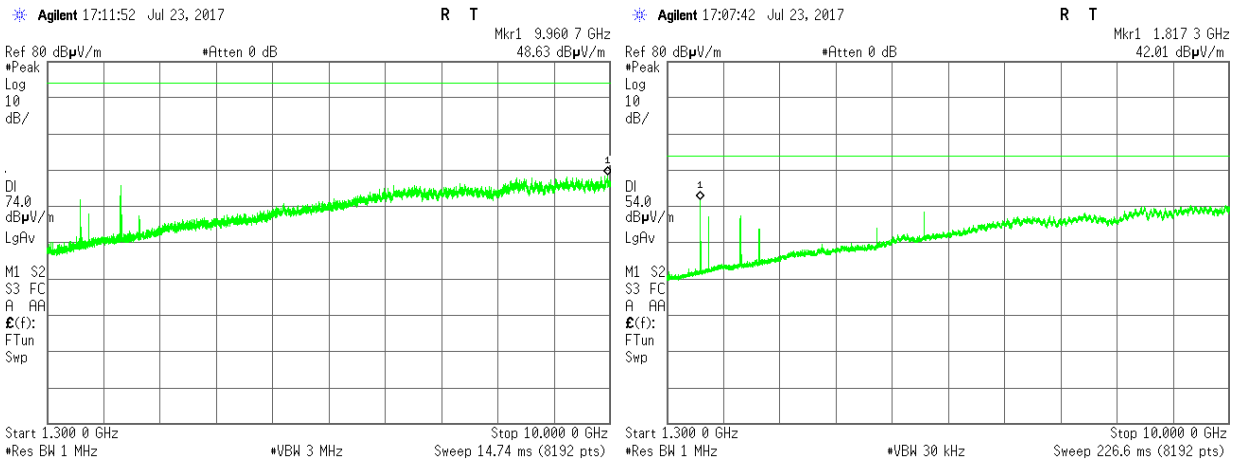
Plot 3.8.27: 3 Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =908.6 MHz, BW = 125 kHz SF 10, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

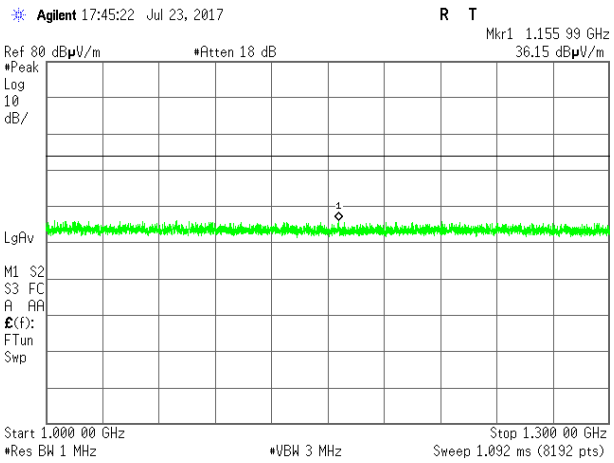
Plot 3.8.28: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =908.6 MHz, BW = 125 kHz SF 10, Horizontal



Peak Average

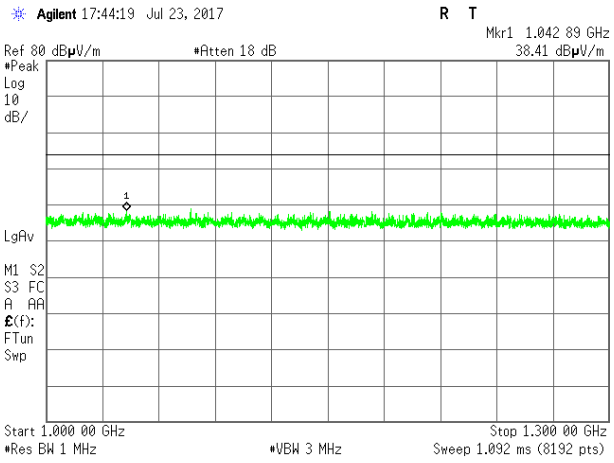
With high pass filter WHK1.2/15G-10EF

Plot 3.8.29: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =914.9 MHz, BW = 125 kHz SF 10, Vertical



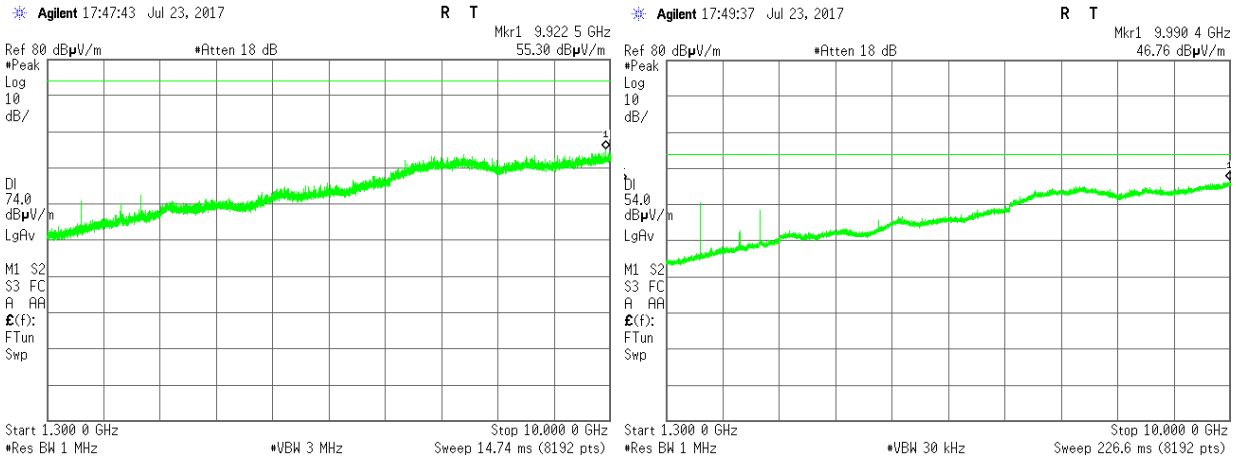
Peak

Plot 3.8.30: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =914.9 MHz, BW = 125 kHz SF 10, Horizontal



Peak

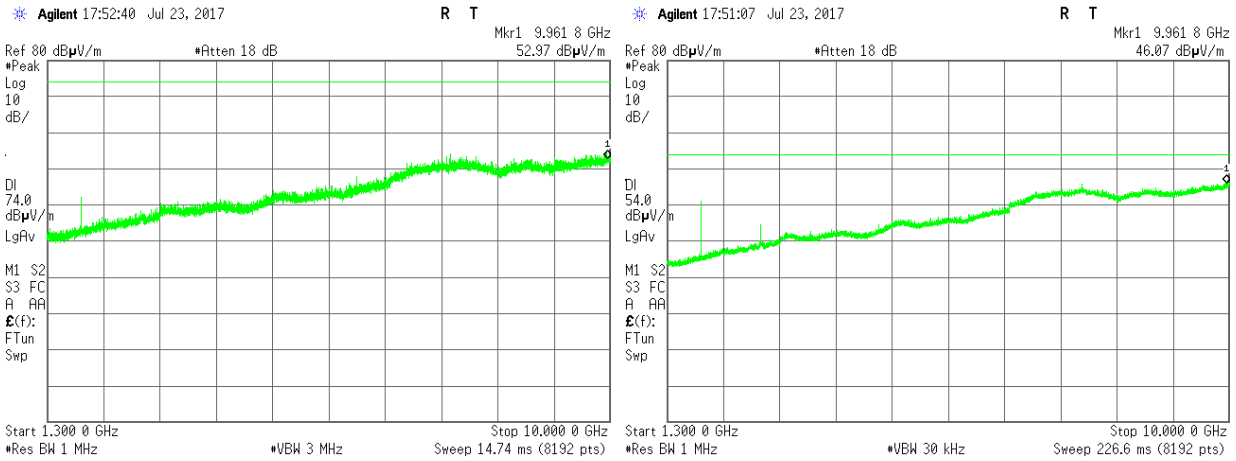
Plot 3.8.31: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =914.9 MHz, BW = 125 kHz SF 10, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

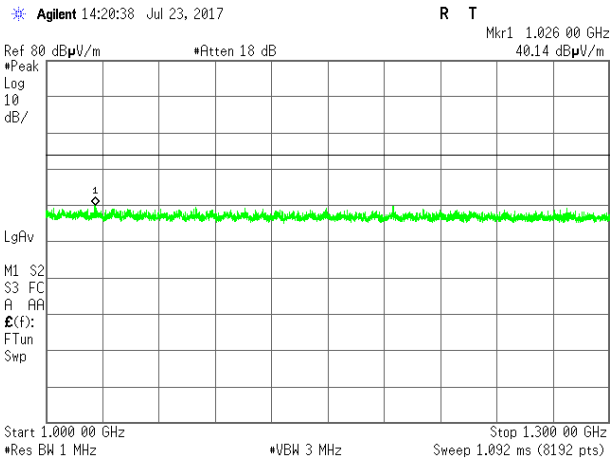
Plot 3.8.32: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =914.9 MHz, BW = 125 kHz SF10, Horizontal



Peak Average

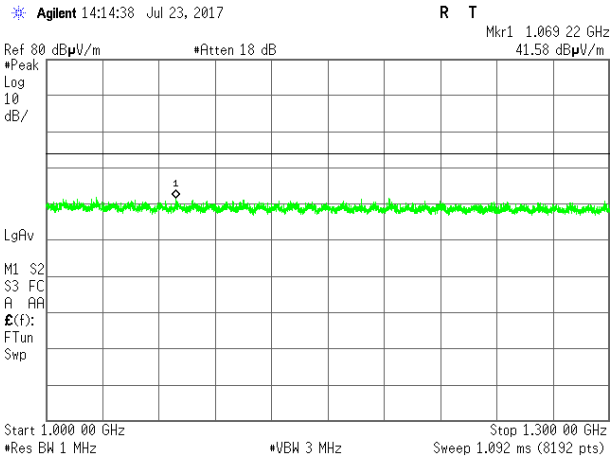
With high pass filter WHK1.2/15G-10EF

Plot 3.8.33: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =903.0 MHz, BW = 500 kHz SF 8, Vertical



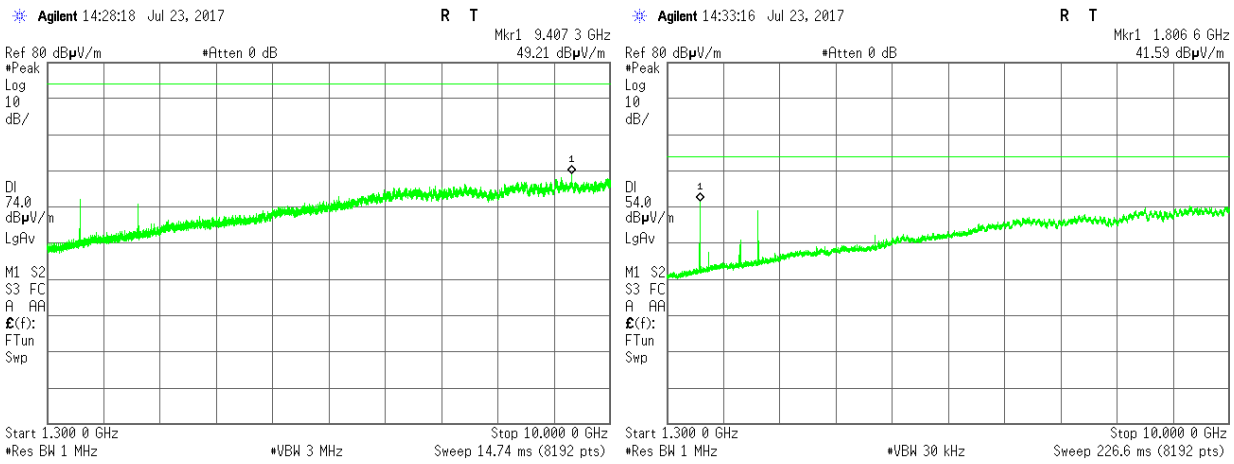
Peak

Plot 3.8.34: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =903.0 MHz, BW = 500 kHz SF 8, Horizontal



Peak

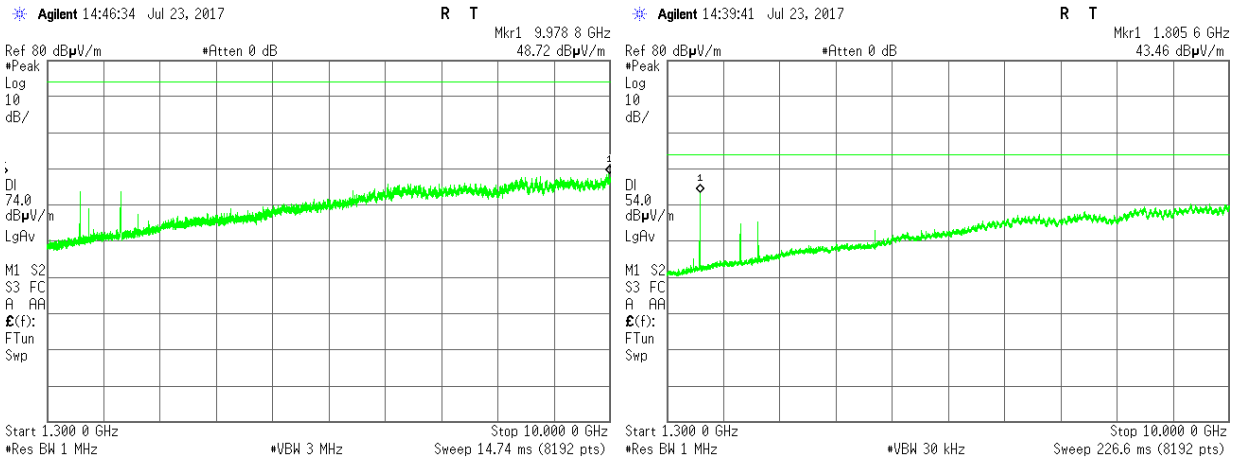
Plot 3.8.35: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =903.0 MHz, BW = 500 kHz SF 8, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

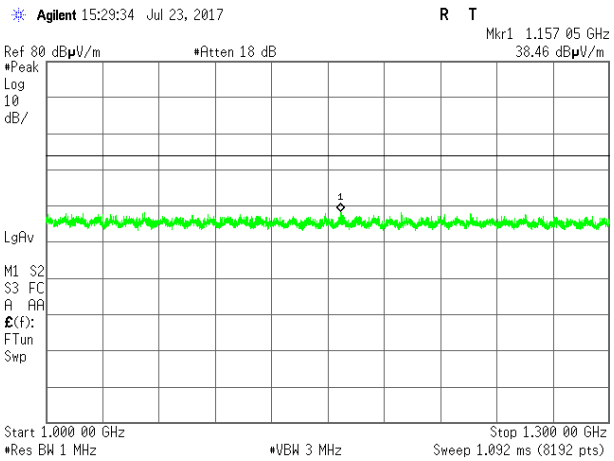
Plot 3.8.36: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =903.0 MHz, BW = 500 kHz SF 8, Horizontal



Peak Average

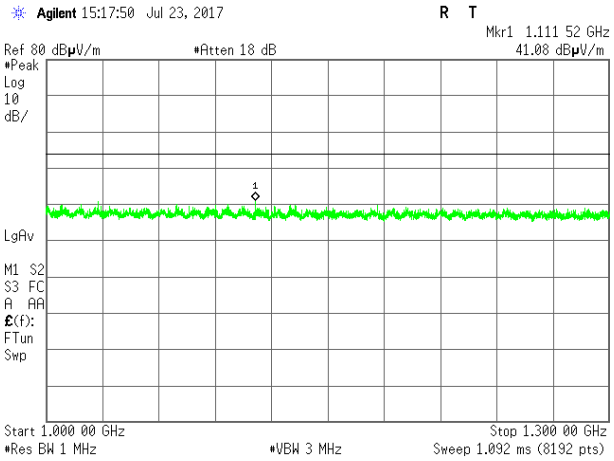
With high pass filter WHK1.2/15G-10EF

Plot 3.8.37: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =908.6 MHz, BW = 500 kHz SF 8, Vertical



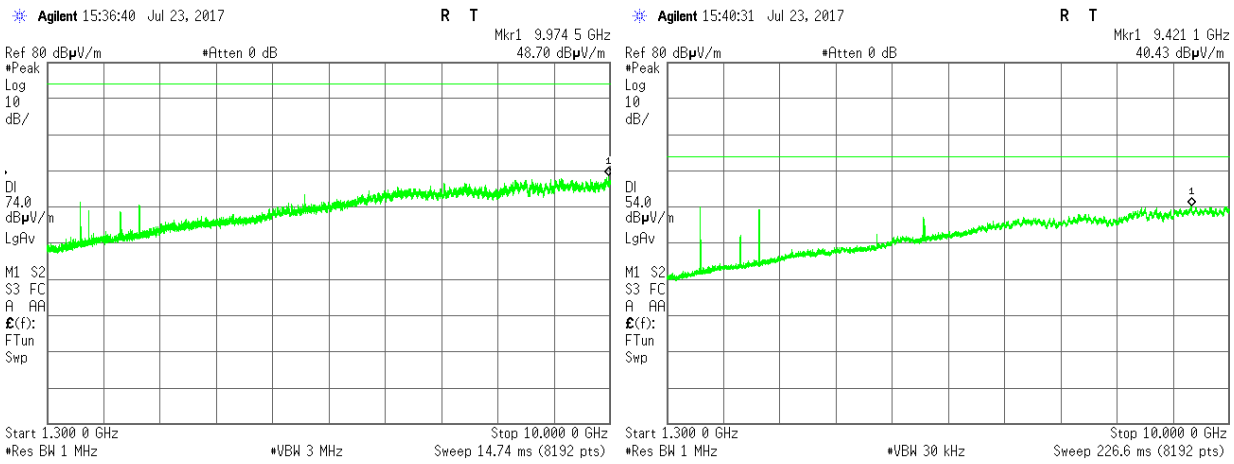
Peak

Plot 3.8.38: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =908.6 MHz, BW = 500 kHz SF 8, Horizontal



Peak

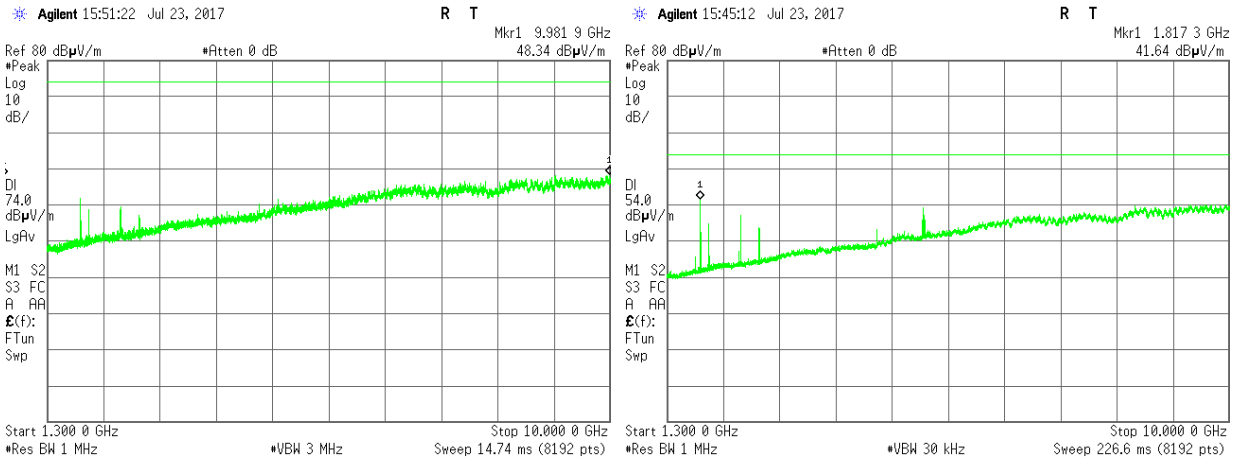
Plot 3.8.39: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =908.6 MHz, BW = 500 kHz SF 8, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

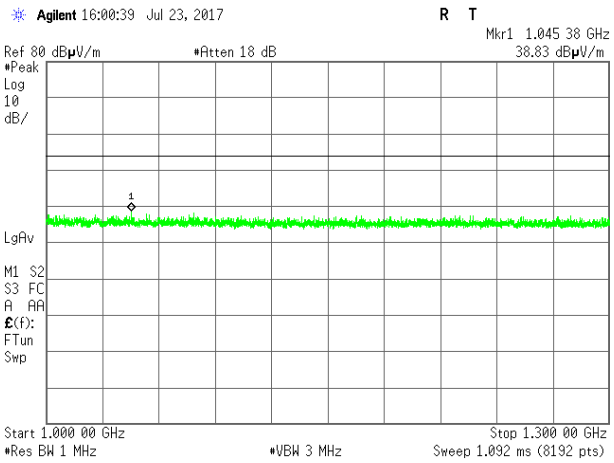
Plot 3.8.401: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =908.6 MHz, BW = 500 kHz SF 8, Horizontal



Peak Average

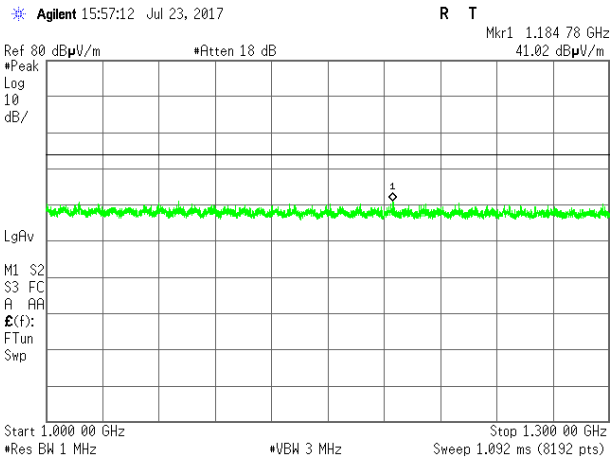
With high pass filter WHK1.2/15G-10EF

Plot 3.8.41: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =914.2 MHz, BW = 500 kHz SF 8, Vertical



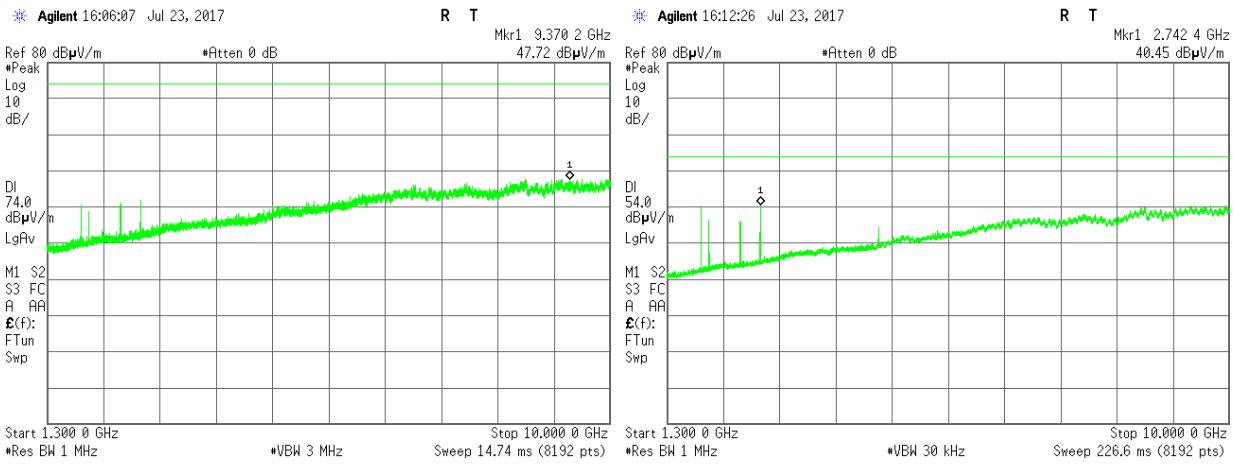
Peak

Plot 3.8.42: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =914.2 MHz, BW = 500 kHz SF 8, Horizontal



Peak

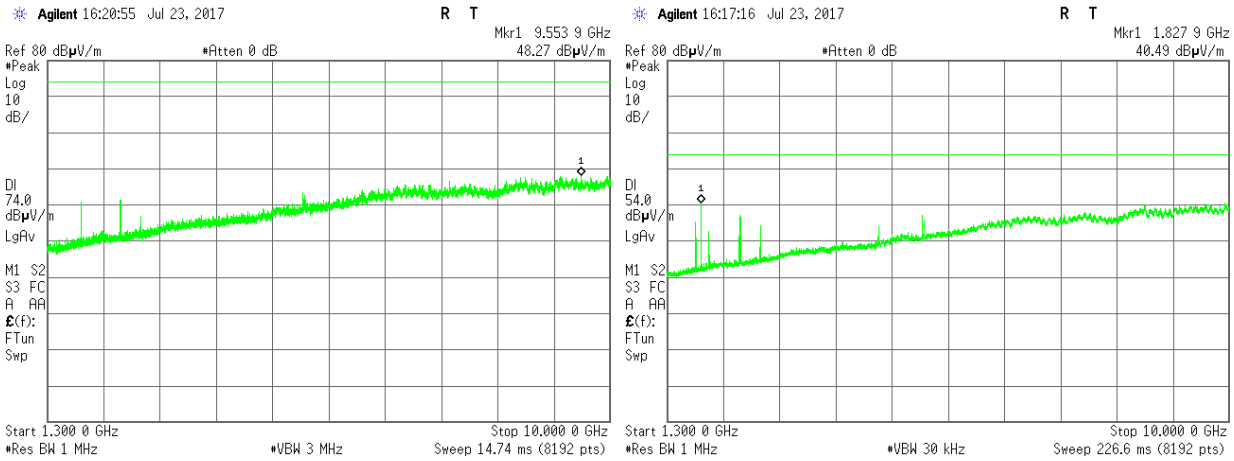
Plot 3.8.43: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =914.2 MHz, BW = 500 kHz SF 8, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

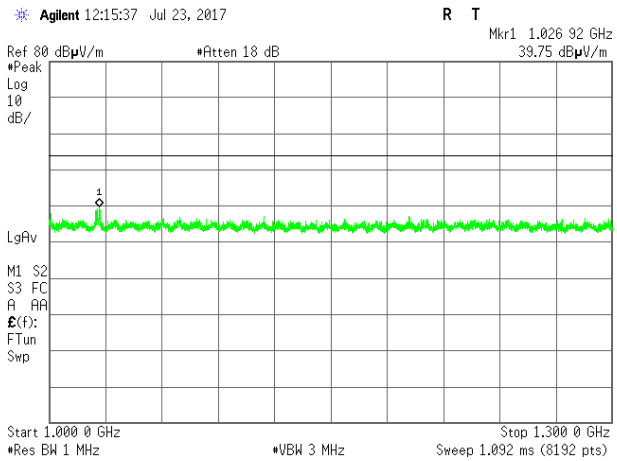
Plot 3.8.44: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =914.2 MHz, BW = 500 kHz SF8, Horizontal



Peak Average

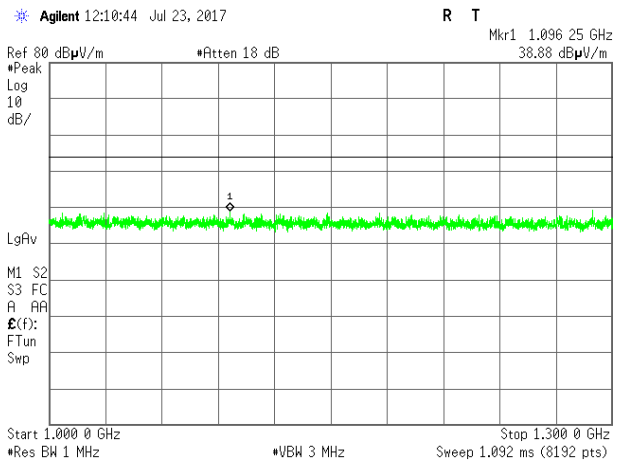
With high pass filter WHK1.2/15G-10EF

Plot 3.8.45: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =916.3 MHz, BW = 500 kHz SF 7, Vertical



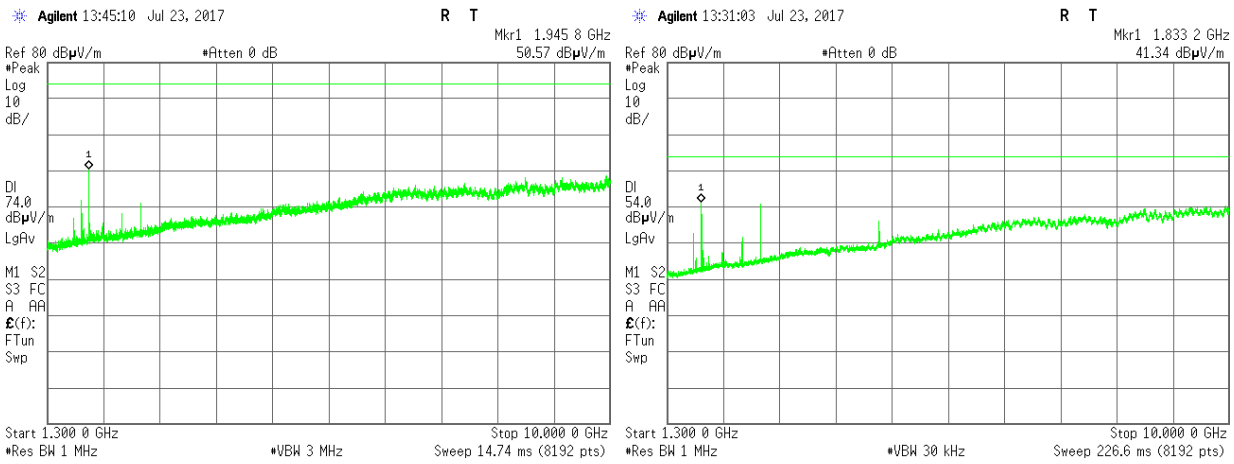
Peak

Plot 3.8.46: Radiated Spurious Emission in 1 – 1.3 GHz range, Fc =916.3 MHz, BW = 500 kHz SF 7, Horizontal



Peak

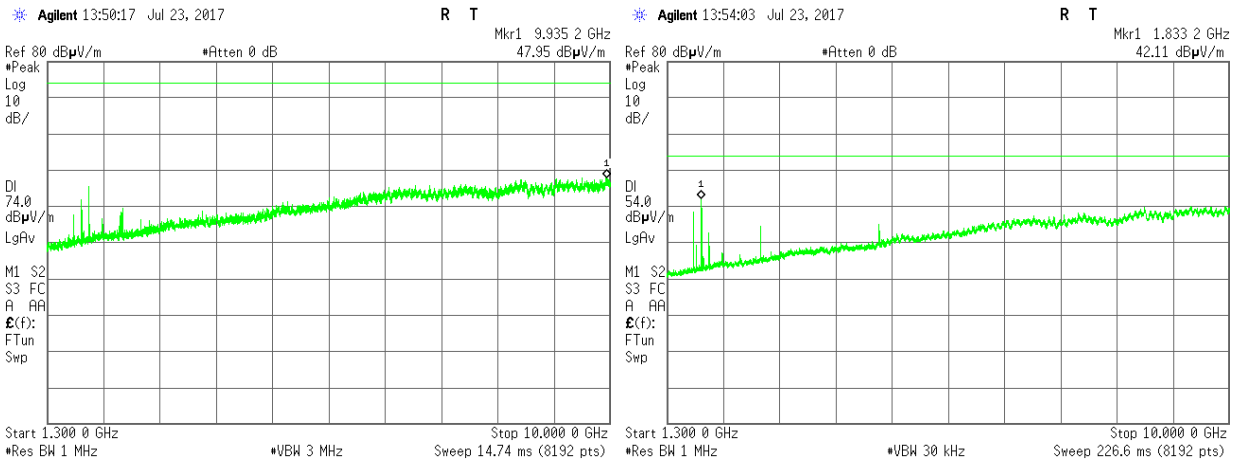
Plot 3.8.47: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =916.3 MHz, BW = 500 kHz SF 7, Vertical



Peak Average

With high pass filter WHK1.2/15G-10EF

Plot 3.8.48: Radiated Spurious Emission in 1.3 – 10.0 GHz range, Fc =916.3 MHz, BW = 500 kHz SF7, Horizontal



Peak Average

With high pass filter WHK1.2/15G-10EF

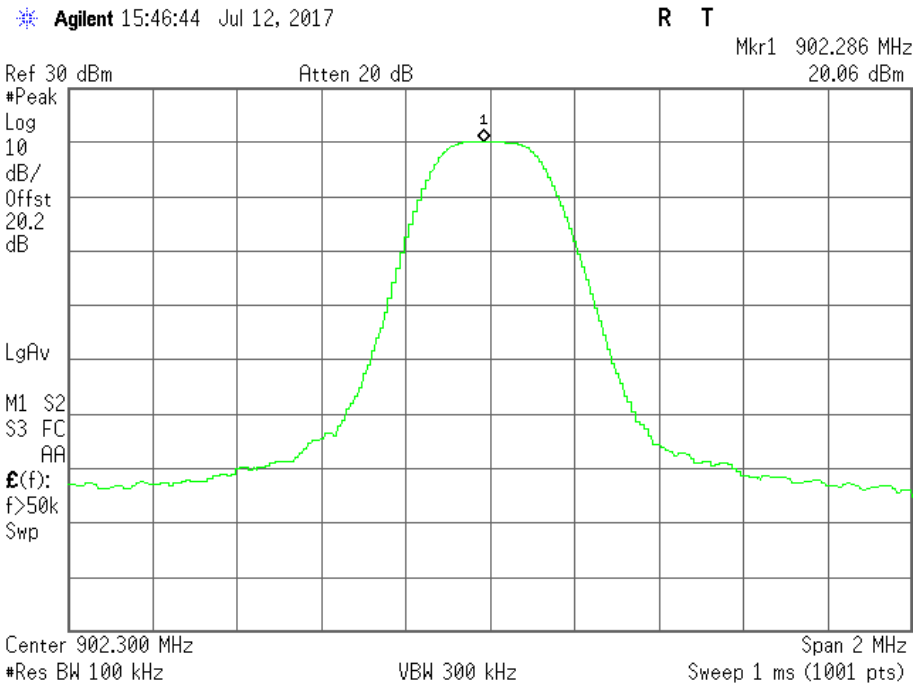
3.8. Band edge measurements

Reference document:	**47 CFR §15.247 (d) & RSS 247 5.5**		
Test Requirements:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB.		
Method of testing:	KDB 558074 D01 v04, Sec.13.2 Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 100 kHz, VBW: ≥3×RBW		
Environment conditions:	Ambient Temperature: 23.7 °C	Relative Humidity: 58.6%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below		

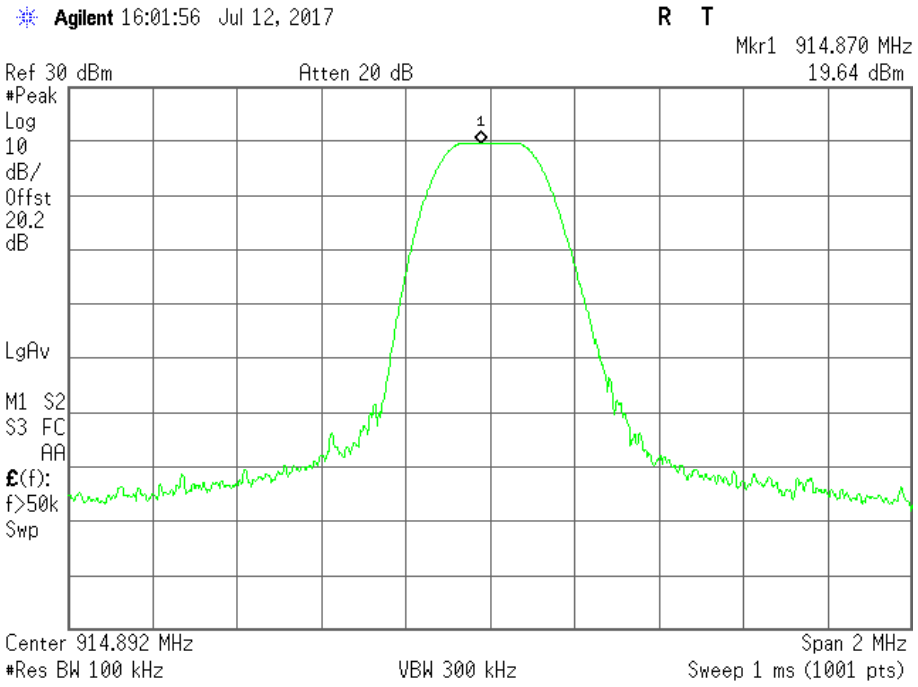
Test results:

Fundamental Frequency, [MHz]	SF	Fundamental Emission Reference Level, [dBm]	Attenuation Below Fundamental, [dB]	Minimum Attenuation Below Fundamental, [dB]	Pass/Fail
902.300	7	20.06	43.51	≥30.00	Pass
914.900	7	19.64	68.59	≥30.00	Pass
916.300	7	19.64	67.46	≥30.00	Pass
916.300	7	19.64	67.04	≥30.00	Pass
903.000	8	19.71	63.84	≥30.00	Pass
914.200	8	19.66	68.73	≥30.00	Pass
902.300	10	19.72	64.42	≥30.00	Pass
914.900	10	19.67	67.83	≥30.00	Pass

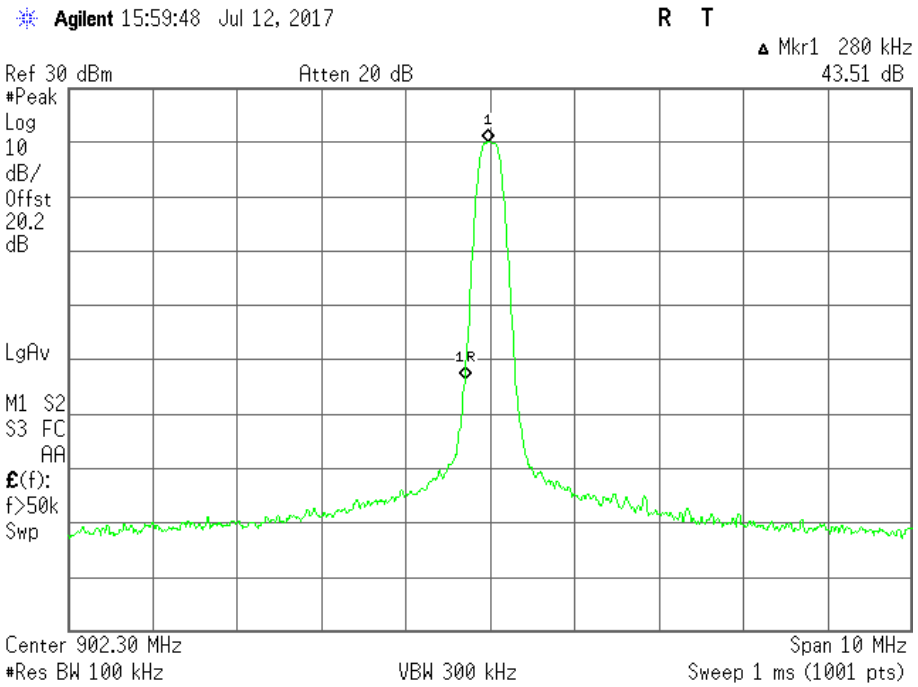
Plot 3.9.1 Band-Edge test results, Fundamental Emission Reference Level, Fc = 902.3 MHz, SF 7



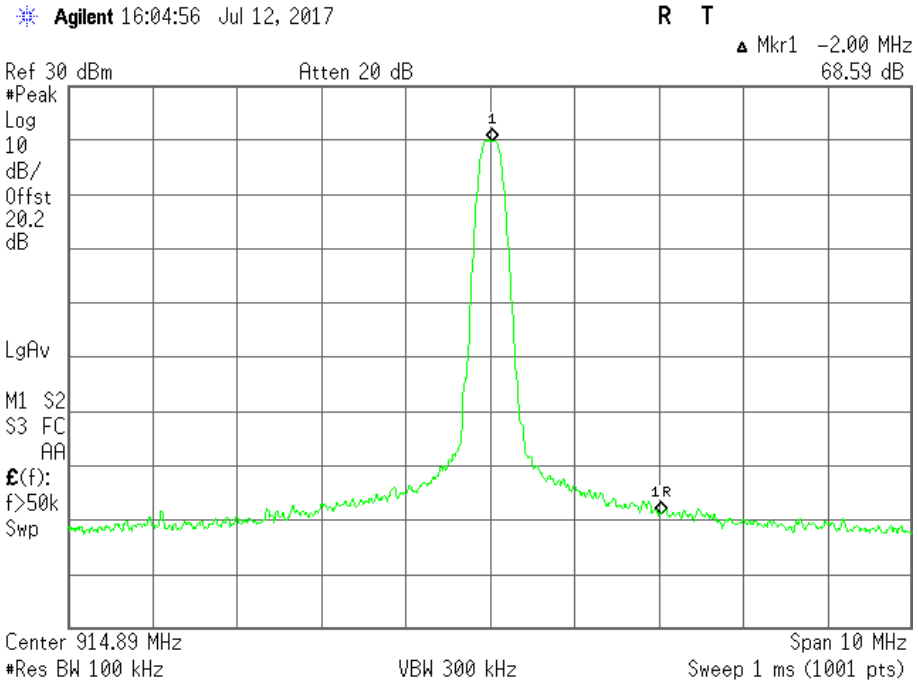
Plot 3.9.2 Band-Edge test results, Fundamental Emission Reference Level, Fc = 914.9 MHz, SF 7



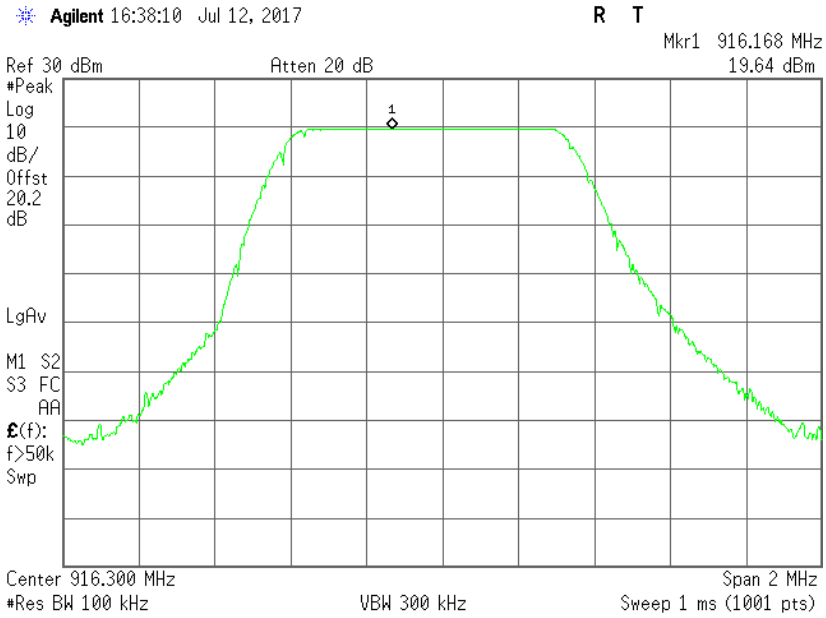
Plot 3.9.3 Band-Edge test results marker-delta measurement, Fc = 902.3 MHz, SF 7



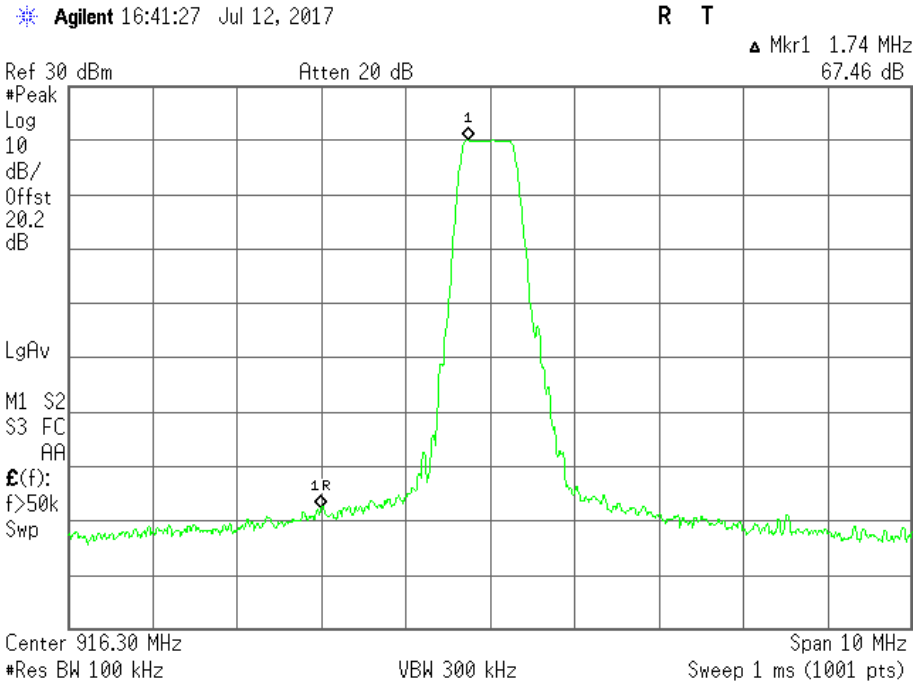
Plot 3.9.4 Band-Edge test results marker-delta measurement, Fc = 914.9 MHz, SF 7



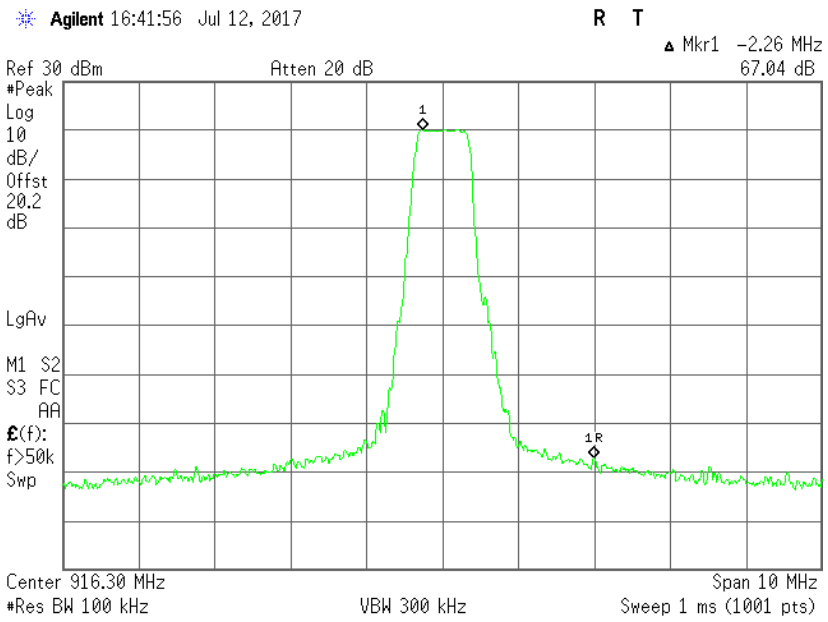
Plot 3.9.5 Band-Edge test results, Fundamental Emission Reference Level, Fc = 916.3 MHz, SF 7



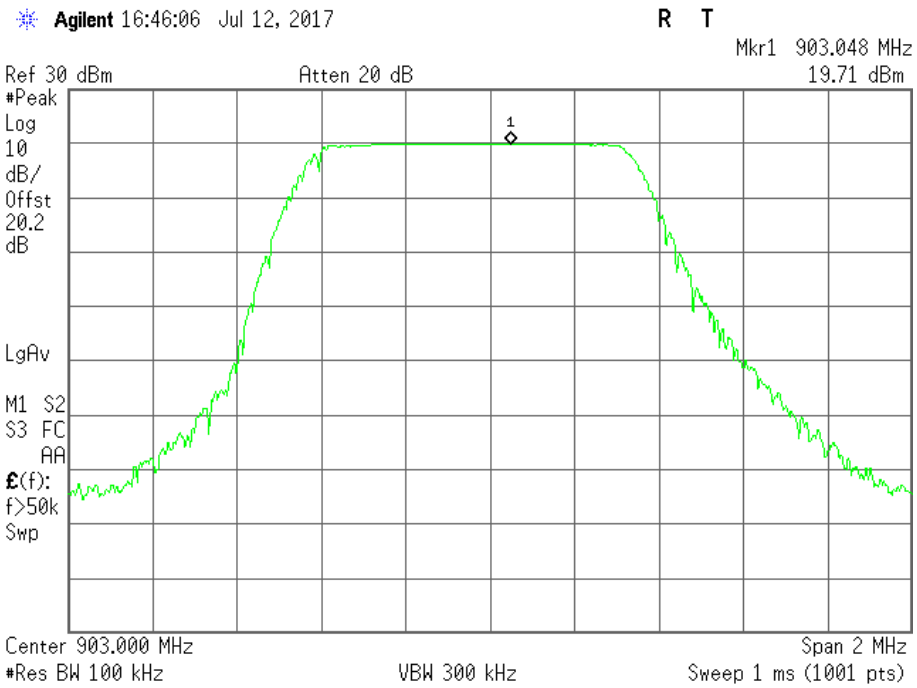
Plot 3.9.6 Band-Edge test results marker-delta measurement, Fc = 916.3 MHz, SF 7



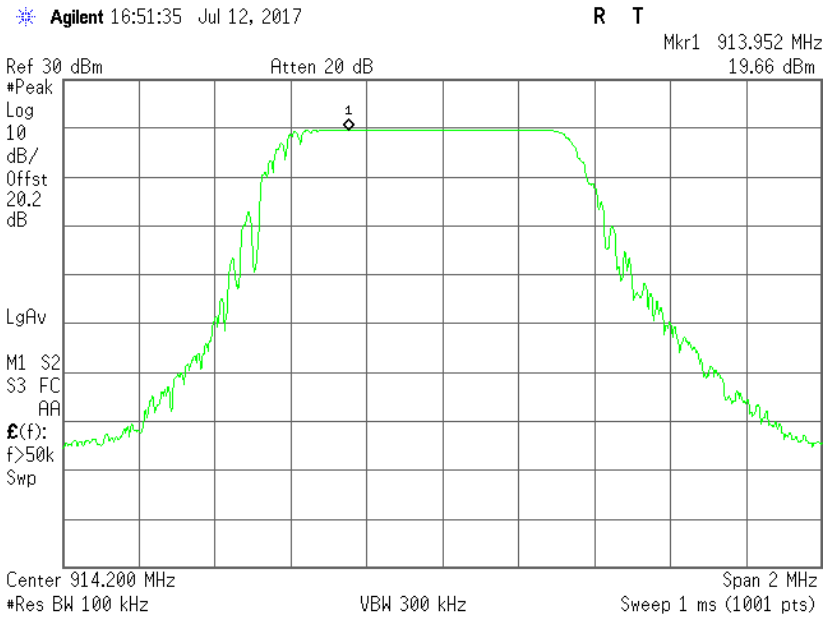
Plot 3.9.7 Band-Edge test results marker-delta measurement, Fc = 916.3 MHz, SF 7



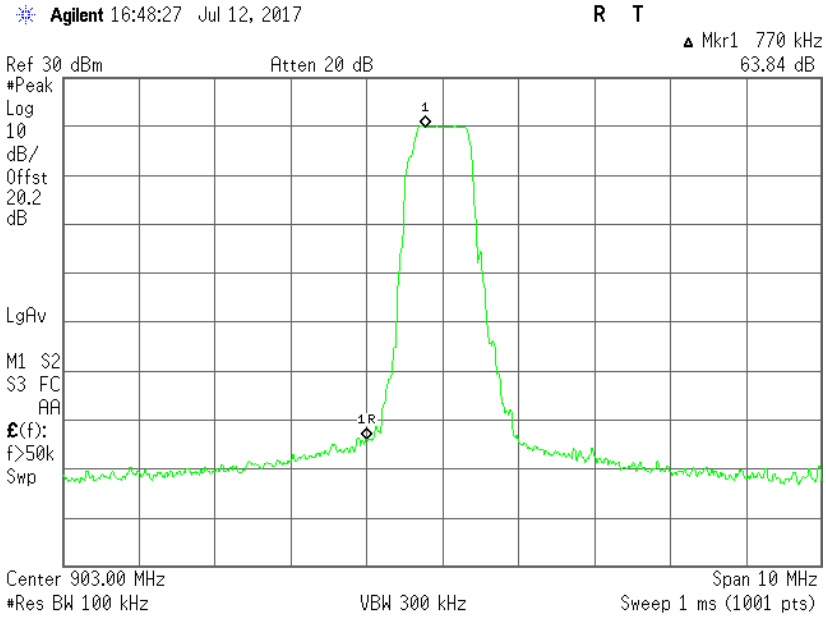
Plot 3.9.8 Band-Edge test results, Fundamental Emission Reference Level, Fc = 903.0 MHz, SF 8



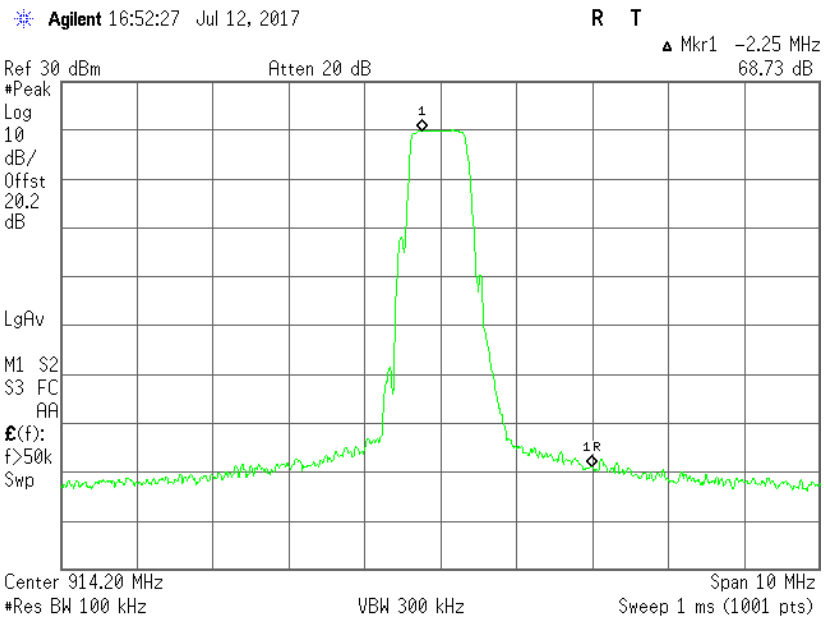
Plot 3.9.9: Band-Edge test results, Fundamental Emission Reference Level, Fc = 914.2 MHz, SF 8



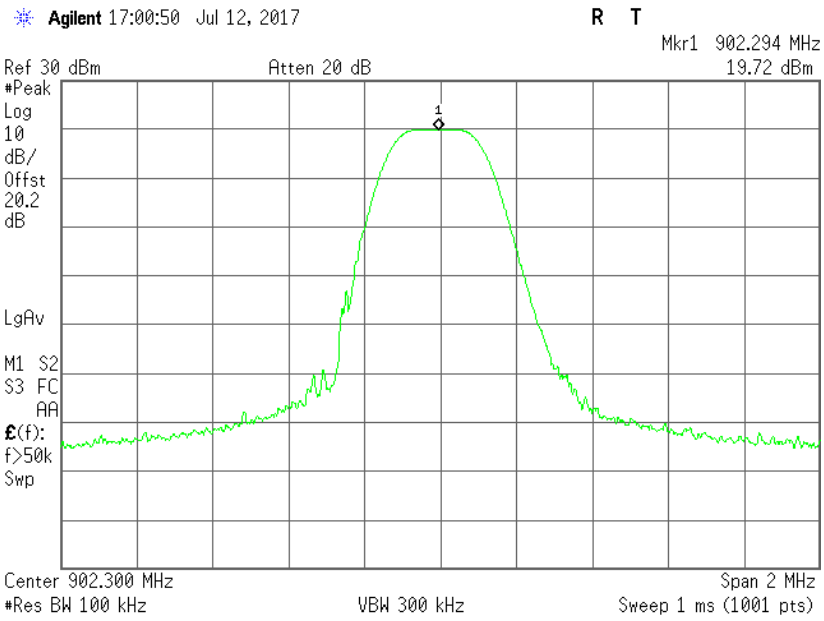
Plot 3.9.10: Band-Edge test results marker-delta measurement, Fc = 903.0 MHz, SF 8



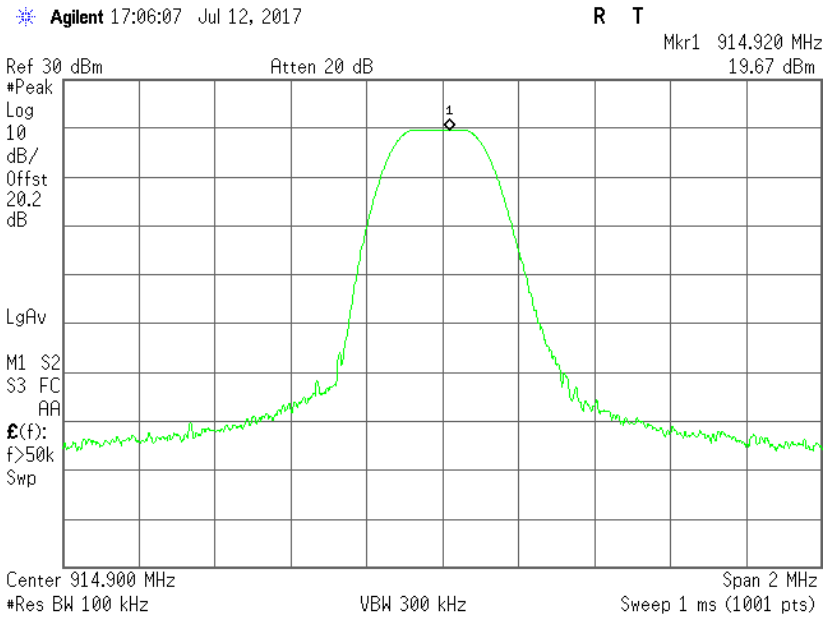
Plot 3.9.11: Band-Edge test results marker-delta measurement, Fc = 914.2 MHz, SF 8



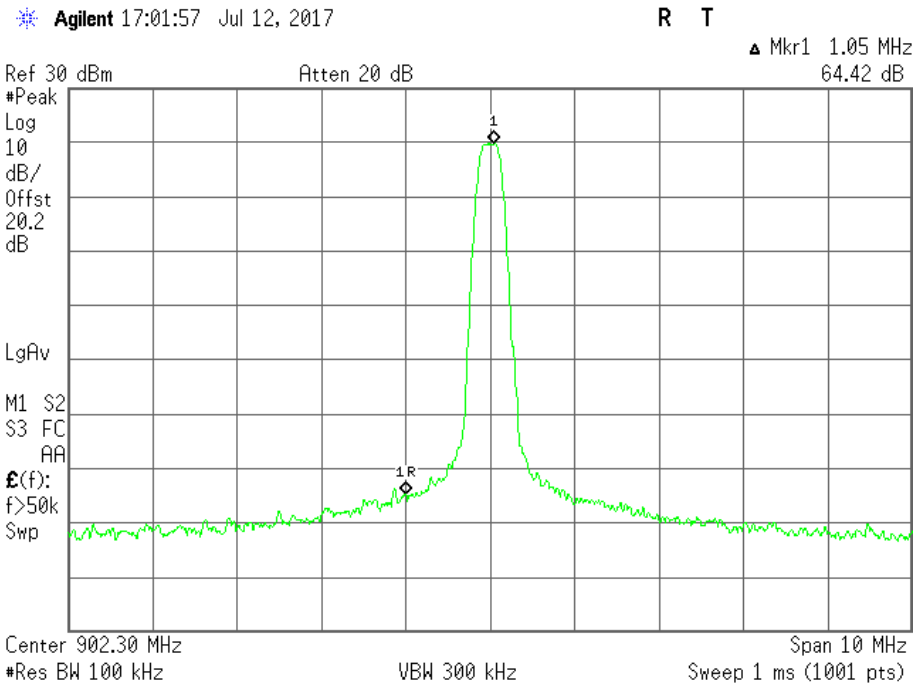
Plot 3.9.12: Band-Edge test results, Fundamental Emission Reference Level, Fc = 902.3 MHz, SF 10



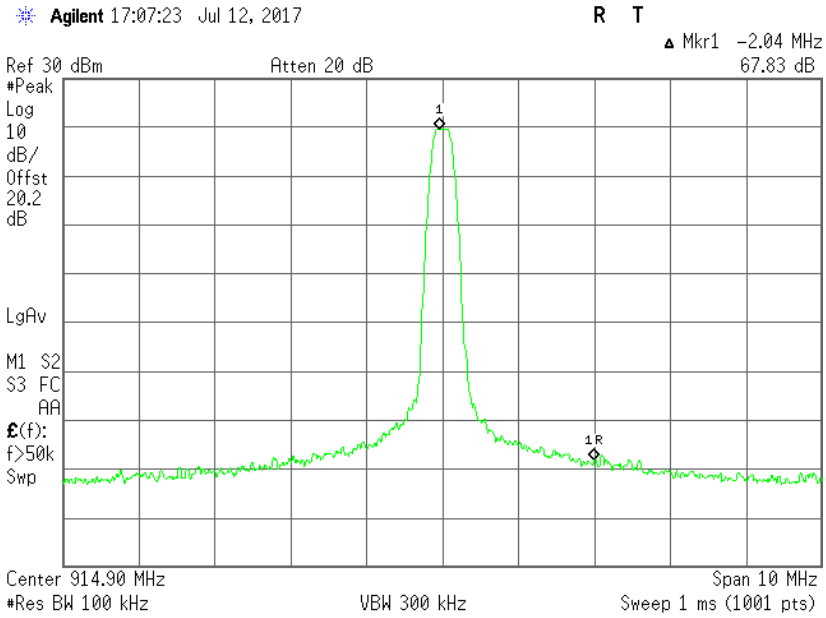
Plot 3.9.13: Band-Edge test results, Fundamental Emission Reference Level, Fc = 914.9 MHz, SF 10



Plot 3.9.14: Band-Edge test results marker-delta measurement, Fc = 902.3 MHz, SF 10



Plot 3.9.15: Band-Edge test results marker-delta measurement, Fc = 914.9 MHz, SF 10



3.9. Antenna Connector Requirements

Reference document:	**47 CFR §15.203 & RSS-Gen Issue 4**	
Test Requirements:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with provisions of this section.	
Test Result:	The EUT contains a permanent antenna – on board printed antenna – no any antenna connector.	**NA**

4. Appendix:

Appendix A: List of test equipment used

Description	Manufacturer	Model	Serial No.	Last Cal	Cal Due
RF Filter Section (2.9GHz)	HP	85460A	3448A00282	6/15/2017	6/15/2018
EMI Receiver (2.9GHz)	HP	8546A	3617A00318	6/15/2017	6/15/2018
RF Filter Section (6.5GHz)	HP	85460A	3704A00366	4/9/2017	4/9/2018
EMI Receiver (6.5GHz)	HP	8546A	3710A00392	4/9/2017	4/9/2018
EMC Analyzer	Agilent	E7405A	US41160436	9/18/2016	9/18/2017
Signal Generator	Marconi	2025	202301940	2/26/2017	2/26/2018
Signal Generator	Marconi	2024	1122681029	1/17/2017	1/17/2018
Bilog Antenna	Teseq	CBL 6141B	34119	7/3/2016	10/3/2017
Horn Antenna (EMM) 1-18GHz	A.R.A	DRG-118/A	17188	5/18/2016	10/18/2017
Line impedance stabilization network, 9 kHz to 30 MHz, 3-Phase	Schwarzbeck	NNLK 8121	8121-526	4/19/2017	4/19/2018
DCAMN (LISN) 150 kHz to 30 MHz	Schwarzbeck	PVDC 8300	30	4/25/2017	4/25/2020
Horn Antenna (for IMM) 1-18GHz	EMCO	3115	9602-4677	7/6/2016	7/6/2019
Isotropic Probe (10MHz-40GHz)	ETS-Lindgren	HI-6153	168752	12/26/2016	12/26/2017
LISN	Schwarzbeck	NNBL 8226-2	8226120	2/1/2017	2/1/2018
LISN	FCC	50/250-25-2	9705	1/26/2017	1/26/2018
Horn Antenna 15-40 GHz	Schwarzbeck	BBHA 9170	BBHA9170214	3/6/2015	3/6/2018
RF Transient Limiter	Agilent	11947A	3107A04119	1/26/2017	1/26/2018
RF Transient Limiter	Agilent	11947A	3107A04121	2/1/2017	2/1/2018
Spectrum Analyzer 3Hz-44GHz	Agilent	E4446A	MY46180602	12/16/2016	12/16/2018
Absorbing Clamp	FCC	F201	248	1/31/2017	1/31/2020
Spectrum Analyzer 9KHz-22GHz	HP	8593EM	3536A00131	8/24/2015	10/24/2017
LNA Amplifier 1 GHz to 18 GHz	AMP	7D-010180-30-10P-GW	618653	2/23/2017	2/23/2018
Low-Noise Amplifier 18 - 26.5 GHz	Miteq	AMF-5F-18002650-30-10P	945372	2/23/2017	2/23/2018
Anechoic old (small) chamber	-----	-----	-----	3/10/2016	3/10/2018

Appendix B: Accreditation Certificate

ilac-MRA A2LA

Accredited Laboratory

A2LA has accredited

QUALITECH

Petah-Tikva, Israel

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION CORPORATE SEAL 1978 DISTRICT OF COLUMBIA A2LA

Presented this 28th day of June 2016.

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 1633.01
Valid to June 30, 2018

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

End of the Test Report