



## **Electromagnetic Compatibility Test Report**

**Test Report No: PET 280714  
Issued on: July 28, 2014**

**Product Name  
Collar**

**Tested According to  
FCC 47 CFR, Part 15, Subparts C  
IC RSS-210, Issue 8**

**Tests Performed for  
PetPace Ltd.**

7 Haavoda street, Ramat Hasharon 47445, Israel  
Tel: 072-2159073

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## Test Personnel



Tests Performed By: -----

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## **Test Report details:**

Test commencement date: 13.07.2014  
Test completion date: 23.07.2014  
Customer's Representative: Tomer Fadlon  
Issued on: 28.07.2014

## **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 setup 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	Remarks
47 CFR §15.247 (a) (1), DA 00-705, RSS-210 section A8.1 (a)	20dB Bandwidth	Pass
47 CFR §15.247 (a) (1), DA 00-705, RSS-210 section A8.1 (b)	Carrier Frequency Separation	Pass
47 CFR §15.247 (a) (1)(iii), DA 00-705, RSS-210 section A8.1 (c)	Number of Hopping Channels	Pass
47 CFR §15.247 (a) (1) (iii), DA 00-705, RSS-210 section A8.1 (c)	Average Time of Occupancy (Dwell Time)	Pass
47 CFR §15.247 (b) (1), DA 00-705, RSS-210 section A8.1 (2)	Maximum Peak Output Power	Pass
47 CFR §15.247 (d), DA 00-705, RSS-210 Section A8.5	Band-edge compliance of RF Conducted Emission	Pass
47 CFR §15.247 (d), §15.209(a) & DA 00-705, RSS-210 Section A8.5	Radiated Spurious Emissions, Restricted Bands (2310-2390MHz, 2483.5-2500MHz)	Pass
47 CFR §15.247 (d), DA 00-705, RSS-210 Section A8.5	Spurious Emission - Conducted	Pass
47 CFR §15.247 (d) , §15.209(a) & DA 00-705, RSS-210 Section A8.5	Spurious Emissions - Radiated	Pass
47 CFR §15.203, RSS-Gen, Section 7.1.4	Antenna Connector Requirements	Pass
47 CFR §15.407(b)(6) & §15.107/207, ICES-003 RSS-GEN section 7.2.3.2	Power line Emission measurements	Pass

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## 1. General Description

**Description of the EUT system/test Item:**

**Product name:** PetPace Collar

**Model:** C102C

**FCC ID:** 2ACUDC102C

**IC ID:** 12216A-C102C

**Description:** Remote collar for monitoring pet's vital signs

**Protocol:** proprietary

**Maximum Peak Output Power:** 11.28 dBm

**Frequency range:** 902 - 928 MHz

**Type of Modulation:**

Protocol	Modulation
Bluetooth	FSK

**Antenna Specification:**

Type: Helix

Antenna Gain: -6 dBi in the range 902 – 928 MHz

## 2. Method of Measurements

### 2.1. Conducted RF Measurements:

The RF output of the transmitter under test was directly connected to the input of the Spectrum analyzer through a specialized antenna connector provided by the manufacturer, and an attenuator as specified. The external attenuator and cable loss were added to the reading. Worst-case results of the various modulation modes (where applicable) were reported.

For carrier frequency separation, number of hopping frequencies, time of occupancy, 20dB BW, peak output power, band edge emissions, and spurious emissions were measured according to the guidelines in DA 00-705.

For PSD, emission peak was zoomed within the pass band with spectrum analyzer's settings as reported (Sweep time=Span/3kHz). Transmitter outputs transmitting simultaneously were aggregated through a combiner.

For Maximum Conducted Output Power, the spectrum analyzer was set for free ran, and 100 traces were averaged in power averaging mode. The transmitter was continuously transmitting, at a duty cycle of about 99%, and power was integrated across a bandwidth of the 26dB EBW of the signal, using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges. Alternatively, Peak Output Power was measured using a Peak Power Meter.

For spurious emissions measurement, the spectrum from 9 kHz to 25GHz was investigated with the transmitter set to the lowest, middle and highest channel frequencies.

### 2.2. Radiated Emissions Measurements in the restricted bands:

For radiated emissions, which fall in the restricted bands the spectrum from 30MHz to 25GHz was investigated following the guidelines in ANSI C63.4-2003, with the transmitter set to the lowest, middle and highest channel frequencies. Measurements were performed with peak detector and repeated averaged with VBW=10Hz. Only Peak detection plots are presented.

### 2.3. Radiated Emission measurements:

Measurements were performed at a 3-meter measurement distance in the semi-anechoic chamber in order to evaluate the radiated electromagnetic interference characteristics of the EUT. The EUT was placed on a non-metallic table/support, 0.8m above the turntable, was configured, arranged and operated in a manner consistent with typical application and load conditions. The test program of exercising the equipment ensured that various parts of the EUT were exercised to permit detection of all EUT disturbances.

An appropriate antenna depending upon the frequency range, per ANSI C63.4-2003 clause 4.1.5 was used. While the turntable was being rotated, the height of the antenna was varied from 1 to 4m for the frequency range of 30MHz to 1GHz. The highest radiated emission was detected by manipulating the system cables to the worst-case position. This process was repeated for both antenna polarizations. The spectrum up to 40GHz was investigated for spurious emissions, using a band-reject filter where appropriate.

The amplitudes of worst-case emission were measured with the detector modes and resolution bandwidths over various frequency ranges according to the requirements of ANSI C63.4-2003 clause 4.2.

#### **2.4. Worst Case Results:**

Worst case result is determined as the channel with the highest output power. Pre-scan has been conducted to determine the worst-case. Worst-case results of various modulation modes/data rates were determined as the modulation with the highest output power, and that was reported.

#### **2.5. Power Line Emission measurements:**

The EUT was placed on a non-conductive table/support 80 cm above the reference ground plane. The EUT was configured in accordance with ANSI C63.4-2003 using a 50 $\mu$ H/50 ohm LISN.

Compliance with the provisions was based on the measurements of the radio frequency voltage between each line and the ground at the power terminal.

The EUT was operated in receive mode and then with DSS, DTS and DSS transmitters operating alternately and the worst case results were presented.



### 3. Test Facility & Uncertainty of Measurement

#### 3.1. Accreditation/ Registration reference:

- A2LA Certificate Number: 1633.01

#### 3.2. Test Facility description

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

**Address:** 30, Hasivim St., Petah Tikva, Israel.  
Tel: 972-3-926-6994

#### 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 $\geq 80$ dB at 15 kHz $\geq 90$ dB at 100 kHz Electric field $> 120$ dB from 1MHz to 1GHz $> 110$ dB 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	$\pm 3.9$ dB, 30MHz to 200MHz $\pm 3$ dB, 200MHz to 1000MHz
Transmission Loss measured at 5 positions, at 1.5m height	$\pm 3$ dB, 1GHz to 18GHz

#### Full-Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	7m x 4m x 3m
Antenna height	1.55m at Horizontal & Vertical polarizations
Shielding Effectiveness	Magnetic field $\geq 80$ dB at 15 kHz $\geq 90$ dB at 100 kHz Electric field $> 120$ dB from 1MHz to 1GHz $> 110$ dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Emerson and Cuming absorbing material in selected positions on the walls and floor
Field Uniformity to EN61000-4-3	$\pm 3$ dB 80MHz to 18GHz

### 3.3. Uncertainty of Measurement:

#### Statement of the measurement uncertainty

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	Range	Expanded U lab Uncertainty	U CISPR Uncertainty
Radiated Emission	30MHz÷200MHz, Horiz. Polar.	± 4.77 dB	±5.06
	30MHz÷200MHz, Ver. Polar.	± 4.90 dB	±5.17
	200MHz÷1000MHz, Horiz. Polar.	± 4.96 dB	±5.34
	200MHz÷1000MHz, Vert. Polar.	± 6.15 dB	±6.32
	1.0GHz -6.0GHz	± 4.33 dB	±5.18
	6.0GHz-18.0GHz	± 4.75 dB	±5.48
Conducted Emission	9 kHz÷150 kHz	± 3.47 dB	±3.83
	150 kHz÷30MHz	± 3.18 dB	±3.44

**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%.

#### 4. Bluetooth: Report of Measurements and examinations

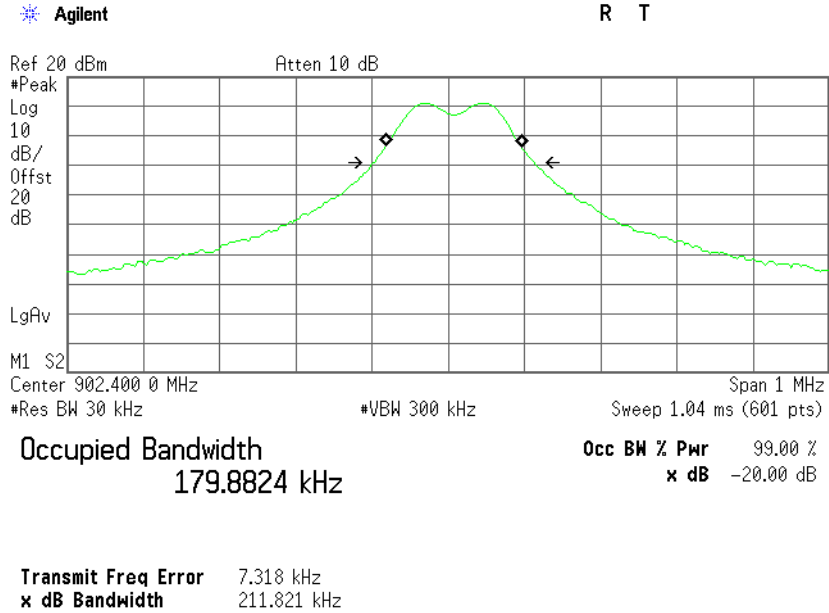
##### 4.1. 20dB Bandwidth

Reference document:	47 CFR §15.247 (a) (1) & DA 00-705		
Test Requirements:	20dB Bandwidth of the hopping channel		
Test setup:	See Sec. 2.1	<b>Pass</b>	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 30kHz, VBW: 300kHz, Span: 3MHz		
Hopping function:	Disabled		
Environment conditions:	Ambient Temperature: 23.5°C	Relative Humidity: 54%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.1.1 – 4.1.3	

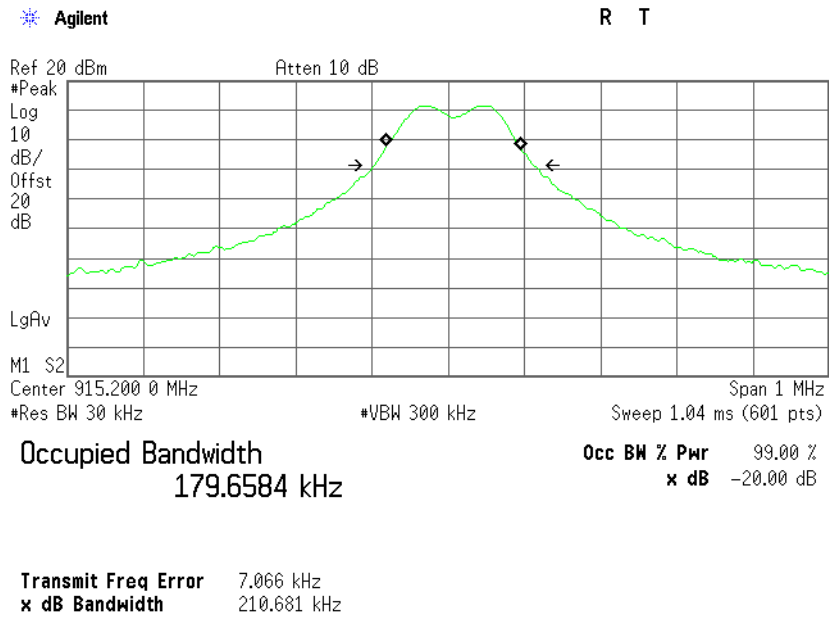
##### Test results:

Channel	Frequency, [MHz]	20dB BW, [kHz]	Limit, [kHz]	Delta, [kHz]	Pass/Fail
<b>FSK</b>					
1	902.400	211.821	500.000	-288.179	Pass
33	915.200	210.681		-289.319	Pass
64	927.600	210.627		-289.373	Pass

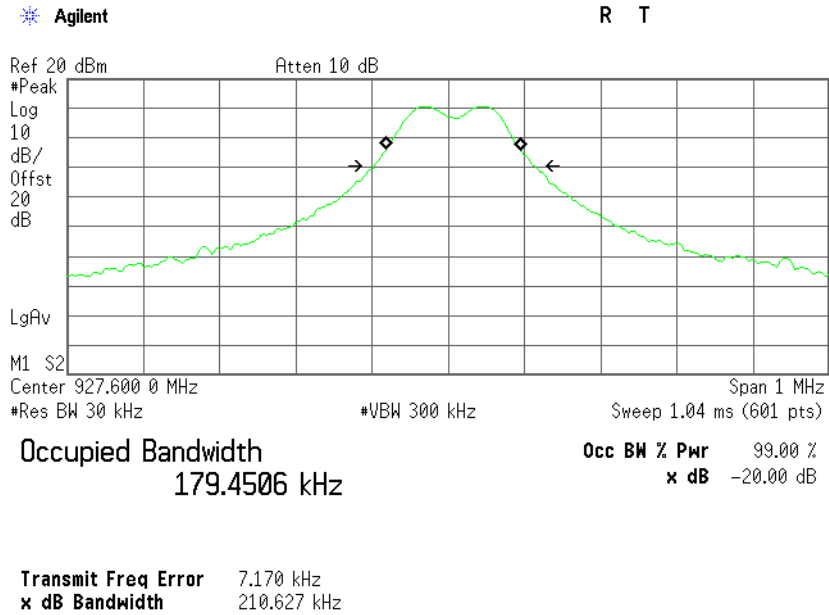
**Plot 4.1.1 20dB bandwidth test results, FSK, channel 1, 902.400MHz**



**Plot 4.1.2 20dB bandwidth test results, FSK, channel 33, 915.200MHz**



**Plot 4.1.3 20dB bandwidth test results, FSK, channel 64, 927.600MHz**



#### 4.2. Carrier Frequency Separation

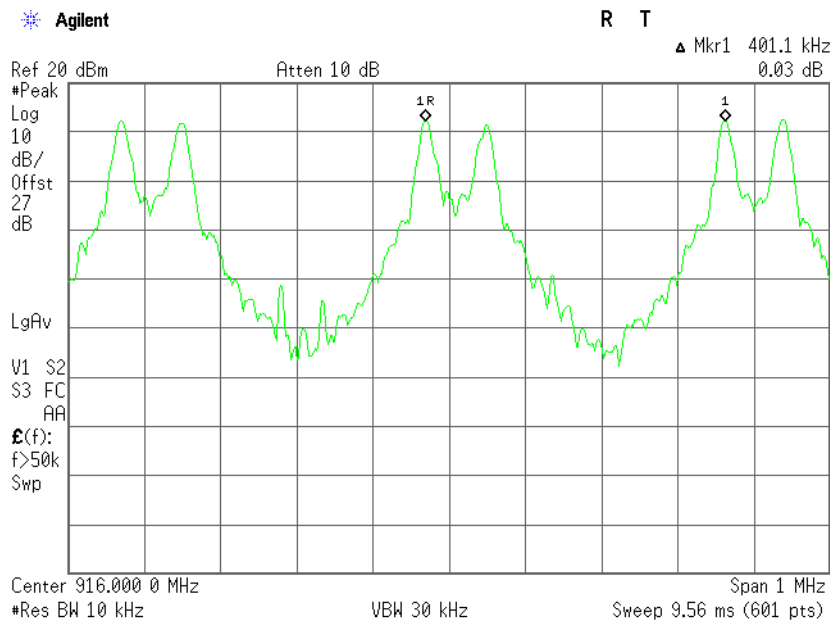
Reference document:	<b>47 CFR §15.247 (a) (1) &amp; DA 00-705</b>		
Test Requirements:	In the 902 - 928 MHz band may have hopping channel carrier frequencies that are separated by a minimum of 25 kHz or 20 dB bandwidth of the hopping channel, whichever is greater.		
Test setup:	See Sec. 2.1	<b>Pass</b>	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 10kHz, VBW: 30kHz		
Hopping function:	Enabled		
Environment conditions:	Ambient Temperature: 24.9°C	Relative Humidity: 50.1%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.2.1	

#### Test results:

Type of Modulation	Measured Carrier separation [kHz]	Limit*, [kHz]	Pass/Fail
FSK	401.100	≥211.821	Pass

\*The limit is 25 kHz or 20 dB bandwidth of the hopping channel, whichever is greater.

**Plot 4.2.1 Carrier Frequency Separation test results, FSK**



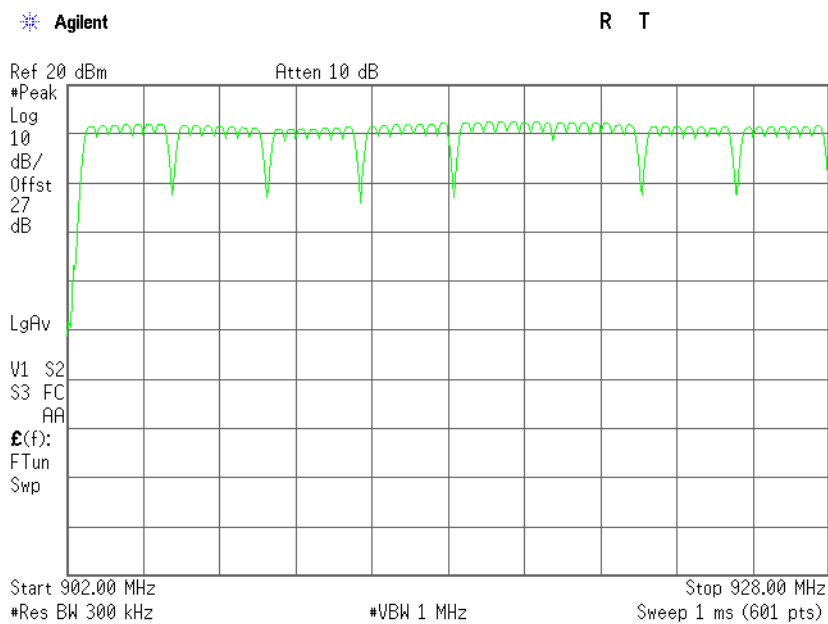
### 4.3. Number of Hopping Channels

Reference document:	47 CFR §15.247 (a) (1)(iii) & DA 00-705		
Test Requirements:	For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies.		
Test setup:	See Sec. 2.1	<b>Pass</b>	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 300kHz, VBW: 1MHz		
Hopping function:	Enabled		
Environment conditions:	Ambient Temperature: 23°C	Relative Humidity: 53.3%	Atmospheric Pressure: 1011.4 hPa
Test Result:	57 hopping channels	See Plot 4.3.1	

### Test results:

Type of Modulation	Number of Hopping Channels	Limit	Pass/Fail	Notes
GFSK	57	≥50	Pass	-

**Plot 4.3.1 Number of Hopping Channels test results, FSK**



#### 4.4. Average Time of Occupancy (Dwell Time)

Reference document:	<b>47 CFR §15.247 (a) (1) (i) &amp; DA 00-705</b>		
Test Requirements:	The average time of occupancy on any frequency shall not be greater than 400 ms within a period of 20 s.		
Test setup:	See Sec. 2.1	<b>Pass</b>	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 1MHz, VBW: 3MHz, Span:0 centered on hopping channel		
Hopping function:	Enabled		
Environment conditions:	Ambient Temperature: 21.5°C	Relative Humidity: 58%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.4.1– Plot 4.4.2	

**Test results:**

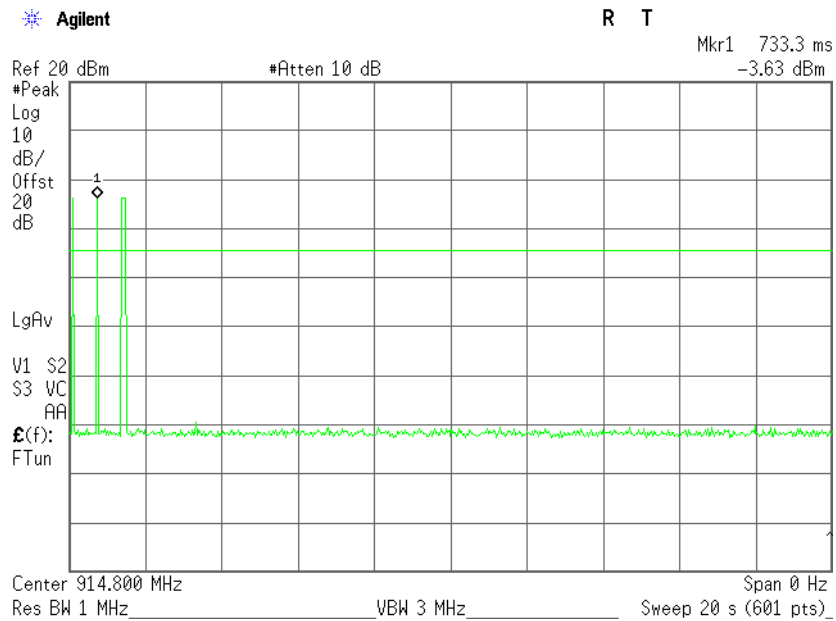
**Test results:**

Type of Modulation	Frequency, MHz	Pulse length, msec	Period Time, s	Number of Hops in Period Time	Dwell time, ms*	Limit, [msec]	Pass/Fail
FSK	914.8	20	20	3	60	400.0	Pass

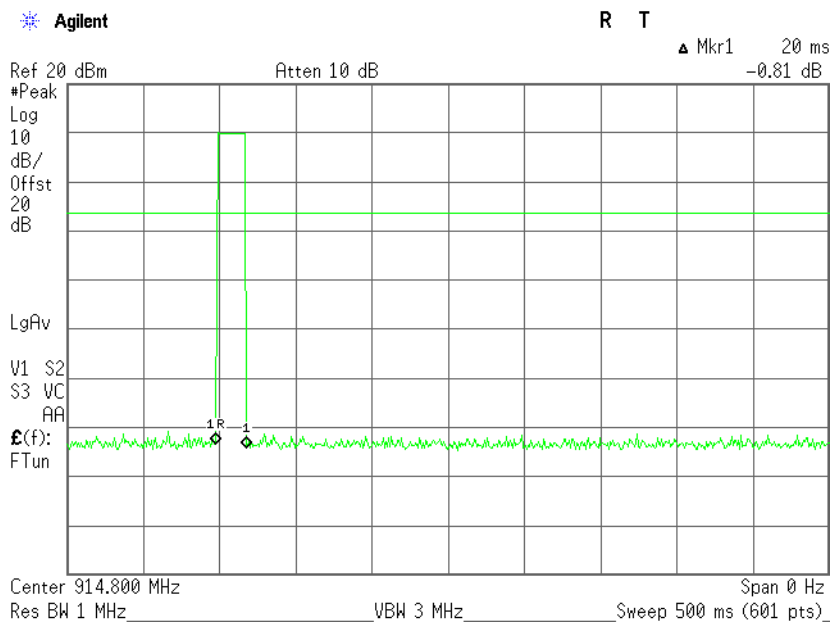
\*Dwell Time = Pulse length × Number of Hops in Period time



**Plot 4.4.1 Average Time of Occupancy (Dwell Time) test results, Time slot length, FSK, channel 32**



**Plot 4.4.2 Average Time of Occupancy (Dwell Time) test results, Number of Slots in a Period, FSK, channel 32**



#### 4.5. Maximum Peak Output Power

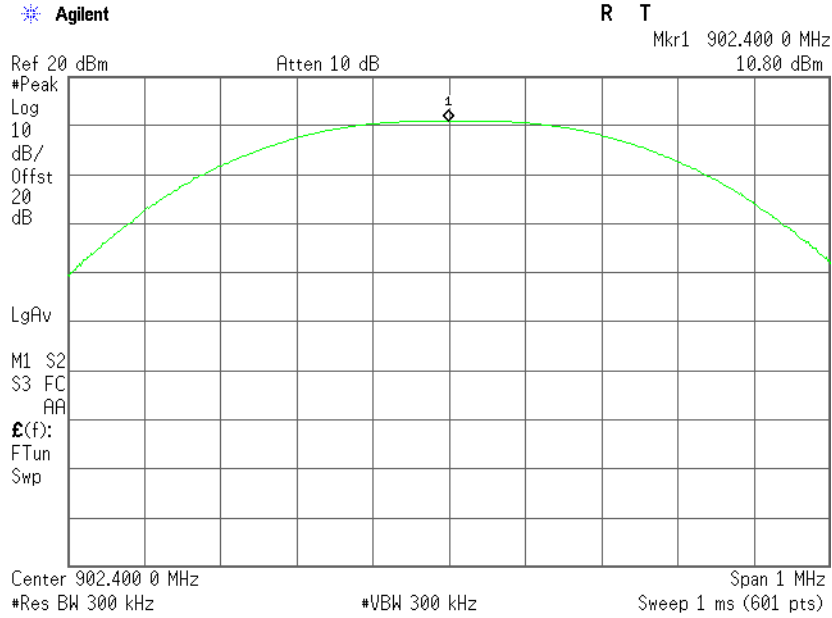
Reference document:	<b>47 CFR §15.247 (b) (1) &amp; DA 00-705</b>		
Test Requirements:	The maximum peak output power shall not exceed 1Watt (30dBm)		
Test setup:	See Sec. 2.1	<b>Pass</b>	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 300kHz, VBW: 300kHz,		
Hopping function:	Disabled		
Environment conditions:	Ambient Temperature: 22.5°C	Relative Humidity: 54.3%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.5.1 – Plot 4.5.3	

#### Test results:

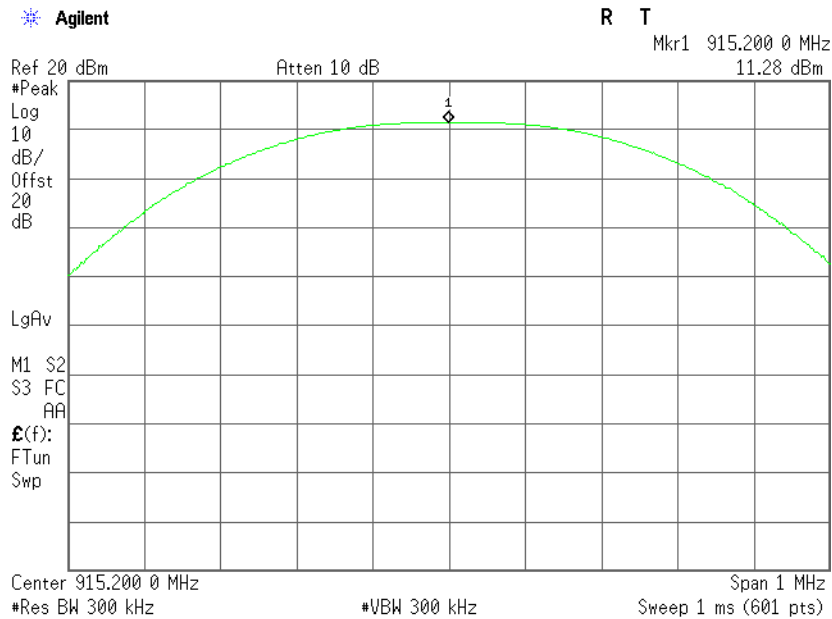
Type of Modulation	Channel	Frequency, [MHz]	Max. Peak Output power*, [dBm]	Limit, [dBm]	Delta, [dB]	Pass/Fail
FSK	1	902.400	10.80	30.00	-19.20	Pass
	33	915.200	11.28	30.00	-18.72	Pass
	64	927.600	10.40	30.00	-19.60	Pass

\*Corrected for external attenuations & cable, antenna gain is – 6 dBi

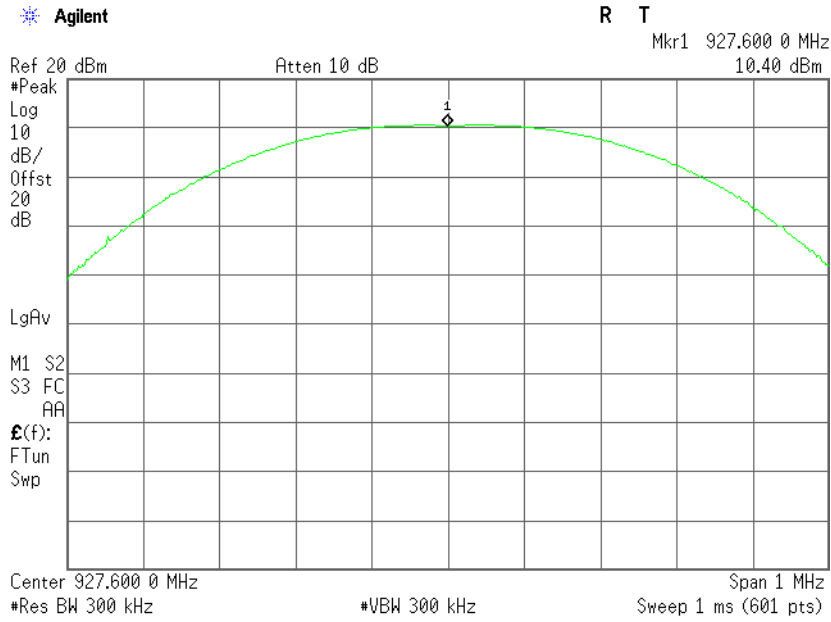
**Plot 4.5.1 Maximum Peak Output Power test results, FSK, channel 1, 902.400MHz**



**Plot 4.5.2 Maximum Peak Output Power test results, FSK, channel 33, 915.200MHz**



**Plot 4.5.3 Maximum Peak Output Power test results, FSK, channel 64, 927.600MHz**



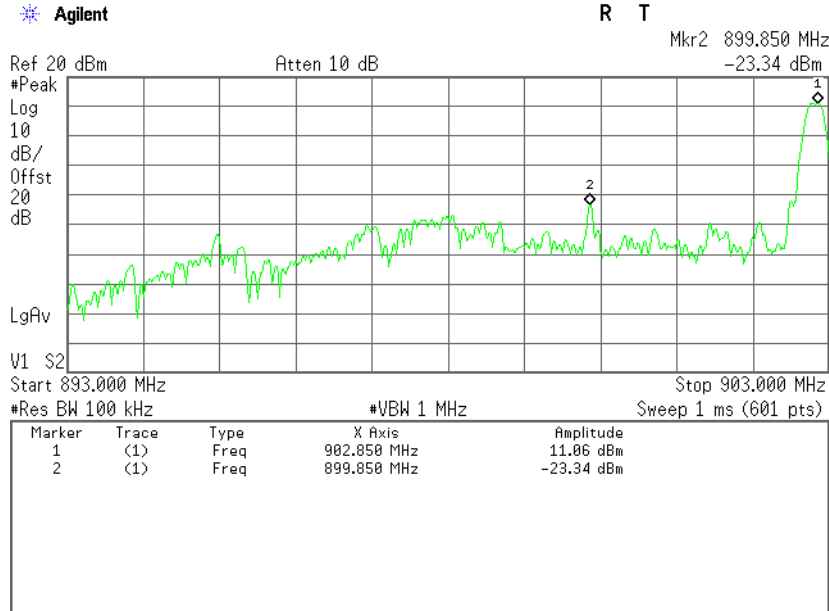
#### 4.6. Band-edge compliance of RF Conducted Emission

Reference document:	<b>47 CFR §15.247 (d) &amp; DA 00-705</b>		
Test Requirements and limit:	In any 100 kHz bandwidth outside the frequency band in which the digitally modulated 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 Section §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).		
Test setup:	See Sec. 2.1	<b>Pass</b>	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 100kHz, VBW: 1MHz		
Hopping function:	Disabled/Enabled		
Environment conditions:	Ambient Temperature: 22.3°C	Relative Humidity: 57.5%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.6.1 – Plot 4.6.4	

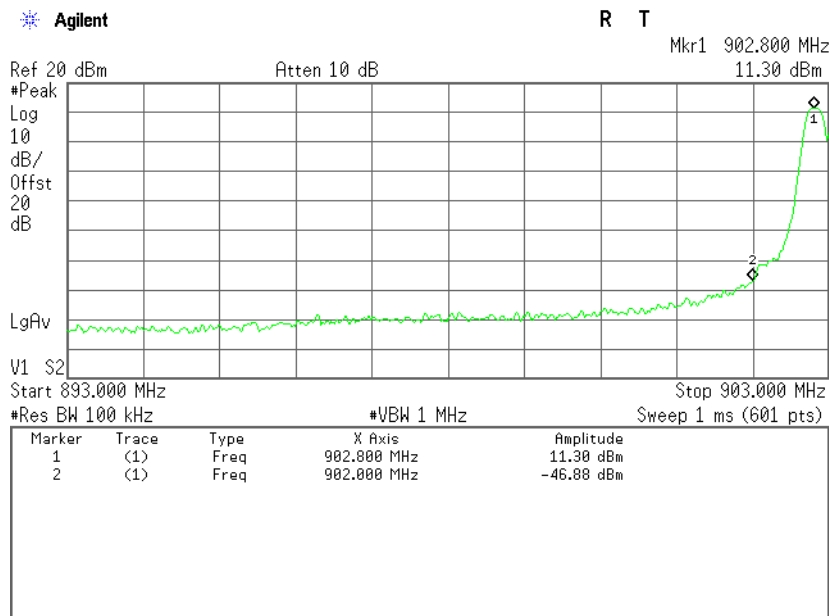
#### Test results

Type of Modulation	Mode	Channel	Measured emission, [dBc]	Limit, [dBc]	Pass/Fail
FSK	Hopping ON	2	-34.40	-20.00	Pass
		64	-44.87	-20.00	Pass
	Hopping OFF	2	-58.18	-20.00	Pass
		64	-44.60	-20.00	Pass

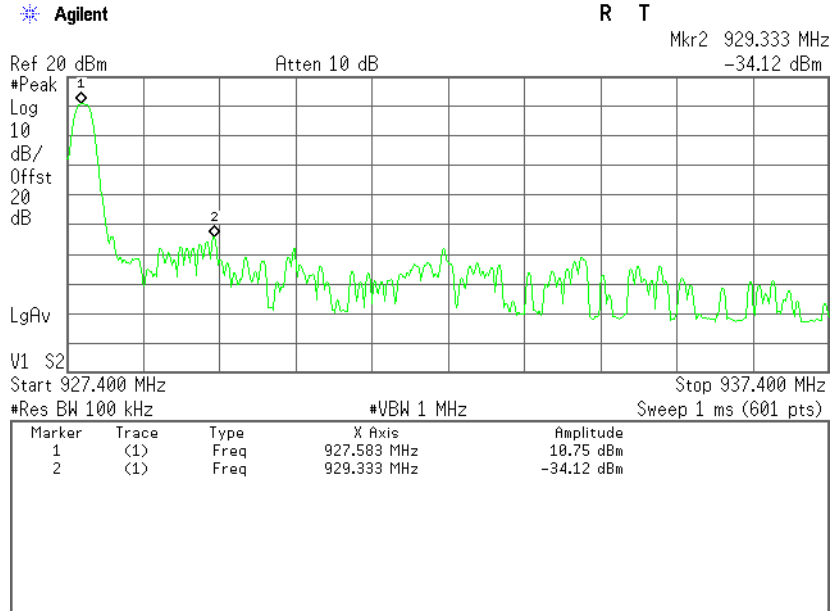
**Plot 4.6.1 Band-edge test results, FSK, channel 2, Hopping ON**



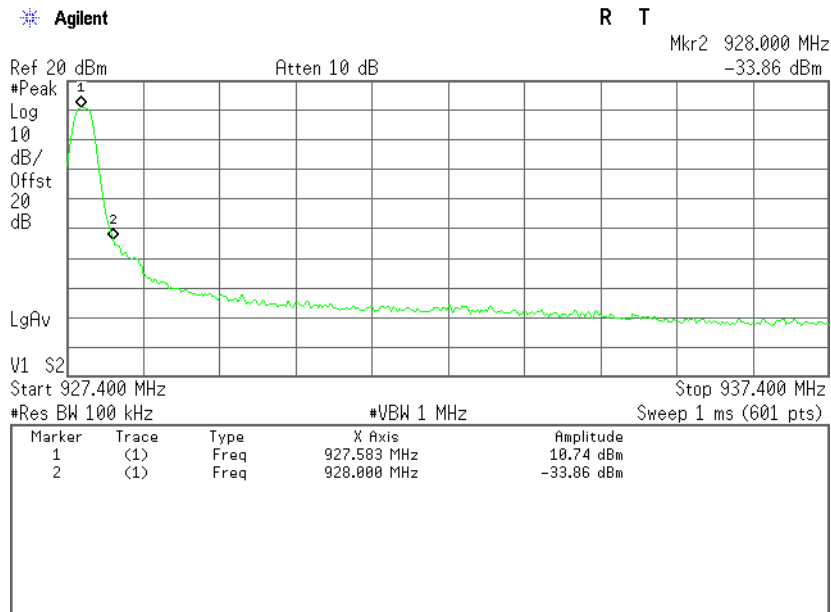
**Plot 4.6.2 Band-edge test results, FSK, channel 2, Hopping OFF**



**Plot 4.6.3 Band-edge test results, FSK, channel 64, Hopping ON**



**Plot 4.6.4 Band-edge test results, FSK, channel 64, Hopping OFF**



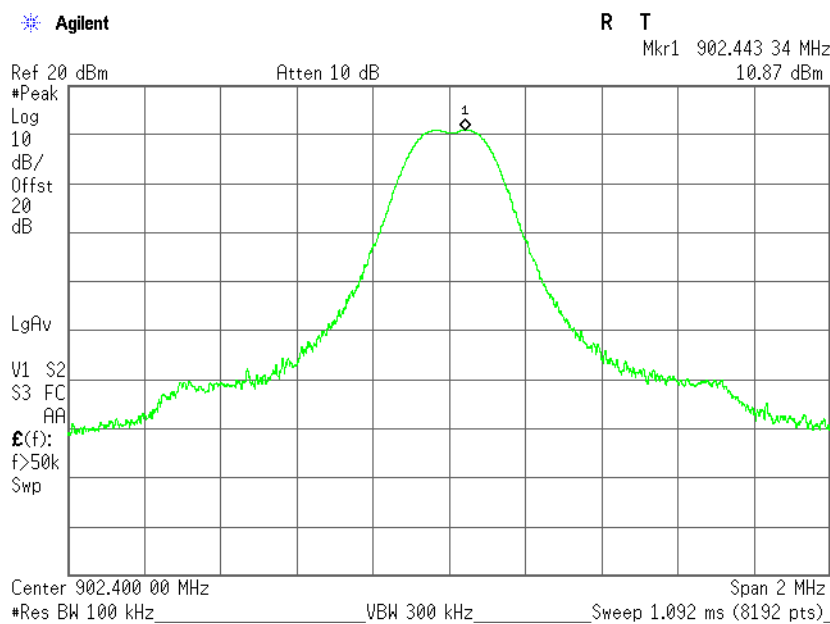
#### 4.7. Spurious Emission- Conducted Measurements

Reference document:	47 CFR §15.247 (d) & DA 00-705		
Test Requirements:	In any 100 kHz bandwidth outside the frequency band at least 20 dB below the highest level of the desired power.		
Test setup:	See Sec. 2.1	<b>Pass</b>	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 100kHz, VBW: 300kHz		
Hopping function:	Disabled (lowest, middle, and highest channels to be investigated)		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.7.1 – Plot 4.7.9	

#### Test results:

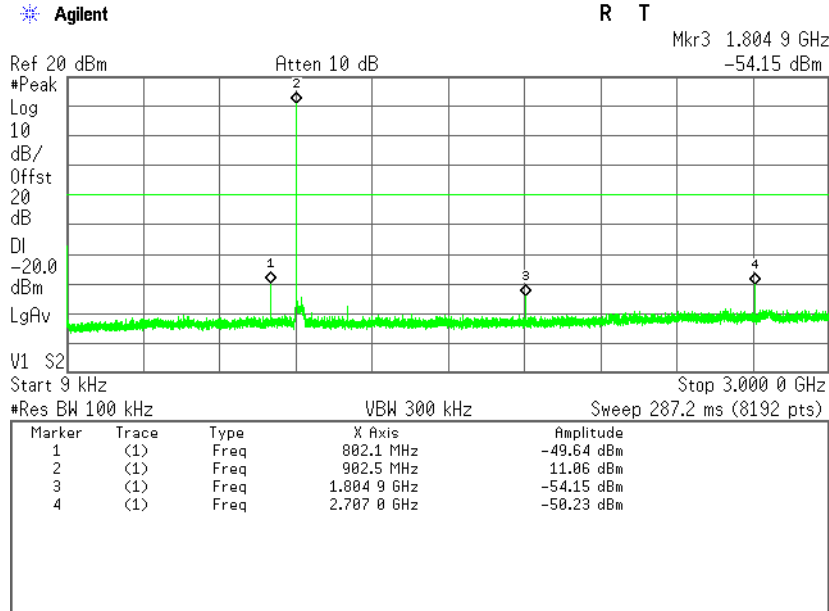
Frequency, [MHz]	Channel	Emission Frequency, [MHz]	Antenna Polarization	Emission Level, [dBμV/m]	Limit, dBc	Pass/Fail
All emissions are at least 20dB below the Limit					-20.0	Pass

**Plot 4.7.1 Conducted Spurious Emission, FSK, channel 1, reference level**

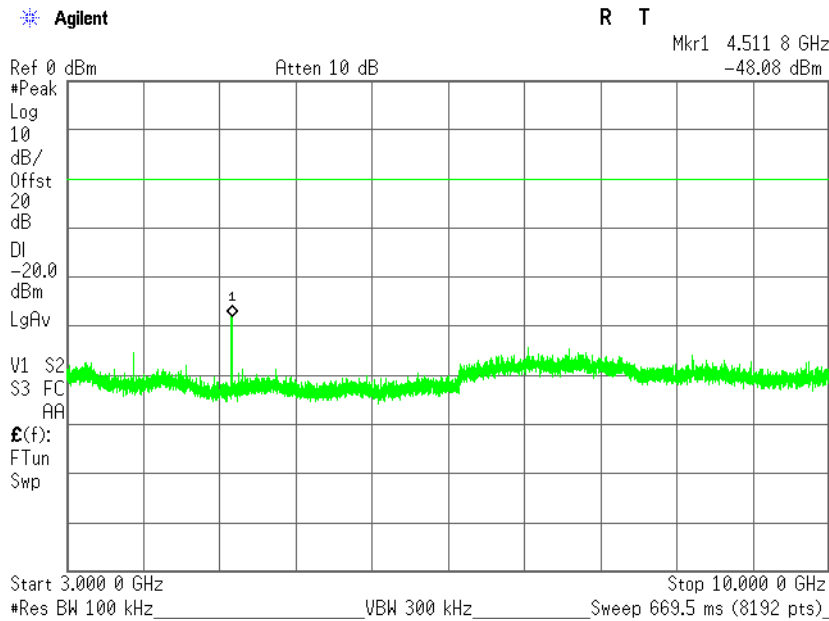




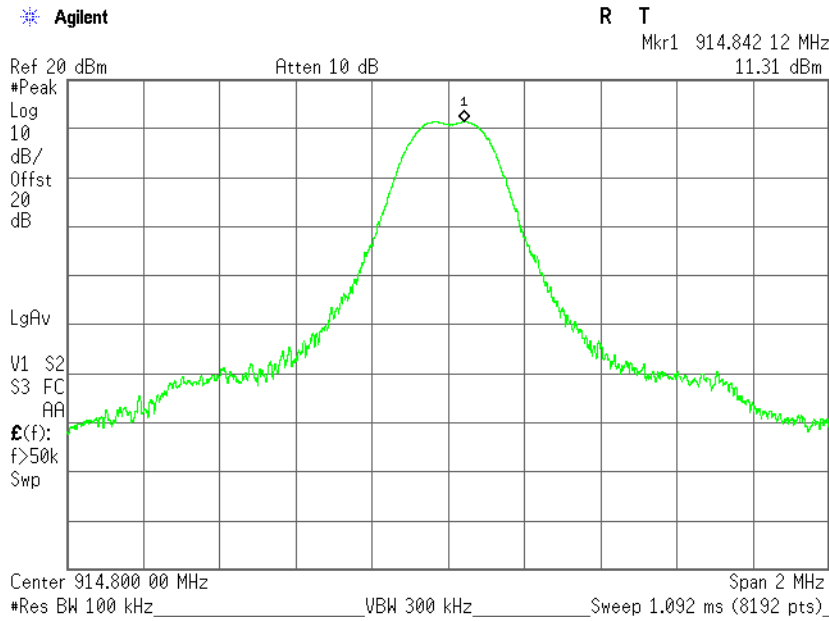
**Plot 4.7.2 Conducted Spurious Emission, FSK, channel 1, 9 kHz – 3 GHz range**



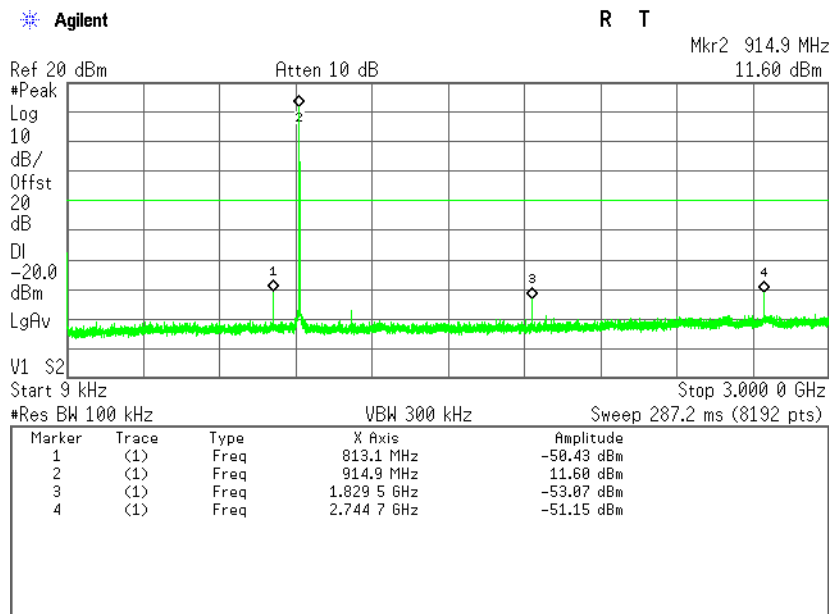
**Plot 4.7.3 Conducted Spurious Emission, FSK, channel 1, 3 GHz – 10 GHz range**



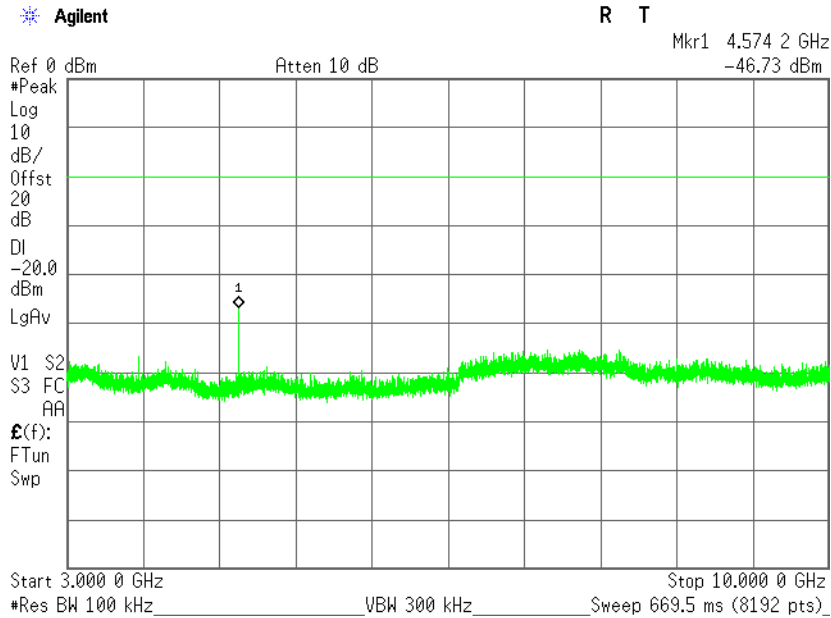
**Plot 4.7.4 Conducted Spurious Emission, FSK, channel 32, reference level**



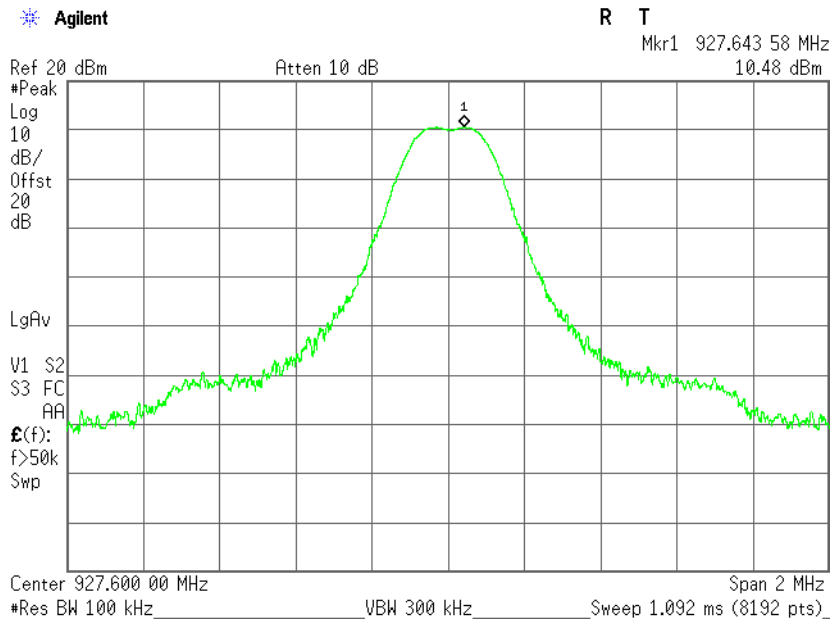
**Plot 4.7.5 Conducted Spurious Emission, FSK, channel 32, 9 kHz – 3 GHz range**



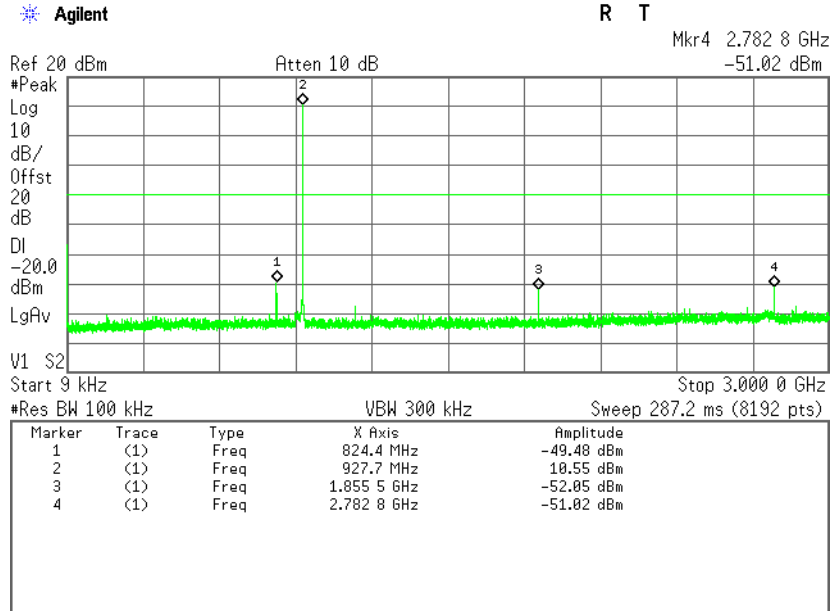
**Plot 4.7.6 Conducted Spurious Emission, FSK, channel 32, 3 GHz – 10 GHz range**



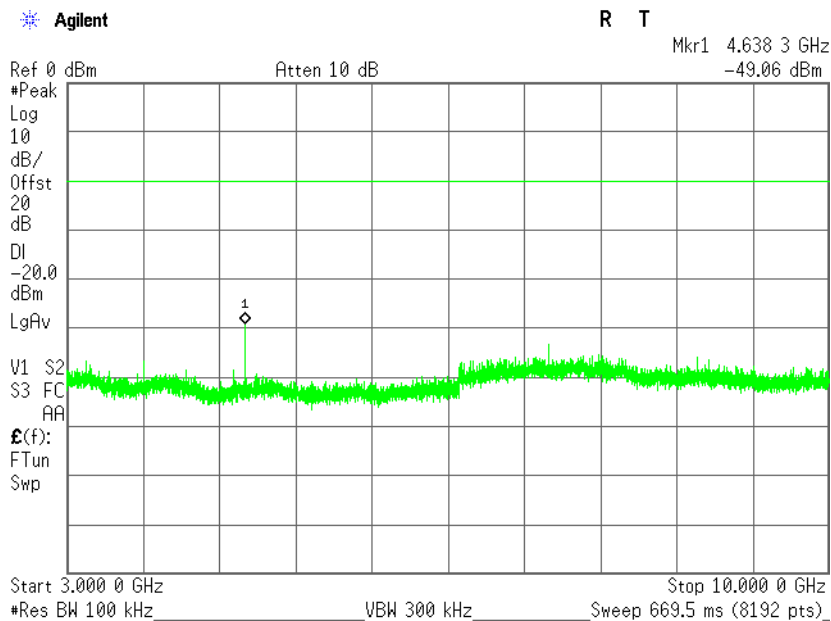
**Plot 4.7.7 Conducted Spurious Emission, FSK, channel 64, reference level**



**Plot 4.7.8 Conducted Spurious Emission, FSK, channel 64, 9 kHz – 3 GHz range**



**Plot 4.7.9 Conducted Spurious Emission, FSK, channel 64, 3 GHz – 10 GHz range**



#### 4.8. Spurious Emissions and Spurious Emissions in Restricted Bands (960-1240MHz) – Radiated Measurements

Reference document:	47 CFR §15.247 (d) & §15.209(a) & DA 00-705		
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	<b>Pass</b>	
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: 53.3%	Atmospheric Pressure: hPa
Test Result:	See below	Plots 4.8.1 – Plot 4.8.8	

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
795.50	QP	Horizontal	34.7	46.5	-11.8	Pass

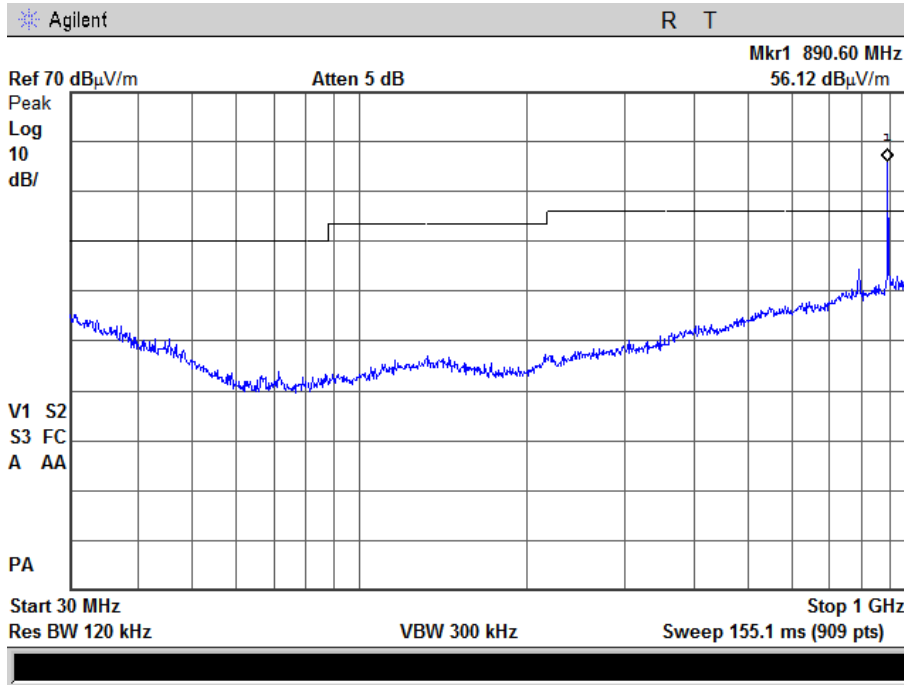
##### Test results above 1GHz:

Emission Frequency, [MHz]	Detector Type	Antenna Polarization	Emission Level, [dBµV/m]	Limit, [dBµV/m]	Delta, [dB]	Pass/Fail
<b>Lowest Frequency, 902.4 MHz</b>						
5415.000	AVG	H	34.67	54.00	-19.33	Pass
<b>Middle Frequency, 914.8 MHz</b>						
2744.400	AVG	H	32.70	54.00	-21.30	Pass
<b>Highest Frequency, 927.6 MHz</b>						
2782.800	AVG	H	34.70	54.00	-19.30	Pass
4638.000	AVG	V	37.06	54.00	-16.94	Pass

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

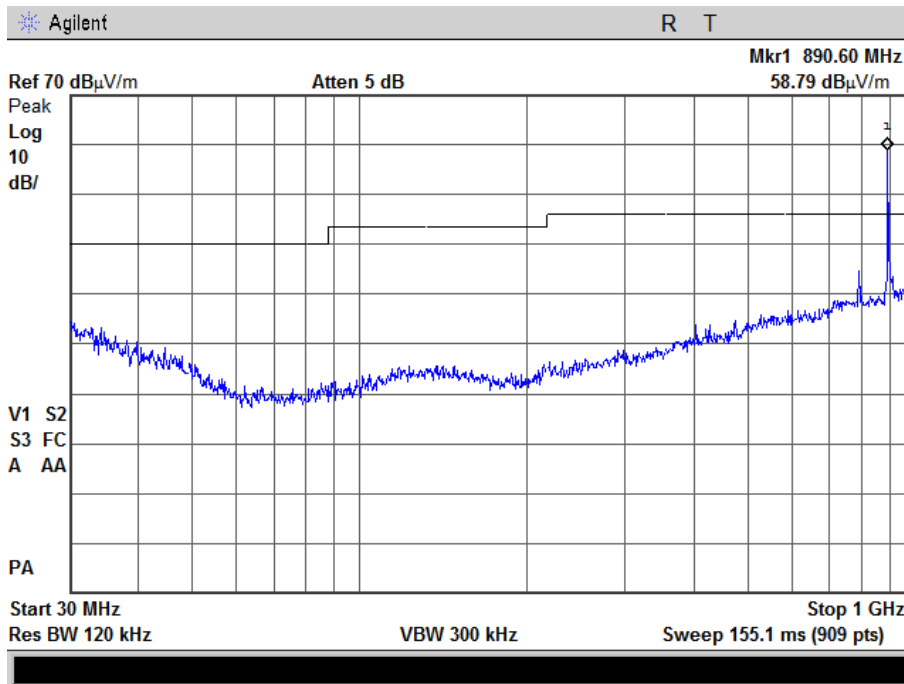
Correction Factor = Antenna factor + Cable Loss + Filter I/L

**Plot 4.8.1 Radiated Spurious Emission in 30 MHz – 1 GHz range, Worst case for all frequencies(channel 1), Vertical**



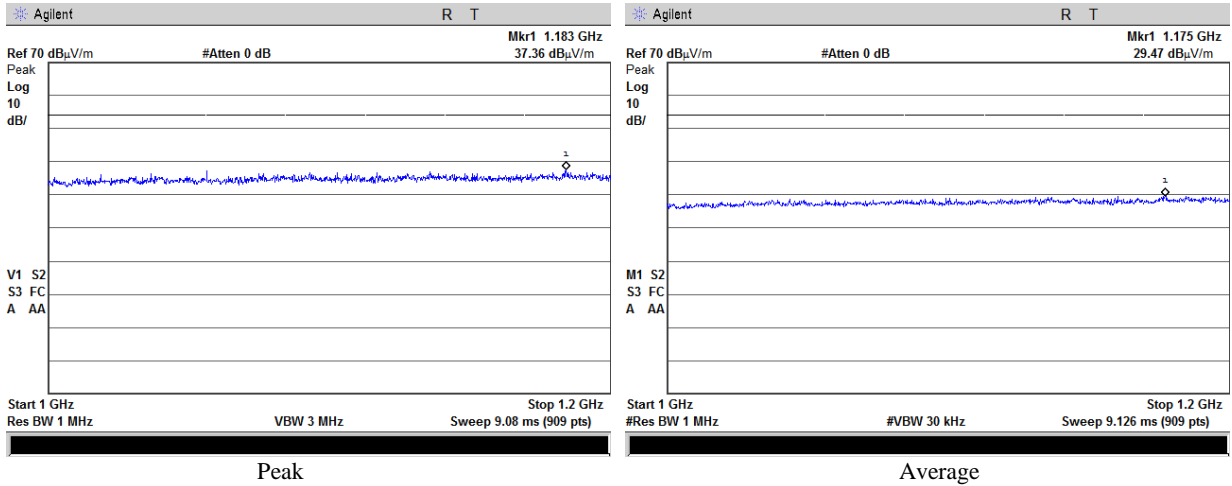
With tunable bandreject filter

**Plot 4.8.2 Radiated Spurious Emission in 30 MHz – 1 GHz range, Worst case for all frequencies(channel 1), Horizontal**

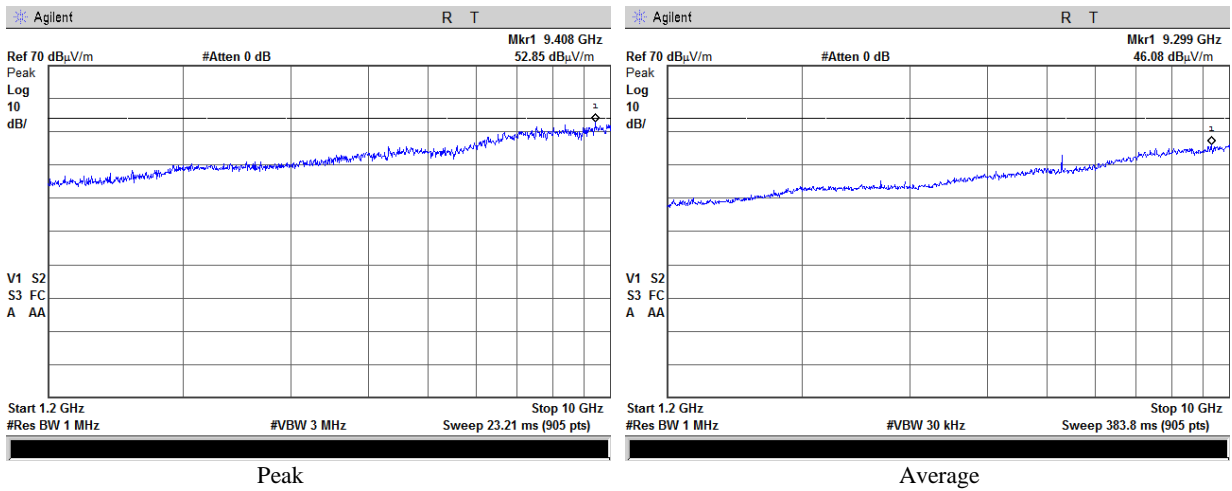


With tunable bandreject filter

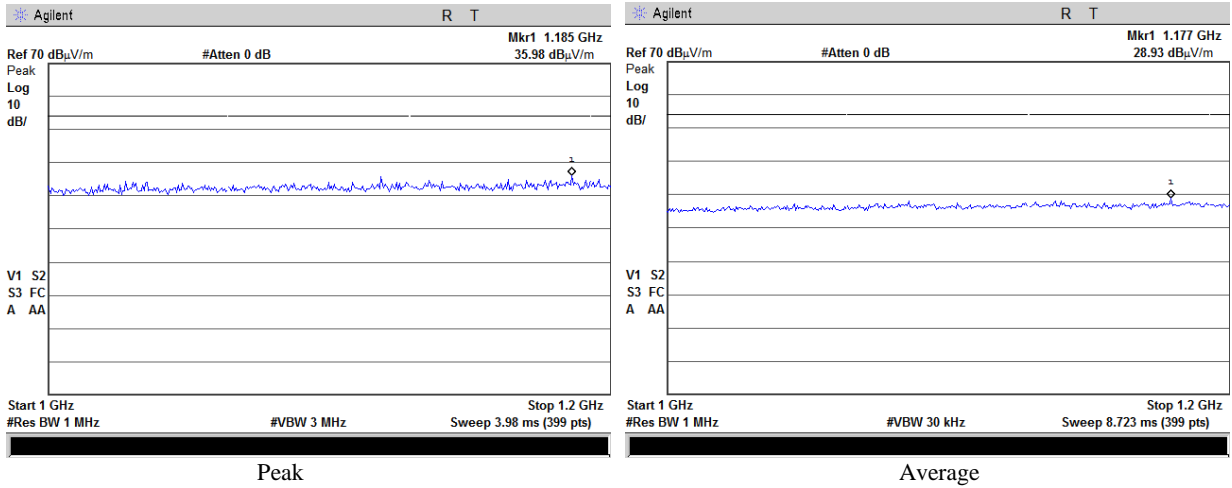
**Plot 4.8.3 Radiated Spurious Emission in 1 – 1.2 GHz range, Fc = 902.4 MHz, Horizontal & Vertical**



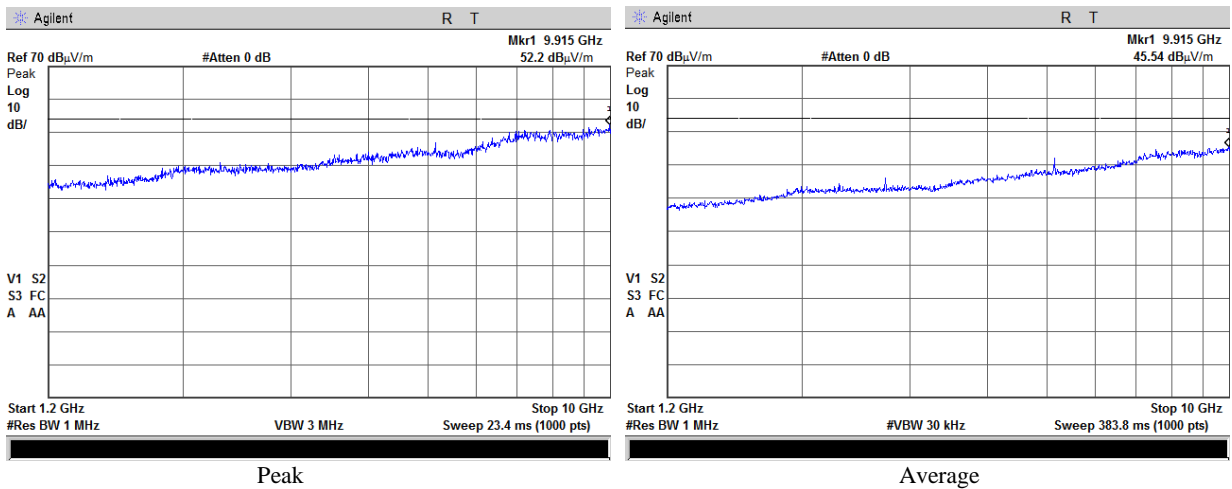
**Plot 4.8.4 Radiated Spurious Emission in 1.2 – 10 GHz range, Fc = 902.4 MHz, Horizontal & Vertical**



**Plot 4.8.5 Radiated Spurious Emission in 1 – 1.2 GHz range, Fc = 914.8 MHz, Horizontal & Vertical**

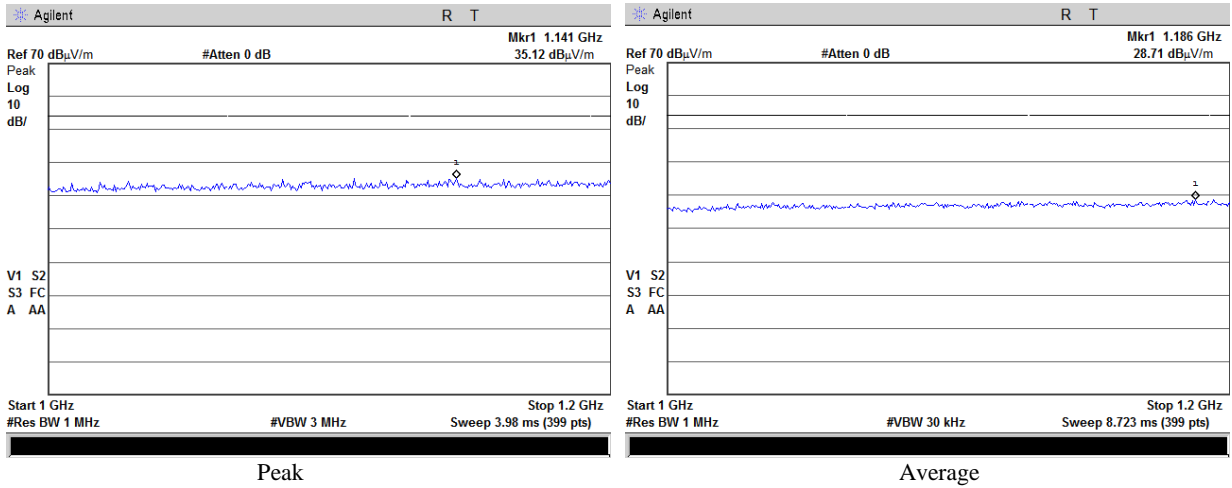


**Plot 4.8.6 Radiated Spurious Emission in 1.2 – 10 GHz range, Fc = 914.8 MHz, Horizontal & Vertical**

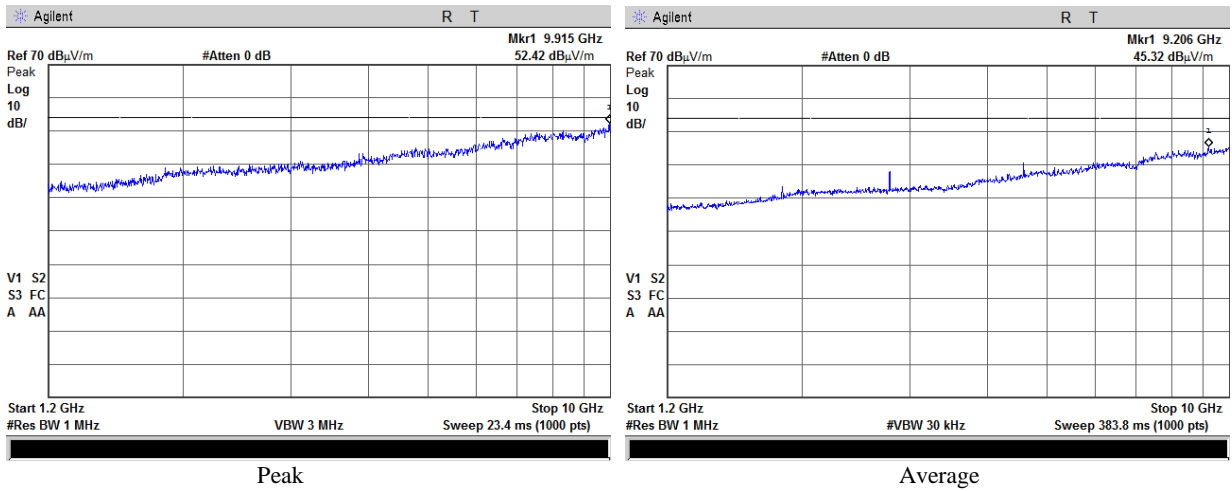




**Plot 4.8.7 Radiated Spurious Emission in 1 – 1.2 GHz range, Fc = 927.6 MHz, Horizontal & Vertical**



**Plot 4.8.8 Radiated Spurious Emission in 1.2 – 10 GHz range, Fc = 927.6 MHz, Horizontal & Vertical**



**4.9. Antenna Connector Requirements**

Reference document:	<b>47 CFR §15.203</b>	
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 antenna is permanently installed	<b>Pass</b>

#### 4.10. Power Line Emissions measurements

Reference document:	<b>47 CFR §207</b>		
Test Requirements:	The emissions from an intentional radiator shall not exceed the field strength levels specified in §15.207. Any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Sec.15.207.		
Test setup:	See Sec. 2.5	<b>Pass</b>	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted Emissions		
S.A. Settings:	f <30MHz: RBW: 9kHz, VBW:30kHz		
Radio device:	Idle		
Environment conditions:	Ambient Temperature: 23.2°C	Relative Humidity: 48.1%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.11.1 - Plot 4.11.6	

#### Test Results:

**Table 4.10.1: Power Supply Ports 110 VAC, Collar with power supply Model: SJB 0500500PU**

#### “Phase” Lead

Frequency [MHz]	Measured Result [dBμV]		Limit [dBμV]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.338539	37.5	29.5	59.24	49.24	-21.74	-19.74	Pass
0.947938	31.4	22.1	56.00	46.00	-24.60	-23.90	Pass
1.293285	30	19.6	56.00	46.00	-26.00	-26.40	Pass
2.834801	22.2	11.6	56.00	46.00	-33.80	-34.40	Pass
1.934714	28.2	15.8	56.00	46.00	-27.80	-30.20	Pass
25.88	17.3	7.7	60.00	50.00	-42.70	-42.30	Pass

#### “Neutral” Lead

Frequency [MHz]	Measured Result [dBμV]		Limit [dBμV]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.340394	37.9	30.5	59.19	49.19	-21.29	-18.69	Pass
0.303276	37.7	30.3	60.15	50.15	-22.45	-19.85	Pass
0.606436	33.6	24.3	56.00	46.00	-22.40	-21.70	Pass
0.190146	34.1	23.7	64.03	54.03	-29.93	-30.33	Pass
1.294013	30.2	19.7	56.00	46.00	-25.80	-26.30	Pass
1.634	29.4	19.3	56.00	46.00	-26.60	-26.70	Pass

**Table 4.10.2: Power Supply Ports 110 VAC, Collar with power supply Model: SAW-0500500**

**“Phase” Lead**

Frequency [MHz]	Measured Result [dB $\mu$ V]		Limit [dB $\mu$ V]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.58949	46.9	42	56.00	46.00	-9.10	-4.00	Pass
1.412781	39.5	34.3	56.00	46.00	-16.50	-11.70	Pass
2.363926	38	32.9	56.00	46.00	-18.00	-13.10	Pass
0.624602	46.6	41.4	56.00	46.00	-9.40	-4.60	Pass
18.801949	32.9	26	60.00	50.00	-27.10	-24.00	Pass
5.15	35.1	30.8	60.00	50.00	-24.90	-19.20	Pass

**“Neutral” Lead**

Frequency [MHz]	Measured Result [dB $\mu$ V]		Limit [dB $\mu$ V]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.573855	45.7	34.6	56.00	46.00	-10.30	-11.40	Pass
0.421809	41.8	31.5	57.41	47.41	-15.61	-15.91	Pass
2.353486	37.6	26.6	56.00	46.00	-18.40	-19.40	Pass
1.558961	37	24.4	56.00	46.00	-19.00	-21.60	Pass
18.800753	33.6	24.1	60.00	50.00	-26.40	-25.90	Pass
20.57	32.5	23.1	60.00	50.00	-27.50	-26.90	Pass

**Table 4.10.3: Power Supply Ports 110 VAC, Collar with power supply Model: MU06-H050100**

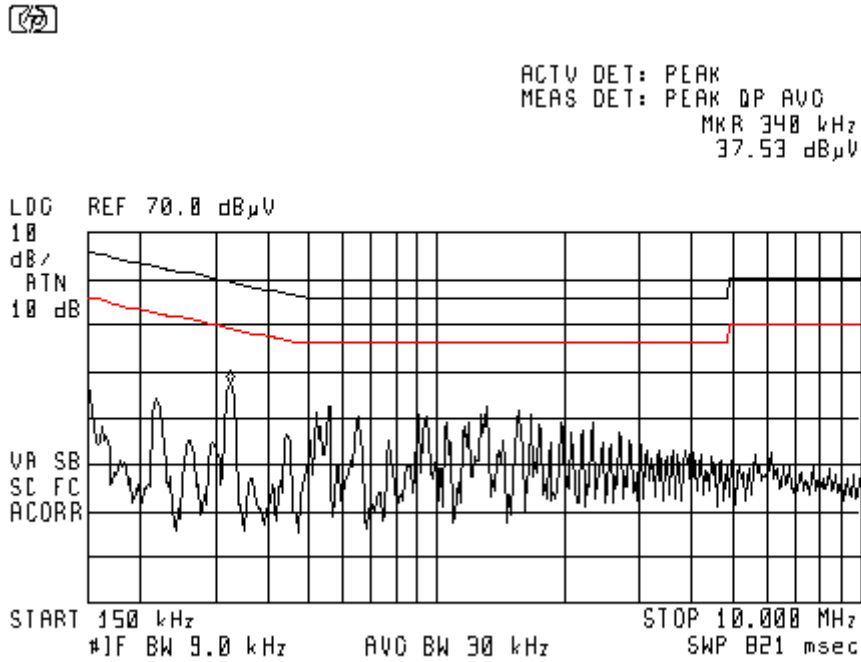
**“Phase” Lead**

Frequency [MHz]	Measured Result [dB $\mu$ V]		Limit [dB $\mu$ V]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.456915	40	30.5	56.75	46.75	-16.75	-16.25	Pass
0.1871	37	26.1	64.16	54.16	-27.16	-28.06	Pass
0.208715	35.2	25.3	63.26	53.26	-28.06	-27.96	Pass
0.22855	34.3	27	62.50	52.50	-28.20	-25.50	Pass
6.719378	29.8	18.1	60.00	50.00	-30.20	-31.90	Pass
295.6	30.3	19.3	60.00	50.00	-29.70	-30.70	Pass

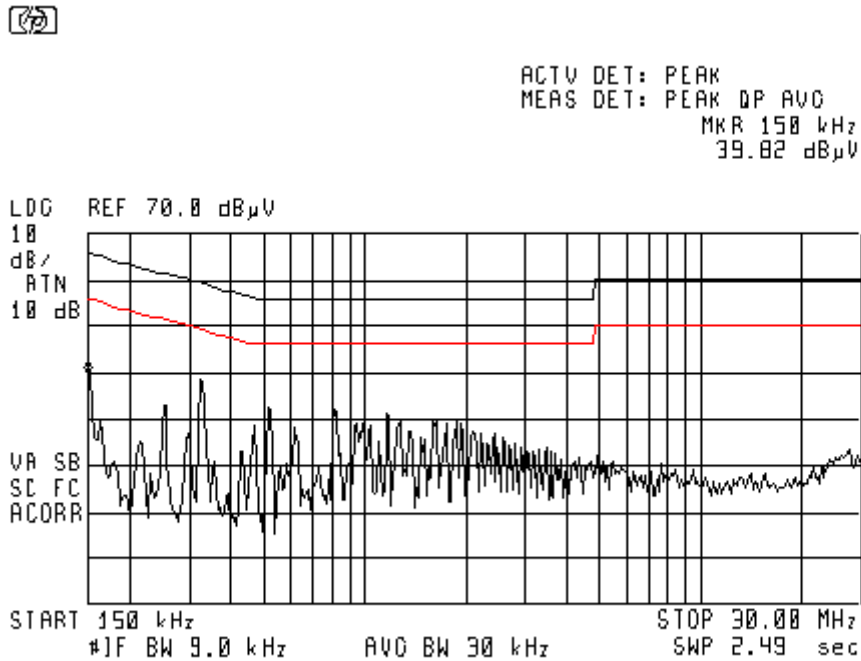
**“Neutral” Lead**

Frequency [MHz]	Measured Result [dB $\mu$ V]		Limit [dB $\mu$ V]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.453345	42.3	34.5	56.81	46.81	-14.51	-12.31	Pass
0.157250	35.6	26.9	65.61	55.61	-30.01	-28.71	Pass
0.20811	33.7	19.9	63.28	53.28	-29.58	-33.38	Pass
6.610575	29.6	22.3	60.00	50.00	-30.40	-27.70	Pass
0.572345	29	20.5	56.00	46.00	-27.00	-25.50	Pass
572.3	29	20.5	60.00	50.00	-31.00	-29.50	Pass

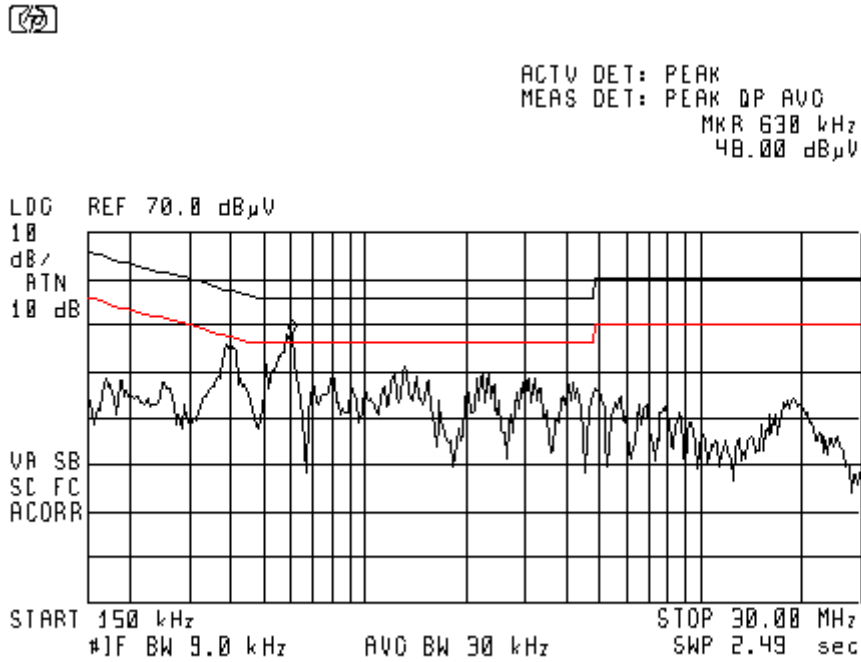
**Plot 4.1: Power Supply Ports 110 VAC, Collar with power supply Model: SJB 0500500PU, 150kHz – 30MHz, “Phase” Lead**



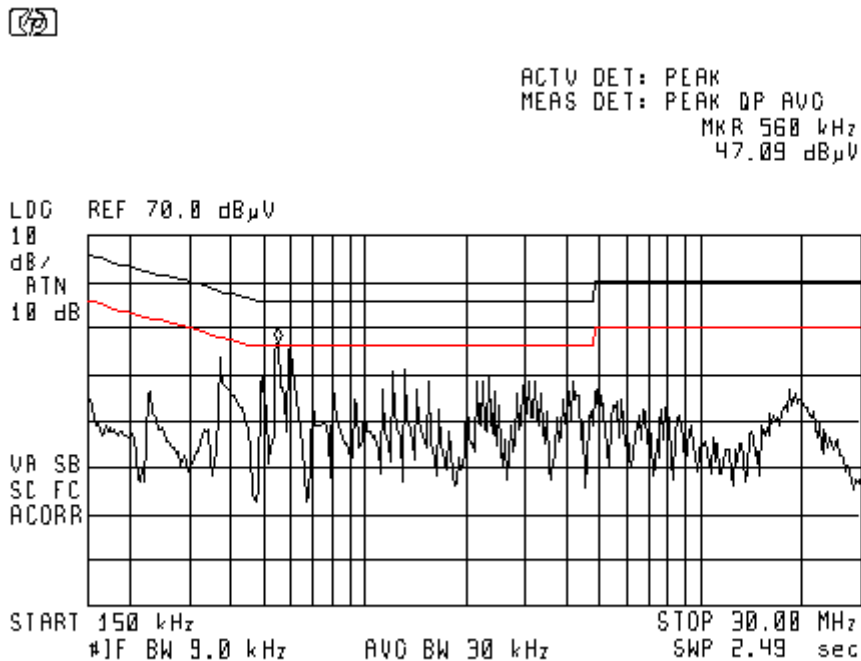
**Plot 4.2: Power Supply Ports 110 VAC, Collar with power supply Model: SJB 0500500PU 150kHz – 30MHz, “Neutral” Lead**



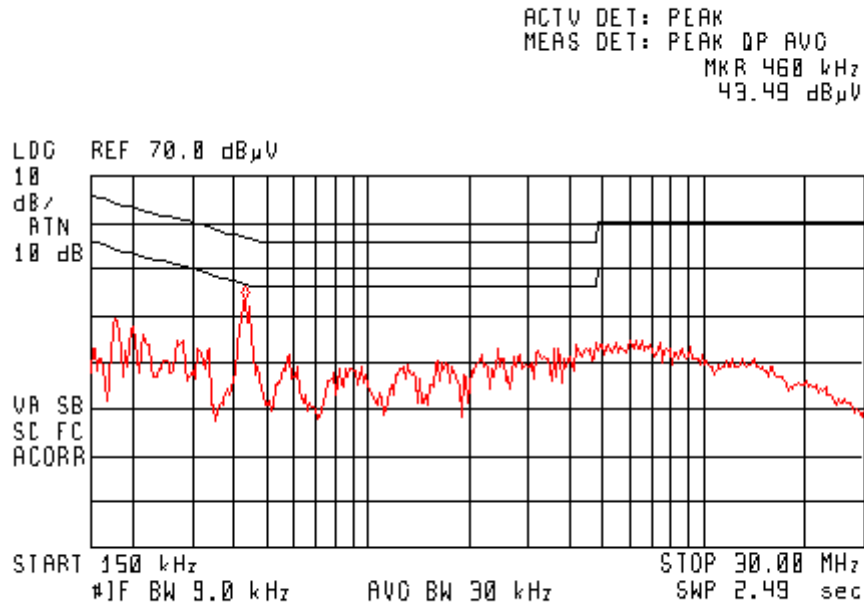
**Plot 4.3: Power Supply Ports 110 VAC, Collar with power supply Model: SAW-0500500, 150kHz – 30MHz, “Phase” Lead**



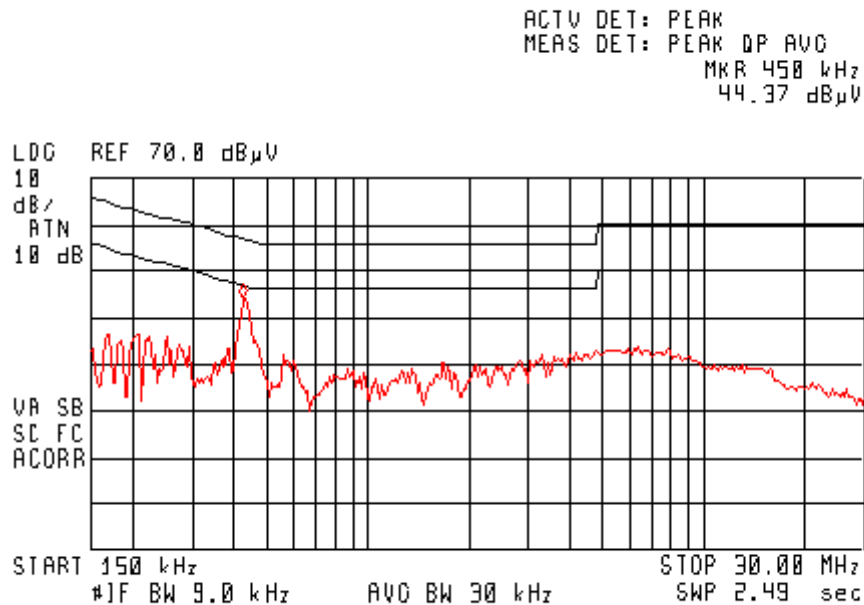
**Plot 4.4: Power Supply Ports 110 VAC, Collar with power supply Model: SAW-0500500, 150kHz – 30MHz, “Neutral” Lead**



**Plot 4.5: Power Supply Ports 110 VAC, Collar with power supply Model: MU06-H050100, 150kHz – 30MHz, “Phase” Lead**



**Plot 4.6: Power Supply Ports 110 VAC, Collar with power supply Model: MU06-H050100, 150kHz – 30MHz, “Neutral” Lead**





## 5. Appendix

### Appendix A: List of Measuring Equipment used:

Equipment	Manufacturer/ Model	Serial Number	Due date
CISPR16 EMI Receiver	HP8546A	3710A00392	30-08-2014
Spectrum Analyzer 9kHz ÷ 22 GHz	HP 8593EM	3536A00131	30-08-2014
Spectrum Analyzer 100 Hz ÷ 26.5 GHz	Agilent E7405A	US41160436	30-08-2014
LNA Amplifier 1 GHz ÷ 18 GHz	AMP – 5D-010180-30-10P-GW	618653	01-01-2015
Power meter	Agilent N1911A	MY45100784	30-08-2014
Dual Ridged Guide Ant. 1-18 GHz	EMCO 3115	9602-4677	01-01-2015
Antenna 15 GHz ÷ 40 GHz	Schwarzbeck BBHA 9170	BBHA9170214	01-01-2015
Turn table	HD100	100/693	-
Antenna Mast	HD 100	100/693	-
Biconical 20 –200 MHz	Schwarzbeck VHBB9124	9124/0255	16-05-2015
Log-Periodic 200 – 1000 MHz	Schwarzbeck VUSLP9111	VUSLP9111184	16-05-2015
Pre-Amplifier	MiTeq, AMF-5F-18002650-30-10P	945372	30-08-2014
LISN	Fischer 50/250-25-2	-	01-01-2015
Transient Limiter	HP11947A	-	01-01-2015
Notch Filter	Micro-Tronics BRM50702-05	0001	01-01-2015

**Appendix C: Accreditation Certificate**



**American Association for Laboratory Accreditation**

**Accredited Laboratory**  
A2LA has accredited  
**QUALITECH**  
*Petach-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-LAF Communiqué dated 8 January 2009).

Presented this 7<sup>th</sup> day of December 2012.



*Pete Mlyne*  
President & CEO  
For the Accreditation Council  
Certificate Number 1633.01  
Valid to September 30, 2014

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

*End of the Test Report*