Wireless Relay Module

EMC Test Report

Model No.: FW-RM

Date: 2017-06-16

Report Prepared By:

Christopher Locke

Report Number	20294-1
EUT Nomenclature	Wireless Relay Module
Sample Identification	Model No. : FW-RM Sl. No. : MEL-159 Software Version : 5.83 Hardware Version : Rev 2
Number of Samples	1
Date of receipt of Sample	2016-06-27
Condition of Sample on receipt	Good
Client name	Honeywell International Inc.
Client Address	System Sensor, 3825, Ohio Ave, St. Charles , IL, USA - 60174
Testing Laboratory	Honeywell Home & Building Technologies RF & EMC HWVA
Address	2 Corporate Center Dr. Suite 100 PO Box 9040 Melville, NY 11747 USA
Test Dates	2016-08-04 to 2017-04-24
Applicable Standard	FCC Part 15 Subpart C
Test Results	PASS

Prepared By: Name: Christopher Locke Signature: Date: 2017-06-16	Reviewed By: Name: Michael Antola Signature: Date: 2017-06-16
Authorized By: Name: Ted Ramos Signature: Date: 2017-06-16	

TEST SUMMARY

#	Name	Specification	Test Method	Pass	Fail	NA
		FHSS				
1	20dB Bandwidth	FCC Part 15.247:2010	DA 00-705	√		
2	Maximum Peak Output Power	FCC Part 15.247:2010	DA 00-705	√		
3	Carrier Frequency Separation	FCC Part 15.247:2010	DA 00-705	√		
4	Number of Hopping Frequencies	FCC Part 15.247:2010	DA 00-705	√		
5	Band-edge Compliance	FCC Part 15.247:2010	DA 00-705	√		
6	Time of Occupancy (Dwell Time)	FCC Part 15.247:2010	DA 00-705	√		
7	Spurious RF Conducted Emissions	FCC Part 15.247:2010	DA 00-705	√		
8	Spurious Radiated Emissions	FCC Part 15.247 and 15.209	DA 00-705	√		
9	Effective Isotropic Radiated Power	FCC Part 15.247 : 2010 and 15.209 : 2010	KDB 412172	√		
		DTS				
1	DTS 6dB Bandwidth	FCC Part 15.247	KDB 558074	√		
2	Maximum Peak Output Power	FCC Part 15.247	KDB 558074	√		
3	Maximum Power Spectral Density	FCC Part 15.247	KDB 558074	√		
4	Band-edge Conducted Emissions	FCC Part 15.247	KDB 558074	√		
5	Radiated Spurious Emissions	FCC Part 15.247 and 15.209	KDB 558074	√		
6	Effective Isotropic Radiated Power	FCC Part 15.247 : 2010 and 15.209 : 2010	KDB 412172	√		

MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels has been estimated for tests performed on the EUT as specified in CISPR 16-4

The Expanded measurement uncertainty (K=2) is provided below

#	Name	Value
1	20dB and 6dB bandwidth	± 0.22 dB
2	Maximum Peak Output Power	± 0.22 dB
3	Maximum Power Spectral Density	± 0.22 dB
4	Band-edge Emissions	± 0.22 dB
5	Spurious RF Conducted Emissions	± 0.22 dB
6	Radiated Spurious Emissions <1GHz	± 10.92 dB
7	Radiated Spurious Emissions >1GHz	± 8.53 dB

1 PRODUCT DETAILS

PRODUCT OPERATION AND INTENDED USE

The wireless relay module is powered by four CR123A batteries. It is intended to use with wireless gateway /Fire Alarm Panel. The module has LED indication, controlled by the panel to indicate the status.

RATINGS AND SYSTEM DETAILS		
Operating Frequency	902MHz to 928MHz	
Number of Channels	DTS	:6
	FHSS	:55
Channel Bandwidth (20 dB)	DTS	:1MHz
	FHSS	:320kHz
Transmitted Power	DTS	:12dBm
	FHSS	:17dBm
Modulation Type	FSK	
Data Rate	DTS	:300Kbps
	FHSS	:150Kbps
Antenna Type	Inverter F Patch Antenna	
No. of Antenna	3	
Antenna Gain	ANT 1 ANT 2 ANT3	:0.65dBi :2dBi :1.3dBi
Supply Voltage and Current	3.3V, 21.5mA	
Dimensions (L x B x H)	4.263mm x 4.171mm x 1.465mm	
Environmental Conditions	Operating Temperature	:0°C to 49°C
	Storage Temperature	:-20°C to 60°C
	Humidity	:10% to 93%

TEST CONFIGURATION

Config #	Description
Conducted Test	EUT is Powered by external 3.3V power supply. EUT Debug port (UART) is connected to Laptop through USB to UART converter cable. EUT is configured to the respective operating mode through HyperTerminal. Test is performed at Antenna 2 as this is the high gain antenna
Radiated Test	EUT is Powered from Battery. EUT Debug port (UART) is connected to Laptop through USB to UART converter cable. EUT is configured to the respective operating mode through HyperTerminal. Test is performed at all 3 antennas

OPERATING MODES

Mode #	Description
DTS	Following DTS channels have been used for Conducted (Continuous Transmission) and Radiated (Continuous Transmission) Tests Channel 1 : 902.875MHz Channel 3 : 914.325MHz Channel 6 : 927.125MHz
FHSS	Following FHSS channels have been used for Conducted (Continuous Transmission) and Radiated (Continuous Transmission) Tests Channel 1 : 903.55MHz Channel 28 : 916.00MHz Channel 55 : 926.45MHz

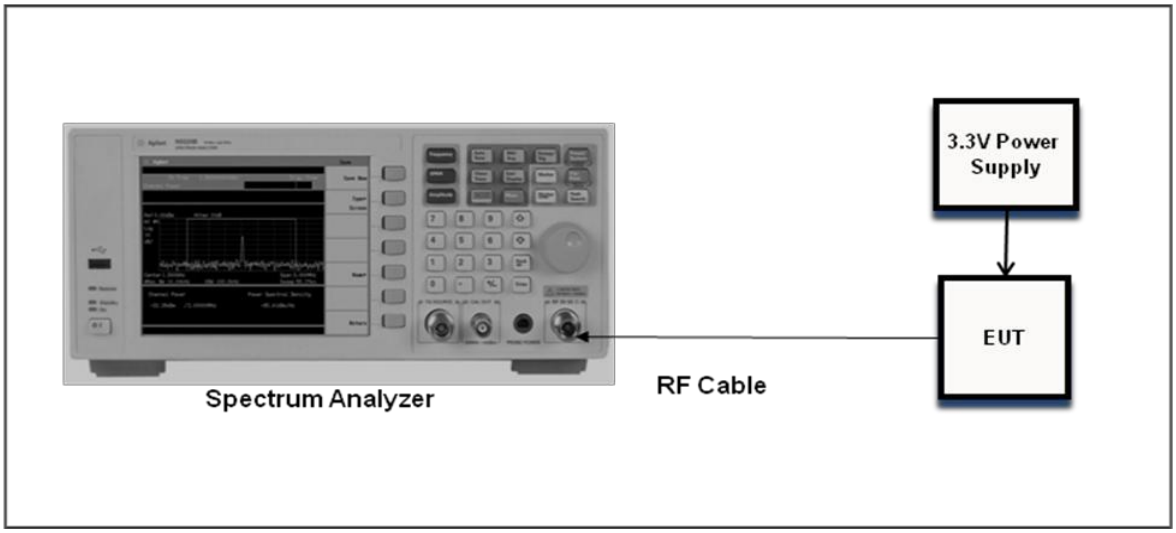
INPUT AND OUTPUT CABLES

Port #	Name	Port Type	Cable Length	Cable type Shielded/ Unshielded	Comments
	Not Applicable				
*Note:	AC = AC Power Port TP = Telecommunication Ports (e.g. Ethernet) N/E = Non-Electrical			DC = DC Power Port DI/ DO = Digital Input/ Output AI/ = Analog Input/ Output	

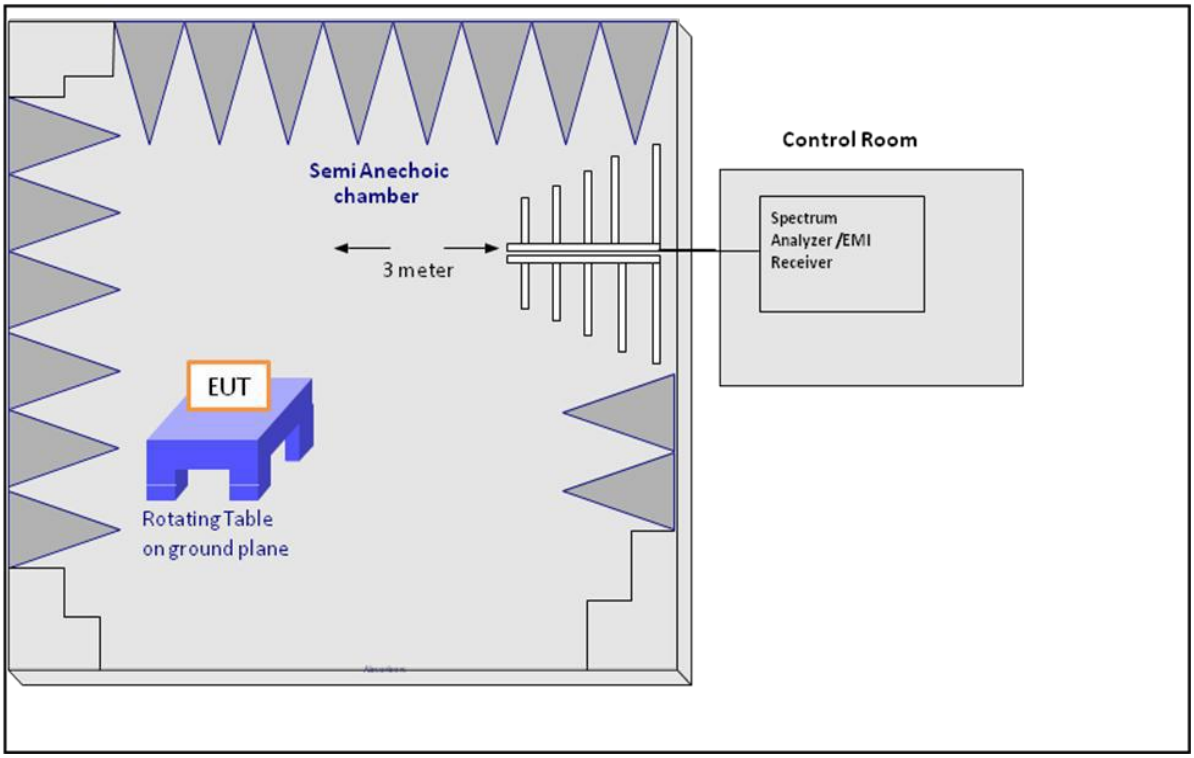
SUPPORT EQUIPMENTS AND ACCESSORIES USED

#	Item Description	Make	Model	Part No. / Sl. No	Cal Due Date
1	Laptop	Dell	CORPMDTW10X64IMAGEV2	339YSC2	NA
2	USB to UART Cable	FTDI	NA	TTL-232R-3V3	NA
3	DC Power Supply	HP	E3611A	KR83015320	NA

CONNECTION DIAGRAM AND SETUP DIAGRAM



Conducted RF Test Setup



Radiated Emission Test Setup

2 FHSS CHANNELS

2.1 20dB BANDWIDTH

EUT Nomenclature	Wireless Relay Module	**Test Request No.**	20294-1
Model No.	FW-RM	**Serial No.**	MEL-159
Test Start Date	2016-08-24	**Temperature (˚C)**	23.6°C
Test End Date	2016-08-24	**Humidity RH (%)**	51.9%RH
Tested By	Jose Badia/Arnoldo Garcia	**Pressure (mbar)**	NR
Input Voltage / Freq.	3.3 Vdc		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std.	NA		
Applicable standard	FCC Part 15.247:2010		
Test Method	DA 00-705		
Comment	NA		

TEST DETAILS

Method	Radiated ☐	Conducted ☒

TEST PARAMETERS

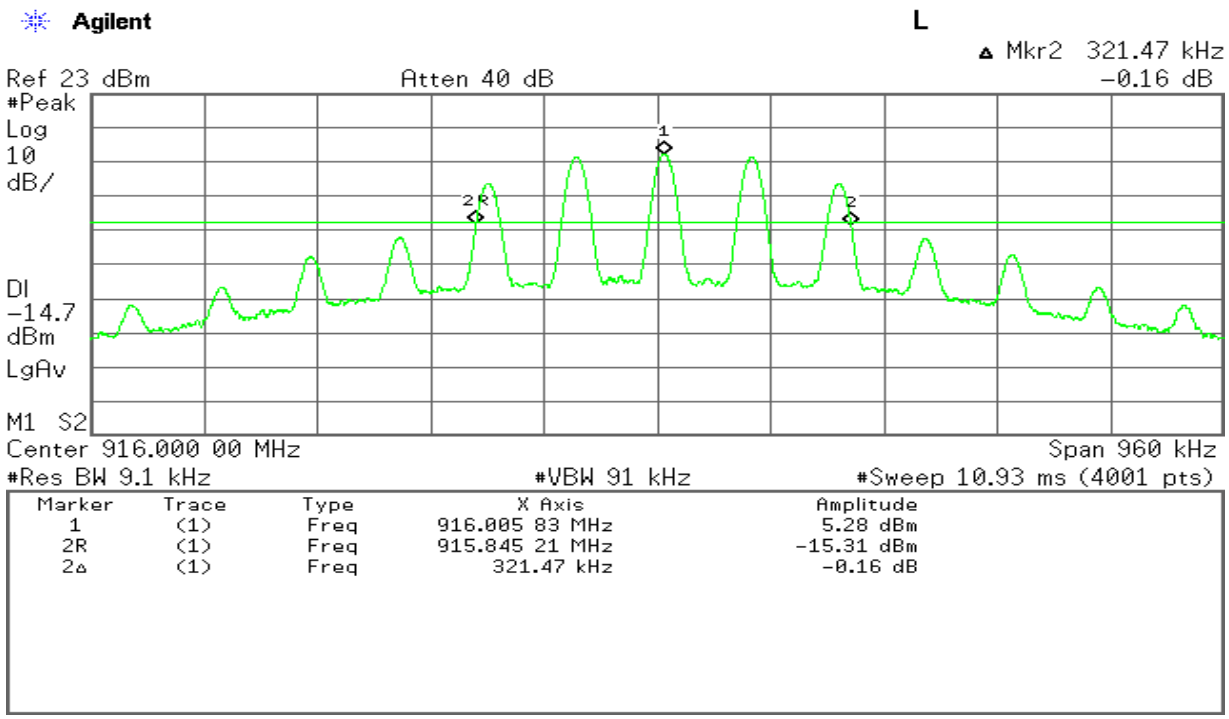
Antenna Height	NA	**Turntable Rotation**	NA
Equipment Class	NA	**Measurement Distance**	NA

TEST EQUIPMENT

Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	E4440A	MY41000078	2017-05-18
Y	RF Cable	Digikey	1	NA	NA

TEST GRAPHS

Channel 28 (916 MHz)



TEST RESULT

Channel #	Frequency MHz	Measured Bandwidth KHz	Limit KHz	Result
28	916	321.47	≥250 & ≤500	PASS

TEST SETUP PHOTOGRAPH

Refer Annexure -1

Conducted RF Test setup

2.2 PEAK OUTPUT POWER

EUT Nomenclature	Wireless Relay Module	**Test Request No.**	20294-1
Model No.	FW-RM	**Serial No.**	MEL-159
Test Start Date	2016-08-30	**Temperature (˚C)**	23.6°C
Test End Date	2016-08-30	**Humidity RH (%)**	51.9%RH
Tested By	Jose Badia/Arnoldo Garcia	**Pressure (mbar)**	NR
Input Voltage / Freq.	3.3 Vdc		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std.	NA		
Applicable standard	FCC Part 15.247:2010		
Test Method	DA 00-705		
Comment	NA		

TEST DETAILS

Method	Radiated ☐	Conducted ☒

TEST PARAMETERS

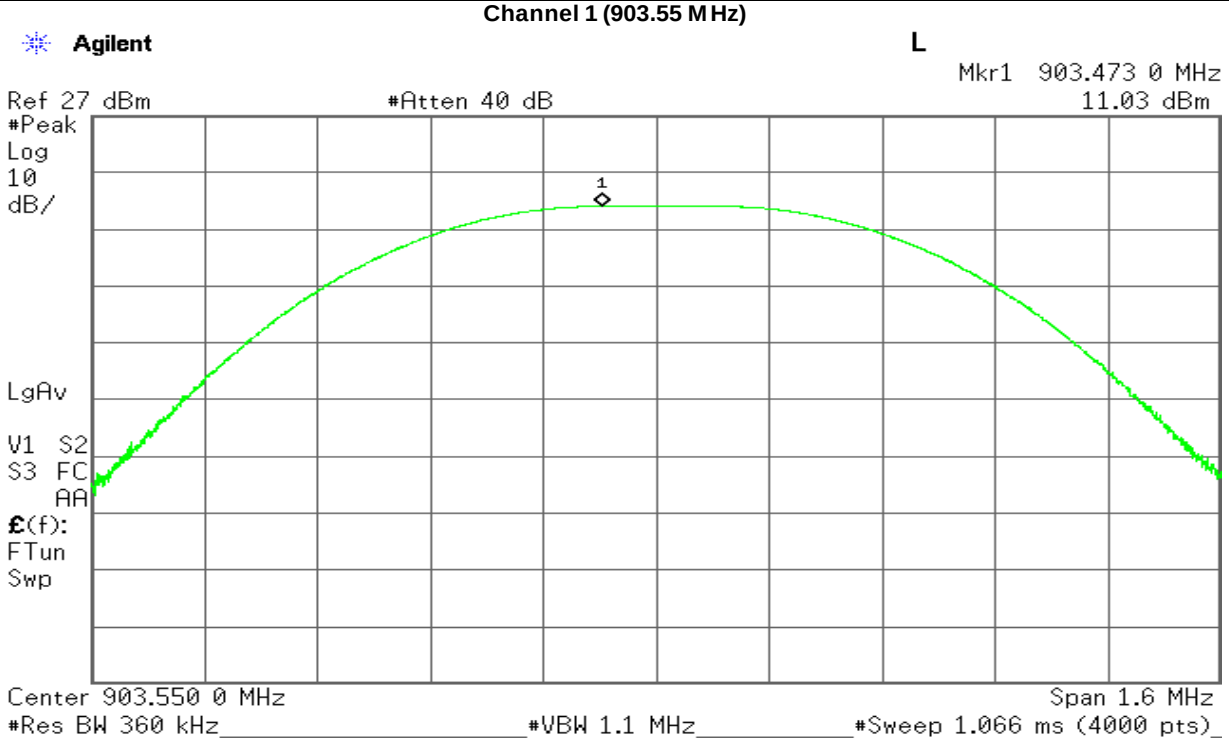
Antenna Height	NA	**Turntable Rotation**	NA
Equipment Class	NA	**Measurement Distance**	NA

TEST EQUIPMENT

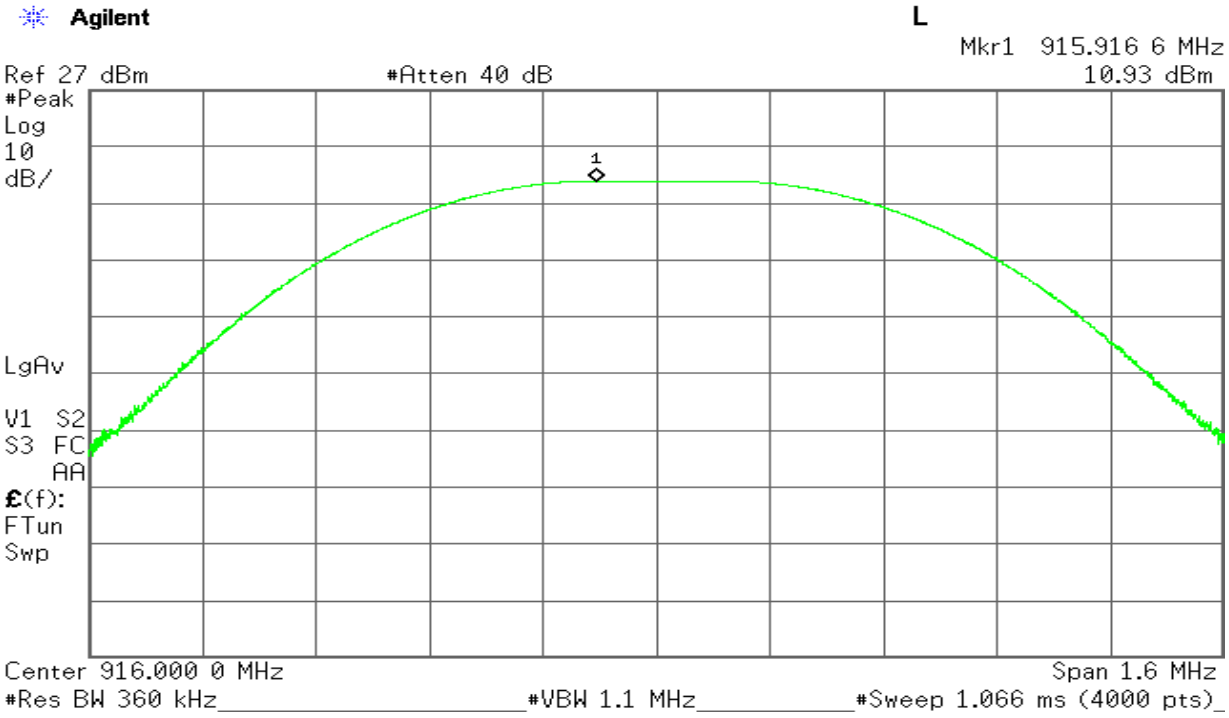
Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	E4440A	MY41000078	2017-05-18
Y	RF Cable	Digikey	1	NA	NA

ANTENNA 1 TEST GRAPHS

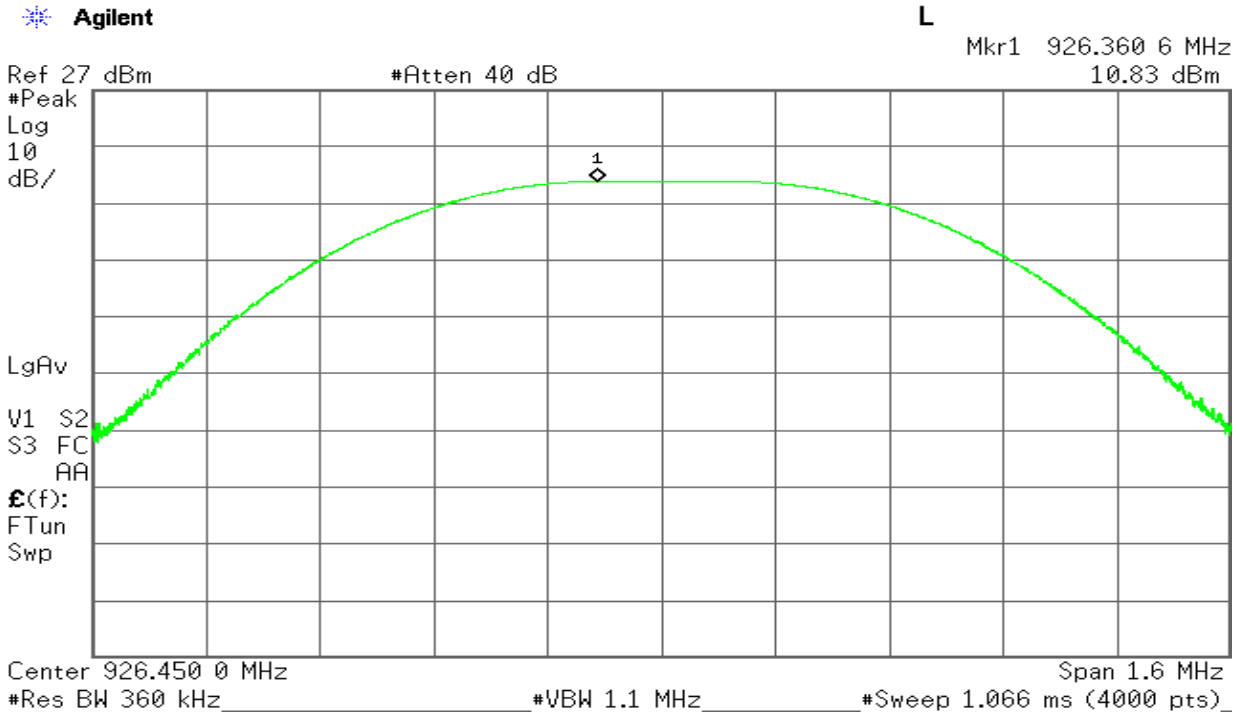
Channel 1 (903.55 MHz)



Channel 28 (916 MHz)

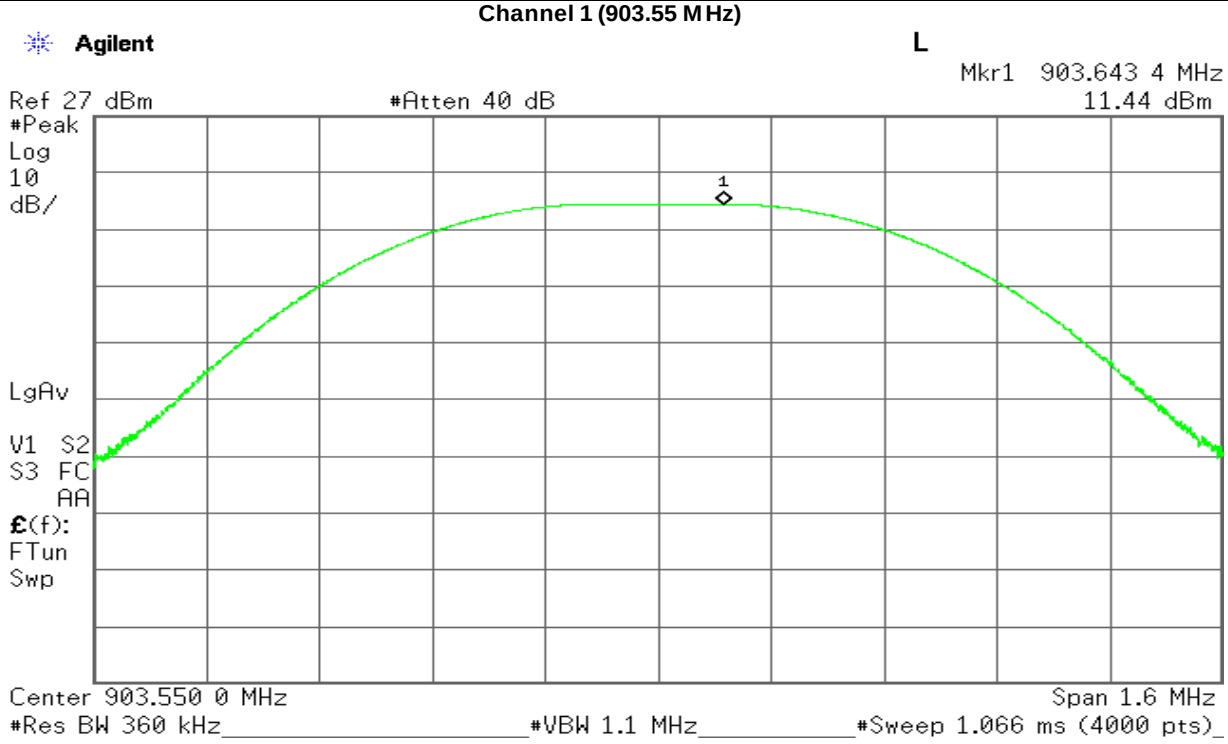


Channel 55 (926.45 MHz)

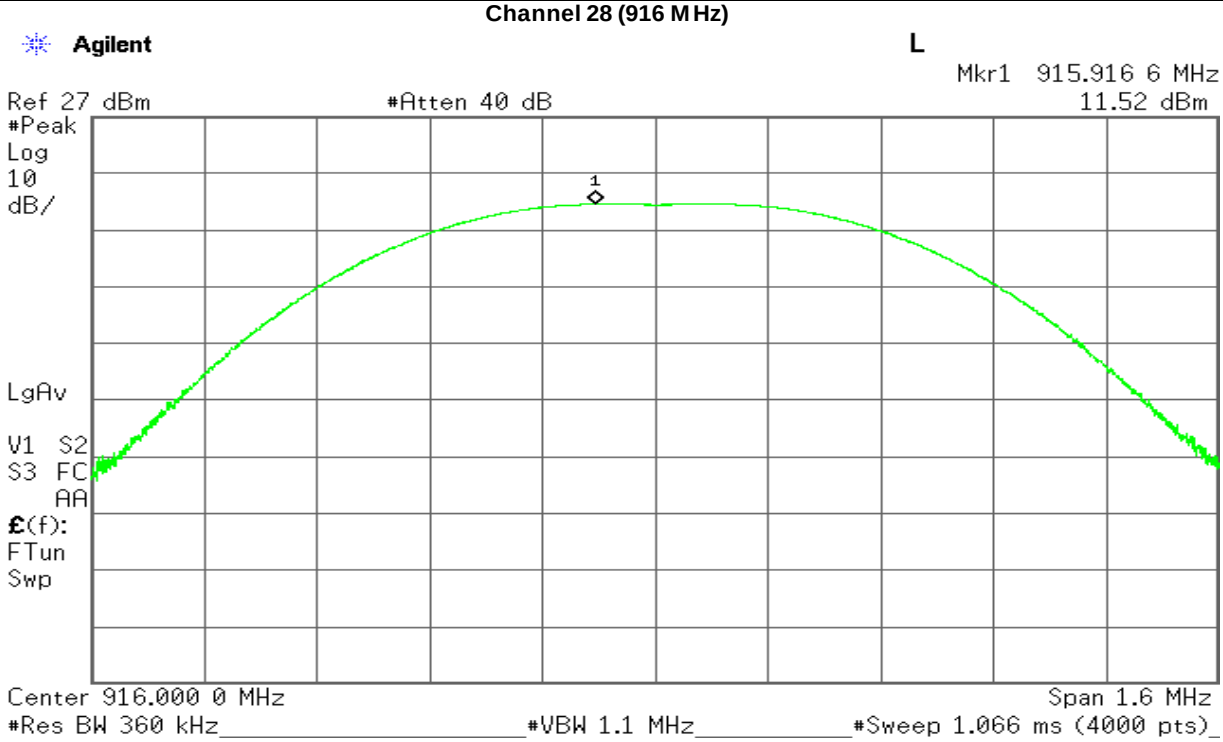


ANTENNA 2 TEST GRAPHS

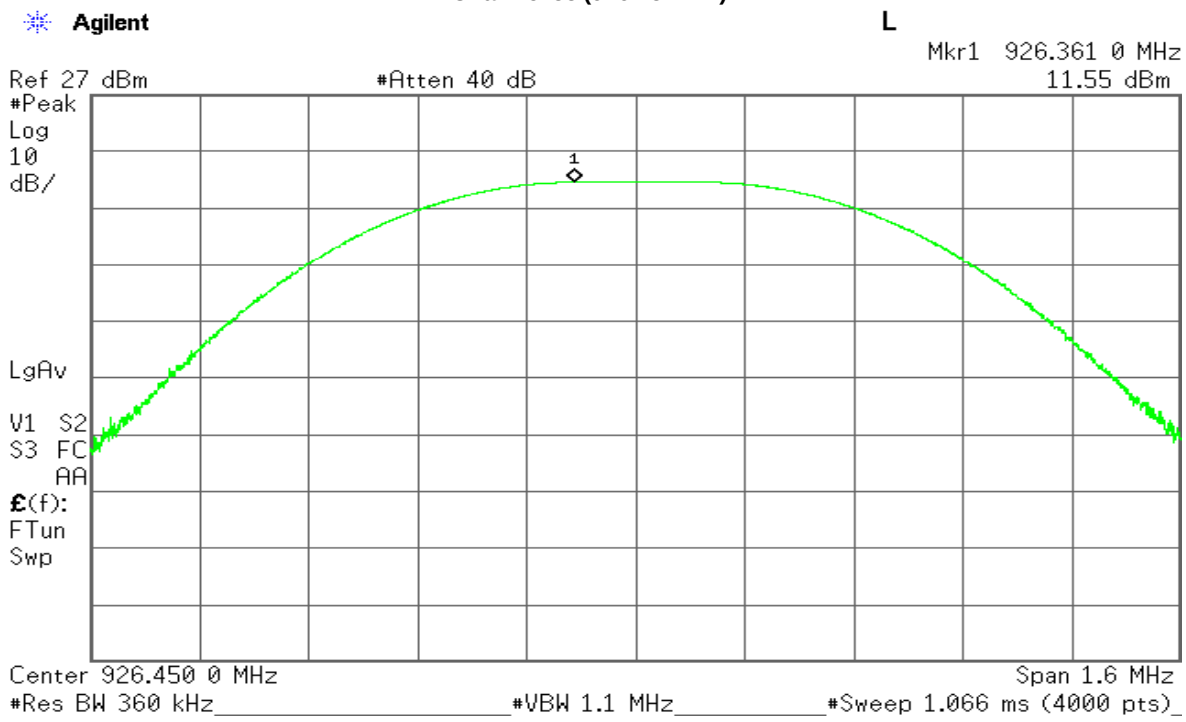
Channel 1 (903.55 MHz)



Channel 28 (916 MHz)

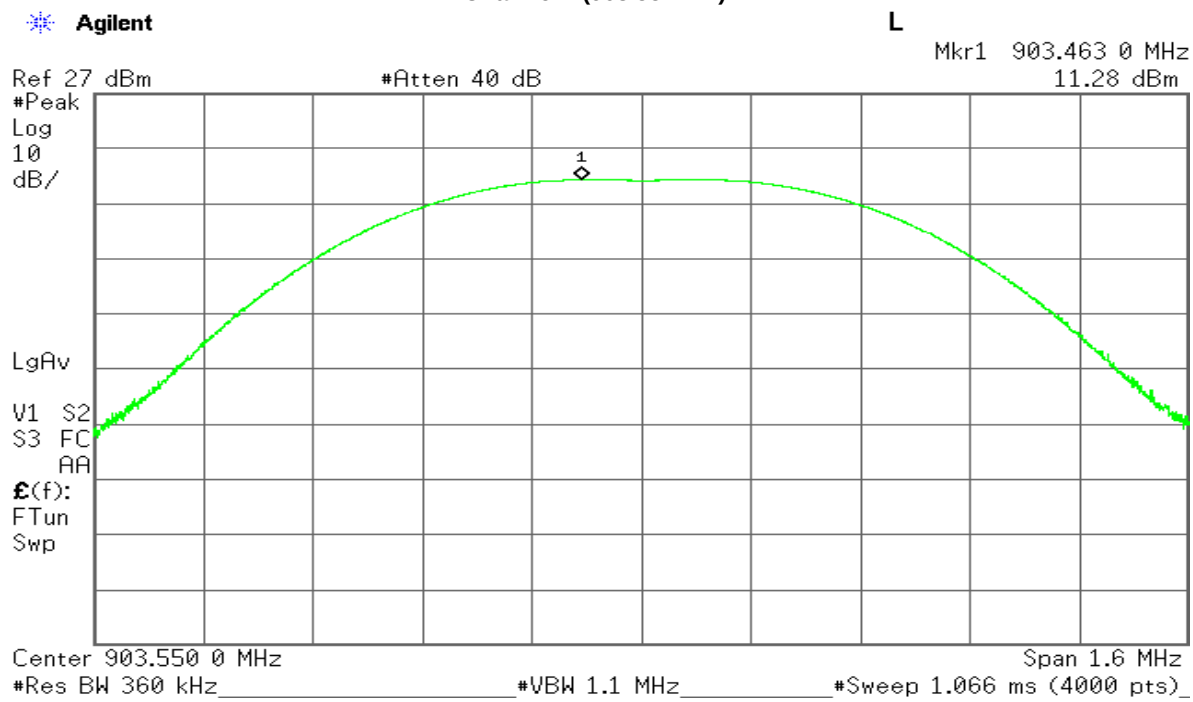


Channel 55 (926.45 MHz)

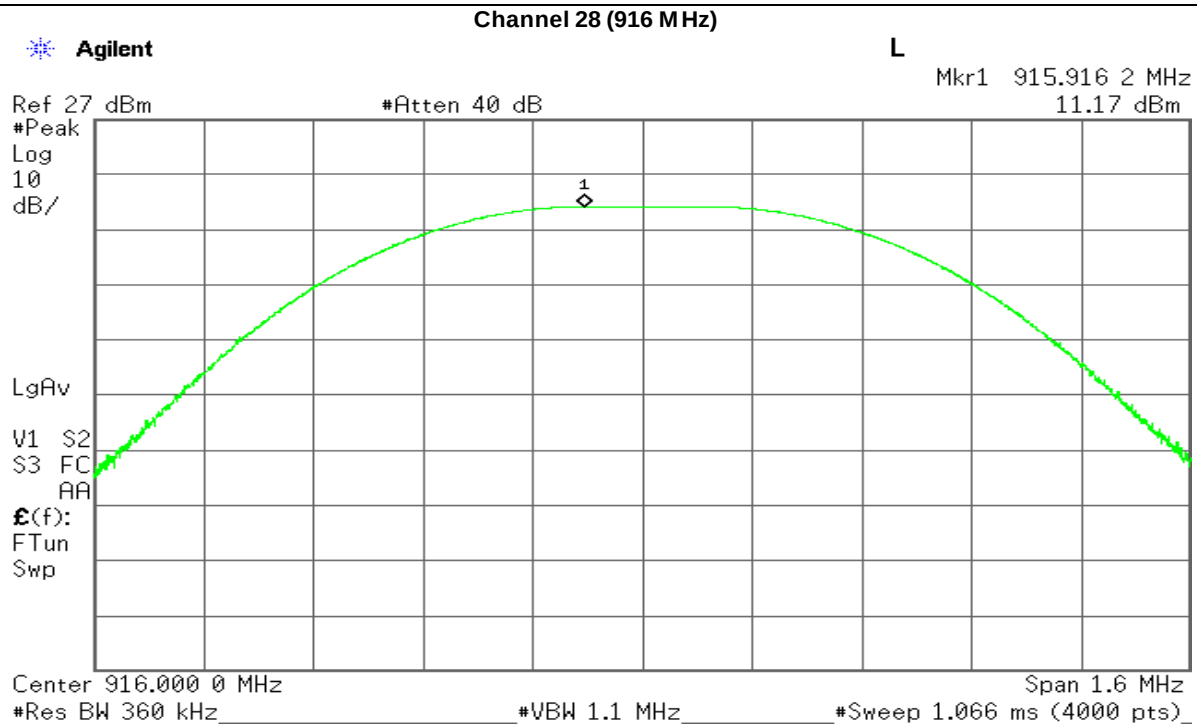


ANTENNA 3 TEST GRAPHS

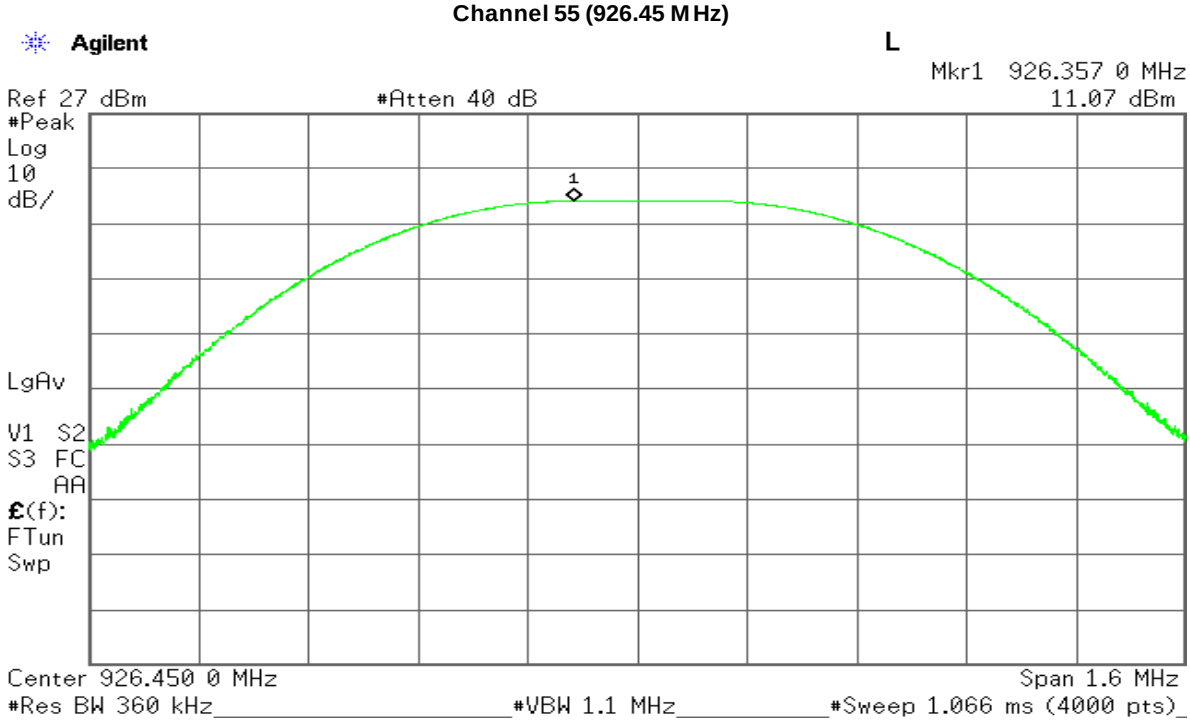
Channel 1 (903.55 MHz)



Channel 28 (916 MHz)



Channel 55 (926.45 MHz)



TEST RESULT							
Antenna	Channel	Frequency	Measured Power Level	Factor Loss	Transmitter Power Level	Limit	Result
#	#	MHz	dBm	dB	dBm	dBm	
1	1	903.55	11.03	5.11	16.14	≤23.979	PASS
	28	916	10.93	5.11	16.04	≤23.979	PASS
	55	926.45	10.83	5.11	15.94	≤23.979	PASS
2	1	903.55	11.44	5.11	16.55	≤23.979	PASS
	28	916	11.52	5.11	16.63	≤23.979	PASS
	55	926.45	11.55	5.11	16.66	≤23.979	PASS
3	1	903.55	11.28	5.11	16.39	≤23.979	PASS
	28	916	11.17	5.11	16.28	≤23.979	PASS
	55	926.45	11.07	5.11	16.18	≤23.979	PASS

Note: Transmitter Output Power = Measured Level (dBm) + Factor Loss (dB)
Factor Loss =Attenuator +Cable loss (dB)

TEST SETUP PHOTOGRAPH

Refer Annexure -1

Conducted RF Test setup

2.3 CARRIER FREQUENCY SEPARATION

EUT Nomenclature	Wireless Relay Module	**Test Request No.**	20294-1
Model No.	FW-RM	**Serial No.**	MEL-159
Test Start Date	2017-04-19	**Temperature (˚C)**	23.6°C
Test End Date	2017-04-21	**Humidity RH (%)**	51.9%RH
Tested By	Jose Badia	**Pressure (mbar)**	NR
Input Voltage / Freq.	3.3 Vdc		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std.	NA		
Applicable standard	FCC Part 15.247:2010		
Test Method	DA 00-705		
Comment	NA		

TEST DETAILS

Method	Radiated ☐	Conducted ☒

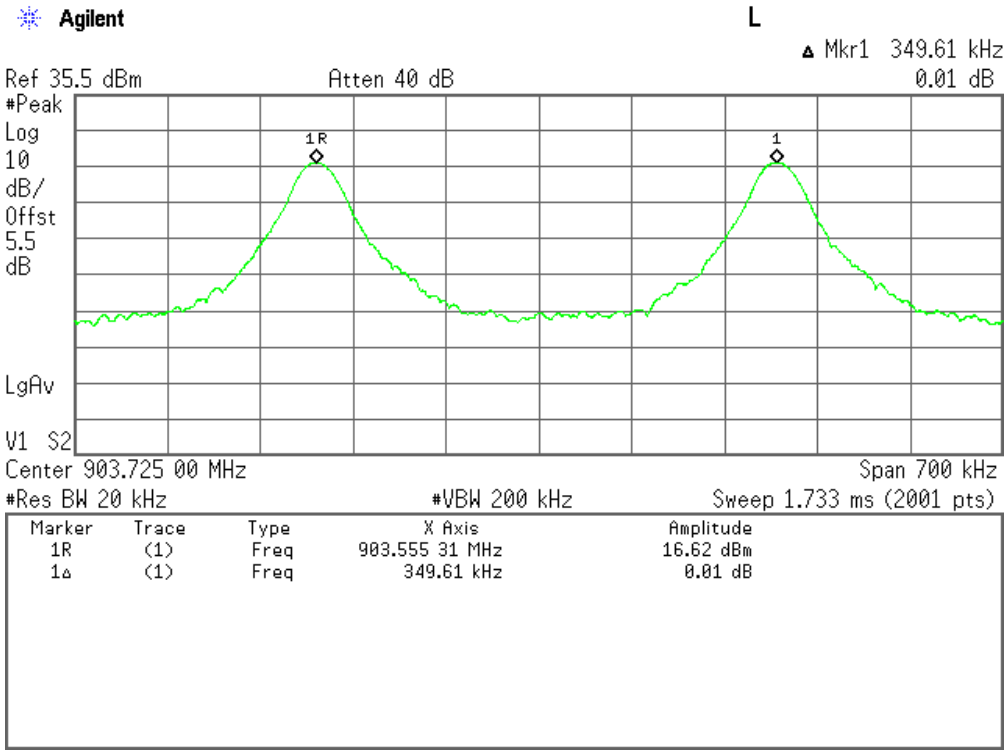
TEST PARAMETERS

Antenna Height	NA	**Turntable Rotation**	NA
Equipment Class	NA	**Measurement Distance**	NA

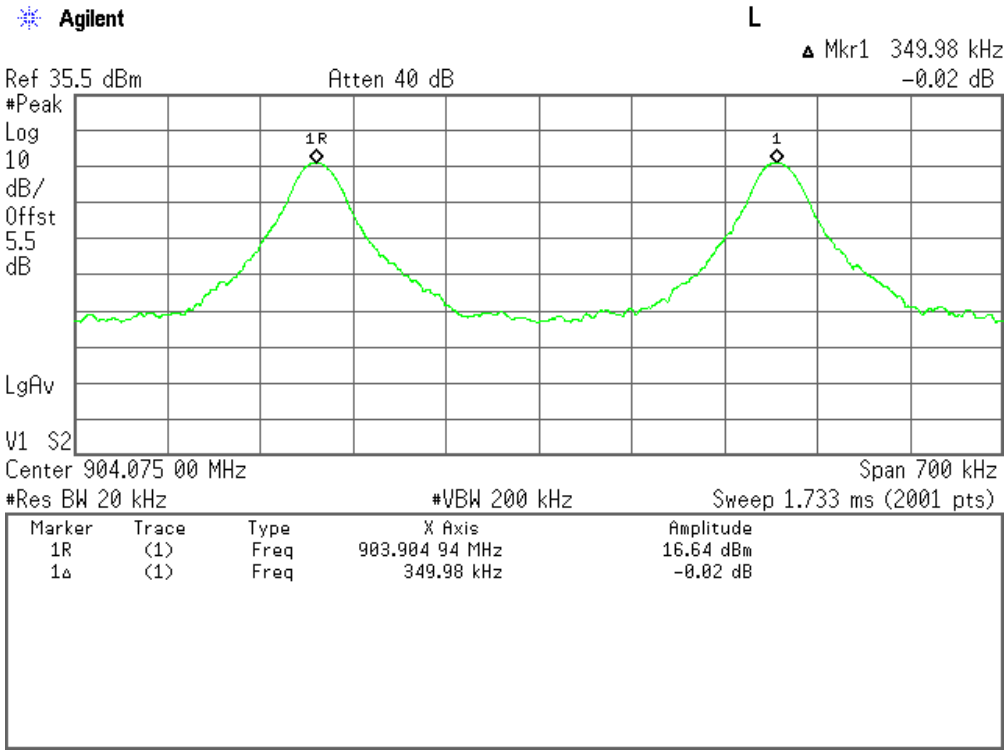
TEST EQUIPMENT

Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	E4440A	MY41000078	2017-05-18
Y	RF Cable	Digikey	1	NA	NA

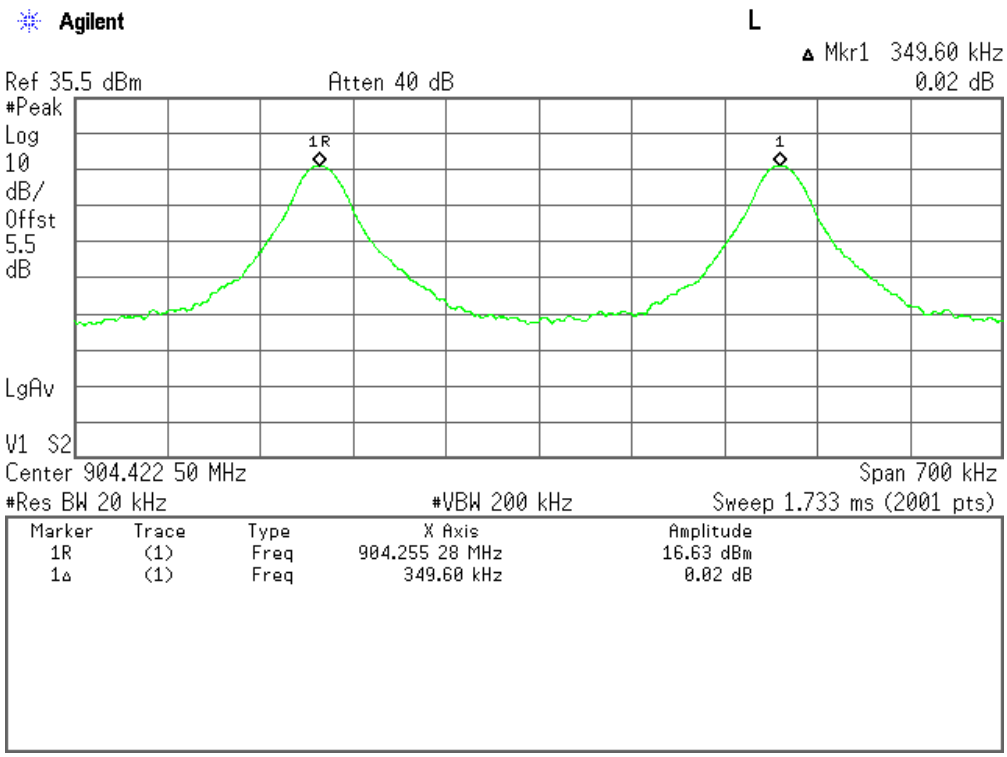
TEST GRAPHS



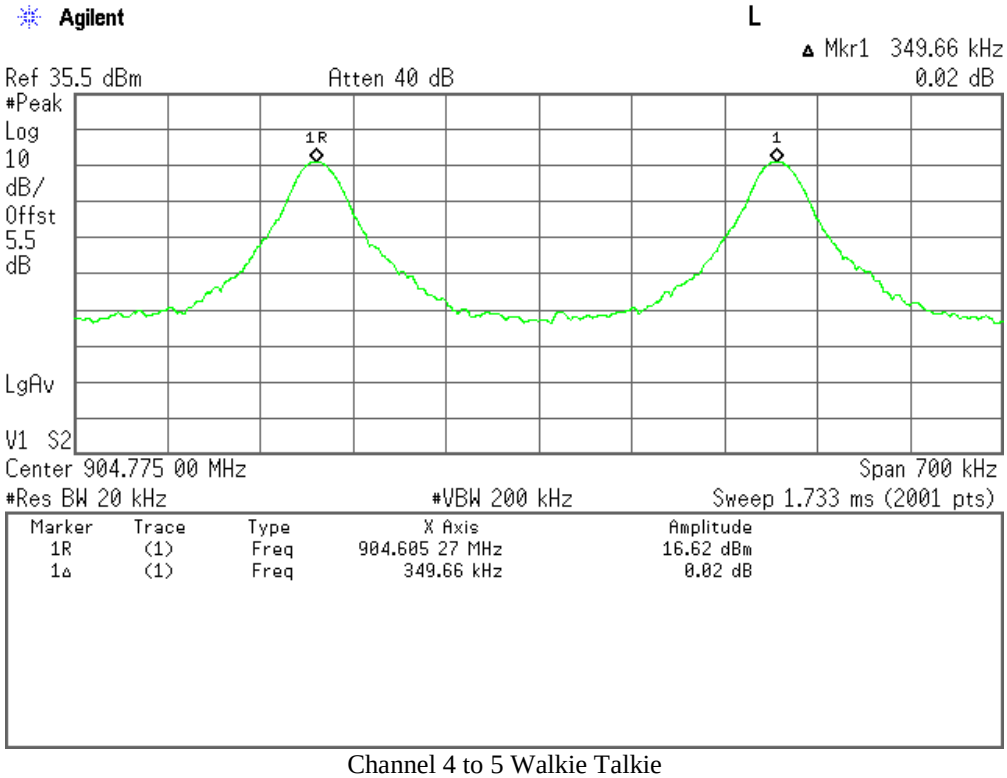
Channel 1 to 2 Walkie Talkie



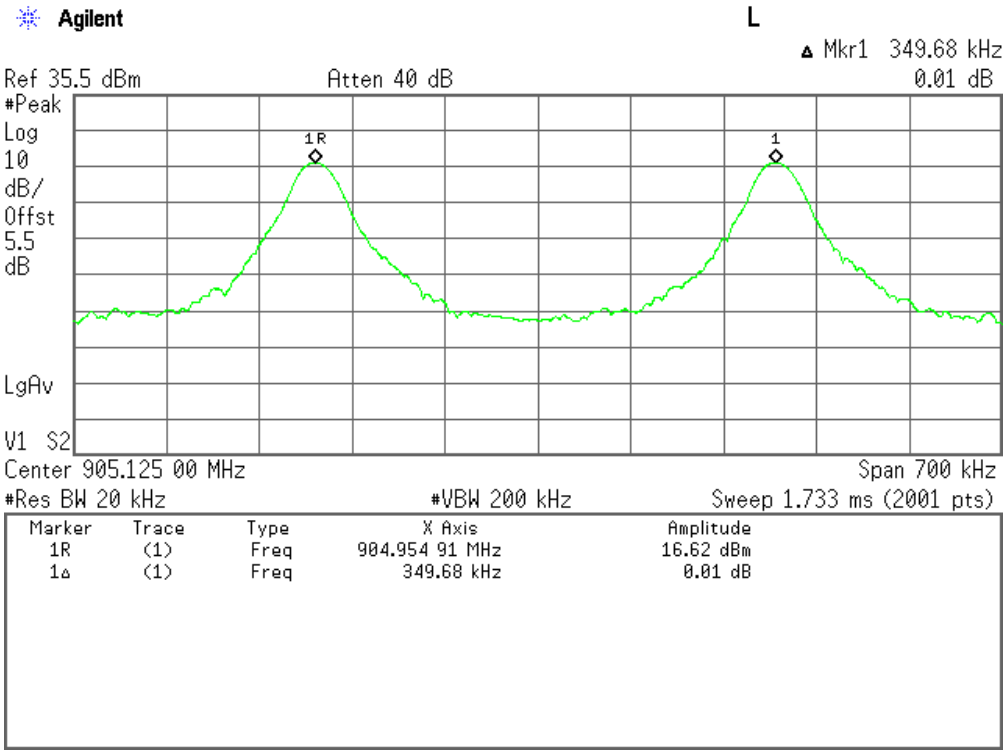
Channel 2 to 3 Walkie Talkie



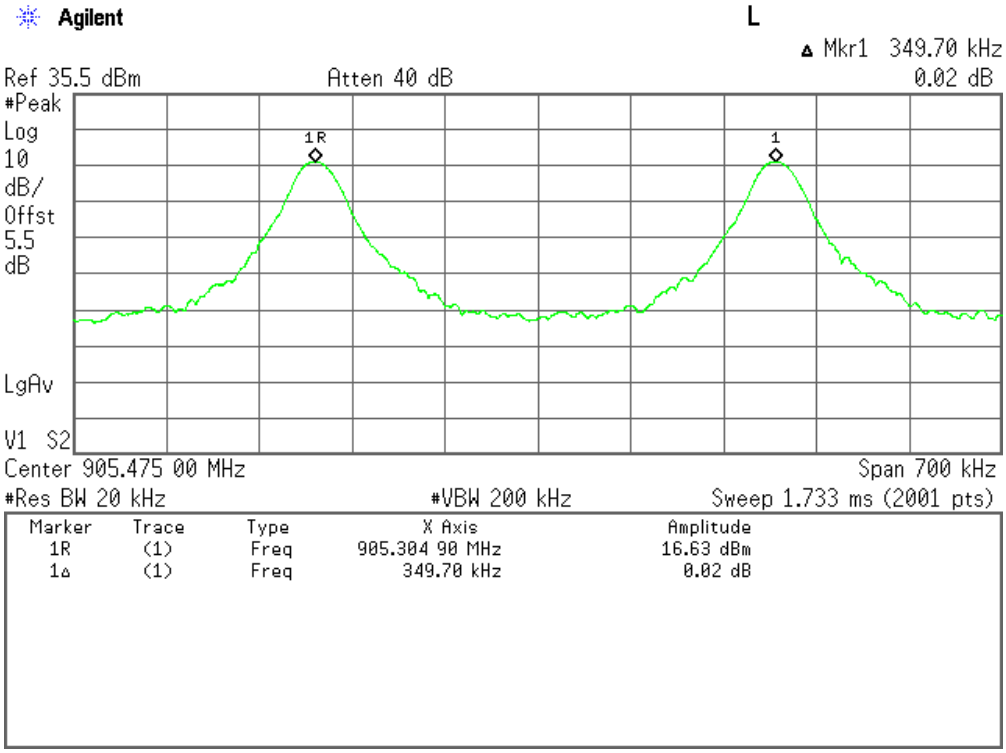
Channel 3 to 4 Walkie Talkie



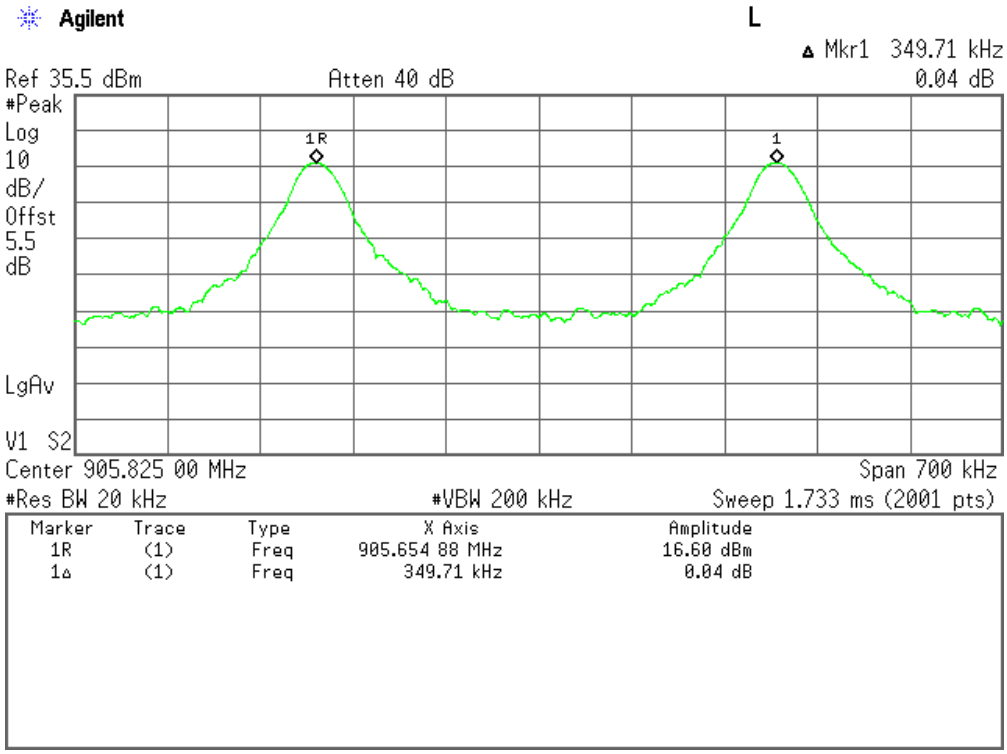
Channel 4 to 5 Walkie Talkie



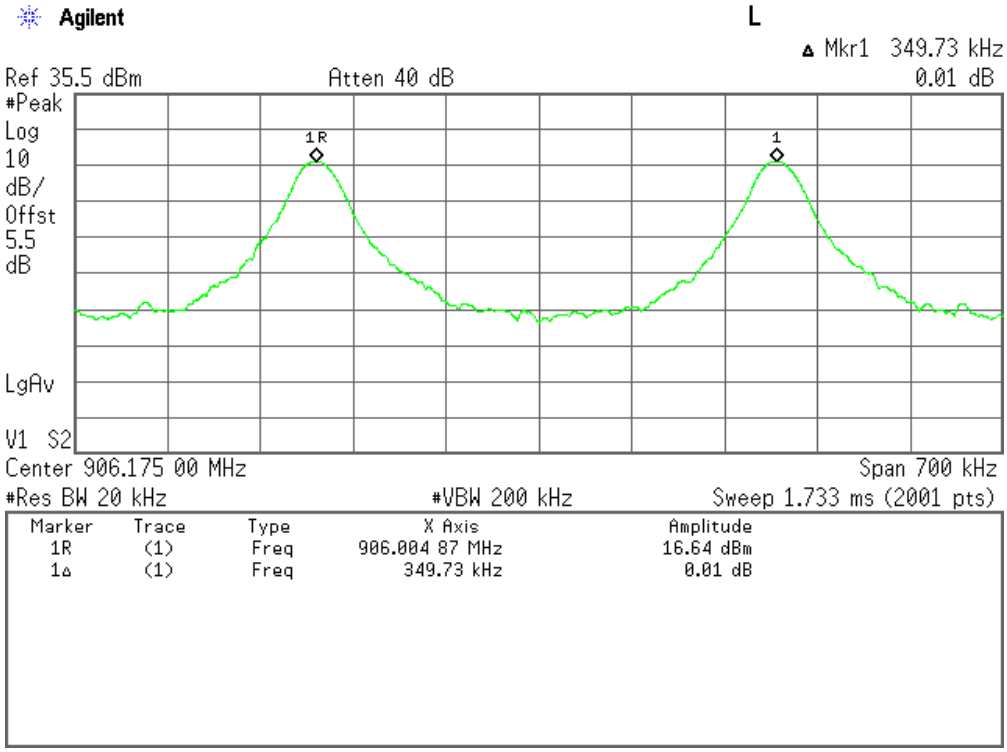
Channel 5 to 6 Walkie Talkie



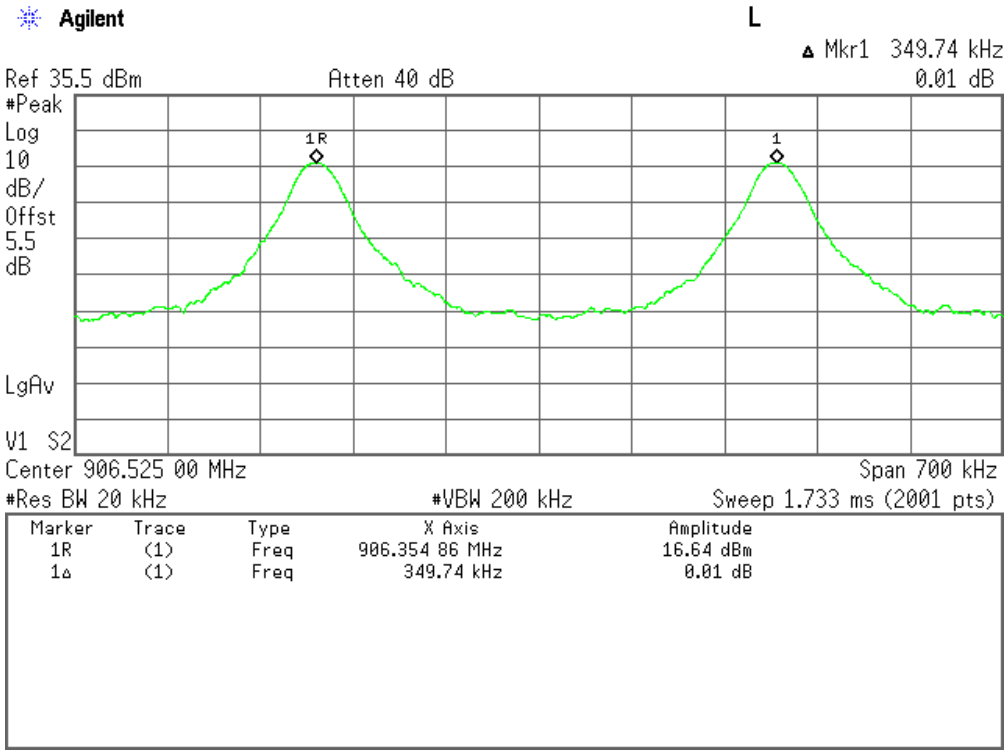
Channel 6 to 7 Walkie Talkie



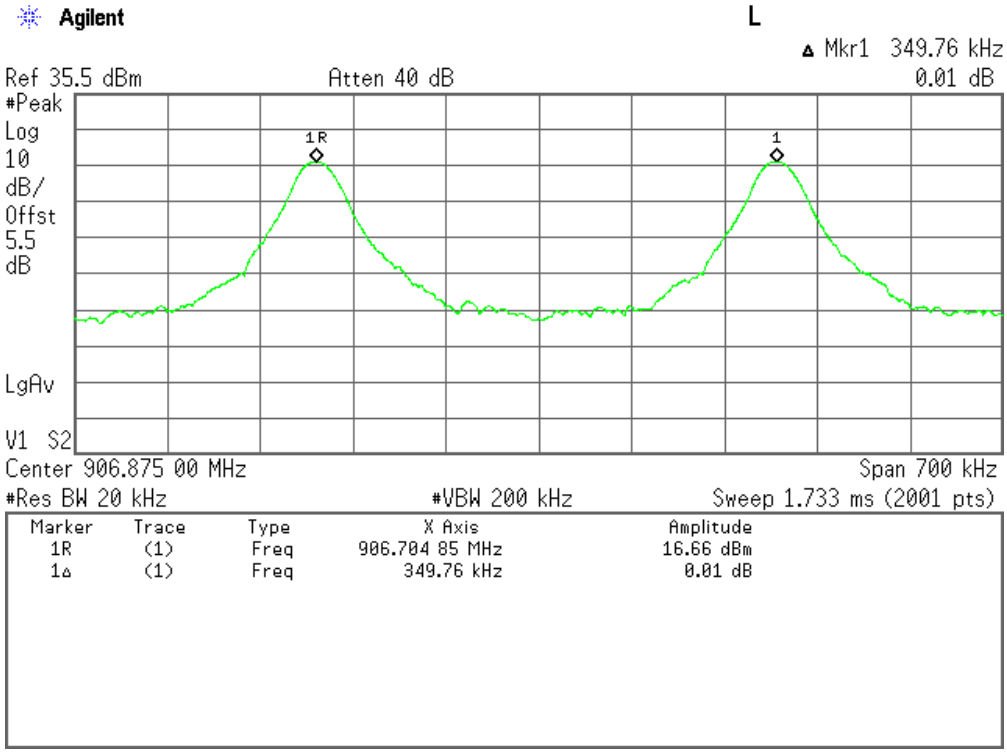
Channel 7 to 8 Walkie Talkie



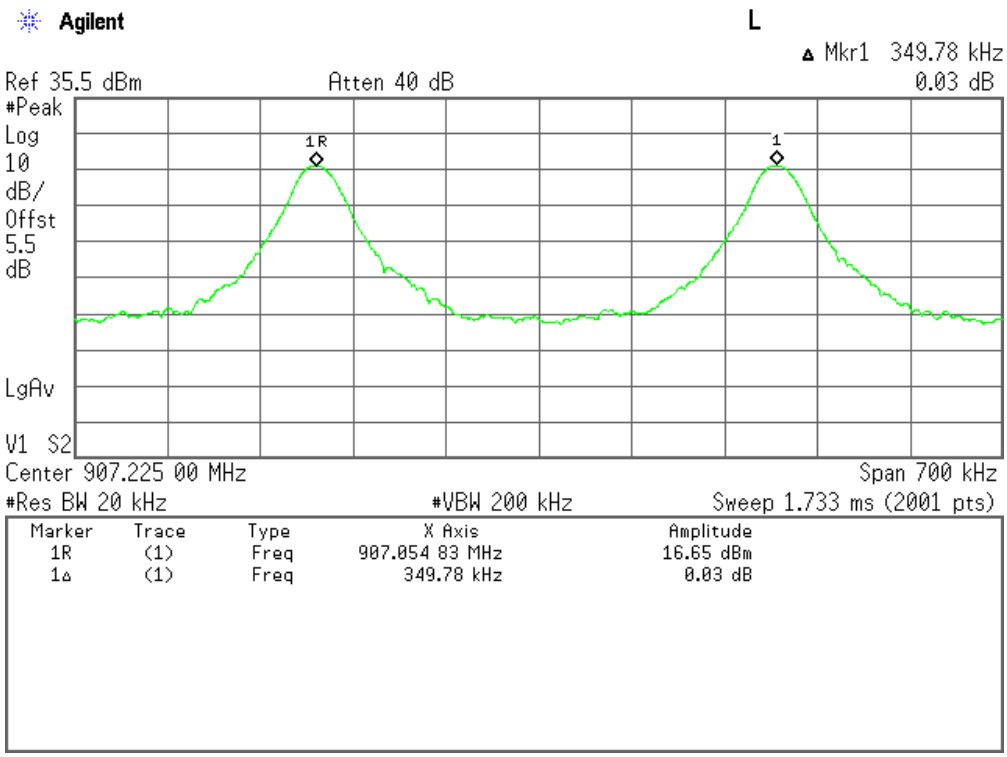
Channel 8 to 9 Walkie Talkie



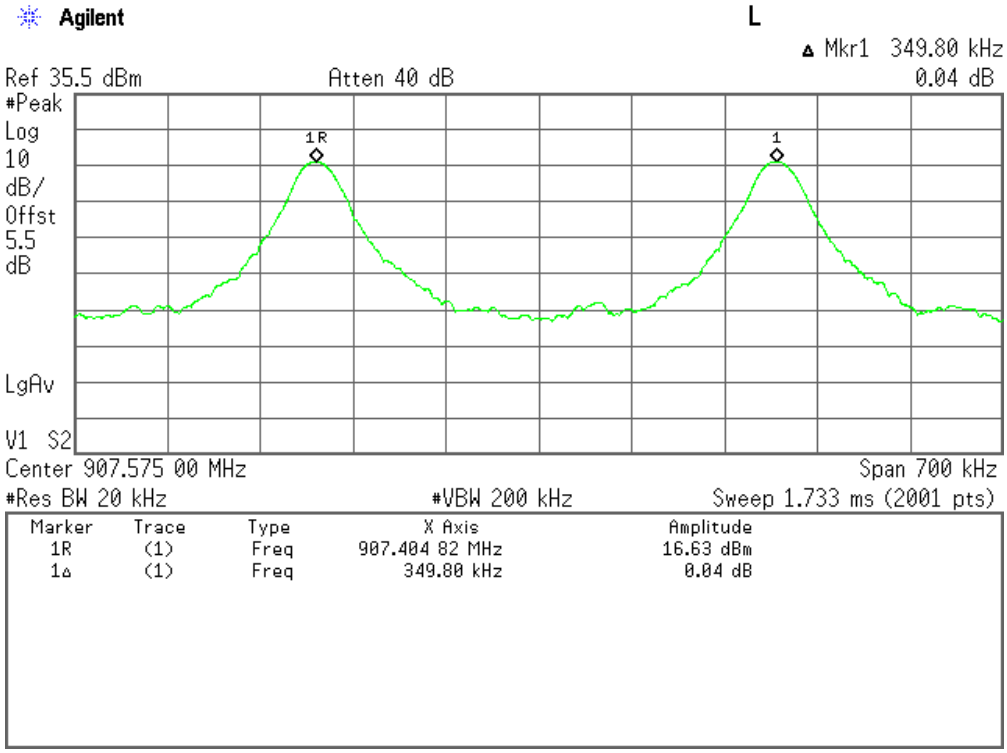
Channel 9 to 10 Walkie Talkie



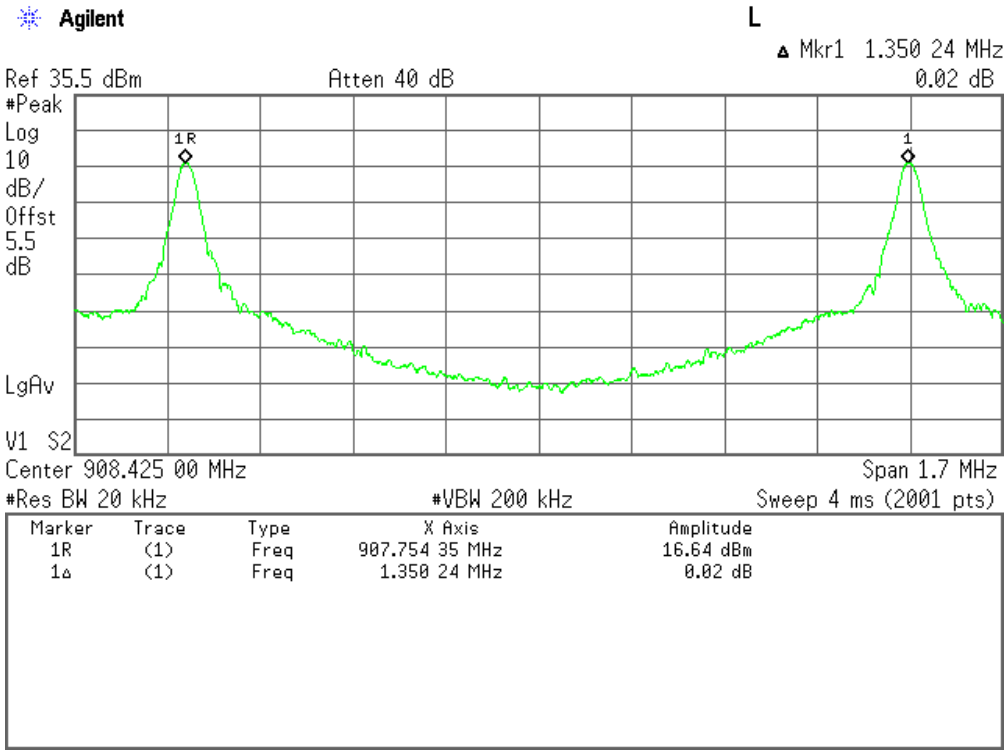
Channel 10 to 11 Walkie Talkie



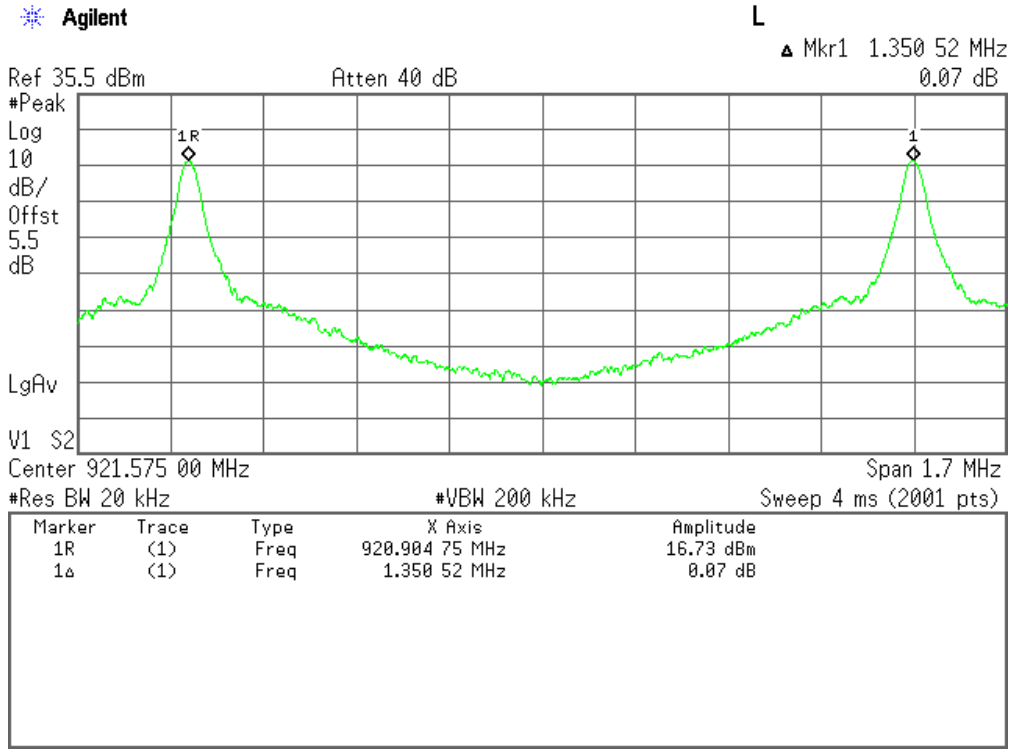
Channel 11 to 12 Walkie Talkie



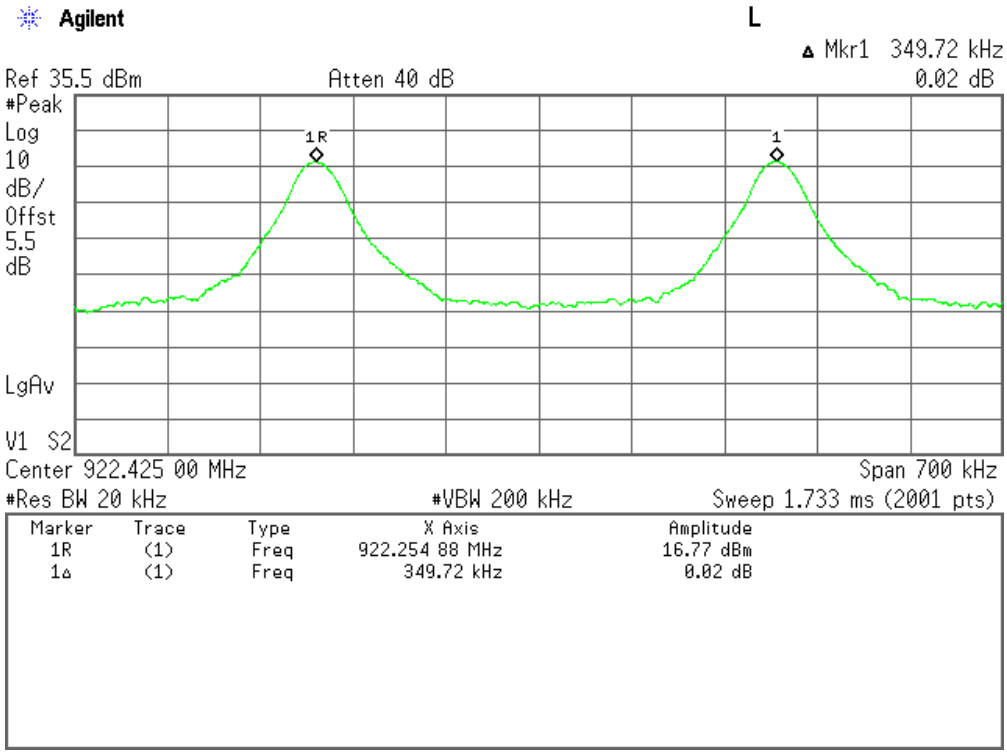
Channel 12 to 13 Walkie Talkie



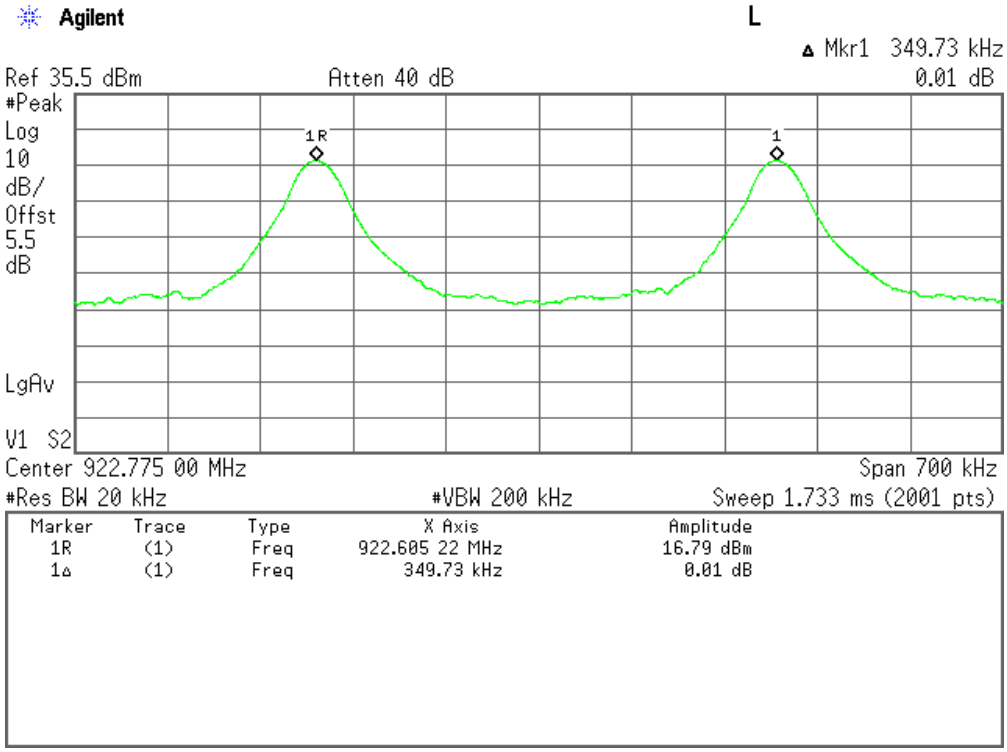
Channel 13 to 14 Walkie Talkie



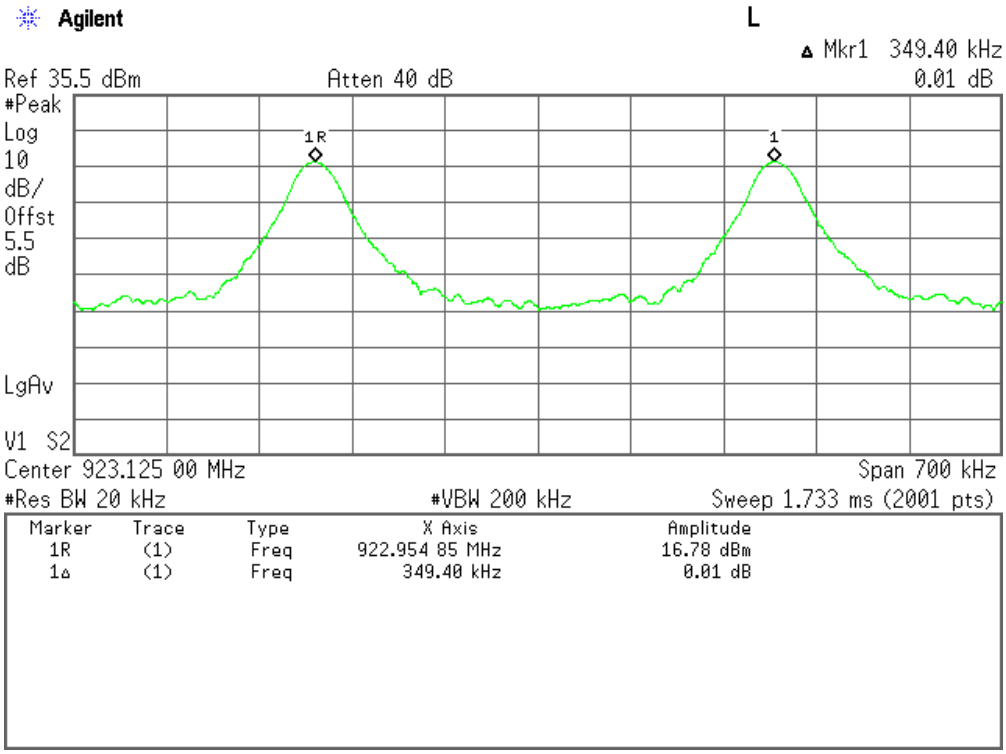
Channel 15 to 16 Walkie Talkie



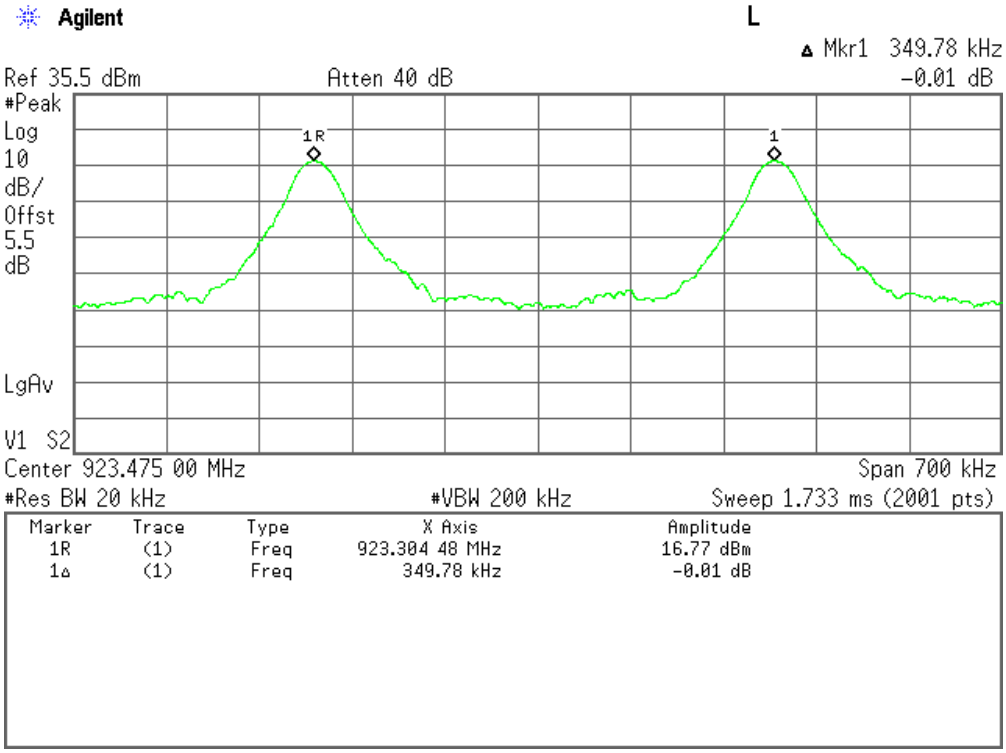
Channel 16 to 17 Walkie Talkie



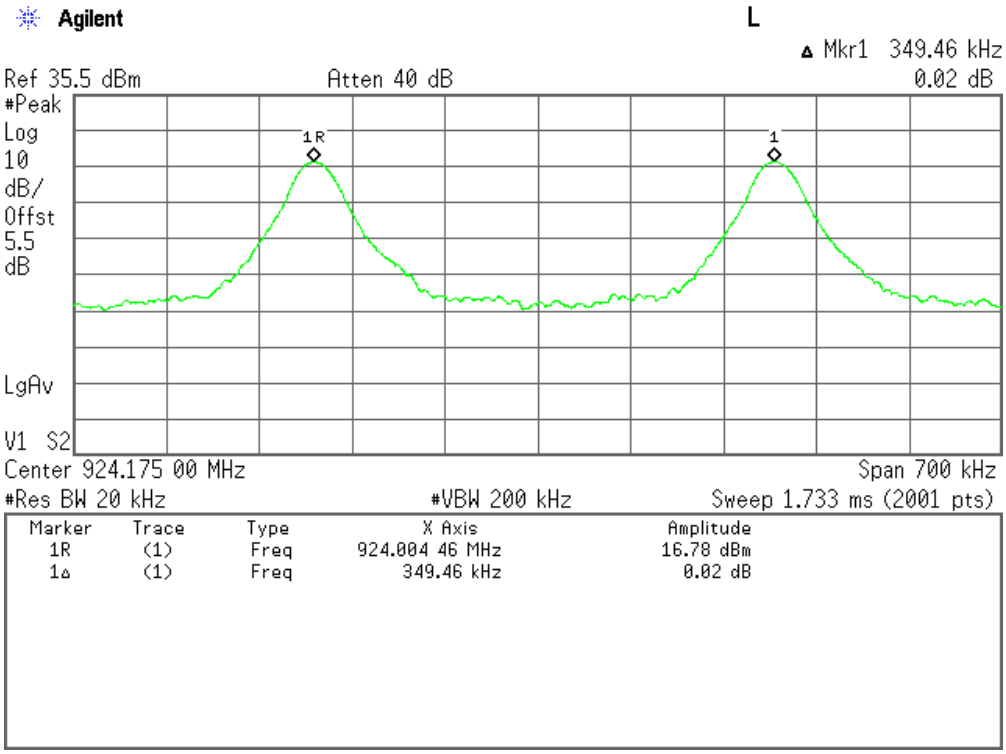
Channel 17 to 18 Walkie Talkie



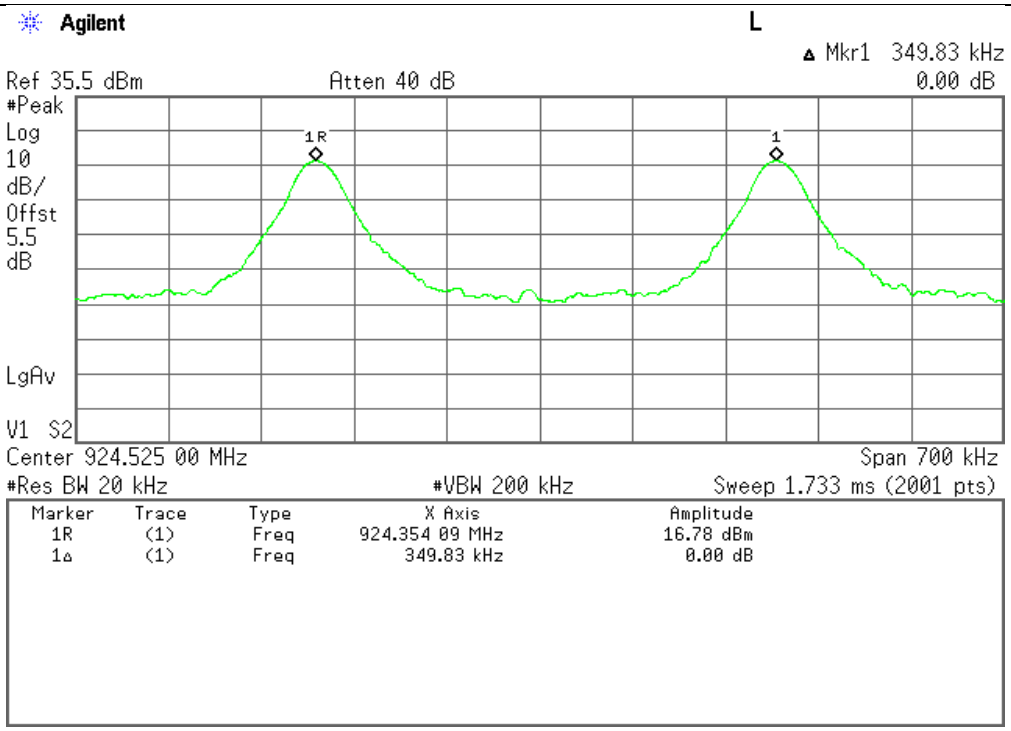
Channel 18 to 19 Walkie Talkie



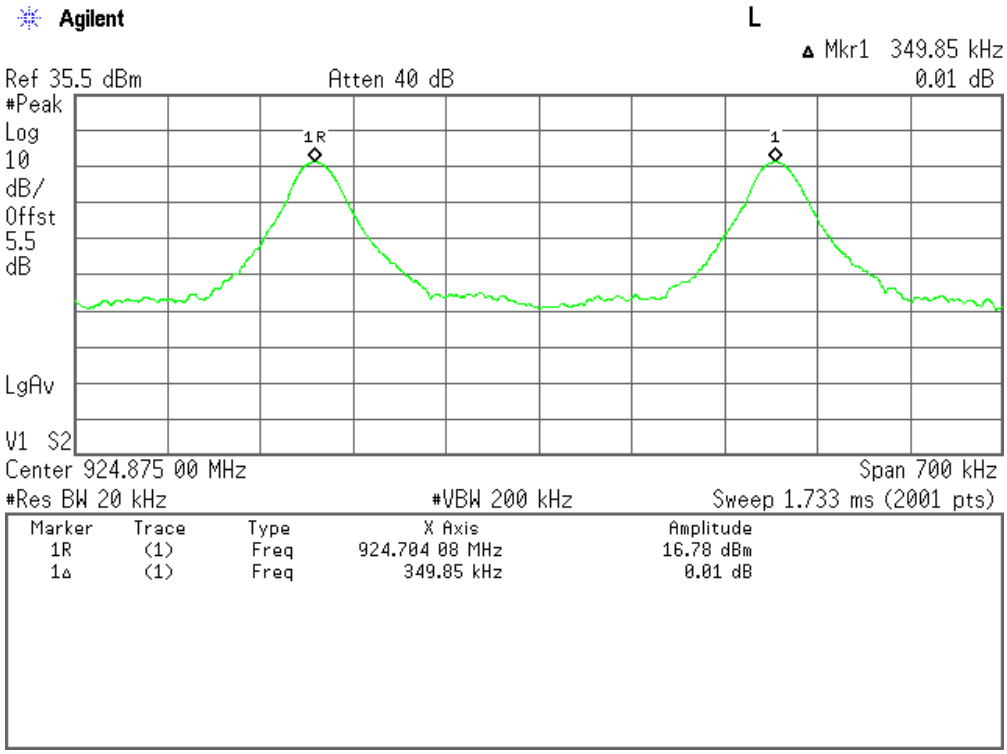
Channel 19 to 20 Walkie Talkie



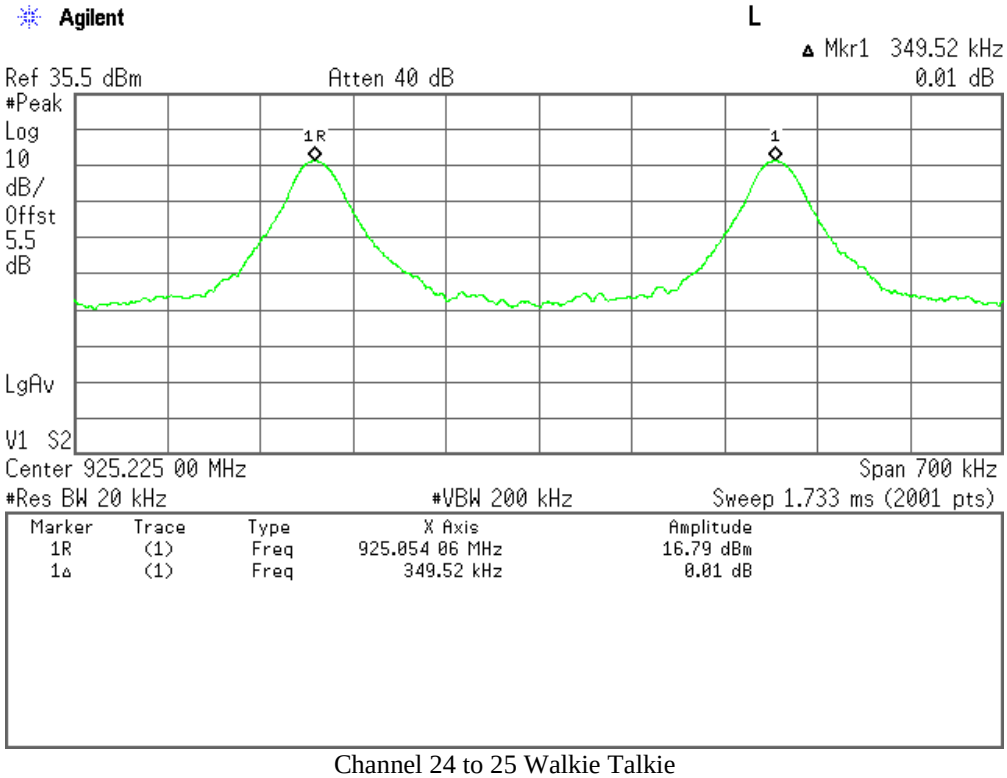
Channel 21 to 22 Walkie Talkie



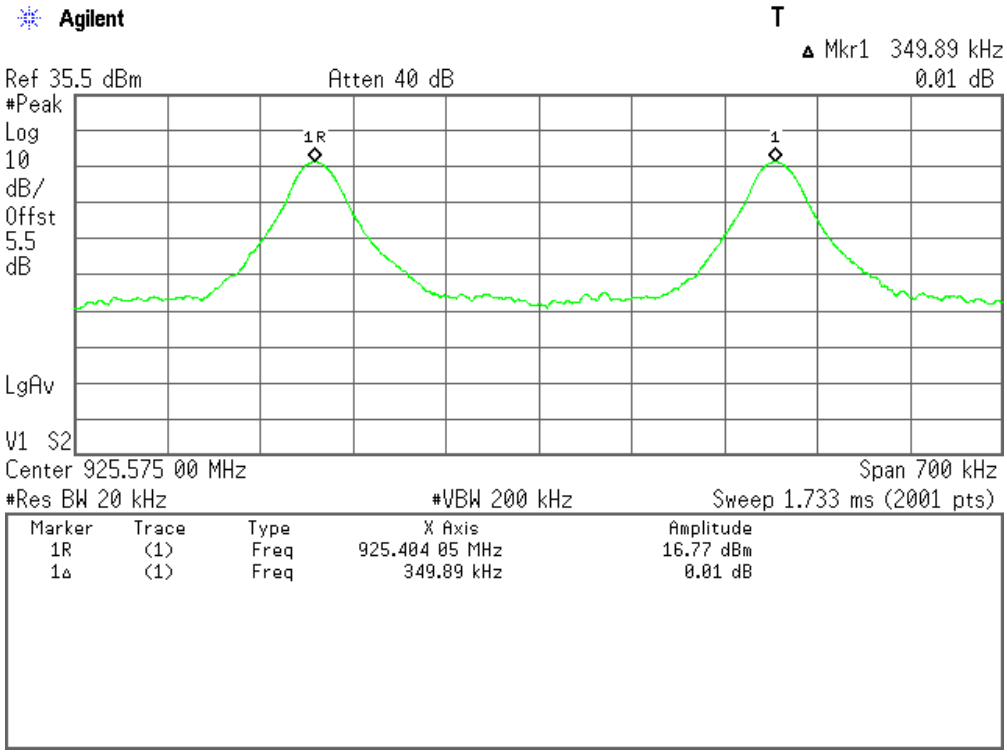
Channel 22 to 23 Walkie Talkie



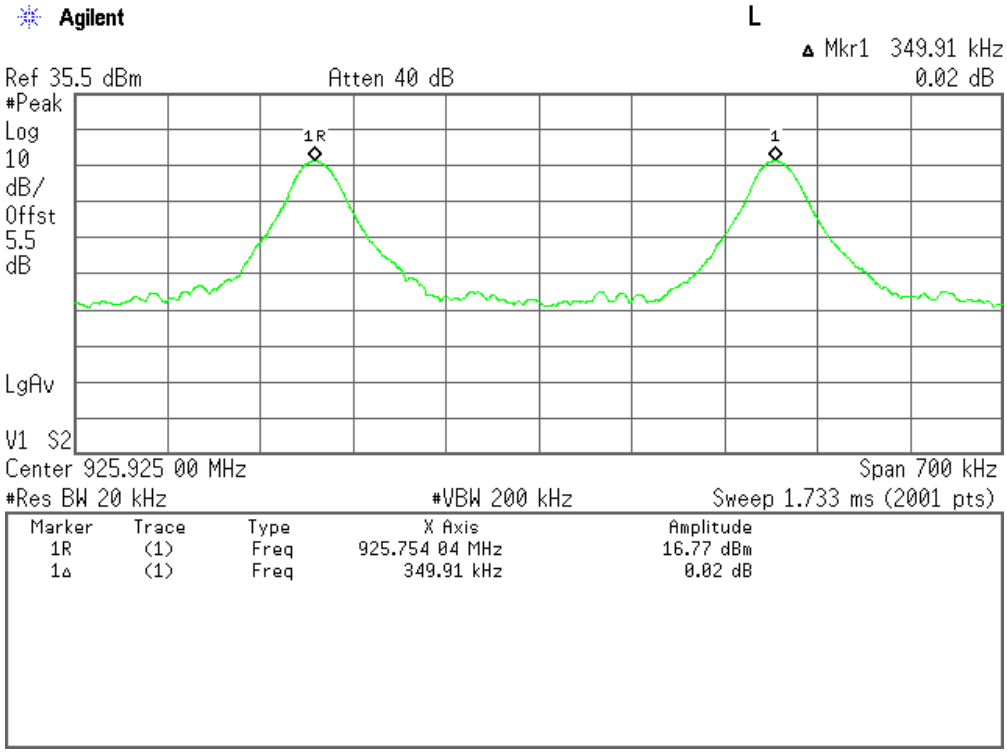
Channel 23 to 24 Walkie Talkie



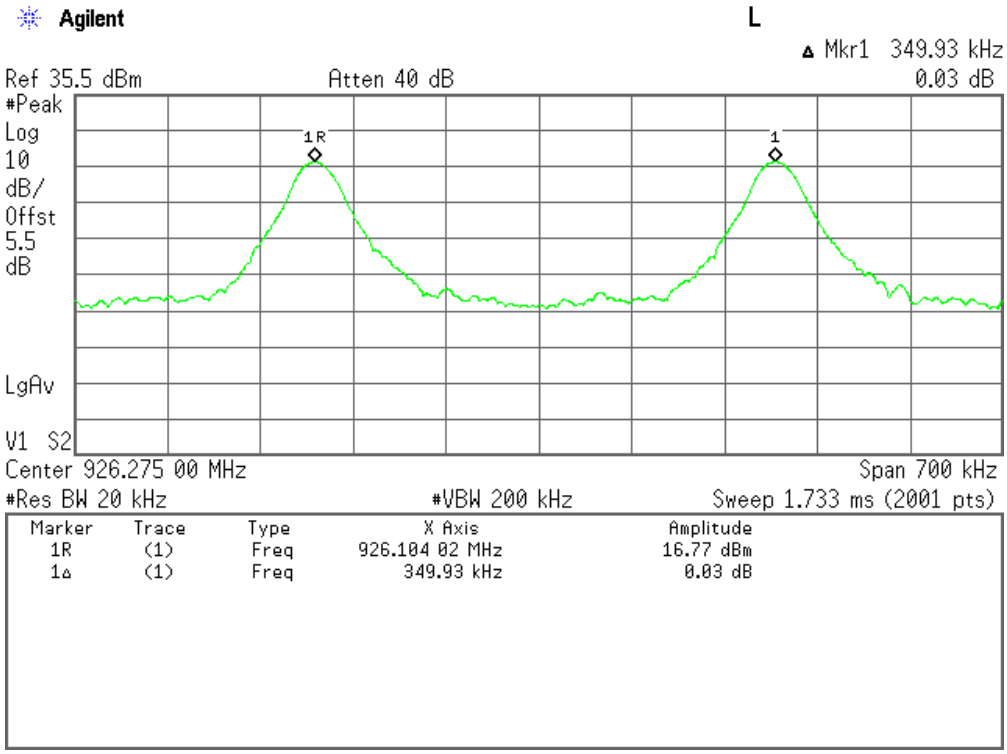
Channel 24 to 25 Walkie Talkie



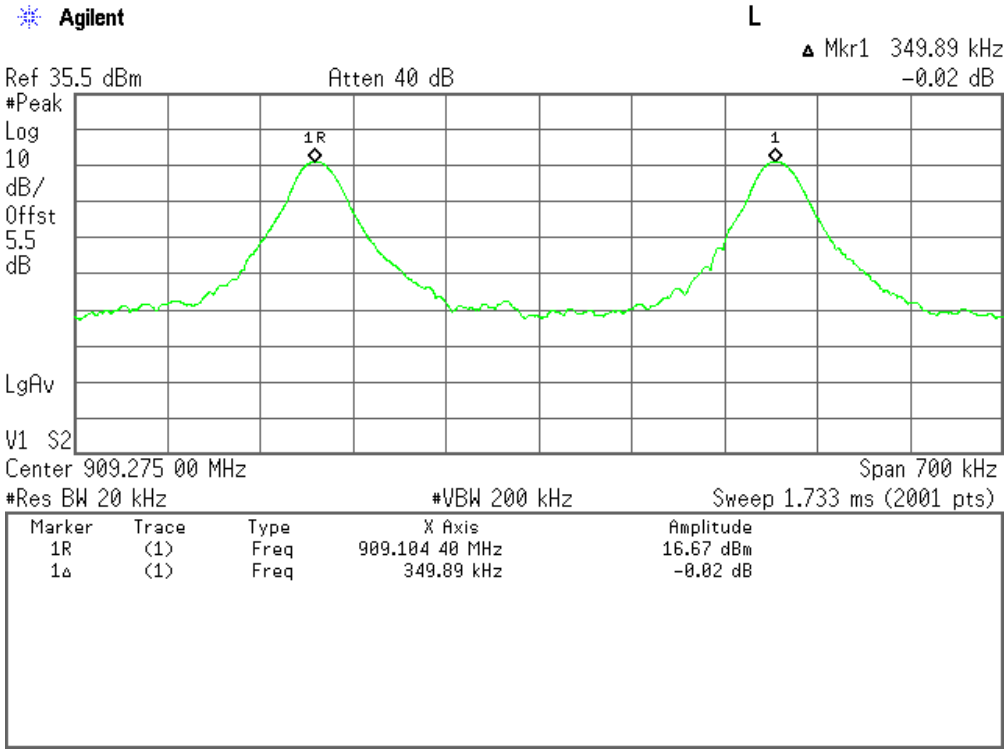
Channel 25 to 26 Walkie Talkie



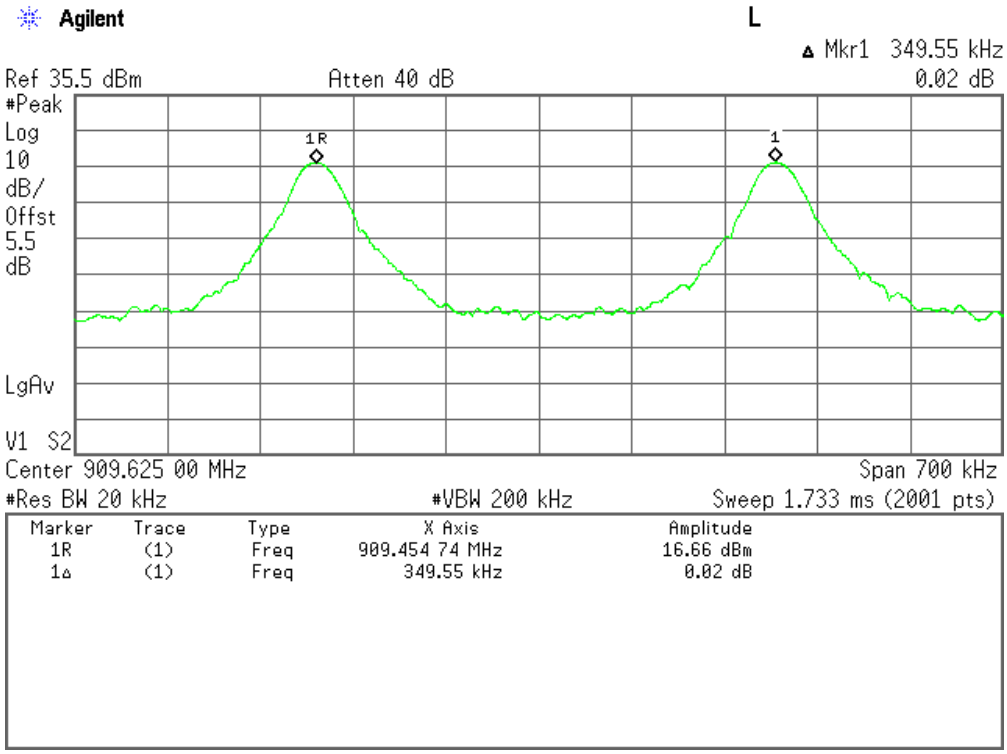
Channel 26 to 27 Walkie Talkie



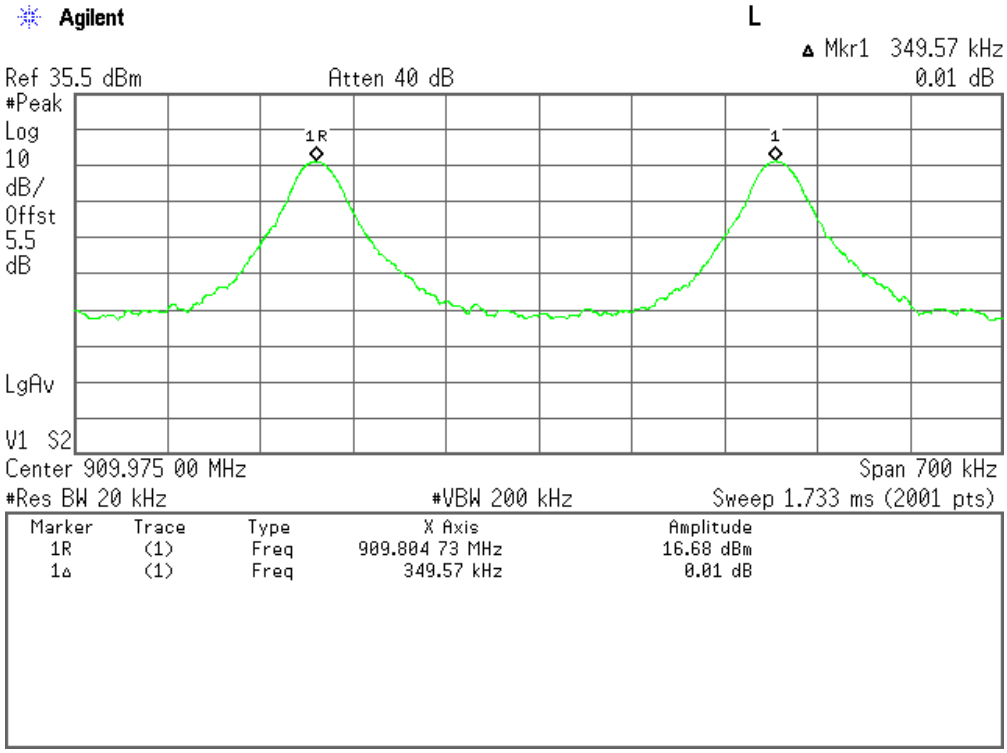
Channel 27 to 28 Walkie Talkie



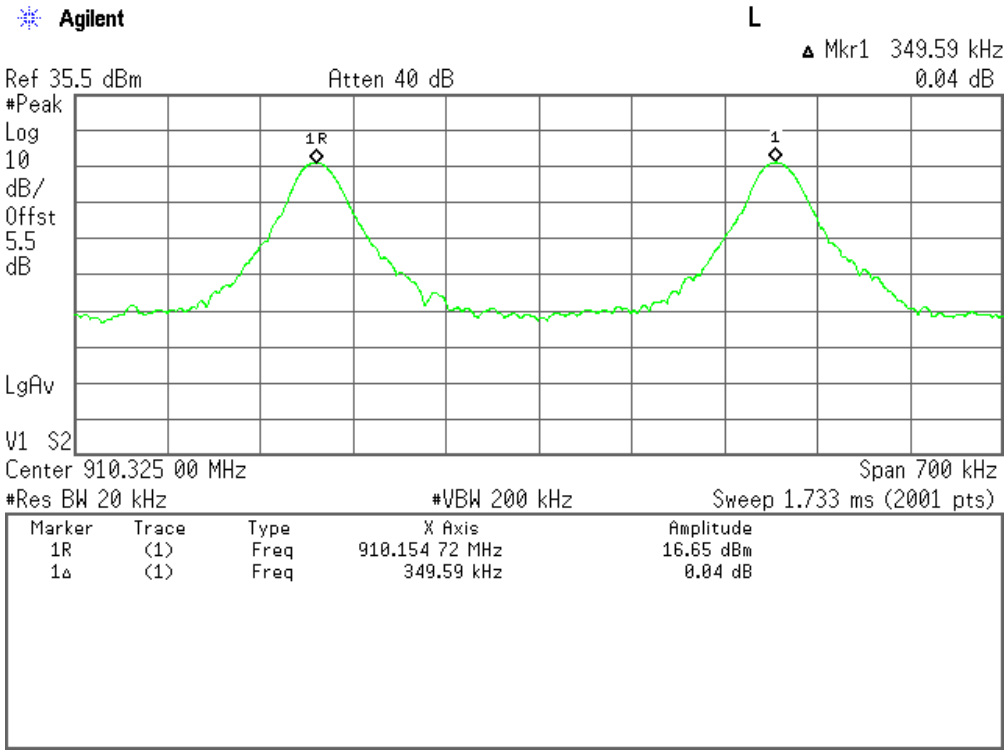
Channel 1 to 2 Normal



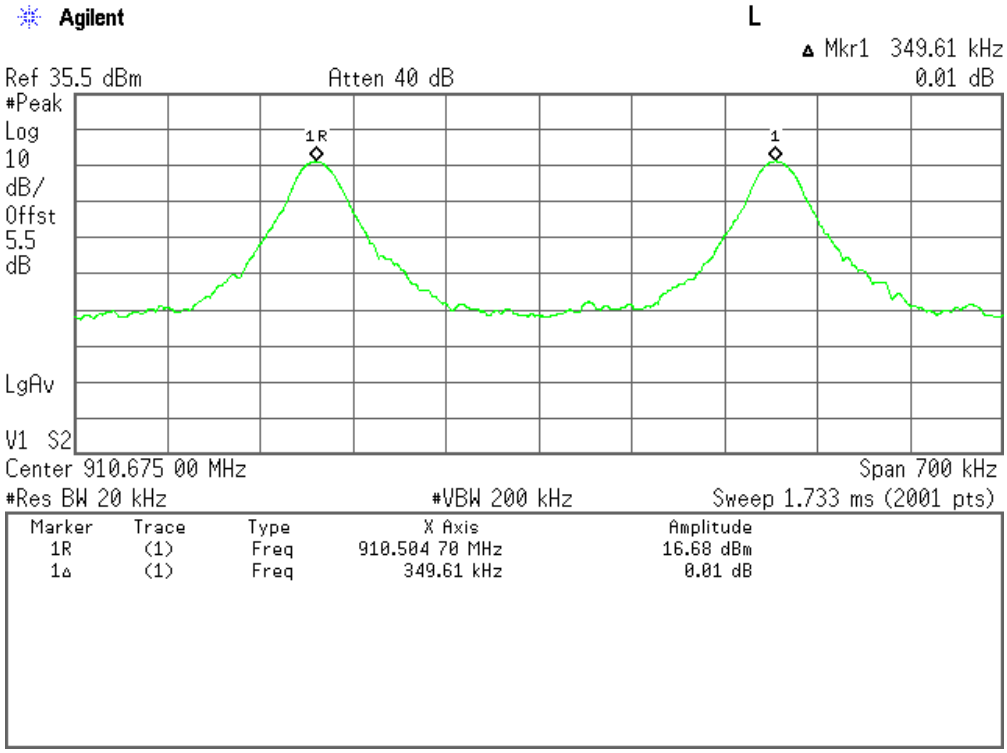
Channel 2 to 3 Normal



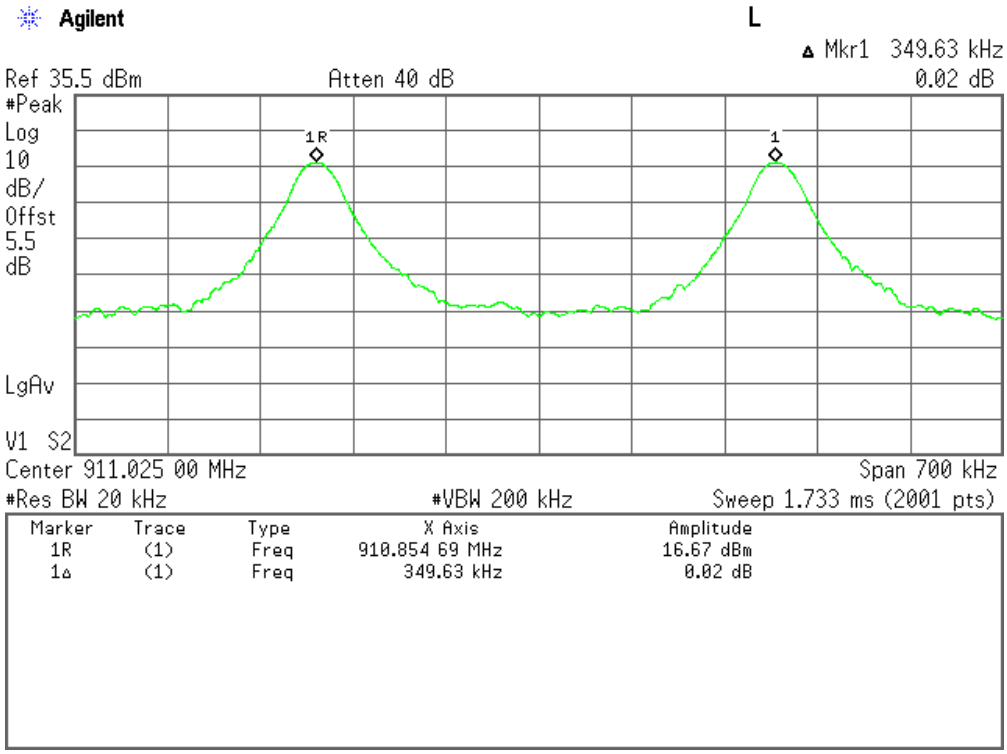
Channel 3 to 4 Normal



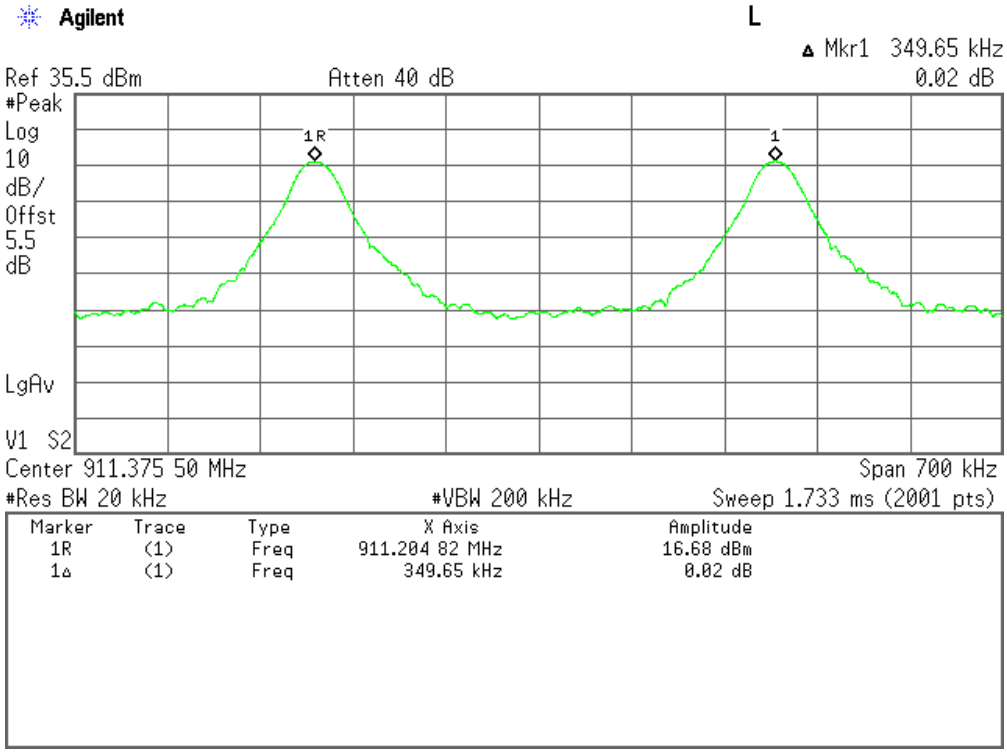
Channel 4 to 5 Normal



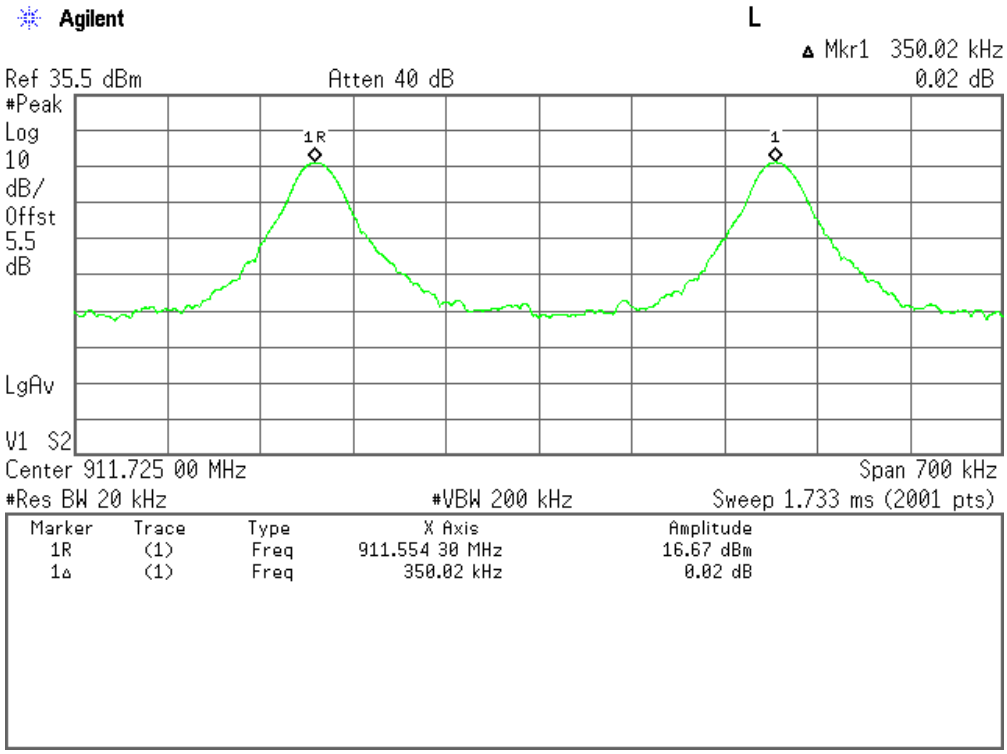
Channel 5 to 6 Normal



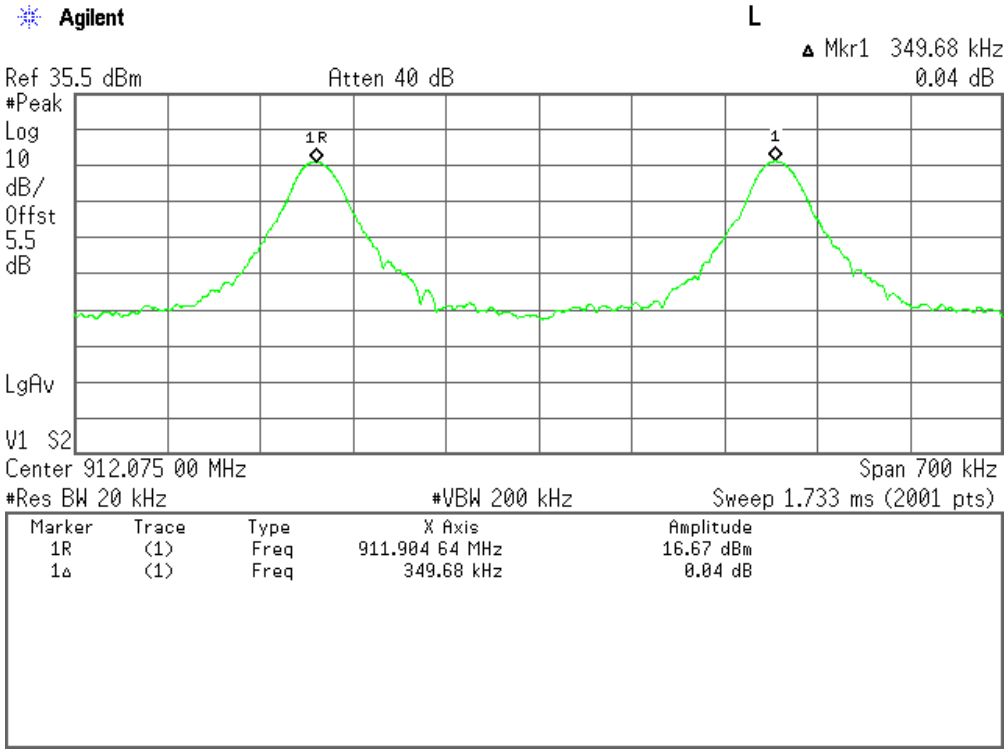
Channel 6 to 7 Normal



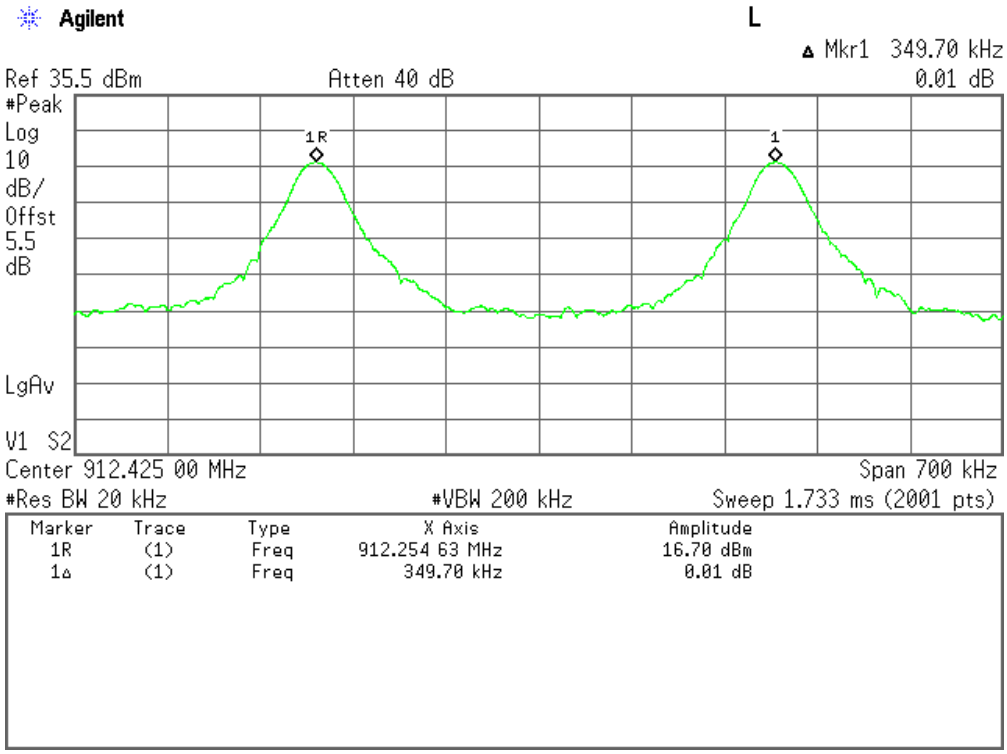
Channel 7 to 8 Normal



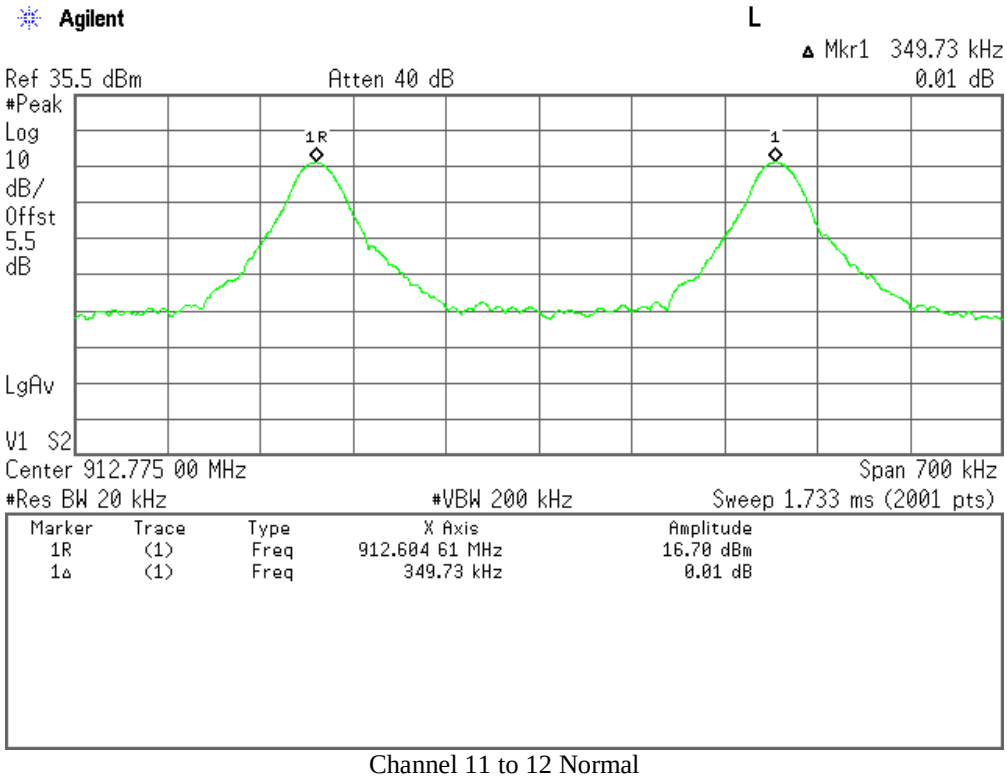
Channel 8 to 9 Normal



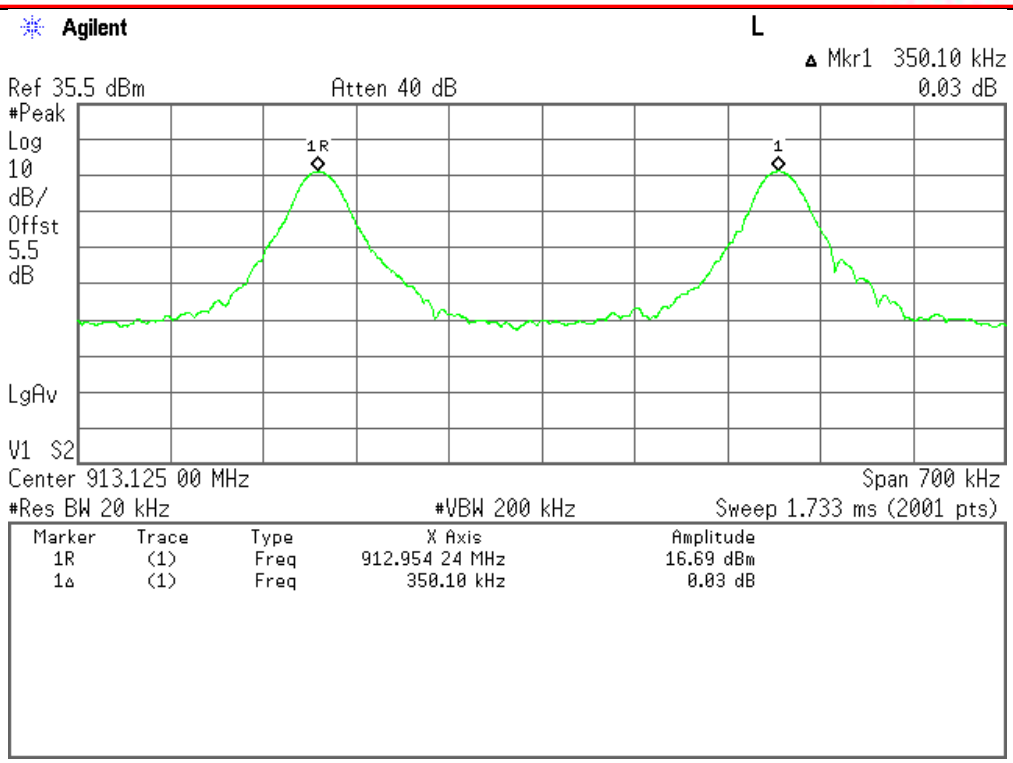
Channel 9 to 10 Normal



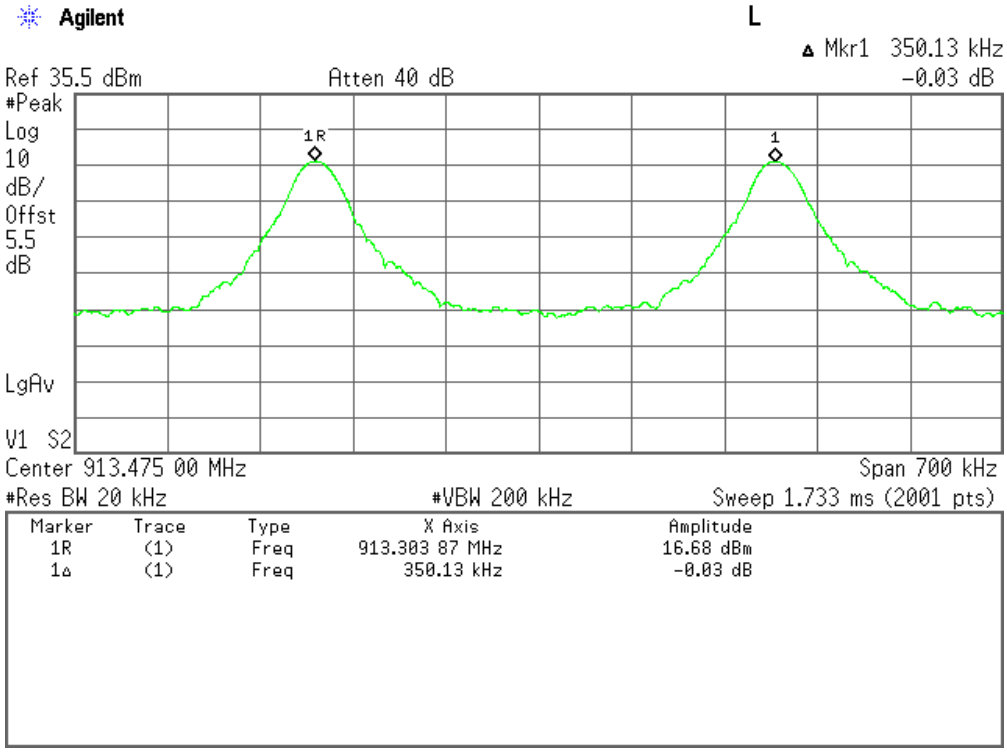
Channel 10 to 11 Normal



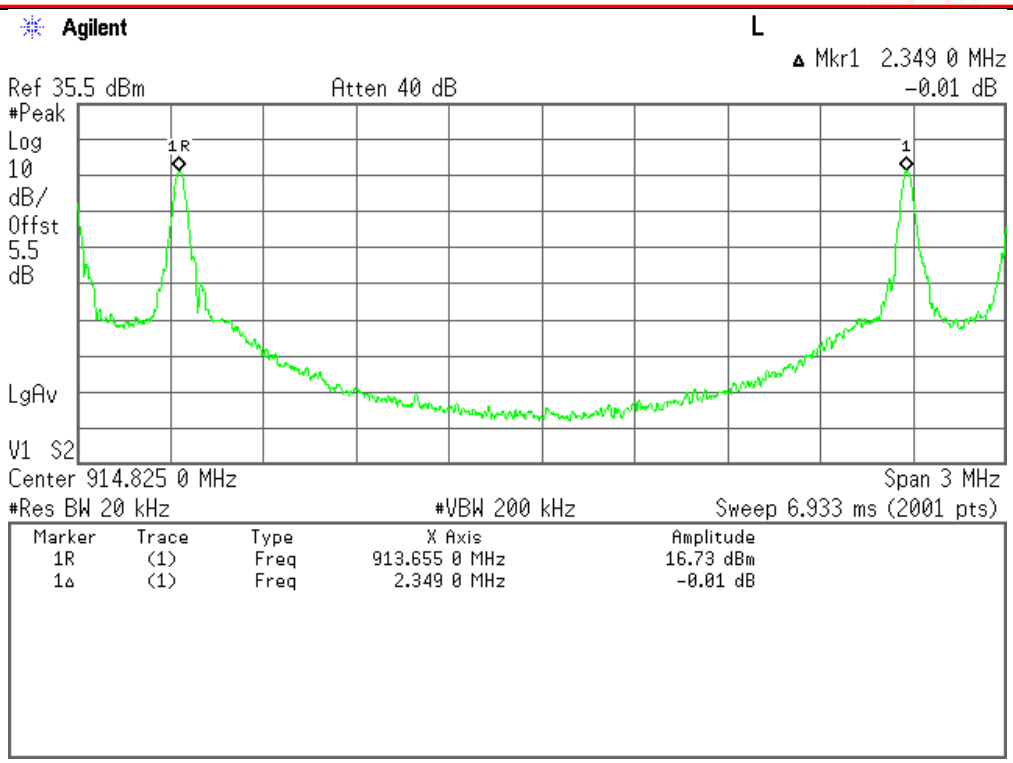
Channel 11 to 12 Normal



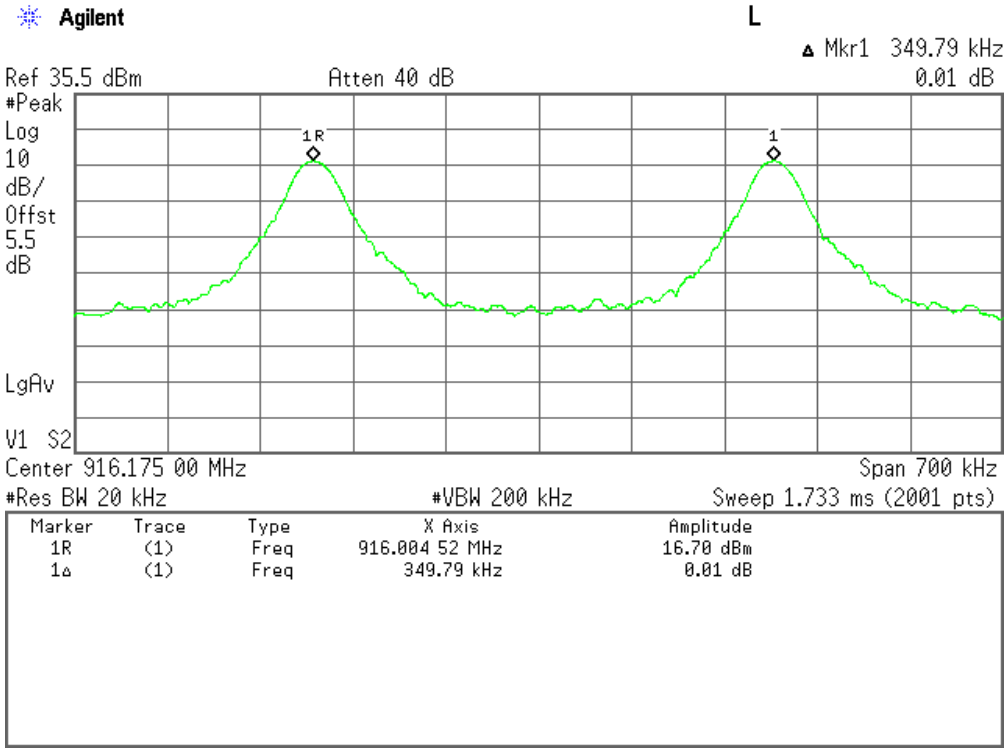
Channel 12 to 13 Normal



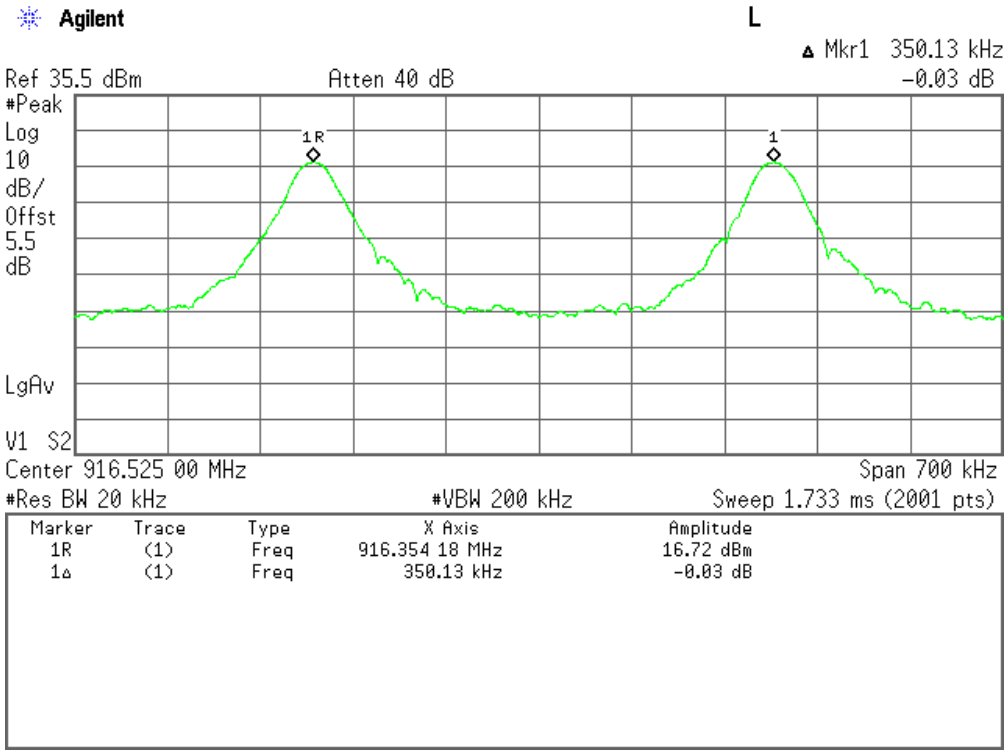
Channel 13 to 14 Normal



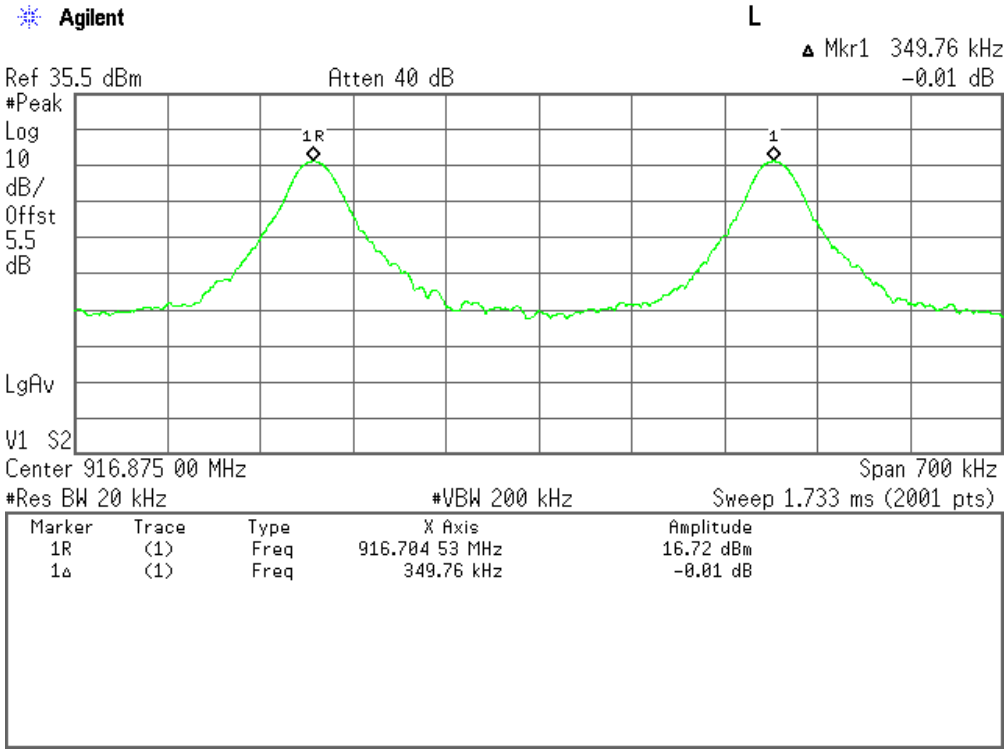
Channel 14 to 15 Normal



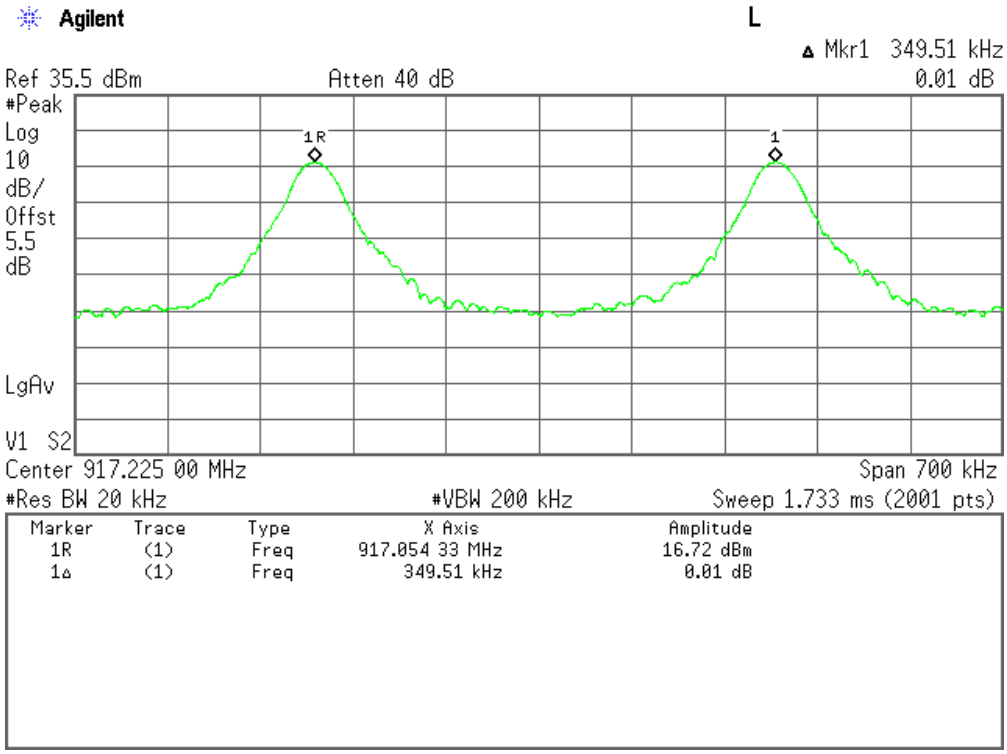
Channel 15 to 16 Normal



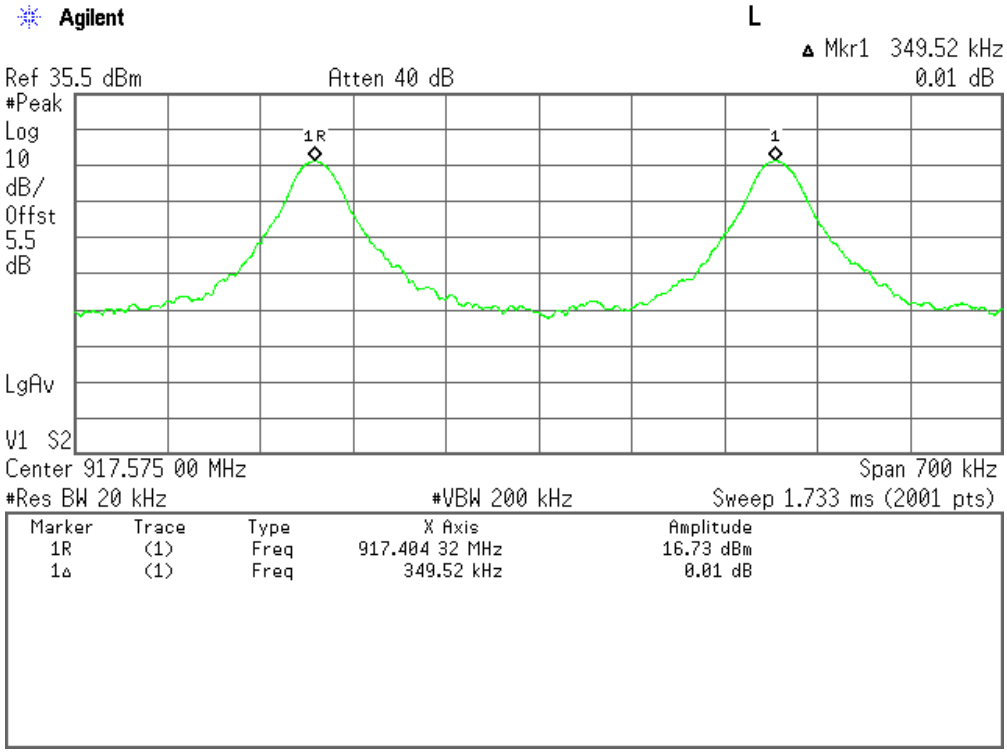
Channel 16 to 17 Normal



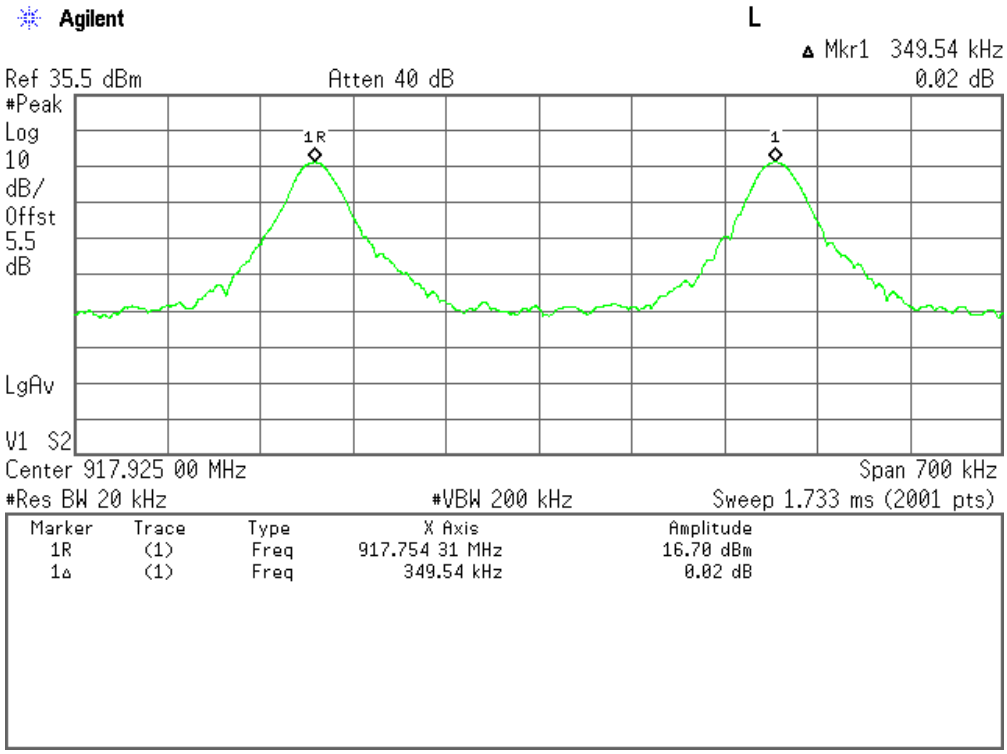
Channel 17 to 18 Normal



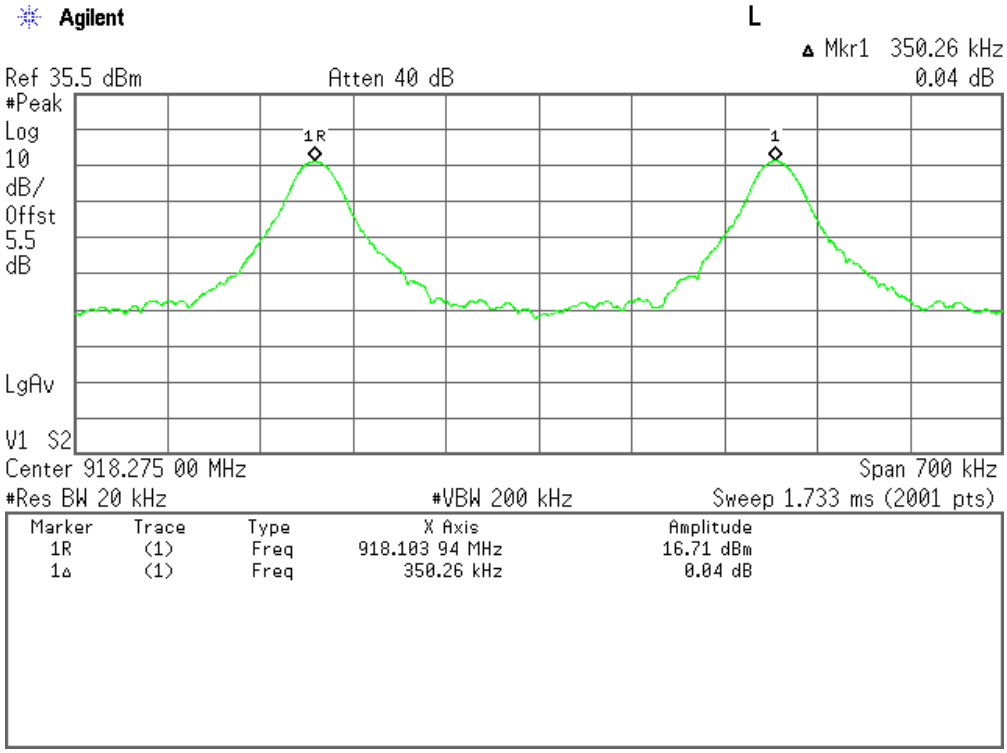
Channel 18 to 19 Normal



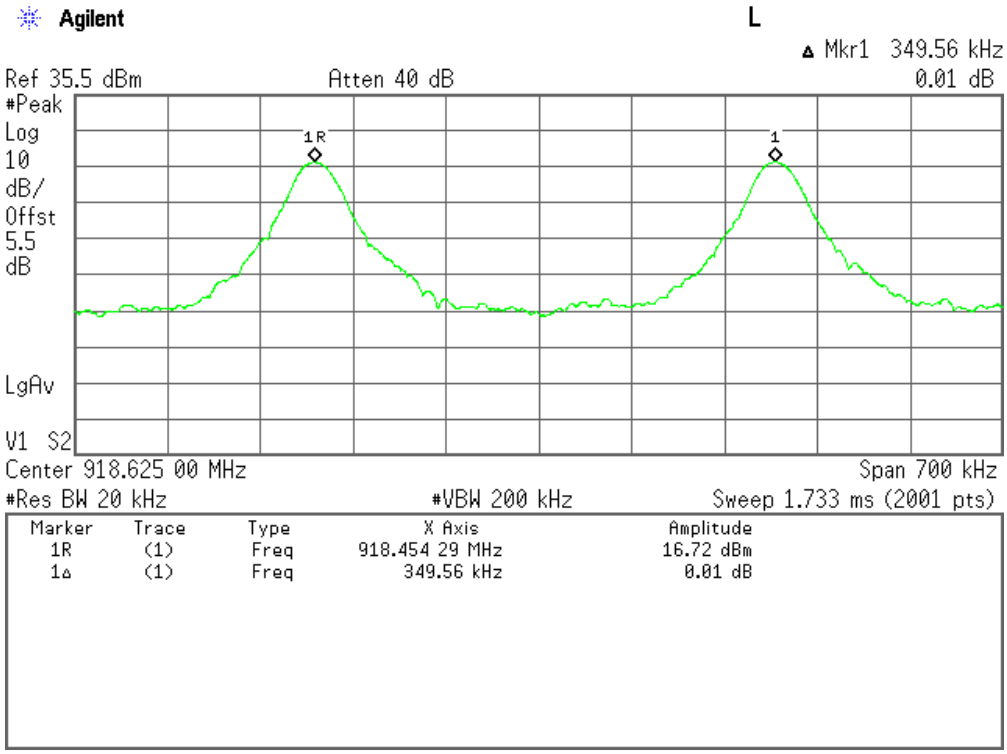
Channel 19 to 20 Normal



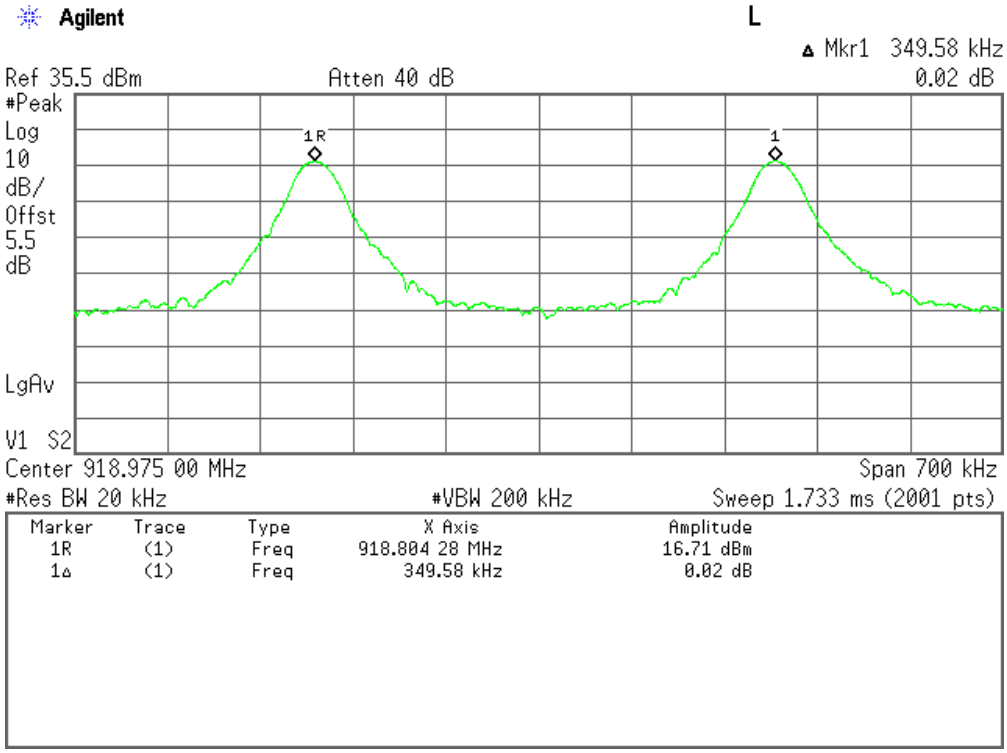
Channel 20 to 21 Normal



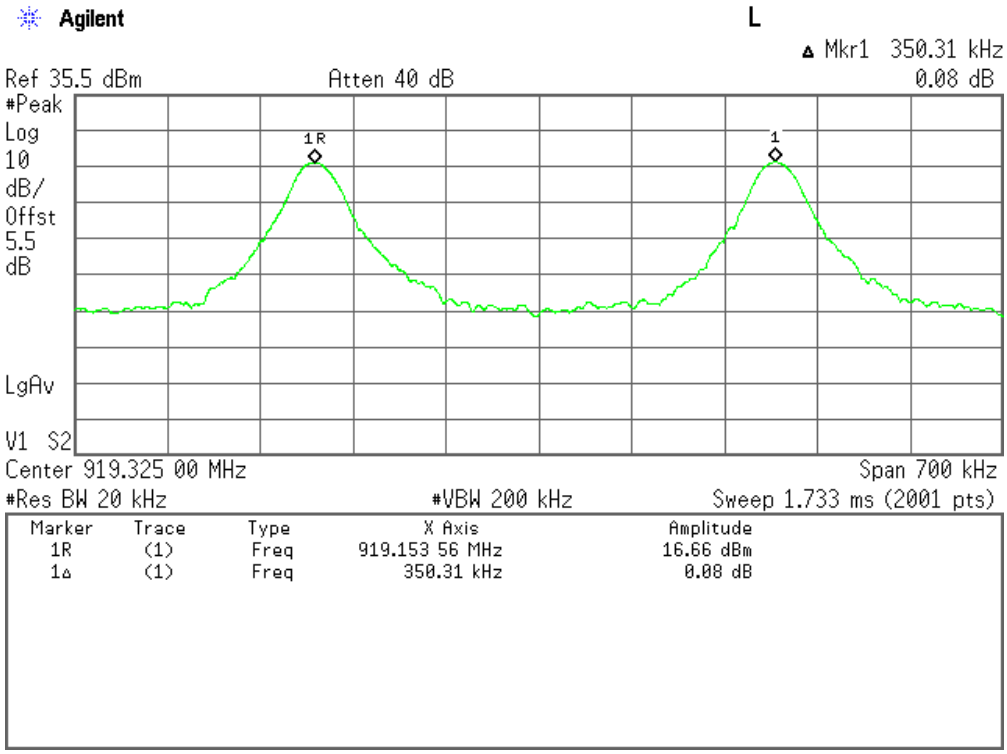
Channel 21 to 22 Normal



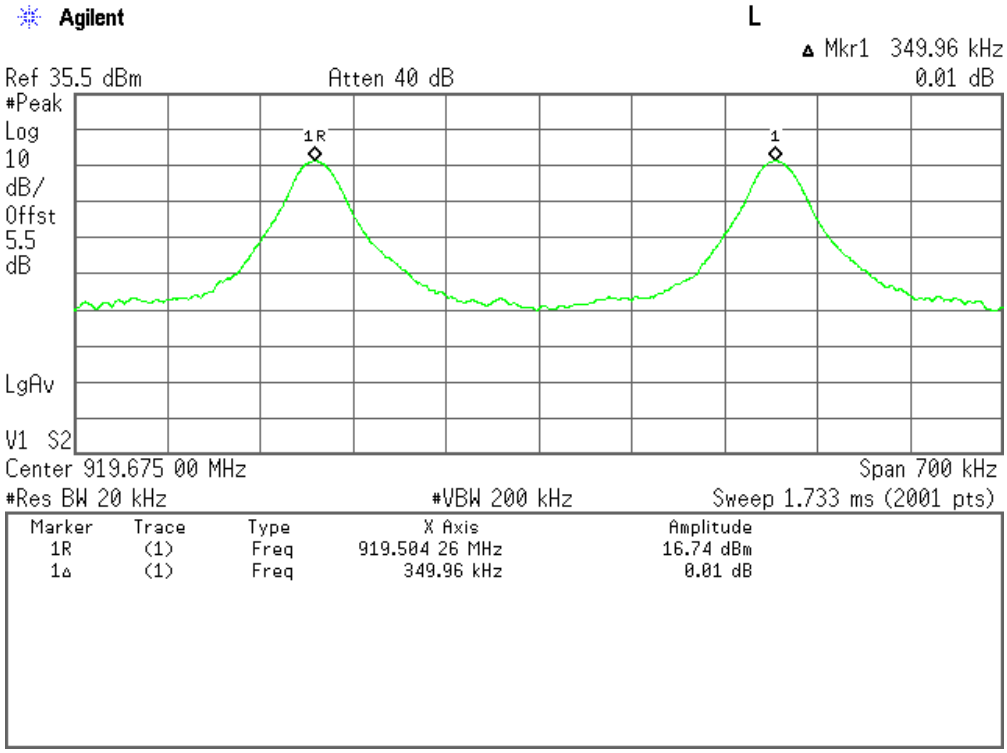
Channel 22 to 23 Normal



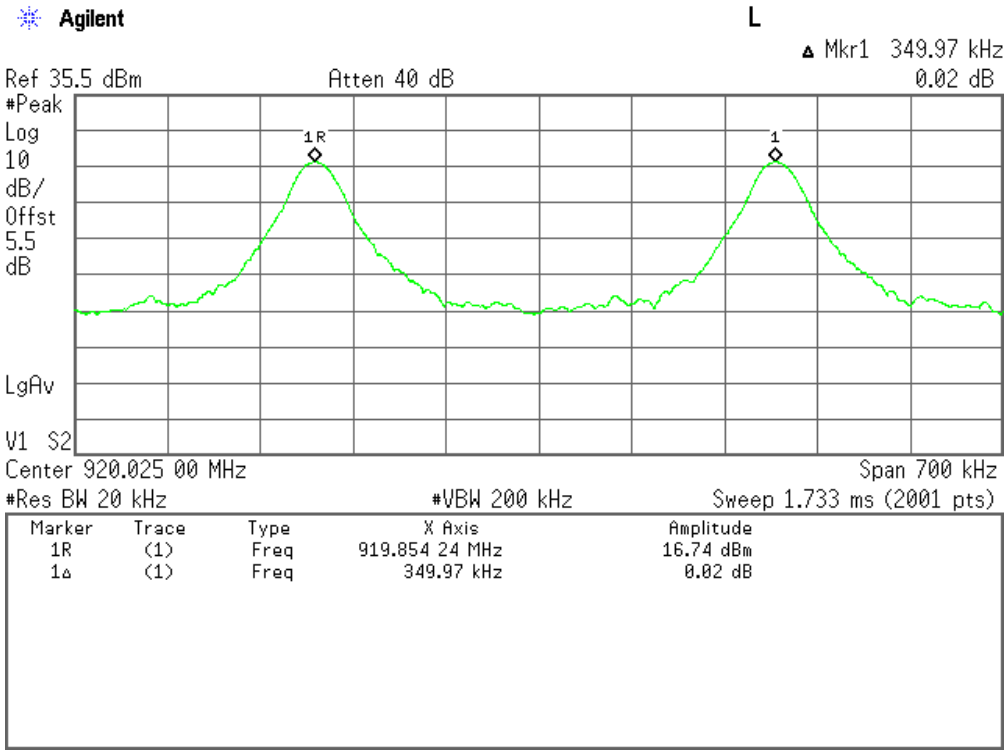
Channel 23 to 24 Normal



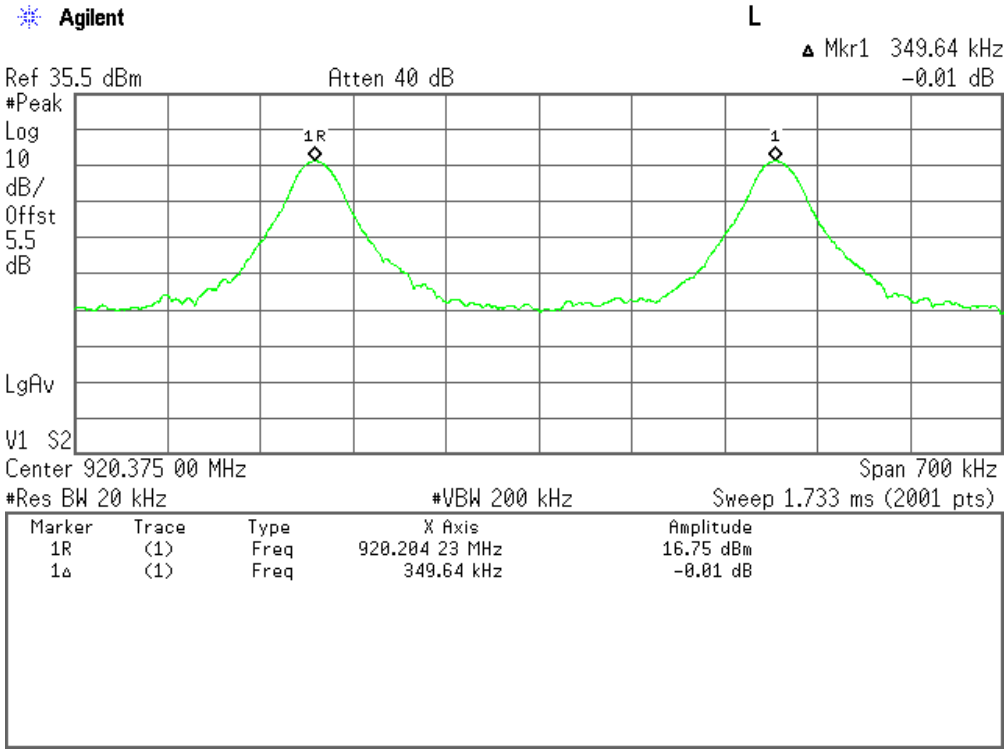
Channel 24 to 25 Normal



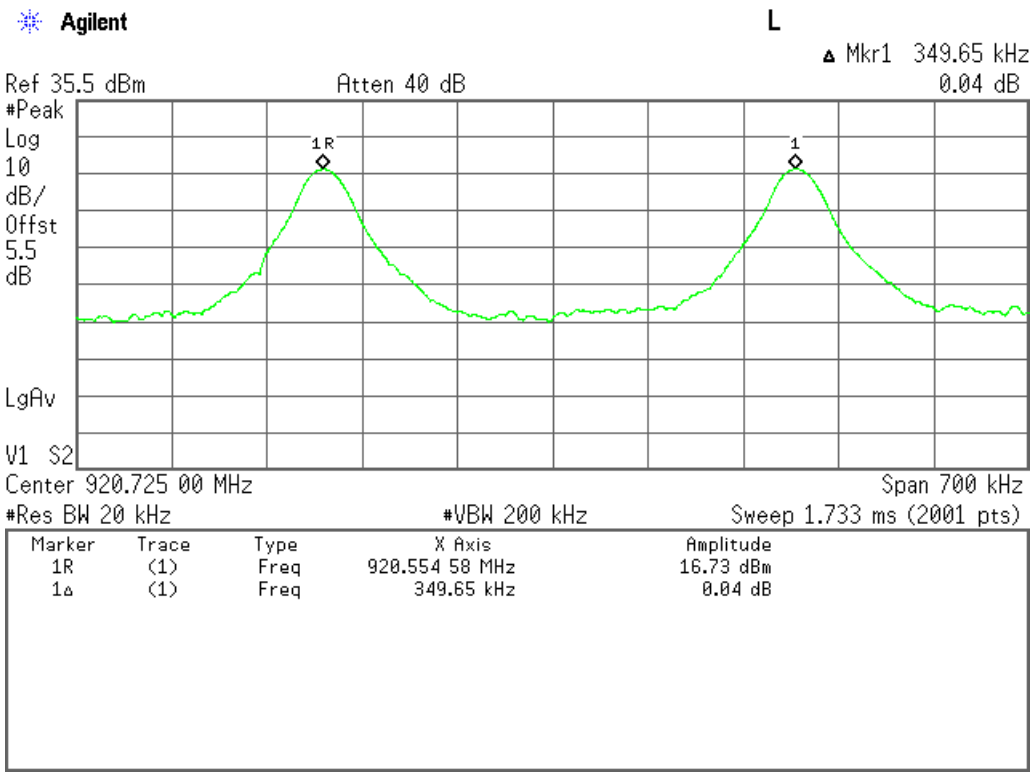
Channel 25 to 26 Normal



Channel 26 to 27 Normal



Channel 27 to 28 Normal



Channel 28 (Normal) to Channel 15 (Walkie Talkie)

TEST RESULT			
Channel (Walkie Talkie) #	Measured value KHz	Limit	Result
1 to 2	349.61	>20dB BW	Pass
2 to 3	349.98	>20dB BW	Pass
3 to 4	349.6	>20dB BW	Pass
4 to 5	349.66	>20dB BW	Pass
5 to 6	349.68	>20dB BW	Pass
6 to 7	349.7	>20dB BW	Pass
7 to 8	349.71	>20dB BW	Pass
8 to 9	349.73	>20dB BW	Pass
9 to 10	349.74	>20dB BW	Pass
10 to 11	349.76	>20dB BW	Pass
11 to 12	349.78	>20dB BW	Pass
12 to 13	349.8	>20dB BW	Pass
13 to 14	1350	>20dB BW	Pass
28 (Normal) to 15 (Walkie Talkie)	349.65	>20dB BW	Pass
15 to 16	1350	>20dB BW	Pass
16 to 17	349.72	>20dB BW	Pass
17 to 18	349.73	>20dB BW	Pass
18 to 19	349.4	>20dB BW	Pass
19 to 20	349.78	>20dB BW	Pass
20 to 21	349.79	>20dB BW	Pass
21 to 22	349.46	>20dB BW	Pass
22 to 23	349.83	>20dB BW	Pass
23 to 24	349.85	>20dB BW	Pass
24 to 25	349.52	>20dB BW	Pass
25 to 26	349.89	>20dB BW	Pass
26 to 27	349.91	>20dB BW	Pass
27 to 28	349.93	>20dB BW	Pass
Channel (Normal) #	Measured value KHz	Limit	Result
1 to 2	349.89	>20dB BW	Pass
2 to 3	349.55	>20dB BW	Pass
3 to 4	349.57	>20dB BW	Pass
4 to 5	349.59	>20dB BW	Pass
5 to 6	349.61	>20dB BW	Pass
6 to 7	349.63	>20dB BW	Pass
7 to 8	349.65	>20dB BW	Pass
8 to 9	350.02	>20dB BW	Pass
9 to 10	349.68	>20dB BW	Pass
10 to 11	349.70	>20dB BW	Pass
11 to 12	349.73	>20dB BW	Pass
12 to 13	350.10	>20dB BW	Pass
13 to 14	350.13	>20dB BW	Pass
14 to 15	2349	>20dB BW	Pass
15 to 16	349.79	>20dB BW	Pass
16 to 17	350.13	>20dB BW	Pass
17 to 18	349.76	>20dB BW	Pass
18 to 19	349.51	>20dB BW	Pass
19 to 20	349.52	>20dB BW	Pass
20 to 21	349.54	>20dB BW	Pass

21 to 22	350.26	>20dB BW	Pass
22 to 23	349.56	>20dB BW	Pass
23 to 24	349.58	>20dB BW	Pass
24 to 25	350.31	>20dB BW	Pass
25 to 26	349.96	>20dB BW	Pass
26 to 27	349.97	>20dB BW	Pass
27 to 28	349.64	>20dB BW	Pass

TEST SETUP PHOTOGRAPH

Refer Annexure -1

Conducted RF Test setup

2.4 NUMBER OF HOPPING FREQUENCIES

EUT Nomenclature	Wireless Relay Module	**Test Request No.**	20294-1
Model No.	FW-RM	**Serial No.**	MEL-159
Test Start Date	2017-04-22	**Temperature (˚C)**	23.6°C
Test End Date	2017-04-24	**Humidity RH (%)**	51.9%RH
Tested By	Arnoldo Garcia	**Pressure (mbar)**	NR
Input Voltage / Freq.	3.3 Vdc		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std.	NA		
Applicable standard	FCC Part 15.247:2010		
Test Method	DA 00-705		
Comment	NA		

TEST DETAILS

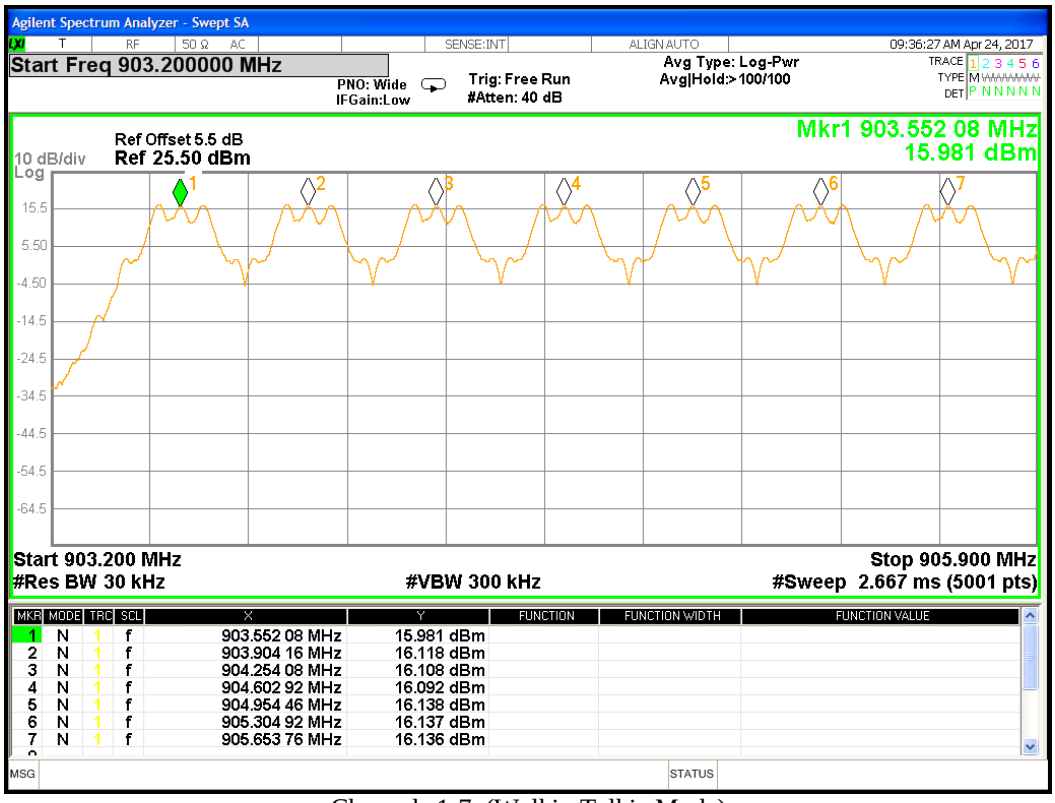
Method	Radiated ☐	Conducted ☒

TEST PARAMETERS

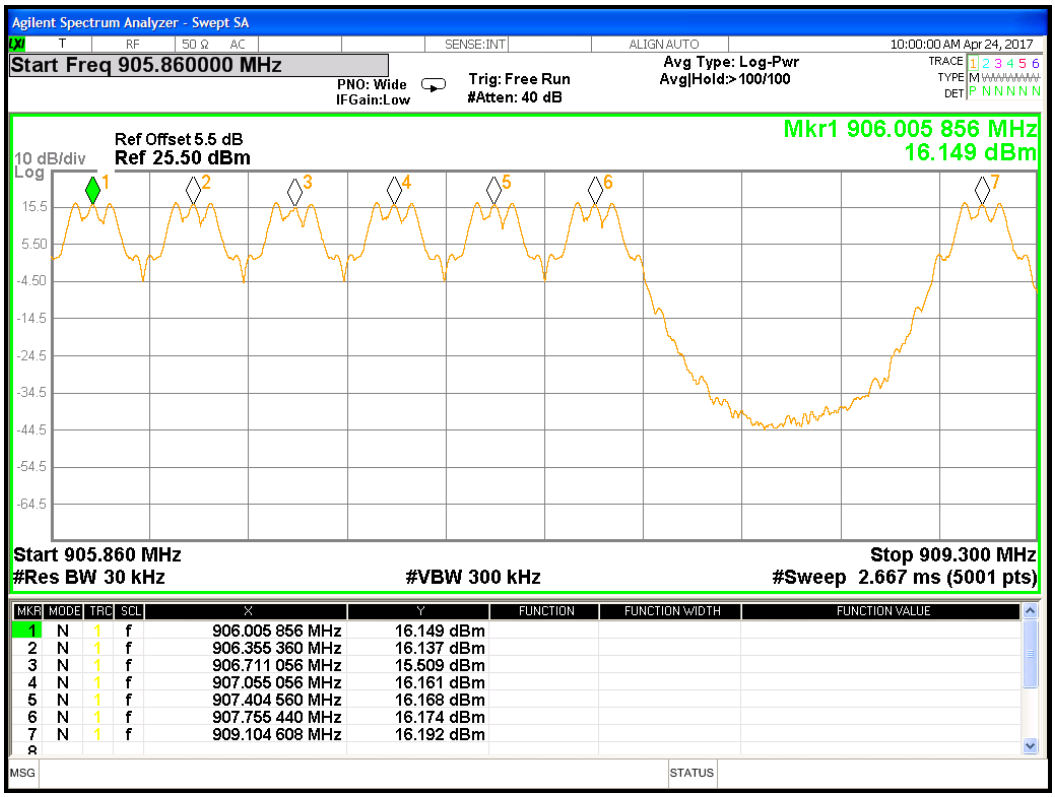
Antenna Height	NA	**Turntable Rotation**	NA
Equipment Class	NA	**Measurement Distance**	NA

TEST EQUIPMENT

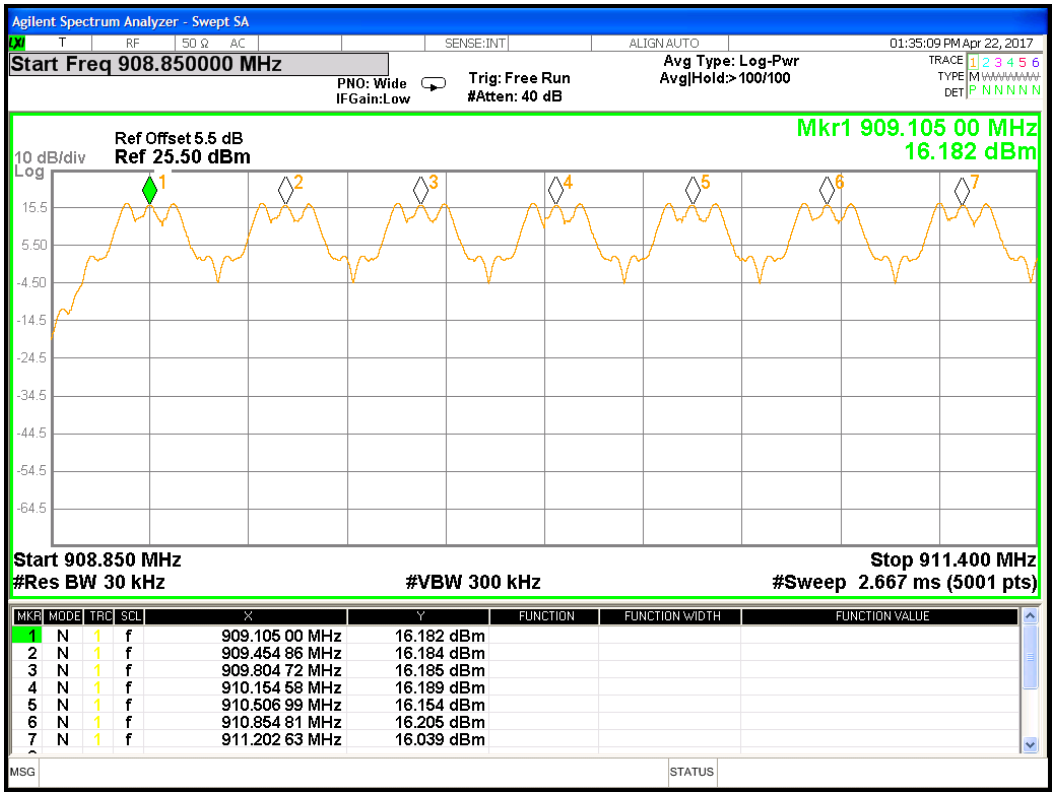
Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Keysight	N9030A (PXA)	MY49431595	2018-01-27
Y	RF Cable	Digikey	1	NA	NA



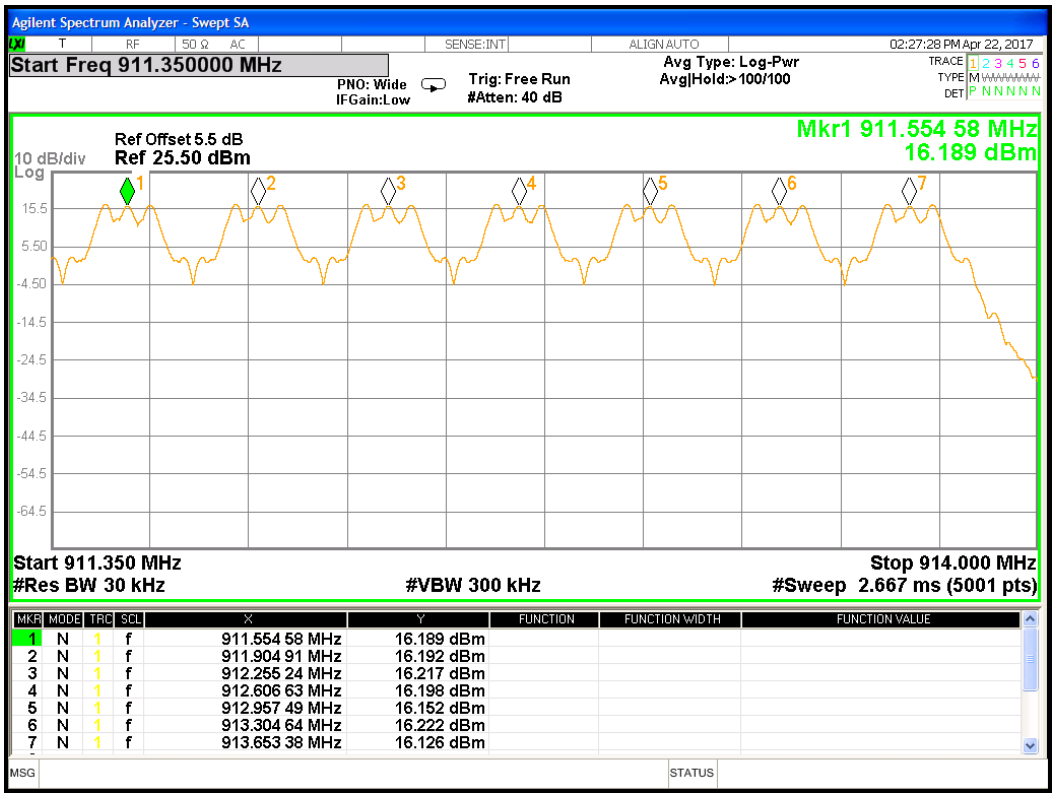
Channels 1-7 (Walkie-Talkie Mode)



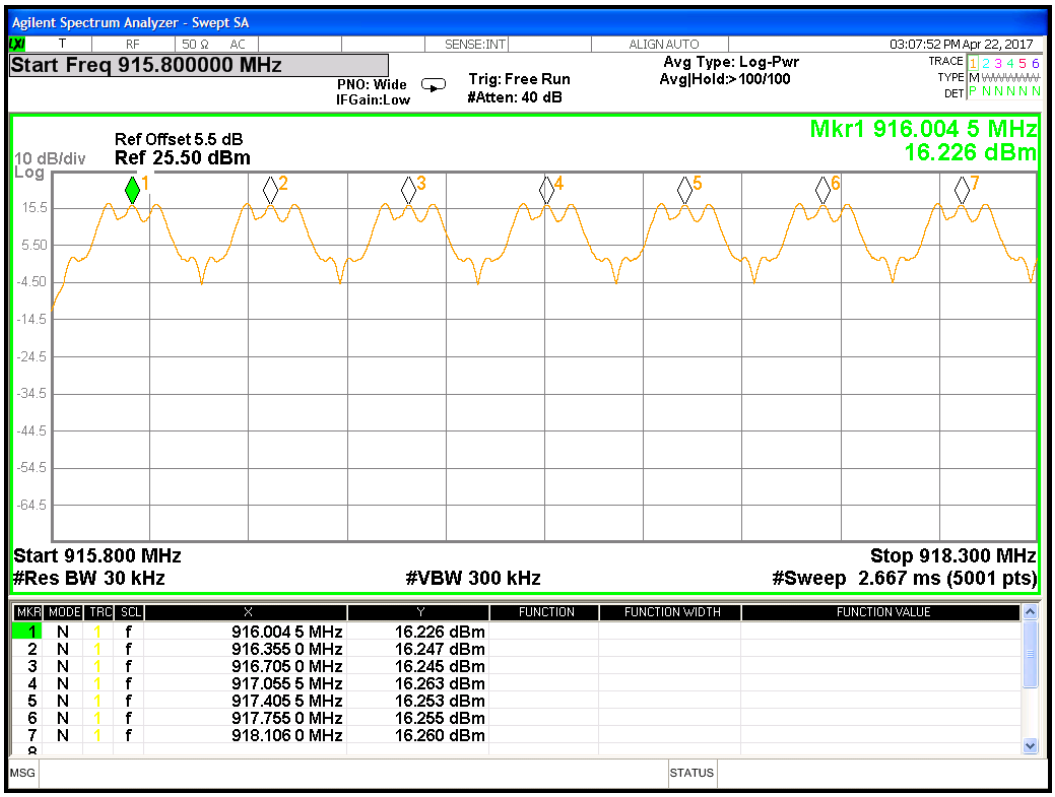
Channels 8-14 (Walkie-Talkie Mode)



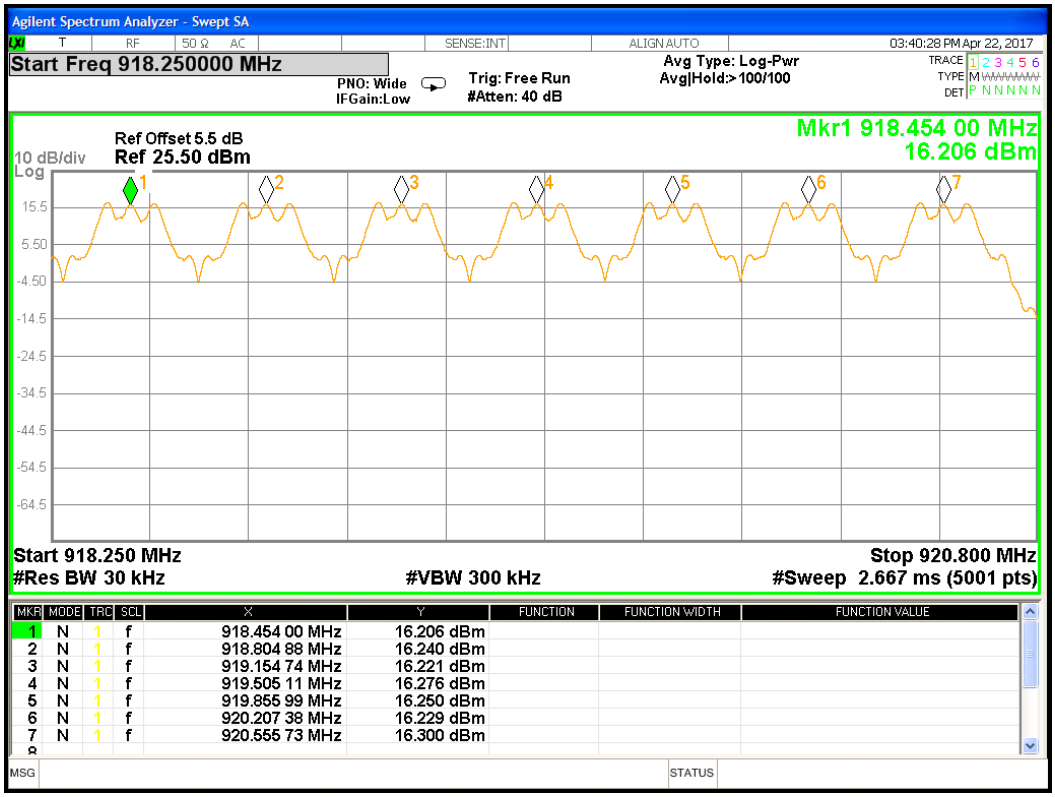
Channels 1-7 (Normal Mode)



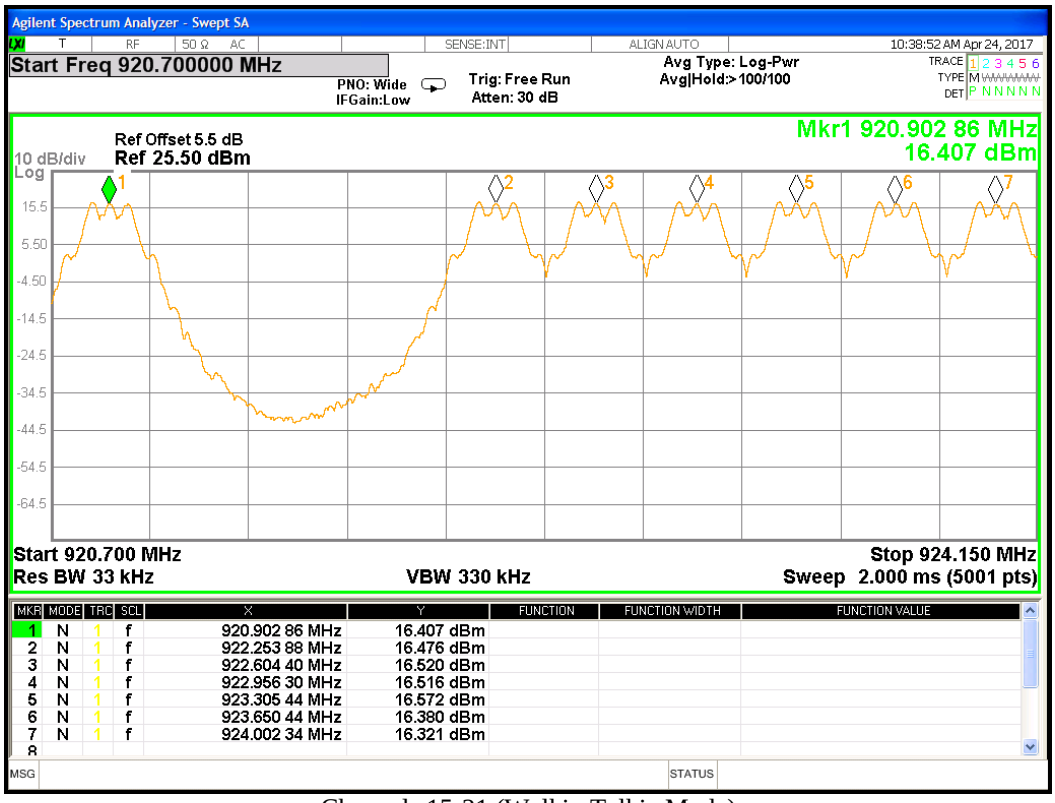
Channels 8-14 (Normal Mode)



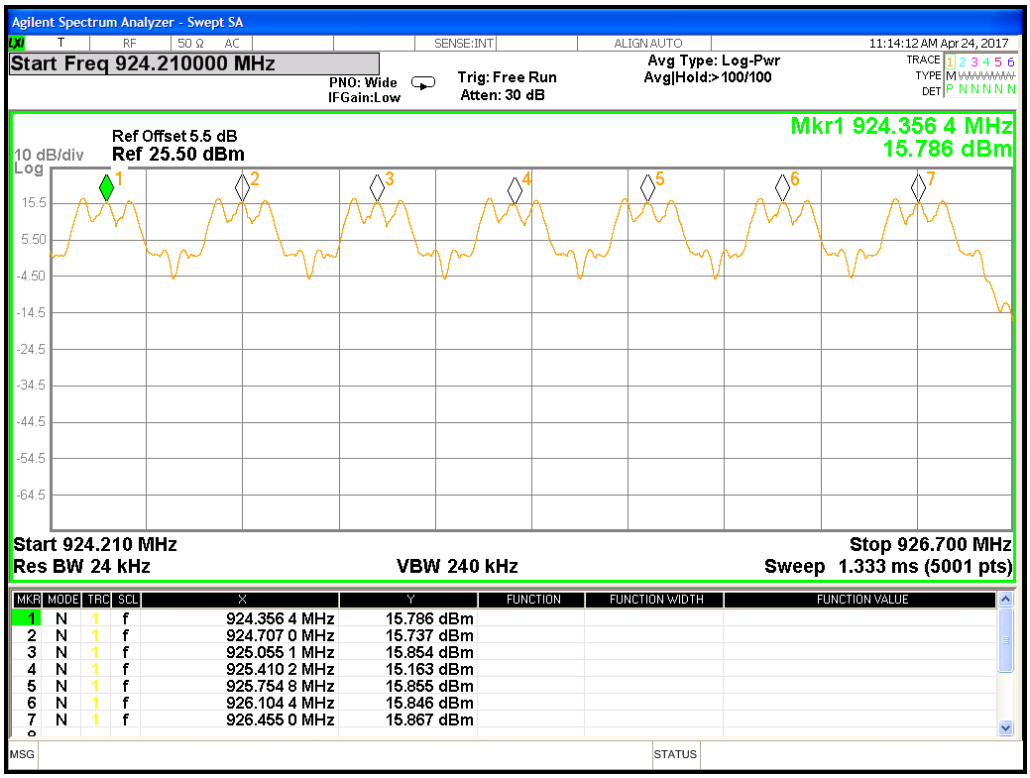
Channels 15-21 (Normal Mode)



Channels 22-28 (Normal Mode)



Channels 15-21 (Walkie-Talkie Mode)



Channels 22-27 (Walkie-Talkie Mode)

TEST RESULT			
Mode of Operation	**No. of Channels Measured**	**Limit (No. of Channels)**	**Test Results**
Normal Mode	28	≥25	PASS
Walkie-Talkie Mode	27	≥25	PASS

TEST SETUP PHOTOGRAPH

Refer Annexure -1

Conducted RF Test setup

2.5 BAND-EDGE COMPLIANCE

EUT Nomenclature	Wireless Relay Module	**Test Request No.**	20294-1
Model No.	FW-RM	**Serial No.**	MEL-159
Test Start Date	2016-08-31	**Temperature (˚C)**	23.6°C
Test End Date	2016-09-06	**Humidity RH (%)**	51.9%RH
Tested By	Jose Badia/Arnoldo Garcia	**Pressure (mbar)**	NR
Input Voltage / Freq.	3.3 Vdc		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std.	NA		
Applicable standard	FCC Part 15.247:2010		
Test Method	DA 00-705		
Comment	NA		

TEST DETAILS

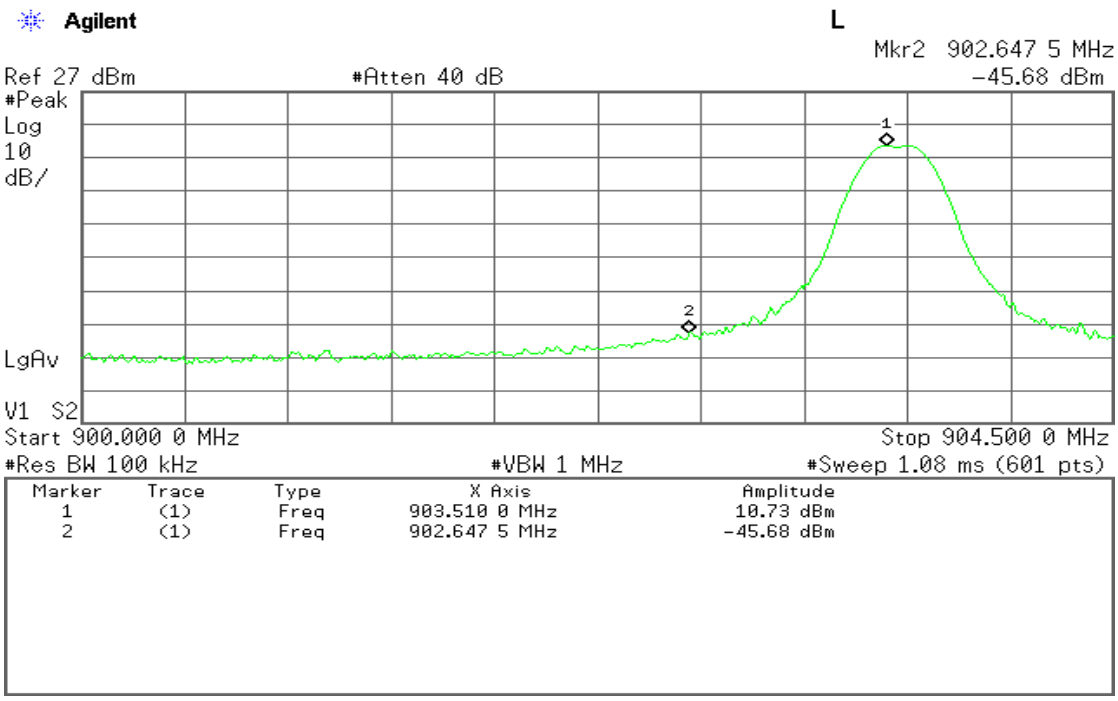
Method	Radiated ☐	Conducted ☒

TEST PARAMETERS

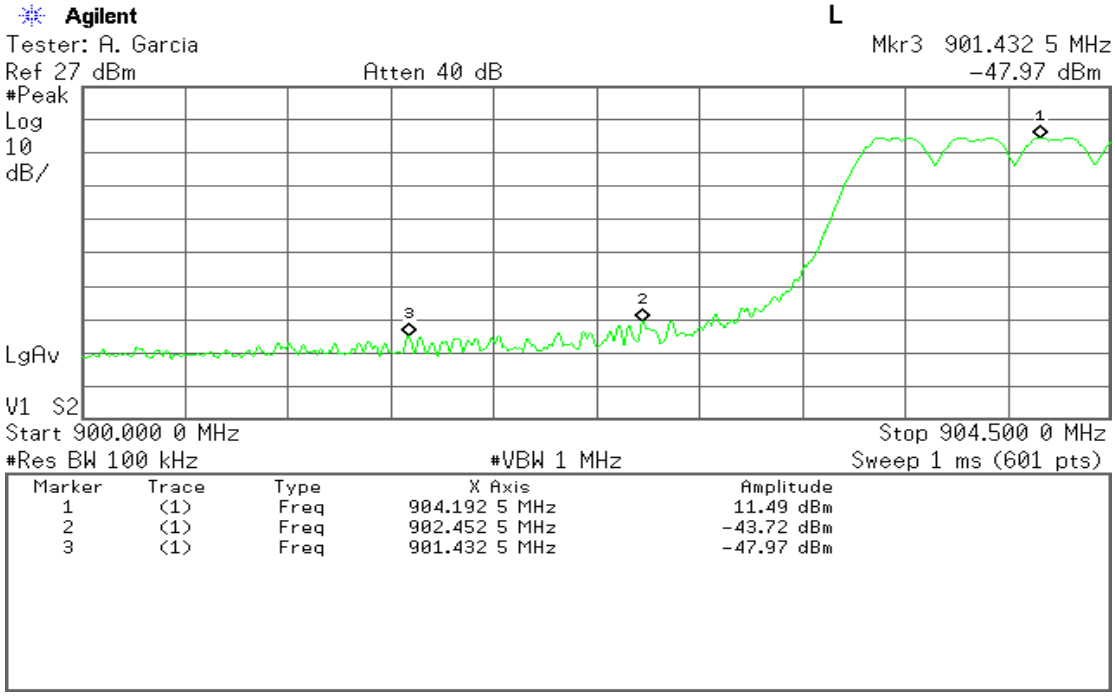
Antenna Height	NA	**Turntable Rotation**	NA
Equipment Class	NA	**Measurement Distance**	NA

TEST EQUIPMENT

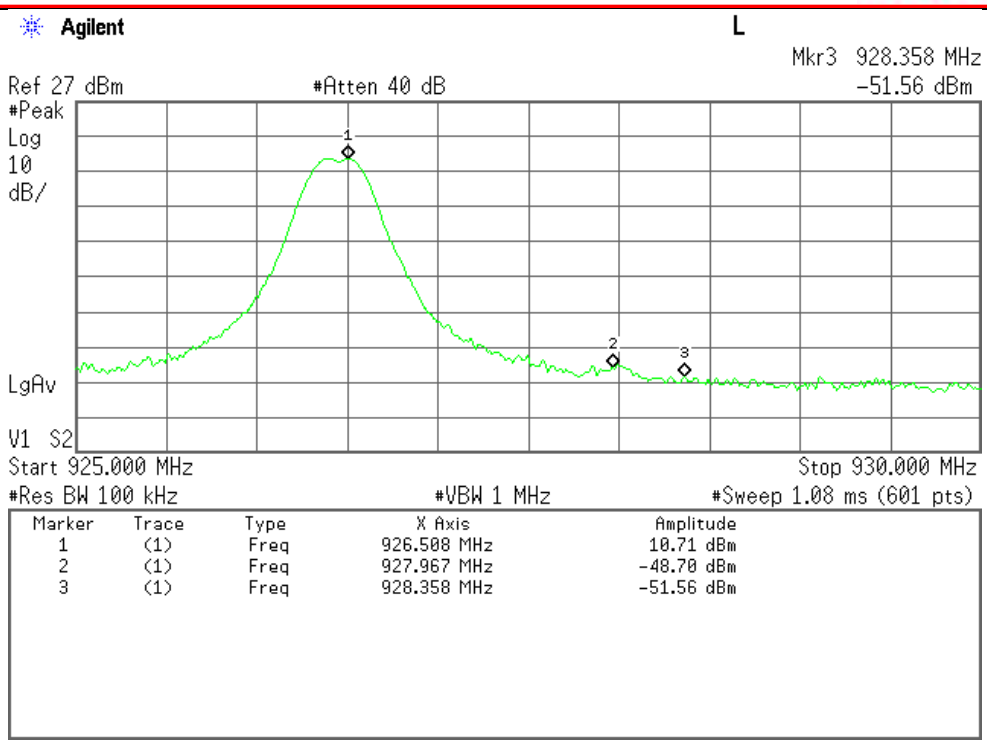
Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	E4440A	MY41000078	2017-05-18
Y	RF Cable	Digikey	1	NA	NA



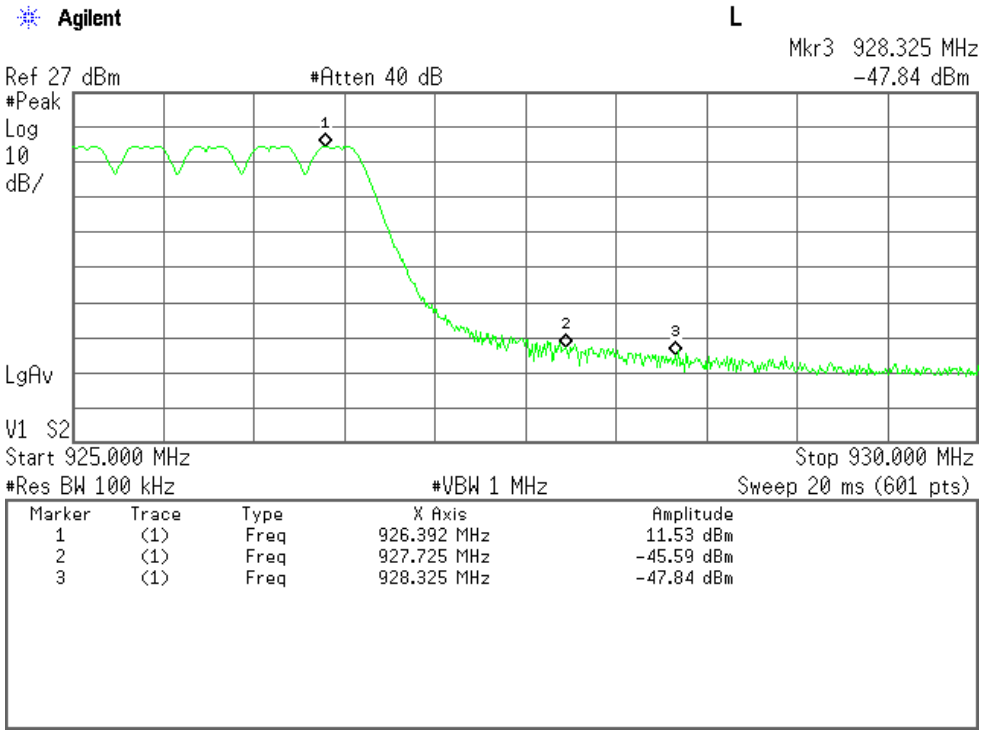
Channel 1 902MHz (903.55MHz)



Channel 1 902MHz (Hopping Enabled)



Channel 55 at 928MHz (926.45MHz)



Channel 55 928MHz (Hopping Enabled)

TEST RESULT					
Channel	Frequency	Measured difference		Limit	Test Results
#	MHz	SINGLE CHANNEL	FHSS ENABLED	dBc	
1	903.355	56.41	55.21	>20	PASS
55	926.45	59.41	57.12	>20	PASS

TEST SETUP PHOTOGRAPH

Refer Annexure -1

Conducted RF Test setup

2.6 TIME OF OCCUPANCY (DWELL TIME)

EUT Nomenclature	Wireless Relay Module	**Test Request No.**	20294-1
Model No.	FW-RM	**Serial No.**	MEL-159
Test Start Date	2016-09-07	**Temperature (˚C)**	23.6°C
Test End Date	2016-09-07	**Humidity RH (%)**	51.9%RH
Tested By	Jose Badia/Arnoldo Garcia	**Pressure (mbar)**	NR
Input Voltage / Freq.	3.3 Vdc		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std.	NA		
Applicable standard	FCC Part 15.247:2010		
Test Method	DA 00-705		
Comment	NA		

TEST DETAILS

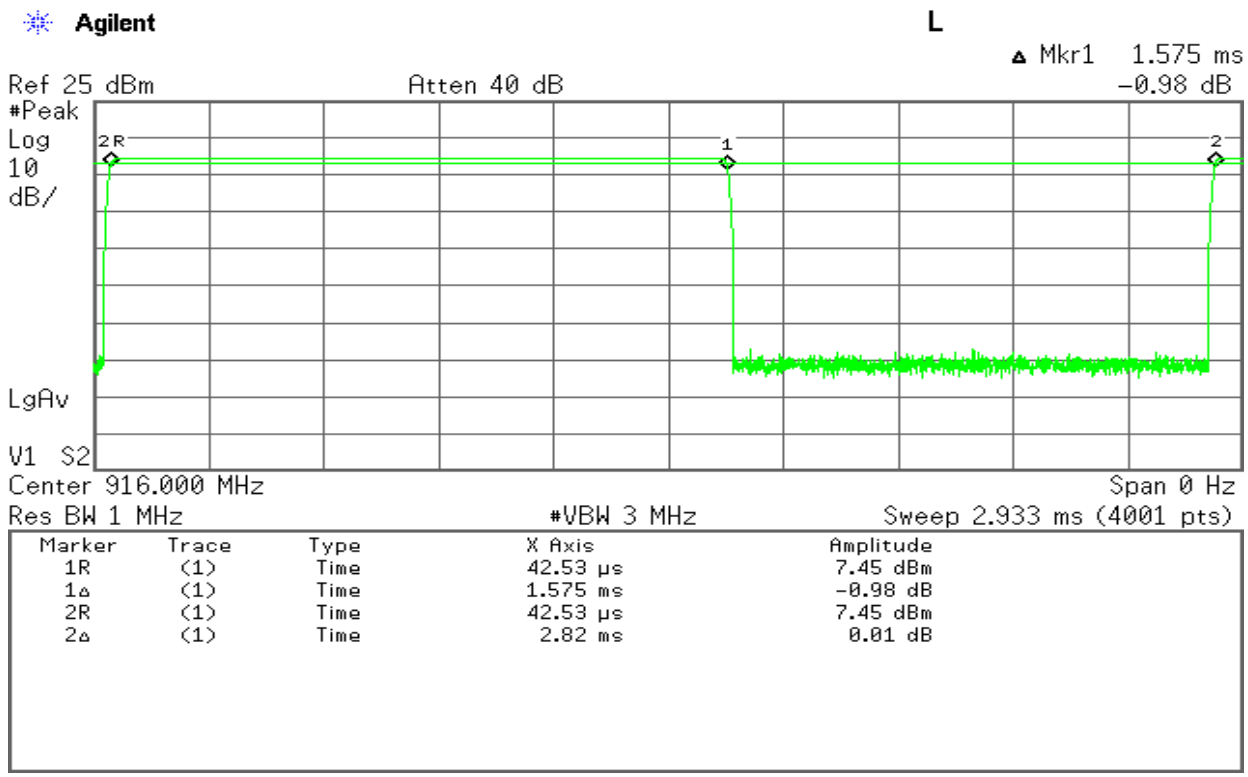
Method	Radiated ☐	Conducted ☒

TEST PARAMETERS

Antenna Height	NA	**Turntable Rotation**	NA
Equipment Class	NA	**Measurement Distance**	NA

TEST EQUIPMENT

Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	E4440A	MY41000078	2017-05-18
Y	RF Cable	Digikey	1	NA	NA



Channel 28(916MHz)

TEST RESULT						
Channel	Channel Frequency	Measured DwellTime	No. of Bursts	Time of Occupancy in 10sec	Limit in 10s period	Results
#	MHz	ms	#	ms	ms	
28	916	1.575	15	23.625	≤ 400	PASS

TEST SETUP PHOTOGRAPHS

Refer Annexure -1

Conducted RF Test setup

2.7 SPURIOUS RF CONDUCTED EMISSIONS

EUT Nomenclature	Wireless Relay Module	**Test Request No.**	20294-1
Model No.	FW-RM	**Serial No.**	MEL-159
Test Start Date	2017-04-19	**Temperature (˚C)**	23.6°C
Test End Date	2017-04-19	**Humidity RH (%)**	51.9%RH
Tested By	Jose Badia	**Pressure (mbar)**	NR
Input Voltage / Freq.	3.3 Vdc		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std.	NA		
Applicable standard	FCC Part 15.247:2010		
Test Method	DA 00-705		
Comment	NA		

TEST DETAILS

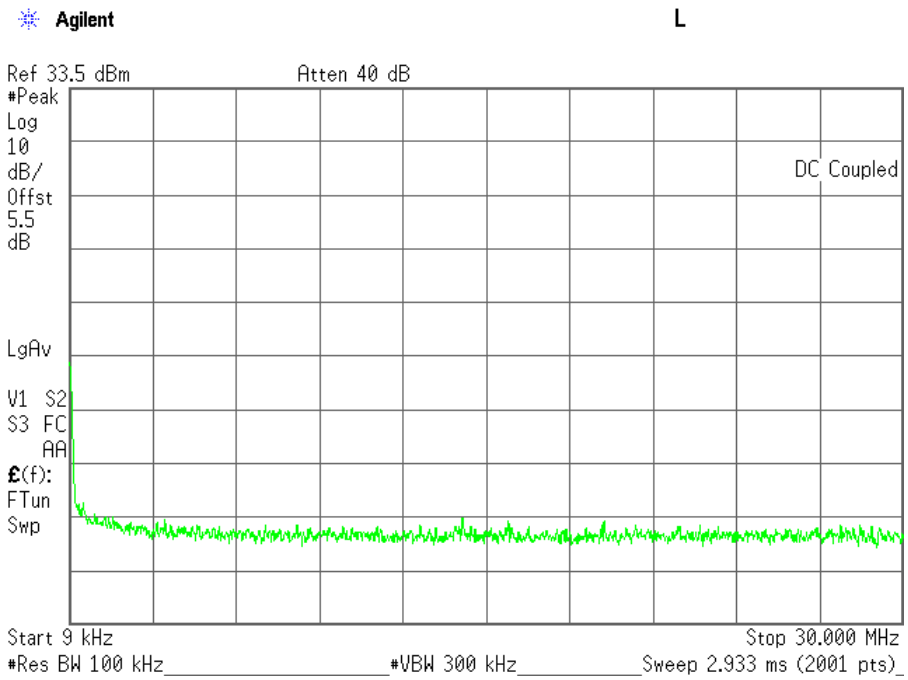
Method	Radiated ☐	Conducted ☒

TEST PARAMETERS

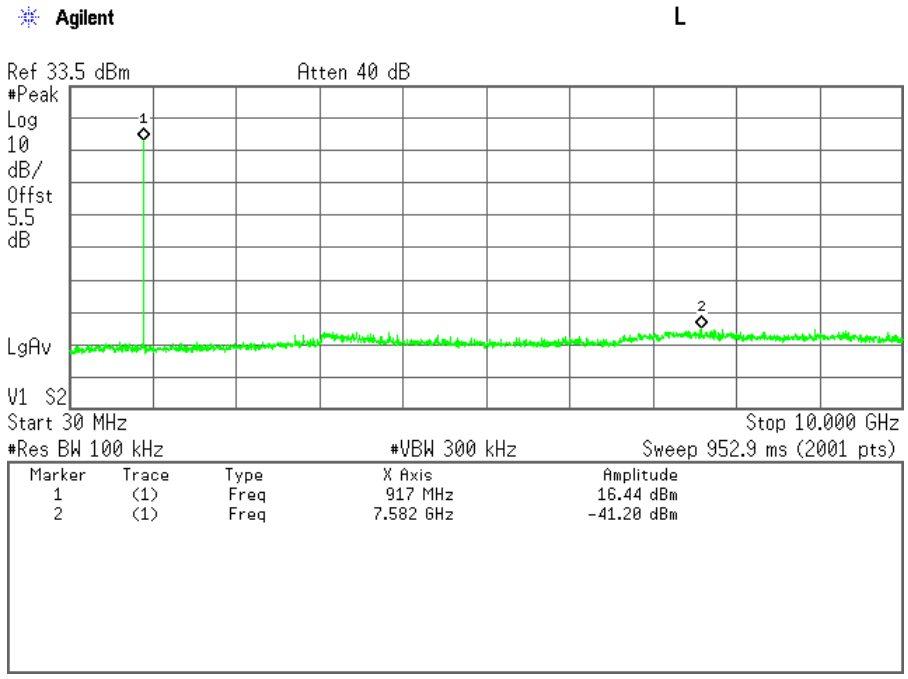
Antenna Height	NA	**Turntable Rotation**	NA
Equipment Class	NA	**Measurement Distance**	NA

TEST EQUIPMENT

Y/N	Equipment	Make	Model	Serial Number	Cal Due Date
Y	Spectrum Analyzer	Agilent	E4440A	MY41000078	2017-05-18
Y	RF Cable	Digikey	1	NA	NA



Channel 28 (916MHz) – 9kHz to 30MHz



Channel 28 (916MHz) – 30MHz to 10GHz

TEST RESULT					
Channel	Channel Frequency	Measured Parameters		Limit	Result
#	MHz	Frequency (GHz)	Level (dBm)	dBc	
28	916	7.582	-41.2	>20	PASS

TEST SETUP PHOTOGRAPH

Refer Annexure -1

Conducted RF Test setup

2.8 SPURIOUS RADIATED EMISSIONS

EUT Nomenclature	Wireless Relay Module	**Test Request No.**	20294-1
Model No.	FW-RM	**Serial No.**	MEL-159
Test Start Date	2016-09-22	**Temperature (˚C)**	0°C-35°C
Test End Date	2017-03-28	**Humidity RH (%)**	10%RH-90%RH
Tested By	Jose Badia/Arnoldo Garcia/Chris Locke	**Pressure (mbar)**	NR
Input Voltage / Freq.	3.3 Vdc		
Operating Mode	Refer Page 5 for Operating Mode Table		
Test configuration	Refer Page 5 for Test Configuration Table		
Deviation from Std.	NA		
Applicable standard	FCC Part 15.247 : 2010 & 15.209 : 2010		
Test Method	ANSI 63.10 - 2013		
Comment	NA		

TEST DETAILS

Method	Radiated ☒	Conducted ☐

TEST PARAMETERS

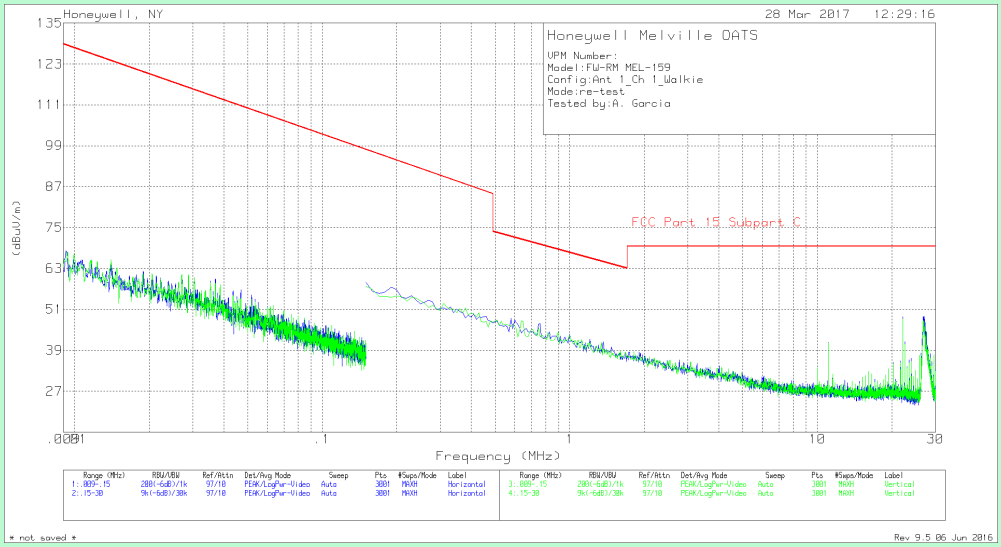
Antenna Height	1m to 4m	**Turntable Rotation**	0° to 360°
Equipment Class	NA	**Measurement Distance**	3m

TEST EQUIPMENT

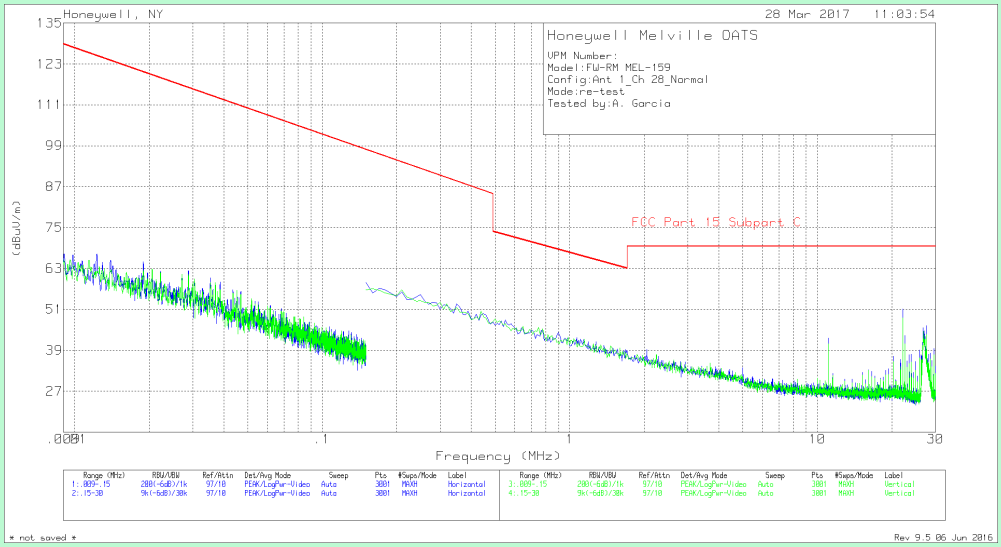
Y/N	Equipment	Make	Model	Sl. No.	Cal Due Date
Y	Spectrum Analyzer	Rohde & Schwarz	FSW26	103125	2018-02-14
Y	Spectrum Analyzer	Rohde & Schwarz	FSU26	100303	2017-03-31
Y	Bilog Antenna	Sunol	JB6	A012816	2018-03-09
Y	Bilog Antenna	Sunol	JB5	A022406	2017-12-18
Y	Horn Antenna	EMCO	RGA-60	3127	2017-02-03
Y	Preamplifier (Below 1GHz)	HP	8447D	2443AUF555	NA
Y	Preamplifier (Above 1GHz)	Amplical	AMP1G18-35	160362	NA
Y	Active Loop Antenna	Com-Power	AL-130R	121080	2017-08-15

Note: Switch ON /OFF the Internal Preamplifier based on carrier level and or noise floor without overloading the receiver

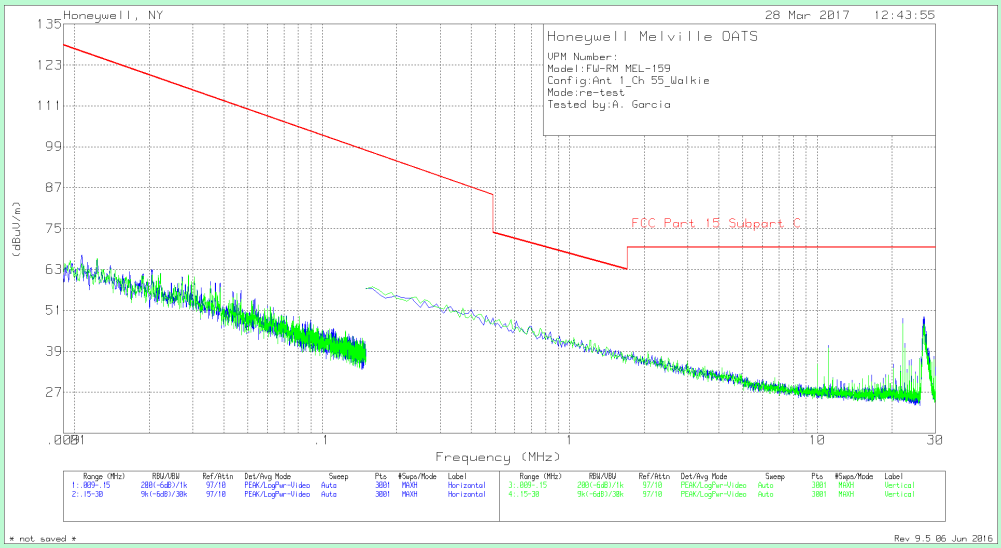
TEST GRAPHS – 9 KHz to 30 MHz (ANTENNA 1)



Channel 1 (903.55 MHz) – Antenna 1



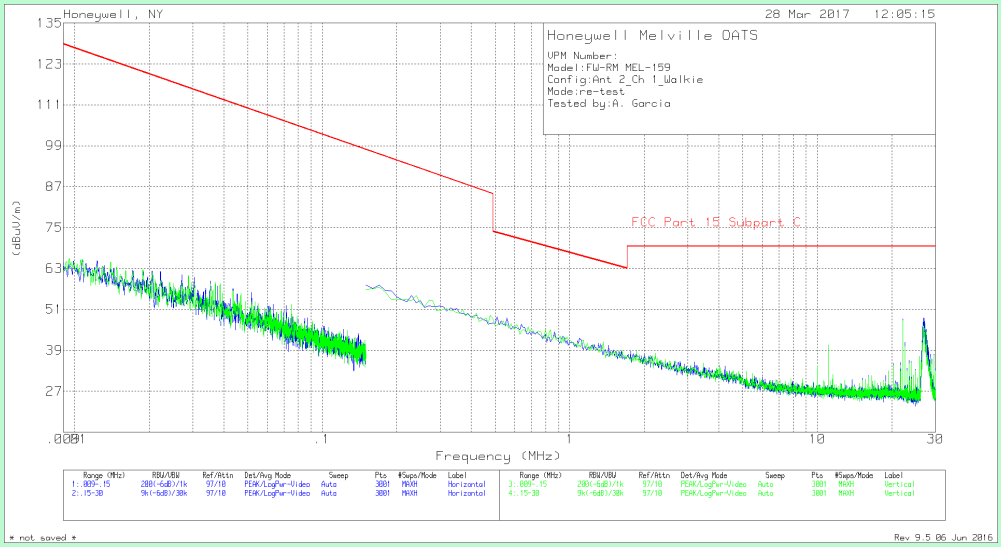
Channel 28 (916.00 MHz) – Antenna 1



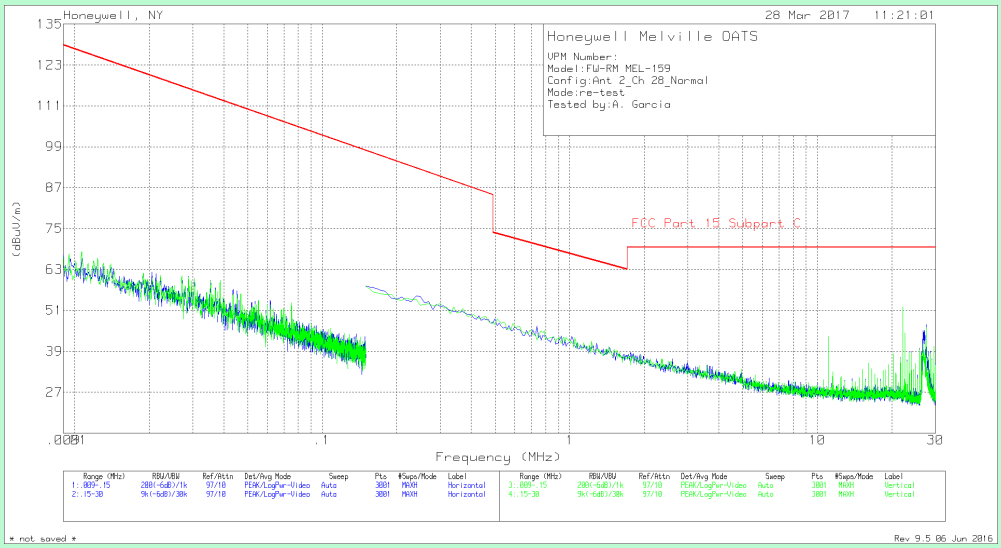
Channel 55 (926.45 MHz) – Antenna 1

TEST RESULT – 9 KHz to 30 MHz									
Channel	Channel Frequency	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	MHz	dBµV/m	cm	Parallel / Perpendicular	deg	dB	dBµV/m	
No emissions detected that are a product of the transmitter. Emissions shown in the plot are related to the chamber ambient									
Note : Measured Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)									

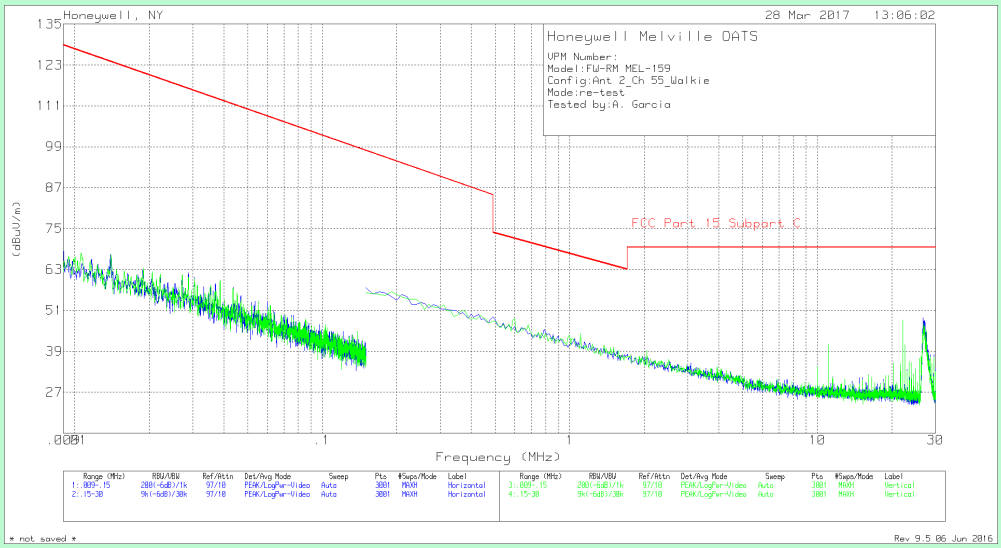
TEST GRAPHS – 9 KHz to 30 MHz (ANTENNA 2)



Channel 1 (903.55 MHz) – Antenna 2



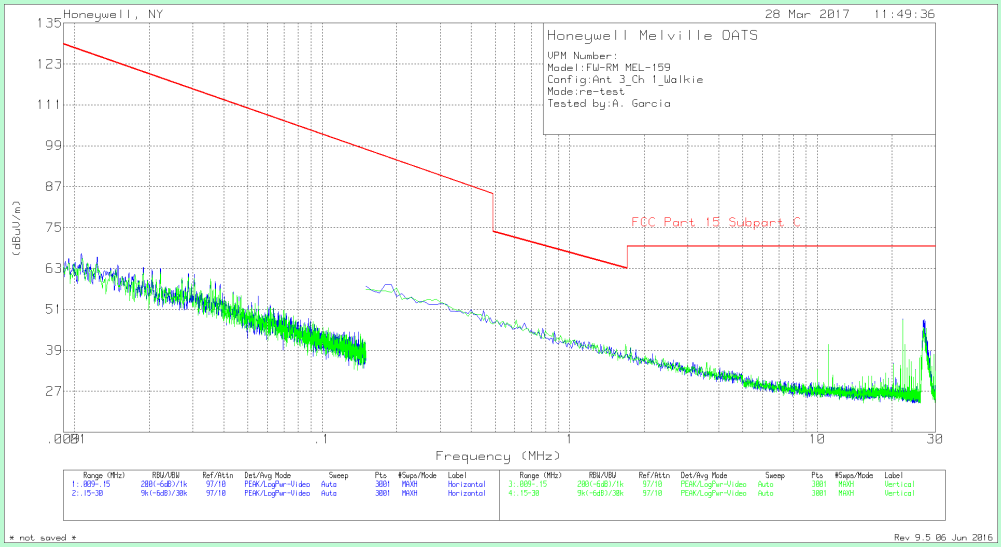
Channel 28 (916.00 MHz) – Antenna 2



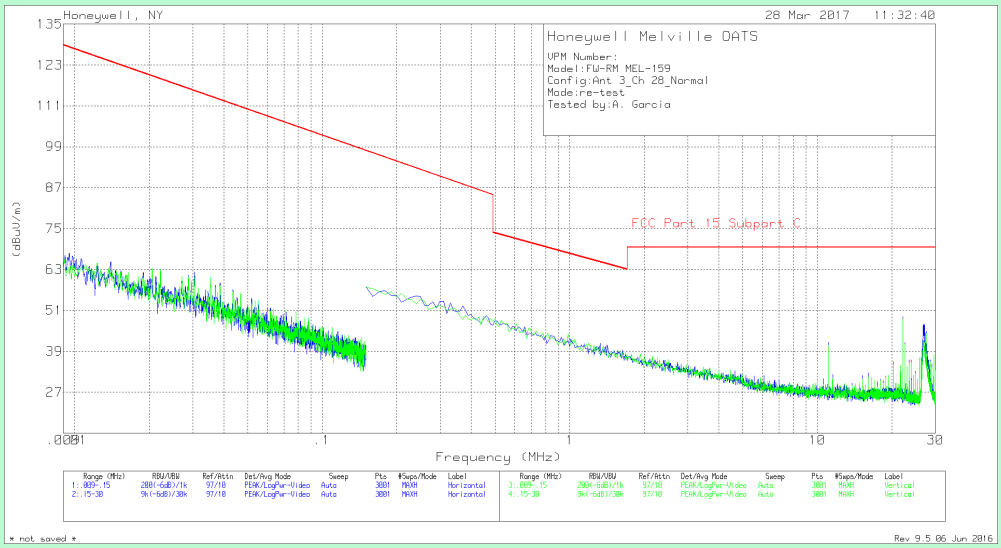
Channel 55 (926.45 MHz) – Antenna 2

TEST RESULT – 9 KHz to 30 MHz									
Channel	Channel Frequency	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	MHz	dBµV/m	cm	Parallel / Perpendicular	deg	dB	dBµV/m	
No emissions detected that are a product of the transmitter. Emissions shown in the plot are related to the chamber ambient									
Note : Measured Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)									

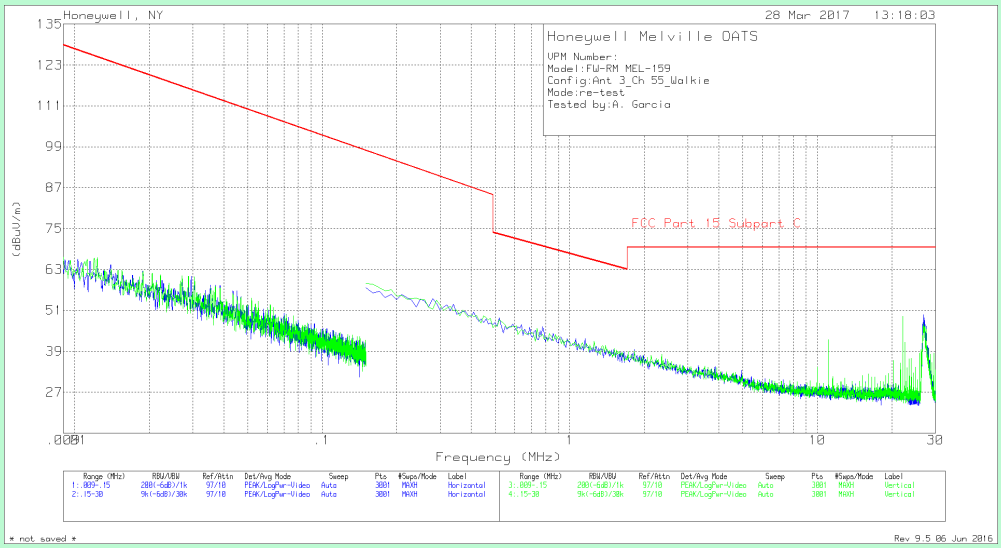
TEST GRAPHS – 9 KHz to 30 MHz (ANTENNA 3)



Channel 1 (903.55 MHz) – Antenna 3



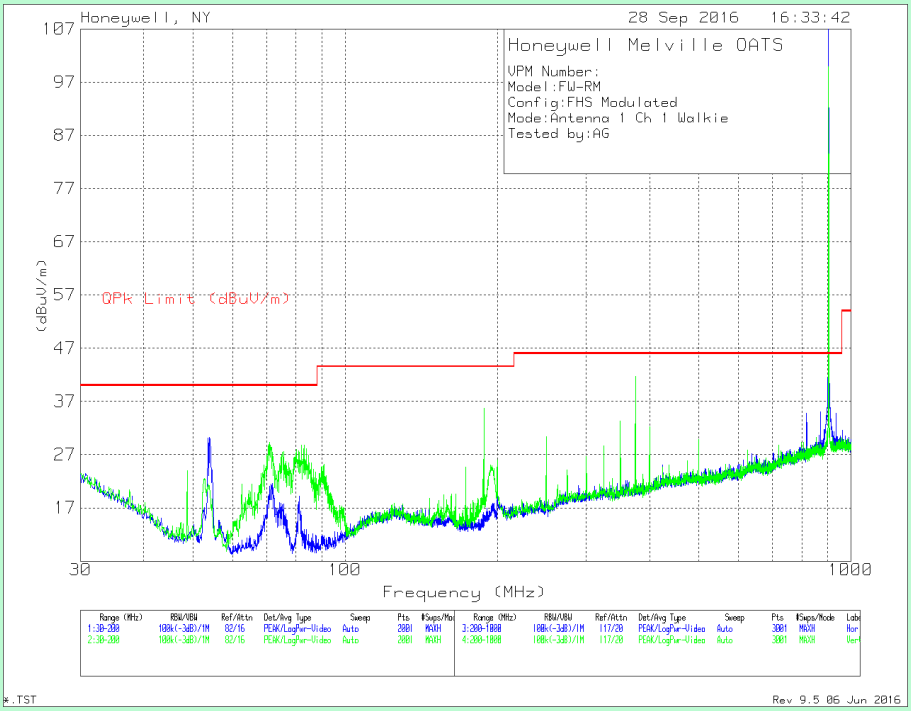
Channel 28 (916.00 MHz) – Antenna 3



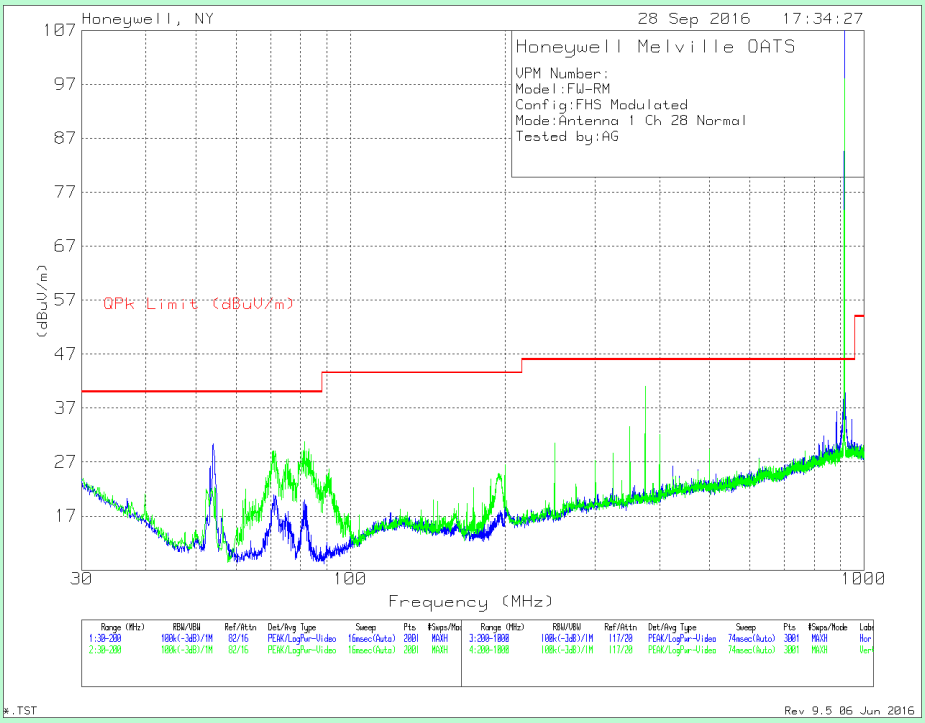
Channel 55 (926.45 MHz) – Antenna 3

TEST RESULT – 9 KHz to 30 MHz									
Channel	Channel Frequency	Measured Spurious	Quasi Peak	Height	Ant Pol	Azimuth	Margin	Limit @ 3m Distance	Results
#	MHz	MHz	dBµV/m	cm	Parallel / Perpendicular	deg	dB	dBµV/m	
No emissions detected that are a product of the transmitter. Emissions shown in the plot are related to the chamber ambient									
Note : Measured Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)									

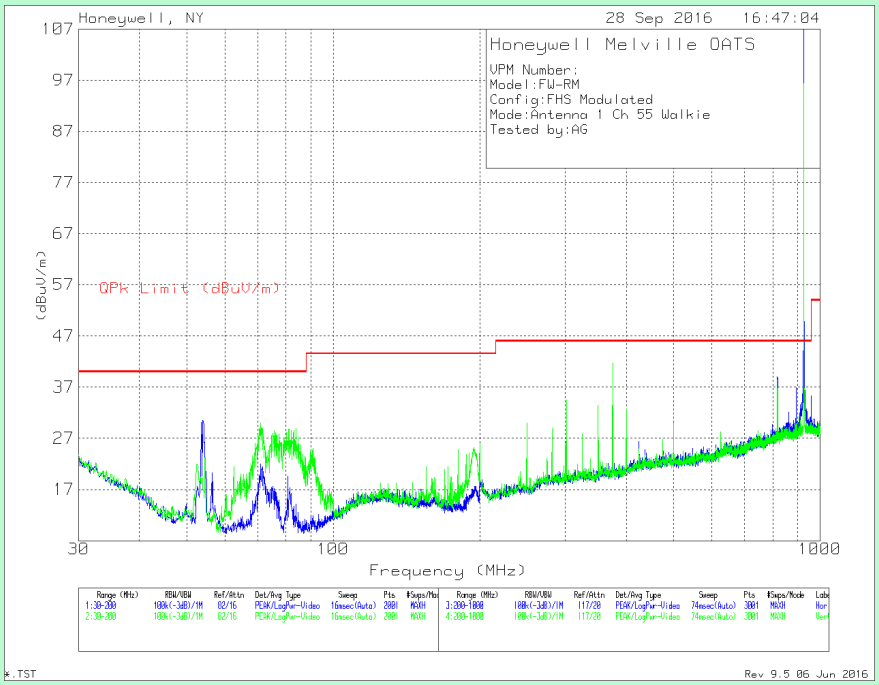
TEST GRAPHS –30 MHz to 1 GHz (ANTENNA 1)



Channel 1 (903.55 MHz) – Antenna 1



Channel 28 (916.00 MHz) – Antenna 1



Channel 55 (926.45 MHz) – Antenna 1

TEST RESULT – 30 MHz to 1 GHz

Frequency (MHz)	Meter Reading (dBuV)	Det	AF [dB/m] JB6 w/4dB pad	Pre Amp #1	RDE #1	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
Channel 1											
54.3206	45.63	Qp	12	-29	1.1	29.73	40	10.27	16	378	H
70.795	39.56	Qp	12.2	-28.9	1.2	24.06	40	15.94	142	335	V
84.0019	41.41	Qp	11.7	-28.9	1.3	25.51	40	14.49	205	130	V
188.005	30.65	Qp	15.8	-28.4	2	20.05	43.52	23.47	263	346	V
** 903.518	106.87	Pk	27	-27.6	5.5	111.77	-	-	59	100	H
375.0128	29.86	Qp	19.7	-28	3.1	24.66	46.02	21.36	128	351	H
** 903.602	95.03	Pk	27	-27.6	5.5	99.93	-	-	181	226	V
375.0102	30.03	Qp	19.7	-28	3.1	24.83	46.02	21.19	45	132	V
Channel 28											
53.8704	35.81	Qp	12	-29	1.1	19.91	40	20.09	335	385	H
70.7053	40.62	Qp	12.2	-28.9	1.2	25.12	40	14.88	48	153	V
81.2035	40.27	Qp	11.8	-28.9	1.3	24.47	40	15.53	114	125	V
** 916.048	104.97	Pk	27.3	-27.5	5.6	110.37	-	-	49	102	H
374.911	29.64	Qp	19.7	-28	3.1	24.44	46.02	21.58	68	108	H
** 915.968	93.66	Pk	27.3	-27.5	5.6	99.06	-	-	180	141	V
349.8549	29.58	Qp	19.4	-27.9	2.9	23.98	46.02	22.04	14	258	V
374.6358	29.69	Qp	19.7	-28	3.1	24.49	46.02	21.53	227	328	V
Channel 55											
53.97	33.38	Qp	12	-29	1.1	17.48	40	22.52	109	369	H
70.97	39.14	Qp	12.2	-28.9	1.2	23.64	40	16.36	230	233	V
** 926.418	102.36	Pk	27.3	-27.5	5.7	107.86	-	-	319	144	H
374.9336	29.59	Qp	19.7	-28	3.1	24.39	46.02	21.63	283	259	H
818.1341	24.12	Pk	26.3	-27.9	5.2	27.72	46.02	18.3	86	279	H
** 926.414	93.76	Pk	27.3	-27.5	5.7	99.26	-	-	141	217	V
374.8979	29.73	Qp	19.7	-28	3.1	24.53	46.02	21.49	81	285	V

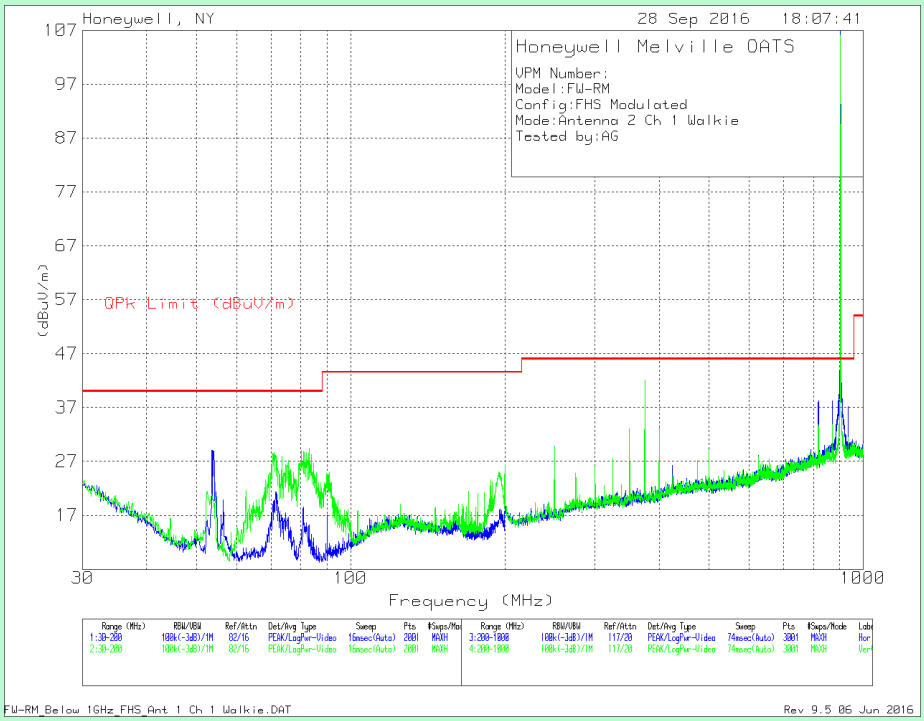
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates intended frequency
Pk - Peak detector
Qp - Quasi-Peak detector

NOTE: Measured Field Strength –dBuV/m (9 KHz to 1GHz) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) - Preamp gain (dB)

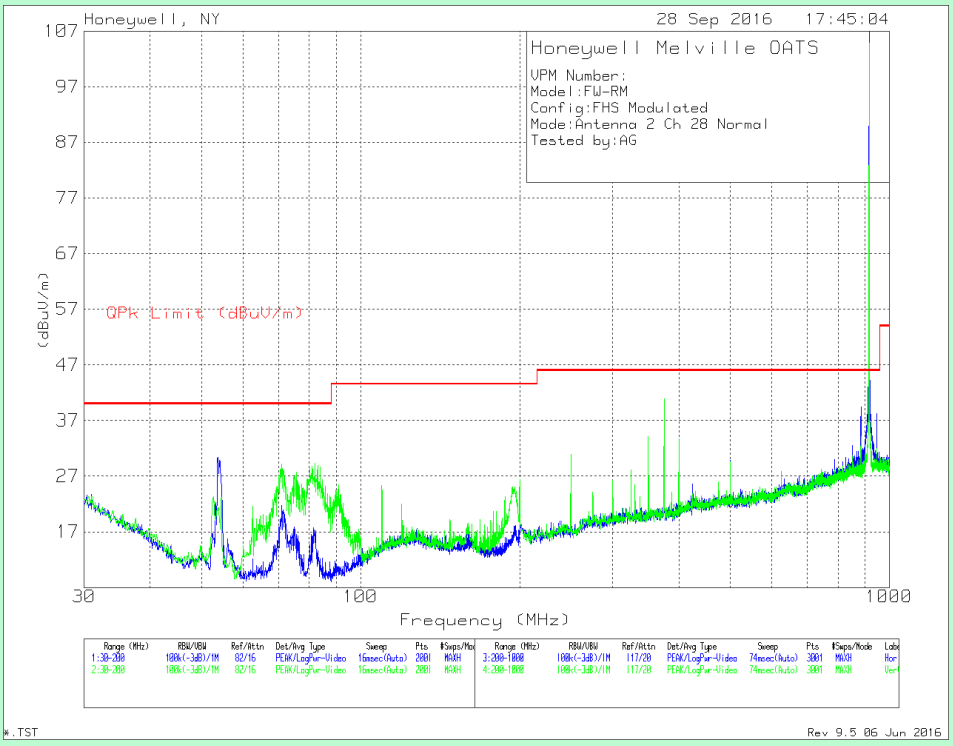
Prescans performed in a pre-compliance chamber. Final measurements performed on an OATS.

Emissions shown in the plot are related to the chamber ambient

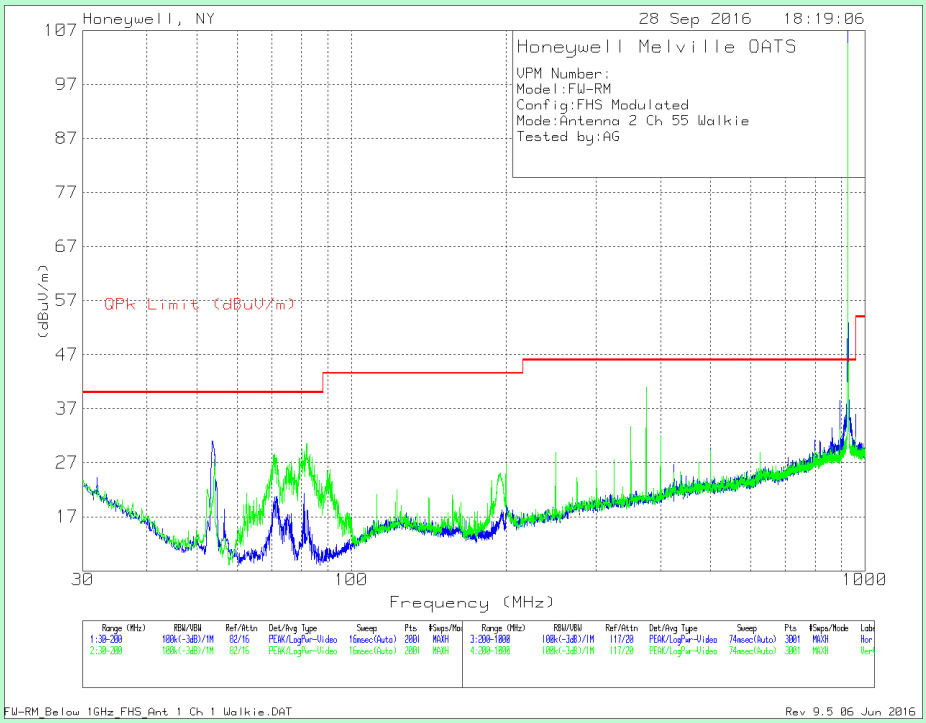
TEST GRAPHS –30 MHz to 1 GHz (ANTENNA 2)



Channel 1 (903.55 MHz) – Antenna 2



Channel 28 (916.00 MHz) – Antenna 2



Channel 55 (926.45 MHz) – Antenna 2

TEST RESULT – 30 MHz to 1 GHz

Frequency (MHz)	Meter Reading (dBuV)	Det	AF [dB/m] JB6 w/4dB pad	Pre Amp #1	RDE #1	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
Channel 1											
53.3996	33.63	Qp	12.1	-29	1.1	17.83	40	22.17	272	272	H
70.256	40.91	Qp	12.2	-28.9	1.2	25.41	40	14.59	333	207	V
82.7436	39.19	Qp	11.8	-28.9	1.3	23.39	40	16.61	248	198	V
** 903.51	107.56	Pk	27	-27.6	5.5	112.46	-	-	160	101	H
374.6259	29.68	Qp	19.7	-28	3.1	24.48	46.02	21.54	108	202	H
818.247	32.04	Qp	26.3	-27.9	5.2	35.64	46.02	10.38	245	222	H
** 903.51	99.42	Pk	27	-27.6	5.5	104.32	-	-	269	229	V
349.9861	29.67	Qp	19.4	-27.9	2.9	24.07	46.02	21.95	149	212	V
Channel 28											
53.4632	36.07	Qp	12.1	-29	1.1	20.27	40	19.73	352	398	H
70.8254	40.92	Qp	12.2	-28.9	1.2	25.42	40	14.58	352	101	V
81.7049	41.06	Qp	11.8	-28.9	1.3	25.26	40	14.74	139	186	V
** 915.956	104.87	Pk	27.3	-27.5	5.6	110.27	-	-	197	250	H
374.5978	29.63	Qp	19.7	-28	3.1	24.43	46.02	21.59	42	236	H
** 915.96	98.97	Pk	27.3	-27.5	5.6	104.37	-	-	290	223	V
350.0404	29.78	Qp	19.4	-27.9	2.9	24.18	46.02	21.84	281	351	V
374.613	29.68	Qp	19.7	-28	3.1	24.48	46.02	21.54	31	400	V
53.4632	36.07	Qp	12.1	-29	1.1	20.27	40	19.73	352	398	H
Channel 55											
53.63	33.63	Qp	12	-29	1.1	17.73	40	22.27	211	339	H
71.1413	39.25	Qp	12.2	-28.9	1.2	23.75	40	16.25	357	376	V
81.8433	40.43	Qp	11.8	-28.9	1.3	24.63	40	15.37	327	391	V
** 926.502	109.39	Pk	27.3	-27.5	5.7	114.89	-	-	209	101	H
375.0095	29.65	Qp	19.7	-28	3.1	24.45	46.02	21.57	92	176	H
** 926.502	96.27	Pk	27.3	-27.5	5.7	101.77	-	-	121	104	V
350.3368	29.65	Qp	19.4	-27.9	2.9	24.05	46.02	21.97	244	207	V
375.0133	29.93	Qp	19.7	-28	3.1	24.73	46.02	21.29	40	110	V
53.63	33.63	Qp	12	-29	1.1	17.73	40	-22.27	211	339	H

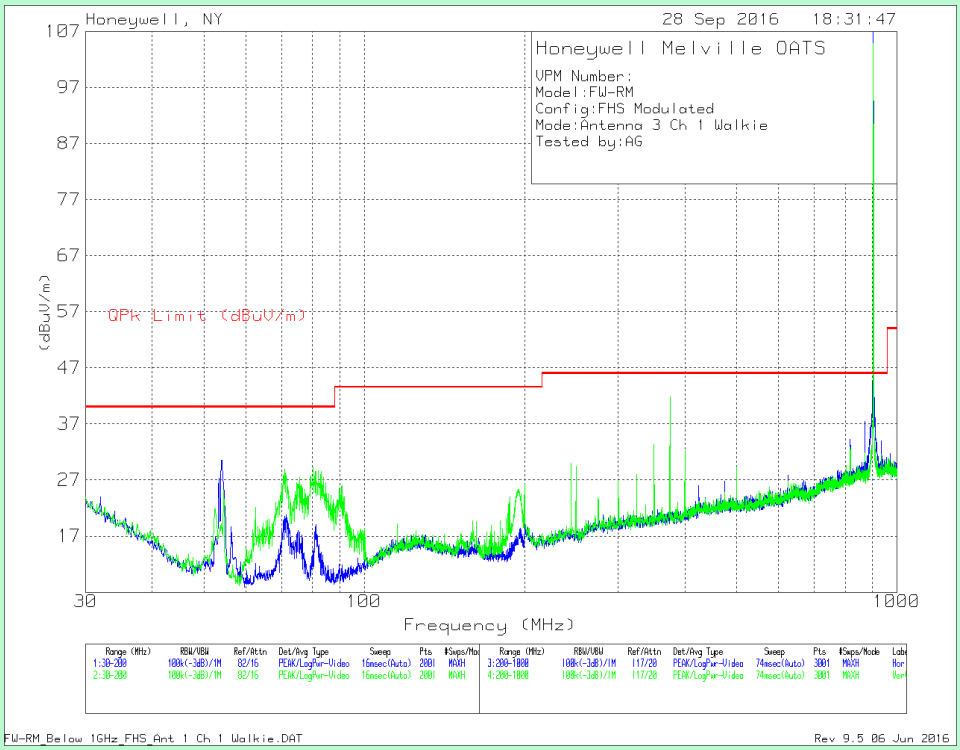
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates intended frequency
Pk - Peak detector
Qp - Quasi-Peak detector

NOTE: Measured Field Strength –dBuV/m (9 KHz to 1GHz) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) - Preamp gain (dB)

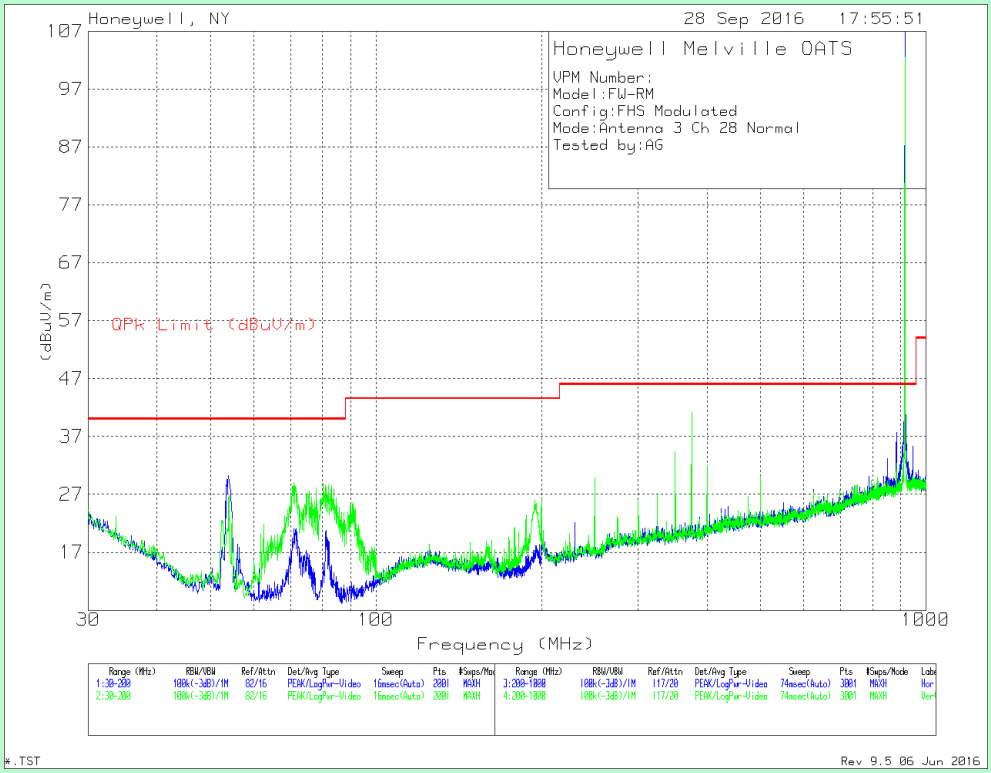
Prescans performed in a pre-compliance chamber. Final measurements performed on an OATS.

Emissions shown in the plot are related to the chamber ambient

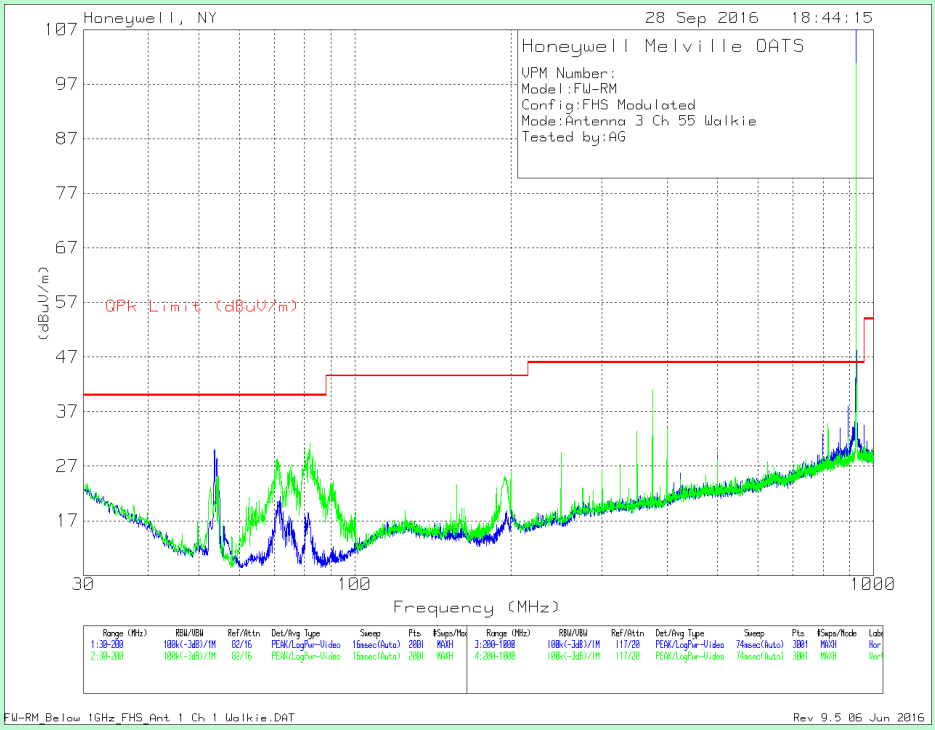
TEST GRAPHS –30 MHz to 1 GHz (ANTENNA 3)



Channel 1 (903.55 MHz) – Antenna 3



Channel 28 (916.00 MHz) – Antenna 3



Channel 55 (926.45 MHz) – Antenna 3

TEST RESULT – 30 MHz to 1 GHz

Frequency (MHz)	Meter Reading (dBuV)	Det	AF [dB/m] JB6 w/4dB pad	Pre Amp #1	RDE #1	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
Channel 1											
53.8894	34.55	Qp	12	-29	1.1	18.65	40	21.35	116	303	H
70.82	40.94	Qp	12.2	-28.9	1.2	25.44	40	14.56	317	104	V
80.0108	45.42	Qp	11.9	-28.9	1.3	29.72	40	10.28	22	148	V
** 903.506	107.64	Pk	27	-27.6	5.5	112.54	-	-	165	158	H
374.7697	29.71	Qp	19.7	-28	3.1	24.51	46.02	21.51	94	228	H
** 903.562	89.91	Pk	27	-27.6	5.5	94.81	-	-	222	191	V
349.9974	29.78	Qp	19.4	-27.9	2.9	24.18	46.02	21.84	303	110	V
374.7726	29.72	Qp	19.7	-28	3.1	24.52	46.02	21.5	10	264	V
Channel 28											
53.885	31.19	Qp	12	-29	1.1	15.29	40	24.71	46	225	H
71.565	33.01	Qp	12.2	-28.9	1.2	17.51	40	22.49	62	249	H
81.255	32.72	Qp	11.8	-28.9	1.3	16.92	40	23.08	121	400	H
70.97	38.58	Qp	12.2	-28.9	1.2	23.08	40	16.92	4	383	V
195.665	30.35	Qp	16.4	-28.3	2.1	20.55	43.52	22.97	87	375	V
** 916.048	107.99	Pk	27.3	-27.5	5.6	113.39	-	-	30	101	H
** 916.052	99.74	Pk	27.3	-27.5	5.6	105.14	-	-	267	117	V
* 250.1334	30.33	Qp	16.3	-28	2.4	21.03	46.02	24.99	341	332	V
Channel 55											
53.63	34.74	Qp	12	-29	1.1	18.84	40	21.16	198	385	H
70.779	40.87	Qp	12.2	-28.9	1.2	25.37	40	14.63	197	139	V
81.8633	42.33	Qp	11.8	-28.9	1.3	26.53	40	13.47	298	185	V
** 926.406	106.5	Pk	27.3	-27.5	5.7	112	-	-	189	103	H
374.6703	29.55	Qp	19.7	-28	3.1	24.35	46.02	21.67	168	156	H
** 926.51	94.52	Pk	27.3	-27.5	5.7	100.02	-	-	174	233	V
350.0271	29.6	Qp	19.4	-27.9	2.9	24	46.02	22.02	4	221	V
374.5815	29.74	Qp	19.7	-28	3.1	24.54	46.02	21.48	138	379	V
53.63	34.74	Qp	12	-29	1.1	18.84	40	21.16	198	385	H

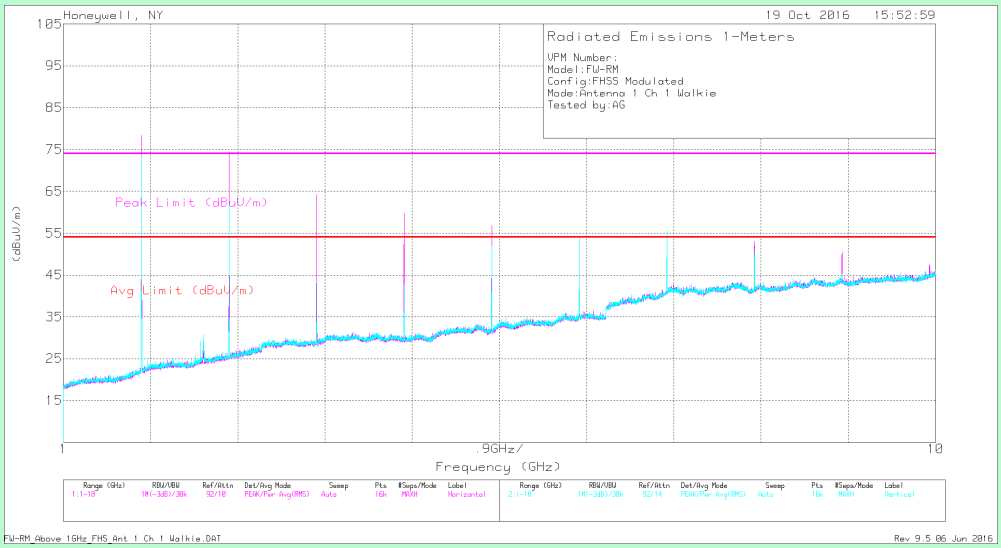
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates intended frequency
Pk - Peak detector
Qp - Quasi-Peak detector

NOTE: Measured Field Strength –dBuV/m (9 KHz to 1GHz) = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) - Preamp gain (dB)

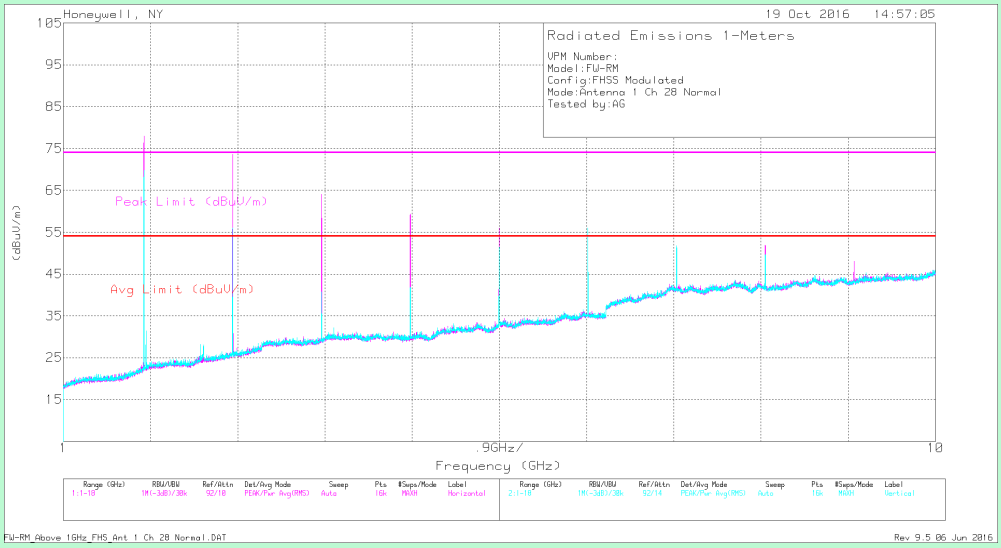
Prescans performed in a pre-compliance chamber. Final measurements performed on an OATS.

Emissions shown in the plot are related to the chamber ambient

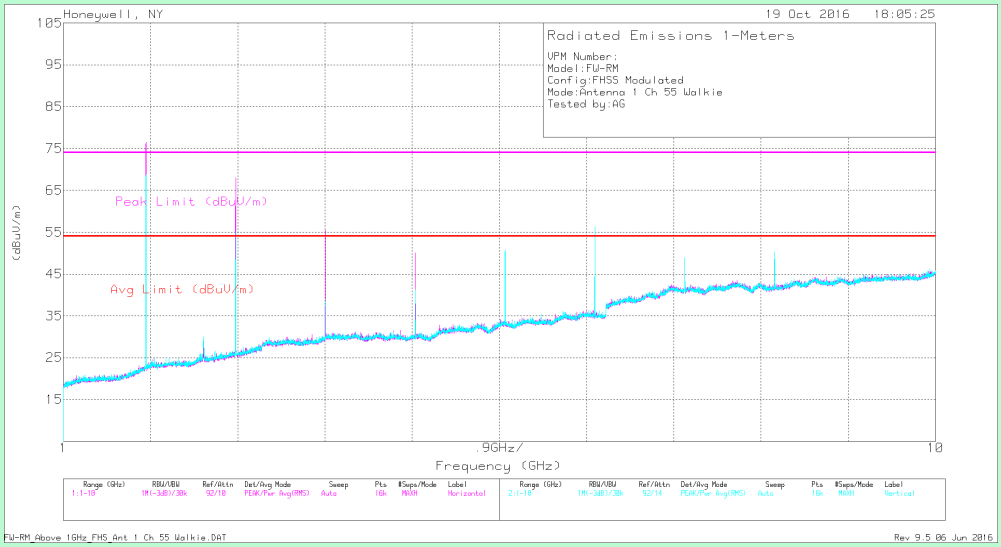
TEST GRAPHS –1 GHz to 10 GHz (ANTENNA 1)



Channel 1 (903.55 MHz) – Antenna 1



Channel 28 (916.00 MHz) – Antenna 1



Channel 55 (926.45 MHz) – Antenna 1

TEST RESULT – 1 GHz to 10 GHz – CHANNEL 1

PEAK DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.71	38.19	PKFH	29.3	-27.1	9	49.39	74	24.61	36	170	H
* 3.614	33.47	PKFH	31.6	-26.8	10.4	48.67	74	25.33	119	208	H
* 4.518	32.8	PKFH	32.2	-26.6	11.7	50.1	74	23.9	161	208	H
* 5.422	41.62	PKFH	34.3	-26.7	12.9	62.12	74	11.88	2	305	H
* 8.133	37.93	PKFH	37.1	-26.2	16	64.83	74	9.17	340	239	H
* 9.035	33.49	PKFH	37.6	-25.9	16.9	62.09	74	11.91	356	262	H
* 2.711	39.34	PKFH	29.3	-27.1	9	50.54	74	23.46	215	360	V
* 3.614	36.02	PKFH	31.6	-26.8	10.4	51.22	74	22.78	256	333	V
* 4.518	34.33	PKFH	32.2	-26.6	11.7	51.63	74	22.37	52	348	V
* 5.422	40.13	PKFH	34.3	-26.7	12.9	60.63	74	13.37	114	333	V
* 8.133	35.72	PKFH	37.1	-26.2	16	62.62	74	11.38	62	382	V
* 9.036	32.66	PKFH	37.6	-25.9	16.9	61.26	74	12.74	72	381	V

PEAK DATA – NON RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit [Fundamental-20dBc] (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.807	59.3	PKFH	27.1	-26.9	7.3	66.8	91.8	25	44	169	H
6.325	38.35	PKFH	34.9	-26.4	14	60.85	91.8	30.95	110	278	H
7.228	37.81	PKFH	36.3	-26.2	15	62.91	91.8	28.89	320	254	H
1.807	48.85	PKFH	27.1	-26.9	7.3	56.35	91.8	35.45	223	298	V
6.324	42.15	PKFH	34.9	-26.4	14	64.65	91.8	27.15	8	265	V
7.229	40.29	PKFH	36.3	-26.2	15	65.39	91.8	26.41	254	273	V

AVERAGE DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.711	34.36	VA1	29.3	-27.1	9	-12.53	33.03	54	20.97	36	170	H
* 3.614	26.4	VA1	31.6	-26.8	10.4	-12.53	29.07	54	24.93	119	208	H
* 4.518	24.39	VA1	32.2	-26.6	11.7	-12.53	29.16	54	24.84	161	208	H
* 5.421	36.24	VA1	34.3	-26.7	12.9	-12.53	44.21	54	9.79	2	305	H
* 8.133	28.97	VA1	37.1	-26.2	16	-12.53	43.34	54	10.66	340	239	H
* 9.036	25.11	VA1	37.6	-25.9	16.9	-12.53	41.18	54	12.82	356	262	H
* 2.711	36.2	VA1	29.3	-27.1	9	-12.53	34.87	54	19.13	215	360	V
* 3.614	30.93	VA1	31.6	-26.8	10.4	-12.53	33.6	54	20.4	256	333	V
* 4.518	27.07	VA1	32.2	-26.6	11.7	-12.53	31.84	54	22.16	52	348	V
* 5.421	33.99	VA1	34.3	-26.7	12.9	-12.53	41.96	54	12.04	114	333	V
* 8.133	27.2	VA1	37.1	-26.2	16	-12.53	41.57	54	12.43	62	382	V
* 9.035	23.21	VA1	37.6	-25.9	16.9	-12.53	39.28	54	14.72	72	381	V

Note: * Indicates Frequency in CFR47 Pt 15 Restricted Band
PKFH –FHSS: RB=1MHz ,VB=3x RB ,Peak
VA1T-FHSS: Linear Voltage Average RB=1MHzVB=10Hz

Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss – Preamplifier Gain (dB)

Prescans performed in a pre-compliance chamber. Final measurements performed on an OATS

Duty Cycle Correction Factor is calculated using the guidelines provided in DA 00 -705

Duty Cycle Factor =20*log (Dwell time /100msec), Number of Transmission for 100msec: 8, Dwell time per Transmission: 1.575 msec
Duty Cycle correction Factor =20 log (1.575*8/100) = -17.99dB

TEST RESULT – 1 GHz to 10 GHz – CHANNEL 28

PEAK DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.748	39.75	PKFH	29.4	-27	9	51.15	74	22.85	263	115	H
* 3.664	34.44	PKFH	31.8	-26.9	10.4	49.74	74	24.26	186	387	H
* 4.58	35.79	PKFH	32.2	-26.7	11.8	53.09	74	20.91	339	321	H
* 7.328	36.89	PKFH	36.7	-26.2	15.1	62.49	74	11.51	306	267	H
* 8.245	37.41	PKFH	37.1	-26.1	16.2	64.61	74	9.39	336	249	H
* 9.161	31.27	PKFH	37.6	-25.9	17	59.97	74	14.03	116	188	H
* 2.748	41.66	PKFH	29.4	-27	9	53.06	74	20.94	212	291	V
* 3.664	35.26	PKFH	31.8	-26.9	10.4	50.56	74	23.44	262	335	V
* 4.581	35.6	PKFH	32.2	-26.7	11.8	52.9	74	21.1	54	310	V
* 7.329	39.65	PKFH	36.7	-26.2	15.1	65.25	74	8.75	249	255	V
* 8.244	34.74	PKFH	37.1	-26.1	16.2	61.94	74	12.06	58	271	V
* 9.161	33.77	PKFH	37.6	-25.9	17	62.47	74	11.53	321	242	V

PEAK DATA – NON RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit [Fundamental-20dBc] (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.832	55.94	PKFH	27.3	-26.9	7.3	63.64	80.4	16.76	41	163	H
5.496	42.9	PKFH	34.4	-26.6	13	63.7	80.4	16.7	0	290	H
6.413	39.42	PKFH	34.8	-26.3	14.1	62.02	80.4	18.38	298	279	H
1.832	47.88	PKFH	27.3	-26.9	7.3	55.58	80.4	24.82	228	191	V
5.497	41.66	PKFH	34.4	-26.6	13	62.46	80.4	17.94	352	278	V
6.412	44.34	PKFH	34.8	-26.3	14.1	66.94	80.4	13.46	6	258	V

AVERAGE DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.748	36.65	VA1T	29.4	-27	9	-12.53	35.52	54	18.48	263	115	H
* 3.664	29.25	VA1T	31.8	-26.9	10.4	-12.53	32.02	54	21.98	186	387	H
* 4.58	28.27	VA1T	32.2	-26.7	11.8	-12.53	33.04	54	20.96	339	321	H
* 7.328	28.57	VA1T	36.7	-26.2	15.1	-12.53	41.64	54	12.36	306	267	H
* 8.244	29.27	VA1T	37.1	-26.1	16.2	-12.53	43.94	54	10.06	336	249	H
* 9.162	21.51	VA1T	37.6	-25.9	17	-12.53	37.68	54	16.32	116	188	H
* 2.748	39.03	VA1T	29.4	-27	9	-12.53	37.9	54	16.1	212	291	V
* 3.664	29.38	VA1T	31.8	-26.9	10.4	-12.53	32.15	54	21.85	262	335	V
* 4.58	28.12	VA1T	32.2	-26.7	11.8	-12.53	32.89	54	21.11	54	310	V
* 7.328	30.53	VA1T	36.7	-26.2	15.1	-12.53	43.6	54	10.4	249	255	V
* 8.244	26.7	VA1T	37.1	-26.1	16.2	-12.53	41.37	54	12.63	58	271	V
* 9.161	24.58	VA1T	37.6	-25.9	17	-12.53	40.75	54	13.25	321	242	V

Note: * Indicates Frequency in CFR47 Pt 15 Restricted Band
PKFH –FHSS: RB=1MHz ,VB=3x RB ,Peak
VA1T-FHSS: Linear Voltage Average RB=1MHzVB=10Hz

Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss – Preamplifier Gain (dB)

Prescans performed in a pre-compliance chamber. Final measurements performed on an OATS

Duty Cycle Correction Factor is calculated using the guidelines provided in DA 00 -705

Duty Cycle Factor =20*log (Dwell time /100msec), Number of Transmission for 100msec: 8, Dwell time per Transmission: 1.575 msec
Duty Cycle correction Factor =20 log (1.575*8/100) = -17.99dB

TEST RESULT – 1 GHz to 10 GHz – CHANNEL 55

PEAK DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.779	41.96	PKFH	29.5	-27.1	9.1	53.46	74	20.54	271	400	H
* 3.706	34.9	PKFH	32	-26.9	10.6	50.6	74	23.4	175	335	H
* 3.706	35.39	PKFH	32	-26.9	10.6	51.09	74	22.91	175	335	H
* 4.633	35.6	PKFH	32.4	-26.6	11.8	53.2	74	20.8	340	341	H
* 7.412	35.58	PKFH	36.8	-26.2	15.2	61.38	74	12.62	306	253	H
* 8.337	35.67	PKFH	37.3	-26.1	16.2	63.07	74	10.93	326	240	H
* 2.779	41.62	PKFH	29.5	-27.1	9.1	53.12	74	20.88	221	371	V
* 3.706	35.4	PKFH	32	-26.9	10.6	51.1	74	22.9	254	394	V
* 4.632	34.82	PKFH	32.3	-26.6	11.8	52.32	74	21.68	255	342	V
* 7.411	36.88	PKFH	36.8	-26.2	15.2	62.68	74	11.32	248	247	V
* 8.339	34.69	PKFH	37.3	-26.1	16.2	62.09	74	11.91	62	241	V

PEAK DATA – NON RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit [Fundamental-20dBc] (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.853	51.66	PKFH	27.5	-26.9	7.4	59.66	87.8	28.14	28	102	H
5.558	40.62	PKFH	34.4	-26.4	13.1	61.72	87.8	26.08	358	283	H
6.485	39.15	PKFH	34.8	-26.4	14.2	61.75	87.8	26.05	304	268	H
9.263	30.9	PKFH	37.8	-26	17.1	59.8	87.8	28	168	290	H
1.853	47.98	PKFH	27.5	-26.9	7.4	55.98	87.8	31.82	109	379	V
5.558	39.09	PKFH	34.4	-26.4	13.1	60.19	87.8	27.61	73	312	V
6.485	44.53	PKFH	34.8	-26.4	14.2	67.13	87.8	20.67	0	249	V
9.265	32.02	PKFH	37.8	-26	17.1	60.92	87.8	26.88	322	255	V

AVERAGE DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.779	39.31	VA1T	29.5	-27.1	9.1	-12.53	38.28	54	15.72	271	400	H
* 3.706	29.79	VA1T	32	-26.9	10.6	-12.53	32.96	54	21.04	175	335	H
* 3.706	30.31	VA1T	32	-26.9	10.6	-12.53	33.48	54	20.52	175	335	H
* 4.632	28.28	VA1T	32.4	-26.6	11.8	-12.53	33.35	54	20.65	340	341	H
* 7.411	27.48	VA1T	36.8	-26.2	15.2	-12.53	40.75	54	13.25	306	253	H
* 8.339	27.68	VA1T	37.3	-26.1	16.2	-12.53	42.55	54	11.45	326	240	H
* 2.779	39.2	VA1T	29.5	-27.1	9.1	-12.53	38.17	54	15.83	221	371	V
* 3.706	30.61	VA1T	32	-26.9	10.6	-12.53	33.78	54	20.22	254	394	V
* 4.632	27.94	VA1T	32.3	-26.6	11.8	-12.53	32.91	54	21.09	255	342	V
* 7.412	29.19	VA1T	36.8	-26.2	15.2	-12.53	42.46	54	11.54	248	247	V
* 8.337	26.64	VA1T	37.3	-26.1	16.2	-12.53	41.51	54	12.49	62	241	V

Note: * Indicates Frequency in CFR47 Pt 15 Restricted Band
PKFH –FHSS: RB=1MHz ,VB=3x RB ,Peak
VA1T-FHSS: Linear Voltage Average RB=1MHzVB=10Hz

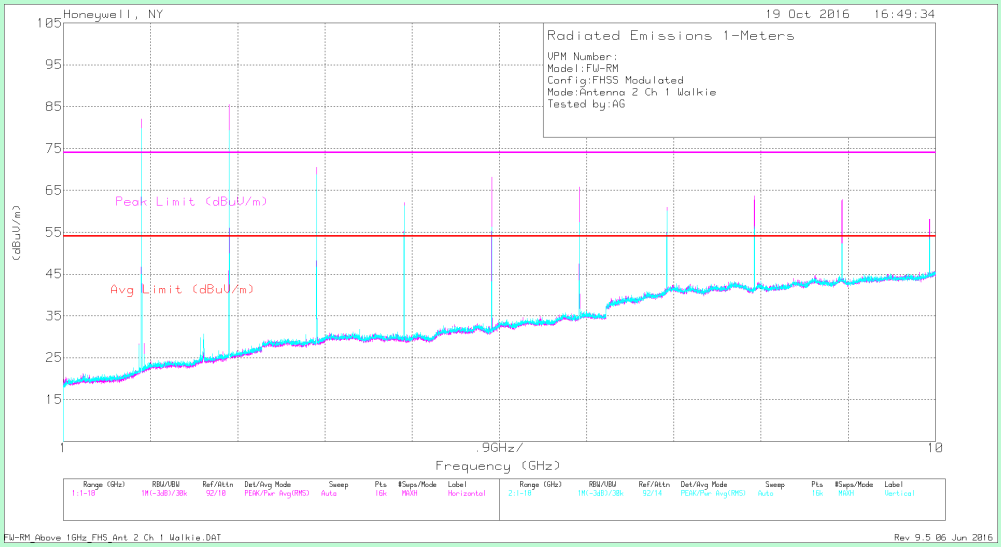
Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss – Preamplifier Gain (dB)

Prescans performed in a pre-compliance chamber. Final measurements performed on an OATS

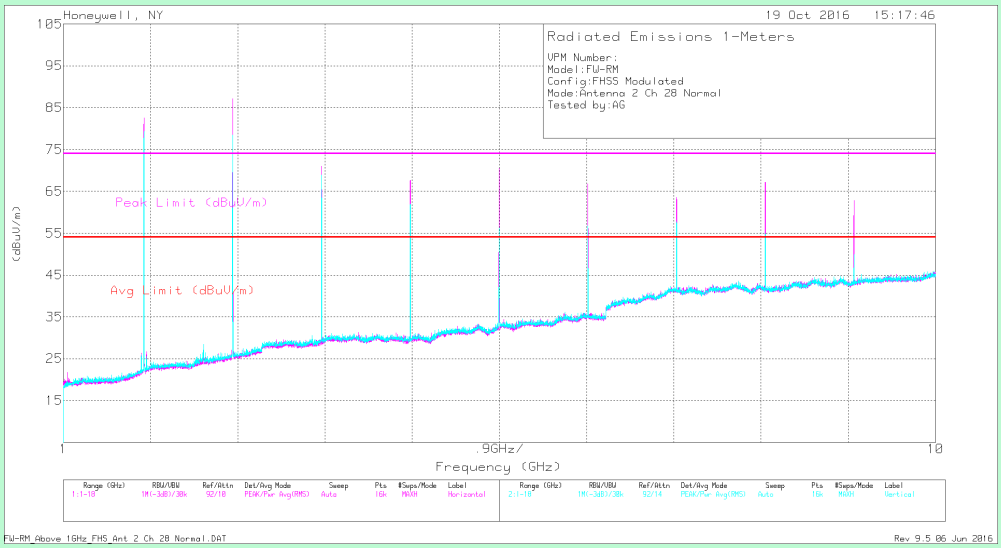
Duty Cycle Correction Factor is calculated using the guidelines provided in DA 00 -705

Duty Cycle Factor =20*log (Dwell time /100msec), Number of Transmission for 100msec: 8, Dwell time per Transmission: 1.575 msec
Duty Cycle correction Factor =20 log (1.575*8/100) = -17.99dB

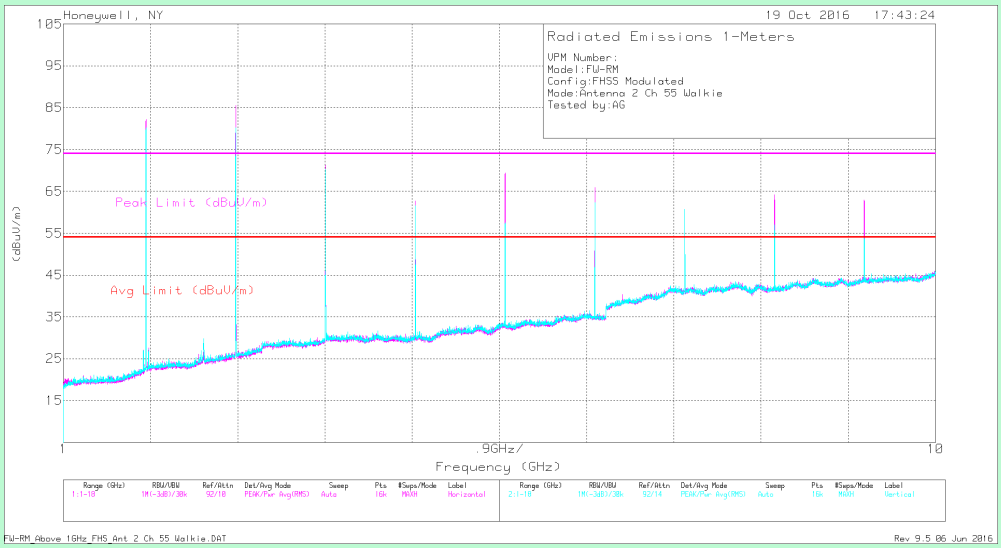
TEST GRAPHS –1 GHz to 10 GHz (ANTENNA 2)



Channel 1 (903.55 MHz) – Antenna 2



Channel 28 (916.00 MHz) – Antenna 2



Channel 55 (926.45 MHz) – Antenna 2

TEST RESULT – 1 GHz to 10 GHz – CHANNEL 1

PEAK DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.71	52.71	PKFH	29.3	-27.1	9	63.91	74	10.09	129	150	H
* 3.614	46.27	PKFH	31.6	-26.8	10.4	61.47	74	12.53	184	294	H
* 4.517	35.66	PKFH	32.2	-26.6	11.7	52.96	74	21.04	63	322	H
* 5.422	35.49	PKFH	34.3	-26.7	12.9	55.99	74	18.01	10	329	H
* 8.131	33.92	PKFH	37.1	-26.2	16	60.82	74	13.18	31	320	H
* 9.035	31.83	PKFH	37.6	-25.9	16.9	60.43	74	13.57	16	272	H
* 2.711	53.62	PKFH	29.3	-27.1	9	64.82	74	9.18	43	156	V
* 3.615	44.68	PKFH	31.6	-26.8	10.4	59.88	74	14.12	349	142	V
* 4.518	36.1	PKFH	32.2	-26.6	11.7	53.4	74	20.6	301	114	V
* 5.421	39.43	PKFH	34.3	-26.7	12.9	59.93	74	14.07	242	106	V
* 8.133	34.41	PKFH	37.1	-26.2	16	61.31	74	12.69	135	103	V
* 9.035	32.42	PKFH	37.6	-25.9	16.9	61.02	74	12.98	21	363	V

PEAK DATA – NON RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit [Fundamental-20dBc] (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.807	65.27	PKFH	27.1	-26.9	7.3	72.77	92.5	19.73	170	112	H
6.325	35.72	PKFH	34.9	-26.4	14	58.22	92.5	34.28	326	292	H
7.229	33.55	PKFH	36.3	-26.2	15	58.65	92.5	33.85	108	306	H
1.807	63.55	PKFH	27.1	-26.9	7.3	71.05	92.5	21.45	143	157	V
6.325	37.95	PKFH	34.9	-26.4	14	60.45	92.5	32.05	192	113	V
7.228	37.43	PKFH	36.3	-26.2	15	62.53	92.5	29.97	123	104	V

AVERAGE DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.711	50.88	VA1T	29.3	-27.1	9	-12.53	49.55	54	4.45	129	150	H
* 3.614	43.32	VA1T	31.6	-26.8	10.4	-12.53	45.99	54	8.01	184	294	H
* 4.518	28.55	VA1T	32.2	-26.6	11.7	-12.53	33.32	54	20.68	63	322	H
* 5.421	28.95	VA1T	34.3	-26.7	12.9	-12.53	36.92	54	17.08	10	329	H
* 8.133	26.22	VA1T	37.1	-26.2	16	-12.53	40.59	54	13.41	31	320	H
* 9.035	22.79	VA1T	37.6	-25.9	16.9	-12.53	38.86	54	15.14	16	272	H
* 2.711	51.87	VA1T	29.3	-27.1	9	-12.53	50.54	54	3.46	43	156	V
* 3.614	41.31	VA1T	31.6	-26.8	10.4	-12.53	43.98	54	10.02	349	142	V
* 4.518	29.29	VA1T	32.2	-26.6	11.7	-12.53	34.06	54	19.94	301	114	V
* 5.421	33.42	VA1T	34.3	-26.7	12.9	-12.53	41.39	54	12.61	242	106	V
* 8.131	26.64	VA1T	37.1	-26.2	16	-12.53	41.01	54	12.99	135	103	V
* 9.035	22.2	VA1T	37.6	-25.9	16.9	-12.53	38.27	54	15.73	21	363	V

Note: * Indicates Frequency in CFR47 Pt 15 Restricted Band
PKFH –FHSS: RB=1MHz ,VB=3x RB ,Peak
VA1T-FHSS: Linear Voltage Average RB=1MHzVB=10Hz

Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss – Preamplifier Gain (dB)

Prescans performed in a pre-compliance chamber. Final measurements performed on an OATS

Duty Cycle Correction Factor is calculated using the guidelines provided in DA 00 -705

Duty Cycle Factor =20*log (Dwell time /100msec), Number of Transmission for 100msec: 8, Dwell time per Transmission: 1.575 msec
Duty Cycle correction Factor =20 log (1.575*8/100) = -17.99dB

TEST RESULT – 1 GHz to 10 GHz – CHANNEL 28

PEAK DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.748	51.89	PKFH	29.4	-27	9	63.29	74	10.71	103	157	H
* 3.664	37.69	PKFH	31.8	-26.9	10.4	52.99	74	21.01	93	174	H
* 4.58	34.32	PKFH	32.2	-26.7	11.8	51.62	74	22.38	179	390	H
* 7.327	35.75	PKFH	36.7	-26.2	15.1	61.35	74	12.65	40	251	H
* 8.245	35.65	PKFH	37.1	-26.1	16.2	62.85	74	11.15	49	242	H
* 9.159	31.87	PKFH	37.6	-25.9	17	60.57	74	13.43	319	248	H
* 2.748	46.76	PKFH	29.4	-27	9	58.16	74	15.84	29	136	V
* 3.664	38.45	PKFH	31.8	-26.9	10.4	53.75	74	20.25	1	143	V
* 4.58	38.02	PKFH	32.2	-26.7	11.8	55.32	74	18.68	69	112	V
* 7.327	38.24	PKFH	36.7	-26.2	15.1	63.84	74	10.16	35	248	V
* 8.245	35.69	PKFH	37.1	-26.1	16.2	62.89	74	11.11	33	242	V
* 9.16	33	PKFH	37.6	-25.9	17	61.7	74	12.3	223	211	V

PEAK DATA – NON RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit [Fundamental-20dBc] (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.832	65.2	PKFH	27.3	-26.9	7.3	72.9	90.3	17.4	101	161	H
5.496	41.38	PKFH	34.4	-26.6	13	62.18	90.3	28.12	267	318	H
6.412	41.12	PKFH	34.8	-26.3	14.1	63.72	90.3	26.58	16	267	H
1.832	52.96	PKFH	27.3	-26.9	7.3	60.66	90.3	29.64	127	386	V
5.496	39.37	PKFH	34.4	-26.6	13	60.17	90.3	30.13	270	325	V
6.413	44.67	PKFH	34.8	-26.3	14.1	67.27	90.3	23.03	273	277	V

AVERAGE DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.748	50.31	VA1T	29.4	-27	9	-12.53	49.18	54	4.82	103	157	H
* 3.664	31.33	VA1T	31.8	-26.9	10.4	-12.53	34.1	54	19.9	93	174	H
* 4.58	25.82	VA1T	32.2	-26.7	11.8	-12.53	30.59	54	23.41	179	390	H
* 7.328	27.09	VA1T	36.7	-26.2	15.1	-12.53	40.16	54	13.84	40	251	H
* 8.245	26.98	VA1T	37.1	-26.1	16.2	-12.53	41.65	54	12.35	49	242	H
* 9.161	22.3	VA1T	37.6	-25.9	17	-12.53	38.47	54	15.53	319	248	H
* 2.748	44.68	VA1T	29.4	-27	9	-12.53	43.55	54	10.45	29	136	V
* 3.664	33.94	VA1T	31.8	-26.9	10.4	-12.53	36.71	54	17.29	1	143	V
* 4.58	32.18	VA1T	32.2	-26.7	11.8	-12.53	36.95	54	17.05	69	112	V
* 7.329	30.92	VA1T	36.7	-26.2	15.1	-12.53	43.99	54	10.01	35	248	V
* 8.245	27.74	VA1T	37.1	-26.1	16.2	-12.53	42.41	54	11.59	33	242	V
* 9.161	22.93	VA1T	37.6	-25.9	17	-12.53	39.1	54	14.9	223	211	V

Note: * Indicates Frequency in CFR47 Pt 15 Restricted Band
PKFH –FHSS: RB=1MHz ,VB=3x RB ,Peak
VA1T-FHSS: Linear Voltage Average RB=1MHzVB=10Hz

Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss – Preamplifier Gain (dB)

Prescans performed in a pre-compliance chamber. Final measurements performed on an OATS

Duty Cycle Correction Factor is calculated using the guidelines provided in DA 00 -705

Duty Cycle Factor =20*log (Dwell time /100msec), Number of Transmission for 100msec: 8, Dwell time per Transmission: 1.575 msec
Duty Cycle correction Factor =20 log (1.575*8/100) = -17.99dB

TEST RESULT – 1 GHz to 10 GHz – CHANNEL 55

PEAK DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.779	55.47	PKFH	29.5	-27.1	9.1	66.97	74	7.03	103	141	H
* 3.706	38.71	PKFH	32	-26.9	10.6	54.41	74	19.59	85	170	H
* 4.632	34.41	PKFH	32.4	-26.6	11.8	52.01	74	21.99	190	277	H
* 7.411	33.97	PKFH	36.8	-26.2	15.2	59.77	74	14.23	21	265	H
* 8.338	35.79	PKFH	37.3	-26.1	16.2	63.19	74	10.81	282	264	H
* 2.779	52.42	PKFH	29.5	-27.1	9.1	63.92	74	10.08	32	159	V
* 3.706	41.15	PKFH	32	-26.9	10.6	56.85	74	17.15	15	145	V
* 4.632	33.97	PKFH	32.3	-26.6	11.8	51.47	74	22.53	194	238	V
* 7.412	35.1	PKFH	36.8	-26.2	15.2	60.9	74	13.1	47	272	V
* 8.337	34.16	PKFH	37.3	-26.1	16.2	61.56	74	12.44	64	253	V

PEAK DATA – NON RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	Corrected Reading (dBuV/m)	Peak Limit [Fundamental-20dBc] (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.853	70.66	PKFH	27.5	-26.9	7.4	78.66	94.9	16.24	336	233	H
5.559	40.75	PKFH	34.4	-26.4	13.1	61.85	94.9	33.05	277	293	H
6.486	41.38	PKFH	34.8	-26.4	14.2	63.98	94.9	30.92	21	265	H
9.268	34.09	PKFH	37.8	-26	17.1	62.99	94.9	31.91	324	156	H
1.853	75.1	PKFH	27.5	-26.9	7.4	83.1	94.9	11.8	186	354	V
5.558	37.75	PKFH	34.4	-26.4	13.1	58.85	94.9	36.05	41	275	V
6.486	43.78	PKFH	34.8	-26.4	14.2	66.38	94.9	28.52	8	261	V
9.263	30.8	PKFH	37.8	-26	17.1	59.7	94.9	35.2	127	280	V

AVERAGE DATA – RESTRICTED BAND

Frequency (GHz)	Meter Reading (dBuV)	Det	AF [dB/m]	Preamp [dB]	SMA1 [dB]	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.779	53.24	VA1T	29.5	-27.1	9.1	-12.53	52.21	54	1.79	103	141	H
* 3.706	33.9	VA1T	32	-26.9	10.6	-12.53	37.07	54	16.93	85	170	H
* 4.632	26.36	VA1T	32.3	-26.6	11.8	-12.53	31.33	54	22.67	190	277	H
* 7.411	23.1	VA1T	36.8	-26.2	15.2	-12.53	36.37	54	17.63	21	265	H
* 8.339	26.59	VA1T	37.3	-26.1	16.2	-12.53	41.46	54	12.54	282	264	H
* 2.779	50.98	VA1T	29.5	-27.1	9.1	-12.53	49.95	54	4.05	32	159	V
* 3.706	37.61	VA1T	32	-26.9	10.6	-12.53	40.78	54	13.22	15	145	V
* 4.632	25.49	VA1T	32.4	-26.6	11.8	-12.53	30.56	54	23.44	194	238	V
* 7.411	26.12	VA1T	36.8	-26.2	15.2	-12.53	39.39	54	14.61	47	272	V
* 8.339	26.73	VA1T	37.3	-26.1	16.2	-12.53	41.6	54	12.4	64	253	V

Note: * Indicates Frequency in CFR47 Pt 15 Restricted Band
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VA1T-FHSS: Linear Voltage Average RB=1MHzVB=10Hz

Field Strength –dBuV/m = Receiver Readings (dBuV) + Antenna Factor (dB/m) + Cable loss (dB) + Filter Insertion loss – Preamplifier Gain (dB)

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