



# Radio Test Report

Report No.: STS2501114W01

Issued for

OKAYO ELECTRONICS CO., LTD.

No. 2, Gongye 10th Rd., Dali Dist., Taichung 41280, Taiwan

Product Name: Receiver Module

Brand Name: OKAYO

Model Name: GX 5 RM3

Series Model(s): GX 5 RMxx (x=0~9 & A~Z)

FCC ID: NTMGXRM

Test Standards: Title 47 of the CFR, Part 15 Subpart D

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.



## TEST RESULT

**Applicant's Name** ..... : OKAYO ELECTRONICS CO., LTD.

Address ..... : No. 2, Gongye 10th Rd., Dali Dist., Taichung 41280, Taiwan

**Manufacturer's Name** ..... : OKAYO ELECTRONICS CO., LTD.

Address ..... : No. 2, Gongye 10th Rd., Dali Dist., Taichung 41280, Taiwan

### Product Description

Product Name ..... : Receiver Module

Brand Name ..... : OKAYO

Model Name ..... : GX 5 RM3

Series Model ..... : GX 5 RMxx (x=0~9 & A~Z)

**Test Standards** ..... : Title 47 of the CFR, Part 15. Subpart D

Test procedure ..... : ANSI C63.17-2013

This device described above has been tested by STS and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.

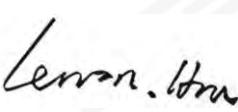
**Date of Test** ..... :

Date of receipt of test item ..... : 15 Jan. 2025

Date of performance of tests ..... : 15 Jan. 2025~ 03 Mar. 2025

Date of Issue ..... : 03 Mar. 2025

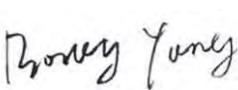
Test Result ..... : **Pass**

Testing Engineer : 

(Lennon Hou)

Technical Manager : 

( Tony Liu )

Authorized Signatory : 

(Bovey Yang)



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**Revision History**

Rev.	Issue Date	Report No.	Effect Page	Contents
00	03 Mar. 2025	STS2501114W01	ALL	Initial Issue



## SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart D.

Requirement	FCC Part	Test Procedure	Result
Emission Bandwidth	15.323 (a)	6.1.3	Compliant
Labeling Requirements	15.19(a)(3)	--	Compliant
Conducted Emissions	15.315 & 15.207	ANSI C63.4	Not Applicable
Antenna Requirements	15.317 & 15.203	Declaration	Compliant
Use digital modulation	15.319 (b)	6.1.4	Compliant
Peak transmit power	15.319 (c)	6.1.2	Compliant
Power spectral density	15.319 (d)	6.1.5	Compliant
Power adjustment for antenna gain	15.319 (e)	4.3.1	Compliant
Automatically discontinue transmission	15.319 (f)	--	Compliant
Spurious emissions conducted	15.323 (d) (1) & 15.323 (d) (2)	6.1.6	Compliant
RF Exposure	15.319 (i) & 1.1307(b), 2.1091 and 2.1093	ANSI/IEEE C95.1	Compliant (The test data please refer to RF exposure report)
Monitoring time	15.323 (c)(1)	7.3.4	Compliant
Monitoring threshold	15.323 (c)(2)	7.3	Compliant
Duration of transmission	15.323 (c)(3)	8.2.2	Not Applicable
System acknowledgment test	15.323(c)(4)	8.2.1	Compliant
Channel confirmation, Power accuracy, Segment occupancy	15.323 (c)(5)	7.3.3 & 7.3.4	Compliant
Random waiting	15.323 (c)(6)	8.1.3	Not Applicable
Monitoring bandwidth	15.323 (c)(7)	7.4	Compliant



Monitoring reaction time	15.323 (c)(1 )	7.5	Compliant
Monitoring antenna	15.323 (c)(8)	4	Compliant
Monitoring threshold relaxation	15.323 (c)(9)	4	Compliant
Duplex connections	15.323 (c)(10)	8.3	Not Applicable
Alternate monitoring interval	15.323 (c)(11)	8.4	Not Applicable
Fair access	15.323 (c)(12)	Declaration	Not Applicable
Frame period	15.323 (e)	6.2.2 & 6.2.3	Compliant
Frequency stability	15.323 (f)	6.2.1	Compliant
Radiated Out of Band Emissions	15.319 (g), 15.309 (b) & FCC Part 15 Subpart B, 15.109 and 15.209	--	Compliant



## 1 INTRODUCTION

### 1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

### 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.755\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.874\text{dB}$
3	All emissions, radiated 30-1GHz	$\pm 4.18\text{dB}$
4	All emissions, radiated 1G-6GHz	$\pm 4.90\text{dB}$
5	All emissions, radiated>6G	$\pm 5.24\text{dB}$
6	Conducted Emission (9KHz-150KHz)	$\pm 2.19\text{dB}$
7	Conducted Emission (150KHz-30MHz)	$\pm 2.53\text{dB}$



## 2 PRODUCT INFORMATION

Product Name	Receiver Module
Brand Name	OKAYO
Model Name	GX 5 RM3
Series Model	GX 5 RMxx (x=0~9 & A~Z)
Product Differences	Only difference in model name.
Hardware version number	N/A
Software version number	N/A
EUT Frequency Ranges	1920 MHz - 1930MHz
Type of Modulations	GFSK
Packet type	PP32Z, PP64Z
Number of Channels	5 CH. Please see Note 2.
Antenna Type	Ant 1: Dipole Ant 2: PCB
Antenna Gain	Ant 1: 3.34dBi Ant 2: 4.84dBi
Power Rating	Input: DC 12V
Extreme Temp. Tolerance	-20°C to 55°C

Note: 1. Antenna 1 and Antenna 2 cannot transmit simultaneously.

2. Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
04	1921.536	03	1923.264	02	1924.992
01	1926.720	00	1928.448	--	--



### 3 TEST CONFIGURATION OF EQUIPMENT UNDER TEST

#### 3.1 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Note
N/A	N/A	N/A	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
N/A	N/A	N/A	N/A	N/A

Note:

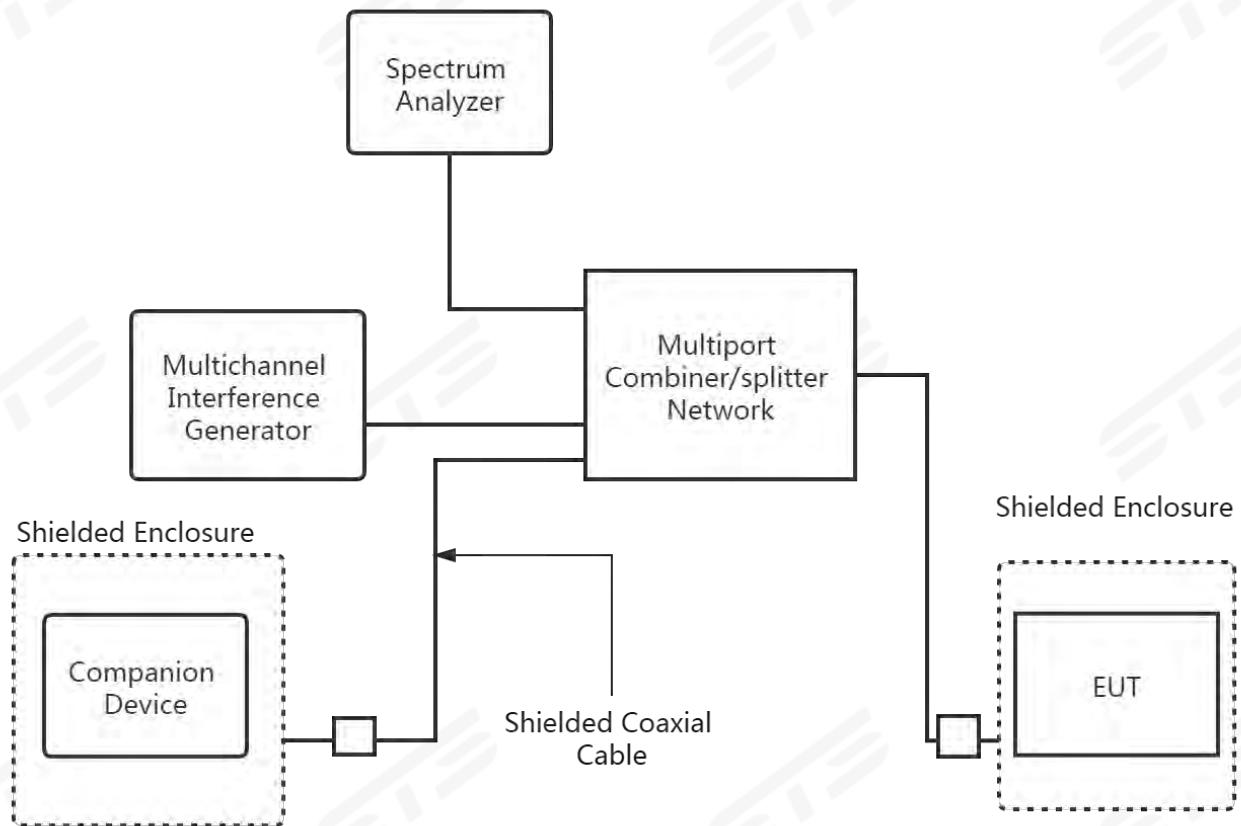
(1) For detachable type I/O cable should be specified the length in cm in «Length» column.

## 3.2 SYSTEM TEST CONFIGURATION

Figure 1:



Figure 2:





## 4 MEASUREMENT INSTRUMENTS

RF Radiation Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2024.03.15	2025.03.14
Wireless Communications Test Set	R&S	CMW 500	117239	2024.09.23	2025.09.22
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2025.02.22	2026.02.21
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2024.09.23	2025.09.22
Positioning Controller	MF	MF-7802	MF-780208587	N/A	N/A
Signal Analyzer	R&S	FSV 40-N	101823	2024.09.23	2025.09.22
Switch Control Box	N/A	N/A	N/A	N/A	N/A
Filter Box	BALUN Technology	SU319E	BL-SZ1530051	N/A	N/A
Video Controller	SKET	FCS C-3	N/A	N/A	N/A
Bilog Antenna	TESEQ	CBL6111D	34678	2024.09.30	2025.09.29
Horn Antenna	SCHWARZ-BECK	BBHA 9120D	02014	2024.09.25	2025.09.24
Antenna Mast	MF	MFA-440H	N/A	N/A	N/A
Turn Table	MF	N/A	N/A	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A
DC Power Supply	Zhaoxin	RXN 605D	20R605D11010081	N/A	N/A
Test SW	EMC Test Software	15.2.0.339			
Conduction Test equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2024.09.23	2025.09.22
LISN	R&S	ENV216	101242	2024.09.23	2025.09.22
LISN	EMCO	3810/2NM	23625	2024.09.23	2025.09.22
Temperature & Humidity	SW-108	SuWei	N/A	2024.03.15	2025.03.14
RF Connected Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2024.03.15	2025.03.14
RF Test Platform For DECT	RTX	RTX 2012 HS	1138-6122	2025.02.22	2026.02.21
Signal Generator	Agilent	N5182A	MY46240556	2024.09.23	2025.09.22
Signal Analyzer	Agilent	N9020A	MY52440124	2025.02.22	2026.02.21
Temperature & Humidity Test Chamber	Safety test	AG80L	171200018	2025.02.22	2026.02.21
Programmable Power Supply	Agilent	E3642A	MY40002025	2024.09.23	2025.09.22
Attenuator	HP	8494B	DC-18G	2024.02.29	2025.02.28
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A
Test SW	RTX2012	RTX20xx v0.9.61 A			

Equipment with a calibration date of "NCR" shown in this list was not used to make direct calibrated measurements.



## 5 TEST ITEMS

### 5.1 ANTENNA REQUIREMENT

#### TEST OVERVIEW

§ 15.203: 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 the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

- a.) Antenna must be permanently attached to the unit.
- b.) Antenna must use a unique type of connector to attach to the EUT.
- c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

#### TEST RESULT

The EUT as tested is compliant the criteria of §15.203. The antenna is permanently attached to the unit.

### 5.2 MODULATION TECHNIQUES

#### TEST REQUIREMENT

All transmissions must use only digital modulation techniques.

#### TEST PROCEDURES

Attestation of manufacturer supported by reference to relevant DECT specifications.

#### ATTESTATION

This device is compliant with the DECT standards described in European Standards EN 300 175-2 and EN 300 175-3. DECT transmissions are MC/TDMA/TDD (Multi carrier / Time Division Multiple Access / Time Division Duplex) using Digital GFSK modulation. For further details see operational description or relevant portions of the DECT standards.

#### TEST RESULTS

The EUT as tested is compliant the criteria of §15.319(b).



## 5.3 EMISSION BANDWIDTH

### TEST OVERVIEW

§ 15.323(a): For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

### TEST PROCEDURE

Operation shall be contained within the 1920-1930 MHz band. The emission bandwidth shall be less than 2.5 MHz. The power level shall be as specified in §15.319(c), but in no event shall the emission bandwidth be less than 50 kHz.

### TEST SETUP

The test setup is shown in section 3.2 figure 1.

TEST RESULTS

The Eut was compliant with this requirement.

Antenna 1  
PP32Z

Channel	Left frequency	Right frequency	26dB BW(MHz)	Limit
Low	1920.900	1922.163	1.263	50KHz~2.5MHz
Mid	1924.329	1925.522	1.193	
High	1927.788	1929.081	1.293	
AVG	\	\	1.250	

## PP64Z

Channel	Left frequency	Right frequency	26dB BW(MHz)	Limit
Low	1920.906	1922.172	1.266	50KHz~2.5MHz
Mid	1924.359	1925.513	1.154	
High	1927.818	1929.069	1.251	
AVG	\	\	1.224	

Antenna 2  
PP32Z

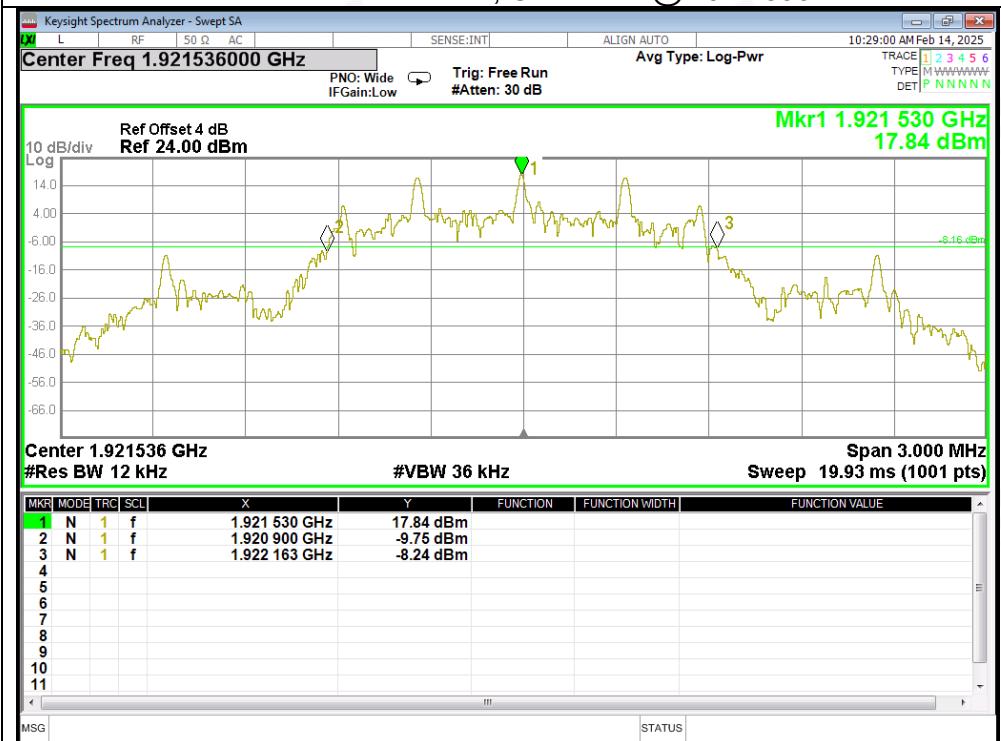
Channel	Left frequency	Right frequency	26dB BW(MHz)	Limit
Low	1920.882	1922.154	1.272	50KHz~2.5MHz
Mid	1924.356	1925.513	1.157	
High	1927.812	1929.069	1.257	
AVG	\	\	1.229	

## PP64Z

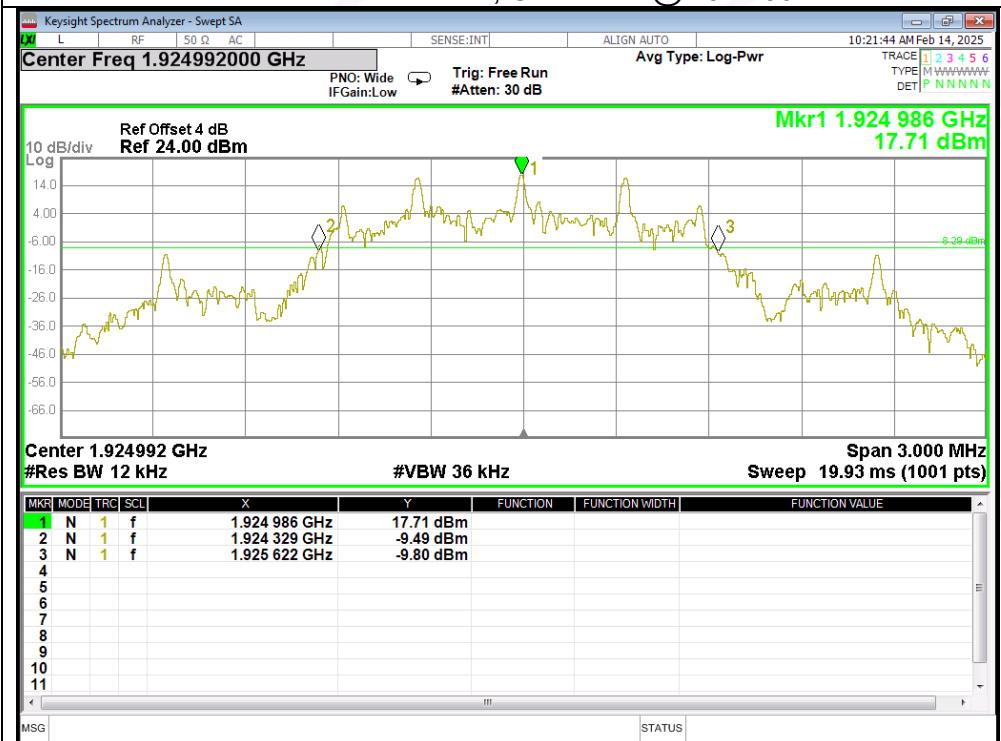
Channel	Left frequency	Right frequency	26dB BW(MHz)	Limit
Low	1920.885	1922.157	1.272	50KHz~2.5MHz
Mid	1924.335	1925.513	1.178	
High	1927.794	1929.069	1.275	
AVG	\	\	1.242	

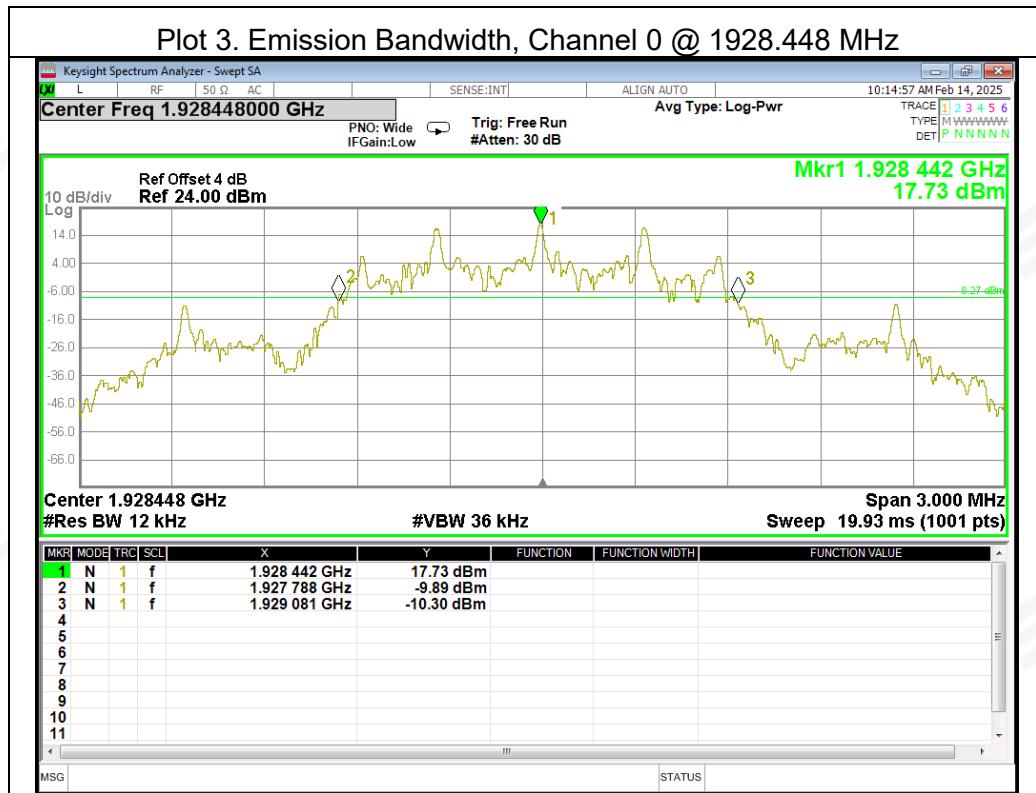
Antenna 1  
PP32Z

## Plot 1. Emission Bandwidth, Channel 4 @ 1921.536 MHz

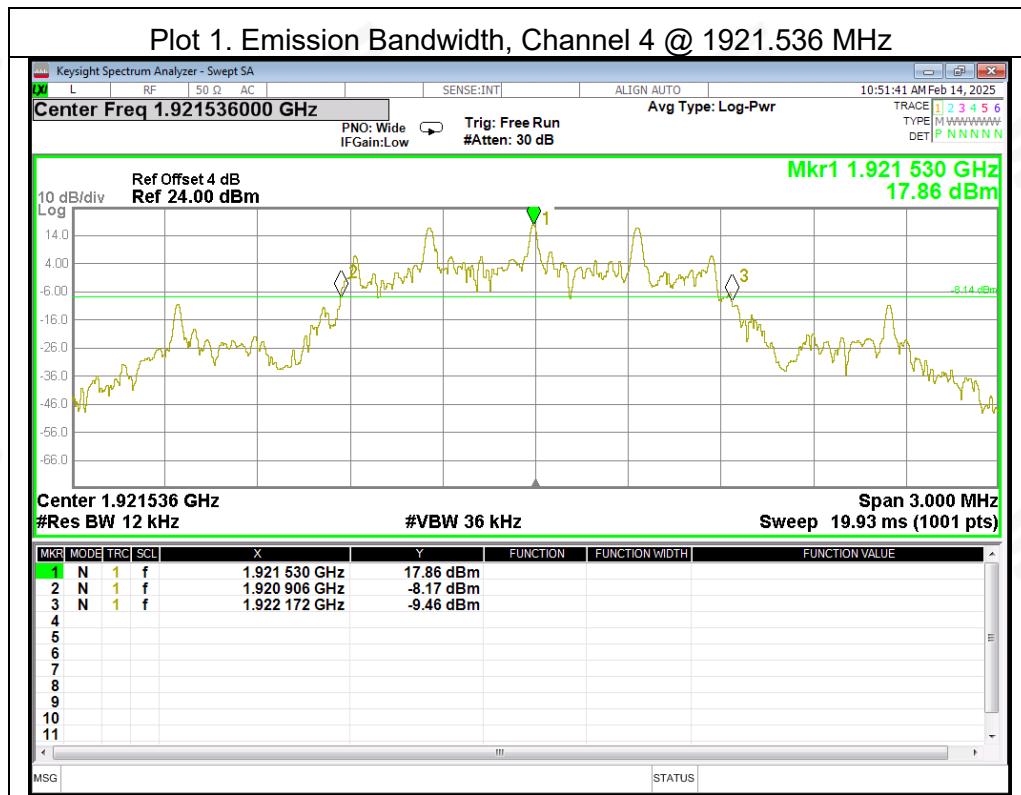


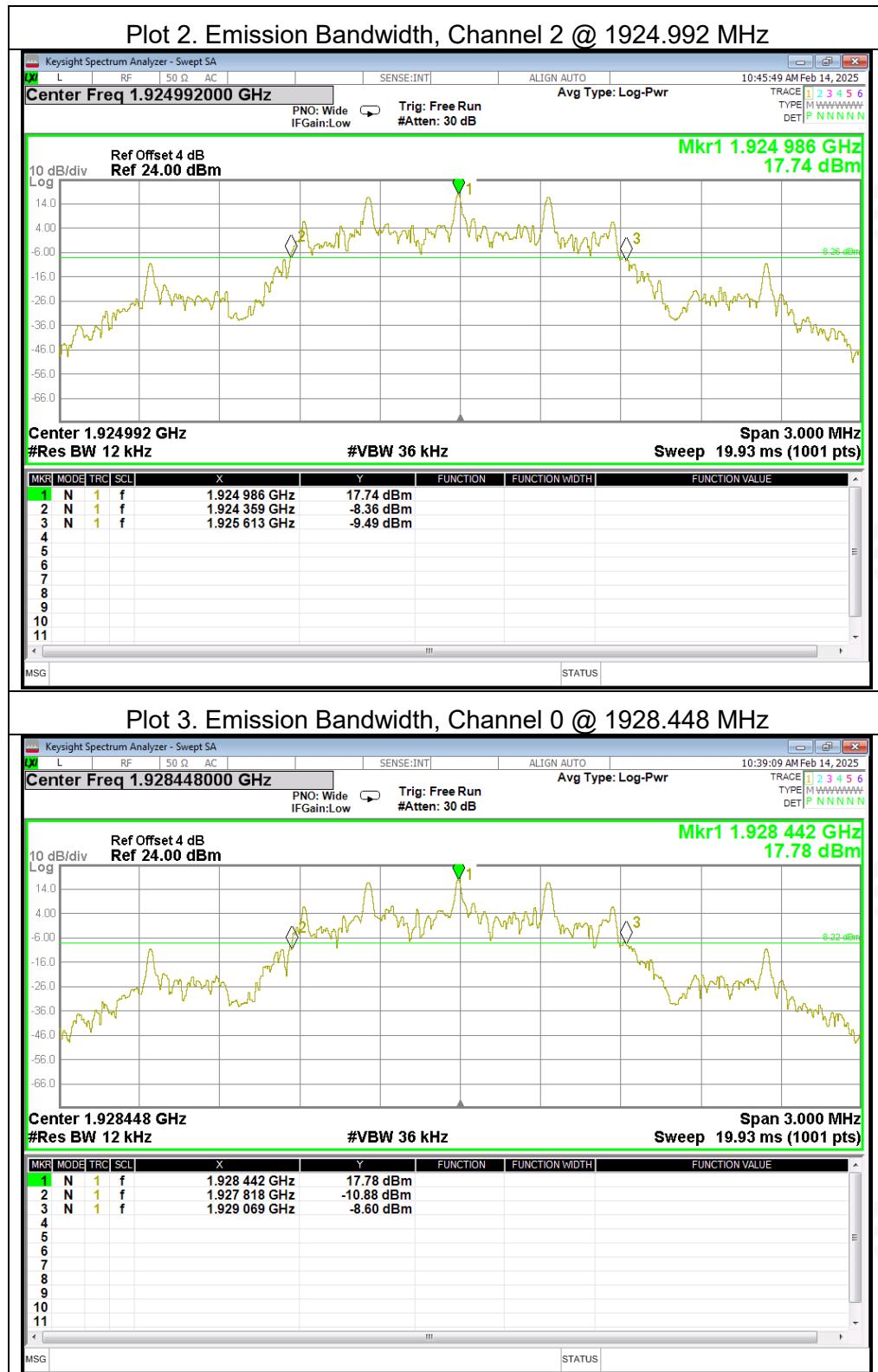
## Plot 2. Emission Bandwidth, Channel 2 @ 1924.992 MHz





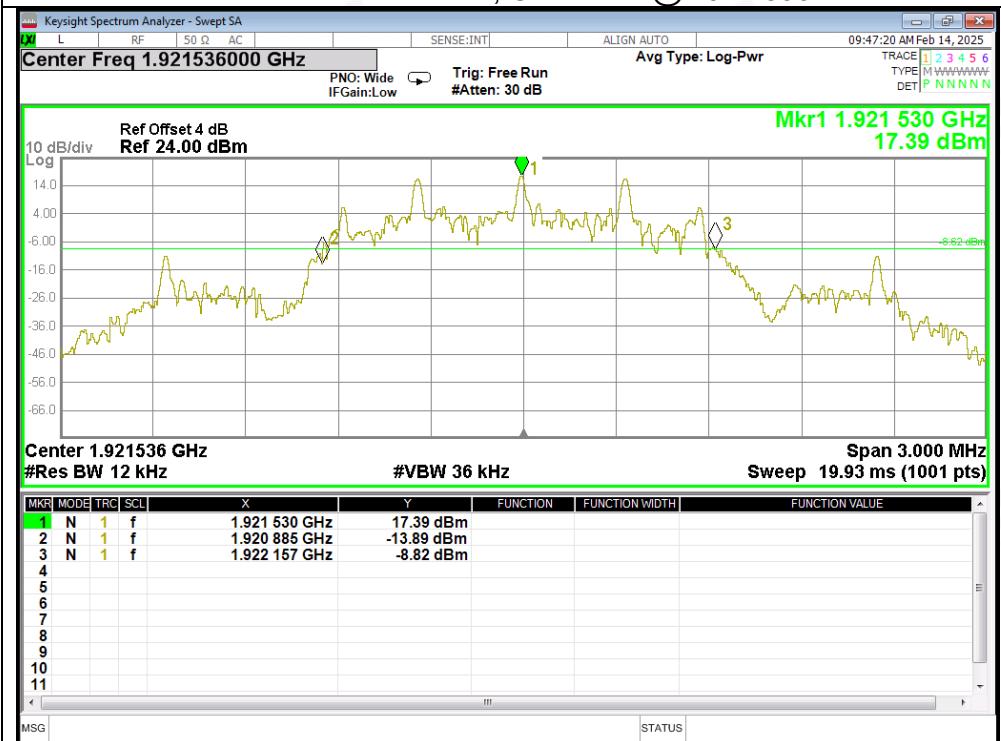
### PP64Z



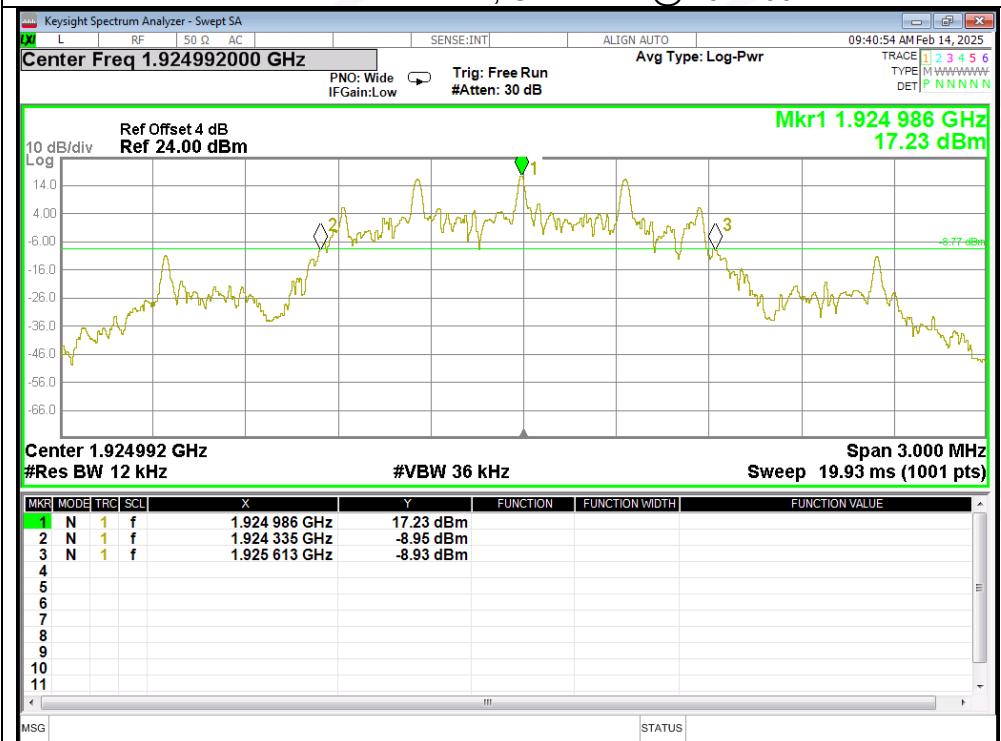


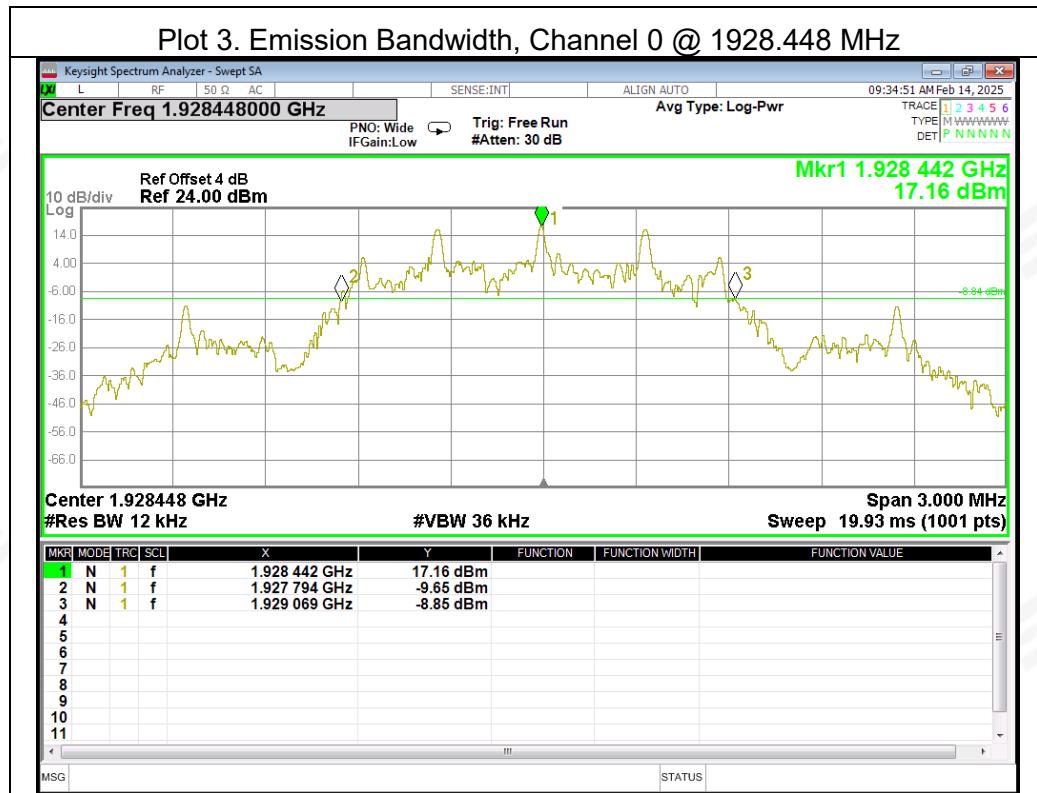
Antenna 2  
PP32Z

## Plot 1. Emission Bandwidth, Channel 4 @ 1921.536 MHz

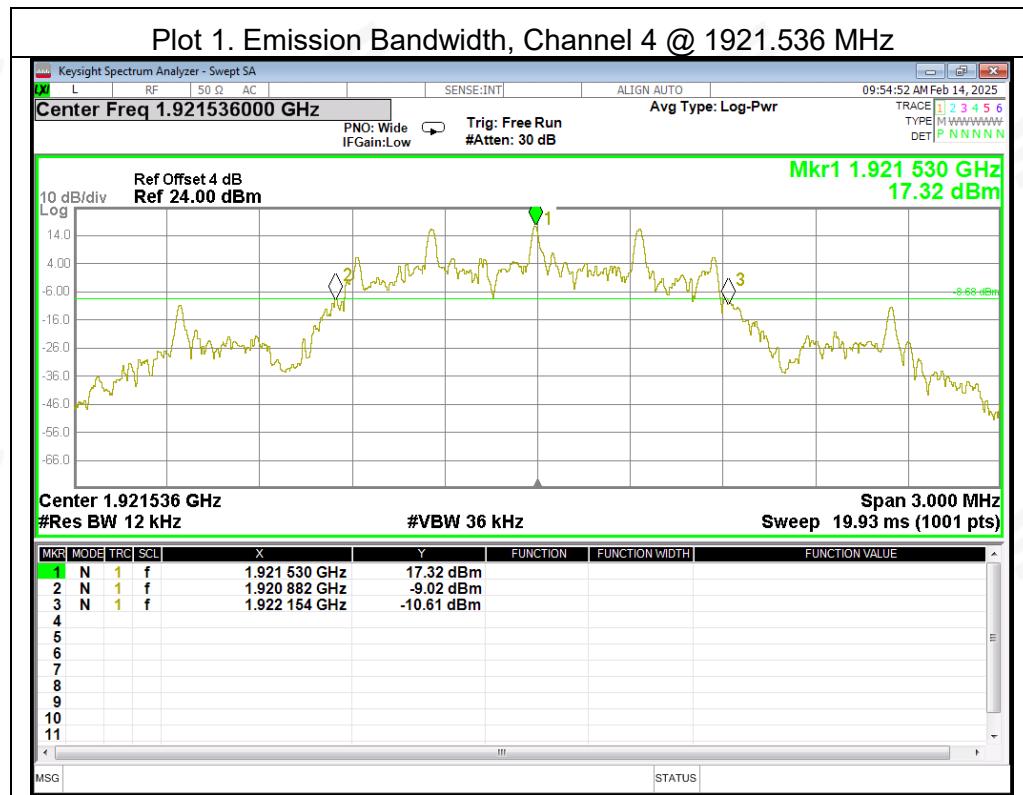


## Plot 2. Emission Bandwidth, Channel 2 @ 1924.992 MHz





### PP64Z







## 5.4 PEAK TRANSMIT POWER

### TEST OVERVIEW

§15.319(c)&RSS 213(5.6): The peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz. Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 6.1.2, which provides the test methodology for this provision. The EUT is controlled from a personal computer and set into continuous transmission mode.

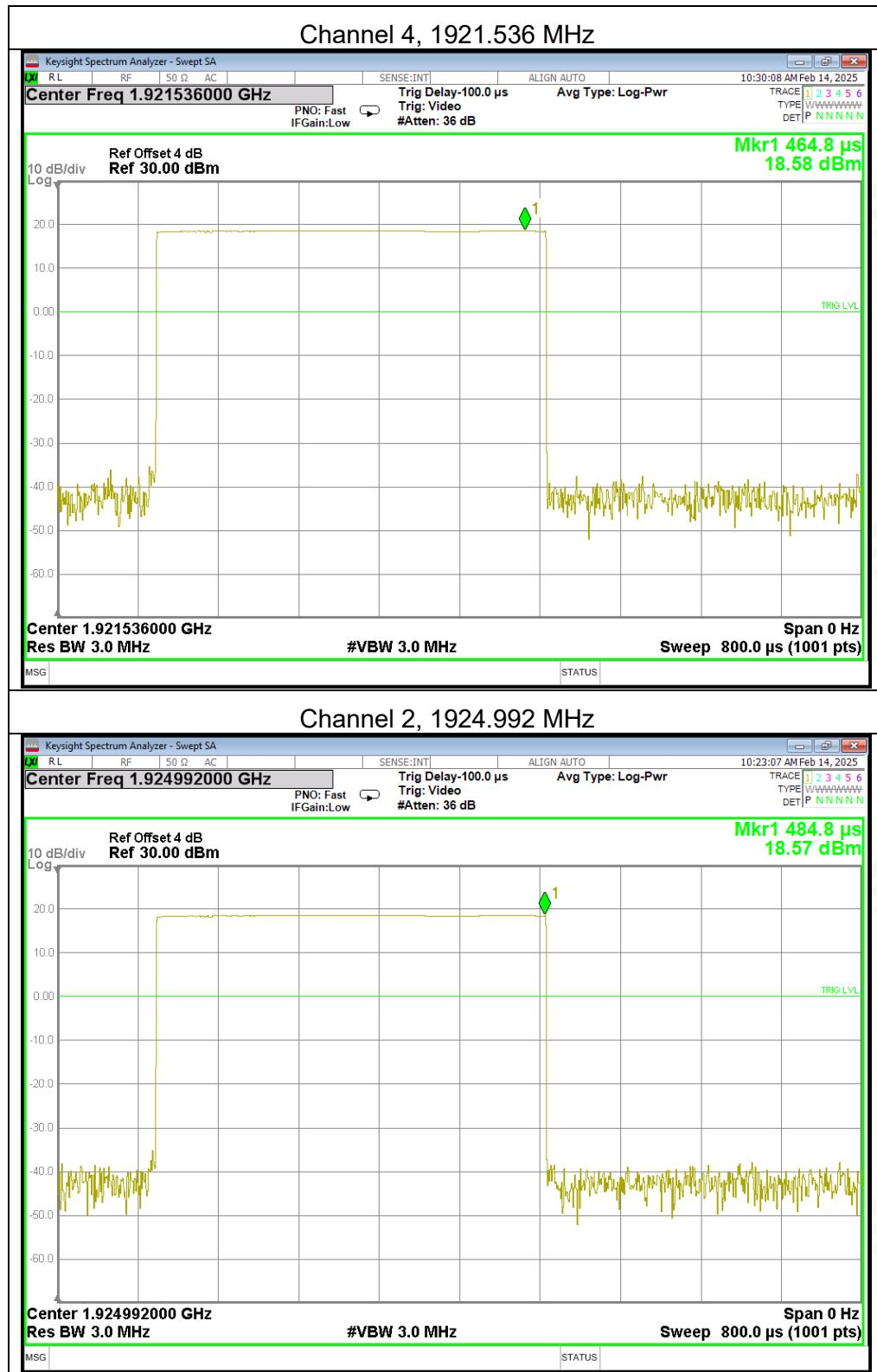
### TEST SETUP

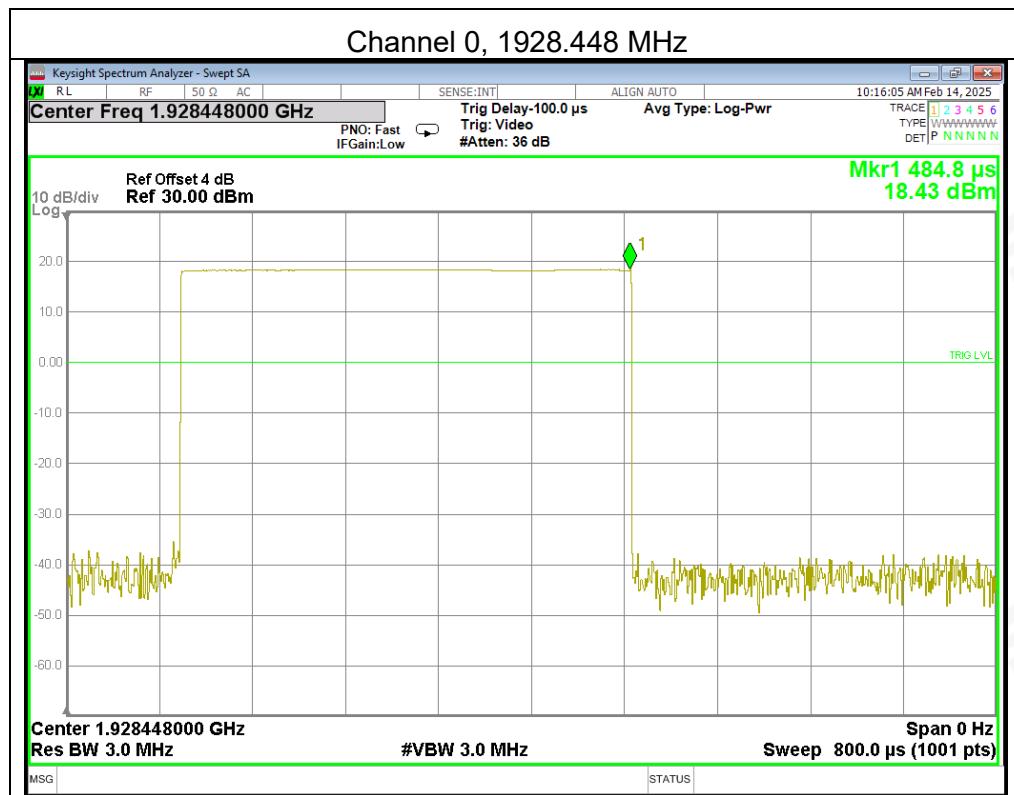
The test setup is shown in section 3.2 figure 1.

### TEST RESULTS

Antenna 1  
PP32Z

Carrier Channel	Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (uW)	Limit (dBm)
Low	1921.536	18.58	112383	20.17
Mid	1924.992	18.57	109225	20.04
High	1928.448	18.43	113710	20.22
EBWLow Channel=	1263000			Hz
EBWMid Channel=	1193000			Hz
EBWHigh Channel=	1293000			Hz
Note:Peak Transmitter Power Limit=100 ( EBW ) 1/2μW				

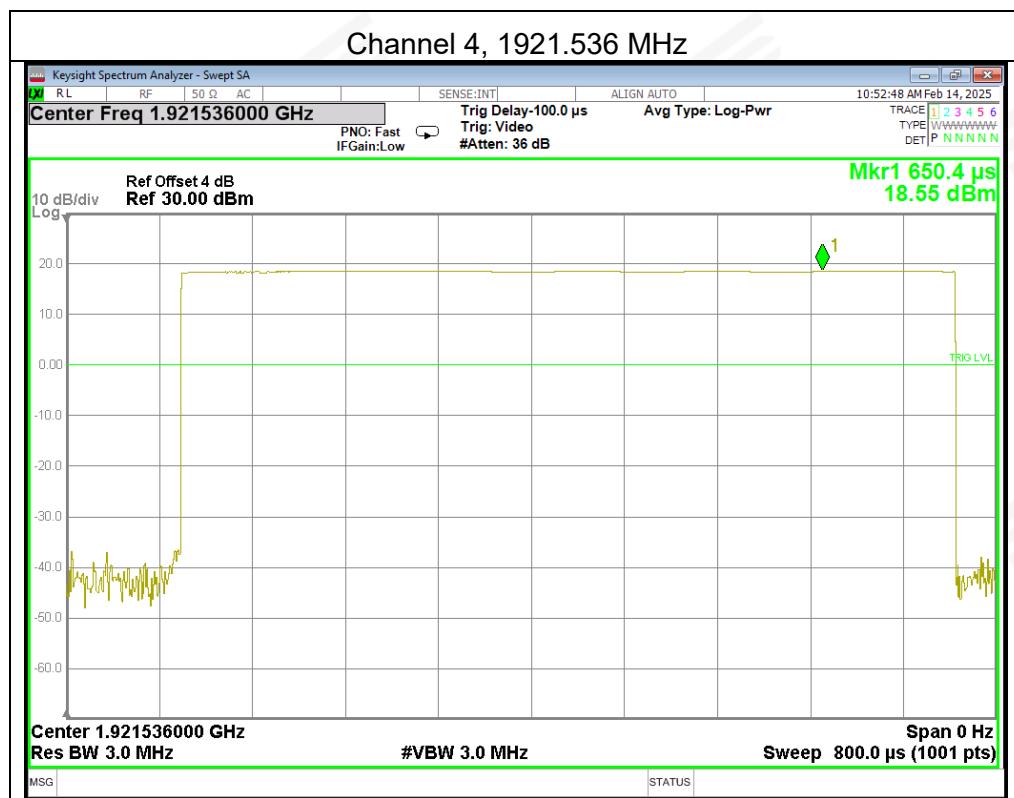


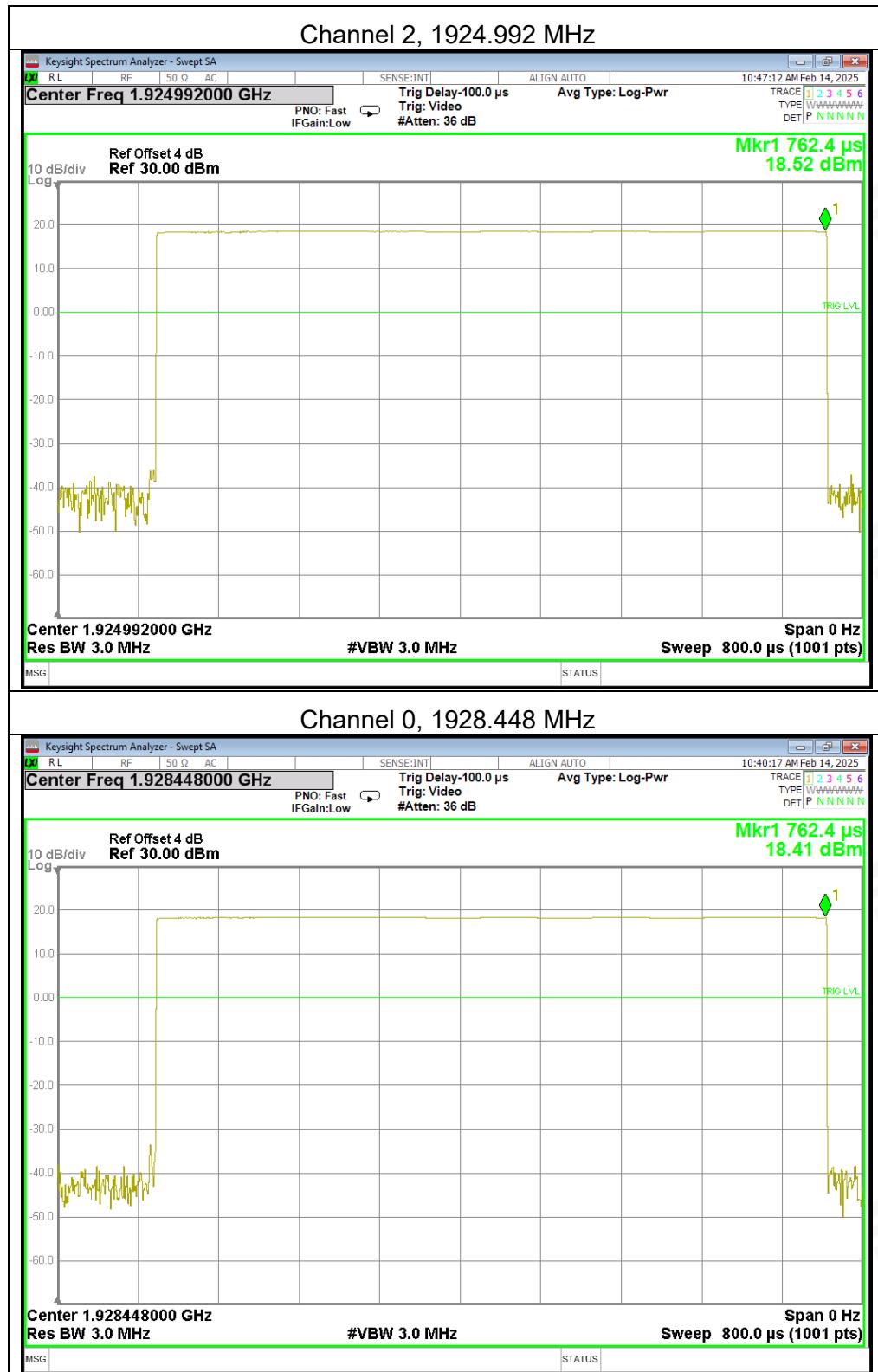




## PP64Z

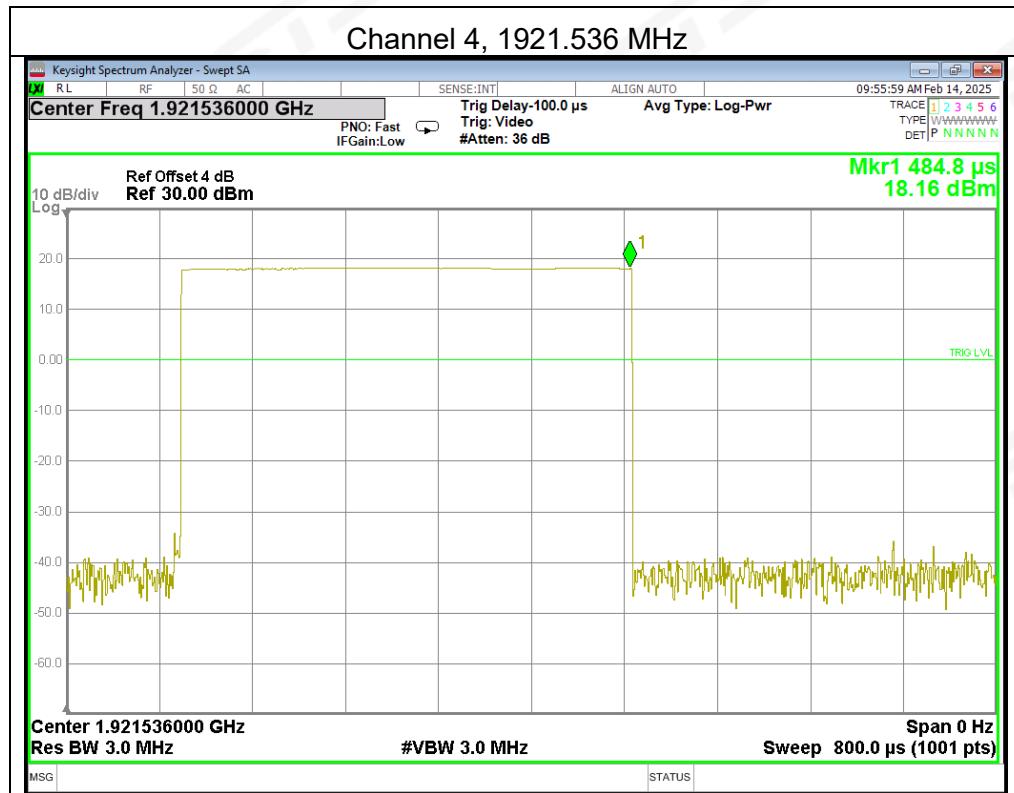
Carrier Channel	Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (uW)	Limit (dBm)
Low	1921.536	18.55	112517	20.17
Mid	1924.992	18.52	107424	19.97
High	1928.448	18.41	111848	20.15
EBWLow Channel=	1266000			Hz
EBWMid Channel=	1154000			Hz
EBWHigh Channel=	1251000			Hz
Note:Peak Transmitter Power Limit=100 ( EBW ) 1/2μW				

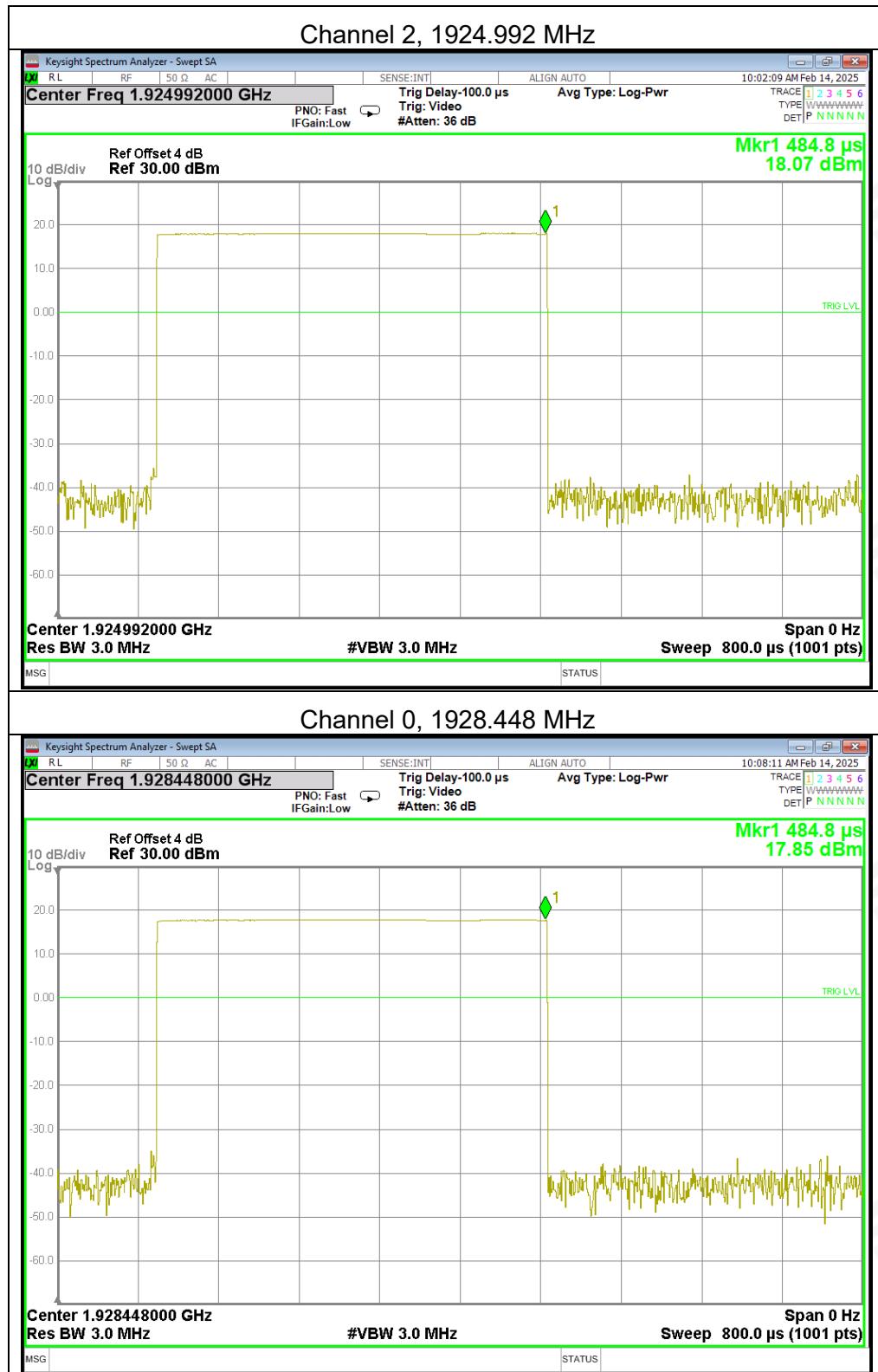




Antenna 2  
PP32Z

Carrier Channel	Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (uW)	Limit (dBm)
Low	1921.536	18.16	112783	18.68
Mid	1924.992	18.07	107564	18.48
High	1928.448	17.85	112116	18.66
EBWLow Channel=	1272000			Hz
EBWMid Channel=	1157000			Hz
EBWHigh Channel=	1257000			Hz
Note:Peak Transmitter Power Limit=100 ( EBW ) 1/2μW				

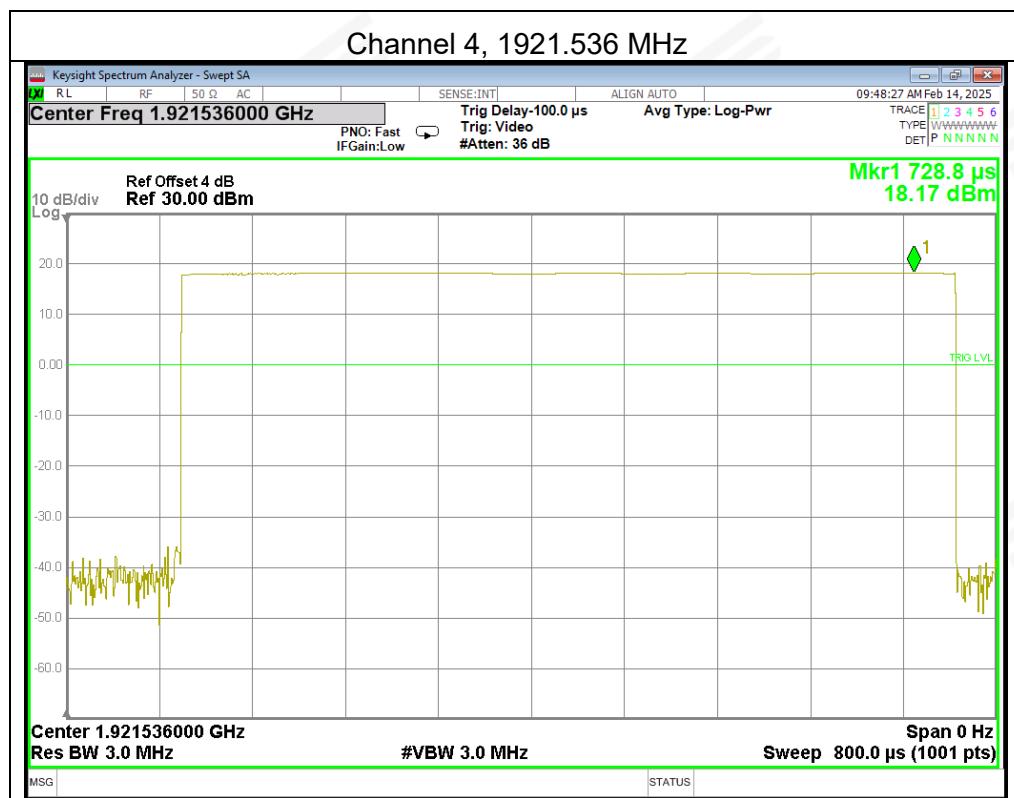


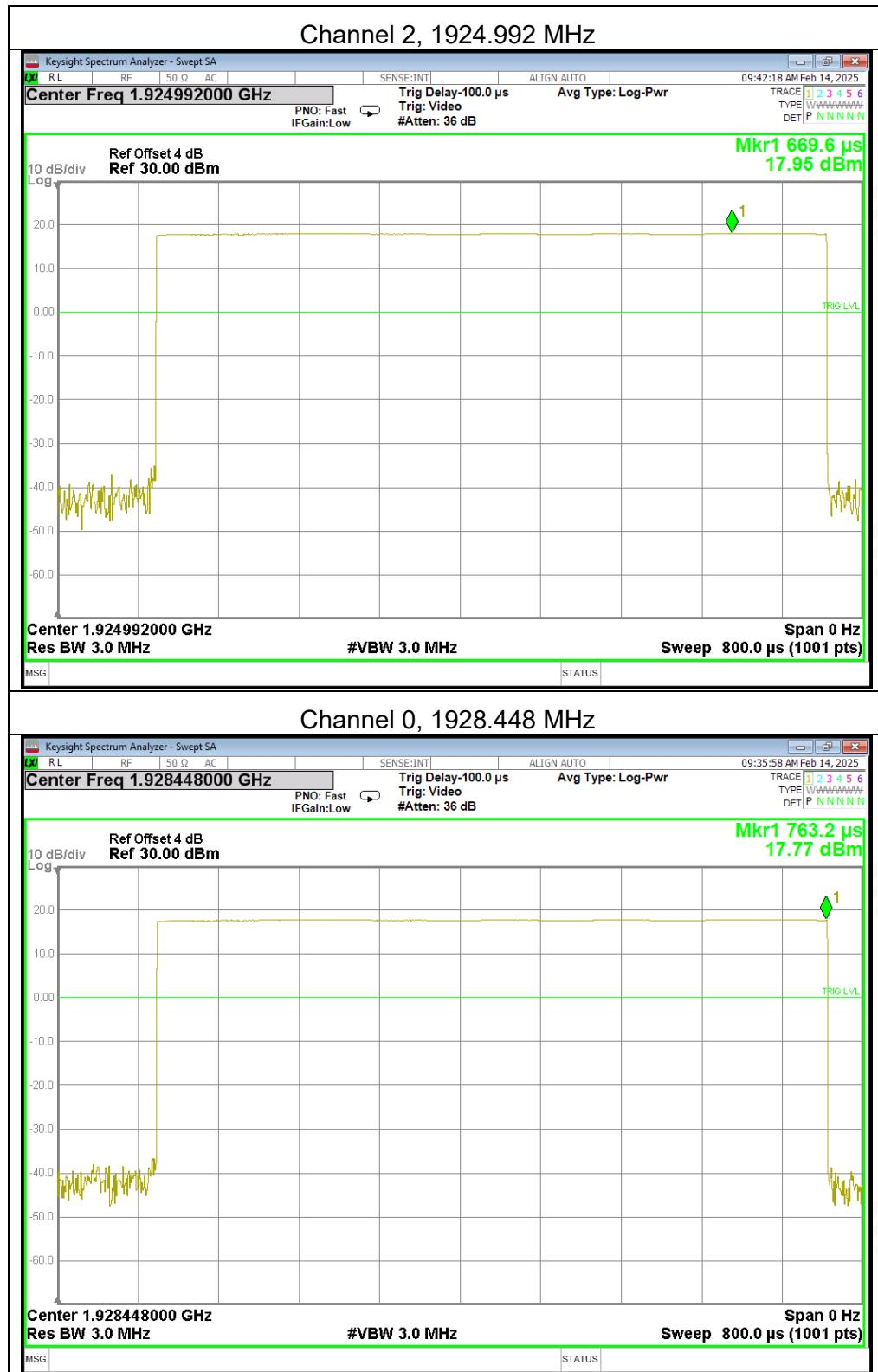




## PP64Z

Carrier Channel	Frequency (MHz)	Measured Peak Output Power (dBm)	Limit (uW)	Limit (dBm)
Low	1921.536	18.17	112783	18.68
Mid	1924.992	17.95	108536	18.52
High	1928.448	17.77	112916	18.69
EBWLow Channel=	1272000			Hz
EBWMid Channel=	1178000			Hz
EBWHigh Channel=	1275000			Hz
Note:Peak Transmitter Power Limit=100 ( EBW ) 1/2μW				







## 5.5 POWER SPECTRAL DENSITY

### TEST OVERVIEW

§15.319(d): Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 6.1.5, which provides the test methodology for this provision.

### TEST SETUP

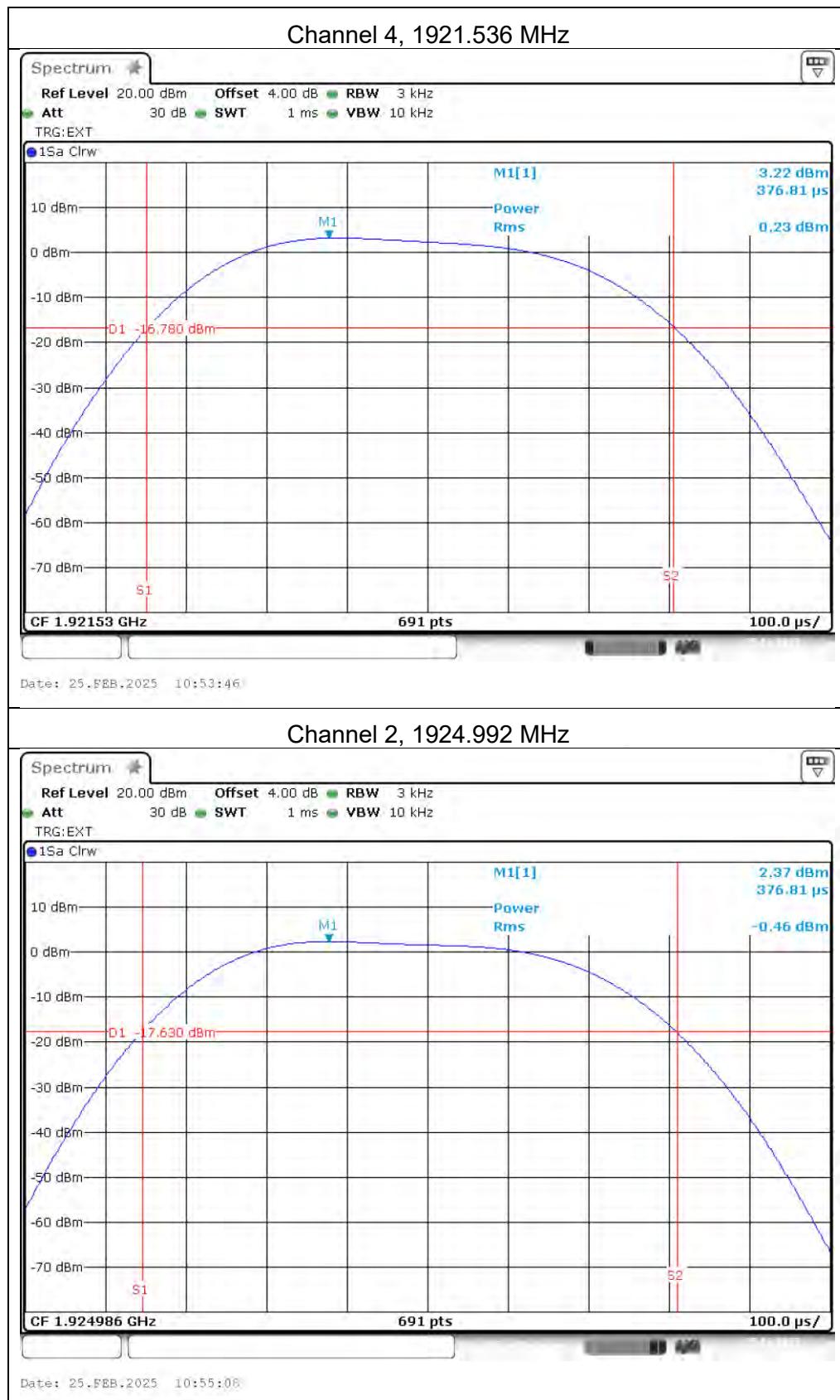
The test setup is shown in section 3.2 figure 1.

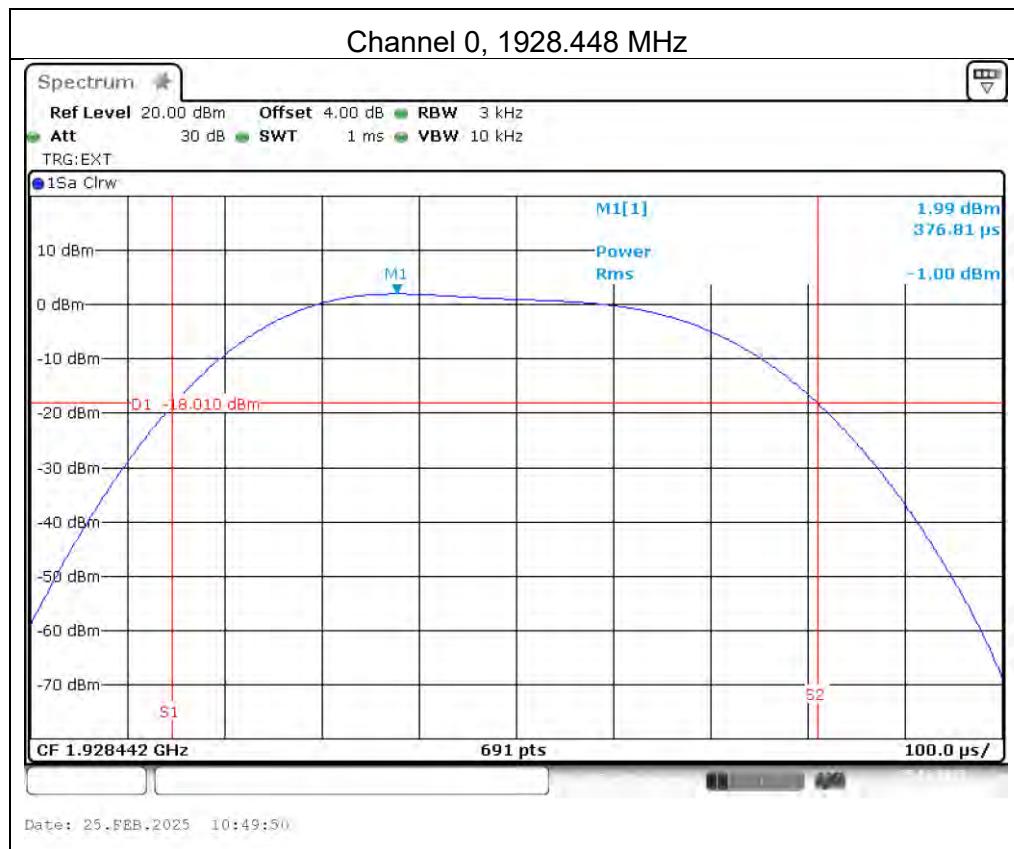
### TEST RESULTS

Antenna 1

PP32Z

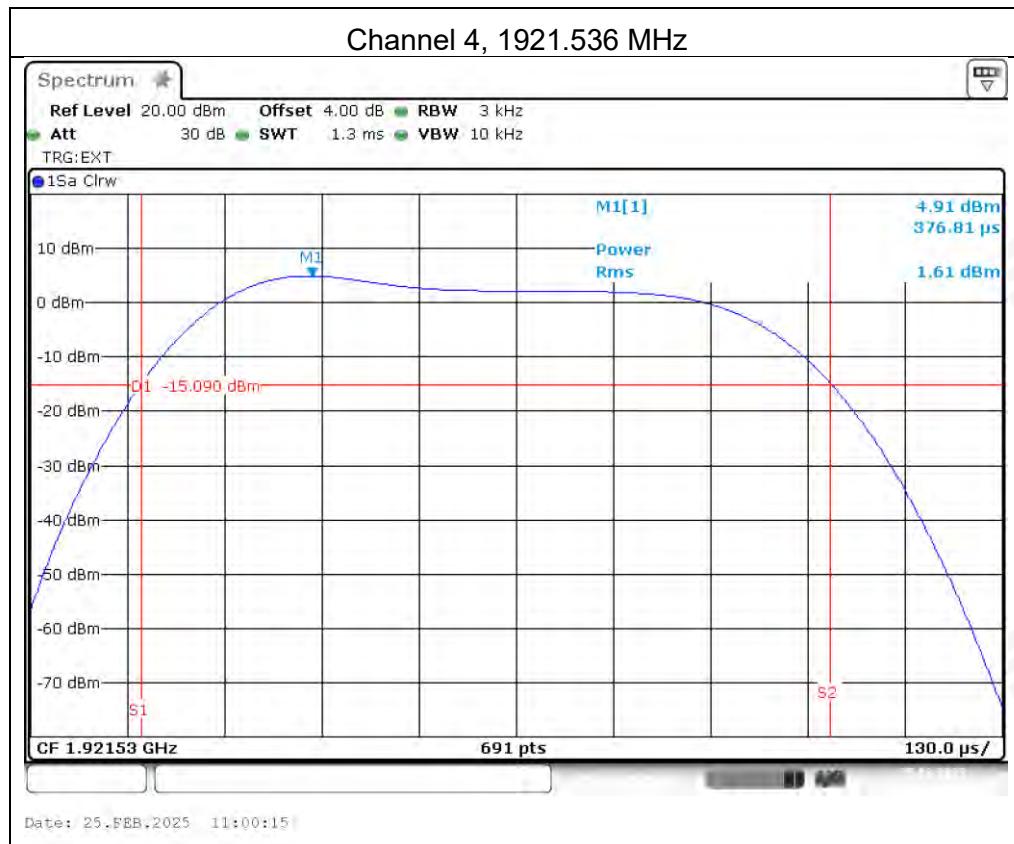
Carrier Channel	Frequency (MHz)	Measured AVG Power Spectral Density (dBm)	Limit(mw)	Limit(dBm)
Low	1921.536	0.23	3	4.77
Mid	1924.992	0.46		
High	1928.448	-1.00		

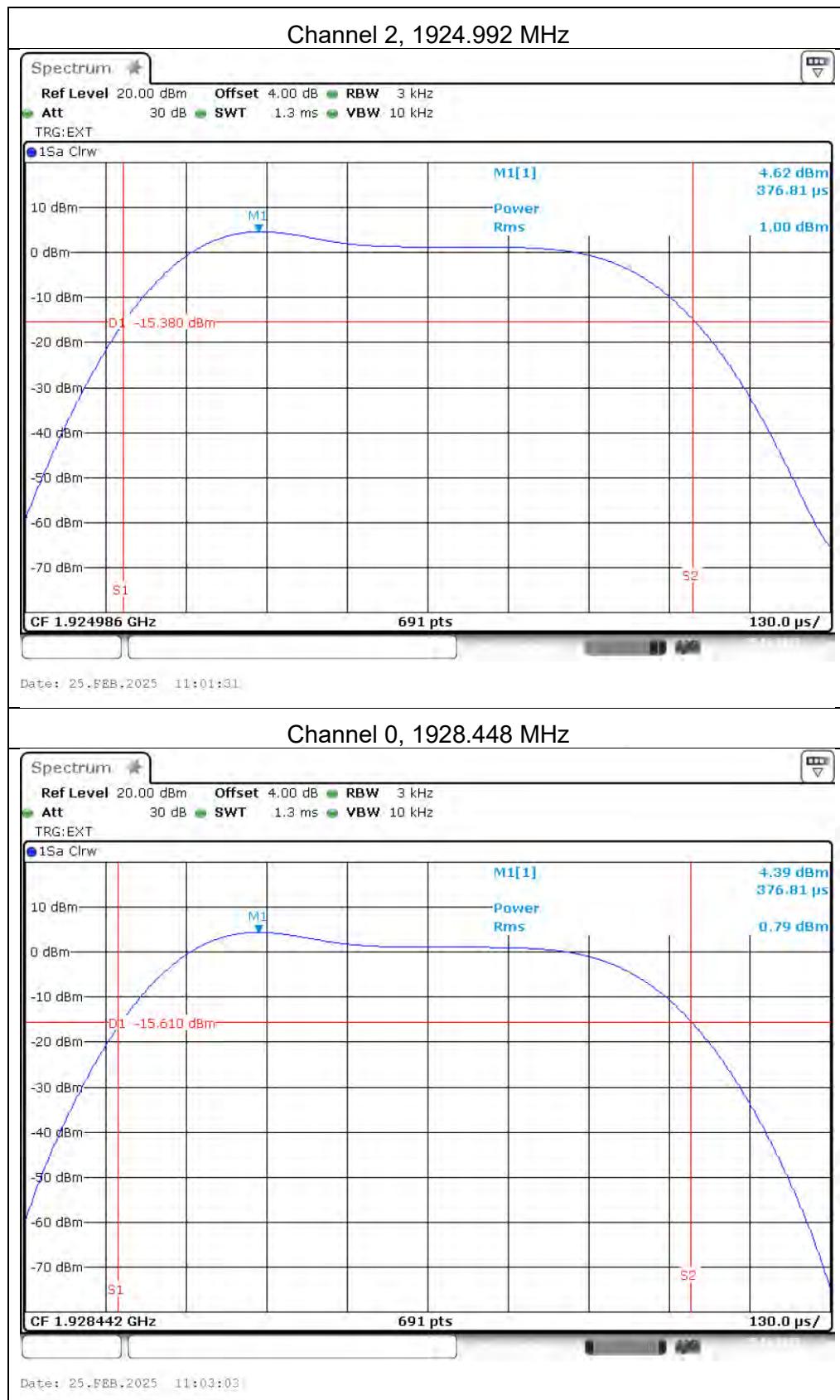




## PP64Z

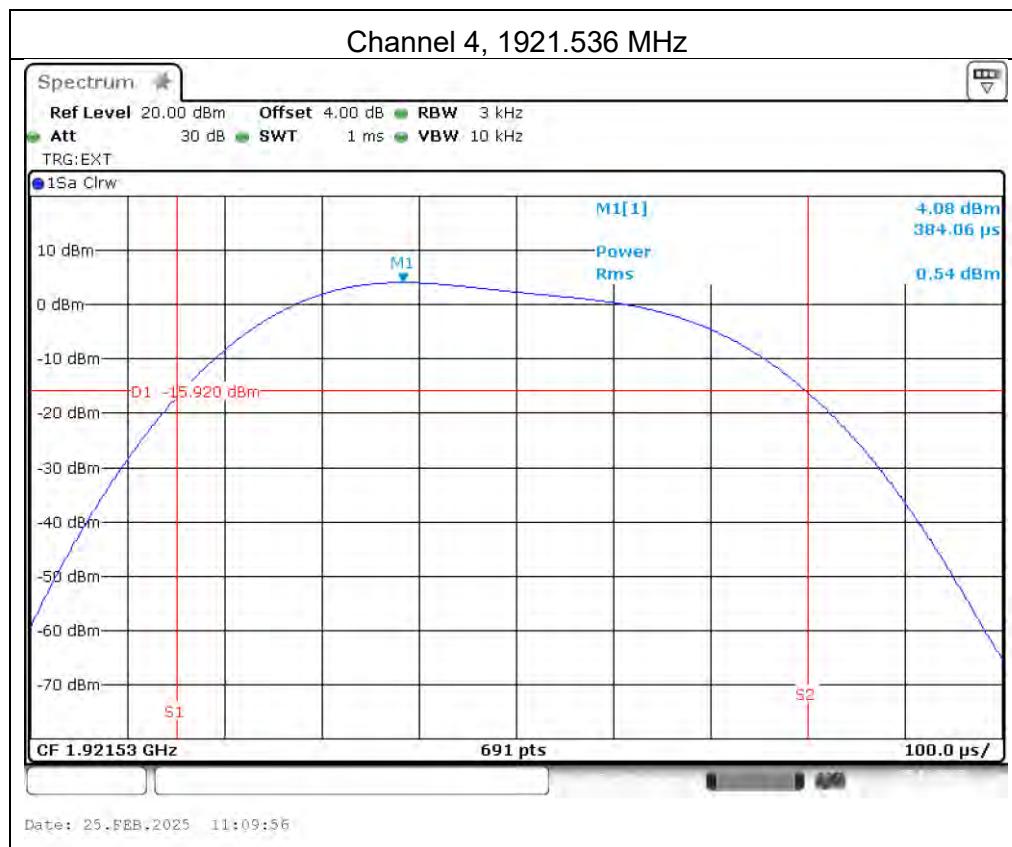
Carrier Channel	Frequency (MHz)	Measured AVG Power Spectral Density (dBm)	Limit(mw)	Limit(dBm)
Low	1921.536	1.61	3	4.77
Mid	1924.992	1.00		
High	1928.448	0.79		

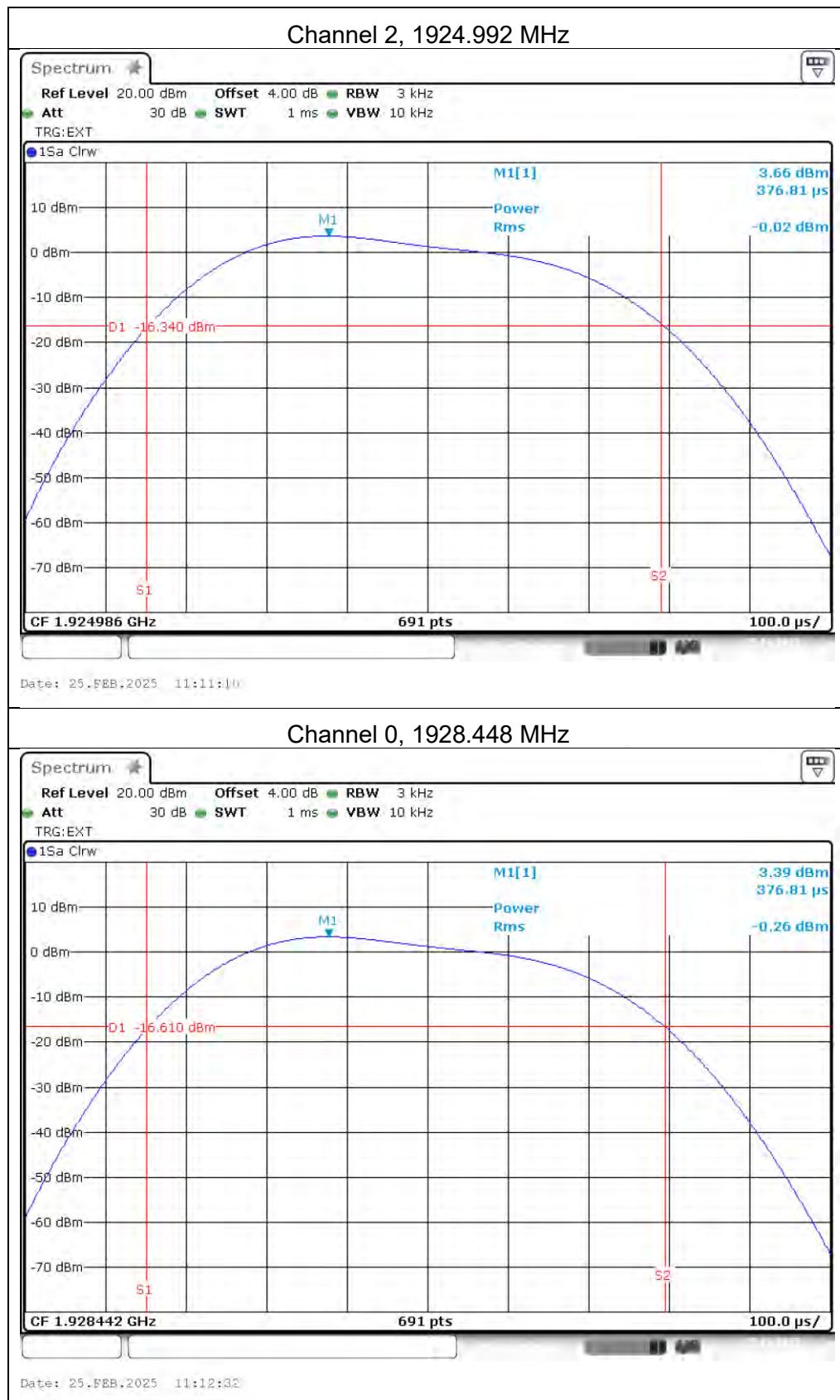




Antenna 2  
PP32Z

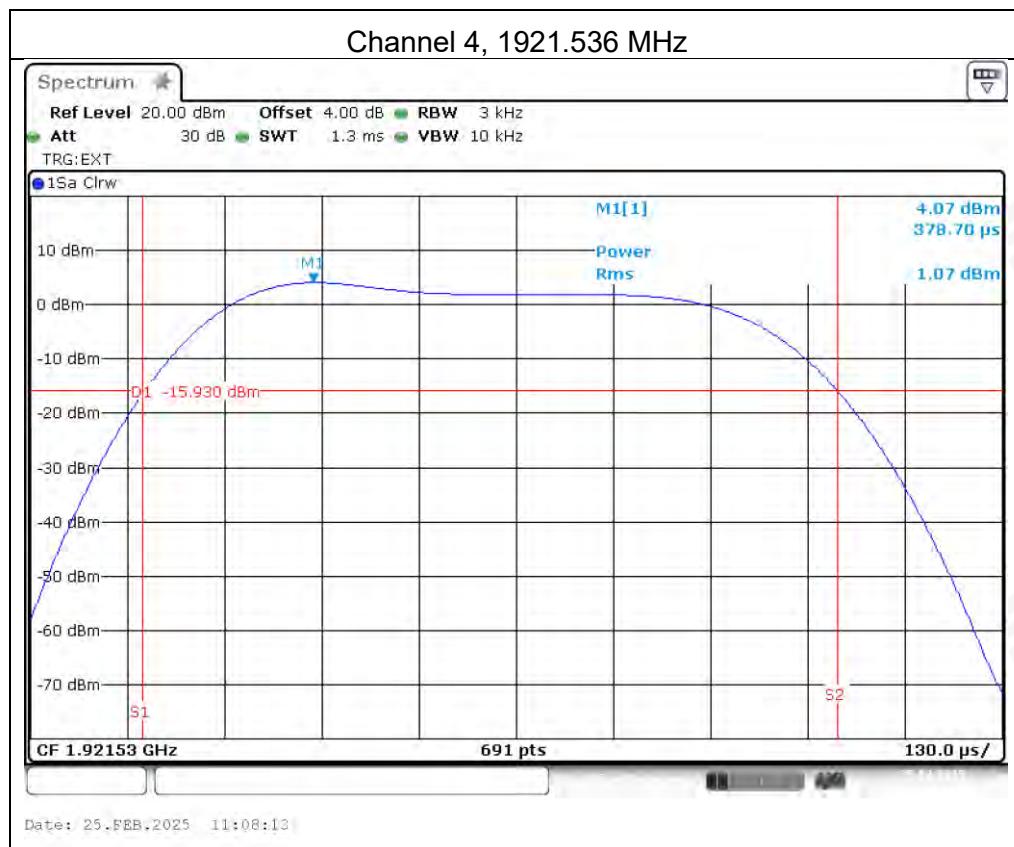
Carrier Channel	Frequency (MHz)	Measured Peak Power Spectral Density (dBm)	Limit(mw)	Limit(dBm)
Low	1921.536	0.54	3	4.77
Mid	1924.992	-0.02		
High	1928.448	-0.26		

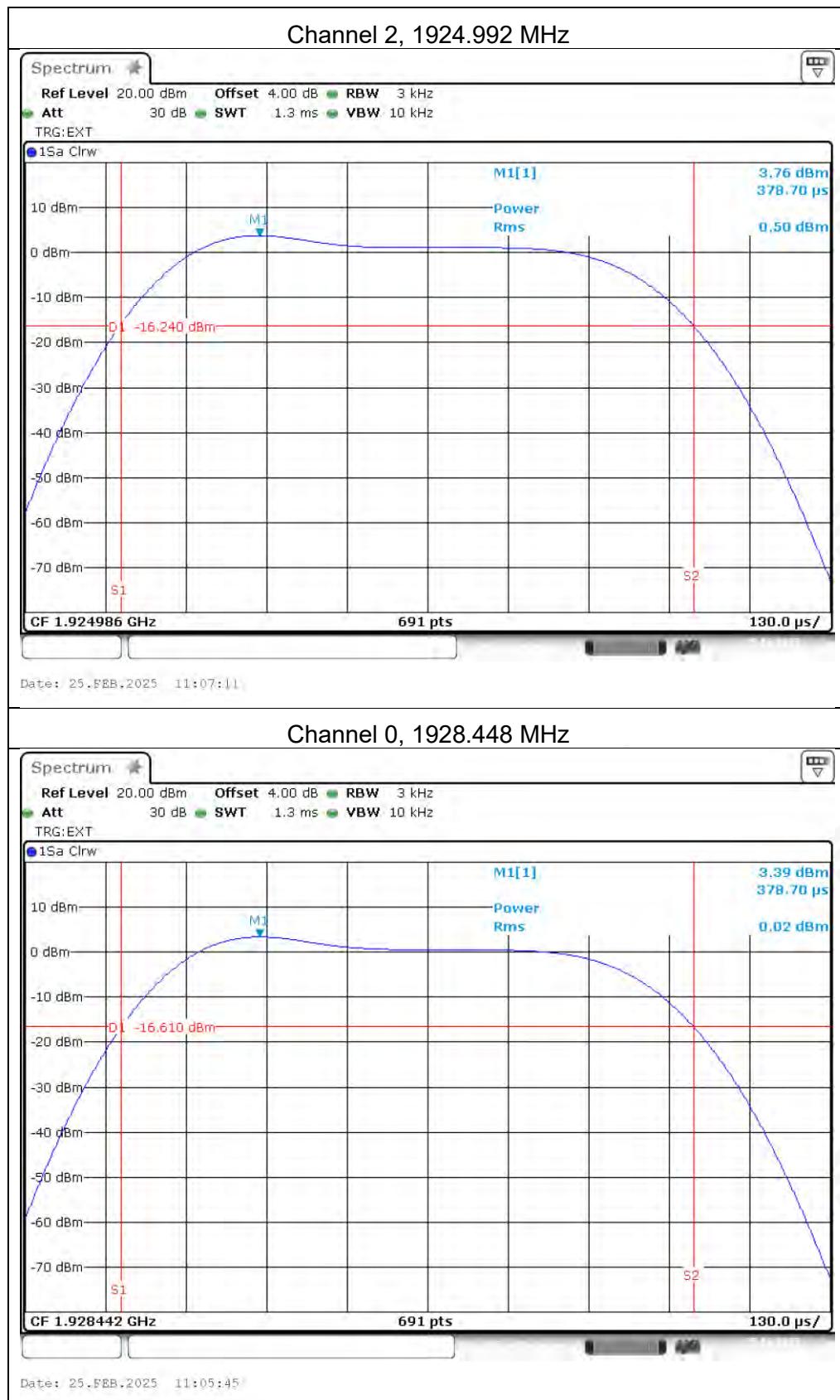




## PP64Z

Carrier Channel	Frequency (MHz)	Measured AVG Power Spectral Density (dBm)	Limit(mw)	Limit(dBm)
Low	1921.536	1.07	3	4.77
Mid	1924.992	0.50		
High	1928.448	0.02		







## 5.6 POWER ADJUSTMENT FOR ANTENNA GAIN

### TEST OVERVIEW

§15.319(e): The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 4.3.1, which provides the test methodology for this provision.

### TEST RESULT

Equipment Employs a 3.34 dBi(Dipole) and 4.84 dBi(PCB) Antenna. Max output power allowed with this gain by the EUT is 18.58dBm. The Max output power does not need to be reduced.

The Output Power complies with the Power Adjustment for Antenna Gain requirements of §15.319(e).



## 5.7 AUTOMATICALLY DISCONTINUE TRANSMISSION

### OVERVIEW

§15.319(f): The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

### TEST RESULTS

	Test	Reaction of EUT	Result
1	Remove Power from Companion Device	A	Pass
2	Switch off the companion device	A	Pass
3	Terminate call at the companion device	NA1	Pass
4	Switch off the EUT	NA2	Pass
5	Terminate call at the EUT	NA3	Pass

A - Connection was terminated and transmission ceased.

B - Connection was terminated but the EUT transmits control or signaling information.

C - Connection was terminated but the companion device transmits control or signaling information.

NA 1 - Companion Device does not have an on/off switch for terminate call.

NA 2 - EUT does not have an on/off switch.

NA 3 – EUT does not have a switch for terminate call.



## 5.8 SYSTEM ACKNOWLEDGE-MENT TEST

### TEST OVERVIEW

§ 15.323(c)(4): Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgments must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgment, at which time the access criteria must be repeated.

### TEST PROCEDURE

Measurement method according to ANSI C63.17 2013 clause 8.2.1

During testing initial transmission without acknowledgement, the signal from the EUT to the companion device is blocked by the circulator.

The test of the transmission time after loss of acknowledgements is performed by cutting off the signal from the companion device by a RF switch and measuring the time until the EUT stops transmitting.

### TEST SETUP

The test setup is shown in section 3.2 figure 2.

TEST RESULTSAntenna 1  
PP32Z

Test	Time taken (second)	Limit (second)	Result
Initial Connection acknowledgement	0.74	1	Pass
Change of access criteria for control information	N/A	30	N/A
Transmission cease time after loss of acknowledgement	3.77	30	Pass

## PP64Z

Test	Time taken (second)	Limit (second)	Result
Initial Connection acknowledgement	0.63	1	Pass
Change of access criteria for control information	N/A	30	N/A
Transmission cease time after loss of acknowledgement	4.57	30	Pass

Antenna 2  
PP32Z

Test	Time taken (second)	Limit (second)	Result
Initial Connection acknowledgement	0.47	1	Pass
Change of access criteria for control information	N/A	30	N/A
Transmission cease time after loss of acknowledgement	4.16	30	Pass

## PP64Z

Test	Time taken (second)	Limit (second)	Result
Initial Connection acknowledgement	0.58	1	Pass
Change of access criteria for control information	N/A	30	N/A
Transmission cease time after loss of acknowledgement	4.72	30	Pass



## 5.9 MONITORING THRESHOLD

### TEST OVERVIEW

§15.323 (c)(2). The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by the device.

§15.323 (c)(9). Devices that have a power output lower than the maximum permitted under this sub-part may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 7.3, which provides the test methodology for this provision. The Clause states that the lower threshold is for devices that do not use the LIC procedure. The equation for the lower monitoring threshold is given in ANSI C63.17 Clause 4.3.4.

### TEST SETUP

The test setup is shown in section 3.2 figure 2.

### TEST RESULTS

Antenna 1  
PP32Z

Upper Threshold		
B	1250000	Hz
Mu	50	dB
Peut	18.43	dBm
TU	-60.976	dBm
Lower Threshold		
B	1250000	Hz
MI	30	dB
Peut	18.58	dBm
TL	-81.126	dBm

PP64Z

Upper Threshold		
B	1224000	Hz
Mu	50	dB
Peut	18.41	dBm
TU	-61.093	dBm
Lower Threshold		
B	1224000	Hz
MI	30	dB
Peut	18.55	dBm
TL	-81.233	dBm

Antenna 2  
PP32Z

Upper Threshold		
B	1242000	Hz
Mu	50	dB
Peut	17.77	dBm
TU	-60.358	dBm
Lower Threshold		
B	1242000	Hz
MI	30	dB
Peut	18.17	dBm
TL	-80.758	dBm

## PP64Z

Upper Threshold		
B	1229000	Hz
Mu	50	dB
Peut	17.85	dBm
TU	-60.507	dBm
Lower Threshold		
B	1229000	Hz
MI	30	dB
Peut	18.16	dBm
TL	-80.817	dBm

ATTESTATION

The sensor will go into hibernation after a few minutes. It is not possible to keep a connection running very long. Therefore, this requirement is not applicable.

## 5.10 DURATION OF TRANSMISSION

### TEST OVERVIEW

§15.323 (c)(3) If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 4, which provides the test methodology for this provision. A communication link is established between BS and MS in a conducted mode and in a room without other US DECT devices to prevent influence from other transmissions. According to FCC Part 15.323(c)(3), the access criteria have to be verified at least every 8 hours. The following test is performed:

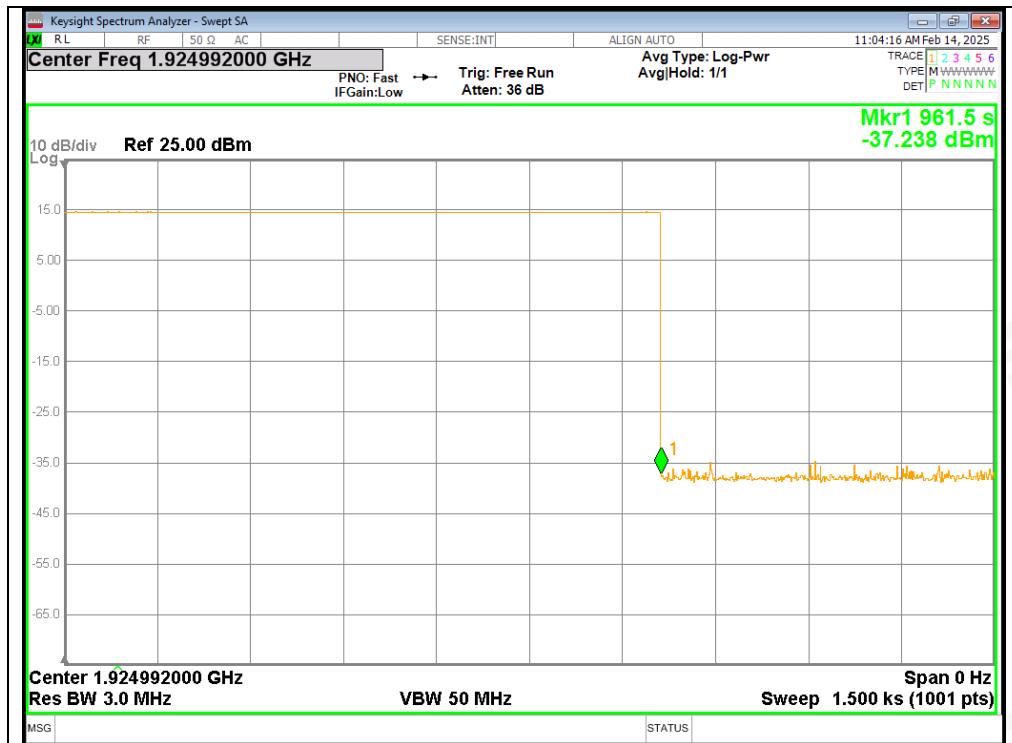
### TEST SETUP

The test setup is shown in section 3.2 figure 2.

### TEST RESULT

Antenna 1  
PP32Z

Test ref. to ANSI C63.17:2013 clause 8.2.2	Observation result(H)	Limit(H)	Verdict
Transmission duration on same time and frequency window	0.2671	8	Pass



PP64Z

Test ref. to ANSI C63.17:2013 clause 8.2.2	Observation result(H)	Limit(H)	Verdict
Transmission duration on same time and frequency window	0.2658	8	Pass



Antenna 2  
PP32Z

Test ref. to ANSI C63.17:2013 clause 8.2.2	Observation result(H)	Limit(H)	Verdict
Transmission duration on same time and frequency window	0.2738	8	Pass



PP64Z

Test ref. to ANSI C63.17:2013 clause 8.2.2	Observation result(H)	Limit(H)	Verdict
Transmission duration on same time and frequency window	0.2704	8	Pass





## 5.11 SELECTED CHANNEL CONFIRMATION, POWER ACCURACY, SEGMENT OCCUPANCY TEST OVERVIEW

§15.323 (c)(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for this comparison must be accurate to within 6 dB. No device or group of co-operating devices located within 1 meter of each other shall during any frame period occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the system.

## TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 7.3.2. & 7.3.3, which provides the test methodology for this provision. The current product offers 12 duplex channels per frequency channel and therefore  $12 \times 5 = 60$  duplex channels in total. Hence Part §15.323(c)(5) applies. The equation for the upper monitoring threshold is given in ANSI C63.17 Clause 4.3.3. Max measured interference level (dBm) = -85.02 dBm

## TEST SETUP

The test setup is shown in section 3.2 figure 2.

## MONITORING LIMIT THRESHOLD

The EUT's monitoring limit threshold power at the monitoring antenna terminals shall be less than a maximum, shown in Equation (3):

$$T_L \leq (-174 + 10\log B + M_L + P_{MAX} - P_{EUT}) \text{ dBm}$$

$M_L$  is a level specified by the manufacturer and is the maximum amount in decibels by which the limiting threshold may exceed thermal noise for an EUT transmitting the maximum allowed power.

Calculation of monitoring threshold limits for isochroous devices:

Lower threshold:  $T_L = -174 + 10\log_{10} B + M_L + P_{MAX} - P_{EUT}$  (dBm)

Where:  $B$  = Emission bandwidth (Hz)

$M_L$  = dB the threshold may exceed thermal noise (30 for  $T_L$ )

$P_{MAX} = 5\log_{10} B - 10$  (dBm)

$P_{EUT}$  = Transmitted power (dBm)



## Antenna 1

## PP32Z

Monitor Threshold	B(Hz)	ML(dB)	PMAX(dBm)	PEUT(dBm)	Threshold(dBm)
Lower threshold	1288333	30	20.55	19.52	-81.87

## PP64Z

Monitor Threshold	B(Hz)	ML(dB)	PMAX(dBm)	PEUT(dBm)	Threshold(dBm)
Lower threshold	1224000	30	20.439	18.55	-81.233

## Antenna 2

## PP32Z

Monitor Threshold	B(Hz)	ML(dB)	PMAX(dBm)	PEUT(dBm)	Threshold(dBm)
Lower threshold	1229000	30	20.448	18.16	-80.816

## PP64Z

Monitor Threshold	B(Hz)	ML(dB)	PMAX(dBm)	PEUT(dBm)	Threshold(dBm)
Lower threshold	1242000	30	20.471	18.17	-80.758

Note: 1. The upper threshold is applicable as the EUT utilizes more than 20 duplex system channels



## TEST RESULTS

### 1) LIC procedure test:

Interference (Refer to ANSI C63.17 clause 7.3.3)	Reaction fo EUT	Results
a) Apply the interference on $f_1$ at level $T_L+U_M+7\text{dB}$ and the interference on $f_2$ at level $T_L+U_M$ . Initiate transmission and verify the transmission only on $f_2$ .Repeat 5 times.	EUT transmits on $f_2$	Pass
b) Apply the interference on $f_1$ at level $T_L+U_M$ and the interference on $f_2$ at level $T_L+U_M+7\text{dB}$ . Initiate transmission and verify the transmission only on $f_1$ .Repeat 5 times.	EUT transmits on $f_1$	Pass
c) Apply the interference on $f_1$ at level $T_L+U_M+1\text{dB}$ and the interference on $f_2$ at level $T_L+U_M-6\text{dB}$ . Initiate transmission and verify the transmission only on $f_2$ .Repeat 5 times.	EUT transmits on $f_2$	Pass
d) Apply the interference on $f_1$ at level $T_L+U_M-6\text{dB}$ and the interference on $f_2$ at level $T_L+U_M+1\text{dB}$ . Initiate transmission and verify the transmission only on $f_2$ .Repeat 5 times.	EUT transmits on $f_1$	Pass

### 2) Selected channel confirmation:

Interference (Refer to ANSI C63.17 clause 7.3.4)	Reaction fo EUT	Results
a) Apply the interference on $f_1$ at level $T_L+U_M$ and no interference on $f_2$ . Initiate transmission and verify the transmission only on $f_2$ .Then terminate it.	EUT transmits on $f_2$	Pass
b) Apply the interference on $f_2$ at level $T_L+U_M$ and immediately remove all interference from $f_2$ . The EUT should immediately attempt transmission $f_1$ (but at least 20ms after the interference on $f_2$ is applied), verify the transmission only on $f_1$ .	EUT transmits on $f_1$	Pass



## 5.12 RANDOM WAITING TEST CRITERIA

§15.323 (c)(6) if the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 8.1.3, which provides the test methodology for this provision.

### ATTESTATION

The Manufacturer declared that this provision is not utilized by the EUT.



## 5.13 MONITORING REQUIREMENTS

### TEST CRITERIA

§15.323 (c)(7) The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and have a maximum reaction time less than  $50 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$  microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds. If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be  $35 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$  microseconds but shall not be required to be less than 35 microseconds.

### TEST PROCEDURE

Measurement method according to ANXI C63.17 2013 clause 7.5

- Restrict the EUT to a single transmit carrier frequency  $f_1$ , and verify that the EUT can establish a connection with no interference applied on  $f_1$ .
- Apply time-synchronized, pulsed interference on  $f_1$  at the pulsed level  $TL+UM$ , verify that the EUT does not establish a connection when the width of the interference pulse exceeds the largest of  $50\mu\text{s}$  and  $50\sqrt{1.25/B}\mu\text{s}$ , where  $B$  is the emission bandwidth of the EUT in megahertz.
- With the channel interference level 6dB above  $TL+UM$ , verify that the EUT does not establish a connection when the width of the interference pulse exceeds the largest of  $35\mu\text{s}$  and  $35\sqrt{1.25/B}\mu\text{s}$ , where  $B$  is the emission bandwidth of the EUT in megahertz.

#### Antenna 1

##### PP32Z

Test pulse width Equation( $\mu\text{s}$ )	B(bandwidth)(MHz)	Pulse width( $\mu\text{s}$ )	Limit(Largest)( $\mu\text{s}$ )
$50(1.25/B)^{1/2}$	1.224	50.528	50
$35(1.25/B)^{1/2}$	1.224	35.370	35

##### PP64Z

Test pulse width Equation( $\mu\text{s}$ )	B(bandwidth)(MHz)	Pulse width( $\mu\text{s}$ )	Limit(Largest)( $\mu\text{s}$ )
$50(1.25/B)^{1/2}$	1.250	50.000	50
$35(1.25/B)^{1/2}$	1.250	35.000	35

#### Antenna 2

##### PP32Z

Test pulse width Equation( $\mu\text{s}$ )	B(bandwidth)(MHz)	Pulse width ( $\mu\text{s}$ )	Limit(Largest) ( $\mu\text{s}$ )
$50(1.25/B)^{1/2}$	1.229	50.425	50
$35(1.25/B)^{1/2}$	1.229	35.298	35

##### PP64Z

Test pulse width Equation( $\mu\text{s}$ )	B(bandwidth)(MHz)	Pulse width ( $\mu\text{s}$ )	Limit(Largest) ( $\mu\text{s}$ )
$50(1.25/B)^{1/2}$	1.242	50.161	50
$35(1.25/B)^{1/2}$	1.242	35.113	35



### TEST SETUP

The test setup is shown in section 3.2 figure 2.

### TEST RESULTS

#### 1) Monitoring Bandwidth:

The antenna of the EUT used for monitoring is the same interior antenna that used for transmission, so the monitoring system bandwidth is equal to the emission bandwidth of the intended transmission.

#### 2) Reaction Time Test:

No.	Interference Pulse width(μs)	Reaction of EUT	Observing time(μs)	Result
1	50 μs with level $T_L+U_m$	No transmission	50	Pass
2	35 μs with level $T_L+U_M +6dB$	No transmission	35	Pass



## 5.14 MONITORING ANTENNA TEST CRITERI

§15.323 (c)(8) Transmission is intended to occupy. The following criteria must be met: (8) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 4, which provides the test methodology for this provision.

### ATTESTATION

The EUT uses the same antennas for transmission and reception as for monitoring

## 5.15 DUPLEX CONNECTIONS

### TEST CRITERIA

§15.323 (c)(10) An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 8.3, which provides the test methodology for this provision. The MS is the initiating device and the BS is the companion device.

### TEST RESULTS

The Manufacturer declares that this provision is not utilized by the EUT.



## 5.16 ALTERNATIVE MONITORING INTERVAL FOR CO-LOCATED DEVICES

### TEST CRITERIA

§15.323 (c)(11) an initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The Monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within the 1.25 mhz frequency channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in The intended transmit window by the initiating device may commence.

### TEST PROCEDURE

Testing to ANSI C63.17-2013 Clause 8.4, which provides the test methodology for this provision. The MS is initiating device and the BS is the companion device.

### TEST RESULTS

The Manufacturer declares that this provision is not utilized by the EUT.

## 5.17 FAIR ACCESS

### TEST CRITERIA

§15.323 (c)(12) The provisions of (c)(10) or (c)(11) of this section shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

### TEST PROCEDURE

The manufacturer supplies an attestation.

### ATTESTATION

The manufacturer declares that the EUT does not work in a mode which denies fair access to spectrum for other devices.

## 5.18 SPURIOUS EMISSIONS

### TEST CRITERIA

#### §15.323(d)(1): Out of Band Emissions

Emissions shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the band edge and 1.25 MHz above or below the band; 50 dB between 1.25 and 2.5 MHz above or below the band; and 60 dB at 2.5 MHz or greater above or below the band.

#### §15.323(d)(2): In-Band Emissions

Emissions inside the band must comply with the following emission mask: In the bands between 1B and 2B measured from the center of the emission bandwidth, the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device; in the bands between 2B and 3B measured from the center of the emission bandwidth, the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and the band edge, the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. "B" is defined as the emission bandwidth of the device in hertz. Compliance with the emission limits is based on the use of measurement instrumentation employing peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

### TEST PROCEDURE

For both in and out of band emissions the EUT was connected directly to a spectrum analyzer. The RBW of the spectrum analyzer was set to a minimum 1% of the emission band width.

### TEST SETUP

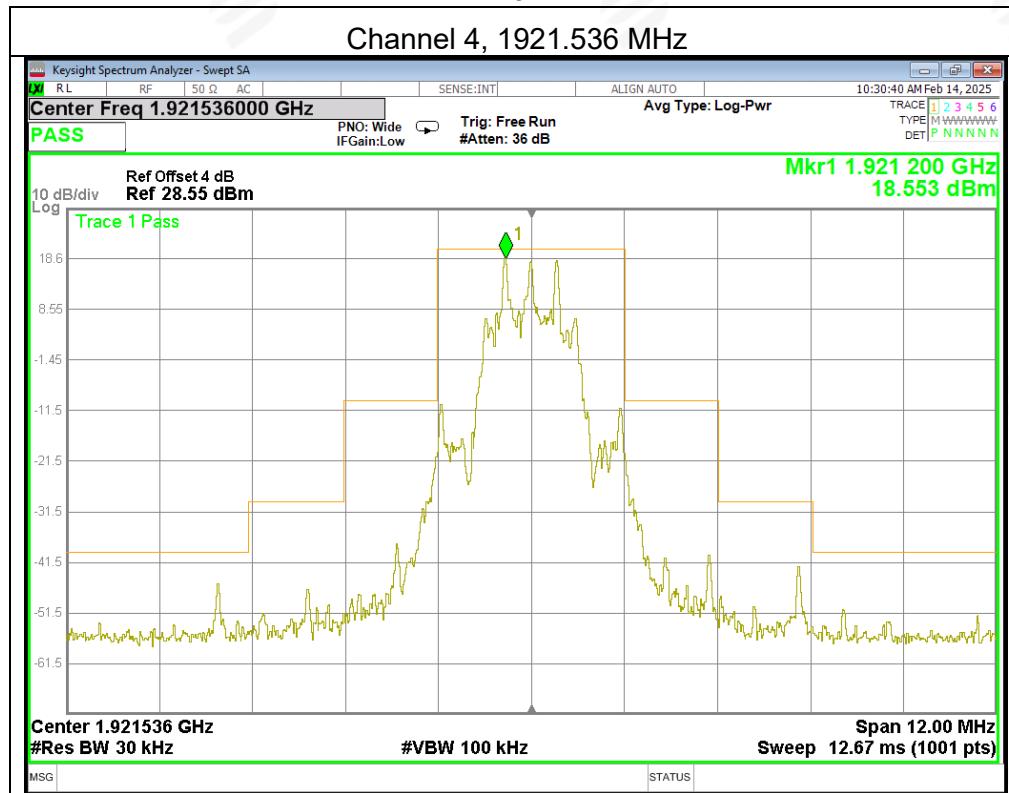
The test setup is shown in section 3.2 figure 1.

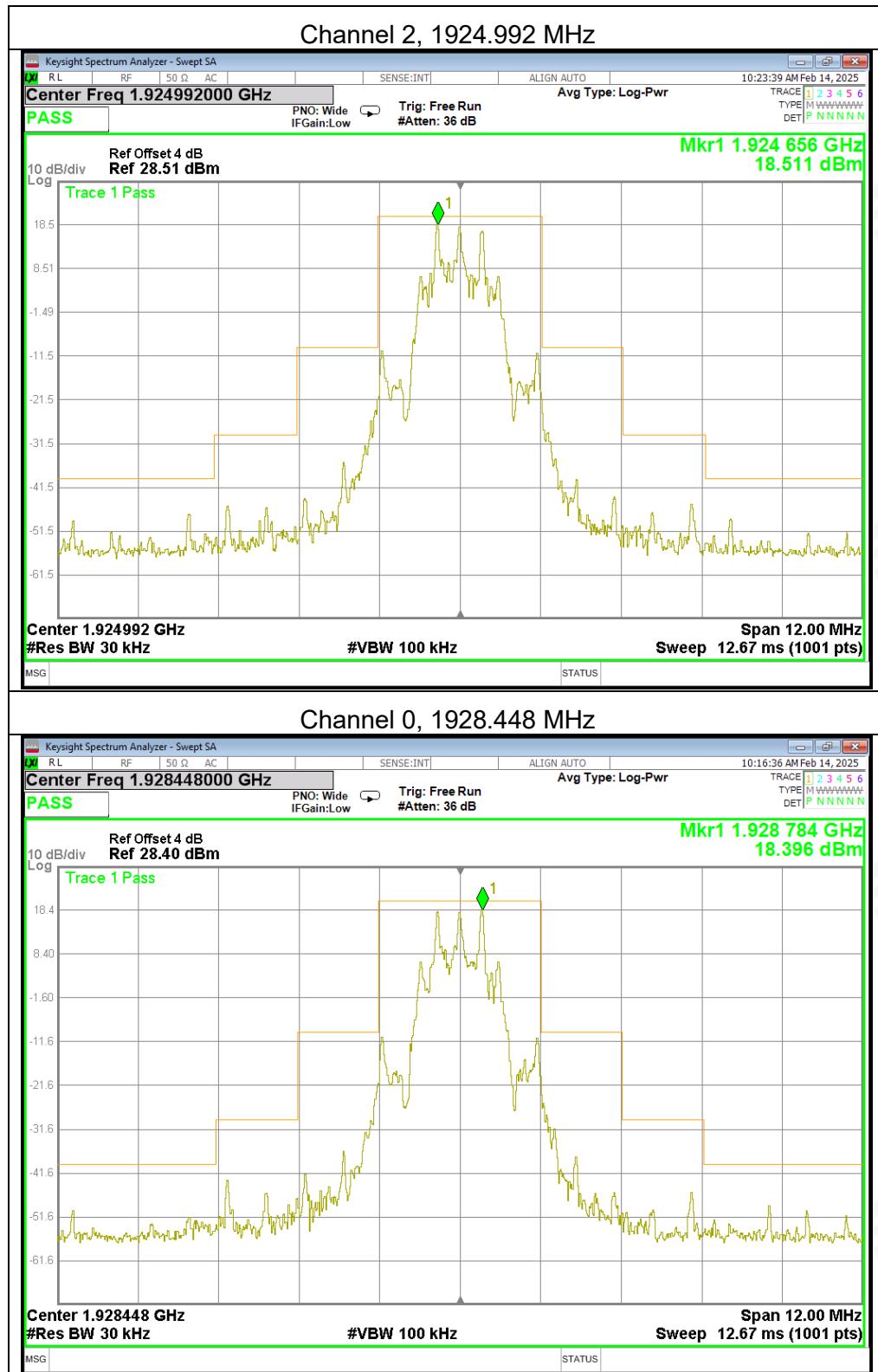
### TEST RESULTS

Equipment complies with the Spurious Emission limits of § 15.323(d)(1).

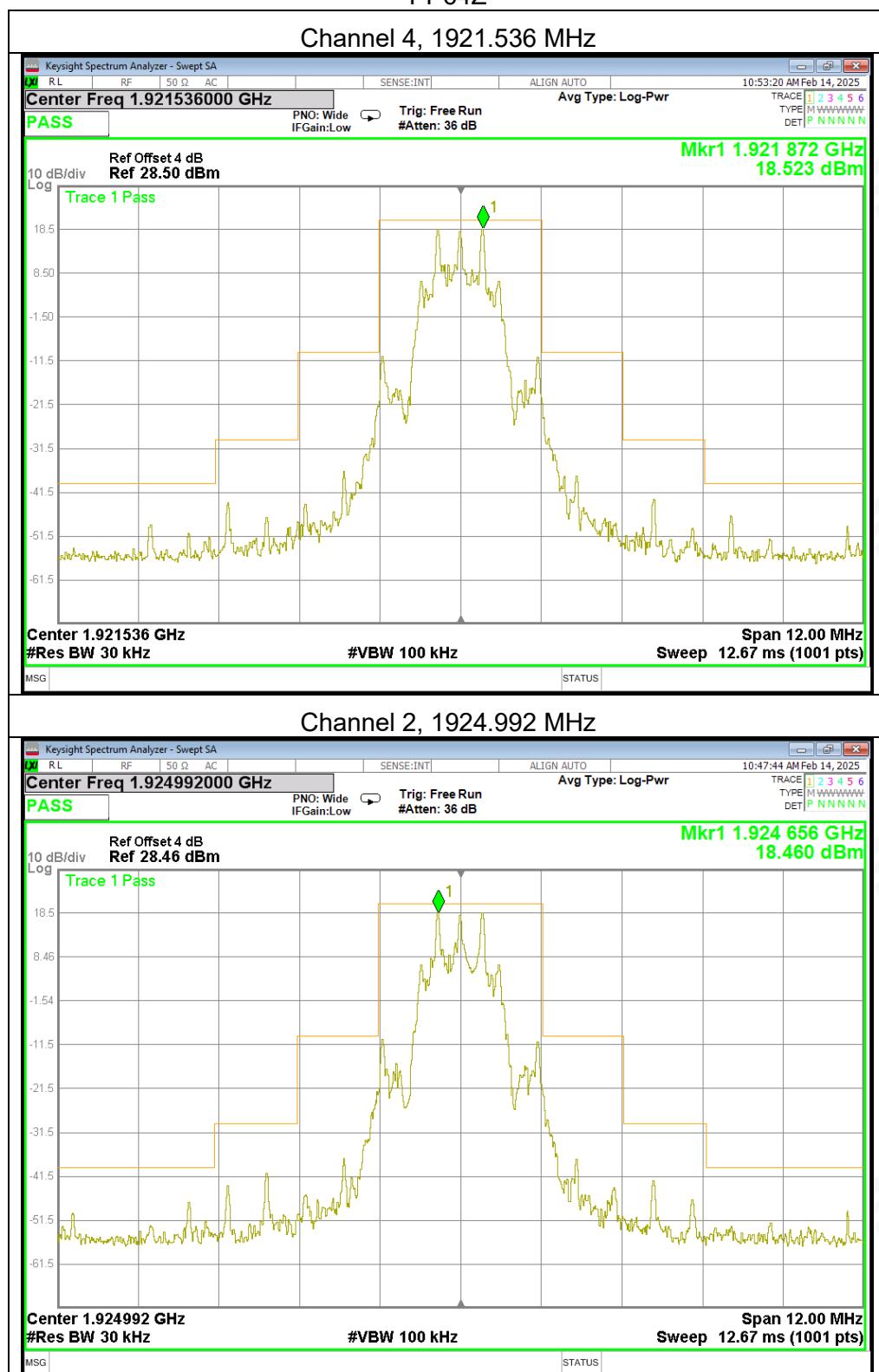
#### In-Band Emissions

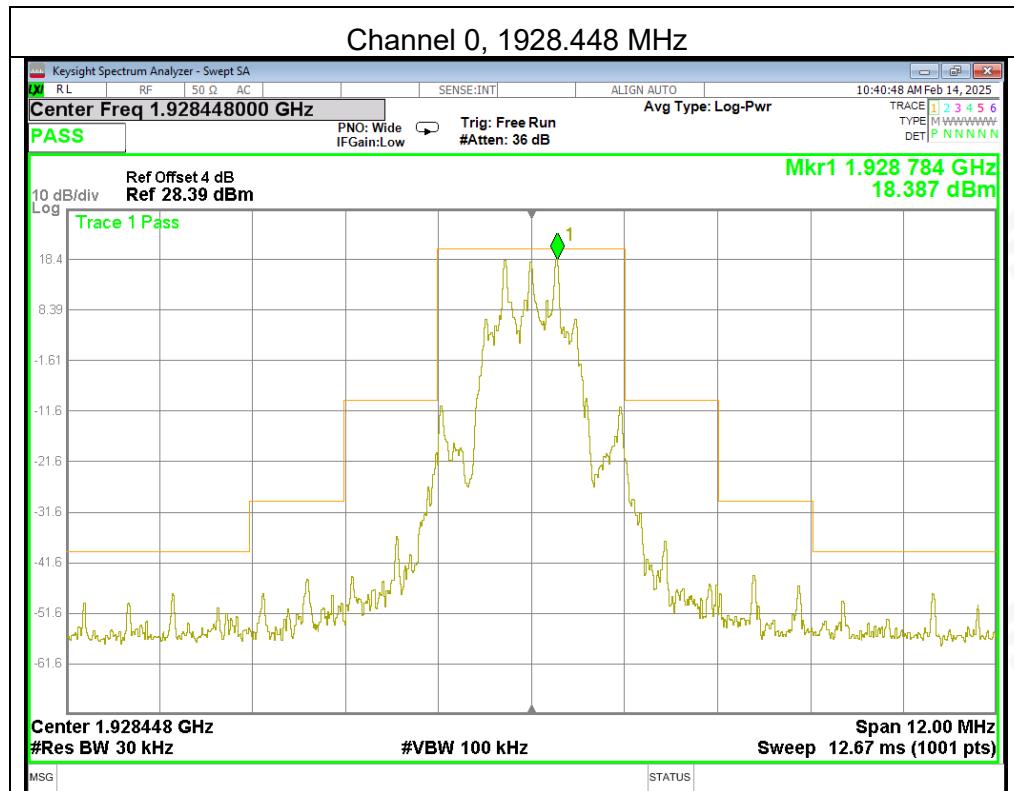
Antenna 1  
PP32Z

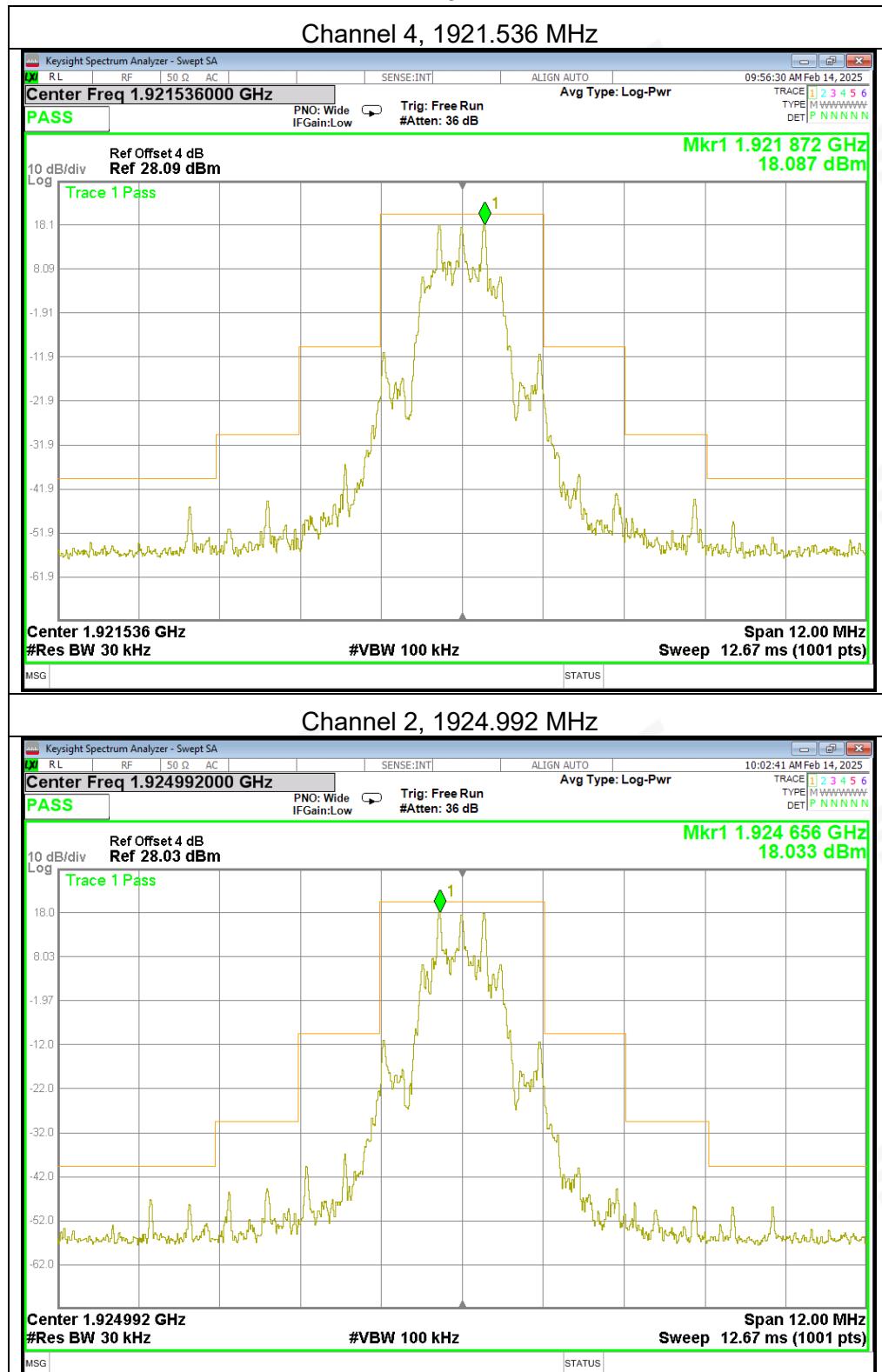


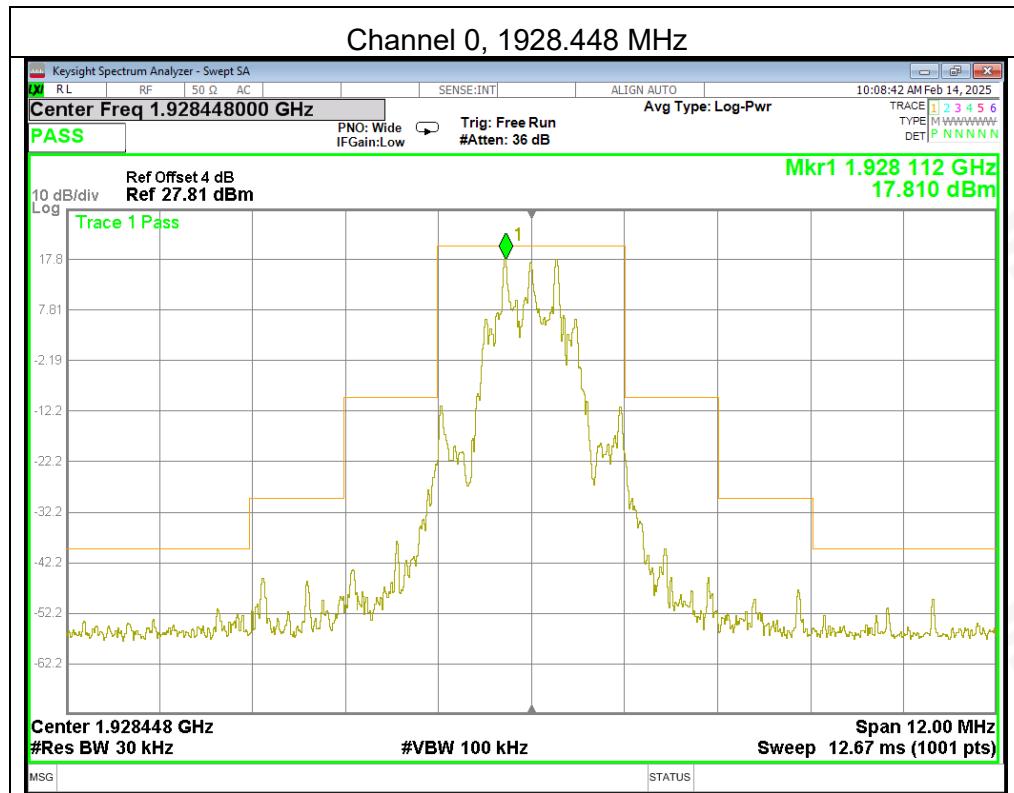


PP64Z

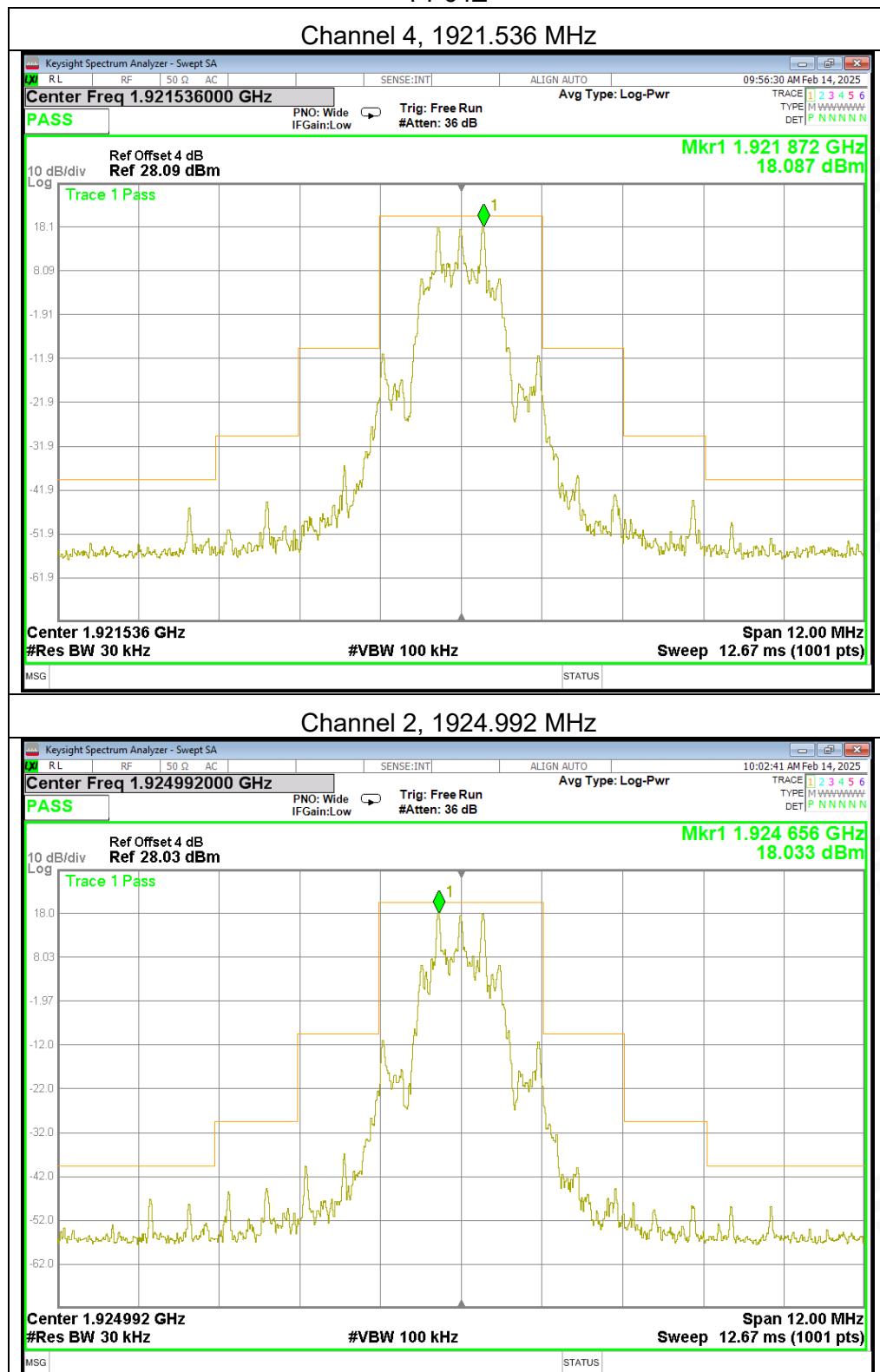


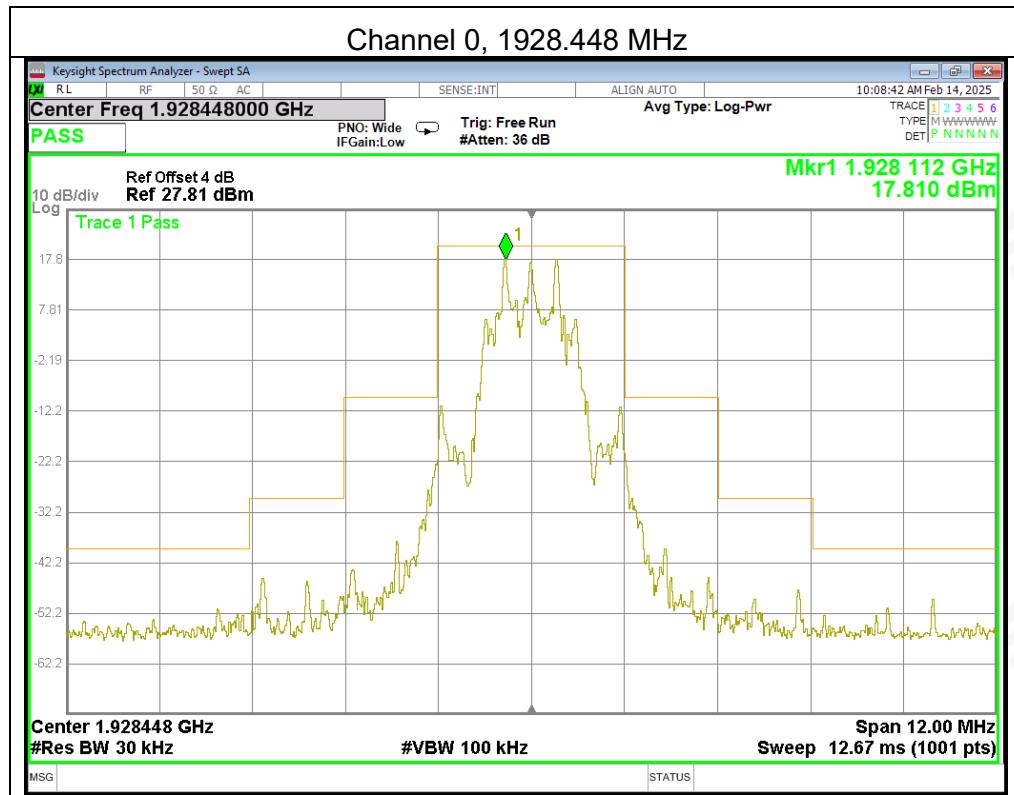


Antenna 2  
PP32Z



PP64Z



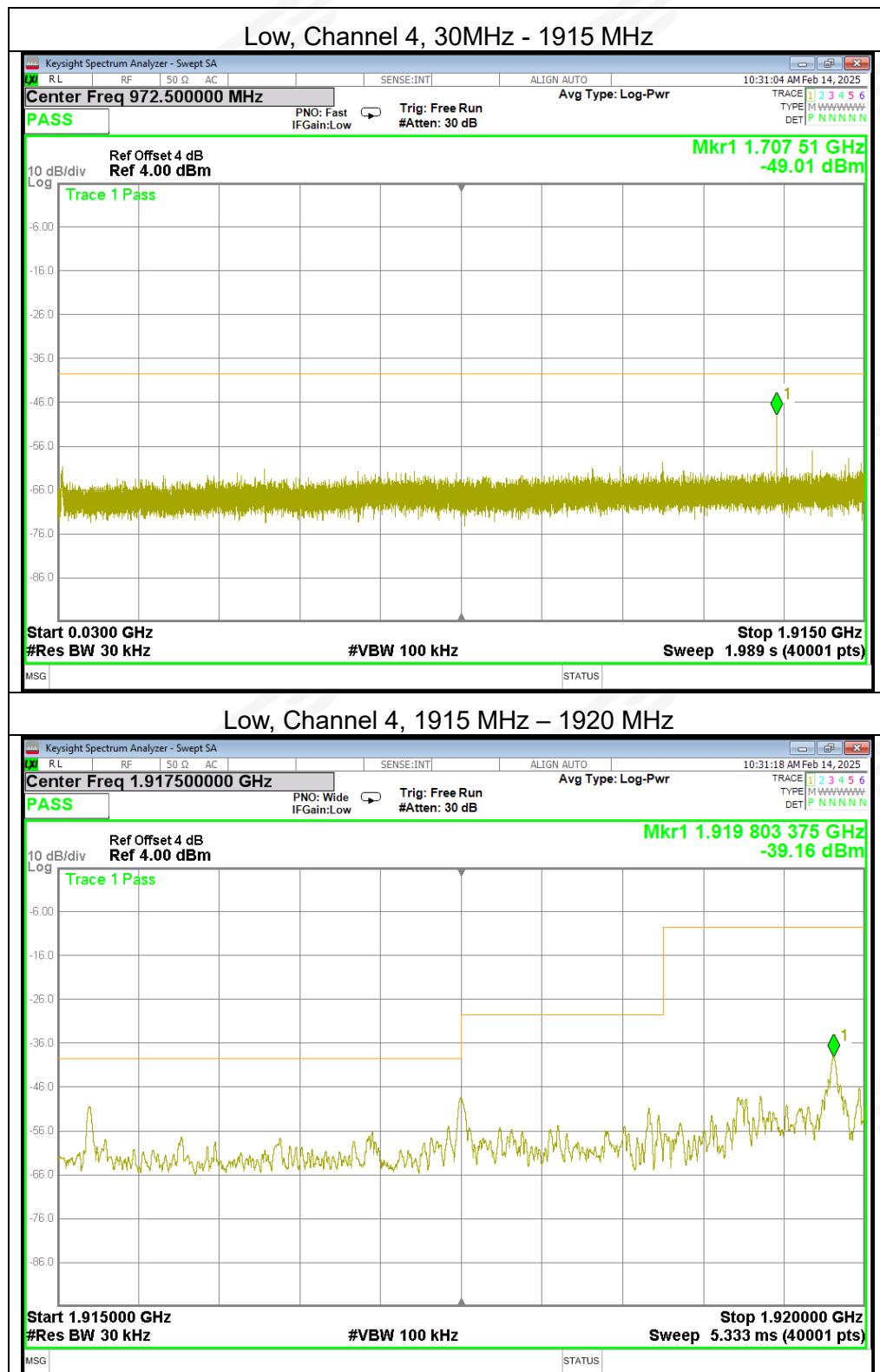


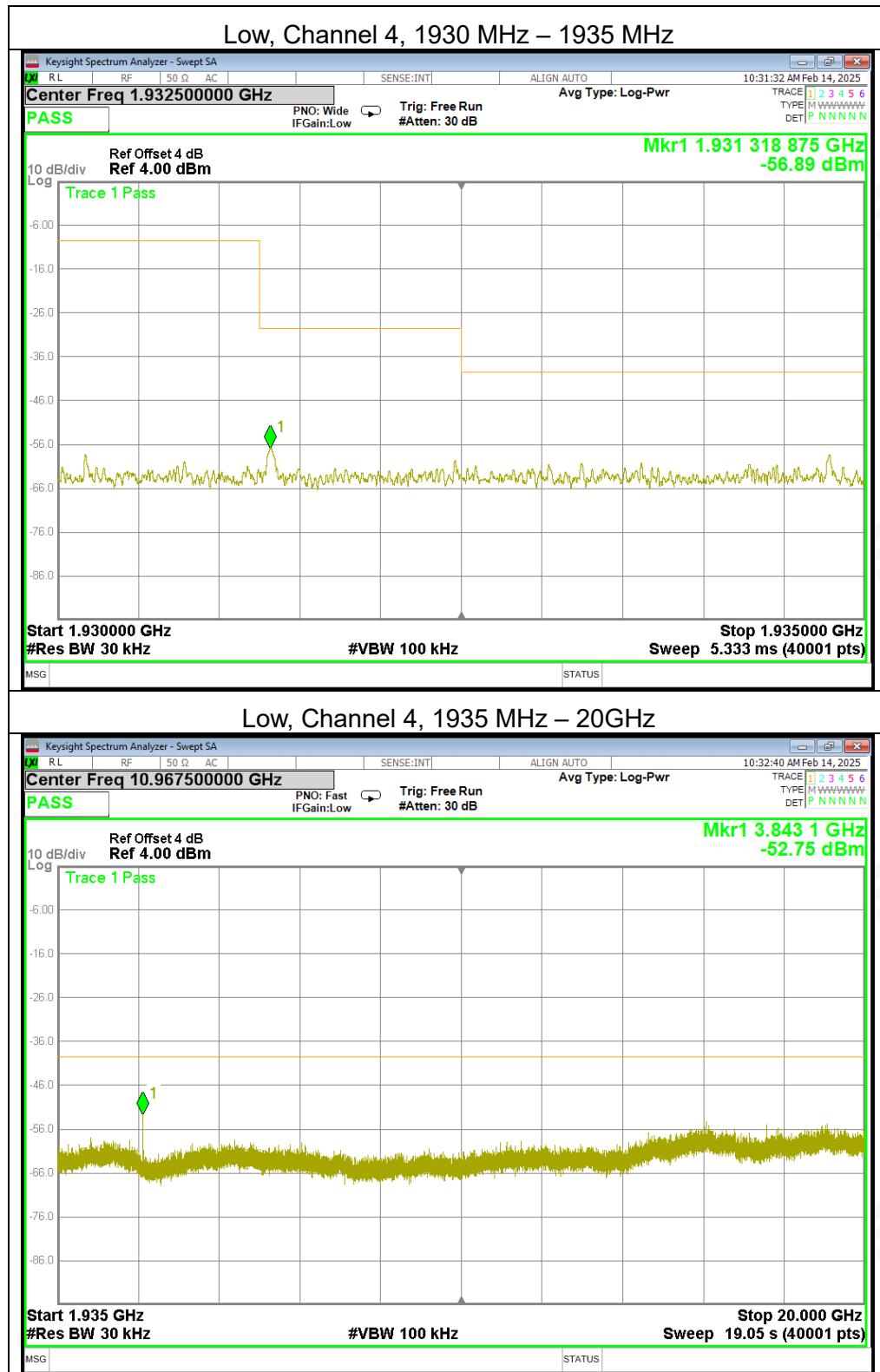


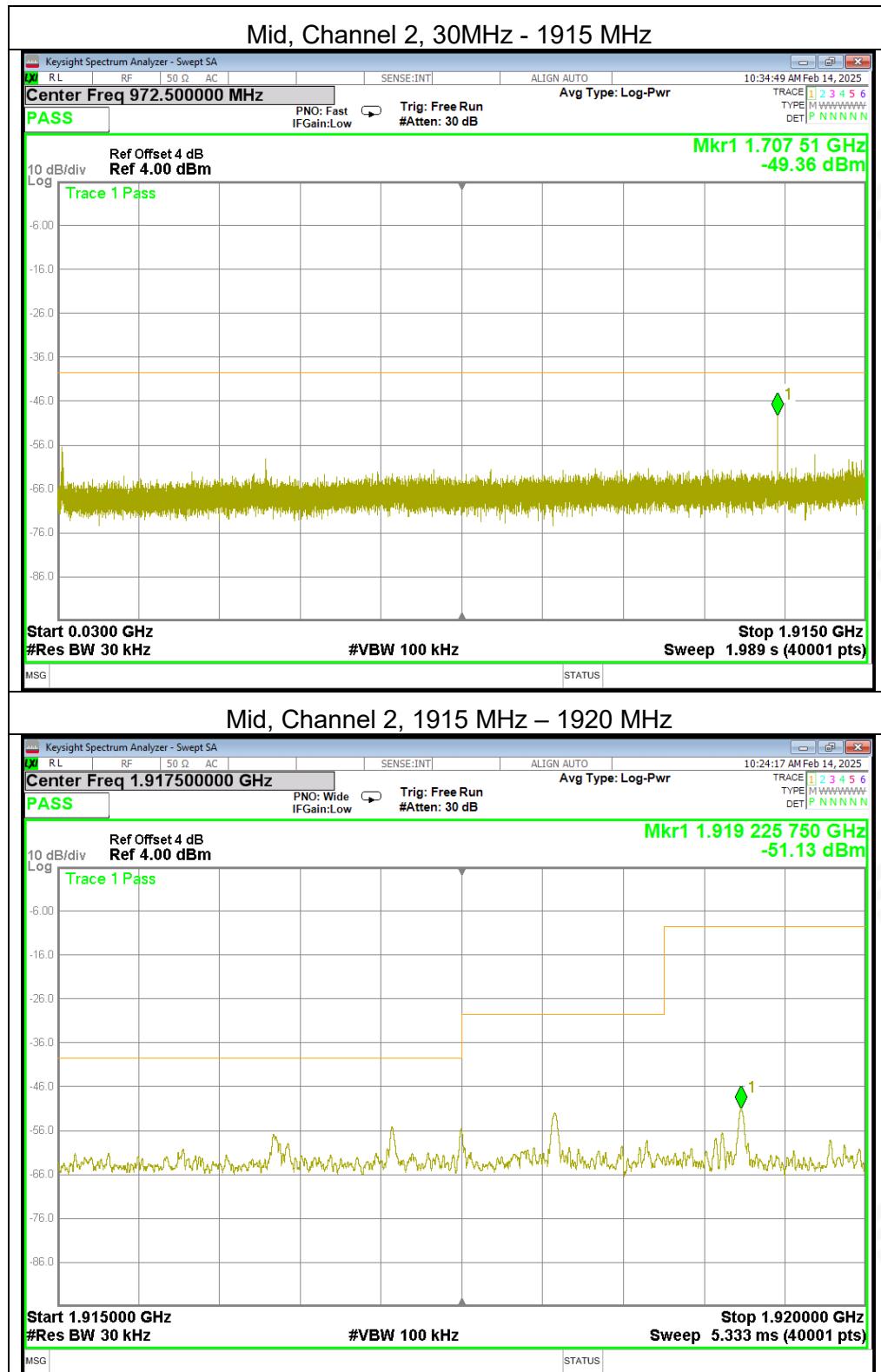
## Out of Band Emissions

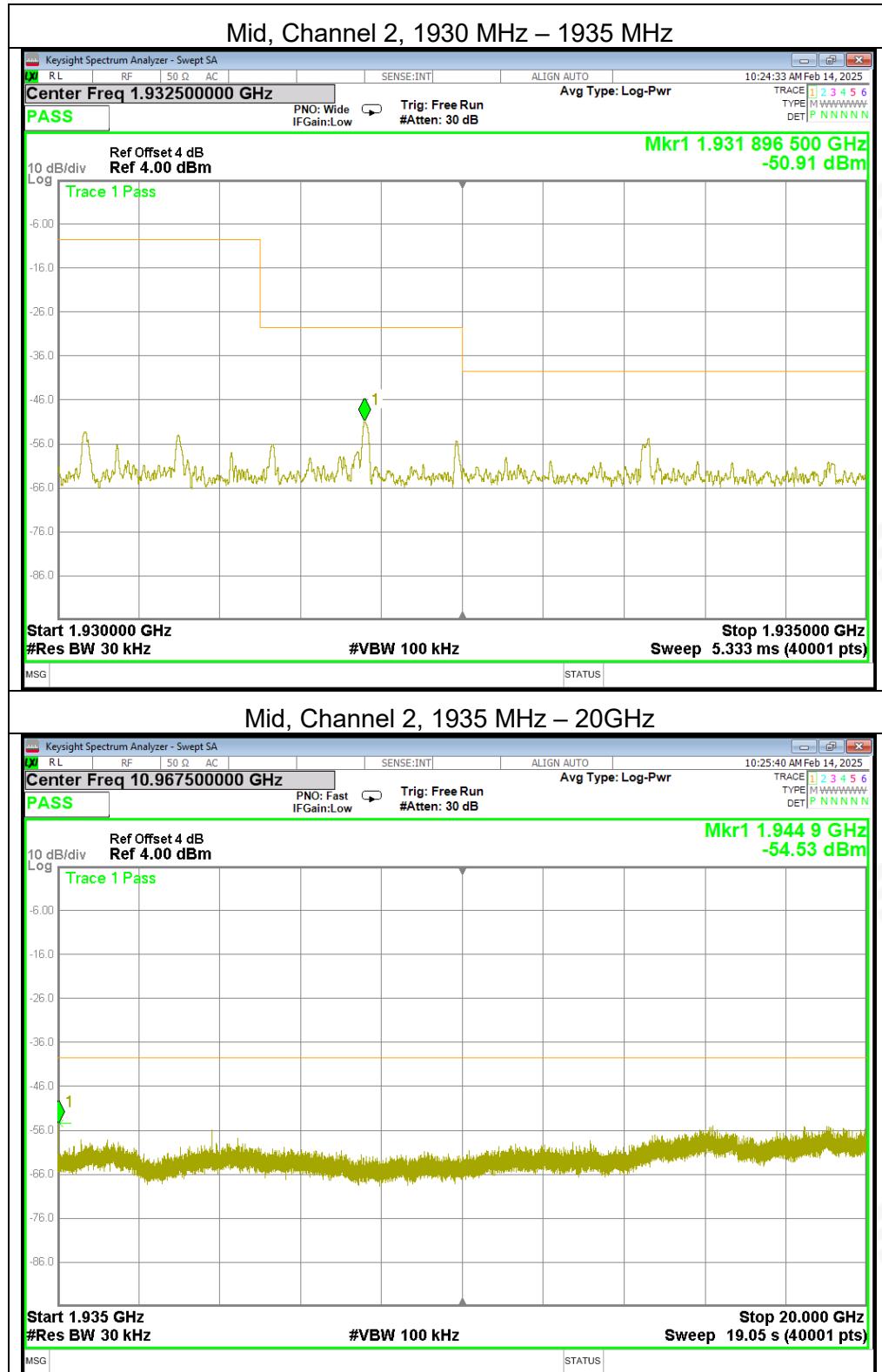
## Antenna 1

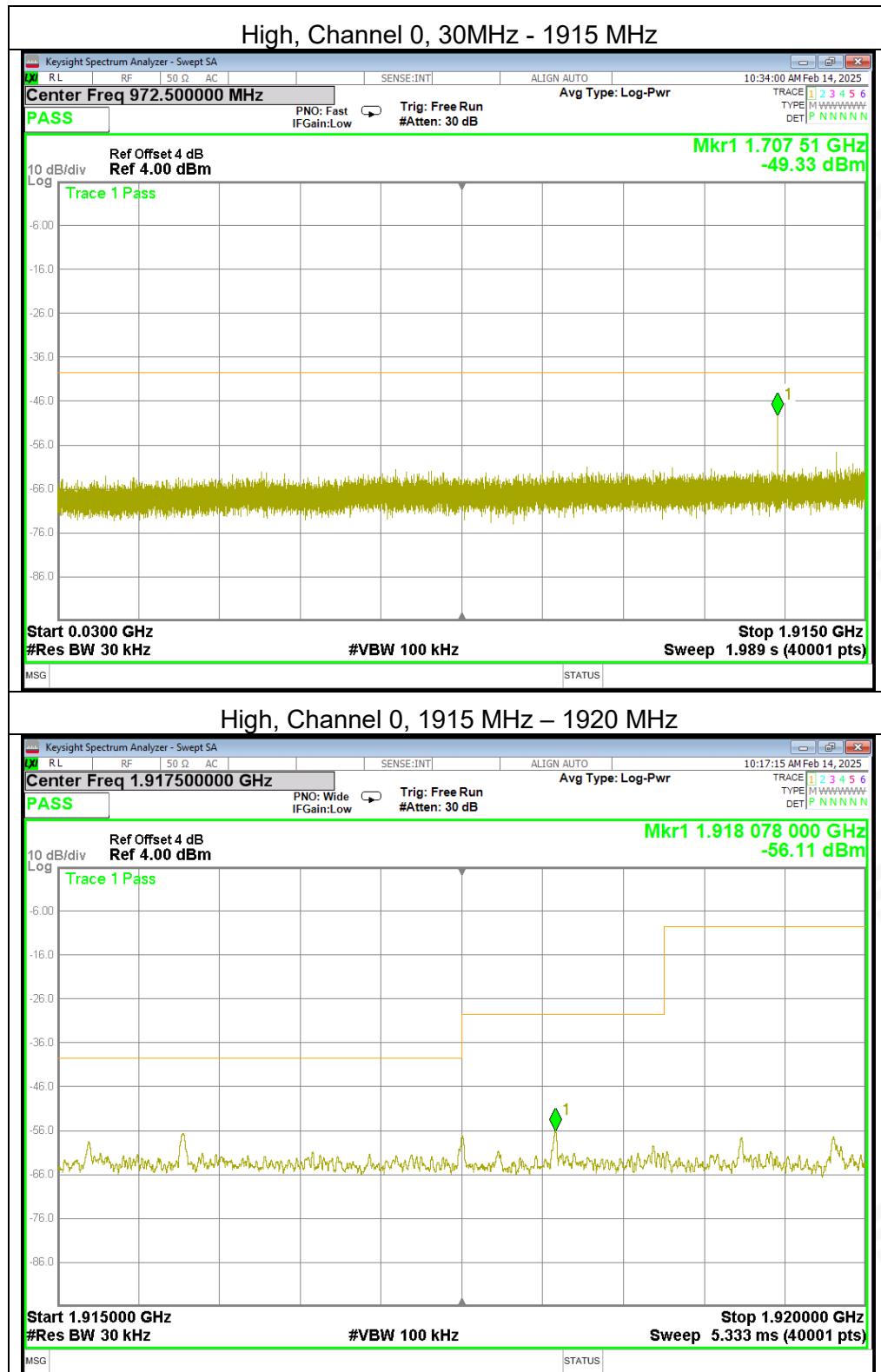
PP32Z

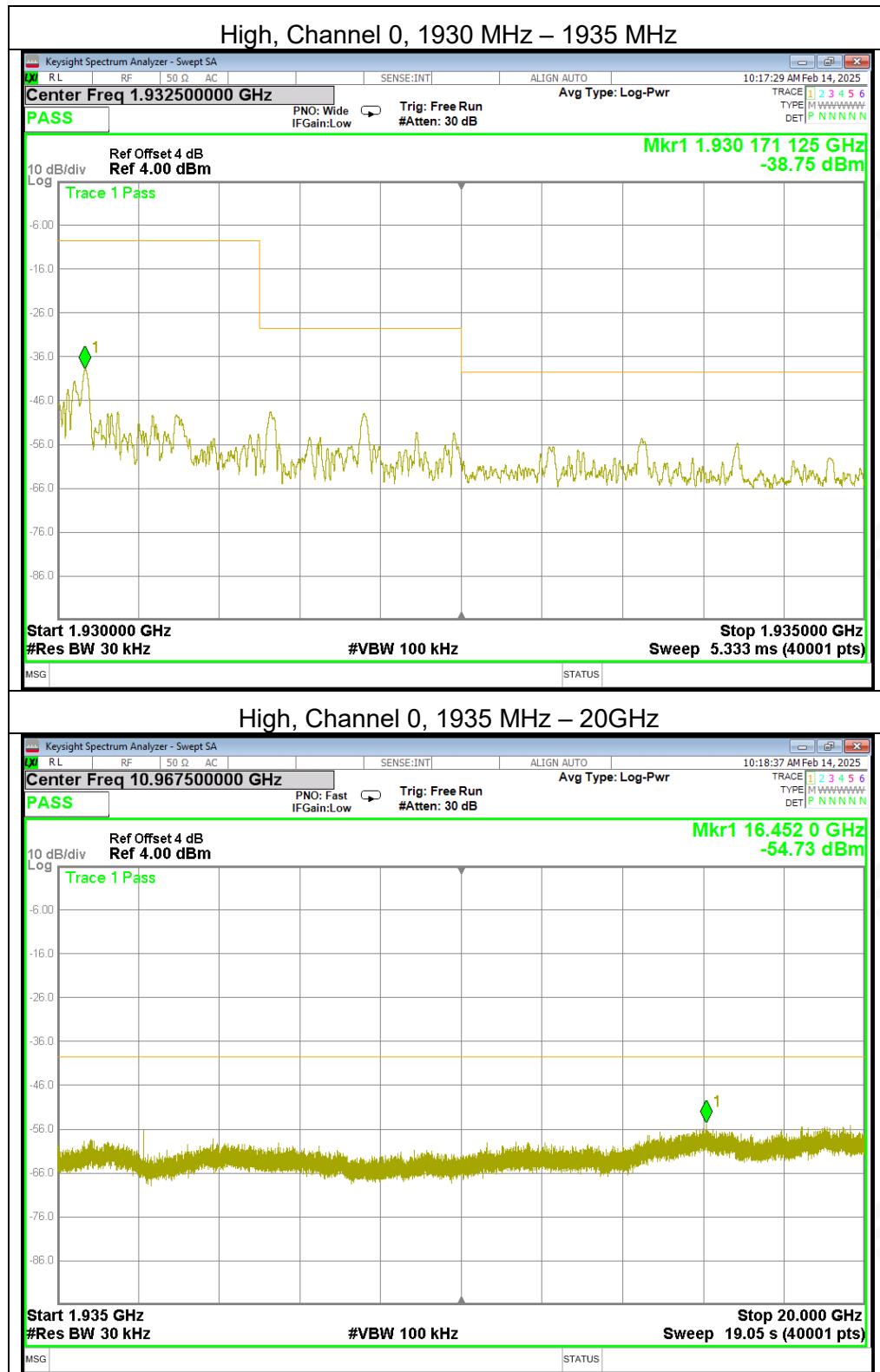






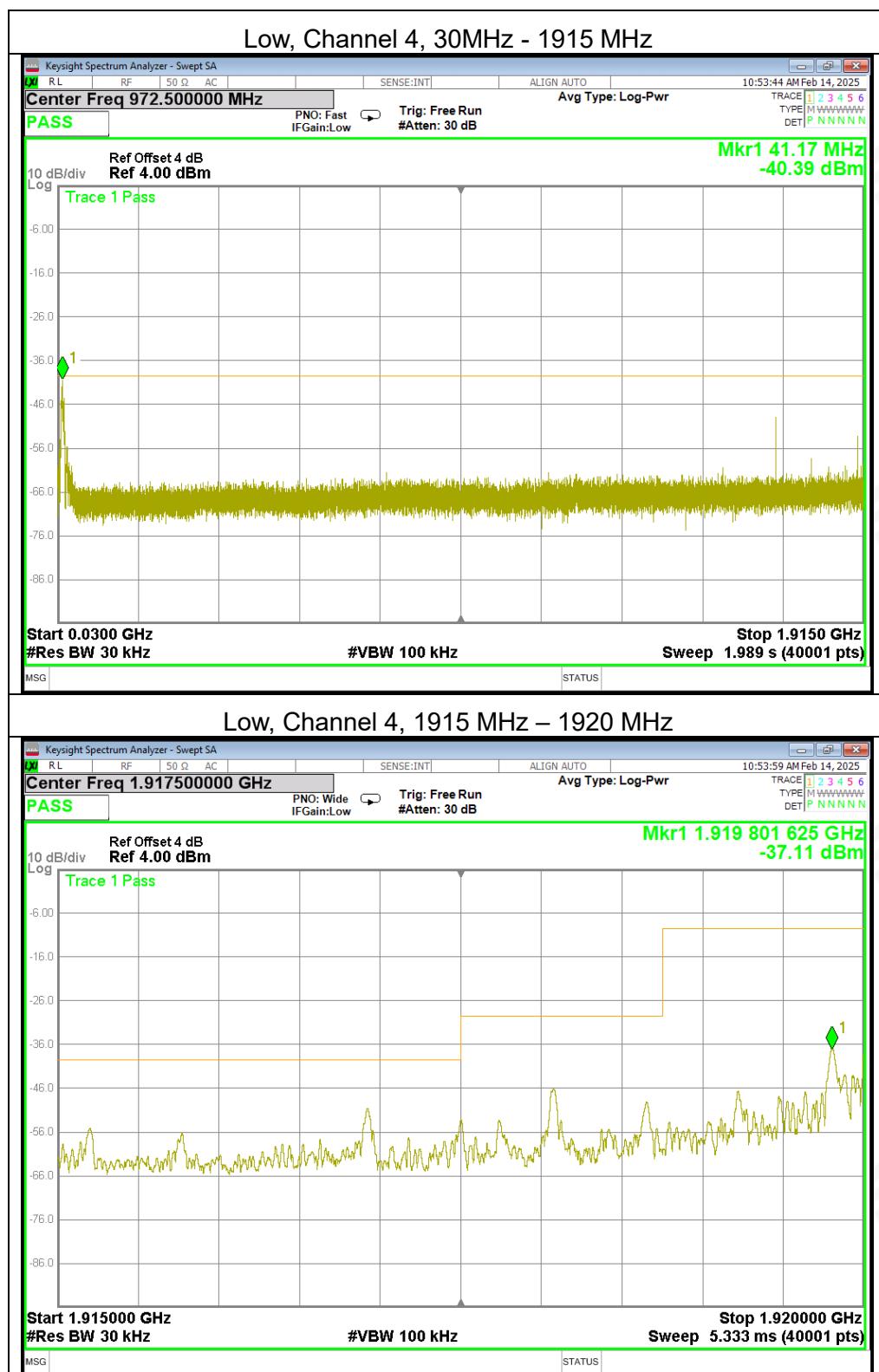


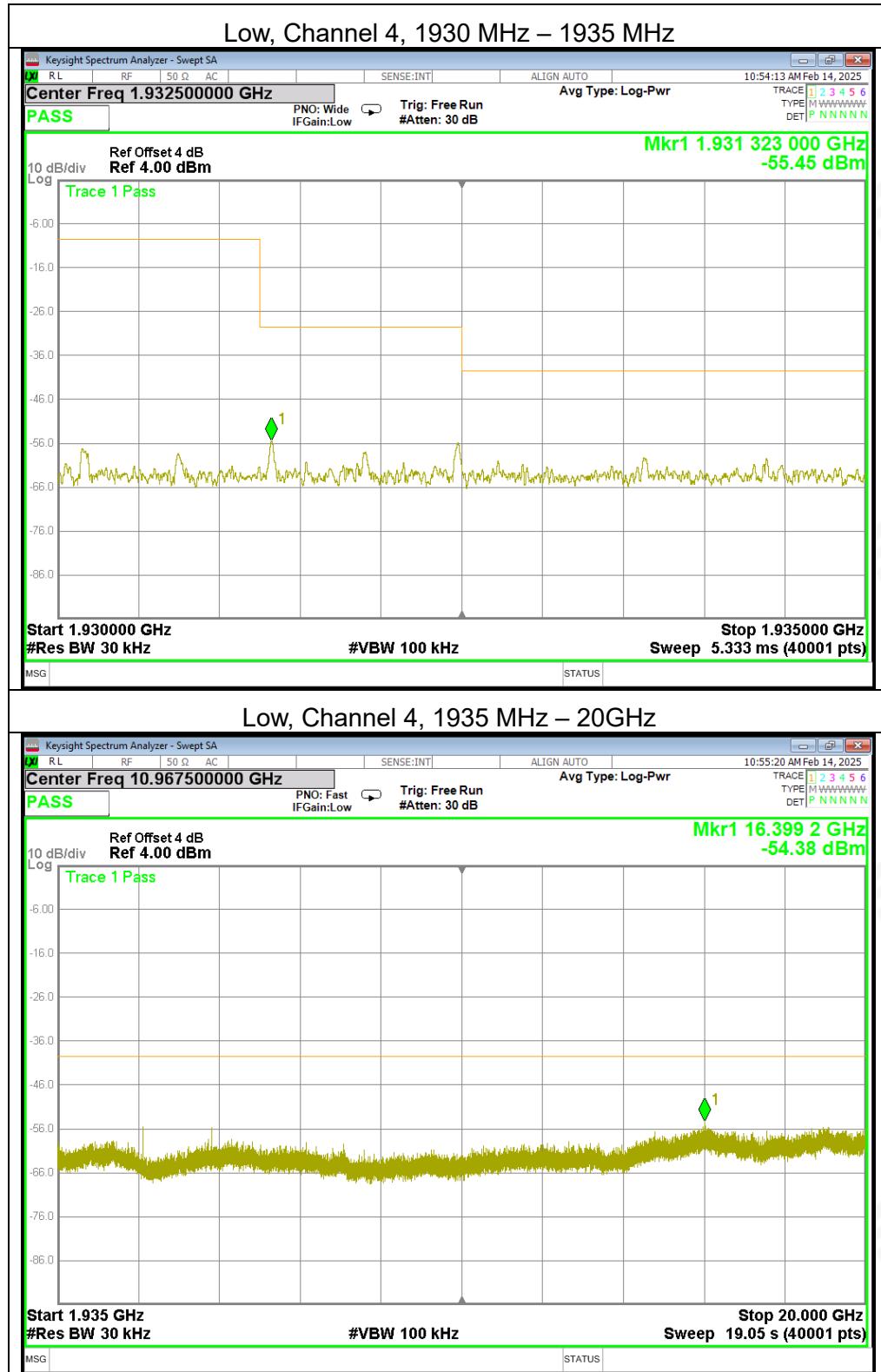


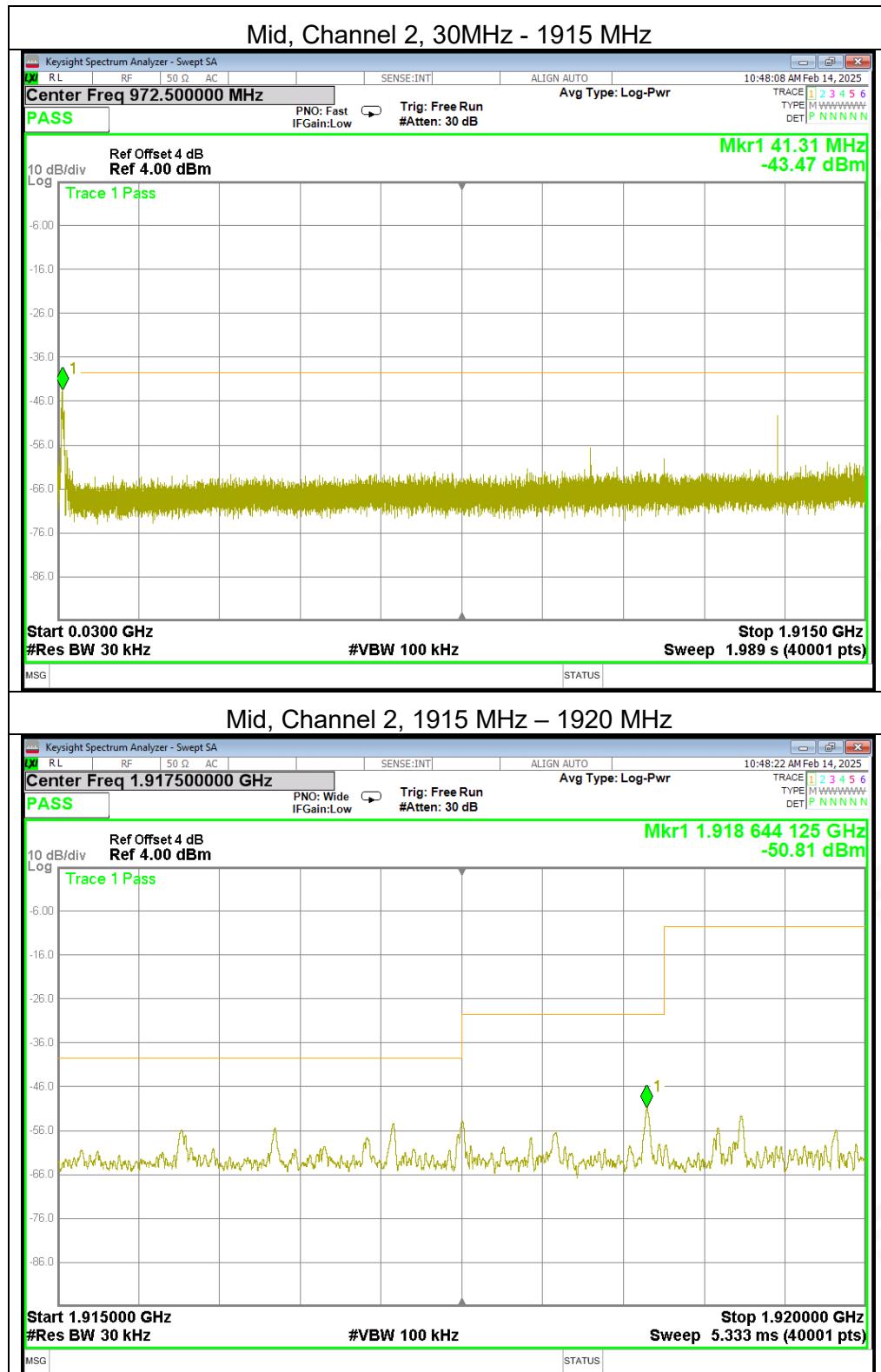


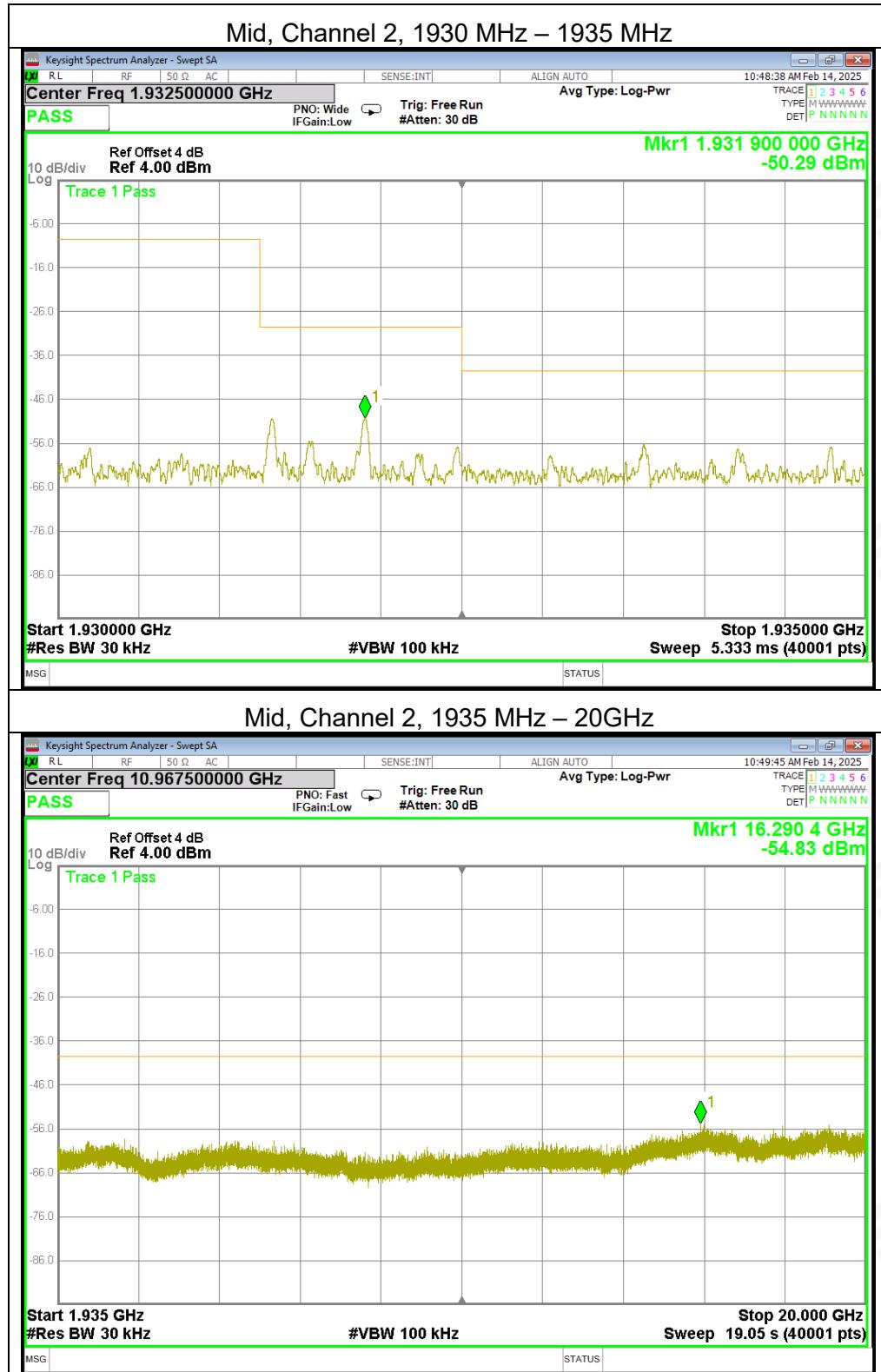


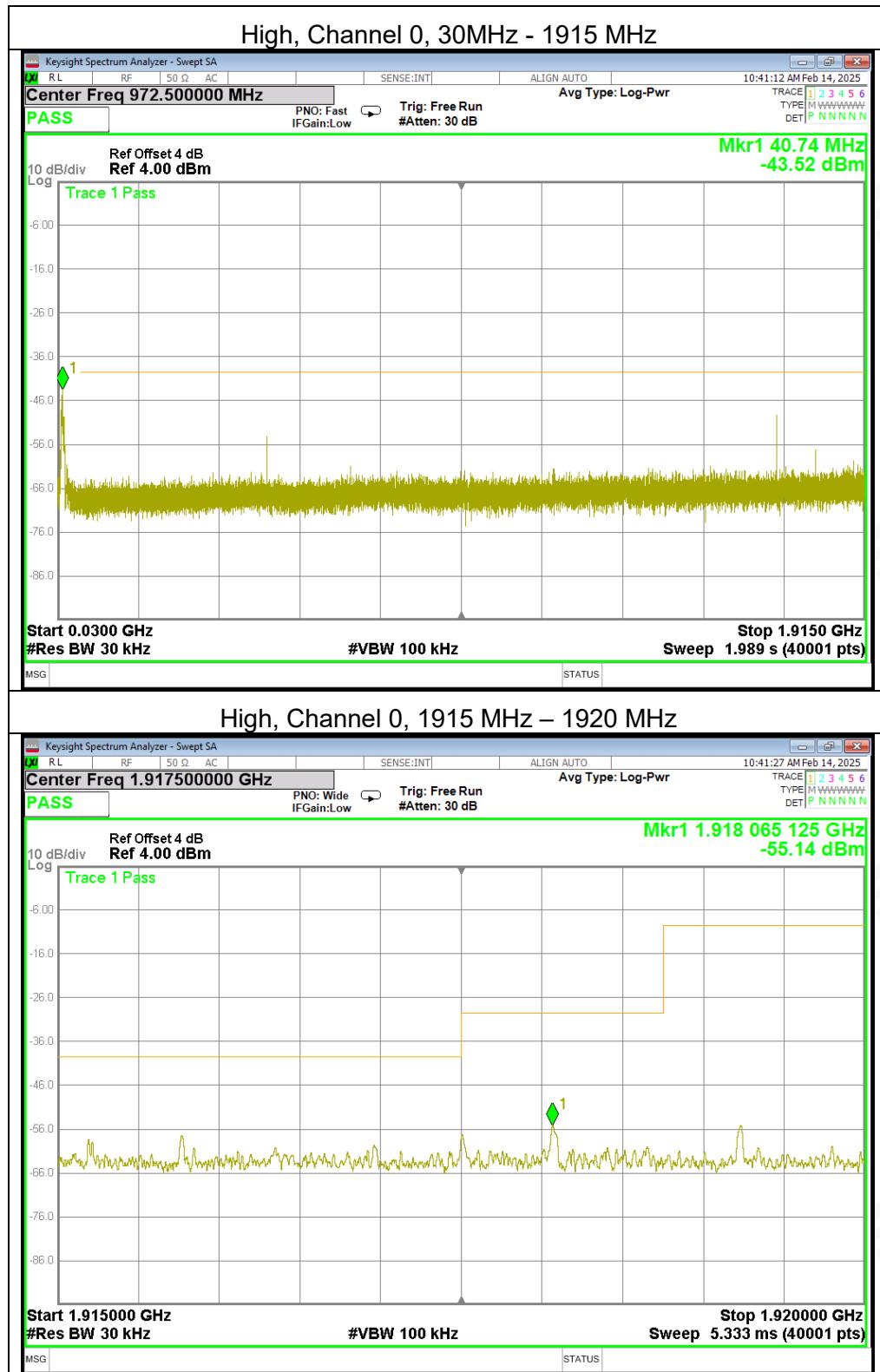
PP64Z

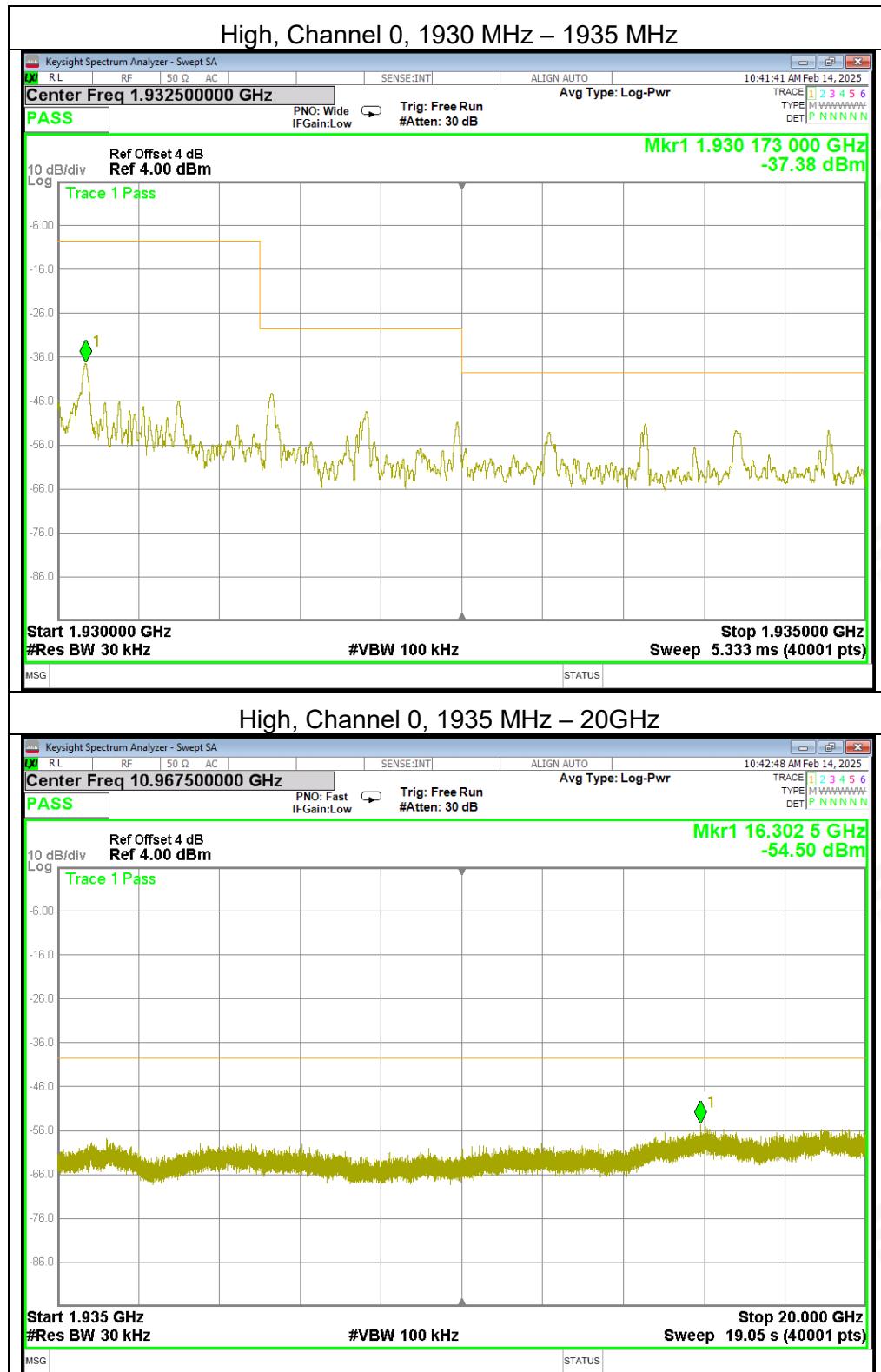














## Antenna 2

PP32Z

