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Report On

FCC and IC Testing of the

Ericsson KRC 161 636/1 (Radio 4415 B2 B25) (G2) NR (1900 MHz)

Base Station in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 24, Industry Canada RSS-GEN and Industry Canada RSS-133

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRC161636

IC ID: 287AB-AS161636

PREPARED BY

APPROVED BY

DATED

A handwritten signature in black ink, appearing to read "Maggie Whiting".

Maggie Whiting
Key Account Manager

A handwritten signature in black ink, appearing to read "Steve Scarfe".

Steve Scarfe
Authorised Signatory

15 July 2019

Document 75946096 Report 02 Issue 01

July 2019



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SECTION 1

REPORT INFORMATION



1.1 REPORT DETAILS

Manufacturer	Ericsson
Address	Torshamnsgatan 23 Kista SE-16480 Stockholm Sweden
Product Name & Product Number	Radio 4415 B2 B25 (G2) & KRC 161 636/1
Non-Tested Variants	Radio 4415 B2 B25 (G2) & KRC 161 636/3
IC Model Name	AS161636
Serial Number(s)	D16X403333
Software Version	CXP9013268/15 Revisions R79CC
Hardware Version	R1B/A
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2018 FCC CFR 47 Part 24: 2018 Industry Canada RSS-GEN: Issue 5 Amdt 1: 2019 Industry Canada RSS-133: Issue 6: 2013, Amdt Jan 2018
Start of Test	17 June 2019
Finish of Test	24 June 2019
Name of Engineer(s)	Brian Scarfe
Related Document(s)	KDB 971168 D01 v02r02 KDB 662911 D01 v02r01

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate compliance with FCC CFR 47 Part 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

A handwritten signature in black ink, appearing to read 'Brian Scarfe', positioned above a horizontal line.

Brian Scarfe



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 24, Industry Canada RSS-GEN and Industry Canada RSS-133 is shown below.

Section	Specification Clause				Test Description	Result
	FCC CFR 47 Part 2	FCC CFR 47 Part 24	RSS-GEN	RSS-133		
2.1	2.1046	24.232 (a)	-	6.4	Maximum Peak Output Power and Peak to Average Ratio - Conducted	Pass
2.2	2.1049	24.238 (b)	6.6	-	Occupied Bandwidth	Pass
2.3	2.1051	24.238 (b)	-	6.5	Band Edge	Pass
2.4	2.1051	24.238 (a)	-	6.5	Transmitter Spurious Emissions	Pass

Measurement Uncertainty Decision Statement

Determination of conformity with the specification limits is based on the results of the compliance measurement and does not take into account measurement instrumentation uncertainty as defined in ANSI C63.26:2015 Clause 1.3.



1.3 CONFIGURATION DESCRIPTION

Configuration	RAT	No. Of carriers	Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
				Bottom	Middle	Top
A	NR	1	5 MHz – SCS 15kHz	1932.5	-	1987.5
	NR	1	10 MHz – SCS 15kHz	1935.0	-	1985.0
	NR	1	15 MHz – SCS 15kHz	1937.5	-	1982.5
	NR	1	20 MHz – SCS 15kHz	1940.0	-	1980.0
	NR	1	20 MHz – SCS 30kHz	1940.0	-	1980.0
	NR	2	20 MHz + 20 MHz SCS 60 kHz	-	1952.5+1972.5	-
B	NR	1	5 MHz – SCS 15kHz	1932.5	-	1992.5
	NR	1	10 MHz – SCS 15kHz	1935.0	-	1990.0
	NR	1	15 MHz – SCS 15kHz	1937.5	-	1987.5
	NR	1	20 MHz – SCS 15kHz	1940.0	-	1985.0
	NR	1	20 MHz – SCS 30kHz	1940.0	-	1985.0
	NR	2	20 MHz + 20 MHz SCS 60 kHz	-	1952.5+1972.5	-



1.4 DECLARATION OF BUILD STATUS

MAIN EUT		
MANUFACTURING DESCRIPTION	Radio Unit	
MANUFACTURER	Ericsson AB	
PRODUCT NAME	Radio 4415 B2/B25 (G2)	
PART NUMBER	KRC161636/1 ¹	KRC161636/3
IC Model Name	AS161636	
SERIAL NUMBER	D16X403333	-
HARDWARE VERSION	R1B/A	-
SOFTWARE VERSION	CXP9013268/15-R79CC	-
TRANSMITTER OPERATING RANGE	B5: 1930 - 1990 MHz B25: 1930 - 1995 MHz	
MODULATIONS	GSM: GMSK, AQPSK, 8PSK WCDMA: QPSK, 16QAM, 64QAM LTE & NR: QPSK, 16QAM, 64QAM, 256QAM	
ITU DESIGNATION OF EMISSION	GSM: 245KGXW	
	GSM: 245KG7W	
	WCDMA 5 MHz BW channel: 4M18F9W	
	LTE 1,4 MHz BW channel: 1M11W7D	
	LTE 3 MHz BW channel: 2M70W7D	
	LTE 5 MHz BW channel: 4M49W7D	
	LTE 10 MHz BW channel: 9M45W7D	
	LTE 15 MHz BW channel: 14M1W7D	
	LTE 20 MHz BW channel: 18M5W7D	
	LTE 20+20 MHz BW channel CA: 39M5W7D	
	NB-IoT SA channel: 199KW7D	
	NR 5 MHz BW channel: 4M47W7D	
	NR 10 MHz BW channel: 9M28W7D	
	NR 15 MHz BW channel: 14M1W7D	
	NR 20 MHz BW channel: 18M9W7D	
	NR 20+20 MHz BW channel CA: 38M8W7D	
OUTPUT POWER (RMS) (W or dBm)	4 ports, 40W per port	
	NB-IoT SA 1 x 20W per port	
	GSM: 20W per port	
FCC ID	TA8AKRC161636	
IC ID	287AB-AS161636	
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Base station radio	

¹ KRC161636/1 is the test object, both variants are electrically equivalent, with only mechanical differences in the enclosure.

LTE carriers 3 MHz and above support NB IoT IB. LTE carriers 10 MHz and above support NB IoT GB

Signature

Audun B Helle

Audun Helle

Date

2019-07-12

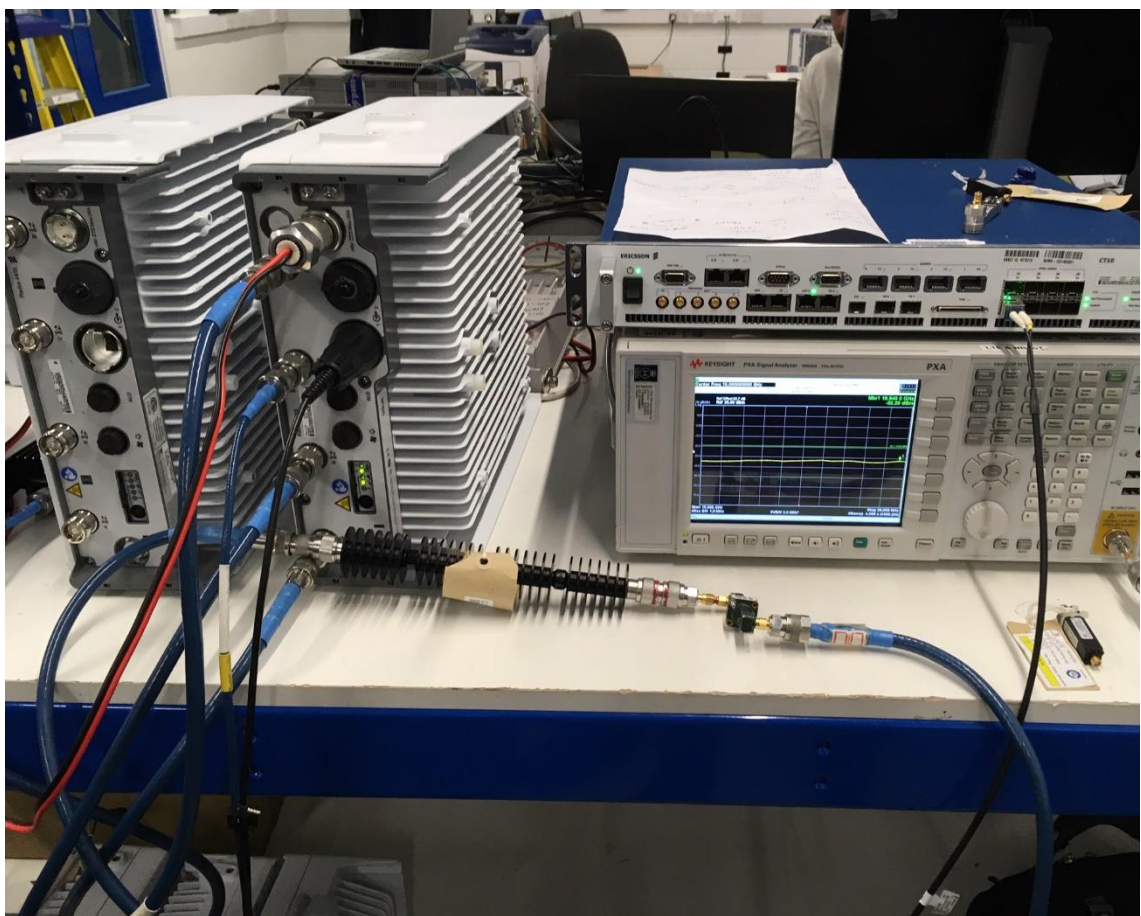
No responsibility will be accepted by TÜV SÜD Product Service UK Limited as to the accuracy of the information declared in this document by the manufacturer.

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

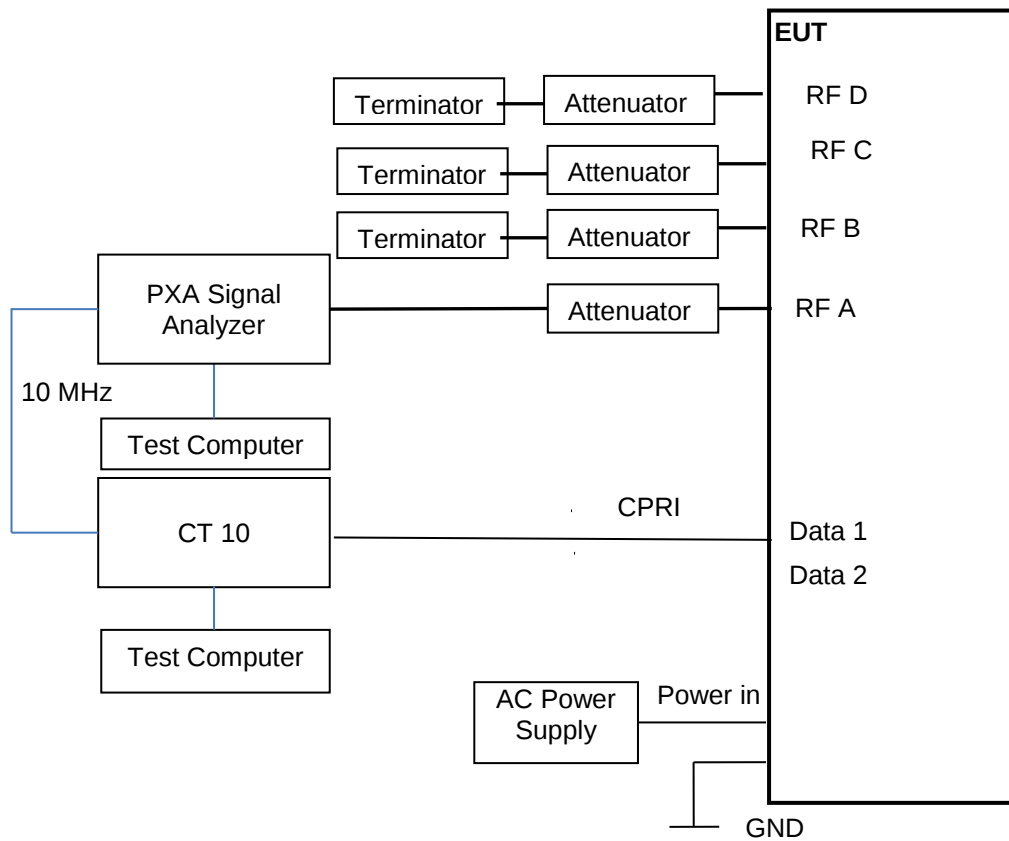
The Equipment Under Test (EUT) Radio 4415 B2 B25 is an Ericsson AB Radio Unit working in the public mobile service 1900 MHz band which provides communication connections to 1900 MHz network. The Radio 4415 B2 B25 operates from a -48V DC supply.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



Equipment Under Test

1.6 TEST SETUP





1.7 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or a chamber as appropriate.

The EUT was powered from a -48V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

1.8 DEVIATION FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.9 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.10 ALTERNATIVE TEST SITE

Under our group UKAS Accreditation, TÜV SÜD conducted the following tests at Ericsson in Fareham, UK.

Test Name	Name of Engineer(s)
Maximum Peak Output Power and Peak to Average Ratio - Conducted	Brian Scarfe
Occupied Bandwidth	Brian Scarfe
Band Edge	Brian Scarfe
Transmitter Spurious Emissions	Brian Scarfe



SECTION 2

TEST DETAILS



2.1 MAXIMUM PEAK OUTPUT POWER AND PEAK TO AVERAGE RATIO - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 24, Clause 24.232 (a)
Industry Canada RSS-133, Clause 6.4

2.1.2 Date of Test and Modification State

17 and 18 June 2019 - Modification State 0

2.1.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.4 Environmental Conditions

Ambient Temperature 25.8°C
Relative Humidity 37.7%

2.1.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, clause 5.2.1 and summed in accordance with FCC KDB 662911 D01.

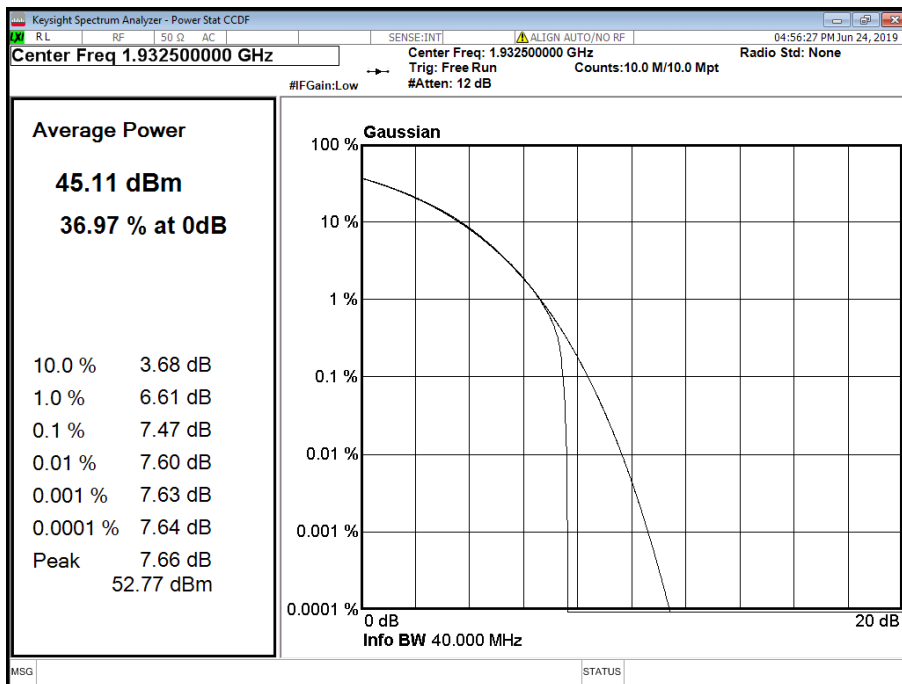
2.1.6 Test Results

Configuration A

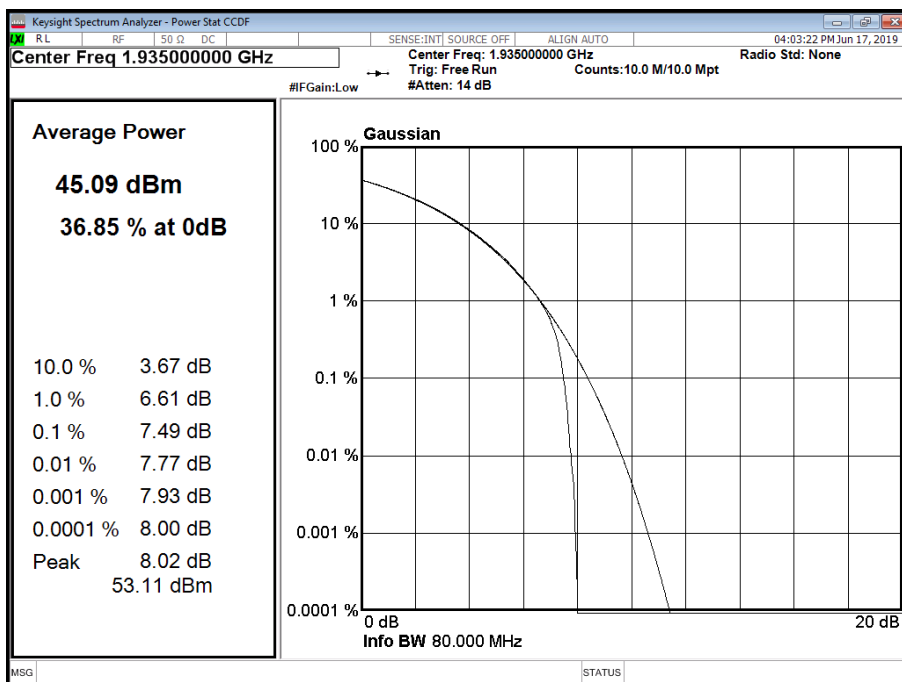
Maximum Output Power 46 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position B		
			PAR (dB)	Average Power	
				dBm	dBm/MHz
A	QPSK	5.0 MHz 15 kHz SCS	7.47	44.96	39.11
A	QPSK	10.0 MHz 15 kHz SCS	7.49	45.08	36.55
A	QPSK	15.0 MHz 15 kHz SCS	7.64	45.42	34.73
A	QPSK	20.0 MHz 15 kHz SCS	7.69	45.42	33.53
A	QPSK	20.0 MHz 60 kHz SCS	7.52	45.38	34.03

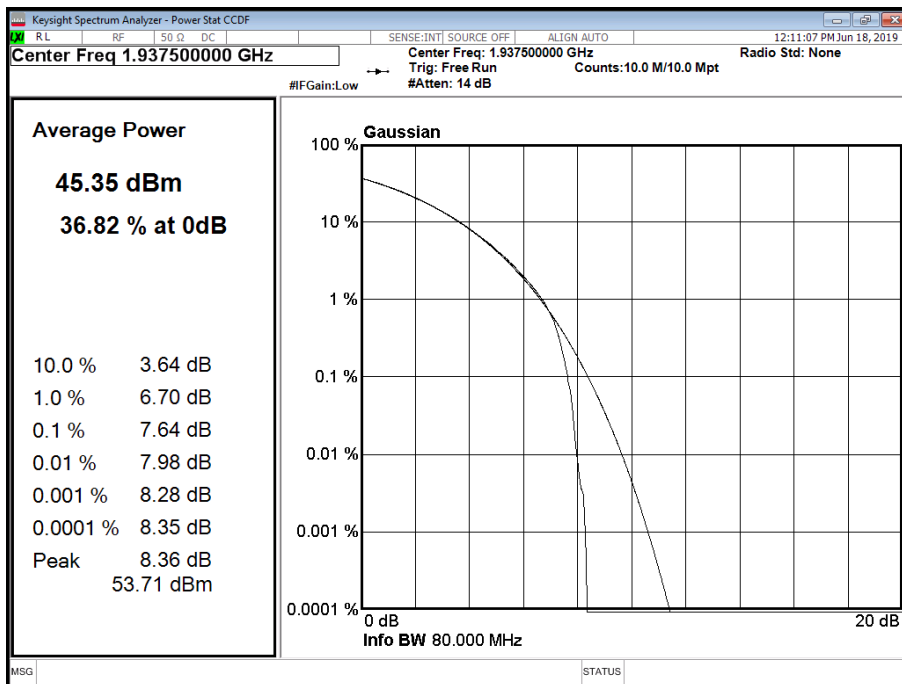
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B



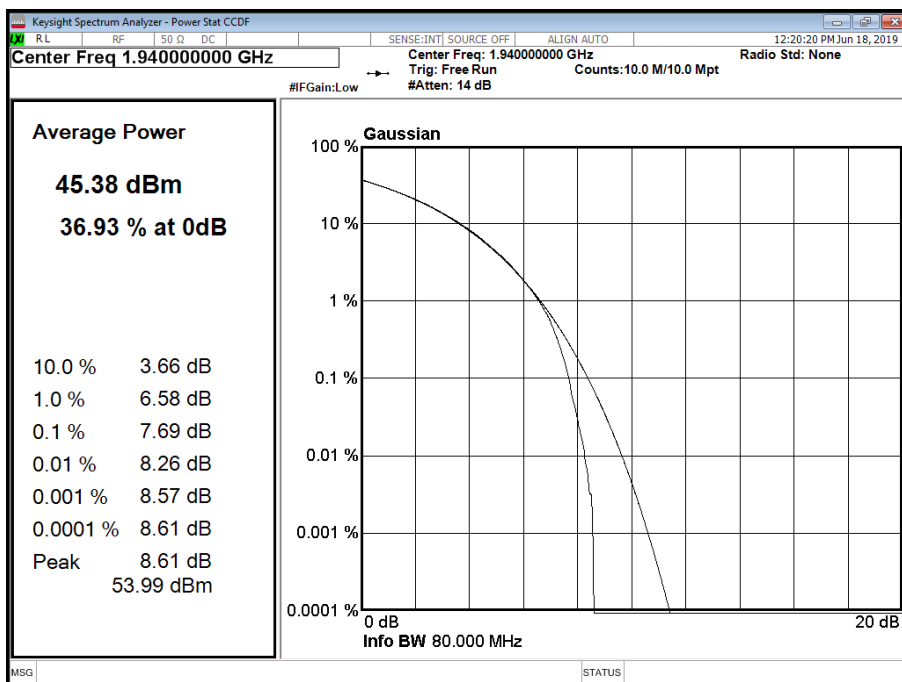
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position B



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position B

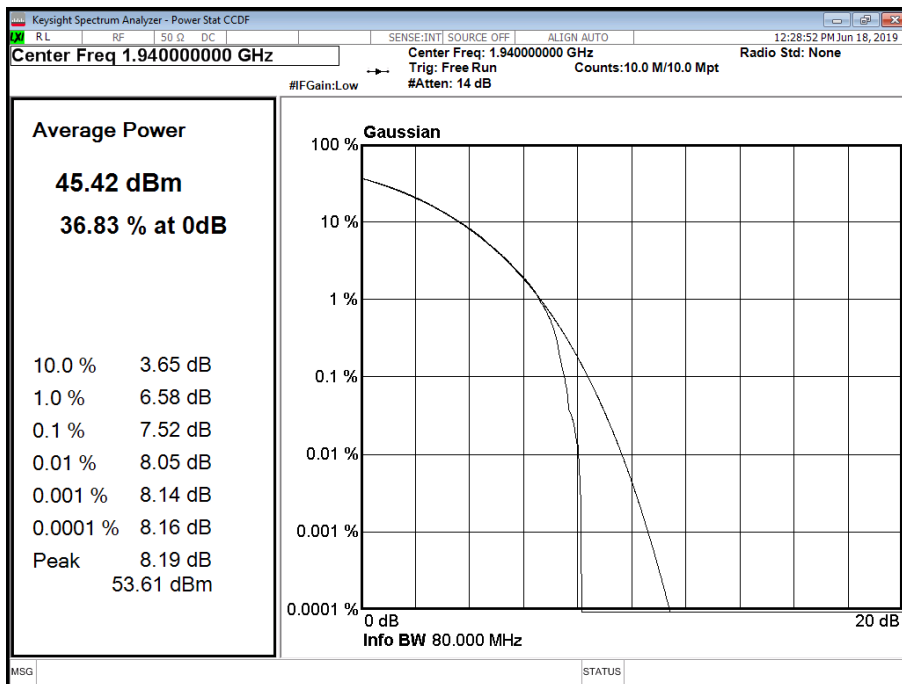


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position B





Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position B



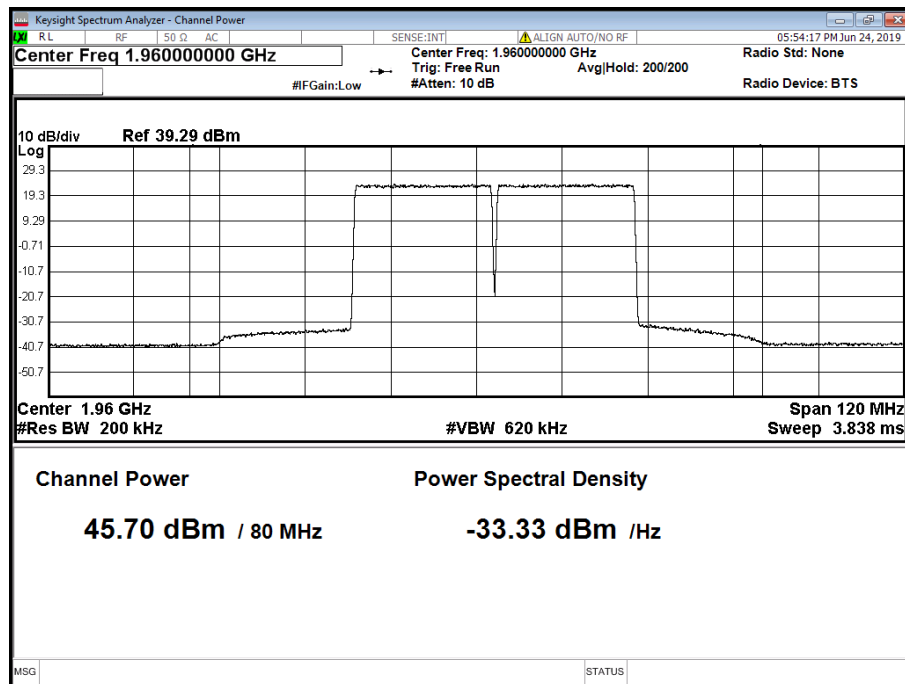
Configuration A

Maximum Output Power 46 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position M		
			PAR (dB)	Average Power	
				dBm	dBm/MHz
A	QPSK	20.0 + 20.0 MHz 15 kHz SCS	-	45.70	-



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 + 20.0 MHz 15 kHz SCS - Channel Position M

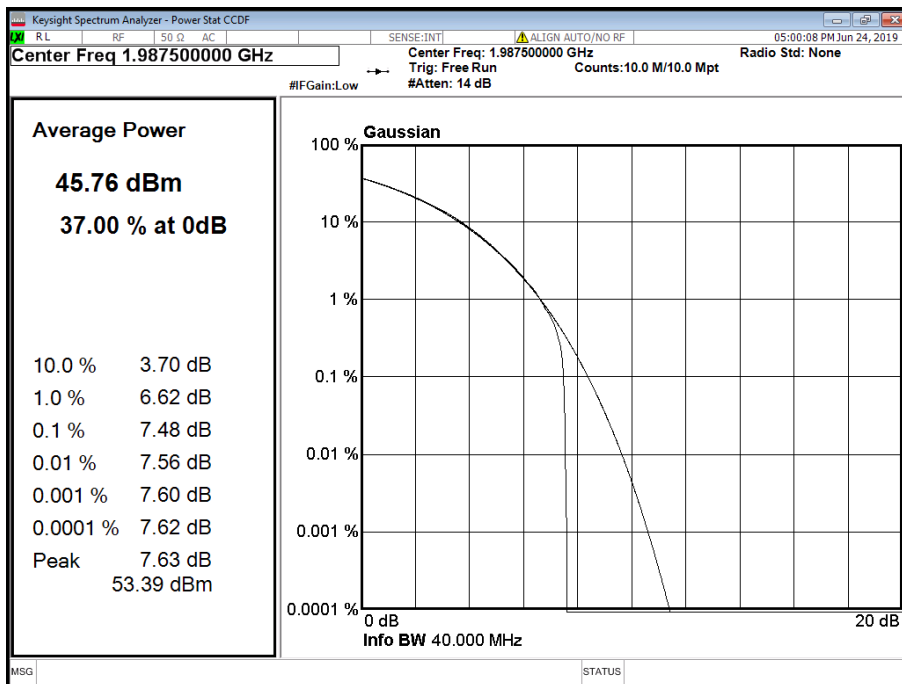


Configuration A

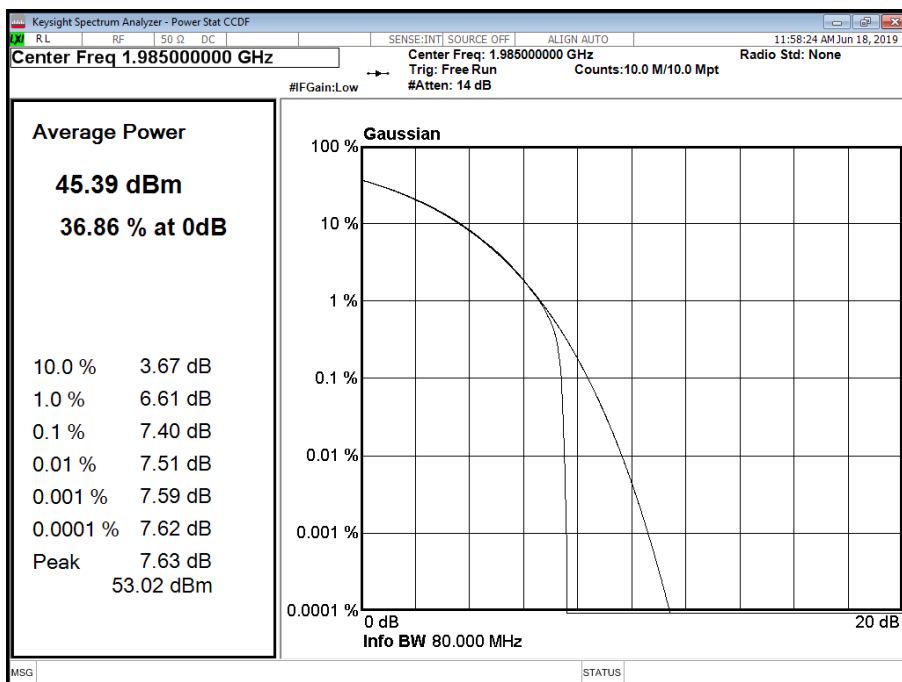
Maximum Output Power 46 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position T		
			PAR (dB)	Average Power	
				dBm	dBm/MHz
A	QPSK	5.0 MHz 15 kHz SCS	7.48	45.66	39.71
A	QPSK	10.0 MHz 15 kHz SCS	7.40	45.87	36.54
A	QPSK	15.0 MHz 15 kHz SCS	7.45	45.88	34.79
A	QPSK	20.0 MHz 15 kHz SCS	7.43	45.74	33.41
A	QPSK	20.0 MHz 60 kHz SCS	7.36	45.75	33.91

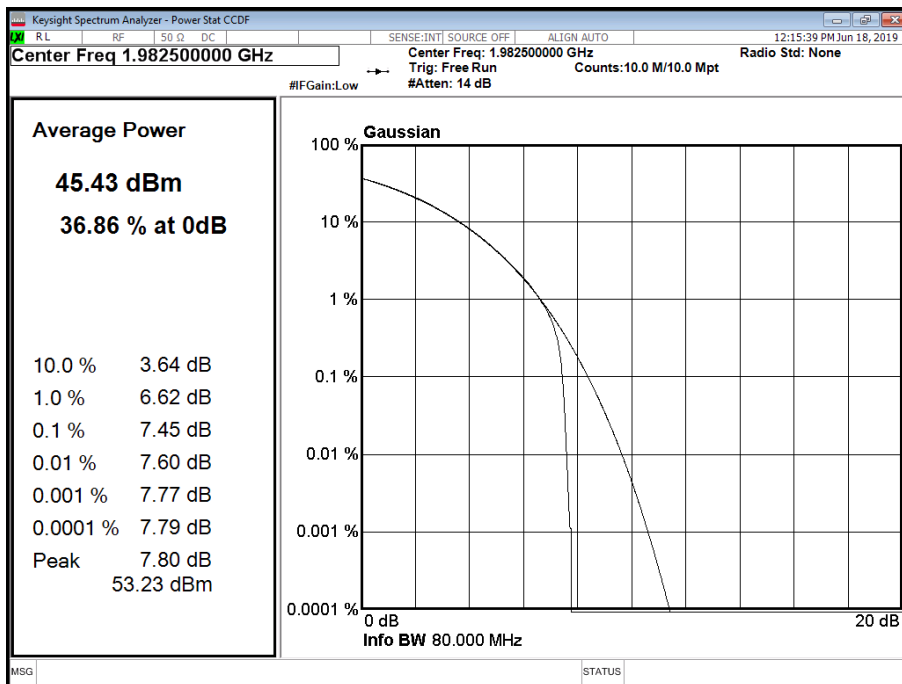
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T



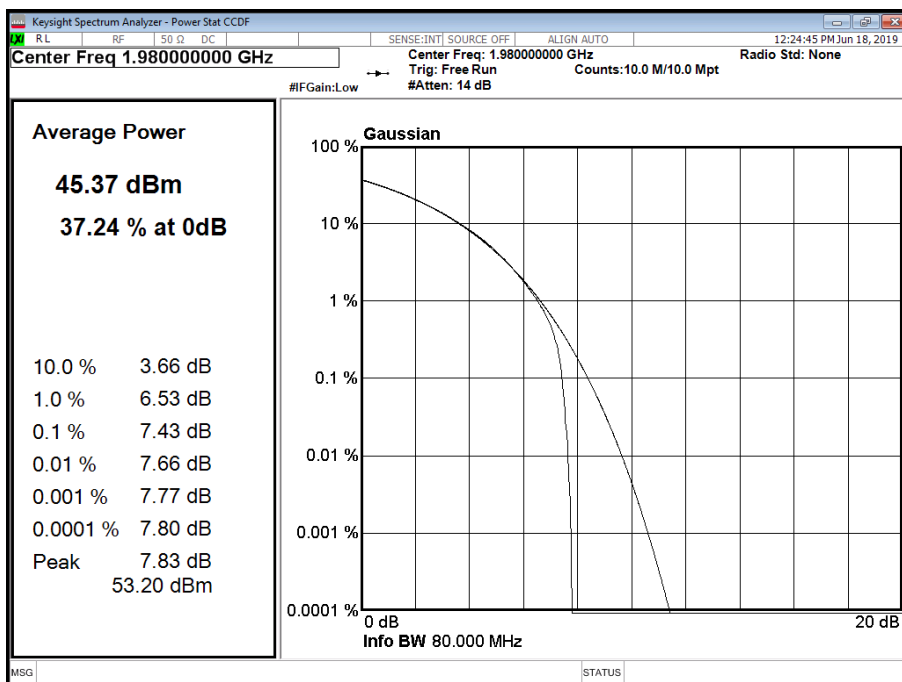
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position T



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position T

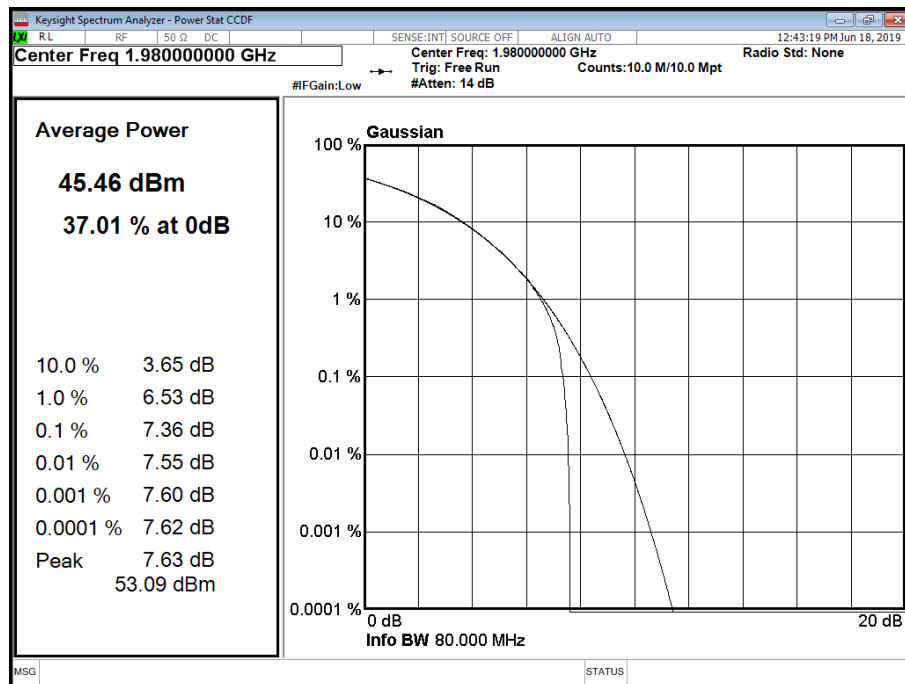


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position T





Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position T

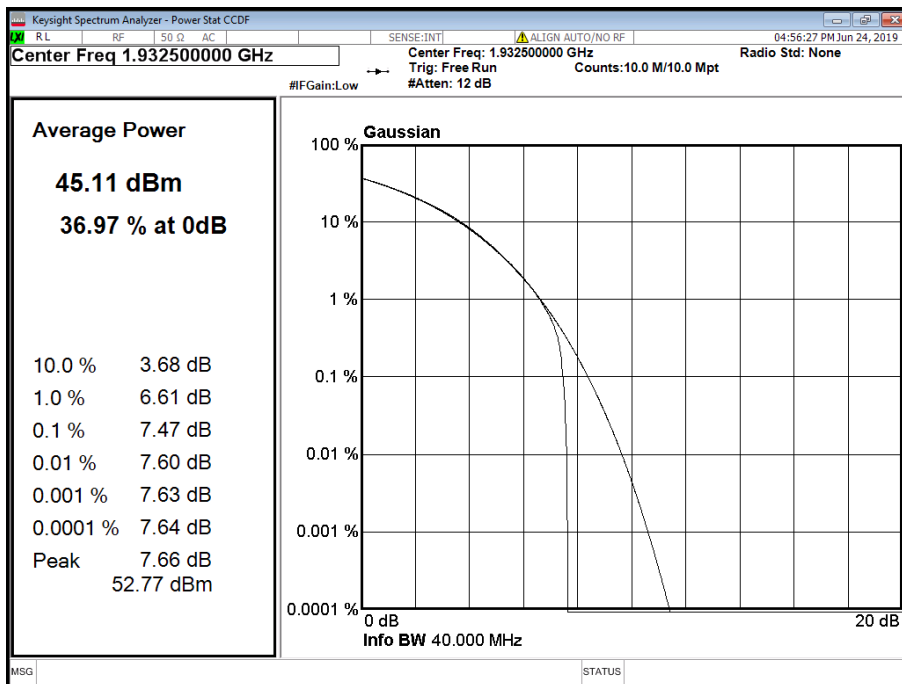


Configuration B

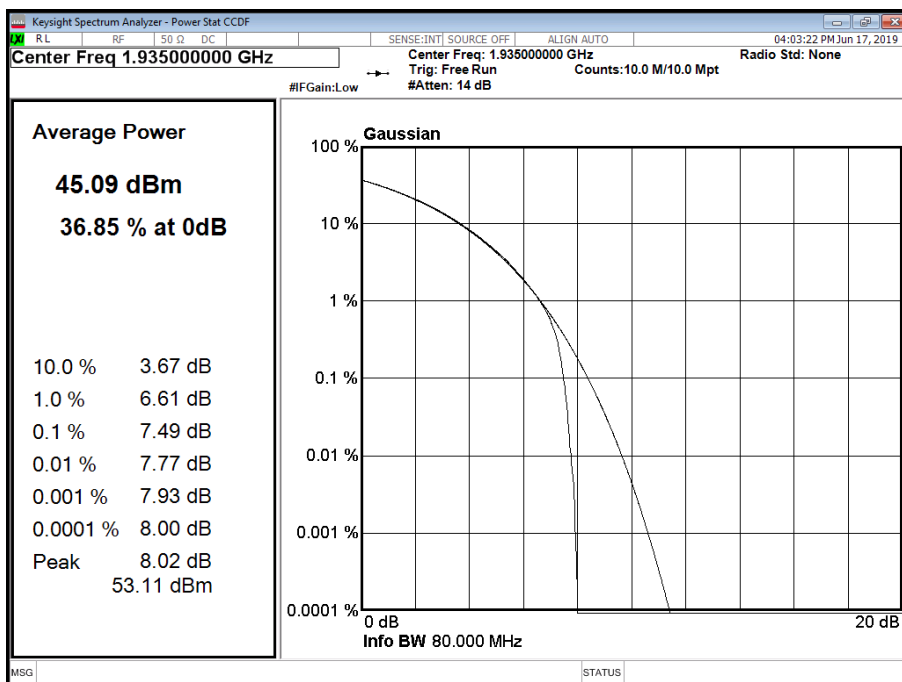
Maximum Output Power 46 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position B		
			PAR (dB)	Average Power	
				dBm	dBm/MHz
A	QPSK	5.0 MHz 15 kHz SCS	7.47	44.96	39.11
A	QPSK	10.0 MHz 15 kHz SCS	7.49	45.08	36.55
A	QPSK	15.0 MHz 15 kHz SCS	7.64	45.42	34.73
A	QPSK	20.0 MHz 15 kHz SCS	7.69	45.42	33.53
A	QPSK	20.0 MHz 60 kHz SCS	7.52	45.38	34.03

Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B

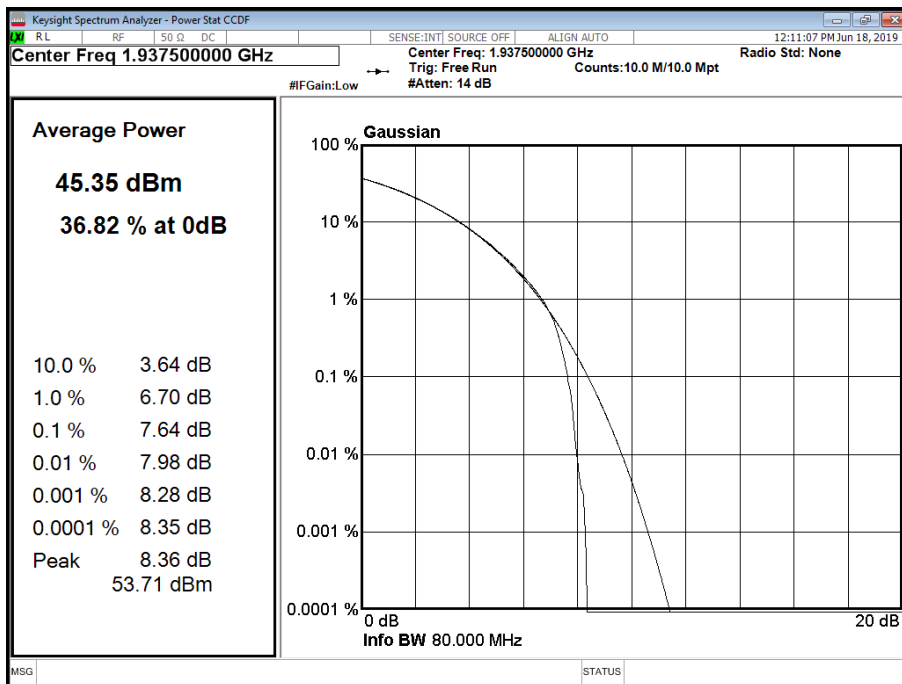


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position B

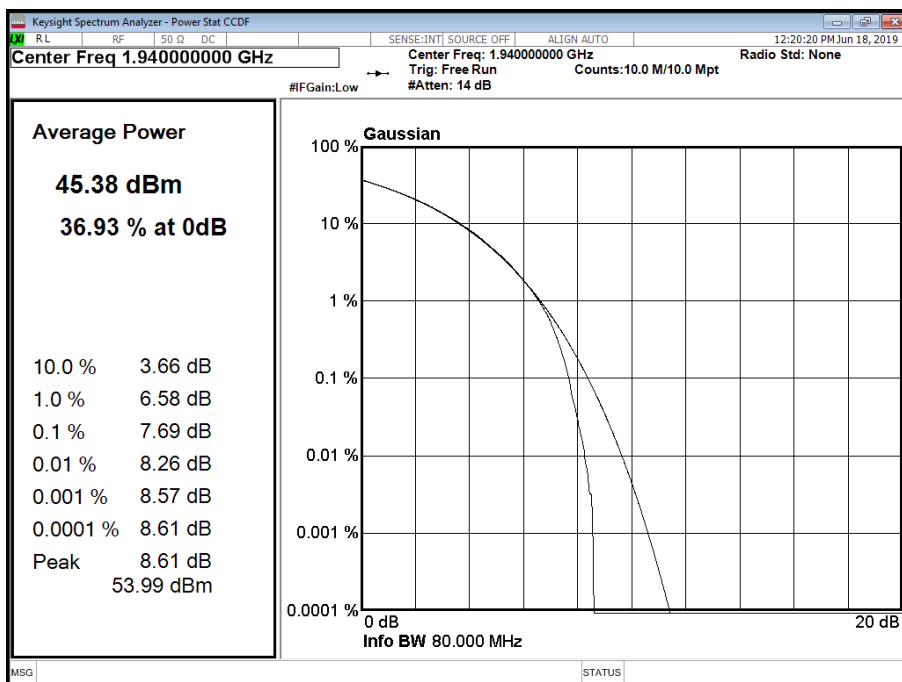




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position B

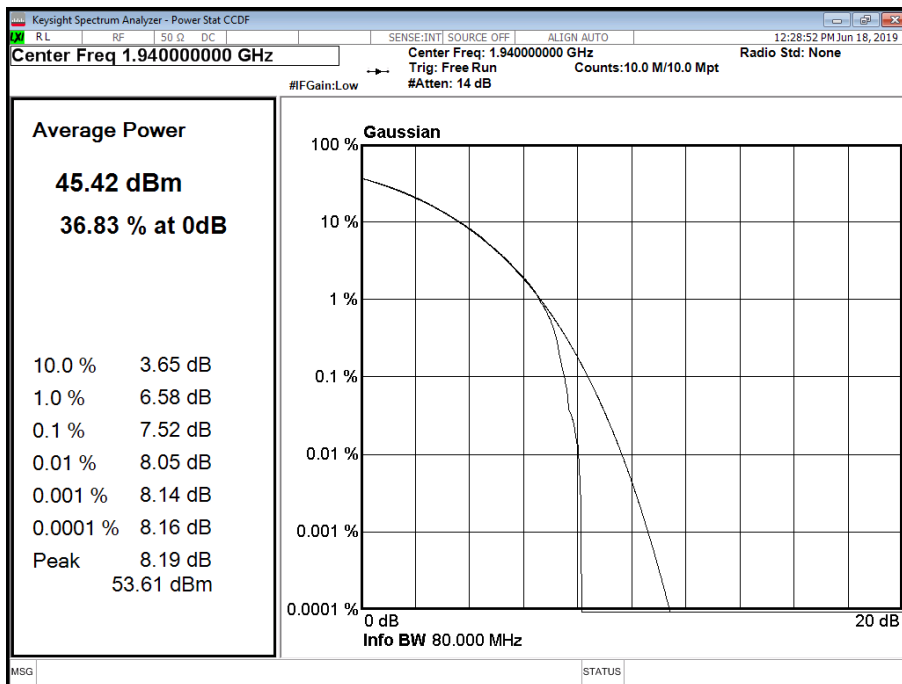


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position B





Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position B



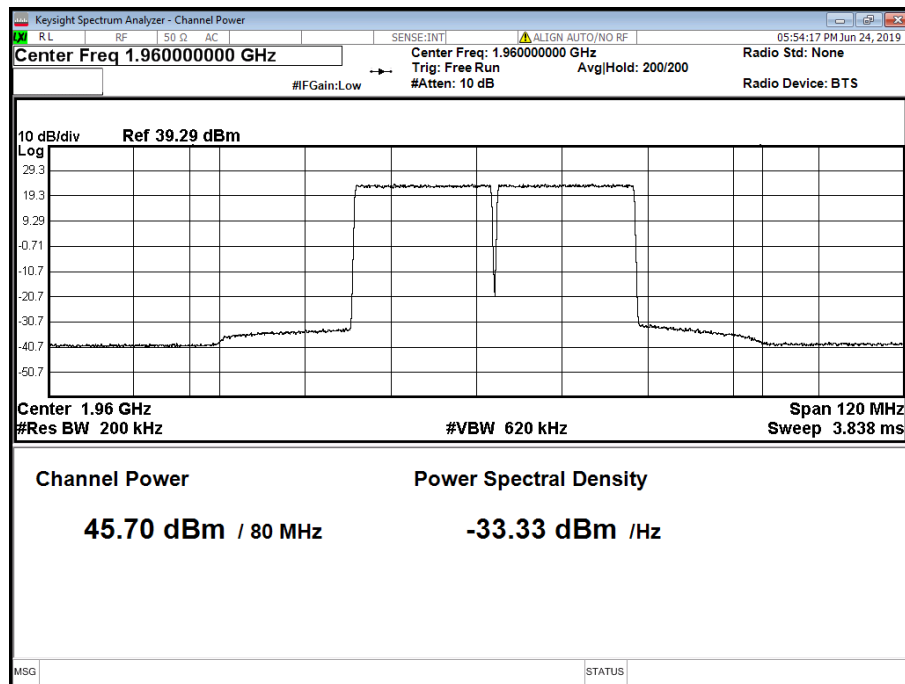
Configuration B

Maximum Output Power 46 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position M		
			PAR (dB)	Average Power	
				dBm	dBm/MHz
A	QPSK	20.0 + 20.0 MHz 15 kHz SCS	-	45.70	-



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 + 20.0 MHz 15 kHz SCS - Channel Position M



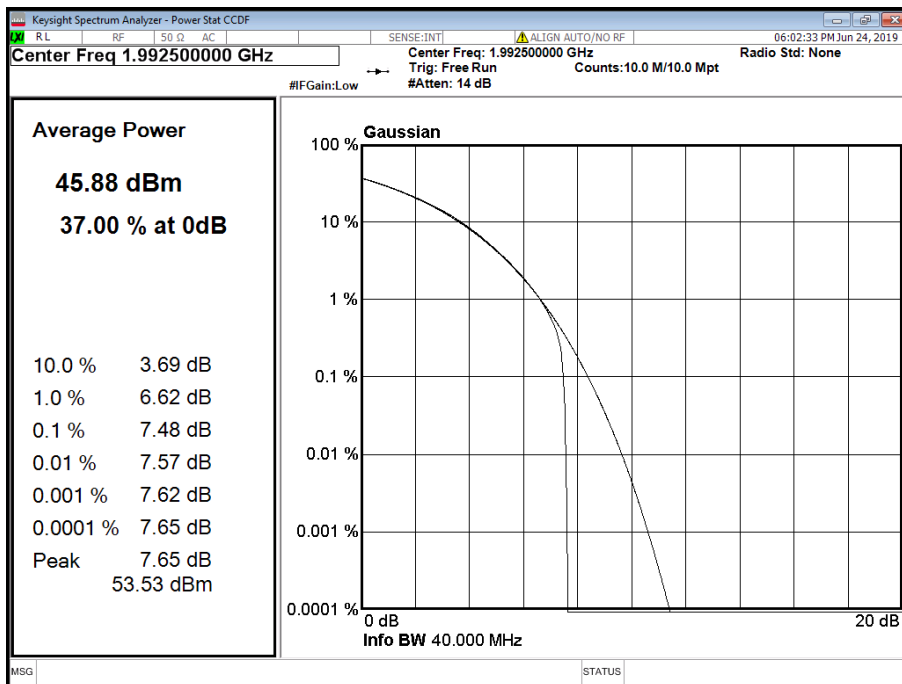
Configuration B

Maximum Output Power 46 dBm

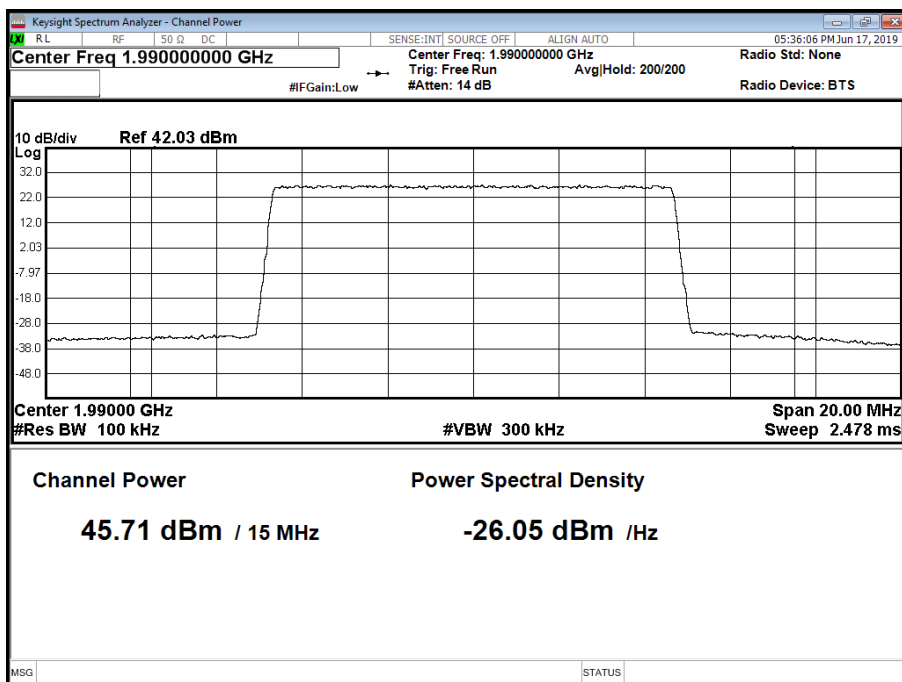
Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position T		
			PAR (dB)	Average Power	
				dBm	dBm/MHz
A	QPSK	5.0 MHz 15 kHz SCS	7.48	45.63	39.64
A	QPSK	10.0 MHz 15 kHz SCS	N/A	45.71	37.11
A	QPSK	15.0 MHz 15 kHz SCS	N/A	45.63	35.07
A	QPSK	20.0 MHz 15 kHz SCS	N/A	45.53	33.79
A	QPSK	20.0 MHz 60 kHz SCS	N/A	45.68	34.20



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T

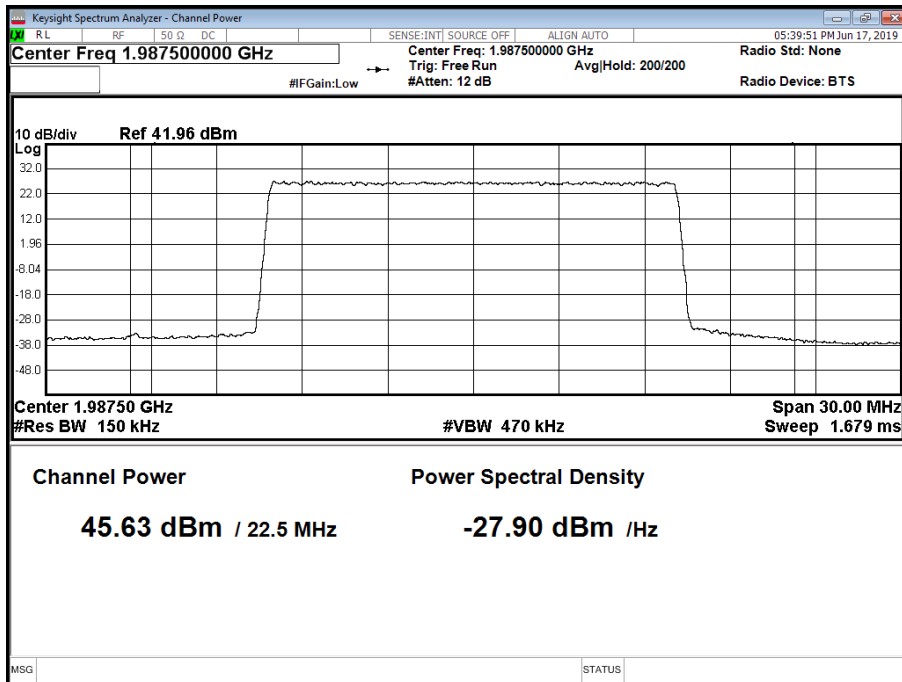


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position T

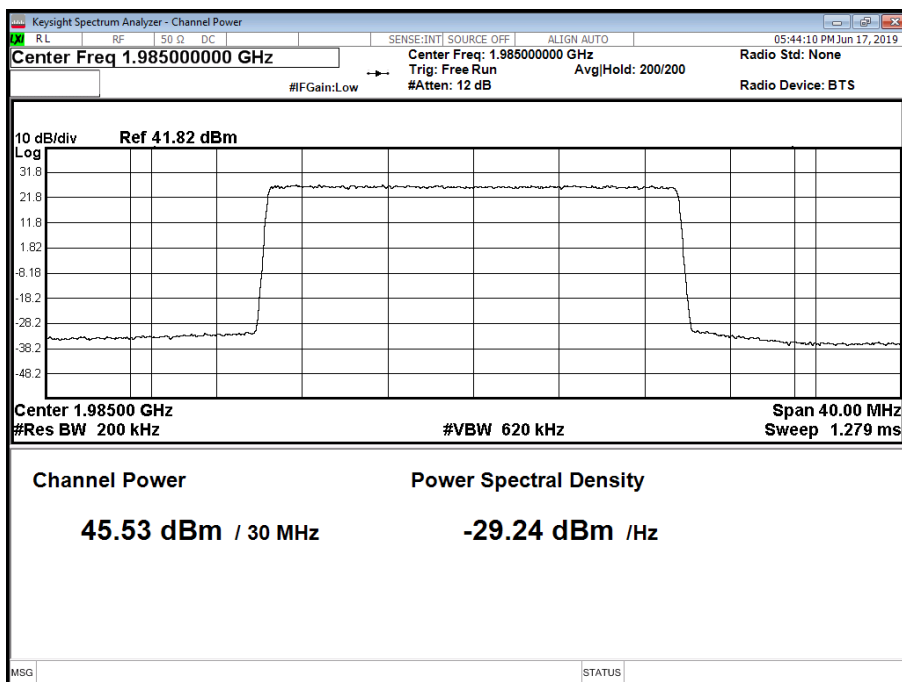




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position T

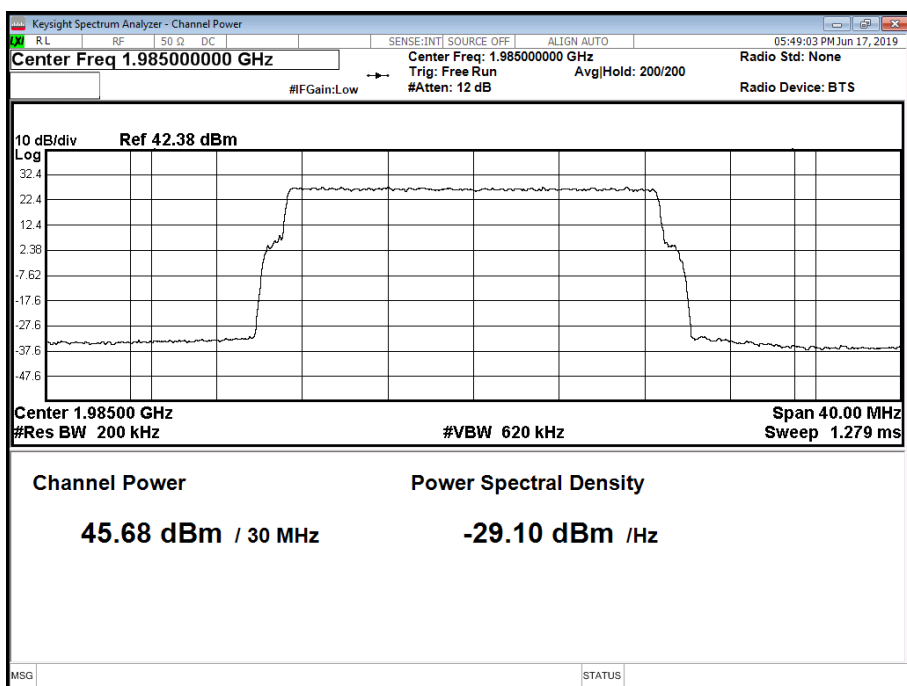


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position T





Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position T



Limit	
Peak Power	≤500 W or ≤+57 dBm
Peak to Average Ratio	13 dB



2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 24, Clause 24.238 (b)
Industry Canada RSS-GEN, Clause 6.6

2.2.2 Date of Test and Modification State

20 and 24 June 2019 - Modification State 0

2.2.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.4 Environmental Conditions

Ambient Temperature 25.6 - 25.8°C
Relative Humidity 37.7%

2.2.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

2.2.6 Test Results

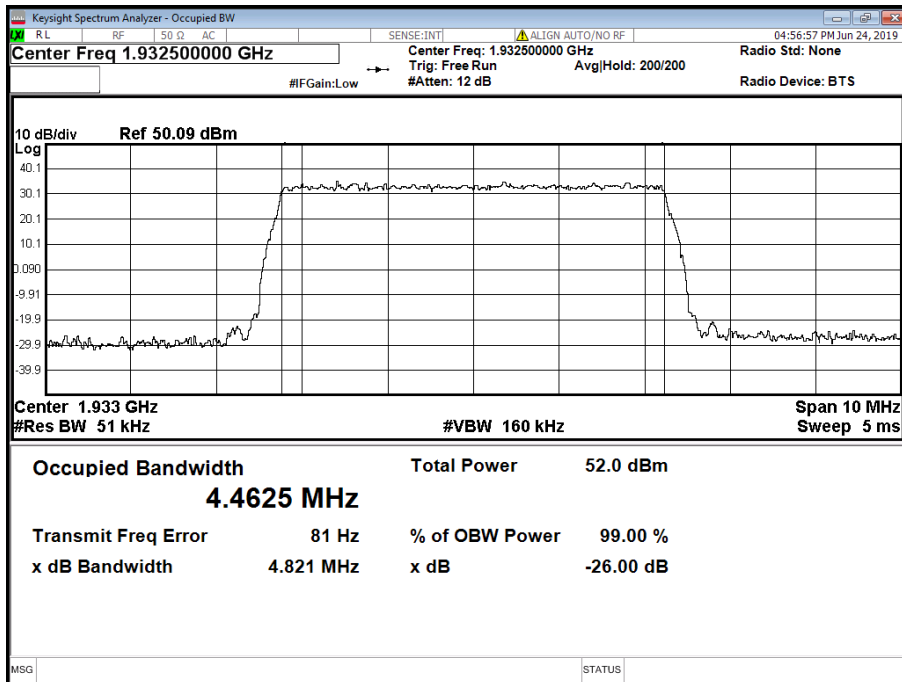
Configuration A

Maximum Output Power 46 dBm

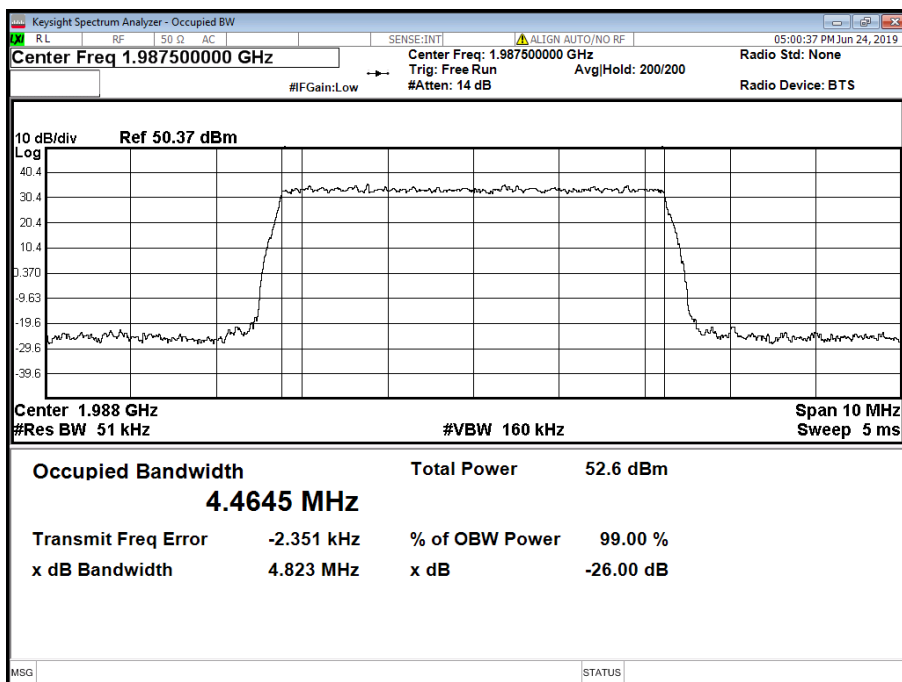
Antenna	NR Modulation	NR Carrier Bandwidth	Result (KHz)					
			Channel Position B		Channel Position M		Channel Position T	
			Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth
A	QPSK	5.0 MHz 15 kHz SCS	4,462.47	4,821.01	-	-	4,464.50	4,822.93
A	QPSK	10.0 MHz 15 kHz SCS	9,277.58	9,766.36	-	-	9,277.66	9,770.23
A	QPSK	15.0 MHz 15 kHz SCS	14,086.25	14,699.52	-	-	14,094.96	14,740.09
A	QPSK	20.0 MHz 15 kHz SCS	18,897.21	19,747.66	-	-	18,920.12	19,714.22
A	QPSK	20.0 MHz 60 kHz SCS	17,256.44	19,557.87	-	-	17,272.86	19,539.72
A	QPSK	20.0 + 20.0 MHz 15 kHz SCS	-	-	38,750.74	39,884.92	-	-



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B

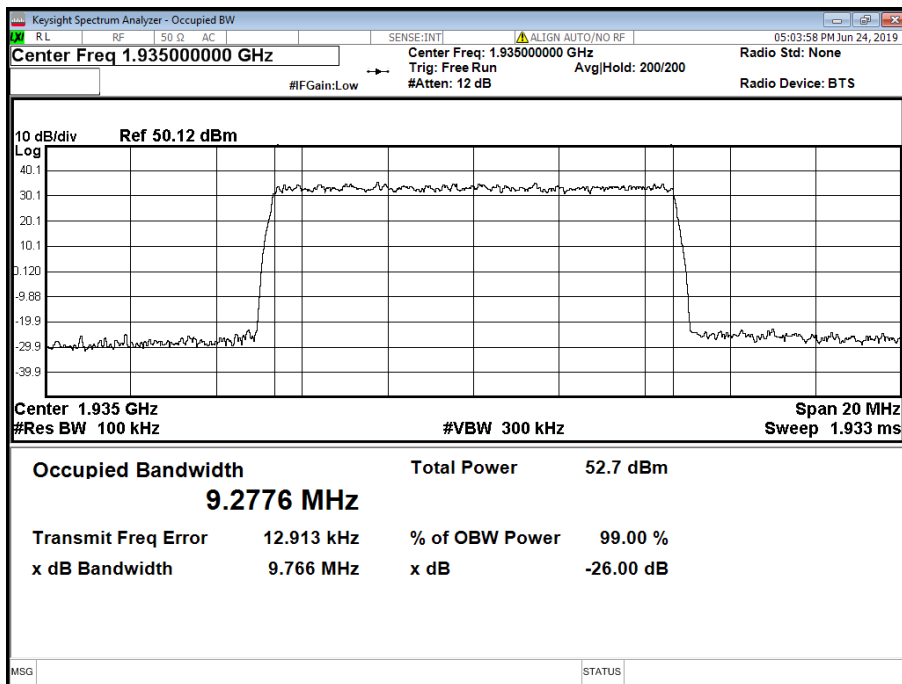


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T

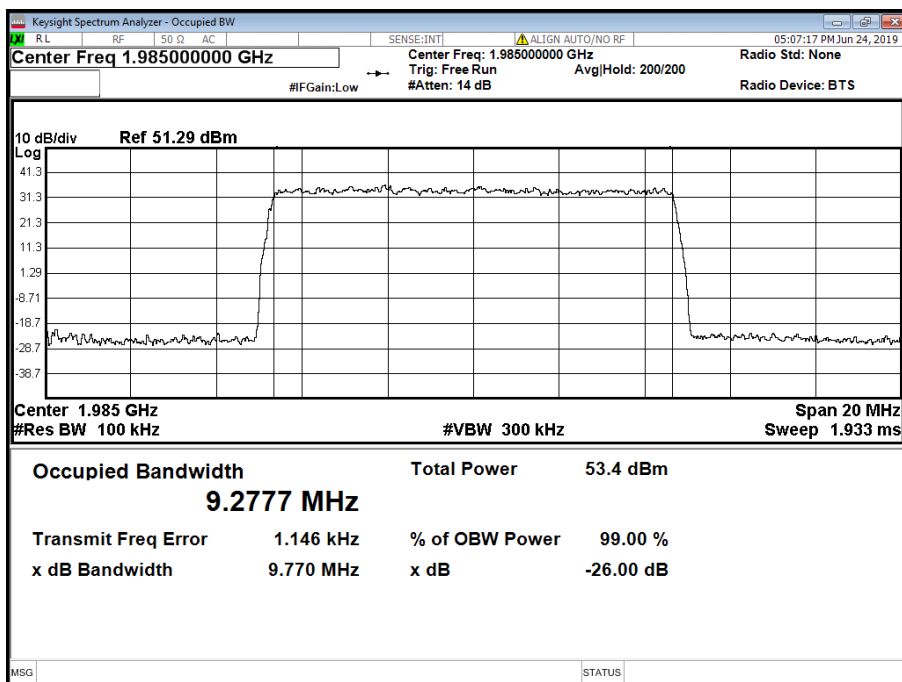




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position B

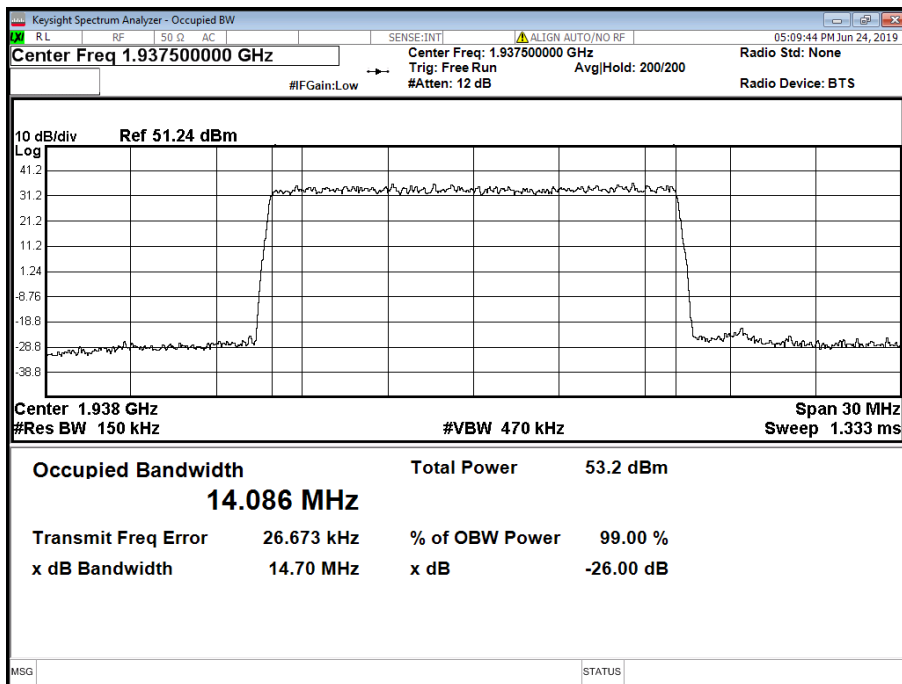


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position T

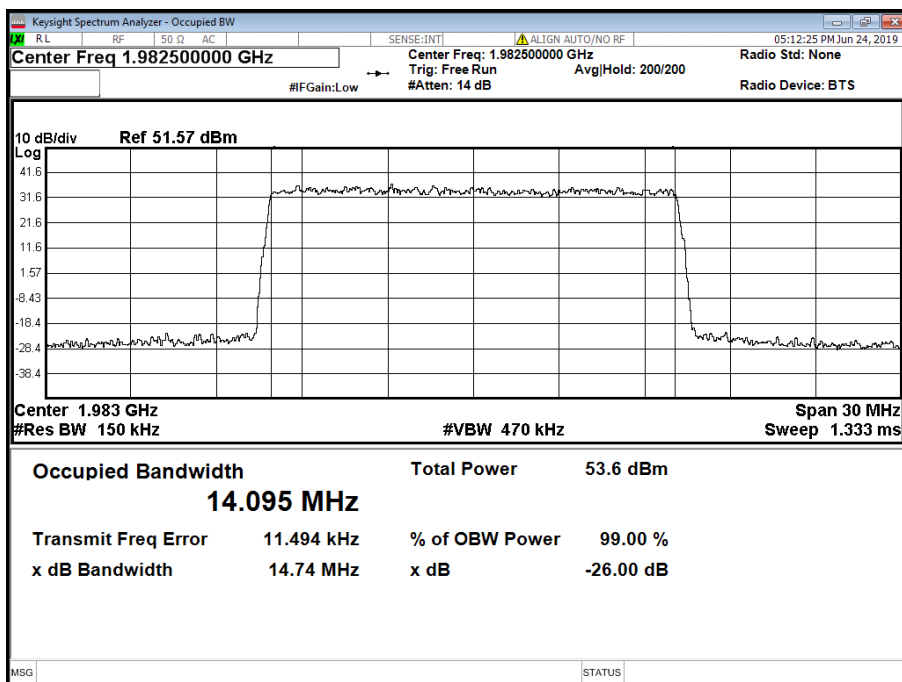




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position B

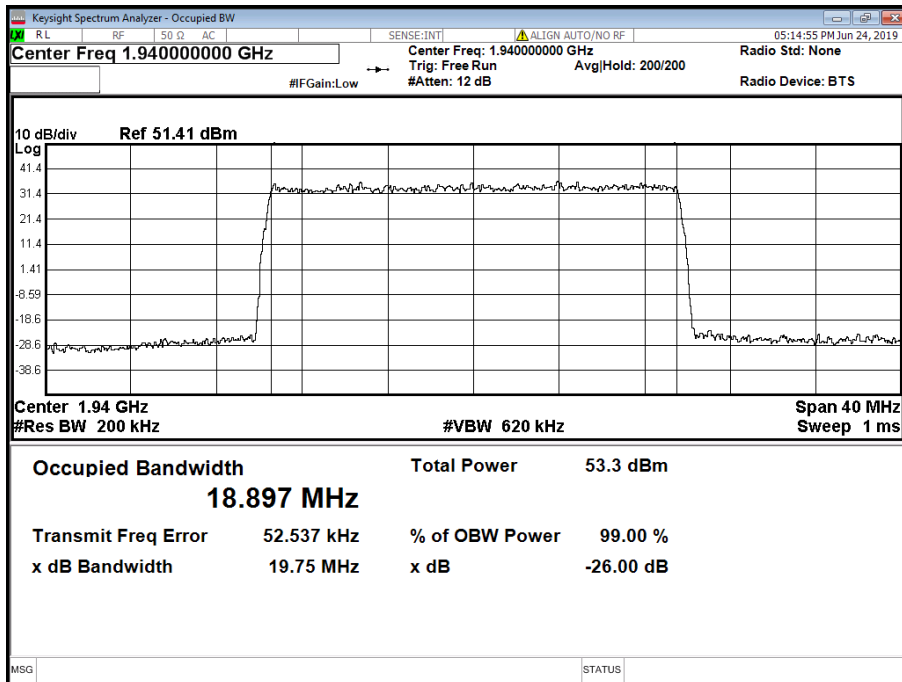


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position T

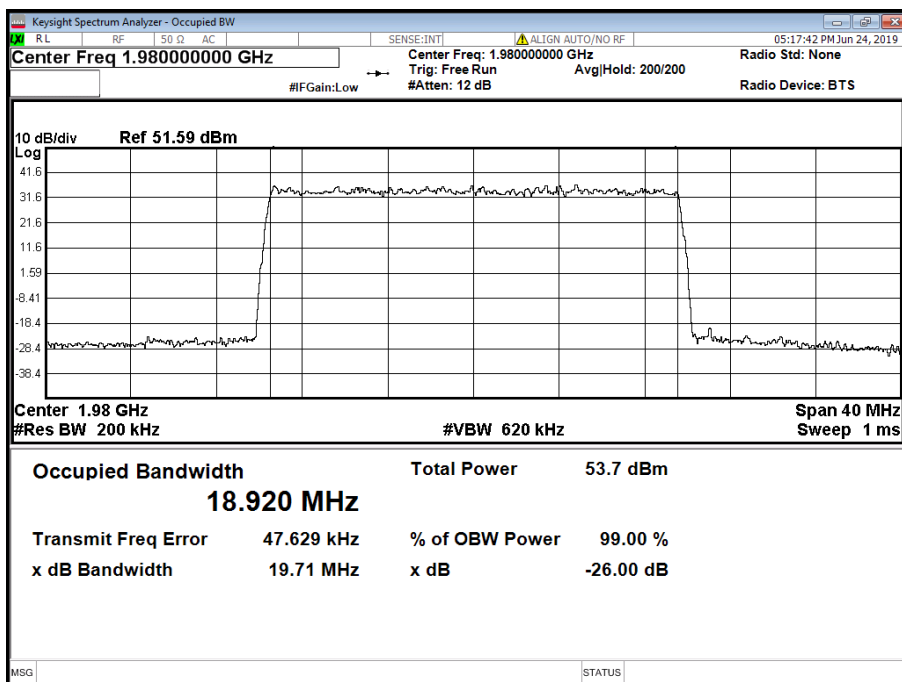




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position B

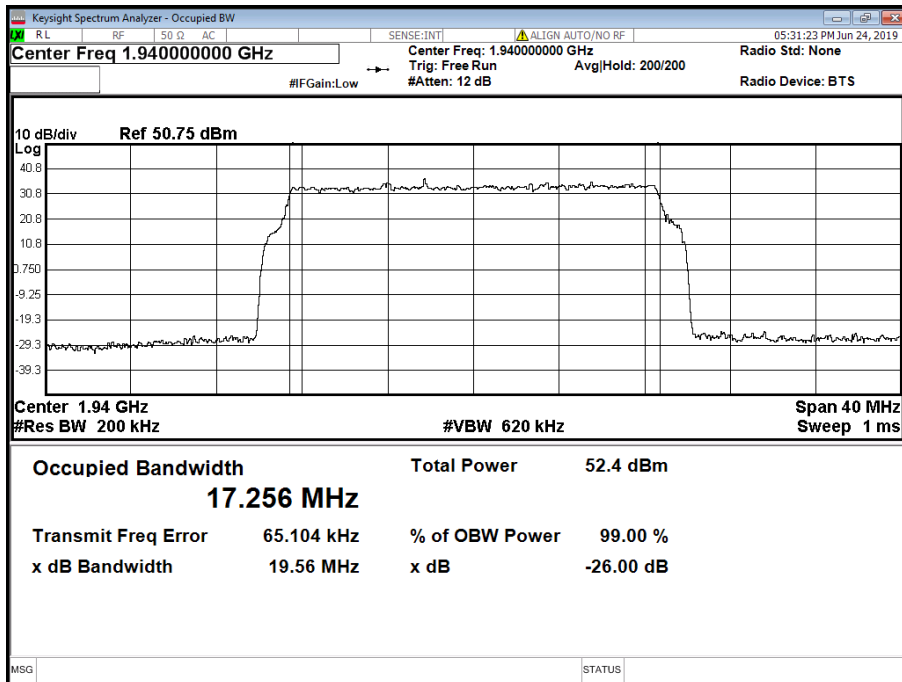


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position T

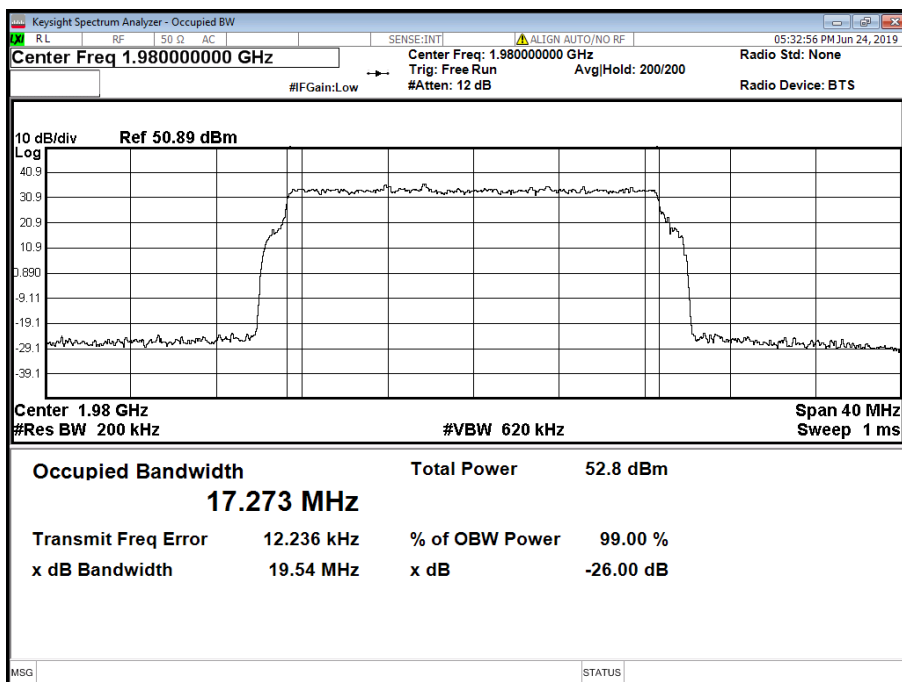




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position B

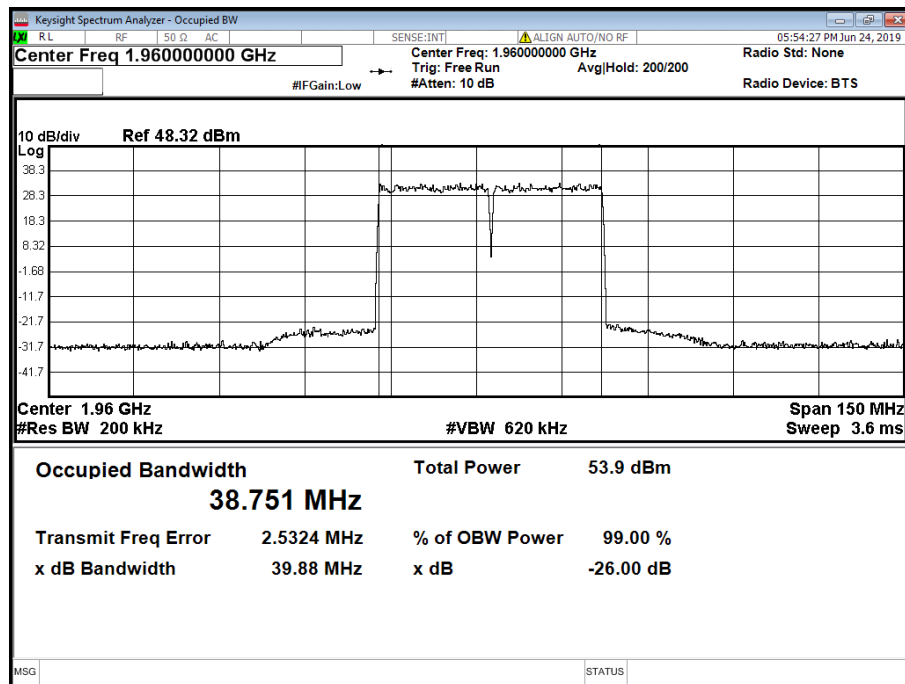


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position T





Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 + 20.0 MHz 15 kHz SCS - Channel Position M



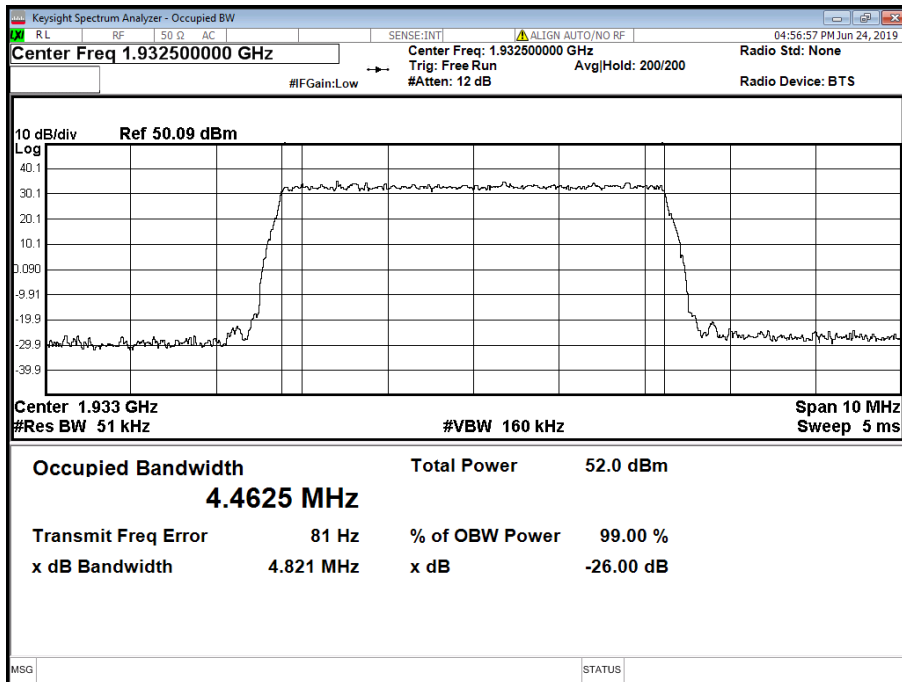
Configuration B

Maximum Output Power 46 dBm

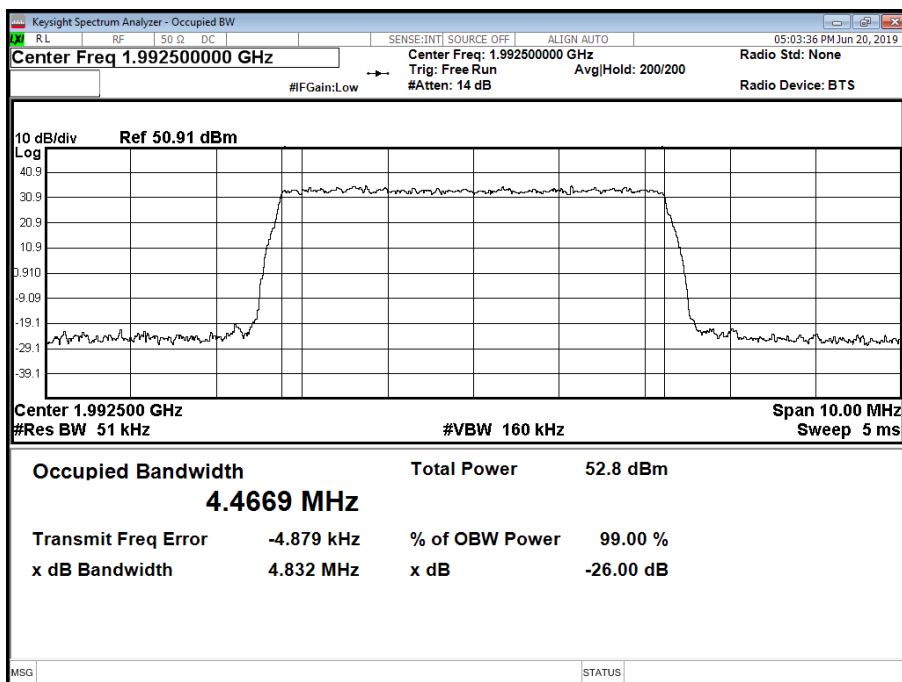
Antenna	NR Modulation	NR Carrier Bandwidth	Result (KHz)					
			Channel Position B		Channel Position M		Channel Position T	
			Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth
A	QPSK	5.0 MHz 15 kHz SCS	4,462.47	4,821.01	-	-	4,466.93	4,831.75
A	QPSK	10.0 MHz 15 kHz SCS	9,277.58	9,766.36	-	-	9,273.63	9,762.04
A	QPSK	15.0 MHz 15 kHz SCS	14,086.25	14,699.52	-	-	14,083.70	14,731.11
A	QPSK	20.0 MHz 15 kHz SCS	18,897.21	19,747.66	-	-	18,927.83	19,712.81
A	QPSK	20.0 MHz 60 kHz SCS	17,256.44	19,557.87	-	-	17,297.25	19,584.20
A	QPSK	20.0 + 20.0 MHz 15 kHz SCS	-	-	38,750.74	39,884.92	-	-



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B

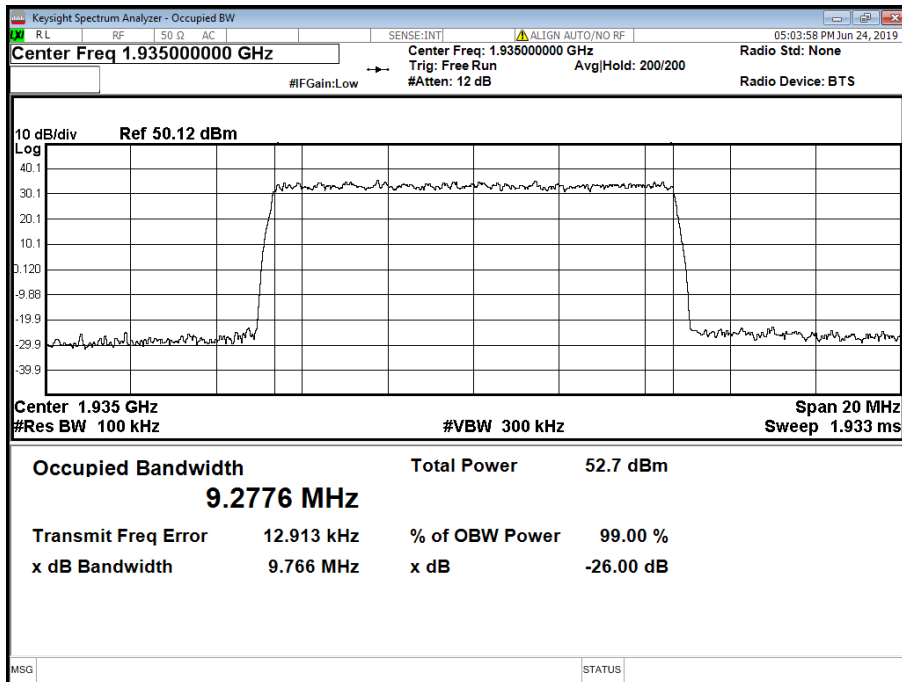


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T

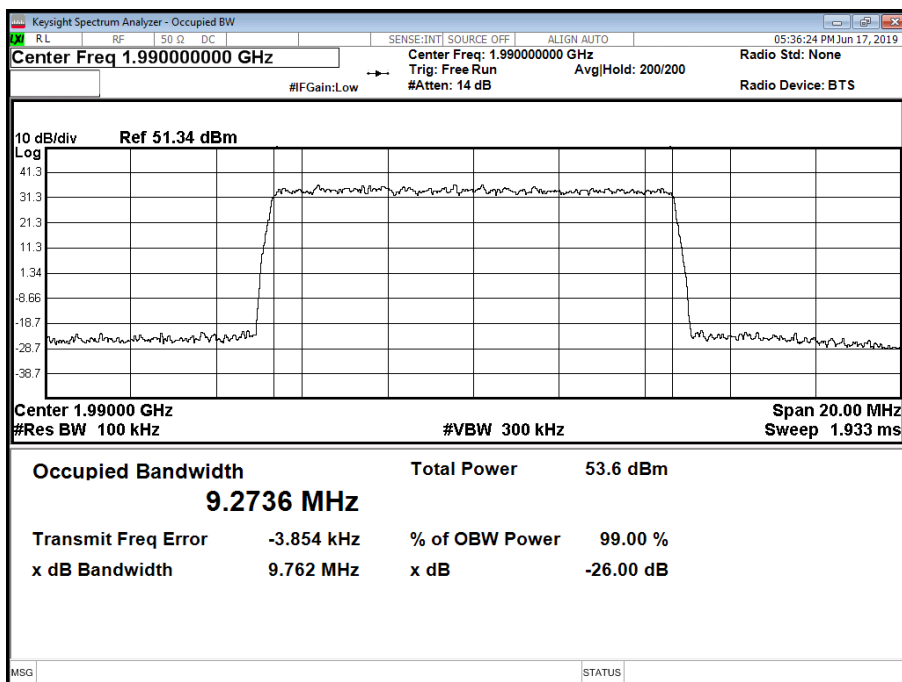




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position B

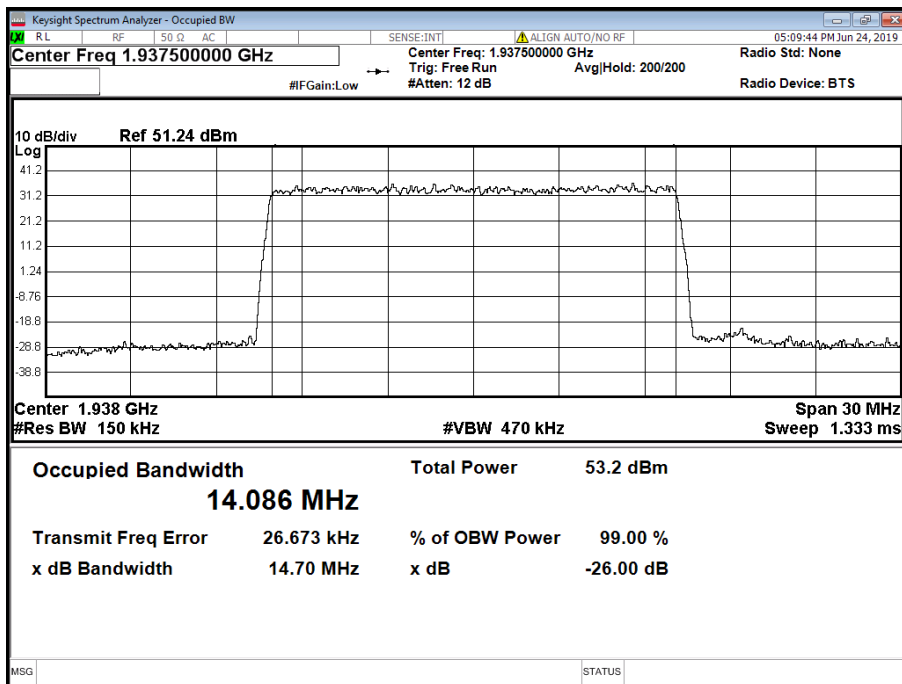


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position T

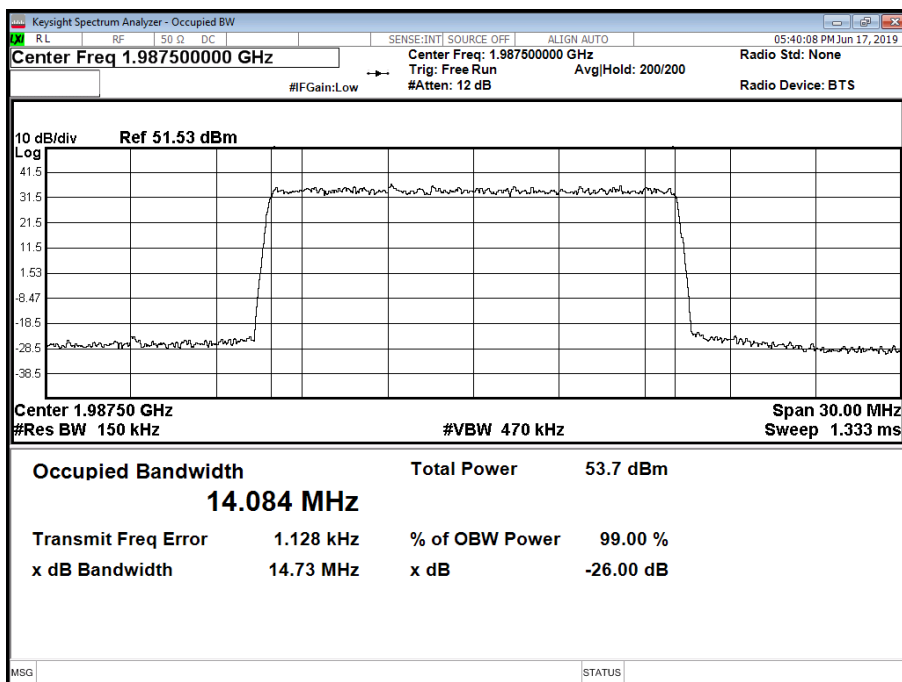




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position B

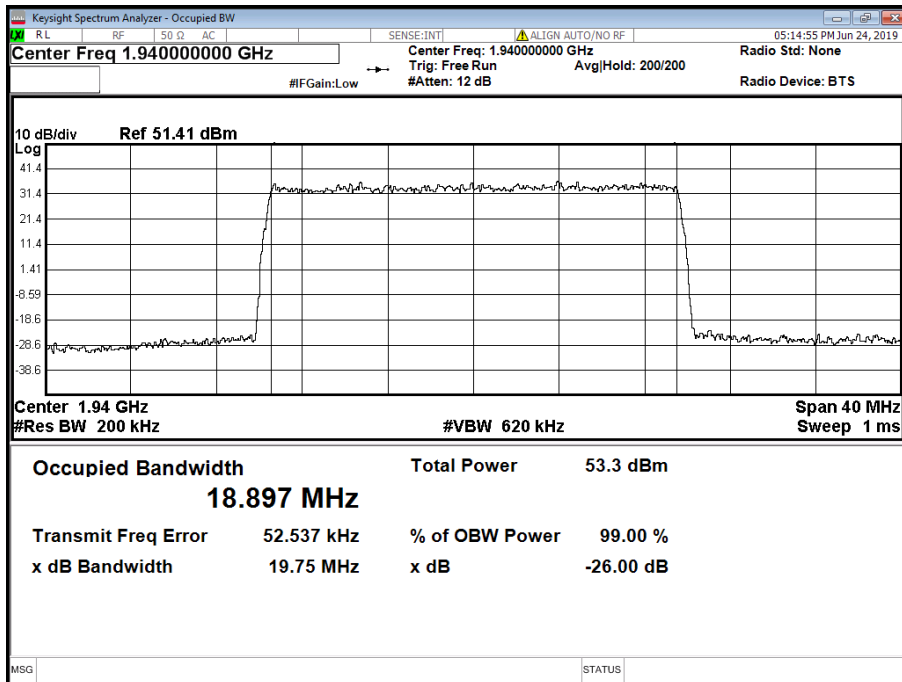


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position T

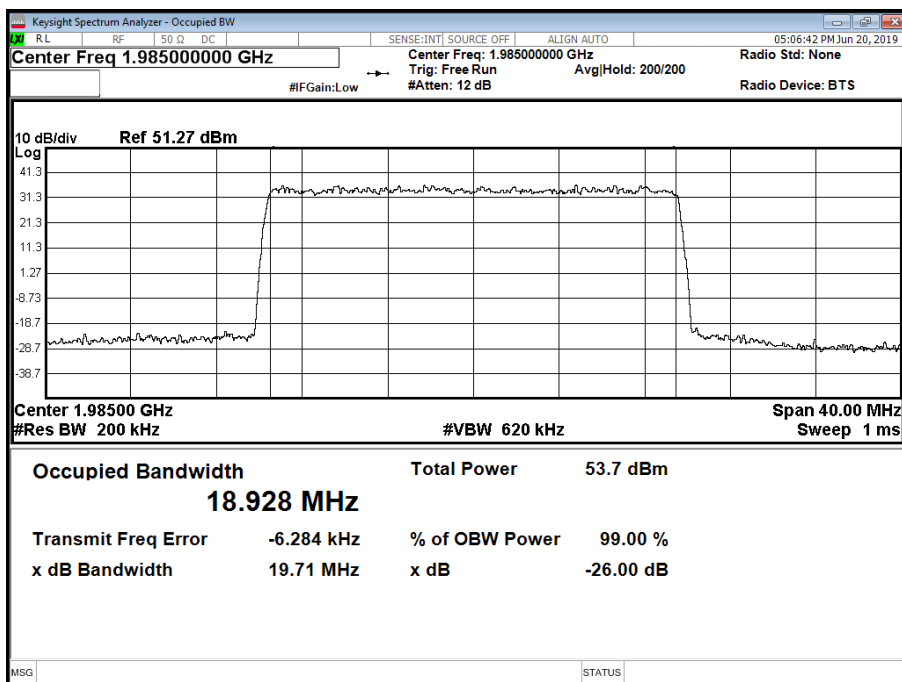




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position B

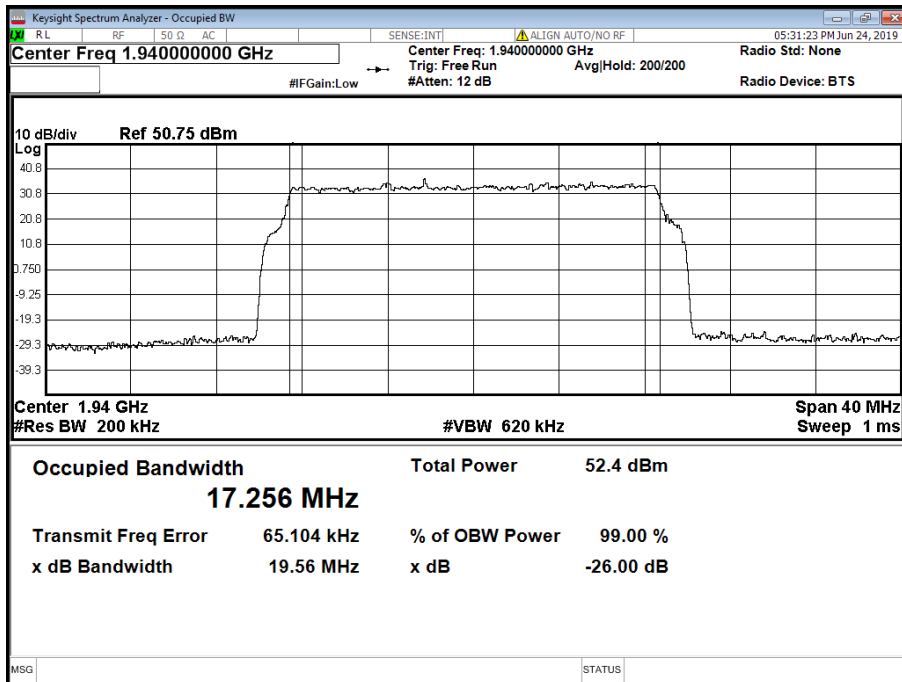


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position T

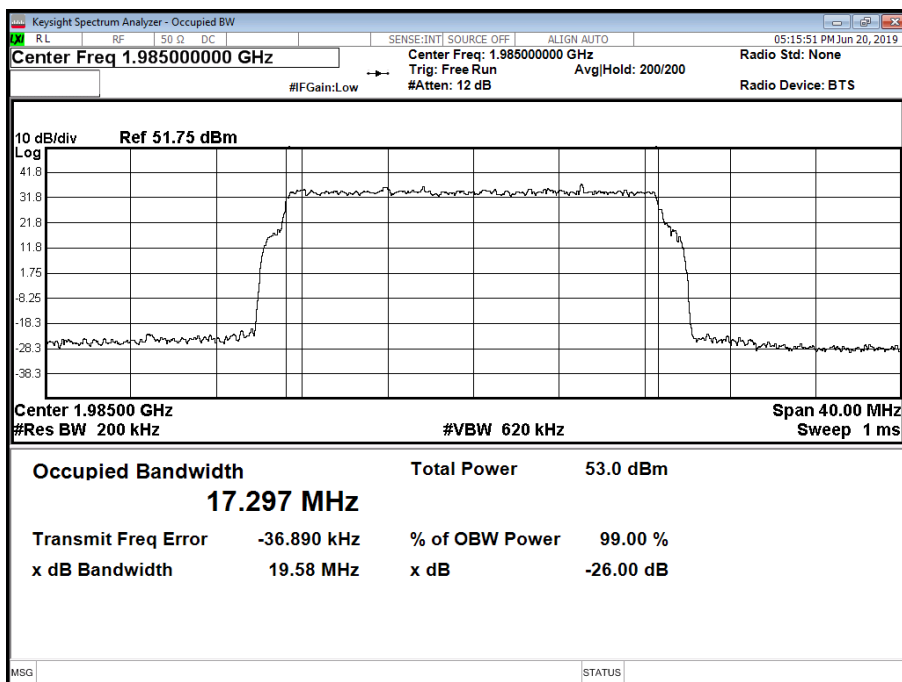




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position B

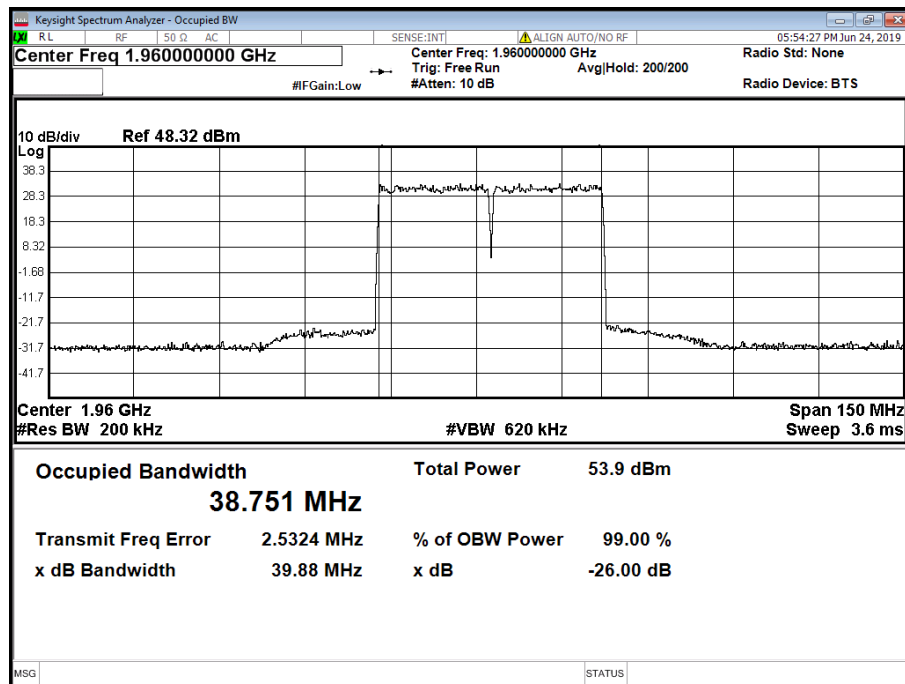


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position T





Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 + 20.0 MHz 15 kHz SCS - Channel Position M





2.3 BAND EDGE

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 24, Clause 24.238 (b)
Industry Canada RSS-133, Clause 6.5

2.3.2 Date of Test and Modification State

20 and 24 June 2019 - Modification State 0

2.3.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.4 Environmental Conditions

Ambient Temperature 25.6 - 25.8°C
Relative Humidity 37.7%

2.3.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

Each antenna port has been declared as being equivalent, therefore measurements were made on one antenna port only. To account for this, the limit was tightened by $10 * \log(N)$, where N is equal to the number of MIMO antenna ports.

For single carrier, the limit was calculated as being $-13 \text{ dBm} - 10 * \log(1) = -19 \text{ dBm}$.

For dual carrier, the limit was calculated as being $-13 \text{ dBm} - 10 * \log(2) = -16 \text{ dBm}$.

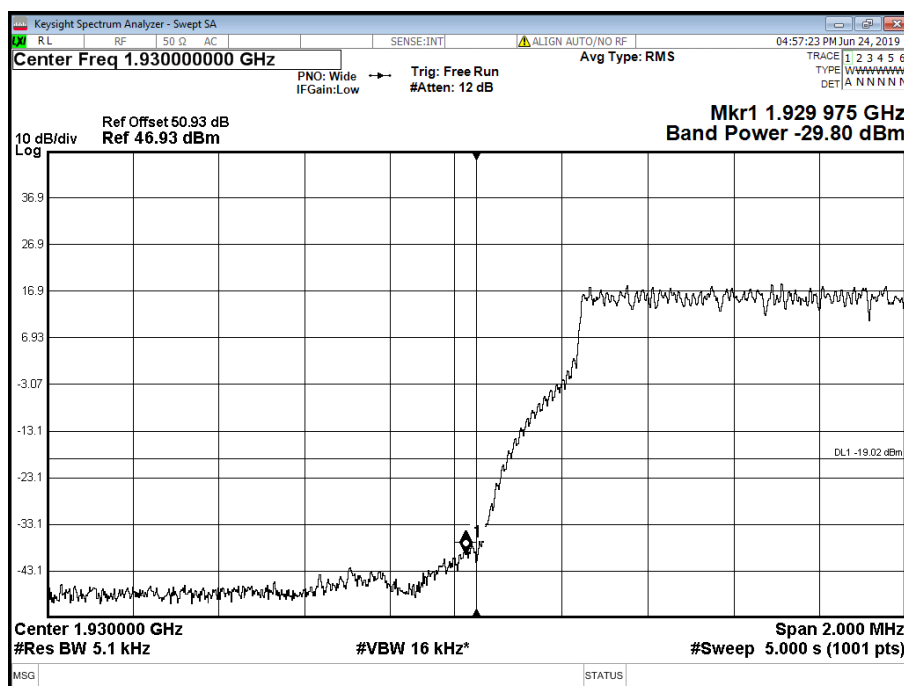
2.3.6 Test Results

Configuration A

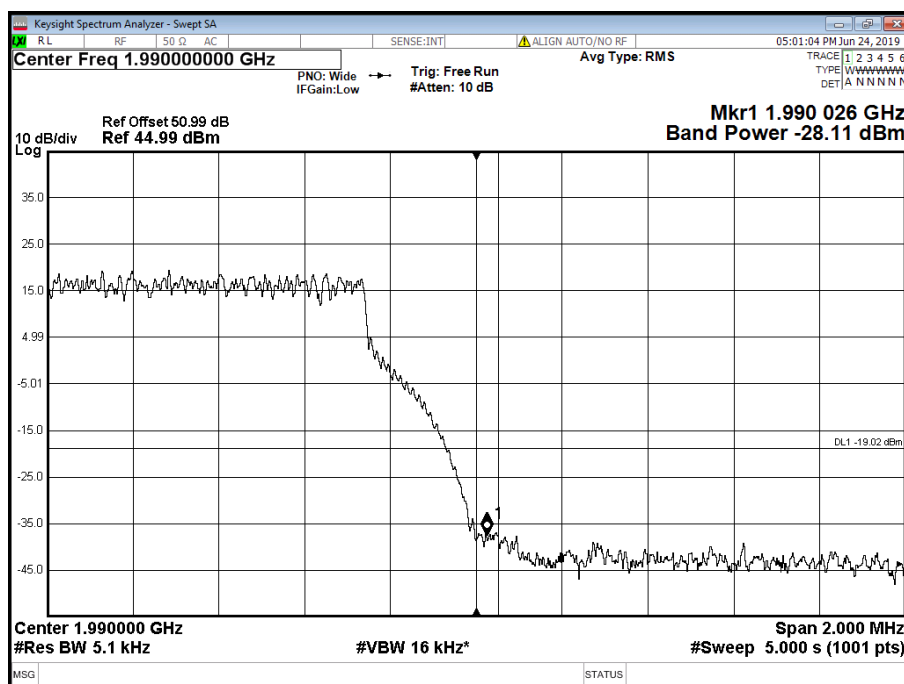
Maximum Output Power 46 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Band Edge (MHz)	
			Channel Position B	Channel Position T
A	QPSK	5.0 MHz 15 kHz SCS	1,932.5	1,987.5
A	QPSK	10.0 MHz 15 kHz SCS	1,935.0	1,985.0
A	QPSK	15.0 MHz 15 kHz SCS	1,937.5	1,982.5
A	QPSK	20.0 MHz 15 kHz SCS	1,940.0	1,980.0
A	QPSK	20.0 MHz 60 kHz SCS	1,940.0	1,980.0

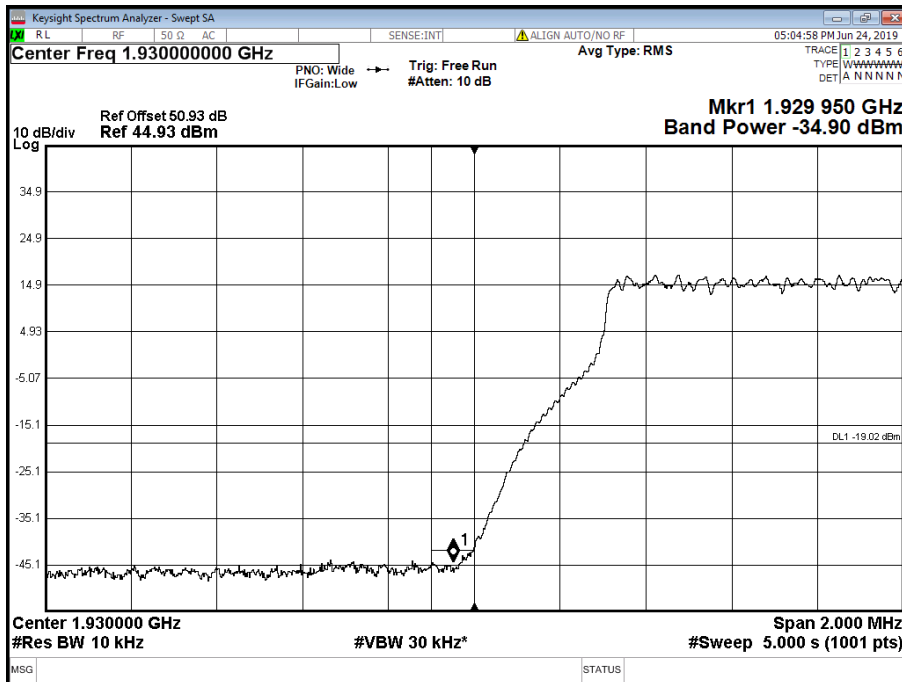
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B



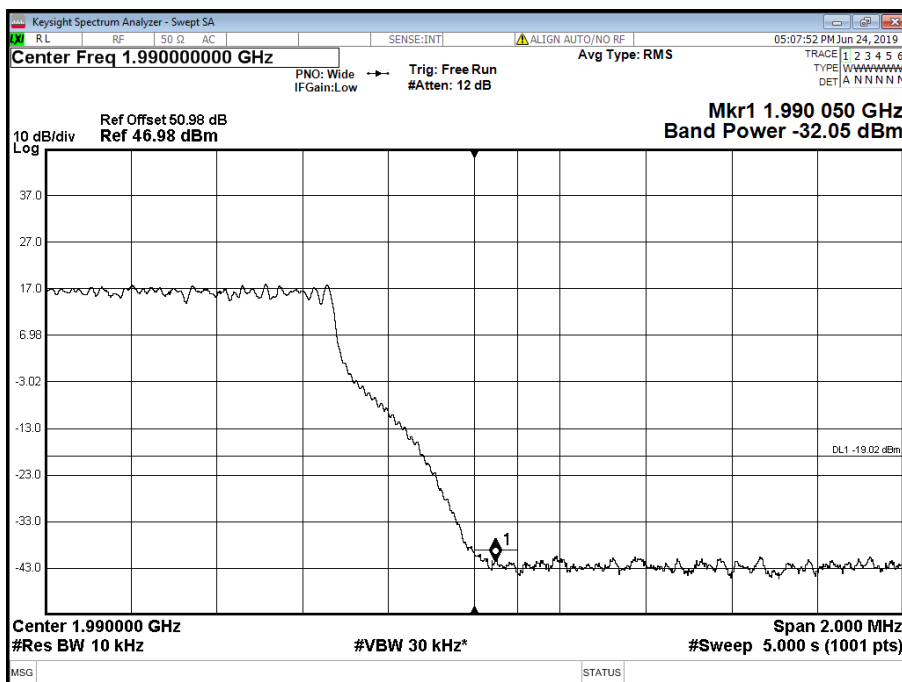
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T



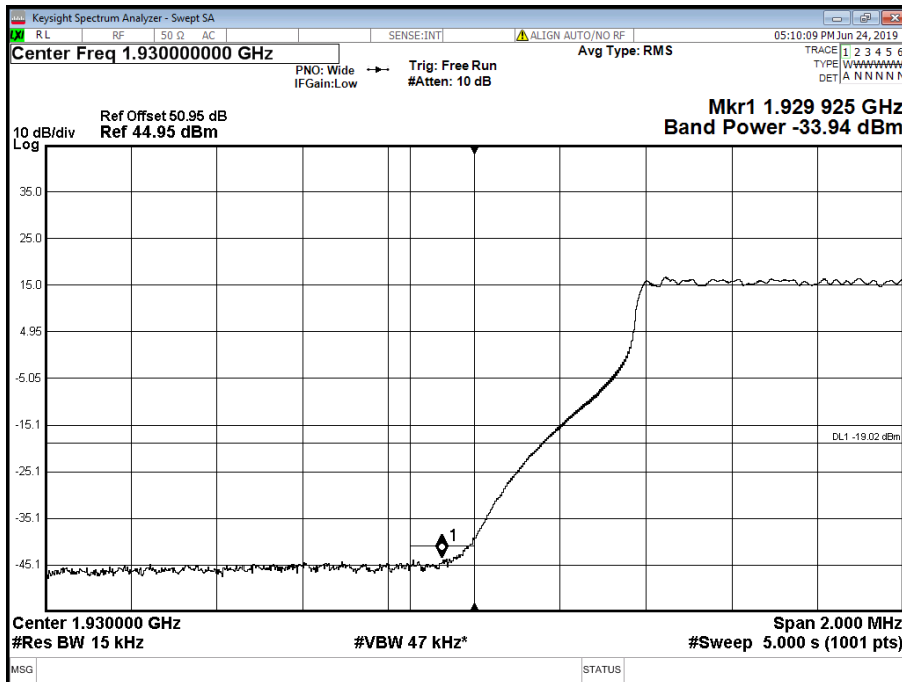
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position B



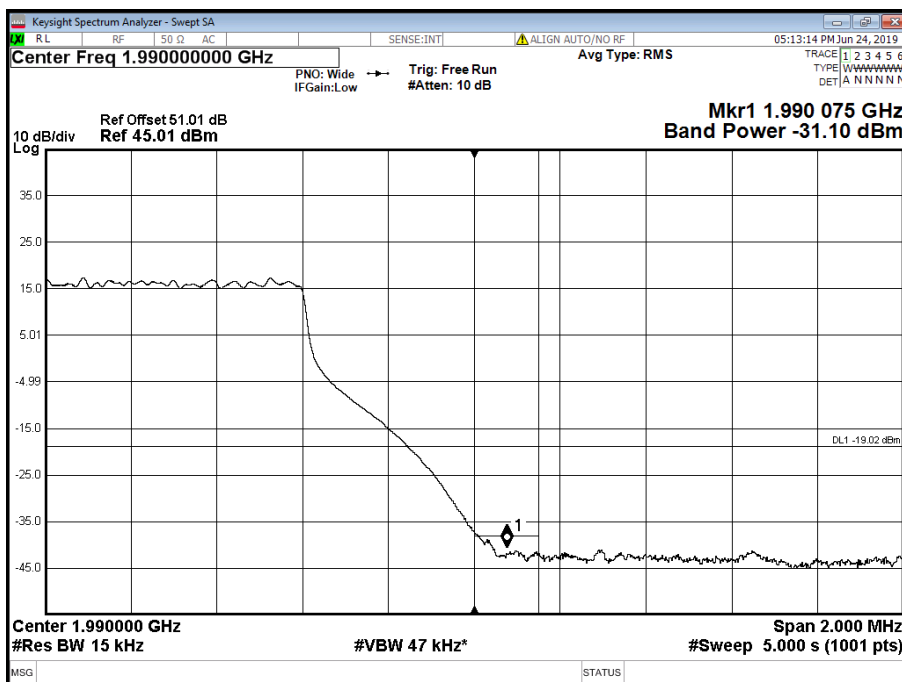
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position T



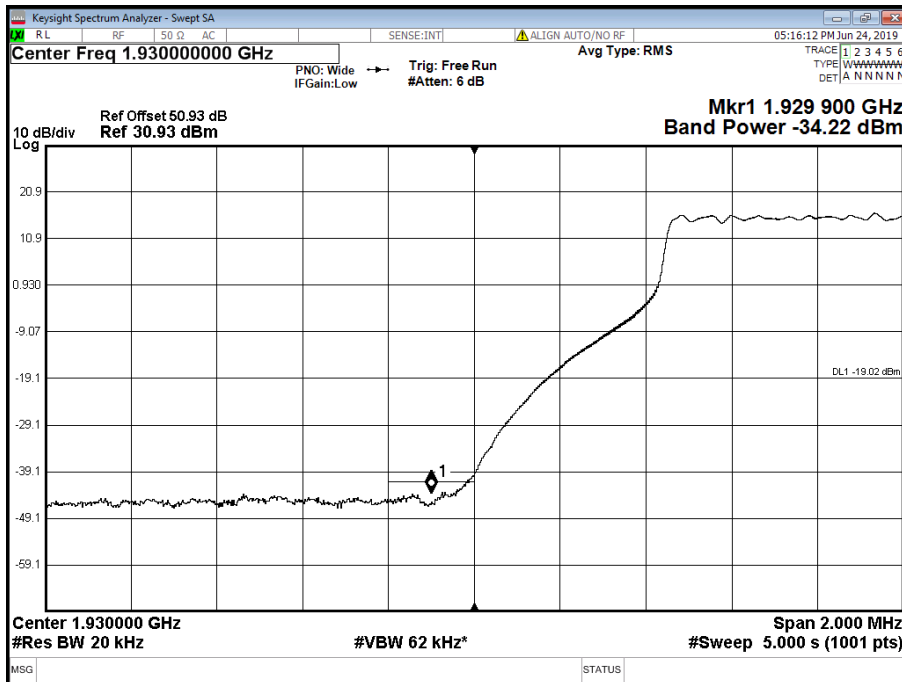
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position B



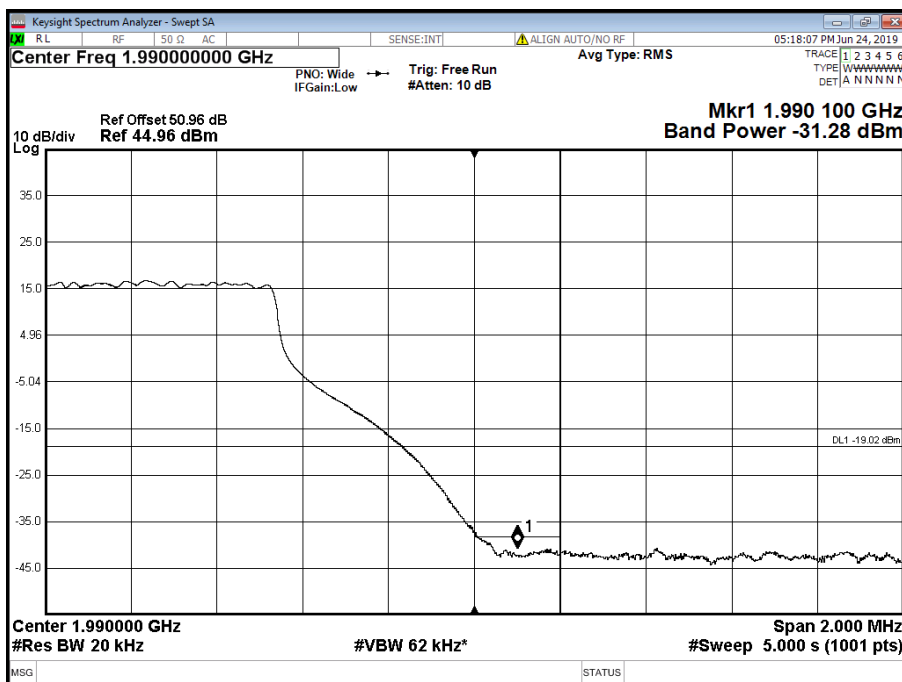
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position T



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position B

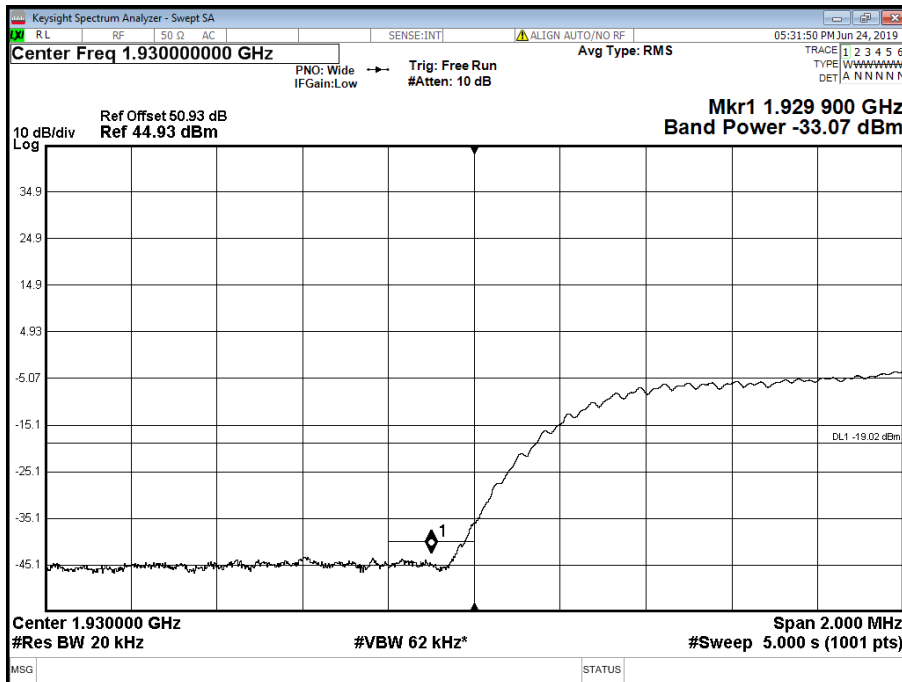


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position T

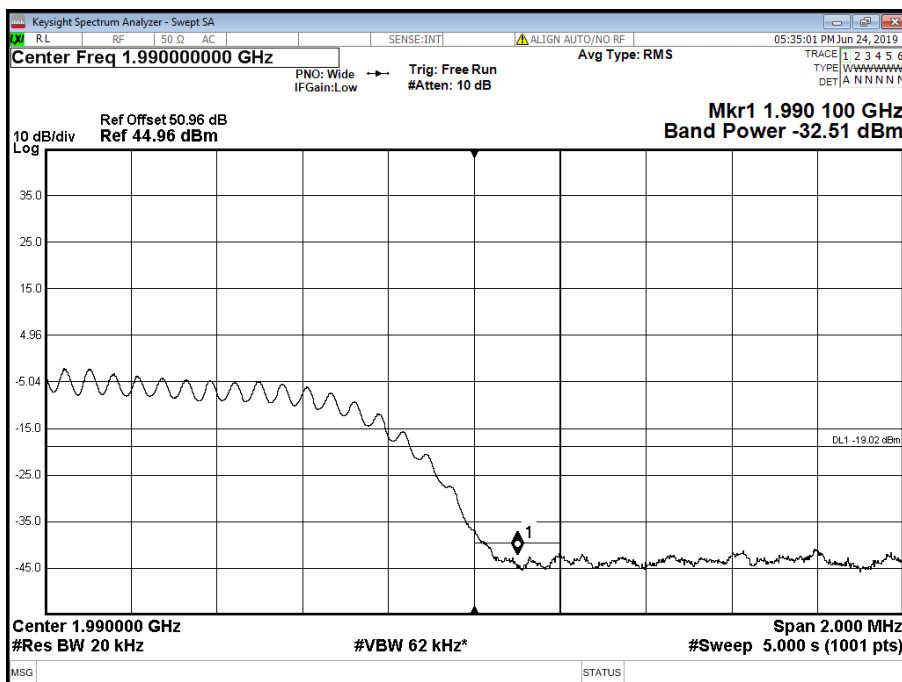




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position B



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position T



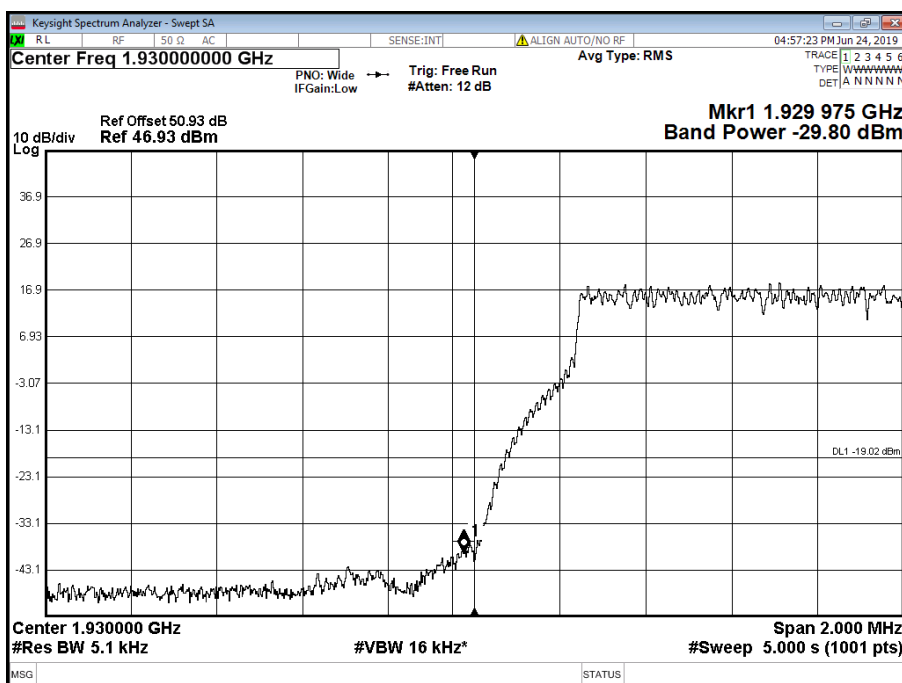


Configuration B

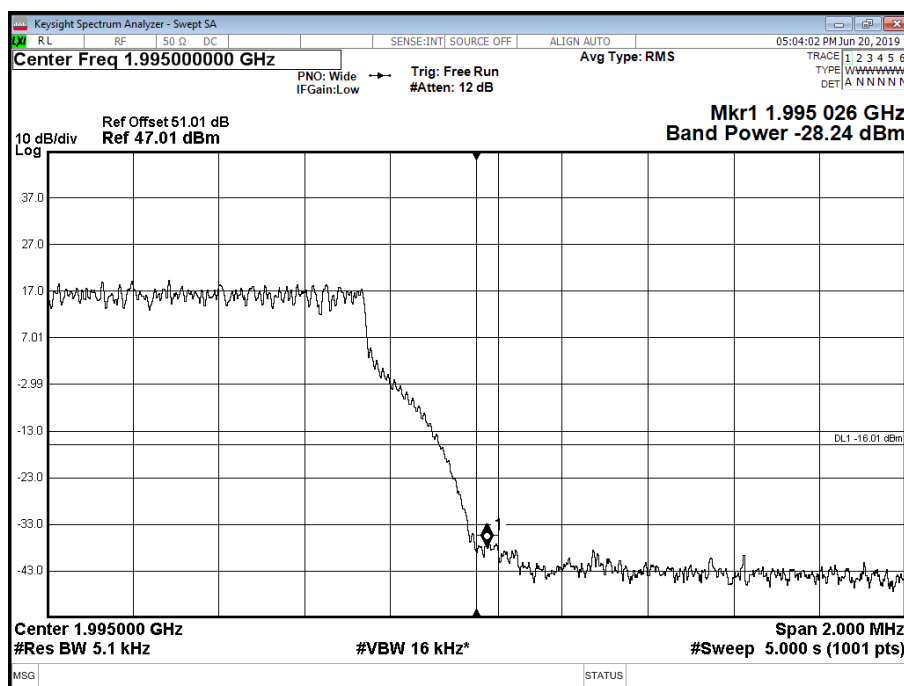
Maximum Output Power 46 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Band Edge (MHz)	
			Channel Position B	Channel Position T
A	QPSK	5.0 MHz 15 kHz SCS	1,932.5	1,992.5
A	QPSK	10.0 MHz 15 kHz SCS	1,935.0	1,990.0
A	QPSK	15.0 MHz 15 kHz SCS	1,937.5	1,987.5
A	QPSK	20.0 MHz 15 kHz SCS	1,940.0	1,985.0
A	QPSK	20.0 MHz 60 kHz SCS	1,940.0	1,985.0

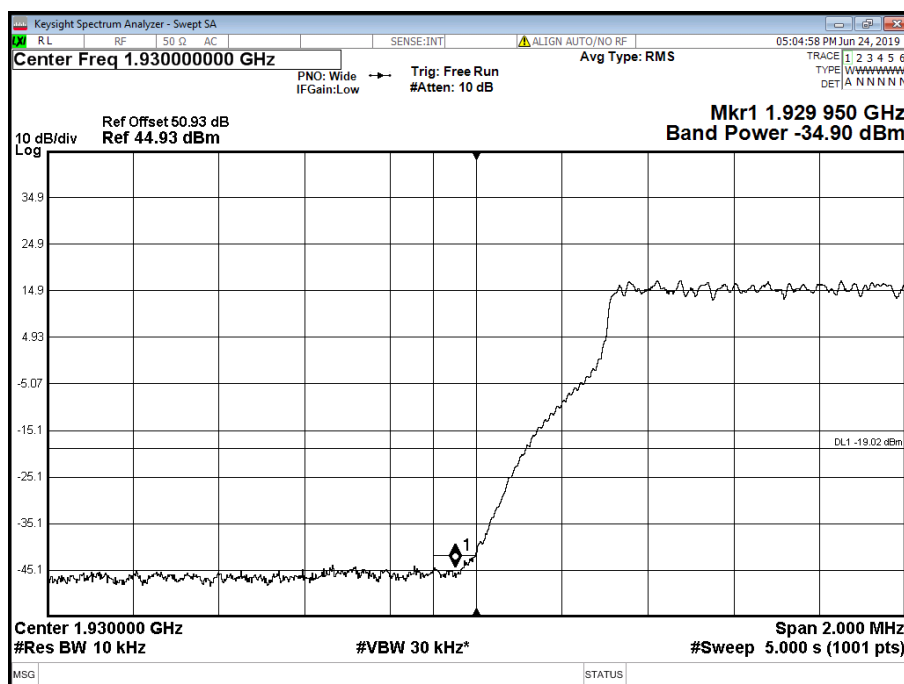
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B



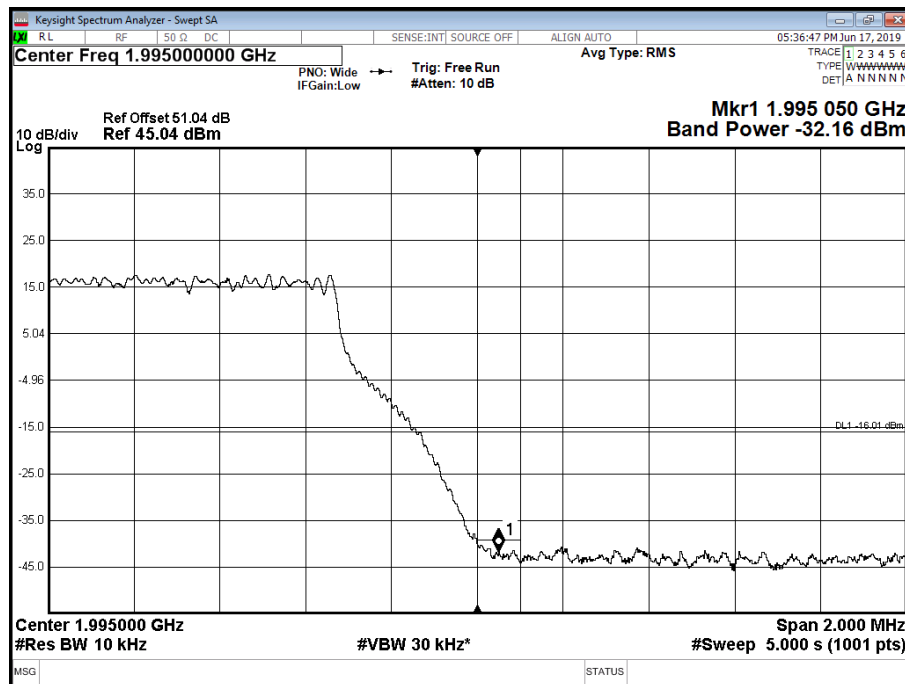
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T



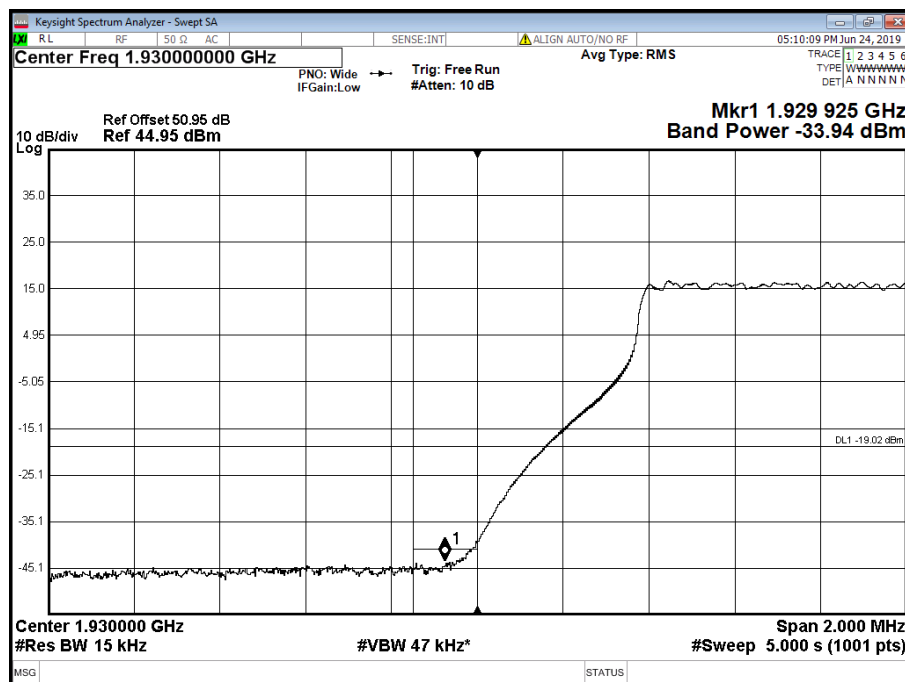
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position B



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position T

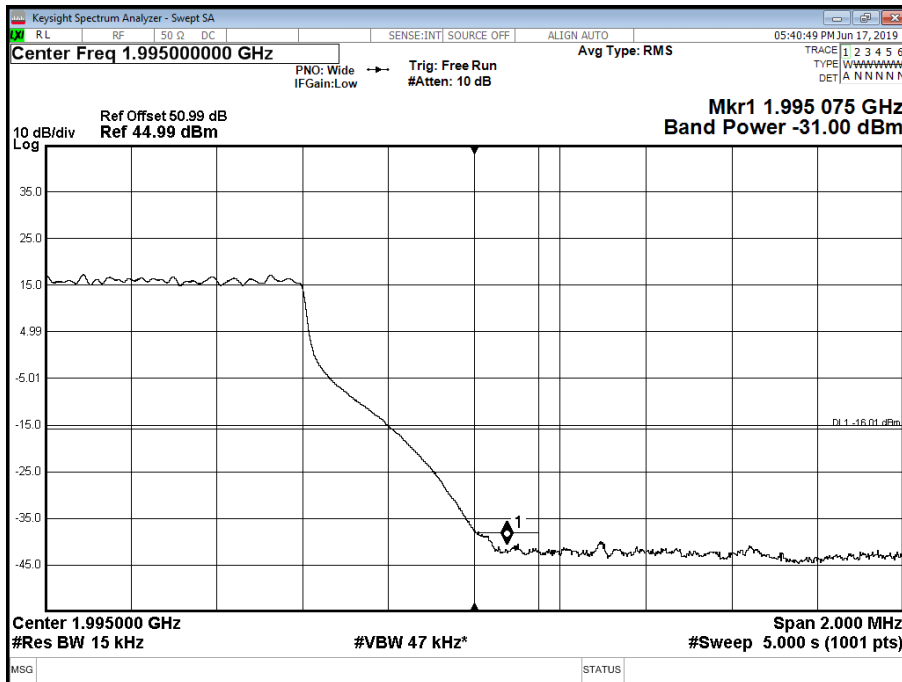


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position B

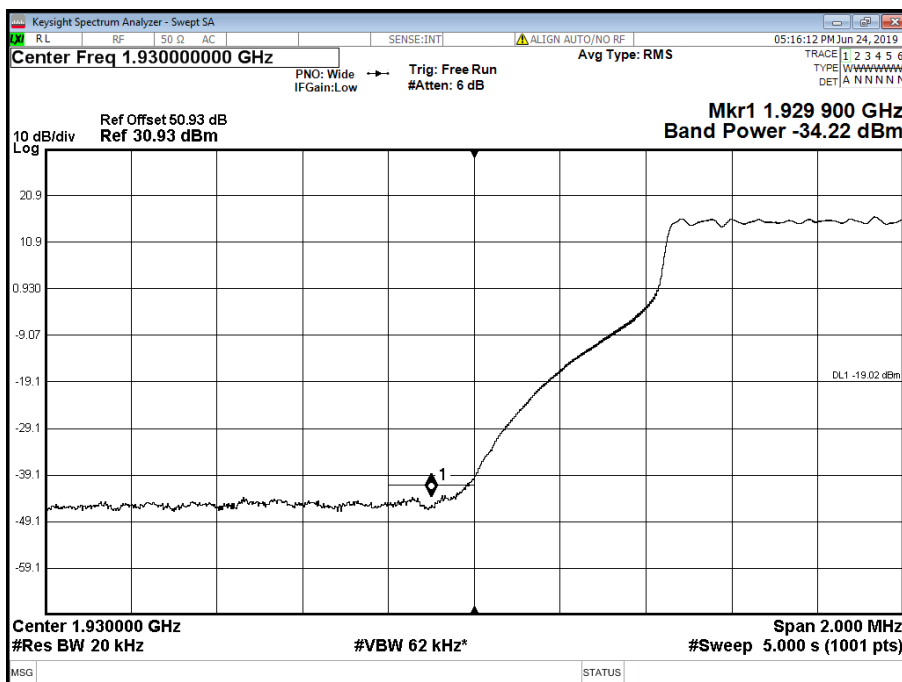




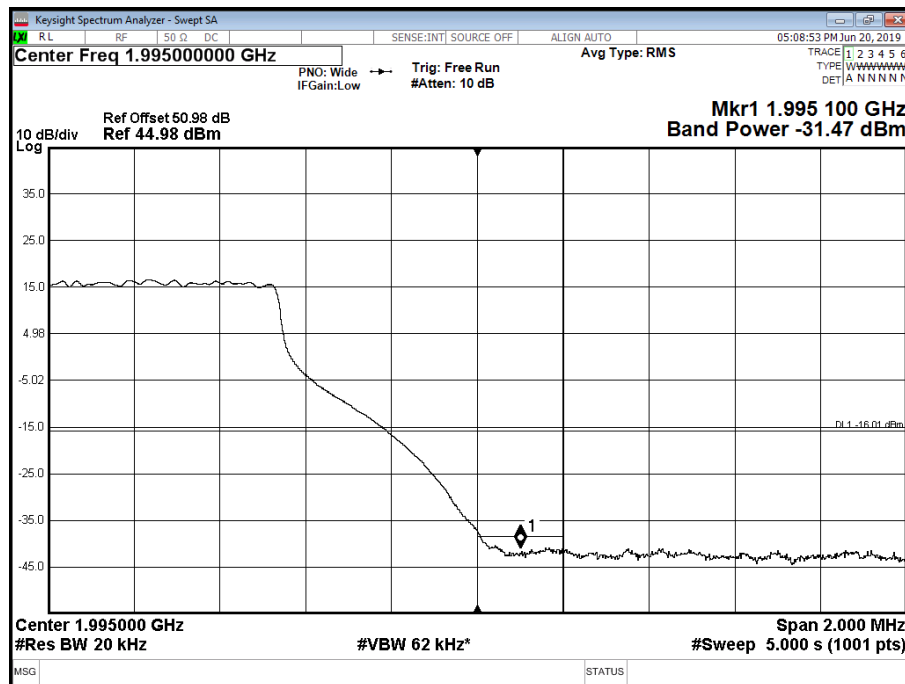
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 15.0 MHz 15 kHz SCS - Channel Position T



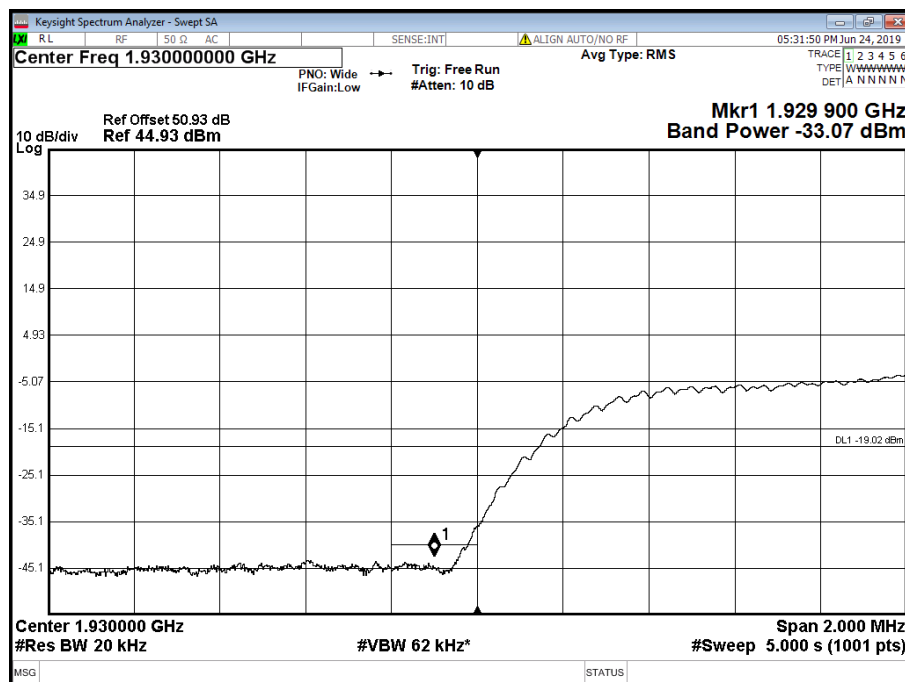
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position B



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position T

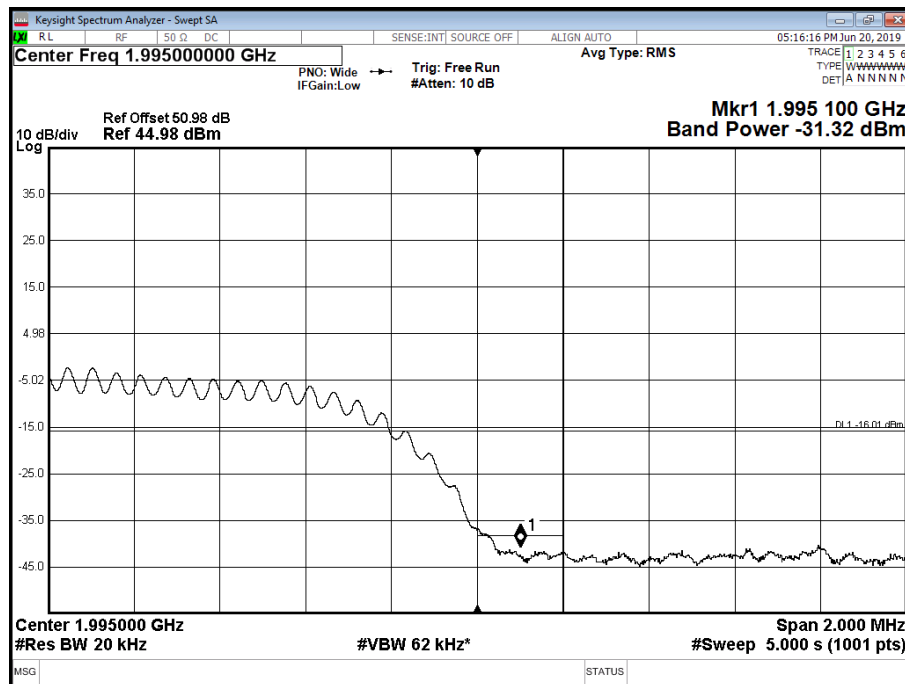


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position B





Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 60 kHz SCS - Channel Position T



Limit	-19 dBm
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2.4 TRANSMITTER SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 24, Clause 24.238 (a)
Industry Canada RSS-133, Clause 6.5

2.4.2 Date of Test and Modification State

21 and 24 June 2019 - Modification State 0

2.4.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.4 Environmental Conditions

Ambient Temperature	25.6°C
Relative Humidity	37.7%

2.4.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

Each antenna port has been declared as being equivalent, therefore measurements were made on one antenna port only. To account for this, the limit was tightened by $10 * \log(N)$, where N is equal to the number of MIMO antenna ports.

For single carrier, the limit was calculated as being $-13 \text{ dBm} - 10 * \log(4) = -19 \text{ dBm}$.

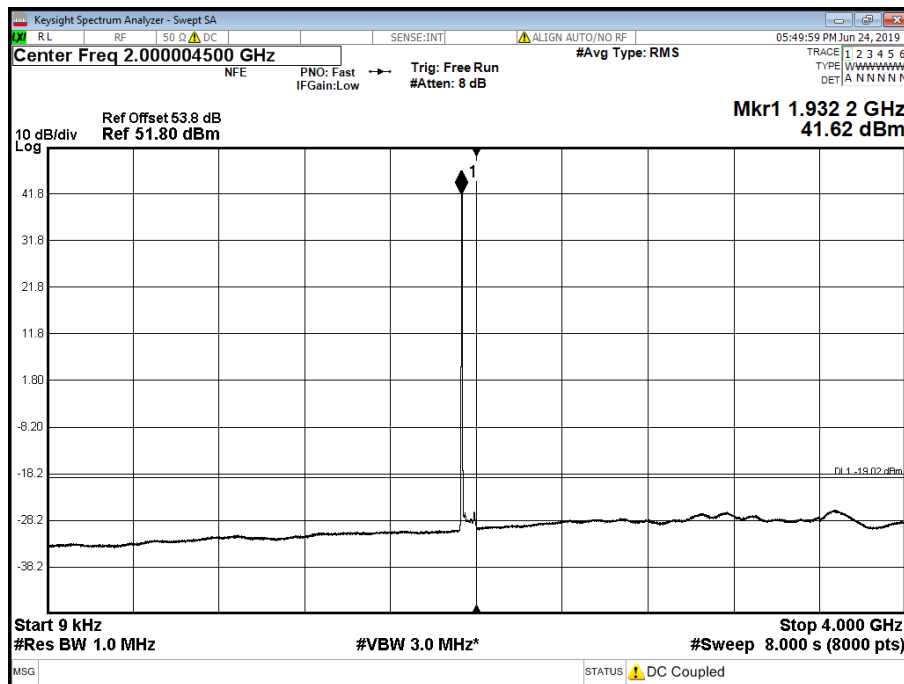
For dual carrier, the limit was calculated as being $-13 \text{ dBm} - 10 * \log(2) = -16 \text{ dBm}$.

2.4.6 Test Results

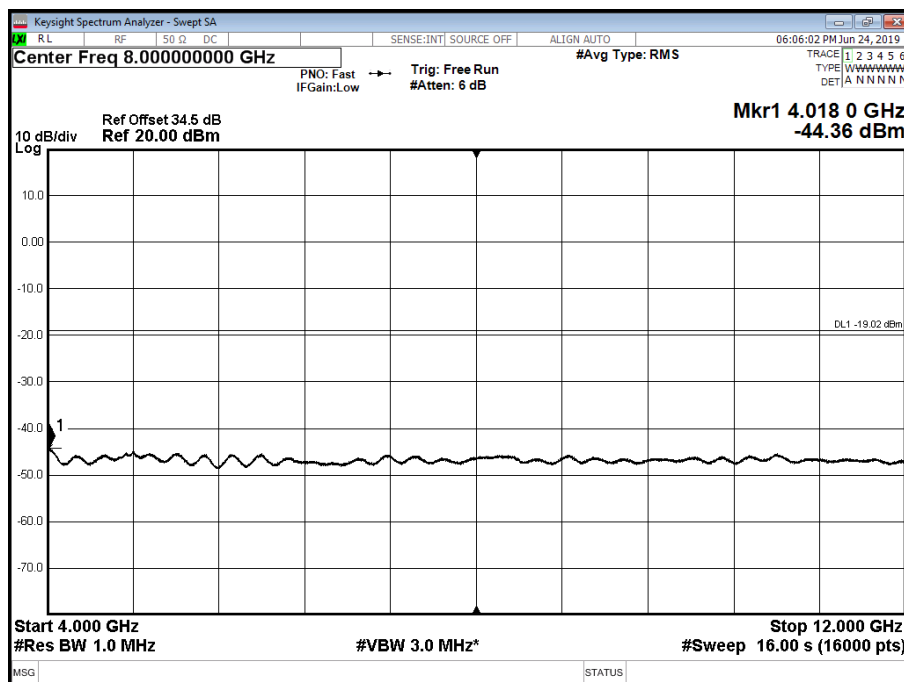
Configuration A

Maximum Output Power 46 dBm

Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B - Band 1 - Range 0.009 to 4000 MHz

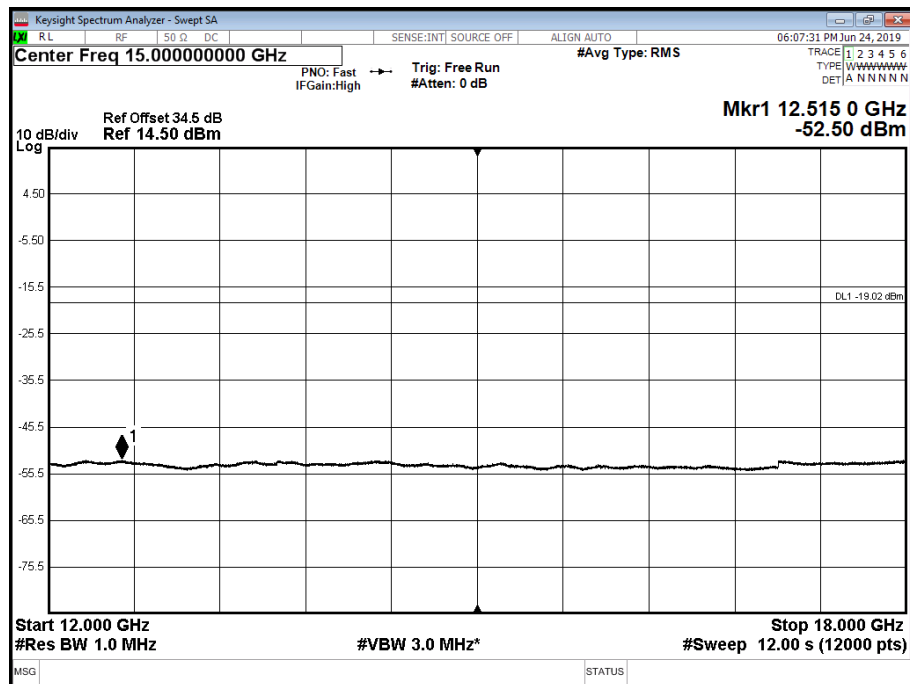


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B - Band 2 - Range 4000 to 12000 MHz

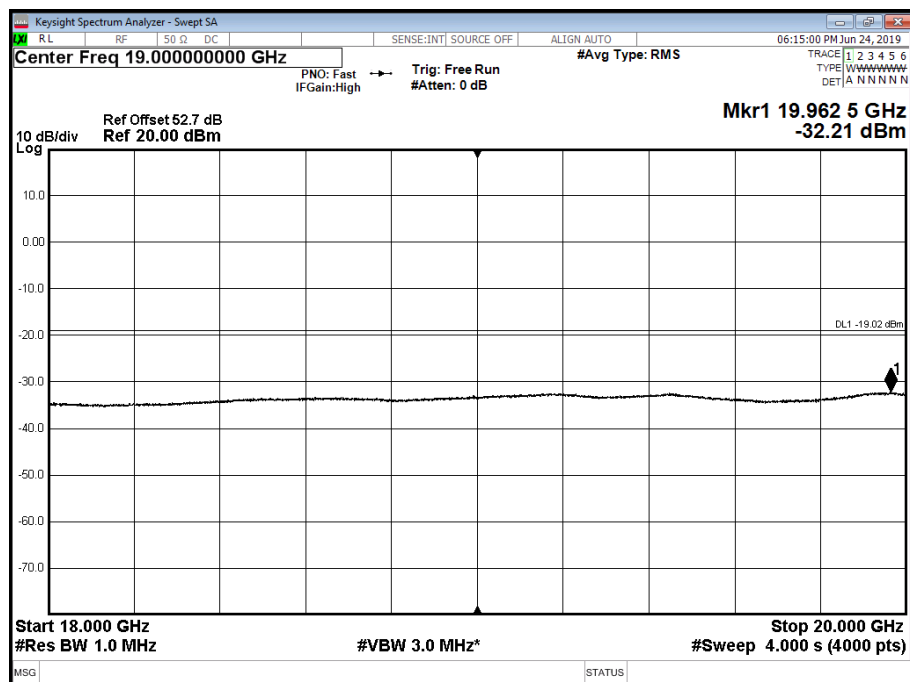




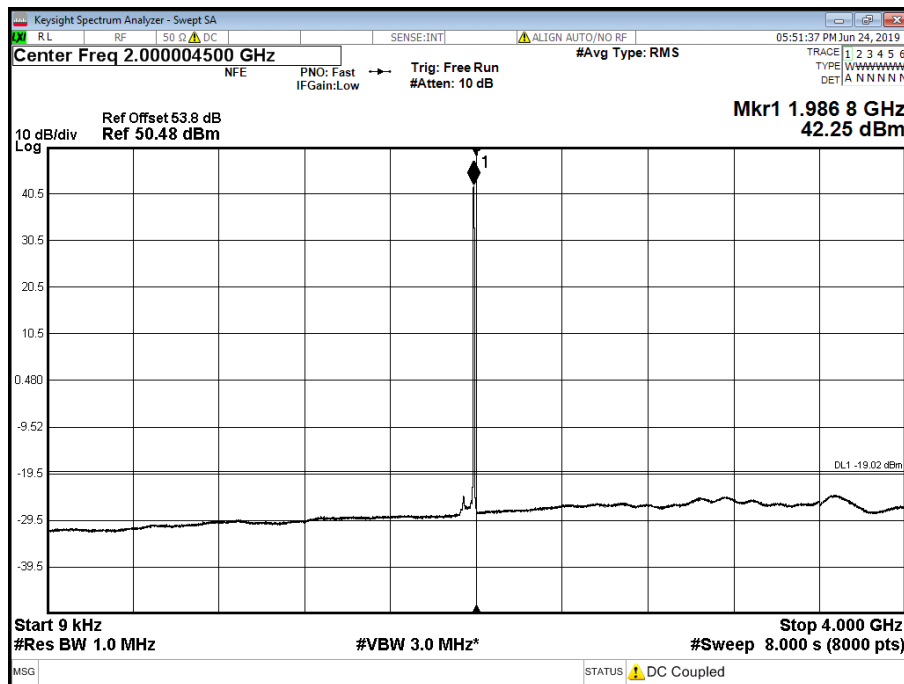
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B - Band 3 - Range 12000 to 18000 MHz



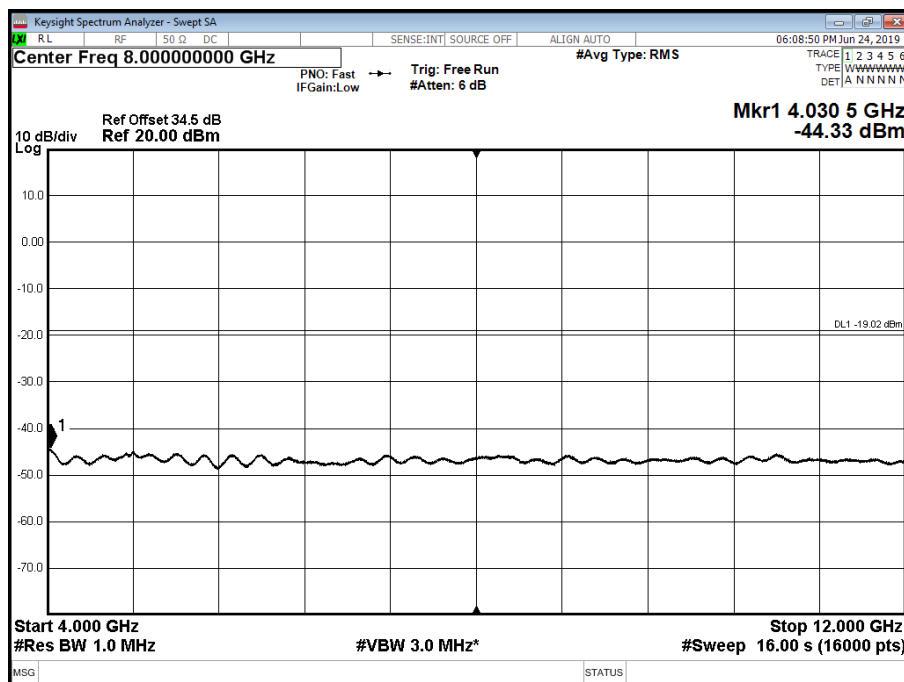
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B - Band 4 - Range 18000 to 20000 MHz



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T - Band 1 - Range 0.009 to 4000 MHz

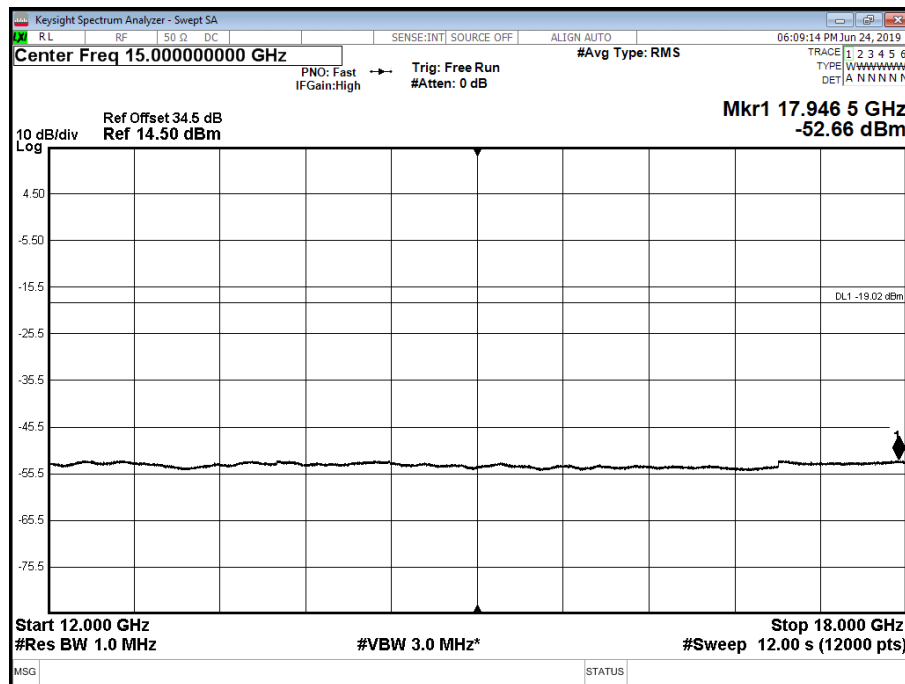


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T - Band 2 - Range 4000 to 12000 MHz

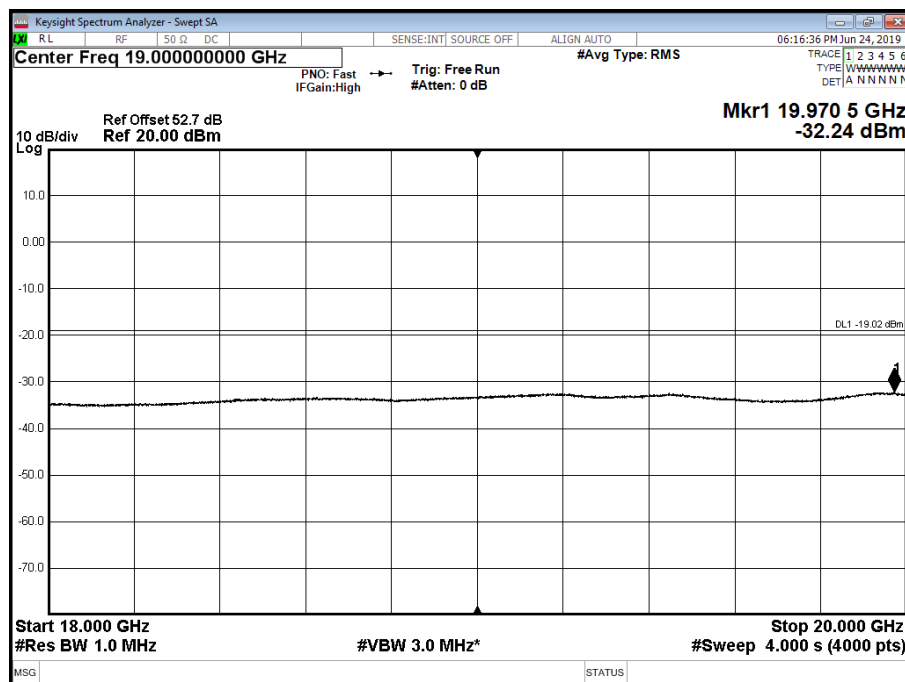




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T - Band 3 - Range 12000 to 18000 MHz



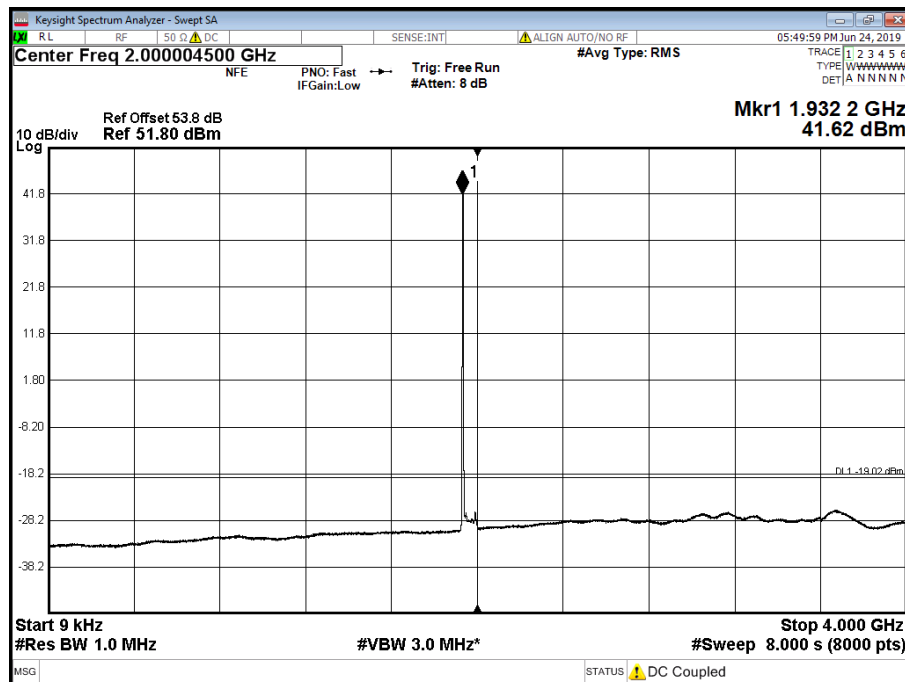
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T - Band 4 - Range 18000 to 20000 MHz



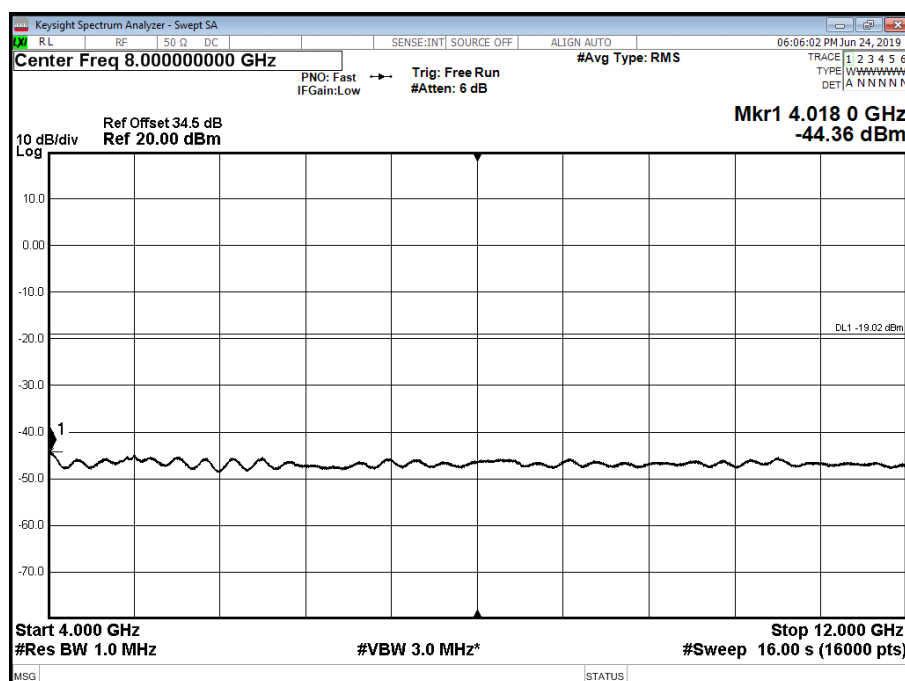
Configuration B

Maximum Output Power 46 dBm

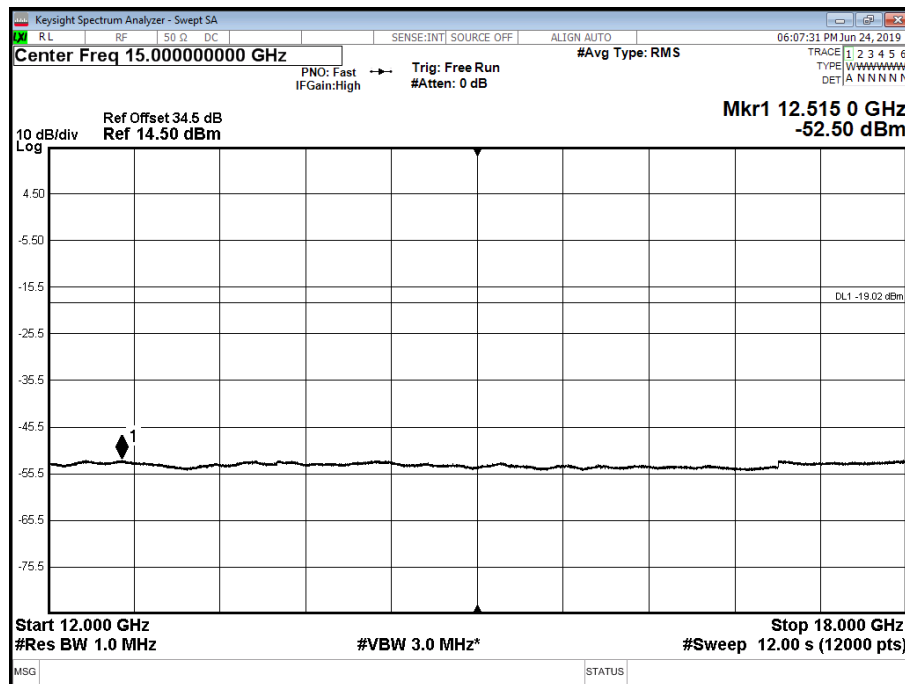
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel
Position B - Band 1 - Range 0.009 to 4000 MHz



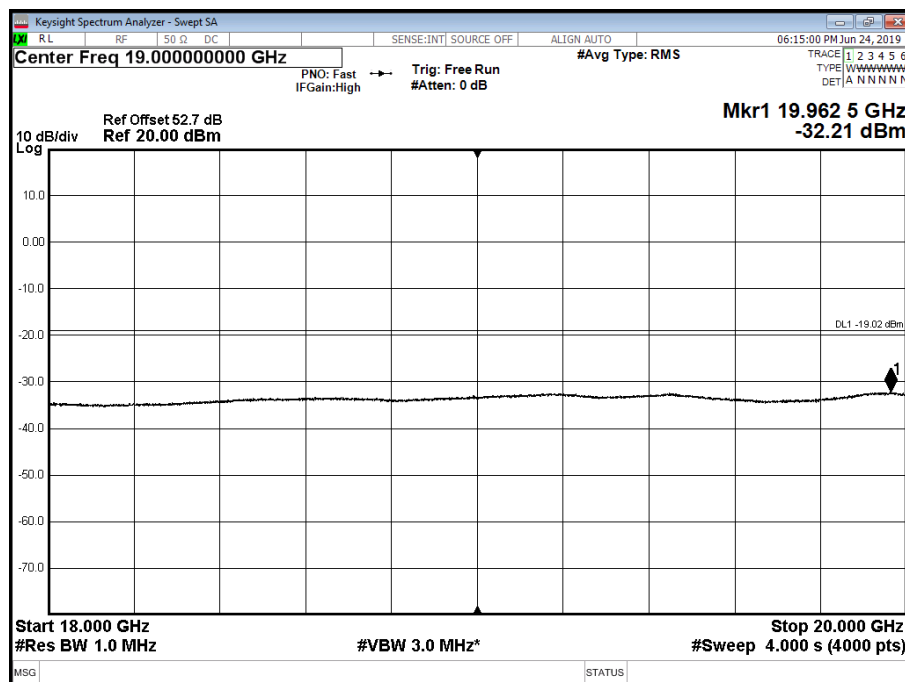
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel
Position B - Band 2 - Range 4000 to 12000 MHz



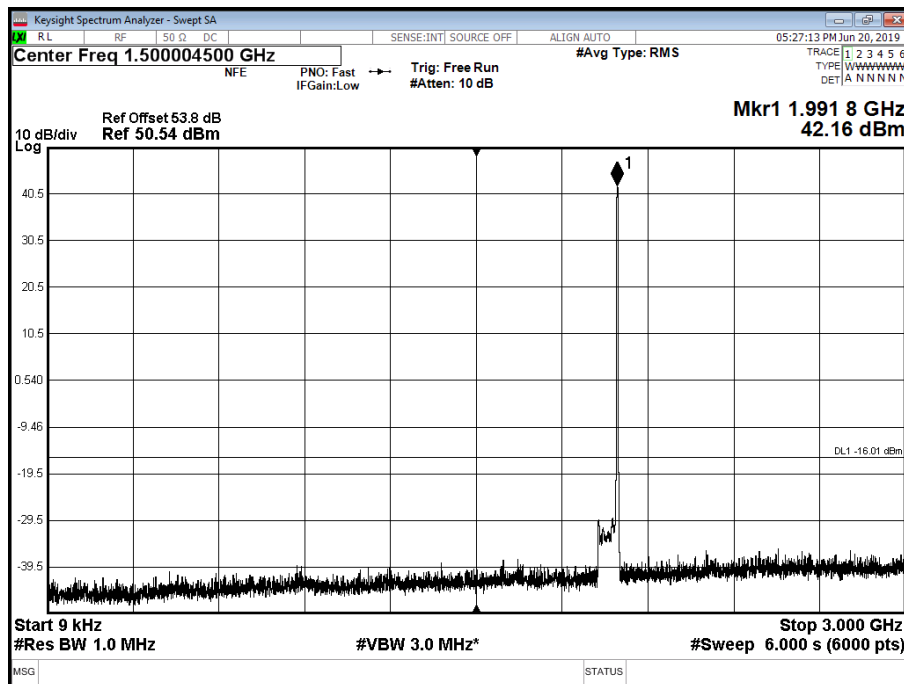
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B - Band 3 - Range 12000 to 18000 MHz



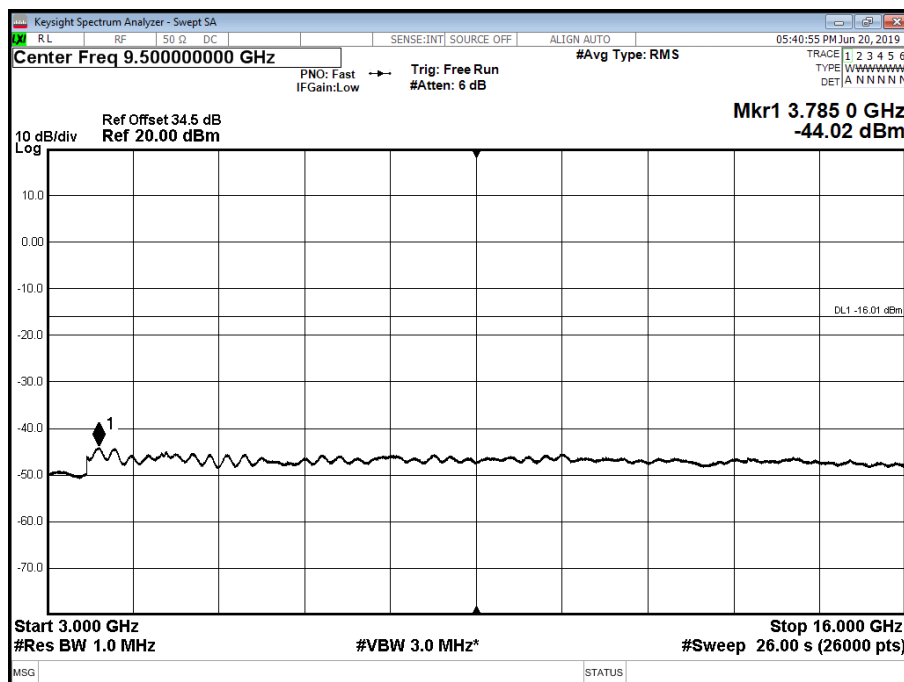
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position B - Band 4 - Range 18000 to 20000 MHz



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T - Band 1 - Range 0.009 to 3000 MHz

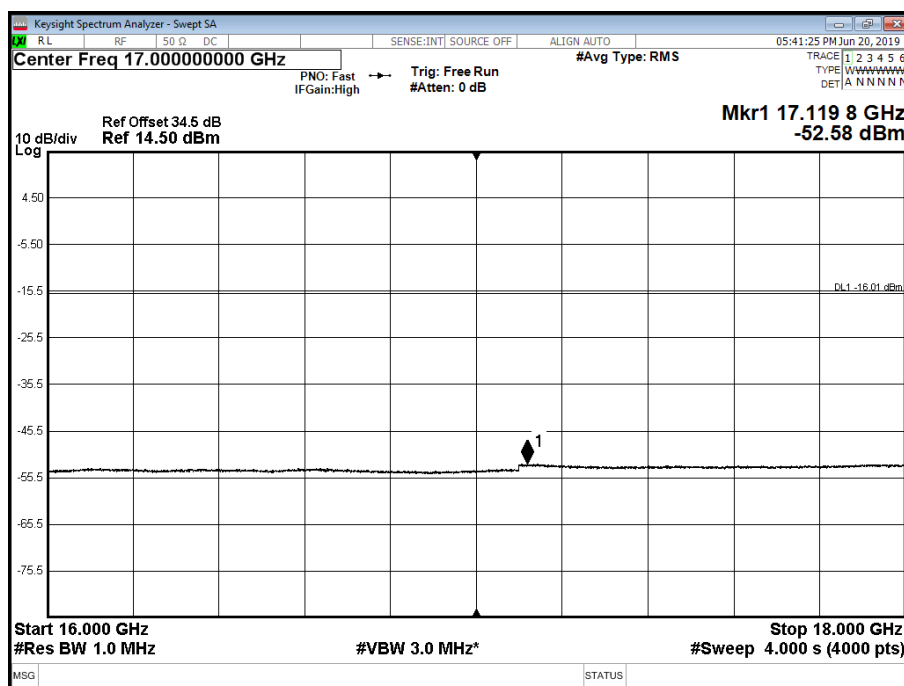


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T - Band 2 - Range 3000 to 16000 MHz

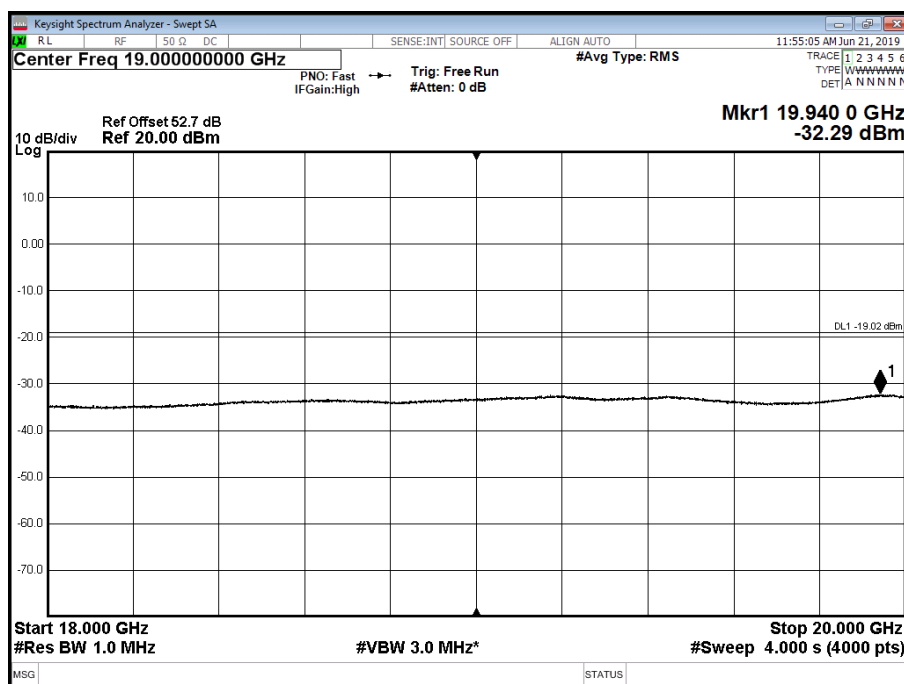




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T - Band 3 - Range 16000 to 18000 MHz



Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 5.0 MHz 15 kHz SCS - Channel Position T - Band 4 - Range 18000 to 20000 MHz



Limit	-19dBm
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SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Maximum Peak Output Power and Peak to Average Ratio - Conducted					
PXA Signal Analyser	Keysight	N9030A	TE 004654	12	08-Oct-2019
Attenuator	API weinschel inc.	30dB	TE 005135	12	07-Nov-2019
Attenuator	API weinschel inc.	20dB	TE 005133	12	07-Nov-2019
Hydrometer	Rotronic	Hygropalm	TE 005264	12	02-May-2020
Occupied Bandwidth					
PXA Signal Analyser	Keysight	N9030A	TE 004654	12	08-Oct-2019
Attenuator	API weinschel inc.	30dB	TE 005135	12	07-Nov-2019
Attenuator	API weinschel inc.	20dB	TE 005133	12	07-Nov-2019
Hydrometer	Rotronic	Hygropalm	TE 005264	12	02-May-2020
Band Edge					
PXA Signal Analyser	Keysight	N9030A	TE 004654	12	08-Oct-2019
Attenuator	API weinschel inc.	30dB	TE 005135	12	07-Nov-2019
Attenuator	API weinschel inc.	20dB	TE 005133	12	07-Nov-2019
Hydrometer	Rotronic	Hygropalm	TE 005264	12	02-May-2020
Transmitter Spurious Emissions					
PXA Signal Analyser	Keysight	N9030A	TE 004654	12	08-Oct-2019
Attenuator	API weinschel inc.	30dB	TE 005135	12	07-Nov-2019
Attenuator	API weinschel inc.	20dB	TE 005133	12	07-Nov-2019
Highpass Filter	Wainwright	3000 -18000Mhz	TE 005219	12	15-Feb-2020
Hydrometer	Rotronic	Hygropalm	TE 005264	12	02-May-2020



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Discipline	Frequency / Parameter	MU
Conducted Maximum Peak Output Power	30 MHz to 20 GHz Amplitude	± 0.1 dB
Conducted Emissions	30 MHz to 20 GHz Amplitude	± 2.3 dB
Frequency Stability	30 MHz to 2 GHz	± 5.0 Hz
Occupied Bandwidth	Up to 20 MHz Bandwidth	± 1.1 Hz
Band Edge	30 MHz to 20 GHz Amplitude	± 2.3 dB



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

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ANNEX A

MODULE LIST



Configuration A & B			
Product	Product No	R-State	Serial No
Radio 4415 B2 B25	KRC161636/1	R1B/A	D16X403333
CT10	LPC102487/1	R1C	T01F375047
Software Version:	CXP9013268/15	Revision:	R79CC