



Sverige



Accred. no. 10363
Testing
ISO/IEC 17025

Report On

FCC and Testing of the Ericsson RRUS 32A B4, LTE and NR (ESS), KRC 161 416/1 (2100 MHz) Base Station in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 27, ISED RSS-GEN and Industry Canada RSS-139

COMMERCIAL-IN-CONFIDENCE

FCC: TA8AKRC118050-1

IC: 287AB-AS1180501

PREPARED BY

Maggie Whiting
Key Account Manager

APPROVED BY

Steve Scarfe
Authorised Signatory

DATED

9 September 2021

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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	RRUS 32A B4 - KRC 118 050/1
Serial Number(s)	C828422384
Software Version	CXP9013268/12 Revision R82CM
Hardware Version	R1C
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2020 FCC CFR 47 Part 27: 2020 ISED RSS-GEN: Issue 5: March 2019 Amendment 1, 2021 Amendment 2 Industry Canada RSS-139: Issue 3: 2015
Test Plan	Q1 FCC_IC test plan for MR7602-1 ESS V 1.2 Reduced Scope
Start of Test	02 July 2021
Finish of Test	07 July 2021
Name of Engineer(s)	Hector Moreno & Ashok Kumar
Related Document(s)	KDB 971168 D01 v02r02 KDB 662911 D01 v02r01 KDB 716230 ICES-003:Issue 7 (2020-10) ANSI C63.26-2015

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 and FCC CFR 47 Part 2: 2020, FCC CFR 47 Part 27: 2020, ISED RSS-GEN: Issue 5: March 2019 Amendment 1, 2021 Amendment 2, Industry Canada RSS-139: Issue 3: 2015. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

Hector Moreno & Ashok Kumar



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 27, ISSED RSS-GEN and Industry Canada RSS-139 is shown below.

Section	Specification Clause				Test Description	Result
	FCC CFR 47 Part 2	FCC CFR 47 Part 27	RSS-GEN	RSS-139		
2.1	2.1046	27.50	-	6.5	Maximum Peak Output Power and Peak to Average Ratio - Conducted	Pass
2.2	2.1049	27.53	6.6	-	Occupied Bandwidth	Pass
2.3	2.1051	27.53	-	6.5	Band Edge	Pass
2.4	2.1051	27.53	-	6.6	Transmitter Spurious Emissions	Pass

Testing for Radiated Spurious Emissions are recording in the following report:
2104108STO-111 RRUS32AB4 ESS FCC27



1.3 TEST RATIONALE

The tests that have been selected are detailed in the customer Test Plan as defined in section 1.1 of this report. The Test Plan is based on the TÜV SÜD FCC Test Plan Rationale, available on request.



1.4 CONFIGURATION DESCRIPTION

Configuration n	RAT	No. Of carriers	Pou t (W)	Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
					Bottom	Middl e	Top
1	ESS, NR/LT E	1	40	10 MHz- SCS 15kHz	2115	2132. 5	2150
				20 MHz- SCS 15kHz	2120	2132. 5	2145
2		3	40	10 MHz- SCS 15kHz	2115+2125+213 5	N/A	2150+2140+213 0
3	NR in NR/ES S Setup	1	40	10 MHz- SCS 15kHz	2115	2132. 5	2150
				20 MHz- SCS 15kHz	2120	2132. 5	2145
4		3	40	10 MHz- SCS 15kHz	2115+2125+213 5	N/A	2150+2140+213 0



1.5 DECLARATION OF BUILD STATUS

Equipment Description						
Technical Description: (Please provide a brief description of the intended use of the equipment including the technologies the product supports)		Multi-standard remote radio unit				
Manufacturer:		Ericsson AB				
Model:		RRUS 32A B4				
Part Number:		KRC 118 050/1				
Hardware Version:		R1C				
Software Version:		CXP 901 3268/12 R82CM				
FCC ID of the product under test		TABAKRC118050-1				
IC ID of the product under test		287AB-AS1180501				
Intentional Radiators						
FDD, TDD		FDD				
Frequency Range (MHz to MHz)		2110MHz - 2155MHz DL 1710MHz - 1755MHz UL				
FDD / TDD		FDD				
Conducted Declared Output Power (dBm)		30W per antenna connector (NB IoT SA carrier max 20W)				
RAT		WCDMA	NB IoT SA	LTE (incl. NB IoT IB, GB)	NR (incl. NB IoT IB)	MRO
Supported Bandwidth(s) (MHz)		5MHz		1.4, 3, 5, 10, 15, 20MHz	5, 10, 15, 20MHz	
Modulation Scheme(s) DL		QPSK, 16QAM, 64QAM	QPSK	QPSK, 16QAM, 64QAM, 256QAM	QPSK, 16QAM, 64QAM, 256QAM	
ITU Emission Designator		5M00F9W	210KW7D	1M40W7D, 3M00W7D, 5M00W7D, 10M0W7D, 15M0W7D, 20M0W7D	4M47W7D, 9M29W7D, 9M45W7D, 14M1W7D, 14M4W7D, 18M9W7D, 19M2W7D, 37M8W7D	
IBW		45MHz	45MHz	45MHz	45MHz	
Maximum number of carriers		2		3	3	8
Unintentional Radiators						
Highest frequency generated or used in the device or on which the device operates or tunes		9,8 Gbit/s				
Lowest frequency generated or used in the device or on which the device operates or tunes if <30MHz						
Class A Digital Device (Use in commercial, industrial or business environment) or Class B Digital Device (Use in residential environment)		Class B				
DC Power Supply (Delete if Not Applicable)						
Nominal voltage:		-48V				
Extreme upper voltage:		-39V				
Extreme lower voltage:		-58.5V				
Max current:		26A				
Temperature						
Minimum temperature:		-40°C				
Maximum temperature:		55°C				
I hereby declare that I am entitled to sign on behalf of the manufacturer and that the information supplied is correct and complete.						
		<i>Faysal Pirmohamed</i>				
Name:		Faysal Pirmohamed				
Position held:		Regulatory Engineer				
Date:		2021-09-08				

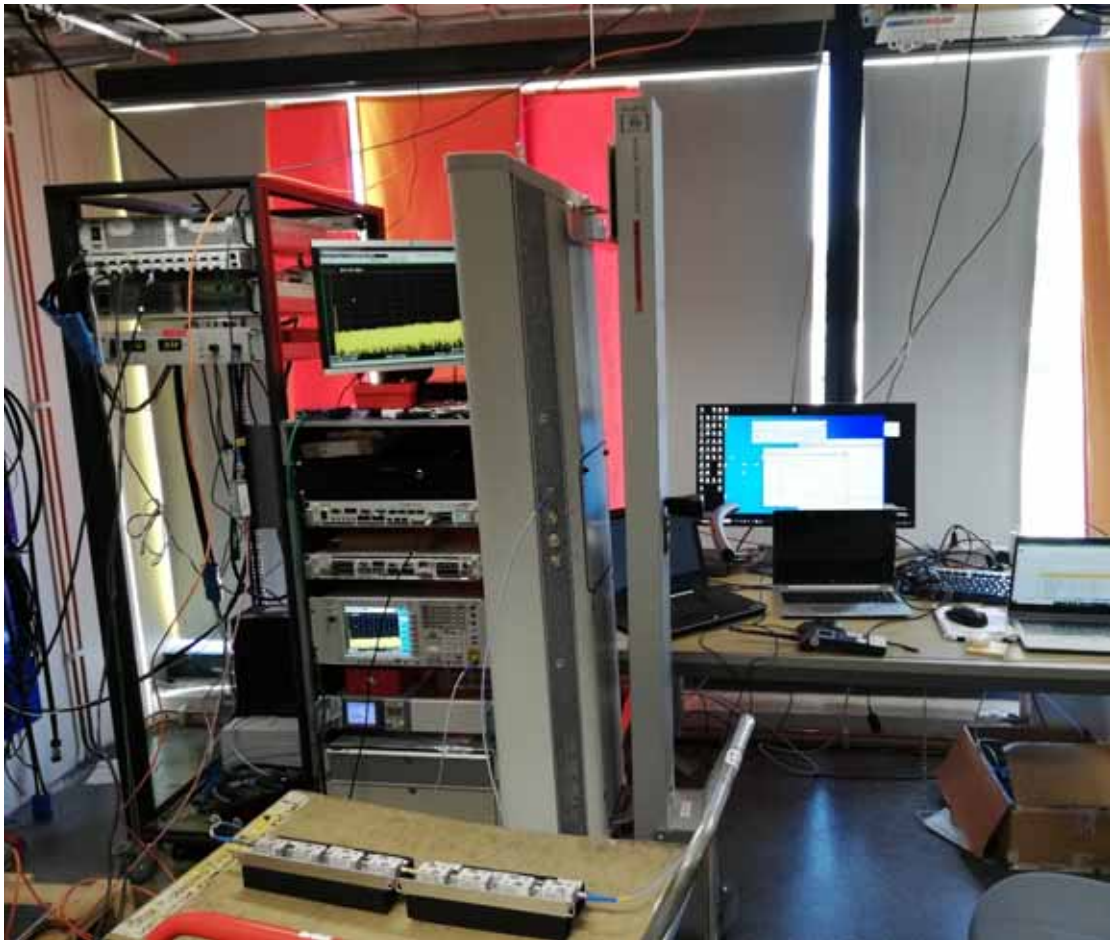
No responsibility will be accepted by TÜV SÜD as to the accuracy of the information declared in this document by the manufacturer.

1.6 PRODUCT INFORMATION

1.6.1 Technical Description

The Equipment Under Test (EUT) RRUS 32A B4 – KRC 118 050/1 is an Ericsson AB Radio Unit working in the public mobile service (2100 MHz) band which provides communication connections to (2100 MHz) network. The EUT operates from a -48V DC supply.

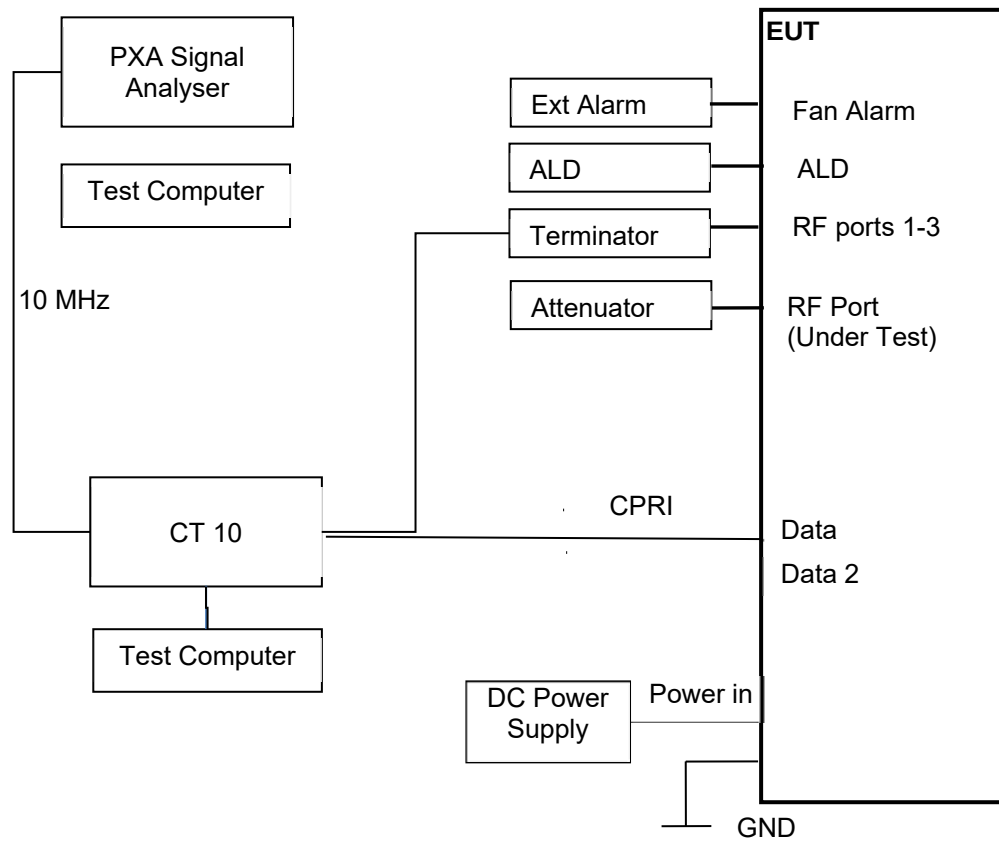
The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



Equipment Under Test

1.7 TEST SETUP

Conducted Test Set Up





1.8 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 as described in the Test Method for each Test.

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

FCC Measurement Facility Registration Number
563983 Ericsson Test Laboratory, Kista
Postal Address: Ericsson AB, Isafjordsgatan 10, Stockholm, SE-16 440, Sweden

ISED Accreditation
IC#26170 Ericsson Test Laboratory, Kista
Postal Address: Ericsson AB, Isafjordsgatan 10, Stockholm, SE-164 40, Sweden

Test Name	Name of Engineer(s)
Maximum Peak Output Power and Peak to Average Ratio - Conducted	Ashok Kumar, Hector Eric Moreno Trujillo
Occupied Bandwidth	Ashok Kumar, Hector Eric Moreno Trujillo
Band Edge	Ashok Kumar, Hector Eric Moreno Trujillo
Transmitter Spurious Emissions	Ashok Kumar, Hector Eric Moreno Trujillo

1.9 DEVIATION FROM THE STANDARD

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

1.10 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.11 ADDITIONAL INFORMATION

This filing is for a Class 2 Permissive change to add NR in NR/ESS (NB-IoT) to a previously certified Radio for use in the USA and Canada under the following ID's:

FCC ID: TA8AKRC118050-1
IC: 287AB-AS1180501

This device is electrically identical as originally certified as no hardware changes have been made
Frequency Stability has been verified at time of original certification.

The Test Plan is based on the TUV SUD Document FCC and ISED Test Plan Rationale for Base Station Equipment.

This TX and RX share the same port and therefore Rx Spurious Emissions have not been performed.



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 27, Clause 27.50
FCC CFR 47 Part 2, Clause 2.1046
Industry Canada RSS-139, Clause 6.5

2.1.2 Date of Test and Modification State

02 June and 07 June 2021 - 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 23.4 - 24.9°C
Relative Humidity 41.6 - 42.0%

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.

Calculations

Total Power = Measured PSD (Total Power Port A) + $10\log(N_{ANT})$, where $N_{ANT}=4$

Maximum Total Power (EIRP) = Total Power (as above) + Declared Antenna Gain

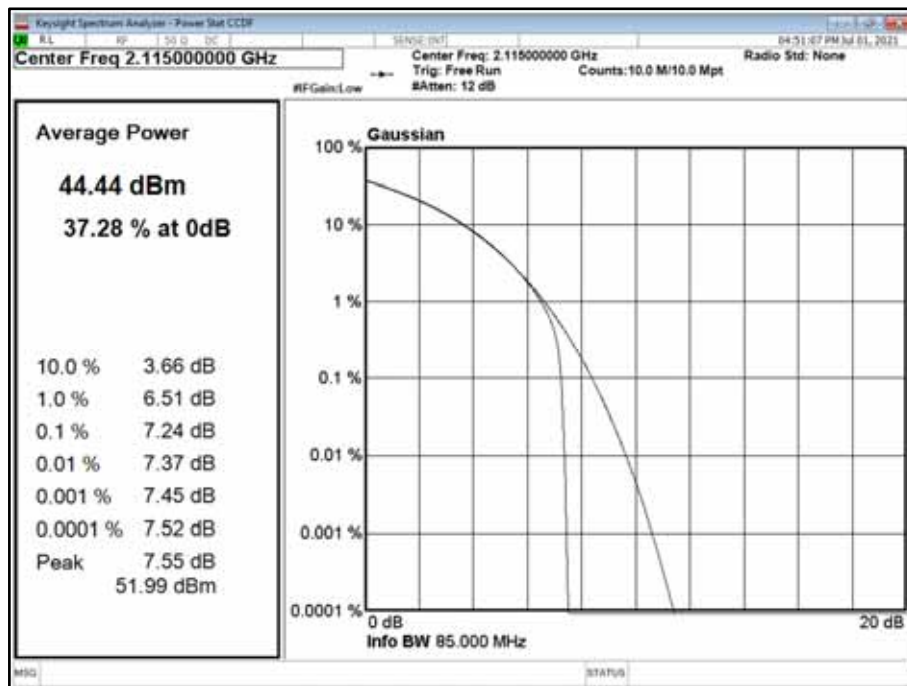
2.1.6 Test Results

Configuration 1

Maximum Output Power 44.80 dBm

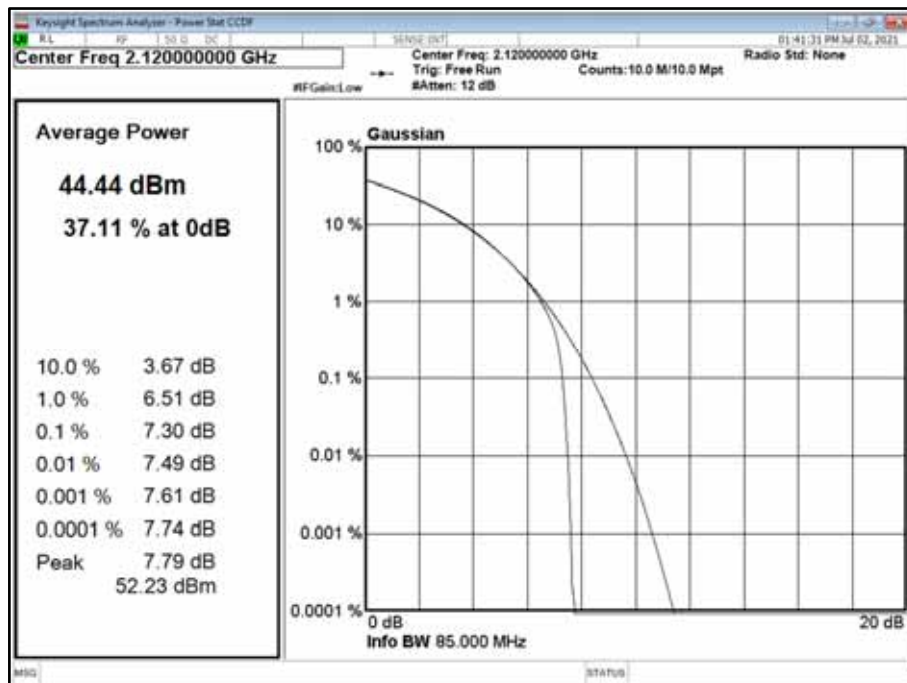
Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD					
			Channel Position B					
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D		
				dBm	dBm/MHz	dBm	dBm/MHz	
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	7.24	44.46	35.86	50.48	41.88	
A	QPSK	ESS 40/60 20.0 MHz 15 kHz SCS	7.30	44.44	32.61	50.46	38.63	
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	7.20	44.49	35.79	50.51	41.81	
A	QPSK	ESS 10/90 20.0 MHz 15 kHz SCS	7.27	44.44	32.58	50.46	38.60	
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	7.30	44.37	35.65	50.39	41.67	
A	QPSK	ESS 90/10 20.0 MHz 15 kHz SCS	7.34	44.32	32.81	50.34	38.83	

Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position B





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position B

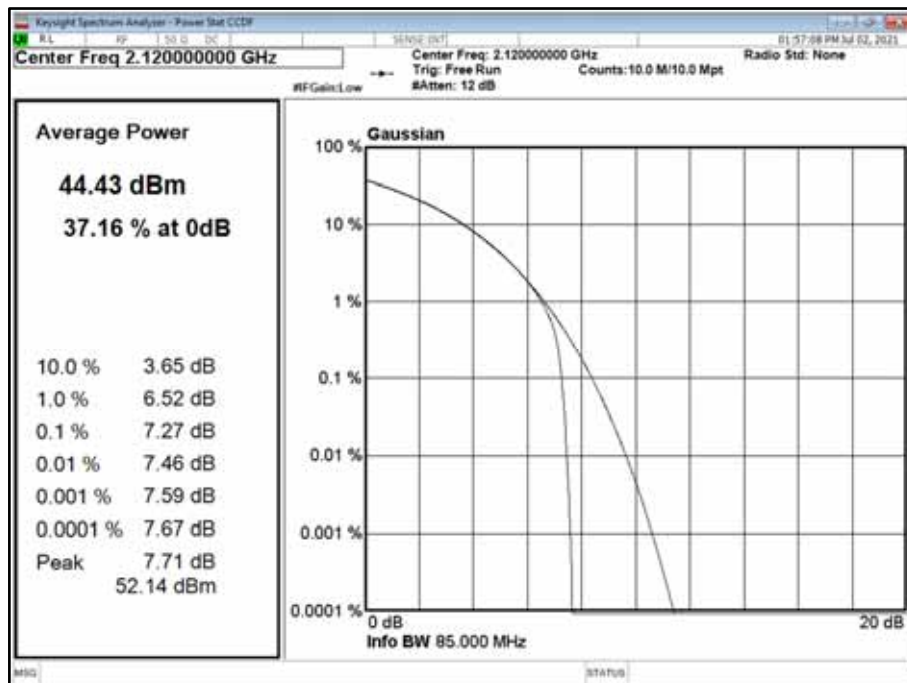


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position B

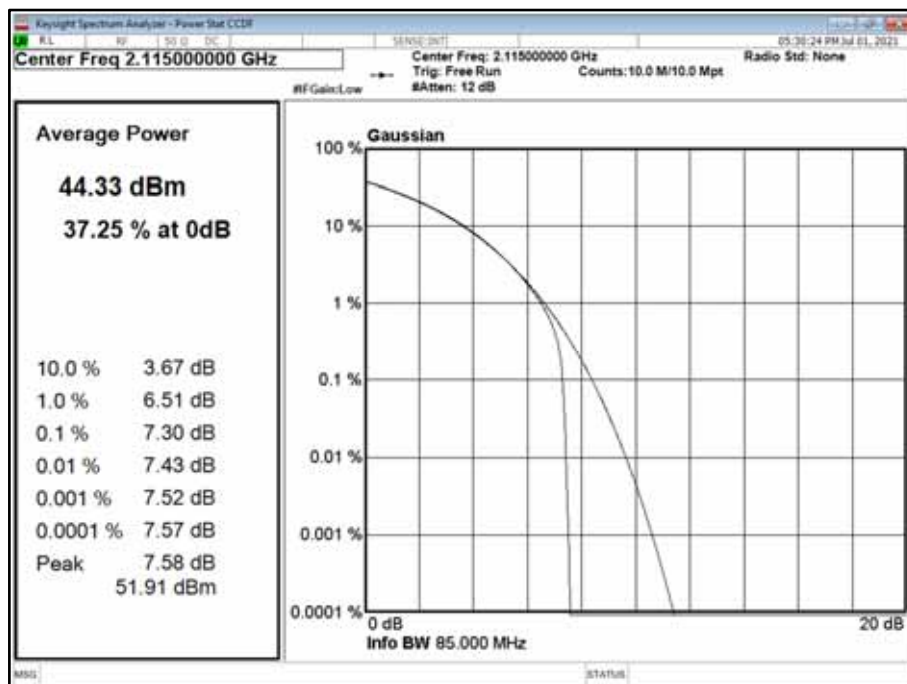




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 20.0 MHz 15 kHz SCS - Channel Position B

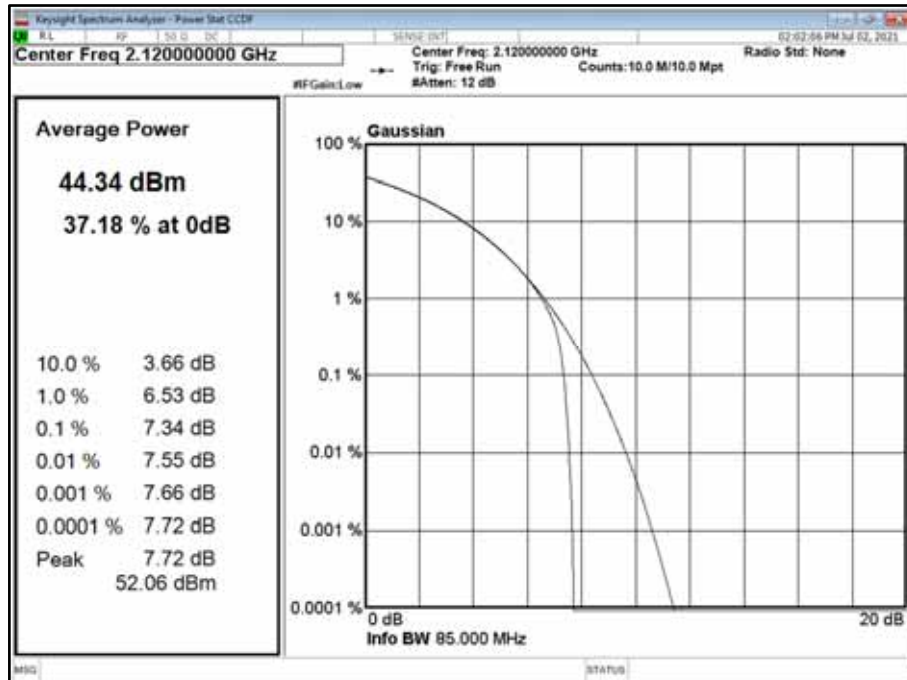


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position B





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 20.0 MHz 15 kHz SCS - Channel Position B

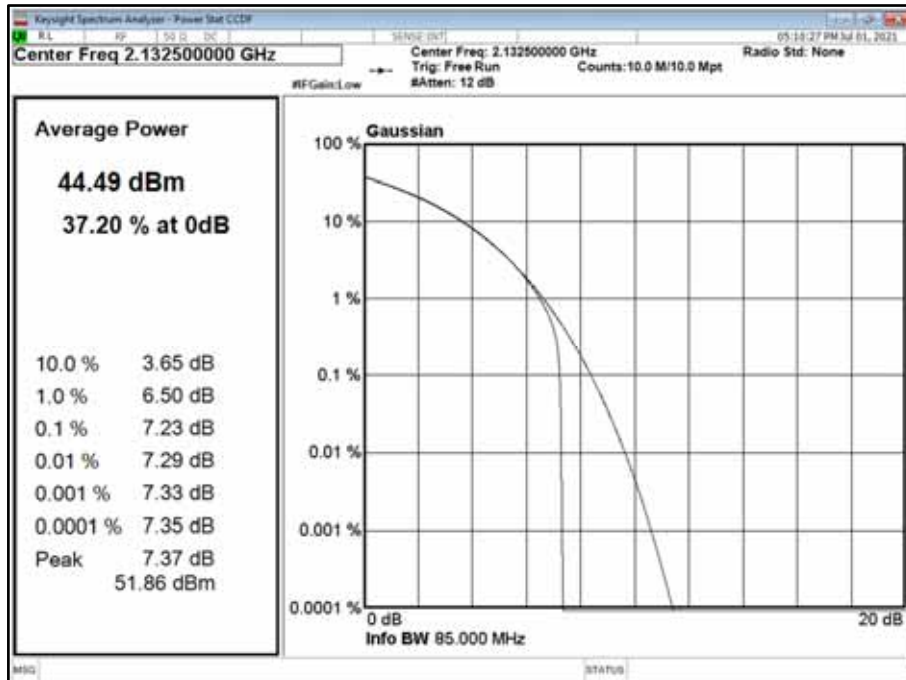


Configuration 1

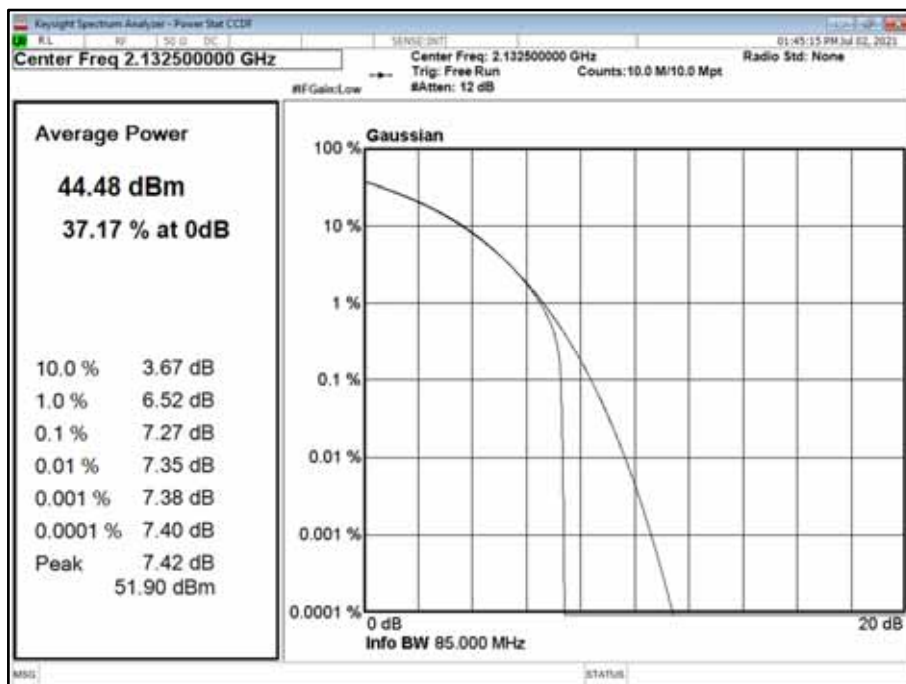
Maximum Output Power 44.80 dBm

Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD					
			Channel Position M					
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D		
				dBm	dBm/MHz	dBm	dBm/MHz	
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	7.23	44.52	35.76	50.54	41.78	
A	QPSK	ESS 40/60 20.0 MHz 15 kHz SCS	7.27	44.48	32.58	50.50	38.60	
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	7.19	44.56	35.76	50.58	41.78	
A	QPSK	ESS 10/90 20.0 MHz 15 kHz SCS	7.23	44.45	32.58	50.47	38.60	
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	7.29	44.42	35.62	50.44	41.64	
A	QPSK	ESS 90/10 20.0 MHz 15 kHz SCS	7.31	44.40	32.72	50.42	38.74	

Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position M

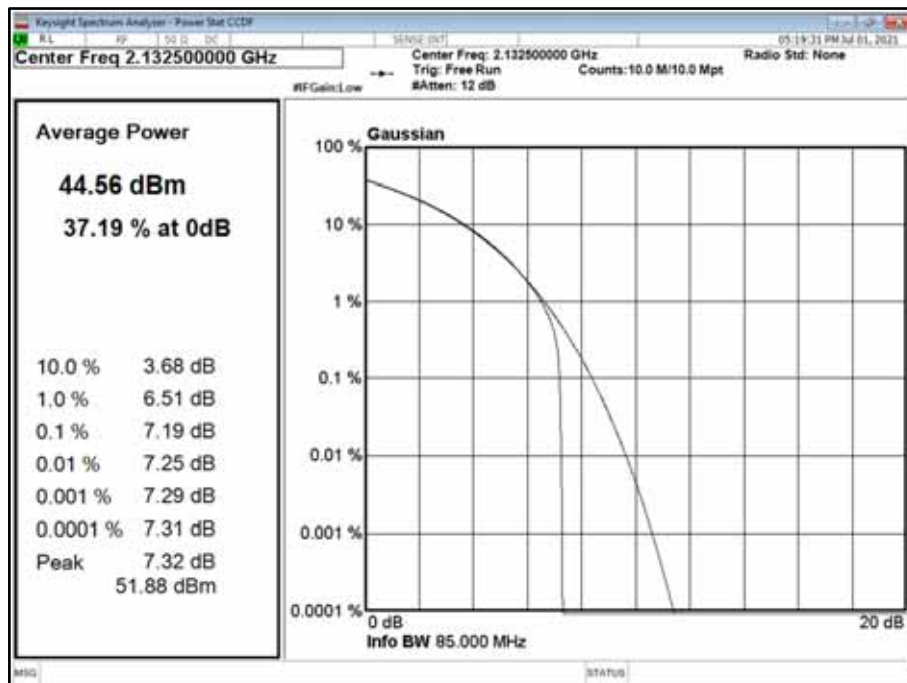


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position M

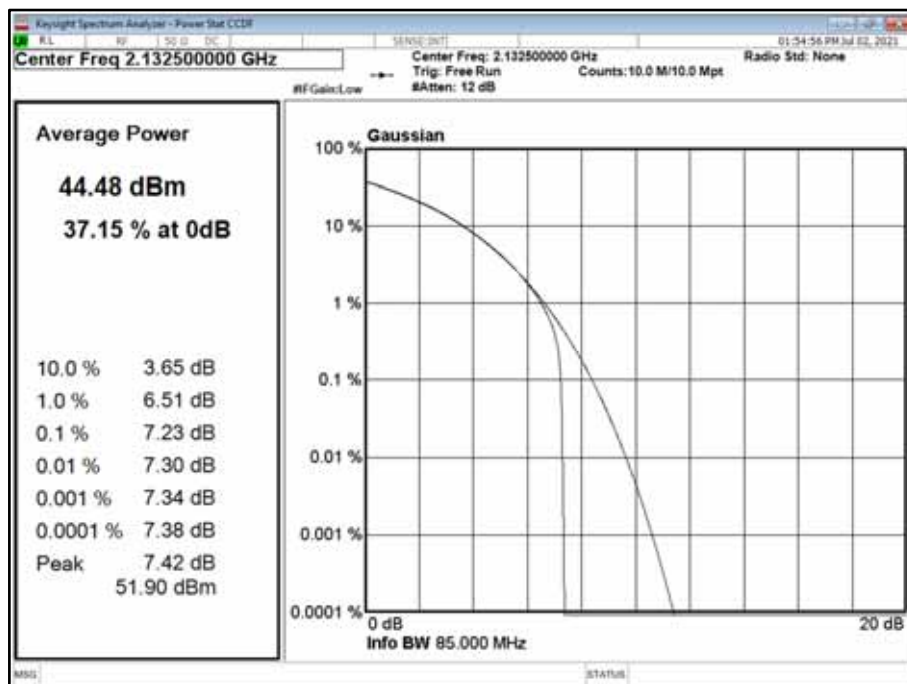




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position M

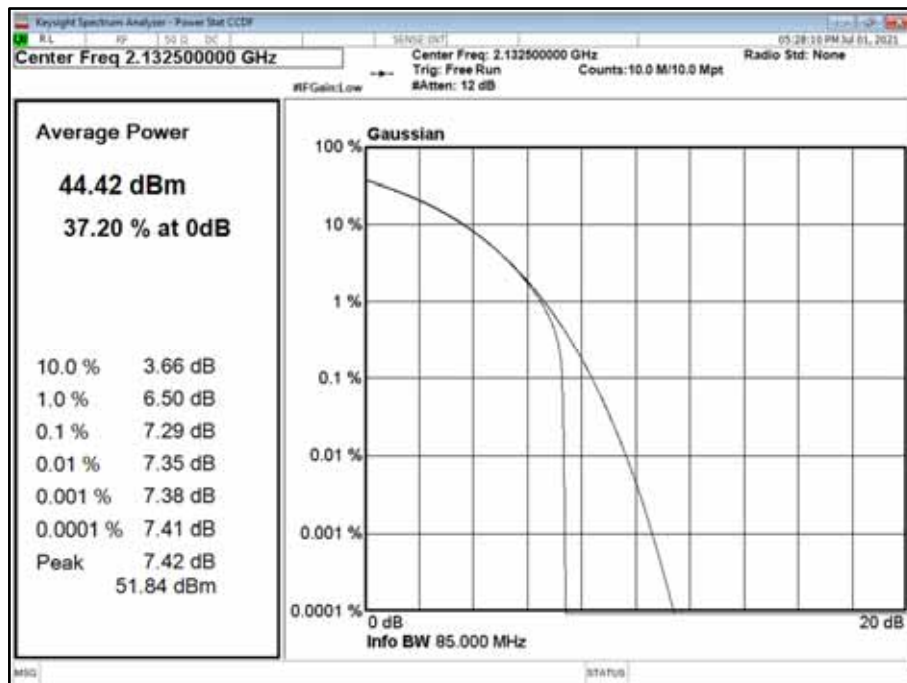


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 20.0 MHz 15 kHz SCS - Channel Position M

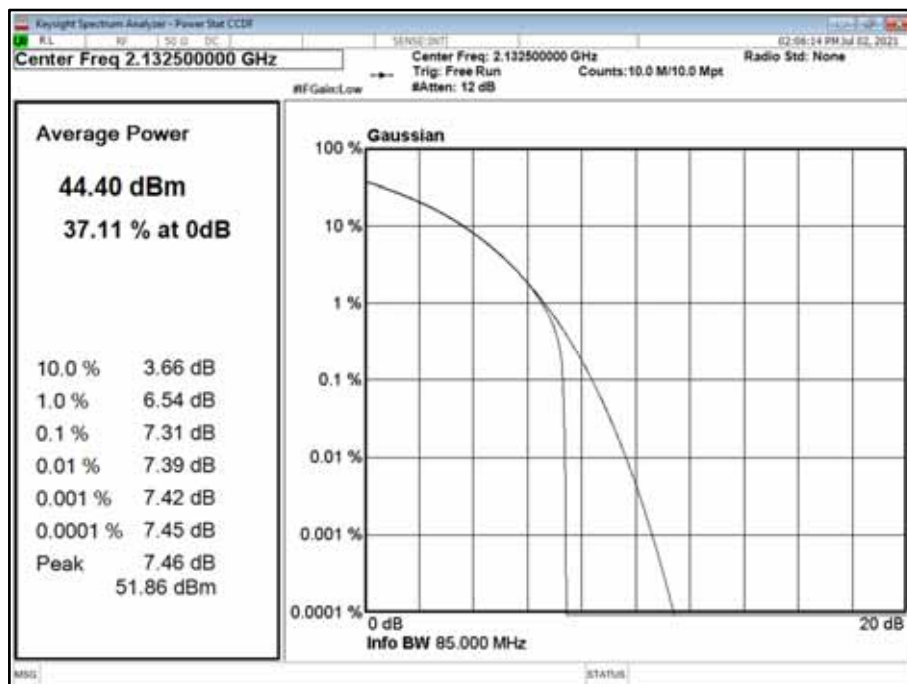




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position M



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 20.0 MHz 15 kHz SCS - Channel Position M



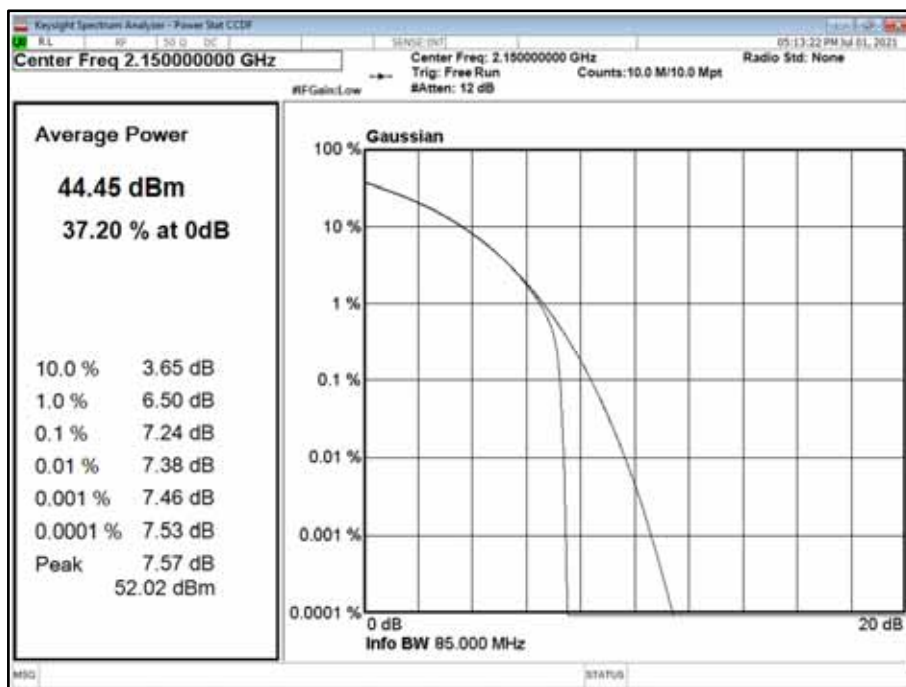


Configuration 1

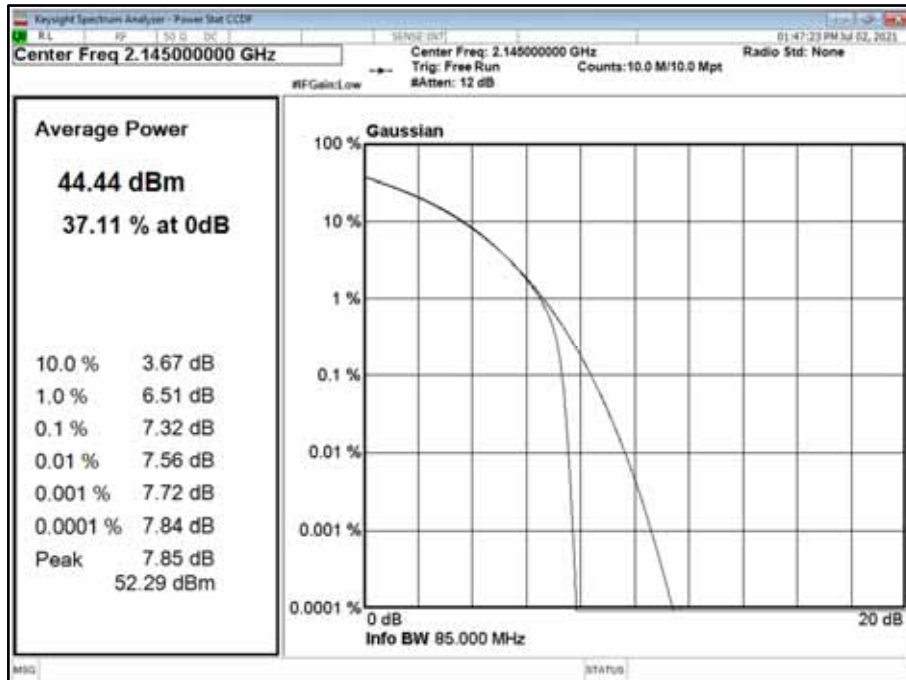
Maximum Output Power 44.80 dBm

Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD				
			Channel Position T				
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	7.24	44.50	35.64	50.52	41.66
A	QPSK	ESS 40/60 20.0 MHz 15 kHz SCS	7.32	44.43	32.69	50.45	38.71
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	7.20	44.54	35.58	50.56	41.60
A	QPSK	ESS 10/90 20.0 MHz 15 kHz SCS	7.29	44.46	32.67	50.48	38.69
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	7.29	44.40	35.59	50.42	41.61
A	QPSK	ESS 90/10 20.0 MHz 15 kHz SCS	7.37	44.35	32.66	50.37	38.68

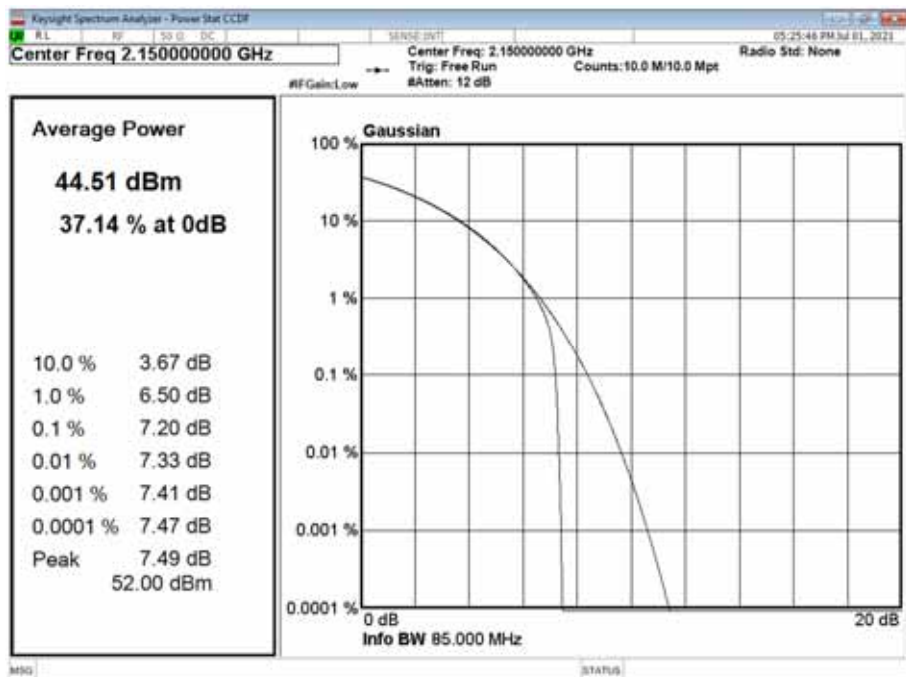
Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position T



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position T

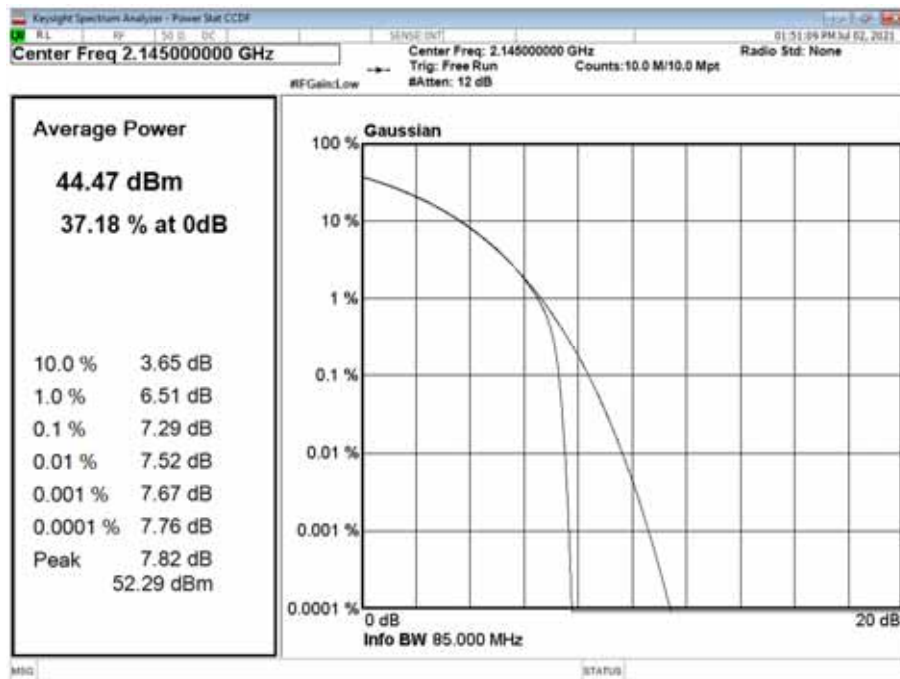


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position T

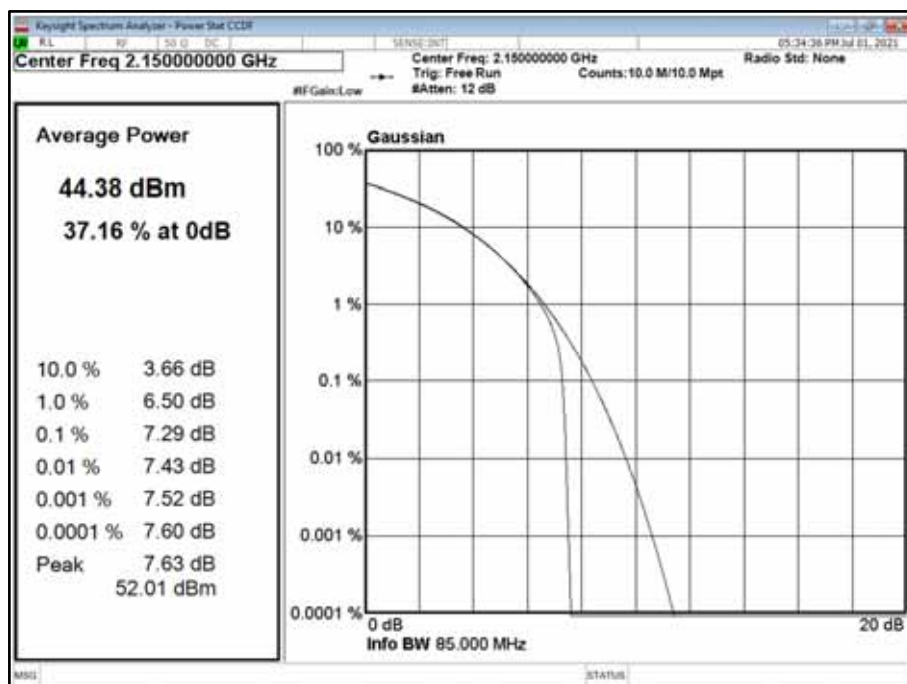




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 20.0 MHz 15 kHz SCS - Channel Position T

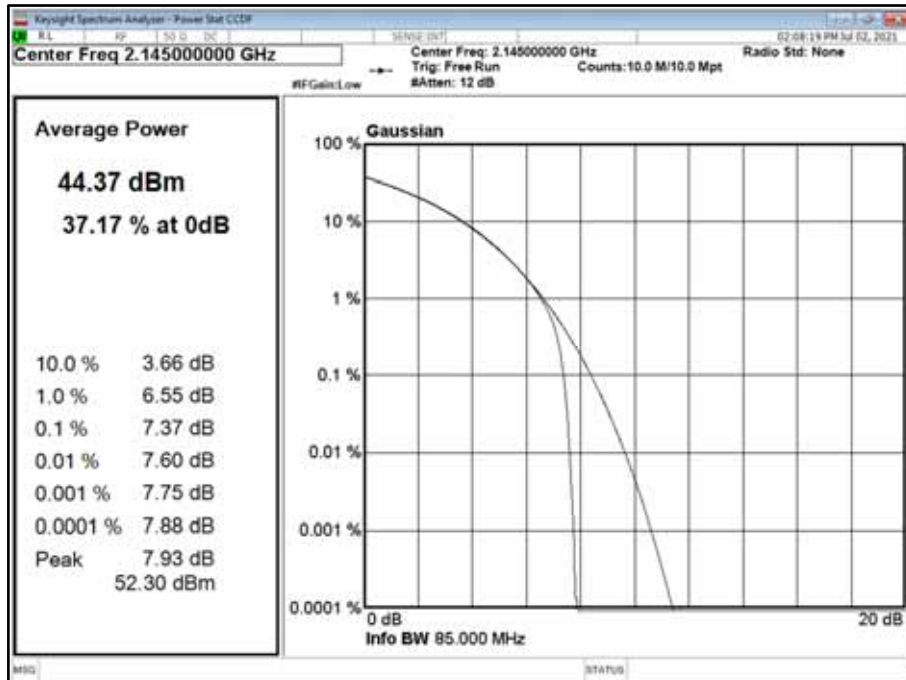


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position T





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 20.0 MHz 15 kHz SCS - Channel Position T



Configuration 2

Maximum Output Power 44.80 dBm

Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD				
			Channel Position B				
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	-	44.35	31.27	50.37	37.29
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	-	44.42	31.07	50.44	37.09
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	-	44.30	30.97	50.32	36.99

Configuration 2

Maximum Output Power 44.80 dBm

Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD				
			Channel Position T				
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	-	44.33	31.15	50.35	37.17
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	-	44.42	31.02	50.44	37.04
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	-	44.28	31.09	50.30	37.11

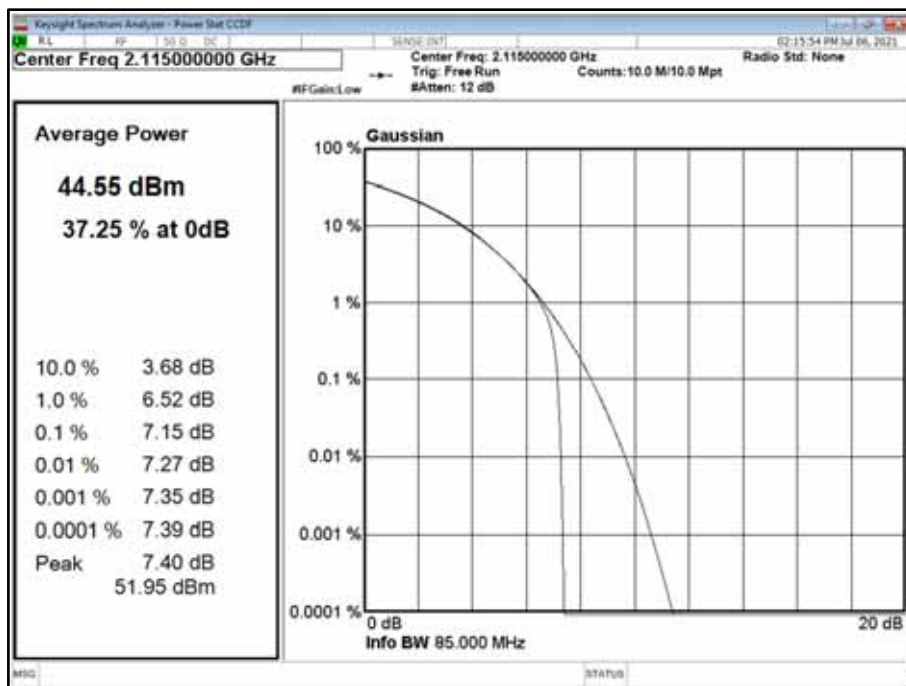


Configuration 3

Maximum Output Power 44.80 dBm

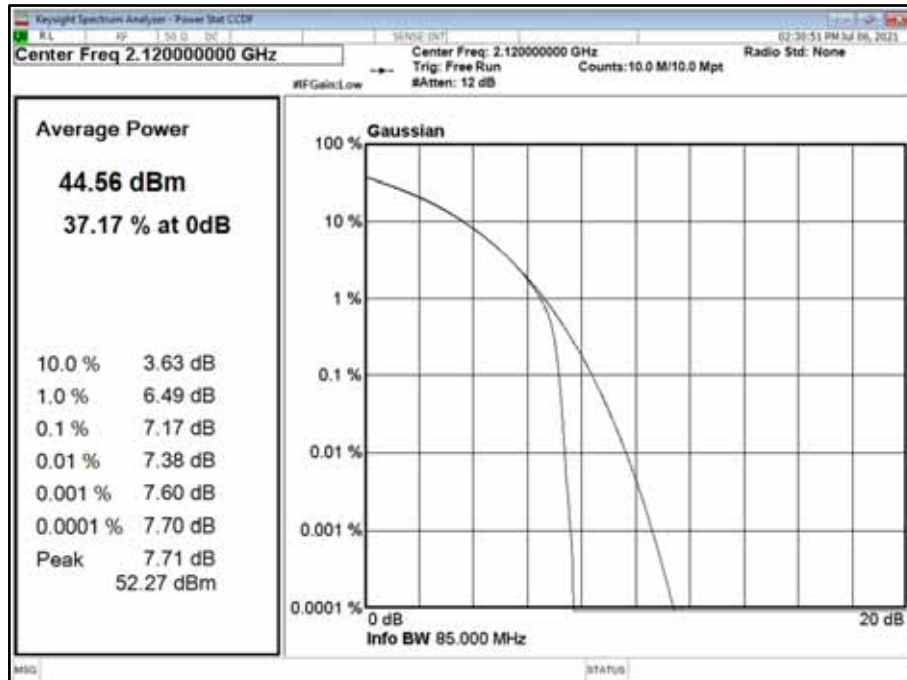
Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD				
			Channel Position B				
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	10.0 MHz 15 kHz SCS	7.15	44.53	35.68	50.55	41.70
A	QPSK	20.0 MHz 15 kHz SCS	7.17	44.53	32.61	50.55	38.63

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 20.0 MHz 15 kHz SCS - Channel Position B

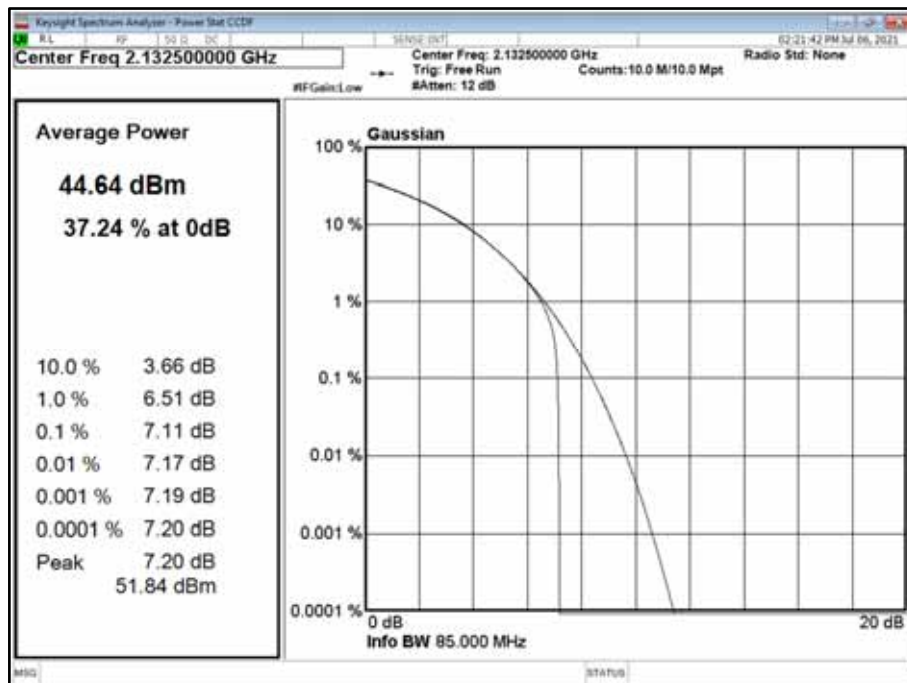


Configuration 3

Maximum Output Power 44.80 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD				
			Channel Position M				
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	10.0 MHz 15 kHz SCS	7.11	44.62	35.89	50.64	41.91
A	QPSK	20.0 MHz 15 kHz SCS	7.13	44.64	32.74	50.66	38.76

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



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



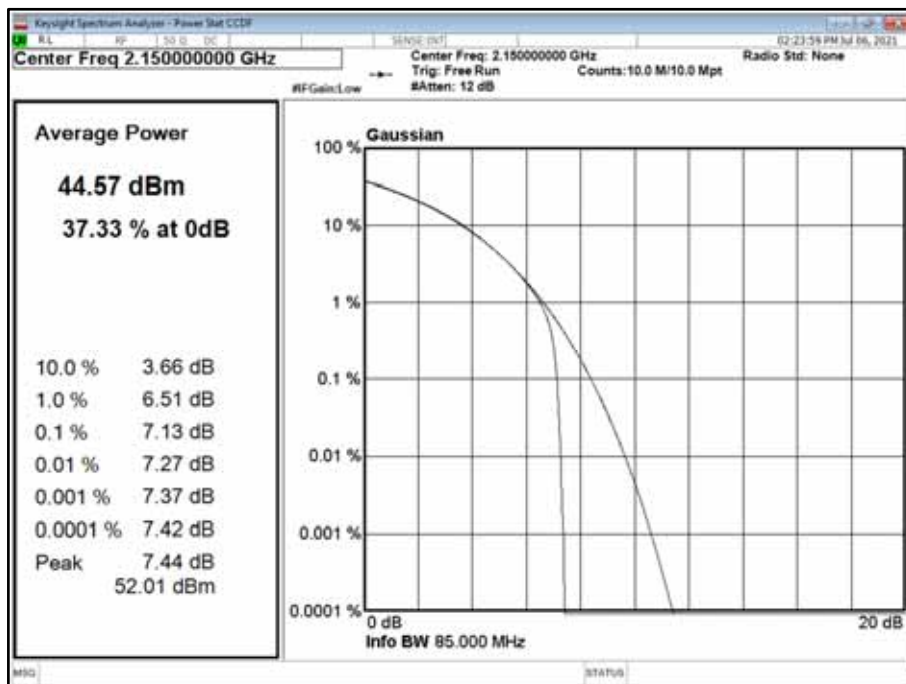


Configuration 3

Maximum Output Power 44.80 dBm

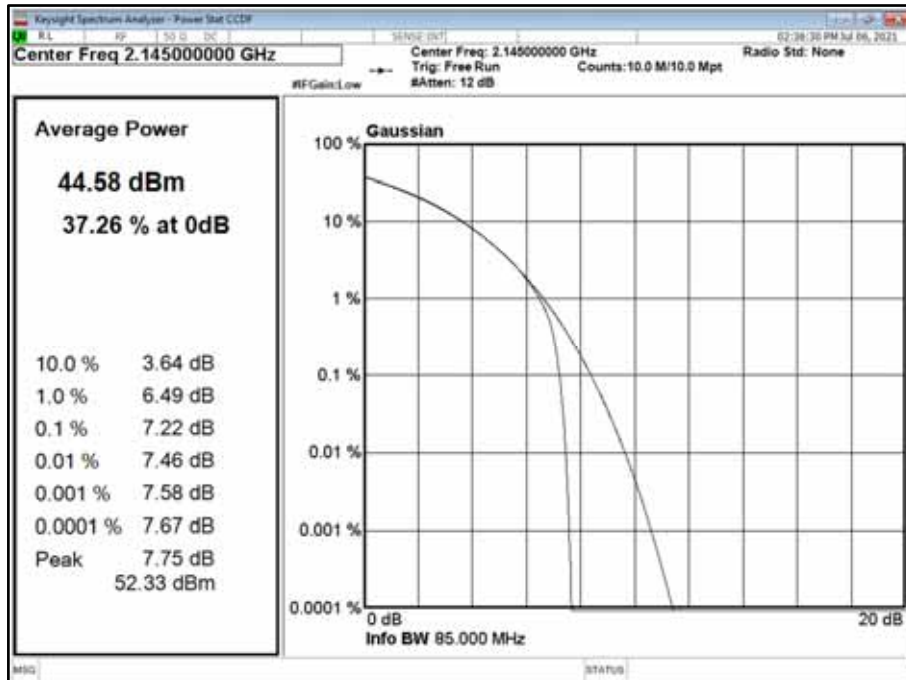
Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD				
			Channel Position T				
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	10.0 MHz 15 kHz SCS	7.13	44.61	35.91	50.63	41.93
A	QPSK	20.0 MHz 15 kHz SCS	7.22	44.60	32.75	50.62	38.77

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 20.0 MHz 15 kHz SCS - Channel Position T



Configuration 4

Maximum Output Power 44.80 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD				
			Channel Position B				
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	10.0 MHz 15 kHz SCS	-	44.52	30.98	50.54	37.00

Configuration 4

Maximum Output Power 44.80 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power / PSD				
			Channel Position T				
			PAR (dB)	Average Power/PSD		Total Power Port A+B+C+D	
				dBm	dBm/MHz	dBm	dBm/MHz
A	QPSK	10.0 MHz 15 kHz SCS	-	44.51	31.16	50.53	37.18



Limit	
Maximum rated output power (Non-Rural)	$\leq 1640 \text{ W/MHz}$ or $\leq +62.15 \text{ dBm/MHz}$
Maximum rated output power (Rural)	$\leq 3280 \text{ W/MHz}$ or $\leq +65.15 \text{ dBm/MHz}$
Peak to Average Ratio	13 dB

The radio unit was tested with maximum output power and without an antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/ISED Bureau(s). Licensees are required to take into account maximum allowed antenna gain used in combination with the applicable power settings to prevent the radiated output power exceeding the limits.



2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53
ISED RSS-GEN, Clause 6.6
FCC CFR 47 Part 2, Clause 2.1049

2.2.2 Date of Test and Modification State

07, 29 and 30 June 2021 - 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	23.4 - 25.2°C
Relative Humidity	37.2 - 42.0%

2.2.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, Clause 4.3. The Spectrum Analyser RBW was configured to be at least 1% of the channel bandwidth of the carrier to be measured.

For 26 dB Bandwidth, in accordance with KDB 971168 D01, a peak detector and a trace setting of Max Hold were used. The trace was allowed to stabilise. Using the Spectrum Analyser function, the 26dB measurement result was obtained.

4.3 Occupied bandwidth – power bandwidth (99 %) measurement procedure
Subclause 5.4.4 of ANSI C63.26-2015 is applicable (wherein the recommendation is to use the 99 % power bandwidth function of a spectrum analyser).

2.2.6 Test Results

Configuration 1

Maximum Output Power 44.80 dBm



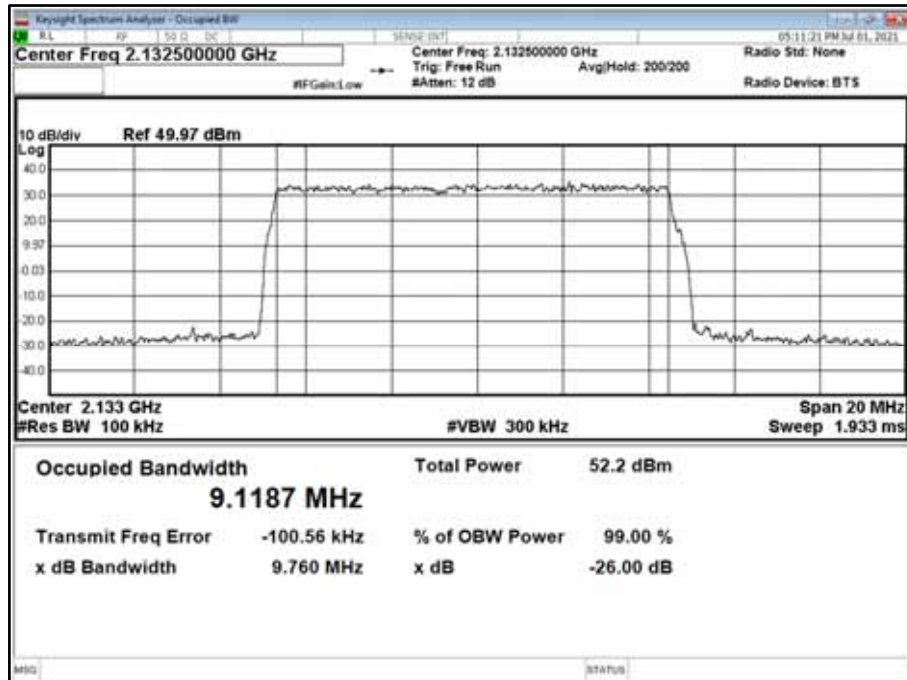
Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Result (MHz)					
			Channel Position B		Channel Position M		Channel Position T	
			Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	9139.57	9742.57	9118.74	9759.60	9130.23	9751.84
A	QPSK	ESS 40/60 20.0 MHz 15 kHz SCS	18434.01	19507.69	18397.80	19646.65	18404.41	19660.05
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	9120.50	9749.21	9135.97	9733.64	9133.22	9727.49
A	QPSK	ESS 10/90 20.0 MHz 15 kHz SCS	18390.56	19540.03	18411.26	19596.59	18480.33	19473.90
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	9133.00	9722.46	9132.82	9786.28	9131.11	9731.15
A	QPSK	ESS 90/10 20.0 MHz 15 kHz SCS	18371.98	19523.13	18417.58	19534.20	18414.21	19606.12

Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position B

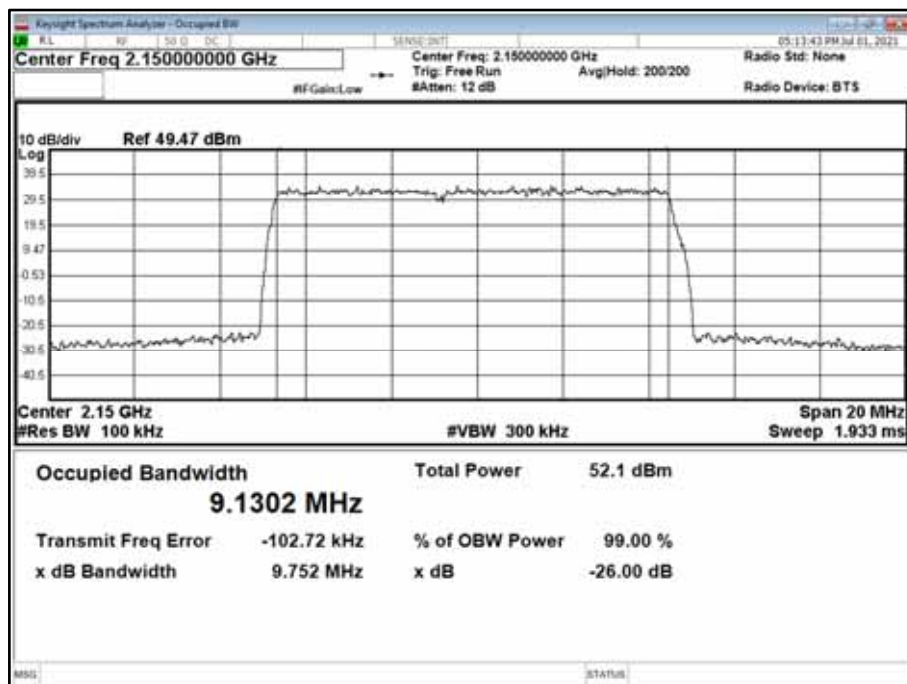




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position M

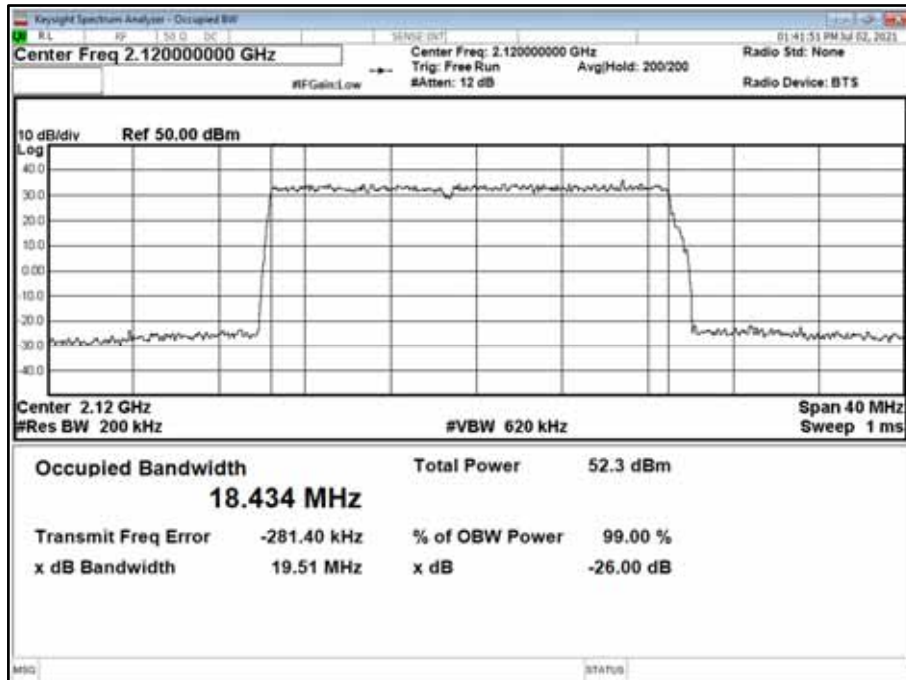


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position T

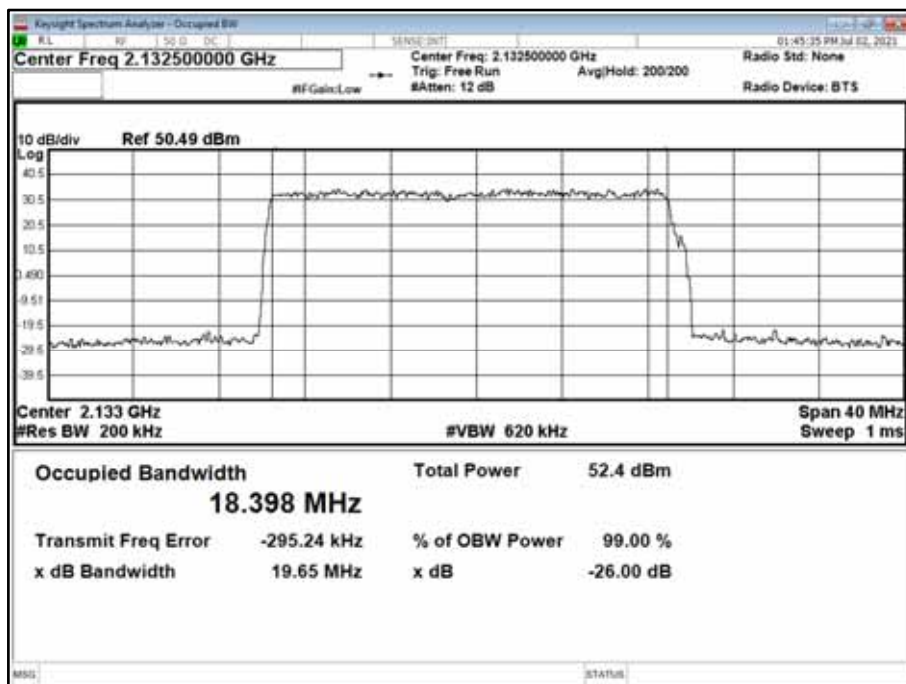




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position B

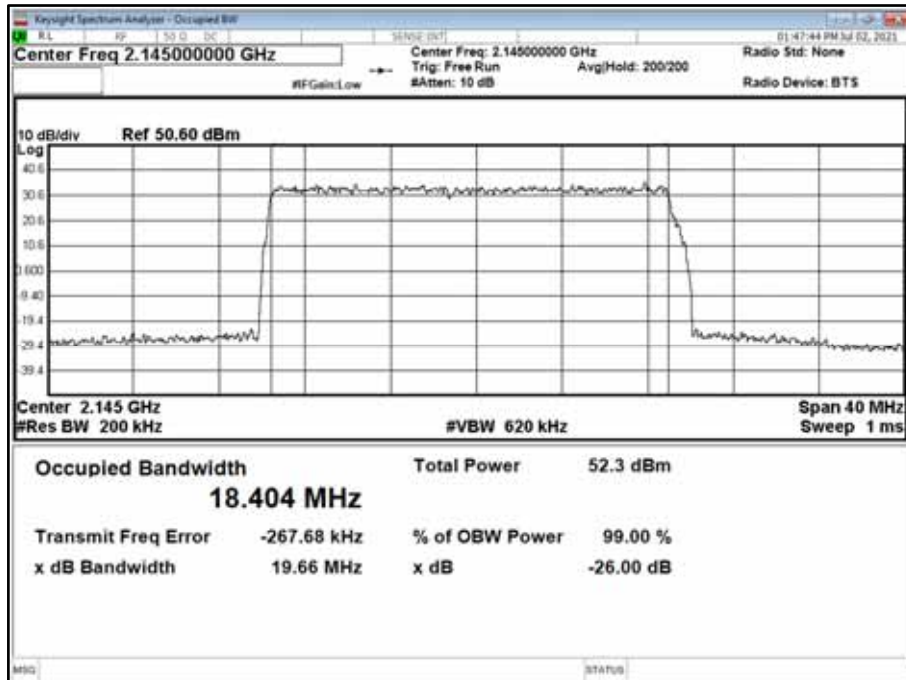


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position M





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position T

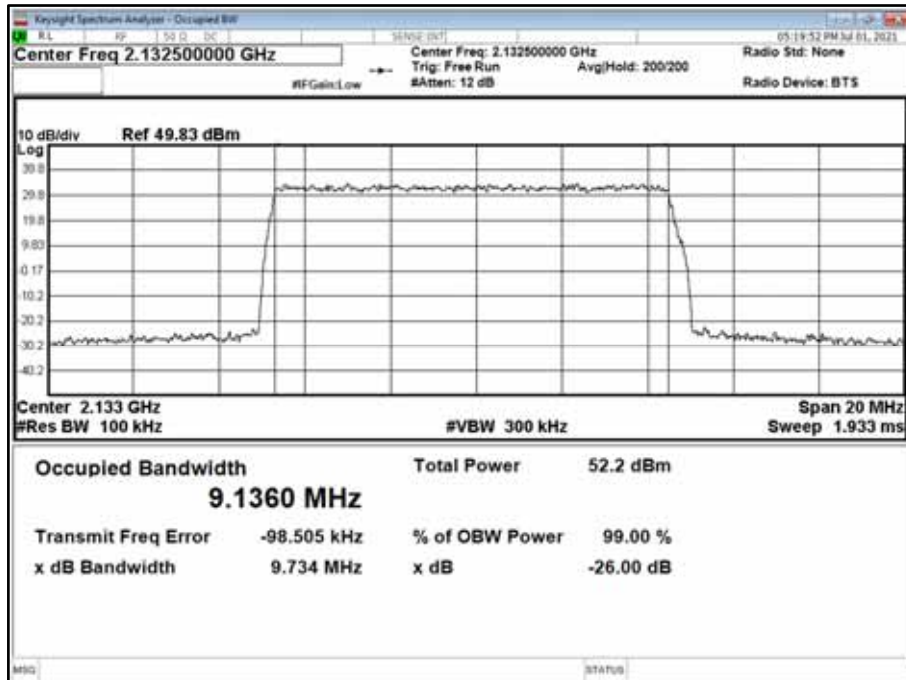


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position B





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position M

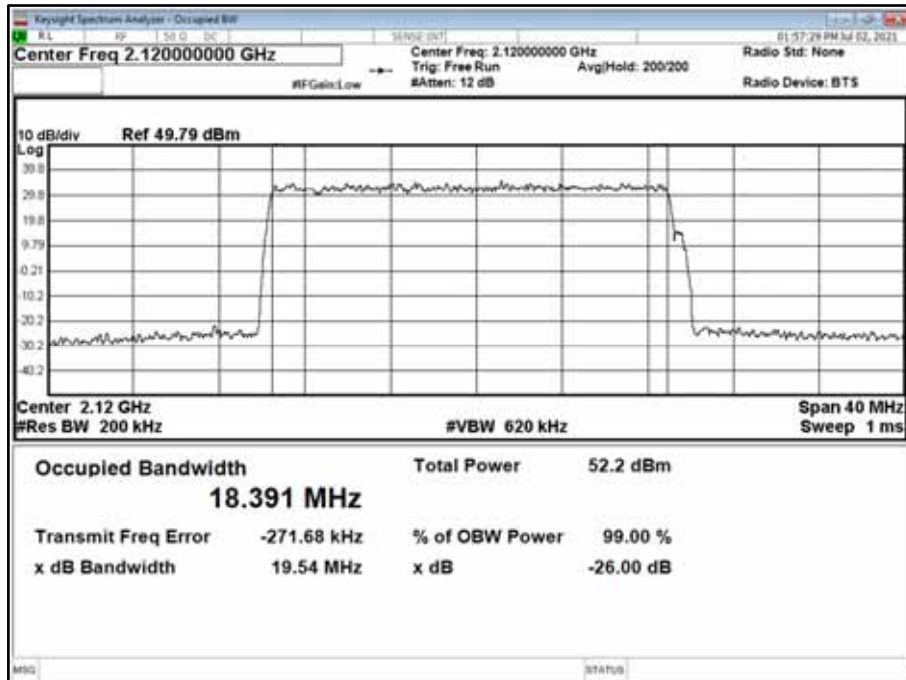


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position T

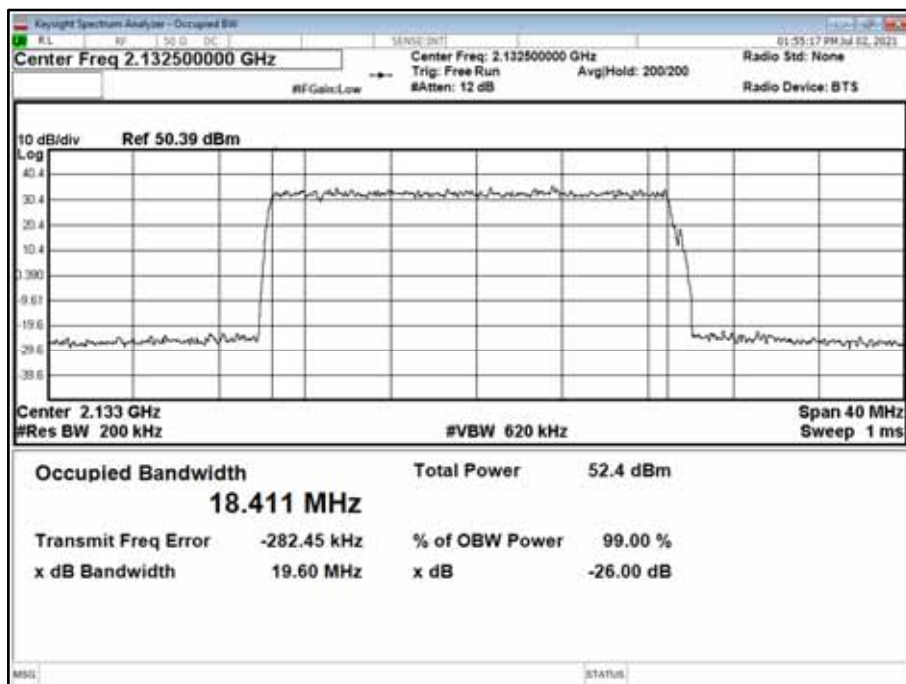




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 20.0 MHz 15 kHz SCS - Channel Position B

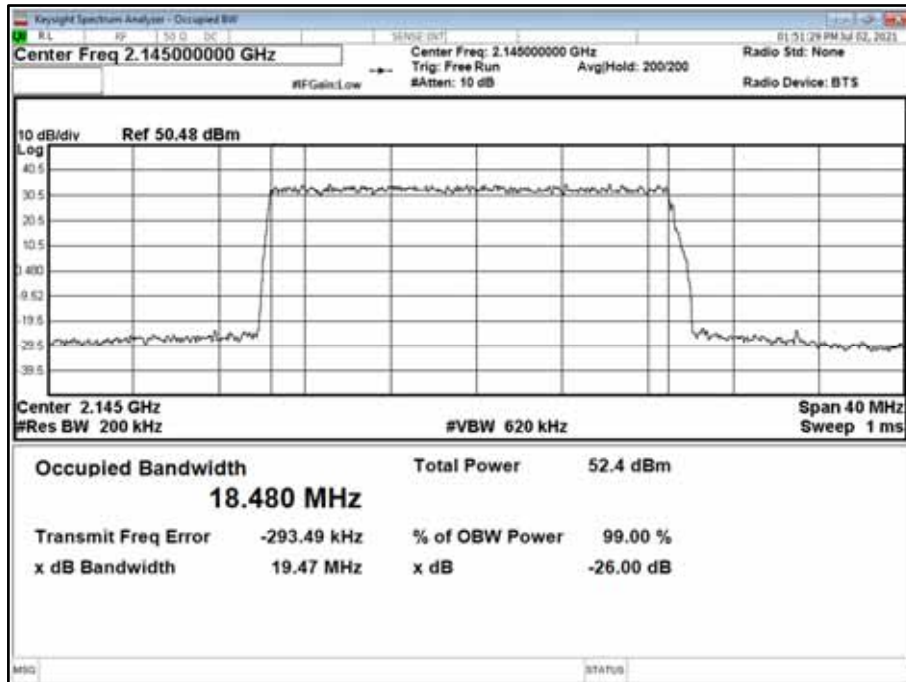


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 20.0 MHz 15 kHz SCS - Channel Position M





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 20.0 MHz 15 kHz SCS - Channel Position T

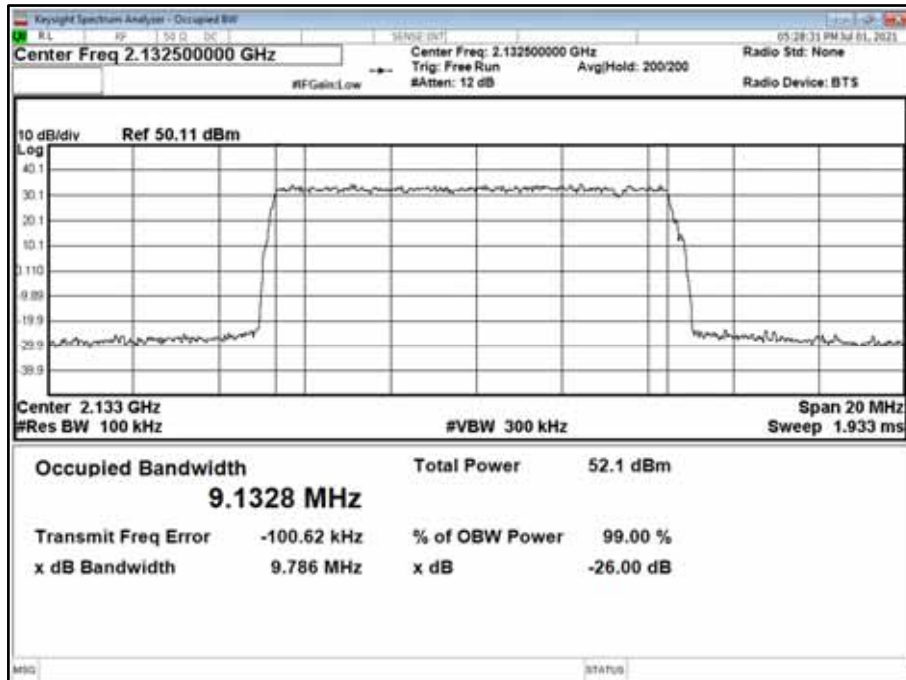


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position B

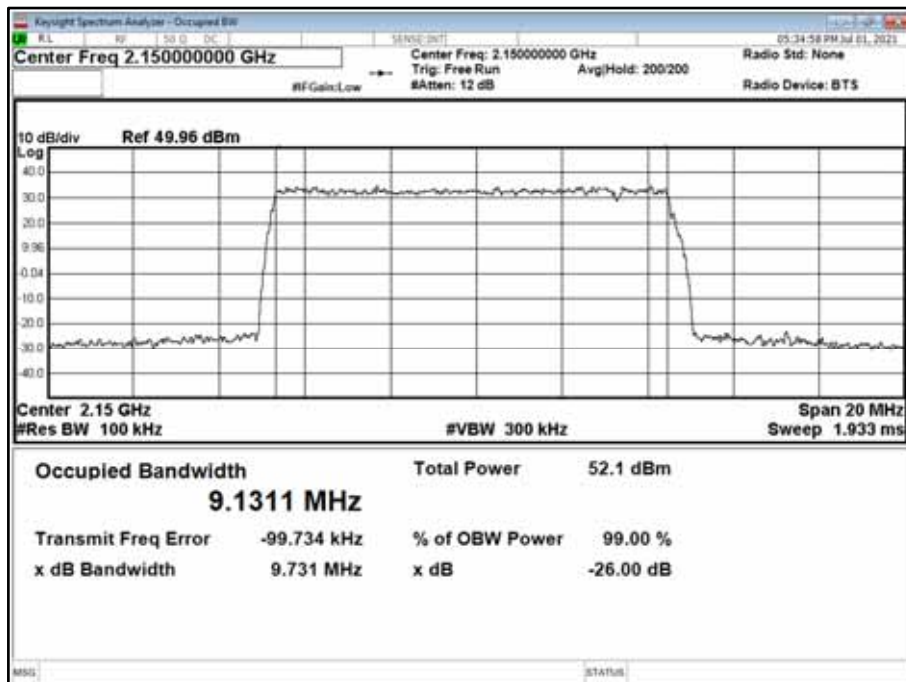




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position M

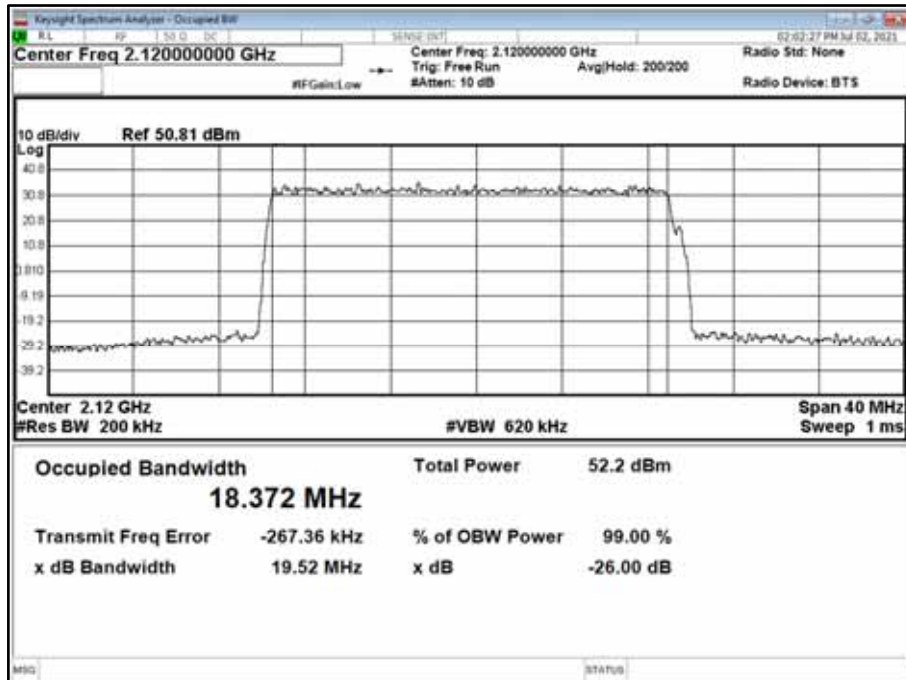


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position T

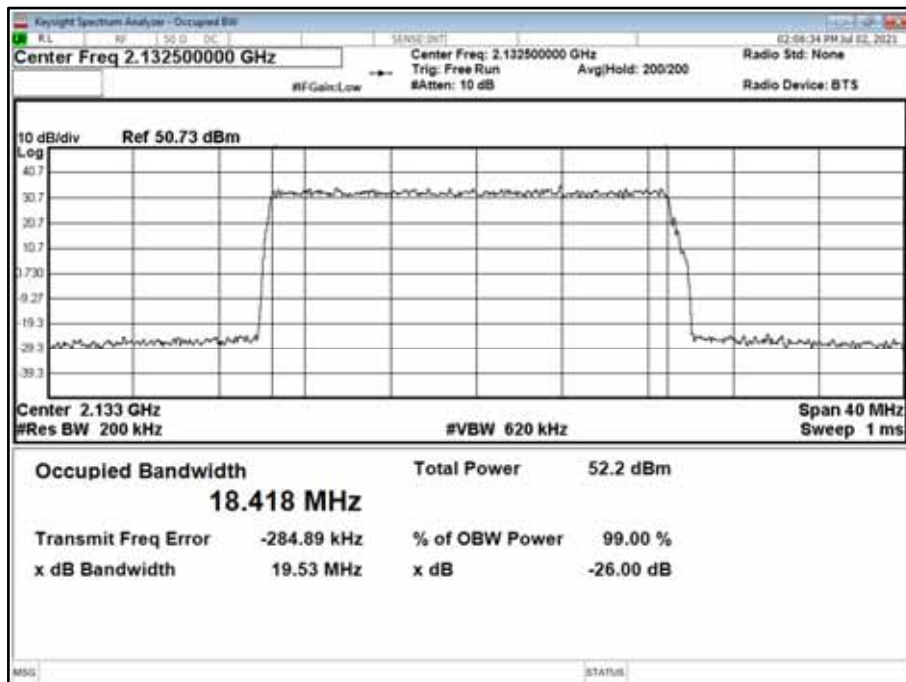




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 20.0 MHz 15 kHz SCS - Channel Position B

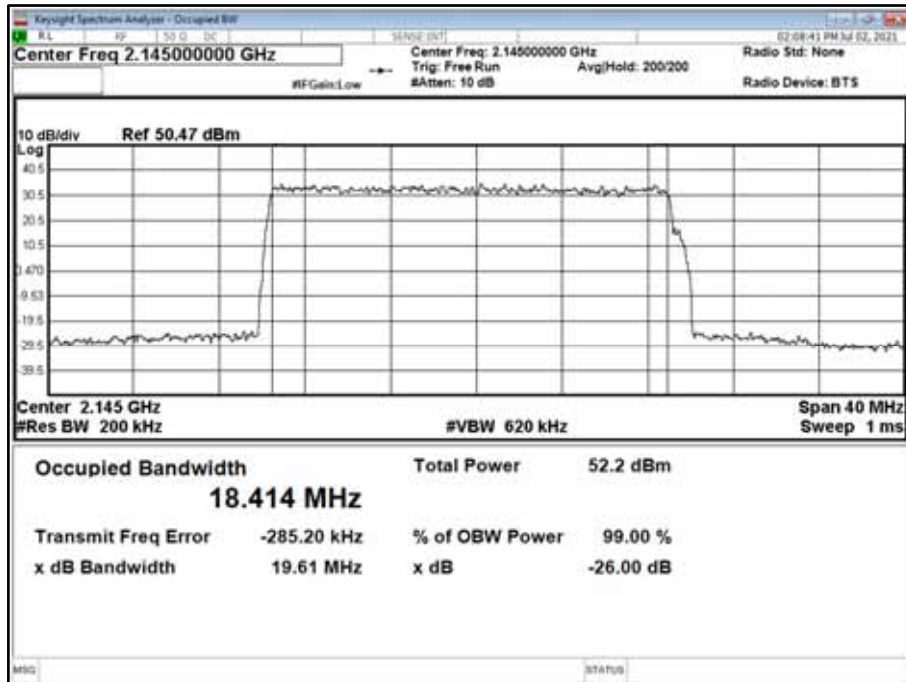


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 20.0 MHz 15 kHz SCS - Channel Position M





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 20.0 MHz 15 kHz SCS - Channel Position T



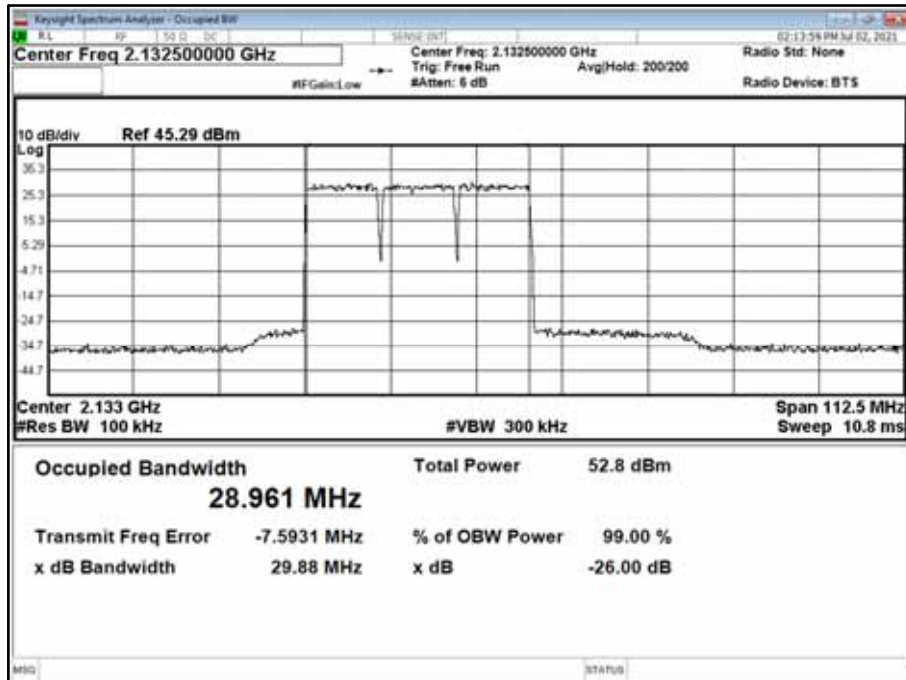
Configuration 2

Maximum Output Power 44.80 dBm

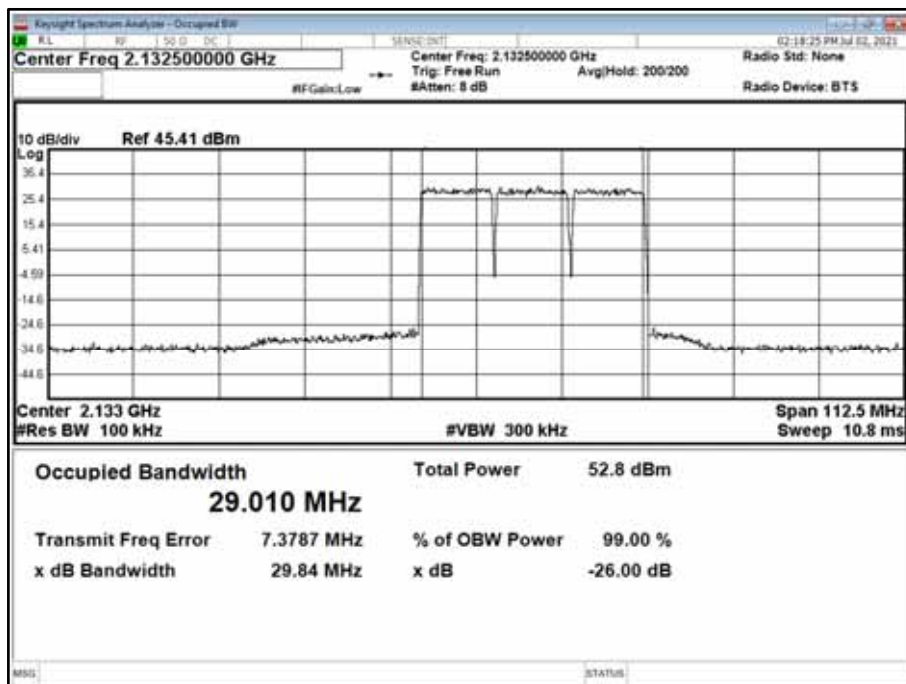
Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Result (MHz)					
			Channel Position B		Channel Position M		Channel Position T	
			Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth	Occupied Bandwidth	-26 dB Bandwidth
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	28960.83	29877.61	-	-	29010.17	29839.09
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	28966.54	29834.11	-	-	28937.91	29872.86
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	28971.65	29889.48	-	-	29002.03	29886.97



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position B

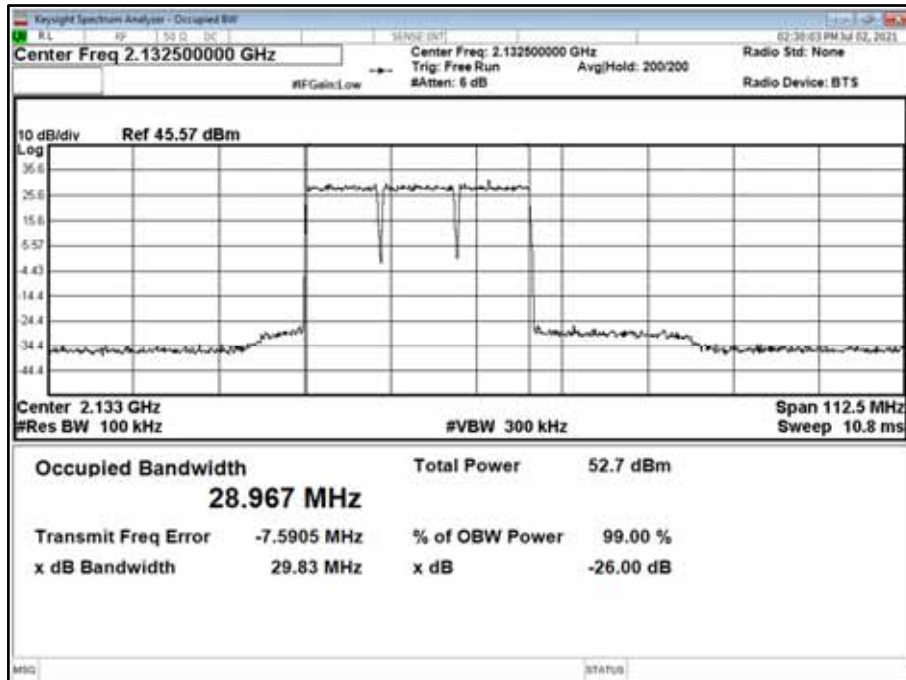


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position T

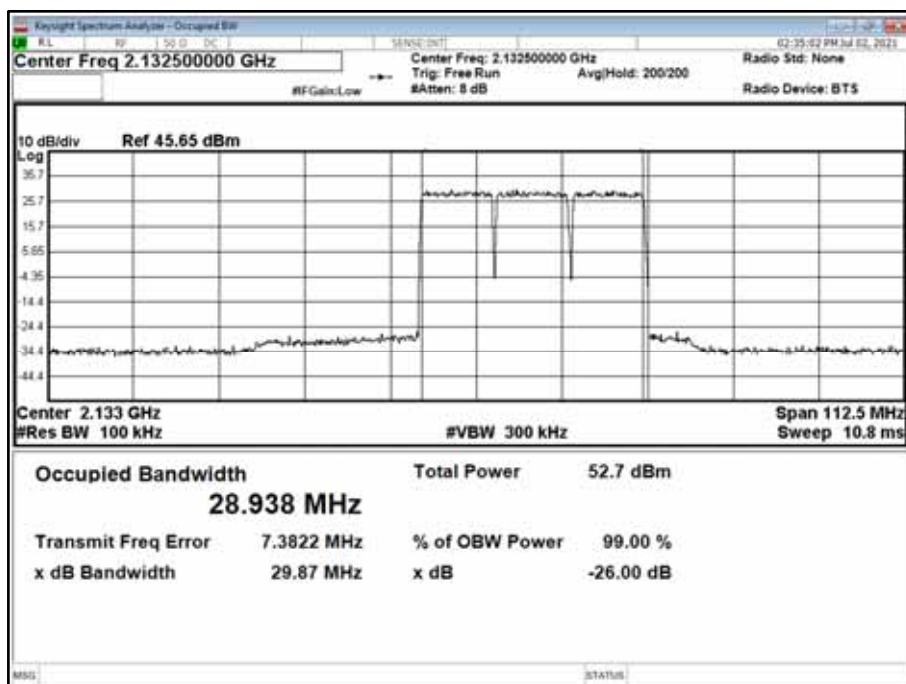




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position B

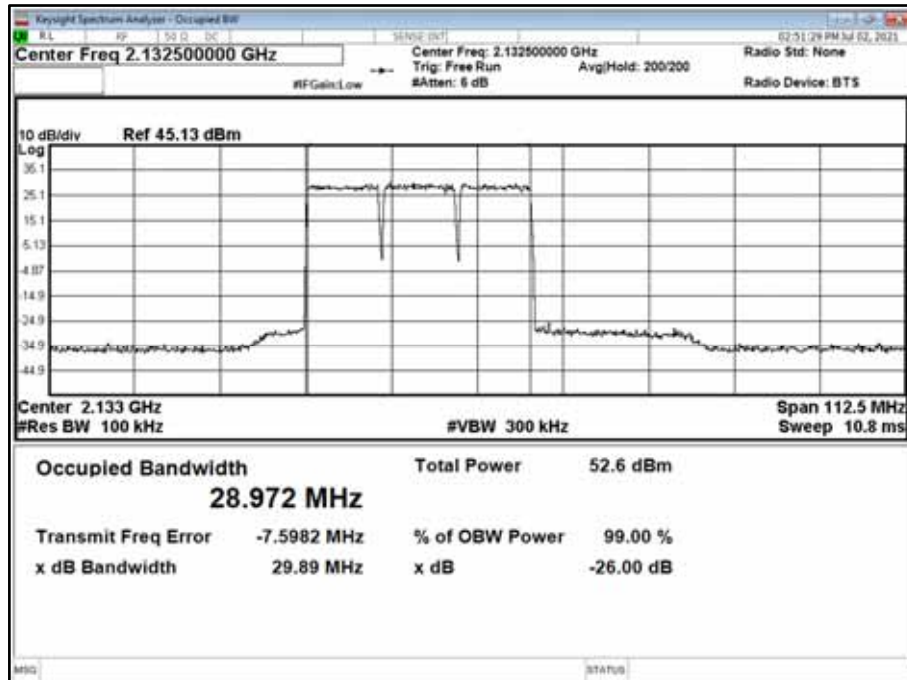


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position T





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position B



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position T





Configuration 3

Maximum Output Power 44.80 dBm

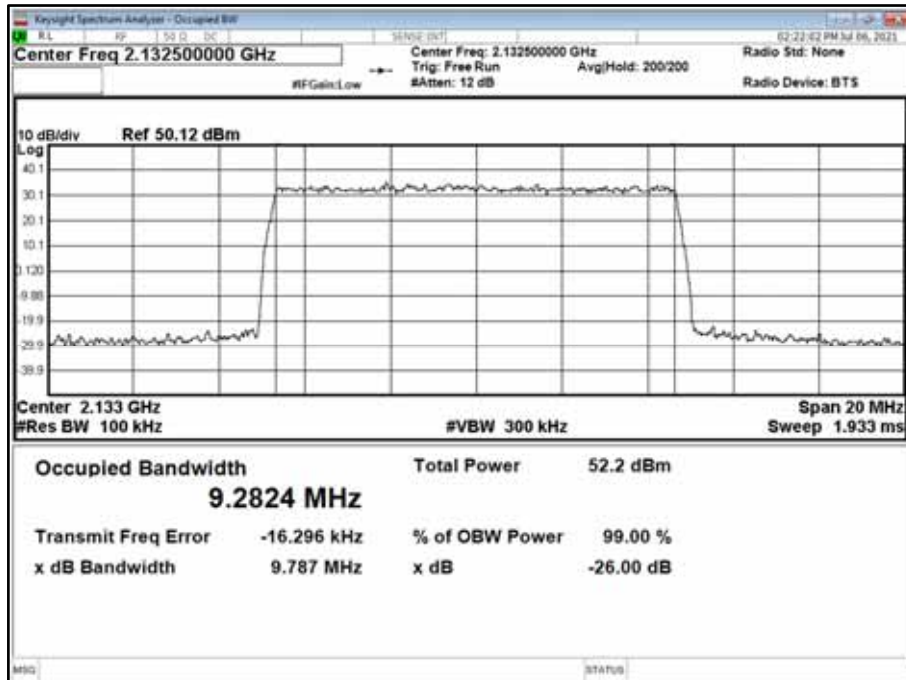
Antenna	NR Modulation	NR Carrier Bandwidth	Result (MHz)					
			Channel Position B		Channel Position M		Channel Position T	
			Occupied Bandwidth h	-26 dB Bandwidth h	Occupied Bandwidth h	-26 dB Bandwidth h	Occupied Bandwidth h	-26 dB Bandwidth h
A	QPSK	10.0 MHz 15 kHz SCS	9291.34	9784.78	9282.44	9787.32	9288.35	9777.69
A	QPSK	20.0 MHz 15 kHz SCS	18920.46	19743.96	18929.37	19651.62	18905.55	19678.51

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

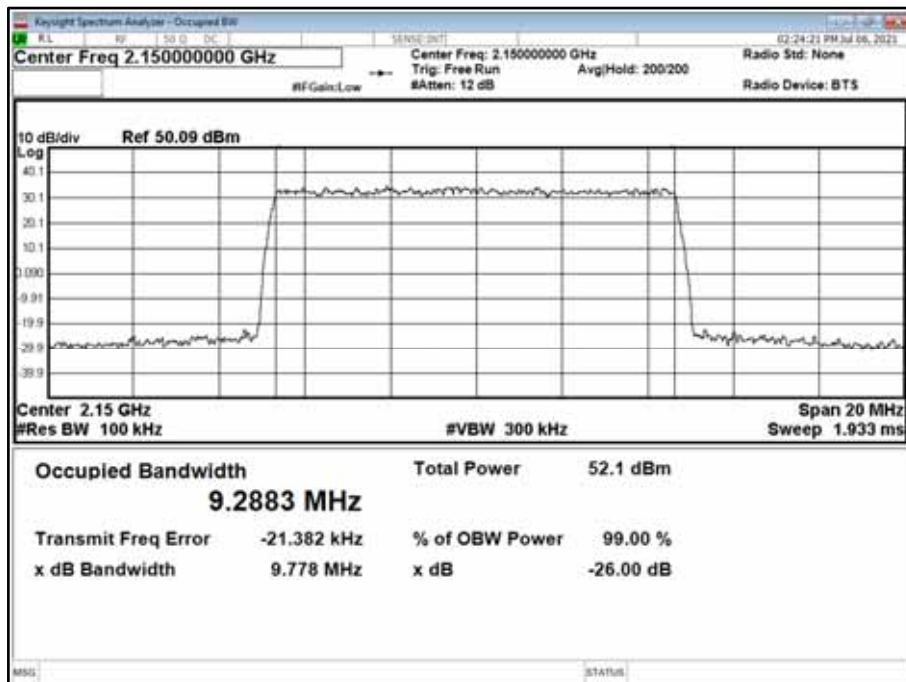




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position M

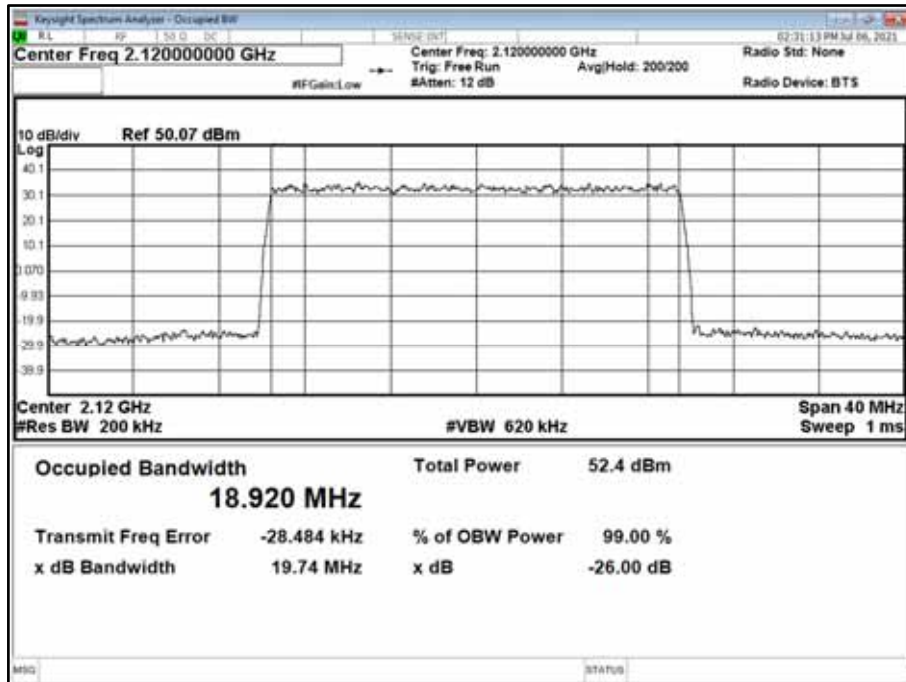


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position T

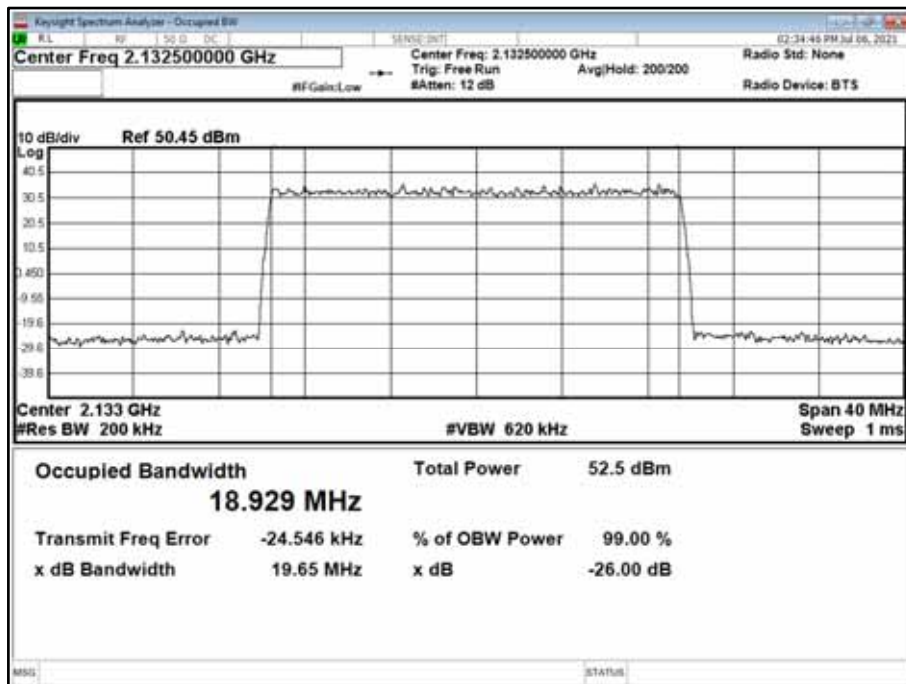




Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position B

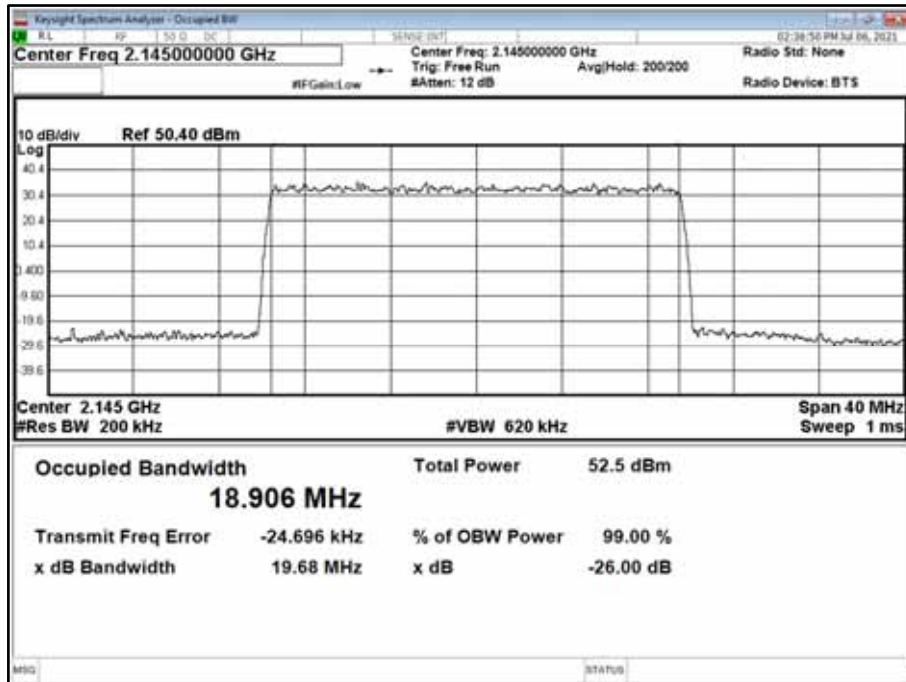


Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 20.0 MHz 15 kHz SCS - Channel Position M





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



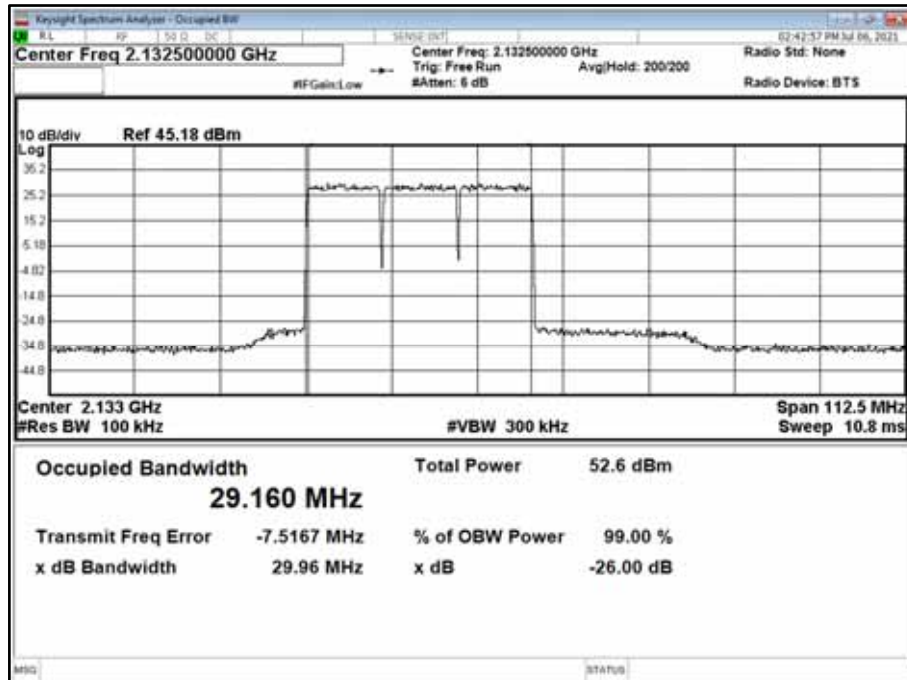
Configuration 4

Maximum Output Power 44.80 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Result (MHz)					
			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	10.0 MHz 15 kHz SCS	29159.79	29959.64	-	-	29125.32	29880.38



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





2.3 BAND EDGE

2.3.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53
Industry Canada RSS-139, Clause 6.5
FCC CFR 47 Part 2, Clause 2.1051

2.3.2 Date of Test and Modification State

02 June, 07 and 29 June 2021 - 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 23.4 - 24.9°C
Relative Humidity 37.2 - 42.0%

2.3.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, Clause 6.0.

Band Edge measurements were used an Integration Bandwidth of at least 1% of the measured 26dB Bandwidth.

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

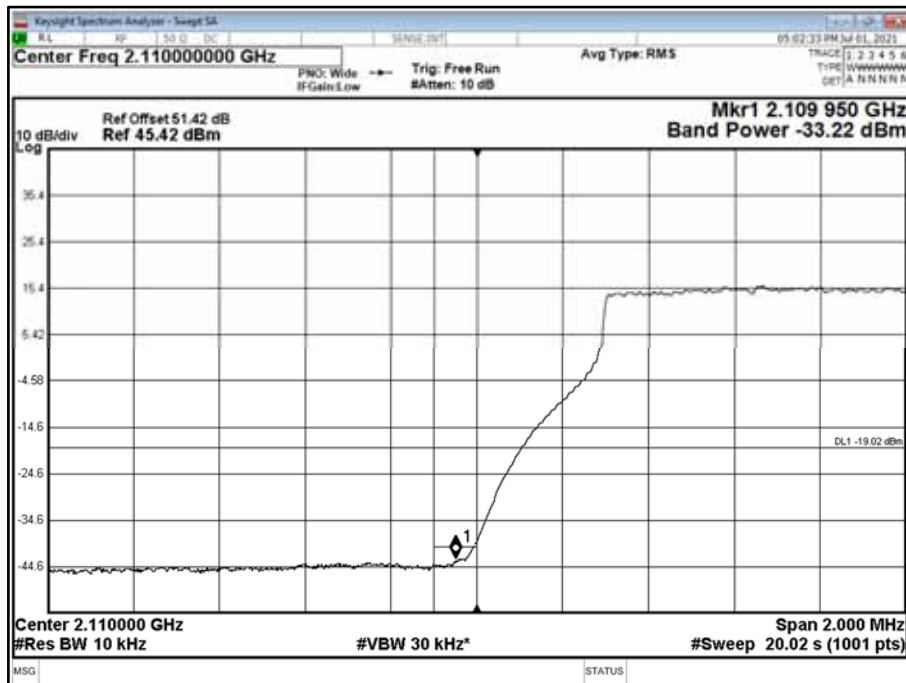
2.3.6 Test Results

Configuration 1

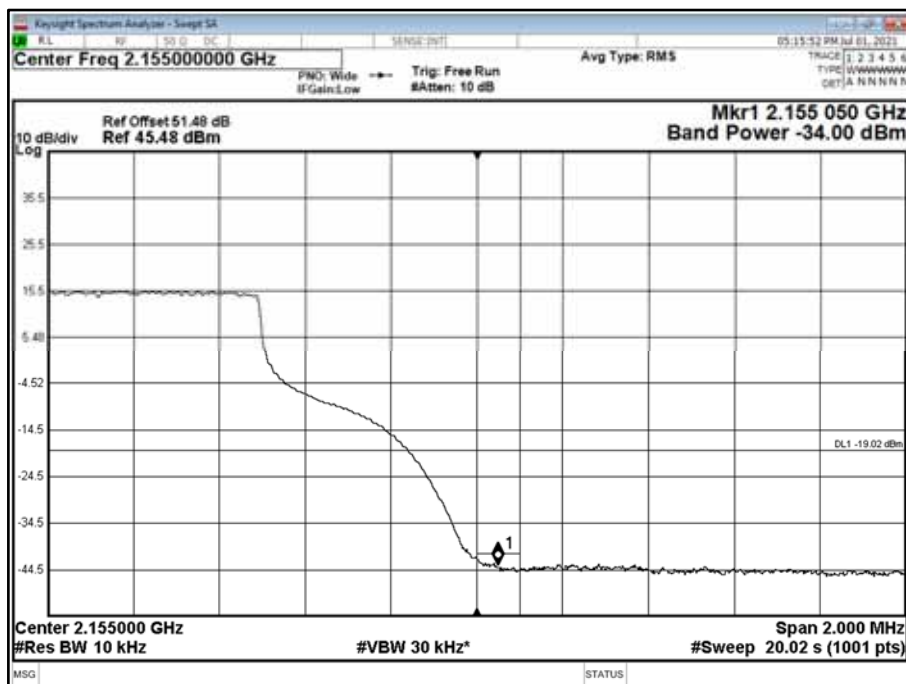
Maximum Output Power 44.80 dBm

Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Band Edge (MHz)	
			Channel Position B	Channel Position T
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	2,115.0	2,150.0
A	QPSK	ESS 40/60 20.0 MHz 15 kHz SCS	2,120.0	2,145.0
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	2,115.0	2,150.0
A	QPSK	ESS 10/90 20.0 MHz 15 kHz SCS	2,120.0	2,145.0
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	2,115.0	2,150.0
A	QPSK	ESS 90/10 20.0 MHz 15 kHz SCS	2,120.0	2,145.0

Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position B

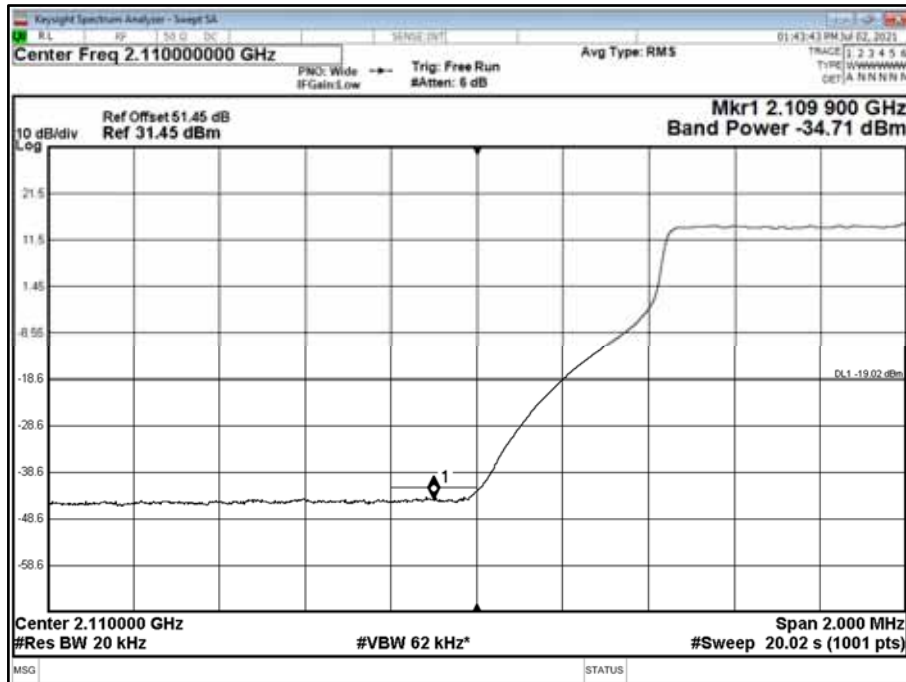


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position T

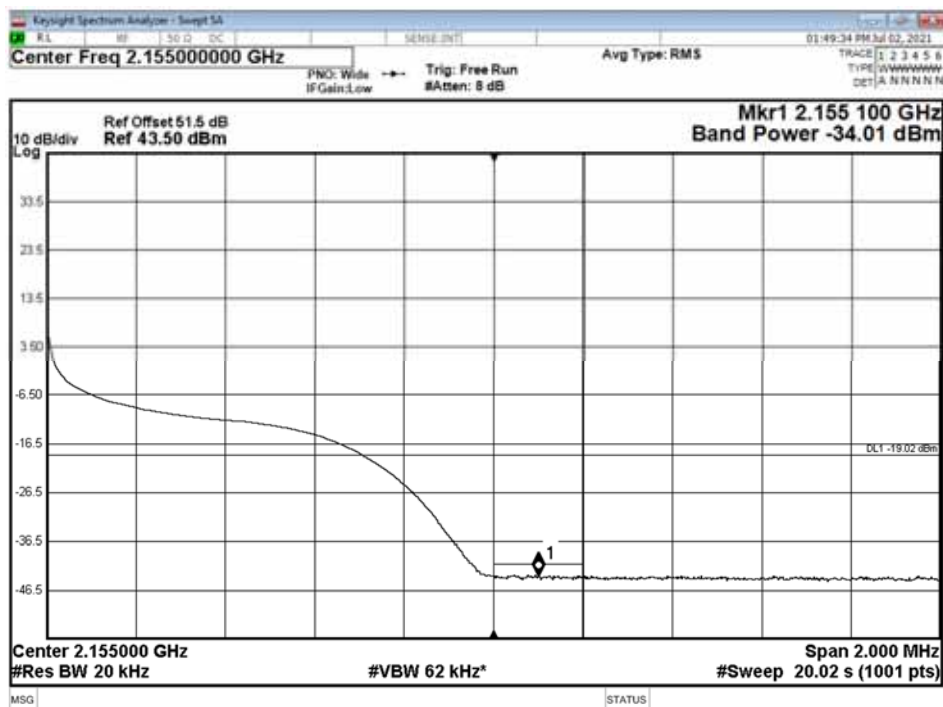




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position B

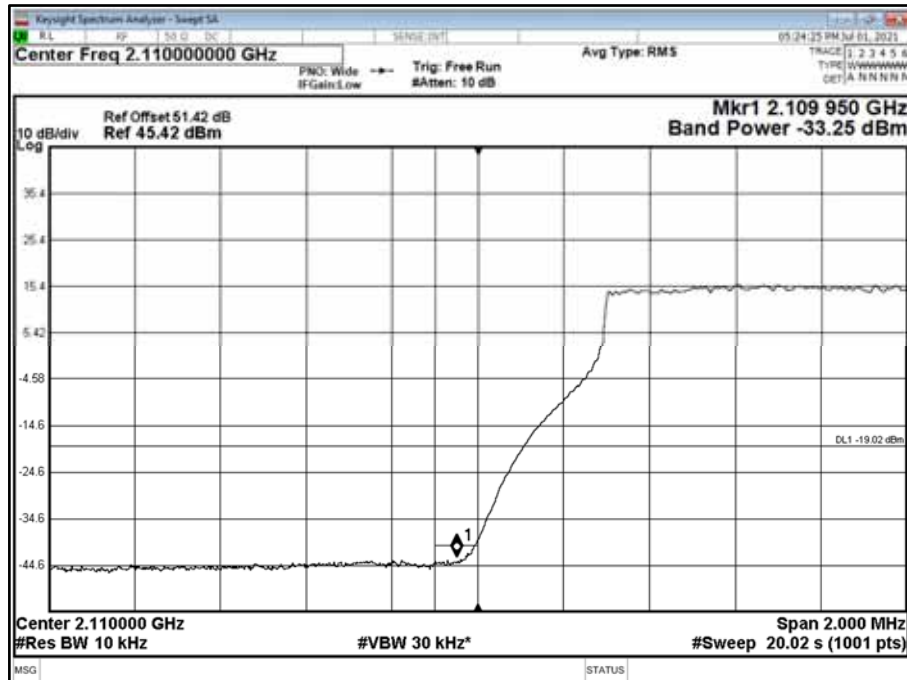


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position T

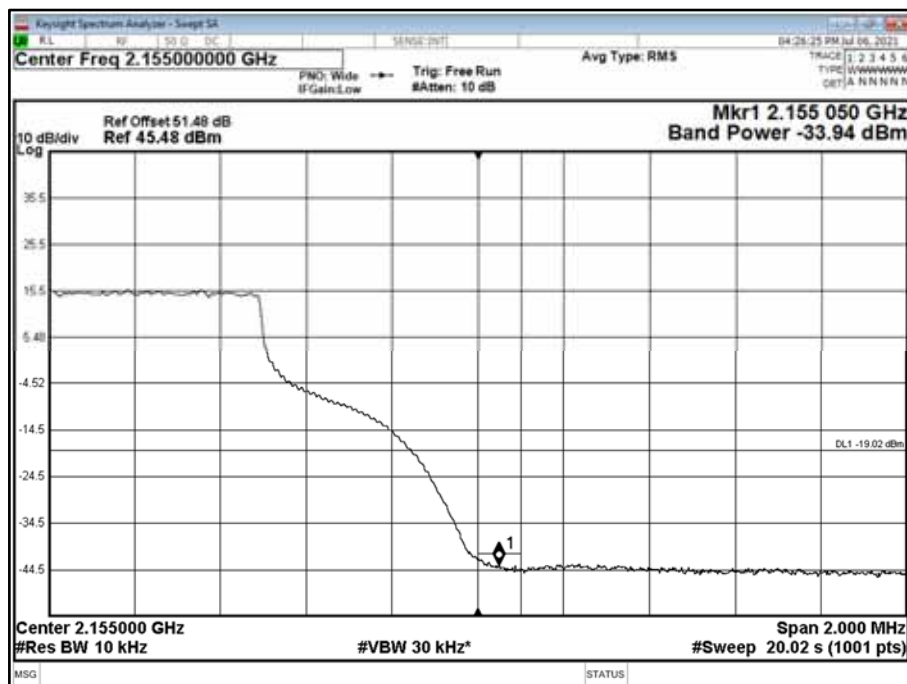




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position B

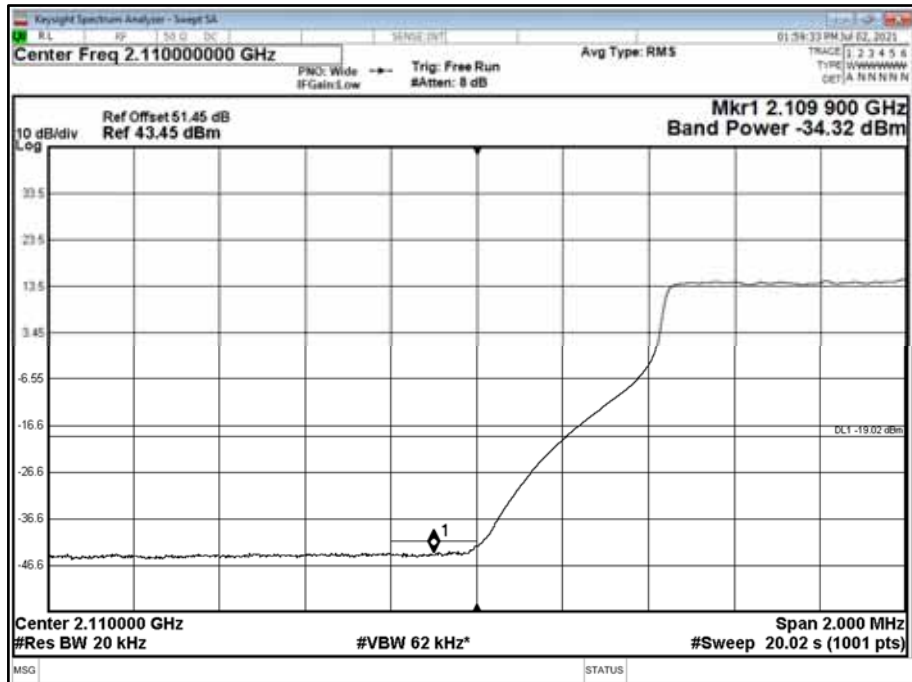


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position T

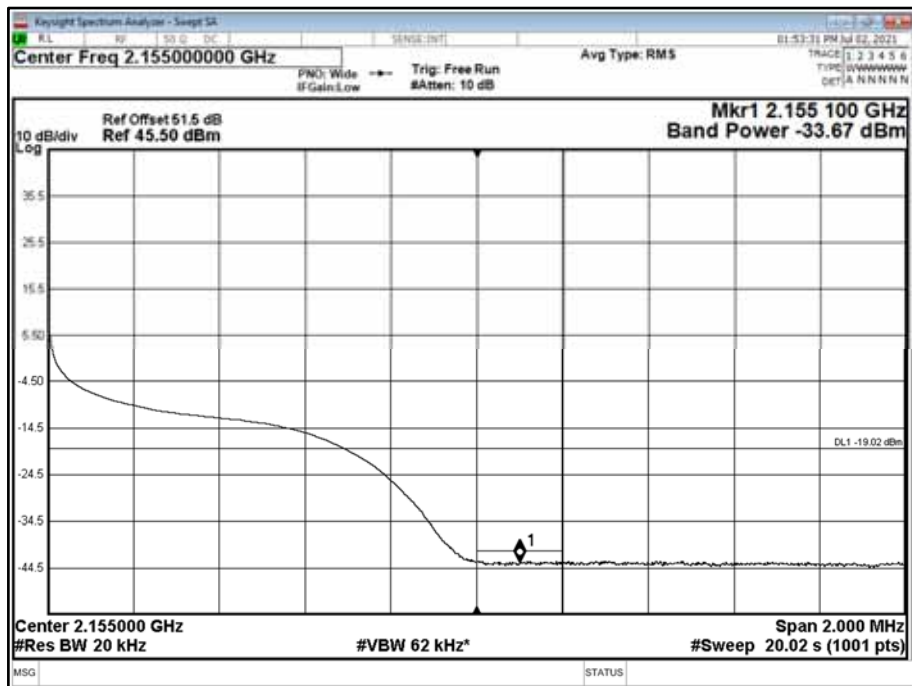




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 20.0 MHz 15 kHz SCS - Channel Position B



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 20.0 MHz 15 kHz SCS - Channel Position T

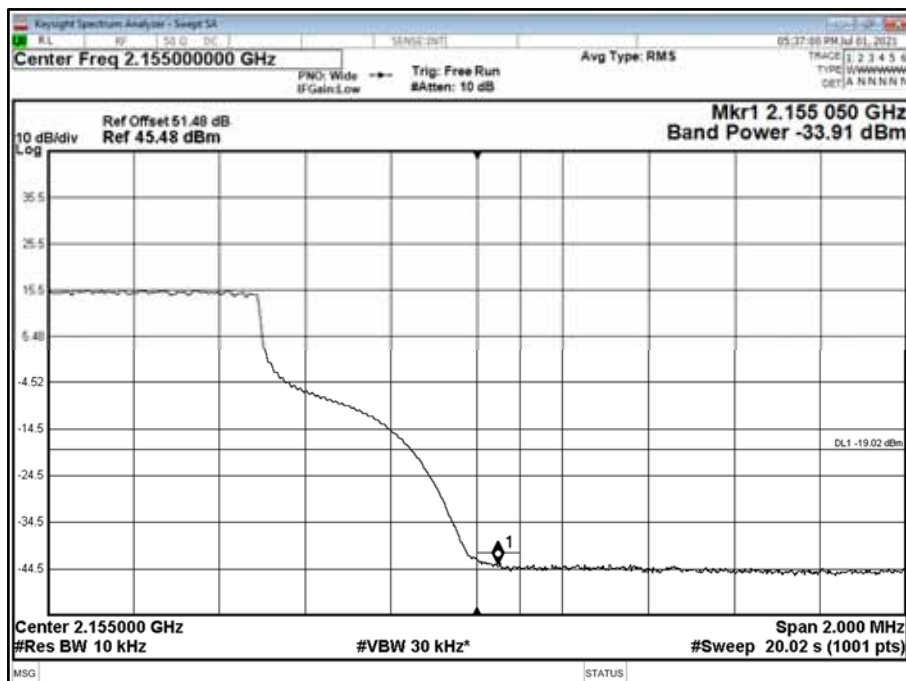




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position B

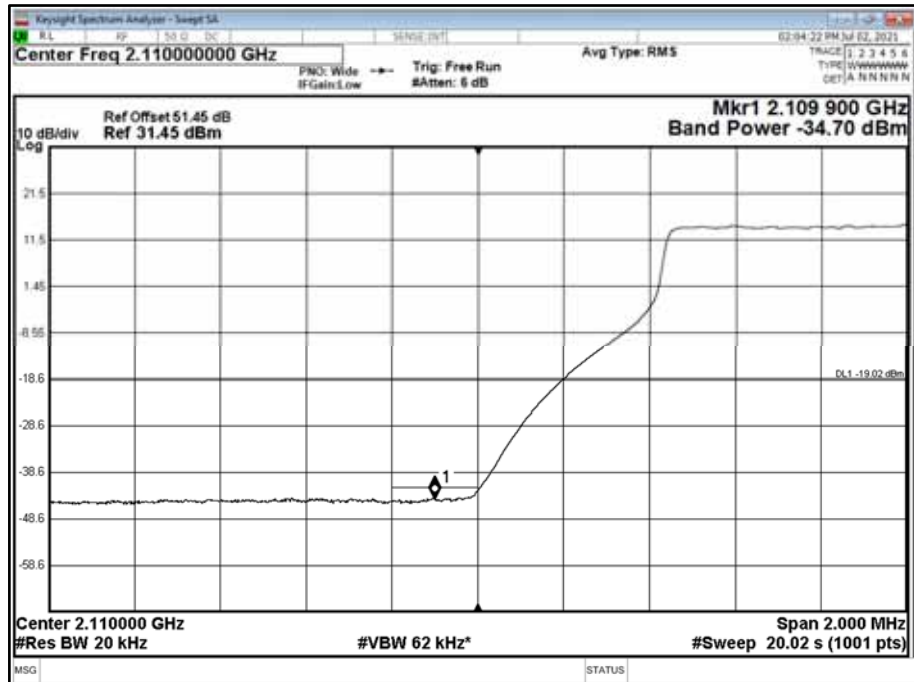


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position T



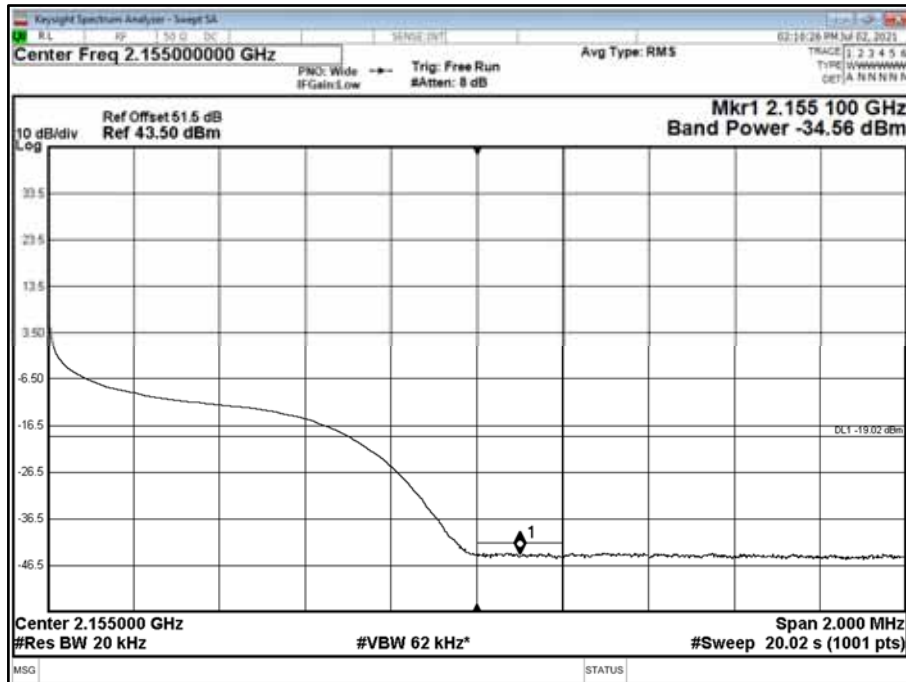


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 20.0 MHz 15 kHz SCS - Channel Position B





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 20.0 MHz 15 kHz SCS - Channel Position T



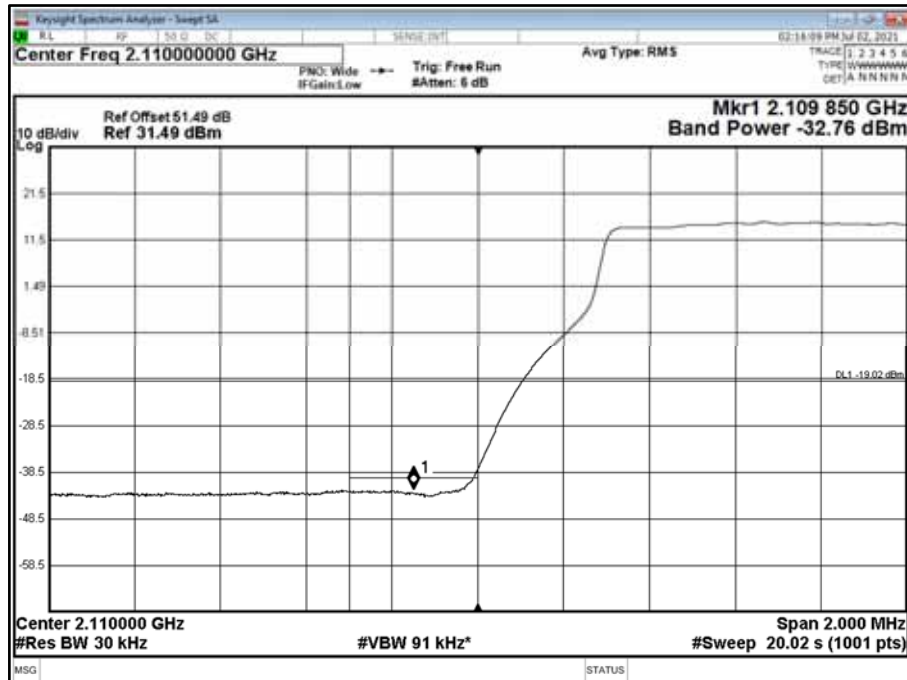
Configuration 2

Maximum Output Power 44.80 dBm

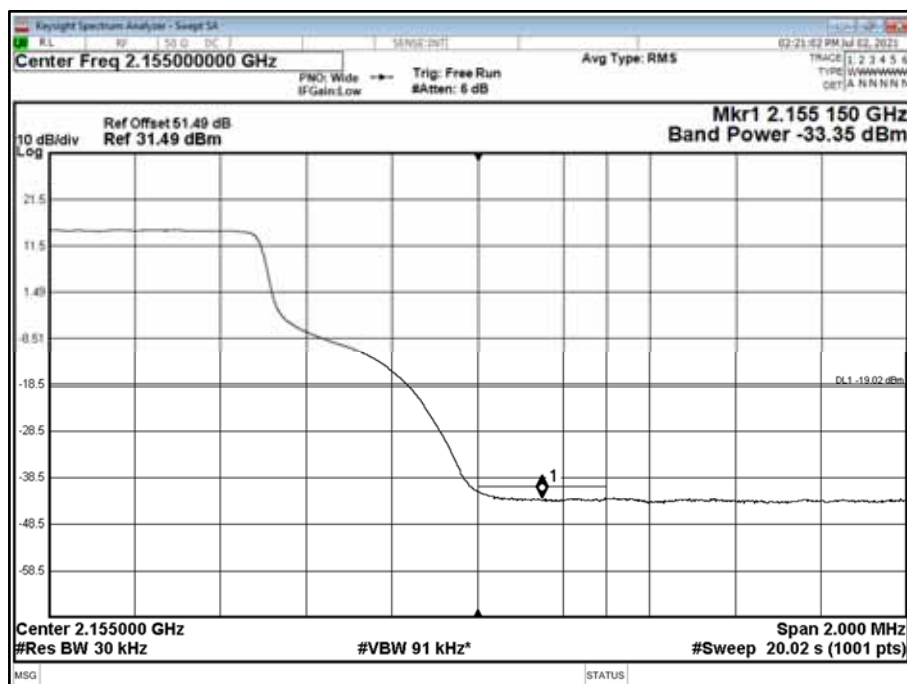
Antenna	LTE / NR Modulation	LTE / NR Carrier Bandwidth	Band Edge (MHz)	
			Channel Position B	Channel Position T
A	QPSK	ESS 40/60 10.0 MHz 15 kHz SCS	2115 + 2125 + 2150	2115 + 2125 + 2150
A	QPSK	ESS 10/90 10.0 MHz 15 kHz SCS	2115 + 2125 + 2150	2115 + 2125 + 2150
A	QPSK	ESS 90/10 10.0 MHz 15 kHz SCS	2115 + 2125 + 2150	2115 + 2125 + 2150



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position B



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position T

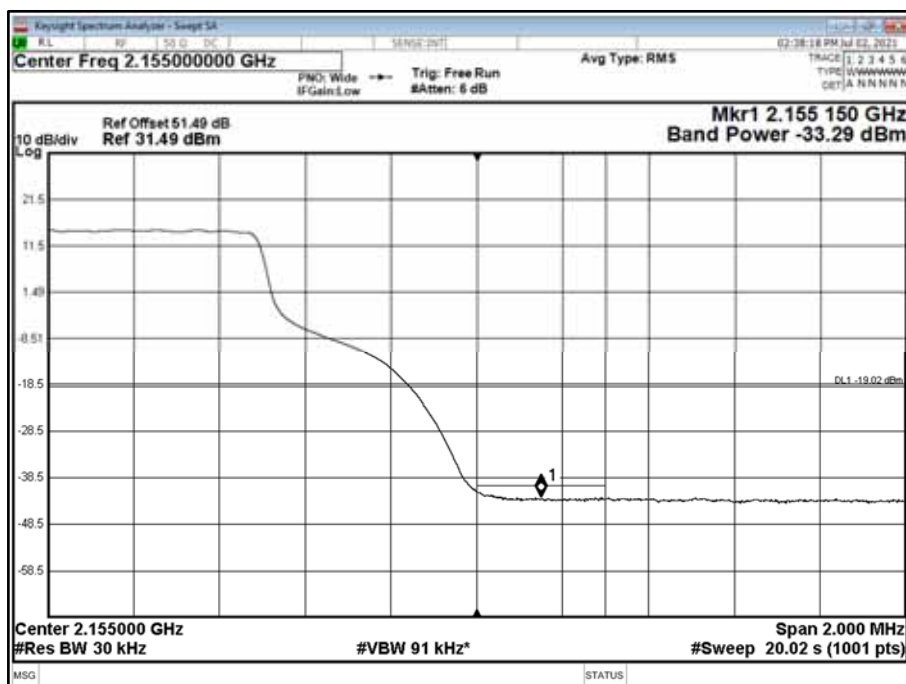




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position B

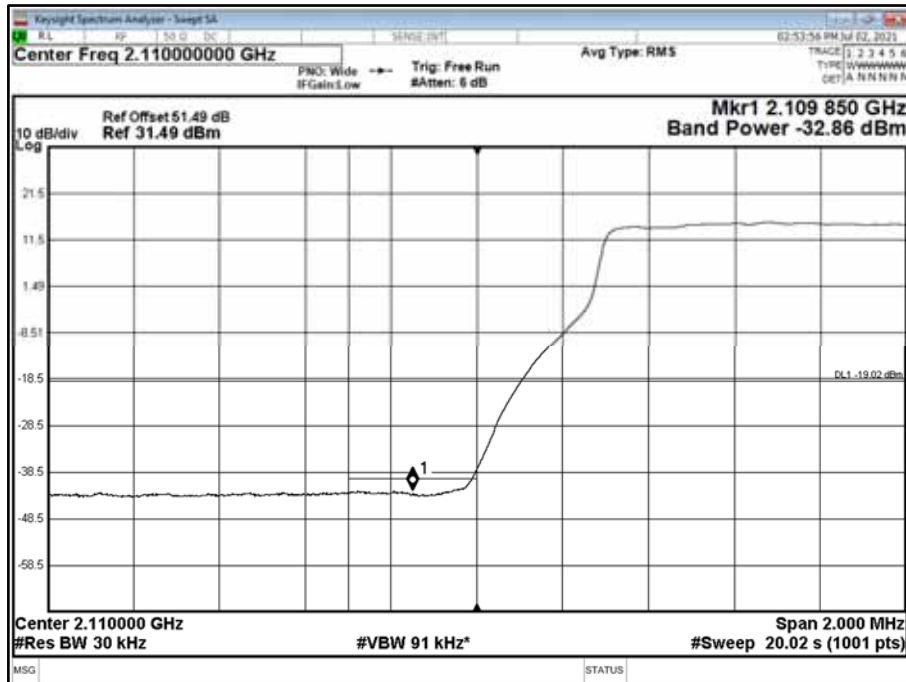


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 10/90 10.0 MHz 15 kHz SCS - Channel Position T

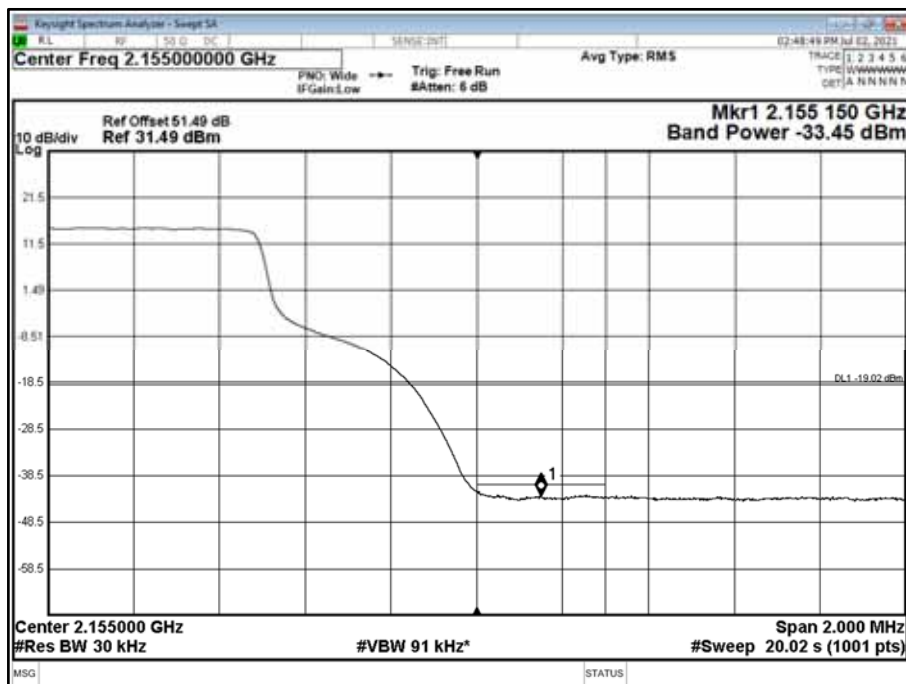




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position B



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 90/10 10.0 MHz 15 kHz SCS - Channel Position T



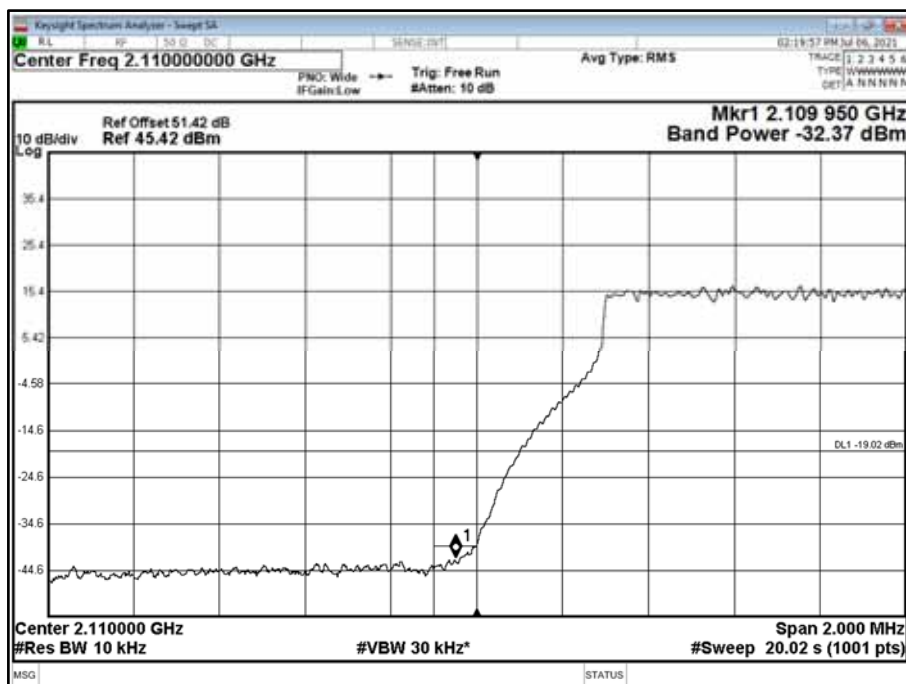


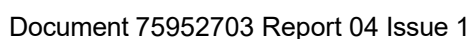
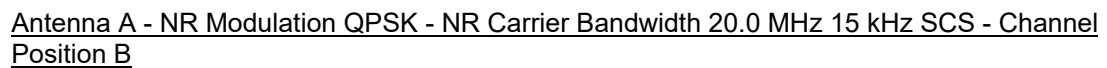
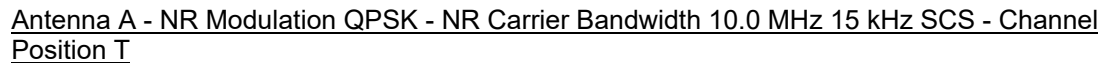
Configuration 3

Maximum Output Power 44.80 dBm

Antenna	NR Modulation	NR Carrier Bandwidth	Band Edge (MHz)	
			Channel Position B	Channel Position T
A	QPSK	10.0 MHz 15 kHz SCS	2,115.0	2,150.0
A	QPSK	20.0 MHz 15 kHz SCS	2,120.0	2,145.0

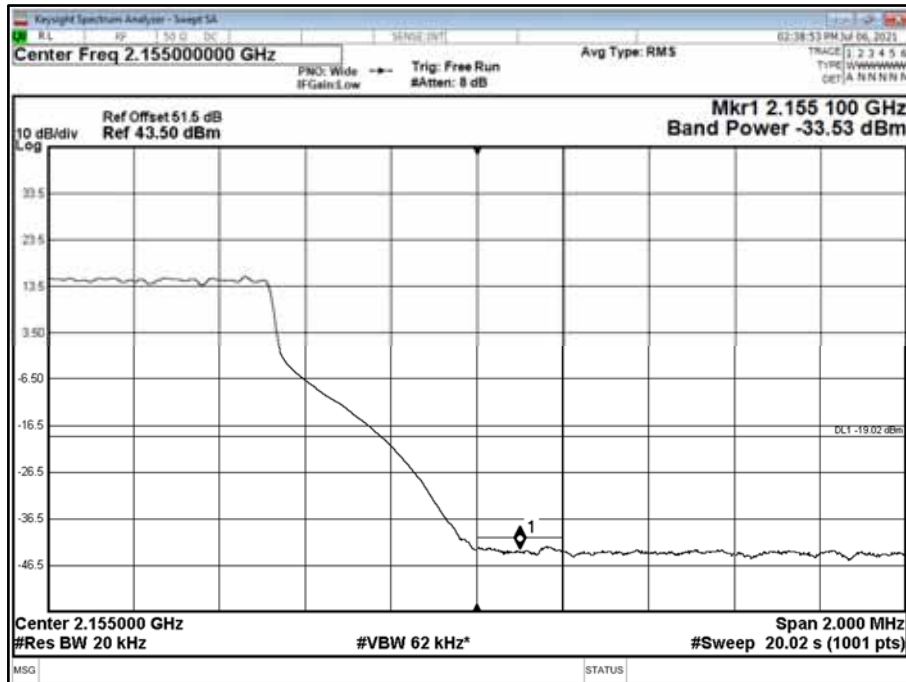
Antenna A - NR Modulation QPSK - NR Carrier Bandwidth 10.0 MHz 15 kHz SCS - Channel Position B







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



Configuration 4

Maximum Output Power 44.80 dBm

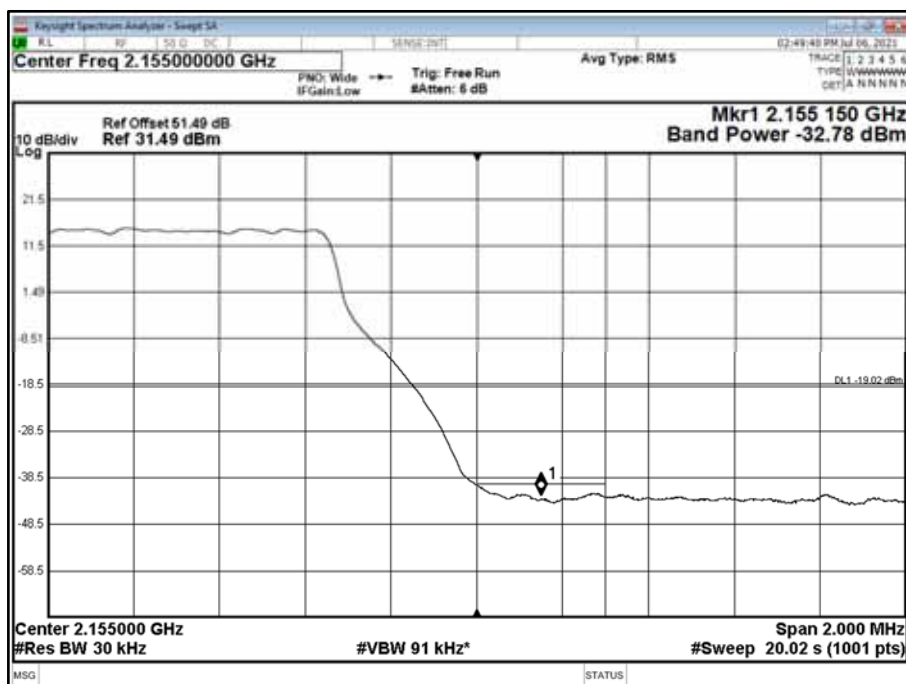
Antenna	NR Modulation	NR Carrier Bandwidth	Band Edge (MHz)	
			Channel Position B	Channel Position T
A	QPSK	10.0 MHz 15 kHz SCS	2115 + 2125 + 2150	2115 + 2125 + 2150



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



Limit	-19 dBm
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2.4 TRANSMITTER SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.53
Industry Canada RSS-139, Clause 6.6
FCC CFR 47 Part 2, Clause 2.1051

2.4.2 Date of Test and Modification State

30 June and 01, 06 July 2021 - 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	23.4 - 25.2°C
Relative Humidity	40.8 - 42.0%

2.4.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, Clause 6.1.

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

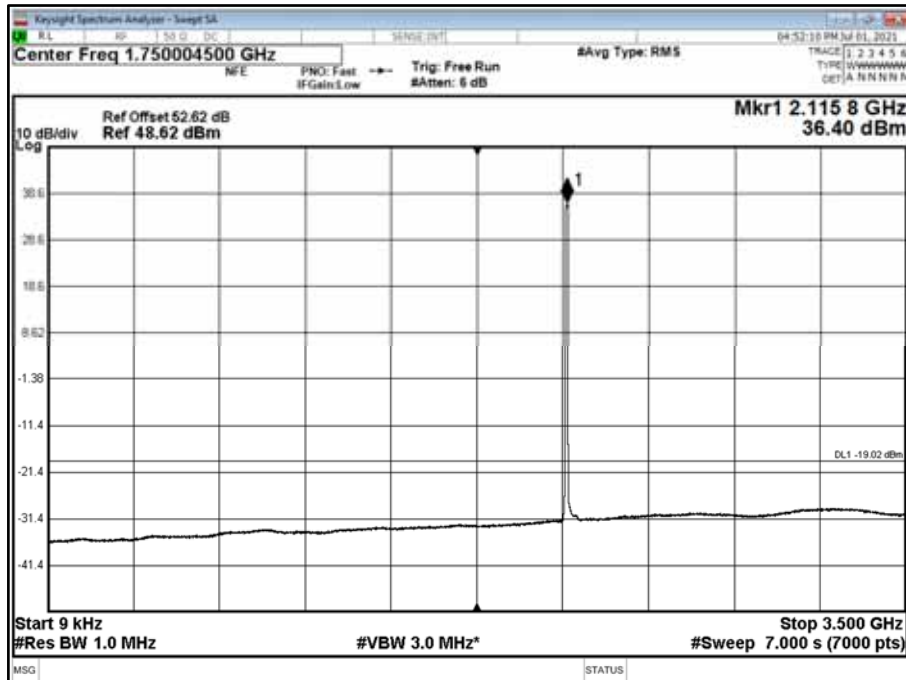
2.4.6 Test Results

Configuration 1

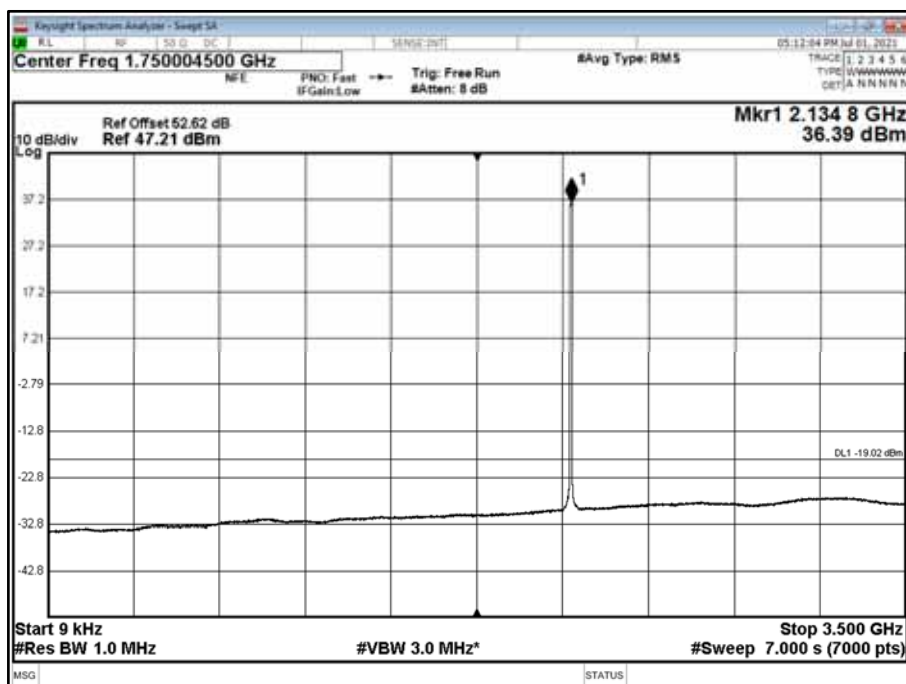
Maximum Output Power 44.80 dBm



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position B - Band 1 - Range 0.009 to 3500 MHz

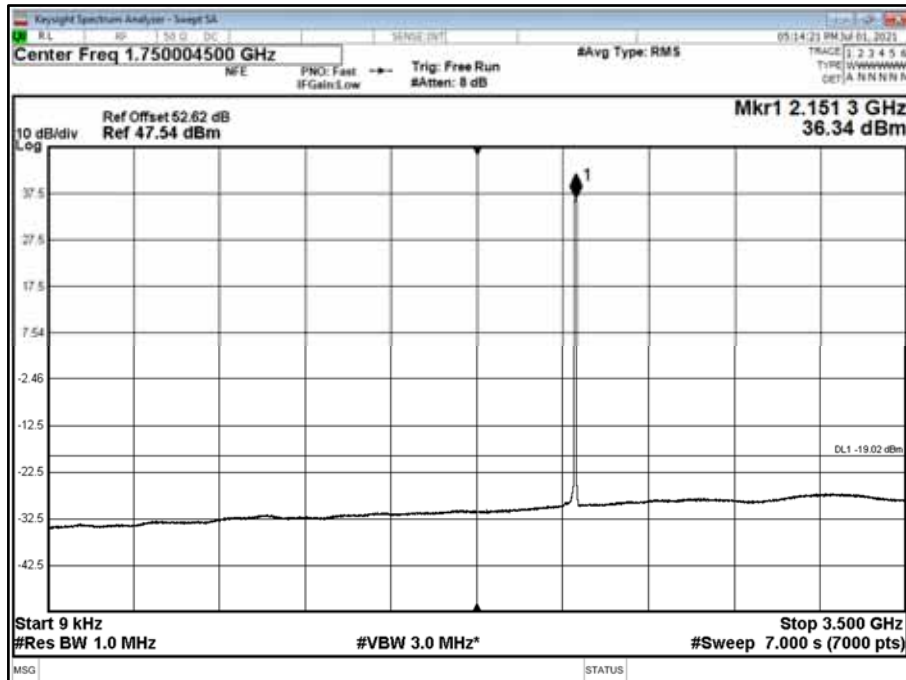


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position M - Band 1 - Range 0.009 to 3500 MHz

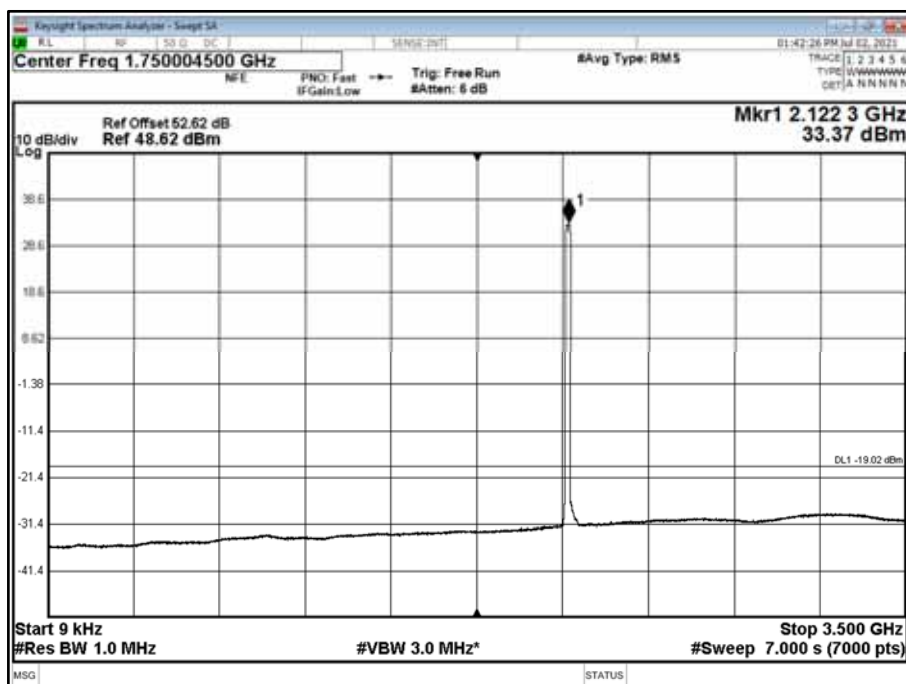




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position T - Band 1 - Range 0.009 to 3500 MHz

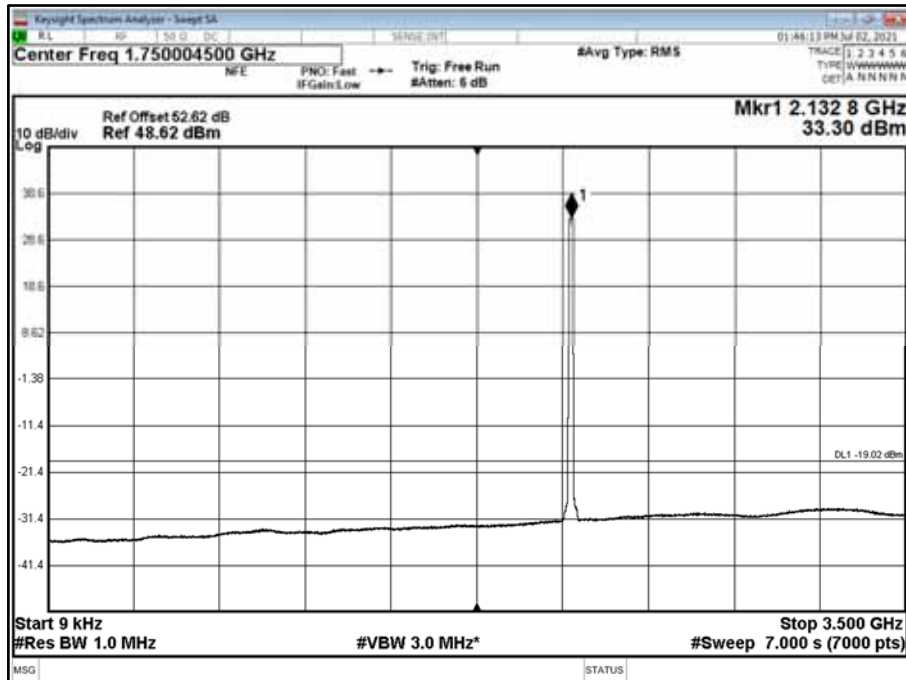


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position B - Band 1 - Range 0.009 to 3500 MHz

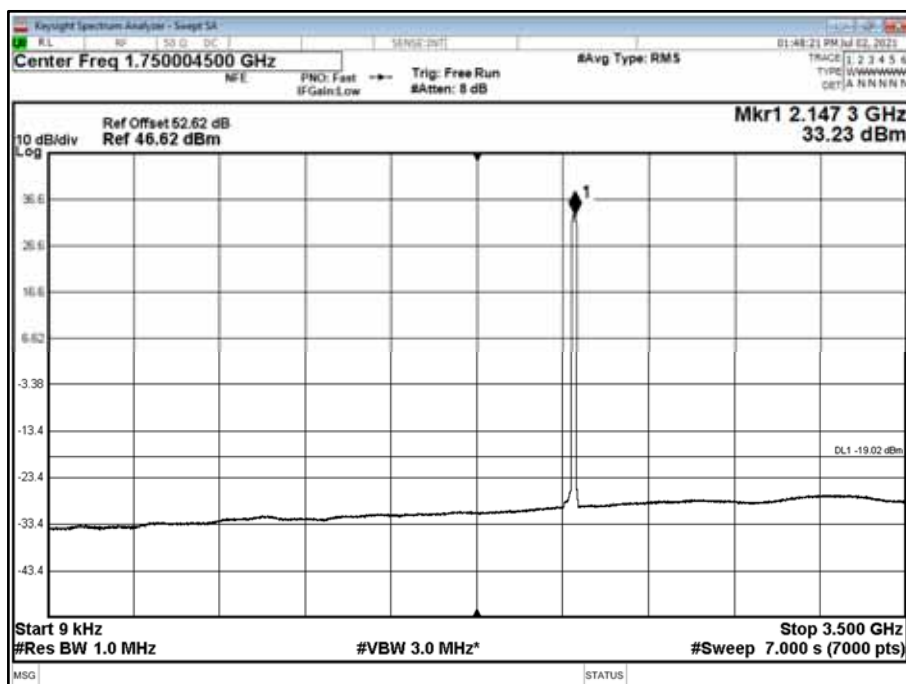




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position M - Band 1 - Range 0.009 to 3500 MHz

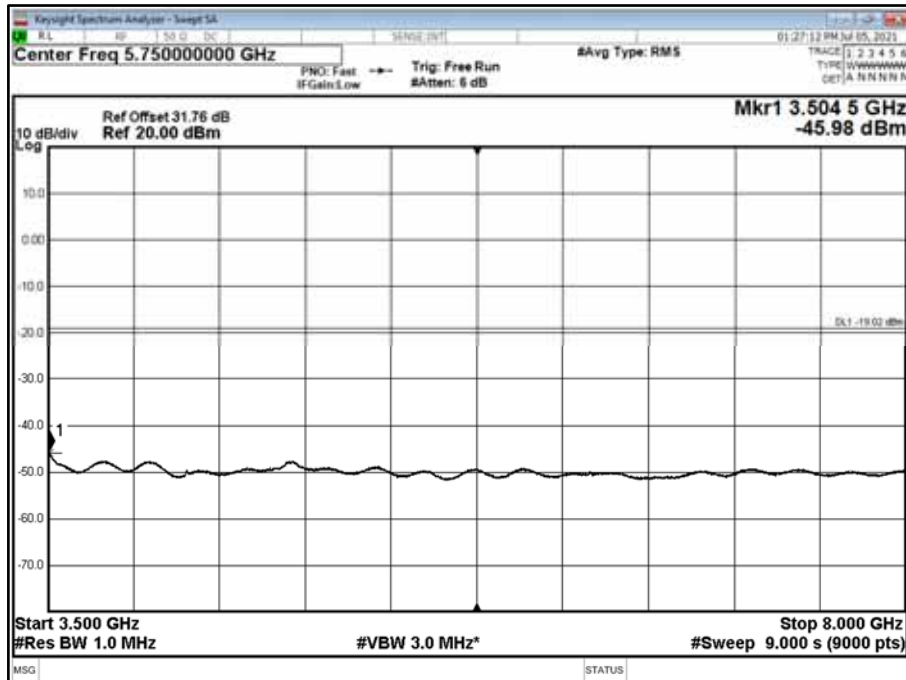


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position T - Band 1 - Range 0.009 to 3500 MHz

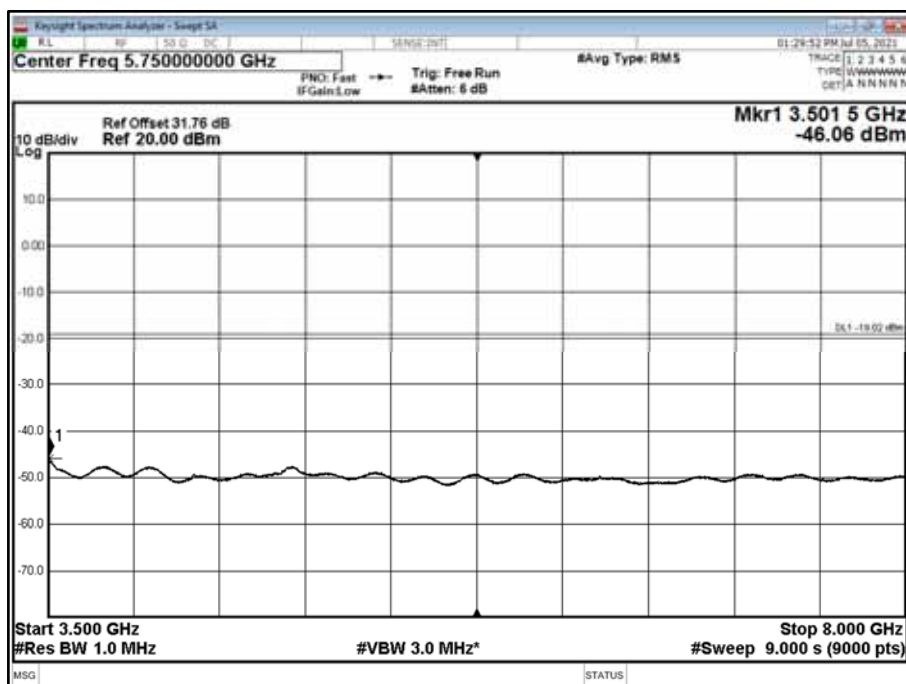




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position B - Band 2 - Range 3500 to 8000 MHz

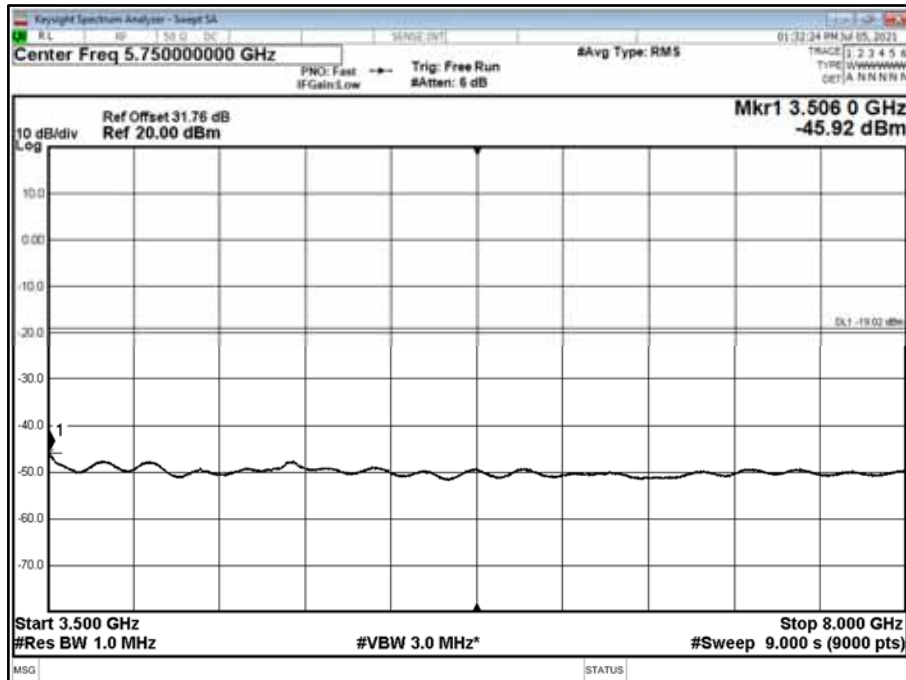


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position M - Band 2 - Range 3500 to 8000 MHz

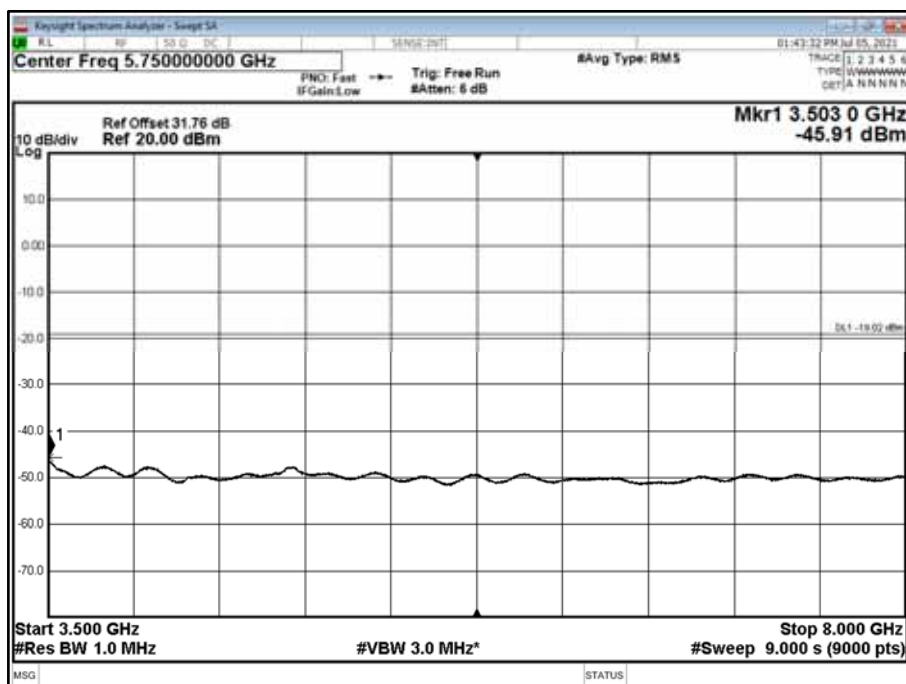




Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 10.0 MHz 15 kHz SCS - Channel Position T - Band 2 - Range 3500 to 8000 MHz

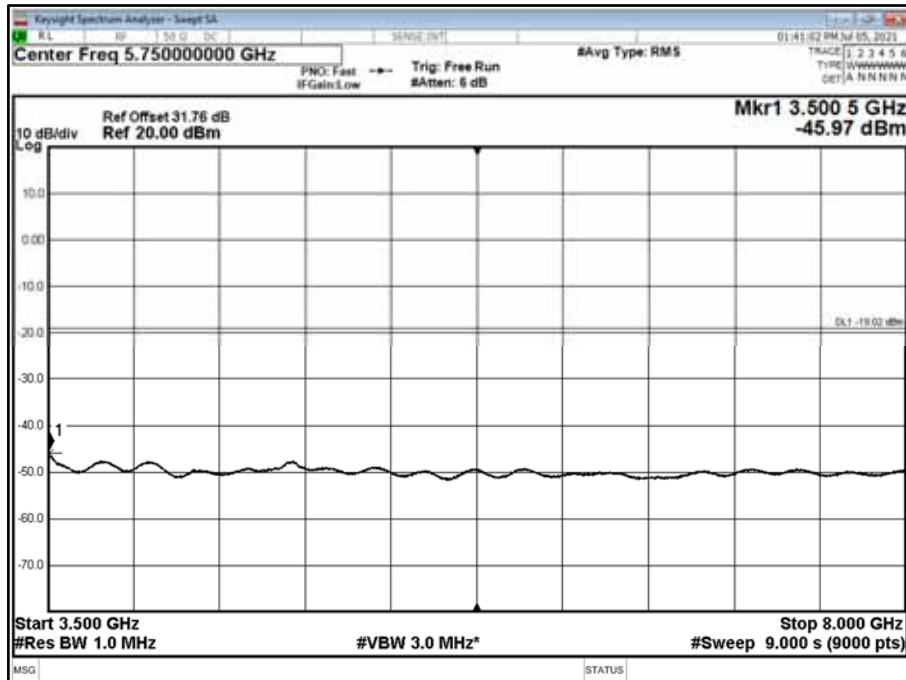


Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position B - Band 2 - Range 3500 to 8000 MHz





Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position M - Band 2 - Range 3500 to 8000 MHz



Antenna A - LTE / NR Modulation QPSK - LTE / NR Carrier Bandwidth ESS 40/60 20.0 MHz 15 kHz SCS - Channel Position T - Band 2 - Range 3500 to 8000 MHz

