FCC/ISED Test Report

Product Name	:	Embedded module
Brand Name	:	AirPrime
Model No.	:	HL7810
FCC ID	:	N7NHL78A
IC	:	2417C-HL78A
Applicant	:	Sierra Wireless, Inc.
Address	:	13811 Wireless Way, Richmond, BC V6V 3A4, Canada
Date of Receipt	:	Feb. 14, 2022
Issued Date	:	Oct. 19, 2022
Report No.	:	2220254R-RFUSOTHV13-B
Report Version	:	V3.0

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.
This report must not be used to claim product endorsement by TAF or any agency of the government.
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Product Name	:	Embedded module
Applicant	:	Sierra Wireless, Inc.
Address	:	13811 Wireless Way, Richmond, BC V6V 3A4, Canada
Manufacturer	:	Sierra Wireless, Inc.
Address	:	13811 Wireless Way, Richmond, BC V6V 3A4, Canada
Brand Name	:	AirPrime
Model No.	:	HL7810
FCC ID	:	N7NHL78A
IC	:	2417C-HL78A
EUT Voltage	:	DC 3.2 ~ 4.35V (host equipment)
Testing Voltage	:	DC 12V
Applicable Standard	:	FCC CFR Title 47 Part 22 Subpart H FCC CFR Title 47 Part 24 Subpart E FCC CFR Title 47 Part 27 Subpart F, Subpart L, Subpart P FCC CFR Title 47 Part 90 Subpart S RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-139 Issue 3 RSS-199 Issue 3 RSS-Gen Issue 5 ANSI/TIA-603-E-2016 ANSI C63.26-2015
Laboratory Name	:	DEKRA Testing and Certification Co., Ltd. Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.
Test Result	:	Complied

Documented By : Amelia Wu

(Amelia Wu / Project Specialist)

Approved By : Rueyyan.Lin

(Rueyyan Lin / Supervisor)

The test results relate only to the samples tested.

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Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Aug. 19, 2022
V2.0	Adding the verify results of LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 13, LTE Band 25, LTE Band 26, LTE Band 66, and the worst result of module “model: HL7800” report to verify radiated spurious emission test and record in the report.	Sep. 30, 2022
V3.0	Adding the verify results of LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 13, LTE Band 25, LTE Band 26, LTE Band 66, and the worst result of module “model: HL7800” report to verify RF output power test and record in the report.	Oct. 19, 2022

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1. General Information

1.1. EUT Description

Product Name	Embedded module
Brand Name	AirPrime
Model No.	HL7810
Uplink Frequency Range (MHz)	LTE Band 2: 1850~1910 LTE Band 4: 1710~1755 LTE Band 5: 824~849 LTE Band 8: 897.5 ~ 900.5 (FCC only) LTE Band 12: 699~716 LTE Band 13: 777~787 LTE Band 25: 1850~1915 LTE Band 26: 814~849 (ISED Not support 814~824MHz) LTE Band 66: 1710~1780 LTE Band 85: 698 ~ 716
Downlink Frequency Range (MHz)	LTE Band 2: 1930~1990 LTE Band 4: 2110~2115 LTE Band 5: 869~894 LTE Band 8: 925 ~ 960 (FCC only) LTE Band 12: 729~746 LTE Band 13: 746~756 LTE Band 25: 1930~1995 LTE Band 26: 859~894 LTE Band 66: 2110~2200 LTE Band 85: 728 ~ 746
Bandwidth (MHz)	LTE Band 2: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 4: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 5: 1.4 / 3 / 5 / 10 LTE Band 8:1.4 / 3 (FCC only) LTE Band 12: 1.4 / 3 / 5 / 10 LTE Band 13: 5 / 10 LTE Band 25: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 26: 1.4 / 3 / 5 / 10 / 15 LTE Band 66: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 85: 5 / 10
Function	Cat-M1
	NB-IoT
Type of Modulation	Cat-M1: QPSK / 16QAM
	NB-IoT: BPSK / QPSK
Hardware Version	1
Software Version	HL78xx.5.4.10.0
IMEI No.	012345678901237

Antenna Information				
Ant.	Brand Name	Model No.	Type	Gain (dBi)
0	Pulse	SPDA24700/2700	Dipole	2
1	Pulse	SPDA24700/2700	Dipole	2

Note:

1. For antenna port: only main port can be used for uplink mode, but both main and aux port can be used for downlink mode.
2. Regarding frequency band operation, the lowest, middle and highest frequency of channel were selected to perform the test, and the details were shown on this report.
3. The EUT description is from the customer declaration.
4. The manufacturer declares that this device (Model: HL7810) uses only 897.5 ~ 900.5 MHz in Band 8.
5. The device was tested under all bandwidths, RB configurations and modulations, and the worst case was found in BPSK / QPSK modulation and show in “Conducted Band Edge” & “Spurious Emission”.

1.2. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode	Mode 1: Cat-M1 Band 8 (FCC only)	Mode 12: Cat-M1 Band 26 (Part 90)
	Mode 2: Cat-M1 Band 85	Mode 13: Cat-M1 Band 66
	Mode 3: NB-IoT Band 8 (FCC only)	Mode 14: NB-IoT Band 2
	Mode 4: NB-IoT Band 85	Mode 15: NB-IoT Band 4
	Mode 5: Cat-M1 Band 2	Mode 16: NB-IoT Band 5
	Mode 6: Cat-M1 Band 4	Mode 17: NB-IoT Band 12
	Mode 7: Cat-M1 Band 5	Mode 18: NB-IoT Band 13
	Mode 8: Cat-M1 Band 12	Mode 19: NB-IoT Band 25
	Mode 9: Cat-M1 Band 13	Mode 20: NB-IoT Band 26 (Part 22)
	Mode 10: Cat-M1 Band 25	Mode 21: NB-IoT Band 26 (Part 90)
	Mode 11: Cat-M1 Band 26 (Part 22)	Mode 22: NB-IoT Band 66

Note:

1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. The difference compared to the certified LTE module (Model No.: HL7800, FCC ID: N7NHL78) is the add in LTE Band 8 (FCC only) and LTE Band 85.
   After evaluating as below:
   (a) For LTE Band 8 (FCC only) and LTE Band 85: Add all test result and record in the report.
   (b) For other Band: The worst result of the certified LTE module (Model No.: HL7800, FCC ID: N7NHL78) report is selected to verify radiated spurious emission and RF output power tests and record in the report.

1.3. Comments and Remarks

The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

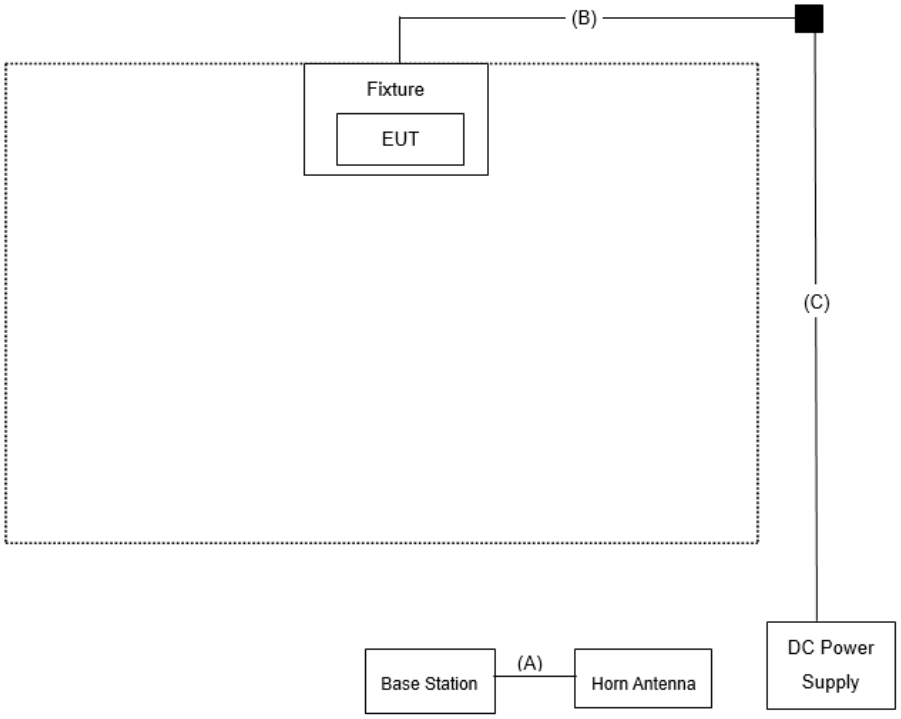
1.4. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system.

	Product	Manufacturer	Model No.	Serial No.
1	Fixture	AirPrime	HL7810	N/A
2	DC Power Supply	Topward	6030D	809508
3	Horn Antenna	Schwarzbeck	BBHA 9120D	1640
4	Base Station	R&S	CMW500	157118

1.5. Configuration of Tested System

Connection Diagram



	Signal Cable Type	Signal cable Description
A	RF Cable*1	Shielded, 6m
B	DC Cable*2	Non-Shielded, 1m
C	DC Cable*2	Non-Shielded, 6m

1.6. EUT Operation of during Test

1	Setup the EUT and Base station as shown on.
2	Turn on the power of all equipment.
3	Configure test mode, test channel and data rate.
4	Keep the EUT and base station in Link mode.
5	Repeat the above procedure (3&4).

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

<For FCC>

LTE Band 2			
FCC Part 24 Subpart E			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1033 §2.1046 §24.232	< 2 Watts	Pass
Spurious Emission	§2.1053 §24.238	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 4			
FCC Part 27 Subpart L			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	< 1 Watts	Pass
Spurious Emission	§27.53	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 5			
FCC Part 22 Subpart H			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1033 §2.1046 §22.913	< 7 Watts	Pass
Spurious Emission	§22.917	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 8			
FCC Part 27 Subpart P			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1046 §27.1507	< 3 Watts	Pass
Occupied Bandwidth	§2.1049	N/A	Pass
Peak to Average Ratio	§27.1507	< 13 dB	Pass
Conducted Band Edge	§2.1051 §27.1509	< -13dBm	Pass
Spurious Emission	§2.1053 §27.1509	< -13dBm	Pass
Frequency Stability	§2.1055 §27.54	± 2.5 ppm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 12			
FCC Part 27 Subpart F			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	< 3 Watts ERP	Pass
Spurious Emission	§27.53	< -13dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 13			
FCC Part 27 Subpart F			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	< 3 Watts ERP	Pass
Spurious Emission	§27.53	< -13 dBm < −70 dBW/MHz e.i.r.p. of all emissions, including harmonics in the band 1559-1610 MHz	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 25			
FCC Part 24 Subpart E			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1033 §2.1046 §24.232	< 2 Watts	Pass
Spurious Emission	§27.238	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 26			
FCC Part 22 Subpart H FCC Part 90 Subpart S			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1033 §2.1046 §90.635(b) §22.913	< 100 Watts	Pass
Spurious Emission	§90.691 §22.917	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 66			
FCC Part 27 Subpart L			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1033 §2.1046 §27.50	< 1 Watts	Pass
Spurious Emission	§27.53	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 85			
FCC Part 27 Subpart F			
Performed Item	FCC Reference Section	Limit	Result
RF Output Power	§2.1046 §27.50	< 3 Watts ERP	Pass
Occupied Bandwidth	§2.1049	N/A	Pass
Peak to Average Ratio	§27.50	< 13 dB	Pass
Conducted Band Edge	§2.1051 §27.53	< -13dBm	Pass
Spurious Emission	§2.1053 §27.53	< -13dBm	Pass
Frequency Stability	§2.1055 §27.54	± 2.5 ppm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

<For ISED>

LTE Band 2			
RSS-133, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§6.4	< 2 Watts	Pass
Spurious Emission	§6.5	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 4			
RSS-139, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§6.5	< 1 Watt	Pass
Spurious Emission	§6.6	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 5			
RSS-132, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§5.4	< 7 Watts EIRP: < 11.5 Watts	Pass
Spurious Emission	§5.5	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 12			
RSS-130, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§4.6	< 3 Watts E.R.P for portable equipment or for indoor fixed subscriber equipment	Pass
Spurious Emission	§4.6	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 13			
RSS-130, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§4.6	< 3 Watts E.R.P for portable equipment or for indoor fixed subscriber equipment	Pass
Spurious Emission	§4.6	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 25			
RSS-133, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§6.4	< 2 Watts	Pass
Spurious Emission	§6.5	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 26 (Uplink: Not support 814-824MHz)			
RSS-132, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§5.4	< 11.5 Watts	Pass
Spurious Emission	§5.5	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 66			
RSS-199, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§6.5	< 1 Watts	Pass
Spurious Emission	§6.6	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 85			
RSS-130, RSS-GEN			
Performed Item	IC Reference Section	Limit	Result
RF Output Power	§4.6	< 3 Watts E.R.P for portable equipment or for indoor fixed subscriber equipment	Pass
Occupied Bandwidth	RSS-GEN §6.7	N/A	Pass
Peak to Average Ratio	§4.6	< 13 dB	Pass
Conducted Band Edge	§4.7	< -13dBm	Pass
Spurious Emission	§4.7	< -13dBm	Pass
Frequency Stability	§4.5	Within the frequency range	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.2. Test Environment

Ambient conditions in the laboratory:

Items	Test Item	Actually	Tested by	Test Date	Test Site
Temperature (°C)	RF Output Power for mode 1 ~ mode 4	20	Getaz Yang	2022/02/22	HC-SR12
Humidity (%RH)		63			
Temperature (°C)	RF Output Power for mode 5 ~ mode 22	26 ~ 27	Max Chang Getaz Yang	2022/09/26, 2022/10/17	HC-SR12
Humidity (%RH)		63 ~ 66			
Temperature (°C)	Occupied Bandwidth	21	Getaz Yang	2022/02/24	HC-SR12
Humidity (%RH)		61			
Temperature (°C)	Peak to Average Ratio	21	Getaz Yang Max Chang	2022/02/24 ~ 2022/03/09	HC-SR12
Humidity (%RH)		60 ~ 61			
Temperature (°C)	Conducted Band Edge	21 ~ 22	Getaz Yang Max Chang	2022/03/01 ~ 2022/03/07	HC-SR12
Humidity (%RH)		60 ~ 62			
Temperature (°C)	Conducted Spurious Emission	21	Max Chang	2022/03/07	HC-SR12
Humidity (%RH)		60			
Temperature (°C)	Radiated Spurious Emission for mode 1 ~ mode 4	23	Cyril Chen	2022/03/16	HC-CB04
Humidity (%RH)		63			
Temperature (°C)	Radiated Spurious Emission for mode 5 ~ mode 22	23	Cyril Chen	2022/09/26	HC-CB04
Humidity (%RH)		59			
Temperature (°C)	Frequency Stability	20	Getaz Yang Max Chang	2022/03/07 ~ 2022/03/08	HC-SR12
Humidity (%RH)		61 ~ 64			

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA	**:**	**FCC Registration Number: TW3024**
Canada		**CAB identifier : TW3024**

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw
Note: Test site for address 1 includes HC-SR02. Test site for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.	

2.3. List of Test Equipment

HC-SR12

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2021/11/12	2022/11/11
Pulse Power Sensor	Anritsu	MA2411B	1531043	2021/11/12	2022/11/11
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2022/01/07	2023/01/06
Pulse Power Sensor	Anritsu	MA2411B	1531044	2021/11/12	2022/11/11
Signal and Spectrum Analyzer	R&S	FSVA40	101435	2021/06/04	2022/06/03
Signal and Spectrum Analyzer	R&S	FSVA40	101435	2022/05/30	2023/05/29
Temperature & Humidity Test Chamber	KSON	THS-B4T-150	A0401	2021/12/16	2022/12/15
Wireless Conn. Tester	R&S	CMW500	157118	2021/07/07	2022/07/06
Wireless Conn. Tester	R&S	CMW500	157118	2022/07/11	2023/07/10

HC-CB04

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2021/10/22	2022/10/21
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2022/01/07	2023/01/06
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1209	2021/05/28	2022/05/27
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1209	2022/06/14	2023/06/13
Horn Antenna	Schwarzbeck	BBHA 9120D	01640	2021/09/03	2022/09/02
Horn Antenna	Schwarzbeck	BBHA 9120D	01640	2022/07/13	2023/07/12
Horn Antenna	Schwarzbeck	BBHA 9170	203	2022/02/23	2023/02/22
Pre-Amplifier	EMCI	EMC01820I	980364	2021/08/27	2022/08/26
Pre-Amplifier	EMCI	EMC01820I	980364	2022/06/10	2023/06/09
Pre-Amplifier	EMEC	EM01G18GA	060835	2021/07/12	2022/07/11
Pre-Amplifier	EMEC	EM01G18GA	060835	2022/07/04	2023/07/03
Pre-Amplifier	DEKRA	AP-400C	201801231	2021/12/24	2022/12/23
Wireless Conn. Tester	R&S	CMW500	157118	2021/07/07	2022/07/06
Wireless Conn. Tester	R&S	CMW500	157118	2022/07/11	2023/07/10
Coaxial Cable(10m)	Suhner	SF102_SF104	HC-CB04	2021/08/09	2022/08/08
Coaxial Cable(10m)	Suhner	SF102_SF104	HC-CB04	2022/08/08	2023/08/07
Coaxial Cable(3m)	Suhnerr,Rosnol	SF102_Rosnol	HC-CB04	2021/08/17	2022/08/18
Coaxial Cable(3m)	Suhner,Rosnol	SF102_UP0264	HC-CB04_1	2022/08/14	2023/08/13
Radiated Software	AUDIX	e3 V9	HC-CB04	N/A	N/A

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

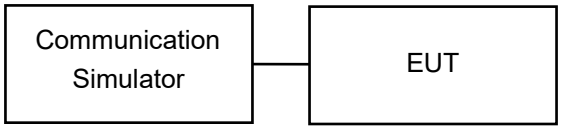
2.4. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Test Item	Uncertainty
RF Output Power	± 1.16 dB
Occupied Bandwidth	± 217.9 Hz
Peak to Average Ratio	± 1.16 dB
Conducted Band Edge	± 1.16 dB
Spurious Emissions	± 3.25 dB below 1 GHz ± 3.32 dB above 1 GHz
Frequency Stability	± 217.9 Hz

3. RF Output Power

3.1. Test Setup



3.2. Test Procedure

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum conducted RF output power under transmission mode and specific channel frequency. The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$$ERP \text{ or } EIRP = P_{Meas} + G_T - L_C$$

where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB

3.3. Test Methodology and Reference Procedures

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI C63.26-2015

3.4. Test Result of RF Output Power

Mode 1: Cat-M1 Band 8 (FCC only)

Band	Channel Freq. (MHz)	Modulation	RB No.	RB Offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 8 1.4 MHz	21632 898.2	QPSK	1	0	Low	22.82	0.185	3
			6	0		21.16	0.126	3
		16-QAM	1	0		22.28	0.163	3
			5	0		20.97	0.121	3
	21640 899	QPSK	1	0		22.84	0.186	3
			6	0		21.13	0.125	3
		16-QAM	1	0		22.27	0.163	3
			5	0		20.95	0.120	3
	21648 899.8	QPSK	1	5	Low	22.86	0.187	3
			6	0		21.09	0.124	3
		16-QAM	1	5		22.15	0.158	3
			5	1		20.91	0.119	3
Band 8 3 MHz	21640 899	QPSK	1	0	Low	22.89	0.188	3
			6	0		21.15	0.126	3
		16-QAM	1	0		22.10	0.157	3
			5	0		20.93	0.120	3
		QPSK	1	5	High	22.83	0.185	3
			6	0		21.04	0.123	3
		16-QAM	1	5		22.12	0.157	3
			5	1		20.83	0.117	3

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15dB
2. Power (W)= $(10^{(Power(dBm)/10)})*10^{-3}$

Mode 2: Cat-M1 Band 85

Band	Channel Freq. (MHz)	Modulation	RB No.	RB Offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 85 5 MHz	134027 700.5	QPSK	1	0	Low	23.03	0.194	3
			6	0		22.02	0.154	3
		16-QAM	1	0		22.77	0.183	3
			5	0		20.83	0.117	3
	134092 707	QPSK	1	0		23.02	0.194	3
			6	0		21.88	0.149	3
		16-QAM	1	0		22.94	0.190	3
			5	0		20.41	0.106	3
	134157 713.5	QPSK	1	5	High	23.13	0.199	3
			6	0		21.93	0.151	3
		16-QAM	1	5		22.71	0.180	3
			5	1		21.03	0.122	3
Band 85 10 MHz	134052 703	QPSK	1	0	Low	23.11	0.198	3
			6	0		22.06	0.155	3
		16-QAM	1	0		22.93	0.190	3
			5	0		21.91	0.150	3
	134092 707	QPSK	1	0		23.13	0.199	3
			6	0		21.94	0.151	3
		16-QAM	1	0		22.70	0.180	3
			5	0		21.75	0.145	3
	134132 711	QPSK	1	5	High	23.15	0.200	3
			6	0		22.11	0.157	3
		16-QAM	1	5		22.92	0.189	3
			5	1		21.07	0.124	3

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15dB
2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 3: NB-IoT Band 8 (FCC only)

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB Offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
21627	897.7	BPSK	3.75	1	0	23.01	0.193	3
			15	1	0	23.00	0.193	3
		QPSK	3.75	1	0	22.92	0.189	3
			15	1	0	22.93	0.190	3
				12	0	21.05	0.123	3
21640	899	BPSK	3.75	1	0	23.06	0.195	3
			15	1	0	23.01	0.193	3
		QPSK	3.75	1	0	22.85	0.186	3
			15	1	0	22.81	0.185	3
				12	0	21.02	0.122	3
21653	900.3	BPSK	3.75	1	47	23.05	0.195	3
			15	1	11	23.02	0.194	3
		QPSK	3.75	1	47	22.96	0.191	3
			15	1	11	22.94	0.190	3
				12	0	21.01	0.122	3

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(Power(dBm)/10)})*10^{-3}$

Mode 4: NB-IoT Band 85

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB Offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
134004	698.2	BPSK	3.75	1	0	23.29	0.206	3
			15	1	0	22.96	0.191	3
		QPSK	3.75	1	0	23.24	0.204	3
			15	1	0	22.85	0.186	3
				12	0	20.94	0.120	3
134082	706	BPSK	3.75	1	0	23.35	0.209	3
			15	1	0	22.96	0.191	3
		QPSK	3.75	1	0	23.31	0.207	3
			15	1	0	22.86	0.187	3
				12	0	20.96	0.121	3
134180	715.8	BPSK	3.75	1	47	23.36	0.209	3
			15	1	11	22.94	0.190	3
		QPSK	3.75	1	47	23.32	0.207	3
			15	1	11	22.87	0.187	3
				12	0	21.00	0.122	3

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 5: Cat-M1 Band 2

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
Band 2 1.4MHz	18607 1850.7	QPSK	1	0	Low	23.66	0.368	2
			6	0		22.88	0.308	2
	18900 1880	QPSK	1	0		23.91	0.390	2
			6	0		22.90	0.309	2
	19193 1909.3	QPSK	1	5	Low	23.73	0.374	2
			6	0		22.87	0.307	2
Band 2 3MHz	18615 1851.5	QPSK	1	0	Low	23.78	0.378	2
			6	0		22.84	0.305	2
	18900 1880	QPSK	1	0		23.85	0.385	2
			6	0		22.91	0.310	2
	19185 1908.5	QPSK	1	5	High	23.82	0.382	2
			6	0		22.81	0.303	2
Band 2 5MHz	18625 1852.5	QPSK	1	0	Low	23.89	0.388	2
			6	0		22.84	0.305	2
	18900 1880	QPSK	1	0		23.95	0.394	2
			6	0		22.92	0.310	2
	19175 1907.5	QPSK	1	5	High	23.87	0.386	2
			6	0		22.91	0.310	2
Band 2 10MHz	18650 1855	QPSK	1	0	Low	23.90	0.389	2
			6	0		22.65	0.292	2
	18900 1880	QPSK	1	0		23.69	0.371	2
			6	0		22.63	0.290	2
	19150 1905	QPSK	1	5	High	23.59	0.362	2
			6	0		22.76	0.299	2

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
Band 2 15MHz	18675	QPSK	1	0	Low	23.79	0.379	2
	1857.5		6	0		22.73	0.297	2
	18900	QPSK	1	0		23.85	0.385	2
	1880		6	0		22.74	0.298	2
	19125	QPSK	1	5	High	23.76	0.377	2
	1902.5		6	0		22.64	0.291	2
Band 2 20MHz	18700	QPSK	1	0	Low	23.92	0.391	2
	1860		6	0		22.68	0.294	2
	18900	QPSK	1	0		23.77	0.378	2
	1880		6	0		22.84	0.305	2
	19100	QPSK	1	5	High	23.88	0.387	2
	1900		6	0		22.80	0.302	2

Note:

1. RF Output Power (W) EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)
2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 6: Cat-M1 Band 4

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
Band 4 1.4MHz	19957	QPSK	1	0	Low	24.01	0.399	1
	1710.7		6	0		21.77	0.238	1
	20175	QPSK	1	0		24.03	0.401	1
	1732.5		6	0		21.75	0.237	1
	20393	QPSK	1	5	Low	24.00	0.398	1
	1754.3		6	0		21.78	0.239	1
Band 4 3MHz	19965	QPSK	1	0	Low	24.00	0.398	1
	1711.5		6	0		21.87	0.244	1
	20175	QPSK	1	0		24.02	0.400	1
	1732.5		6	0		21.88	0.244	1
	20385	QPSK	1	5	High	23.93	0.392	1
	1753.5		6	0		21.97	0.249	1
Band 4 5MHz	19975	QPSK	1	0	Low	23.97	0.395	1
	1712.5		6	0		21.87	0.244	1
	20175	QPSK	1	0		23.84	0.384	1
	1732.5		6	0		21.96	0.249	1
	20375	QPSK	1	5	High	23.88	0.387	1
	1752.5		6	0		21.86	0.243	1
Band 4 10MHz	20000	QPSK	1	0	Low	23.97	0.395	1
	1715		6	0		21.89	0.245	1
	20175	QPSK	1	0		23.93	0.392	1
	1732.5		6	0		21.88	0.244	1
	20350	QPSK	1	5	High	23.99	0.397	1
	1750		6	0		21.79	0.239	1

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
Band 4 15MHz	20025 1717.5	QPSK	1	0	Low	23.78	0.378	1
			6	0		21.95	0.248	1
	20175 1732.5	QPSK	1	0		23.89	0.388	1
			6	0		21.93	0.247	1
	20325 1747.5	QPSK	1	5	High	23.85	0.385	1
			6	0		21.86	0.243	1
Band 4 20MHz	20050 1720	QPSK	1	0	Low	23.97	0.395	1
			6	0		21.66	0.232	1
	20175 1732.5	QPSK	1	0		23.96	0.394	1
			6	0		21.97	0.249	1
	20300 1745	QPSK	1	5	High	24.00	0.398	1
			6	0		21.88	0.244	1

Note:

1. RF Output Power (W) EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)
2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 7: Cat-M1 Band 5

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 5 1.4MHz	20407 824.7	QPSK	1	0	Low	24.01	0.243	7
			6	0		21.78	0.146	7
	20525 836.5	QPSK	1	0		24.06	0.246	7
			6	0		21.74	0.144	7
	20643 848.3	QPSK	1	5	Low	24.05	0.245	7
			6	0		21.74	0.144	7
Band 5 3MHz	20415 825.5	QPSK	1	0	Low	23.66	0.224	7
			6	0		21.77	0.145	7
	20525 836.5	QPSK	1	0		23.65	0.224	7
			6	0		21.85	0.148	7
	20635 847.5	QPSK	1	5	High	23.72	0.228	7
			6	0		21.90	0.150	7
Band5 5MHz	20425 826.5	QPSK	1	0	Low	23.87	0.236	7
			6	0		21.88	0.149	7
	20525 836.5	QPSK	1	0		23.78	0.231	7
			6	0		21.58	0.139	7
	20625 846.5	QPSK	1	5	High	23.71	0.227	7
			6	0		21.66	0.142	7
Band 5 10MHz	20450 829	QPSK	1	0	Low	23.88	0.236	7
			6	0		21.85	0.148	7
	20525 836.5	QPSK	1	0		23.98	0.242	7
			6	0		21.64	0.141	7
	20600 844	QPSK	1	5	High	23.91	0.238	7
			6	0		21.77	0.145	7

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 8: Cat-M1 Band 12

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 12 1.4MHz	23017 699.7	QPSK	1	0	Low	23.75	0.229	3
			6	0		21.60	0.140	3
	23095 707.5	QPSK	1	0		23.81	0.232	3
			6	0		21.59	0.139	3
	23173 715.3	QPSK	1	5	Low	23.77	0.230	3
			6	0		21.55	0.138	3
Band 12 3MHz	23025 700.5	QPSK	1	0	Low	23.53	0.218	3
			6	0		21.89	0.149	3
	23095 707.5	QPSK	1	0		23.70	0.226	3
			6	0		21.60	0.140	3
	23165 714.5	QPSK	1	5	High	23.60	0.221	3
			6	0		21.97	0.152	3
Band 2 5MHz	23035 701.5	QPSK	1	0	Low	23.83	0.233	3
			6	0		21.63	0.141	3
	23095 707.5	QPSK	1	0		23.97	0.241	3
			6	0		21.45	0.135	3
	23155 713.5	QPSK	1	5	High	23.99	0.242	3
			6	0		21.74	0.144	3
Band 12 10MHz	23060 704	QPSK	1	0	Low	23.55	0.219	3
			6	0		21.92	0.150	3
	23095 707.5	QPSK	1	0		23.76	0.230	3
			6	0		21.61	0.140	3
	23130 711	QPSK	1	5	High	23.60	0.221	3
			6	0		21.88	0.149	3

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 9: Cat-M1 Band 13

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 13 5MHz	23205 779.5	QPSK	1	0	Low	22.80	0.184	3
			6	0		22.00	0.153	3
	23230 782	QPSK	1	0		22.94	0.190	3
			6	0		22.10	0.157	3
	23255 784.5	QPSK	1	5	High	22.85	0.186	3
			6	0		22.05	0.155	3
Band 13 10MHz	23230 782	QPSK	1	0	Low	22.78	0.183	3
			6	0		22.20	0.160	3
		QPSK	1	5	High	22.90	0.188	3
			6	0		22.15	0.158	3

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 10: Cat-M1 Band 25

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
Band 25 1.4MHz	26047 1850.7	QPSK	1	0	Low	23.87	0.307	2
			6	0		22.49	0.223	2
	26365 1882.5	QPSK	1	0		23.90	0.309	2
			6	0		22.51	0.224	2
	26683 1914.3	QPSK	1	5	Low	23.76	0.299	2
			6	0		22.46	0.222	2
Band 25 3MHz	26055 1851.5	QPSK	1	0	Low	23.66	0.292	2
			6	0		22.73	0.236	2
	26365 1882.5	QPSK	1	0		23.69	0.294	2
			6	0		22.48	0.223	2
	26675 1913.5	QPSK	1	5	High	23.60	0.288	2
			6	0		22.67	0.233	2
Band 25 5MHz	26065 1852.5	QPSK	1	0	Low	23.80	0.302	2
			6	0		22.47	0.222	2
	26365 1882.5	QPSK	1	0		23.87	0.307	2
			6	0		22.76	0.238	2
	26665 1912.5	QPSK	1	5	High	23.92	0.310	2
			6	0		22.64	0.231	2
Band 25 10MHz	26090 1855	QPSK	1	0	Low	22.76	0.299	2
			6	0		21.52	0.225	2
	26365 1882.5	QPSK	1	0		22.87	0.307	2
			6	0		21.60	0.229	2
	26640 1910	QPSK	1	5	High	22.84	0.305	2
			6	0		21.44	0.221	2

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
Band 25 15MHz	26115 1857.5	QPSK	1	0	Low	23.63	0.290	2
			6	0		22.94	0.248	2
	26365 1882.5	QPSK	1	0		23.93	0.311	2
			6	0		22.98	0.250	2
	26615 1907.5	QPSK	1	5	High	23.78	0.301	2
			6	0		22.79	0.239	2
Band 25 20MHz	26140 1860	QPSK	1	0	Low	23.53	0.284	2
			6	0		22.45	0.221	2
	26365 1882.5	QPSK	1	0		23.42	0.277	2
			6	0		22.54	0.226	2
	26590 1905	QPSK	1	5	High	23.61	0.289	2
			6	0		22.80	0.240	2

Note:

1. RF Output Power (W) EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)
2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 11: Cat-M1 Band 26 (Part 22)

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 26 1.4MHz	26797 824.7	QPSK	1	0	Low	23.99	0.192	7
			6	0		21.87	0.118	7
	26915 836.5	QPSK	1	0		24.02	0.194	7
			6	0		21.90	0.119	7
	27033 848.3	QPSK	1	5	Low	23.89	0.188	7
			6	0		21.88	0.118	7
Band 26 3MHz	26805 825.5	QPSK	1	0	Low	23.89	0.188	7
			6	0		21.66	0.112	7
	26915 836.5	QPSK	1	0		23.78	0.183	7
			6	0		21.85	0.117	7
	27025 847.5	QPSK	1	5	High	23.75	0.182	7
			6	0		21.29	0.103	7
Band 26 5MHz	26815 826.5	QPSK	1	0	Low	23.54	0.173	7
			6	0		21.68	0.113	7
	26915 836.5	QPSK	1	0		23.64	0.177	7
			6	0		21.83	0.117	7
	27015 846.5	QPSK	1	5	High	23.91	0.189	7
			6	0		21.63	0.112	7
Band 26 10MHz	26840 829	QPSK	1	0	Low	23.78	0.183	7
			6	0		21.87	0.118	7
	26915 836.5	QPSK	1	0		23.98	0.192	7
			6	0		21.60	0.111	7
	26990 844	QPSK	1	5	High	23.56	0.174	7
			6	0		21.69	0.113	7

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 26 15MHz	26865 831.5	QPSK	1	0	Low	23.46	0.170	7
			6	0		21.63	0.112	7
	26915 836.5	QPSK	1	0		23.84	0.186	7
			6	0		21.42	0.106	7
	26965 841.5	QPSK	1	5	High	23.95	0.191	7
			6	0		21.44	0.107	7

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 12: Cat-M1 Band 26 (Part 90)

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 26 1.4MHz	26697 814.7	QPSK	1	0	Low	23.25	0.204	100
			6	0		22.15	0.158	100
	26740 819	QPSK	1	0		23.26	0.205	100
			6	0		22.16	0.159	100
	26783 823.3	QPSK	1	5	Low	23.20	0.202	100
			6	0		22.25	0.162	100
Band 26 3MHz	26705 815.5	QPSK	1	0	Low	23.40	0.211	100
			6	0		22.25	0.162	100
	26740 819	QPSK	1	0		23.21	0.202	100
			6	0		22.33	0.165	100
	26775 822.5	QPSK	1	5	High	23.28	0.206	100
			6	0		22.36	0.166	100
Band 26 5MHz	26715 816.5	QPSK	1	0	Low	23.48	0.215	100
			6	0		22.45	0.170	100
	26740 819	QPSK	1	0		23.33	0.208	100
			6	0		22.49	0.171	100
	26765 821.5	QPSK	1	5	High	23.27	0.205	100
			6	0		22.27	0.163	100
Band 26 10MHz	26740 819	QPSK	1	0	Low	23.42	0.212	100
			6	0		22.22	0.161	100
		QPSK	1	5	High	23.23	0.203	100
			6	0		22.31	0.164	100

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 13: Cat-M1 Band 66

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
Band 66 1.4MHz	131979 1710.7	QPSK	1	0	Low	23.87	0.386	1
			6	0		21.72	0.236	1
	132322 1745	QPSK	1	0		23.88	0.387	1
			6	0		21.92	0.247	1
	132665 1779.3	QPSK	1	5	Low	23.51	0.356	1
			6	0		21.81	0.240	1
Band 66 3MHz	131987 1711.5	QPSK	1	0	Low	23.58	0.361	1
			6	0		21.65	0.232	1
	132322 1745	QPSK	1	0		23.64	0.366	1
			6	0		21.82	0.241	1
	132657 1778.5	QPSK	1	5	High	23.84	0.384	1
			6	0		21.64	0.231	1
Band 66 5MHz	131997 1712.5	QPSK	1	0	Low	23.93	0.392	1
			6	0		21.57	0.228	1
	132322 1745	QPSK	1	0		23.63	0.366	1
			6	0		21.78	0.239	1
	132647 1777.5	QPSK	1	5	High	23.67	0.369	1
			6	0		21.84	0.242	1
Band 66 10MHz	132022 1715	QPSK	1	0	Low	23.81	0.381	1
			6	0		21.50	0.224	1
	132322 1745	QPSK	1	0		23.56	0.360	1
			6	0		21.77	0.238	1
	132622 1775	QPSK	1	5	High	23.78	0.378	1
			6	0		21.96	0.249	1

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
Band 66 15MHz	132047 1717.5	QPSK	1	0	Low	23.83	0.383	1
			6	0		21.84	0.242	1
	132322 1745	QPSK	1	0		23.83	0.383	1
			6	0		21.74	0.237	1
	132597 1772.5	QPSK	1	5	High	23.53	0.357	1
			6	0		21.96	0.249	1
Band 66 20MHz	132072 1720	QPSK	1	0	Low	23.79	0.379	1
			6	0		21.86	0.243	1
	132322 1745	QPSK	1	0		23.99	0.397	1
			6	0		21.89	0.245	1
	132572 1770	QPSK	1	5	High	23.88	0.387	1
			6	0		21.97	0.249	1

Note:

1. RF Output Power (W) EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)
2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 14: NB-IoT Band 2

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
18601	1850.1	BPSK	3.75	1	0	23.85	0.385	2
			15	1	0	23.46	0.352	2
18900	1880	BPSK	3.75	1	0	23.96	0.394	2
			15	1	0	23.45	0.351	2
19199	1909.9	BPSK	3.75	1	47	23.84	0.384	2
			15	1	11	23.42	0.348	2

Note:

1. RF Output Power (W) EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 15: NB-IoT Band 4

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
19951	1710.1	BPSK	3.75	1	0	24.12	0.409	2
			15	1	0	23.84	0.384	2
20175	1732.5	BPSK	3.75	1	0	24.17	0.414	2
			15	1	0	23.87	0.386	2
20399	1754.9	BPSK	3.75	1	47	24.07	0.405	2
			15	1	11	23.78	0.378	2

Note:

1. RF Output Power (W) EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 16: NB-IoT Band 5

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
20401	824.1	BPSK	3.75	1	0	24.16	0.252	7
			15	1	0	23.64	0.223	7
20525	836.5	BPSK	3.75	1	0	24.21	0.255	7
			15	1	0	23.73	0.228	7
20649	848.9	BPSK	3.75	1	47	24.17	0.252	7
			15	1	11	23.65	0.224	7

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 17: NB-IoT Band 12

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
23011	699.1	BPSK	3.75	1	0	23.65	0.224	2
			15	1	0	23.21	0.202	2
23095	707.5	BPSK	3.75	1	0	24.12	0.249	2
			15	1	0	23.72	0.228	2
23179	715.9	BPSK	3.75	1	47	24.07	0.247	2
			15	1	11	23.64	0.223	2

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 18: NB-IoT Band 13

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
23181	777.1	BPSK	3.75	1	0	23.95	0.240	2
			15	1	0	23.79	0.231	2
23230	782	BPSK	3.75	1	0	24.02	0.244	2
			15	1	0	23.84	0.234	2
23279	786.9	BPSK	3.75	1	47	23.91	0.238	2
			15	1	11	23.72	0.228	2

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 19: NB-IoT Band 25

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
26041	1850.1	BPSK	3.75	1	0	23.88	0.387	2
			15	1	0	23.56	0.360	2
26365	1882.5	BPSK	3.75	1	0	23.95	0.394	2
			15	1	0	23.63	0.366	2
26689	1914.9	BPSK	3.75	1	47	23.78	0.378	2
			15	1	11	23.45	0.351	2

Note:

1. RF Output Power (W) EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 20: NB-IoT Band 26 (Part 22)

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
26791	824.1	BPSK	3.75	1	0	24.11	0.249	7
			15	1	0	23.75	0.229	7
26915	836.5	BPSK	3.75	1	0	24.27	0.258	7
			15	1	0	23.84	0.234	7
27039	848.9	BPSK	3.75	1	47	24.11	0.249	7
			15	1	11	23.76	0.230	7

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 21: NB-IoT Band 26 (Part 90)

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
26691	814.1	BPSK	3.75	1	0	23.92	0.238	100
			15	1	0	23.84	0.234	100
26740	819	BPSK	3.75	1	0	23.95	0.240	100
			15	1	0	23.88	0.236	100
26789	823.9	BPSK	3.75	1	47	23.91	0.238	100
			15	1	11	23.82	0.233	100

Note:

1. RF Output Power (W) ERP = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

Mode 22: NB-IoT Band 66

Channel	Frequency (MHz)	Modulation	BW (kHz)	RB No.	RB offset	Conducted Output Power (dBm)	RF Output Power (W) EIRP	Limit (W) EIRP
131973	1710.1	BPSK	3.75	1	0	24.16	0.413	2
			15	1	0	23.74	0.375	2
		QPSK	15	12	0	21.94	0.248	2
132322	1745	BPSK	3.75	1	0	24.19	0.416	2
			15	1	0	23.77	0.378	2
132671	1779.9	BPSK	3.75	1	47	23.99	0.397	2
			15	1	11	23.61	0.364	2

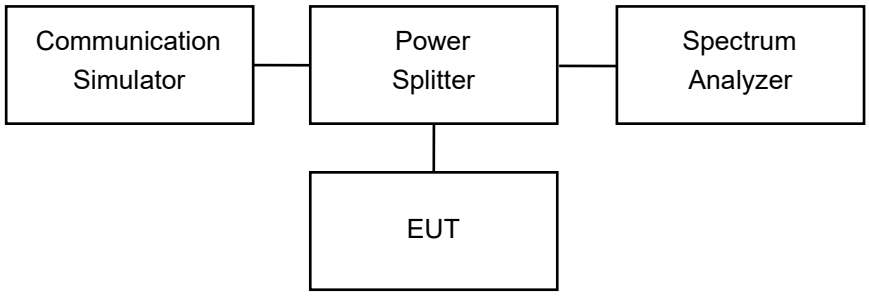
Note:

1. RF Output Power (W) EIRP = Conducted Output Power (dBm) + Antenna Gain (dBi)

2. Power (W)= $(10^{(\text{Power(dBm)}/10)})*10^{-3}$

4. Occupied Bandwidth

4.1. Test Setup



4.2. Test Procedure

The EUT makes a call to the communication simulator. The 26dB bandwidth and 99% occupied bandwidth measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.

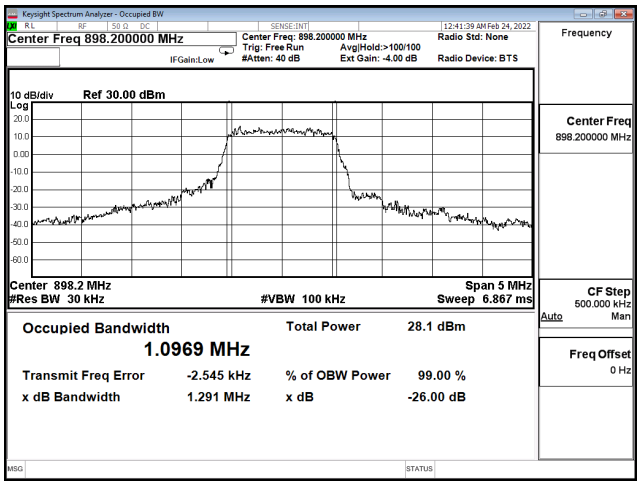
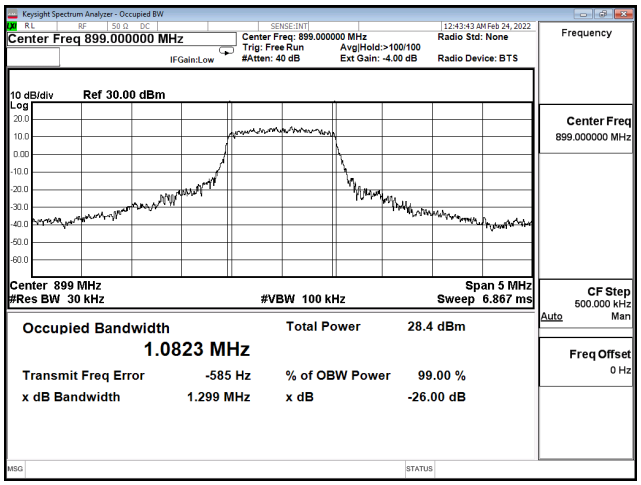
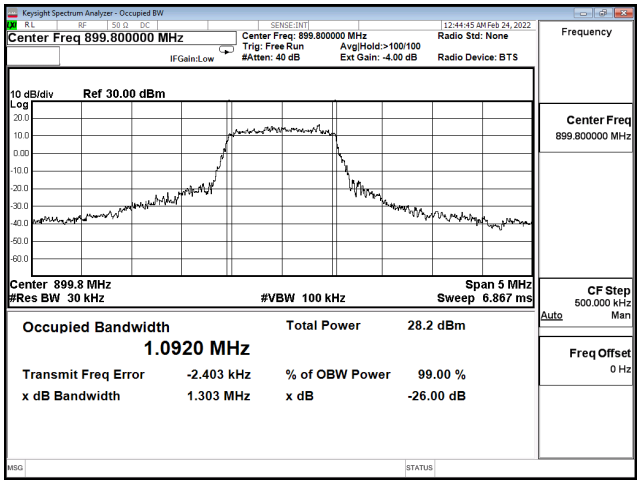
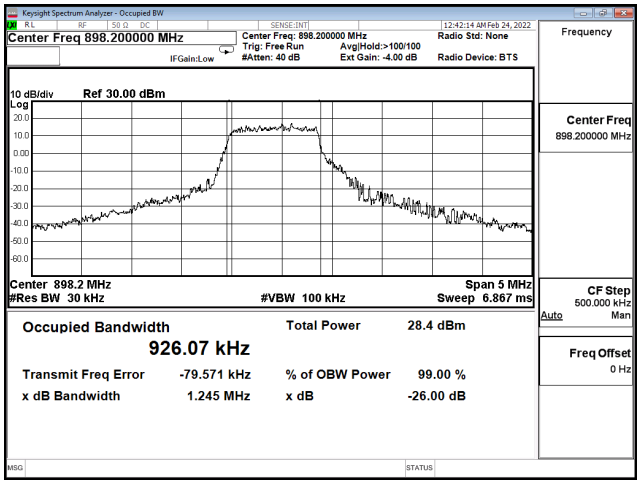
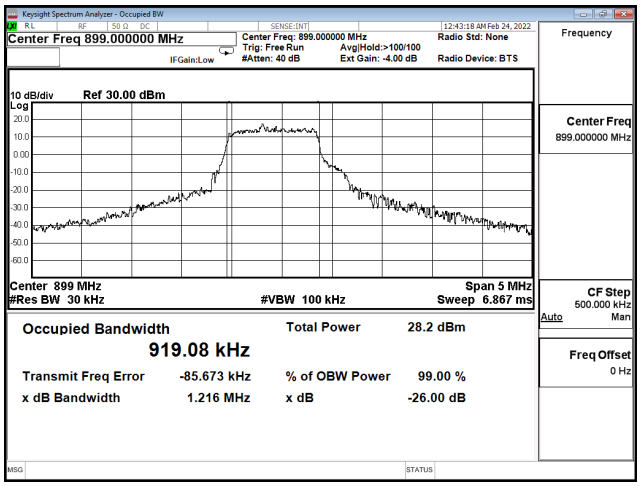
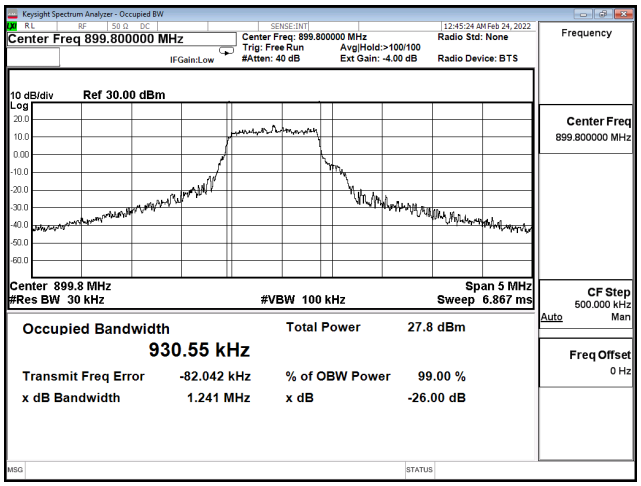
4.3. Test Methodology and Reference Procedures

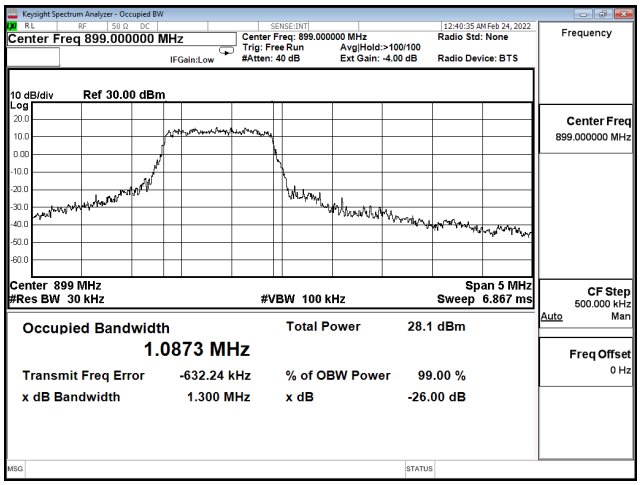
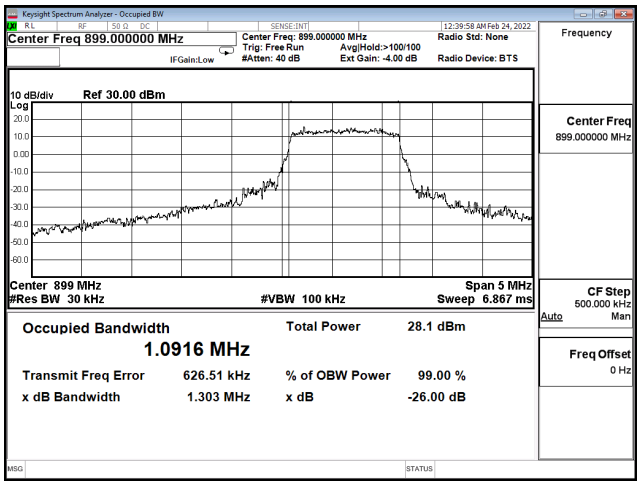
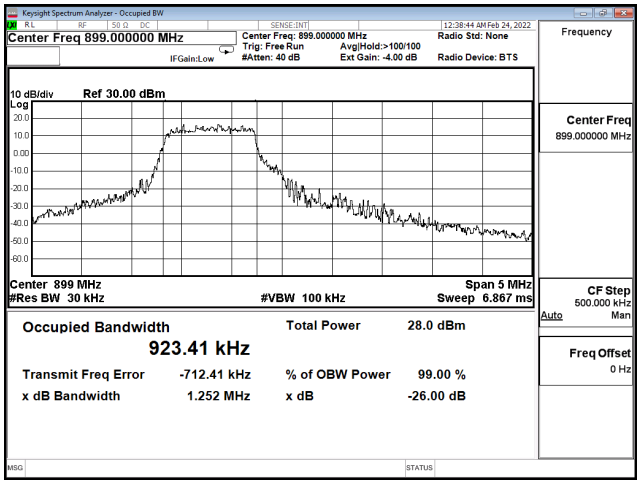
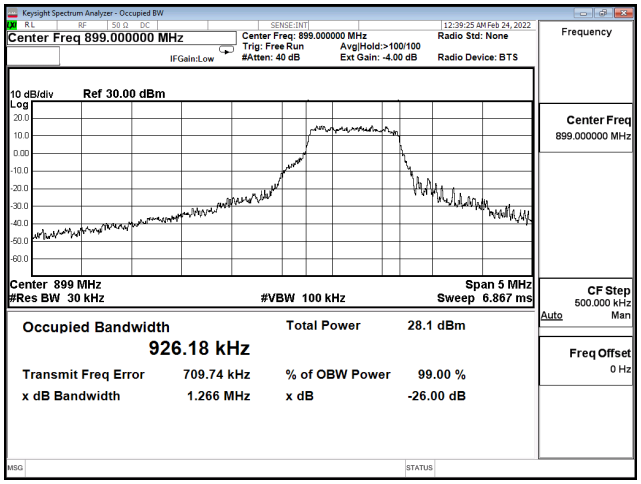
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI C63.26-2015

4.4. Test Result of Occupied Bandwidth

Mode 1: Cat-M1 Band 8 (FCC only)

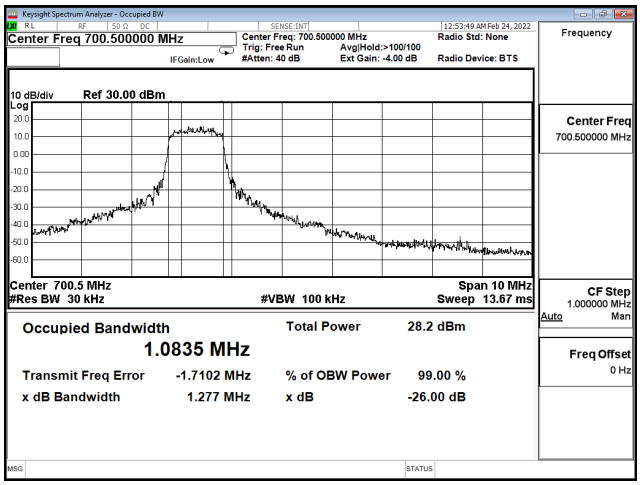
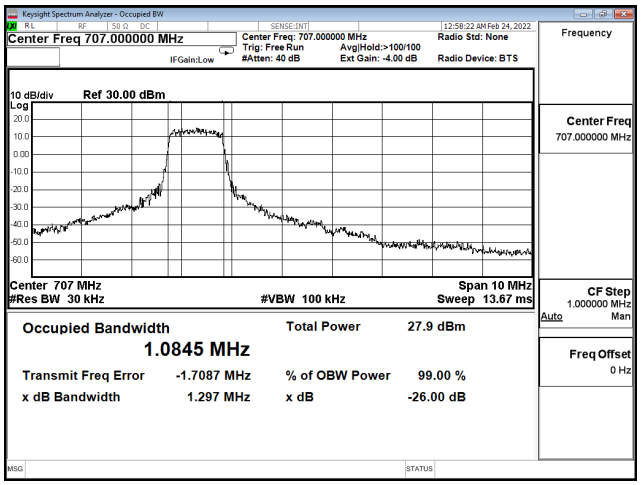
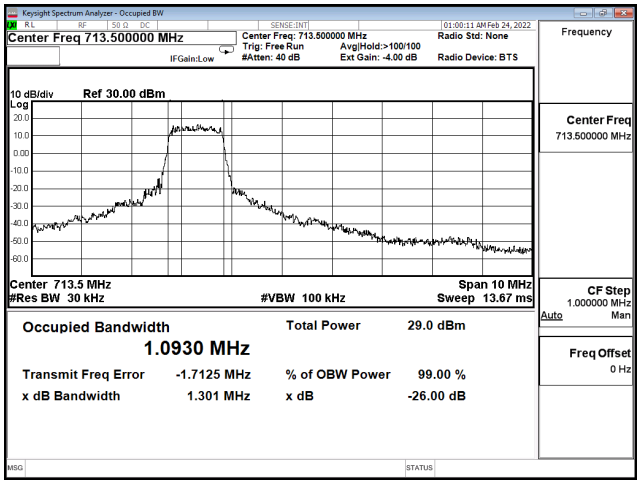
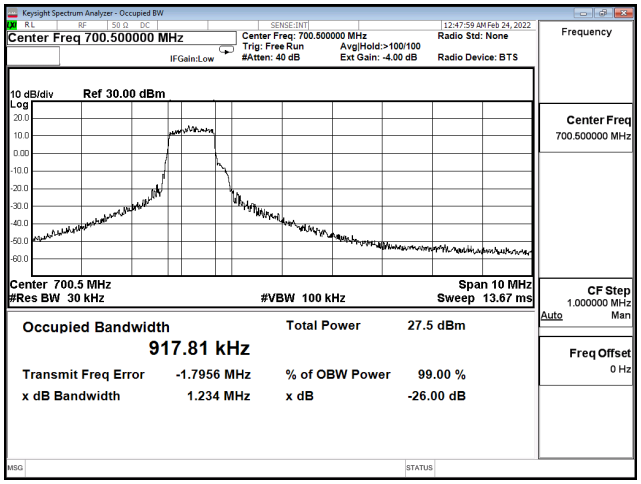
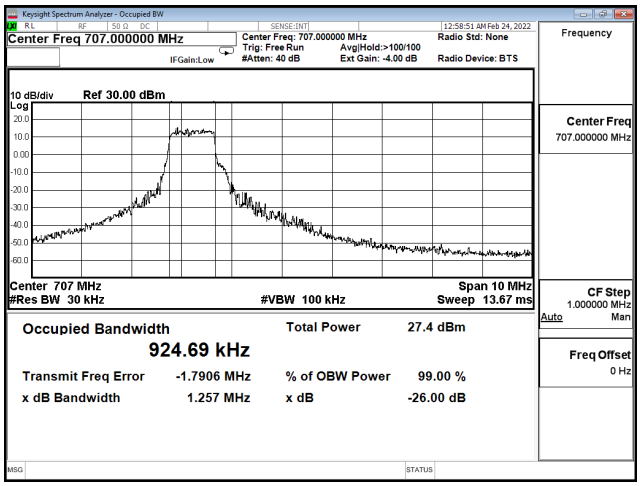
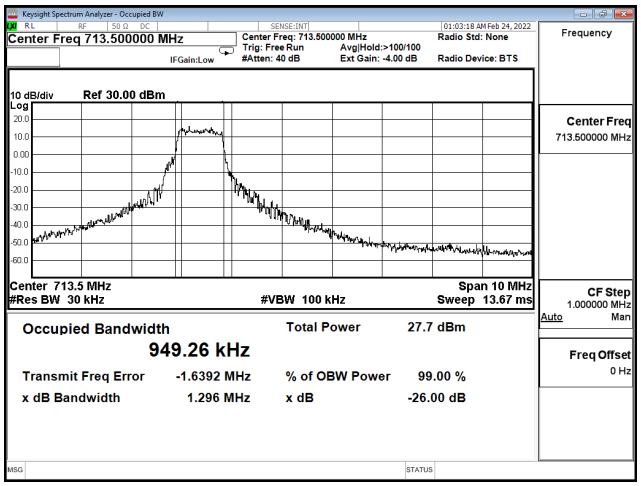
Bandwidth (MHz)	Modulation	Frequency (MHz)	Measure Level (MHz)		Limit (MHz)
			26dB BW	99% BW	
1.4	QPSK	898.2	1.291	1.096	N/A
		899.0	1.299	1.082	N/A
		899.8	1.303	1.092	N/A
	16-QAM	898.2	1.245	0.926	N/A
		899.0	1.216	0.919	N/A
		899.8	1.241	0.930	N/A
3	QPSK - Low	899.0	1.300	1.087	N/A
	QPSK - High	899.0	1.303	1.091	N/A
	16-QAM - Low	899.0	1.252	0.923	N/A
	16-QAM - High	899.0	1.266	0.926	N/A

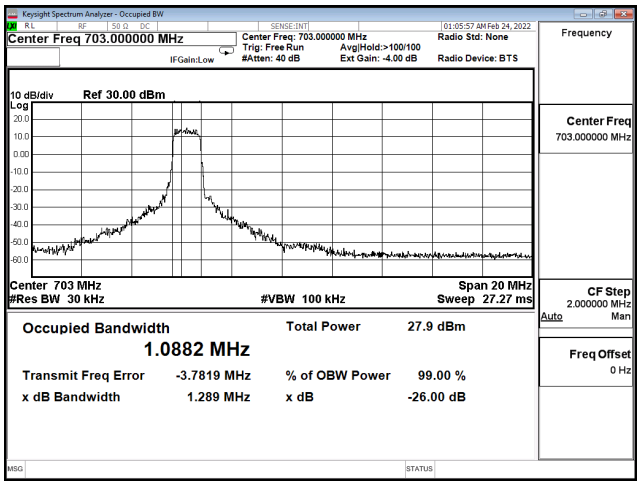
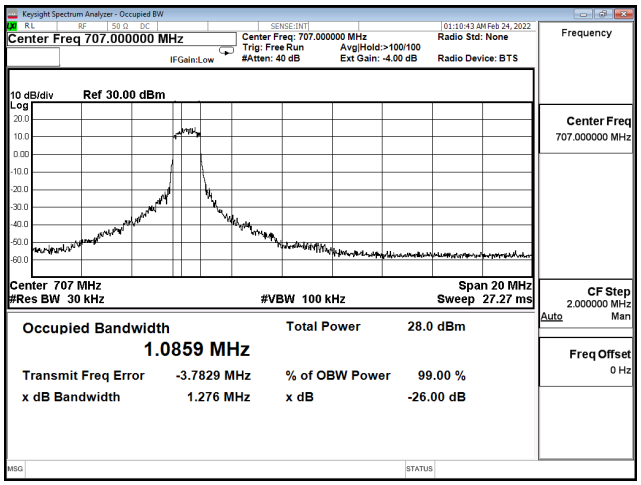
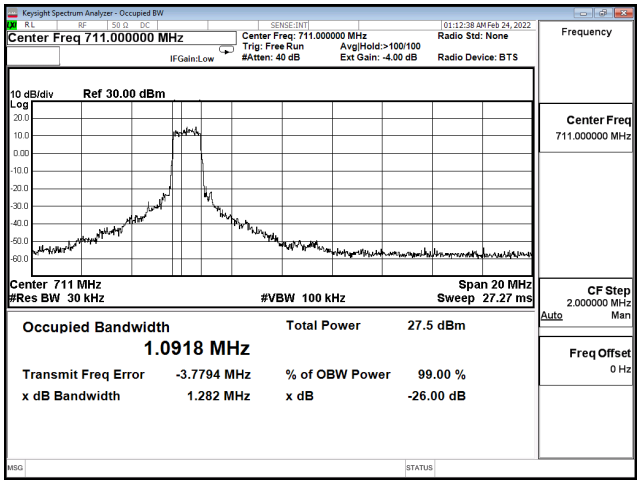
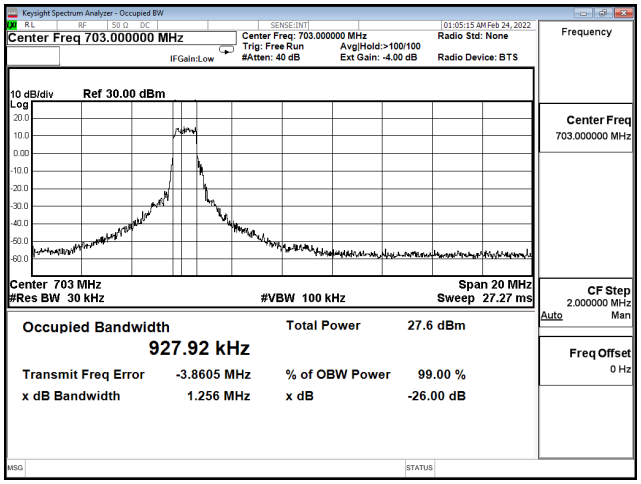
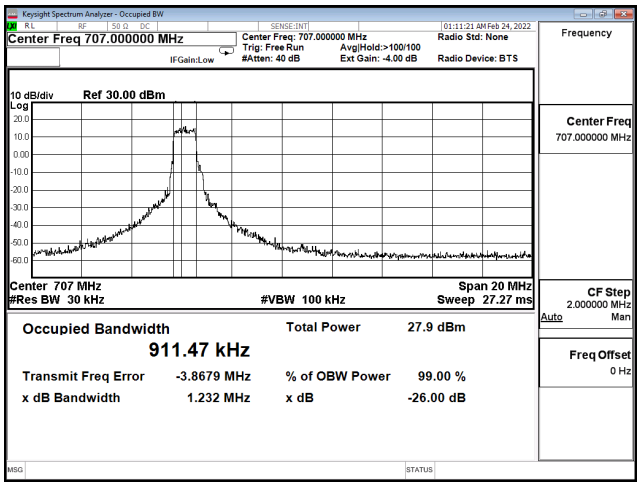
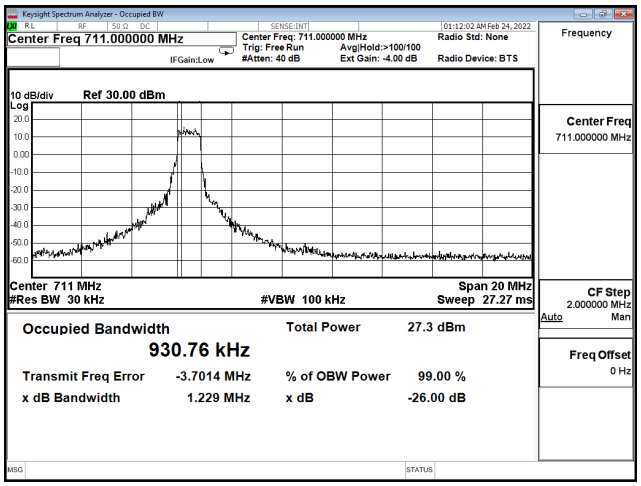
1.4 MHz / QPSK / CH21632 / 6RB0	1.4 MHz / QPSK / CH21640 / 6RB0
	
1.4 MHz / QPSK / CH21648 / 6RB0	**1.4 MHz / 16-QAM / CH21632 / 5RB0**
	
1.4 MHz / 16-QAM / CH21640 / 5RB0	**1.4 MHz / 16-QAM / CH21648 / 5RB0**
	

3 MHz / QPSK - Low / CH21640 / 6RB0	3 MHz / QPSK - Hight / CH21640 / 6RB0
	
3 MHz / 16-QAM - Low / CH21640 / 5RB0	**3 MHz / 16-QAM - Hight / CH21640 / 5RB1**
	

Mode 2: Cat-M1 Band 85

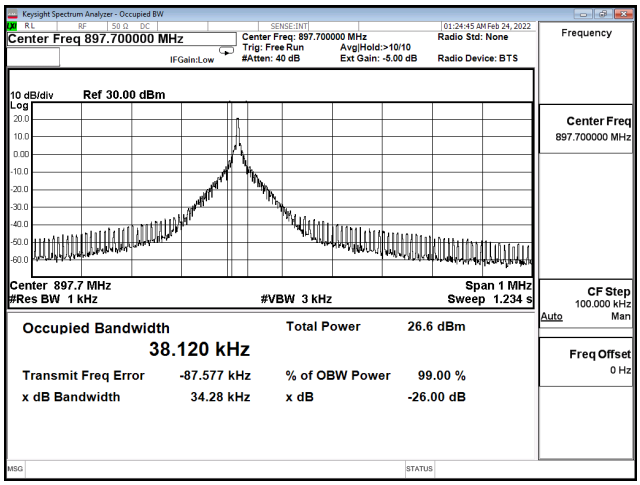
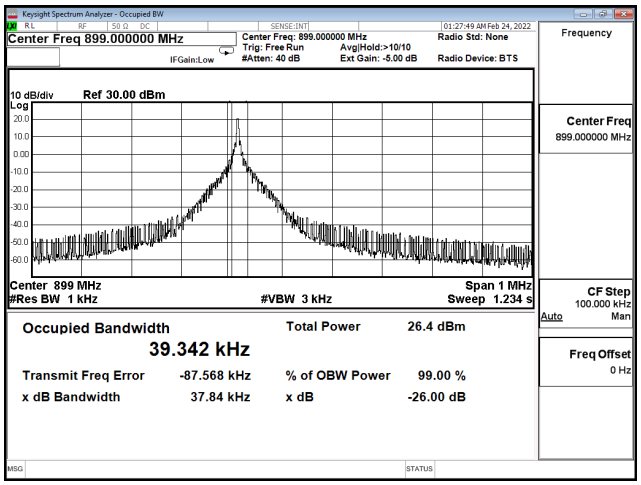
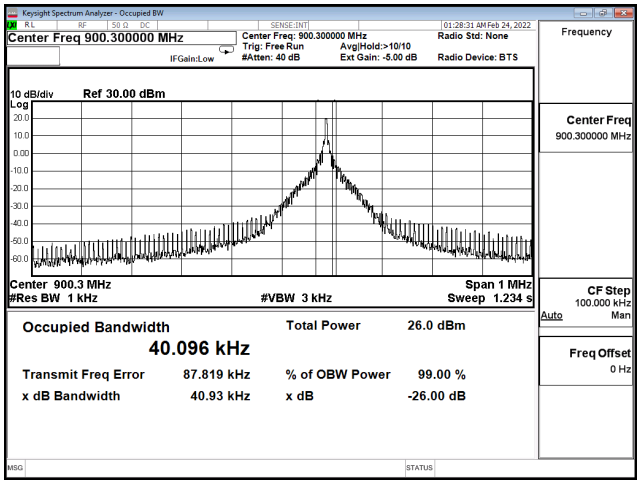
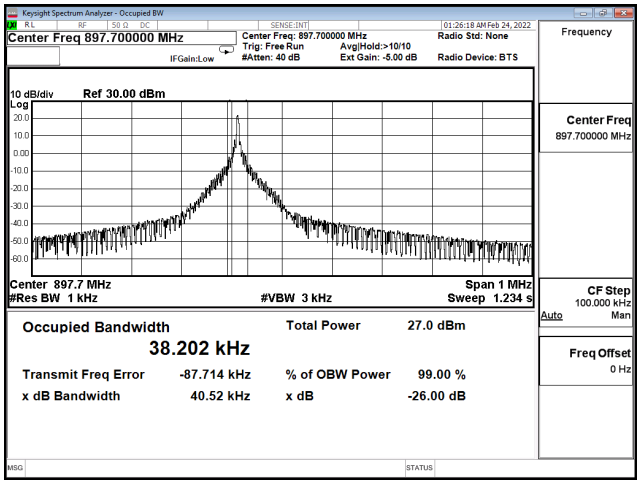
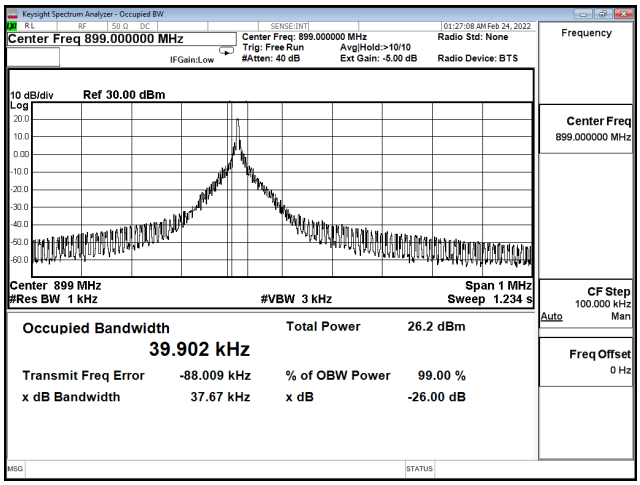
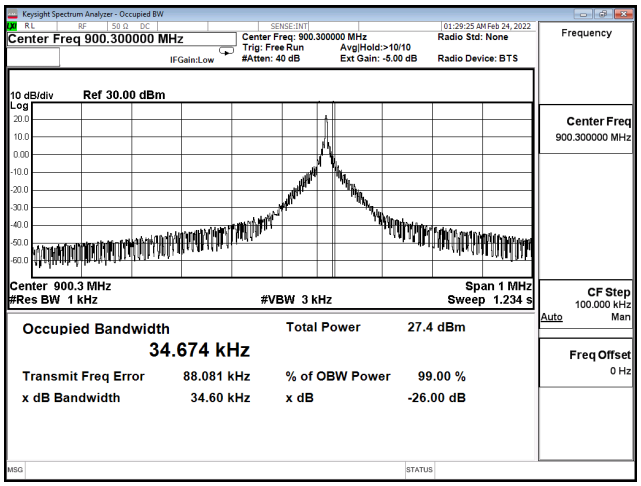
Bandwidth (MHz)	Modulation	Frequency (MHz)	Measure Level (MHz)		Limit (MHz)
			26dB BW	99% BW	
5	QPSK	700.5	1.277	1.083	N/A
		707.0	1.297	1.084	N/A
		713.5	1.301	1.093	N/A
	16-QAM	700.5	1.234	0.917	N/A
		707.0	1.257	0.924	N/A
		713.5	1.296	0.949	N/A
10	QPSK	703.0	1.289	1.088	N/A
		707.0	1.276	1.085	N/A
		711.0	1.282	1.091	N/A
	16-QAM	703.0	1.256	0.927	N/A
		707.0	1.232	0.911	N/A
		711.0	1.229	0.930	N/A

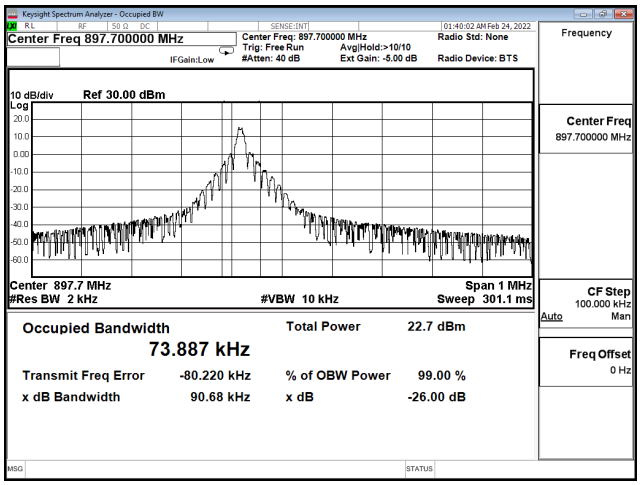
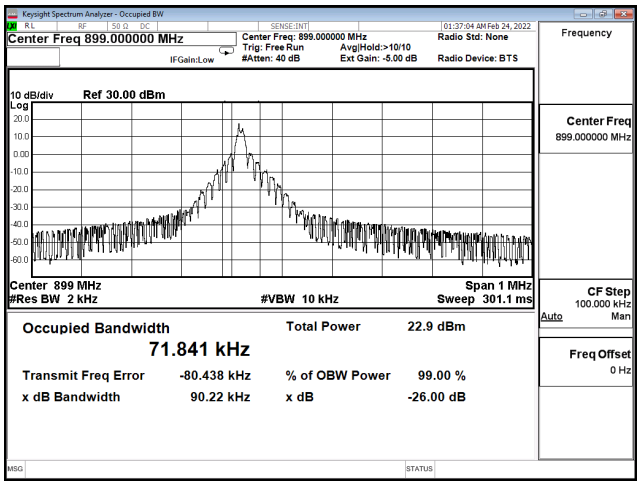
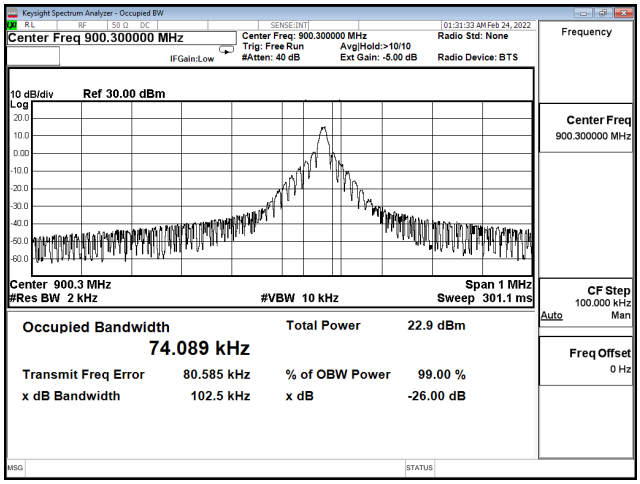
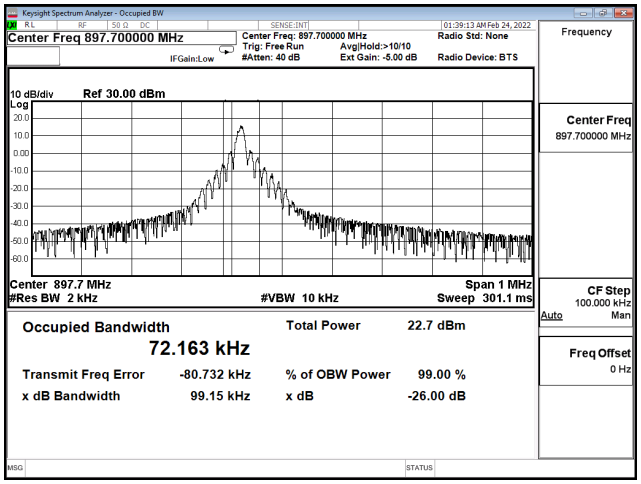
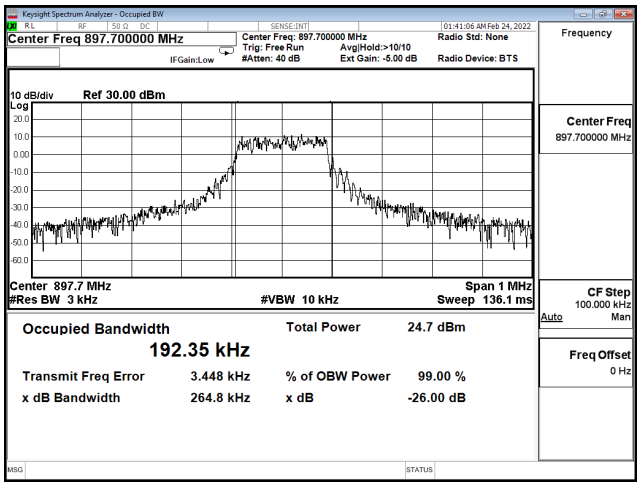
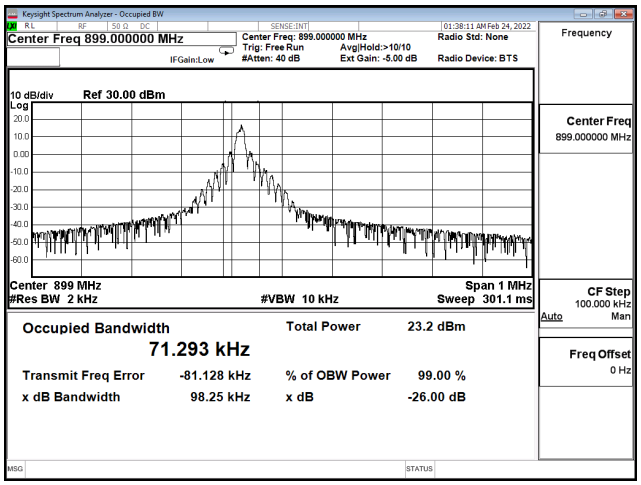
5 MHz / QPSK / CH134027 / 6RB0	5 MHz / QPSK / CH134092 / 6RB0
	
5 MHz / QPSK / CH134157 / 6RB0	**5 MHz / 16-QAM / CH134027 / 5RB0**
	
5 MHz / 16-QAM / CH134092 / 5RB0	**5 MHz / 16-QAM / CH134157 / 5RB1**
	

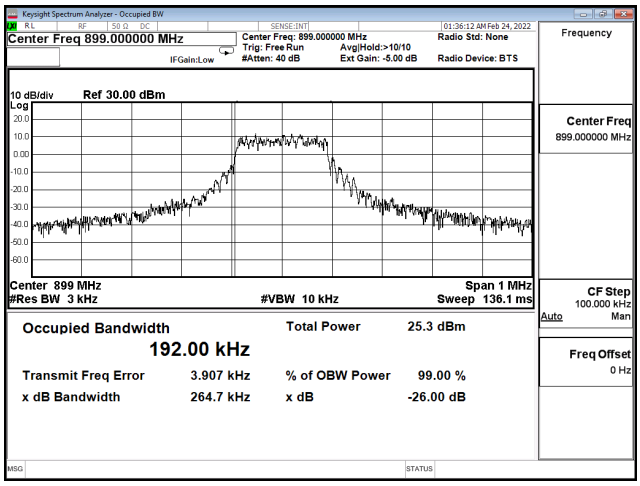
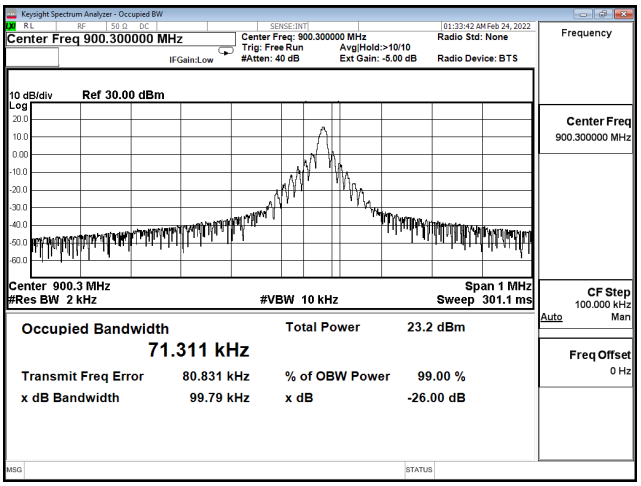
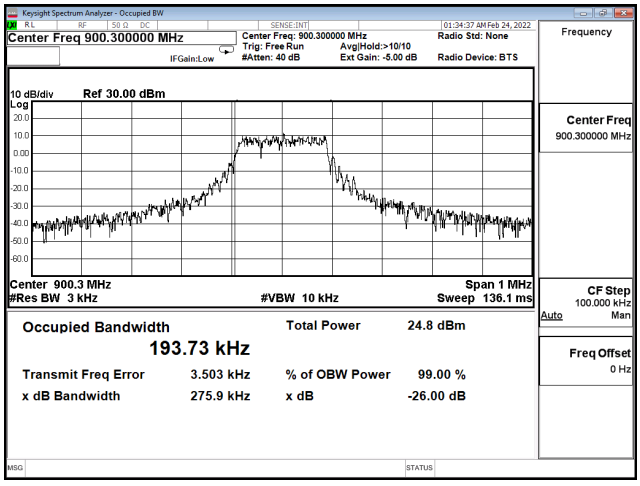
10 MHz / QPSK / CH134052 / 6RB0	10 MHz / QPSK / CH134092 / 6RB0
	
10 MHz / QPSK / CH134132 / 6RB0	**10 MHz / 16-QAM / CH134052 / 5RB0**
	
10 MHz / 16-QAM / CH134092 / 5RB0	**10 MHz / 16-QAM / CH134132 / 5RB1**
	

Mode 3: NB-IoT Band 8 (FCC only)

Channel	Frequency (MHz)	Modulation	Bandwidth (kHz)	RB No.	RB Offset	Measure Level (kHz)		Limit (kHz)
						26dB BW	99% BW	
21627	897.7	BPSK	3.75	1	0	34.280	38.120	N/A
			15	1	0	90.680	73.887	N/A
		QPSK	3.75	1	0	40.520	38.202	N/A
			15	1	0	99.150	72.163	N/A
				12	0	264.800	192.350	N/A
21640	899	BPSK	3.75	1	0	37.840	39.342	N/A
			15	1	0	90.220	71.841	N/A
		QPSK	3.75	1	0	37.670	39.902	N/A
			15	1	0	98.250	71.293	N/A
				12	0	264.700	192.000	N/A
21653	900.3	BPSK	3.75	1	47	40.930	40.096	N/A
			15	1	11	102.500	74.089	N/A
		QPSK	3.75	1	47	34.600	34.674	N/A
			15	1	11	99.790	71.311	N/A
				12	0	275.900	193.730	N/A

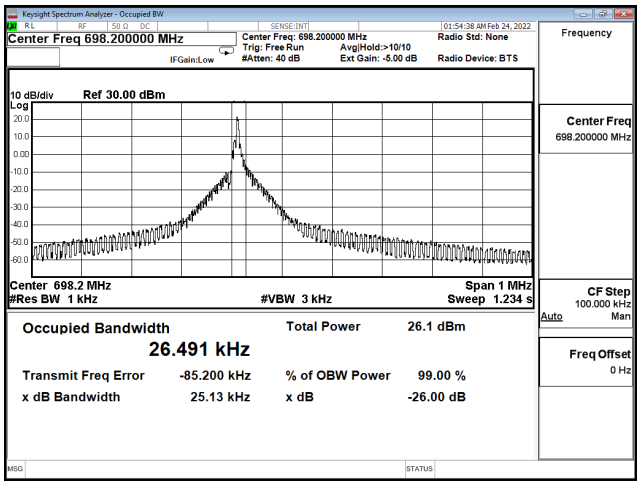
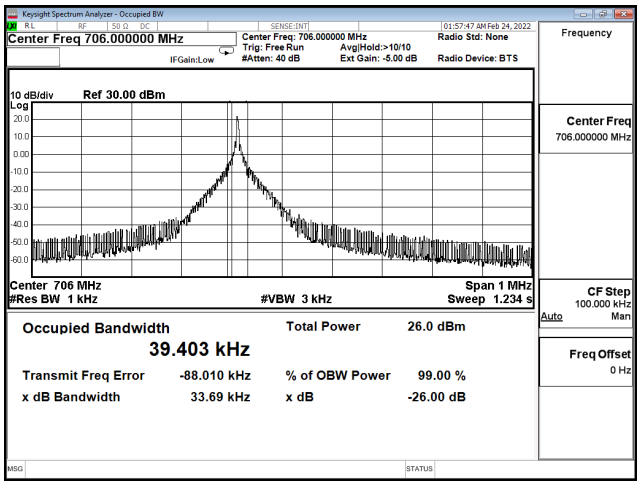
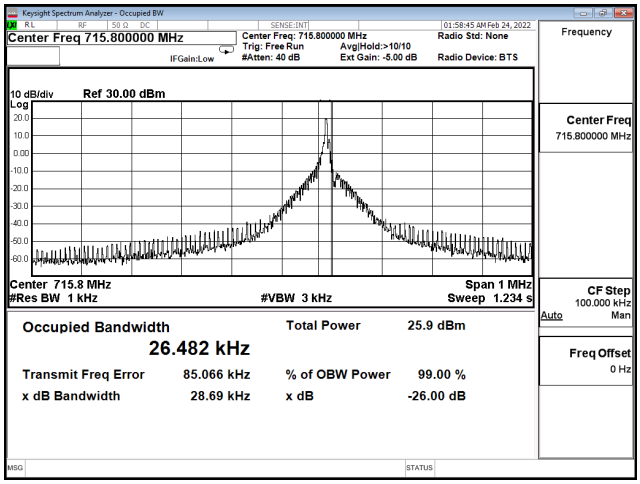
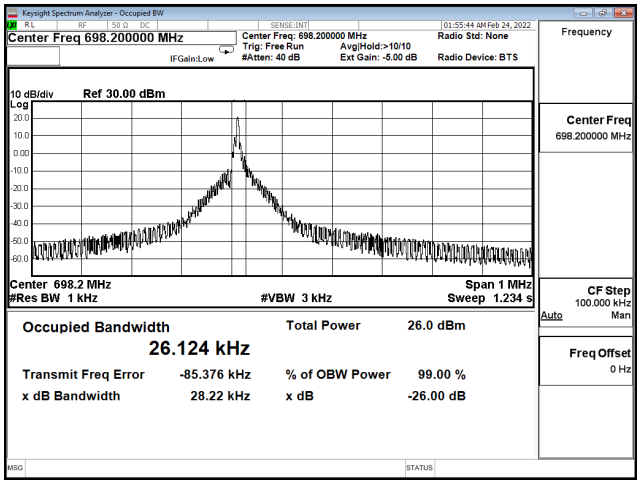
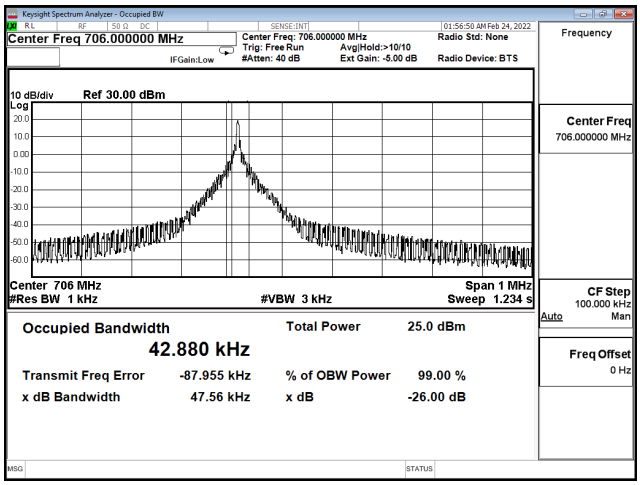
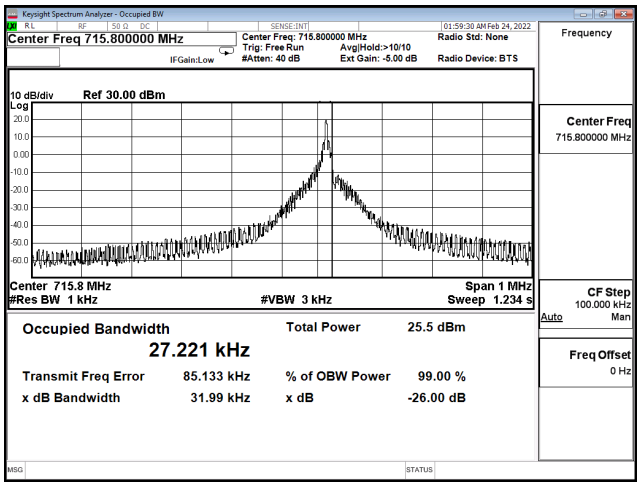
3.75 kHz / BPSK / CH21627 / 1RB0	3.75 kHz / BPSK / CH21640 / 1RB0
	
3.75 kHz / BPSK / CH21653 / 1RB47	**3.75 kHz / QPSK / CH21627 / 1RB0**
	
3.75 kHz / QPSK / CH21640 / 1RB0	**3.75 kHz / QPSK / CH21653 / 1RB47**
	

15 kHz / BPSK / CH21627 / 1RB0	15 kHz / BPSK / CH21640 / 1RB0
	
15 kHz / BPSK / CH21653 / 1RB11	**15 kHz / QPSK / CH21627 / 1RB0**
	
15 kHz / QPSK / CH21627 / 12RB0	**15 kHz / QPSK / CH21640 / 1RB0**
	

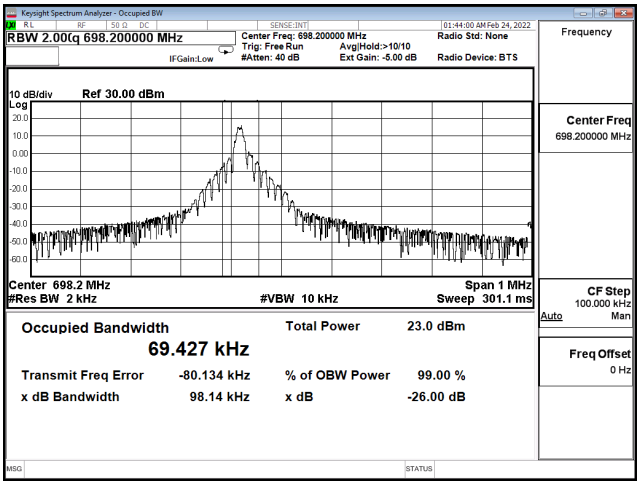
15 kHz / QPSK / CH21640 / 12RB0	15 kHz / QPSK / CH21653 / 1RB11
	
15 kHz / QPSK / CH21653 / 12RB0	
	

Mode 4: NB-IoT Band 85

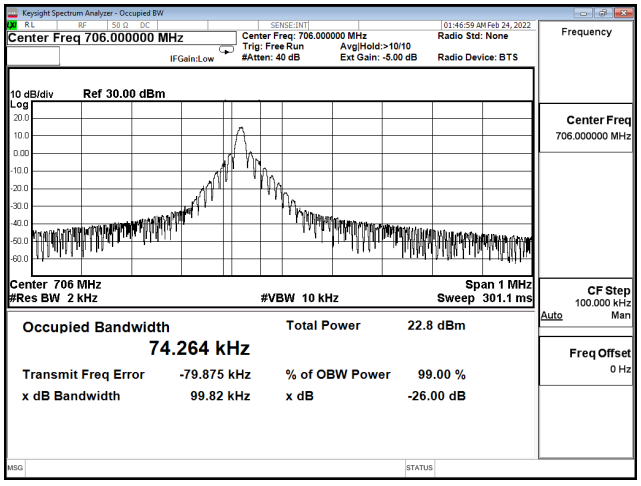
Channel	Frequency (MHz)	Modulation	Bandwidth (kHz)	RB No.	RB Offset	Measure Level (kHz)		Limit (kHz)
						26dB BW	99% BW	
134004	698.2	BPSK	3.75	1	0	25.130	26.491	N/A
			15	1	0	98.140	69.427	N/A
		QPSK	3.75	1	0	28.220	26.124	N/A
			15	1	0	88.640	68.884	N/A
				12	0	263.100	191.340	N/A
134082	706	BPSK	3.75	1	0	33.690	39.403	N/A
			15	1	0	99.820	74.264	N/A
		QPSK	3.75	1	0	47.560	42.880	N/A
			15	1	0	97.930	72.443	N/A
				12	0	277.400	192.530	N/A
134180	715.8	BPSK	3.75	1	47	28.690	26.482	N/A
			15	1	11	78.300	68.814	N/A
		QPSK	3.75	1	47	31.990	27.221	N/A
			15	1	11	88.800	68.804	N/A
				12	0	264.200	185.870	N/A

3.75 kHz / BPSK / CH134004 / 1RB0	3.75 kHz / BPSK / CH134082 / 1RB0
	
3.75 kHz / BPSK / CH134180 / 1RB47	**3.75 kHz / QPSK / CH134004 / 1RB0**
	
3.75 kHz / QPSK / CH134082 / 1RB0	**3.75 kHz / QPSK / CH134180 / 1RB47**
	

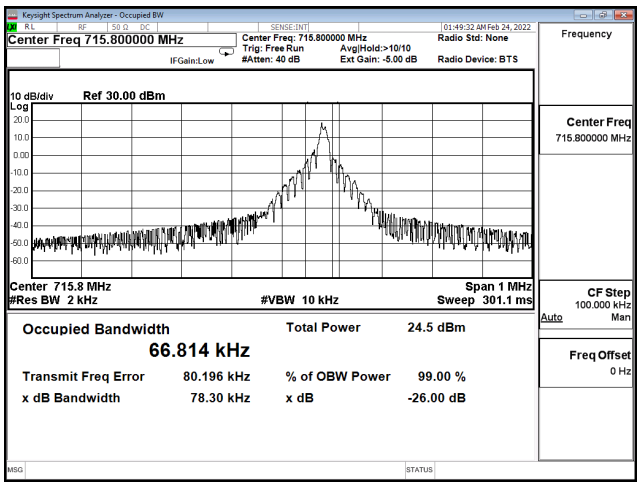
15 kHz / BPSK / CH134004 / 1RB0



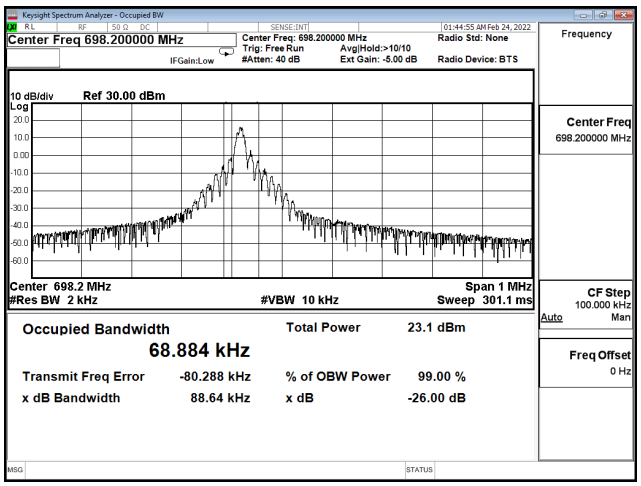
15 kHz / BPSK / CH134082 / 1RB0



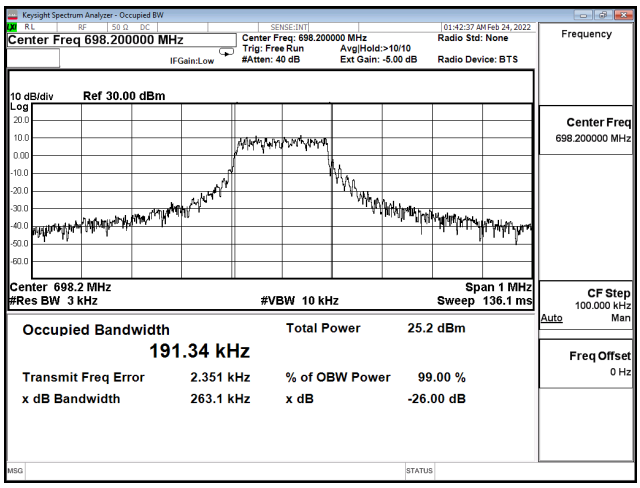
15 kHz / BPSK / CH134180 / 1RB11



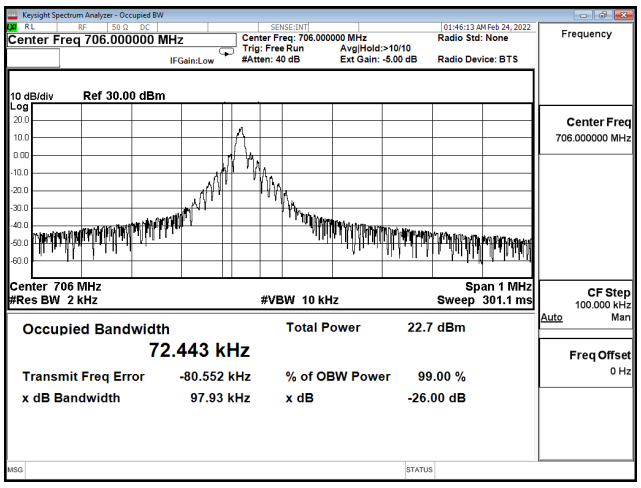
15 kHz / QPSK / CH134004 / 1RB0

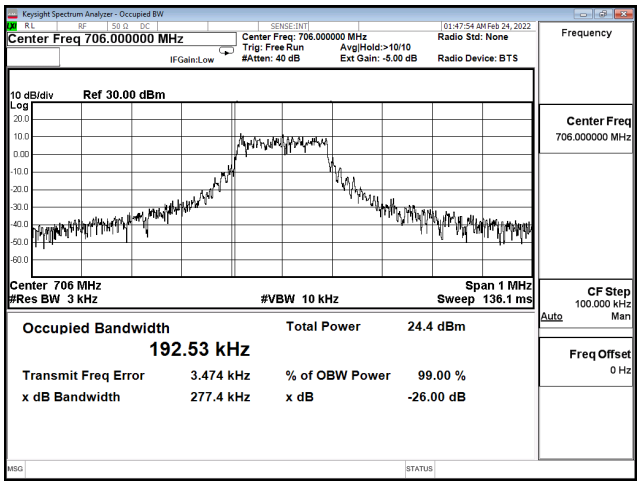
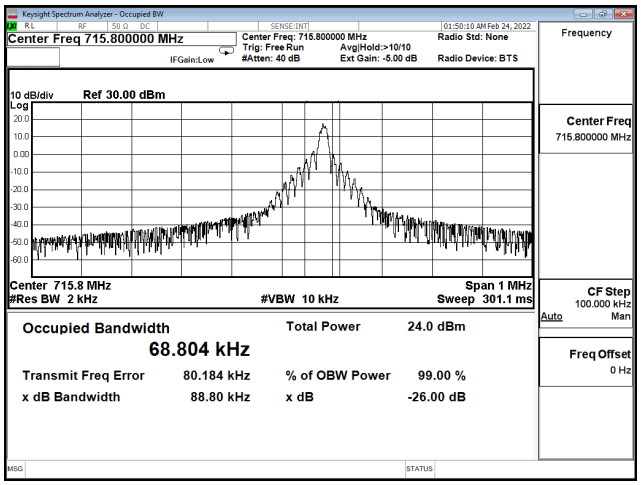
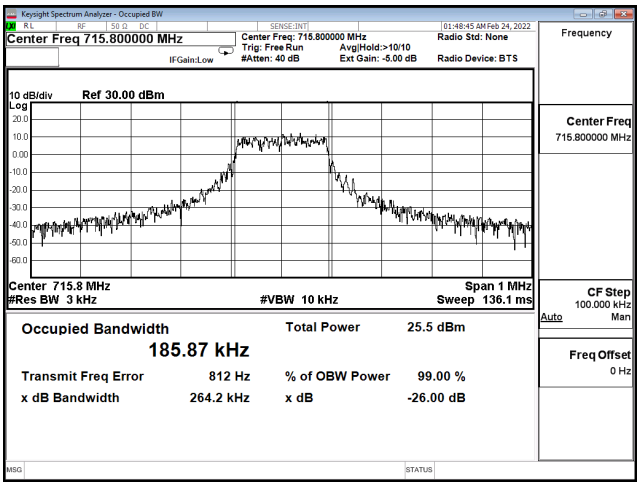


15 kHz / QPSK / CH134004 / 12RB0



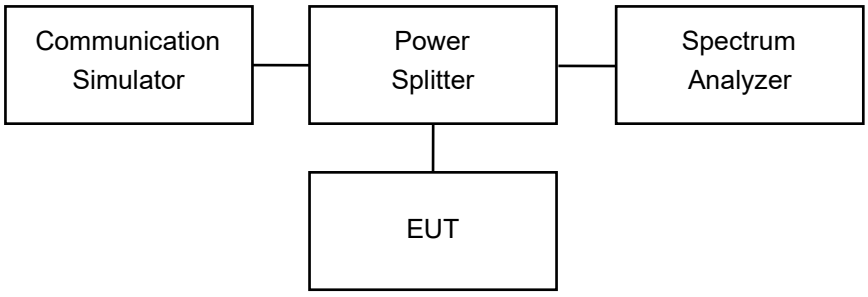
15 kHz / QPSK / CH134082 / 1RB0



15 kHz / QPSK / CH134082 / 12RB0	15 kHz / QPSK / CH134180 / 1RB11
	
15 kHz / QPSK / CH134180 / 12RB0	
	

5. Peak to Average Ratio

5.1. Test Setup



5.2. Test Procedure

1. The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.
2. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth.
3. Set the number of counts to a value that stabilizes the measured CCDF curve.
4. Record the maximum PAPR level associated with a probability of 0.1 %.

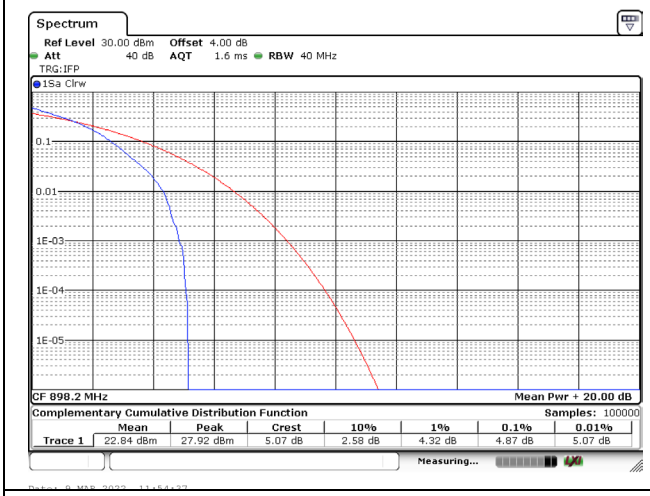
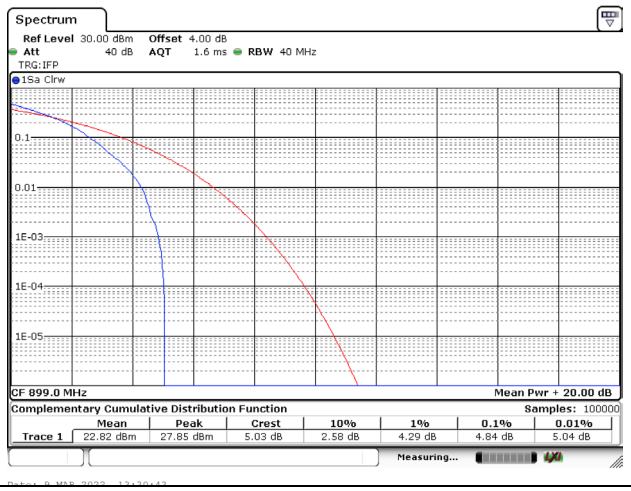
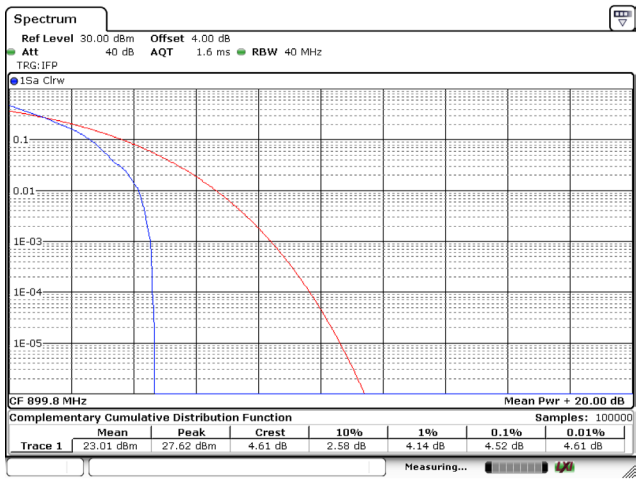
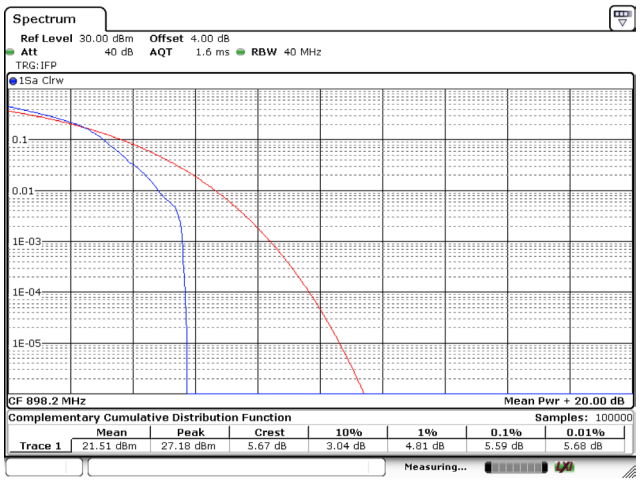
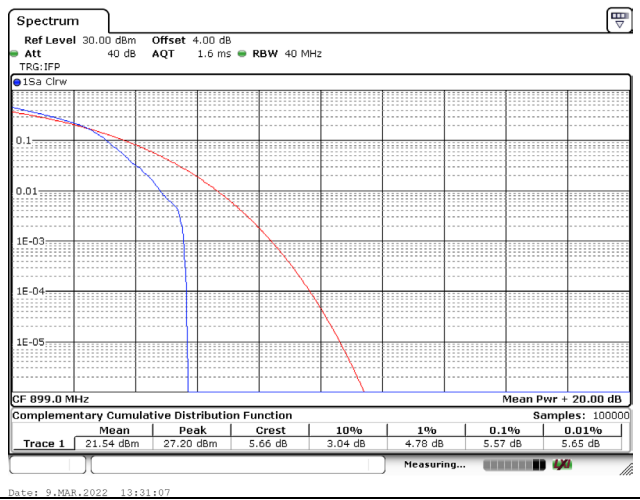
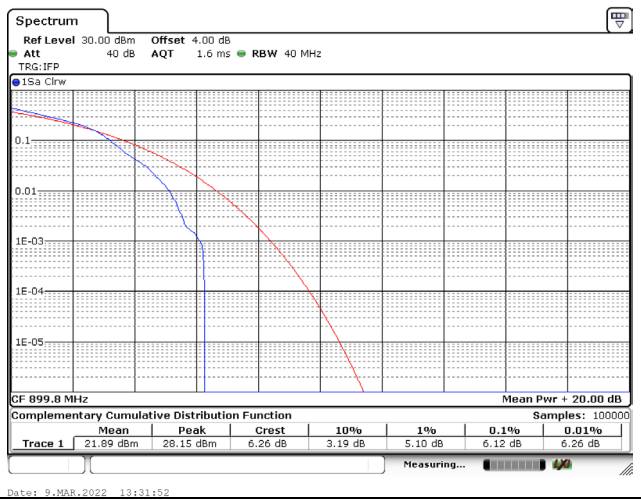
5.3. Test Methodology and Reference Procedures

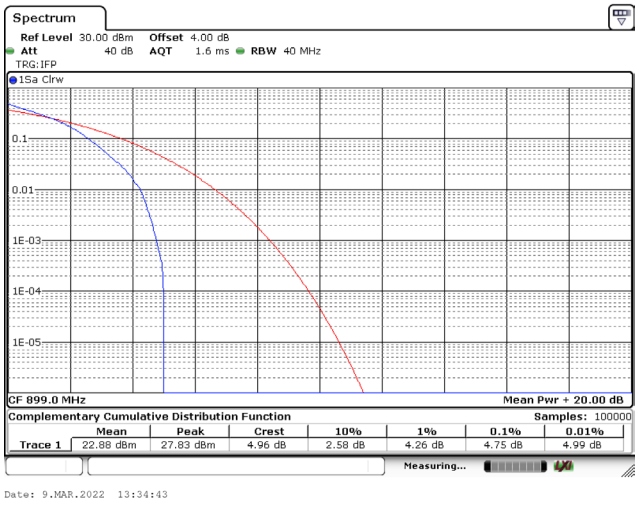
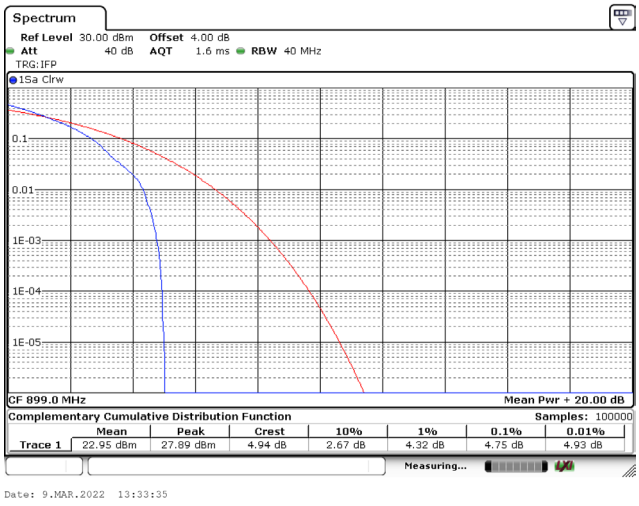
KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI C63.26-2015

5.4. Test Result of Peak to Average Ratio

Mode 1: Cat-M1 Band 8 (FCC only)

1.4 MHz / QPSK / CH21632 / 1RB0	1.4 MHz / QPSK / CH21640 / 1RB0
	
1.4 MHz / QPSK / CH21648 / 1RB5	**1.4 MHz / 16-QAM / CH21632 / 1RB0**
	
1.4 MHz / 16-QAM / CH21640 / 1RB0	**1.4 MHz / 16-QAM / CH21648 / 1RB5**
	

3 MHz / QPSK - Low / CH21640 / 1RB0	3 MHz / QPSK - Hight / CH21640 / 1RB5
	
3 MHz / 16-QAM - Low / CH21640 / 1RB0	3 MHz / 16-QAM - Hight / CH21640 / 1RB5