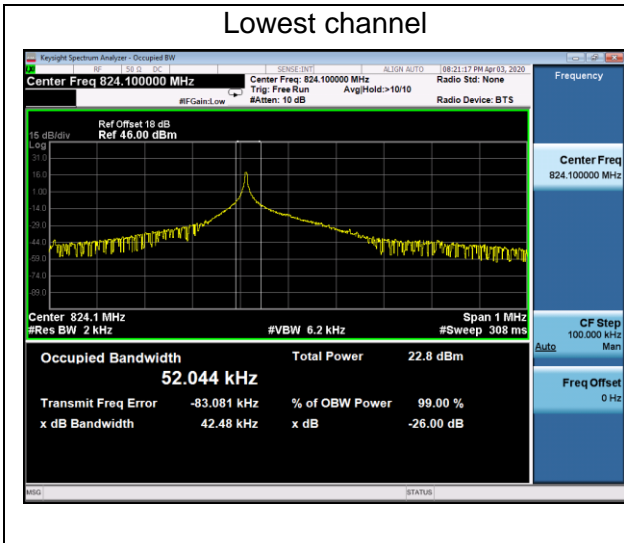


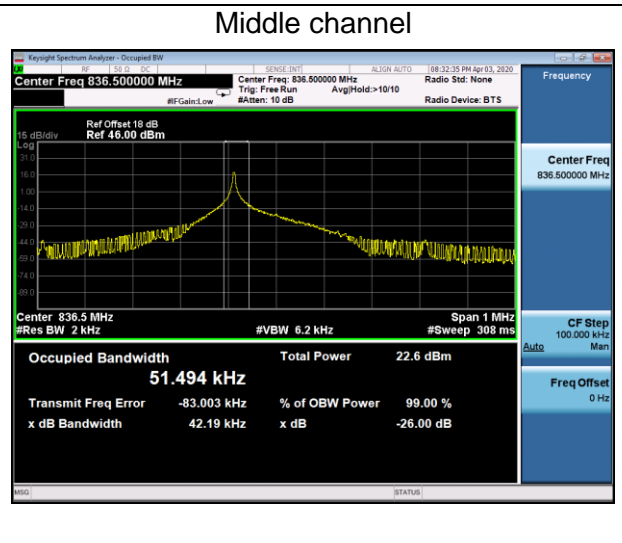
Tone 3.75kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	52.044	51.494	52.217
-26 dBc bandwidth (kHz)	42.48	42.19	41.93

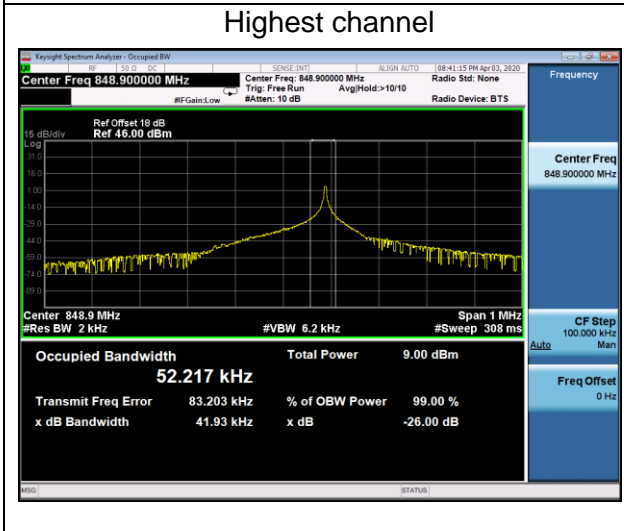
Lowest channel



Middle channel

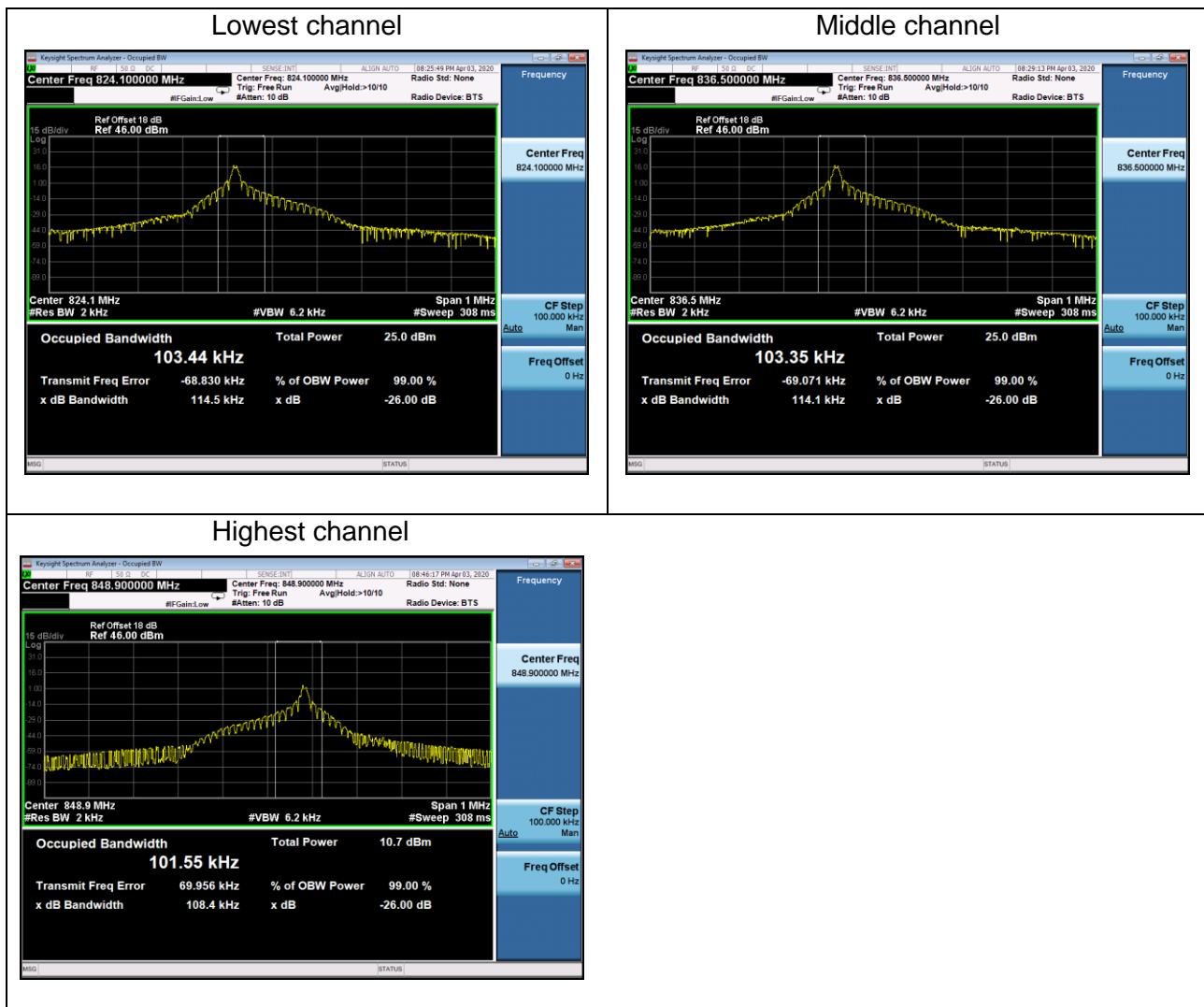


Highest channel



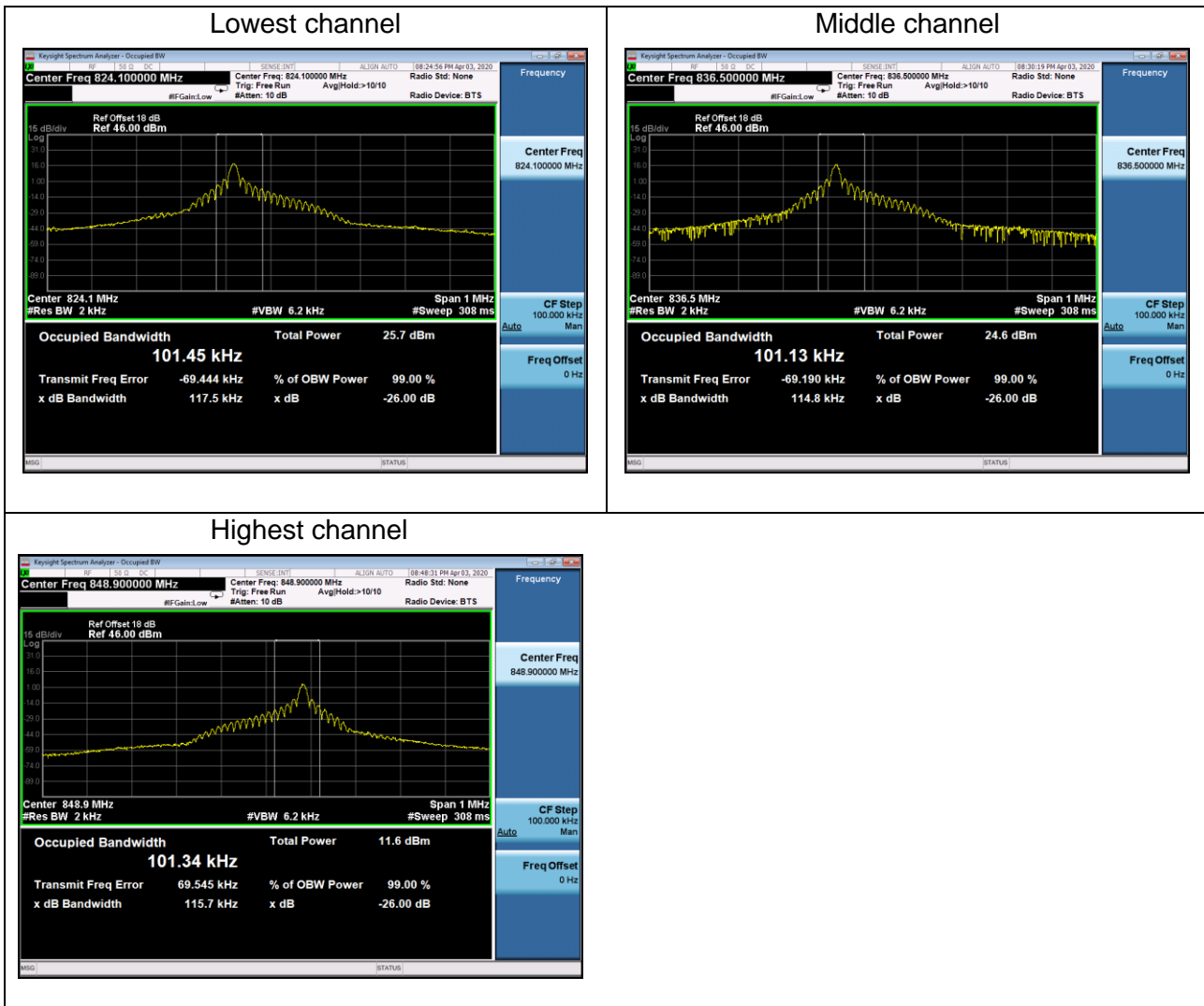
Tone 15kHz BPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	103.44	103.35	101.55
-26 dBc bandwidth (kHz)	114.5	114.1	108.4



Tone 15kHz QPSK Modulation

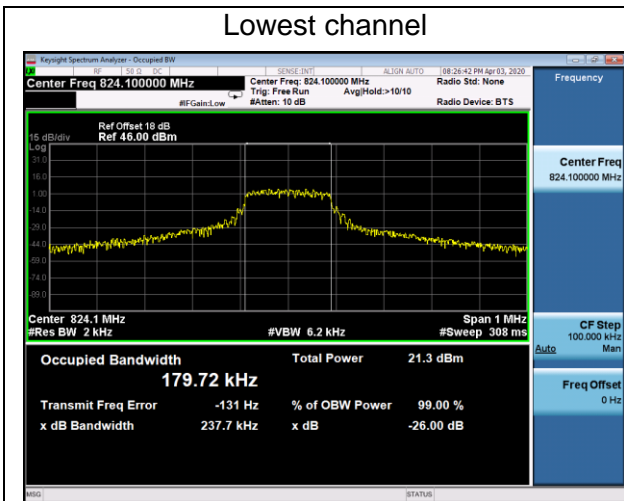
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	101.45	101.13	101.34
-26 dBc bandwidth (kHz)	117.5	114.8	115.7



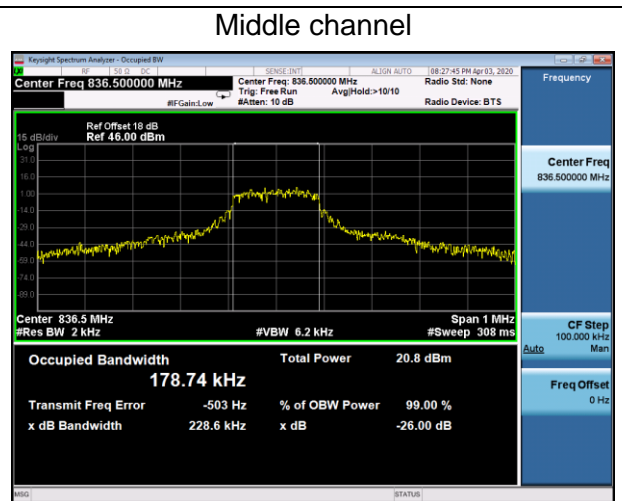
12 Tones 15kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	179.72	178.74	180.22
-26 dBc bandwidth (kHz)	237.7	228.6	235.5

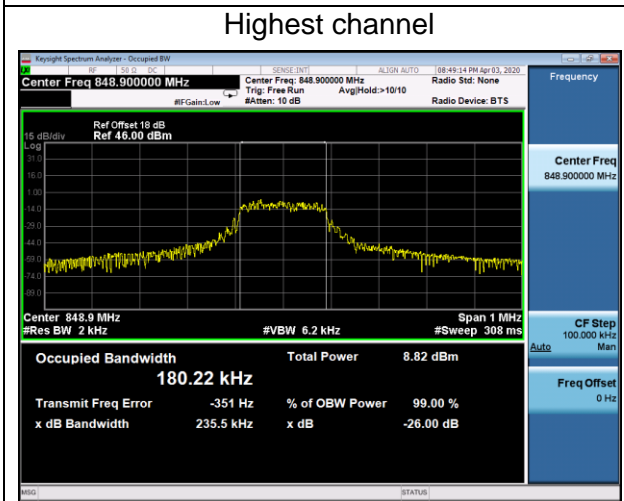
Lowest channel



Middle channel



Highest channel

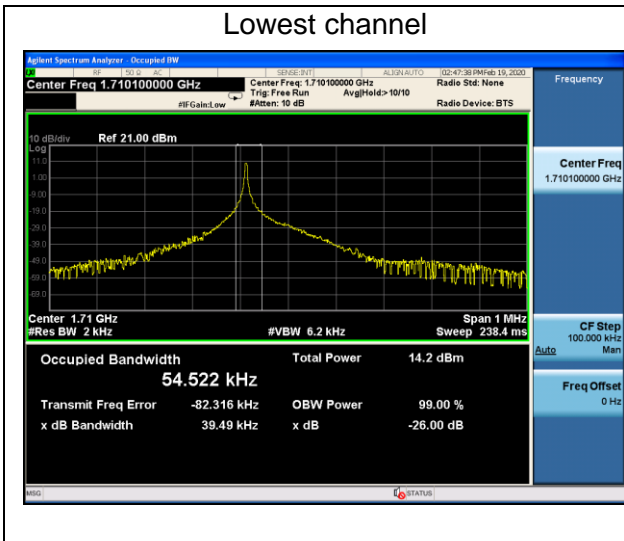


**NB-IoT Band 66**

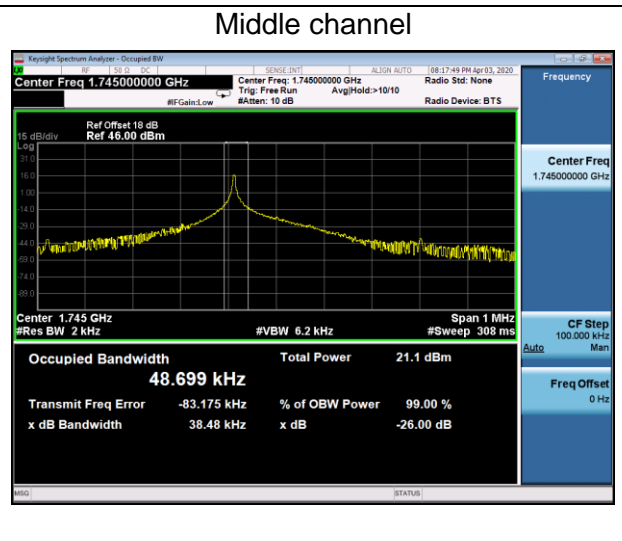
Tone 3.75kHz BPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	54.522	48.699	52.930
-26 dBc bandwidth (kHz)	39.49	38.48	39.03

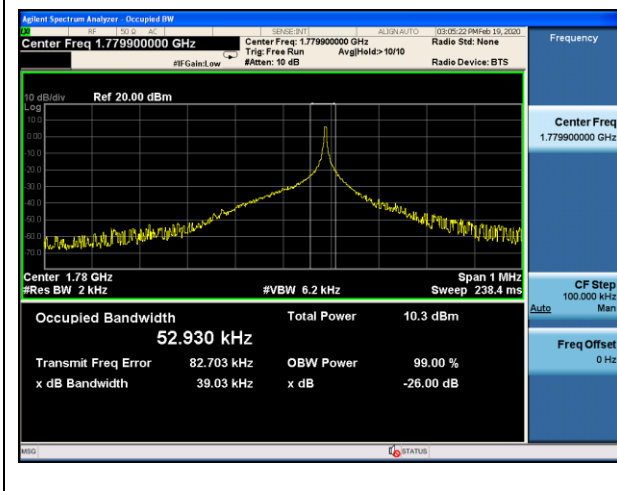
Lowest channel



Middle channel



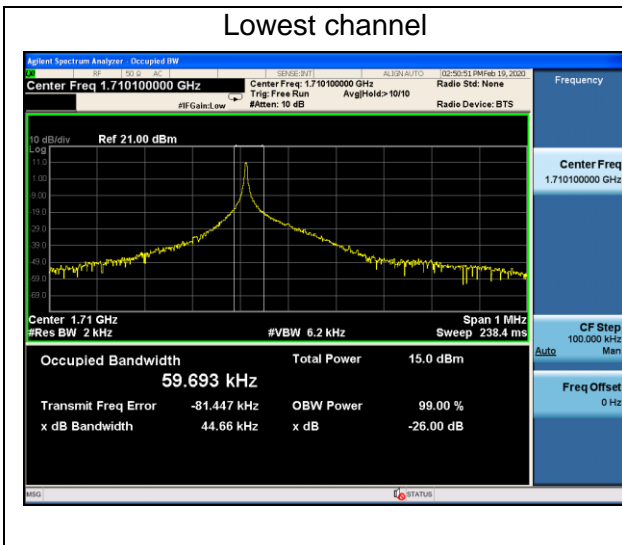
Highest channel



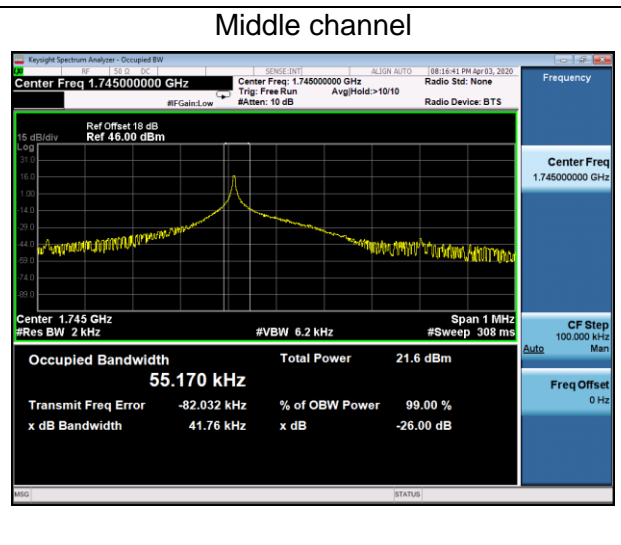
Tone 3.75kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	59.693	55.170	58.876
-26 dBc bandwidth (kHz)	44.66	41.76	42.57

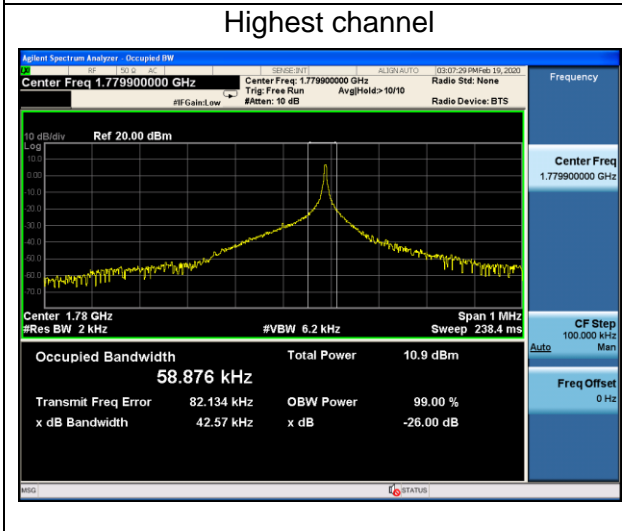
Lowest channel



Middle channel



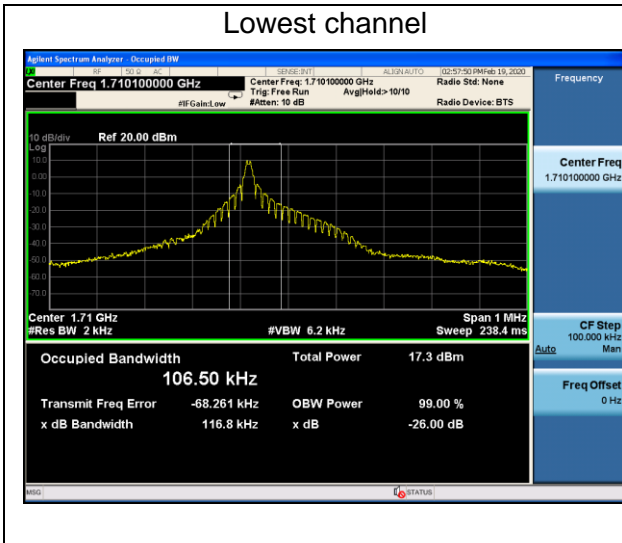
Highest channel



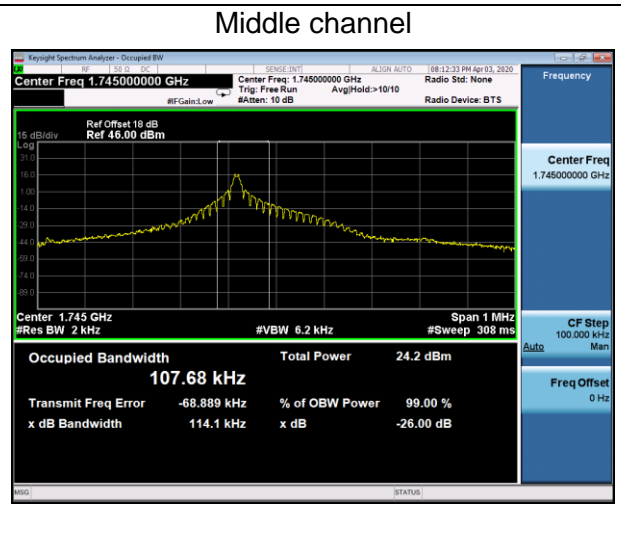
Tone 15kHz BPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	106.50	107.68	106.47
-26 dBc bandwidth (kHz)	116.8	114.1	114.0

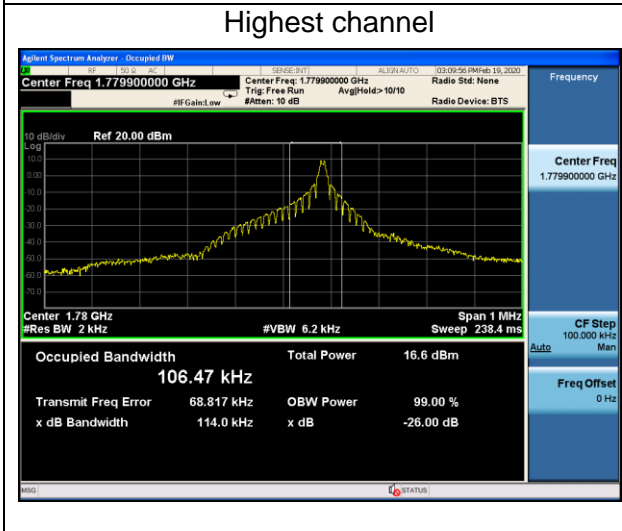
Lowest channel



Middle channel



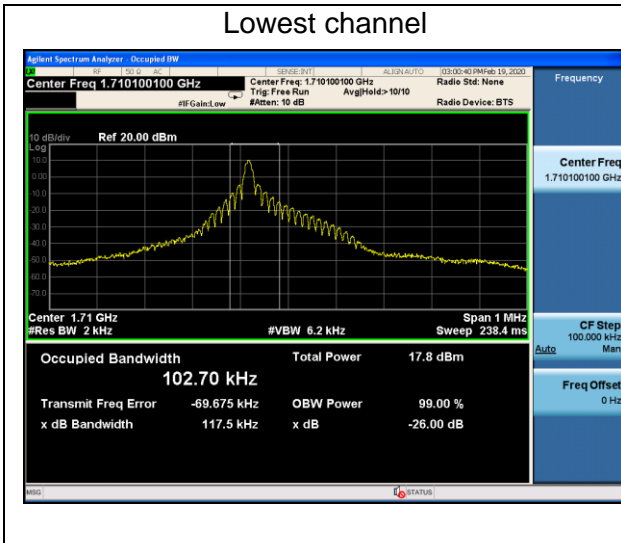
Highest channel



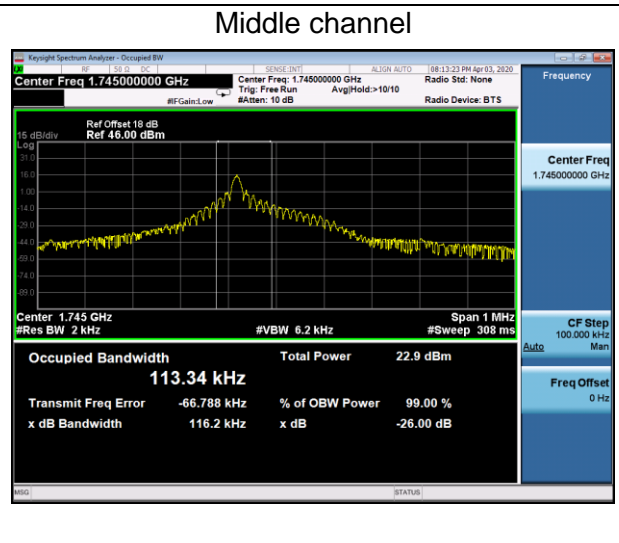
Tone 15kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	102.70	113.34	104.43
-26 dBc bandwidth (kHz)	117.5	116.2	116.6

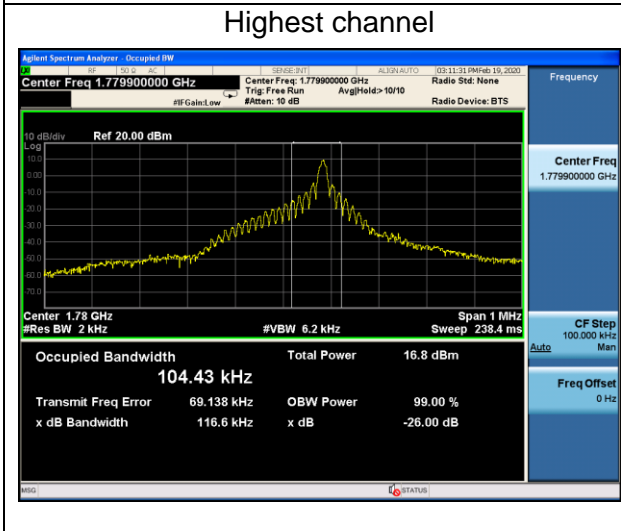
Lowest channel



Middle channel



Highest channel

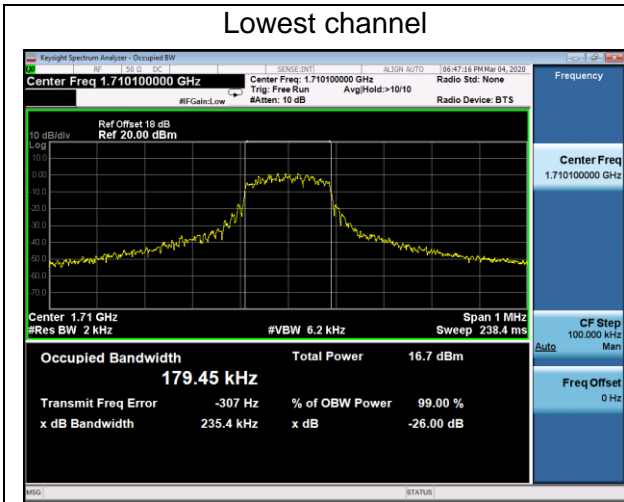




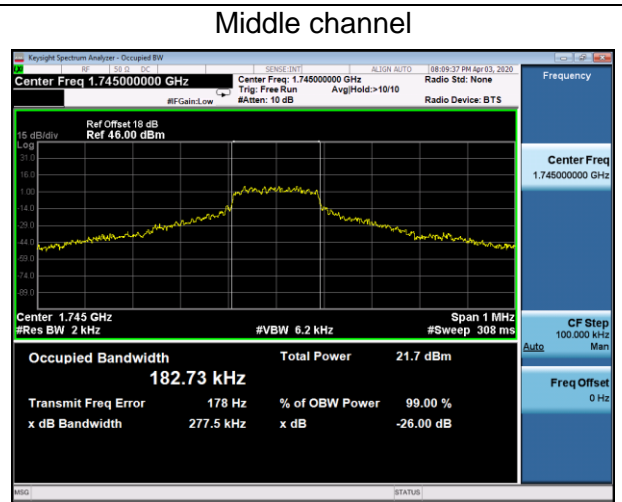
12 Tones 15kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	179.45	182.73	178.60
-26 dBc bandwidth (kHz)	235.4	277.5	232.9

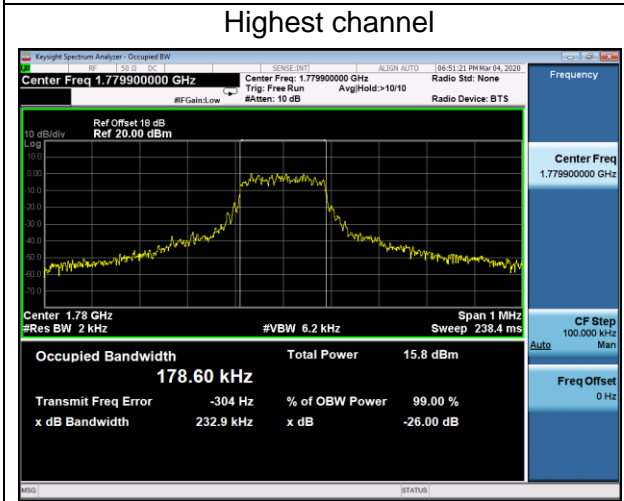
Lowest channel



Middle channel



Highest channel

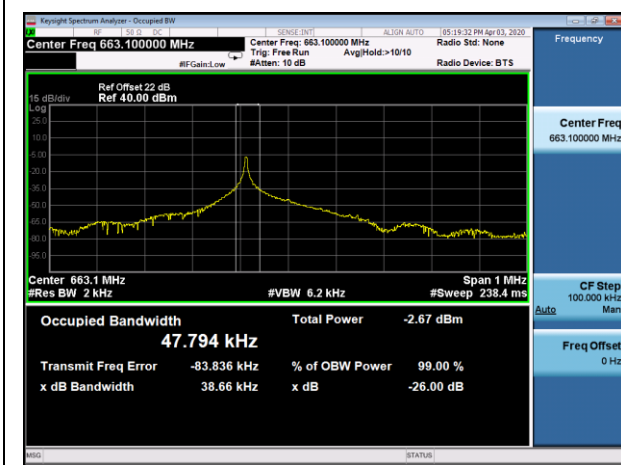


**NB-IoT Band 71**

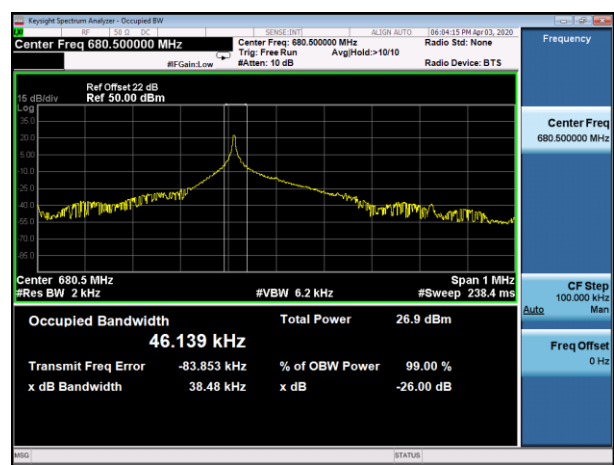
Tone 3.75kHz BPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	47.794	46.139	47.884
-26 dBc bandwidth (kHz)	38.66	38.48	38.81

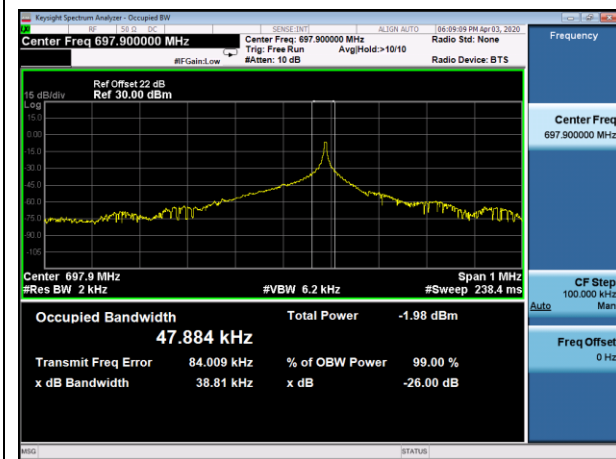
Lowest channel



Middle channel



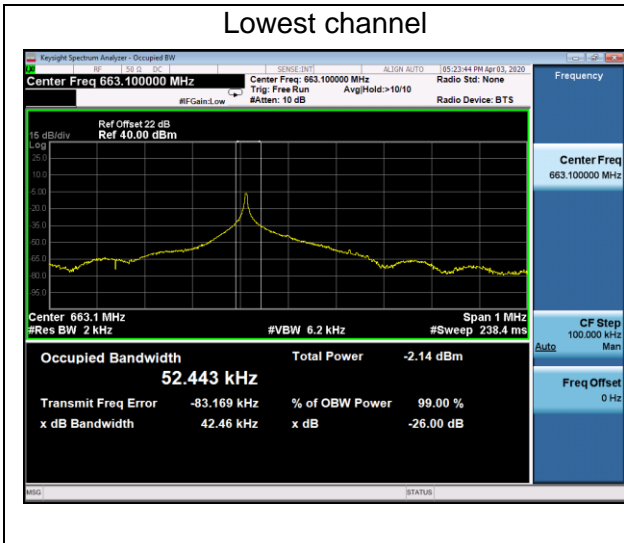
Highest channel



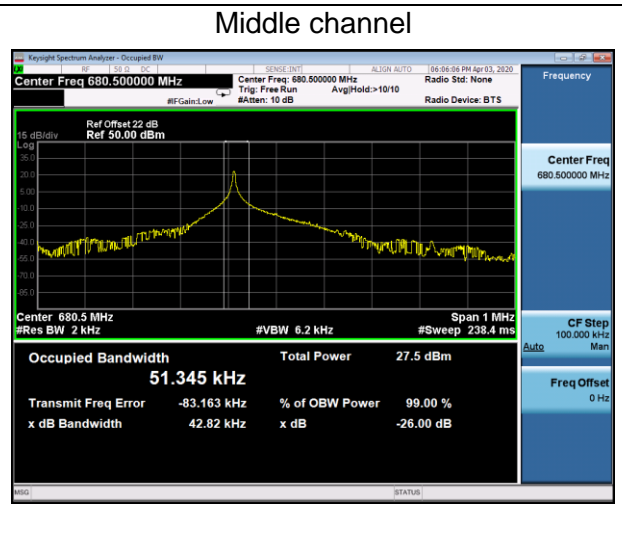
Tone 3.75kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	52.443	51.345	50.433
-26 dBc bandwidth (kHz)	42.46	42.82	41.79

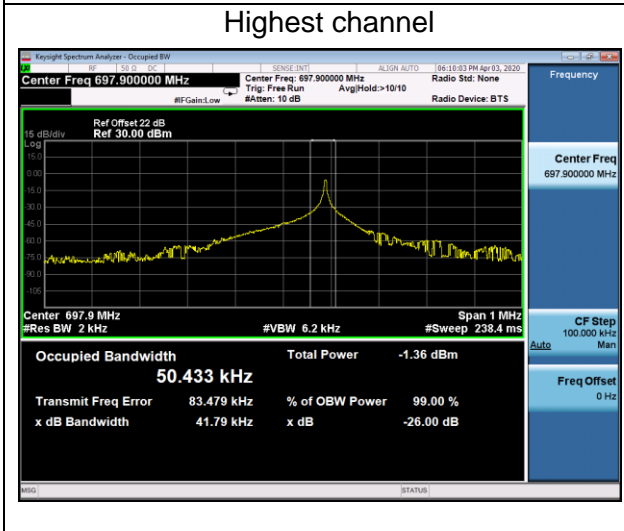
Lowest channel



Middle channel



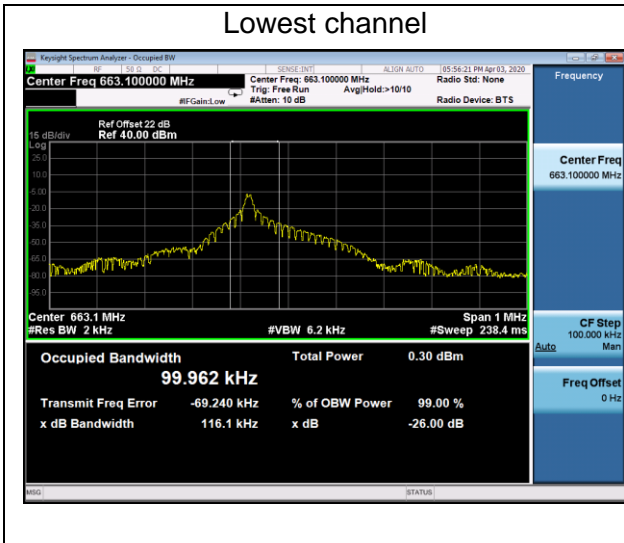
Highest channel



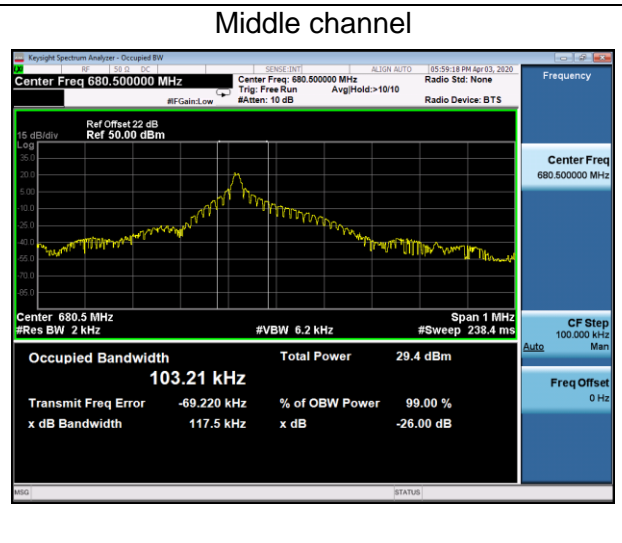
Tone 15kHz BPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	99.962	103.21	100.43
-26 dBc bandwidth (kHz)	116.1	117.5	103.1

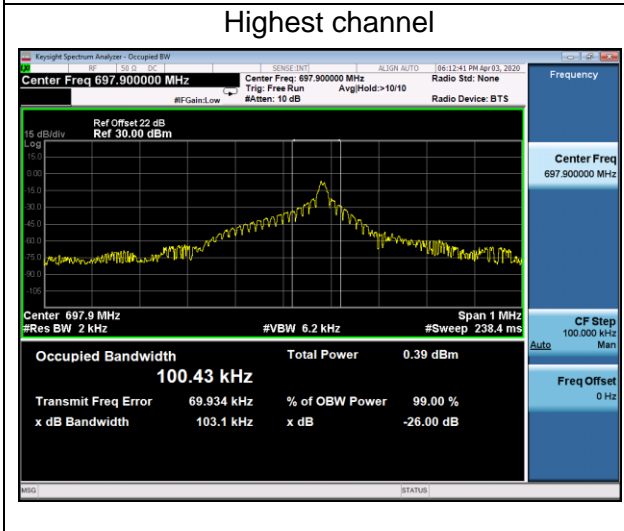
Lowest channel



Middle channel

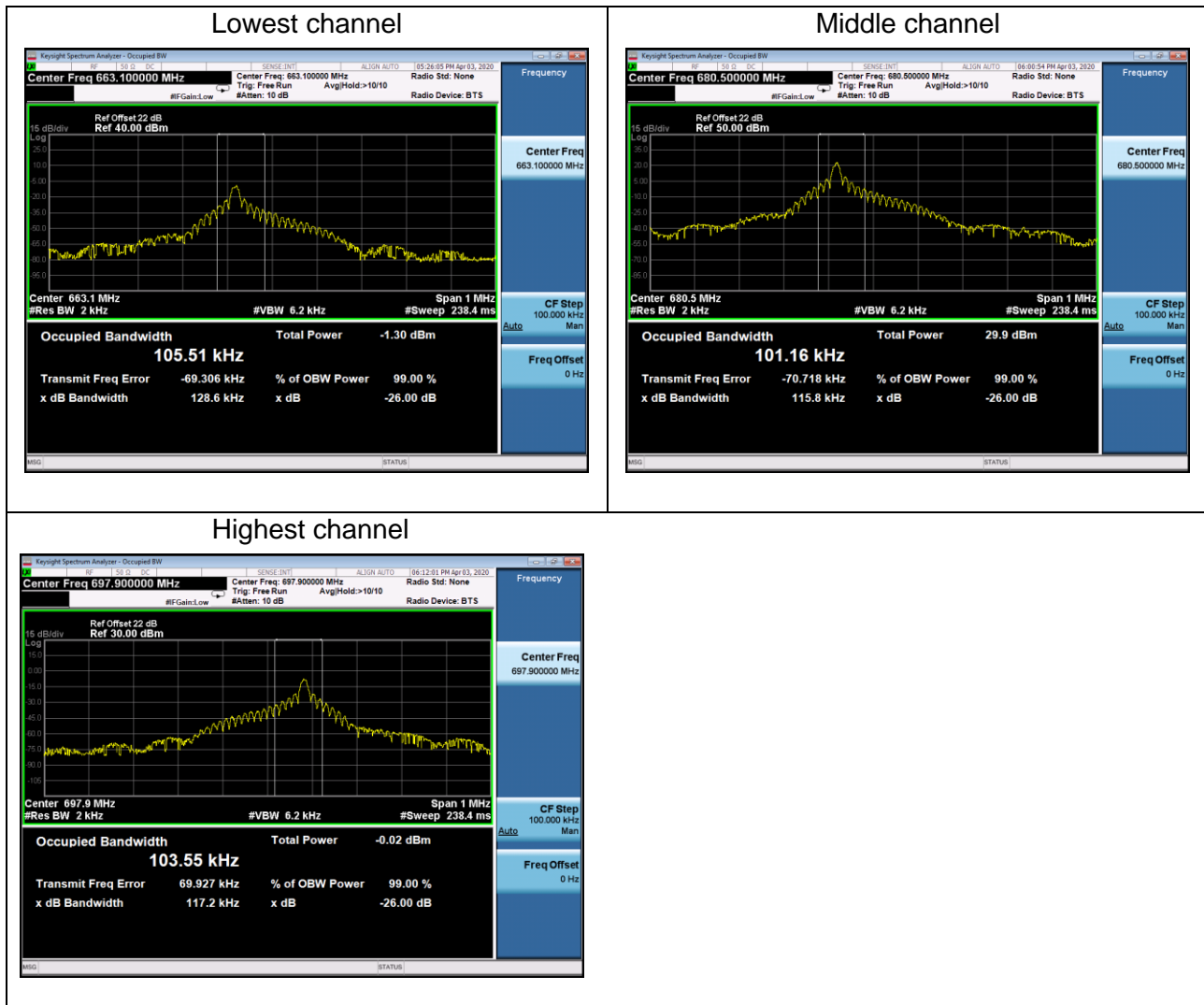


Highest channel



Tone 15kHz QPSK Modulation

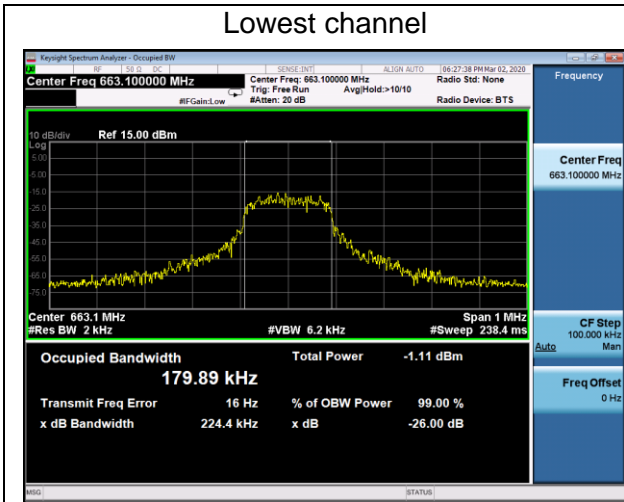
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	105.51	101.16	103.55
-26 dBc bandwidth (kHz)	128.6	115.8	117.2



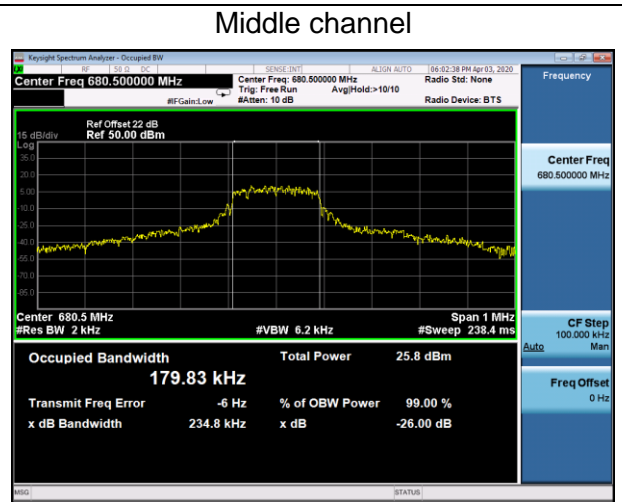
12 Tones 15kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	179.89	179.83	179.32
-26 dBc bandwidth (kHz)	224.4	234.8	235.0

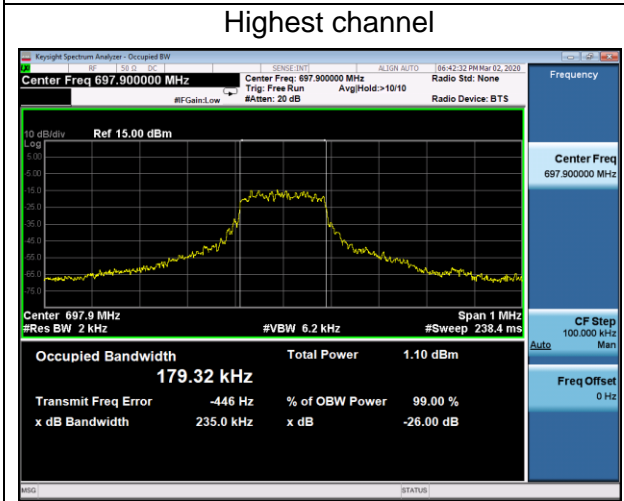
Lowest channel



Middle channel



Highest channel

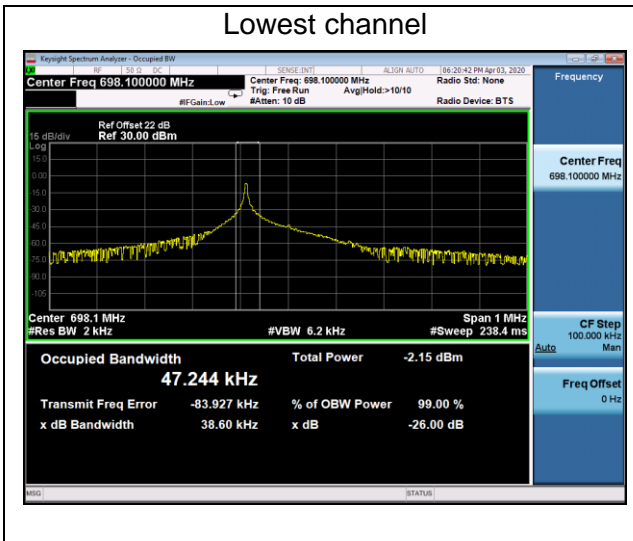


**NB-IoT Band 85**

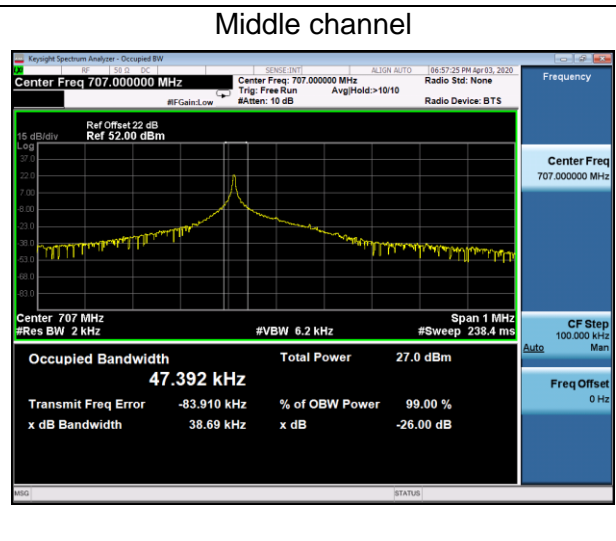
Tone 3.75kHz BPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	47.244	47.392	46.156
-26 dBc bandwidth (kHz)	38.60	38.69	38.49

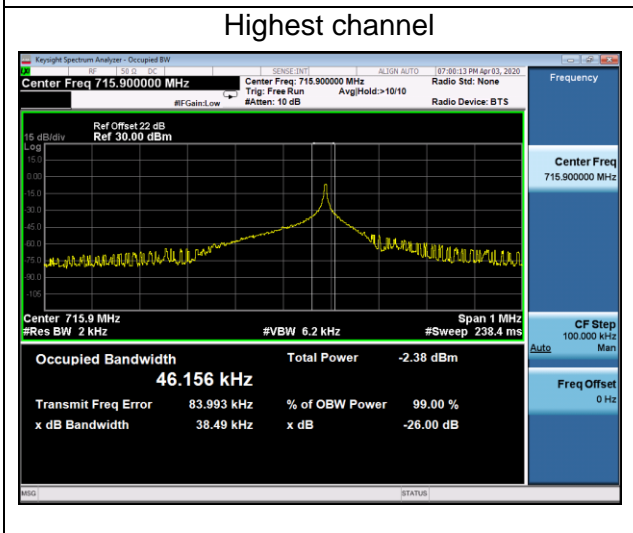
Lowest channel



Middle channel



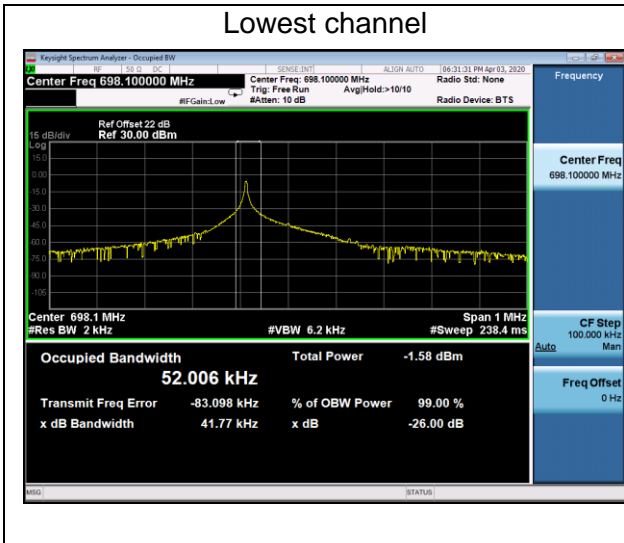
Highest channel



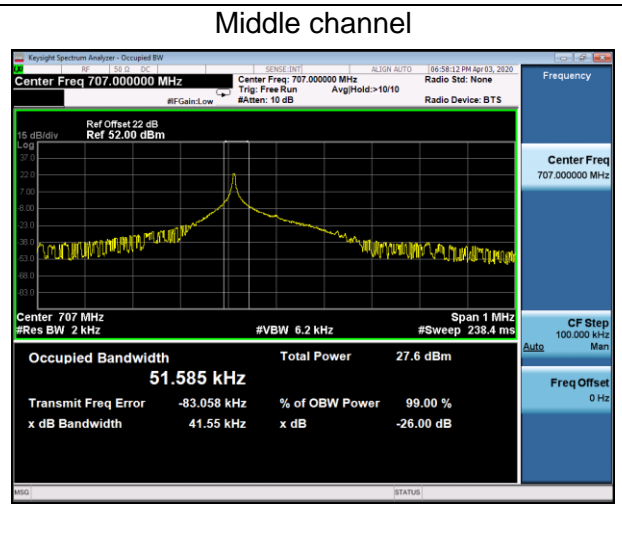
Tone 3.75kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	52.006	51.585	52.141
-26 dBc bandwidth (kHz)	41.77	41.55	42.28

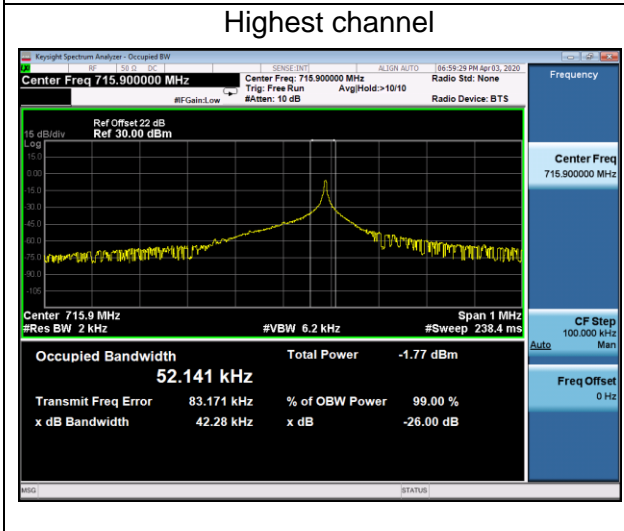
Lowest channel



Middle channel



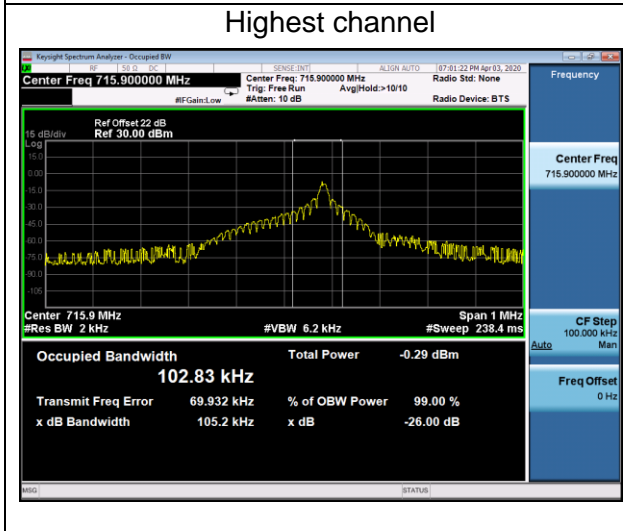
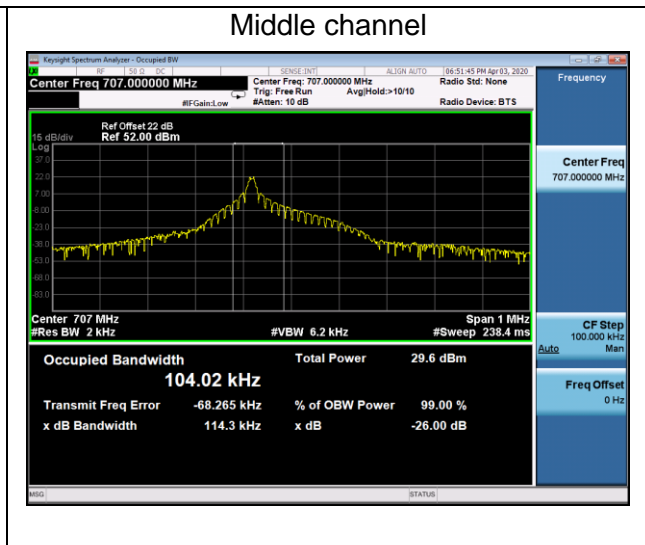
Highest channel





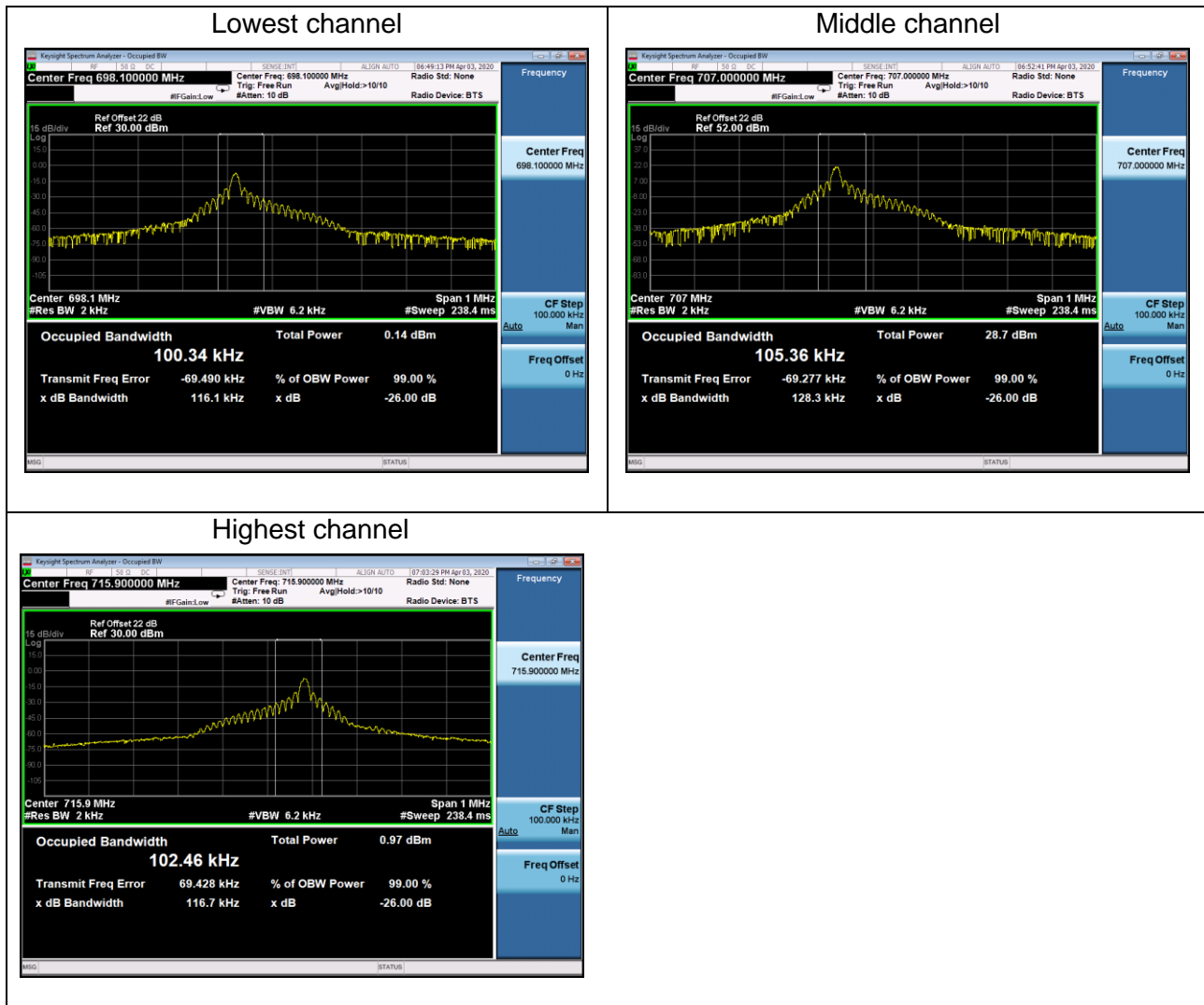
Tone 15kHz BPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	102.12	104.02	102.83
-26 dBc bandwidth (kHz)	116.7	114.3	105.2



Tone 15kHz QPSK Modulation

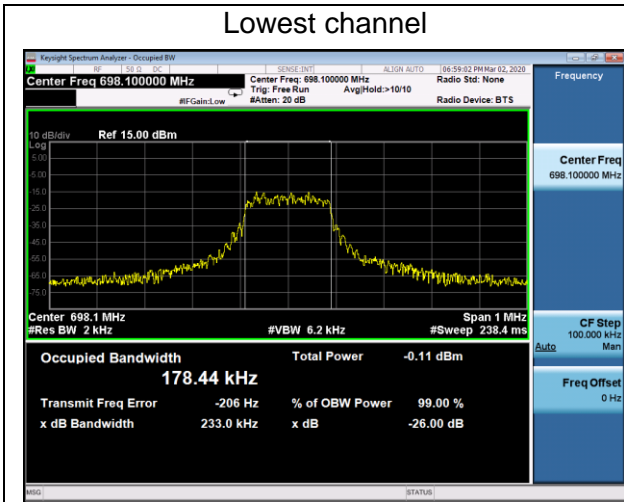
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	100.34	105.36	102.46
-26 dBc bandwidth (kHz)	116.1	128.3	116.7



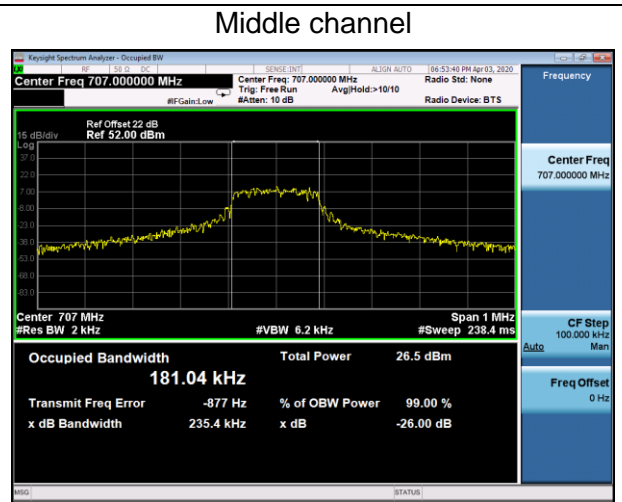
12 Tones 15kHz QPSK Modulation

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	178.44	181.04	179.63
-26 dBc bandwidth (kHz)	233.0	235.4	236.2

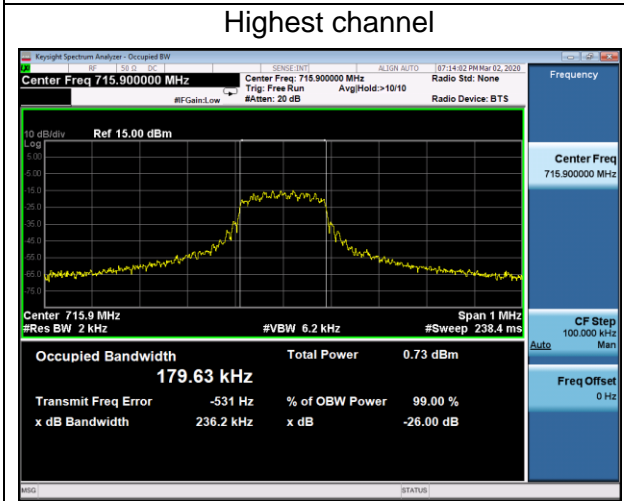
Lowest channel



Middle channel



Highest channel



**4.4 Spurious Emissions at antenna terminals**

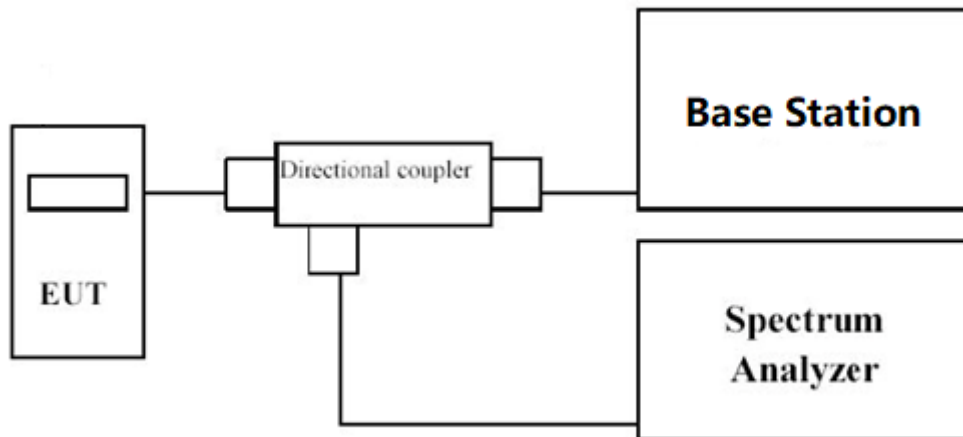
**VERDICT: PASS**

4.4.1 Limit	
NB IoT Band	Standard
5/26	FCC §2.1051: The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna.
	FCC §22.917: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.
	FCC §90.691: For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.
	RSS-132: Section 5.5: The power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).
2/25	FCC §2.1051: The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna.
	FCC §24.238: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.
	RSS-133 Section 6.5: The emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).
12/13/17 /71/85	FCC §2.1051: The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna.
	FCC §27.53(g): For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
	FCC §27.53(c): On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB. On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.
	RSS-130 Section 4.7: The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. Equipment operating in the frequency bands 746- 756 MHz and 777-787 MHz shall also comply with the following restrictions: The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least: $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment. The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.
4/66	FCC §2.1051: The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna.

FCC §27.53(h): The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

RSS-139 Section 6.6: The emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

#### 4.4.2 Test Setup



#### 4.4.3 Test Procedure

References Rule	Chapter	Description
<input checked="" type="checkbox"/> ANSI C63.26	5.7	Unwanted (out-of-band and spurious) conducted emissions measurement procedures (conducted test at antenna port)

The EUT RF output connector was connected to a spectrum analyser and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using directional coupler.

The spectrum was investigated from 9 kHz to the 10th harmonic of the highest frequency generated within the equipment.

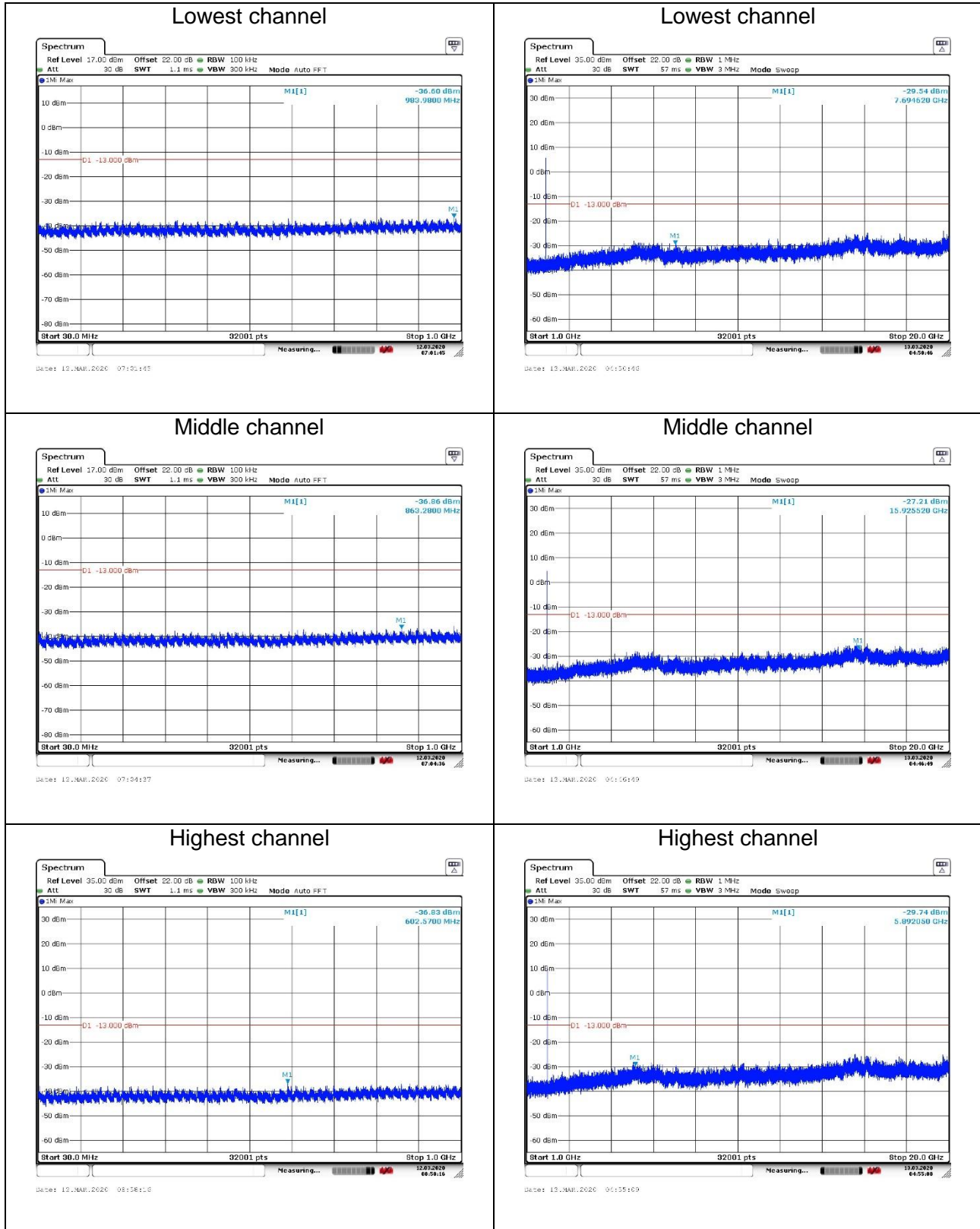
The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $X + 10 \log (P)$  dB. P in watts. The specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e.,  $10 \log P - \{X + 10 \log P\}$ ], resulting in an absolute level of -X dBW [or  $(-X + 30)$  dBm].

The configuration of tones and modulation which is the worst case for conducted power was used.

### 4.4.4 Test Data

#### NB-IoT Band 2



NB-IoT Band 4

