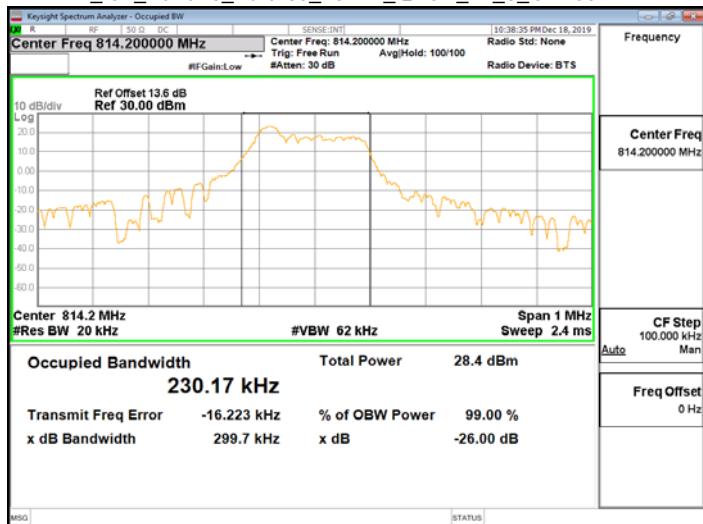
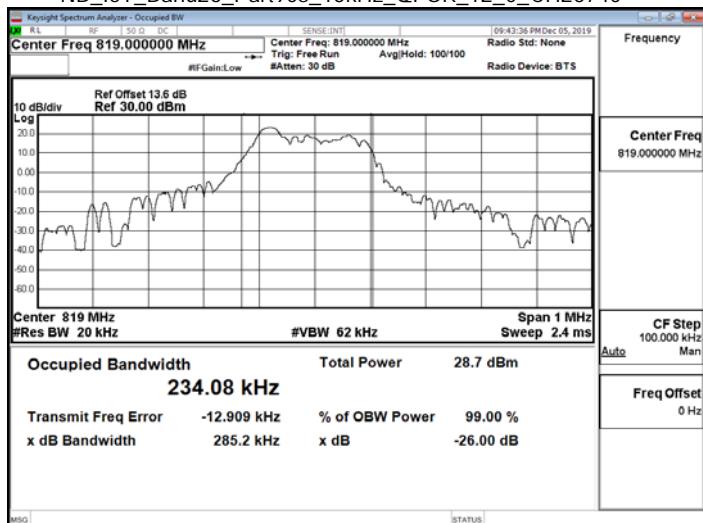


NB\_IoT\_Band26\_Part90s\_15kHz\_QPSK\_12\_0\_CH26692



NB\_IoT\_Band26\_Part90s\_15kHz\_QPSK\_12\_0\_CH26740



NB\_IoT\_Band26\_Part90s\_15kHz\_QPSK\_12\_0\_CH26788



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## 8 OUT OF BAND EMISSION AT ANTENNA TERMINALS

### 8.1 Standard Applicable

#### FCC §22.917(a), §24.238(a), §27.53(h)

#### RSS-130 §4.7, RSS-132 §5.5, RSS-139 §6.5, RSS-139 §6.6

Out of band emissions. 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 §27.53(c) for B13

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the 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, in accordance with the following:

- (2) 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 (-13dBm)
- (4) 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;

#### FCC §27.53 (f) for B13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

#### FCC §27.53(c) (5) & FCC §27.53(g) for B12, 13

Compliance for operations in the 600 MHz, 698-746 MHz, 746-758 MHz and the 776-788 MHz band 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.

#### ISED RSS-130 §4.7.1 for B12, 13

Compliance for operations in the 617-652 MHz, 663-698 MHz, 698-756 MHz and the 777-787 MHz band, 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. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

#### ISED RSS-130 §4.7.2 for B13

In addition to the limit outlined in section 4.7.1 above, 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:

76 + 10  $\log_{10} p$  (watts), dB, for base and fixed equipment and  
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.

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**FCC §27.53(h)(3) for B4**

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

**RSS-139 §6.6 for B4**

In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, 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.

**FCC §90.691 Emission mask requirements for EA-based systems for B26**

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  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 12.5 kHz.

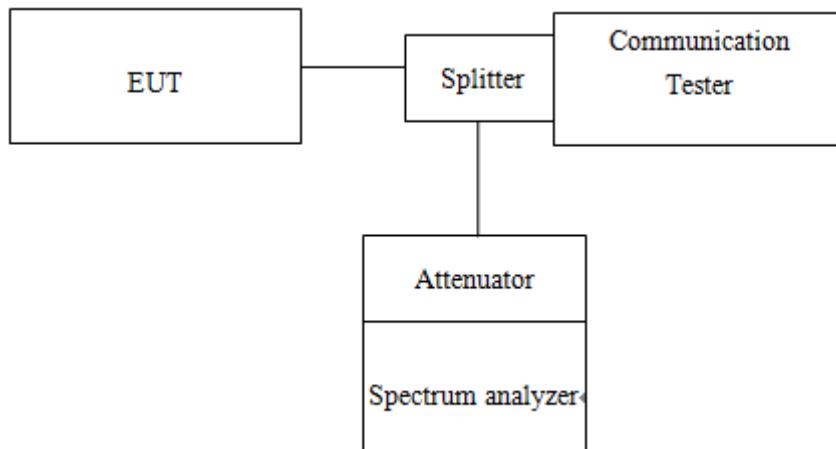
(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

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## 8.2 Test SET-UP



## 8.3 Measurement Procedure

### 8.3.1 Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

### 8.3.2 Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting RBW  $\geq$  1% EBW.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

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## 8.4 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Power Supply	Agilent	E3640A	MY53140006	05/31/2019	05/30/2020
Radio Communication Analyer	Anritsu	MT8821C	6261786084	01/09/2019	01/09/2020
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	07/15/2019	07/14/2020
Splitter	Marvelous	MVE8586	RF265	11/20/2019	11/19/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	WATT-218FS-10	RF268	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A 185C	RF220	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A 185C	RF229	11/20/2019	11/19/2020

*Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown blow indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.*

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Radio Communication Analyer	Anritsu	MT8821C	6262044739	12/06/2019	12/05/2020

## 8.5 Measurement Result:

Refer to next pages.

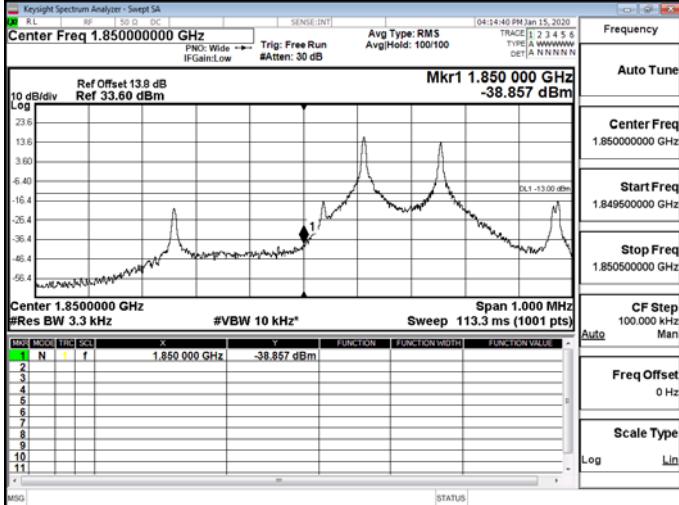
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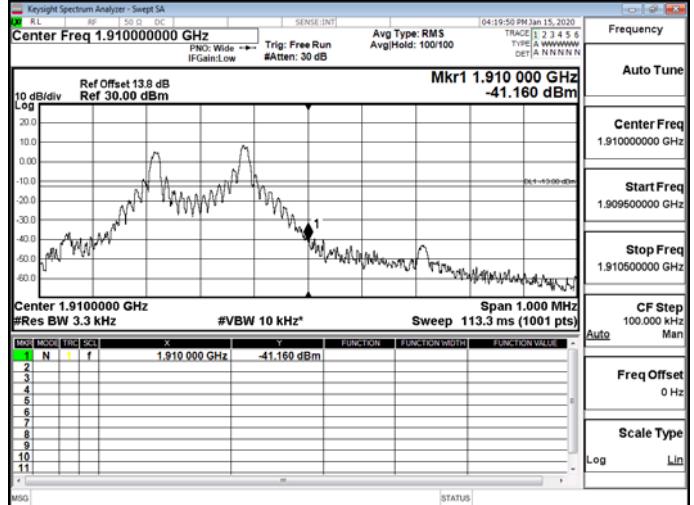
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## 8.5.1 Bandedge

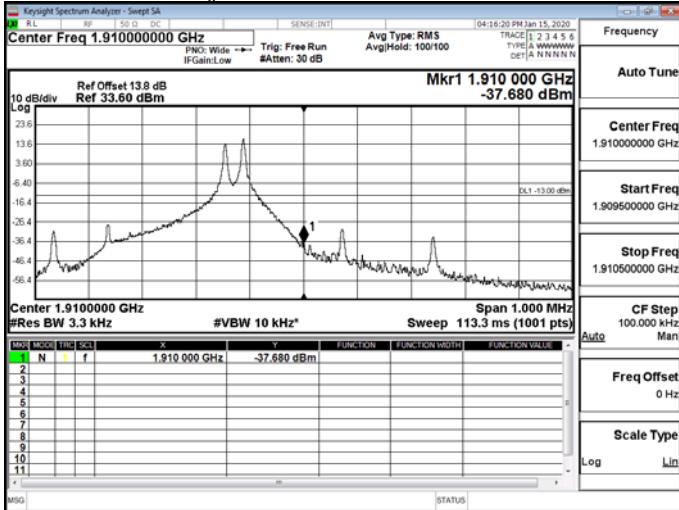
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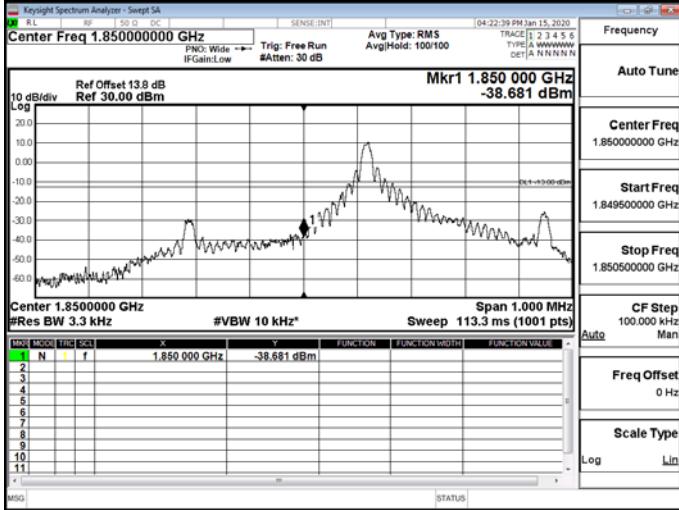
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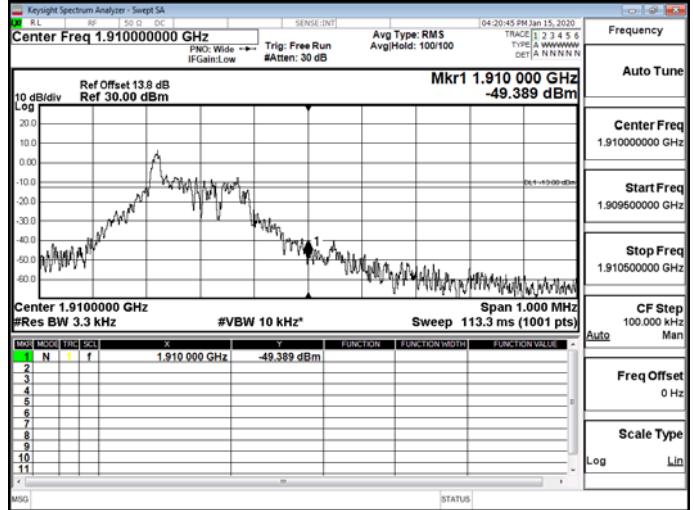
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NB\_IoT\_Band Edge\NB\_IoT\Band2\_15kHz\_QPSK\_12\_0\_CH19198



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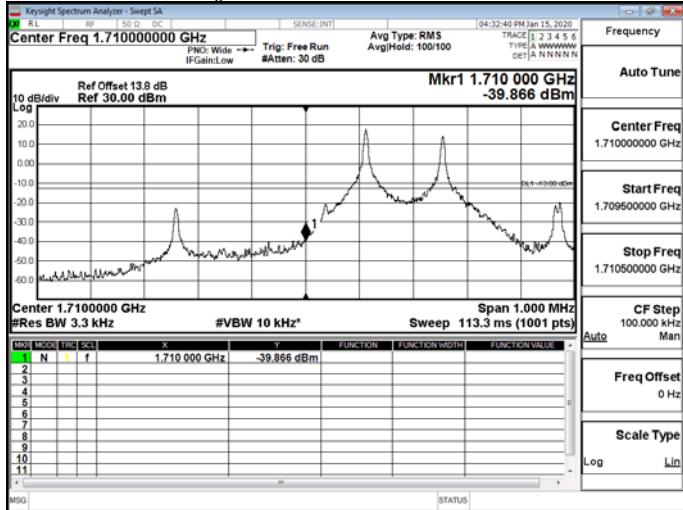
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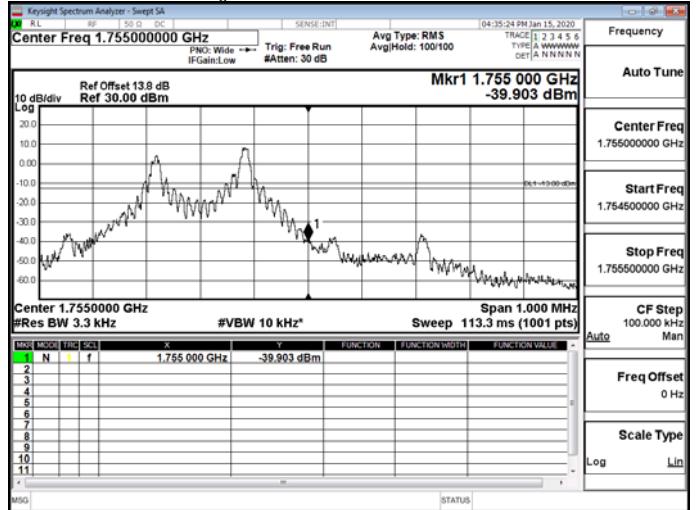
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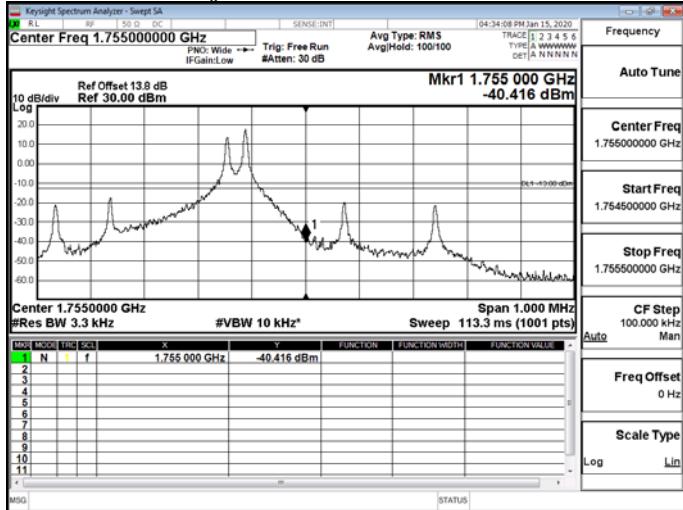
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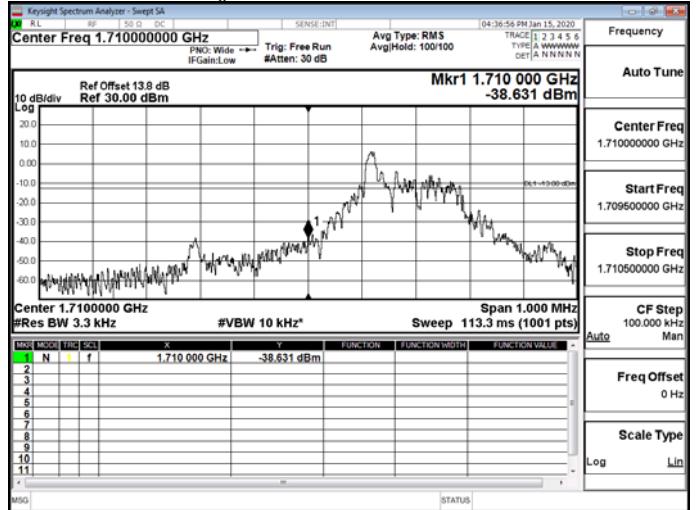
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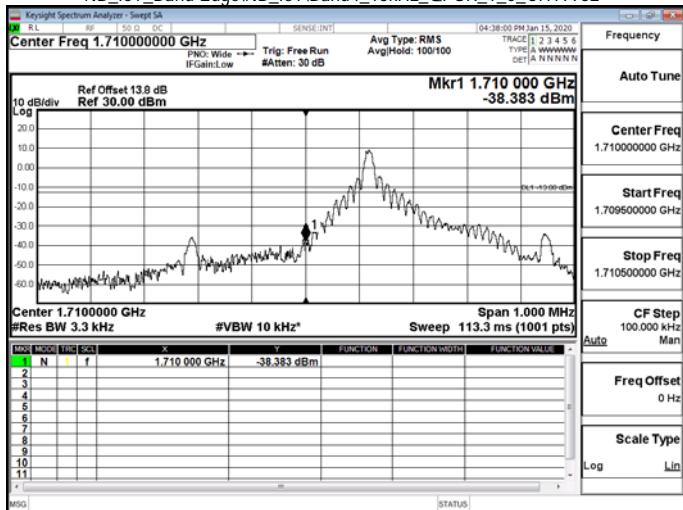
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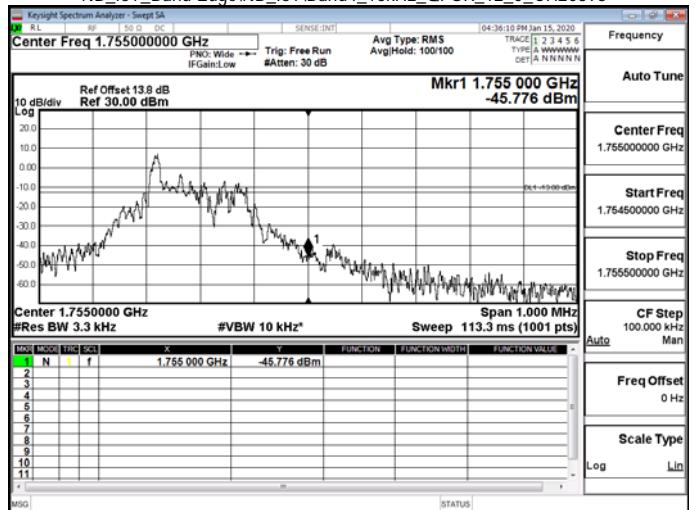
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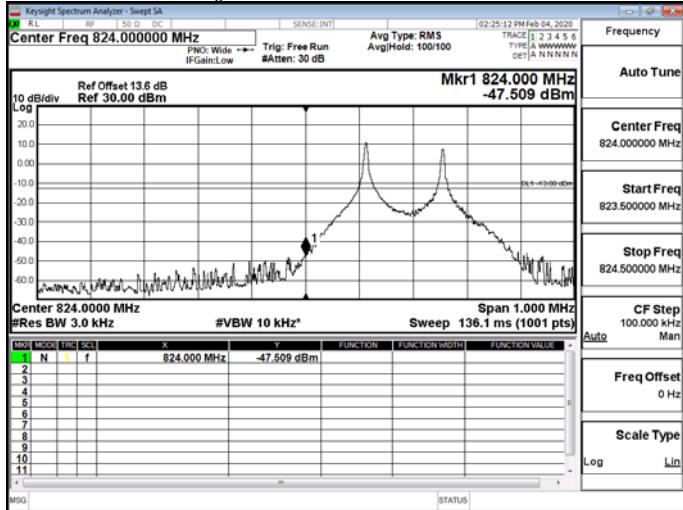
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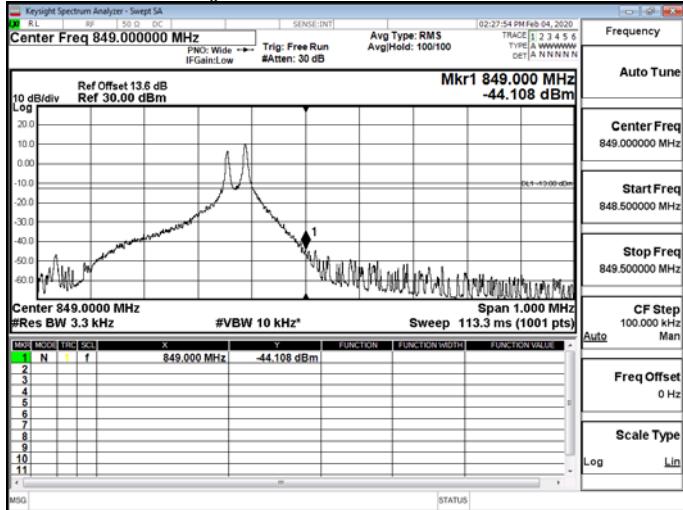
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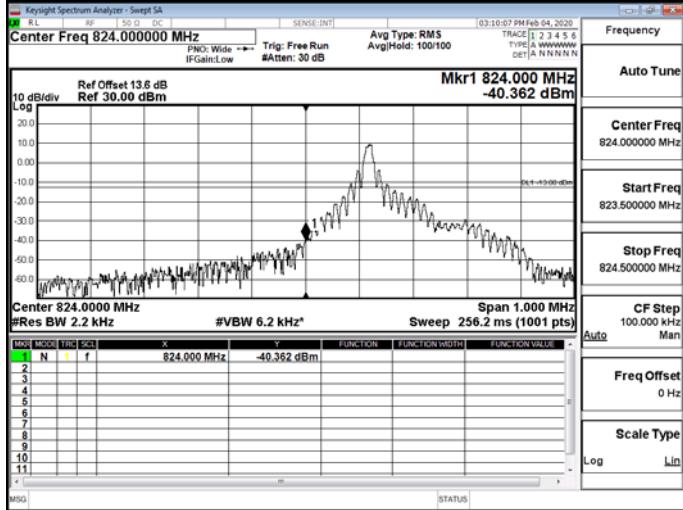
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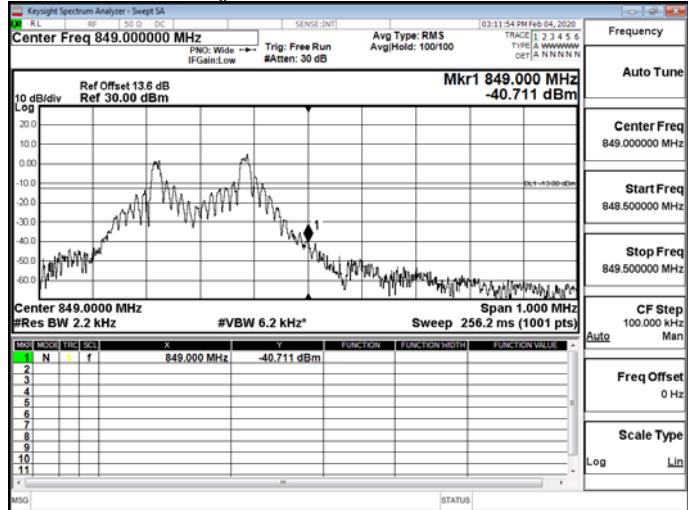
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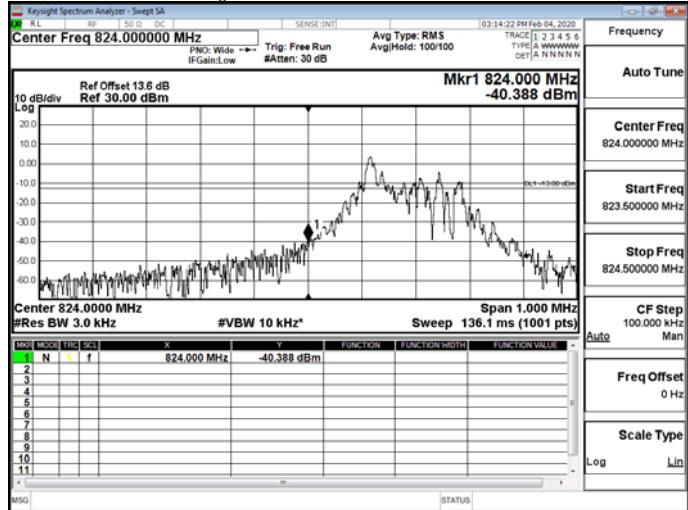
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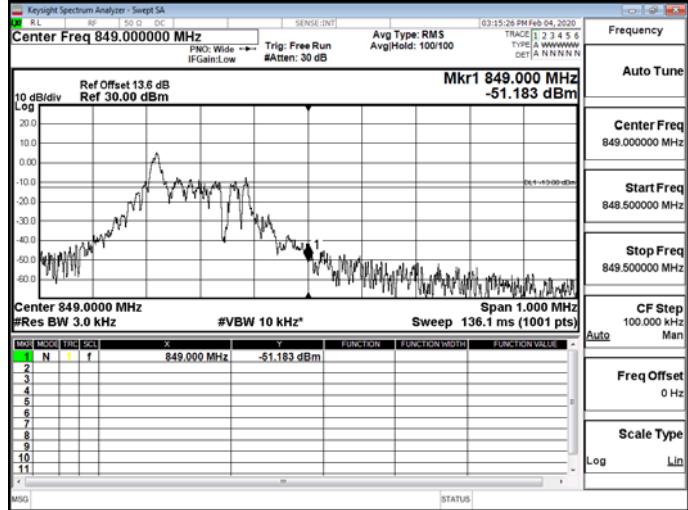
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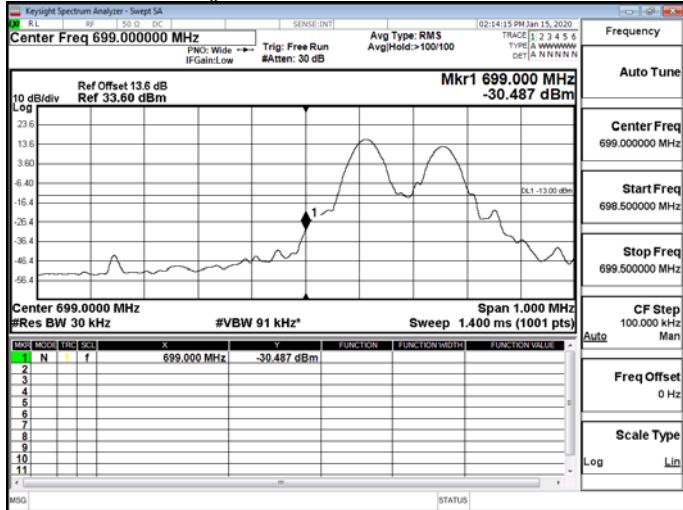


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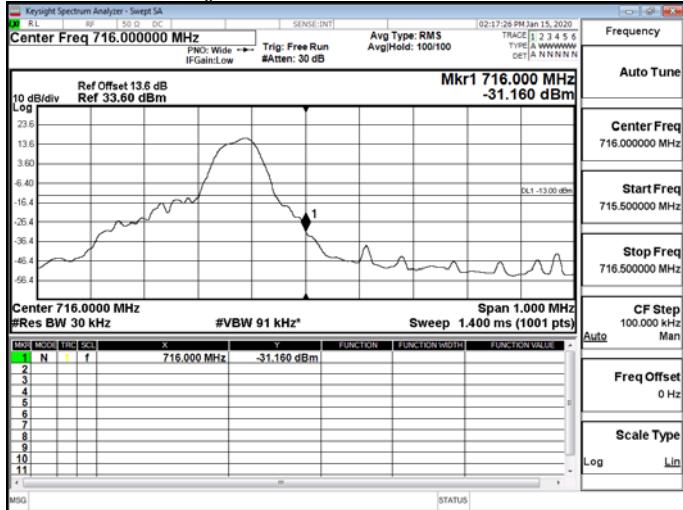
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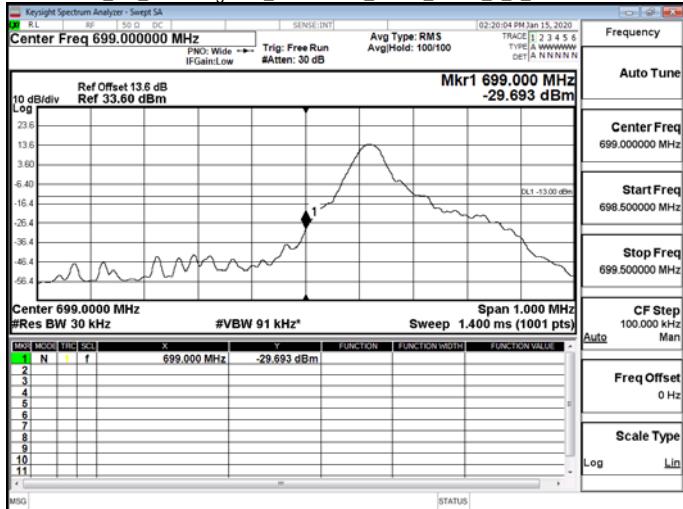
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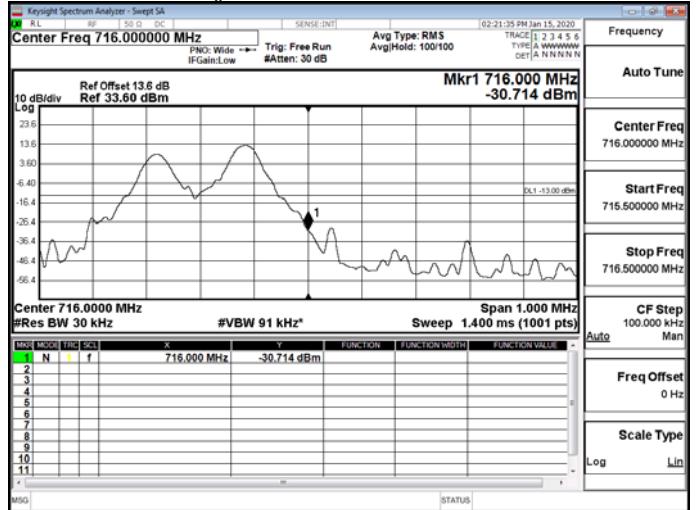
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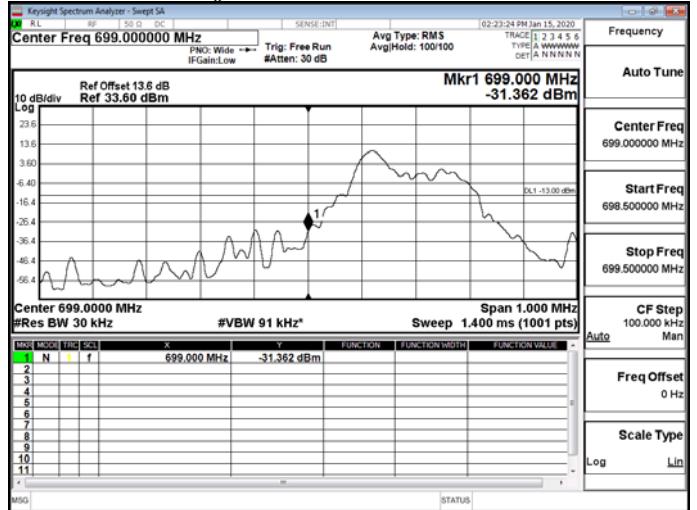
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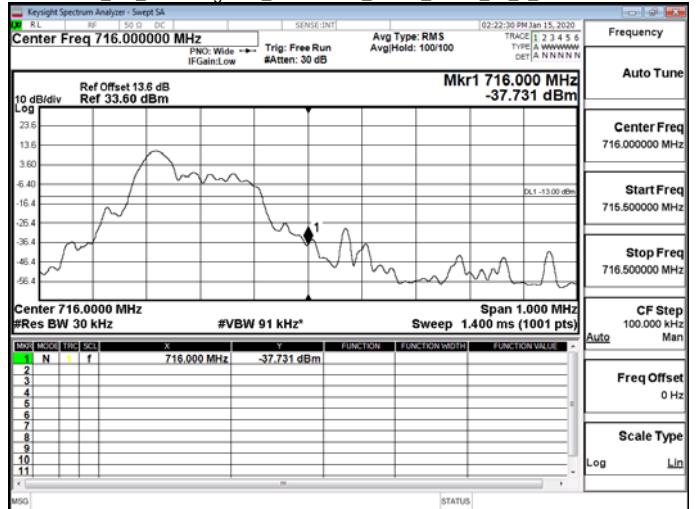
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NB\_IoT\_Band Edge\NB\_IoT\Band12\_15kHz\_QPSK\_12\_0\_CH23178



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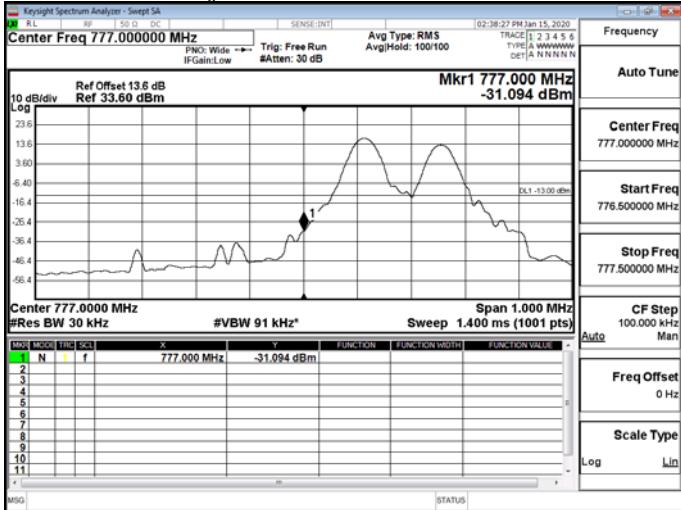
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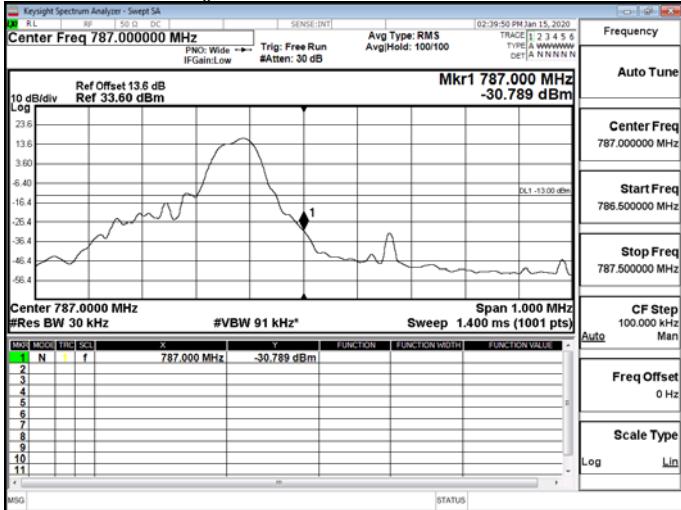
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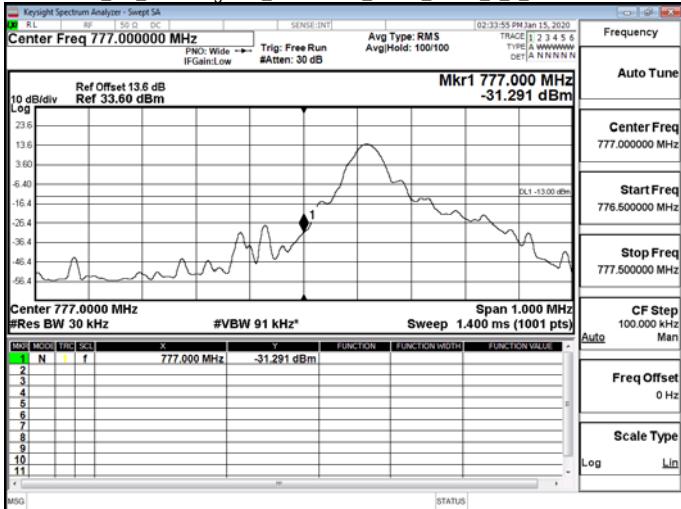
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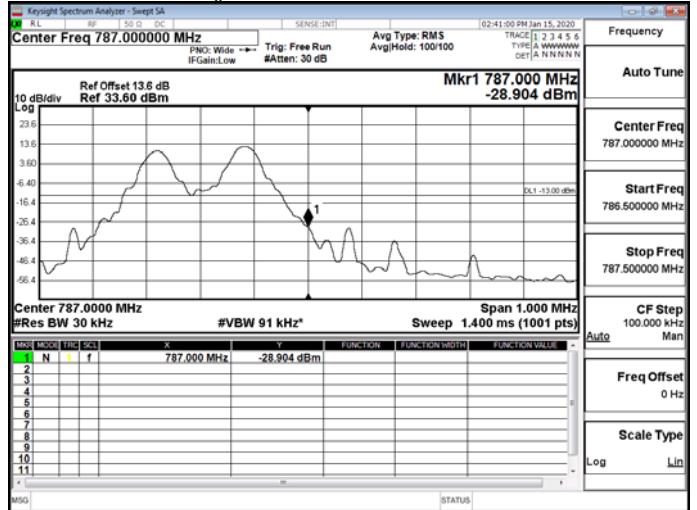
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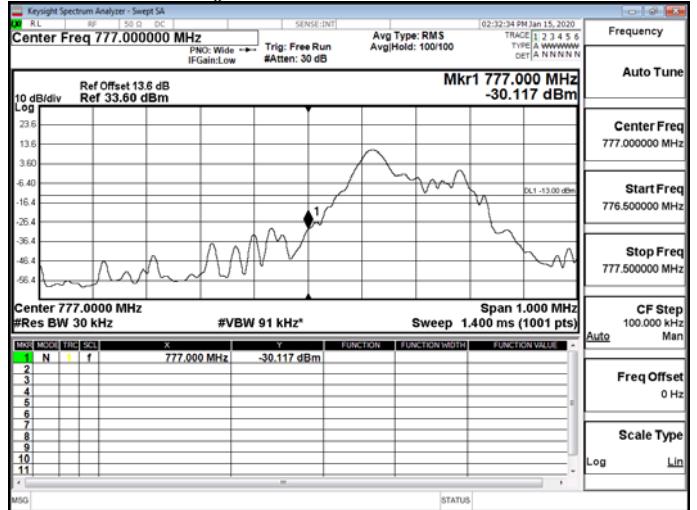
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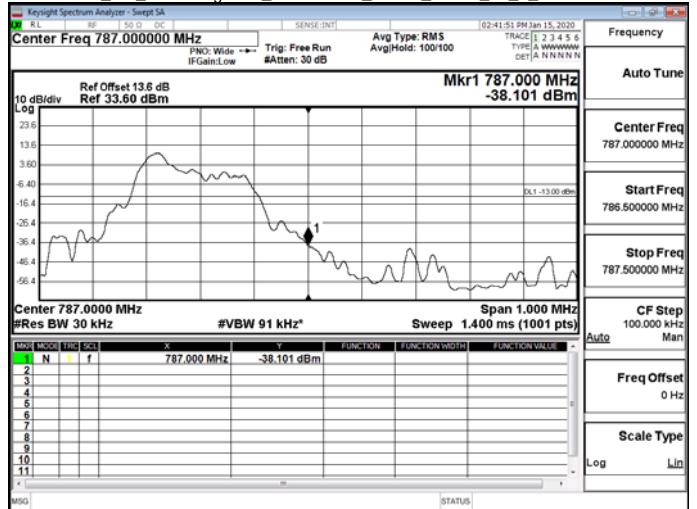
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NB\_IoT\_Band Edge\NB\_IoT\Band13\_15kHz\_QPSK\_12\_0\_CH23278



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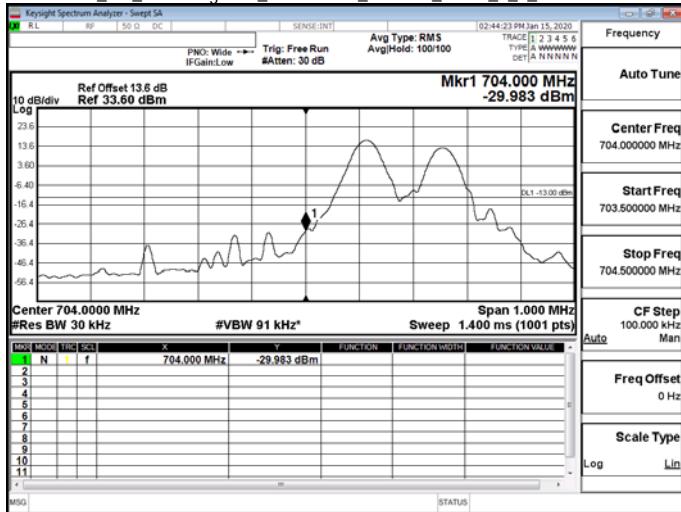
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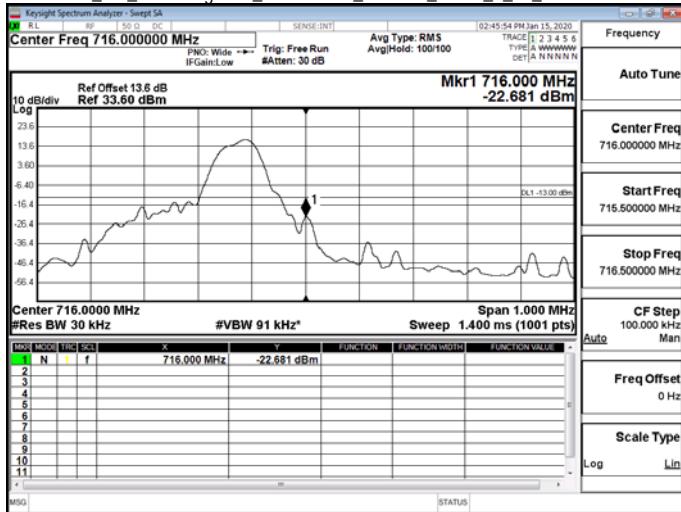
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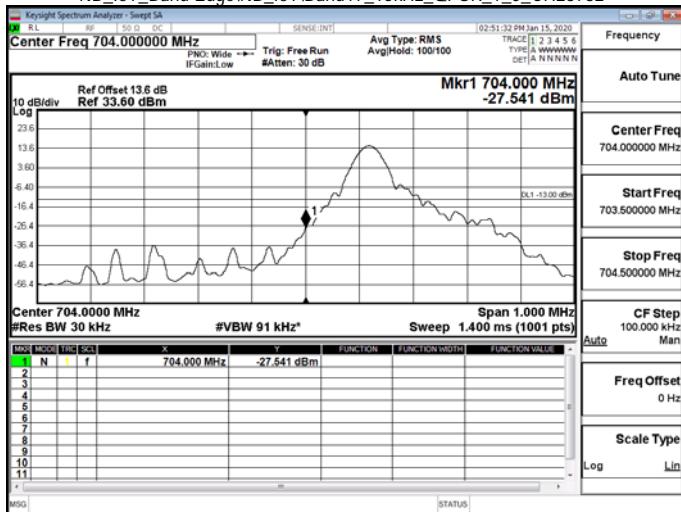
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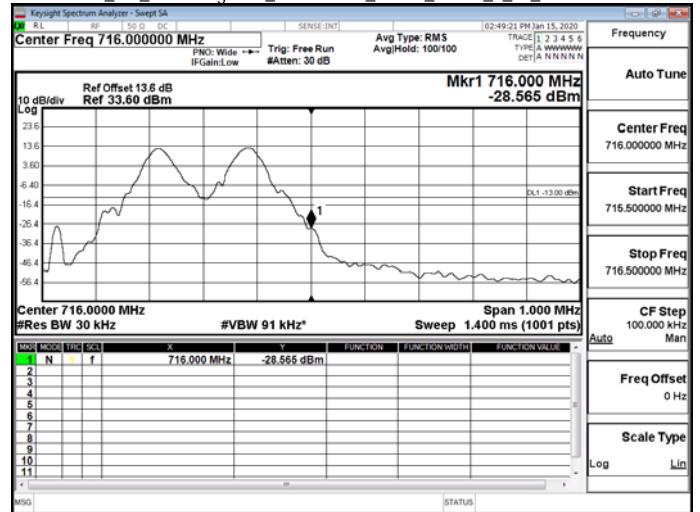
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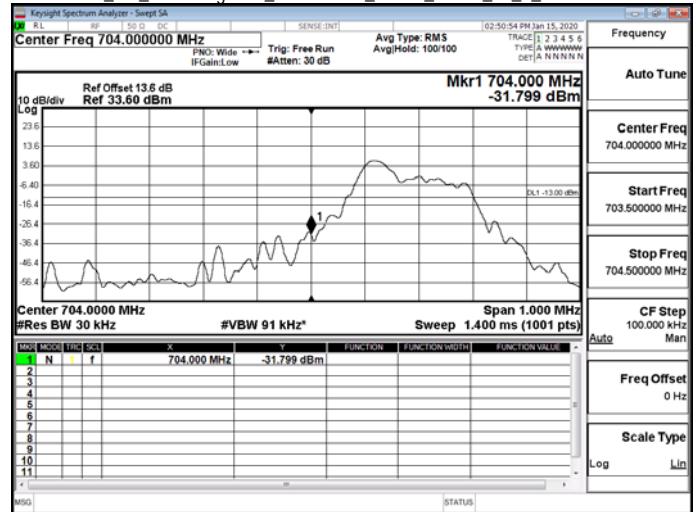
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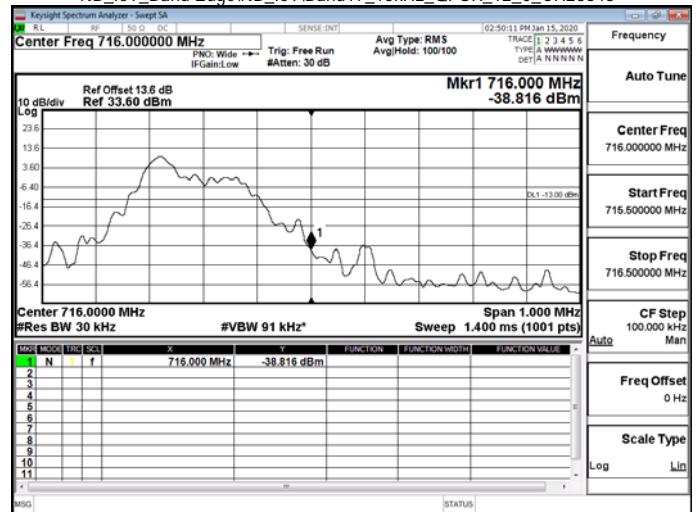
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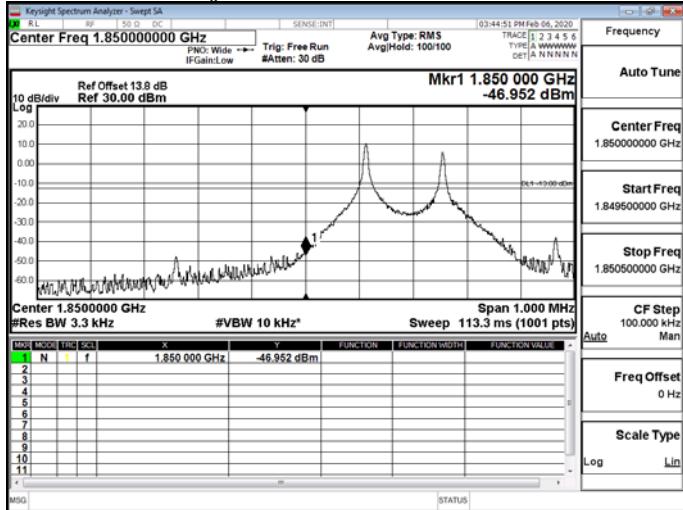
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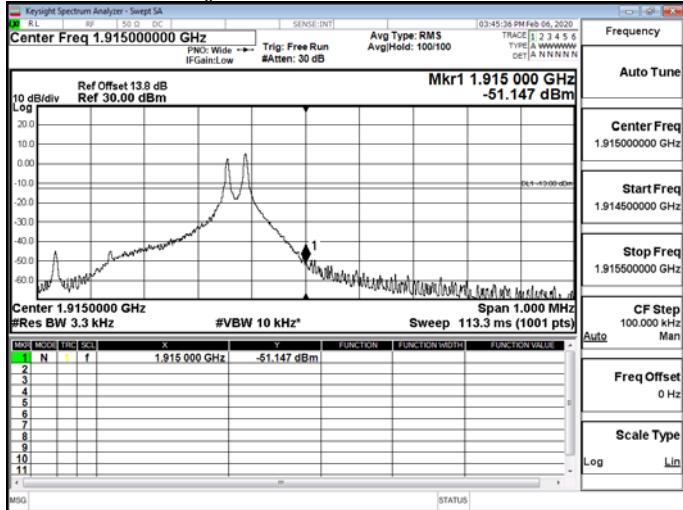
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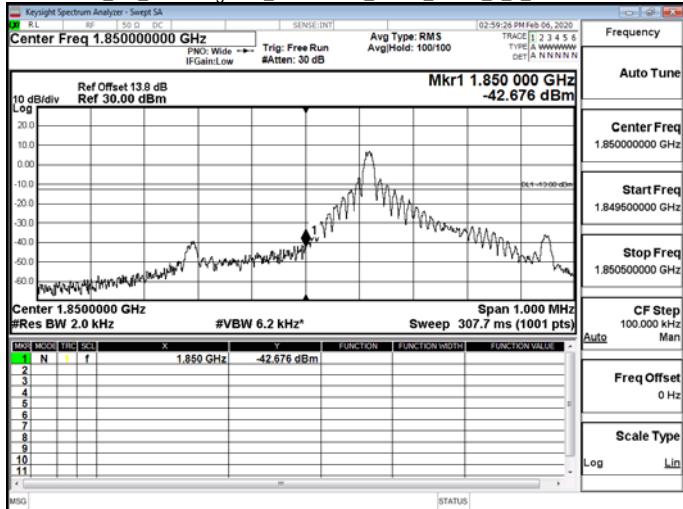
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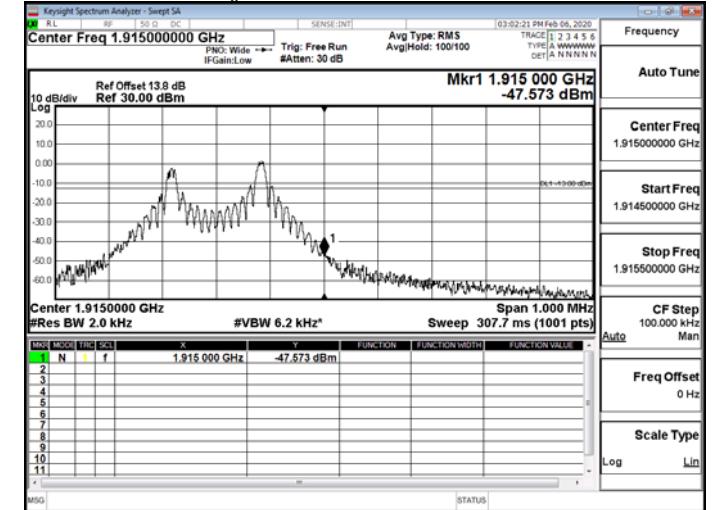
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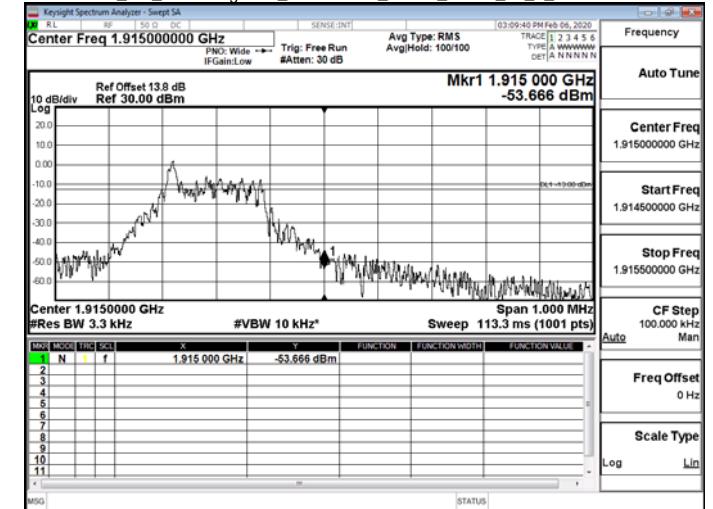
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NB\_IoT\_Band Edge\NB\_IoT\Band25\_15kHz\_QPSK\_12\_0\_CH26688



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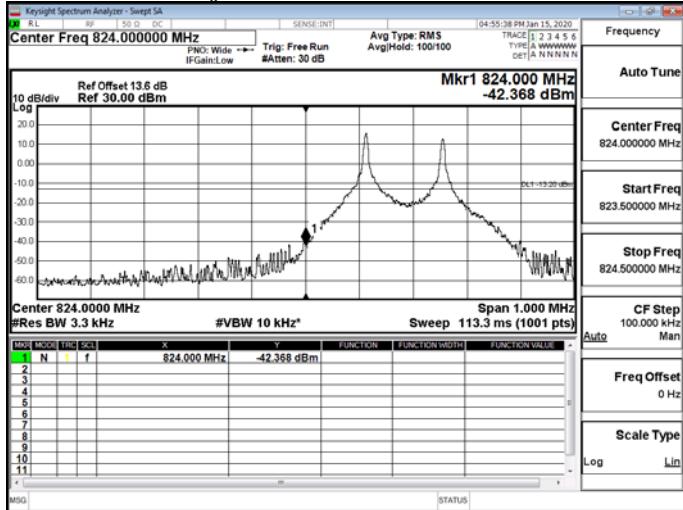
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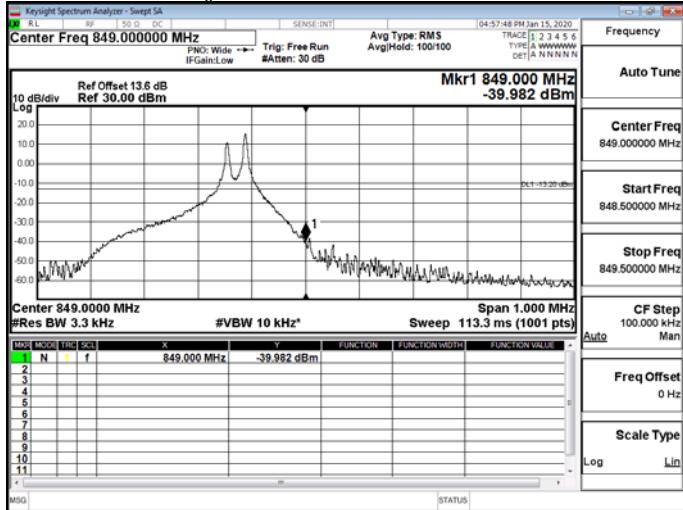
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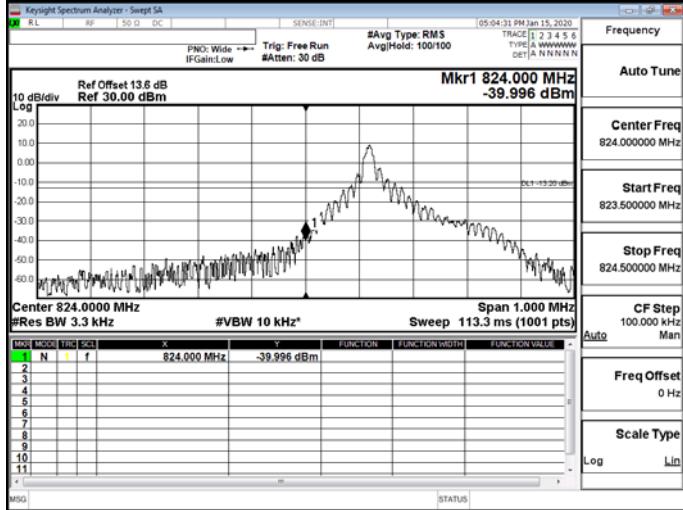
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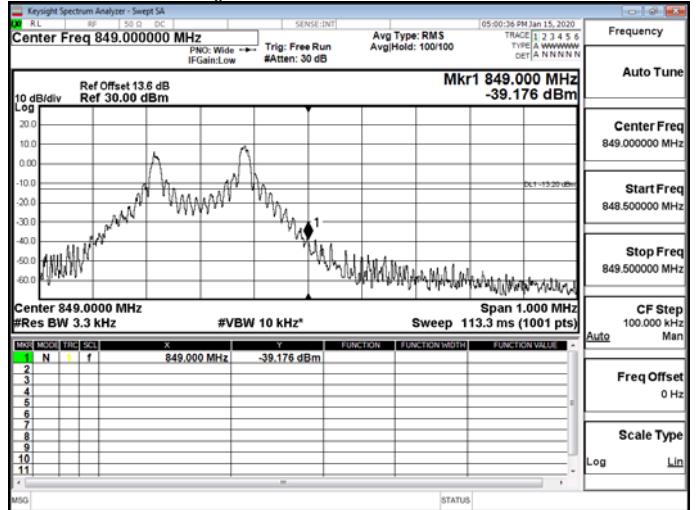
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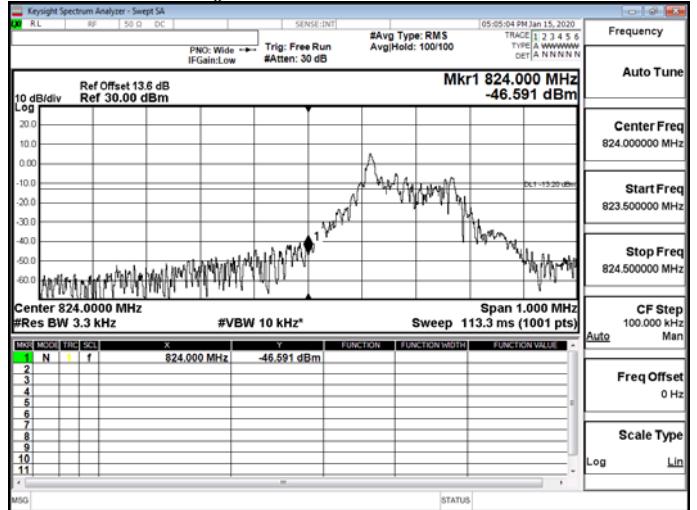
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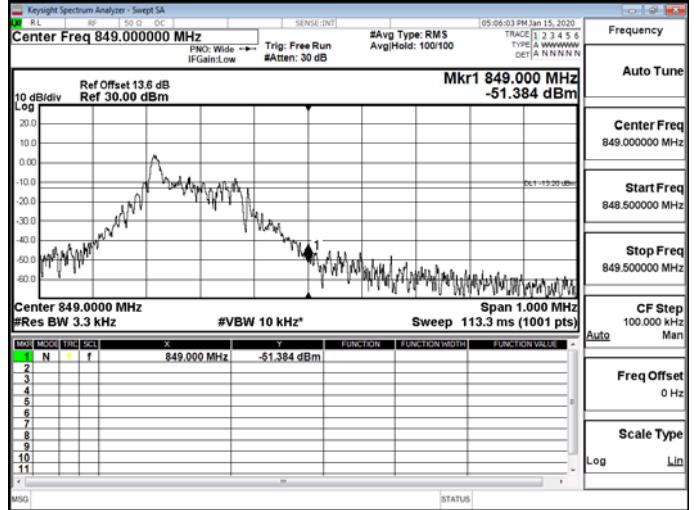
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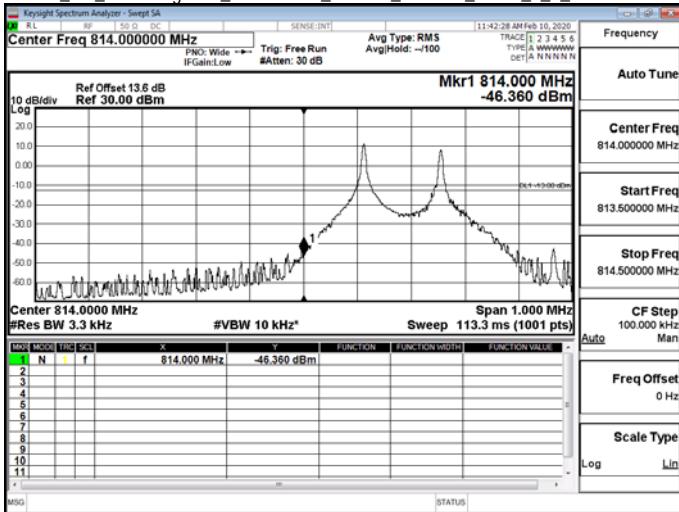
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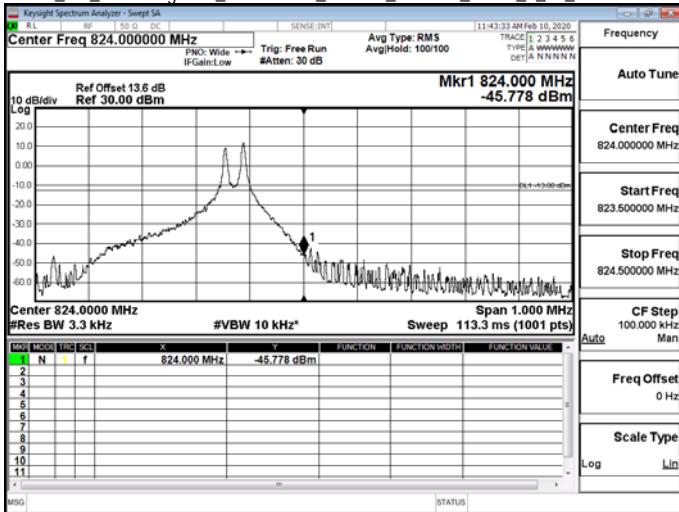
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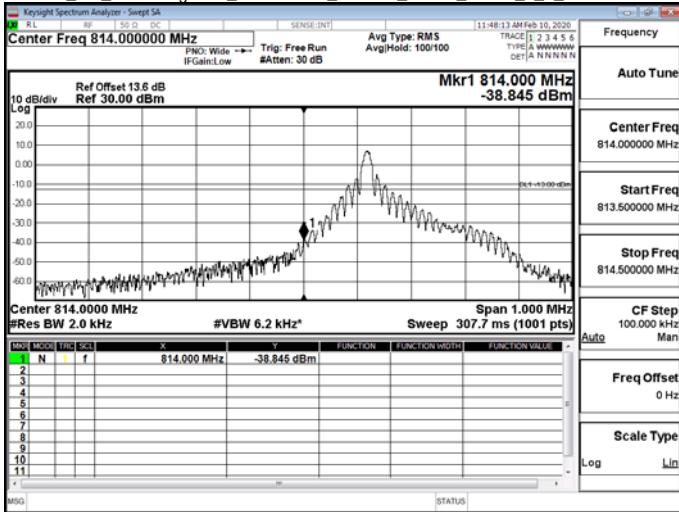
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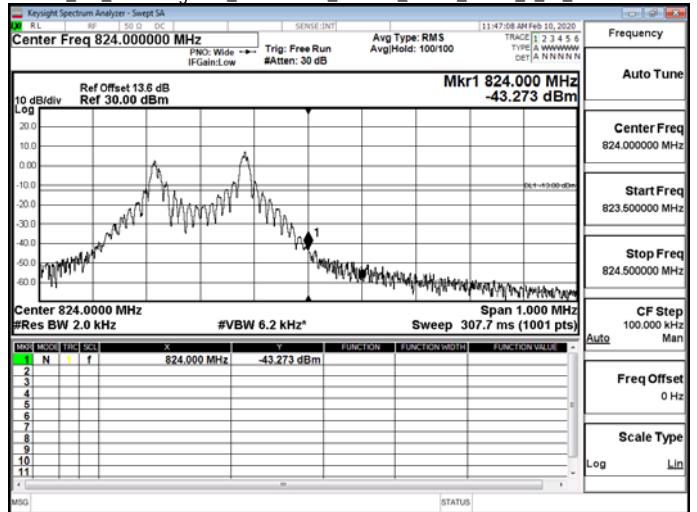
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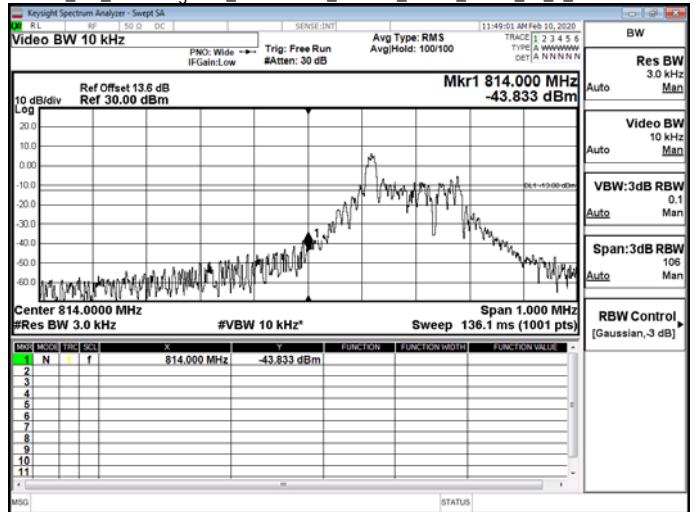
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NB\_IoT\_Band Edge\NB\_IoT\Band26\_Part90s\_15kHz\_QPSK\_1\_11\_CH26788



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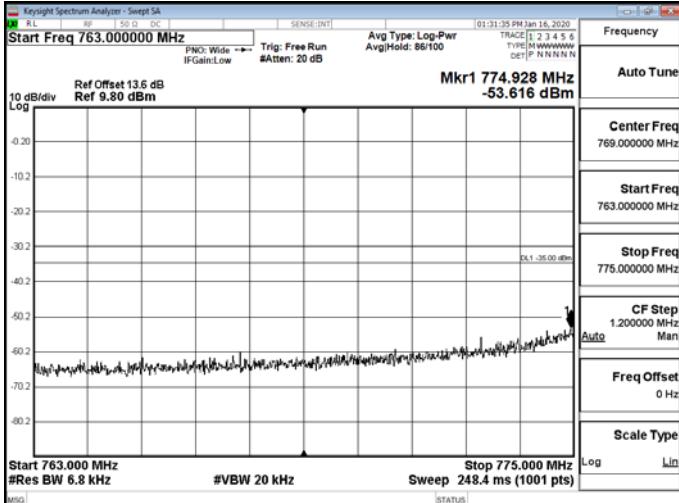
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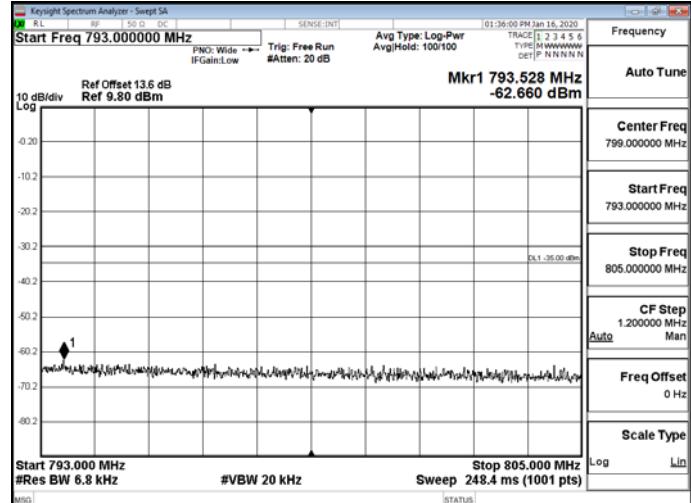
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## 8.5.2 Emissions outside the 746–758, 776–788 MHz

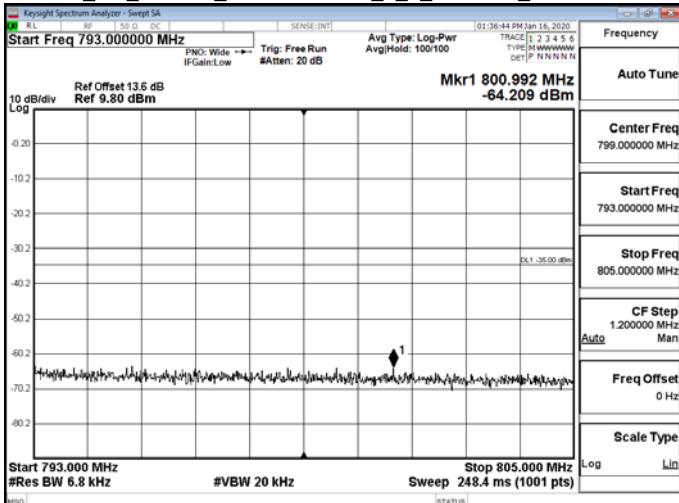
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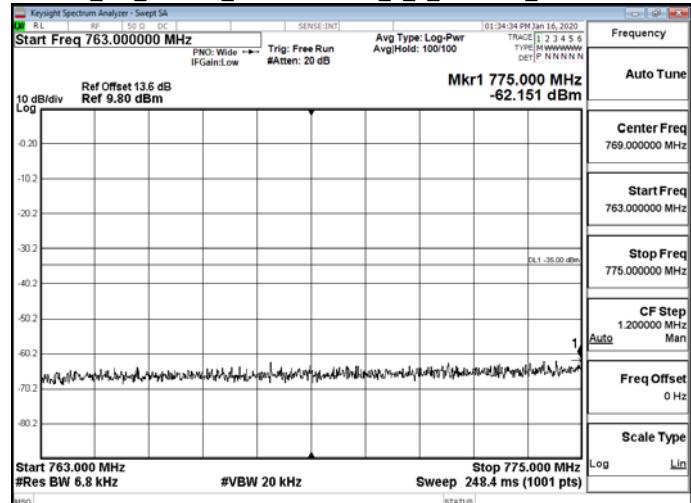
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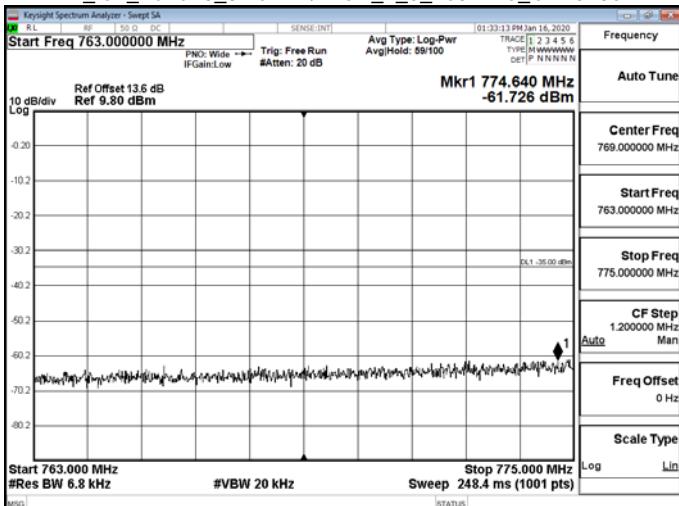
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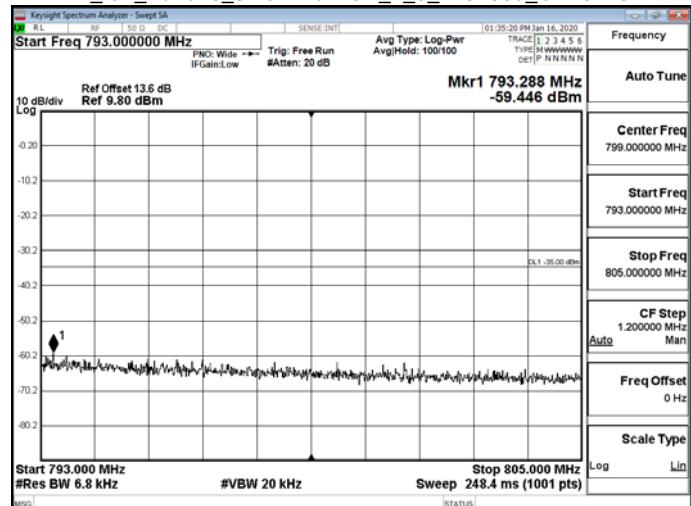
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NB\_IoT\_Band13\_3.75kHz|BPSK\_1\_0\_793~805\_CH23278



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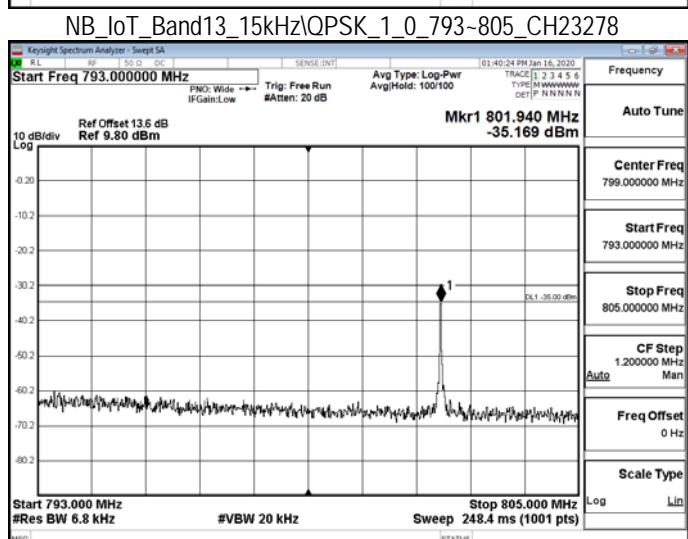
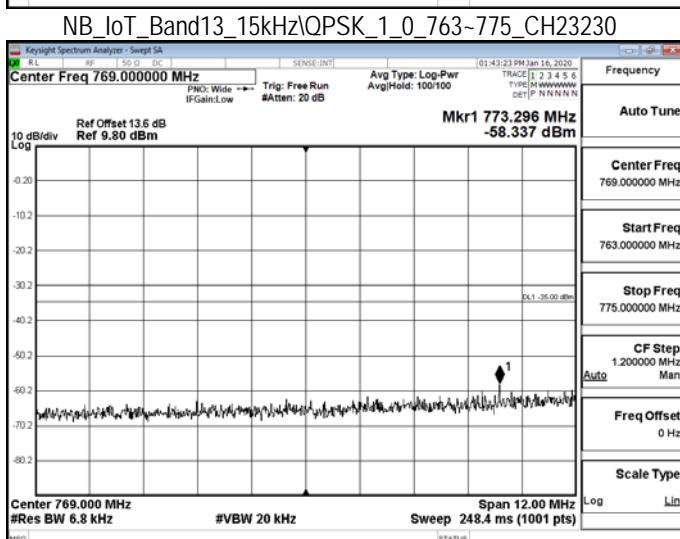
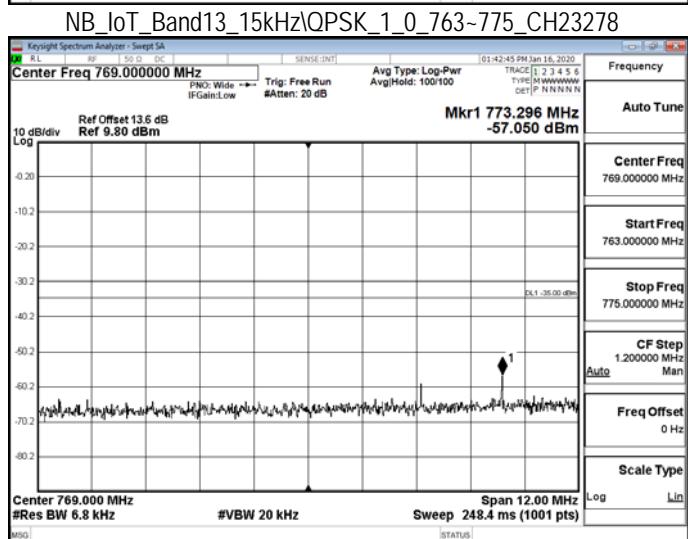
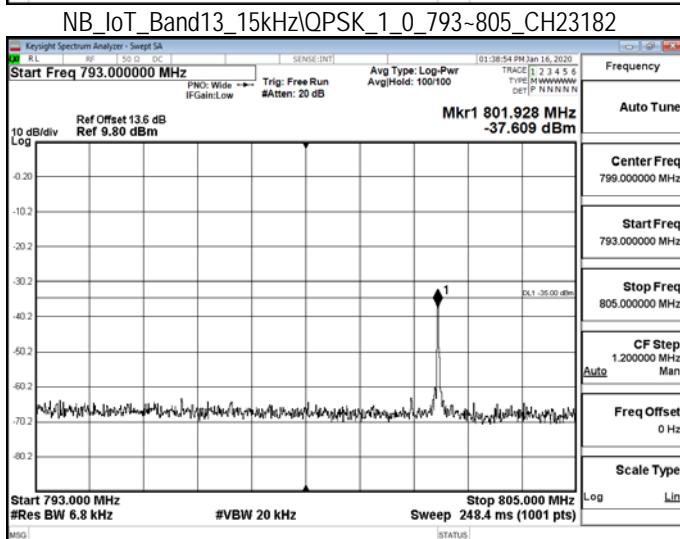
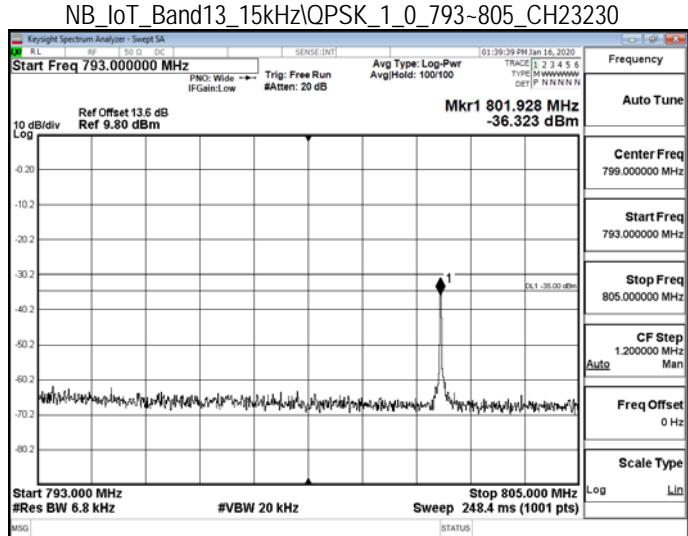
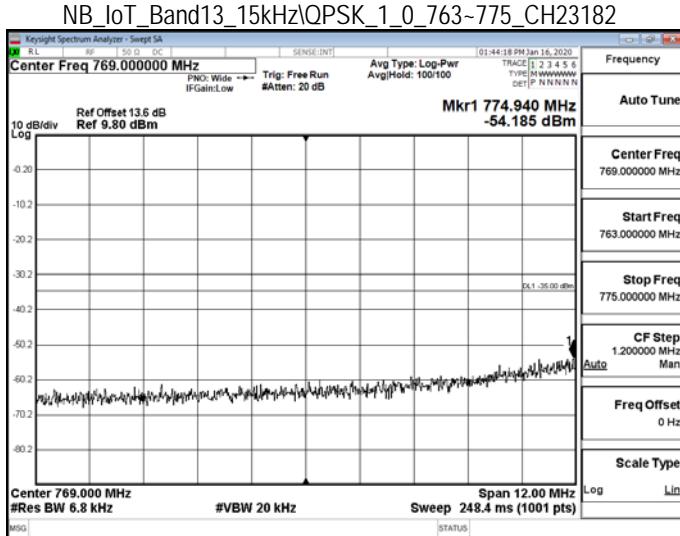
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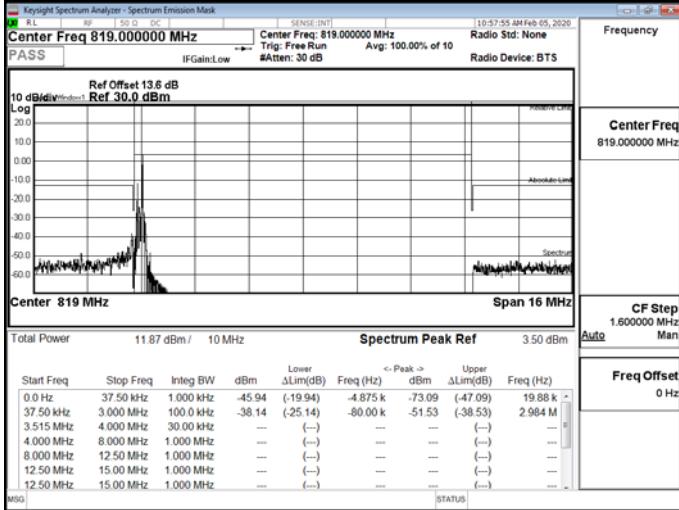
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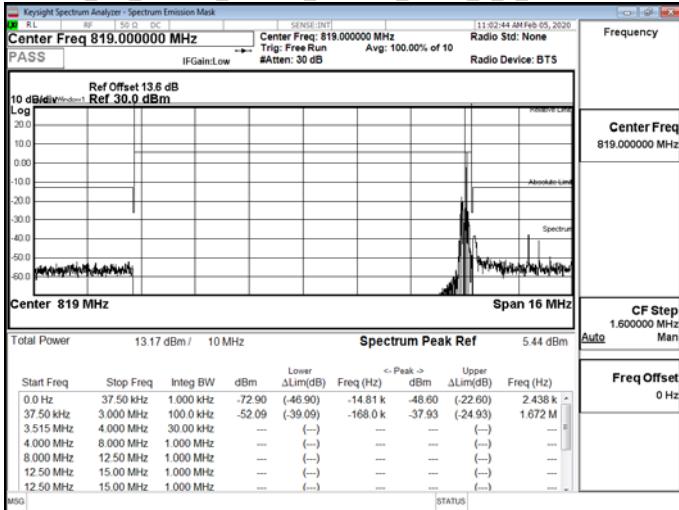


### 8.5.3 Emissions Mask

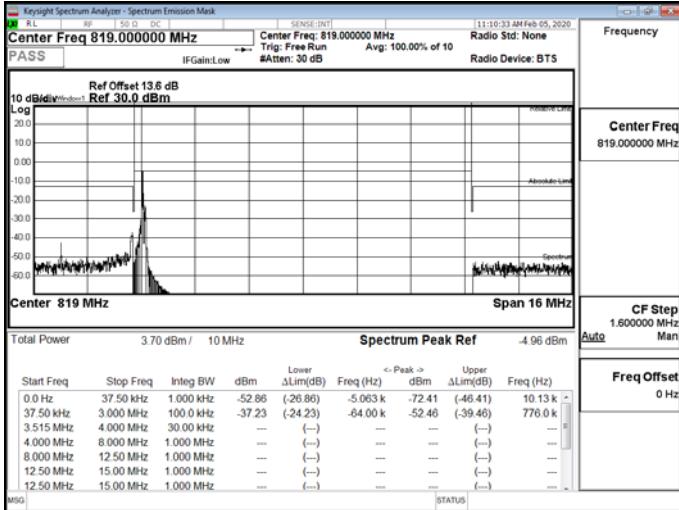
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NB\_IoT\_Band26\_Part90s\_3.75kHz\_BPSK\_1\_47\_CH26692



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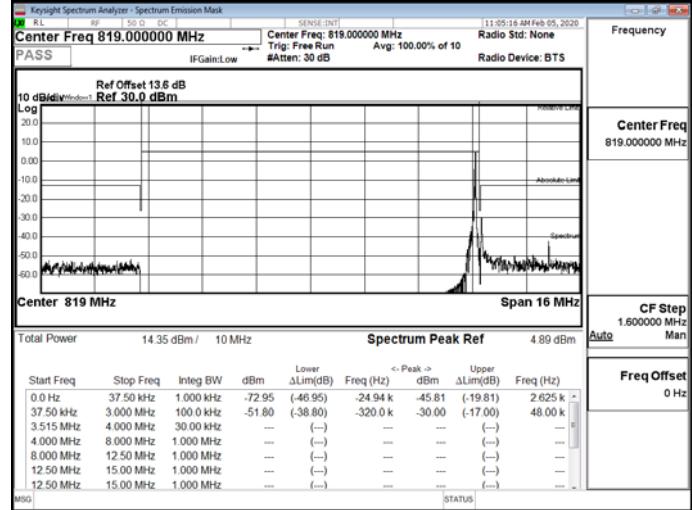
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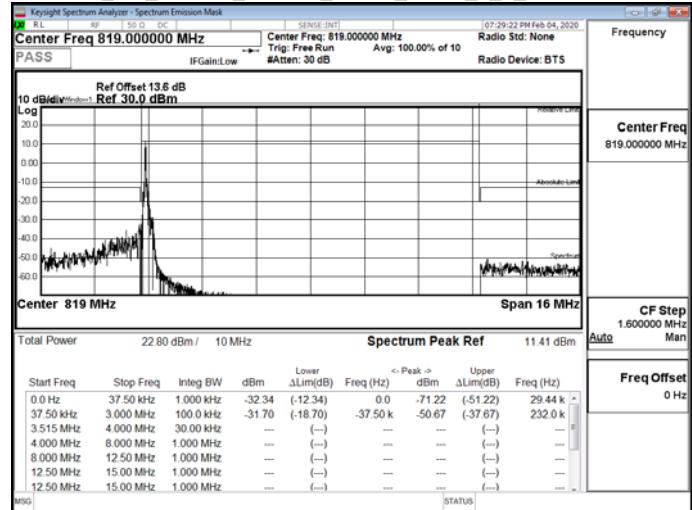
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