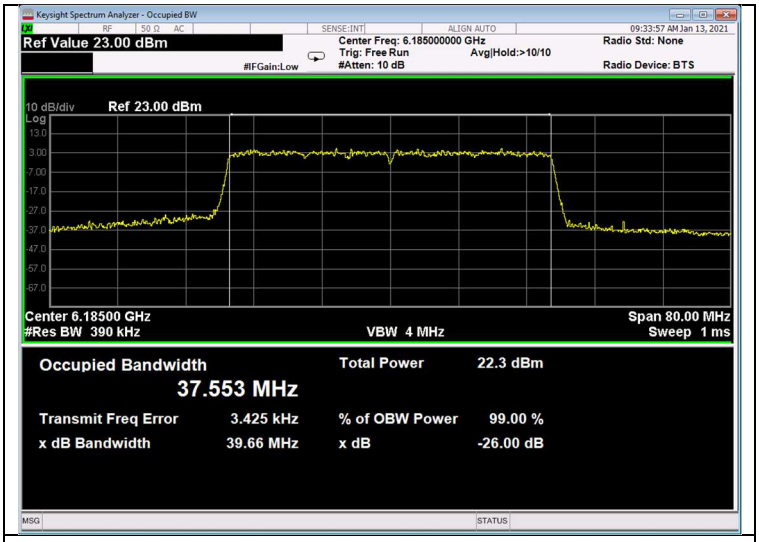


Figure 131. 6185.0MHz, 40MHz BW

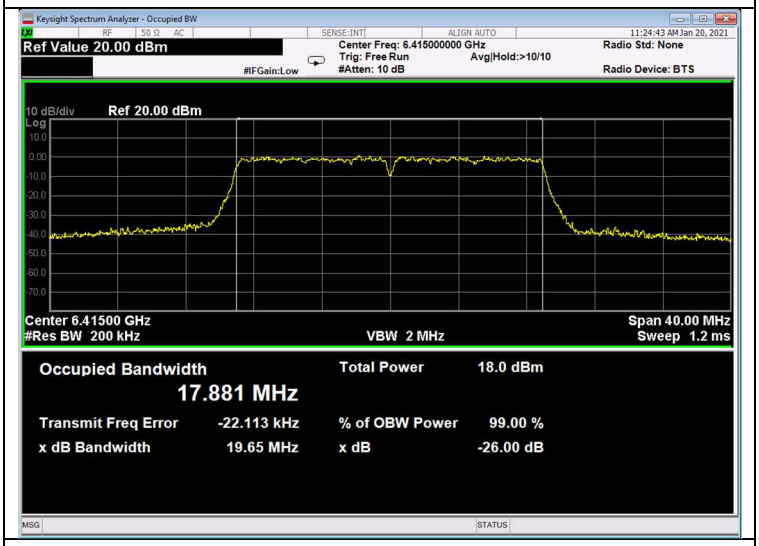


Figure 132. 6415.0MHz, 20MHz BW

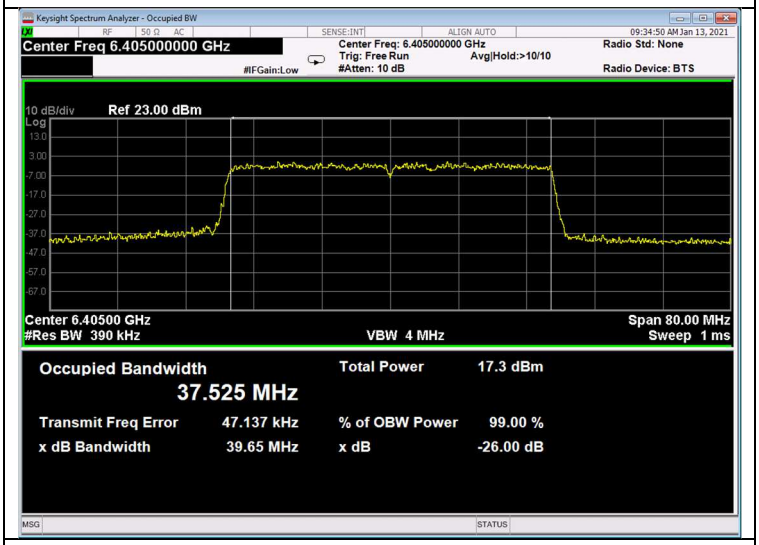


Figure 133. 6405.0MHz, 40MHz BW

9.5 Test Equipment Used; Occupied Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EXA Signal Analyzer	Agilent Technologies	N9010A	902A000401	March 1, 2019	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	Huber Suner	Sucofelex	28239/4PEA	August 23, 2020	August 31, 2021

Figure 134 Test Equipment Used

10. 26dB Bandwidth

10.1 Test Specification

FCC Part 2, Sub part J, Section 2.1049

10.2 Test Procedure

(Temperature (22°C)/ Humidity (56%RH))
The E.U.T. operation mode and test set-up are as described in Section 2 of this report. The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss= 31.0dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW set to the range of 1% of the EBW.

10.3 Test Limit

N/A

10.4 Test Results

BW (MHz)	Operation Frequency (MHz)	Reading (MHz)
20.0	5935.0	19.6
	6175.0	19.8
	6415.0	19.7
40.0	5945.0	39.7
	6185.0	39.5
	6405.0	39.5

Figure 135. 26dB Bandwidth Test Results, 2TX mode

BW (MHz)	Operation Frequency (MHz)	Reading (MHz)
20.0	5935.0	19.5
	6175.0	19.6
	6415.0	19.7
40.0	5945.0	39.7
	6185.0	39.7
	6405.0	39.7

Figure 136. 26dB Bandwidth Test Results, 4TX mode

JUDGEMENT: Passed

See additional information in Figure 137 to Figure 148.

2TX mode:

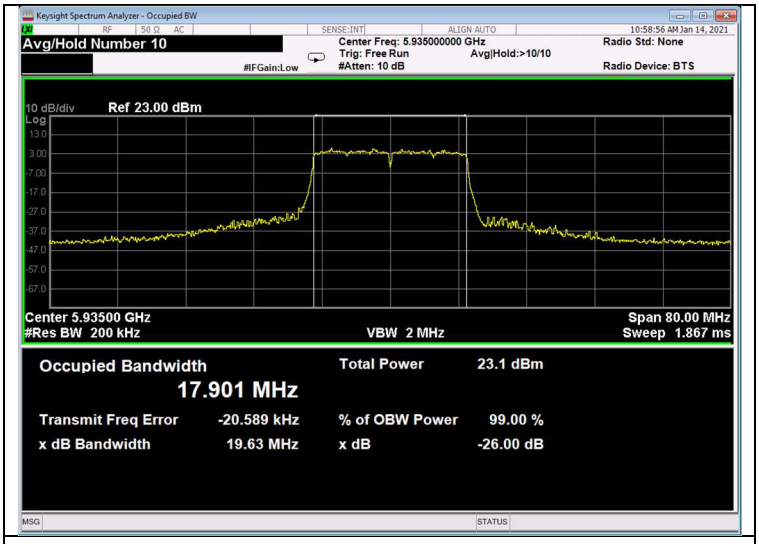


Figure 137. 5935.0MHz, 20MHz BW

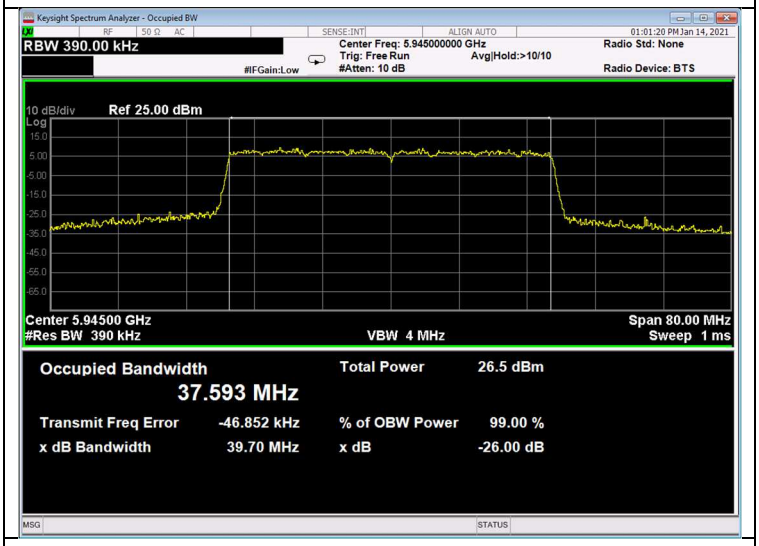


Figure 138. 5945.0MHz, 40MHz BW

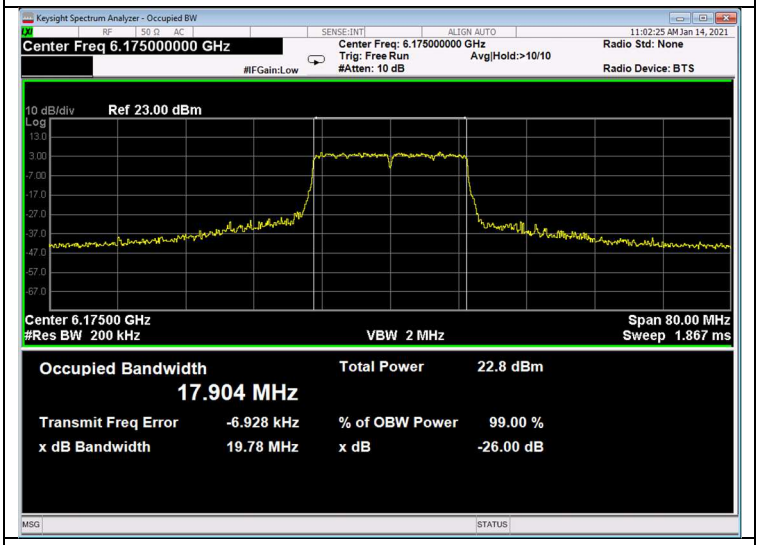


Figure 139. 6175.0MHz, 20MHz BW

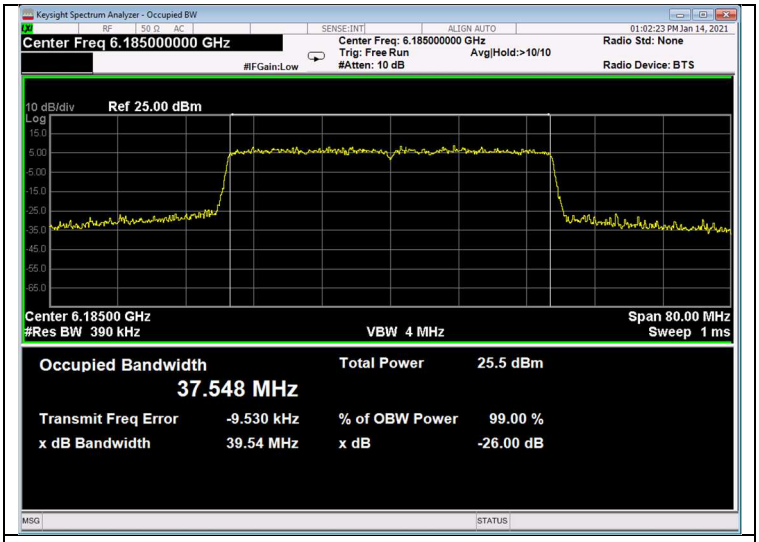


Figure 140. 6185.0MHz, 40MHz BW

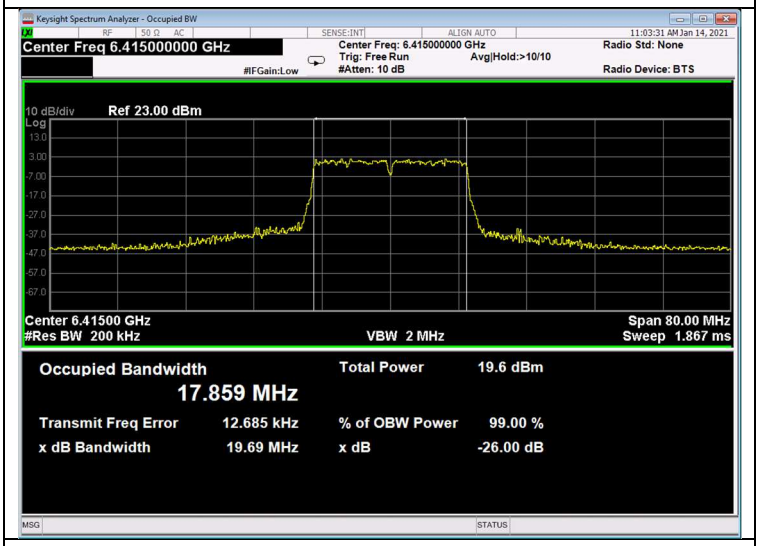


Figure 141. 6415.0MHz, 20MHz BW

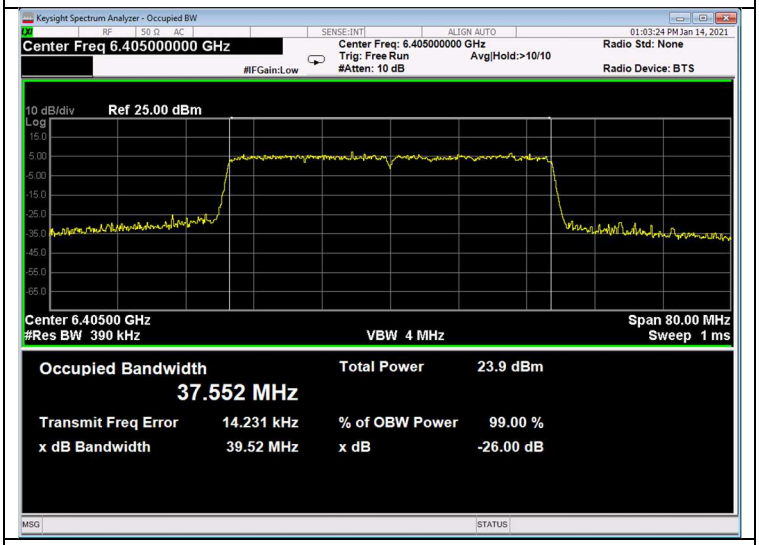


Figure 142. 6405.0MHz, 40MHz BW

4TX mode:

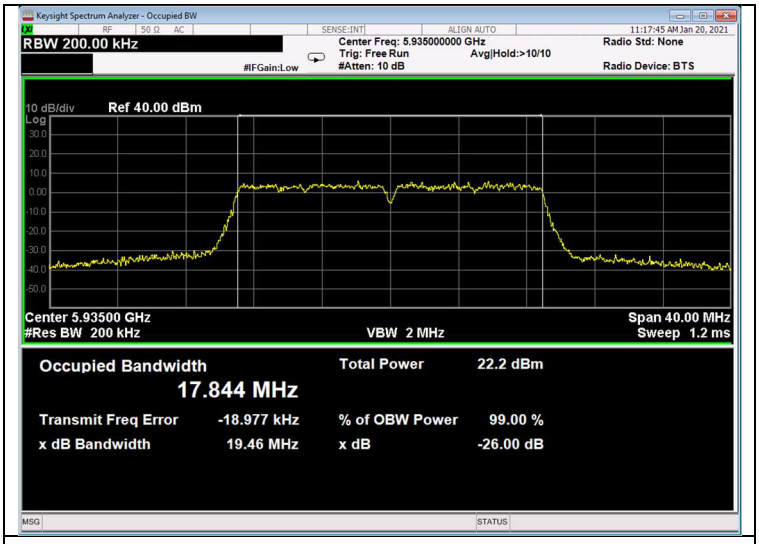


Figure 143. 5935.0MHz, 20MHz BW

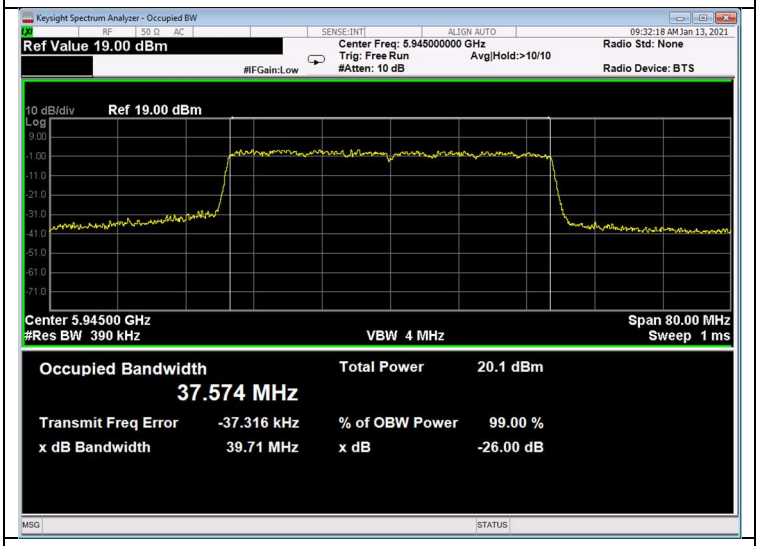


Figure 144. 5945.0MHz, 40MHz BW

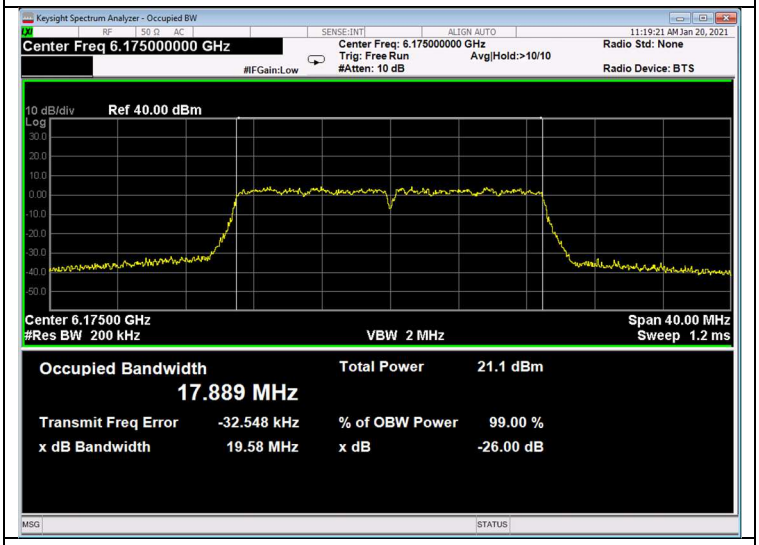


Figure 145. 6175.0MHz, 20MHz BW

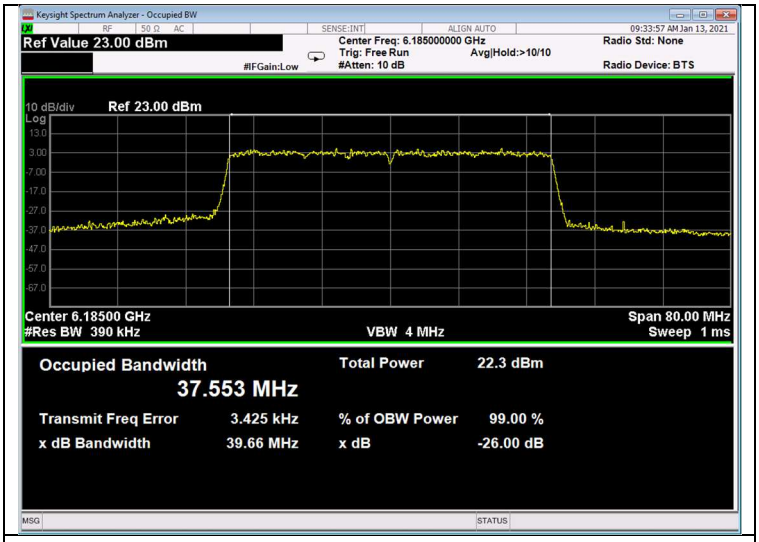


Figure 146. 6185.0MHz, 40MHz BW

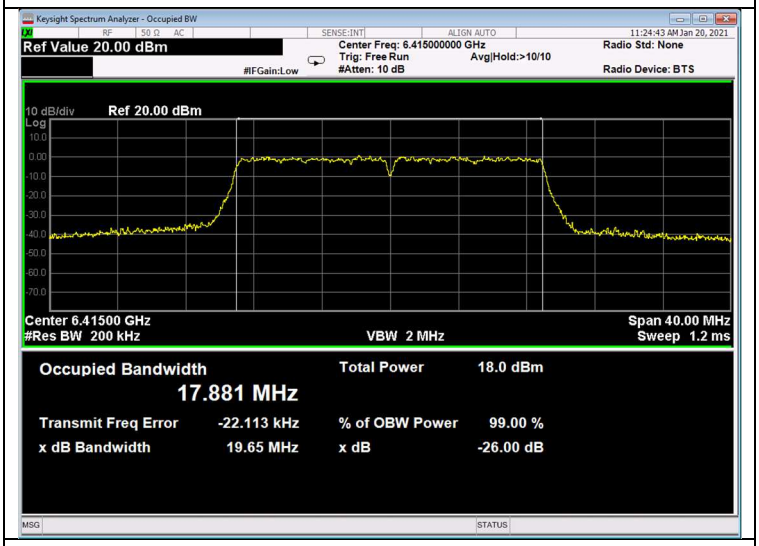


Figure 147. 6415.0MHz, 20MHz BW

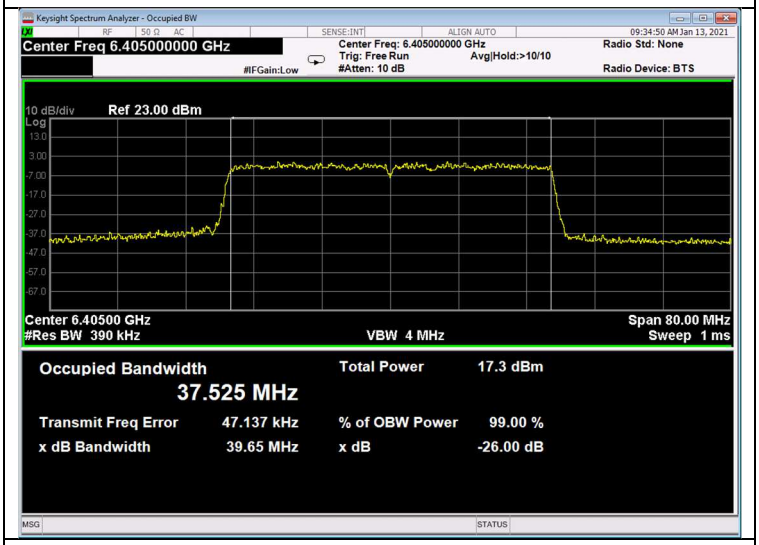


Figure 148. 6405.0MHz, 40MHz BW

10.5 Test Equipment Used; 26dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EXA Signal Analyzer	Agilent Technologies	N9010A	902A000401	March 1, 2019	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	Huber Suner	Sucofelex	28239/4PEA	August 23, 2020	August 31, 2021

Figure 149 Test Equipment Used

11. In-band Emission Mask

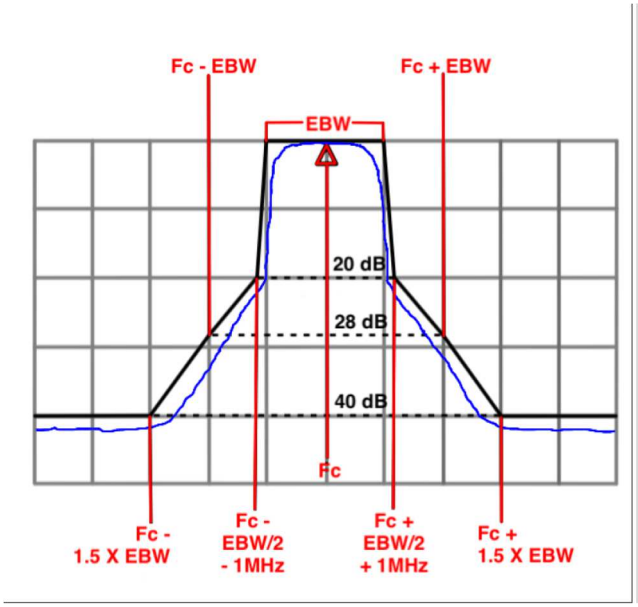
11.1 Test Specification

FCC, Part 2, Sub part J, Section 2.1049
RSS-Gen, Issue 5, March 2019, Amendment 1, Section 4.7.2(b)

11.2 Test Procedure

(Temperature (22°C)/ Humidity (56%RH))
The E.U.T. operation mode and test set-up are as described in Section 2 of this report. The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss= 31.0dB). Special attention was taken to prevent Spectrum Analyzer RF input overload. Test procedure was performed according to Section J in KDB 987594.

11.3 Test Limit



11.4 Test Results

JUDGEMENT: Passed

See additional information in *Figure 150* to *Figure 161*.

2TX mode:

Figure 150. 5935.0MHz, 20MHz BW

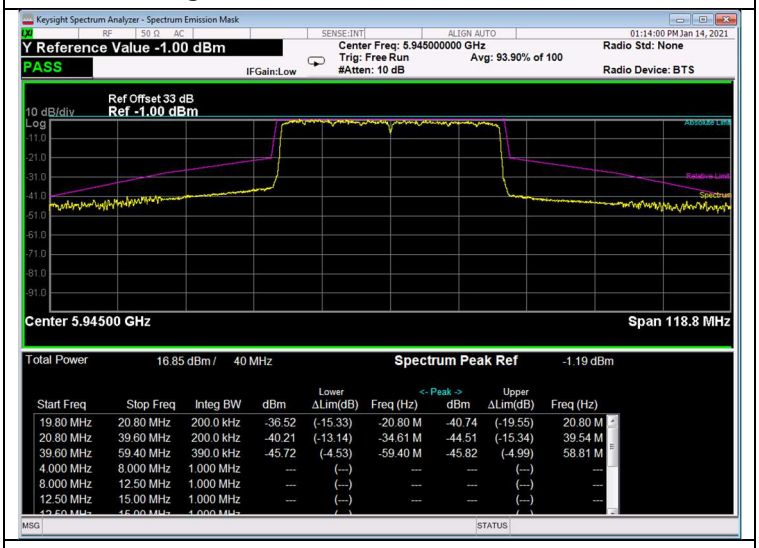


Figure 151. 5945.0MHz, 40MHz BW

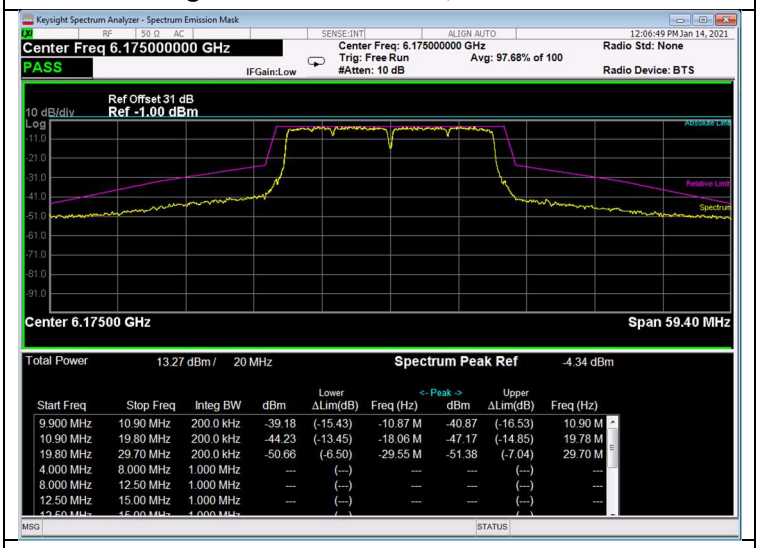


Figure 152. 6175.0MHz, 20MHz BW

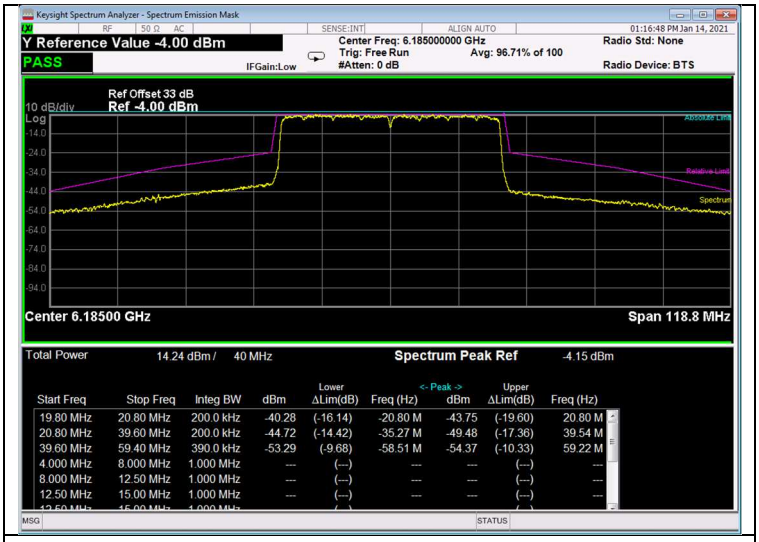


Figure 153. 6185.0MHz, 40MHz BW

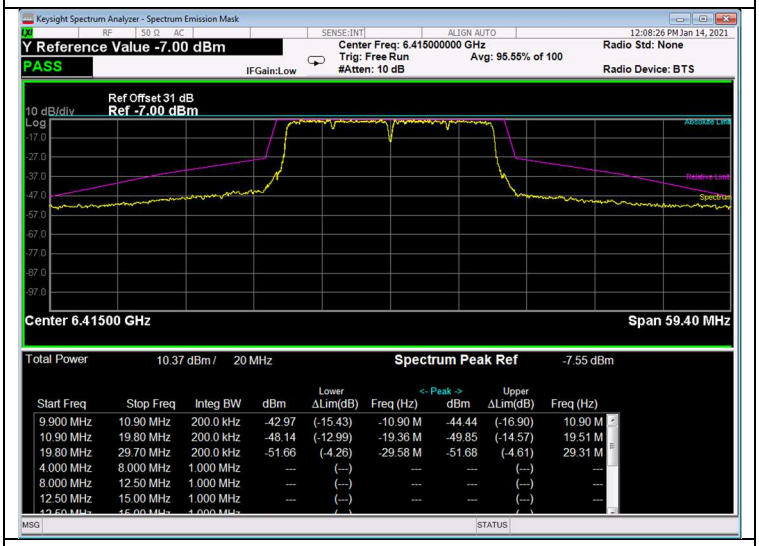


Figure 154. 6415.0MHz, 20MHz BW

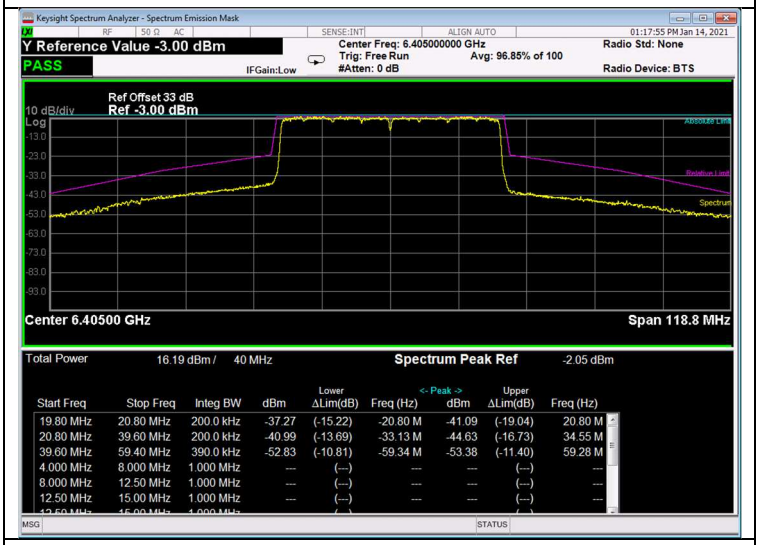


Figure 155. 6405.0MHz, 40MHz BW

4TX mode:

Figure 156. 5935.0MHz, 20MHz BW

Figure 157. 5945.0MHz, 40MHz BW

Figure 158. 6175.0MHz, 20MHz BW

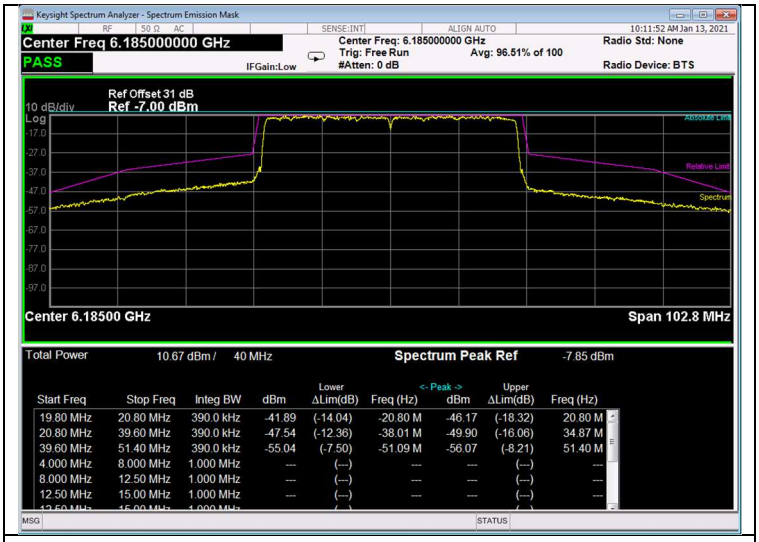


Figure 159. 6185.0MHz, 40MHz BW

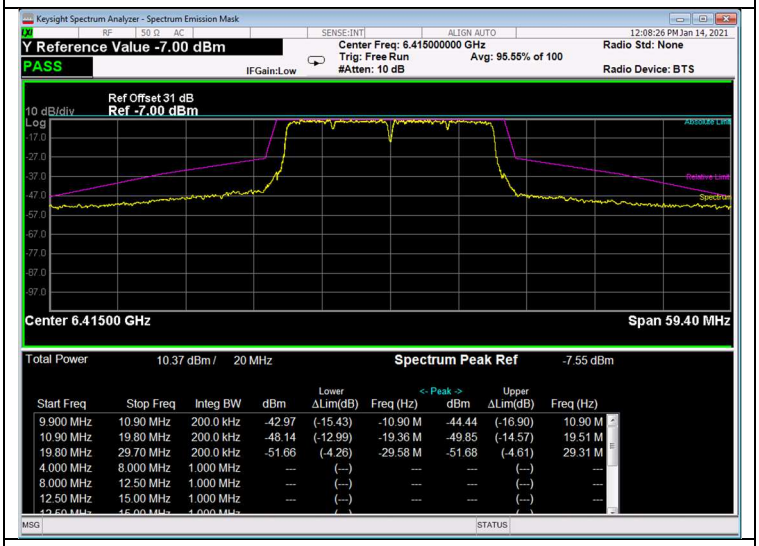


Figure 160. 6415.0MHz, 20MHz BW

Figure 161. 6405.0MHz, 40MHz BW

11.5 Test Equipment Used; In-band Emission Mask

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EXA Signal Analyzer	Agilent Technologies	N9010A	902A000401	March 1, 2019	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	Huber Suner	Sucofelex	28239/4PEA	August 23, 2020	August 31, 2021

Figure 162 Test Equipment Used

12. Contention Based Protocol

12.1 Test Specification

KDB 987594 D02 U-NII 6GHz EMC Measurement v01
RSS 248 Issue 1 November 19, 2021, Section 4.8

12.2 Test Procedure

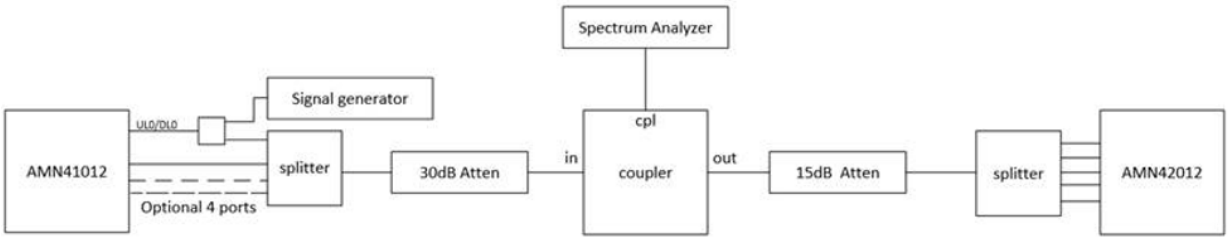
(Temperature (22°C)/ Humidity (56%RH))
Test procedure was performed according to Section I in KDB 987594.

1. The EUT was configured to transmit with a constant duty cycle at the power level, frequency, BW listed in the result table.
2. An AWGN signal of 10 MHz-wide was generated and the AWGN power injected was calibrated to -60dBm at the EUT RF connector assuming 0dBi antenna gain
3. The setup shown below per KDB 851776 was connected to the setup.
4. The EUT was set to 20MHz BW and was set to transmit at 5935MHz, as shown in figure 105.
5. The AWGN signal was set to the center frequencies 5930MHz (according to table 1 of KDB987594 D02) at AWGN signal power of -85dBm (which is 25 dB below the -62 dBm threshold when assuming 0dBi antenna gain).
6. The AWGN signal source was turned ON.
7. The AWGN signal was increased until the EUT stopped transmitting. The level of the AWGN signal is listed in the results table.
8. The procedure was repeated 10 times to verify the EUT can detect an AWGN signal at the same level.
9. The process was repeated for 40MHz BW performance: at the AWGN signal center frequencies of 5930MHz and 5960MHz for a 40MHz wide EUT signal transmitting at 5945MHz (according to table 1 of KDB987594 D02).
10. The procedure was repeated 10 times to verify the EUT can detect an AWGN signal at the same level.

12.3 Test Procedure Modification

Contention based protocol setup was done in link mode, which was approved by the FCC in KDB851776. The setup is shown in the following scheme.

AMN41012 – UNII5 – Contention Based Protocol Setup



12.4 Test Limit

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain.

12.5 Test Results

EUT frequency	BW_{EUT}	Incumbent frequency	BW_{inc}	AWGN Power	Ant gain	Adjusted AWGN Power	Detection Limit	Number success/ Number of trials	verdict
F_{c1}[MHz]	[MHz]	F_{c2}[MHz]	[MHz]	[dBm]	[dBi]	[dBm]	[dBm]		p/f
5935	20	5930	10	-68.5	2	-70.5	-62	10/10	pass
5945	40	5930	10	-67.5	2	-69.5	-62	10/10	pass
5945	40	5960	10	-67.5	2	-69.5	-62	10/10	pass

BW_{EUT}: Transmission bandwidth of EUT signal

BW_{INC}: Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)

Fc1: Center frequency of EUT transmission

Fc2: Center frequency of simulated incumbent signal

AWGN Power:

- AWGN power turned ON at -85dBm = no impact on transmission, starting from -85dBm, which is 25dB below the -62dBm defined threshold assuming 0dBi antenna gain
- Minimal = this condition is not supported due to technical design
- AWGN power listed in the table = detection of incumbent signal and transmitter evacuated of the center frequency

JUDGEMENT: Pass

Criteria for Pass: evacuation of channel when interferer was detected

The channel was vacated at every trial.

See additional information in *Figure 164* to *Figure 169.*

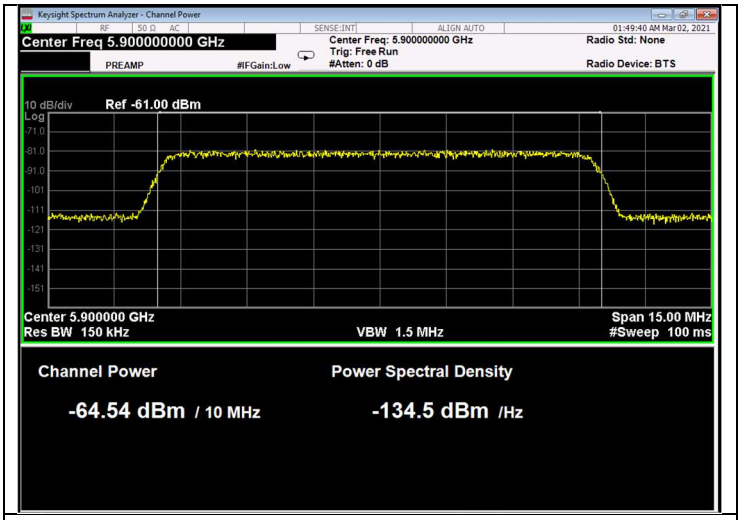


Figure 163. AWGN Signal

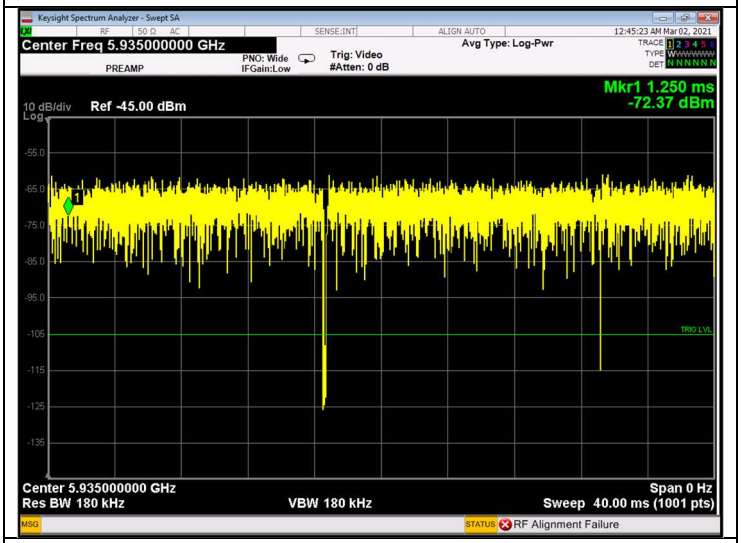


Figure 164. E.U.T transmission 5935.0MHz (20MHz BW) incumbent signal 5930.0MHz OFF

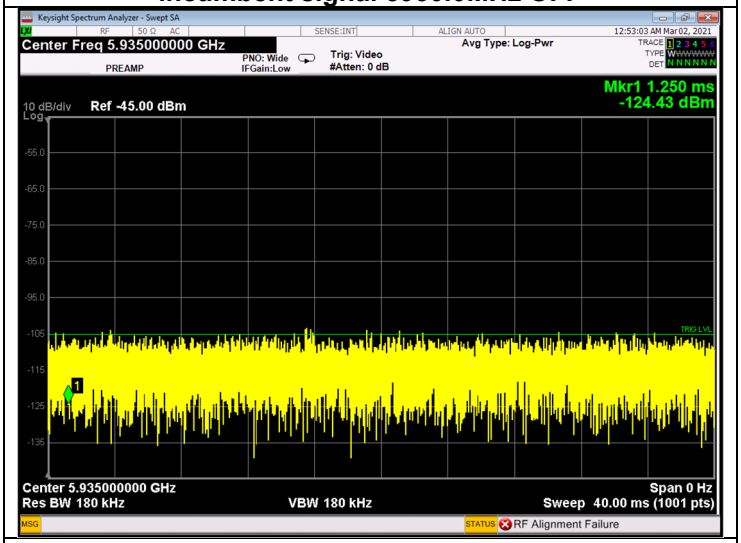


Figure 165. E.U.T cease transmission 5935.0MHz (20MHz BW) incumbent signal 5930.0MHz ON

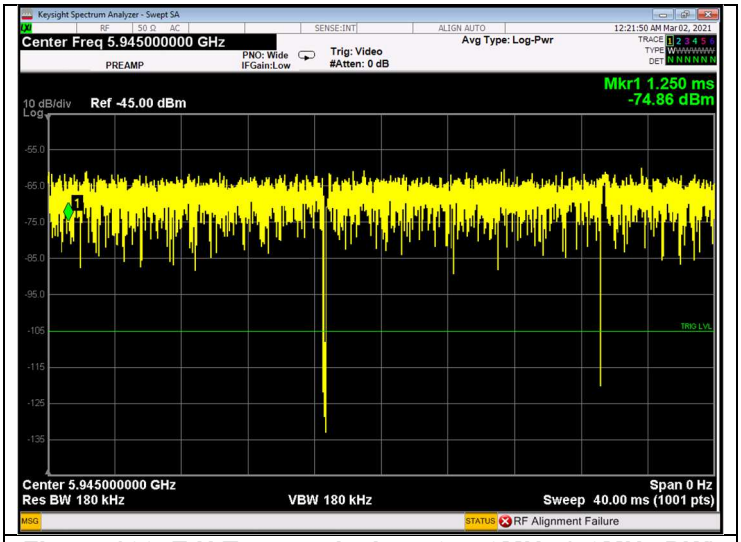


Figure 166. E.U.T transmission 5945.0MHz (40MHz BW) incumbent signal 5930.0MHz OFF

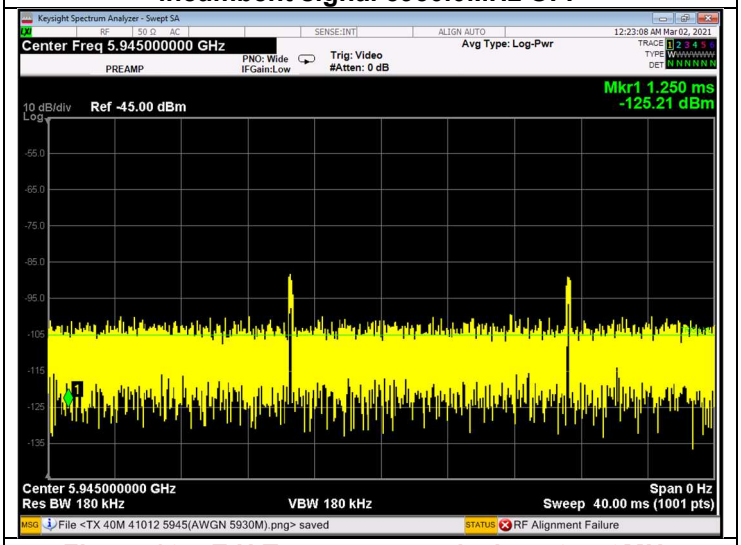


Figure 167. E.U.T cease transmission 5945.0MHz (40MHz BW) incumbent signal 5930.0MHz ON

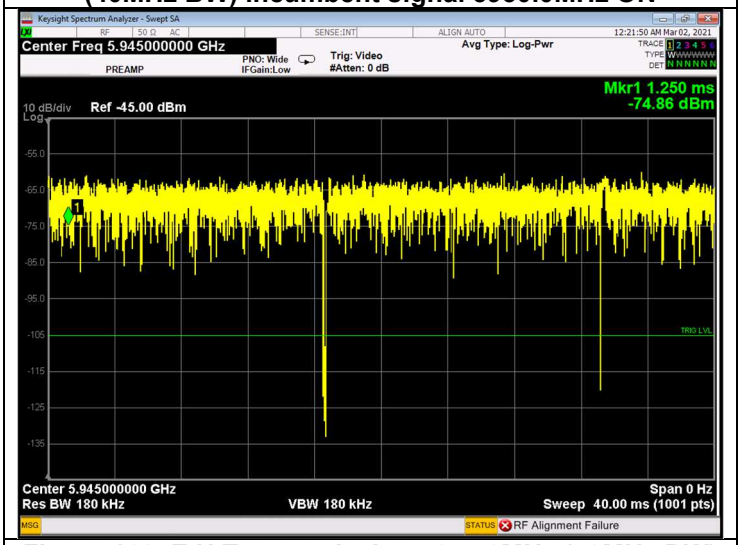


Figure 168. E.U.T transmission 5945.0MHz (40MHz BW) incumbent signal 5960.0MHz OFF

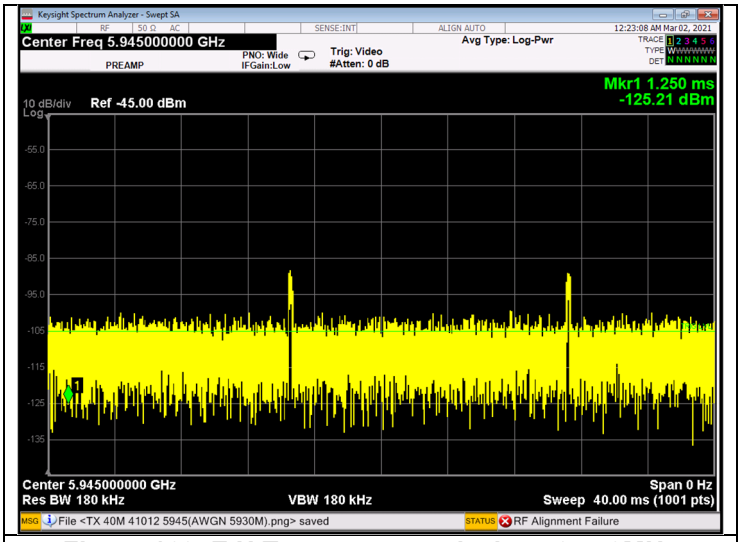


Figure 169. E.U.T cease transmission 5945.0MHz (40MHz BW) incumbent signal 5960.0MHz ON

12.6 Test Equipment Used; Contention Based Protocol

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EXA Signal Analyzer	Agilent Technologies	N9010A	902A000401	March 1, 2019	March 31, 2021
MXG Vector Signal Generator	Agilent Technologies	N5182A	MY47070174	October 10, 2020	October 10, 2023

Figure 170 Test Equipment Used

13. Antenna Gain/Information

13.1 Test Specification

FCC, Part 15, Subpart B. section 212 (a)(iv)

13.2 Test Limit

The modular transmitter must comply with the antenna and transmission system requirements of §§15.203, 15.204(b) and 15.204(c). The antenna must either be permanently attached or employ a “unique” antenna coupler (at all connections between the module and the antenna, including the cable).

13.3 Test Results

Judgment: Passed

The table below describes the antennae used for testing the device:

Antenna Model	Type	Antenna Gain	Impedance
AMN_ANT_1010	Dipole	2dBi	50Ω
AMN_ASM_1011	Mushroom	2dBi	50Ω

2dBi antenna with RP-SMA connector type

14. Appendix A - Correction Factors

14.1 For ITL #1911 OATS RF Cable

Frequency (MHz)	Cable Loss (dB)		Frequency (MHz)	Cable Loss (dB)
1.0	0.5		450.00	5.83
10.00	1.0		500.00	6.33
20.00	1.34		550.00	6.67
30.00	1.5		600.00	6.83
50.00	1.83		650.00	7.17
100.00	2.67		700.00	7.66
150.00	3.17		750.00	7.83
200.00	3.83		800.00	8.16
250.00	4.17		850.00	8.5
300.00	4.5		900.00	8.83
350.00	5.17		950.00	8.84
400.00	5.5		1000.00	9.0

14.2 For ITL #1840 Anechoic Chamber RF Cable

Frequency (MHz)	Cable Loss (dB)		Frequency (MHz)	Cable Loss (dB)
1000.0	-1.4		10000.0	-6.0
1500.0	-1.7		10500.0	-6.2
2000.0	-2.0		11000.0	-6.2
2500.0	-2.3		11500.0	-6.0
3000.0	-2.6		12000.0	-6.0
3500.0	-2.8		12500.0	-6.1
4000.0	-3.1		13000.0	-6.3
4500.0	-3.3		13500.0	-6.5
5000.0	-3.6		14000.0	-6.7
5500.0	-3.7		14500.0	-7.0
6000.0	-4.0		15000.0	-7.3
6500.0	-4.4		15500.0	-7.5
7000.0	-4.7		16000.0	-7.6
7500.0	-4.8		16500.0	-8.0
8000.0	-5.0		17000.0	-8.0
8500.0	-5.1		17500.0	-8.1
9000.0	-5.6		18000.0	-8.2
9500.0	-5.8			

14.3 For ITL # 1075 Active Loop Antenna

Frequency (MHz)	MAF (dBs/m)	AF (dB/m)
0.01	-33.1	18.4
0.02	-37.2	14.3
0.03	-38.2	13.3
0.05	-39.8	11.7
0.1	-40.1	11.4
0.2	-40.3	11.2
0.3	-40.3	11.2
0.5	-40.3	11.2
0.7	-40.3	11.2
1	-40.1	11.4
2	-40.0	11.5
3	-40.0	11.5
4	-40.1	11.4
5	-40.2	11.3
6	-40.4	11.1
7	-40.4	11.1
8	-40.4	11.1
9	-40.5	11.0
10	-40.5	11.0
20	-41.5	10.0
30	-43.5	8.0

14.4 For ITL #1356 Biconical Antenna

Frequency (MHz)	AF (dB/m)
30	13.00
35	10.89
40	10.59
45	10.63
50	10.12
60	9.26
70	7.74
80	6.63
90	8.23
100	11.12
120	13.16
140	13.07
160	14.80
180	16.95
200	17.17

14.5 For ITL # 1349 Log Periodic Antenna

Frequency (MHz)	AF (dB/m)
200	11.58
250	12.04
300	14.76
400	15.55
500	17.85
600	18.66
700	20.87
800	21.15
900	22.32
1000	24.22

14.6 For ITL # 1352 1-18 Horn Antenna

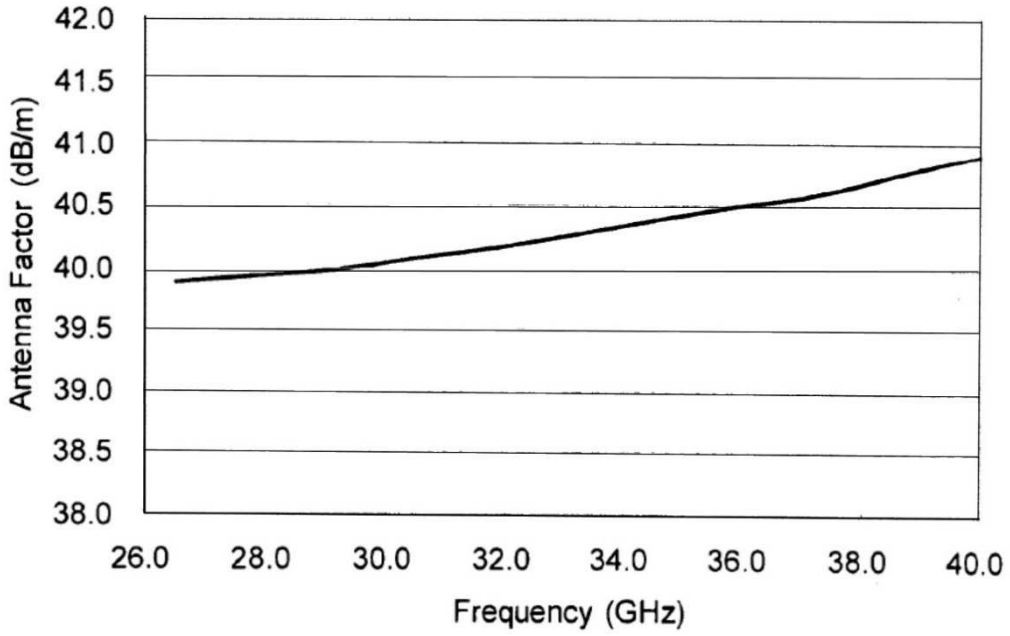
Frequency (GHz)	AF (dB/m)		Frequency (GHz)	AF (dB/m)
0.75	25		9.5	38
1.0	23.5		10.0	38.5
1.5	26.0		10.5	38.5
2.0	29.0		11.0	38.5
2.5	27.5		11.5	38.5
3.0	30.0		12.0	38.0
3.5	31.5		12.5	38.5
4.0	32.5		13.0	40.0
4.5	32.5		13.5	41.0
5.0	33.0		14.0	40.0
5.5	35.0		14.5	39.0
6.0	36.5		15.0	38.0
6.5	36.5		15.5	37.5
7.0	37.5		16.0	37.5
7.5	37.5		16.5	39.0
8.0	37.5		17.0	40.0
8.5	38.0		17.5	42.0
9.0	37.5		18.0	42.5

14.7 For ITL # 1353 18-26.5 GHz Horn Antenna

Frequency (MHz)	Measured antenna factor dB/m
18000	32.4
18500	32.0
19000	32.3
19500	32.4
20000	32.3
20500	32.8
21000	32.8
21500	32.7
22000	33.1
22500	33.0
23000	33.1
23500	33.8
24000	33.5
24500	33.5
25000	33.8
25500	33.9
26000	34.2
26500	34.7

The antenna factor shall be added to the receiver reading in dBµV to obtain field strength in dBµ V/m.

14.8 For ITL # 1777 26.5-40 GHz Horn Antenna



14.9 For Horn Antenna Model: SWH-28

CALIBRATION DATA

3 m distance

Frequency MHZ	Measured antenna factor dB/m
18000	32.4
18500	32.0
19000	32.3
19500	32.4
20000	32.3
20500	32.8
21000	32.8
21500	32.7
22000	33.1
22500	33.0
23000	33.1
23500	33.8
24000	33.5
24500	33.5
25000	33.8
25500	33.9
26000	34.2
26500	34.7

[1] The antenna factor shall be added to receiver reading in dBµV to obtain field strength in dBµV/m.

End of Test Report