

5 Band Edge Spectrum

5.1 Test Specification

FCC Part 27, Subpart C, Section 27.53 (c)(1)

5.2 Test Procedure

(Temperature (22°C)/ Humidity (35%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (20.8 dB).

The spectrum analyzer was set to 100 kHz R.B.W.

5.3 Test Limit

The power of any emission outside of the authorized operating frequency ranges (617-652 MHz) must be attenuated below the transmitting power (P) by a factor of at least $43 + \log(P)$ dB, yielding -13dBm.

5.4 Test Results

JUDGEMENT: Passed

See additional information in Table 6 to Table 9 and Figure 139 to Figure 226.

Modulation	Bandwidth	Sub Carrier	Band Edge Frequency	Reading	Limit	Margin
	(MHz)	(kHz)	(MHz)	(dBm)	(dBm)	(dB)
16QAM	5	15	617.0	-40.093	-13.0	-27.1
			652.0	-42.583		-29.6
		30	617.0	-51.649		-38.6
			652.0	-54.288		-41.3
	10	15	617.0	-36.349		-23.3
			652.0	-37.384		-24.4
		30	617.0	-38.633		-25.6
			652.0	-41.998		-29.0
		60	617.0	-49.899		-36.9
			652.0	-51.357		-38.4
	15	15	617.0	-41.203		-28.2
			652.0	-43.056		-30.1
		30	617.0	-40.010		-27.0
			652.0	-41.064		-28.1
		60	617.0	-39.092		-26.1
			652.0	-39.943		-26.9
	20	15	617.0	-34.53		-21.5
			652.0	-37.573		-24.6
		30	617.0	-36.670		-23.7
			652.0	-41.578		-28.6
		60	617.0	-37.038		-24.0
			652.0	-41.243		-28.2

Table 6 Band Edge Spectrum Results 16QAM

Modulation	Bandwidth	Sub Carrier	Band Edge Frequency	Reading	Limit	Margin
	(MHz)	(kHz)	(MHz)	(dBm)	(dBm)	(dB)
64QAM	5	15	617.0	-55.561	-13.0	-42.6
			652.0	-56.261		-43.3
		30	617.0	-55.966		-43.0
			652.0	-56.974		-44.0
	10	15	617.0	-52.777		-39.8
			652.0	-53.490		-40.5
		30	617.0	-52.661		-39.7
			652.0	-53.377		-40.4
		60	617.0	-53.115		-40.1
			652.0	-53.969		-41.0
	15	15	617.0	-48.678		-35.7
			652.0	-49.297		-36.3
		30	617.0	-51.462		-38.5
			652.0	-52.443		-39.4
		60	617.0	-49.357		-36.4
			652.0	-50.202		-37.2
	20	15	617.0	-48.740		-35.7
			652.0	-50.072		-37.1
		30	617.0	-49.929		-36.9
			652.0	-51.348		-38.3
		60	617.0	-50.356		-37.4
			652.0	-51.150		-38.2

Table 7 Band Edge Spectrum Results 64QAM

Modulation	Bandwidth	Sub Carrier	Band Edge Frequency	Reading	Limit	Margin
	(MHz)	(kHz)	(MHz)	(dBm)	(dBm)	(dB)
256QAM	5	15	617.0	-55.134	-13.0	-42.1
			652.0	-57.096		-44.1
		30	617.0	-56.550		-43.6
			652.0	-56.042		-43.0
	10	15	617.0	-52.768		-39.8
			652.0	-54.420		-41.4
		30	617.0	-53.141		-40.1
			652.0	-54.258		-41.3
		60	617.0	-53.698		-40.7
			652.0	-53.758		-40.8
	15	15	617.0	-49.095		-36.1
			652.0	-49.445		-36.4
		30	617.0	-51.339		-38.3
			652.0	-52.255		-39.3
		60	617.0	-51.228		-38.2
			652.0	-52.255		-39.3
	20	15	617.0	-48.807		-35.8
			652.0	-50.171		-37.2
		30	617.0	-50.127		-37.1
			652.0	-51.200		-38.2
		60	617.0	-50.646		-37.6
			652.0	-51.665		-38.7

Table 8 Band Edge Spectrum Results 256QAM

Modulation	Bandwidth	Sub Carrier	Band Edge Frequency	Reading	Limit	Margin
	(MHz)	(kHz)	(MHz)	(dBm)	(dBm)	(dB)
QPSK	5	15	617.0	-54.610	-13.0	-41.6
			652.0	-53.948		-40.9
		30	617.0	-52.591		-39.6
			652.0	-54.518		-41.5
	10	15	617.0	-52.220		-39.2
			652.0	-53.710		-40.7
		30	617.0	-51.263		-38.3
			652.0	-52.530		-39.5
		60	617.0	-51.657		-38.7
			652.0	-52.610		-39.6
	15	15	617.0	-49.901		-36.9
			652.0	-48.847		-35.8
		30	617.0	-50.908		-37.9
			652.0	-51.011		-38.0
		60	617.0	-51.038		-38.0
			652.0	-50.729		-37.7
	20	15	617.0	-48.971		-36.0
			652.0	-50.240		-37.2
		30	617.0	-49.642		-36.6
			652.0	-51.145		-38.1
		60	617.0	-49.132		-36.1
			652.0	-50.688		-37.7

Table 9 Band Edge Spectrum Results QPSK

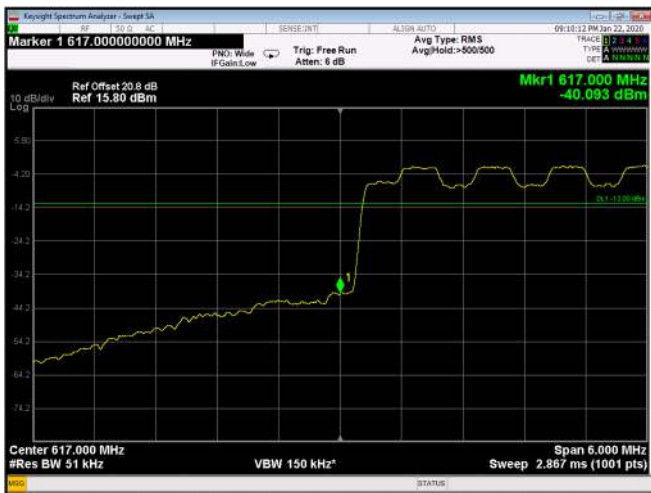


Figure 139: 16QAM 5MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 140: 16QAM 5MHz B.W.; 652.0MHz, 15kHz Upper Edge

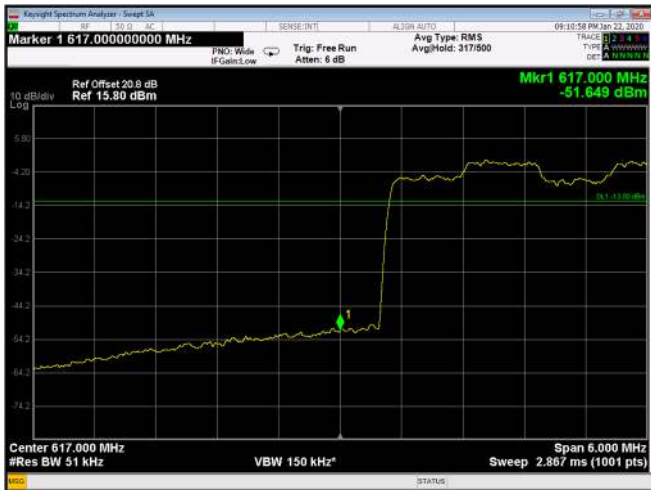


Figure 141: 16QAM 5MHz B.W.; 617.0MHz, 30kHz Lower Edge

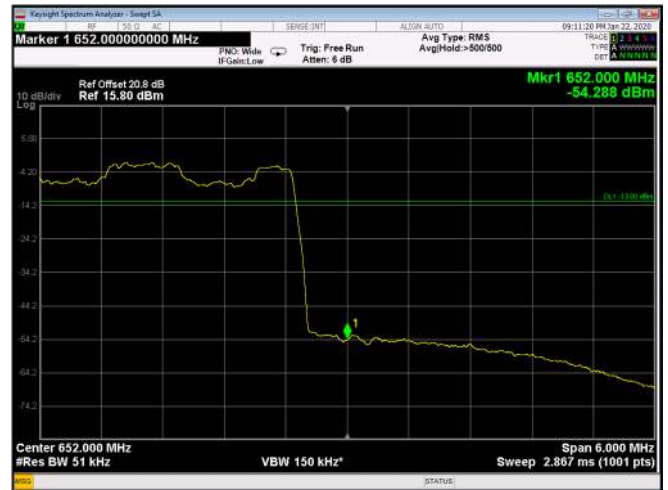


Figure 142: 16QAM 5MHz B.W.; 652.0MHz, 30kHz Upper Edge

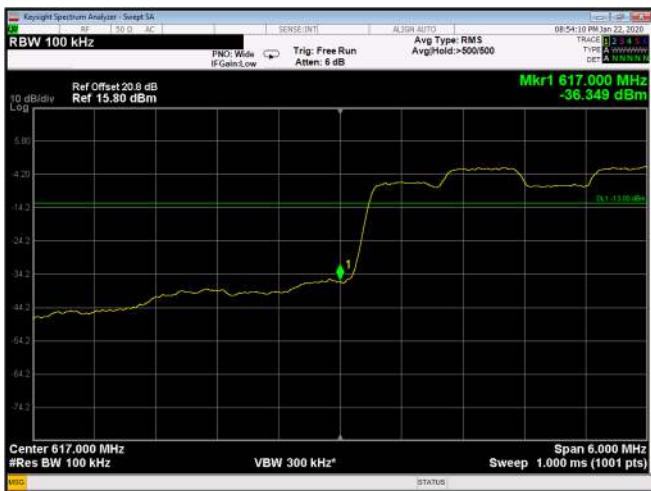


Figure 143: 16QAM 10MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 144: 16QAM 10MHz B.W.; 652.0MHz, 15kHz Upper Edge

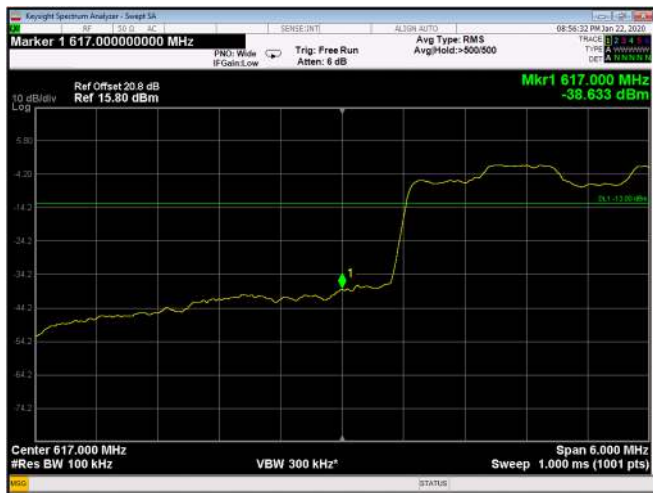


Figure 145: 16QAM 10MHz B.W.; 617.0MHz, 30kHz Lower Edge



Figure 146: 16QAM 10MHz B.W.; 652.0MHz, 30kHz Upper Edge



Figure 147: 16QAM 10MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 148: 16QAM 10MHz B.W.; 652.0MHz, 60kHz Upper Edge

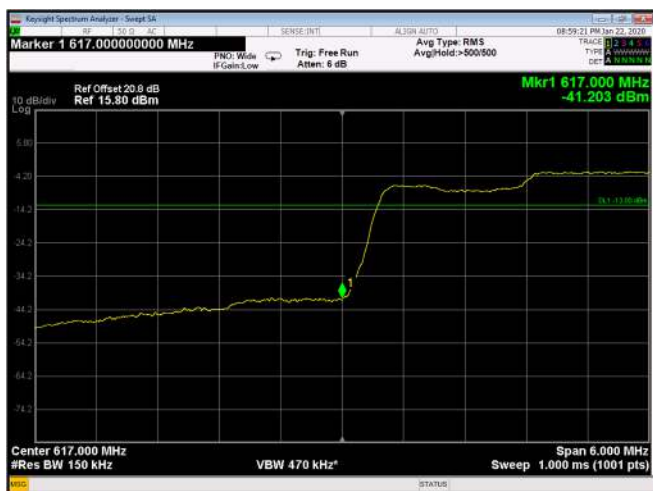


Figure 149: 16QAM 15MHz B.W.; 617.0MHz, 15kHz Lower Edge

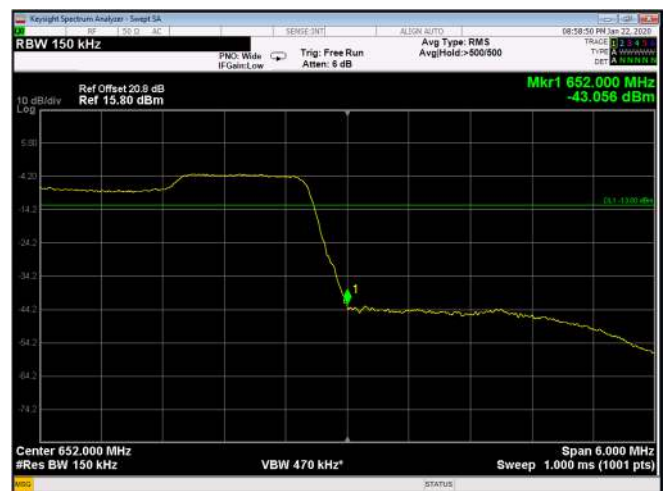


Figure 150: 16QAM 15MHz B.W.; 652.0MHz, 15kHz Upper Edge



Figure 151: 16QAM 15MHz B.W.; 617.0MHz, 30kHz Lower Edge

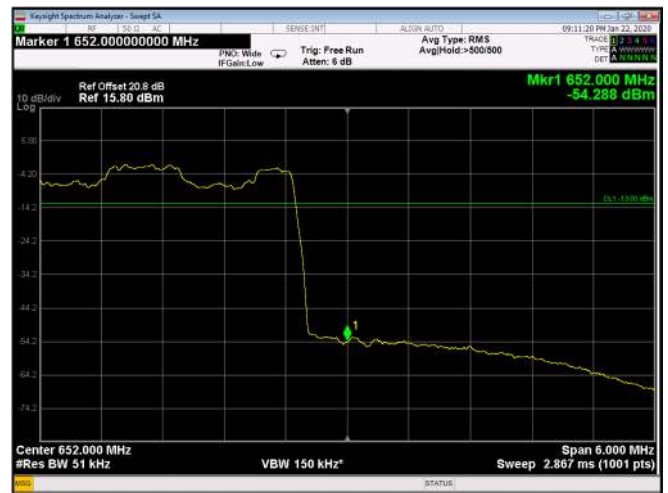


Figure 152: 16QAM 15MHz B.W.; 652.0MHz, 30kHz Upper Edge

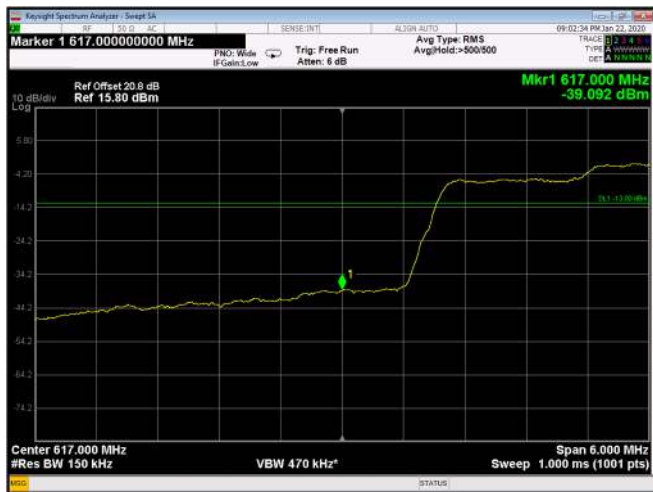


Figure 153: 16QAM 15MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 154: 16QAM 15MHz B.W.; 652.0MHz, 60kHz Upper Edge

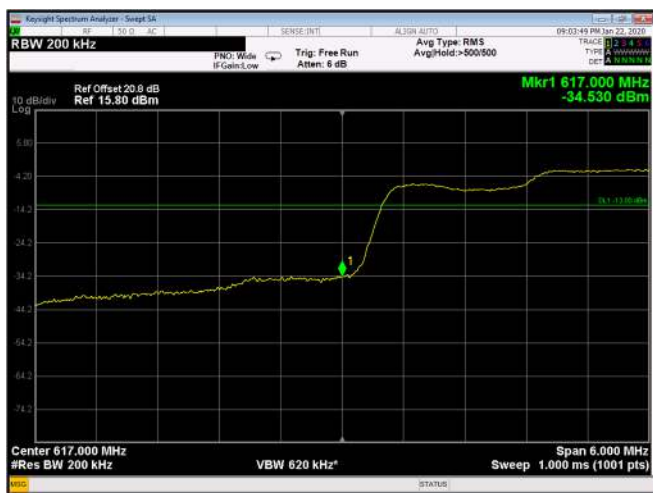


Figure 155: 16QAM 20MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 156: 16QAM 20MHz B.W.; 652.0MHz, 15kHz Upper Edge

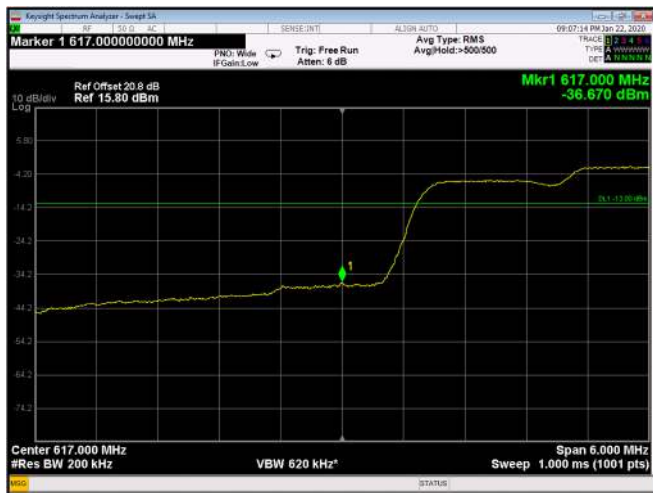


Figure 157: 16QAM 20MHz B.W.; 617.0MHz, 30kHz Lower Edge



Figure 158: 16QAM 20MHz B.W.; 652.0MHz, 30kHz Upper Edge

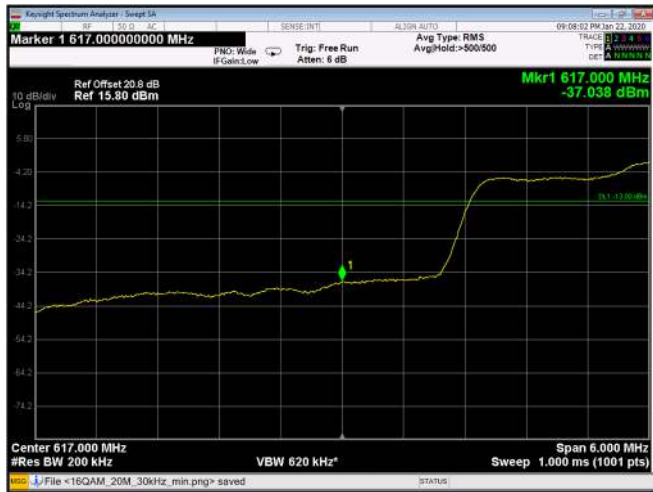


Figure 159: 16QAM 20MHz B.W.; 617.0MHz, 60kHz Lower Edge

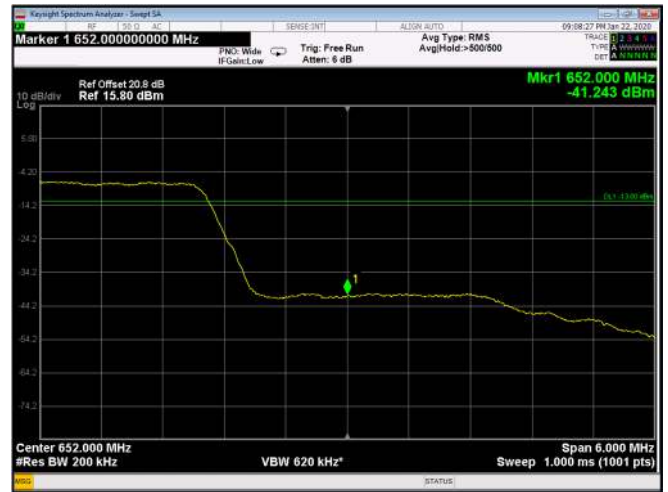


Figure 160: 16QAM 20MHz B.W.; 652.0MHz, 60kHz Upper Edge

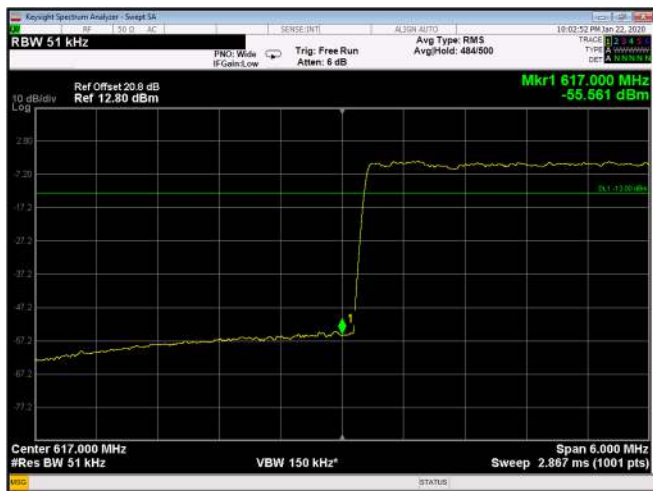


Figure 161: 64QAM 5MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 162: 64QAM 5MHz B.W.; 652.0MHz, 15kHz Upper Edge

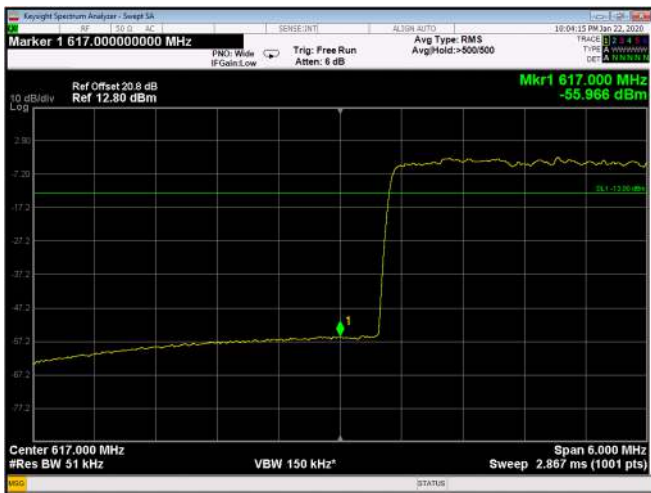


Figure 163: 64QAM 5MHz B.W.; 617.0MHz, 30kHz
Lower Edge

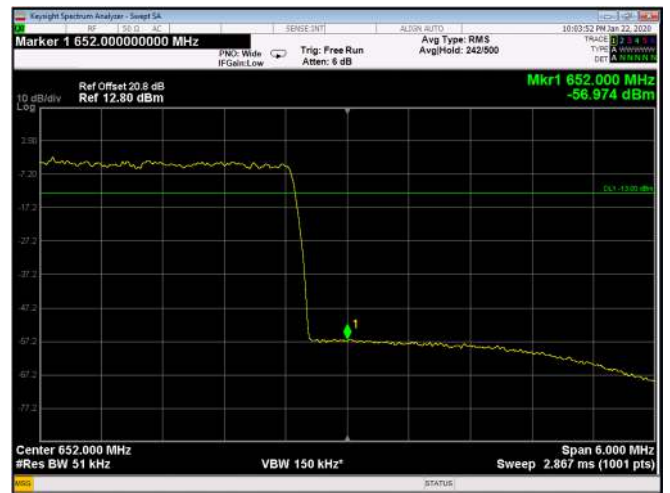


Figure 164: 16QAM 5MHz B.W.; 652.0MHz, 30kHz
Upper Edge

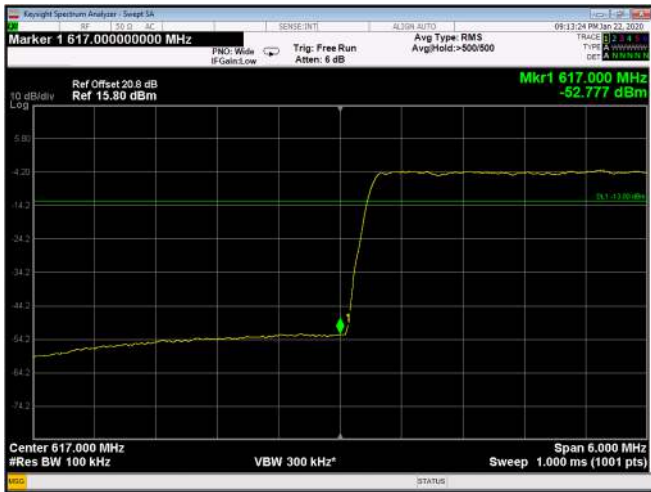


Figure 165: 64QAM 10MHz B.W.; 617.0MHz, 15kHz
Lower Edge

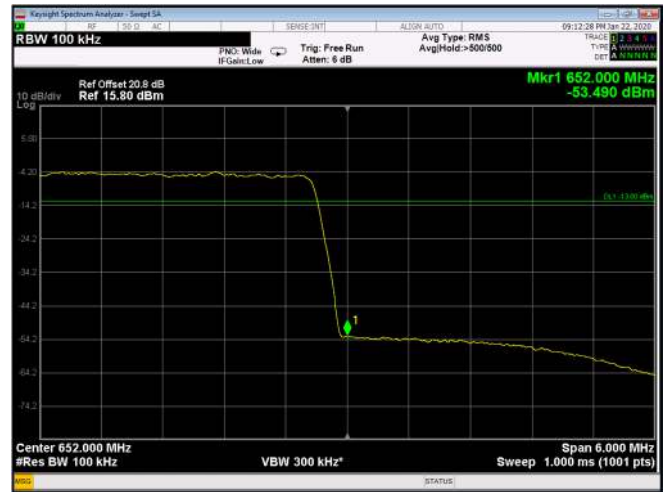


Figure 166: 64QAM 10MHz B.W.; 652.0MHz, 15kHz
Upper Edge

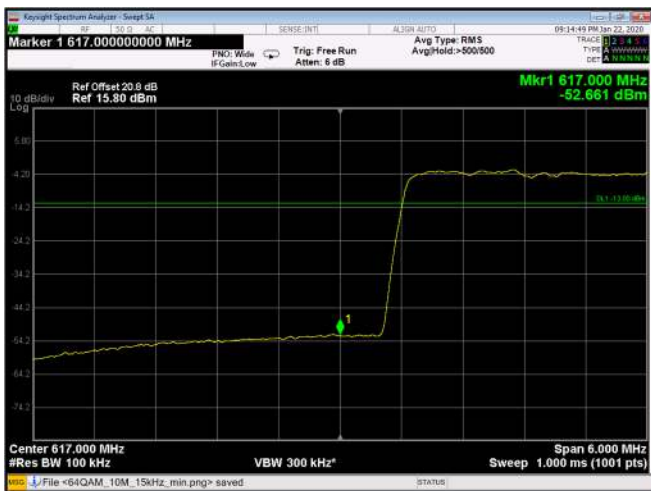


Figure 167: 64QAM 10MHz B.W.; 617.0MHz, 30kHz
Lower Edge



Figure 168: 64QAM 10MHz B.W.; 652.0MHz, 30kHz
Upper Edge

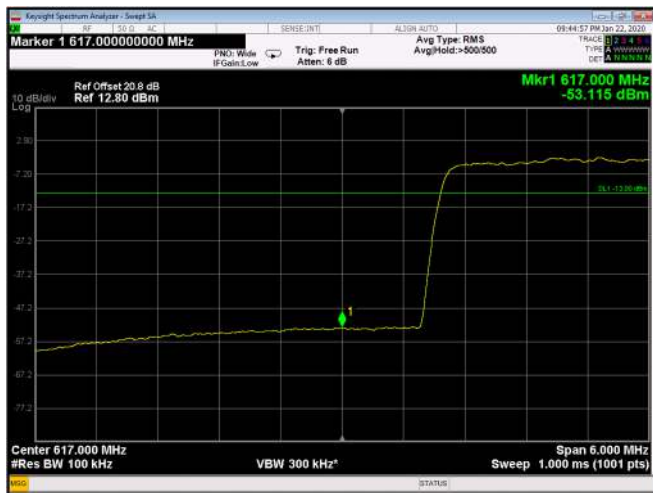


Figure 169: 64QAM 10MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 170: 64QAM 10MHz B.W.; 652.0MHz, 60kHz Upper Edge



Figure 171: 64QAM 15MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 172: 64QAM 15MHz B.W.; 652.0MHz, 15kHz Upper Edge

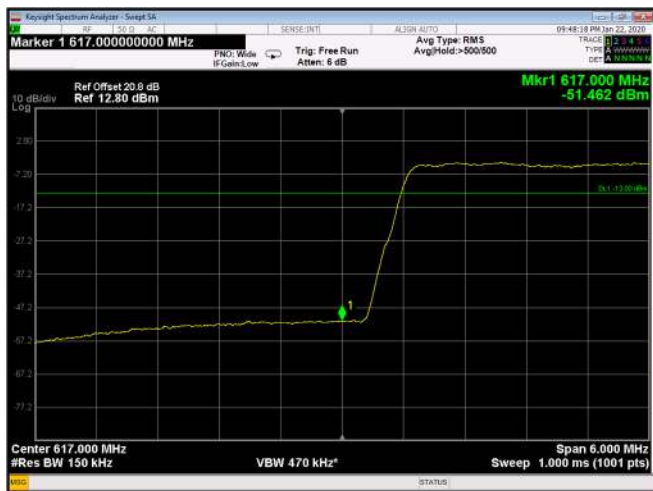


Figure 173: 64QAM 15MHz B.W.; 617.0MHz, 30kHz Lower Edge



Figure 174: 64QAM 15MHz B.W.; 652.0MHz, 30kHz Upper Edge

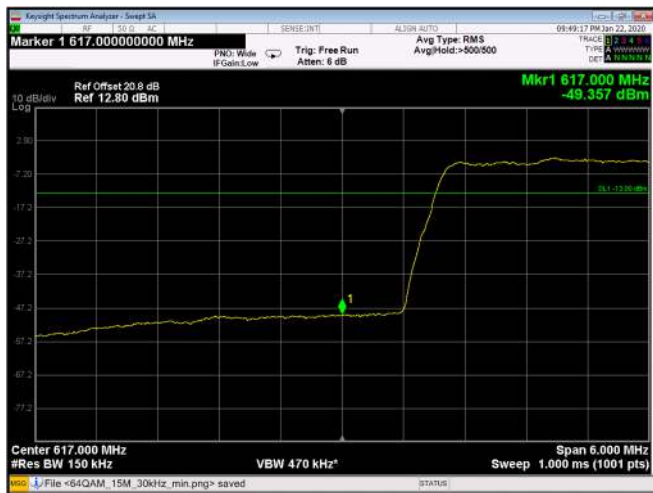


Figure 175: 64QAM 15MHz B.W.; 617.0MHz, 60kHz
Lower Edge



Figure 176: 64QAM 15MHz B.W.; 652.0MHz, 60kHz
Upper Edge

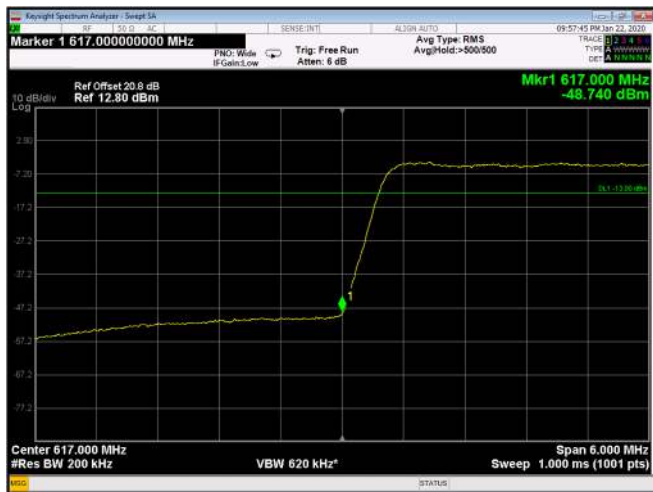


Figure 177: 64QAM 20MHz B.W.; 617.0MHz, 15kHz
Lower Edge



Figure 178: 64QAM 20MHz B.W.; 652.0MHz, 15kHz
Upper Edge



Figure 179: 64QAM 20MHz B.W.; 617.0MHz, 30kHz
Lower Edge

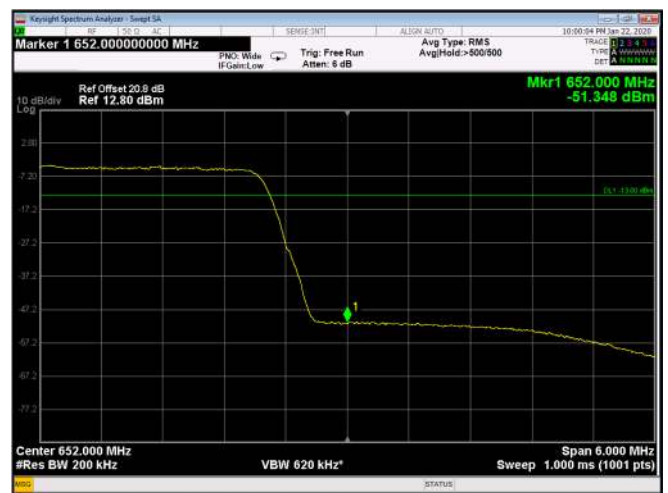


Figure 180: 64QAM 20MHz B.W.; 652.0MHz, 30kHz
Upper Edge

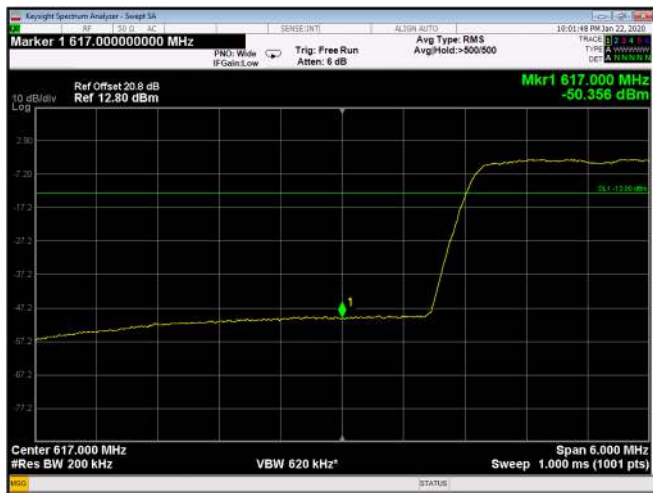


Figure 181: 64QAM 20MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 182: 64QAM 20MHz B.W.; 652.0MHz, 60kHz Upper Edge

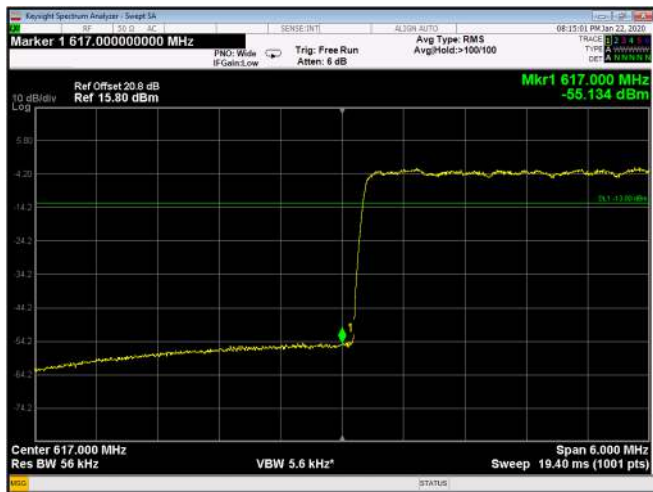


Figure 183: 256QAM 5MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 184: 256QAM 5MHz B.W.; 652.0MHz, 15kHz Upper Edge

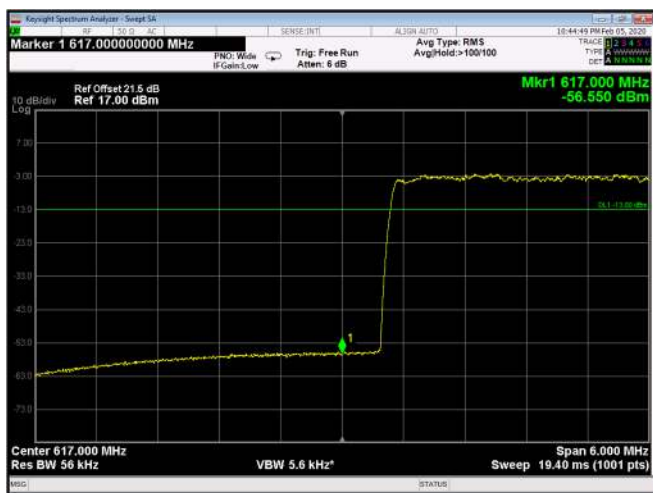


Figure 185: 256QAM 5MHz B.W.; 617.0MHz, 30kHz Lower Edge

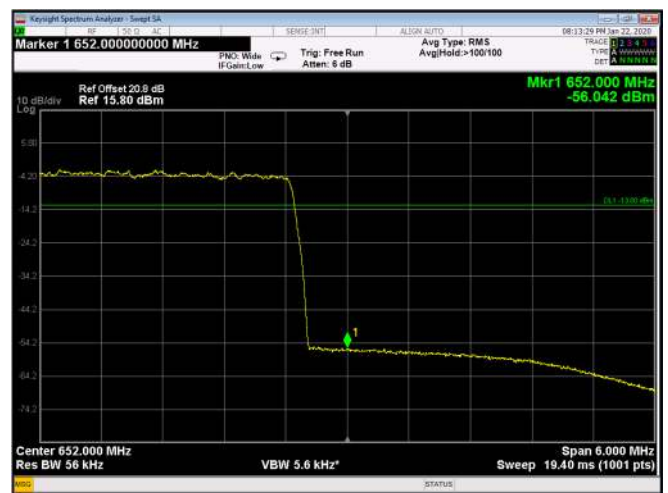


Figure 186: 256QAM 5MHz B.W.; 652.0MHz, 30kHz Upper Edge

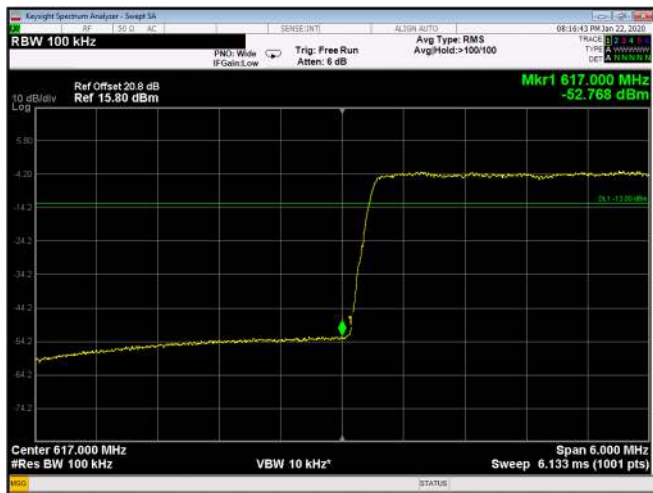


Figure 187: 256QAM 10MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 188: 256QAM 10MHz B.W.; 652.0MHz, 15kHz Upper Edge

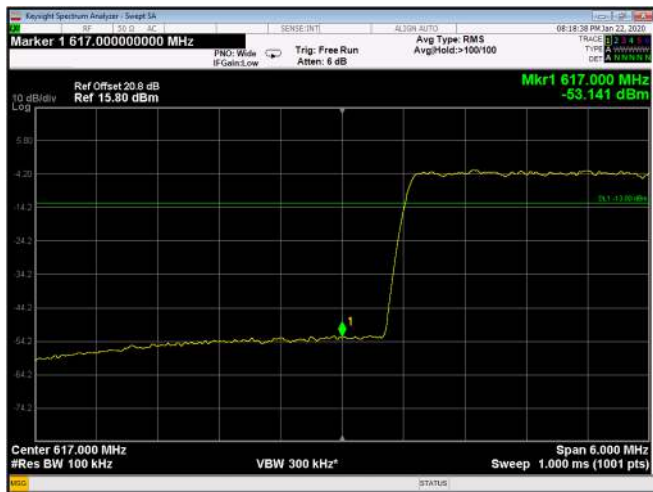


Figure 189: 256QAM 10MHz B.W.; 617.0MHz, 30kHz Lower Edge

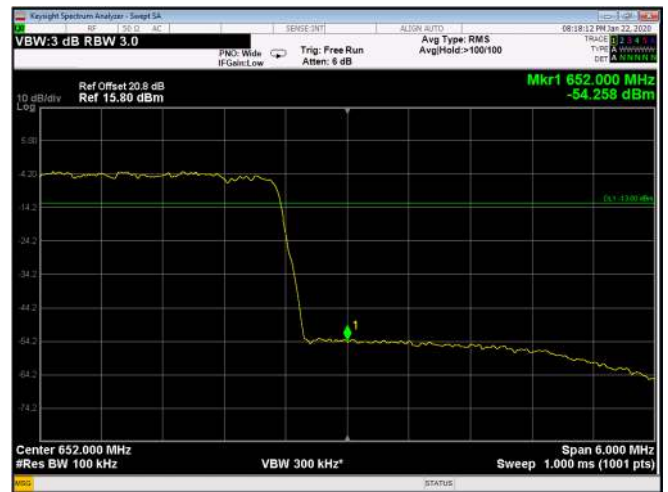


Figure 190: 256QAM 10MHz B.W.; 652.0MHz, 30kHz Upper Edge

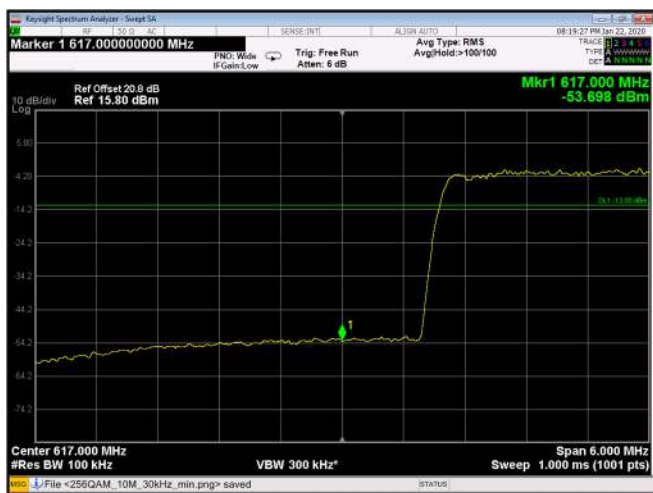


Figure 191: 256QAM 10MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 192: 256QAM 10MHz B.W.; 652.0MHz, 60kHz Upper Edge



Figure 193: 256QAM 15MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 194: 256QAM 15MHz B.W.; 652.0MHz, 15kHz Upper Edge



Figure 195: 256QAM 15MHz B.W.; 617.0MHz, 30kHz Lower Edge

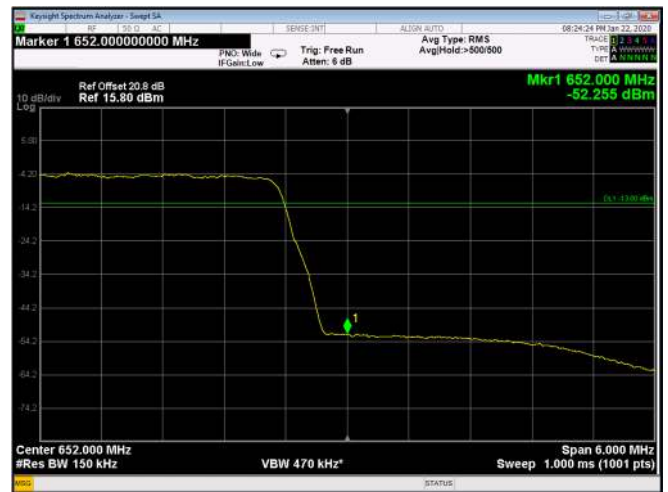


Figure 196: 256QAM 15MHz B.W.; 652.0MHz, 30kHz Upper Edge



Figure 197: 256QAM 15MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 198: 256QAM 15MHz B.W.; 652.0MHz, 60kHz Upper Edge

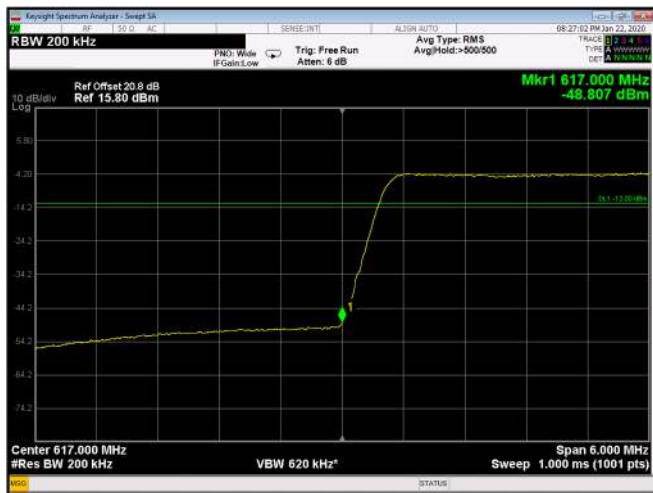


Figure 199: 256QAM 20MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 200: 256QAM 20MHz B.W.; 652.0MHz, 15kHz Upper Edge



Figure 201: 256QAM 20MHz B.W.; 617.0MHz, 30kHz Lower Edge

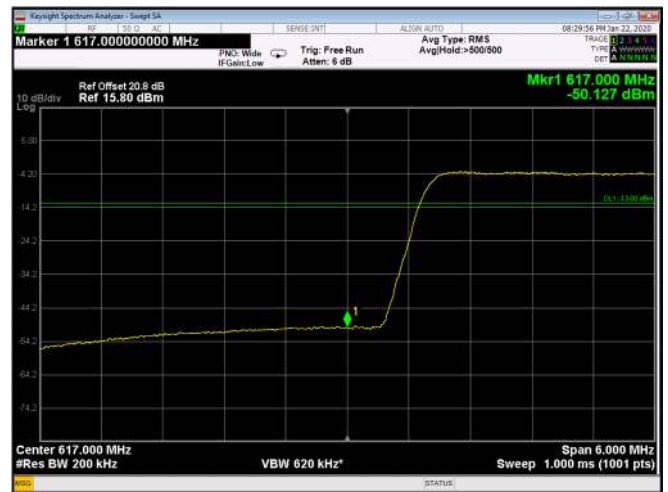


Figure 202: 256QAM 20MHz B.W.; 652.0MHz, 30kHz Upper Edge

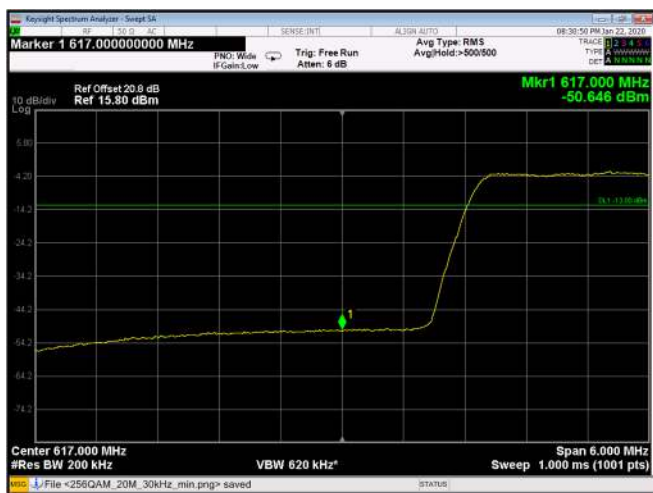


Figure 203: 256QAM 15MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 204: 256QAM 20MHz B.W.; 652.0MHz, 60kHz Upper Edge

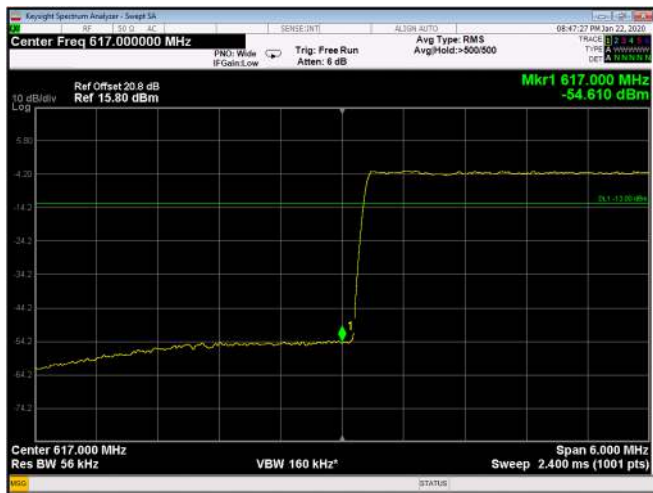


Figure 205: QPSK 5MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 206: QPSK 5MHz B.W.; 652.0MHz, 5kHz Upper Edge

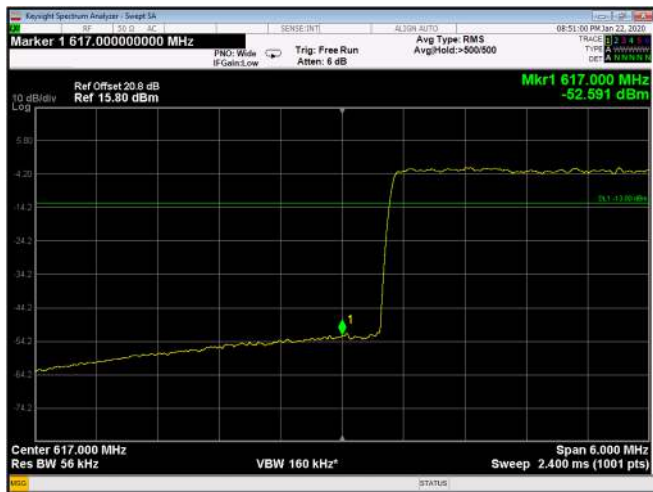


Figure 207: QPSK 5MHz B.W.; 617.0MHz, 30kHz Lower Edge

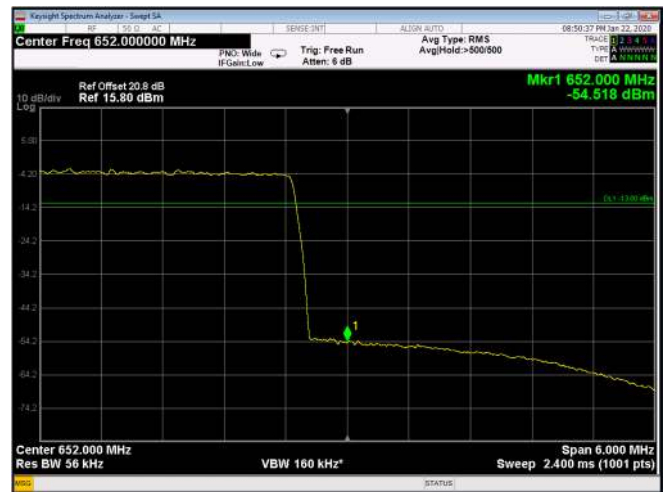


Figure 208: QPSK 5MHz B.W.; 652.0MHz, 30kHz Upper Edge

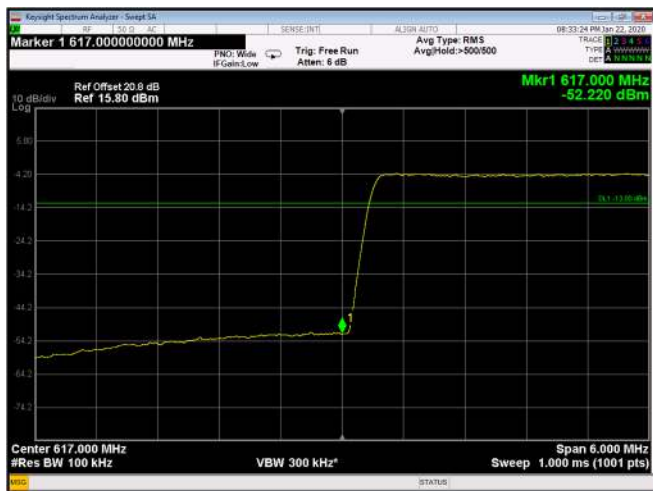


Figure 209: QPSK 10MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 210: QPSK 10MHz B.W.; 652.0MHz, 15kHz Upper Edge

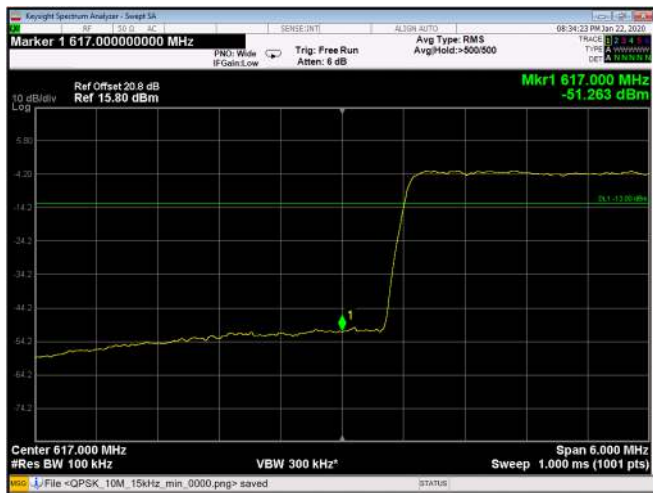


Figure 211: QPSK 10MHz B.W.; 617.0MHz, 30kHz Lower Edge



Figure 212: QPSK 10MHz B.W.; 652.0MHz, 30kHz Upper Edge

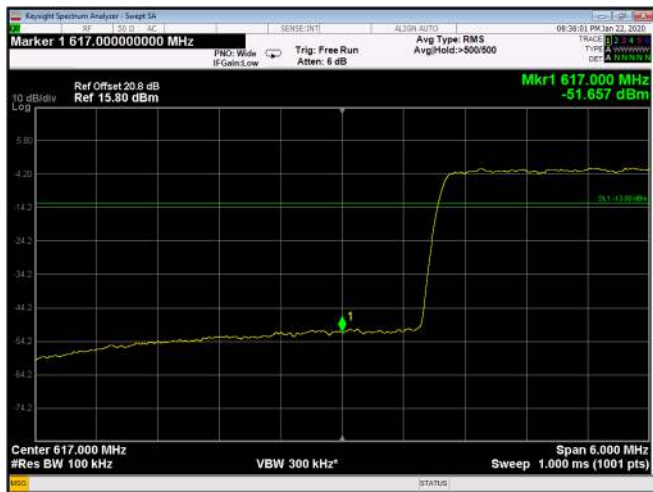


Figure 213: QPSK 10MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 214: QPSK 10MHz B.W.; 652.0MHz, 60kHz Upper Edge

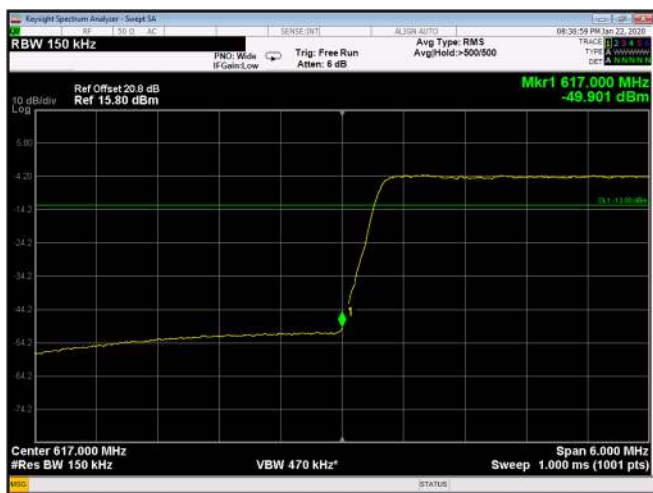


Figure 215: QPSK 15MHz B.W.; 617.0MHz, 15kHz Lower Edge



Figure 216: QPSK 15MHz B.W.; 652.0MHz, 15kHz Upper Edge

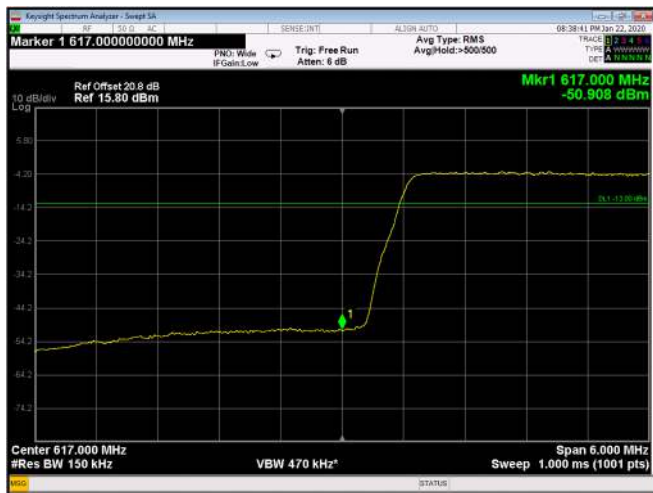


Figure 217: QPSK 15MHz B.W.; 617.0MHz, 30kHz
Lower Edge



Figure 218: QPSK 15MHz B.W.; 652.0MHz, 30kHz
Upper Edge

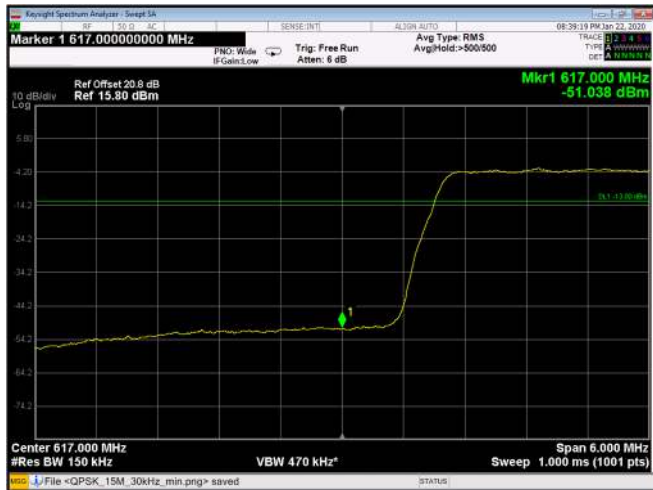


Figure 219: QPSK 15MHz B.W.; 617.0MHz, 60kHz
Lower Edge



Figure 220: QPSK 15MHz B.W.; 652.0MHz, 60kHz
Upper Edge

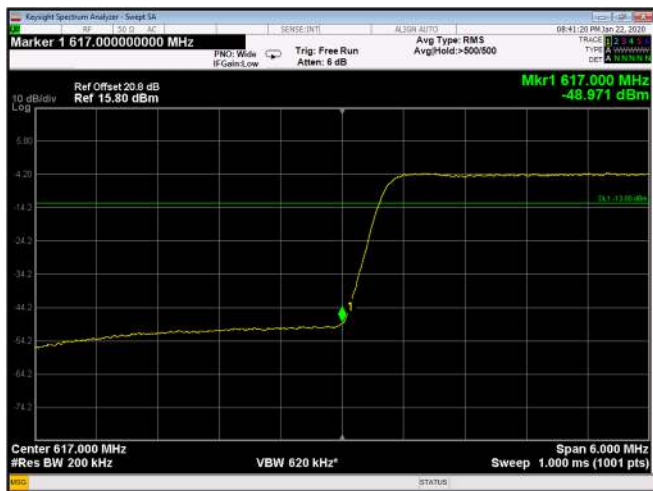


Figure 221: QPSK 20MHz B.W.; 617.0MHz, 15kHz
Lower Edge

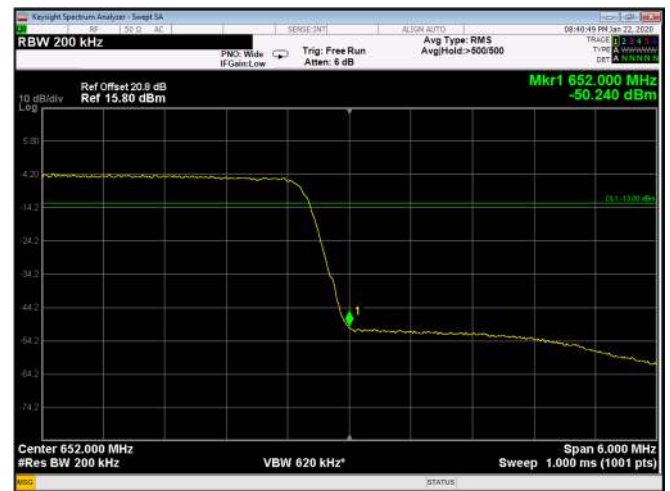


Figure 222: QPSK 20MHz B.W.; 652.0MHz, 15kHz
Upper Edge

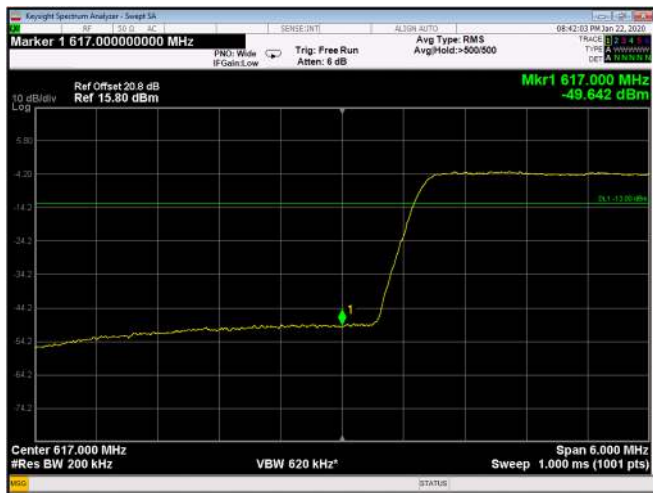


Figure 223: QPSK 20MHz B.W.; 617.0MHz, 30kHz Lower Edge



Figure 224: QPSK 20MHz B.W.; 652.0MHz, 30kHz Upper Edge

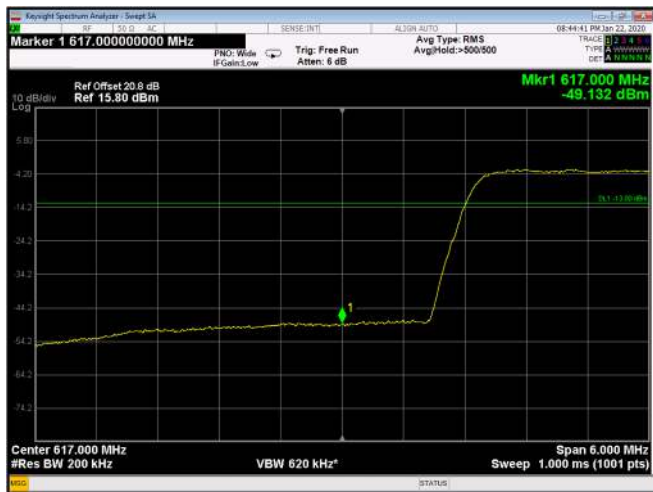


Figure 225: QPSK 20MHz B.W.; 617.0MHz, 60kHz Lower Edge



Figure 226: QPSK 20MHz B.W.; 652.0MHz, 60kHz Upper Edge

5.1 Test Equipment Used; Band Edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
EXA signal Analyzer	Agilent Technologies	N9010A	MY52220686	28 November 2018	28 November 2020
EXG Vector Signal Generator	Agilent Technologies	N5172B	MY51350437	03 December 2018	03 December 2020
20 dB Attenuator	Bird	8304-N20DB	-	24 December 2019	24 December 2020

Table 10 Test Equipment Used