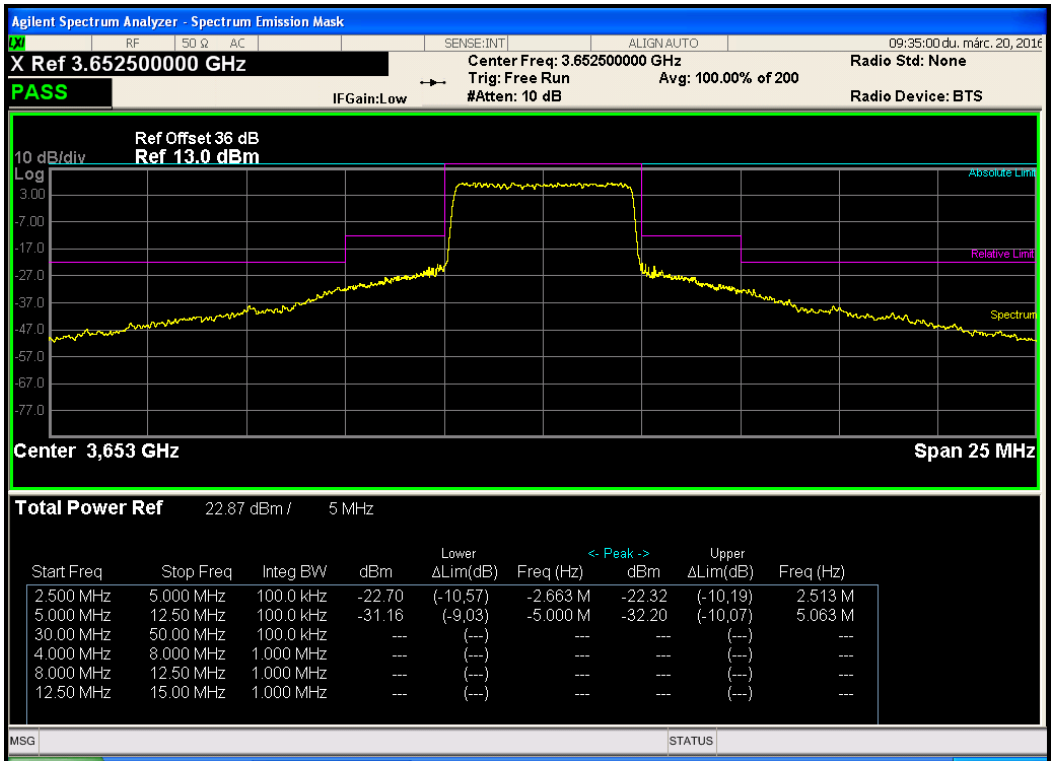


Figure 157. —5MHz CBW – Low Frequency, QPSK

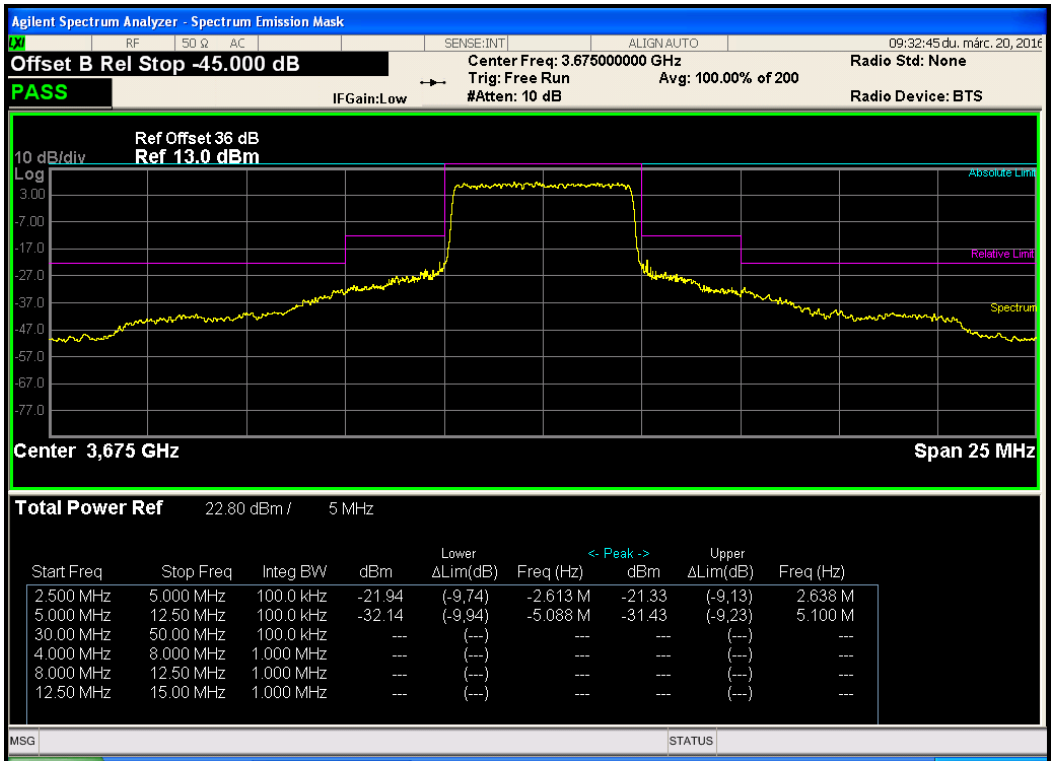


Figure 158. —5MHz CBW – Mid Frequency, 64QAM

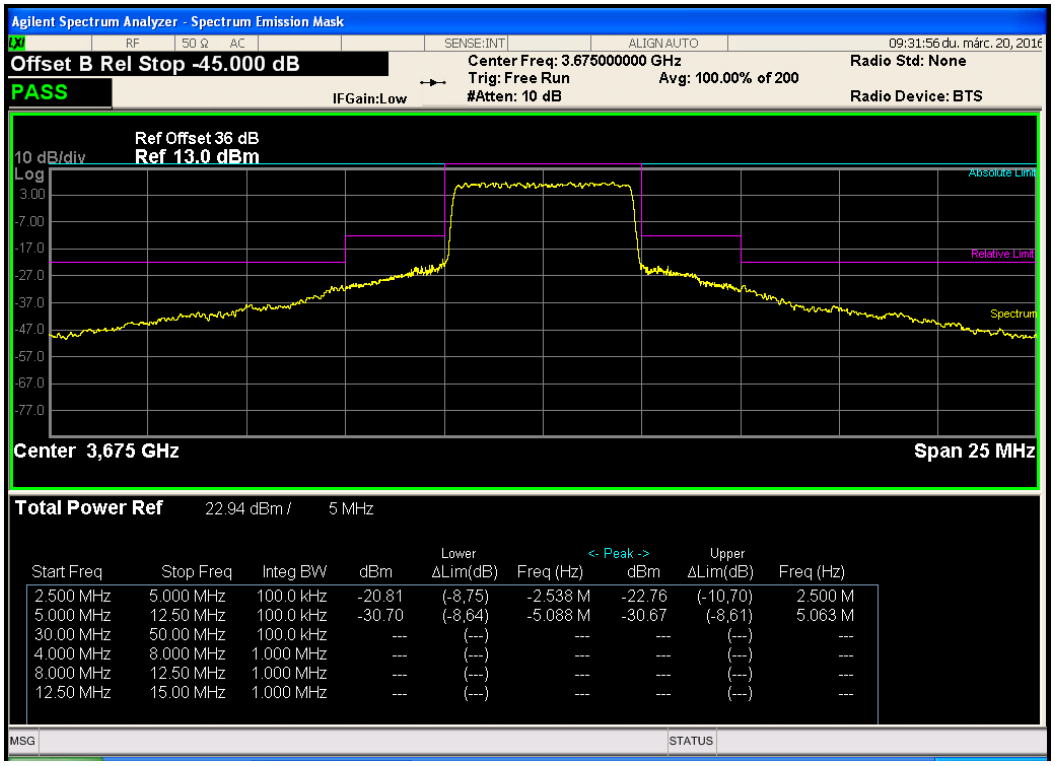


Figure 159. —5MHz CBW – Mid Frequency, 16QAM

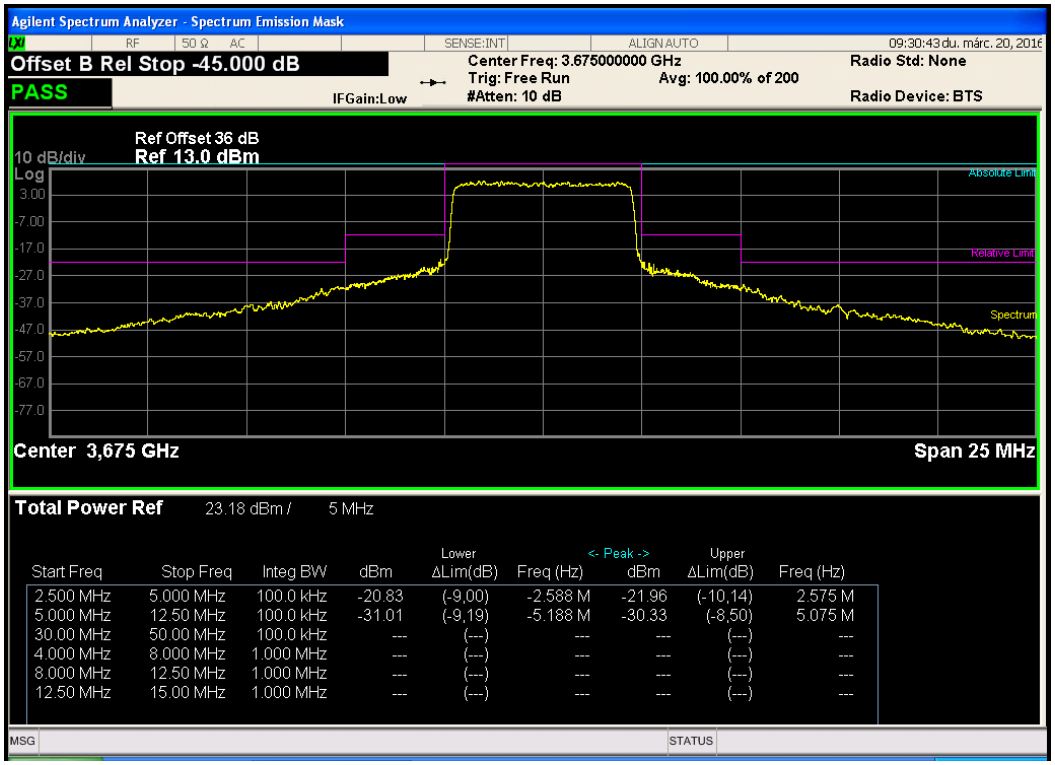


Figure 160. —5MHz CBW – Mid Frequency, QPSK

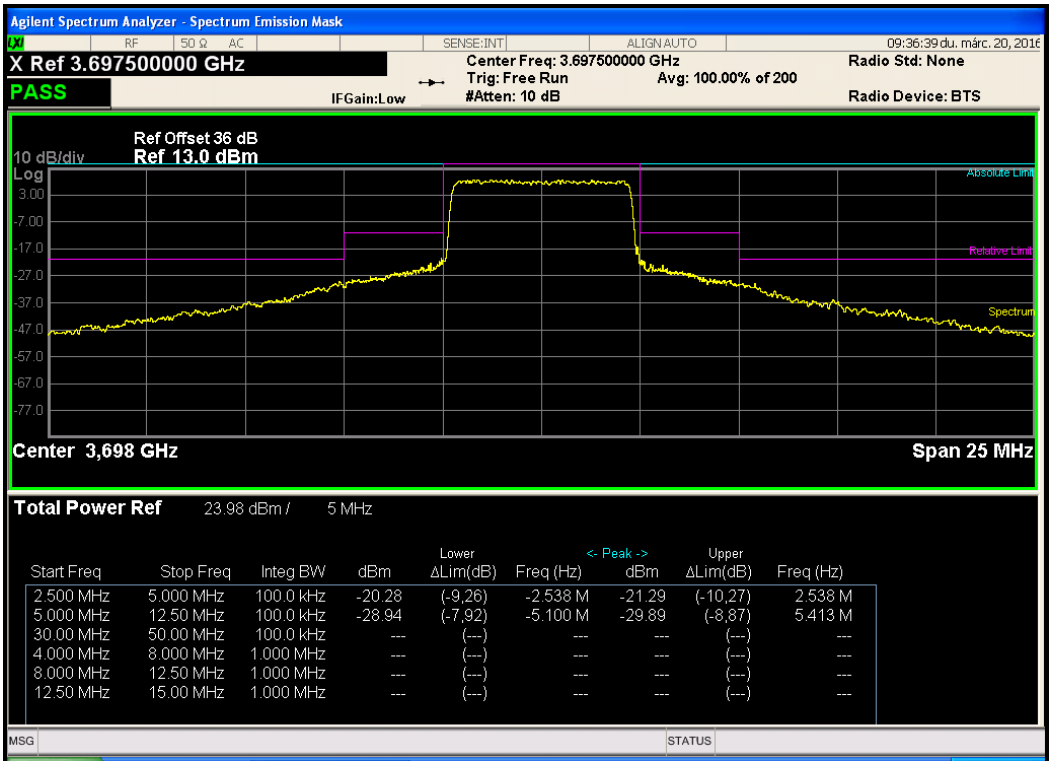


Figure 161. —5MHz CBW – High Frequency, 64QAM

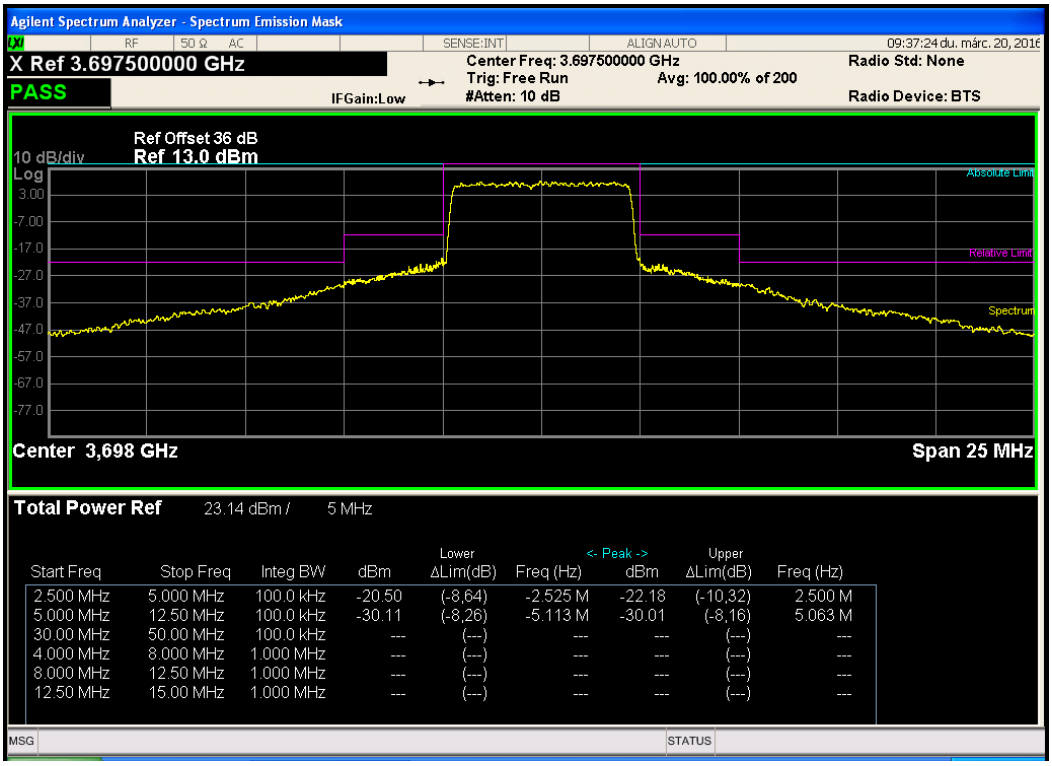


Figure 162. —5MHz CBW – High Frequency, 16QAM

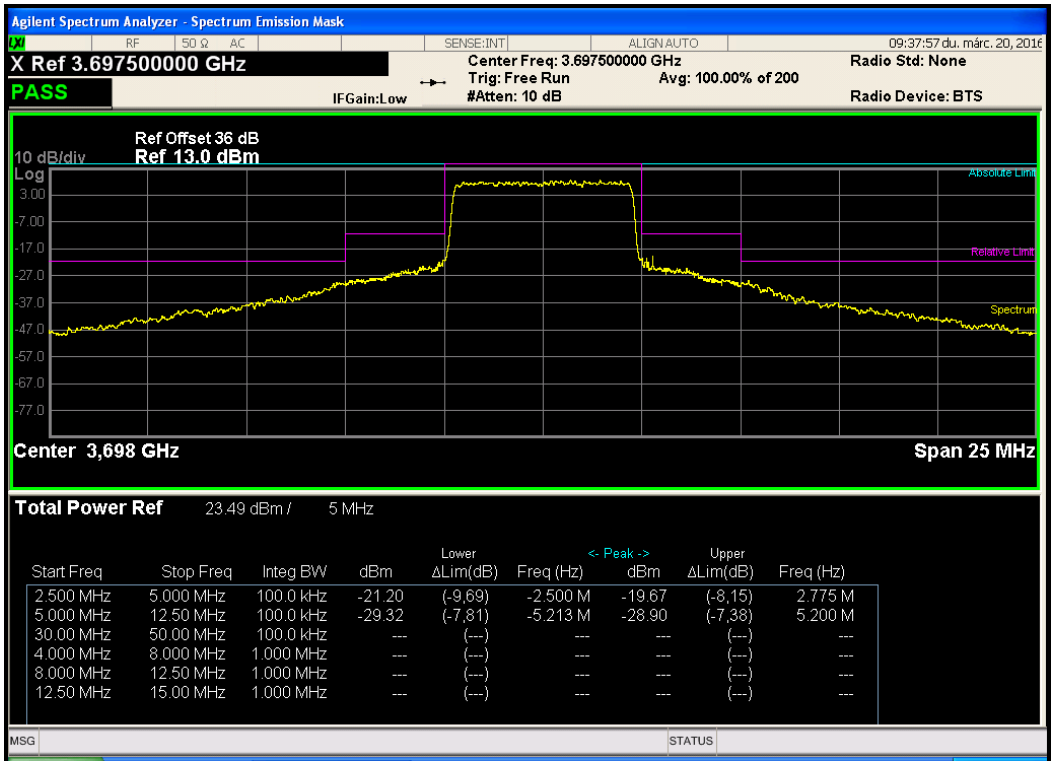


Figure 163. —5MHz CBW – High Frequency, QPSK

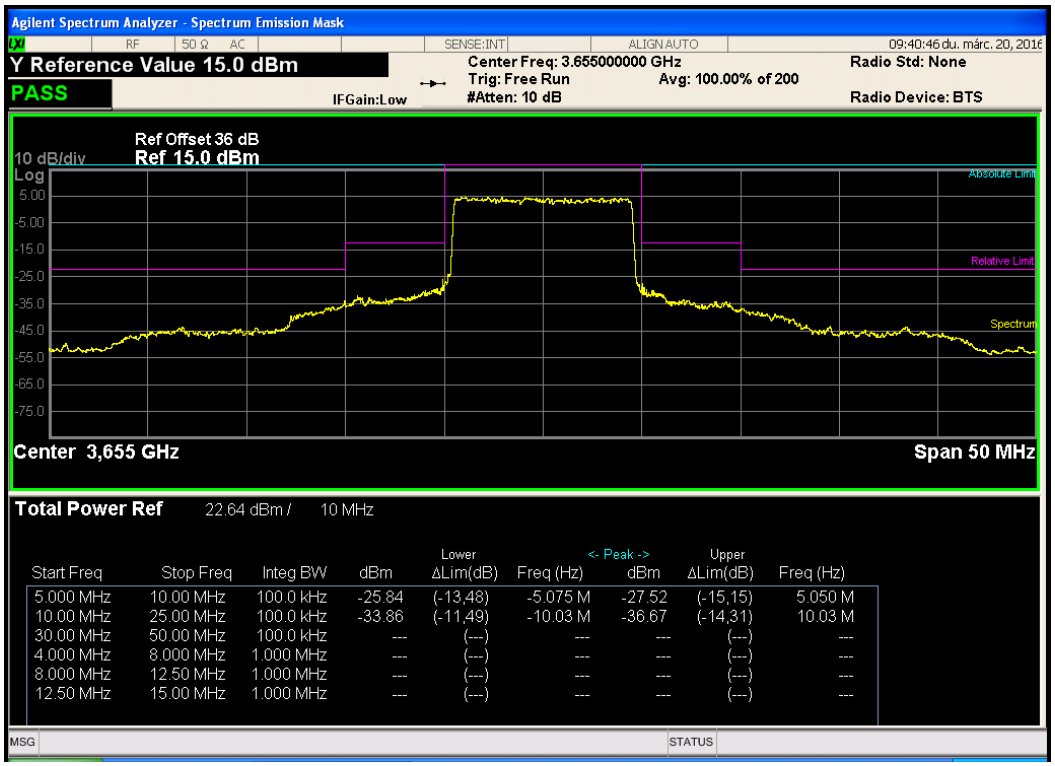


Figure 164. —10MHz CBW – Low Frequency, 64QAM

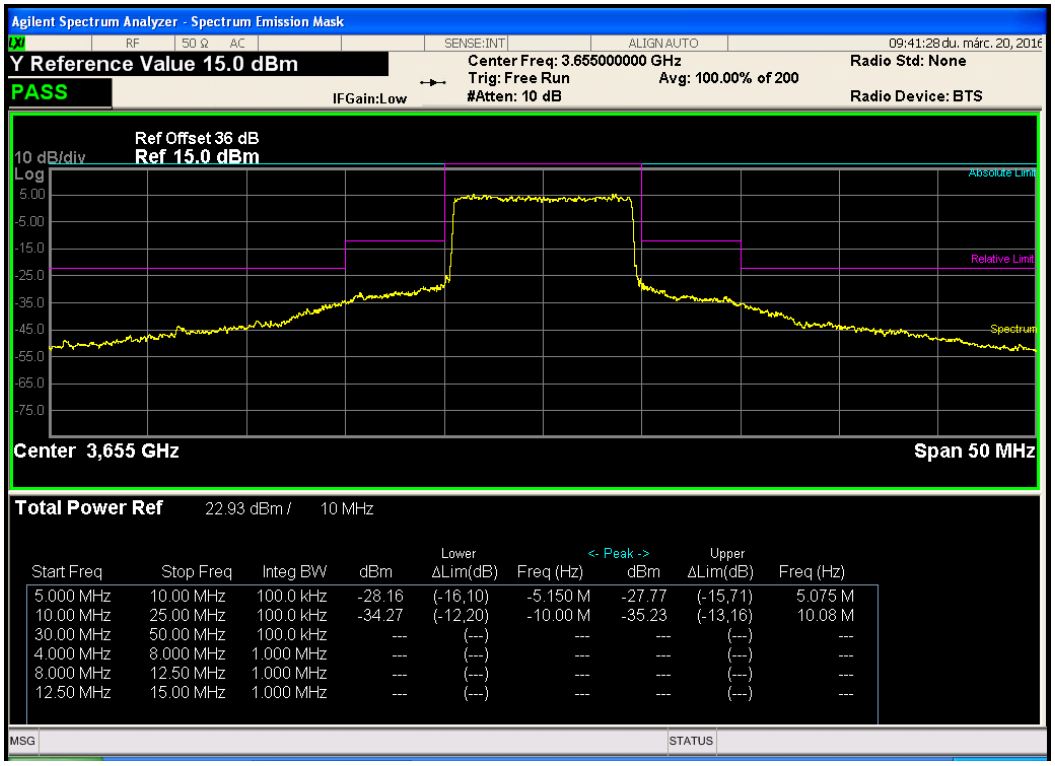


Figure 165. —10MHz CBW – Low Frequency, 16QAM

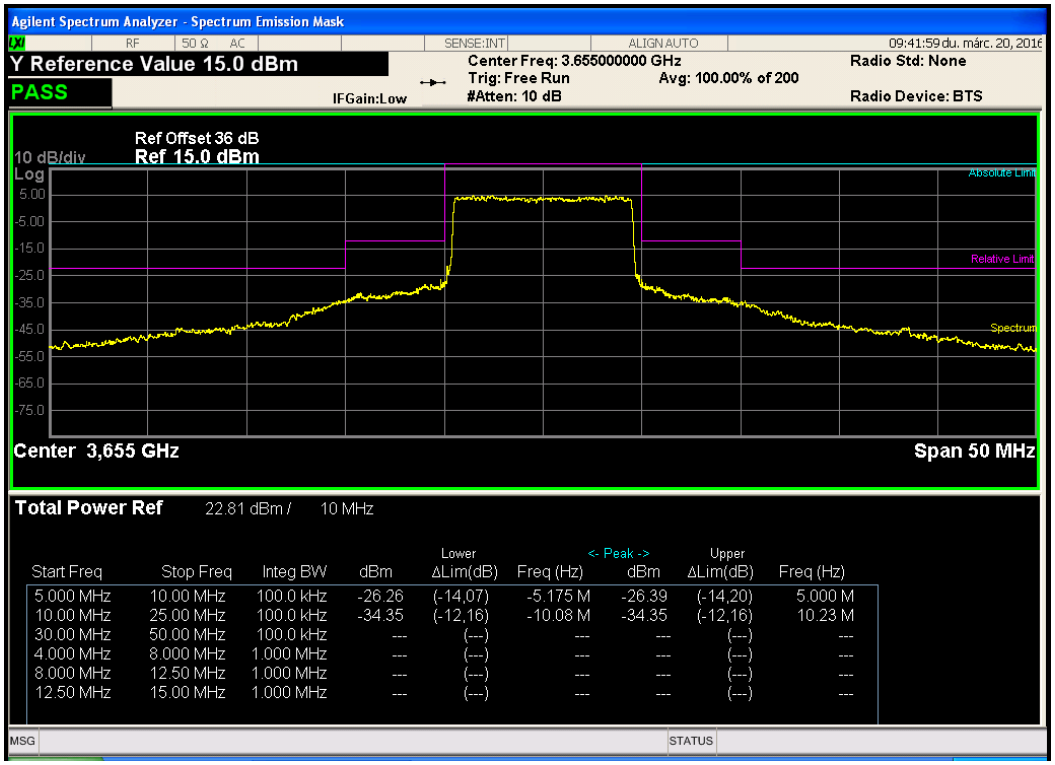


Figure 166. —10MHz CBW – Low Frequency, QPSK

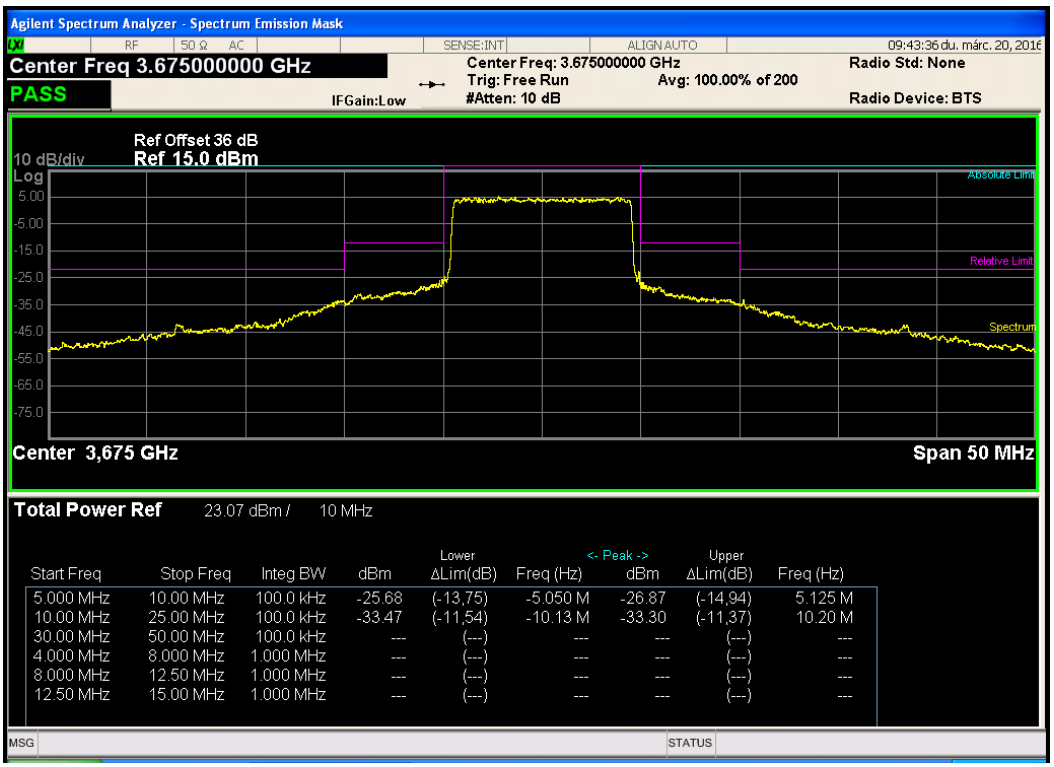


Figure 167. —10MHz CBW – Mid Frequency, 64QAM

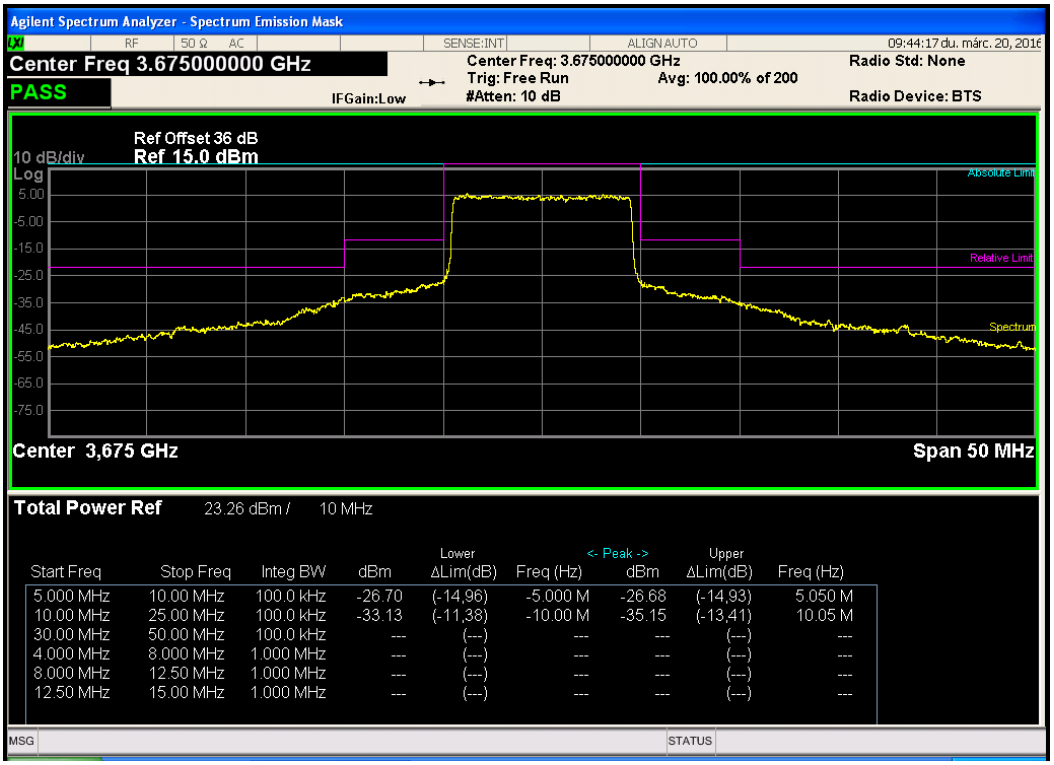


Figure 168. —10MHz CBW – Mid Frequency, 16QAM

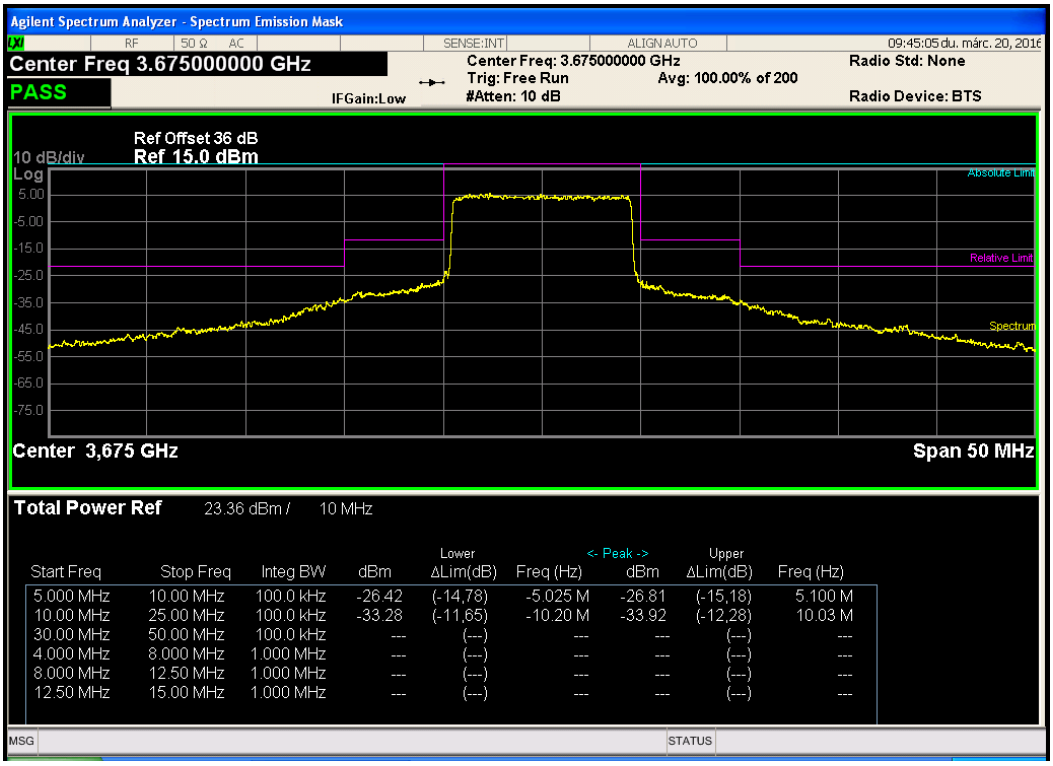


Figure 169. —10MHz CBW – Mid Frequency, QPSK

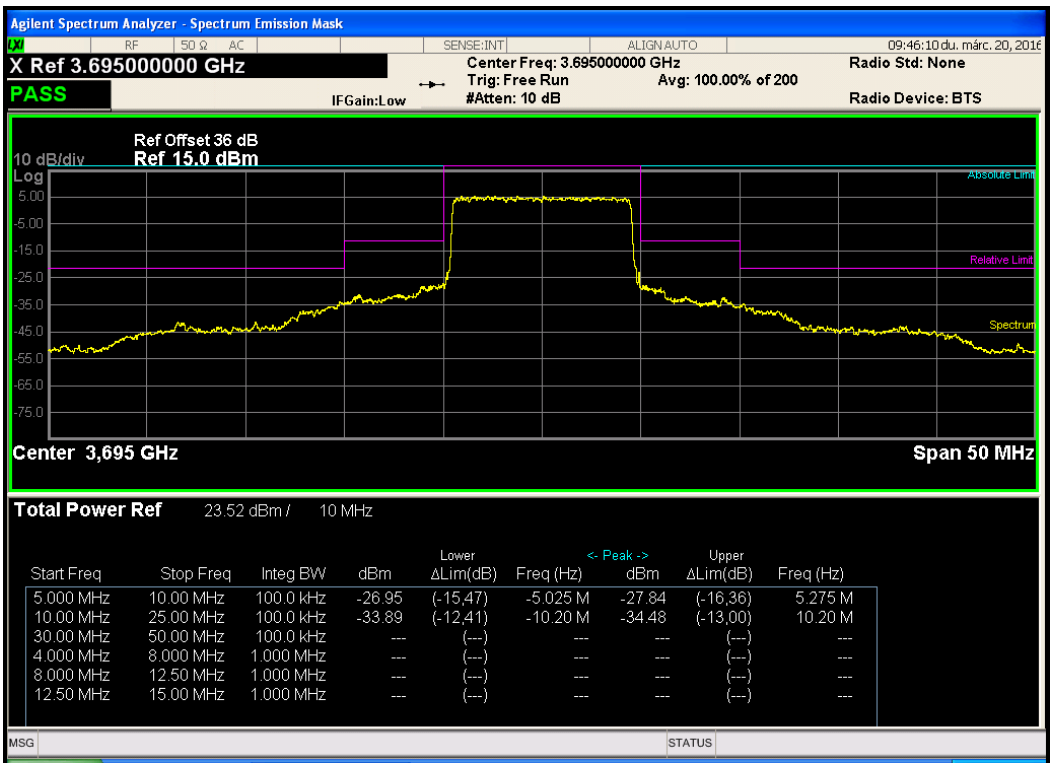


Figure 170. —10MHz CBW – High Frequency, 64QAM

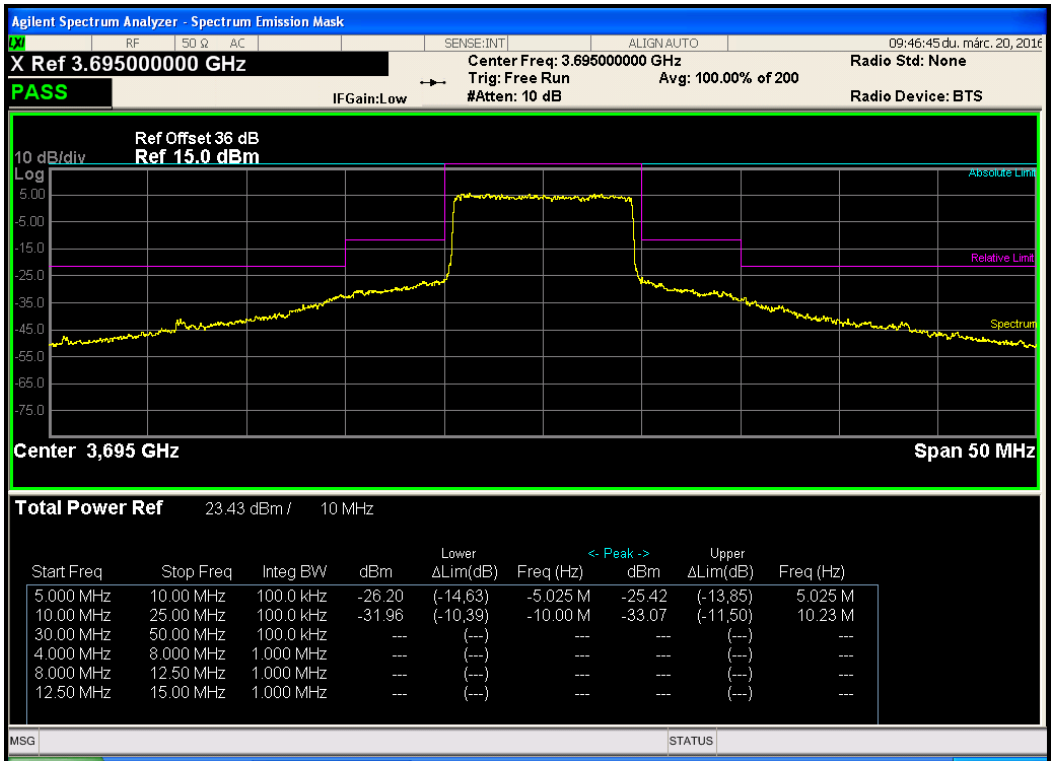


Figure 171. —10MHz CBW – High Frequency, 16QAM

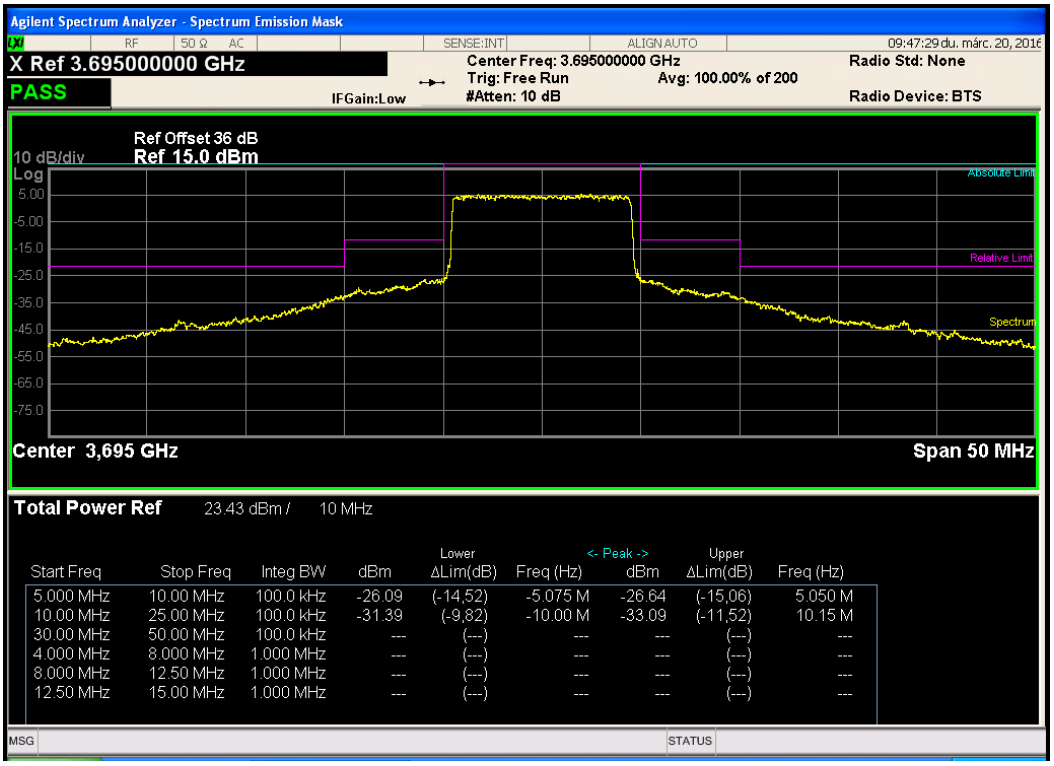


Figure 172. —10MHz CBW – High Frequency, QPSK

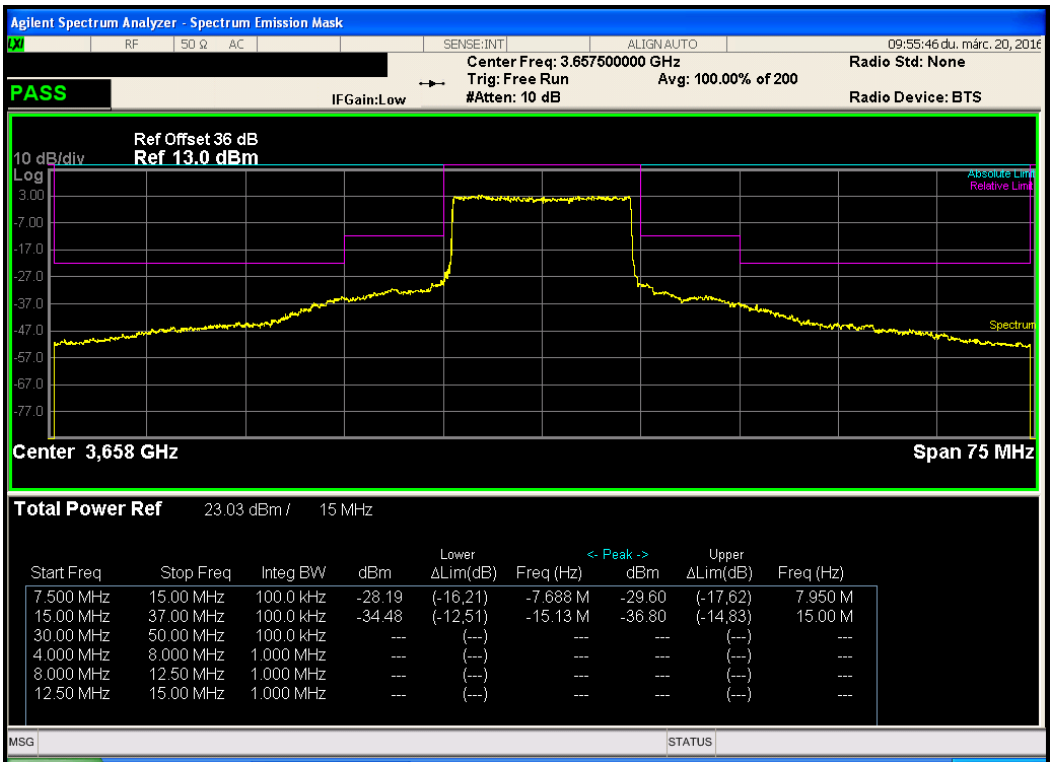


Figure 173. —15MHz CBW – Low Frequency, 64QAM

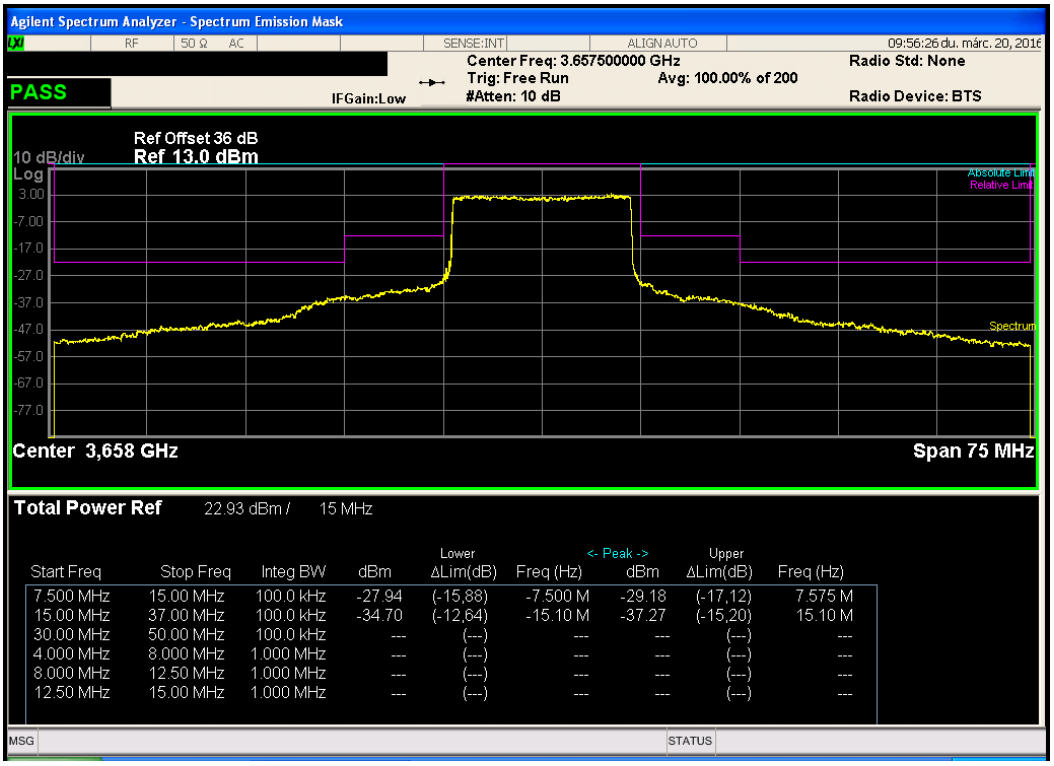


Figure 174. —15MHz CBW – Low Frequency, 16QAM

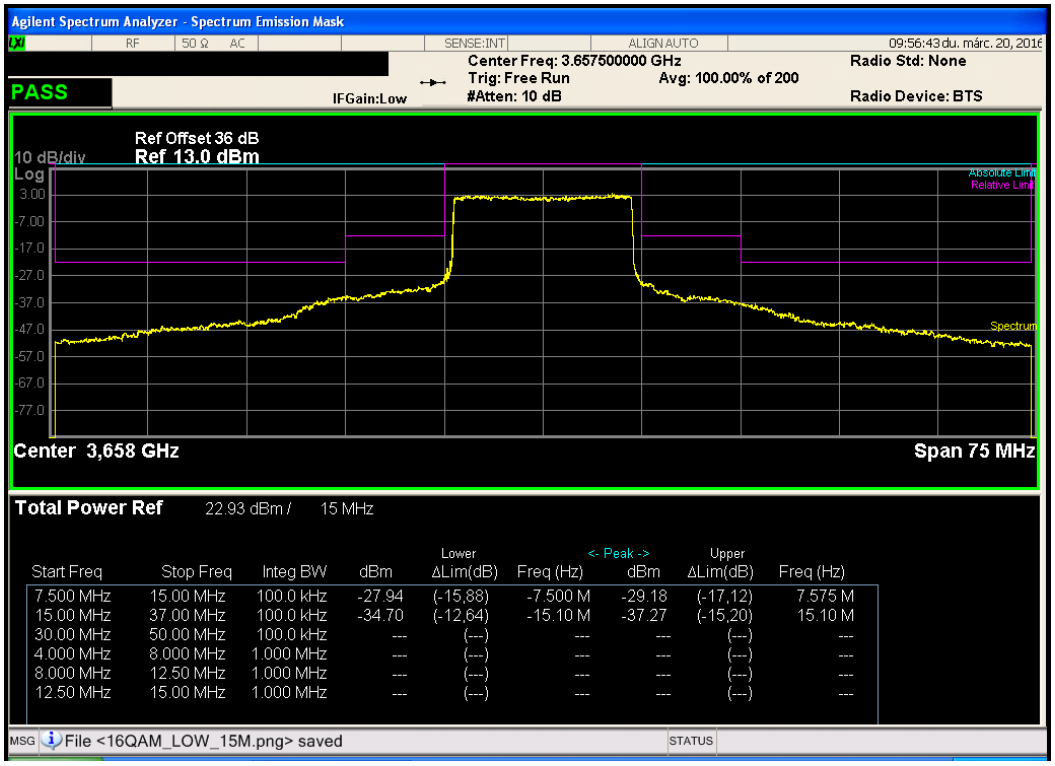


Figure 175. —15MHz CBW – Low Frequency, QPSK

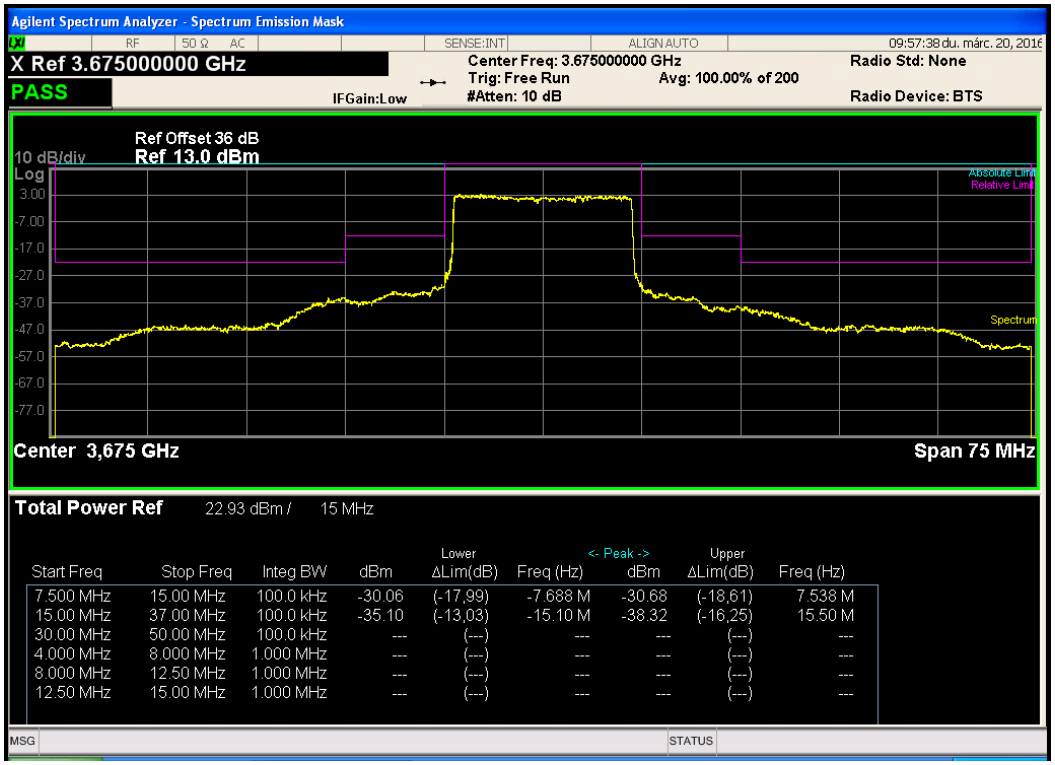


Figure 176. — 15MHz CBW – Mid Frequency, 64QAM

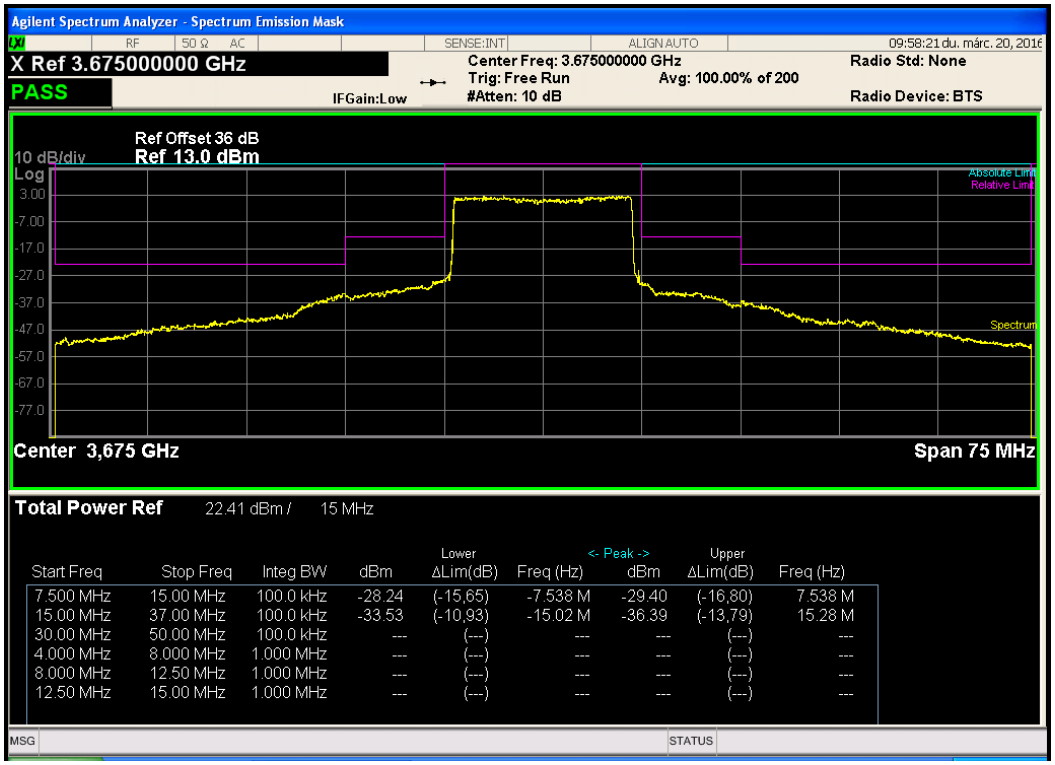


Figure 177. —15MHz CBW – Mid Frequency, 16QAM

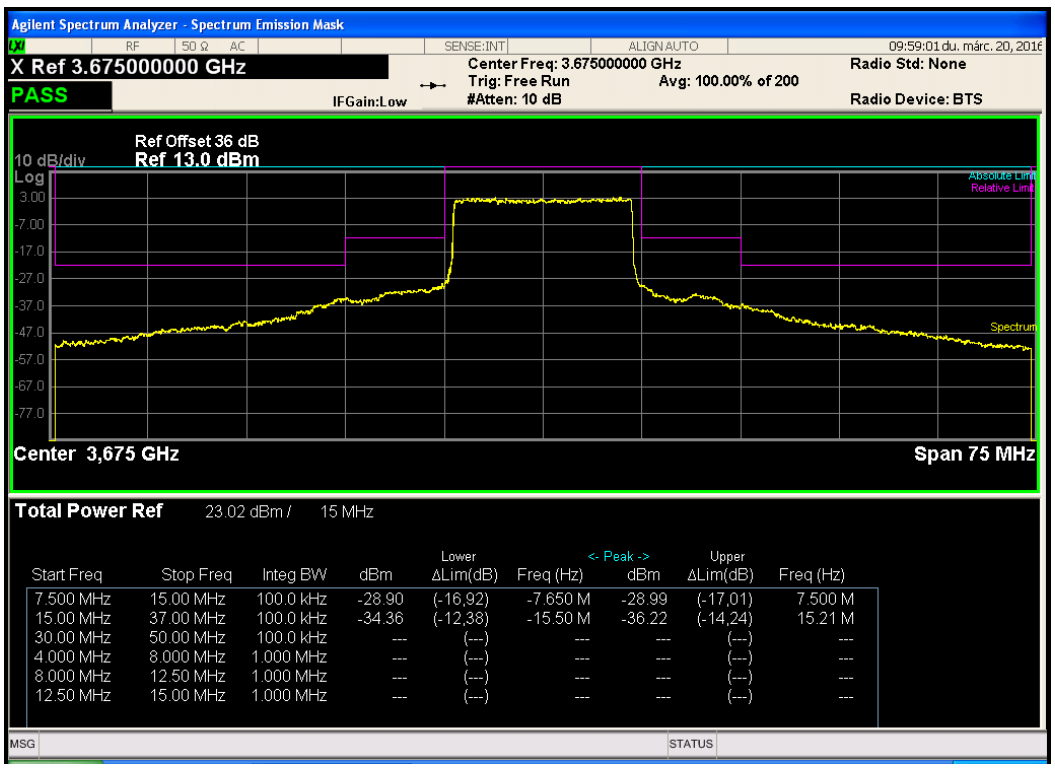


Figure 178. —15MHz CBW – Mid Frequency, QPSK

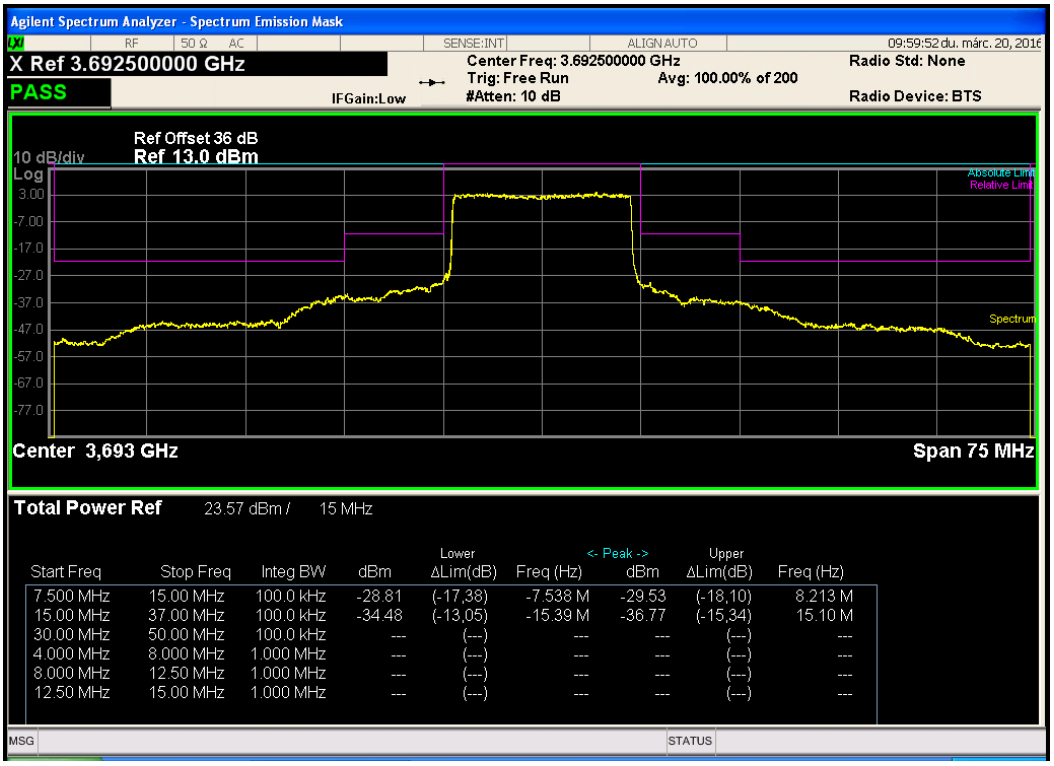


Figure 179. —15MHz CBW – High Frequency, 64QAM

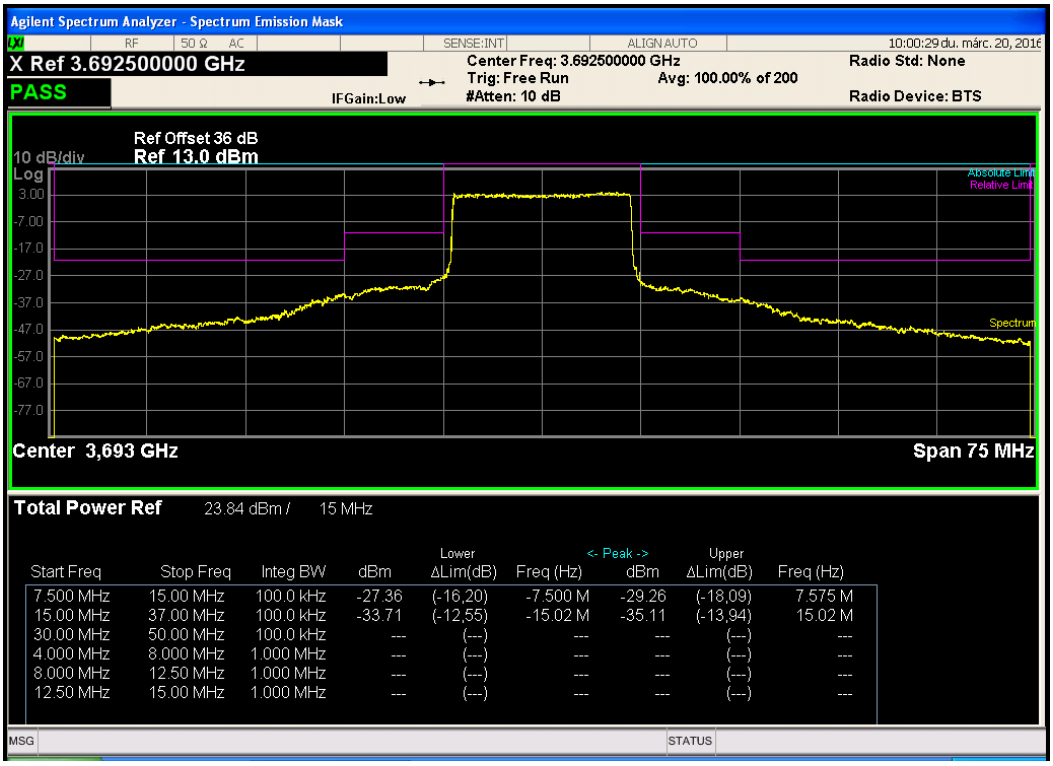


Figure 180. —15MHz CBW – High Frequency, 16QAM

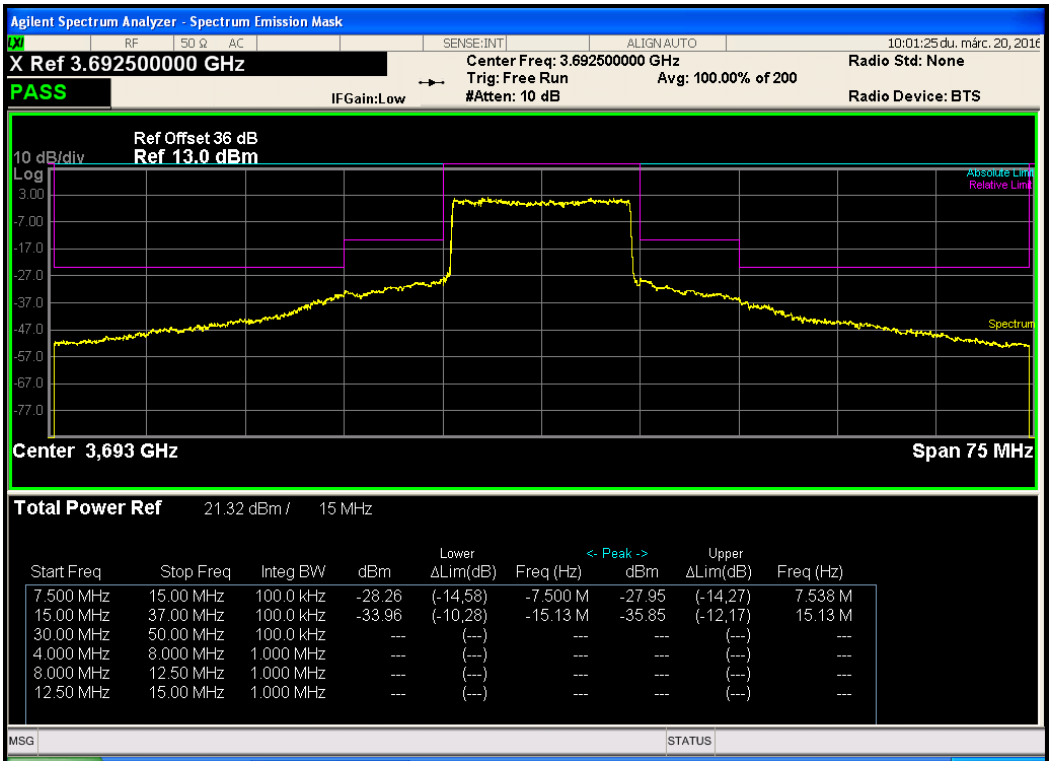


Figure 181. —15MHz CBW – High Frequency, QPSK

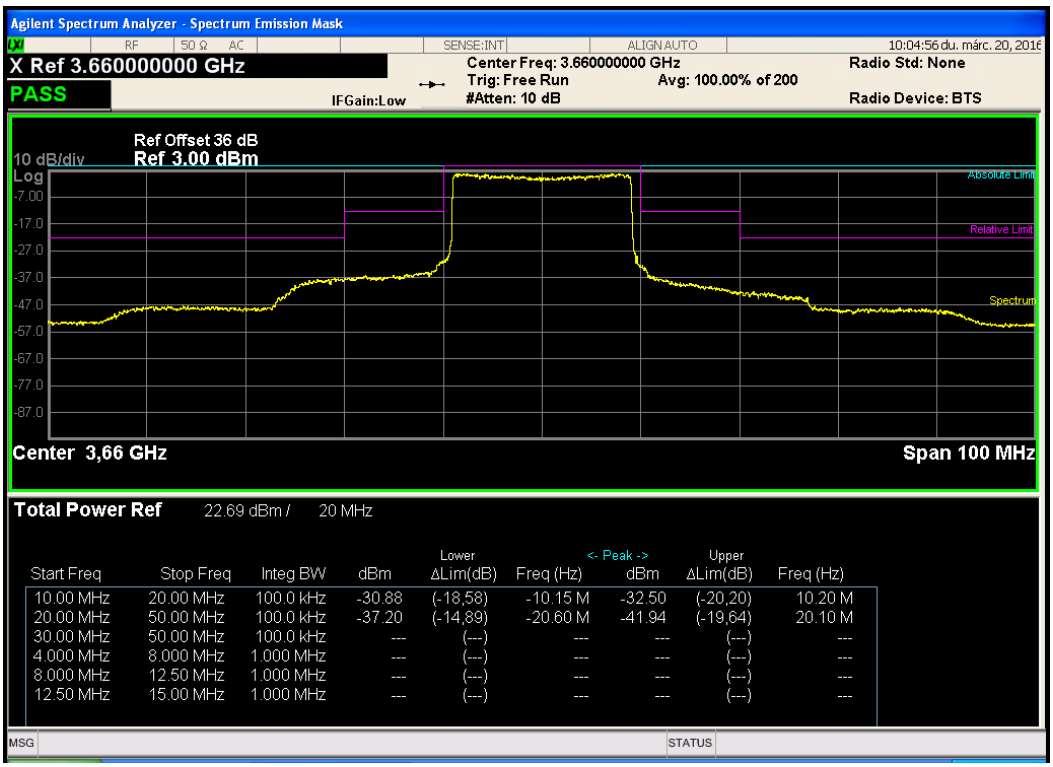


Figure 182. —20MHz CBW – Low Frequency, 64QAM

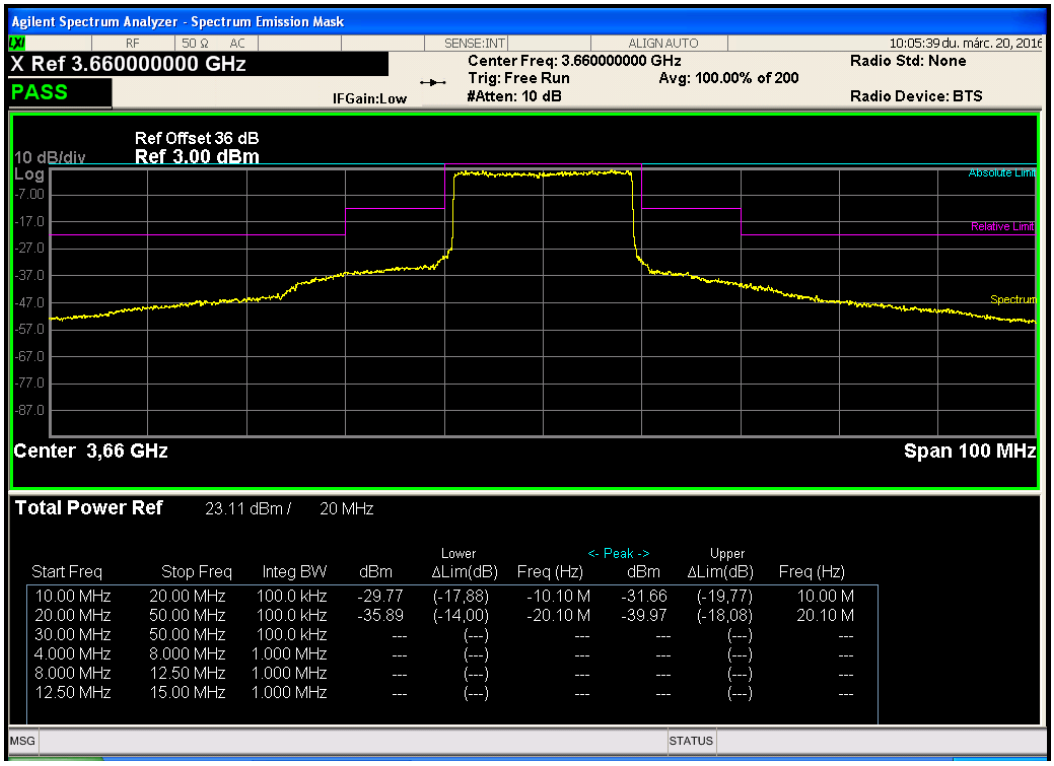


Figure 183. —20MHz CBW – Low Frequency, 16QAM

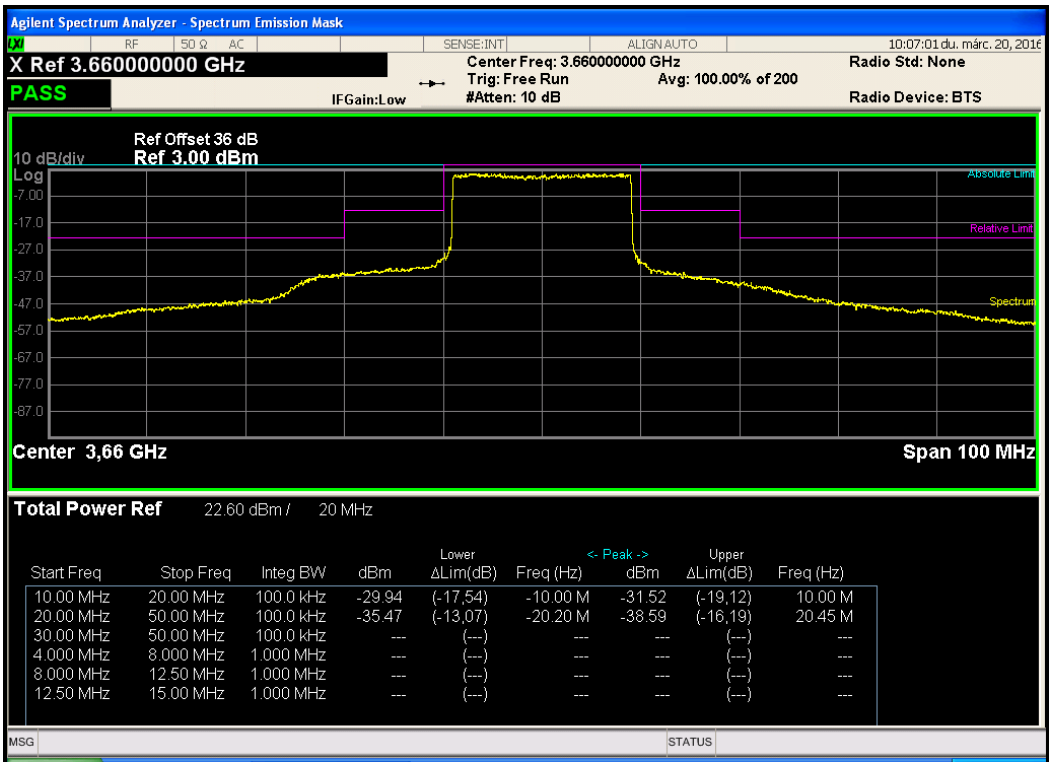


Figure 184. —20MHz CBW – Low Frequency, QPSK

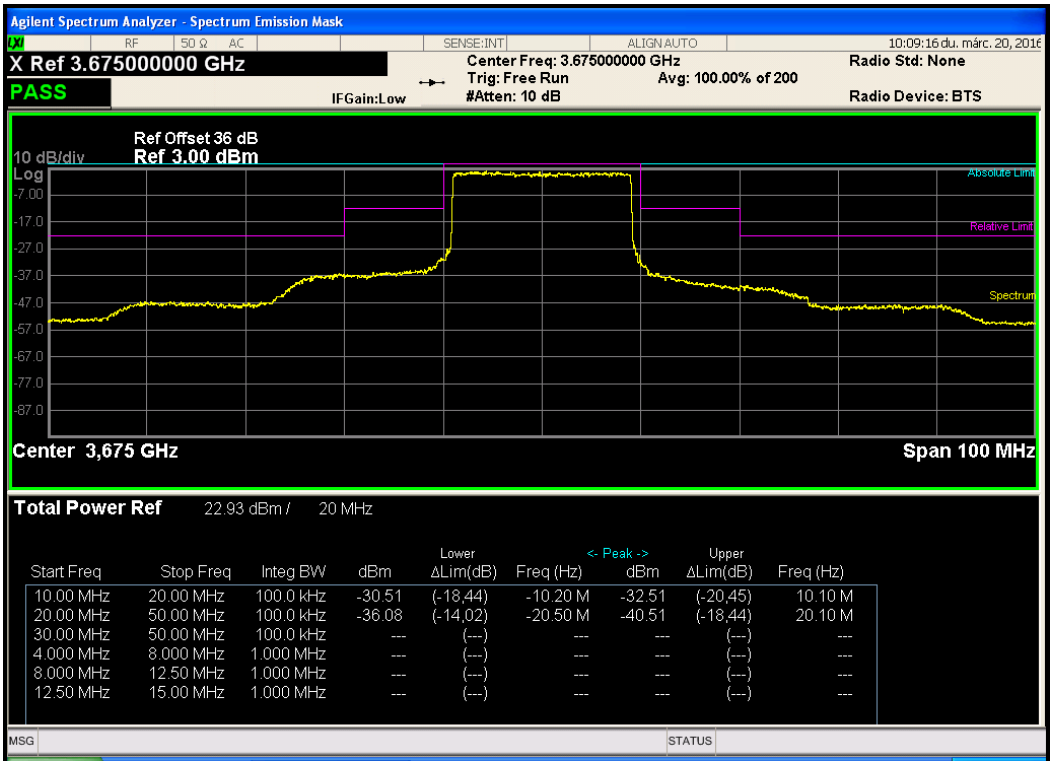


Figure 185. —20MHz CBW – Mid Frequency, 64QAM

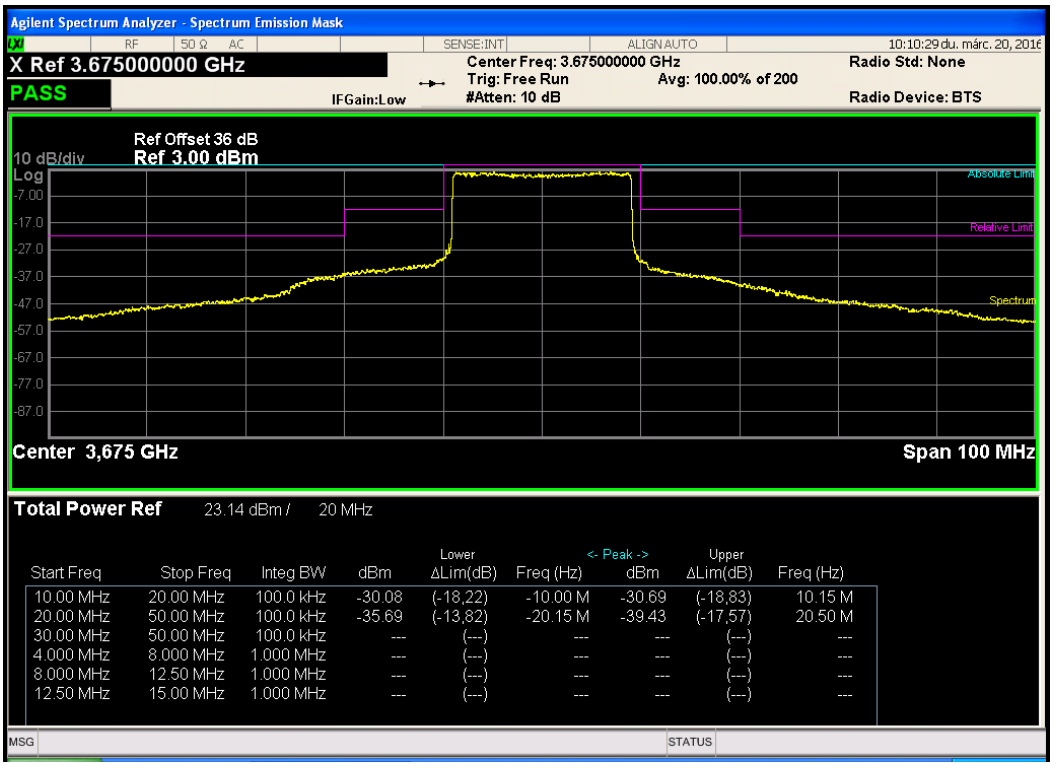


Figure 186. —20MHz CBW – Mid Frequency, 16QAM

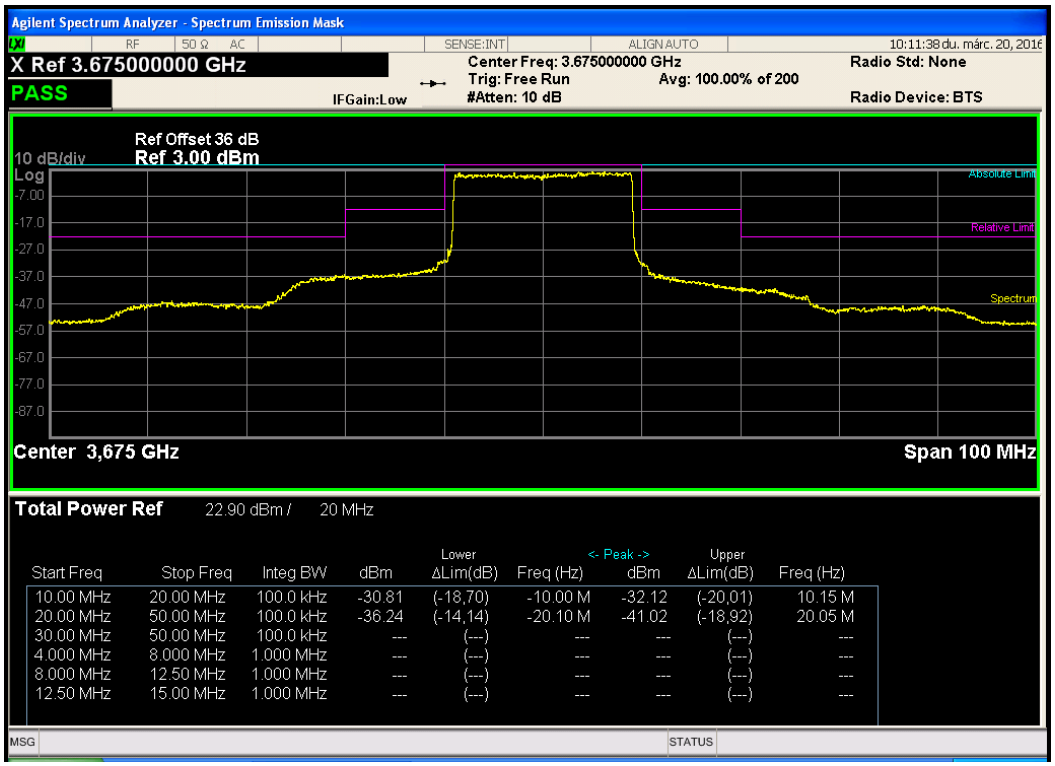


Figure 187. —20MHz CBW – Mid Frequency, QPSK

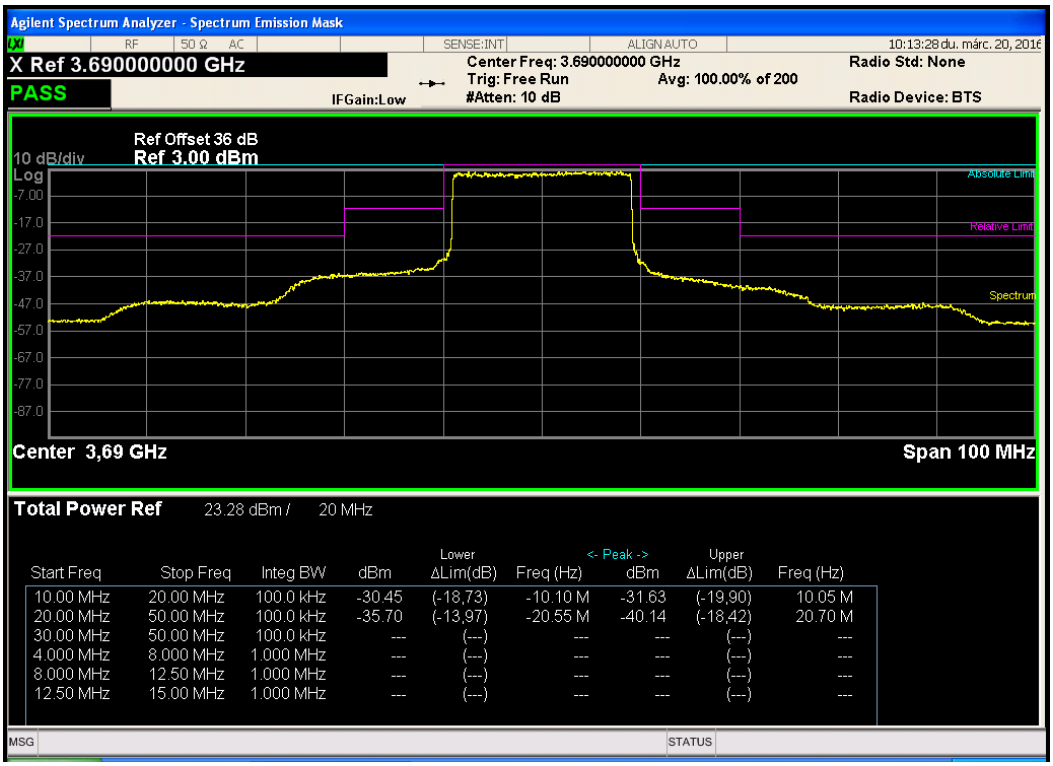


Figure 188. —20MHz CBW – High Frequency, 64QAM

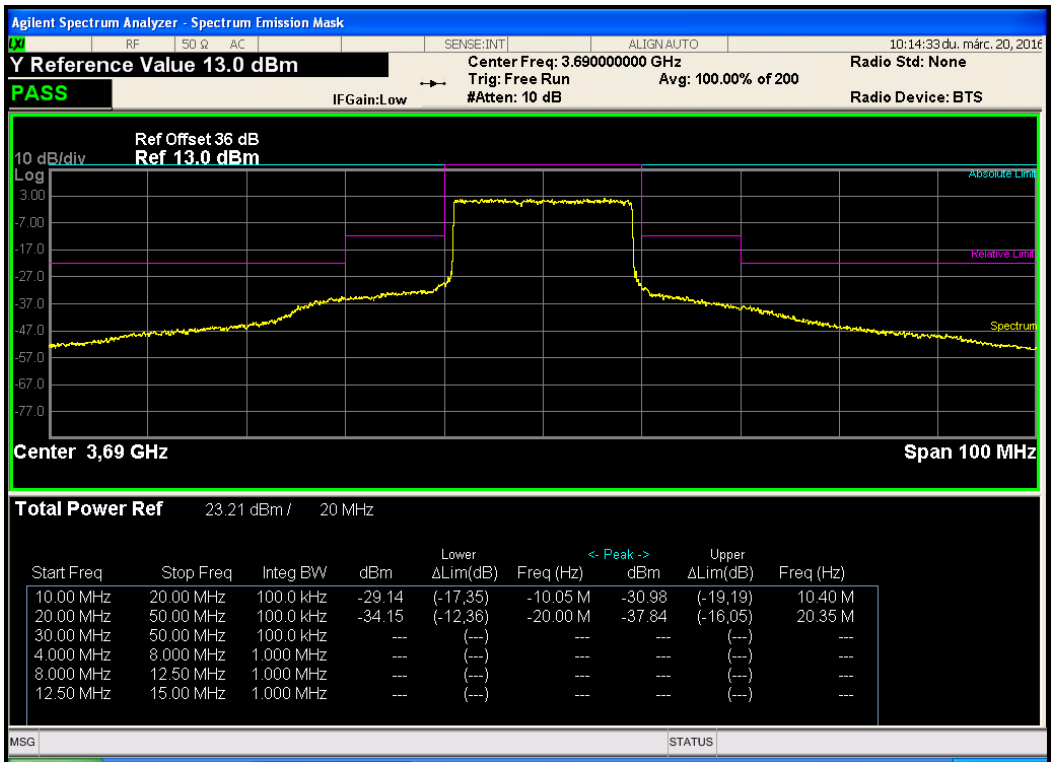


Figure 189. —20MHz CBW – High Frequency, 16QAM

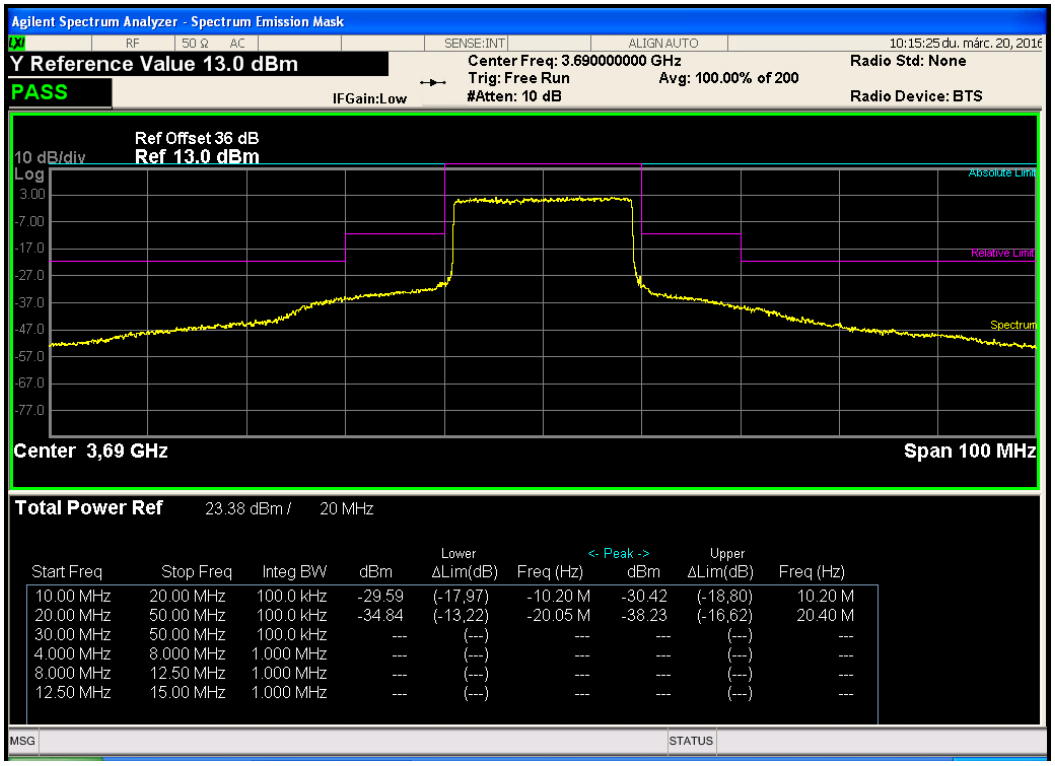


Figure 190. —20MHz CBW – High Frequency, QPSK

7.5 Test Equipment Used; Transmitter Output Power and EIRP

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Next Calibration Due
MXA Signal Analyzer	Agilent	N9020A	MY48011785	July 26 2015	July 26, 2017
DC block	JFW	50DB-007	1-23	N/A	N/A
Attenuator	MINI-CIRCUTS	MCL BW S10W2+	0728	N/A	N/A
Attenuator	MINI-CIRCUTS	MCL BW S10W2+	6090	N/A	N/A

Figure 191. Test Equipment Used

8. Conducted Transmitter Unwanted Emissions

8.1 Test Specification

RSS-197, Issue 1: 2010, Section 5.7
FCC, Part 90, Subpart Z, Section 90.1323

8.2 Test Procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator, an appropriate coaxial cable and DC block. (max total loss= 38.0 dB).
Top and bottom operational frequencies were tested for all BWs (5, 10, 15, 20MHz) for each modulation type (QPSK, 16QAM and 64QAM).
The testing was performed in low population power mode as the "worst case".
Scanning was performed from 10.0MHz until 37.0GHz.

8.3 Limit

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at 43 + 10 log (P) dB, yielding -13dBm.

8.4 Test Results

JUDGEMENT: Passed

For additional information see *Figure 192* to *Figure 311*.

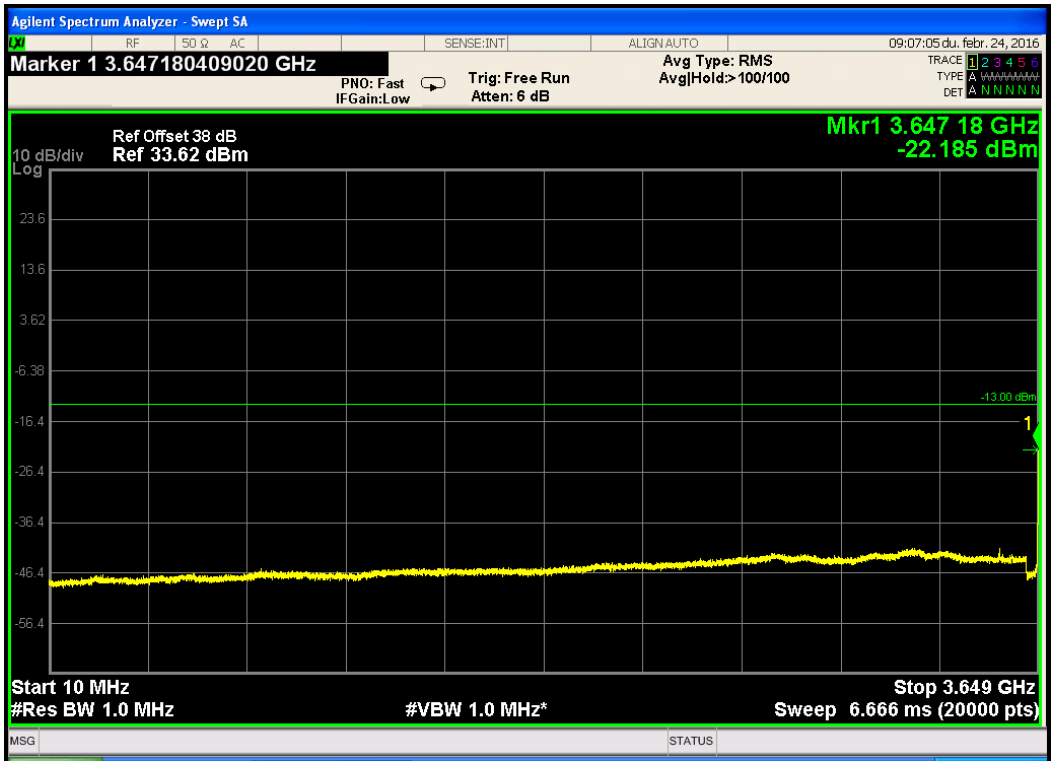


Figure 192. —5MHz CBW -10.0MHz-3649.0MHz band, bottom frequency, 64QAM

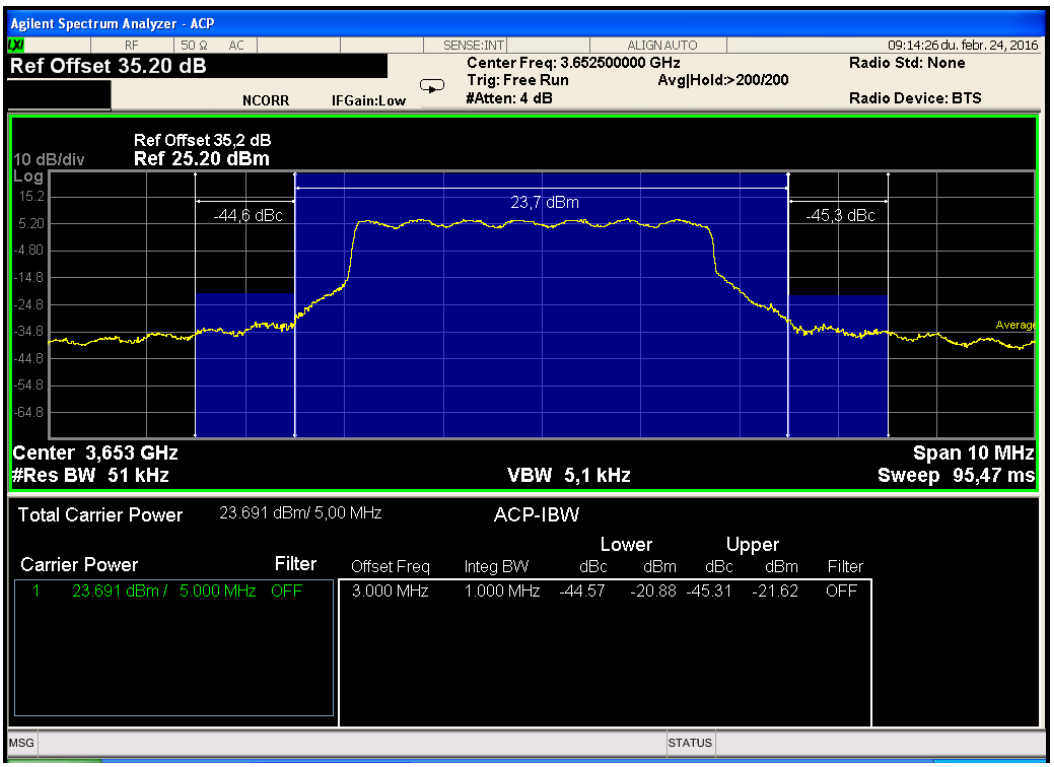


Figure 193. —5MHz CBW -3649.0MHz-3650.0MHz band, bottom frequency, 64QAM

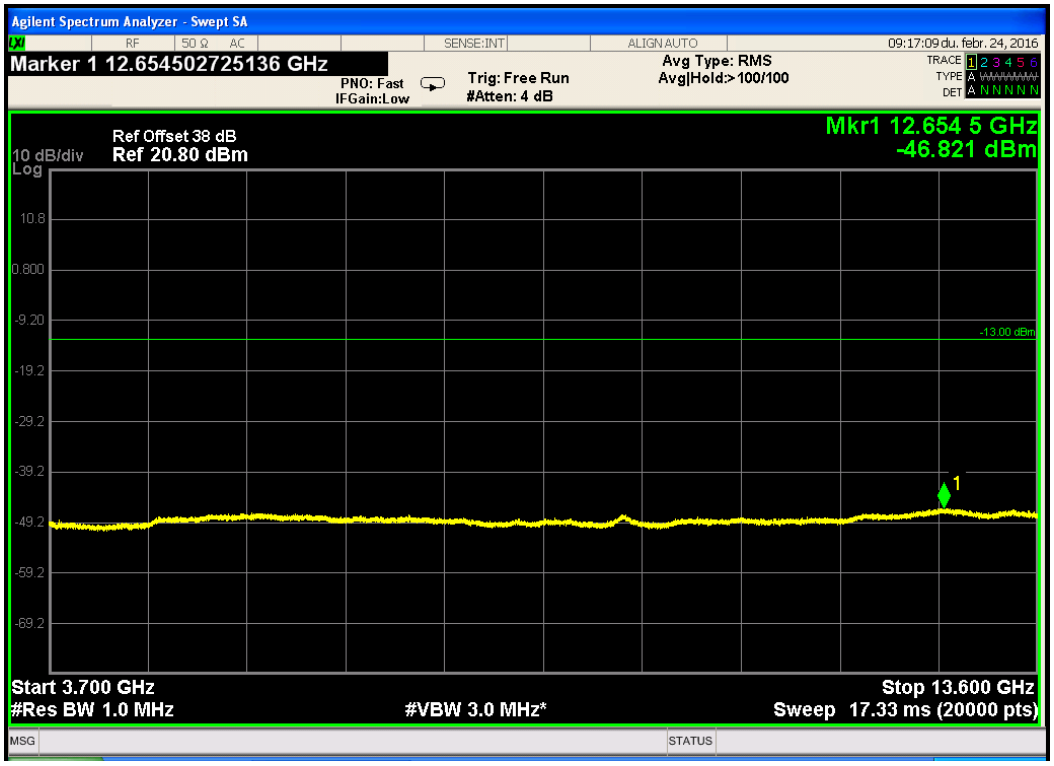


Figure 194. —5MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, 64QAM

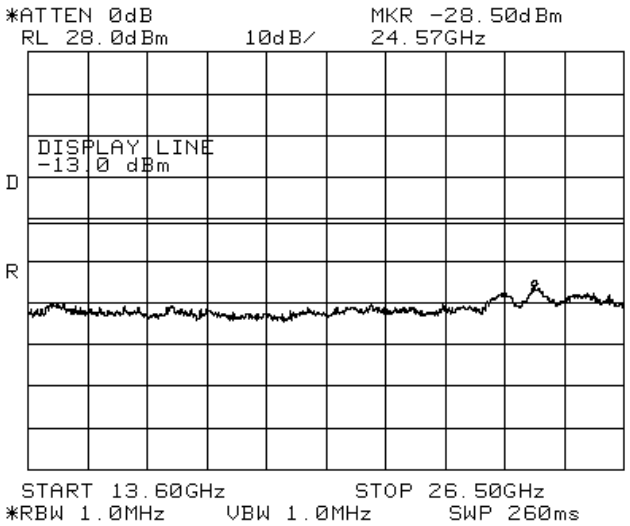


Figure 195. —5MHz CBW - 13.6GHz-26.5GHz band bottom frequency, 64QAM

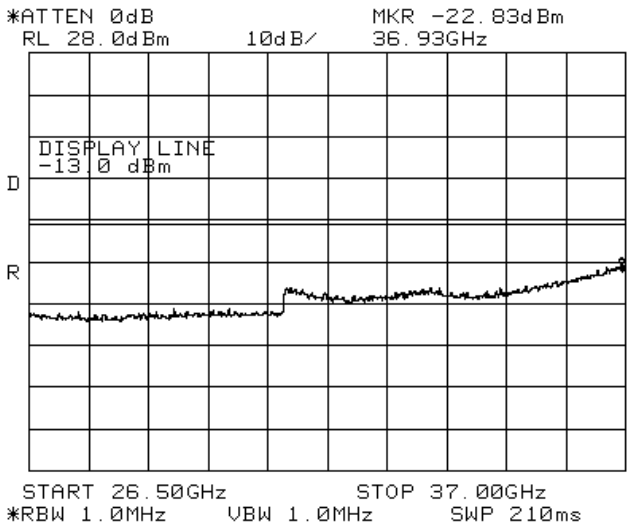


Figure 196. —5MHz CBW - 26.5GHz-37.0GHz band bottom frequency, 64QAM

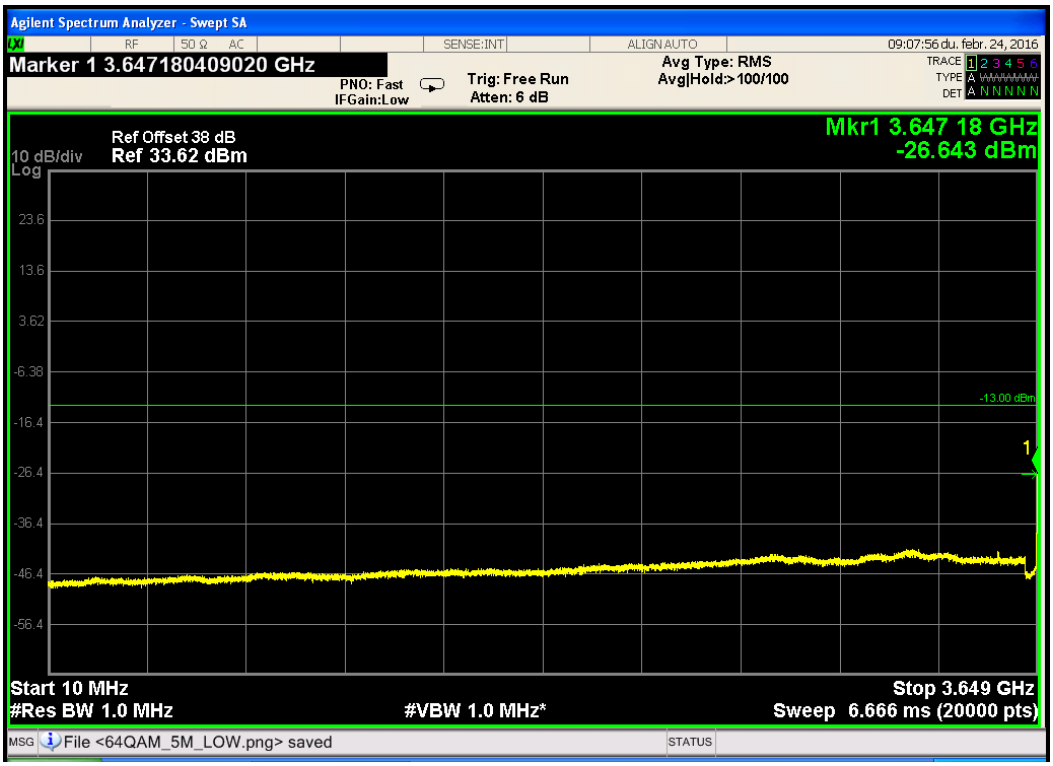


Figure 197. —5MHz CBW - 10.0MHz-3649.0MHz band, bottom frequency, 16QAM

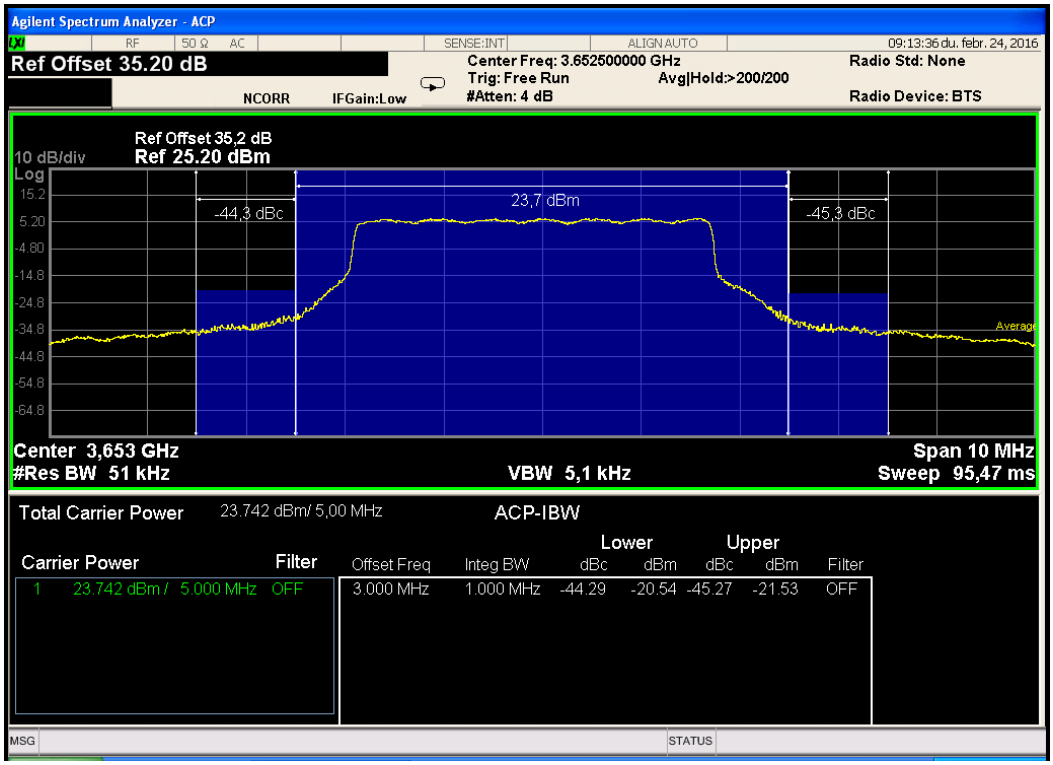


Figure 198. —5MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, 16QAM

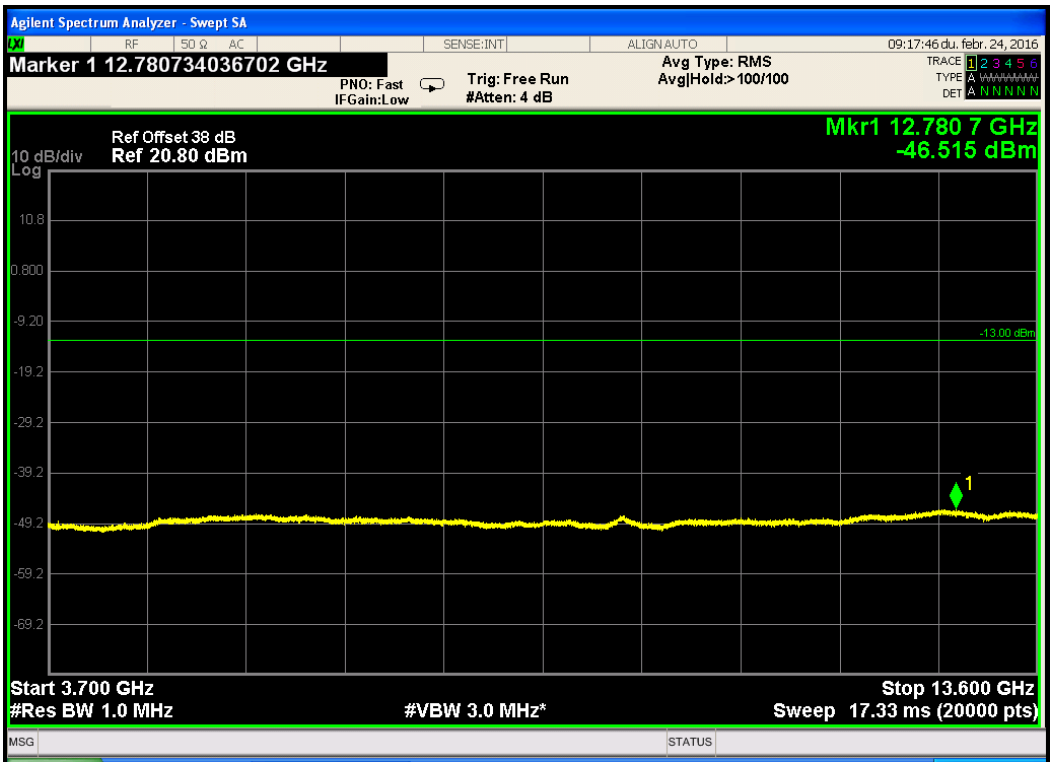


Figure 199. —5MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, 16QAM

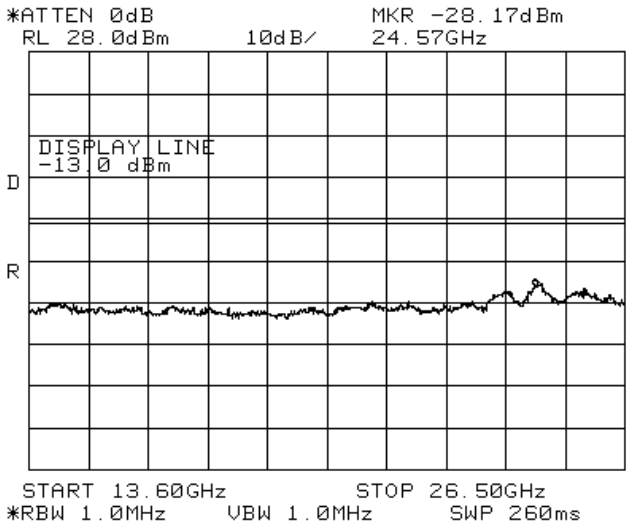


Figure 200. —5MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, 16QAM

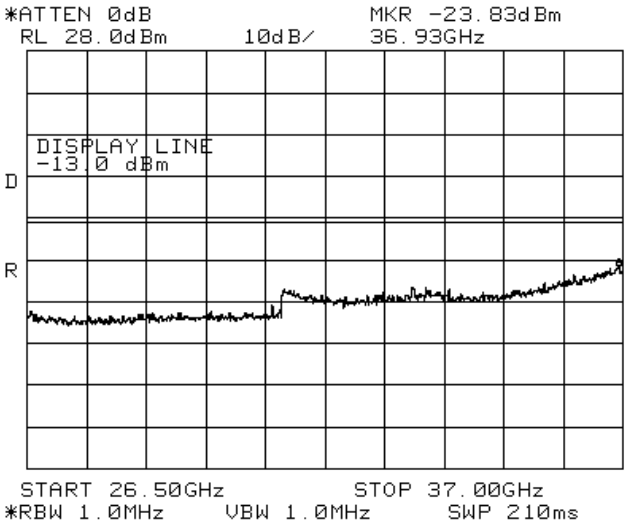


Figure 201. —5MHz CBW - 26.5GHz-37.0GHz band bottom frequency, 16QAM

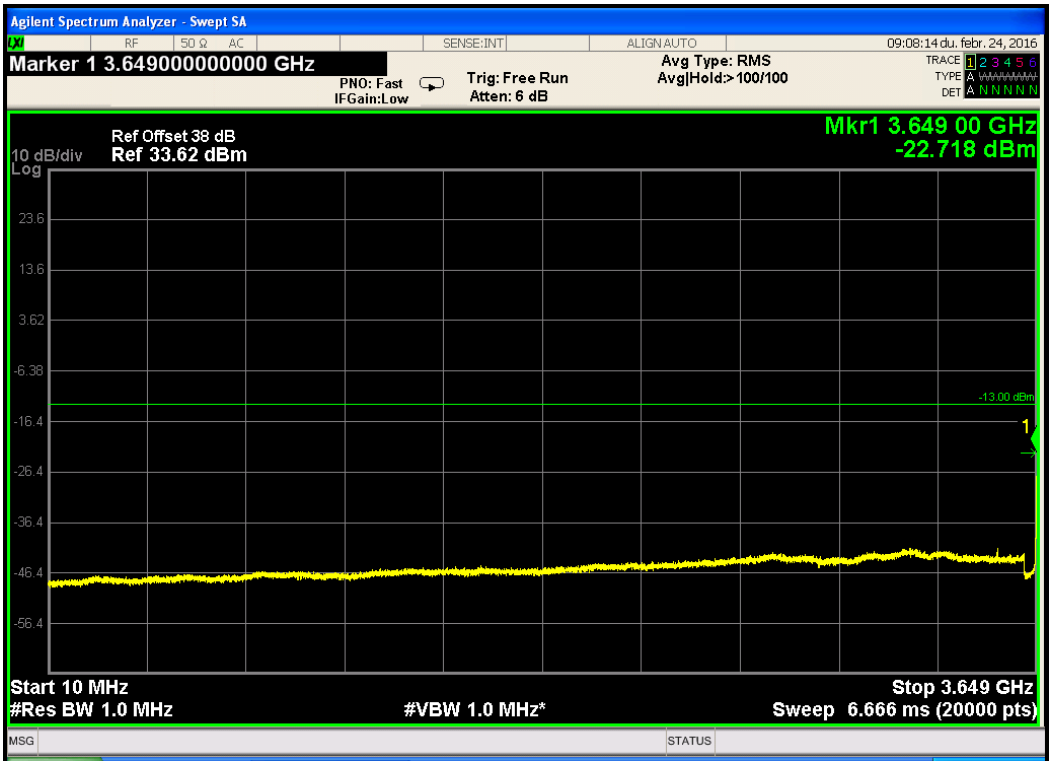


Figure 202. —5MHz CBW - 10.0MHz-3649.0MHz band, bottom frequency, QPSK

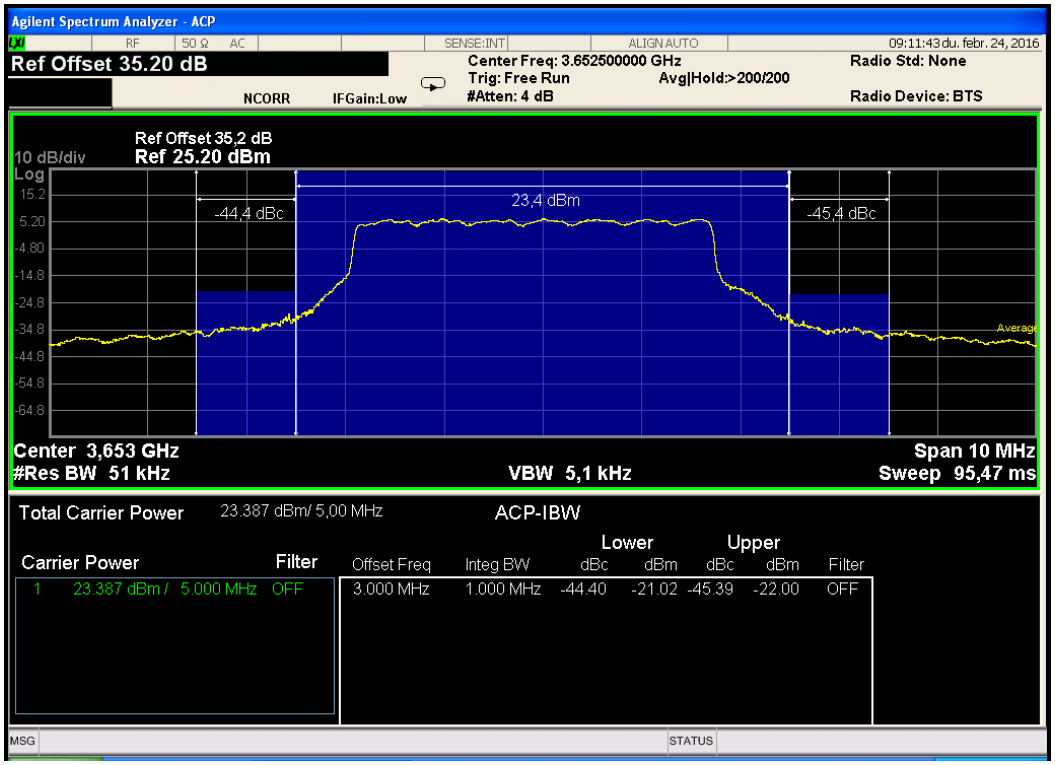


Figure 203. —5MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, QPSK

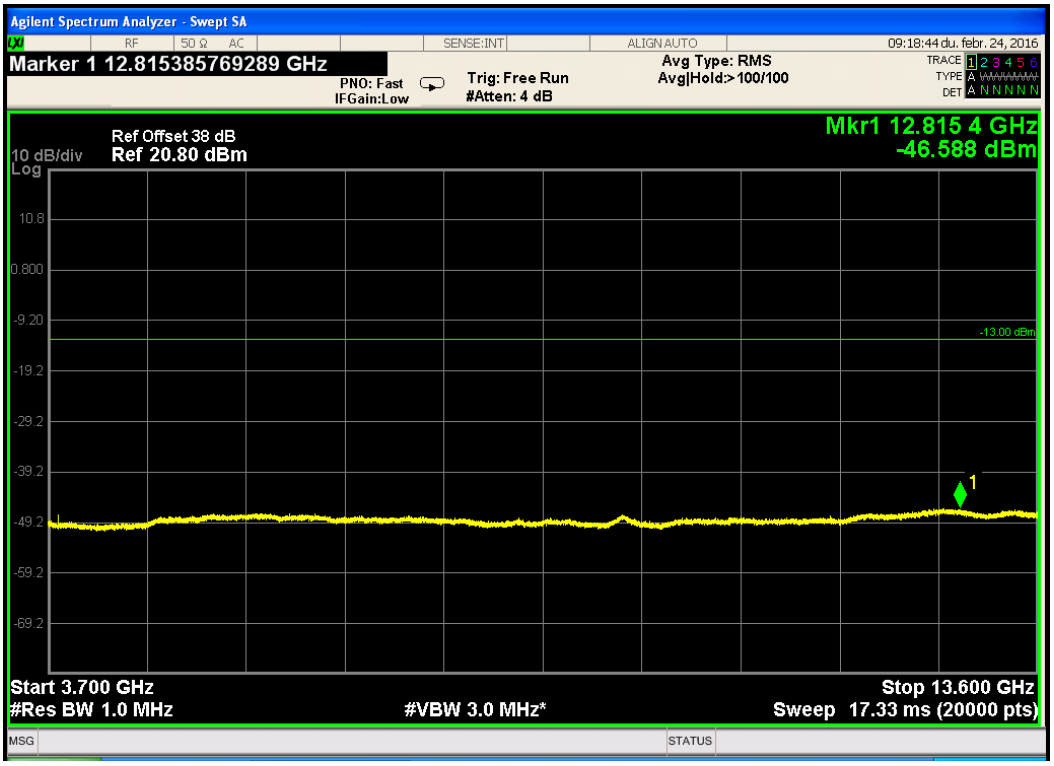


Figure 204. —5MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, QPSK

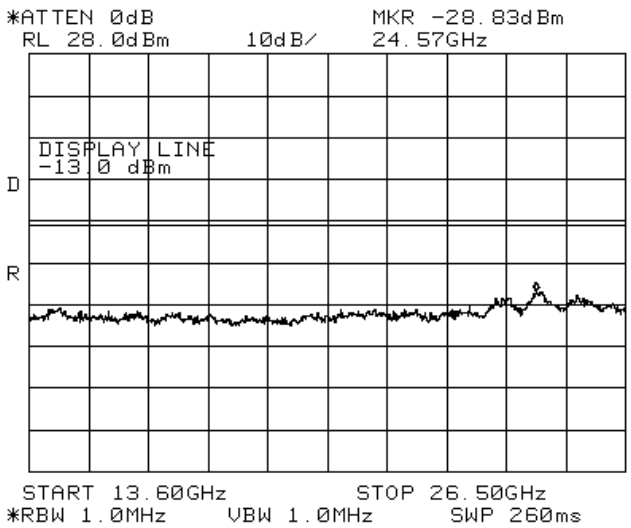


Figure 205. —5MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, QPSK

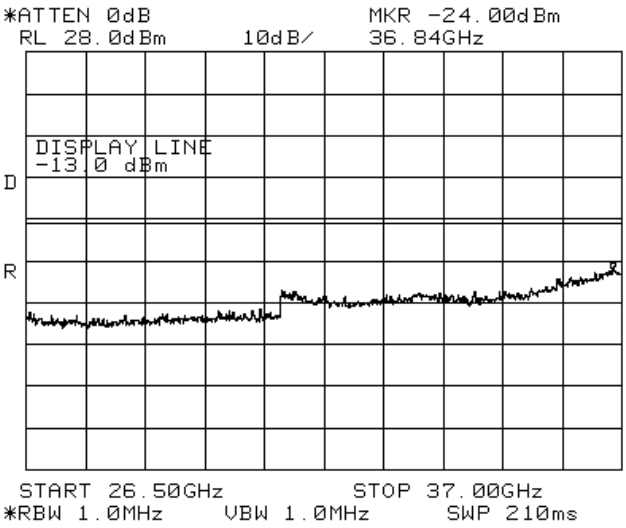


Figure 206. —5MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, QPSK

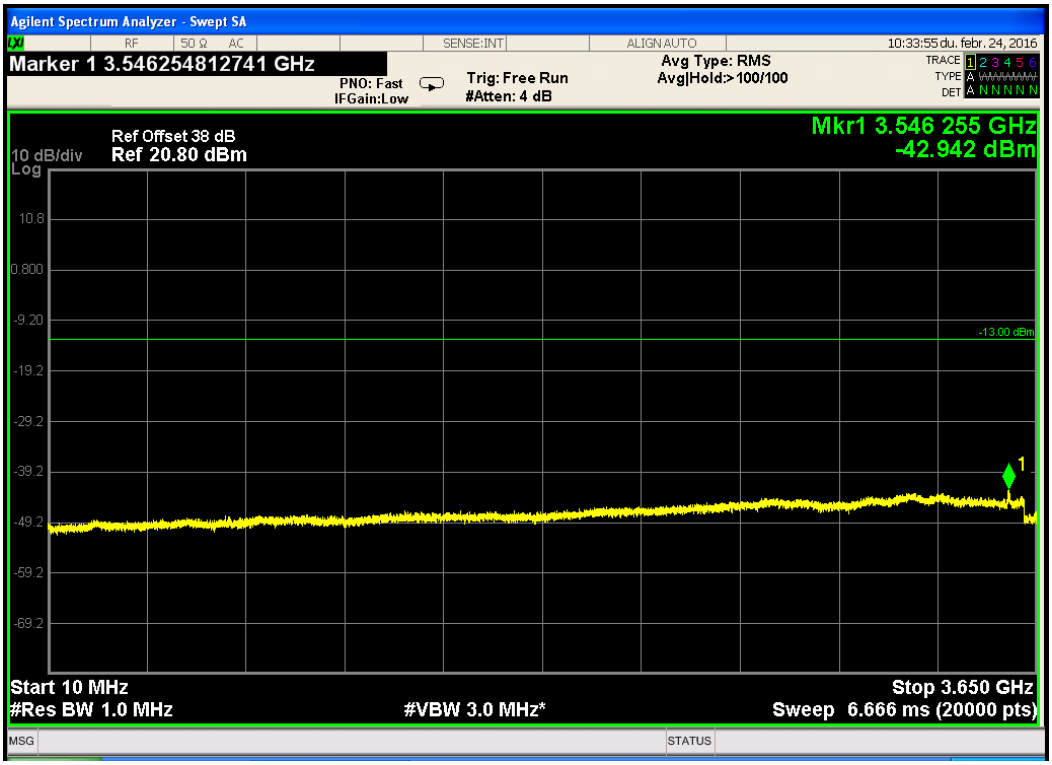


Figure 207. —5MHz CBW - 10.0MHz-3650.0MHz band, top frequency, 64QAM

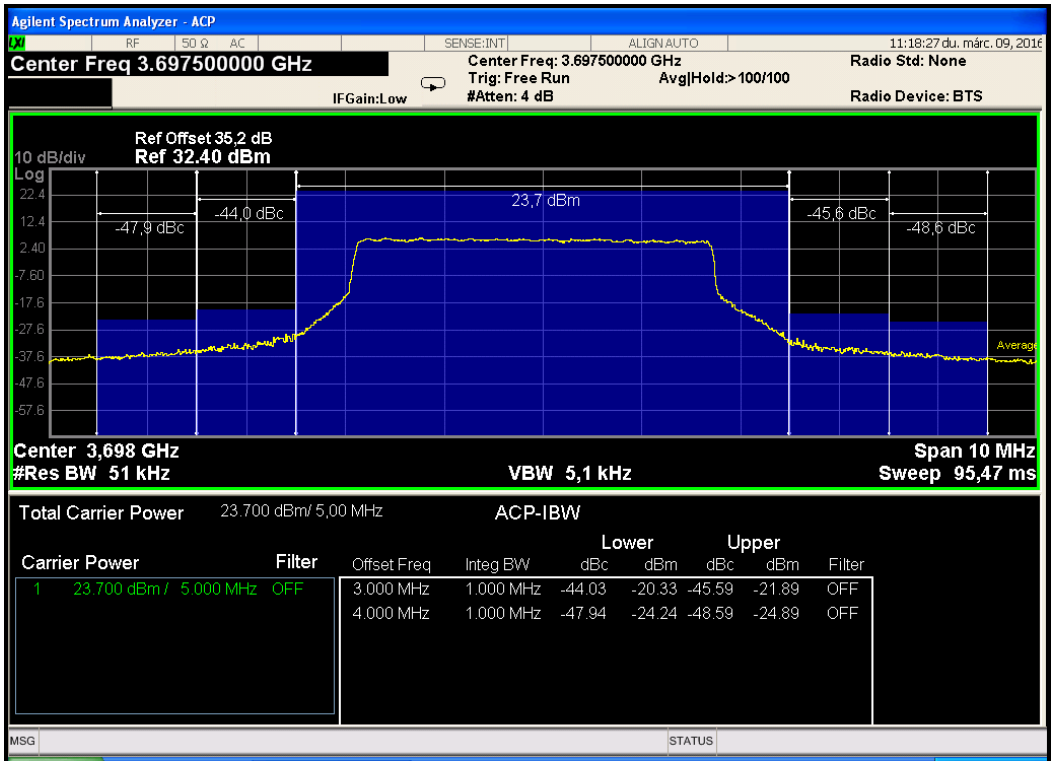


Figure 208. —5MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, 64QAM

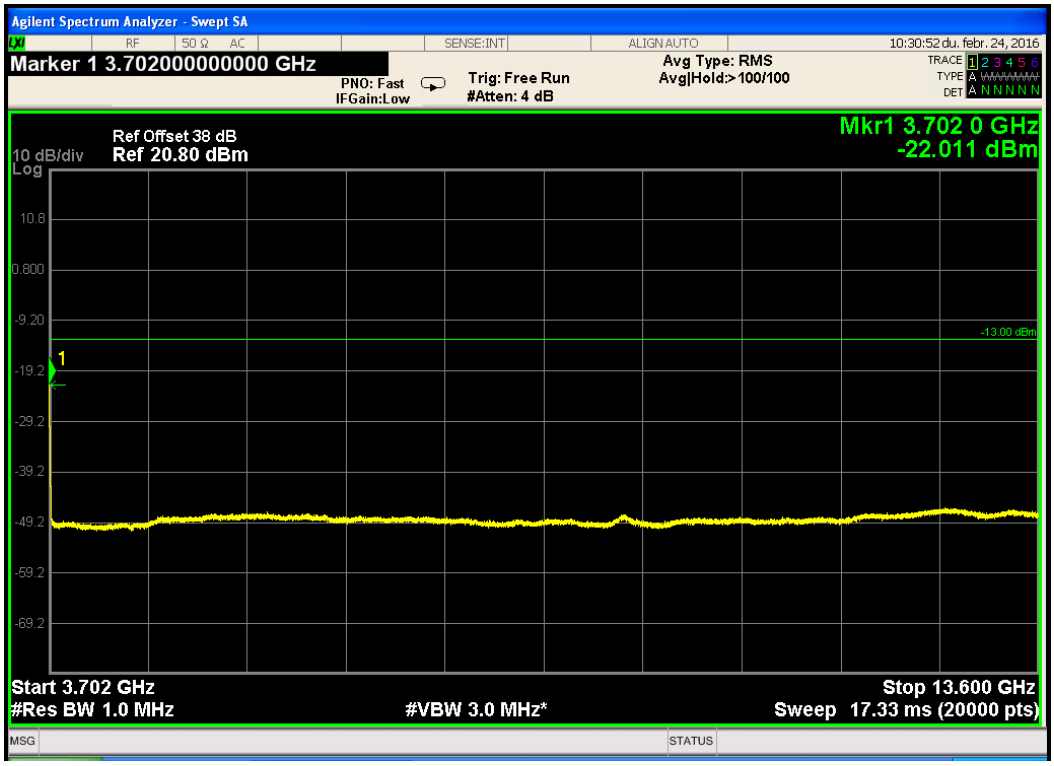


Figure 209. —5MHz CBW - 3702.0MHz-13.6GHz band, top frequency, 64QAM

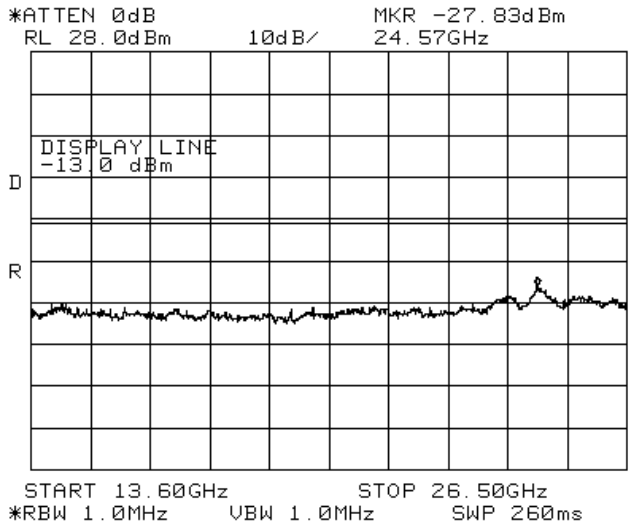


Figure 210. —5MHz CBW - 13.6GHz-26.5GHz band, top frequency, 64QAM

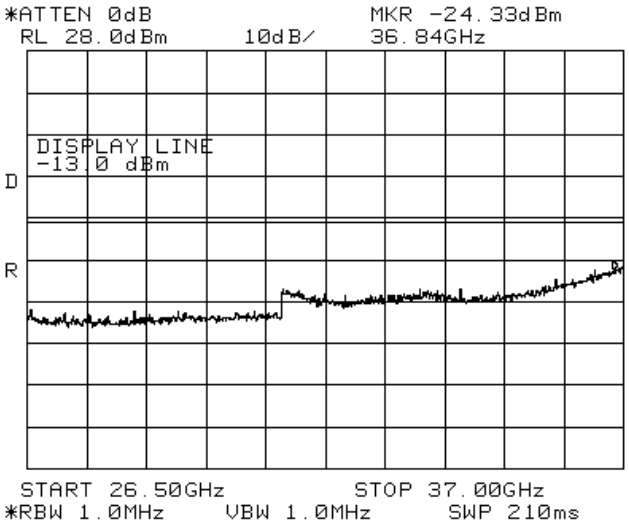


Figure 211. —5MHz CBW - 26.5GHz -37.0GHz band, top frequency, 64QAM

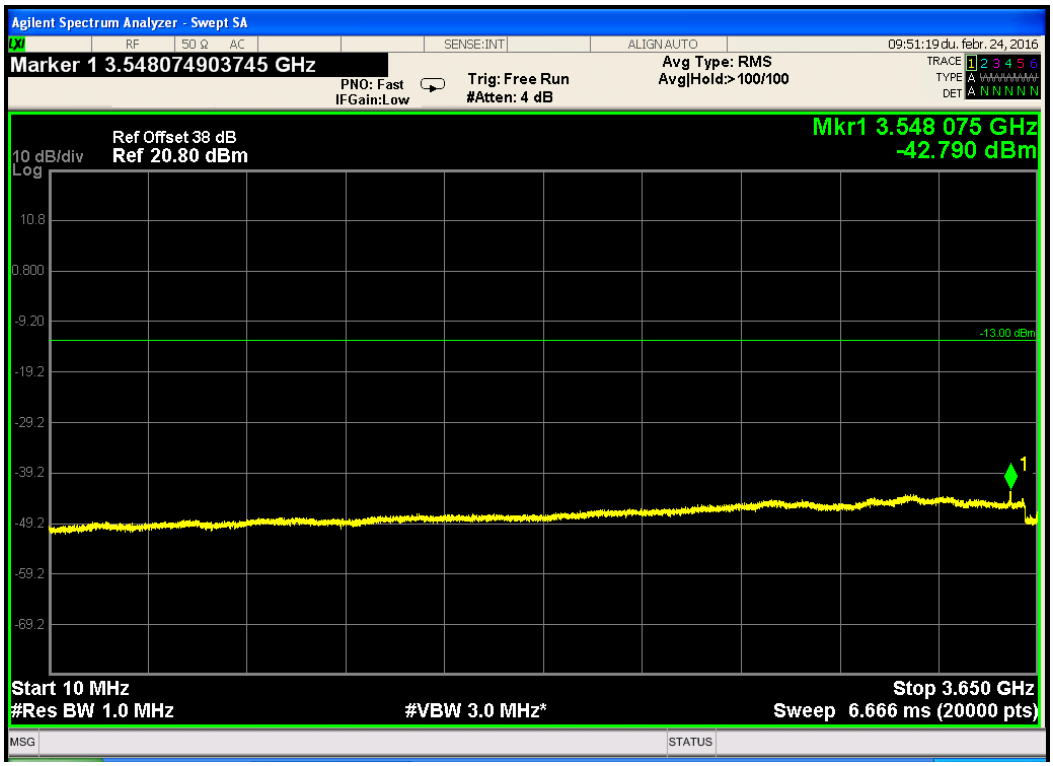


Figure 212. —5MHz CBW - 10.0MHz-3650.0MHz band, top frequency, 16QAM

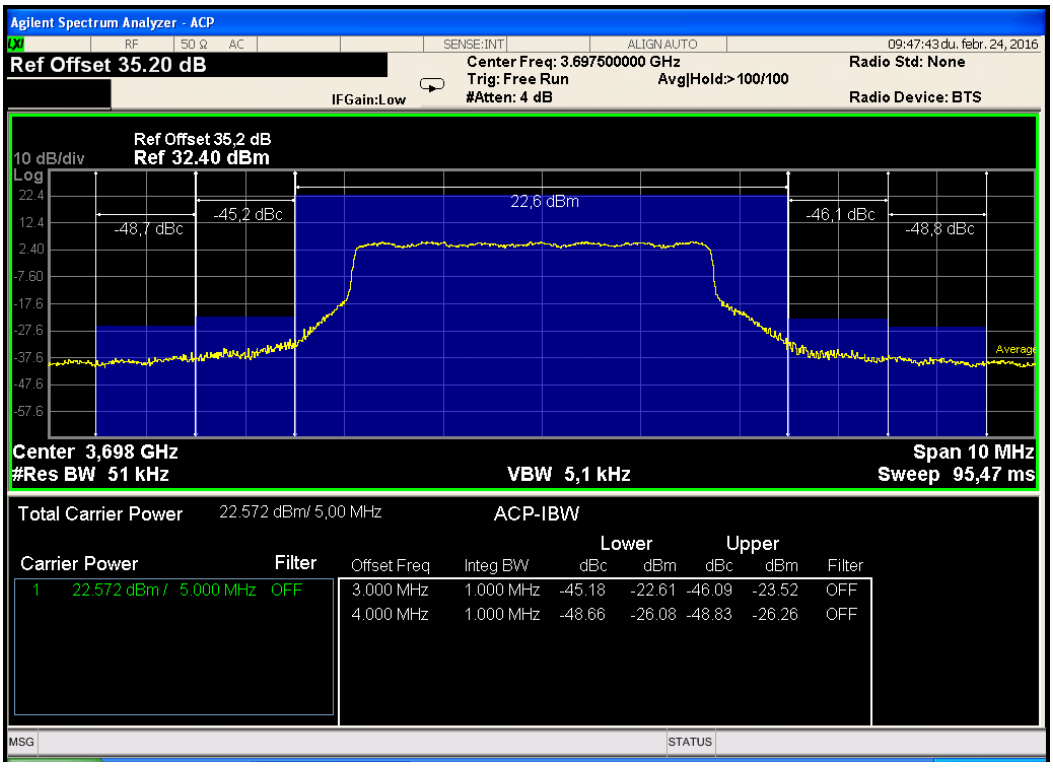


Figure 213. —5MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, 16QAM

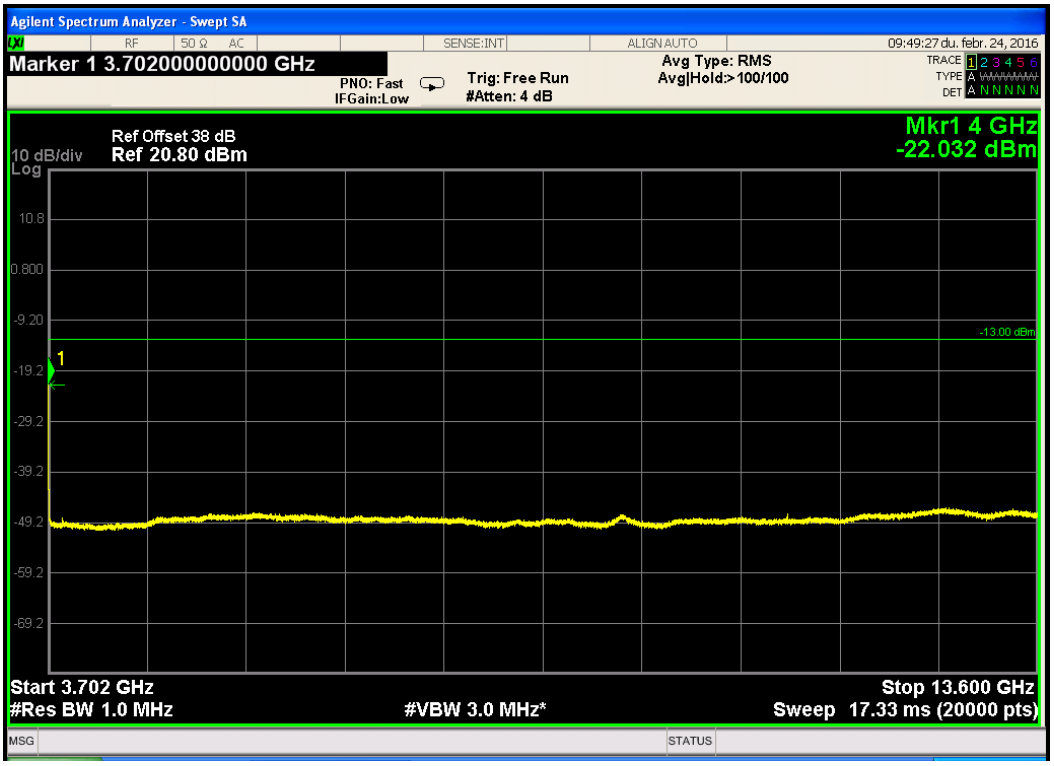


Figure 214. —5MHz CBW - 3702.0MHz-13.6GHz band, top frequency, 16QAM

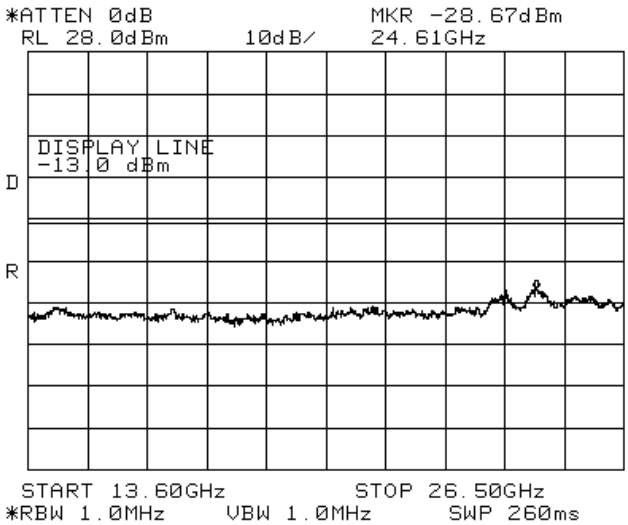


Figure 215.— 5MHz CBW - 13.6GHz-26.5GHz band, top frequency, 16QAM

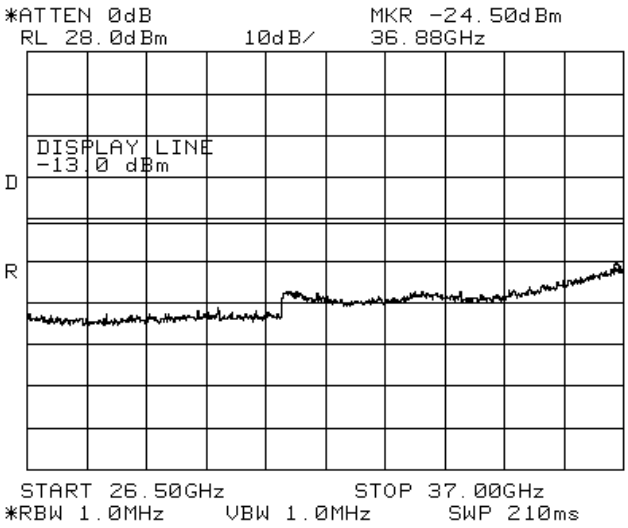


Figure 216. — 5MHz CBW - 26.5GHz-37.0GHz band, top frequency, 16QAM

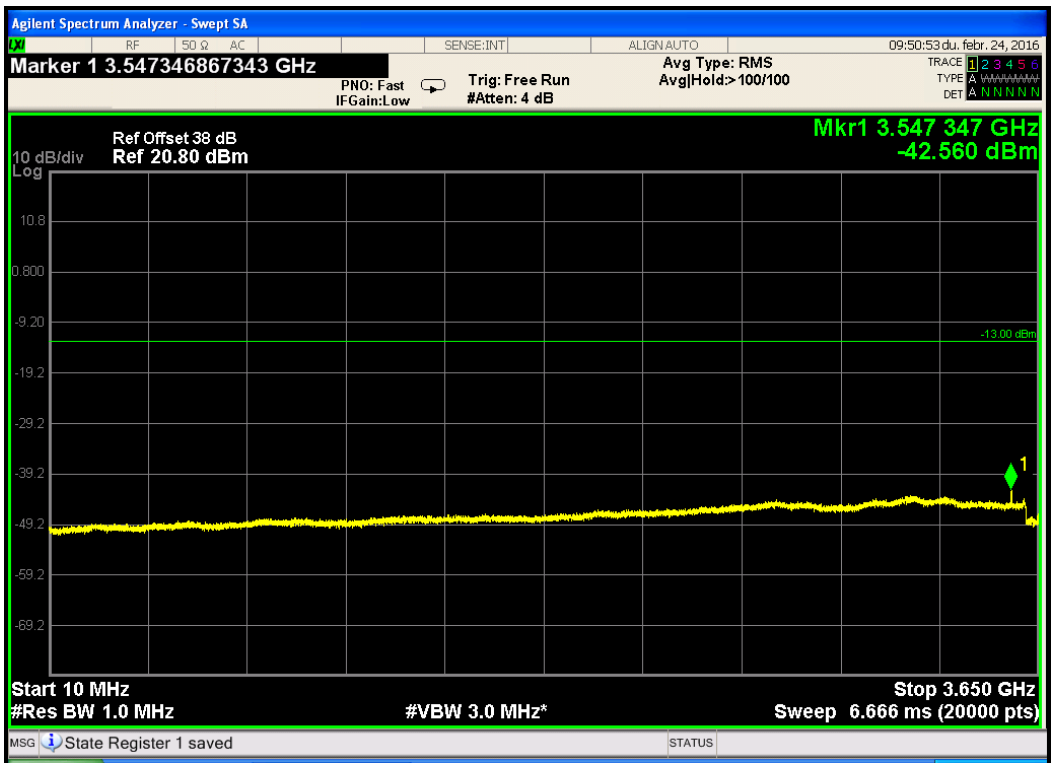


Figure 217. —5MHz CBW - 10.0MHz-3650.0MHz band, top frequency, QPSK

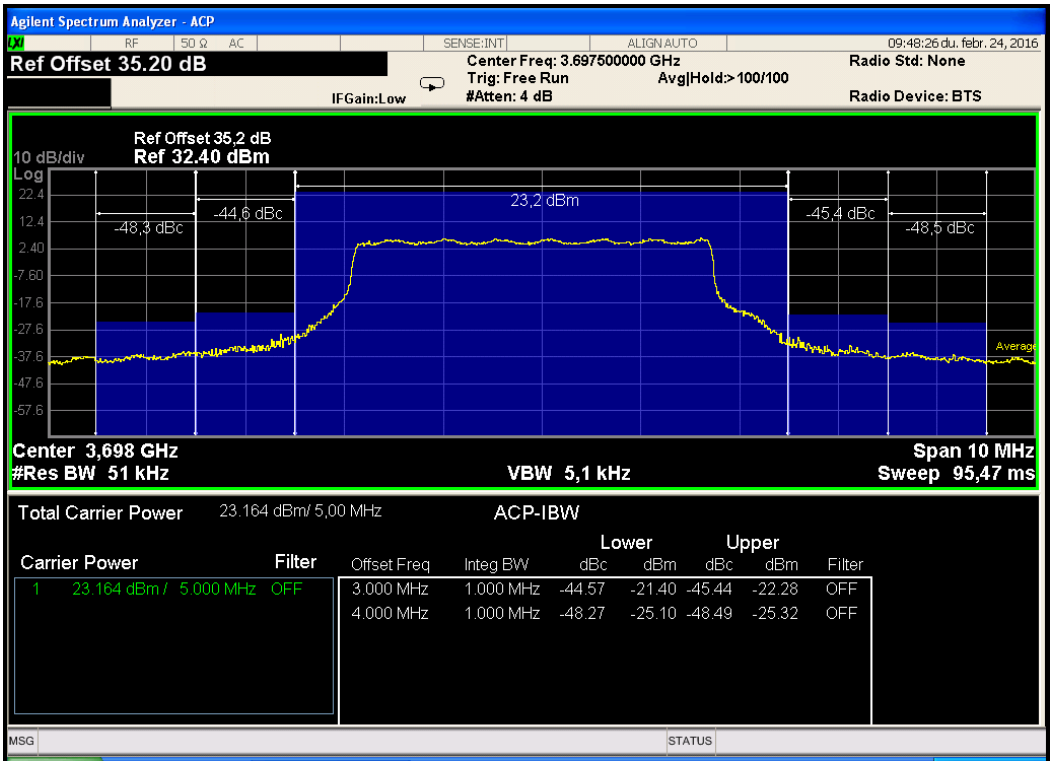


Figure 218. —5MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, QPSK

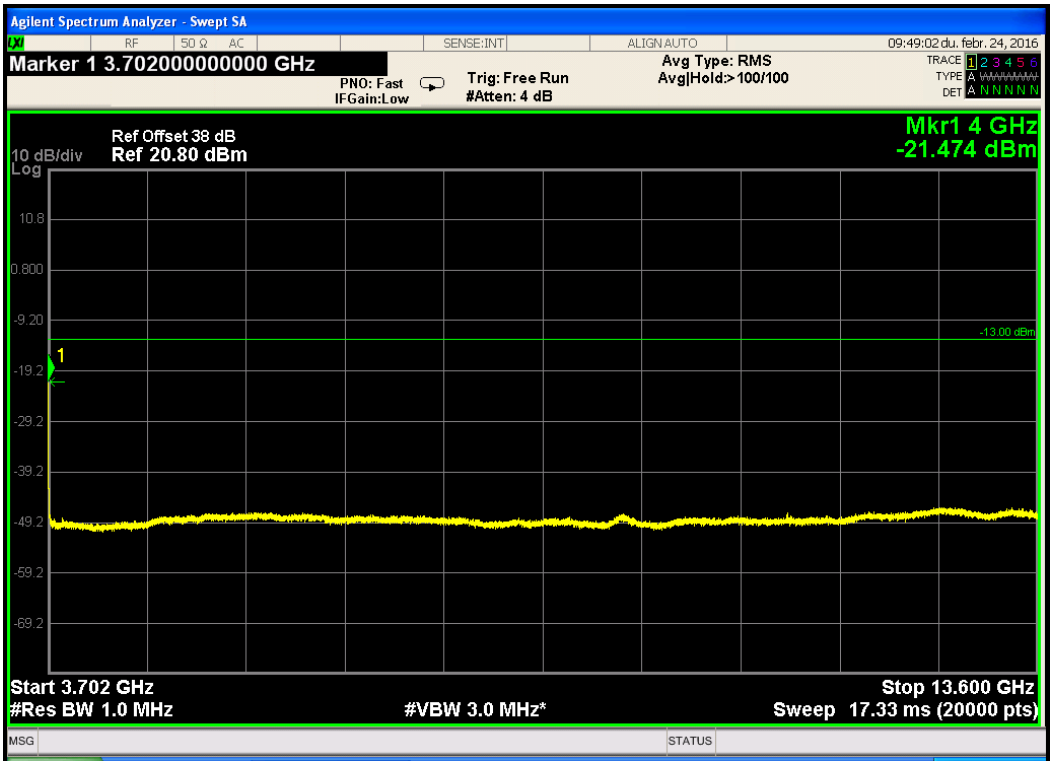


Figure 219. —5MHz CBW 3702.0MHz-13.6GHz band, top frequency, QPSK

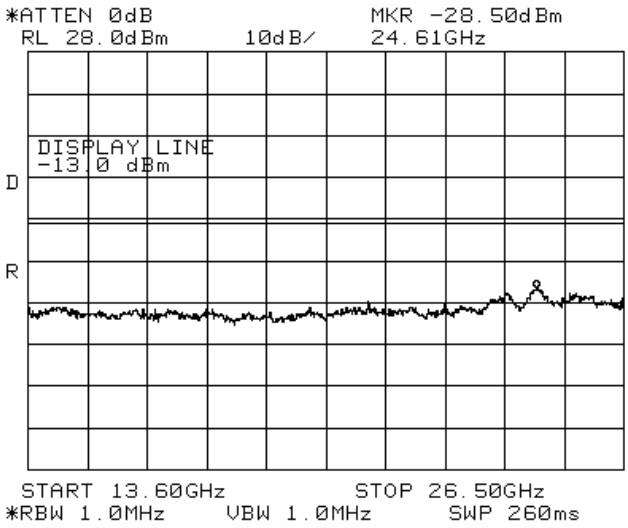


Figure 220. —5MHz CBW - 13.6GHz-26.5GHz band, top frequency, QPSK

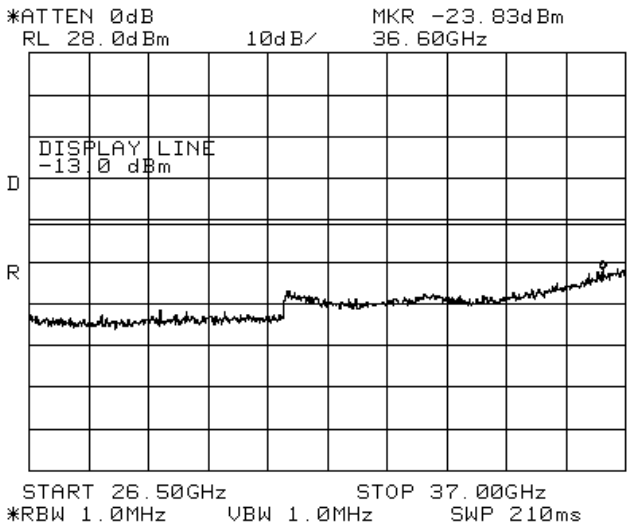


Figure 221. — 5MHz CBW - 26.5GHz-37.0GHz band, top frequency, QPSK

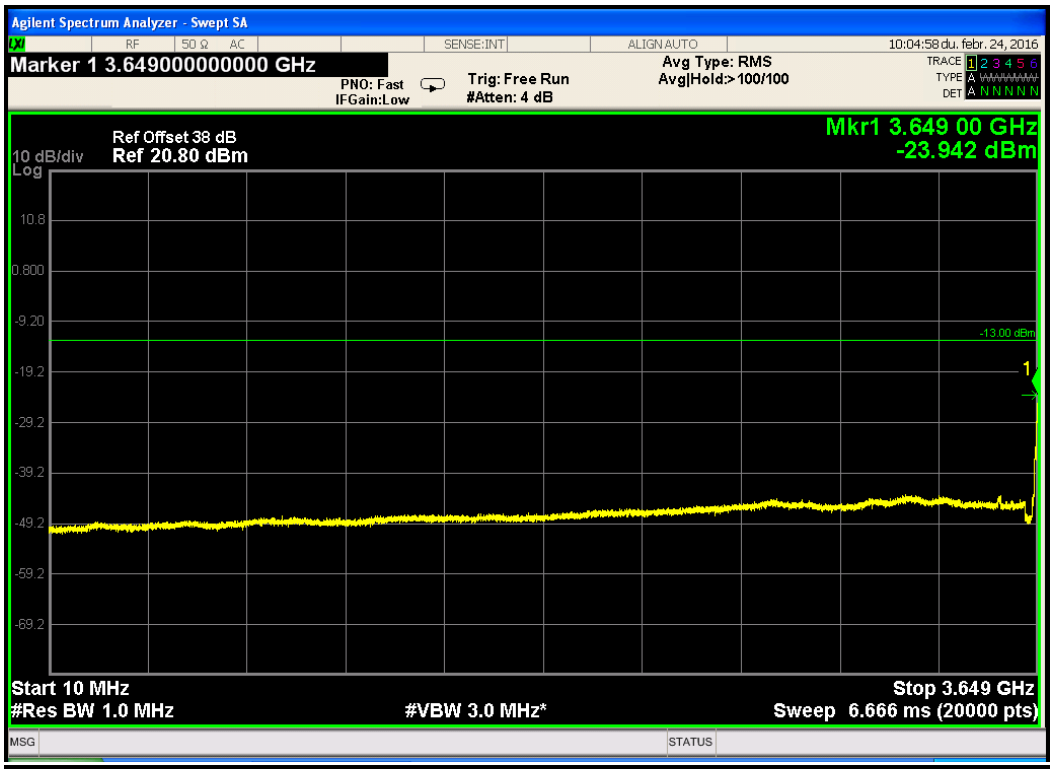


Figure 222.—10MHz CBW - 10.0MHz-3649.0MHz band, bottom frequency, 64QAM

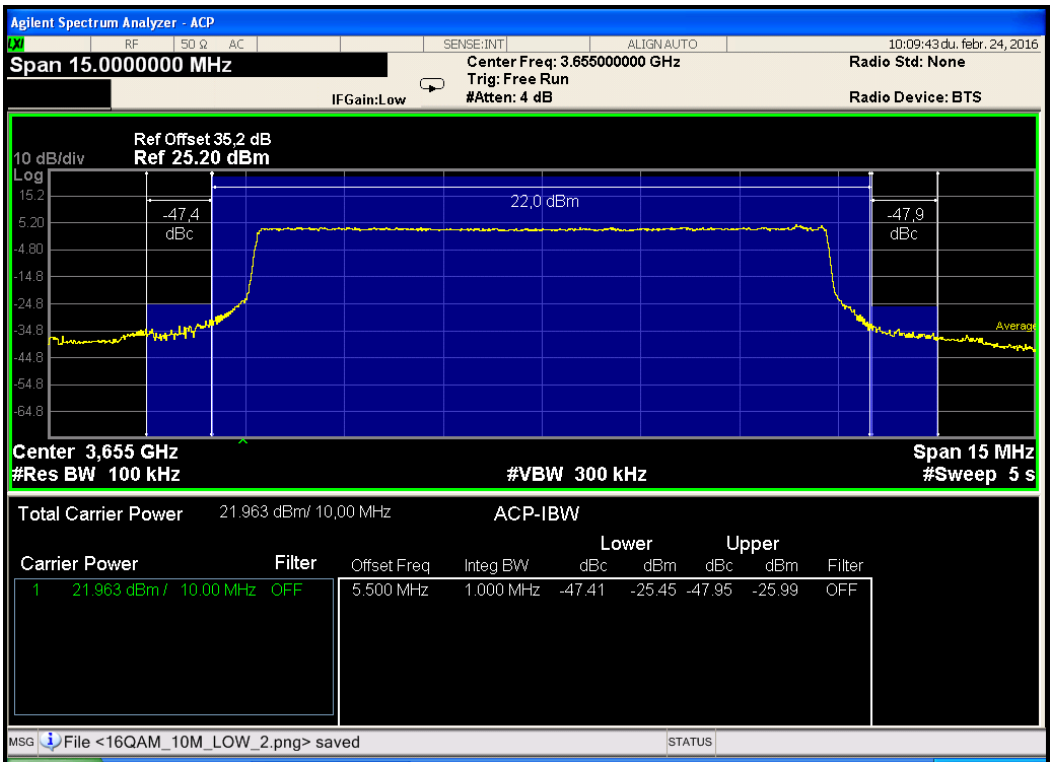


Figure 223.— 10MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, 64QAM

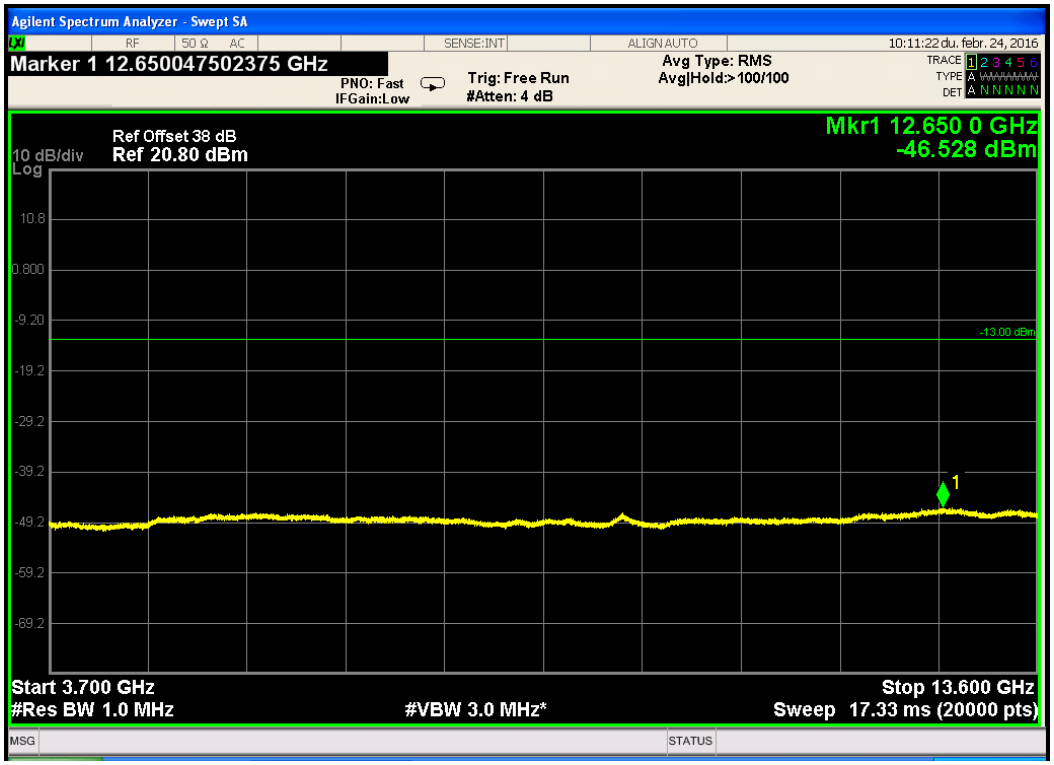


Figure 224. — 10MHz CBW -3700.0MHz-13.6GHz band, bottom frequency, 64QAM

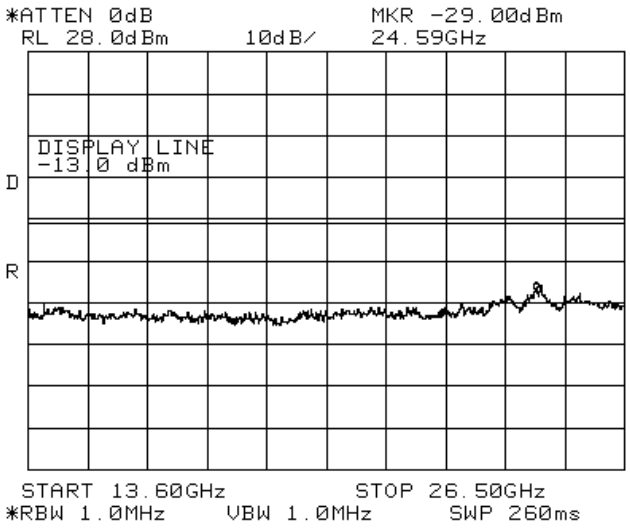


Figure 225. —10MHz CBW -13.6GHz-26.5GHz band, bottom frequency, 64QAM

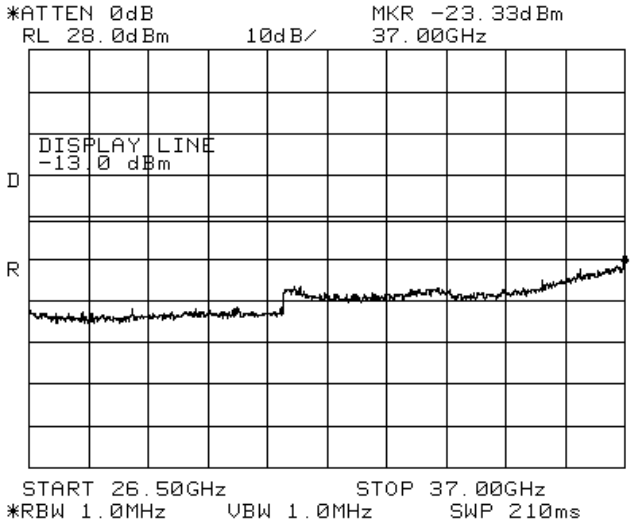


Figure 226. —10MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, 64QAM

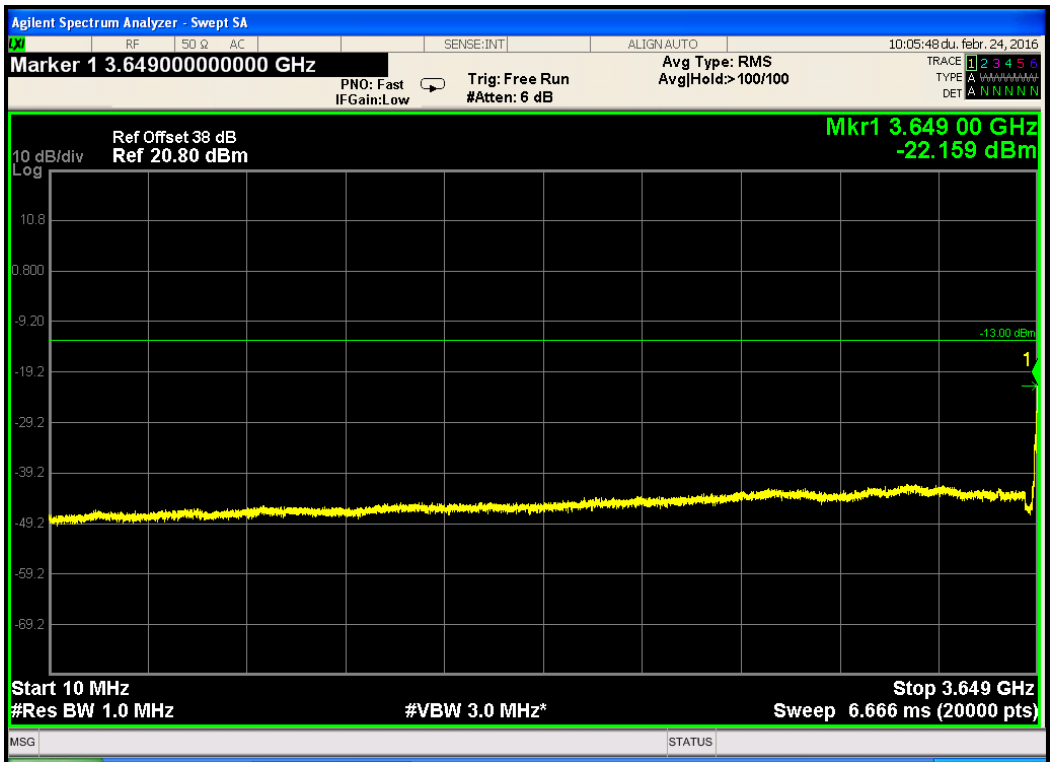


Figure 227. — 10MHz CBW - 10.0MHz-3649.0MHz band, bottom frequency, 16QAM

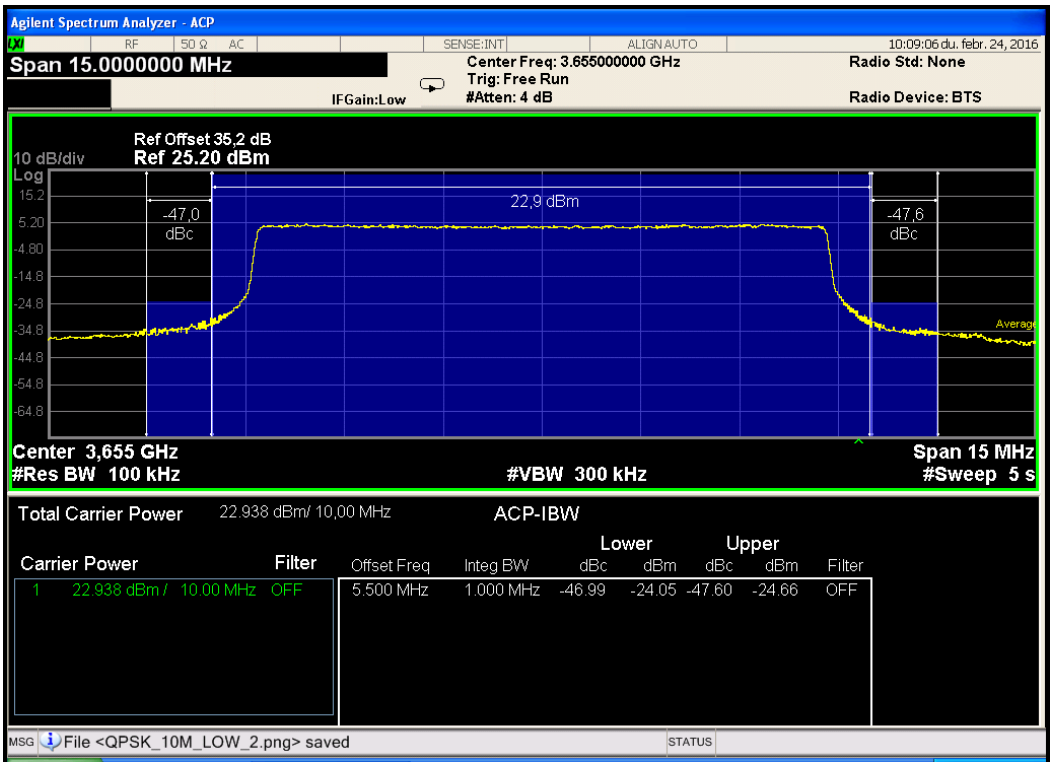


Figure 228. — 10MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, 16QAM

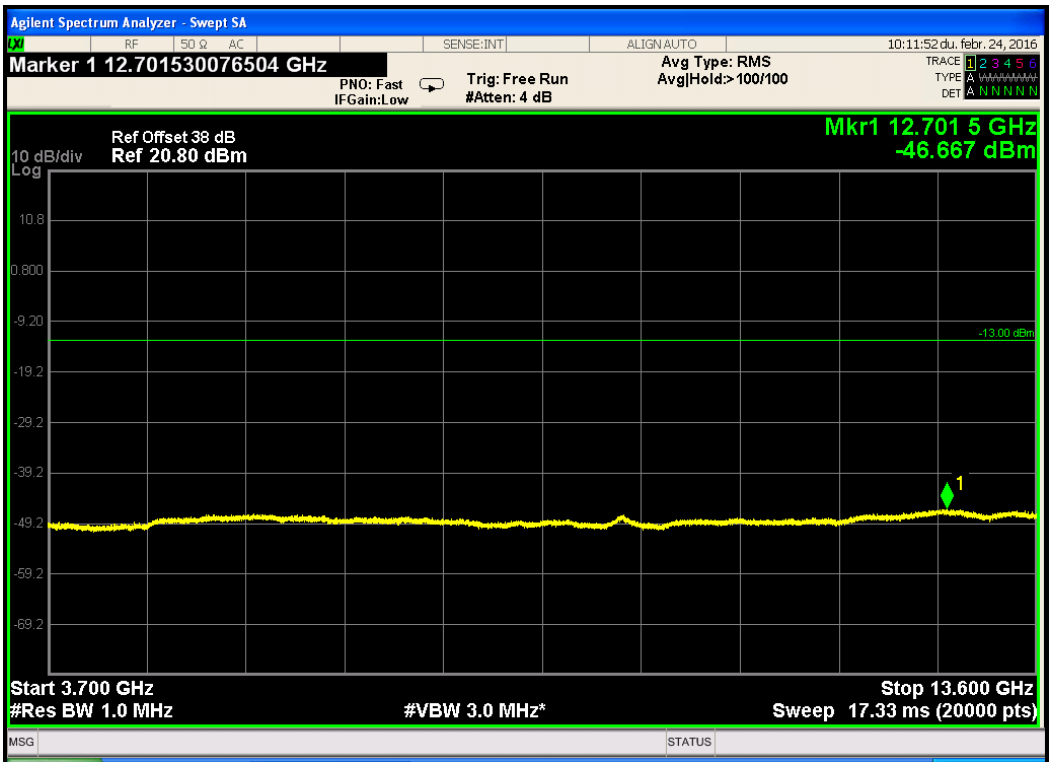


Figure 229. — 10MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, 16QAM

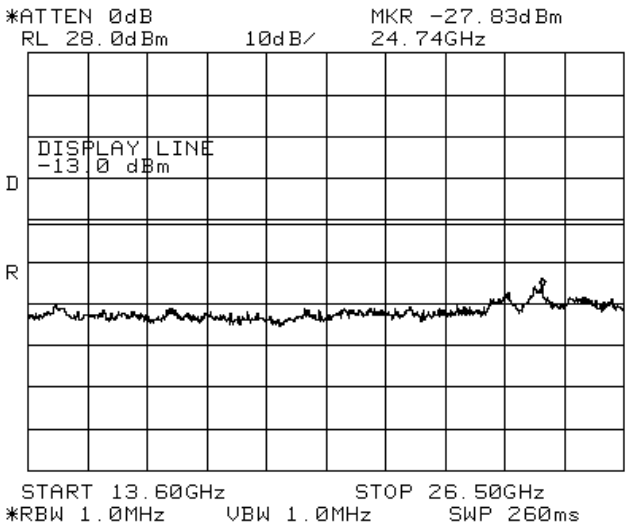


Figure 230. — 10MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, 16QAM

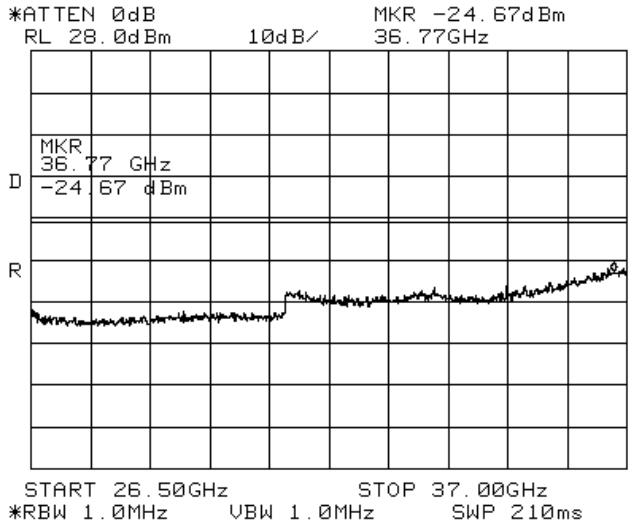


Figure 231. — 10MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, 16QAM

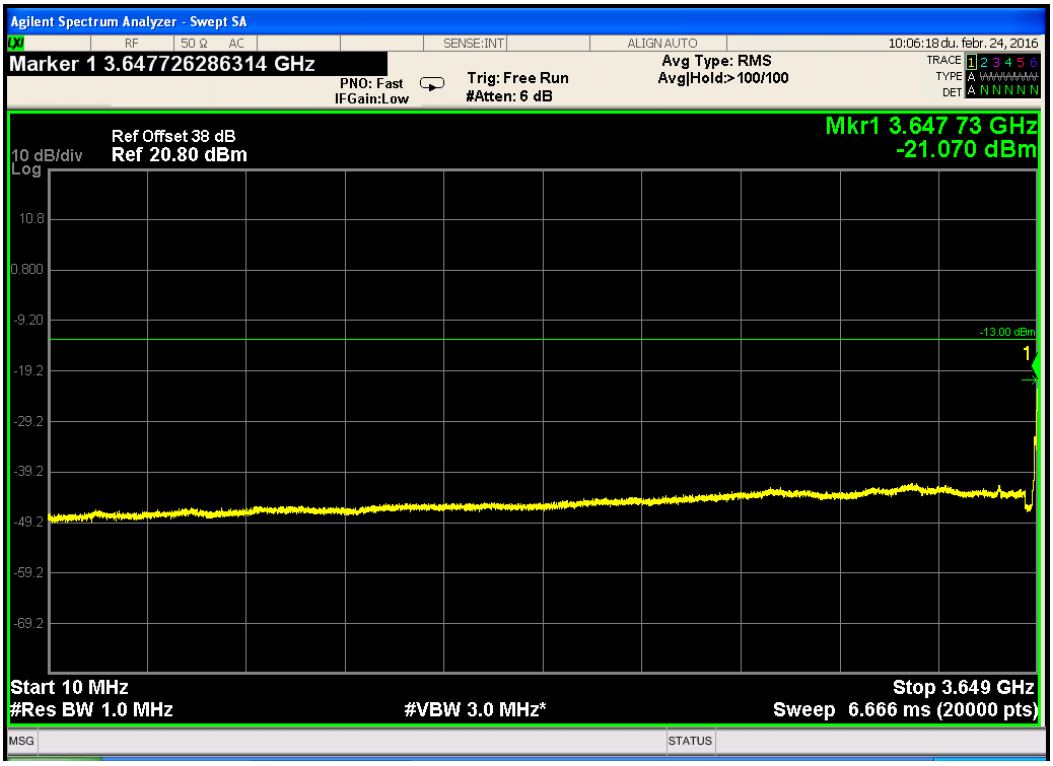


Figure 232. — 10MHz CBW -10.0MHz-3649.0MHz band, bottom frequency, QPSK

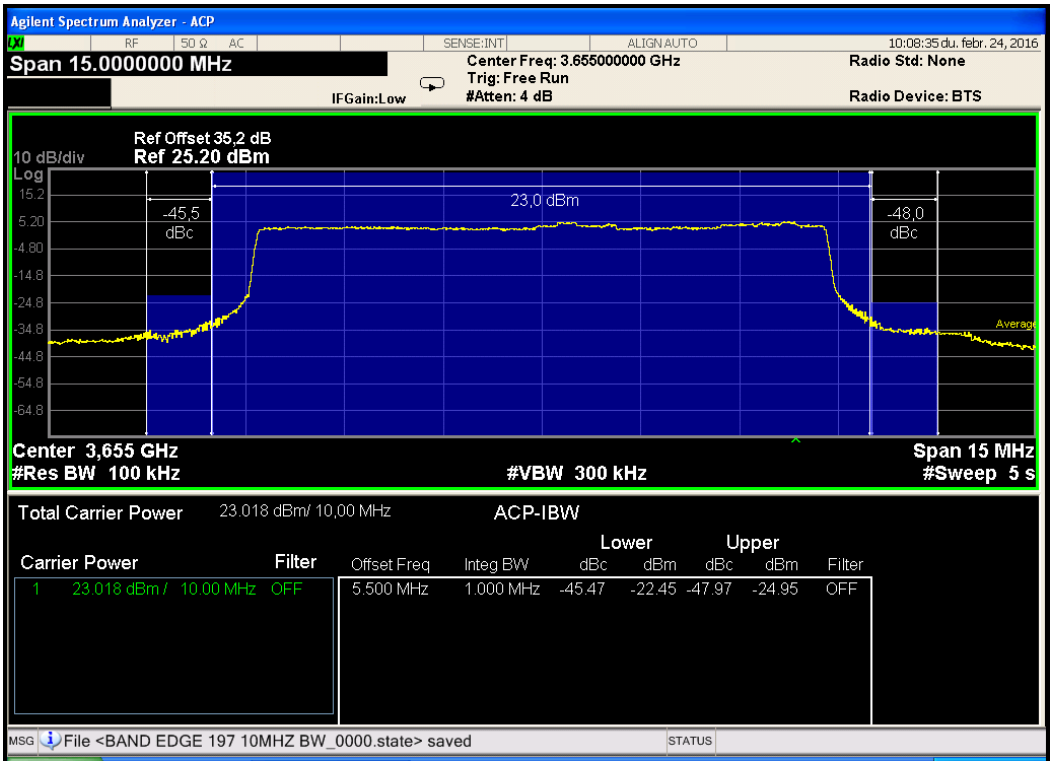


Figure 233. — 10MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, QPSK

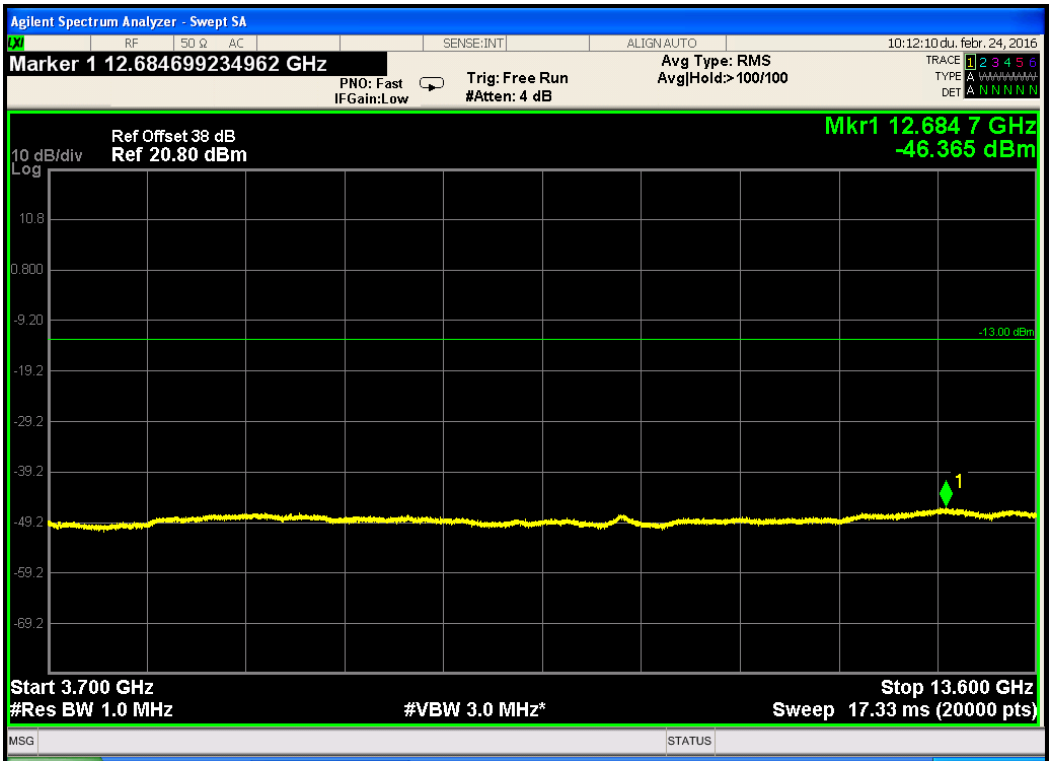


Figure 234.— 10MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, QPSK

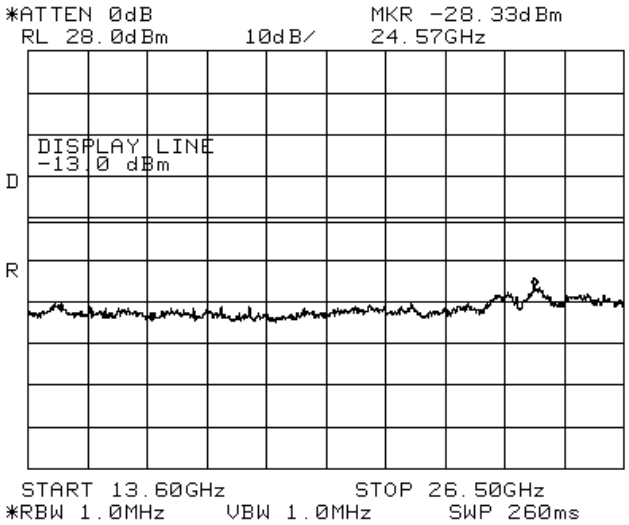


Figure 235.— 10MHz CBW -13.6GHz-26.5GHz band, bottom frequency, QPSK

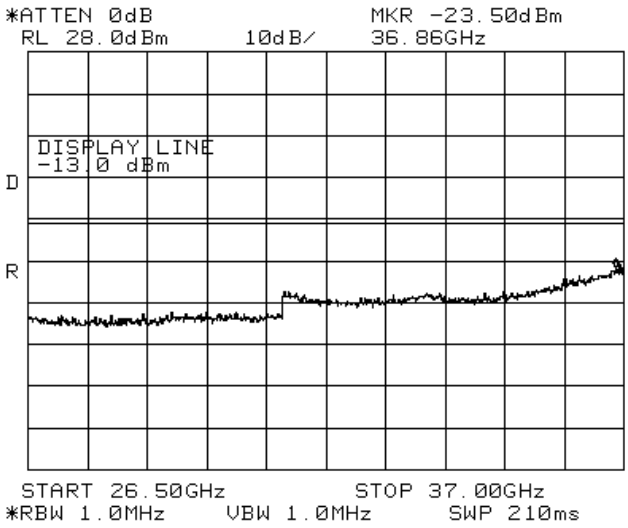


Figure 236. — 10MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, QPSK

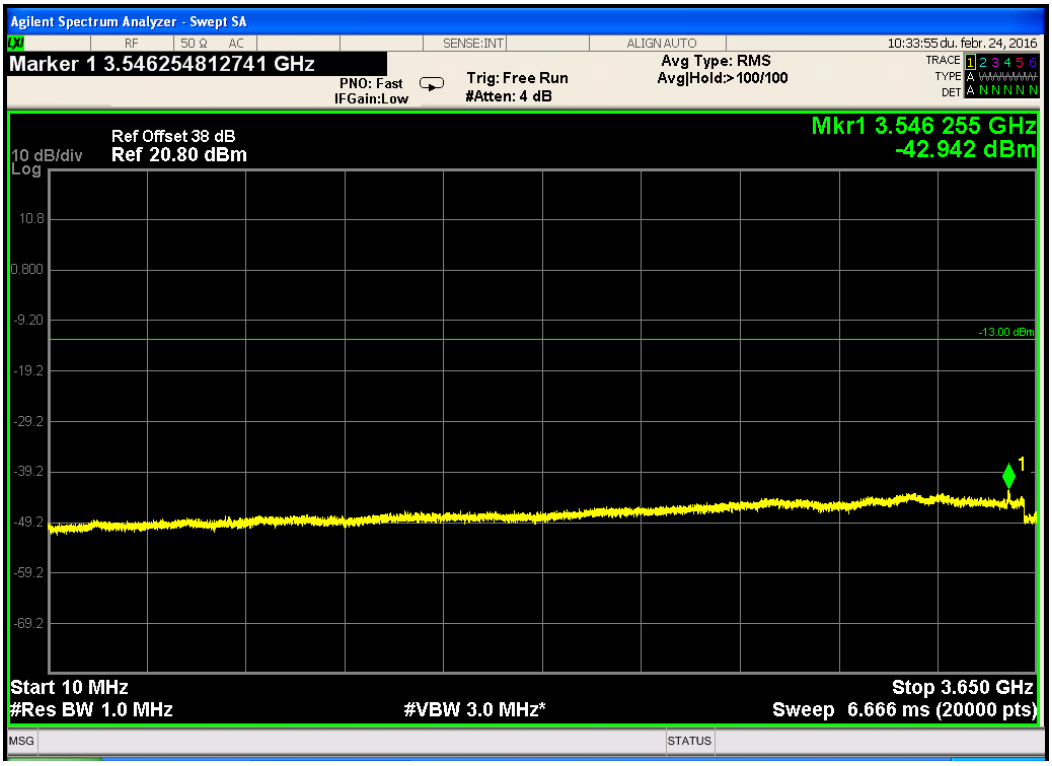


Figure 237. — 10MHz CBW - 10.0MHz-3650.0MHz band, top frequency, 64QAM

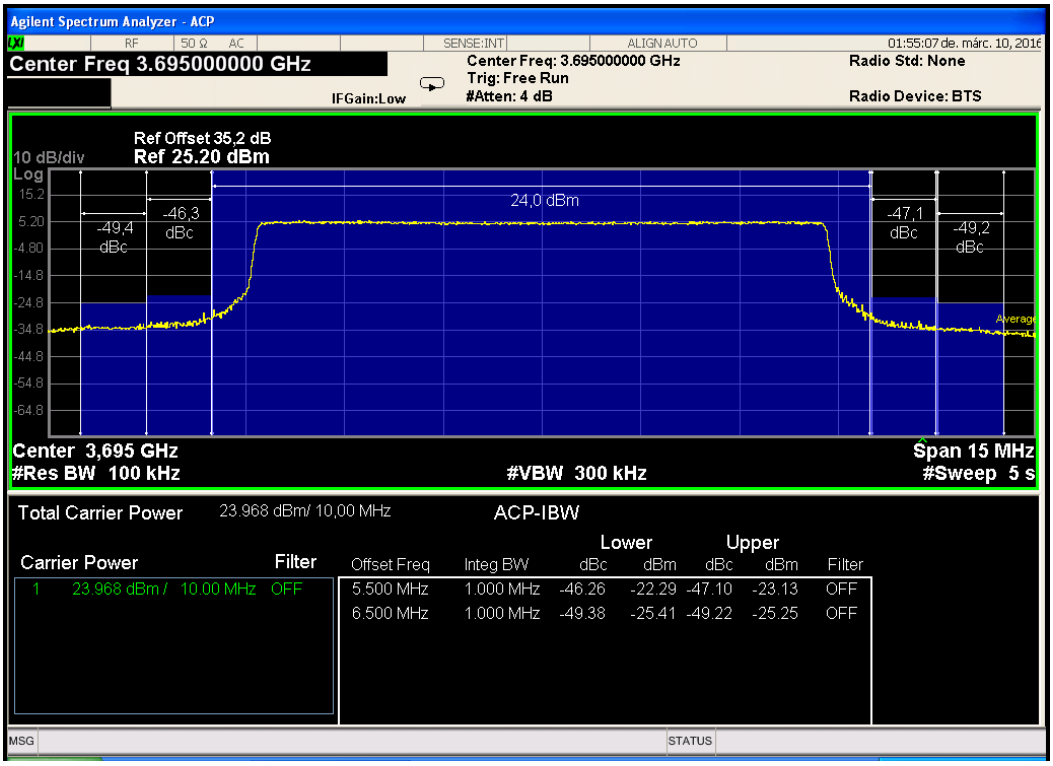


Figure 238.— 10MHz CBW -3700.0MHz-3702.0MHz band, top frequency, 64QAM

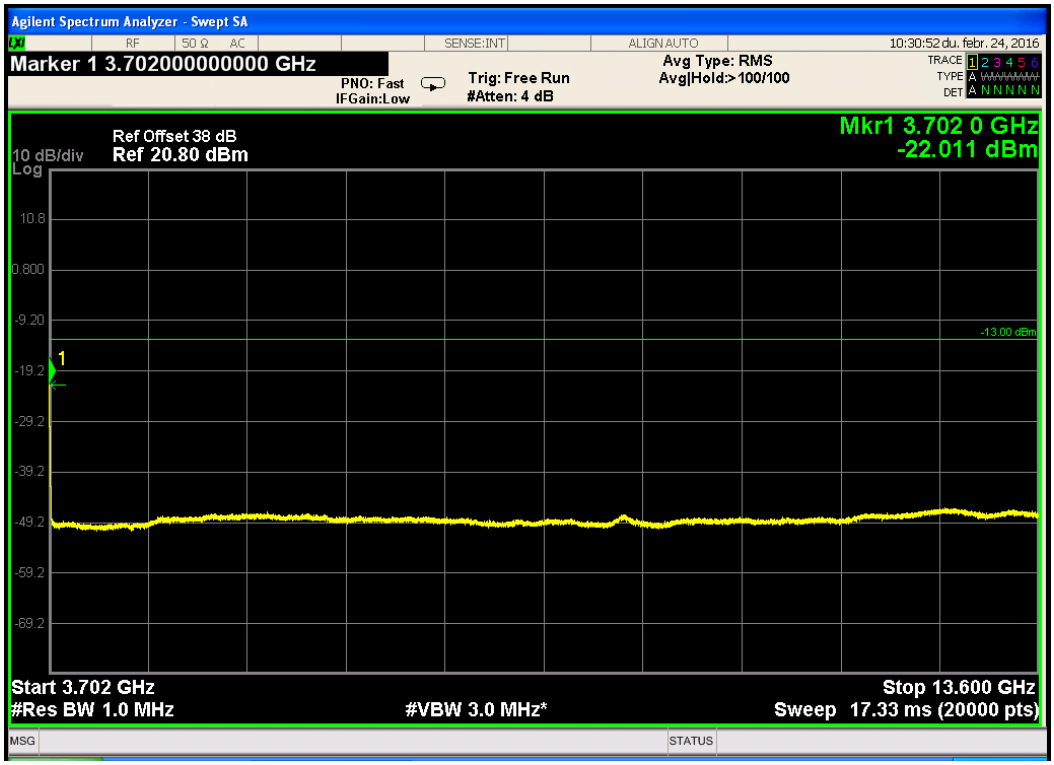


Figure 239.— 10MHz CBW -3702.0MHz -13.6GHz band, top frequency, 64QAM

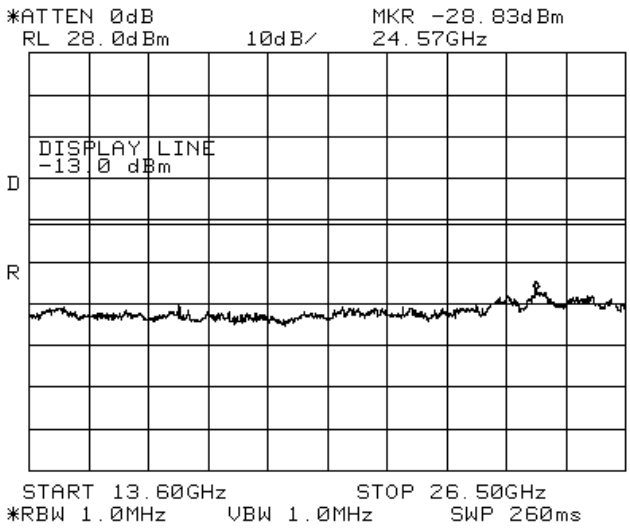


Figure 240. — 10MHz CBW -13.6GHz-26.5GHz band, top frequency, 64QAM

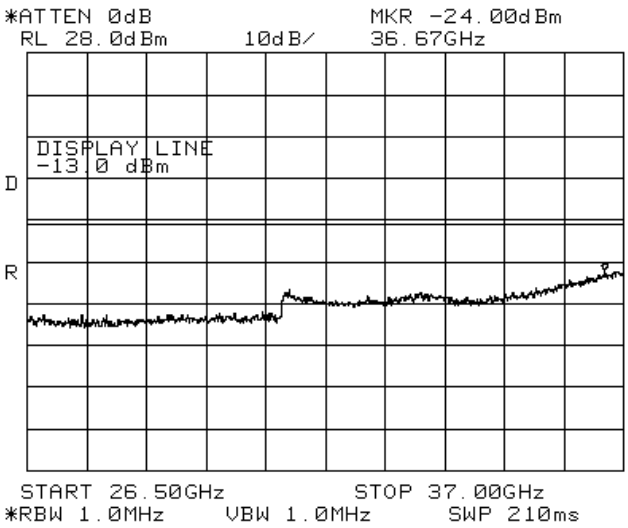


Figure 241. —10MHz CBW - 26.5GHz -37.0GHz band, top frequency, 64QAM

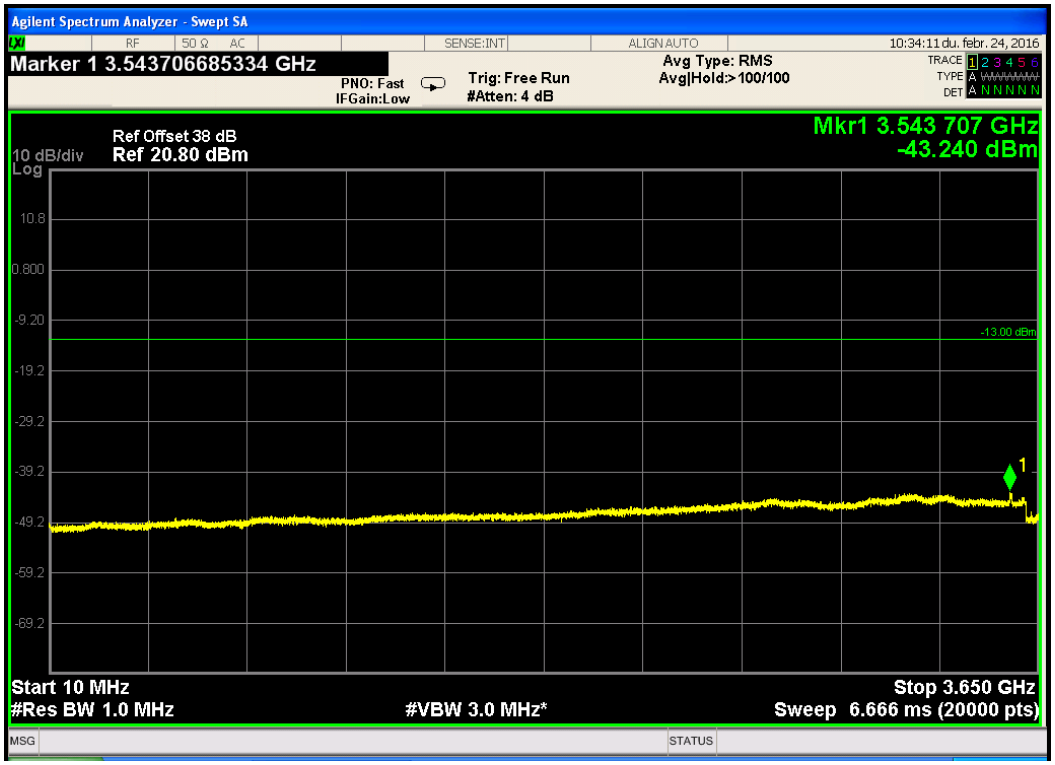


Figure 242.— 10MHz CBW -10.0MHz-3650.0MHz band, top frequency, 16QAM

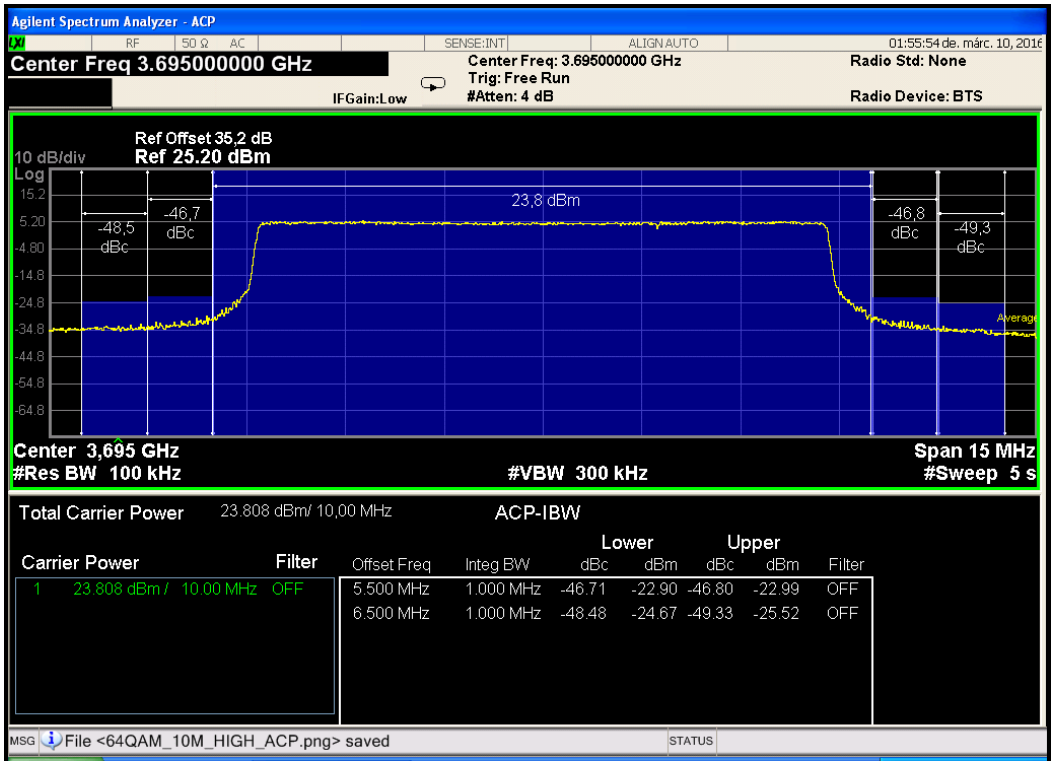


Figure 243.— 10MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, 16QAM

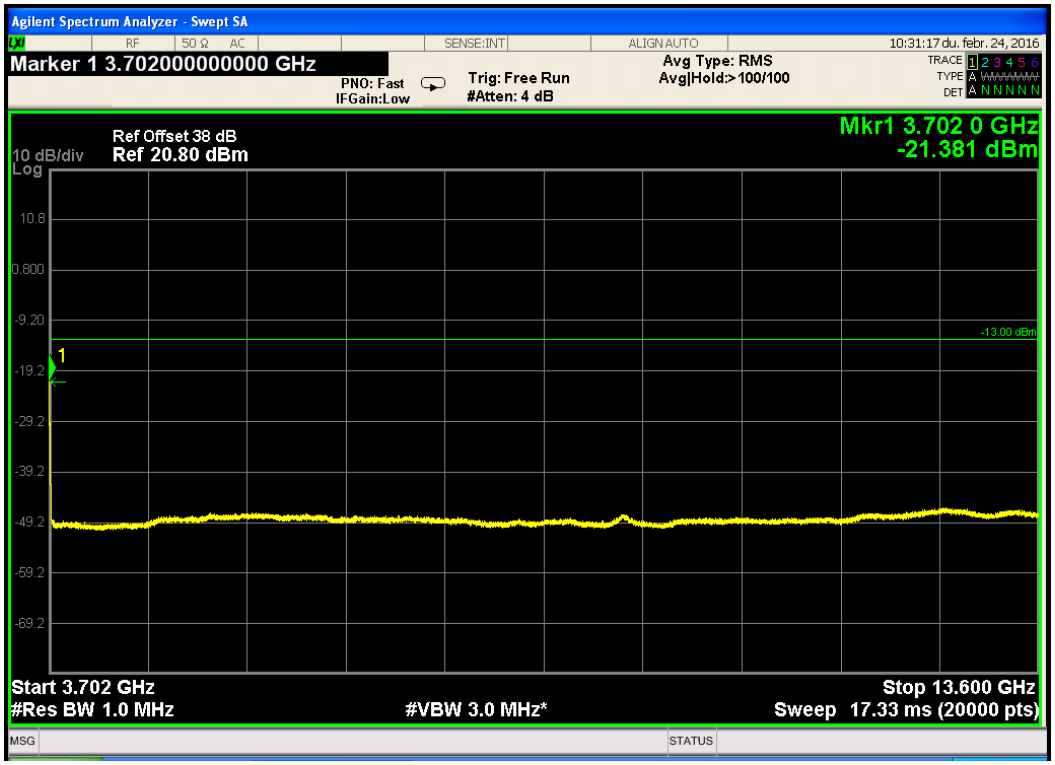


Figure 244.— 10MHz CBW - 3702.0MHz -13.6GHz band, top frequency, 16QAM

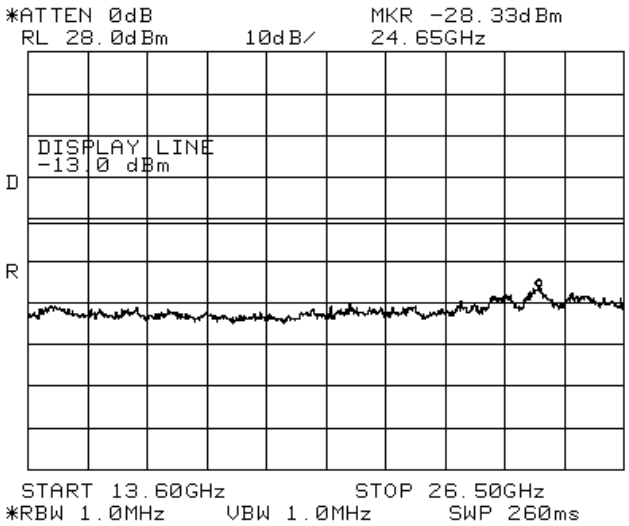


Figure 245.— 10MHz CBW - 13.6GHz-26.5GHz band, top frequency, 16QAM

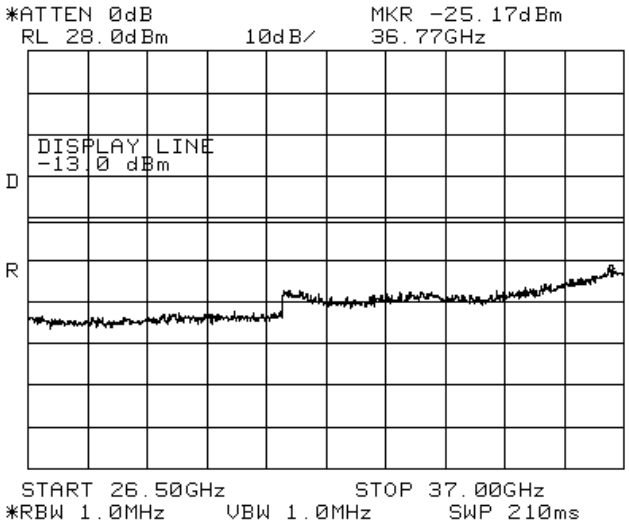


Figure 246.— 10MHz CBW - 26.5GHz-37.0GHz band, top frequency, 16QAM

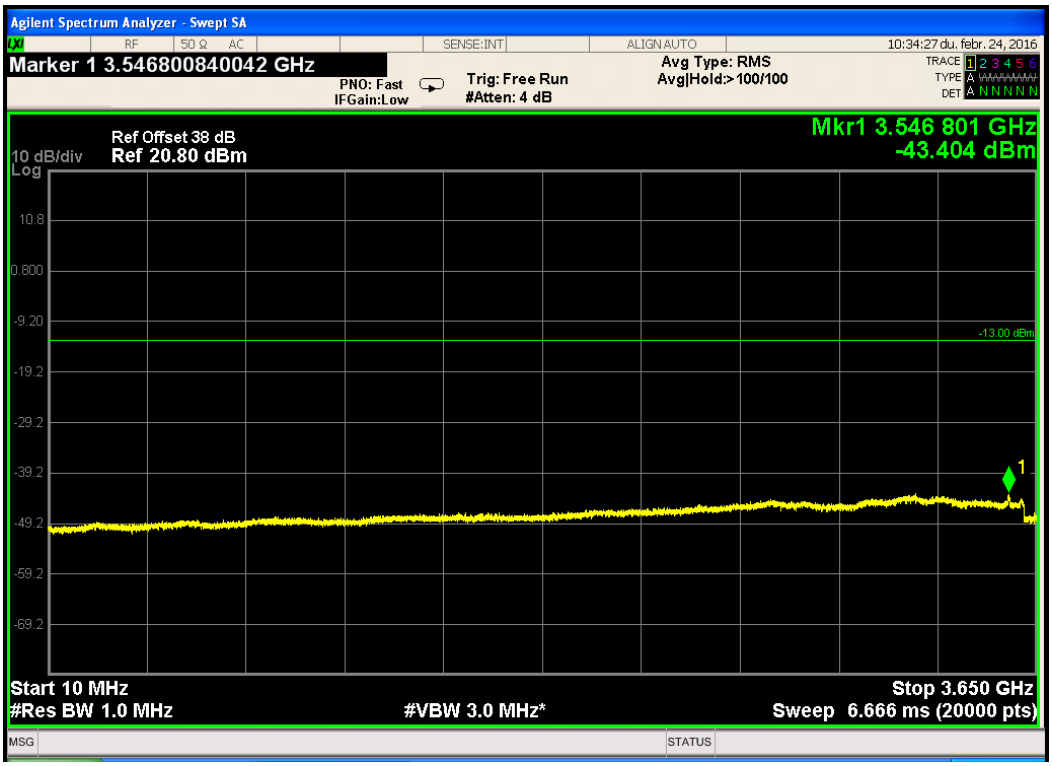


Figure 247.— 10MHz CBW - 10.0MHz-3650.0MHz band, top frequency, QPSK

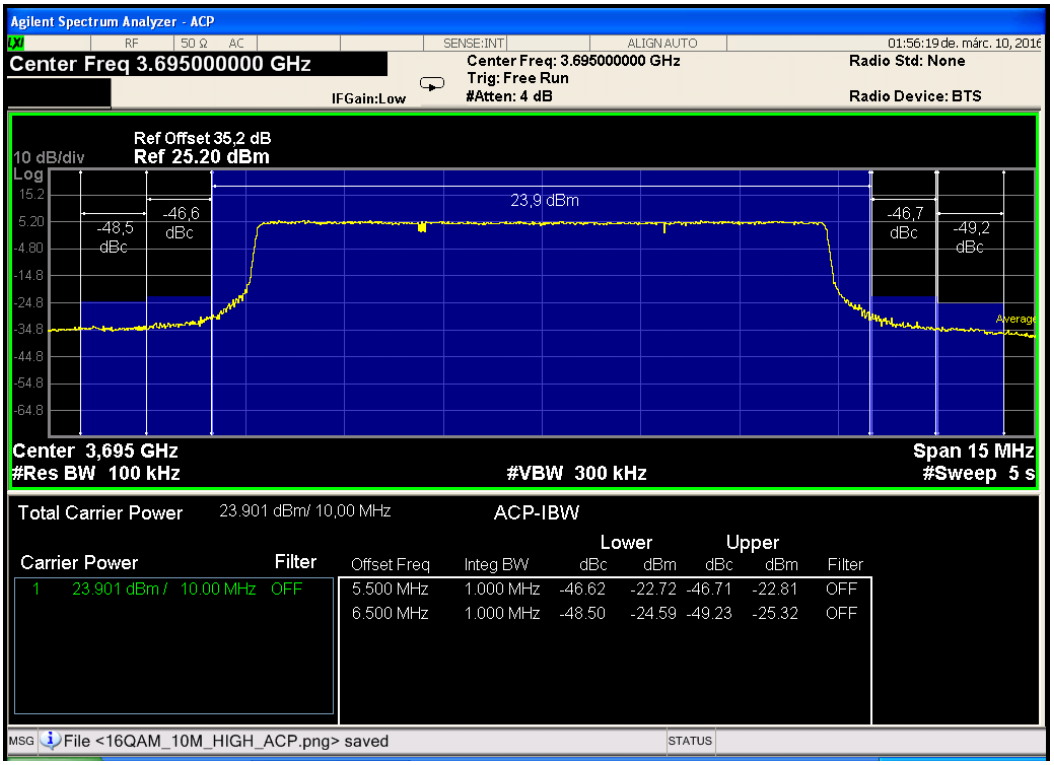


Figure 248.— 10MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, QPSK

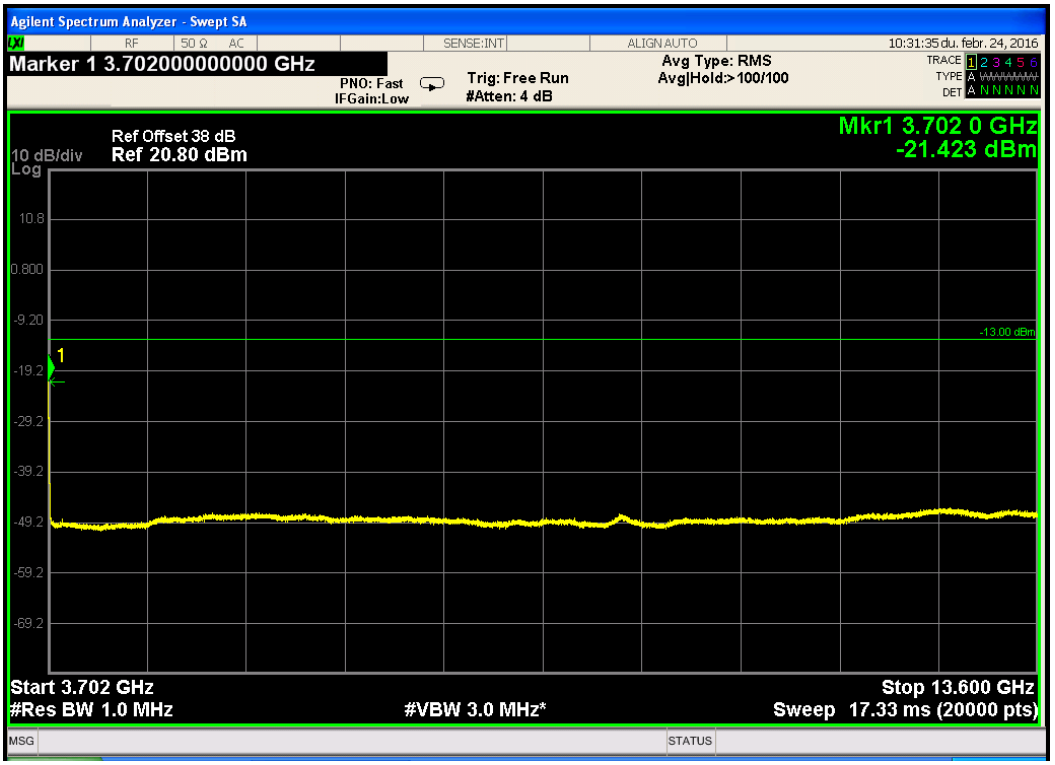


Figure 249.— 10MHz CBW - 3702.0MHz -13.6GHz band, top frequency, QPSK

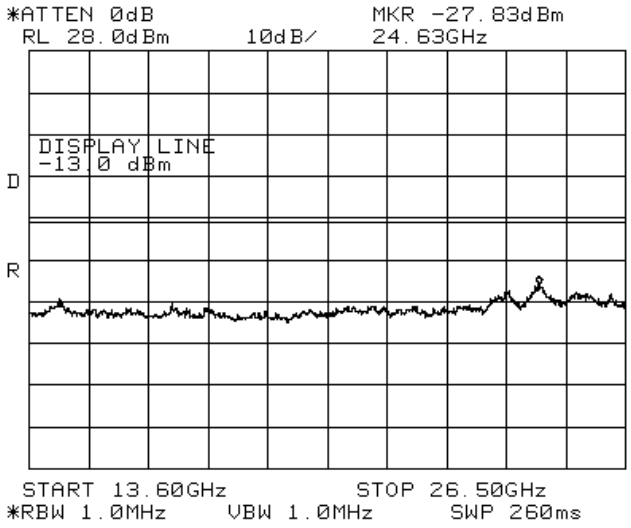


Figure 250.— 10MHz CBW - 13.6GHz-26.5GHz band, top frequency, QPSK

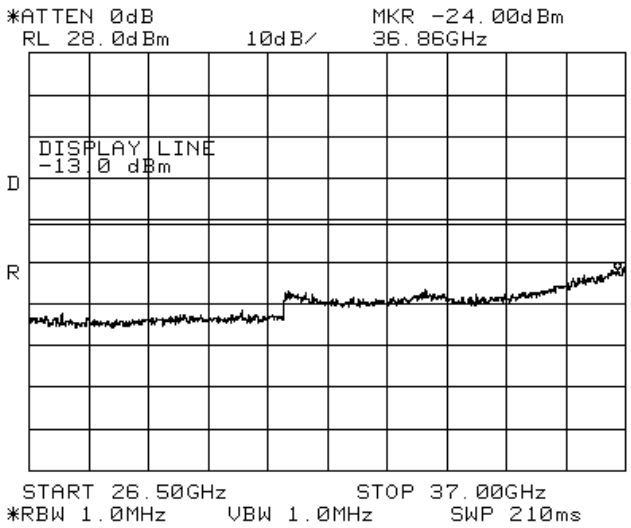


Figure 251.— 10MHz CBW - 26.5GHz-37.0GHz band, top frequency, QPSK

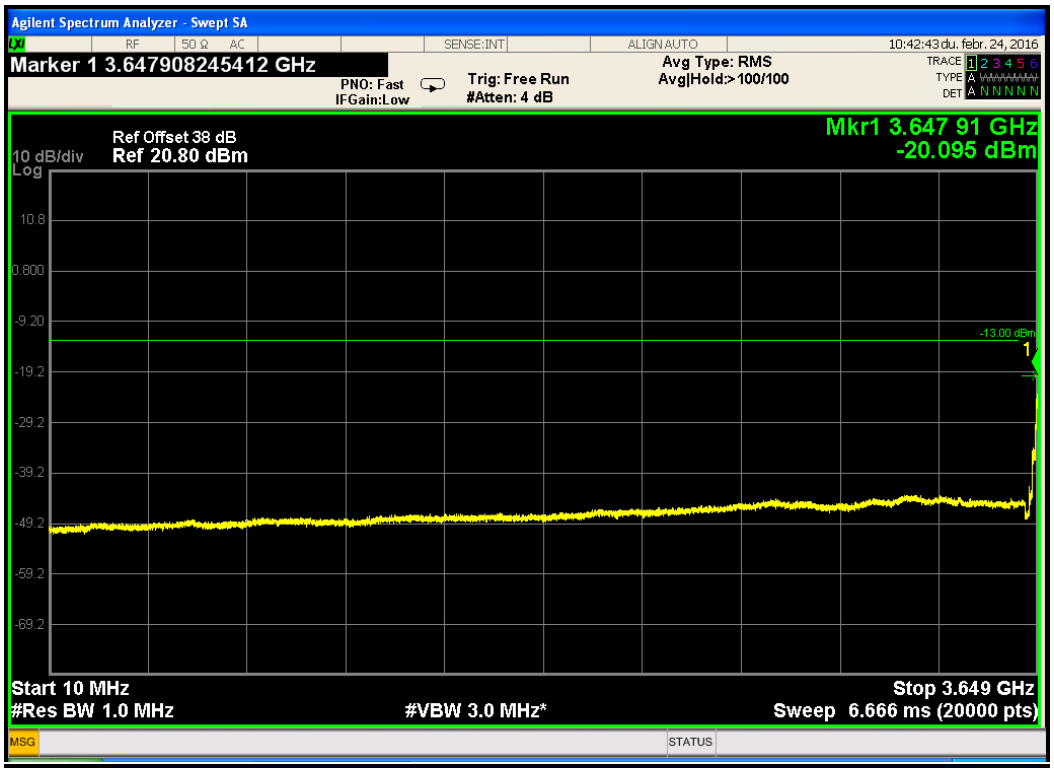


Figure 252.— 15MHz CBW - 10.0MHz-3649.0MHz band, bottom frequency, 64QAM

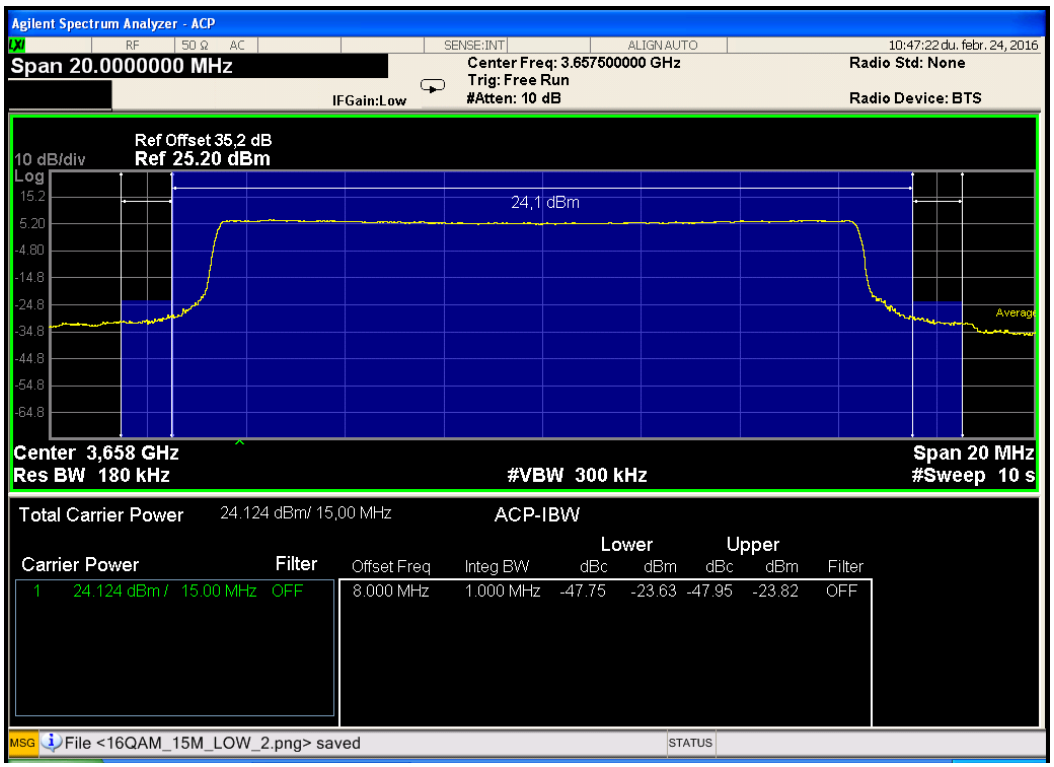


Figure 253.— 15MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, 64QAM

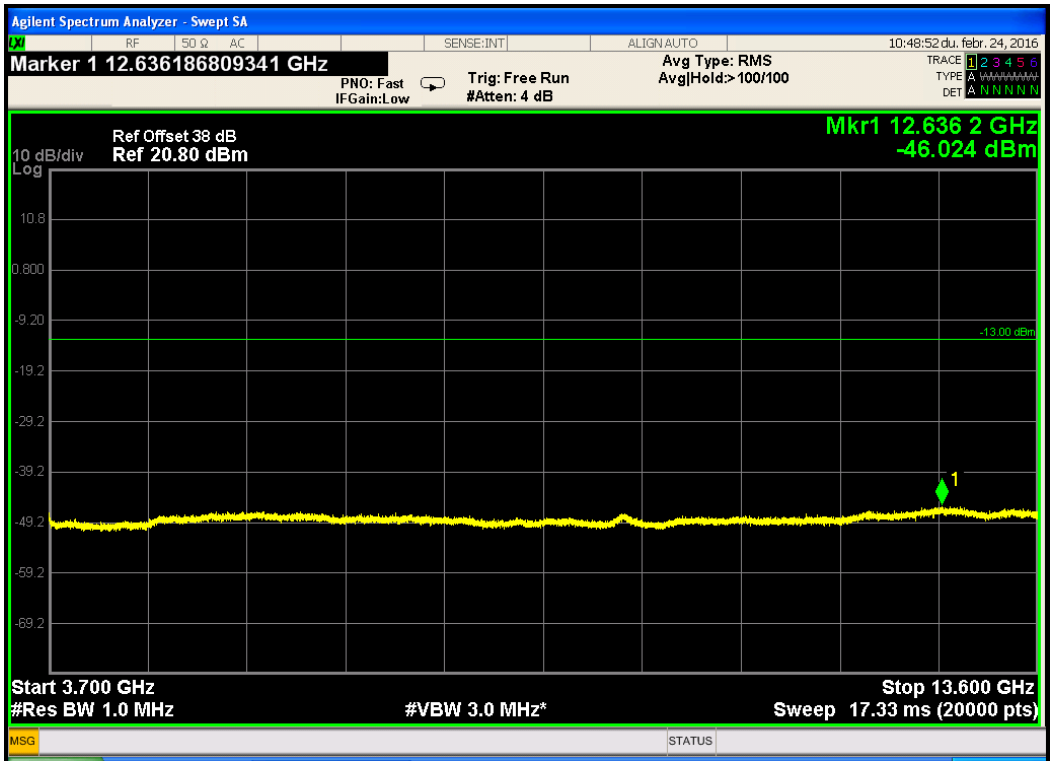


Figure 254.— 15MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, 64QAM

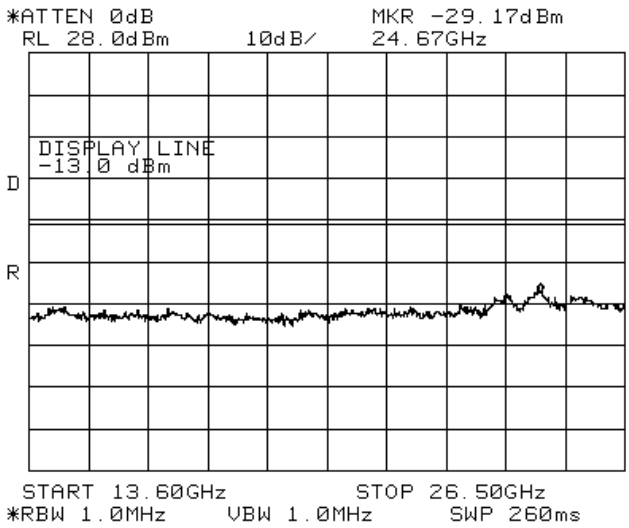


Figure 255.— 15MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, 64QAM

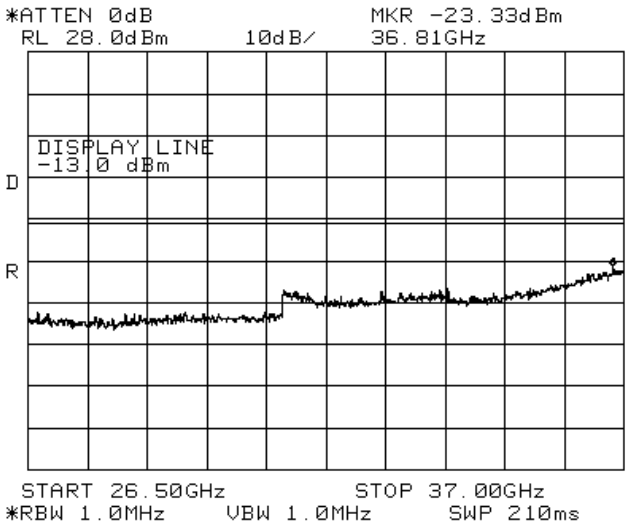


Figure 256.— 15MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, 64QAM

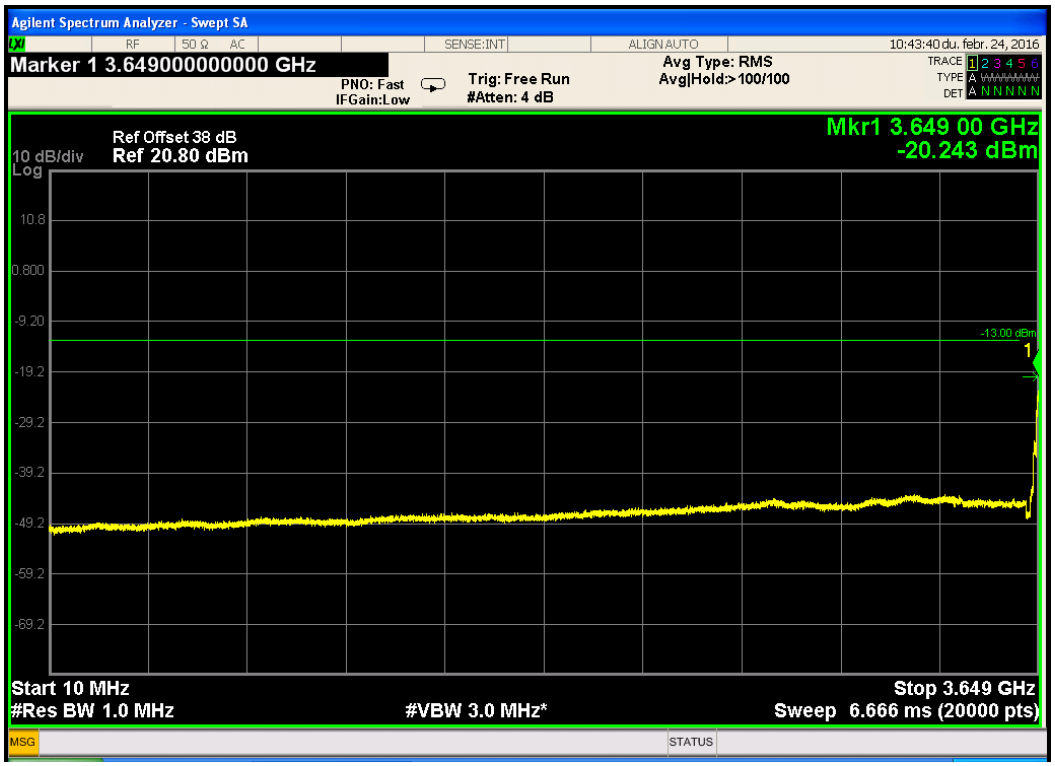


Figure 257. — 15MHz CBW - 10.0MHz-3649.0MHz band, bottom frequency, 16QAM

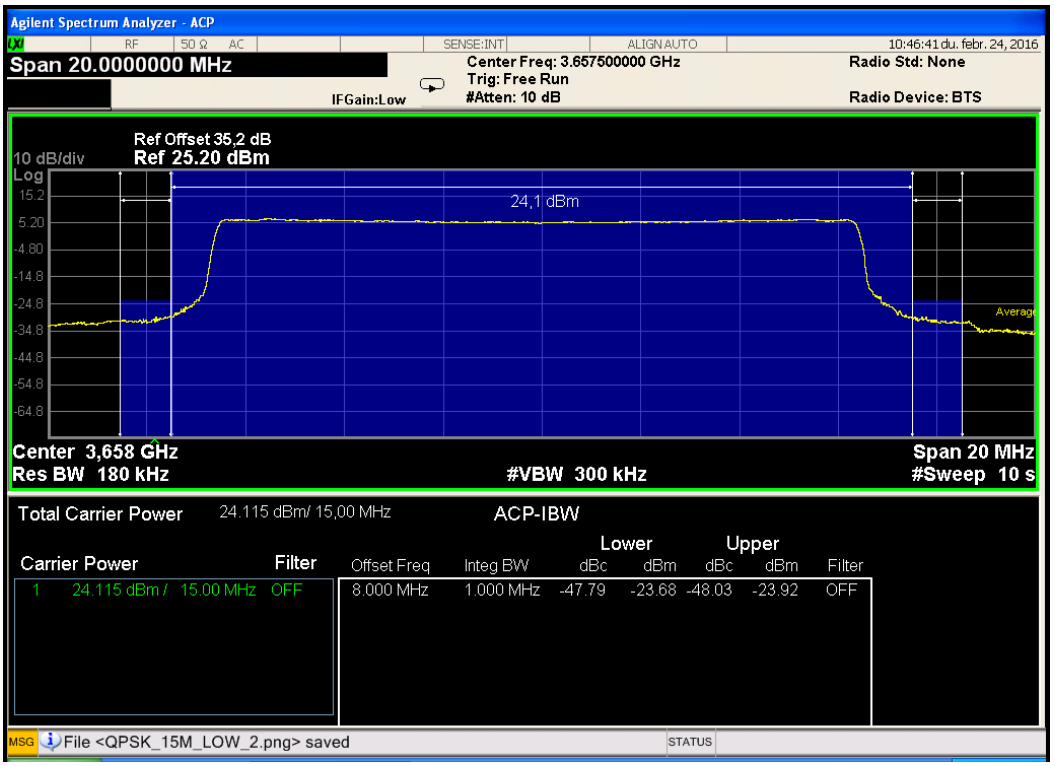


Figure 258. — 15MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, 16QAM

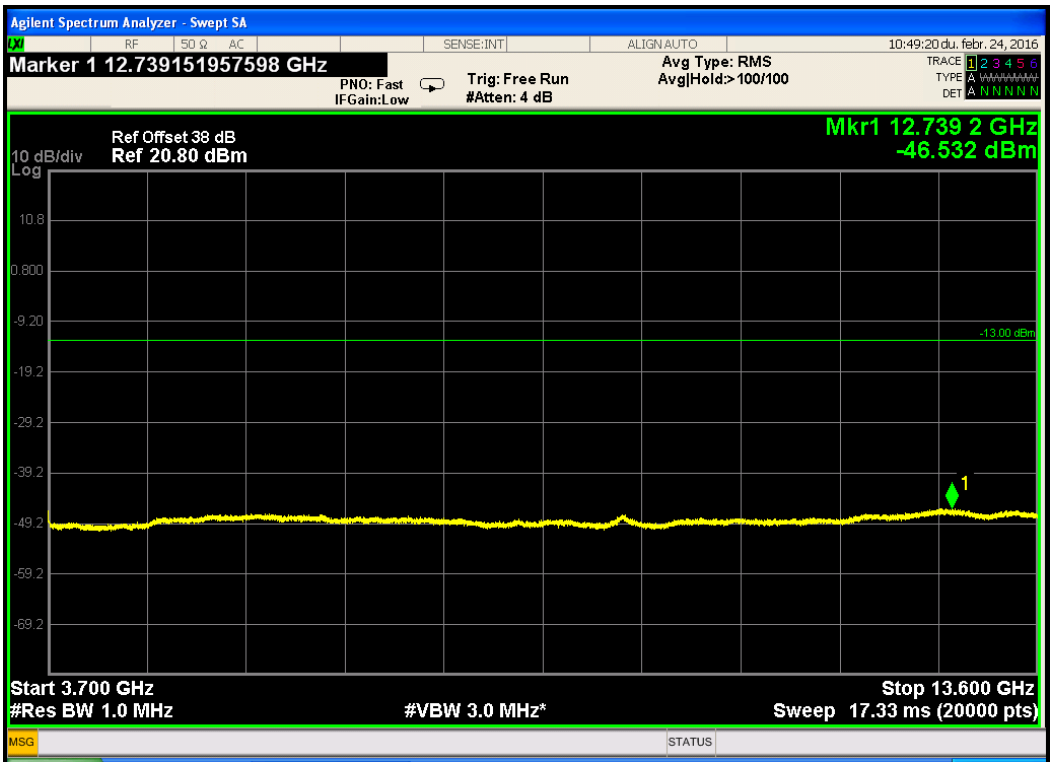


Figure 259.— 15MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, 16QAM

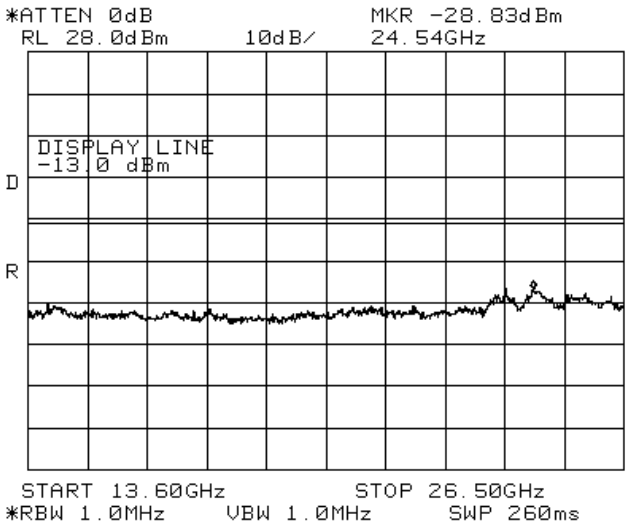


Figure 260. — 15MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, 16QAM

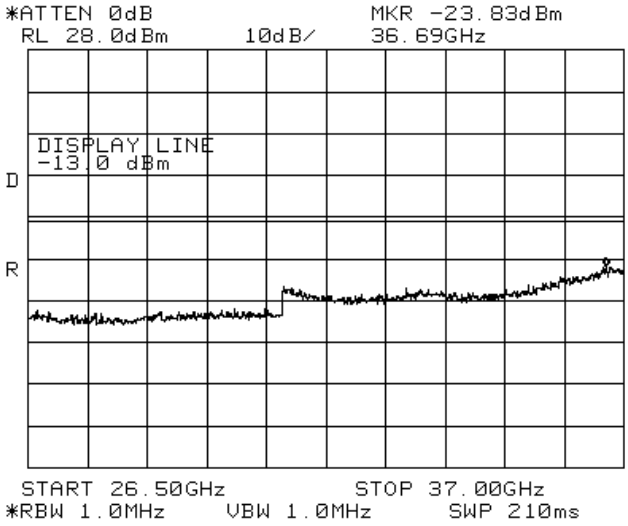


Figure 261. — 15MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, 16QAM

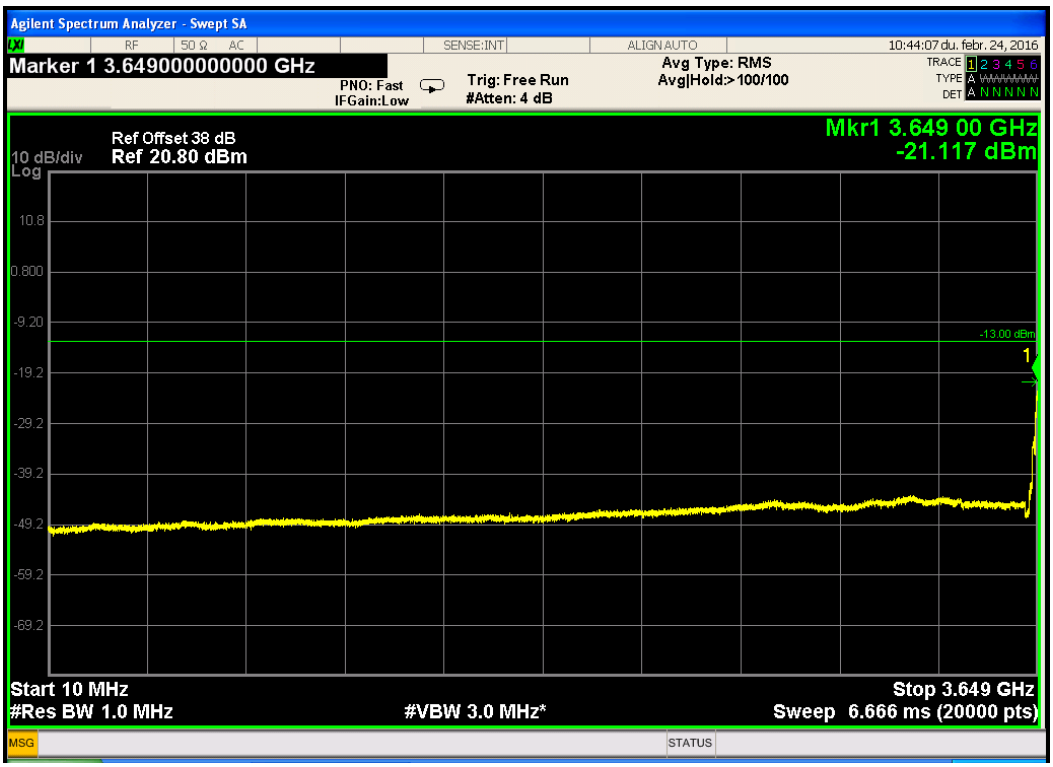


Figure 262. — 15MHz CBW -10.0MHz-3649.0MHz band, bottom frequency, QPSK

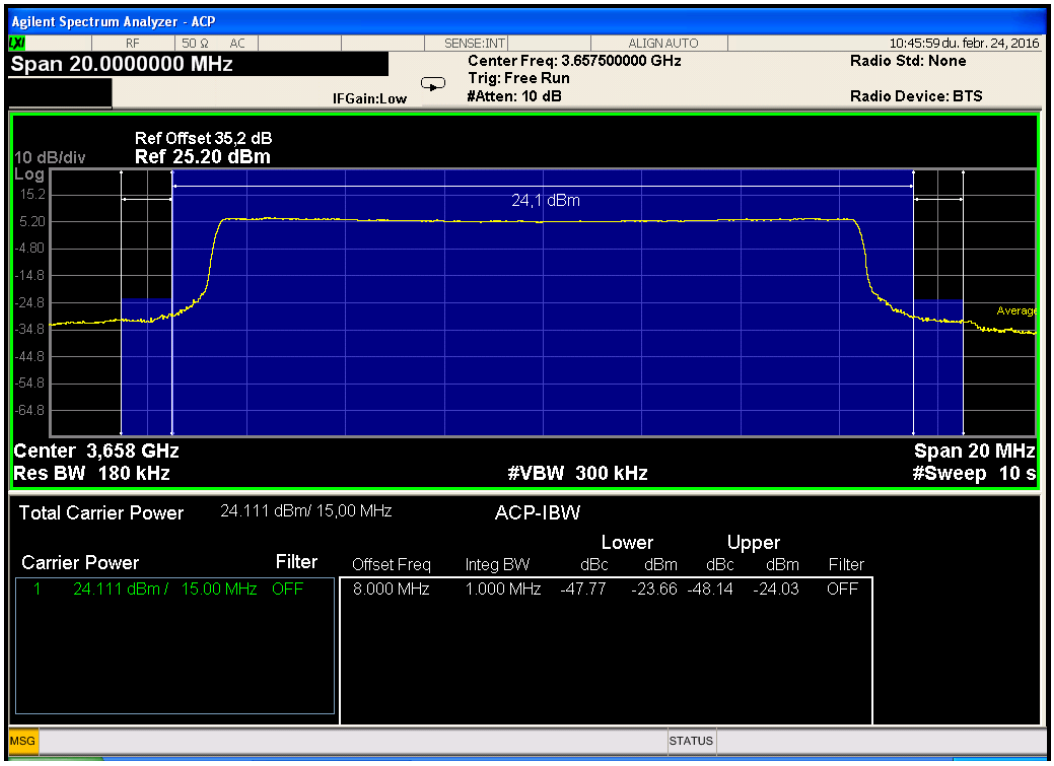


Figure 263.— 15MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, QPSK

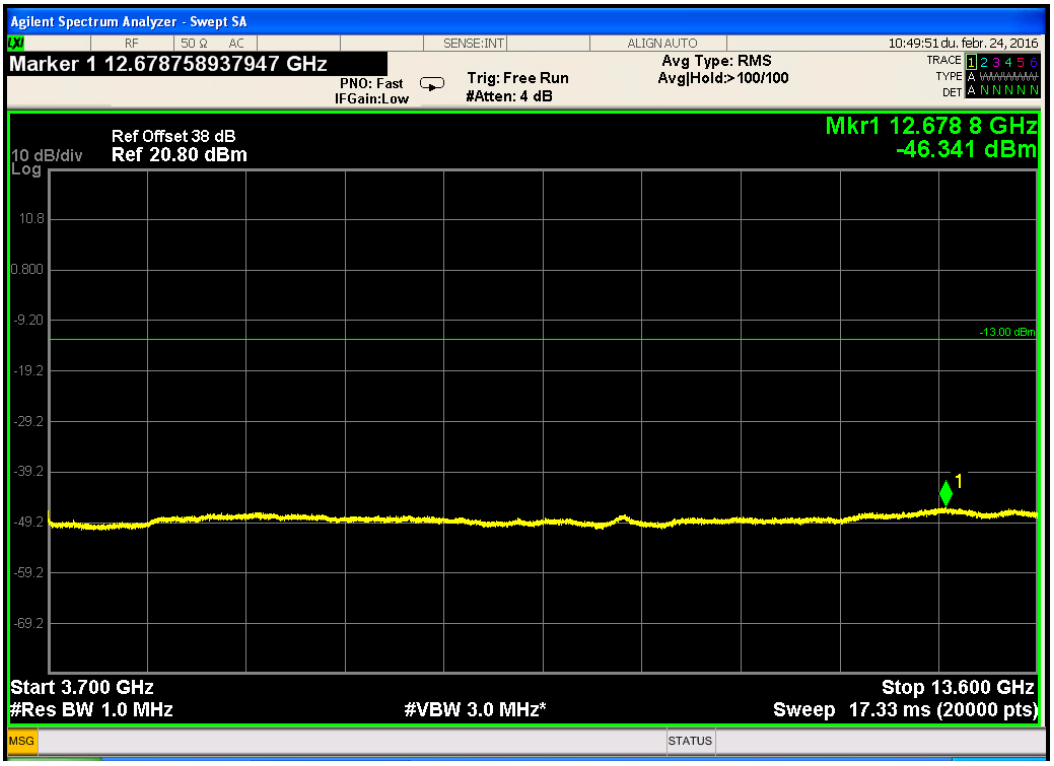


Figure 264.— 15MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, QPSK

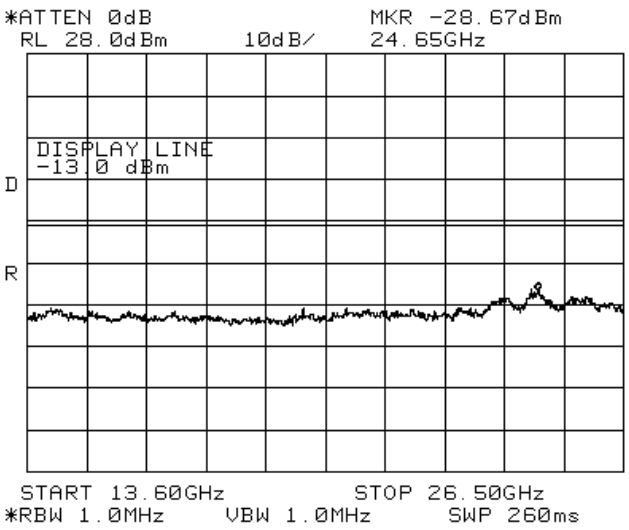


Figure 265. — 15MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, QPSK

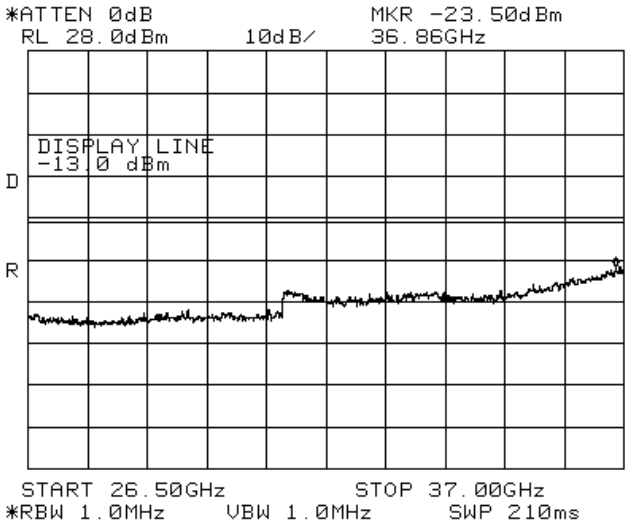


Figure 266.— 15MHz CBW -26.5GHz-37.0GHz band, bottom frequency, QPSK

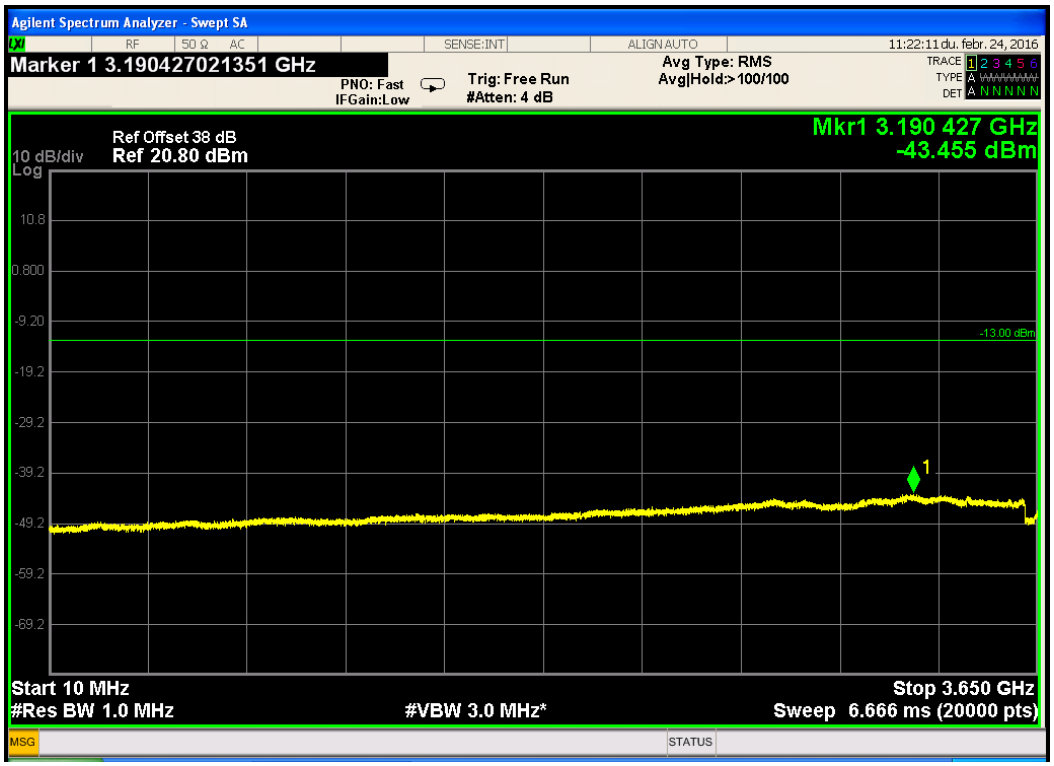


Figure 267.— 15MHz CBW - 10.0MHz-3650.0MHz band, top frequency, 64QAM

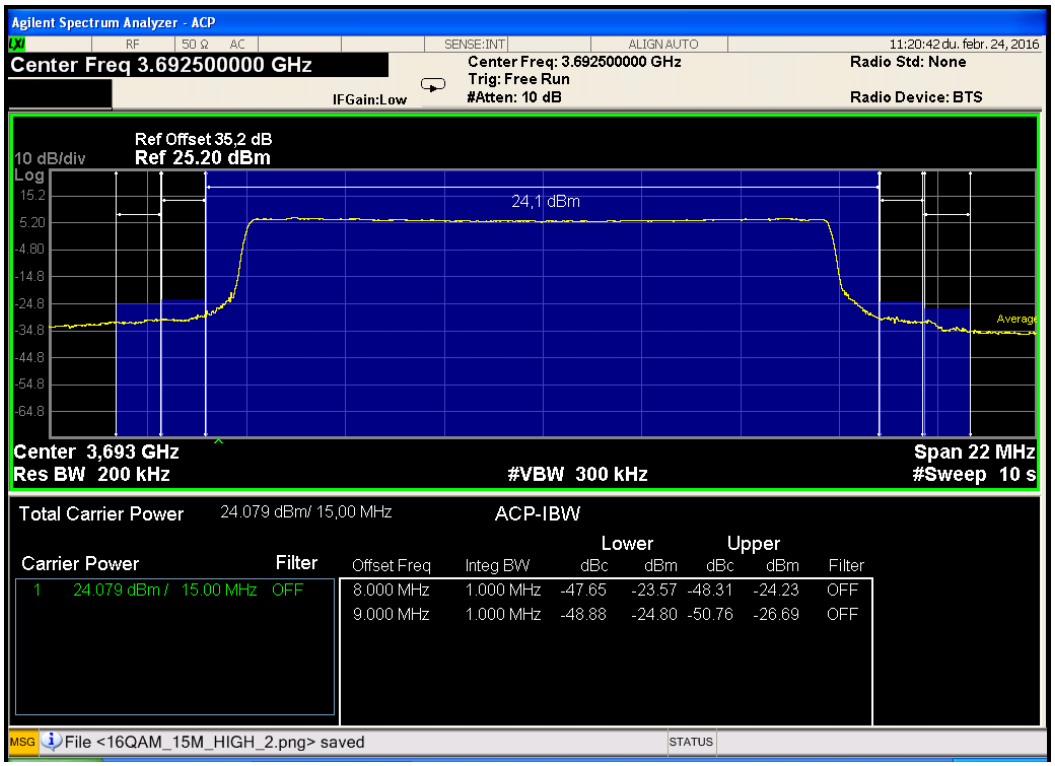


Figure 268.— 15MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, 64QAM

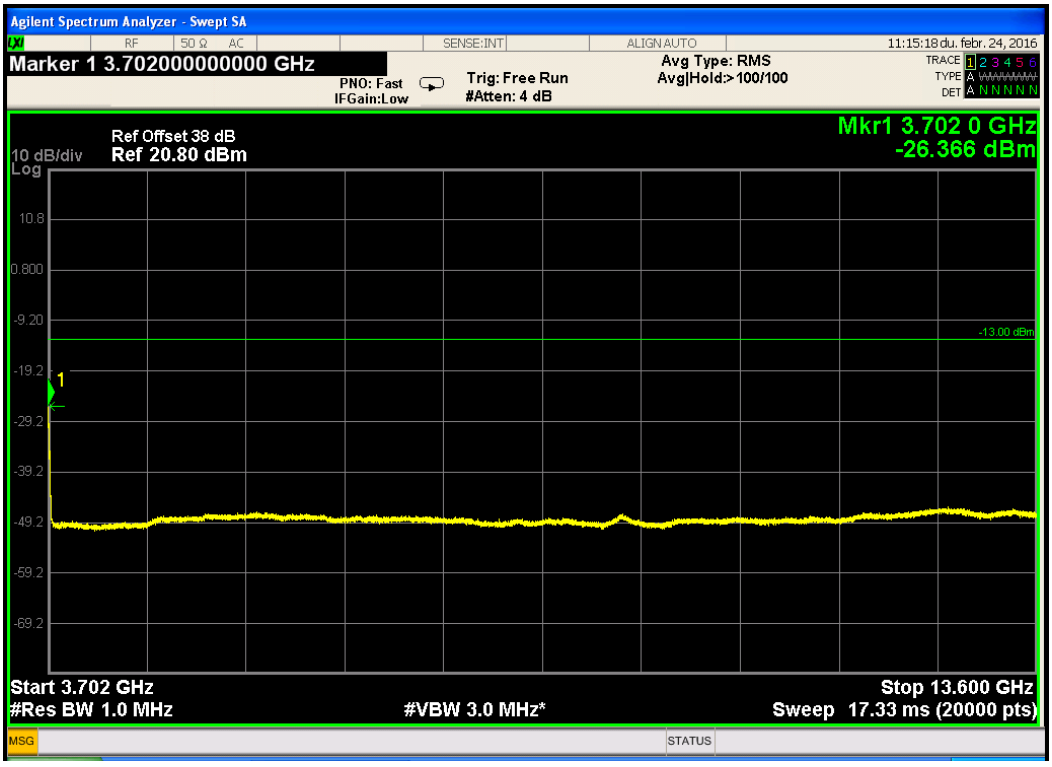


Figure 269. — 15MHz CBW - 3702.0MHz -13.6GHz band, top frequency, 64QAM

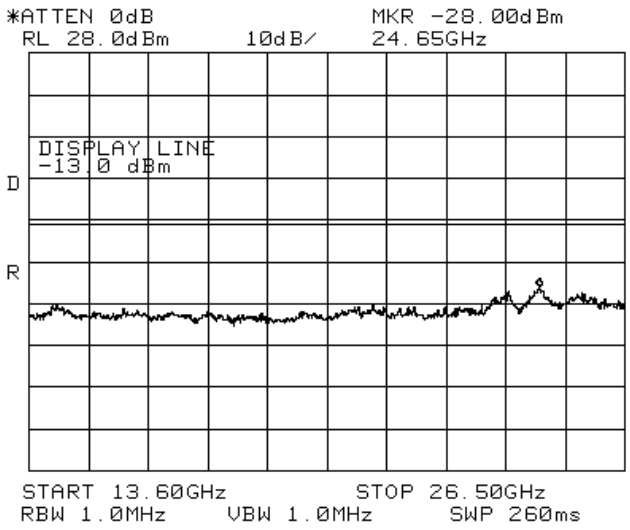


Figure 270. — 15MHz CBW - 13.6GHz-26.5GHz band, top frequency, 64QAM

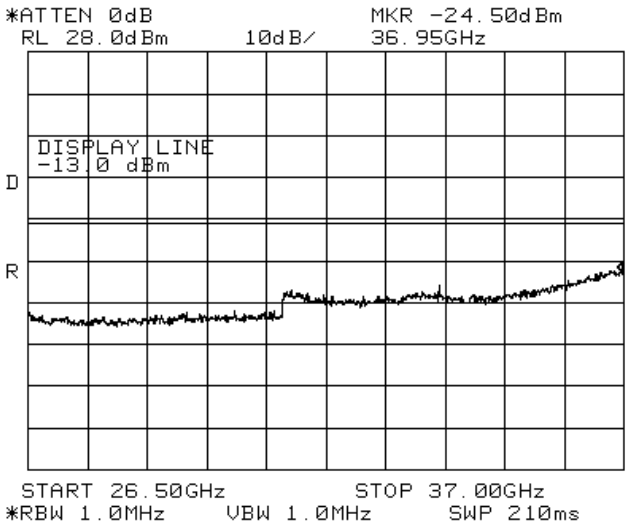


Figure 271. — 15MHz CBW - 26.5GHz -37.0GHz band, top frequency, 64QAM

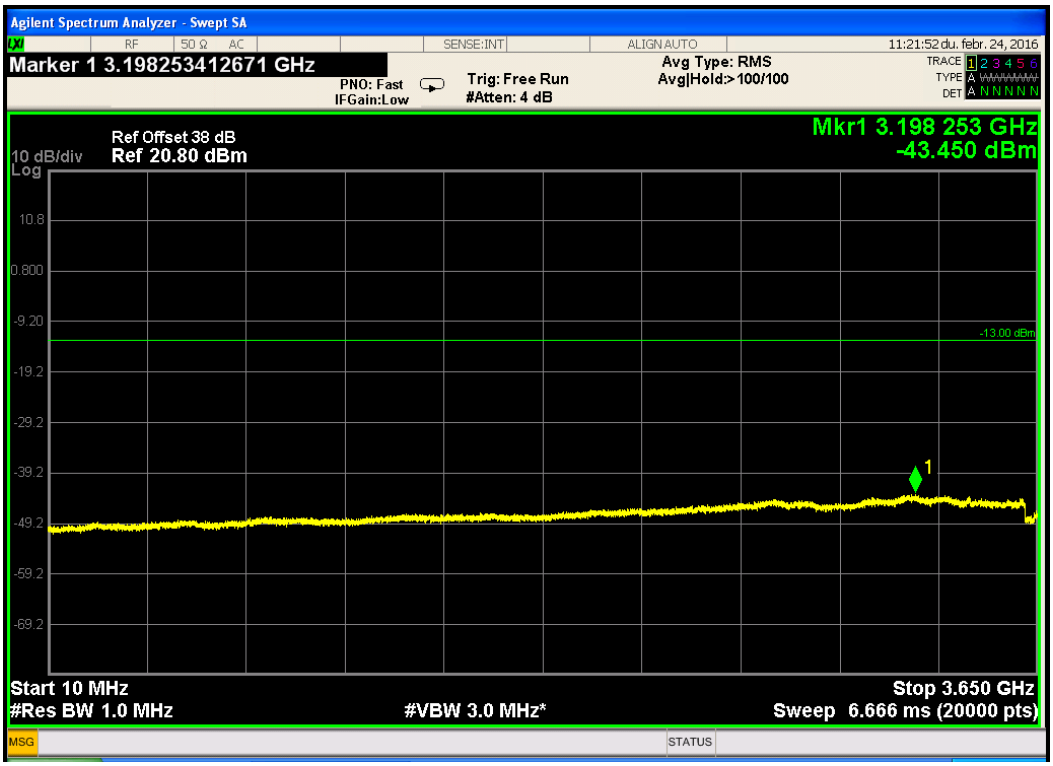


Figure 272.— 15MHz CBW -10.0MHz-3650.0MHz band, top frequency, 16QAM

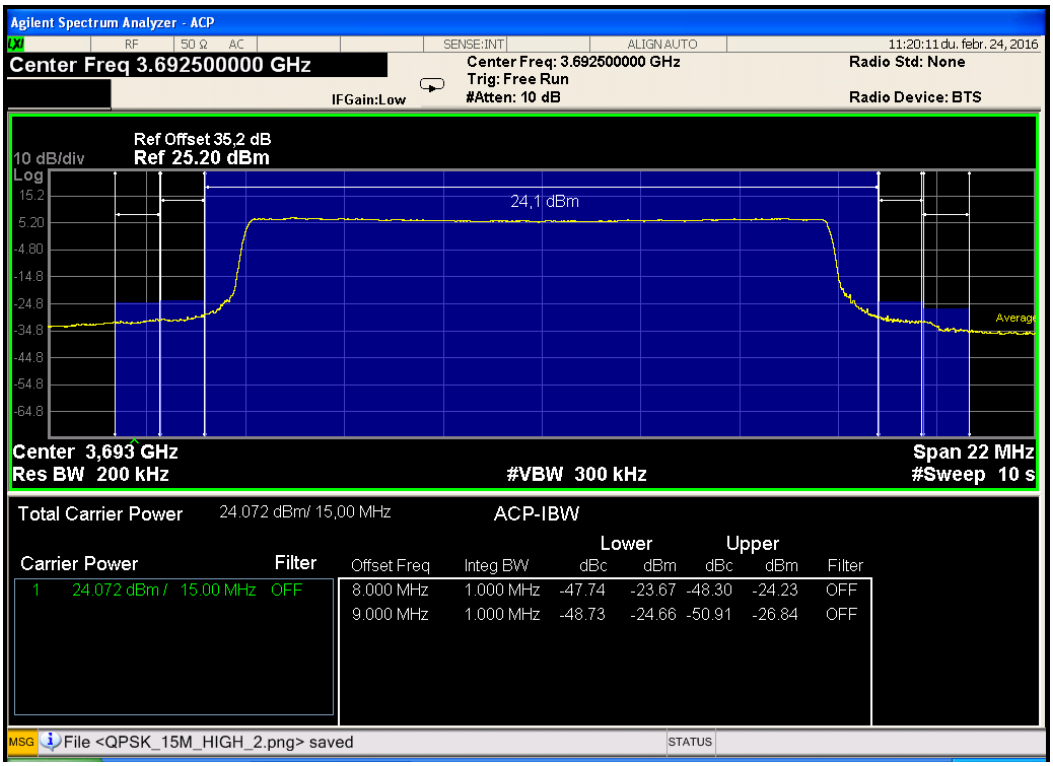


Figure 273.— 15MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, 16QAM

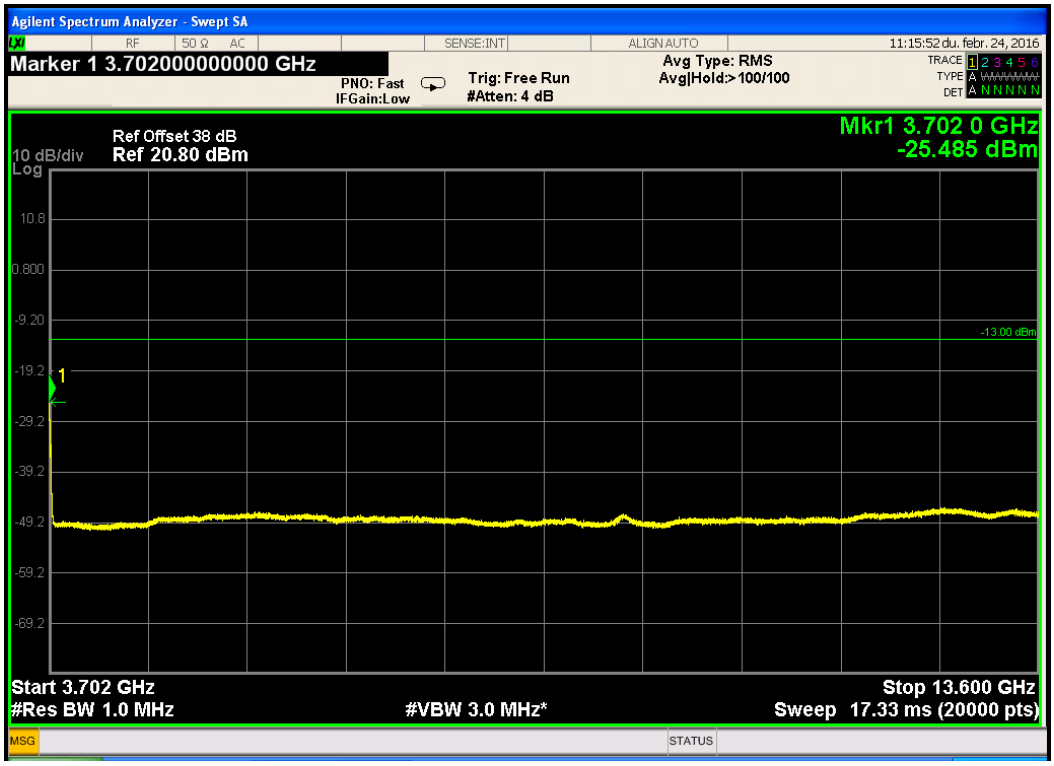


Figure 274.— 15MHz CBW - 3702.0MHz -13.6GHz band, top frequency, 16QAM

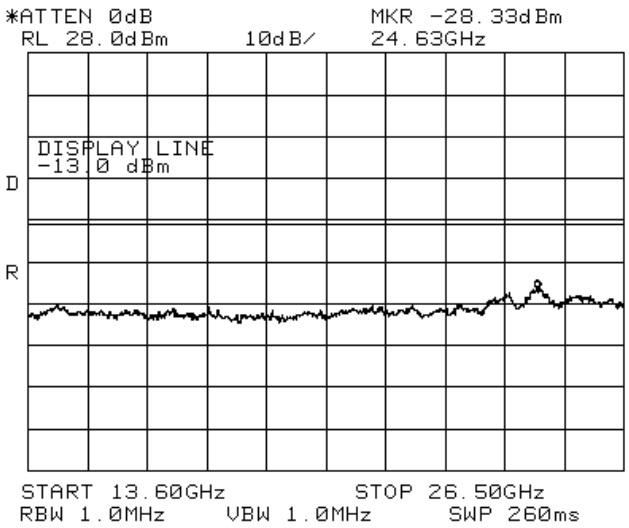


Figure 275.— 15MHz CBW -13.6GHz-26.5GHz band, top frequency, 16QAM

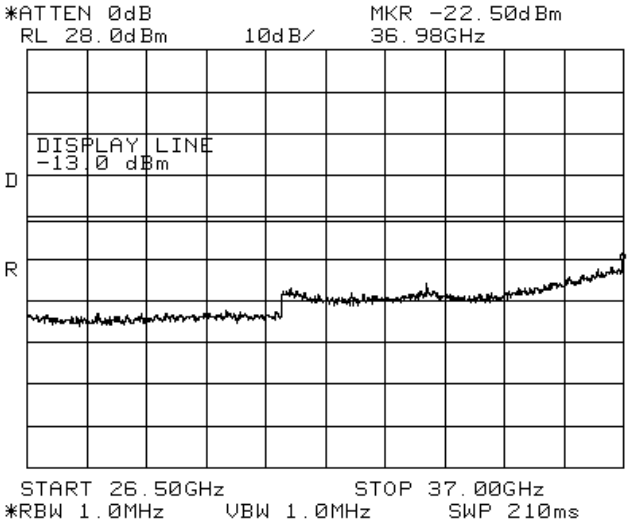


Figure 276.— 15MHz CBW - 26.5GHz-37.0GHz band, top frequency, 16QAM

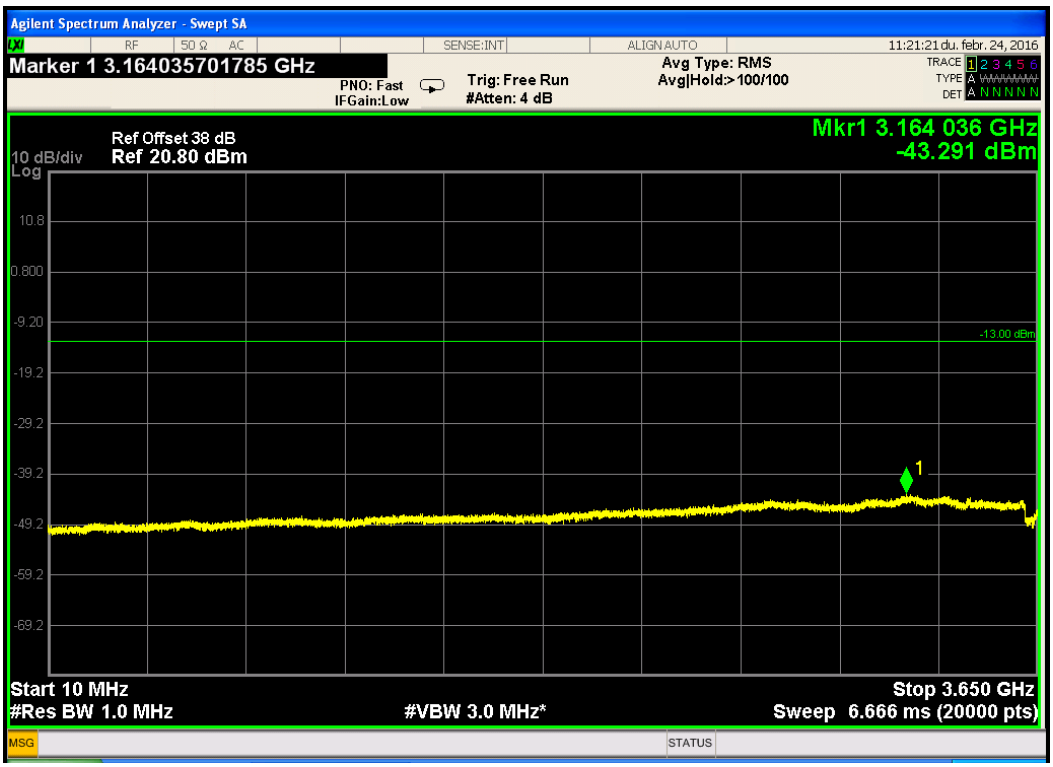


Figure 277.— 15MHz CBW -10.0MHz-3650.0MHz band, top frequency, QPSK

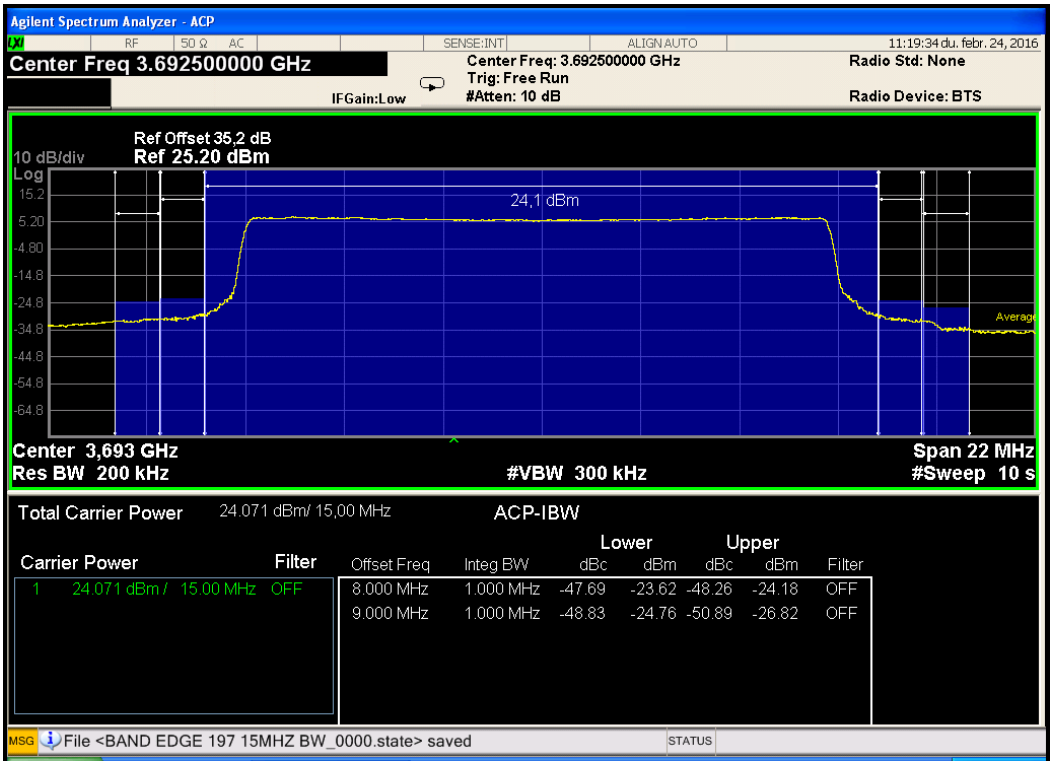


Figure 278.— 15MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, QPSK

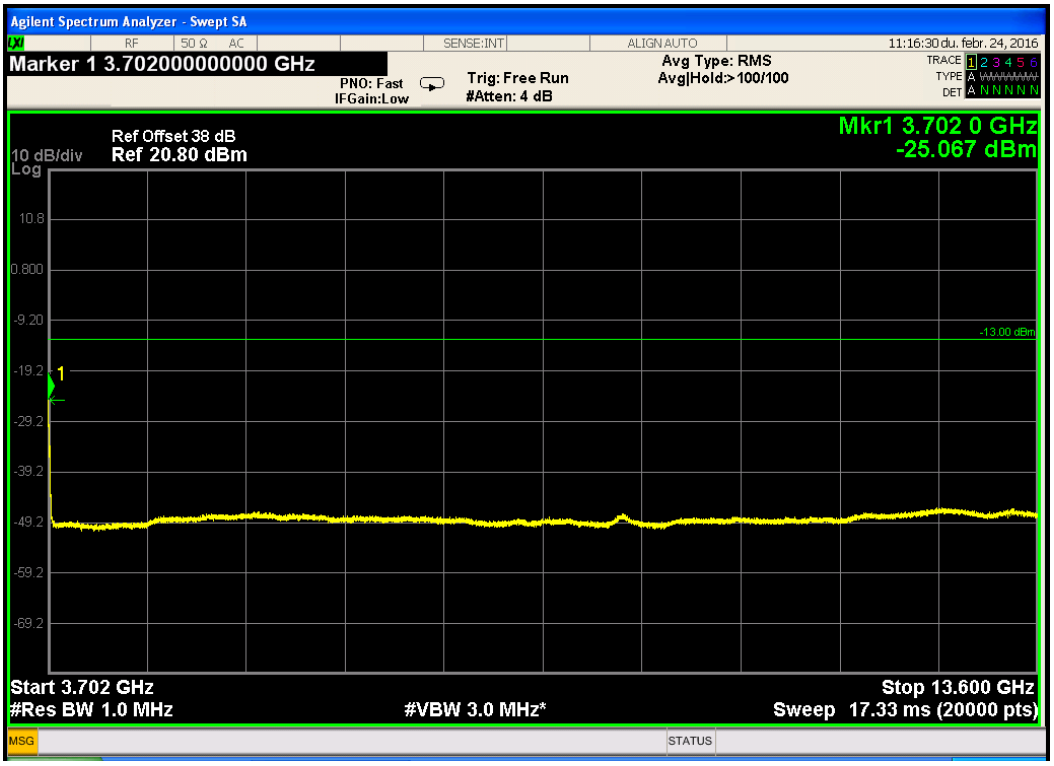


Figure 279.— 15MHz CBW - 3702.0MHz -13.6GHz band, top frequency, QPSK

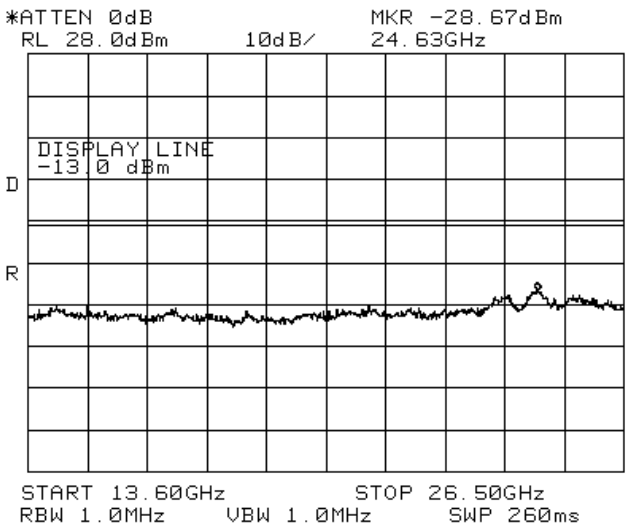


Figure 280.— 15MHz CBW -13.6GHz-26.5GHz band, top frequency, QPSK

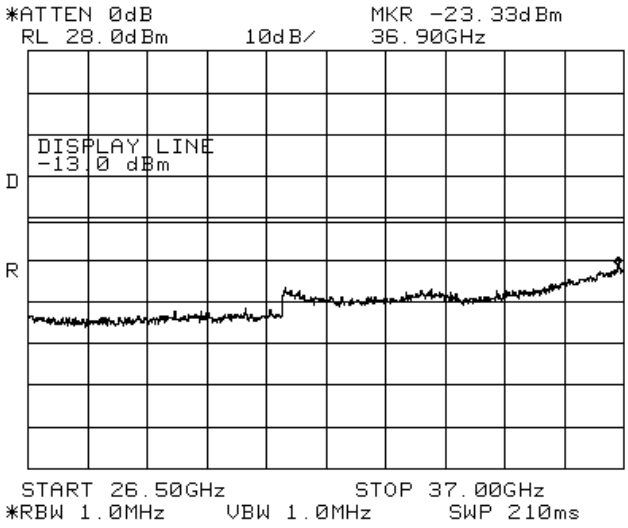


Figure 281.— 15MHz CBW - 26.5GHz-37.0GHz band, top frequency, QPSK

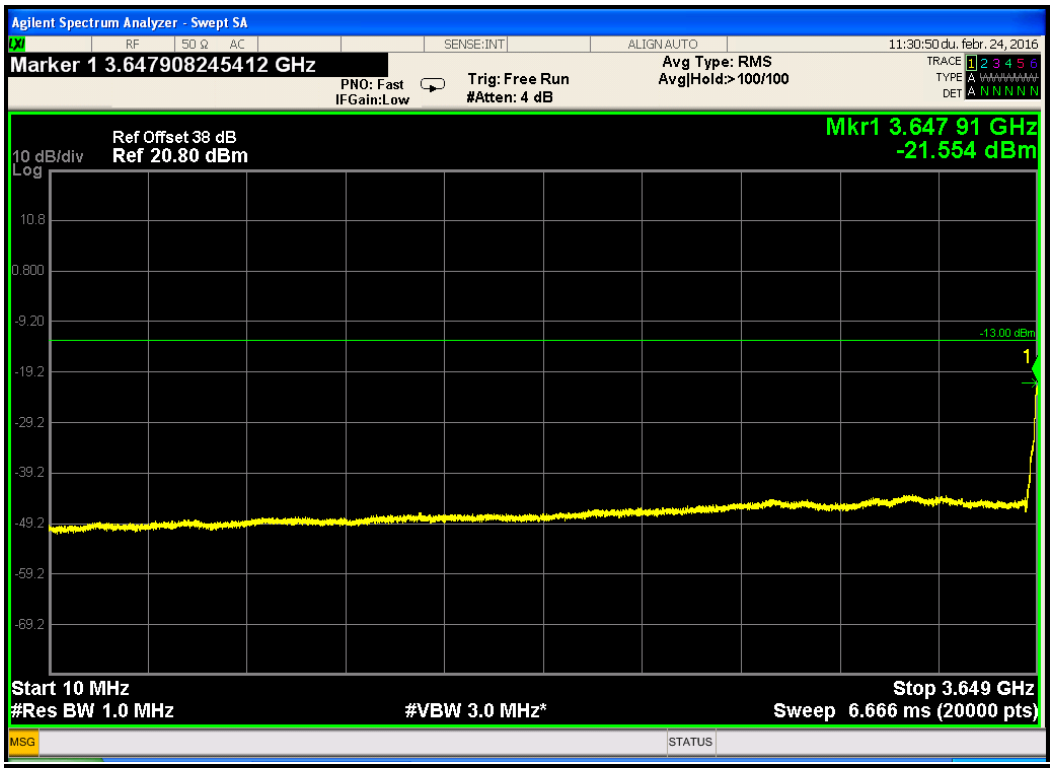


Figure 282.— 20MHz CBW -10.0MHz-3649.0MHz band, bottom frequency, 64QAM

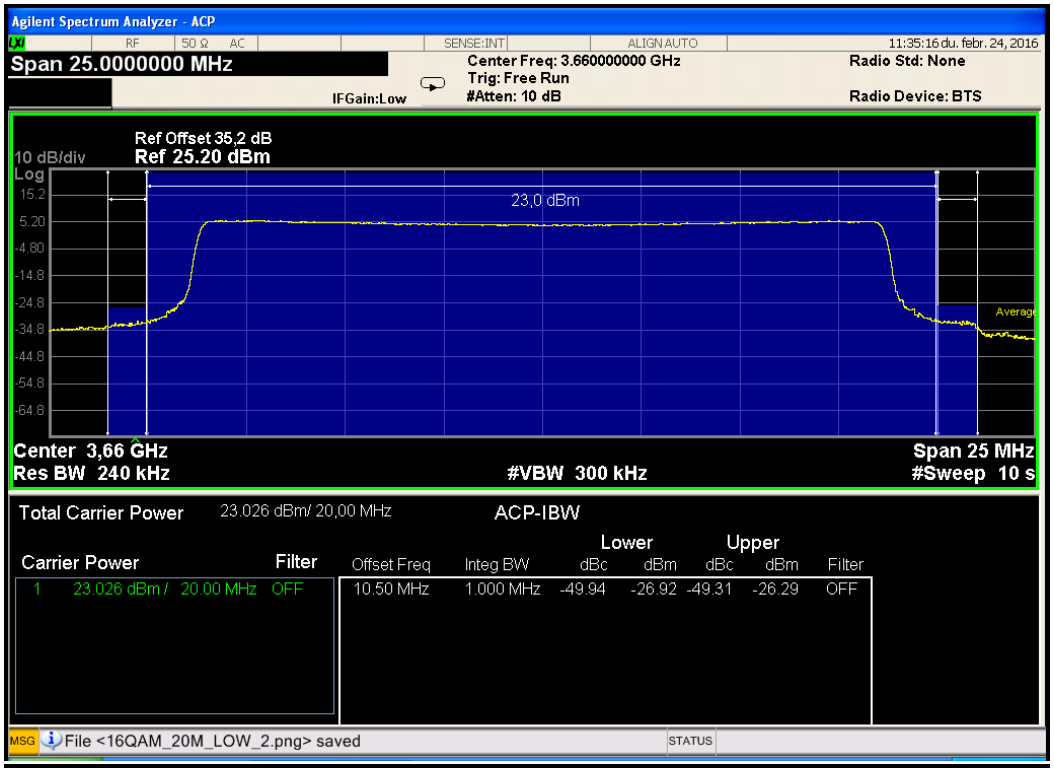


Figure 283.— 20MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, 64QAM

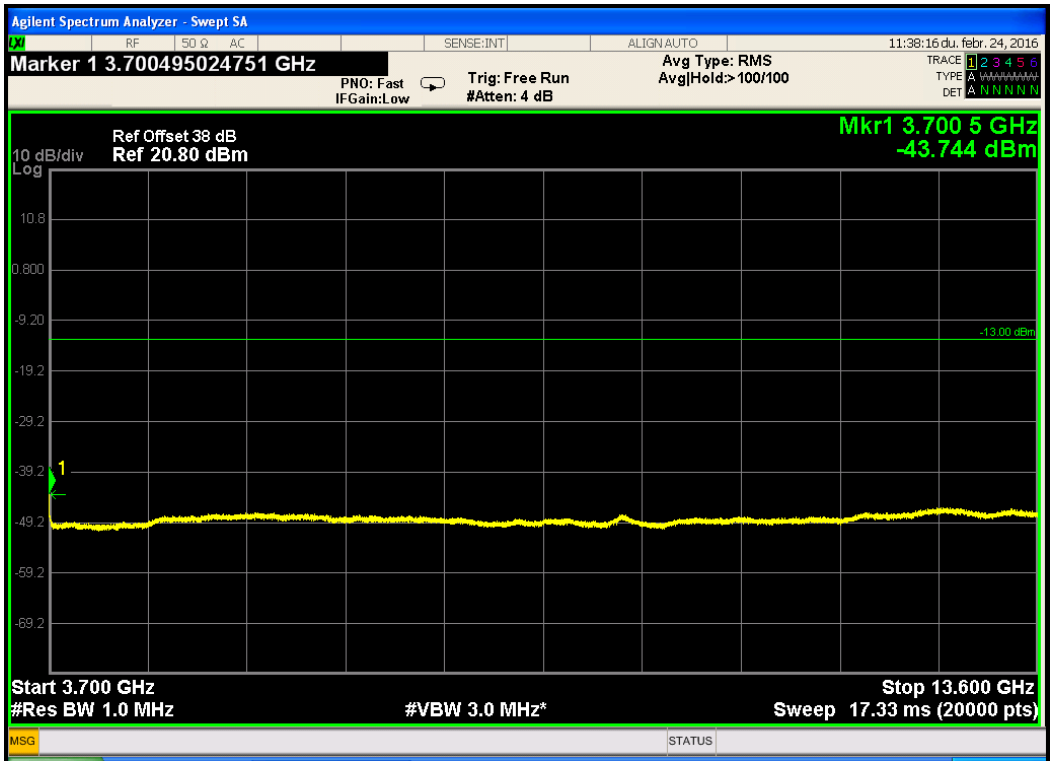


Figure 284.— 20MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, 64QAM

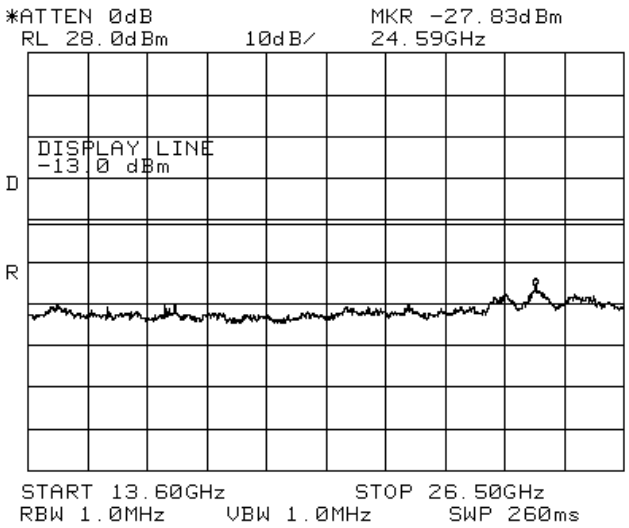


Figure 285.— 20MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, 64QAM

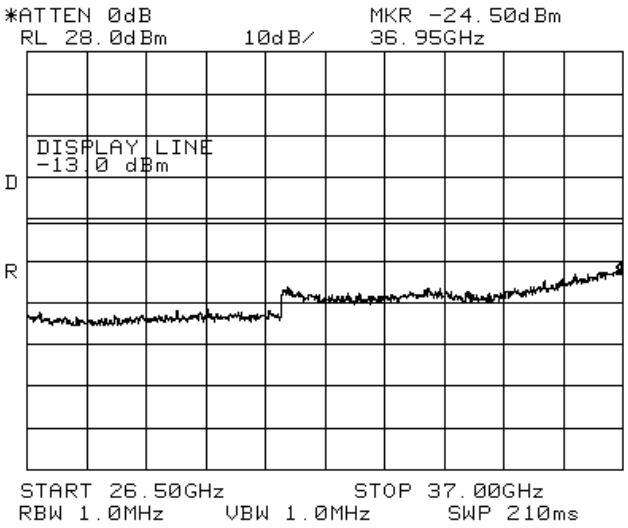


Figure 286.— 20MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, 64QAM

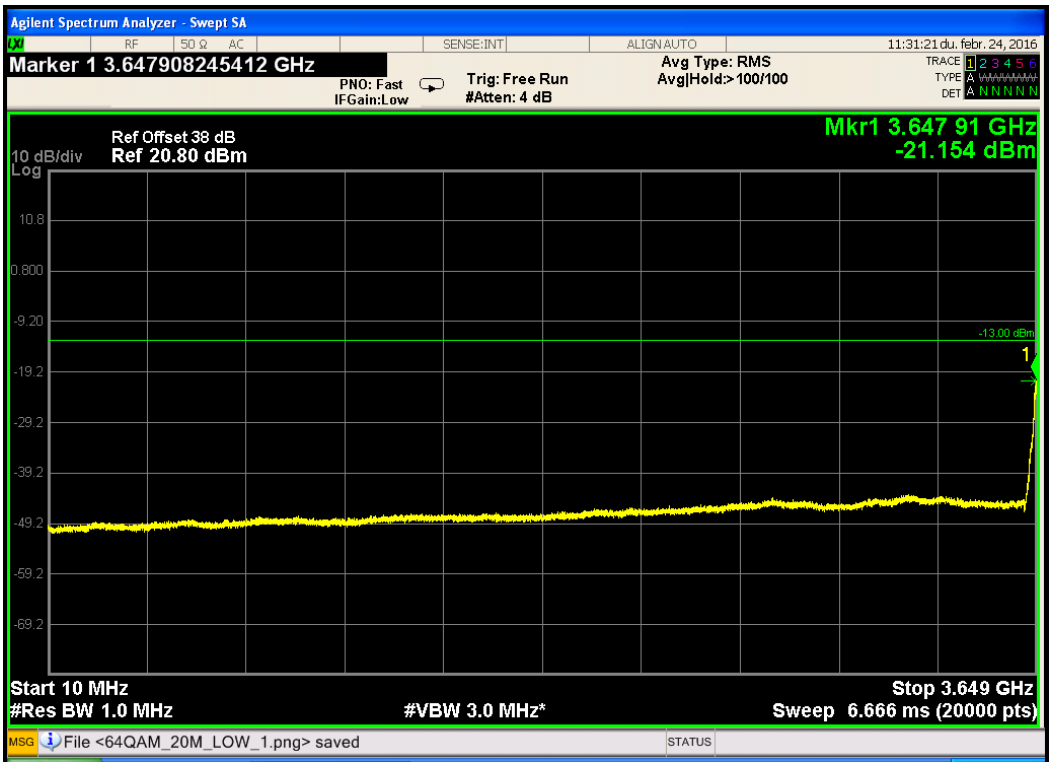


Figure 287.— 20MHz CBW - 10.0MHz-3649.0MHz band, bottom frequency, 16QAM

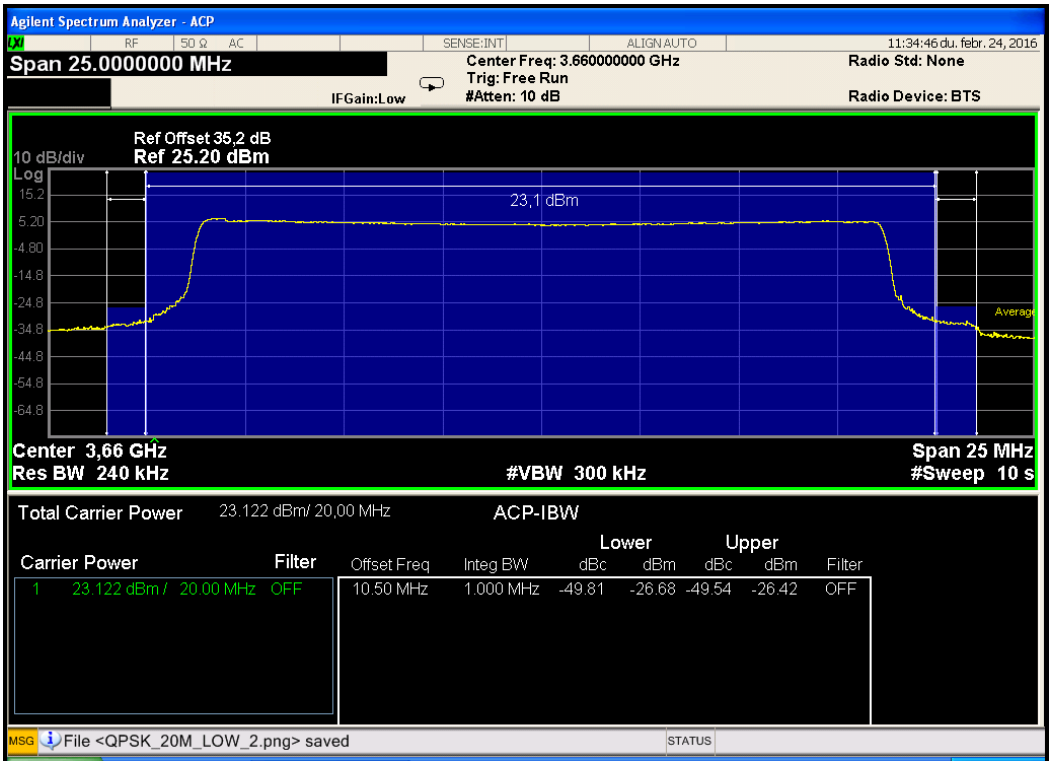


Figure 288.— 20MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, 16QAM

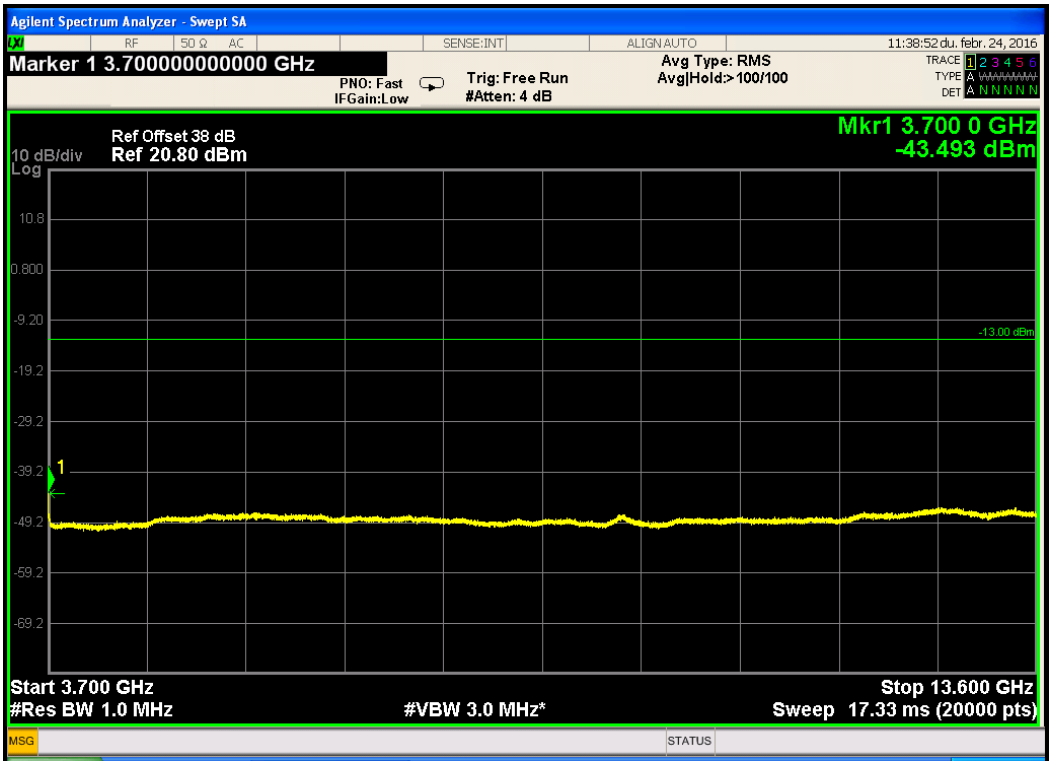


Figure 289.— 20MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, 16QAM

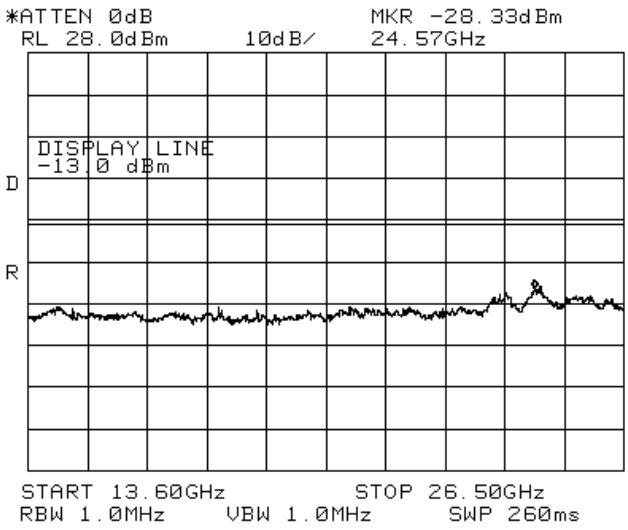


Figure 290.— 20MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, 16QAM

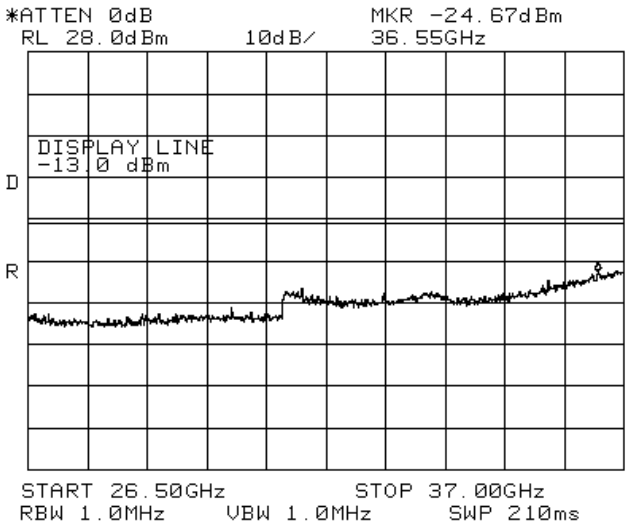


Figure 291.— 20MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, 16QAM

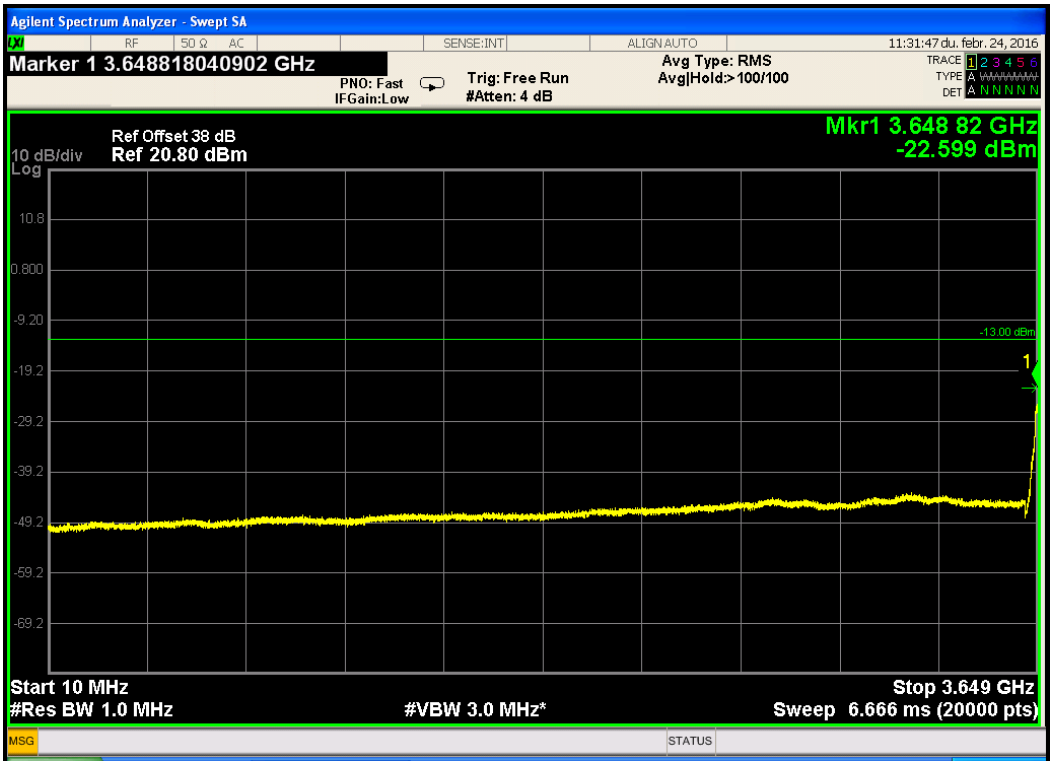


Figure 292.— 20MHz CBW - 10.0MHz-3649.0MHz band, bottom frequency, QPSK

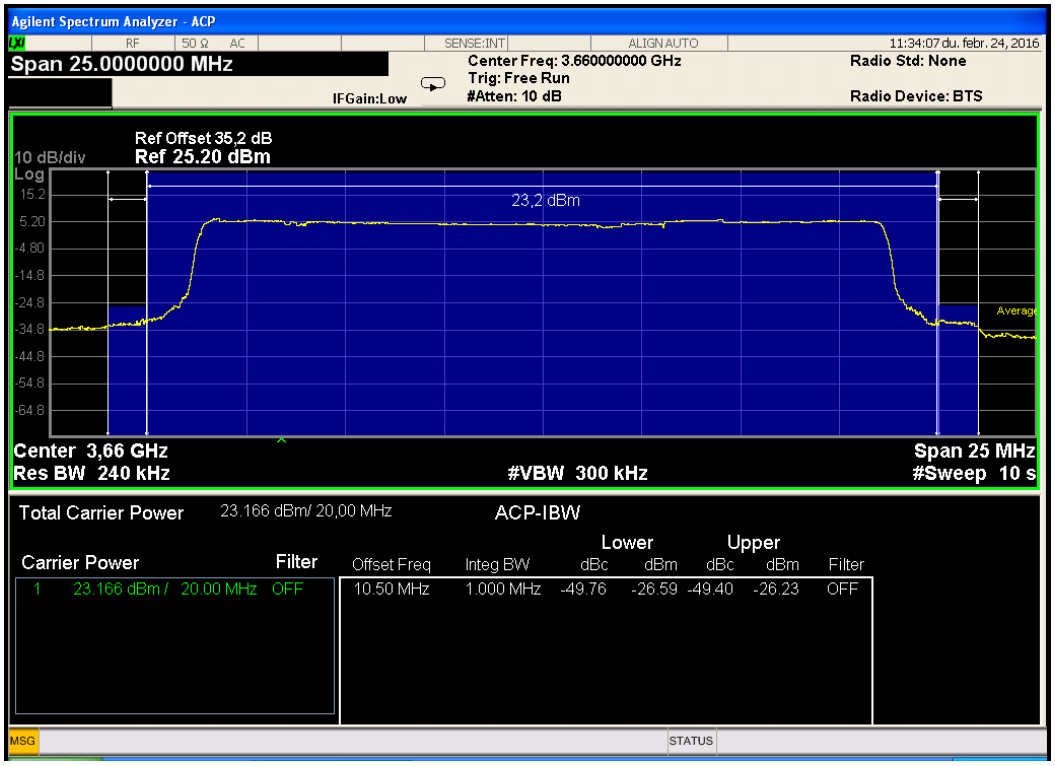


Figure 293.— 20MHz CBW - 3649.0MHz-3650.0MHz band, bottom frequency, QPSK

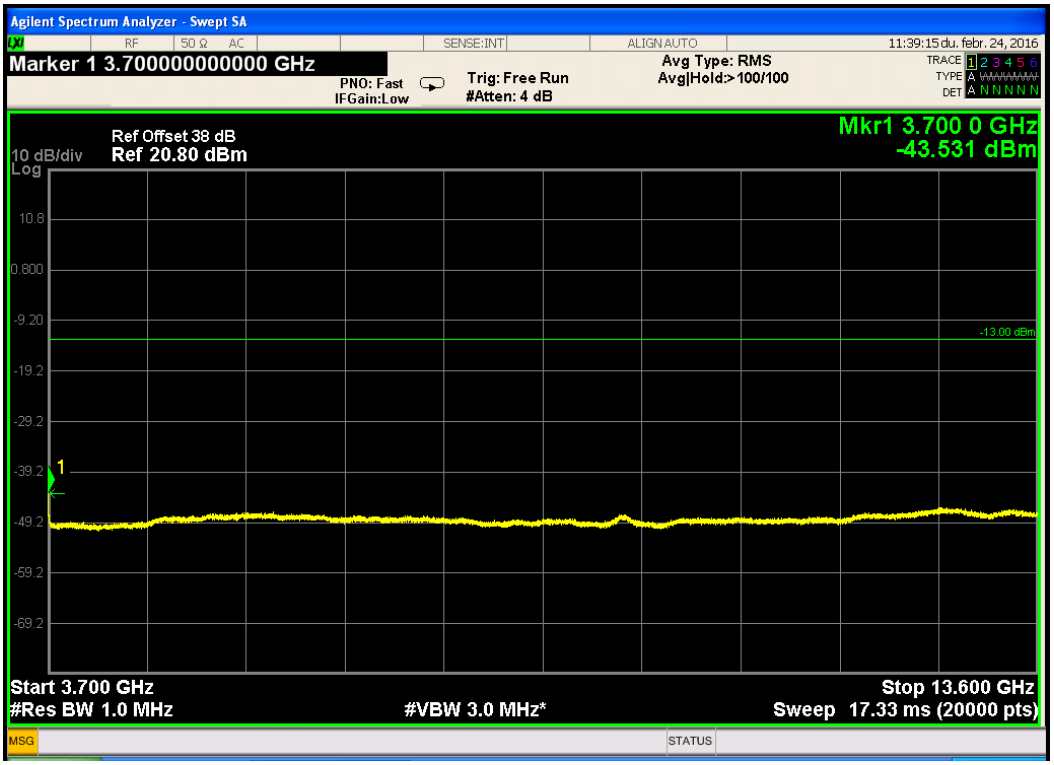


Figure 294.— 20MHz CBW - 3700.0MHz-13.6GHz band, bottom frequency, QPSK

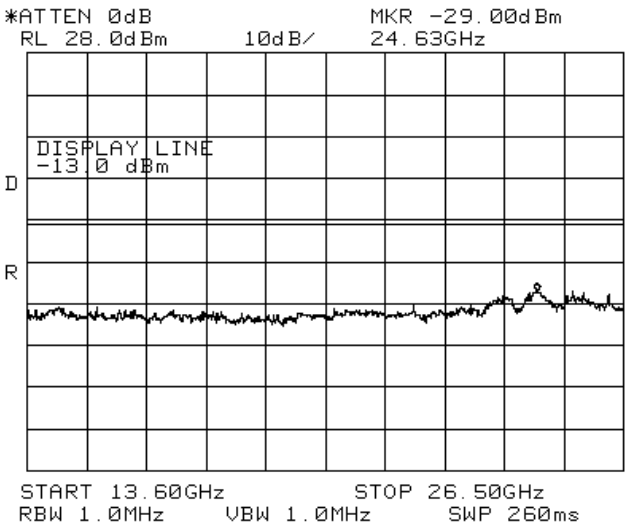


Figure 295.— 20MHz CBW - 13.6GHz-26.5GHz band, bottom frequency, QPSK

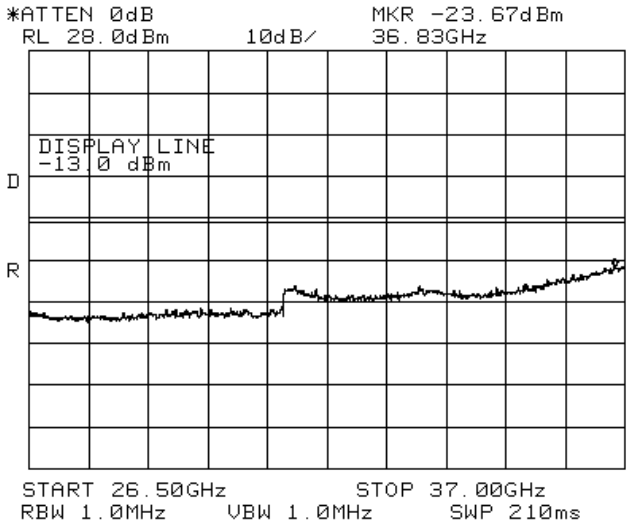


Figure 296.— 20MHz CBW - 26.5GHz-37.0GHz band, bottom frequency, QPSK

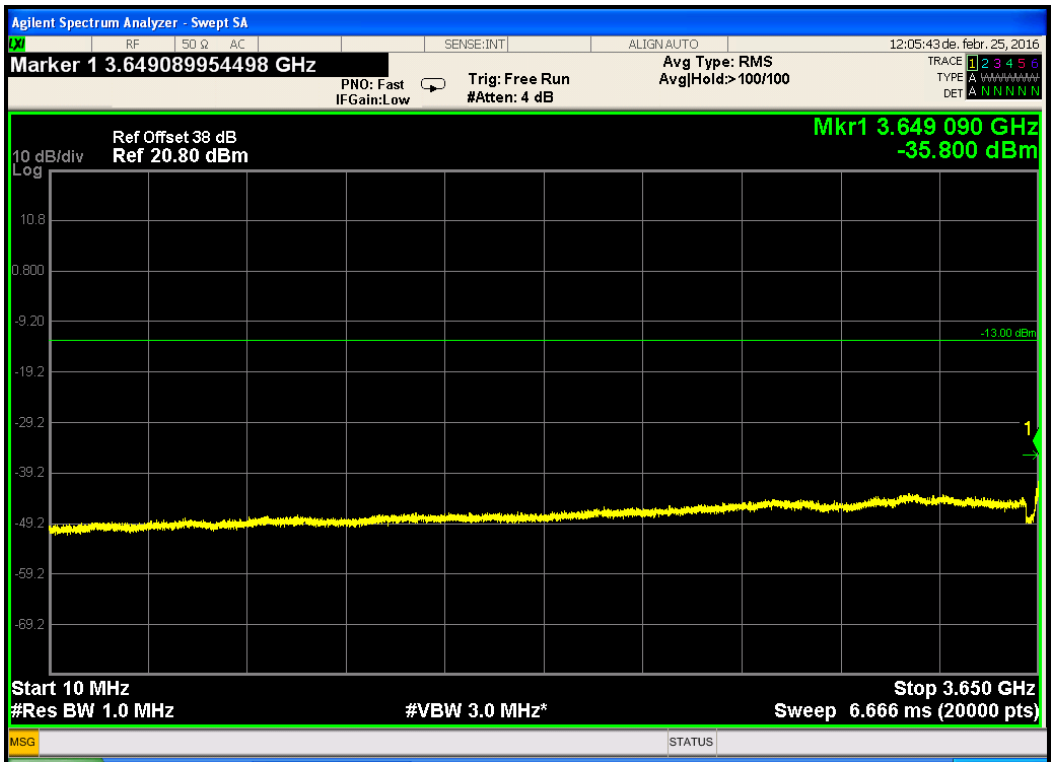


Figure 297.— 20MHz CBW - 10.0MHz-3650.0MHz band, top frequency, 64QAM

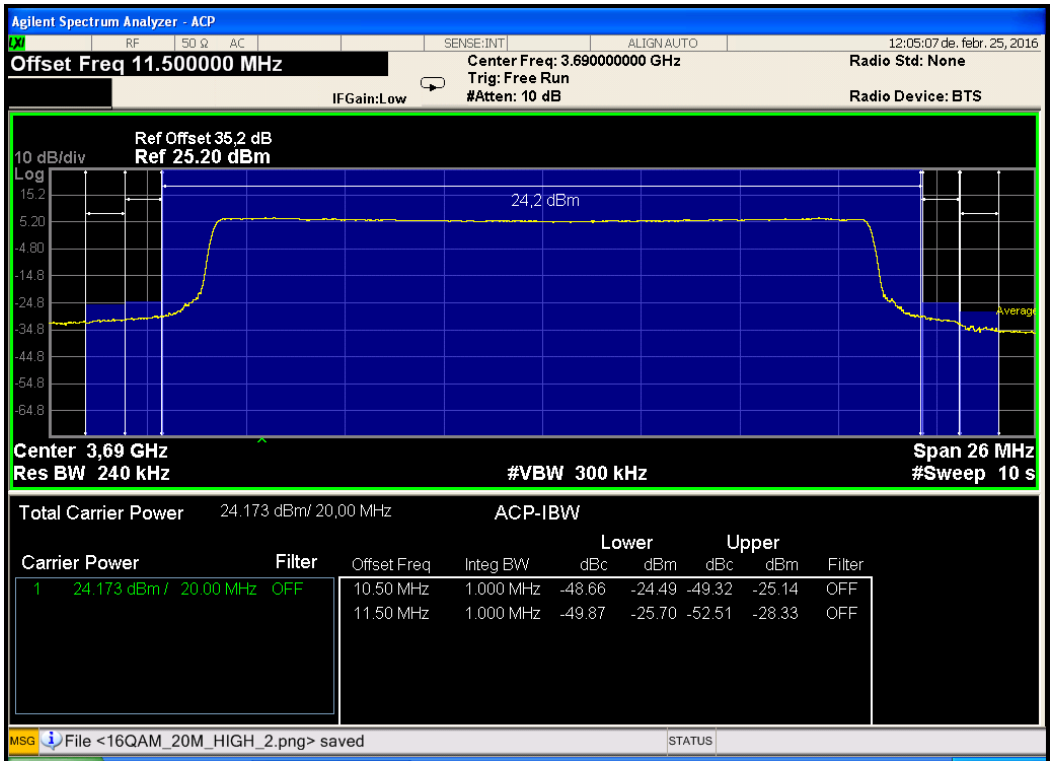


Figure 298.— 20MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, 64QAM

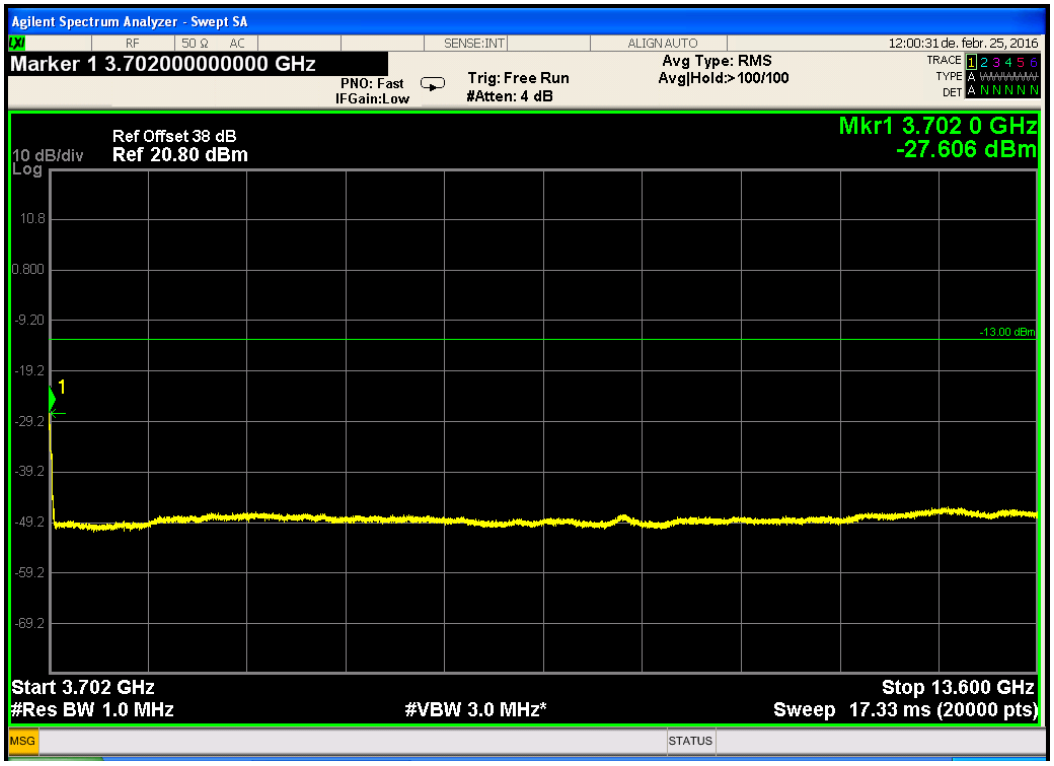


Figure 299.— 20MHz CBW - 3702.0MHz -13.6GHz band, top frequency, 64QAM

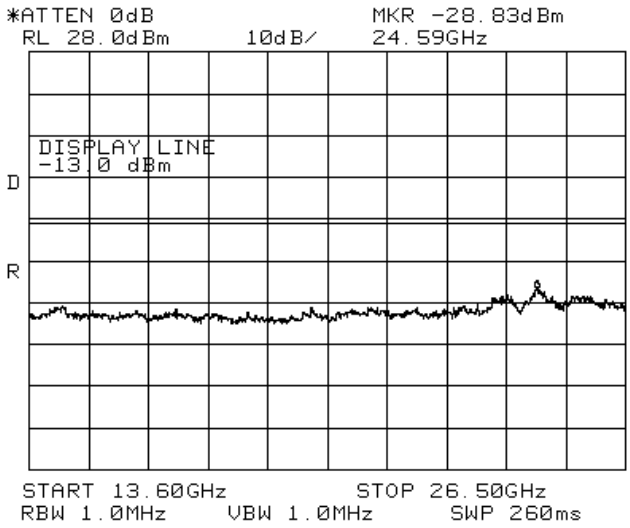


Figure 300.— 20MHz CBW - 13.6GHz-26.5GHz band, top frequency, 64QAM

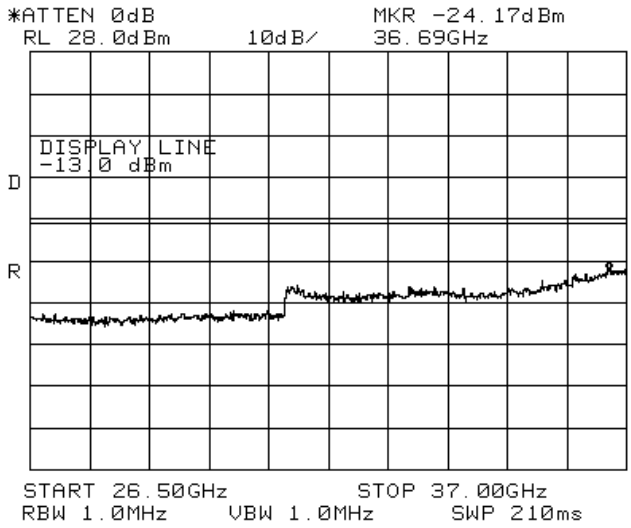


Figure 301.— 20MHz CBW - 26.5GHz -37.0GHz band, top frequency, 64QAM

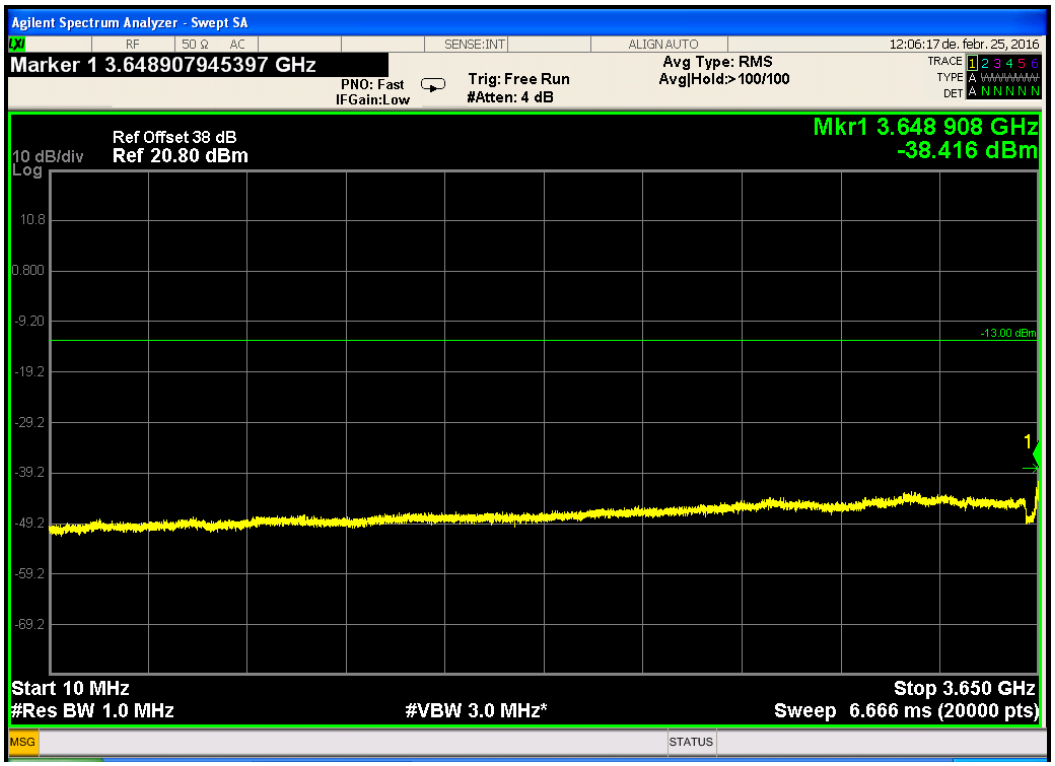


Figure 302.— 20MHz CBW -10.0MHz-3650.0MHz band, top frequency, 16QAM

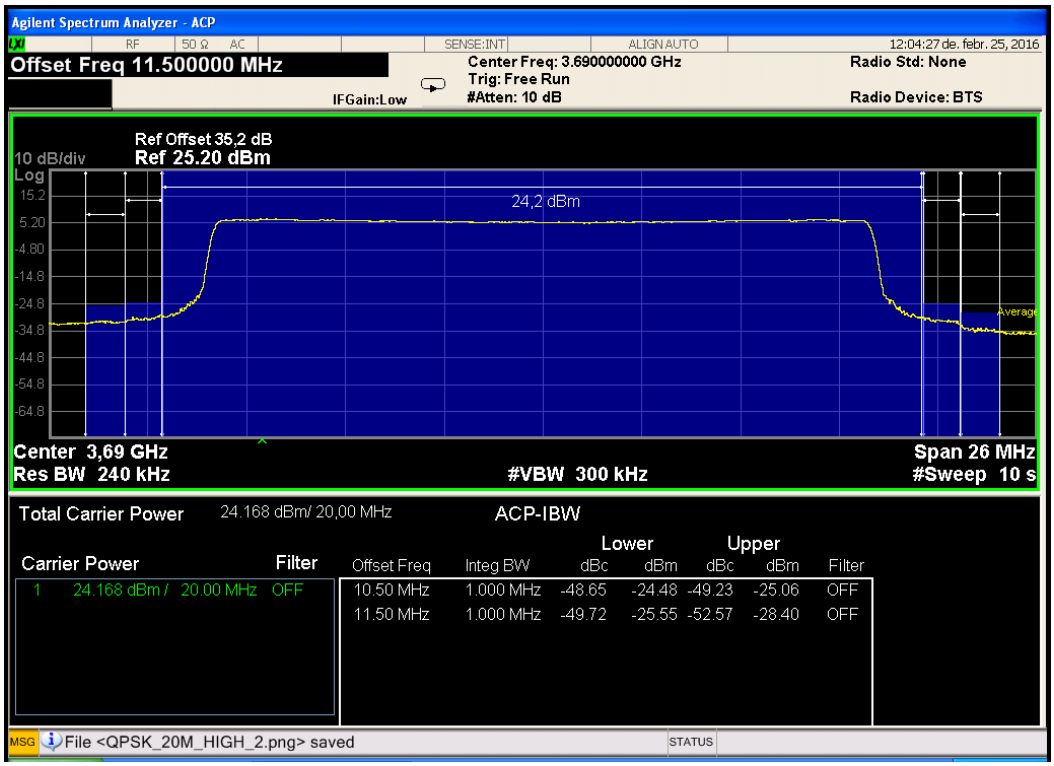


Figure 303.— 20MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, 16QAM

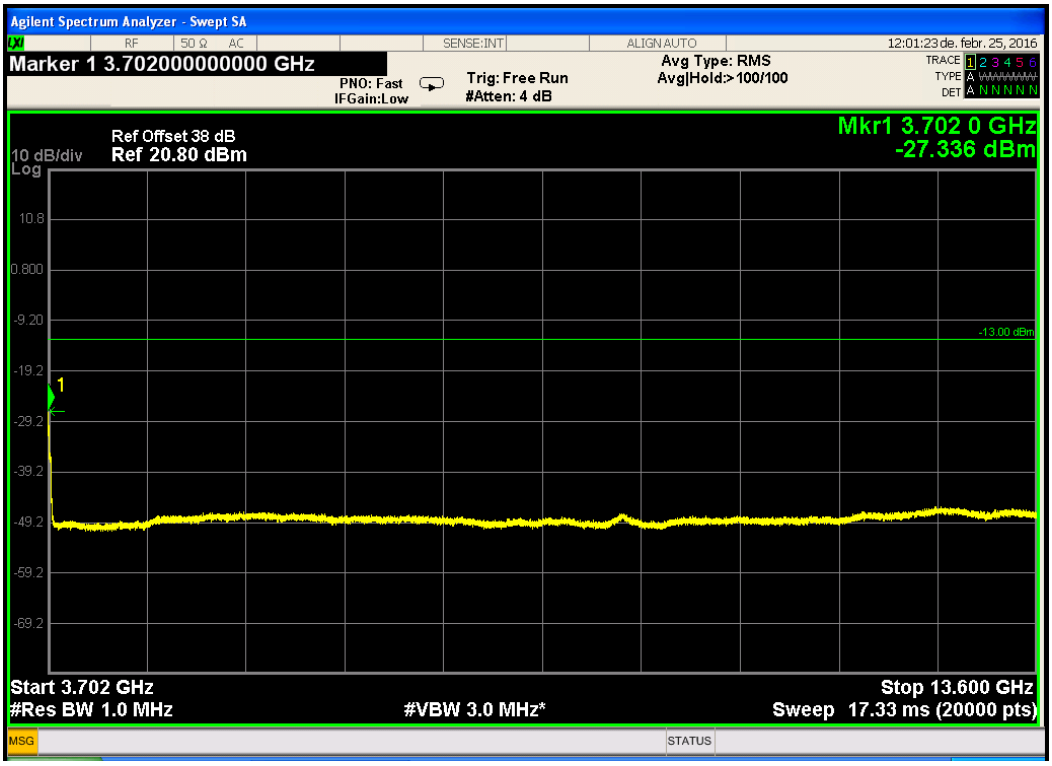


Figure 304.— 20MHz CBW - 3702.0MHz -13.6GHz band, top frequency, 16QAM

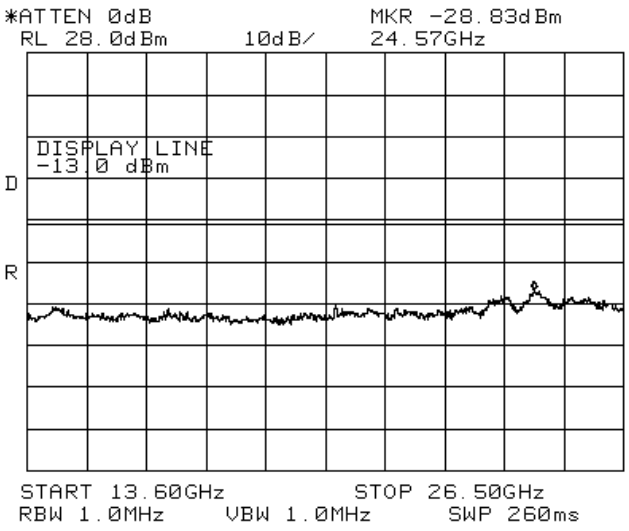


Figure 305.— 20MHz CBW - 13.6GHz-26.5GHz band, top frequency, 16QAM

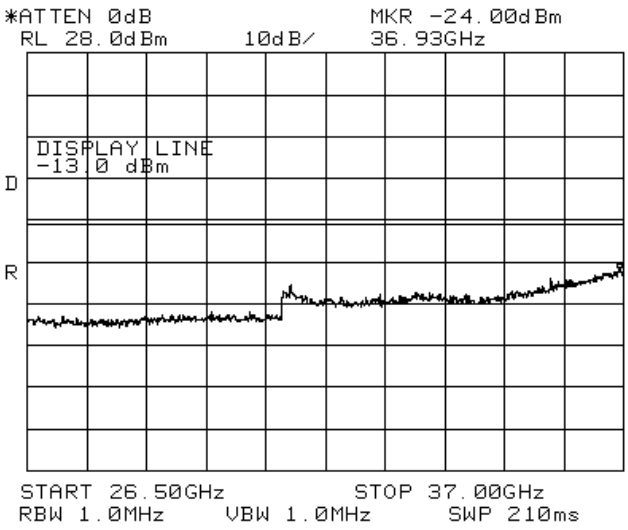


Figure 306.— 20MHz CBW - 26.5GHz-37.0GHz band, top frequency, 16QAM

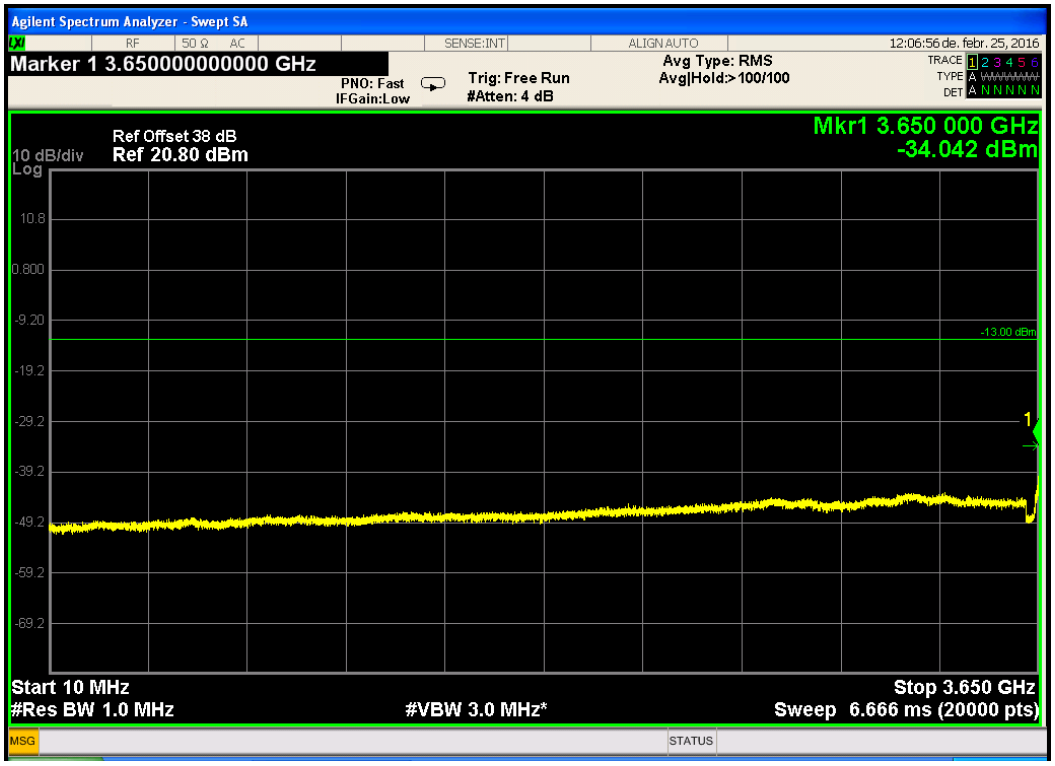


Figure 307.— 20MHz CBW - 10.0MHz-3650.0MHz band, top frequency, QPSK

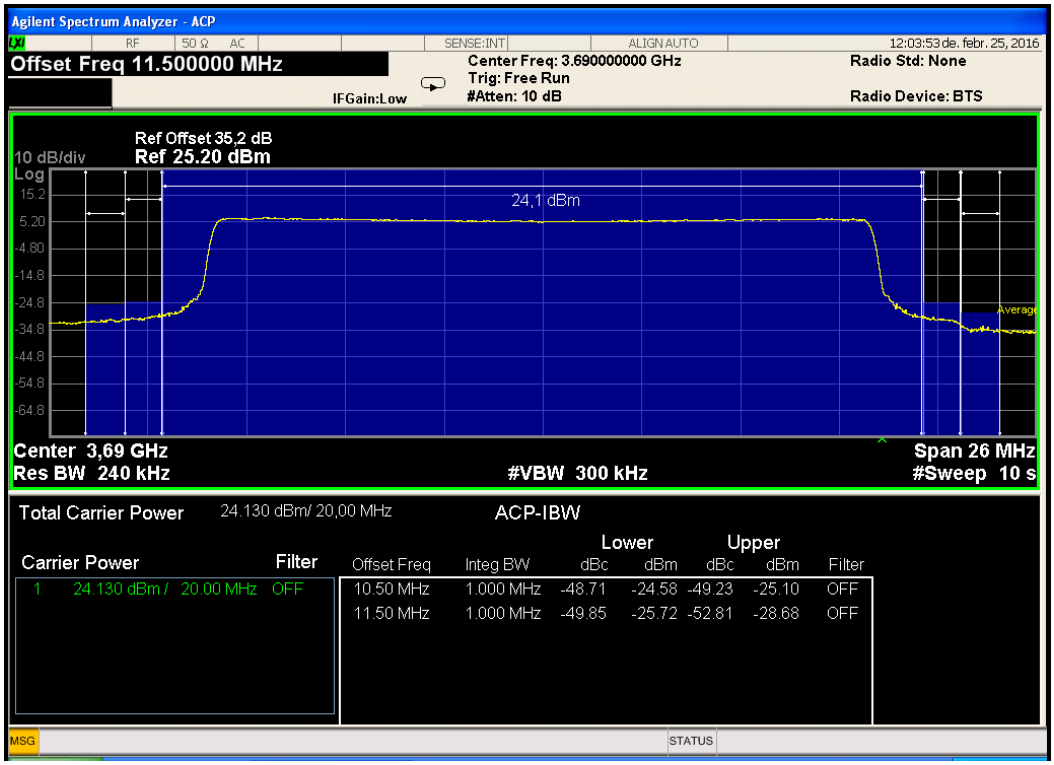


Figure 308.— 20MHz CBW - 3700.0MHz-3702.0MHz band, top frequency, QPSK

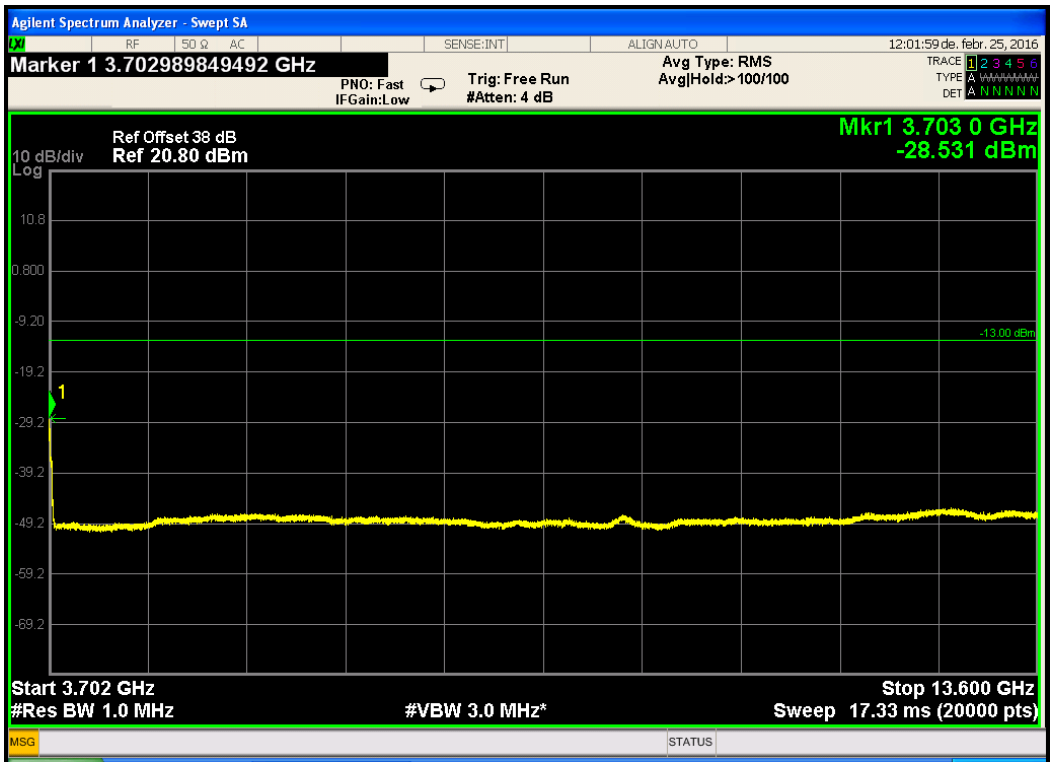


Figure 309.— 20MHz CBW - 3702.0MHz -13.6GHz band, top frequency, QPSK

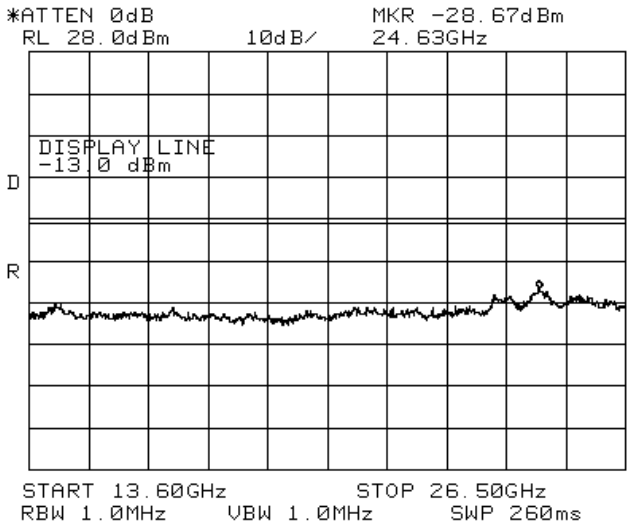


Figure 310.— 20MHz CBW - 13.6GHz-26.5GHz band, top frequency, QPSK

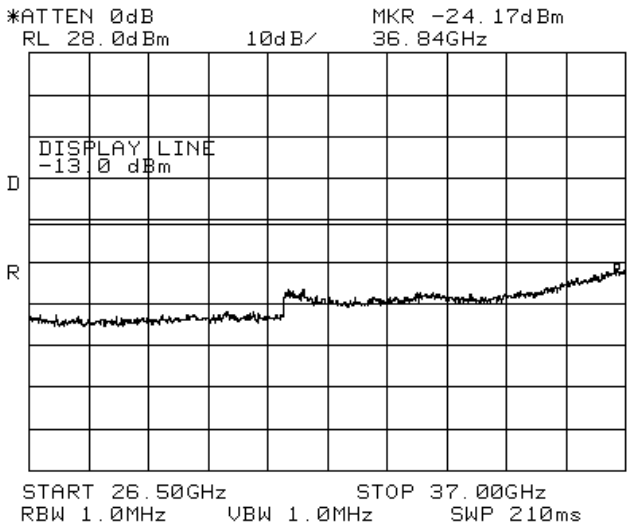


Figure 311.— 20MHz CBW - 26.5GHz-37.0GHz band, top frequency, QPSK

8.5 Test Equipment Used; Conducted Unwanted Emissions

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Next Calibration Due
MXA Signal Analyzer	Agilent	N9020A	MY48011785	July 26 2015	July 26 2017
DC block	JFW	50DB-007	1-23	N/A	N/A
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	March 31, 2016
Splitter	Weinschel 93459	1515	MH203	N/A	N/A
Attenuator	MINI-CIRCUTS	MCL BW S10W2+	0728	N/A	N/A

Figure 312. Test Equipment Used

9. Radiated Unwanted Emissions

9.1 Test Specification

RSS 197, Issue 1: 2010, Section 5.7
FCC, Part 90, Subpart Z, Section 90.1323

9.2 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12 Unwanted Emissions: Radiated Spurious.

(a) The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

For measurements between 0.009MHz-30MHz:

The E.U.T was tested inside the shielded room at a distance of 3 meters and the E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The frequency range 0.009MHz-30MHz was scanned. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

For measurements between 30.0MHz-1.0GHz:
A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 1.0 meters above the ground. The frequency range 30.0MHz -1.0GHz was scanned and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

For measurements between 1.0GHz-37.0GHz:

The E.U.T was tested inside the shielded room at a distance of 3 meters and the E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The frequency range 1.0GHz -37.0GHz was scanned. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).
The signals observed in step (a) were converted to radiated power using:
P_d(dBm) = P_g(dBm) – Cable Loss (dB) + Substitution Antenna Gain (dBd)

P_d = Equivalent Radiated Power (result).
P_g = Signal generator output level.

The tests were performed in 2 operational frequencies: bottom and top at 5M, 10M, 15M and 20MHz CBW (64QAM modulation as the "worst case "for radiated emission). Testing was performed with the E.U.T. transmitting maximum power at the RF port in low population power mode (RF port was connected to 50 Ω termination).

The table below describe only the results with the highest radiation.

9.3 Limit

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, yielding –13dBm.

9.4 Test Results

JUDGEMENT: Passed by 25.7 dB (5MHz Bandwidth)
Passed by 25.6 dB (10 MHz Bandwidth)

The E.U.T met the requirements of the RSS-197, Issue 1:2010, Section 5.7 specification.

For additional information see details in *Figure 313* to *Figure 314.*

Radiated Unwanted Emissions

Channel	Freq.	Antenna Pol.	Maximum Peak Level	Signal Generator RF Output	Cable Loss	Antenna Gain	ERP	Limit	Margin
(MHz)	(MHz)	(V/H)	(dBµV/m)	(dBm)	(dB)	(dBd)	(dBm)	(dBm)	(dB)
Bottom	7305.0	V	52.1	-51.1	1.0	7.9	-44.2	-13.0	-31.2
	7305.0	H	52.5	-51.6	1.0	7.9	-44.7	-13.0	-31.7
	10,957.5	V	55.1	-48.6	1.5	10.4	-39.7	-13.0	-26.7
	10,957.5	H	55.0	-48.3	1.5	10.4	-39.4	-13.0	-26.4
Top	7395.0	V	53.0	-50.3	1.0	7.9	-43.4	-13.0	-30.4
	7395.0	H	52.4	-51.7	1.0	7.9	-44.8	-13.0	-31.8
	11,092.5	V	56.2	-47.6	1.5	10.4	-38.7	-13.0	-25.7
	11,092.5	H	55.5	-47.8	1.5	10.4	-38.9	-13.0	-25.9

Figure 313. Spurious Radiated Emission Test Results 5 MHz CBW

Channel	Freq.	Antenna Pol.	Maximum Peak Level	Signal Generator RF Output	Cable Loss	Antenna Gain	ERP	Limit	Margin
(MHz)	(MHz)	(V/H)	(dBµV/m)	(dBm)	(dB)	(dBd)	(dBm)	(dBm)	(dB)
Bottom	7310.0	V	52.0	-51.2	1.0	7.9	-44.3	-13.0	-31.3
	7310.0	H	52.9	-51.2	1.0	7.9	-44.3	-13.0	-31.3
	10,965.0	V	56.1	-47.5	1.5	10.4	-38.6	-13.0	-25.6
	10,965.0	H	55.3	-48.0	1.5	10.4	-39.1	-13.0	-26.1
Top	7390.0	V	52.4	-50.9	1.0	7.9	-44.0	-13.0	-31.0
	7390.0	H	52.4	-51.7	1.0	7.9	-44.8	-13.0	-31.8
	11,085.0	V	55.7	-47.9	1.5	10.4	-39.0	-13.0	-26.0
	11,085.0	H	55.5	-47.8	1.5	10.4	-38.9	-13.0	-25.9

Figure 314. Spurious Radiated Emission Test Results 10 MHz CBW

9.5 Test Instrumentation Used; Spurious Radiated Emission

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	HP	85422E	3906A00276	March 11 2015	March 31 2016
RF Filter Section	HP	85420E	3705A00248	March 19, 2015	March 31 2016
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	March 31 2016
EMI Receiver	R&S	ESCI7	100724	February 29, 2016	March 1, 2017
Spectrum Analyzer	HP	8593EM	3536A00120ADI	February 24, 2015	March 31, 2016
Active Loop Antenna	EMCO	6502	9506-2950	November 5, 2015	November 5, 2016
Antenna Biconical	EMCO	3104	2606	December 28, 2015	December 28, 2016
Antenna Log Periodic	EMCO	3146	9505-4081	December 28, 2014	December 28, 2016
Horn Antenna 1G-18G	ETS	3115	29845	May 19, 2015	May 19, 2018
Horn Antenna 18G-26G	ARA	SWH-28	1007	March 30, 2014	March 30, 2016
Horn antenna 26G-40G	OSR Electronics	PE9850R-20	J202021732	February 1, 2015	March 31, 2016
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	March 1, 2015	March 31, 2016
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	March 1, 2015	March 31, 2016
Semi Anechoic Civil Chamber	ETS	S81	SL 11643	N/A	N/A
Antenna Mast	ETS	2070-2	-	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 315. Test Equipment Used Spurious Radiated Emission 5MHz and 10 MHz Bandwidth

10. Receiver Spurious Emissions

10.1 Test Specification

RSS 197, Issue 1: 2010, Section 5.8
RSS Gen, Issue 4:2014, Section 7.1.3

10.2 Test Procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through, an appropriate coaxial cable, and DC block. (total loss= 2.0 dB).
Scanning was performed between 10MHz until 20.0GHz.
2 ports were tested.

10.3 Limit

Receiver spurious emissions shall not exceed -57.0dBm below 1.0 GHz, and -53.0dBm above 1.0 GHz at the antenna connector.

10.4 Test Results

JUDGEMENT: Passed

The E.U.T met the requirements of RSS 197, Issue 1: 2010, Section 5.8 and RSS Gen, Issue 4:2014, Section 7.1.3 specification.

For additional information see details in *Figure 316* to *Figure 319.*

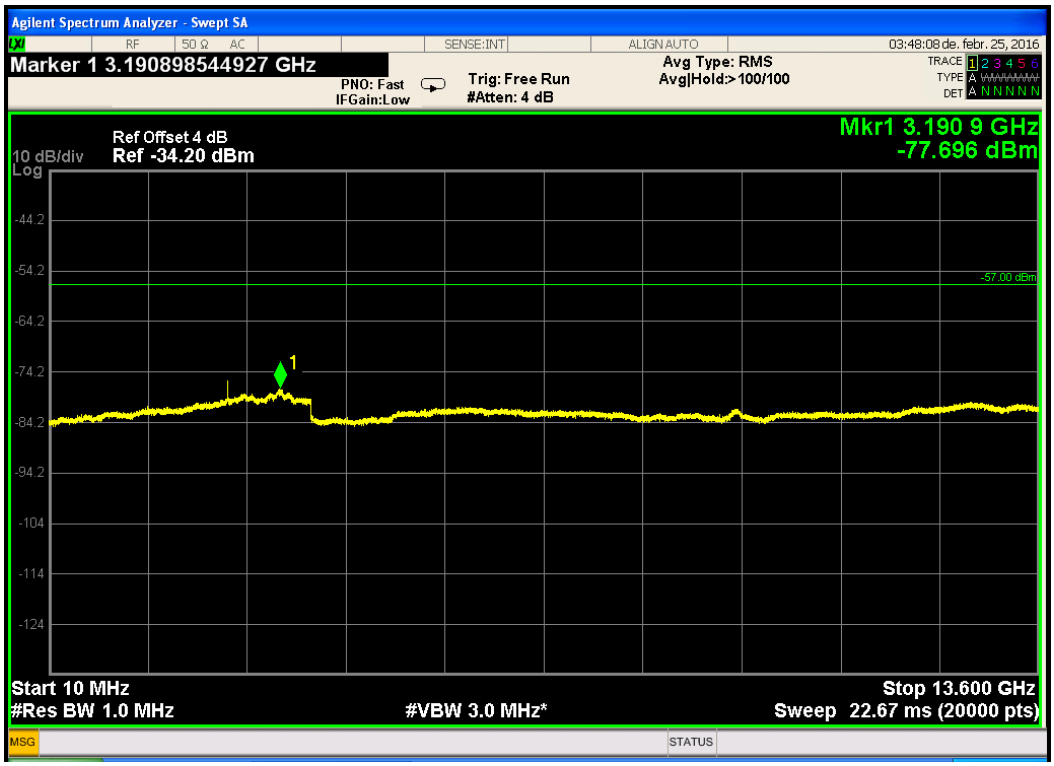


Figure 316. 10MHz-13.6GHz band, Port A

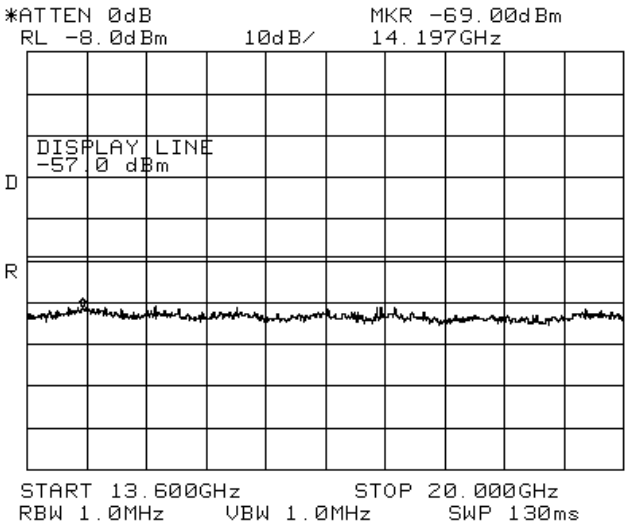


Figure 317. 13.6GHz – 20.0GHz band, Port A

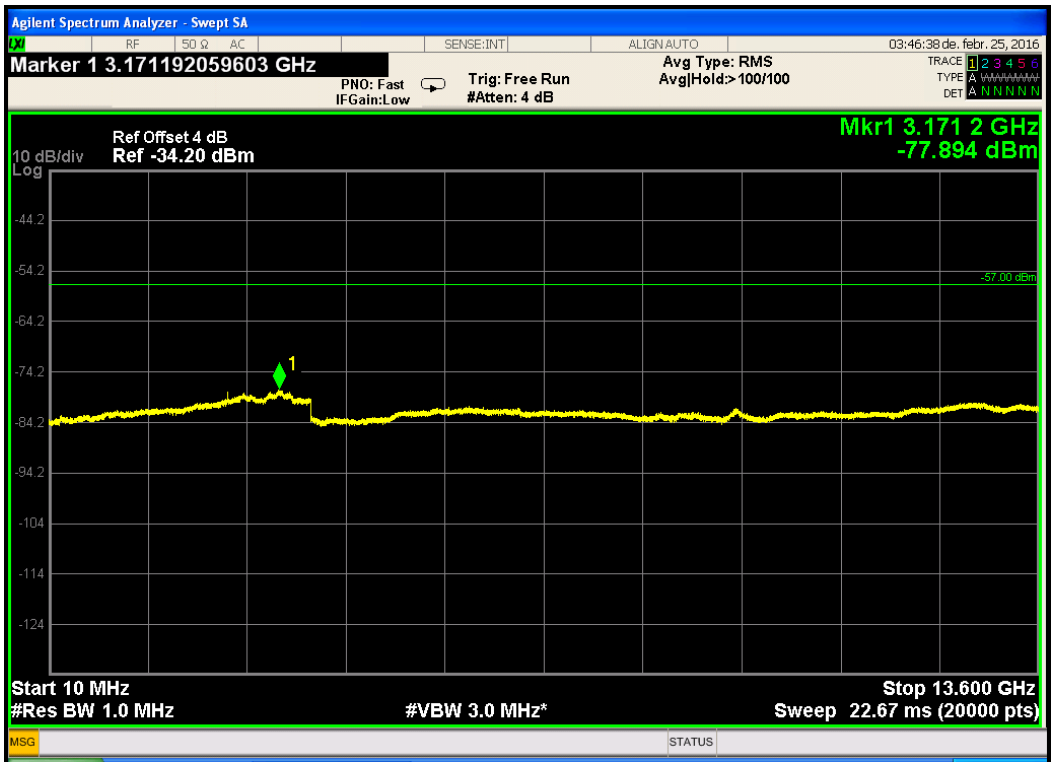


Figure 318. 10MHz-13.6GHz band, Port B

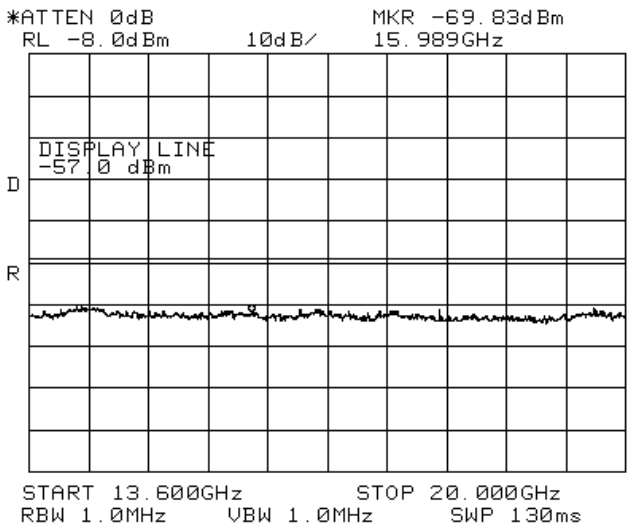


Figure 319. 13.6GHz – 20.0GHz band, Port B

10.5 Test Instrumentation Used; Receiver Spurious Emissions

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Next Calibration Due
MXA Signal Analyzer	Agilent	N9020A	MY48011785	July 26 2015	July 26 2017
DC block	JFW	50DB-007	1-23	N/A	N/A
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	March 31 2016

Figure 320. Test Equipment Used Radiated Transmitted Unwanted Emissions

11. Antenna Gain/Information

15 dBi antenna gain

4000D-F35 宽兆科技 BROADBAND TECHNOLOGIES

3300-3800MHz CPE Antenna
(Vertical and Horizontal Polarization)

The 4000D-F35 is a broadband, dual polarized, dual port. Emphasis has been placed on rugged mechanical construction, styling, small dimensions plus superior electrical performance. This antenna is designed to meet the most stringent environmental conditions.

Features:

- Good radiation patterns.
- Wide bandwidth stable gain across the band.
- Flying leads allowing easy connection to CPE.
- UV Stabilized radome.

Applications:

- WIMAX or LTE patch antenna
- 2x2 and 4x2 MIMO application

Electrical specifications:	
Frequency Range:	3300MHz - 3800MHz
Gain:	15±1 dBi
Return Loss:	< - 10 dB
Polarization:	Vertical and Horizontal
Isolation:	> 28 dB
Front to Back Ratio:	> 25 dB
Horizontal 3dB BW:	36°
Vertical 3dB BW:	24°
Power handling:	50W

Mechanical Specifications:	
Connector Type:	2 x MCX Male
Connector Location:	Flying Lead, Back Side
Dimensions (LxWxD):	203 x 203 x 25 mm
Weight:	0.428kg
Radome:	UV-Stabilized PC

12. APPENDIX A - CORRECTION FACTORS

12.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
0.010	0.4	50.00	1.2
0.015	0.2	100.00	0.7
0.020	0.2	150.00	2.1
0.030	0.3	200.00	2.3
0.050	0.3	300.00	2.9
0.075	0.3	500.00	3.8
0.100	0.2	750.00	4.8
0.150	0.2	1000.00	5.4
0.200	0.3	1500.00	6.7
0.500	0.4	2000.00	9.0
1.00	0.4	2500.00	9.4
1.50	0.5	3000.00	9.9
2.00	0.5	3500.00	10.2
5.00	0.6	4000.00	11.2
10.00	0.8	4500.00	12.1
15.00	0.9	5000.00	13.1
20.00	0.8	5500.00	13.5
		6000.00	14.5

NOTES:

1. The cable type is SPUMA400 RF-11N(X2) and 39m long

2. The cable is manufactured by Huber + Suhner

12.2 Correction factors for Log Periodic Antenna EMCO model 3146 Serial Number 9505-4081

CALIBRATION DATA

Frequency, MHz	Antenna factor, dB/m [1]
200	11.55
250	11.60
300	14.43
400	15.38
500	17.98
600	18.78
700	21.17
800	21.16
900	22.67
1000	24.09

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

12.3 Correction factors for Biconical Antenna EMCO Model 3104 Serial No 2606

CALIBRATION DATA

Frequency, MHz	Near free space antenna factor, dB/m	Geometry specific correction factor, dB	Free space antenna factor, dB/m [1)]
30	12.97	0.13	12.84
35	12.34	0.09	12.25
40	12.03	0.06	11.97
45	11.42	0.02	11.40
50	11.91	0.03	11.88
60	11.92	0.37	11.55
70	9.60	0.25	9.35
80	6.99	-0.45	7.44
90	10.87	-0.34	11.21
100	11.51	-0.06	11.57
120	13.30	0.20	13.10
140	12.56	-0.01	12.57
160	14.49	-0.12	14.61
180	16.53	0.05	16.48
200	15.30	0.15	15.15

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

12.4 Correction factors forACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2

12.5 Correction factors for Horn ANTENNA

Model: 3115
Antenna serial number: 29845
3 meter range

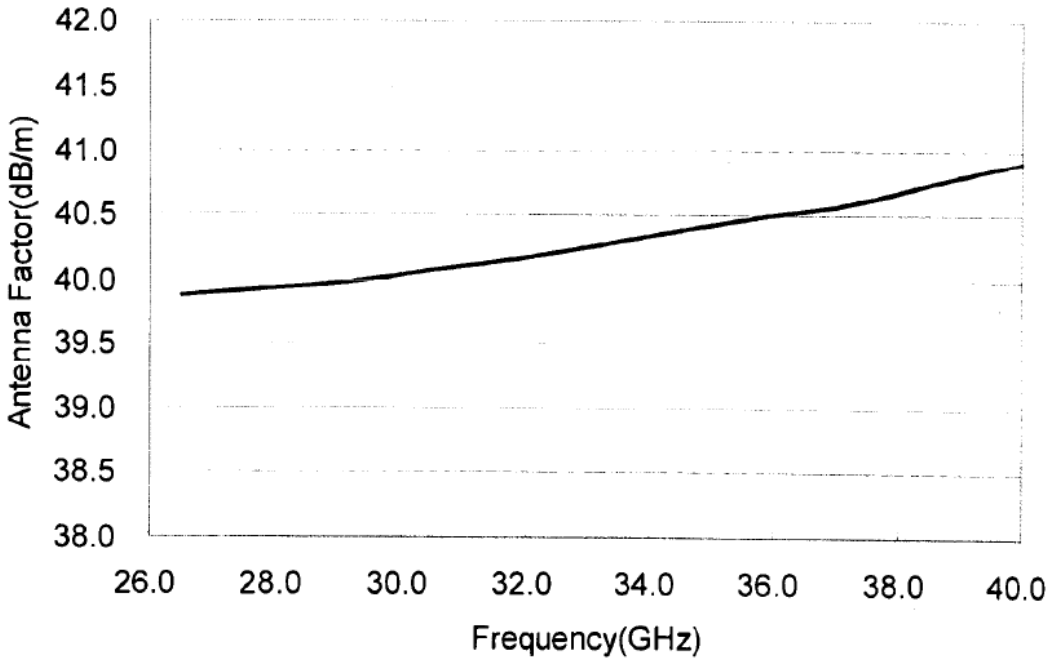
FREQUENCY (MHz)	Antenna Factor (dB/m)	FREQUENCY (MHz)	Antenna Factor (dB/m)
1000	23.9	10500	38.4
1500	25.4	11000	38.5
2000	27.3	11500	39.4
2500	28.5	12000	39.2
3000	30.4	12500	39.4
3500	31.6	13000	40.7
4000	33	14000	42.1
4500	32.7	15000	40.1
5000	34.1	16000	38.2
5500	34.5	17000	41.7
6000	34.9	17500	45.7
6500	35.1	18000	47.7
7000	35.9		
7500	37.5		
8000	37.6		
8500	38.3		
9000	38.5		
9500	38.1		
10000	38.6		

12.6 Correction factors for Horn Antenna

Model: SWH-28
at 1 meter range.

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

12.7 Correction factors for Horn Antenna Ka Band
Model: PE9850R-20
Serial No: J202021732



Frequency(GHz)	Gain(dB)	Antenna Factor(dB/m)
26.50	18.80	39.87
27.85	19.18	39.93
29.20	19.53	39.99
30.55	19.83	40.08
31.90	20.12	40.17
33.25	20.37	40.28
34.60	20.60	40.39
35.95	20.82	40.50
37.30	21.05	40.59
38.65	21.20	40.75
40.00	21.34	40.91