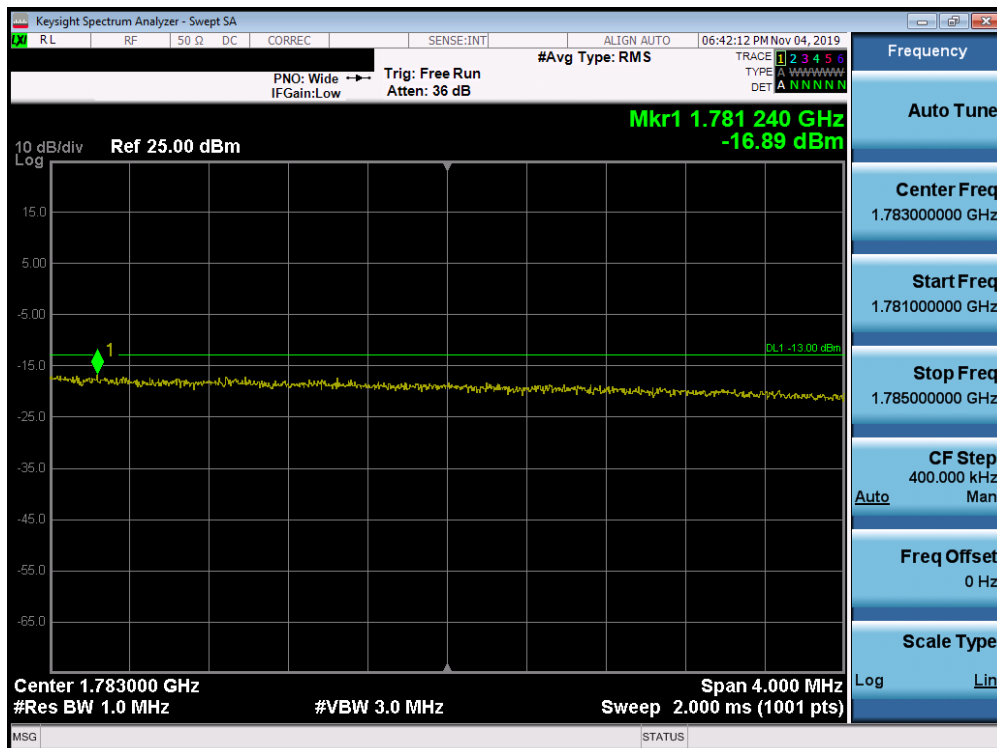
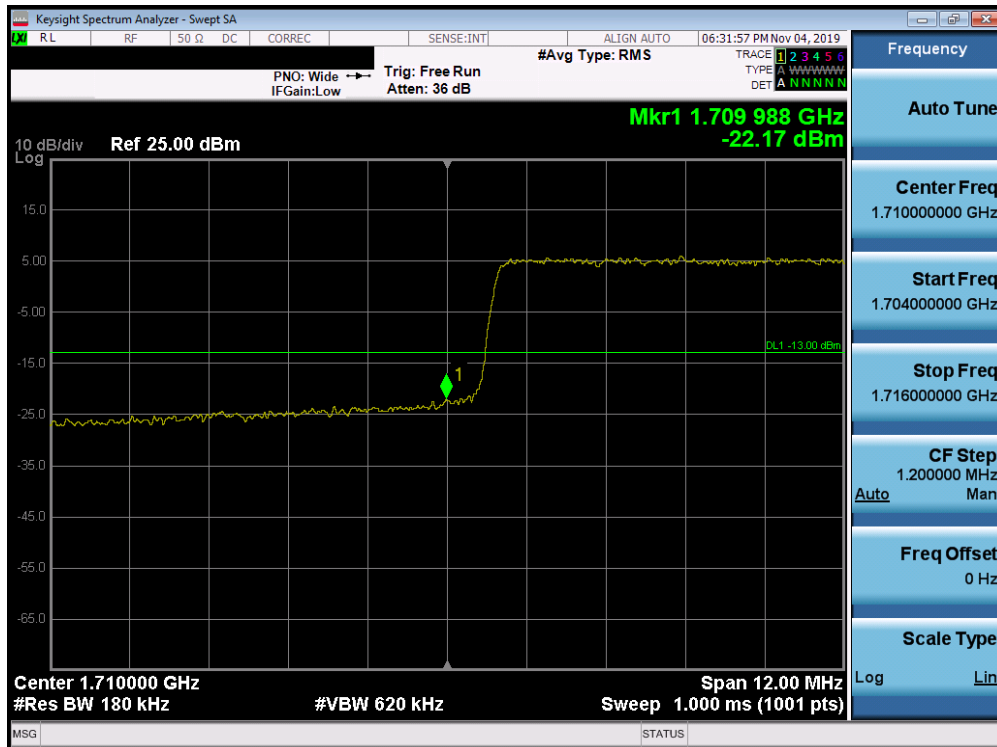


Plot 7-216. Upper Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)

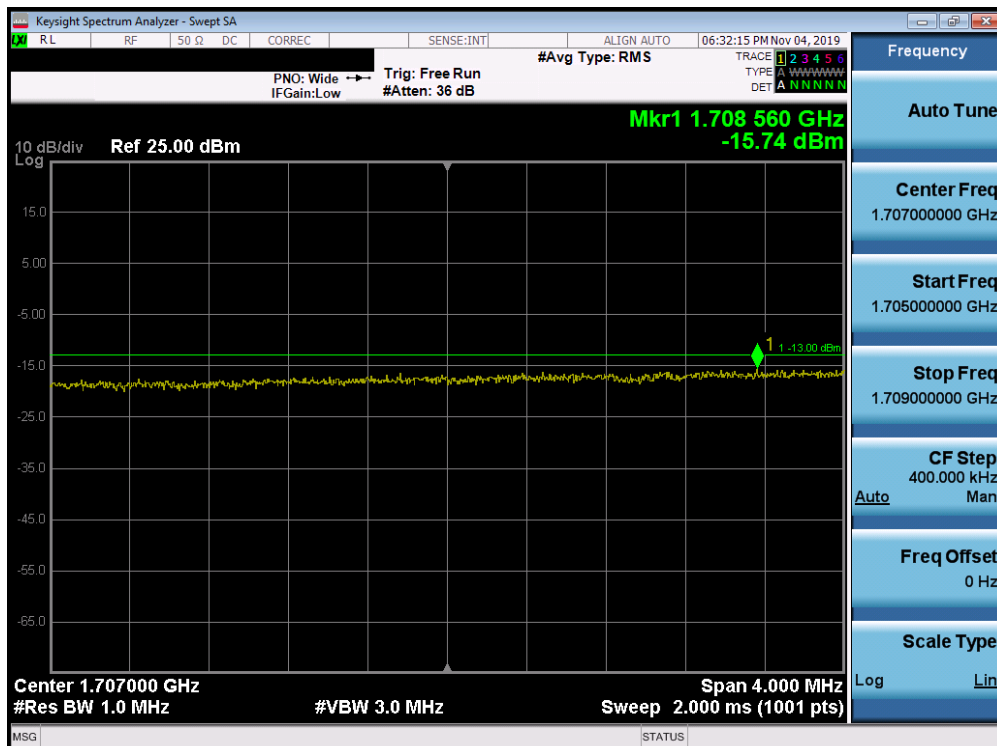


Plot 7-217. Upper Extended Band Edge Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/209	EUT Type: Portable Handset		Page 132 of 250

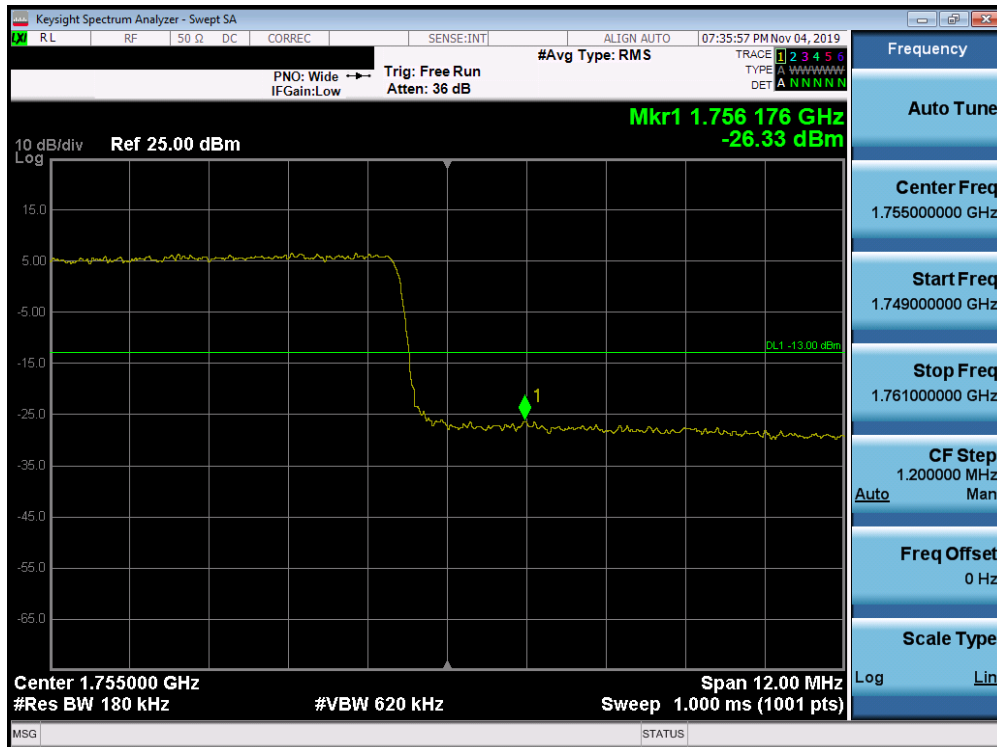


Plot 7-218. Lower Band Edge Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)

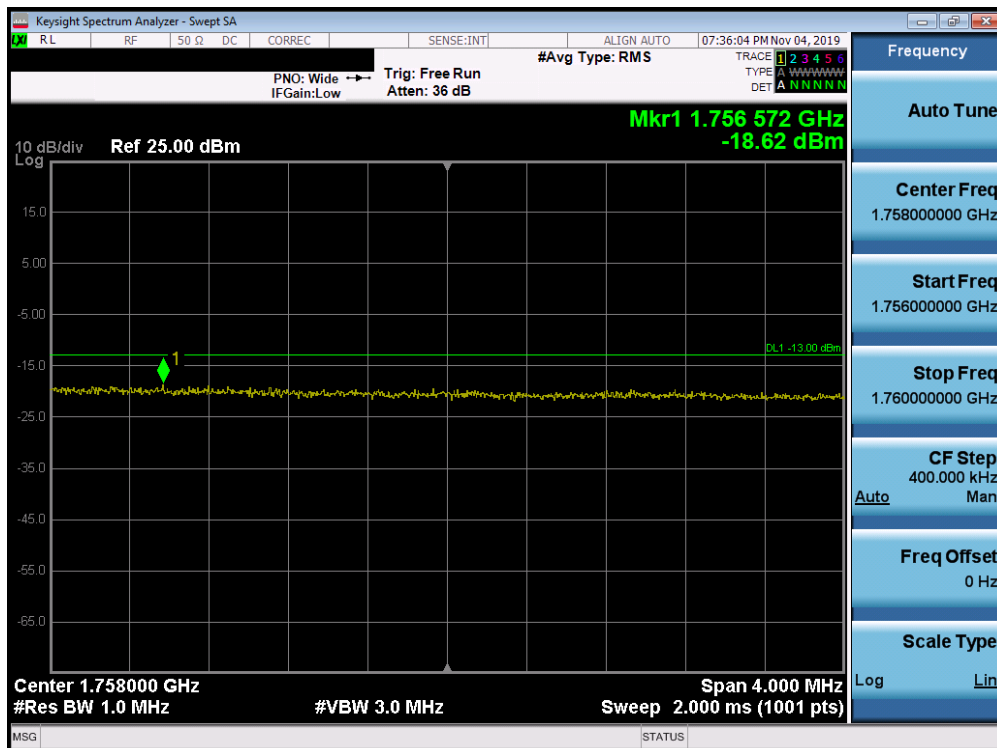


Plot 7-219. Lower Extended Band Edge Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 133 of 250

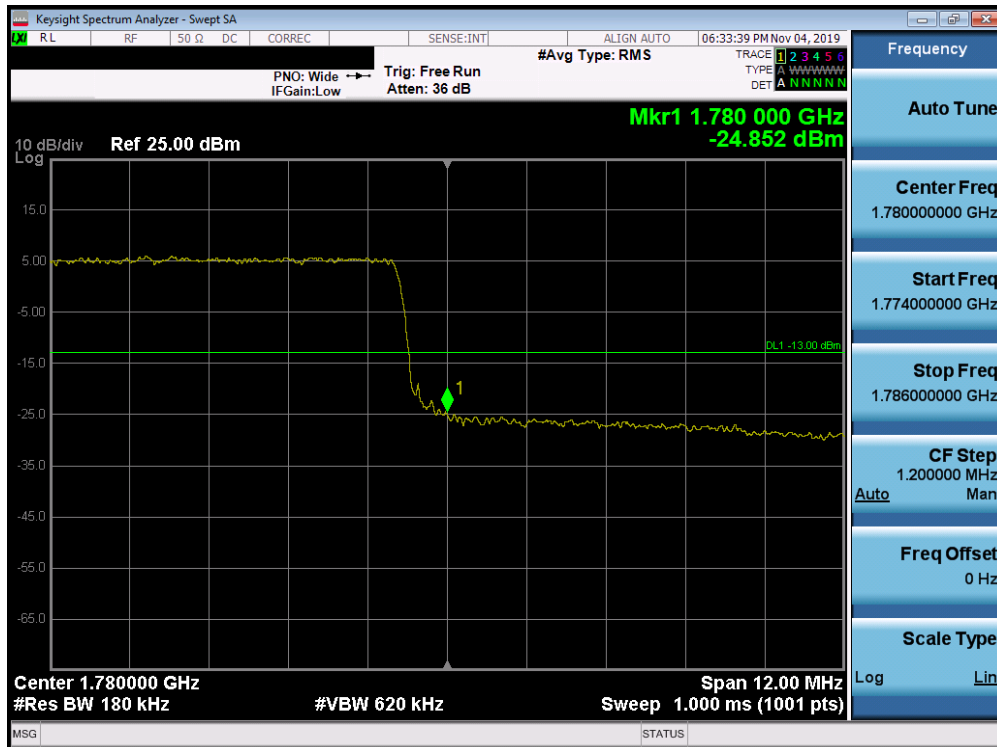


Plot 7-220. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

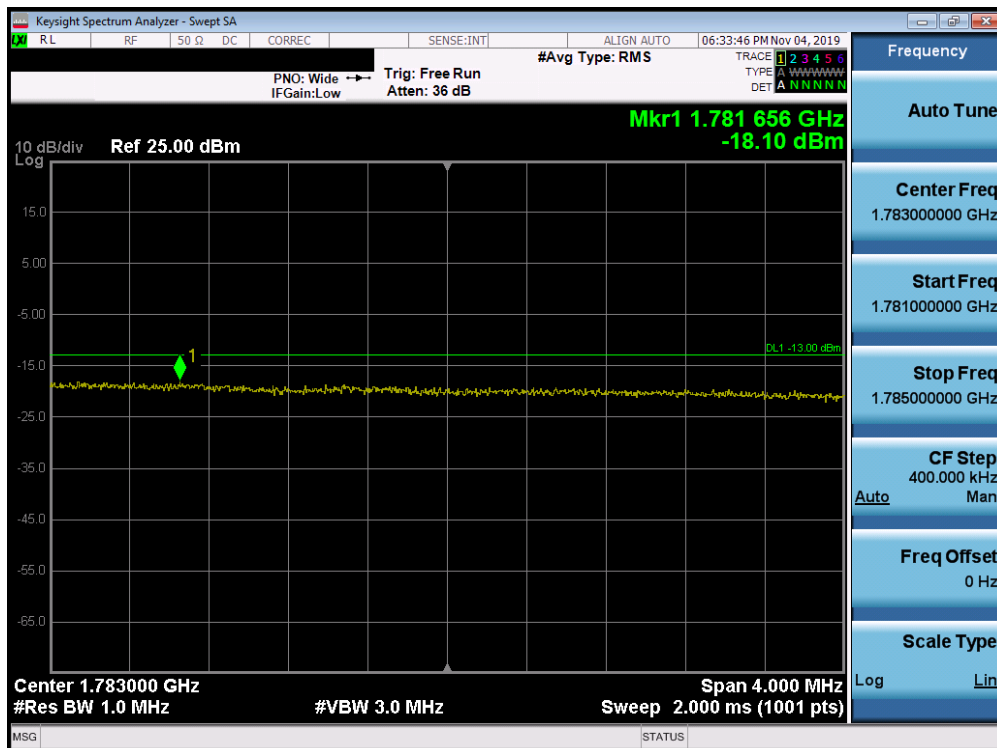


Plot 7-221. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 134 of 250

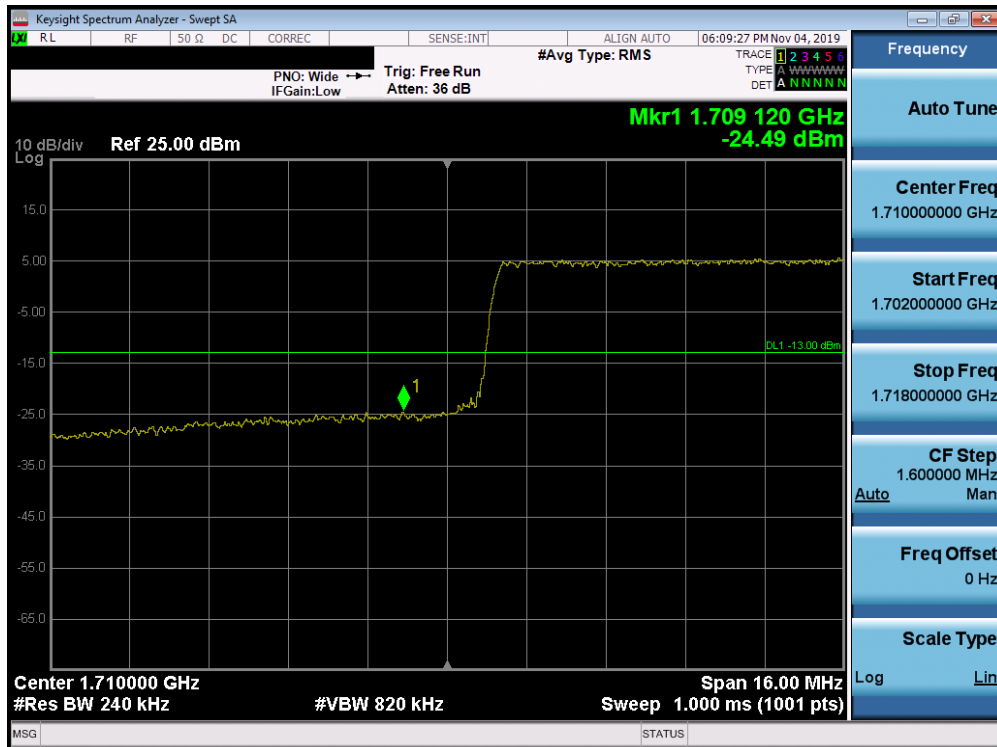


Plot 7-222. Upper Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)

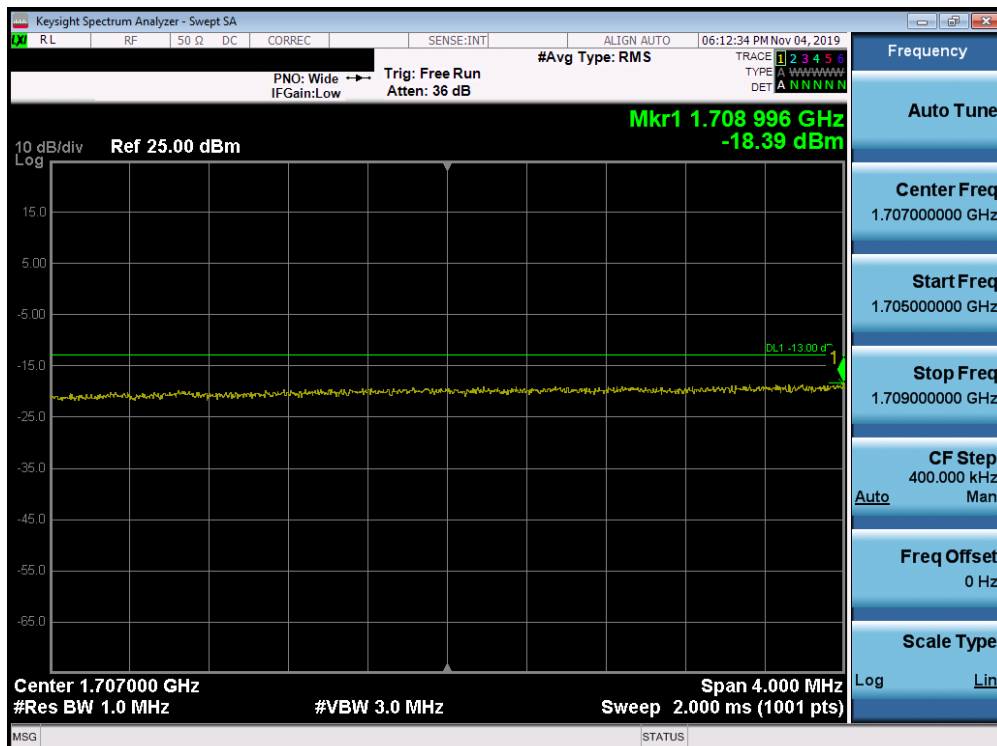


Plot 7-223. Upper Extended Band Edge Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 135 of 250

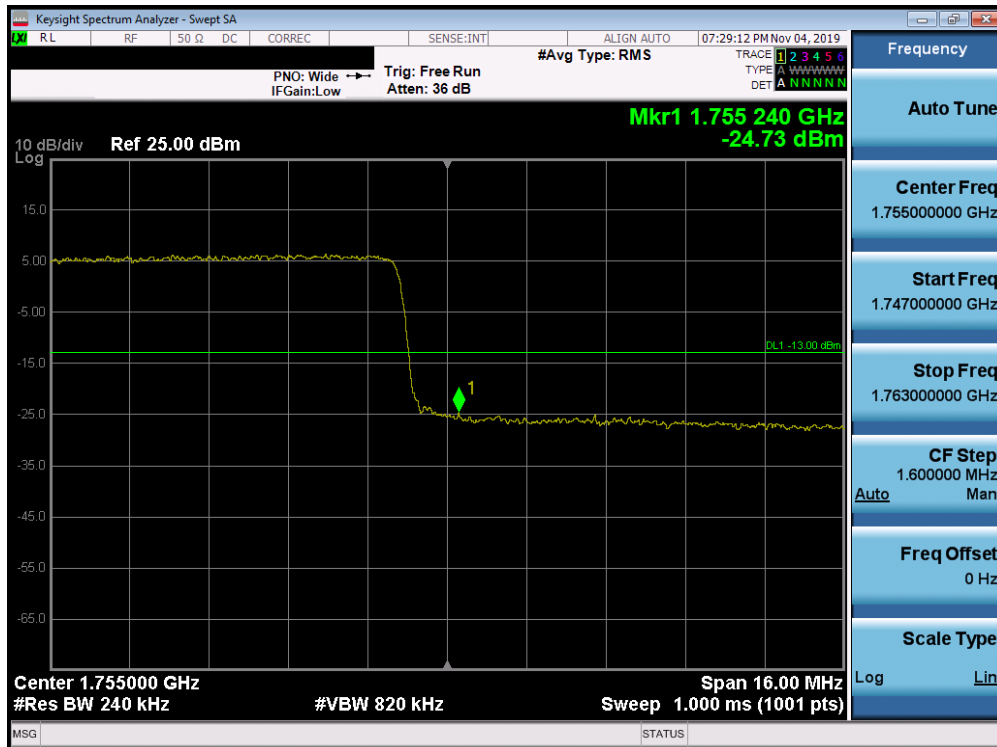


Plot 7-224. Lower Band Edge Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

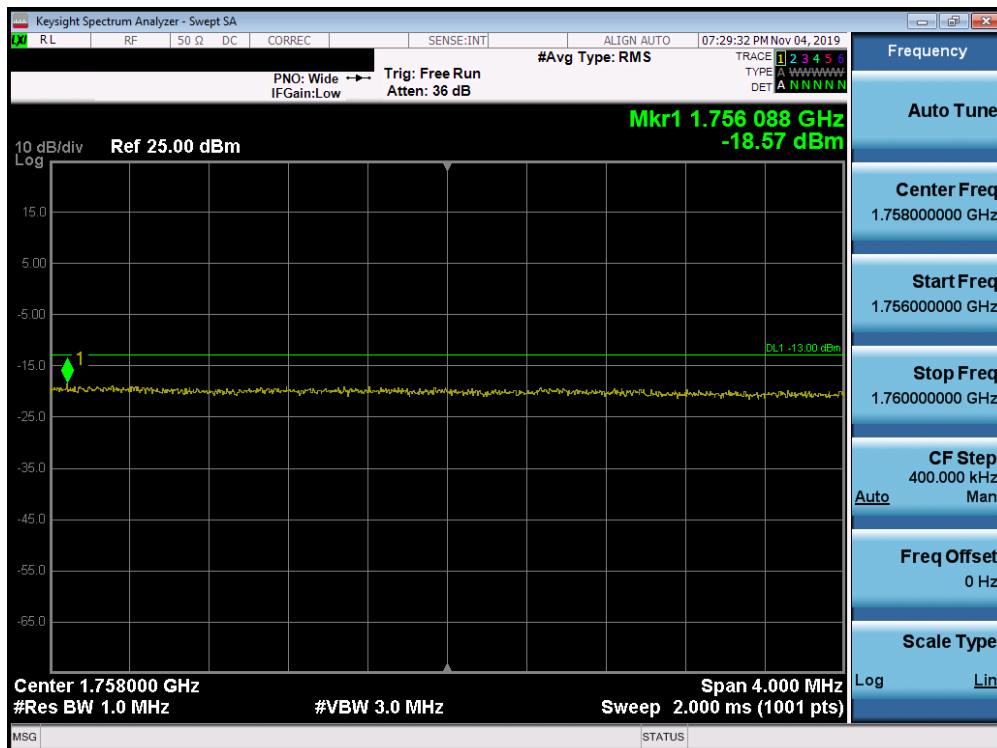


Plot 7-225. Lower Extended Band Edge Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 136 of 250

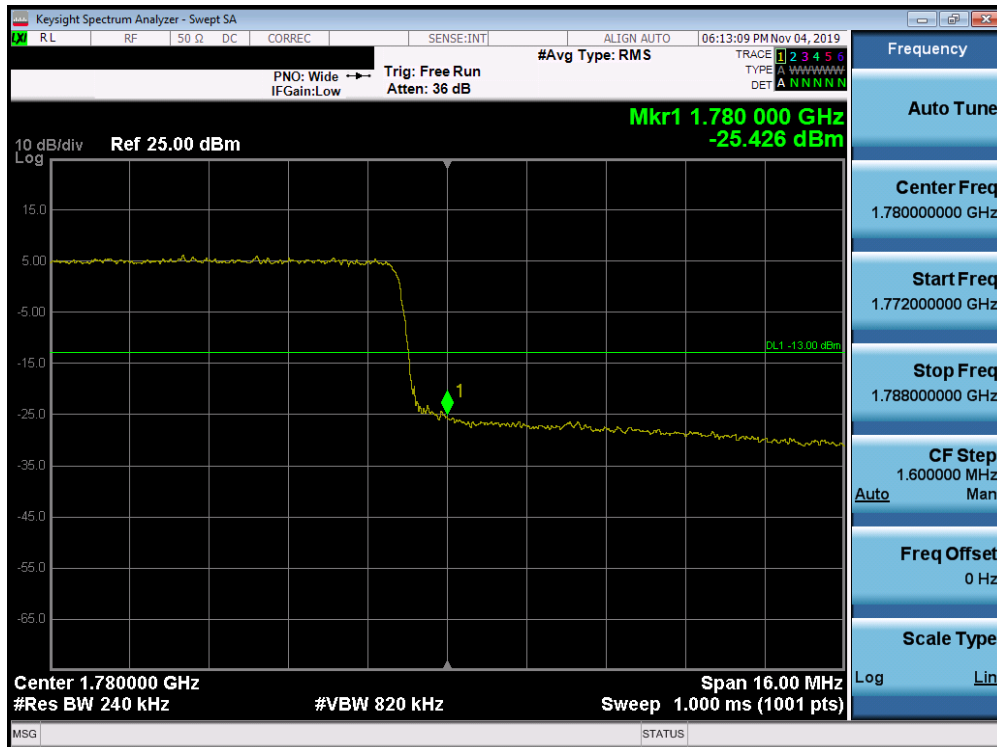


Plot 7-226. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

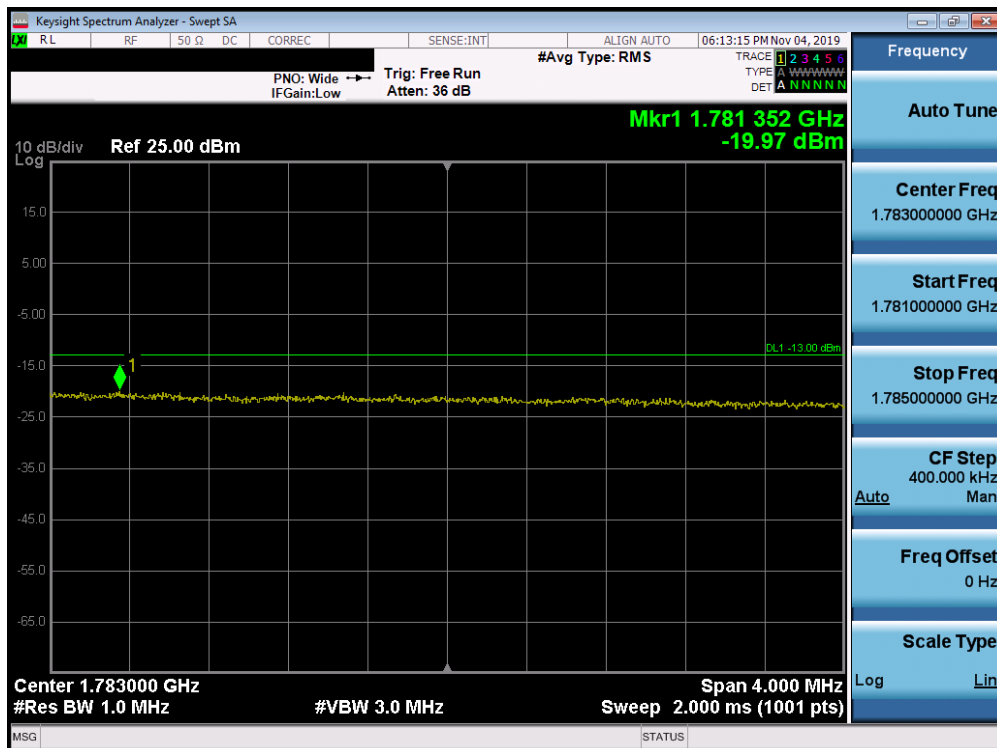


Plot 7-227. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 137 of 250



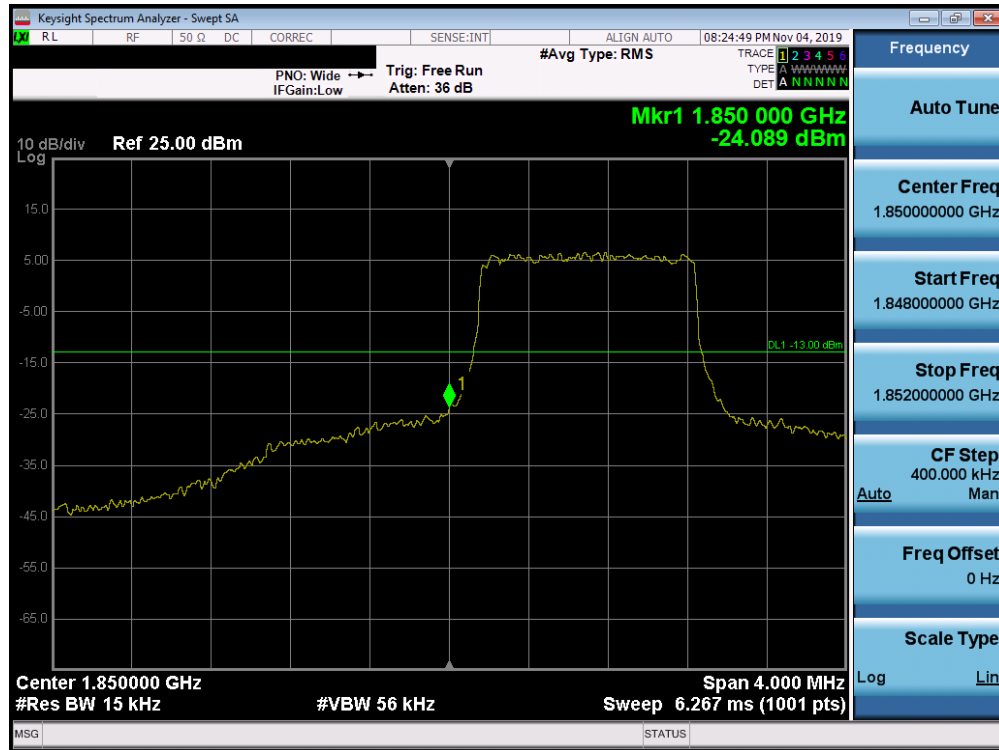
Plot 7-228. Upper Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)



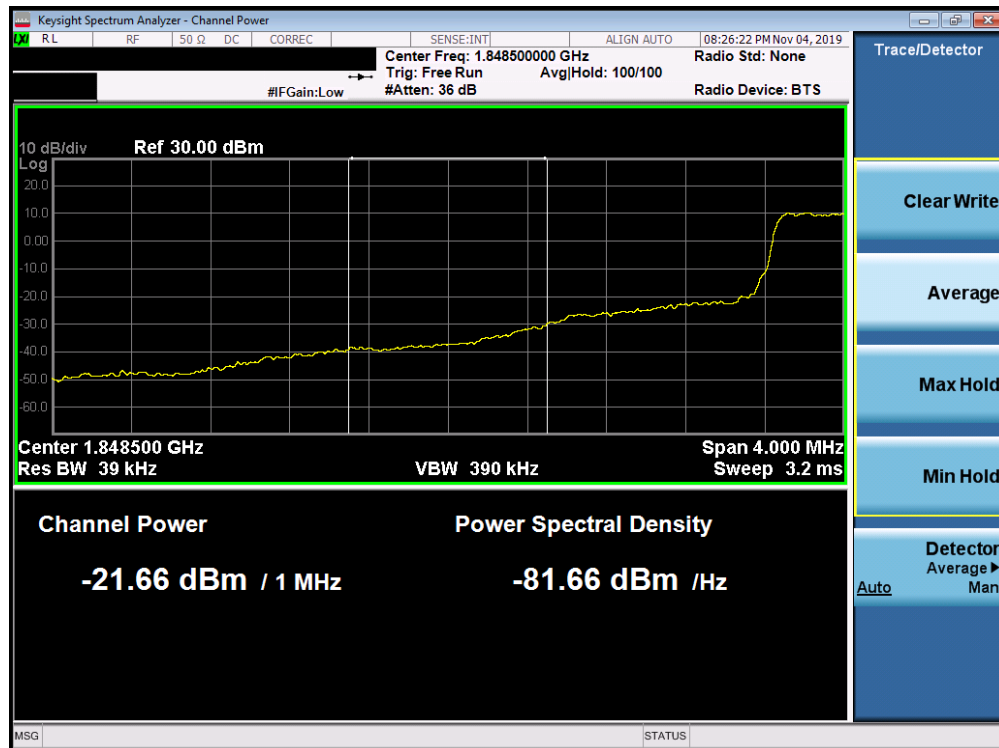
Plot 7-229. Upper Extended Band Edge Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 138 of 250

Band 25/2

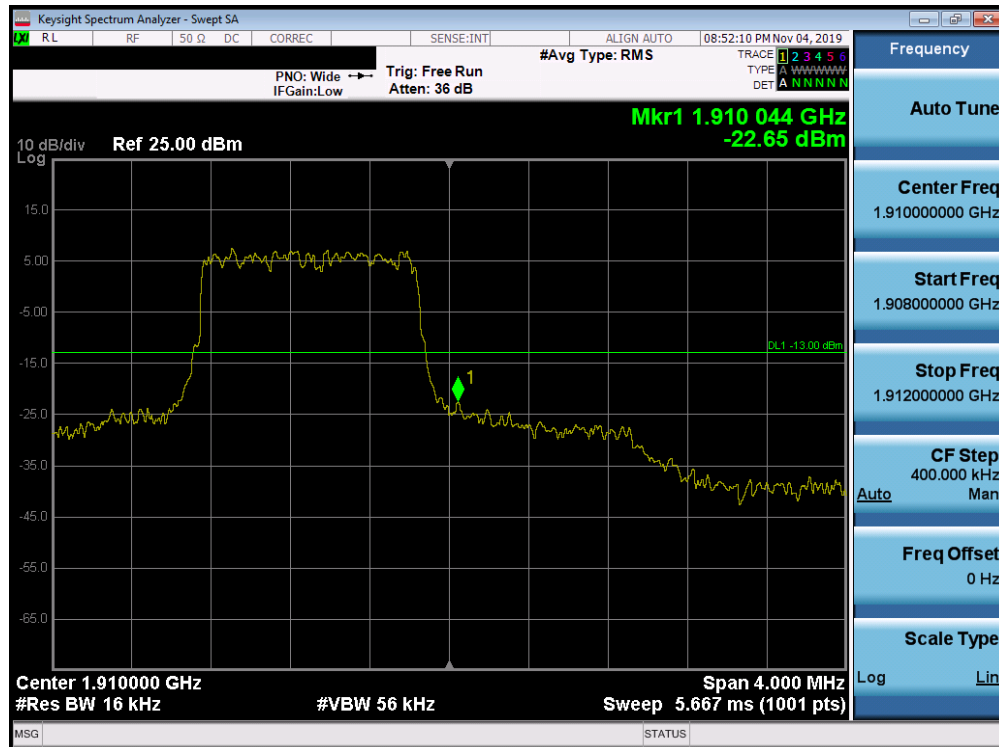


Plot 7-230. Lower Band Edge Plot (Band 25/2 - 1.4MHz QPSK - Full RB Configuration)

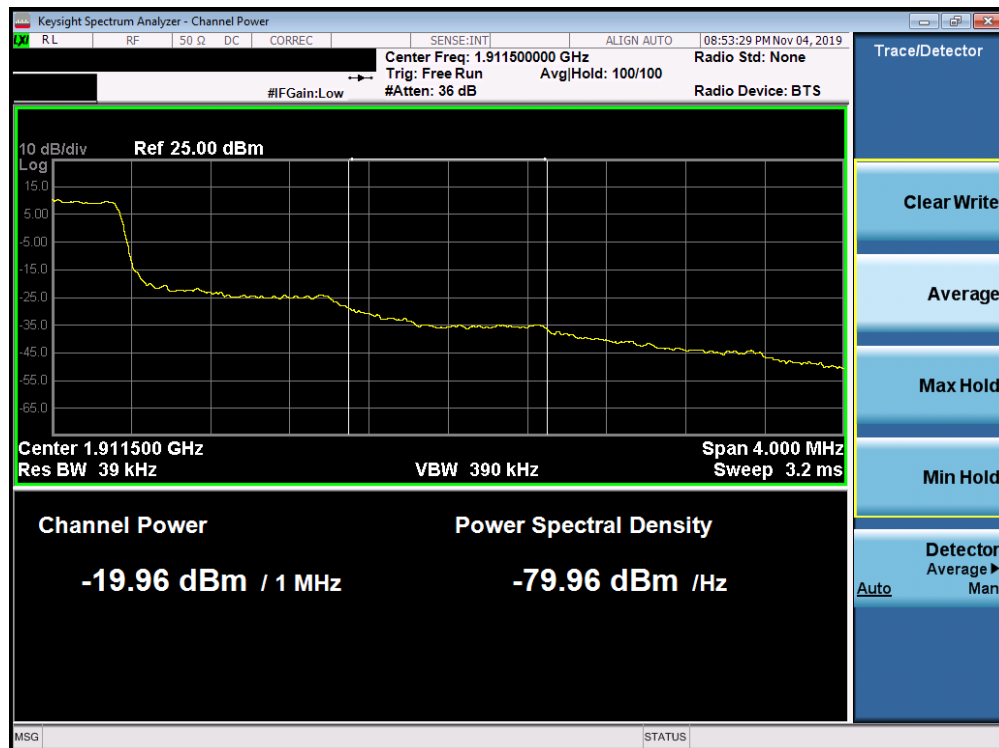


Plot 7-231. Lower Extended Band Edge Plot (Band 25/2 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 139 of 250

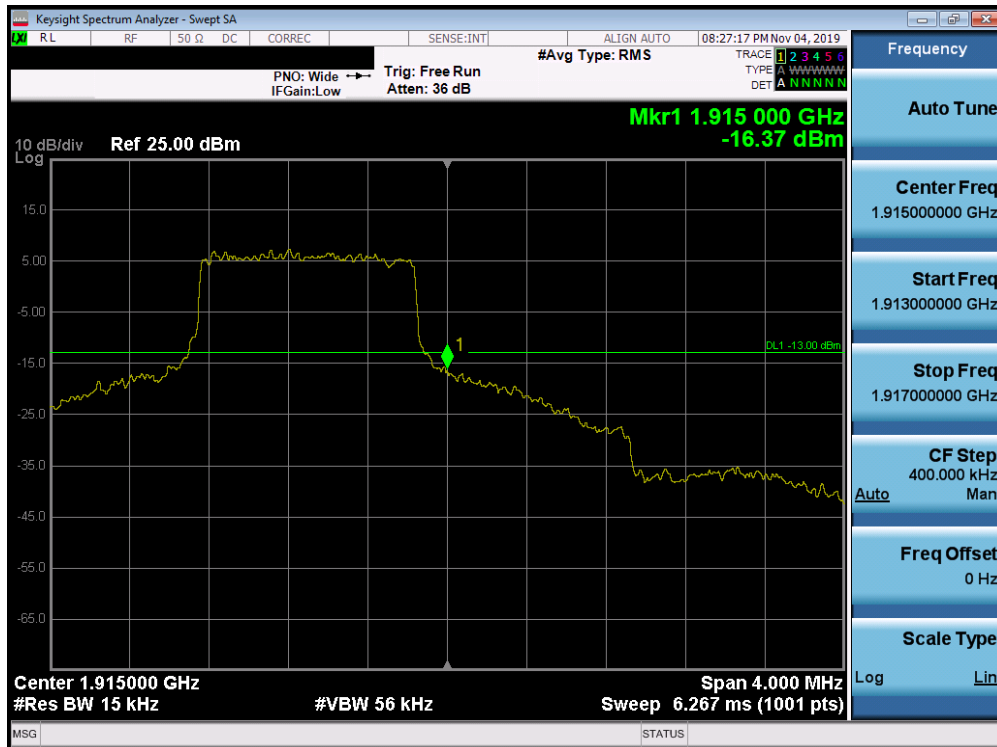


Plot 7-232. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

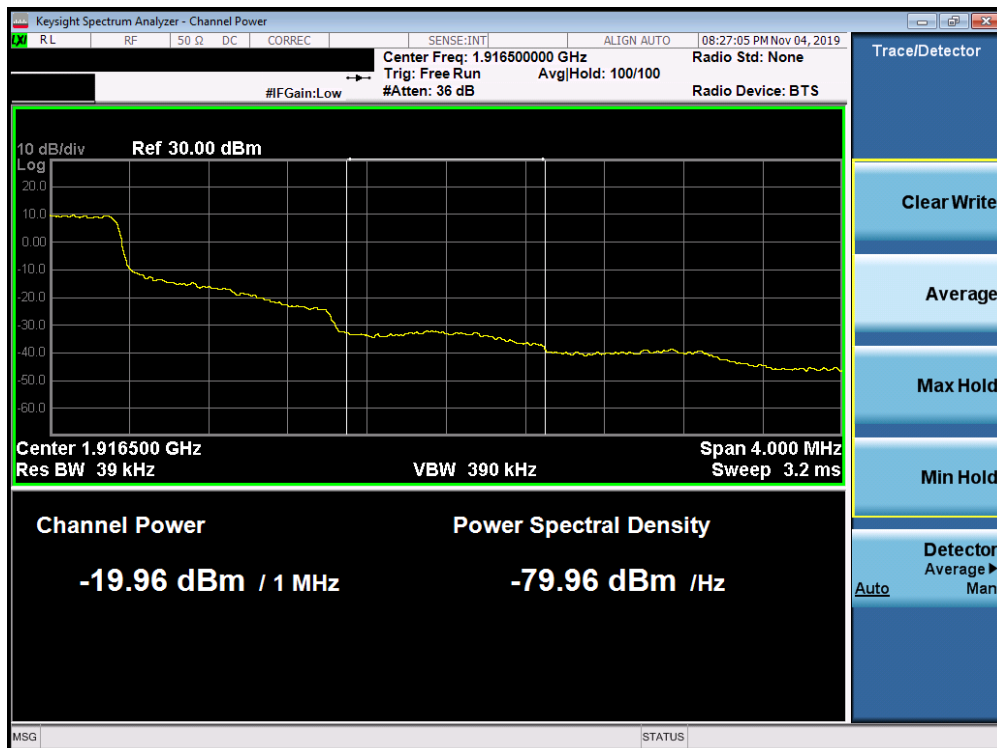


Plot 7-233. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 140 of 250

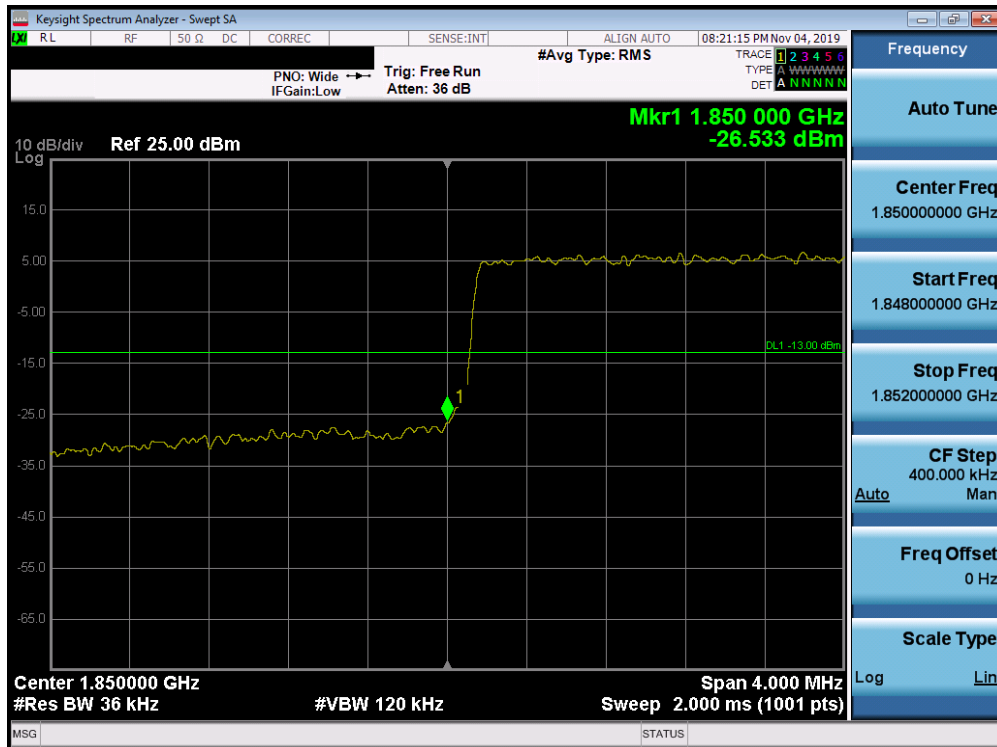


Plot 7-234. Upper Band Edge Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)

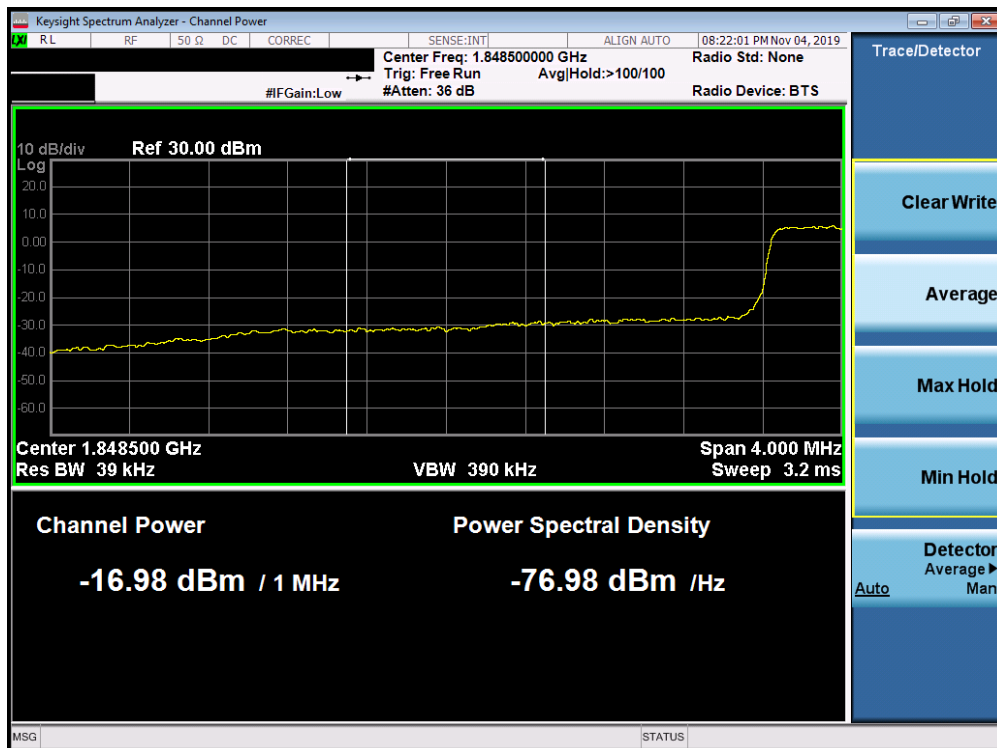


Plot 7-235. Upper Extended Band Edge Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 141 of 250

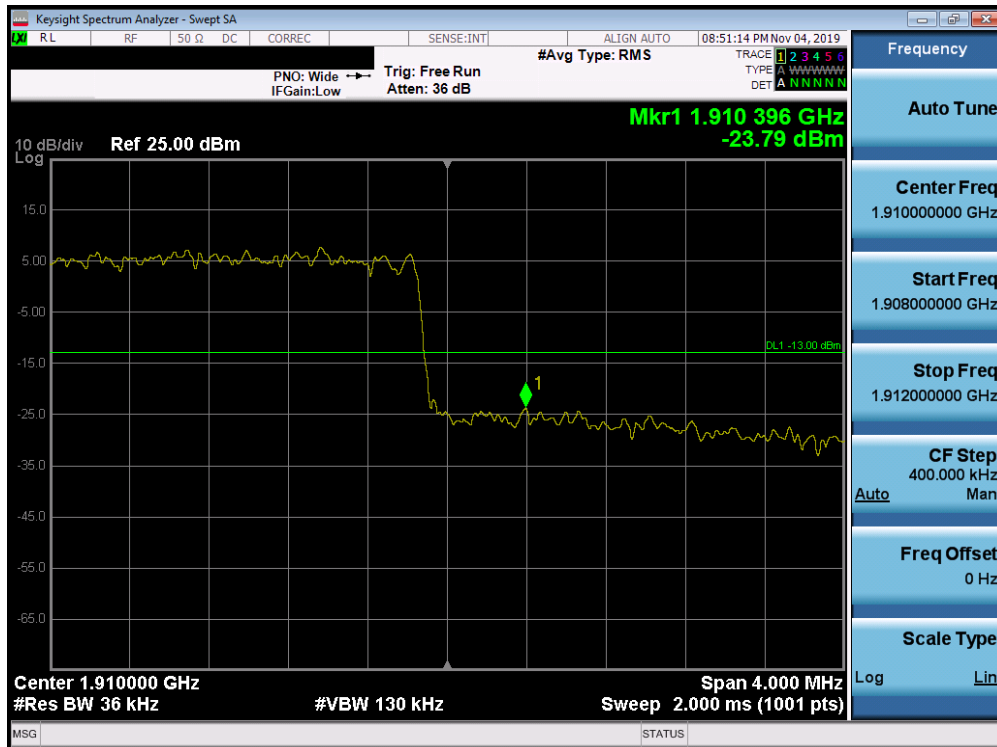


Plot 7-236. Lower Band Edge Plot (Band 25/2 - 3.0MHz QPSK - Full RB Configuration)

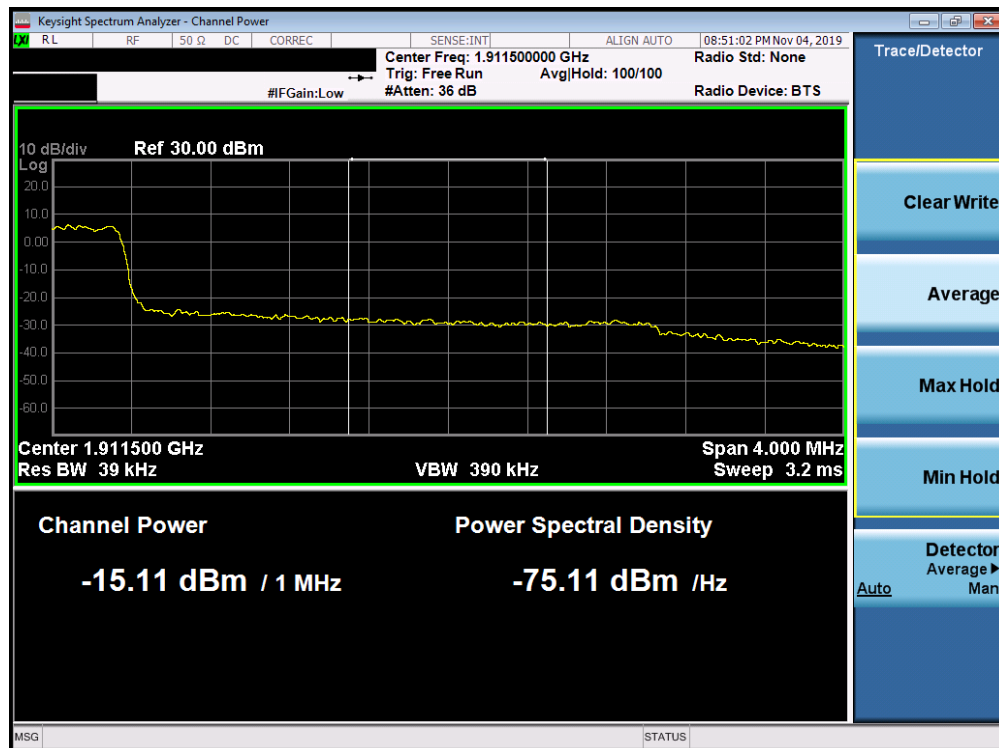


Plot 7-237. Lower Extended Band Edge Plot (Band 25/2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 142 of 250

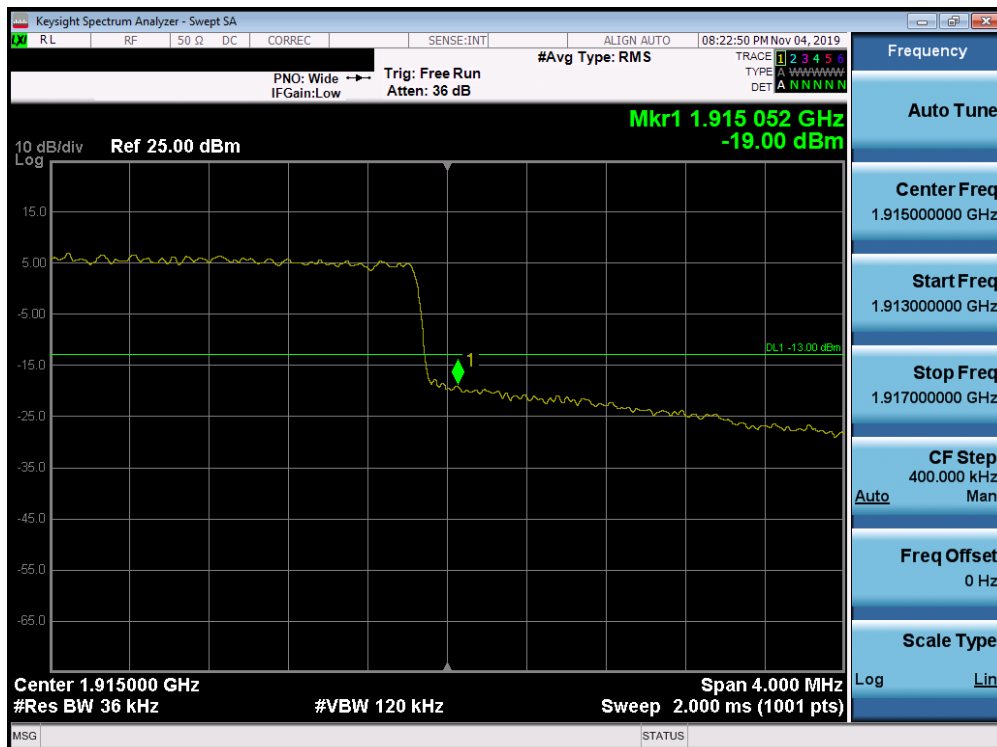


Plot 7-238. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

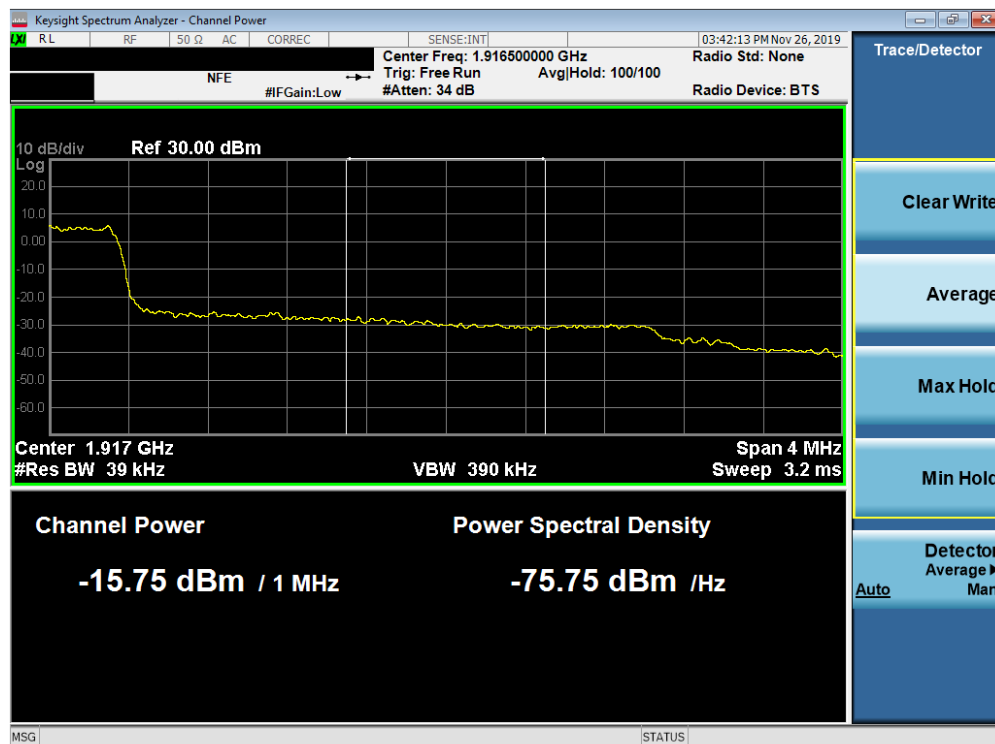


Plot 7-239. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 143 of 250

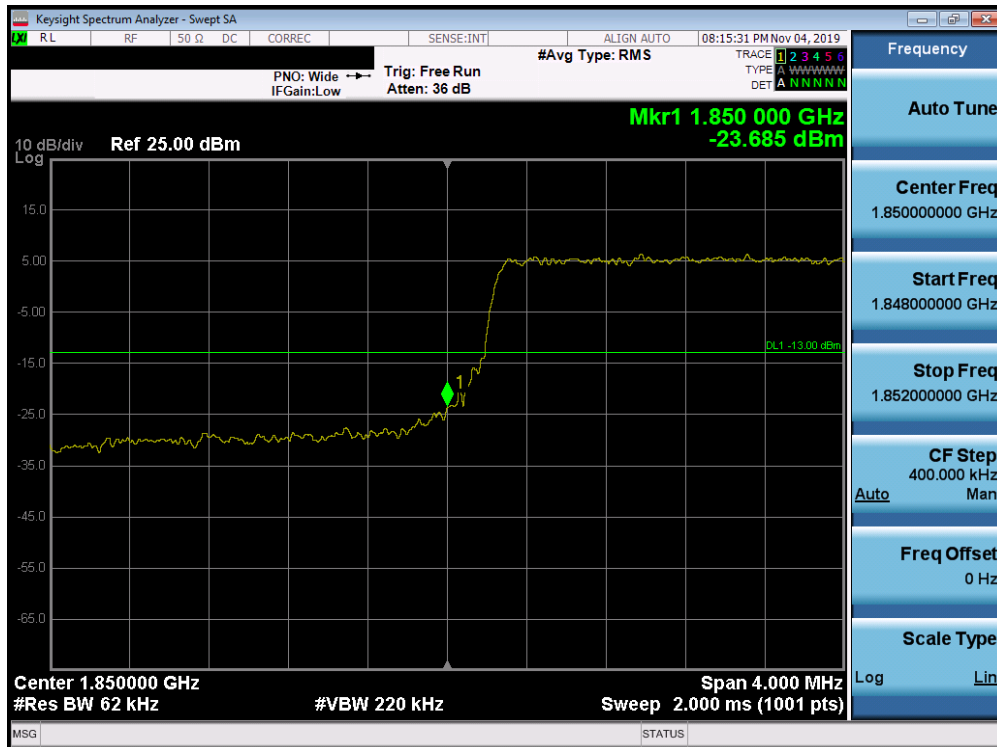


Plot 7-240. Upper Band Edge Plot (Band 25 - 3.0MHz QPSK - Full RB Configuration)

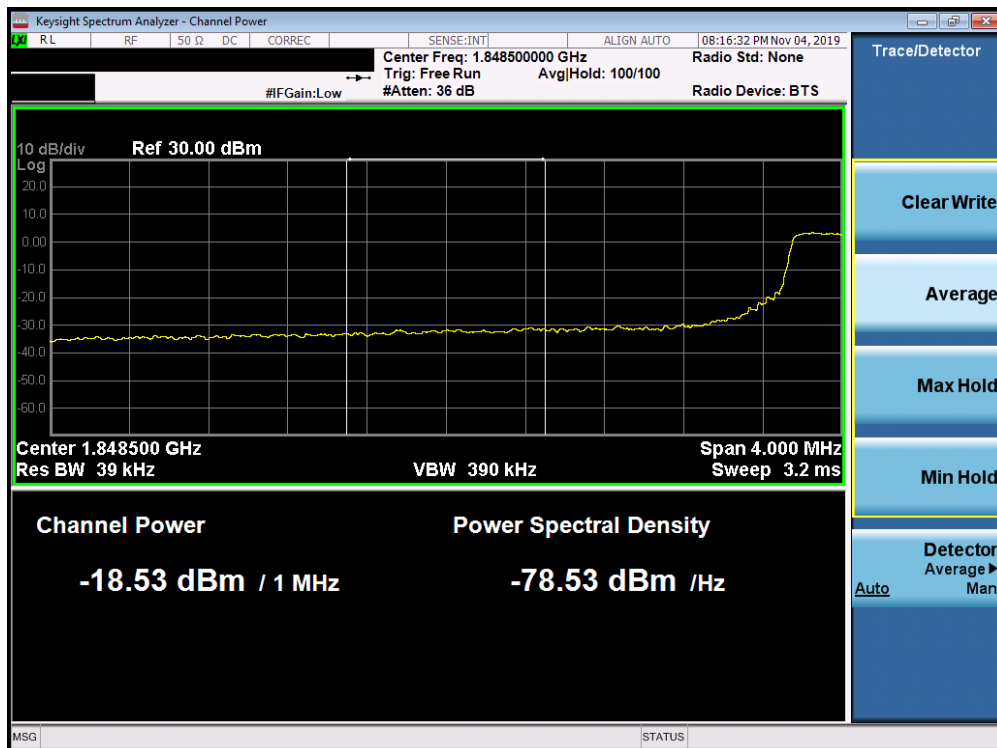


Plot 7-241. Upper Extended Band Edge Plot (Band 25 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 144 of 250

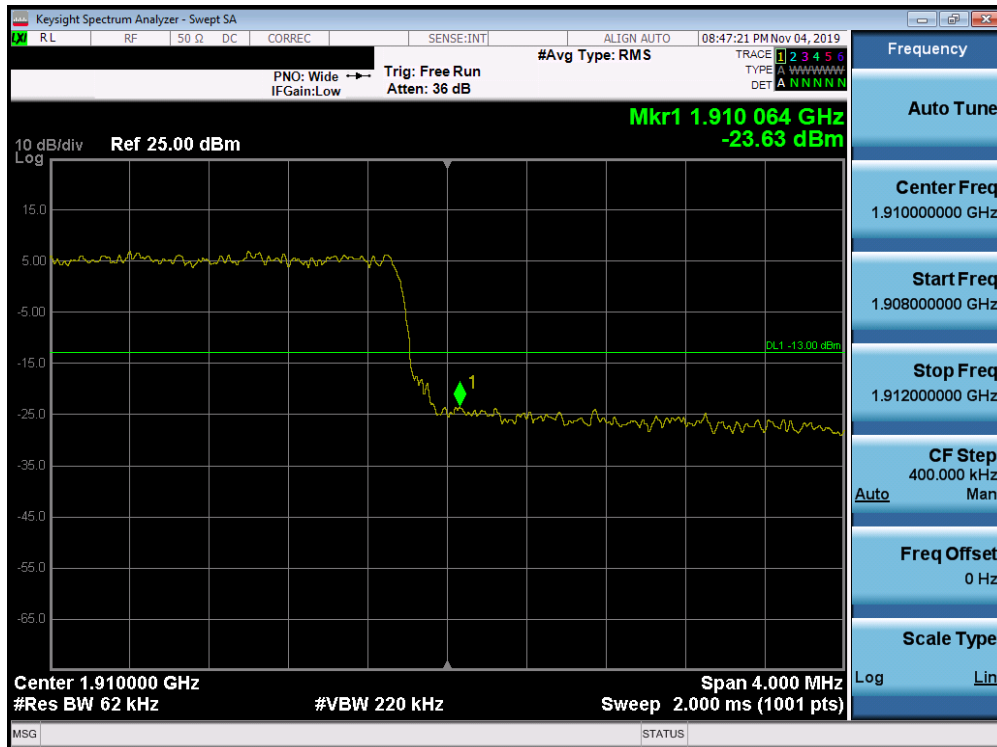


Plot 7-242. Lower Band Edge Plot (Band 25/2 - 5.0MHz QPSK - Full RB Configuration)

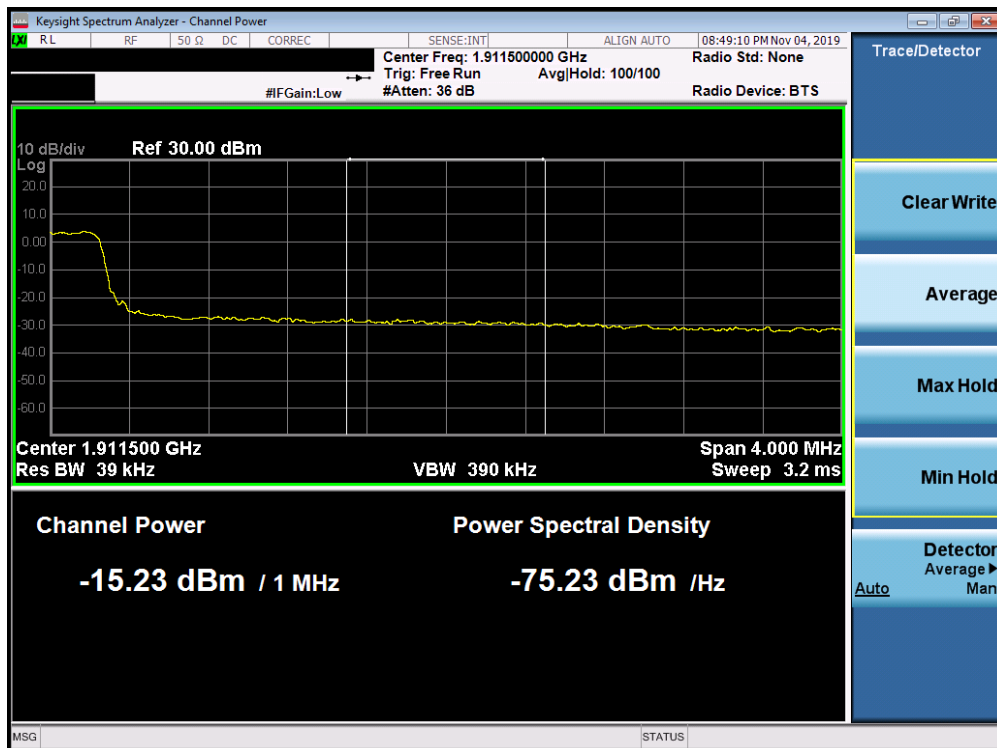


Plot 7-243. Lower Extended Band Edge Plot (Band 25/2 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 145 of 250

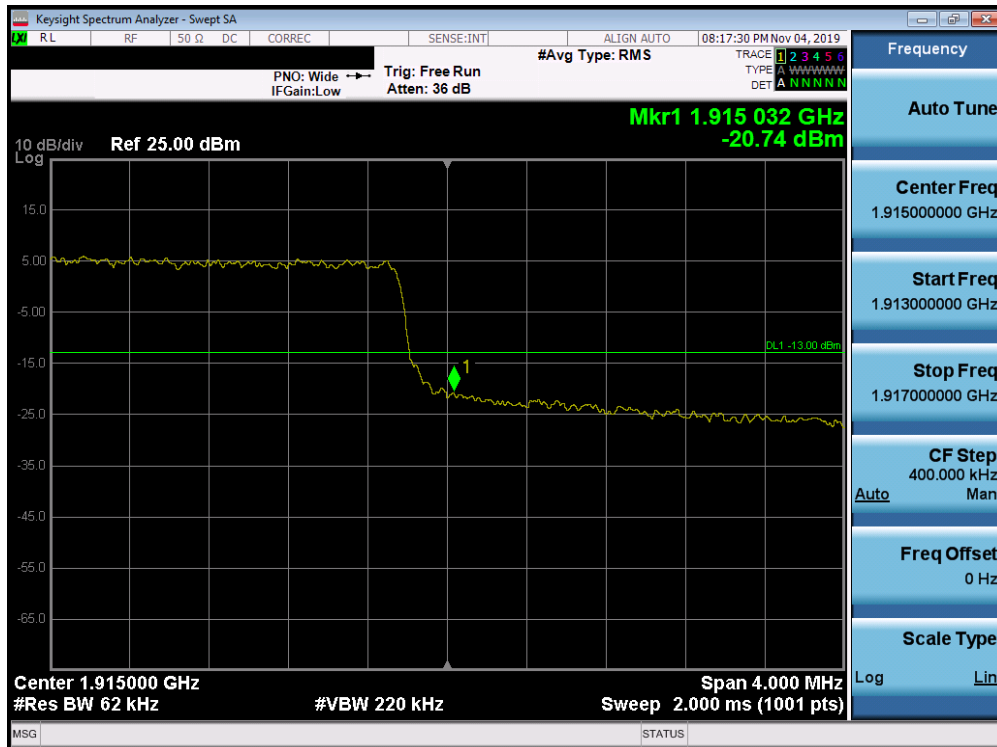


Plot 7-244. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

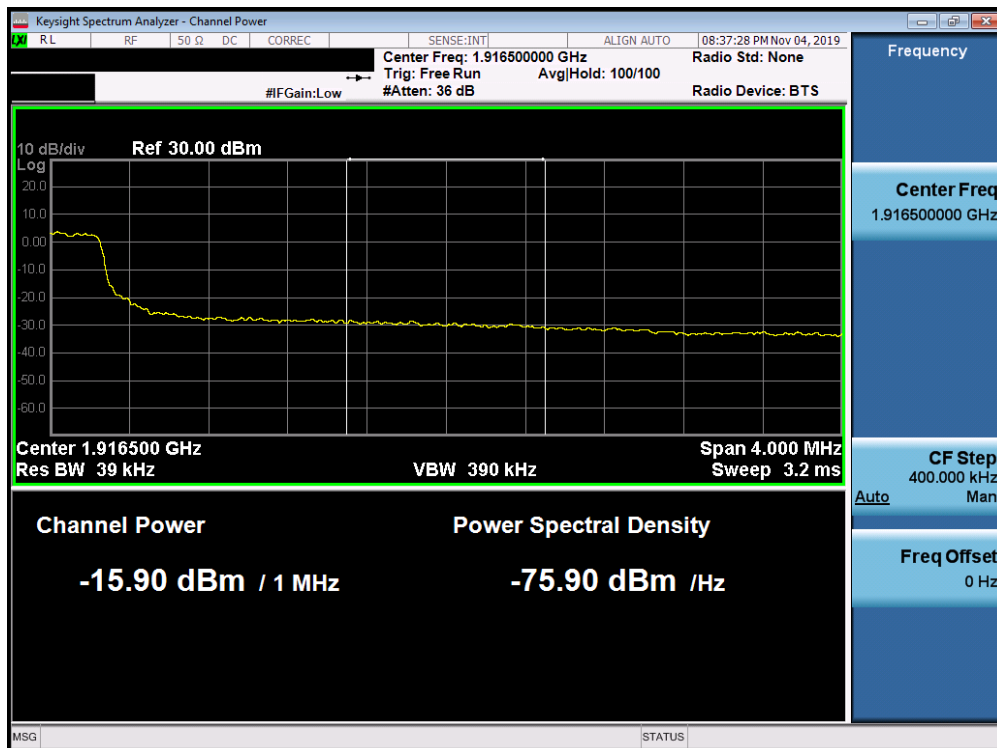


Plot 7-245. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 146 of 250

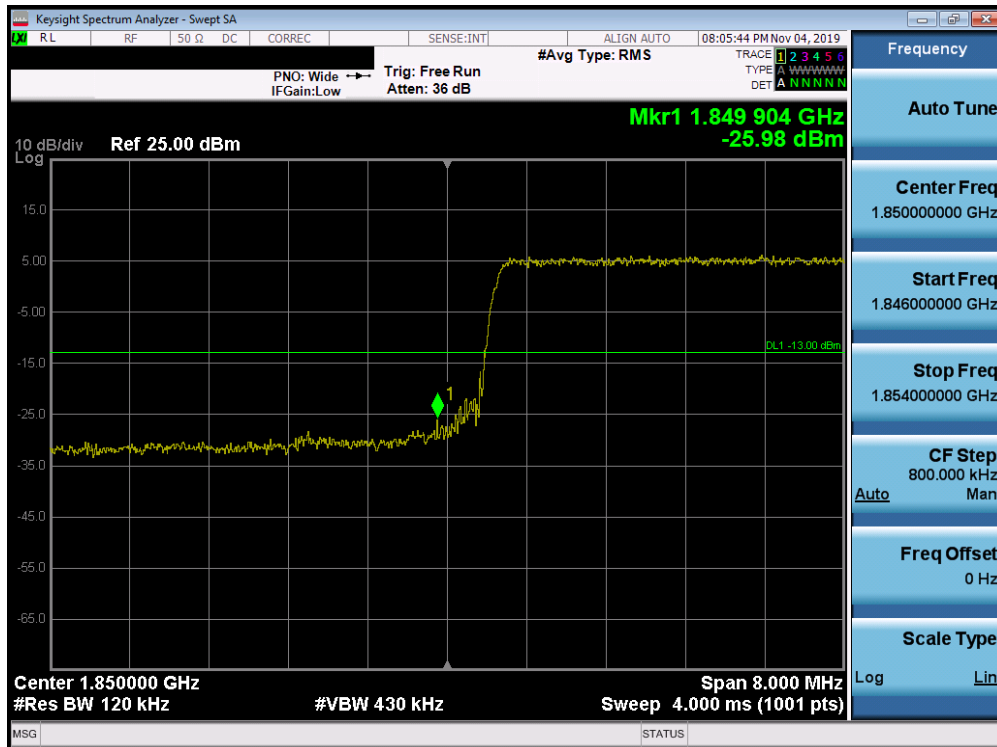


Plot 7-246. Upper Band Edge Plot (Band 25 - 5.0MHz QPSK - Full RB Configuration)

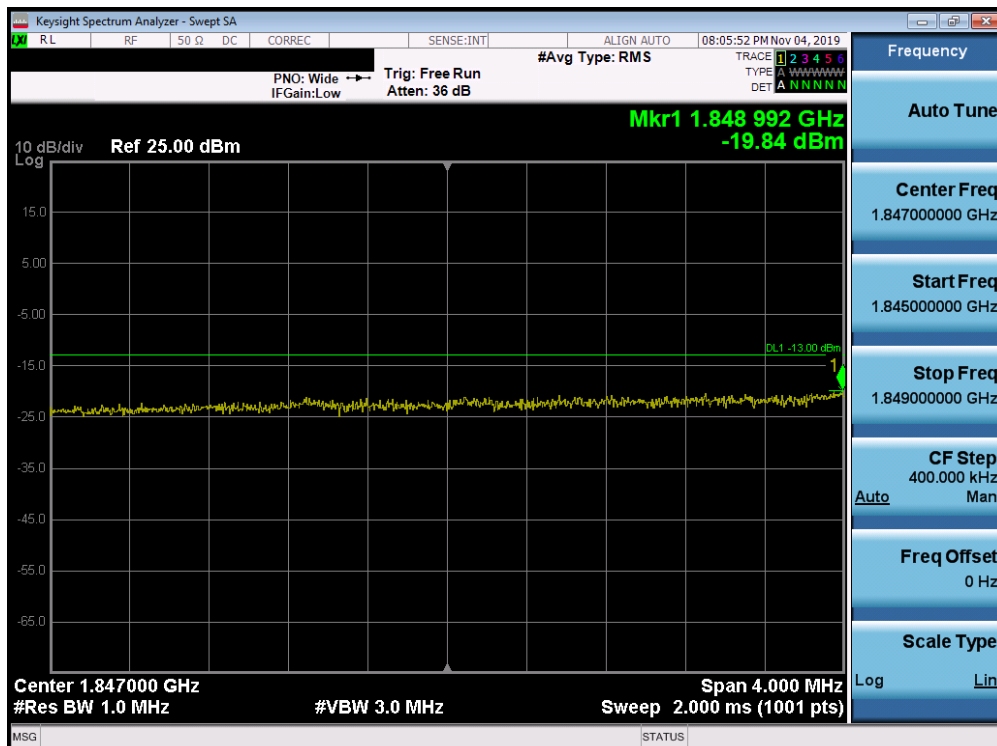


Plot 7-247. Upper Extended Band Edge Plot (Band 25 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 147 of 250



Plot 7-248. Lower Band Edge Plot (Band 25/2 - 10.0MHz QPSK - Full RB Configuration)

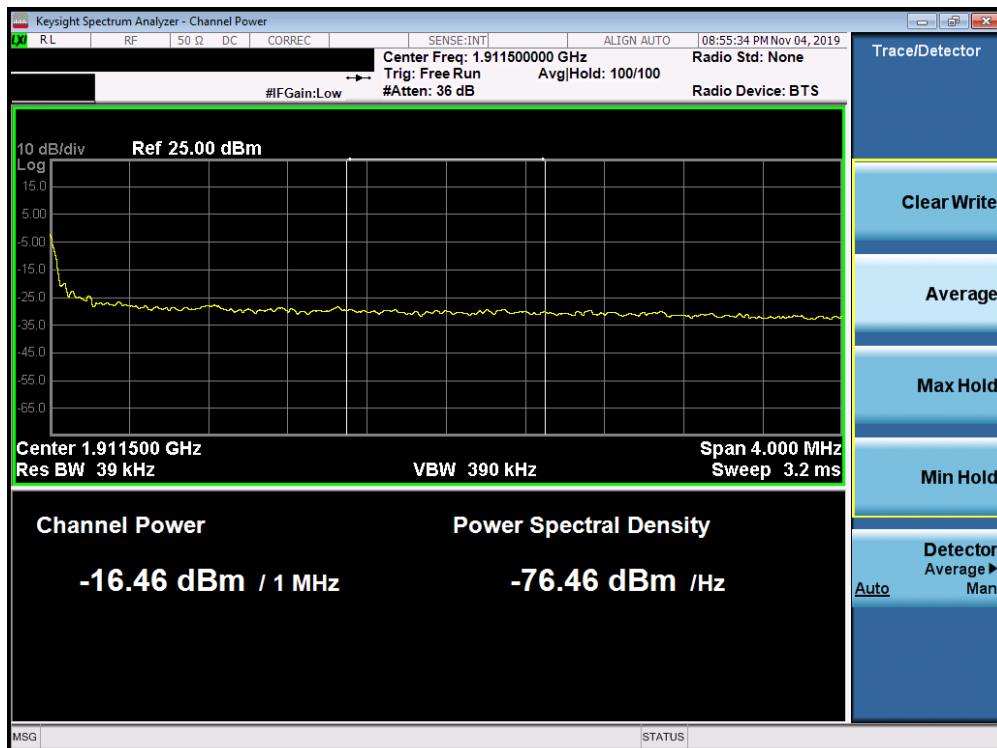


Plot 7-249. Lower Extended Band Edge Plot (Band 25/2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 148 of 250

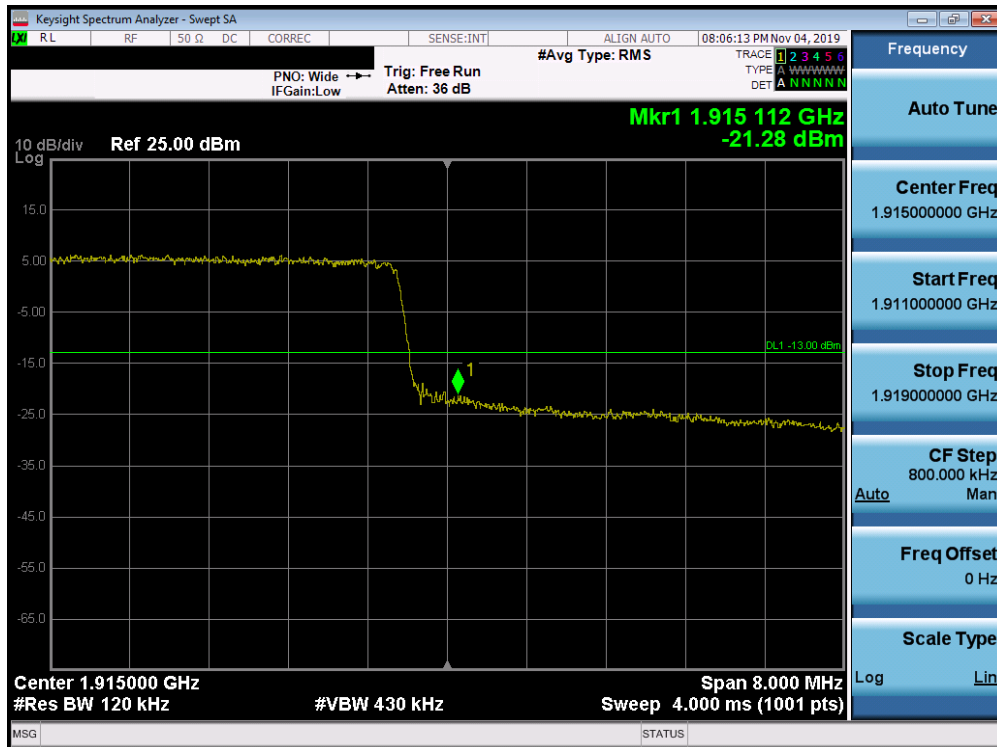


Plot 7-250. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

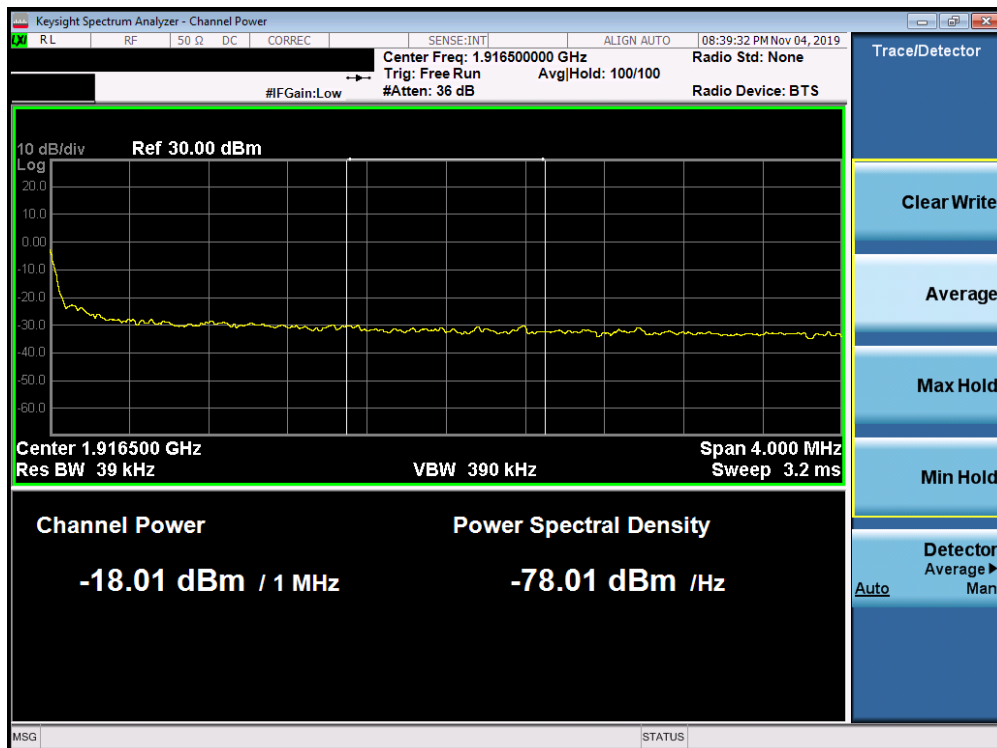


Plot 7-251. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 149 of 250

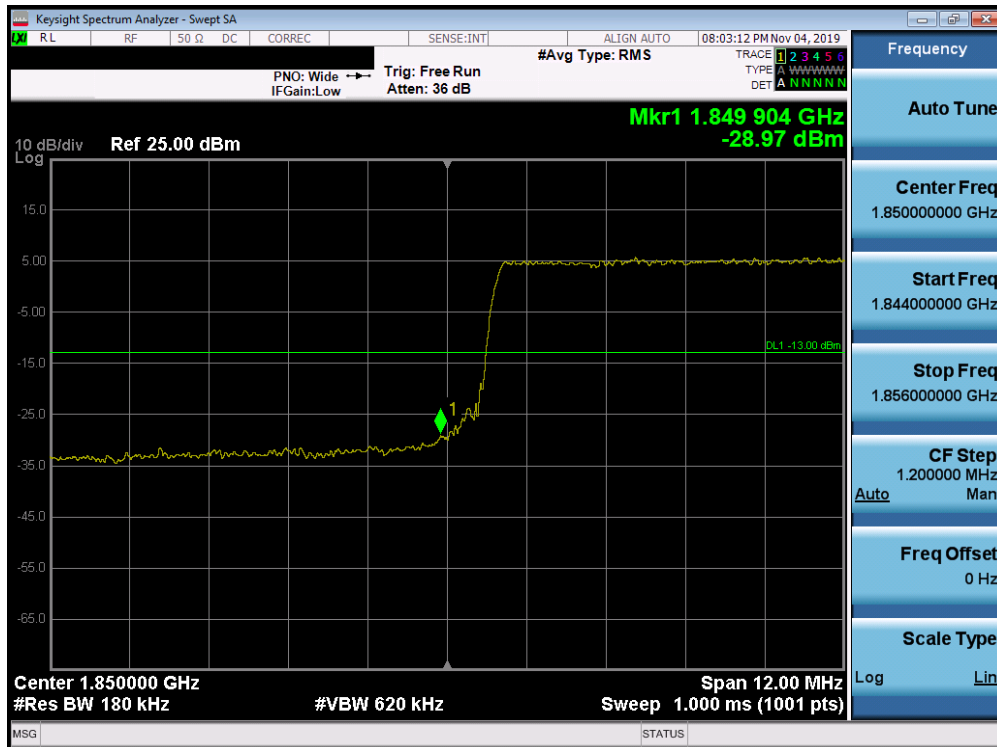


Plot 7-252. Upper Band Edge Plot (Band 25 - 10.0MHz QPSK - Full RB Configuration)

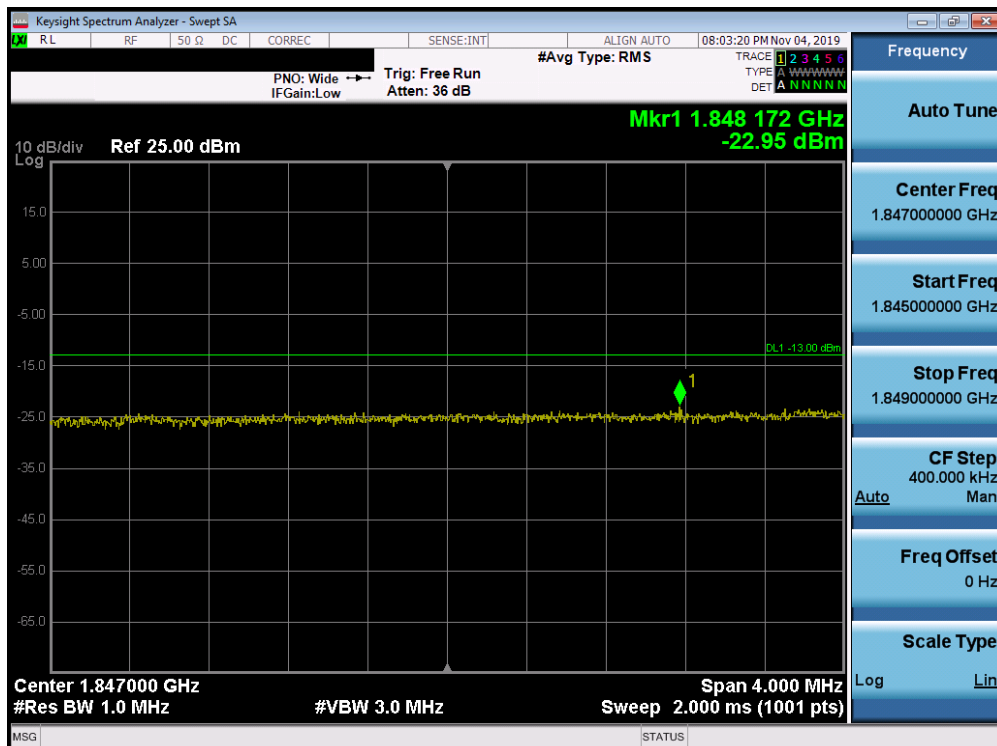


Plot 7-253. Upper Extended Band Edge Plot (Band 25 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 150 of 250

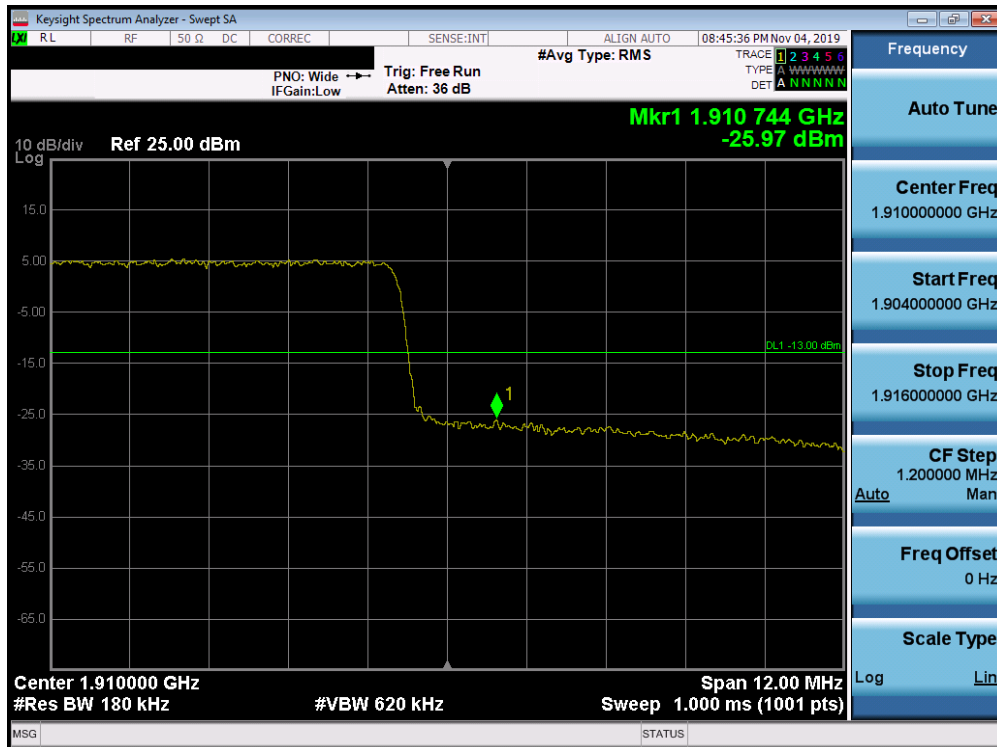


Plot 7-254. Lower Band Edge Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)

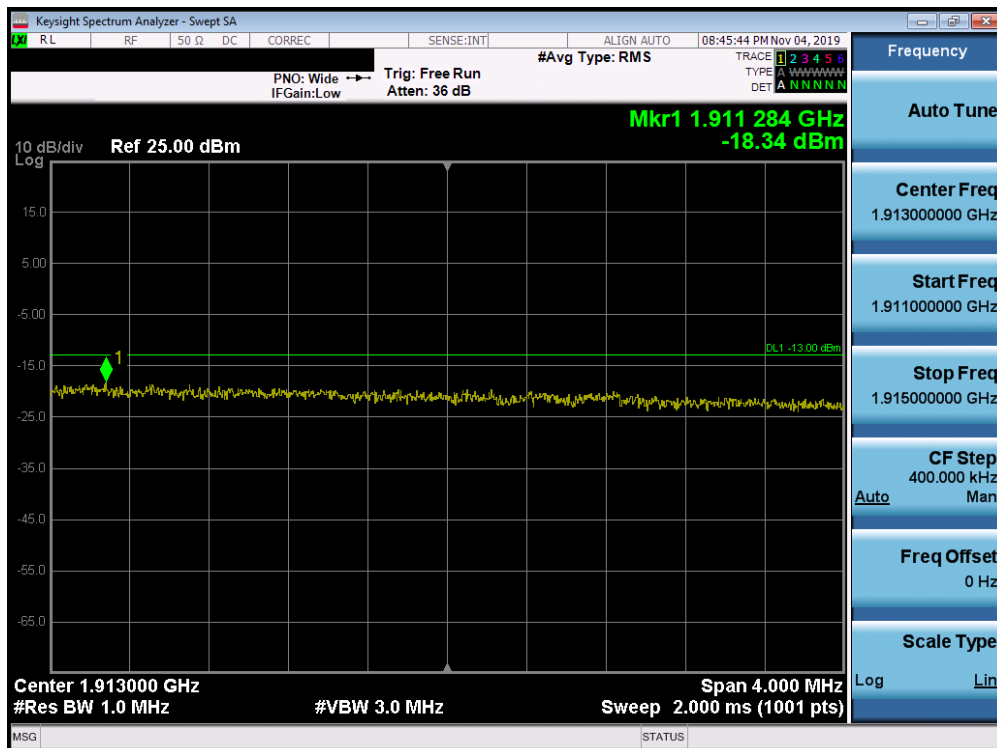


Plot 7-255. Lower Extended Band Edge Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 151 of 250

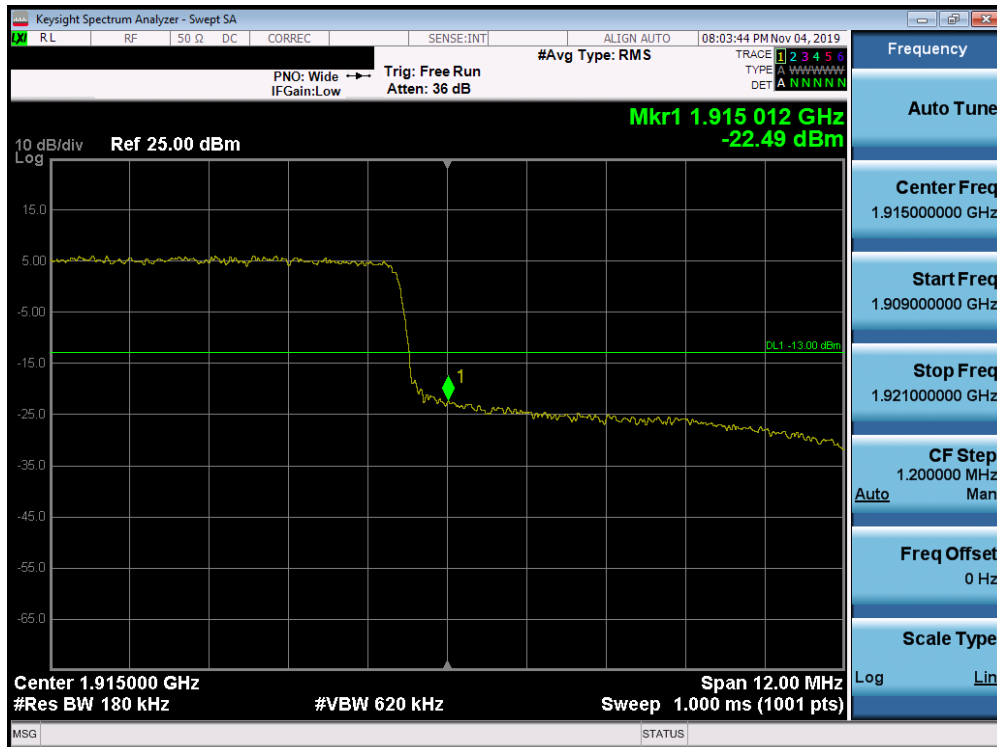


Plot 7-256. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

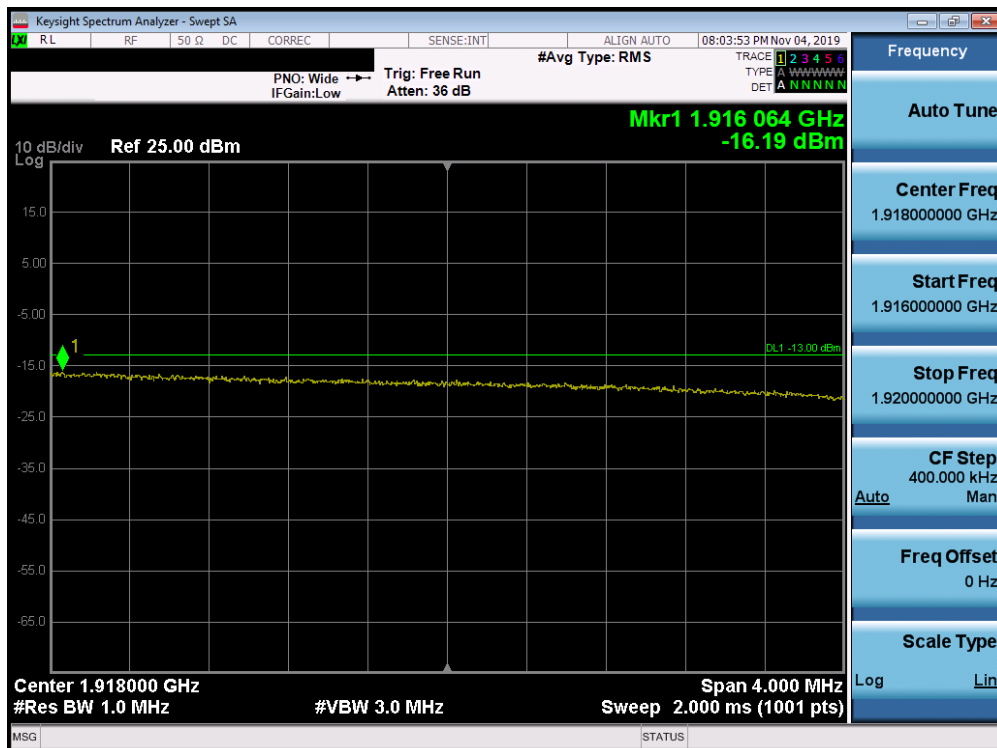


Plot 7-257. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 152 of 250

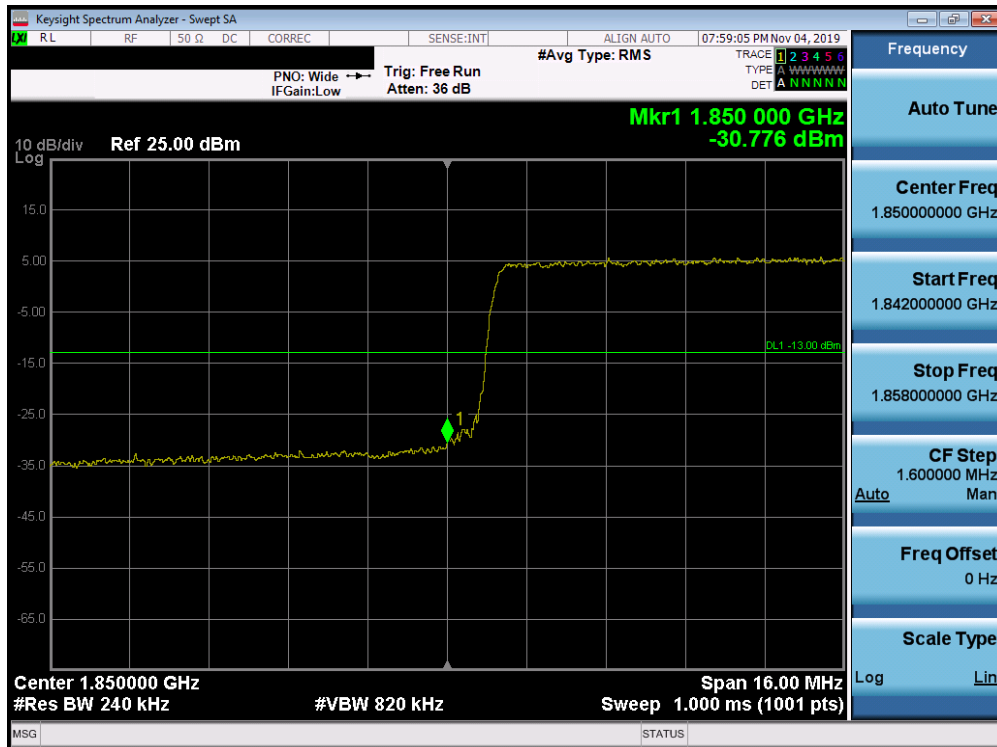


Plot 7-258. Upper Band Edge Plot (Band 25 - 15.0MHz QPSK - Full RB Configuration)

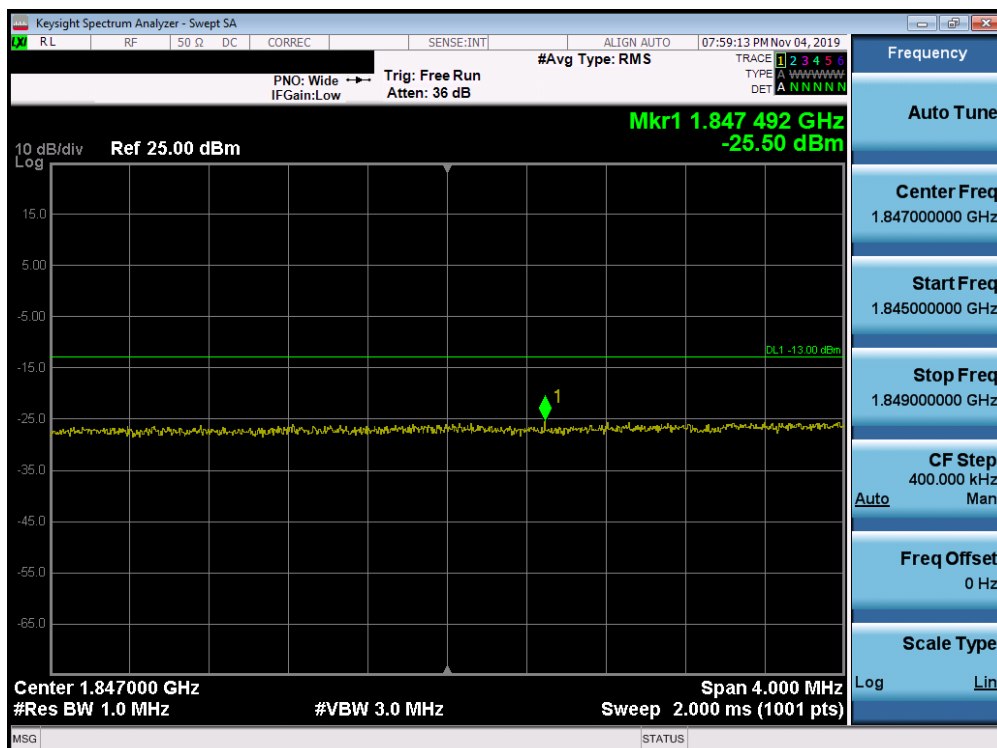


Plot 7-259. Upper Extended Band Edge Plot (Band 25 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 153 of 250

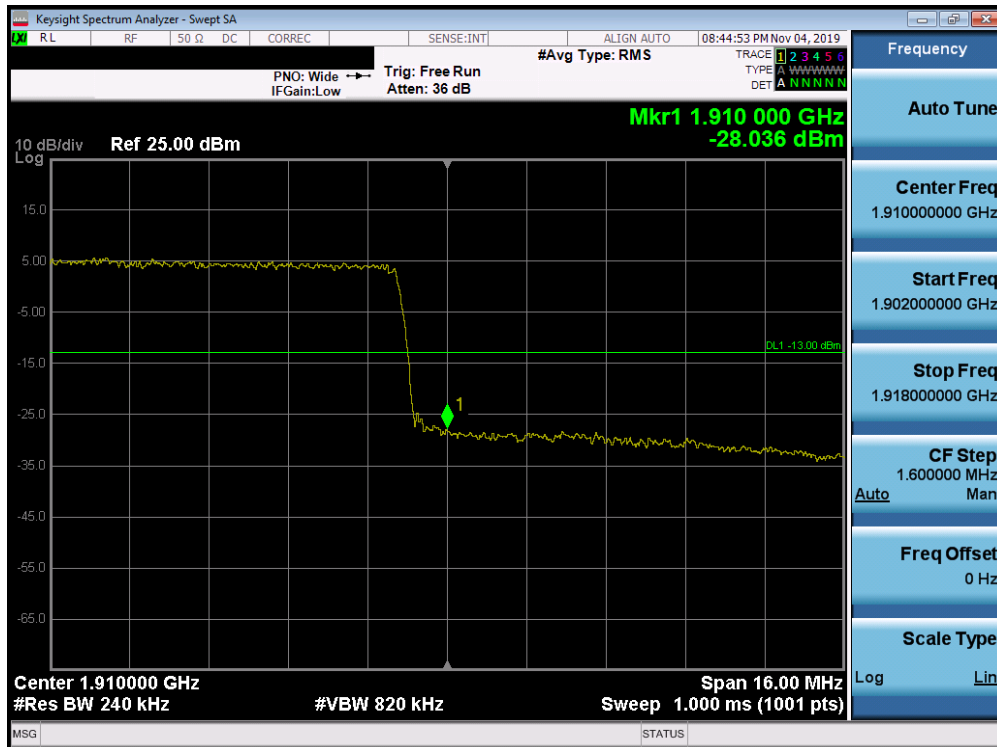


Plot 7-260. Lower Band Edge Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)

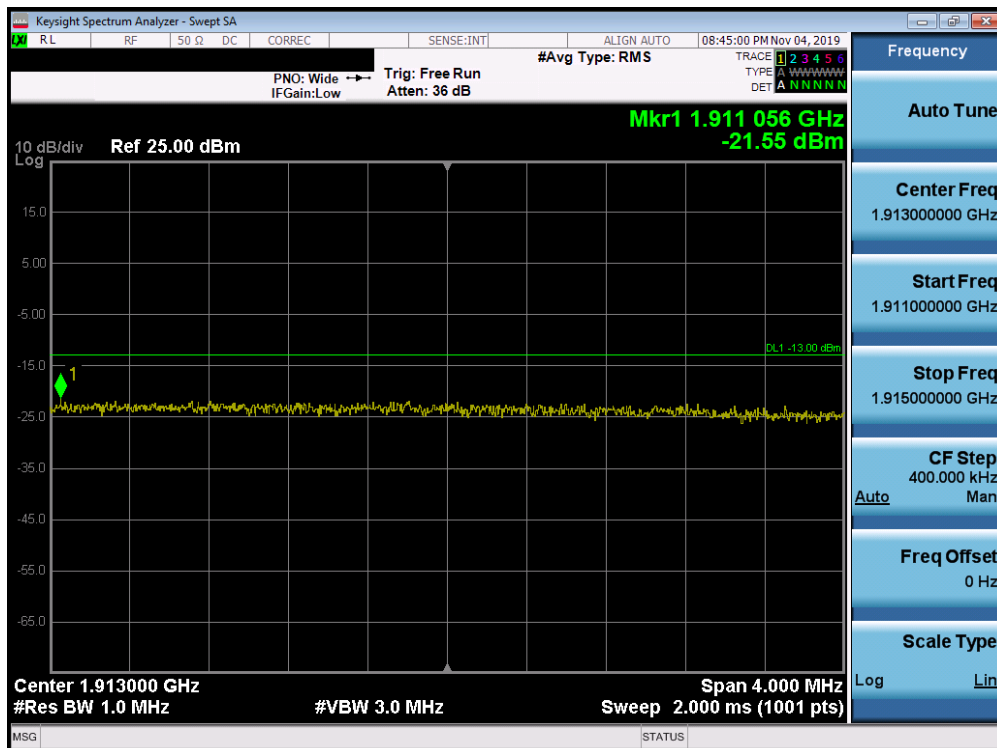


Plot 7-261. Lower Extended Band Edge Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 154 of 250



Plot 7-262. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

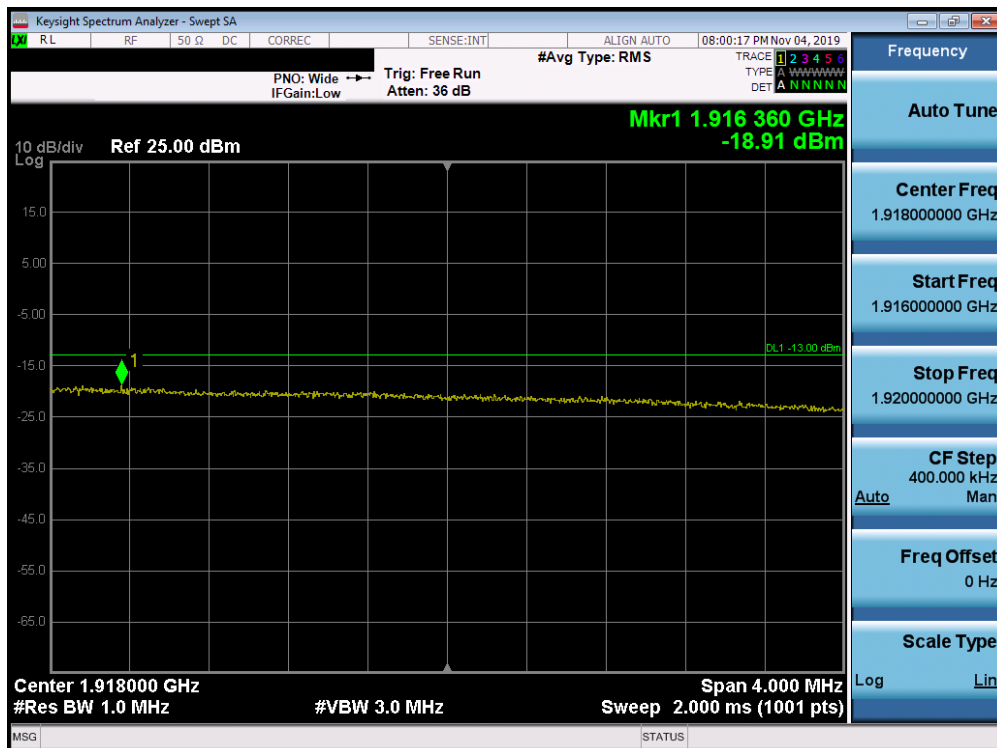


Plot 7-263. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 155 of 250



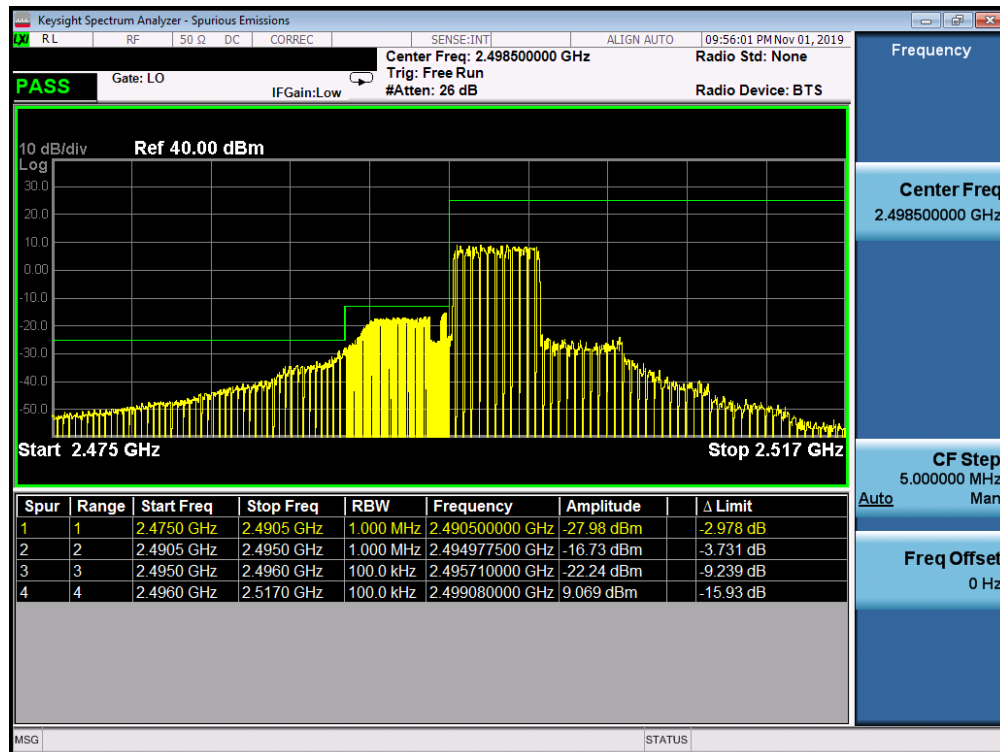
Plot 7-264. Upper Band Edge Plot (Band 25 - 20.0MHz QPSK - Full RB Configuration)



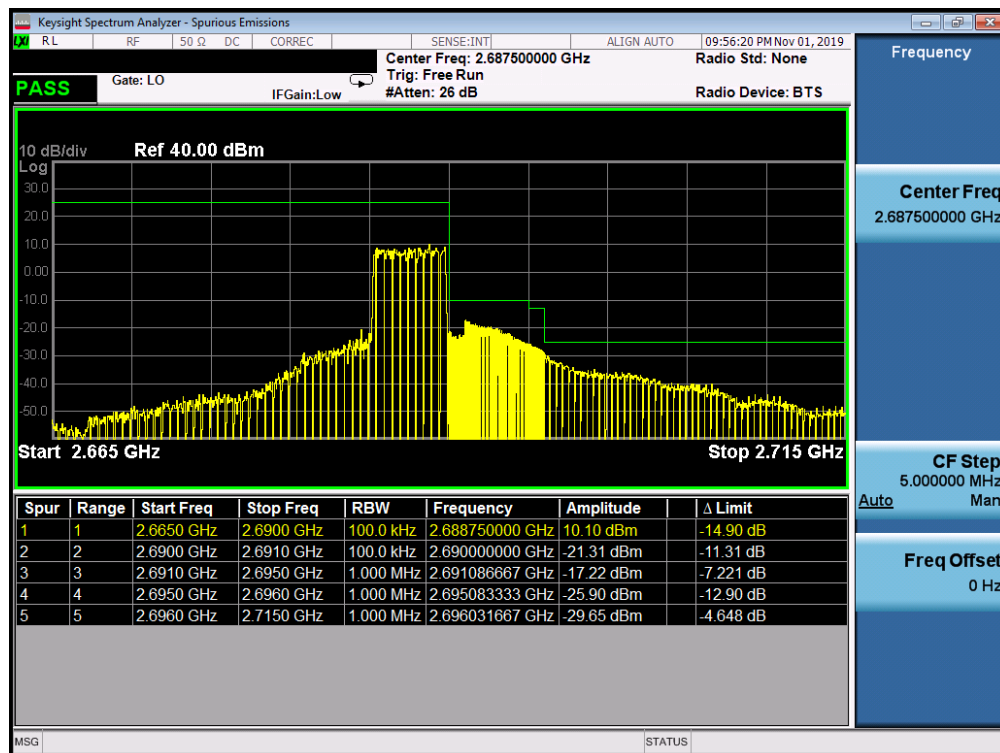
Plot 7-265. Upper Extended Band Edge Plot (Band 25 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 156 of 250

Band 41 (PC2)

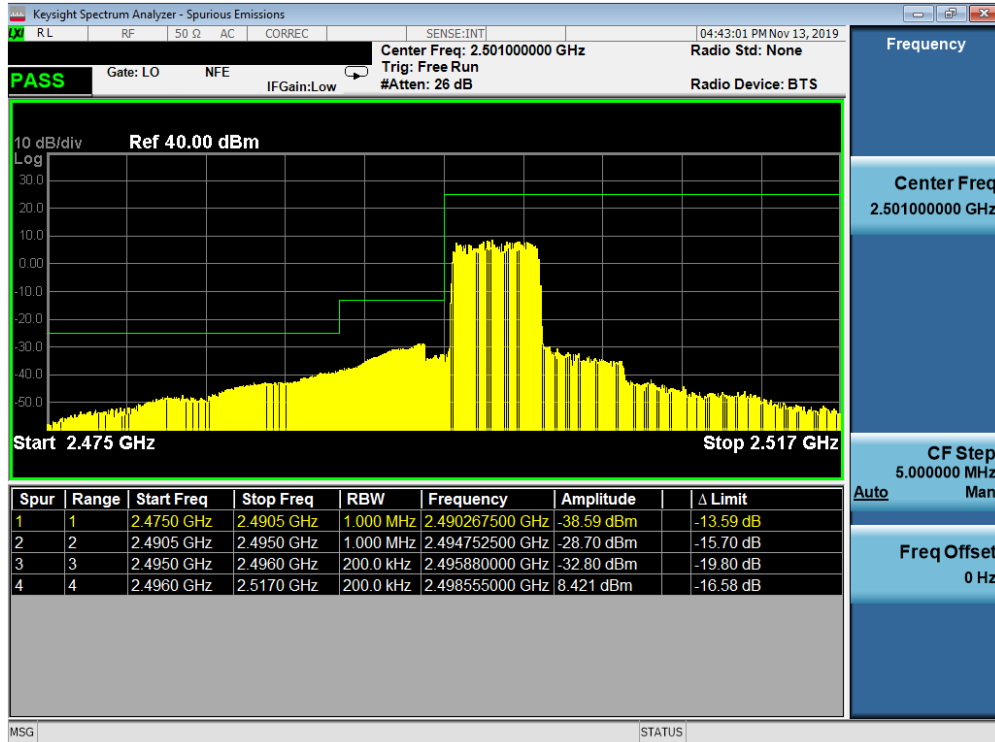


Plot 7-266. Lower ACP Plot (Band 41 (PC2) - 5.0MHz QPSK - Full RB Configuration)

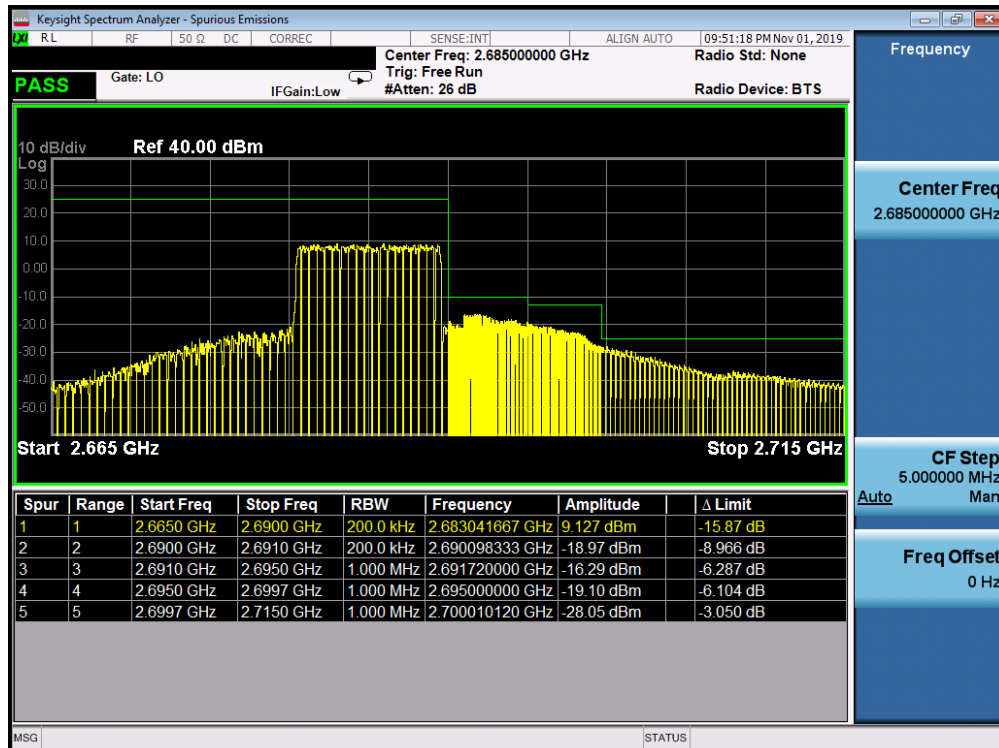


Plot 7-267. Upper ACP Plot (Band 41 (PC2) - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 157 of 250

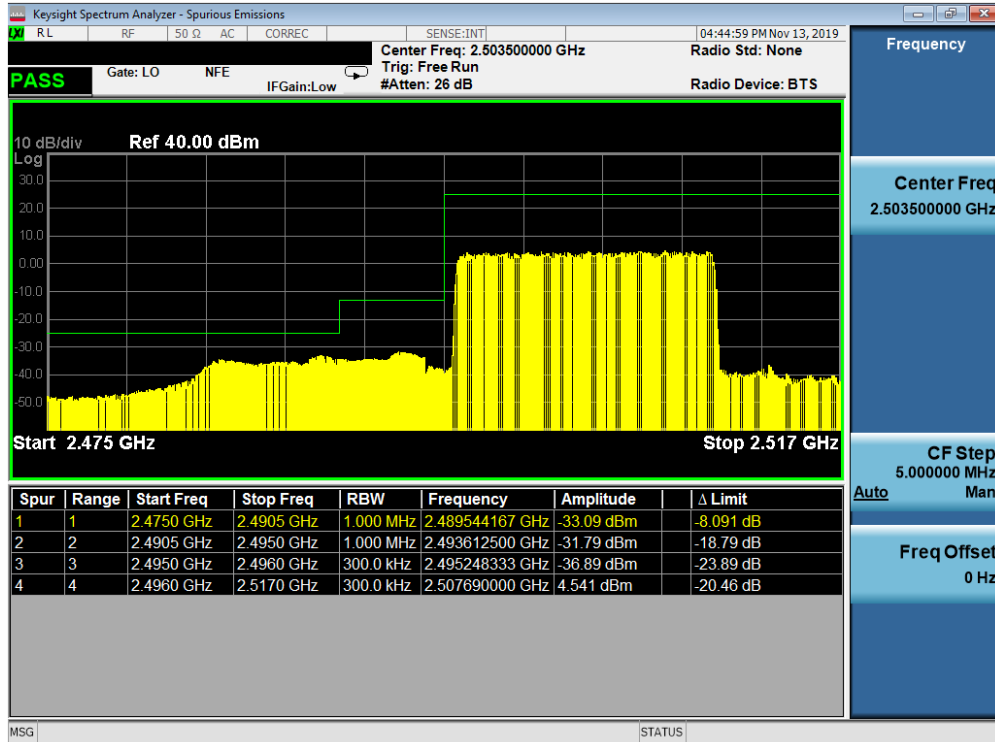


Plot 7-268. Lower ACP Plot (Band 41 (PC2) - 10.0MHz QPSK - Full RB Configuration)

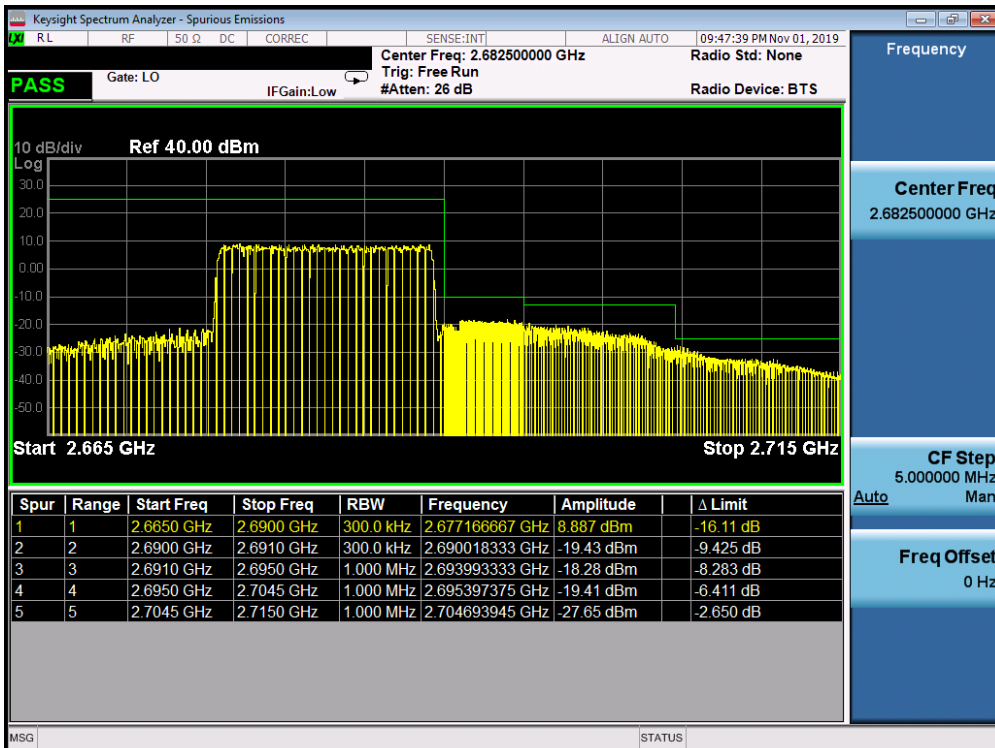


Plot 7-269. Upper ACP Plot (Band 41 (PC2) - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 158 of 250

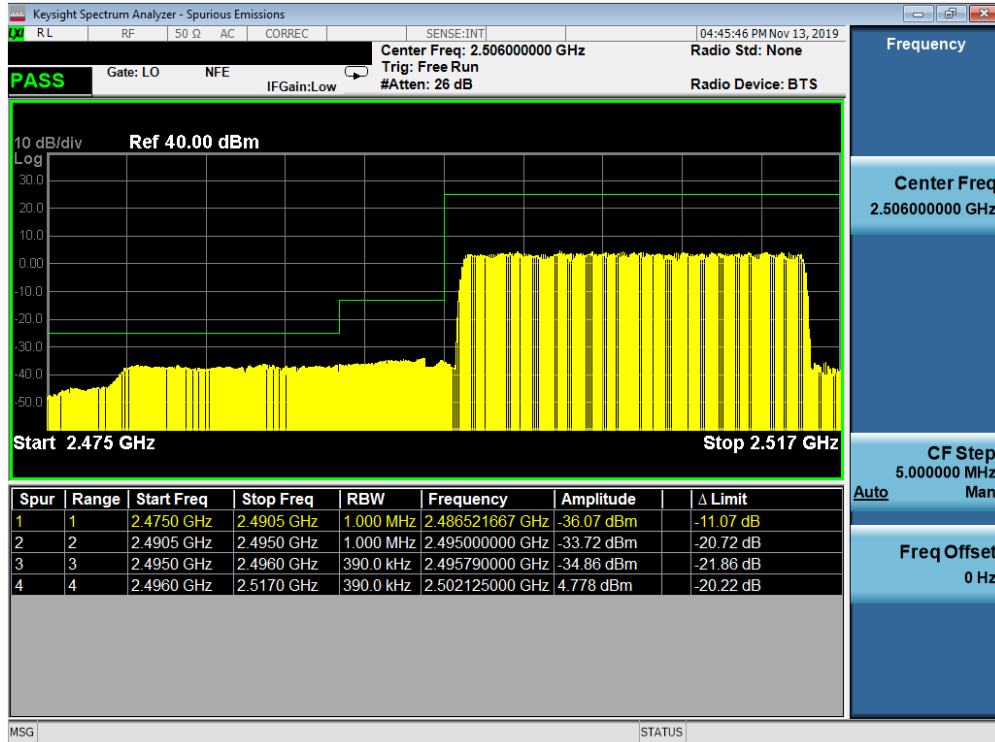


Plot 7-270. Lower ACP Plot (Band 41 (PC2) - 15.0MHz QPSK - Full RB Configuration)

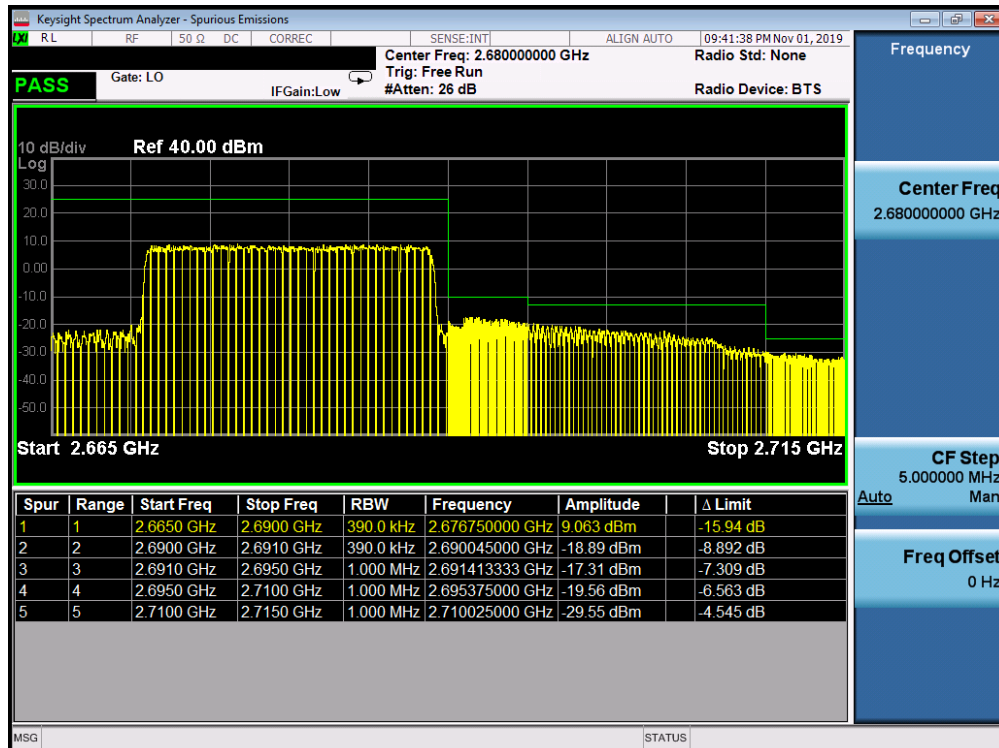


Plot 7-271. Upper ACP Plot (Band 41 (PC2) - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 159 of 250



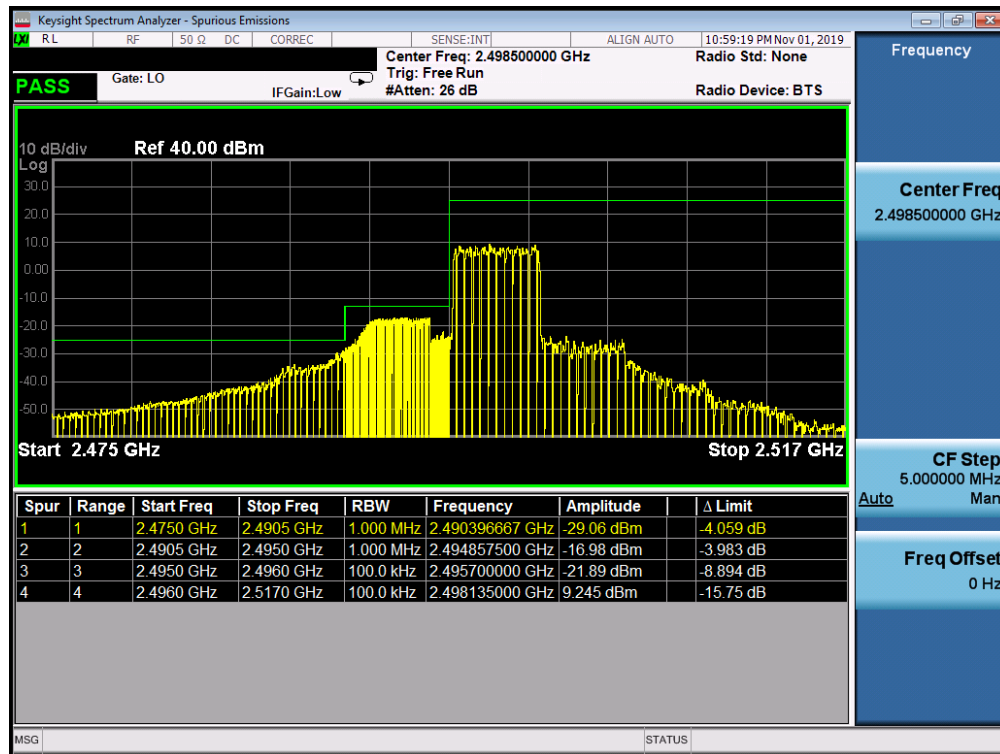
Plot 7-272. Lower ACP Plot (Band 41 (PC2) - 20.0MHz QPSK - Full RB Configuration)



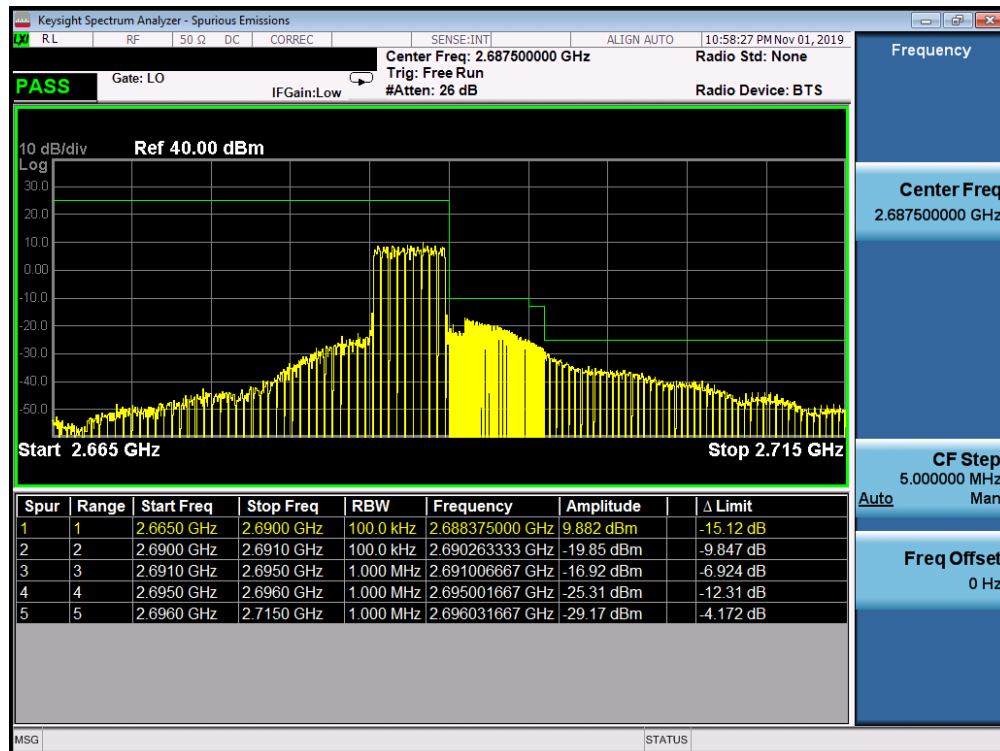
Plot 7-273. Upper ACP Plot (Band 41 (PC2) - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL			MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset			Page 160 of 250

Band 41 (PC3)

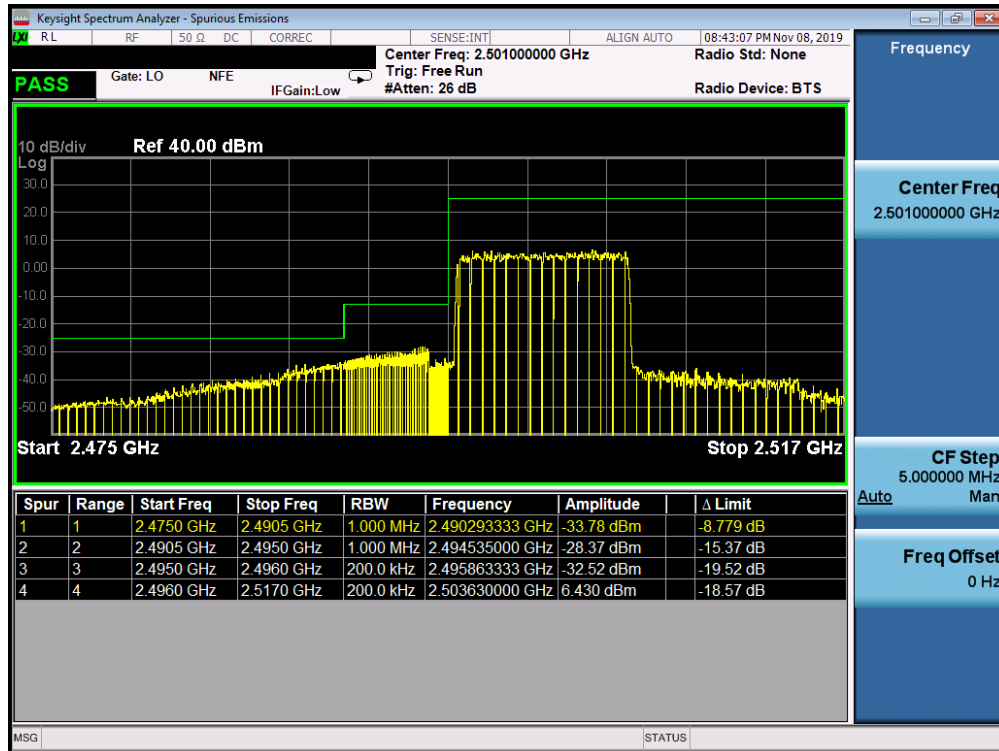


Plot 7-274. Lower ACP Plot (Band 41 (PC3) - 5.0MHz QPSK - Full RB Configuration)

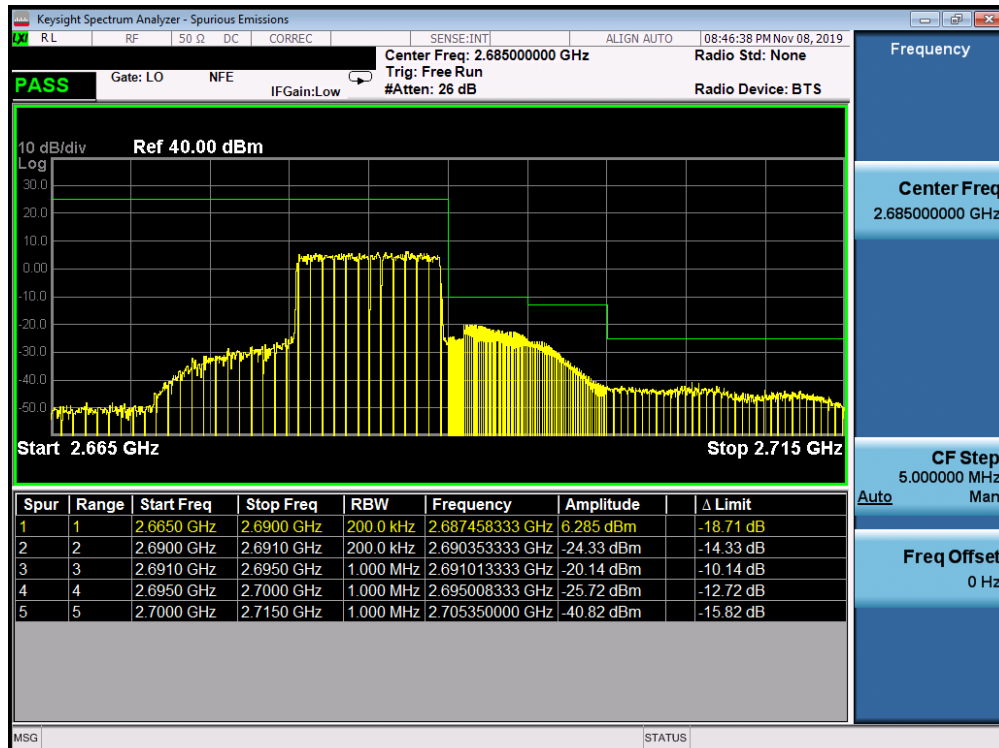


Plot 7-275. Upper ACP Plot (Band 41 (PC3) - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 161 of 250

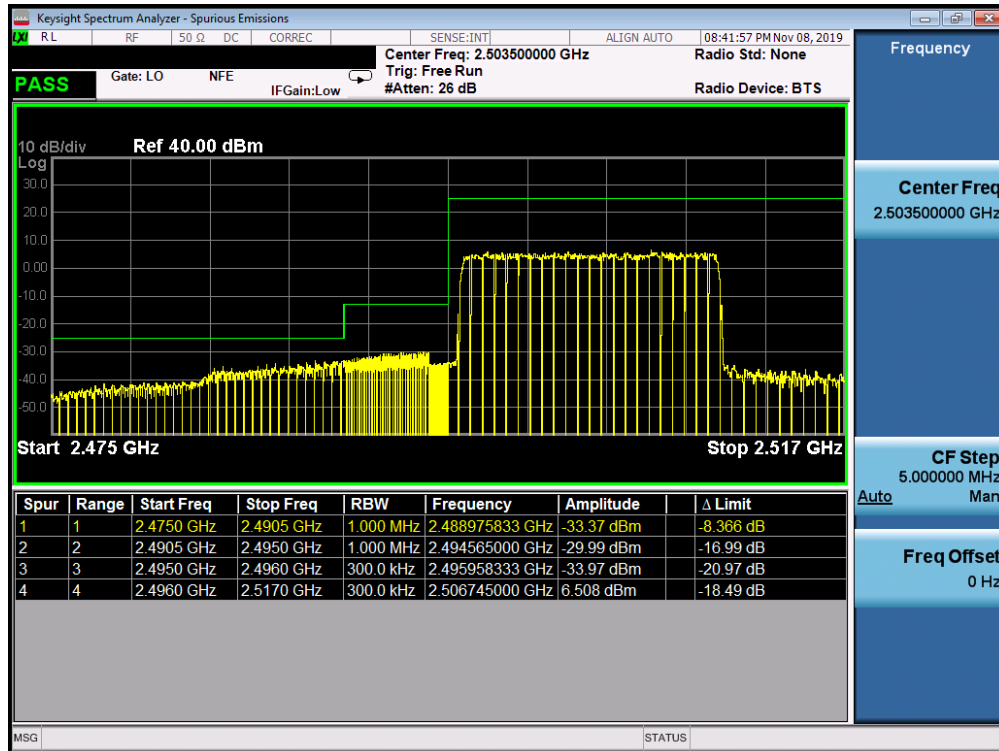


Plot 7-276. Lower ACP Plot (Band 41 (PC3) - 10.0MHz QPSK - Full RB Configuration)

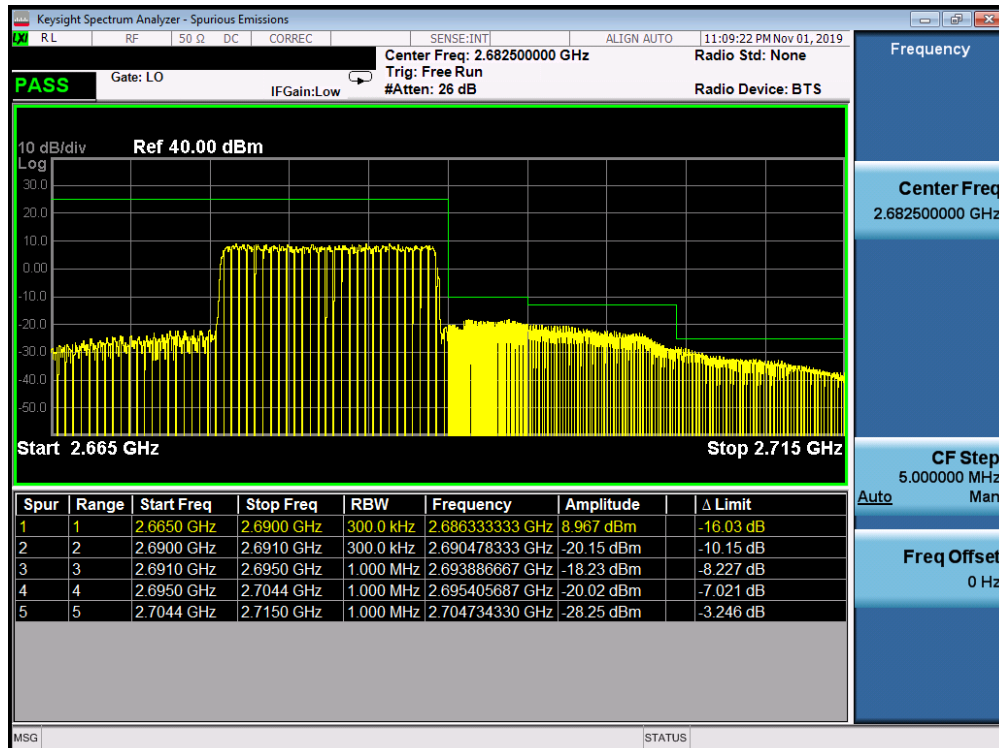


Plot 7-277. Upper ACP Plot (Band 41 (PC3) - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 162 of 250

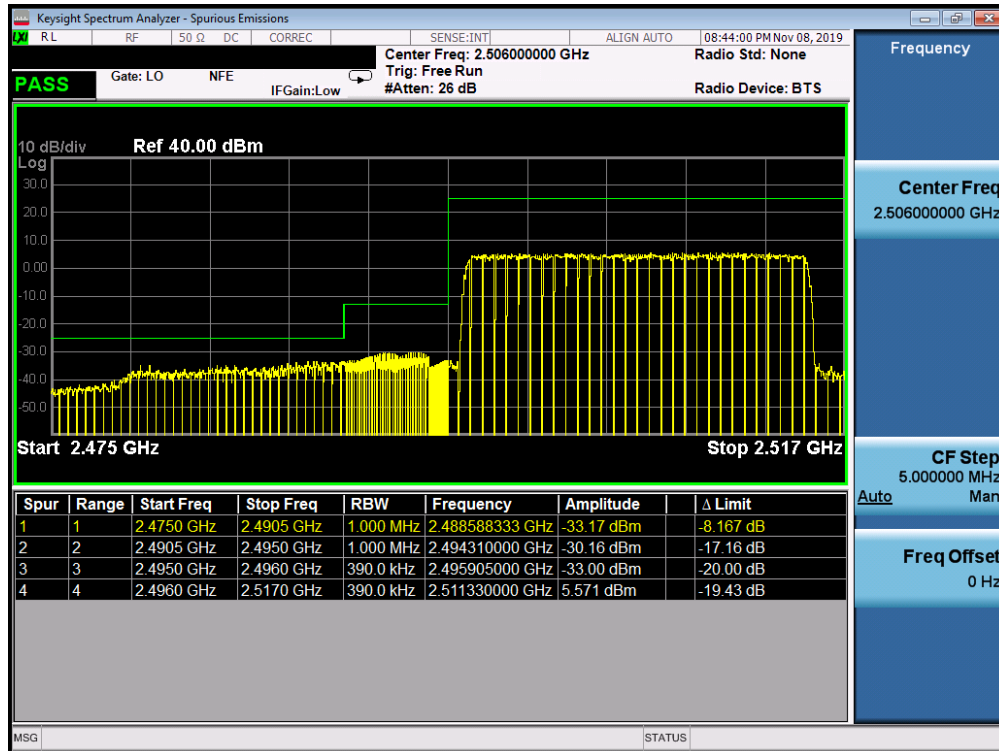


Plot 7-278. Lower ACP Plot (Band 41 (PC3) - 15.0MHz QPSK - Full RB Configuration)

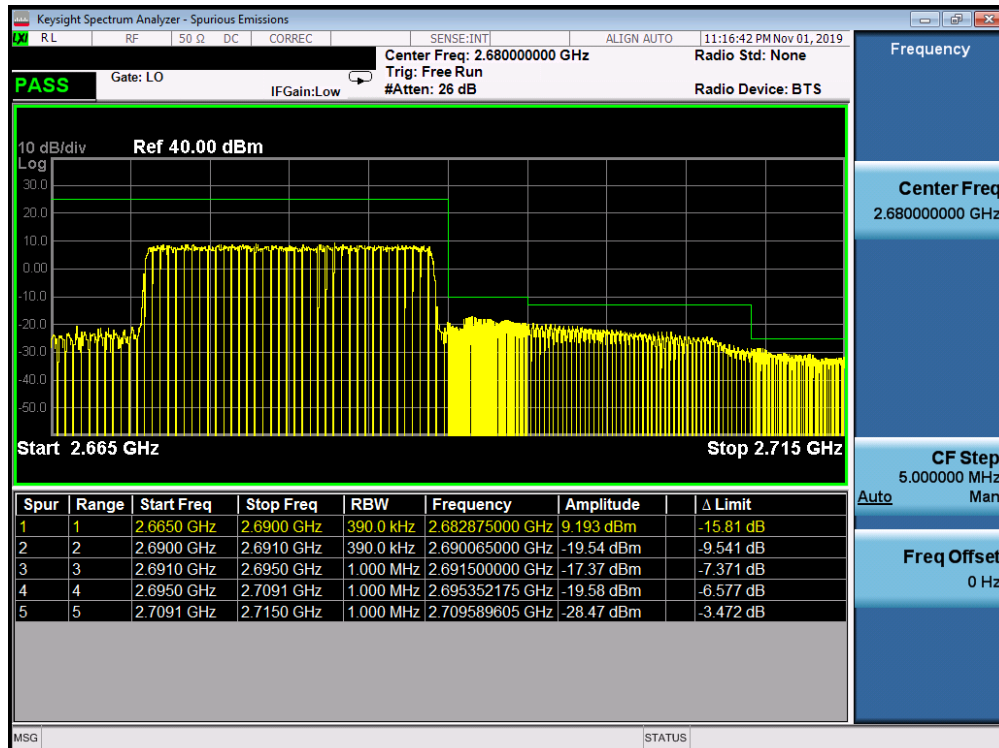


Plot 7-279. Upper ACP Plot (Band 41 (PC3) - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 163 of 250



Plot 7-280. Lower ACP Plot (Band 41 (PC3) - 20.0MHz QPSK - Full RB Configuration)



Plot 7-281. Upper ACP Plot (Band 41 (PC3) - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 164 of 250

7.5 Peak-Average Ratio

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW \geq OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

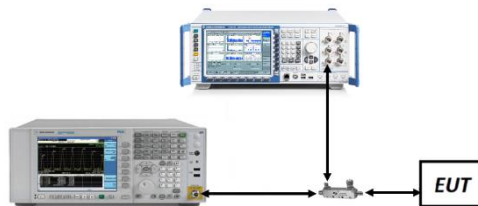


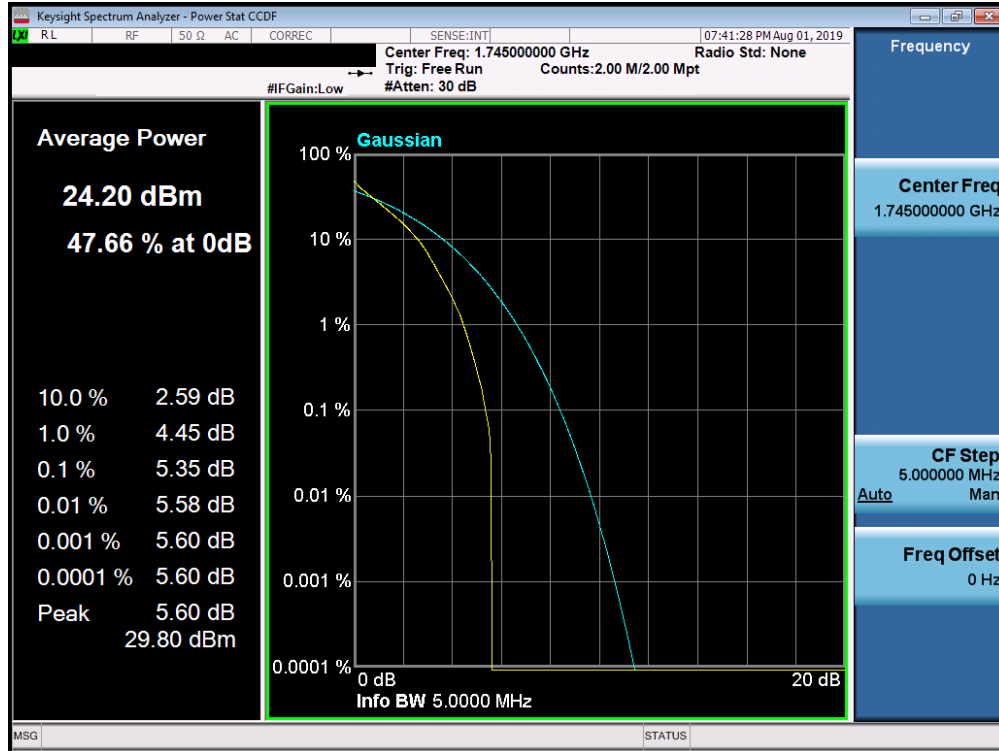
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

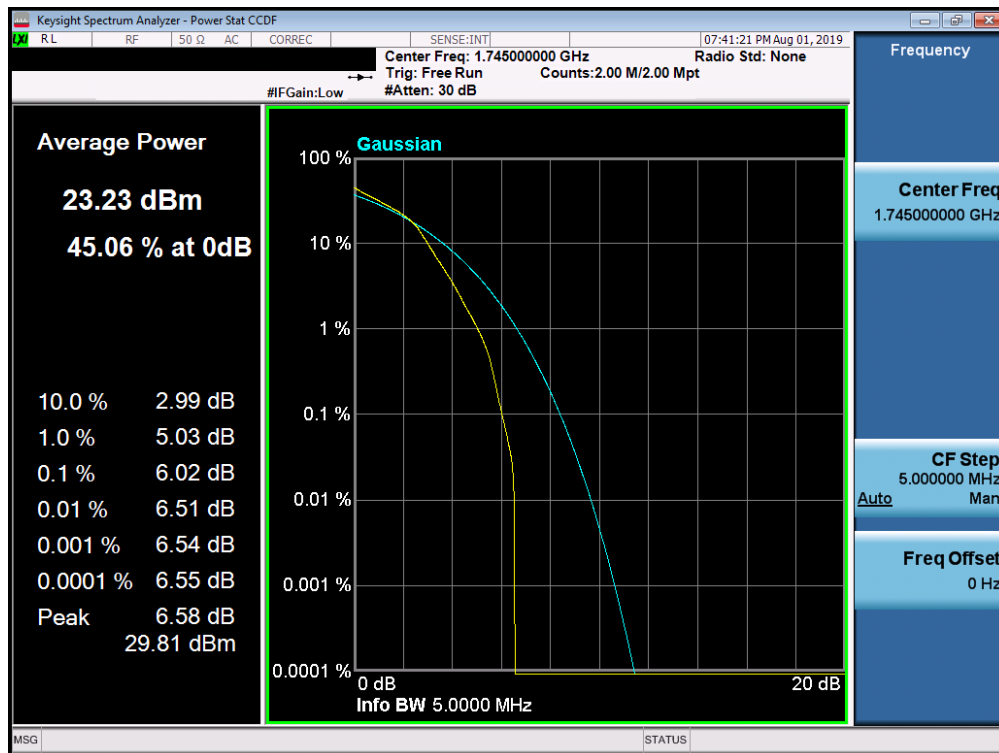
None.

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/209	EUT Type: Portable Handset		Page 165 of 250

Band 66/4

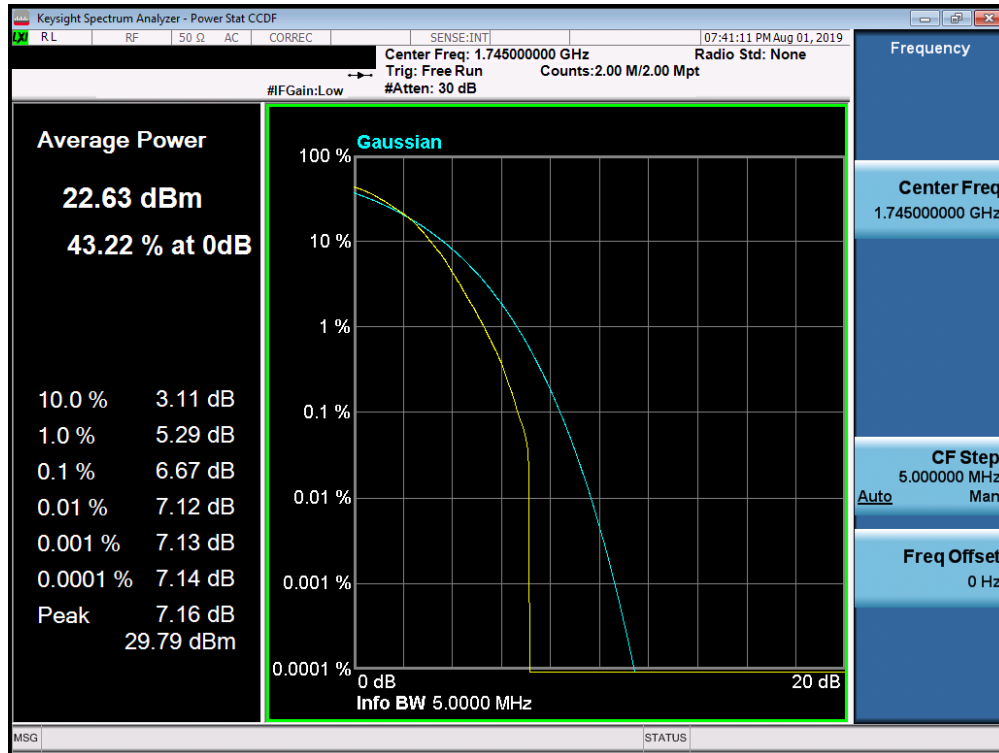


Plot 7-282. PAR Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)

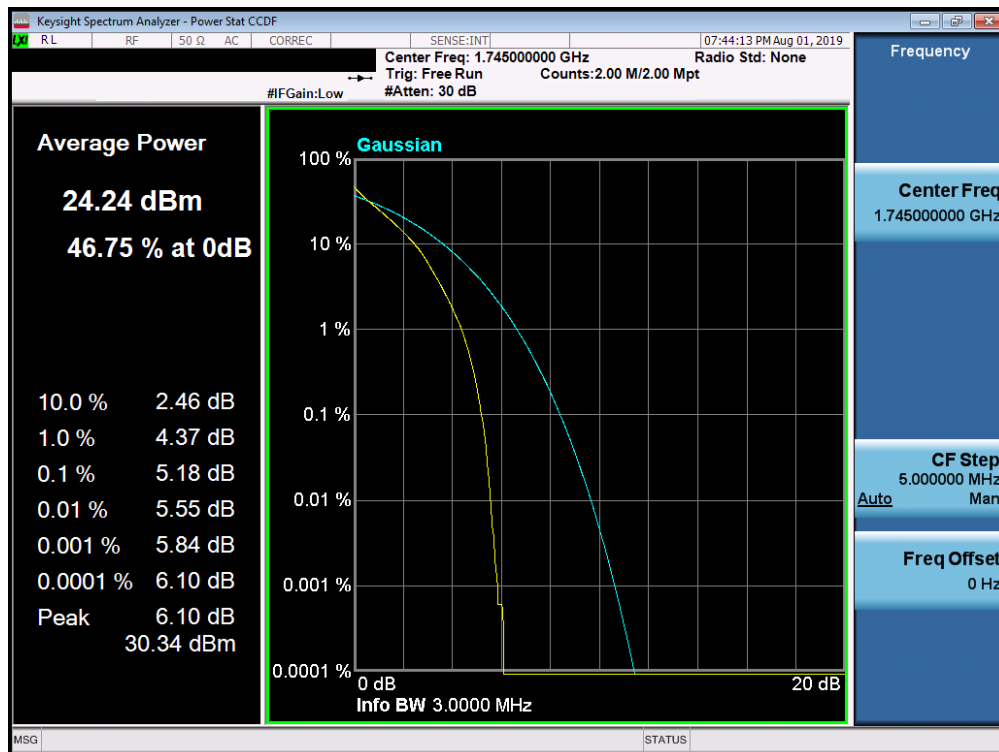


Plot 7-283. PAR Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 166 of 250

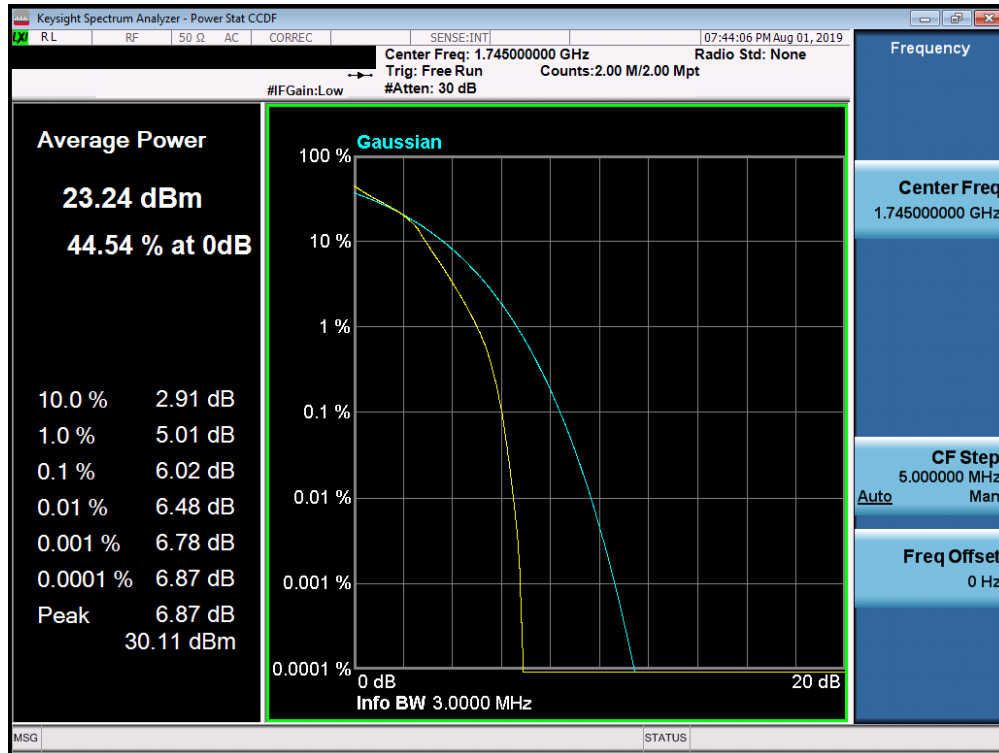


Plot 7-284. PAR Plot (Band 66/4 - 1.4MHz 64-QAM - Full RB Configuration)

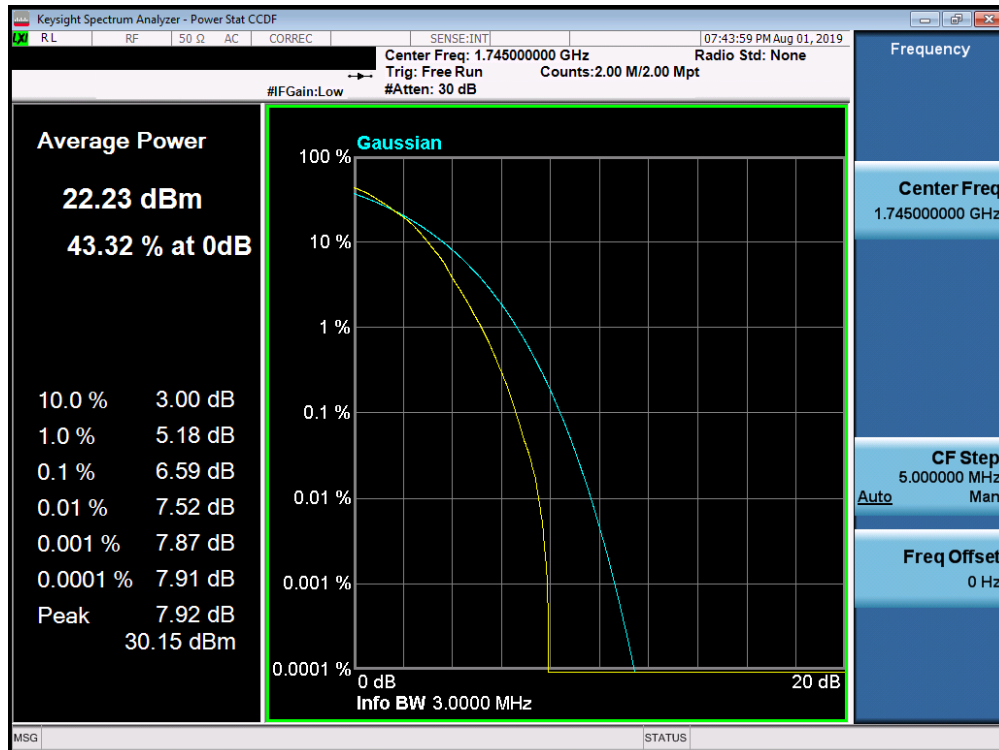


Plot 7-285. PAR Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset	Page 167 of 250

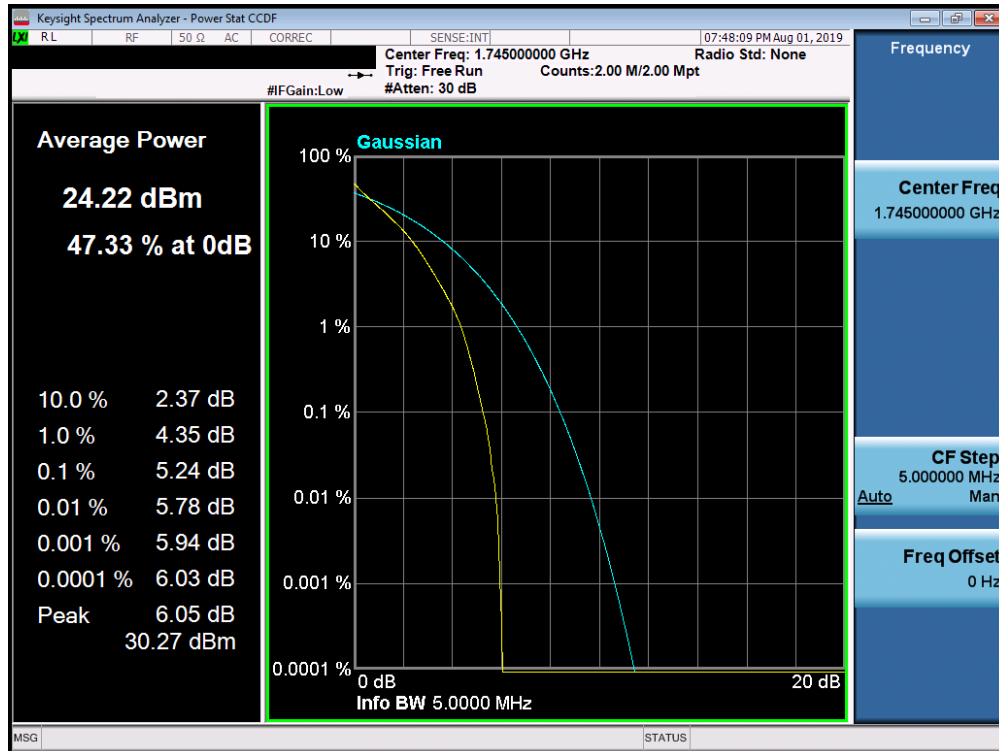


Plot 7-286. PAR Plot (Band 66/4 – 3.0MHz 16-QAM - Full RB Configuration)

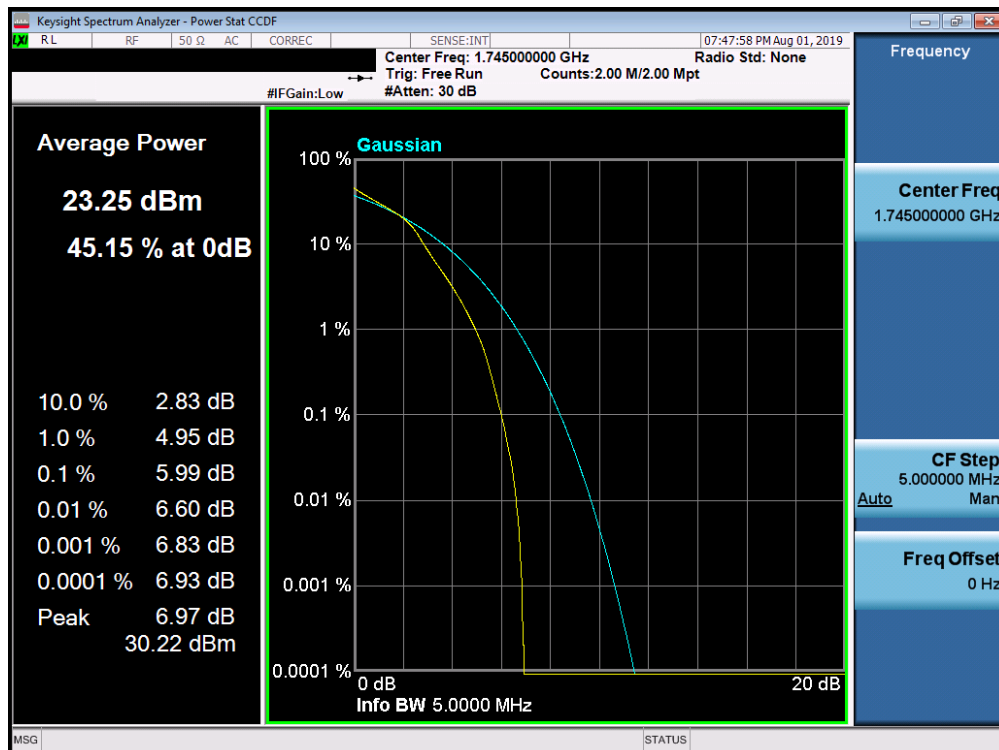


Plot 7-287. PAR Plot (Band 66/4 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 168 of 250

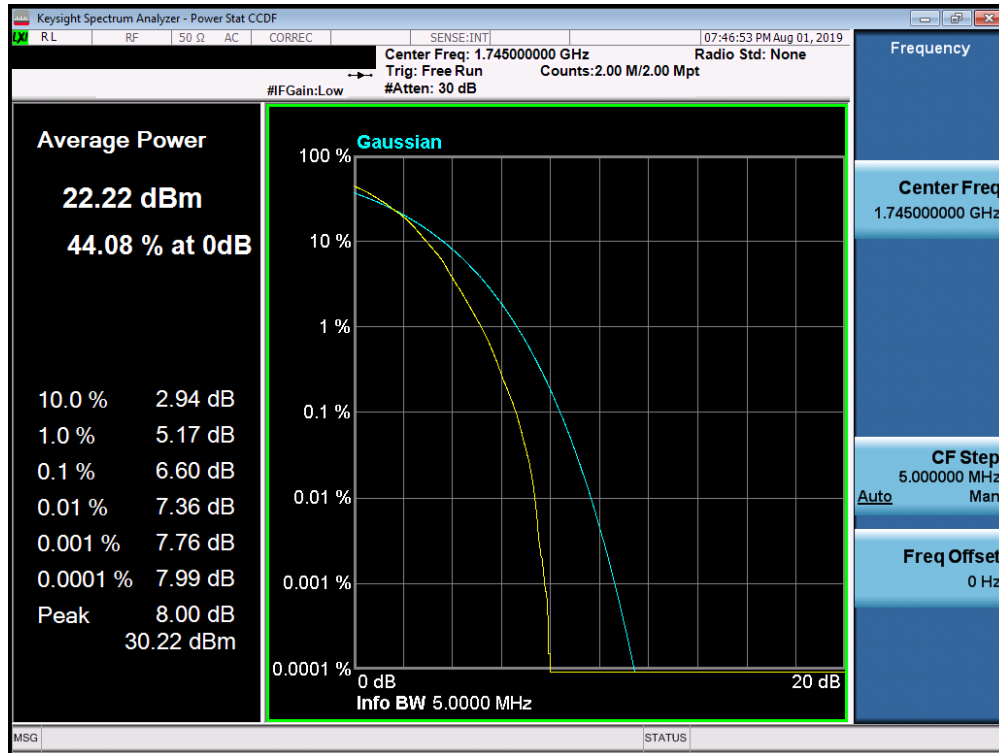


Plot 7-288. PAR Plot (Band 66/4 – 5.0MHz QPSK - Full RB Configuration)

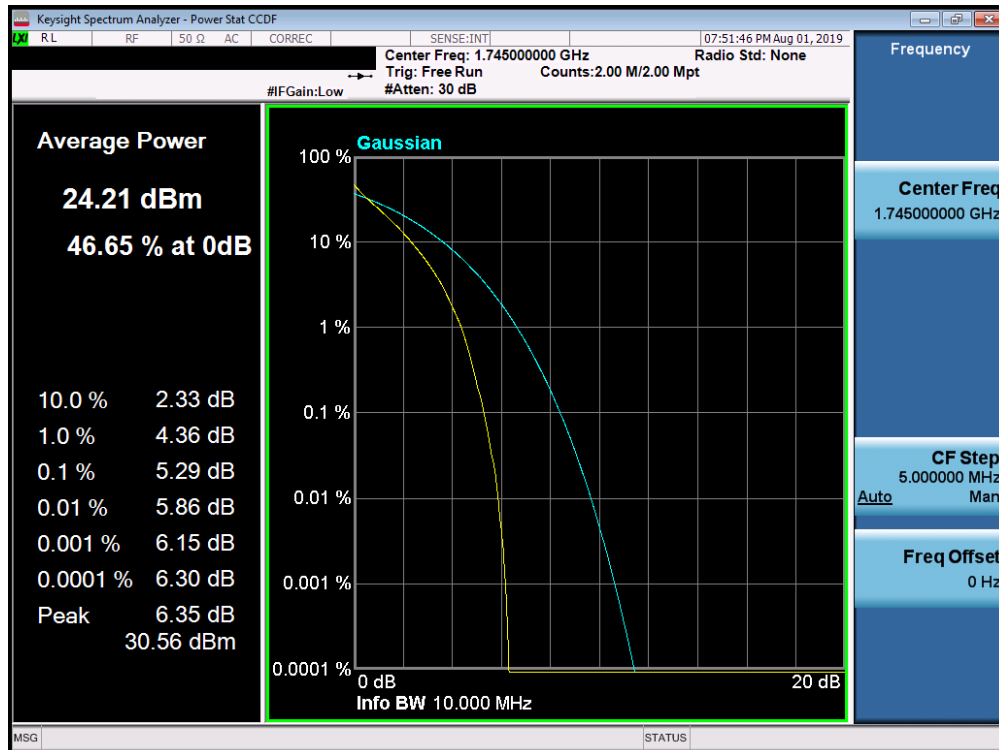


Plot 7-289. PAR Plot (Band 66/4 – 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 169 of 250

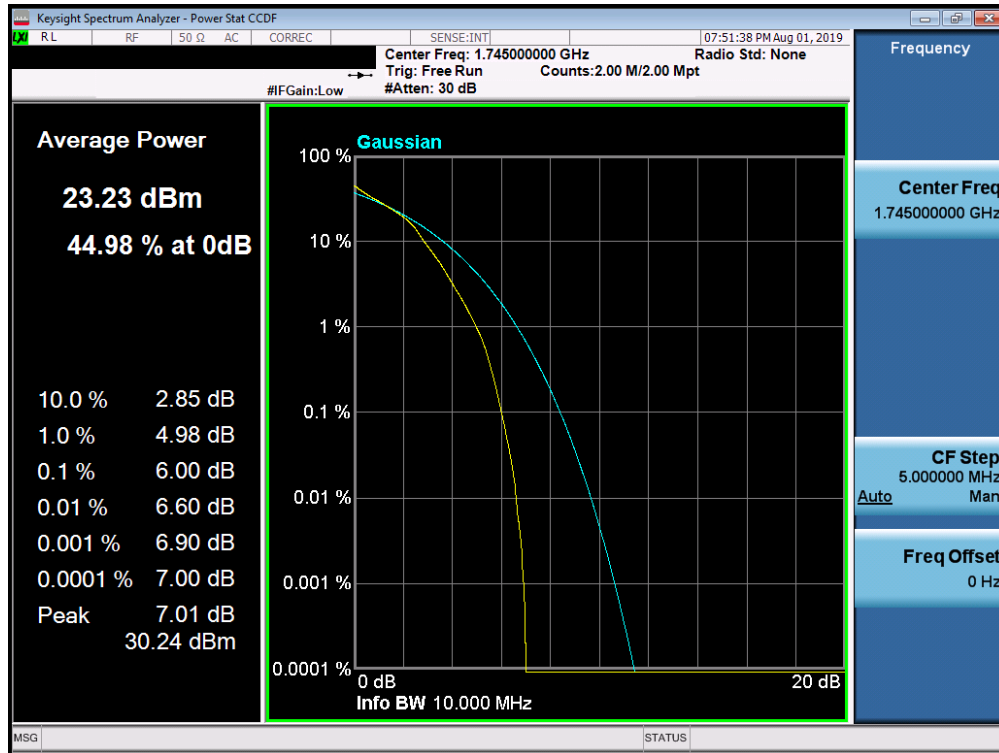


Plot 7-290. PAR Plot (Band 66/4 – 5.0MHz 64-QAM - Full RB Configuration)

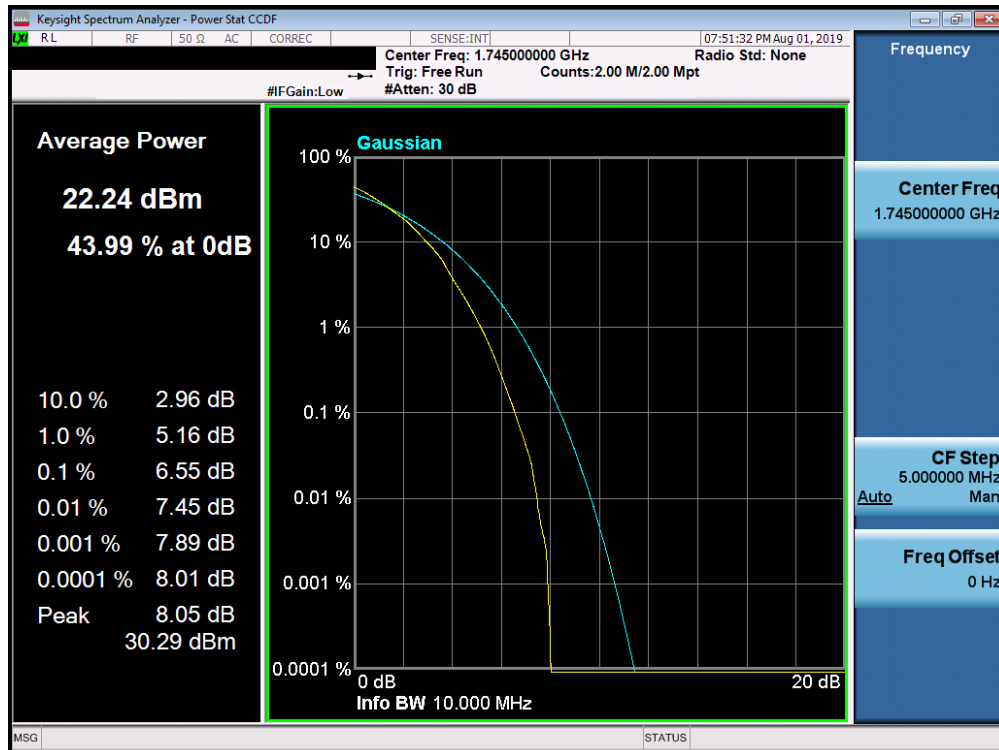


Plot 7-291. PAR Plot (Band 66/4 – 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 170 of 250

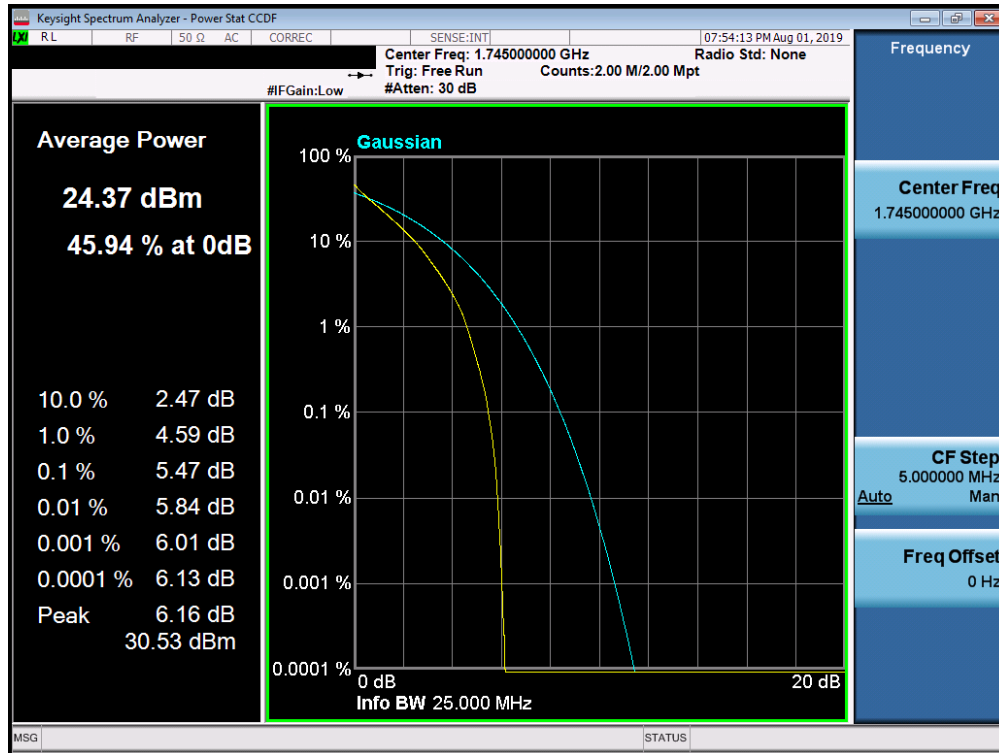


Plot 7-292. PAR Plot (Band 66/4 – 10.0MHz 16-QAM - Full RB Configuration)

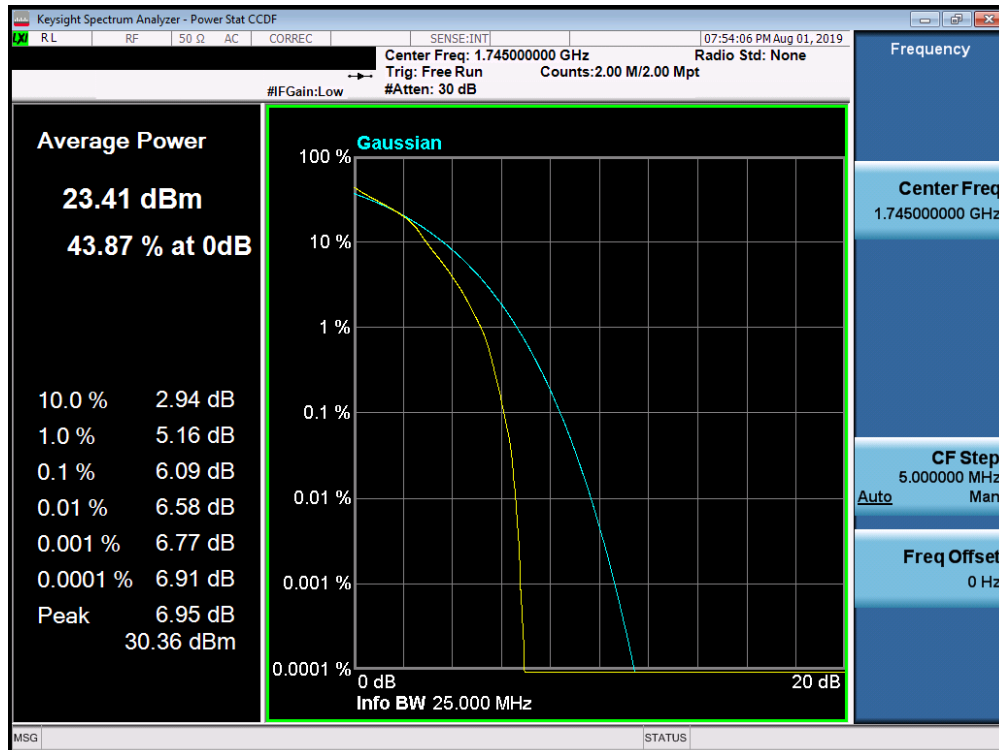


Plot 7-293. PAR Plot (Band 66/4 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 171 of 250

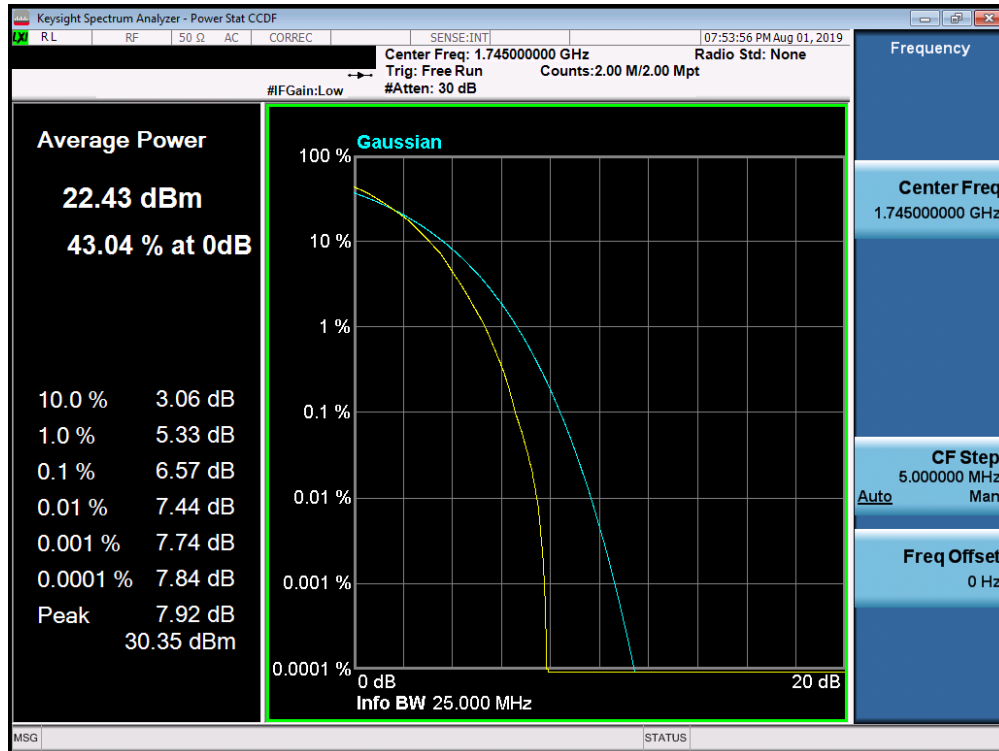


Plot 7-294. PAR Plot (Band 66/4 – 15.0MHz QPSK - Full RB Configuration)

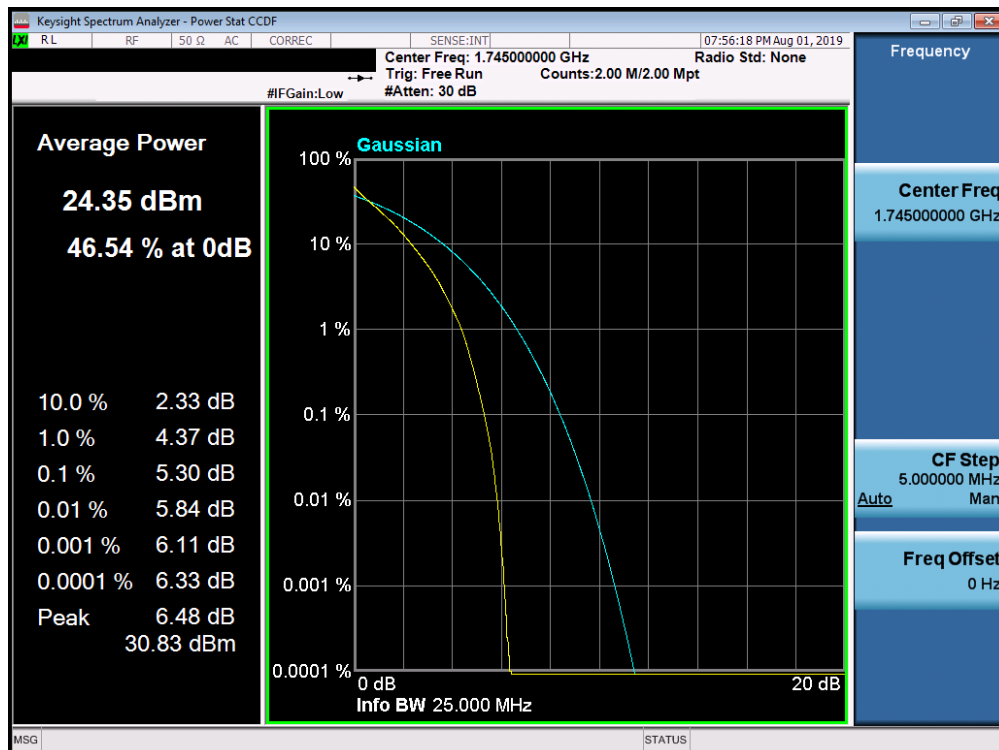


Plot 7-295. PAR Plot (Band 66/4 – 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 172 of 250

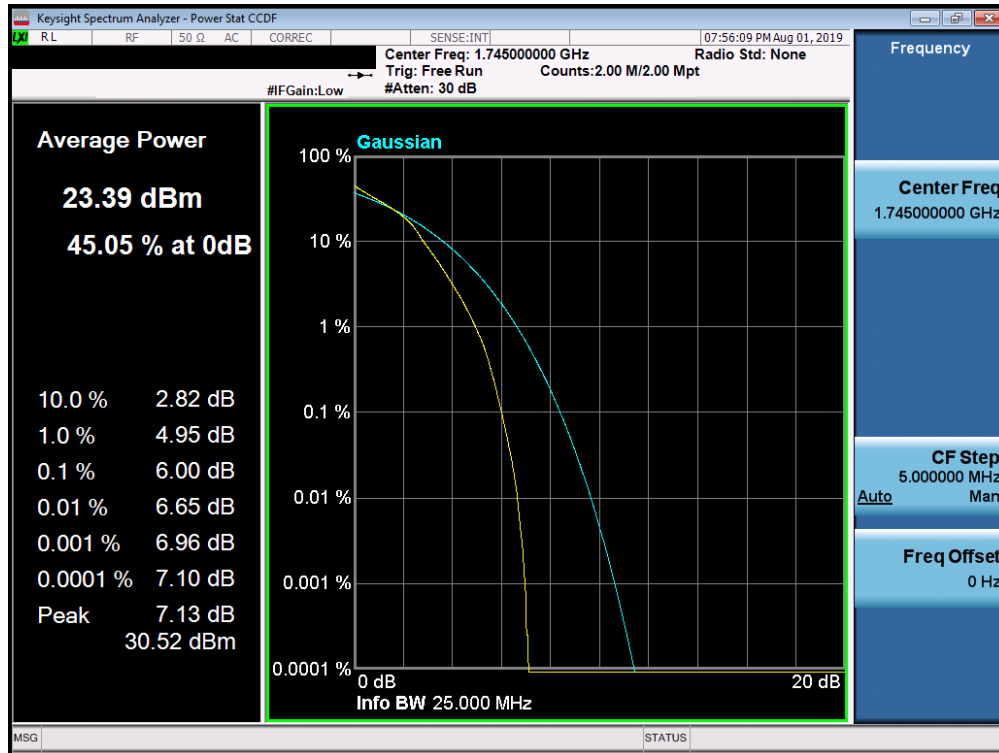


Plot 7-296. PAR Plot (Band 66/4 – 15.0MHz 64-QAM - Full RB Configuration)

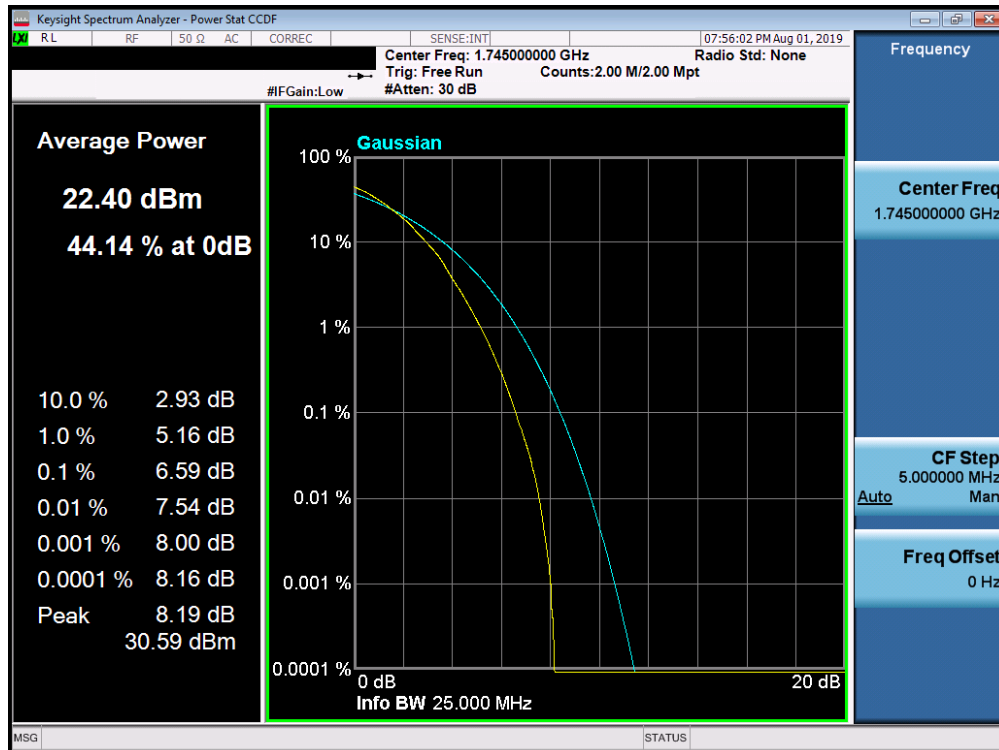


Plot 7-297. PAR Plot (Band 66/4 – 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset		Page 173 of 250



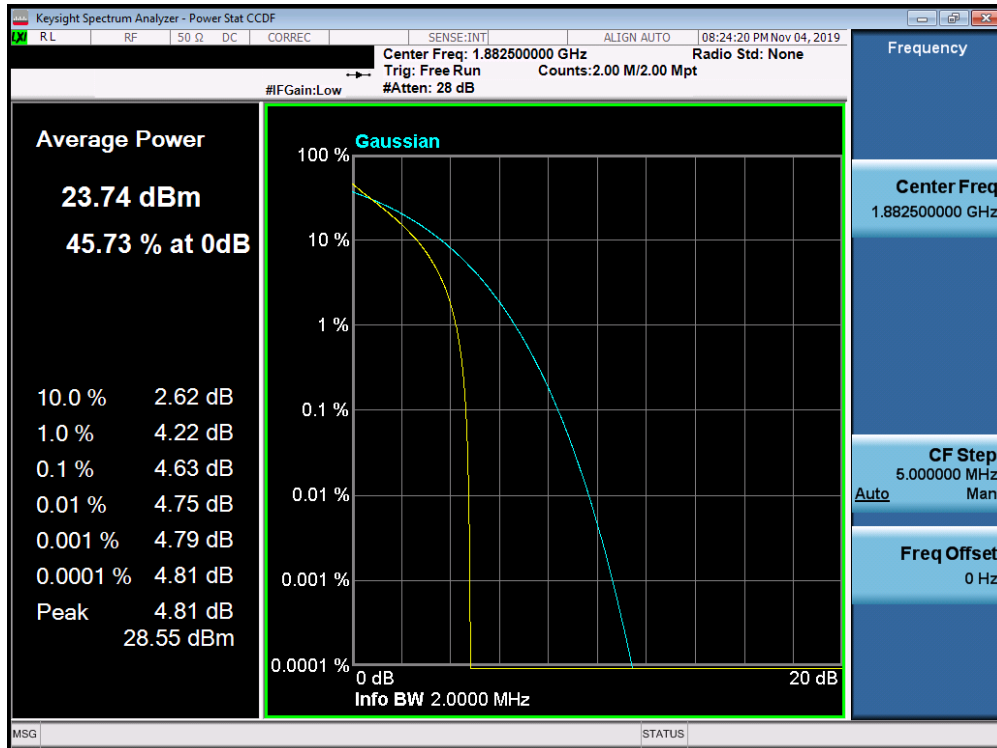
Plot 7-298. PAR Plot (Band 66/4 – 20.0MHz 16-QAM - Full RB Configuration)



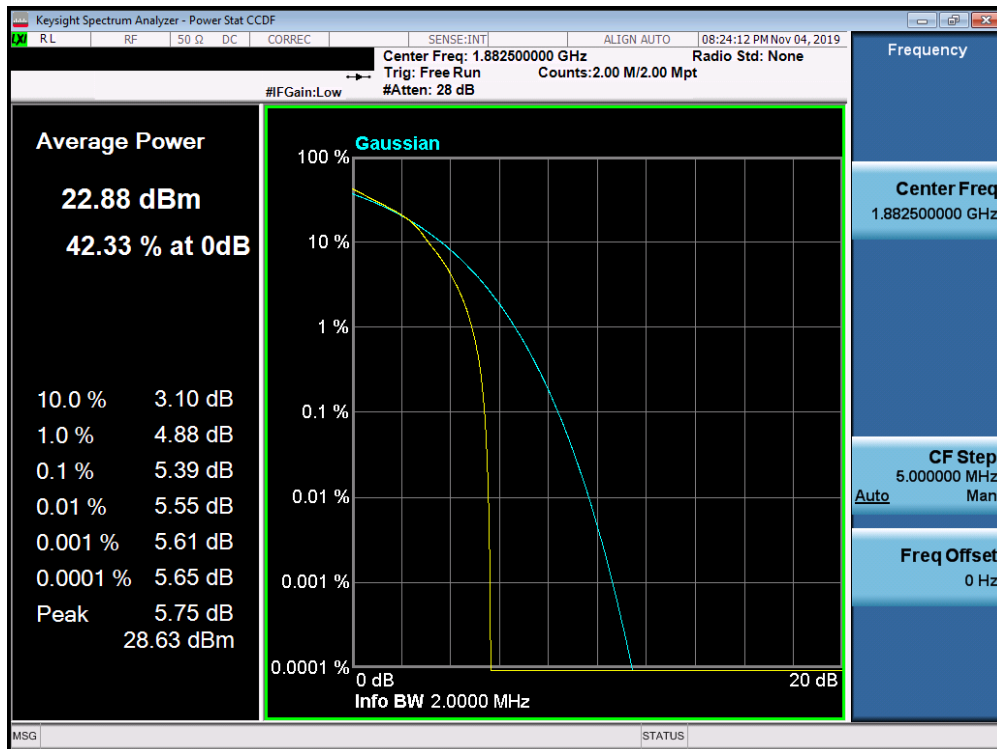
Plot 7-299. PAR Plot (Band 66/4 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 174 of 250

Band 25/2

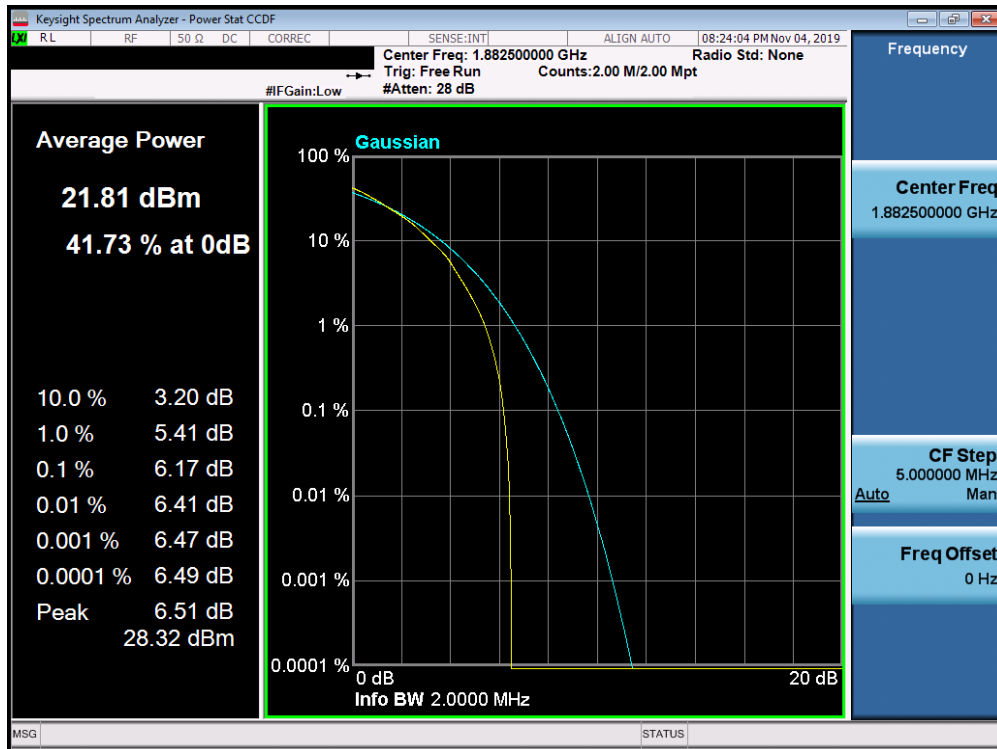


Plot 7-300. PAR Plot (Band 25/2 - 1.4MHz QPSK - Full RB Configuration)

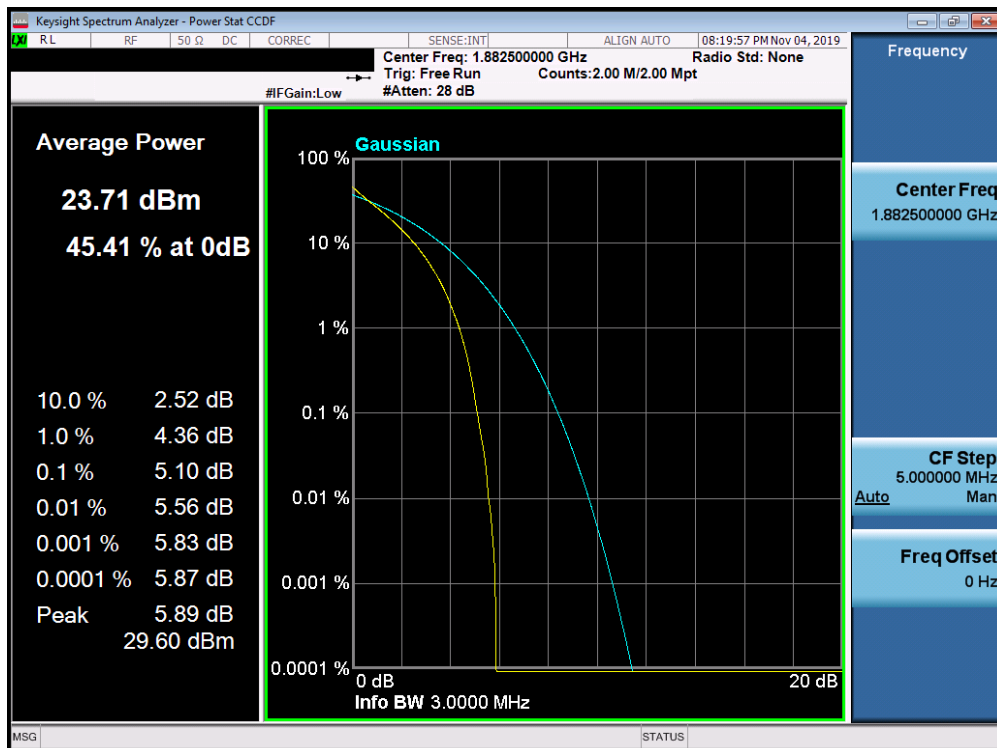


Plot 7-301. PAR Plot (Band 25/2 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 175 of 250

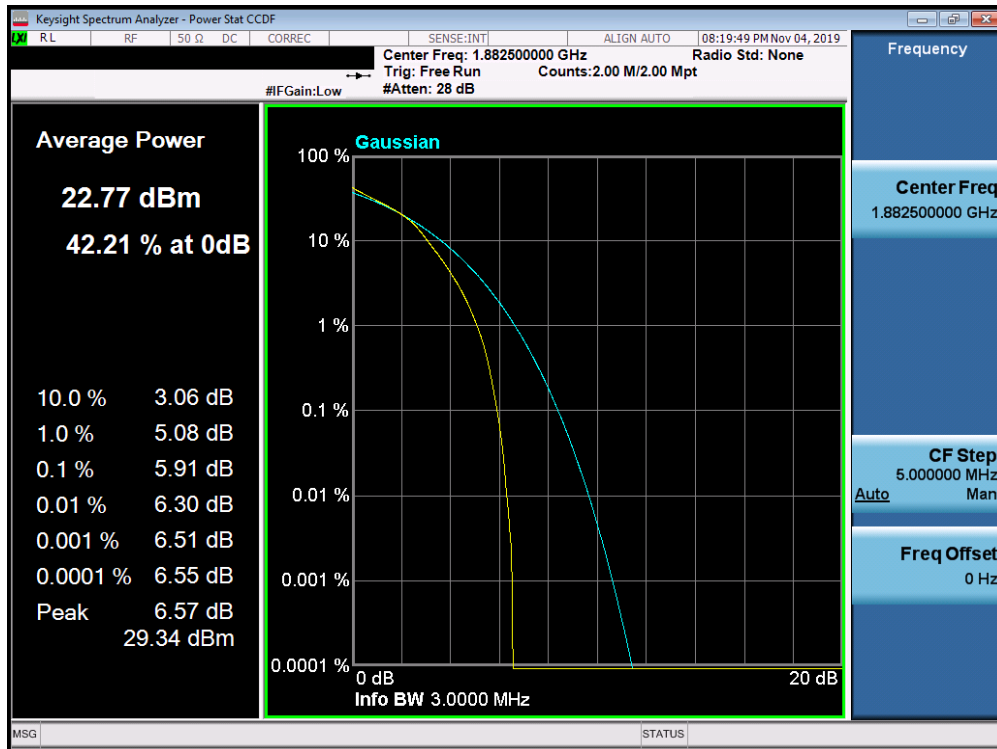


Plot 7-302. PAR Plot (Band 25/2 - 1.4MHz 64-QAM - Full RB Configuration)

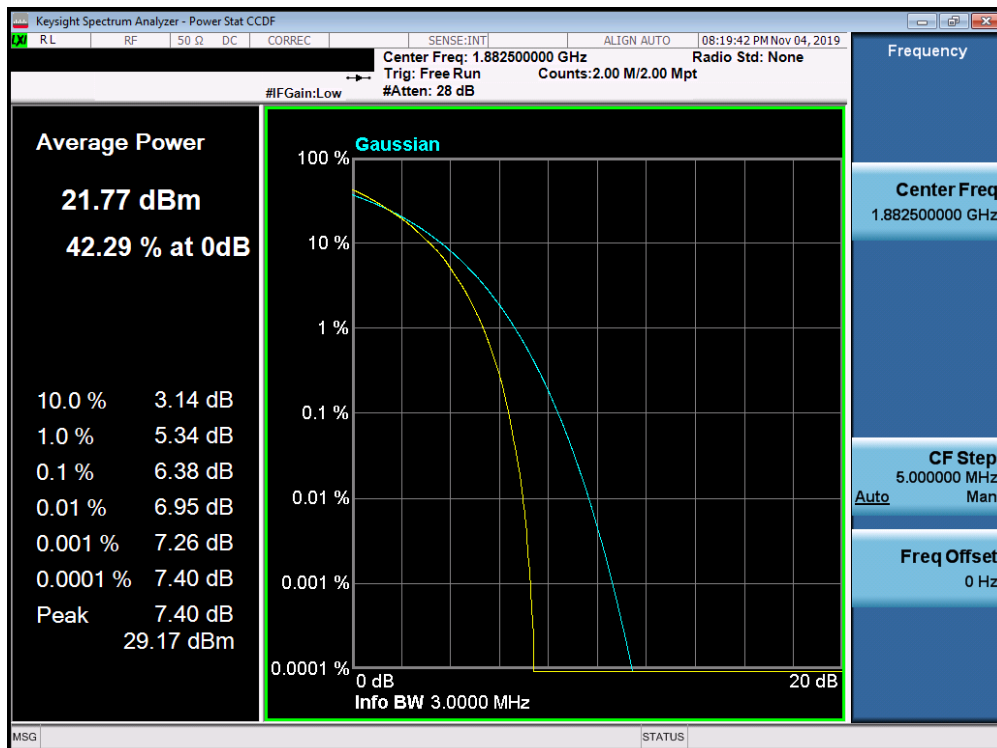


Plot 7-303. PAR Plot (Band 25/2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 176 of 250

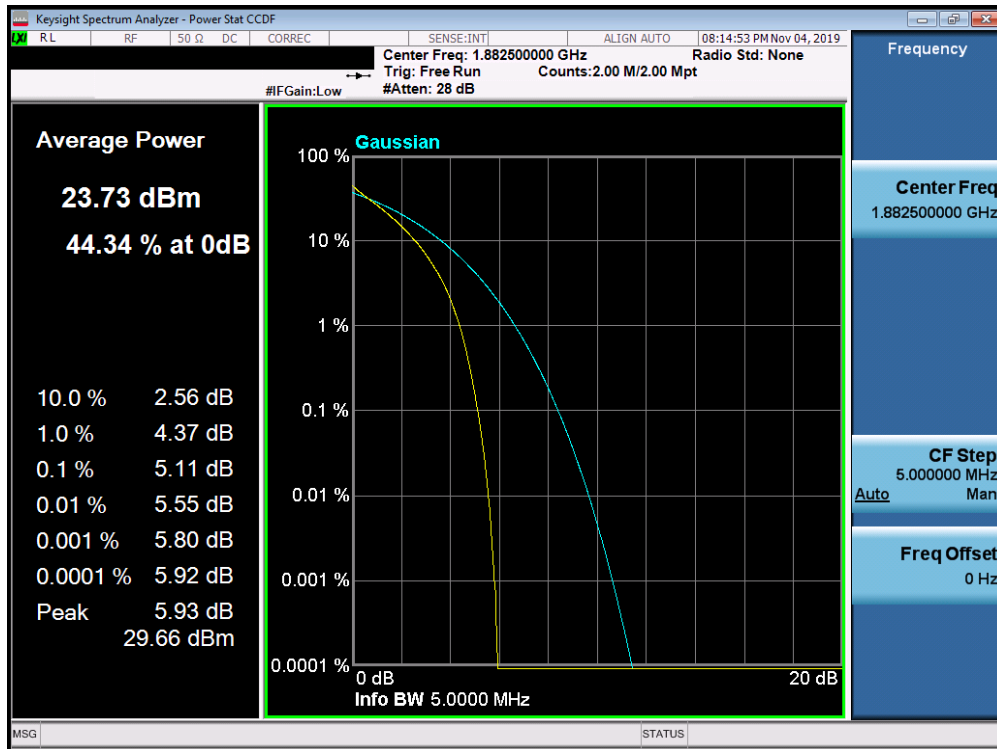


Plot 7-304. PAR Plot (Band 25/2 - 3.0MHz 16-QAM - Full RB Configuration)

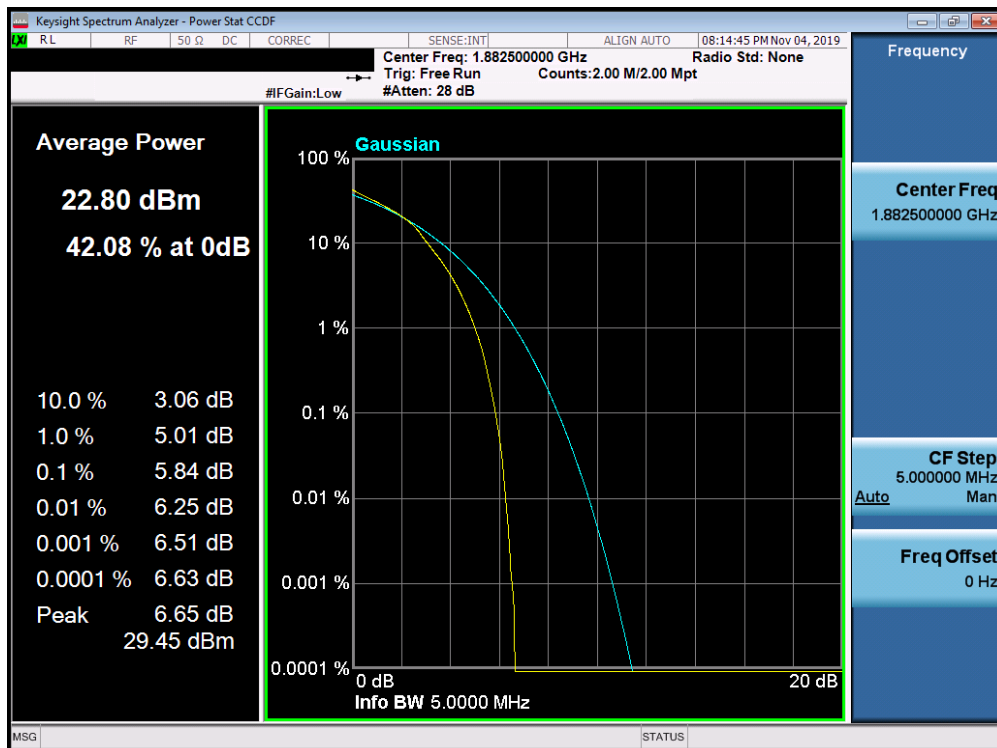


Plot 7-305. PAR Plot (Band 25/2 - 3.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset	Page 177 of 250

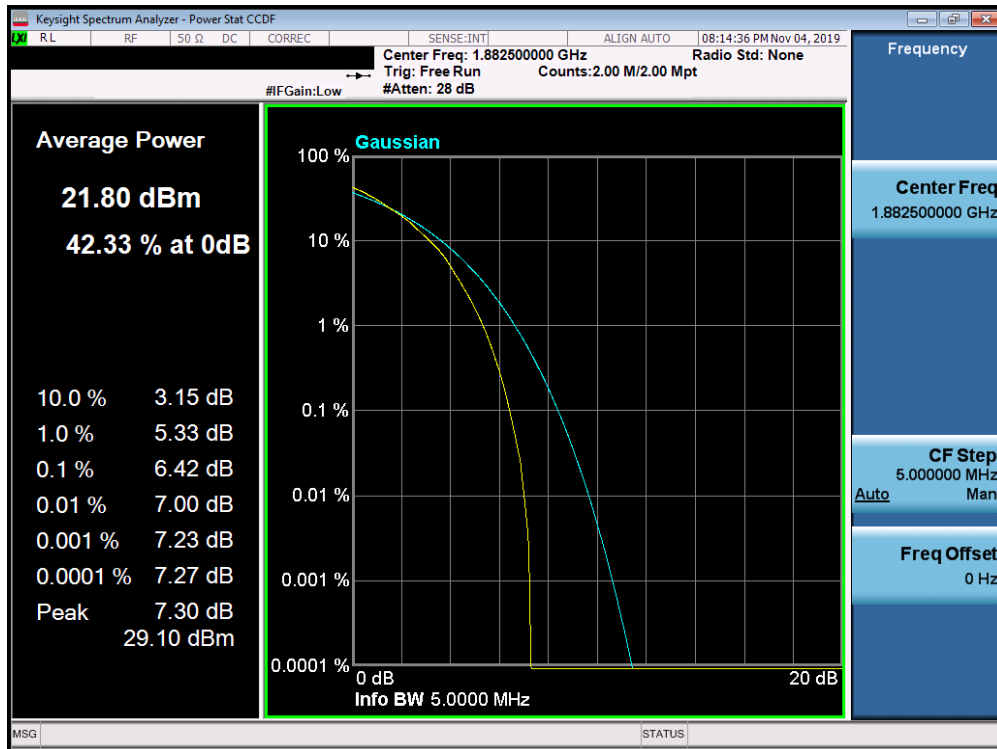


Plot 7-306. PAR Plot (Band 25/2 - 5.0MHz QPSK - Full RB Configuration)

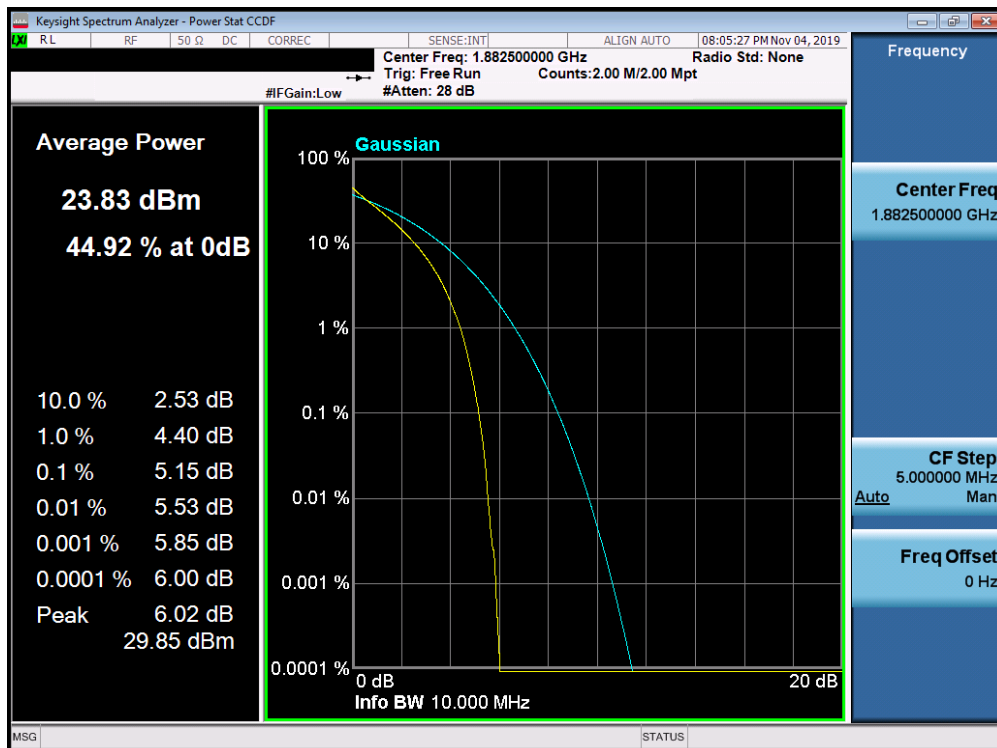


Plot 7-307. PAR Plot (Band 25/2 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 178 of 250

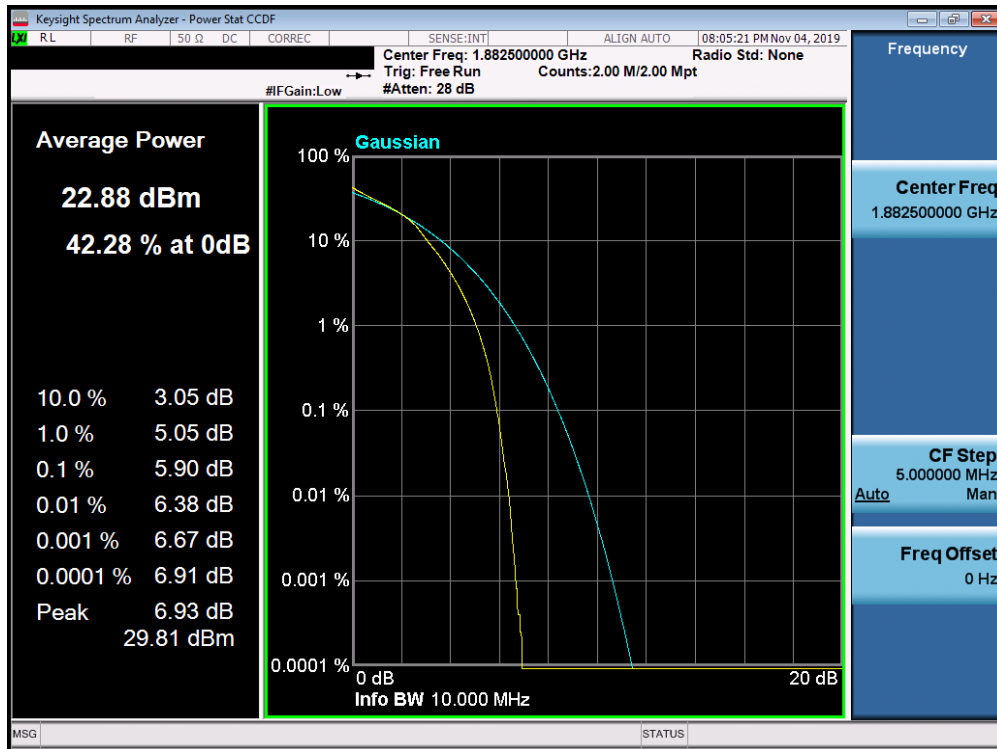


Plot 7-308. PAR Plot (Band 25/2 - 5.0MHz 64-QAM - Full RB Configuration)

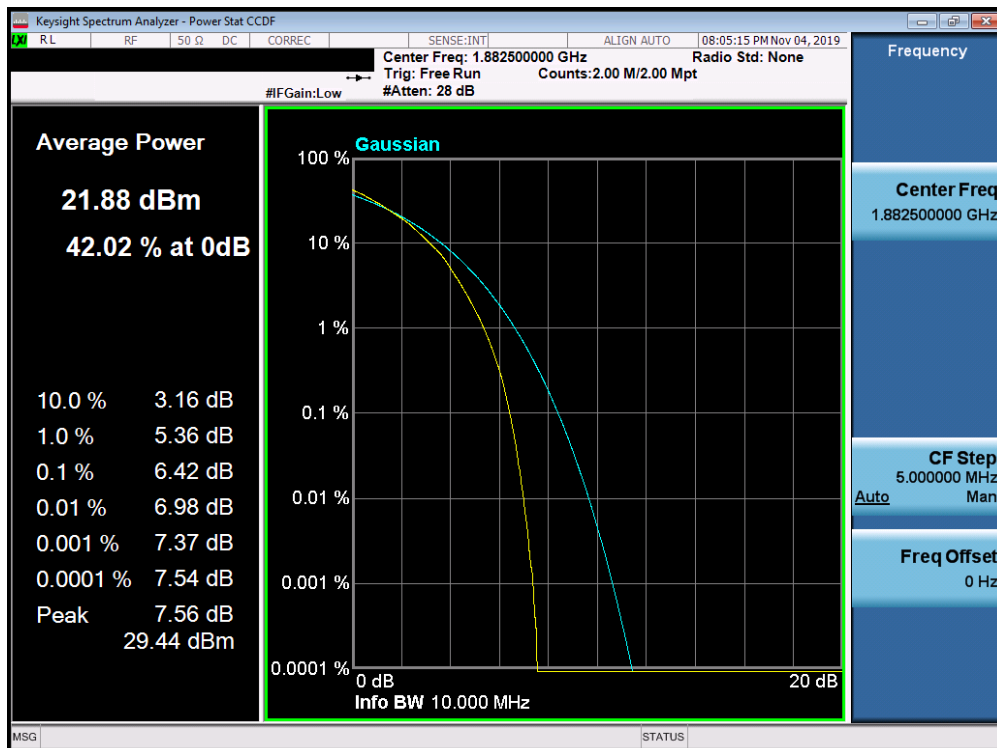


Plot 7-309. PAR Plot (Band 25/2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset	Page 179 of 250

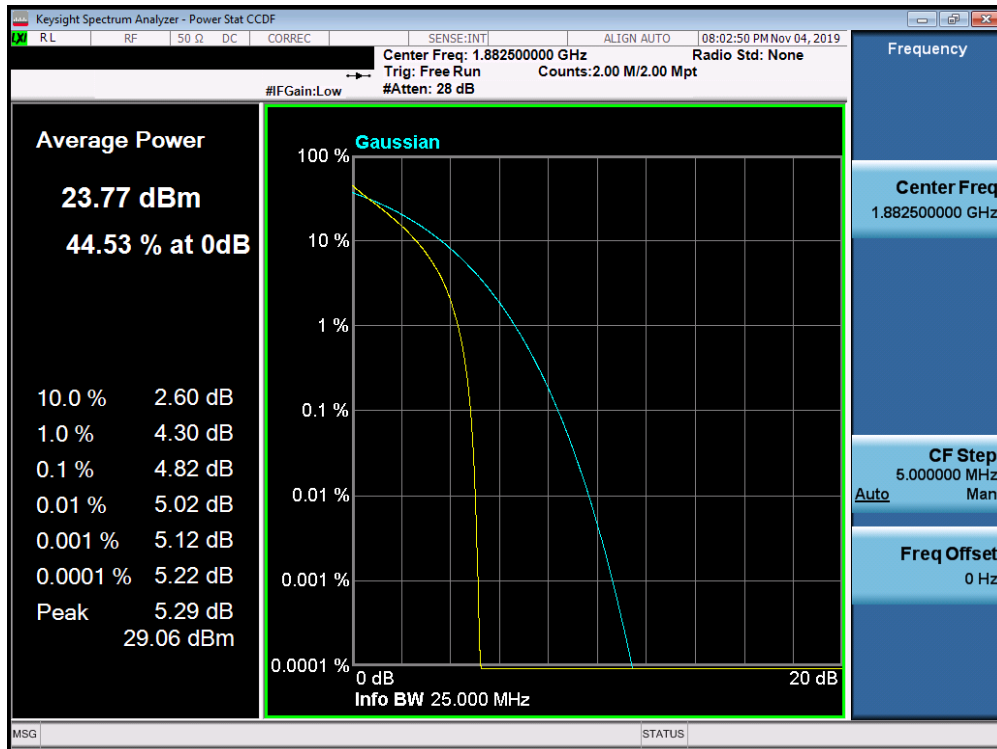


Plot 7-310. PAR Plot (Band 25/2 - 10.0MHz 16-QAM - Full RB Configuration)

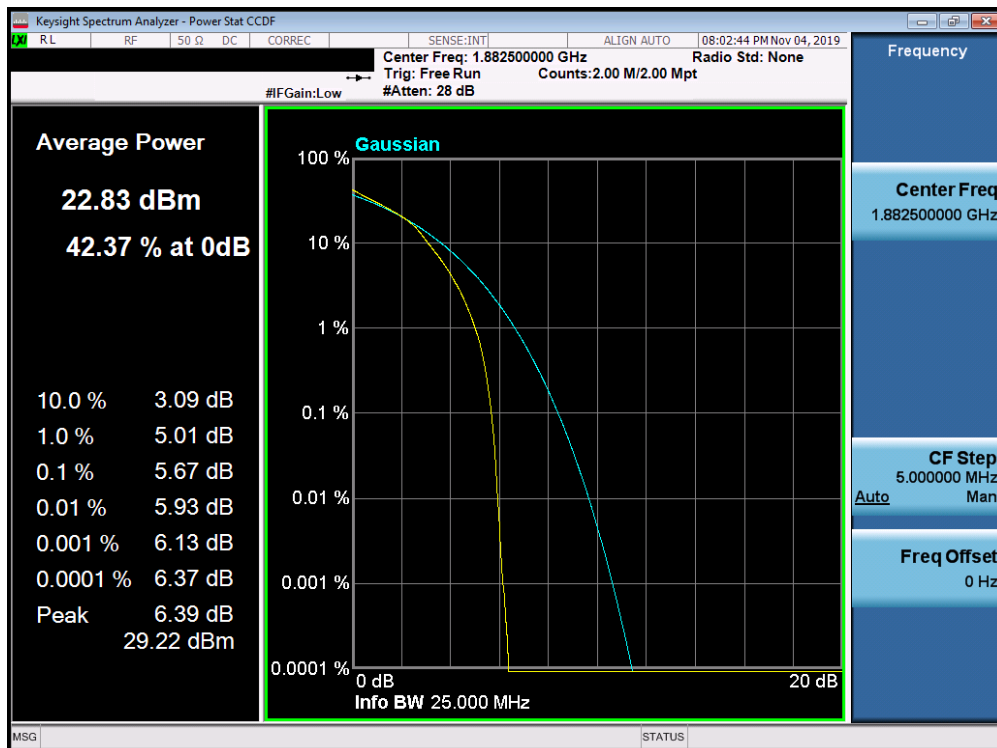


Plot 7-311. PAR Plot (Band 25/2 - 10.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 180 of 250

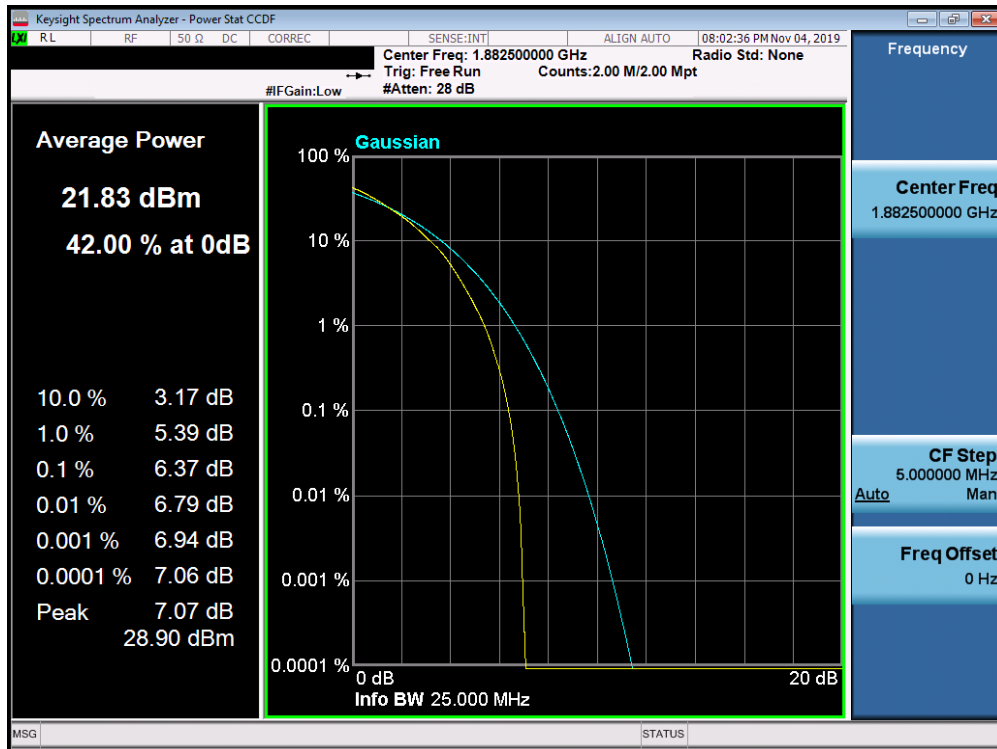


Plot 7-312. PAR Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)

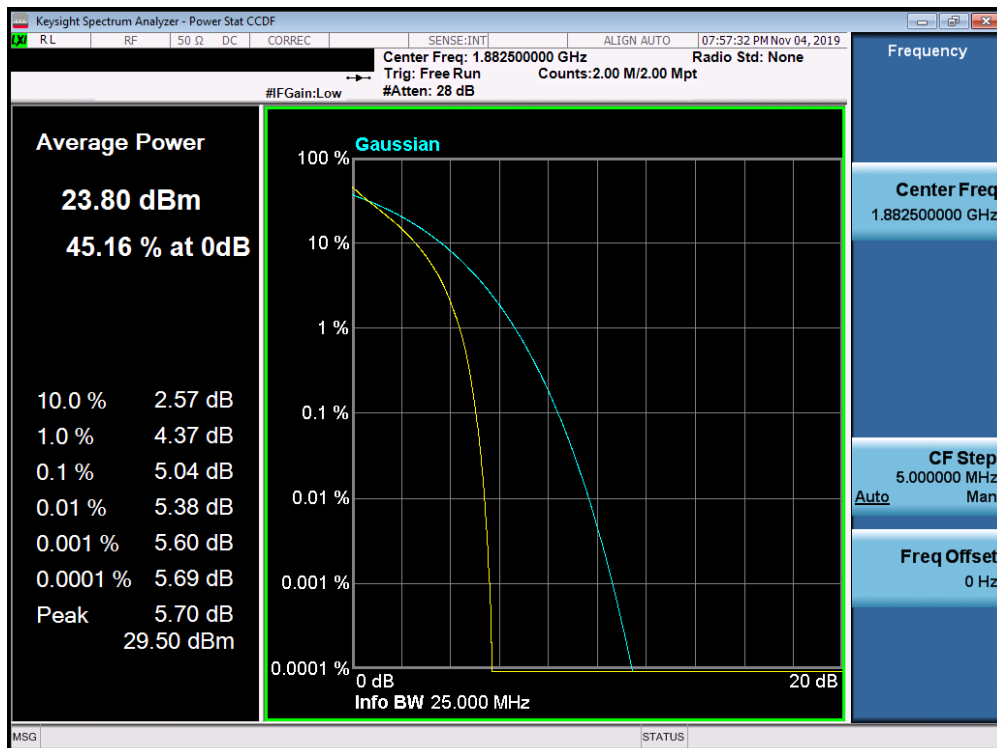


Plot 7-313. PAR Plot (Band 25/2 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset	Page 181 of 250

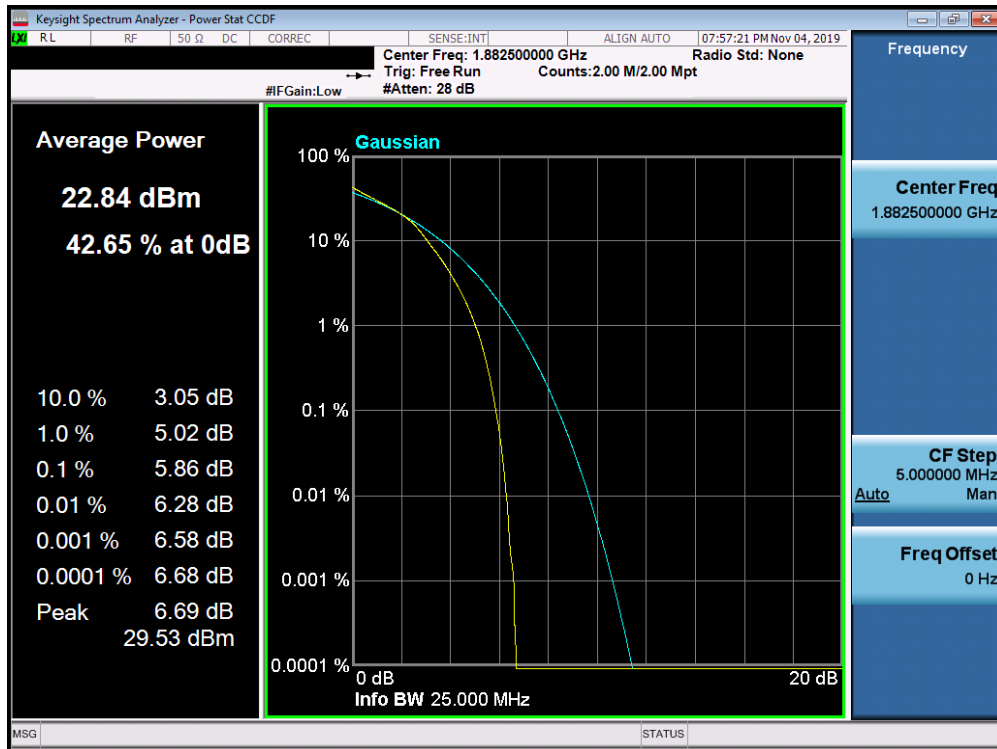


Plot 7-314. PAR Plot (Band 25/2 - 15.0MHz 64-QAM - Full RB Configuration)

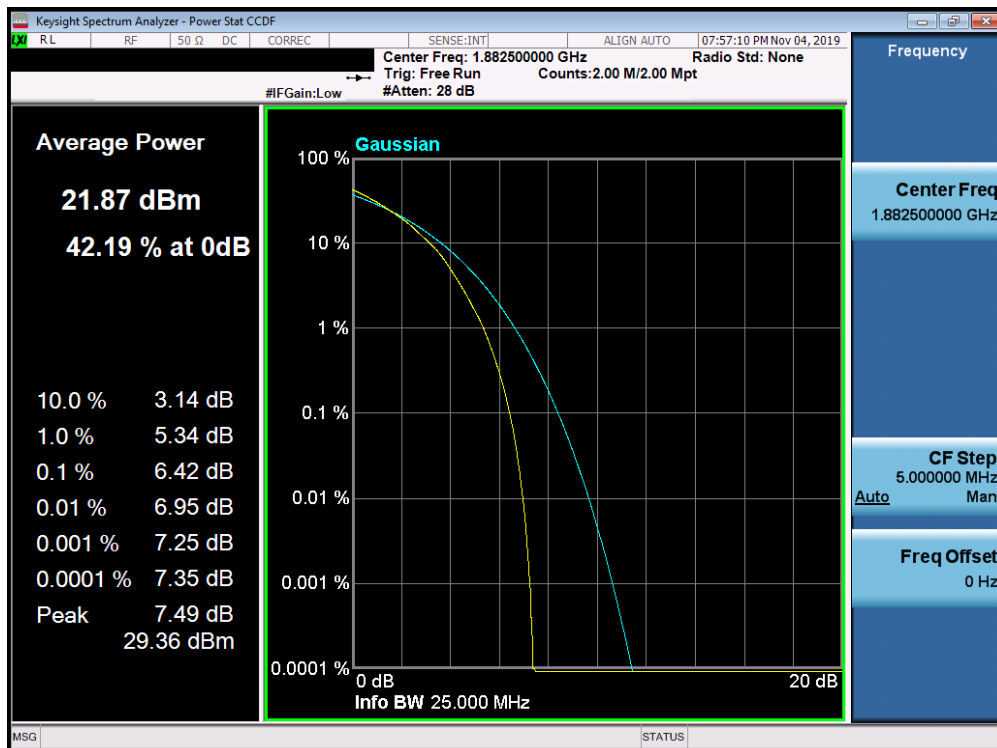


Plot 7-315. PAR Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 182 of 250



Plot 7-316. PAR Plot (Band 25/2 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-317. PAR Plot (Band 25/2 - 20.0MHz 64-QAM - Full RB Configuration)

FCC ID: ZNFL455DL	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2-ZNF	Test Dates: 10/28 - 11/26/2019	EUT Type: Portable Handset		Page 183 of 250

7.6 Additional Maximum Power Reduction (A-MPR)

§2.1046

Test Overview

A-MPR is implemented in this device when operating at Power Class 2 in LTE Band 41 per the A-MPR specification in 3GPP TS 36.101. The conducted powers are shown herein to cover the different A-MPR levels specified in the standard. Measurement equipment was set up with triggering/gating on the spectrum analyzer such that powers were measured only during the on-time of the signal.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.2.2

Test Settings

1. Span = 2 x OBW to 3 x OBW
2. RBW = 1% to 5% of the OBW
3. Number of measurement points in sweep $\geq 2 \times \text{span} / \text{RBW}$
4. Sweep = auto-couple (less than transmission burst duration)
5. Detector = RMS (power)
6. Trigger was set to enable power measurements only on full power bursts
7. Trace was allowed to stabilize
8. Spectrum analyzer's "Channel Power" function was used to compute the power by integrating the spectrum across the OBW of the signal

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

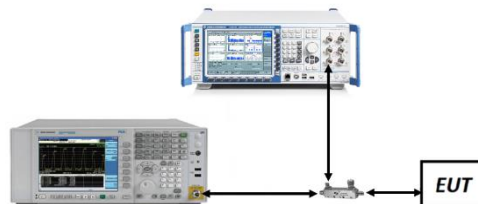


Figure 7-5. Test Instrument & Measurement Setup

Test Notes

None.

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/209	EUT Type: Portable Handset	Page 184 of 250

MCC	MNC	Channel BW [MHz]	Channel Number	Channel Frequency [MHz]	Modulation	RB Size	RB Offset	MPR [dB]	MPR [dB]	A-MPR [dB]	A-MPR [dB]	Measured Power [dBm]	Lowest Typical Power [dBm]	Delta [dB]
310	120	10	39700	2501	QPSK	1	0	0	0	≤ 5	5	21.13	20.7	0.43
					16-QAM	1	0	≤ 1	1		5	20.38	19.7	0.68
					64-QAM	1	0	≤ 2	2		5	19.60	18.7	0.90
		10	39700	2501	QPSK	20	0	0	1	≤ 2	2	23.59	22.7	0.89
					16-QAM	20	0	≤ 1	2		2	22.74	21.7	1.04
					64-QAM	20	0	≤ 2	3		2	21.58	20.7	0.88
		10	39700	2501	QPSK	50	0	0	1	≤ 3	3	22.60	21.7	0.90
					16-QAM	50	0	≤ 1	2		3	21.60	20.7	0.90
					64-QAM	50	0	≤ 2	3		3	20.63	19.7	0.93
		10	39700	2501	QPSK	25	20	0	1	≤ 1	1	24.66	23.7	0.96
					16-QAM	25	20	≤ 1	2		1	23.03	22.7	0.33
					64-QAM	25	20	≤ 2	3		1	22.29	21.7	0.59
		10	39700	2501	QPSK	1	36	0	0	0	0	26.11	25.7	0.41
					16-QAM	1	36	≤ 1	1		0	25.46	24.7	0.76
					64-QAM	1	36	≤ 2	2		0	24.60	23.7	0.90
		20	39750	2506	QPSK	1	0	0	0	≤ 5	5	21.48	20.7	0.78
					16-QAM	1	0	≤ 1	1		5	21.10	19.7	1.40
					64-QAM	1	0	≤ 2	2		5	19.90	18.7	1.20
		20	39750	2506	QPSK	20	0	0	1	≤ 2	2	23.49	22.7	0.79
					16-QAM	20	0	≤ 1	2		2	22.52	21.7	0.82
					64-QAM	20	0	≤ 2	3		2	21.47	20.7	0.77
		20	39750	2506	QPSK	100	0	0	1	≤ 4	4	21.58	20.7	0.88
					16-QAM	100	0	≤ 1	2		4	20.63	19.7	0.93
					64-QAM	100	0	≤ 2	3		4	19.67	18.7	0.97
		20	39750	2506	QPSK	75	24	0	1	≤ 3	3	22.62	21.7	0.92
					16-QAM	75	24	≤ 1	2		3	21.66	20.7	0.96
					64-QAM	75	24	≤ 2	3		3	20.70	19.7	1.00
		20	39750	2506	QPSK	1	77	0	0	0	0	26.75	25.7	1.05
					16-QAM	1	77	≤ 1	1		0	26.32	24.7	1.62
					64-QAM	1	77	≤ 2	2		0	25.06	23.7	1.36

Table 7-3. A-MPR Conducted Power Measurements

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/209	EUT Type: Portable Handset	Page 185 of 250

7.7 Uplink Carrier Aggregation

§27.53(m)

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

For Band 41, the minimum permissible attenuation level of any spurious emission is $55 + 10 \log_{10}(P_{\text{Watts}})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

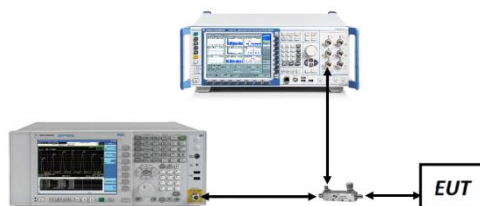


Figure 7-6. Test Instrument & Measurement Setup

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 186 of 250

Test Notes

1. For Band 41, uplink carrier aggregation is supported in this EUT while operating in Power Class 2 and 3.
2. Conducted power and spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation, as shown in Table 7-4 and 7-6 below, with both carriers set to transmit using 1RB.
3. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

FCC ID: ZNFL455DL	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset	Page 187 of 250

Uplink CA Configuration B41 (PC3)

Power State	PCC							SCC							Power
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset	ULCA Tx.Power (dBm)
Max	LTE B41	20	39750	2506	QPSK	1	99	LTE B41	20	39948	2525.8	QPSK	1	0	23.44
Max	LTE B41	20	40620	2593	QPSK	1	99	LTE B41	20	40818	2612.8	QPSK	1	0	23.52
Max	LTE B41	20	41490	2680	QPSK	1	0	LTE B41	20	41292	2660.2	QPSK	1	99	23.41

Table 7-4. Conducted Powers (B41 (PC3) – 20MHz + 20MHz Channel Bandwidth - PCC/SCC: 1RB)

Power State	PCC							SCC							Power
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	ULCA Tx.Power (dBm)
Max	LTE B41	20	40620	2593	QPSK	100	0	LTE B41	20	40818	2612.8	QPSK	100	0	21.95
Max	LTE B41	20	40620	2593	16-QAM	100	0	LTE B41	20	40818	2612.8	16-QAM	100	0	20.88
Max	LTE B41	20	40620	2593	64-QAM	100	0	LTE B41	20	40818	2612.8	64-QAM	100	0	20.87

Table 7-5. Conducted Powers (B41 (PC3) with Various Combinations for 20MHz + 20MHz Channel Bandwidth)

FCC ID: ZNFL455DL	 PCTEST ENGINEERING LABORATORY, INC.		MEASUREMENT REPORT (CERTIFICATION)	 LG	Approved by: Quality Manager
Test Report S/N: 1M1910280174-03-R2.ZNF	Test Dates: 10/28 – 11/26/2019	EUT Type: Portable Handset			Page 188 of 250