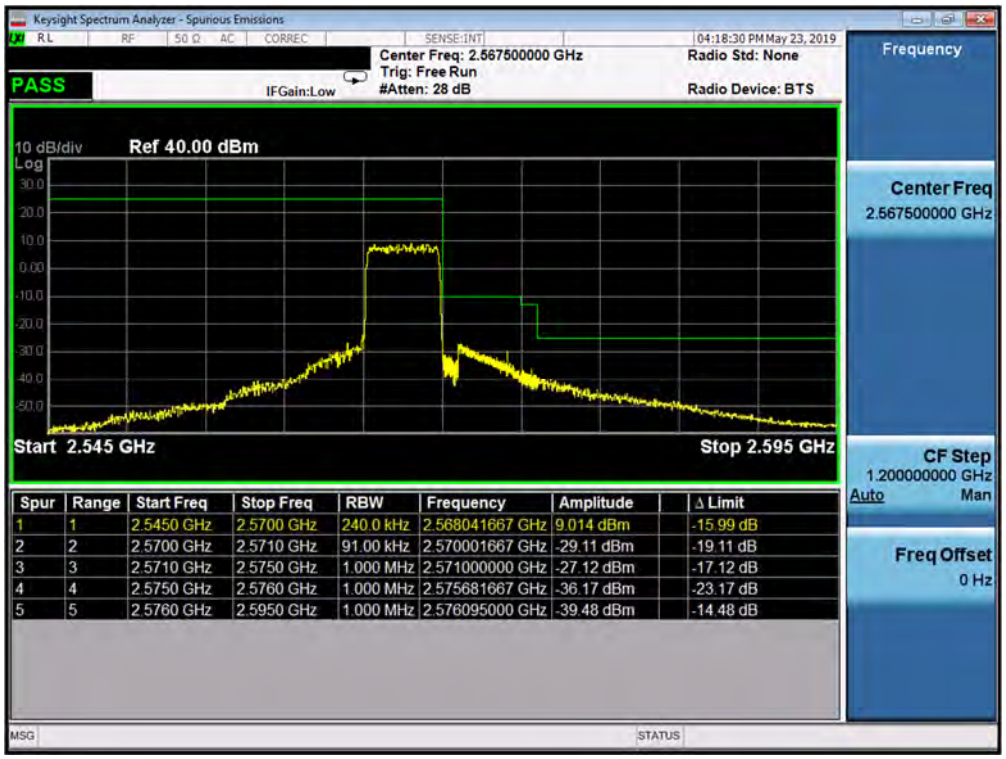
Band 7

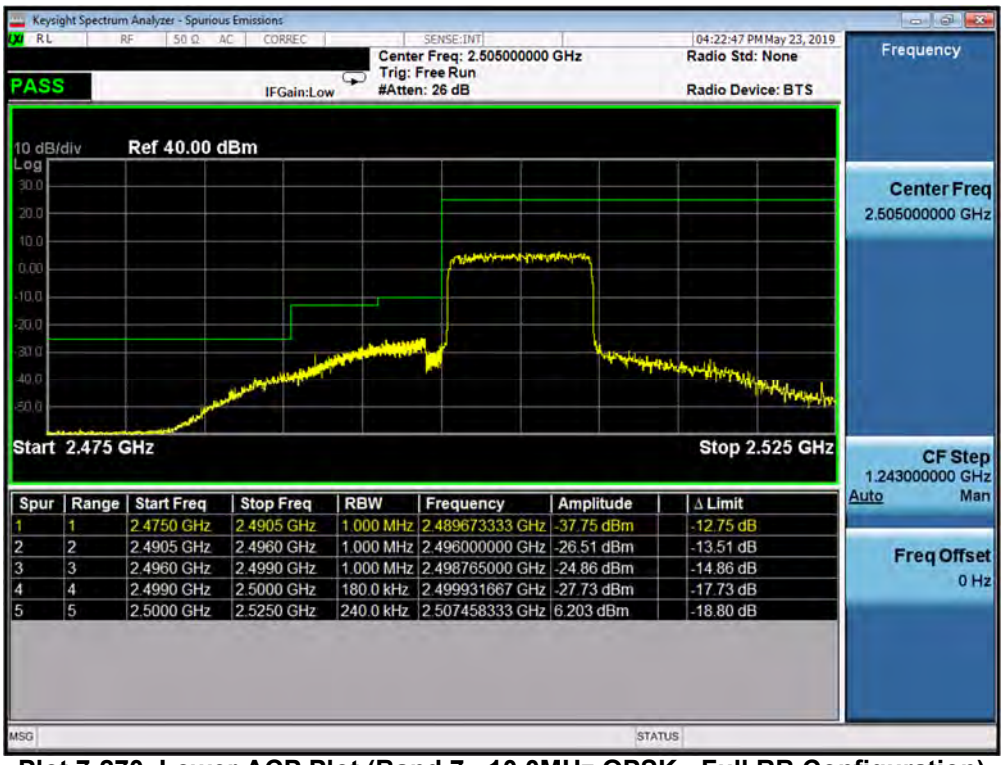
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4940 GHz	1.000 MHz	2.493588333 GHz	-36.56 dBm	-11.56 dB
2	2	2.4940 GHz	2.4960 GHz	1.000 MHz	2.495933333 GHz	-33.40 dBm	-20.40 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.496915000 GHz	-25.22 dBm	-15.22 dB
4	4	2.4990 GHz	2.5000 GHz	91.00 kHz	2.499971667 GHz	-27.74 dBm	-17.74 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.502166667 GHz	9.456 dBm	-15.54 dB

Plot 7-268. Lower ACP Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)

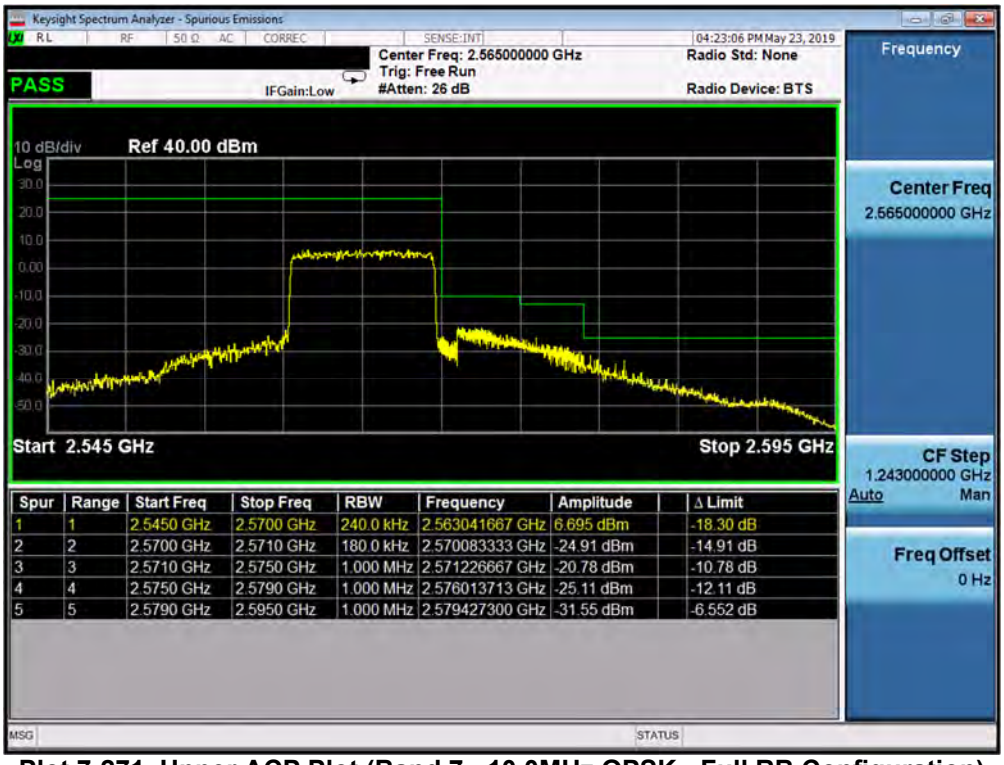


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.568041667 GHz	9.014 dBm	-15.99 dB
2	2	2.5700 GHz	2.5710 GHz	91.00 kHz	2.570001667 GHz	-29.11 dBm	-19.11 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571000000 GHz	-27.12 dBm	-17.12 dB
4	4	2.5750 GHz	2.5760 GHz	1.000 MHz	2.575681667 GHz	-36.17 dBm	-23.17 dB
5	5	2.5760 GHz	2.5950 GHz	1.000 MHz	2.576095000 GHz	-39.48 dBm	-14.48 dB

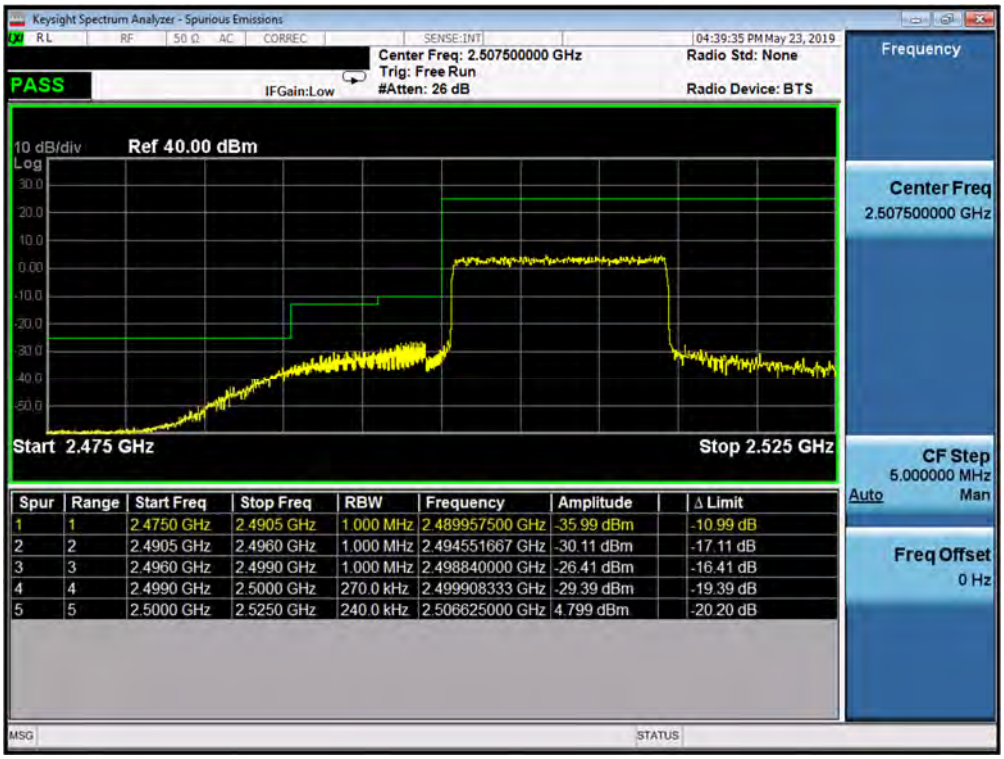
Plot 7-269. Upper ACP Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



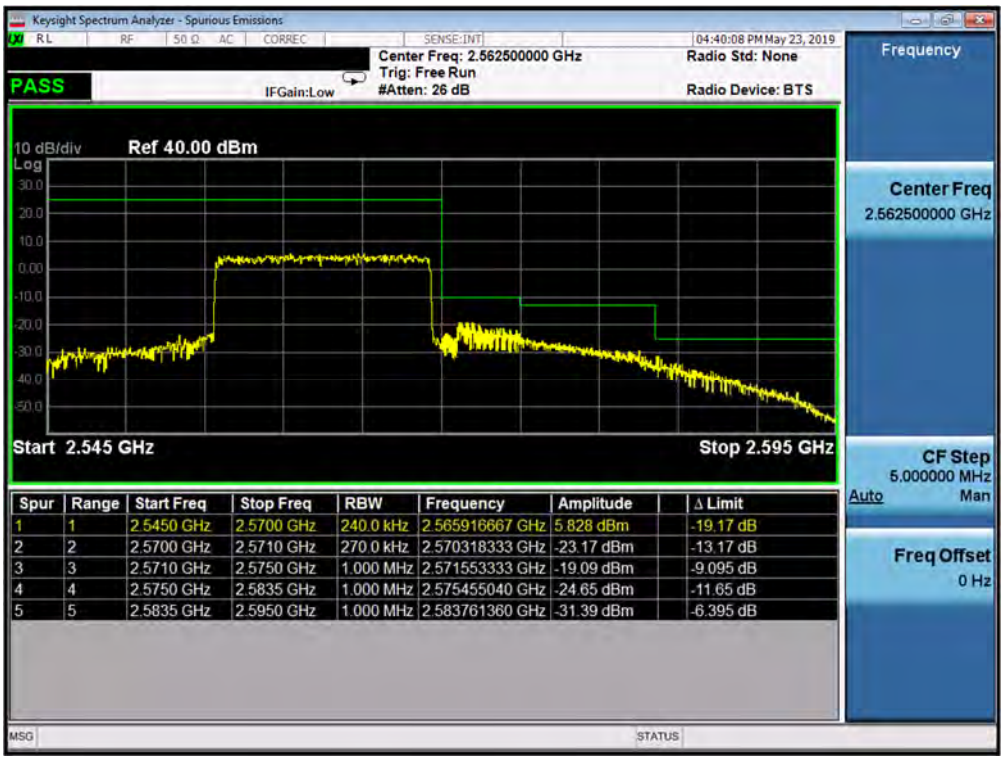
Plot 7-270. Lower ACP Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)



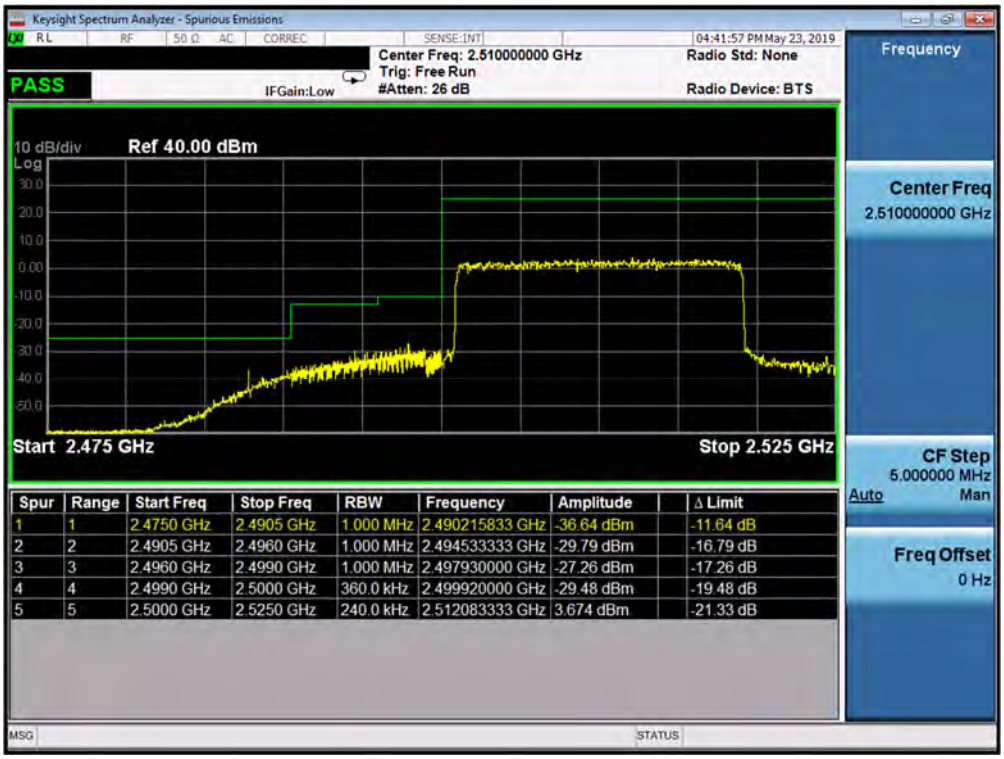
Plot 7-271. Upper ACP Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-272. Lower ACP Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)

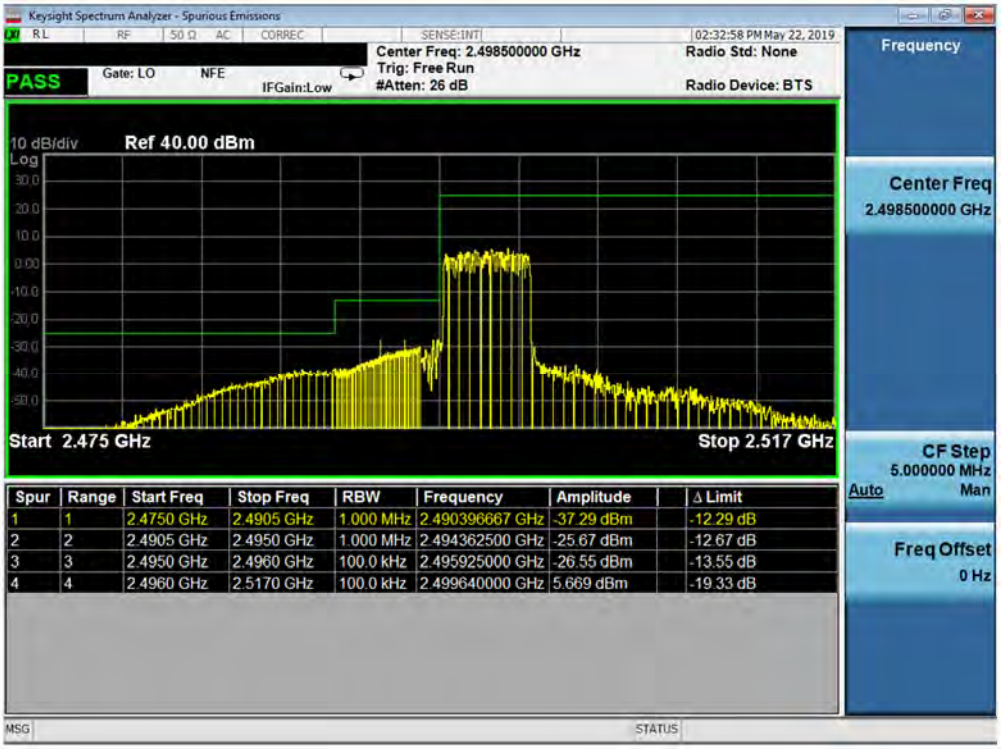


Plot 7-273. Upper ACP Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)



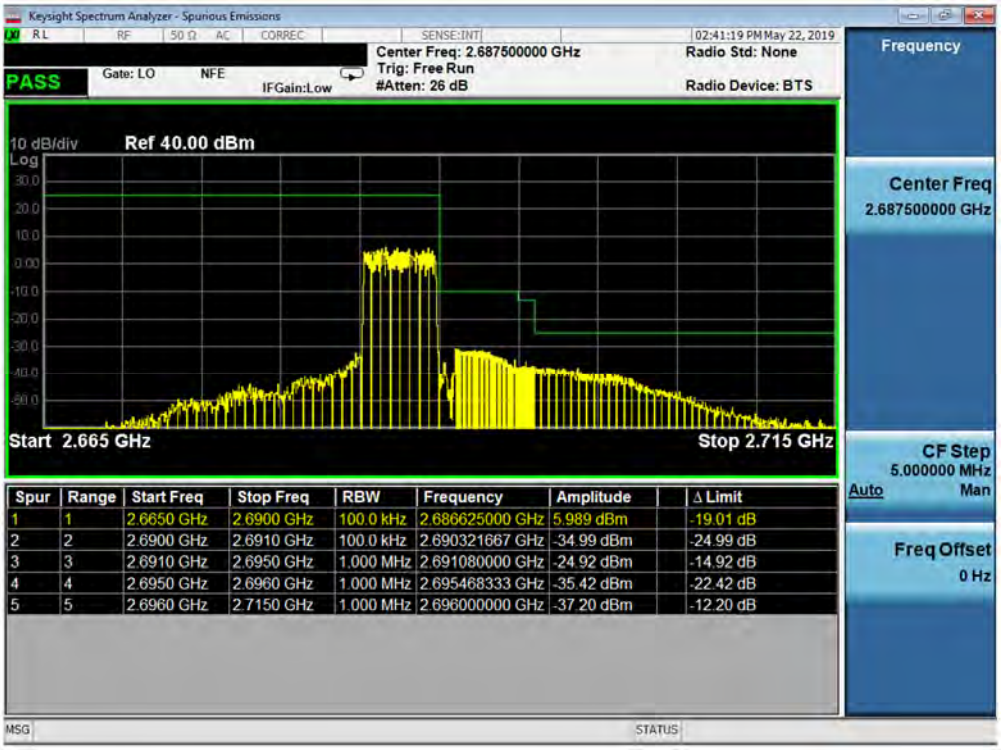
Plot 7-274. Lower ACP Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)

Plot 7-275. Upper ACP Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)



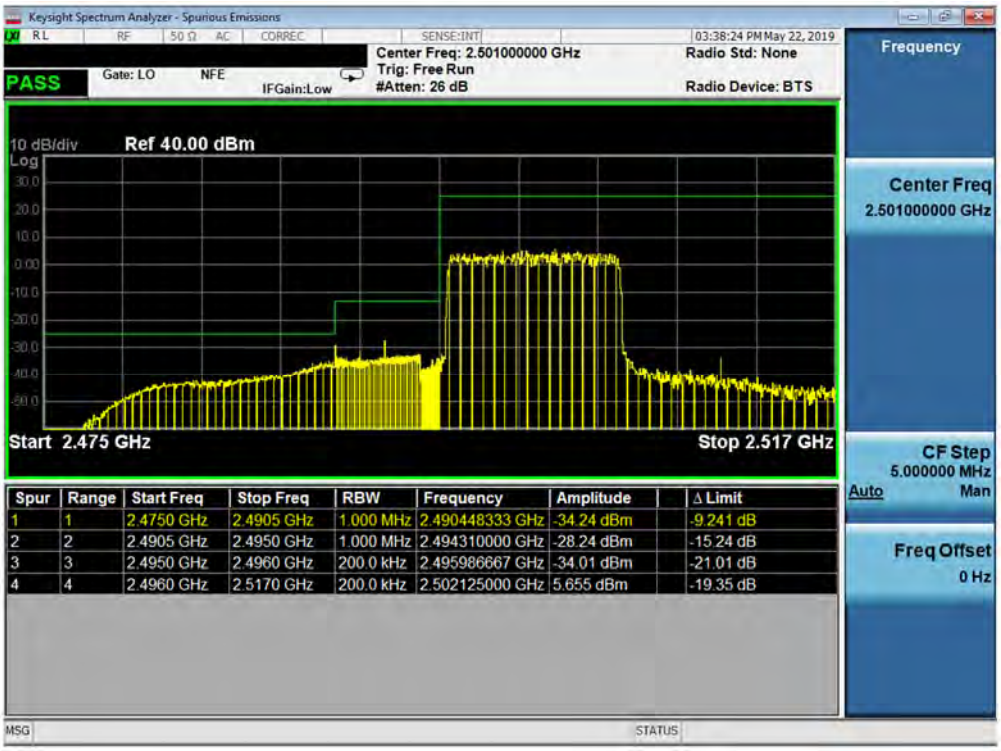
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490396667 GHz	-37.29 dBm	-12.29 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494362500 GHz	-25.67 dBm	-12.67 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495925000 GHz	-26.55 dBm	-13.55 dB
4	4	2.4960 GHz	2.5170 GHz	100.0 kHz	2.499640000 GHz	5.669 dBm	-19.33 dB

Plot 7-276. Lower ACP Plot at 2496 MHz (Band 41 - 5.0MHz QPSK - Full RB Configuration)



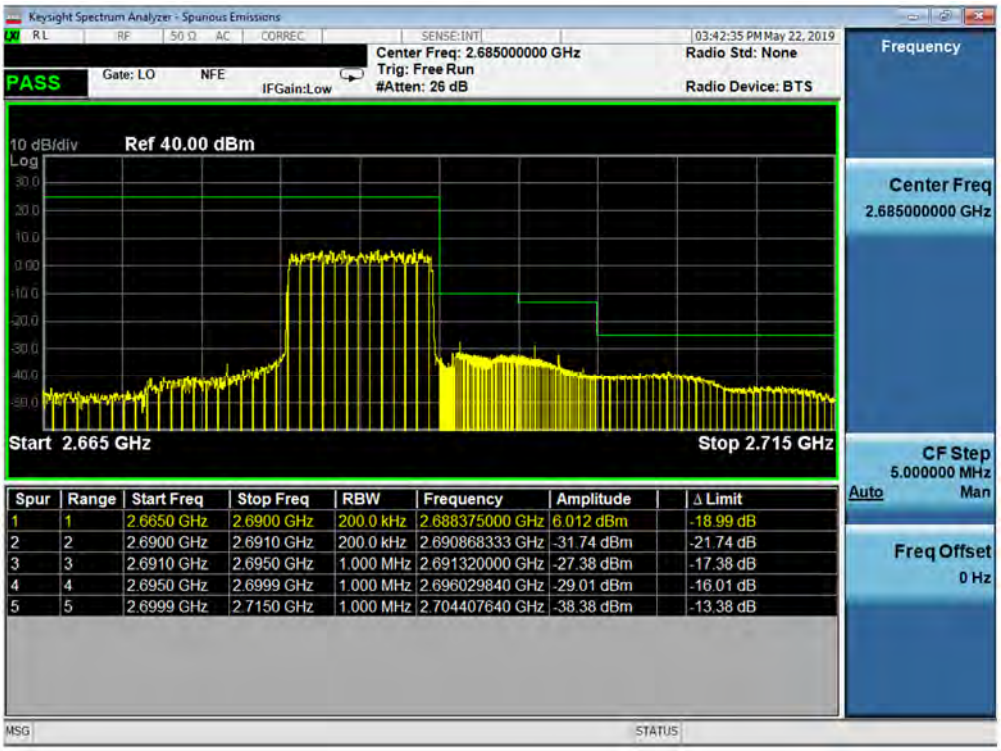
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	100.0 kHz	2.686625000 GHz	5.989 dBm	-19.01 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690321667 GHz	-34.99 dBm	-24.99 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691080000 GHz	-24.92 dBm	-14.92 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695468333 GHz	-35.42 dBm	-22.42 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696000000 GHz	-37.20 dBm	-12.20 dB

Plot 7-277. Upper ACP Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490448333 GHz	-34.24 dBm	-9.241 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494310000 GHz	-28.24 dBm	-15.24 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495986667 GHz	-34.01 dBm	-21.01 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.502125000 GHz	5.655 dBm	-19.35 dB

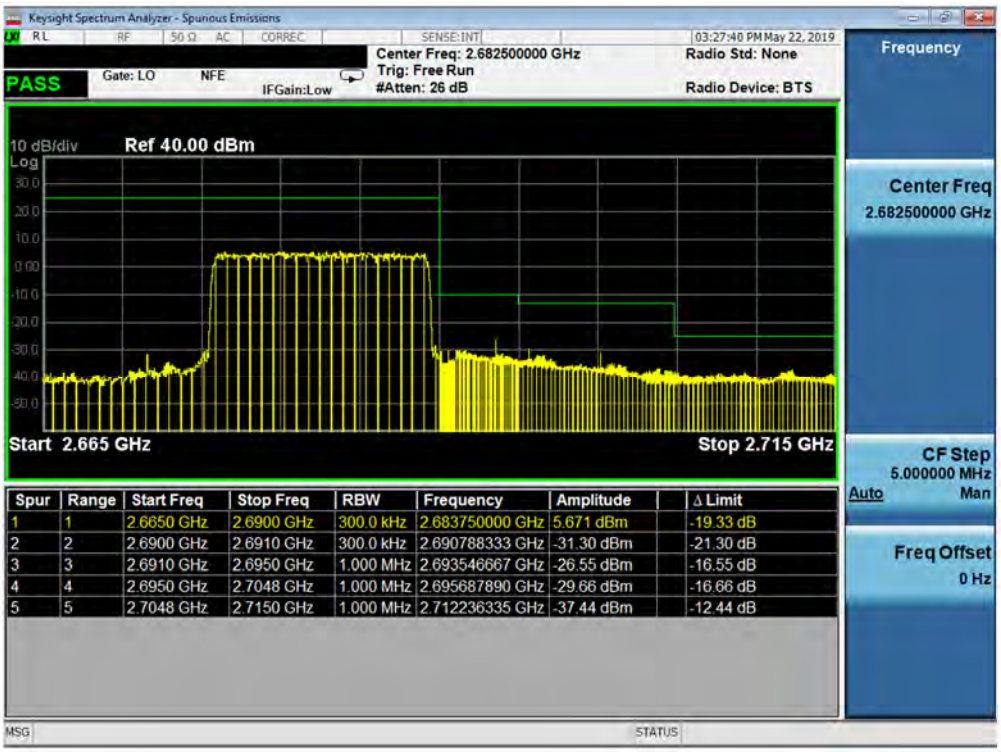
Plot 7-278. Lower ACP Plot at 2496 MHz (Band 41 - 10.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	200.0 kHz	2.688375000 GHz	6.012 dBm	-18.99 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690868333 GHz	-31.74 dBm	-21.74 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691320000 GHz	-27.38 dBm	-17.38 dB
4	4	2.6950 GHz	2.6999 GHz	1.000 MHz	2.696029840 GHz	-29.01 dBm	-16.01 dB
5	5	2.6999 GHz	2.7150 GHz	1.000 MHz	2.704407640 GHz	-38.38 dBm	-13.38 dB

Plot 7-279. Upper ACP Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-280. Lower ACP Plot at 2496 MHz (Band 41 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-281. Upper ACP Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)

Plot 7-282. Lower ACP Plot at 2496 MHz (Band 41 - 20.0MHz QPSK - Full RB Configuration)

Plot 7-283. Upper ACP Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)

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 ≥ 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. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

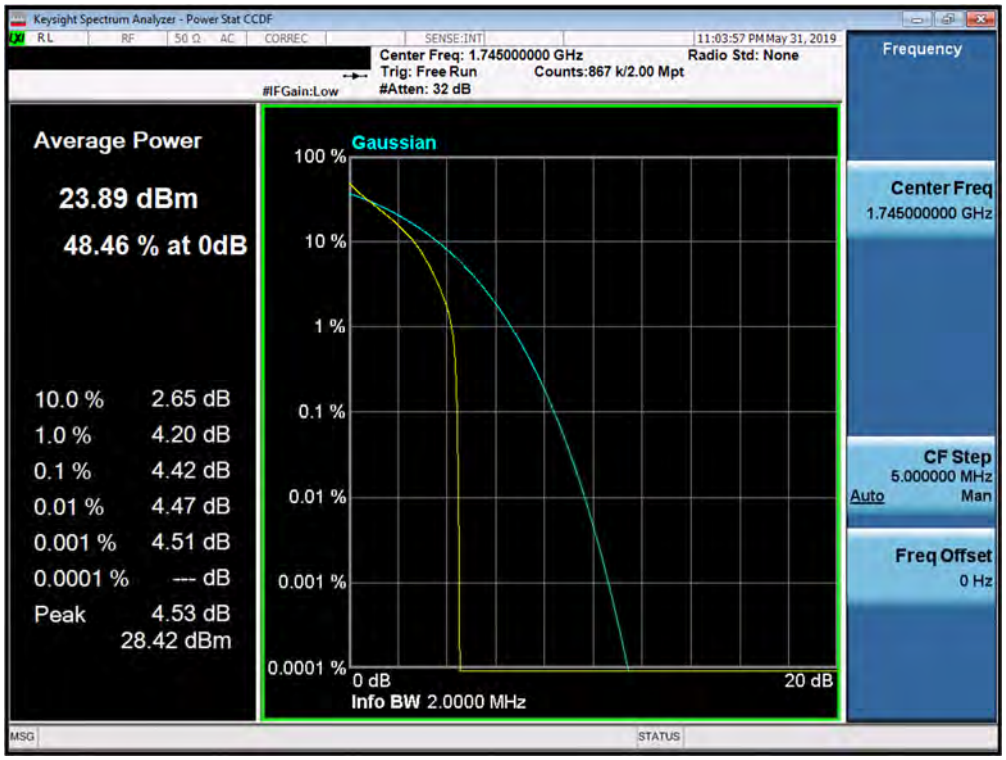
Test Setup

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

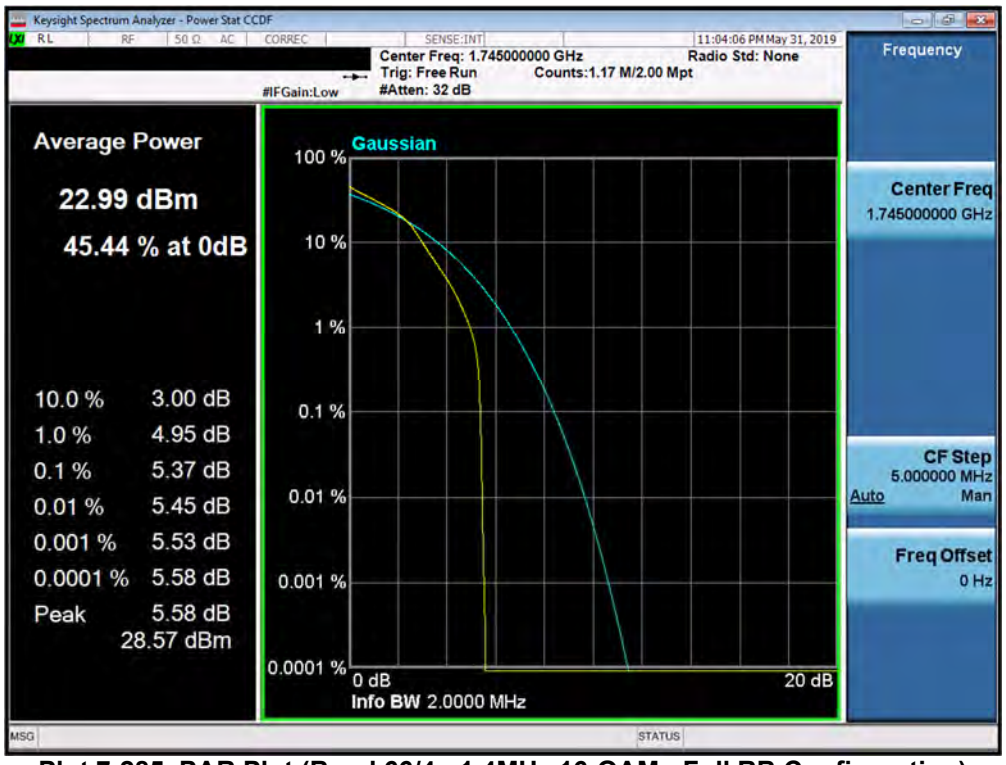
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

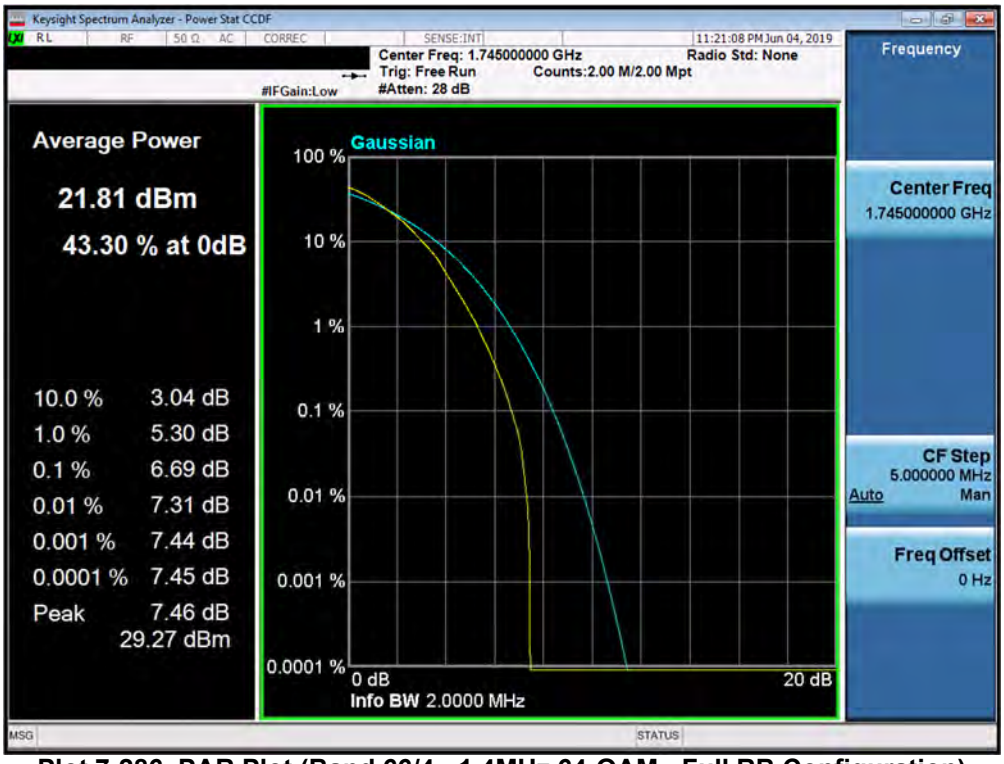
None.



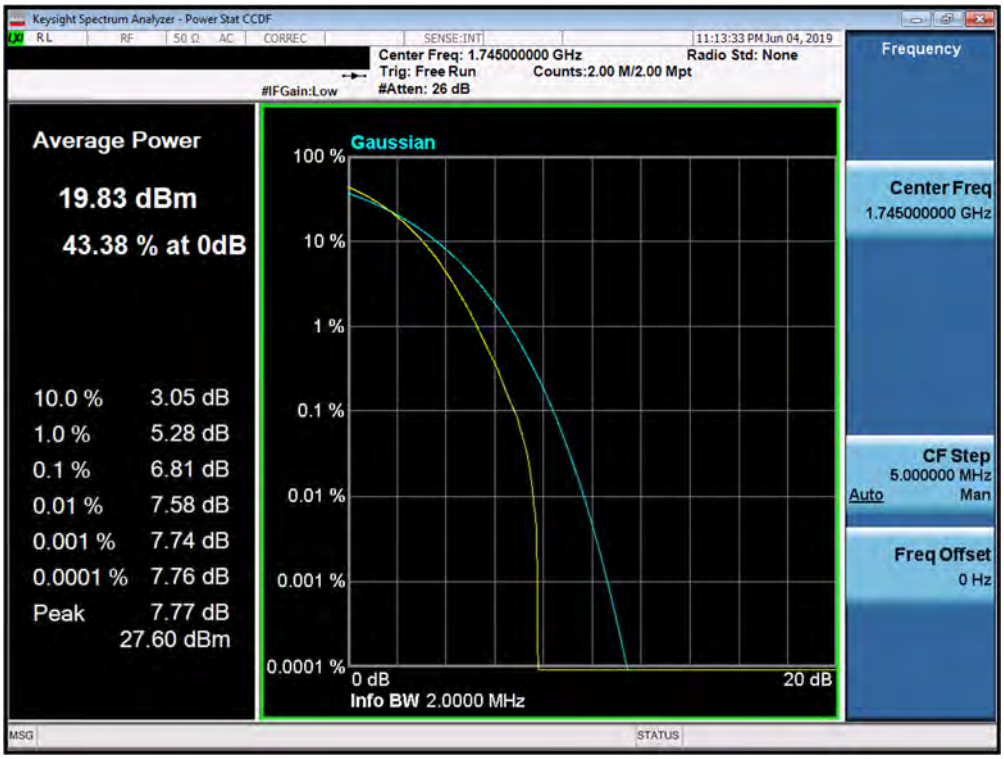
Plot 7-284. PAR Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



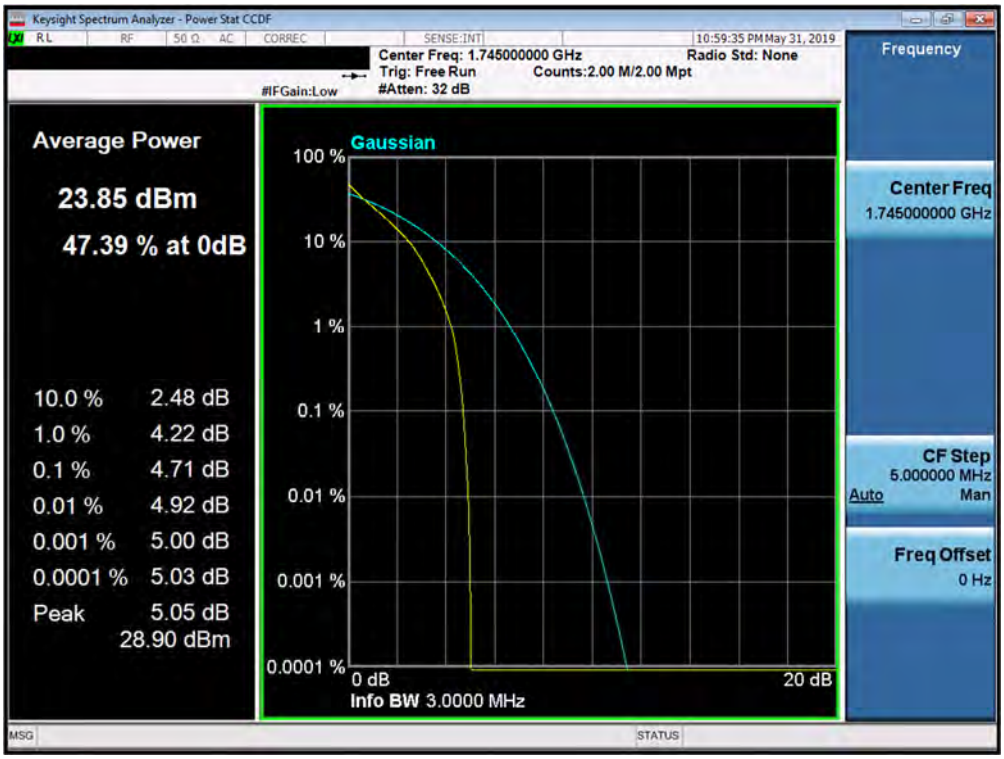
Plot 7-285. PAR Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)



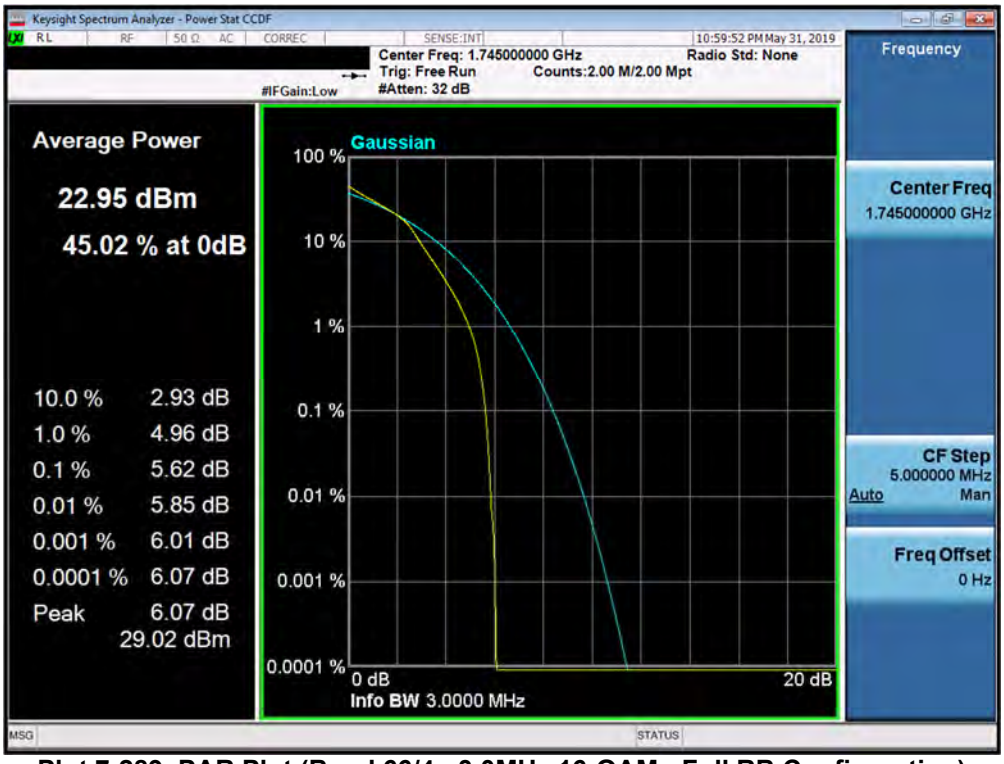
Plot 7-286. PAR Plot (Band 66/4 - 1.4MHz 64-QAM - Full RB Configuration)



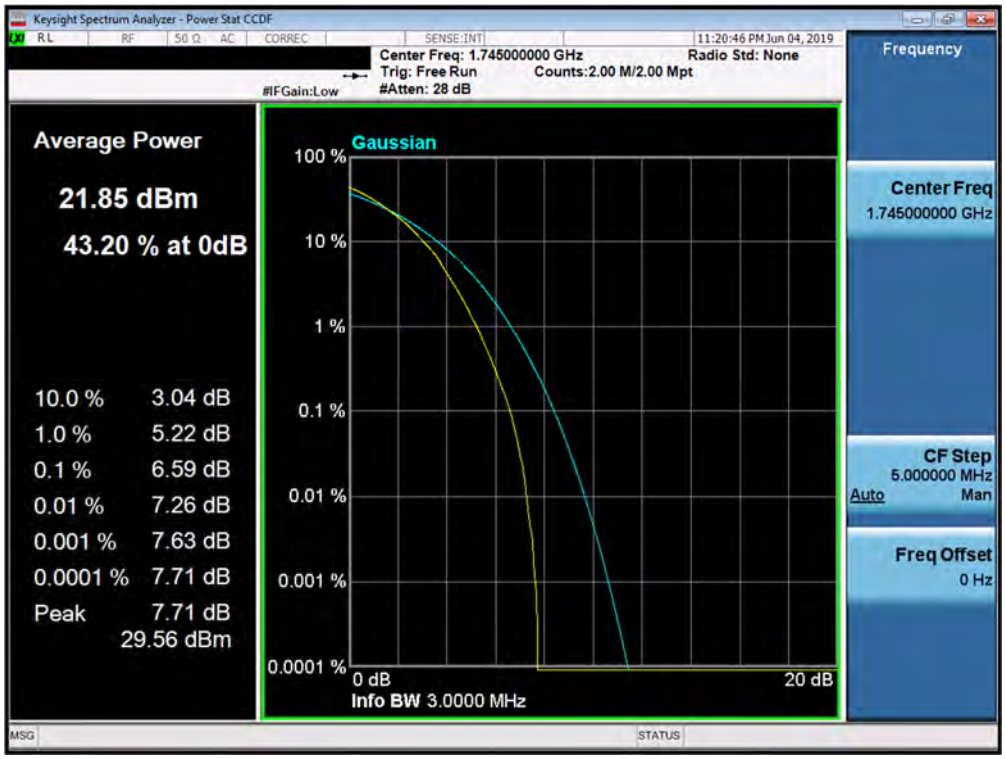
Plot 7-287. PAR Plot (Band 66/4 - 1.4MHz 256-QAM - Full RB Configuration)



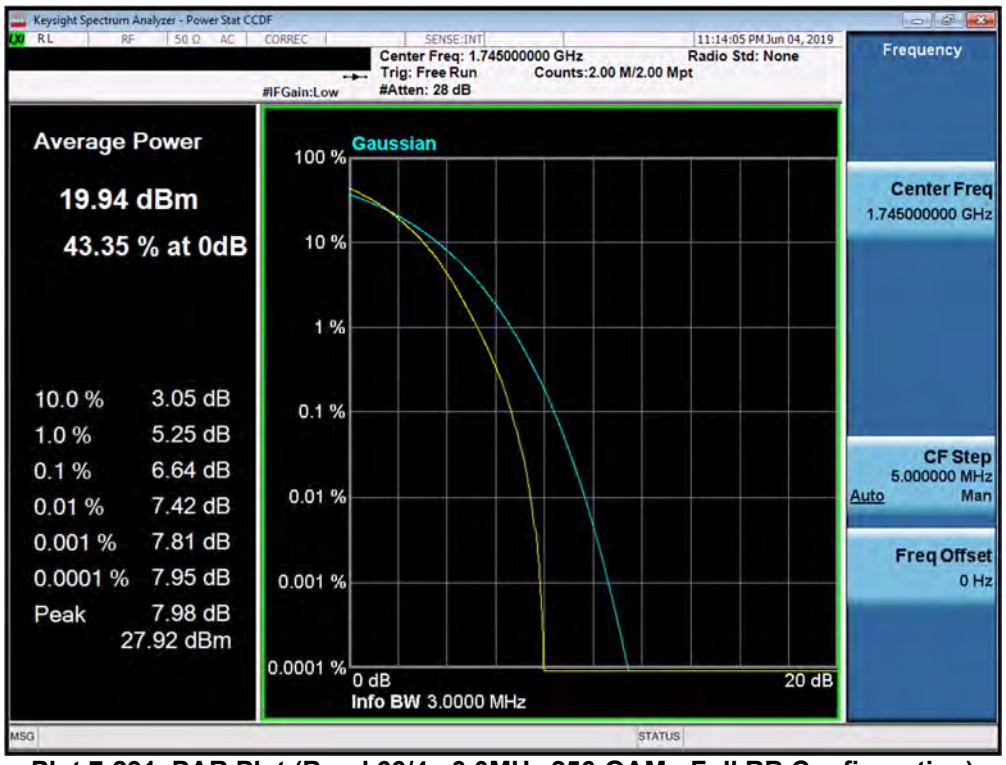
Plot 7-288. PAR Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



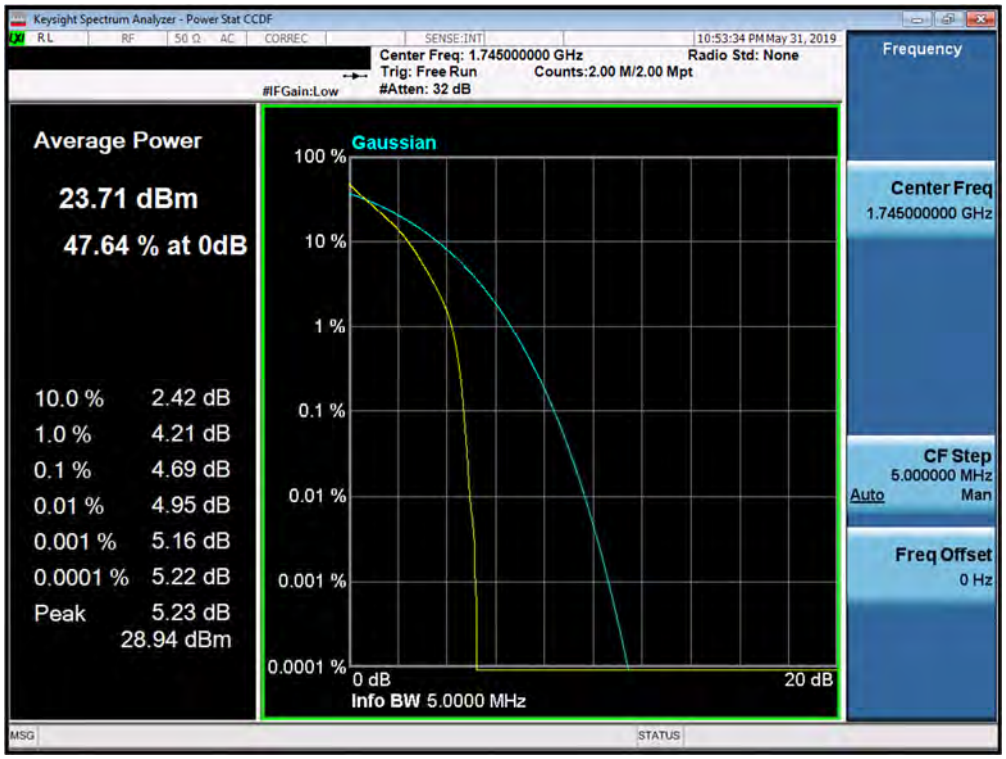
Plot 7-289. PAR Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)



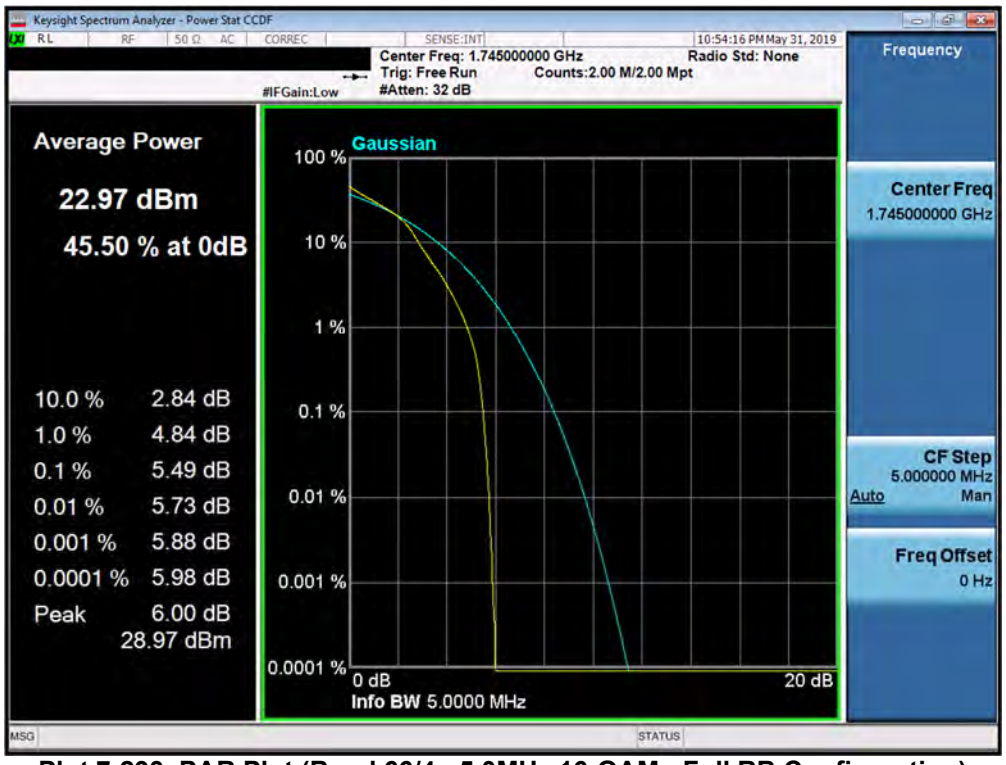
Plot 7-290. PAR Plot (Band 66/4 - 3.0MHz 64-QAM - Full RB Configuration)



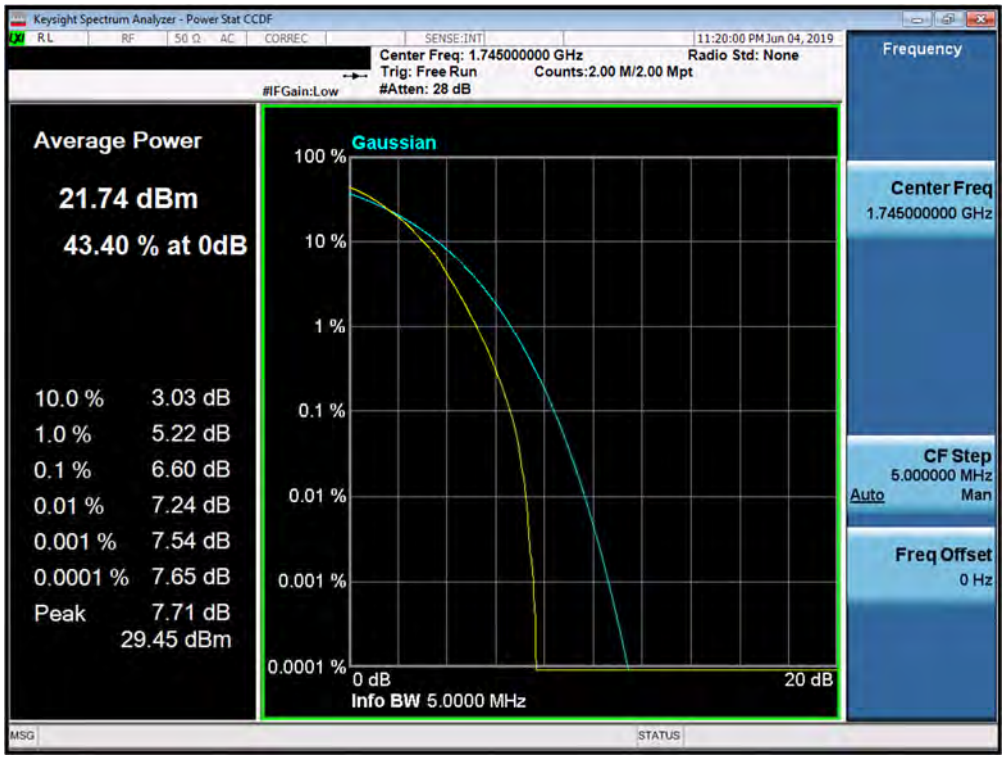
Plot 7-291. PAR Plot (Band 66/4 - 3.0MHz 256-QAM - Full RB Configuration)



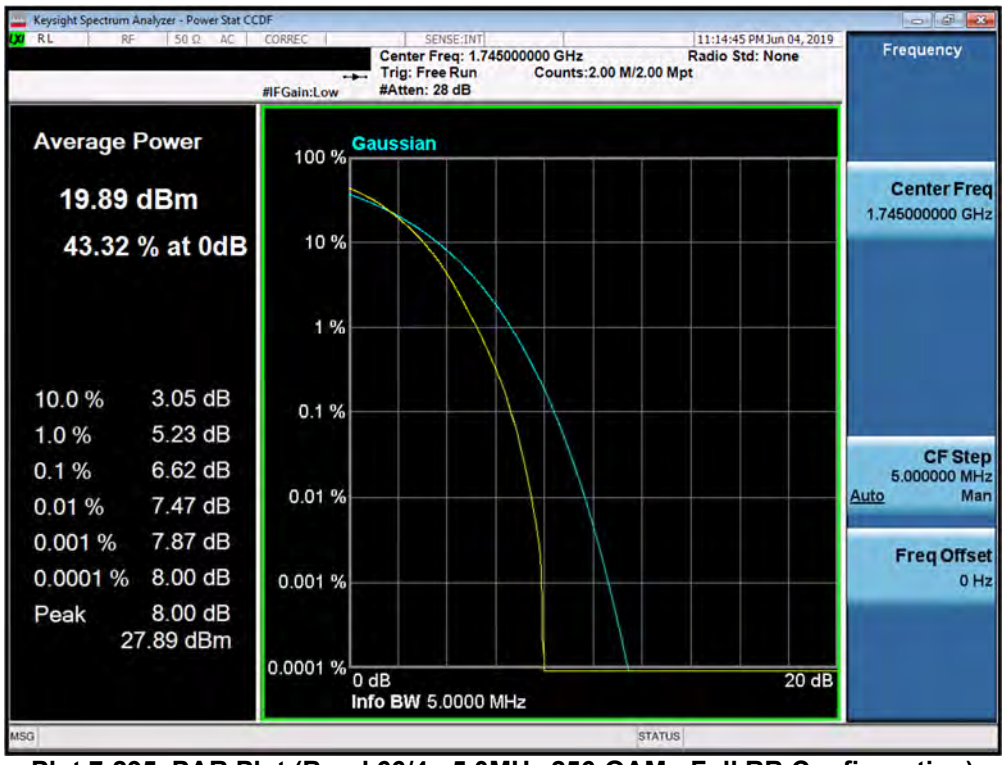
Plot 7-292. PAR Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



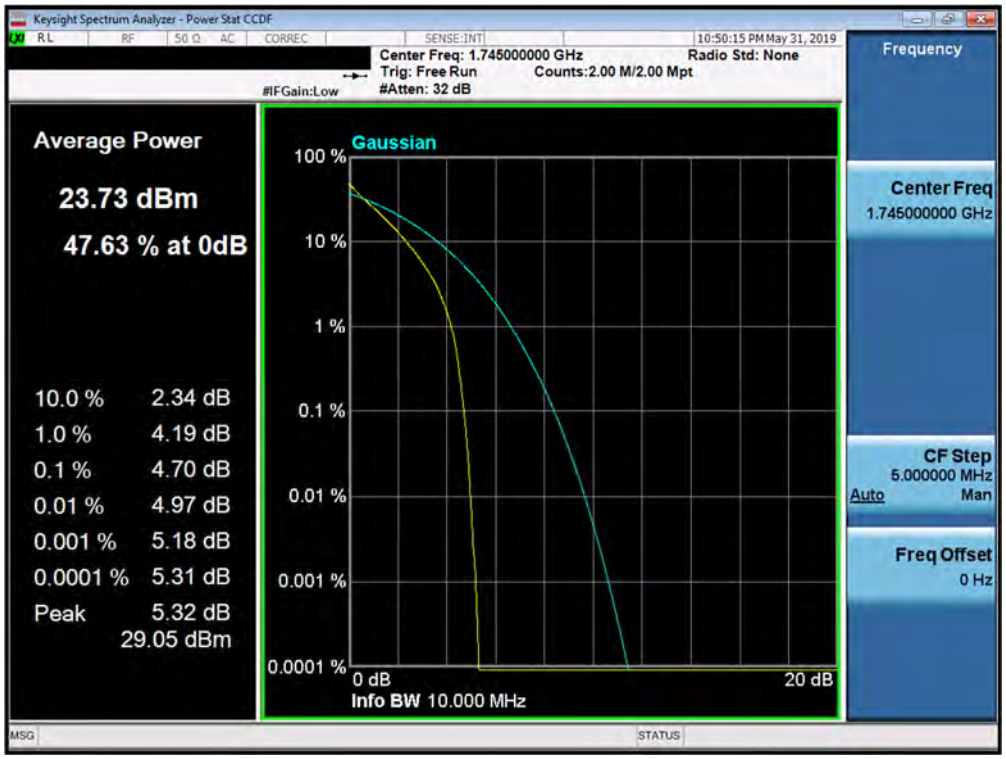
Plot 7-293. PAR Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)



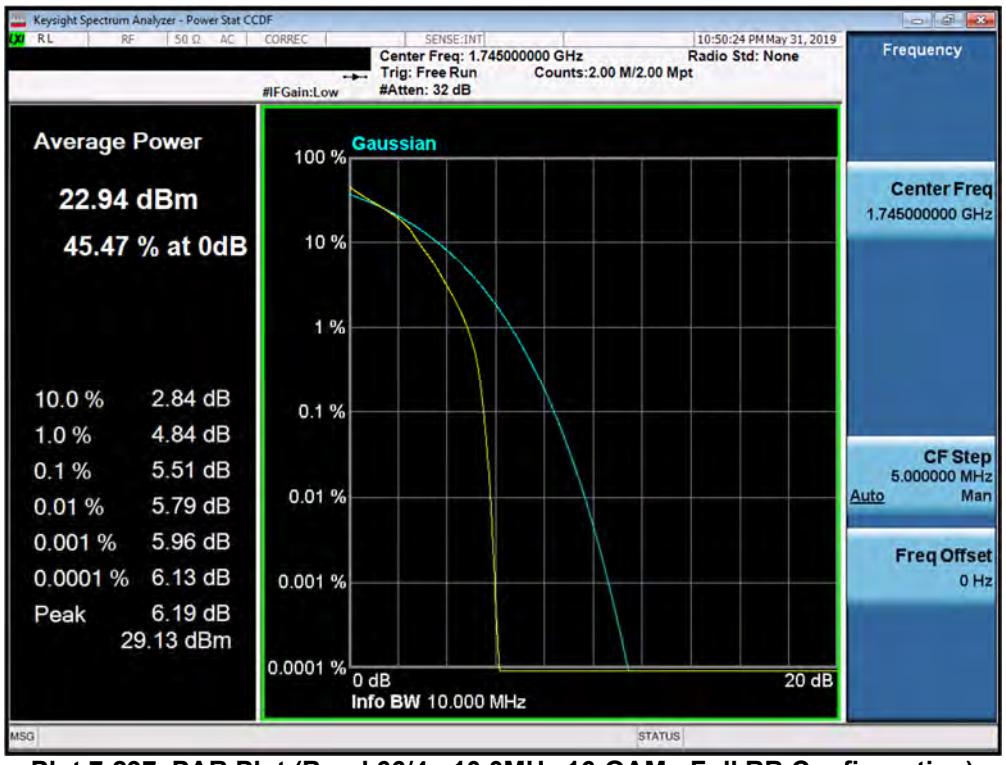
Plot 7-294. PAR Plot (Band 66/4 - 5.0MHz 64-QAM - Full RB Configuration)



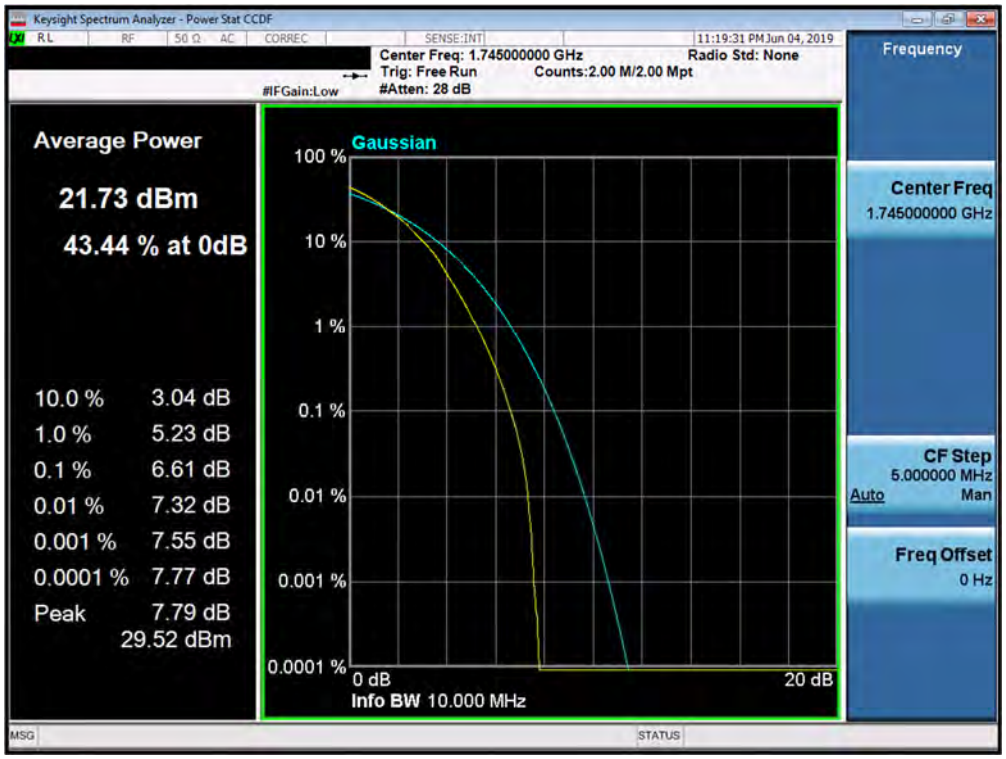
Plot 7-295. PAR Plot (Band 66/4 - 5.0MHz 256-QAM - Full RB Configuration)



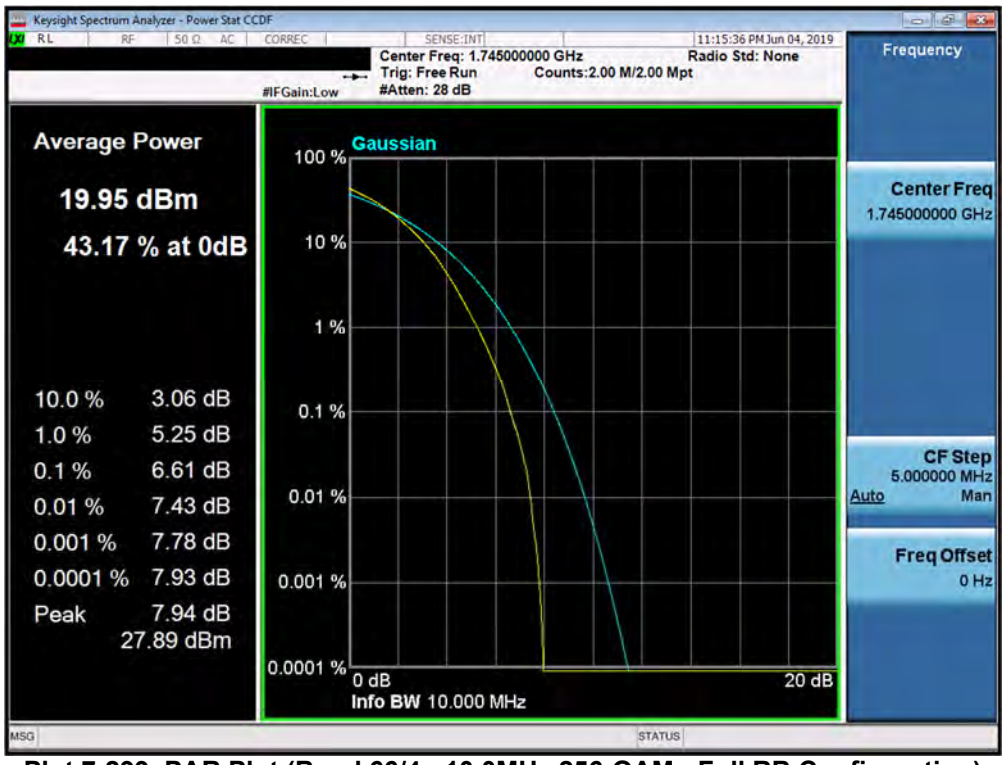
Plot 7-296. PAR Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



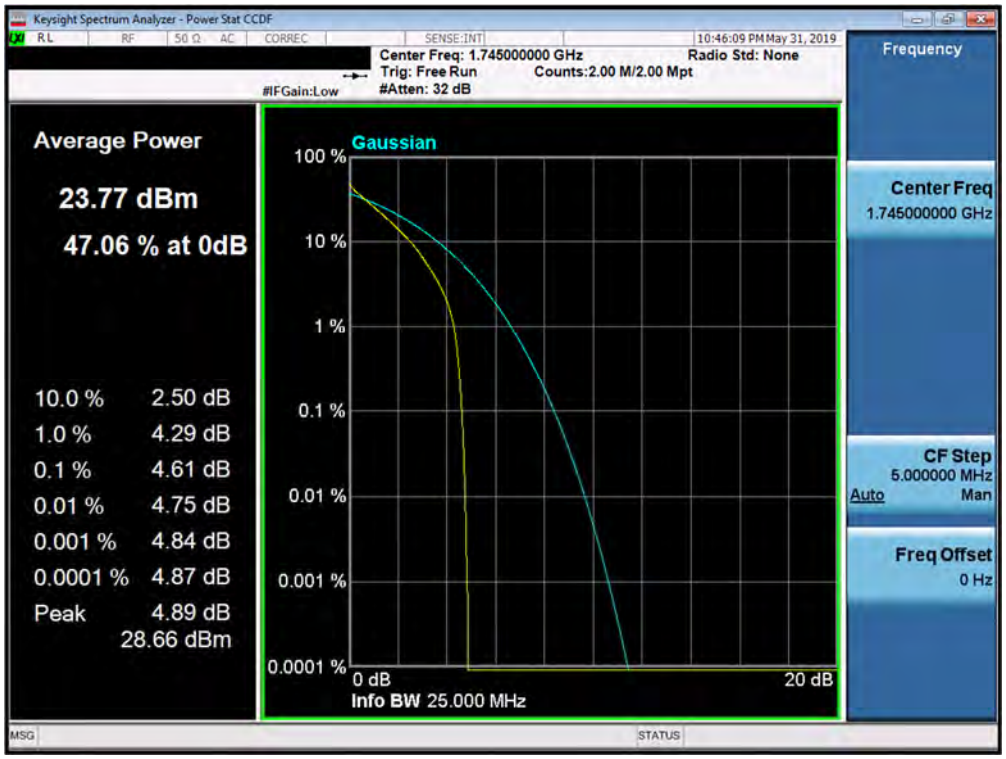
Plot 7-297. PAR Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)



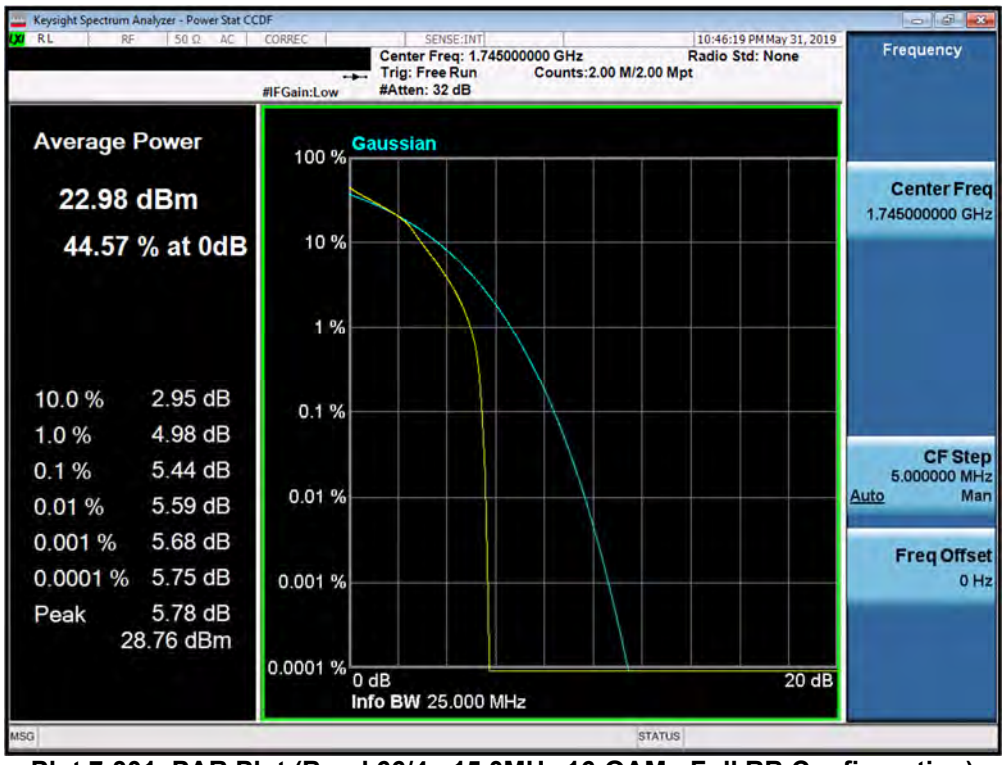
Plot 7-298. PAR Plot (Band 66/4 - 10.0MHz 64-QAM - Full RB Configuration)



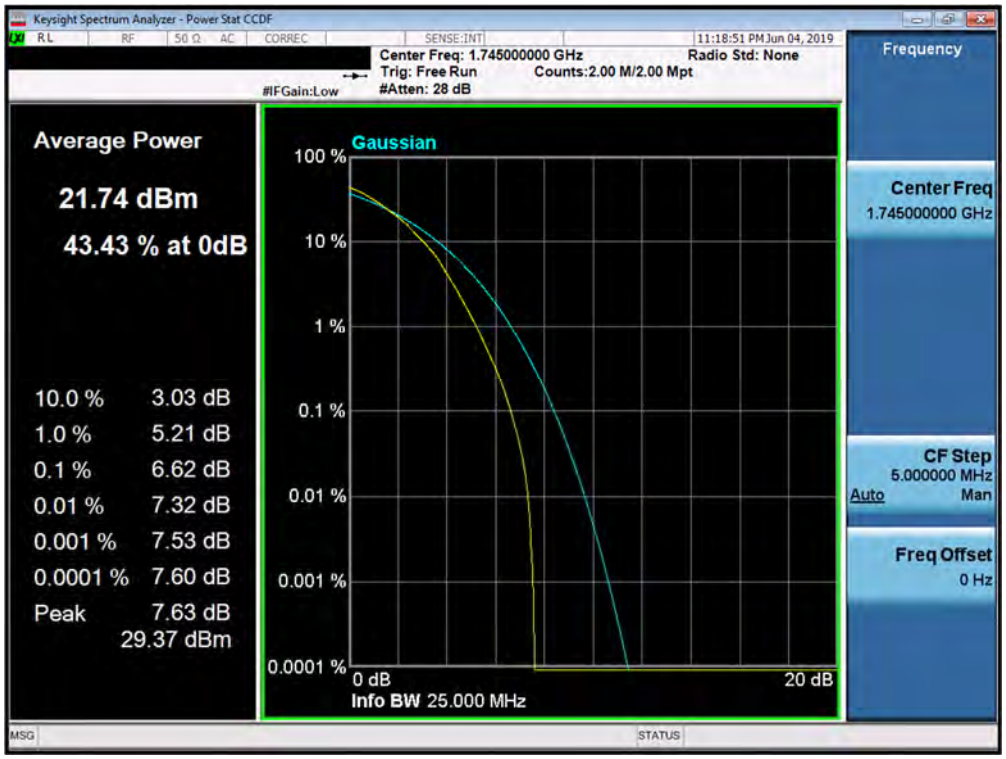
Plot 7-299. PAR Plot (Band 66/4 - 10.0MHz 256-QAM - Full RB Configuration)



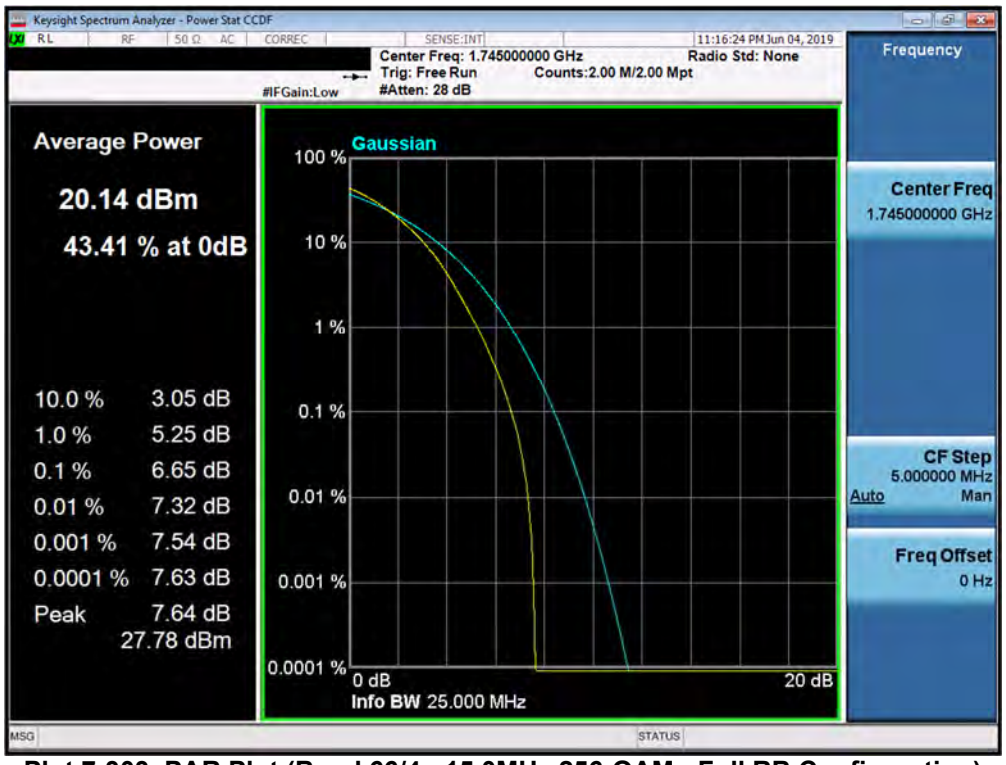
Plot 7-300. PAR Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



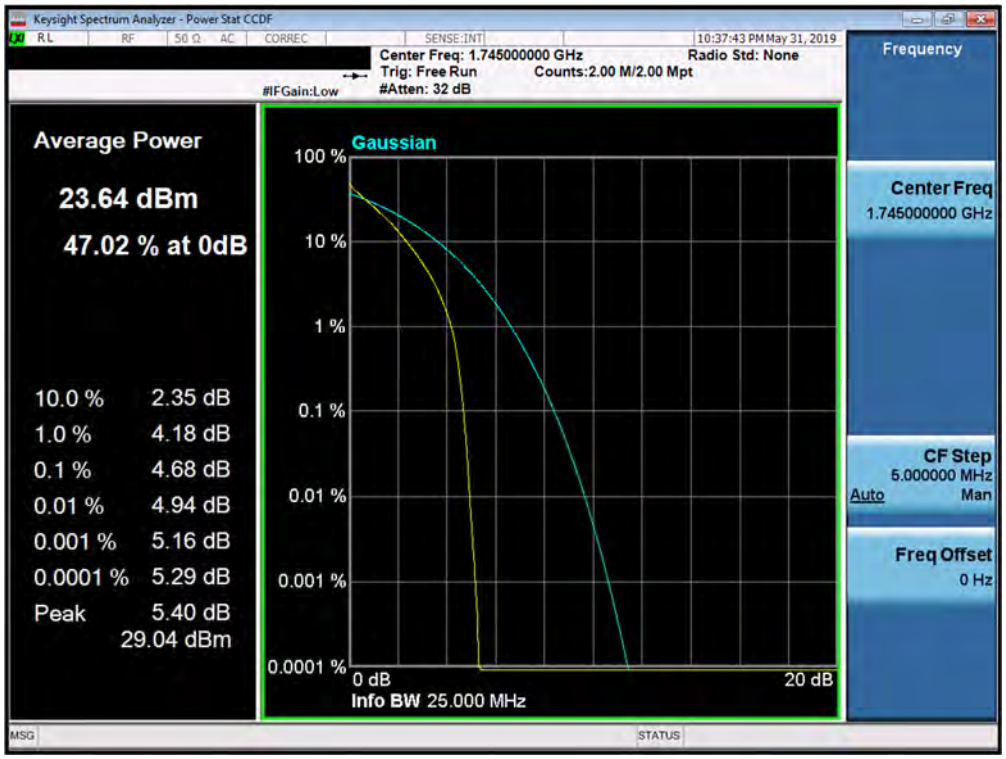
Plot 7-301. PAR Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)



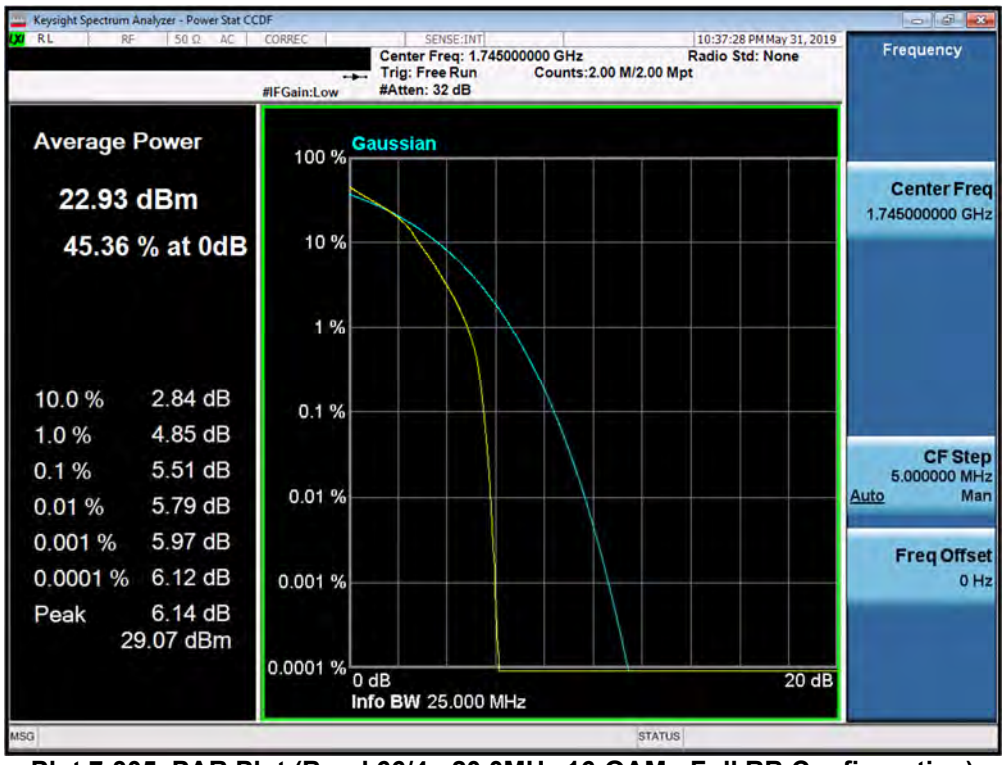
Plot 7-302. PAR Plot (Band 66/4 - 15.0MHz 64-QAM - Full RB Configuration)



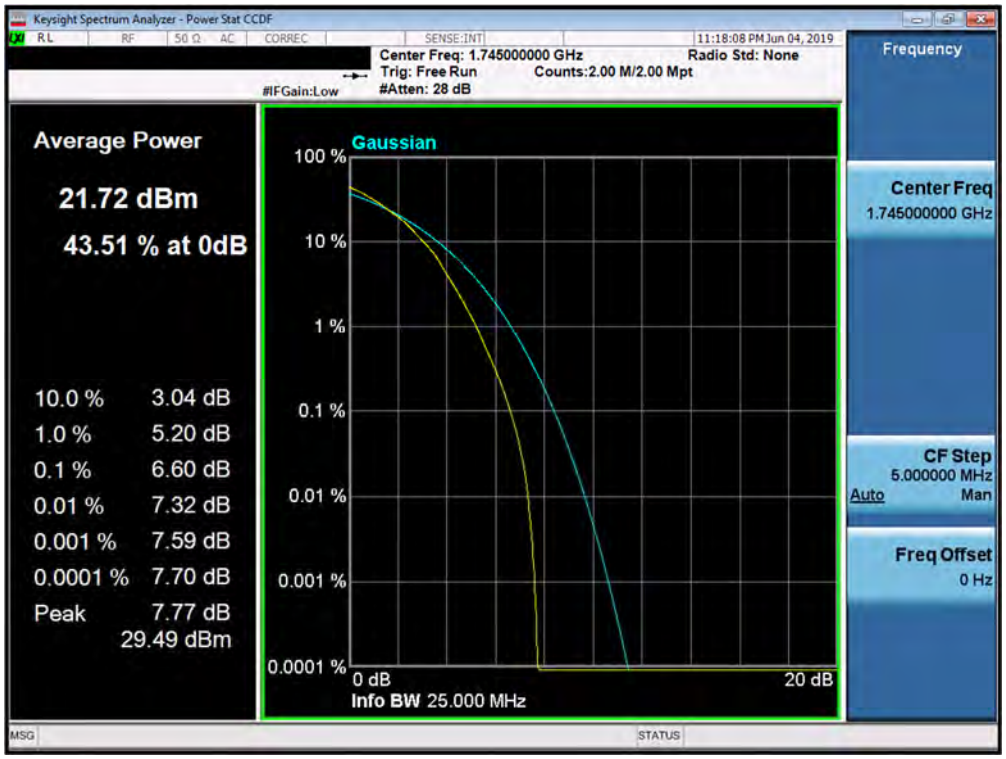
Plot 7-303. PAR Plot (Band 66/4 - 15.0MHz 256-QAM - Full RB Configuration)



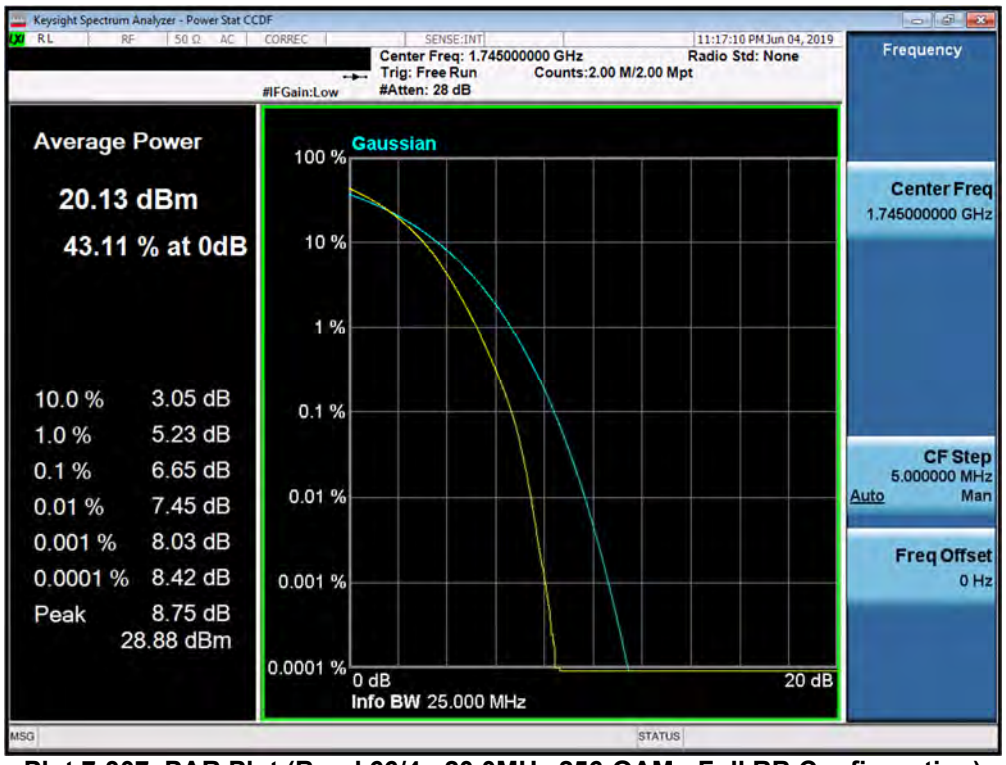
Plot 7-304. PAR Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-305. PAR Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)

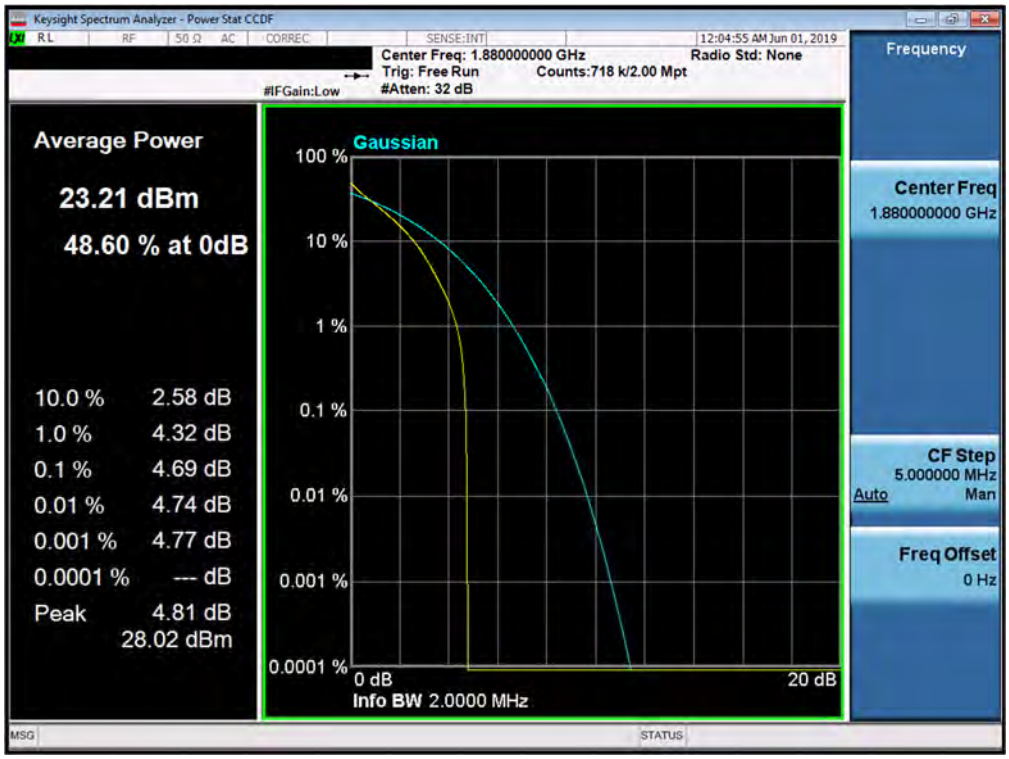


Plot 7-306. PAR Plot (Band 66/4 - 20.0MHz 64-QAM - Full RB Configuration)

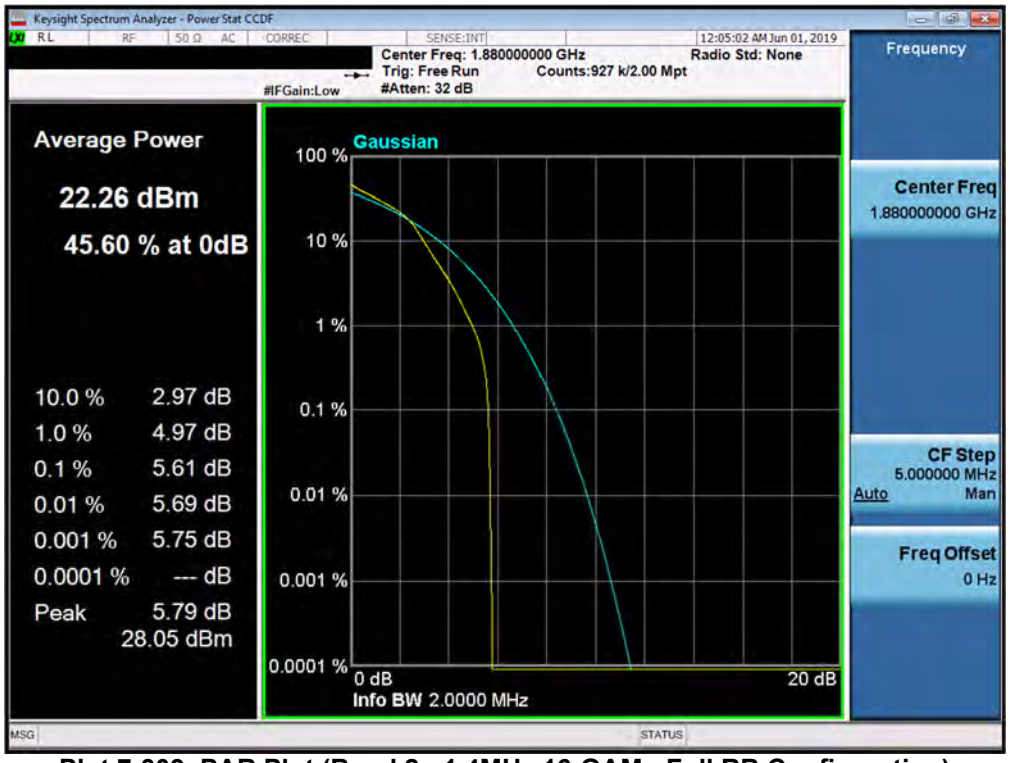


Plot 7-307. PAR Plot (Band 66/4 - 20.0MHz 256-QAM - Full RB Configuration)

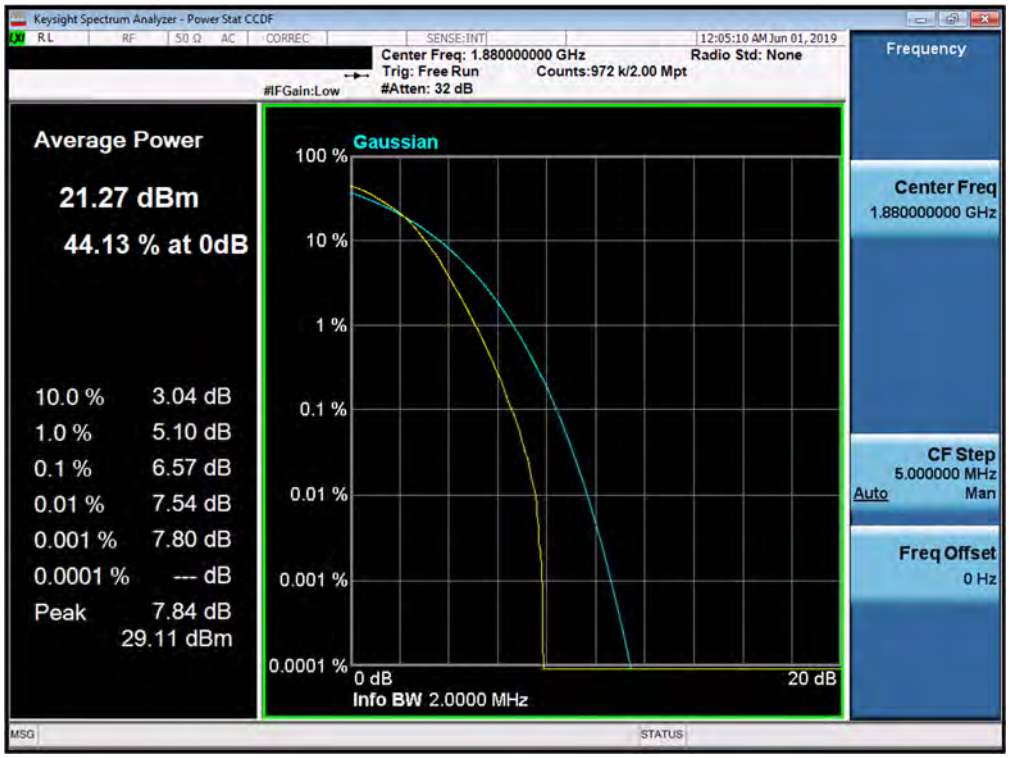
Band 2



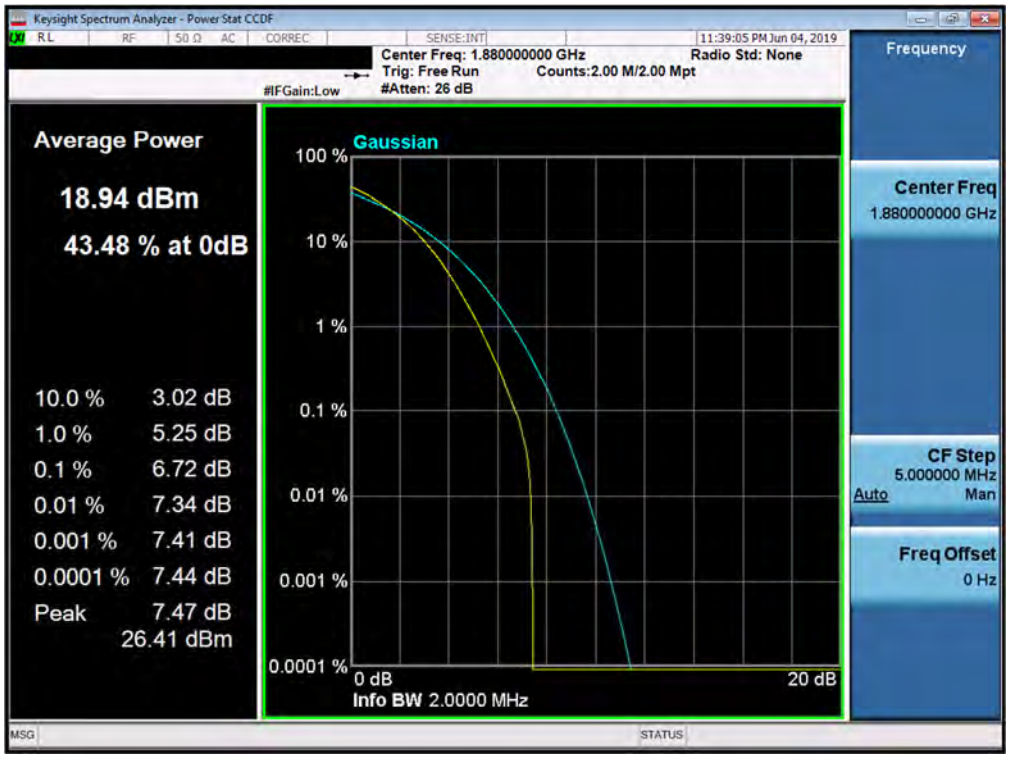
Plot 7-308. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



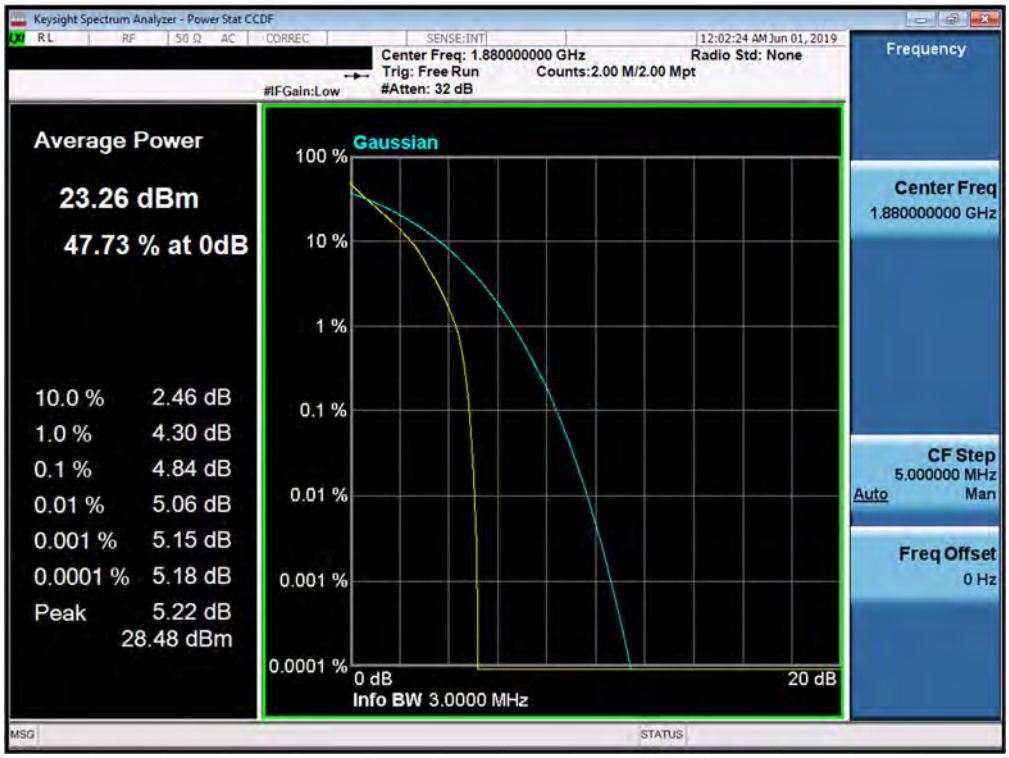
Plot 7-309. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)



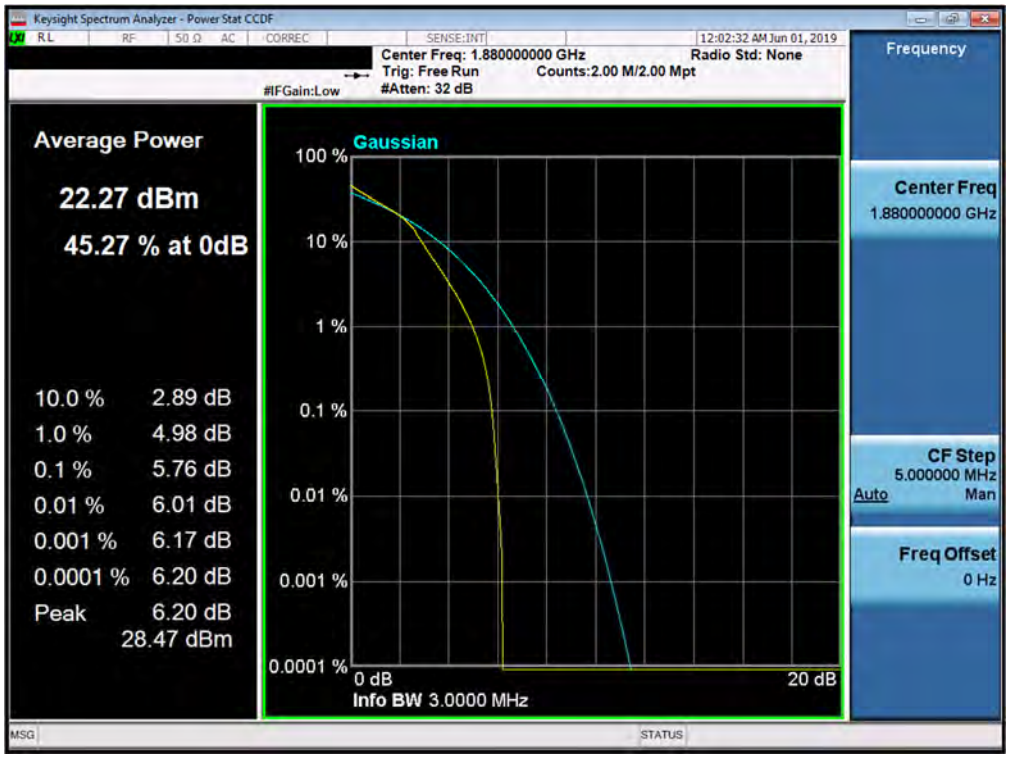
Plot 7-310. PAR Plot (Band 2 - 1.4MHz 64-QAM - Full RB Configuration)



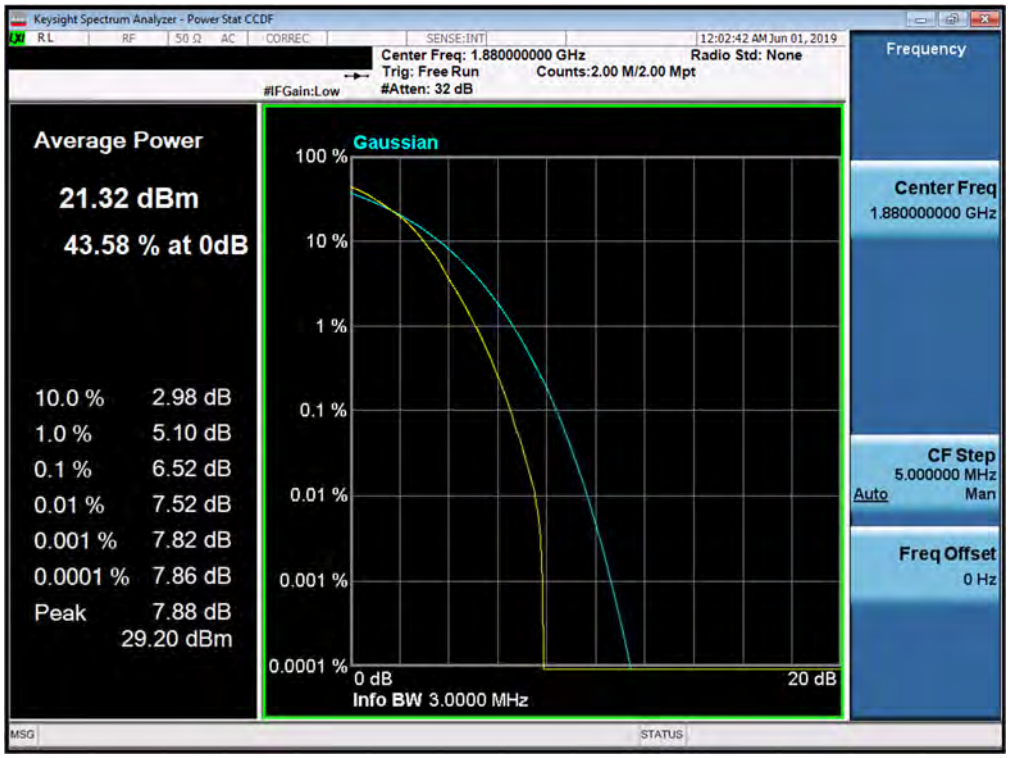
Plot 7-311. PAR Plot (Band 2 - 1.4MHz 256-QAM - Full RB Configuration)



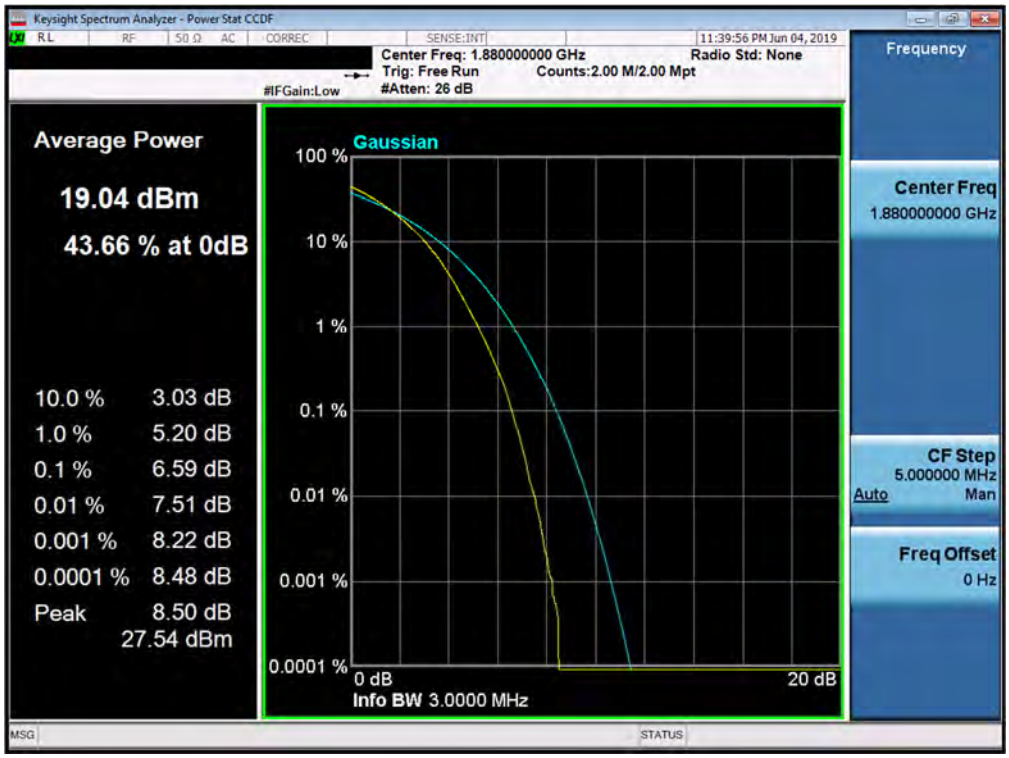
Plot 7-312. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



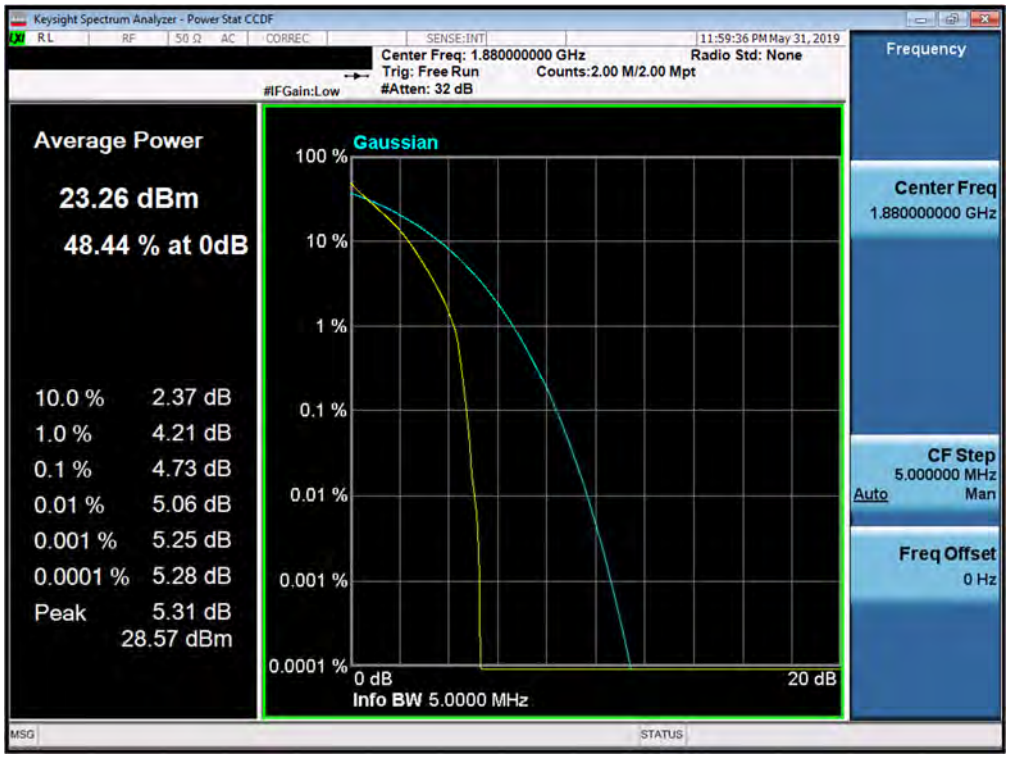
Plot 7-313. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



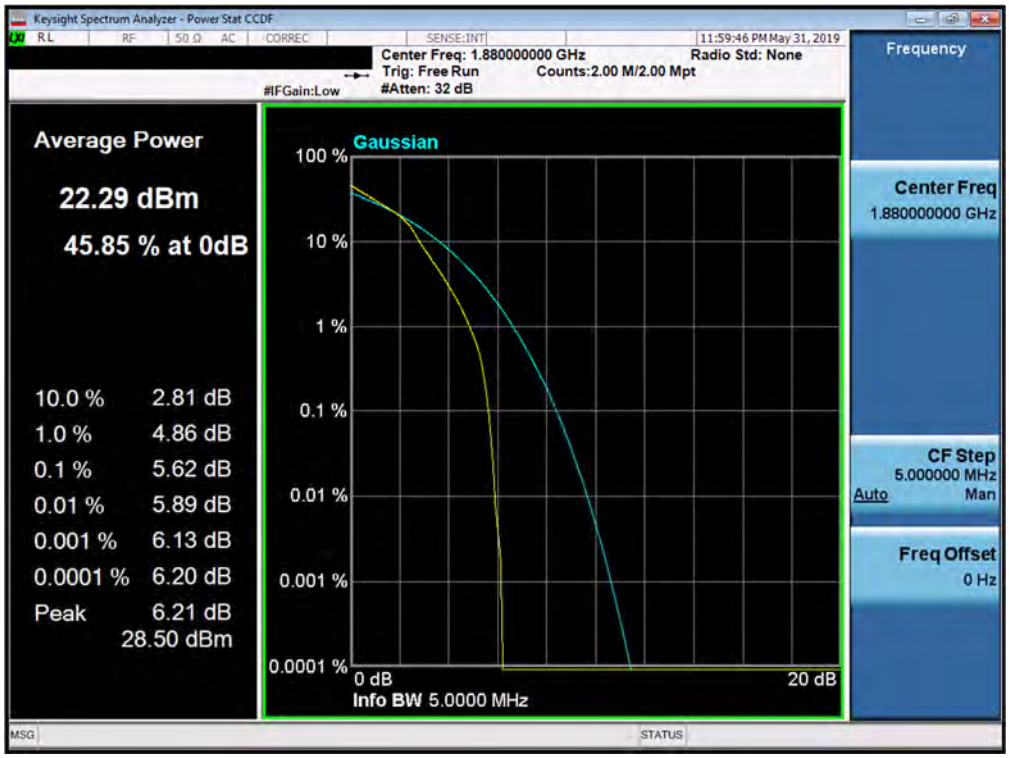
Plot 7-314. PAR Plot (Band 2 - 3.0MHz 64-QAM - Full RB Configuration)



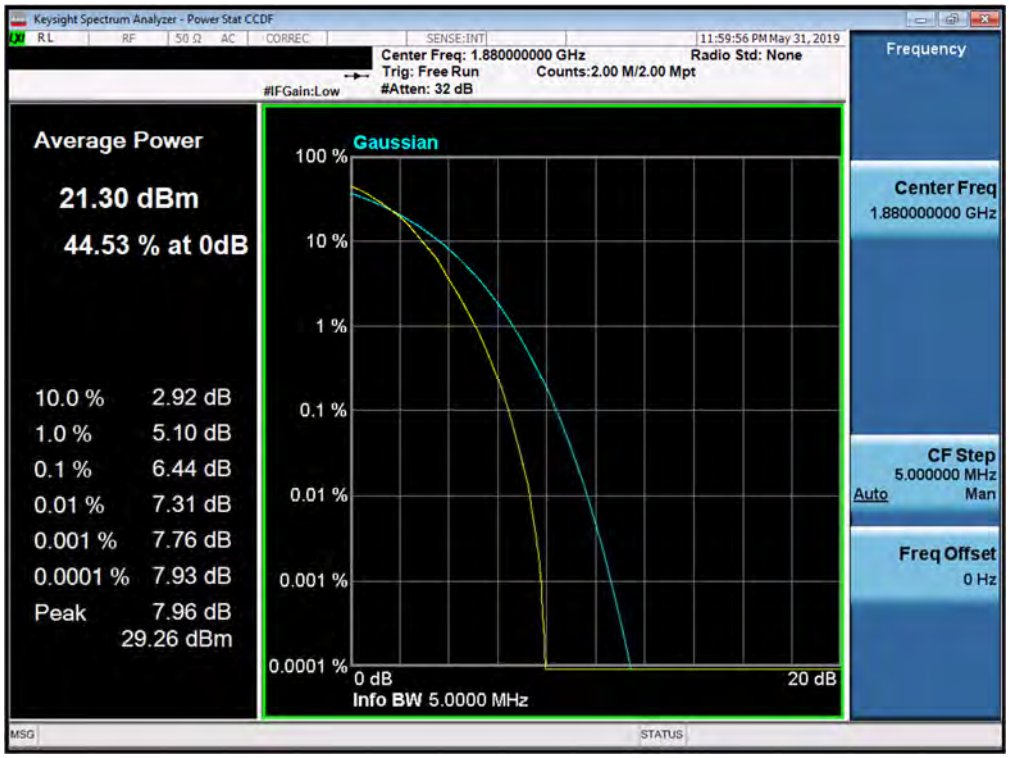
Plot 7-315. PAR Plot (Band 2 - 3.0MHz 256-QAM - Full RB Configuration)



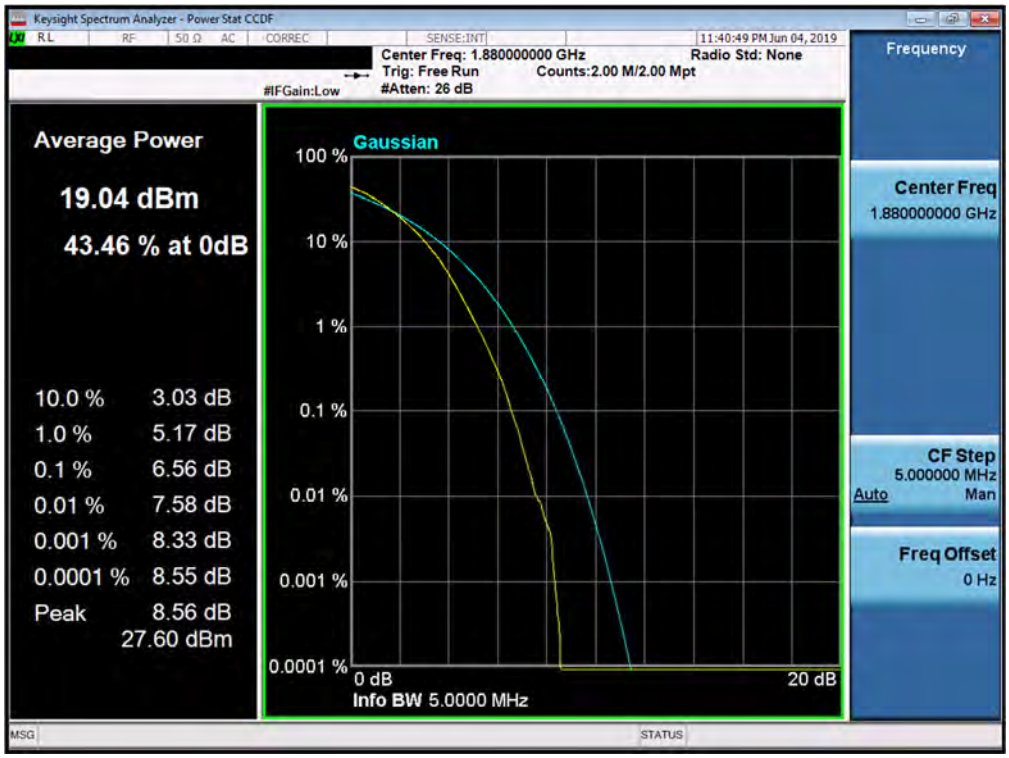
Plot 7-316. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



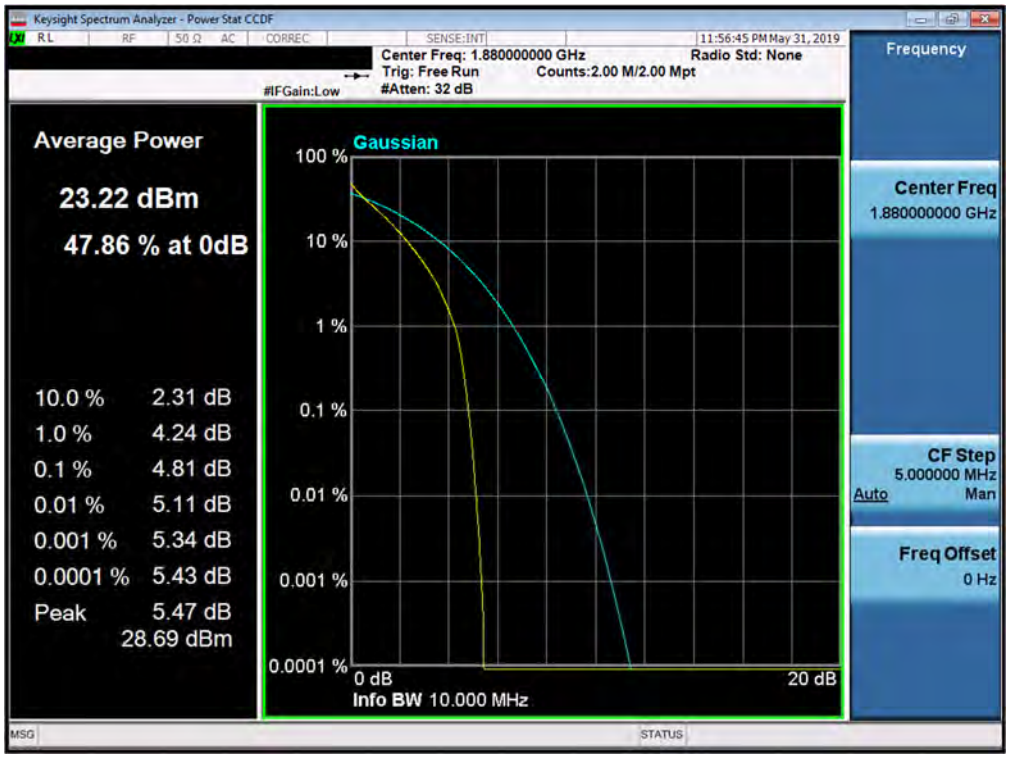
Plot 7-317. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)



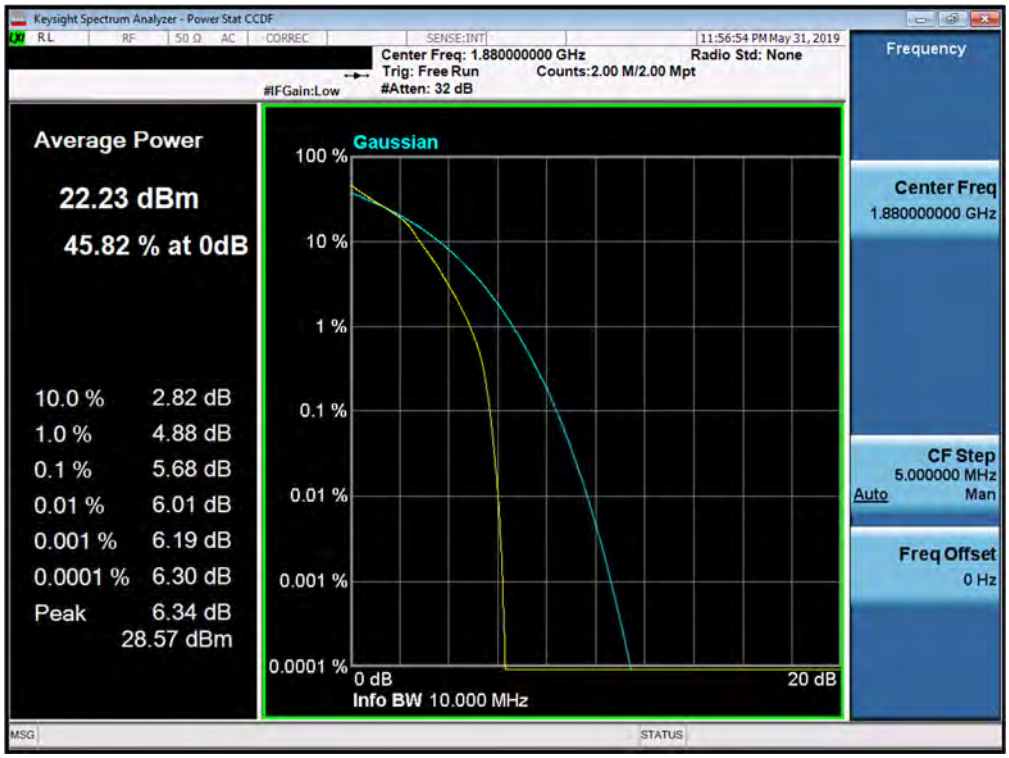
Plot 7-318. PAR Plot (Band 2 - 5.0MHz 64-QAM - Full RB Configuration)



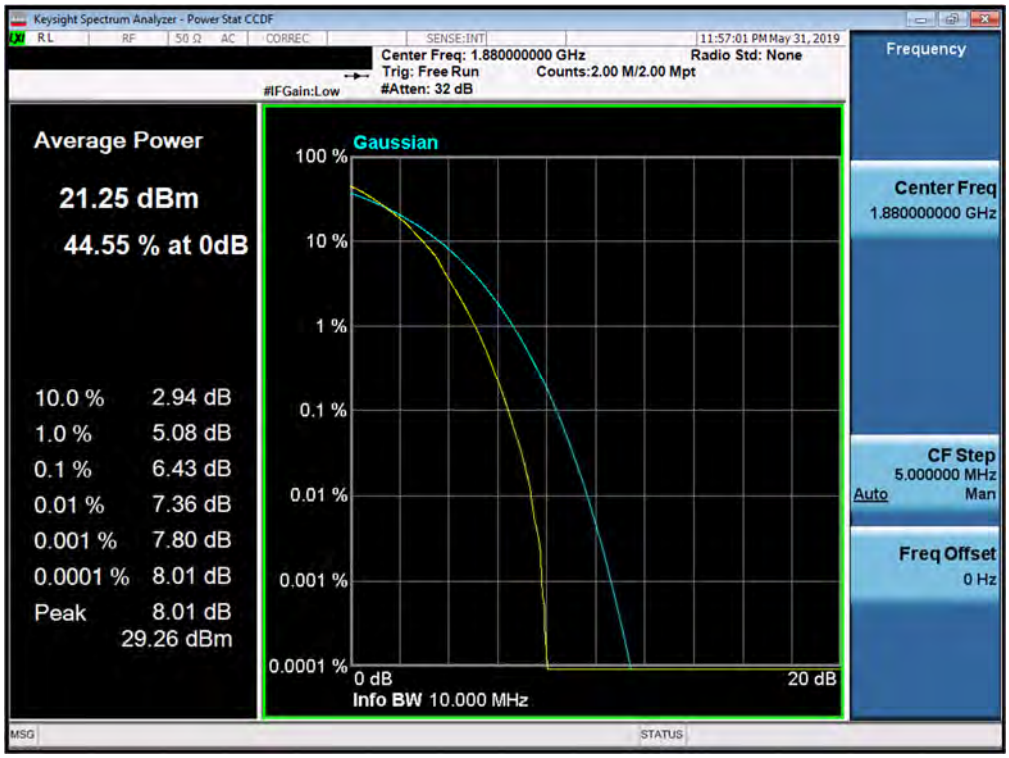
Plot 7-319. PAR Plot (Band 2 - 5.0MHz 256-QAM - Full RB Configuration)



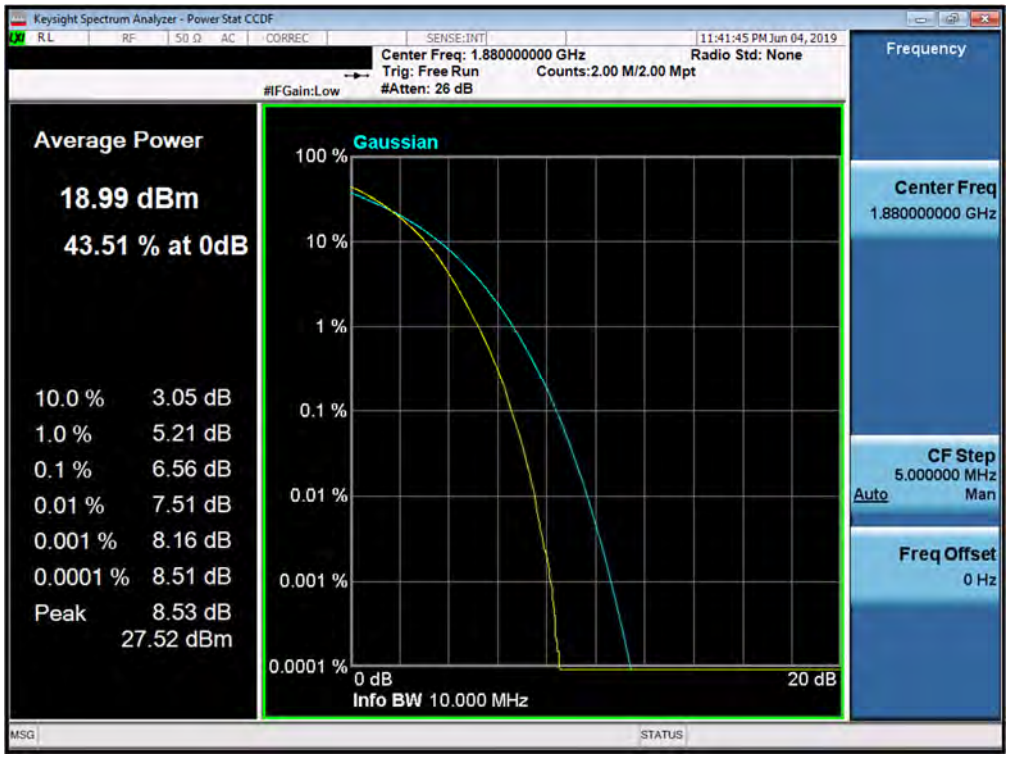
Plot 7-320. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



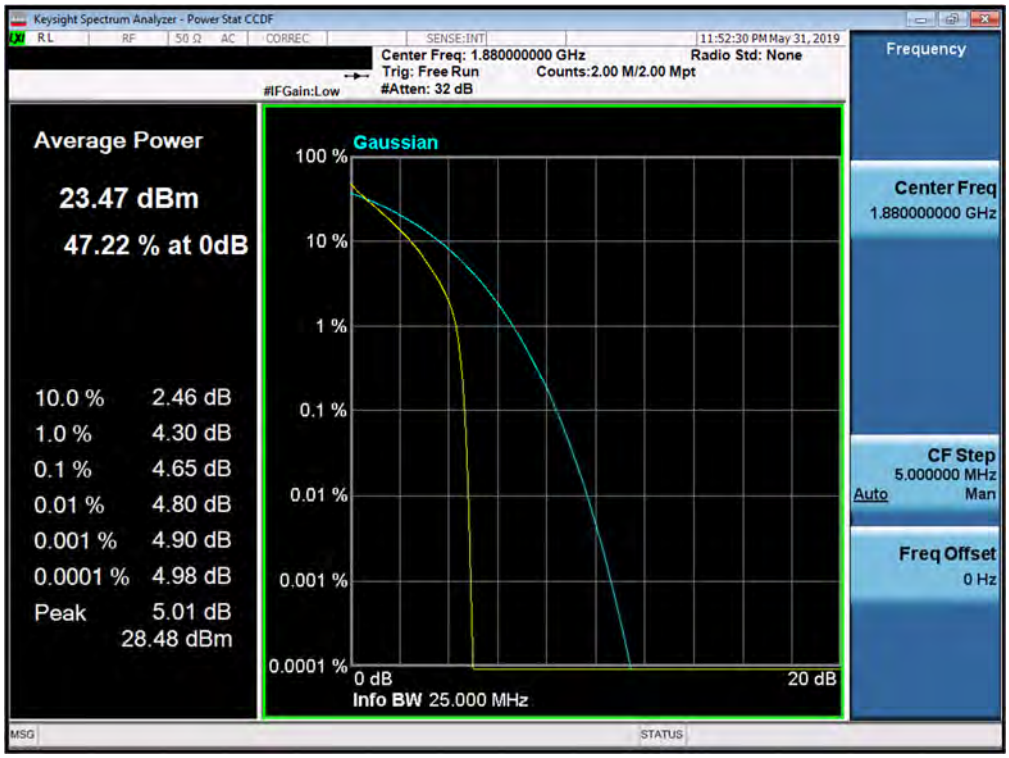
Plot 7-321. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



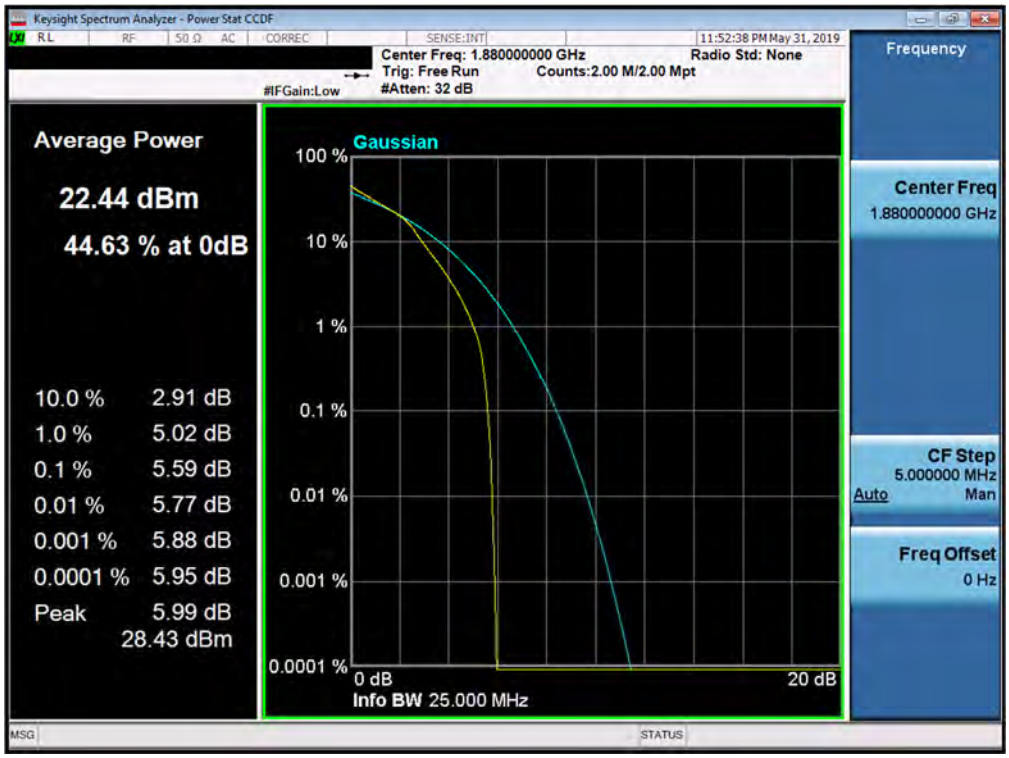
Plot 7-322. PAR Plot (Band 2 - 10.0MHz 64-QAM - Full RB Configuration)



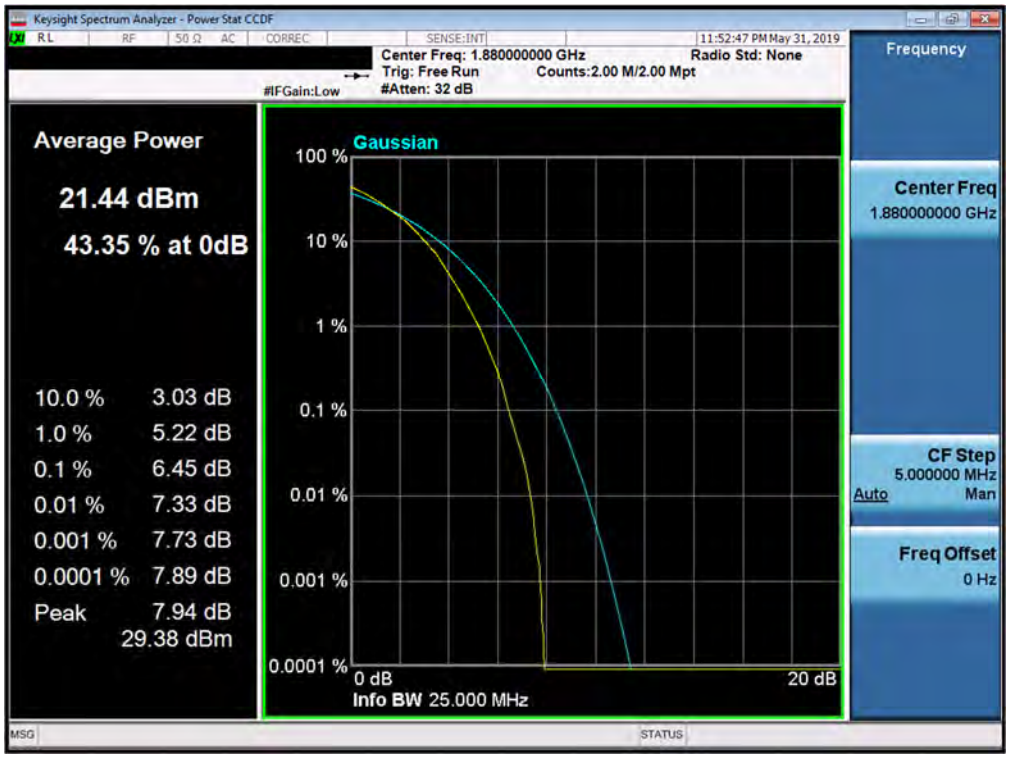
Plot 7-323. PAR Plot (Band 2 - 10.0MHz 256-QAM - Full RB Configuration)



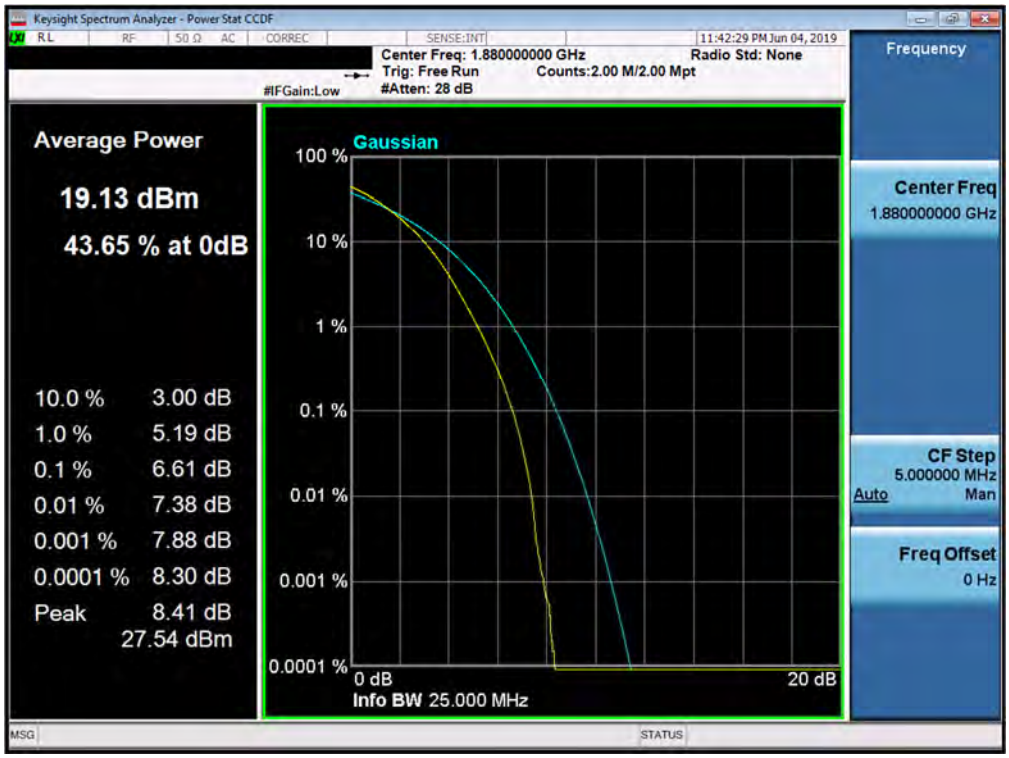
Plot 7-324. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



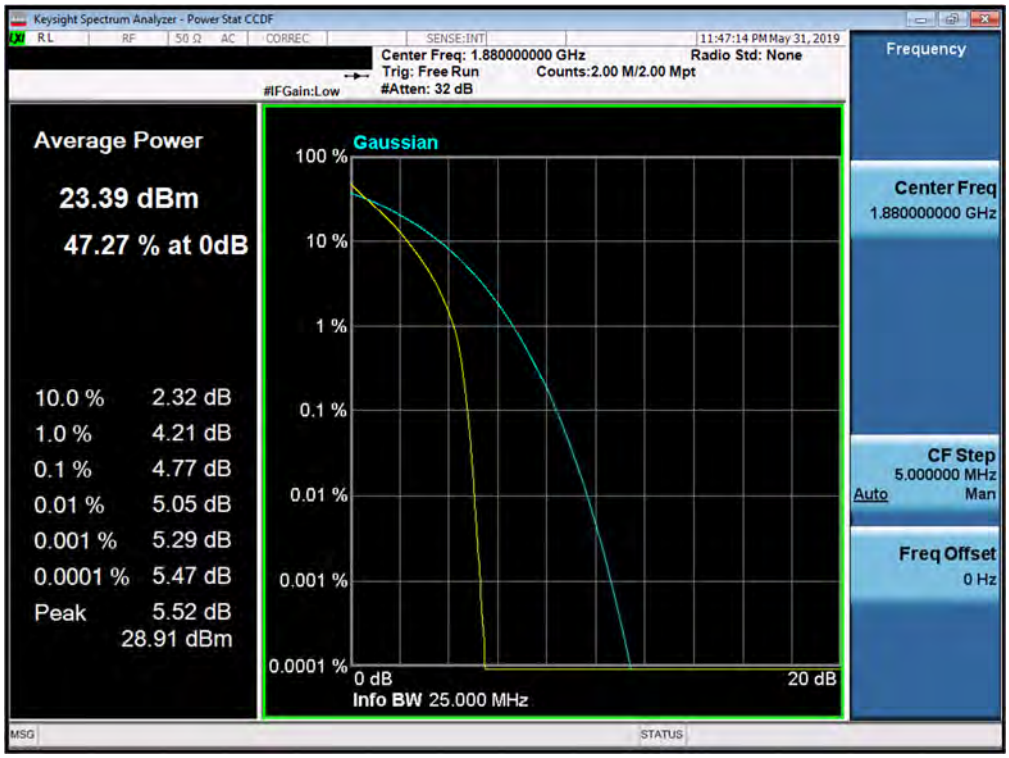
Plot 7-325. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)



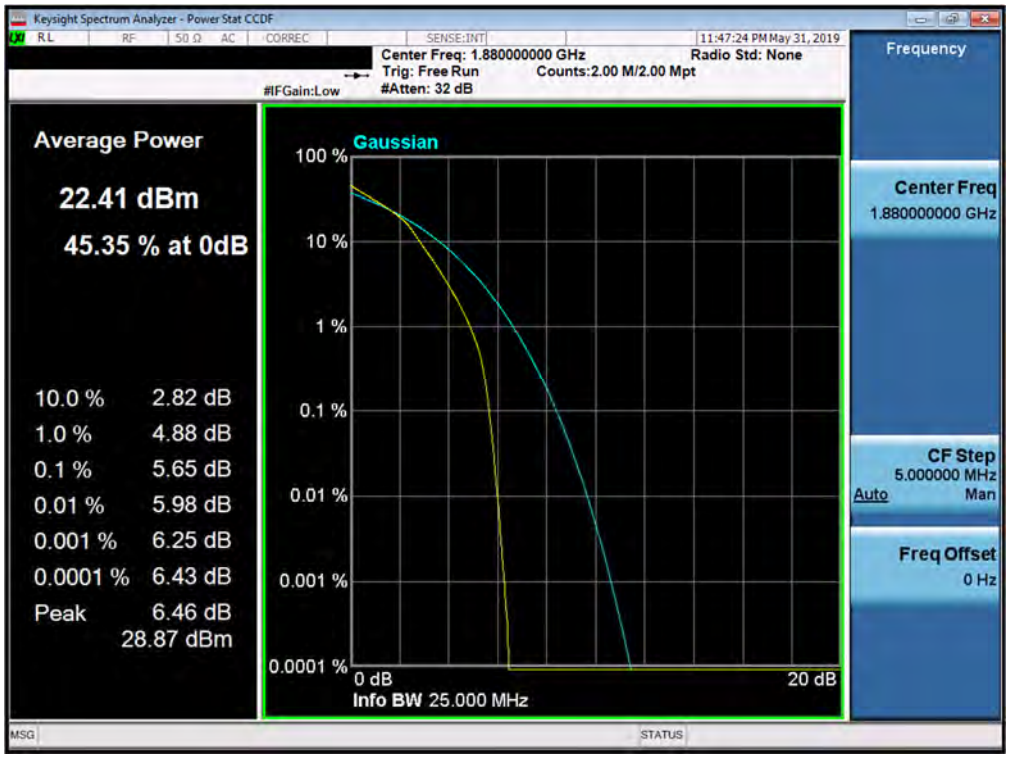
Plot 7-326. PAR Plot (Band 2 - 15.0MHz 64-QAM - Full RB Configuration)



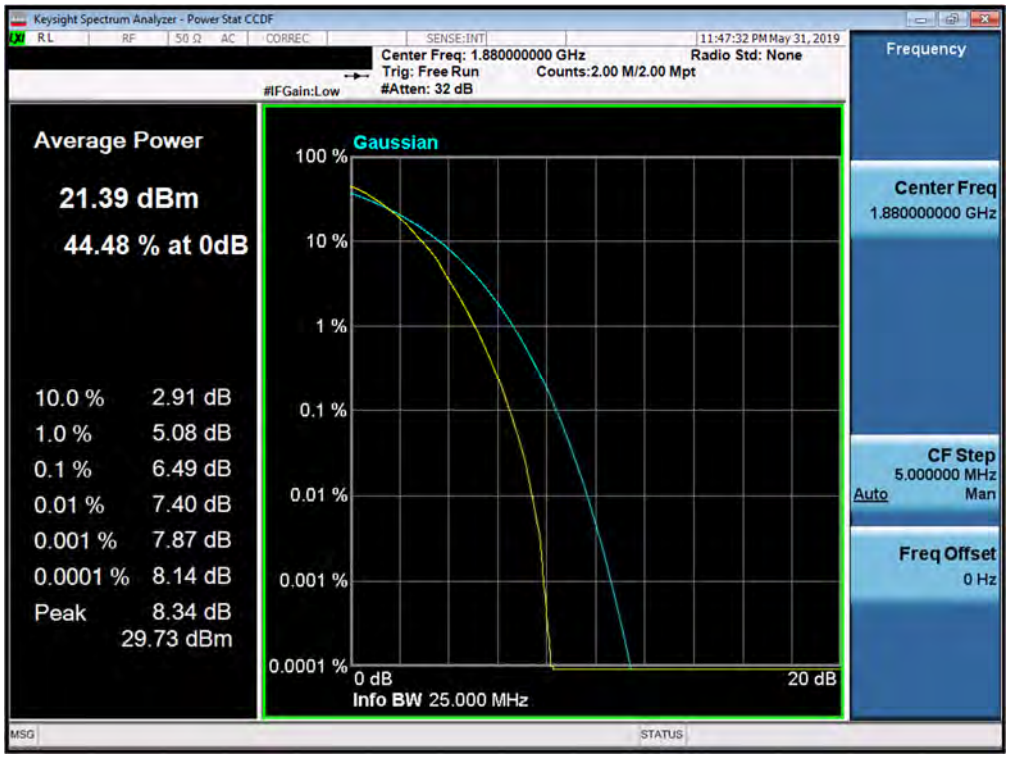
Plot 7-327. PAR Plot (Band 2 - 15.0MHz 256-QAM - Full RB Configuration)



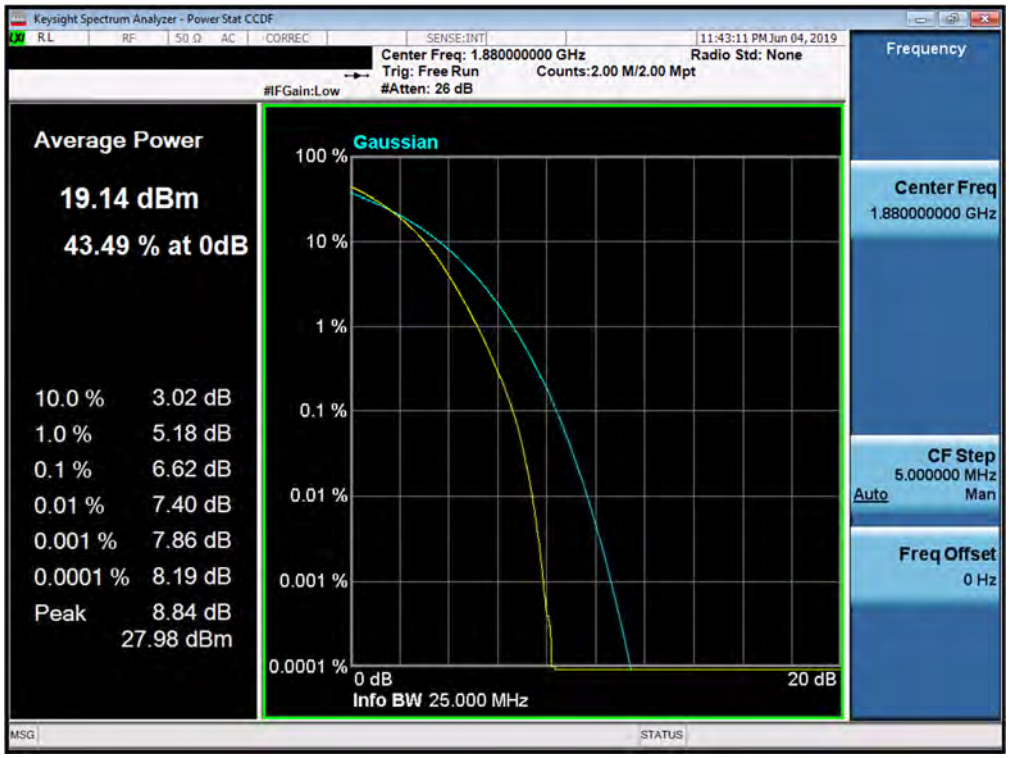
Plot 7-328. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-329. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-330. PAR Plot (Band 2 - 20.0MHz 64-QAM - Full RB Configuration)



Plot 7-331. PAR Plot (Band 2 - 20.0MHz 256-QAM - Full RB Configuration)

7.6 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 5 and 66, the minimum permissible attenuation level of any spurious emission is 43 + $10log_{10}(P_{[Watts]})$.

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 7-5. Test Instrument & Measurement Setup

Test Notes

1. Uplink carrier aggregation is only supported in this EUT for LTE Band 5 and Band 66.

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 7-503 and 7-504 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.

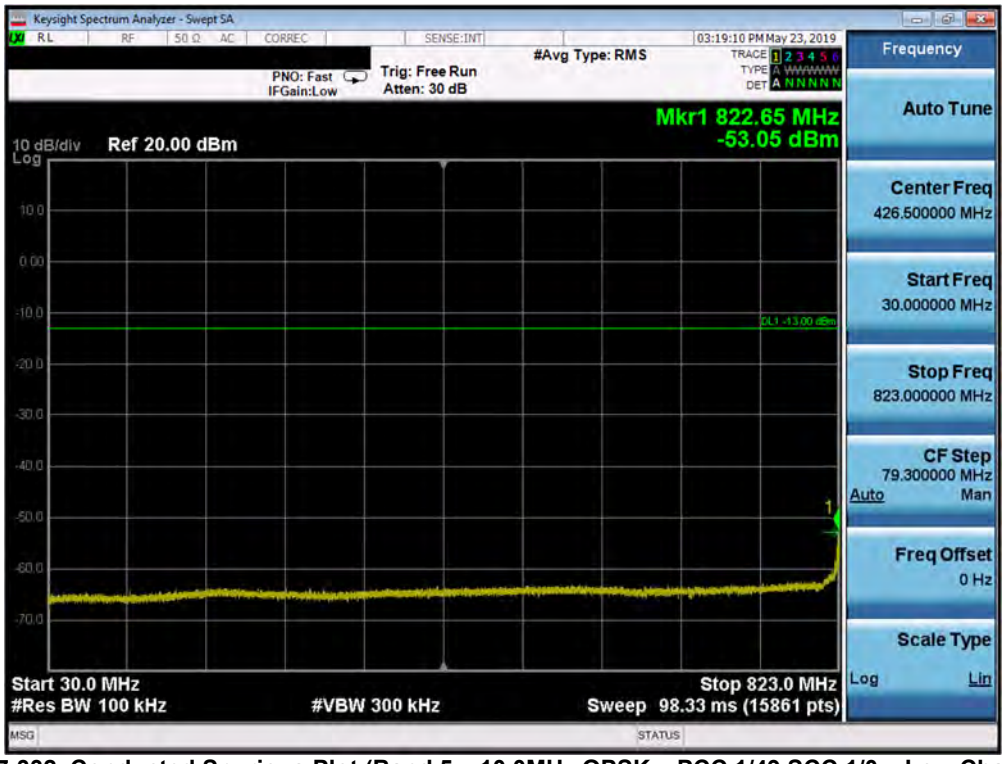
Uplink CA Configuration 5B

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 B5	10	20450	829	QPSK	1	49	LTE B5	10	20549	838.9	QPSK	1	0	25.26
Max	LTE B5	10	20525	836.5	QPSK	1	49	LTE B5	5	20597	843.7	QPSK	1	0	25.25
Max	LTE B5	10	20600	844	QPSK	1	0	LTE B5	10	20501	834.1	QPSK	1	49	25.37

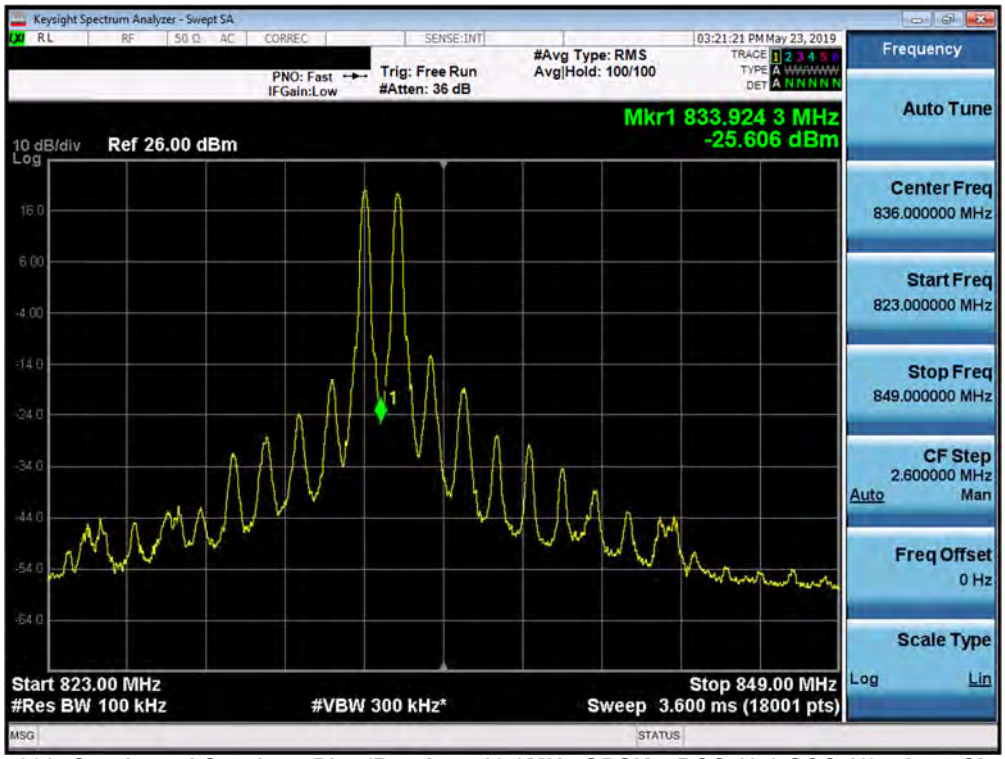
Table 7-3. Conducted Powers (B5 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

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 B5	10	20600	844	QPSK	50	0	LTE B5	10	20501	834.1	QPSK	50	0	23.06
Max	LTE B5	10	20600	844	16-QAM	50	0	LTE B5	10	20501	834.1	16-QAM	50	0	22.09
Max	LTE B5	10	20600	844	64-QAM	50	0	LTE B5	10	20501	834.1	64-QAM	50	0	22.04
Max	LTE B5	10	20600	844	256-QAM	50	0	LTE B5	10	20501	834.1	256-QAM	50	0	19.99

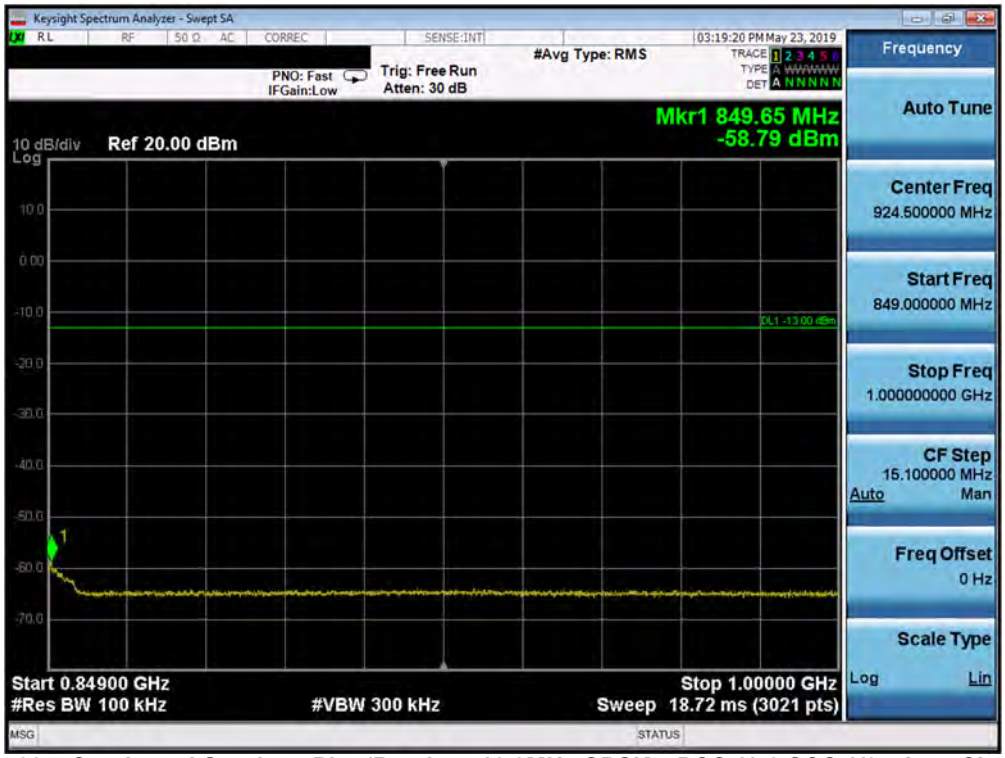
Table 7-4. Conducted Powers (B5 with Various Combinations for 10MHz Channel Bandwidth)



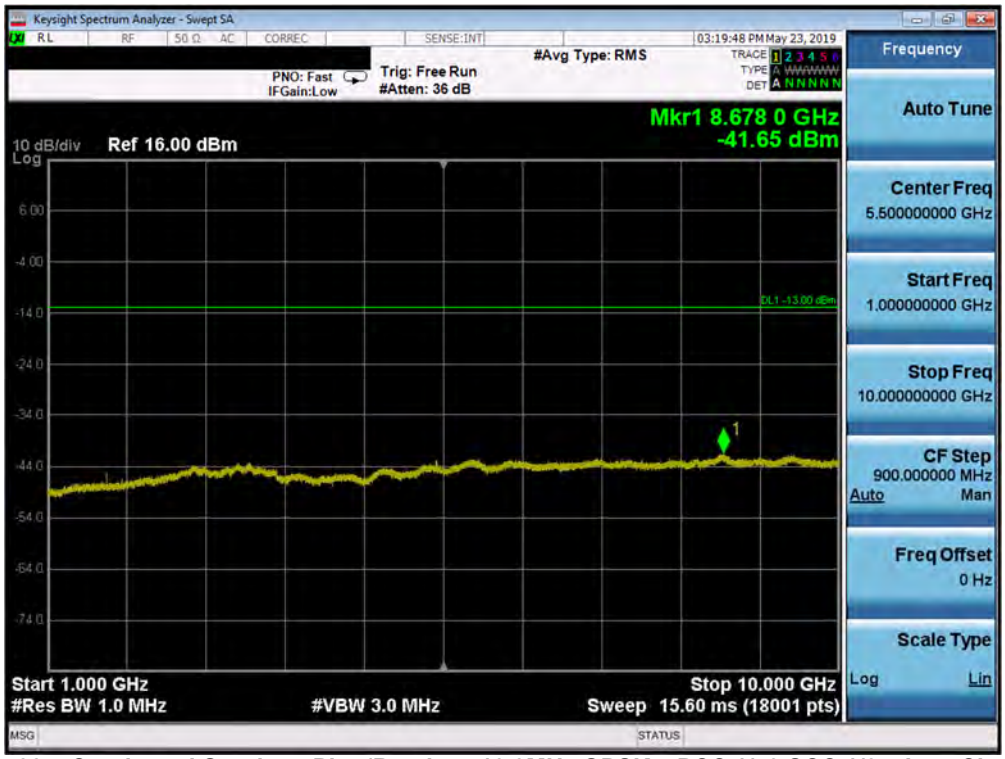
Plot 7-332. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)



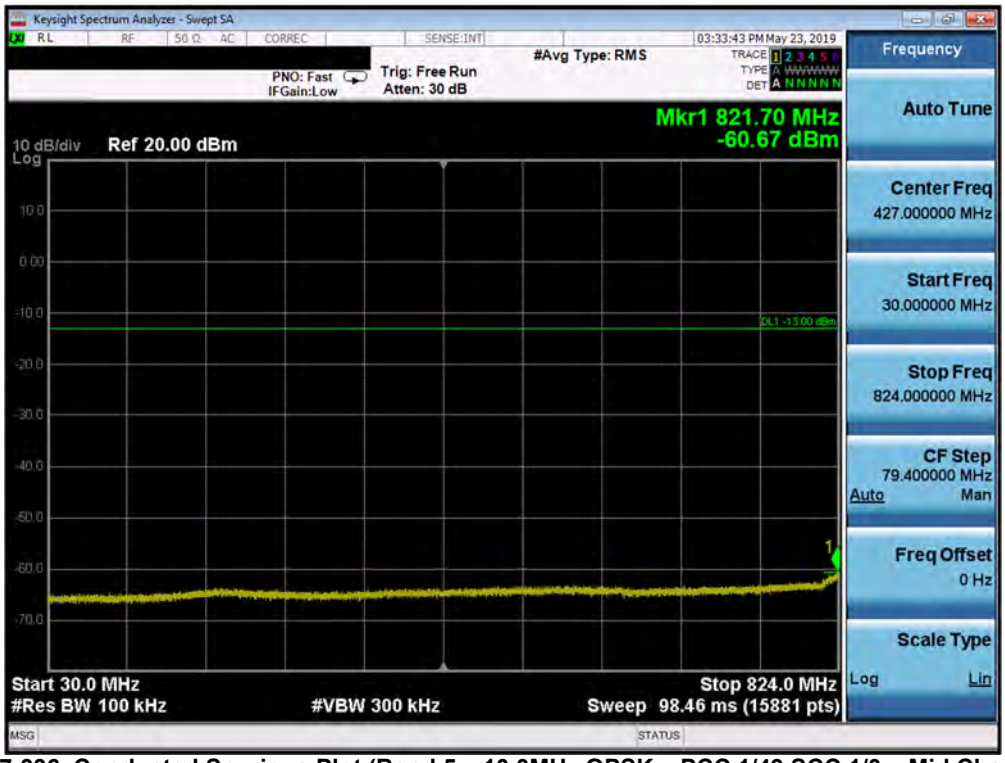
Plot 7-333. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)



Plot 7-334. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)

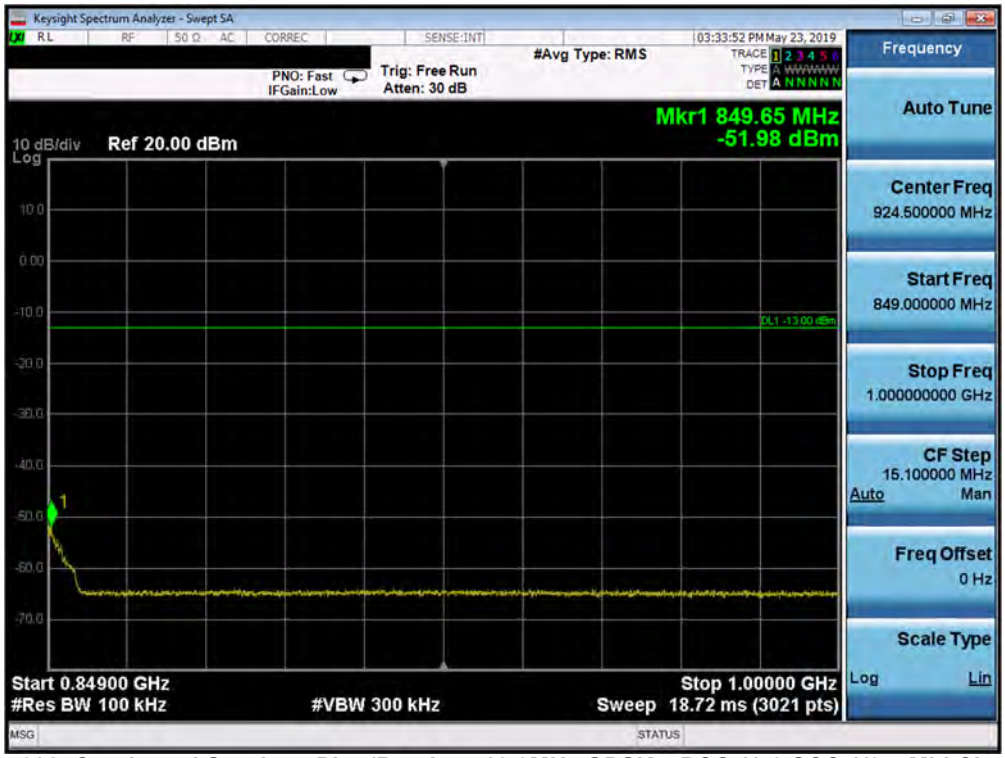


Plot 7-335. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)

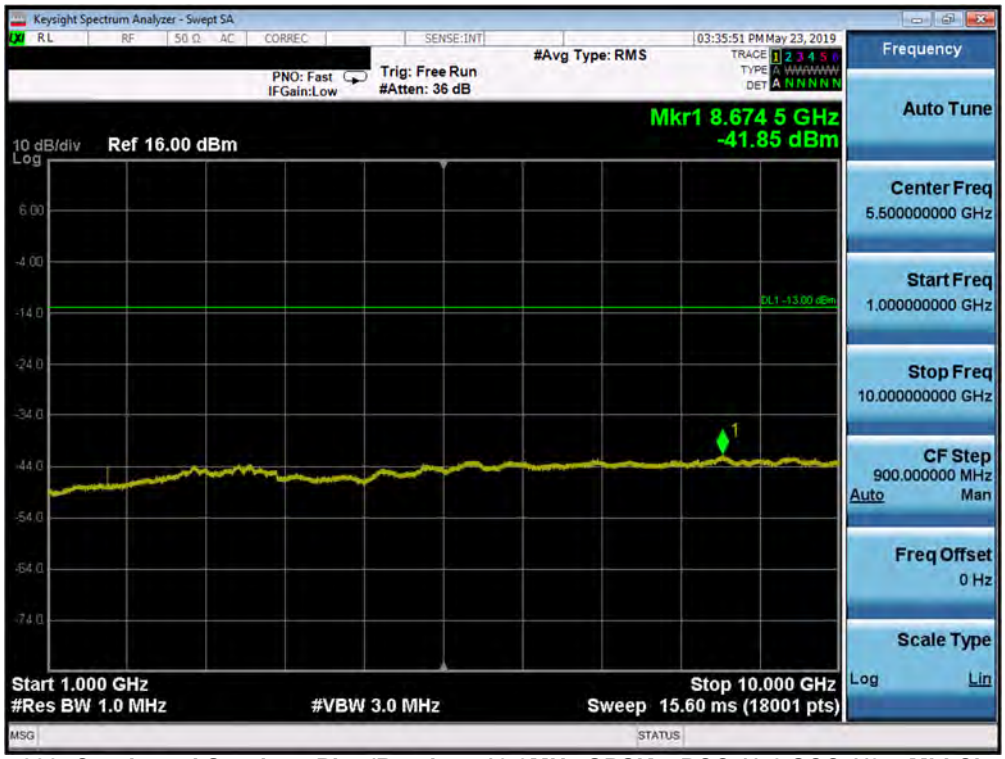


Plot 7-336. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Mid Channel)

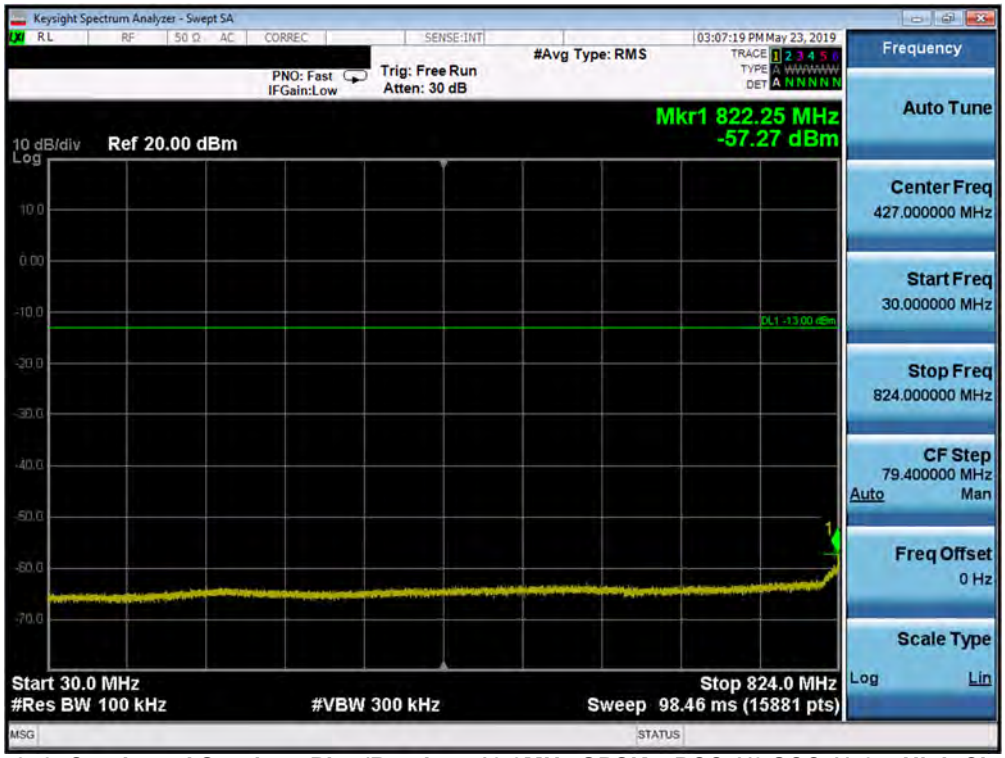
Plot 7-337. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Mid Channel)



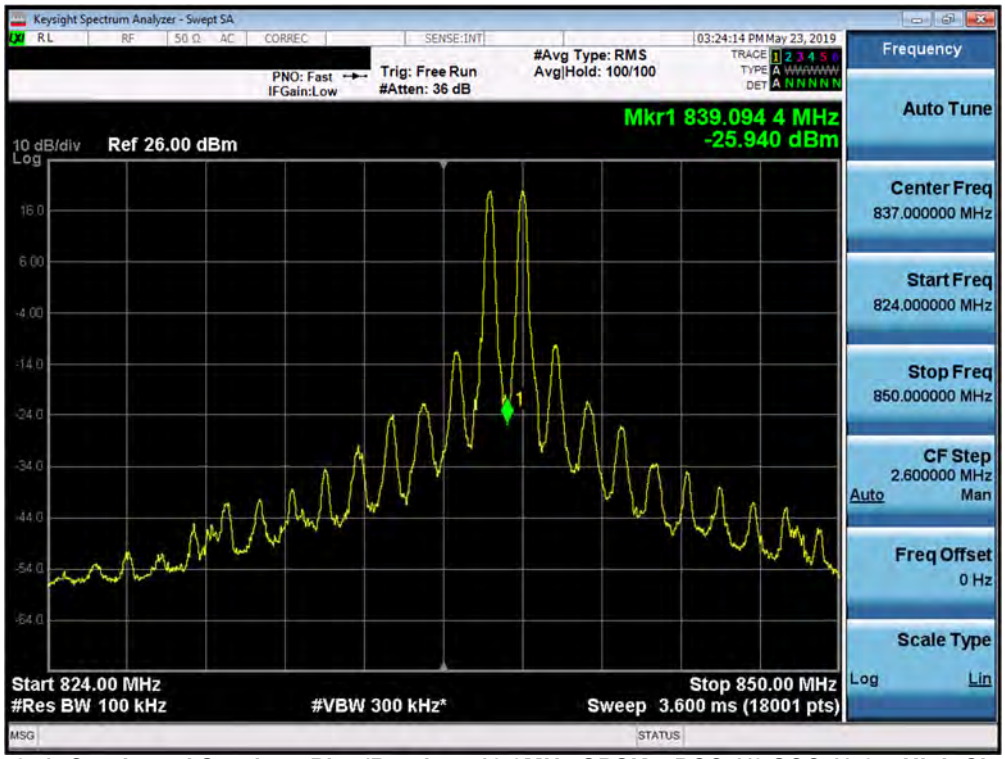
Plot 7-338. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Mid Channel)



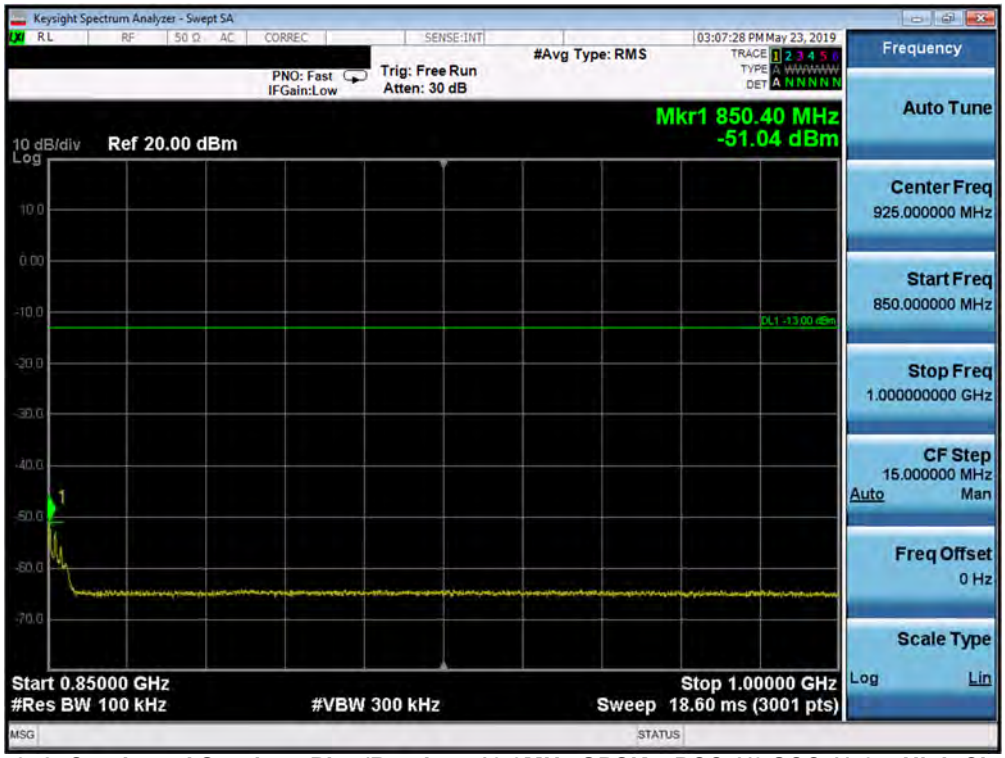
Plot 7-339. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Mid Channel)



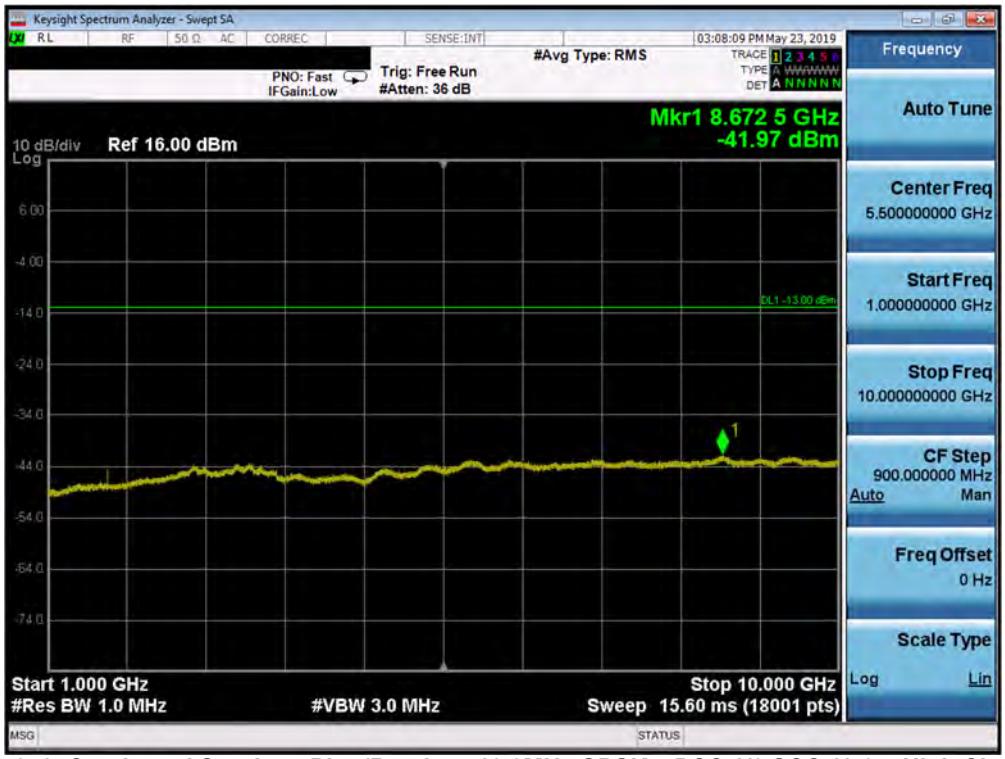
Plot 7-340. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)



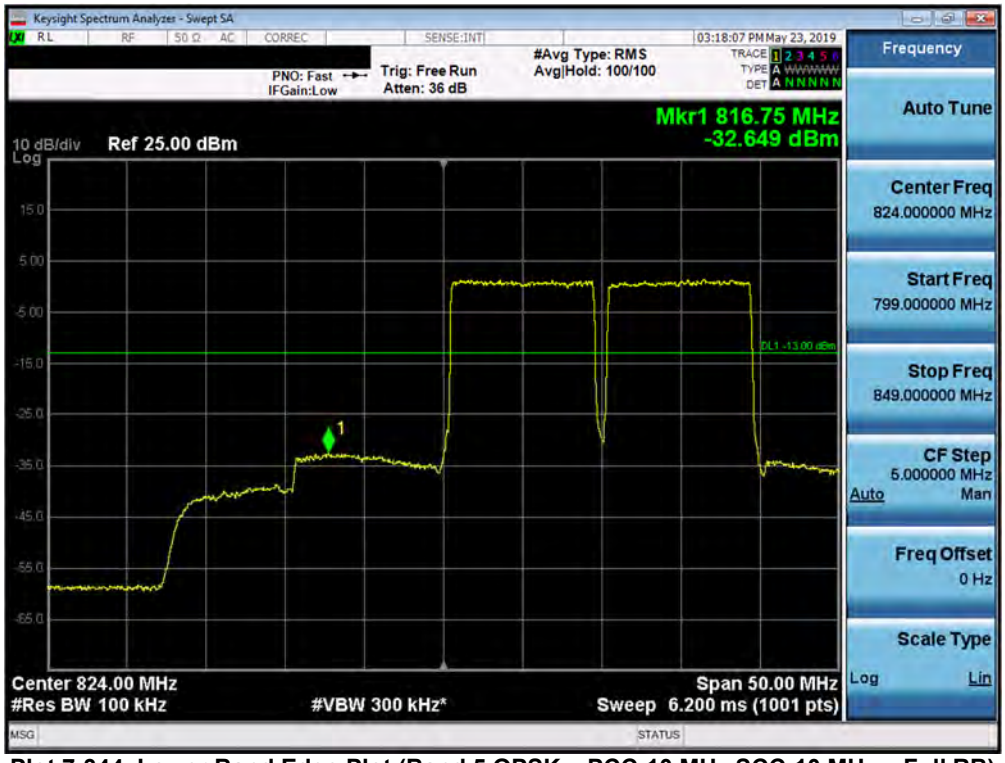
Plot 7-341. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)



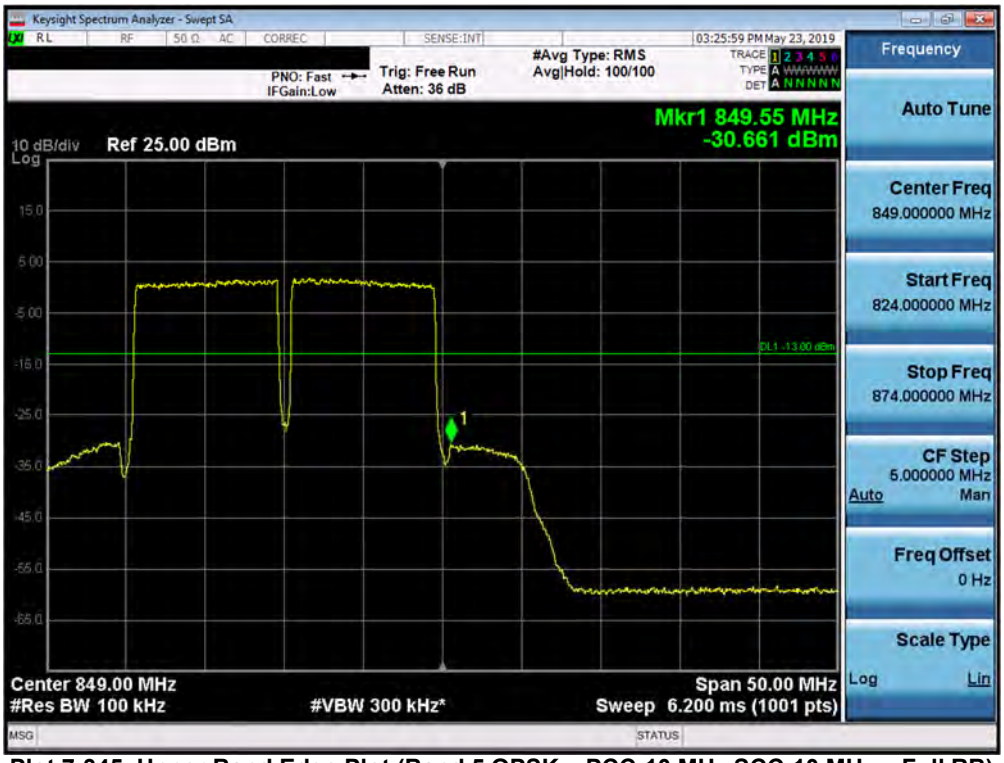
Plot 7-342. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)



Plot 7-343. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)



Plot 7-344. Lower Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:10 MHz – Full RB)



Plot 7-345. Upper Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:10 MHz – Full RB)

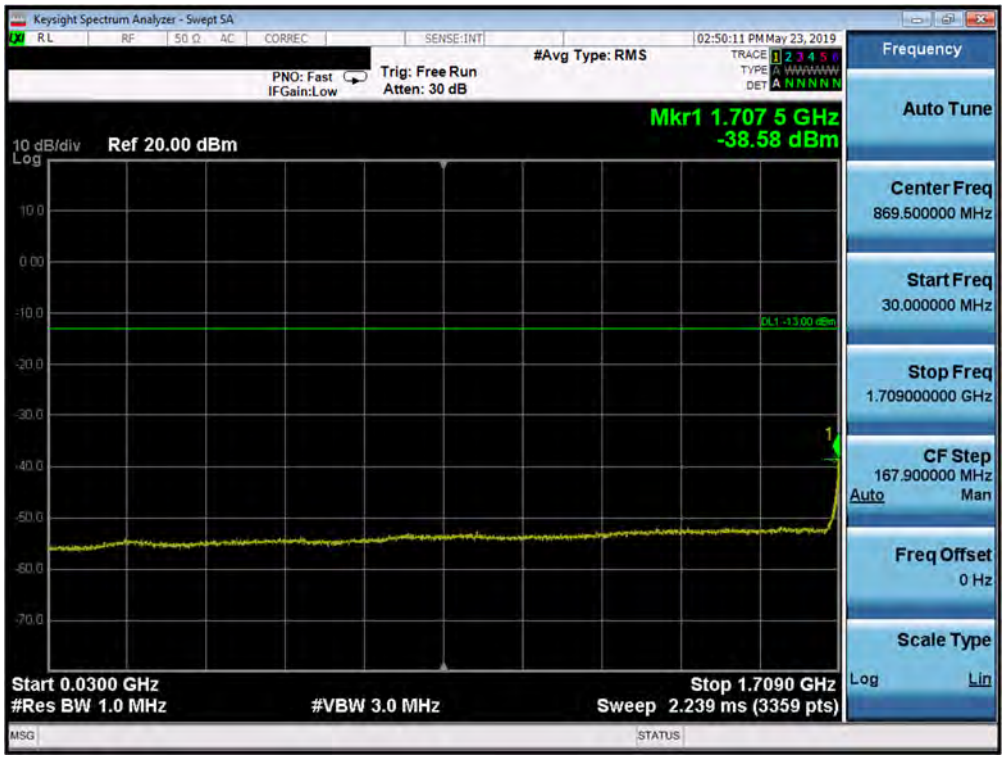
Uplink CA Configuration 66B/C

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 B66	20	132072	1720	QPSK	1	99	LTE B66	20	132270	1739.8	QPSK	1	0	23.46
Max	LTE B66	20	132322	1745	QPSK	1	99	LTE B66	20	132520	1764.8	QPSK	1	0	24.42
Max	LTE B66	20	132572	1770	QPSK	1	0	LTE B66	20	132374	1750.2	QPSK	1	99	24.12

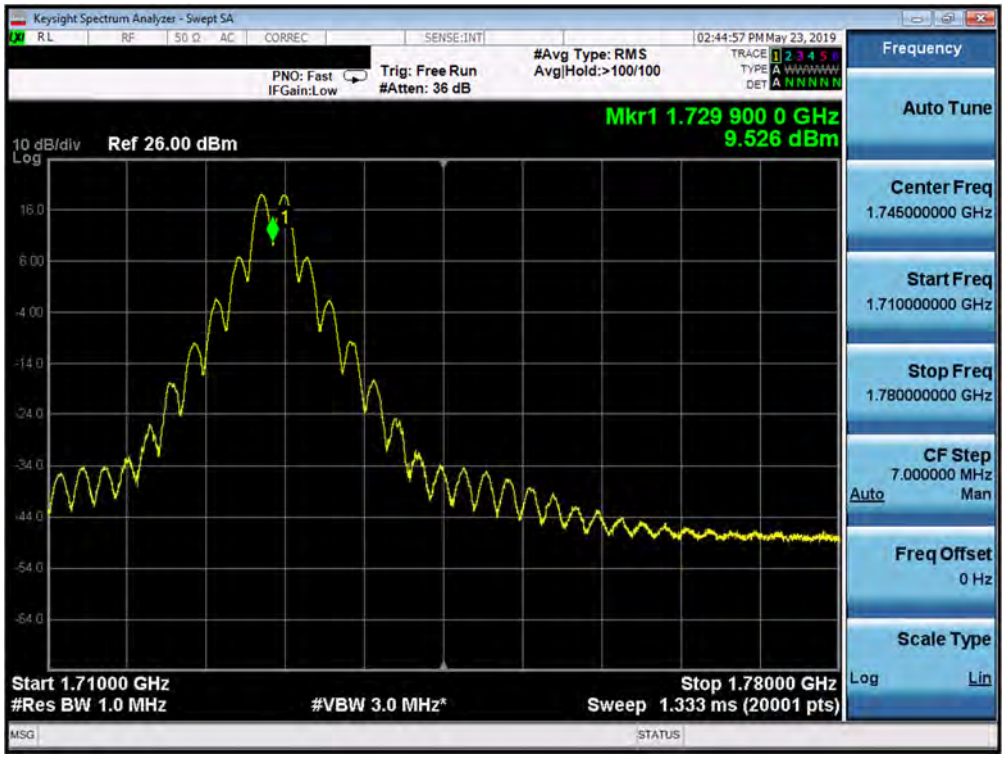
Table 7-5. Conducted Powers (B66 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

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 B66	20	132322	1745	QPSK	100	0	LTE B66	20	132520	1764.8	QPSK	100	0	23.11
Max	LTE B66	20	132322	1745	16-QAM	100	0	LTE B66	20	132520	1764.8	16-QAM	100	0	21.98
Max	LTE B66	20	132322	1745	64-QAM	100	0	LTE B66	20	132520	1764.8	64-QAM	100	0	21.06
Max	LTE B66	20	132322	1745	64-QAM	100	0	LTE B66	20	132520	1764.8	256-QAM	100	0	19.43

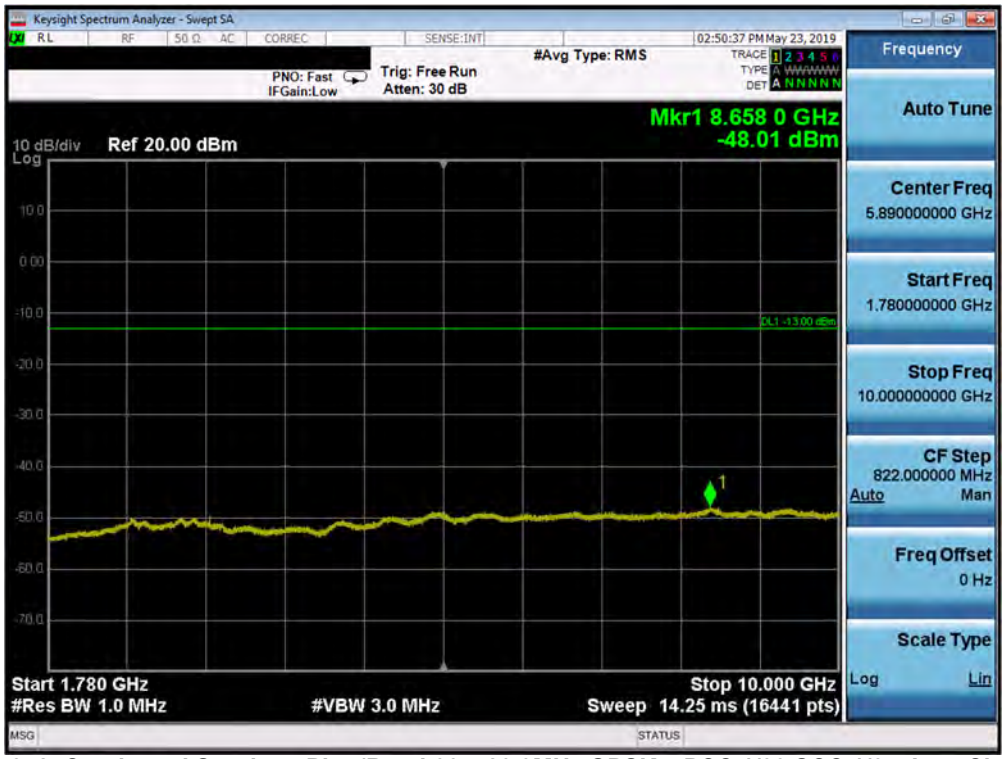
Table 7-6. Conducted Powers (B66 with Various Combinations for 20MHz + 20MHz Channel Bandwidth)



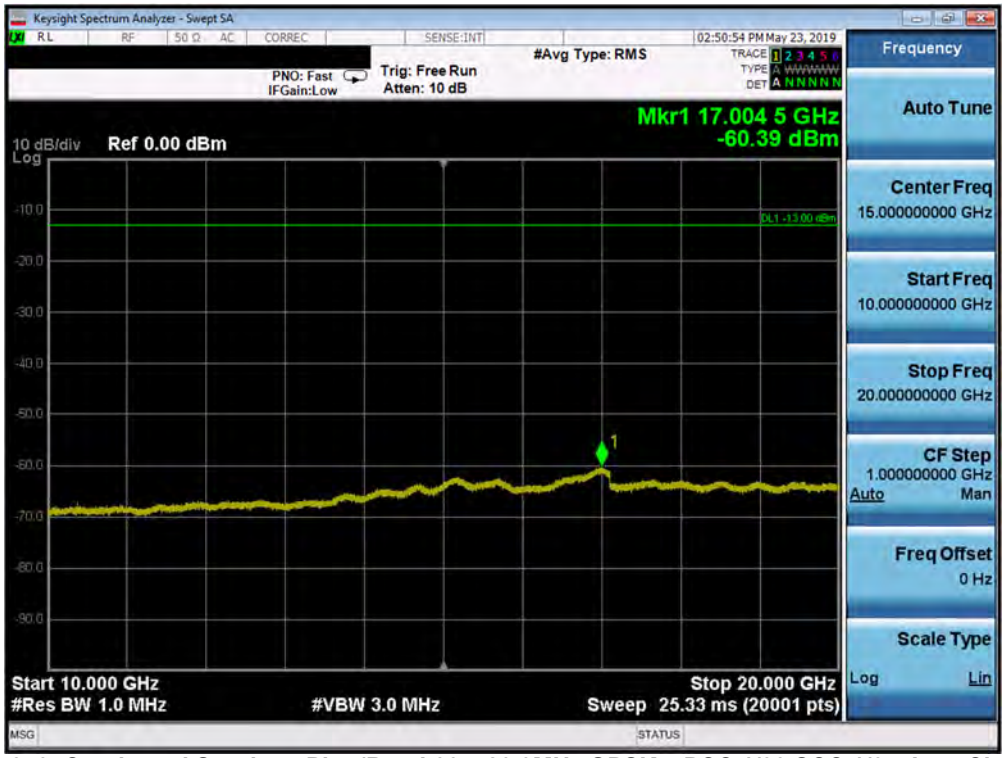
Plot 7-346. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



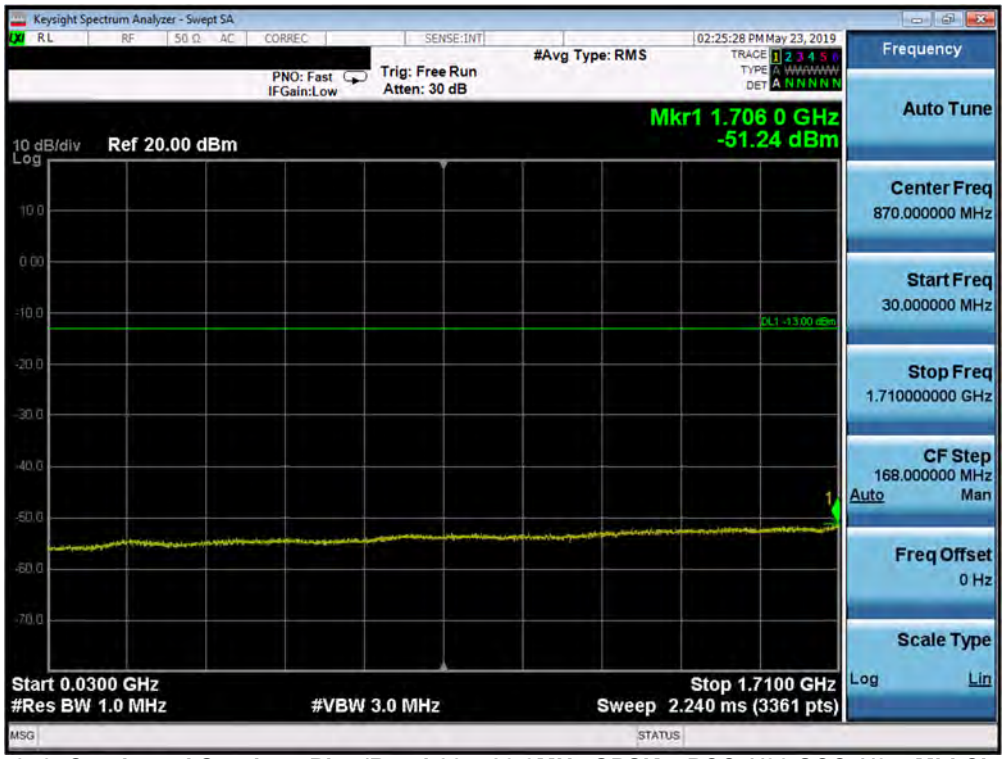
Plot 7-347. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



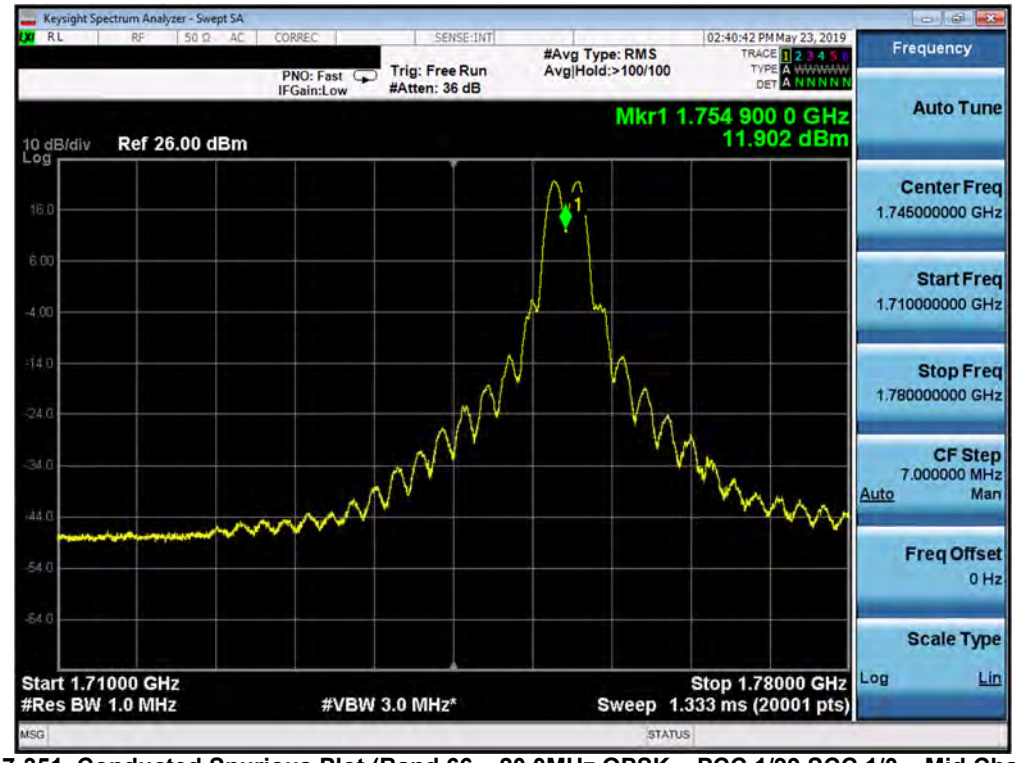
Plot 7-348. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



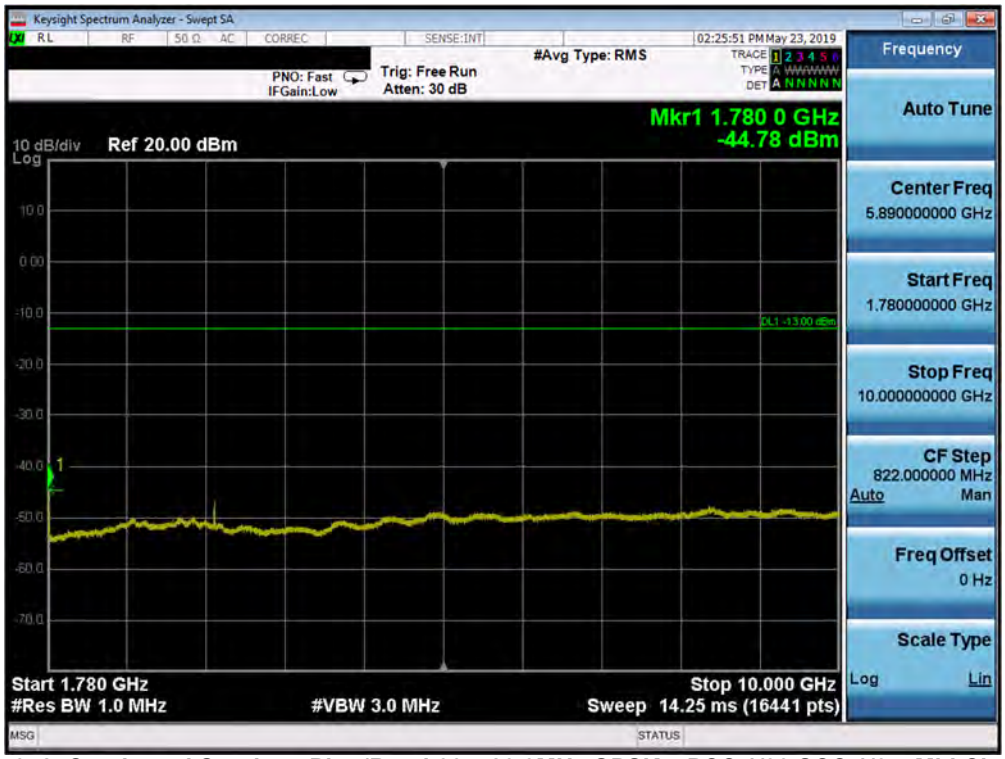
Plot 7-349. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



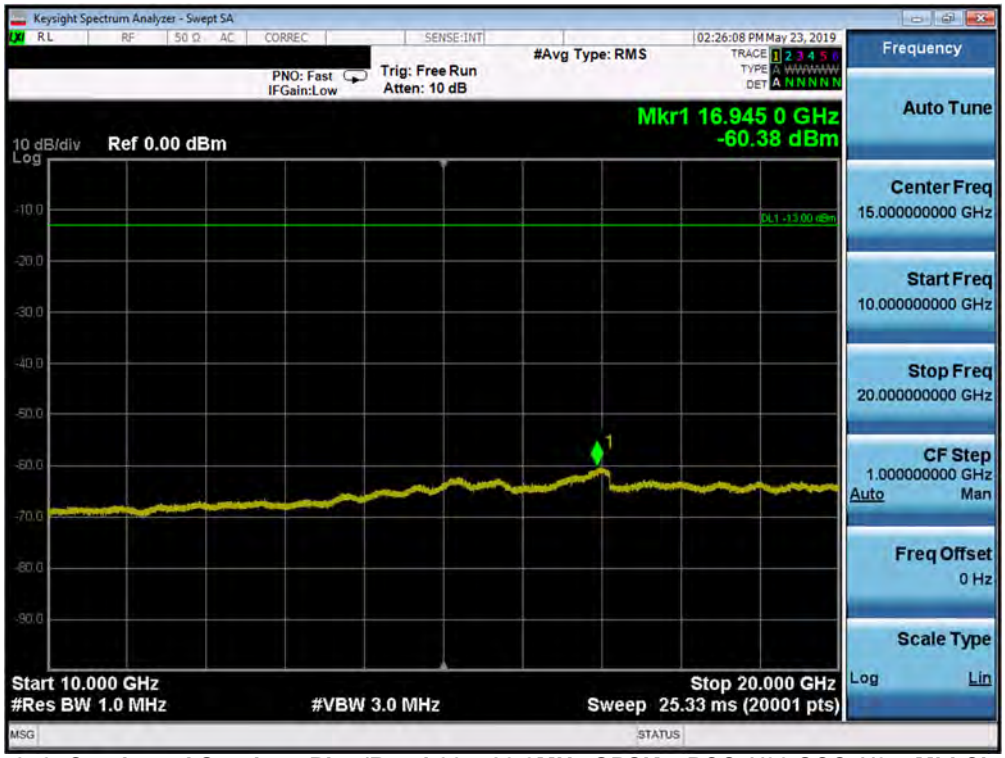
Plot 7-350. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



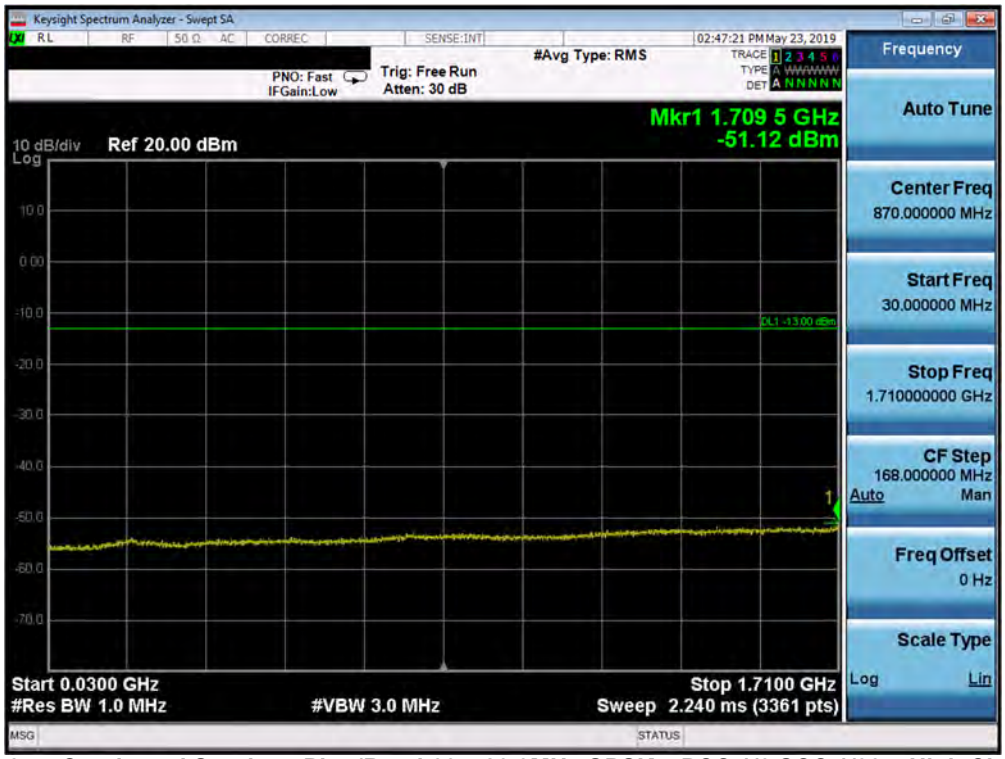
Plot 7-351. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



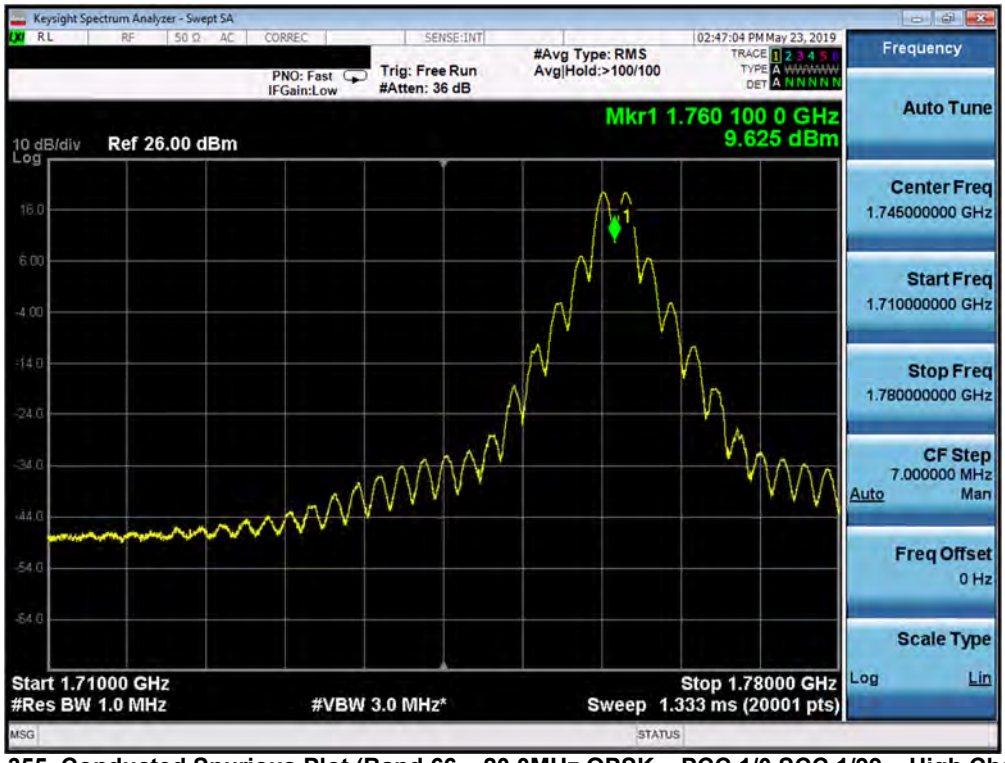
Plot 7-352. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



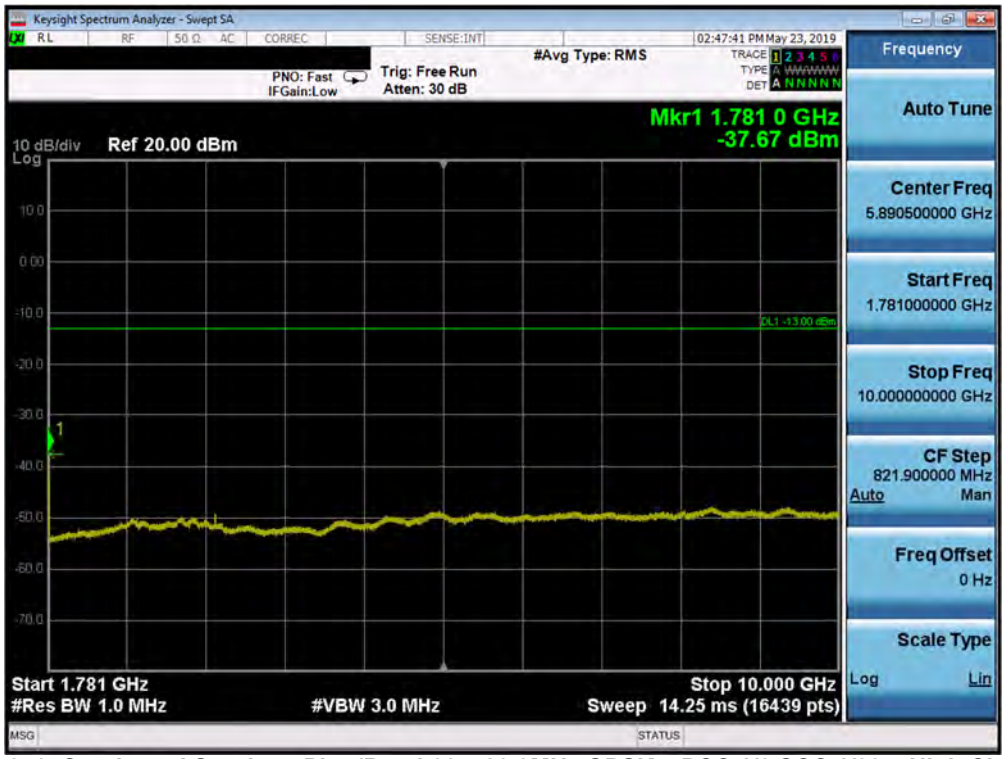
Plot 7-353. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



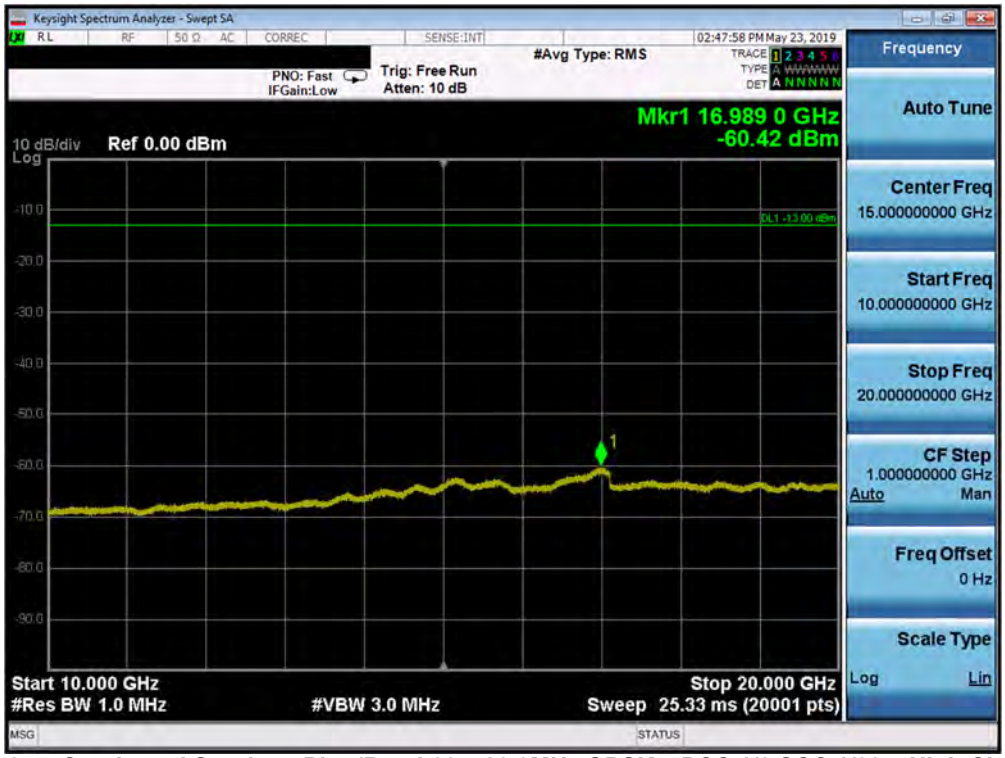
Plot 7-354. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Plot 7-355. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

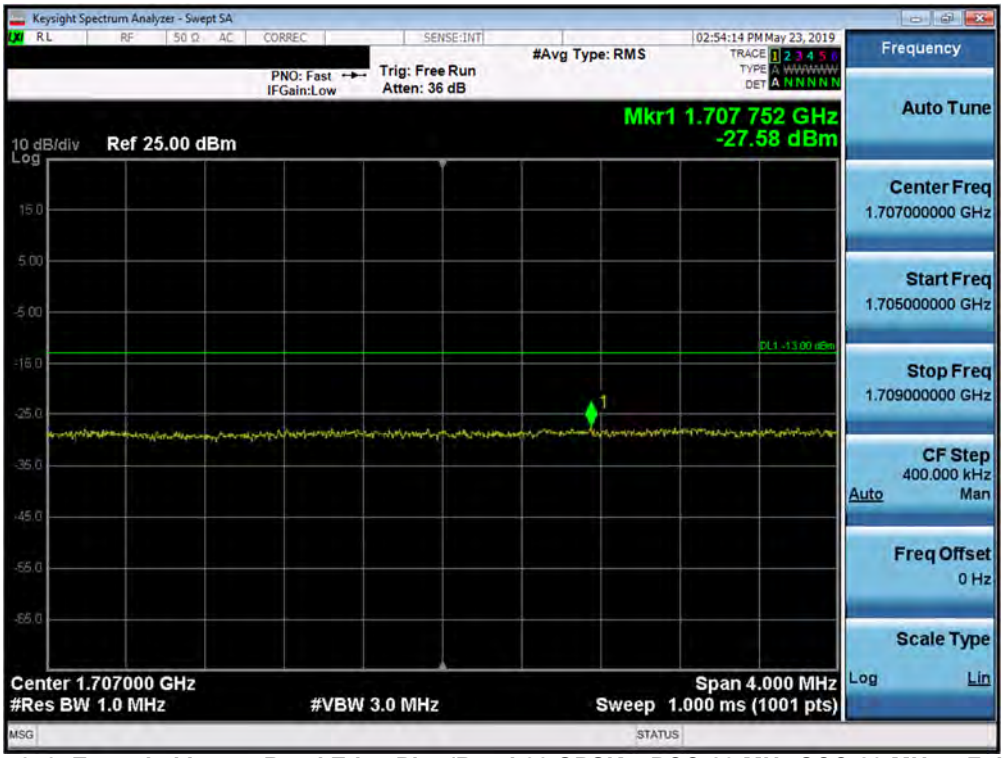


Plot 7-356. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



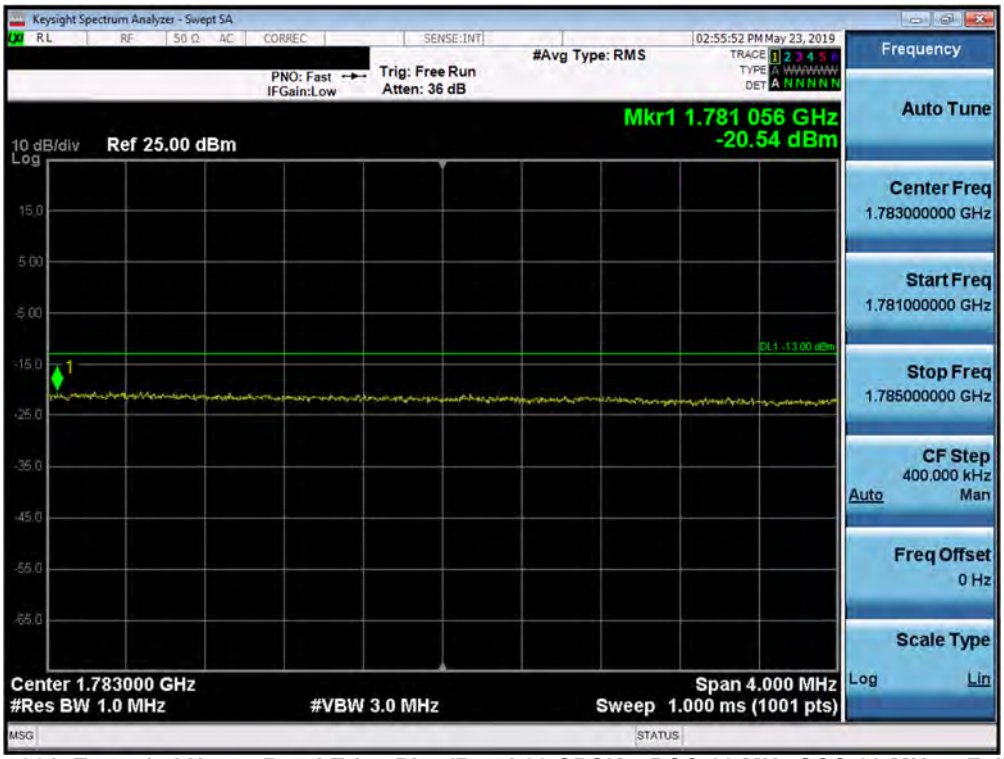
Plot 7-357. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

Plot 7-358. Lower Band Edge Plot (Band 66 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)



Plot 7-359. Extended Lower Band Edge Plot (Band 66 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

Plot 7-360. Upper Band Edge Plot (Band 66 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)



Plot 7-361. Extended Upper Band Edge Plot (Band 66 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

7.7 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Setup

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

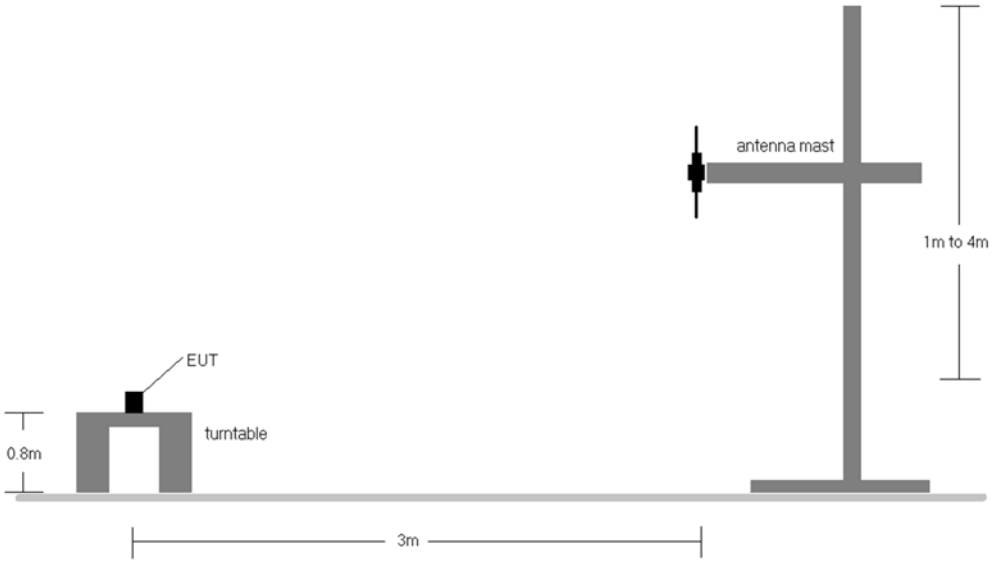


Figure 7-6. Radiated Test Setup <1GHz

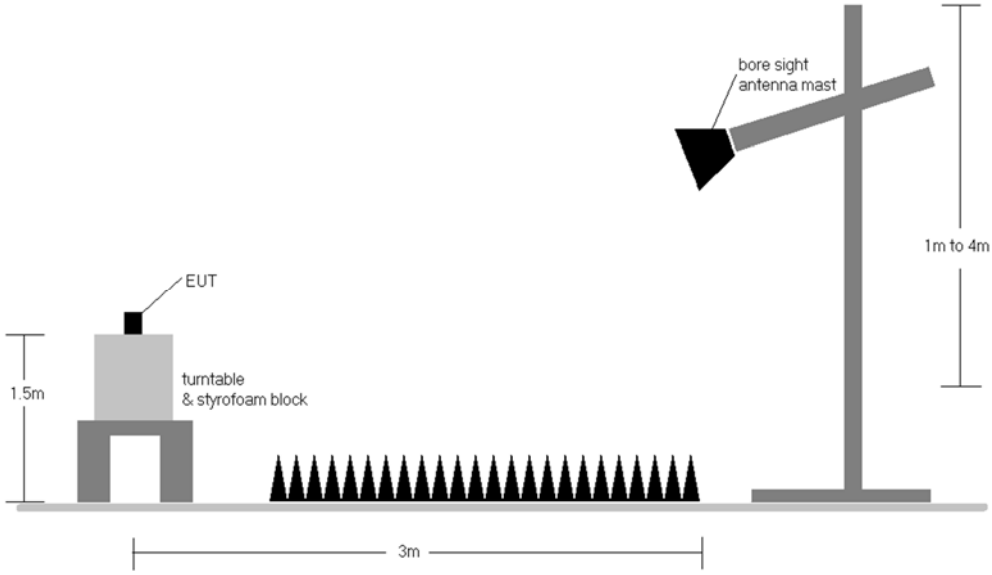


Figure 7-7. Radiated Test Setup >1GHz

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	124	224	1 / 5	14.18	4.50	16.53	0.045	34.77	-18.24	18.68	0.074	36.99	-18.31
707.50	1.4	QPSK	V	115	235	1 / 5	14.89	4.60	17.34	0.054	34.77	-17.43	19.49	0.089	36.99	-17.50
715.30	1.4	QPSK	V	108	230	1 / 5	15.23	4.63	**17.71**	0.059	34.77	-17.06	**19.86**	0.097	36.99	-17.13
707.50	1.4	16-QAM	V	115	235	1 / 5	14.39	4.60	**16.84**	0.048	34.77	-17.93	**18.99**	0.079	36.99	-18.00
707.50	1.4	64-QAM	V	115	235	1 / 5	13.15	4.60	**15.60**	0.036	34.77	-19.17	**17.75**	0.060	36.99	-19.24
707.50	1.4	256-QAM	V	115	235	1 / 5	10.37	4.60	**12.82**	0.019	34.77	-21.95	**14.97**	**0.031**	36.99	-22.02
700.50	3	QPSK	V	118	250	1 / 14	14.12	4.55	16.52	0.045	34.77	-18.25	18.67	0.074	36.99	-18.32
707.50	3	QPSK	V	110	222	1 / 14	14.98	4.60	17.43	0.055	34.77	-17.34	19.58	0.091	36.99	-17.41
714.50	3	QPSK	V	105	235	1 / 14	15.18	4.60	**17.63**	0.058	34.77	-17.14	**19.78**	0.095	36.99	-17.21
714.50	3	16-QAM	V	105	235	1 / 14	14.41	4.60	**16.86**	0.049	34.77	-17.91	**19.01**	0.080	36.99	-17.98
714.50	3	64-QAM	V	105	235	1 / 14	13.29	4.60	**15.74**	0.037	34.77	-19.03	**17.89**	0.062	36.99	-19.10
707.50	3	256-QAM	V	110	222	1 / 14	10.41	4.60	**12.86**	0.019	34.77	-21.91	**15.01**	**0.032**	36.99	-21.98
701.50	5	QPSK	V	115	245	1 / 24	14.30	4.60	16.75	0.047	34.77	-18.02	18.90	0.078	36.99	-18.09
707.50	5	QPSK	V	102	240	1 / 24	15.08	4.60	17.53	0.057	34.77	-17.24	19.68	0.093	36.99	-17.31
713.50	5	QPSK	V	100	245	1 / 24	15.39	4.60	**17.84**	**0.061**	34.77	-16.93	**19.99**	**0.100**	36.99	-17.00
713.50	5	16-QAM	V	100	245	1 / 24	14.46	4.60	**16.91**	0.049	34.77	-17.86	**19.06**	0.081	36.99	-17.93
713.50	5	64-QAM	V	100	245	1 / 24	13.30	4.60	**15.75**	0.038	34.77	-19.02	**17.90**	0.062	36.99	-19.09
707.50	5	256-QAM	V	102	240	1 / 24	10.40	4.60	**12.85**	0.019	34.77	-21.92	**15.00**	**0.032**	36.99	-21.99
704.00	10	QPSK	V	117	248	1 / 49	13.97	4.50	16.32	0.043	34.77	-18.45	18.47	0.070	36.99	-18.52
707.50	10	QPSK	V	102	238	1 / 49	14.85	4.60	17.30	0.054	34.77	-17.47	19.45	0.088	36.99	-17.54
711.00	10	QPSK	V	100	234	1 / 49	14.99	4.60	**17.44**	0.055	34.77	-17.33	**19.59**	0.091	36.99	-17.40
711.00	10	16-QAM	V	100	234	1 / 49	14.23	4.60	**16.68**	0.047	34.77	-18.09	**18.83**	0.076	36.99	-18.16
711.00	10	64-QAM	V	100	234	1 / 49	13.23	4.60	**15.68**	0.037	34.77	-19.09	**17.83**	0.061	36.99	-19.16
711.00	10	256-QAM	V	100	234	1 / 49	10.42	4.60	**12.87**	0.019	34.77	-21.90	**15.02**	**0.032**	36.99	-21.97
713.50	5	QPSK	H	308	290	1 / 24	14.77	3.70	16.32	0.043	34.77	-18.45	18.47	0.070	36.99	-18.52
713.50	5 (WCP)	QPSK	V	100	325	1 / 24	13.40	4.60	15.85	0.038	34.77	-18.92	18.00	0.063	36.99	-18.99

Table 7-7. ERP/EIRP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	275	275	1 / 0	14.38	5.70	17.93	0.062	34.77	-16.84	20.08	0.102	36.99	-16.91
782.00	5	QPSK	V	280	275	1 / 0	14.27	5.80	17.92	0.062	34.77	-16.85	20.07	0.102	36.99	-16.92
784.50	5	QPSK	V	275	276	1 / 0	14.31	5.80	**17.96**	0.063	34.77	-16.81	**20.11**	0.103	36.99	-16.88
779.50	5	16-QAM	V	275	275	1 / 0	14.37	5.70	**17.92**	0.062	34.77	-16.85	**20.07**	0.102	36.99	-16.92
784.50	5	64-QAM	V	275	276	1 / 0	12.37	5.80	**16.02**	0.040	34.77	-18.75	**18.17**	0.066	36.99	-18.82
782.00	5	256-QAM	V	280	275	1 / 0	10.41	5.80	**14.06**	0.025	34.77	-20.71	**16.21**	**0.042**	36.99	-20.78
782.00	10	QPSK	V	277	277	1 / 0	14.79	5.80	**18.44**	**0.070**	34.77	-16.33	**20.59**	**0.115**	36.99	-16.40
782.00	10	16-QAM	V	277	277	1 / 0	14.06	5.80	**17.71**	0.059	34.77	-17.06	**19.86**	0.097	36.99	-17.13
782.00	10	64-QAM	V	277	277	1 / 0	12.46	5.80	**16.11**	0.041	34.77	-18.66	**18.26**	0.067	36.99	-18.73
782.00	10	256-QAM	V	277	277	1 / 0	10.36	5.80	**14.01**	0.025	34.77	-20.76	**16.16**	**0.041**	36.99	-20.83
782.00	10	QPSK	H	160	294	5.80	14.55	5.80	18.20	0.066	34.77	-16.57	20.35	0.108	36.99	-16.64
782.00	10 (WCP)	QPSK	V	157	319	1 / 0	-36.84	5.80	-33.19	0.000	34.77	-67.96	-31.04	0.000	36.99	-68.03

Table 7-8. ERP/EIRP Data (Band 13)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	V	240	312	1 / 5	11.13	6.30	15.28	0.034	38.45	-23.17	17.43	0.055	40.61	-23.18
836.50	1.4	QPSK	V	230	280	1 / 5	13.71	6.40	17.96	0.063	38.45	-20.49	20.11	0.103	40.61	-20.50
848.30	1.4	QPSK	V	240	291	1 / 5	14.68	6.50	**19.03**	0.080	38.45	-19.42	**21.18**	0.131	40.61	-19.43
848.30	1.4	16-QAM	V	240	291	1 / 5	14.09	6.50	**18.44**	0.070	38.45	-20.01	**20.59**	0.115	40.61	-20.02
848.30	1.4	64-QAM	V	240	291	1 / 5	12.67	6.50	**17.02**	0.050	38.45	-21.43	**19.17**	0.083	40.61	-21.44
848.30	1.4	256-QAM	V	240	291	1 / 5	10.62	6.50	**14.97**	0.031	38.45	-23.48	**17.12**	**0.052**	40.61	-23.49
825.50	3	QPSK	V	240	312	1 / 14	13.07	6.30	17.22	0.053	38.45	-21.23	19.37	0.086	40.61	-21.24
836.50	3	QPSK	V	230	280	1 / 14	13.81	6.40	18.06	0.064	38.45	-20.39	20.21	0.105	40.61	-20.40
847.50	3	QPSK	V	240	291	1 / 14	14.71	6.50	**19.06**	0.081	38.45	-19.39	**21.21**	0.132	40.61	-19.40
847.50	3	16-QAM	V	240	291	1 / 14	14.06	6.50	**18.41**	0.069	38.45	-20.04	**20.56**	0.114	40.61	-20.05
847.50	3	64-QAM	V	240	291	1 / 14	12.70	6.50	**17.05**	0.051	38.45	-21.40	**19.20**	0.083	40.61	-21.41
847.50	3	256-QAM	V	240	291	1 / 14	10.65	6.50	**15.00**	0.032	38.45	-23.45	**17.15**	**0.052**	40.61	-23.46
826.50	5	QPSK	V	244	289	1 / 24	13.10	6.30	17.25	0.053	38.45	-21.20	19.40	0.087	40.61	-21.21
836.50	5	QPSK	V	201	224	1 / 24	13.82	6.40	18.07	0.064	38.45	-20.38	20.22	0.105	40.61	-20.39
846.50	5	QPSK	V	267	287	1 / 24	14.81	6.50	**19.16**	**0.082**	38.45	-19.29	**21.31**	**0.135**	40.61	-19.30
846.50	5	16-QAM	V	267	287	1 / 24	14.21	6.50	**18.56**	0.072	38.45	-19.89	**20.71**	0.118	40.61	-19.90
846.50	5	64-QAM	V	267	287	1 / 24	12.71	6.50	**17.06**	0.051	38.45	-21.39	**19.21**	0.083	40.61	-21.40
846.50	5	256-QAM	V	267	287	1 / 24	10.78	6.50	**15.13**	0.033	38.45	-23.32	**17.28**	**0.053**	40.61	-23.33
829.00	10	QPSK	V	256	273	1 / 49	13.18	6.30	17.33	0.054	38.45	-21.12	19.48	0.089	40.61	-21.13
836.50	10	QPSK	V	260	284	1 / 49	13.80	6.40	18.05	0.064	38.45	-20.40	20.20	0.105	40.61	-20.41
844.00	10	QPSK	V	267	288	1 / 49	14.83	6.40	**19.08**	0.081	38.45	-19.37	**21.23**	0.133	40.61	-19.38
844.00	10	16-QAM	V	267	288	1 / 49	14.26	6.40	**18.51**	0.071	38.45	-19.94	**20.66**	0.116	40.61	-19.95
844.00	10	64-QAM	V	267	288	1 / 49	12.67	6.40	**16.92**	0.049	38.45	-21.53	**19.07**	0.081	40.61	-21.54
844.00	10	256-QAM	V	267	288	1 / 49	10.75	6.40	**15.00**	0.032	38.45	-23.45	**17.15**	**0.052**	40.61	-23.46
846.50	5	QPSK	H	267	290	1 / 24	14.32	6.40	18.57	0.072	38.45	-19.88	20.72	0.118	40.61	-19.89
846.50	5 (WCP)	QPSK	V	127	311	1 / 24	12.26	6.40	16.51	0.045	38.45	-21.94	18.66	0.073	40.61	-21.95

Table 7-9. ERP/EIRP Data (Band 26/5)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
831.50	15	QPSK	V	273	283	1 / 74	13.26	6.35	17.46	0.056	38.45	-20.99	19.61	0.091	40.61	-21.00
836.50	15	QPSK	V	270	284	1 / 74	13.78	6.40	18.03	0.064	38.45	-20.42	20.18	0.104	40.61	-20.43
841.50	15	QPSK	V	267	290	1 / 74	14.81	6.40	**19.06**	0.081	38.45	-19.39	**21.21**	0.132	40.61	-19.40
841.50	15	16-QAM	V	267	290	1 / 74	14.19	6.40	**18.44**	0.070	38.45	-20.01	**20.59**	0.115	40.61	-20.02
841.50	15	64-QAM	V	267	290	1 / 74	12.63	6.40	**16.88**	0.049	38.45	-21.57	**19.03**	0.080	40.61	-21.58
841.50	15	256-QAM	V	267	290	1 / 74	10.70	6.40	**14.95**	0.031	38.45	-23.50	**17.10**	**0.051**	40.61	-23.51

Table 7-10. ERP/EIRP Data (Band 26)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	V	108	310	1 / 5	12.64	9.35	21.99	0.158	30.00	-8.01
1745.00	1.4	QPSK	V	108	310	1 / 5	14.91	9.11	**24.02**	0.252	30.00	-5.98
1779.30	1.4	QPSK	V	108	310	1 / 0	14.38	9.17	23.55	0.227	30.00	-6.45
1745.00	1.4	16-QAM	V	108	310	1 / 5	14.27	9.11	**23.38**	0.218	30.00	-6.62
1745.00	1.4	64-QAM	V	108	310	1 / 5	12.70	9.11	**21.81**	0.152	30.00	-8.19
1745.00	1.4	256-QAM	V	108	310	1 / 5	10.04	9.11	**19.15**	0.082	30.00	-10.85
1711.50	3	QPSK	V	108	310	1 / 14	12.31	9.34	21.65	0.146	30.00	-8.35
1745.00	3	QPSK	V	108	312	1 / 14	14.89	9.11	**24.00**	0.251	30.00	-6.00
1778.50	3	QPSK	V	108	310	1 / 0	14.47	9.17	23.63	0.231	30.00	-6.37
1745.00	3	16-QAM	V	108	312	1 / 14	14.52	9.11	**23.63**	0.231	30.00	-6.37
1745.00	3	64-QAM	V	108	312	1 / 14	12.73	9.11	**21.84**	0.153	30.00	-8.16
1745.00	3	256-QAM	V	108	312	1 / 14	10.50	9.11	**19.61**	0.091	30.00	-10.39
1712.50	5	QPSK	V	108	330	1 / 24	12.56	9.34	21.90	0.155	30.00	-8.10
1745.00	5	QPSK	V	108	320	1 / 24	14.41	9.11	23.52	0.225	30.00	-6.48
1777.50	5	QPSK	V	108	330	1 / 0	14.52	9.16	**23.69**	0.234	30.00	-6.31
1745.00	5	16-QAM	V	108	320	1 / 24	14.12	9.11	**23.23**	0.210	30.00	-6.77
1777.50	5	64-QAM	V	108	330	1 / 0	12.89	9.16	**22.06**	0.161	30.00	-7.94
1745.00	5	256-QAM	V	108	320	1 / 24	10.10	9.11	**19.21**	0.083	30.00	-10.79
1715.00	10	QPSK	V	100	323	1 / 49	12.38	9.32	21.70	0.148	30.00	-8.30
1745.00	10	QPSK	V	105	320	1 / 49	14.64	9.11	23.75	0.237	30.00	-6.25
1775.00	10	QPSK	V	100	334	1 / 0	14.82	9.16	**23.98**	0.250	30.00	-6.02
1745.00	10	16-QAM	V	105	320	1 / 49	14.11	9.11	**23.22**	0.210	30.00	-6.78
1775.00	10	64-QAM	V	100	334	1 / 0	12.73	9.16	**21.89**	0.154	30.00	-8.11
1745.00	10	256-QAM	V	105	320	1 / 49	10.12	9.11	**19.23**	0.084	30.00	-10.77
1717.50	15	QPSK	V	100	323	1 / 74	12.65	9.30	21.95	0.157	30.00	-8.05
1745.00	15	QPSK	V	105	320	1 / 74	15.16	9.11	**24.27**	**0.267**	30.00	-5.73
1772.50	15	QPSK	V	100	334	1 / 0	14.44	9.15	23.59	0.228	30.00	-6.41
1745.00	15	16-QAM	V	105	320	1 / 74	14.26	9.11	**23.37**	0.217	30.00	-6.63
1745.00	15	64-QAM	V	105	320	1 / 74	13.05	9.11	**22.16**	0.164	30.00	-7.84
1745.00	15	256-QAM	V	105	320	1 / 74	10.28	9.11	**19.39**	0.087	30.00	-10.61
1720.00	20	QPSK	V	100	323	1 / 99	13.22	9.28	22.50	0.178	30.00	-7.50
1745.00	20	QPSK	V	100	326	1 / 99	14.92	9.11	24.03	0.253	30.00	-5.97
1770.00	20	QPSK	V	100	334	1 / 0	15.08	9.14	**24.22**	0.264	30.00	-5.78
1770.00	20	16-QAM	V	100	334	1 / 0	14.36	9.14	**23.50**	0.224	30.00	-6.50
1770.00	20	64-QAM	V	100	334	1 / 0	13.36	9.14	**22.50**	0.178	30.00	-7.50
1770.00	20	256-QAM	V	100	334	1 / 0	11.40	9.14	**20.54**	0.113	30.00	-9.46
1745.00	15	QPSK	H	102	354	1 / 74	12.65	9.11	21.76	0.150	30.00	-8.24
1745.00	15 (WCP)	QPSK	V	100	49	1 / 74	9.67	9.11	18.78	0.075	30.00	-11.22

Table 7-11. EIRP Data (Band 66/4)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	108	221	1 / 5	12.95	9.48	22.44	0.175	33.01	-10.58
1880.00	1.4	QPSK	H	108	228	1 / 5	13.42	9.90	23.32	0.215	33.01	-9.69
1909.30	1.4	QPSK	H	108	228	1 / 0	13.77	10.25	**24.03**	0.253	33.01	-8.98
1909.30	1.4	16-QAM	H	108	228	1 / 0	13.35	10.25	**23.61**	0.229	33.01	-9.40
1909.30	1.4	64-QAM	H	108	228	1 / 0	13.04	10.25	**23.30**	0.214	33.01	-9.71
1909.30	1.4	256-QAM	H	108	228	1 / 0	10.94	10.25	**21.20**	0.132	33.01	-11.81
1851.50	3	QPSK	H	100	240	1 / 14	13.02	9.50	22.51	0.178	33.01	-10.50
1880.00	3	QPSK	H	100	240	1 / 14	13.45	9.90	23.35	0.216	33.01	-9.66
1908.50	3	QPSK	H	100	241	1 / 0	13.88	10.25	**24.13**	0.259	33.01	-8.88
1908.50	3	16-QAM	H	100	241	1 / 0	12.84	10.25	**23.09**	0.204	33.01	-9.92
1908.50	3	64-QAM	H	100	241	1 / 0	13.10	10.25	**23.35**	0.216	33.01	-9.66
1908.50	3	256-QAM	H	100	241	1 / 0	11.00	10.25	**21.25**	0.133	33.01	-11.76
1852.50	5	QPSK	H	100	229	1 / 24	12.98	9.51	22.49	0.177	33.01	-10.52
1880.00	5	QPSK	H	100	219	1 / 24	13.44	9.90	23.34	0.216	33.01	-9.67
1907.50	5	QPSK	H	100	219	1 / 0	13.92	10.24	**24.16**	0.261	33.01	-8.85
1907.50	5	16-QAM	H	100	219	1 / 0	13.12	10.24	**23.36**	0.217	33.01	-9.65
1907.50	5	64-QAM	H	100	219	1 / 0	13.12	10.24	**23.36**	0.217	33.01	-9.65
1907.50	5	256-QAM	H	100	219	1 / 0	11.02	10.24	**21.26**	0.134	33.01	-11.75
1855.00	10	QPSK	H	100	228	1 / 49	12.76	9.55	22.30	0.170	33.01	-10.71
1880.00	10	QPSK	H	100	232	1 / 49	13.37	9.90	23.27	0.212	33.01	-9.74
1905.00	10	QPSK	H	100	242	1 / 0	13.87	10.22	**24.09**	0.256	33.01	-8.92
1905.00	10	16-QAM	H	100	242	1 / 0	12.81	10.22	**23.03**	0.201	33.01	-9.98
1905.00	10	64-QAM	H	100	242	1 / 0	13.22	10.22	**23.44**	0.221	33.01	-9.57
1905.00	10	256-QAM	H	100	242	1 / 0	11.12	10.22	**21.34**	0.136	33.01	-11.67
1857.50	15	QPSK	H	105	230	1 / 74	12.86	9.58	22.44	0.175	33.01	-10.57
1880.00	15	QPSK	H	105	235	1 / 74	13.51	9.90	23.41	0.219	33.01	-9.60
1902.50	15	QPSK	H	105	238	1 / 0	14.01	10.20	**24.21**	0.264	33.01	-8.80
1902.50	15	16-QAM	H	105	238	1 / 0	13.18	10.20	**23.38**	0.218	33.01	-9.63
1902.50	15	64-QAM	H	105	238	1 / 0	13.23	10.20	**23.43**	0.220	33.01	-9.58
1902.50	15	256-QAM	H	105	238	1 / 0	11.13	10.20	**21.33**	0.136	33.01	-11.68
1860.00	20	QPSK	H	100	228	1 / 99	13.06	9.62	22.68	0.185	33.01	-10.33
1880.00	20	QPSK	H	100	232	1 / 99	13.47	9.90	23.37	0.217	33.01	-9.64
1900.00	20	QPSK	H	100	242	1 / 0	14.20	10.18	**24.38**	**0.274**	33.01	-8.63
1900.00	20	16-QAM	H	100	242	1 / 0	13.19	10.18	**23.37**	0.217	33.01	-9.64
1900.00	20	64-QAM	H	100	242	1 / 0	12.14	10.18	**22.32**	0.171	33.01	-10.69
1900.00	20	256-QAM	H	100	242	1 / 0	10.04	10.18	**20.22**	0.105	33.01	-12.79
1900.00	20	QPSK	V	100	277	1 / 0	13.65	10.18	23.83	0.242	33.01	-9.18
1900.00	20 (WCP)	QPSK	H	105	210	1 / 0	12.30	10.18	22.48	0.177	33.01	-10.53

Table 7-12. EIRP Data (Band 2)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	H	115	233	1 / 24	11.87	9.43	**21.30**	0.135	33.01	-11.71
2535.00	5	QPSK	H	100	220	1 / 0	10.35	9.39	19.74	0.094	33.01	-13.27
2567.50	5	QPSK	H	100	220	1 / 24	8.26	9.45	17.71	0.059	33.01	-15.30
2502.50	5	16-QAM	H	115	233	1 / 24	10.46	9.43	**19.89**	0.098	33.01	-13.12
2502.50	5	64-QAM	H	115	233	1 / 24	8.51	9.43	**17.94**	0.062	33.01	-15.07
2502.50	5	256-QAM	H	115	233	1 / 24	6.67	9.43	**16.10**	0.041	33.01	-16.91
2505.00	10	QPSK	H	115	221	1 / 49	11.97	9.43	**21.39**	**0.138**	33.01	-11.62
2535.00	10	QPSK	H	100	221	1 / 0	10.19	9.39	19.58	0.091	33.01	-13.43
2565.00	10	QPSK	H	100	221	1 / 49	8.32	9.44	17.76	0.060	33.01	-15.25
2505.00	10	16-QAM	H	115	221	1 / 49	10.47	9.43	**19.89**	0.098	33.01	-13.12
2505.00	10	64-QAM	H	115	221	1 / 49	8.40	9.43	**17.82**	0.061	33.01	-15.19
2505.00	10	256-QAM	H	115	221	1 / 49	6.59	9.43	**16.01**	0.040	33.01	-17.00
2507.50	15	QPSK	H	118	233	1 / 74	11.97	9.42	**21.39**	0.138	33.01	-11.62
2535.00	15	QPSK	H	101	221	1 / 0	10.25	9.39	19.64	0.092	33.01	-13.37
2562.50	15	QPSK	H	101	210	1 / 74	8.35	9.43	17.78	0.060	33.01	-15.23
2507.50	15	16-QAM	H	118	233	1 / 74	10.56	9.42	**19.98**	0.100	33.01	-13.03
2507.50	15	64-QAM	H	118	233	1 / 74	8.42	9.42	**17.84**	0.061	33.01	-15.17
2507.50	15	256-QAM	H	118	233	1 / 74	6.66	9.42	**16.08**	0.041	33.01	-16.93
2510.00	20	QPSK	H	115	233	1 / 99	11.66	9.42	**21.08**	0.128	33.01	-11.93
2535.00	20	QPSK	H	100	221	1 / 0	10.02	9.39	19.41	0.087	33.01	-13.60
2560.00	20	QPSK	H	100	210	1 / 99	8.15	9.42	17.57	0.057	33.01	-15.44
2510.00	20	16-QAM	H	115	233	1 / 99	10.79	9.42	**20.21**	0.105	33.01	-12.80
2510.00	20	64-QAM	H	115	233	1 / 99	8.49	9.42	**17.91**	0.062	33.01	-15.10
2510.00	20	256-QAM	H	115	233	1 / 99	6.75	9.42	**16.17**	0.041	33.01	-16.84
2505.00	10	QPSK	V	123	321	1 / 49	11.57	9.43	21.00	0.126	33.01	-12.01
2505.00	10 (WCP)	QPSK	H	155	225	1 / 49	8.86	9.43	18.29	0.067	33.01	-14.72

Table 7-13. EIRP Data (Band 7)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	100	220	1 / 0	14.65	9.43	**24.08**	0.256	33.01	-8.93
2593.00	5	QPSK	H	100	224	1 / 0	14.31	9.55	23.86	0.243	33.01	-9.15
2687.50	5	QPSK	H	100	222	1 / 0	13.98	9.82	23.80	0.240	33.01	-9.21
2498.50	5	16-QAM	H	100	220	1 / 24	13.66	9.43	**23.09**	0.204	33.01	-9.92
2498.50	5	64-QAM	H	100	220	1 / 0	12.70	9.43	**22.13**	0.163	33.01	-10.88
2498.50	5	256-QAM	H	100	220	1 / 24	9.64	9.43	**19.07**	**0.081**	33.01	-13.94
2501.00	10	QPSK	H	100	221	1 / 0	14.91	9.43	**24.34**	0.272	33.01	-8.67
2593.00	10	QPSK	H	101	225	1 / 0	14.29	9.55	23.84	0.242	33.01	-9.17
2685.00	10	QPSK	H	100	220	1 / 0	14.27	9.82	24.09	0.257	33.01	-8.92
2501.00	10	16-QAM	H	100	221	1 / 0	14.14	9.43	**23.57**	0.228	33.01	-9.44
2501.00	10	64-QAM	H	100	221	1 / 0	13.12	9.43	**22.55**	0.180	33.01	-10.46
2501.00	10	256-QAM	H	100	221	1 / 0	9.83	9.43	**19.26**	**0.084**	33.01	-13.75
2503.50	15	QPSK	H	101	222	1 / 74	14.92	9.43	**24.35**	0.272	33.01	-8.66
2593.00	15	QPSK	H	100	224	1 / 0	14.71	9.55	24.26	0.267	33.01	-8.75
2682.50	15	QPSK	H	100	223	1 / 74	14.21	9.83	24.04	0.253	33.01	-8.97
2503.50	15	16-QAM	H	101	222	1 / 74	14.03	9.43	**23.46**	0.222	33.01	-9.55
2593.00	15	64-QAM	H	100	224	1 / 0	13.01	9.55	**22.56**	0.180	33.01	-10.45
2503.50	15	256-QAM	H	101	222	1 / 74	9.83	9.43	**19.26**	**0.084**	33.01	-13.75
2506.00	20	QPSK	H	100	221	1 / 0	15.19	9.42	24.61	0.289	33.01	-8.40
2593.00	20	QPSK	H	100	225	1 / 99	15.07	9.55	**24.62**	**0.290**	33.01	-8.39
2680.00	20	QPSK	H	100	225	1 / 99	14.77	9.83	24.60	0.289	33.01	-8.41
2593.00	20	16-QAM	H	100	225	1 / 99	14.11	9.55	**23.66**	0.232	33.01	-9.35
2680.00	20	64-QAM	H	100	225	1 / 99	13.80	9.83	**23.63**	0.231	33.01	-9.38
2680.00	20	256-QAM	H	100	225	1 / 99	12.44	9.83	**22.27**	**0.169**	33.01	-10.74
20.00	QPSK	H	V	100	321	1 / 99	14.73	9.55	24.28	0.268	33.01	-8.73
20.00	QPSK (WCP	H	X	100	225	1 / 99	12.17	9.55	21.72	0.149	33.01	-11.29

Table 7-14. EIRP Data (Band 41 – PC3)

7.8 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

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

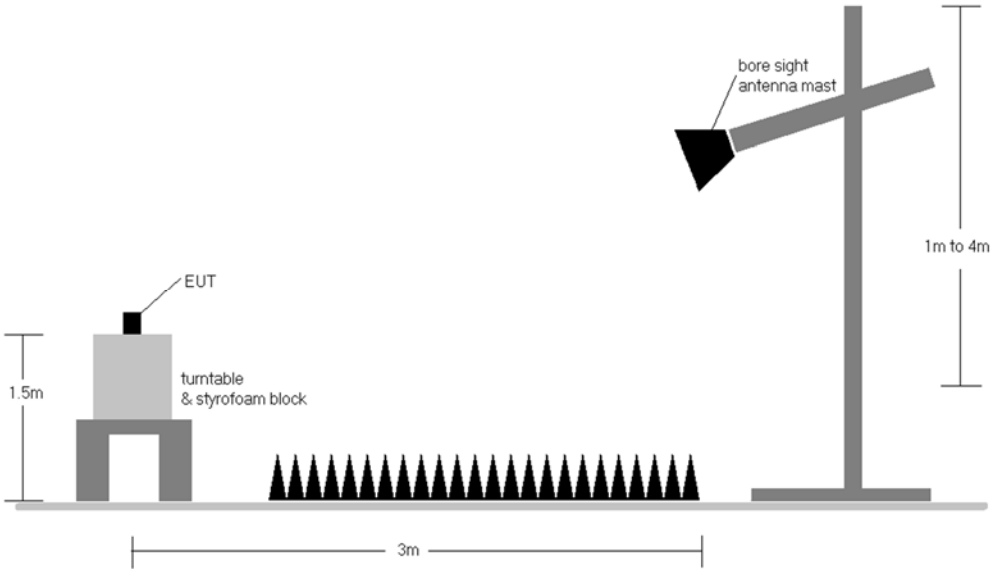


Figure 7-8. Test Instrument & Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

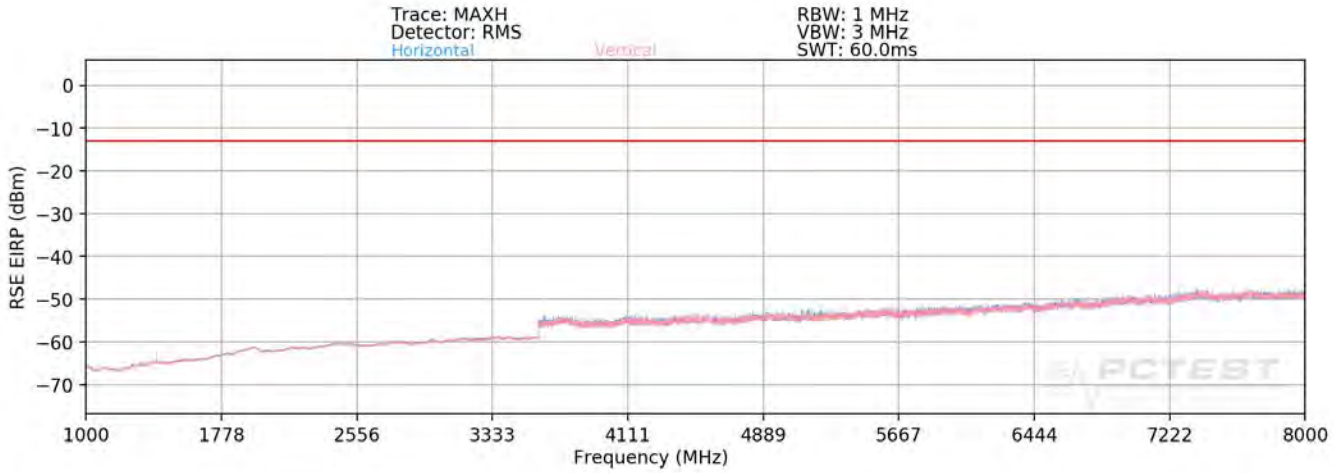
2) This unit was tested with its standard battery.

3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Band 12



Plot 7-362. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	701.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1403.00	H	152	199	-69.25	7.54	-61.71	-48.7
2104.50	H	-	-	-73.08	8.85	-64.23	-51.2
2806.00	H	-	-	-72.93	10.12	-62.81	-49.8

Table 7-15. Radiated Spurious Data (Band 12 – Low Channel)

OPERATING FREQUENCY:	707.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	157	192	-65.76	7.63	-58.13	-45.1
2122.50	H	-	-	-72.89	8.86	-64.03	-51.0
2830.00	H	-	-	-73.04	10.10	-62.95	-49.9

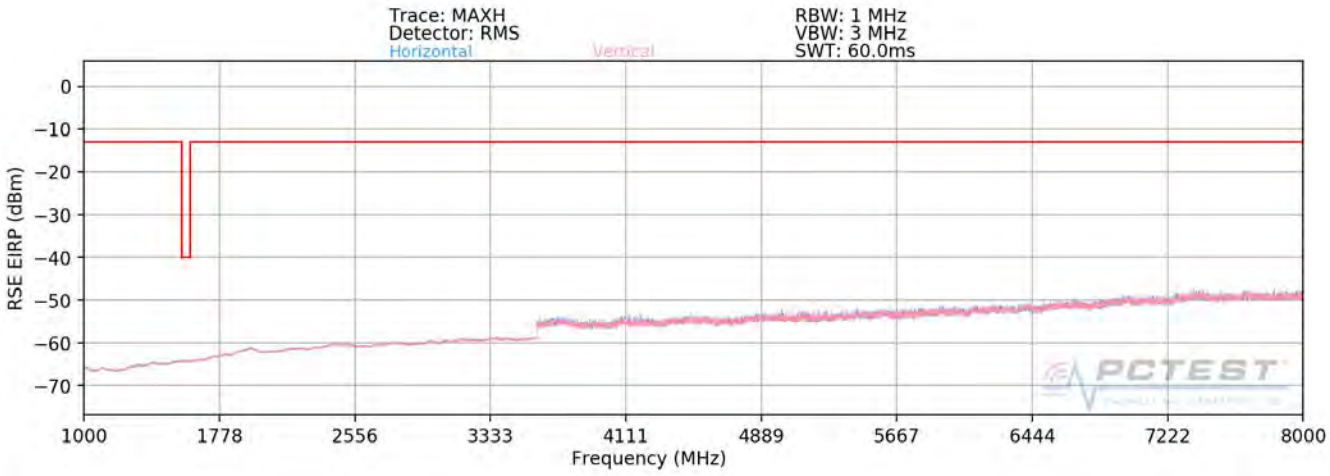
Table 7-16. Radiated Spurious Data (Band 12 – Mid Channel)

OPERATING FREQUENCY:	713.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1427.00	H	162	197	-65.46	7.72	-57.73	-44.7
2140.50	H	-	-	-73.19	8.87	-64.32	-51.3
2854.00	H	-	-	-73.02	10.07	-62.95	-50.0

Table 7-17. Radiated Spurious Data (Band 12 – High Channel)

Band 13



Plot 7-363. Radiated Spurious Plot above 1GHz (Band 13)

OPERATING FREQUENCY:	782.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	V	-	-	-73.46	9.43	-64.03	-51.0
3128.00	V	-	-	-72.19	9.34	-62.85	-49.8

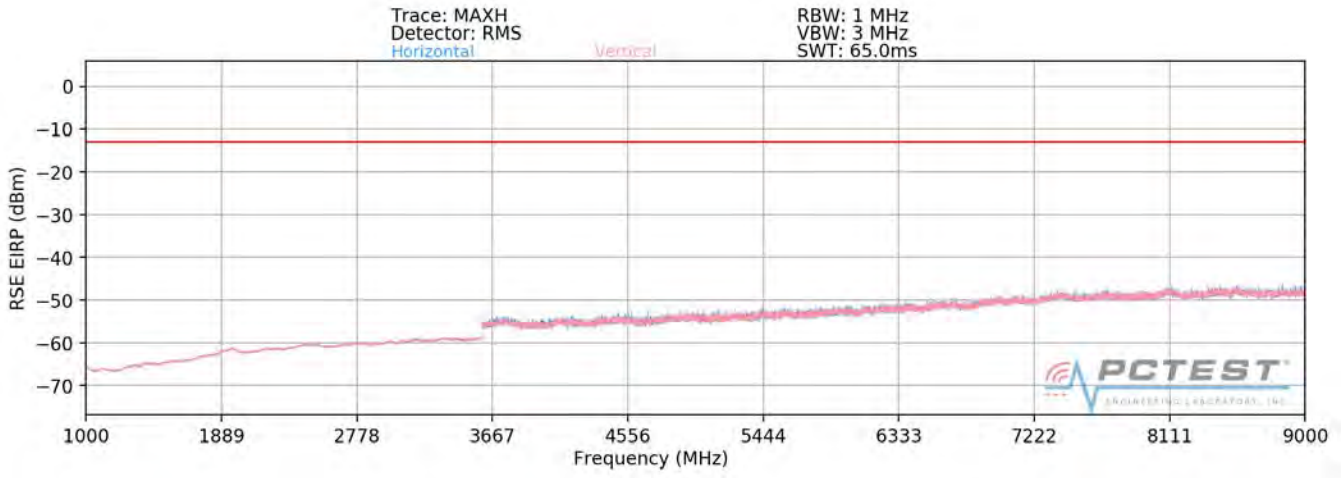
Table 7-18. Radiated Spurious Data (Band 13)

MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.00	MHz
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	V	135	328	-74.26	8.53	-65.73	-25.7

Table 7-19. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

Band 26/5



Plot 7-364. Radiated Spurious Plot above 1GHz (Band 26/5)

OPERATING FREQUENCY:	826.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1653.00	V	-	-	-75.46	8.95	-66.51	-53.5
2479.50	V	-	-	-73.35	9.73	-63.62	-50.6

Table 7-20. Radiated Spurious Data (Band 26/5 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	V	-	-	-75.45	8.95	-66.50	-53.5
2509.50	V	-	-	-73.37	9.75	-63.62	-50.6

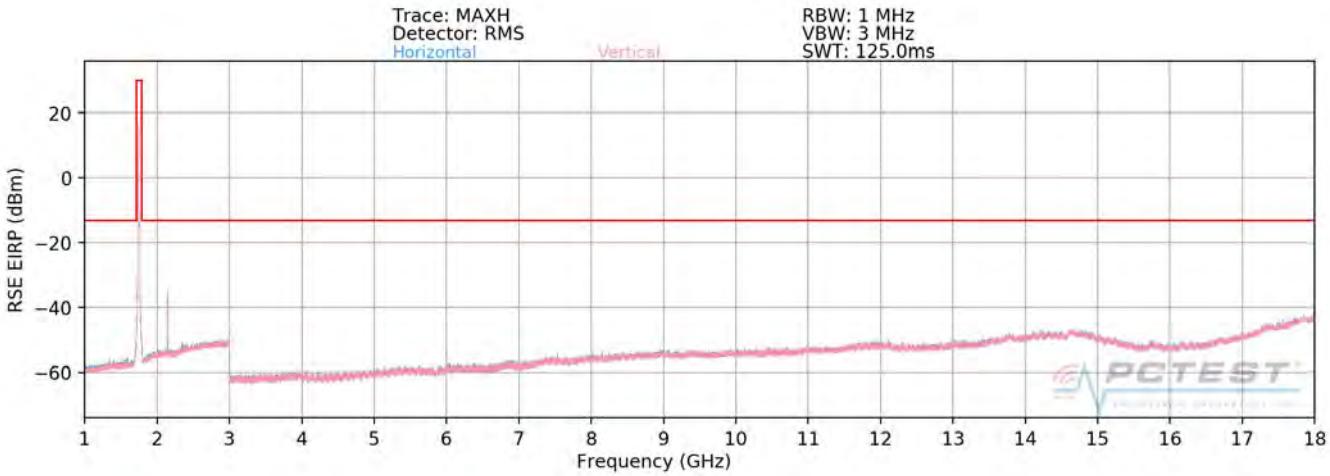
Table 7-21. Radiated Spurious Data (Band 26/5 – Mid Channel)

OPERATING FREQUENCY:	846.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1693.00	V	-	-	-75.37	8.95	-66.42	-53.4
2539.50	V	-	-	-73.43	9.75	-63.68	-50.7

Table 7-22. Radiated Spurious Data (Band 26/5 – High Channel)

Band 66/4



Plot 7-365. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY:	1717.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3435.00	H	-	-	-71.89	9.84	-62.05	-49.0
5152.50	H	-	-	-71.68	10.71	-60.97	-48.0

Table 7-23. Radiated Spurious Data (Band 66/4 – Low Channel)

OPERATING FREQUENCY:	1745.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	H	110	209	-72.09	9.91	-62.18	-49.2
5235.00	H	-	-	-71.68	10.73	-60.95	-47.9
6980.00	H	-	-	-69.43	11.82	-57.61	-44.6

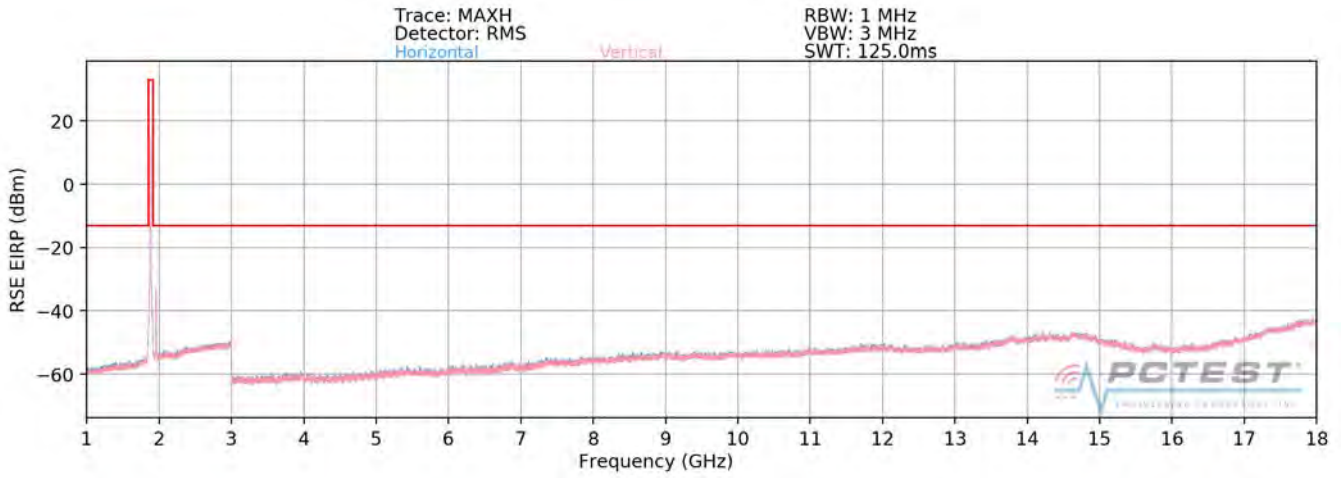
Table 7-24. Radiated Spurious Data (Band 66/4 – Mid Channel)

OPERATING FREQUENCY:	1772.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3545.00	H	-	-	-71.76	9.89	-61.86	-48.9
5317.50	H	108	107	-68.85	10.69	-58.17	-45.2
7090.00	H	-	-	-69.00	11.79	-57.22	-44.2
8862.50	H	100	145	-59.72	11.00	-48.72	-35.7
10635.00	H	100	180	-59.81	12.58	-47.24	-34.2
12407.50	H	-	-	-65.35	13.33	-52.01	-39.0
14180.00	H	-	-	-61.50	11.53	-49.96	-37.0

Table 7-25. Radiated Spurious Data (Band 66/4 – High Channel)

Band 2



Plot 7-366. Radiated Spurious Plot above 1GHz (Band 2)

OPERATING FREQUENCY:	1860.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3720.00	V	343	356	-65.16	9.51	-55.66	-42.7
5580.00	V	147	351	-65.71	10.99	-54.73	-41.7
7440.00	V	-	-	-67.61	10.99	-56.62	-43.6
9300.00	V	135	18	-64.29	11.61	-52.68	-39.7
11160.00	V	144	350	-64.10	12.73	-51.36	-38.4
13020.00	V	129	355	-63.06	13.23	-49.84	-36.8
14880.00	V	-	-	-62.73	12.62	-50.12	-37.1
16740.00	V	-	-	-62.55	15.17	-47.38	-34.4

Table 7-26. Radiated Spurious Data (Band 2 – Low Channel)

OPERATING FREQUENCY:	1880.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	V	146	354	-63.97	9.37	-54.60	-41.6
5640.00	V	133	329	-62.01	11.17	-50.84	-37.8
7520.00	V	-	-	-67.91	11.11	-56.79	-43.8
9400.00	V	119	27	-62.46	11.57	-50.88	-37.9
11280.00	V	133	354	-65.66	12.72	-52.95	-39.9
13160.00	V	160	313	-62.13	13.15	-48.98	-36.0
15040.00	V	-	-	-62.89	13.52	-49.37	-36.4
16920.00	V	-	-	-61.81	14.36	-47.44	-34.4

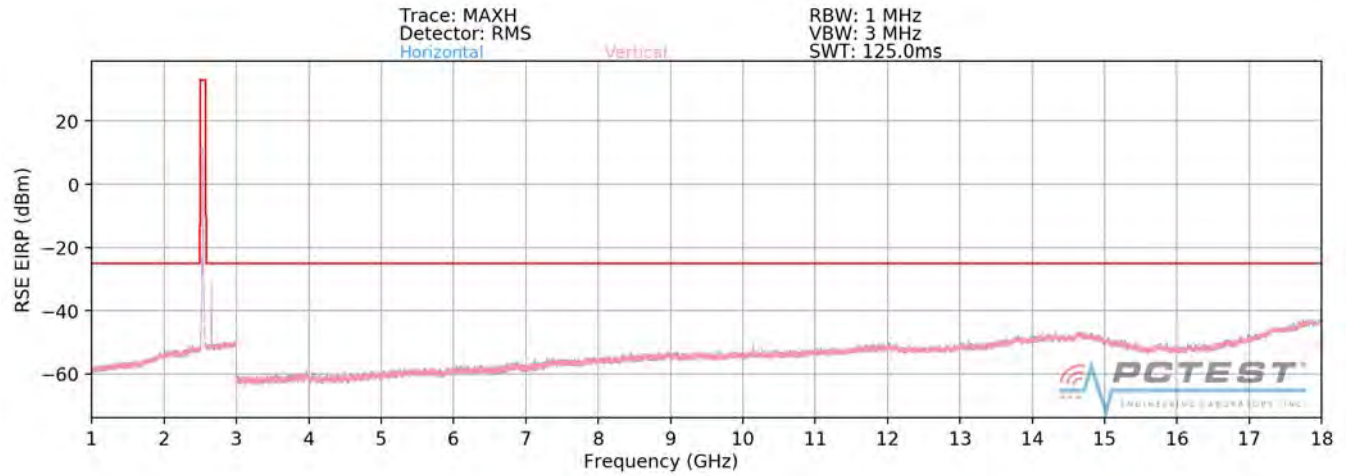
Table 7-27. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	1900.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

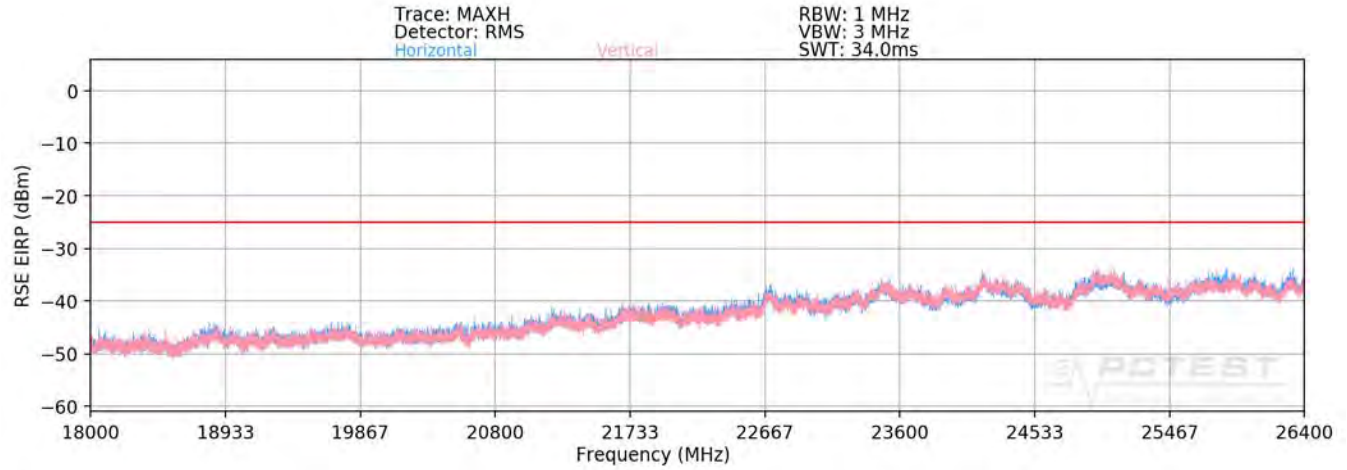
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3800.00	V	144	351	-68.10	9.28	-58.81	-45.8
5700.00	V	171	262	-68.31	11.31	-57.01	-44.0
7600.00	V	-	-	-68.02	11.24	-56.78	-43.8
9500.00	V	157	262	-67.36	11.67	-55.68	-42.7
11400.00	V	115	20	-56.01	12.84	-43.17	-30.2
13300.00	V	195	27	-63.22	12.81	-50.41	-37.4
15200.00	V	-	-	-62.94	14.68	-48.26	-35.3
17100.00	V	-	-	-59.99	13.50	-46.49	-33.5

Table 7-28. Radiated Spurious Data (Band 2 – High Channel)

Band 7



Plot 7-367. Radiated Spurious Plot 1GHz - 18GHz (Band 7)



Plot 7-368. Radiated Spurious Plot 18GHz – 26.5GHz (Band 7)

OPERATING FREQUENCY:	2505.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5010.00	V	393	7	-74.04	10.88	-63.16	-38.2
7515.00	V	-	-	-71.73	11.13	-60.60	-35.6
10020.00	V	363	37	-49.93	11.99	-37.94	-12.9
12525.00	V	400	333	-69.31	13.56	-55.75	-30.7
15030.00	V	124	351	-65.83	13.58	-52.25	-27.3
17535.00	V	-	-	-62.94	11.59	-51.35	-26.3

Table 7-29. Radiated Spurious Data (Band 7 – Low Channel)

OPERATING FREQUENCY:	2535.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	V	359	355	-72.14	10.75	-61.39	-36.4
7605.00	V	-	-	-72.31	11.25	-61.06	-36.1
10140.00	V	123	17	-51.28	12.07	-39.21	-14.2
12675.00	V	-	-	-70.68	13.66	-57.01	-32.0
15210.00	V	112	204	-67.58	14.71	-52.87	-27.9
17745.00	V	-	-	-59.97	10.38	-49.59	-24.6

Table 7-30. Radiated Spurious Data (Band 7 – Mid Channel)

OPERATING FREQUENCY:	2565.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5130.00	V	400	355	-72.10	10.68	-61.42	-36.4
7695.00	V	-	-	-72.31	11.39	-60.92	-35.9
10260.00	V	142	16	-51.07	12.18	-38.88	-13.9
12825.00	V	398	346	-67.67	13.50	-54.17	-29.2
15390.00	V	257	187	-68.70	15.29	-53.41	-28.4
17955.00	V	-	-	-58.43	9.40	-49.04	-24.0

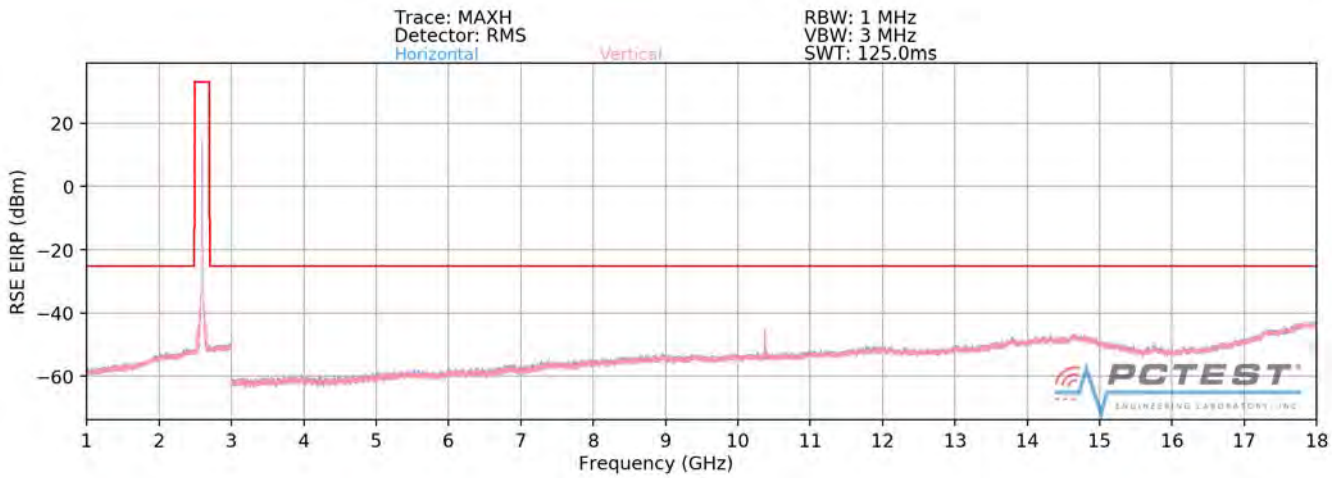
Table 7-31. Radiated Spurious Data (Band 7 – High Channel)

OPERATING FREQUENCY:	2505.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

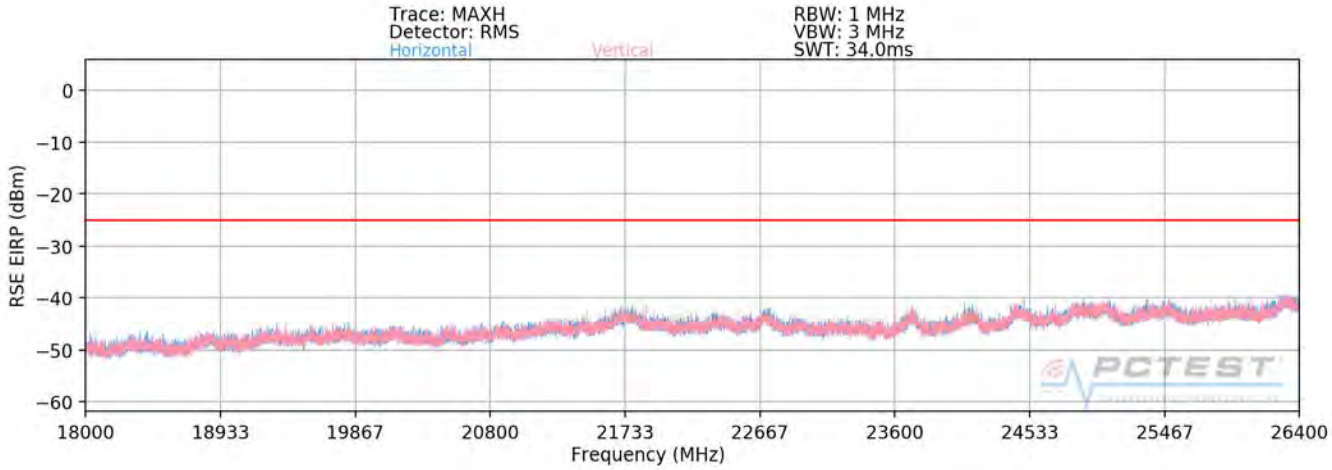
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5010.00	V	398	3	-74.75	10.88	-63.87	-38.9
7515.00	V	125	356	-71.57	11.13	-60.44	-35.4
10020.00	V	135	18	-51.81	11.99	-39.82	-14.8
12525.00	V	-	-	-70.10	13.56	-56.54	-31.5
15030.00	V	400	338	-68.81	13.58	-55.23	-30.2
17535.00	V	-	-	-62.89	11.59	-51.30	-26.3

Table 7-32. Radiated Spurious Data with WCP (Band 7 – Low Channel)

Band 41



Plot 7-369. Radiated Spurious Plot 1GHz - 18GHz (Band 41)



Plot 7-370. Radiated Spurious Plot 18GHz – 26.5GHz (Band 41)

OPERATING FREQUENCY:	2510.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5020.00	V	400	350	-69.83	10.88	-58.95	-34.0
7530.00	V	-	-	-67.71	11.13	-56.58	-31.6
10040.00	V	394	315	-44.08	11.99	-32.09	-7.1
12550.00	V	364	18	-64.59	13.56	-51.03	-26.0
15060.00	V	355	333	-63.07	13.58	-49.49	-24.5
17570.00	V	-	-	-57.10	11.59	-45.51	-20.5

Table 7-33. Radiated Spurious Data (Band 41 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	V	113	349	-63.24	10.74	-52.49	-27.5
7779.00	V	400	42	-64.55	11.44	-53.11	-28.1
10372.00	V	147	42	-43.24	12.42	-30.81	-5.8
12965.00	V	115	20	-63.66	13.29	-50.37	-25.4
15558.00	V	112	351	-65.09	16.33	-48.76	-23.8

Table 7-34. Radiated Spurious Data (Band 41 – Mid Channel)

OPERATING FREQUENCY:	2680.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	V	329	16	-65.67	10.70	-54.97	-30.0
8040.00	V	400	2	-63.49	11.16	-52.33	-27.3
10720.00	V	400	330	-45.32	12.59	-32.72	-7.7
13400.00	V	365	5	-62.08	12.59	-49.49	-24.5
16080.00	V	165	319	-68.17	16.68	-51.49	-26.5

Table 7-35. Radiated Spurious Data (Band 41 – High Channel)

OPERATING FREQUENCY:	2593.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	V	127	326	-65.37	10.74	-54.62	-29.6
7779.00	V	400	193	-68.01	11.44	-56.57	-31.6
10372.00	V	111	20	-44.90	12.42	-32.47	-7.5
12965.00	V	-	-	-64.12	13.29	-50.83	-25.8
15558.00	V	135	343	-67.66	16.33	-51.33	-26.3

Table 7-36. Radiated Spurious Data with WCP (Band 41 – Mid Channel)

7.9 Uplink Carrier Aggregation Radiated Measurements

§2.1053, §27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. No. of sweep points ≥ 2 x span / RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. The trace was allowed to stabilize

Test Setup

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

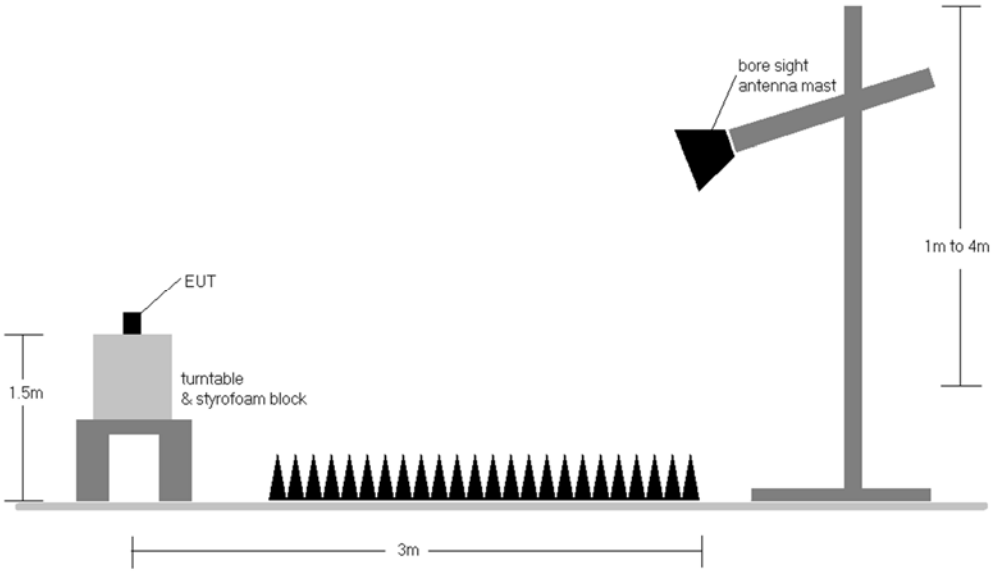


Figure 7-9. Test Instrument & Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

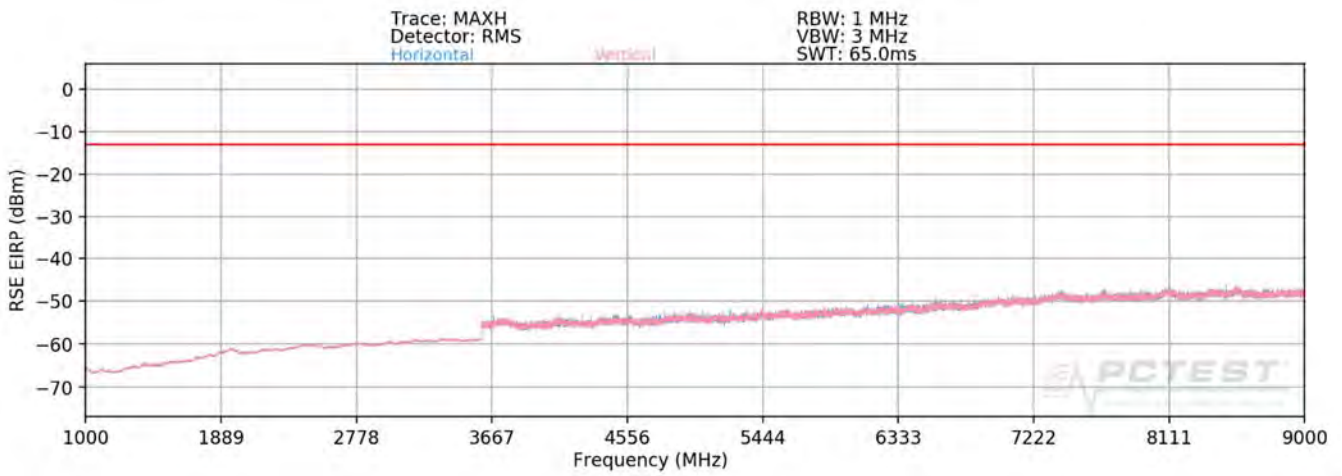
3) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.

4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

6) No significant emissions were found as a result of two uplink carriers operating contiguously.

Uplink CA Configuration 5B



Plot 7-371. Radiated Spurious Plot (ULCA B5 PCC: RB 1 Offset 49, SCC: RB 1 Offset 0)

OPERATING FREQUENCY:	829.00	MHz
OPERATING FREQUENCY:	838.90	MHz
CHANNEL:	20450	
CHANNEL:	20549	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10+ 10	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	V	-	-	-80.15	8.95	-71.20	-58.2
2487.00	V	-	-	-78.06	9.70	-68.35	-55.4

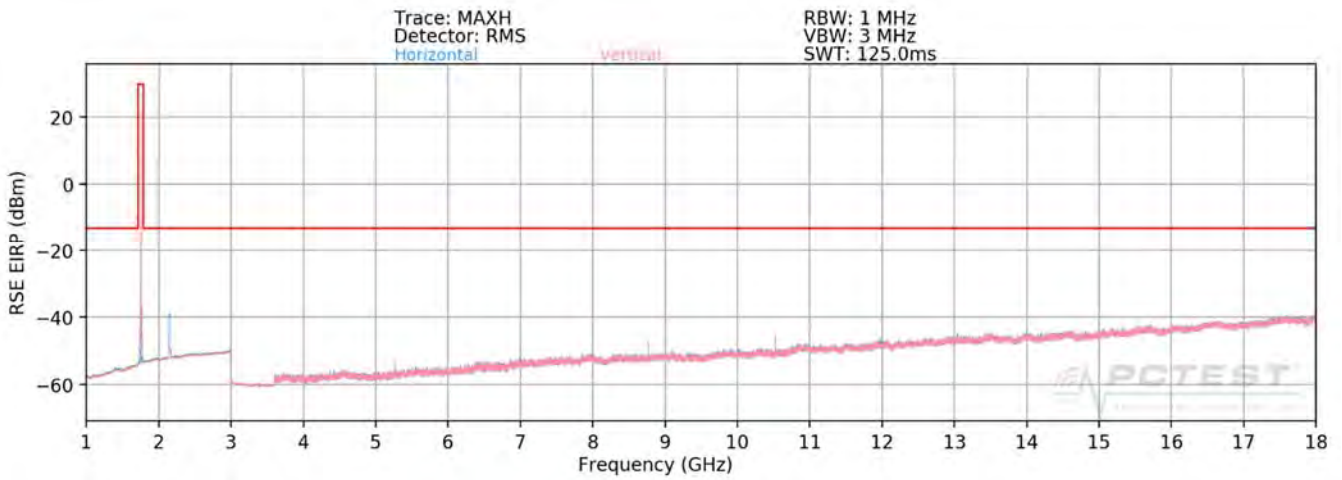
Table 7-37. Radiated Spurious Data (ULCA B5 PCC: RB 1 Offset 49, SCC: RB 1 Offset 0 – Low Channel)

OPERATING FREQUENCY:	844.00	MHz
OPERATING FREQUENCY:	834.10	MHz
CHANNEL:	20600	
CHANNEL:	20501	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10+ 10	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	V	-	-	-80.04	8.95	-71.09	-58.1
2532.00	V	-	-	-77.76	9.75	-68.01	-55.0

Table 7-38. Radiated Spurious Data (ULCA B5 PCC: RB 1 Offset 0, SCC: RB 1 Offset 49 – High Channel)

Uplink CA Configuration 66B/C



Plot 7-372. Radiated Spurious Plot (ULCA B66 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)

OPERATING FREQUENCY:	1720.00	MHz
OPERATING FREQUENCY:	1739.80	MHz
CHANNEL:	132072	
CHANNEL:	132270	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3440.00	H	400	82	-73.15	9.84	-63.31	-50.3
5160.00	H	-	-	-73.08	10.71	-62.37	-49.4
6880.00	H	-	-	-70.17	11.68	-58.49	-45.5
8600.00	H	112	324	-64.60	11.08	-53.52	-40.5
10320.00	H	244	329	-58.51	12.38	-46.13	-33.1
12040.00	H	247	2	-63.77	12.71	-51.06	-38.1
13760.00	H	-	-	-61.49	11.99	-49.50	-36.5
15480.00	H	-	-	-67.73	15.88	-51.85	-38.9

Table 7-39. Radiated Spurious Data (ULCA B66 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel)

OPERATING FREQUENCY:	1745.00	MHz
OPERATING FREQUENCY:	1764.80	MHz
CHANNEL:	132322	
CHANNEL:	132520	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	H	372	9	-71.82	9.91	-61.91	-48.9
5235.00	H	257	25	-71.81	10.73	-61.07	-48.1
6980.00	H	-	-	-71.22	11.82	-59.39	-46.4
8725.00	H	287	20	-62.69	11.00	-51.70	-38.7
10470.00	H	248	339	-65.89	12.58	-53.31	-40.3
12215.00	H	279	359	-64.03	13.11	-50.92	-37.9
13960.00	H	-	-	-61.96	11.85	-50.12	-37.1
15705.00	H	-	-	-68.85	16.63	-52.22	-39.2

Table 7-40. Radiated Spurious Data (ULCA B66 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)

OPERATING FREQUENCY:	1770.00	MHz
OPERATING FREQUENCY:	1750.20	MHz
CHANNEL:	132572	
CHANNEL:	132374	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3540.00	H	347	121	-73.53	9.89	-63.64	-50.6
5310.00	H	358	28	-70.26	10.69	-59.58	-46.6
7080.00	H	-	-	-71.08	11.79	-59.29	-46.3
8850.00	H	293	18	-61.78	11.00	-50.79	-37.8
10620.00	H	114	353	-60.53	12.58	-47.95	-35.0
12390.00	H	252	1	-65.05	13.33	-51.72	-38.7
14160.00	H	-	-	-60.99	11.53	-49.46	-36.5
15930.00	H	-	-	-69.88	16.76	-53.11	-40.1

Table 7-41. Radiated Spurious Data (ULCA B66 PCC: RB 1 Offset 0, SCC: RB 1 Offset 99 – High Channel)

7.10 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

Band 12 Frequency Stability Measurements

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	4.29	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.29	+ 20 (Ref)	707,499,953	0	0.0000000
100 %		- 30	707,500,426	426	0.0000602
100 %		- 20	707,500,302	302	0.0000427
100 %		- 10	707,500,155	155	0.0000219
100 %		0	707,500,079	79	0.0000112
100 %		+ 10	707,500,122	122	0.0000172
100 %		+ 20	707,500,183	183	0.0000259
100 %		+ 30	707,499,961	-39	-0.0000055
100 %		+ 40	707,500,084	84	0.0000119
100 %		+ 50	707,499,925	-75	-0.0000106
BATT. ENDPOINT	3.37	+ 20	707,499,903	-97	-0.0000137

Table 7-42. Frequency Stability Data (Band 12)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 12 Frequency Stability Measurements

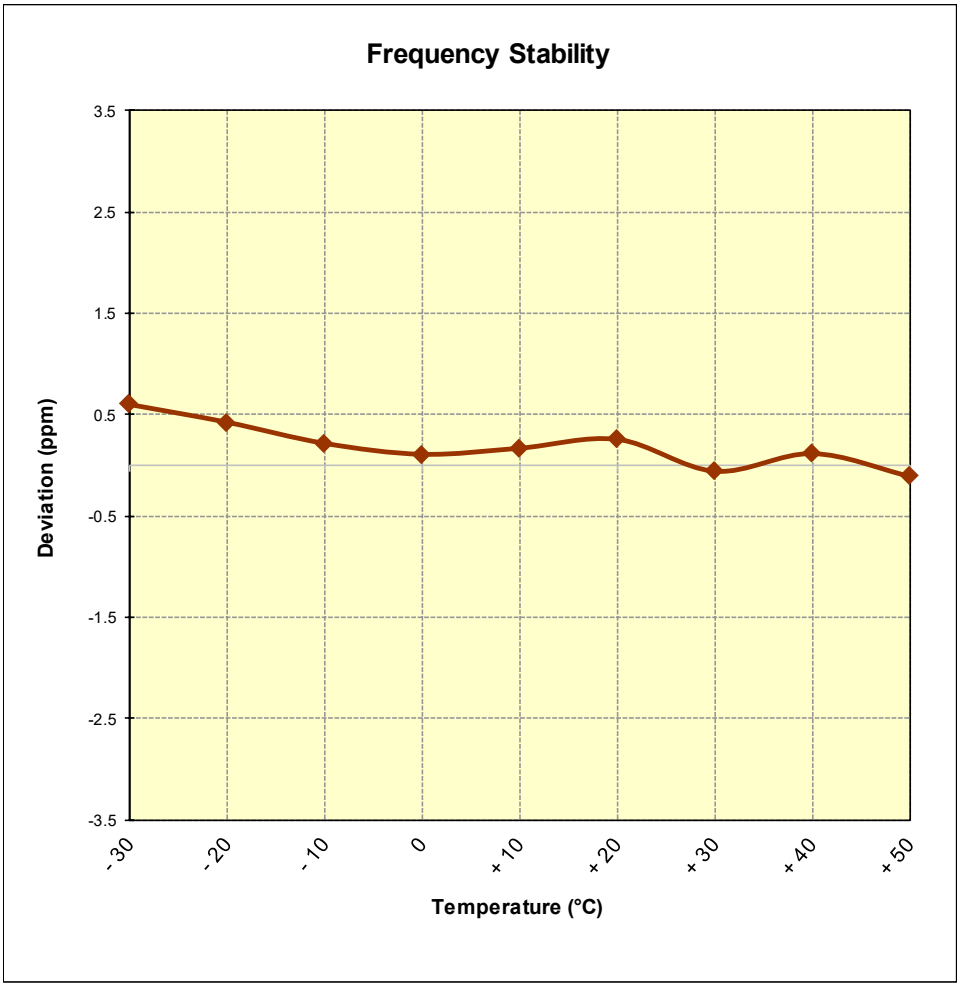


Figure 7-10. Frequency Stability Graph (Band 12)

Band 13 Frequency Stability Measurements

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	4.29	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.29	+ 20 (Ref)	782,000,037	0	0.0000000
100 %		- 30	782,000,087	87	0.0000111
100 %		- 20	782,000,259	259	0.0000331
100 %		- 10	781,999,815	-185	-0.0000237
100 %		0	782,000,073	73	0.0000093
100 %		+ 10	782,000,137	137	0.0000175
100 %		+ 20	782,000,115	115	0.0000147
100 %		+ 30	782,000,103	103	0.0000132
100 %		+ 40	781,999,814	-186	-0.0000238
100 %		+ 50	781,999,506	-494	-0.0000632
BATT. ENDPOINT	3.37	+ 20	781,999,932	-68	-0.0000087

Table 7-43. Frequency Stability Data (Band 13)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 13 Frequency Stability Measurements

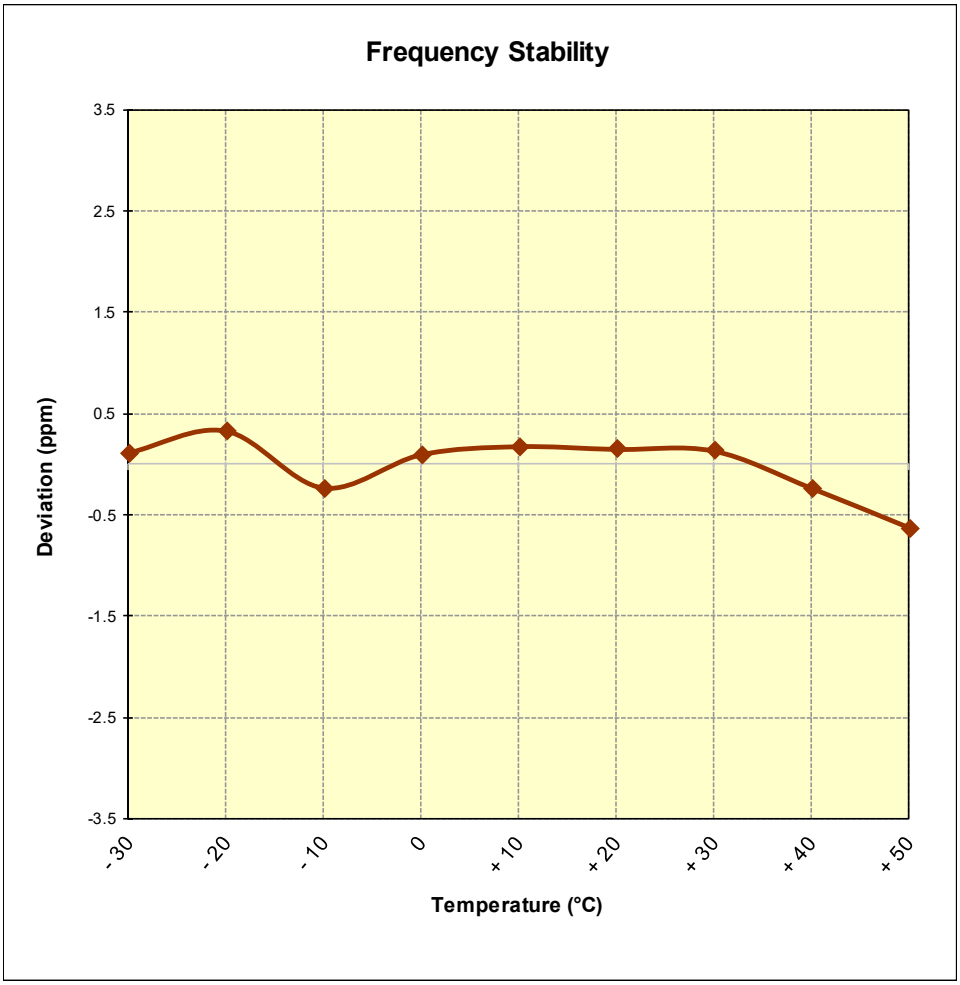


Figure 7-11. Frequency Stability Graph (Band 13)

Band 26/5 Frequency Stability Measurements

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	4.29	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.29	+ 20 (Ref)	836,500,088	0	0.0000000
100 %		- 30	836,500,079	79	0.0000094
100 %		- 20	836,500,023	23	0.0000027
100 %		- 10	836,499,940	-60	-0.0000072
100 %		0	836,500,101	101	0.0000121
100 %		+ 10	836,500,017	17	0.0000020
100 %		+ 20	836,499,939	-61	-0.0000073
100 %		+ 30	836,500,200	200	0.0000239
100 %		+ 40	836,499,969	-31	-0.0000037
100 %		+ 50	836,499,771	-229	-0.0000274
BATT. ENDPOINT	3.37	+ 20	836,500,094	94	0.0000112

Table 7-44. Frequency Stability Data (Band 26/5)

Band 26/5 Frequency Stability Measurements

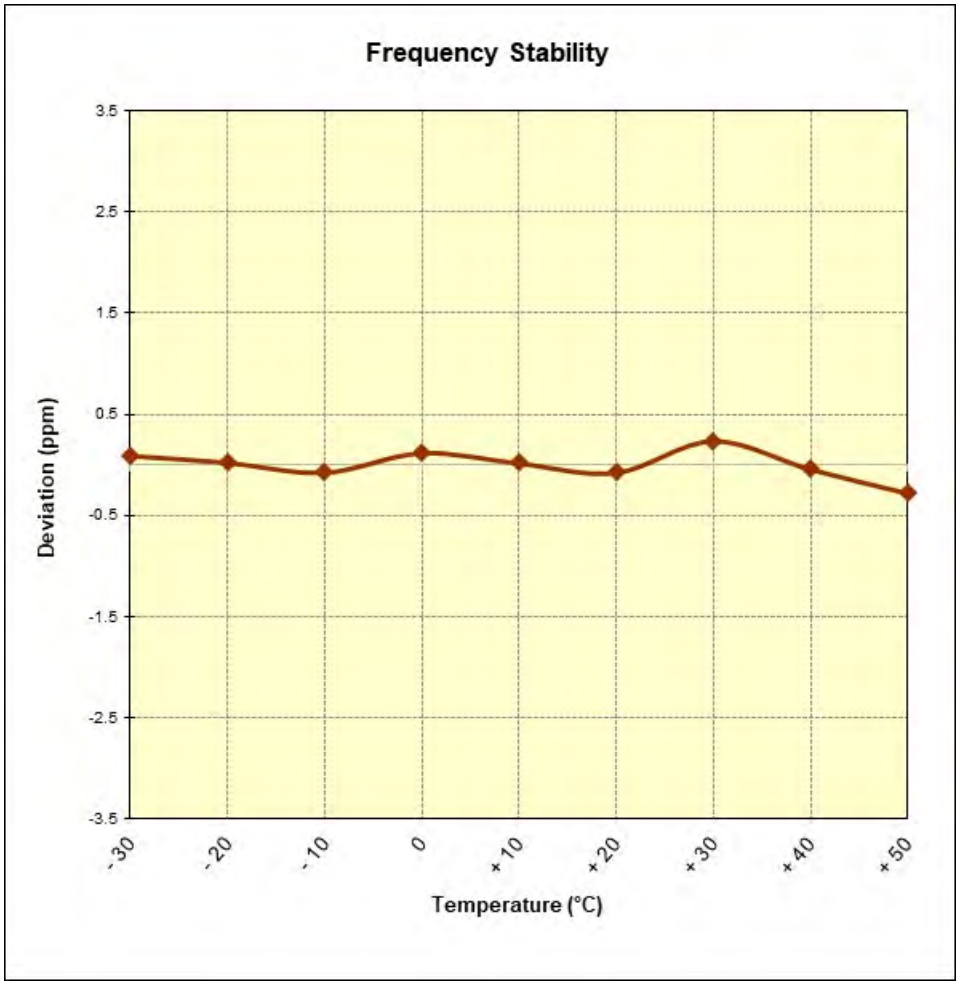


Figure 7-12. Frequency Stability Graph (Band 26/5)

Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	
REFERENCE VOLTAGE:	4.29	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.29	+ 20 (Ref)	1,744,999,958	0	0.0000000
100 %		- 30	1,744,999,781	-219	-0.0000126
100 %		- 20	1,745,000,008	8	0.0000005
100 %		- 10	1,745,000,206	206	0.0000118
100 %		0	1,744,999,996	-4	-0.0000002
100 %		+ 10	1,745,000,030	30	0.0000017
100 %		+ 20	1,745,000,164	164	0.0000094
100 %		+ 30	1,745,000,424	424	0.0000243
100 %		+ 40	1,744,999,873	-127	-0.0000073
100 %		+ 50	1,745,000,445	445	0.0000255
BATT. ENDPOINT	3.37	+ 20	1,744,999,958	-42	-0.0000024

Table 7-45. Frequency Stability Data (Band 66/4)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 66/4 Frequency Stability Measurements

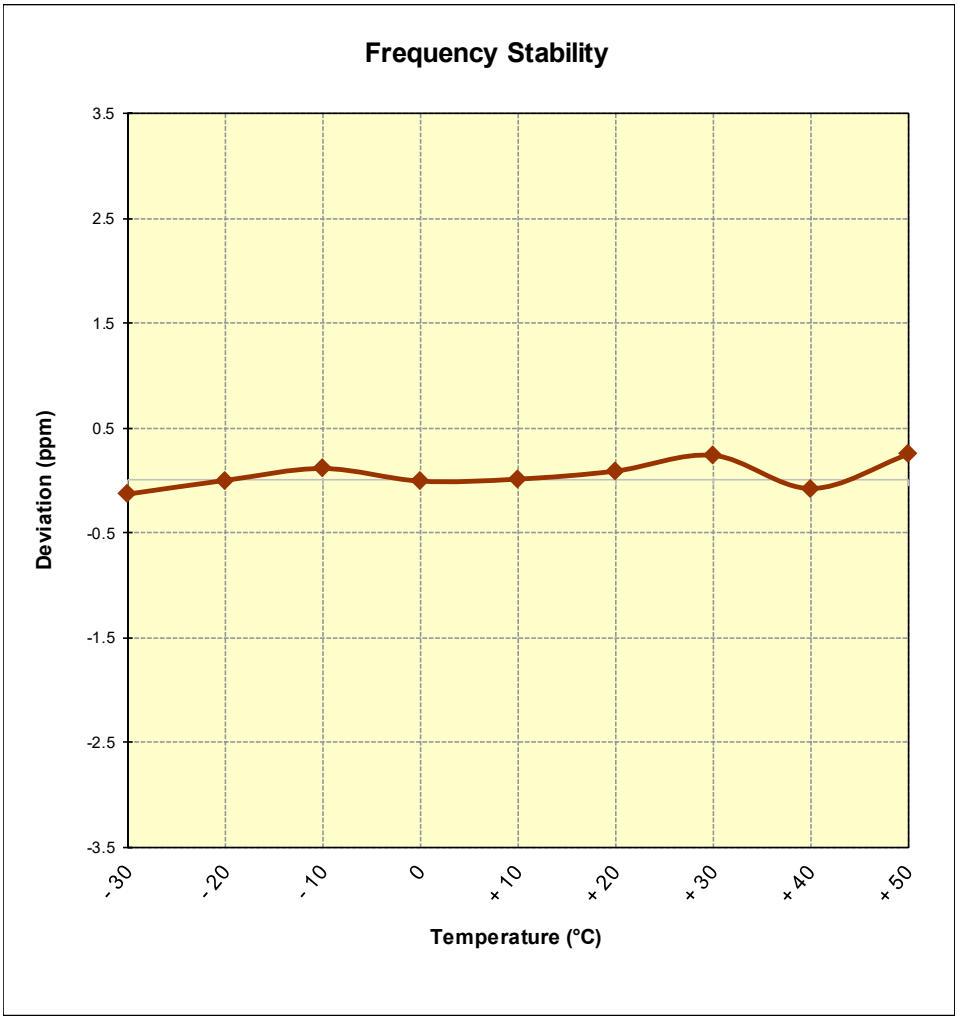


Figure 7-13. Frequency Stability Graph (Band 66/4)

Band 2 Frequency Stability Measurements

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	4.29	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.29	+ 20 (Ref)	1,880,000,043	0	0.0000000
100 %		- 30	1,880,000,095	95	0.0000051
100 %		- 20	1,879,999,916	-84	-0.0000045
100 %		- 10	1,880,000,010	10	0.0000005
100 %		0	1,880,000,012	12	0.0000006
100 %		+ 10	1,879,999,899	-101	-0.0000054
100 %		+ 20	1,879,999,602	-398	-0.0000212
100 %		+ 30	1,879,999,737	-263	-0.0000140
100 %		+ 40	1,880,000,165	165	0.0000088
100 %		+ 50	1,879,999,989	-11	-0.0000006
BATT. ENDPOINT	3.37	+ 20	1,880,000,082	82	0.0000044

Table 7-46. Frequency Stability Data (Band 2)

Band 2 Frequency Stability Measurements

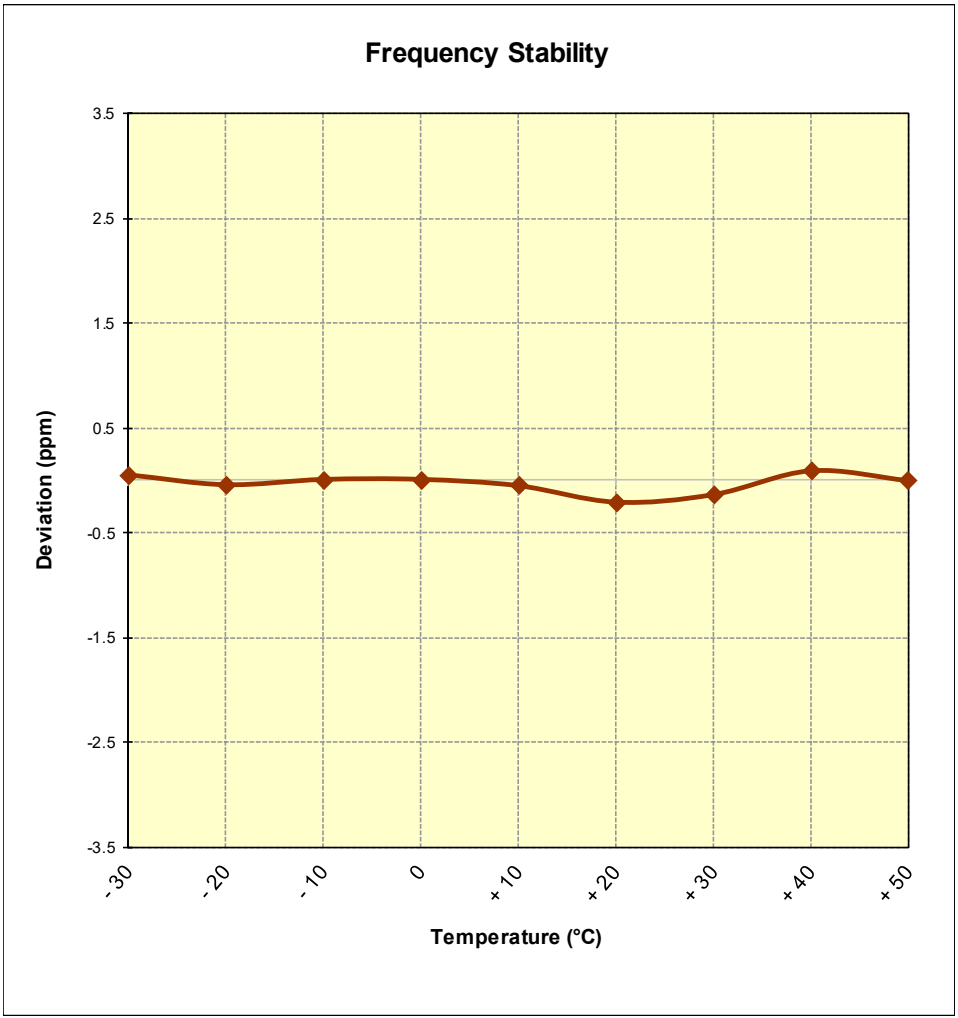


Figure 7-14. Frequency Stability Graph (Band 2)

Band 7 Frequency Stability Measurements

OPERATING FREQUENCY:	2,535,000,000	Hz
CHANNEL:	21100	
REFERENCE VOLTAGE:	4.29	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.29	+ 20 (Ref)	2,535,000,081	0	0.0000000
100 %		- 30	2,534,999,894	-106	-0.0000042
100 %		- 20	2,535,000,032	32	0.0000013
100 %		- 10	2,534,999,913	-87	-0.0000034
100 %		0	2,535,000,232	232	0.0000092
100 %		+ 10	2,535,000,195	195	0.0000077
100 %		+ 20	2,534,999,909	-91	-0.0000036
100 %		+ 30	2,535,000,137	137	0.0000054
100 %		+ 40	2,535,000,423	423	0.0000167
100 %		+ 50	2,534,999,928	-72	-0.0000028
BATT. ENDPOINT	3.37	+ 20	2,535,000,108	108	0.0000043

Table 7-47. Frequency Stability Data (Band 7)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 7 Frequency Stability Measurements

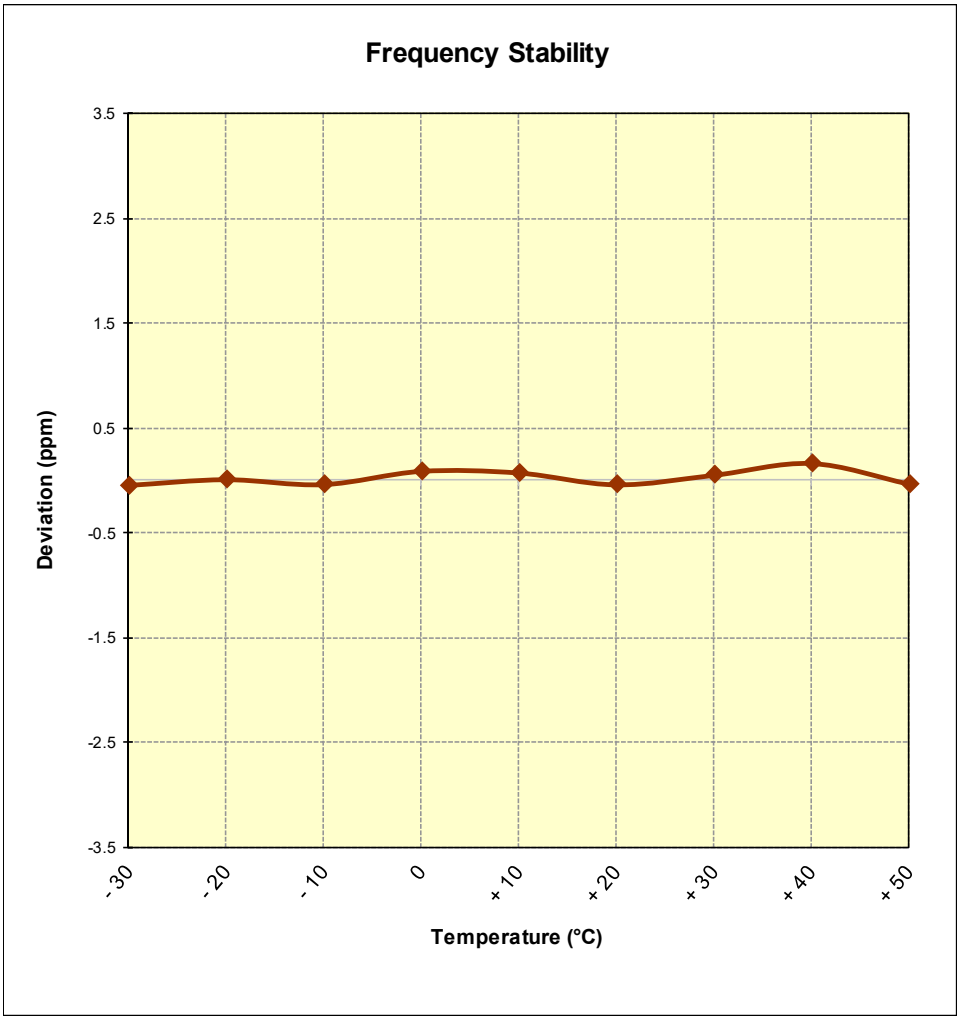


Figure 7-15. Frequency Stability Graph (Band 7)

Band 41 Frequency Stability Measurements

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	4.29	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.29	+ 20 (Ref)	2,592,999,793	0	0.0000000
100 %		- 30	2,593,000,097	97	0.0000037
100 %		- 20	2,592,999,735	-265	-0.0000102
100 %		- 10	2,593,000,294	294	0.0000113
100 %		0	2,592,999,858	-142	-0.0000055
100 %		+ 10	2,593,000,124	124	0.0000048
100 %		+ 20	2,593,000,059	59	0.0000023
100 %		+ 30	2,593,000,057	57	0.0000022
100 %		+ 40	2,592,999,720	-280	-0.0000108
100 %		+ 50	2,593,000,111	111	0.0000043
BATT. ENDPOINT	3.37	+ 20	2,592,999,953	-47	-0.0000018

Table 7-48. Frequency Stability Data (Band 41)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 41 Frequency Stability Measurements

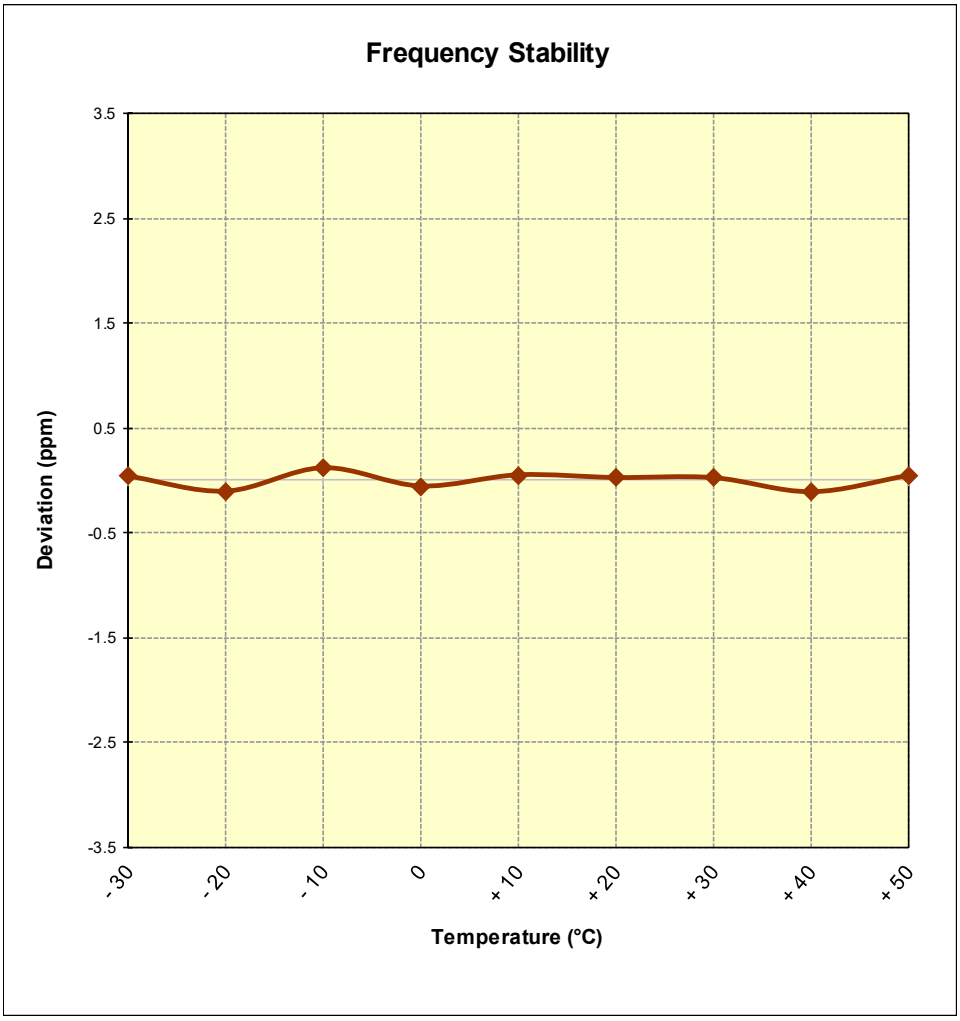


Figure 7-16. Frequency Stability Graph (Band 41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMN976V** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.