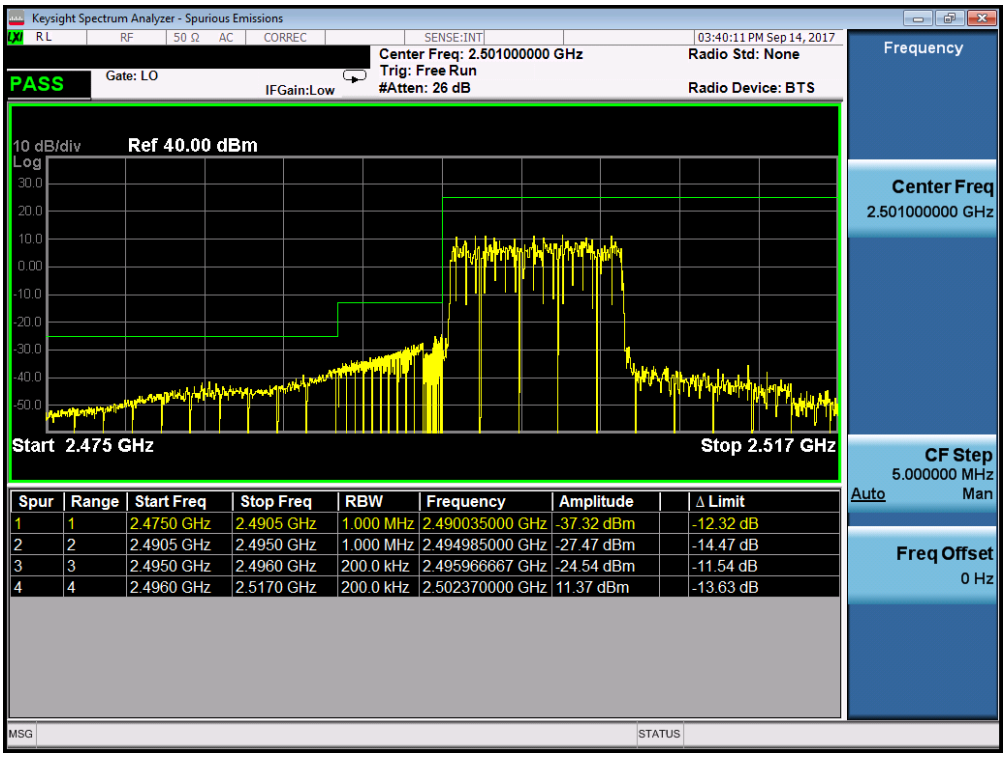
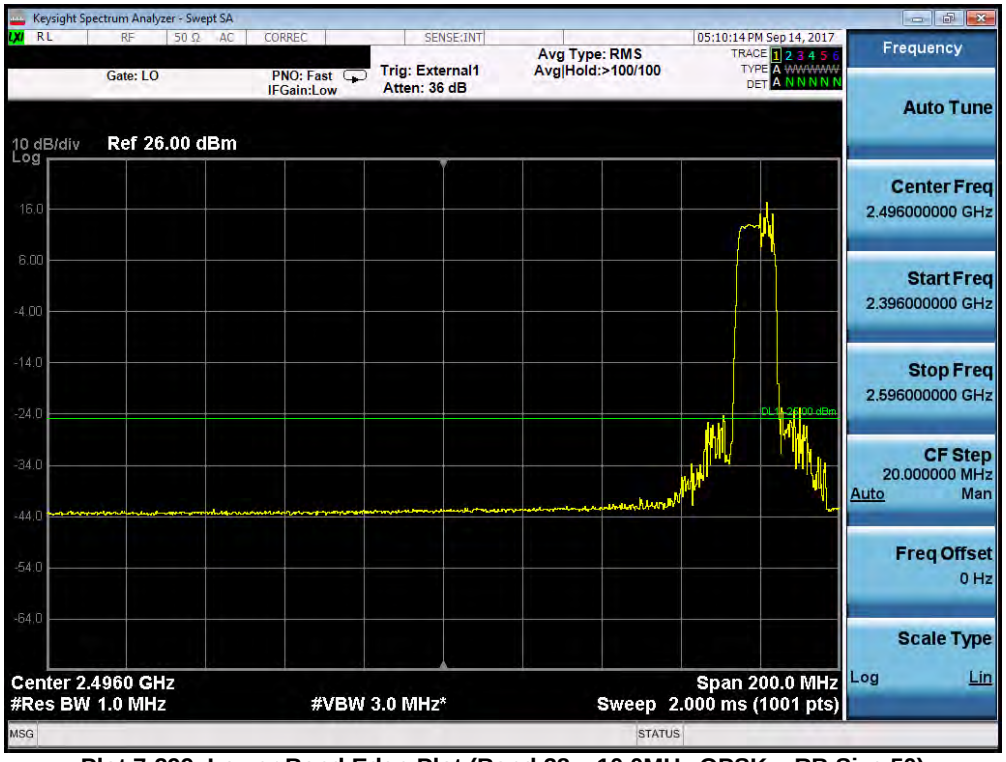
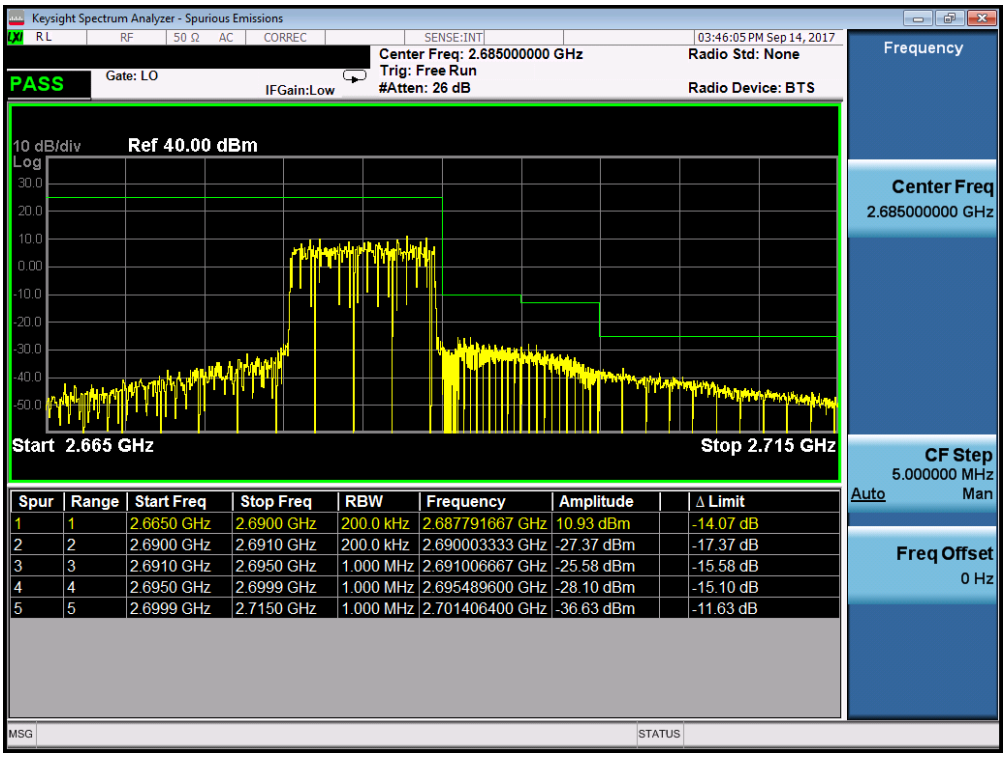


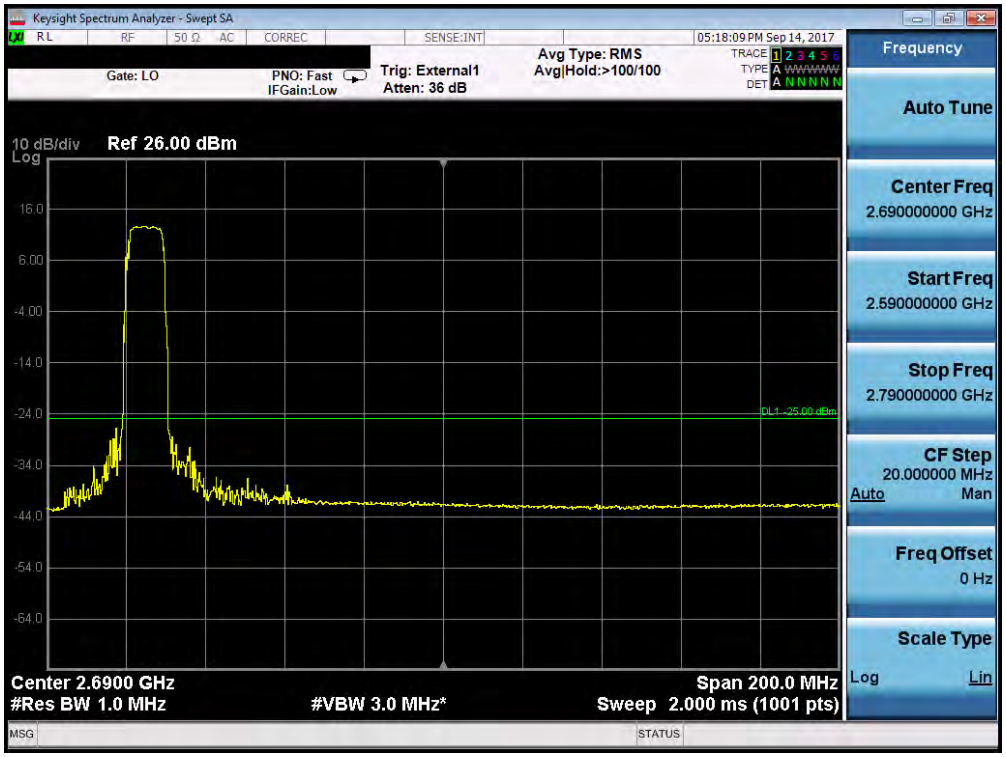
Plot 7-298. Lower ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



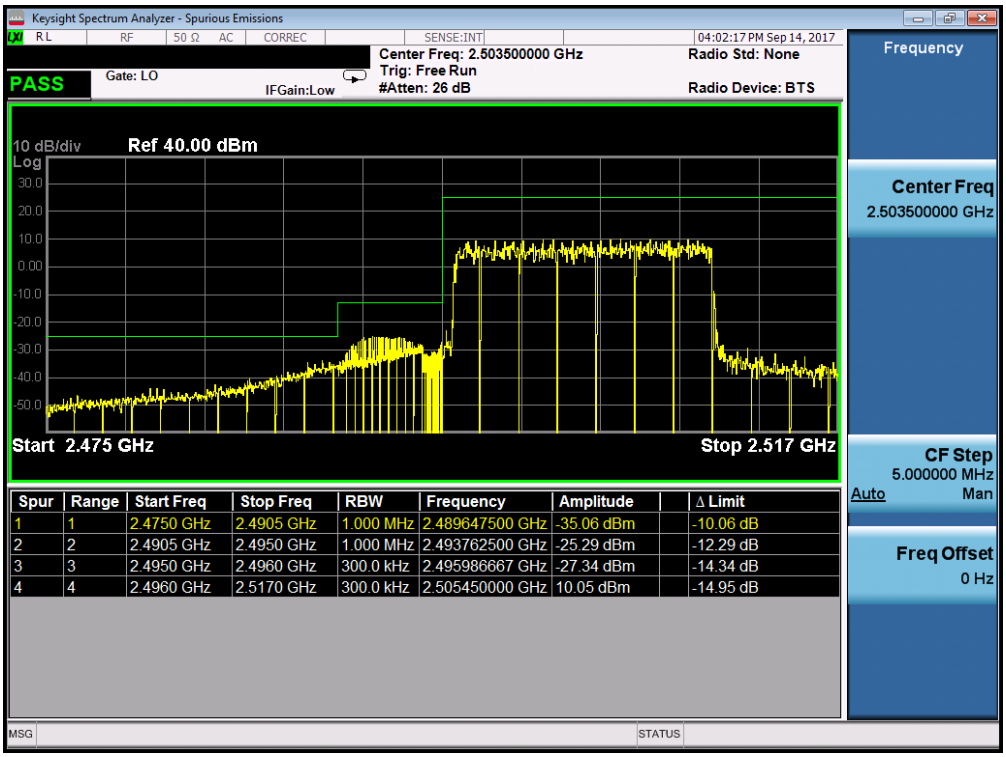
Plot 7-299. Lower Band Edge Plot (Band 38 – 10.0MHz QPSK – RB Size 50)



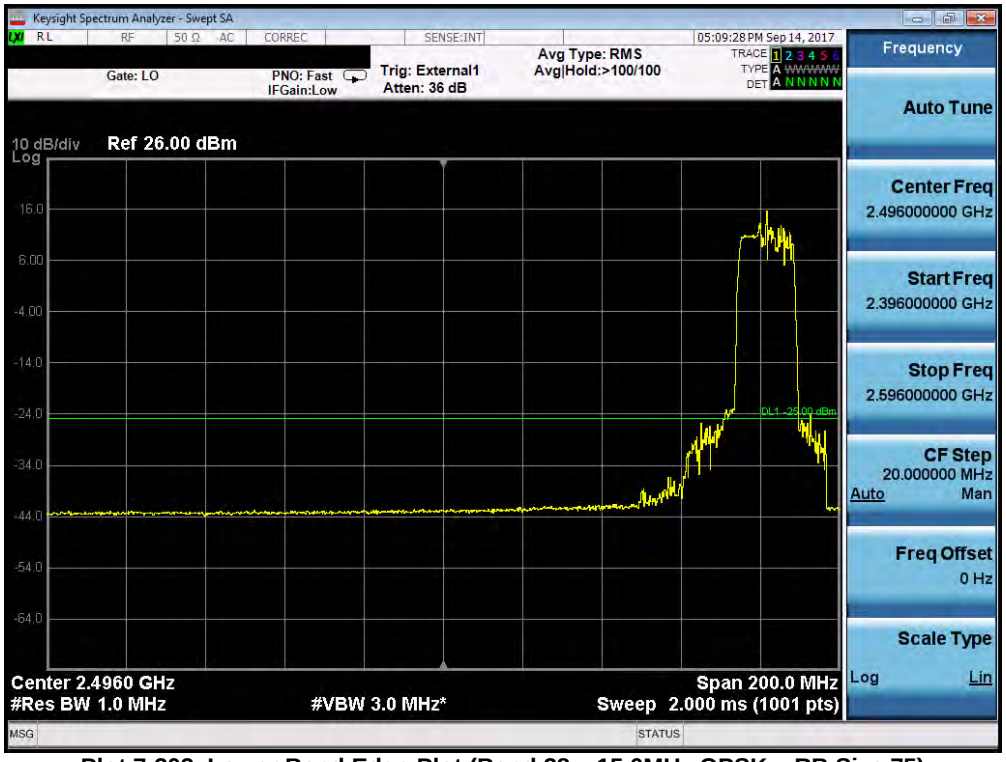
Plot 7-300. Upper ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



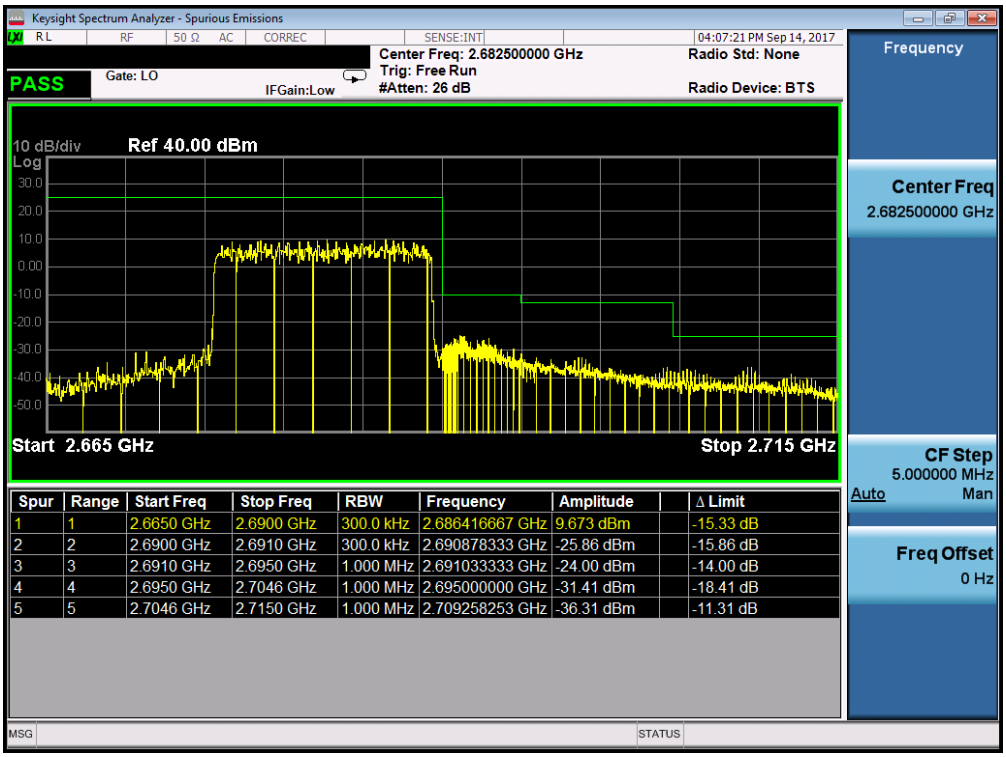
Plot 7-301. Upper Band Edge Plot (Band 38 – 10.0MHz QPSK – RB Size 50)



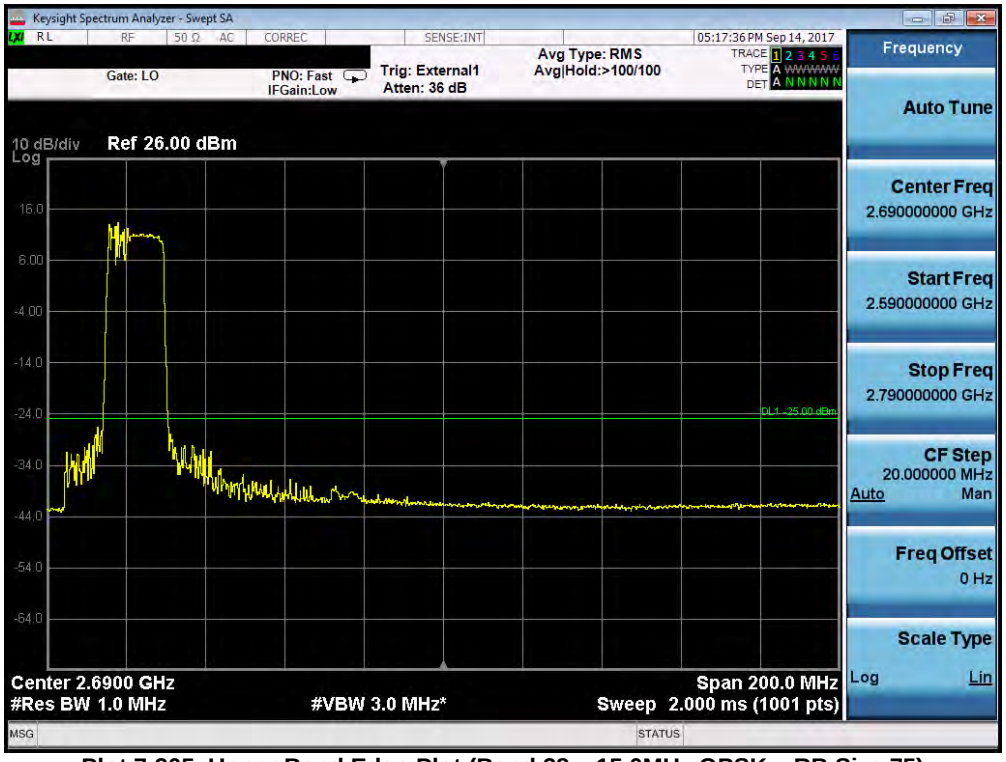
Plot 7-302. Lower ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



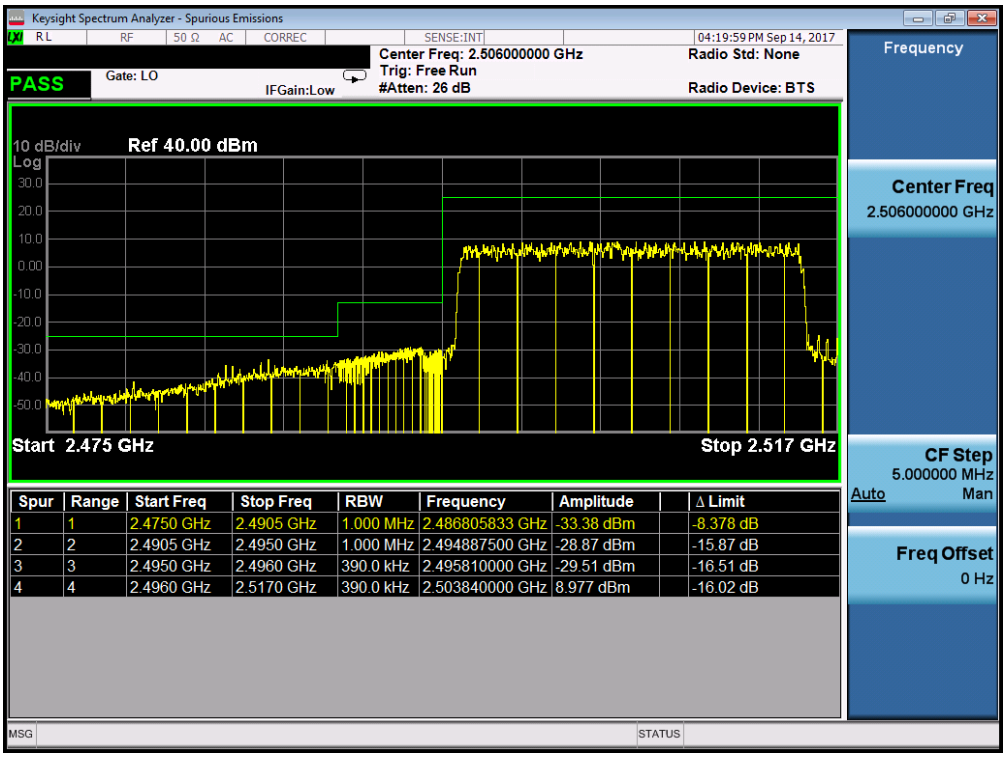
Plot 7-303. Lower Band Edge Plot (Band 38 – 15.0MHz QPSK – RB Size 75)



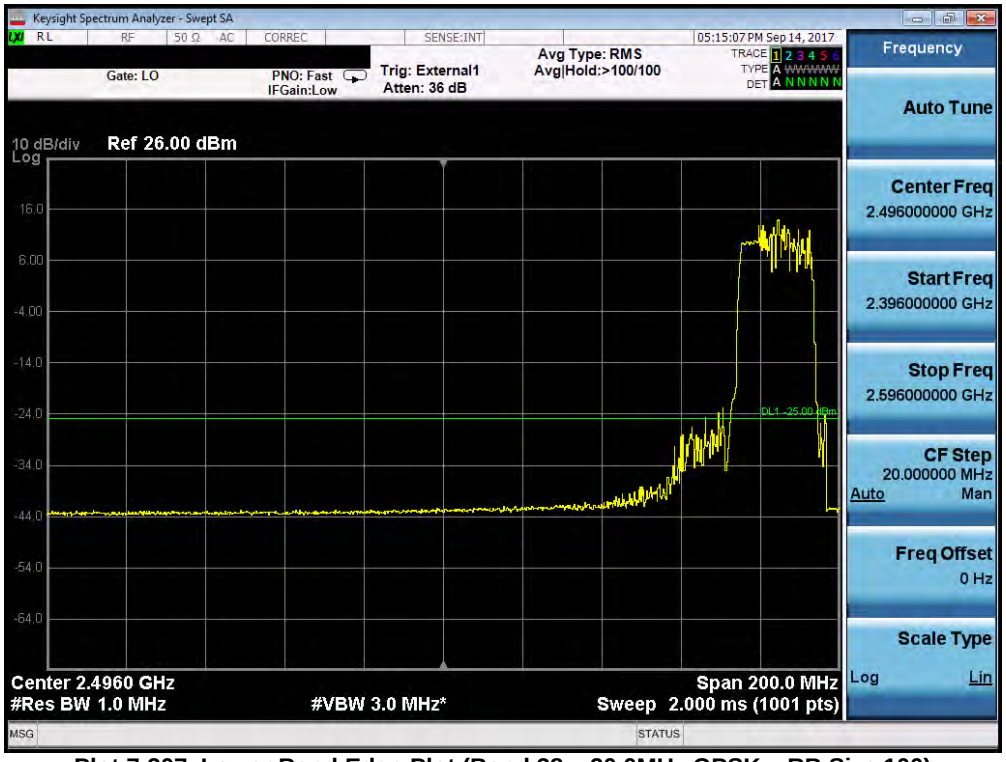
Plot 7-304. Upper ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



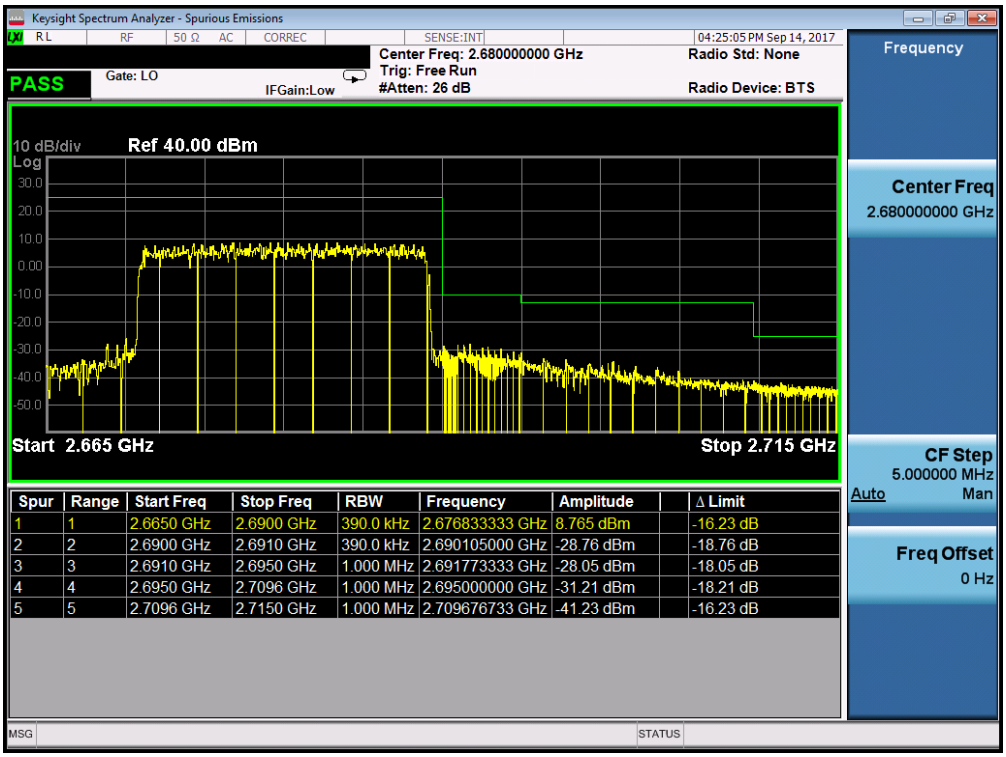
Plot 7-305. Upper Band Edge Plot (Band 38 – 15.0MHz QPSK – RB Size 75)



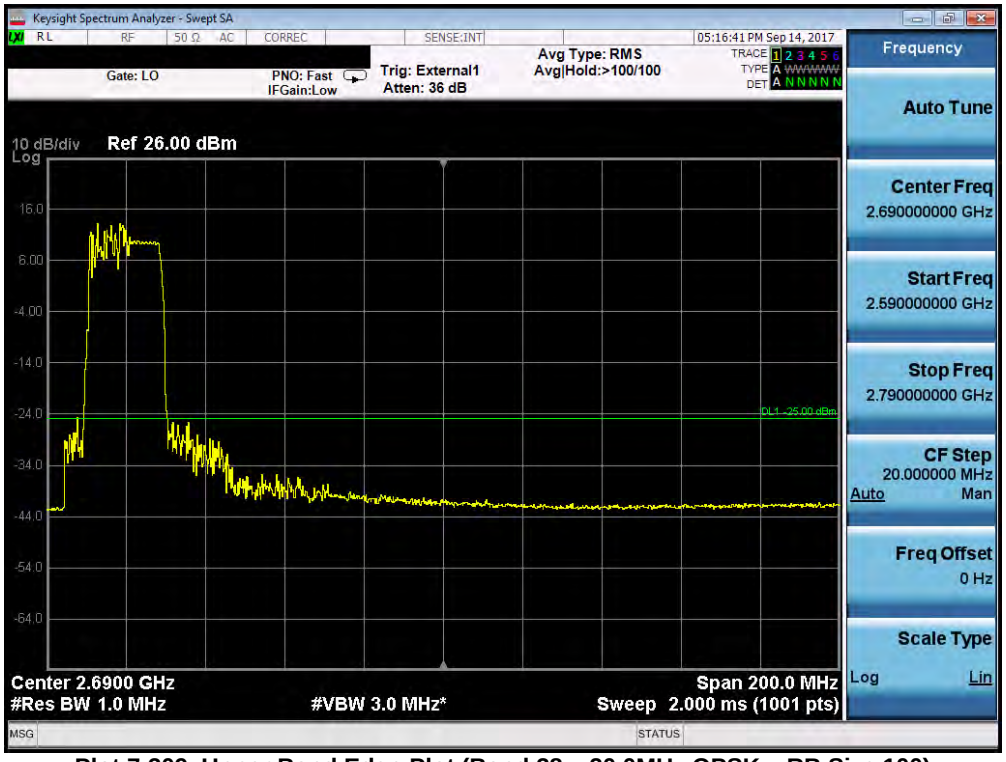
Plot 7-306. Lower ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)



Plot 7-307. Lower Band Edge Plot (Band 38 – 20.0MHz QPSK – RB Size 100)



Plot 7-308. Upper ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)



Plot 7-309. Upper Band Edge Plot (Band 38 – 20.0MHz QPSK – RB Size 100)

7.5 Uplink Carrier Aggregation

§27.53(m)

Test Overview

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

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

Test Procedure Used

KDB 971168 D01 v02r02 – 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.

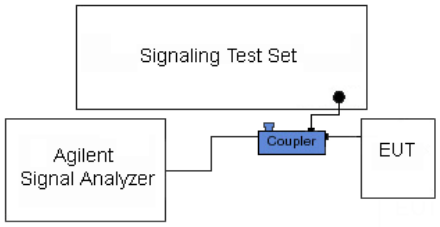


Figure 7-4. Test Instrument & Measurement Setup

Test Notes

1. Uplink carrier aggregation is only supported in this EUT while operating in Power Class 3.

2. Conducted power and spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation, as shown in Table 7-3 below, with both carriers set to transmit using 1RB.

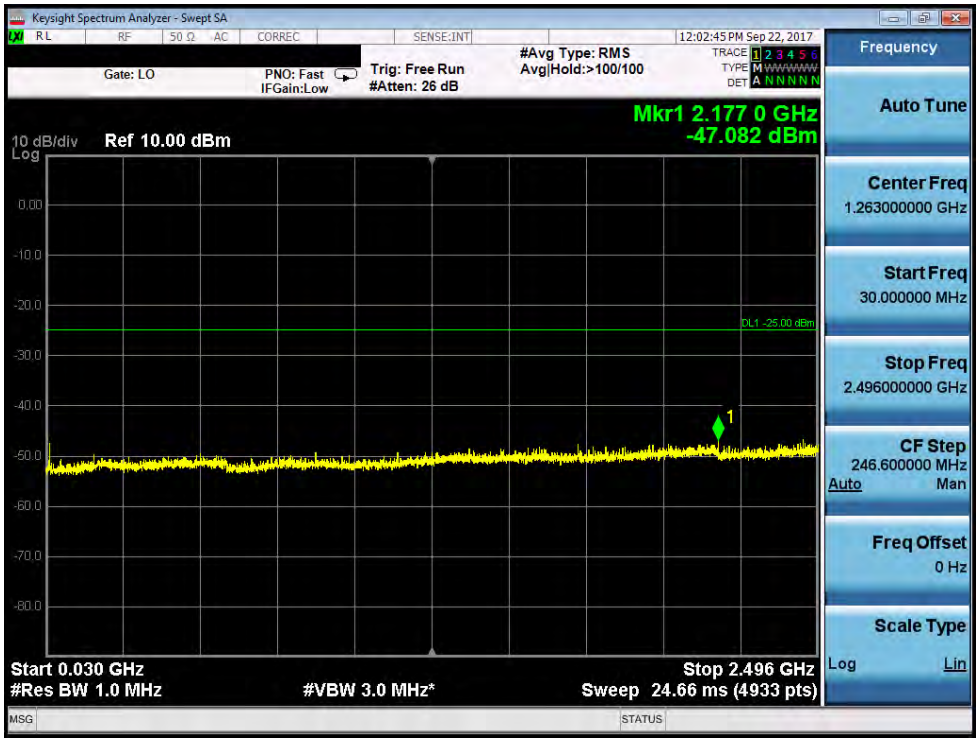
3. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

Power State	PCC							SCC							Power
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	ULCA Tx.Power (dBm)
Max	LTE B41	5	40620	2593	QPSK	1	24	LTE B41	20	40737	2604.7	QPSK	1	0	23.96
Max	LTE B41	10	40620	2593	QPSK	1	49	LTE B41	15	40740	2605	QPSK	1	0	23.93
Max	LTE B41	10	40620	2593	QPSK	1	49	LTE B41	20	40764	2607.4	QPSK	1	0	24.31
Max	LTE B41	15	40620	2593	QPSK	1	74	LTE B41	10	40770	2608	QPSK	1	0	23.83
Max	LTE B41	15	40620	2593	QPSK	1	74	LTE B41	15	40791	2610.1	QPSK	1	0	23.71
Max	LTE B41	15	40620	2593	QPSK	1	74	LTE B41	20	40791	2610.1	QPSK	1	0	24.11
Max	LTE B41	20	40620	2593	QPSK	1	99	LTE B41	5	40743	2605.3	QPSK	1	0	23.72
Max	LTE B41	20	40620	2593	QPSK	1	99	LTE B41	10	40764	2607.4	QPSK	1	0	23.54
Max	LTE B41	20	40620	2593	QPSK	1	99	LTE B41	15	40791	2610.1	QPSK	1	0	23.90
Max	LTE B41	20	40620	2593	QPSK	1	99	LTE B41	20	40818	2612.8	QPSK	1	0	23.85

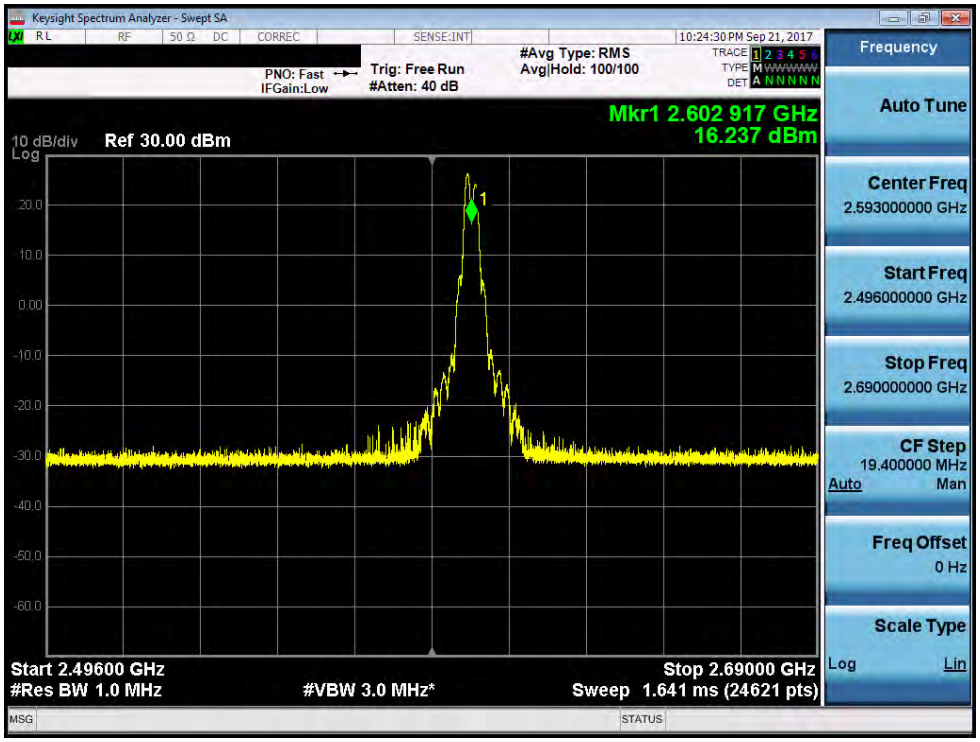
Table 7-2. Conducted Powers (B41 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

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 B41	20	39750	2506	QPSK	1	0	LTE B41	20	39948	2525.8	QPSK	1	0	20.01
Max	LTE B41	20	39750	2506	QPSK	1	99	LTE B41	20	39948	2525.8	QPSK	1	99	20.12
Max	LTE B41	20	39750	2506	QPSK	1	0	LTE B41	20	39948	2525.8	QPSK	1	99	16.02
Max	LTE B41	20	39750	2506	QPSK	1	50	LTE B41	20	39948	2525.8	QPSK	1	50	19.97
Max	LTE B41	20	39750	2506	QPSK	1	99	LTE B41	20	39948	2525.8	QPSK	1	0	24.73
Max	LTE B41	20	39750	2506	QPSK	100	0	LTE B41	20	39948	2525.8	QPSK	100	0	22.42
Max	LTE B41	20	39750	2506	16-QAM	100	0	LTE B41	20	39948	2525.8	16-QAM	100	0	21.39
Max	LTE B41	20	39750	2506	64-QAM	100	0	LTE B41	20	39948	2525.8	64-QAM	100	0	21.35

Table 7-3. Conducted Powers (B41 with Various Combinations for 20MHz Channel Bandwidth)



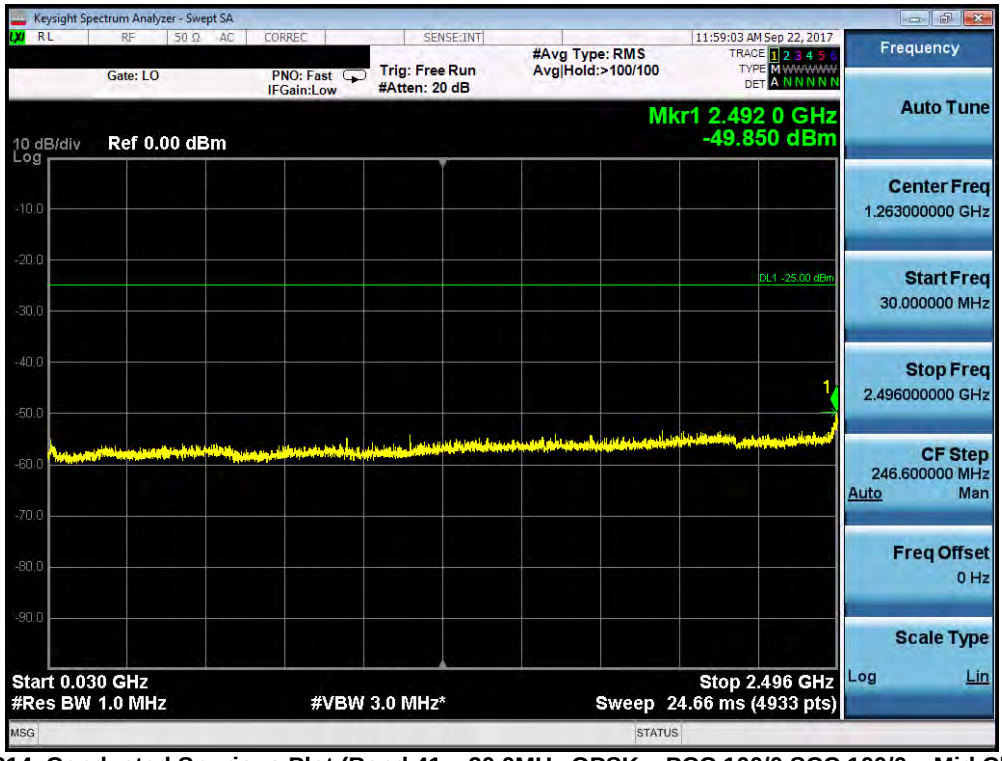
Plot 7-310. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



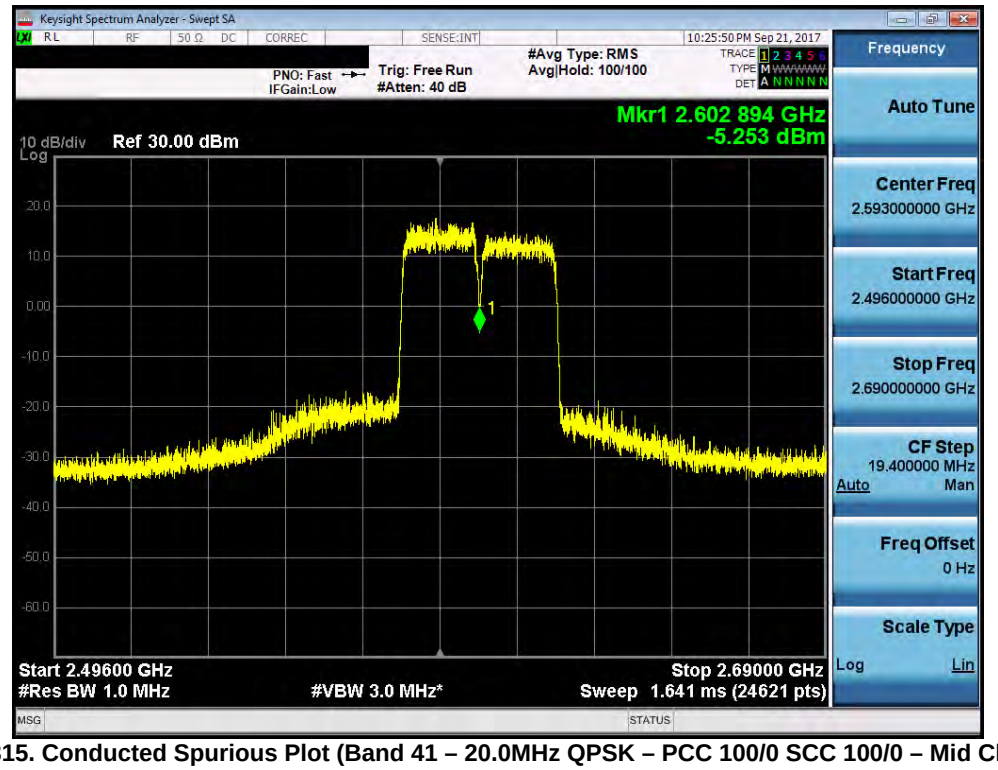
Plot 7-311. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

Plot 7-312. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

Plot 7-313. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



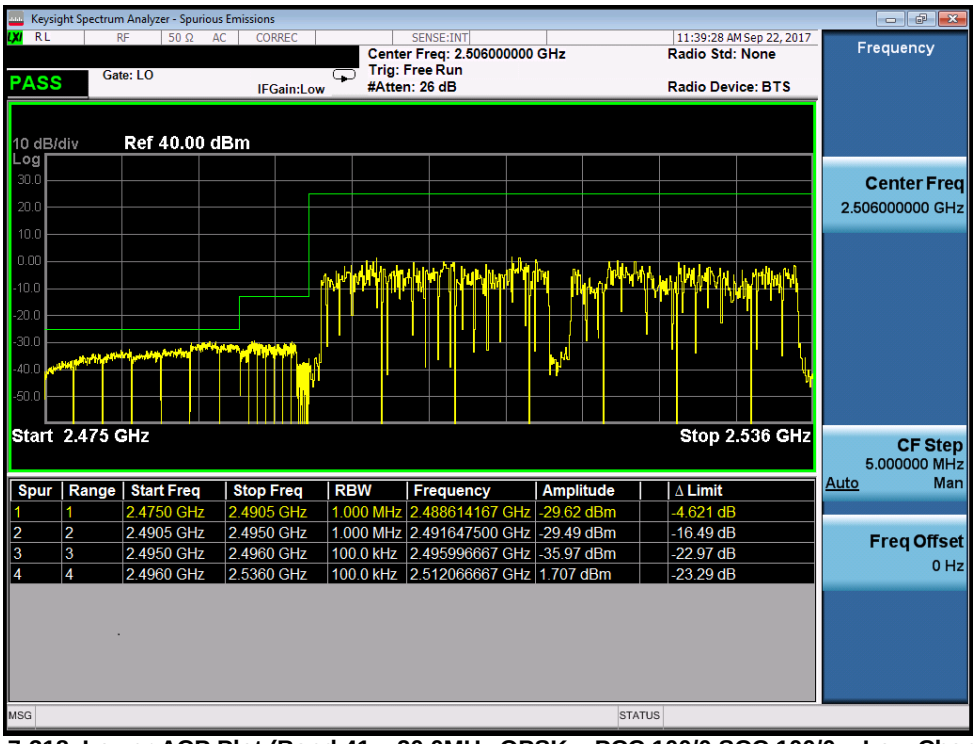
Plot 7-314. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)



Plot 7-315. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)

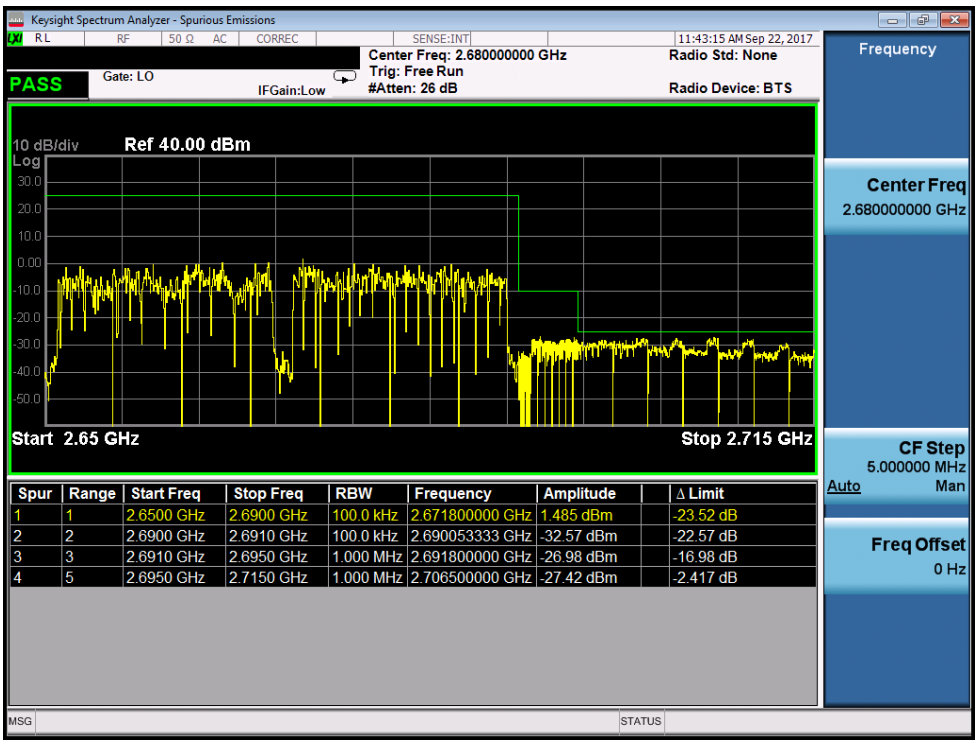
Plot 7-316. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)

Plot 7-317. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Mid Channel)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.488614167 GHz	-29.62 dBm	-4.621 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.491647500 GHz	-29.49 dBm	-16.49 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495996667 GHz	-35.97 dBm	-22.97 dB
4	4	2.4960 GHz	2.5360 GHz	100.0 kHz	2.512066667 GHz	1.707 dBm	-23.29 dB

Plot 7-318. Lower ACP Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – Low Channel)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6500 GHz	2.6900 GHz	100.0 kHz	2.671800000 GHz	1.485 dBm	-23.52 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690053333 GHz	-32.57 dBm	-22.57 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691800000 GHz	-26.98 dBm	-16.98 dB
4	5	2.6950 GHz	2.7150 GHz	1.000 MHz	2.706500000 GHz	-27.42 dBm	-2.417 dB

Plot 7-319. Upper ACP Plot (Band 41 – 20.0MHz QPSK – PCC 100/0 SCC 100/0 – High Channel)

7.6 Peak-Average Ratio

§24.232(d)

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 v02r02 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
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.

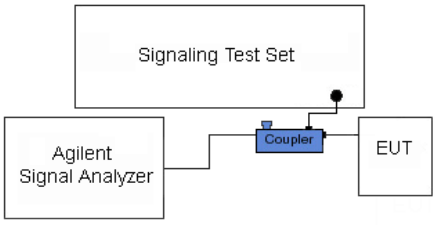
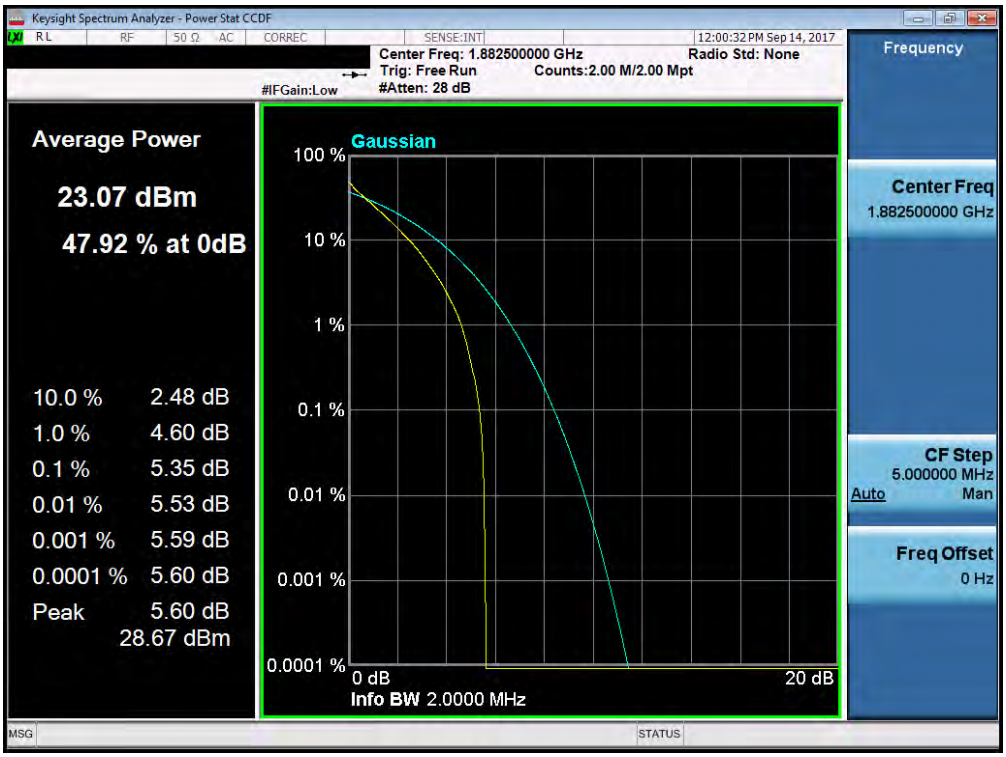


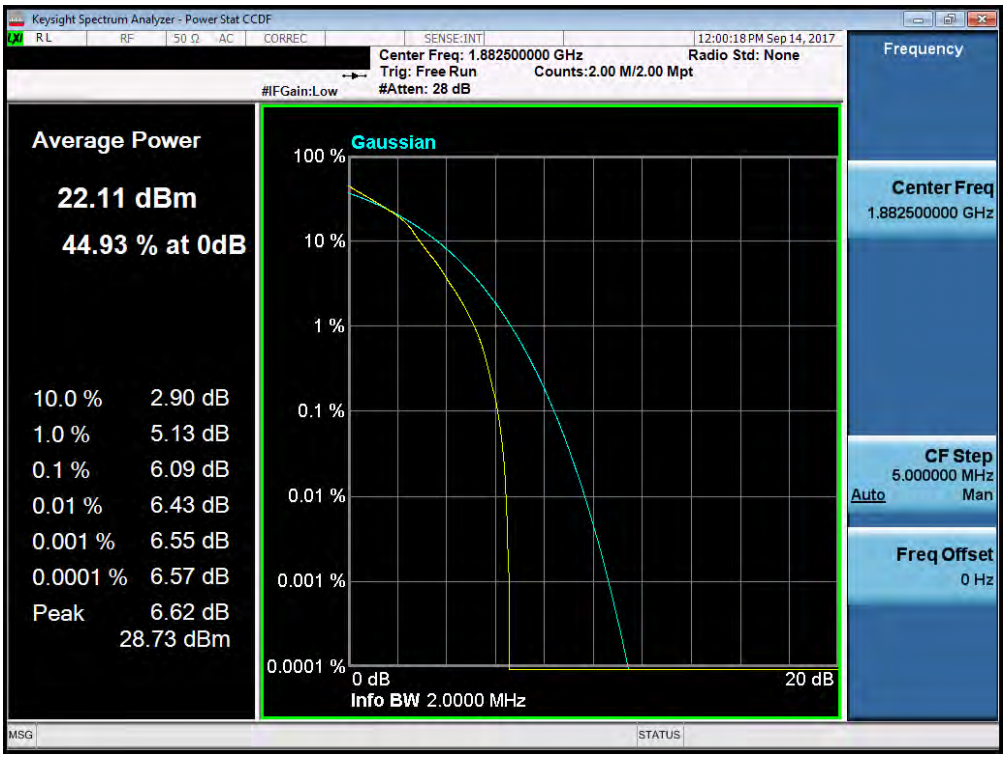
Figure 7-5. Test Instrument & Measurement Setup

Test Notes

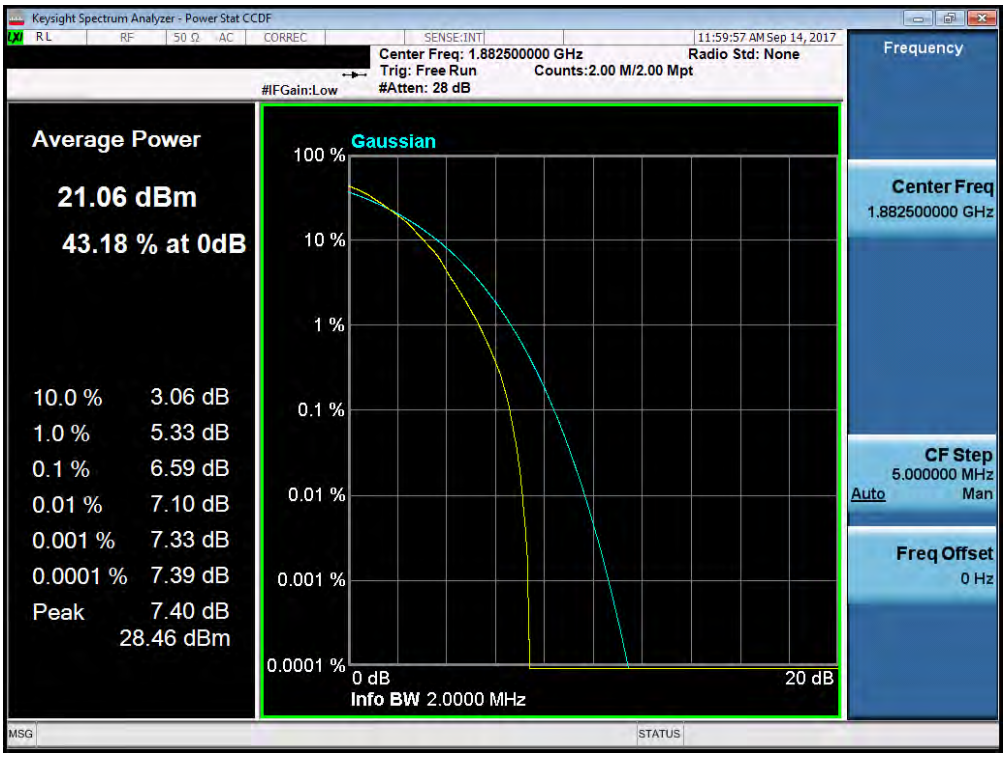
None.



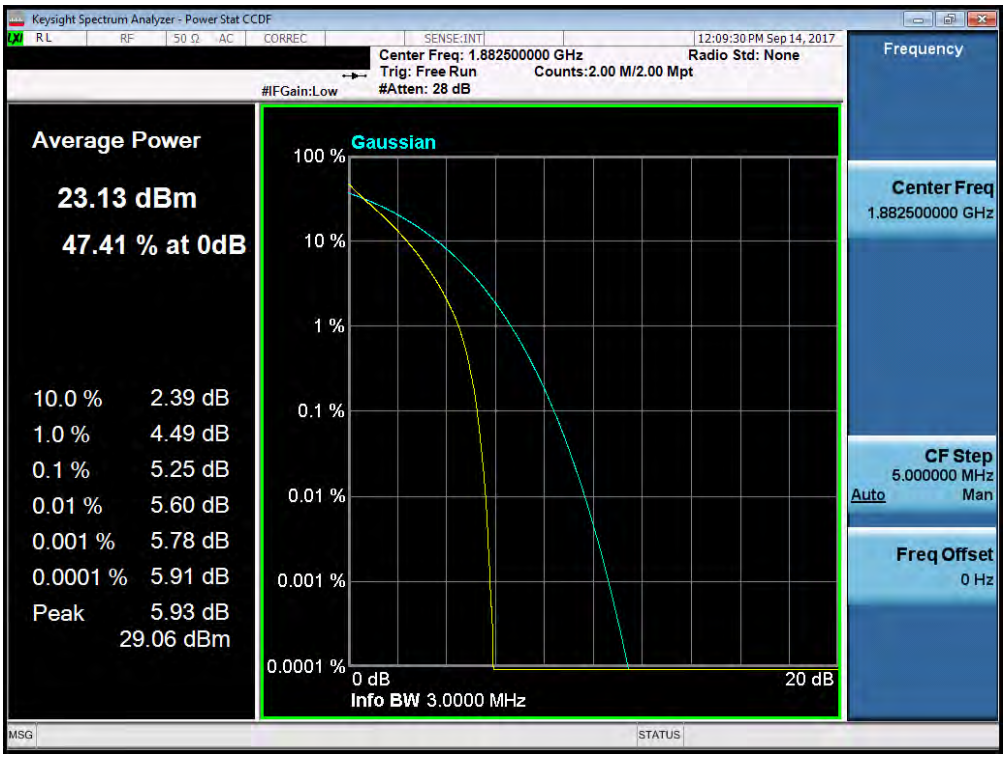
Plot 7-320. PAR Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



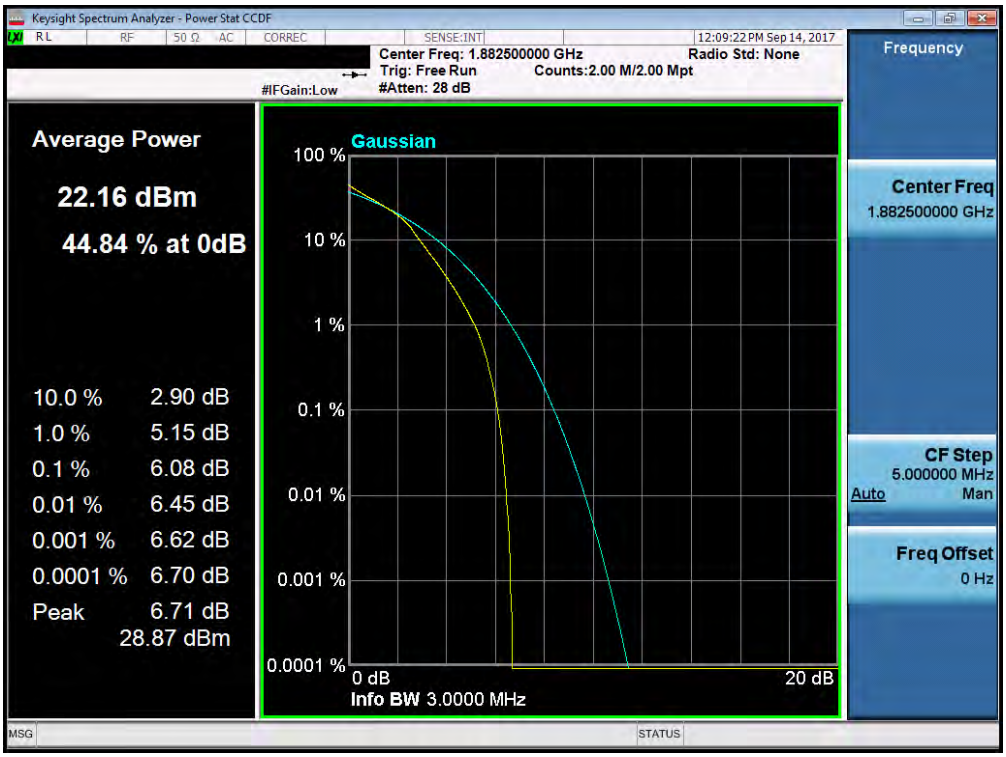
Plot 7-321. PAR Plot (Band 2/25 – 1.4MHz 16-QAM – RB Size 6)



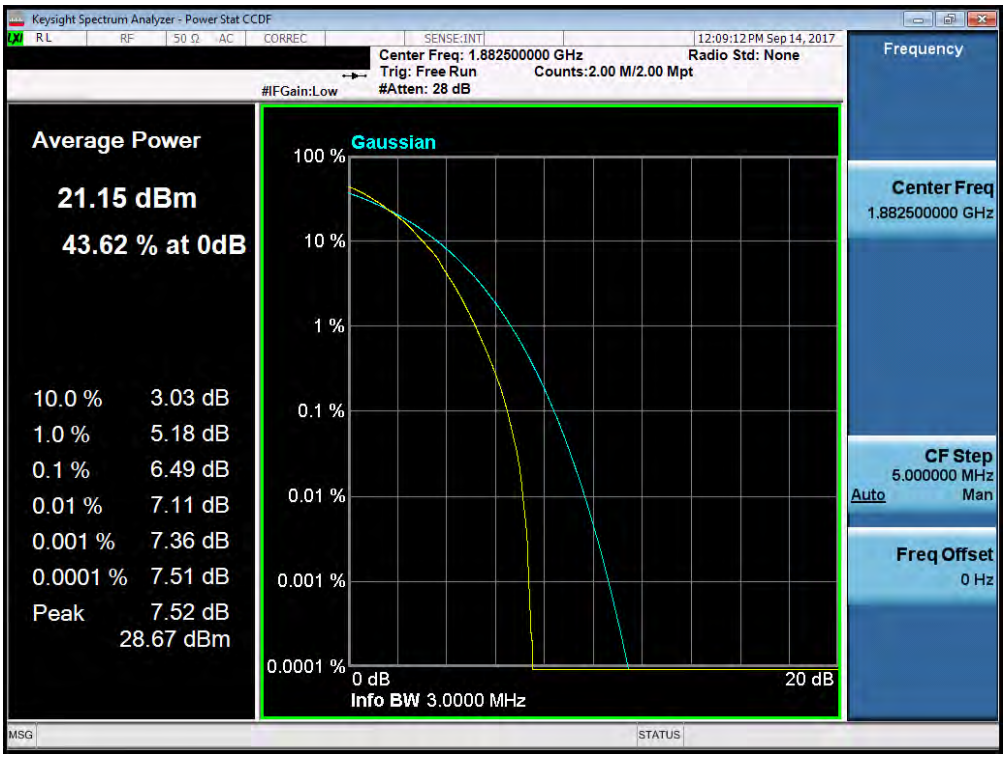
Plot 7-322. PAR Plot (Band 2/25 – 1.4MHz 64-QAM – RB Size 6)



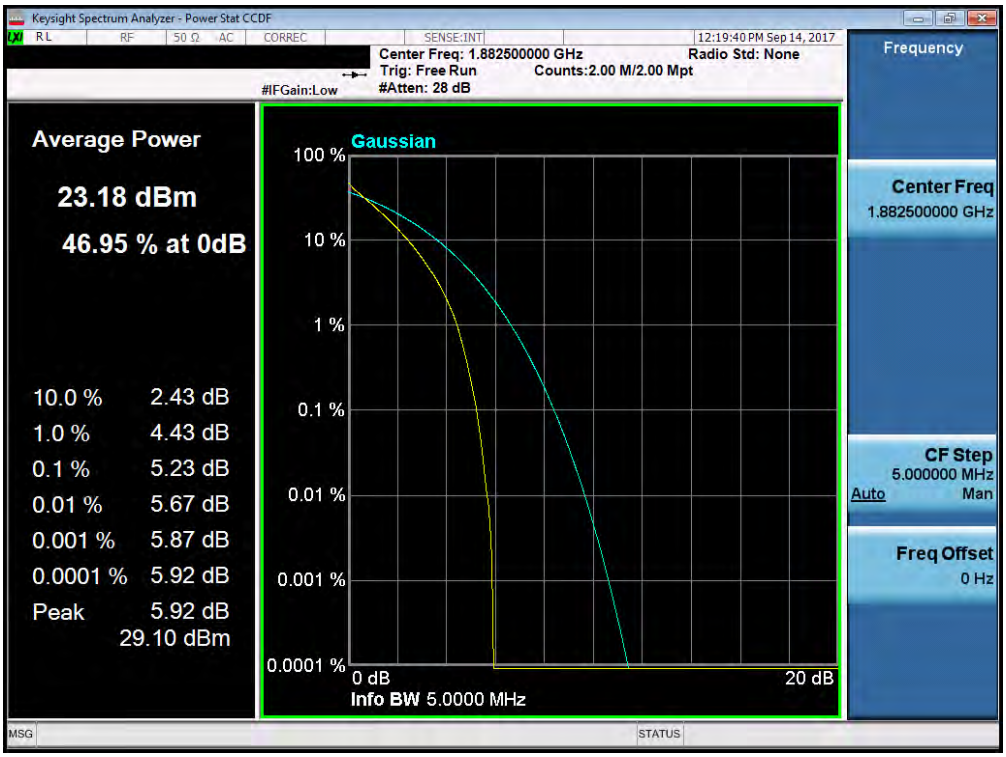
Plot 7-323. PAR Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



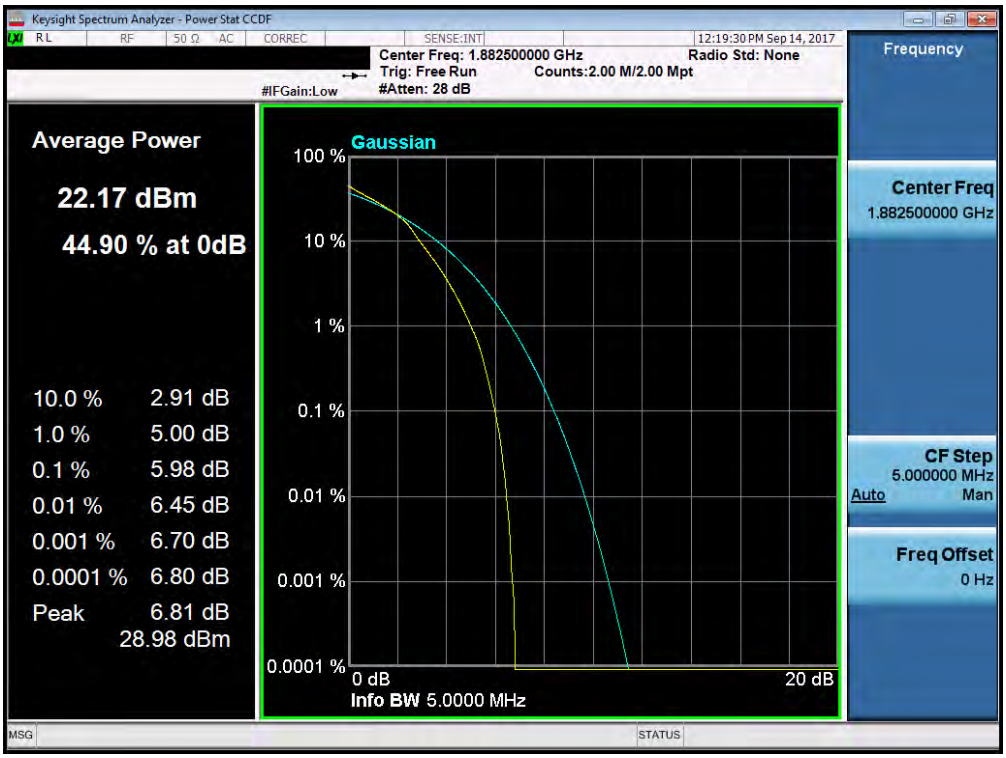
Plot 7-324. PAR Plot (Band 2/25 – 3.0MHz 16-QAM – RB Size 15)



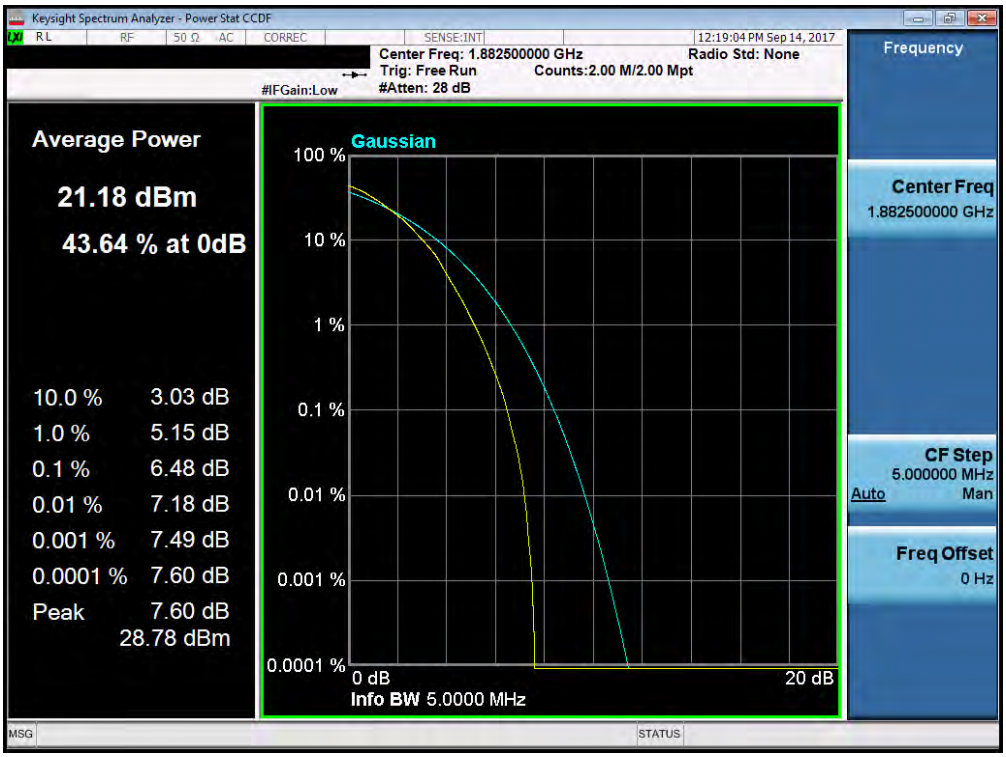
Plot 7-325. PAR Plot (Band 2/25 – 3.0MHz 64-QAM – RB Size 15)



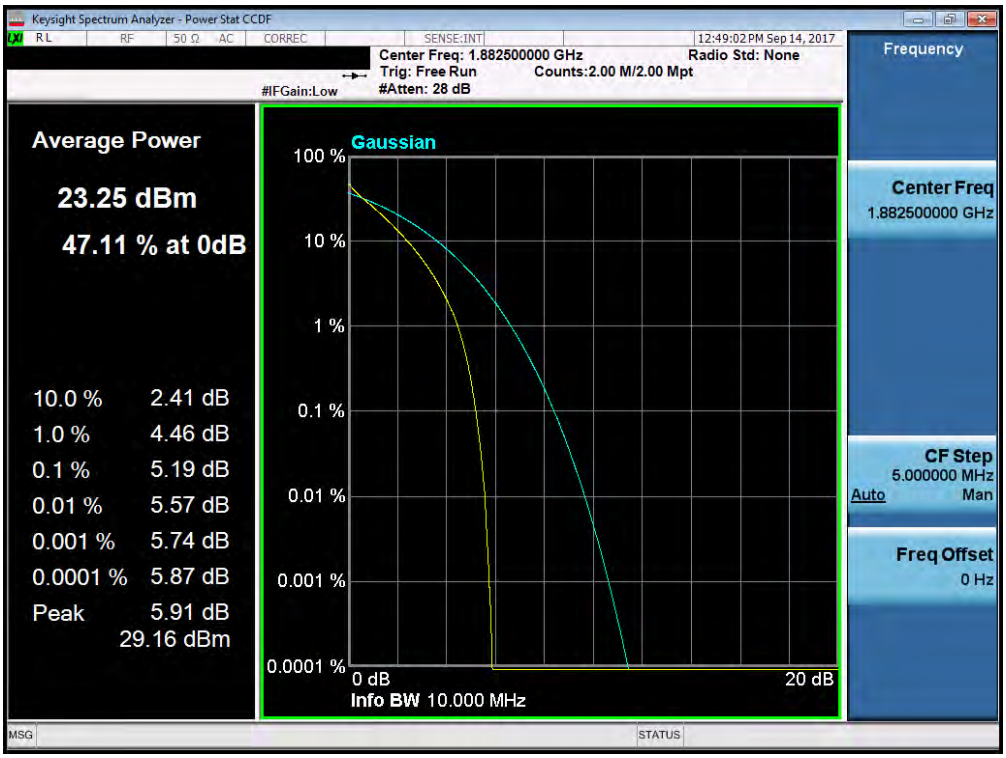
Plot 7-326. PAR Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)



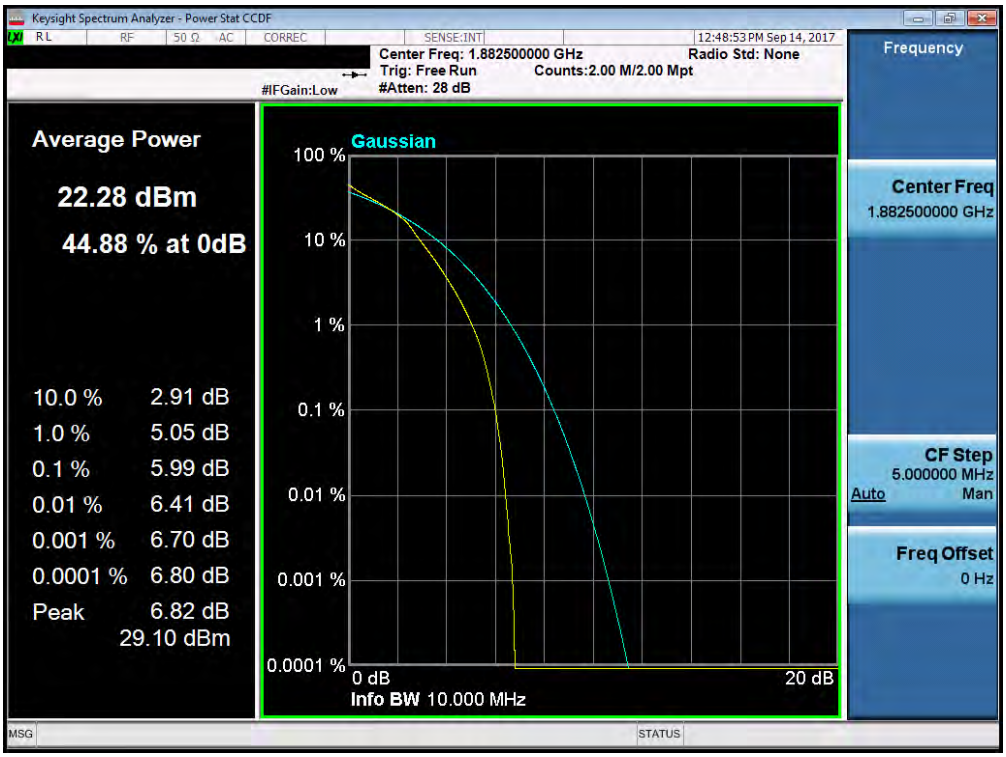
Plot 7-327. PAR Plot (Band 2/25 – 5.0MHz 16-QAM – RB Size 25)



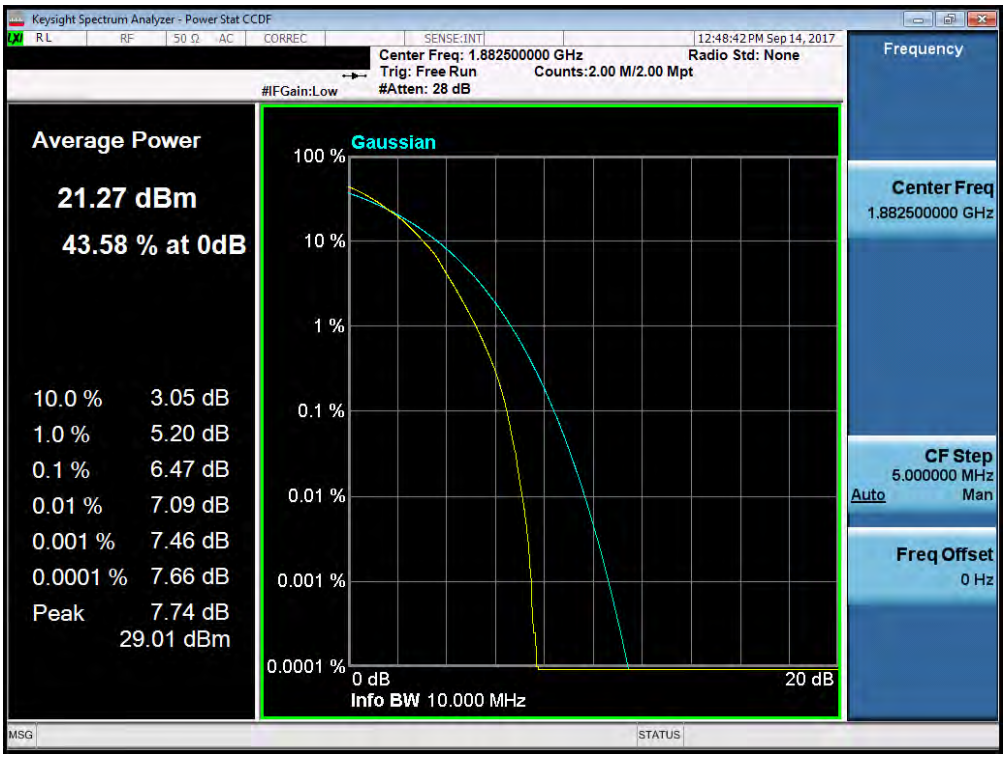
Plot 7-328. PAR Plot (Band 2/25 – 5.0MHz 64-QAM – RB Size 25)



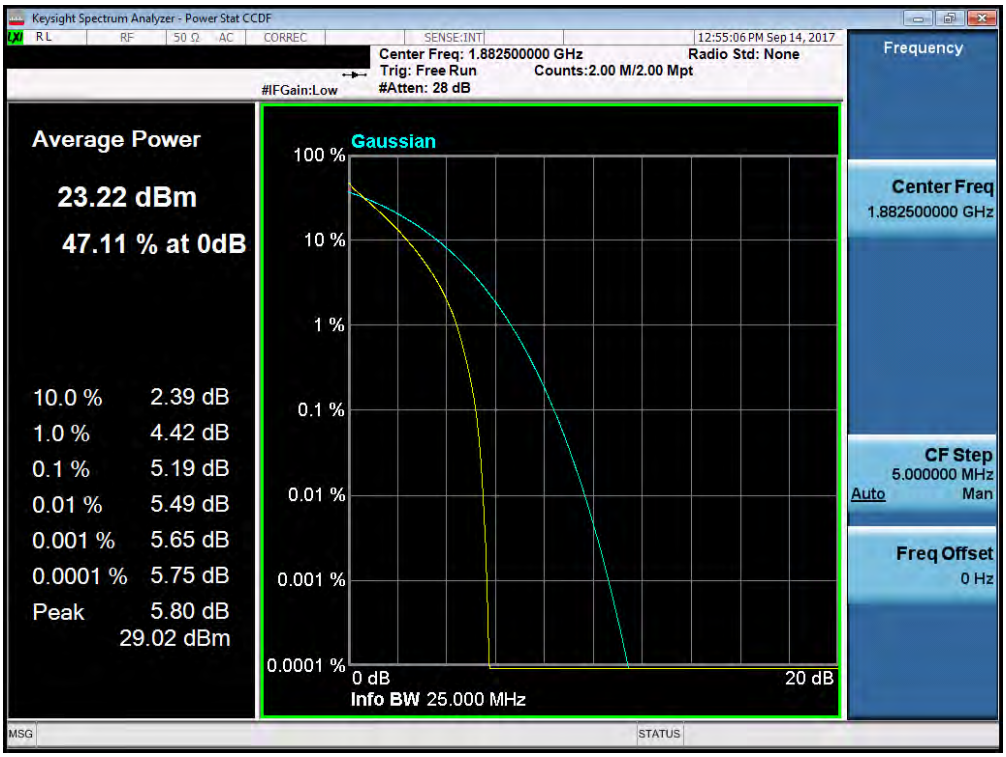
Plot 7-329. PAR Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)



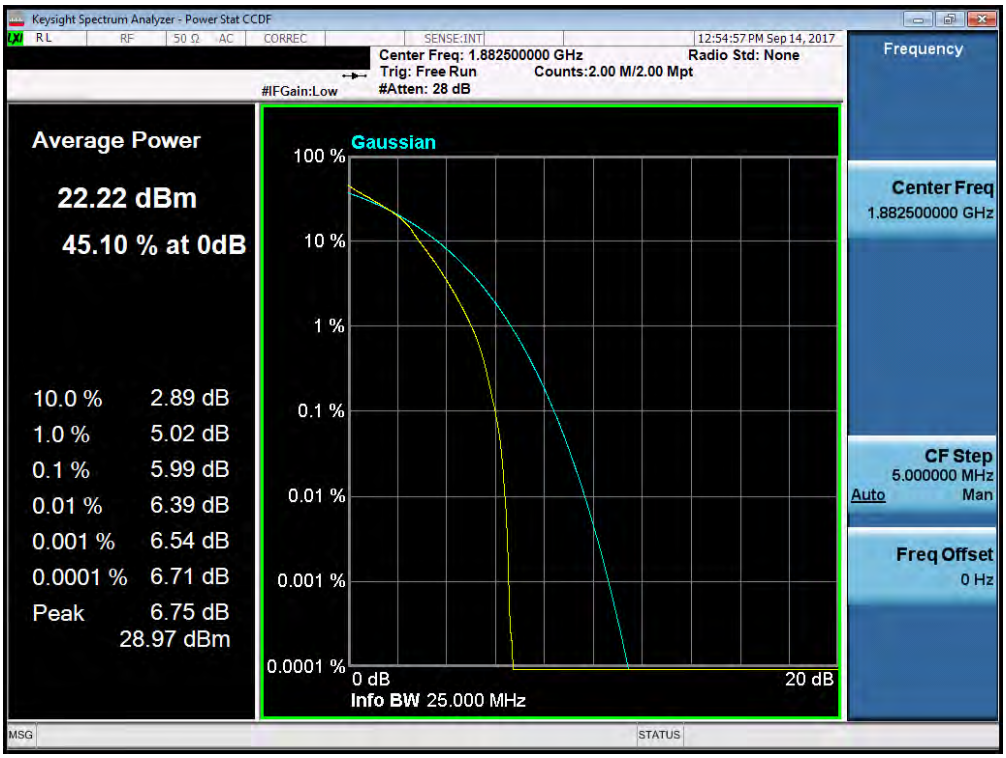
Plot 7-330. PAR Plot (Band 2/25 – 10.0MHz 16-QAM – RB Size 50)



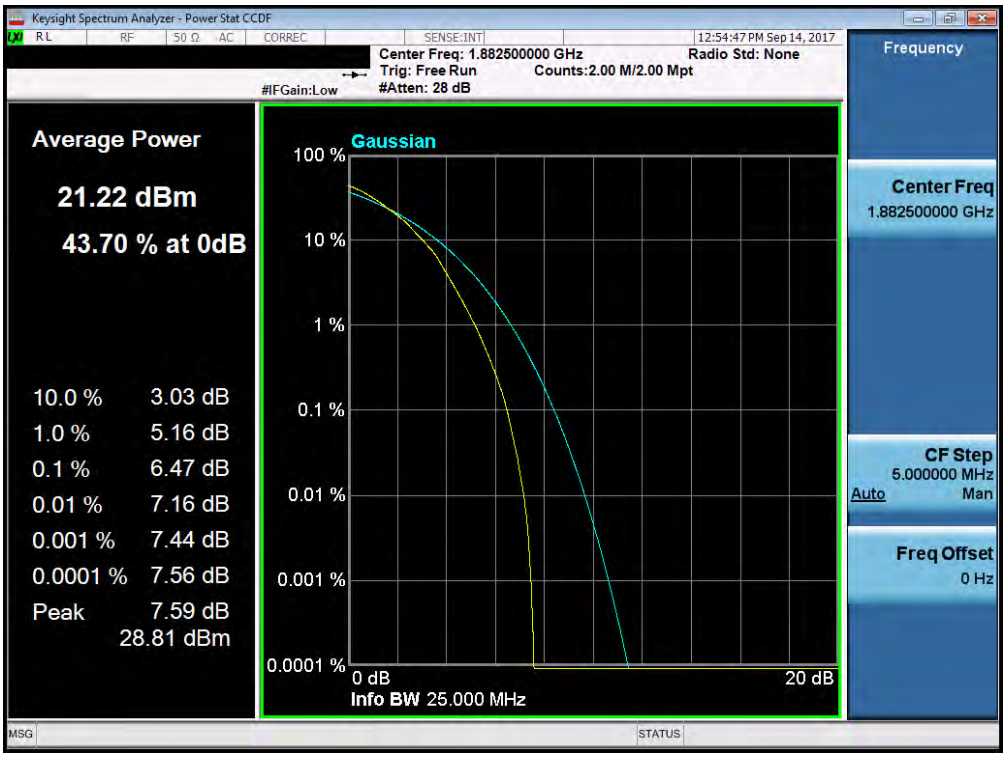
Plot 7-331. PAR Plot (Band 2/25 – 10.0MHz 64-QAM – RB Size 50)



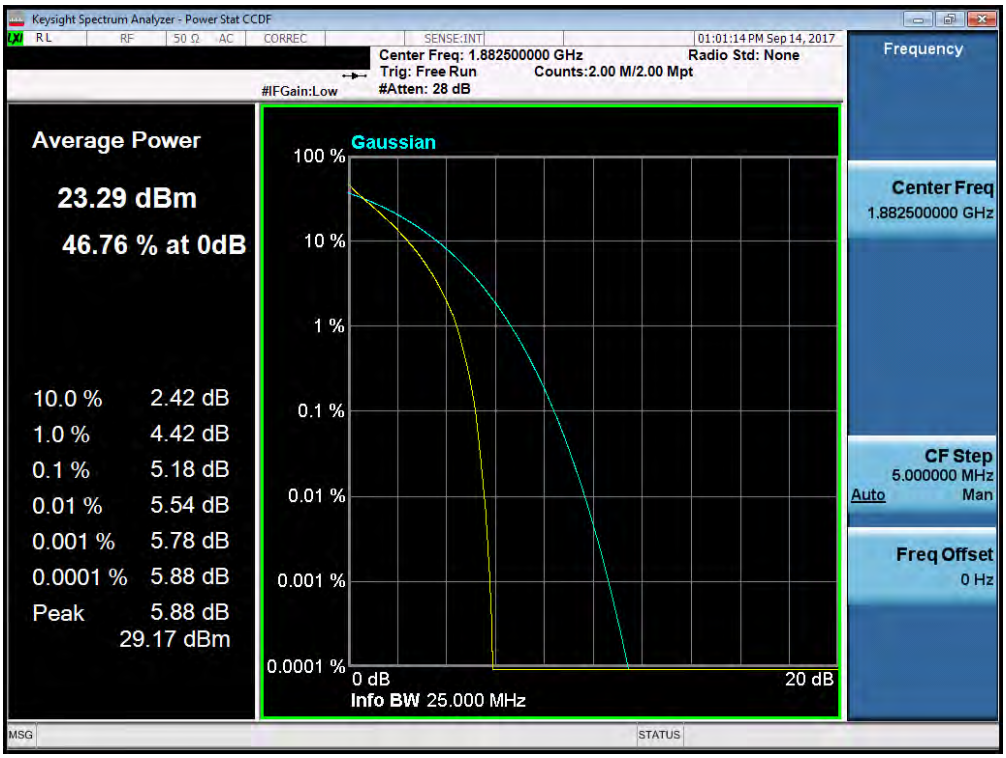
Plot 7-332. PAR Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)



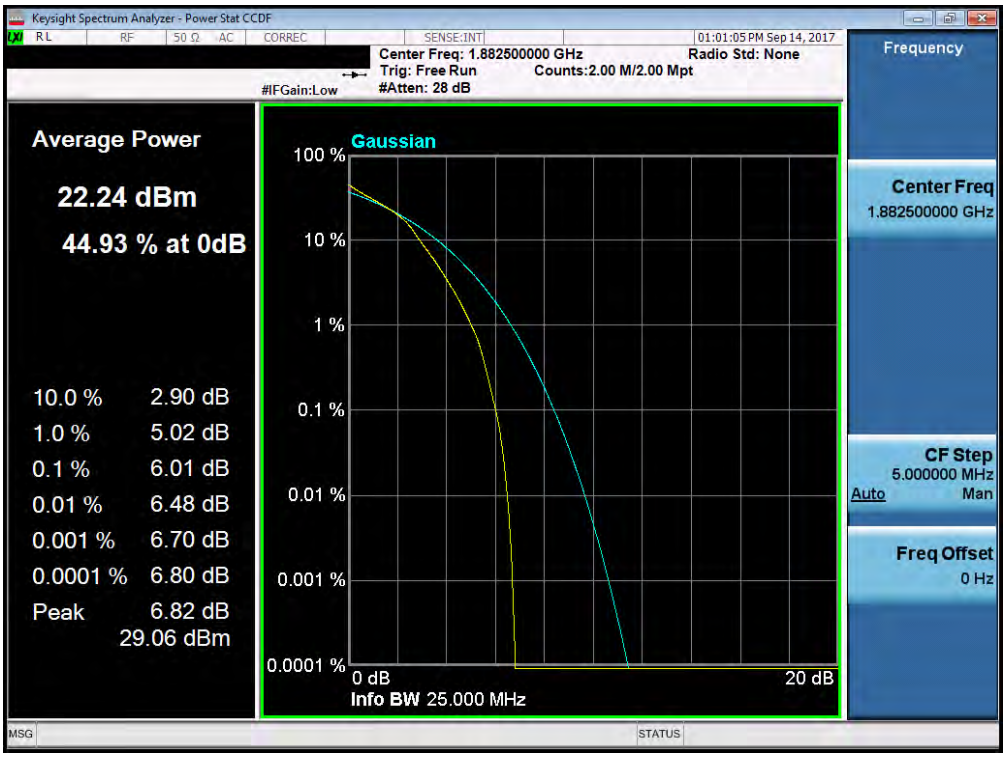
Plot 7-333. PAR Plot (Band 2/25 – 15.0MHz 16-QAM – RB Size 75)



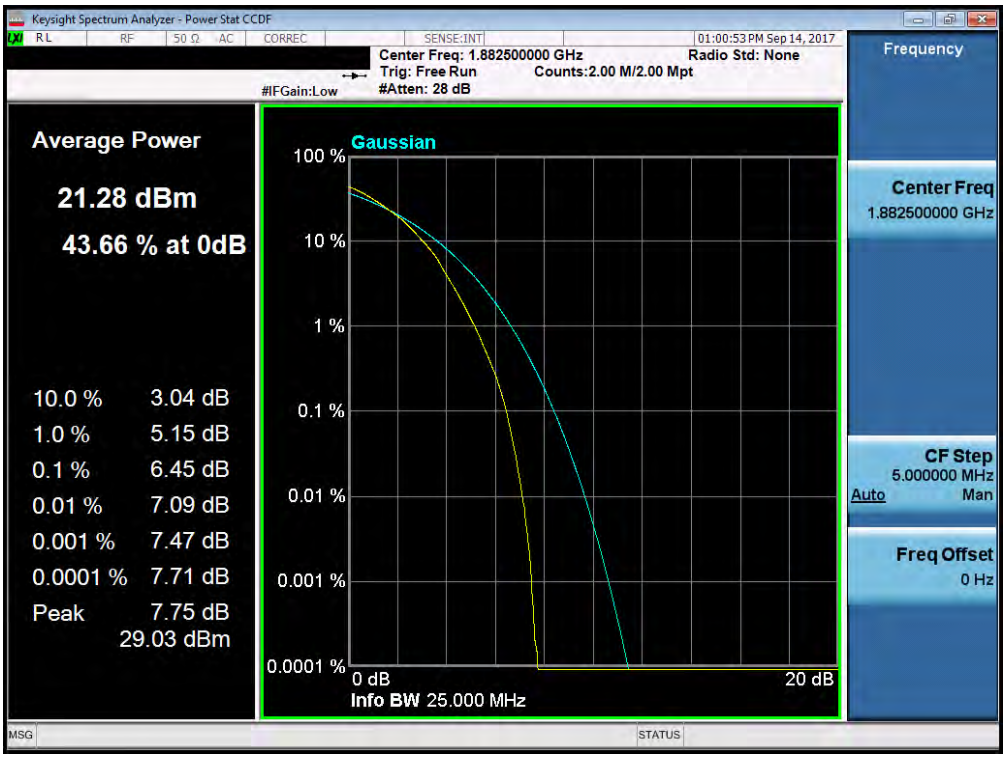
Plot 7-334. PAR Plot (Band 2/25 – 15.0MHz 64-QAM – RB Size 75)



Plot 7-335. PAR Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)



Plot 7-336. PAR Plot (Band 2/25 – 20.0MHz 16-QAM – RB Size 100)



Plot 7-337. PAR Plot (Band 2/25 – 20.0MHz 64-QAM – RB Size 100)

7.7 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(h.2) §27.50(b.10) §27.50(c.10) §27.50(d.4)

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 v02r02 – 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.

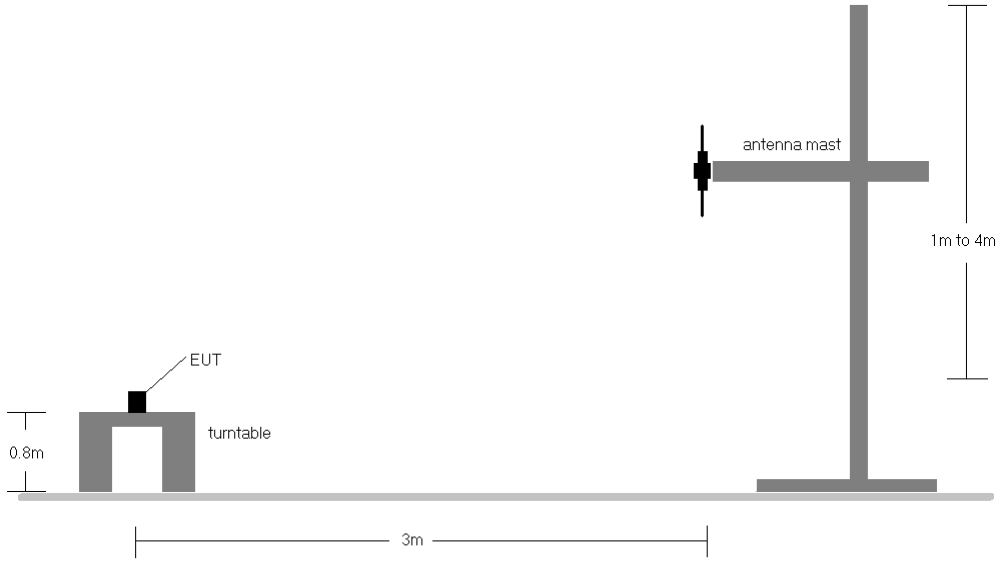


Figure 7-6. Radiated Test Setup <1GHz

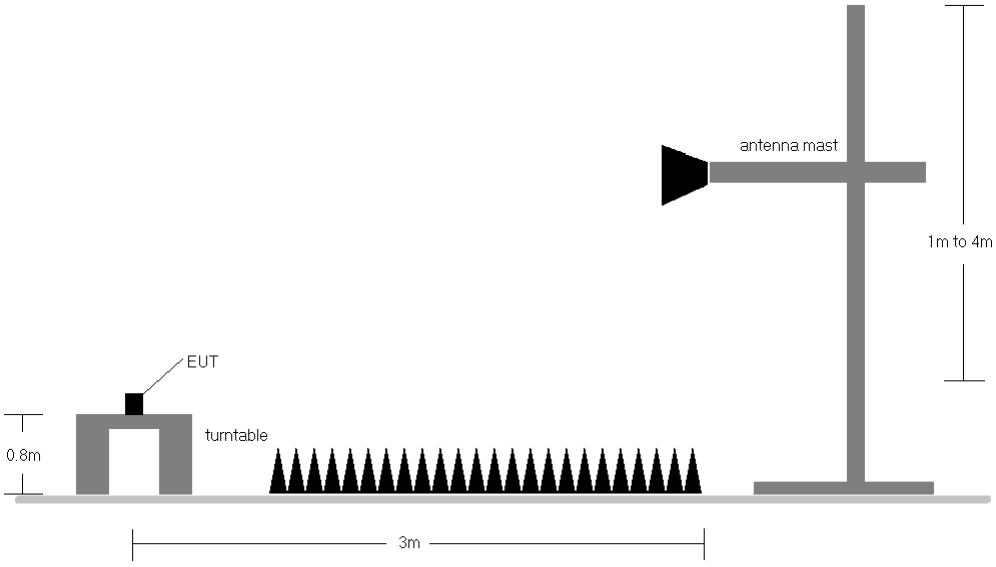


Figure 7-7. Radiated Test Setup >1GHz

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.

7.7.1 Radiated Power (ERP/EIRP)

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 Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
665.50	5	QPSK	H	150	240	1 / 24	21.38	1.10	20.33	34.77	-14.44	22.48	40.61	-18.13
680.50	5	QPSK	H	150	240	1 / 24	22.19	1.10	21.14	34.77	-13.63	23.29	40.61	-17.32
695.50	5	QPSK	H	150	210	1 / 24	21.75	1.10	20.70	34.77	-14.07	22.85	40.61	-17.76
680.50	5	16-QAM	H	150	240	1 / 24	21.55	1.10	20.50	34.77	-14.27	22.65	40.61	-17.96
680.50	5	64-QAM	H	150	240	1 / 24	20.20	1.10	19.15	34.77	-15.62	21.30	40.61	-19.31
668.00	10	QPSK	H	150	215	1 / 49	22.21	1.10	21.16	34.77	-13.61	23.31	40.61	-17.30
680.50	10	QPSK	H	150	227	1 / 0	22.51	1.10	21.46	34.77	-13.31	23.61	40.61	-17.00
693.00	10	QPSK	H	150	249	1 / 49	22.44	1.10	21.39	34.77	-13.38	23.54	40.61	-17.07
680.50	10	16-QAM	H	150	227	1 / 0	20.95	1.10	19.90	34.77	-14.87	22.05	40.61	-18.56
680.50	10	64-QAM	H	150	227	1 / 0	20.10	1.10	19.05	34.77	-15.72	21.20	40.61	-19.41
670.50	15	QPSK	H	150	242	1 / 74	22.74	1.10	21.69	34.77	-13.08	23.84	40.61	-16.77
680.50	15	QPSK	H	150	233	1 / 0	22.41	1.10	21.36	34.77	-13.41	23.51	40.61	-17.10
690.50	15	QPSK	H	150	240	1 / 74	21.81	1.10	20.76	34.77	-14.01	22.91	40.61	-17.70
670.50	15	16-QAM	H	150	242	1 / 74	21.82	1.10	20.77	34.77	-14.00	22.92	40.61	-17.69
670.50	15	64-QAM	H	150	242	1 / 74	20.35	1.10	19.30	34.77	-15.47	21.45	40.61	-19.16
673.00	20	QPSK	H	150	231	1 / 99	22.67	1.10	21.62	34.77	-13.15	23.77	40.61	-16.84
680.50	20	QPSK	H	150	222	1 / 0	22.46	1.10	21.41	34.77	-13.36	23.56	40.61	-17.05
688.00	20	QPSK	H	150	213	1 / 99	22.24	1.10	21.19	34.77	-13.58	23.34	40.61	-17.27
673.00	20	16-QAM	H	150	231	1 / 99	22.09	1.10	21.04	34.77	-13.73	23.19	40.61	-17.42
673.00	20	64-QAM	H	150	231	1 / 99	20.55	1.10	19.50	34.77	-15.27	21.65	40.61	-18.96
670.50	15	QPSK	V	150	353	1 / 0	17.55	1.10	16.50	34.77	-18.27	18.65	40.61	-21.96
670.50	15 (WCP)	QPSK	H	150	235	1 / 99	19.32	1.10	18.27	34.77	-16.50	20.42	40.61	-20.19

Table 7-4. ERP/EIRP Data (Band 71)

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 Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	150	355	1 / 5	19.10	1.10	18.05	34.77	-16.72	20.20	40.61	-20.41
707.50	1.4	QPSK	V	150	356	1 / 0	20.03	1.13	19.01	34.77	-15.76	21.16	40.61	-19.45
715.30	1.4	QPSK	V	150	369	1 / 5	20.66	1.16	19.67	34.77	-15.10	21.82	40.61	-18.79
715.30	1.4	16-QAM	V	150	369	1 / 5	19.73	1.16	18.74	34.77	-16.03	20.89	40.61	-19.72
715.30	1.4	64-QAM	V	150	369	1 / 5	18.92	1.16	17.93	34.77	-16.84	20.08	40.61	-20.53
700.50	3	QPSK	V	150	356	1 / 14	19.30	1.10	18.25	34.77	-16.52	20.40	40.61	-20.20
707.50	3	QPSK	V	150	354	1 / 14	20.03	1.13	19.01	34.77	-15.76	21.16	40.61	-19.45
714.50	3	QPSK	V	150	356	1 / 14	20.68	1.16	19.69	34.77	-15.08	21.84	40.61	-18.77
714.50	3	16-QAM	V	150	356	1 / 14	19.83	1.16	18.84	34.77	-15.93	20.99	40.61	-19.62
714.50	3	64-QAM	V	150	356	1 / 14	18.70	1.16	17.71	34.77	-17.06	19.86	40.61	-20.75

Table 7-5. 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 Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
701.50	5	QPSK	V	150	353	1 / 24	19.71	1.11	18.67	34.77	-16.11	20.82	40.61	-19.79
707.50	5	QPSK	V	150	352	1 / 24	19.97	1.13	18.95	34.77	-15.82	21.10	40.61	-19.51
713.50	5	QPSK	V	150	7	1 / 24	20.38	1.15	19.38	34.77	-15.39	21.53	40.61	-19.07
713.50	5	16-QAM	V	150	7	1 / 24	19.53	1.15	18.53	34.77	-16.24	20.68	40.61	-19.92
713.50	5	64-QAM	V	150	7	1 / 24	18.55	1.15	17.55	34.77	-17.22	19.70	40.61	-20.90
704.00	10	QPSK	V	150	356	1 / 49	19.84	1.12	18.81	34.77	-15.96	20.96	40.61	-19.65
707.50	10	QPSK	V	150	353	1 / 49	20.30	1.13	19.28	34.77	-15.49	21.43	40.61	-19.18
711.00	10	QPSK	V	150	0	1 / 49	20.73	1.14	19.72	34.77	-15.05	21.87	40.61	-18.73
711.00	10	16-QAM	V	150	0	1 / 49	19.72	1.14	18.71	34.77	-16.06	20.86	40.61	-19.74
711.00	10	64-QAM	V	150	0	1 / 49	18.82	1.14	17.81	34.77	-16.96	19.96	40.61	-20.64
711.00	10	QPSK	H	150	1	1 / 74	19.30	1.14	18.29	34.77	-16.48	20.44	40.61	-20.16
711.00	10 (WCP)	QPSK	V	150	1	1 / 0	16.77	1.14	15.76	34.77	-19.01	17.91	40.61	-22.69

Table 7-6. ERP/EIRP Data (Band 12/17)

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 Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	161	237	1 / 24	18.04	6.00	21.89	34.77	-12.88	24.04	40.61	-16.57
782.00	5	QPSK	V	156	247	1 / 0	18.08	6.07	22.00	34.77	-12.77	24.15	40.61	-16.45
784.50	5	QPSK	V	161	250	1 / 0	17.83	6.17	21.85	34.77	-12.92	24.00	40.61	-16.61
782.00	5	16-QAM	V	156	247	1 / 0	17.33	6.07	21.25	34.77	-13.52	23.40	40.61	-17.20
782.00	5	64-QAM	V	156	247	1 / 0	16.30	6.07	20.22	34.77	-14.55	22.37	40.61	-18.23
782.00	10	QPSK	V	152	249	1 / 0	17.93	6.07	21.85	34.77	-12.92	24.00	40.61	-16.60
782.00	10	16-QAM	V	152	249	1 / 0	17.15	6.07	21.07	34.77	-13.70	23.22	40.61	-17.38
782.00	10	64-QAM	V	152	249	1 / 0	16.10	6.07	20.02	34.77	-14.75	22.17	40.61	-18.43
782.00	5	QPSK	H	118	275	1 / 0	16.16	4.69	18.70	34.77	-16.07	20.85	40.61	-19.76
782.00	5 (WCP)	QPSK	H	110	286	1 / 0	14.26	4.69	16.80	34.77	-17.97	18.95	40.61	-21.66

Table 7-7. 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 Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	H	150	359	1 / 0	21.70	1.50	21.05	38.45	-17.40	23.20	36.99	-13.79
836.50	1.4	QPSK	H	150	358	1 / 5	21.60	1.50	20.95	38.45	-17.50	23.10	36.99	-13.89
848.30	1.4	QPSK	H	150	350	1 / 0	21.36	1.50	20.71	38.45	-17.74	22.86	36.99	-14.13
824.70	1.4	16-QAM	H	150	359	1 / 0	20.85	1.50	20.20	38.45	-18.25	22.35	36.99	-14.64
824.70	1.4	64-QAM	H	150	359	1 / 0	19.99	1.50	19.34	38.45	-19.11	21.49	36.99	-15.50
825.50	3	QPSK	H	150	357	1 / 0	21.69	1.50	21.04	38.45	-17.41	23.19	36.99	-13.80
836.50	3	QPSK	H	150	2	1 / 0	21.67	1.50	21.02	38.45	-17.43	23.17	36.99	-13.82
847.50	3	QPSK	H	150	350	1 / 0	21.27	1.50	20.62	38.45	-17.83	22.77	36.99	-14.22
825.50	3	16-QAM	H	150	357	1 / 0	20.80	1.50	20.15	38.45	-18.30	22.30	36.99	-14.69
825.50	3	64-QAM	H	150	357	1 / 0	19.96	1.50	19.31	38.45	-19.14	21.46	36.99	-15.53
826.50	5	QPSK	H	150	357	1 / 24	21.63	1.50	20.98	38.45	-17.47	23.13	36.99	-13.86
836.50	5	QPSK	H	150	7	1 / 0	21.61	1.50	20.96	38.45	-17.49	23.11	36.99	-13.88
846.50	5	QPSK	H	150	359	1 / 0	21.19	1.50	20.54	38.45	-17.91	22.69	36.99	-14.30
826.50	5	16-QAM	H	150	357	1 / 24	20.77	1.50	20.12	38.45	-18.33	22.27	36.99	-14.72
826.50	5	64-QAM	H	150	357	1 / 24	19.70	1.50	19.05	38.45	-19.40	21.20	36.99	-15.79
829.00	10	QPSK	H	150	357	1 / 0	21.98	1.50	21.33	38.45	-17.12	23.48	36.99	-13.51
836.50	10	QPSK	H	150	356	1 / 0	21.60	1.50	20.95	38.45	-17.50	23.10	36.99	-13.89
844.00	10	QPSK	H	150	355	1 / 0	21.62	1.50	20.97	38.45	-17.48	23.12	36.99	-13.87
829.00	10	16-QAM	H	150	357	1 / 0	20.89	1.50	20.24	38.45	-18.21	22.39	36.99	-14.60
829.00	10	64-QAM	H	150	357	1 / 0	19.94	1.50	19.29	38.45	-19.16	21.44	36.99	-15.55
829.00	10	QPSK	V	150	1	1 / 0	19.40	1.50	18.75	38.45	-19.70	20.90	36.99	-16.09
829.00	10 (WCP)	QPSK	H	150	0	1 / 0	21.96	1.50	21.31	38.45	-17.14	23.46	36.99	-13.53

Table 7-8. ERP/EIRP Data (Band 5/26)

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]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
831.50	15	QPSK	H	150	358	1 / 0	21.83	1.50	21.18	38.45	-17.27	23.33	36.99	-13.66
836.50	15	QPSK	H	150	351	1 / 0	21.82	1.50	21.17	38.45	-17.28	23.32	36.99	-13.67
841.50	15	QPSK	H	150	3	1 / 0	21.79	1.50	21.14	38.45	-17.31	23.29	36.99	-13.70
831.50	15	16-QAM	H	150	358	1 / 0	21.11	1.50	20.46	38.45	-17.99	22.61	36.99	-14.38
831.50	15	64-QAM	H	150	358	1 / 0	20.21	1.50	19.56	38.45	-18.89	21.71	36.99	-15.28

Table 7-9. 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 Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	156	175	1 / 0	15.64	9.62	25.26	30.00	-4.74
1745.00	1.4	QPSK	H	155	184	1 / 0	14.84	9.43	24.27	30.00	-5.73
1779.30	1.4	QPSK	H	147	188	1 / 5	13.83	9.25	23.08	30.00	-6.92
1710.70	1.4	16-QAM	H	156	175	1 / 0	14.88	9.62	24.50	30.00	-5.50
1710.70	1.4	64-QAM	H	156	175	1 / 0	13.83	9.62	23.45	30.00	-6.55
1711.50	3	QPSK	H	159	184	1 / 0	15.48	9.62	25.10	30.00	-4.90
1745.00	3	QPSK	H	153	184	1 / 0	14.92	9.43	24.35	30.00	-5.65
1778.50	3	QPSK	H	155	194	1 / 0	13.58	9.26	22.84	30.00	-7.16
1711.50	3	16-QAM	H	159	184	1 / 0	14.71	9.62	24.33	30.00	-5.67
1711.50	3	64-QAM	H	159	184	1 / 0	13.67	9.62	23.29	30.00	-6.71
1712.50	5	QPSK	H	157	175	1 / 0	15.92	9.61	25.53	30.00	-4.47
1745.00	5	QPSK	H	155	185	1 / 0	15.67	9.43	25.10	30.00	-4.90
1777.50	5	QPSK	H	147	188	1 / 24	14.18	9.26	23.44	30.00	-6.56
1712.50	5	16-QAM	H	157	175	1 / 0	15.18	9.61	24.79	30.00	-5.21
1712.50	5	64-QAM	H	157	175	1 / 0	14.03	9.61	23.64	30.00	-6.36
1715.00	10	QPSK	H	159	181	1 / 0	16.05	9.60	25.65	30.00	-4.35
1745.00	10	QPSK	H	158	191	1 / 0	15.75	9.43	25.18	30.00	-4.82
1775.00	10	QPSK	H	150	192	1 / 49	13.73	9.28	23.01	30.00	-6.99
1715.00	10	16-QAM	H	159	181	1 / 0	15.32	9.60	24.92	30.00	-5.08
1715.00	10	64-QAM	H	159	181	1 / 0	14.21	9.60	23.81	30.00	-6.19
1717.50	15	QPSK	H	160	180	1 / 0	15.98	9.58	25.56	30.00	-4.44
1745.00	15	QPSK	H	158	190	1 / 0	15.84	9.43	25.27	30.00	-4.73
1772.50	15	QPSK	H	151	188	1 / 0	14.11	9.29	23.40	30.00	-6.60
1717.50	15	16-QAM	H	160	180	1 / 0	15.22	9.58	24.80	30.00	-5.20
1717.50	15	64-QAM	H	160	180	1 / 0	14.16	9.58	23.74	30.00	-6.26
1720.00	20	QPSK	H	157	179	1 / 0	16.04	9.57	25.61	30.00	-4.39
1745.00	20	QPSK	H	151	188	1 / 0	15.32	9.43	24.75	30.00	-5.25
1770.00	20	QPSK	H	150	183	1 / 0	14.37	9.30	23.67	30.00	-6.33
1720.00	20	16-QAM	H	157	179	1 / 0	15.26	9.57	24.83	30.00	-5.17
1720.00	20	64-QAM	H	157	179	1 / 0	14.23	9.57	23.80	30.00	-6.20
1715.00	10	QPSK	V	127	332	1 / 0	14.49	9.42	23.91	30.00	-6.09
1715.00	10 (WCP)	QPSK	H	153	165	1 / 0	13.72	9.60	23.32	30.00	-6.68

Table 7-10. EIRP Data (Band 4/66)

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 Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	150	183	1 / 0	13.96	9.12	23.08	33.01	-9.93
1882.50	1.4	QPSK	H	144	190	1 / 0	13.19	9.10	22.29	33.01	-10.72
1914.30	1.4	QPSK	H	143	197	1 / 5	13.48	9.20	22.68	33.01	-10.33
1850.70	1.4	16-QAM	H	150	183	1 / 0	13.11	9.12	22.23	33.01	-10.78
1850.70	1.4	64-QAM	H	150	183	1 / 5	12.36	9.12	21.48	33.01	-11.53
1851.50	3	QPSK	H	146	181	1 / 0	13.73	9.12	22.85	33.01	-10.16
1882.50	3	QPSK	H	146	194	1 / 0	13.22	9.10	22.32	33.01	-10.69
1913.50	3	QPSK	H	143	191	1 / 14	13.59	9.19	22.78	33.01	-10.23
1851.50	3	16-QAM	H	146	181	1 / 0	12.90	9.12	22.02	33.01	-10.99
1851.50	3	64-QAM	H	146	181	1 / 0	11.87	9.12	20.99	33.01	-12.02
1852.50	5	QPSK	H	150	180	1 / 0	14.65	9.12	23.77	33.01	-9.24
1882.50	5	QPSK	H	146	192	1 / 0	13.71	9.10	22.81	33.01	-10.20
1912.50	5	QPSK	H	141	185	1 / 24	13.65	9.18	22.83	33.01	-10.18
1852.50	5	16-QAM	H	150	180	1 / 0	13.82	9.12	22.94	33.01	-10.07
1852.50	5	64-QAM	H	150	180	1 / 0	13.01	9.12	22.13	33.01	-10.88
1855.00	10	QPSK	H	149	186	1 / 0	14.39	9.12	23.51	33.01	-9.50
1882.50	10	QPSK	H	145	194	1 / 0	13.31	9.10	22.41	33.01	-10.60
1910.00	10	QPSK	H	141	199	1 / 49	13.20	9.16	22.36	33.01	-10.65
1855.00	10	16-QAM	H	149	186	1 / 0	13.54	9.12	22.66	33.01	-10.35
1855.00	10	64-QAM	H	149	186	1 / 0	12.57	9.12	21.69	33.01	-11.32
1857.50	15	QPSK	H	150	190	1 / 0	14.40	9.11	23.51	33.01	-9.50
1882.50	15	QPSK	H	146	190	1 / 0	13.30	9.10	22.40	33.01	-10.61
1907.50	15	QPSK	H	142	196	1 / 0	13.36	9.15	22.51	33.01	-10.50
1857.50	15	16-QAM	H	150	190	1 / 0	13.65	9.11	22.76	33.01	-10.25
1857.50	15	64-QAM	H	150	190	1 / 0	12.55	9.11	21.66	33.01	-11.35
1860.00	20	QPSK	H	150	185	1 / 0	14.26	9.11	23.37	33.01	-9.64
1882.50	20	QPSK	H	144	196	1 / 0	13.08	9.10	22.18	33.01	-10.83
1905.00	20	QPSK	H	142	195	1 / 0	13.14	9.13	22.27	33.01	-10.74
1860.00	20	16-QAM	H	150	185	1 / 0	13.48	9.11	22.59	33.01	-10.42
1860.00	20	64-QAM	H	150	185	1 / 0	12.91	9.11	22.02	33.01	-10.99
1852.50	5	QPSK	V	165	219	1 / 0	14.07	8.97	23.04	33.01	-9.97
1852.50	5 (WCP)	QPSK	H	194	24	1 / 0	13.28	9.12	22.40	33.01	-10.61

Table 7-11. EIRP Data (Band 2/25)

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 Limit [dBm]	Margin [dB]
2502.50	5	QPSK	H	150	306	1 / 0	16.20	5.74	21.94	33.01	-11.07
2535.00	5	QPSK	H	150	310	1 / 24	16.50	5.86	22.36	33.01	-10.65
2567.50	5	QPSK	H	150	308	1 / 0	16.68	5.98	22.66	33.01	-10.35
2567.50	5	16-QAM	H	150	308	1 / 24	15.98	5.98	21.96	33.01	-11.05
2567.50	5	64-QAM	H	150	308	1 / 24	14.81	5.98	20.79	33.01	-12.22
2505.00	10	QPSK	H	150	281	1 / 0	16.85	5.75	22.60	33.01	-10.41
2535.00	10	QPSK	H	150	13	1 / 0	16.61	5.86	22.47	33.01	-10.54
2565.00	10	QPSK	H	150	309	1 / 49	16.82	5.97	22.79	33.01	-10.22
2505.00	10	16-QAM	H	150	281	1 / 0	15.97	5.75	21.72	33.01	-11.29
2505.00	10	64-QAM	H	150	281	1 / 0	14.78	5.75	20.53	33.01	-12.48
2507.50	15	QPSK	H	150	304	1 / 74	16.23	5.76	21.99	33.01	-11.02
2535.00	15	QPSK	H	150	309	1 / 74	16.59	5.86	22.45	33.01	-10.56
2562.50	15	QPSK	H	150	309	1 / 0	16.46	5.96	22.42	33.01	-10.59
2535.00	15	16-QAM	H	150	309	1 / 74	15.70	5.86	21.56	33.01	-11.45
2535.00	15	64-QAM	H	150	309	1 / 74	14.50	5.86	20.36	33.01	-12.65
2510.00	20	QPSK	H	150	325	1 / 99	16.13	5.77	21.90	33.01	-11.11
2535.00	20	QPSK	H	150	310	1 / 99	16.39	5.86	22.25	33.01	-10.76
2560.00	20	QPSK	H	150	309	1 / 99	16.43	5.95	22.38	33.01	-10.63
2535.00	20	16-QAM	H	150	310	1 / 99	15.62	5.86	21.48	33.01	-11.53
2560.00	20	16-QAM	H	150	309	1 / 99	15.82	5.95	21.77	33.01	-11.24
2535.00	20	64-QAM	H	150	310	1 / 99	14.62	5.86	20.48	33.01	-12.53
2560.00	20	64-QAM	H	150	309	1 / 99	14.66	5.95	20.61	33.01	-12.40
2565.00	10	QPSK	V	150	310	1 / 0	16.46	6.07	22.53	33.01	-10.48
2565.00	10 (WCP)	QPSK	H	150	318	1 / 0	16.54	5.86	22.40	33.01	-10.61

Table 7-12. 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 Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	195	195	1 / 24	17.11	8.42	25.53	33.01	-7.48
2593.00	5	QPSK	H	183	194	1 / 24	16.37	8.65	25.02	33.01	-7.99
2687.50	5	QPSK	H	173	203	1 / 0	15.52	8.44	23.96	33.01	-9.05
2498.50	5	16-QAM	H	195	195	1 / 0	16.07	8.42	24.49	33.01	-8.52
2498.50	5	64-QAM	H	195	195	1 / 24	15.45	8.42	23.87	33.01	-9.14
2501.00	10	QPSK	H	196	199	1 / 49	17.09	8.41	25.50	33.01	-7.51
2593.00	10	QPSK	H	180	190	1 / 0	15.67	8.65	24.32	33.01	-8.69
2685.00	10	QPSK	H	172	204	1 / 49	15.13	8.45	23.58	33.01	-9.43
2501.00	10	16-QAM	H	196	199	1 / 0	15.79	8.41	24.20	33.01	-8.81
2501.00	10	64-QAM	H	196	199	1 / 49	15.13	8.41	23.54	33.01	-9.47
2503.50	15	QPSK	H	118	191	1 / 74	16.71	8.42	25.13	33.01	-7.88
2593.00	15	QPSK	H	113	202	1 / 0	16.82	8.65	25.47	33.01	-7.54
2682.50	15	QPSK	H	110	208	1 / 0	16.79	8.46	25.25	33.01	-7.76
2593.00	15	16-QAM	H	113	202	1 / 74	15.59	8.65	24.24	33.01	-8.77
2593.00	15	64-QAM	H	113	202	1 / 0	14.94	8.65	23.59	33.01	-9.42
2506.00	20	QPSK	H	121	208	1 / 0	16.54	8.42	24.96	33.01	-8.05
2593.00	20	QPSK	H	114	204	1 / 0	16.82	8.65	25.47	33.01	-7.54
2680.00	20	QPSK	H	111	208	1 / 0	16.66	8.46	25.12	33.01	-7.89
2593.00	20	16-QAM	H	114	204	1 / 99	15.45	8.65	24.10	33.01	-8.91
2593.00	20	64-QAM	H	114	204	1 / 0	14.88	8.65	23.53	33.01	-9.48
2498.50	5	QPSK	V	138	359	1 / 99	15.92	8.74	24.66	33.01	-8.35
2498.50	5 (WCP)	QPSK	H	184	196	1 / 0	16.92	8.42	25.34	33.01	-7.67

Table 7-13. EIRP Data (Band 38/41)

7.8 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) §27.53(m) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6) RSS-195(5.6) RSS-199(4.5)

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 v02r02 – 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.

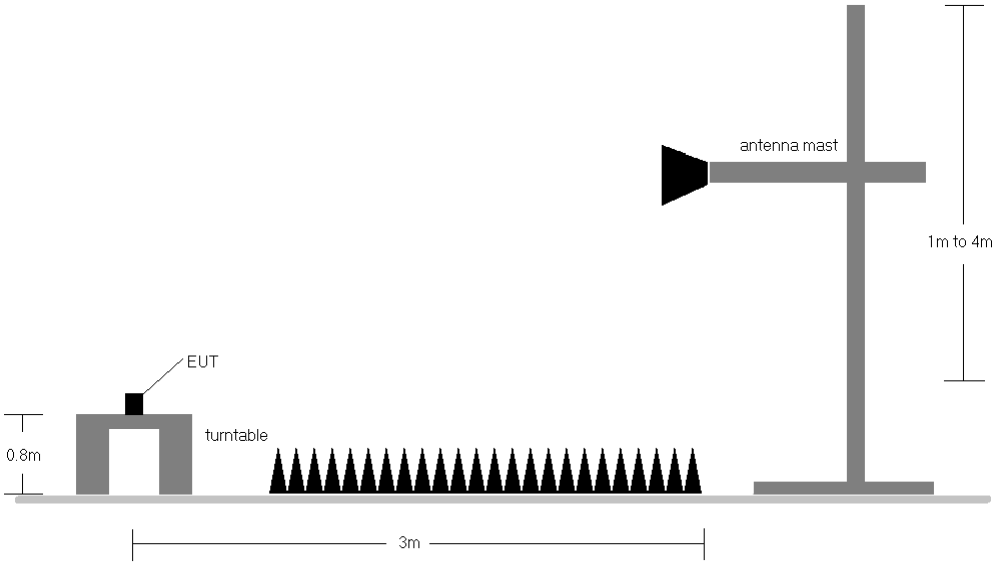


Figure 7-8. Test Instrument & Measurement Setup

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.

7.8.1 Radiated Spurious Emissions Measurements

Band 71

OPERATING FREQUENCY:	670.50	MHz
CHANNEL:	133197	
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]
1341.00	H	150	5	-56.61	7.52	-49.09	-36.1
2011.50	H	150	3	-69.04	7.58	-61.46	-48.5
2682.00	H	-	-	-71.37	10.03	-61.35	-48.3

Table 7-14. Radiated Spurious Data (Band 71 – Low Channel)

OPERATING FREQUENCY:	680.50	MHz
CHANNEL:	133297	
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]
1361.00	H	150	16	-64.46	7.61	-56.85	-43.8
2041.50	H	150	11	-69.40	7.78	-61.62	-48.6
2722.00	H	-	-	-70.61	10.01	-60.60	-47.6

Table 7-15. Radiated Spurious Data (Band 71 – Mid Channel)

OPERATING FREQUENCY:	690.50	MHz
CHANNEL:	133397	
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]
1381.00	H	150	10	-62.85	7.70	-55.15	-42.1
2071.50	H	150	18	-69.50	7.98	-61.53	-48.5
2762.00	H	-	-	-71.07	10.01	-61.06	-48.1

Table 7-16. Radiated Spurious Data (Band 71 – High Channel)

OPERATING FREQUENCY:	670.50	MHz
CHANNEL:	0	
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]
1341.00	H	150	12	-58.40	7.52	-50.87	-37.9
2011.50	H	-	-	-68.42	7.58	-60.85	-47.8
2682.00	H	-	-	-70.92	10.03	-60.90	-47.9

Table 7-17. Radiated Spurious Data with WCP (Band 71 – Low Channel)

Band 12/17

OPERATING FREQUENCY:	704.00	MHz
CHANNEL:	23060	
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]
1408.00	H	100	190	-63.01	8.00	-55.00	-42.0
2112.00	H	-	-	-74.92	8.89	-66.02	-53.0
2816.00	H	-	-	-74.29	10.10	-64.20	-51.2

Table 7-18. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY:	707.50	MHz
CHANNEL:	23095	
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]
1415.00	H	100	191	-62.24	8.09	-54.15	-41.1
2122.50	H	-	-	-74.84	8.88	-65.96	-53.0
2830.00	H	-	-	-74.27	10.13	-64.14	-51.1

Table 7-19. Radiated Spurious Data (Band 12/17 – Mid Channel)

OPERATING FREQUENCY:	711.00	MHz
CHANNEL:	23130	
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]
1422.00	H	100	179	-63.59	8.17	-55.42	-42.4
2133.00	H	-	-	-74.72	8.87	-65.85	-52.9
2844.00	H	-	-	-74.24	10.16	-64.07	-51.1

Table 7-20. Radiated Spurious Data (Band 12/17 – High Channel)

OPERATING FREQUENCY:	711.00	MHz
CHANNEL:	23130	
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]
1422.00	H	100	120	-67.36	8.17	-59.19	-46.2
2133.00	H	-	-	-74.73	8.87	-65.86	-52.9
2844.00	H	-	-	-74.23	10.16	-64.06	-51.1

Table 7-21. Radiated Spurious Data with WCP (Band 12/17 – High Channel)

Band 13

OPERATING FREQUENCY:	779.50	MHz
CHANNEL:	23205	
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]
2338.50	H	-	-	-74.02	9.52	-64.50	-51.5
3118.00	H	-	-	-70.88	9.56	-61.32	-48.3

Table 7-22. Radiated Spurious Data (Band 13 – Low Channel)

OPERATING FREQUENCY:	782.00	MHz
CHANNEL:	23230	
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]
2346.00	H	-	-	-74.08	9.49	-64.60	-51.6
3128.00	H	-	-	-70.75	9.53	-61.22	-48.2

Table 7-23. Radiated Spurious Data (Band 13 – Mid Channel)

OPERATING FREQUENCY:	784.50	MHz
CHANNEL:	23255	
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]
2353.50	H	-	-	-70.82	9.45	-61.38	-48.4
3138.00	H	-	-	-67.02	9.50	-57.52	-44.5

Table 7-24. Radiated Spurious Data (Band 13 – High Channel)

MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.00	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]
1559.00	H	-	-	-76.83	8.72	-68.10	-28.1
1564.00	H	-	-	-76.76	8.73	-68.03	-28.0
1569.00	H	-	-	-76.52	8.74	-67.78	-27.8

Table 7-25. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.00	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	H	-	-	-78.12	8.73	-69.39	-29.4

Table 7-26. Radiated Spurious Data With WCP (Band 13 – 1559-1610MHz Band)

OPERATING FREQUENCY:	782.00	MHz
CHANNEL:	23230	
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]
2346.00	H	-	-	-76.12	9.49	-66.64	-53.6

Table 7-27. Radiated Spurious Data with WCP (Band 13 – Mid Channel)

Band 5/26

OPERATING FREQUENCY:	829.00	MHz
CHANNEL:	26840	
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]
1658.00	H	109	96	-77.71	8.96	-68.75	-55.8
2487.00	H	-	-	-74.89	9.13	-65.76	-52.8
3316.00	H	-	-	-71.99	9.36	-62.62	-49.6

Table 7-28. Radiated Spurious Data (Band 5/26 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz
CHANNEL:	26915	
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]
1673.00	H	115	157	-77.31	8.85	-68.46	-55.5
2509.50	H	-	-	-74.58	9.17	-65.42	-52.4
3346.00	H	-	-	-71.69	9.36	-62.33	-49.3

Table 7-29. Radiated Spurious Data (Band 5/26 – Mid Channel)

OPERATING FREQUENCY:	844.00	MHz
CHANNEL:	26990	
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]
1688.00	H	356	15	-77.11	8.74	-68.37	-55.4
2532.00	H	-	-	-74.88	9.24	-65.64	-52.6
3376.00	H	-	-	-71.52	9.42	-62.10	-49.1

Table 7-30. Radiated Spurious Data (Band 5/26 – High Channel)

OPERATING FREQUENCY:	829.00	MHz
CHANNEL:	26840	
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]
1658.00	H	239	181	-77.70	8.96	-68.74	-55.7
2487.00	H	-	-	-74.74	9.13	-65.61	-52.6
3316.00	H	-	-	-71.98	9.36	-62.61	-49.6

Table 7-31. Radiated Spurious Data with WCP (Band 5/26 – Low Channel)

Band 4/66

OPERATING FREQUENCY:	1715.00	MHz
CHANNEL:	132022	
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]
3430.00	H	-	-	-67.99	9.53	-58.47	-45.5
5145.00	H	-	-	-66.24	10.79	-55.45	-42.4
6860.00	H	-	-	-60.21	10.84	-49.37	-36.4

Table 7-32. Radiated Spurious Data (Band 4/66 – Low Channel)

OPERATING FREQUENCY:	1745.00	MHz
CHANNEL:	132322	
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]
3490.00	H	-	-	-68.81	9.65	-59.16	-46.2
5235.00	H	-	-	-66.01	10.93	-55.08	-42.1
6980.00	H	-	-	-60.17	10.96	-49.21	-36.2

Table 7-33. Radiated Spurious Data (Band 4/66 – Mid Channel)

OPERATING FREQUENCY:	1775.00	MHz
CHANNEL:	132622	
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]
3550.00	H	-	-	-68.67	9.70	-58.97	-46.0
5325.00	H	-	-	-66.46	10.98	-55.48	-42.5
7100.00	H	-	-	-60.13	10.99	-49.14	-36.1

Table 7-34. Radiated Spurious Data (Band 4/66 – High Channel)

OPERATING FREQUENCY:	1715.00	MHz
CHANNEL:	132022	
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]
3430.00	H	-	-	-65.63	9.53	-56.11	-43.1
5145.00	H	-	-	-66.11	10.79	-55.32	-42.3
6860.00	H	-	-	-59.97	10.84	-49.13	-36.1

Table 7-35. Radiated Spurious Data with WCP (Band 4/66 – Low Channel)

Band 2/25

OPERATING FREQUENCY:	1852.50	MHz
CHANNEL:	26065	
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]
3705.00	H	-	-	-63.55	9.72	-53.83	-40.8
5557.50	H	-	-	-65.45	10.99	-54.47	-41.5
7410.00	H	-	-	-59.05	10.79	-48.26	-35.3

Table 7-36. Radiated Spurious Data (Band 2/25 – Low Channel)

OPERATING FREQUENCY:	1882.50	MHz
CHANNEL:	26365	
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]
3765.00	H	-	-	-63.83	9.48	-54.35	-41.4
5647.50	H	-	-	-66.45	11.18	-55.27	-42.3
7530.00	H	-	-	-59.01	11.05	-47.96	-35.0

Table 7-37. Radiated Spurious Data (Band 2/25 – Mid Channel)

OPERATING FREQUENCY:	1912.50	MHz
CHANNEL:	26665	
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]
3825.00	H	-	-	-64.50	9.28	-55.22	-42.2
5737.50	H	-	-	-66.00	11.35	-54.65	-41.6
7650.00	H	-	-	-59.75	11.29	-48.45	-35.5

Table 7-38. Radiated Spurious Data (Band 2/25 – High Channel)

OPERATING FREQUENCY:	1852.50	MHz
CHANNEL:	26065	
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]
3705.00	H	-	-	-64.85	9.72	-55.13	-42.1
5557.50	H	-	-	-65.71	10.99	-54.73	-41.7
7410.00	H	-	-	-59.11	10.79	-48.32	-35.3

Table 7-39. Radiated Spurious Data with WCP (Band 2/25 – Low Channel)

Band 7

OPERATING FREQUENCY:	2505.00	MHz
CHANNEL:	20800	
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	H	142	322	-58.56	11.14	-47.42	-22.4
7515.00	H	-	-	-59.42	11.02	-48.41	-23.4
10020.00	H	-	-	-58.26	12.15	-46.10	-21.1

Table 7-40. Radiated Spurious Data (Band 7 – Low Channel)

OPERATING FREQUENCY:	2535.00	MHz
CHANNEL:	21100	
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	H	153	324	-58.73	10.91	-47.82	-22.8
7605.00	H	-	-	-59.39	11.22	-48.17	-23.2
10140.00	H	-	-	-58.62	12.28	-46.34	-21.3

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

OPERATING FREQUENCY:	2565.00	MHz
CHANNEL:	21400	
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	H	153	2	-61.17	10.82	-50.35	-25.3
7695.00	H	-	-	-59.53	11.36	-48.18	-23.2
10260.00	H	-	-	-59.02	12.44	-46.58	-21.6

Table 7-42. Radiated Spurious Data (Band 7 – High Channel)

OPERATING FREQUENCY:	2565.00	MHz
CHANNEL:	21400	
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	H	153	224	-61.90	10.82	-51.08	-26.1
7695.00	H	-	-	-59.43	11.36	-48.08	-23.1
10260.00	H	-	-	-58.99	12.44	-46.55	-21.5

Table 7-43. Radiated Spurious Data with WCP (Band 7 – High Channel)

Band 38/41

OPERATING FREQUENCY:	2498.50	MHz
CHANNEL:	39675	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
4997.00	H	109	60	-63.68	11.20	-52.48	-27.5
7495.50	H	-	-	-57.09	10.97	-46.11	-21.1

Table 7-44. Radiated Spurious Data (Band 38/41 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz
CHANNEL:	40620	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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	H	113	29	-51.13	10.82	-40.31	-15.3
7779.00	H	169	318	-57.01	11.45	-45.55	-20.6
10372.00	H	-	-	-57.02	12.53	-44.49	-19.5

Table 7-45. Radiated Spurious Data (Band 38/41 – Mid Channel)

OPERATING FREQUENCY:	2687.50	MHz
CHANNEL:	41565	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
5375.00	H	123	58	-46.88	11.05	-35.83	-10.8
8062.50	H	178	60	-51.14	11.41	-39.73	-14.7
10750.00	H	132	340	-56.00	12.87	-43.13	-18.1
13437.50	H	-	-	-52.80	12.75	-40.05	-15.1

Table 7-46. Radiated Spurious Data (Band 38/41 – High Channel)

OPERATING FREQUENCY:	2498.50	MHz
CHANNEL:	39675	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
4997.00	H	-	-	-66.20	11.20	-55.00	-30.0
7495.50	H	-	-	-58.28	10.97	-47.30	-22.3

Table 7-47. Radiated Spurious Data with WCP (Band 38/41 – Low 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-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 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-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. No. of sweep points ≥ 2 x span / RBW
4. Detector = RMS
5. Trace mode = Max Hold
6. The trace was allowed to stabilize

Test Setup

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

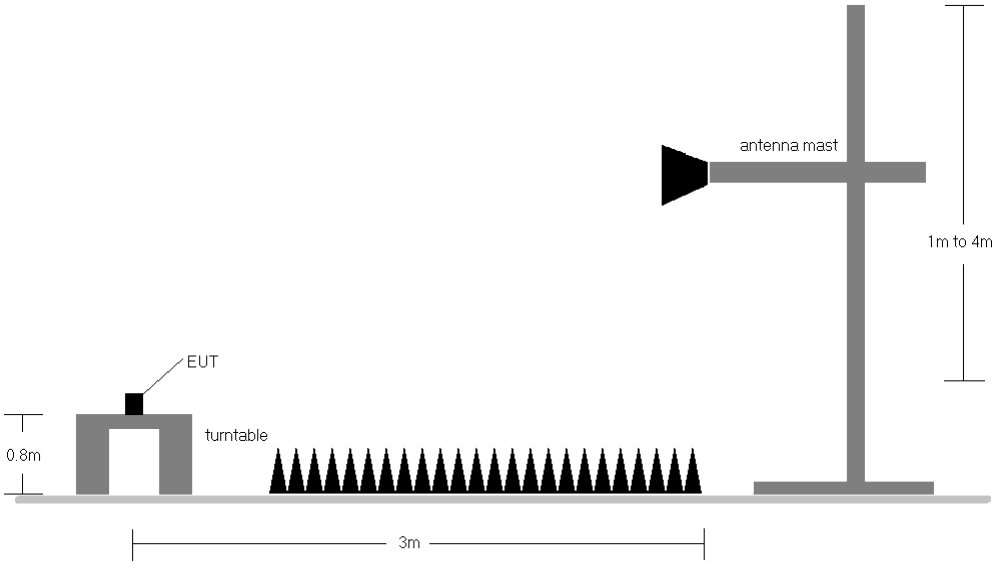


Figure 7-9. Test Instrument & Measurement Setup

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.

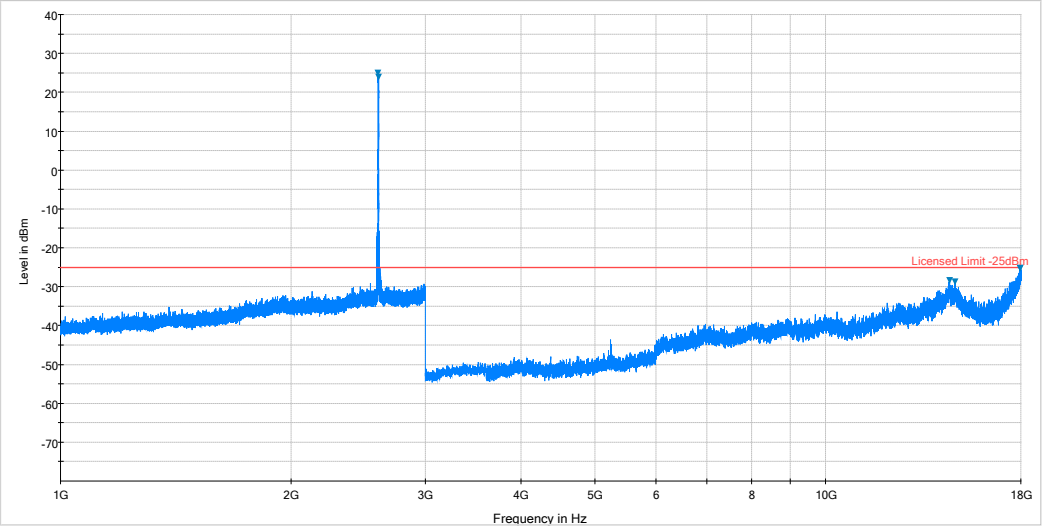
2) This unit was tested with its standard battery.

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.

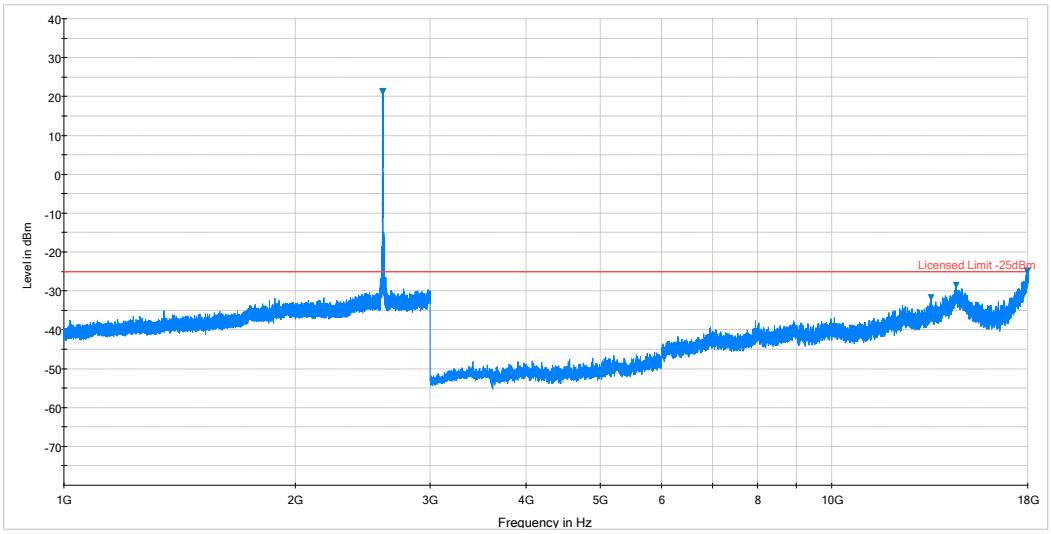
4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

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.

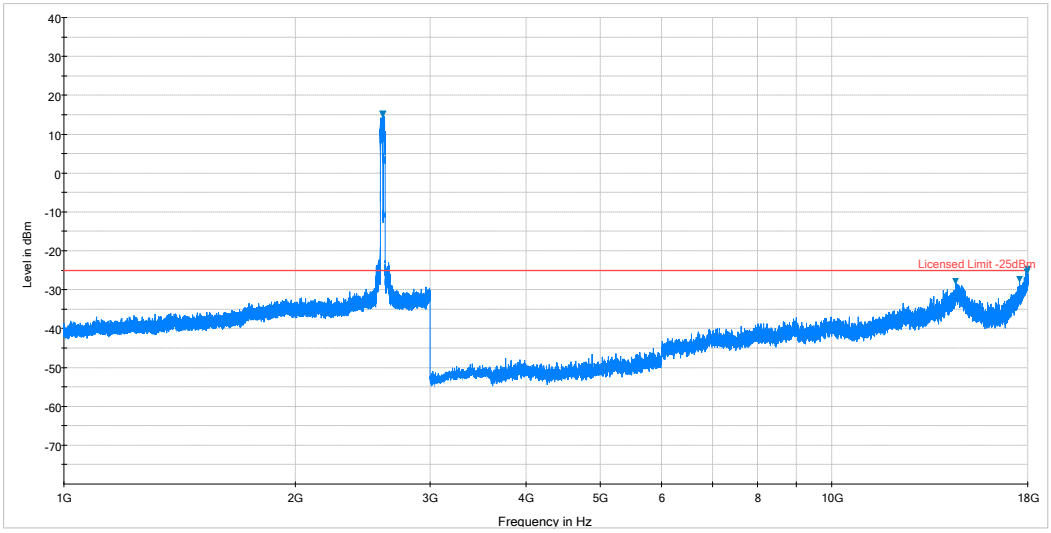
6) No significant emissions were found as a result of two uplink carriers operating contiguously.



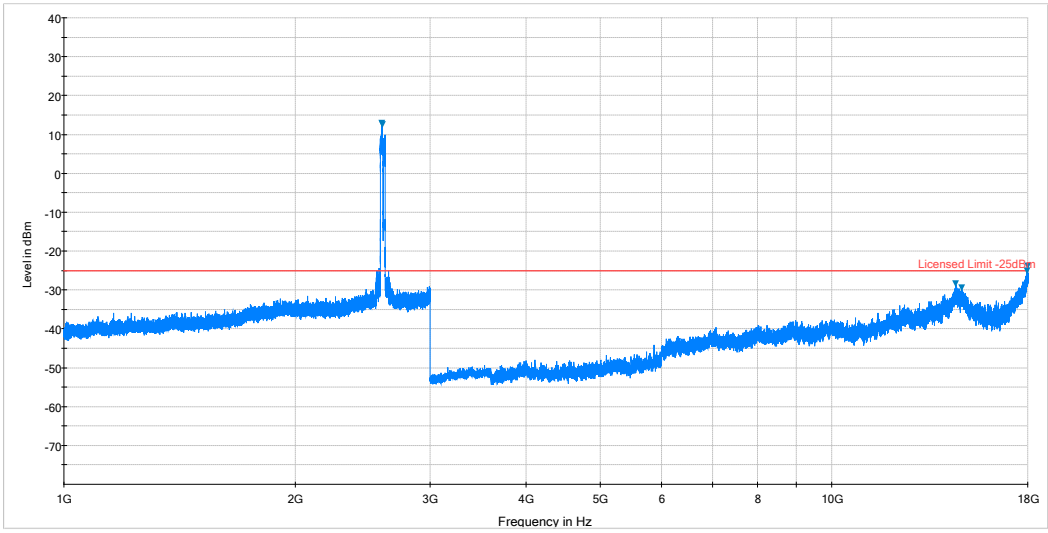
Plot 7-338. Radiated Spruious Plot (ULCA B41 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0, Ant. Pol. H)



Plot 7-339. Radiated Spruious Plot (ULCA B41 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0, Ant. Pol. V)



Plot 7-340. Radiated Spruious Plot (ULCA B41 PCC: RB 100 Offset 0, SCC: RB 100 Offset 0, Ant. Pol. H)



Plot 7-341. Radiated Spruious Plot (ULCA B41 PCC: RB 100 Offset 0, SCC: RB 100 Offset 0, Ant. Pol. V)

7.10 Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54 RSS-130(4.3) RSS-132(5.3) RSS-133(6.3) RSS-139(6.3) RSS-195(5.4) RSS-199(4.3)

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, RSS-132 and RSS-133, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, RSS-130, RSS-139 and RSS-199, 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 71 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	680,500,000	Hz
CHANNEL:	133297	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	680,500,025	25	0.0000037
100 %		- 30	680,500,038	38	0.0000056
100 %		- 20	680,499,996	-4	-0.0000006
100 %		- 10	680,500,348	348	0.0000511
100 %		0	680,499,988	-12	-0.0000018
100 %		+ 10	680,500,002	2	0.0000003
100 %		+ 20	680,499,835	-165	-0.0000242
100 %		+ 30	680,500,186	186	0.0000273
100 %		+ 40	680,500,078	78	0.0000115
100 %		+ 50	680,500,002	2	0.0000003
BATT. ENDPOINT	3.45	+ 20	680,499,955	-45	-0.0000066

Table 7-48. Frequency Stability Data (Band 71)

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 71 Frequency Stability Measurements

§2.1055 §27.54

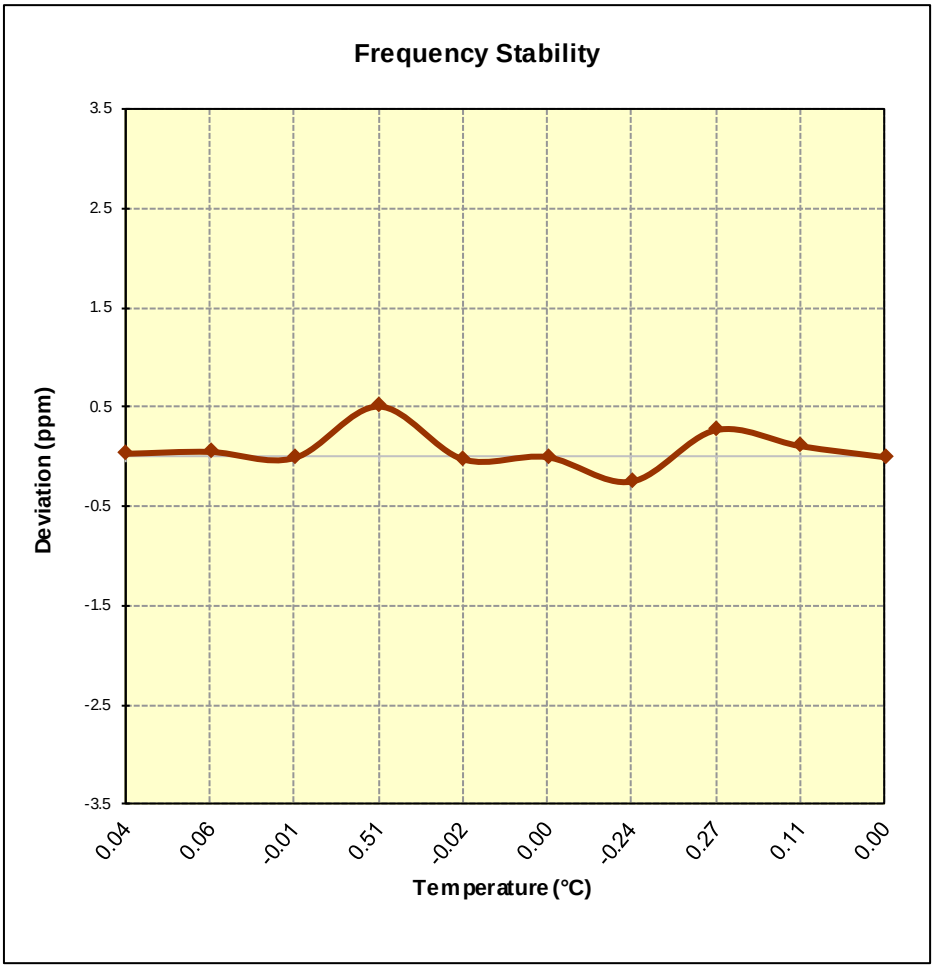


Figure 7-10. Frequency Stability Graph (Band 71)

Band 12/17 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,946	-54	-0.0000076
100 %		- 30	707,499,931	-69	-0.0000098
100 %		- 20	707,500,083	83	0.0000117
100 %		- 10	707,499,647	-353	-0.0000499
100 %		0	707,500,005	5	0.0000007
100 %		+ 10	707,499,749	-251	-0.0000355
100 %		+ 20	707,499,955	-45	-0.0000064
100 %		+ 30	707,500,043	43	0.0000061
100 %		+ 40	707,499,547	-453	-0.0000640
100 %		+ 50	707,499,823	-177	-0.0000250
BATT. ENDPOINT	3.45	+ 20	707,500,011	11	0.0000016

Table 7-49. Frequency Stability Data (Band 12/17)

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 12/17 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

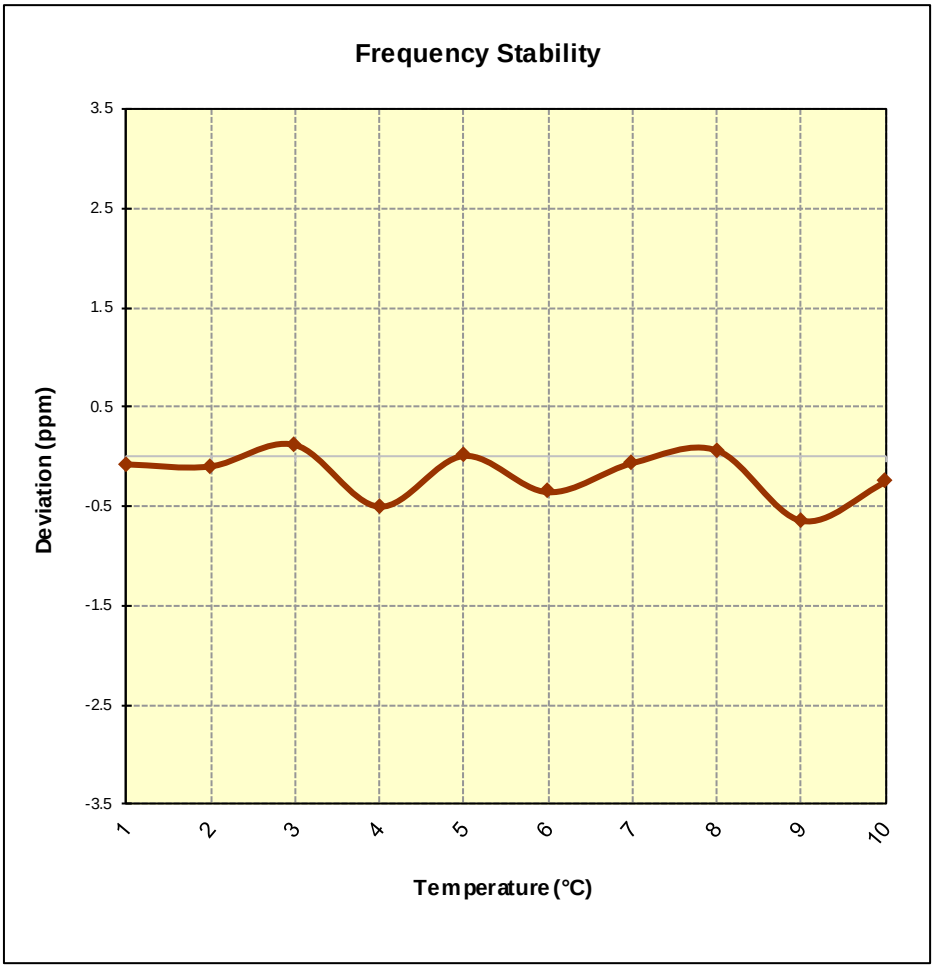


Figure 7-11. Frequency Stability Graph (Band 12/17)

Band 13 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	781,999,936	-64	-0.0000082
100 %		- 30	782,000,006	6	0.0000008
100 %		- 20	781,999,619	-381	-0.0000487
100 %		- 10	781,999,948	-52	-0.0000066
100 %		0	781,999,982	-18	-0.0000023
100 %		+ 10	781,999,946	-54	-0.0000069
100 %		+ 20	782,000,055	55	0.0000070
100 %		+ 30	781,999,945	-55	-0.0000070
100 %		+ 40	782,000,205	205	0.0000262
100 %		+ 50	781,999,948	-52	-0.0000066
BATT. ENDPOINT	3.45	+ 20	782,000,208	208	0.0000266

Table 7-50. 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

§2.1055 §27.54 RSS-130(4.3)

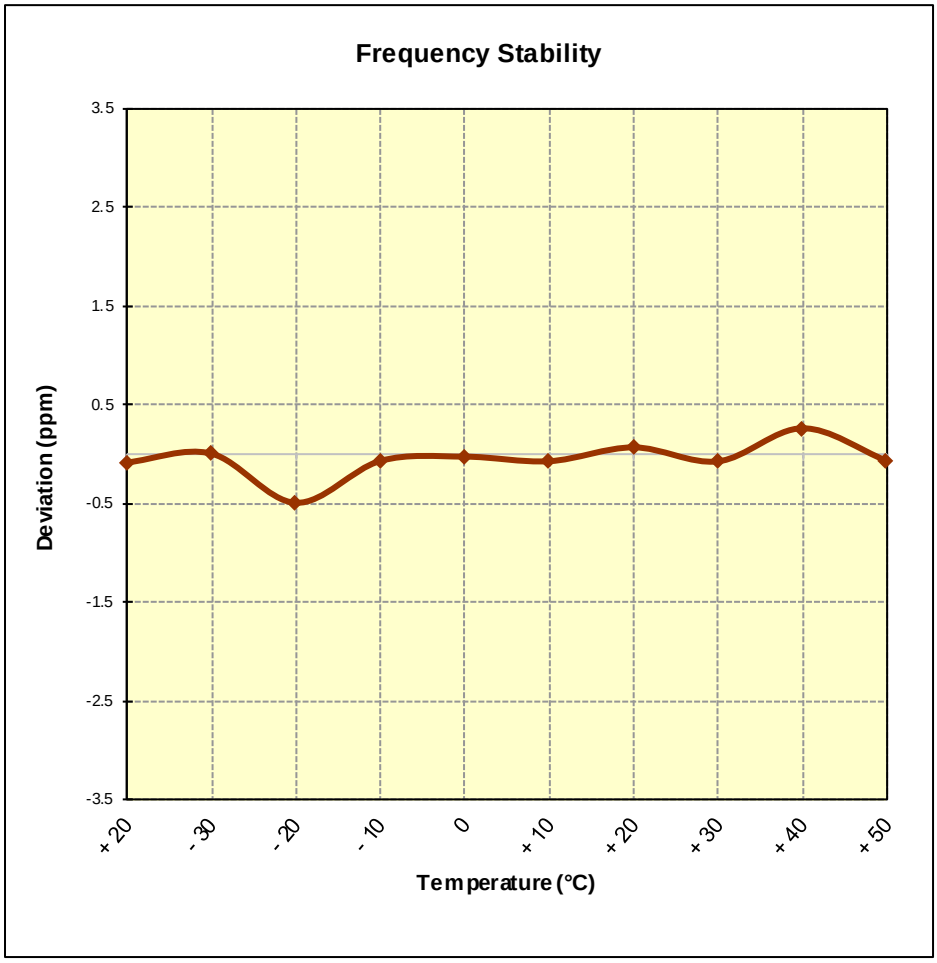


Figure 7-12. Frequency Stability Graph (Band 13)

Band 5/26 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(5.3)

OPERATING FREQUENCY:	831,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	3.85	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	831,500,092	92	0.0000111
100 %		- 30	831,499,924	-76	-0.0000091
100 %		- 20	831,499,969	-31	-0.0000037
100 %		- 10	831,499,864	-136	-0.0000164
100 %		0	831,500,075	75	0.0000090
100 %		+ 10	831,500,251	251	0.0000302
100 %		+ 20	831,499,963	-37	-0.0000044
100 %		+ 30	831,500,126	126	0.0000152
100 %		+ 40	831,500,094	94	0.0000113
100 %		+ 50	831,500,242	242	0.0000291
BATT. ENDPOINT	3.45	+ 20	831,499,652	-348	-0.0000419

Table 7-51. Frequency Stability Data (Band 5)

Band 5/26 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(5.3)

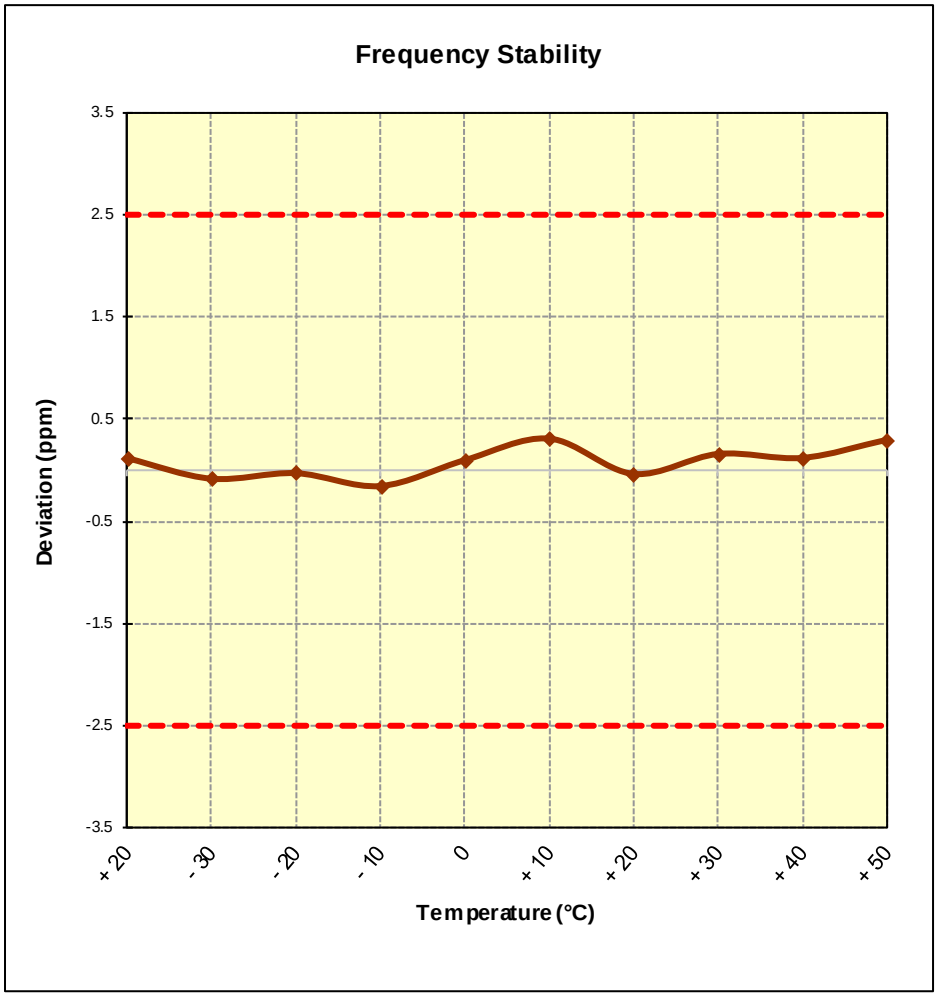


Figure 7-13. Frequency Stability Graph (Band 5/26)

Band 4/66 Frequency Stability Measurements

§2.1055 §§27.54 RSS-139(6.4)

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,744,999,933	-67	-0.0000038
100 %		- 30	1,745,000,077	77	0.0000044
100 %		- 20	1,744,999,897	-103	-0.0000059
100 %		- 10	1,744,999,987	-13	-0.0000007
100 %		0	1,745,000,312	312	0.0000179
100 %		+ 10	1,744,999,776	-224	-0.0000128
100 %		+ 20	1,745,000,166	166	0.0000095
100 %		+ 30	1,744,999,729	-271	-0.0000155
100 %		+ 40	1,744,999,906	-94	-0.0000054
100 %		+ 50	1,744,999,996	-4	-0.0000002
BATT. ENDPOINT	3.45	+ 20	1,745,000,044	44	0.0000025

Table 7-52. Frequency Stability Data (Band 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 4/66 Frequency Stability Measurements

§2.1055 §§27.54 RSS-139(6.4)

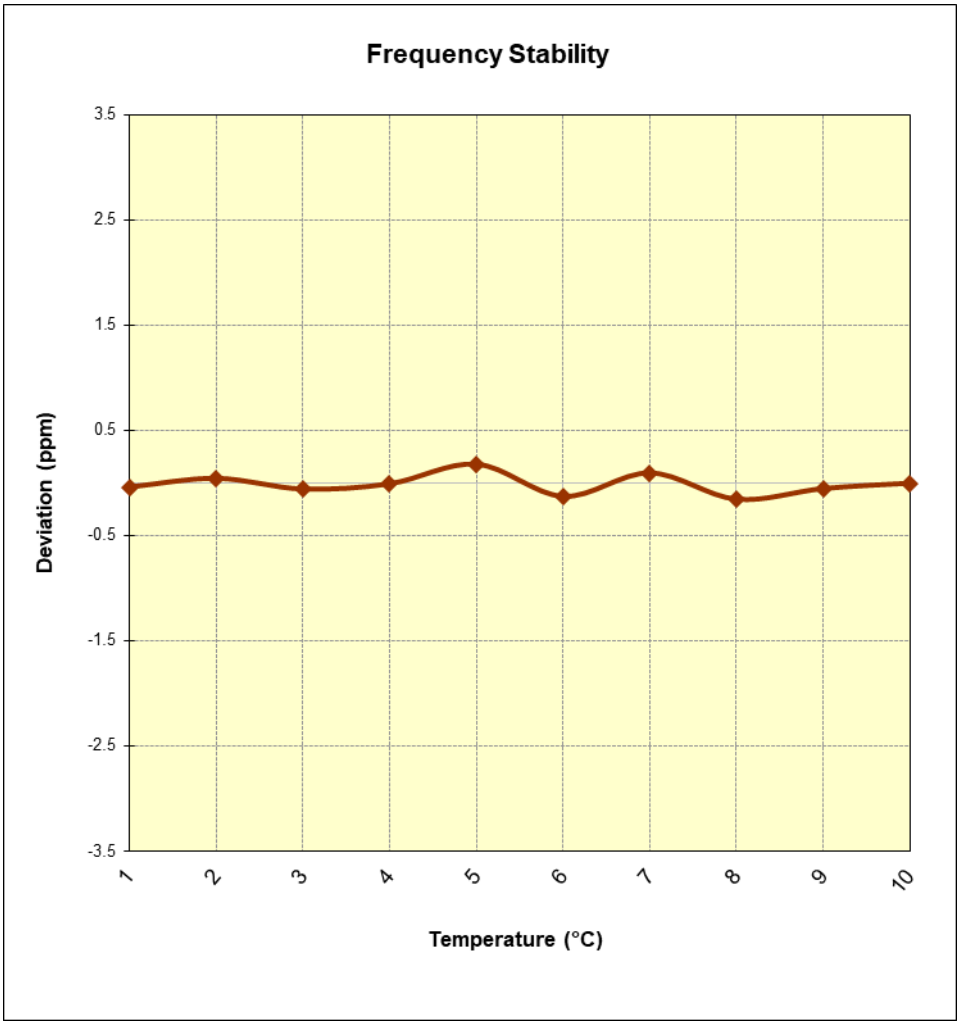


Figure 7-14. Frequency Stability Graph (Band 4/66)

Band 2/25 Frequency Stability Measurements

§2.1055 §24.235 RSS-133(6.3)

OPERATING FREQUENCY:	1,882,500,000	Hz
CHANNEL:	26365	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,882,500,273	273	0.0000145
100 %		- 30	1,882,499,867	-133	-0.0000071
100 %		- 20	1,882,499,533	-467	-0.0000248
100 %		- 10	1,882,499,796	-204	-0.0000108
100 %		0	1,882,500,150	150	0.0000080
100 %		+ 10	1,882,500,322	322	0.0000171
100 %		+ 20	1,882,499,920	-80	-0.0000042
100 %		+ 30	1,882,500,288	288	0.0000153
100 %		+ 40	1,882,499,956	-44	-0.0000023
100 %		+ 50	1,882,499,883	-117	-0.0000062
BATT. ENDPOINT	3.45	+ 20	1,882,499,919	-81	-0.0000043

Table 7-53. Frequency Stability Data (Band 2/25)

Band 2/25 Frequency Stability Measurements

§2.1055 §24.235 RSS-133(6.3)

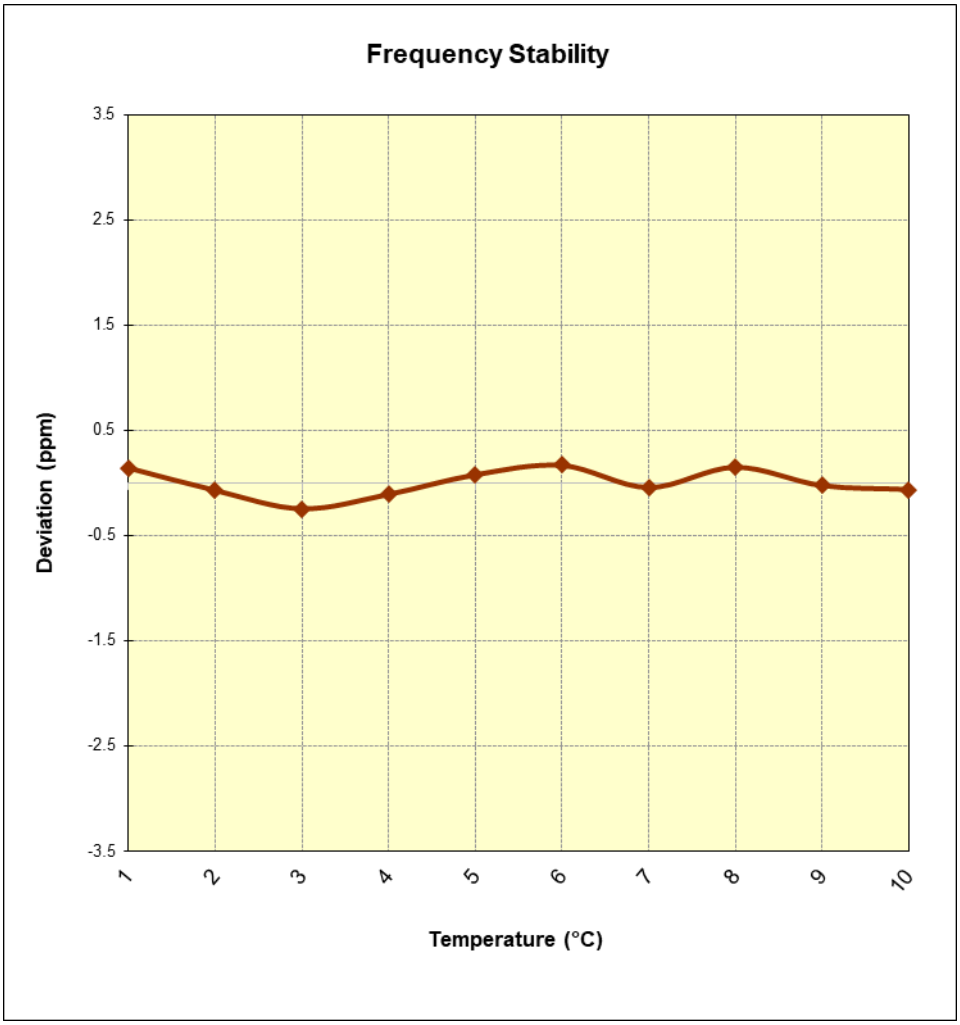


Figure 7-15. Frequency Stability Graph (Band 2/25)

Band 7 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

OPERATING FREQUENCY:	2,535,000,000	Hz
CHANNEL:	21100	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,534,999,716	-284	-0.0000112
100 %		- 30	2,535,000,130	130	0.0000051
100 %		- 20	2,534,999,818	-182	-0.0000072
100 %		- 10	2,535,000,067	67	0.0000026
100 %		0	2,535,000,012	12	0.0000005
100 %		+ 10	2,535,000,141	141	0.0000056
100 %		+ 20	2,535,000,028	28	0.0000011
100 %		+ 30	2,535,000,249	249	0.0000098
100 %		+ 40	2,534,999,952	-48	-0.0000019
100 %		+ 50	2,535,000,420	420	0.0000166
BATT. ENDPOINT	3.45	+ 20	2,534,999,850	-150	-0.0000059

Table 7-54. 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

§2.1055 §27.54 RSS-199(4.3)

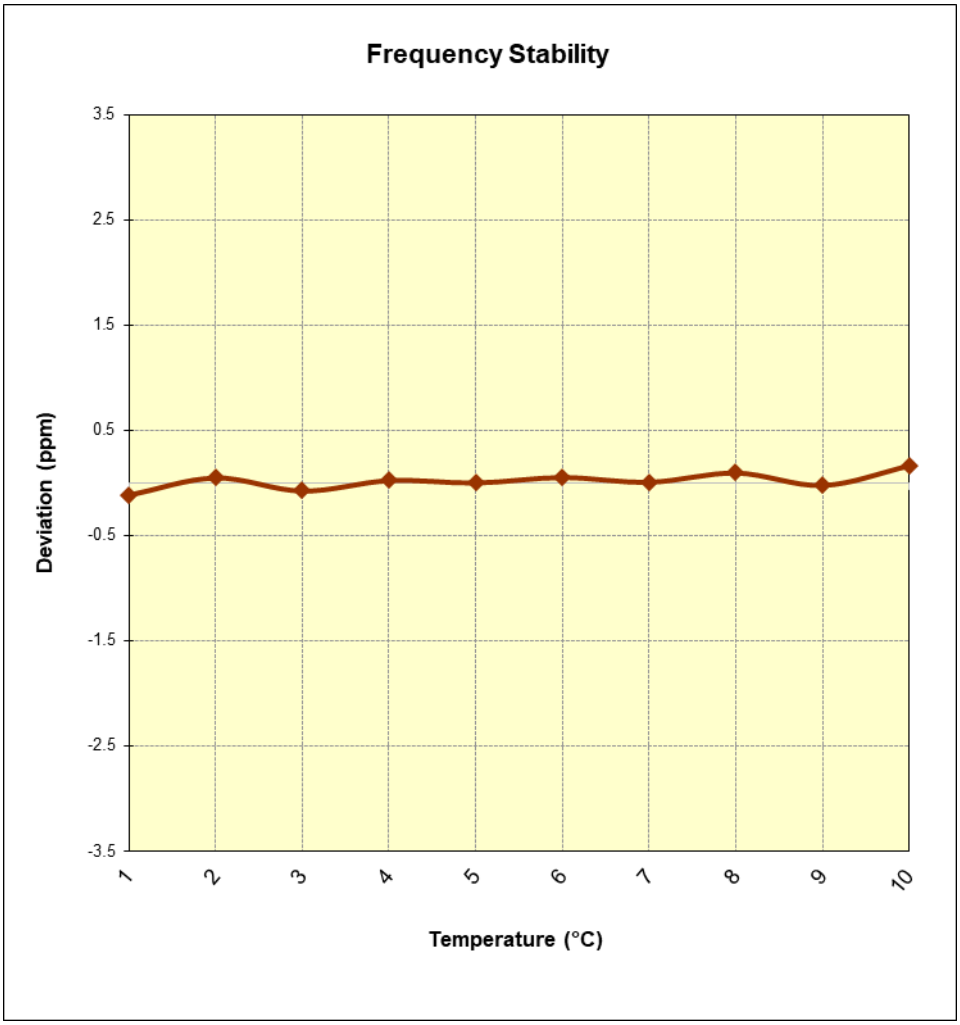


Figure 7-16. Frequency Stability Graph (Band 7)

Band 38/41 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

OPERATING FREQUENCY: 2,593,000,000 Hz

CHANNEL: 40620

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,593,000,101	101	0.0000039
100 %		- 30	2,593,000,022	22	0.0000008
100 %		- 20	2,593,000,043	43	0.0000017
100 %		- 10	2,593,000,057	57	0.0000022
100 %		0	2,592,999,735	-265	-0.0000102
100 %		+ 10	2,593,000,009	9	0.0000003
100 %		+ 20	2,592,999,794	-206	-0.0000079
100 %		+ 30	2,593,000,153	153	0.0000059
100 %		+ 40	2,592,999,837	-163	-0.0000063
100 %		+ 50	2,592,999,944	-56	-0.0000022
BATT. ENDPOINT	3.45	+ 20	2,593,000,291	291	0.0000112

Table 7-55. Frequency Stability Data (Band 38/41)

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 38/41 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

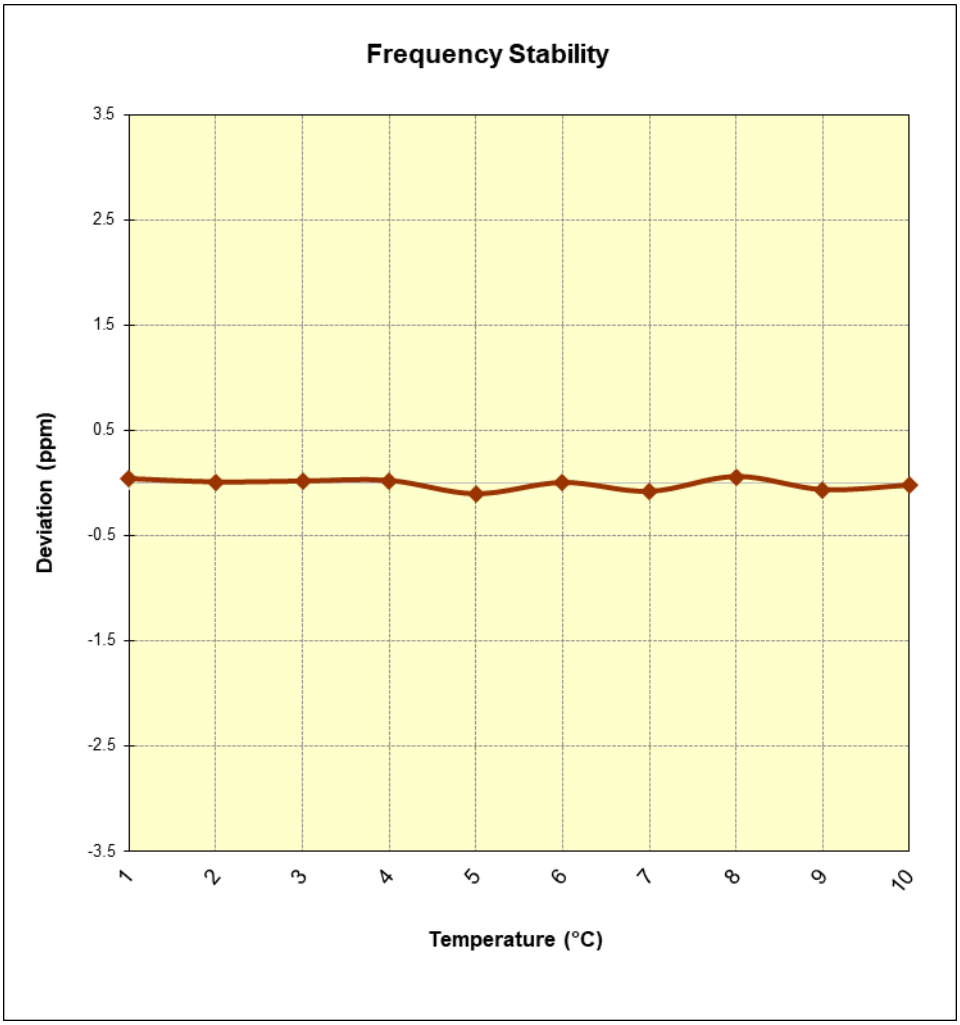


Figure 7-17. Frequency Stability Graph (Band 38/41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG892U** complies with all the requirements of for LTE operation only.