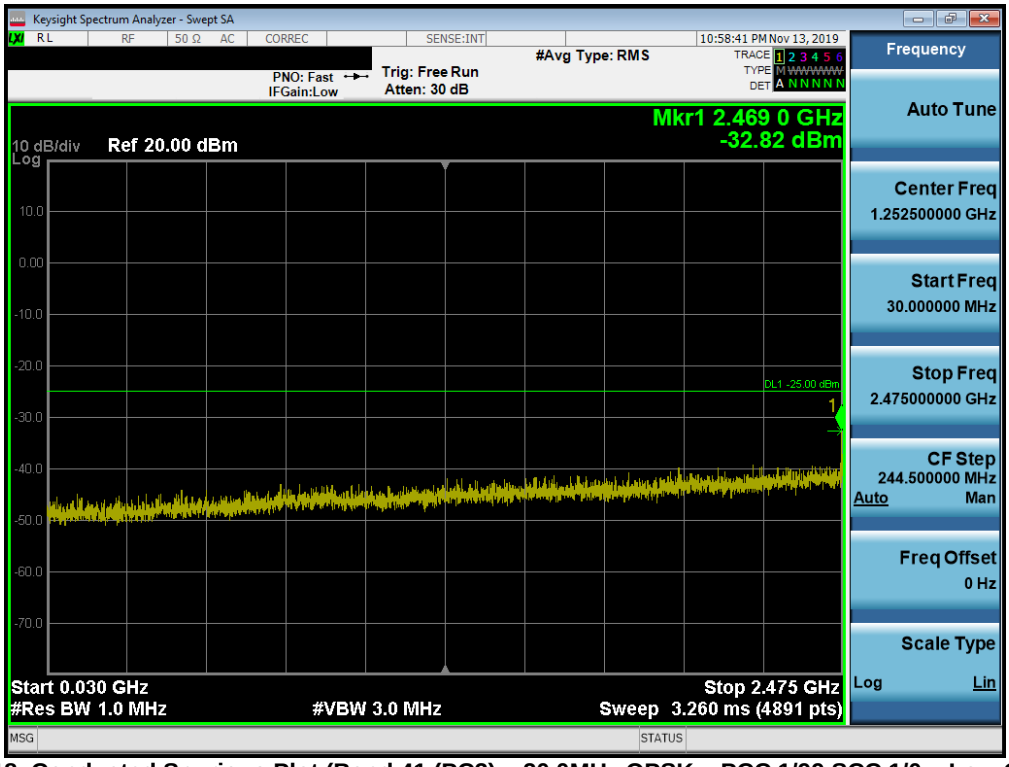
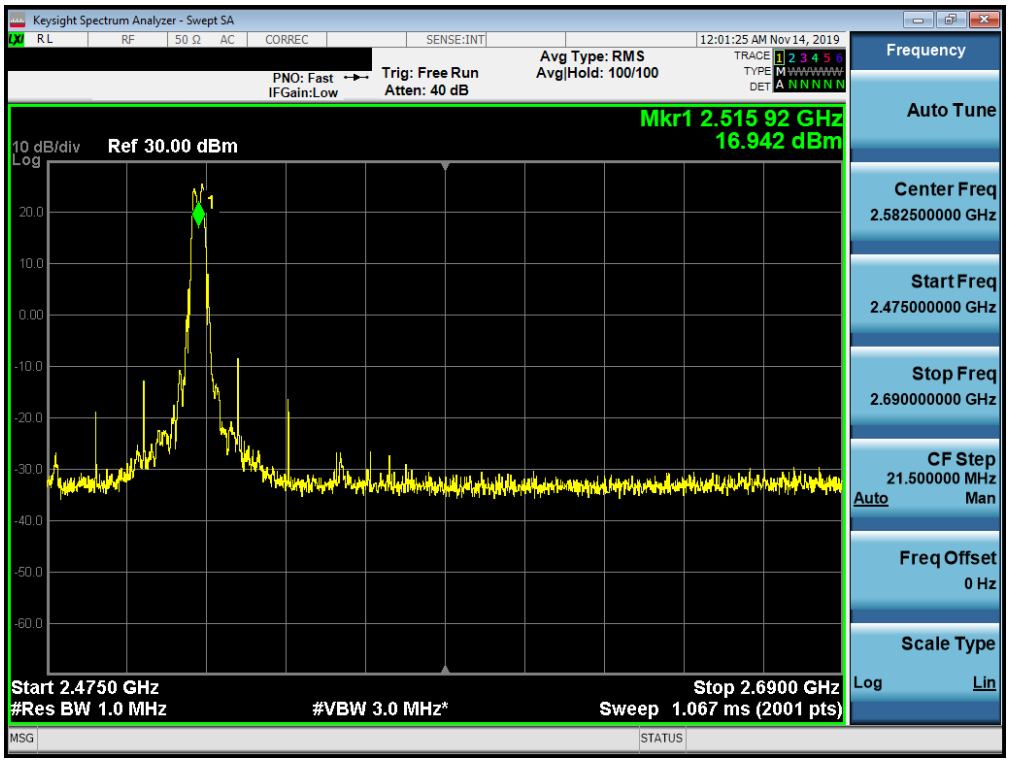
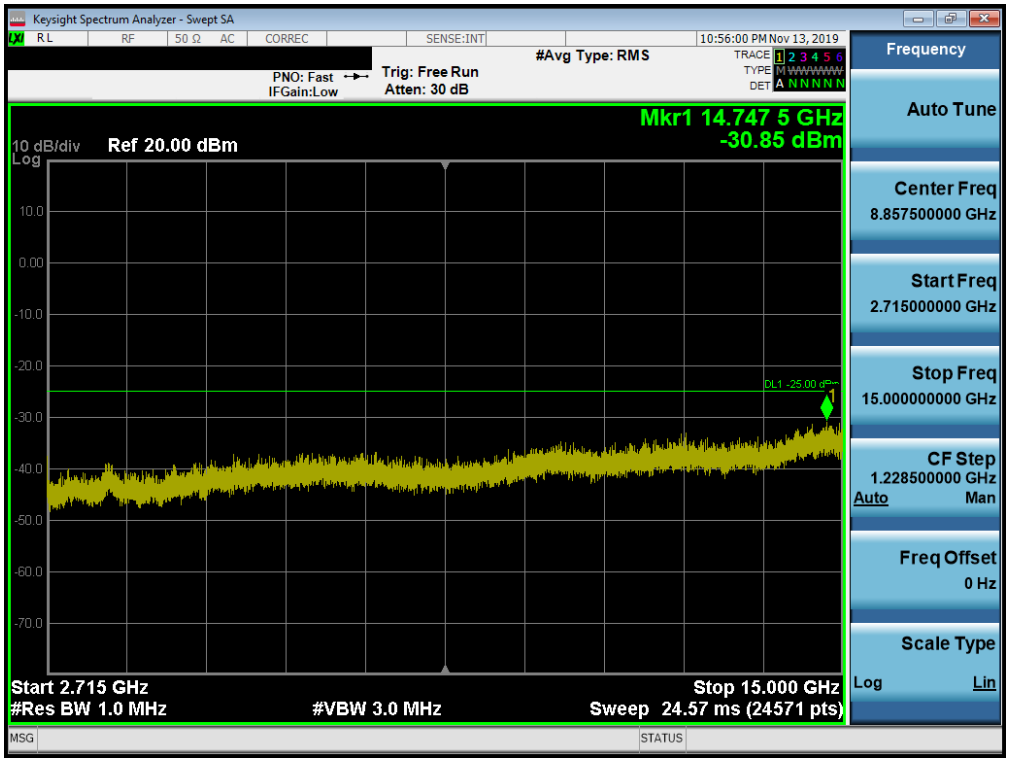


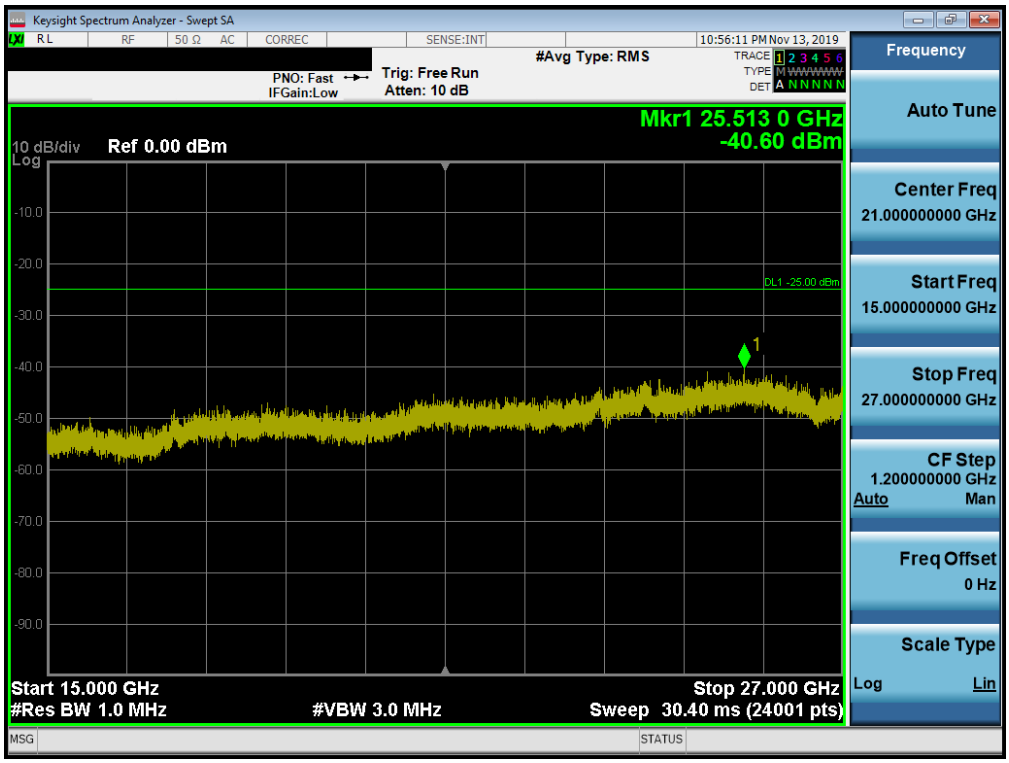
Plot 7-318. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



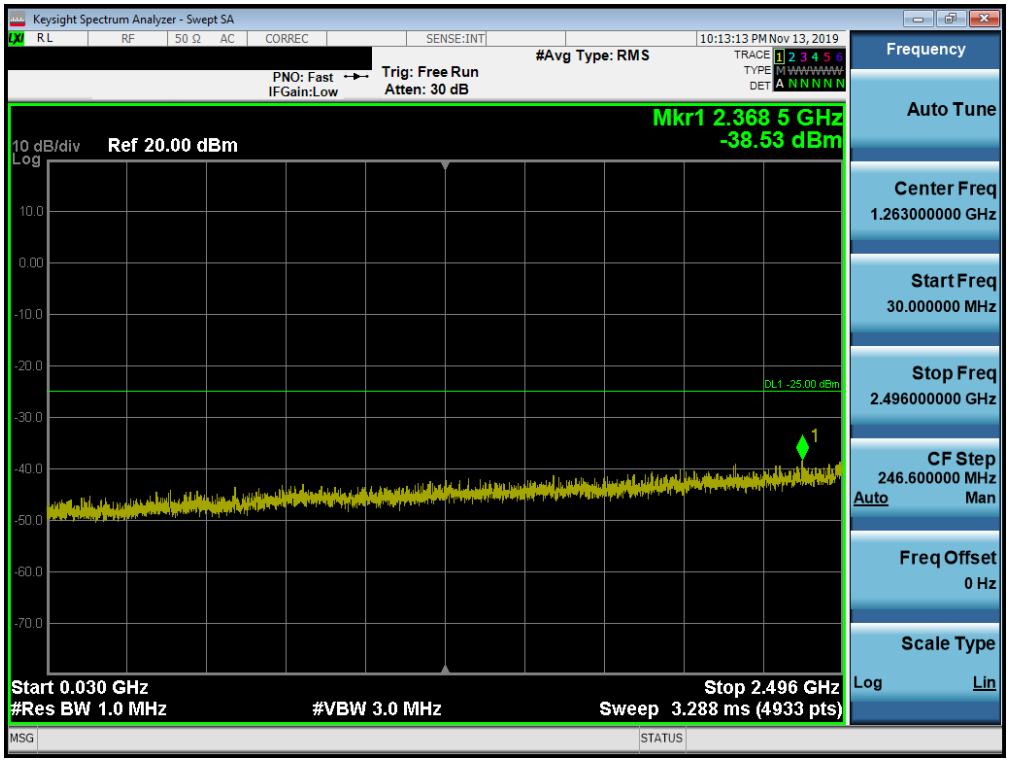
Plot 7-319. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



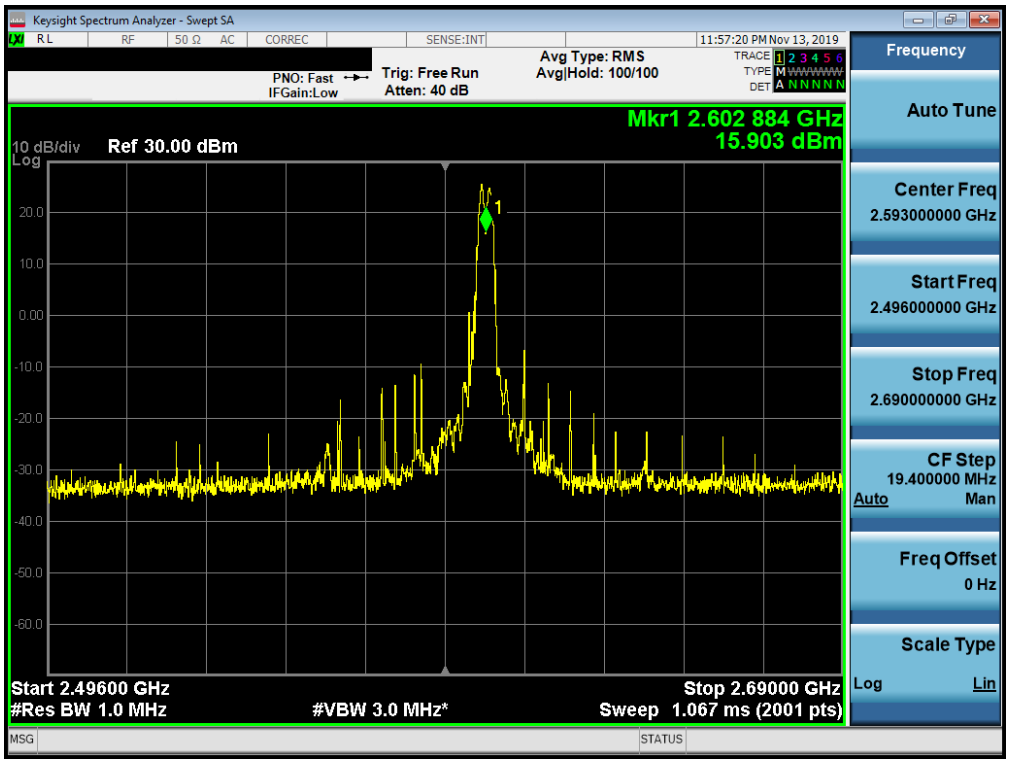
Plot 7-320. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



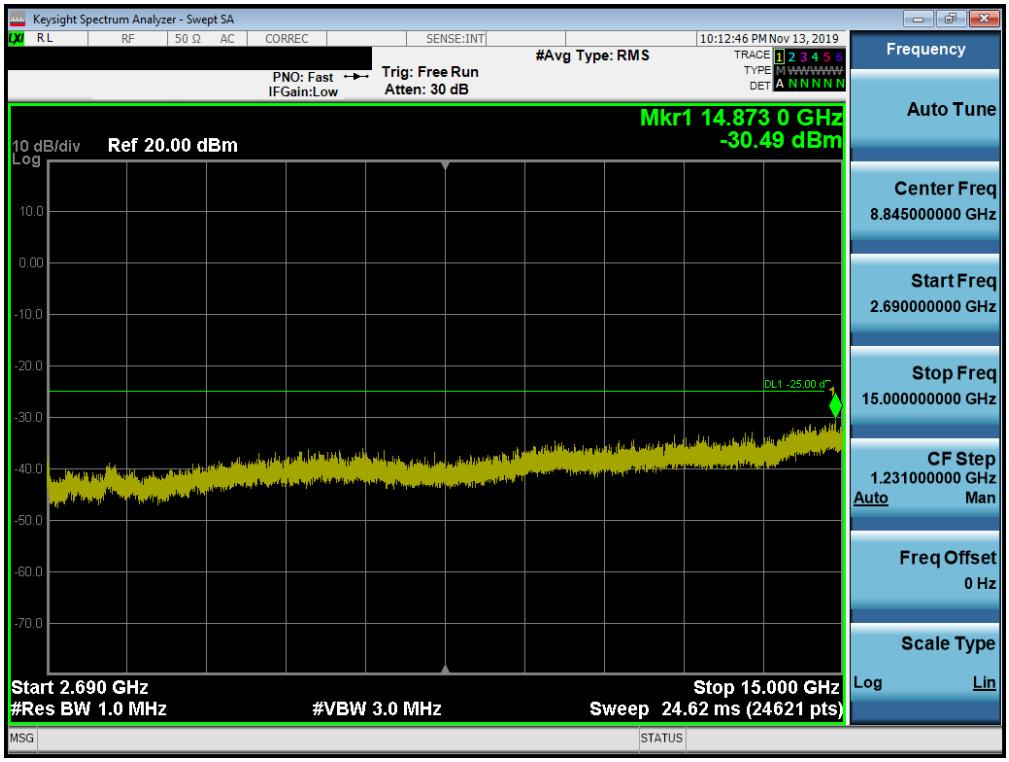
Plot 7-321. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



Plot 7-322. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

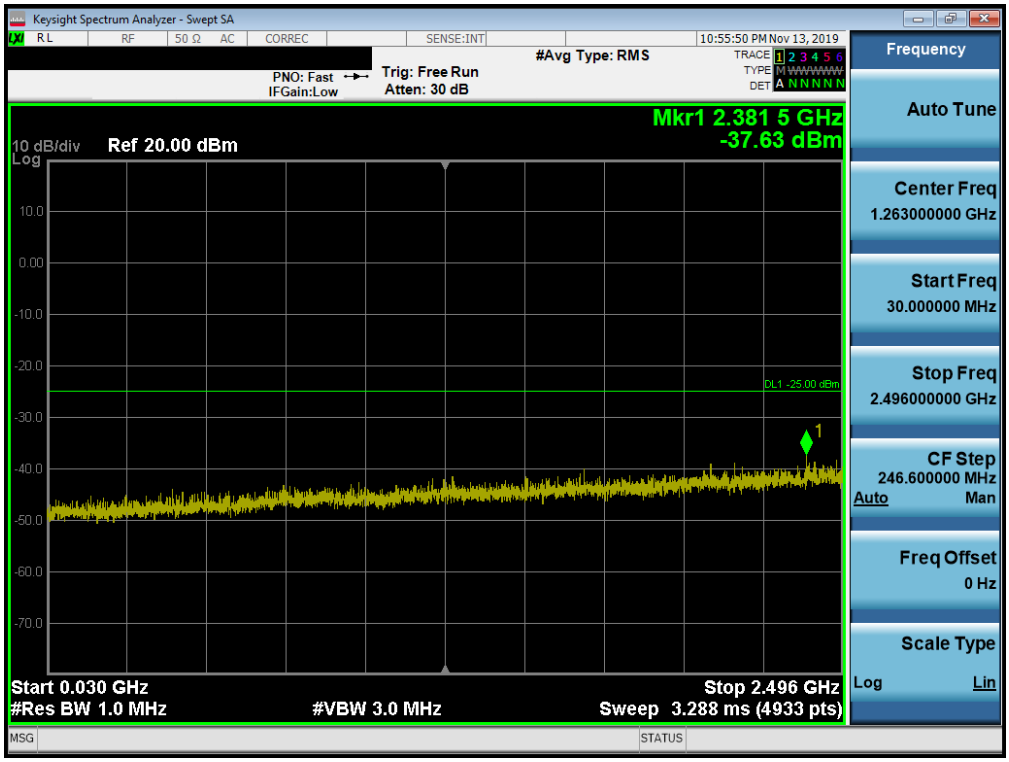


Plot 7-323. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

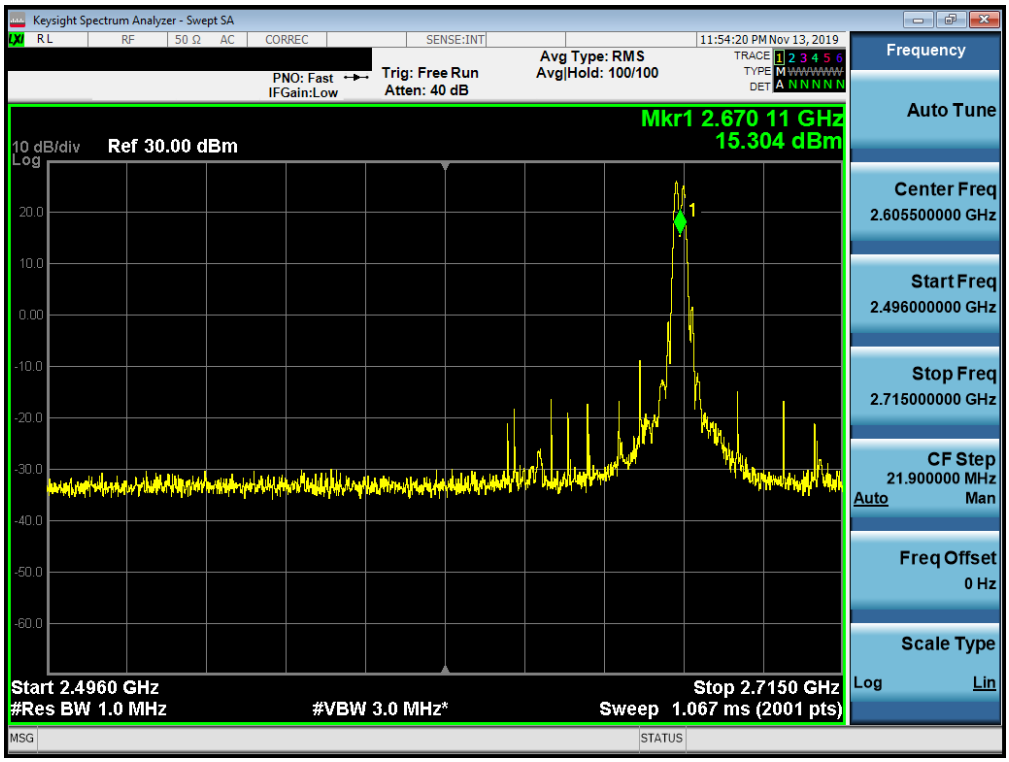


Plot 7-324. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

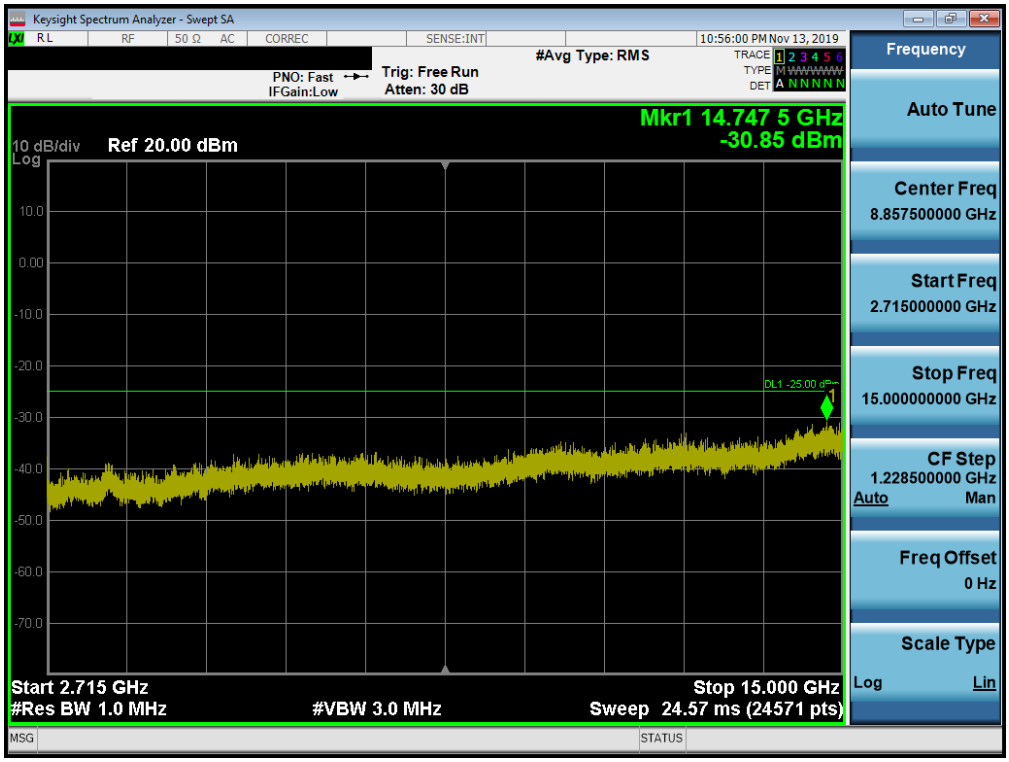
Plot 7-325. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



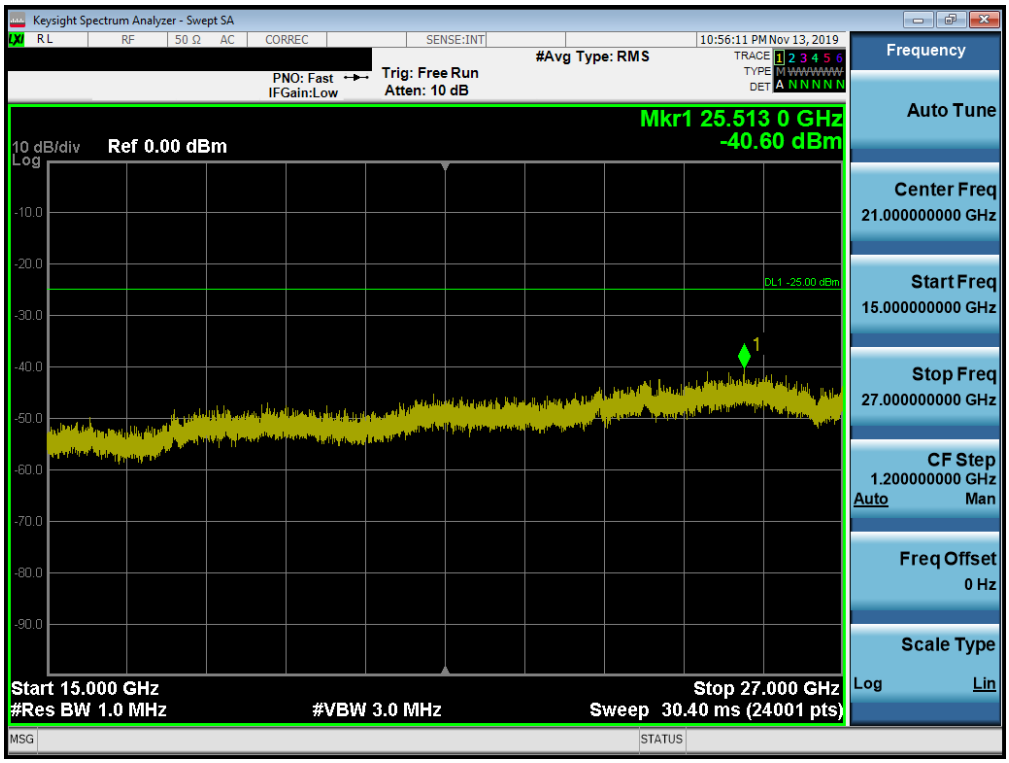
Plot 7-326. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Plot 7-327. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Plot 7-328. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Plot 7-329. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

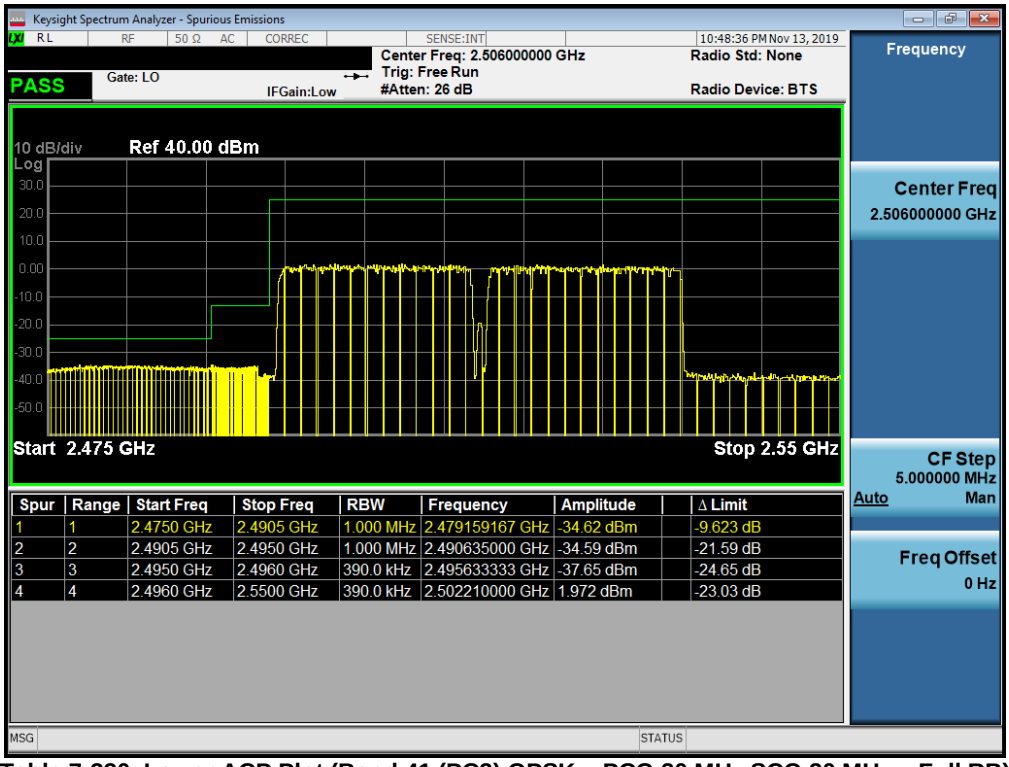


Table 7-330. Lower ACP Plot (Band 41 (PC3) QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

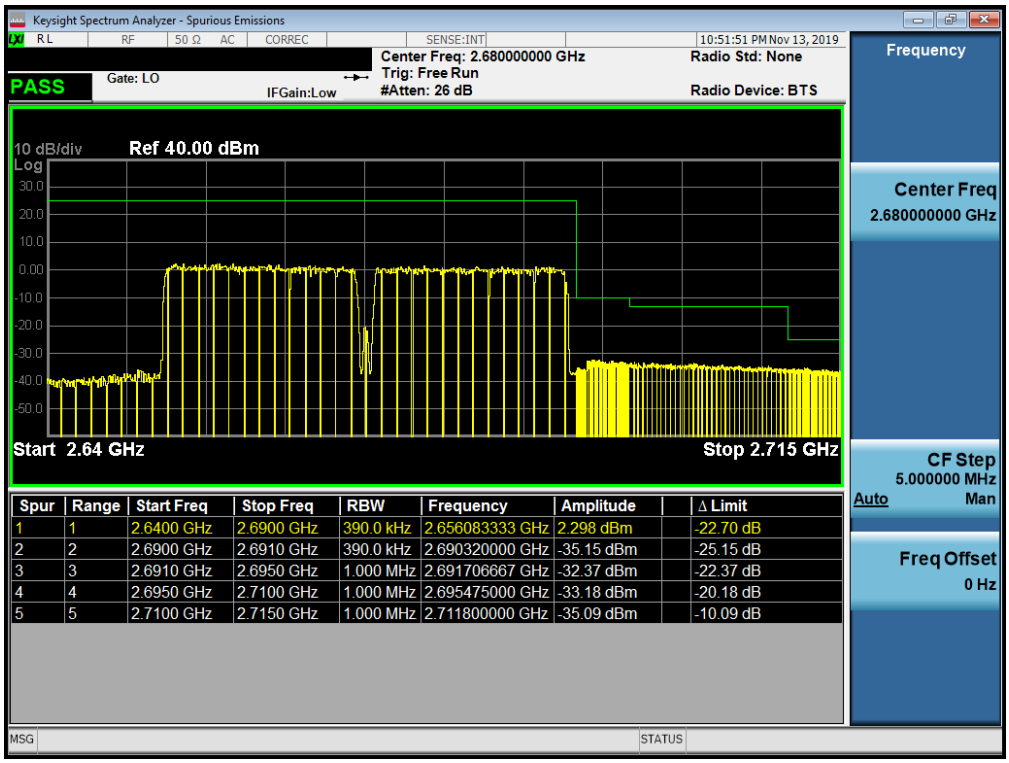


Table 7-331. Upper ACP Plot (Band 41 (PC3) QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

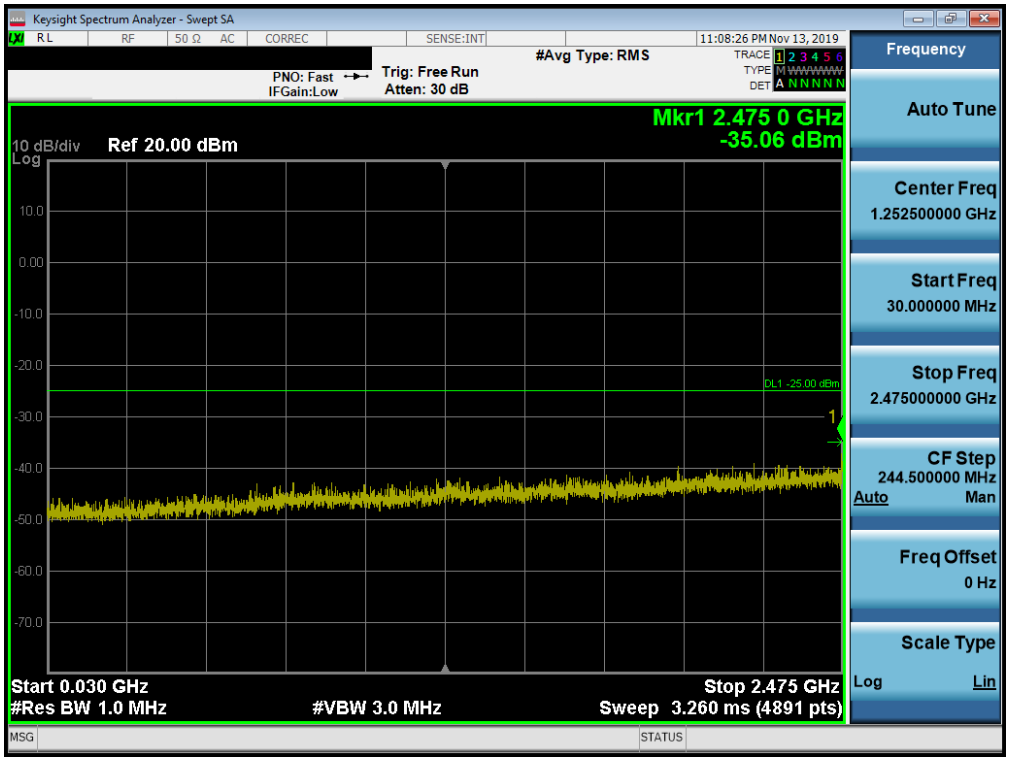
Uplink CA Configuration B41 (PC2)

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	99	LTE B41	20	39948	2525.8	QPSK	1	0	25.28
Max	LTE B41	20	40620	2593	QPSK	1	99	LTE B41	20	40818	2612.8	QPSK	1	0	25.52
Max	LTE B41	20	41490	2680	QPSK	1	0	LTE B41	20	41292	2660.2	QPSK	1	99	25.22

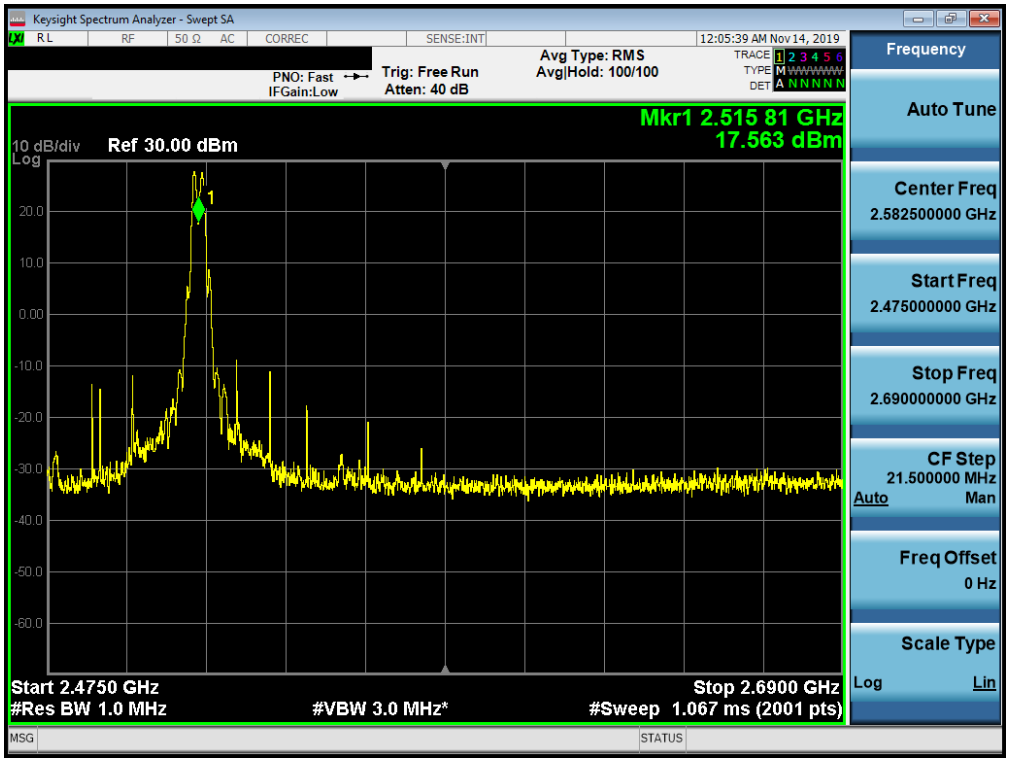
Table 7-6. Conducted Powers (B41 (PC2) - 20MHz + 20MHz Channel Bandwidth - PCC/SCC: 1RB)

Power State	PCC							SCC							Power
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	ULCA Tx.Power (dBm)
Max	LTE B41	20	40620	2593	QPSK	100	0	LTE B41	20	40818	2612.8	QPSK	100	0	23.50
Max	LTE B41	20	40620	2593	16-QAM	100	0	LTE B41	20	40818	2612.8	16-QAM	100	0	22.52
Max	LTE B41	20	40620	2593	64-QAM	100	0	LTE B41	20	40818	2612.8	64-QAM	100	0	22.44

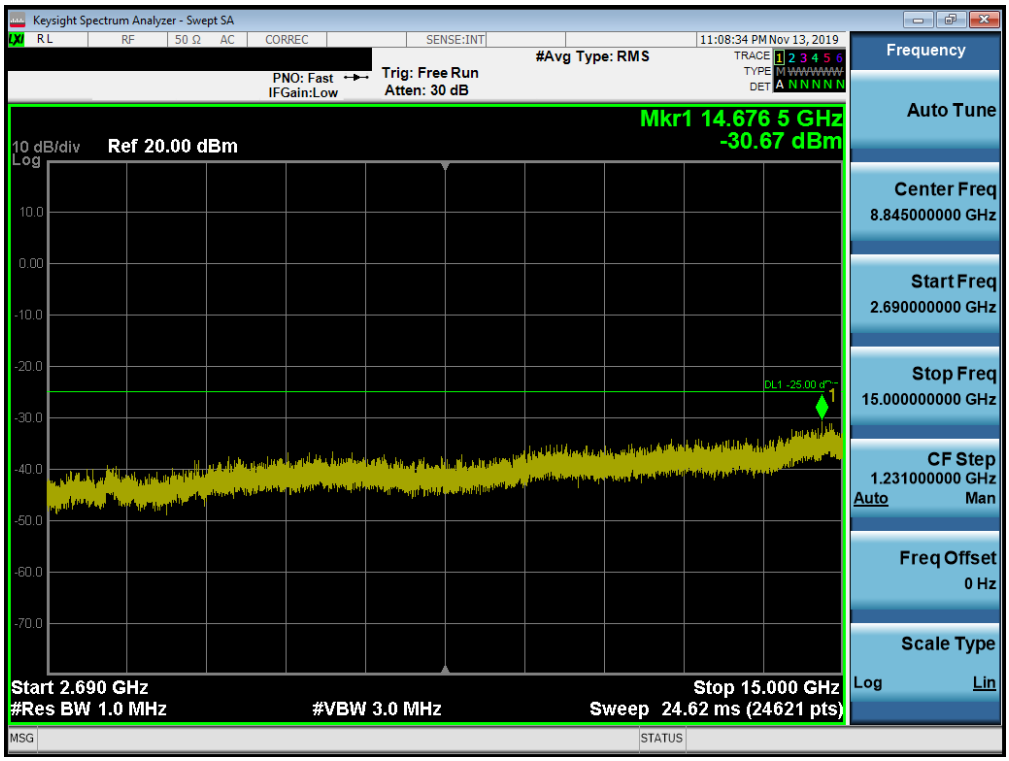
Table 7-7. Conducted Powers (B41 (PC2) with Various Combinations for 20MHz + 20MHz Channel Bandwidth)



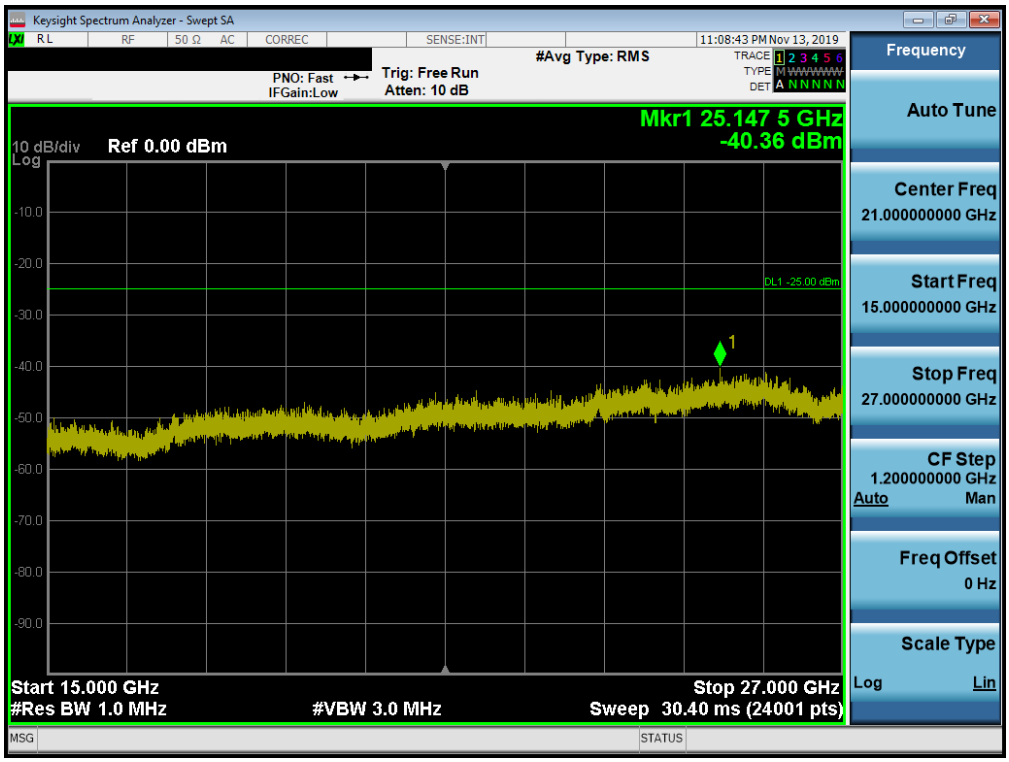
Plot 7-332. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



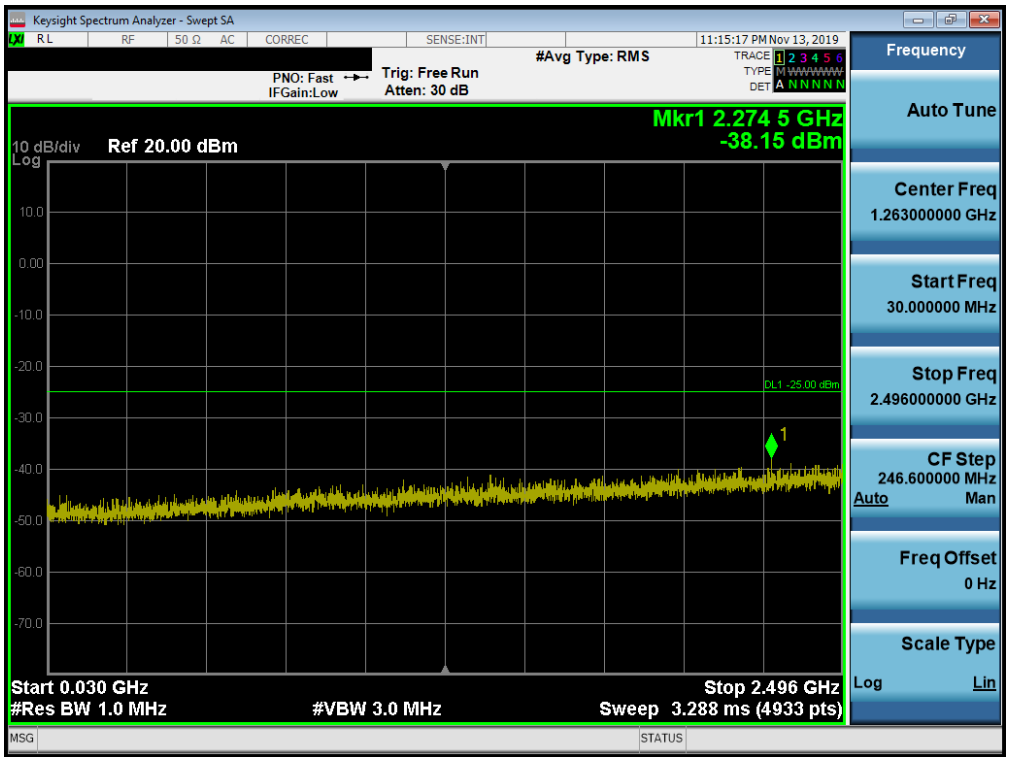
Plot 7-333. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



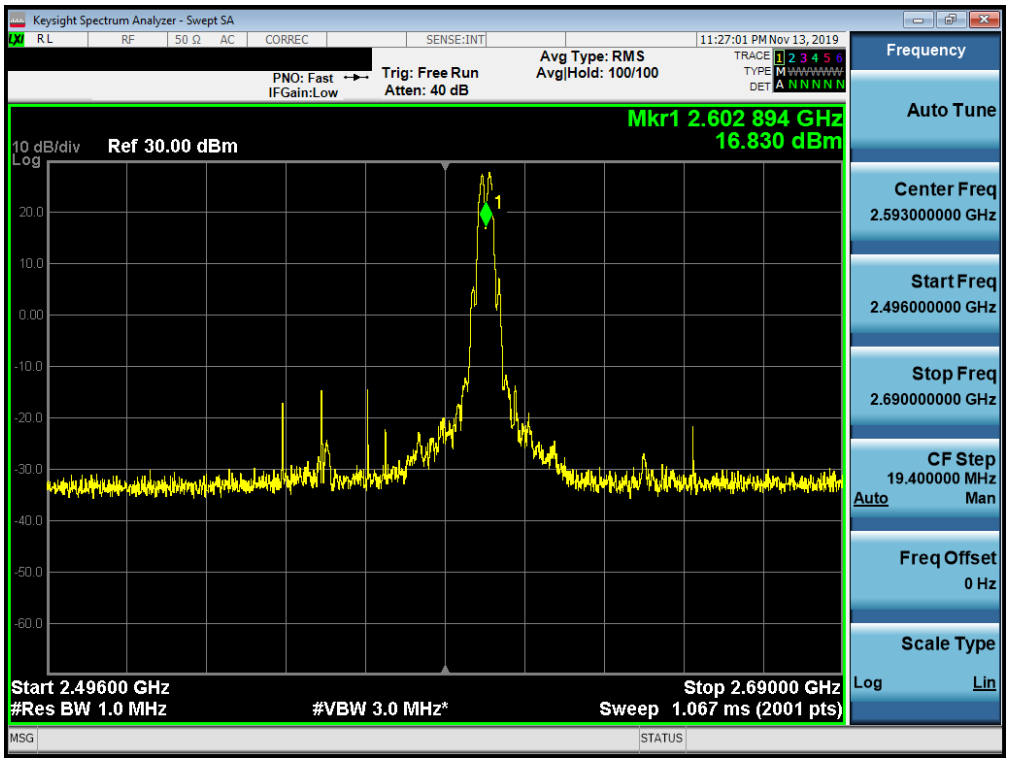
Plot 7-334. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



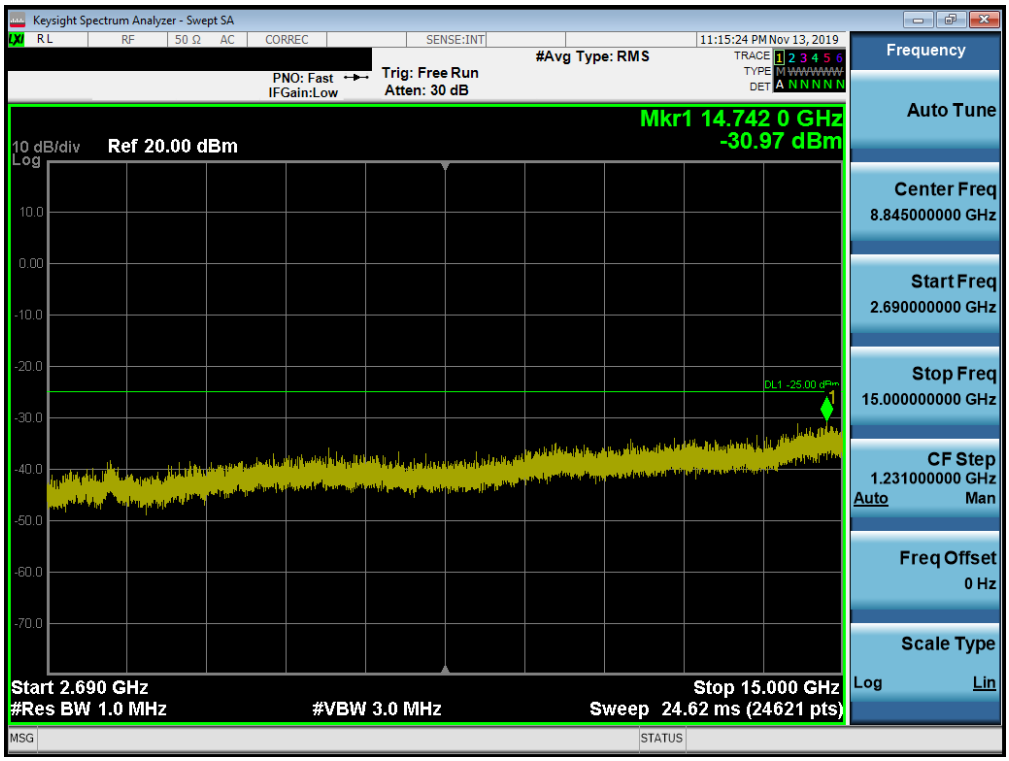
Plot 7-335. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



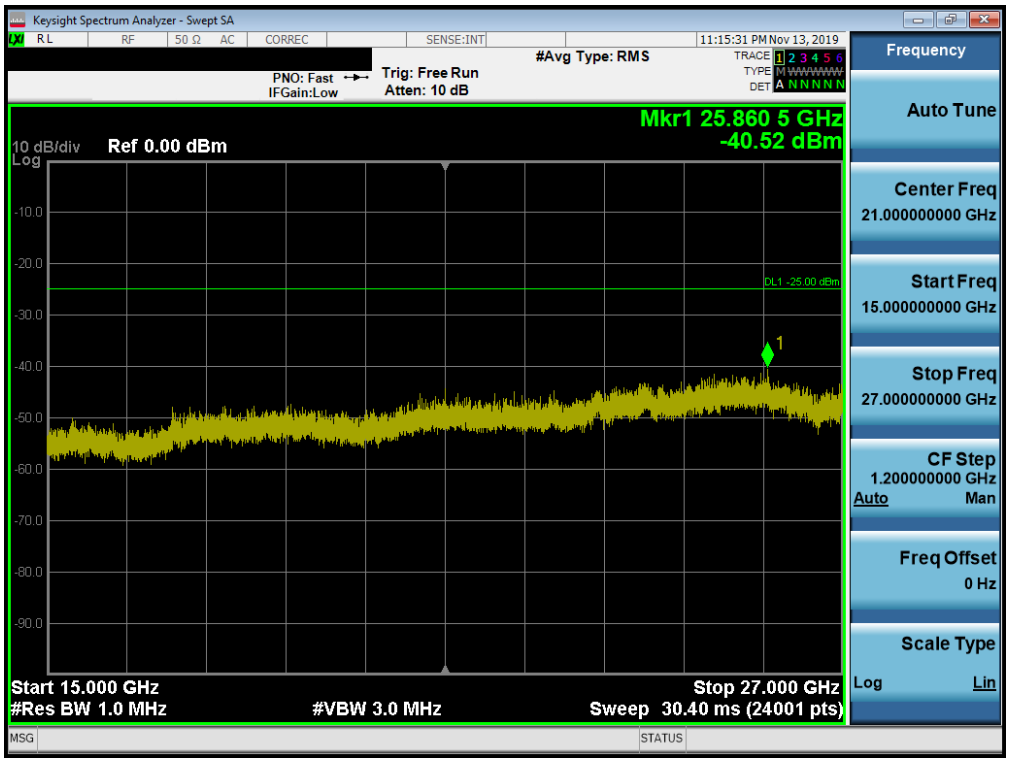
Plot 7-336. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



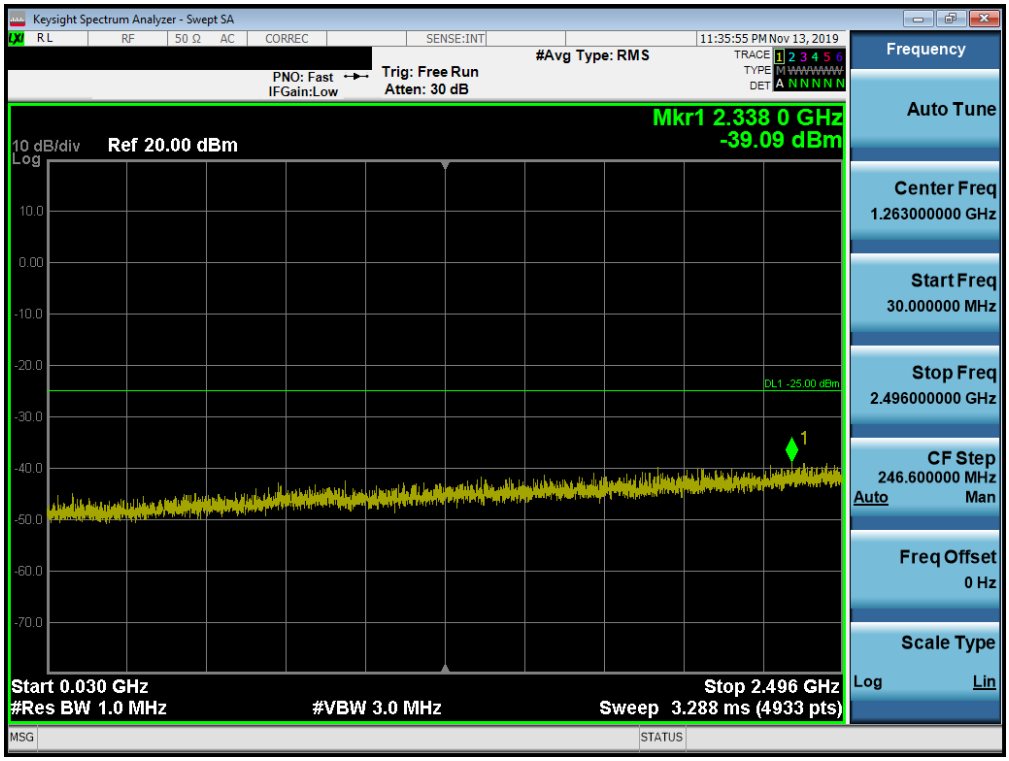
Plot 7-337. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



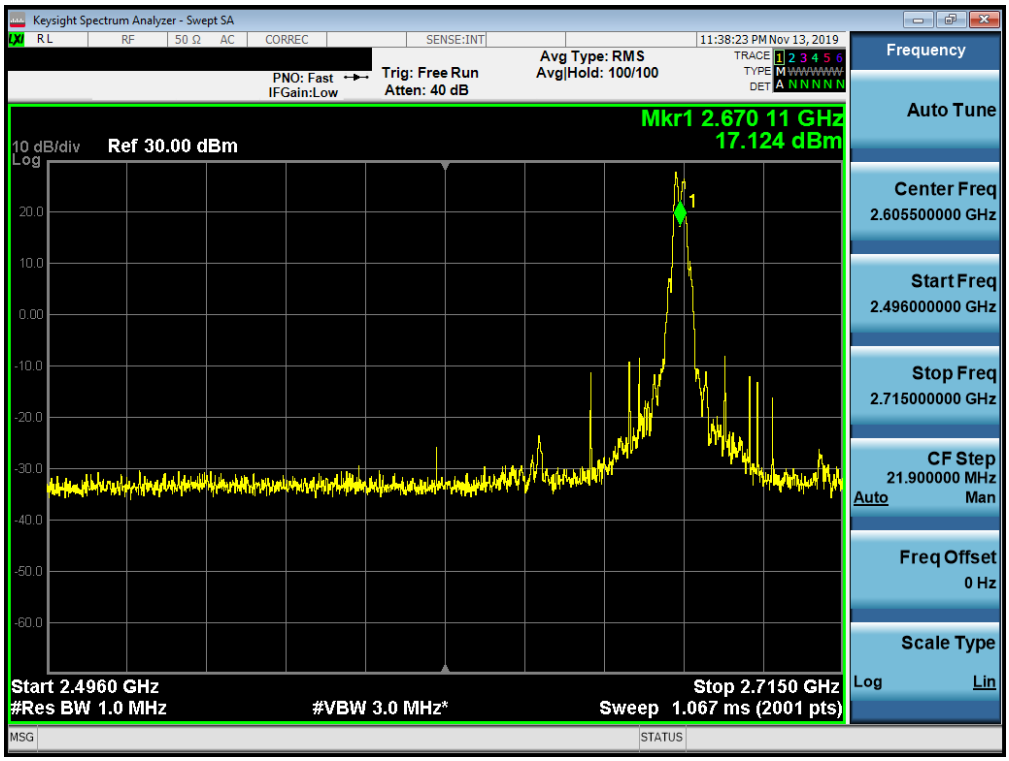
Plot 7-338. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



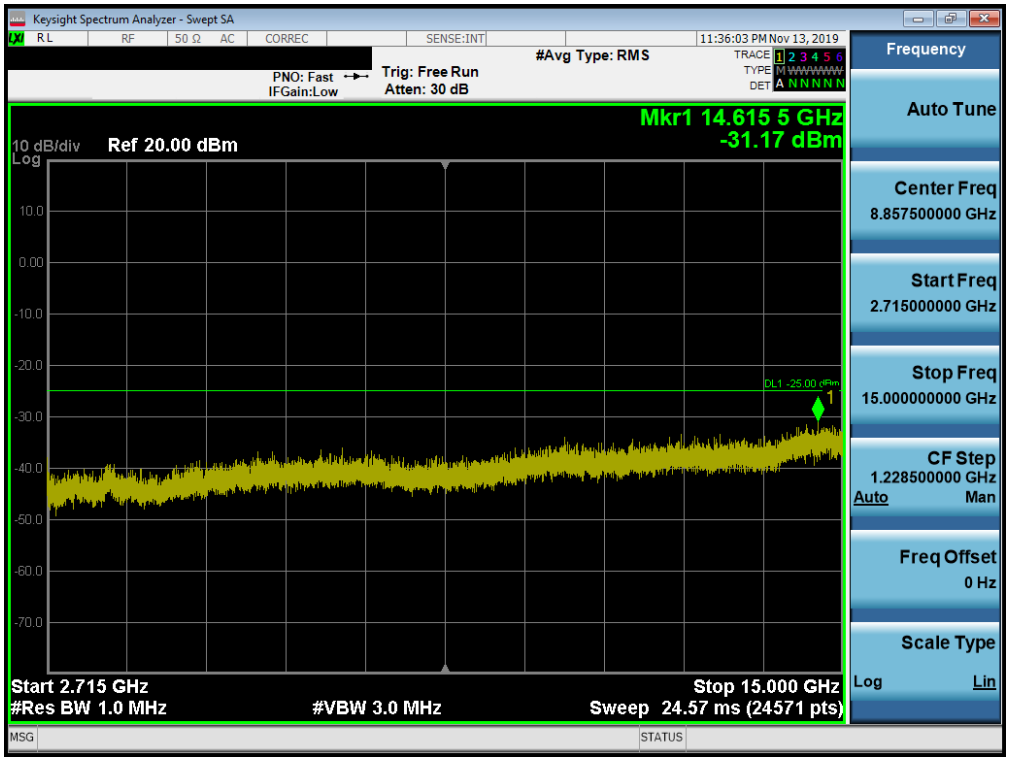
Plot 7-339. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-340. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

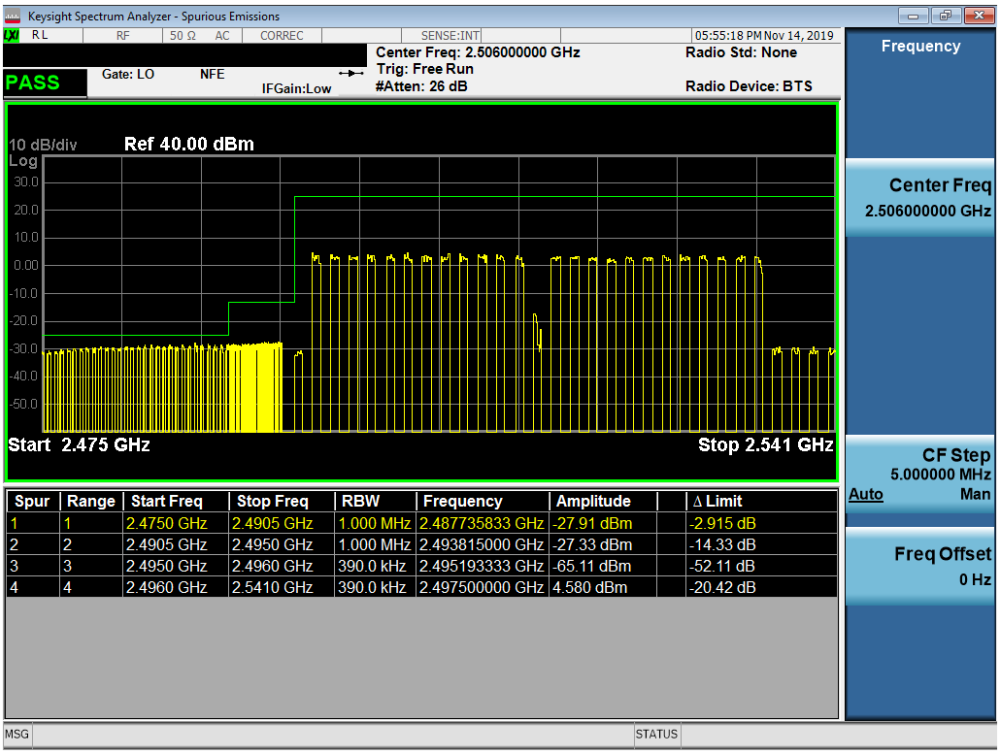


Plot 7-341. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



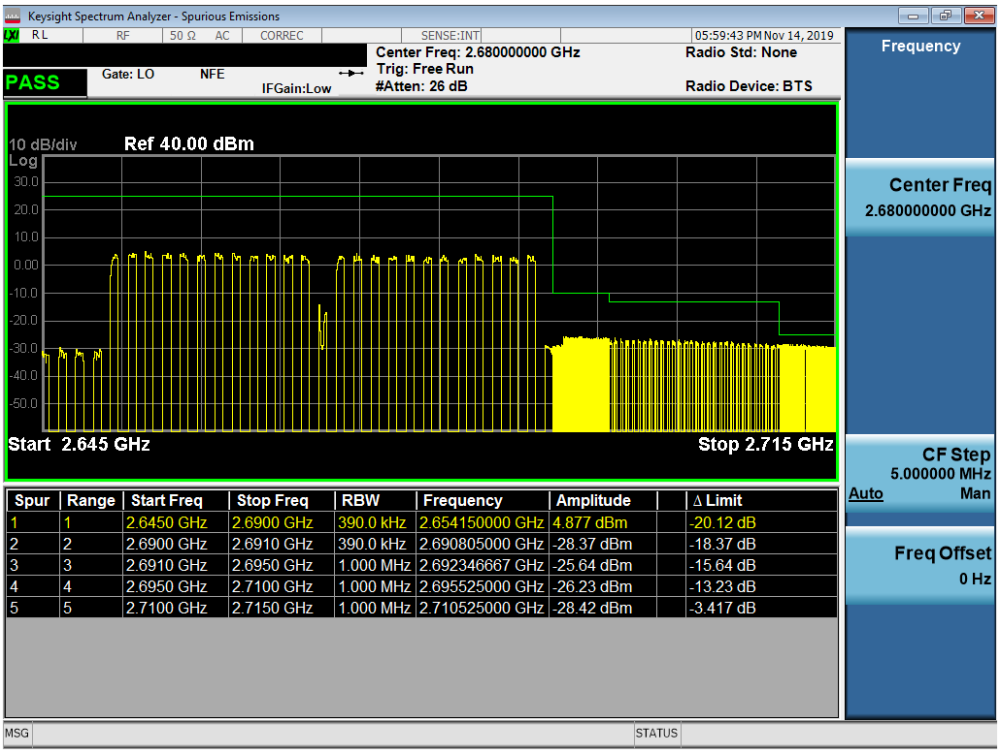
Plot 7-342. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

Plot 7-343. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.487735833 GHz	-27.91 dBm	-2.915 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.493815000 GHz	-27.33 dBm	-14.33 dB
3	3	2.4950 GHz	2.4960 GHz	390.0 kHz	2.495193333 GHz	-65.11 dBm	-52.11 dB
4	4	2.4960 GHz	2.5410 GHz	390.0 kHz	2.497500000 GHz	4.580 dBm	-20.42 dB

Table 7-344. Lower ACP Plot (Band 41 (PC2) QPSK – PCC:20 MHz SCC:20 MHz – Full RB)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6450 GHz	2.6900 GHz	390.0 kHz	2.654150000 GHz	4.877 dBm	-20.12 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690805000 GHz	-28.37 dBm	-18.37 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692346667 GHz	-25.64 dBm	-15.64 dB
4	4	2.6950 GHz	2.7100 GHz	1.000 MHz	2.695525000 GHz	-26.23 dBm	-13.23 dB
5	5	2.7100 GHz	2.7150 GHz	1.000 MHz	2.710525000 GHz	-28.42 dBm	-3.417 dB

Table 7-345. Upper ACP Plot (Band 41 (PC2) QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

7.8 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.
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".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
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.

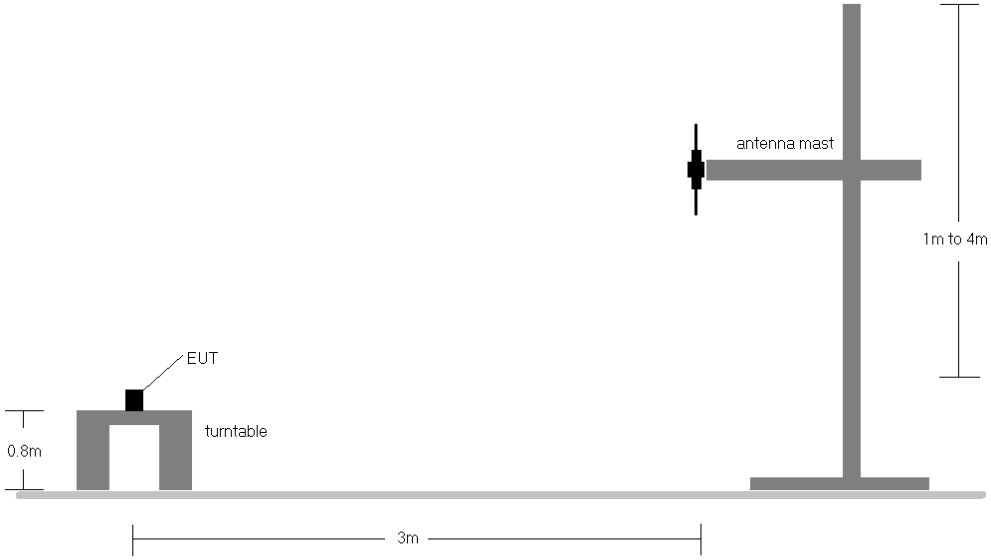


Figure 7-7. Radiated Test Setup <1GHz

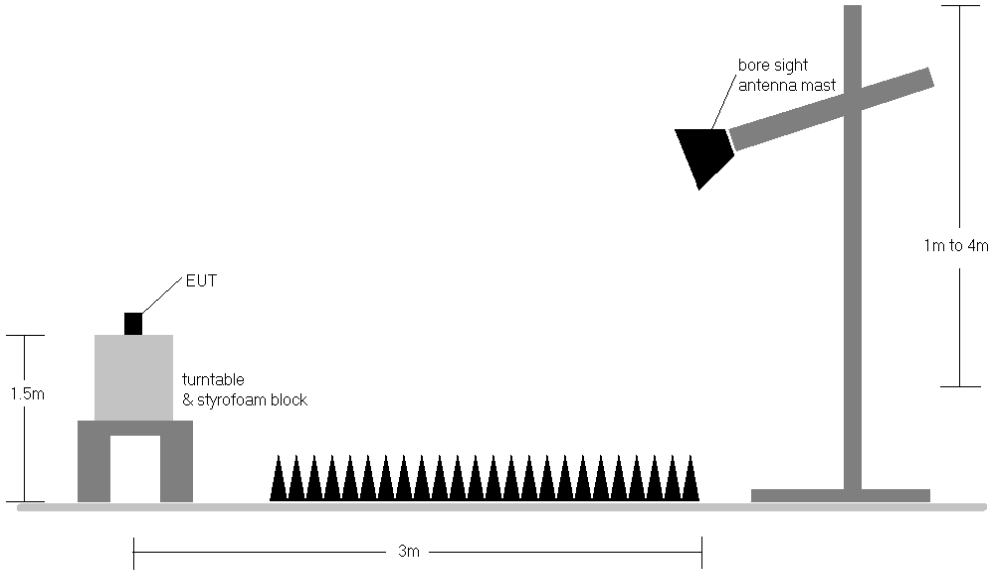


Figure 7-8. Radiated Test Setup >1GHz

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]
665.50	5	QPSK	H	142	97	1 / 24	18.62	2.90	19.37	0.086	34.77	-15.40
680.50	5	QPSK	H	143	94	1 / 24	17.84	3.20	18.89	0.077	34.77	-15.88
695.50	5	QPSK	H	144	96	1 / 0	18.51	3.30	**19.66**	**0.092**	34.77	-15.11
695.50	5	16-QAM	H	144	96	1 / 0	18.17	3.30	**19.32**	0.086	34.77	-15.45
695.50	5	64-QAM	H	144	96	1 / 0	17.11	3.30	**18.26**	0.067	34.77	-16.51
668.00	10	QPSK	H	139	91	1 / 49	18.53	2.90	19.28	0.085	34.77	-15.49
680.50	10	QPSK	H	141	92	1 / 49	17.66	3.20	18.71	0.074	34.77	-16.06
693.00	10	QPSK	H	140	94	1 / 0	18.49	3.30	**19.64**	0.092	34.77	-15.13
693.00	10	16-QAM	H	140	94	1 / 0	17.97	3.30	**19.12**	0.082	34.77	-15.65
693.00	10	64-QAM	H	140	94	1 / 0	17.05	3.30	**18.20**	0.066	34.77	-16.57
670.50	15	QPSK	H	140	95	1 / 74	18.40	3.00	19.25	0.084	34.77	-15.52
680.50	15	QPSK	H	141	92	1 / 74	17.96	3.20	19.01	0.080	34.77	-15.76
690.50	15	QPSK	H	139	94	1 / 0	18.30	3.30	**19.45**	0.088	34.77	-15.32
690.50	15	16-QAM	H	139	94	1 / 0	17.59	3.30	**18.74**	0.075	34.77	-16.03
690.50	15	64-QAM	H	139	94	1 / 0	16.59	3.30	**17.74**	0.059	34.77	-17.03
673.00	20	QPSK	H	138	93	1 / 99	18.33	3.10	19.28	0.085	34.77	-15.49
680.50	20	QPSK	H	137	98	1 / 99	17.89	3.20	18.94	0.078	34.77	-15.83
688.00	20	QPSK	H	138	92	1 / 0	18.23	3.30	**19.38**	0.087	34.77	-15.39
688.00	20	16-QAM	H	138	92	1 / 0	17.54	3.30	**18.69**	0.074	34.77	-16.08
688.00	20	64-QAM	H	138	92	1 / 0	16.56	3.30	**17.71**	0.059	34.77	-17.06
695.50	5	QPSK	V	185	322	1 / 99	16.92	4.40	19.17	0.083	34.77	-15.60

Table 7-8. ERP 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 [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	162	320	1 / 0	20.55	4.50	**22.90**	**0.195**	34.77	-11.87	**25.05**	**0.320**	36.99	-11.94
707.50	1.4	QPSK	V	171	311	1 / 0	20.39	4.60	22.84	0.192	34.77	-11.93	24.99	0.316	36.99	-12.00
715.30	1.4	QPSK	V	154	328	1 / 0	20.38	4.63	22.86	0.193	34.77	-11.91	25.01	0.317	36.99	-11.98
699.70	1.4	16-QAM	V	162	320	1 / 0	19.65	4.50	**22.00**	0.158	34.77	-12.77	**24.15**	0.260	36.99	-12.84
699.70	1.4	64-QAM	V	162	320	1 / 0	18.45	4.50	20.80	0.120	34.77	-13.97	22.95	0.197	36.99	-14.04
700.50	3	QPSK	V	164	318	1 / 0	20.25	4.55	22.65	0.184	34.77	-12.12	24.80	0.302	36.99	-12.19
707.50	3	QPSK	V	175	308	1 / 0	20.31	4.60	22.76	0.189	34.77	-12.01	24.91	0.310	36.99	-12.08
714.50	3	QPSK	V	156	330	1 / 0	20.35	4.60	**22.80**	0.191	34.77	-11.97	**24.95**	0.313	36.99	-12.04
714.50	3	16-QAM	V	156	330	1 / 0	19.49	4.60	**21.94**	0.156	34.77	-12.83	**24.09**	0.256	36.99	-12.90
714.50	3	64-QAM	V	156	330	1 / 0	18.55	4.60	**21.00**	0.126	34.77	-13.77	**23.15**	0.207	36.99	-13.84
701.50	5	QPSK	V	172	321	1 / 0	20.34	4.60	22.79	0.190	34.77	-11.98	24.94	0.312	36.99	-12.05
707.50	5	QPSK	V	178	310	1 / 0	20.42	4.60	**22.87**	0.194	34.77	-11.90	**25.02**	0.318	36.99	-11.97
713.50	5	QPSK	V	153	328	1 / 0	20.33	4.60	22.78	0.190	34.77	-11.99	24.93	0.311	36.99	-12.06
707.50	5	16-QAM	V	178	310	1 / 0	19.57	4.60	22.02	0.159	34.77	-12.75	24.17	0.261	36.99	-12.82
707.50	5	64-QAM	V	178	310	1 / 0	18.53	4.60	20.98	0.125	34.77	-13.79	23.13	0.206	36.99	-13.86
704.00	10	QPSK	V	168	319	1 / 0	18.37	4.50	**20.72**	0.118	34.77	-14.05	**22.87**	0.194	36.99	-14.12
707.50	10	QPSK	V	179	306	1 / 0	17.54	4.60	19.99	0.100	34.77	-14.78	22.14	0.164	36.99	-14.85
711.00	10	QPSK	V	154	326	1 / 0	17.52	4.60	19.97	0.099	34.77	-14.80	22.12	0.163	36.99	-14.87
704.00	10	16-QAM	V	168	319	1 / 0	17.43	4.50	**19.78**	0.095	34.77	-14.99	**21.93**	0.156	36.99	-15.06
704.00	10	64-QAM	V	168	319	1 / 0	16.10	4.50	**18.45**	0.070	34.77	-16.32	**20.60**	0.115	36.99	-16.39
699.70	1.4	QPSK	H	278	158	1 / 0	17.81	3.50	19.16	0.082	34.77	-15.61	21.31	0.135	36.99	-15.68

Table 7-9. ERP 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	H	241	304	1 / 0	16.68	5.80	20.33	0.108	34.77	-14.44	22.48	0.177	36.99	-14.51
782.00	5	QPSK	H	250	303	1 / 0	16.23	5.80	19.88	0.097	34.77	-14.89	22.03	0.160	36.99	-14.96
784.50	5	QPSK	H	237	302	1 / 0	16.76	5.90	**20.51**	**0.112**	34.77	-14.26	**22.66**	**0.185**	36.99	-14.33
784.50	5	16-QAM	H	237	302	1 / 0	16.07	5.90	**19.82**	0.096	34.77	-14.95	**21.97**	0.157	36.99	-15.02
784.50	5	64-QAM	H	237	302	1 / 0	14.84	5.90	**18.59**	0.072	34.77	-16.18	**20.74**	0.119	36.99	-16.25
782.00	10	QPSK	H	261	285	1 / 0	16.36	5.80	**20.01**	0.100	34.77	-14.76	**22.16**	0.164	36.99	-14.83
782.00	10	16-QAM	H	261	285	1 / 0	15.83	5.80	**19.48**	0.089	34.77	-15.29	**21.63**	0.146	36.99	-15.36
782.00	10	64-QAM	H	261	285	1 / 0	14.76	5.80	**18.41**	0.069	34.77	-16.36	**20.56**	0.114	36.99	-16.43
784.50	5	QPSK	V	141	151	1 / 0	15.13	5.80	18.78	0.076	34.77	-15.99	20.93	0.124	36.99	-16.06

Table 7-10. ERP 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	H	204	160	1 / 5	18.25	6.70	**22.80**	0.191	38.45	-15.65	**24.95**	0.313	40.61	-15.66
836.50	1.4	QPSK	H	210	158	1 / 0	17.86	6.70	22.41	0.174	38.45	-16.04	24.56	0.286	40.61	-16.05
848.30	1.4	QPSK	H	202	166	1 / 0	17.96	6.70	22.51	0.178	38.45	-15.94	24.66	0.292	40.61	-15.95
824.70	1.4	16-QAM	H	204	160	1 / 5	17.19	6.70	**21.74**	0.149	38.45	-16.71	**23.89**	0.245	40.61	-16.72
824.70	1.4	64-QAM	H	204	160	1 / 5	16.45	6.70	**21.00**	0.126	38.45	-17.45	**23.15**	0.207	40.61	-17.46
825.50	3	QPSK	H	198	159	1 / 14	18.12	6.70	**22.67**	0.185	38.45	-15.78	**24.82**	0.303	40.61	-15.79
836.50	3	QPSK	H	204	162	1 / 0	17.98	6.70	22.53	0.179	38.45	-15.92	24.68	0.294	40.61	-15.93
847.50	3	QPSK	H	209	168	1 / 0	18.12	6.65	22.62	0.183	38.45	-15.83	24.77	0.300	40.61	-15.84
825.50	3	16-QAM	H	198	159	1 / 14	17.31	6.70	**21.86**	0.153	38.45	-16.59	**24.01**	0.252	40.61	-16.60
825.50	3	64-QAM	H	198	159	1 / 14	16.34	6.70	**20.89**	0.123	38.45	-17.56	**23.04**	0.201	40.61	-17.57
826.50	5	QPSK	H	202	162	1 / 24	18.16	6.70	22.71	0.187	38.45	-15.74	24.86	0.306	40.61	-15.75
836.50	5	QPSK	H	207	160	1 / 0	18.21	6.70	22.76	0.189	38.45	-15.69	24.91	0.310	40.61	-15.70
846.50	5	QPSK	H	204	164	1 / 0	18.35	6.60	**22.80**	0.191	38.45	-15.65	**24.95**	0.313	40.61	-15.66
846.50	5	16-QAM	H	204	164	1 / 0	17.49	6.60	**21.94**	0.156	38.45	-16.51	**24.09**	0.256	40.61	-16.52
846.50	5	64-QAM	H	204	164	1 / 0	16.55	6.60	**21.00**	0.126	38.45	-17.45	**23.15**	0.207	40.61	-17.46
829.00	10	QPSK	H	211	157	1 / 49	18.23	6.70	22.78	0.190	38.45	-15.67	24.93	0.311	40.61	-15.68
836.50	10	QPSK	H	206	161	1 / 0	18.32	6.70	**22.87**	**0.194**	38.45	-15.58	**25.02**	**0.318**	40.61	-15.59
844.00	10	QPSK	H	208	159	1 / 0	18.33	6.60	22.78	0.190	38.45	-15.67	24.93	0.311	40.61	-15.68
844.00	10	16-QAM	H	208	159	1 / 0	17.59	6.60	**22.04**	0.160	38.45	-16.41	**24.19**	0.262	40.61	-16.42
844.00	10	64-QAM	H	208	159	1 / 0	16.58	6.60	**21.03**	0.127	38.45	-17.42	**23.18**	0.208	40.61	-17.43
836.50	10	QPSK	V	115	4	1 / 0	13.45	6.70	18.00	0.063	38.45	-20.45	20.15	0.104	40.61	-20.46

Table 7-11. ERP 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	H	209	160	1 / 74	14.09	6.70	18.64	0.073	38.45	-19.81	20.79	0.120	40.61	-19.82
836.50	15	QPSK	H	205	161	1 / 0	14.19	6.70	18.74	0.075	38.45	-19.71	20.89	0.123	40.61	-19.72
841.50	15	QPSK	H	205	162	1 / 0	14.63	6.60	**19.08**	0.081	38.45	-19.37	**21.23**	0.133	40.61	-19.38
841.50	15	16-QAM	H	205	162	1 / 0	13.64	6.60	**18.09**	0.064	38.45	-20.36	**20.24**	0.106	40.61	-20.37
841.50	15	64-QAM	H	205	162	1 / 0	12.79	6.60	**17.24**	0.053	38.45	-21.21	**19.39**	0.087	40.61	-21.22

Table 7-12. ERP Da ta (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	H	140	27	1 / 0	15.02	9.44	**24.46**	0.279	30.00	-5.54
1745.00	1.4	QPSK	H	142	30	1 / 0	15.13	9.23	24.36	0.273	30.00	-5.64
1779.30	1.4	QPSK	H	117	25	1 / 5	15.04	9.26	24.30	0.269	30.00	-5.70
1710.70	1.4	16-QAM	H	140	27	1 / 0	14.08	9.44	**23.52**	0.225	30.00	-6.48
1710.70	1.4	64-QAM	H	140	27	1 / 0	13.08	9.44	**22.52**	0.179	30.00	-7.48
1711.50	3	QPSK	H	136	31	1 / 0	15.06	9.44	**24.50**	0.282	30.00	-5.50
1745.00	3	QPSK	H	133	32	1 / 0	15.03	9.23	24.26	0.267	30.00	-5.74
1778.50	3	QPSK	H	111	29	1 / 14	15.05	9.26	24.31	0.270	30.00	-5.69
1711.50	3	16-QAM	H	136	31	1 / 0	14.15	9.44	**23.59**	0.228	30.00	-6.41
1711.50	3	64-QAM	H	136	31	1 / 0	13.17	9.44	**22.61**	0.182	30.00	-7.39
1712.50	5	QPSK	H	138	28	1 / 0	15.16	9.43	**24.59**	0.288	30.00	-5.41
1745.00	5	QPSK	H	146	29	1 / 0	14.93	9.23	24.16	0.261	30.00	-5.84
1777.50	5	QPSK	H	114	27	1 / 24	15.09	9.26	24.35	0.272	30.00	-5.65
1712.50	5	16-QAM	H	138	28	1 / 0	14.29	9.43	**23.72**	0.236	30.00	-6.28
1712.50	5	64-QAM	H	138	28	1 / 0	13.17	9.43	22.60	0.182	30.00	-7.40
1715.00	10	QPSK	H	142	33	1 / 0	15.22	9.42	**24.64**	**0.291**	30.00	-5.36
1745.00	10	QPSK	H	141	29	1 / 0	15.03	9.23	24.26	0.267	30.00	-5.74
1775.00	10	QPSK	H	117	33	1 / 49	15.02	9.25	24.27	0.267	30.00	-5.73
1715.00	10	16-QAM	H	142	33	1 / 0	14.10	9.42	23.52	0.225	30.00	-6.48
1715.00	10	64-QAM	H	142	33	1 / 0	12.83	9.42	22.25	0.168	30.00	-7.75
1717.50	15	QPSK	H	150	31	1 / 0	15.10	9.40	**24.50**	0.282	30.00	-5.50
1745.00	15	QPSK	H	135	25	1 / 0	15.12	9.23	24.35	0.272	30.00	-5.65
1772.50	15	QPSK	H	110	31	1 / 74	15.08	9.25	24.33	0.271	30.00	-5.67
1717.50	15	16-QAM	H	150	31	1 / 0	14.08	9.40	23.48	0.223	30.00	-6.52
1717.50	15	64-QAM	H	150	31	1 / 0	12.86	9.40	22.26	0.168	30.00	-7.74
1720.00	20	QPSK	H	147	29	1 / 0	14.46	9.38	**23.84**	0.242	30.00	-6.16
1745.00	20	QPSK	H	131	20	1 / 0	13.48	9.23	22.71	0.187	30.00	-7.29
1770.00	20	QPSK	H	106	35	1 / 99	13.91	9.24	23.15	0.207	30.00	-6.85
1720.00	20	16-QAM	H	147	29	1 / 0	13.22	9.38	**22.60**	0.182	30.00	-7.40
1720.00	20	64-QAM	H	147	29	1 / 0	12.30	9.38	**21.68**	0.147	30.00	-8.32
1715.00	10	QPSK	V	121	59	1 / 0	13.57	9.23	22.80	0.191	30.00	-7.20

Table 7-13. ERP 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	V	141	50	1 / 5	14.75	9.88	24.63	0.290	33.01	-8.38
1882.50	1.4	QPSK	V	120	51	1 / 0	14.58	10.12	24.70	0.295	33.01	-8.31
1914.30	1.4	QPSK	V	137	62	1 / 0	14.37	10.34	**24.71**	0.295	33.01	-8.30
1914.30	1.4	16-QAM	V	137	62	1 / 0	13.30	10.34	**23.64**	0.231	33.01	-9.37
1914.30	1.4	64-QAM	V	137	62	1 / 0	12.37	10.34	**22.71**	0.186	33.01	-10.30
1851.50	3	QPSK	V	144	48	1 / 14	14.58	9.88	24.46	0.279	33.01	-8.55
1882.50	3	QPSK	V	127	56	1 / 0	14.29	10.12	24.41	0.276	33.01	-8.60
1913.50	3	QPSK	V	133	65	1 / 0	14.42	10.33	**24.75**	0.299	33.01	-8.26
1913.50	3	16-QAM	V	133	65	1 / 0	13.41	10.33	**23.74**	0.237	33.01	-9.27
1913.50	3	64-QAM	V	133	65	1 / 0	12.22	10.33	22.55	0.180	33.01	-10.46
1852.50	5	QPSK	V	140	52	1 / 24	14.57	9.89	24.46	0.279	33.01	-8.55
1882.50	5	QPSK	V	122	55	1 / 0	14.52	10.12	24.64	0.291	33.01	-8.37
1912.50	5	QPSK	V	131	68	1 / 0	14.38	10.33	**24.71**	0.296	33.01	-8.30
1912.50	5	16-QAM	V	131	68	1 / 0	13.41	10.33	**23.74**	0.236	33.01	-9.27
1912.50	5	64-QAM	V	131	68	1 / 0	12.39	10.33	**22.72**	0.187	33.01	-10.29
1855.00	10	QPSK	V	137	56	1 / 49	14.75	9.91	24.66	0.292	33.01	-8.35
1882.50	10	QPSK	V	125	57	1 / 0	14.45	10.12	24.57	0.287	33.01	-8.44
1910.00	10	QPSK	V	133	73	1 / 0	14.39	10.31	**24.70**	0.295	33.01	-8.31
1910.00	10	16-QAM	V	133	73	1 / 0	13.42	10.31	**23.73**	0.236	33.01	-9.28
1910.00	10	64-QAM	V	133	73	1 / 0	12.34	10.31	22.65	0.184	33.01	-10.36
1857.50	15	QPSK	V	142	54	1 / 74	14.54	9.93	24.47	0.280	33.01	-8.54
1882.50	15	QPSK	V	126	58	1 / 0	14.38	10.12	24.50	0.282	33.01	-8.51
1907.50	15	QPSK	V	135	71	1 / 0	14.25	10.30	**24.55**	0.285	33.01	-8.46
1907.50	15	16-QAM	V	135	71	1 / 0	13.35	10.30	**23.65**	0.232	33.01	-9.36
1907.50	15	64-QAM	V	135	71	1 / 0	12.27	10.30	22.57	0.181	33.01	-10.44
1860.00	20	QPSK	V	139	56	1 / 99	14.78	9.95	24.73	0.297	33.01	-8.28
1882.50	20	QPSK	V	124	55	1 / 0	15.43	10.12	**25.55**	**0.359**	33.01	-7.46
1905.00	20	QPSK	V	137	69	1 / 0	13.97	10.28	24.25	0.266	33.01	-8.76
1882.50	20	16-QAM	V	124	55	1 / 0	14.69	10.12	**24.81**	0.303	33.01	-8.20
1882.50	20	64-QAM	V	124	55	1 / 0	13.89	10.12	**24.01**	0.252	33.01	-9.00
1882.50	20	QPSK	H	102	365	1 / 0	15.01	10.12	25.13	0.326	33.01	-7.88

Table 7-14. ERP Data (Band 25/2)

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]
2498.50	5	QPSK	V	102	65	1 / 24	13.77	9.40	23.17	0.208	33.01	-9.84
2593.00	5	QPSK	V	104	102	1 / 24	14.02	9.56	23.58	0.228	33.01	-9.43
2687.50	5	QPSK	V	103	134	1 / 24	14.01	9.69	**23.70**	0.234	33.01	-9.31
2687.50	5	16-QAM	V	103	134	1 / 24	12.63	9.69	22.32	0.170	33.01	-10.69
2687.50	5	64-QAM	V	103	134	1 / 24	12.08	9.69	21.77	0.150	33.01	-11.24
2501.00	10	QPSK	V	102	67	1 / 49	13.77	9.40	23.17	0.207	33.01	-9.84
2593.00	10	QPSK	V	105	103	1 / 49	14.06	9.56	23.62	0.230	33.01	-9.39
2685.00	10	QPSK	V	104	137	1 / 49	14.04	9.68	**23.72**	**0.236**	33.01	-9.29
2685.00	10	16-QAM	V	104	137	1 / 49	12.66	9.68	22.34	0.172	33.01	-10.67
2685.00	10	64-QAM	V	104	137	1 / 49	11.90	9.68	21.58	0.144	33.01	-11.43
2503.50	15	QPSK	V	103	67	1 / 74	13.68	9.39	23.07	0.203	33.01	-9.94
2593.00	15	QPSK	V	104	104	1 / 74	13.91	9.56	23.47	0.222	33.01	-9.54
2682.50	15	QPSK	V	102	139	1 / 74	14.02	9.68	**23.70**	0.235	33.01	-9.31
2682.50	15	16-QAM	V	102	139	1 / 74	13.05	9.68	22.73	0.188	33.01	-10.28
2682.50	15	64-QAM	V	102	139	1 / 74	12.48	9.68	**22.16**	0.165	33.01	-10.85
2506.00	20	QPSK	V	104	65	1 / 99	13.62	9.39	23.01	0.200	33.01	-10.00
2593.00	20	QPSK	V	104	107	1 / 99	13.79	9.56	23.35	0.216	33.01	-9.66
2680.00	20	QPSK	V	104	136	1 / 99	13.91	9.68	**23.59**	0.229	33.01	-9.42
2680.00	20	16-QAM	V	104	136	1 / 99	12.99	9.68	**22.67**	0.185	33.01	-10.34
2680.00	20	64-QAM	V	104	136	1 / 99	11.94	9.68	**21.62**	0.145	33.01	-11.39
2685.00	10	QPSK	H	131	12	1 / 49	12.75	9.94	22.69	0.186	33.01	-10.32

Table 7-15. ERP Data (Band 41 – PC2)

7.9 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.

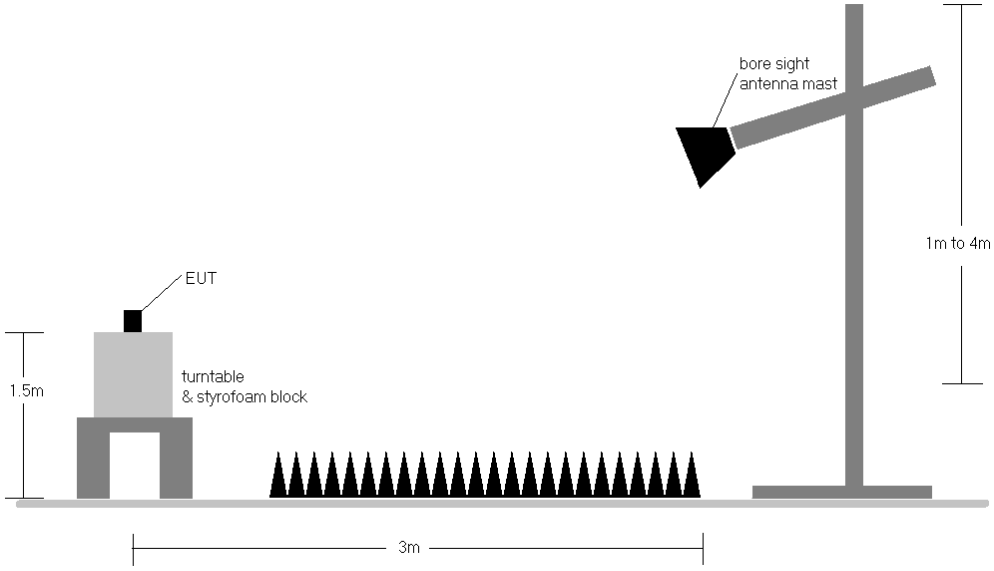


Figure 7-9. Test Instrument & Measurement Setup

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.

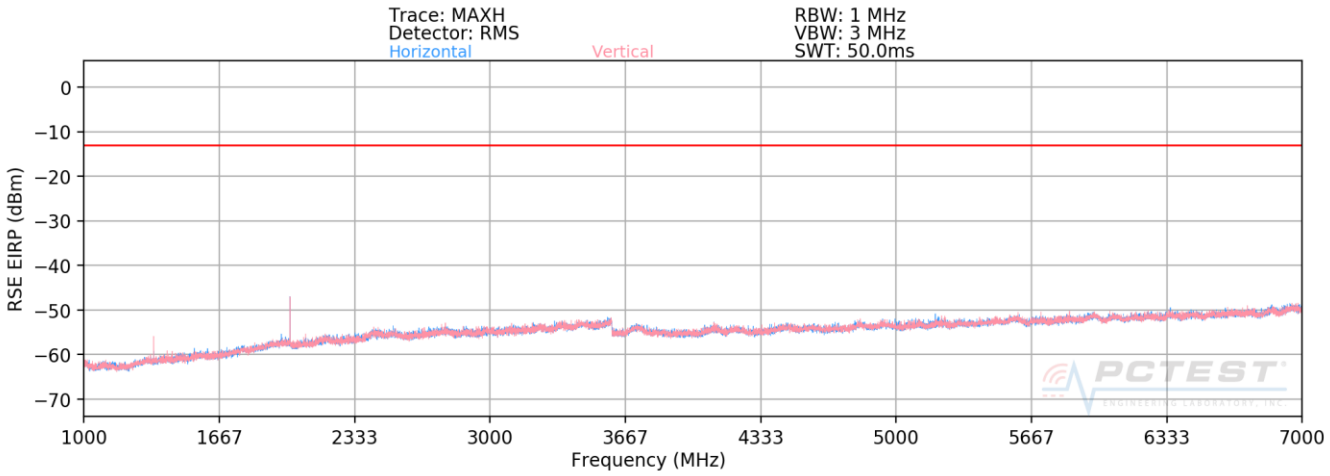
2) This unit was tested with its standard battery.

3) 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 71



Plot 7-346. Radiated Spurious Plot above 1GHz (Band 71)

OPERATING FREQUENCY:	673.00	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]
1346.00	H	105	332	-65.63	3.15	-62.48	-49.5
2019.00	H	146	325	-55.94	3.52	-52.42	-39.4
2692.00	H	-	-	-67.17	4.77	-62.40	-49.4
3365.00	H	-	-	-66.58	6.00	-60.58	-47.6

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

OPERATING FREQUENCY:	680.50	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]
1361.00	H	104	333	-67.18	3.04	-64.13	-51.1
2041.50	H	138	331	-52.82	3.49	-49.34	-36.3
2722.00	H	-	-	-67.18	4.83	-62.35	-49.3
3402.50	H	-	-	-67.75	6.16	-61.59	-48.6

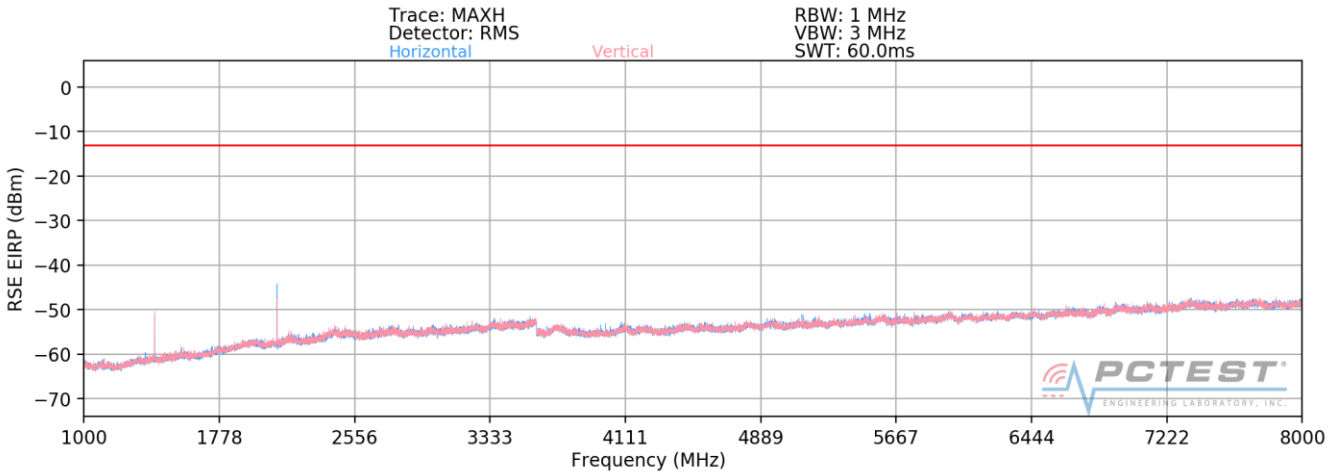
Table 7-17. Radiated Spurious Data (Band 71 – Mid Channel)

OPERATING FREQUENCY:	688.00	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]
1376.00	H	119	337	-65.28	2.88	-62.40	-49.4
2064.00	H	124	323	-51.34	3.50	-47.84	-34.8
2752.00	H	-	-	-67.22	4.88	-62.34	-49.3
3440.00	H	-	-	-67.70	6.22	-61.49	-48.5

Table 7-18. Radiated Spurious Data (Band 71 – High Channel)

Band 12



Plot 7-347. 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	144	40	-61.00	2.71	-58.29	-45.3
2104.50	H	101	135	-58.17	3.57	-54.60	-41.6
2806.00	H	-	-	-67.60	4.98	-62.62	-49.6
3507.50	H	-	-	-67.96	6.33	-61.63	-48.6

Table 7-19. 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	158	44	-60.30	2.80	-57.50	-44.5
2122.50	H	109	136	-57.83	3.57	-54.26	-41.3
2830.00	H	-	-	-67.77	5.02	-62.75	-49.8
3537.50	H	-	-	-67.71	6.31	-61.41	-48.4

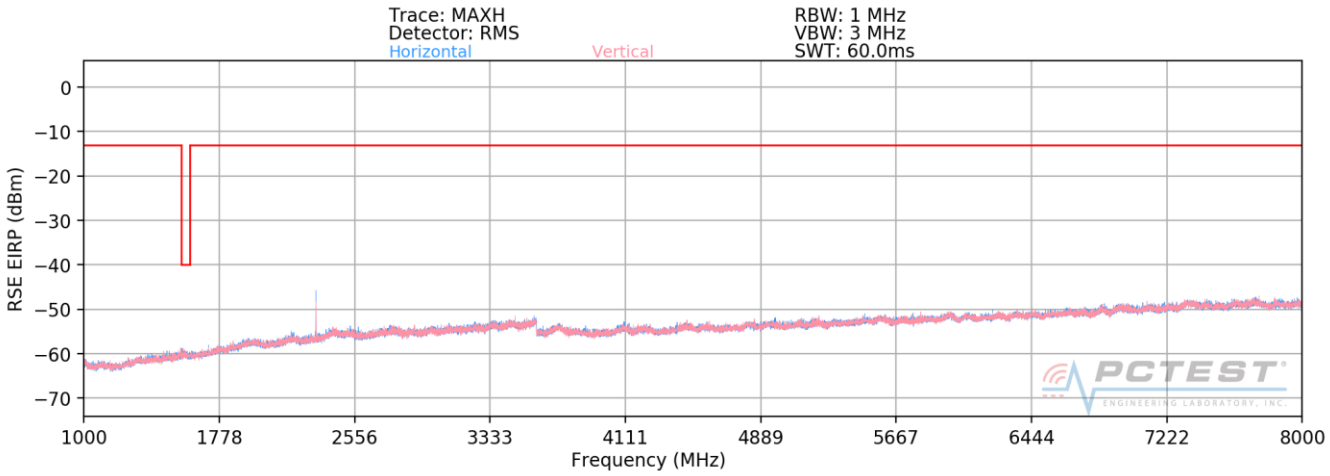
Table 7-20. Radiated Spurious Data (Band 12 – Mid Channel)

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	152	41	-60.18	2.88	-57.29	-44.3
2140.50	H	124	138	-57.78	3.58	-54.20	-41.2
2854.00	H	-	-	-67.57	5.07	-62.50	-49.5
3567.50	H	-	-	-67.33	6.31	-61.02	-48.0

Table 7-21. Radiated Spurious Data (Band 12 – High Channel)

Band 13



Plot 7-348. Radiated Spurious Plot above 1GHz (Band 13)

OPERATING FREQUENCY:	779.50	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]
2338.50	H	138	38	-52.34	3.99	-48.35	-35.3
3118.00	H	-	-	-67.23	5.37	-61.86	-48.9
3897.50	H	102	13	-65.60	7.06	-58.54	-45.5
4677.00	H	-	-	-68.72	8.34	-60.38	-47.4
5456.50	H	-	-	-68.22	8.73	-59.49	-46.5

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

OPERATING FREQUENCY:	782.00	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]
2346.00	H	115	44	-51.87	4.00	-47.86	-34.9
3128.00	H	-	-	-67.27	5.38	-61.88	-48.9
3910.00	H	101	13	-65.82	7.09	-58.73	-45.7
4692.00	H	-	-	-68.57	8.37	-60.20	-47.2
5474.00	H	-	-	-67.83	8.73	-59.10	-46.1

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

OPERATING FREQUENCY:	784.50	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]
2353.50	H	112	38	-51.94	4.02	-47.92	-34.9
3138.00	H	-	-	-67.11	5.40	-61.71	-48.7
3922.50	H	100	17	-65.11	7.13	-57.98	-45.0
4707.00	H	-	-	-69.21	8.39	-60.81	-47.8
5491.50	H	-	-	-67.75	8.74	-59.02	-46.0

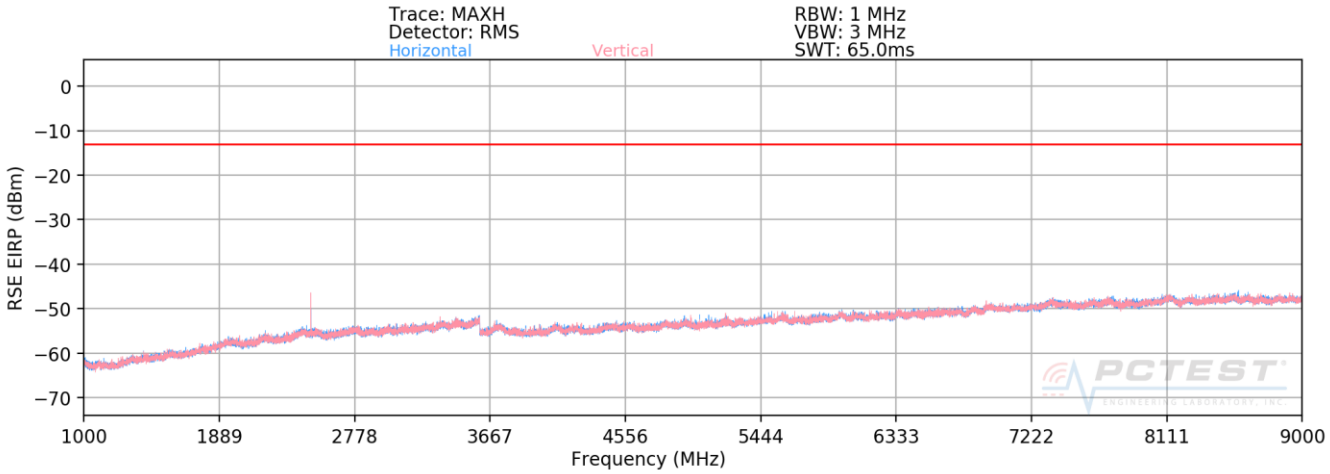
Table 7-24. Radiated Spurious Data (Band 13 – High Channel)

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	181	309	-73.93	8.51	-65.41	-25.4
1564.00	H	185	309	-73.74	8.53	-65.21	-25.2
1569.00	H	184	307	-74.09	8.55	-65.54	-25.5

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

Band 26/5



Plot 7-349. Radiated Spurious Plot above 1GHz (Band 26)

OPERATING FREQUENCY:	829.00	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]
1658.00	V	137	150	-60.82	3.61	-57.20	-44.2
2487.00	V	259	277	-44.07	4.26	-39.81	-26.8
3316.00	V	-	-	-67.15	5.86	-61.29	-48.3
4145.00	V	228	283	-67.10	7.68	-59.42	-46.4
4974.00	V	-	-	-69.13	8.56	-60.57	-47.6
5803.00	V	-	-	-68.05	8.87	-59.18	-46.2

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

OPERATING FREQUENCY:	836.50	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]
1673.00	V	126	141	-60.07	3.62	-56.45	-43.5
2509.50	V	259	278	-44.66	4.33	-40.33	-27.3
3346.00	V	-	-	-66.88	5.92	-60.96	-48.0
4182.50	V	215	279	-66.40	7.69	-58.71	-45.7
5019.00	V	-	-	-69.70	8.56	-61.13	-48.1
5855.50	V	-	-	-67.73	8.87	-58.86	-45.9

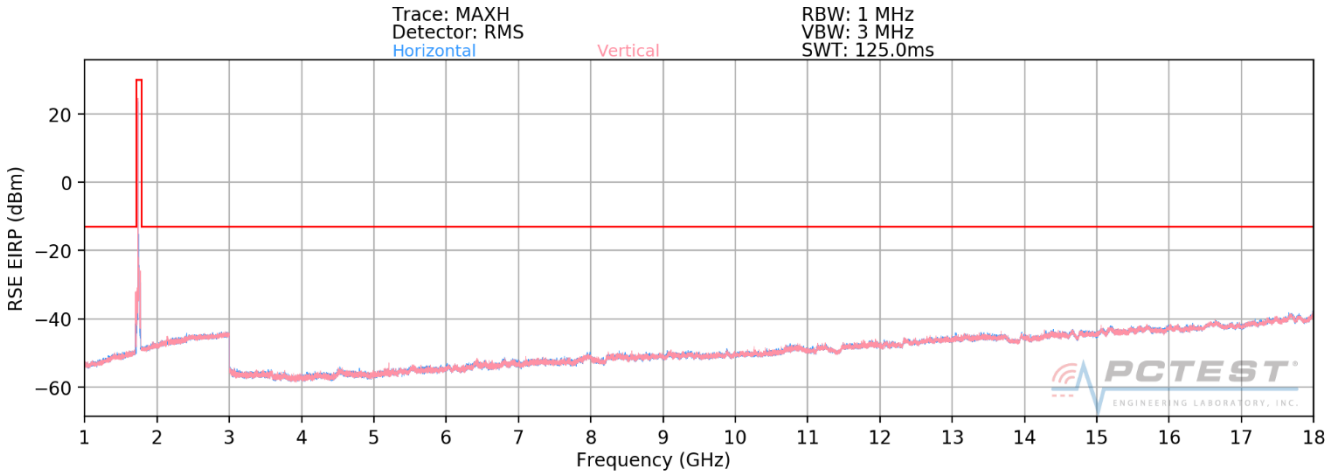
Table 7-27. Radiated Spurious Data (Band 26/5 – Mid Channel)

OPERATING FREQUENCY:	844.00	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]
1688.00	V	123	144	-63.29	3.62	-59.67	-46.7
2532.00	V	253	282	-47.55	4.42	-43.13	-30.1
3376.00	V	-	-	-66.98	6.00	-60.98	-48.0
4220.00	V	202	273	-66.31	7.72	-58.59	-45.6
5064.00	V	-	-	-69.27	8.56	-60.71	-47.7
5908.00	V	-	-	-68.35	8.90	-59.45	-46.5

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

Band 66/4



Plot 7-350. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY:	1715.00	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]
3430.00	H	158	48	-58.29	6.22	-52.07	-39.1
5145.00	H	-	-	-64.08	8.68	-55.41	-42.4

Table 7-29. Radiated Spurious Data (Band 66/4 – Low Channel)

OPERATING FREQUENCY:	1745.00	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]
3490.00	H	163	151	-60.66	6.32	-54.34	-41.3
5235.00	H	104	315	-54.76	8.71	-46.05	-33.1
6980.00	H	-	-	-61.75	8.74	-53.02	-40.0

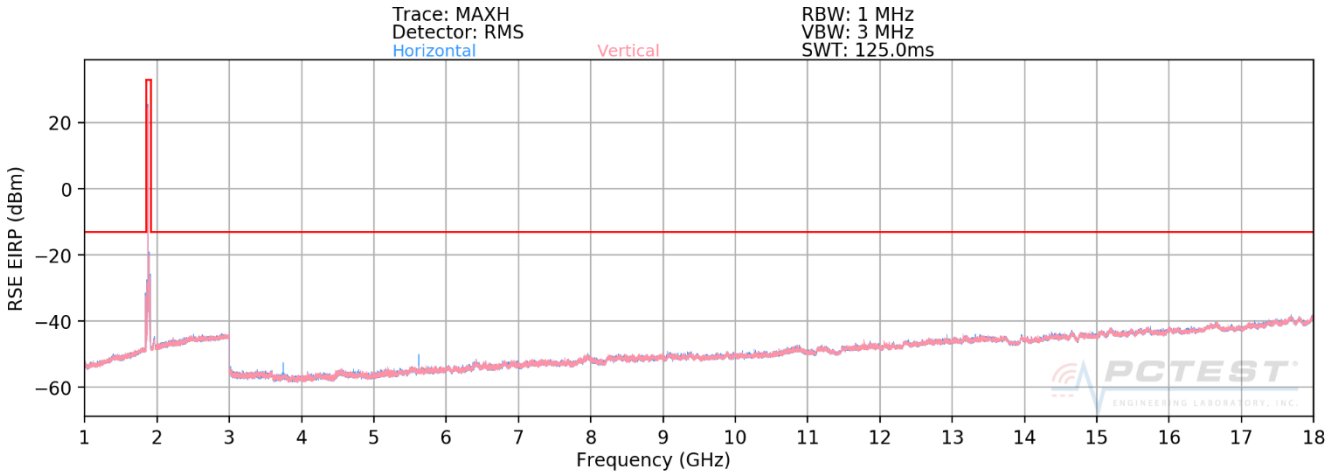
Table 7-30. Radiated Spurious Data (Band 66/4 – Mid Channel)

OPERATING FREQUENCY:	1775.00	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]
3550.00	H	112	154	-62.44	6.31	-56.13	-43.1
5325.00	H	-	-	-64.57	8.74	-55.83	-42.8

Table 7-31. Radiated Spurious Data (Band 66/4 – High Channel)

Band 25/2



Plot 7-351. Radiated Spurious Plot above 1GHz (Band 25/2)

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	142	105	-64.35	6.58	-57.77	-44.8
5580.00	V	101	138	-59.80	8.74	-51.07	-38.1
7440.00	V	-	-	-61.07	8.41	-52.65	-39.7

Table 7-32. Radiated Spurious Data (Band 25/2 – Low Channel)

OPERATING FREQUENCY:	1882.50	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]
3765.00	V	148	61	-64.42	6.70	-57.73	-44.7
5647.50	V	107	131	-55.81	8.83	-46.98	-34.0
7530.00	V	-	-	-61.40	8.46	-52.95	-39.9

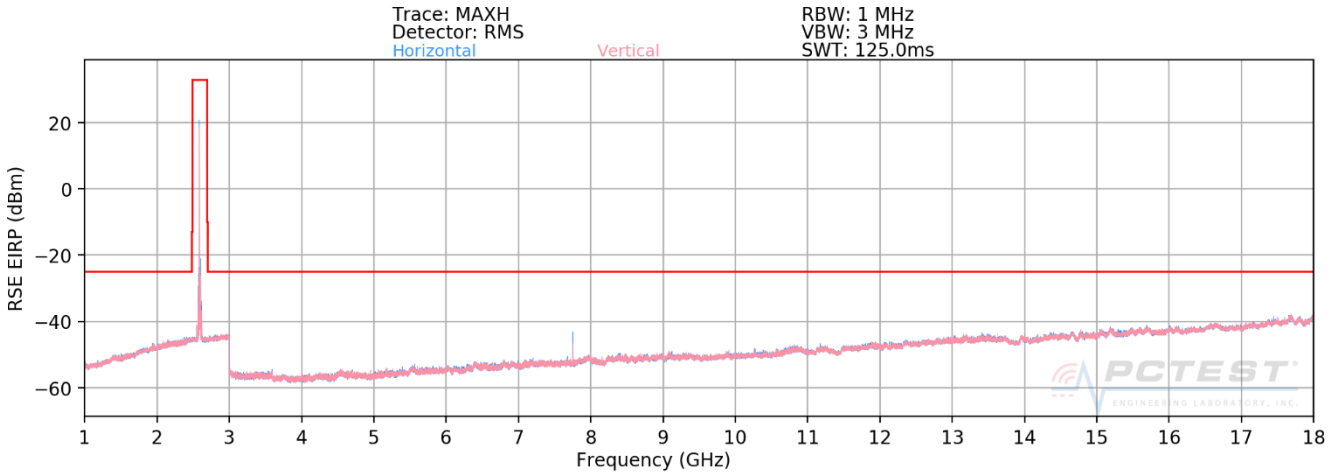
Table 7-33. Radiated Spurious Data (Band 25/2 – Mid Channel)

OPERATING FREQUENCY:	1905.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

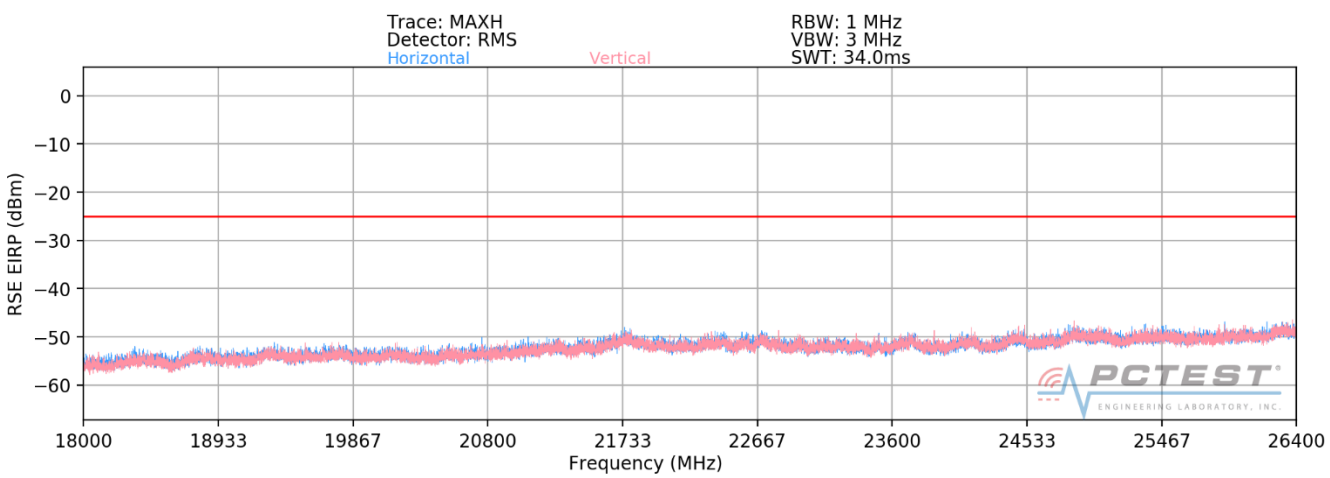
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3810.00	V	119	258	-64.62	6.94	-57.68	-44.7
5715.00	V	196	84	-61.18	8.77	-52.42	-39.4
7620.00	V	-	-	-59.59	8.51	-51.08	-38.1

Table 7-34. Radiated Spurious Data (Band 25/2 – High Channel)

Band 41 (PC2)



Plot 7-352. Radiated Spurious Plot above 1GHz – 18GHz (Band 41)



Plot 7-353. Radiated Spurious Plot above 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	H	101	25	-54.61	8.56	-46.04	-21.0
7530.00	H	325	293	-45.32	8.46	-36.87	-11.9
10040.00	H	149	304	-57.30	9.85	-47.44	-22.4
12550.00	H	-	-	-54.85	9.06	-45.79	-20.8
15060.00	H	-	-	-50.87	8.74	-42.13	-17.1

Table 7-35. Radiated Spurious Data (Band 41 (PC2) – 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	H	101	15	-57.92	8.70	-49.22	-24.2
7779.00	H	325	301	-46.22	8.69	-37.53	-12.5
10372.00	H	157	299	-56.28	9.62	-46.65	-21.7
12965.00	H	-	-	-54.00	8.99	-45.01	-20.0
15558.00	H	-	-	-50.35	8.32	-42.03	-17.0

Table 7-36. Radiated Spurious Data (Band 41 (PC2) – 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	H	101	14	-55.34	8.70	-46.64	-21.6
8040.00	H	321	305	-47.95	8.95	-38.99	-14.0
10720.00	H	155	291	-54.01	9.32	-44.69	-19.7
13400.00	H	-	-	-53.18	8.77	-44.40	-19.4
16080.00	H	-	-	-49.56	8.01	-41.55	-16.6

Table 7-37. Radiated Spurious Data (Band 41 (PC2) – High Channel)

7.10 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.

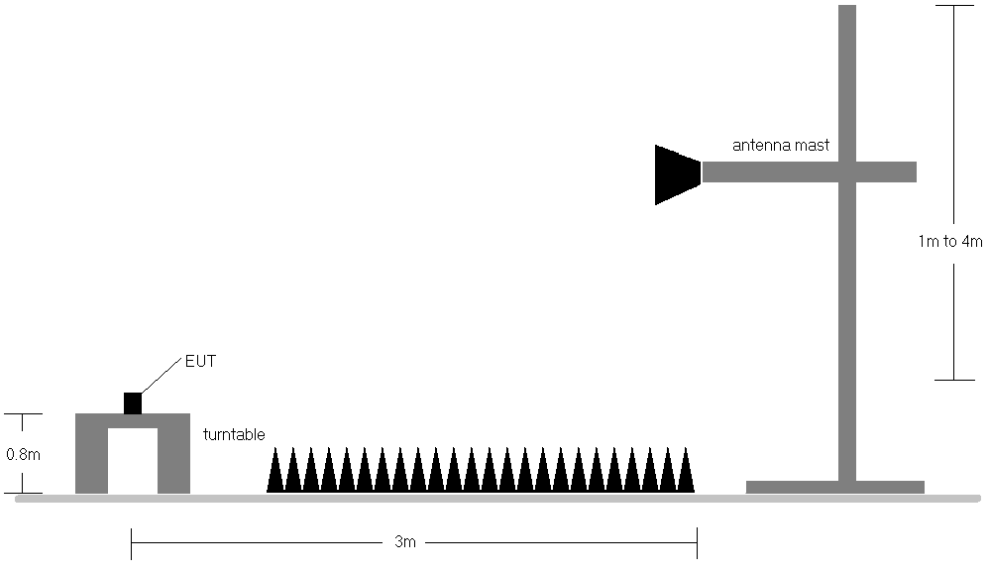


Figure 7-10. Test Instrument & Measurement Setup

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.

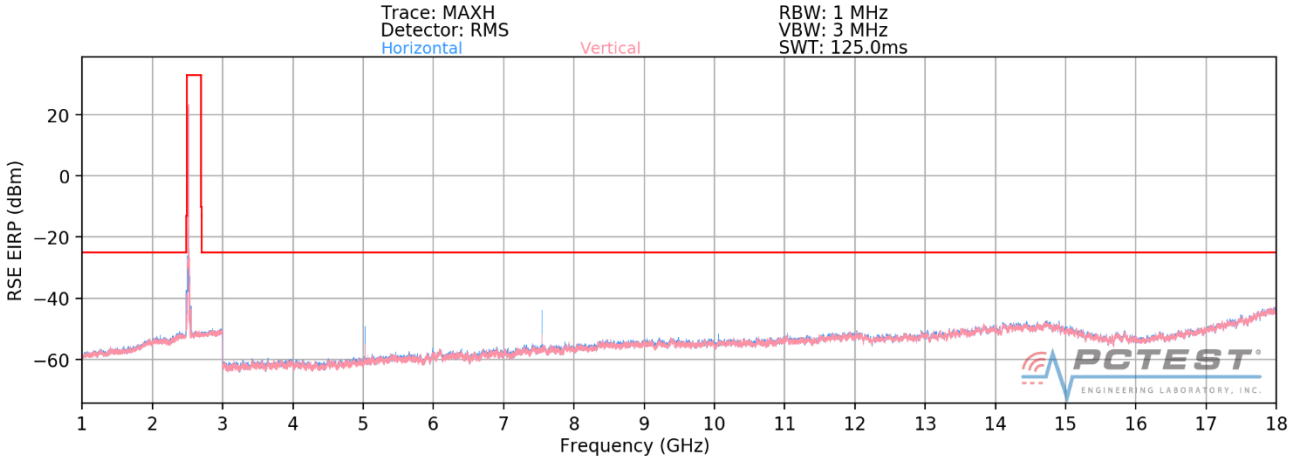
3) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.

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

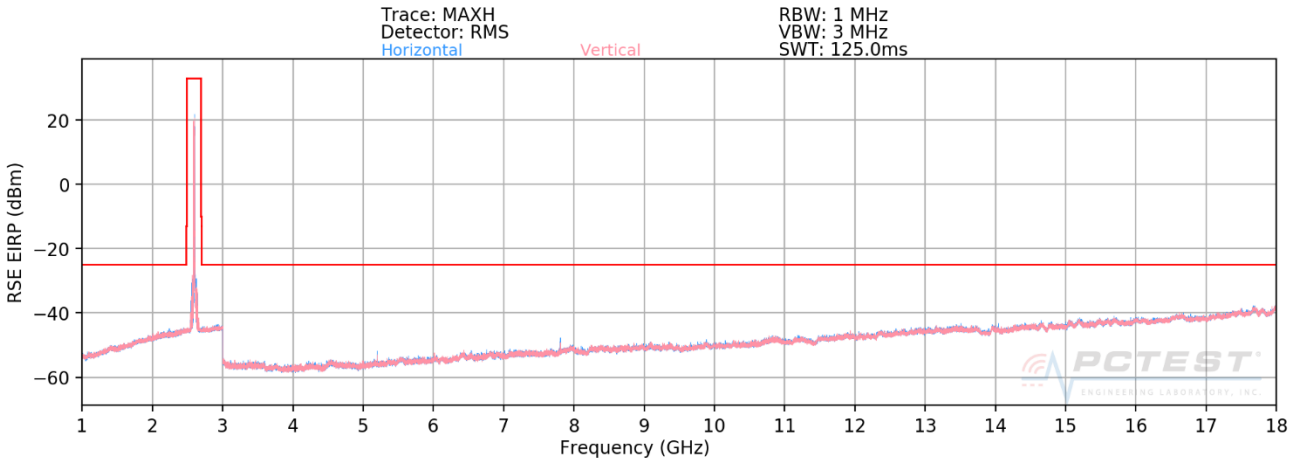
5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

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

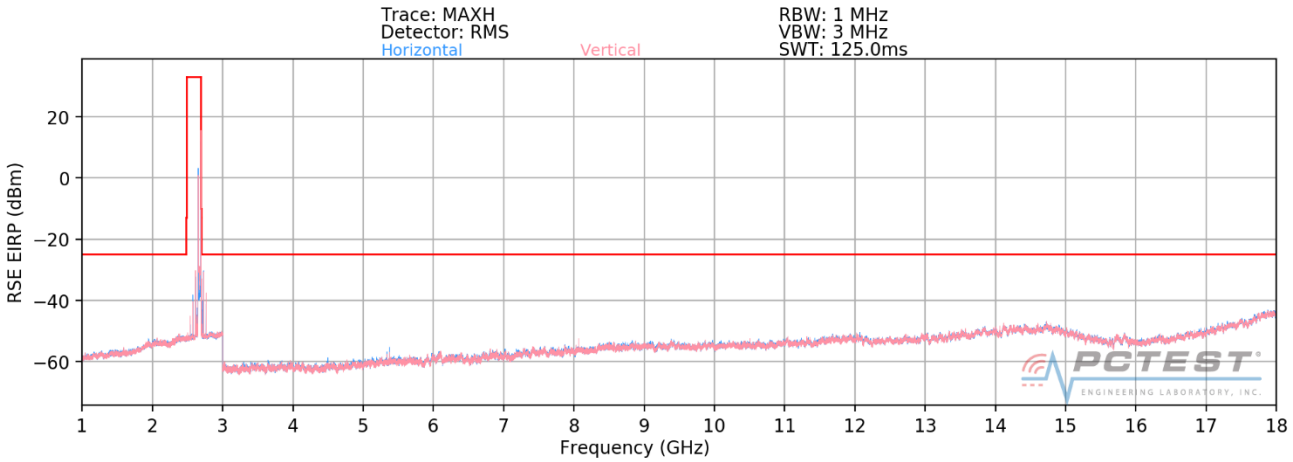
ULCA Band 41 (PC2)



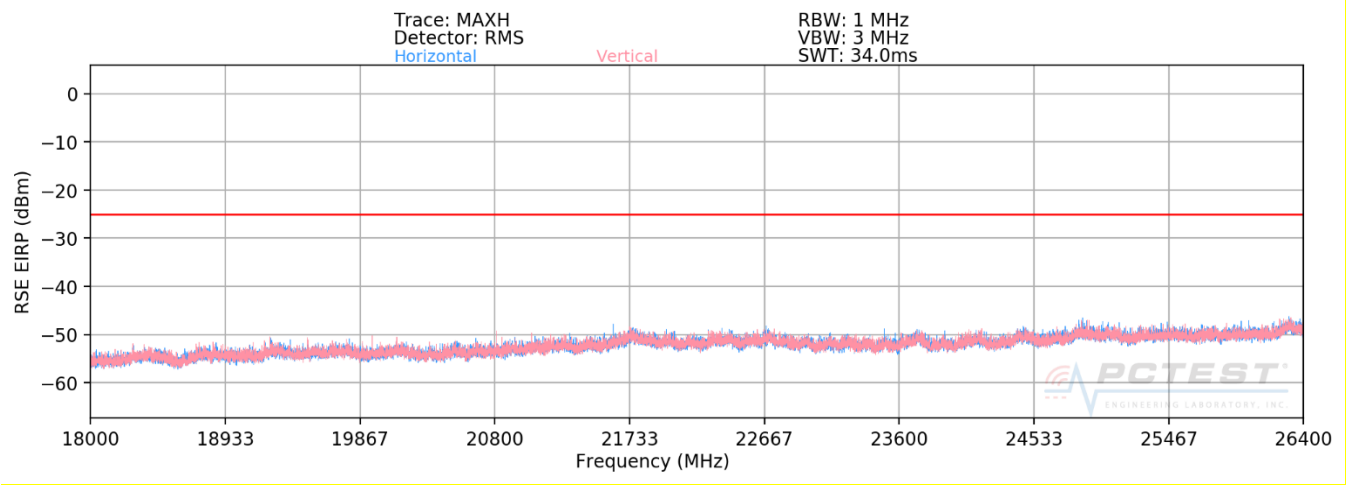
Plot 7-354. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) Low Channel – PCC/SCC: 1RB)



Plot 7-355. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) Mid Channel – PCC/SCC: 1RB)



Plot 7-356. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) High Channel – PCC/SCC: 1RB)



Plot 7-357. Radiated Spurious Plot 18GHz – 26.5GHz (ULCA Band 41 (PC2))

OPERATING FREQUENCY (PCC):	2506.00	MHz
OPERATING FREQUENCY (SCC):	2525.80	MHz
CHANNEL (PCC):	39750	
CHANNEL (SCC):	39948	
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]
5012.00	V	100	127	-58.33	8.56	-49.77	-24.8
7518.00	V	104	102	-49.28	8.49	-40.79	-15.8
10024.00	V	112	271	-55.37	9.85	-45.52	-20.5
12530.00	V	-	-	-54.91	9.07	-45.84	-20.8
15036.00	V	-	-	-51.86	8.77	-43.09	-18.1

Plot 7-38. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel)

OPERATING FREQUENCY (PCC):	2593.00	MHz
OPERATING FREQUENCY (SCC):	2612.80	MHz
CHANNEL (PCC):	40620	
CHANNEL (SCC):	40818	
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	115	136	-60.62	8.70	-51.92	-26.9
7779.00	V	101	101	-48.85	8.69	-40.16	-15.2
10372.00	V	102	268	-56.75	9.62	-47.12	-22.1
12965.00	V	-	-	-53.97	8.99	-44.98	-20.0
15558.00	V	-	-	-50.59	8.32	-42.27	-17.3

Plot 7-39. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)

OPERATING FREQUENCY (PCC):	2680.00	MHz
OPERATING FREQUENCY (SCC):	2660.20	MHz
CHANNEL (PCC):	41490	
CHANNEL (SCC):	41292	
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	207	195	-62.45	8.70	-53.75	-28.8
8040.00	V	103	140	-55.79	8.95	-46.83	-21.8
10720.00	V	-	-	-57.07	9.32	-47.75	-22.8
13400.00	V	-	-	-53.39	8.77	-44.61	-19.6

Plot 7-40. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 0, SCC: RB 1 Offset 99 – High Channel)

7.11 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 71 Frequency Stability Measurements

OPERATING FREQUENCY:	680,500,000	Hz
CHANNEL:	133372	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	680,500,158	158	0.0000232
100 %		- 20	680,500,155	155	0.0000228
100 %		- 10	680,500,016	16	0.0000024
100 %		0	680,499,720	-280	-0.0000411
100 %		+ 10	680,500,090	90	0.0000132
100 %		+ 20	680,499,667	-333	-0.0000489
100 %		+ 30	680,499,916	-84	-0.0000123
100 %		+ 40	680,499,874	-126	-0.0000185
100 %		+ 50	680,500,140	140	0.0000206
BATT. ENDPOINT	2.78	+ 20	680,499,882	-118	-0.0000173

Table 7-41. Frequency Stability Data (Band 71)

Band 71 Frequency Stability Measurements

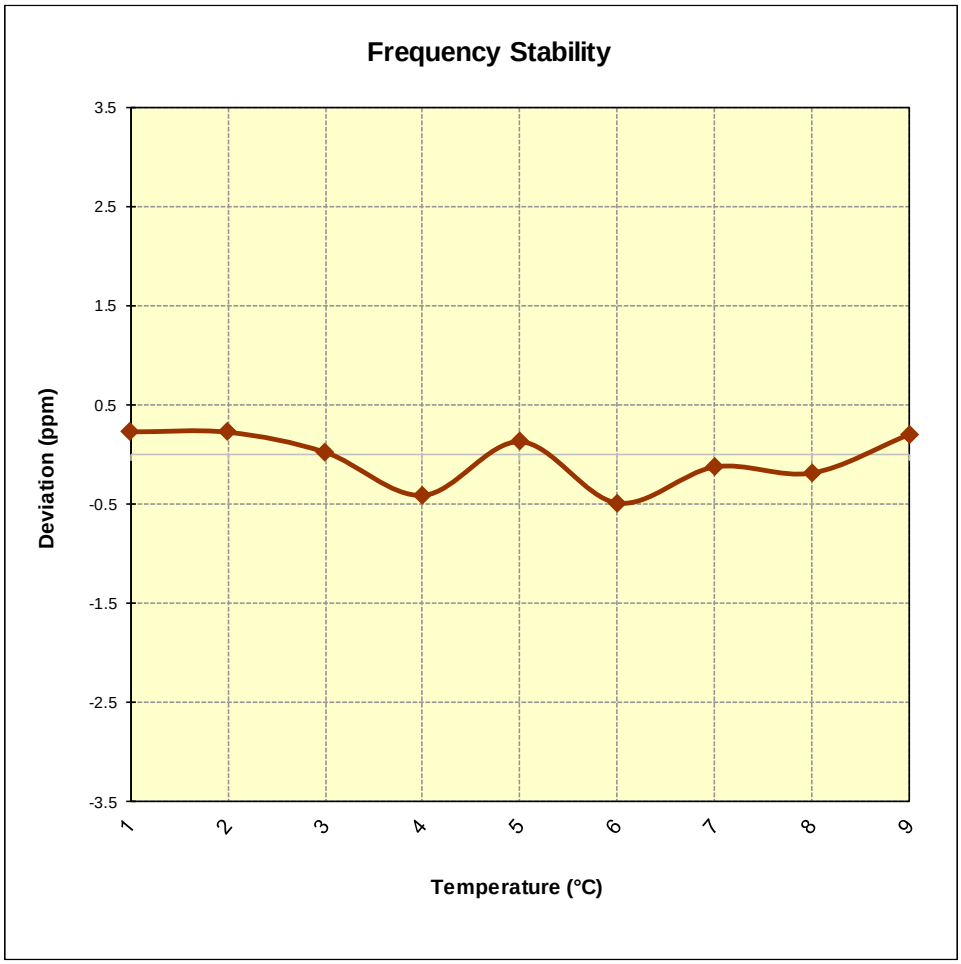


Figure 7-11. Frequency Stability Graph (Band 71)

Band 12 Frequency Stability Measurements

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	707,499,979	-21	-0.0000030
100 %		- 20	707,499,942	-58	-0.0000082
100 %		- 10	707,499,883	-117	-0.0000165
100 %		0	707,499,921	-79	-0.0000112
100 %		+ 10	707,500,066	66	0.0000093
100 %		+ 20	707,500,054	54	0.0000076
100 %		+ 30	707,499,822	-178	-0.0000252
100 %		+ 40	707,499,833	-167	-0.0000236
100 %		+ 50	707,499,587	-413	-0.0000584
BATT. ENDPOINT	2.78	+ 20	707,499,922	-78	-0.0000110

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

Band 12 Frequency Stability Measurements

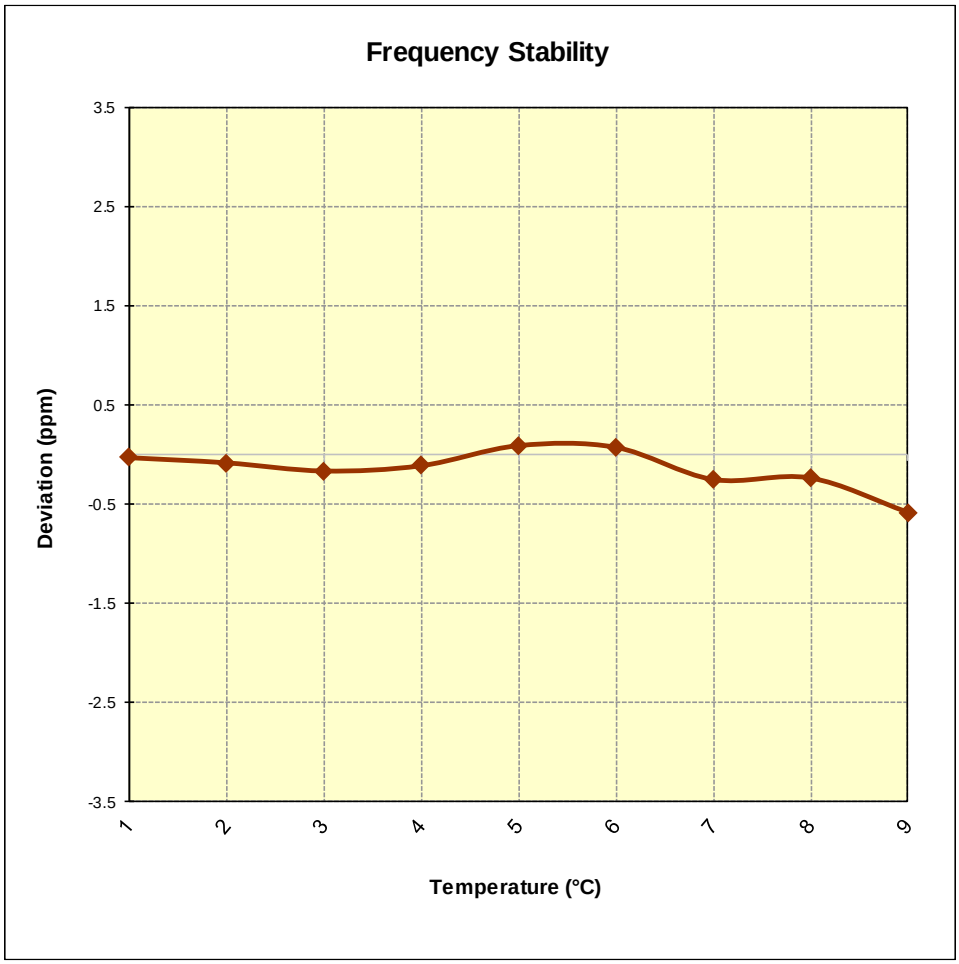


Figure 7-12. Frequency Stability Graph (Band 12)

Band 13 Frequency Stability Measurements

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	781,999,961	-39	-0.0000050
100 %		- 20	782,000,082	82	0.0000105
100 %		- 10	782,000,220	220	0.0000281
100 %		0	782,000,095	95	0.0000121
100 %		+ 10	781,999,817	-183	-0.0000234
100 %		+ 20	782,000,316	316	0.0000404
100 %		+ 30	781,999,979	-21	-0.0000027
100 %		+ 40	782,000,009	9	0.0000012
100 %		+ 50	782,000,328	328	0.0000419
BATT. ENDPOINT	2.78	+ 20	781,999,816	-184	-0.0000235

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

Band 13 Frequency Stability Measurements

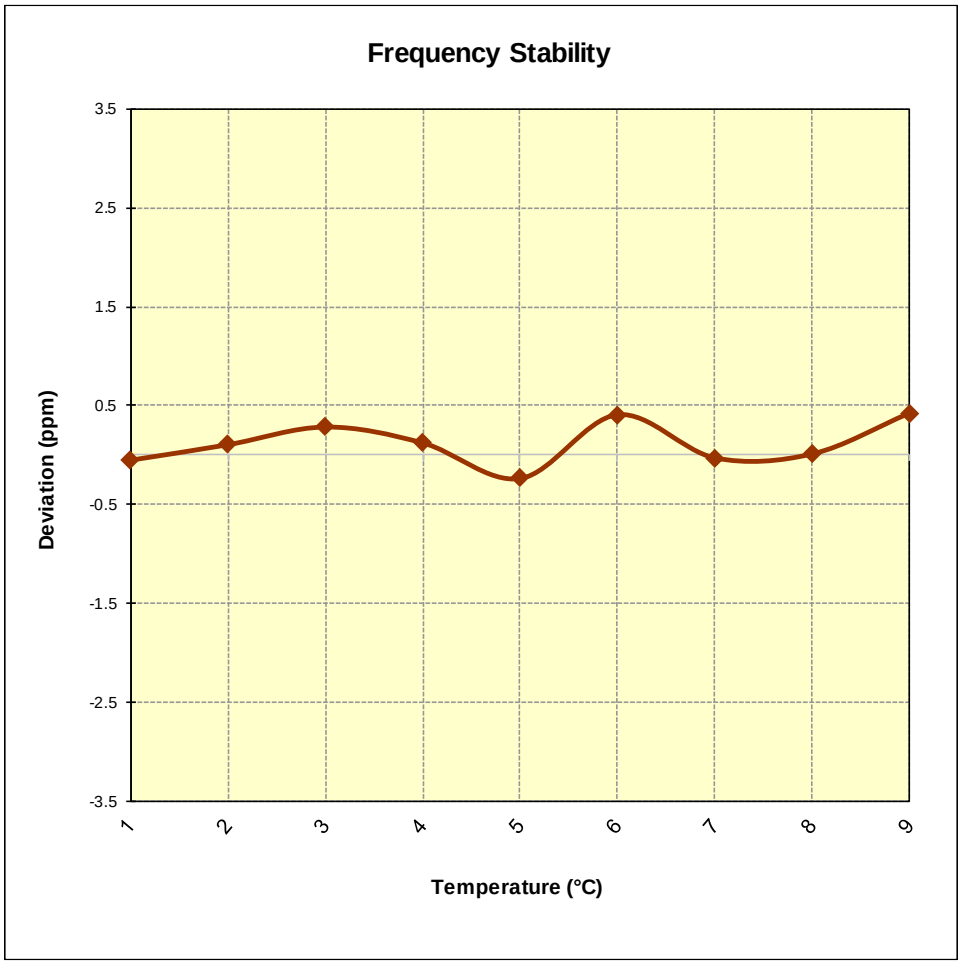


Figure 7-13. Frequency Stability Graph (Band 13)

Band 26/5 Frequency Stability Measurements

OPERATING FREQUENCY:	831,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	4.25	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	831,499,973	-27	-0.0000032
100 %		- 20	831,500,024	24	0.0000029
100 %		- 10	831,500,117	117	0.0000141
100 %		0	831,499,965	-35	-0.0000042
100 %		+ 10	831,500,161	161	0.0000194
100 %		+ 20	831,500,113	113	0.0000136
100 %		+ 30	831,499,967	-33	-0.0000040
100 %		+ 40	831,500,089	89	0.0000107
100 %		+ 50	831,499,920	-80	-0.0000096
BATT. ENDPOINT	2.78	+ 20	831,500,076	76	0.0000091

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

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 26/5 Frequency Stability Measurements

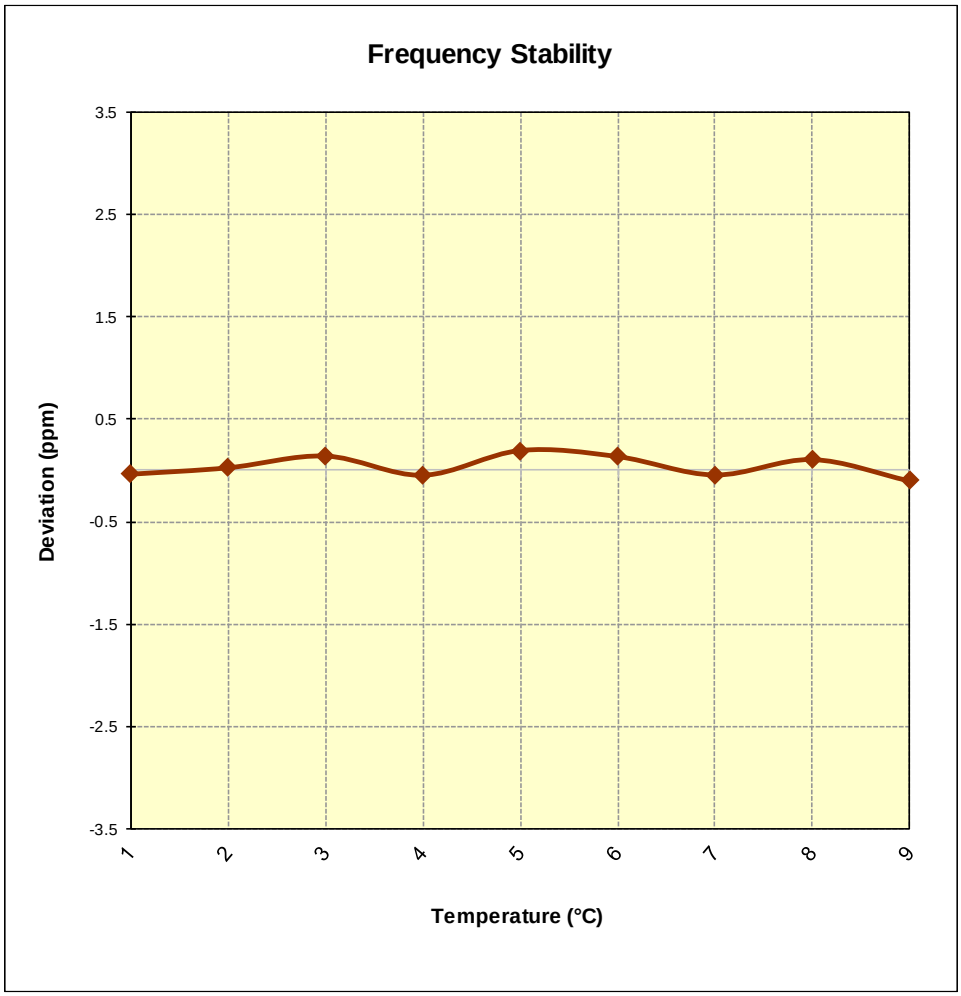


Figure 7-14. Frequency Stability Graph (Band 26/5)

Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	1,745,000,124	124	0.0000071
100 %		- 20	1,744,999,958	-42	-0.0000024
100 %		- 10	1,745,000,247	247	0.0000142
100 %		0	1,745,000,340	340	0.0000195
100 %		+ 10	1,744,999,928	-72	-0.0000041
100 %		+ 20	1,744,999,986	-14	-0.0000008
100 %		+ 30	1,745,000,362	362	0.0000207
100 %		+ 40	1,745,000,242	242	0.0000139
100 %		+ 50	1,744,999,959	-41	-0.0000023
BATT. ENDPOINT	2.78	+ 20	1,744,999,690	-310	-0.0000178

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

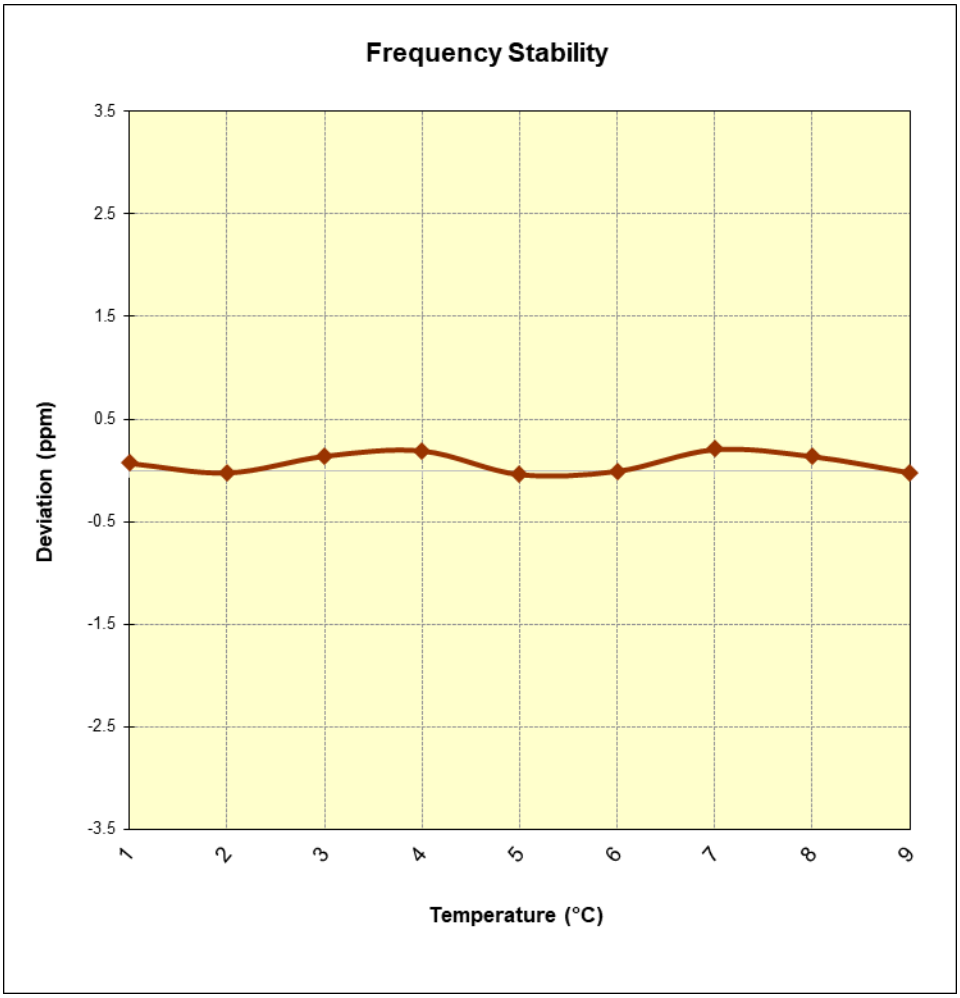


Figure 7-15. Frequency Stability Graph (Band 66/4)

Band 25/2 Frequency Stability Measurements

OPERATING FREQUENCY:	1,882,500,000	Hz
CHANNEL:	26365	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	1,882,500,378	378	0.0000201
100 %		- 20	1,882,499,907	-93	-0.0000049
100 %		- 10	1,882,500,228	228	0.0000121
100 %		0	1,882,499,559	-441	-0.0000234
100 %		+ 10	1,882,499,729	-271	-0.0000144
100 %		+ 20	1,882,500,096	96	0.0000051
100 %		+ 30	1,882,499,905	-95	-0.0000050
100 %		+ 40	1,882,499,851	-149	-0.0000079
100 %		+ 50	1,882,499,633	-367	-0.0000195
BATT. ENDPOINT	2.78	+ 20	1,882,500,244	244	0.0000130

Table 7-46. Frequency Stability Data (Band 25/2)

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 25/2 Frequency Stability Measurements

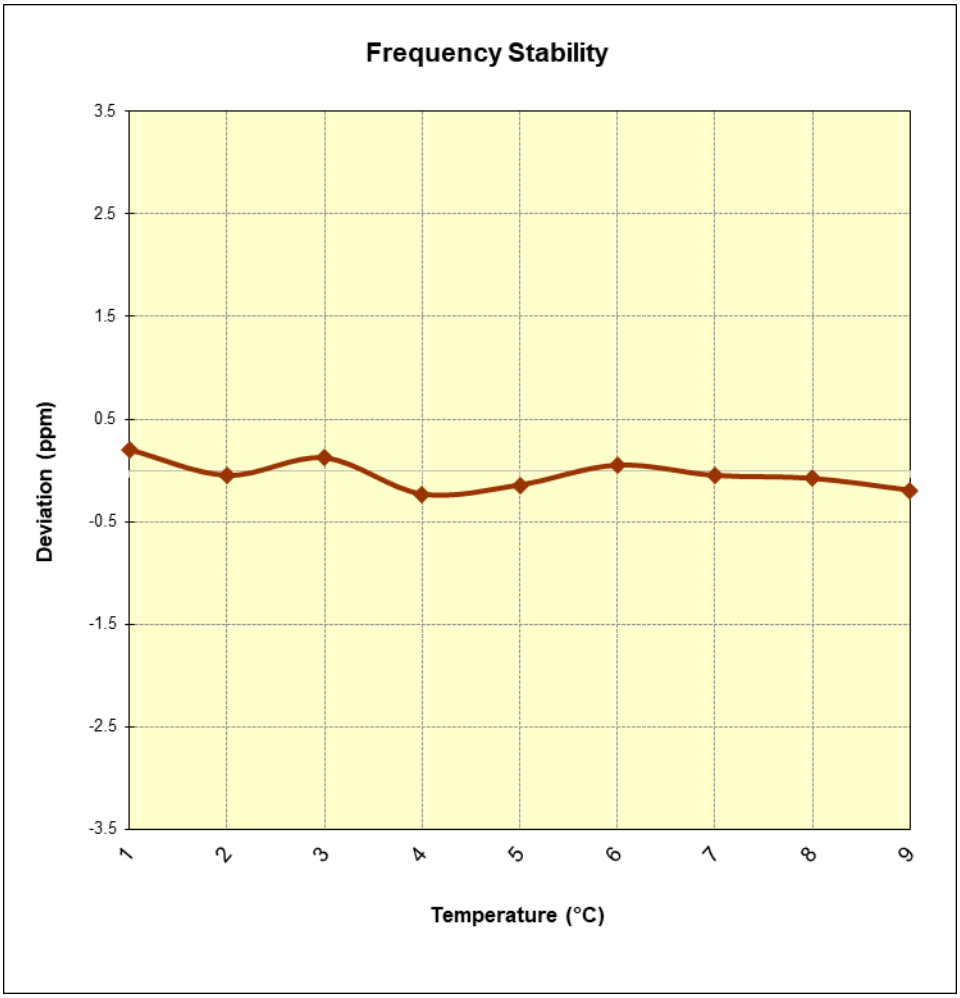


Figure 7-16. Frequency Stability Graph (Band 25/2)

Band 41 Frequency Stability Measurements

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	2,593,000,229	229	0.0000088
100 %		- 20	2,593,000,040	40	0.0000015
100 %		- 10	2,592,999,897	-103	-0.0000040
100 %		0	2,593,000,229	229	0.0000088
100 %		+ 10	2,593,000,069	69	0.0000027
100 %		+ 20	2,592,999,906	-94	-0.0000036
100 %		+ 30	2,592,999,999	-1	0.0000000
100 %		+ 40	2,593,000,160	160	0.0000062
100 %		+ 50	2,593,000,358	358	0.0000138
BATT. ENDPOINT	2.78	+ 20	2,593,000,229	229	0.0000088

Table 7-47. 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

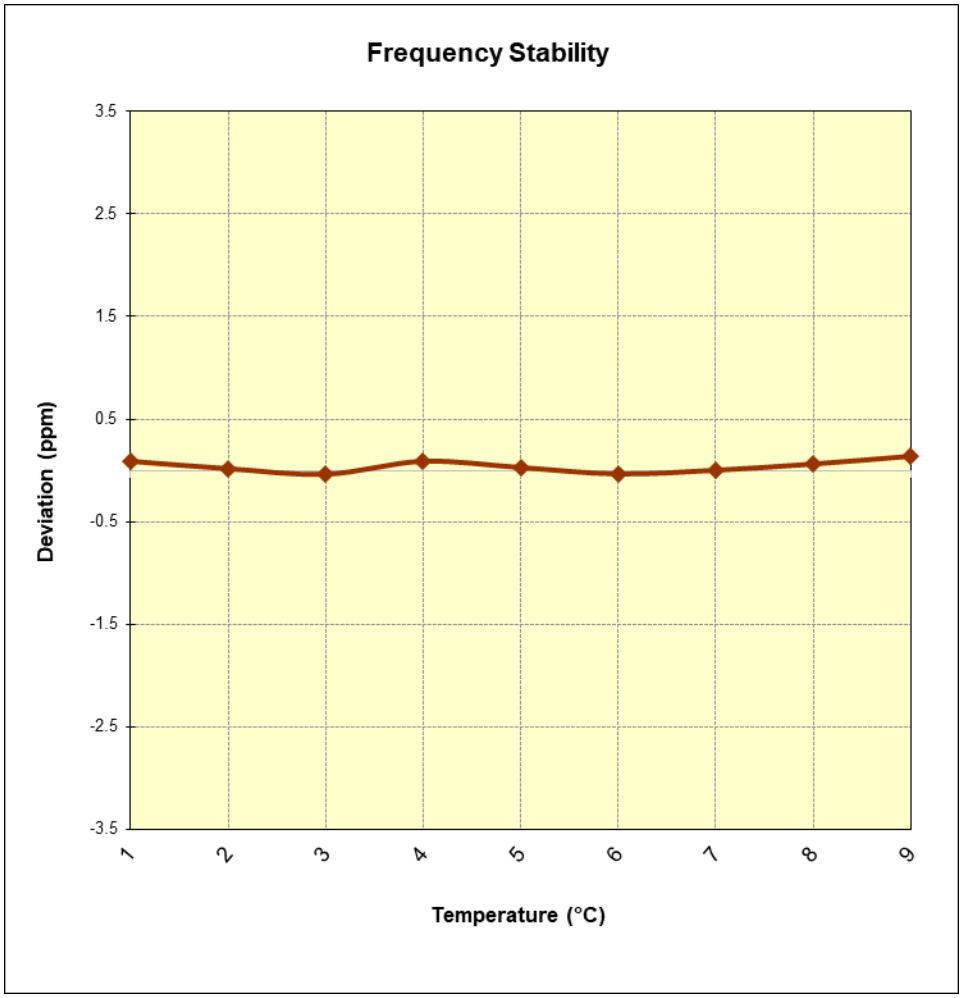


Figure 7-17. Frequency Stability Graph (Band 41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFL455DL** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.