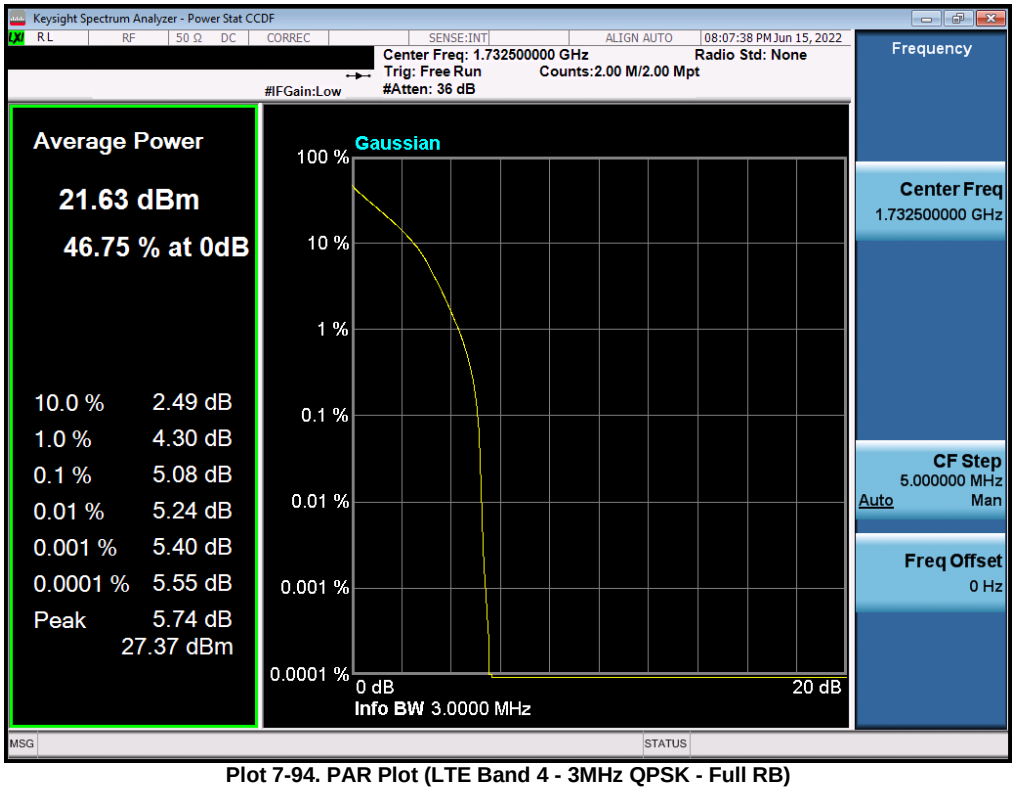
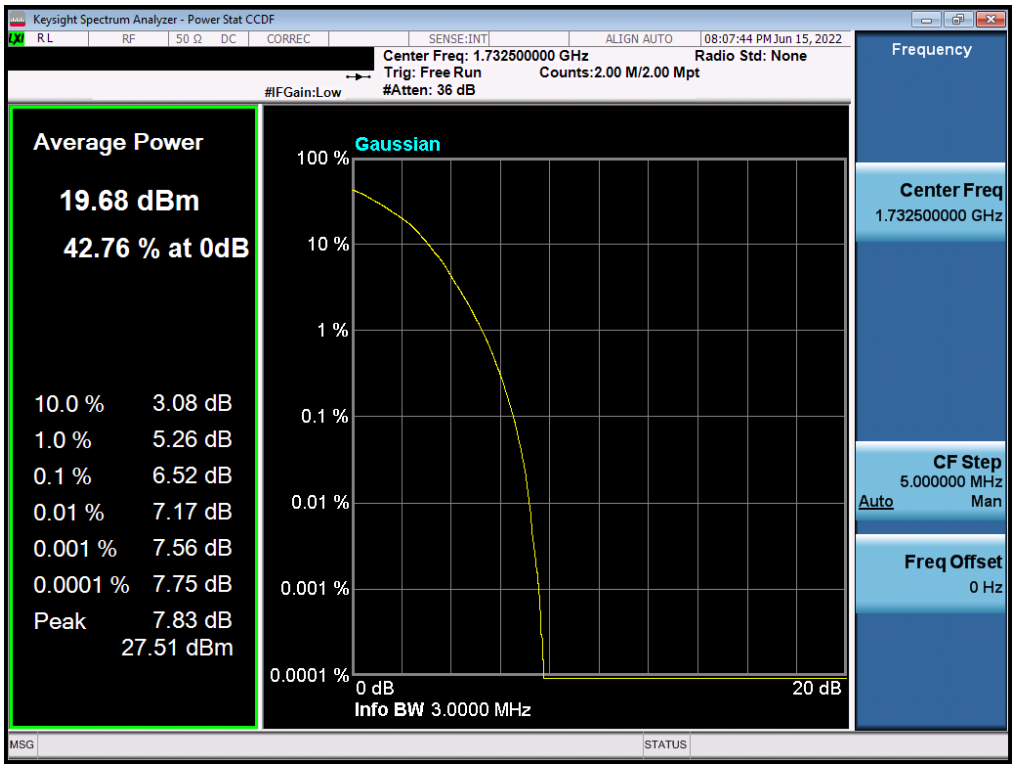
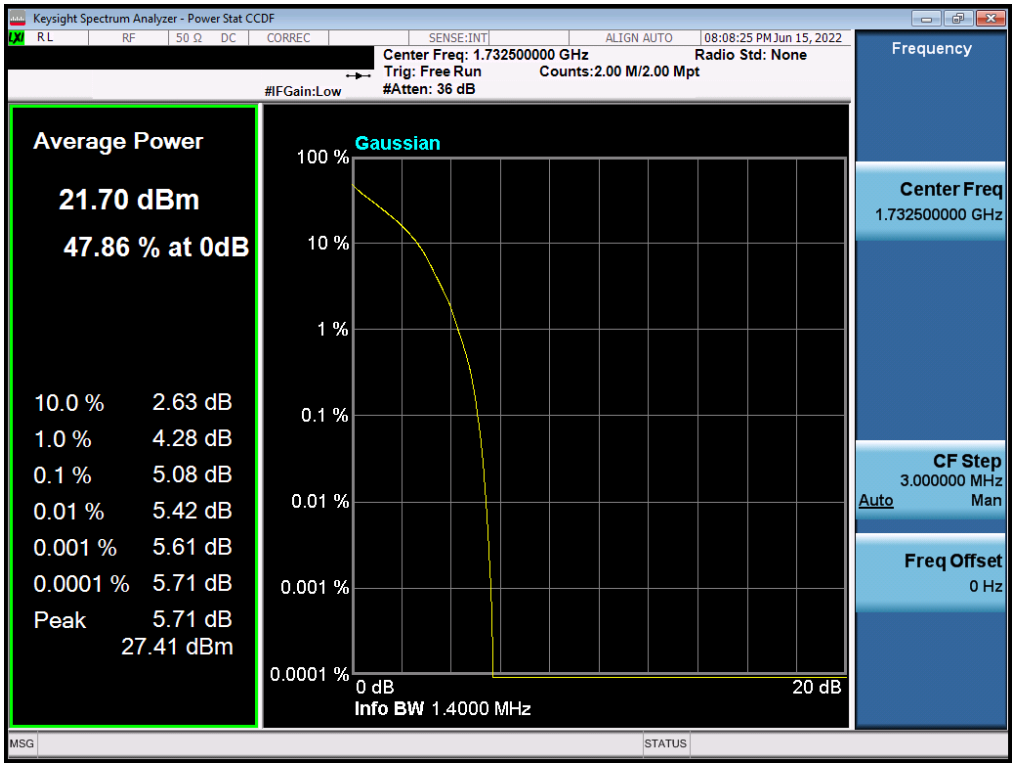
Plot 7-93. PAR Plot (LTE Band 4 - 5MHz 64-QAM - Full RB)



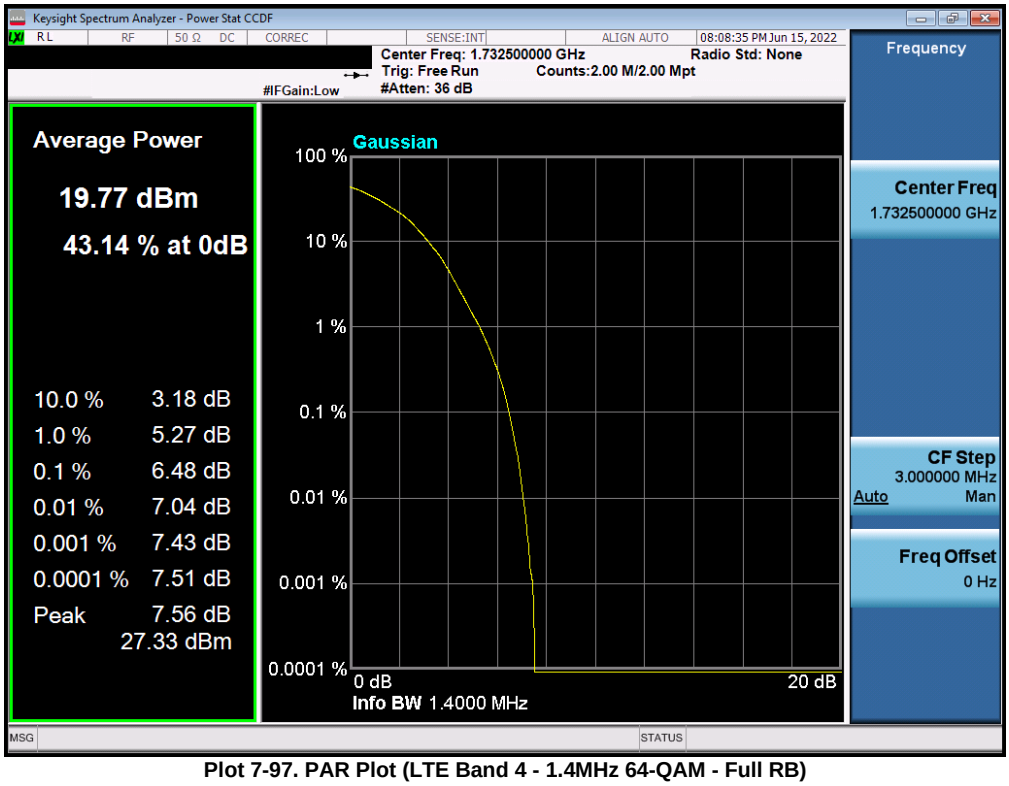
Plot 7-94. PAR Plot (LTE Band 4 - 3MHz QPSK - Full RB)



Plot 7-95. PAR Plot (LTE Band 4 - 3MHz 64-QAM - Full RB)



Plot 7-96. PAR Plot (LTE Band 4 - 1.4MHz QPSK - Full RB)



Plot 7-97. PAR Plot (LTE Band 4 - 1.4MHz 64-QAM - Full RB)

7.6 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 C63.26-2015 with the EUT transmitting into an integral antenna. Measurements are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.2.4.4

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.

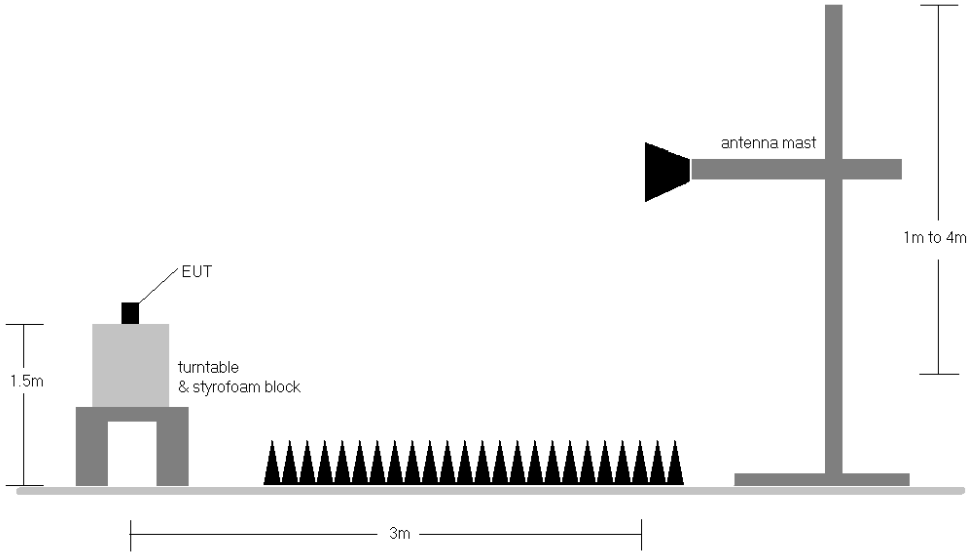


Figure 7-5. Radiated Test Setup <1GHz

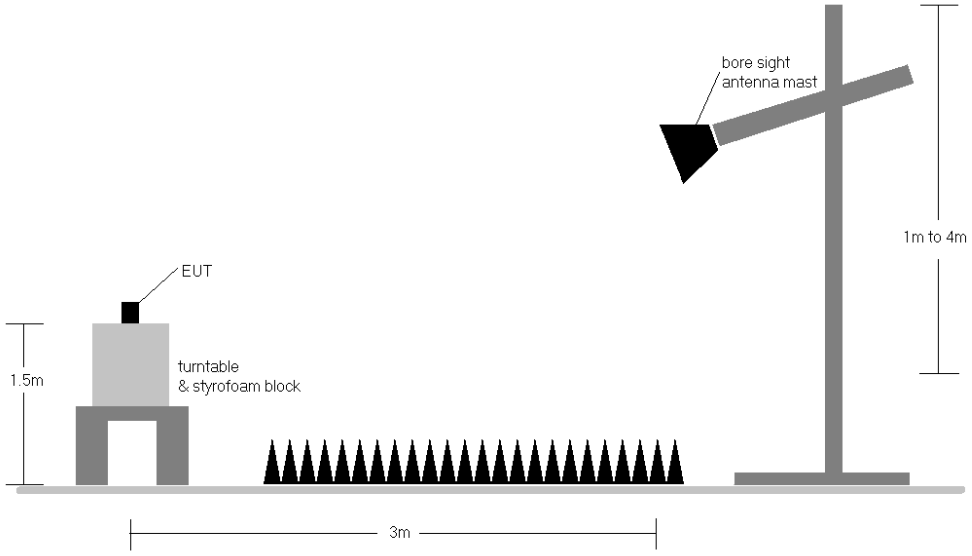


Figure 7-6. Radiated Test Setup >1GHz

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.

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	QPSK	1720.0	H	138	152	9.47	1 / 50	13.33	**22.80**	0.190	30.00	-7.20
	QPSK	1732.5	H	130	145	9.49	1 / 50	13.22	22.71	0.186	30.00	-7.29
	QPSK	1745.0	H	129	145	9.48	1 / 50	12.99	22.47	0.177	30.00	-7.53
	16-QAM	1720.0	H	138	152	9.47	1 / 50	12.98	22.45	0.176	30.00	-7.55
15 MHz	QPSK	1717.5	H	138	152	9.49	1 / 37	13.08	**22.57**	0.181	30.00	-7.43
	QPSK	1732.5	H	130	145	9.49	1 / 37	13.03	22.52	0.179	30.00	-7.48
	QPSK	1747.5	H	129	145	9.47	1 / 37	13.03	22.50	0.178	30.00	-7.50
	16-QAM	1717.5	H	138	152	9.49	1 / 37	12.84	22.33	0.171	30.00	-7.67
10 MHz	QPSK	1715.0	H	138	152	9.52	1 / 25	13.26	**22.78**	0.190	30.00	-7.22
	QPSK	1732.5	H	130	145	9.49	1 / 25	13.28	22.77	0.189	30.00	-7.23
	QPSK	1750.0	H	129	145	9.47	1 / 25	13.30	22.77	0.189	30.00	-7.23
	16-QAM	1732.5	H	130	145	9.49	1 / 25	12.70	22.19	0.166	30.00	-7.81
5 MHz	QPSK	1712.5	H	138	152	9.54	1 / 12	13.05	22.59	0.182	30.00	-7.41
	QPSK	1732.5	H	130	145	9.49	1 / 12	13.49	**22.98**	0.199	30.00	-7.02
	QPSK	1752.5	H	129	145	9.46	1 / 12	13.22	22.68	0.185	30.00	-7.32
	16-QAM	1712.5	H	138	152	9.54	1 / 12	12.66	22.21	0.166	30.00	-7.79
3 MHz	QPSK	1711.5	H	138	152	9.55	1 / 7	13.11	22.66	0.185	30.00	-7.34
	QPSK	1732.5	H	130	145	9.49	1 / 7	13.36	**22.85**	0.193	30.00	-7.15
	QPSK	1753.5	H	129	145	9.46	1 / 7	13.16	22.62	0.183	30.00	-7.38
	16-QAM	1753.5	H	129	145	9.46	1 / 7	12.76	22.22	0.167	30.00	-7.78
1.4 MHz	QPSK	1710.7	H	138	152	9.56	1 / 3	13.08	22.64	0.184	30.00	-7.36
	QPSK	1732.5	H	130	145	9.49	1 / 3	13.26	**22.75**	0.188	30.00	-7.25
	QPSK	1754.3	H	129	145	9.46	1 / 3	13.17	22.63	0.183	30.00	-7.37
	16-QAM	1732.5	H	130	145	9.49	1 / 3	12.72	22.21	0.166	30.00	-7.79
20 MHz	QPSK (Opposite Pol.)	1720.0	V	119	358	9.33	1 / 50	10.55	19.88	0.097	30.00	-10.12
	QPSK (CLOSED)	1720.0	V	145	333	9.33	1 / 50	12.19	21.52	0.142	30.00	-8.48
	QPSK (WCP)	1720.0	H	128	161	9.47	1 / 50	11.19	20.66	0.116	30.00	-9.34

Table 7-2. EIRP Data (LTE Band 4)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	704.0	H	142	337	3.48	1 / 0	13.60	17.08	0.051	36.99	-19.91	14.93	0.031	34.77	-19.84
	QPSK	707.5	H	131	329	3.52	1 / 49	13.77	17.29	0.054	36.99	-19.70	15.14	0.033	34.77	-19.63
	QPSK	711.0	H	132	330	3.57	1 / 49	13.87	**17.44**	0.055	36.99	-19.55	**15.29**	0.034	34.77	-19.48
	16-QAM	711.0	H	132	330	3.57	1 / 49	13.19	16.76	0.047	36.99	-20.23	14.61	0.029	34.77	-20.16
5 MHz	QPSK	701.5	H	142	337	3.45	1 / 24	13.74	17.19	0.052	36.99	-19.80	15.04	0.032	34.77	-19.73
	QPSK	707.5	H	131	329	3.52	1 / 12	13.69	17.21	0.053	36.99	-19.78	15.06	0.032	34.77	-19.71
	QPSK	713.5	H	132	330	3.70	1 / 12	13.95	**17.65**	0.058	36.99	-19.34	**15.50**	0.035	34.77	-19.27
	16-QAM	713.5	H	132	330	3.70	1 / 12	13.01	16.71	0.047	36.99	-20.28	14.56	0.029	34.77	-20.22
3 MHz	QPSK	700.5	H	142	337	3.39	1 / 14	13.88	17.27	0.053	36.99	-19.72	15.12	0.032	34.77	-19.65
	QPSK	707.5	H	131	329	3.52	1 / 0	13.74	17.26	0.053	36.99	-19.73	15.11	0.032	34.77	-19.66
	QPSK	714.5	H	132	330	3.71	1 / 7	13.90	**17.61**	0.058	36.99	-19.38	**15.46**	0.035	34.77	-19.31
	16-QAM	714.5	H	132	330	3.71	1 / 7	12.98	16.69	0.047	36.99	-20.30	14.54	0.028	34.77	-20.23
1.4 MHz	QPSK	699.7	H	142	337	3.33	1 / 3	13.91	17.23	0.053	36.99	-19.76	15.08	0.032	34.77	-19.69
	QPSK	707.5	H	131	329	3.52	1 / 3	13.71	17.24	0.053	36.99	-19.75	15.09	0.032	34.77	-19.68
	QPSK	715.3	H	132	330	3.72	1 / 3	13.78	**17.50**	0.056	36.99	-19.49	**15.35**	0.034	34.77	-19.42
	16-QAM	699.7	H	142	337	3.33	1 / 3	13.28	16.60	0.046	36.99	-20.39	14.45	0.028	34.77	-20.32
10 MHz	QPSK (Opposite Pol.)	711.0	V	158	151	3.67	1 / 0	12.28	15.95	0.039	36.99	-21.04	13.80	0.024	34.77	-20.97
	QPSK (Half Open)	711.0	H	283	309	3.57	1 / 49	12.79	16.36	0.043	36.99	-20.63	14.21	0.026	34.77	-20.56
	QPSK (WCP)	711.0	H	130	162	3.57	1 / 49	10.74	14.31	0.027	36.99	-22.68	12.16	0.016	34.77	-22.61

Table 7-3. ERP Data (LTE Band 12 – Ant A + ANT B)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	704.0	V	172	218	3.58	1 / 0	11.12	**14.70**	0.030	36.99	-22.29	**12.55**	0.018	34.77	-22.22
	QPSK	707.5	V	152	223	3.62	1 / 49	10.43	14.05	0.025	36.99	-22.94	11.90	0.016	34.77	-22.87
	QPSK	711.0	V	148	188	3.67	1 / 49	10.80	14.47	0.028	36.99	-22.52	12.32	0.017	34.77	-22.45
	16-QAM	704.0	V	172	218	3.58	1 / 0	10.28	13.86	0.024	36.99	-23.13	11.71	0.015	34.77	-23.06
5 MHz	QPSK	701.5	V	172	218	3.55	1 / 24	11.26	**14.81**	0.030	36.99	-22.18	**12.66**	0.018	34.77	-22.11
	QPSK	707.5	V	152	223	3.62	1 / 12	10.35	13.97	0.025	36.99	-23.02	11.82	0.015	34.77	-22.95
	QPSK	713.5	V	148	188	3.80	1 / 12	10.88	14.68	0.029	36.99	-22.31	12.53	0.018	34.77	-22.24
	16-QAM	701.5	V	172	218	3.55	1 / 24	10.46	14.01	0.025	36.99	-22.98	11.86	0.015	34.77	-22.91
3 MHz	QPSK	700.5	V	172	218	3.54	1 / 14	11.35	**14.89**	0.031	36.99	-22.10	**12.74**	0.019	34.77	-22.03
	QPSK	707.5	V	152	223	3.62	1 / 0	10.40	14.02	0.025	36.99	-22.97	11.87	0.015	34.77	-22.90
	QPSK	714.5	V	148	188	3.81	1 / 7	10.83	14.64	0.029	36.99	-22.35	12.49	0.018	34.77	-22.28
	16-QAM	700.5	V	172	218	3.54	1 / 14	10.28	13.82	0.024	36.99	-23.17	11.67	0.015	34.77	-23.10
1.4 MHz	QPSK	699.7	V	172	218	3.53	1 / 3	11.33	**14.85**	0.031	36.99	-22.14	**12.70**	0.019	34.77	-22.07
	QPSK	707.5	V	152	223	3.62	1 / 3	10.37	14.00	0.025	36.99	-22.99	11.85	0.015	34.77	-22.92
	QPSK	715.3	V	148	188	3.85	1 / 3	10.68	14.53	0.028	36.99	-22.46	12.38	0.017	34.77	-22.39
	16-QAM	699.7	V	172	218	3.53	1 / 3	10.71	14.23	0.027	36.99	-22.76	12.08	0.016	34.77	-22.69
10 MHz	Opposite Pol.	704.0	H	131	297	3.48	1 / 49	8.25	11.73	0.015	36.99	-25.26	9.58	0.009	34.77	-25.19
	WCP	704.0	V	164	257	3.58	1 / 0	8.37	11.95	0.016	36.99	-25.04	9.80	0.010	34.77	-24.97

Table 7-4. ERP Data (LTE Band 12 – Ant A)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	782.0	H	241	319	6.09	1 / 25	13.94	**20.03**	0.101	36.99	-16.96	**17.88**	0.061	34.77	-16.89
	16-QAM	782.0	H	241	319	6.09	1 / 25	13.33	19.42	0.088	36.99	-17.57	17.27	0.053	34.77	-17.50
5 MHz	QPSK	779.5	H	241	319	5.97	1 / 12	13.89	19.86	0.097	36.99	-17.13	17.71	0.059	34.77	-17.06
	QPSK	782.0	H	241	319	6.09	1 / 24	13.99	20.08	0.102	36.99	-16.91	17.93	0.062	34.77	-16.84
	QPSK	784.5	H	241	319	6.17	1 / 12	13.94	**20.11**	0.103	36.99	-16.88	**17.96**	0.063	34.77	-16.81
	16-QAM	779.5	H	241	319	5.97	1 / 12	13.67	19.63	0.092	36.99	-17.36	17.48	0.056	34.77	-17.29
10 MHz	QPSK (Opposite Pol.)	782.0	V	152	171	5.99	1 / 49	13.01	19.00	0.079	36.99	-17.99	16.85	0.048	34.77	-17.92
	QPSK (Half Open)	782.0	H	236	314	6.09	1 / 0	13.46	19.55	0.090	36.99	-17.44	17.40	0.055	34.77	-17.37
	QPSK (WCP)	782.0	H	202	355	6.09	1 / 49	8.23	14.32	0.027	36.99	-22.67	12.17	0.016	34.77	-22.60

Table 7-5. ERP Data (LTE Band 13 – Ant A + ANT B)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	782.0	V	146	186	5.99	1 / 25	10.83	**16.82**	0.048	36.99	-20.17	**14.67**	0.029	34.77	-20.10
	16-QAM	782.0	V	146	186	5.99	1 / 25	10.03	16.02	0.040	36.99	-20.97	13.87	0.024	34.77	-20.90
5 MHz	QPSK	779.5	V	146	186	5.97	1 / 12	10.68	16.65	0.046	36.99	-20.34	14.50	0.028	34.77	-20.27
	QPSK	782.0	V	146	186	5.99	1 / 24	10.88	16.87	0.049	36.99	-20.12	14.72	0.030	34.77	-20.05
	QPSK	784.5	V	146	186	6.07	1 / 12	10.83	**16.90**	0.049	36.99	-20.09	**14.75**	0.030	34.77	-20.02
	16-QAM	779.5	V	146	186	5.97	1 / 12	10.27	16.23	0.042	36.99	-20.76	14.08	0.026	34.77	-20.69
10 MHz	Opposite Pol.	782.0	H	246	96	6.09	1 / 0	9.75	15.84	0.038	36.99	-21.15	13.69	0.023	34.77	-21.08
	WCP	782.0	V	137	273	5.99	1 / 0	8.52	14.51	0.028	36.99	-22.48	12.36	0.017	34.77	-22.41

Table 7-6. ERP Data (LTE Band 13 – Ant A)

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.5.4

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.

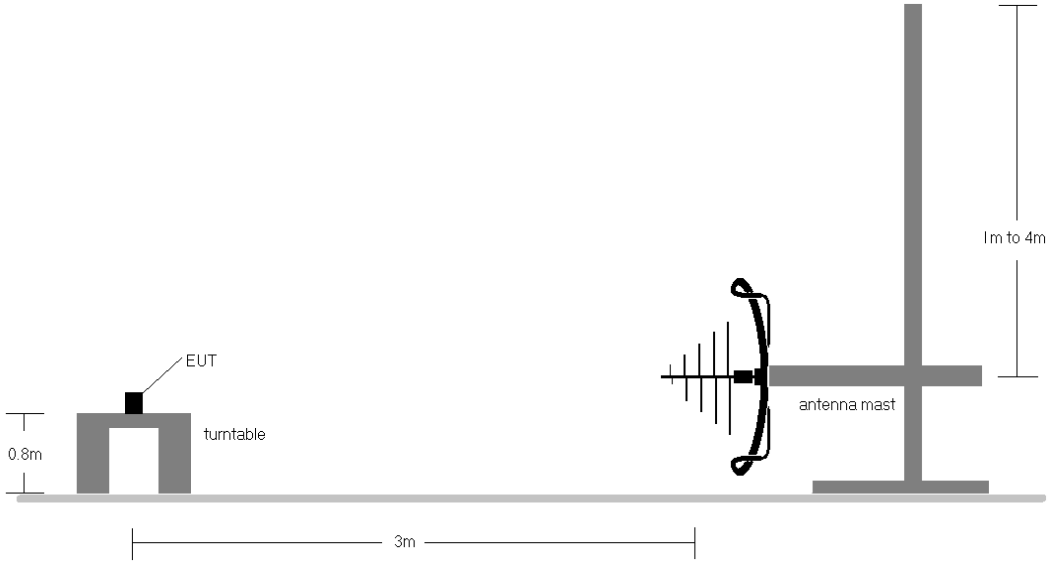


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

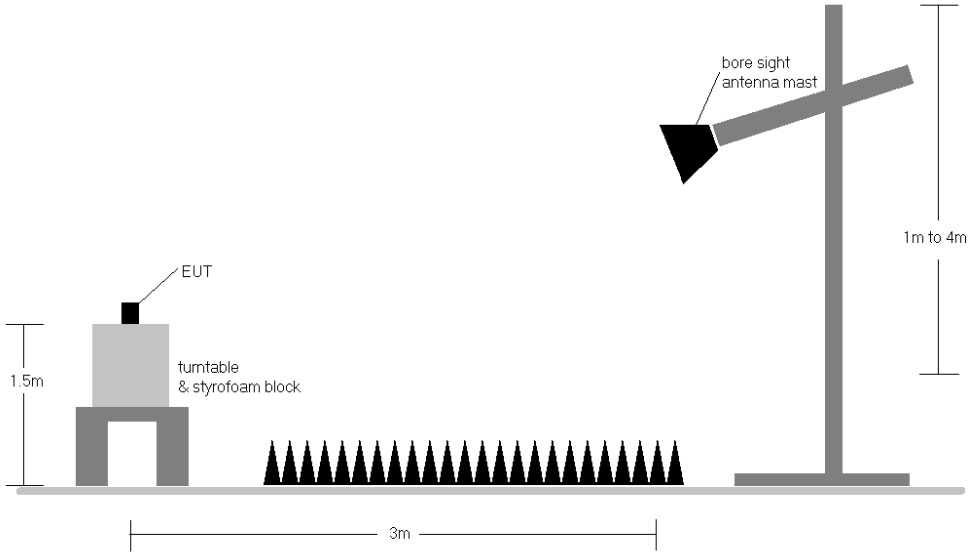


Figure 7-8. Test Instrument & Measurement Setup > 1GHz

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) 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.

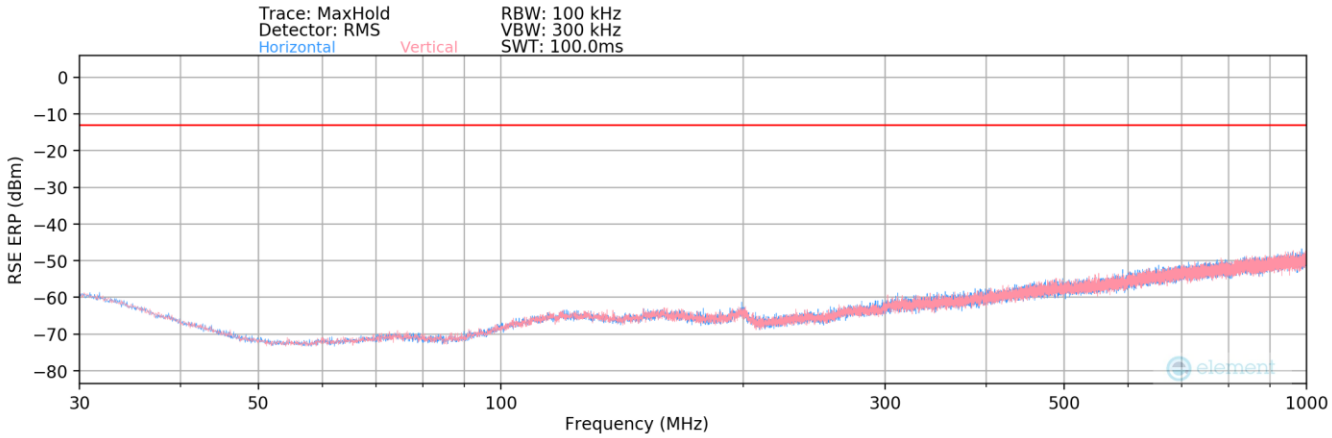
3) This unit was tested with its standard battery.

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

LTE Band 4

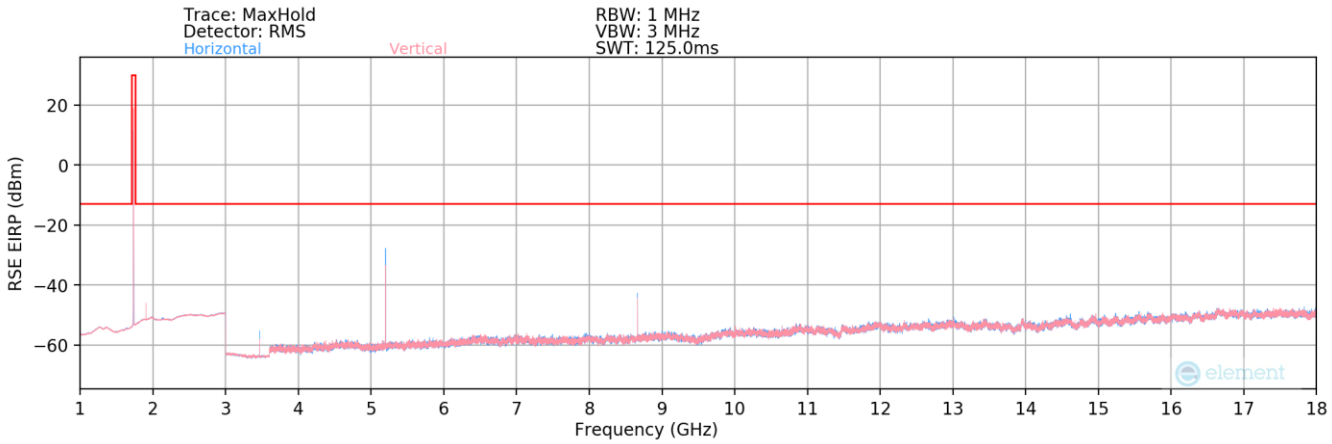


Plot 7-98. Radiated Spurious Plot (LTE Band 4)

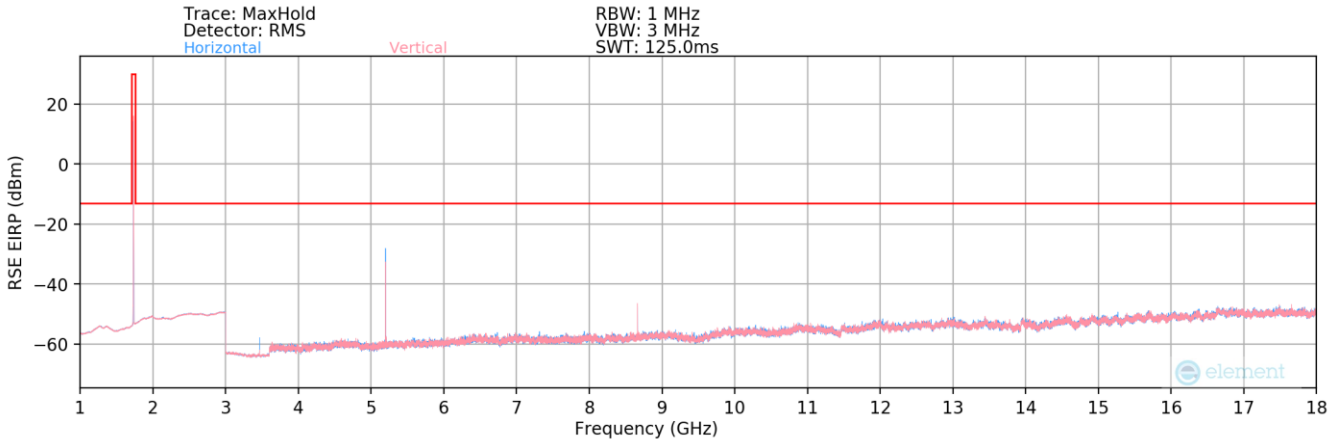
Bandwidth (MHz):	20
Frequency (MHz):	1732.5
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
692.37	H	-	-	-99.61	28.49	35.88	-61.53	-13.00	-48.53
955.38	H	-	-	-99.04	31.82	39.78	-57.63	-13.00	-44.63

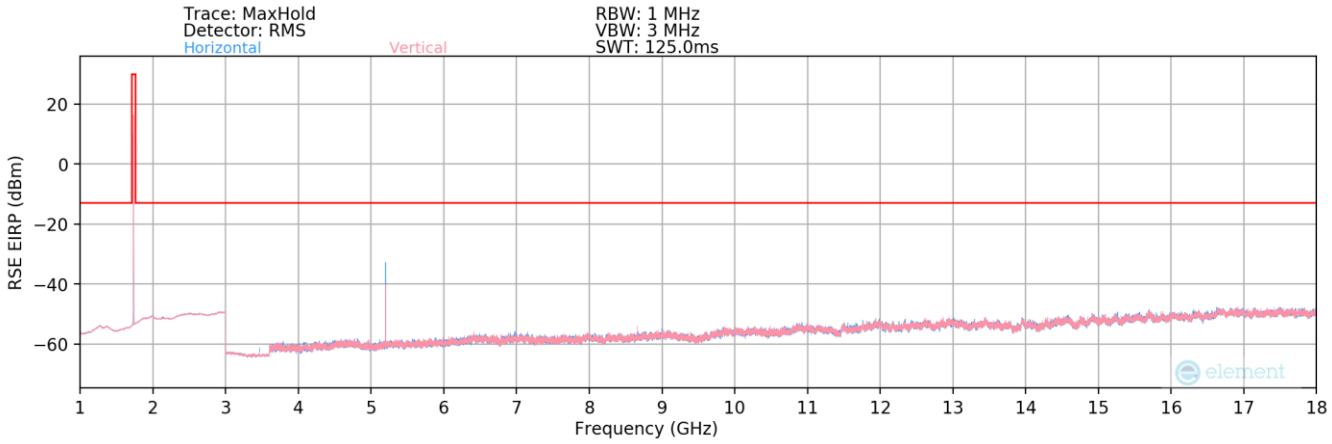
Table 7-7. Radiated Spurious Data (LTE Band 4 – Mid Channel)



Plot 7-99. Radiated Spurious Plot (LTE Band 4) _OPEN



Plot 7-100. Radiated Spurious Plot (LTE Band 4) _HALF



Plot 7-101. Radiated Spurious Plot (LTE Band 4) _CLOSED

Bandwidth (MHz):	20
Frequency (MHz):	1720
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3440.00	H	180	185	-71.59	2.88	38.29	-56.97	-13.00	-43.97
5160.00	H	206	338	-45.01	5.00	66.99	-28.27	-13.00	-15.27
6880.00	H	186	334	-77.23	7.96	37.73	-57.53	-13.00	-44.53
8600.00	H	141	349	-68.64	8.43	46.79	-48.46	-13.00	-35.46
10320.00	H	-	-	-79.89	11.16	38.27	-56.99	-13.00	-43.99
12040.00	H	130	81	-79.83	14.12	41.29	-53.97	-13.00	-40.97
13760.00	H	-	-	-80.59	15.19	41.60	-53.65	-13.00	-40.65
15480.00	H	-	-	-80.79	16.27	42.48	-52.77	-13.00	-39.77

Table 7-8. Radiated Spurious Data (LTE Band 4 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1732.5
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3465.00	H	231	18	-70.38	2.76	39.38	-55.88	-13.00	-42.88
5197.50	H	239	329	-44.08	5.32	68.24	-27.02	-13.00	-14.02
6930.00	H	192	335	-77.45	7.75	37.30	-57.96	-13.00	-44.96
8662.50	H	140	350	-67.93	8.84	47.91	-47.35	-13.00	-34.35
10395.00	H	-	-	-80.02	11.68	38.66	-56.60	-13.00	-43.60
12127.50	H	234	77	-78.69	13.74	42.05	-53.20	-13.00	-40.20
13860.00	H	-	-	-81.03	14.71	40.68	-54.57	-13.00	-41.57
15592.50	H	-	-	-80.16	16.11	42.95	-52.31	-13.00	-39.31

Table 7-9. Radiated Spurious Data (LTE Band 4 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1745
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3490.00	H	252	190	-68.14	2.69	41.55	-53.71	-13.00	-40.71
5235.00	H	202	74	-44.06	5.03	67.97	-27.29	-13.00	-14.29
6980.00	H	184	358	-77.72	7.16	36.44	-58.82	-13.00	-45.82
8725.00	H	144	19	-67.38	8.55	48.17	-47.08	-13.00	-34.08
10470.00	H	-	-	-80.23	11.64	38.41	-56.85	-13.00	-43.85
12215.00	H	223	80	-79.42	13.70	41.28	-53.98	-13.00	-40.98
13960.00	H	-	-	-80.11	14.14	41.03	-54.23	-13.00	-41.23
15705.00	H	-	-	-80.15	17.45	44.30	-50.96	-13.00	-37.96

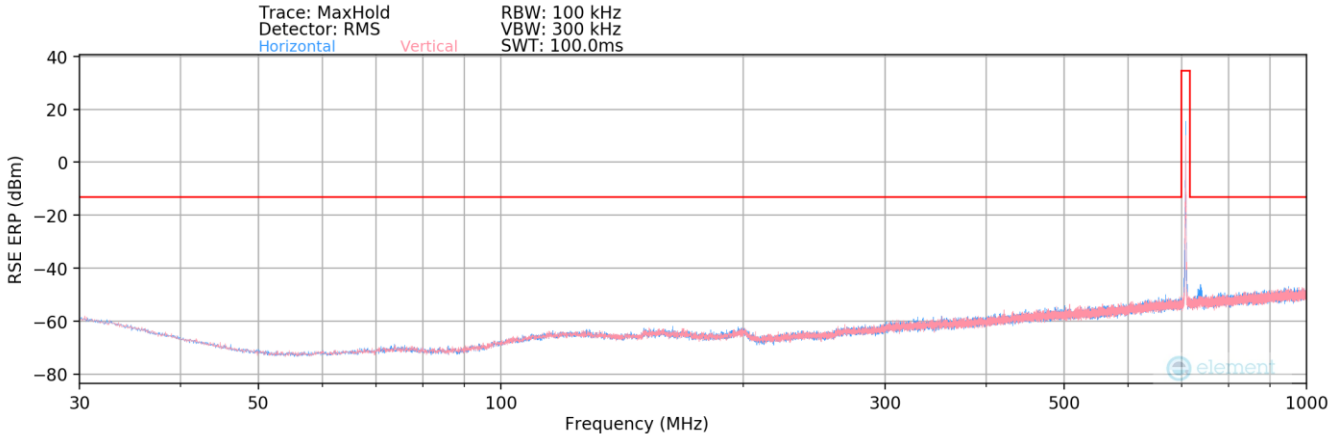
Table 7-10. Radiated Spurious Data (LTE Band 4 – High Channel)

Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	20
Frequency (MHz):	1732.5
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3465.00	H	140	178	-70.88	2.76	38.88	-56.38	-13.00	-43.38
5197.50	H	350	226	-48.97	5.32	63.35	-31.91	-13.00	-18.91
6930.00	H	288	343	-77.85	7.75	36.90	-58.36	-13.00	-45.36
8662.50	H	276	319	-75.42	8.84	40.42	-54.84	-13.00	-41.84
10395.00	H	-	-	-80.11	11.68	38.57	-56.69	-13.00	-43.69
12127.50	H	-	-	-80.38	13.74	40.36	-54.89	-13.00	-41.89
13860.00	H	-	-	-81.05	14.71	40.66	-54.59	-13.00	-41.59

Table 7-11. Radiated Spurious Data with WCP (LTE Band 4)

LTE Band 12 – Ant A + ANT B

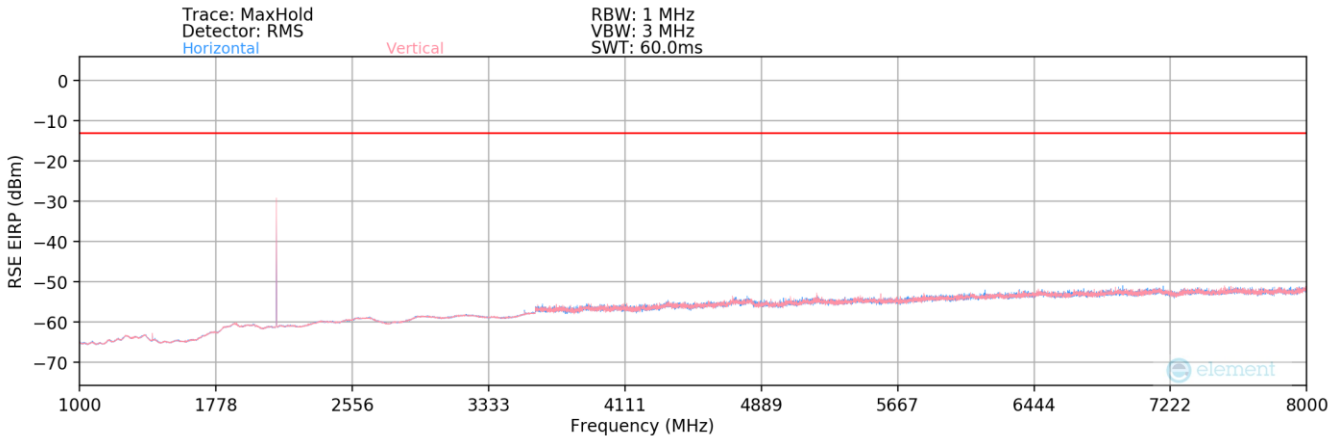


Plot 7-102. Radiated Spurious Plot (LTE Band 12 – Ant A + ANT B)

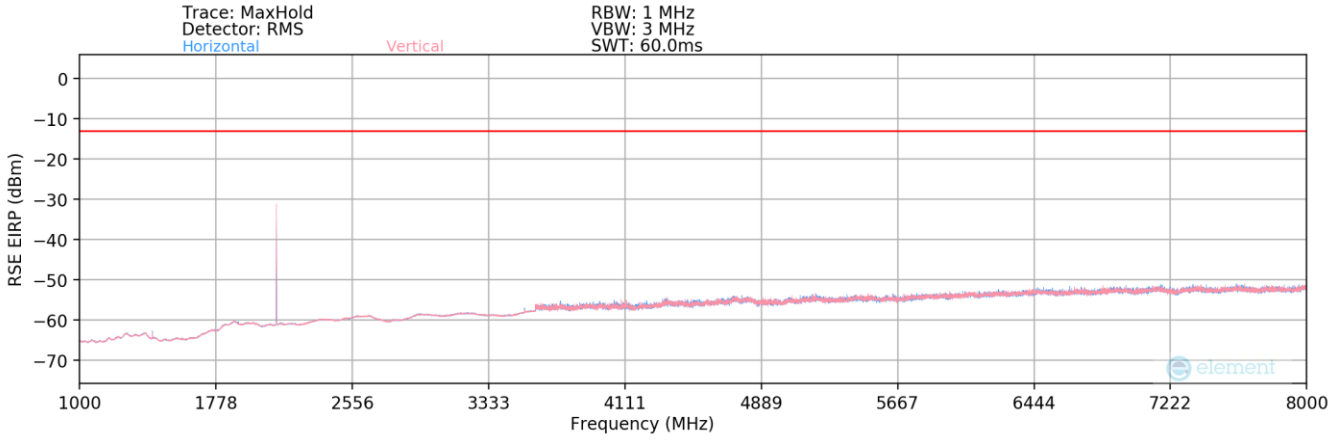
Bandwidth (MHz):	10
Frequency (MHz):	707.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
166.84	V	-	-	-101.64	19.47	24.83	-72.58	-13.00	-59.58
352.01	V	-	-	-101.28	22.26	27.98	-69.42	-13.00	-56.42
737.00	V	-	-	-99.59	29.14	36.55	-60.86	-13.00	-47.86

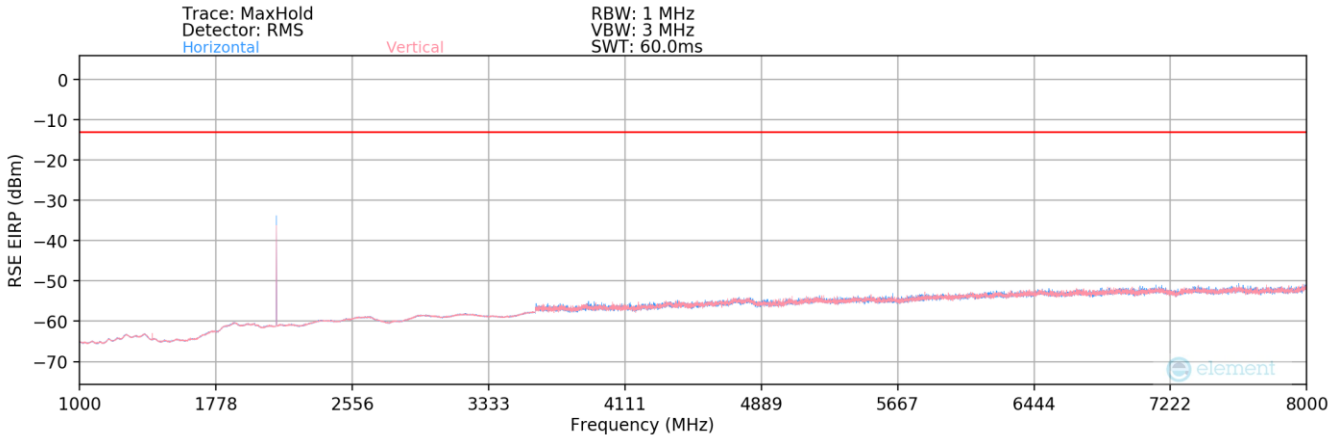
Table 7-12. Radiated Spurious Data (LTE Band 12 – Mid Channel – Ant A + ANT B)



Plot 7-103. Radiated Spurious Plot (LTE Band 12 – Ant A + ANT B) _OPEN



Plot 7-104. Radiated Spurious Plot (LTE Band 12 – Ant A + ANT B) _HALF



Plot 7-105. Radiated Spurious Plot (LTE Band 12 – Ant A + ANT B) _CLOSED

Bandwidth (MHz):	10
Frequency (MHz):	704
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1408.00	V	285	126	-70.70	-3.69	32.61	-62.65	-13.00	-49.65
2112.00	V	145	250	-40.55	-0.26	66.19	-29.07	-13.00	-16.07
2816.00	V	135	116	-76.03	0.80	31.77	-63.49	-13.00	-50.49
3520.00	V	145	89	-72.09	2.19	37.10	-58.16	-13.00	-45.16
4224.00	V	-	-	-77.04	2.93	32.89	-62.37	-13.00	-49.37
4928.00	V	-	-	-77.83	3.97	33.14	-62.12	-13.00	-49.12
5632.00	V	-	-	-77.92	5.33	34.41	-60.84	-13.00	-47.84
6336.00	V	-	-	-78.61	6.67	35.06	-60.20	-13.00	-47.20

Table 7-13. Radiated Spurious Data (LTE Band 12 – Low Channel – Ant A + ANT B)

Bandwidth (MHz):	10
Frequency (MHz):	707.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1415.00	V	300	133	-72.23	-3.79	30.98	-64.28	-13.00	-51.28
2122.50	V	134	251	-40.31	-0.25	66.44	-28.81	-13.00	-15.81
2830.00	V	145	113	-76.23	0.83	31.60	-63.66	-13.00	-50.66
3537.50	V	141	191	-73.13	2.43	36.30	-58.95	-13.00	-45.95
4245.00	V	-	-	-77.43	3.01	32.58	-62.68	-13.00	-49.68
4952.50	V	-	-	-77.92	3.89	32.97	-62.29	-13.00	-49.29
5660.00	V	-	-	-78.12	5.27	34.15	-61.11	-13.00	-48.11
6367.50	V	-	-	-78.39	6.55	35.16	-60.10	-13.00	-47.10

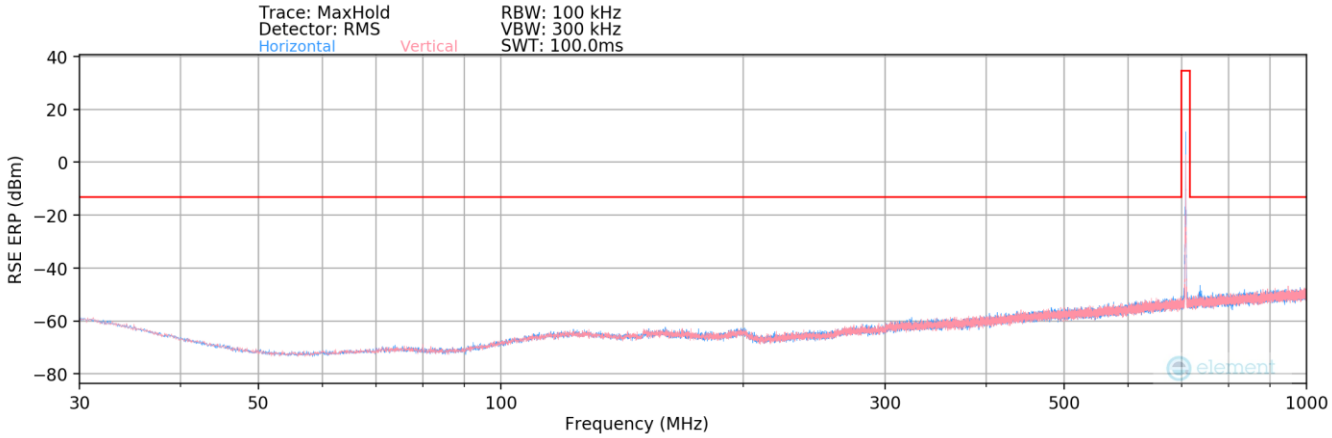
Table 7-14. Radiated Spurious Data (LTE Band 12 – Mid Channel – Ant A + ANT B)

Bandwidth (MHz):	10
Frequency (MHz):	711
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1422.00	V	380	321	-71.03	-3.83	32.14	-63.12	-13.00	-50.12
2133.00	V	186	293	-41.21	-0.22	65.57	-29.69	-13.00	-16.69
2844.00	V	143	105	-76.21	0.93	31.72	-63.54	-13.00	-50.54
3555.00	V	148	181	-73.73	2.76	36.03	-59.23	-13.00	-46.23
4266.00	V	-	-	-77.72	3.24	32.52	-62.74	-13.00	-49.74
4977.00	V	-	-	-78.11	4.07	32.96	-62.30	-13.00	-49.30
5688.00	V	-	-	-78.67	5.36	33.69	-61.57	-13.00	-48.57
6399.00	V	-	-	-78.59	6.78	35.19	-60.07	-13.00	-47.07

Table 7-15. Radiated Spurious Data (LTE Band 12 – High Channel – Ant A + ANT B)

LTE Band 12 – Ant A

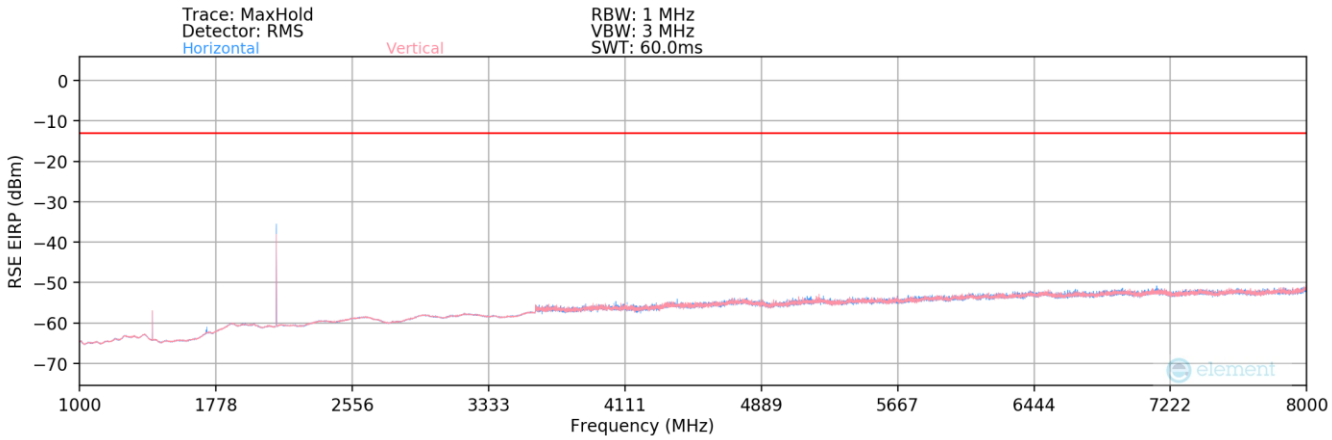


Plot 7-106. Radiated Spurious Plot (LTE Band 12 – Ant A)

Bandwidth (MHz):	10
Frequency (MHz):	707.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
838.70	H	-	-	-99.21	30.81	38.60	-58.81	-13.00	-45.81
737.50	H	-	-	-97.32	29.29	38.97	-58.44	-13.00	-45.44

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



Plot 7-107. Radiated Spurious Plot (LTE Band 12 – Ant A)

Bandwidth (MHz):	10
Frequency (MHz):	704
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3.00	H	168	234	-64.45	-3.80	38.75	-56.51	-13.00	-43.51
2.00	H	156	202	-47.91	-0.50	58.59	-36.66	-13.00	-23.66
3.00	H	-	-	-76.35	0.60	31.25	-64.00	-13.00	-51.00
3.00	H	127	294	-76.70	2.12	32.42	-62.84	-13.00	-49.84
4.00	H	-	-	-76.72	2.81	33.09	-62.17	-13.00	-49.17
3.00	H	-	-	-77.41	3.64	33.23	-62.03	-13.00	-49.03
2.00	H	-	-	-77.73	5.22	34.49	-60.77	-13.00	-47.77

Table 7-17. Radiated Spurious Data (LTE Band 12 – Low Channel – Ant A)

Bandwidth (MHz):	10
Frequency (MHz):	707.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5.00	H	228	235	-64.35	-3.90	38.75	-56.51	-13.00	-43.51
2.50	H	120	146	-43.94	-0.41	62.65	-32.60	-13.00	-19.60
3.00	H	-	-	-76.83	0.72	30.89	-64.37	-13.00	-51.37
7.50	H	179	285	-76.59	2.45	32.86	-62.40	-13.00	-49.40
5.00	H	-	-	-77.08	2.96	32.88	-62.37	-13.00	-49.37
2.50	H	-	-	-77.51	3.85	33.34	-61.92	-13.00	-48.92
3.00	H	-	-	-77.56	5.26	34.70	-60.56	-13.00	-47.56

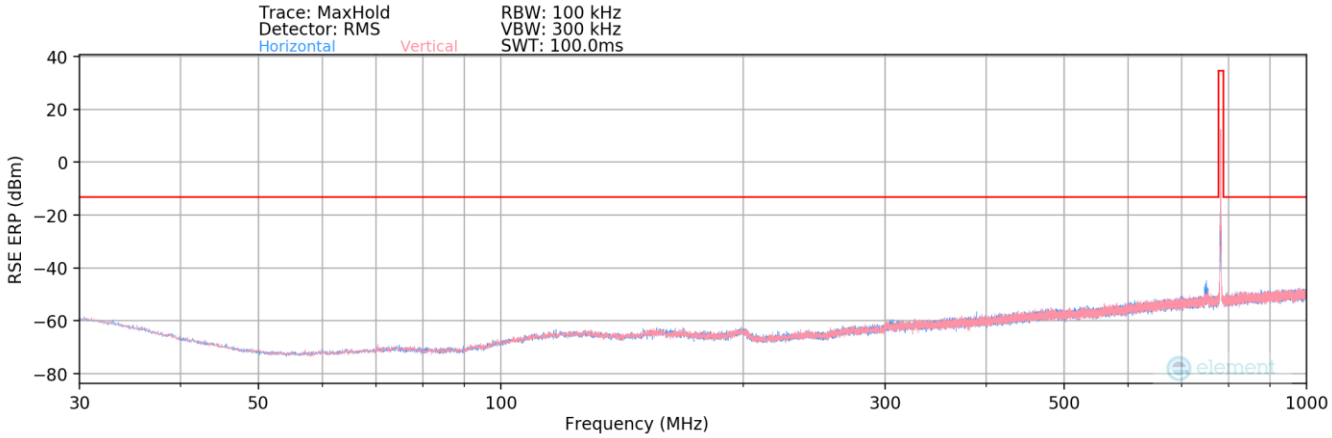
Table 7-18. Radiated Spurious Data (LTE Band 12 – Mid Channel – Ant A)

Bandwidth (MHz):	10
Frequency (MHz):	711
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
2.00	H	157	197	-63.88	-3.98	39.14	-56.12	-13.00	-43.12
3.00	H	200	178	-44.58	-0.28	62.14	-33.12	-13.00	-20.12
4.00	H	-	-	-76.53	0.89	31.36	-63.90	-13.00	-50.90
5.00	H	398	286	-75.96	2.66	33.70	-61.56	-13.00	-48.56
6.00	H	-	-	-77.11	3.15	33.04	-62.21	-13.00	-49.21
7.00	H	-	-	-77.46	4.01	33.55	-61.70	-13.00	-48.70
8.00	H	0	0	-77.92	5.09	34.17	-61.09	-13.00	-48.09

Table 7-19. Radiated Spurious Data (LTE Band 12 – High Channel – Ant A)

LTE Band 13 – Ant A + ANT B

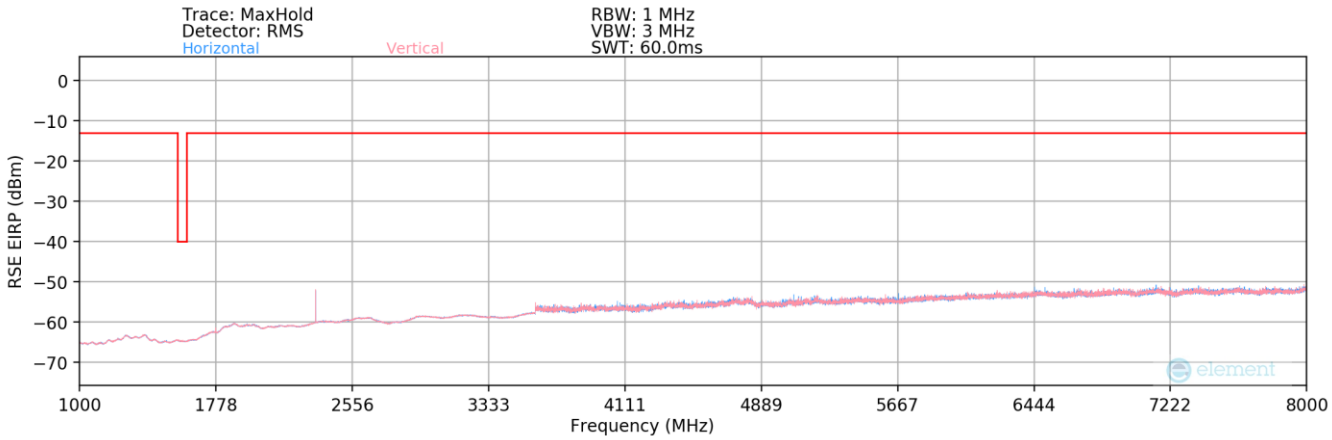


Plot 7-108. Radiated Spurious Plot (LTE Band 13 – Ant A + ANT B)

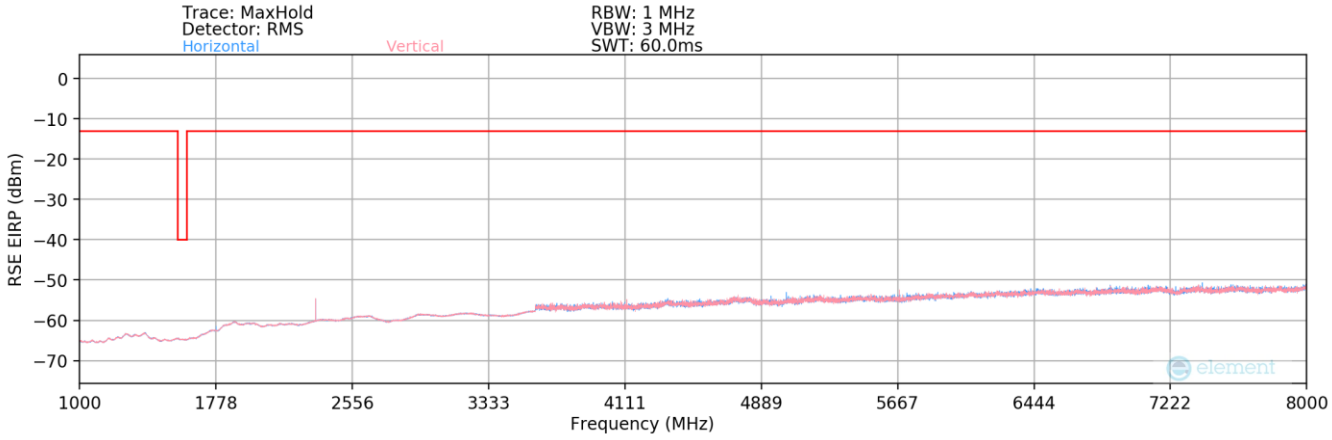
Bandwidth (MHz):	10
Frequency (MHz):	782
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
381.11	H	-	-	-101.68	22.62	27.94	-69.46	-13.00	-56.46
751.00	H	-	-	-99.24	29.63	37.39	-60.02	-13.00	-47.02

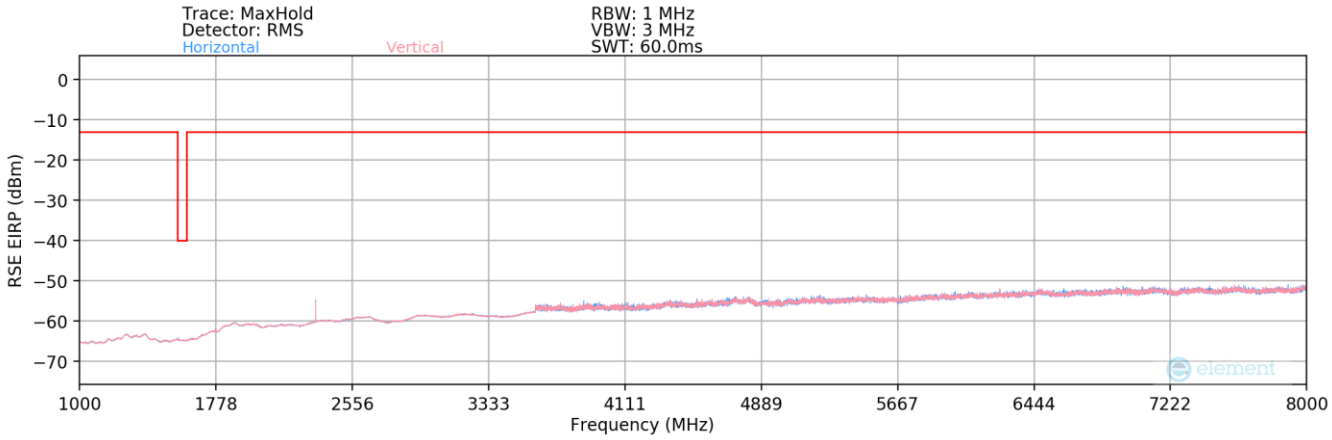
Table 7-20. Radiated Spurious Data (LTE Band 13 – Mid Channel – Ant A + ANT B)



Plot 7-109. Radiated Spurious Plot (LTE Band 13 – Ant A + ANT B) _OPEN



Plot 7-110. Radiated Spurious Plot (LTE Band 13 – Ant A + ANT B) _HALF



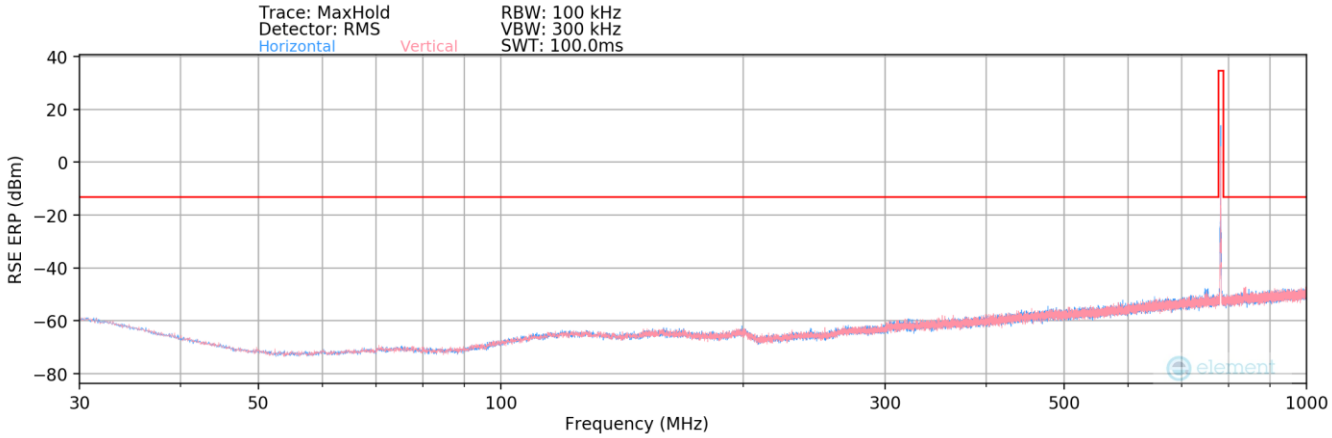
Plot 7-111. Radiated Spurious Plot (LTE Band 13 – Ant A + ANT B) _CLOSED

Bandwidth (MHz):	10
Frequency (MHz):	782
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1564.00	H	-	-	-76.49	-3.87	26.64	-68.62	-40.00	-28.62
2346.00	H	201	148	-61.34	0.64	46.30	-48.96	-13.00	-35.96
3128.00	H	-	-	-77.16	1.93	31.77	-63.49	-13.00	-50.49
3910.00	H	-	-	-77.64	3.09	32.45	-62.81	-13.00	-49.81
4692.00	H	-	-	-77.65	4.17	33.52	-61.73	-13.00	-48.73

Table 7-21. Radiated Spurious Data (LTE Band 13 – Mid Channel – Ant A + ANT B)

LTE Band 13 – Ant A

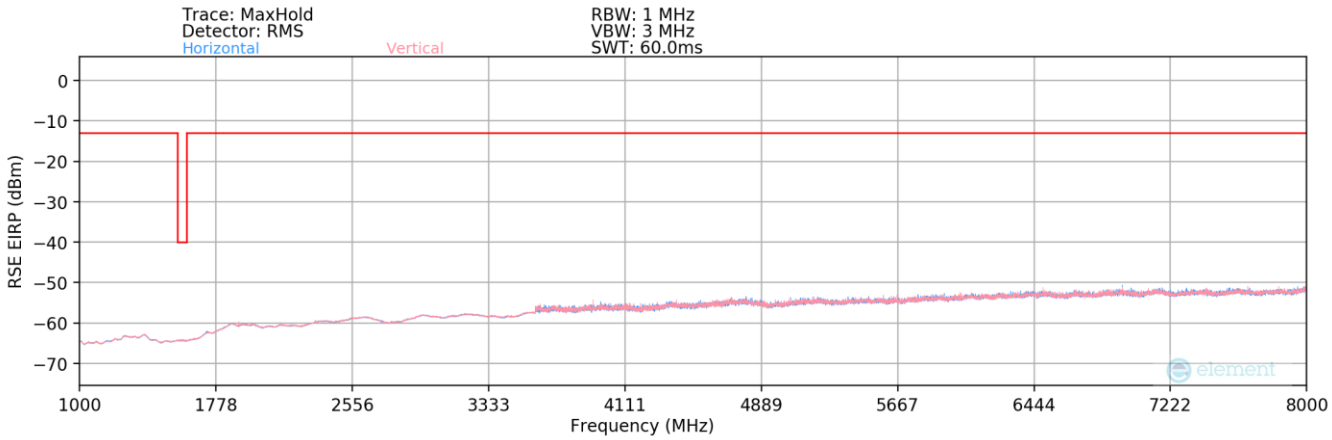


Plot 7-112. Radiated Spurious Plot (LTE Band 13 – Ant A)

Bandwidth (MHz):	10
Frequency (MHz):	782
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
737.50	H	-	-	-99.41	29.29	36.88	-60.53	-13.00	-47.53
807.89	H	-	-	-99.61	30.31	37.70	-59.71	-13.00	-46.71

Table 7-22. Radiated Spurious Data (LTE Band 13 – Mid Channel – Ant A)



Plot 7-113. Radiated Spurious Plot (LTE Band 13 – Ant A)

Bandwidth (MHz):	10
Frequency (MHz):	782
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1564.00	H	-	-	-76.06	-4.11	26.83	-68.42	-40.00	-28.42
2346.00	H	255	151	-74.82	0.50	32.68	-62.57	-13.00	-49.57
3128.00	H	-	-	-76.38	1.83	32.45	-62.81	-13.00	-49.81
3910.00	H	-	-	-77.64	3.05	32.41	-62.85	-13.00	-49.85
4692.00	H	-	-	-77.42	4.38	33.96	-61.30	-13.00	-48.30

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

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. 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 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI C63.26-2015 – Section 5.6

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

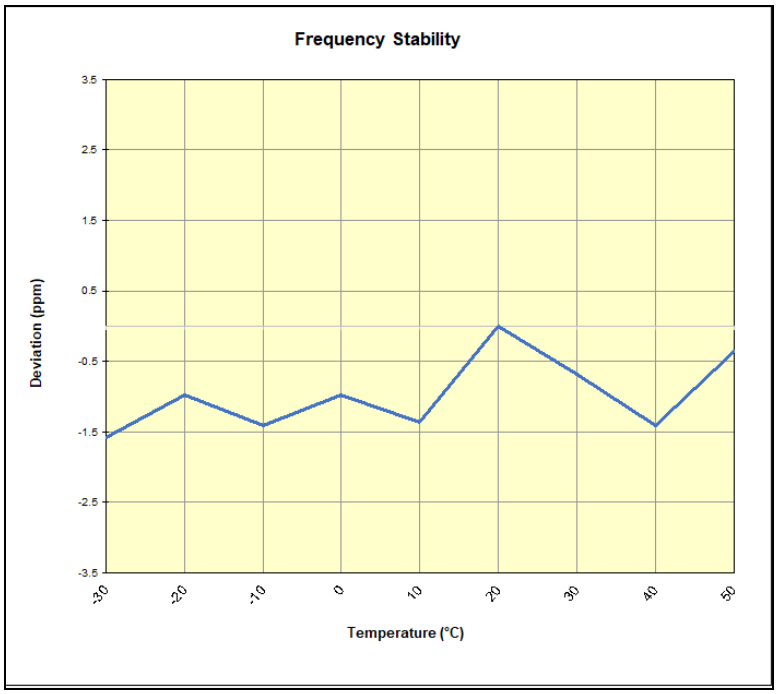
Frequency Stability / Temperature Variation

LTE Band 4

Operating Frequency (Hz):	1,732,500,000
Ref. Voltage (VDC):	4.38
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.38	- 30	1,732,500,005	-2,745	-0.0001584
		- 20	1,732,501,061	-1,689	-0.0000975
		- 10	1,732,500,316	-2,434	-0.0001405
		0	1,732,501,073	-1,677	-0.0000968
		+ 10	1,732,500,397	-2,353	-0.0001358
		+ 20 (Ref)	1,732,502,750	0	0.0000000
		+ 30	1,732,501,558	-1,192	-0.0000688
		+ 40	1,732,500,312	-2,438	-0.0001407
		+ 50	1,732,502,128	-622	-0.0000359
Battery Endpoint	3.35	+ 20	1,732,504,046	1,296	0.0000748

Table 7-24. LTE Band 4 Frequency Stability Data



Plot 7-114. LTE Band 4 Frequency Stability Chart

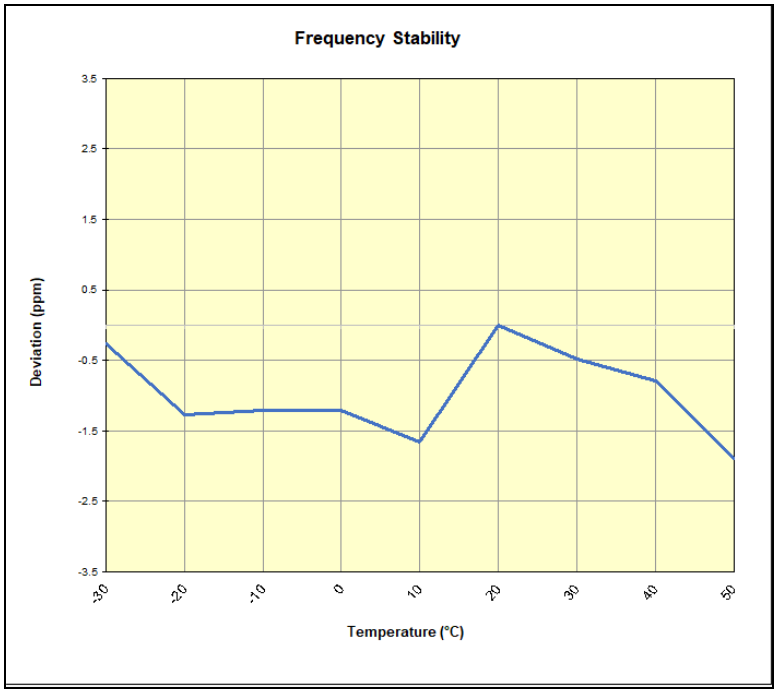
Frequency Stability / Temperature Variation

LTE Band 12

Operating Frequency (Hz):	707,500,000
Ref. Voltage (VDC):	4.38
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.38	- 30	707,510,772	-182	-0.0000258
		- 20	707,510,057	-898	-0.0001269
		- 10	707,510,105	-850	-0.0001201
		0	707,510,096	-859	-0.0001214
		+ 10	707,509,781	-1,173	-0.0001659
		+ 20 (Ref)	707,510,955	0	0.0000000
		+ 30	707,510,615	-340	-0.0000481
		+ 40	707,510,398	-557	-0.0000787
		+ 50	707,509,614	-1,341	-0.0001895
Battery Endpoint	3.35	+ 20	707,509,654	-1,301	-0.0001839

Table 7-25. LTE Band 12 Frequency Stability Data



Plot 7-115. LTE Band 12 Frequency Stability Chart

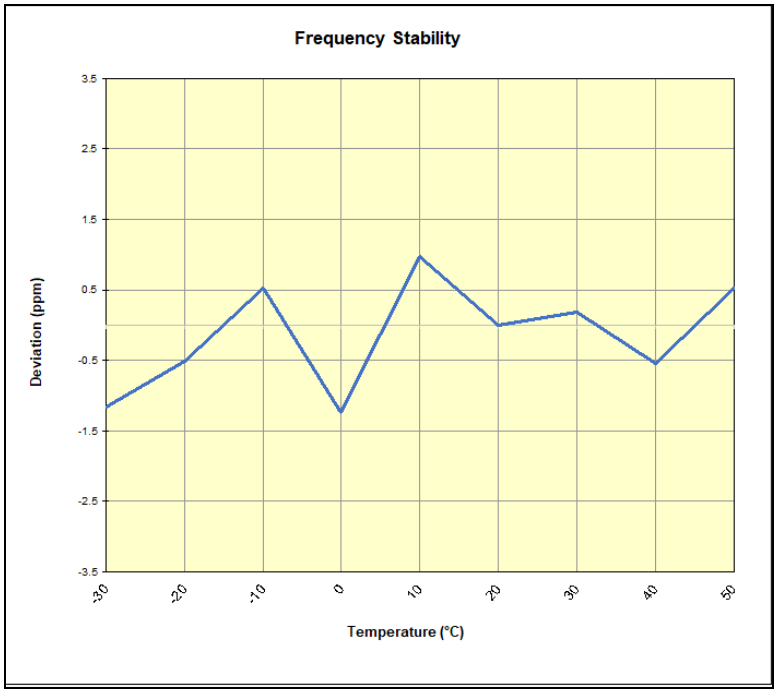
Frequency Stability / Temperature Variation

LTE Band 13

Operating Frequency (Hz):	782,000,000
Ref. Voltage (VDC):	4.38
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.38	- 30	782,009,321	-914	-0.0001168
		- 20	782,009,839	-396	-0.0000506
		- 10	782,010,651	417	0.0000533
		0	782,009,267	-968	-0.0001238
		+ 10	782,010,998	764	0.0000976
		+ 20 (Ref)	782,010,235	0	0.0000000
		+ 30	782,010,375	140	0.0000179
		+ 40	782,009,813	-421	-0.0000539
		+ 50	782,010,642	408	0.0000521
Battery Endpoint	3.35	+ 20	782,008,942	-1,293	-0.0001653

Table 7-26. LTE Band 13 Frequency Stability Data



Plot 7-116. LTE Band 13 Frequency Stability Chart

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMF936JPN** complies with all the requirements of Part 27 of the FCC rules.