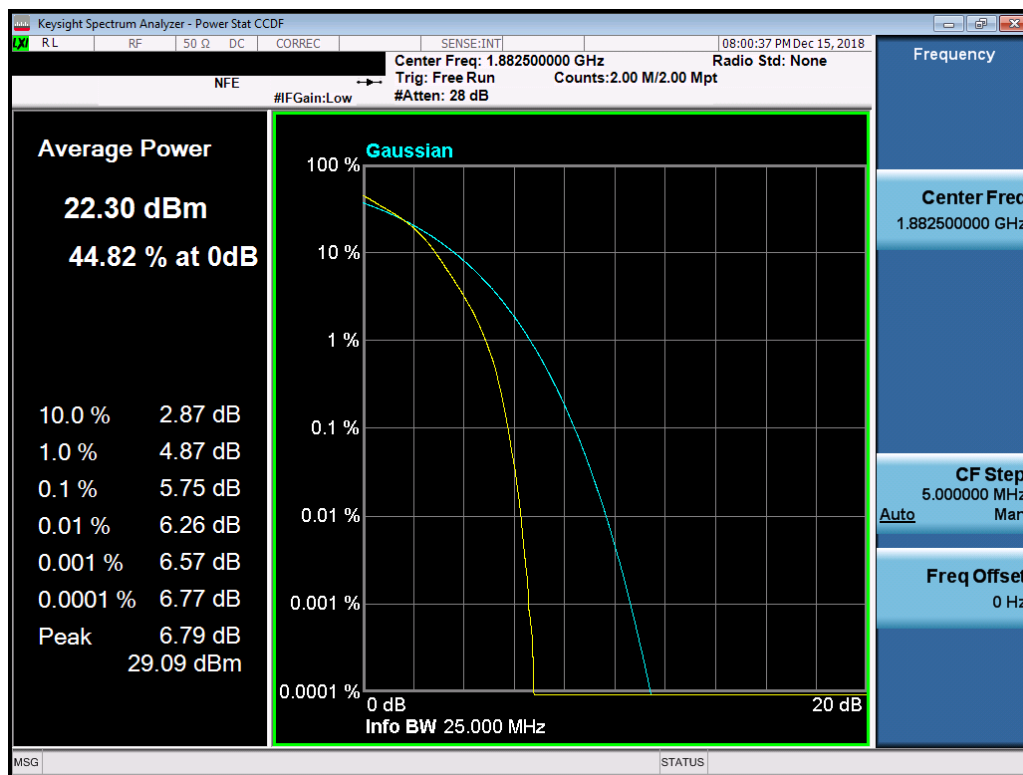


Plot 7-175. PAR Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-176. PAR Plot (Band 25/2 - 20.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX220QM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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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/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

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

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Test Setup

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

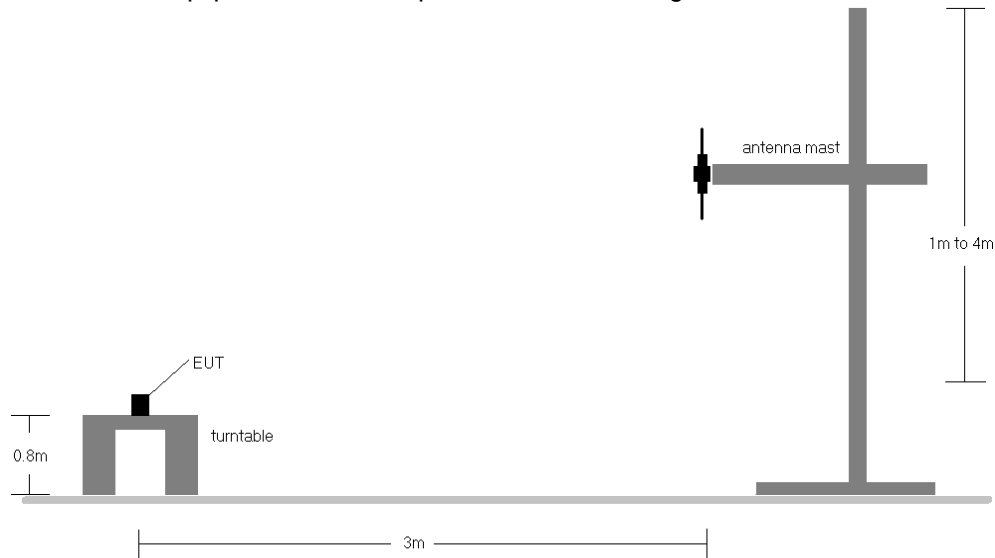


Figure 7-5. Radiated Test Setup <1GHz

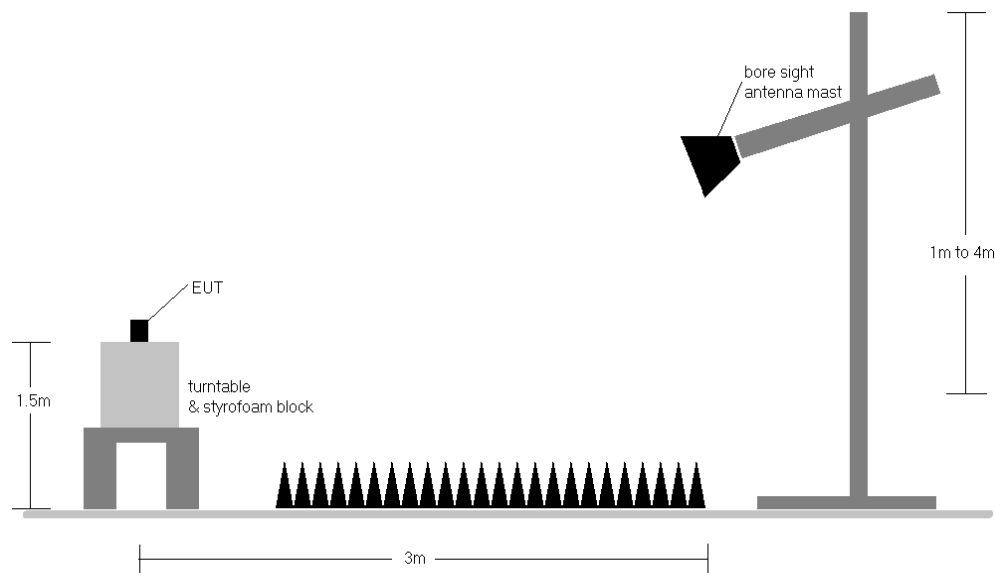


Figure 7-6. Radiated Test Setup >1GHz

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.

FCC ID: ZNFX220QM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 111 of 134

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	H	158	275	1 / 5	14.00	4.00	15.85	0.038	34.77	-18.92	18.00	0.063	36.99	-18.99
707.50	1.4	QPSK	H	158	275	1 / 5	14.91	4.22	16.98	0.050	34.77	-17.80	19.13	0.082	36.99	-17.86
715.30	1.4	QPSK	H	158	275	1 / 5	15.88	4.44	18.17	0.066	34.77	-16.60	20.32	0.108	36.99	-16.67
715.30	1.4	16-QAM	H	158	275	1 / 0	14.81	4.44	17.10	0.051	34.77	-17.67	19.25	0.084	36.99	-17.74
700.50	3	QPSK	H	155	278	1 / 14	14.97	4.01	16.83	0.048	34.77	-17.94	18.98	0.079	36.99	-18.01
707.50	3	QPSK	H	157	269	1 / 14	15.99	4.22	18.06	0.064	34.77	-16.72	20.21	0.105	36.99	-16.78
714.50	3	QPSK	H	155	278	1 / 14	16.57	4.41	18.83	0.076	34.77	-15.94	20.98	0.125	36.99	-16.01
714.50	3	16-QAM	H	155	278	1 / 14	15.83	4.41	18.09	0.064	34.77	-16.68	20.24	0.106	36.99	-16.75
701.50	5	QPSK	H	156	282	1 / 24	15.99	4.04	17.88	0.061	34.77	-16.89	20.03	0.101	36.99	-16.96
707.50	5	QPSK	H	158	277	1 / 24	17.06	4.22	19.13	0.082	34.77	-15.65	21.28	0.134	36.99	-15.71
713.50	5	QPSK	H	156	282	1 / 24	17.39	4.39	19.63	0.092	34.77	-15.14	21.78	0.151	36.99	-15.21
713.50	5	16-QAM	H	156	282	1 / 24	16.01	4.39	18.25	0.067	34.77	-16.52	20.40	0.110	36.99	-16.59
704.00	10	QPSK	H	159	276	1 / 49	16.36	4.12	18.33	0.068	34.77	-16.45	20.48	0.112	36.99	-16.51
707.50	10	QPSK	H	169	282	1 / 49	17.23	4.22	19.30	0.085	34.77	-15.48	21.45	0.139	36.99	-15.54
711.00	10	QPSK	H	160	263	1 / 49	16.39	4.32	18.56	0.072	34.77	-16.22	20.71	0.118	36.99	-16.28
707.50	10	16-QAM	H	169	282	1 / 49	15.81	4.22	17.88	0.061	34.77	-16.90	20.03	0.101	36.99	-16.96
713.50	5	QPSK	V	172	351	1 / 24	15.80	4.39	18.04	0.064	34.77	-16.73	20.19	0.104	36.99	-16.80

Table 7-3. 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]
824.70	1.4	QPSK	V	239	328	1 / 0	14.00	6.30	18.15	0.065	38.45	-20.30	20.30	0.107	40.61	-20.30
836.50	1.4	QPSK	V	239	328	1 / 0	14.85	6.35	19.05	0.080	38.45	-19.40	21.20	0.132	40.61	-19.41
848.30	1.4	QPSK	V	239	328	1 / 0	13.35	6.40	17.60	0.058	38.45	-20.85	19.75	0.094	40.61	-20.86
836.50	1.4	16-QAM	V	239	328	1 / 0	13.42	6.35	17.62	0.058	38.45	-20.83	19.77	0.095	40.61	-20.84
825.50	3	QPSK	V	254	323	1 / 14	14.17	6.31	18.33	0.068	38.45	-20.12	20.48	0.112	40.61	-20.13
836.50	3	QPSK	V	254	323	1 / 14	15.23	6.35	19.43	0.088	38.45	-19.02	21.58	0.144	40.61	-19.03
847.50	3	QPSK	V	254	323	1 / 0	14.34	6.40	18.59	0.072	38.45	-19.87	20.74	0.118	40.61	-19.87
836.50	3	16-QAM	V	254	323	1 / 14	13.74	6.35	17.94	0.062	38.45	-20.51	20.09	0.102	40.61	-20.52
826.50	5	QPSK	V	245	321	1 / 24	15.36	6.31	19.52	0.090	38.45	-18.93	21.67	0.147	40.61	-18.94
836.50	5	QPSK	V	239	335	1 / 0	15.23	6.35	19.43	0.088	38.45	-19.02	21.58	0.144	40.61	-19.03
846.50	5	QPSK	V	245	321	1 / 0	15.27	6.39	19.51	0.089	38.45	-18.94	21.66	0.147	40.61	-18.95
826.50	5	16-QAM	V	245	321	1 / 24	13.87	6.31	18.03	0.064	38.45	-20.42	20.18	0.104	40.61	-20.43
829.00	10	QPSK	V	133	320	1 / 49	15.42	6.32	19.59	0.091	38.45	-18.86	21.74	0.149	40.61	-18.87
836.50	10	QPSK	V	132	306	1 / 0	15.29	6.35	19.49	0.089	38.45	-18.96	21.64	0.146	40.61	-18.97
844.00	10	QPSK	V	123	319	1 / 0	14.75	6.38	18.98	0.079	38.45	-19.47	21.13	0.130	40.61	-19.48
829.00	10	16-QAM	V	133	320	1 / 49	14.04	6.32	18.21	0.066	38.45	-20.24	20.36	0.109	40.61	-20.25
829.00	10	QPSK	H	133	299	1 / 49	14.16	6.76	18.77	0.075	38.45	-19.68	20.92	0.124	40.61	-19.69

Table 7-4. ERP Data (Band 5)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 112 of 134

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	17	1 / 0	12.77	8.16	20.93	0.124	30.00	-9.07
1732.50	1.4	QPSK	H	140	17	1 / 0	13.04	8.18	21.22	0.132	30.00	-8.78
1754.30	1.4	QPSK	H	140	17	1 / 5	13.25	8.21	21.46	0.140	30.00	-8.54
1754.30	1.4	16-QAM	H	140	17	1 / 5	12.11	8.21	20.32	0.108	30.00	-9.68
1711.50	3	QPSK	H	139	16	1 / 14	13.46	8.16	21.62	0.145	30.00	-8.38
1732.50	3	QPSK	H	139	16	1 / 0	13.95	8.18	22.13	0.163	30.00	-7.87
1753.50	3	QPSK	H	139	16	1 / 14	14.16	8.21	22.37	0.172	30.00	-7.63
1753.50	3	16-QAM	H	139	16	1 / 14	12.55	8.21	20.76	0.119	30.00	-9.24
1712.50	5	QPSK	H	140	16	1 / 0	14.06	8.16	22.22	0.167	30.00	-7.78
1732.50	5	QPSK	H	137	11	1 / 0	14.82	8.18	23.00	0.200	30.00	-7.00
1752.50	5	QPSK	H	125	17	1 / 24	14.62	8.20	22.82	0.192	30.00	-7.18
1732.50	5	16-QAM	H	137	11	1 / 24	12.76	8.18	20.94	0.124	30.00	-9.06
1715.00	10	QPSK	H	139	15	1 / 49	14.17	8.16	22.33	0.171	30.00	-7.67
1732.50	10	QPSK	H	139	15	1 / 0	14.65	8.18	22.83	0.192	30.00	-7.17
1750.00	10	QPSK	H	139	15	1 / 49	14.48	8.20	22.68	0.185	30.00	-7.32
1732.50	10	16-QAM	H	139	15	1 / 0	13.32	8.18	21.50	0.141	30.00	-8.50
1717.50	15	QPSK	H	133	19	1 / 74	14.48	8.16	22.64	0.184	30.00	-7.36
1732.50	15	QPSK	H	138	25	1 / 0	14.65	8.18	22.83	0.192	30.00	-7.17
1747.50	15	QPSK	H	138	25	1 / 0	14.23	8.20	22.43	0.175	30.00	-7.57
1732.50	15	16-QAM	H	138	25	1 / 0	13.32	8.18	21.50	0.141	30.00	-8.50
1720.00	20	QPSK	H	138	25	1 / 99	14.95	8.17	23.12	0.205	30.00	-6.88
1732.50	20	QPSK	H	138	25	1 / 0	14.45	8.18	22.63	0.183	30.00	-7.37
1745.00	20	QPSK	H	138	25	1 / 99	13.31	8.19	21.50	0.141	30.00	-8.50
1720.00	20	16-QAM	H	138	25	1 / 99	13.28	8.17	21.45	0.140	30.00	-8.55
1720.00	20	QPSK	V	160	125	1 / 99	13.23	8.17	21.40	0.138	30.00	-8.60

Table 7-5. EIRP Data (Band 4)

FCC ID: ZNFX220QM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset	Page 113 of 134

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	110	7	1 / 0	12.66	8.37	21.03	0.127	33.01	-11.98
1882.50	1.4	QPSK	H	110	7	1 / 0	12.92	8.42	21.34	0.136	33.01	-11.67
1914.30	1.4	QPSK	H	108	7	1 / 5	12.34	8.47	20.81	0.120	33.01	-12.20
1882.50	1.4	16-QAM	H	110	7	1 / 5	11.98	8.42	20.40	0.110	33.01	-12.61
1851.50	3	QPSK	H	105	7	1 / 14	13.95	8.37	22.32	0.171	33.01	-10.69
1882.50	3	QPSK	H	105	7	1 / 14	13.50	8.42	21.92	0.156	33.01	-11.09
1913.50	3	QPSK	H	108	7	1 / 14	13.09	8.47	21.56	0.143	33.01	-11.45
1851.50	3	16-QAM	H	105	7	1 / 14	12.36	8.37	20.73	0.118	33.01	-12.28
1852.50	5	QPSK	H	106	4	1 / 0	13.80	8.37	22.17	0.165	33.01	-10.84
1882.50	5	QPSK	H	106	4	1 / 24	14.21	8.42	22.63	0.183	33.01	-10.38
1912.50	5	QPSK	H	109	5	1 / 24	13.70	8.47	22.17	0.165	33.01	-10.84
1882.50	5	16-QAM	H	106	4	1 / 24	12.52	8.42	20.94	0.124	33.01	-12.07
1855.00	10	QPSK	H	121	12	1 / 49	13.84	8.37	22.21	0.167	33.01	-10.80
1882.50	10	QPSK	H	113	1	1 / 49	14.22	8.42	22.64	0.184	33.01	-10.37
1910.00	10	QPSK	H	105	9	1 / 49	13.71	8.46	22.17	0.165	33.01	-10.84
1882.50	10	16-QAM	H	113	1	1 / 49	13.09	8.42	21.51	0.142	33.01	-11.50
1857.50	15	QPSK	H	120	10	1 / 0	13.95	8.38	22.33	0.171	33.01	-10.68
1882.50	15	QPSK	H	105	14	1 / 74	14.17	8.42	22.59	0.181	33.01	-10.42
1907.50	15	QPSK	H	110	9	1 / 0	13.39	8.46	21.85	0.153	33.01	-11.16
1882.50	15	16-QAM	H	105	14	1 / 0	12.57	8.42	20.99	0.126	33.01	-12.02
1860.00	20	QPSK	H	116	12	1 / 0	13.80	8.38	22.18	0.165	33.01	-10.83
1882.50	20	QPSK	H	110	18	1 / 99	13.73	8.42	22.15	0.164	33.01	-10.86
1905.00	20	QPSK	H	101	9	1 / 0	13.06	8.45	21.51	0.142	33.01	-11.50
1860.00	20	16-QAM	H	116	12	1 / 0	12.24	8.38	20.62	0.115	33.01	-12.39
1882.50	10	QPSK	V	100	119	1 / 49	12.60	8.42	21.02	0.126	33.01	-11.99

Table 7-6. EIRP Data (Band 25/2)

FCC ID: ZNFX220QM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset	Page 114 of 134

7.7 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 $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 115 of 134

Test Setup

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

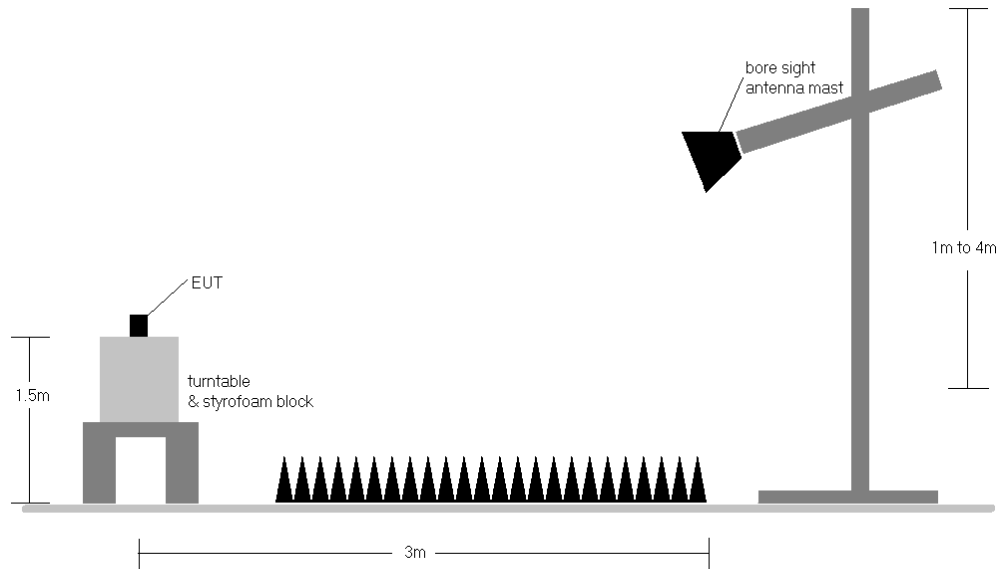


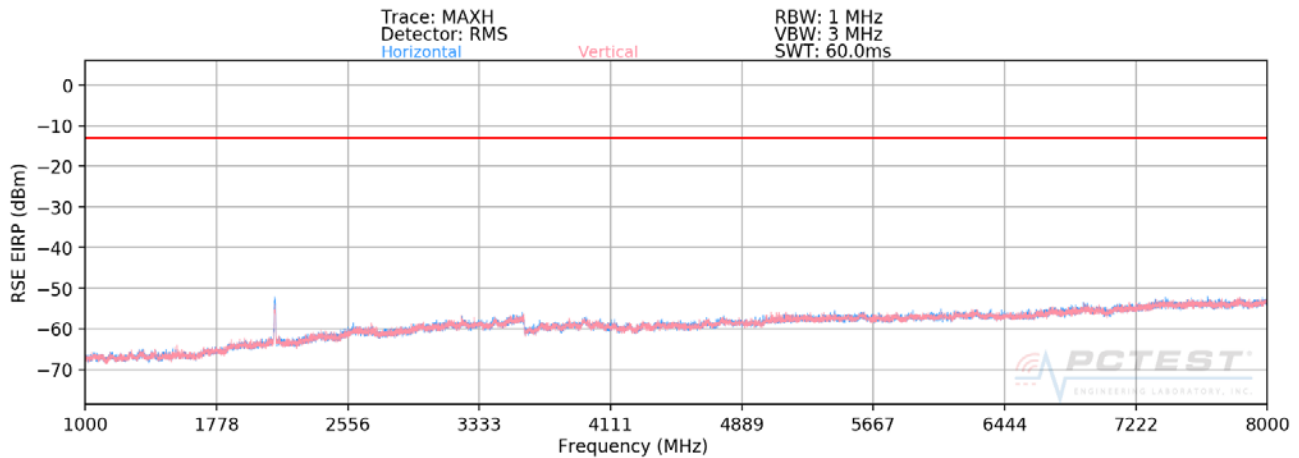
Figure 7-7. Test Instrument & Measurement Setup

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.

FCC ID: ZNFX220QM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 116 of 134

Band 12



Plot 7-177. 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	129	369	-77.58	8.08	-69.50	-56.5
2104.50	H	116	8	-65.08	8.30	-56.79	-43.8
2806.00	H	-	-	-74.66	7.31	-67.35	-54.3

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

FCC ID: ZNFX220QM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset			Page 117 of 134

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	398	340	-75.54	8.06	-67.48	-54.5
2122.50	H	170	59	-66.17	8.25	-57.92	-44.9
2830.00	H	-	-	-74.68	7.27	-67.41	-54.4

Table 7-8. Radiated Spurious Data (Band 12 – Mid Channel)

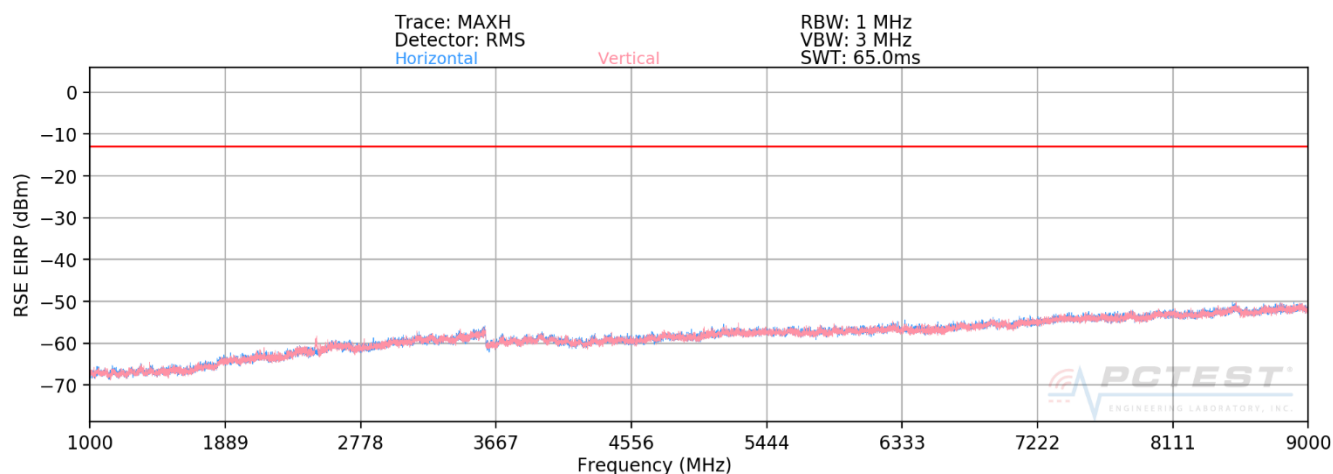
OPERATING FREQUENCY: 713.50 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 5.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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	160	327	-78.84	8.04	-70.81	-57.8
2140.50	H	142	6	-64.73	8.20	-56.53	-43.5
2854.00	H	-	-	-74.58	7.23	-67.35	-54.4

Table 7-9. Radiated Spurious Data (Band 12 – High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 118 of 134

Band 5



Plot 7-178. Radiated Spurious Plot above 1GHz (Band 5)

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	H	154	21	-76.14	8.09	-68.05	-55.0
2487.00	H	126	3	-70.55	7.90	-62.65	-49.6
3316.00	H	-	-	-73.63	7.00	-66.63	-53.6

Table 7-10. Radiated Spurious Data (Band 5 – Low Channel)

FCC ID: ZNFX220QM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 119 of 134

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	H	155	24	-70.35	8.11	-62.23	-49.2
2509.50	H	146	295	-74.65	7.88	-66.77	-53.8
3346.00	H	-	-	-74.00	7.00	-67.00	-54.0

Table 7-11. Radiated Spurious Data (Band 5 – Mid Channel)

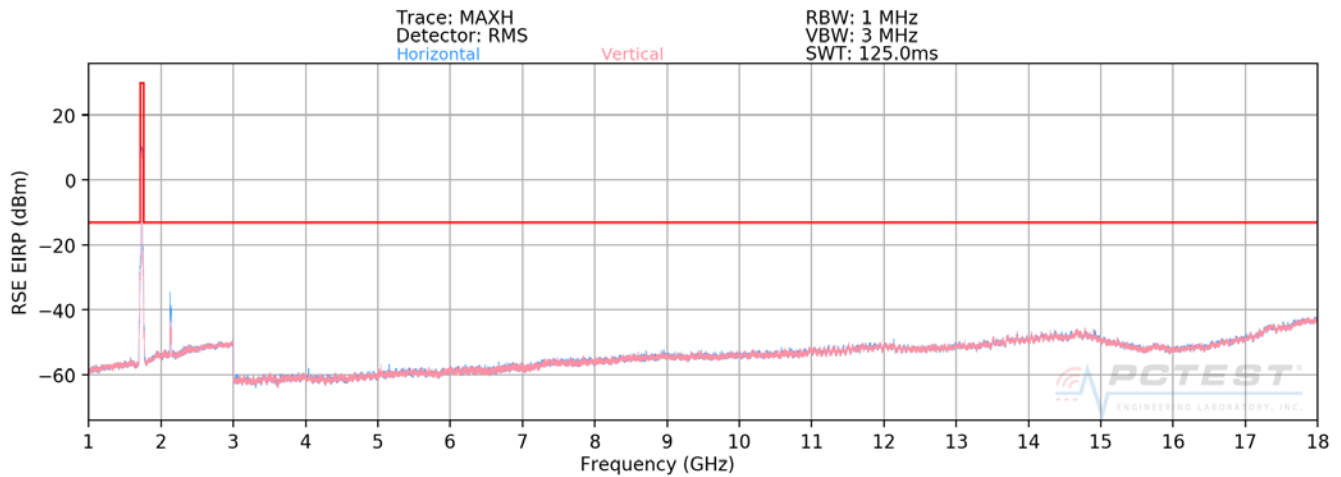
OPERATING FREQUENCY: 844.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 10.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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	H	213	28	-72.31	8.13	-64.18	-51.2
2532.00	H	112	1	-74.90	7.83	-67.07	-54.1
3376.00	H	-	-	-74.14	7.00	-67.14	-54.1

Table 7-12. Radiated Spurious Data (Band 5 – High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 4



Plot 7-179. Radiated Spurious Plot above 1GHz (Band 4)

OPERATING FREQUENCY: 1720.00 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]
3440.00	H	-	-	-71.04	7.00	-64.04	-51.0
5160.00	H	-	-	-71.29	8.61	-62.68	-49.7

Table 7-13. Radiated Spurious Data (Band 4 – Low Channel)

FCC ID: ZNFX220QM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset			Page 121 of 134

OPERATING FREQUENCY: 1732.50 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]
3465.00	H	-	-	-70.78	7.00	-63.78	-50.8
5197.50	H	-	-	-69.84	8.52	-61.32	-48.3

Table 7-14. Radiated Spurious Data (Band 4 – Mid Channel)

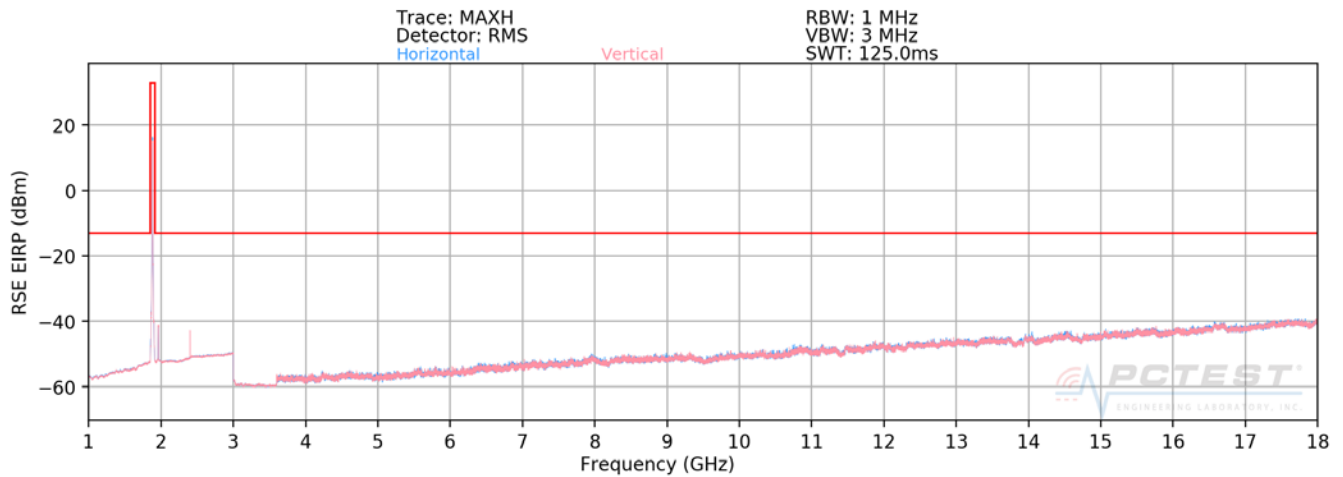
OPERATING FREQUENCY: 1745.00 MHz
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 20.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

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]
3490.00	H	-	-	-70.93	7.00	-63.93	-50.9
5235.00	H	-	-	-71.24	8.44	-62.81	-49.8

Table 7-15. Radiated Spurious Data (Band 4 – High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 25/2



Plot 7-180. Radiated Spurious Plot above 1GHz (Band 25/2)

OPERATING FREQUENCY: 1855.00 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]
3710.00	H	-	-	-66.80	5.40	-61.40	-48.4
5565.00	H	-	-	-68.10	9.49	-58.61	-45.6

Table 7-16. Radiated Spurious Data (Band 25/2 – Low Channel)

FCC ID: ZNFX220QM	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
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OPERATING FREQUENCY: 1882.50 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]
3765.00	H	-	-	-66.50	5.11	-61.40	-48.4
5647.50	H	-	-	-68.35	9.72	-58.63	-45.6

Table 7-17. Radiated Spurious Data (Band 25/2 – Mid Channel)

OPERATING FREQUENCY: 1910.00 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]
3820.00	H	-	-	-66.13	5.13	-61.00	-48.0
5730.00	H	-	-	-68.74	9.95	-58.80	-45.8

Table 7-18. Radiated Spurious Data (Band 25/2 – High Channel)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 124 of 134

7.8 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 $\pm 0.00025\%$ (± 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

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 12 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz
 CHANNEL: 23790
 REFERENCE VOLTAGE: 4.36 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	707,499,830	-170	-0.0000240
100 %		- 20	707,499,948	-52	-0.0000073
100 %		- 10	707,499,895	-105	-0.0000148
100 %		0	707,499,864	-136	-0.0000192
100 %		+ 10	707,499,622	-378	-0.0000534
100 %		+ 20	707,499,858	-142	-0.0000201
100 %		+ 30	707,499,816	-184	-0.0000260
100 %		+ 40	707,499,938	-62	-0.0000088
100 %		+ 50	707,499,917	-83	-0.0000117
BATT. ENDPOINT	3.40	+ 20	707,500,039	39	0.0000055

Table 7-19. Frequency Stability Data (Band 12)

Note:

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

FCC ID: ZNFX220QM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
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Band 12 Frequency Stability Measurements

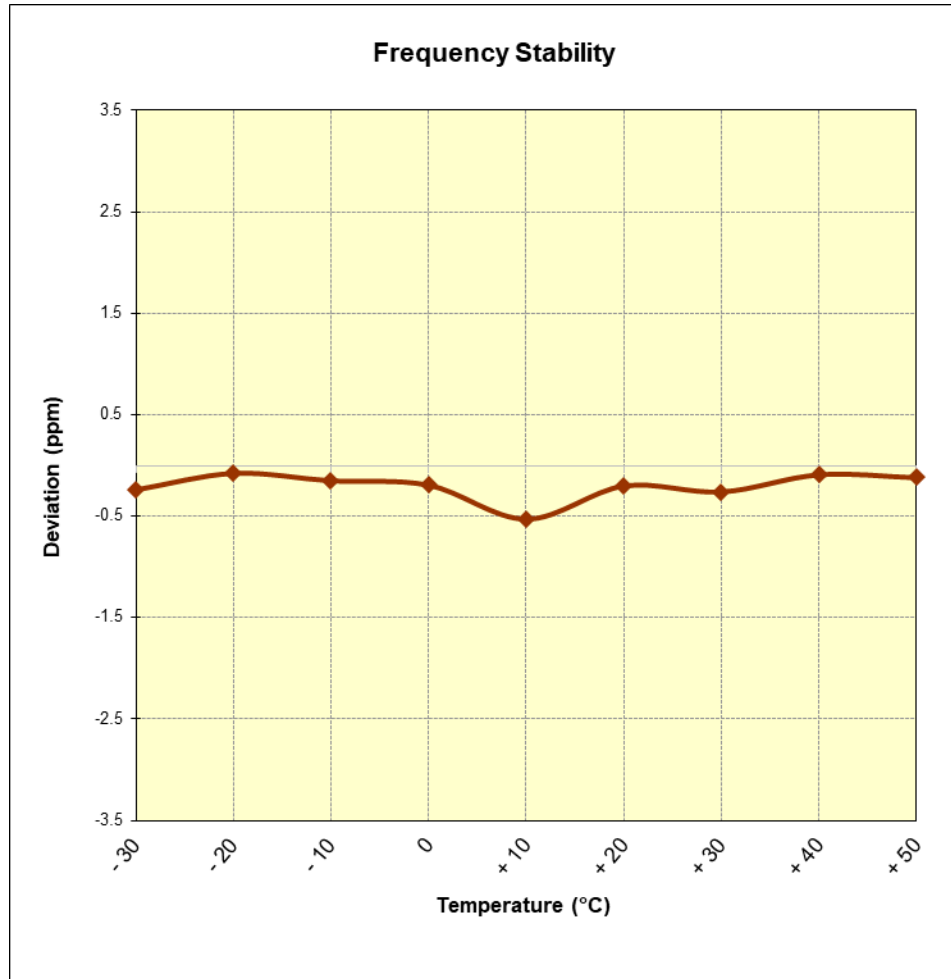


Figure 7-8. Frequency Stability Graph (Band 12)

FCC ID: ZNFX220QM	 PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	 LG	Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset	Page 127 of 134	

Band 5 Frequency Stability Measurements

OPERATING FREQUENCY: 836,500,000 Hz
 CHANNEL: 20525
 REFERENCE VOLTAGE: 4.36 VDC
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	836,499,997	-3	-0.0000004
100 %		- 20	836,500,273	273	0.0000326
100 %		- 10	836,499,675	-325	-0.0000389
100 %		0	836,500,321	321	0.0000384
100 %		+ 10	836,500,139	139	0.0000166
100 %		+ 20	836,500,163	163	0.0000195
100 %		+ 30	836,499,896	-104	-0.0000124
100 %		+ 40	836,500,073	73	0.0000087
100 %		+ 50	836,499,602	-398	-0.0000476
BATT. ENDPOINT	3.40	+ 20	836,499,697	-303	-0.0000362

Table 7-20. Frequency Stability Data (Band 5)

FCC ID: ZNFX220QM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset	Page 128 of 134

Band 5 Frequency Stability Measurements

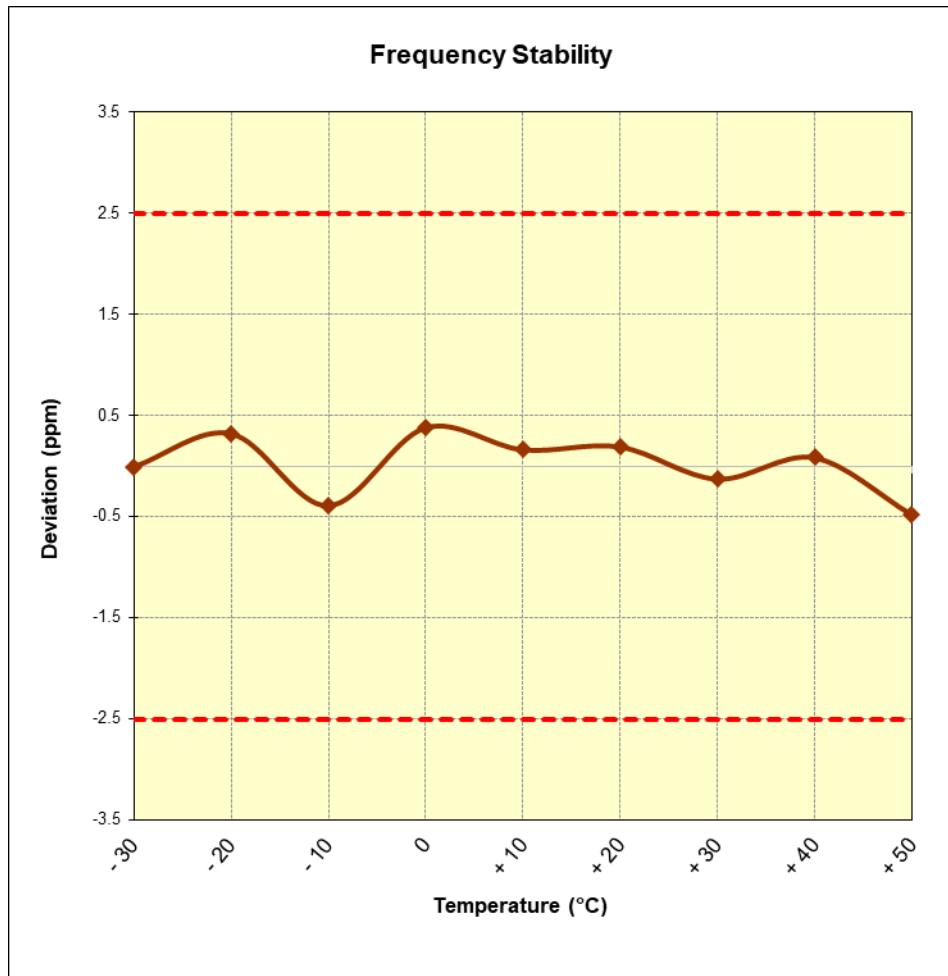


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: ZNFX220QM	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset	Page 129 of 134

Band 4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,732,500,000 Hz
 CHANNEL: 20175
 REFERENCE VOLTAGE: 4.36 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	1,732,500,058	58	0.0000033
100 %		- 20	1,732,500,056	56	0.0000032
100 %		- 10	1,732,499,588	-412	-0.0000238
100 %		0	1,732,499,948	-52	-0.0000030
100 %		+ 10	1,732,499,799	-201	-0.0000116
100 %		+ 20	1,732,500,078	78	0.0000045
100 %		+ 30	1,732,499,738	-262	-0.0000151
100 %		+ 40	1,732,500,037	37	0.0000021
100 %		+ 50	1,732,499,791	-209	-0.0000121
BATT. ENDPOINT	3.40	+ 20	1,732,500,183	183	0.0000106

Table 7-21. Frequency Stability Data (Band 4)

Note:

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

FCC ID: ZNFX220QM	 MEASUREMENT REPORT (CERTIFICATION) 		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset	Page 130 of 134

Band 4 Frequency Stability Measurements

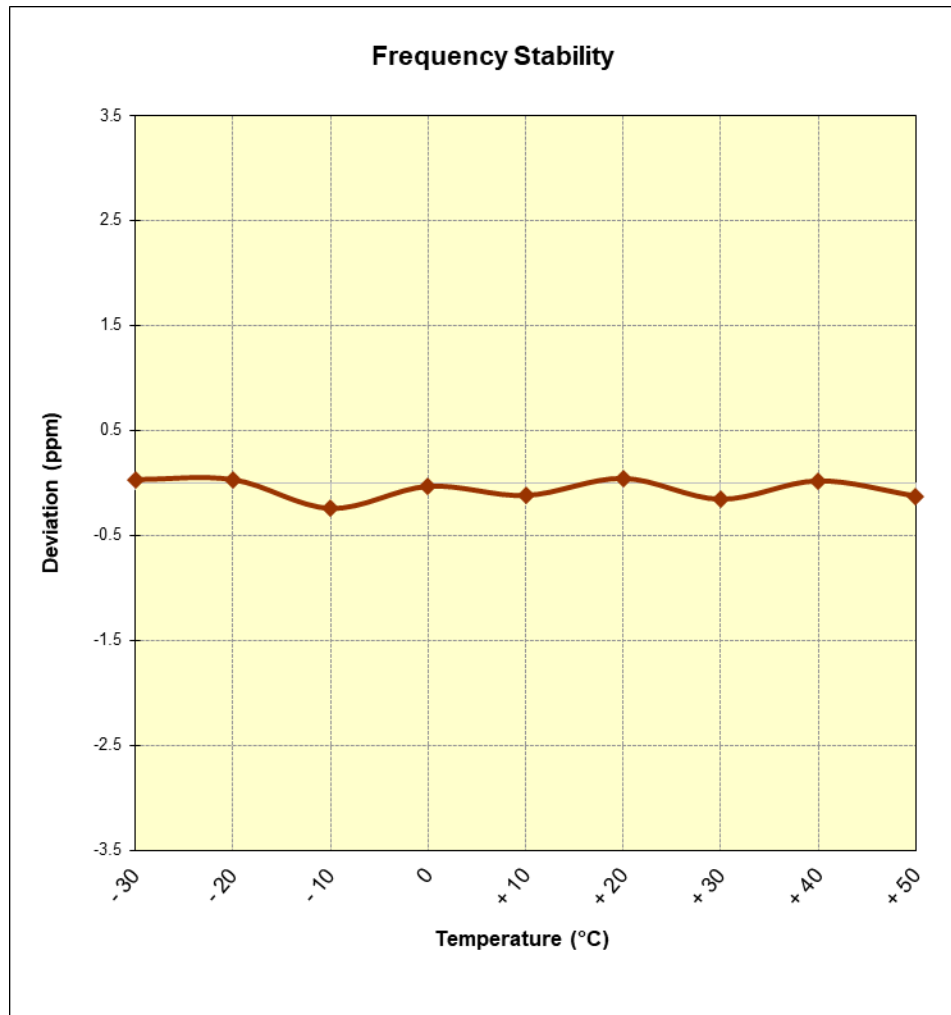


Figure 7-10. Frequency Stability Graph (Band 4)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 131 of 134

Band 25/2 Frequency Stability Measurements

OPERATING FREQUENCY: 1,882,500,000 Hz
 CHANNEL: 26365
 REFERENCE VOLTAGE: 4.36 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.36	- 30	1,882,500,176	176	0.0000093
100 %		- 20	1,882,499,866	-134	-0.0000071
100 %		- 10	1,882,500,109	109	0.0000058
100 %		0	1,882,500,144	144	0.0000076
100 %		+ 10	1,882,499,782	-218	-0.0000116
100 %		+ 20	1,882,499,962	-38	-0.0000020
100 %		+ 30	1,882,499,832	-168	-0.0000089
100 %		+ 40	1,882,500,177	177	0.0000094
100 %		+ 50	1,882,499,986	-14	-0.0000007
BATT. ENDPOINT	3.40	+ 20	1,882,500,065	65	0.0000035

Table 7-22. 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.

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band 25/2 Frequency Stability Measurements

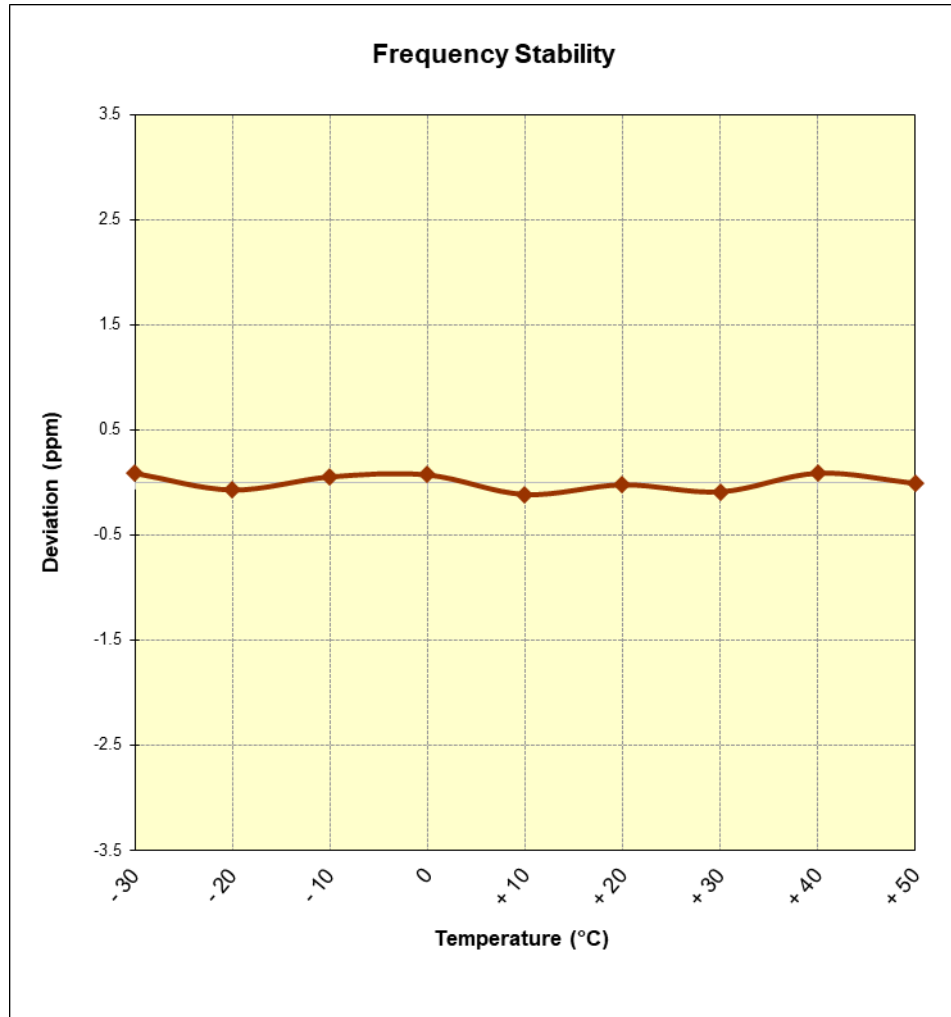


Figure 7-11. Frequency Stability Graph (Band 25/2)

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 133 of 134

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFX220QM** complies with all the requirements of Part 22,24, & 27 of the FCC Rules for LTE operation only.

FCC ID: ZNFX220QM		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1812110223-03.ZNF	Test Dates: 12/10-12/21/2018	EUT Type: Portable Handset		Page 134 of 134