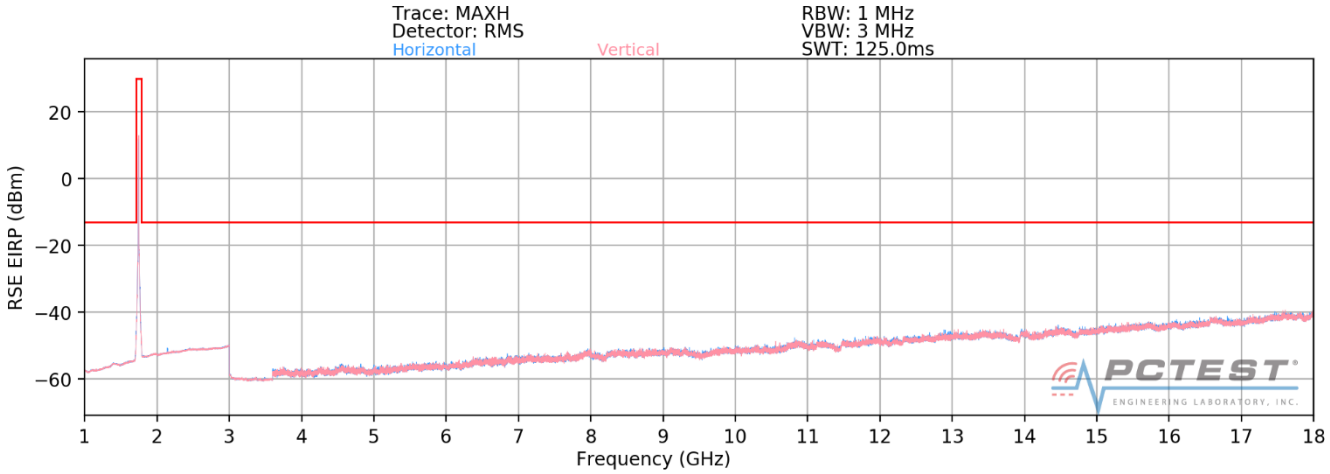
Band 66/4



Plot 7-194. Radiated Spurious Plot above 1GHz (Band 66/4)

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	322	100	-63.82	6.28	-57.54	-44.5
5160.00	H	-	-	-69.51	8.98	-60.53	-47.5
6880.00	H	-	-	-67.61	9.42	-58.19	-45.2

Table 7-14. Radiated Spurious Data (Band 66/4 – Low 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	241	133	-60.70	6.47	-54.23	-41.2
5235.00	H	-	-	-69.67	8.97	-60.70	-47.7
6980.00	H	-	-	-66.42	9.23	-57.19	-44.2

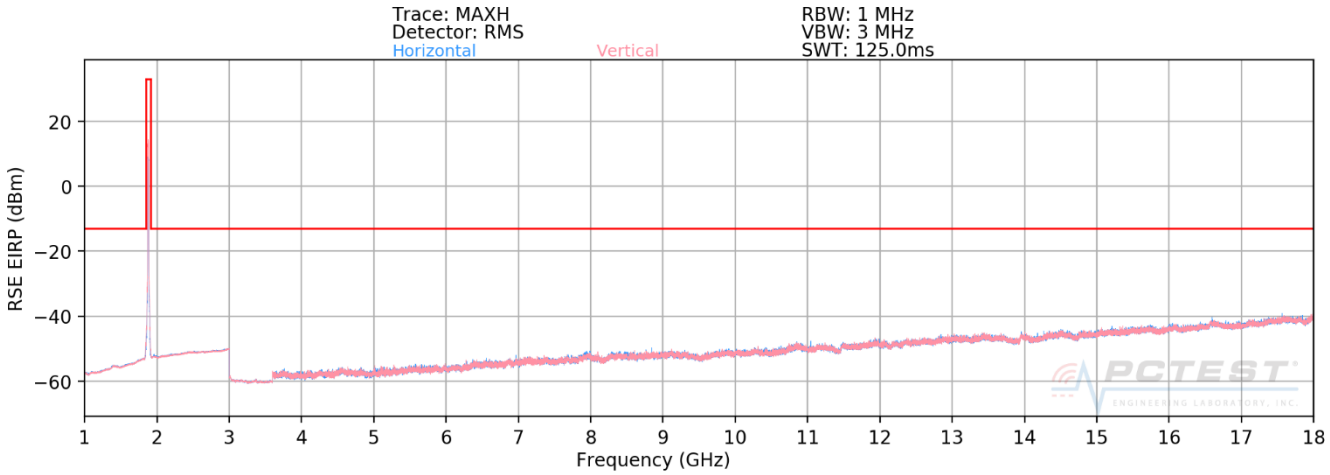
Table 7-15. Radiated Spurious Data (Band 66/4 – Mid Channel)

OPERATING FREQUENCY:	1770.00	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]
3540.00	H	237	129	-62.62	6.45	-56.17	-43.2
5310.00	H	-	-	-69.17	9.09	-60.07	-47.1
7080.00	H	-	-	-66.01	9.17	-56.84	-43.8

Table 7-16. Radiated Spurious Data (Band 66/4 – High Channel)

Band 2



Plot 7-195. Radiated Spurious Plot above 1GHz (Band 2)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3720.00	V	129	127	-63.61	6.90	-56.71	-43.7
5580.00	V	-	-	-69.13	9.06	-60.07	-47.1
7440.00	V	-	-	-66.70	9.26	-57.44	-44.4

Table 7-17. Radiated Spurious Data (Band 2 – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	V	161	127	-64.01	6.93	-57.08	-44.1
5640.00	V	-	-	-68.69	9.15	-59.54	-46.5
7520.00	V	-	-	-64.68	9.31	-55.37	-42.4

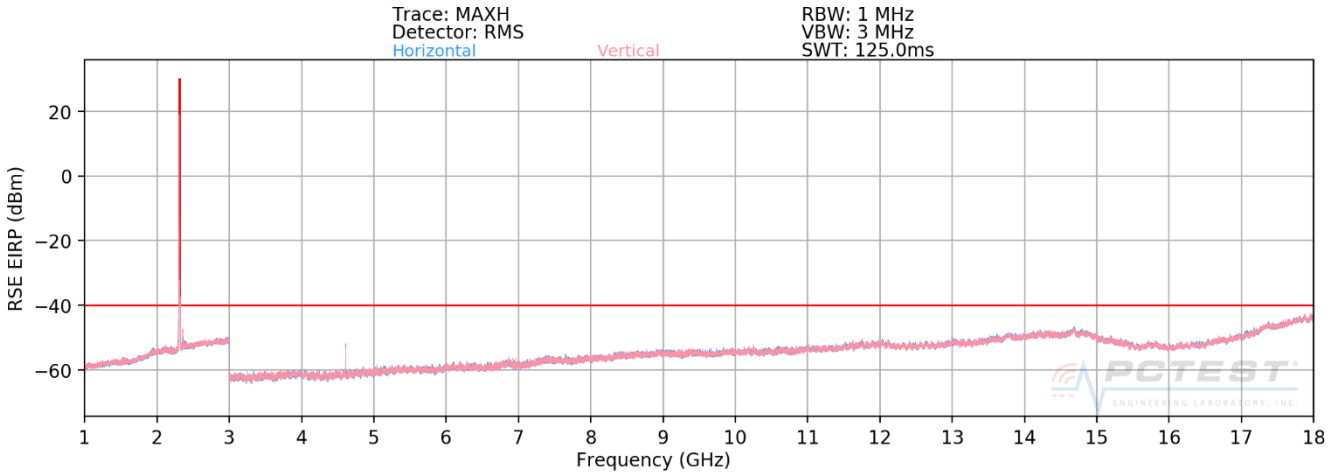
Table 7-18. Radiated Spurious Data (Band 2 – Mid Channel)

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

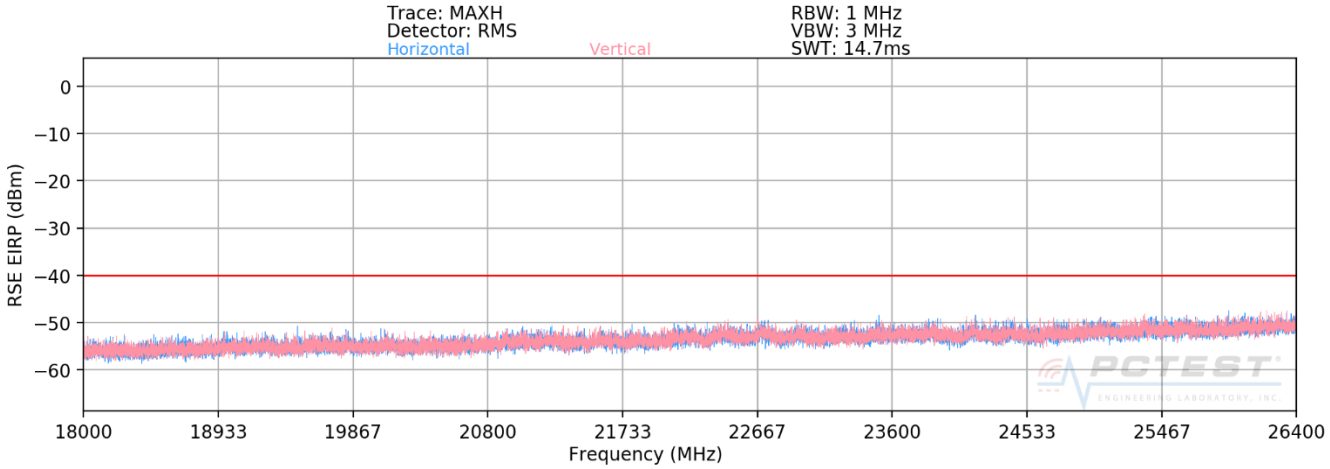
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3800.00	V	177	127	-63.52	7.02	-56.50	-43.5
5700.00	V	-	-	-68.90	9.05	-59.85	-46.9
7600.00	V	-	-	-66.17	9.25	-56.92	-43.9

Table 7-19. Radiated Spurious Data (Band 2 – High Channel)

Band 30



Plot 7-196. Radiated Spurious Plot above 1GHz (Band 30)



Plot 7-197. Radiated Spurious Plot above 18GHz (Band 30)

OPERATING FREQUENCY:	2310.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-40	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]
4620.00	V	100	296	-58.83	8.42	-50.41	-10.4
6930.00	V	108	331	-61.44	9.38	-52.06	-12.1
9240.00	V	-	-	-62.63	9.46	-53.17	-13.2
11550.00	V	-	-	-61.53	9.48	-52.05	-12.1

Table 7-20. Radiated Spurious Data (Band 30 – Mid Channel)

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

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

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

Test Setup

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

Test Notes

None

Band 12 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	707,500,036	36	0.0000051
100 %		- 20	707,500,276	276	0.0000390
100 %		- 10	707,499,831	-169	-0.0000239
100 %		0	707,499,734	-266	-0.0000376
100 %		+ 10	707,499,986	-14	-0.0000020
100 %		+ 20	707,500,057	57	0.0000081
100 %		+ 30	707,499,886	-114	-0.0000161
100 %		+ 40	707,499,907	-93	-0.0000131
100 %		+ 50	707,499,886	-114	-0.0000161
BATT. ENDPOINT	3.52	+ 20	707,499,689	-311	-0.0000440

Table 7-21. Frequency Stability Data (Band 12)

Note:

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

Band 12 Frequency Stability Measurements

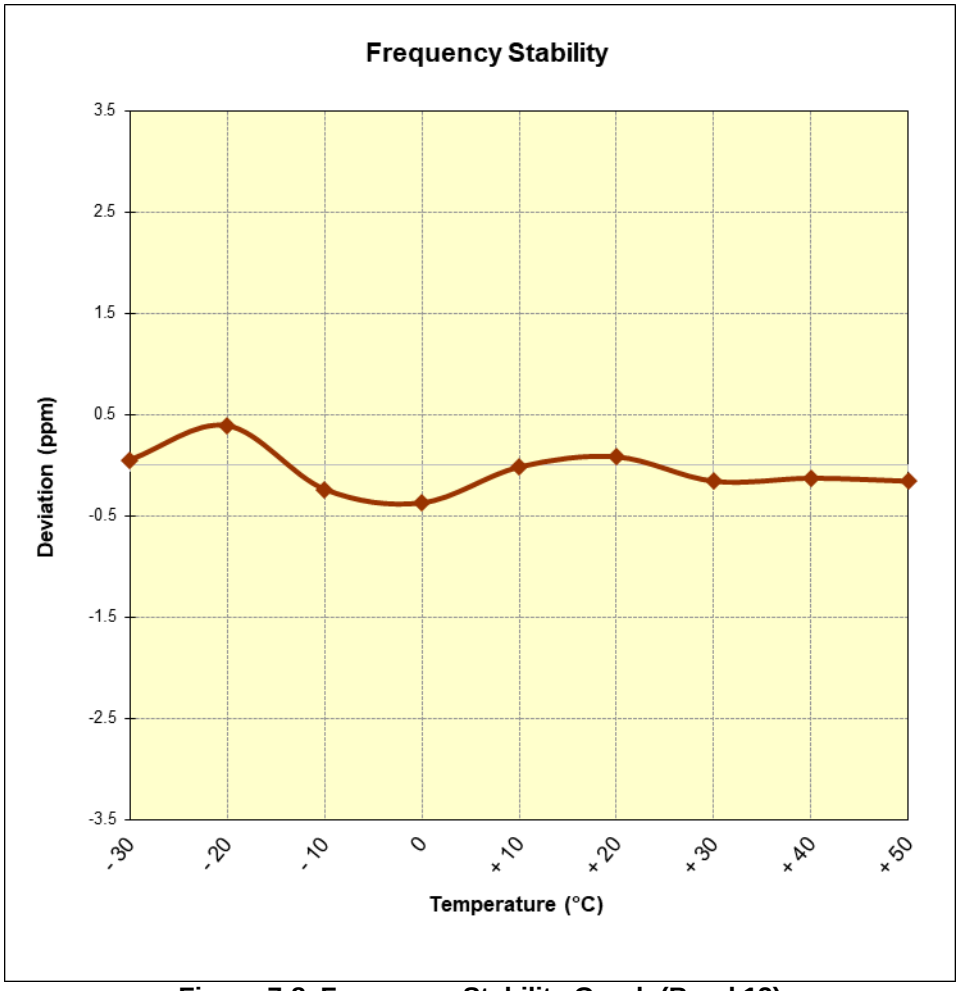


Figure 7-8. Frequency Stability Graph (Band 12)

Band 5 Frequency Stability Measurements

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
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	836,499,955	-45	-0.0000054
100 %		- 20	836,499,932	-68	-0.0000081
100 %		- 10	836,499,746	-254	-0.0000304
100 %		0	836,499,915	-85	-0.0000102
100 %		+ 10	836,500,234	234	0.0000280
100 %		+ 20	836,499,935	-65	-0.0000078
100 %		+ 30	836,499,692	-308	-0.0000368
100 %		+ 40	836,500,306	306	0.0000366
100 %		+ 50	836,499,627	-373	-0.0000446
BATT. ENDPOINT	3.52	+ 20	836,499,781	-219	-0.0000262

Table 7-22. Frequency Stability Data (Band 5)

Band 5 Frequency Stability Measurements

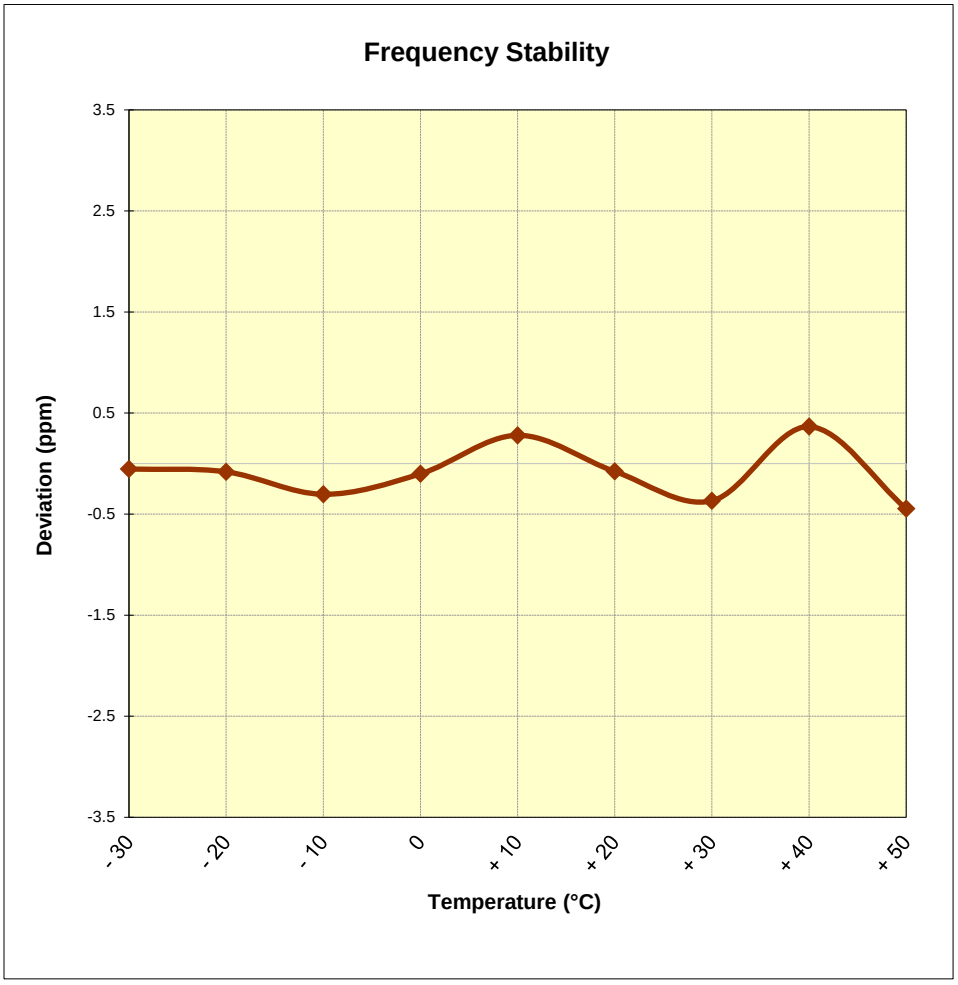


Figure 7-9. Frequency Stability Graph (Band 5)

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	1,745,000,085	85	0.0000049
100 %		- 20	1,745,000,193	193	0.0000111
100 %		- 10	1,744,999,723	-277	-0.0000159
100 %		0	1,744,999,912	-88	-0.0000050
100 %		+ 10	1,745,000,296	296	0.0000170
100 %		+ 20	1,744,999,813	-187	-0.0000107
100 %		+ 30	1,745,000,072	72	0.0000041
100 %		+ 40	1,744,999,758	-242	-0.0000139
100 %		+ 50	1,744,999,971	-29	-0.0000017
BATT. ENDPOINT	3.52	+ 20	1,745,000,409	409	0.0000234

Table 7-23. 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

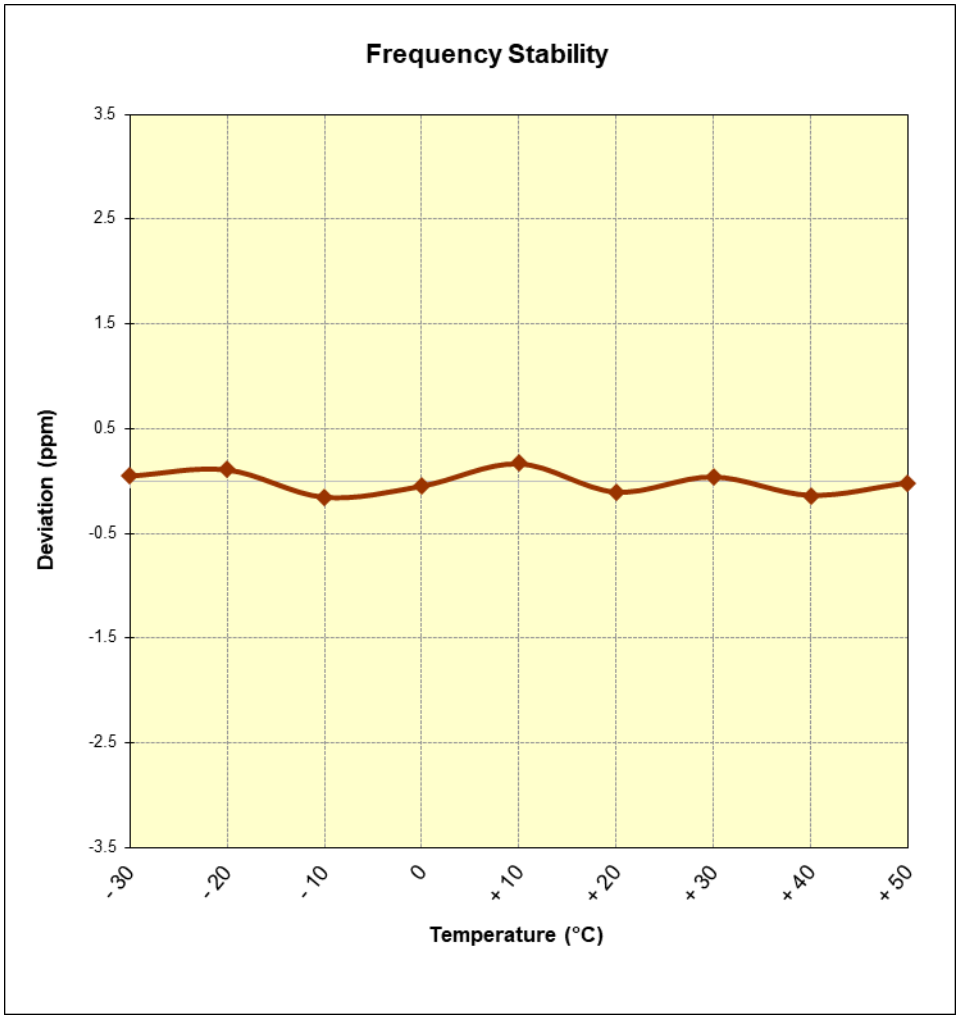


Figure 7-10. Frequency Stability Graph (Band 66/4)

Band 2 Frequency Stability Measurements

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
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	1,880,000,089	89	0.0000047
100 %		- 20	1,880,000,114	114	0.0000061
100 %		- 10	1,880,000,146	146	0.0000078
100 %		0	1,880,000,113	113	0.0000060
100 %		+ 10	1,879,999,698	-302	-0.0000161
100 %		+ 20	1,879,999,938	-62	-0.0000033
100 %		+ 30	1,879,999,883	-117	-0.0000062
100 %		+ 40	1,879,999,970	-30	-0.0000016
100 %		+ 50	1,880,000,084	84	0.0000045
BATT. ENDPOINT	3.52	+ 20	1,880,000,095	95	0.0000051

Table 7-24. Frequency Stability Data (Band 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 2 Frequency Stability Measurements

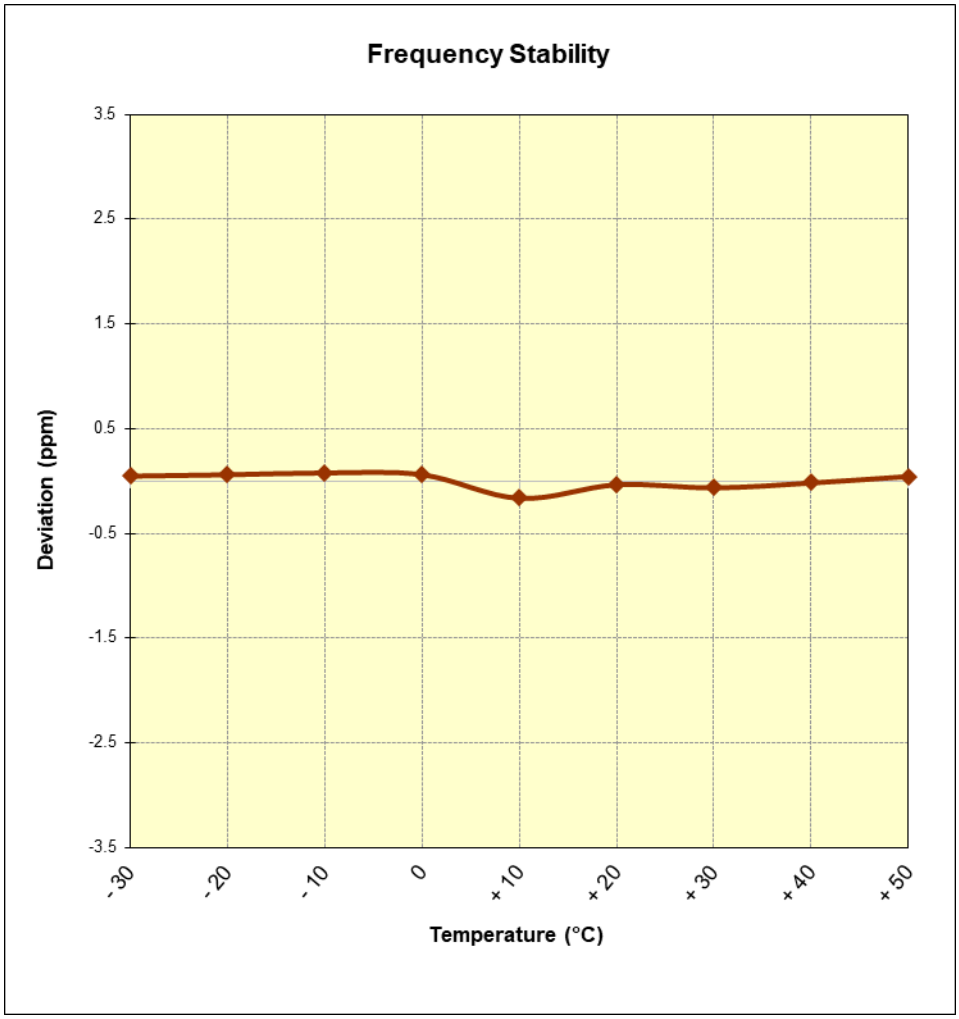


Figure 7-11. Frequency Stability Graph (Band 2)

Band 30 Frequency Stability Measurements

OPERATING FREQUENCY:	2,310,000,000	Hz
CHANNEL:	27710	
REFERENCE VOLTAGE:	4.25	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.25	- 30	2,309,999,960	-40	-0.0000017
100 %		- 20	2,309,999,941	-59	-0.0000026
100 %		- 10	2,310,000,056	56	0.0000024
100 %		0	2,309,999,944	-56	-0.0000024
100 %		+ 10	2,310,000,111	111	0.0000048
100 %		+ 20	2,310,000,308	308	0.0000133
100 %		+ 30	2,310,000,383	383	0.0000166
100 %		+ 40	2,310,000,026	26	0.0000011
100 %		+ 50	2,309,999,951	-49	-0.0000021
BATT. ENDPOINT	3.52	+ 20	2,310,000,015	15	0.0000006

Table 7-25. Frequency Stability Data (Band 30)

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 30 Frequency Stability Measurements

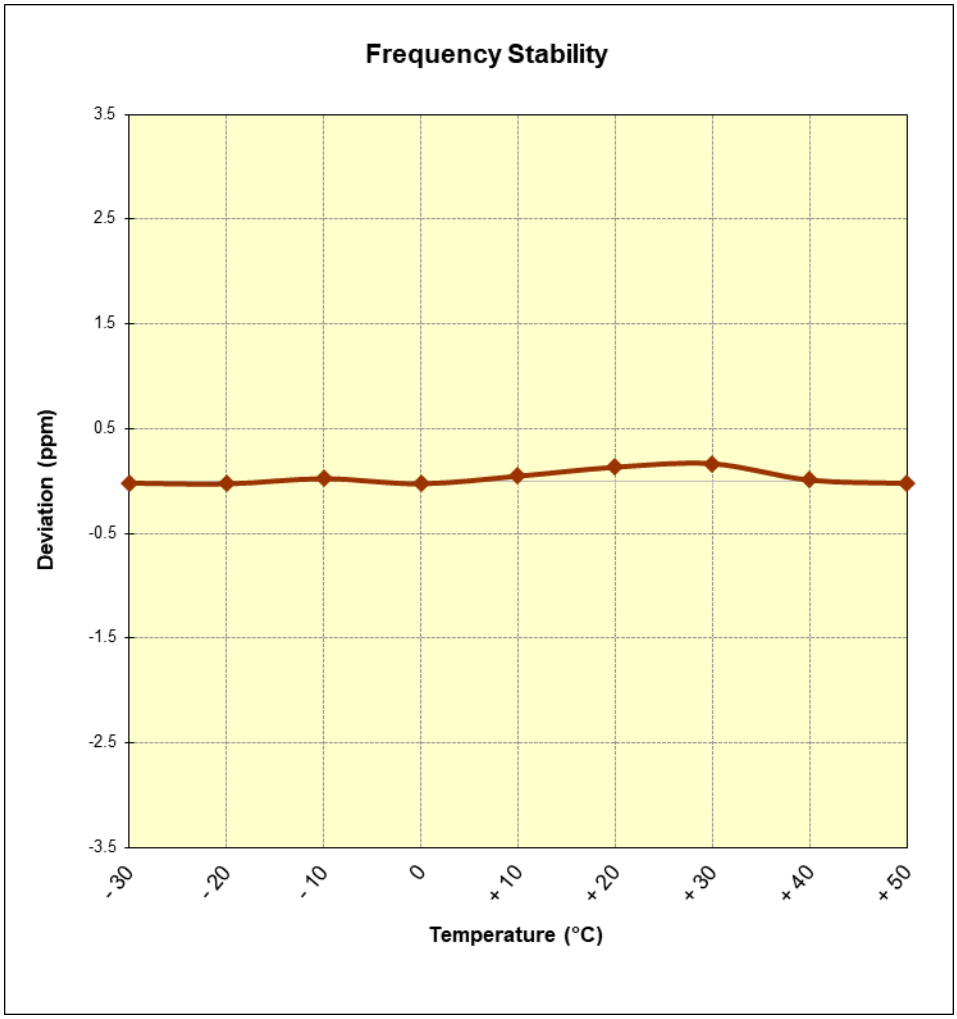


Figure 7-12. Frequency Stability Graph (Band 30)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFX420AS8** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.