

## 7.10 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  $\pm 0.00025\%$  ( $\pm 2.5$  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

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## Band 71 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	680,500,170	170	0.0000250
100 %		- 20	680,499,971	-29	-0.0000043
100 %		- 10	680,500,046	46	0.0000068
100 %		0	680,500,019	19	0.0000028
100 %		+ 10	680,500,066	66	0.0000097
100 %		+ 20	680,500,290	290	0.0000426
100 %		+ 30	680,500,277	277	0.0000407
100 %		+ 40	680,499,837	-163	-0.0000240
100 %		+ 50	680,499,859	-141	-0.0000207
BATT. ENDPOINT	3.16	+ 20	680,500,012	12	0.0000018

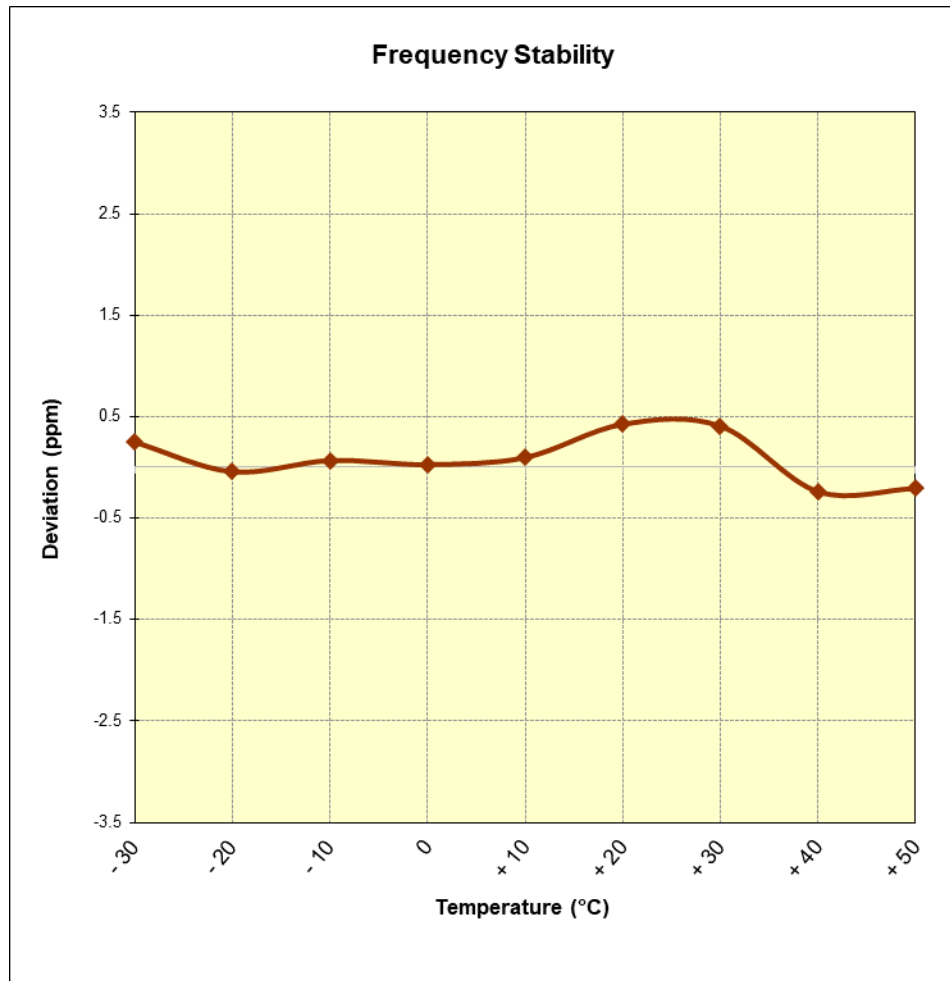
**Table 7-51. Frequency Stability Data (Band 71)**

### Note:

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

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## Band 71 Frequency Stability Measurements



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

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## Band 12 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz  
 CHANNEL: 23790  
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	707,500,011	11	0.0000016
100 %		- 20	707,499,739	-261	-0.0000369
100 %		- 10	707,499,962	-38	-0.0000054
100 %		0	707,499,696	-304	-0.0000430
100 %		+ 10	707,500,368	368	0.0000520
100 %		+ 20	707,500,049	49	0.0000069
100 %		+ 30	707,500,260	260	0.0000367
100 %		+ 40	707,500,282	282	0.0000399
100 %		+ 50	707,499,612	-388	-0.0000548
BATT. ENDPOINT	3.16	+ 20	707,500,193	193	0.0000273

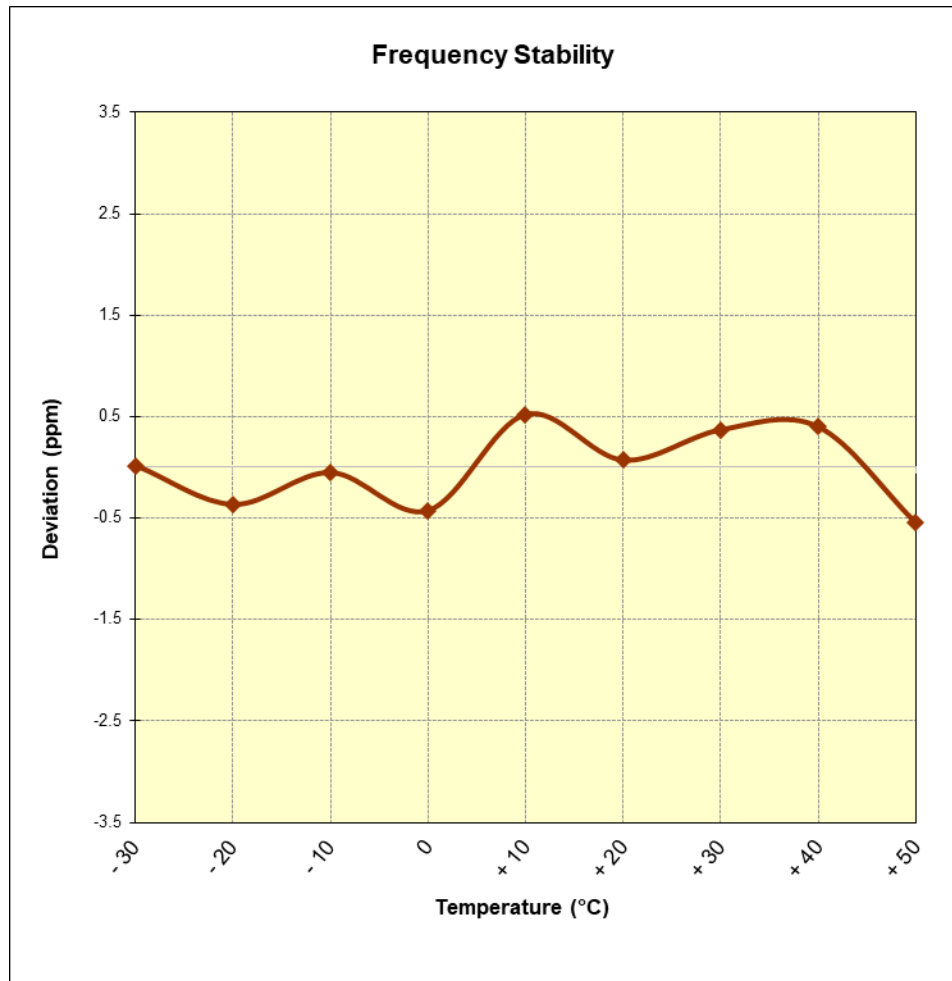
**Table 7-52. Frequency Stability Data (Band 12)**

### 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.

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## Band 12 Frequency Stability Measurements



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

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## Band 13 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	781,999,916	-84	-0.0000107
100 %		- 20	781,999,977	-23	-0.0000029
100 %		- 10	781,999,873	-127	-0.0000162
100 %		0	781,999,746	-254	-0.0000325
100 %		+ 10	782,000,090	90	0.0000115
100 %		+ 20	781,999,959	-41	-0.0000052
100 %		+ 30	781,999,996	-4	-0.0000005
100 %		+ 40	782,000,059	59	0.0000075
100 %		+ 50	781,999,940	-60	-0.0000077
BATT. ENDPOINT	3.16	+ 20	781,999,994	-6	-0.0000008

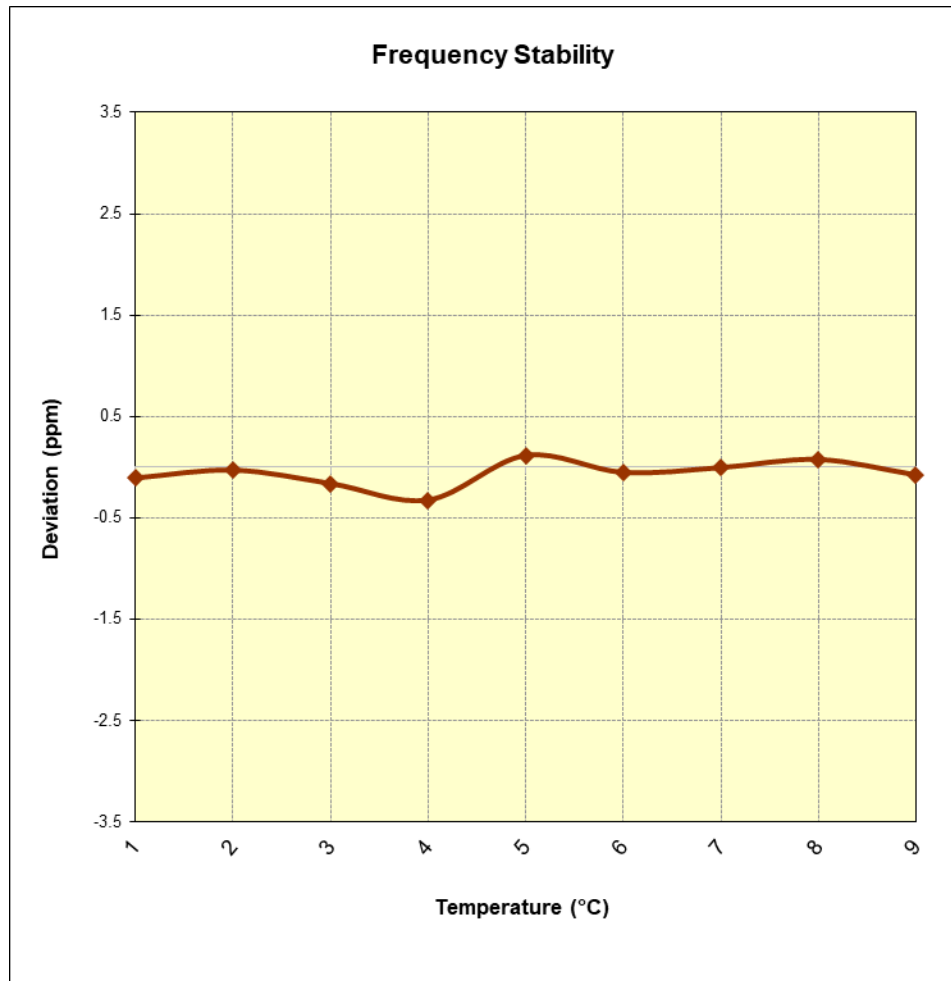
**Table 7-53. Frequency Stability Data (Band 13)**

### Note:

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

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## Band 13 Frequency Stability Measurements



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

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## Band 26/5 Frequency Stability Measurements

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

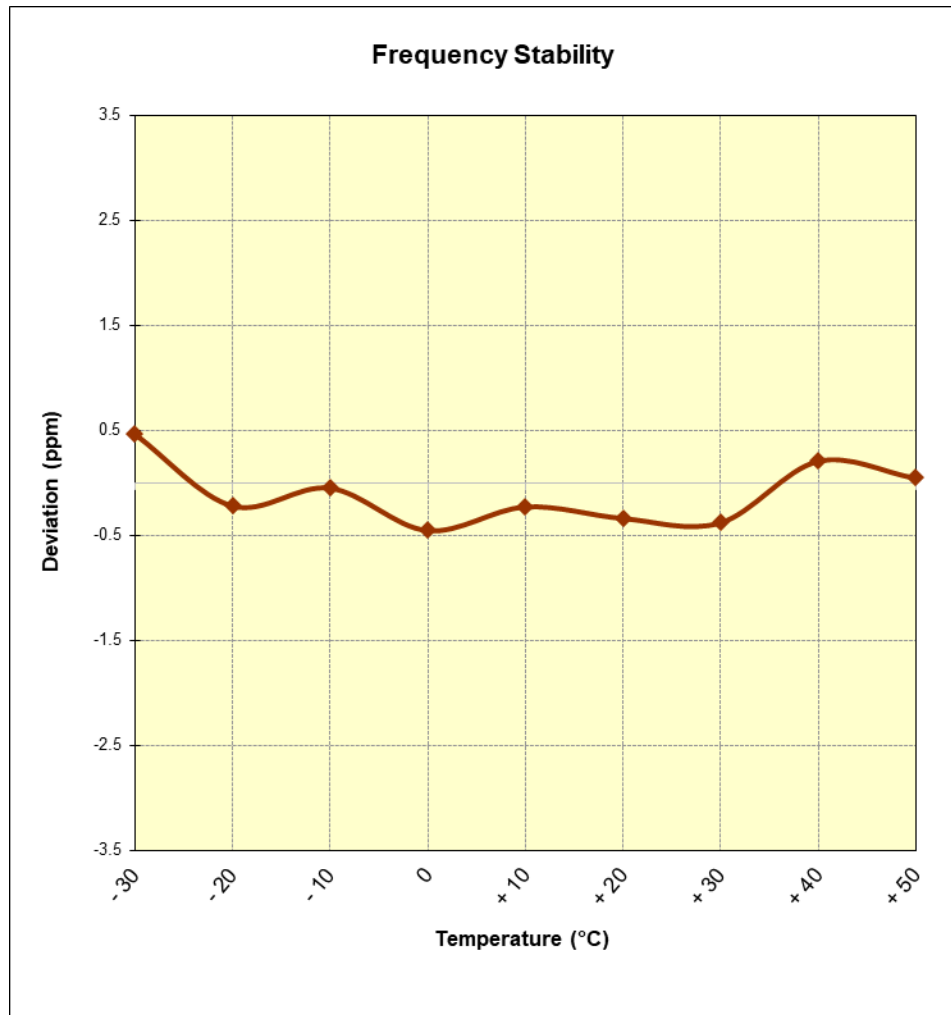
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	831,500,395	395	0.0000475
100 %		- 20	831,499,822	-178	-0.0000214
100 %		- 10	831,499,964	-36	-0.0000043
100 %		0	831,499,626	-374	-0.0000450
100 %		+ 10	831,499,814	-186	-0.0000224
100 %		+ 20	831,499,723	-277	-0.0000333
100 %		+ 30	831,499,687	-313	-0.0000376
100 %		+ 40	831,500,176	176	0.0000212
100 %		+ 50	831,500,042	42	0.0000051
BATT. ENDPOINT	3.16	+ 20	831,500,093	93	0.0000112

Table 7-54. Frequency Stability Data (Band 26/5)

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## Band 26/5 Frequency Stability Measurements



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

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## Band 66/4 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	1,745,000,230	230	0.0000132
100 %		- 20	1,745,000,026	26	0.0000015
100 %		- 10	1,744,999,909	-91	-0.0000052
100 %		0	1,744,999,877	-123	-0.0000070
100 %		+ 10	1,745,000,034	34	0.0000019
100 %		+ 20	1,744,999,805	-195	-0.0000112
100 %		+ 30	1,744,999,971	-29	-0.0000017
100 %		+ 40	1,745,000,007	7	0.0000004
100 %		+ 50	1,745,000,004	4	0.0000002
BATT. ENDPOINT	3.16	+ 20	1,744,999,876	-124	-0.0000071

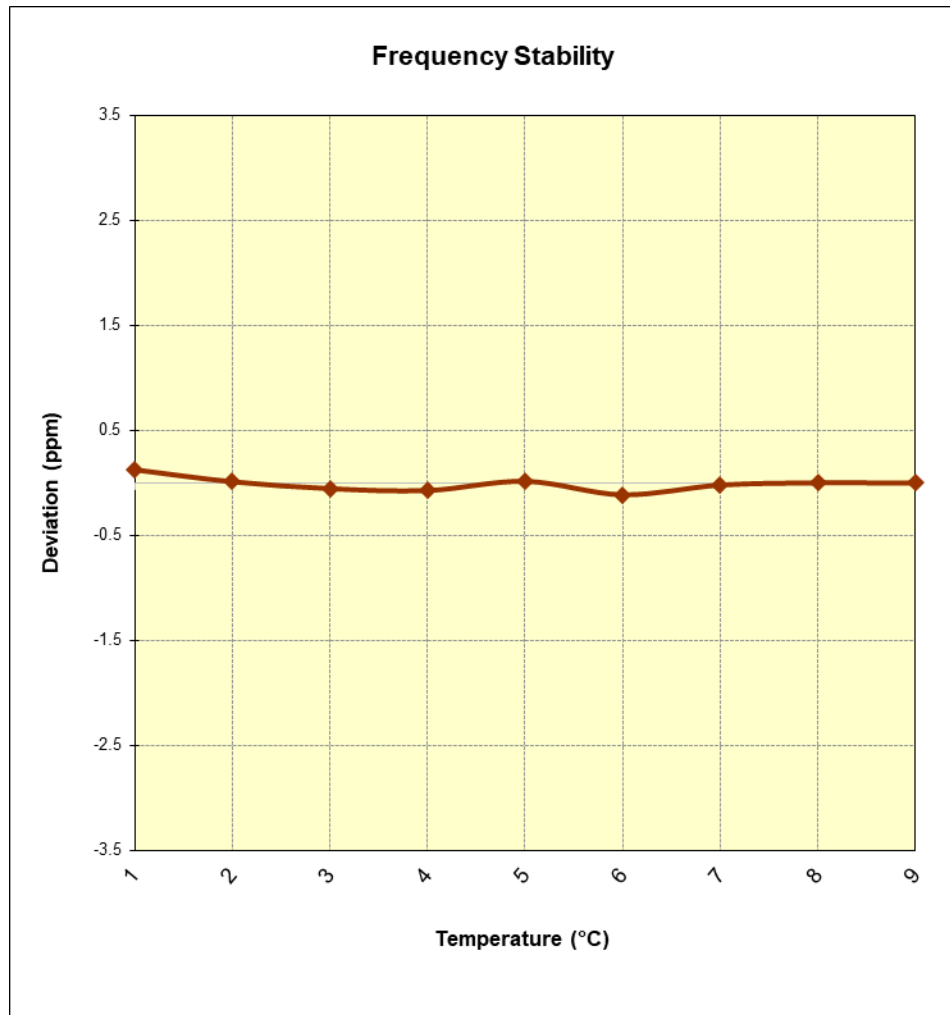
**Table 7-55. Frequency Stability Data (Band 66/4)**

### 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.

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## Band 66/4 Frequency Stability Measurements



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

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## Band 25/2 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	1,882,499,652	-348	-0.0000185
100 %		- 20	1,882,499,880	-120	-0.0000064
100 %		- 10	1,882,500,007	7	0.0000004
100 %		0	1,882,500,100	100	0.0000053
100 %		+ 10	1,882,500,435	435	0.0000231
100 %		+ 20	1,882,499,967	-33	-0.0000018
100 %		+ 30	1,882,500,398	398	0.0000211
100 %		+ 40	1,882,499,917	-83	-0.0000044
100 %		+ 50	1,882,499,974	-26	-0.0000014
BATT. ENDPOINT	3.16	+ 20	1,882,500,059	59	0.0000031

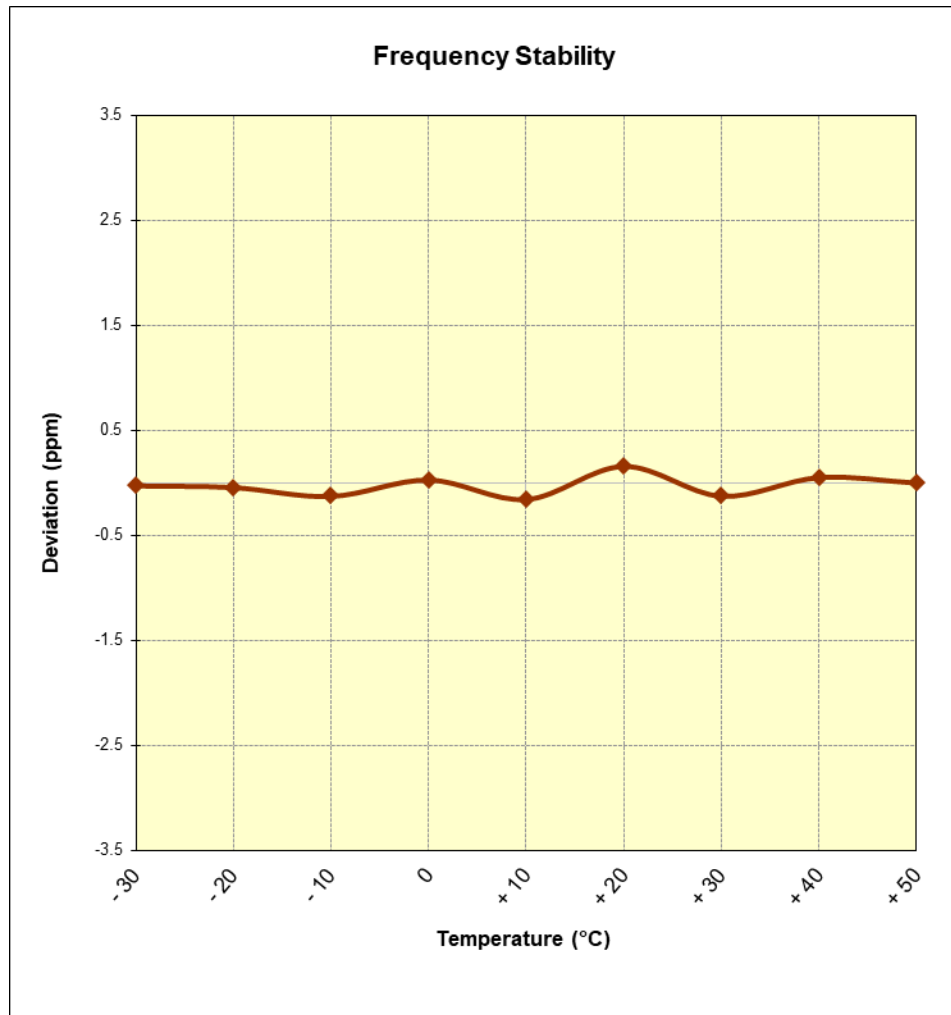
**Table 7-56. Frequency Stability Data (Band 25/2)**

### 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.

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## Band 25/2 Frequency Stability Measurements



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

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## Band 7 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	2,534,999,827	-173	-0.0000068
100 %		- 20	2,534,999,978	-22	-0.0000009
100 %		- 10	2,535,000,034	34	0.0000013
100 %		0	2,534,999,989	-11	-0.0000004
100 %		+ 10	2,535,000,252	252	0.0000099
100 %		+ 20	2,534,999,990	-10	-0.0000004
100 %		+ 30	2,534,999,929	-71	-0.0000028
100 %		+ 40	2,534,999,957	-43	-0.0000017
100 %		+ 50	2,534,999,917	-83	-0.0000033
BATT. ENDPOINT	3.16	+ 20	2,534,999,927	-73	-0.0000029

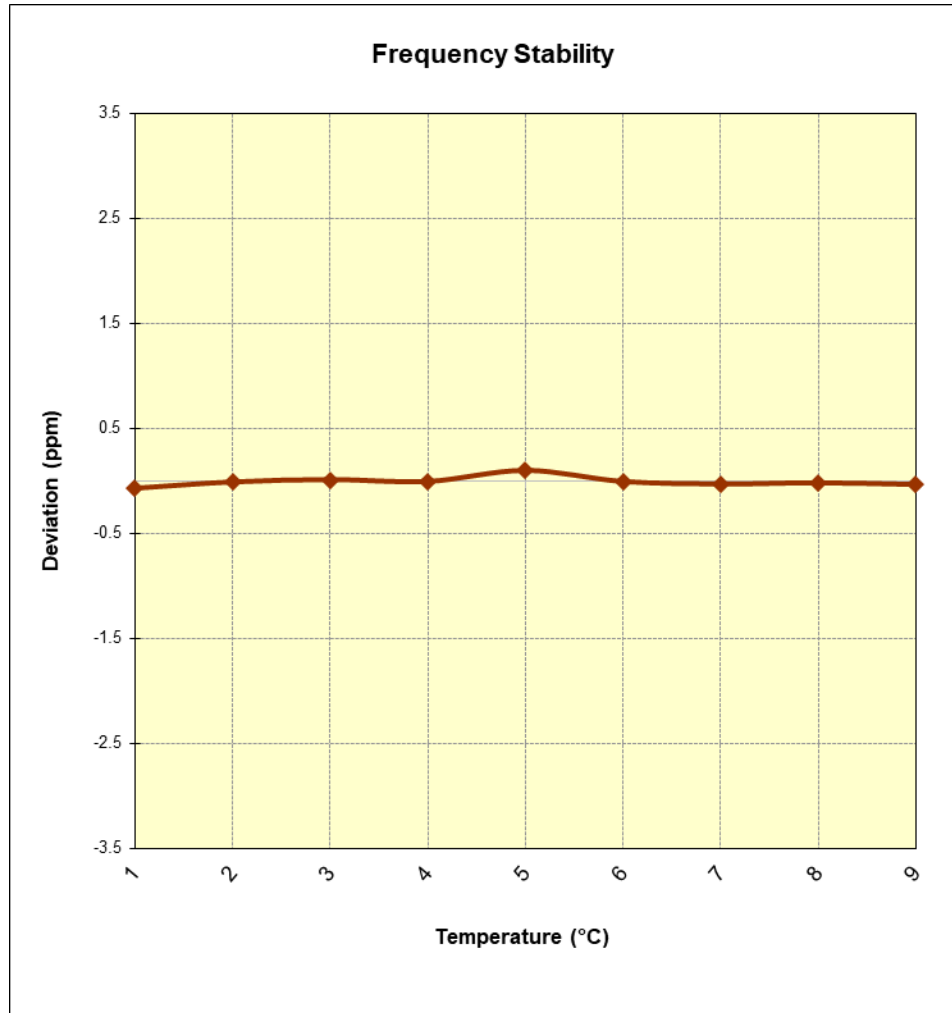
**Table 7-57. Frequency Stability Data (Band 7)**

### Note:

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

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## Band 7 Frequency Stability Measurements



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

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## Band 41 Frequency Stability Measurements

OPERATING FREQUENCY: 2,593,000,000 Hz  
 CHANNEL: 40620  
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	2,592,999,994	-6	-0.0000002
100 %		- 20	2,593,000,115	115	0.0000044
100 %		- 10	2,592,999,792	-208	-0.0000080
100 %		0	2,592,999,715	-285	-0.0000110
100 %		+ 10	2,592,999,920	-80	-0.0000031
100 %		+ 20	2,593,000,067	67	0.0000026
100 %		+ 30	2,593,000,169	169	0.0000065
100 %		+ 40	2,593,000,318	318	0.0000123
100 %		+ 50	2,592,999,879	-121	-0.0000047
BATT. ENDPOINT	3.16	+ 20	2,592,999,955	-45	-0.0000017

**Table 7-58. Frequency Stability Data (Band 41)**

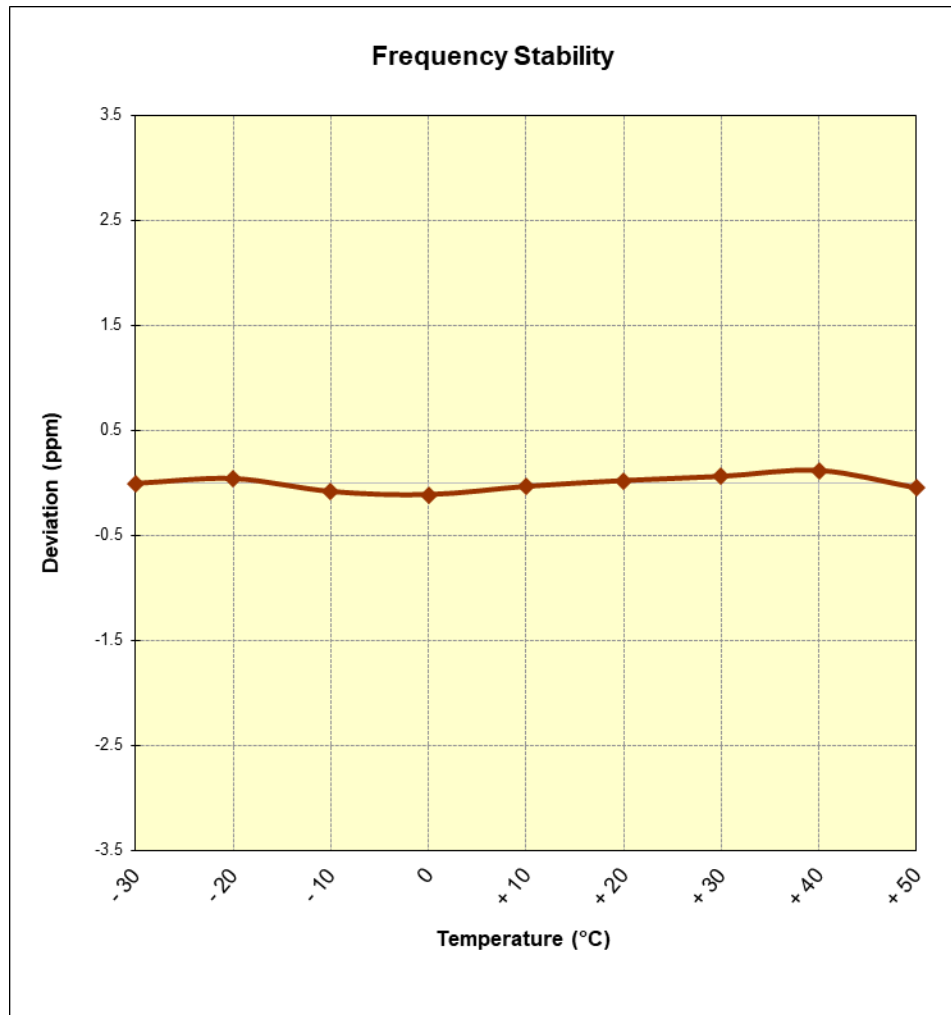
### Note:

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.

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## Band 41 Frequency Stability Measurements



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

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## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Tablet FCC ID: A3LSMT867U** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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