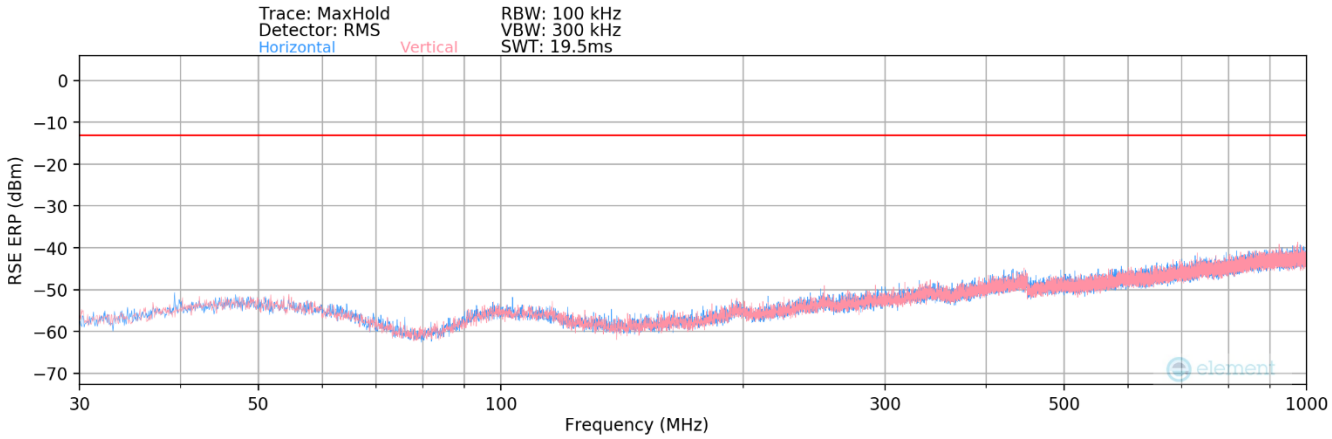
## LTE Band 66/4 – Ant F

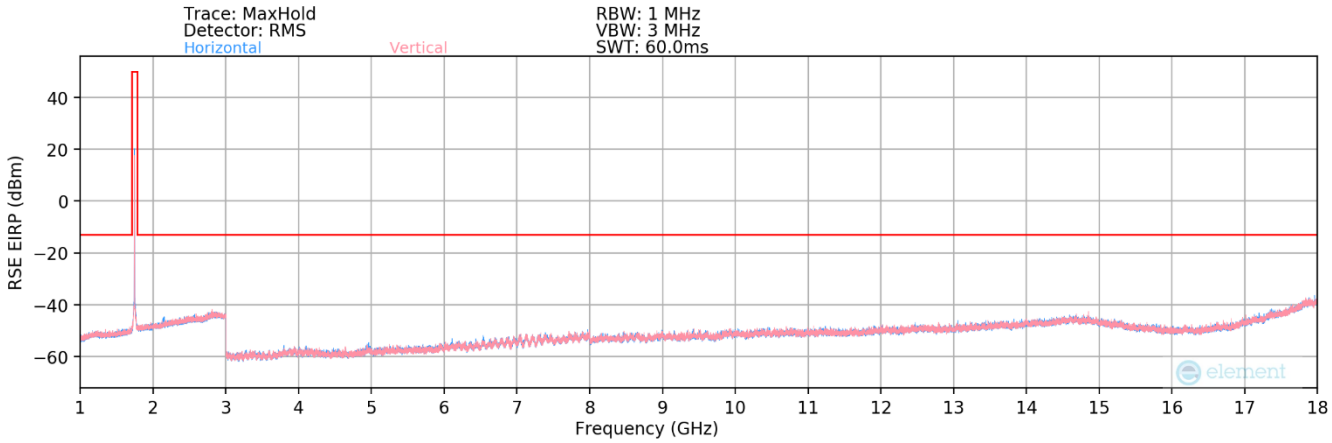



**Plot 7-146. Radiated Spurious Plot Below 1GHz (LTE Band 66/4 – Ant F)**

| | |
|---|---|
| **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] | ERP Spurious Emission Level [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|
| 550.30 | H | - | - | -79.23 | 25.39 | 53.16 | -44.25 | -13.00 | -31.25 |

**Table 7-42. Radiated Spurious Data Below 1GHz (LTE Band 66/4 – Ant F)**




**Plot 7-147. Radiated Spurious Plot Above 1GHz (LTE Band 66/4 – Ant F)**

| | |
|---|---|
| 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 | - | - | -75.09 | -1.14 | 30.77 | -64.49 | -13.00 | -51.49 |
| 5160.00 | H | - | - | -75.51 | 1.17 | 32.66 | -62.59 | -13.00 | -49.59 |
| 6880.00 | H | - | - | -75.86 | 5.99 | 37.13 | -58.13 | -13.00 | -45.13 |

**Table 7-43. Radiated Spurious Data Above 1GHz (LTE Band 66/4 – Low Channel – Ant F)**

| | |
|---|---|
| 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 | - | - | -75.20 | -1.34 | 30.46 | -64.80 | -13.00 | -51.80 |
| 5235.00 | H | - | - | -75.72 | 1.54 | 32.82 | -62.44 | -13.00 | -49.44 |
| 6980.00 | H | - | - | -75.97 | 5.46 | 36.49 | -58.77 | -13.00 | -45.77 |

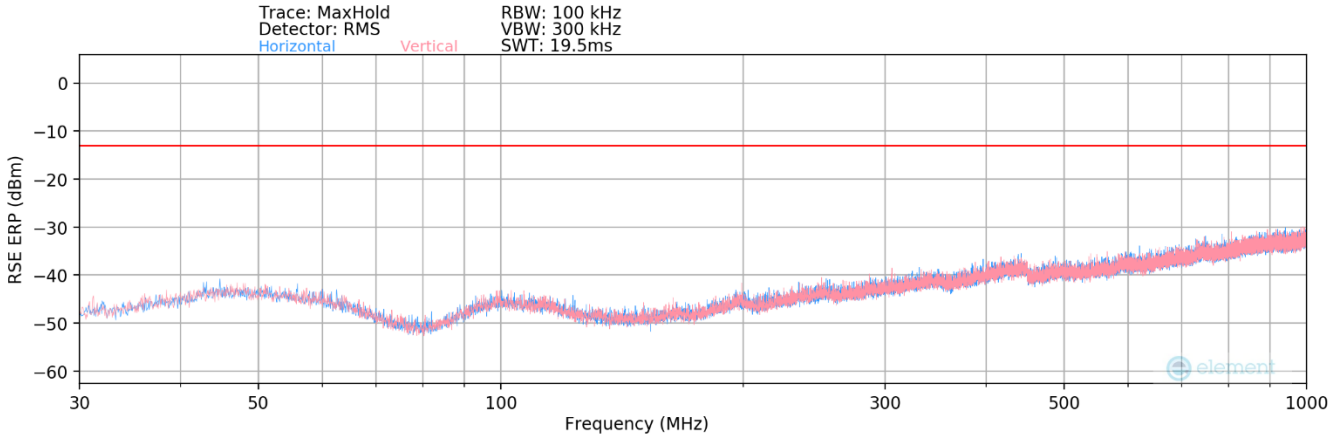
**Table 7-44. Radiated Spurious Data Above 1GHz (LTE Band 66/4 – Mid Channel – Ant F)**

| | |
|---|---|
| Bandwidth (MHz): | 20 |
| Frequency (MHz): | 1770 |
| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 3540.00 | H | - | - | -74.90 | -1.36 | 30.74 | -64.52 | -13.00 | -51.52 |
| 5310.00 | H | - | - | -76.21 | 2.10 | 32.89 | -62.37 | -13.00 | -49.37 |
| 7080.00 | H | - | - | -76.70 | 5.38 | 35.68 | -59.57 | -13.00 | -46.57 |

**Table 7-45. Radiated Spurious Data Above 1GHz (LTE Band 66/4 – High Channel – Ant F)**

## NR Band n66 – Ant F

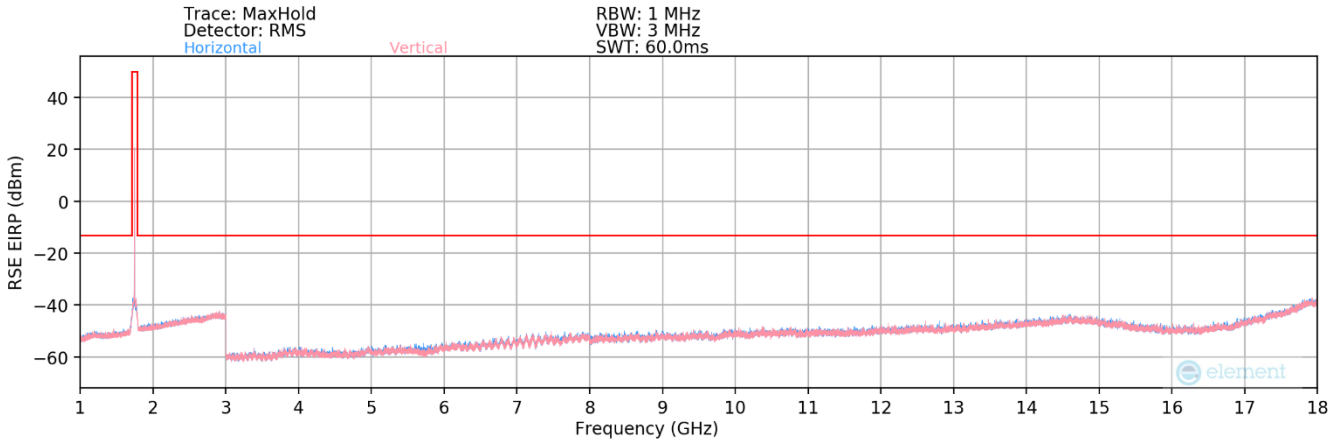



**Plot 7-148. Radiated Spurious Plot Below 1GHz (NR Band n66 – Ant F)**

| | |
|---|---|
| **Bandwidth (MHz):** | 40 |
| **Frequency (MHz):** | 1745 |
| **RB / Offset:** | 1 / 108 |

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 549.81 | H | - | - | -79.86 | 25.38 | 52.52 | -44.89 | -13.00 | -31.89 |

**Table 7-46. Radiated Spurious Data Below 1GHz (NR Band n66 – Ant F)**




**Plot 7-149. Radiated Spurious Plot Above 1GHz (NR Band n66 – Ant F)**

| | |
|---|---|
| Bandwidth (MHz): | 40 |
| Frequency (MHz): | 1730 |
| RB / Offset: | 1 / 108 |

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 3460.00 | H | - | - | -74.67 | -1.38 | 30.95 | -64.30 | -13.00 | -51.30 |
| 5190.00 | H | - | - | -76.01 | 1.74 | 32.73 | -62.53 | -13.00 | -49.53 |
| 6920.00 | H | - | - | -77.38 | 4.80 | 34.42 | -60.83 | -13.00 | -47.83 |

**Table 7-47. Radiated Spurious Data Above 1GHz (NR Band n66 – Low Channel – Ant F)**

| | |
|---|---|
| Bandwidth (MHz): | 40 |
| Frequency (MHz): | 1745 |
| RB / Offset: | 1 / 108 |

| 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 | - | - | -75.23 | -1.34 | 30.43 | -64.83 | -13.00 | -51.83 |
| 5235.00 | H | - | - | -76.38 | 1.54 | 32.16 | -63.10 | -13.00 | -50.10 |
| 6980.00 | H | - | - | -77.09 | 5.46 | 35.37 | -59.89 | -13.00 | -46.89 |

**Table 7-48. Radiated Spurious Data Above 1GHz (NR Band n66 – Mid Channel – Ant F)**

| | |
|---|---|
| Bandwidth (MHz): | 40 |
| Frequency (MHz): | 1760 |
| RB / Offset: | 1 / 108 |

| 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] |
|---|---|---|---|---|---|---|---|---|---|
| 3520.00 | H | - | - | -75.14 | -1.36 | 30.50 | -64.76 | -13.00 | -51.76 |
| 5280.00 | H | - | - | -76.16 | 1.87 | 32.71 | -62.54 | -13.00 | -49.54 |
| 7040.00 | H | - | - | -76.97 | 6.72 | 36.75 | -58.51 | -13.00 | -45.51 |

**Table 7-49. Radiated Spurious Data Above 1GHz (NR Band n66 – High Channel – Ant F)**

## 7.9 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

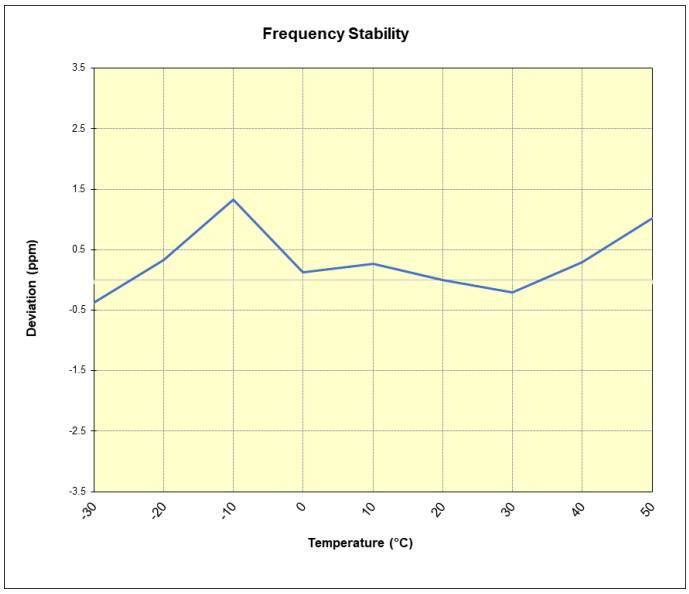
## Frequency Stability / Temperature Variation

**LTE Band 12**

| | |
|---|---|
| Operating Frequency (Hz): | 707,500,000 |
| Ref. Voltage (VDC): | 4.414 |
| Deviation Limit: | ± 0.00025% or 2.5 ppm |

| Voltage (%) | Power (VDC) | Temp (°C) | Frequency (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.414 | - 30 | 707,499,419 | -261 | -0.0000369 |
| | | - 20 | 707,499,919 | 239 | 0.0000337 |
| | | - 10 | 707,500,623 | 942 | 0.0001332 |
| | | 0 | 707,499,773 | 92 | 0.0000130 |
| | | + 10 | 707,499,867 | 186 | 0.0000263 |
| | | + 20 (Ref) | 707,499,681 | 0 | 0.0000000 |
| | | + 30 | 707,499,539 | -142 | -0.0000201 |
| | | + 40 | 707,499,887 | 206 | 0.0000291 |
| | | + 50 | 707,500,402 | 721 | 0.0001019 |
| Battery Endpoint | 3.774 | + 20 | 707,500,233 | 553 | 0.0000781 |

**Table 7-50. LTE Band 12 Frequency Stability Data**




**Plot 7-150. LTE Band 12 Frequency Stability Chart**

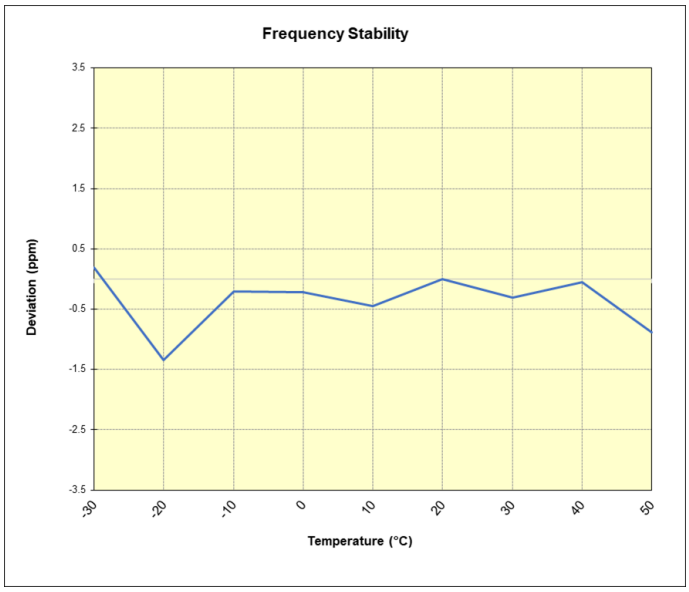
## Frequency Stability / Temperature Variation

**LTE Band 13**

| | |
|---|---|
| Operating Frequency (Hz): | 782,000,000 |
| Ref. Voltage (VDC): | 4.414 |
| Deviation Limit: | ± 0.00025% or 2.5 ppm |

| Voltage (%) | Power (VDC) | Temp (°C) | Frequency (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.414 | - 30 | 782,000,812 | 147 | 0.0000188 |
| | | - 20 | 781,999,613 | -1,051 | -0.0001344 |
| | | - 10 | 782,000,505 | -160 | -0.0000205 |
| | | 0 | 782,000,498 | -167 | -0.0000214 |
| | | + 10 | 782,000,314 | -350 | -0.0000448 |
| | | + 20 (Ref) | 782,000,665 | 0 | 0.0000000 |
| | | + 30 | 782,000,424 | -241 | -0.0000308 |
| | | + 40 | 782,000,625 | -40 | -0.0000051 |
| | | + 50 | 781,999,970 | -695 | -0.0000889 |
| Battery Endpoint | 3.774 | + 20 | 781,999,701 | -964 | -0.0001233 |

**Table 7-51. LTE Band 13 Frequency Stability Data**




**Plot 7-151. LTE Band 13 Frequency Stability Chart**

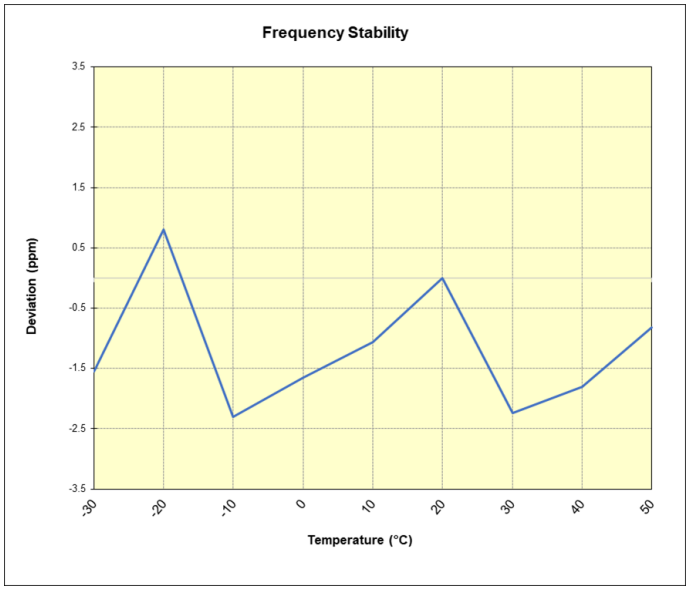
## Frequency Stability / Temperature Variation

**WCDMA AWS**

| | |
|---|---|
| Operating Frequency (Hz): | 1,732,600,000 |
| Ref. Voltage (VDC): | 4.414 |
| Deviation Limit: | ± 0.00025% or 2.5 ppm |

| Voltage (%) | Power (VDC) | Temp (°C) | Frequency (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.414 | - 30 | 1,732,659,687 | -2,683 | -0.0001548 |
| | | - 20 | 1,732,663,769 | 1,400 | 0.0000808 |
| | | - 10 | 1,732,658,377 | -3,992 | -0.0002304 |
| | | 0 | 1,732,659,520 | -2,850 | -0.0001645 |
| | | + 10 | 1,732,660,533 | -1,836 | -0.0001060 |
| | | + 20 (Ref) | 1,732,662,370 | 0 | 0.0000000 |
| | | + 30 | 1,732,658,495 | -3,875 | -0.0002236 |
| | | + 40 | 1,732,659,248 | -3,122 | -0.0001802 |
| | | + 50 | 1,732,660,958 | -1,412 | -0.0000815 |
| Battery Endpoint | 3.774 | + 20 | 1,732,664,837 | 2,468 | 0.0001424 |

**Table 7-52. WCDMA AWS Frequency Stability Data**




**Plot 7-152. WCDMA AWS Frequency Stability Chart**

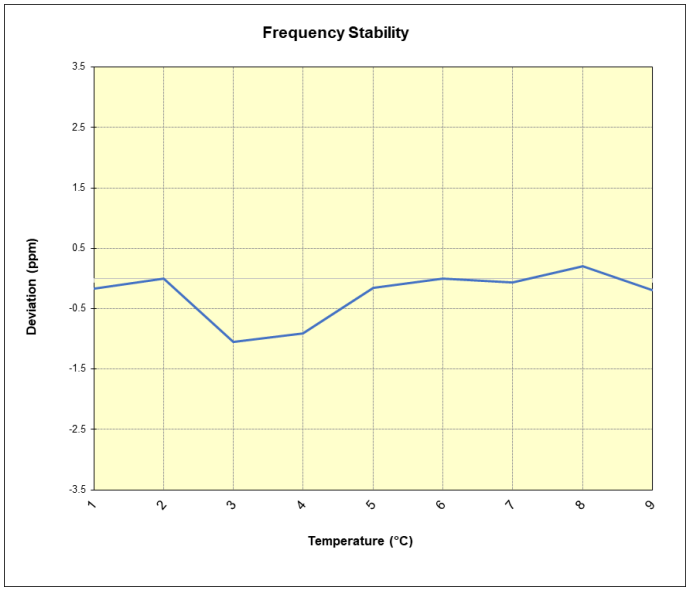
## Frequency Stability / Temperature Variation

**LTE Band 66/4**

| | |
|---|---|
| Operating Frequency (Hz): | 1,745,000,000 |
| Ref. Voltage (VDC): | 4.414 |
| Deviation Limit: | ± 0.00025% or 2.5 ppm |

| Voltage (%) | Power (VDC) | Temp (°C) | Frequency (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.414 | - 30 | 1,744,999,837 | -297 | -0.0000170 |
| | | - 20 | 1,745,000,131 | -3 | -0.0000002 |
| | | - 10 | 1,744,998,305 | -1,829 | -0.0001048 |
| | | 0 | 1,744,998,549 | -1,585 | -0.0000908 |
| | | + 10 | 1,744,999,862 | -272 | -0.0000156 |
| | | + 20 (Ref) | 1,745,000,134 | 0 | 0.0000000 |
| | | + 30 | 1,745,000,027 | -108 | -0.0000062 |
| | | + 40 | 1,745,000,479 | 345 | 0.0000198 |
| | | + 50 | 1,744,999,803 | -331 | -0.0000190 |
| Battery Endpoint | 3.774 | + 20 | 1,745,000,214 | 80 | 0.0000046 |

**Table 7-53. LTE Band 66/4 Frequency Stability Data**




**Plot 7-153. LTE Band 66/4 Frequency Stability Chart**

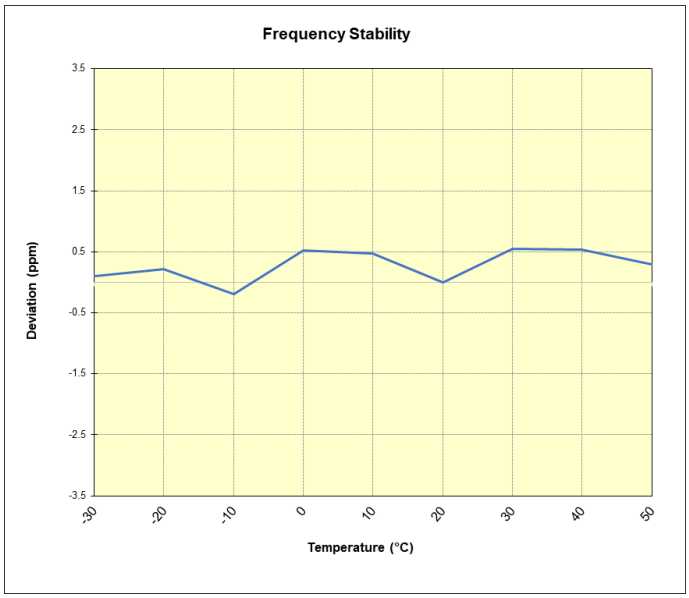
## Frequency Stability / Temperature Variation

**NR Band n66**

| | |
|---|---|
| Operating Frequency (Hz): | 1,745,000,000 |
| Ref. Voltage (VDC): | 4.414 |
| Deviation Limit: | ± 0.00025% or 2.5 ppm |

| Voltage (%) | Power (VDC) | Temp (°C) | Frequency (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 4.414 | - 30 | 1,745,082,762 | 170 | 0.0000097 |
| | | - 20 | 1,745,082,975 | 383 | 0.0000219 |
| | | - 10 | 1,745,082,255 | -337 | -0.0000193 |
| | | 0 | 1,745,083,499 | 907 | 0.0000520 |
| | | + 10 | 1,745,083,417 | 824 | 0.0000472 |
| | | + 20 (Ref) | 1,745,082,592 | 0 | 0.0000000 |
| | | + 30 | 1,745,083,544 | 951 | 0.0000545 |
| | | + 40 | 1,745,083,517 | 925 | 0.0000530 |
| | | + 50 | 1,745,083,103 | 511 | 0.0000293 |
| Battery Endpoint | 3.774 | + 20 | 1,745,083,176 | 584 | 0.0000334 |

**Table 7-54. NR Band n66 Frequency Stability Data**




**Plot 7-154. NR Band n66 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: A3LSMA356E** complies with all the requirements of Part 27 of the FCC rules.