# 8 Frequency Stability Versus Temperature

FCC 2.1055

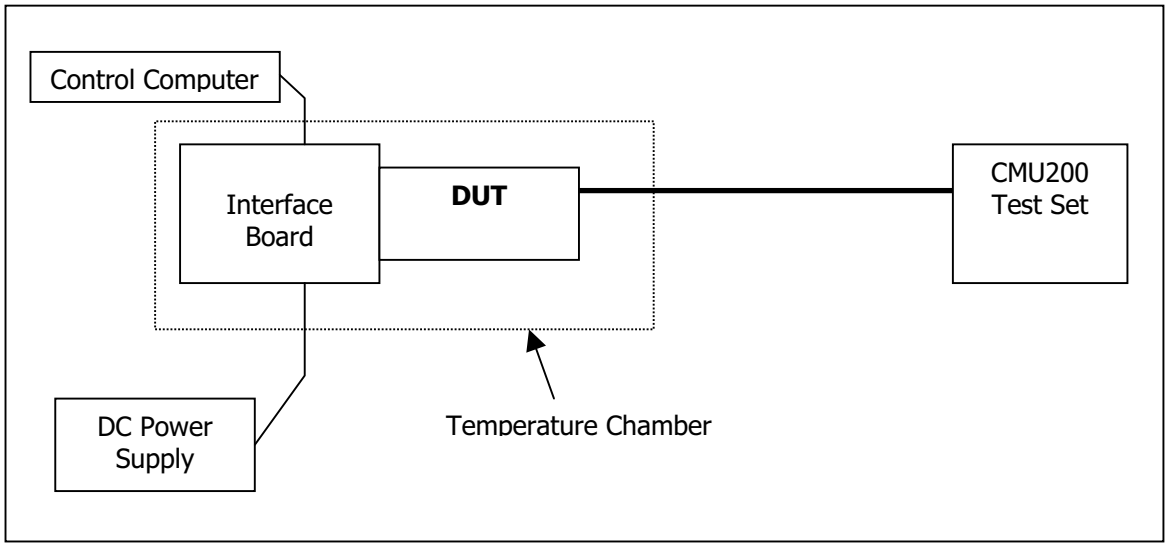
## *8.1 Summary of Results*

The AC755 Frequency Stability versus temperature meets the requirement of being within ±0.1ppm of the received base station frequency.

## *8.2 Test Procedure*

The AC755 was placed inside the temperature chamber. The transmitting frequency error is measured at 25 degrees C, then the temperature is set to +60 degrees C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is decreased by 10 degrees, allowed to stabilize and soak, then the measurement is repeated. This is repeated until -20 degrees C is completed. The process is then repeated back up to +60 degrees C. Frequency metering included internal averaging of the CMU200 to stabilize the reading. Reference power supply voltage for these tests is 5.0 volts.

**Test Setup**




## *8.3 Test Equipment*

| EQUIPMENT | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DATE |
|---|---|---|---|---|
| Control Computer | TC | Generic PC | 100488 | N/A |
| Wireless Test Set | Rohde & Schwarz | CMU200 | 836766/030 | N/A |
| Spectrum Analyzer | Rohde & Schwarz | FSP 30GHz | US41421268 | Sept. 12, 2003 |
| DC Power Supply | HP | E3631A | 100060 | N/A |
| Interface Board | Shop built | Minnow | N/A | N/A |

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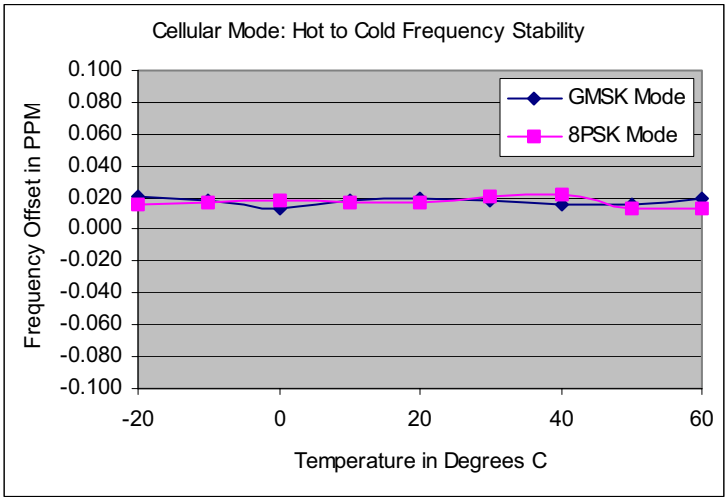
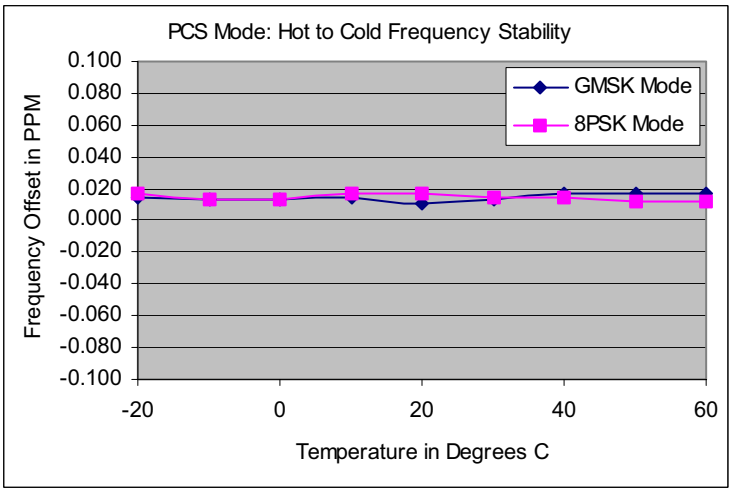
### *8.4 Test Results*

High to Low Temperature Frequency Error




High to Low Temperature Tabular Readings

| Temp.(C) | Cellular Mode: 824MHz to 848MHz | | | | PCS Mode: 1850MHz to 1909MHz | | | |
|---|---|---|---|---|---|---|---|---|
| | GMSK Mode | | 8-PSK Mode | | GMSK Mode | | 8-PSK Mode | |
| | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) |
| 60 | 16 | 0.019 | 11 | 0.013 | 24 | 0.013 | 27 | 0.014 |
| 50 | 13 | 0.016 | 11 | 0.013 | 21 | 0.011 | 32 | 0.017 |
| 40 | 13 | 0.016 | 18 | 0.022 | 22 | 0.012 | 21 | 0.011 |
| 30 | 15 | 0.018 | 17 | 0.020 | 30 | 0.016 | 21 | 0.011 |
| 20 | 16 | 0.019 | 14 | 0.017 | 25 | 0.013 | 23 | 0.012 |
| 10 | 15 | 0.018 | 14 | 0.017 | 26 | 0.014 | 27 | 0.014 |
| 0 | 11 | 0.013 | 15 | 0.018 | 21 | 0.011 | 26 | 0.014 |
| -10 | 15 | 0.018 | 14 | 0.017 | 21 | 0.011 | 34 | 0.018 |
| -20 | 17 | 0.020 | 13 | 0.016 | 28 | 0.015 | 33 | 0.018 |

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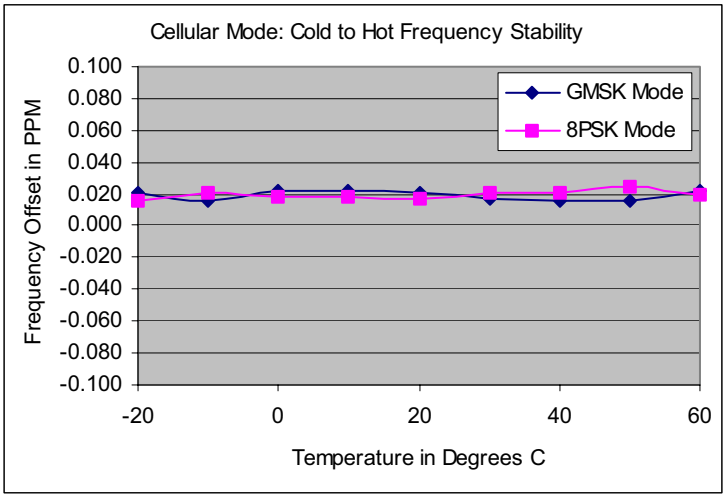
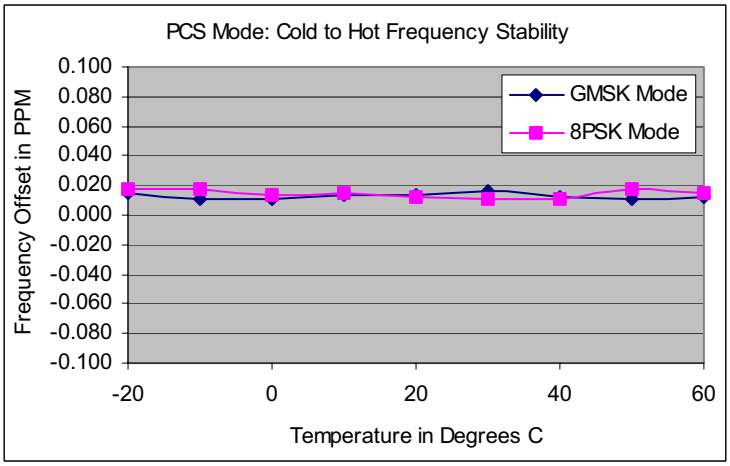
Low to High Temperature Frequency Error




Low to High Temperature Tabular Readings

| Temp.(C) | Cellular Mode: 824MHz to 848MHz | | | | PCS Mode: 1850MHz to 1909MHz | | | |
|---|---|---|---|---|---|---|---|---|
| | GMSK Mode | | 8-PSK Mode | | GMSK Mode | | 8-PSK Mode | |
| | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) |
| -20 | 17 | 0.020 | 13 | 0.016 | 28 | 0.015 | 33 | 0.018 |
| -10 | 13 | 0.016 | 17 | 0.020 | 25 | 0.013 | 24 | 0.013 |
| 0 | 18 | 0.022 | 15 | 0.018 | 25 | 0.013 | 24 | 0.013 |
| 10 | 18 | 0.022 | 15 | 0.018 | 28 | 0.015 | 33 | 0.018 |
| 20 | 17 | 0.020 | 14 | 0.017 | 20 | 0.011 | 31 | 0.016 |
| 30 | 14 | 0.017 | 17 | 0.020 | 25 | 0.013 | 28 | 0.015 |
| 40 | 13 | 0.016 | 17 | 0.020 | 33 | 0.018 | 28 | 0.015 |
| 50 | 13 | 0.016 | 21 | 0.025 | 33 | 0.018 | 23 | 0.012 |
| 60 | 18 | 0.022 | 16 | 0.019 | 31 | 0.016 | 22 | 0.012 |

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# 9 Frequency Stability Versus Voltage

FCC 2.1055

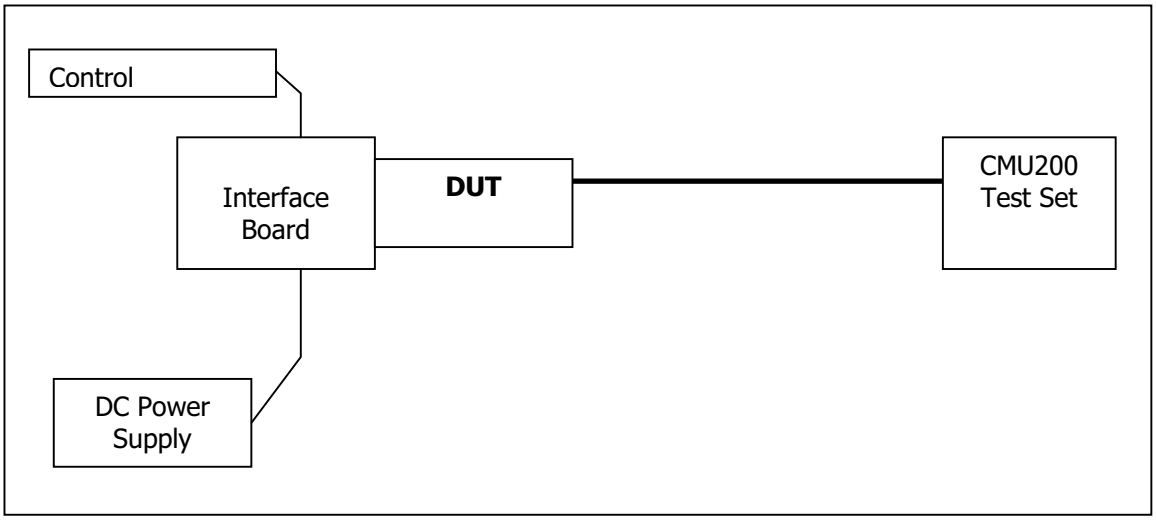
## *9.1 Summary of Results*

The unit meets the limit of less than 0.1ppm of frequency offset from center for 85% and 115% of the supply voltage for 5.0 volts.

## *9.2 Test Procedure*

The AC755 was connected to a DC Power Supply and a GSM test set (CMU 200) with frequency error measurement capability. The power supply output is adjusted to the test voltage as measured at the input terminals to the module while transmitting. A voltmeter was used to confirm the terminal voltage. The peak frequency error is recorded (worst case).
The test voltages are 4.25 volts to 5.75 volts.

**Test Setup**




## *9.3 Test Equipment*

| EQUIPMENT | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DATE |
|---|---|---|---|---|
| Control Computer | TC | Generic PC | 100488 | N/A |
| Wireless Test Set | Rohde & Schwarz | CMU200 | 836766/030 | N/A |
| Spectrum Analyzer | Rohde & Schwarz | FSP 30GHz | US41421268 | Sept. 12, 2003 |
| DC Power Supply | HP | E3631A | 100060 | N/A |
| Interface Board | Shop built | Minnow | N/A | N/A |

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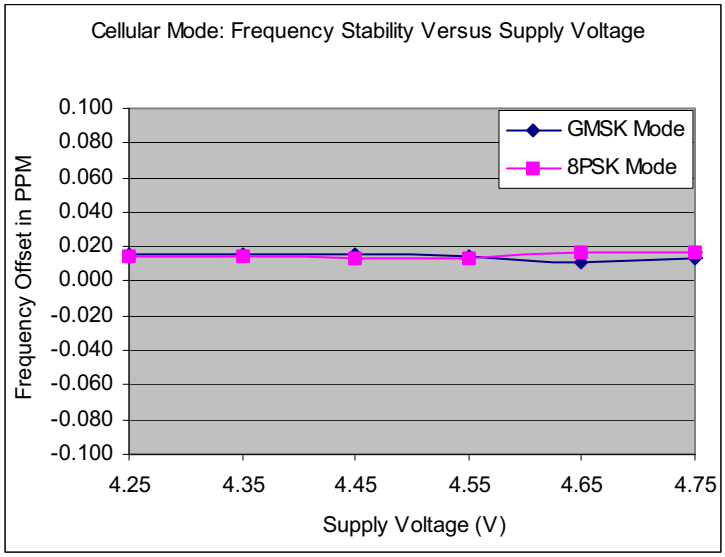
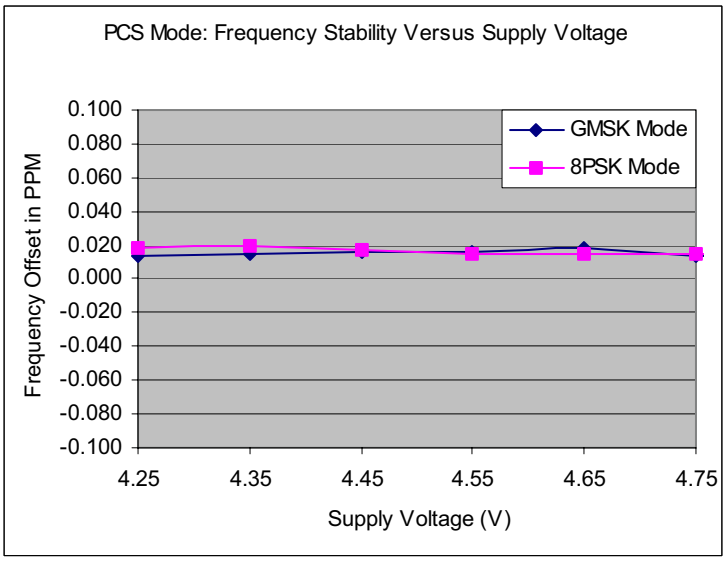
### *9.4 Test Results*

85% to 115% of 5 Volts Frequency Error

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85% to 115% of 5 Volts Frequency Error, Tabular Data

| Supply (V) | Cellular Mode: 824MHz to 848MHz | | | | PCS Mode: 1850MHz to 1909MHz | | | |
|---|---|---|---|---|---|---|---|---|
| | GMSK Mode | | 8-PSK Mode | | GMSK Mode | | 8-PSK Mode | |
| | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) | Offset (Hz) | Offset (ppm) |
| 4.25 | 13 | 0.016 | 12 | 0.014 | 26 | 0.014 | 34 | 0.018 |
| 4.35 | 13 | 0.016 | 12 | 0.014 | 28 | 0.015 | 37 | 0.020 |
| 4.45 | 13 | 0.016 | 11 | 0.013 | 31 | 0.016 | 33 | 0.018 |
| 4.55 | 12 | 0.014 | 11 | 0.013 | 31 | 0.016 | 28 | 0.015 |
| 4.65 | 9 | 0.011 | 14 | 0.017 | 34 | 0.018 | 27 | 0.014 |
| 4.75 | 11 | 0.013 | 14 | 0.017 | 26 | 0.014 | 27 | 0.014 |
| 4.85 | 13 | 0.016 | 13 | 0.016 | 25 | 0.013 | 28 | 0.015 |
| 4.95 | 13 | 0.016 | 13 | 0.016 | 24 | 0.013 | 29 | 0.015 |
| 5.05 | 12 | 0.014 | 13 | 0.016 | 27 | 0.014 | 31 | 0.016 |
| 5.15 | 12 | 0.014 | 10 | 0.012 | 28 | 0.015 | 31 | 0.016 |
| 5.25 | 12 | 0.014 | 9 | 0.011 | 27 | 0.014 | 30 | 0.016 |
| 5.35 | 12 | 0.014 | 9 | 0.011 | 29 | 0.015 | 31 | 0.016 |
| 5.45 | 14 | 0.017 | 12 | 0.014 | 31 | 0.016 | 31 | 0.016 |
| 5.55 | 14 | 0.017 | 13 | 0.016 | 31 | 0.016 | 24 | 0.013 |
| 5.65 | 13 | 0.016 | 11 | 0.013 | 28 | 0.015 | 25 | 0.013 |
| 5.75 | 12 | 0.014 | 11 | 0.013 | 24 | 0.013 | 27 | 0.014 |

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