

**MEASUREMENT OF FREQUENCY  
STABILITY**  
SECTION 2.1055

## **MEASUREMENT OF FREQUENCY STABILITY**

### **SECTION 2.1055**

#### **RESPONSE:**

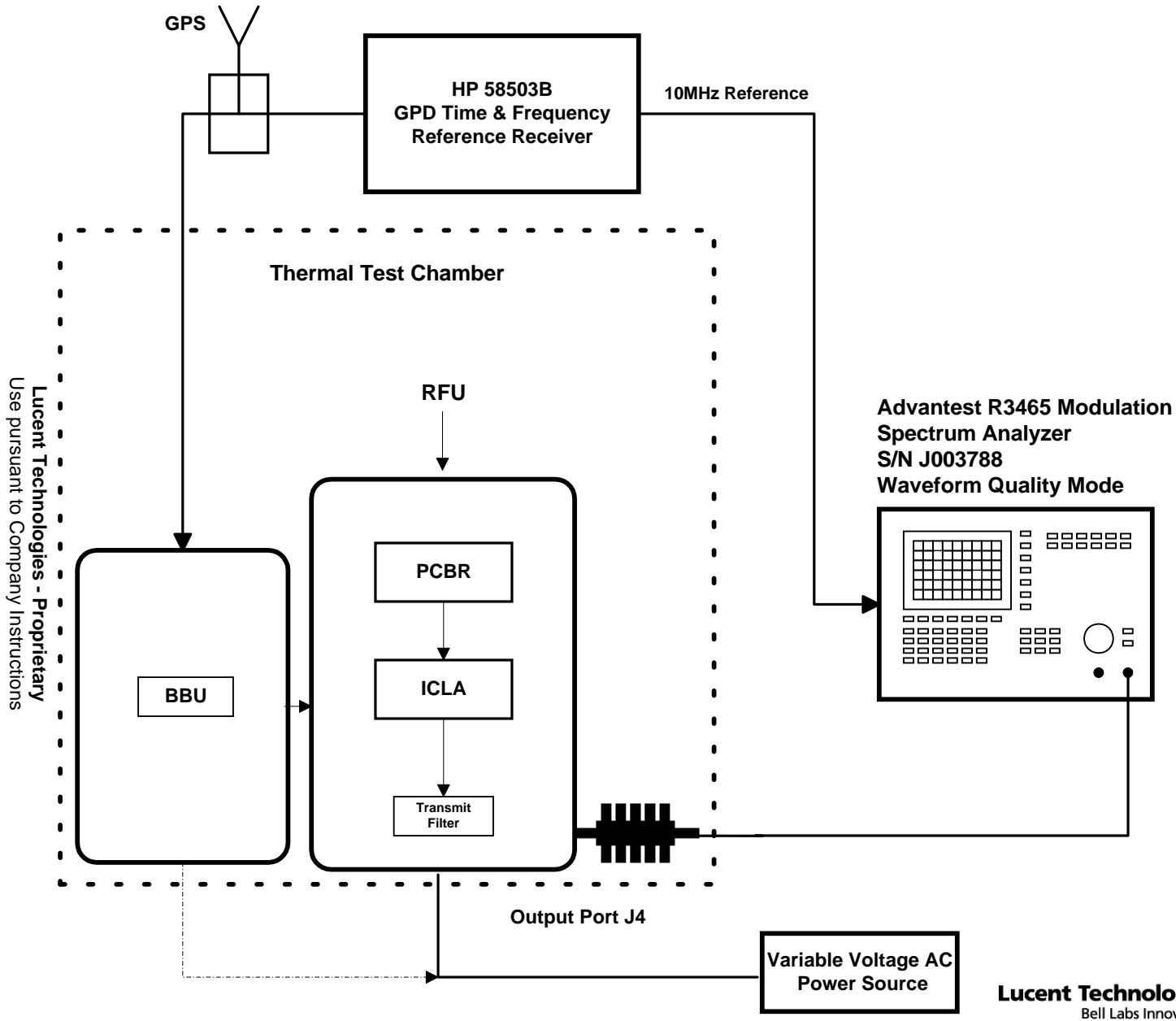
The frequency stabilization and accuracy of the CDMA signal amplified by the ICLA(FCC ID: AS5CMP-44) is a function of the input signal which it is provided from the PCBR (FCC ID: **AS5CMP-43**). The Baseband Unit (BBU) contains Time Frequency Unit. The TFU provides the time and frequency reference (19.66 MHz) used by the PCBR (FCC ID: **AS5CMP-43**). The reference frequency to PCBR is supplied through a Fiber Optic link from the BBU. The Reference frequency is highly accurate time and frequency unit which relies upon a signal lock of GPS satellite signals to provide the primary discipline of system timing. In the event of loss of GPS lock, the Oscillator Module (OM) can provide up to eight hours of freewheel operation. The system provides for automatic timing synchronization upon reacquisition of GPS lock. These units are powered by an AC-DC converter with battery backup to provide immunity to power fluctuations and failures.

The following frequency stability test data for the PCBR output was measured as installed and tested in a FLEXENT MicroMiniCell. The entire MicroMiniCell (BBU and Radio Frequency Unit) were subjected to the FCC specified environments while operating at full rated power. The Carrier Frequency deviations were measured. The nominal Voltage input to this device is 120V, but, it is designed to operate between 100 to 230V. The measurement setup is depicted in Figure 1A.

#### **RESULTS:**

The attached data documents that the worse case carrier frequency stability over temperature and voltage was 0.0486 ppm.

Figure 1A. TEST CONFIGURATION FOR FREQUENCY STABILITY



**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at -40 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-6.2
0.5	8.7
1.0	4.6
1.5	-5.4
2.0	4.1
2.5	-20.7
3.0	-8.2
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at -40 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-5.5
100	4.6
120	5.6
130	-5.4
180	4.0
220	-2.3
265	5.2
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at -30 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	10.2
0.5	21.6
1.0	2.8
1.5	-10.5
2.0	4.5
2.5	-17.7
3.0	-8.9
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at -30 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-6.1
100	-8.0
120	1.4
130	-4.8
180	-2.7
220	-4.0
265	-3.4
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.1 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at -20 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	15.5
0.5	-25.4
1.0	21.8
1.5	7.7
2.0	16.3
2.5	-12.5
3.0	-4.9
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at -20 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	2.8
100	-6.9
120	-9.9
130	-5.9
180	-4.1
220	-1.7
265	3.3
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.6 dB, Transmit Channel monitored : 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at -10 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-10.2
0.5	-42.7
1.0	29.0
1.5	-17.3
2.0	-5.1
2.5	-2.6
3.0	-15.3
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at -10 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-3.3
100	-1.3
120	-6.4
130	-4.5
180	7.9
220	-2.3
265	-5.4
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at 0 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-9.0
0.5	4.4
1.0	25.6
1.5	-4.8
2.0	17.0
2.5	2.5
3.0	-28.9
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at 0 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	2.2
100	1.1
120	4.9
130	-4.8
180	-2.6
220	4.6
265	-8.1
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 283 [878.49 MHz]



**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at +10 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-9.7
0.5	15.9
1.0	12.5
1.5	3.0
2.0	4.5
2.5	3.6
3.0	3.7
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at +10 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	3.6
100	-3.3
120	4.7
130	-5.3
180	0.2
220	-3.6
265	1.5
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at +20 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.6
0.5	-2.7
1.0	-4.1
1.5	17.4
2.0	8.5
2.5	8.2
3.0	14.3
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at +20 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	2.5
100	-2.1
120	2.4
130	-3.0
180	18.2
220	-2.1
265	-8.2
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.3 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at +30 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-2.4
0.5	-27.4
1.0	-6.7
1.5	-5.4
2.0	0.3
2.5	13.8
3.0	23.3
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at +30 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	3.1
100	4.9
120	1.8
130	2.1
180	4.1
220	1.6
265	3.2
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at +40 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-8.9
0.5	35.4
1.0	18.0
1.5	-37.7
2.0	-6.0
2.5	-14.1
3.0	31.0
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at +40 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-1.9
100	0.2
120	6.6
130	2.3
180	-5.7
220	-5.8
265	-0.8
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at +50 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-20.9
0.5	-17.2
1.0	0.2
1.5	-13.3
2.0	18.9
2.5	0.6
3.0	-15.9
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at +50 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	4.8
100	4.0
120	-1.9
130	6.5
180	4.0
220	4.2
265	2.0
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation at +55 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	28.1
0.5	-25.1
1.0	-6.0
1.5	-9.7
2.0	-12.1
2.5	-30.0
3.0	-4.3
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation at +55 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-1.1
100	4.7
120	-6.4
130	-8.0
180	7.0
220	4.6
265	-8.8
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 283 [878.49 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
MicroMiniCell

Reference and Transmit Frequency Deviation upon return to +25 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	5.0
0.5	12.2
1.0	-15.5
1.5	20.5
2.0	7.5
2.5	-8.0
3.0	-1.6
Specification	+ / - 43.92 Hz (+ / - 0.05 ppm)
<b>RESULTS</b>	<b>PASS</b>

**Reference and Transmit Frequency Deviation upon return to +25 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	5.7
100	11.1
120	1.0
130	-5.9
180	3.4
220	10.5
265	0.5
SPECIFICATIONS	+/- 43.92 Hz (+/- 0.05 PPM)
<b>RESULTS</b>	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 283 [878.49 MHz]