

## **FREQUENCY STABILITY SUBCLAUSE § 24.235**

### **Method of Measurement:**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the DUT in "call mode". This is accomplished with the use of an R&S CMU 200 Universal Radio Communication Tester.

1. Measure the carrier frequency at room temperature.
2. Subject the DUT to a 45 minute soak at -30 C.
3. With the DUT, powered via 5.0 Volts, connected to the R&S CMU 200 and in a simulated call on channel 661 (center channel), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the DUT, to prevent significant self-warming.
4. Repeat the above measurements at 10 C increments from -30 C to +50 C. Allow at least 45 minutes at each temperature, un-powered, before making measurements. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.
5. Re-measure carrier frequency at room temperature with nominal 5.0 Volts. Vary supply voltage from minimum 3.1 Volts to 3.5 Volts, in 0.2 Volt increments re-measuring the carrier frequency at each voltage. Then vary the supply voltage from 4.5V to the maximum 5.5V, in 0.2V increments re-measuring the carrier frequency at each voltage

### **Measurement Limit:**

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment...", Section 2.1055(d)(2) applies. This requires that the manufacturer specify the voltage limits for frequency stability testing. This transceiver is specified to operate with an input voltage of between 3.15 VDC and 3.45 VDC, with a nominal voltage of 3.3 VDC and between 4.5 VDC and 5.5 VDC, with a nominal voltage of 5.0 VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of + 5 % and -5 % for the nominal voltage of 3.3 VDC and a tolerance of +10% and -10% for 5 VDC. For the purposes of measuring frequency stability these voltage limits are to be used.

**AFC Frequency Error vs. Temperature** (PCL = 0, AirCard 750 SN = S01092000037031)

<u>Temperature</u> (deg C)	<u>Voltage</u> (volts)	<u>channel</u>	<u>Frequency Error</u> (Hz)	<u>Frequency Error</u> (ppm)
50	5	661	-24.47	-0.0136
40	5	661	-6.72	0.0037
30	5	661	-10.59	-0.0059
20	5	661	-16.21	-0.0090
10	5	661	-16.08	-0.0089
0	5	661	-24.99	-0.0139
-10	5	661	-39.45	-0.0219
-20	5	661	-47.14	-0.0262
-30	5	661	-76.7	-0.0426

**AFC Frequency Error vs. Voltage** (PCL = 0, AirCard 750 SN = S01092000037031)

<u>Temperature</u> (deg C)	<u>Voltage</u> (volts)	<u>Channel</u>	<u>Frequency Error</u> (Hz)	<u>Frequency Error</u> (ppm)
25	5.5	661	-19.44	-0.0108
25	5.3	661	-14.21	-0.0079
25	5.1	661	-11.69	-0.0065
25	5	661	-16.21	-0.0090
25	4.9	661	-15.37	-0.0085
25	4.7	661	-11.11	-0.0062
25	4.5	661	-28.02	-0.0156
25	3.5	661	-1.87	-0.0010
25	3.3	661	-3.55	-0.0020
25	3.1	661	-4.58	-0.0025