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# Exhibit D
# Frequency Stability Data:
# Variation of Ambient Temperature

## D.1  Introduction

The frequency stability of the ITCU was measured with variation of the ambient temperature.  The following data supports FCC requirements outlined in Section 2.995.

## D.2  Equipment

- Sorensen LT 30-3 DC Power Supply (Set at 12.0 V, 0.6 A)

- Thermotron Temperature Chamber

- Fluke Multimeter with Thermocouple Module (taped directly to ITCU)

- HP Spectrum Analyzer 8563 E

- Maintenance Monitor with special test mode software

## D.3  Overview

Testing for temperature stability took place at GE Harris under the supervision of Michael Lipsky.

In compliance with FCC code 2.995,(a),1, ambient temperature was varied from −40 C to +70 C.

In compliance with FCC code 2.995,(b), measurements were made at intervals of 10 C, while allowing a sufficient period of time (30 min.) to stabilize all of the components.

For this test, the radio was placed in a test mode that causes it to generate two non-spread tones at $f_c \pm 5.5$ MHz.  The actual center frequency is derived by calculating the centerpoint between the frequencies of these tones.  This center frequency was determined for ambient temperatures from -40°C to +70°C, the operating temperature range of the device.  The test data and a plot of frequency deviation vs. ITCU temperature is provided below.

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## D.4 Test Data

**Temperature Stability Test**          5-Mar-99          Performed by Michael Lipsky
**(Center Frequency - 2438 MHz)**

| Chamber Temperature | ITCU Temperature | Lower | Upper | Center (Calculated - GHz) | **Deviation from Nominal Center Freq.** |
|---|---|---|---|---|---|
| -40 | -33.5 | 2.4325054 | 2.4435069 | **2438006.15** | 6.15 |
| -30 | -29.5 | 2.4325069 | 2.4435078 | **2438007.35** | 7.35 |
| -20 | -19.9 | 2.4325069 | 2.4435061 | **2438006.5** | 6.5 |
| -10 | -9.4 | 2.432506 | 2.4435054 | **2438005.7** | 5.7 |
| 0 | 0.1 | 2.432506 | 2.4435057 | **2438005.85** | 5.85 |
| 10 | 10.2 | 2.432506 | 2.4435067 | **2438006.35** | 6.35 |
| 20 | 19.1 | 2.4325057 | 2.4435057 | **2438005.7** | 5.7 |
| 25 | 25.2 | 2.43250459 | 2.4435044 | **2438004.495** | 4.495000001 |
| 30 | 28.5 | 2.4325047 | 2.443505 | **2438004.85** | 4.85 |
| 40 | 39.1 | 2.4325035 | 2.44350373 | **2438003.615** | 3.615 |
| 50 | 46.8 | 2.432504 | 2.4435043 | **2438004.15** | 4.15 |
| 60 | 57.3 | 2.432504 | 2.443504 | **2438004** | 4 |
| 70 | 67.8 | 2.432504 | 2.4435037 | **2438003.85** | 3.85 |

Table D.4  Temperature Stability Test Data

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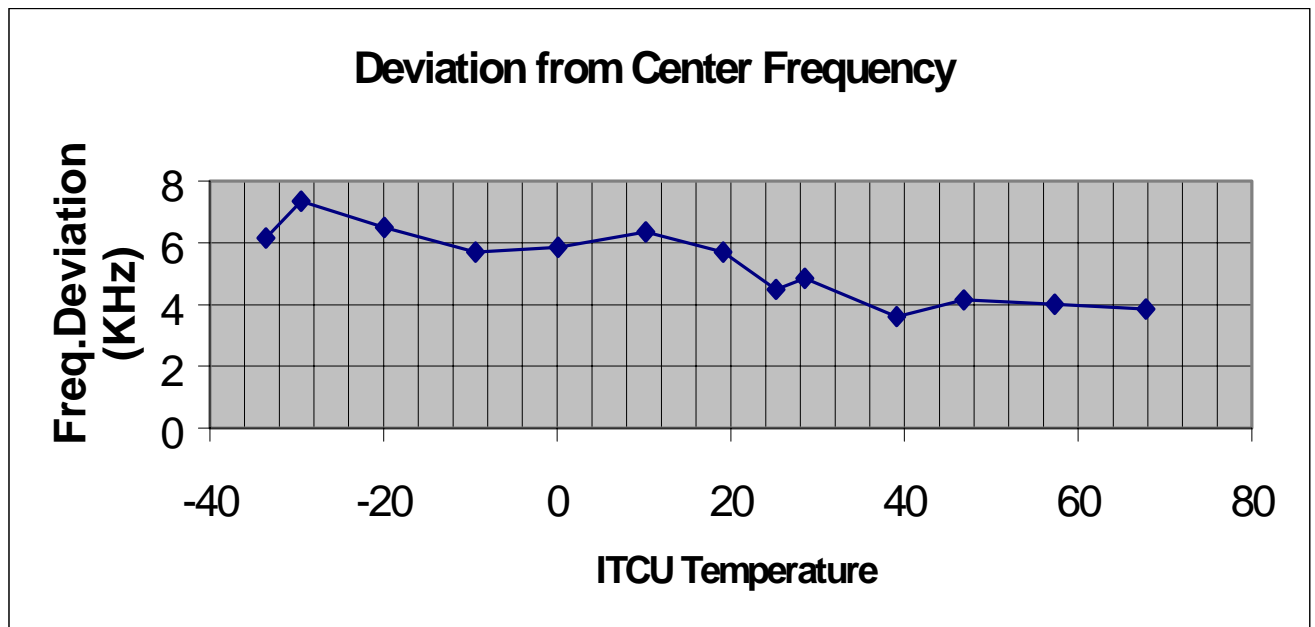
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Figure D.4   Deviation vs. Temperature

### D.5  Test Results

The test data presented in Section D.4 proves that the ITCU is frequency stable under all specified ambient temperature conditions.  The largest frequency deviation was 7.35 kHz which occurred at –30 C.  The specified requirement for center frequency variation is $f_c \pm 40$ KHz