

## **Measurement-6**

### **MEASUREMENT OF FREQUENCY STABILITY**

**SECTION 2.1055**

## **MEASUREMENT OF FREQUENCY STABILITY**

### **SECTION 2.1055**

#### **RESPONSE:**

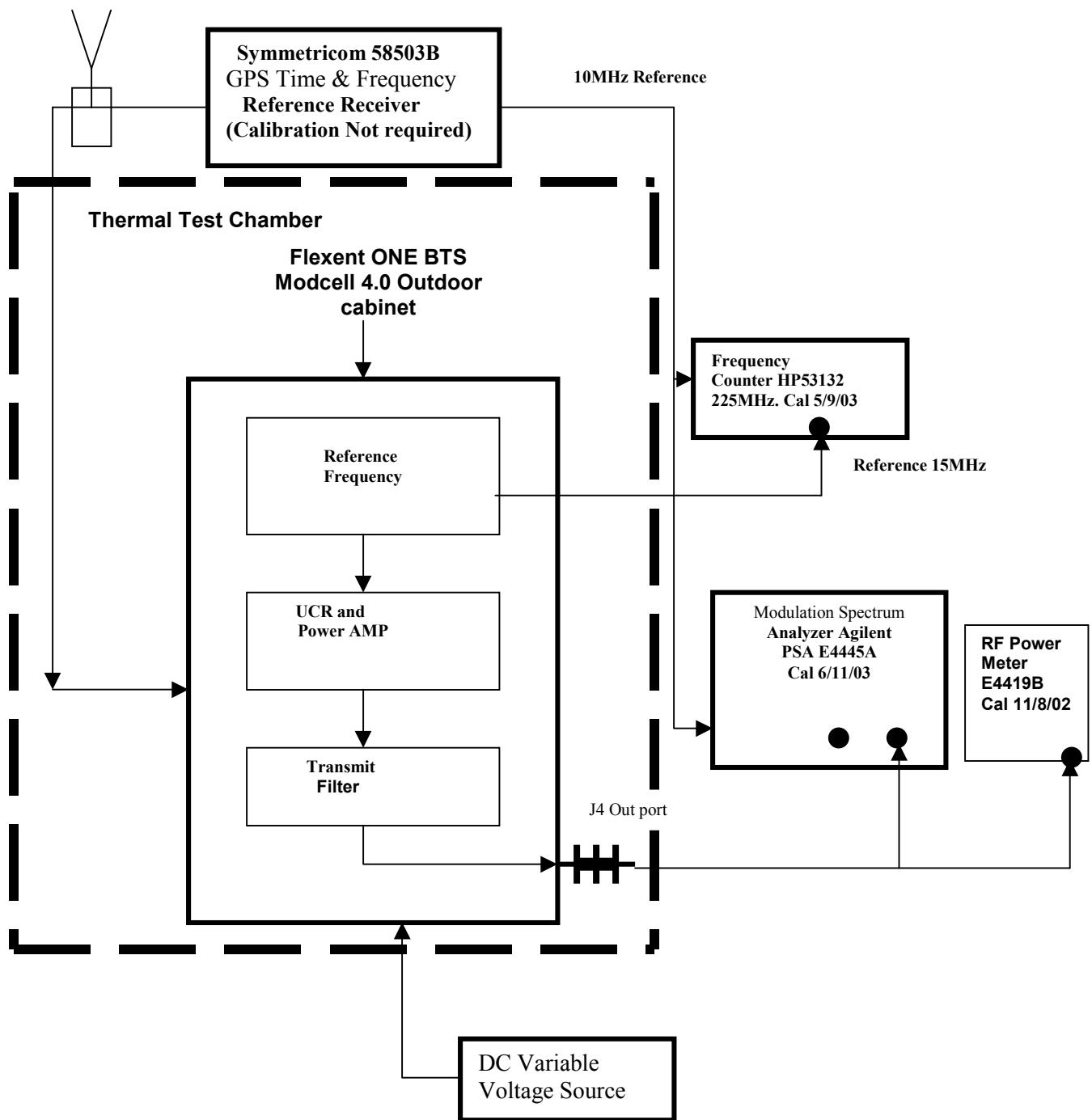
The frequency stabilization and accuracy of the UMTS CDMA signal amplified by the Flexent Power Amplifier is a function of the input signal which it is provided from the UMTS CDMA Radio (PCS) (UCR). The Time Frequency Unit/CDMA Timing Unit (TFU/CTU) provides the time and frequency reference used by the UCR (FCC ID: **AS5ONEBTS-04**). The TFU 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. The rubidium oscillator and crystal oscillator circuits provides reference signal for TFU/CTU. In the event of loss of GPS lock the Oscillator Module (OM) standalone can provides up to eight hours of freewheel operation. The system provides automatic timing synchronization upon reacquisition of GPS lock. These units were powered by AC-DC converters with battery backup to provide immunity to power fluctuations and failures.

The frequency stability test data was measured with TFU/CTUs, UCRs, OM and other digital circuit packs installed in a FLEXENT One BTS Modcell 4.0 Outdoor cabinet. The entire Modcell cabinet was subjected to the FCC specified environments while operating at full rated power. The 15 MHz reference oscillator deviations were measured. The measurement data is provided for both rubidium and crystal oscillators.

The primary input power supply voltage for Flexent One BTS Modcell 4.0 cabinet is either from a 24VDC or 208VAC 3 phase/240V AC 1 phase. The 208V AC is rectified to produce stabilized constant voltage 24VDC. Therefore, frequency stability tests were performed varying temperature and voltage for 24VDC input. The stability of 24VDC for variations in 208V/240V was tested at different levels and data is presented. The measurement setup is depicted in Figure 6A.

#### **RESULTS:**

The attached data documents that the worse case frequency stability over temperature and voltage was 0.0018 ppm.

**Figure 6A:Test Setup**

**Data for Rubidium Oscillator:****REFERENCE DATA AT +20°C**

Reference and Transmit Frequency Deviation From GPS at +20°C at 100% of Nominal Voltage, 24VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	-3	1.20
0.5	-4	2.86
1	-1	0.42
1.5	-1	1.88
2	-4	2.56
2.5	-2	-0.46
3	0	-2.37
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

Reference and Transmit Frequency Deviation From GPS at +20°C at 85% of Nominal Voltage, 20.4VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	3	2.51
0.5	2	1.62
1	2	2.21
1.5	3	1.82
2	0	-1.62
2.5	-3	-2.63
3	2	-0.95
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

Reference and Transmit Frequency Deviation From GPS at +20°C at 115% of Nominal Voltage, 27.6VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	3	-1.52
0.5	3	0.64
1	5	1.83
1.5	3	-2.63
2	3	-2.41
2.5	4	-0.42
3	3	1.58
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

## DATA AT -40°C

Reference and Transmit Frequency Deviation From GPS at -40°C at 100% of Nominal Voltage, 24VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	3	2.54
0.5	3	2.15
1	-2	1.13
1.5	-3	-1.54
2	2	-1.67
2.5	1	1.32
3	-3	2.76
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

Reference and Transmit Frequency Deviation From GPS at -40°C at 85% of Nominal Voltage, 20.4VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	2	2.91
0.5	2	0.92
1	3	1.67
1.5	1	-2.22
2	-3	-1.37
2.5	-2	0.81
3	3	2.84
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

Reference and Transmit Frequency Deviation From GPS at -40°C at 115% of Nominal Voltage, 27.6VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	4	-2.35
0.5	4	-0.48
1	4	1.38
1.5	3	2.46
2	4	0.91
2.5	3	-1.52
3	1	2.34
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

## DATA AT -30°C

Reference and Transmit Frequency Deviation From GPS at -30°C at 100% of Nominal Voltage, 24VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	-4	1.54
0.5	-5	-0.83
1	-4	1.95
1.5	-3	-1.44
2	-1	0.87
2.5	-5	1.42
3	-3	2.31
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

Reference and Transmit Frequency Deviation From GPS at -30°C at 85% of Nominal Voltage, 20.4VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	-3	-2.37
0.5	-3	-1.53
1	3	-2.18
1.5	2	-2.52
2	3	-0.81
2.5	-2	-1.67
3	3	-1.33
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

Reference and Transmit Frequency Deviation From GPS at -30°C at 115% of Nominal Voltage, 27.6VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	2	-0.64
0.5	2	1.55
1	3	2.37
1.5	3	2.18
2	2	1.21
2.5	2	-0.72
3	4	-1.61
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

## DATA AT -20°C

## Reference and Transmit Frequency Deviation From GPS at -20°C at 100% of Nominal Voltage, 24VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	5	1.53
0.5	5	0.54
1	6	0.47
1.5	5	0.48
2	4	0.33
2.5	4	1.21
3	4	1.13
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## Reference and Transmit Frequency Deviation From GPS at -20°C at 85% of Nominal Voltage, 20.4VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	-1.24
0.5	3	-0.23
1	3	-0.37
1.5	2	0.84
2	2	0.58
2.5	3	-0.45
3	2	-0.57
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## Reference and Transmit Frequency Deviation From GPS at -20°C at 115% of Nominal Voltage, 27.6VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	0.25
0.5	3	0.31
1	3	0.47
1.5	2	0.36
2	2	0.21
2.5	1	-0.84
3	2	-0.93
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## DATA AT -10°C

## Reference and Transmit Frequency Deviation From GPS at -10°C at 100% of Nominal Voltage, 24VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	1.22
0.5	-2	1.14
1	-2	0.21
1.5	2	0.35
2	-2	0.48
2.5	-2	-0.87
3	-3	-1.37
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## Reference and Transmit Frequency Deviation From GPS at -10°C at 85% of Nominal Voltage, 20.4VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-2	0.34
0.5	-2	-1.88
1	-2	-1.67
1.5	-3	-1.54
2	-1	-1.69
2.5	-1	0.38
3	-3	-0.28
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## Reference and Transmit Frequency Deviation From GPS at -10°C at 115% of Nominal Voltage, 27.6VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	-0.64
0.5	2	-0.87
1	2	-1.11
1.5	4	-1.45
2	4	-0.68
2.5	4	-0.98
3	3	-2.13
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## DATA AT 0°C

## Reference and Transmit Frequency Deviation From GPS at 0°C at 100% of Nominal Voltage, 24VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	1.14
0.5	4	1.25
1	3	0.65
1.5	3	-1.11
2	2	-0.54
2.5	3	0.63
3	2	0.51
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## Reference and Transmit Frequency Deviation From GPS at 0°C at 85% of Nominal Voltage, 20.4VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-3	0.25
0.5	-3	-0.77
1	-2	-1.26
1.5	-2	0.55
2	-2	1.24
2.5	-3	0.64
3	-2	0.35
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## Reference and Transmit Frequency Deviation From GPS at 0°C at 115% of Nominal Voltage, 27.6VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	1.23
0.5	3	0.92
1	2	0.63
1.5	3	-0.87
2	2	-1.42
2.5	3	-1.15
3	3	-0.81
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**DATA AT +10°C**

<b>Reference and Transmit Frequency Deviation From GPS at +10°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	1	0.94
0.5	1	0.54
1	0	-0.27
1.5	0	0.37
2	-2	-0.45
2.5	-2	0.68
3	0	-0.37
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**Reference and Transmit Frequency Deviation From GPS at +10°C at 85% of Nominal Voltage, 20.4VDC**

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	4	1.67
0.5	4	2.23
1	3	0.67
1.5	3	0.47
2	3	-0.23
2.5	4	-1.14
3	2	-0.48
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**Reference and Transmit Frequency Deviation From GPS at +10°C at 115% of Nominal Voltage, 27.6VDC**

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-3	0.35
0.5	-3	0.92
1	-4	-0.47
1.5	-3	-0.23
2	-3	-1.28
2.5	-2	-0.63
3	-2	0.71
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**DATA AT +20°C**

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	1.47
0.5	4	0.52
1	3	-1.38
1.5	1	-2.37
2	-3	-0.85
2.5	-2	1.19
3	3	2.61
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	0	-2.95
0.5	1	-1.11
1	-2	1.39
1.5	-2	2.15
2	1	-0.48
2.5	1	1.84
3	-2	-0.62
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	1.42
0.5	3	2.51
1	3	0.48
1.5	2	-1.57
2	3	-0.97
2.5	1	1.55
3	3	1.27
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**DATA AT +30°C****Reference and Transmit Frequency Deviation From GPS at +30°C at 100% of Nominal Voltage, 24VDC**

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-4	2.13
0.5	-4	0.68
1	-4	-1.15
1.5	-5	-2.62
2	-5	0.84
2.5	-3	2.58
3	-2	1.48
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**Reference and Transmit Frequency Deviation From GPS at +30°C at 85% of Nominal Voltage, 20.4VDC**

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	-2.23
0.5	3	-0.86
1	3	1.67
1.5	4	1.31
2	2	-2.03
2.5	5	1.38
3	3	-1.53
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**Reference and Transmit Frequency Deviation From GPS at +30°C at 115% of Nominal Voltage, 27.6VDC**

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-3	0.42
0.5	2	1.56
1	5	-2.13
1.5	-4	-2.91
2	2	-1.62
2.5	3	-2.33
3	5	0.87
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**DATA AT +40°C**

<b>Reference and Transmit Frequency Deviation From GPS at +40°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-4	2.41
0.5	-4	0.57
1	-5	-1.84
1.5	-3	-0.67
2	-3	-2.35
2.5	2	-0.48
3	3	1.64
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +40°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	4	1.47
0.5	4	2.38
1	3	0.42
1.5	1	-1.56
2	3	-1.81
2.5	-3	0.97
3	-4	1.58
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +40°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	4	-2.94
0.5	5	-1.36
1	5	-0.91
1.5	4	1.56
2	3	3.18
2.5	3	2.41
3	1	0.67
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## DATA AT +50C

Reference and Transmit Frequency Deviation From GPS at +50°C at 100% of Nominal Voltage, 24VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	-3	1.87
0.5	-3	-0.44
1	-4	-2.34
1.5	-4	-2.93
2	2	-2.15
2.5	4	0.68
3	3	2.18
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

Reference and Transmit Frequency Deviation From GPS at +50°C at 85% of Nominal Voltage, 20.4VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	-2	2.22
0.5	-2	1.54
1	4	2.63
1.5	-3	0.91
2	-5	-2.28
2.5	2	-1.55
3	-3	-2.49
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

Reference and Transmit Frequency Deviation From GPS at +50°C at 115% of Nominal Voltage, 27.6VDC		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	-5	0.42
0.5	-5	2.31
1	-6	1.52
1.5	-4	0.62
2	-4	-1.68
2.5	-5	-2.84
3	4	-2.16
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

## END DATA AT +20°C

## Reference and Transmit Frequency Deviation From GPS at +20°C at 100% of Nominal Voltage, 24VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-2	0.67
0.5	-2	-1.27
1	0	0.88
1.5	3	-.047
2	2	1.35
2.5	-2	0.51
3	0	-1.24
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## Reference and Transmit Frequency Deviation From GPS at +20°C at 85% of Nominal Voltage, 20.4VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	-1.87
0.5	3	-0.24
1	2	0.86
1.5	3	0.57
2	2	-0.71
2.5	3	1.37
3	2	0.49
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

## Reference and Transmit Frequency Deviation From GPS at +20°C at 115% of Nominal Voltage, 27.6VDC

Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	-0.72
0.5	2	1.13
1	0	0.82
1.5	0	-0.47
2	-2	1.24
2.5	-2	0.63
3	-3	-0.45
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS



**Data for Crystal Oscillator:****REFERENCE DATA AT +20°C**

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-2	2.42
0.5	-1	1.37
1	-2	0.82
1.5	-2	-1.42
2	-1	0.97
2.5	-2	1.63
3	-3	-2.35
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05\text{ppm} = \pm 0.75\text{Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05\text{ppm})$ $\pm 0.05\text{ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	1.87
0.5	-1	0.86
1	-1	-1.85
1.5	-1	2.23
2	2	1.65
2.5	-2	1.84
3	-1	-0.93
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05\text{ppm} = \pm 0.75\text{Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05\text{ppm})$ $\pm 0.05\text{ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	0	-2.54
0.5	1	1.43
1	-2	1.82
1.5	1	-1.96
2	1	-1.52
2.5	-2	2.78
3	0	0.43
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05\text{ppm} = \pm 0.75\text{Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05\text{ppm})$ $\pm 0.05\text{ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT -40°C**

<b>Reference and Transmit Frequency Deviation From GPS at -40°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-3	3.47
0.5	-1	2.56
1	-1	0.64
1.5	-2	1.87
2	-3	-1.42
2.5	-2	2.67
3	-3	-0.63
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at -40°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-3	2.21
0.5	-2	0.62
1	-2	-1.52
1.5	-3	1.22
2	-1	0.93
2.5	-2	3.28
3	-3	1.47
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at -40°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-1	0.44
0.5	-2	1.86
1	0	1.44
1.5	1	2.33
2	-1	1.68
2.5	2	0.72
3	0	-1.29
FCC SPECIFICATION	$\pm 15.0$ MHz( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 0.75$ Hz	$\pm 1952.5$ MHz ( $\pm 0.05$ ppm) $\pm 0.05$ ppm = $\pm 97.62$ Hz
FCC RESULT	PASS	PASS

**DATA AT -30°C**

<b>Reference and Transmit Frequency Deviation From GPS at -30°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	6	1.82
0.5	4	-0.77
1	4	1.64
1.5	-3	0.66
2	4	-1.44
2.5	-3	1.65
3	-3	0.88
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at -30°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	4	2.11
0.5	4	1.45
1	3	1.52
1.5	4	0.87
2	3	1.86
2.5	3	2.36
3	3	0.56
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at -30°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	1	2.25
0.5	0	-1.53
1	2	-0.87
1.5	2	1.41
2	1	1.82
2.5	2	0.81
3	2	-0.96
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT -20°C**

<b>Reference and Transmit Frequency Deviation From GPS at -20°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-2	1.87
0.5	-3	0.63
1	-3	-0.47
1.5	-2	-0.35
2	-2	-1.54
2.5	-1	-0.25
3	-3	1.17
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at -20°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	-1.47
0.5	-2	-0.65
1	-2	-0.25
1.5	2	-1.25
2	-2	0.68
2.5	-3	1.58
3	-3	1.44
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at -20°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	0.23
0.5	2	0.49
1	-3	-0.57
1.5	-3	-1.14
2	-2	0.63
2.5	2	-0.85
3	2	-1.22
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT -10°C**

<b>Reference and Transmit Frequency Deviation From GPS at -10°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	4	0.37
0.5	4	-0.55
1	3	-1.41
1.5	3	0.29
2	4	0.59
2.5	3	0.46
3	3	-0.47
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at -10°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	-1.47
0.5	3	-1.85
1	2	-0.82
1.5	2	-0.23
2	2	0.57
2.5	2	-0.43
3	3	-0.72
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at -10°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	0.59
0.5	2	1.24
1	3	0.32
1.5	3	-0.45
2	3	-0.82
2.5	2	-1.35
3	-2	-0.57
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT 0°C**

<b>Reference and Transmit Frequency Deviation From GPS at 0°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-3	-1.54
0.5	-3	-1.47
1	-3	-1.36
1.5	-4	-1.48
2	-3	-1.30
2.5	-3	-0.67
3	-2	-0.58
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at 0°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	4	0.87
0.5	4	-0.51
1	4	-0.44
1.5	4	-1.12
2	3	-0.35
2.5	3	0.25
3	4	-0.64
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at 0°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	1.84
0.5	2	1.65
1	-2	1.63
1.5	-2	1.42
2	-4	1.37
2.5	-3	1.48
3	2	1.54
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT +10°C**

<b>Reference and Transmit Frequency Deviation From GPS at +10°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-4	0.47
0.5	-3	-1.17
1	-3	0.46
1.5	-4	1.77
2	-2	0.82
2.5	-3	-0.62
3	-3	-1.53
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +10°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-2	1.82
0.5	-2	1.12
1	-2	1.93
1.5	-3	0.67
2	-2	-1.22
2.5	-2	-1.87
3	-3	-1.53
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +10°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	1	2.37
0.5	2	1.84
1	2	0.92
1.5	2	1.15
2	3	1.36
2.5	1	0.64
3	1	1.28
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT +20°C**

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	1	0.63
0.5	0	1.74
1	-1	2.21
1.5	-1	1.59
2	-2	0.82
2.5	0	-0.43
3	-3	.1.62
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	-1	-1.65
0.5	-1	-0.42
1	-1	1.24
1.5	-2	1.87
2	-2	1.32
2.5	-1	0.66
3	-2	-0.68
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	1	-2.56
0.5	0	-1.95
1	1	-2.21
1.5	1	-1.22
2	-1	0.67
2.5	0	1.28
3	1	1.87
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT +30°C**

<b>Reference and Transmit Frequency Deviation From GPS at +30°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	1.87
0.5	3	0.63
1	4	1.15
1.5	3	2.78
2	4	3.12
2.5	2	2.55
3	3	1.17
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +30°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	2.17
0.5	3	1.53
1	2	2.33
1.5	3	1.57
2	2	1.89
2.5	3	2.16
3	2	1.74
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +30°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	1	1.47
0.5	1	1.95
1	0	1.25
1.5	1	0.67
2	1	1.86
2.5	0	2.25
3	1	1.73
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT +40°C**

<b>Reference and Transmit Frequency Deviation From GPS at +40°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	2.27
0.5	2	3.19
1	3	2.84
1.5	2	2.46
2	3	2.54
2.5	3	2.05
3	2	2.13
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +40°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	4	2.49
0.5	4	2.17
1	5	1.84
1.5	4	2.63
2	5	2.18
2.5	3	2.68
3	4	1.75
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +40°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	0.42
0.5	2	1.29
1	3	-0.87
1.5	2	-1.54
2	2	-2.44
2.5	3	-1.67
3	2	-0.98
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**DATA AT +50C**

<b>Reference and Transmit Frequency Deviation From GPS at +50°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	2	3.17
0.5	3	3.44
1	2	2.91
1.5	2	2.53
2	3	2.98
2.5	5	2.62
3	-3	2.57
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +50°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	-2	2.44
0.5	-2	1.87
1	-2	1.55
1.5	-1	-2.30
2	-1	-1.57
2.5	0	-2.33
3	-2	1.46
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +50°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS (x10 <sup>-4</sup> Hz)	Transmit Carrier Deviation (Hz)
0	-3	-0.94
0.5	-3	1.18
1	-2	-1.26
1.5	0	-2.61
2	1	-1.87
2.5	2	-1.52
3	-1	-0.42
FCC SPECIFICATION	±15.0 MHz(±0.05 ppm) ±0.05ppm = ±0.75Hz	±1952.5 MHz (±0.05ppm) ±0.05ppm = ±97.62 Hz
FCC RESULT	PASS	PASS

**END DATA AT +20°C**

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 100% of Nominal Voltage, 24VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	1.87
0.5	4	2.62
1	4	2.15
1.5	2	1.42
2	5	0.87
2.5	-3	-2.21
3	-4	-1.95
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 85% of Nominal Voltage, 20.4VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	3	2.33
0.5	3	2.14
1	3	1.66
1.5	2	-0.42
2	2	-1.53
2.5	-2	0.78
3	-3	1.86
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

<b>Reference and Transmit Frequency Deviation From GPS at +20°C at 115% of Nominal Voltage, 27.6VDC</b>		
Time (minutes)	15MHZ Deviation from GPS ( $\times 10^{-4}$ Hz)	Transmit Carrier Deviation (Hz)
0	2	0.47
0.5	4	1.58
1	3	-1.27
1.5	3	-2.15
2	-4	-0.85
2.5	3	1.82
3	2	0.83
FCC SPECIFICATION	$\pm 15.0 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 0.75 \text{ Hz}$	$\pm 1952.5 \text{ MHz} (\pm 0.05 \text{ ppm})$ $\pm 0.05 \text{ ppm} = \pm 97.62 \text{ Hz}$
FCC RESULT	PASS	PASS

**Variation 24VDC with respect to 208V/240V AC**

AC Input	Load Current	Rectified DC Output
150	0	26.83
200	0	26.83
250	0	26.83
276	0	26.83
184	110.2	26.52
220	110.2	26.52
250	110.2	26.52
276	110.1	26.52
183.6	0.0	26.82
183.9	21.5	26.65
183.7	41.4	26.62
184.0	60.7	26.60
183.8	80.0	26.57
184.1	98.6	26.54
184.0	107.9	26.52
184.2	110.7	26.51
219.8	0.0	26.82
219.3	21.5	26.65
219.6	41.5	26.62
219.6	60.7	26.60
219.5	80.0	26.57
220.3	98.6	26.54
219.5	107.9	26.52
219.9	110.7	26.51
276.4	0.0	26.82
275.5	21.5	26.65
276.3	41.4	26.62
275.6	60.7	26.60
275.5	80.0	26.57
276.5	98.6	26.54
276.3	107.9	26.52
275.9	109.8	26.52
276.0	110.7	26.51