

FCC PART 95
MEASUREMENT AND TEST REPORT
FOR

SHENZHEN UNITED ELECTRONIC CO., LTD.
BLOCK C42, TANTOU COMMERCIAL STREET, SONGGANG,
BAO'AN, SHENZHEN, GUANGDONG, P. R. C.

FCC ID: UYSFLH-3206

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|--|--|
| Report Concerns: Original Report | Equipment Type: Hobby |
| Model: | <u>FLH-3206/3208/3209/3210/3212/3213</u> <u>FLH-3218/3238/3268/3288</u> |
| Report No.: | <u>STR07018022I</u> |
| Test/Witness Engineer: | <u>Innaz Lee</u> |
| Test Date: | <u>2007-01-24</u> |
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| Approved & Authorized By: |  PSQ Manager / Jandy So |

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: SHENZHEN UNITED ELECTRONIC CO., LTD.
Address of applicant: BLOCK C42, TANTOU COMMERCIAL STREET,
SONGGANG, BAO'AN, SHENZHEN, GUANGDONG,
P. R. C.
Manufacturer: SHENZHEN UNITED ELECTRONIC CO., LTD.
Address of manufacturer: BLOCK C42, TANTOU COMMERCIAL STREET,
SONGGANG, BAO'AN, SHENZHEN, GUANGDONG,
P. R. C.

General Description of E.U.T

| Items | Description |
|---|---|
| EUT Description: | Hobby |
| Trade Name: | / |
| Model No.: | FLH-3206 |
| Rated Voltage: | DC 12V Battery |
| Output Power: | <0.75W |
| Frequency Range: | 72.510MHz |
| No. of Channel: | 4 CH With different encode for identification |
| Size: | 8.0X6.0X20.0 cm |
| Antenna Type: | Dedicated Antenna |
| Antenna Length: | 94cm |
| For more information refer to the circuit diagram form and the user's manual. | |

The test data gathered are from a production sample, provided by the manufacturer. Test is carried out with model FLH-3206 only since the other models have the different appearance only.

1.2 Test Standards

The following report of is prepared on behalf of SHENZHEN UNITED ELECTRONIC CO., LTD. in accordance with FCC Rules and Regulations Part 2 & FCC Rules and Regulations Part 95 Subpart C of the Federal Communication Commissions rules.

The objective is to determine compliance with the FCC Rules and Regulations Part 2 & FCC Rules and Regulations Part 95 Subpart C of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

1.4 Test Methodology

Measurements contained in this report were also conducted with Part 2 & FCC Rules and Regulations Part 95 Subpart C of the Federal Communication Commissions rules and ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level according to TIA/EIA 603A to represent the worst-case results during the final qualification test. The test modes were adapted with transmitting mode. For more detail refere to the Operating Instructions.

1.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

United States of American Federal Communications Commission (**FCC**), and the registration number is **274801**.

Industry Canada (**IC**), and the registration number is **IC4174**.

All measurement required was performed at laboratory of Shenzhen Academy of Metrology and Quality Inspection, Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China.

1.6 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components.

1.7 Accessories Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|--------------|-------------|-------|---------------|
| / | / | / | / |

1.8 EUT Cable List and Details

| Cable Description | Length (M) | Shielded/Unshielded | With Cord/Without Cord |
|-------------------|------------|---------------------|------------------------|
| / | / | / | / |

2. SUMMARY OF TEST RESULTS

| FCC RULES | DESCRIPTION OF TEST | LIMIT |
|---|--|---|
| 2.1046 95.639 (b)(3) | RF Output Power | 0.75W |
| 2.1049 95.633 (b) | Occupied Bandwidth Emission | 8 kHz |
| 95.635(b)(1) 95.635(b)(3) 95.635(b)(7) 95.635(b)(10) 95.635(b)(11) 95.635(b)(12) | Radiated Spurious Emissions | Reference to section 6.3 in this report |
| 2.1055 95.623 | Frequency Stability Vs. Temperature Vs. Voltage | Deviation < 0.002% |

3. §2.1046 and §95.639(b) (3) - RF OUTPUT POWER

3.1 Standard Applicable

According to FCC §2.1046, and §95.639(b)(3), No R/C transmitter, under any condition of modulation, shall exceed a carrier power or peak envelope TP (single-sideband only) of: 0.75 W in the 72-76 MHz frequency band.

3.2 Test Equipment List and Detail

| Manufacturer | Description | Model | Serial Number | Cal. Date | Due. Date |
|-----------------|-------------------------|-----------|---------------|-----------|-----------|
| Rohde & Schwarz | EMI Test Receiver | ESI26 | 830245/009 | 2007-1-16 | 2008-1-15 |
| ETS | Multi_Device Controller | 2090 | 57230 | 2007-1-16 | 2008-1-15 |
| Schwarzbeck | Antenna | VUBA9117 | 115 | 2007-1-14 | 2008-1-13 |
| 3m chamber | Albatross Projects | 9X6X6 | ---- | 2007-1-14 | 2008-1-13 |
| Rohde & Schwarz | Horn Antenna | HF906 | 100014 | 2007-1-16 | 2008-1-15 |
| Rohde & Schwarz | Signal Generator | SMR20 | 100047 | 2007-1-14 | 2008-1-13 |
| Schwarzbeck | Dipole Antenna | H00009170 | 9136 | 2007-1-14 | 2008-1-13 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

3.3 Test Procedure

1. The EUT was powered ON and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length of 91cm.
2. The fundamental frequency (72.510MHz) of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna and by rotating the turntable. After the fundamental emission was maximized, a field strength measurement was made.
3. Steps 1 and 2 were preformed with the EUT and the receive antenna in both vertical and horizontal polarization and performed a pre-test three orthogonal planes.
4. The transmitter was then removed and replaced with a substitution antenna.
5. A signal at the fundamental frequency (72.510MHz) was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally and vertically polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2 is obtained for this set of conditions.

6. The output power into the substitution antenna was then measured.

3.4 Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 18° C |
| Relative Humidity: | 50% |
| ATM Pressure: | 1012 mbar |

3.5 Test Result/Plots

| Frequency | Substitute SG Reading | Height | Table | Polar | Cable loss | Antenna Gain | Corrected Ampl. | Corrected Ampl. | FCC Part 95 Limit |
|-----------|-----------------------------|--------|--------|-------|------------|-----------------|--------------------|--------------------|----------------------|
| MHz | dBm | Meter | Degree | H / V | dB | dB | dBm | mW | mW |
| 72.510 | 12.96 | 1.5 | 130 | H | 0.8 | 0 | 12.16 | 16.44 | 750 |
| 72.510 | 16.92 | 1.6 | 181 | V | 0.8 | 0 | 16.12 | 40.93 | 750 |

4. §2.1049 and § 95.633(b) - OCCUPIED BANDWIDTH OF EMISSION

4.1 Standard Applicable

According to FCC §2.1049 and FCC §95.633 (b), The authorized bandwidth for any emission type transmitted by an R/C transmitter is 8 kHz.

4.2 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|-------------|-------------------|---------|---------------|------------|------------|
| Agilent | Spectrum Analyzer | E4402B | US41192821 | 2006-06-30 | 2007-06-29 |
| Atten | Attenuator | DC-4GHz | ATS100-4-20 | 2006-06-30 | 2007-06-29 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.3 Test Procedure

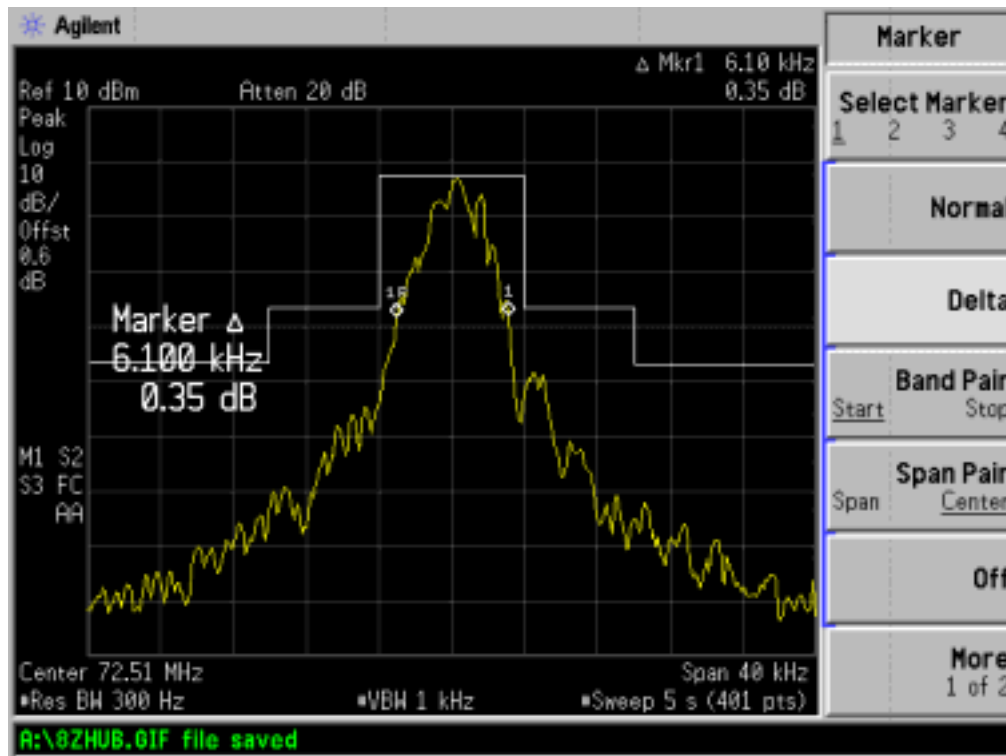
1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. Turn on the transmitter, and set it to transmit the pulse train continuously.
3. The -26dB bandwidth of the carrier was measured and recorded.

4.4 Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 18° C |
| Relative Humidity: | 50% |
| ATM Pressure: | 1012 mbar |

4.5 Test Results/Masks

The occupied Bandwidth Emission of all fall in the Mask, full fit the requirements of the standards.



5. §95.635(b)(1), §95.635(b)(3), §95.635(b)(7), §95.635(b)(10), §95.635(b)(11), §95.635(b)(12)- RADIATED SPURIOUS EMISSION

5.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 0.5 dB.

5.2 Standard Applicable

Per FCC §95.635 (b)(1), at least 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

Per FCC §95.635 (b)(3), at least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

Per FCC §95.635 (b)(7), at least $43 \pm 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

Per FCC §95.635 (b)(10), At least 45 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 125% of the authorized bandwidth.

Per FCC §95.635 (b)(11), At least 55 dB on any frequency removed from the center of the authorized bandwidth by more than 125% up to and including 250% of the authorized bandwidth.

Per FCC §95.635 (b)(12), At least $56 + 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

5.3 Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Cal. Date | Due. Date |
|--------------------|-------------------------|-----------|---------------|-----------|-----------|
| Rohde & Schwarz | EMI Test Receiver | ESI26 | 830245/009 | 2006-1-26 | 2007-1-25 |
| ETS | Multi_Device Controller | 2090 | 57230 | 2006-1-26 | 2007-1-25 |
| Schwarzbeck | Antenna | VUBA9117 | 115 | 2006-1-24 | 2009-1-25 |
| Albatross Projects | 3m chamber | 9X6X6 | ---- | 2006-1-24 | 2008-1-25 |
| Rohde & Schwarz | Horn Antenna | HF906 | 100014 | 2006-1-26 | 2007-1-25 |
| Rohde & Schwarz | Signal Generator | SMR20 | 100047 | 2006-1-24 | 2007-1-25 |
| Schwarzbeck | Dipole Antenna | H00009170 | 9136 | 2006-1-24 | 2007-1-25 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.4 Test Procedure

1. The setup of EUT is according with per TIA/EIA Standard 603 and ANSI C63.4-2003 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

$$\text{Spurious attenuation limit in dB} = 56 + 10 \log_{10} (\text{power out in Watts})$$

5.5 Environmental Conditions

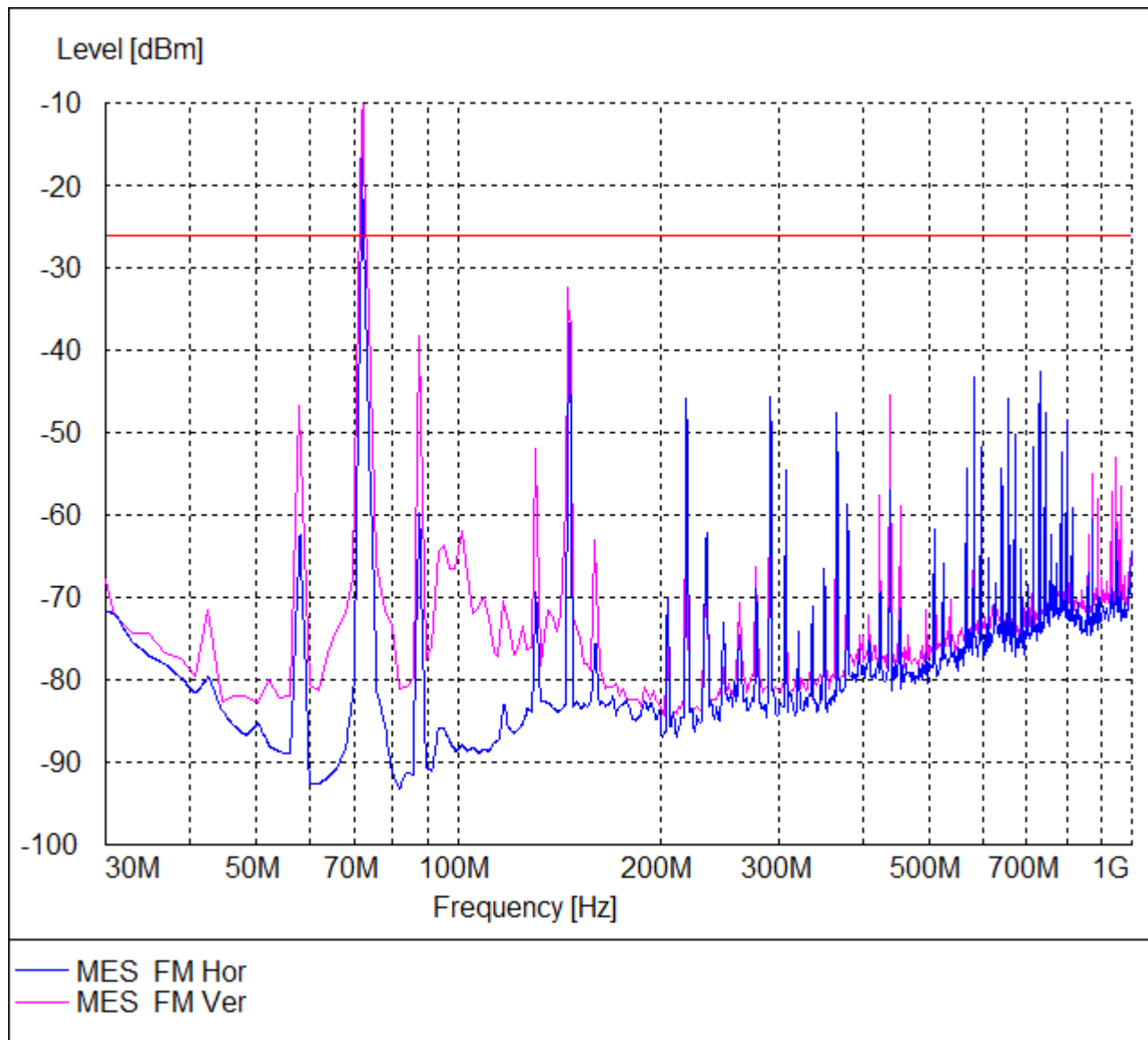
| | |
|--------------------|-----------|
| Temperature: | 18° C |
| Relative Humidity: | 53% |
| ATM Pressure: | 1012 mbar |

5.6 Summary of Test Results/Plots

According to the data below, the FCC Part 95 standards, and had the worst margin of:

-6.60 dB at 217.53 MHz in the Vertical polarization, 30 MHz to 8 GHz, 3Meters.

| Frequency | SG Reading | Height | Polar | Cable loss | Antenna Gain | Corrected Ampl. | FCC Part 95 Limit | FCC Part 95 Margin |
|-----------|------------|--------|-------|------------|--------------|-----------------|-------------------|--------------------|
| MHz | dBm | Meter | H / V | dB | dB | dBm | dBm | dB |
| 217.53 | -33.7 | 1.5 | V | 1.1 | 0 | -32.6 | -26 | -6.6 |
| 72.51 | -36.9 | 1.6 | H | 1.1 | 0 | -35.8 | -26 | -9.8 |
| 145.02 | -39.2 | 1.7 | V | 0.9 | 0 | -38.3 | -26 | -12.3 |
| 435.06 | -46.3 | 1.6 | H | 3.1 | 0 | -43.2 | -26 | -17.2 |
| 362.55 | -46.2 | 1.5 | H | 2.7 | 0 | -43.5 | -26 | -17.5 |
| 217.53 | -46.6 | 1.4 | H | 1.6 | 0 | -45.0 | -26 | -19.0 |
| 435.06 | -47.5 | 1.5 | V | 2.2 | 0 | -45.3 | -26 | -19.3 |
| 72.51 | -46.8 | 1.6 | V | 0.7 | 0 | -46.1 | -26 | -20.1 |
| 145.02 | -48.6 | 1.7 | H | 1.3 | 0 | -47.3 | -26 | -21.3 |
| 290.04 | -48.8 | 1.4 | V | 1.3 | 0 | -47.5 | -26 | -21.5 |
| 290.04 | -49.7 | 1.4 | H | 1.8 | 0 | -47.9 | -26 | -21.9 |
| 362.55 | -50.3 | 1.6 | V | 1.6 | 0 | -48.7 | -26 | -22.7 |



Note: Testing is carried out with 3-orthogonal axis and frequency rang 30MHz to the tenth harmonics. Emissions undetected below the base noise are not reported.

6. §2.1055, §95.621 and §95.627(b)- FREQUENCY STABILITY

6.1 Standard Applicable

According to FCC §2.1055(a)(1), the frequency stability shall be measure with variation of ambient temperature from -30°C to $+50^{\circ}\text{C}$, and according to FCC 2.1055(d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC §95.623(c), All R/C transmitters capable of operation in the 72-76 MHz band that are manufactured in or imported into the United States, on or after March 1, 1992, or are marketed on or after March 1, 1993, must be maintained within a frequency tolerance of 0.002%.

6.2 Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Cal. Date | Due. Date |
|--------------|-----------------------|---------|---------------|------------|------------|
| Agilent | Spectrum Analyzer | E4402B | US41192821 | 2006-06-30 | 2007-06-29 |
| Atten | Attenuator | DC-4GHz | ATS100-4-20 | 2006-06-30 | 2007-06-29 |
| GONGWEN | Moisture Test Chamber | GDS-150 | SEMT-0013 | 2006-06-30 | 2007-06-29 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

1. Setup the configuration of the ambient temperature form -30°C to 50°C with sufficient time. And measure the different power of the EUT with an artificial power from highest to end point voltage.
2. Active the Analyzer frequency counter option, center frequency to the right frequency needs to be measured.

6.4 Test Results/Plots

| Reference Frequency: 72.51 MHz, Limit: +/-0.002% | | | |
|--|----------------------|-------------------------------------|---------|
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | MCF (MHz) | Error % |
| 50 | 12 | 72.51131 | +0.0018 |
| 40 | 12 | 72.51131 | +0.0018 |
| 30 | 12 | 72.51116 | +0.0016 |
| 20 | 12 | 72.51116 | +0.0016 |
| 10 | 12 | 72.51094 | +0.0013 |
| 0 | 12 | 72.51094 | +0.0013 |
| -10 | 12 | 72.51073 | +0.0010 |
| -20 | 12 | 72.51073 | +0.0010 |
| -30 | 12 | 72.51073 | +0.0010 |

So, Frequency Stability Versus Input Voltage is:

| Reference Frequency: 72.51 MHz, Limit: +/-0.002% | | |
|--|-------------------------------------|---------|
| Power Supplied (V DC) | Frequency Measure with Time Elapsed | |
| | Frequency (MHz) | Error % |
| Measured End Point = 3.677 v | 72.51116 | +0.0016 |