683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
Tel: +82-31-321-2664 Fax: +82-31-321-1664
http://www.digitalemc.com

# CERTIFICATE OF COMPLIANCE
# FCC Part 22 Certification

Dates of Tests: Sep. 24 ~ Oct. 5, 2004
Test Report S/N:DR50110410J
Test Site : DIGITAL EMC CO., LTD.

Model No. **NPQMTD7800**

APPLICANT **Telian Corporation**

| | | |
|---|---|---|
| **Classification** | : | **Licensed Non-Broadcast Station Transmitter (TNB)** |
| **FCC Rule Part(s)** | : | **§22(H), §15, §2** |
| **EUT Type** | : | **AMPS/TDMA Cellular Phone** |
| **Model name** | : | **MTD-7800** |
| **Serial number** | : | **Identical prototype** |
| **Frequency Range** | : | **824.04 ~ 848.97 MHz (AMPS)** |
| | | **824.04 ~ 848.97 MHz (TDMA)** |
| **Max. RF Output Power** | : | **0.163 W ERP AMPS (22.13dBm)** |
| | | **0.625 W ERP TDMA (27.96dBm)** |
| **Max. SAR Measurement** | : | **0.919W/kg AMPS Head SAR / 0.766W/kg AMPS Body SAR** |
| | | **0.813W/kg TDMA Head SAR / 0.656W/kg TDMA Body SAR** |
| **Emission Designators:** | : | **40K0F8W, 40K0F1D, 30K0DXW** |
| **Date of Issue** | : | **October 7, 2004** |

**I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.**

NVLAP LAB CODE 200559-0

# TABLE OF CONTENTS



# MEASUREMENT REPORT

## 1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

## §2.1033 General Information

**Applicant: Telian Corporation**
**Address: 4th Fl, Nam Jeun B/D 53-3 Haan-Dong, Kwang Myung-Si, Kyung Gi-Do, KOREA**
**Attention: Kay Choi**

# Telian Corporation

- FCC ID: NPQMTD7800
- Quantity: Quantity production is planned
- Emission Designators: 40K0F8W, 40K0F1D, 30K0DXW
- Freq. Range: 824.04 ~ 848.97 MHz (AMPS)
  824.04 ~ 848.97 MHz (TDMA)
- Max. Power Rating: 0.163 W ERP AMPS (22.13dBm)
  0.625 W ERP TDMA (27.96dBm)
- FCC Classification(s): Licensed Non-Broadcast Station Transmitter (TNB)
- Equipment (EUT) Type: AMPS/TDMA Potable Cellular Phone
- Modulation(s): AMPS/TDMA
- Frequency Tolerance: ± 0.00025 % (2.5ppm)
- FCC Rule Part(s): §22(H), §15, §2
- Dates of Tests: September 24 ~ October 5, 2004
- Place of Tests: DIGITAL EMC
- Test Report S/N: DR50110410J

## 2.1. General information's

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.
Address : 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
http://www.digitalemc.com E-mail : demc@unitel.co.kr
Tel: +82-31-321-2664 Fax: +82-31-321-1664

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".
This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200559-0.

**Test operator: engineer**

| Data | Name | Signature |
|---|---|---|
| October 07, 2004 | Kyung-Taek LEE | |

**Report Reviewed By: manager**

| Data | Name | Signature |
|---|---|---|
| October 07, 2004 | Dong –Min JUNG | |

Ordering party:

| | | |
|---|---|---|
| Company name | : | TELIAN CORPORATION |
| Address | : | 4th Fl, Nam Jeun B/D 53-3 Haan-Dong, Kwang Myung-Si |
| Zipcode | : | 423-606 |
| City/town | : | Kyung Gi-Do |
| Country | : | KOREA |
| Date of order | : | September 22, 2004 |

## 3.1 INSERTS

**Function of Active Devices (Confidential)**

The Function of active devices are shown in Attachment K.

**Block & Schematic Diagrams (Confidential)**

The block diagrams are shown in Attachment I, and the schematic diagrams are shown in Attachment J.

**Operating Instructions**

The instruction manual is shown in Attachment M.

**Parts List & Tune-Up Procedure (Confidential)**

The parts list & tune-up procedure is shown in Attachment L.

**Description of Freq. Stabilization Circuit (Confidential)**

The description of frequency stabilization circuit is shown in Attachment K.

**Description for Suppression of Spurious Radiation, for Limiting Modulation, and Harmonic Suppresion Circuits (Confidential)**

The description of suppression stabilization circuits is shown in Attachment K.

# 4.1 DESCRIPTION OF TESTS

## 4.2 Transmitter Audio Frequency Response

The frequency response of the audio modulating circuit over the frequency range 100-5000Hz is measured. The audio signal generator is connected to the audio input circuit/microphone of the EUT. The audio signal input is adjusted to obtain 50% modulation at 1㎑ and this point is taken as the 0dB reference. With the input held constant and below the limit at all frequency, the audio signal generator is varied from 100 to 50㎑.

## 4.3 Audio Low Pass Filter Frequency Response

The response in dB relative to 1㎑ is measured using the HP8901 a Modulation Analyzer. For the frequency response of the audio low-pass filter, the audio input is connected at the input to the modulation limiter and the modulated stage. The audio output is connected at the output of the modulated stage. The corresponding plots are shown herein.

## 4.4 Modulation Limiting

The audio signal generator is connected to the audio put circuit/microphone of the EUT. The modulation response is measured for each of the three modulating frequencies(300Hz, 1000Hz and 3000Hz), and the input voltage is varied form 30% modulation (±3.6㎑ deviation) to at least 20dB higher than the saturation point. Measurements of modulation and the plots are attached herein . Measurements were performed for ST, SAT and wide-band data modulations. The corresponding results are shown herein.

Note: ST, SAT and wide-band data were internally generated by the EUT.

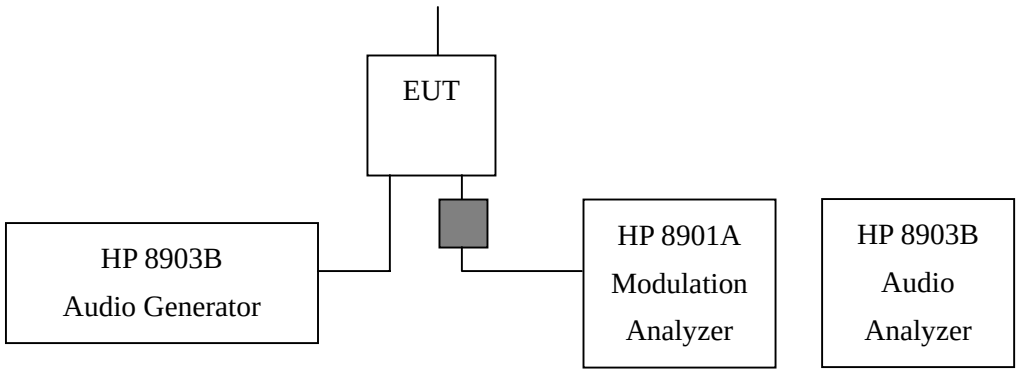



Fig. Transmitter Audio Frequency & Tone Test Setup.

# 4.1 DESCRIPTION OF TESTS (CONTINUED)

## 4.5 Occupied Bandwidth Emission Limits

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB.

(b) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(c) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

## 4.6 Occupied Bandwidth

The 99% power bandwidth was measured with a calibrated spectrum analyzer.

## 4.7 Spurious and Harmonic Emissions at Antenna Terminal

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to 10 GHz.

At the input terminals of the spectrum analyzer, an isolator(RF circulator with on port terminated with 50ohms) and an 870 MHz to 890 MHz bandpass filter is connected between the test transceiver(for conducted tests)or the receive antenna(for radiated tests) and the analyzer . The rejection of the bandpass filter to signals in the 825-845 MHz range is adequate to limit the transmit energy from the test transceiver which appears to a level which will allow the analyzer to measure signals less than-90dBm. Calibration of the test receiver is performed in the 870-890 MHz range to insure accuracy to allow variation in the bandpass filter insertion loss to be calibrated.

## 4.8 Frequencies

At the input terminals of the spectrum analyzer, an isolator (RF pad) and a high-pass filter are connected between the test transceiver (for conducted tests) or the receive antenna (for radiated tests) and the analyzer. The high-pass filter (signals below 1.6 GHz) is to limit the fundamental frequency from interfering with the measurement of low-level spurious and harmonic emissions and to ensure that the preamplifier is not saturated.

## 4.9 Radiation Spurious and Harmonic Emissions

Radiation and harmonic emissions are measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turntable 3-meters from the receive antenna.
The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

# 4.1 DESCRIPTION OF TESTS (CONTINUED)

## 4.10 Frequency Stability/Temperature Variation.

The frequency stability of the transmitter is measured by:

a) **Temperature** :The temperature is varied from -30°C to + 60°C using an environmental chamber.
b) **Primary Supply Voltage** :The primary supply voltage is varied from 85% to 115% of the voltage Normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification –The minimum frequency stability shall be +/- 0.00025% at any time during normal operation.

Specification — The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025(±2.5ppm) of the center frequency.

**Time Period and Procedure:**

1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (25°C to 27 °C to provide a reference)
2. The equipment is subjected to an overnight “soak” at -30°C without any power applied.
3. After the overnight ”soak” at 30°C(usually 14-16 hours),the equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency to the transmitter and the individual oscillators is made within a three minute interval after applying power to the transmitter.
4. Frequency measurements is made at 10°C interval up to room temperature. At least a period of one and one half hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency were made at 10intervals starting at 30°C up to +50°C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

**NOTE : The EUT is tested down to the battery endpoint.**

# 4.1 DESCRIPTION OF TESTS (CONTINUED)

## 4.11 Radiated Emission

Final test was performed according to ANSI C63.4-2001 at the open field test site. There are no deviations from the standard.
The EUT was placed in a 0.8m high table along with the peripherals. The turn table was separated from the antenna distance 3meters. Cables were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum.
The frequencies and amplitudes of maximum emission were measured at varying azimuths, antenna heights and antenna polarities. Reported are maximized emission levels.
These tests were performed at 120kHz of 6dB bandwidth.

## 4.12 Conducted Emission

The power line conducted interference measurements were performed according to ANSI C63.4-2001 in a shielded enclosure with peripherals placed on a table, 0.8m high over a metal floor. It was located more than required distance away from the shielded enclosure wall. There are no deviations from the standard.
The EUT was plugged into the LISN and the frequency range of interest scanned.
Reported are maximized emission levels.
These tests were performed at 9kHz of 6dB bandwidth.

# 5.1 TEST DATA

## 5.2 Effective Radiated Power Output

A. POWER: **High (Analog Mode)**

| **Freq. Tuned** (MHz) | **REF. LEVEL** (dBm) | **POL** (H/V) | **ERP** (W) | **ERP** (dBm) | **Supplied Power** |
|---|---|---|---|---|---|
| 824.04 | -15.42 | V | **0.163** | **22.13** | Battery |
| 836.52 | -16.62 | V | 0.117 | 20.70 | Battery |
| 848.97 | -16.18 | V | 0.129 | 21.09 | Battery |

Note: battery is options for this phone.

**NOTES:**

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured.
The ERP is recorded.

## 5.1 TEST DATA (CONTINUED)

## 5.3 Effective Radiated Power Output

A. POWER: **High (TDMA Mode)**

| **Freq. Tuned** (MHz) | **REF. LEVEL** (dBm) | **POL** (H/V) | **ERP** (W) | **ERP** (dBm) | **Supplied Power** |
|---|---|---|---|---|---|
| 824.04 | -9.54 | V | **0.625** | **27.96** | Battery |
| 836.52 | -10.22 | V | 0.513 | 27.10 | Battery |
| 848.97 | -10.20 | V | 0.508 | 27.06 | Battery |

Note: battery is options for this phone.

**NOTES:**

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured.
The ERP is recorded.

# 6.1 TEST DATA

## 6.2 AMPS Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 824.04 MHz
CHANNEL : 0991(Low)
MEASURED OUTPUT POWER : 22.13 dBm = 0.163 W
MODULATION SIGNAL : FM (Internal)
DISTANCE : 3 meters
LIMIT : 43 + 10 $\log_{10}$ (W) = 35.13 dBc

| **Freq.** (MHz) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBd) | **CORRECT GENERATOR LEVEL** (dBm) | **POL** (H/V) | (dBc) |
|---|---|---|---|---|---|
| 1648.08 | -43.4 | 6.3 | -37.1 | V | 59.23 |
| 2472.12 | -42.8 | 9.1 | -33.7 | V | 55.83 |
| 3296.16 | -54.6 | 9.0 | -45.6 | V | 67.73 |
| 4120.20 | -53.3 | 9.5 | -43.8 | V | 65.93 |
| - | - | - | - | - | - |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn-table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

# 6.1 TEST DATA (CONTINUED)

## 6.3 AMPS Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 836.52 MHz
CHANNEL : 0384(Mid)
MEASURED OUTPUT POWER : 22.13 dBm = 0.163 W
MODULATION SIGNAL : FM (Internal)
DISTANCE : 3 meters
LIMIT : 43 + 10 $\log_{10}$ (W) = 35.13 dBc

| **Freq.** (MHz) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBd) | **CORRECT GENERATOR LEVEL** (dBm) | **POL** (H/V) | (dBc) |
|---|---|---|---|---|---|
| 1673.04 | -43.2 | 6.3 | -36.9 | V | 59.03 |
| 2509.56 | -42.8 | 9.1 | -33.7 | V | 55.83 |
| 3346.08 | -53.4 | 9.0 | -44.4 | V | 66.53 |
| 4182.60 | -52.3 | 9.5 | -42.8 | V | 64.93 |
| - | - | - | - | - | - |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

# 6.1 TEST DATA (CONTINUED)

## 6.4 AMPS Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 848.97 MHz
CHANNEL : 0799(High)
MEASURED OUTPUT POWER : 22.13 dBm = 0.163 W
MODULATION SIGNAL : FM (Internal)
DISTANCE : 3 meters
LIMIT : 43 + 10 $\log_{10}$ (W) = 35.13 dBc

| **Freq.** (MHz) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBd) | **CORRECT GENERATOR LEVEL** (dBm) | **POL** (H/V) | (dBc) |
|---|---|---|---|---|---|
| 1697.94 | -44.1 | 6.3 | -37.8 | V | 59.93 |
| 2546.91 | -45.1 | 9.1 | -36 | V | 58.13 |
| 3395.88 | -53.5 | 9.0 | -44.5 | V | 66.63 |
| - | - | - | - | - | - |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

# 6.1 TEST DATA (CONTINUED)

## 6.5 TDMA Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 824.04 MHz
CHANNEL : 0991(Low)
MEASURED OUTPUT POWER : 27.96 dBm = 0.625 W
MODULATION SIGNAL : TDMA (Internal)
DISTANCE : 3 meters
LIMIT : 43 + 10 $\log_{10}$ (W) = 40.96 dBc

| **Freq.** (MHz) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBd) | **CORRECT GENERATOR LEVEL** (dBm) | **POL** (H/V) | (dBc) |
|---|---|---|---|---|---|
| 1648.08 | -38.4 | 6.3 | -32.1 | V | 60.06 |
| 2472.12 | -39.3 | 9.1 | -30.2 | V | 58.16 |
| 3296.16 | -48.6 | 9.0 | -39.6 | V | 67.56 |
| 4120.20 | -50.3 | 9.5 | -40.8 | V | 68.76 |
| - | - | - | - | - | - |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn-table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

# 6.1 TEST DATA (CONTINUED)

## 6.6 TDMA Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 836.52 MHz
CHANNEL : 0384(Mid)
MEASURED OUTPUT POWER : 27.96 dBm = 0.625 W
MODULATION SIGNAL : TDMA (Internal)
DISTANCE : 3 meters
LIMIT : 43 + 10 $\log_{10}$ (W) = 40.96 dBc

| **Freq.** (MHz) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBd) | **CORRECT GENERATOR LEVEL** (dBm) | **POL** (H/V) | (dBc) |
|---|---|---|---|---|---|
| 1673.04 | -39.2 | 6.3 | -32.9 | V | 60.86 |
| 2509.56 | -38.8 | 9.1 | -29.7 | V | 57.66 |
| 3346.08 | -47.3 | 9.0 | -38.3 | V | 66.26 |
| 4182.60 | -52.4 | 9.5 | -42.9 | V | 70.86 |
| - | - | - | - | - | - |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

# 6.1 TEST DATA (CONTINUED)

## 6.7 TDMA Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 848.97 MHz
CHANNEL : 0799(High)
MEASURED OUTPUT POWER : 27.96 dBm = 0.625 W
MODULATION SIGNAL : TDMA (Internal)
DISTANCE : 3 meters
LIMIT : 43 + 10 $\log_{10}$ (W) = 40.96 dBc

| **Freq.** (MHz) | **LEVEL@ ANTENNA TERMINALS** (dBm) | **SUBSTITUTE ANTENNA GAIN** (dBd) | **CORRECT GENERATOR LEVEL** (dBm) | **POL** (H/V) | (dBc) |
|---|---|---|---|---|---|
| 1697.94 | -41.9 | 6.3 | -35.6 | V | 63.56 |
| 2546.91 | -42.5 | 9.1 | -33.4 | V | 61.36 |
| 3395.88 | -51.5 | 9.0 | -42.5 | V | 70.46 |
| - | - | - | - | - | - |
| - | - | - | - | - | - |
| - | - | - | - | - | - |

**NOTE**

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

# 7.1 TEST DATA

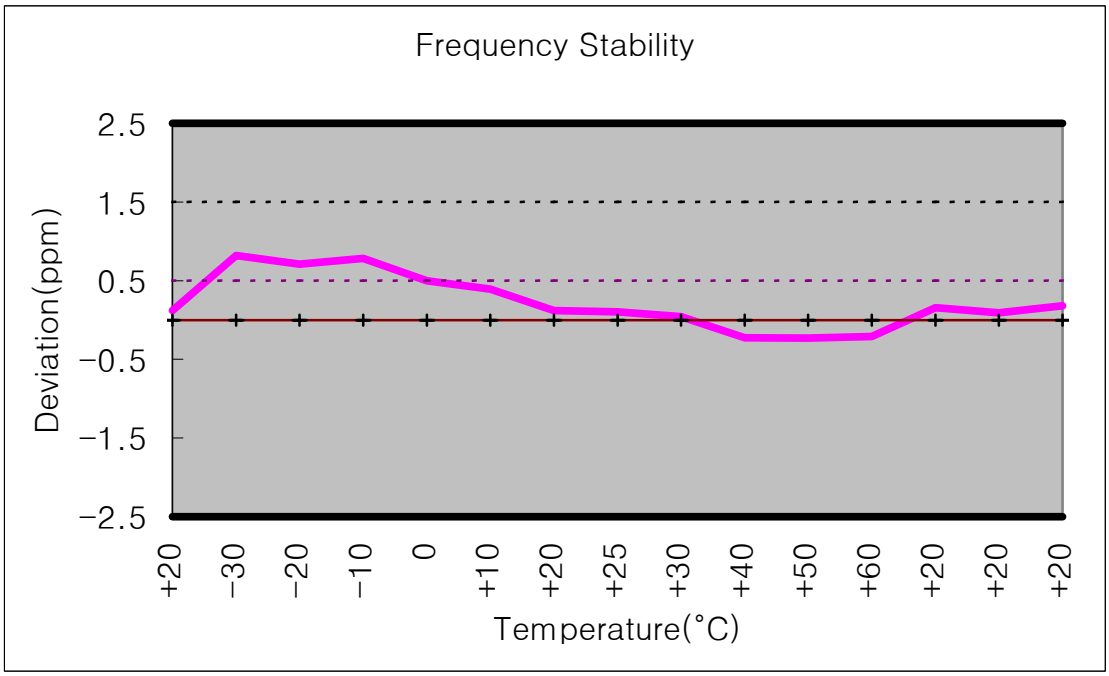
## 7.2 Frequency Stability (AMPS)

OPERATING FREQUENCY : 836,520,000 Hz
CHANNEL : 0384(Mid)
REFERENCE VOLTAGE : 3.7 VDC
DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

| VOLTAGE (%) | POWER (VDC) | TEMP (dB) | FREQ (Hz) | Deviation (%) |
|---|---|---|---|---|
| 100% | 3.7 | +20(Ref) | 835,520,099 | 0.000012 |
| 100% | | -30 | 835,520,686 | -0.000082 |
| 100% | | -20 | 835,520,592 | -0.000071 |
| 100% | | -10 | 835,520,654 | -0.000078 |
| 100% | | 0 | 835,520,416 | -0.000050 |
| 100% | | +10 | 835,520,327 | -0.000039 |
| 100% | | +20 | 835,520,099 | -0.000012 |
| 100% | | +25 | 835,520,087 | -0.000010 |
| 100% | | +30 | 835,520,034 | -0.000004 |
| 100% | | +40 | 835,519,812 | 0.000023 |
| 100% | | +50 | 835,519,809 | 0.000023 |
| 100% | | +60 | 835,519,825 | 0.000021 |
| 85% | 3.3 | +20 | 835,520,132 | -0.000016 |
| 115% | 4.37 | +20 | 835,520,075 | -0.000009 |
| BATT.ENDPOINT | 2.88 | +20 | 835,520,151 | -0.000018 |

## 7.1 TEST DATA (CONTINUED)

### 7.3 Frequency Stability (AMPS)



# 8.1 TEST DATA

## 8.2 MODULATION DEVIATION LIMITING

OPERATING FREQUENCY: 836.52 MHz

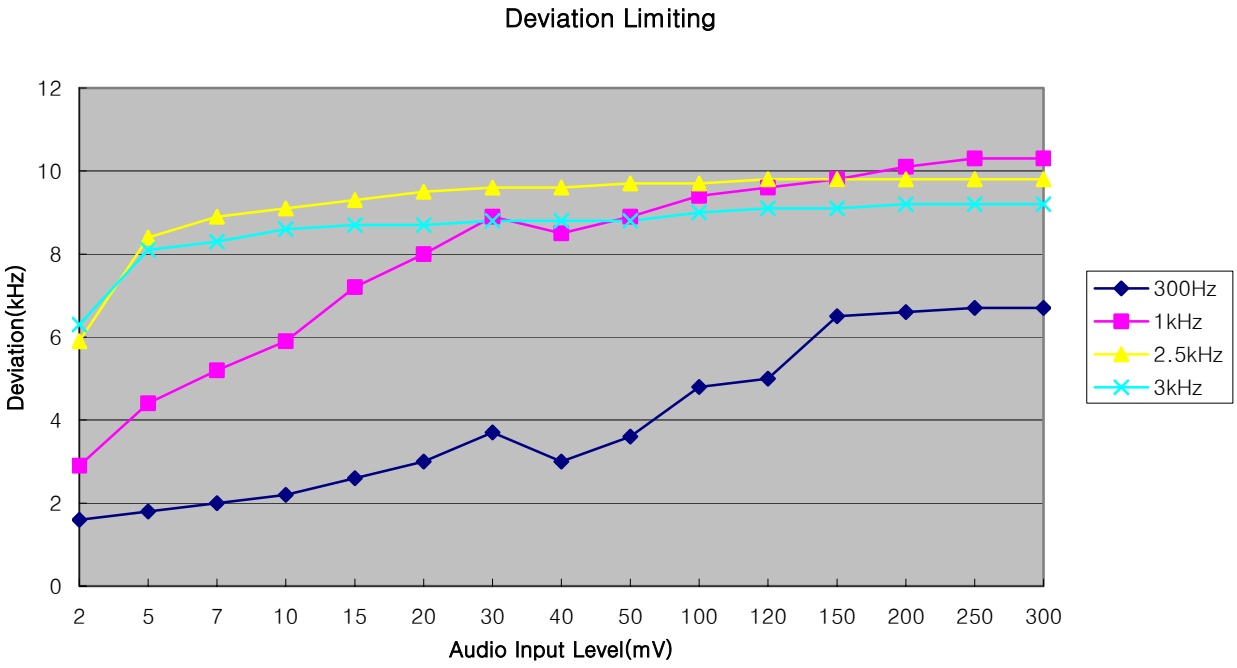
CHANNEL: 0384

DEVIATION LIMIT: 13.2 KHz

| Input Level (mV) | FM Deviation in kHz at Indicated Modulating Frequency | | | |
|---|---|---|---|---|
| | 300Hz | 1KHz | 2.5KHz | 3KHz |
| **2** | 1.6 | 2.9 | 5.9 | 6.3 |
| **5** | 1.8 | 4.4 | 8.4 | 8.1 |
| **7** | 2.0 | 5.2 | 8.9 | 8.3 |
| **10** | 2.2 | 5.9 | 9.1 | 8.6 |
| **15** | 2.6 | 7.2 | 9.3 | 8.7 |
| **20** | 3.0 | 8.0 | 9.5 | 8.7 |
| **30** | 3.7 | 8.9 | 9.6 | 8.8 |
| **40** | 3.0 | 8.5 | 9.6 | 8.8 |
| **50** | 3.6 | 8.9 | 9.7 | 8.8 |
| **100** | 4.8 | 9.4 | 9.7 | 9.0 |
| **120** | 5.0 | 9.6 | 9.8 | 9.1 |
| **150** | 6.5 | 9.8 | 9.8 | 9.1 |
| **200** | 6.6 | 10.1 | 9.8 | 9.2 |
| **250** | 6.7 | 10.3 | 9.8 | 9.2 |
| **300** | 6.7 | 10.3 | 9.8 | 9.2 |

# 8.1 TEST DATA (CONTINUED)

## 8.3 MODULATION DEVIATION LIMITING



# 9.1 TEST DATA

## 9.2 AUDIO FREQUENCY RESPONSE

OPERATING FREQUENCY: 836.52 MHz

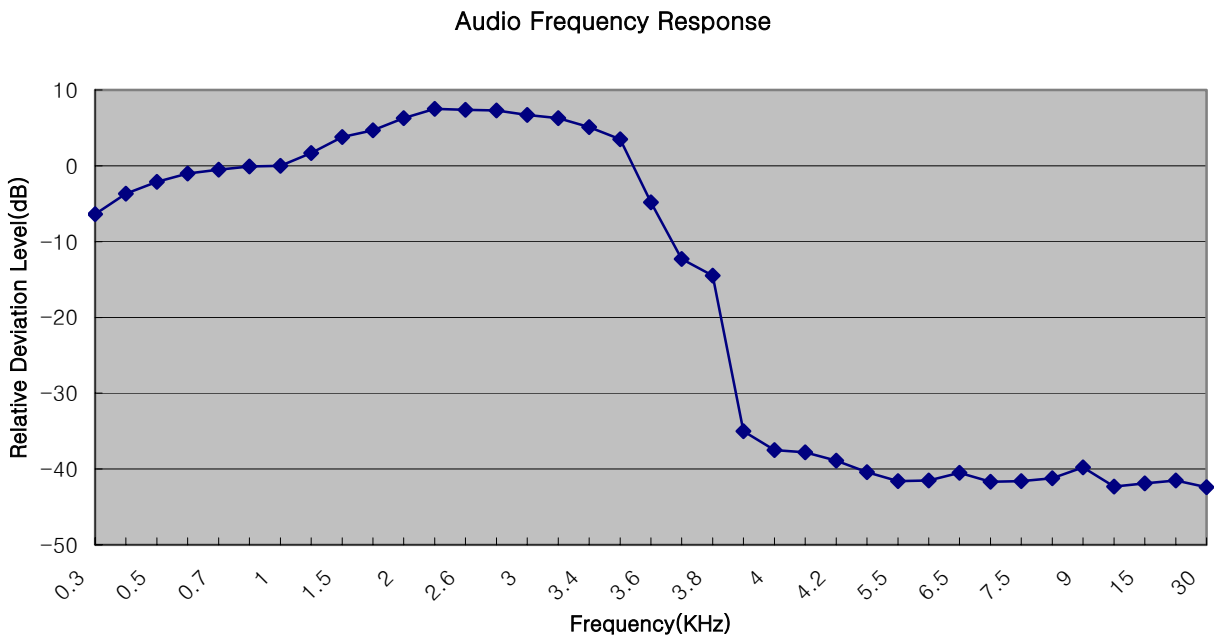
CHANNEL: 0384

Reference level: 0dB @ 1kHz

| Audio Frequency Response | | | | | |
|---|---|---|---|---|---|
| **Freq., kHz** | **Level, dB** | **Freq., kHz** | **Level, dB** | **Freq., kHz** | **Level, dB** |
| **0.3** | -6.4 | **3.3** | 6.3 | **7.5** | -41.6 |
| **0.4** | -3.7 | **3.4** | 5.1 | **8.0** | -41.2 |
| **0.5** | -2.1 | **3.5** | 3.5 | **9.0** | -39.8 |
| **0.6** | -1 | **3.6** | -4.8 | **10.0** | -42.3 |
| **0.7** | -0.5 | **3.7** | -12.3 | **15.0** | -41.9 |
| **0.8** | -0.1 | **3.8** | -14.5 | **20.0** | -41.5 |
| **1.0** | 0 | **3.9** | -35 | **30.0** | -42.4 |
| **1.2** | 1.7 | **4.0** | -37.5 | | |
| **1.5** | 3.8 | **4.1** | -37.8 | | |
| **1.7** | 4.7 | **4.2** | -38.9 | | |
| **2.0** | 6.3 | **4.8** | -40.4 | | |
| **2.3** | 7.5 | **5.5** | -41.6 | | |
| **2.6** | 7.4 | **6.0** | -41.5 | | |
| **2.8** | 7.3 | **6.5** | -40.5 | | |
| **3.0** | 6.7 | **7.0** | -41.7 | | |

# 9.1 TEST DATA (CONTINUED)

## 9.3 AUDIO FREQUENCY RESPONSE



# 10.1 EMISSION TEST DATA

## 10.2 Radiated Emission

**Distance: 3m**

| Frequency [㎒] | ANT Pol. | QP Reading [dB㎶] | T.F [dB] | Results [dB㎶/m] | Limits [dB㎶/m] | Margin [dB] |
|---|---|---|---|---|---|---|
| 486.0 | H | 47.5 | -7.92 | 39.58 | 46 | 6.42 |
| 515.14 | H | 47.0 | -7.25 | 39.75 | 46 | 6.25 |
| **524.85** | **H** | **49.5** | **-7.20** | **42.30** | **46** | **3.70** |
| 524.88 | V | 48.5 | -7.20 | 41.30 | 46 | 4.70 |
| 544.03 | H | 49.5 | -7.37 | 42.13 | 46 | 3.87 |
| 554.00 | H | 48.5 | -7.07 | 41.43 | 46 | 4.57 |
| 563.73 | H | 48.5 | -6.86 | 41.64 | 46 | 4.36 |
| 583.18 | V | 44.0 | -6.74 | 37.26 | 46 | 8.74 |
| 592.89 | H | 46.0 | -6.69 | 39.31 | 46 | 6.69 |
| - | - | - | - | - | - | - |

**NOTE**

1. No other emissions were detected at a level greater than 10dB below limit.
2. Measurements above 1GHz is performed using a minimum resolution bandwidth of 1MHz. The EUT was tested up to the 10GHz and no significant emission was found.

# 10.1 EMISSION TEST DATA (CONTINUED)

## 10.3 Conducted Emission

(SEE ATTACHMENT D)

## 11.1 PLOT(S) OF EMISSIONS

(SEE ATTACHMENT D)

# 12.1 TEST EQUIPMENT

| | Type | Manufacturer | Model | Cal.Due.Date (dd/mm/yy) | S/N |
|---|---|---|---|---|---|
| 01 | Spectrum Analyzer | Agilent | E4404B | 22/11/04 | US41061134 |
| 02 | Spectrum Analyzer | H.P | 8563E | 25/09/05 | 3551A04634 |
| 03 | Power Meter | H.P | EPM-442A | 15/07/05 | GB37170413 |
| 04 | Power Sensor | H.P | 8481A | 15/07/05 | 3318A96332 |
| 05 | Frequency Counter | H.P | 5342A | 07/10/05 | 2119A04450 |
| 06 | Multfunction Synthesizer | H.P | 8904A | 15/10/04 | 3633A08404 |
| 07 | Signal Generator | H.P | 8673D | 28/03/05 | 2844A00753 |
| 08 | Signal Generator | H.P | E4421A | 29/04/05 | US37230529 |
| 09 | Signal Generator | H.P | 8657A | 05/06/05 | 3430U02049 |
| 10 | Audio Analyzer | H.P | 8903B | 18/04/05 | 3011A0944B |
| 11 | Modulation Analyzer | H.P | 8901B | 21/04/05 | 3028A03029 |
| 12 | Sensor Module | H.P | 11722A | 21/04/05 | 3111A04665 |
| 13 | Oscilloscope | LeCroy | 9314A | 30/08/05 | 93144390 |
| 14 | CDMA Mobile Station Test Set | H.P | 8924C | 01/09/05 | US35360688 |
| 15 | Power Splitter | WEINSCHEL | 1593 | 23/04/05 | 332 |
| 16 | BAND Reject Filter | Microwave circuits INC. | NO308372 | 22/12/04 | 3125-01DC0312 |
| 17 | BAND Reject Filter | Wainwright | WRCG1750 | 25/08/05 | SN2 |
| 18 | AC Power supply | DAEKWANG | 5KVA | 03/04/05 | N/A |
| 19 | DC Power Supply | H.P | 6622A | 24/03/05 | 465487 |
| 20 | Attenuator (30dB) | H.P | 8498A | 23/05/05 | 50101 |
| 21 | Attenuator (10dB) | WEINSCHEL | 23-10-34 | 15/10/04 | BP4387 |
| 22 | HORN ANT | EMCO | 3115 | 04/04/05 | 6419 |
| 23 | HORN ANT | EMCO | 3115 | 10/01/05 | 21097 |
| 24 | HORN ANT | A.H.Systems | SAS-574 | 27/11/04 | 154 |
| 25 | HORN ANT | A.H.Systems | SAS-574 | 14/11/04 | 155 |
| 26 | Dipole Antenna | Schwarzbeck | VHA9103 | 04/10/04 | 2116 |

## 12.1 TEST EQUIPMENT (CONTINUED)

| | Type | Manufacturer | Model | Cal.Due.Date (dd/mm/yy) | S/N |
|---|---|---|---|---|---|
| 27 | Dipole Antenna | Schwarzbeck | VHA9103 | 04/10/04 | 2117 |
| 28 | Dipole Antenna | Schwarzbeck | UHA9105 | 04/10/04 | 2261 |
| 29 | Dipole Antenna | Schwarzbeck | UHA9105 | 04/10/04 | 2262 |
| 30 | RFI/FIELD Iintensity Meter | Kyorits | KNM-504D | 07/07/05 | SN-161-4 |
| 31 | Frequency Converter | Kyorits | KCV-604C | 07/07/05 | 4-230-3 |
| 32 | TEMP & HUMIDITY Chamber | JISCO | J-RHC2 | 10/09/05 | 021031 |
| 33 | Log Periodic Antenna | Schwarzbeck | UHALP9108A1 | 23/10/04 | 1098 |
| 34 | Biconical Antenna | Schwarzbeck | VHA9103 | 23/10/04 | VHA91031946 |
| 35 | Digital Multimeter | H.P | 34401A | 07/04/05 | 3146A13475 |
| 36 | Attenuator (10dB) | WEINSCHEL | 23-10-34 | 15/10/04 | BP4386 |
| 37 | High-Pass Filter | ANRITSU | MP526 | 12/05/05 | M27756 |
| 38 | Attenuator (3dB) | Agilent | 8491B | 15/10/04 | 58177 |
| 39 | Wireless communication test set | Agilent | 8960 | 10/11/04 | GB41321167 |
| 40 | RFI/FIELD Intensity Meter | Kyorits | KNW-2402 | 07/07/05 | 4N-170-3 |
| 41 | LISN | Kyorits | KNW-407 | 16/08/05 | 8-317-8 |
| 42 | LISN | Kyorits | KNW-242 | 16/08/05 | 8-654-15 |
| 43 | Spectrum Analyzer | H.P | 8591E | 23/05/05 | 3649A05889 |
| 44 | Software | ToYo EMI | EP5/CE | N/A | Ver 2.0.801 |
| 45 | CVCF | NF Electronic | 4400 | N/A | 344536 4420064 |

# 13.1 SAMPLE CALCULATIONS

**Emission Designator**

A. Voice and SAT signals:

Voice (M=2.5 kHz, D=12 kHz)

SAT (M=6 kHz, D=2 kHz)

Bn = 2(6+12+2) = 40 kHz

Emission Designator = 40K0F8W

B. Wideband data:

Data (M = 10 kHz, D = 8 kHz)

SAT (M = 6 kHz, D = 2 kHz)

Bn = 2(10+8+2) = 40kHz

Emission Designator = 40K0F1D

C. TDMA

Emission Designator = 30K0DXW

## 14.1 CONCLUSION

The data collected shows that the **Telian Corporation** Portable Cellular Phone (**FCC ID: NPQMTD7800)** complies with all the requirements of Parts 2, 15 and 22 of the FCC rules.