TEST SET- UP PROCEDURES

Except where otherwise stated, all measurements are made following the Electronic Industries Association (EIA) Minimum Standard for Portable/Personal Land Mobile Communications FM or PM Equipment 25-1000 MHz-(TIA/EIA-603).

This exhibit presents a brief summary of how the measurements were made, the required limits, and the test equipment used.

The following procedures are presented with this application.

1.	RF Power Output	X
2.	Audio Response	X
3.	Low Pass Filter Response	X
4.	Modulation Limiting	X
5.	Occupied Bandwidth	X
6.	Radiated Spurious Emissions	X
7.	Conducted Spurious Emissions	X
8.	Frequency Stability	X
9.	Transient Frequency Behavior	X

TEST EQUIPMENT LIST

Pursuant to 47 CFR 2.1033(c)

1. Spectrum Analyzer
   A. HP 8591E
   B. HP 8566
   C. HP35665A
2. RF Signal Generators
   A. HP 8665
   B. HP 8642
   C. HP 8656
3. RF Millivoltmeter
   A. Boonton 4200
   B. Boonton 4210
4. RF Loads
5. Dipole Antenna Set
   A. Singer DM-105A series
   B. EMCO Model 3120
6. RF Power Meters
   A. HP 436A
   B. 8482B Power Sensor
   C. 30 dB High Power Pad
7. Monitor Receivers
   A. Motorola Comm System Analyzer
   B. HP8901
8. Tenny Temperature Chamber
9. Frequency Counters
   a. HP 5385A
10. Audio Analyzer
    a. HP8903B
11. AC/DC Voltmeters
    a. Fluke8012A Digital Multimeter
12. HP8901B Modulation Analyzer
13. WEINSCHEL M1418

Measurement Procedures Used for Submitted Data:

EXHIBIT 7A - RF Output Power vs. DC Power Input - Pursuant to 47 CFR 2.1046

The transmitter is operated under normal conditions at the specified nominal DC input voltage. The antenna output is terminated in 50 ohms. The DC supply path to the final stage only is interrupted to allow insertion of a DC ammeter in series with the DC supply. The DC voltage drop of the ammeter is negligible. A DC voltmeter is computed as the product of the DC current (in amps) times the DC voltage (in volts). This measurement is performed at the upper and lower limits of the frequency range. At each frequency, the measurement is performed at the upper and lower limits of the specified adjustable power range.

EXHIBIT 7B - Transmit Audio Frequency Response – Pursuant to 47 CFR 2.1047(a)

The transmitter output is monitored with an HP8901B modulation analyzer, whose FM demodulator output is fed to an HP8903B audio analyzer. De-emphasis or filtering within the test equipment is not used. An audio oscillator signal, derived from the HP8903B Audio Analyzer, is connected to the microphone audio input of the transmitter. At a frequency of 1 kHz, the level is adjusted to obtain 20% of full system deviation, to ensure that limiting does not occur at any frequency in the range of 300 – 3000 Hz. A constant input level is then maintained and the oscillator frequency is varied between the range of 100 Hz to 5000 Hz. The frequency response is plotted, using a reference of 0 dB at 1 kHz.

EXHIBIT 7C - Transmit Audio Post Limiter Lowpass Filter Response – Pursuant to 47 CFR 2.1047(a)

The audio oscillator portion of an HP8903B audio analyzer is connected to the input of the post limiter lowpass filter. The output of the lowpass filter is measured with an HP35665A dynamic signal analyzer. The response is swept between the limits of 100 Hz and 100 kHz. Oscillator level is chosen to be as high as possible and that will not cause limiting at any frequency, and is maintained constant versus frequency.

EXHIBIT 7D – Modulation Limiting Characteristic – Pursuant to 47 CFR 2.1047(b)

An audio oscillator is connected to the microphone audio input. The transmitter output is monitored with an HP8901B modulation analyzer. The flat frequency response FM demodulator output of the HP8901B is fed to an HP8903B audio analyzer. The 20 kHz lowpass filter of the modulation analyzer is used to reduce the level of residual high frequency noise. The oscillator level is adjusted, at 1 kHz, to obtain 60% of full system deviation. The oscillator level is then varied over a range of +/-25 dB in 5 dB increments, and the resulting deviation is plotted. This measurement is repeated at 300 Hz and 3 kHz. The above procedure is performed three times, for conditions with Tone Private Line, Digital Private Line, and Carrier Squelch Mode (without subaudible signaling).

EXHIBIT 7E - Occupied Bandwidth - Pursuant to 47 CFR 2.1049(c)(1)

Procedure for Occupied Bandwidth for Voice Transmission

An audio oscillator is connected to the microphone audio input. The frequency is set to 2500 Hz and the amplitude is adjusted to a level 16 dB above that is required to produce 50% of

full system deviation at the frequency of maximum response of the audio modulation circuit, in accordance with FCC rules Part 2.1049(c)(1).

The transmitter output is connected, via a 30 dB attenuator, which also provides a 50-ohm termination to the transmitter output, to an HP8560E spectrum analyzer that outputs directly to a computer. Spectrum analysis of the transmitter output is performed to at least +/-2.5 times the channel spacing. The unmodulated carrier is used to establish a 0-dB reference, then with the modulating signal applied. This 0 dB reference is equivalent to the power rating of the transmitter, which is specified in each page of the exhibit. This measurement is repeated with

Tone Private Line continuous subaudible signaling added (250.3 Hz at 15% full system deviation) and again with Digital Private Line (code 131 at 15% of full system deviation) for 25 kHz channel spacing.

EXHIBIT 7F - Conducted Spurious Emissions - Pursuant to FCC Rule 2.1051

The output of the transmitter is connected, via a suitable attenuator, to the input of an HP8560E spectrum analyzer. This data is measured at the upper and lower frequency limits of the frequency range. If transmit power is adjusted, the measurement is repeated at various power levels including minimum and maximum.

EXHIBIT 7G - Radiated Spurious Emissions - Pursuant to 47 CFR 2.1053

Transmitter radiated spurious emissions were measured by Motorola Plantation EMC Lab. Measurements were made at an approved open field test site constructed in accordance with Appendix B, FCC/OST 55 (1982), and were performed in accordance with the Code of Federal Regulations, Title 47, Part 2, paragraph 2.1053. The specification limit corresponding to a level of 43 dB + 10log(Pout) for 25 kHz below the fundamental carrier power of the transmitter. The data is plotted as “Radiated Spurious Emissions” on the graphs comprising EXHIBIT 6G.

The test site is: Motorola Plantation EMC Lab, located in Florida, United States of America. Motorola Plantation EMC Lab is listed with FCC and Industry Canada as follows:

1. FCC OATS registration number is: 91932
2. Industry Canada OATS registration number is: IC 3679

Site address:

8000 West Sunrise Blvd

Plantation, Florida 33322

EXHIBIT 7H – Frequency Stability vs. Temperature and vs. Voltage - Pursuant to 47 CFR 2.1055(a) (b) (d)

Frequency Stability vs. Temperature data is measured in accordance with FCC Rules Part 2.1055(a) (1). An HP8901B modulation analyzer is used to measure the frequency of the signal transmitter by the radio. The radio is placed in a Votsch, model VT4010 Temperature Chamber, and the frequency is measured as the temperature is incremented from –30 to +60 degrees C in 5 degrees increments Frequency Stability vs. Voltage data is measured in accordance with FCC Rules Part 2.1055(d). An HP8901B modulation analyzer is used to

measure the frequency of the signal transmitter by the radio by way of a 30dB attenuator. The supply voltage of the radio is swept +20% and –20% of 13.6Vdc.

Method of Measurement -- Per TIA/EIA-603

For RF Output Power ON: Turn the transmitter ON. Once the demodulator output has been captured by the transmitter power, the 1 kHz test signal will be completely suppressed. This point in time is named T-on. The display will then show the frequency difference from the assigned frequency to the actual transmitter frequency versus time. Two time intervals will be measured following T-on: T-1 and T-2.

So, the RF ON time intervals are as follows: T-on --------> T-1 -> T-2

For RF Output Power OFF: Turn the transmitter OFF. The display will show the transmitter frequency difference versus time, and when the 1 kHz test signal starts to rise, it indicates total absence of the transmitter output at the specified frequency. This point is named T-off. Time interval T-3 precedes T-off.

So, the RF OFF time intervals are as follows: T-3 --------> T-off

FCC Limits—Per 90.214.

Frequency Range (MHz)	Time Interval
30 to 300	T-1
	5.0 ms
300 to 500	10.0 ms
500 to 1000	20.0 ms
	T-2
	20.0 ms
	25.0 ms
	50.0 ms
	T-3
	5.0 ms
	10.0 ms
	10.0 ms