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-D).

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 Frequency Response	X
3.	Modulation Limiting	X
4.	Occupied Bandwidth	X
5.	Radiated Spurious Emissions	X
6.	Conducted Spurious Emissions	X
7.	Frequency Stability	X
8.	Transient Frequency Behavior	X

TEST EQUIPMENT LIST

	Calibration Due Date
1. Spectrum Analyzer	
A. Rohde & Schwarz	17-MAR-2015
2. RF Signal Generators	
A. HP 8657B	03-MAR-2015
A. WEINSCHEL M1418	
3. Dipole Antenna Set	No Calibration Required
A. Singer DM-105A series	
B. EMCO Model 3120	
4. RF Power Meters	
A. Agilent E4416A	28-JAN-2015
B. E9321A Power Sensor	28-JAN-2015
C. 20 dB High Power Pad	28-JAN-2015
5. Monitor Receivers	
A. HP RF Comm Test System HP8920B	10-FEB- 2015
6. Tenny Temperature Chamber	No Calibration Required
7. Audio Analyzer	
a. HP8903B	28-JAN-2015
8. AC/DC Voltmeters	
a. HP34401A Digital Multimeter	28-JAN-2015
9. HP8901B Modulation Analyzer	25-JAN-2015

RF POWER OUTPUT

Pursuant to FCC Rules 2.1046 (a).

Method of Measurement *(Measured in October 2014 MSI Plantation EME Lab)*

The RF power output is measured with the value of voltage and current specified in Exhibit 3 as required by 2.1046. A 50 ohm RF attenuator of proper power rating was used as a load for making these measurements. For Transmitter having output impedance other than 50 ohm, a suitable matching network is placed between the transmitter and the load.

The power measurements are made using a Hewlett Packard series HP 436A power meter and a 30 dB attenuator or a HP 437B power meter.

AUDIO FREQUENCY RESPONSE

Method of Measurement *(Measured in October 2014 MSI Plantation Engineering Lab)*

Operate the transmitter under standard test conditions and monitor the output with a frequency deviation meter or calibrated test receiver. With 1000 Hz sine wave audio input applied through a dummy microphone circuit, adjust the audio input to give 30% of full rated system deviation Maintaining constant deviation, vary the input frequency from 100 to 5000 Hz, and observe the level necessary to maintain a constant 30% modulation.

Minimum Standard

The audio frequency response shall not vary more than +1 or -3 dB from 300 to 3000 Hz as referenced to 1000 Hz level (with the exception of a permissible 6 dB/octave roll off from 2500 to 3000 Hz)

MODULATION LIMITING

Pursuant FCC Rules 2.1047

Method of Measurement (Measured in October 2014 MSI Plantation Engineering Lab)

The transmitter shall be adjusted for full rated system deviation. Adjust the audio input for 60% of rated system deviation at 1000 Hz. Using this level as a reference (0 dB) vary the audio input level from the reference to a level 20 dB above it for modulation frequencies of 100 Hz and 5000 Hz. Record the system deviation obtained as a function of the input level.

FCC Limits

Minimum Standard - The transmitter modulation must not exceed rated system deviation at any audio frequency input or reasonable change in input level.

OCCUPIED BANDWIDTH

Pursuant to FCC Rules 2.1049

Method of Measurement *(Measured in October 2014 MSI Plantation Engineering Lab)*

Data on occupied bandwidth is presented in the form of a spectrum analyzer photograph, which illustrates the transmitter sidebands. A photograph is taken of the unmodulated carrier, for reference, to which is superimposed the sideband display generated by modulating the carrier with a 2500 Hz tone at a level 16 dB greater than that required to produce 50 percent modulation. If tone or digital coded squelch is indicated, photographs using both the 2500 Hz tone and the indicated squelch signal are used to modulate the transmitter. During these measurements, the instantaneous Deviation Control is set for a maximum of +2.5 kHz.

FCC Limits - Per Applicable Rule Parts.

Measured Data: On any frequency removed from the assigned frequency up to 5.625 kHz, the spec is 0 dB. On any frequency removed from the assigned frequency from 5.625 kHz up to and including 12.5 kHz, the spec is at least 7.27(fd-2.88 kHz) dB down. On any frequency removed from the assigned frequency by more than 12.5 kHz, the spec is at least 50+10log(P) dB (mean output power in watts) or 70 decibels whichever is the lesser attenuation.

RADIATED SPURIOUS EMISSIONS

Pursuant to FCC Rules 2.1053

Test Site:

(Measured in October 2014 MSI Plantation EME Lab)

The site, located at Plantation, Florida in a region, which is reasonably free from RF interference and has been approved by the Commission for Spurious Measurements.

The equipment is placed on the turntable and then placed in normal operation using the intended power source. A broadband receiving antenna located 15 ft. from the transmitter picks up any signal radiated from the transmitter and its operation accessories. The antenna is adjustable in height and can by horizontally and vertically polarized. A spectrum analyzer covering the necessary frequency range is used to detect and measure any radiation picked up by the antenna. The RBW/VBW used for measurements are 100Hz/300Hz for freqs below 1 GHz and 1MHz/3MHz for frequencies above 1 GHz.

CONDUCTED SPURIOUS EMISSIONS

Pursuant to FCC Rule 2.1051

Method of Measurement: *(Measured in October 2014 MSI Plantation EME Lab)*

The transmitter is terminated into a 50 ohm load and interfaced with a spectrum analyzer, which allows the spurious emission level relative to the carrier level to be measured directly. Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that required producing 50% of rated system deviation at 1000 Hz. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier or as high as the state of the art permits except for that region close to the carrier equal to ± 250% of the authorized bandwidth. The RBW/VBW used for measurements are 100Hz/300Hz for freqs below 1 GHz and 1MHz/3MHz for frequencies above 1 GHz.

FCC Limits: Per Applicable Rule Parts.

Conducted spurious emissions shall be attenuated below the maximum level of emission of the carrier frequency in accordance with the following formula:

Spurious attenuation in dB = 50 + 10 $\log_{10}$ (Power output in watts) or 70 dB, whichever is less.

FREQUENCY STABILITY

Pursuant to FCC Rule 2.1055

Method of Measurement: (Measured in October 2014 MSI Plantation Engineering Lab)

A. Temperature (Non-heated type crystals oscillators):

Frequency measurements are made at the extremes of the temperature range -30 to +50 degrees centigrade and at intervals of not more than 10 degrees centigrade through out the range. Sufficient time is allowed prior to each measurement for the circuit components to stabilize.

B. Power Supply Voltage:

The primary voltage was varied from 80% to 120% of the normal supply voltage. Voltage is measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

FCC Limits—Per 2.1055 (1) & (2) and Applicable Rule Parts.

Temperature - Frequency Stability of +.00025% from -30 to +50 degrees centigrade

(-20 to + 50 degrees centigrade Maritime parts 81 & 83).

Power Supply Voltage - Frequency Stability of ± .0005% from 85% to 115% of nominal voltage. (See CFR Rule Part 90.213)

*Per Applicable Rule Parts.

EXHIBIT 7

TRANSIENT FREQUENCY BEHAVIOR

Pursuant to FCC Rule 90.214

Transient frequency behavior is a measure of the difference, as a function in time, of the actual transmitter frequency to the assigned transmitter frequency when the transmitted RF output power is switched on or off.

Setup—Per TIA/EIA-603, Section 2.2.19

(Measured in October 2014 MSI Plantation Engineering Lab)

Connect the output port of the transmitter under test to an attenuator and this to a directional coupler. Connect an RF peak detector to the coupled output of the directional coupler and connect the output of the RF peak detector to the external trigger on a storage scope. The output of the directional coupler is mixed, via an RF combining network, with the output of a signal generator. Verify that the

Approximately 40 dB below the maximum input level of the test receiver as per step (f). Set the signal generator at the same frequency as the transmitter under test, modulated with a 1 kHz tone, with an FM deviation equal to the assigned channel spacing (+25 kHz). Following step (h), adjust the signal generator to

Provide 20 dB less power at the combiner output than the level set in step (f). Connect the output of the RF combiner to a test receiver. Connect the test receiver's output port to the vertical input channel of the storage scope. Adjust the horizontal sweep rate on the oscilloscope to 10 msec/div and adjust the vertical amplitude to display the 1 kHz tone at +/- 4 divisions centered on the display. Reduce the transmit attenuator by 30 dB as per step (l) so that the difference in power between the reference signal and the transmitter signal at the combiner is 50 dB when the transmitter is turned on. Following step (k), adjust the oscilloscope to trigger on an increasing signal from the RF detector at one division from the left side of the display when the transmitter is turned on. Switch on the transmitter and record the display (For RF Output Power ON.)

Following step (q), adjust the oscilloscope trigger controls to trigger on a decreasing signal from the RF peak detector, at 1 division from the right side of the display when the transmitter is turned off. Switch off the transmitter and record the display (For RF Output Power OFF).

Steps (f), (h), (k), (l), (q) Section 2.2.19 of the TIA/EIA-603 were followed.

Method of Measurement -- Per TIA/EIA-603

(Measured in October 2014 MSI Plantation Engineering Lab)

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)

421 to 512 MHz

Time Interval

T-1 10 ms

T-2 25.0 ms

T-3 10.0 ms