

**Measurement Procedure & Test Equipment Used**

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-(EIA/TIA-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. | Test Equipment List          | <u>    x    </u> |
| 2. | RF Power Output Data         | <u>    x    </u> |
| 3. | Occupied Bandwidth           | <u>    x    </u> |
| 4. | Radiated Spurious Emissions  | <u>    x    </u> |
| 5. | Conducted Spurious Emissions | <u>    x    </u> |

**Test Equipment List**

Pursuant To FCC Rules 2.947 (d)

	<b>MODEL</b>	<b>MANUFACTURER</b>	<b>Instrument</b>	<b>Calibration Due Date</b>
1	3488A	Hewlett-Packard	Switch Control	No Cal. Required
2	6672A	Hewlett-Packard	Power Supply	8/5/2014
3	E4440	Agilent	Spectrum Analyzer	8/5/2014
4	8656A	Hewlett-Packard	Signal Generator	8/5/2014
5	8902A	Hewlett-Packard	Measuring Receiver	8/5/2014
6	8903A	Hewlett-Packard	Audio Analyzer	8/5/2014
7	SMP22	Rhode & Schwarz	Signal Generator	12/11/2013
8	ESI 26	Rhode & Schwarz	Spectrum Analyzer/ESI Test Receiver	5/2/2014
9	ESI 26	Rhode & Schwarz	EMI Test Receiver	9/4/2014
10	SC99V	Sunol Sciences Corp.	System controller	No Cal. Required
11	FM2011VS	Sunol Sciences Corp.	Turntable. Flush Mount 2M Part# 15284	No Cal. Required
12	TLT2	Sunol Sciences Corp.	Antenna Positioning Tower	No Cal. Required
13	TLT2	Sunol Sciences Corp.	Antenna Positioning Tower	No Cal. Required
14	2000	Motorola	RF Tray	No Cal. Required
15	6032A	Hewlett Packard	Power Supply	12/19/2014
16	SAS-571	A.H. Systems Inc.	DRG Horn Freq. 700MHZ-18GHZ antenna	9/5/2014
17	SAS-571	A.H. Systems Inc.	DRG Horn Freq. 700MHZ-18GHZ antenna	6/13/2014
18	CBL 6112D	TESEQ GmbH Berlin	Bilog Antenna 30MHz to 2GHz	9/4/2014
19	3141	EMCO	Biconilog. Freq. 30MHZ-2GHZ antenna	4/30/2014
20	CBL 6112D	TESEQ GmbH Berlin	Bilog Antenna 30MHz to 2GHz	9/26/2014
21	6632A	Hewlett-Packard	System DC Power Supply	10/14/2014
22	437B	Hewlett-Packard	Power Meter	1/14/2015
23	8481A	Agilent	Power Sensor	10/17/2014
24	9305-20	Weinschel	20 dB Attenuator	10/14/2014

**RF Power Output**

Pursuant to FCC Rules 2.1046 (a)

**Method of Measurement**

The RF power output is measured as required by 2.1033(c) (8) with the transmitter adjusted in accordance with the tune-up procedure. A 50-ohm RF attenuator of proper power rating was used as a load for making these measurements.

The power measurements are made using a Hewlett-Packard 437B power meter, an Agilent 8481A power sensor, and a 20dB attenuator.

**Occupied Bandwidth**

Pursuant to FCC Rules 2.1049

**Method of Measurement**

Data on occupied bandwidth is presented in the form of a spectrum analyzer photograph, which illustrates the transmitter sidebands. For analog signals, the reference line for the data plot is taken of the unmodulated carrier, 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. For digital voice, data, and TDMA, the reference line for the data plot is that of the peak value of the modulated carrier. For digital data, the Standard Transmitter Test Pattern is a continuously repeating 511 bit pseudo-random bit sequence based on ITU-T 0.153. 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 +5 kHz.

**FCC Limits - Per Applicable Rule Parts.**

**For Part 90**

Measured Data: At least +25 dB down on any frequency removed from the assigned frequency by more than 50 % and up to and including 100% of the authorized bandwidth. At least +35 dB down on any frequency removed from the assigned frequency by more than 100% up to and including 250% of the authorized bandwidth; at least  $43 + 10 \log (P)$  dB or 70 decibels, whichever is the lesser attenuation. The resolution bandwidth used is per TIA procedures.

**For Part 22**

Measured Data: The power of emissions outside of the authorized operating frequency range is attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB. A narrower resolution bandwidth is employed to improve measurement accuracy and the measured power is integrated over the full required measurement bandwidth of 30 KHz. Data presented in Exhibit 06.

**Radiated Spurious Emissions**

Pursuant to FCC Rules 2.1053

**Test Site:**

The site, located at Plantation, Florida, is 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, connected to a dummy RF load and then placed in normal operation using the intended power source. A broadband receiving antenna, located 3 meters from the

transmitter-under-test (TUT), picks up any signals radiated from the transmitter and its operation accessories. The antenna is adjustable in height and can be horizontally and vertically polarized. A spectrum analyzer covering the necessary frequency range is used to detect and measure any radiation picked up by the above mentioned receiving antenna.

Method of Measurement:

The equipment is adjusted to obtain peak reading of received signals wherever they occur in the spectrum by:

1. Rotating the transmitter under test.
2. Adjusting the antenna height.

The testing procedure is repeated for both horizontal and vertical polarization of the receiving antenna. Relative signal strength is indicated on the spectrum analyzer connected to the receiving antenna. To obtain actual radiated signal strength for each spurious and harmonic frequency observed, a standard signal generator with calibrated output is connected to a dipole antenna adjusted to that particular frequency. This dipole antenna is substituted for the transmitter under test. The signal generator is adjusted in output level until a reading identical to that obtained with the actual transmitter is observed on the spectrum analyzer. Signal strength is then read directly from the generator. Actual measurements are recorded on the attached graphs.

Note: Measurement is made following a resolution bandwidth setting of 100 KHz.

FCC Limits -- Per Applicable Rule Parts.

Radiated 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 =  $43 + 10 \log (P)$  dB

**Conducted Spurious Emissions**

Pursuant to FCC Rule 2.1051

Method of Measurement:

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 to produce 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  $\pm 250\%$  of the authorized bandwidth.

Note:

For part 90, the resolution bandwidth used is per TIA procedures.

For part 22, measurement is made following a resolution bandwidth setting of 30 KHz.

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 =  $43 + 10 \log (P)$  for 25 kHz Channelization.

Spurious attenuation in dB =  $50 + 10 \log (P)$  for 12.5 kHz Channelization.