

To: Federal Communications Commission

Att: Application Examiner / Review Engineer

Sub: Additional test data to be included in Test report no:J98033279

Ref: Applicant: Spectrian , FCC ID:I20MCPS2000

Dear Application Examiner :

These are additional tests performed by Compliance Engineering Services, Inc. In this test procedure summary, we have tested five types of modulation. They are : AMP-Voice, AMP-WB, CDMA, CDPD and TDMA. Each modulation was investigated with EUT output and signal generator input comparison, intermodulation, and out of band emission.

If you have any question, please feel free to contact me.

Best Regards

Mike C.I. Kuo / Vice President
Compliance Engineering Services, Inc.

SECTION 2.1049 (WAS SECTION 2.989): OCCUPIED BANDWIDTH

Test Equipment:

HP Spectrum Analyzer/8593EM

SIGNAL GENERATORS USED:

AMPS: Fluke/6060B (Asset No.: 3030)

Fluke/6060B (Asset No. : 1678)

CDMA/CDPD: HP/ESG-D3000A (Asset No.: 8776)

HP/ESG-D3000A (Asset No.: 8775)

TDMA: Marconi/2051 (Asset No.: 6376)

Marconi/2051 (Asset No.: 5324)

Waveform generator; HP/2021 (Asset No.: 8455)

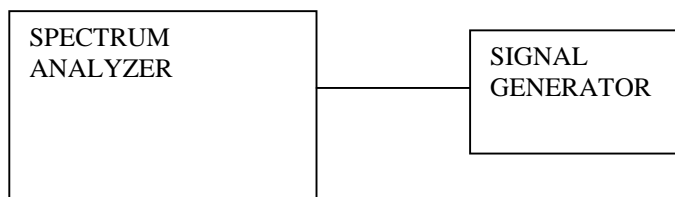
HP/2021 (Asset No. 7092)

Power Attenuator; Weinschel

Low loss cable, 2ft(loss: 0.85dB/ft @ 26GHZ)

Test Setup:

SETUP (A) FOR INPUT FROM SIGNAL GENERATOR



SETUP (B) FOR OUPUT FROM EUT (AMPLIFIER).

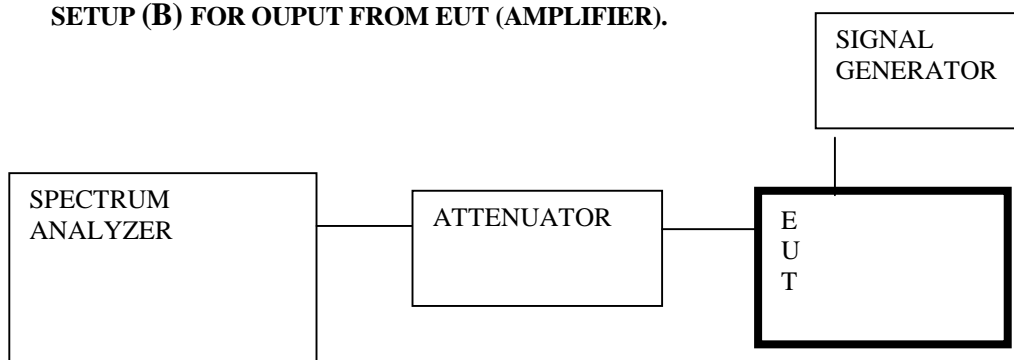


FIG. 1

Minimum:

Section 2.1049(i); transmitters designed for other types of modulation-when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

Test Procedure:

The Eut's occupied bandwidth is compared to the input source plot (signal generator) and output plot (power amplifier) and check that no distortion is created when input signal is amplified by Eut.

Used setup **B** and connect output from Eut to spectrum analyzer, making sure that enough external attenuation is being used to protect input of spectrum analyzer. Used the **REF LVL OFF** function to correct for external attenuation and cable loss. Set the spectrum to the frequency that will be measured. Set the power amplifier to the maximum output gain. Set spectrum **SWEEP TIME** to **AUTO** and slowly reduce **RES BW.** to 300Hz and **AVG BW** to 300Hz. Use enough **SPAN** to display the whole signal on spectrum analyzer. Activate the **MAX HOLD** function and wait while the spectrum analyzer captures the envelope of the transmitted occupied bandwidth. Set the **TRACE** function to **VIEW**.

Use setup **A** and connect signal generator to spectrum analyzer, make sure that the input signal from signal generator is low enough, before connecting to spectrum analyzer. Keep all settings on spectrum analyzer the same and only remove the **REF LVL OFF** function, which was used to correct the external attenuation. Set the spectrum to the frequency that will be measured. Set spectrum **SWEEP TIME** to **AUTO** and slowly reduce **RES BW** to 300Hz and **AVG BW** to 300Hz. Use enough **SPAN** to display the whole signal on spectrum analyzer. Activate the **MAX HOLD** function and wait while the spectrum analyzer captures the envelope of the transmitted occupied bandwidth. Set the **TRACE** function to **VIEW**.

All modulation that amplifier can amplify was measured.

Test Result:

Plot out results, one for the input and another for the output.

SECTION 2.1051 (WAS SECTION 2.991): SPURIOUS EMISSION AT ANTENNA TERMINAL.

1) TWO-TONE TEST

Test Equipment:

HP Spectrum Analyzer/8593EM

SIGNAL GENERATORS USED:

AMPS: Fluke/6060B (Asset No.: 3030)

Fluke/6060B (Asset No. : 1678)

CDMA/CDPD: HP/ESG-D3000A (Asset No.: 8776)

HP/ESG-D3000A (Asset No.: 8775)

TDMA: Marconi/2051 (Asset No.: 6376)

Marconi/2051 (Asset No.: 5324)

Waveform generator; HP/2021 (Asset No.: 8455)

HP/2021 (Asset No. 7092)

Power Attenuator; Weinschel

Low loss cable, 2ft(loss: 0.85dB/ft @ 26GHZ)

TEST SETUP:

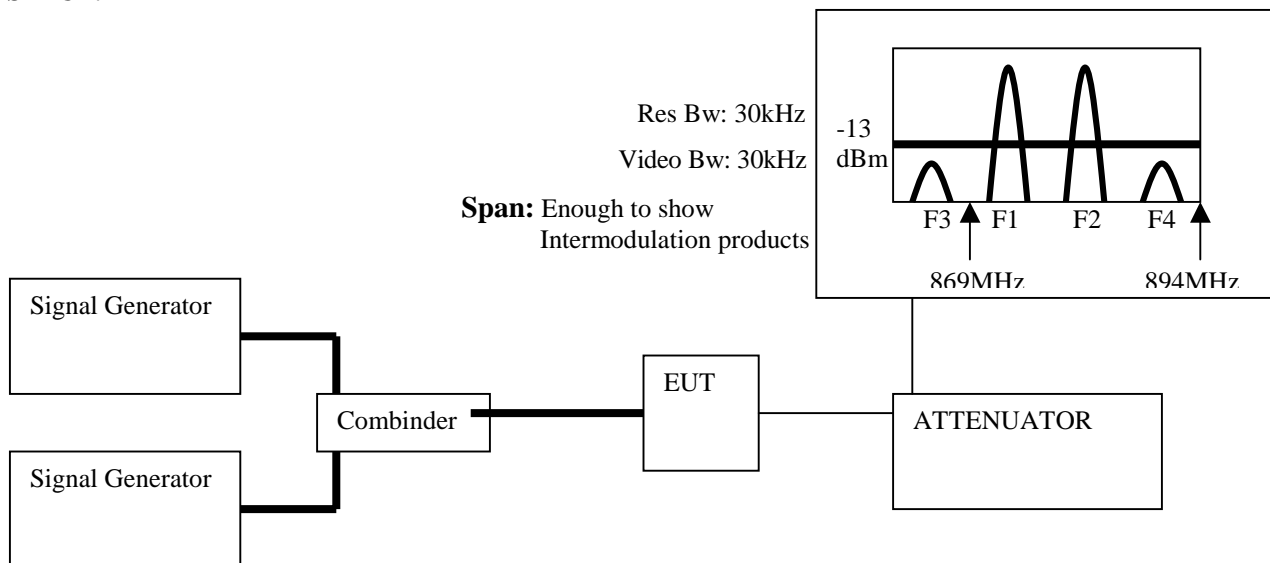


Fig. 2

Minimum Requirement:

Intermodulation products must be attenuated below the rated power of the Eut by at least $43 + 10\log(P)$, or 70 dB, whichever is lesser attenuation. Equivalent to -13 dBm.

Test Procedure:

Connect two signal generators to the Eut's input, via a proper impedance matching network or Combiner, so that the two input signals are equal in level (and can be raised equally). Both signals were the same modulation.

When two-tone was tested one intermod product was placed outside the passband and the other intermod product was placed inside the passband.

To calculate f3 and f4 use: $f3 = 2(f1) - f2$
 $f4 = 2(f2) - f1$

The first signal generator will be set to 870 MHz and the second signal generator will be set to 880 MHz.

Set the **REW BW** : 30 kHz and **SPAN** was be enough to show both the two-tone and intermodulation products. Using the **DISPLAY LINE** place it at -13 dBm. Use enough attenuation to prevent overload at spectrum analyzer input. **This test was repeated for all modulations that the Eut can perform.**

Test Result:

Plot out tests Results.

2) Harmonic test from 1 MHz to 10th harmonic of the carrier

Test Equipment:

HP Spectrum Analyzer/8593EM

SIGNAL GENERATORS USED:

AMPS: Fluke/6060B (Asset No.: 3030)

Fluke/6060B (Asset No. : 1678)

CDMA/CDPD: HP/ESG-D3000A (Asset No.: 8776)

HP/ESG-D3000A (Asset No.: 8775)

TDMA: Marconi/2051 (Asset No.: 6376)

Marconi/2051 (Asset No.: 5324)

Waveform generator; HP/2021 (Asset No.: 8455)

HP/2021 (Asset No. 7092)

Power Attenuator; Weinschel

Low loss cable, 2ft(loss: 0.85dB/ft @ 26GHZ)

TEST SETUP:

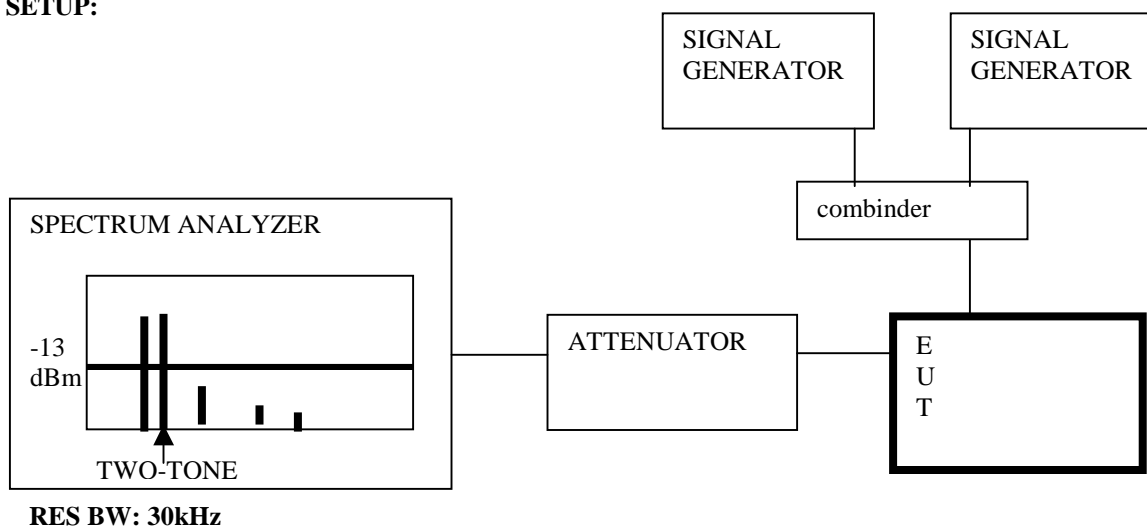


FIG. 3

Minimum Requirement:

Section 22.917(e):

For Base stations transmitters the magnitude of each spurious, harmonic, and intermodulation emissions that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not be more than $43 + 10 \log (P)$ dBc below the mean power output, which is equivalent to -13 dBm.

Test Procedure:

For the Out-of-Band emission test was be performed with the two-tone signals. Scan Eut from 1MHz to the 10th harmonic of carrier, while ignoring the two-tones and intermodulation products. Set RES Bw: 30kHz and using the DISPLAY LINE place it at -13dBm. Use enough attenuation to prevent overload on the spectrum analyzer input, which can cause distortion.

This test was repeated for all modulations that the Eut can perform.

Test Result:

Plot out tests Results.

RADIATED EMISSIONS: TEST REQUIREMENT: 15.109

Measurement Equipment:

HP Spectrum Analyzer/8546A
Bilog Antenna; Chase/CBL6112
Pre-Amp; HP/8447D-P1

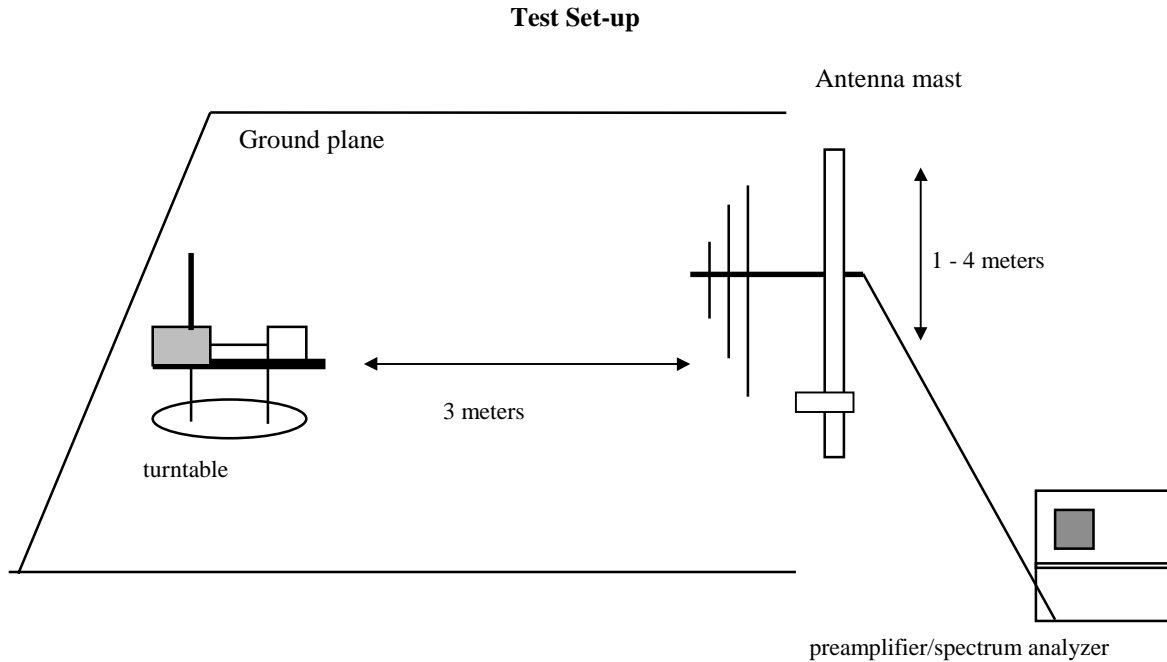


Fig.4

The EUT was placed on a turntable at a distance of 3 meters from the Bilog search antenna. The antenna was raised and lowered, the EUT was rotated on the turntable, until the EUT azimuth, antenna elevation, and antenna polarity are found which yielded maximum received emission levels on the spectrum analyzer.

Test Result: Record maximum readings on a tabular data sheet.