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Class II Permissive Change - FCC Part 22 Type Acceptance Test Report

for

Spectrian
Dual Mode Cellular Power Amplifier
Model No.: SCLPA 800 CR

FCC ID: I2ONTHX51AA

Report # J99013340

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Note: The second harmonic attenuation is below the specified limit, however the amplifier is to be used with a low pass filter reducing the second harmonic level.

Barry Smith
Test Engineer

Date

1.2 Product Description

The Spectrian Model SCLPA 800 CR is a dual mode cellular power amplifier.

2.0 **RF Power Output**, FCC §2.985(a)

2.1 Test Procedure

The amplifier's output was connected to a calibrated coaxial attenuator, the other end of which was connected to a spectrum analyzer. The resolution bandwidth and the video bandwidth of the spectrum analyzer were set up to 300 kHz and 300 kHz. The attenuator was included in spectrum analyzer OFFSET function.Transmitter output was read off the spectrum analyzer in dBm.

The output power was also measured with a power meter.

2.2 Test Equipment

Marconi Instruments 205 digital & vector signal generator
Gigatronics 8542C Power Meter
Hewlett Packard HP8566B Spectrum Analyzer, 100 Hz - 22 GHz
Tektronix 2782 Spectrum Analyzer, 100 Hz - 40 GHz

2.3 Test Results

Refer to Appendix A; the plots shown 47.5 dBm output power at 869 MHz, 881.5 MHz and 894 MHz.

3.0 **Effective Radiated Power**, FCC §22.913

Requirement: The Effective Radiated Power (ERP) must not exceed 500 Watts.

3.1 Test Procedure

The amplifier was positioned on a non-conductive turntable, 0.8m above the ground plane on an open test site. The half-wave tuned dipole was connected to the amplifier.

The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidths of the spectrum analyzer were set to 100 kHz. Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The spectrum analyzer reading (R_{EUT}) was recorded.

The EUT was replaced by a signal generator. The frequency of the signal generator was adjusted to the transmitting frequency.

The test antenna was raised and lowered to ensure that a maximum signal was received. The signal generator output level (P_G) was adjusted to obtain the spectrum analyzer reading (R_G) as close as possible to the previously recorded spectrum analyzer reading (R_{EUT}).

The ERP was calculated as follows:

$$ERP(dBm) = P_G(dBm) + R_{EUT}(dBm) - R_G(dBm)$$

The test was performed at three frequencies (low, middle, and high channels).

3.2 Test Equipment

Rhode & Schwartz SMH Signal Generator
Hewlett Packard HP8566B Spectrum Analyzer
CDI Roberts Antenna

3.3 Test Results

See attached page.

FCC Part 22.913, Effective Radiated Power

Frequency MHz	Spectrum Analyzer Reading (EUT) dB(uV)	Spectrum Analyzer Reading (sig. gen + tuned dipole) dB(uV)	Signal Generator Power dBm	ERP (EUT) dBm
869.0	123.7	90.2	16.0	49.5
881.5	124.0	90.3	16.0	49.7
894.0	124.3	90.3	16.0	50.0

4.0 **Occupied Bandwidth**, Emission Limitations. FCC §2.989(I), §22.917

4.1 Test Procedure

The RF output of the EUT was connected to the input of the spectrum analyzer through sufficient attenuation.

The spectrum with no modulation was ploted.

The EUT was set up to transmit a TDMA signal and the spectrum with modulation was ploted.

4.2 Test Equipment

Marconi Instruments 205 digital & vector signal generator
Gigatronics 8542C Power Meter
HP 8566B Spectrum Analyzer, 100 Hz - 22 GHz
Tektronix 2784 Spectrum Analyzer, 100 Hz - 40 GHz
HP 7470A Plotter

4.3 Test Results

For test results refer to Appendix A for the plots 4.3.a, 4.3.b shown emission on the amplifier's output, and plots 4.3 c, 4.3.d - on the amplifier's intput.

As can be seen, there are no noticeable changes in the occupied bandwidth on the input and on the output.

The EUT passed the F1D emission mask tests.

Emission Limitations, Occupied Bandwidth Plots Description

Plot Number	Description
4.3.a	Output, TDMA signal, span 100 kHz
4.3.b	Output,TDMA signal, span 200 kHz
4.3.c	Input, TDMA signal, span 100 kHz
4.3.d	Input, TDMA signal, span 200 kHz

5.0 **Out of Band Emissions at Antenna Terminals** , FCC §2.991, §22.917 (e)

Out of Band Emissions:

The power of emissions must be attenuated below the power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least 43 + 10 log P dB.

5.1 Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The TDMA modulating signals was set up. Sufficient scans were also taken to show the out-of-band emissions if any up to 10th harmonic for 3 fundamental frequences: 869MHz, 881.5 MHz, and 894 MHz.

5.2 Test Equipment

HP 8566B Spectrum Analyzer, 100 Hz - 22 GHz
Tektronix 2784 Spectrum Analyzer, 100 Hz - 40 GHz

5.3 Test Results

See Appendix A for the plots.

Note: The second harmonic attenuation is below the specified limit, however the amplifier is to be used with a low pass filter reducing the second harmonic level.

Plots of Out-of-Band Emissions at Antenna Terminal Description

PLOT NUMBER	DESCRIPTION
5.3.a	869 MHz, Scan 1MHz - 1 GHz
5.3.b	869 MHz, Scan 1GHz - 2.5 GHz
5.3.c	869 MHz, Scan 2.5 GHz - 10 GHz
5.3.d	881.5 MHz, Scan 1MHz - 1 GHz
5.3.e	881.5 MHz, Scan 1GHz - 2.5 GHz
5.3.f	881.5 MHz, Scan 2.5 GHz - 10 GHz
5.3.g	894 MHz, Scan 1MHz - 1 GHz
5.3.h	894 MHz, Scan 1GHz - 2.5 GHz
5.3.i	894 MHz, Scan 2.5 GHz - 10 GHz

6.0 **Field Strength of Spurious Radiation**, FCC § 2.993, §15.109

6.1 Test Procedure

For radiated emission measurement below 1GHz, an antenna was connected to the transmitted output. For radiated emission measurement above 1GHz, a 50 Ohm coaxial load was connected to the transmitter output. The transmitter was placed on a wooden turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

The spurious harmonic attenuation was calculated as the difference between E in dB(uV/m) at the fundamental frequency and at the spurious emission frequency.

The Field Strength at the fundamental frequency (in dBuV/m) was calculated using the formula:

$E_{dB(uV/m)} = P_{dBm} + 10\text{Log } 30 + 10\text{Log } G - 20\text{Log } D + 90$,

where P is the output power,
G =1.64 is the gain of half-wave dipole,
D= 3 m is the distance

6.2 Test Equipment

EMCO 3115 Horn Antenna
HP 8566B Spectrum Analyzer
Tektronix 2784 Spectrum Analyzer
High Pass Filter
CDI Preamplifier P1000

6.3 Test Result

Please refer to Appendix A.

Test site: #1

Test Engineer: D. Chernomordik
Operation Mode: Transmitting at 881.5 MHz.

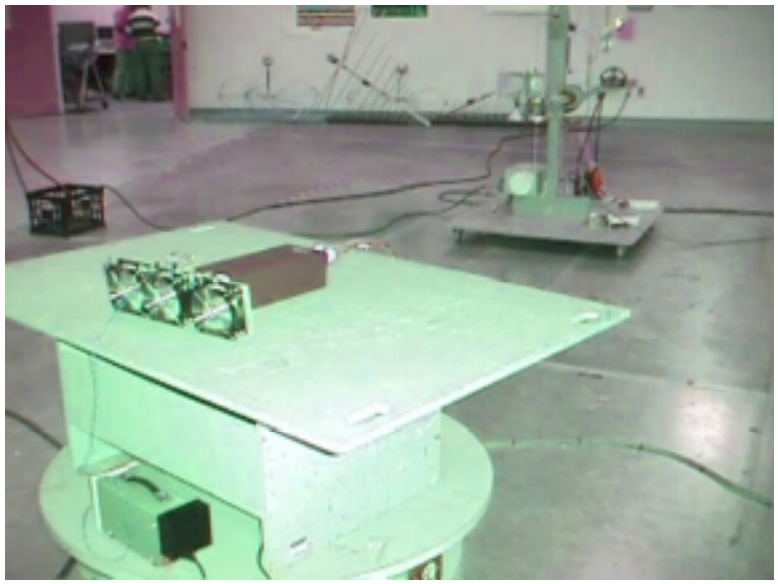
FCC Part 15.109 Radiated Emission

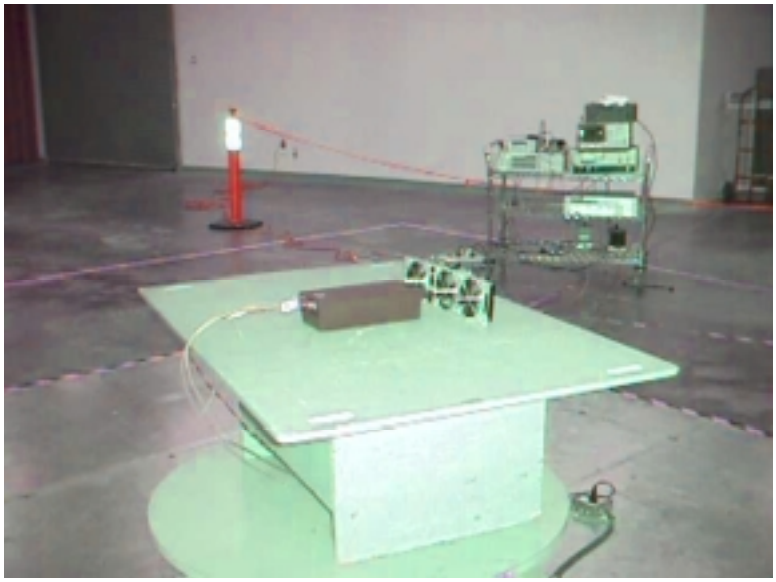
Frequency MHz	Antenna Pol.	SA Reading dB(uV)	Antenna Factor dB(1/m)	Pre-amp. Correct. dB	Cable loss dB	Field Strength dB(uV/m)	Limit dB(uV/m)	Margin dB
No emissions were detected above the noise floor, which is at least 20 dB below the limit								

Note: All measurements were made at 3 m distance.
Frequency range investigated is from 30 to 1000 MHz.

Justification: Passed

6.4 Test Configuration Setup - Radiated Emissions





7.0 **Line Conducted Emissions**, FCC § 15.107

7.1 Test Procedure

Test procedure described in the ANSI C63.4 Standard was employed.

The EUT was connected to an AC line through the LISNs.

Both HOT and NEUTRAL leads were tested.

7.2 Test Configuration Setup - Line Conducted Emissions

Not Applicable. The EUT is DC powered only.

7.3 Test Results

Not applicable, the EUT is DC powered only.

8.0 **Frequency Stability vs Temperature**, FCC § 2.995(a)

8.1 Test Procedure

The RF output of the EUT was connected to a spectrum analyzer via feedthrough attenuators. The EUT was placed inside the temperature chamber. The RF output cable exited the chamber through an opening.

After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the spectrum analyzer.

8.2 Test Equipment

Thermotron Ind. Temperature Chamber, Model S-8C
Hewlett Packard 8591E Spectrum Analyzer

8.3 Test Results

Not applicable.

9.0 **Frequency Stability vs Voltage,** FCC 2.995(d)(2)

9.1 Test Procedure

An external variable AC power source was connected to the EUT. The frequency of the transmitter was measured for 115% of the AC nominal value and for 85% of the nominal value.

9.2 Test Equipment

Hewlett Packard 8591E Spectrum Analyzer

9.3 Test Results.

Not applicable.