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APPLICATION FOR CERTIFICATION

OF

RF-215D

MICROWAVE AMPLIFIER

October 27, 1999

RF TECHNOLOGY, INC.

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RF TECHNOLOGY, INC.

INTRODUCTION

The RF-215D is a all solid-state amplifier, having an input power range of 10mW to 40mW with a saturated power output of 12 watts maximum, operating in the 1990 to 2500 MHz frequency band under parts 74, 78, 90, and 101 of the FCC Rules and Regulations. It is designed to be used with FM transmitters.

TECHNICAL DESCRIPTION

A technical description is contained in the manual.

MEASUREMENT DATA

In order to demonstrate compliance to the FCC Rules and Regulation, measurements were taken at RF Technology's facilities. The results of these measurements show that the RF-215D amplifier meets or exceeds all requirements for parts 74, 78, 90 and 101.

SPURIOUS EMISSION AT ANTENNA TERMINAL

The antenna conducted spurious emission test set-up is shown in Figure 1. The analyzer was first tuned for a reference carrier level at the fundamental operating frequency. The output spectrum was then slowly scanned from 50MHz to 26GHz. Special attention was given to those frequencies which corresponded to possible harmonics and sub-harmonics.

The FCC limit for antenna conducted spurious emission is 43+10LOG P below the main carrier. For the RF-215D with P=12W (+41dBm), this corresponds to 54dB below the main carrier, or a level of -13dBm. The second harmonic was at a level of –23dBm no other signals were noted within 20dB of the FCC limit and therefore, the amplifier meets the requirements set forth in Paragraphs 74.637, 78.103, 90.210 and 101.111.

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FIELD STRENGTH OF SPURIOUS RADIATION

Case radiated spurious emission test set-up is shown in Figure 2. Observations were made at one meter from the amplifier in all planes of polarization. The output spectrum, as received at one meter, was slowly scanned upward from 50MHz to 26GHz. Special attention was given to those frequencies which corresponded to possible harmonics and sub-harmonics.

A radiated reference level can be calculated using the formula:

$$E = \sqrt{\frac{30xGxP}{R}}$$

Where: G = Power Gain of Antenna
P = Amplifier Power in Watts
R = Distance from radiator at which field intensity is measured.

In this case: G = 1.64 (gain of dipole over isotropic)
P = 12 Watts
R = 1 meter

Therefore: $E = \sqrt{\frac{30x1.64x12}{1}} = 24.298$ V/meter = 147.7dBuV/M

The FCC requires case radiated signals to be attenuated by a factor of 43+10LOG P or 43+10log 12 = 53.8dB. Thus, 147.7dBuv/M reduced by 53.8dB = 93.9dBuv/M. No case radiated signals were detected within 20dB of the FCC limit and therefore the amplifier meets the requirements set forth in Paragraphs 74.637, 78.103, 90.210 and 101.111

OCCUPIED BANDWIDTH

To measure the occupied bandwidth, the equipment was set up as shown in Figure 1, and the transmitter was modulated by a multiburst video signal and the audio subcarrier was modulated by a 1KHz sinewave, which produced a modulated output that was then fed to the RF-215D amplifier. The output of the RF_218D amplifier was viewed on a spectrum analyzer. Since the spectrum is symmetrical, about Fo, calculations were performed on one-half of the spectrum and then doubled to find the occupied bandwidth. A reference level was set at Fo and the amplitude readings were taken every 0.5MHz from Fo to Fo+12MHz. The readings were then converted to a linear scale and the total power was then calculated using Simpson's Rules of Numerical Integration.

The total power was then multiplied by 99.5% to obtain the 0.5% power point. Calculations were then performed to find the frequency that corresponds to the 0.5% power point. From these calculations the occupied bandwidth was determined to be 15.2MHz.

RF POWER OUTPUT

The RF power output test set up is shown in Figure 3. The input power to the RF-215D amplifier was varied across its input range from 10mW to 40mW with no change in its output power of 12 watts. The DC input voltage was varied across the range of 10.6 to 18V with no change in output power.
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ENGINEERING CERTIFICATION

It is hereby certified that the Certification Tests on RF Technology's RF-215D Microwave Amplifier were made under my supervision and that all the data submitted in the attached report is true and correct to the beast of my knowledge and belief.

John Timm
Technical Sales Manager

QUALIFICATIONS

Mr. Timm has been employed by RF Technology Inc. for over 20 years. He received an A.A.S. degree from Norwalk State Technical College in 1971. He has been in the Engineering Department and has worked on the development and testing of equipment that has been submitted to the FCC for approval.

PRODUCTION
RF Technology, Inc. is planning a quantity production of the RF-215D Microwave amplifier.

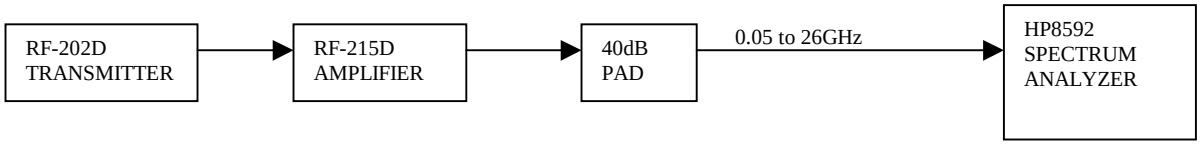

FIGURE 1 – SPURIOUS EMISSION AT ANTENNA TEST SET-UP

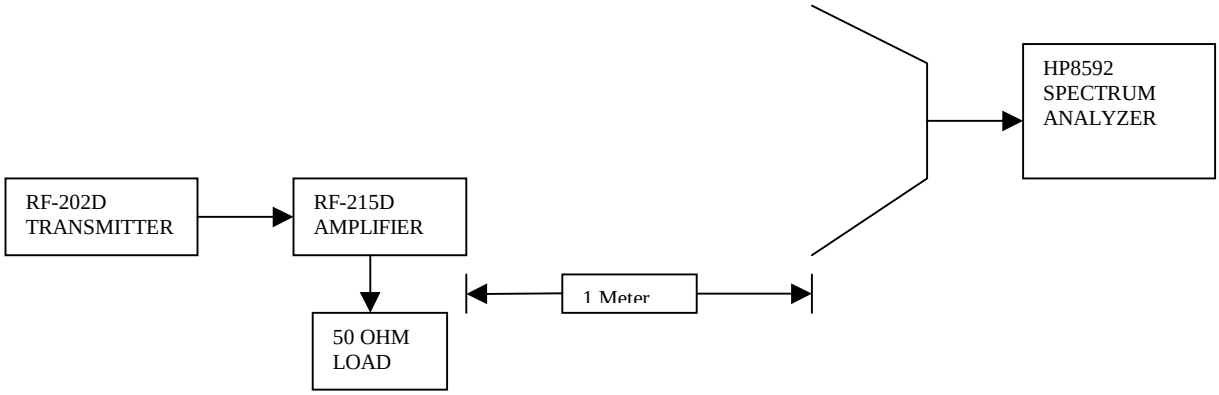

FIGURE 2 – FIELD STRENGTH OF SPURIOUS RADIATION TEST SET-UP

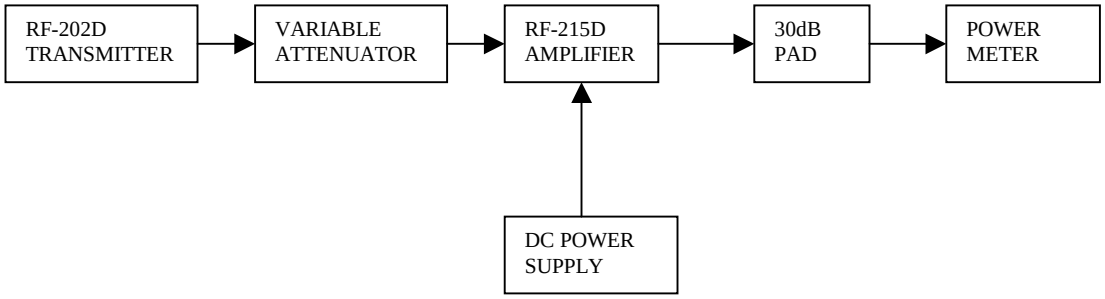

FIGURE 3 – OUTPUT POWER VERSUS DC VOLTAGE AND RF INPUT POWER TEST SET-UP

TABLE 1

The following test equipment or equal was used to perform tests.

DESCRIPTION	MANUFACTURER	MODEL
Spectrum analyzer	H.P.	8592
Power meter	Narda	447A
Thermistor mount	H.P.	8478B
Voltmeter	Fluke	8050A
Antenna	AEL	APN-101B
Antenna	Electro-Metrics	TDA-25
Antenna	Electro-Metrics	TDS-25
Antenna	Waveline	799
Antenna	AEL	H-1459
Power supply	Power Designs	3650-S