Application for Certification
For an RF Power Amplifier

TPL Communications
3370 San Fernando Road, Suite 206
Los Angeles, CA 90065

RF Power Amplifier:

Part # PA3-1EE-TMS

FCC ID: BBD3-1EE

REPORT # RV38004I

This report was prepared in accordance with the requirements of the FCC Rules and Regulations Part 2, Subpart J, 2.1031 through 2.1057, and Part 90 and other applicable sections of the rules as indicated herein.

Prepared By:

C. L. Payne III

DNB Engineering, Inc.
5969 Robinson Avenue
Riverside, Ca 92503-8620

29 July 2003

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1.0 ADMINISTRATIVE DATA

1.1 Certifications and Qualifications

I certify that DNB Engineering, Inc conducted the tests performed in order to obtain the technical data presented in this application. Also, based on the results of the enclosed data, I have concluded that the equipment tested meets or exceeds the requirements of the Rules and Regulations governing this application.

1.2 Measurement Repeatability Information

The test data presented in this report has been acquired using the guidelines set forth in FCC Part 2.1031 through 2.1057, and Part 90. The test results presented in this document are valid only for the equipment identified herein under the test conditions described. Repeatability of these test results will only be achieved with identical measurement conditions. These conditions include: The same test distance, EUT Height, Measurement Site Characteristics, and the same EUT System Components. The system must have the same Interconnecting Cables arranged in identical placement to that in the test set-up, with the system and/or EUT functioning in the identical mode of operation (i.e. software and so on) as on the date of the test. Any deviation from the test conditions and the environment on the date of the test may result in measurement repeatability difficulties.
All changes made to the EUT during the course of testing as identified in this test report must be incorporated into the EUT or identical models to ensure compliance with the FCC regulations.

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2.1033 (C) (1) Application for Certification

Name of Applicant:		TPL Communications 3370 San Fernando Road, Suite 206 Los Angeles, Ca 90065
FRN:		0008271447
Applicant is:	X	Manufacturer Vendor Licensee Prospective Licensee Other
Name of Manufacturer		TPL Communications
Description:		RF Power Amplifier
Part Number:		PA3-1EE-TMS
Anticipated Production Quantity:		Multiple Units
Applicable FCC Parts:		90
FCC ID No:		BBD3-1EE
FCC Emissions Designator:		F3E
Frequency Range:		136 – 174 MHz
Rated Output Power:		150W

2.1033 (C) (2) FCC Identifier

FCC ID: BBD3-1EE

2.1033 (C) 3) Installation and Operating Instructions

Reference attached manual

2.1033 (C) (4) Type of Emission

N/A (FM Modulation)

Emission Designator: F3E

2.1033 (C) (5) Frequency Range

136-174MHz (Factory set for 160MHz)

2.1033 (C) (6) Operating Power

150 Watts

2.1033 (C) (7) Maximum Power Allowed in Applicable Part(s) of the Rules

RULES PART	MAXIMUM POWER (WATTS)
Part 90.205(q)	180

2.1033 (C) (8) Final RF Amplifier Input Power Characteristics

Reference attached manual

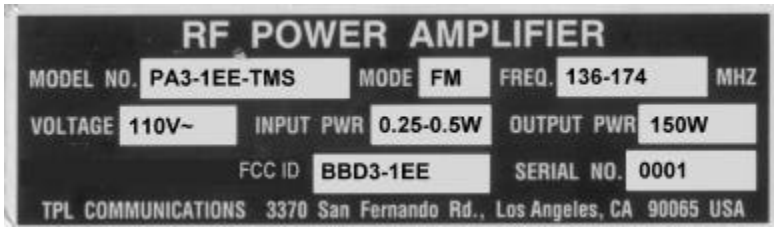
2.1033 (C) (9) Tune Up Procedure

Reference attached manual

2.1033 (C) (10) Schematic Diagram and Circuit Description

Reference attached manual

2.1033 (C) (11) Equipment Identification Plate



NOTES:
Label will be constructed of 0.02 inch aluminum as shown on the equipment with permanent adhesive.

All information on the label will be etched or stamped. Both methods will exceed the expected lifetime of the equipment.

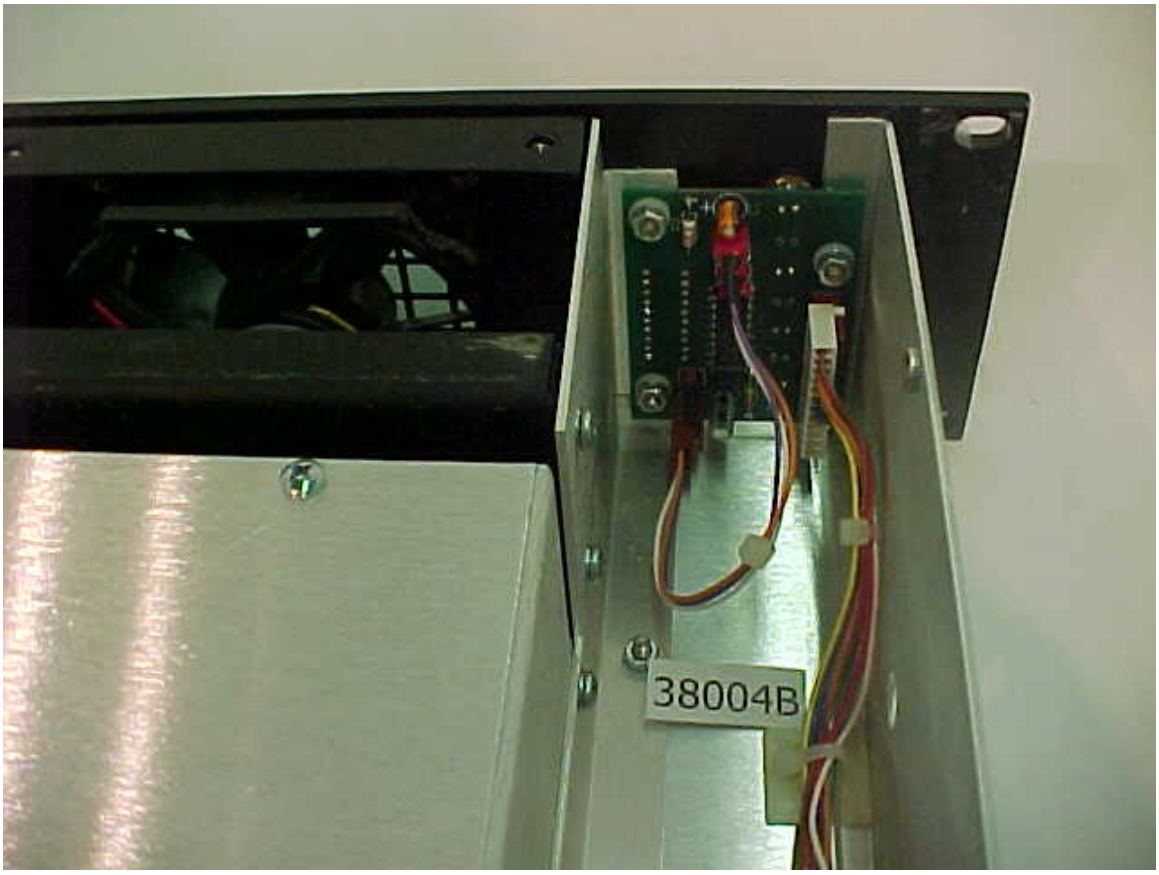
The label will be large enough to allow all information to be legible.

2.1033 (C) (12) Equipment Photographs - Internal

Photo 1 Detail View – Internal

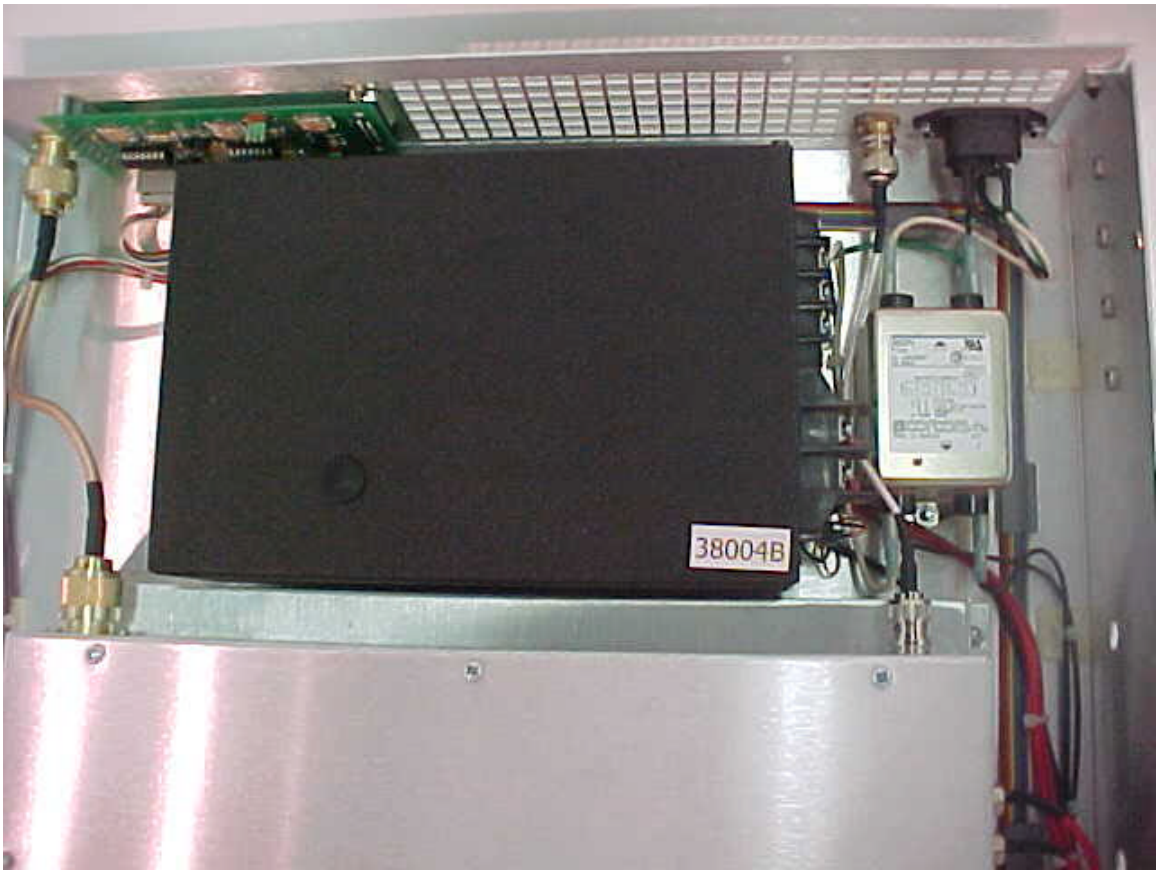
2.1033 (C) (12) Equipment Photographs - Internal

Photo 2 Detail View – Internal



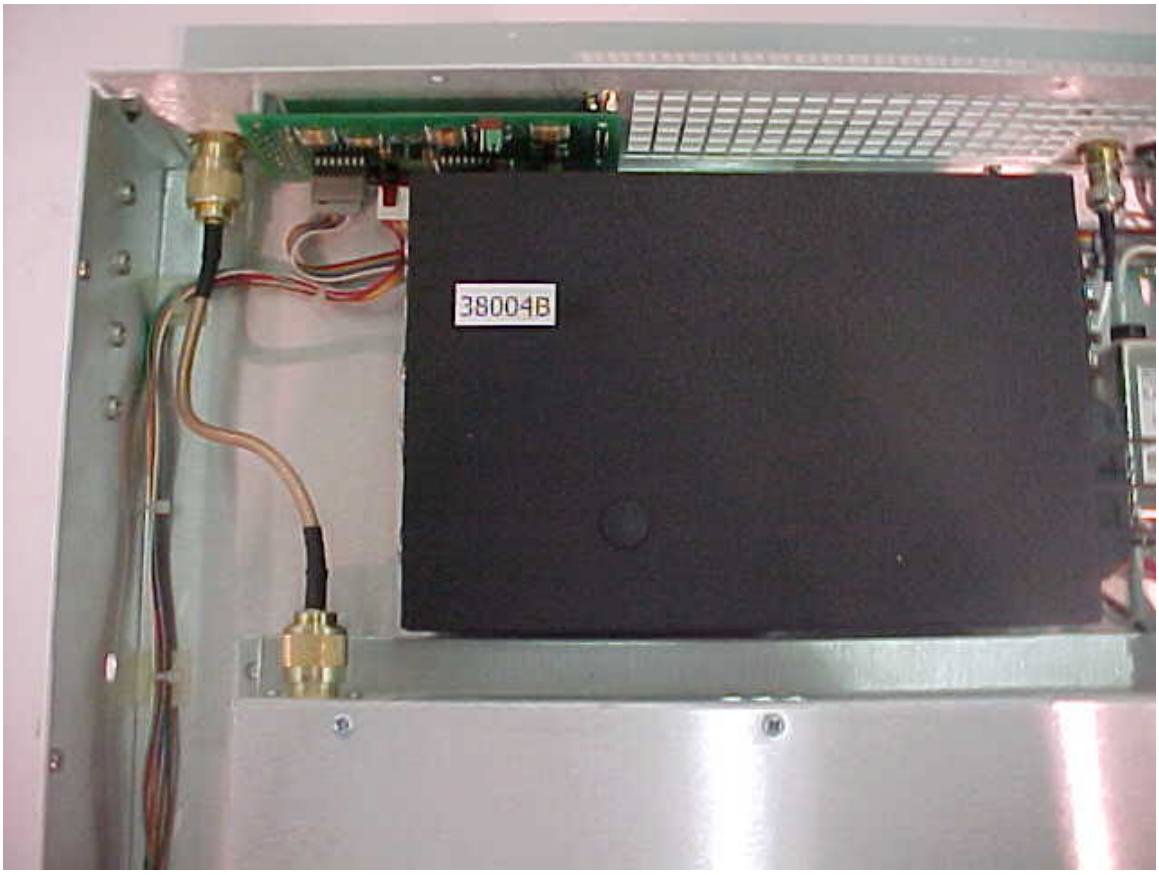
2.1033 (C) (12) Equipment Photographs - Internal

Photo 3 Detail View – Internal



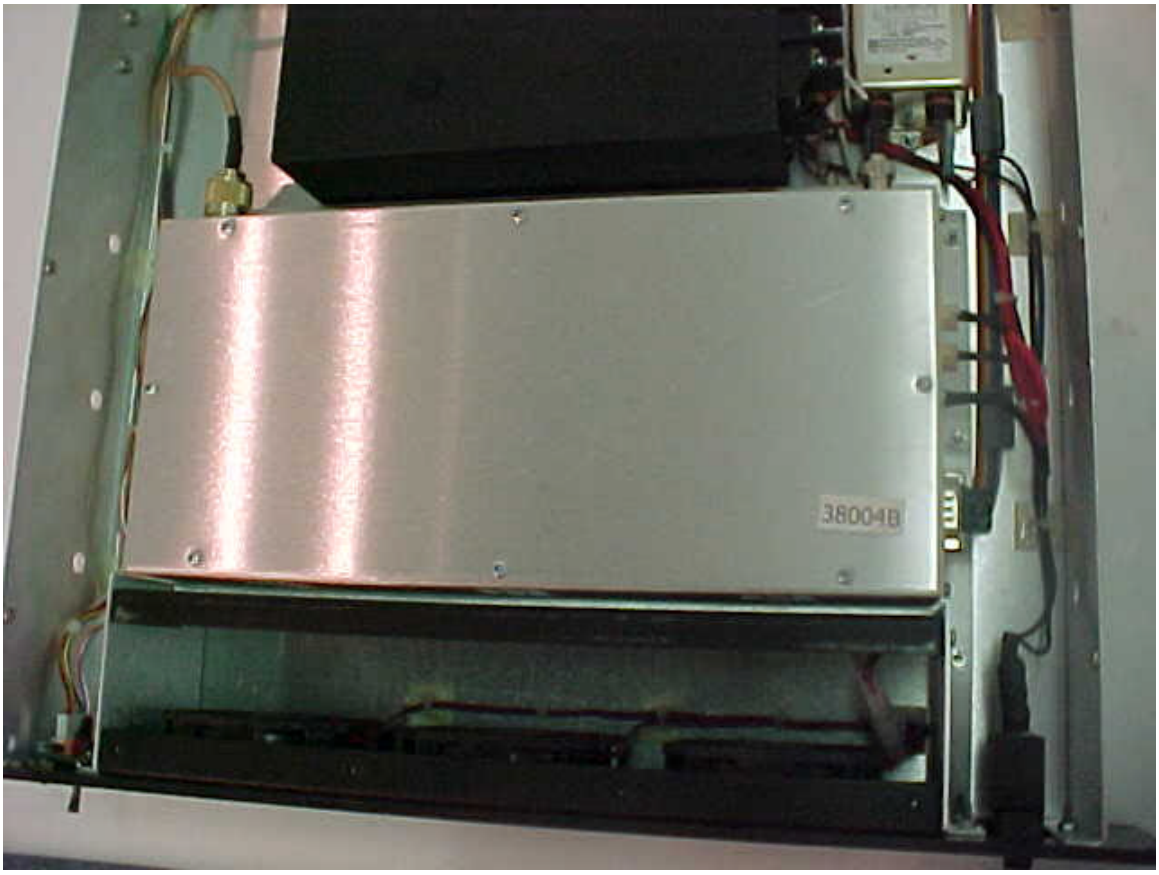
2.1033 (C) (12) Equipment Photographs - Internal

Photo 4 Detail View – Internal



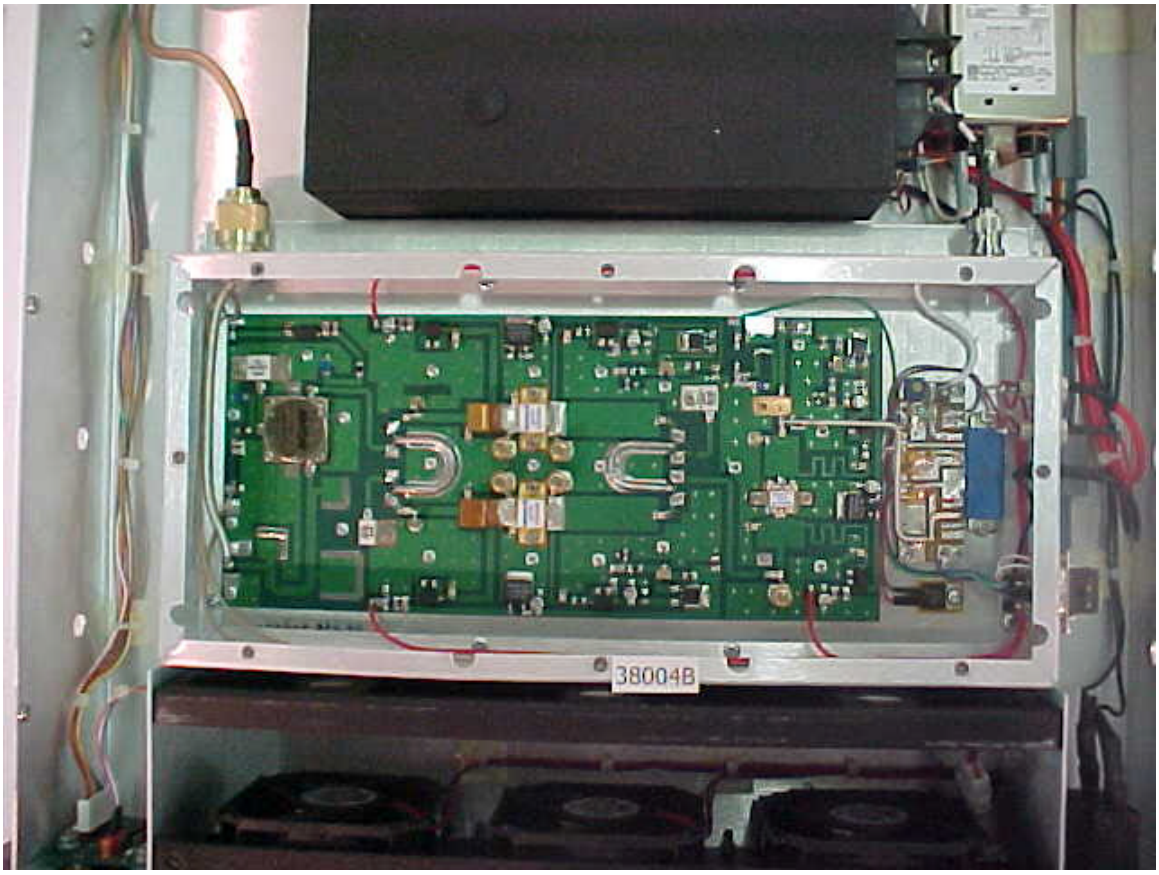
2.1033 (C) (12) Equipment Photographs - Internal

Photo 5 Detail View – Internal



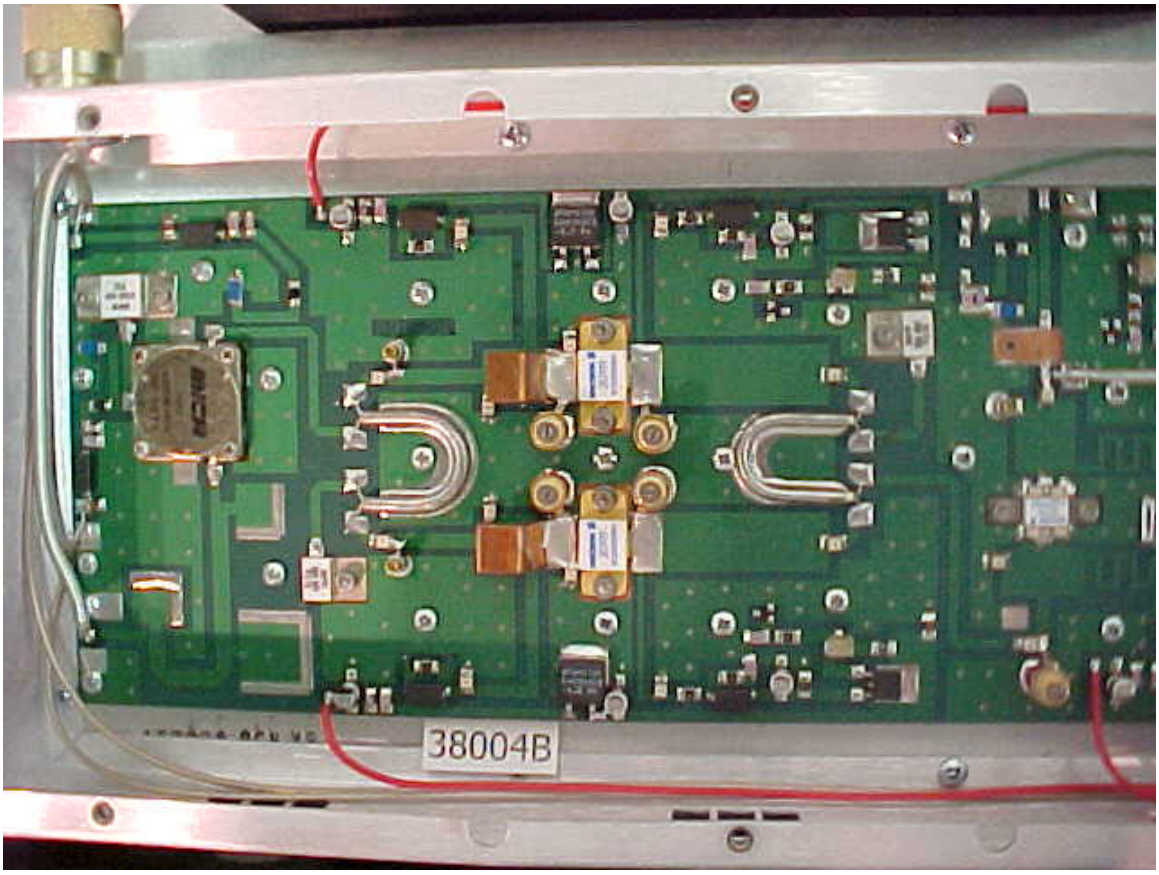
2.1033 (C) (12) Equipment Photographs - Internal

Photo 6 Detail View – Internal



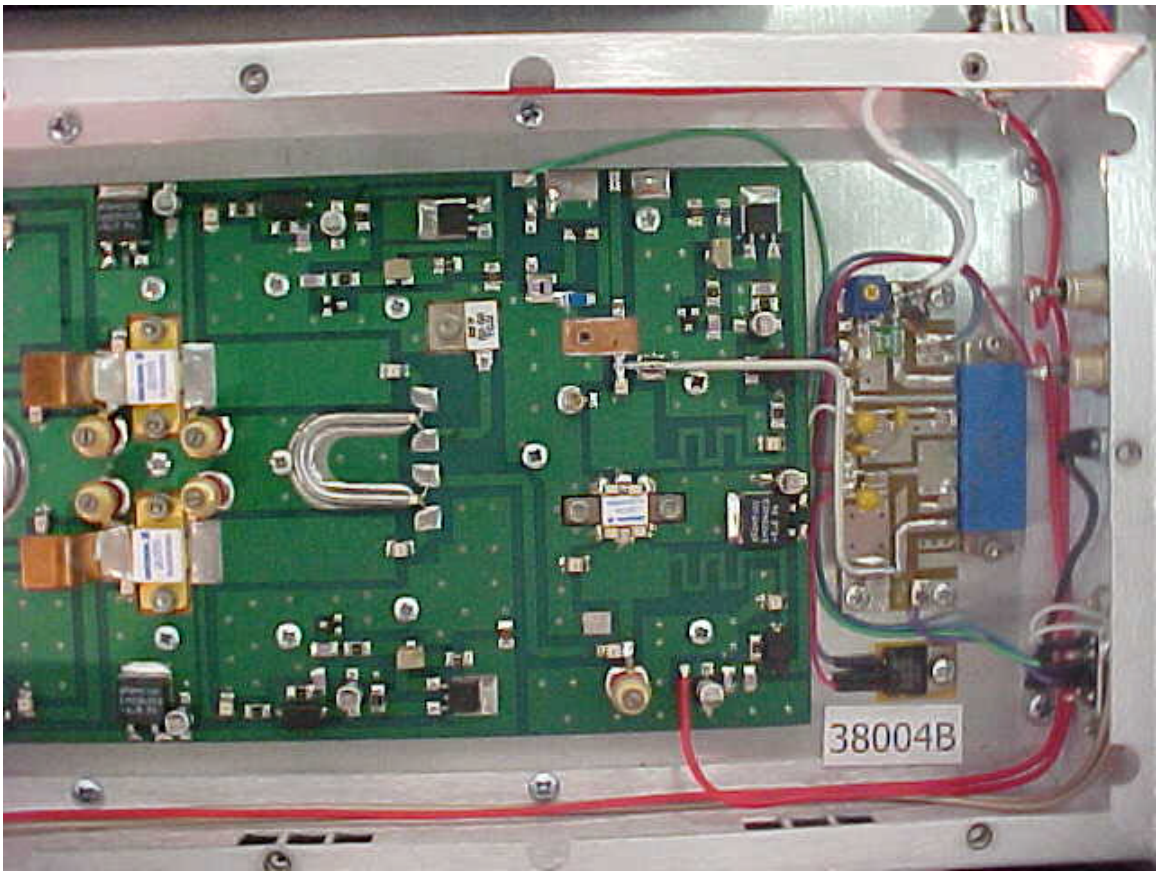
2.1033 (C) (12) Equipment Photographs - Internal

Photo 7 Detail View – Internal



2.1033 (C) (12) Equipment Photographs - Internal

Photo 8 Detail View – Internal



2.1033 (C) (12) Equipment Photographs - External

Photo 9 Detail View – External – Front

2.1033 (C) (12) Equipment Photographs - External

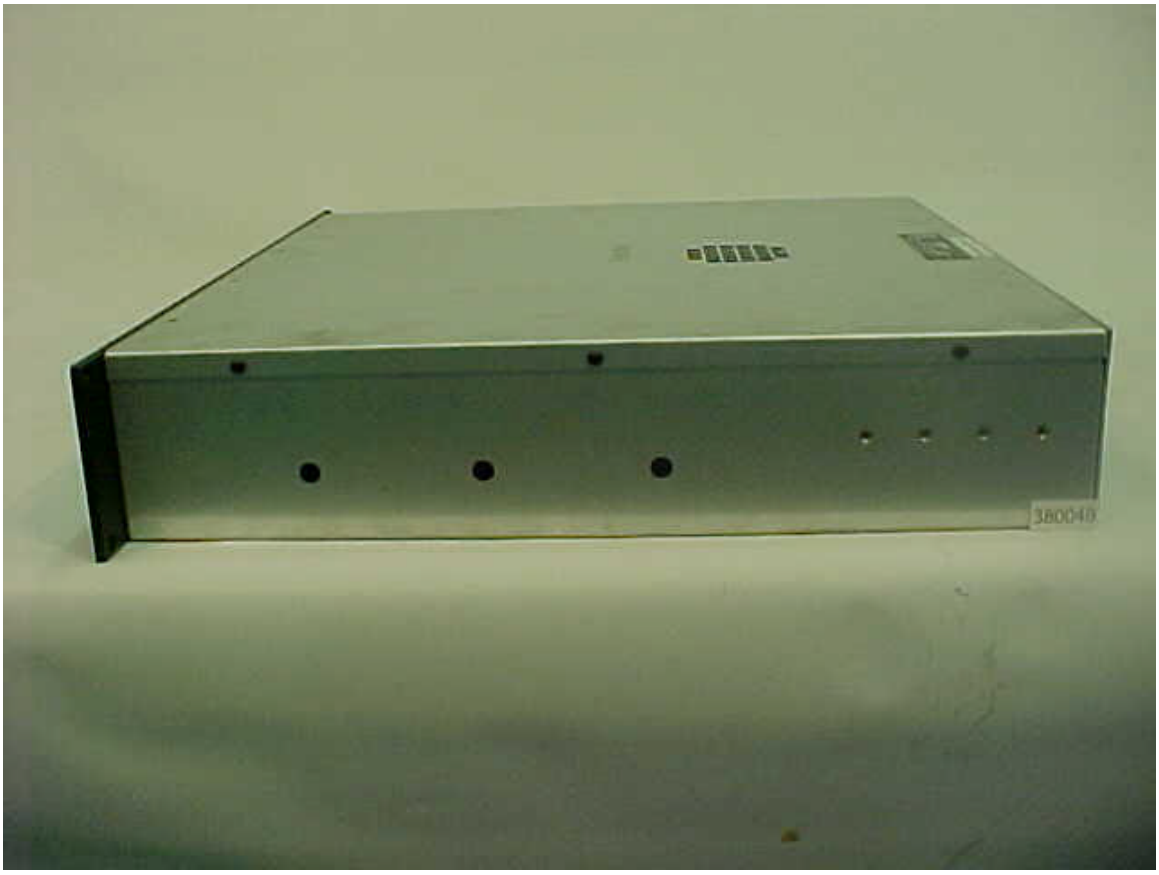
Photo 10 Detail View – External – Left Side

2.1033 (C) (12) Equipment Photographs - External

Photo 11 Detail View – External - Rear

2.1033 (C) (12) Equipment Photographs - External

Photo 12 Detail View – External – Right Side

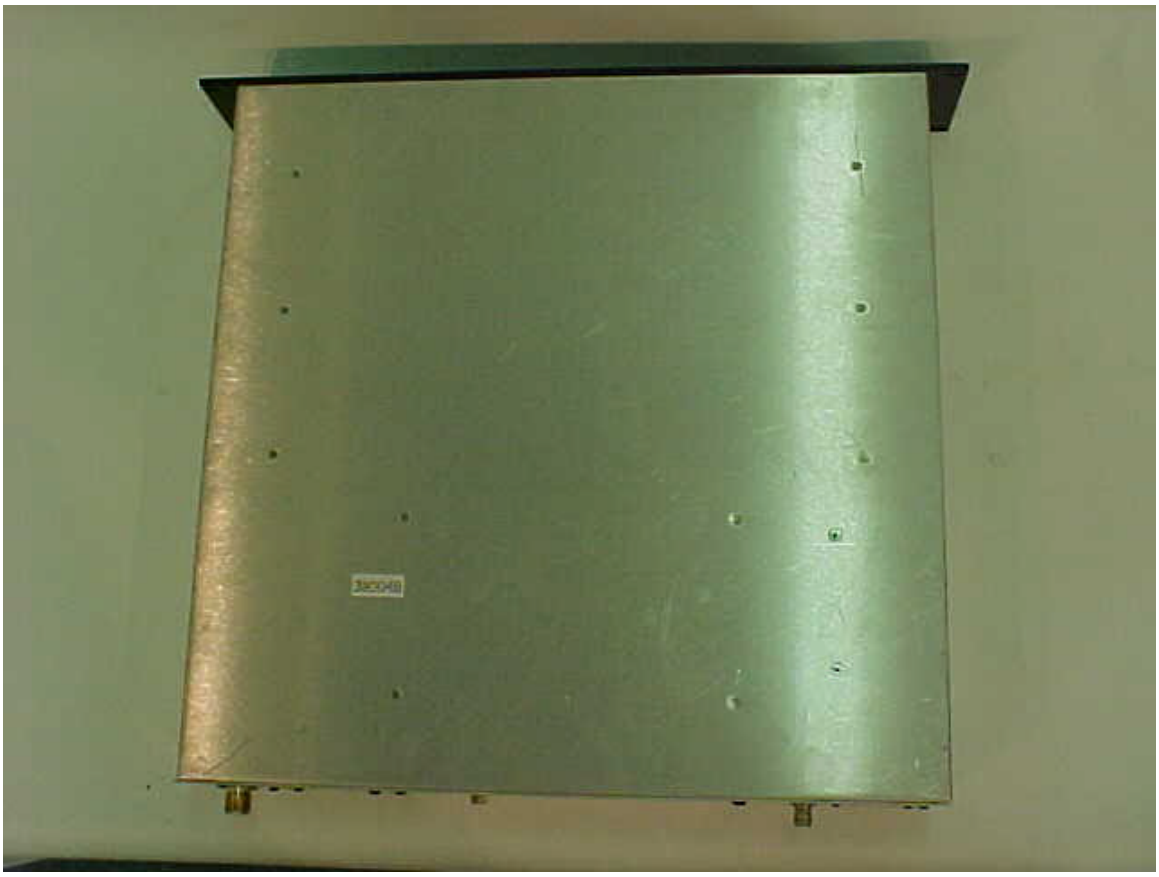


2.1033 (C) (12) Equipment Photographs - External

Photo 13 Detail View – External - Top

2.1033 (C) (12) Equipment Photographs - External

Photo 14 Detail View – External - Bottom



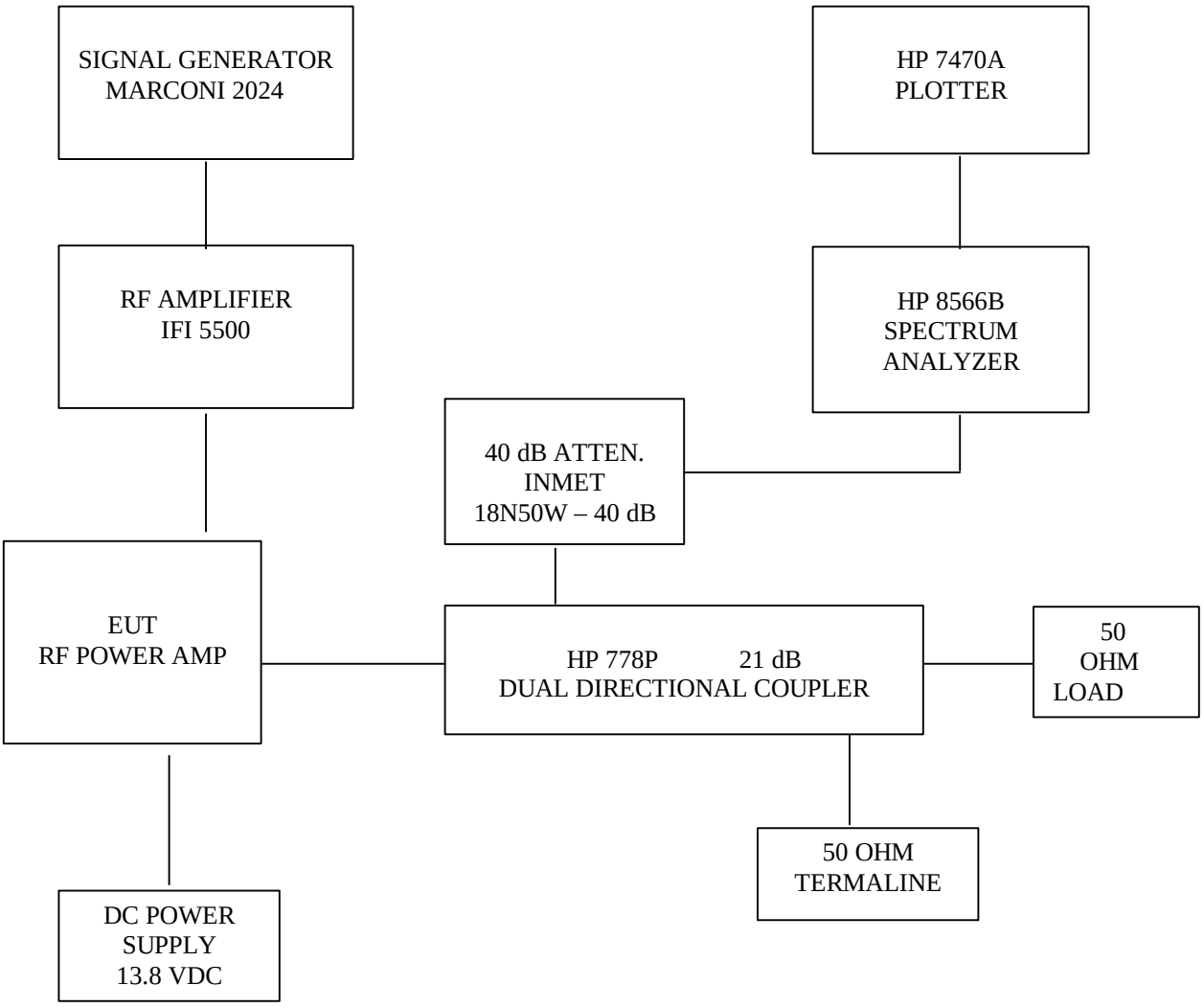
2.1033 (C) (13) Digital Modulation Techniques

Not Applicable

2.1033 (c) (14) Test Data

Refer to 2.1046 through 2.1057

2.1033 (c) (14) FIGURE 1: Block Diagram



2.1033 (c) (14) Photograph of Test Set Up

2.1046 Measurement of RF Power Output

Definition: For RF Amplifiers.

Test Method: See FIGURE 1.

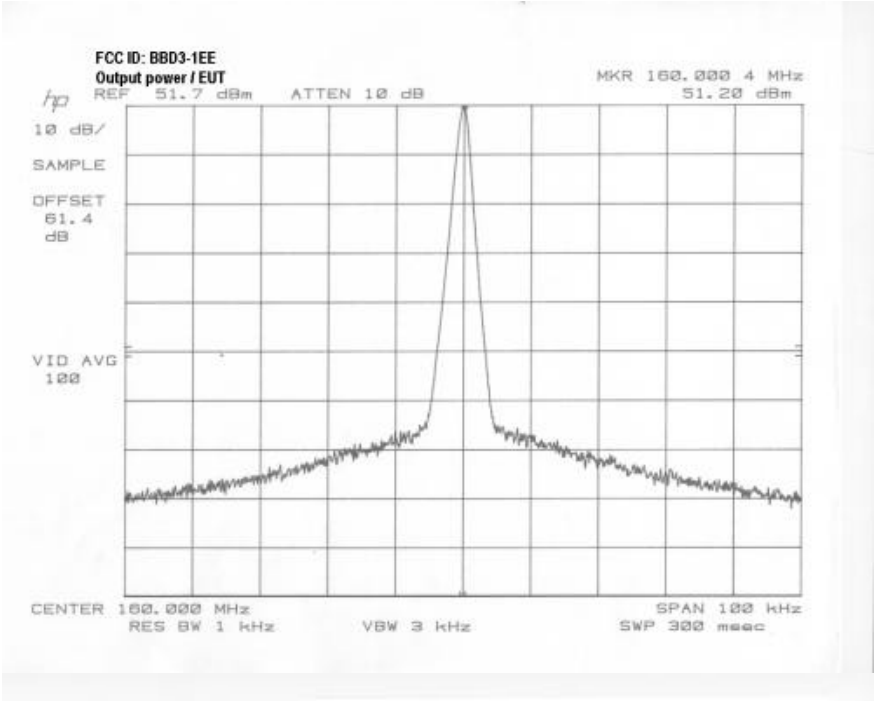
Output Power is measured across a precision 50 ohm load with a Spectrum Analyzer. For the power measurement, CW (no modulation) is used.

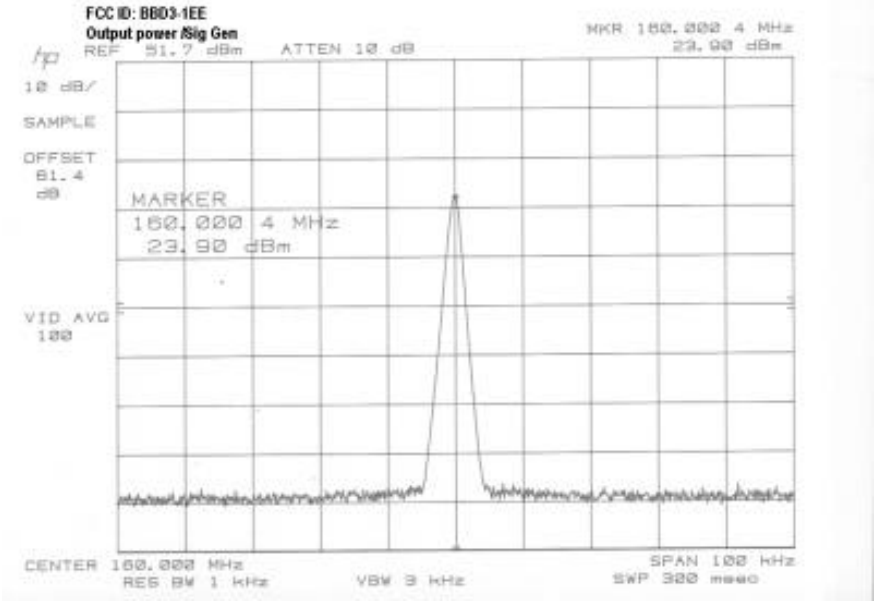
Test Results:

POWER OUTPUT MEASURED AT NOMINAL VOLTAGE WAS:

Frequency (MHz)	Power (dBm)	Power (W)
160	51.2	132.00

	5969 Robinson Avenue Riverside, CA 92503 (909) 637-2630 FAX (909) 637-2704	**Output Power**	
DNB Job Number:	38004	Date: 28 aug 2002	**Conformance Standards** [X] FCC Part 15 [X] FCC Part 90
Customer:	TPL Communications		
Model Number:	PA3-1EE-TMS	Serial Number: 1000	
Description:	RF Amplifier		





2.1049 Measurement of Occupied Bandwidth

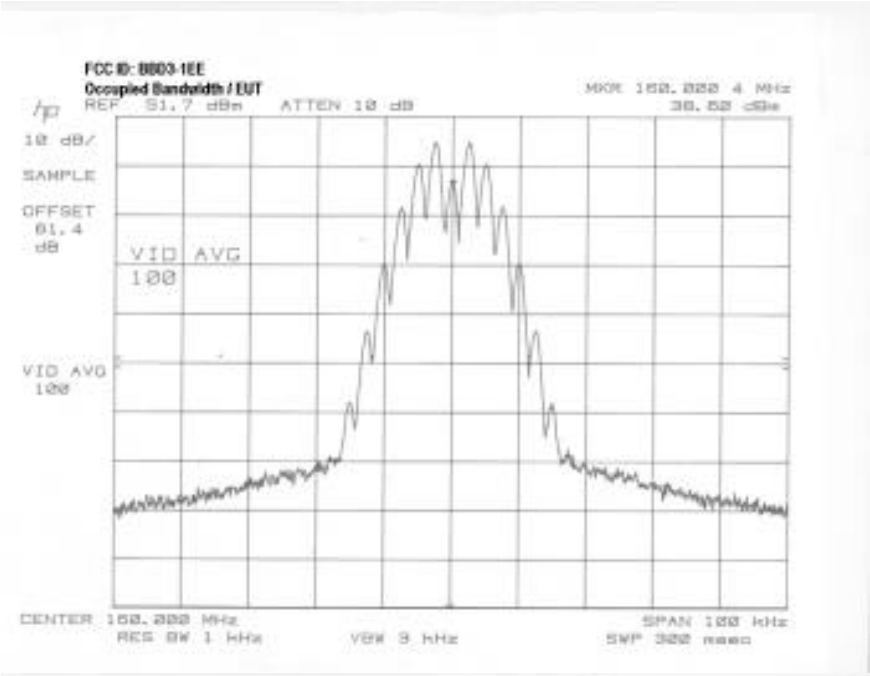
Definition:
Occupied Bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are equal to 0.5 percent of the total mean power radiated by a given emission.

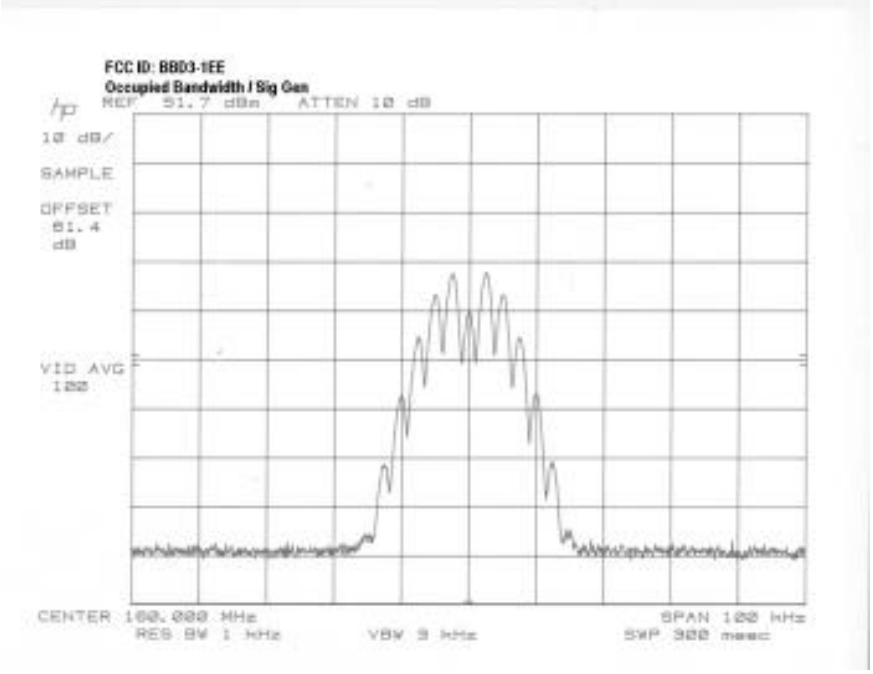
Test Method: Connect the Equipment per FIGURE 1.
Measurements were made while modulation the driving source with a FM signal.

Test Results: See Plots

The center frequency of the signal did not shift with modulation. The Spectrum Bandwidth was well within the limits specified in the FCC Regulations.

	5969 Robinson Avenue Riverside, CA 92503 (909) 637-2630 FAX (909) 637-2704	**Occupied Bandwidth**	
DNB Job Number:	38004	Date: 28 Aug 2002	**Conformance Standards** [X] FCC Part 15 [X] FCC Part 90
Customer:	TPL Communications		
Model Number:	PA3-1EE-TMS	Serial Number: 1000	
Description:	RF Amplifier		





2.1051 Spurious Emissions at Antenna Terminals

Definition:
Conducted Spurious Emissions are emissions at the antenna terminals on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communication desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted.

Conducted Spurious Emissions shall be attenuated below the maximum level of the carrier frequency in accordance with the following formula:

Spurious attenuation in dB = $43 + 10 \log_{10} Po$

Where Po = Output in Watts (CW)

$= 43 + 10 \log_{10} (100)$

$= 63.0$ dB

Test Method: Per EIA RS 152-B, Paragraph 4 as modified below.

Connect the equipment as shown in FIGURE 1.

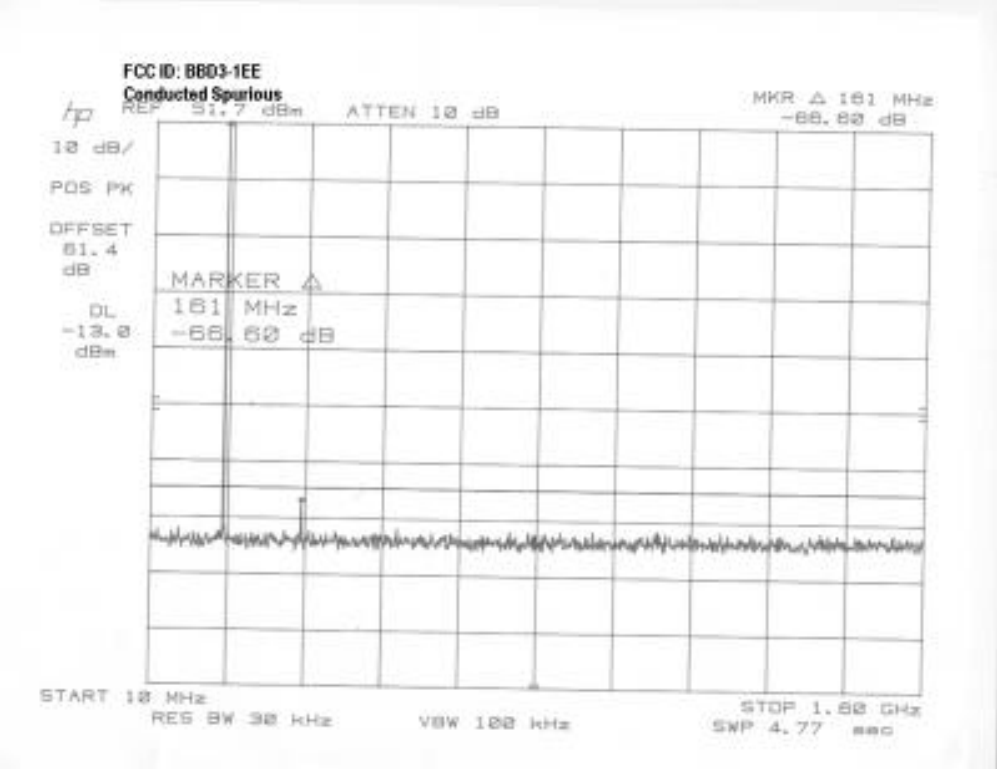
Adjust the drive source to produce FM modulation. Adjust the Spectrum Analyzer to display the Modulated Carrier.

Scan the frequency spectrum from the lowest radio frequency generated in the equipment through the 10^{th} harmonic of the carrier frequency.

Test Results: See Plots

All spurious emissions at the antenna terminals are below the FCC specifications

	5969 Robinson Avenue Riverside, CA 92503 (909) 637-2630 FAX (909) 637-2704	**Antenna Conducted Spurious**	
DNB Job Number:	38004	Date: 28 Aug 2002	**Conformance Standards** [X] FCC Part 15 [X] FCC Part 90
Customer:	TPL Communications		
Model Number:	PA3-1EE-TMS	Serial Number: 1000	
Description:	RF Amplifier		



2.1053 Field Strength of Spurious Radiation

Definition:
Emissions from the equipment when connected into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communication desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted.

Test Method: Per TIA /EIA 603.

Connect the equipment and follow the procedure described in paragraph 2.2.1.1 and paragraph 5.0. Measure the amplitude of each spurious radiated signal through the 10^{th} harmonic. The spurious signals are then measured on the 3 meter range. First the EUT is measured using a tuned reference dipole below 1GHz and a double ridge guide Horn antenna above 1GHz. If the DRG antenna is used the appropriate gain factor for the antenna is subtracted from the final measurement. Then a dipole to dipole (or drg to drg) measurement is conducted to determine the actual power at each harmonic being generated by the EUT. If no noticeable emission can be observed the ground floor is recorded in the data sheets.

Test Results: All readings were at the spectrum analyzer ground floor above the fundamental.

All radiated spurious emissions are below the FCC Specifications.

	5969 Robinson Avenue Riverside, CA 92503 (909) 637-2630 FAX (909) 637-2704	**Radiated Spurious**	
DNB Job Number:	38004	Date: 29 May 2002	**Conformance Standards** [X] FCC Part 15 [X] FCC Part 90
Customer:	TPL Communications		
Model Number:	PA3-1EE-TMS	Serial Number: 1000	
Description:	RF Amplifier		

Fundamental Freq In MHz	Rated Output Power In Watts	Channel Spacing In kHz	Modulation
160	150	12.5 , 25	FM

						Limit (dBm)	
Freq (MHz)	Antenna	Horn Gain	Meter	Power	Corrected	12.5kHz BW	25.0kHz BW
320	Dipole - Hz	N/A	-34.3	-26.8	-26.8	-13	-20
480	Dipole - Hz	N/A	-49.3	-41.4	-41.4	-13	-20
640	Dipole – Hz	N/A	-54.6	-53.2	-53.2	-13	-20
800	Dipole – Hz	N/A	-59.4	-53.6	-53.6	-13	-20
960	Dipole – Hz	N/A	-58.7	-55.0	-55.0	-13	-20
1120	Horn – Hz	6.3	-61.4	-65.0*	-71.3	-13	-20
1280	Horn - Hz	7.1	-62.8	-64.7*	-71.8	-13	-20
1440	Horn - Vt	7.8	-61.8	-64.9*	-72.7	-13	-20
1600	Horn - Hz	7.9	-60.3	-65.1*	-73.0	-13	-20

* = Ground floor

2.1055 Measurement of Frequency Stability

The EUT is a power amplifier and contains no circuitry for generating or stabilizing the RF signal. The driver will be responsible for this task.

2.1057 Frequency Spectrum to be Investigated

The Frequency was searched from the lowest radio frequency generated in the equipment through the 10^{th} harmonic of the carrier frequency.

RF Exposure

The information contained in "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65; August 1997 is applicable when a radiating antenna is connected to this amplifier. Paging stations that utilize this amplifier authorized under Part 22 (Subpart E) and Part 90 are subject to routine environmental evaluation for RF exposure if an antenna is located on a rooftop and if its ERP exceeds 1000 watts.

This product is certified to meet the RF exposure guidelines of OET-65 as a stand-alone RF power amplifier. The RF spurious emissions recorded when the antenna output connector is terminated into a non-radiating 50 ohm load do not exceed the 27.5 V/m limit specified for General Population/Uncontrolled Exposure in OET Bulletin 65.

Test Equipment Log

Item No:	Description	Manufacturer	M/N	S/N	Calibration Due Date	Test Equip Used On
1	Push/Pull Scale	Imada	MF	70403	5/30/03	
2	Power Analyzer	Voltech	PM3000A	1273	5/7/03	Harm / Flick
3	Digital MultiMeter	Chief Engineer	104	31220125	8/26/03	
4	Digital MultiMeter	Amprobe	AM-1250	330224	10/24/03	
5	LCR Meter	B & K Precision	878	23702237	10/24/03	
6	Digital MultiMeter	Amprobe	AM-1250	330139	8/6/03	
7	Dial Caliper	General MG	MG 6"	958	12/2/03	
8	Micrometer	General MG	1050C	959	12/2/03	
9	Impact Hammer	E.D. & D.	F22-50	9606235-3	11/6/03	
10	Process Meter	Newport	INFCP-210	4381880	4/5/03	
11	Process Meter	Newport	INFCP-210	6150730	4/5/03	
12	Oscilloscope	Tektronix	464	B133241	9/16/03	
13	Line Leakage Tester	Associated Research	510L	A130511	4/19/03	
14	Safety Compl Analyzer	Associated Research	7564SA	A100601	4/19/03	
15	AC/DC Current Probe	Amprobe	CT600	30301828	4/9/03	
16	Data Acquisition Unit	Hewlett Packard	34970A	US37017024	4/29/03	
17	Data Acquisition Unit	Hewlett Packard	34970A	US37016877	5/21/03	
18	Input Multiplexer	Hewlett Packard	34901A	US37017773	5/21/03	
19	Input Multiplexer	Hewlett Packard	34901A	US37017729	5/21/03	
20	Input Multiplexer	Hewlett Packard	34901A	US37019488	5/4/03	
21	Weather Station	Davis	7400	PC70804A01	1/29/03	All Tests
22	Safety Analyzer	Dynatech Nevada	431A	431A-1230	4/12/03	
23	SA - RF Section	Hewlett Packard	85680B	2330A02791	8/27/03	CE / RE / CS
24	SA - Display Section	Hewlett Packard	85662A	2318A05282	8/27/03	CE / RE / CS
25	RF Preselector	Hewlett Packard	85685A	2724A00659	8/26/03	CE / RE / CS
26	QP Adapter	Hewlett Packard	85650A	2811A01240	8/27/03	CE / RE / CS
27	SA - RF Section	Hewlett Packard	85680B	2049A01403	6/14/03	CE / RE / CS
28	SA - Display Section	Hewlett Packard	85662A	2112A02234	6/14/03	CE / RE / CS
29	QP Adapter	Hewlett Packard	85650A	2043A00184	6/14/03	CE / RE / CS
30	ESD Power Supply/Gun	Haefely	PSD 25 B	083 427-05	3/29/03	ESD
31	ESD Simulator	Haefely	PESD3000	H002033	6/13/03	ESD
32	Signal Source 9Khz-2Ghz	Marconi	2024	112231/034	2/2/03	RS / CS
33	Scale 300lb Capacity	Hanson	8930	1403	6/3/03	
34	Scale 25lb Capacity	Hanson	40	1402	4/26/03	
35	Precision Torque Gauge	SeeKonik	SL-12	967	7/9/03	
36	Precision Torque Wrench	Husky	39104	4980656019	7/18/03	
37	Step Attenuator 120dB	Hewlett Packard	355D	2522A43896	10/25/03	As Req'd
38	Step Attenuator 12dB	Hewlett Packard	355C	2524A42578	10/25/03	As Req'd
39	Oscilloscope	LeCroy	9400	85584	2/26/03	Surg / EFT/ ESD
40	Pressure Gauge	Ashcroft	0-30 PSI	1500	9/13/03	
41	Pressure Gauge	Ashcroft	0-30 PSI	1501	9/13/03	
42	Pressure Gauge	Ashcroft	0-30 PSI	1502	9/13/03	
43	Artificial Mains Network	Schwarzbeck	NNLA 8120	8120288	6/13/03	CE / CS
44	A.C. Leakage Current Tstr	Simpson	229-2	948	10/28/03	
45	Leakage Current tester	Simpson	228	709721	10/28/03	
46	Insulation Tester	Amprobe	AMB-1A	340055	10/28/03	
47	Hypot Tester	Beckman	P-2B	64999	10/29/03	
48	Ground Continuity Tester	Rod-I	M25	12485	10/29/03	
49	Digital MultiMeter	Di-log	DL-297T	23702237	11/13/03	
50	Probe	Omega	HX94V		4/5/03	
51	L I S N	ComPower Corp	L1-300	1331	5/13/03	CE / CS
52	L I S N	ComPower Corp	L1-300	1373	5/13/03	CE / CS

** When necessary, equivalent calibrated equipment may be substituted for the equipment listed here.*