DOC-CR-84-046

(1)

REPORT ON EVALUATION OF A 14 GHz POWER AMPLIFIER USED IN THE SPARCOM 101C TELEPHONY TERMINAL

DOC ORDER NO. 388821

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Prepared for: Department of Communications

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1. BACKGROUND

During the period between June 1982 and December 1983, the Communications Systems Division (CSD) of Spar Aerospace Limited was involved in field trials of the prototype of a 14/12 GHz Low Cost Telephony Terminal. This terminal was developed with financial and technical support from DOC/CRC as detailed in the final report, #DOC-CR-SP-83-010, of this three phase program. CSD purchased a 14 GHz solid state power amplifier for use in the terminal prototype. DOC/CRC requested that an evaluation in the actual terminal be made of a similar amplifier (CRC Asset Number 83592) which was developed for DOC under contract SN15SV.36100-9-0934 by MA Electronics of Mississauga. The details of this evaluation are noted in the following pages.

2. POWER AMPLIFIER BENCH TESTS

The amplifier, MA Electronics Limited, Model MC2024, Ser. 001, was bench tested for gain and intermodulation parameters. The swept response display photographs and the intermodulation test set up are shown in Figures 1a and 1b respectively. Figure 2 shows the plot of power out vs power in for a single carrier and for 3 carriers. The 3rd order intermodulation levels observed are also shown.

3. FIELD TEST OBSERVATIONS

After the amplifier was tested thoroughly in a bench set-up as detailed in Section 2, it was installed in the Outdoor Unit of the CSD telephony terminal. This took place in the summer of 1982. Since that time repeated tests and demonstrations have been carried out from this terminal through the Anik B satellite to 3m or 9m CRC terminals. The amplifier has performed reliably and as specified from locations in Montreal, Ottawa and Calgary. The environmental conditions which were varied, with the outdoor unit containing the amplifier being exposed to an air ambient temperature range of +30°C to -20°C and to rain, ice and snow. Artificial heating is not provided in this enclosure.

4. CONCLUSION

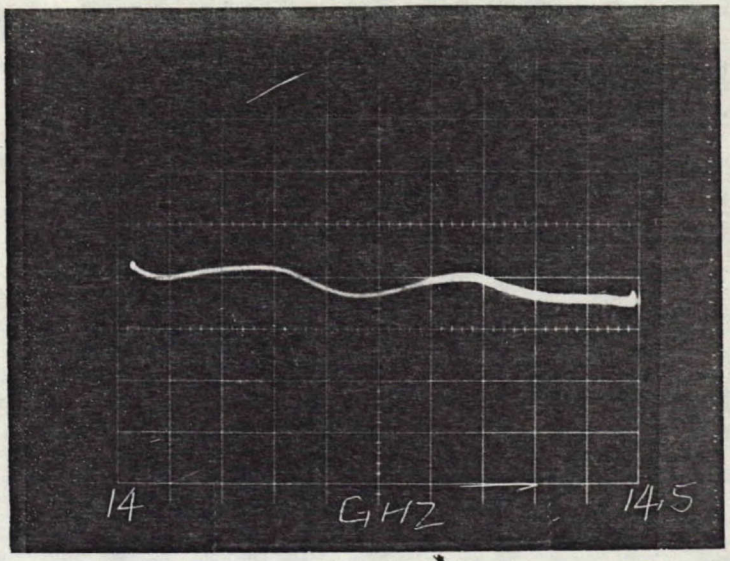
The power amplifier unit under evaluation performed satisfactorily under bench test and in actual operating conditions in the field.

As a result of this contract Spar Aerospace Limited has been able to increase their knowledge of, and familiarity with, this design of a 14 GHz solid state amplifier. The opportunity to evaluate a second model which was similar to the unit which Spar purchased was extremely important.

This evaluation period has proven the domestic availability of this component which is vital to the Sparcom 101C terminal product.

SWEEPGEN RESPONSE

14 - 14.5 GHz, 0.6dB/cm



P.A. RESPONSE

14 - 14.5 GHz, 0.6dB/cm

CURVE	INPUT LEVEL
Top	- 10 dBm
Middle	- 13 dBm
Bottom	- 16 dBm

(Scope expansion was adjusted for each curve)

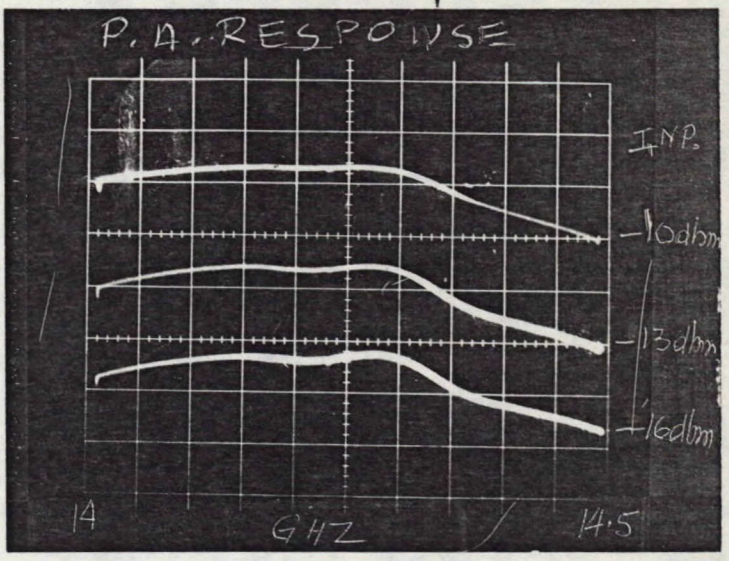


Figure 1a: Power Amplifier Swept Response

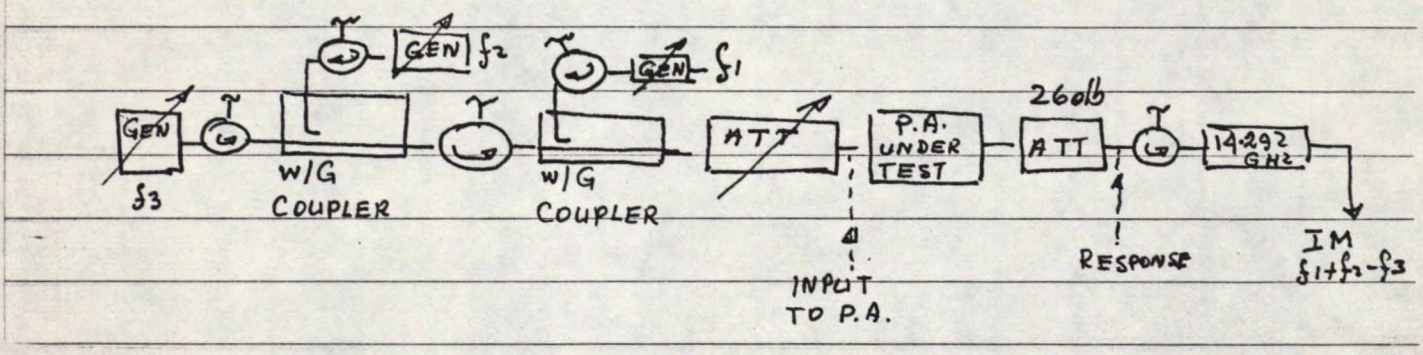


Figure 1b: Intermodulation Test Set-Ups

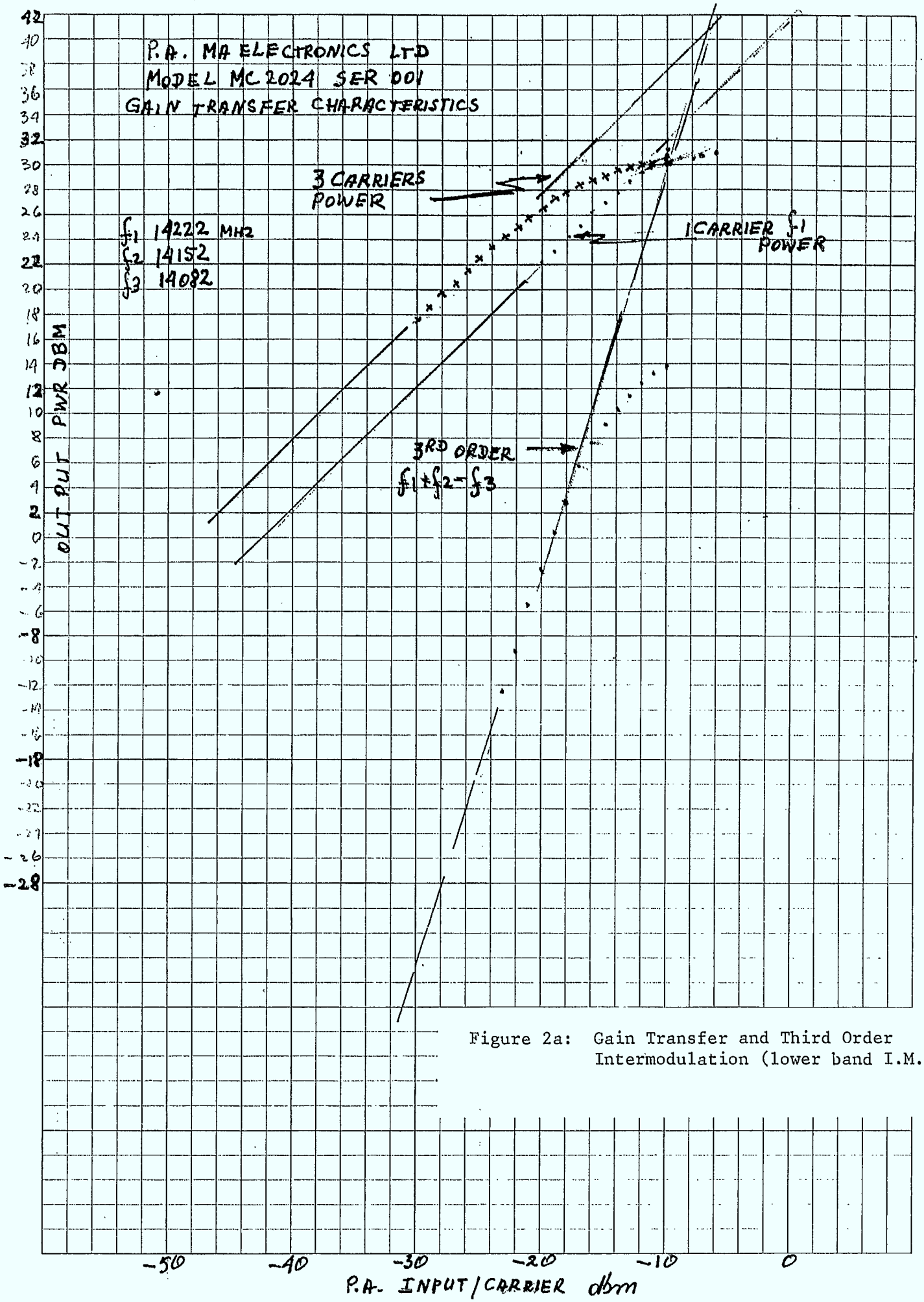


Figure 2a: Gain Transfer and Third Order Intermodulation (lower band I.M.)

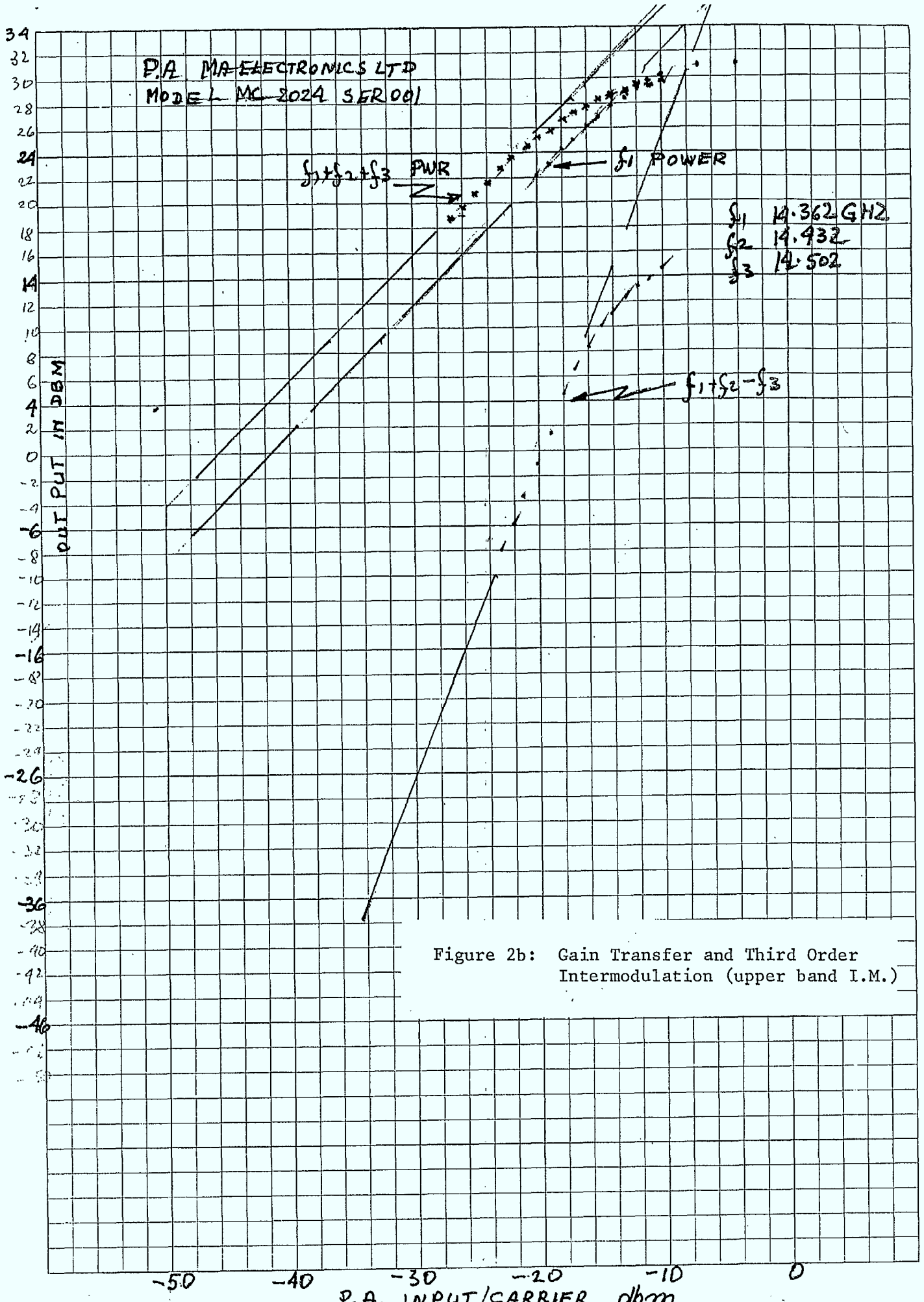


Figure 2b: Gain Transfer and Third Order Intermodulation (upper band I.M.)

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