SGS-THOMSON MICROELECTRONICS

DEMOBOARD

TEA5702 DEMOBOARD USER'S INSTRUCTION AND CHARACTERISTICS

SUMMARY **Page**

I - INTRODUCTION

The demoboard is intended to provide the user with an example of application of the SGS-THOMSON head amplifier TEA5702.

Although the demoboard is just an example, a lot of care have been taken in making the layout of the printed copper board, and in the component dimensioning.

To better understand the operation of the TEA5702, the user can refer to the relevant SGS-THOMSON's application note : "VCR Record and Playback Head Amplifiers" (AN445).

Remark : The typical application diagrams given in this document are updated versions of the typical application diagrams given in the application note.

II - DEMOBOARD ELECTRICAL DIAGRAM

The demonstration board has been mounted according to the typical application diagram given in Figure 2.

Compared with the simplest application diagram , the potentiometers V_{R1} and V_{R2} have been added in the record signals input section in order to allow the user to adjust the input level at his convenience.

III. OPTIONS GIVEN BY THE LAYOUT OF THE PRINTED CIRCUIT BOARD (PCB)(Figure3)

The layout of the PCB has been designed in order to give to the user the opportunity to evaluate the integrated circuit TEA5702 in configurations different from the typical application diagram.

The layout of the PCB allows the following options :

- Addition of capacitors in the playback preamplifier section for adjusting the peaking effect in the frequency response (C16, C17).
- Implementation of an FM equalizing circuit at the luma output (R6, C9, L3, Q1, R7).
- To filter the control signals(C10).
  This filtering is not mandatory, however some users use it to prevent the application from parasitics induced in the control wires.
- To use only one supply line for both playback and record modes .
  In this option the V_{REC} line is provided from the V_{CC} line through a switching circuit made by : Q2, Q3, R10, R11, R12, R13. The record mode is controlled by a signal provided at Pin Pb/REC of connector J2 (Figure 1) (L1 is naturally removed).

The electrical diagram in Figure 3 gives an example in which all the options given by the PCB layout have been used.

Figure 1

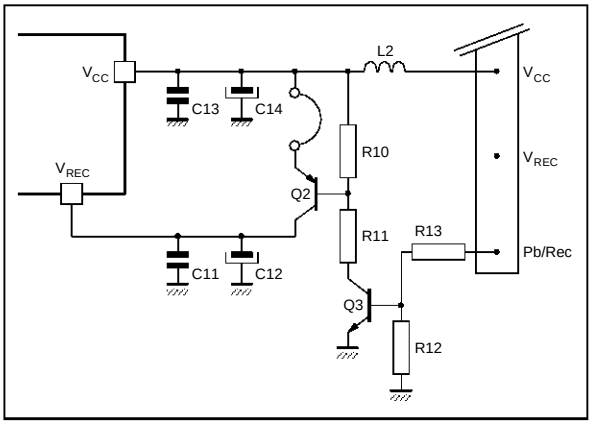


Figure 2 : Electrical Diagram of the Demonstration Board

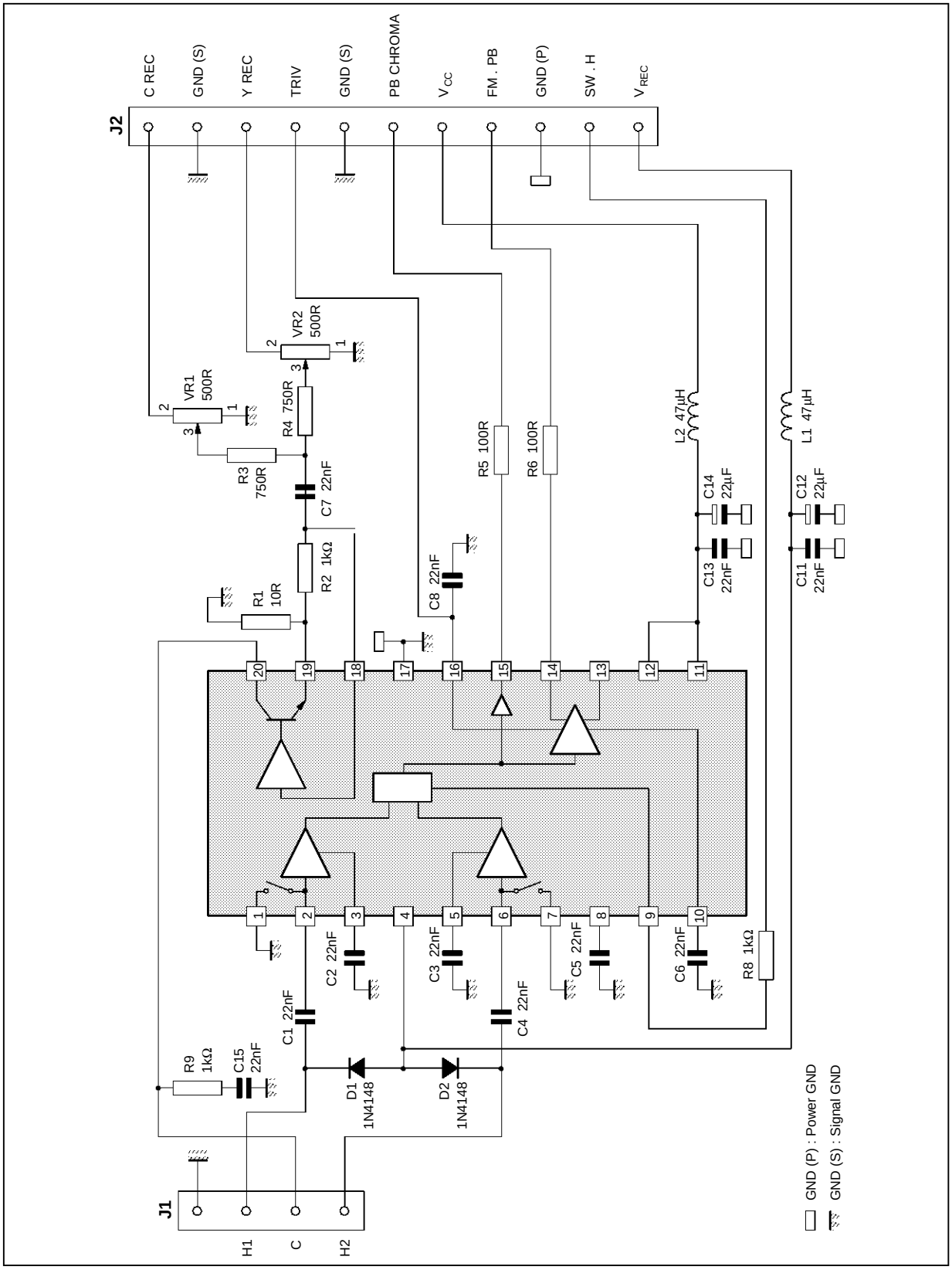
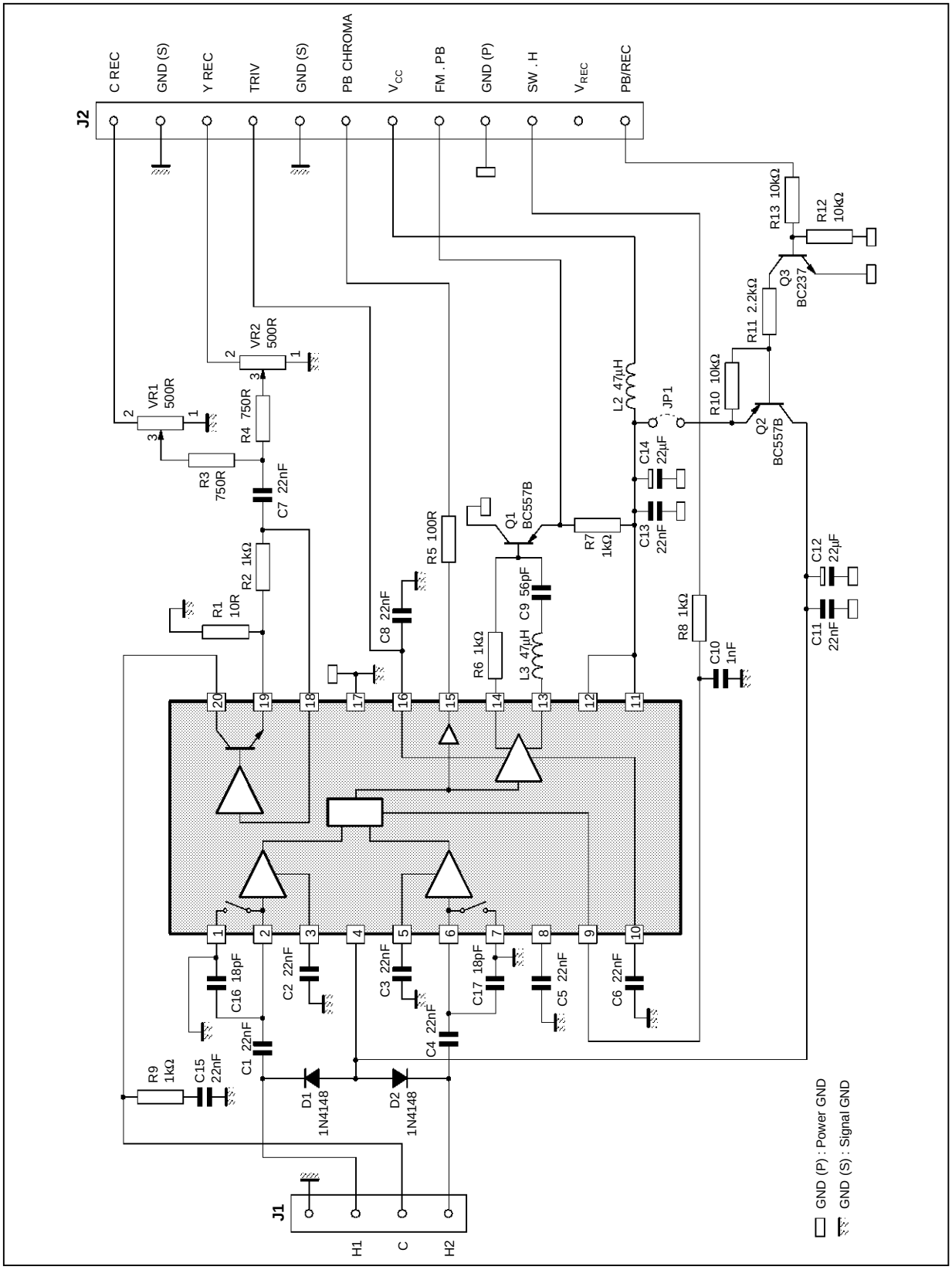
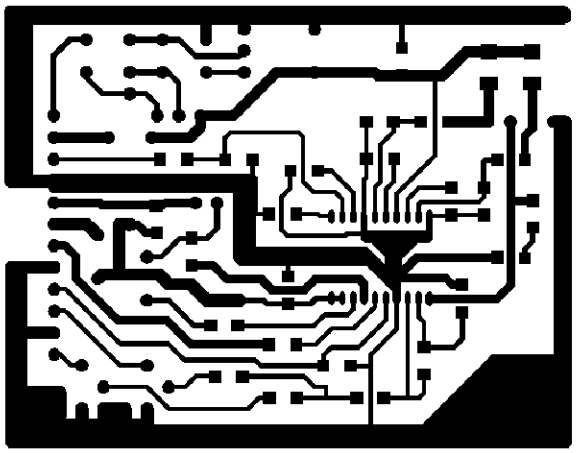


Figure 3 : Example of an Application which uses all the options of the PCB Layout



IV.1 - Printed Circuit Board Layout

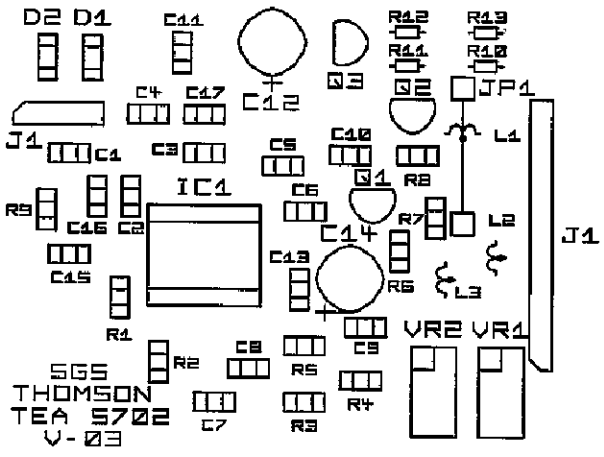
Figure 4



AN639-04.IMG

IV.2 - Silkscreen Printing

Figure 5



AN639-05.IMG

V - MEASUREMENTS RESULTS

In order to characterize the integrated circuit and the application, the following measurements have been given :

a. Playback Mode

- luma output bandwidth
- chroma output bandwidth
- chroma output harmonic 2, f_{IN} = 3.8MHz
- luma output harmonic 2, f_{IN} = 3.8MHz
- crosstalk between channels
- equivalent input voltage and current noise

b. Record Mode

- bandwidth for 10 and 60mAp-pk output current
- harmonic 2 for I_{REC} = 10mA and 60mAp-pk
- harmonic 2 and bandwidth versus V_{REC} value
- intermodulation

Remarks :

1. The measurements have been made with an application board corresponding with the electrical diagram given in Figure 2.
2. Regarding the load used in playback mode. Z : 470Ω//47pF has been choosen in order to give results in a case close to the application.
3. Most of the measurements have been made with a spectrum analyser : HP4195A equiped with active probes HP41800A.

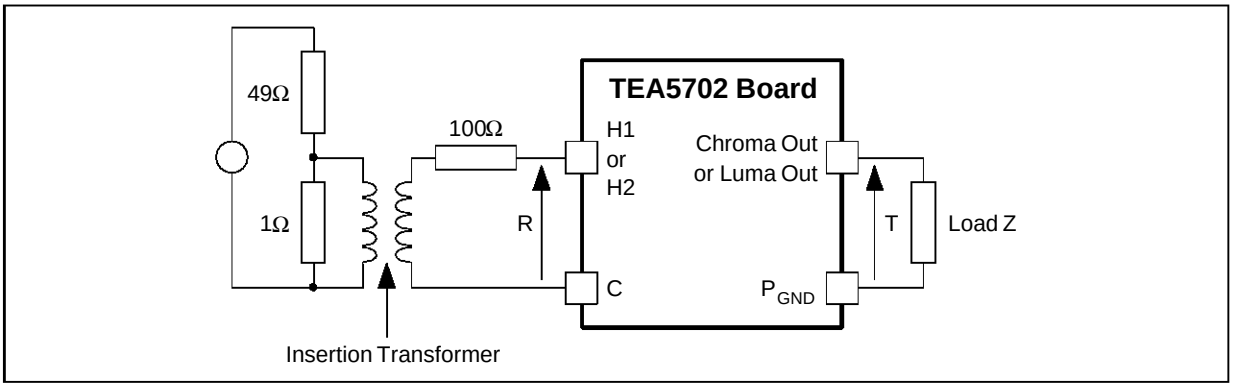
V.1 - TEA5702 Playback Mode

LUMA/CHROMA OUTPUTS BANDWIDTH AND HARMONIC 2 MEASURING METHOD

See Figure 6

- Bandwitdth : For chroma output the bandwidth is measured for V_{OUT} = 400mVp-pk (f_{REF} = 600kHz) For luma output the bandwidth is measured for V_{IN} = 200µVp-pk (f_{REF} = 3.8MHz)
- Harmonic 2 : Harmonic 2 is measured with V_{IN} = 400µVp-pk

Figure 6



LUMA OUTPUT BANDWIDTH (Z = 470Ω//47pF)

Figure 7 : H1

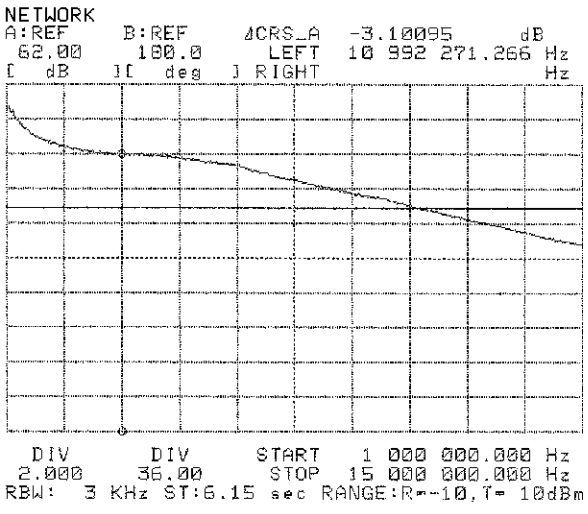
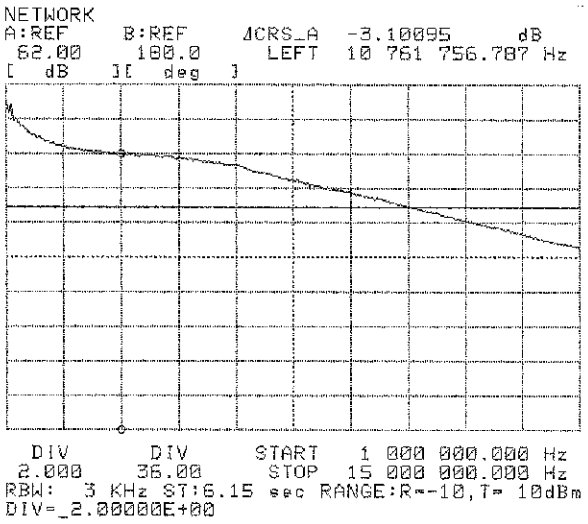


Figure 8 : H2



CHROMA OUTPUT BANDWIDTH (Z = 470Ω//47pF)

Figure 9 : H1

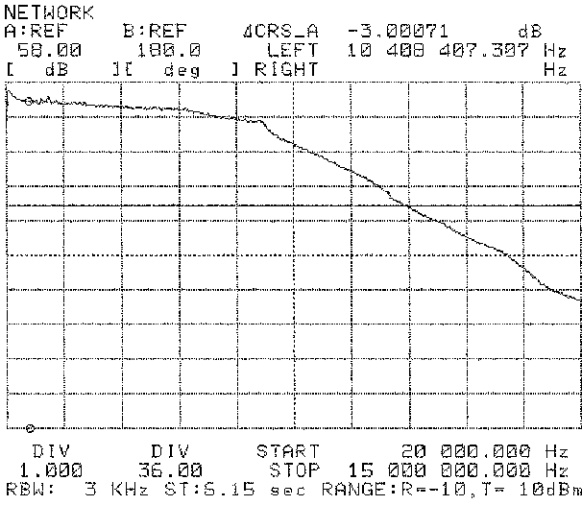
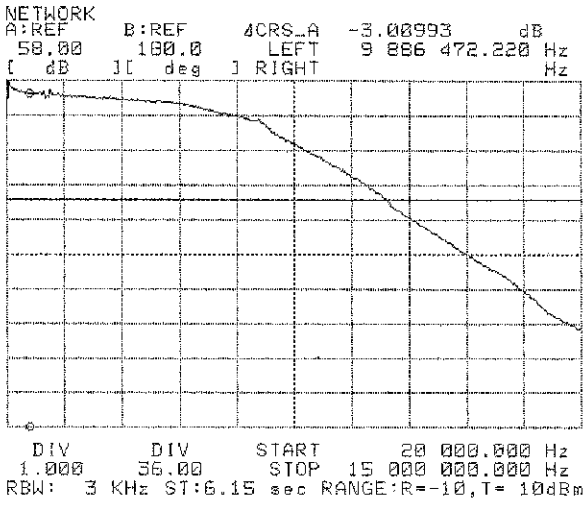


Figure 10 : H2



HARMONIC 2 / CHROMA OUTPUT (f_{IN} = 3.8MHz, Z = 470Ω//100pF)

Figure 11 : H1

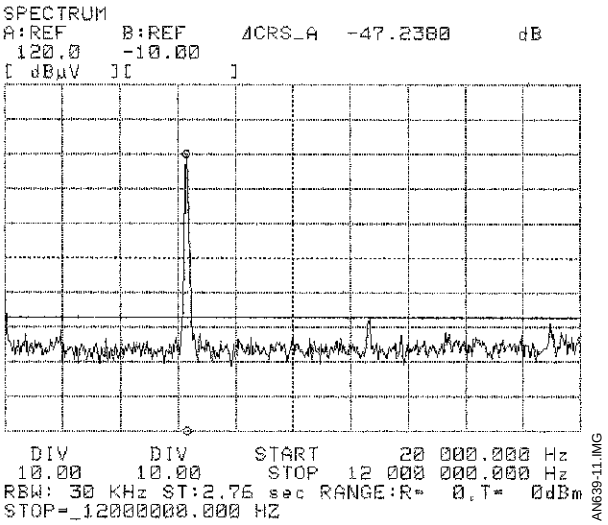
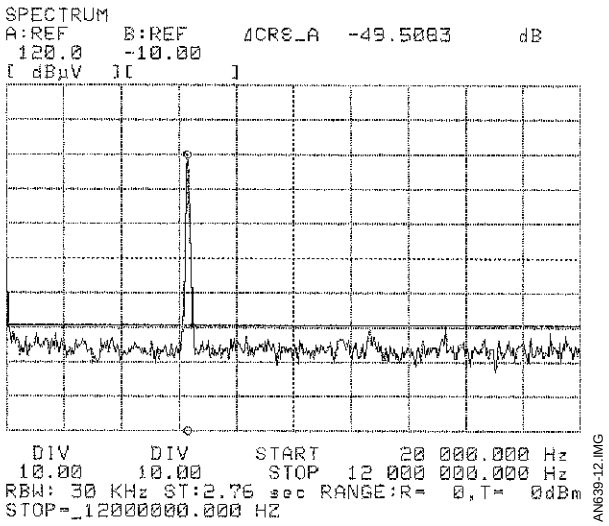


Figure 12 : H2



HARMONIC 2 / LUMA OUTPUT (f_{IN} = 3.8MHz, Z = 470Ω//100pF)

Figure 13 : H1

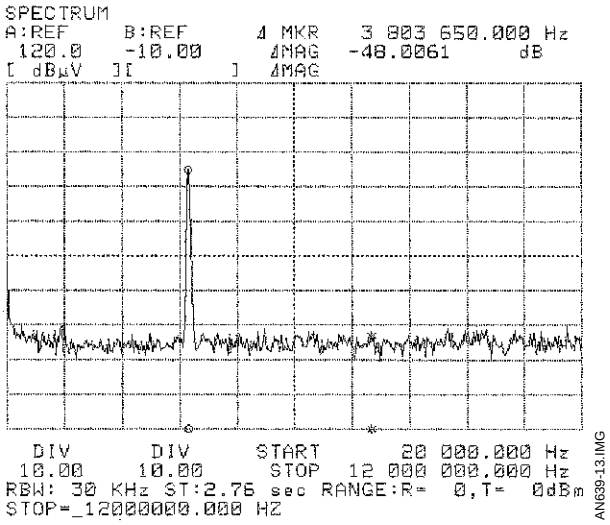
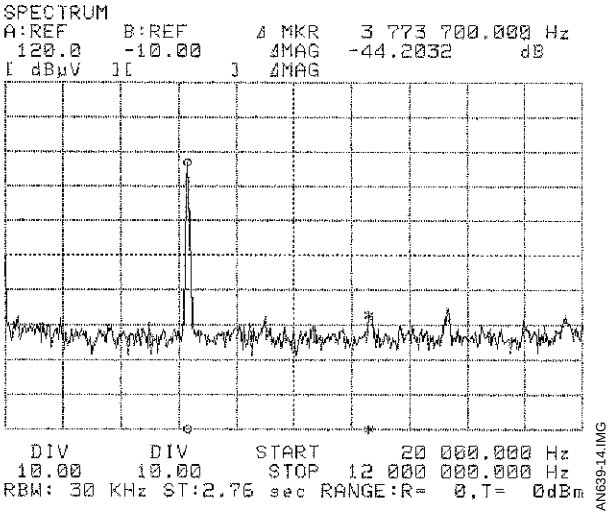


Figure 14 : H2

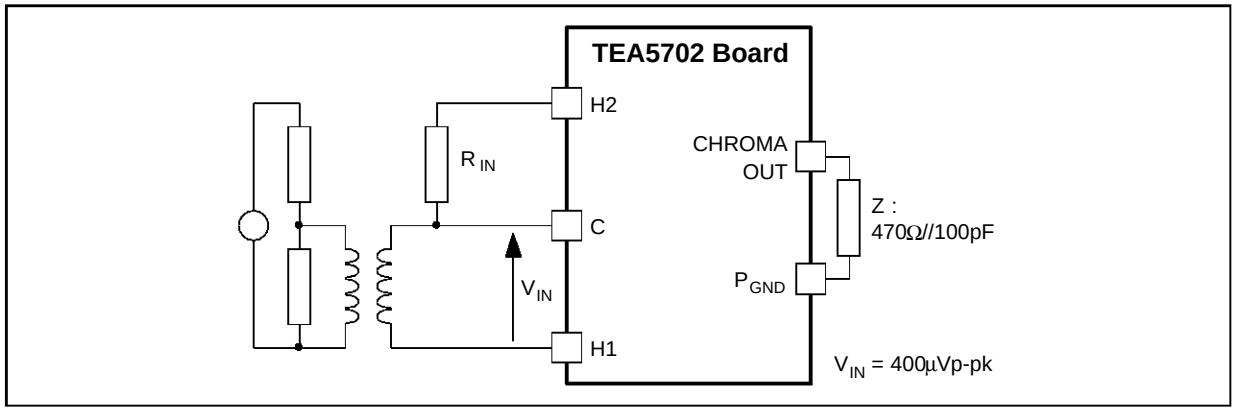


CROSSTALK MEASUREMENTS (see Figure 15)
Measuring method : Example, crosstalk of H2 on H1 channel

1. The frequency response of the gain of H1 channel is measured → (G dB)
2. Then the input signal is supplied to H2 channel, and the frequency response is measured at the output with H1 remaining selected →(G_C dB)
3. $(crosstalk)_{dB}$ is : (G dB) - (G_C dB)

Remark : Crosstalk has be measured in two cases $R_{IN} = 0$ and $R_{IN} = \infty$

Figure 15



CROSSTALK OF H2 CHANNEL ON H1 CHANNEL

Figure 16 : $R_{IN} = 0$

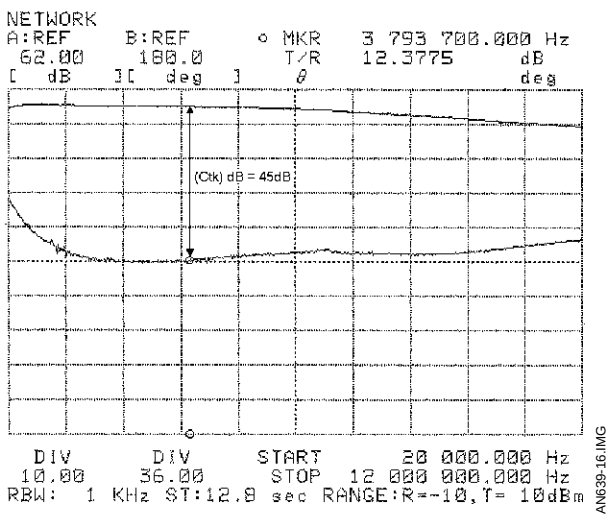
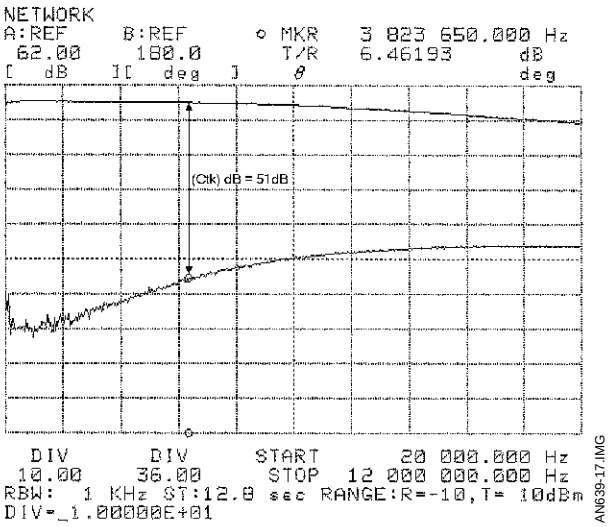


Figure 17 : $R_{IN} = \infty$



CROSSTALK OF H1 CHANNEL ON H2 CHANNEL

Figure 18 : $R_{IN} = 0$

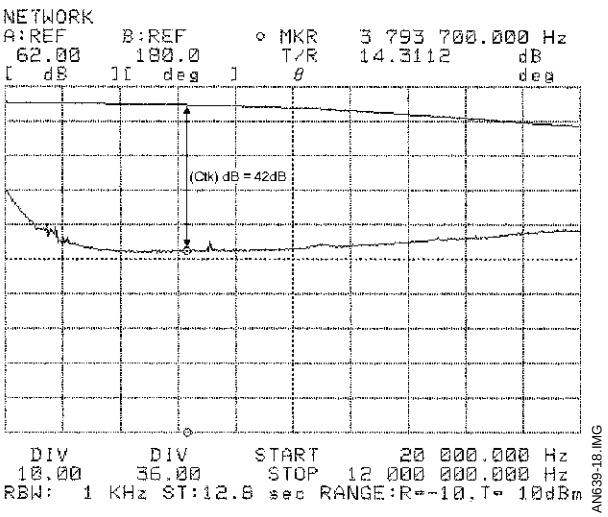
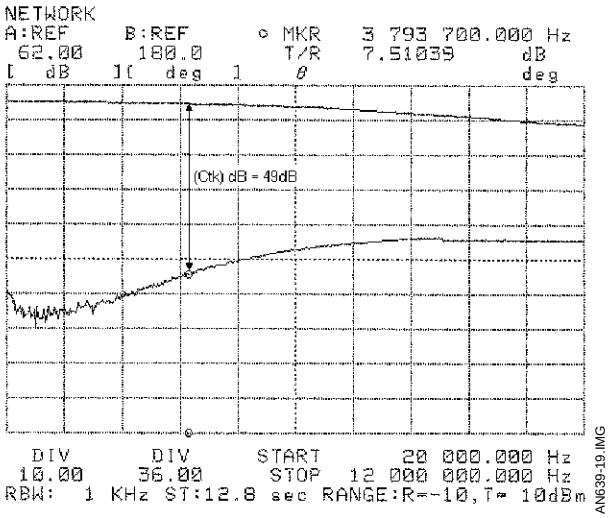


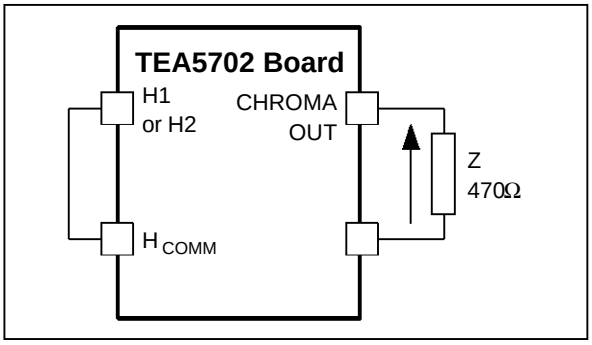
Figure 19 : $R_{IN} = \infty$



EQUIVALENT INPUT VOLTAGE NOISE MEASUREMENT e_N
EQUIVALENT INPUT CURRENT NOISE MEASUREMENT i_N

- Input voltage noise : e_N (see Figure 20)
  The output voltage (V_{OUT}) is measured with the input pin connected to the commun point. In this way the input of the preamplifier is grouded in AC.
  $e_N = \frac{V_{OUT}}{G_V}$ (G_V : voltage gain of the channel)
- Input current noise : i_N
  Same method but the input pin is floating.
  $i_N = \frac{1}{Z_{IN}} \cdot \frac{V_{OUT}}{G_V}$
  Z_{IN} : Preamplifier Input Impedance

Figure 20



NOISE CHARACTERISTICS OF H1

Figure 21 : e_N ($e_N = \frac{V_{OUT}}{G_V}$, G_V = 59.1dB)

$e_N = 0.479nV/\sqrt{Hz}$

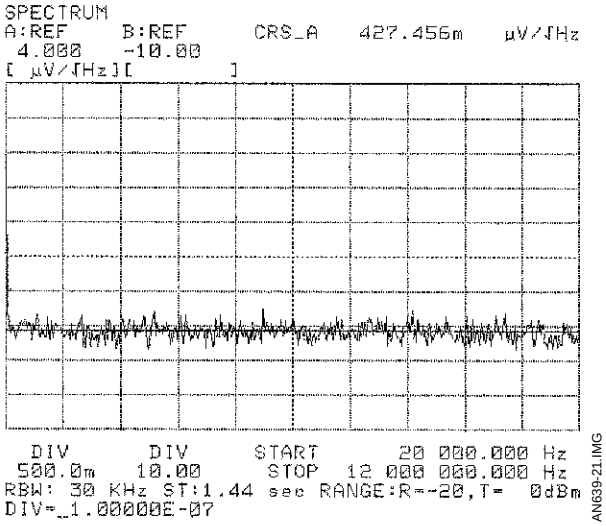
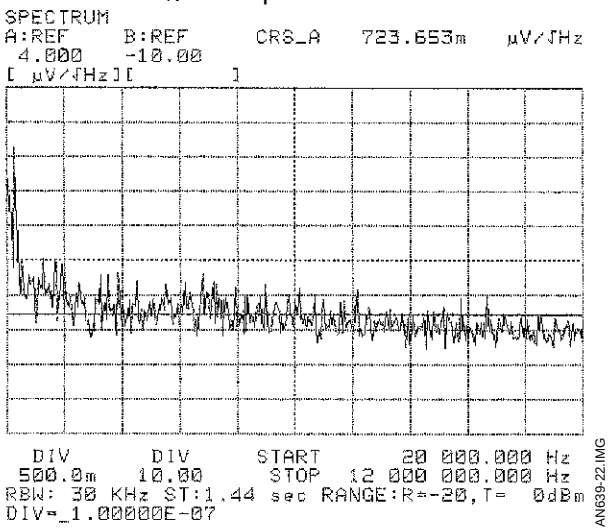


Figure 22 : I_N ($e_N = \frac{V_{OUT}}{G_V \cdot Z_{IN}}$ - Z_{IN} = 500Ω)

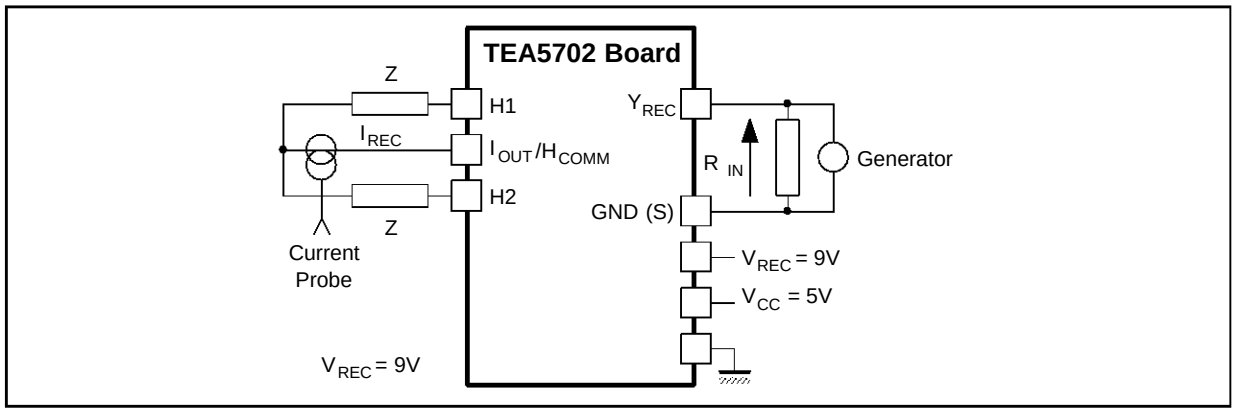
$I_N = 1.62pA/\sqrt{Hz}$



V.2 - TEA5702 Record Mode

BANDWIDTH AND HARMONIC 2 MEASURING CIRCUIT

Figure 23



BANDWIDTH (Z = 100Ω)

Figure 24 : I_{REC} = 10mA p-pk

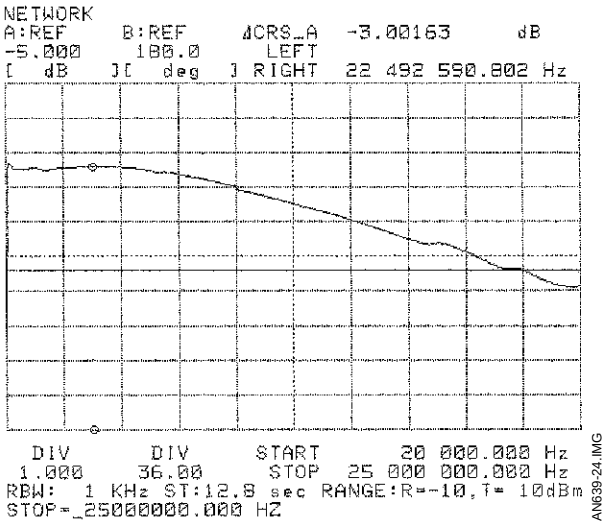
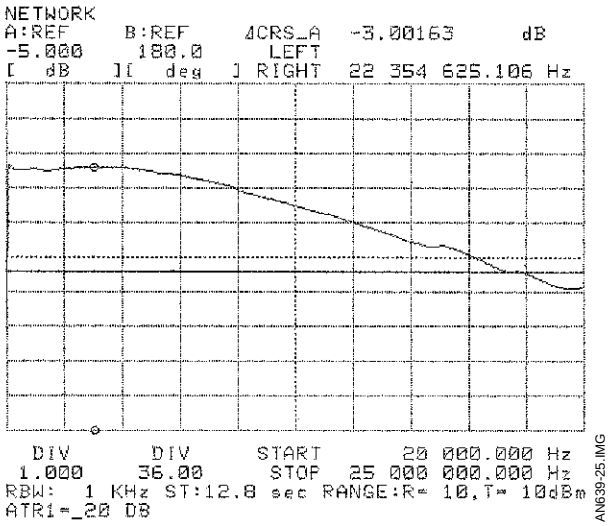


Figure 25 : I_{REC} = 60mA p-pk



RECORD MODE - HARMONIC 2 (Z = 100Ω)

Figure 26 : I_{REC} = 10mA p-pk

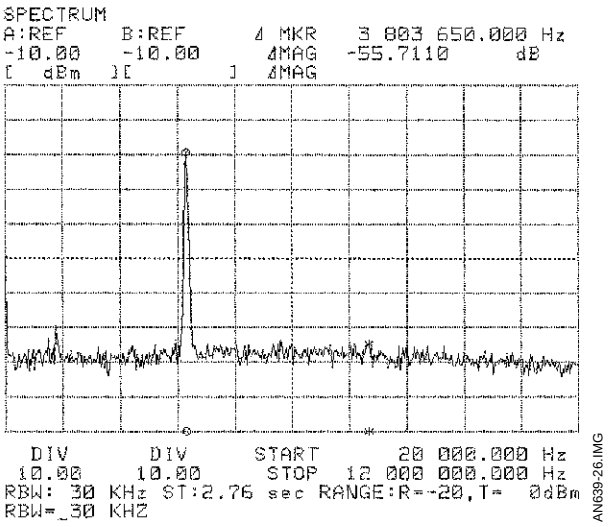
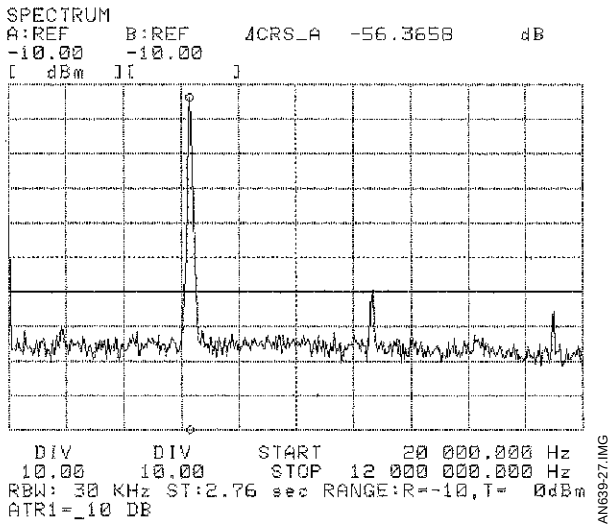


Figure 27 : I_{REC} = 60mA p-pk



RECORD MODE RESULTS VERSUS V_{REC} - HARMONIC 2 (f_{IN} = 3.8MHz, I_{REC} = 60mA p-pk)

Figure 28 : V_{REC} = 2.5V

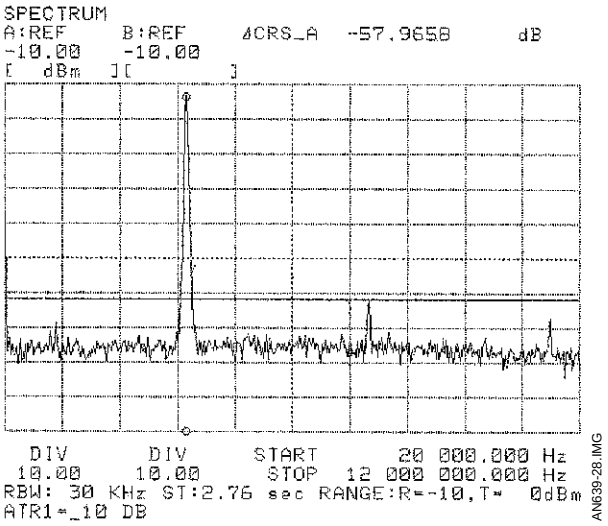


Figure 29 : V_{REC} = 5V

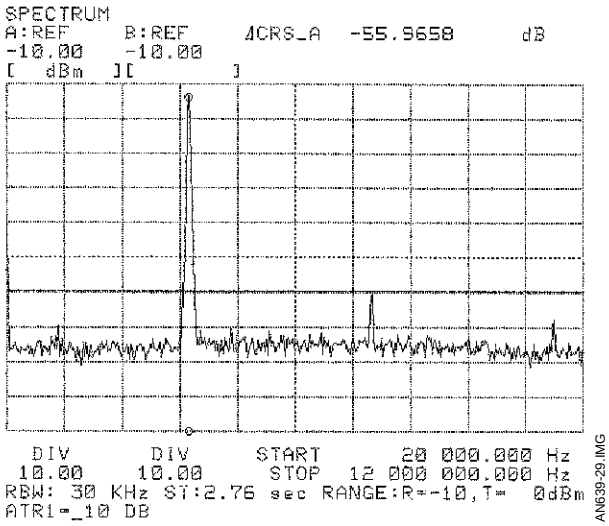


Figure 30 : V_{REC} = 9V

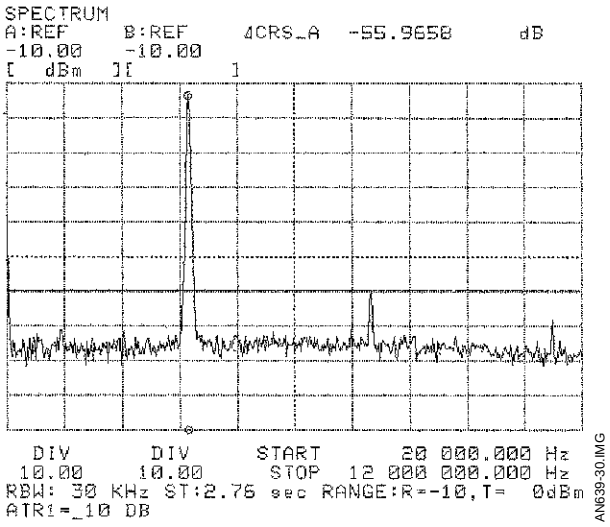
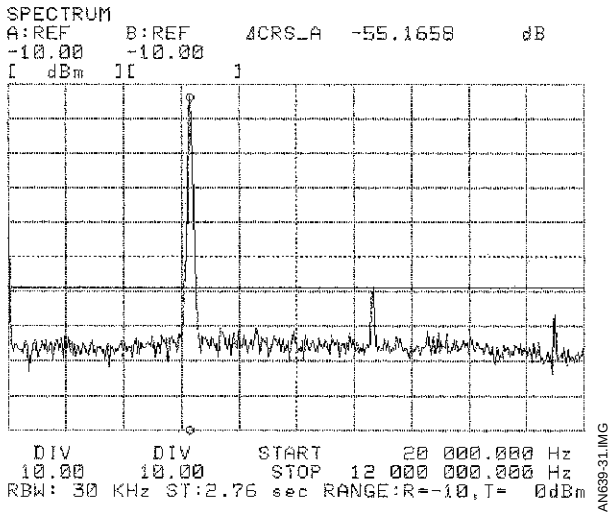
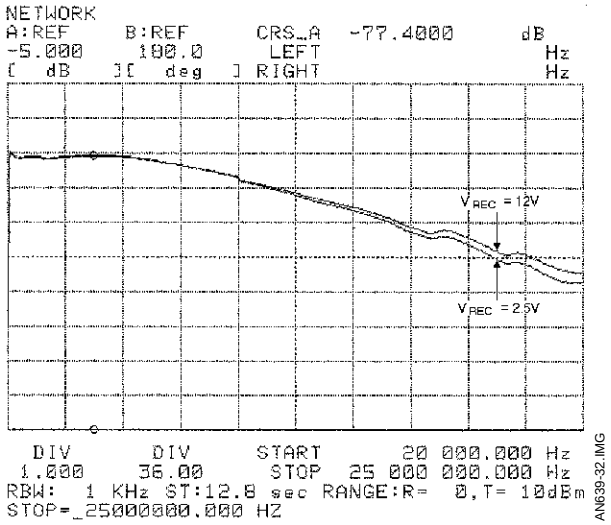


Figure 31 : V_{REC} = 12V



RECORD MODE - BANDWIDTH VERSUS V_{REC}

Figure 32 : V_{REC} = 2.5V and V_{REC} = 12V



RECORD MODE - INTERMODULATION

Figure 33

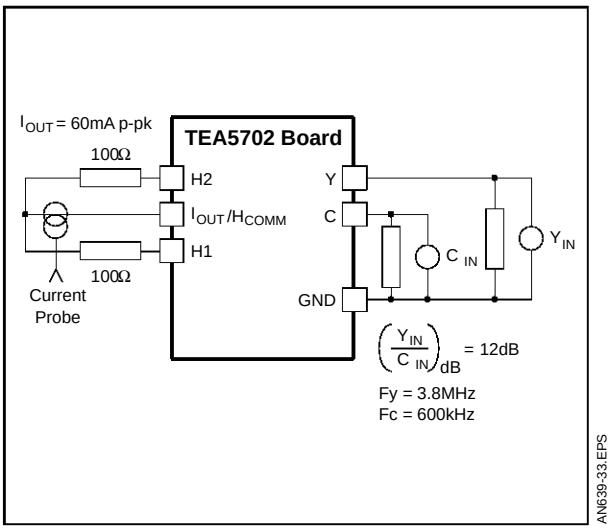


Figure 34