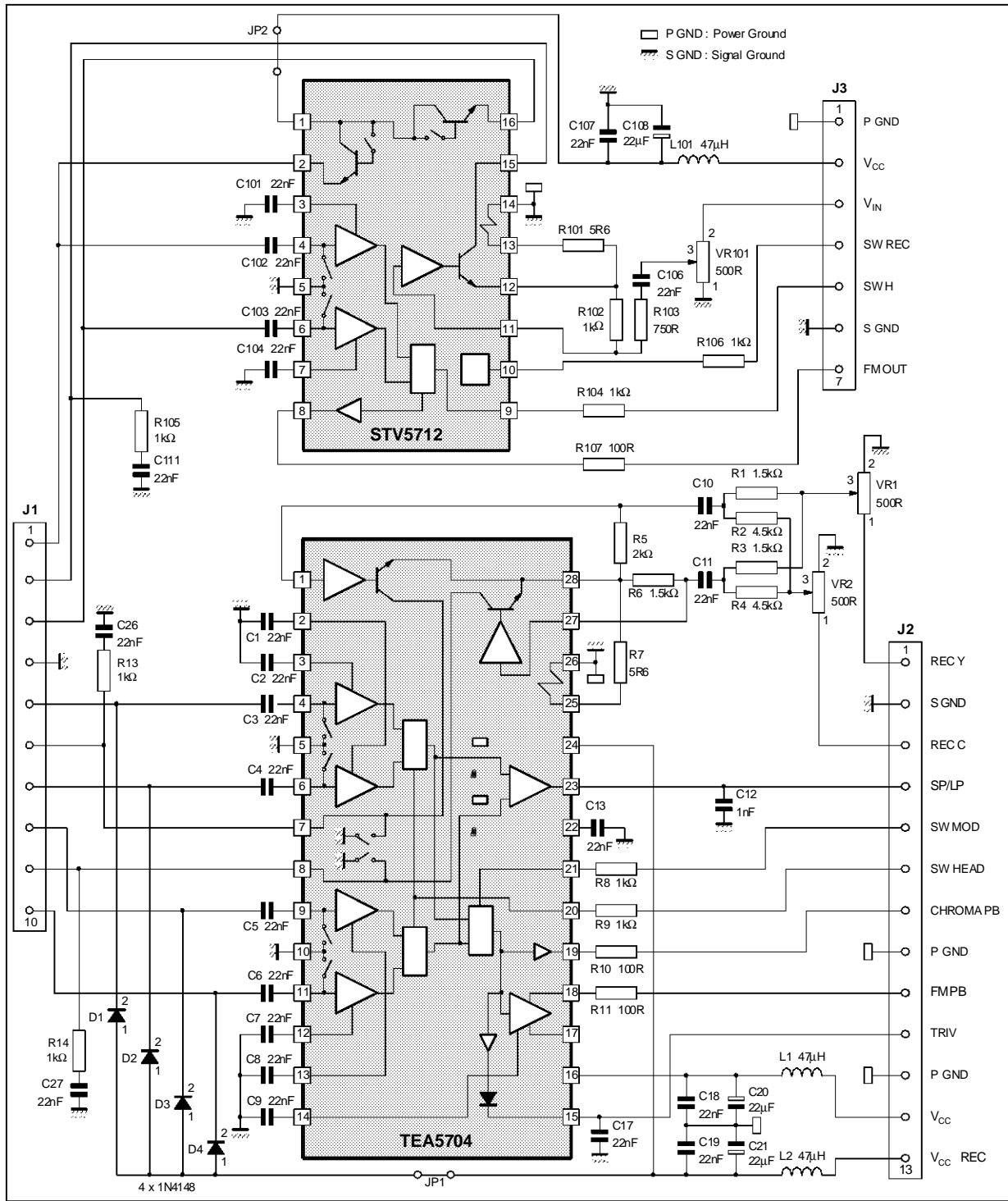


TEA5704 - STV5712 DEMOBOARD

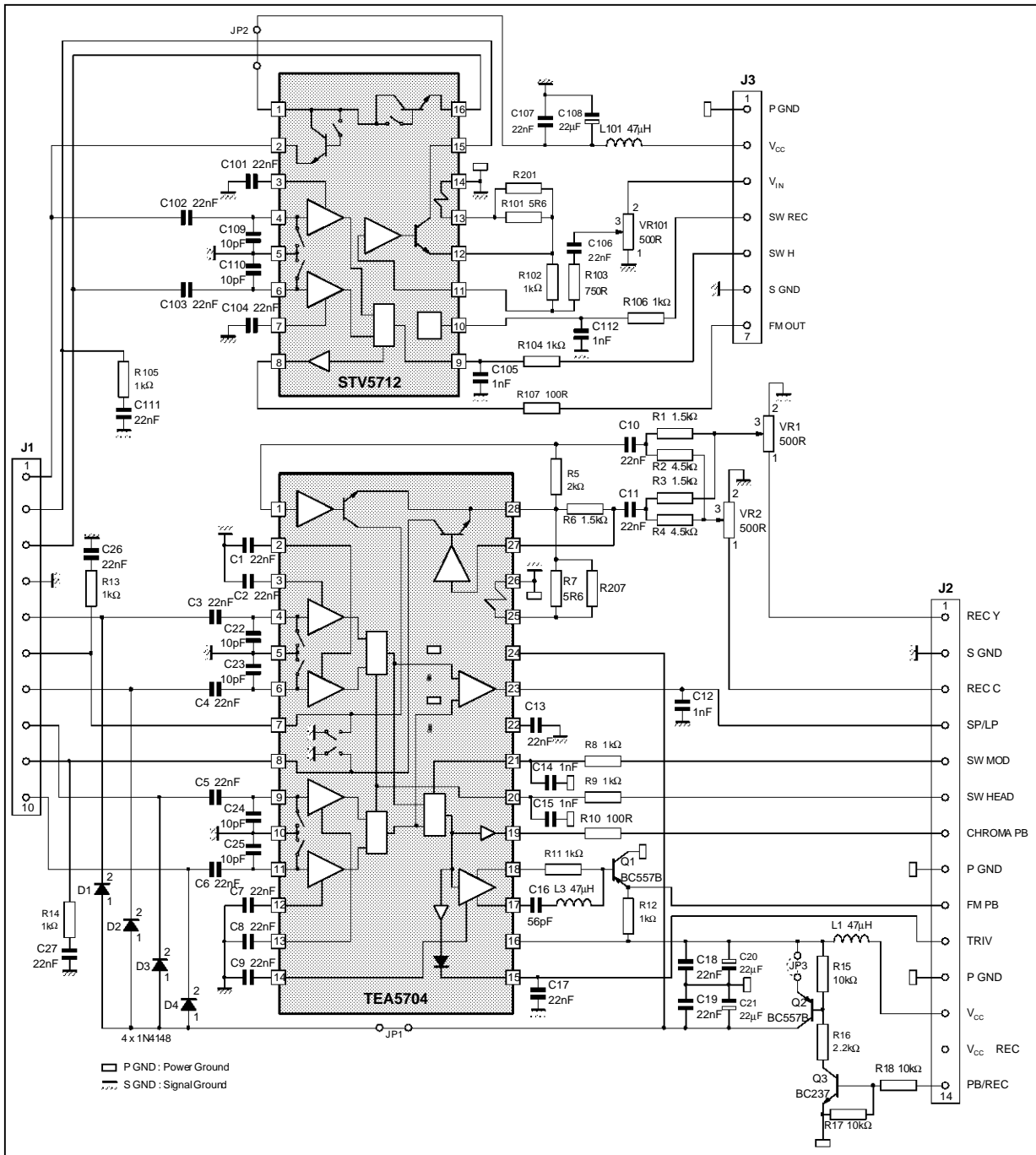
Figure 2 : Electrical Diagram of the Demonstration Board



AN640-02.EPS

TEA5704 - STV5712 DEMOBOARD

Figure 3 : Example of an application which uses all the options of the PCB layout

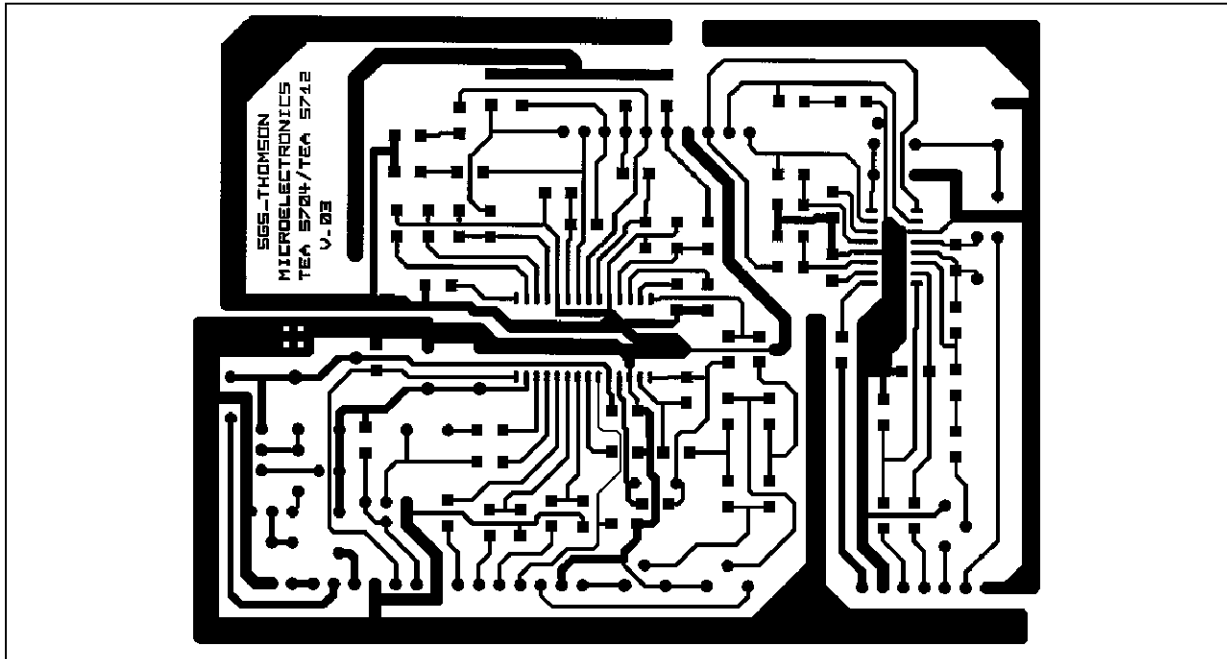


ANG640-03.EPS

TEA5704 - STV5712 DEMOBOARD

IV.1 - Printed Circuit Board Layout

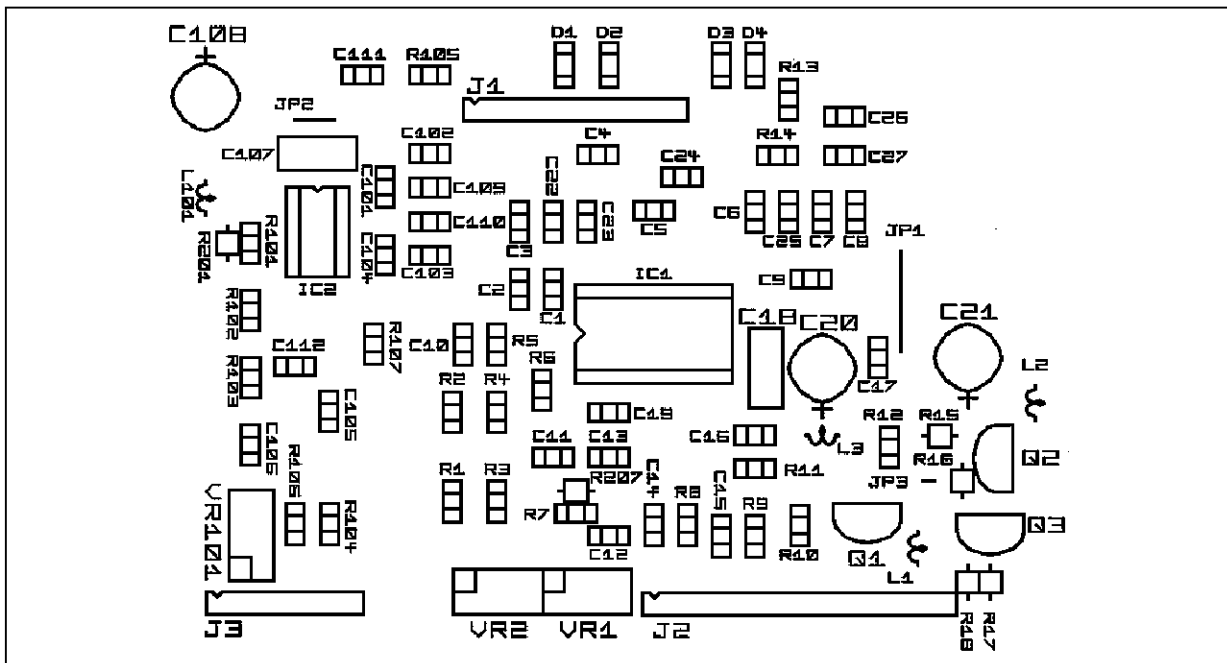
Figure 4



AN640-04.IMG

IV.2 - Silkscreen Printing

Figure 5



AN640-05.IMG

V - MEASUREMENTS RESULTS

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

TEA5704 Application

a. PLAYBACK MODE

- luma output bandwidth all channels
- chroma output bandwidth all channels
- chroma output harmonic 2, $f_{IN} = 3.8\text{MHz}$
- chroma output harmonic 2, $f_{IN} = 6\text{MHz}$
- luma output harmonic 2, $f_{IN} = 3.8\text{MHz}$
- luma output harmonic 2, $f_{IN} = 6\text{MHz}$
- crosstalk between channels
- equivalent input voltage and current noise

b. RECORD MODE

- bandwidth with different output currents
- harmonic 2 for $f_{IN} = 3.8\text{MHz}$
- harmonic 2 for $f_{IN} = 6\text{MHz}$
- bandwidth measured with drum
- harmonic 2 and bandwidth versus V_{REC} value
- intermodulation

STV5712 Application

a. PLAYBACK MODE

- bandwidth
- harmonic 2

- crosstalk
- b. RECORD MODE
- harmonic 2
- bandwidth

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. $Z : 470\Omega//47\text{pF}$ has been chosen 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 equipped with active probes HP41800A.

V.1 - TEA5704 Application

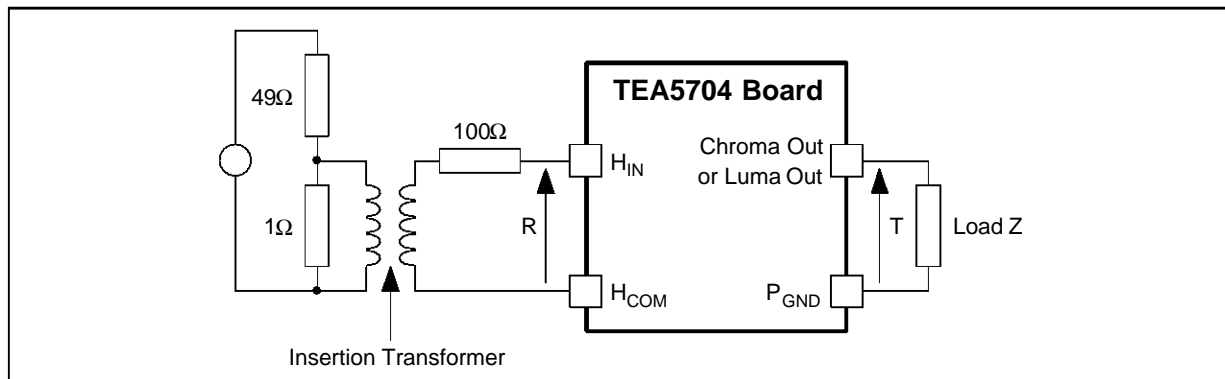
V.1.a - TEA5704 Playback Mode

LUMA/CHROMA OUTPUTS BANDWIDTH AND HARMONIC 2 MEASURING METHOD

See Figure 6

- Bandwidth
- For chroma output the bandwidth is measured for $V_{OUT} = 400\text{mVp-pk}$ ($f_{REF} = 600\text{kHz}$)
- For luma output the bandwidth is measured for $V_{IN} = 200\mu\text{Vp-pk}$ ($f_{REF} = 3.8\text{MHz}$)
- Harmonic 2
- Harmonic 2 is measured with $V_{IN} = 400\mu\text{Vp-pk}$

Figure 6



AN640-06.EPS

TEA5704 - STV5712 DEMOBOARD

LUMA OUTPUT BANDWIDTH (Z = 470Ω/47pF)

Figure 7 : H2LP

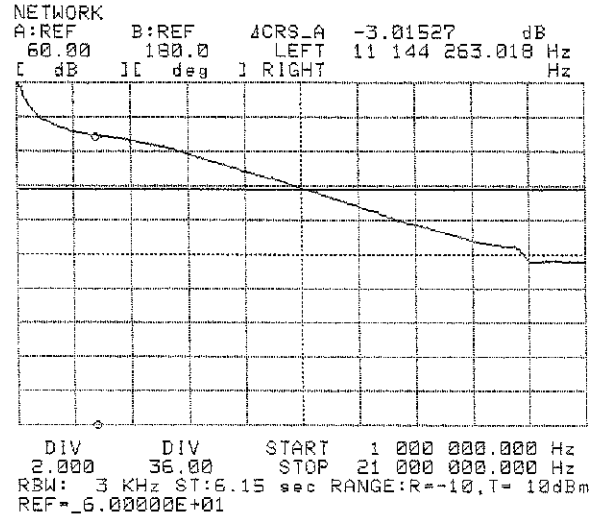


Figure 8 : H1LP

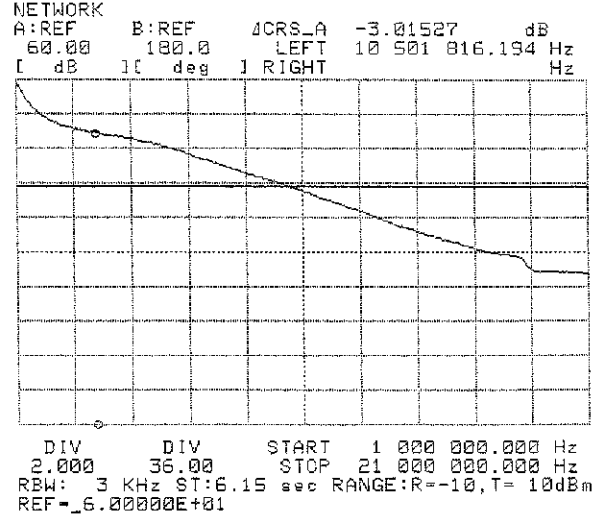


Figure 9 : H1SP

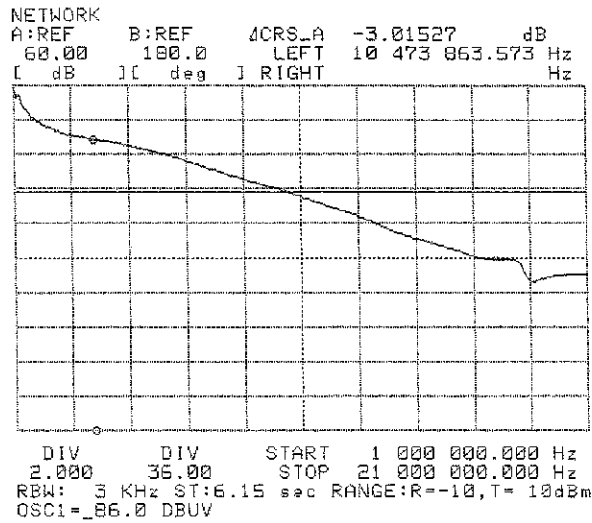
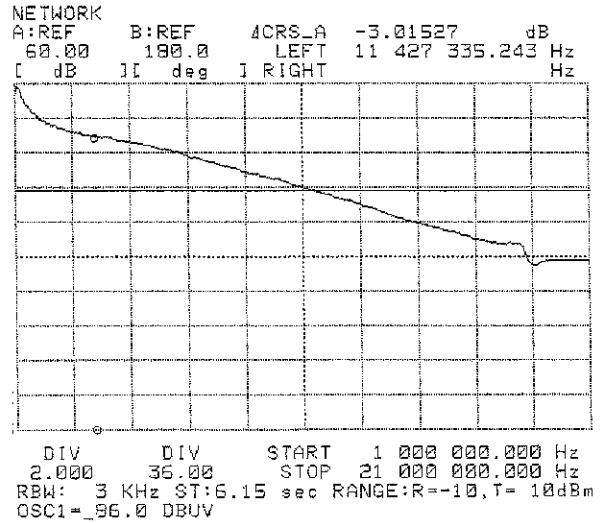


Figure 10 : H2SP



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

Figure 11 : H1SP

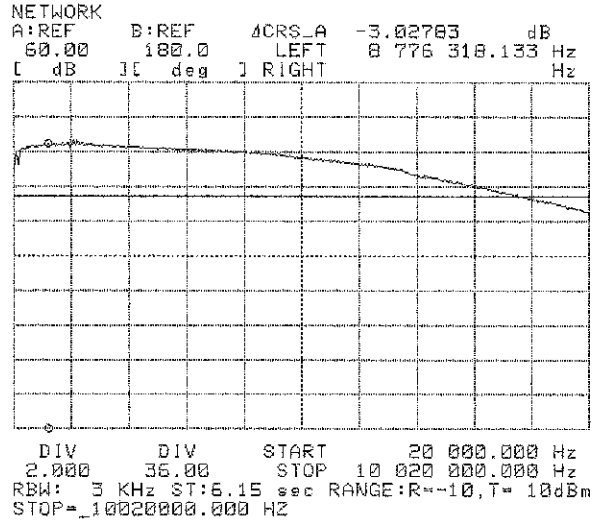


Figure 12 : H2SP

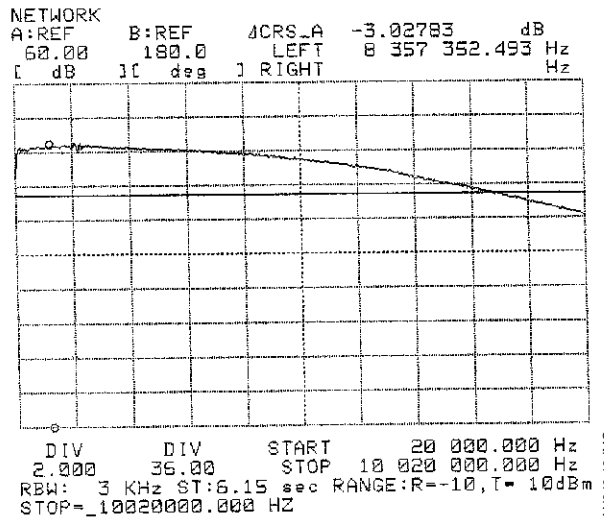


Figure 13 : H2LP

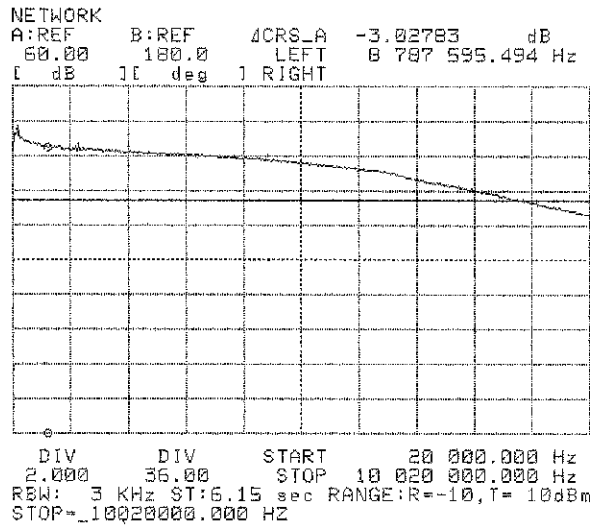
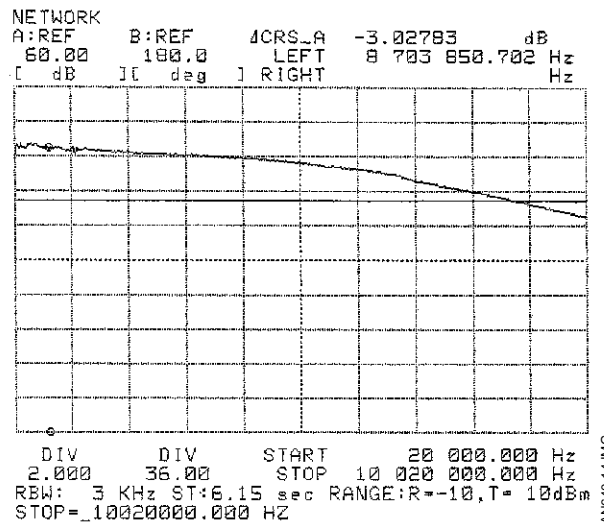


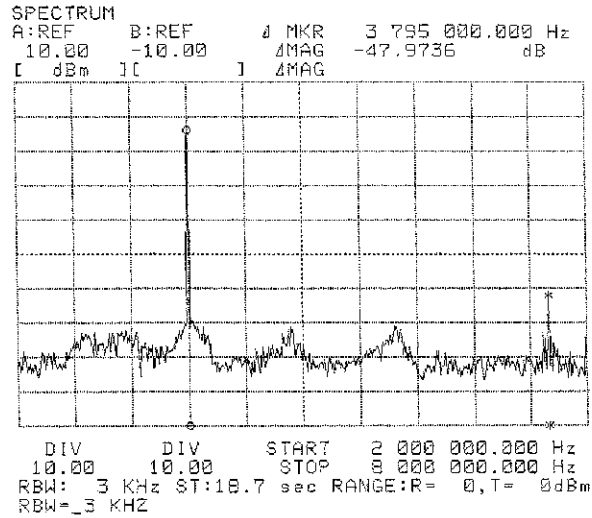
Figure 14 : H1LP



TEA5704 - STV5712 DEMOBOARD

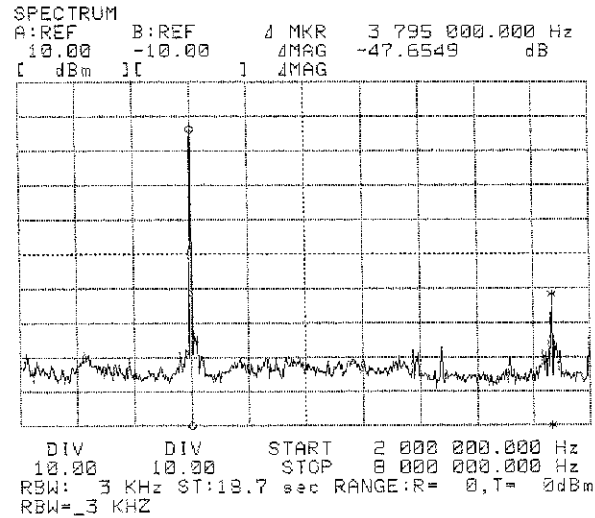
HARMONIC 2 / CHROMA OUTPUT (all channels $f_{IN} = 3.8\text{MHz}$, $Z = 470\Omega//100\text{pF}$)

Figure 15 : H1SP



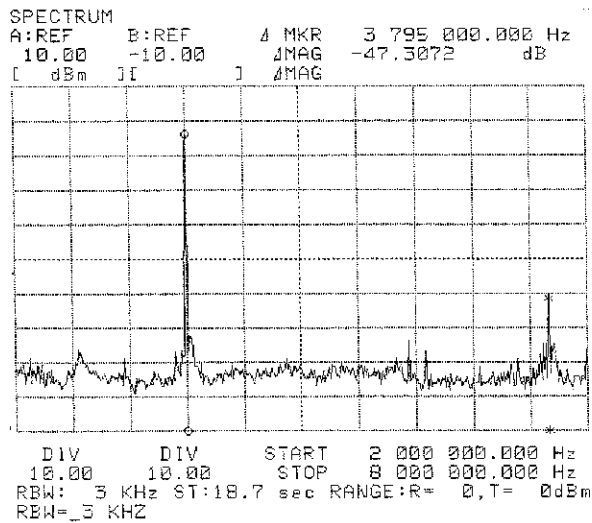
ANG40-15.IMG

Figure 16 : H2SP



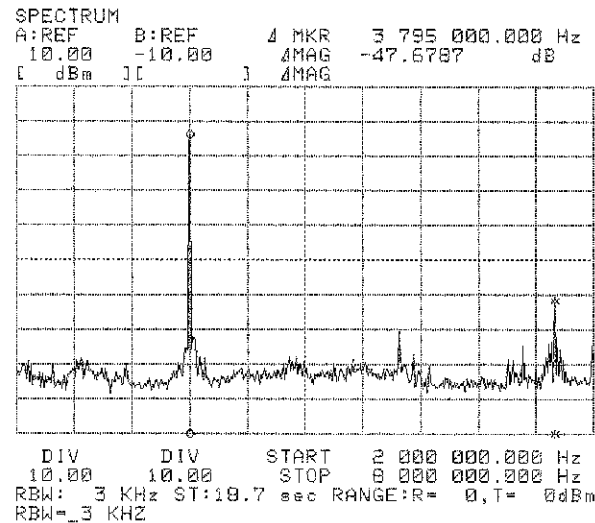
ANG40-16.IMG

Figure 17 : H2LP



ANG40-17.IMG

Figure 18 : H1LP



ANG40-18.IMG

HARMONIC 2 / CHROMA OUTPUT ($f_{IN} = 6\text{MHz} - \text{H2LP}$)

Figure 19 : $Z = 470\Omega$

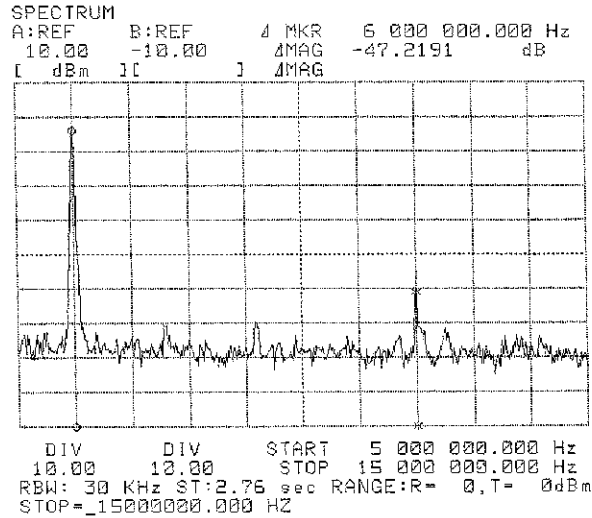
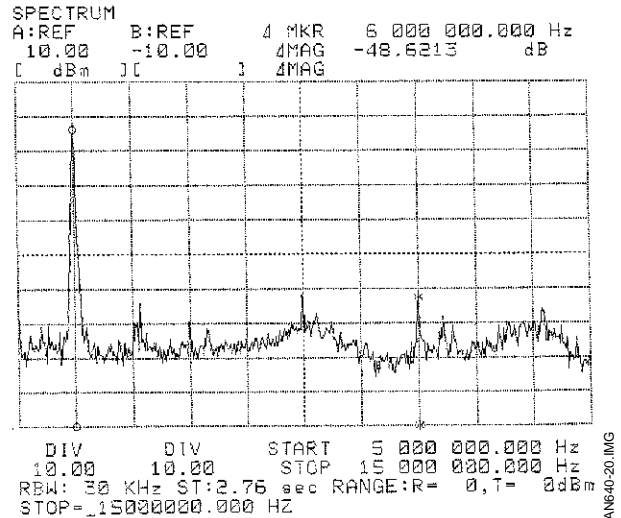


Figure 20 : $Z = 470\Omega//100\text{pF}$



HARMONIC 2 / LUMA OUTPUT ($f_{IN} = 3.8\text{MHz} - \text{H2LP}$)

Figure 21 : $Z = 470\Omega$

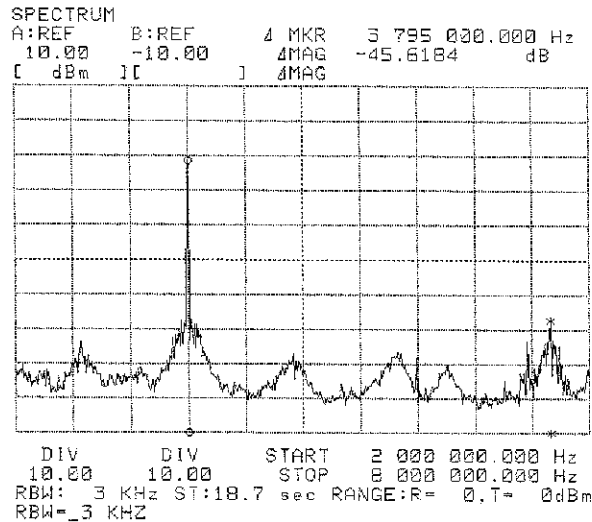
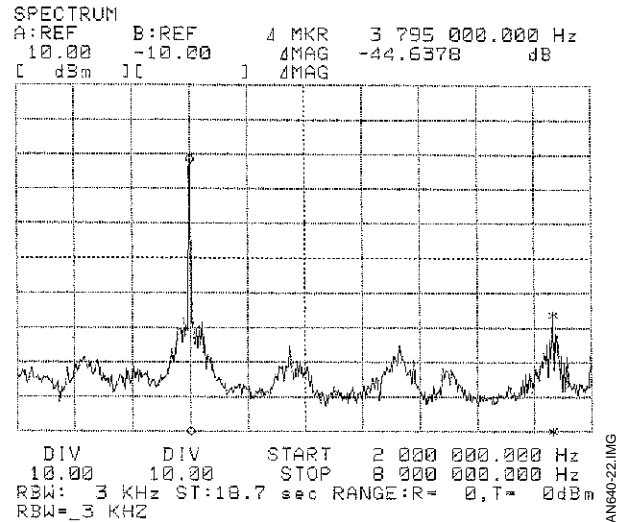


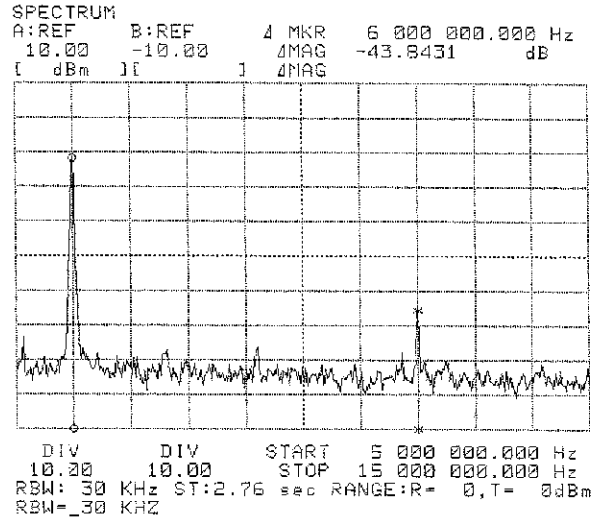
Figure 22 : $Z = 470\Omega//100\text{pF}$



TEA5704 - STV5712 DEMOBOARD

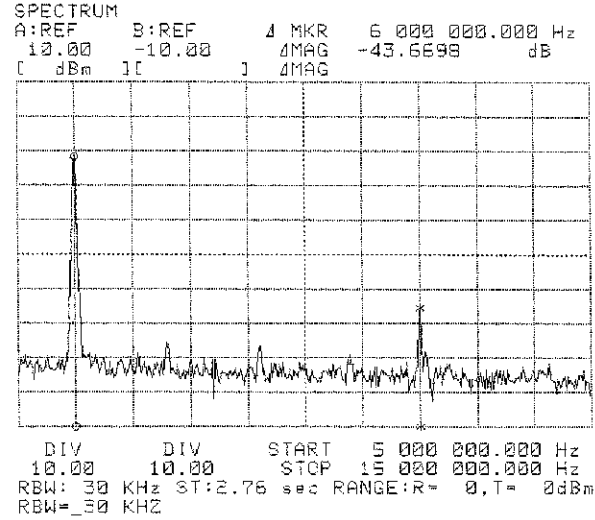
HARMONIC 2 / LUMA OUTPUT ($f_{IN} = 6\text{MHz} - \text{H2LP}$)

Figure 23 : $Z = 470\Omega$



AN640-23.IMG

Figure 24 : $Z = 470\Omega//100\text{pF}$



AN640-24.IMG

CROSSTALK BETWEEN CHANNELS

H2LP → on the other channels (See Figure 25).

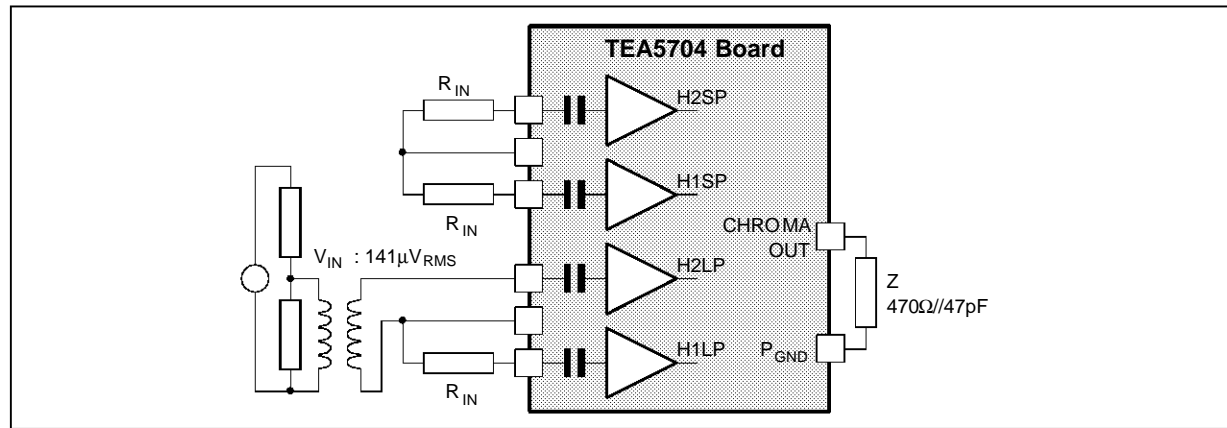
Measuring method : Example crosstalk of H2LP channel on H1LP

1. The frequency response of the gain of H1LP is measured → (G dB)

2. Then the input signal is supplied to H2LP, and the frequency response is measured at the output with H1LP remaining selected → (G_C dB)
3. (crosstalk)_{dB} is : (G dB) - (G_C dB)

Remark : Crosstalk can be measured with different value of input impedances R_{IN}

Figure 25



AN640-25.EPS

CROSSTALK OF H2LP ON THE OTHER CHANNELS

Figure 26 : H1LP - $R_{IN} = 0$

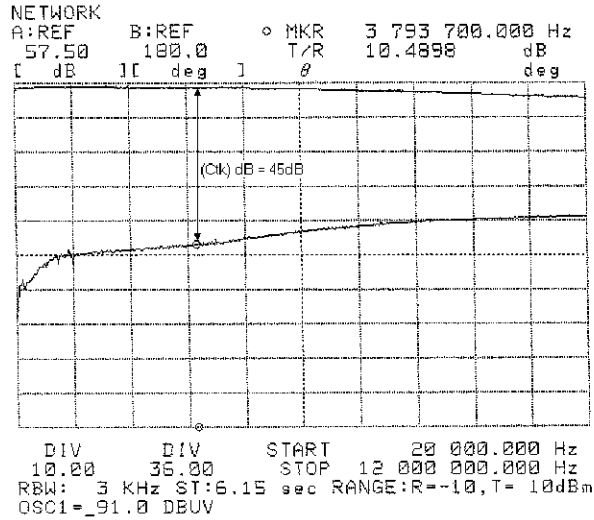


Figure 27 : H2SP - $R_{IN} = 0$

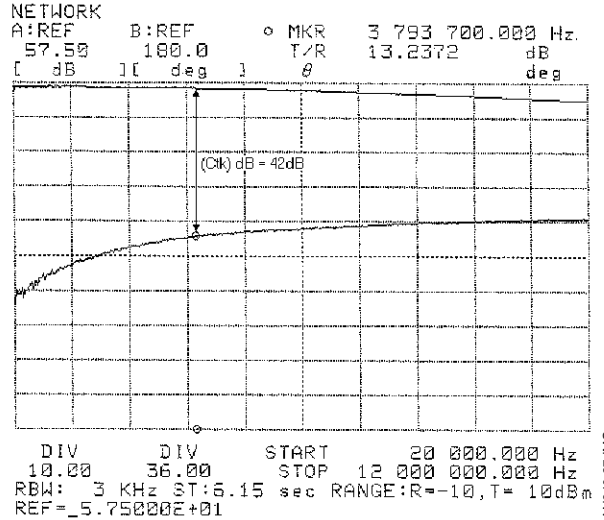


Figure 28 : H1SP - $R_{IN} = 0$

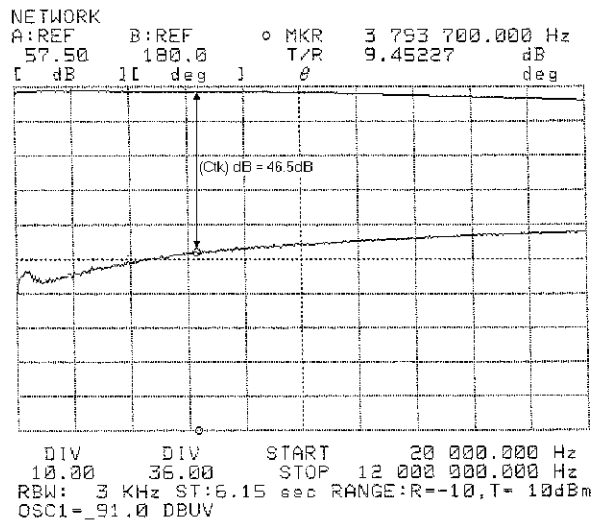
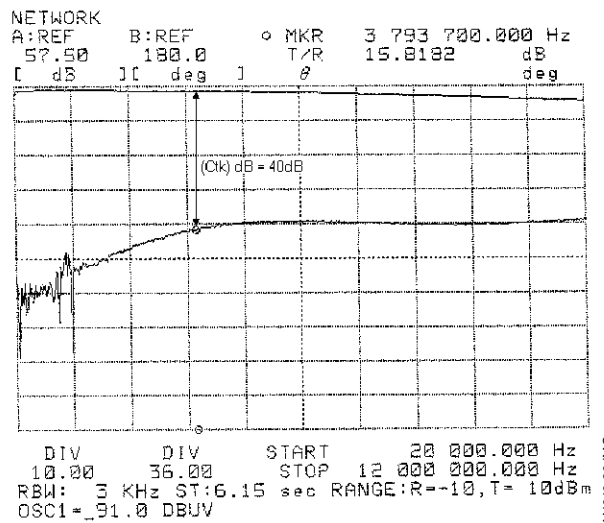


Figure 29 : H1LP - $R_{IN} = \infty$ (open)



TEA5704 - STV5712 DEMOBOARD

CROSSTALK OF H2LP ON THE OTHER CHANNELS (continued)

Figure 30 : H2SP - R_{IN} = ∞ (open)

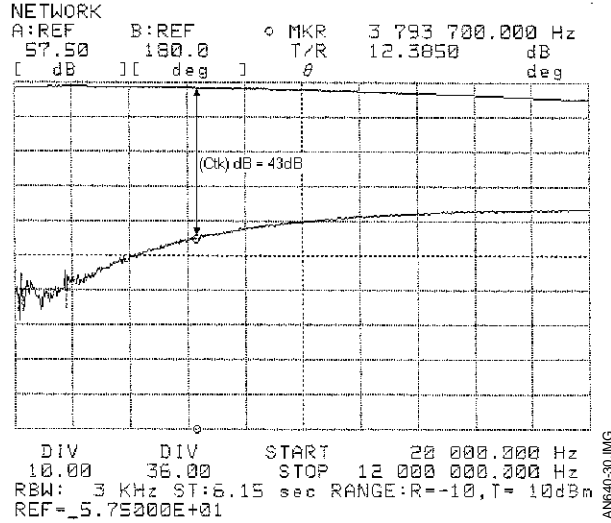
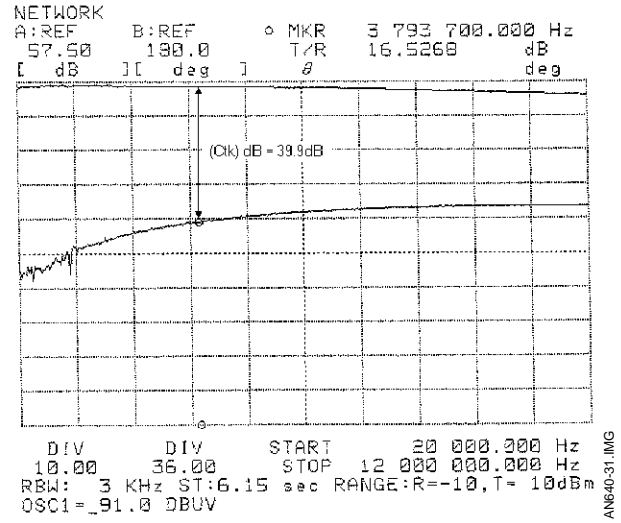


Figure 31 : H1SP - R_{IN} = ∞ (open)



EQUIVALENT INPUT VOLTAGE NOISE MEASUREMENT e_N

EQUIVALENT INPUT CURRENT NOISE MEASUREMENT i_N

- Input voltage noise : e_N (see Figure 32)

The output voltage (V_{OUT}) is measured with the input pin connected to the common point. In this way the input of the preamplifier is grounded in AC.

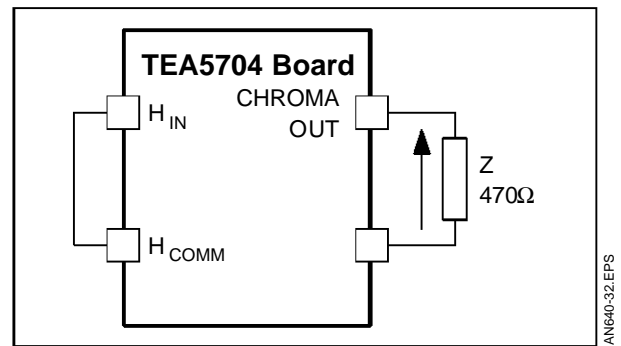
$$e_N = \frac{V_{OUT}}{G_V} \quad (G_V : \text{voltage gain of the channel})$$

- 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 32



NOISE CHARACTERISTICS OF H2LP

Figure 33 : $e_N (e_N = \frac{V_{OUT}}{G_V}, G_V = 59.3dB)$
 $e_N = 0.58nV/\sqrt{Hz}$

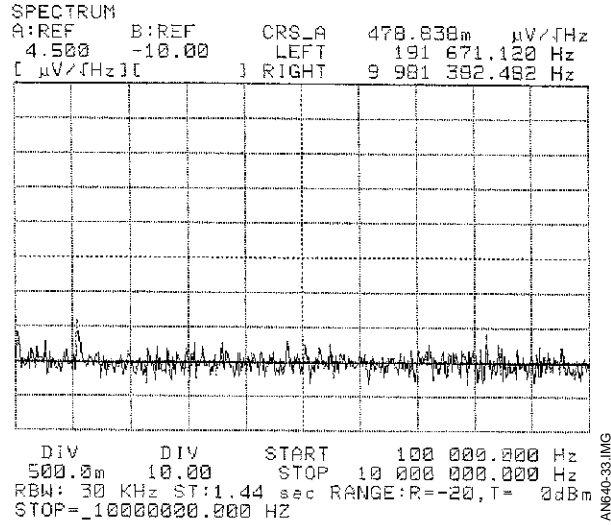
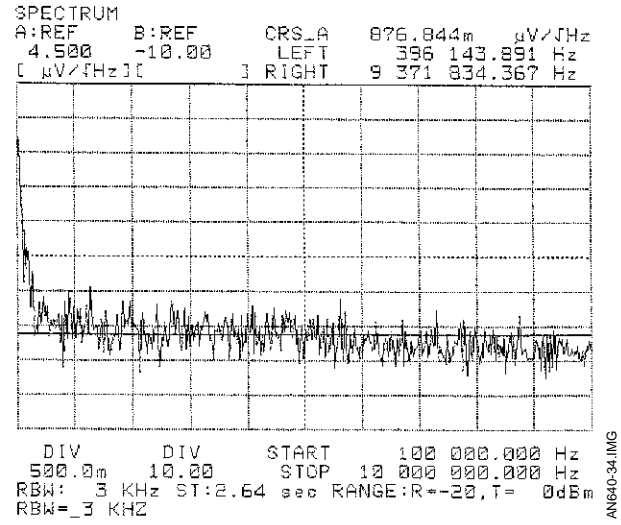


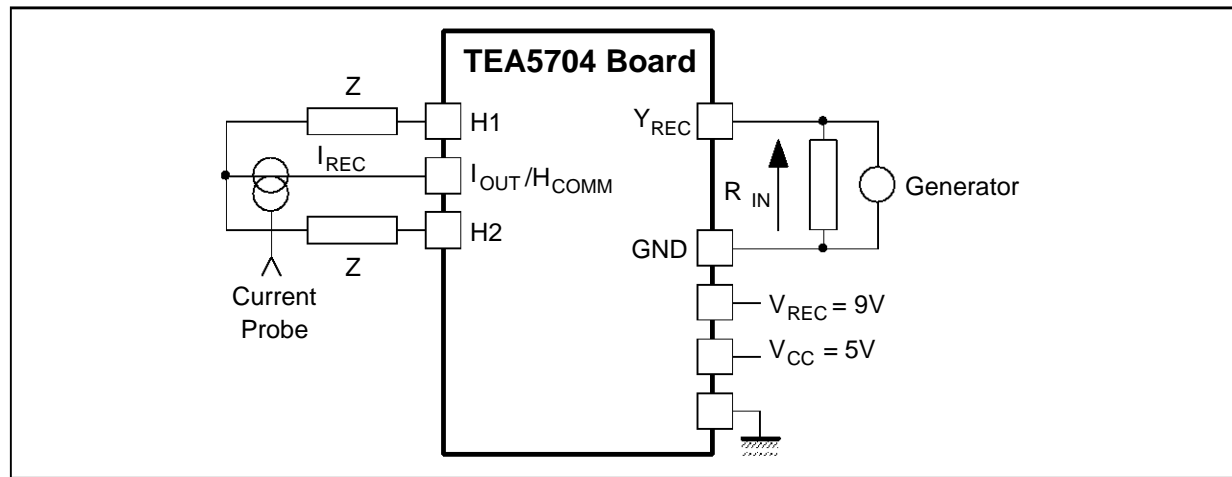
Figure 34 : $I_N (e_N = \frac{V_{OUT}}{G_V \cdot Z_{IN}} - Z_{IN} = 500\Omega)$
 $I_N = 1.88pA/\sqrt{Hz}$



V.1.b - TEA5704 Record Mode

BANDWIDTH AND HARMONIC 2 MEASURING CIRCUIT

Figure 35



TEA5704 - STV5712 DEMOBOARD

BANDWIDTH : $\frac{I_{REC}}{V_{IN}}$ ($I_{REC} = 10\text{mA p-pk}$)

Figure 36 : SP Channel - Z = 100Ω

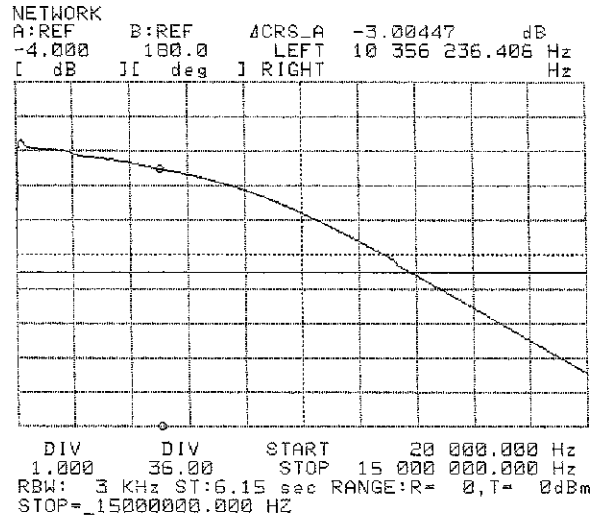
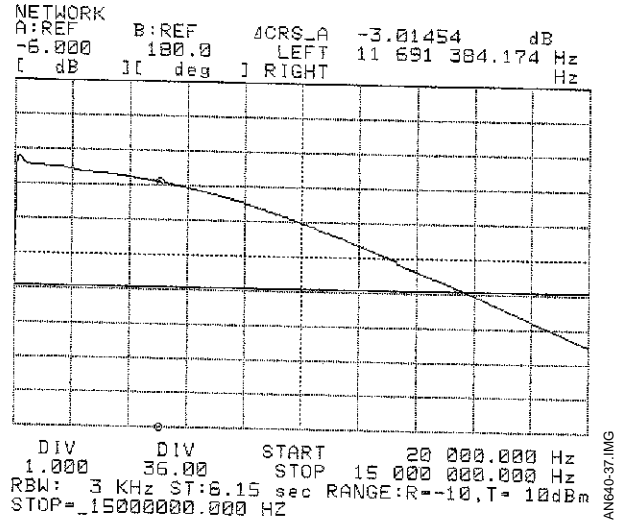


Figure 37 : LP Channel - Z = 100Ω



BANDWIDTH : $\frac{I_{REC}}{V_{IN}}$ ($I_{REC} = 60\text{mA p-pk}$)

Figure 38 : SP Channel - Z = 100Ω

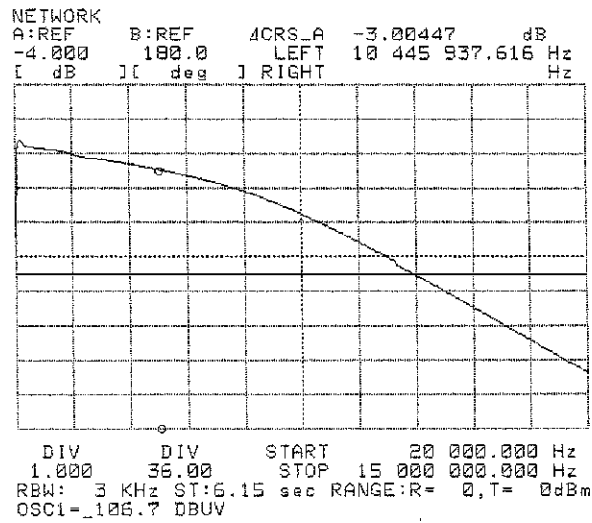
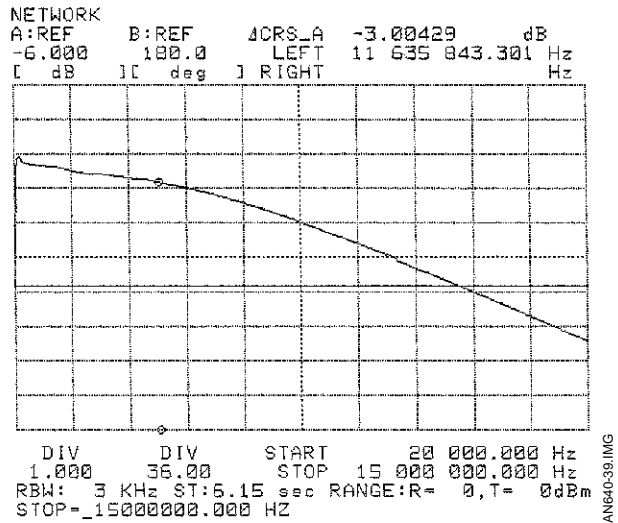


Figure 39 : LP Channel - Z = 100Ω



RECORD MODE - HARMONIC 2 ($I_{REC} = 20\text{mA p-pk}$, $f_{IN} = 3.8\text{MHz}$)

Figure 40 : SP Channel - $Z = 100\Omega$

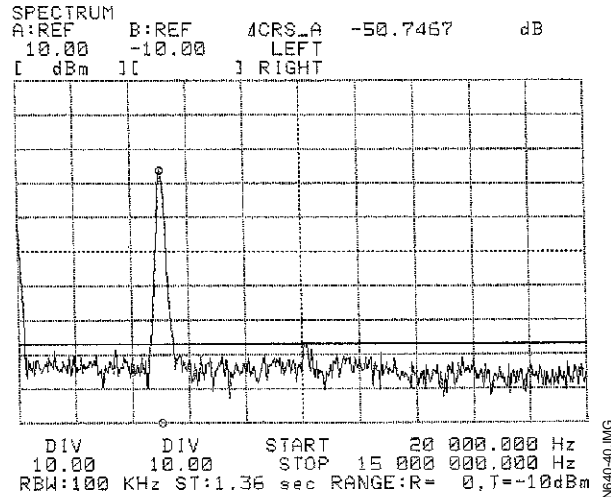
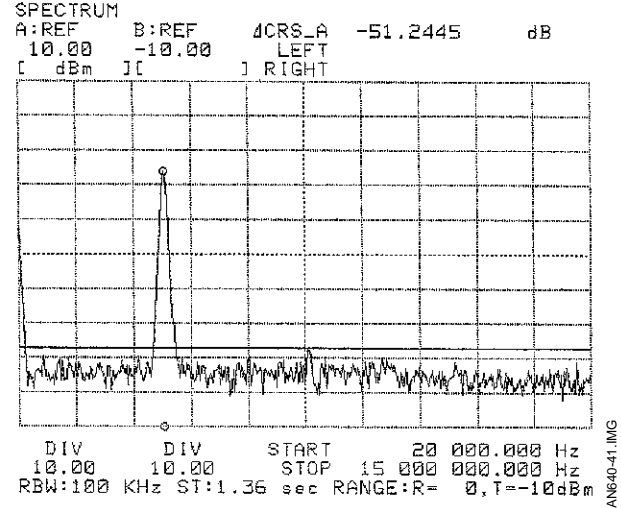


Figure 41 : LP Channel - $Z = 100\Omega$



RECORD MODE - HARMONIC 2 ($I_{REC} = 60\text{mA p-pk}$, $f_{IN} = 3.8\text{MHz}$)

Figure 42 : SP Channel - $Z = 100\Omega$

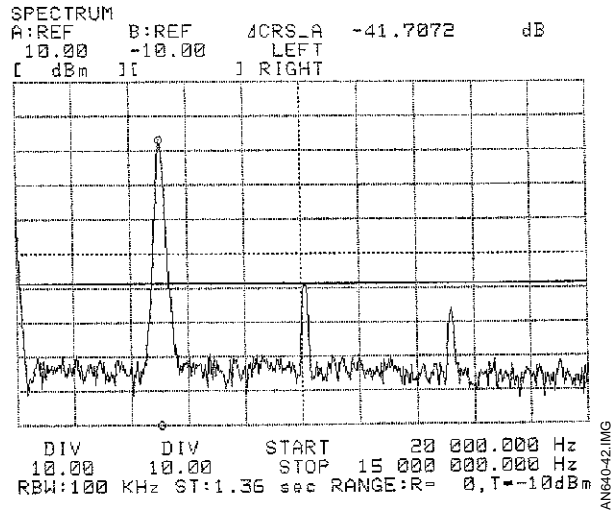
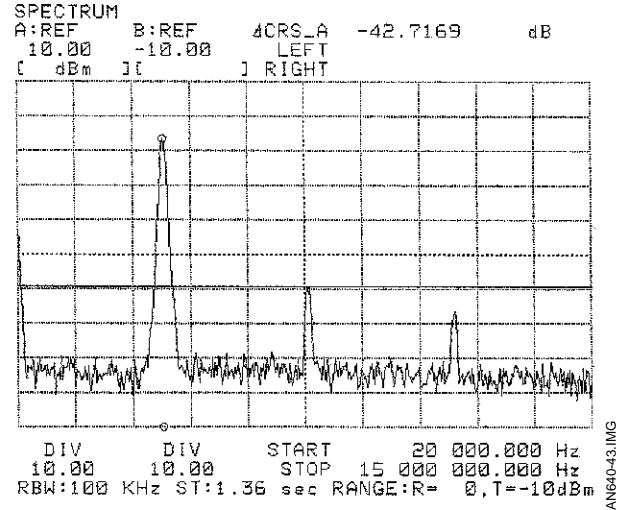


Figure 43 : LP Channel - $Z = 100\Omega$



TEA5704 - STV5712 DEMOBOARD

RECORD MODE - HARMONIC 2 ($F_{IN} = 6\text{MHz}$, $Z = 100\Omega$)

Figure 44 : $I_{REC} = 60\text{mA p-pk}$

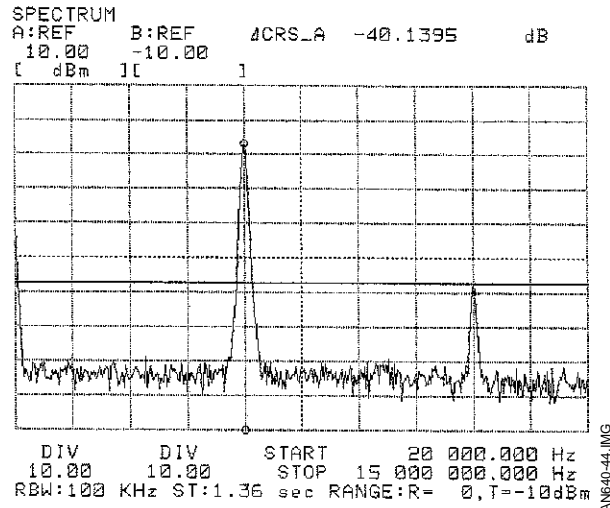
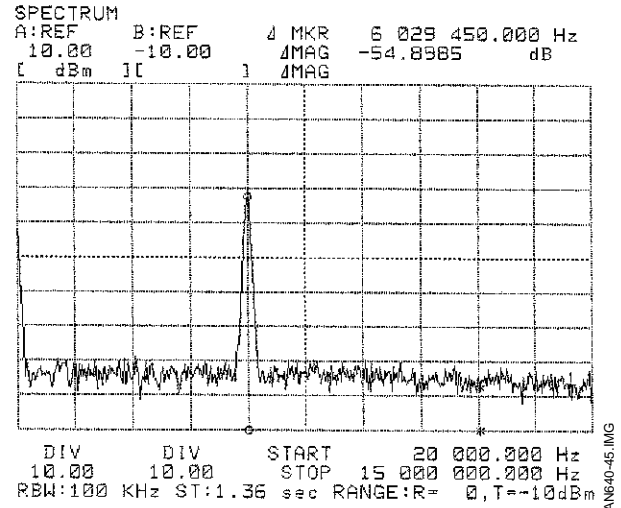


Figure 45 : $I_{REC} = 10\text{mA p-pk}$



RECORD MODE RESULTS VERSUS V_{REC} - HARMONIC 2 ($f_{IN} = 3.8\text{MHz}$, $I_{REC} = 60\text{mA p-pk}$, $Z = 0\Omega$)

Figure 46 : $V_{REC} = 2.5\text{V}$

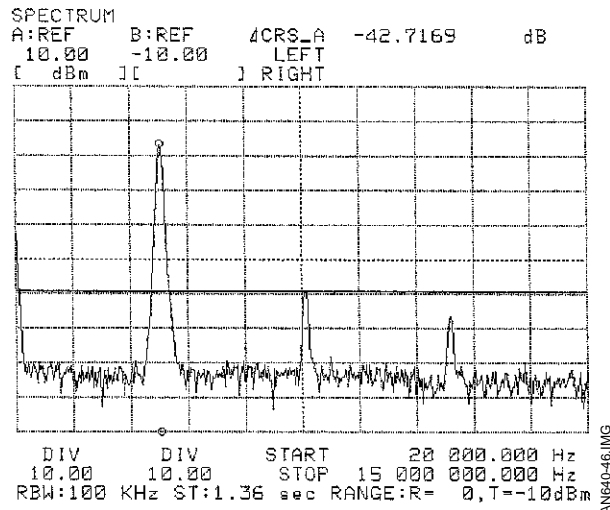
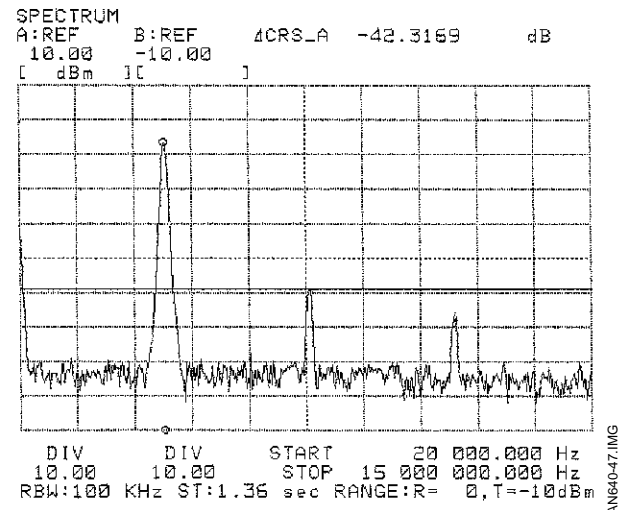


Figure 47 : $V_{REC} = 5\text{V}$



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

Figure 48 : $V_{REC} = 9\text{V}$

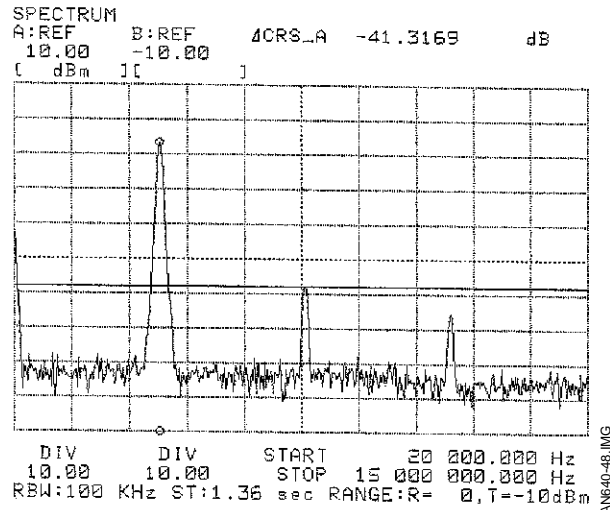
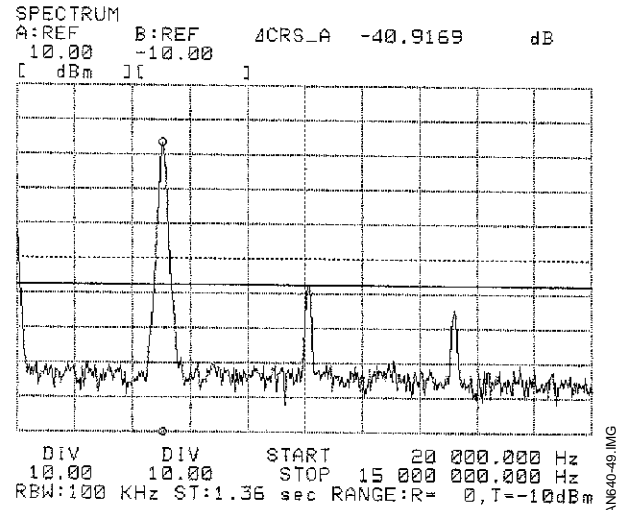


Figure 49 : $V_{REC} = 12\text{V}$



RECORD MODE RESULTS VERSUS V_{REC} - HARMONIC 2 ($f_{IN} = 6\text{MHz}$)

Figure 50 : $V_{REC} = 5\text{V}$, $I_{REC} = 10\text{mA p-pk}$

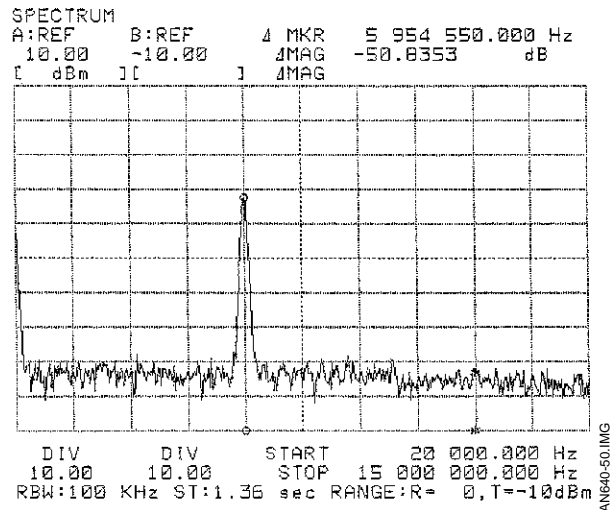
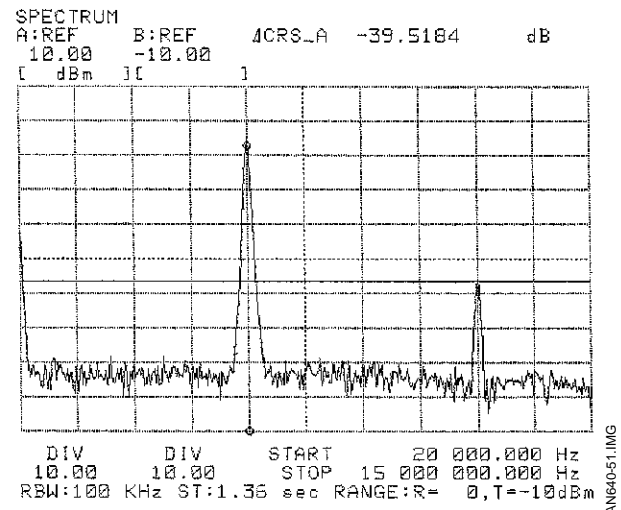


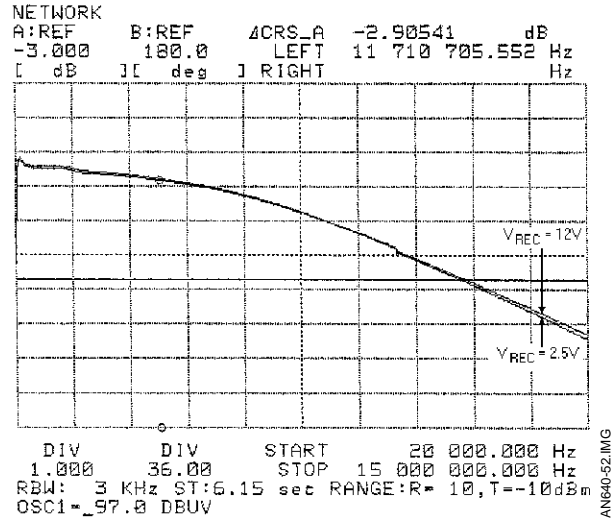
Figure 51 : $V_{REC} = 5\text{V}$, $I_{REC} = 60\text{mA p-pk}$



TEA5704 - STV5712 DEMOBOARD

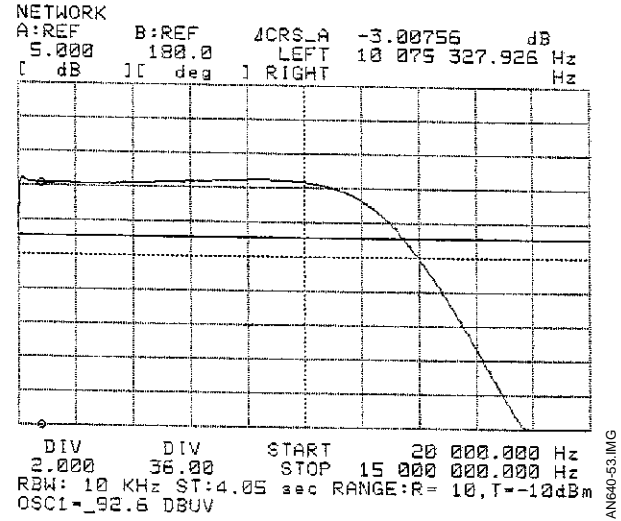
RECORD MODE - BANDWIDTH VERSUS V_{REC}

Figure 52 : $I_{REC} = 20\text{mA p-pk}$



RECORD MODE - BANDWIDTH WITH DRUM ($I_{REC} = 20\text{ mA p-pk}$)

Figure 53 : SP Channel - Z = head



RECORD MODE - INTERMODULATION

Figure 54

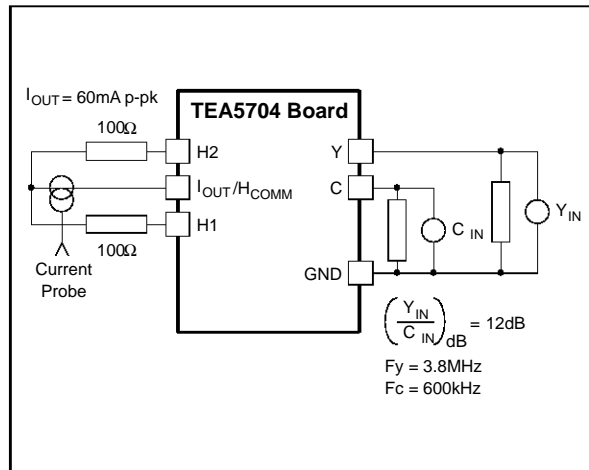
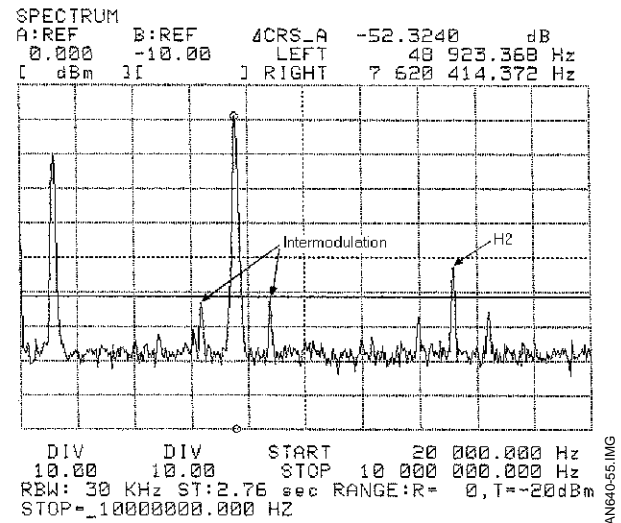


Figure 55 : SP Channel



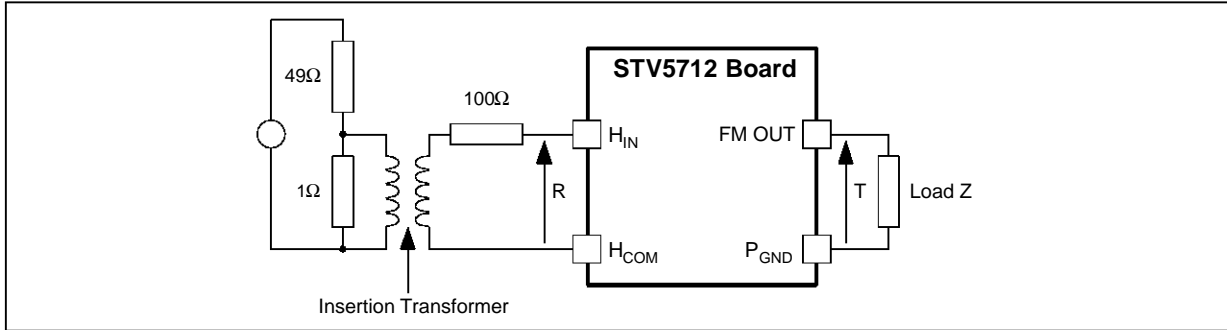
V.1 - STV5712 Application

V.1.a - STV5712 Playback Mode

BANDWIDTH AND HARMONIC 2 MEASUREMENTS METHOD

For harmonic 2 measurement $f_{IN} = 1.6\text{MHz}$, $V_{IN} = 100\mu\text{Vp-pk}$

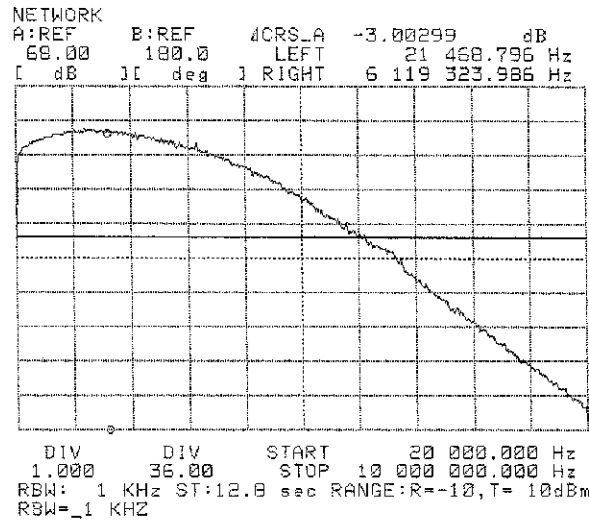
Figure 56



AN640-56.EPS

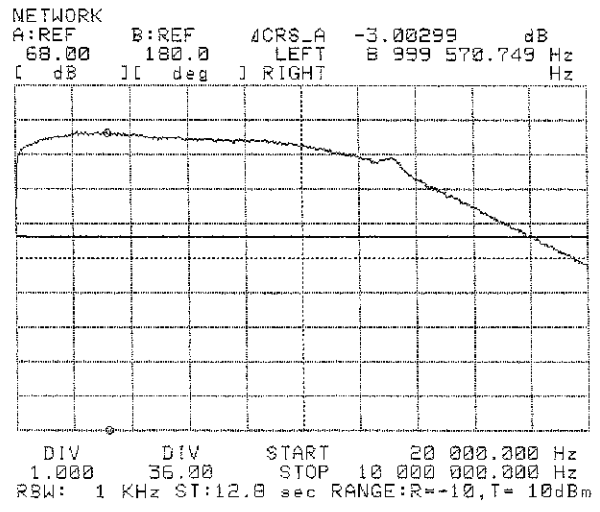
BANDWIDTH ($Z = 470\Omega//47\text{pF}$)

Figure 57 : H1



AN640-57.IMG

Figure 58 : H2



AN640-58.IMG

TEA5704 - STV5712 DEMOBOARD

HARMONIC 2 (Z = 470Ω//100pF)

Figure 59 : H1

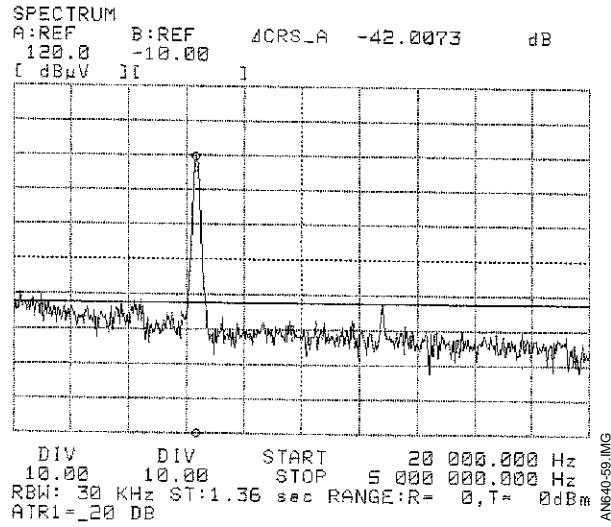
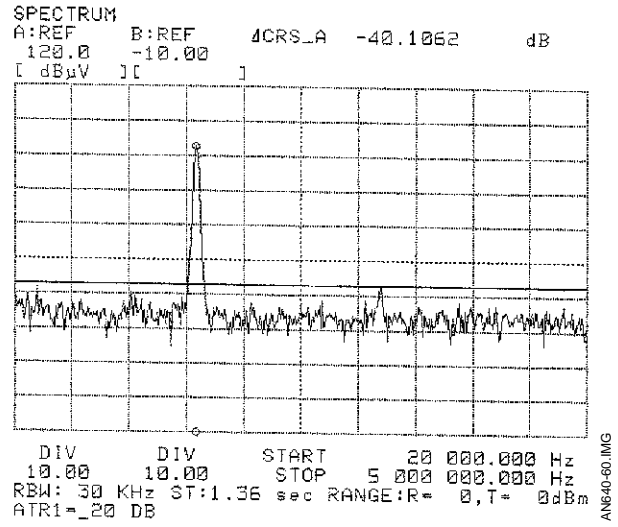


Figure 60 : H2



CROSSTALK MEASUREMENTS

See Figure 61.

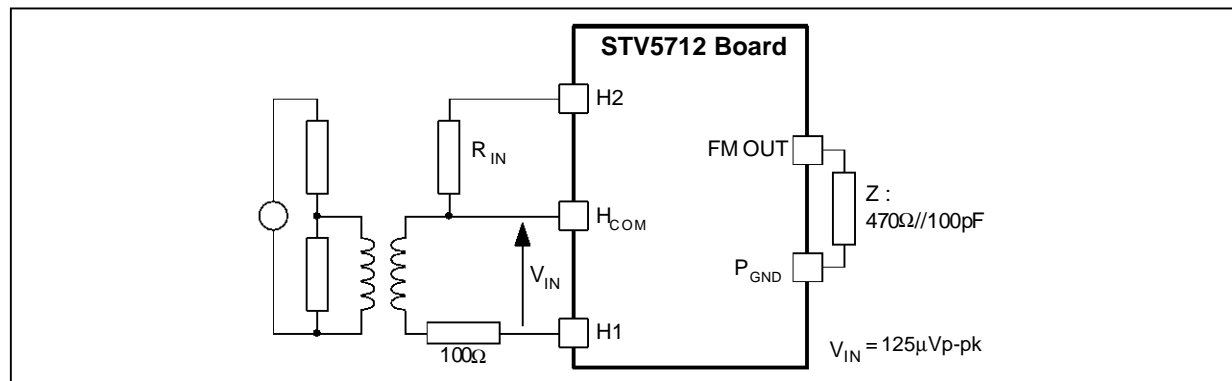
Measuring method : Example crosstalk of H2 on H1 Channel

1. The frequency response of the gain of H1 is measured → (G dB)

2. Then the input signal is supplied to H2, 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 been measured in two cases R_{IN} = 0 and 10kΩ.

Figure 61



CROSSTALK INFLUENCE OF H2 ON H1 CHANNEL

Figure 62 : $R_{IN} = 10k\Omega$

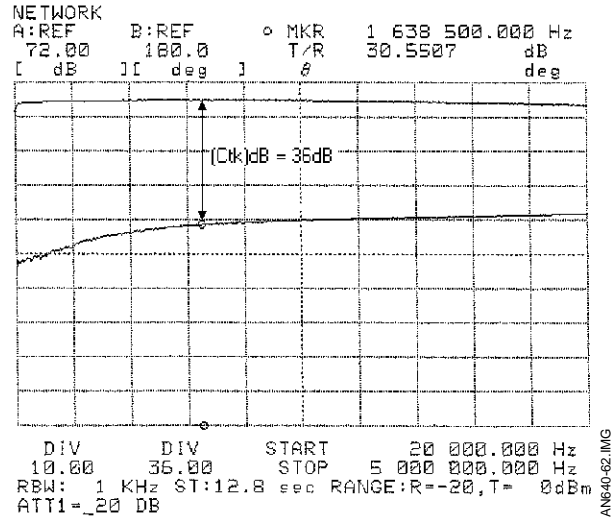
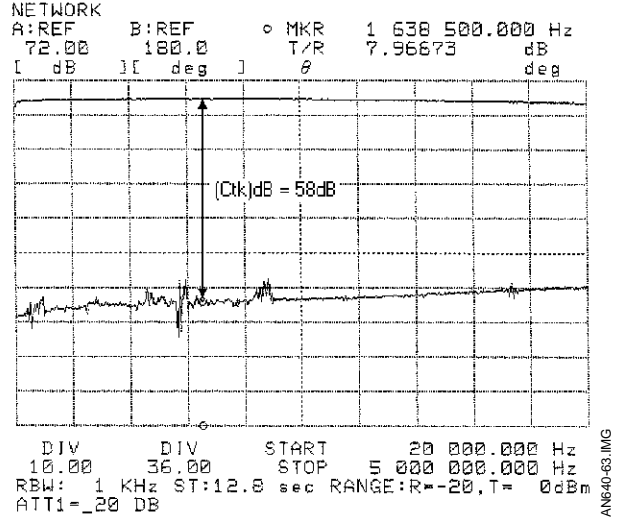


Figure 63 : $R_{IN} = 0\Omega$



CROSSTALK INFLUENCE OF H1 ON H2 CHANNEL

Figure 64 : $R_{IN} = 10k\Omega$

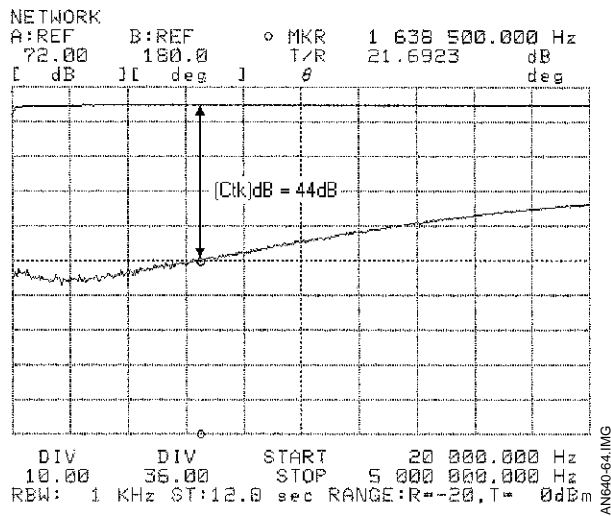
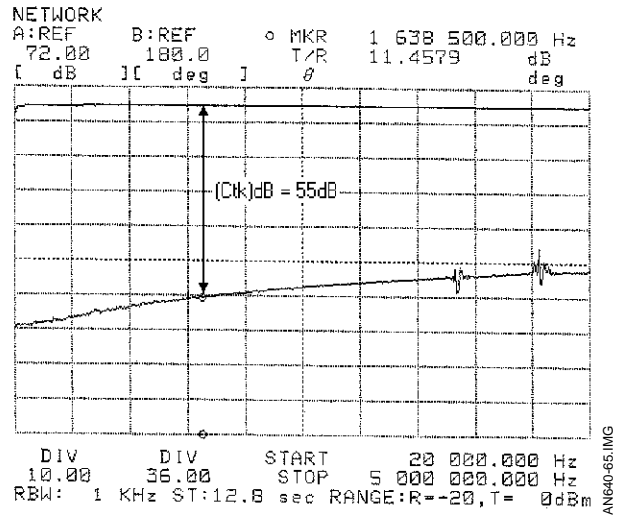


Figure 65 : $R_{IN} = 0\Omega$

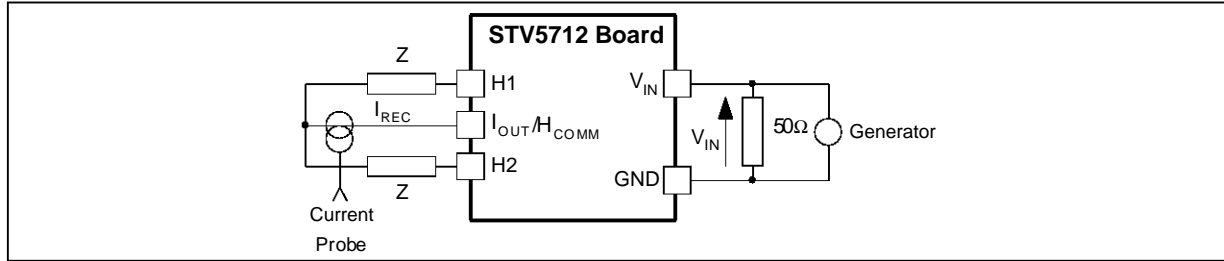


TEA5704 - STV5712 DEMOBOARD

V.1.b - STV5712 Record Mode

BANDWIDTH AND HARMONIC 2 MESURING CIRCUIT

Figure 66



RECORD MODE - HARMONIC 2 (Z = 0Ω)

Figure 67 : I_REC = 60mA p-pk

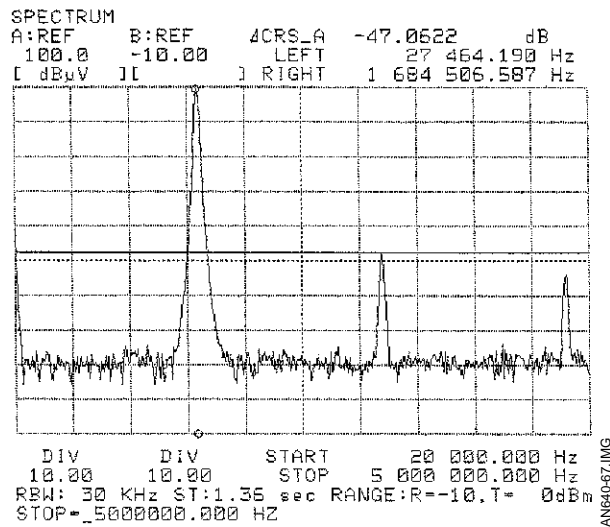
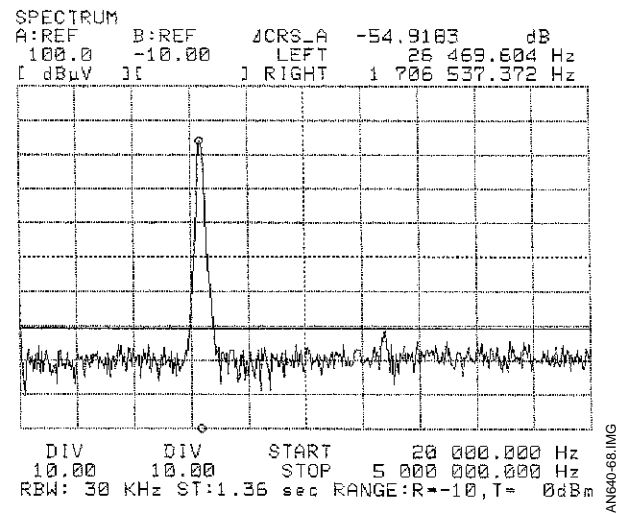


Figure 68 : I_REC = 10mA p-pk



$$\text{BANDWIDTH} : \frac{I_{REC}}{V_{IN}}$$

Figure 69 : Z = 15Ω, I_REC = 60mA p-pk

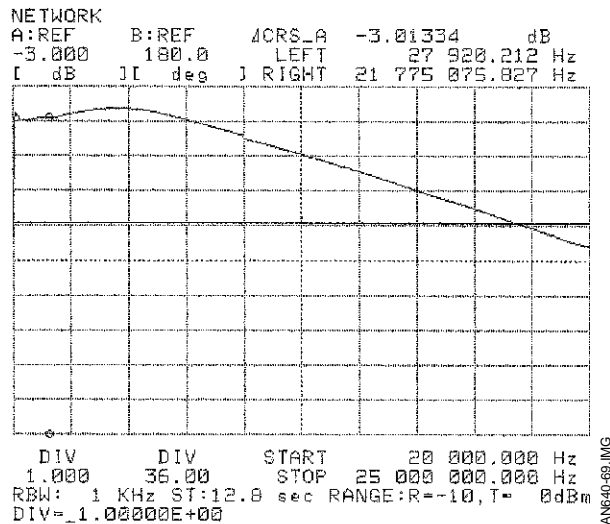
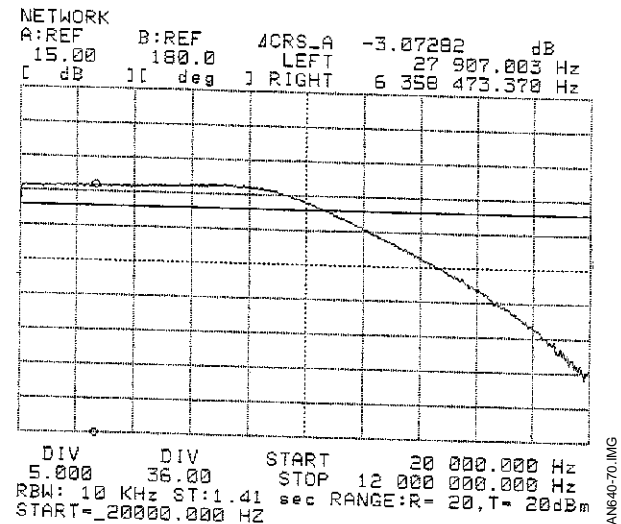


Figure 70 : Z = VTR drum, I_REC = 20mA p-pk (R105 = 330Ω in the damping circuit)



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