APPLICATION NOTE

SPURIOUS MEASUREMENTS ON THE TDA8722/C2A

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Abstract

The TDA8722 is an I²C bus programmable modulator IC for negative video modulation and FM sound. The TDA8722 generates an RF TV channel from a baseband video signal and a baseband audio signal. This report contains the spurious measurements. It is very important to know the level of the harmonics and sub-harmonics in a specific application in order to meet the requirements (e.g.: CENELEC) and / or the specification of the customer.

Purchase of Philips I^2C components conveys a license under the I^2C patent to use the components in the I^2C system, provided the system conforms to the I^2C specifications defined by Philips.

APPLICATION NOTE

SPURIOUS MEASUREMENTS ON THE TDA8722/C2A

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Summary

The TDA8722 is an I²C bus programmable modulator IC for negative video modulation and FM sound. The TDA8722 generates an RF TV channel from a baseband video signal and a baseband audio signal. This report contains the spurious measurements. It is very important to know the level of the harmonics and sub-harmonics in a specific application in order to meet the requirements (e.g.: CENELEC) and / or the specification of the customer.

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1. INTRODUCTION

1.1 The TDA8722

The TDA8722 is an I²C bus programmable modulator IC for negative video modulation and FM sound. The TDA8722 generates an RF TV channel from a baseband video signal and a baseband audio signal. It has been designed to cover the complete UHF frequency range (471.25 MHz ...855.25 MHz). This IC is available in a 20 pins SO (TDA8722T) or SSOP (TDA8722M) package. It is especially suited for satellite receivers, video recorders and cable converters. The picture carrier frequency is set exactly to the right channel frequency by a phase locked loop synthesizer which is programmed according to the I²C bus format. The latest version of this IC is the TDA8722/C2A.

1.2 Spurious Measurements

It is very important to know the level of the harmonics and sub-harmonics in a specific application in order to meet the requirements (e.g.: CENELEC) and / or the specification of the customer.

It is possible to increase performance of the TDA8722 by using a wide band transformer at the output of the IC. In this way, one creates a symmetrical application (see also the measurements of chapter 2), and for instance reduces the level of the second harmonic.

To reduce the out-of-band harmonics and especially the third one in a real application, it is necessary to use a low-pass filter at the output of the IC. On the demo board and also in this measurement no low-pass filter is used in order to measure the performance of the IC only.

1.2.1 Applications of the TDA8722

All the measurements were done on the following applications of the TDA8722:

- Symmetrical output with the use of a wide band transformer
- Asymmetrical output pin 15 (pin 16 loaded with 75 Ω)
- Asymmetrical output pin 16 (pin 15 loaded with 75 Ω)

1.2.2 Measurement

To cover most cases the following measurements were done:

- Level of the second harmonic of the RF oscillator frequency (2*Fp)

  The RF second harmonic (2*Fp) level on an asymmetrical output is maximum -25 dBc (-30 dBc typical) at the low end of the UHF band (Fp = 471.25 MHz) and maximum -15 dBc (-20 dBc typical) at the high end of the UHF band (Fp = 855.25 MHz).
  The level of the RF second harmonic is shown in figure 1 for a symmetrical RF output, in figure 8 for an asymmetrical RF output at pin 15 and in figure 15 for an asymmetrical RF output at pin 16.

- Level of the third harmonic of the RF oscillator frequency (3*Fp)

  There is no specification point for the level of the RF third harmonic (3*Fp) included in the data sheet.
  The level of the RF third harmonic is shown in figure 2 for a symmetrical RF output, in figure 9 for an asymmetrical RF output at pin 15 and in figure 16 for an asymmetrical RF output at pin 16.

- Level of the spurious outside channel at 0.5*Fp
- Level of the spurious outside channel at 1.5*Fp
- Level of the spurious outside channel at 2.5*Fp

  The data sheet of the TDA8722/C2A gives for spurious outside channel a value of -62 dBc typical. Except for the harmonics of the RF oscillator frequency (Fp) and for the combinations between the RF oscillator frequency and the sound oscillator frequency (Fp+2*Fs, Fp+3*Fs, etc.). This measurement includes the spurious at 0.25*Fp, 0.5*Fp, 0.75*Fp, etc.

- Level of the sound carrier second harmonic (Fp+2*Fs)

  The sound carrier second harmonic (Fp+2*Fs) level for a sound carrier frequency of 5.5 MHz is maximum -60 dBc (-65 dBc typical) for Fp < 700 MHz and maximum -58 dBc (-63 dBc typical) for Fp > 700 MHz (with capacitor on pin 17 of the IC of C_{ADJUST} = 15 pF).

- Level of the sound carrier third harmonic (Fp+3*Fs)

  The sound carrier third harmonic (Fp+3*Fs) level for a sound carrier frequency of 5.5 MHz is maximum -60 dBc (-65 dBc typical) for the complete UHF band.

This IC has been designed to have the lowest level of unwanted RF harmonics at the frequencies where these are the hardest to be filtered out, especially for the second harmonic of the RF carrier (2*Fp) at the lowest frequencies of the UHF band.

Due to differences in IC-batches and design of the application the level of the harmonics can vary.

In order to get a clear picture 11 channels in the UHF band have been measured. The levels of the (sub-) harmonics have been measured with a Spectrum Analyzer (Hewlett Packard HP8595E): Span 500 kHz, Resolution Bandwidth 3 kHz, Video Bandwidth 3 kHz and Attenuation 0 dB.

- The IC batch number of the SO20 sample is: j14227 - jnj9522_2.
- The IC batch number of the SSOP20 sample is: j12054 - sj501 _2.

In table 1 all frequencies of the measured harmonics and sub-harmonics are shown.

TABLE 1

CHAN.	FREQ. [MHz]	freq. 2*Fp [MHz]	freq. 3*Fp [MHz]	freq. 0.5*Fp [MHz]	freq. 1.5*Fp [MHz]	freq. 2.5*Fp [MHz]	freq. Fp+2Fs [MHz]	freq. Fp+3Fs [MHz]
21	471.25	942.5	1413.75	235.625	706.875	1178.125	482.25	487.75
25	503.25	1006.5	1509.75	251.625	754.875	1258.125	514.25	519.75
30	543.25	1086.5	1629.75	271.625	814.875	1358.125	554.25	559.75
35	583.25	1166.5	1749.75	291.625	874.875	1458.125	594.25	599.75
40	623.25	1246.5	1869.75	311.625	934.875	1558.125	634.25	639.75
45	663.25	1326.5	1989.75	331.625	994.875	1658.125	674.25	679.75
50	703.25	1406.5	2109.75	351.625	1054.875	1758.125	714.25	719.75
55	743.25	1486.5	2229.75	371.625	1114.875	1858.125	754.25	759.75
60	783.25	1566.5	2349.75	391.625	1174.875	1958.125	794.25	799.75
65	823.25	1646.5	2469.75	411.625	1234.875	2058.125	834.25	839.75
69	855.25	1710.5	2565.75	427.625	1282.875	2138.125	866.25	871.75

The TDA8722 is available in both SO20 package and SSOP20 package. A demo board is available for both packages. Since the results of the spurious measurement can vary due to differences between an SO and SSOP package, measurements have been done on both the packages.

- In APPENDIX 1 the schematic and layout of the demo board PR36828 for the TDA8722T/C2A (SO20 package) are shown.
- In APPENDIX 2 the schematic and layout of the demo board PR36826 for the TDA8722M/C2A (SSOP20 package) are shown.

2. SPURIOUS MEASUREMENTS TDA8722/C2A WITH SYMMETRICAL RF OUTPUT

2.1 Level of 2*Fp

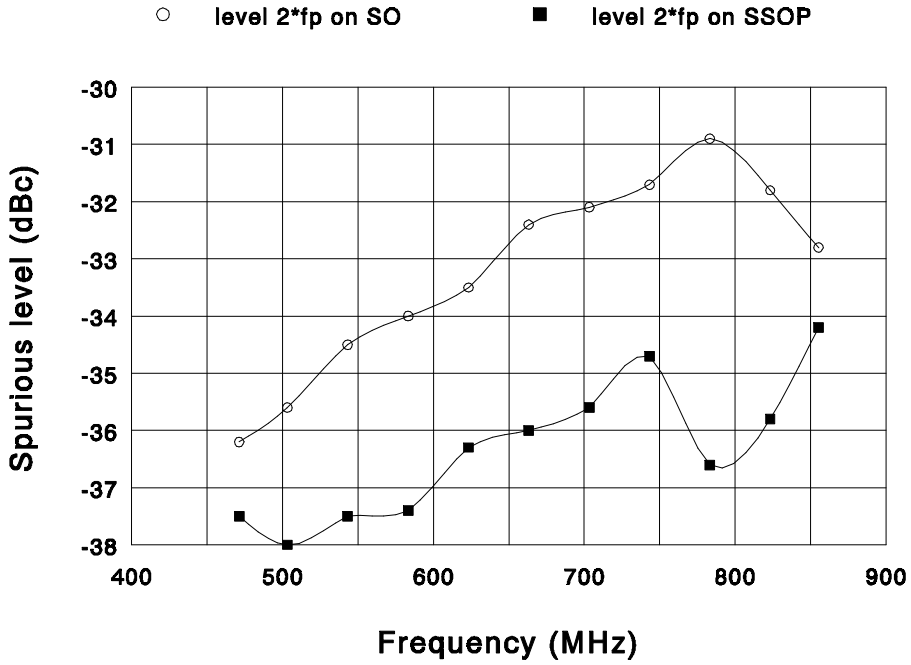

Fig. 1

TABLE 2

CHANNEL	FREQ. [MHz]	Level 2*Fp on SO [dBc]	Level 2*Fp on SSOP [dBc]
21	471.25	-36.2	-37.5
25	503.25	-35.6	-38.0
30	543.25	-34.5	-37.5
35	583.25	-34.0	-37.4
40	623.25	-33.5	-36.3
45	663.25	-32.4	-36.0
50	703.25	-32.1	-35.6
55	743.25	-31.7	-34.7
60	783.25	-30.9	-36.6
65	823.25	-31.8	-35.8
69	855.25	-32.8	-34.2

2.2 Level of 3*Fp

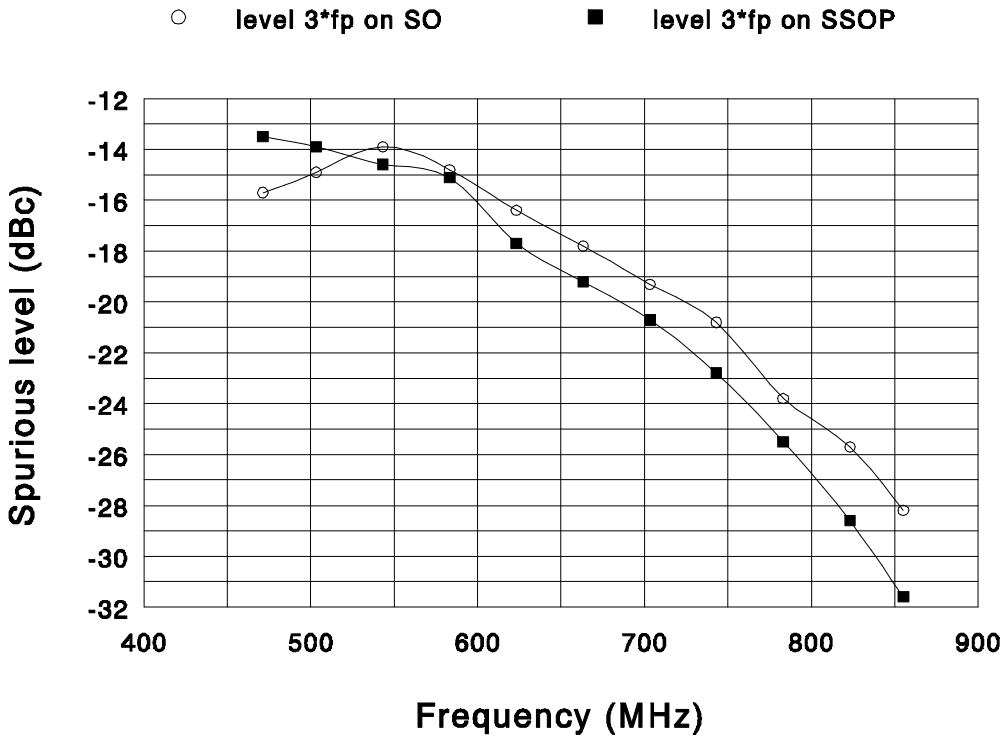

Fig. 2

TABLE 3

CHANNEL	FREQ. [MHz]	Level 3*Fp on SO [dBc]	Level 3*Fp on SSOP [dBc]
21	471.25	-15.7	-13.5
25	503.25	-14.9	-13.9
30	543.25	-13.9	-14.6
35	583.25	-14.8	-15.1
40	623.25	-16.4	-17.7
45	663.25	-17.8	-19.2
50	703.25	-19.3	-20.7
55	743.25	-20.8	-22.8
60	783.25	-23.8	-25.5
65	823.25	-25.7	-28.6
69	855.25	-28.2	-31.6

2.3 Level of 0.5*Fp

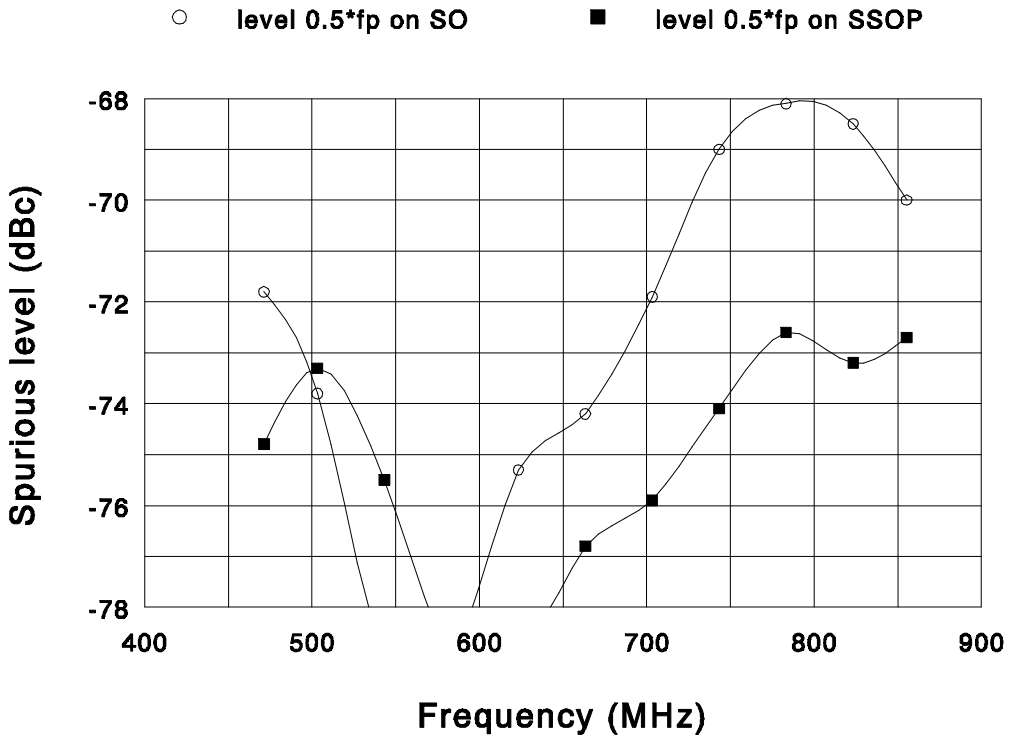

Fig. 3

TABLE 4

CHANNEL	FREQ. [MHz]	Level 0.5*Fp on SO [dBc]	Level 0.5*Fp on SSOP [dBc]
21	471.25	-71.8	-74.8
25	503.25	-73.8	-73.3
30	543.25	>78	-75.5
35	583.25	>78	>78
40	623.25	-75.3	>78
45	663.25	-74.2	-76.8
50	703.25	-71.9	-75.9
55	743.25	-69.0	-74.1
60	783.25	-68.1	-72.6
65	823.25	-68.5	-73.2
69	855.25	-70.0	-72.7

2.4 Level of 1.5*Fp

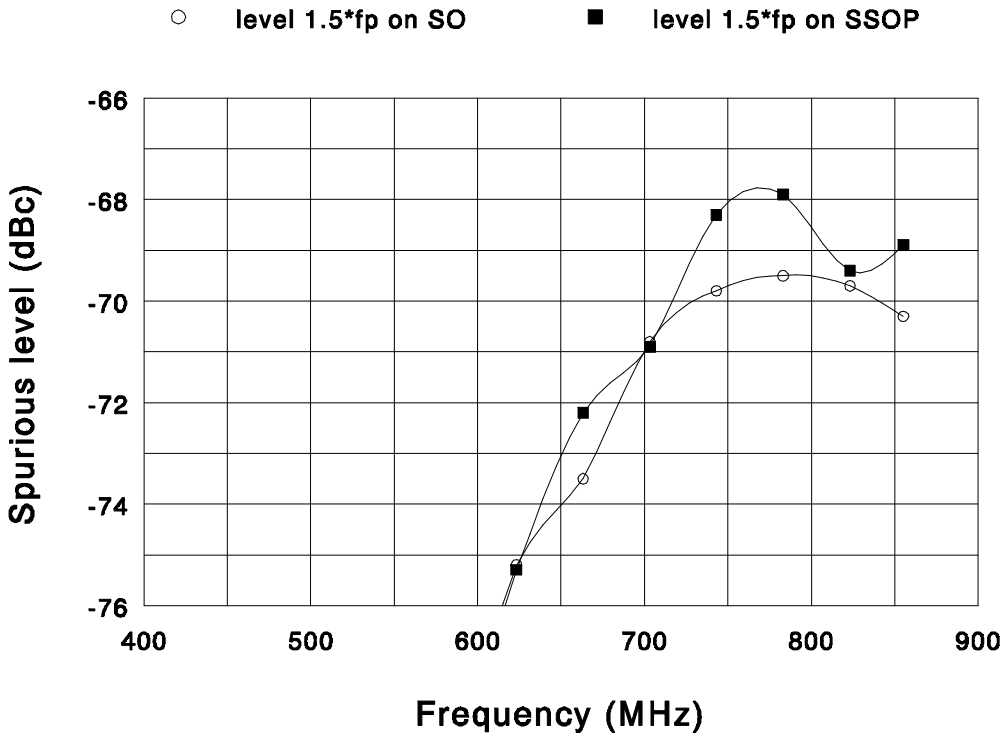

Fig. 4

TABLE 5

CHANNEL	FREQ. [MHz]	Level 1.5*Fp on SO [dBc]	Level 1.5*Fp on SSOP [dBc]
21	471.25	>78	>78
25	503.25	>78	>78
30	543.25	>78	>78
35	583.25	>78	>78
40	623.25	-75.2	-75.3
45	663.25	-73.5	-72.2
50	703.25	-70.8	-70.9
55	743.25	-69.8	-68.3
60	783.25	-69.5	-67.9
65	823.25	-69.7	-69.4
69	855.25	-70.3	-68.9

2.5 Level of 2.5*Fp

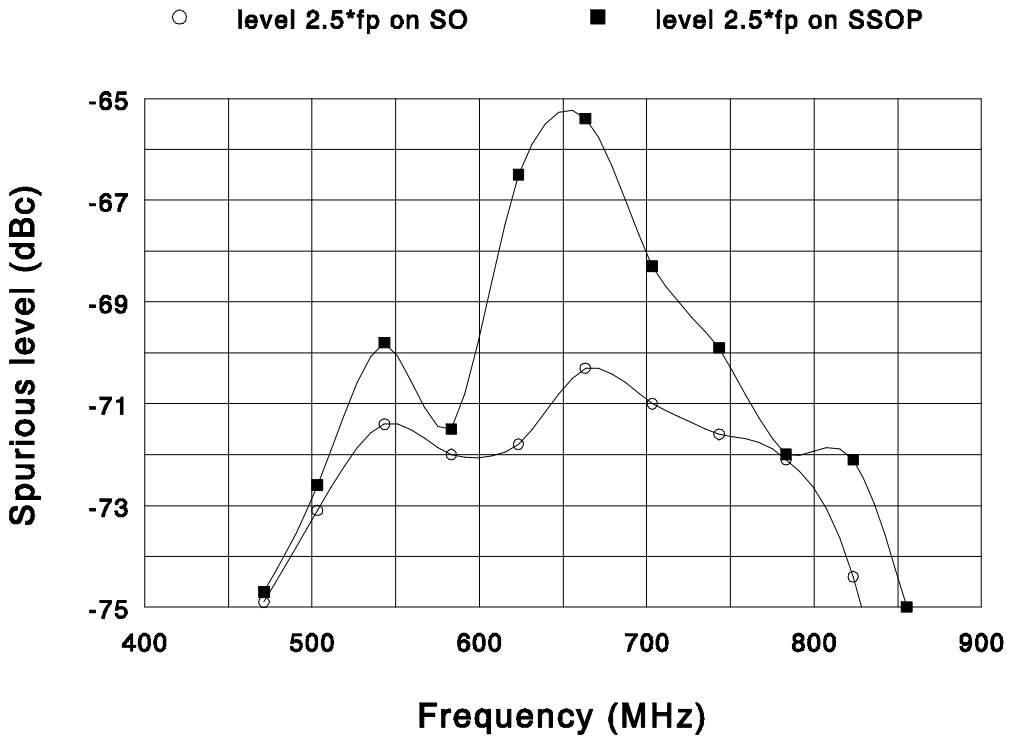

Fig. 5

TABLE 6

CHANNEL	FREQ.[MHz]	Level 2.5*Fp on SO [dBc]	Level 2.5*Fp on SSOP [dBc]
21	471.25	-74.9	-74.7
25	503.25	-73.1	-72.6
30	543.25	-71.4	-69.8
35	583.25	-72.0	-71.5
40	623.25	-71.8	-66.5
45	663.25	-70.3	-65.4
50	703.25	-71.0	-68.3
55	743.25	-71.6	-69.9
60	783.25	-72.1	-72.0
65	823.25	-74.4	-72.1
69	855.25	>78	-75.0

2.6 Level of Fp+2*Fs

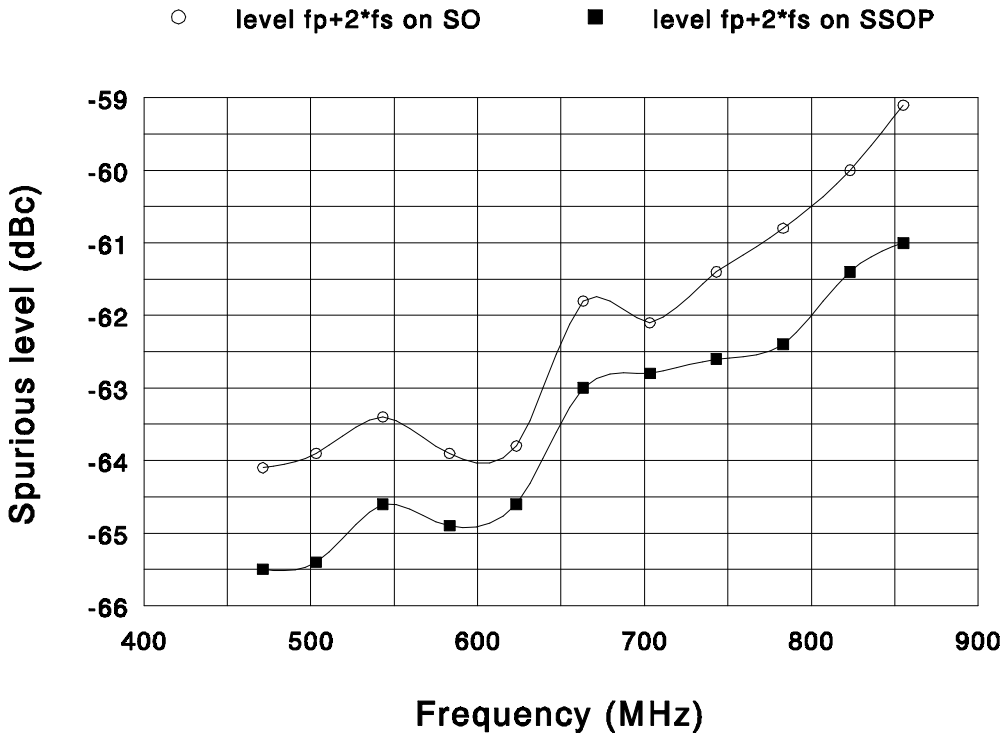

Fig. 6

TABLE 7

CHANNEL	FREQ. [MHz]	Level Fp+2*Fs on SO [dBc]	Level Fp+2*Fs on SSOP [dBc]
21	471.25	-64.1	-65.5
25	503.25	-63.9	-65.4
30	543.25	-63.4	-64.6
35	583.25	-63.9	-64.9
40	623.25	-63.8	-64.6
45	663.25	-61.8	-63.0
50	703.25	-62.1	-62.8
55	743.25	-61.4	-62.6
60	783.25	-60.8	-62.4
65	823.25	-60.0	-61.4
69	855.25	-59.1	-61.0

2.7 Level of Fp+3*Fs

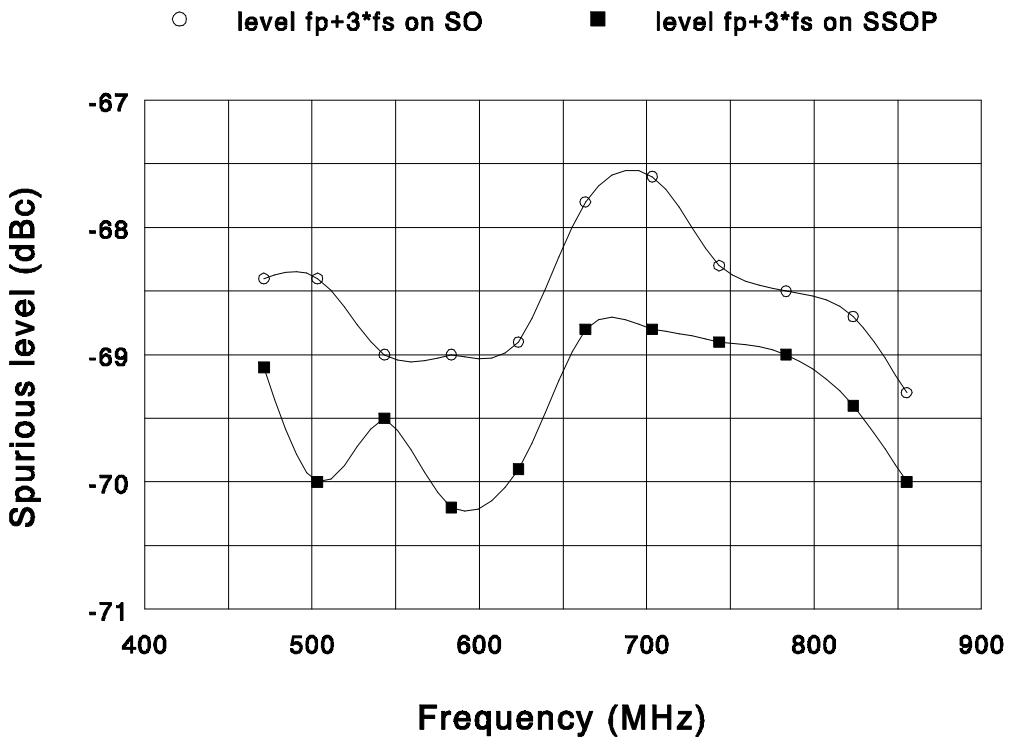

Fig. 7

TABLE 8

CHANNEL	FREQ. [MHz]	Level Fp+3*Fs on SO [dBc]	Level Fp+3*Fs on SSOP [dBc]
21	471.25	-68.4	-69.1
25	503.25	-68.4	-70.0
30	543.25	-69.0	-69.5
35	583.25	-69.0	-70.2
40	623.25	-68.9	-69.9
45	663.25	-67.8	-68.8
50	703.25	-67.6	-68.8
55	743.25	-68.3	-68.9
60	783.25	-68.5	-69.0
65	823.25	-68.7	-69.4
69	855.25	-69.3	-70.0

3. SPURIOUS MEASUREMENTS TDA8722/C2A WITH ASYMMETRICAL RF OUTPUT

3.1 Asymmetrical RF-output pin 15

3.1.1 Level of 2*Fp

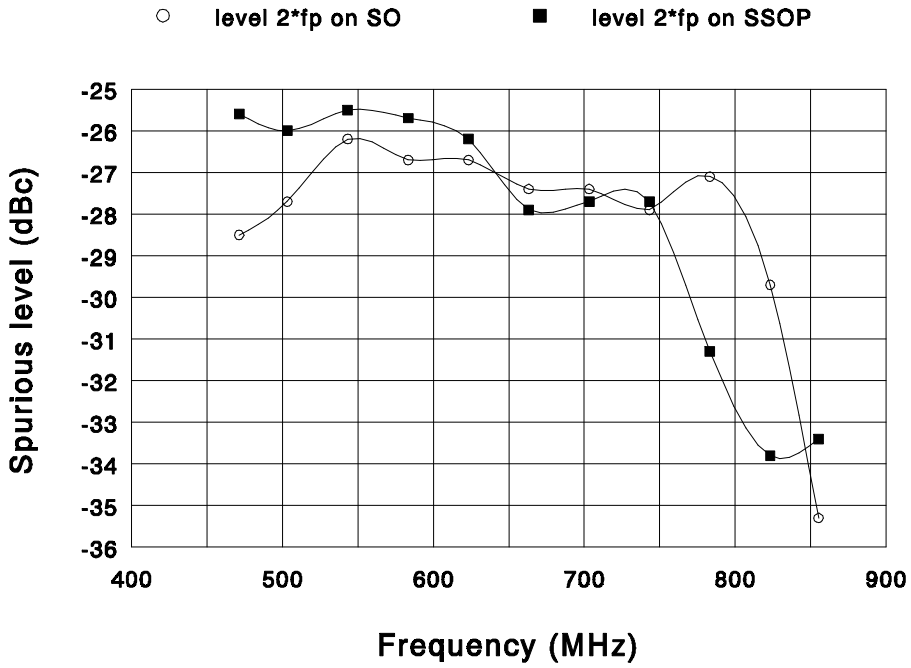

Fig. 8

TABLE 9

CHANNEL	FREQ. [MHz]	Level 2*Fp on SO [dBc]	Level 2*Fp on SSOP [dBc]
21	471.25	-28.5	-25.6
25	503.25	-27.7	-26.0
30	543.25	-26.2	-25.5
35	583.25	-26.7	-25.7
40	623.25	-26.7	-26.2
45	663.25	-27.4	-27.9
50	703.25	-27.4	-27.7
55	743.25	-27.9	-27.7
60	783.25	-27.1	-31.3
65	823.25	-29.7	-33.8
69	855.25	-35.3	-33.4

3.1.2 Level of 3*Fp

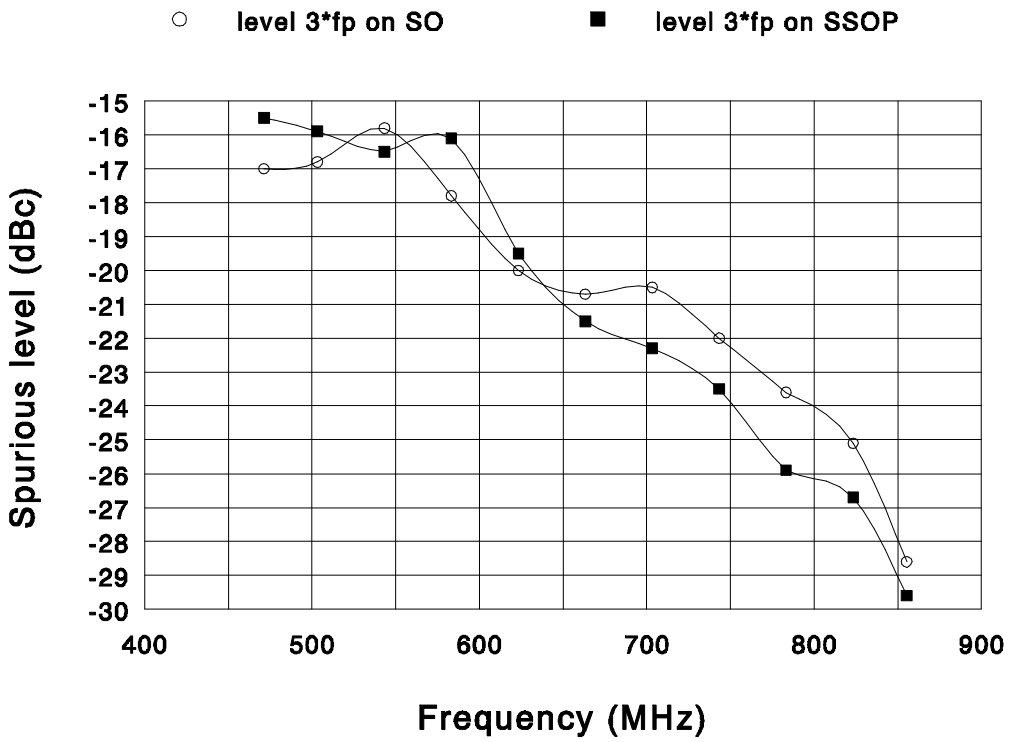

Fig. 9

TABLE 10

CHANNEL	FREQ. [MHz]	Level 3*Fp on SO [dBc]	Level 3*Fp on SSOP [dBc]
21	471.25	-17.0	-15.5
25	503.25	-16.8	-15.9
30	543.25	-15.8	-16.5
35	583.25	-17.8	-16.1
40	623.25	-20.0	-19.5
45	663.25	-20.7	-21.5
50	703.25	-20.5	-22.3
55	743.25	-22.0	-23.5
60	783.25	-23.6	-25.9
65	823.25	-25.1	-26.7
69	855.25	-28.6	-29.6

3.1.3 Level of 0.5*Fp

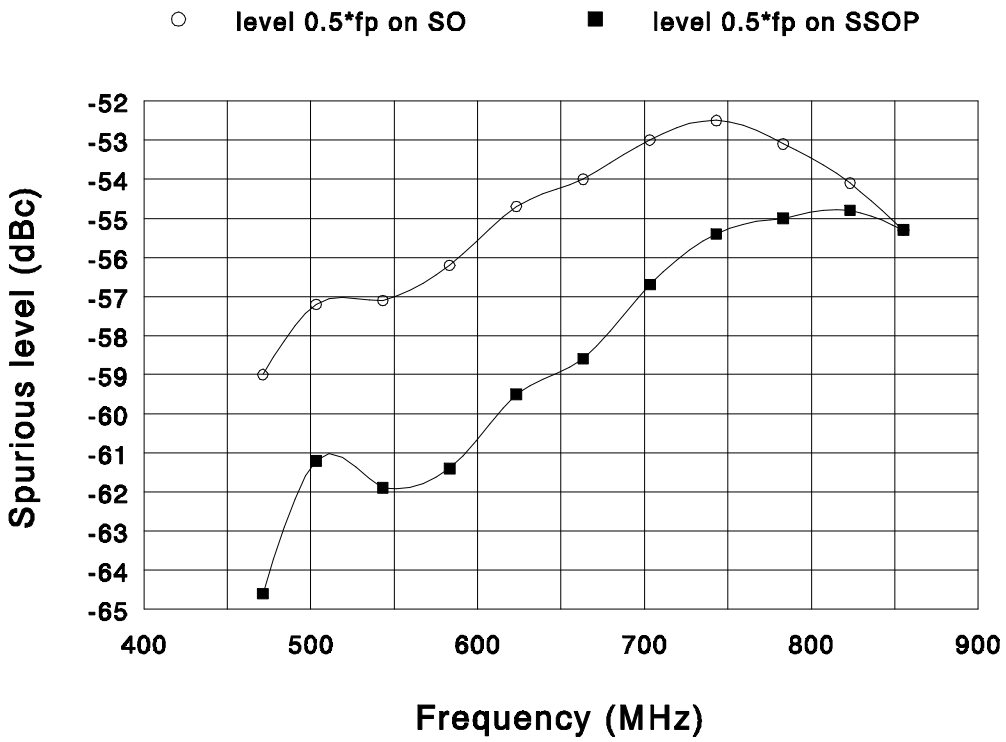

Fig. 10

TABLE 11

CHANNEL	FREQ. [MHz]	Level 0.5*Fp on SO [dBc]	Level 0.5*Fp on SSOP [dBc]
21	471.25	-59.0	-64.6
25	503.25	-57.2	-61.2
30	543.25	-57.1	-61.9
35	583.25	-56.2	-61.4
40	623.25	-54.7	-59.5
45	663.25	-54.0	-58.6
50	703.25	-53.0	-56.7
55	743.25	-52.5	-55.4
60	783.25	-53.1	-55.0
65	823.25	-54.1	-54.8
69	855.25	-55.3	-55.3

3.1.4 Level of 1.5*Fp

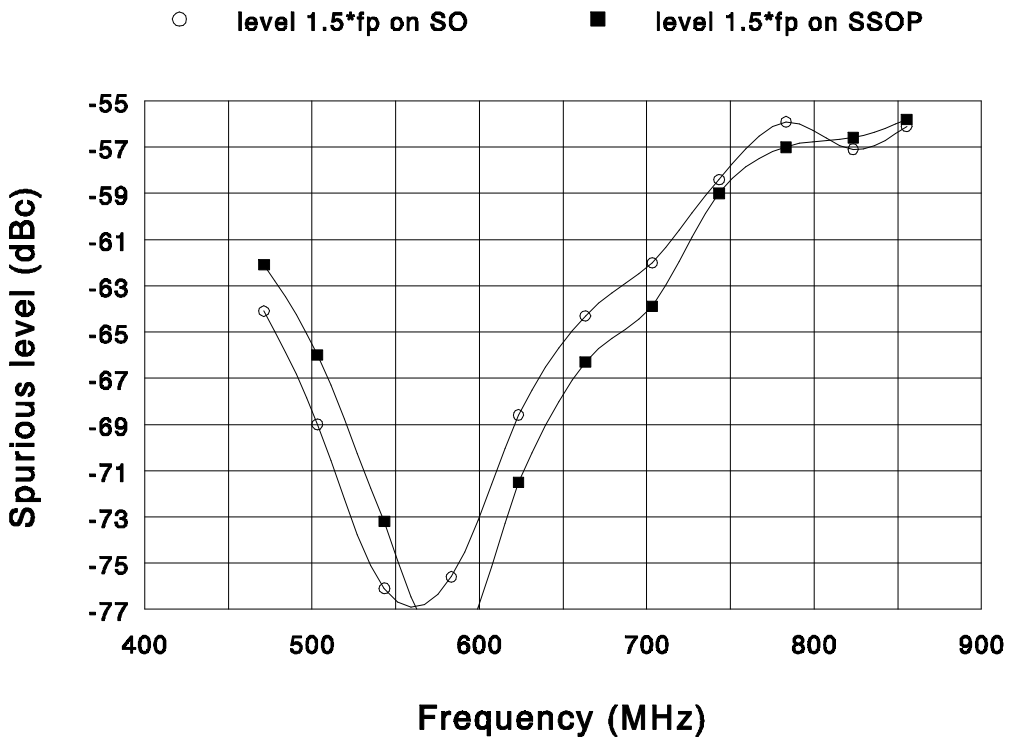

Fig. 11

TABLE 12

CHANNEL	FREQ. [MHz]	Level 1.5*Fp on SO [dBc]	Level 1.5*Fp on SSOP [dBc]
21	471.25	-64.1	-62.1
25	503.25	-69.0	-66.0
30	543.25	-76.1	-73.2
35	583.25	-75.6	>78
40	623.25	-68.6	-71.5
45	663.25	-64.3	-66.3
50	703.25	-62.0	-63.9
55	743.25	-58.4	-59.0
60	783.25	-55.9	-57.0
65	823.25	-57.1	-56.6
69	855.25	-56.1	-55.8

3.1.5 Level of 2.5*Fp

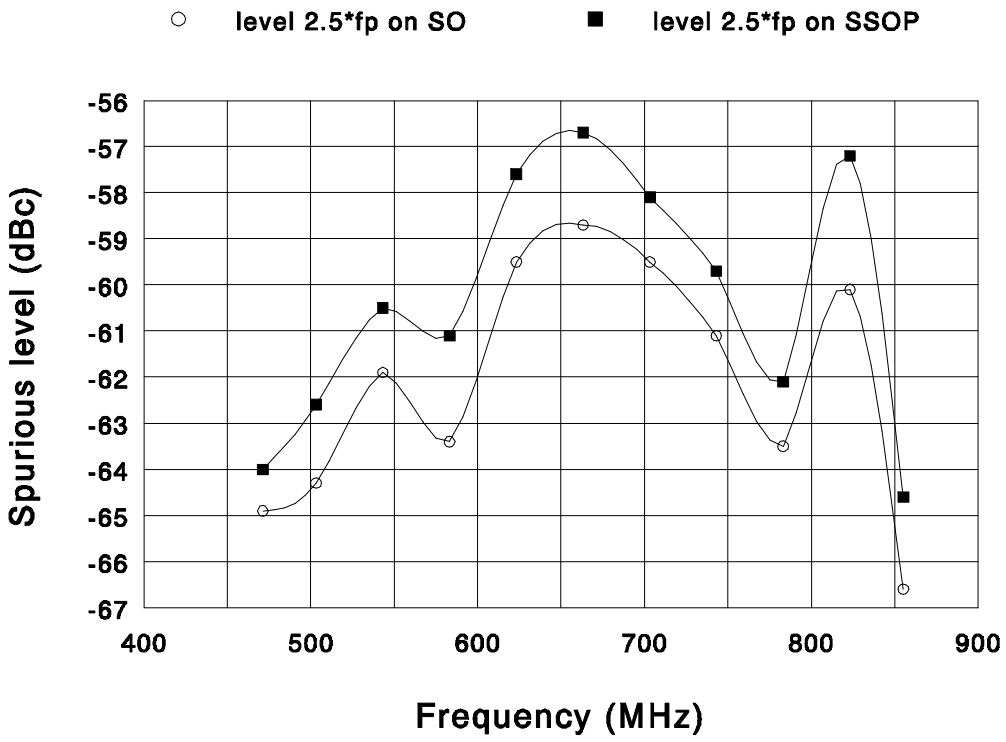

Fig. 12

TABLE 13

CHANNEL	FREQ. [MHz]	Level 2.5*Fp on SO [dBc]	Level 2.5*Fp on SSOP [dBc]
21	471.25	-64.9	-64.0
25	503.25	-64.3	-62.6
30	543.25	-61.9	-60.5
35	583.25	-63.4	-61.1
40	623.25	-59.5	-57.6
45	663.25	-58.7	-56.7
50	703.25	-59.5	-58.1
55	743.25	-61.1	-59.7
60	783.25	-63.5	-62.1
65	823.25	-60.1	-57.2
69	855.25	-66.6	-64.6

3.1.6 Level of Fp+2*Fs

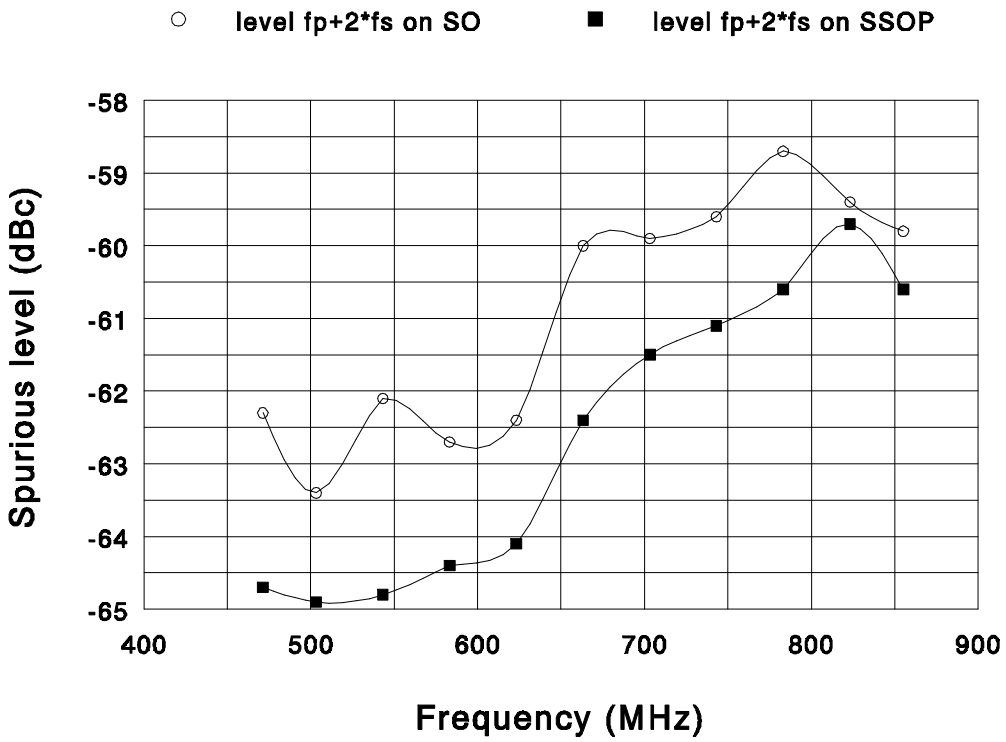

Fig. 13

TABLE 14

CHANNEL	FREQ. [MHz]	Level Fp+2*Fs on SO [dBc]	Level Fp+2*Fs on SSOP [dBc]
21	471.25	-62.3	-64.7
25	503.25	-63.4	-64.9
30	543.25	-62.1	-64.8
35	583.25	-62.7	-64.4
40	623.25	-62.4	-64.1
45	663.25	-60.0	-62.4
50	703.25	-59.9	-61.5
55	743.25	-59.6	-61.1
60	783.25	-58.7	-60.6
65	823.25	-59.4	-59.7
69	855.25	-59.8	-60.6

3.1.7 Level of Fp+3*Fs

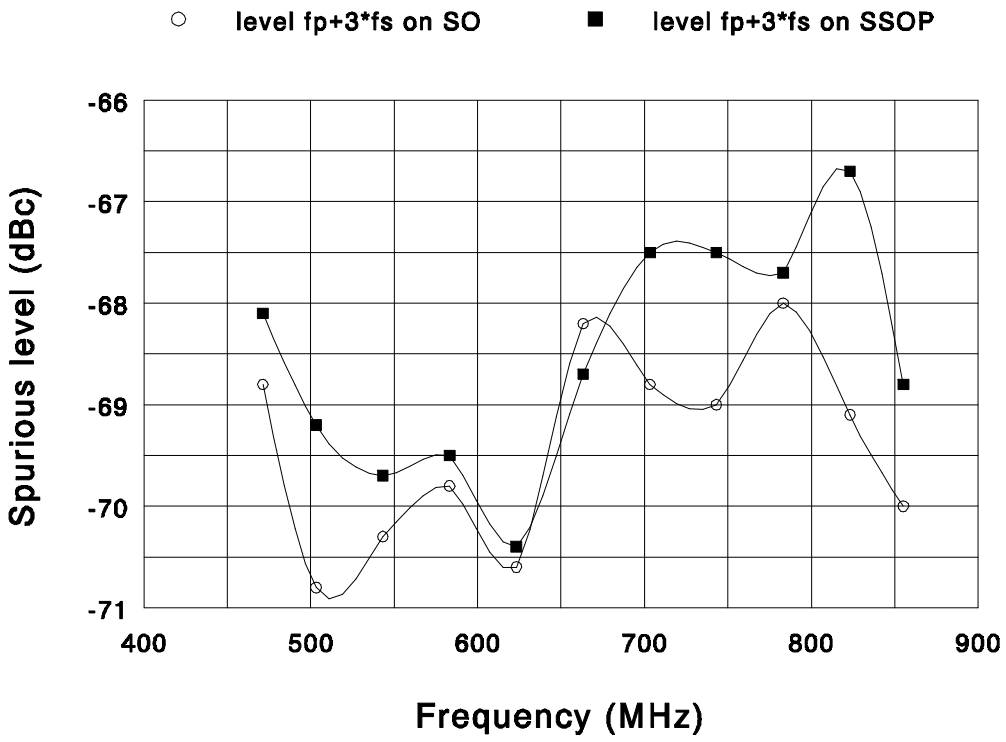

Fig. 14

TABLE 15

CHANNEL	FREQ. [MHz]	Level Fp+3*Fs on SO [dBc]	Level Fp+3*Fs on SSOP [dBc]
21	471.25	-68.8	-68.1
25	503.25	-70.8	-69.2
30	543.25	-70.3	-69.7
35	583.25	-69.8	-69.5
40	623.25	-70.6	-70.4
45	663.25	-68.2	-68.7
50	703.25	-68.8	-67.5
55	743.25	-69.0	-67.5
60	783.25	-68.0	-67.7
65	823.25	-69.1	-66.7
69	855.25	-70.0	-68.8

3.2 Asymmetrical RF-output pin 16

3.2.1 Level of 2*Fp

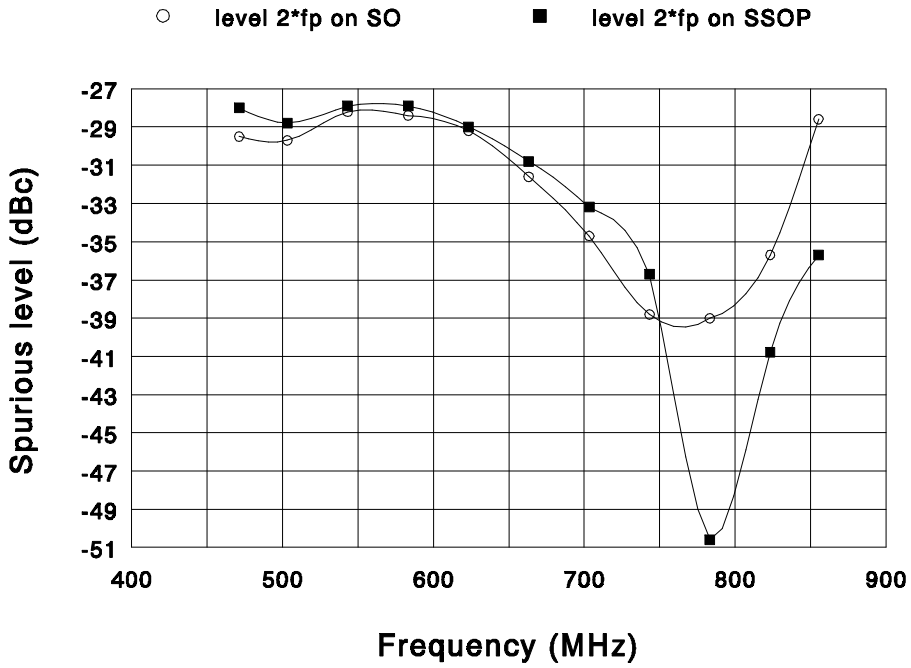

Fig. 15

TABLE 16

CHANNEL	FREQ. [MHz]	Level 2*Fp on SO [dBc]	Level 2*Fp on SSOP [dBc]
21	471.25	-29.5	-28.0
25	503.25	-29.7	-28.8
30	543.25	-28.2	-27.9
35	583.25	-28.4	-27.9
40	623.25	-29.2	-29.0
45	663.25	-31.6	-30.8
50	703.25	-34.7	-33.2
55	743.25	-38.8	-36.7
60	783.25	-39.0	-50.6
65	823.25	-35.7	-40.8
69	855.25	-28.6	-35.7

3.2.2 Level of 3*Fp

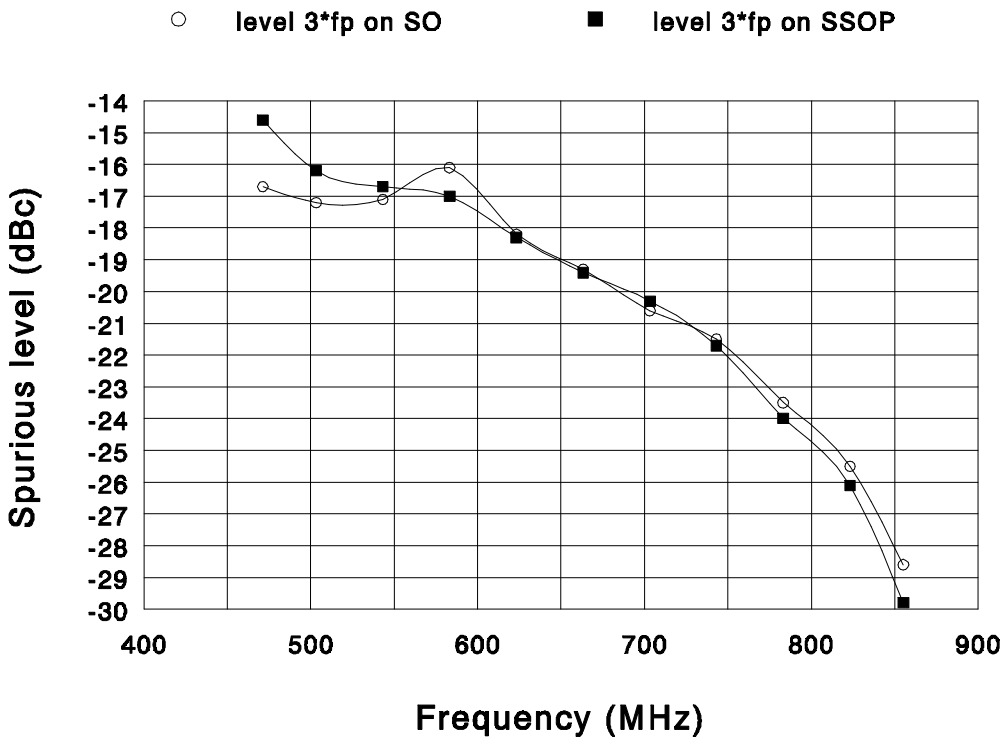

Fig. 16

TABLE 17

CHANNEL	FREQ. [MHz]	Level 3*Fp on SO [dBc]	Level 3*Fp on SSOP [dBc]
21	471.25	-16.7	-14.6
25	503.25	-17.2	-16.2
30	543.25	-17.1	-16.7
35	583.25	-16.1	-17.0
40	623.25	-18.2	-18.3
45	663.25	-19.3	-19.4
50	703.25	-20.6	-20.3
55	743.25	-21.5	-21.7
60	783.25	-23.5	-24.0
65	823.25	-25.5	-26.1
69	855.25	-28.6	-29.8

3.2.3 Level of 0.5*Fp

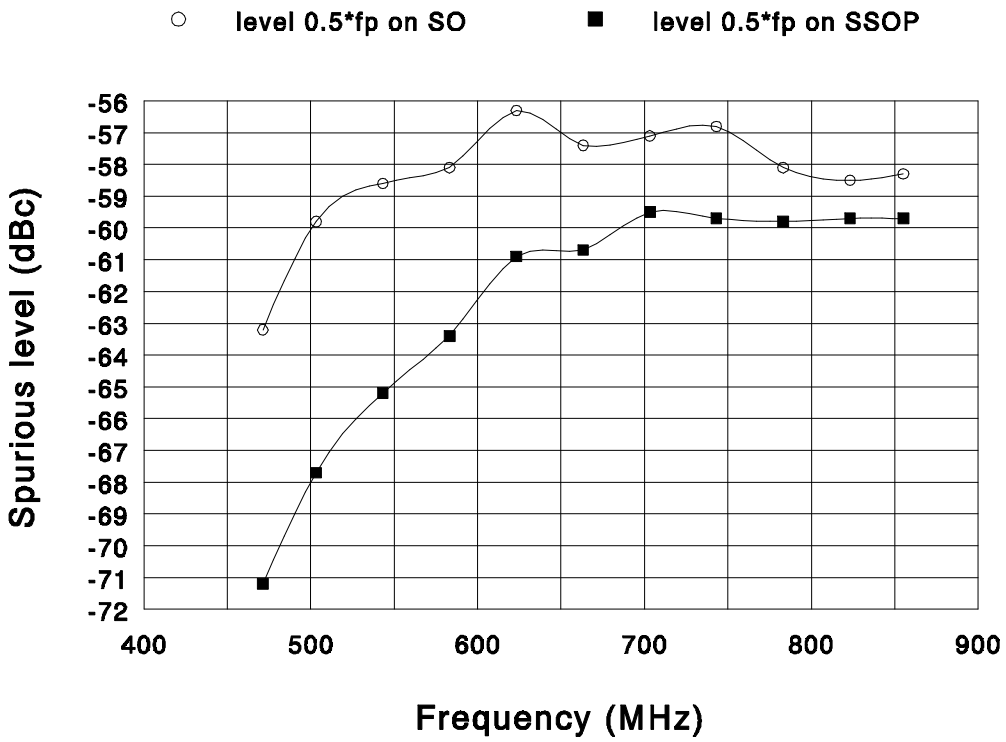

Fig. 17

TABLE 18

CHANNEL	FREQ. [MHz]	Level 0.5*Fp on SO [dBc]	Level 0.5*Fp on SSOP [dBc]
21	471.25	-63.2	-71.2
25	503.25	-59.8	-67.7
30	543.25	-58.6	-65.2
35	583.25	-58.1	-63.4
40	623.25	-56.3	-60.9
45	663.25	-57.4	-60.7
50	703.25	-57.1	-59.5
55	743.25	-56.8	-59.7
60	783.25	-58.1	-59.8
65	823.25	-58.5	-59.7
69	855.25	-58.3	-59.7

3.2.4 Level of 1.5*Fp

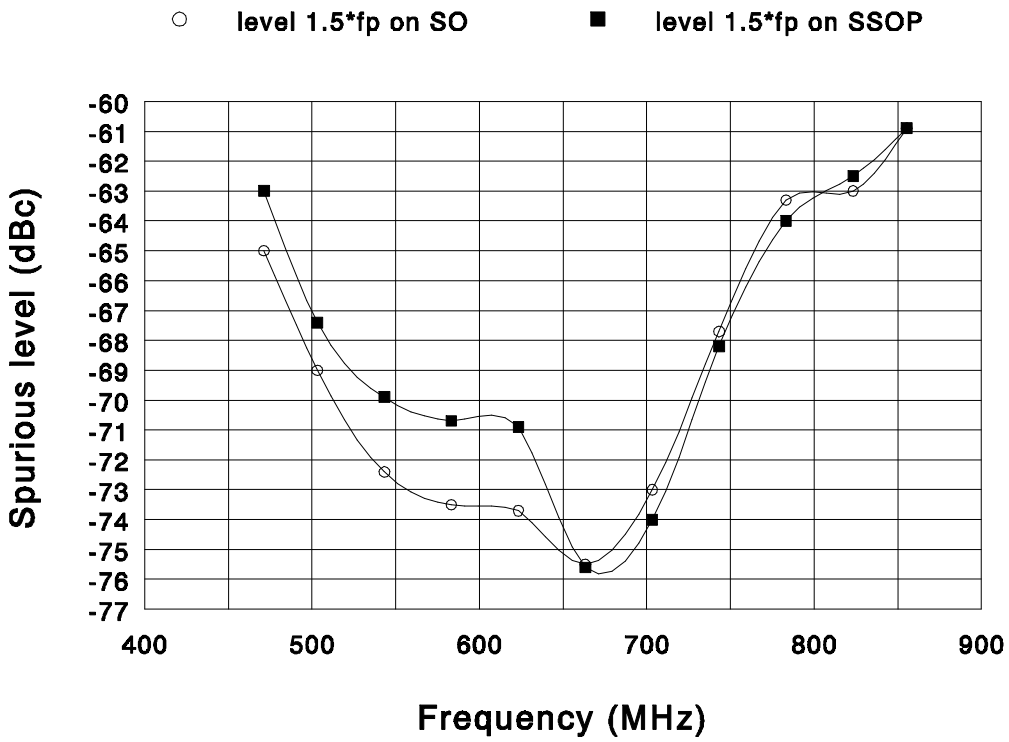

Fig. 18

TABLE 19

CHANNEL	FREQ. [MHz]	Level 1.5*Fp on SO [dBc]	Level 1.5*Fp on SSOP [dBc]
21	471.25	-65.0	-63.0
25	503.25	-69.0	-67.4
30	543.25	-72.4	-69.9
35	583.25	-73.5	-70.7
40	623.25	-73.7	-70.9
45	663.25	-75.5	-75.6
50	703.25	-73.0	-74.0
55	743.25	-67.7	-68.2
60	783.25	-63.3	-64.0
65	823.25	-63.0	-62.5
69	855.25	-60.9	-60.9

3.2.5 Level of 2.5*Fp

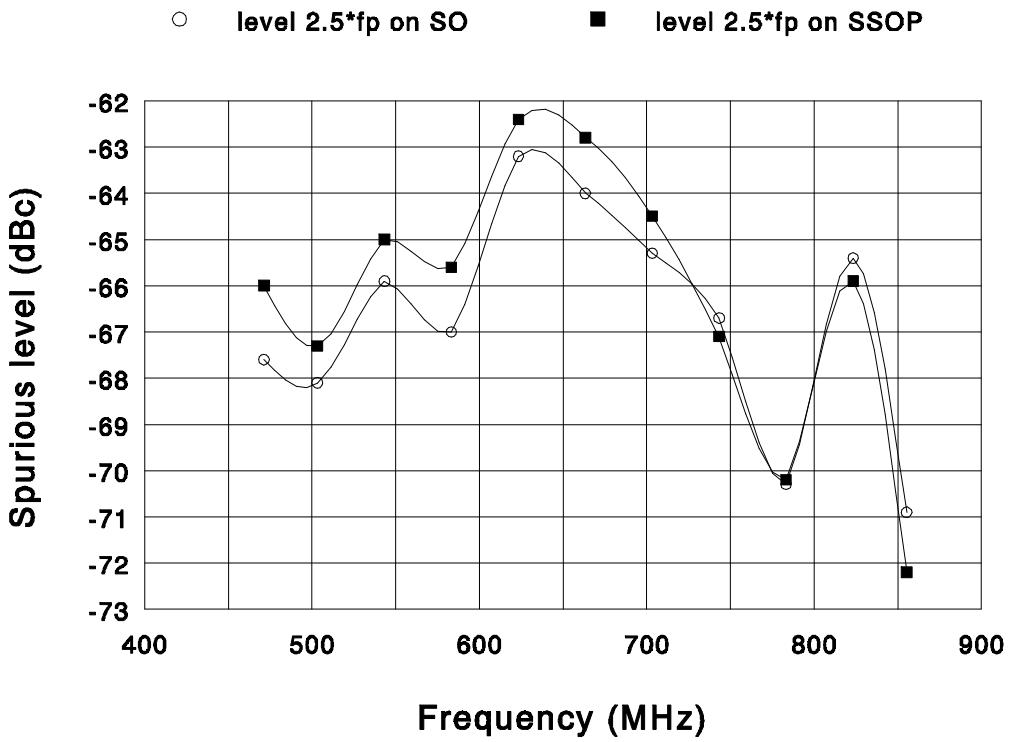

Fig. 19

TABLE 20

CHANNEL	FREQ. [MHz]	Level 2.5*Fp on SO [dBc]	Level 2.5*Fp on SSOP [dBc]
21	471.25	-67.6	-66.0
25	503.25	-68.1	-67.3
30	543.25	-65.9	-65.0
35	583.25	-67.0	-65.6
40	623.25	-63.2	-62.4
45	663.25	-64.0	-62.8
50	703.25	-65.3	-64.5
55	743.25	-66.7	-67.1
60	783.25	-70.3	-70.2
65	823.25	-65.4	-65.9
69	855.25	-70.9	-72.2

3.2.6 Level of Fp+2*Fs

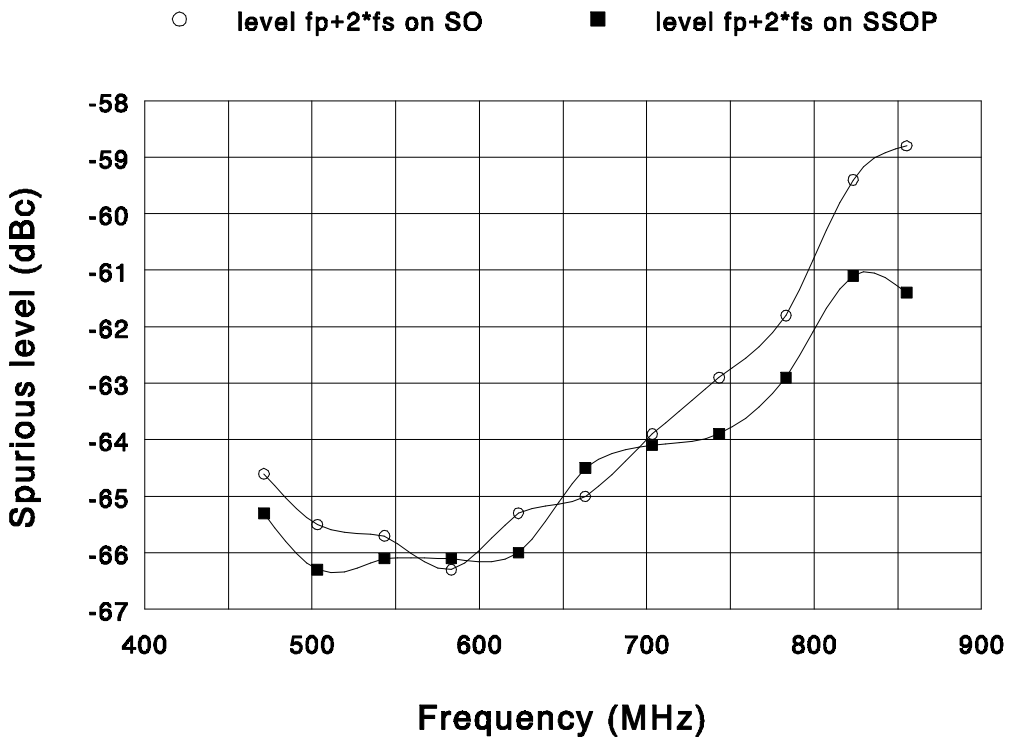

Fig. 20

TABLE 21

CHANNEL	FREQ. [MHz]	Level Fp+2*Fs on SO [dBc]	Level Fp+2*Fs on SSOP [dBc]
21	471.25	-64.6	-65.3
25	503.25	-65.5	-66.3
30	543.25	-65.7	-66.1
35	583.25	-66.3	-66.1
40	623.25	-65.3	-66.0
45	663.25	-65.0	-64.5
50	703.25	-63.9	-64.1
55	743.25	-62.9	-63.9
60	783.25	-61.8	-62.9
65	823.25	-59.4	-61.1
69	855.25	-58.8	-61.4

3.2.7 Level of Fp+3*Fs

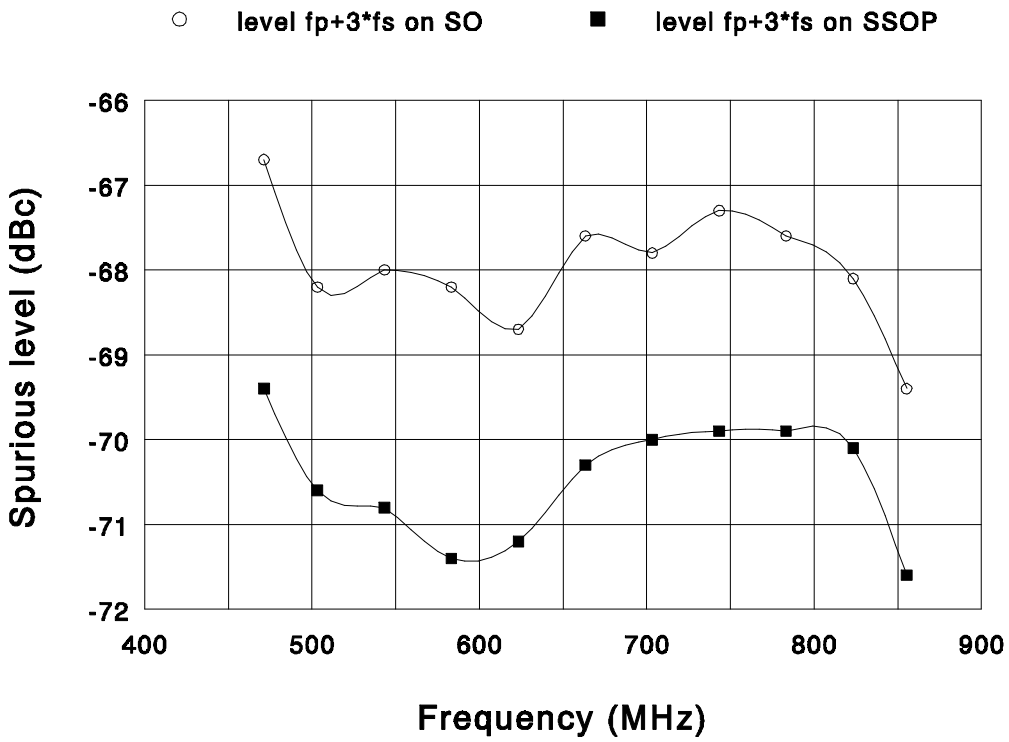

Fig. 21

TABLE 22

CHANNEL	FREQ. [MHz]	Level Fp+3*Fs on SO [dBc]	Level Fp+3*Fs on SSOP [dBc]
21	471.25	-66.7	-69.4
25	503.25	-68.2	-70.6
30	543.25	-68.0	-70.8
35	583.25	-68.2	-71.4
40	623.25	-68.7	-71.2
45	663.25	-67.6	-70.3
50	703.25	-67.8	-70.0
55	743.25	-67.3	-69.9
60	783.25	-67.6	-69.9
65	823.25	-68.1	-70.1
69	855.25	-69.4	-71.6

4. QUICK OVERVIEW OF MEASUREMENT RESULTS

The worst value of every measurement is given in table 23.

TABLE 23

Measurement parameter	Spec. condition Max. Level [dBc]	Worst case Level SO sample [dBc]	Worst case Level SSOP sample [dBc]	Remarks
2*Fp sym	see 2*Fp asym	**-30.9** (783.25MHz)	**-34.2** (855.25MHz)	note 1
3*Fp sym	not specified	**-13.9** (543.25MHz)	**-13.5** (471.25MHz)	note 2
0.5*Fp sym	-62	**-68.1** (783.25MHz)	**-72.6** (783.25MHz)	note 3
1.5*Fp sym	-62	**-69.5** (783.25MHz)	**-67.9** (783.25MHz)	note 3
2.5*Fp sym	-62	**-70.3** (663.25MHz)	**-65.4** (663.25MHz)	note 3
Fp+2*Fs sym	see asym	**-59.1** (855.25MHz)	**-61.0** (855.25MHz)	
Fp+3*Fs sym	see asym	**-67.6** (703.25MHz)	**-68.8** (663.25MHz)	
2*Fp asym pin 15	471.25 MHz: -25 855.25 MHz: -15	**-26.2** (543.25MHz)	**-25.5** (543.25MHz)	
3*Fp asym pin 15	not specified	**-15.8** (543.25MHz)	**-15.5** (471.25MHz)	
0.5*Fp asym pin 15	-62	**-52.5** (743.25MHz)	**-54.8** (823.25MHz)	note 3
1.5*Fp asym pin 15	-62	**-55.9** (783.25MHz)	**-55.8** (855.25MHz)	note 3
2.5*Fp asym pin 15	-62	**-58.7** (663.25MHz)	**-56.7** (663.25MHz)	note 3
Fp+2*Fs asym pin 15	<700 MHz: -60 >700 MHz: -58	**-58.7** (783.25MHz)	**-59.7** (823.25MHz)	
Fp+3*Fs asym pin 15	-60	**-68.0** (783.25MHz)	**-66.7** (823.25MHz)	
2*Fp asym pin 16	471.25 MHz: -25 855.25 MHz: -15	**-28.2** (543.25MHz)	**-27.9** (543.25MHz)	
3*Fp asym pin 16	not specified	**-16.1** (583.25MHz)	**-14.6** (471.25MHz)	
0.5*Fp asym pin 16	-62	**-56.3** (623.25MHz)	**-59.5** (703.25MHz)	note 3
1.5*Fp asym pin 16	-62	**-60.9** (855.25MHz)	**-60.9** (855.25MHz)	note 3
2.5*Fp asym pin 16	-62	**-63.2** (623.25MHz)	**-62.4** (623.25MHz)	note 3
Fp+2*Fs asym pin 16	<700 MHz: -60 >700 MHz: -58	**-58.8** (855.25MHz)	**-61.1** (823.25MHz)	
Fp+3*Fs asym pin 16	-60	**-66.7** (471.25MHz)	**-69.4** (471.25MHz)	

- Note 1: This IC has been designed to have the lowest level of unwanted RF harmonics at the frequencies where these are the hardest to be filtered out, especially for the second harmonic of the RF carrier at the lowest frequencies of the UHF band.
  By creating an symmetrical application by using a wide band transformer at the output of the IC it is possible to reduce the level of the second harmonic (2*Fp).
  The Data Sheet only shows worst case and therefor is specified for an asymmetrical application only.

- Note 2: There is no spec point included in the Data Sheet of the TDA8722 for the RF third harmonic (3*Fp) level of the unmodulated carrier. Only a graph with typical levels of RF second and third harmonics for an asymmetrical application is shown in the Data Sheet. The typical value for the RF third harmonic is -15 dBc at 500 MHz and -30 dBc at 850 MHz.
  These values can vary depending on the design of the application. To reduce the RF third harmonic it is necessary to use a low-pass filter at the output of the IC.

- Note 3: In the Data Sheet it is not specified whether this is measured symmetrically or asymmetrically.

5. CONCLUSIONS

It is very important to know the level of the harmonics and sub-harmonics in a specific application in order to meet the requirements (e.g.: CENELEC) and / or the specification of the customer.

This IC has been designed to have the lowest level of unwanted RF harmonics at the frequencies where these are the hardest to be filtered out, especially for the second harmonic of the RF carrier at the lowest frequencies of the UHF band.

For inexpensive applications, it is possible to use the IC with an asymmetrical output (pin 15 or 16). In this event, the unused output pin must be loaded with a load as similar as possible to the load connected to the used pin. A good improvement in performance, especially for the level of the second harmonic and the spurious outside channel, is obtained using a symmetrical to asymmetrical wide band transformer (balun; balance-to-unbalance).

In several graphs a consistent difference can be seen between the SSOP sample and the SO sample. This may be due to several causes:

1. The two IC’s are from a different batch, so there can be a spread on some specification points.
2. The two samples have different packages (SSOP and SO).
3. Only *one* sample of *one* batch each is measured, and not *a lot of IC’s* from *different* batches.
4. The IC’s are mounted on different demo boards, one suited for an SSOP sample and one for an SO sample. These boards are of course not identical.

APPENDIX 1 SCHEMATIC AND LAYOUT OF DEMO BOARD PR36828 FOR TDA8722T/C2A

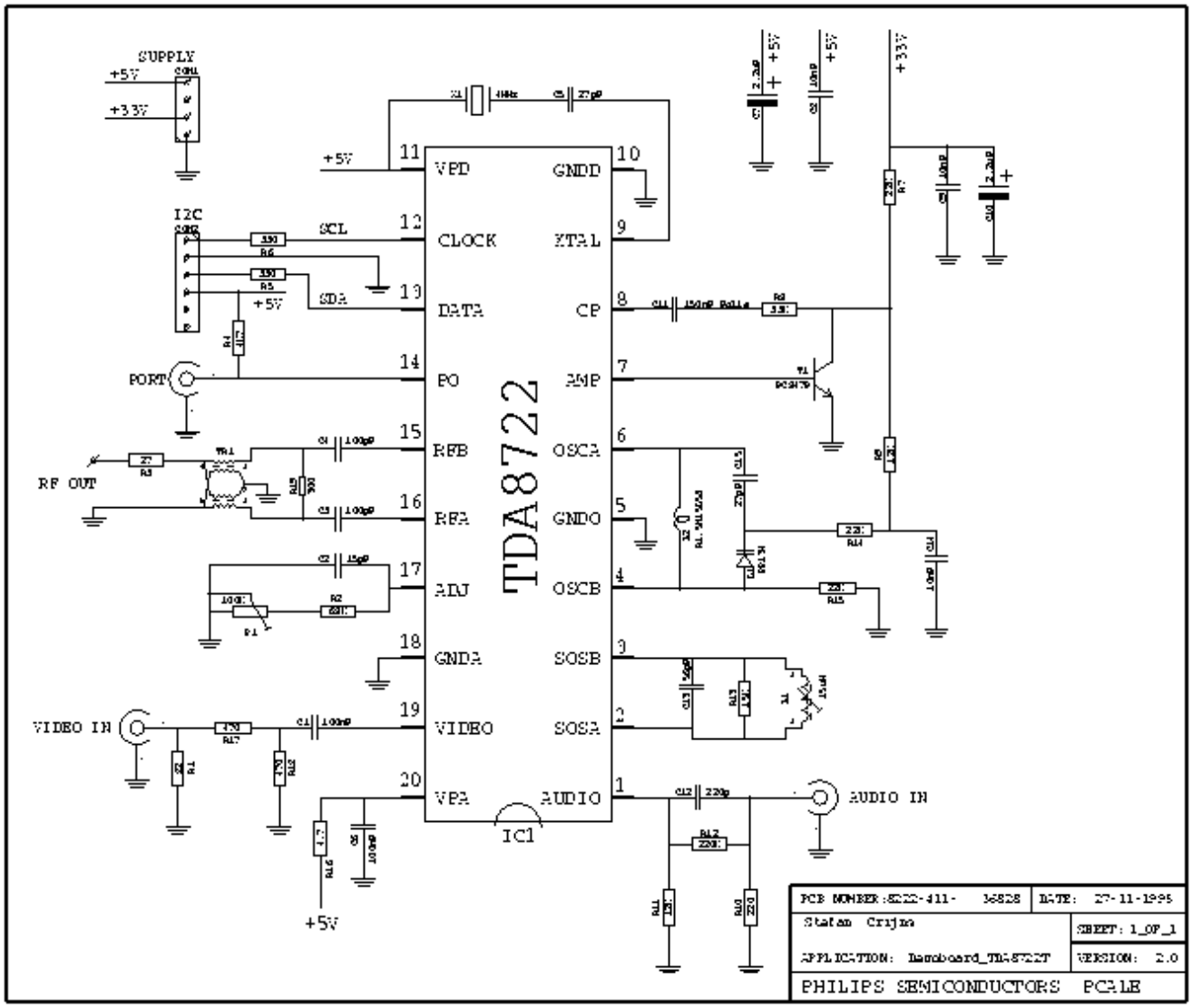

Fig. 22: Schematic of demo board PR36828

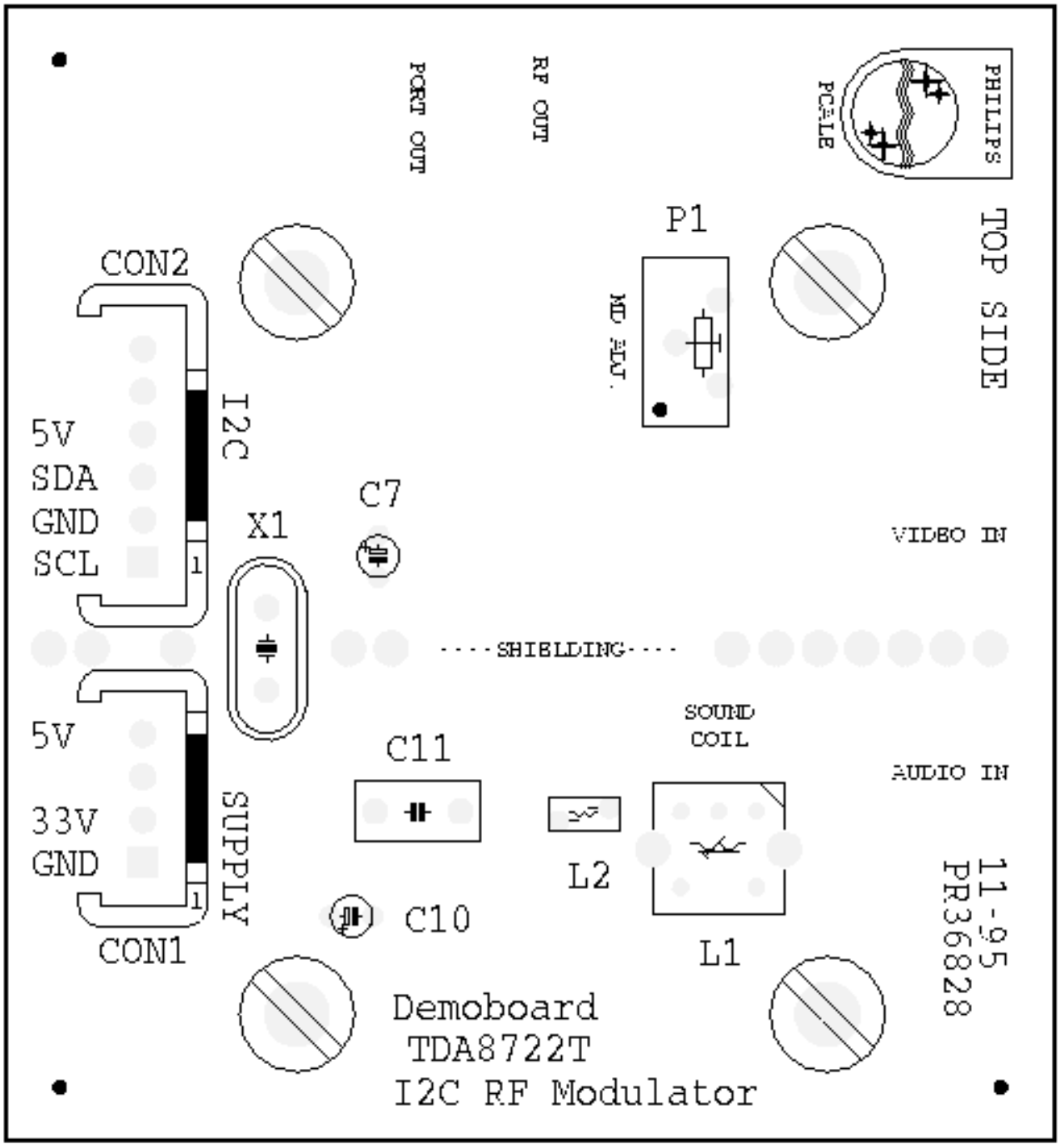

Fig. 23: Top side layout of demo board PR36828

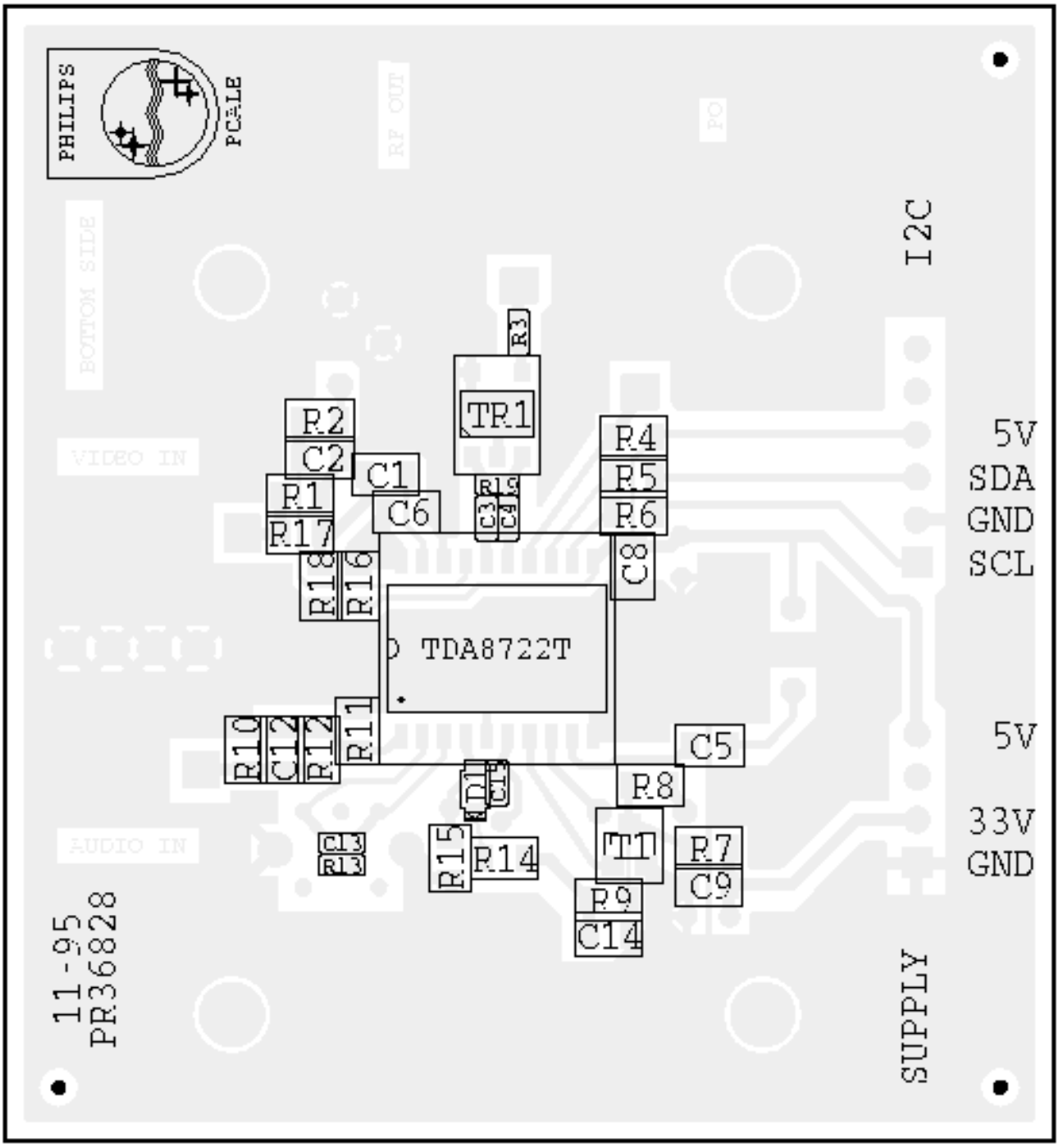

Fig. 24: Bottom side layout of demo board PR36828

APPENDIX 2 SCHEMATIC AND LAYOUT OF DEMO BOARD PR36826 FOR TDA8722M/C2A

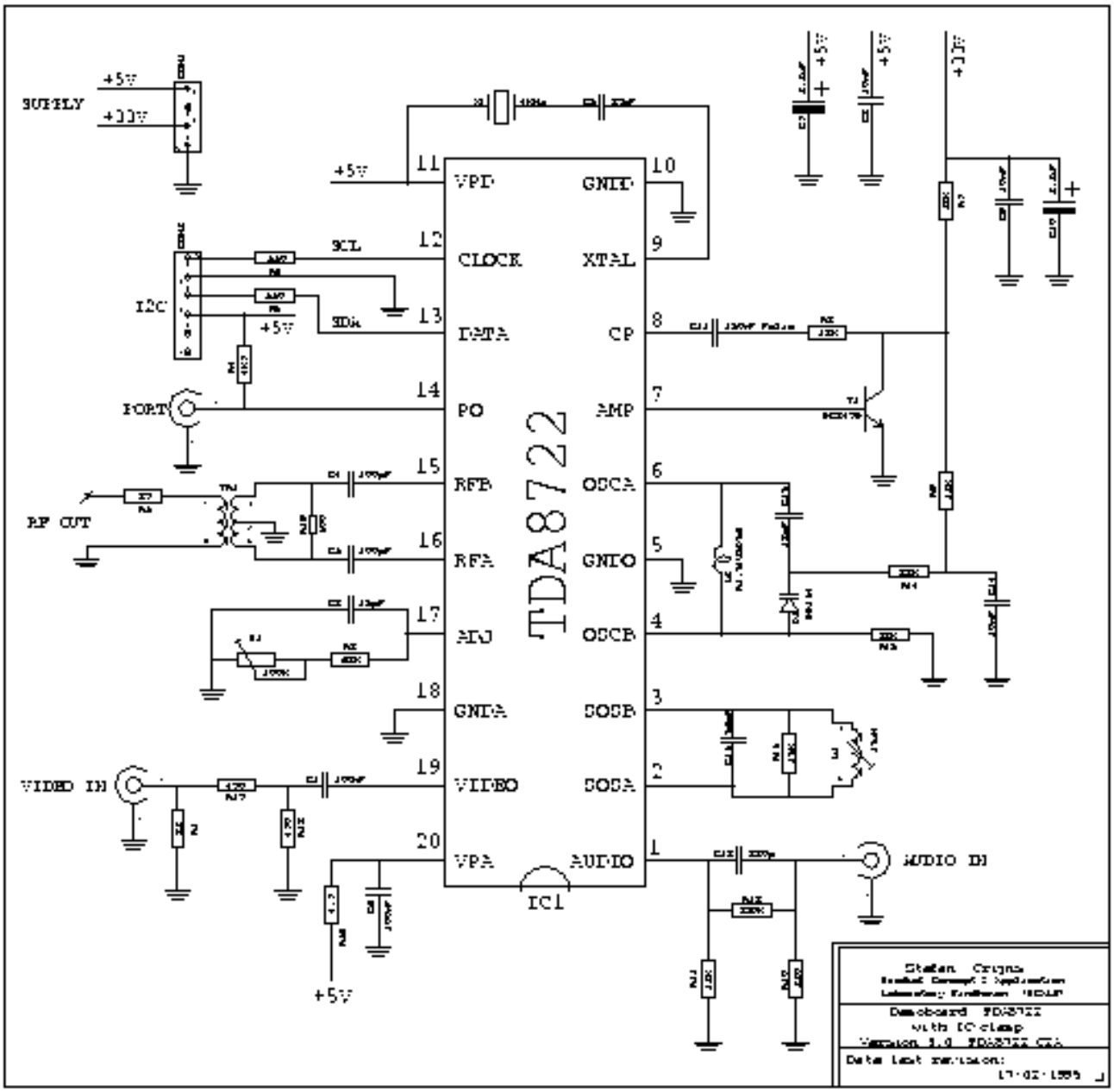

Fig. 25: Schematic of demo board PR36826

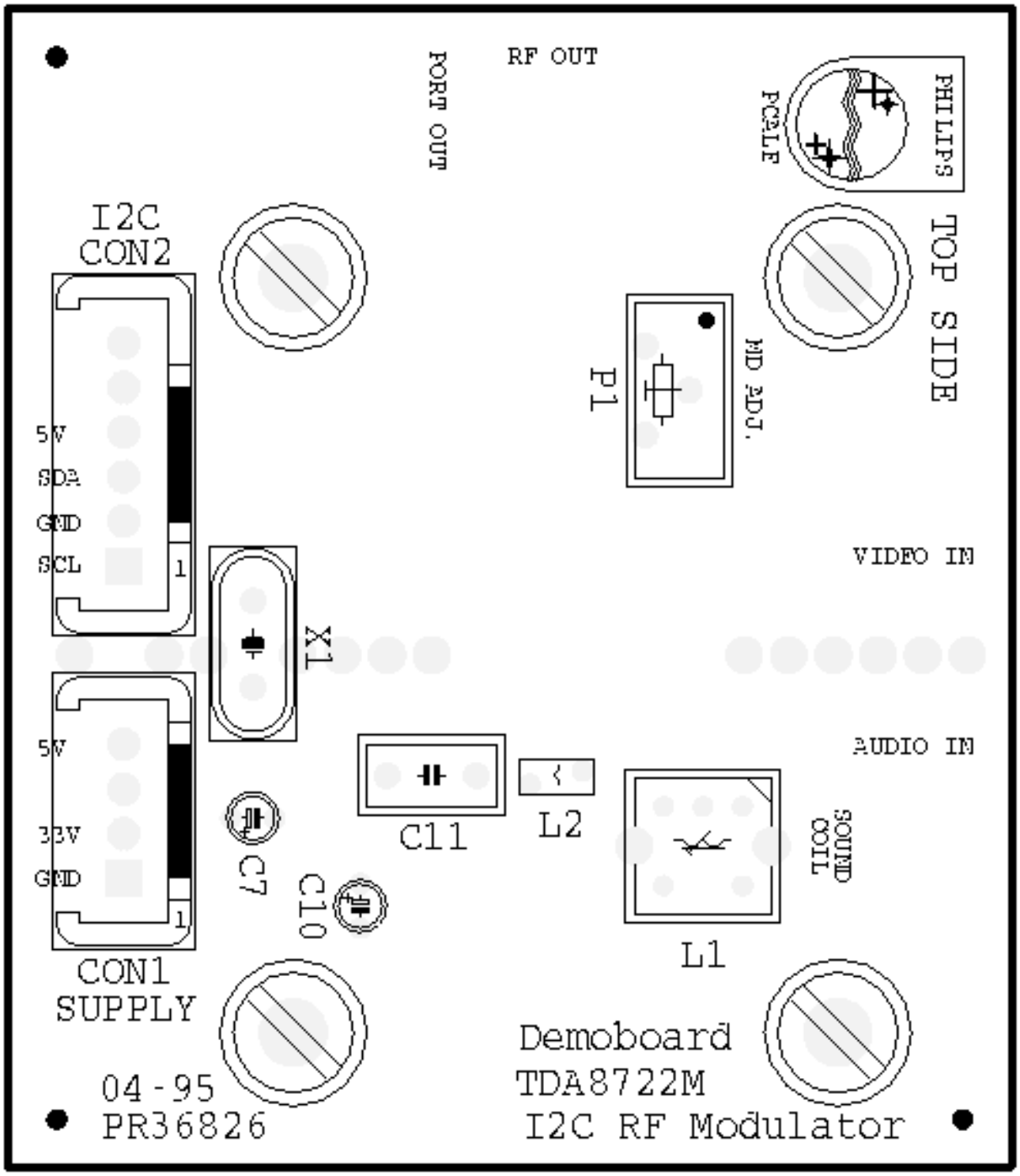

Fig. 26: Top side layout of demo board PR36826

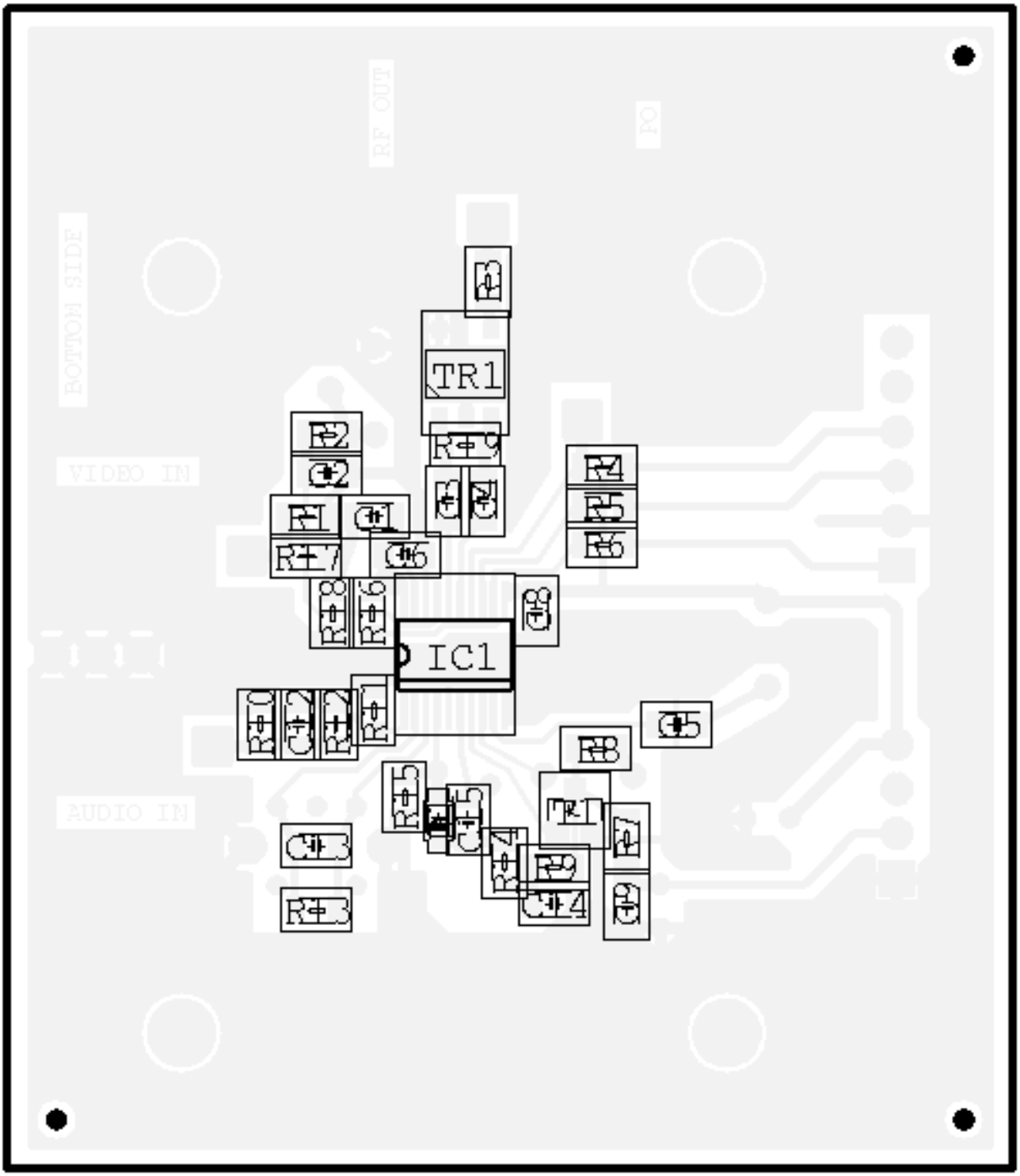

Fig. 27: Bottom side layout of demo board PR36826