SGS-THOMSON MICROELECTRONICS

APPLICATION NOTE

SGS-THOMSON SLIC KITS AND COMBO II

by W. Rossi

1. INTRODUCTION

One of the main feature of COMBO II is the possibility to program TX and RX gains and to perform the two to four wire conversion (echo cancellation).

In particular the echo cancellation feature allows you to save external components in the SLIC circuitry.

In the following tables you can find different values for COMBOII hybrid balance filter in order to satisfy different administrations requirements.

Three SLIC KITS are analyzed :
L3000N/L3030
L3000N/L3092
L303X(L3035/6/7)

for each administration also the external components are specified.

If you need more specific informations the complete Application Note is available, ask for it to our sales office.

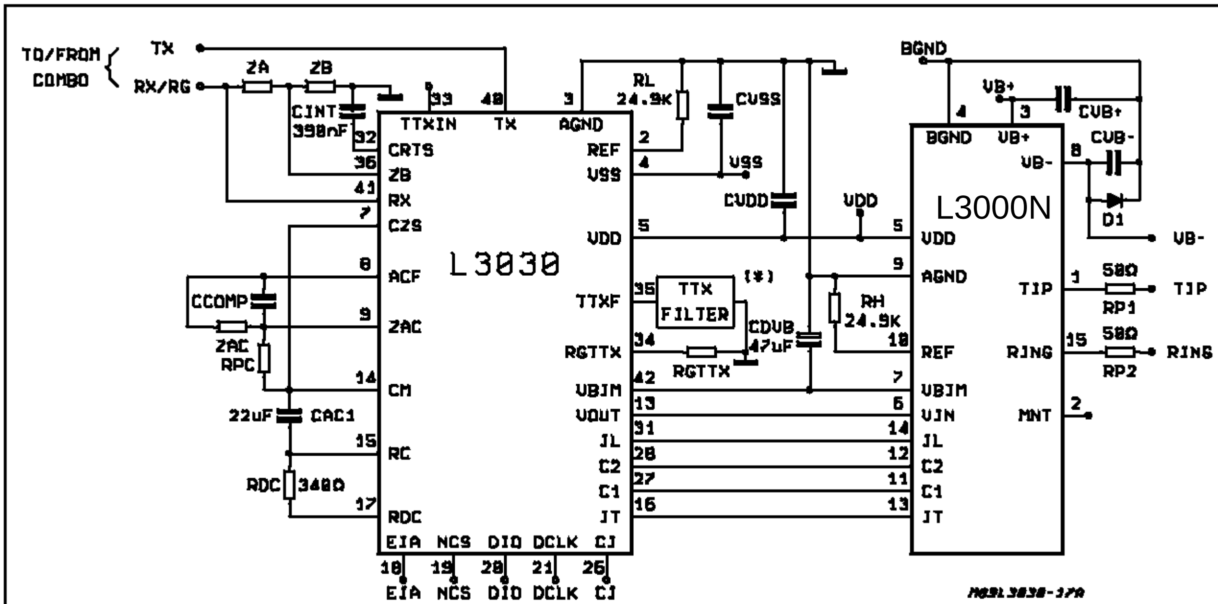
In the complete Application Note you can find all the details for each country in particular :

- Echo measurements
- Combo II simulation software results
- Bench measurements with PCM-4 Wandel & Goltermann

Table 1.

	Administration	R. L. Test Netw.	SLIC Ext. Comp.	THL. Test Netw.	COMBO II Hybal Coeff.
1.	Germany/Austria/ Switzerland	R1 = 220Ω R2 = 820Ω C1 = 115nF	ZAC = (1) RPC = 60Ω ZA = 2K ZB = 6.19K CCOMP = 10nF (1): 160W + (820Ω//115nF)	R1 = 220Ω R2 = 820Ω C1 = 115nF	EC; 32; C4

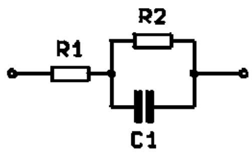
Figure 1: L3000N+L3030 Application Diagram.



(*) All measurements were made substituting the TTX filter with 1K resistor and RGTTX with 10K. The 1K resistor is equivalent to TTX filter for speech band signals.

2. L3000N/L3030 + COMBO II APPLICATION

Test network :



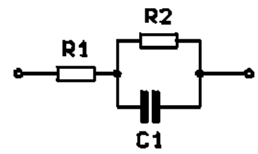
In Table 1 you can find the SLIC external components and the COMBO II programming coefficient for Germany, Austria and Switzerland followed by the application diagram (Fig. 1).

TX and RX gain are chosen in order to have :

0dBm0 ⇔ 0dBm 600 ohm (TXgain reg. = BF ; RXgain reg. = AE)

3. L3000N/L3092 + COMBO II APPLICATION

Test network :



In Table 2 you can find the SLIC external components and the COMBO II programming coefficient for different countries followed by the application diagram (Fig. 2).

TX and RX gain are chosen in order to have :

0dBm0 ⇔ 0dBm 600 ohm (TXgain reg. = 83; RXgain reg. = AE)

Table 2.

	Administration	R. L. Test Netw.	SLIC Ext. Comp.	THL. Test Netw.	COMBO II Hybal Coeff.
1	600Ω KOREA/US PRIV. PORTUGAL PRIV. FRANCE PUB.	R1 = 600Ω R2 = 0 C1 = 0	R1 = 0 R2 = 12.5K C1 = 0	R1 = 600Ω R2 = 0 C1 = 0	EE 01 44
2	CHINA	R1 = 200Ω R2 = 680 C1 = 0.1µF	R1 = 2.5K R2 = 17K C1 = 4nF	R1 = 200Ω R2 = 680Ω C1 = 0.1µF	EE 11 A6
3	ITALY PRIV.	R1 = 180Ω R2 = 630Ω C1 = 60nF	R1 = 2K R2 = 15.75K C1 = 2.4nF	R1 = 0 R2 = 750Ω C1 = 18nF	EF 00 A1
4	ITALY PUBL.	R1 = 600Ω R2 = 0 C1 = 0	R1 = 0 R2 = 12.5K C1 = 0	R1 = 0 R2 = 1.1K C1 = 33nF	E5 11 C0
5	GERMANY AUSTRIA SWITZERLAND	R1 = 220Ω R2 = 820Ω C1 = 115nF	R1 = 3K R2 = 20.5K C1 = 4.6nF	R1 = 220Ω R2 = 820Ω C1 = 115nF	EE 00 44
6	FINLAND	R1 = 270Ω R2 = 910Ω C1 = 120nF	R1 = 4.25K R2 = 22.75K C1 = 4.8nF	A: R1 = 270Ω R2 = 1.2K C1 = 120nF	EB 11 FF
				B: R1 = 390Ω R2 = 620Ω C1 = 100nF	F1 11 EF
7	BELGIUM PRIV.	R1 = 150Ω R2 = 830Ω C1 = 72nF	R1 = 1.25K R2 = 20.75K C1 = 2.88nF	A: R1 = 150Ω R2 = 830Ω C1 = 72nF	EF 11 6E
				B: R1 = 600Ω R2 = 0 C1 = 0	F8 01 0E
8	UK PRIV.	R1 = 300Ω R2 = 1K C1 = 220nF	R1 = 5K R2 = 25K C1 = 8.8nF	R1 = 370Ω R2 = 620Ω C1 = 310nF	F4 12 6B

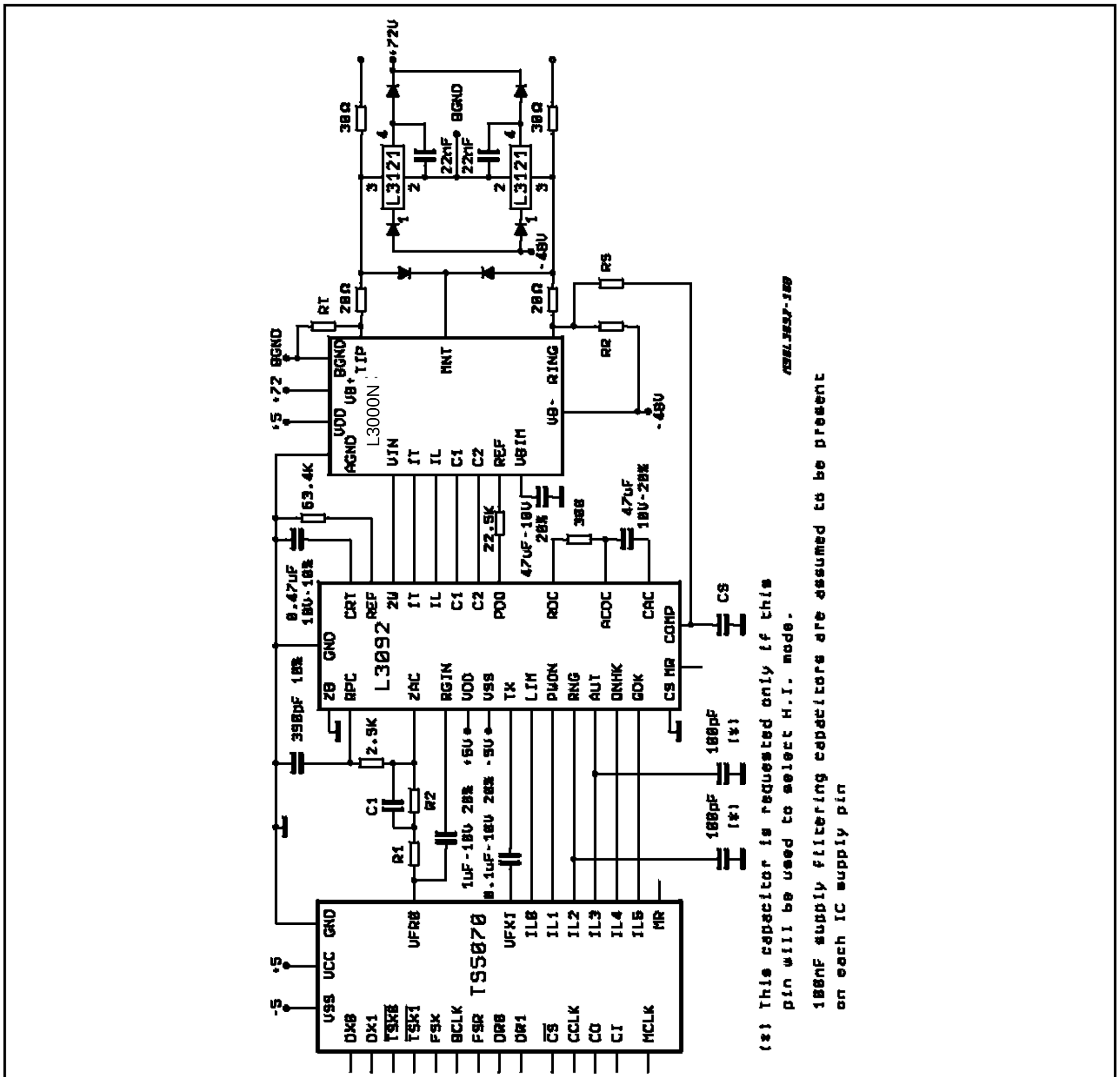
	Administration	R. L. Test Netw.	SLIC Ext. Comp.	THL. Test Netw.	COMBO II Hybal Coeff.
9	UK PUBL.	R1 = 370Ω R2 = 620Ω C1 = 310nF	R1 = 6.75K R2 = 15.5K C1 = 12.4nF	Note 1 A: SHORT LINE B: LONG LINE S.G C: LONG LINE L.G	 ED, 23, 48 EF, 39, AC E8, 35, EA
10	USA PUBL.	R1 = 900Ω R2 = INF. C1 = 2.16µF	R1 = 20K R2 = 90K C1 = 110nF *CCOMP = 150pF	Note 2 A: LOAD LINE B: NOT LOAD LINE	 E5, 20, 48 F1, 41, 20

Notes :

1. U.K THL TEST NETWORKS (See Figure 3)

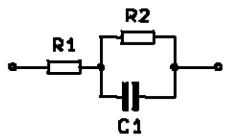
2. U.S. THL TEST NETWORKS (See Figure 4)

Figure 2: L3000N/L3092 + COMBO II



4. L303X (L3035/6/7) + COMBO II APPLICATION

Test network :



In Table 3 you can find the SLIC external components and the COMBO II programming coefficient for different countries followed by the application diagram (Fig. 3).

TX and RX gain are chosen in order to have :

0dBm0 ⇔ 0dBm 600 ohm (TXgain reg. = 83 ; RXgain reg. = AE)

Table 3.

	Administration	R. L. Test Netw.	SLIC Ext. Comp. (ZAC)	THL. Test Netw.	COMBO II Hybal Coeff.
1	600Ω FRANCE PUB. AUSTRIA (I) PRI. USA PRI. PORTUGAL PRI. KOREA	R1 = 600Ω R2 = 0 C1 = 0	R1 = 0 R2 = 26K C1 = 0	R1 = 600Ω R2 = 0 C1 = 0	EE 01 44
2	CHINA –A–	R1 = 200Ω R2 = 680Ω C1 = 100nF	R1 = 6K R2 = 34K C1 = 2nF	R1 = 200Ω R2 = 680Ω C1 = 100nF	EE 00 6E
3	CHINA –B–	R1 = 200Ω R2 = 560Ω C1 = 100nF	R1 = 6K R2 = 28K C1 = 2nF	R1 = 200Ω R2 = 560Ω C1 = 100nF	EF 12 2A
4	ITALY PRI.	R1 = 180Ω R2 = 630Ω C1 = 60nF	R1 = 5K R2 = 31.5K C1 = 1.2nF	R1 = 0 R2 = 750Ω C1 = 18nF	F0 01 9B
5	ITALY PUBL.	R1 = 600Ω R2 = 0 C1 = 0	R1 = 0 R2 = 26K C1 = 0	R1 = 0 R2 = 1.1K C1 = 33nF	E5 11 C0
6	GERMANY AUSTRIA AUSTRALIA PR. SWITZERLAND	R1 = 220Ω R2 = 820Ω C1 = 115nF	R1 = 7K R2 = 41K C1 = 2.3nF	R1 = 220Ω R2 = 820Ω C1 = 115nF	EF 11 C2
7	AUSTRIA (II) PRIV.	R1 = 220Ω R2 = 820Ω C1 = 115nF	R1 = 7K R2 = 41K C1 = 2.3nF	R1 = 220Ω R2 = 1.2K C1 = 150	EB 23 FB
8	BELGIUM PRI.	R1 = 150Ω R2 = 830Ω C1 = 72nF	R1 = 3.5K R2 = 41.5K C1 = 1.44nF	A: R1 = 150Ω R2 = 830Ω C1 = 72nF	FF 00 6E
				B: R1 = 600Ω R2 = 0 C1 = 0	F7 01 06
9	DENMARK	R1 = 400Ω R2 = 500Ω C1 = 330nF	R1 = 16K R2 = 25K C1 = 6.6nF	R1 = 300Ω R2 = 1K C1 = 220nF	E9 22 39
10	NETHERLANDS	R1 = 600Ω R2 = 0 C1 = 0	R1 = 26K R2 = 0 C1 = 0	R1 = 340Ω R2 = 422Ω C1 = 100nF	EA 01 24
11	NORWAY	R1 = 120Ω R2 = 820Ω C1 = 112nF	R1 = 2K R2 = 41K C1 = 2.24nF	R1 = 120Ω R2 = 820Ω C1 = 110nF	EF 12 4C

	Administration	R. L. Test Netw.	SLIC Ext. Comp.	THL. Test Netw.	COMBO II Hybal Coeff.
12	SWEDEN	R1 = 200Ω R2 = 1K C1 = 100nF	R1 = 6K R2 =50K C1 = 2nF	R1 = 0 R2 = 900Ω C1 = 30nF	F3 01 6F
13	FINLAND	R1 = 270Ω R2 = 910Ω C1 = 120nF	R1 = 9.5K R2 = 45.5K C1 = 2.4nF	A: R1 = 270Ω R2 = 1.2K C1 = 120nF	EB 11 77
				B: R1 = 390Ω R2 = 620Ω C1 = 100nF	F1 01 EF
14	FRANCE PRI.	R1 = 215Ω R2 = 1K C1 = 137nF	R1 = 6.75K R2 = 50K C1 = 2.74nF	R1 = 600Ω R2 = 0 C1 = 0	F8 00 0F
15	GREECE	R1 = 400Ω R2 = 500Ω C1 = 50nF	R1 = 16K R2 = 25K C1 = 1nF	R1 = 220Ω R2 = 820Ω C1 = 115nF	ED 23 92
16	SPAIN	R1 = 220Ω R2 = 820Ω C1 = 120nF	R1 = 7K R2 = 41K C1 = 2.4nF	R1 = 220Ω R2 = 820Ω C1 = 120nF	EF 12 DF
17	UK PRI.	R1 = 300Ω R2 = 1K C1 = 220nF	R1 = 11K R2 = 50K C1 = 4.4nF	R1 = 370Ω R2 = 620Ω C1 = 310nF	F4 12 6B
18	UK PUB.	R1 = 370Ω R2 = 620Ω C1 = 310nF	R1 = 14.5K R2 = 31K C1 = 6.2nF	Note 1 A: SHORT LINE B: LONG LINE (S. GAUGE) C: LONG LINE (L. GAUGE)	 EE, 12, CC EE, 38, 1A E9, 36, EA
19	USA PUB.	R1 = 900Ω R2 = INF. C1 = 2.16µF	R1 = 39K R2 = 180K C1 = 55nF Note 3	Note 2 A: LOAD LINE B: NOT LOAD LINE	 E6, 20, 48 F2, 20, A0

Notes :

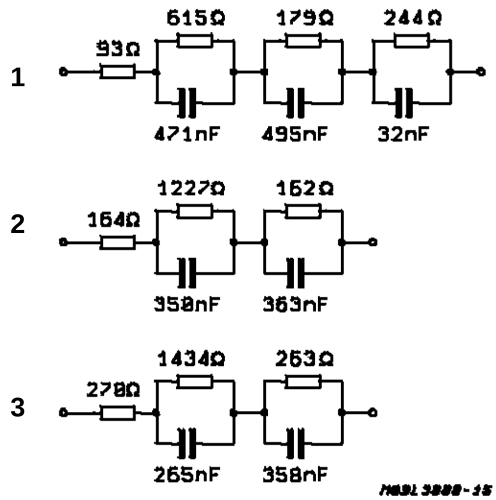
1. U.K THL TEST NETWORKS (see Figure 3)

2. U.S. THL TEST NETWORKS (see Figure 4)

3. CCOMP = 100pF; Rp = 62Ω; Rs = 6.2K

4. CREV is used for reversal polarity transition time programming only with L3037. With L3035/6 this pin is shorted to AGND. (see Figure 5)

Figure 3:



1. Short lines

2. Long lines (small gauge)

3. Long lines (large gauge)

Figure 4:

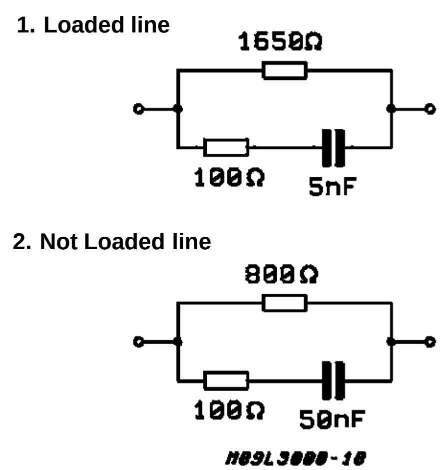


Figure 5: Typical Application Circuit (Full Feature) TS5070 + L303X + LCP1511.