SGS-THOMSON MICROELECTRONICS

DEMOBOARD

ECONOMY NICAM APPLICATION BOARD

1. INTRODUCTION

The SGS-Thomson NICAM stereo decoder kit comprises two integrated circuits, namely the TDA8204 and TDA8205. Together they form a comprehensive architechure including not only the QPSK demodulation and NICAM decoding, but also the DAC circuitry (including audio filters), and an audio switching matrix to interface with the SCART connnector and auxilliary mono FM sound input. The kit is able to automatically synchronise with either system I or B/G NICAM signals, without adjustments of any kind, and requiring the use of only one quartz crystal.

The architechture of the kit is such that, not only does it provide a comprehensive solution for high-end CTV applications, but it is also very economical for low-end applications. This is due to the high level of integration employed, requiring only about 40 external components to obtain a complete basic standalone NICAM application.

The objective therefore of the Economy NICAM Application Board, is to present the TDA8204 and TDA8205 in a very compact application. As a result, certain features of the kit are deliberately not provided for, such as SCART interface and automatic dual-standard operation. The kit is normally controlled via the I^2C bus, but is totally automatic even without any bus control. Thus the board is completely operational from power-up. Even so the Economy NICAM board has been provided with connections to the I^2C bus terminals of the TDA8204 in order to retain access to certain of the inbuilt device features.

A complete parts list and bill of materials has been provided in the appendix at the end of this document.

2. SET-UP

Connect a 6.552MHz (or 5.85MHz) QPSK I/P signal of nominal level $100mV_{PP}$ (40dB AGC range) to CN1.

Power supplies are +5V for V_{DD} and +12V for the V_{CC} via the power connector CN2. Switch on both supplies together or +12V first.

Audio outputs are available on CN4 ($500mV_{RMS}$ nom.). In addition, the FM backup input ($500mV_{RMS}$ nom.) is also applied to CN4.

CN3 provides the possibility of access to the I^2C bus, mute and RSW functions of the TDA8204.

3. OPERATION

The power on default modes for the decoder are AUT_STD = ON and AUTO_NICAM = ON. In this case, the decoder automatically synchronises with the transmission standard in use (system I or system B/G). FM backup sound is selected if no NICAM signal is present. If a NICAM signal is present and then removed and the Reserve Sound Flag (C4) was set to 1, the decoder will select FM sound. If C4 = 0, the audio outputs are muted. The Economy NICAM Application Board has been fitted with only one QPSK filter, for mono-standard applications. However all that is needed to convert from system I to system B/G, is to change the filter for the appropriate B/G version, no further adjustments being needed.

The transmission mode is indicated by 3 LED's :
- LED4 = Stereo (RED)
- LED3 = Dual-Mono (RED)
- LED2 = Single-Mono (RED)

If no LED lights, either the mode is Data Only or the decoder is out of alignment.

For Stereo and Single Mono modes, FM backup is provided for both audio outputs. For Dual Mono, FM backup is only for M1.

4. APPLICATION NOTES

A layout of the application board is shown in Figure 1, enabling the user to identify the positions of all of the components. Figure 2 shows the circuit diagram of the application board.

Several optional modifications can be made to the circuit as described in the following notes. Reference should be made to the data sheets of the TDA8204 and TDA8205 for full details of their implementation.

The common connection to the three LEDs 2,3,4 can include a resistor if desired to reduce the

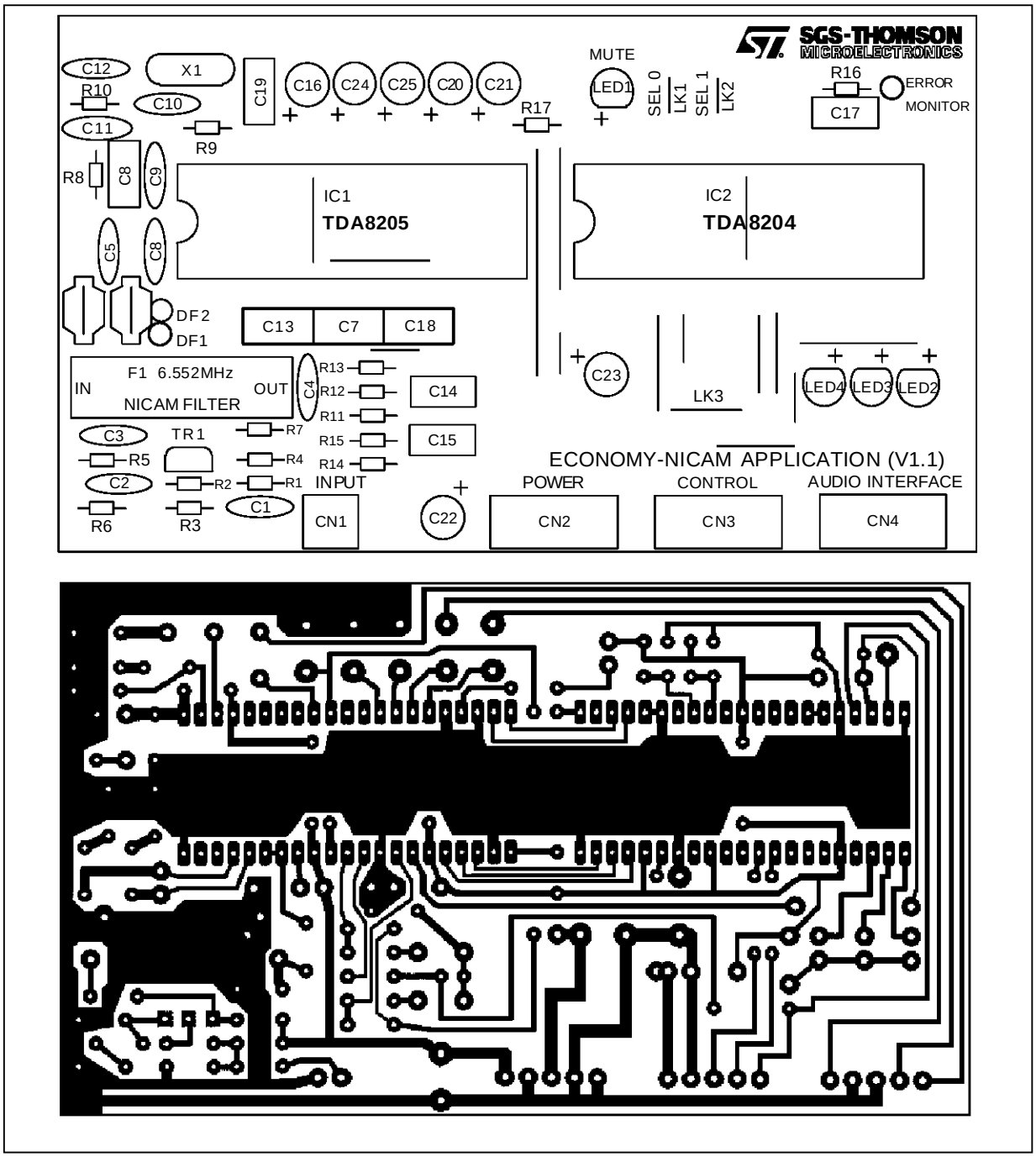
brightness of the LED. The link to place this resistor is located adjacent to LED4.

LK1 and LK2 provide the possibility to force the language select option, in bi-lingual mode, via the SEL0 and SEL1 pins of the TDA8204. The board is supplied with both SEL pins connected to ground (ie normal stereo/mono mode).

LK3 provides the possibility to force the RSW function on-board.

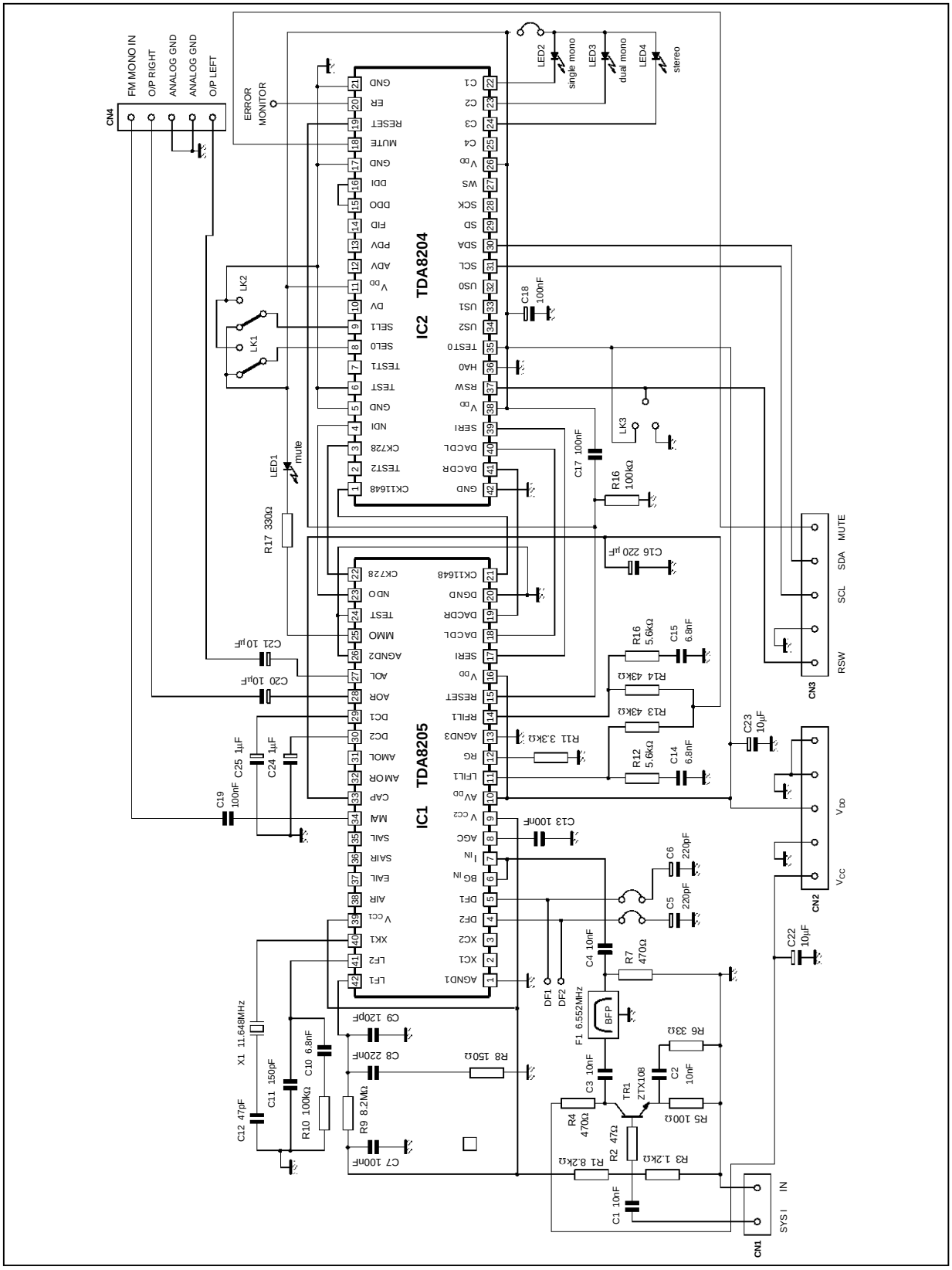
The mute input on CN3 is bi-directional, and indicates or activates the DAC mute status. An indication of this status is shown by the yellow LED1.

Figure 1 : Economy NICAM PCB Layout



AN636-01.EPS / AN636-02.TIF

Figure 2 : Economy NICAM Application Circuit



5. ADDENDUM TO THE NICAM DEMOBOARD NOTES

Component Choice

The components chosen for this application board have been selected on the basis of their size rather than specific need. There are no critical characteristic requirements for any of the components other than the capacitor C12. The value of this capacitor is simply chosen to match the particular quartz crystal source purchased. Voltage ratings of capacitors will be those appropriate to the total system, 16V types usually being sufficient in most cases.

Two improvements are possible to the application circuit if neccessary and may be needed principally by system B/G with its closer wanted/unwanted carrier spacing. Details are as follows:

1) In system B/G mode, a 5.5MHz ceramic filter can be used to attenuate the FM sound by about 20dB with very little eye-diagram degradation. No provision is made on the application board for this filter.
2) A baseband L-C notch filter tuned to 350KHz can be fitted on DF1/2 pins by replacing the links in series with C5,6 (adjacent to the DF1 and DF2 monitor points), by inductors of 820%H (Toko style 7BS).

6. APPENDIX TO THE ECONOMY NICAM APPLICATION BOARD NOTES

6.1.Bill Of Materials

6.1.1. CAPACITORS (all rated at 16V)

Reference	Value	Type
C1	10nF	Monolithic Ceramic
C2	10nF	Monolithic Ceramic
C3	10nF	Monolithic Ceramic
C4	10nF	Monolithic Ceramic
C5	220pF	Ceramic Plate
C6	220pF	Ceramic Plate
C7	100nF	Monolithic Ceramic
C8	220nF	Polyester
C9	120pF	Ceramic Plate
C10	6.8nF	Polyester
C11	150pF	Ceramic Plate
C12	47pF	Ceramic Plate
C13	100nF	Monolithic Ceramic
C14	6.8nF	Polyester
C15	6.8nF	Polyester
C16	220µF	Electrolytic
C17	100nF	Monolithic Ceramic
C18	100nF	Monolithic Ceramic
C19	100nF	Monolithic Ceramic
C20	10µF	Tantalum Bead
C21	10µF	Tantalum Bead
C22	10µF	Tantalum Bead
C23	10µF	Tantalum Bead
C24	1µF	Tantalum Bead
C25	1µF	Tantalum Bead

6.1.2. LIGHT EMITTING DIODES
(low current type)

Reference	Colour	Function Indication
LED1	Yellow	Audio Muted
LED2	Red	Single Mono Transmission
LED3	Red	Dual Mono Transmission
LED4	Red	Stereo Transmission

6.1.3. FILTERS

Reference	Frequency	TYpe
F1	6.552MHz	TOKO 5VFP TH316BQM2110QDAF

6.1.4. INTEGRATED CIRCUITS

Reference	Type	Function
IC1	TDA8205	QPSK, DAC and Audio Matrix
IC2	TDA8204	NICAM Decoder and I^2S Bus Output

6.1.5. TRANSISTORS

Reference	Type	Function
TR1	ZTX108	6.552MHz Filter Input Buffer

6.1.6 . RESISTORS
(all 1/8W carbon film and values in 2)

Reference	Value
R1	8.2kΩ
R2	47Ω
R3	1.2kΩ
R4	470Ω
R5	100Ω
R6	33Ω
R7	470Ω
R8	150Ω
R9	8.2MΩ
R10	180kΩ
R11	3.3kΩ
R12	5.6kΩ
R13	43kΩ
R14	43kΩ
R15	5.6kΩ
R16	100kΩ
R17	330Ω

6.1.7. QUARTZ CRYSTALS

Reference	Frequency
X1	11.648MHz, Series Resonant with 30pF HC49U Package

6.1.8. CONNECTORS

Reference	Type	Function
CN1	2-way	Sound IF Input
CN2	5-way	Power Input
CN3	5-way	Control Input/Output
CN4	5-way	Audio Input/Output

6.2. Component Purchase List

6.2.1.CAPACITORS

Value	Type	Quantity
47pF	Ceramic Plate	1
120pF	Ceramic Plate	1
150pF	Ceramic Plate	1
220pF	Ceramic Plate	2
6.8nF	Polyester	3
10nF	Monolithic Ceramic	4
100nF	Monolithic Ceramic	5
220nF	Polyester	1
10µF	Tantalum Bead	4
220µF	Electrolytic	1

6.2.2. LIGHT EMITTING DIODES

Colour	Quantity
Red	3
Yellow	1

6.2.3. FILTERS

Type	Quantity
TOKO 5VFP TH3167BQM2110QDAF	1

6.2.4. INTEGRATED CIRCUITS

Type	Quantity
TDA8204	1
TDA8205	1

6.2.5. TRANSISTORS

Type	Quantity
ZTX108	1

6.2.6. QUARTZ CRYSTALS

Frequency	Quantity
11.648MHz	1

6.2.7. RESISTORS

Value	Quantity
33Ω	1
47Ω	1
100Ω	1
150Ω	1
330Ω	1
470Ω	2
1.2kΩ	1
3.3kΩ	1
5.6kΩ	2
8.2kΩ	1
43kΩ	2
100kΩ	1
180kΩ	1
8.2MΩ	1

6.2.8 CONNECTORS

Type	Quantity
2-way Header	1
5-way Header	3