

## 阅读申明

- 1.本站收集的数据手册和产品资料都来自互联网，版权归原作者所有。如读者和版权方有任何异议请及时告之，我们将妥善解决。
- 2.本站提供的中文数据手册是英文数据手册的中文翻译，其目的是协助用户阅读，该译文无法自动跟随原稿更新，同时也可能存在翻译上的不当。建议读者以英文原稿为参考以便获得更精准的信息。
- 3.本站提供的产品资料，来自厂商的技术支持或者使用者的心得体会等，其内容可能存在描述上的差异，建议读者做出适当判断。
- 4.如需与我们联系，请发邮件到marketing@iczoom.com，主题请标有“数据手册”字样。

## Read Statement

1. The datasheets and other product information on the site are all from network reference or other public materials, and the copyright belongs to the original author and original published source. If readers and copyright owners have any objections, please contact us and we will deal with it in a timely manner.
2. The Chinese datasheets provided on the website is a Chinese translation of the English datasheets. Its purpose is for reader's learning exchange only and do not involve commercial purposes. The translation cannot be automatically updated with the original manuscript, and there may also be improper translations. Readers are advised to use the English manuscript as a reference for more accurate information.
3. All product information provided on the website refer to solutions from manufacturers' technical support or users the contents may have differences in description, and readers are advised to take the original article as the standard.
4. If you have any questions, please contact us at marketing@iczoom.com and mark the subject with "Datasheets" .



# TDA7430 TDA7431

## DIGITALLY CONTROLLED AUDIO PROCESSOR WITH SURROUND SOUND MATRIX AND VOICE CANCELLER

### 1 FEATURES

- 1 STEREO (4STEREO) INPUT + 1 MIXER INPUT
- INPUT ATTENUATION CONTROL IN 0.5dB STEP
- VOICE CANCELLER IS AVAILABLE
- TREBLE MIDDLE AND BASS CONTROL
- THREE SURROUND MODES ARE AVAILABLE
  - MUSIC: 4 SELECTABLE RESPONSES
  - MOVIE AND SIMULATED: 256 SELECTABLE RESPONSES
- 2 SPEAKERS AND 2 RECORD ATTENUATORS:
  - 2 INDEPENDENT SPEAKERS AND 2 INDEPENDENT RECORD CONTROL IN 1dB STEP FOR BALANCE FACILITY
  - AVAILABILITY OF LOUDSPEAKER EQUALIZATION FIXED BY EXTERNAL COMPONENTS
  - INDEPENDENT MUTE FUNCTION
- ALL FUNCTIONS PROGRAMMABLE VIA SERIAL BUS

Figure 1. Package



Table 1. Order Codes

| Part Number | Package     |
|-------------|-------------|
| TDA7431S    | SDIP42      |
| TDA7430     | TQFP44      |
| TDA7430TR   | Tape & Reel |

### 2 DESCRIPTION

The TDA7430/TDA7431 is volume tone (bass middle and treble) balance (Left/Right) processors voice canceller for quality audio applications in car radio and Hi-Fi systems.

They reproduce surround sound by using programmable phase shifters and a signal matrix.

Control of all the functions is accomplished by serial bus. The AC signal setting is obtained by resistor networks and switches combined with operational amplifiers. Thanks to the used BIPO-LAR/CMOS Technology,

Low Distortion, Low Noise and DC stepping are obtained.

Figure 2. Pin Connection (TDA7430)

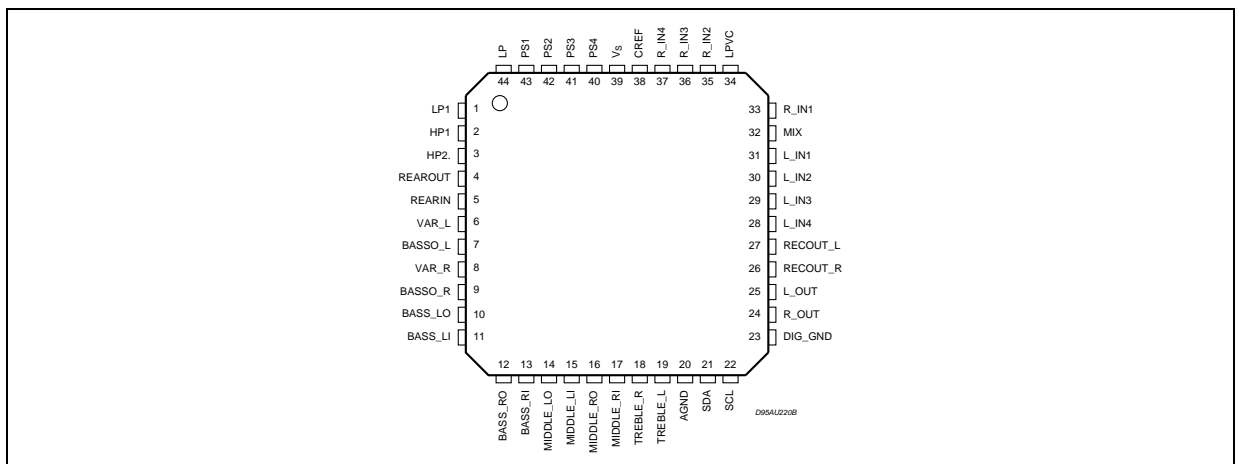


Figure 3. Pin Connection (TDA7431)

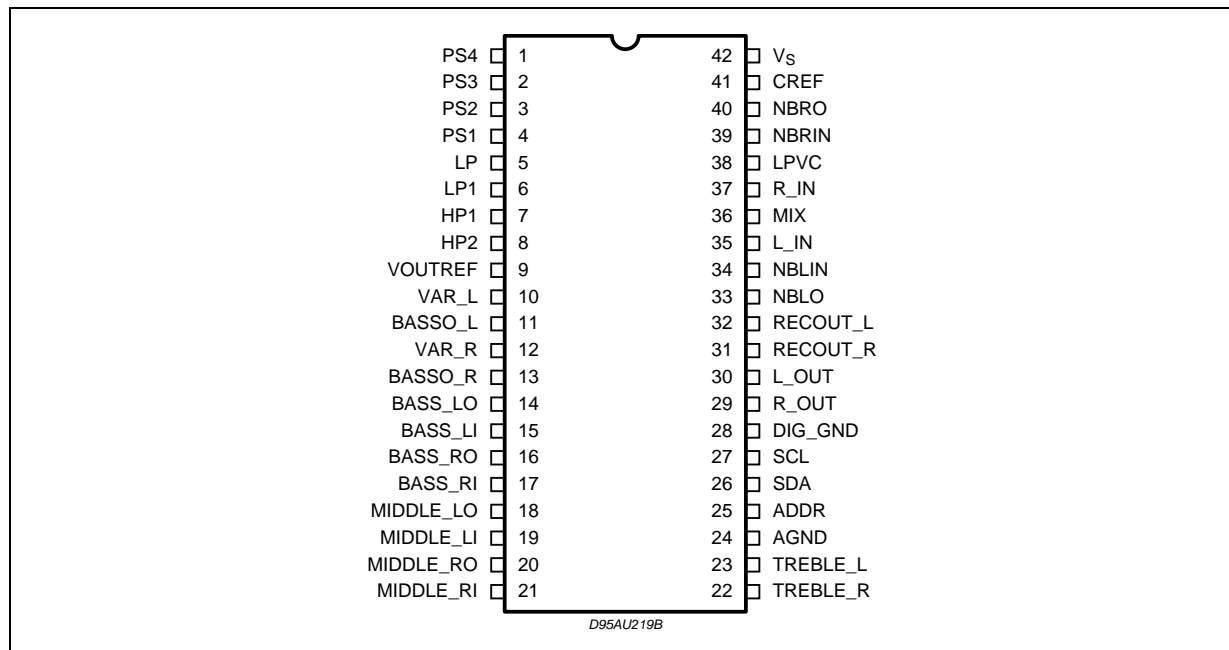


Table 2. Absolute Maximum Ratings

| Symbol           | Parameter                     | Value      | Unit |
|------------------|-------------------------------|------------|------|
| V <sub>S</sub>   | Operating Supply Voltage      | 11         | V    |
| T <sub>amb</sub> | Operating Ambient Temperature | 0 to 70    | °C   |
| T <sub>stg</sub> | Storage Temperature Range     | -55 to 150 | °C   |

Table 3. Quick Reference Data

| Symbol          | Parameter   | Min. | Typ. | Max. | Unit             |
|-----------------|---|------|------|------|------------------|
| V <sub>S</sub>  | Supply Voltage  | 7    | 9    | 10.2 | V                |
| V <sub>CL</sub> | Max Input Signal Handling   | 2    |      |      | V <sub>RMS</sub> |
| THD             | Total Harmonic Distortion V = 0.1V <sub>rms</sub> f = 1KHz              |      | 0.01 | 0.1  | %                |
| S/N             | Signal to Noise Ratio V <sub>out</sub> = 1V <sub>rms</sub> (mode = OFF) |      | 106  |      | dB               |
| S <sub>C</sub>  | Channel Separation f = 1KHz   |      | 90   |      | dB               |
|                 | Treble Control (2dB step)   | -14  |      | 14   | dB               |
|                 | Middle Control (2dB step)   | -14  |      | 14   | dB               |
|                 | Bass Control (2dB step)   | -14  |      | 14   | dB               |
|                 | Balance Control 1dB step (LCH, RCH)                                     | -79  |      | 0    | dB               |
|                 | Mute Attenuation  |      | 100  |      | dB               |

Table 4. Thermal Data

| Symbol                | Parameter                        | Value | Unit |
|-----------------------|----------------------------------|-------|------|
| R <sub>th j-pin</sub> | Thermal Resistance Junction-pins | 85    | °C/W |

Figure 4. TEST CIRCUIT (TDA7430)

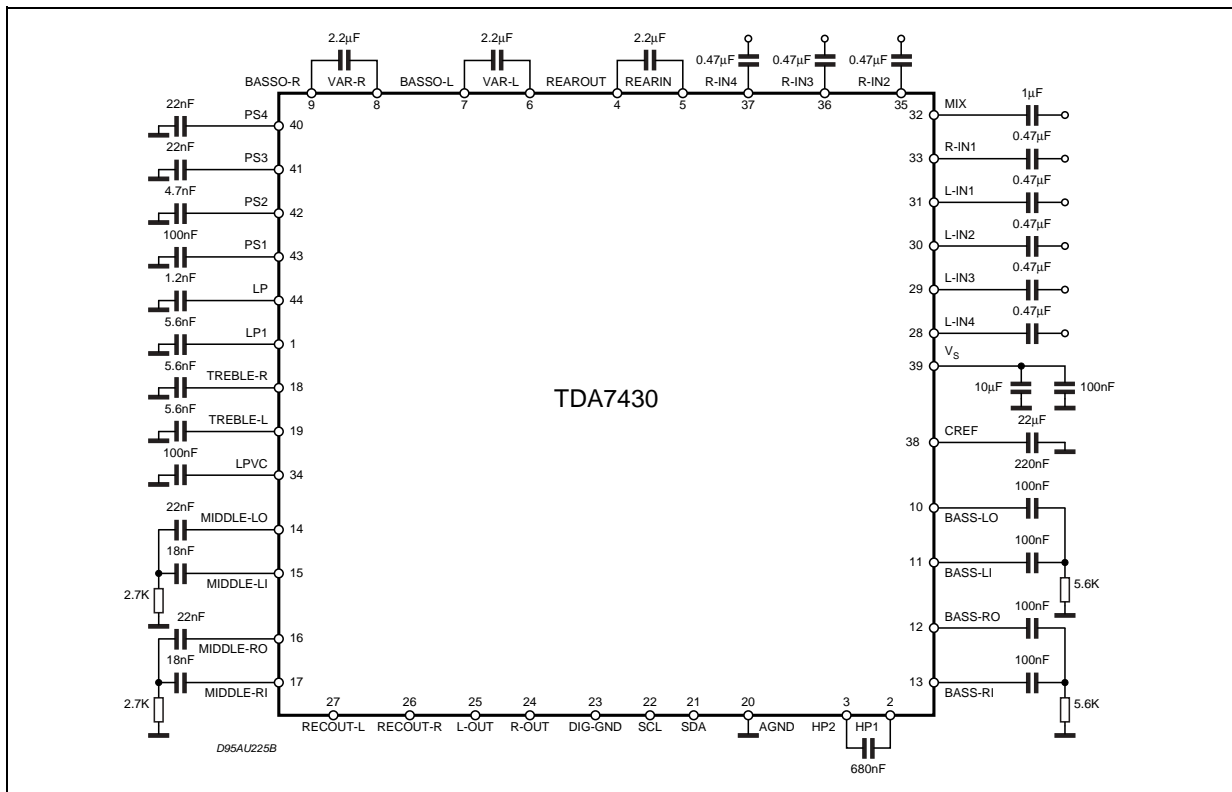


Figure 5. TEST CIRCUIT (TDA7431)

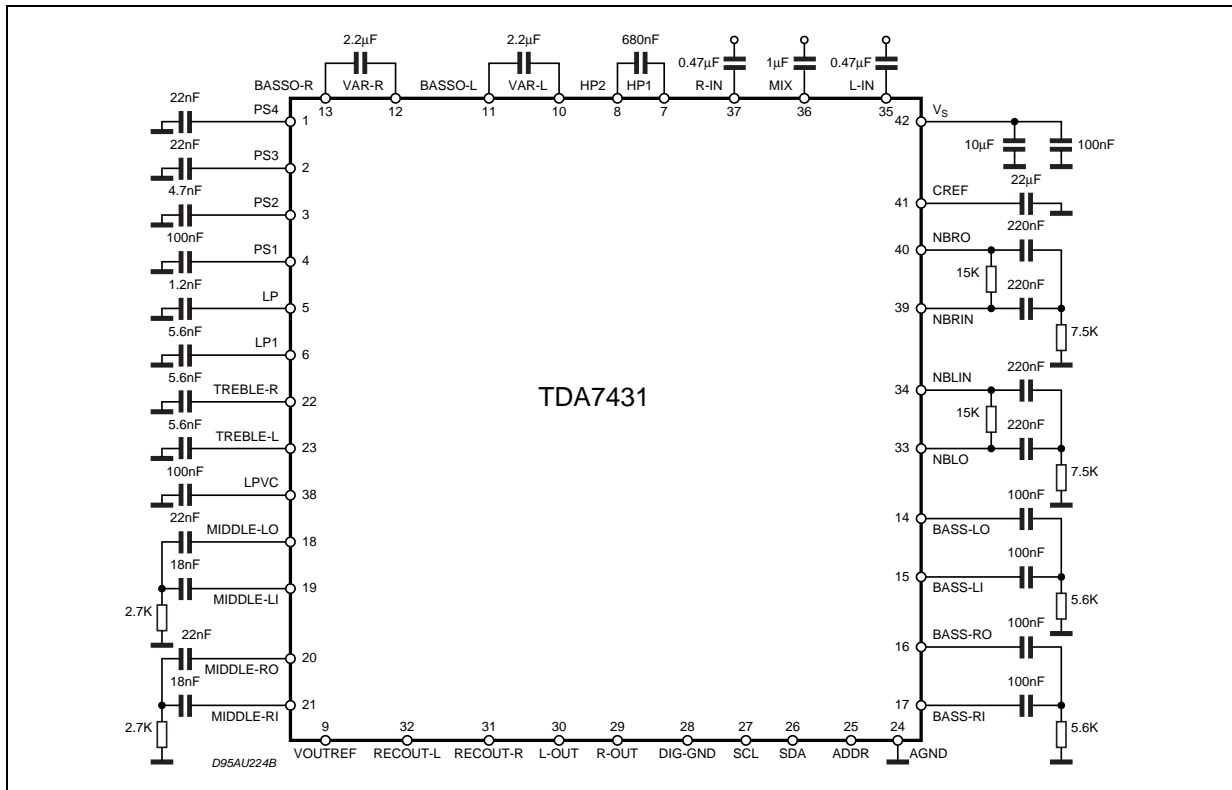
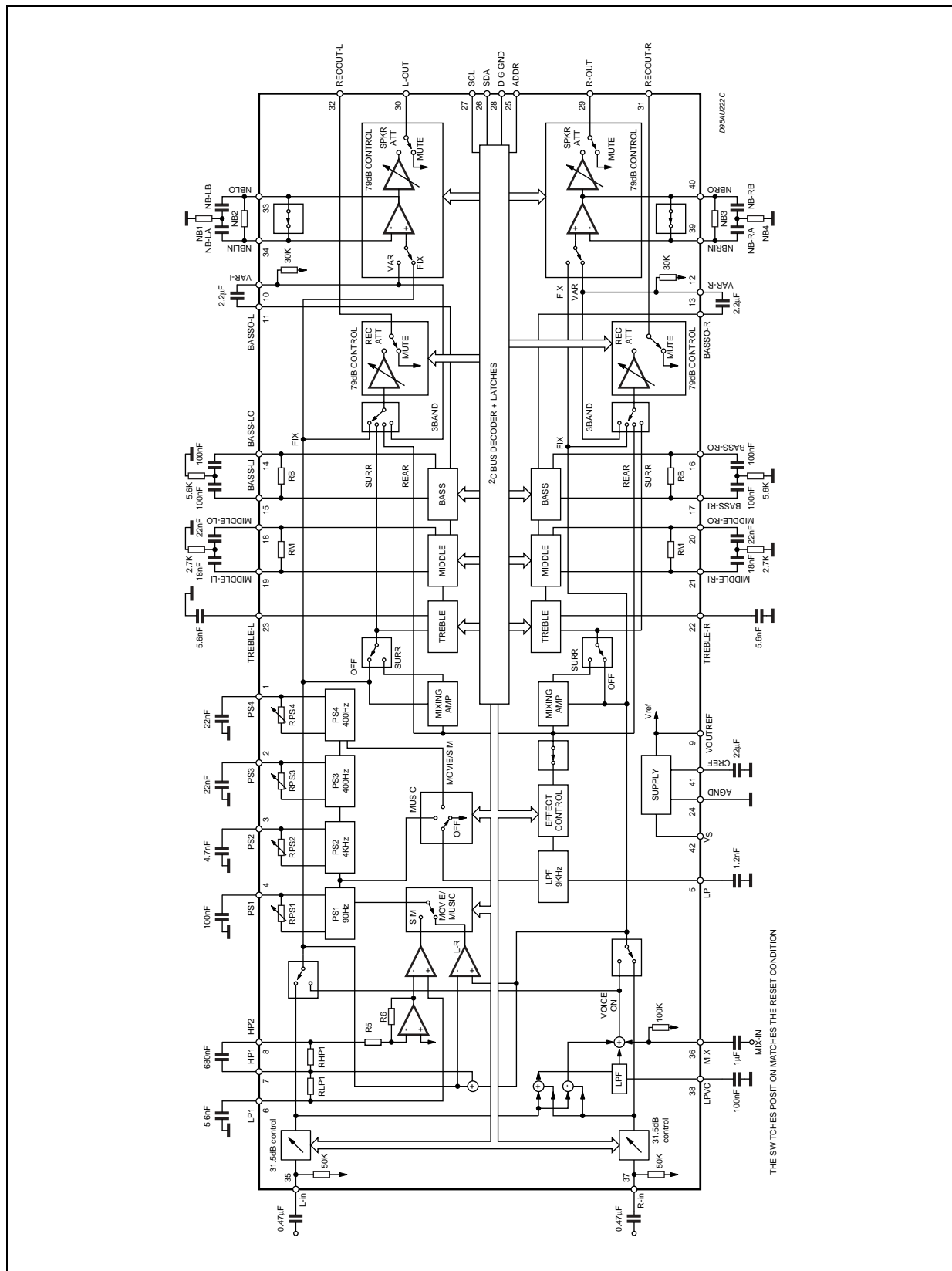




Figure 7. Block Diagram (TDA7431)



**Table 5. Electrical Characteristics** (refer to the test circuit  $T_{amb} = 25^{\circ}\text{C}$ ,  $V_S = 9\text{V}$ ,  $R_L = 10\text{K}\Omega$ ,  $V_{in} = 1\text{V}_{rms}$ ;  $R_G = 600\Omega$ , all controls flat ( $G = 0\text{dB}$ ), Effect CTRL =  $-6\text{dB}$ , MODE = OFF;  $f = 1\text{KHz}$  unless otherwise specified).

| Symbol                | Parameter                    | Test Condition  | Min.       | Typ.       | Max.       | Unit             |
|-----------------------|------------------------------|---|------------|------------|------------|------------------|
| <b>SUPPLY</b>         |                              |   |            |            |            |                  |
| $V_S$                 | Supply Voltage               |   | 7          | 9          | 10.2       | V                |
| $I_S$                 | Supply Current               |   | 10         | 18         | 26         | mA               |
| SVR                   | Ripple Rejection             | $L_{CH} / R_{CH\ out}$ , Mode = OFF   | 60         | 80         |            | dB               |
| <b>INPUT STAGE</b>    |                              |   |            |            |            |                  |
| $R_{IN}$              | Input Resistance             |   | 35         | 50         | 65         | $\text{K}\Omega$ |
| $V_{CL}$              | Clipping Level               | THD = 0.3%  | 2          | 2.5        |            | $V_{rms}$        |
| $C_{RANGE}$           | Control Range                |   |            | 31.5       |            | dB               |
| $A_{VMIN}$            | Min. Attenuation             |   | -1         | 0          | 1          | dB               |
| $A_{VMAX}$            | Max. Attenuation             |   | 31         | 31.5       | 32         | dB               |
| $A_{STEP}$            | Step Resolution              |   |            | 0.5        | 1          | dB               |
| $V_{DC}$              | DC Steps                     | adjacent att. step  | -3         | 0          | 3          | mV               |
| $A_{VO1}$             | Voice Canceler Output 1      | $L_{IN} = R_{IN}$ , $R_{IN} = \text{ON}$ ,<br>$V_{mix} = 0\text{V FIX}$ , 0dB attenuation | 5          | 6          | 7          | dB               |
| $A_{VO2}$             | Voice Canceler Output 2      | $L_{IN} = R_{IN} = 0\text{V}$ ,<br>$V_{mix} = 1\text{V}_{rms\ FIX}$ , 0dB attenuation     | -1         | 0          | 1          | dB               |
| $A_{VO3}$             | Voice Canceler Output 3      | $L_{IN} = R_{IN}$ , $V_{mix} = 0\text{V FIX}$ ,<br>0dB attenuation                        | 5          | 6          | 7          | dB               |
| $R_{LPV}$             | Low Pass Filter Resistance   |   | 22.4       | 32         | 41.6       | $\text{K}\Omega$ |
| $R_{MIX}$             | Input Impedance              |   | 70         | 100        | 130        | $\text{K}\Omega$ |
| <b>BASS CONTROL</b>   |                              |   |            |            |            |                  |
| $G_b$                 | Control Range                | Max. Boost/cut  | $\pm 11.5$ | $\pm 14.0$ | $\pm 16.0$ | dB               |
| $B_{STEP}$            | Step Resolution              |   | 1          | 2          | 3          | dB               |
| $R_B$                 | Internal Feedback Resistance |   | 32         | 44         | 56         | $\text{K}\Omega$ |
| <b>MIDDLE CONTROL</b> |                              |   |            |            |            |                  |
| $G_m$                 | Control Range                | Max. Boost/cut  | $\pm 11.5$ | $\pm 14.0$ | $\pm 16.0$ | dB               |
| $M_{STEP}$            | Step Resolution              |   | 1          | 2          | 3          | dB               |
| $R_M$                 | Internal Feedback Resistance |   | 17.5       | 25         | 32.5       | $\text{K}\Omega$ |
| <b>TREBLE CONTROL</b> |                              |   |            |            |            |                  |
| $G_t$                 | Control Range                | Max. Boost/cut  | $\pm 13.0$ | $\pm 14.0$ | $\pm 15.0$ | dB               |
| $T_{STEP}$            | Step Resolution              |   | 1          | 2          | 3          | dB               |

Table 5. Electrical Characteristics (continued)

| Symbol   | Parameter                           | Test Condition  | Min.  | Typ. | Max. | Unit |
|--|-------------------------------------|---|-------|------|------|------|
| <b>EFFECT CONTROL</b>  |                                     |   |       |      |      |      |
| C <sub>RANGE</sub>   | Control Range                       |   | ±13.0 |      | 6    | dB   |
| S <sub>STEP</sub>  | Step Resolution                     |   | 0.5   | 1    | 1.5  | dB   |
| <b>SURROUND SOUND MATRIX</b>   |                                     |   |       |      |      |      |
| TEST CONDITION (Phase Resistor Selection D0=0, D1=1, D2=0, D3=1, D4=0, D5=1, D6=0, D7=1) |                                     |   |       |      |      |      |
| G <sub>OFF</sub>   | In-phase Gain (OFF)                 | Mode OFF, Input signal of 1kHz, 1.4 V <sub>p-p</sub> , R <sub>in</sub> → R <sub>out</sub> , L <sub>in</sub> → L <sub>out</sub>                                | -1    | 0    | 1    | dB   |
| D <sub>G</sub> OFF   | LR In-phase Gain Difference (OFF)   | Mode OFF, Input signal of 1kHz, 1.4 V <sub>p-p</sub> , R <sub>in</sub> → R <sub>out</sub> , L <sub>in</sub> → L <sub>out</sub>                                | -1    | 0    | 1    | dB   |
| G <sub>MOV</sub>   | In-phase Gain (Movie)               | Movie mode, Effect Ctrl = -6dB<br>1kHz, 1.4 V <sub>p-p</sub> ,<br>R <sub>in</sub> → R <sub>out</sub> , L <sub>in</sub> → L <sub>out</sub>                     |       | 8    |      | dB   |
| D <sub>G</sub> MOV   | LR In-phase Gain Difference (Movie) | Movie mode, Effect Ctrl = -6dB<br>Input signal of 1kHz, 1.4 V <sub>p-p</sub><br>(R <sub>in</sub> → R <sub>out</sub> ) - (L <sub>in</sub> → L <sub>out</sub> ) |       | 0    |      | dB   |
| G <sub>MUS</sub>   | In-phase Gain (Music)               | Music mode, Effect Ctrl = -6dB<br>Input signal of 1kHz, 1.4 V <sub>p-p</sub><br>(R <sub>in</sub> → R <sub>out</sub> ), (L <sub>in</sub> → L <sub>out</sub> )  |       | 7    |      | dB   |
| D <sub>G</sub> MUS   | LR In-phase Gain Difference (Music) | Music mode, Effect Ctrl = -6dB<br>Input signal of 1kHz, 1.4 V <sub>p-p</sub><br>(R <sub>in</sub> → R <sub>out</sub> ), (L <sub>in</sub> → L <sub>out</sub> )  |       | 0    |      | dB   |
| L <sub>MON1</sub>  | Simulated L Output 1                | Simulated Mode, Effect Ctrl = -6dB<br>Input signal of 250Hz,<br>1.4 V <sub>p-p</sub> , R <sub>in</sub> and L <sub>in</sub> → L <sub>out</sub>                 |       | 4.5  |      | dB   |
| L <sub>MON2</sub>  | Simulated L Output 2                | Simulated Mode, Effect Ctrl = -6dB<br>Input signal of 1kHz,<br>1.4 V <sub>p-p</sub> , R <sub>in</sub> and L <sub>in</sub> → L <sub>out</sub>                  |       | -4.0 |      | dB   |
| L <sub>MON3</sub>  | Simulated L Output 3                | Simulated Mode, Effect Ctrl = -6dB<br>Input signal of 3.6kHz,<br>1.4 V <sub>p-p</sub> , R <sub>in</sub> and L <sub>in</sub> → L <sub>out</sub>                |       | 7.0  |      | dB   |
| R <sub>MON1</sub>  | Simulated R Output 1                | Simulated Mode, Effect Ctrl = -6dB<br>Input signal of 250Hz,<br>1.4 V <sub>p-p</sub> , R <sub>in</sub> and L <sub>in</sub> → R <sub>out</sub>                 |       | -4.5 |      | dB   |
| R <sub>MON2</sub>  | Simulated R Output 2                | Simulated Mode, Effect Ctrl = -6dB<br>Input signal of 1kHz,<br>1.4 V <sub>p-p</sub> , R <sub>in</sub> and L <sub>in</sub> → R <sub>out</sub>                  |       | 3.8  |      | dB   |
| R <sub>MON3</sub>  | Simulated R Output 3                | Simulated Mode, Effect Ctrl = -6dB<br>Input signal of 3.6kHz,<br>1.4 V <sub>p-p</sub> , R <sub>in</sub> and L <sub>in</sub> → R <sub>out</sub>                |       | -20  |      | dB   |
| R <sub>LP1</sub>   | Low Pass Filter Resistance          |   | 7     | 10   | 13   | KΩ   |
| R <sub>HPI</sub>   | High Pass Filter Resistance         |   | 42    | 60   | 78   | KΩ   |
| R <sub>LPF</sub>   | LP Pin Impedance                    |   | 7     | 10   | 13   | KΩ   |



Table 5. Electrical Characteristics (continued)

| Symbol                                  | Parameter                       | Test Condition                          | Min. | Typ.   | Max.  | Unit                                   |
|---|---------------------------------|---|------|--------|-------|--|
| <b>SURROUBND SOUBND MATRIX PHASE</b>    |                                 |   |      |        |       |  |
| R <sub>PS10</sub>                       | Phase Shifter 1: D1 = 0, D0 = 0 |   | 8.3  | 11.8   | 15.2  | KΩ                                     |
| R <sub>PS11</sub>                       | Phase Shifter 1: D1 = 0, D0 = 1 |   | 10   | 14.1   | 18.3  | KΩ                                     |
| R <sub>PS12</sub>                       | Phase Shifter 1: D1 = 1, D0 = 0 |   | 12.6 | 17.9   | 23.3  | KΩ                                     |
| R <sub>PS13</sub>                       | Phase Shifter 1: D1 = 1, D0 = 1 |   | 26.4 | 37.3   | 48.85 | KΩ                                     |
| R <sub>PS20</sub>                       | Phase Shifter 2: D3 = 0, D2 = 0 |   | 4    | 5.6    | 7.2   | KΩ                                     |
| R <sub>PS21</sub>                       | Phase Shifter 2: D3 = 0, D2 = 1 |   | 4.8  | 6.8    | 8.7   | KΩ                                     |
| R <sub>PS22</sub>                       | Phase Shifter 2: D3 = 1, D2 = 0 |   | 6    | 8.4    | 10.9  | KΩ                                     |
| R <sub>PS23</sub>                       | Phase Shifter 2: D3 = 1, D2 = 1 |   | 12.9 | 18.3   | 23.7  | KΩ                                     |
| R <sub>PS30</sub>                       | Phase Shifter 3: D5 = 0, D4 = 0 |   | 8.5  | 12.1   | 15.6  | KΩ                                     |
| R <sub>PS31</sub>                       | Phase Shifter 3: D5 = 0, D4 = 1 |   | 10.2 | 14.5   | 18.7  | KΩ                                     |
| R <sub>PS32</sub>                       | Phase Shifter 3: D5 = 1, D4 = 0 |   | 12.7 | 18.1   | 23.3  | KΩ                                     |
| R <sub>PS33</sub>                       | Phase Shifter 3: D5 = 1, D4 = 1 |   | 27.4 | 39.1   | 50.75 | KΩ                                     |
| R <sub>PS40</sub>                       | Phase Shifter 4: D7 = 0, D6 = 0 |   | 8.5  | 12.1   | 15.6  | KΩ                                     |
| R <sub>PS41</sub>                       | Phase Shifter 4: D7 = 0, D6 = 1 |   | 10.2 | 14.5   | 18.7  | KΩ                                     |
| R <sub>PS42</sub>                       | Phase Shifter 4: D7 = 1, D6 = 0 |   | 12.7 | 18.1   | 23.3  | KΩ                                     |
| R <sub>PS43</sub>                       | Phase Shifter 4: D7 = 1, D6 = 1 |   | 27.4 | 39.1   | 50.75 | KΩ                                     |
| <b>SPEAKER &amp; RECORD ATTENUATORS</b> |                                 |   |      |        |       |  |
| C <sub>RANGE</sub>                      | Control Range                   |   |      | 79     |       | dB                                     |
| S <sub>STEP</sub>                       | Step Resolution                 |   | -0.5 | 1      | 1.5   | dB                                     |
| E <sub>A</sub>                          | Attenuation set error           | A <sub>V</sub> = 0 to -20dB             | -1.5 | 0      | 1.5   | dB                                     |
|   |                                 | A <sub>V</sub> = -20 to -79dB           | -3   | 0      | 2     | dB                                     |
| V <sub>DC</sub>                         | DC Steps                        | adjacent att. steps                     | -3   | 0      | 3     | mV                                     |
| A <sub>MUTE</sub>                       | Output Mute Condition           |   | +70  | 100    |       | dB                                     |
| R <sub>VEA</sub>                        | Input Impedance                 |   | 21   | 30     | 39    | KΩ                                     |
| <b>AUDIO OUTPUTS</b>                    |                                 |   |      |        |       |  |
| N <sub>O(OFF)</sub>                     | Output Noise (OFF)              | Output Mute, Flat<br>BW = 20Hz to 20KHz |      | 4<br>5 |       | μV <sub>rms</sub><br>μV <sub>rms</sub> |
| N <sub>O(MOV)</sub>                     | Output Noise (Movie)            | Mode = Movie<br>BW = 20Hz to 20KHz      |      | 30     |       | μV <sub>rms</sub>                      |
| N <sub>O(Mus)</sub>                     | Output Noise (Music)            | Mode = Music<br>BW = 20Hz to 20KHz      |      | 30     |       | μV <sub>rms</sub>                      |
| N <sub>O(MON)</sub>                     | Output Noise (Simulated)        | Mode Simulated<br>BW = 20Hz to 20KHz    |      | 30     |       | μV <sub>rms</sub>                      |

Table 5. Electrical Characteristics (continued)

| Symbol            | Parameter                      | Test Condition                | Min. | Typ. | Max. | Unit             |
|-------------------|--------------------------------|-------------------------------|------|------|------|------------------|
| d                 | Distorsion                     | $A_V = 0 ; V_{in} = 1V_{rms}$ |      | 0.01 | 0.1  | %                |
| S <sub>C</sub>    | Channel Separation             |                               | 70   | 90   |      | dB               |
| V <sub>OCL</sub>  | Clipping Level                 | d = 0.3%                      | 2    | 2.5  |      | V <sub>rms</sub> |
| R <sub>OUT</sub>  | Output Resistance              |                               | 10   | 40   | 70   | Ω                |
| V <sub>OUT</sub>  | DC Voltage Level               |                               |      | 3.8  |      | V                |
| <b>BUS INPUTS</b> |                                |                               |      |      |      |                  |
| V <sub>IL</sub>   | Input Low Voltage              |                               |      |      | 1    | V                |
| V <sub>IH</sub>   | Input High Voltage             |                               | 3    |      |      | V                |
| I <sub>IN</sub>   | Input Current                  |                               | -5   |      | +5   | mA               |
| V <sub>O</sub>    | Output Voltage SDA Acknowledge | I <sub>O</sub> = 1.6mA        |      |      | 0.4  | V                |

### 3 I<sup>2</sup>C BUS INTERFACE

Data transmission from microprocessor to the TDA7430/TDA7431 and viceversa takes place through the 2 wires I<sup>2</sup>C BUS interface, consisting of the two lines SDA and SCL (pull-up resistors to positive supply voltage must be connected).

#### 3.1 Data Validity

As shown in fig. 8, the data on the SDA line must be stable during the high period of the clock. The HIGH and LOW state of the data line can only change when the clock signal on the SCL line is LOW.

#### 3.2 Start and Stop Conditions

As shown in fig.9 a start condition is a HIGH to LOW transition of the SDA line while SCL is HIGH. The stop condition is a LOW to HIGH transition of the SDA line while SCL is HIGH.

#### 3.3 Byte Format

Every byte transferred on the SDA line must contain 8 bits. Each byte must be followed by an acknowledge bit. The MSB is transferred first.

#### 3.4 Acknowledge

The master (μP) puts a resistive HIGH level on the SDA line during the acknowledge clock pulse (see fig. 10). The peripheral (audioprocessor) that acknowledges has to pull-down (LOW) the SDA line during this clock pulse.

The audioprocessor which has been addressed has to generate an acknowledge after the reception of each byte, otherwise the SDA line remains at the HIGH level during the ninth clock pulse time. In this case the master transmitter can generate the STOP information in order to abort the transfer.

#### 3.5 Transmission without Acknowledge

Avoiding to detect the acknowledge of the audioprocessor, the μP can use a simpler transmission: simply it waits one clock without checking the slave acknowledging, and sends the new data.

This approach of course is less protected from misworking.

Figure 8. Data validity on the I<sup>2</sup>C bus

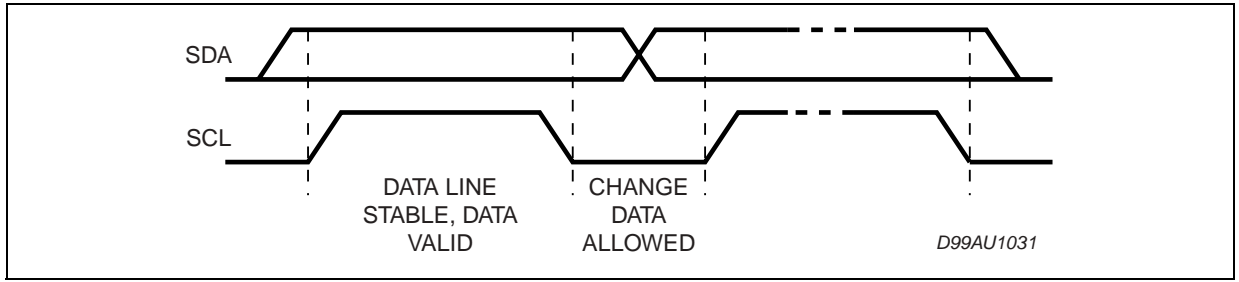


Figure 9. Timing Diagram of I<sup>2</sup>C bus

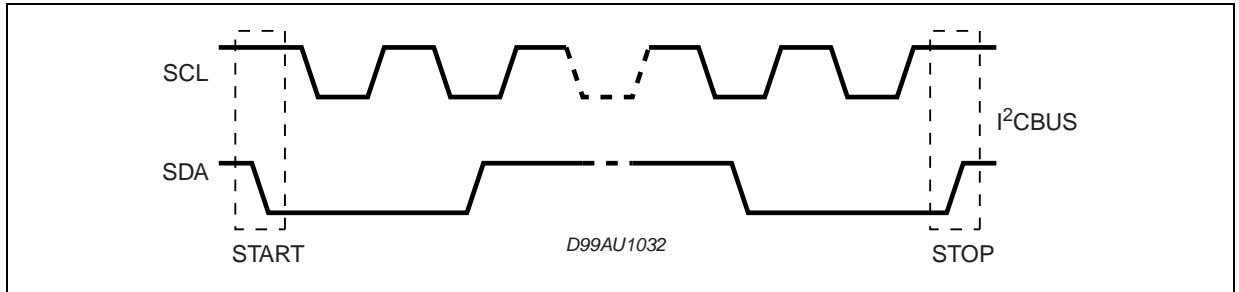
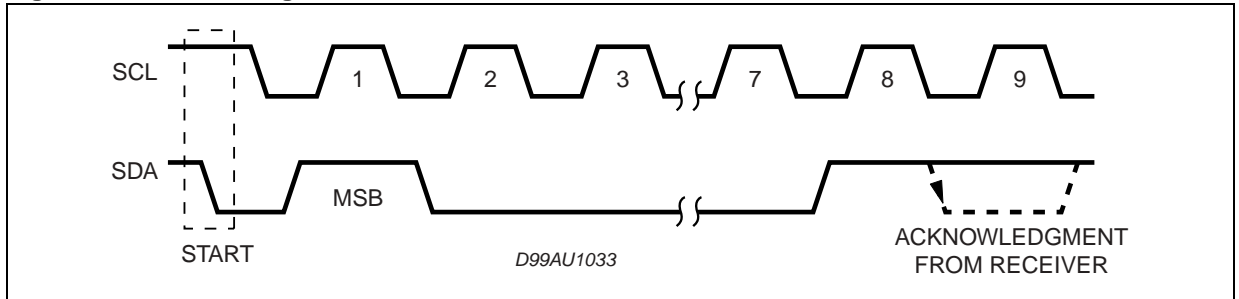


Figure 10. Acknowledge on the I<sup>2</sup>C bus



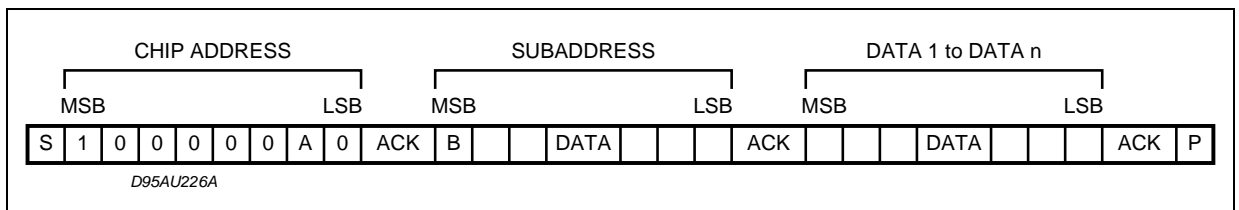
## 4 SOFTWARE SPECIFICATION

### 4.1 Interface Protocol

The interface protocol comprises:

- A start condition (S)
- A chip address byte, containing the TDA7430/TDA7431 address
- A subaddress bytes
- A sequence of data (N byte + acknowledge)
- A stop condition (P)

Figure 11.

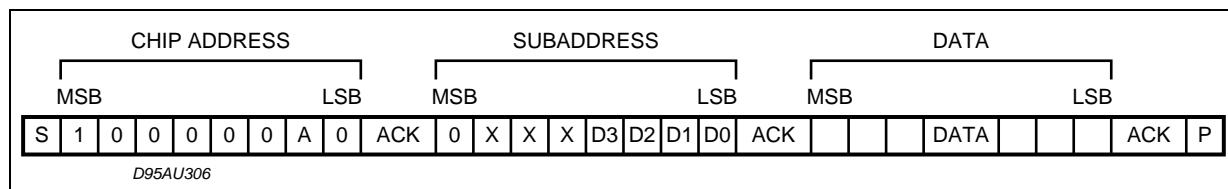


## 5 EXAMPLES

### 5.1 No Incremental Bus

The TDA7430/TDA7431 receives a start condition, the correct chip address, a subaddress with the MSB = 0 (no incremental bus), N-datas (all these datas concern the subaddress selected), a stop condition.

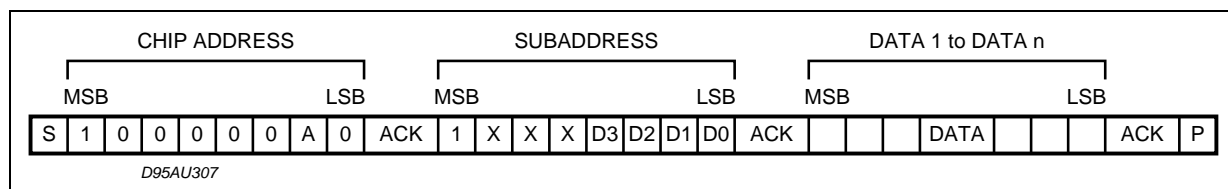
Figure 12.



### 5.2 Incremental Bus

The TDA7430/TDA7431 receives a start condition, the correct chip address, a subaddress with the MSB = 1 (incremental bus): now it is in a loop condition with an autoincrease of the subaddress whereas SUBADDRESS from "1XXX1010" to "1XXX1111" of DATA are ignored. The DATA 1 concern the subaddress sent, and the DATA 2 concern the subaddress sent plus one in the loop etc, and at the end it receives the stop condition.

Figure 13.



## 6 DATA BYTES

Address = 80(HEX) ADDR open; 82 (HEX): need to connect supply

### 6.1 Function Selection

Table 6. The first byte (Subaddress)

| MSB |    |    |    | LSB |    |    |    | SUBADDRESS                      |
|-----|----|----|----|-----|----|----|----|---------------------------------|
| D7  | D6 | D5 | D4 | D3  | D2 | D1 | D0 |                                 |
| B   | X  | X  | X  | 0   | 0  | 0  | 0  | INPUT ATTENUATION               |
| B   | X  | X  | X  | 0   | 0  | 0  | 1  | SURROUND & OUT & EFFECT CONTROL |
| B   | X  | X  | X  | 0   | 0  | 1  | 0  | PHASE RESISTOR                  |
| B   | X  | X  | X  | 0   | 0  | 1  | 1  | BASS & NATURAL BASE             |
| B   | X  | X  | X  | 0   | 1  | 0  | 0  | MIDDLE & TREBLE                 |
| B   | X  | X  | X  | 0   | 1  | 0  | 1  | SPEAKER ATTENUATION "L"         |
| B   | X  | X  | X  | 0   | 1  | 1  | 0  | SPEAKER ATTENUATION "R"         |
| B   | X  | X  | X  | 0   | 1  | 1  | 1  | AUX ATTENUATION "L"             |
| B   | X  | X  | X  | 1   | 0  | 0  | 0  | AUX ATTENUATION "R"             |
| B   | X  | X  | X  | 1   | 0  | 0  | 1  | INPUT MULTIPLEXER, & AUX OUT    |

B = 1 incremental bus; active

B = 0 no incremental bus;

X = indifferent 0,1

Table 7. INPUT ATTENUATION SELECTION

| MSB |    |    |    |    |    |    | LSB | INPUT ATTENUATION |
|-----|----|----|----|----|----|----|-----|-------------------|
| D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0  | 0.5 dB STEPS      |
| X   |    |    |    |    | 0  | 0  | 0   | 0                 |
| X   |    |    |    |    | 0  | 0  | 1   | -0.5              |
| X   |    |    |    |    | 0  | 1  | 0   | -1                |
| X   |    |    |    |    | 0  | 1  | 1   | -1.5              |
| X   |    |    |    |    | 1  | 0  | 0   | -2                |
| X   |    |    |    |    | 1  | 0  | 1   | -2.5              |
| X   |    |    |    |    | 1  | 1  | 0   | -3                |
| X   |    |    |    |    | 1  | 1  | 1   | -3.5              |
|     |    |    |    |    |    |    |     | <b>4 dB STEPS</b> |
| X   |    | 0  | 0  | 0  |    |    |     | 0                 |
| X   |    | 0  | 0  | 1  |    |    |     | -4                |
| X   |    | 0  | 1  | 0  |    |    |     | -8                |
| X   |    | 0  | 1  | 1  |    |    |     | -12               |
| X   |    | 1  | 0  | 0  |    |    |     | -16               |
| X   |    | 1  | 0  | 1  |    |    |     | -20               |
| X   |    | 1  | 1  | 0  |    |    |     | -24               |
| X   |    | 1  | 1  | 1  |    |    |     | -28               |

INPUT ATTENUATION = 0 ~ -31.5dB

Table 8.

| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | REAR SWITCH                |
|----|----|----|----|----|----|----|----|----------------------------|
| X  | 0  |    |    |    |    |    |    | REARIN, REAROUT PIN ACTIVE |
| X  | 1  |    |    |    |    |    |    | NO REARIN, REAROUT PIN     |

Table 9. SURROUND SELECTION

| MSB                   |    |    |    |    |    |    | LSB |           | SURROUND MODE |
|-----------------------|----|----|----|----|----|----|-----|-----------|---------------|
| D7                    | D6 | D5 | D4 | D3 | D2 | D1 | D0  |           |               |
|                       |    |    |    |    |    | 0  | 0   | SIMULATED |               |
|                       |    |    |    |    |    | 0  | 1   | MUSIC     |               |
|                       |    |    |    |    |    | 1  | 0   | OFF       |               |
|                       |    |    |    |    |    | 1  | 1   | MOVIE     |               |
| <b>OUT</b>            |    |    |    |    |    |    |     |           |               |
|                       |    |    |    |    | 0  |    |     | VAR       |               |
|                       |    |    |    |    | 1  |    |     | FIX       |               |
| <b>EFFECT CONTROL</b> |    |    |    |    |    |    |     |           |               |
|                       | 0  | 0  | 0  | 0  |    |    |     | -6        |               |
|                       | 0  | 0  | 0  | 1  |    |    |     | -7        |               |
|                       | 0  | 0  | 1  | 0  |    |    |     | -8        |               |
|                       | 0  | 0  | 1  | 1  |    |    |     | -9        |               |
|                       | 0  | 1  | 0  | 0  |    |    |     | -10       |               |
|                       | 0  | 1  | 0  | 1  |    |    |     | -11       |               |
|                       | 0  | 1  | 1  | 0  |    |    |     | -12       |               |
|                       | 0  | 1  | 1  | 1  |    |    |     | -13       |               |
|                       | 1  | 0  | 0  | 0  |    |    |     | -14       |               |
|                       | 1  | 0  | 0  | 1  |    |    |     | -15       |               |
|                       | 1  | 0  | 1  | 0  |    |    |     | -16       |               |
|                       | 1  | 0  | 1  | 1  |    |    |     | -17       |               |
|                       | 1  | 1  | 0  | 0  |    |    |     | -18       |               |
|                       | 1  | 1  | 0  | 1  |    |    |     | -19       |               |
|                       | 1  | 1  | 1  | 0  |    |    |     | -20       |               |
|                       | 1  | 1  | 1  | 1  |    |    |     | -21       |               |

Table 10. PHASE RESISTOR SELECTION

| MSB   |    |    |    |    |    |    | LSB |                             | SURROUND PHASE RESISTOR |
|---|----|----|----|----|----|----|-----|-----------------------------|-------------------------|
| D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0  |                             |                         |
|   |    |    |    |    |    | 0  | 0   | PHASE SHIFT 1 (K $\Omega$ ) |                         |
|   |    |    |    |    |    | 0  | 1   | 12                          |                         |
|   |    |    |    |    |    | 1  | 0   | 14                          |                         |
|   |    |    |    |    |    | 1  | 1   | 18                          |                         |
|   |    |    |    |    |    |    |     | 37                          |                         |
| <b>PHASE SHIFT 2 (K<math>\Omega</math>)</b> |    |    |    |    |    |    |     |                             |                         |
|   |    |    |    | 0  | 0  |    |     | 6                           |                         |
|   |    |    |    | 0  | 1  |    |     | 7                           |                         |
|   |    |    |    | 1  | 0  |    |     | 8                           |                         |
|   |    |    |    | 1  | 1  |    |     | 18                          |                         |
| <b>PHASE SHIFT 3 (K<math>\Omega</math>)</b> |    |    |    |    |    |    |     |                             |                         |
|   |    | 0  | 0  |    |    |    |     | 12                          |                         |
|   |    | 0  | 1  |    |    |    |     | 14                          |                         |
|   |    | 1  | 0  |    |    |    |     | 18                          |                         |
|   |    | 1  | 1  |    |    |    |     | 39                          |                         |
| <b>PHASE SHIFT 4 (K<math>\Omega</math>)</b> |    |    |    |    |    |    |     |                             |                         |
| 0   | 0  |    |    |    |    |    |     | 12                          |                         |
| 0   | 1  |    |    |    |    |    |     | 14                          |                         |
| 1   | 0  |    |    |    |    |    |     | 18                          |                         |
| 1   | 1  |    |    |    |    |    |     | 39                          |                         |

Table 11. BASS SELECTION

| MSB |    |    |    |    |    |    | LSB | BASS                                   |
|-----|----|----|----|----|----|----|-----|--|
| D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0  | 2 dB STEPS                             |
|     |    |    |    | 0  | 0  | 0  | 0   | -14                                    |
|     |    |    |    | 0  | 0  | 0  | 1   | -12                                    |
|     |    |    |    | 0  | 0  | 1  | 0   | -10                                    |
|     |    |    |    | 0  | 0  | 1  | 1   | -8                                     |
|     |    |    |    | 0  | 1  | 0  | 0   | -6                                     |
|     |    |    |    | 0  | 1  | 0  | 1   | -4                                     |
|     |    |    |    | 0  | 1  | 1  | 0   | -2                                     |
|     |    |    |    | 0  | 1  | 1  | 1   | 0                                      |
|     |    |    |    | 1  | 1  | 1  | 1   | 0                                      |
|     |    |    |    | 1  | 1  | 1  | 0   | 2                                      |
|     |    |    |    | 1  | 1  | 0  | 1   | 4                                      |
|     |    |    |    | 1  | 1  | 0  | 0   | 6                                      |
|     |    |    |    | 1  | 0  | 1  | 1   | 8                                      |
|     |    |    |    | 1  | 0  | 1  | 0   | 10                                     |
|     |    |    |    | 1  | 0  | 0  | 1   | 12                                     |
|     |    |    |    | 1  | 0  | 0  | 0   | 14                                     |
|     |    |    |    |    |    |    |     | <b>NATURAL BASE</b>                    |
|     |    |    | 0  |    |    |    |     | NBRIN, NBRO, NBLIN,<br>NBLO PIN ACTIVE |
|     |    |    | 1  |    |    |    |     | NO NBRIN, NBRO, NBLIN,<br>NBLO PIN     |

Table 12. SPEAKER/AUX ATT. R &amp; L SELECTION

| MSB |    |    |    |    |    |    | LSB | SPEAKER/AUX ATT   |
|-----|----|----|----|----|----|----|-----|-------------------|
| D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0  | 1 dB STEPS        |
|     |    |    |    |    | 0  | 0  | 0   | 0                 |
|     |    |    |    |    | 0  | 0  | 1   | -1                |
|     |    |    |    |    | 0  | 1  | 0   | -2                |
|     |    |    |    |    | 0  | 1  | 1   | -3                |
|     |    |    |    |    | 1  | 0  | 0   | -4                |
|     |    |    |    |    | 1  | 0  | 1   | -5                |
|     |    |    |    |    | 1  | 1  | 0   | -6                |
|     |    |    |    |    | 1  | 1  | 1   | -7                |
|     |    |    |    |    |    |    |     | <b>8 dB STEPS</b> |
|     | 0  | 0  | 0  | 0  |    |    |     | 0                 |
|     | 0  | 0  | 0  | 1  |    |    |     | -8                |
|     | 0  | 0  | 1  | 0  |    |    |     | -16               |
|     | 0  | 0  | 1  | 1  |    |    |     | -24               |
|     | 0  | 1  | 0  | 0  |    |    |     | -32               |
|     | 0  | 1  | 0  | 1  |    |    |     | -40               |
|     | 0  | 1  | 1  | 0  |    |    |     | -48               |
|     | 0  | 1  | 1  | 1  |    |    |     | -56               |
|     | 1  | 0  | 0  | 0  |    |    |     | -64               |
|     | 1  | 0  | 0  | 1  |    |    |     | -72               |
|     |    |    |    |    |    |    |     | <b>MUTE</b>       |
|     | 1  | 0  | 1  | X  |    |    |     |                   |
|     | 1  | 1  | X  | X  |    |    |     |                   |

X = INDIFFERENT 0,1

SPEAKER/AUX ATTENUATION = 0dB ~ -79dB

Table 13. MIDDLE &amp; TREBLE SELECTION

| MSB |    |    |    | LSB |    |    |    | MIDDLE            |
|-----|----|----|----|-----|----|----|----|-------------------|
| D7  | D6 | D5 | D4 | D3  | D2 | D1 | D0 | 2 dB STEPS        |
|     |    |    |    | 0   | 0  | 0  | 0  | -14               |
|     |    |    |    | 0   | 0  | 0  | 1  | -12               |
|     |    |    |    | 0   | 0  | 1  | 0  | -10               |
|     |    |    |    | 0   | 0  | 1  | 1  | -8                |
|     |    |    |    | 0   | 1  | 0  | 0  | -6                |
|     |    |    |    | 0   | 1  | 0  | 1  | -4                |
|     |    |    |    | 0   | 1  | 1  | 0  | -2                |
|     |    |    |    | 0   | 1  | 1  | 1  | 0                 |
|     |    |    |    | 1   | 1  | 1  | 1  | 0                 |
|     |    |    |    | 1   | 1  | 1  | 0  | 2                 |
|     |    |    |    | 1   | 1  | 0  | 1  | 4                 |
|     |    |    |    | 1   | 1  | 0  | 0  | 6                 |
|     |    |    |    | 1   | 0  | 1  | 1  | 8                 |
|     |    |    |    | 1   | 0  | 1  | 0  | 10                |
|     |    |    |    | 1   | 0  | 0  | 1  | 12                |
|     |    |    |    | 1   | 0  | 0  | 0  | 14                |
|     |    |    |    |     |    |    |    | <b>TREBLE</b>     |
|     |    |    |    |     |    |    |    | <b>2 dB STEPS</b> |
| 0   | 0  | 0  | 0  |     |    |    |    | -14               |
| 0   | 0  | 0  | 1  |     |    |    |    | -12               |
| 0   | 0  | 1  | 0  |     |    |    |    | -10               |
| 0   | 0  | 1  | 1  |     |    |    |    | -8                |
| 0   | 1  | 0  | 0  |     |    |    |    | -6                |
| 0   | 1  | 0  | 1  |     |    |    |    | -4                |
| 0   | 1  | 1  | 0  |     |    |    |    | -2                |
| 0   | 1  | 1  | 1  |     |    |    |    | 0                 |
| 1   | 1  | 1  | 1  |     |    |    |    | 0                 |
| 1   | 1  | 1  | 0  |     |    |    |    | 2                 |
| 1   | 1  | 0  | 1  |     |    |    |    | 4                 |
| 1   | 1  | 0  | 0  |     |    |    |    | 6                 |
| 1   | 0  | 1  | 1  |     |    |    |    | 8                 |
| 1   | 0  | 1  | 0  |     |    |    |    | 10                |
| 1   | 0  | 0  | 1  |     |    |    |    | 12                |
| 1   | 0  | 0  | 0  |     |    |    |    | 14                |



Table 14. VOICE CANCELLER/INPUT/RECOUT L & R SELECTION

| MSB |    |    |    |    |    |    | LSB |                   |
|-----|----|----|----|----|----|----|-----|-------------------|
| D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0  | VOICE CANCELER    |
|     |    |    |    |    | 0  | 1  | 0   | OFF               |
|     |    |    |    |    | 0  | 0  | 1   | ON                |
|     |    |    |    |    |    |    |     | INPUT MULTIPLEXER |
|     |    |    |    |    | 0  | 0  |     | IN2               |
|     |    |    |    |    | 0  | 1  |     | IN3               |
|     |    |    |    |    | 1  | 0  |     | IN4               |
|     |    |    |    |    | 1  | 1  |     | IN1               |
|     |    |    |    |    |    |    |     | REC OUT "L"       |
|     |    |    | 0  | 0  |    |    |     | VER 1 (3BAND)     |
|     |    |    | 0  | 1  |    |    |     | VER 2 (SURR)      |
|     |    |    | 1  | 0  |    |    |     | VER 3 (REAR)      |
|     |    |    | 1  | 1  |    |    |     | FIX               |
|     |    |    |    |    |    |    |     | REC OUT "R"       |
|     | 0  | 0  |    |    |    |    | 0   | VER 1 (3BAND)     |
|     | 0  | 1  |    |    |    |    | 0   | VER 2 (SURR)      |
|     | 1  | 0  |    |    |    |    | 0   | VER 3 (REAR)      |
|     | 1  | 1  |    |    |    |    | 0   | FIX               |

Table 15.

| POWER ON RESET                         |                             |
|--|-----------------------------|
| BASS & MIDDLE                          | 2dB                         |
| TREBLE                                 | 0dB                         |
| SURROUND & OUT CONTROL+ EFFECT CONTROL | OFF + FIX + MAX ATTENUATION |
| SPEAKER/AUX ATTENUATION L & R          | MUTE                        |
| INPUT ATTENUATION + REAR SWITCH        | MAX ATTENUATION + ON        |
| NATURAL BASE                           | OFF                         |
| INPUT                                  | IN1                         |

Figure 14. PINS: L-OUT, R-OUT, RECOUT-L, RECOUT-R,

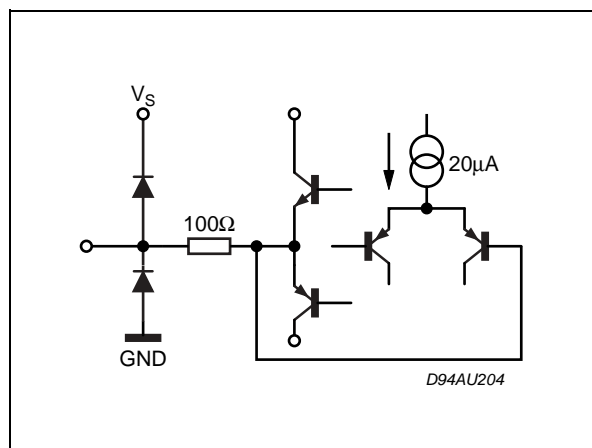


Figure 15. PIN: HP1

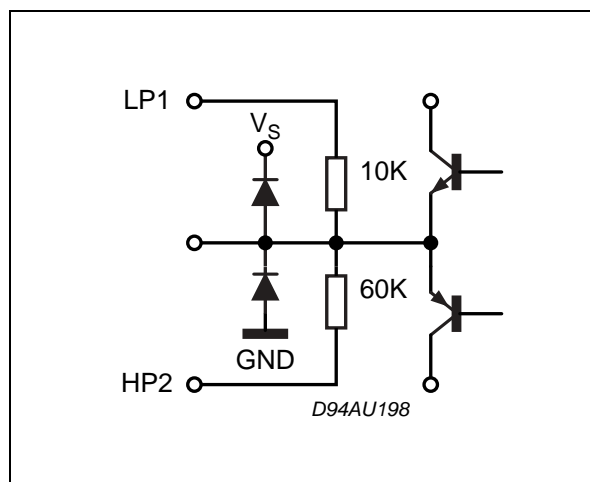


Figure 16. PIN: HP2

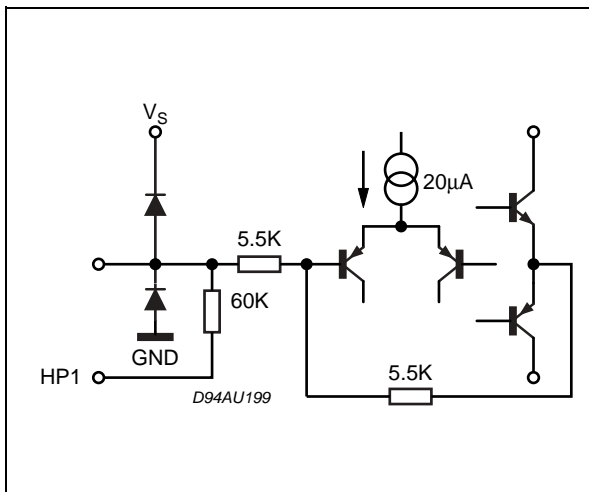


Figure 19. PIN: LP1

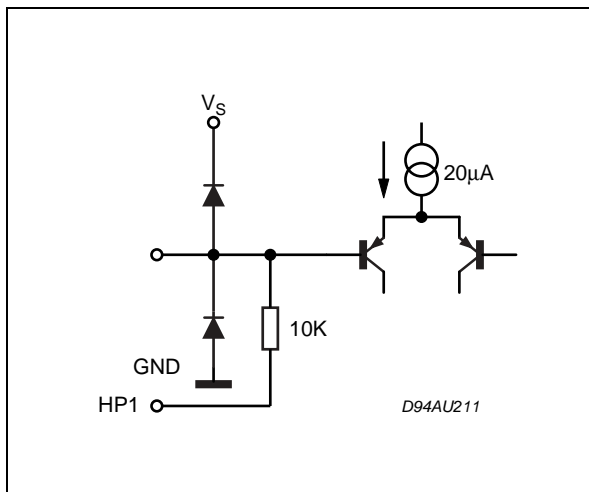


Figure 17. PIN: VAR-L, VAR-R,

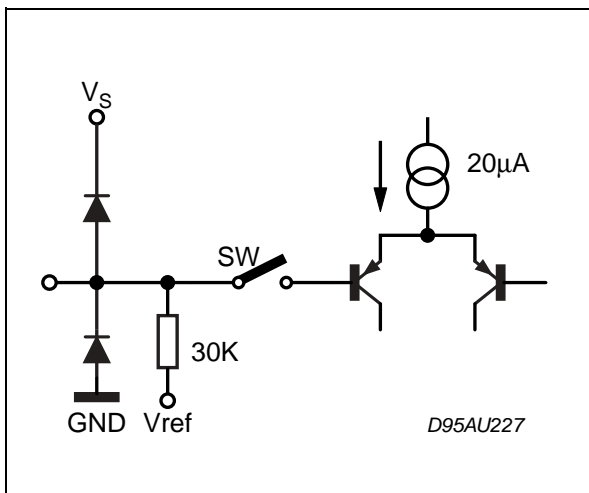


Figure 20. PIN: CREF

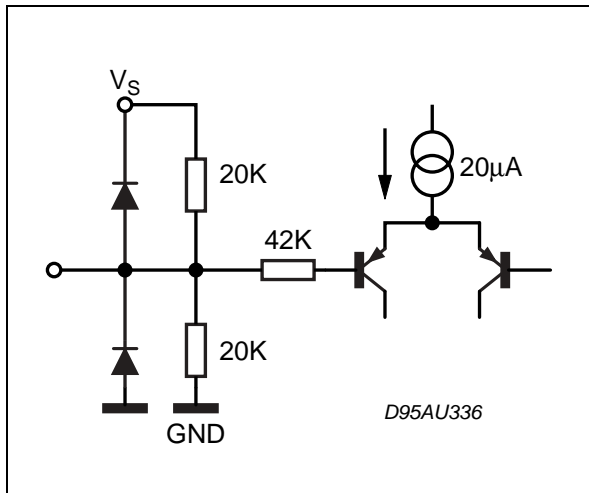


Figure 18. PIN: L-IN, R-IN, L-IN2, R-IN2, L-IN3, R-IN3, L-IN4, R-IN4,

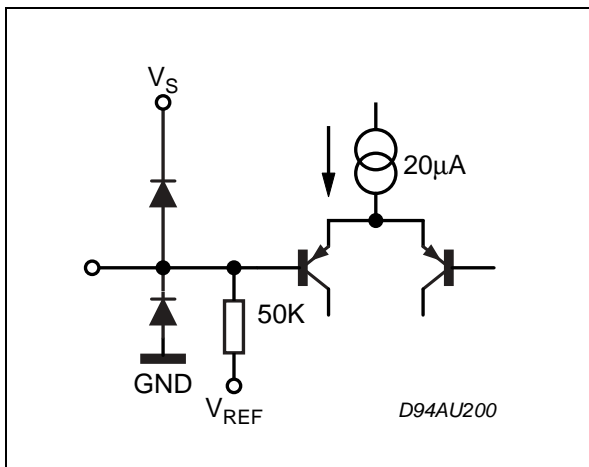


Figure 21. PIN: SCL, SDA

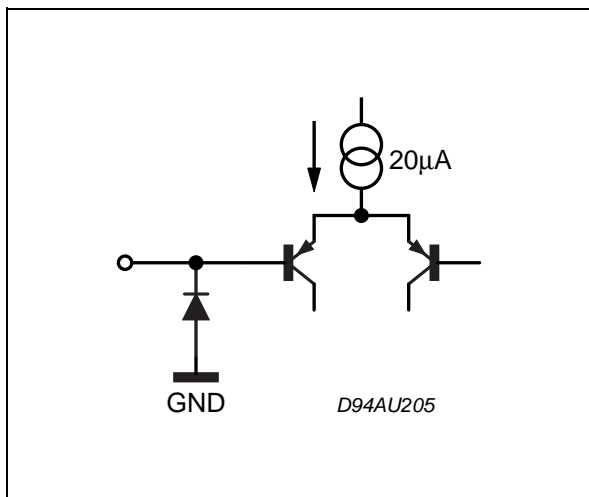


Figure 22. PIN: PS1, PS2, PS3, PS4, LP

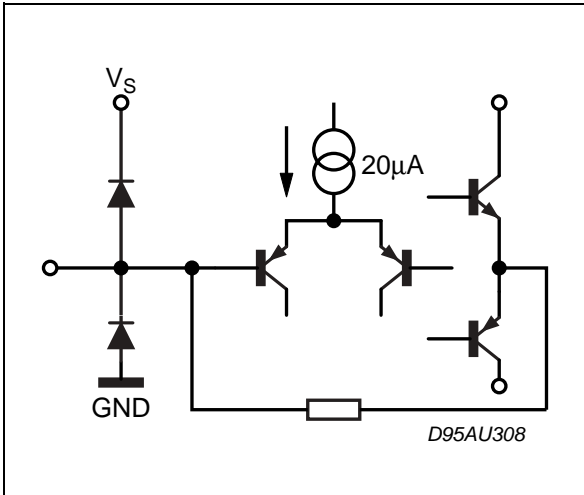


Figure 25. PIN: MIX

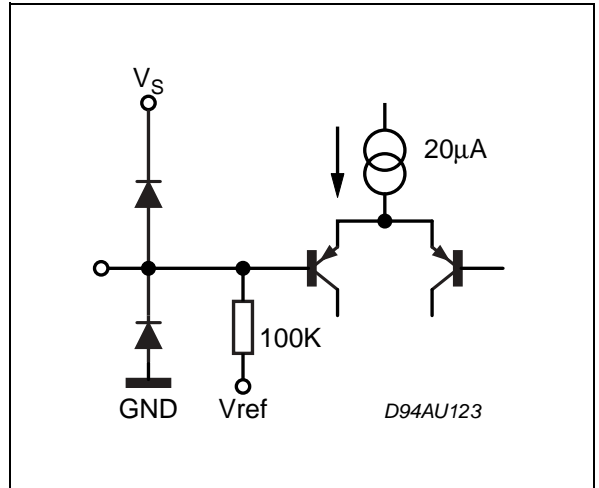


Figure 23. PIN: ADDR

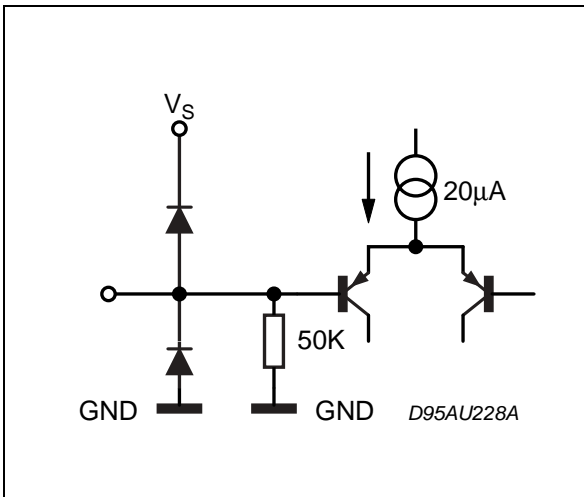


Figure 26. PINS: REAEROUT, BASSO-L, BASSO-R

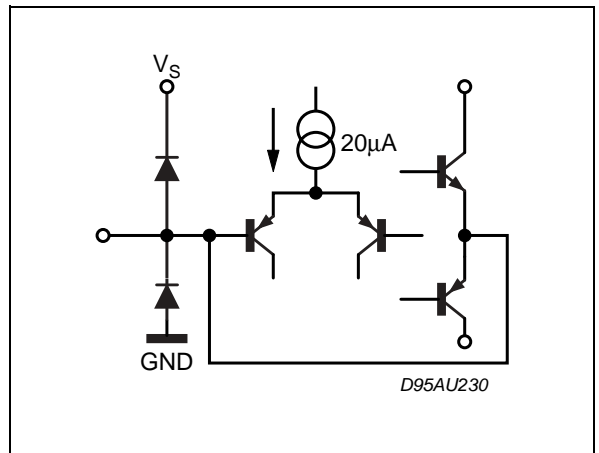


Figure 24. PIN: REARIN

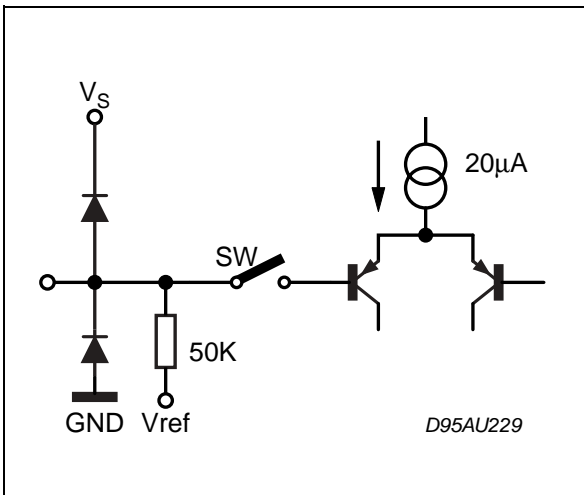


Figure 27. BASS-LI, BASS-RI, MIDDLE-L, MIDDLE-RII

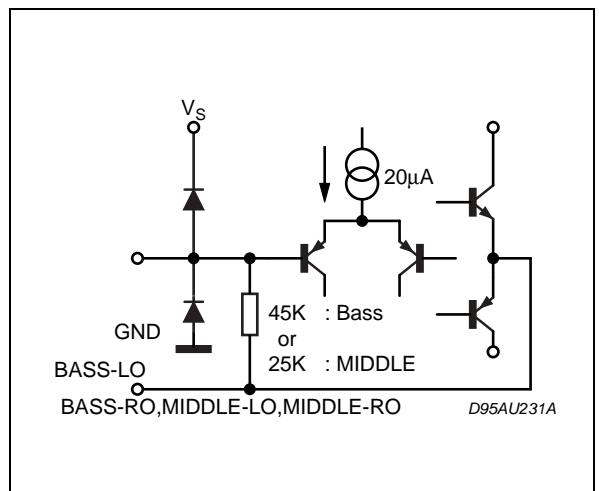


Figure 28. PIN: BASS-LO, BASS-RO, MIDDLE-LO, MIDDLE-RO,

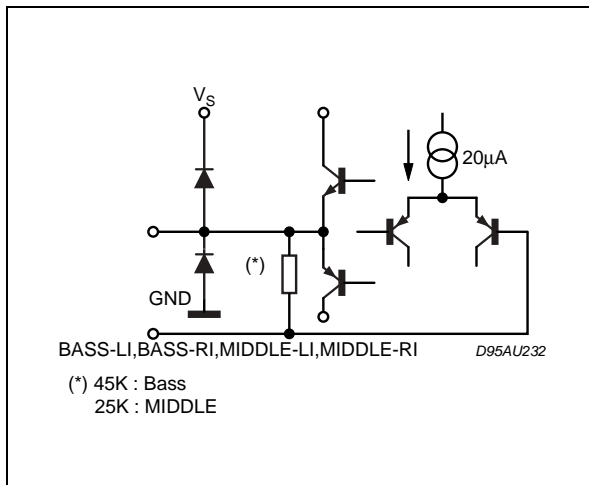


Figure 31. NBLIN, NBRIN

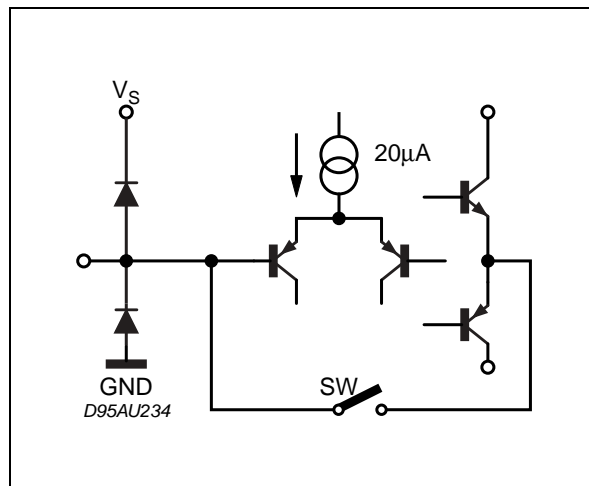


Figure 29. PIN: TREBLE-L, TREBLE-R,

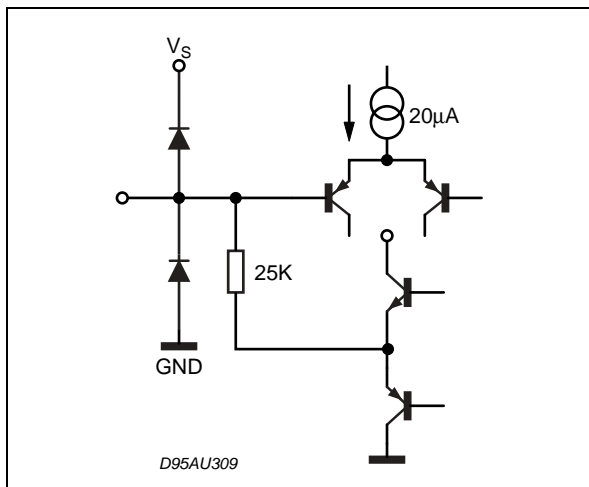


Figure 32. NBLO, NBRO

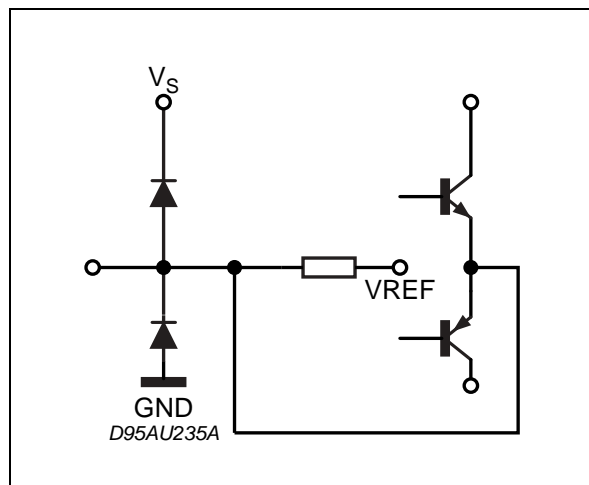


Figure 30. PIN VOUT REF,

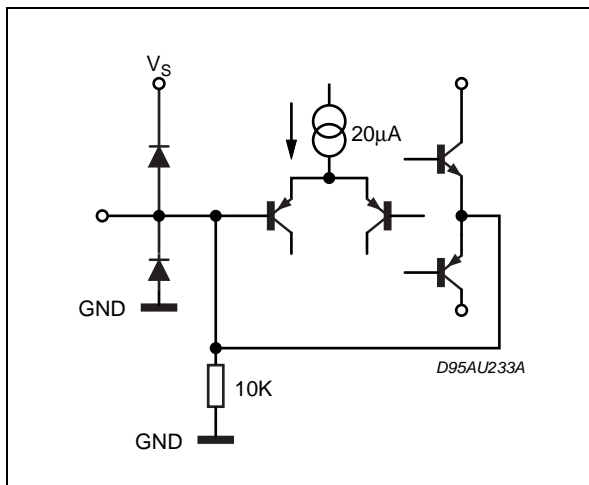
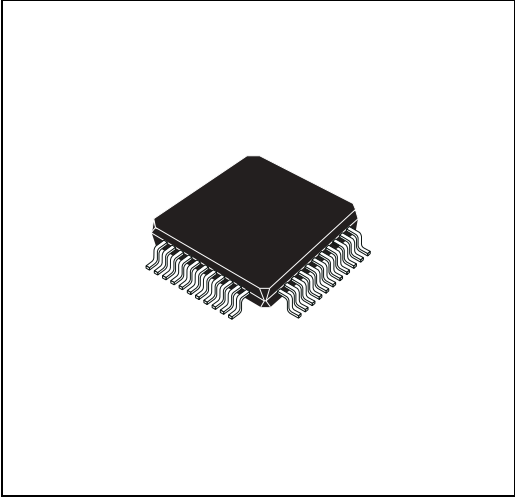


Figure 33. TQFP44 (10 x 10) Mechanical Data & Package Dimensions

| DIM. | mm                                |       |       | inch  |       |       |
|------|-----------------------------------|-------|-------|-------|-------|-------|
|      | MIN.                              | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    |                                   |       | 1.60  |       |       | 0.063 |
| A1   | 0.05                              |       | 0.15  | 0.002 |       | 0.006 |
| A2   | 1.35                              | 1.40  | 1.45  | 0.053 | 0.055 | 0.057 |
| B    | 0.30                              | 0.37  | 0.45  | 0.012 | 0.015 | 0.018 |
| C    | 0.09                              |       | 0.20  | 0.004 |       | 0.008 |
| D    | 11.80                             | 12.00 | 12.20 | 0.464 | 0.472 | 0.480 |
| D1   | 9.80                              | 10.00 | 10.20 | 0.386 | 0.394 | 0.401 |
| D3   |                                   | 8.00  |       |       | 0.315 |       |
| E    | 11.80                             | 12.00 | 12.20 | 0.464 | 0.472 | 0.480 |
| E1   | 9.80                              | 10.00 | 10.20 | 0.386 | 0.394 | 0.401 |
| E3   |                                   | 8.00  |       |       | 0.315 |       |
| e    |                                   | 0.80  |       |       | 0.031 |       |
| L    | 0.45                              | 0.60  | 0.75  | 0.018 | 0.024 | 0.030 |
| L1   |                                   | 1.00  |       |       | 0.039 |       |
| k    | 0° (min.), 3.5° (typ.), 7° (max.) |       |       |       |       |       |

**OUTLINE AND MECHANICAL DATA**



**TQFP44 (10 x 10 x 1.4mm)**

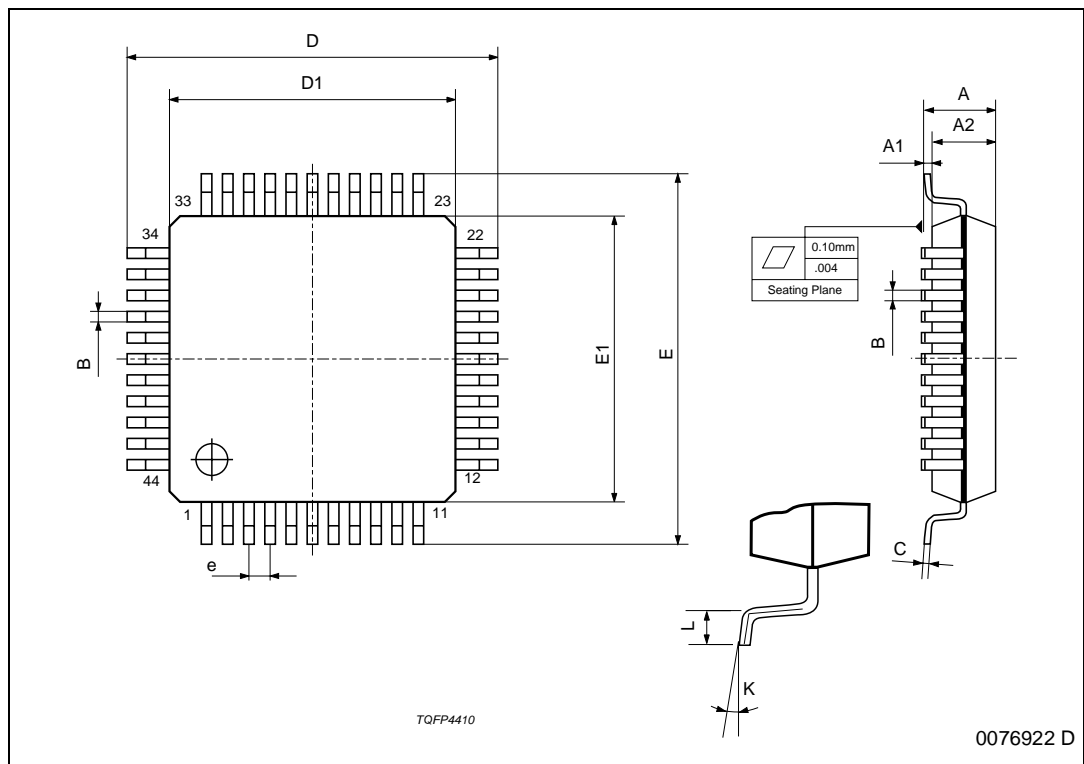
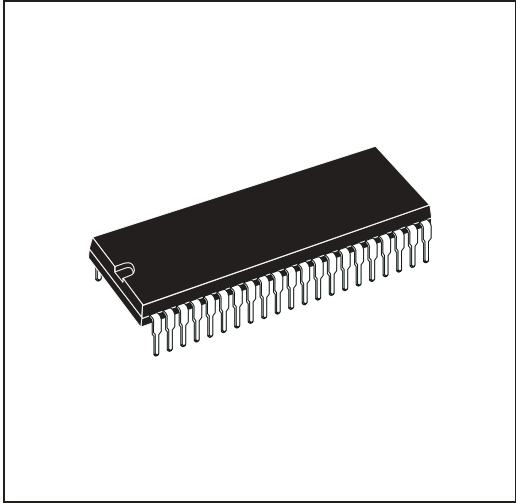


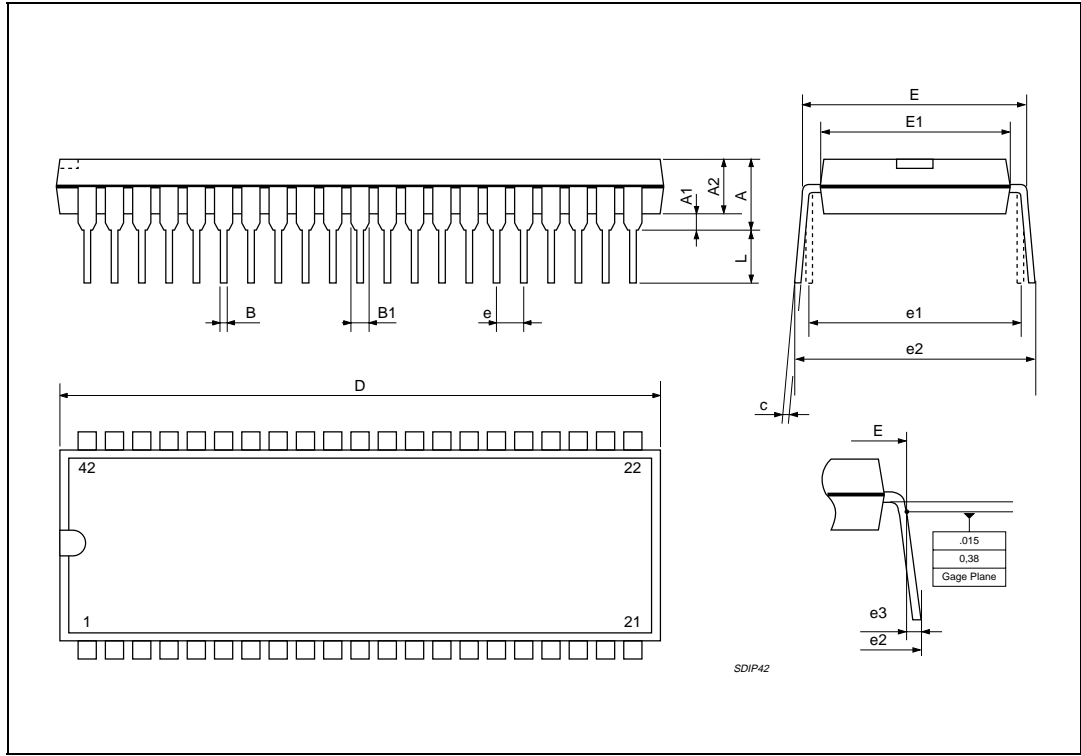
Figure 34. SDIP42 Mechanical Data & Package Dimensions

| DIM. | mm    |       |       | inch   |        |        |
|------|-------|-------|-------|--------|--------|--------|
|      | MIN.  | TYP.  | MAX.  | MIN.   | TYP.   | MAX.   |
| A    |       |       | 5.08  |        |        | 0.20   |
| A1   | 0.51  |       |       | 0.020  |        |        |
| A2   | 3.05  | 3.81  | 4.57  | 0.120  | 0.150  | 0.180  |
| B    | 0.38  | 0.46  | 0.56  | 0.0149 | 0.0181 | 0.0220 |
| B1   | 0.89  | 1.02  | 1.14  | 0.035  | 0.040  | 0.045  |
| c    | 0.23  | 0.25  | 0.38  | 0.0090 | 0.0098 | 0.0150 |
| D    | 36.58 | 36.83 | 37.08 | 1.440  | 1.450  | 1.460  |
| E    | 15.24 |       | 16.00 | 0.60   |        | 0.629  |
| E1   | 12.70 | 13.72 | 14.48 | 0.50   | 0.540  | 0.570  |
| e    |       | 1.778 |       |        | 0.070  |        |
| e1   |       | 15.24 |       |        | 0.60   |        |
| e2   |       |       | 18.54 |        |        | 0.730  |
| e3   |       |       | 1.52  |        |        | 0.060  |
| L    | 2.54  | 3.30  | 3.56  | 0.10   | 0.130  | 0.140  |

**OUTLINE AND MECHANICAL DATA**



**SDIP42 (0.600")**



**Table 16. Revision History**

| Date         | Revision | Description of Changes   |
|--------------|----------|--|
| January 2004 | 9        | First Issue in EDOCS DMS   |
| June 2004    | 10       | Changed the Style-sheet in compliance to the new "Corporate Technical Publications Design Guide" |

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics.  
All other names are the property of their respective owners

© 2004 STMicroelectronics - All rights reserved

**STMicroelectronics GROUP OF COMPANIES**

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan -  
Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States

[www.st.com](http://www.st.com)