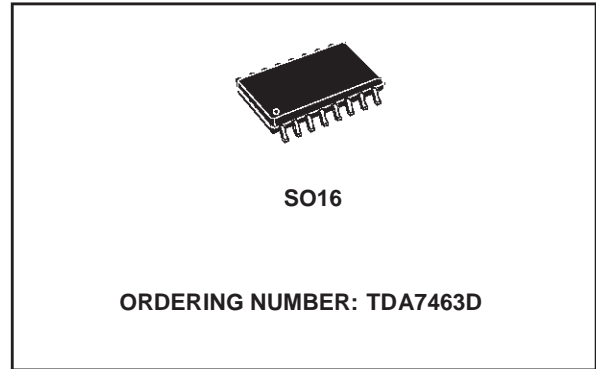




TDA7463D

LOW VOLTAGE TONE CONTROL DIGITALLY CONTROLLED AUDIO PROCESSOR

- 1 STEREO INPUT
- 1 STEREO OUTPUT
- TREBLE BOOST
- BASS CONTROL
- BASS AUTOMATIC LEVEL CONTROL
- VOLUME CONTROL IN 1dB STEPS
- MUTE
- STAND-BY FUNCTION SOFTWARE CONTROLLED
- ALL FUNCTION ARE PROGRAMMABLE VIA SERIAL BUS



DESCRIPTION

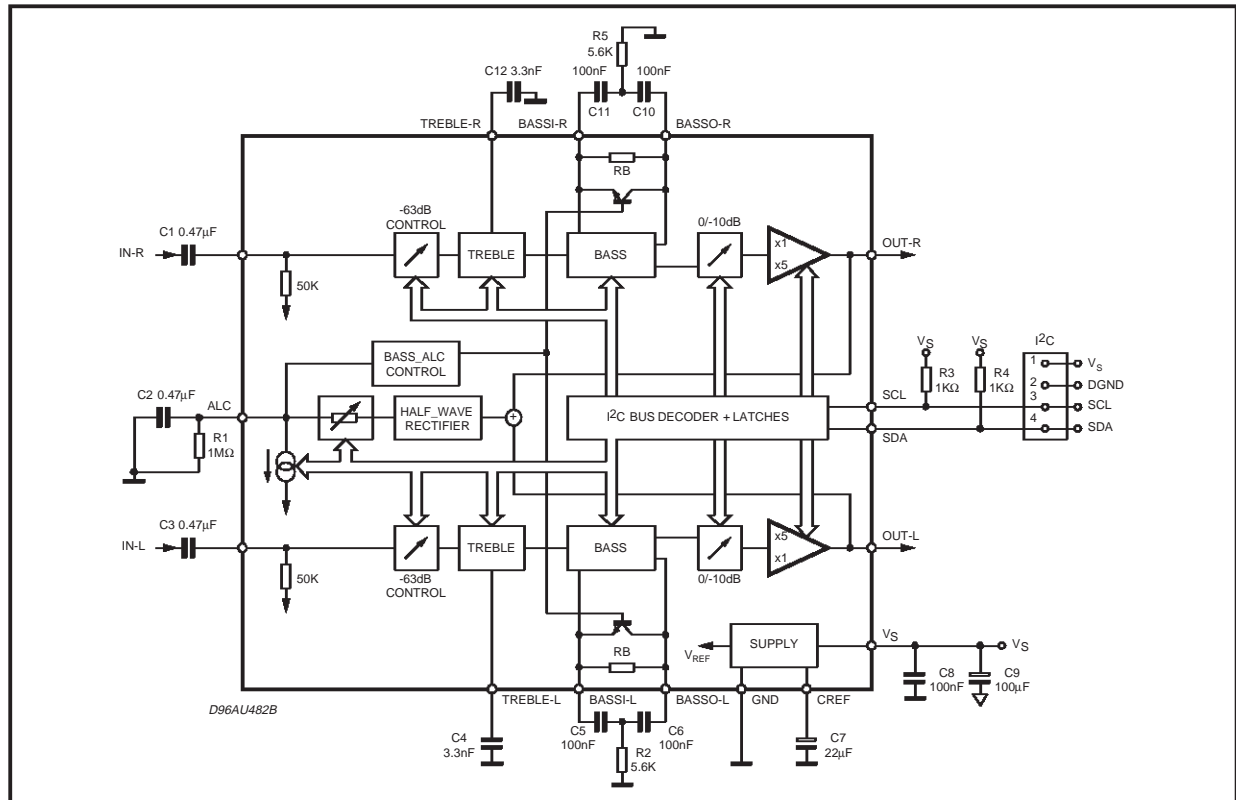
The TDA7463 is a volume tone (bass and treble) processor for quality audio applications in Low voltage supply portable systems.

Bass ALC (Automatic Level Control) function can be adjusted by a dedicated pin. The 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 BIPOLAR/CMOS Technology, Low Distortion, Low Noise and DC stepping are obtained.

BLOCK DIAGRAM

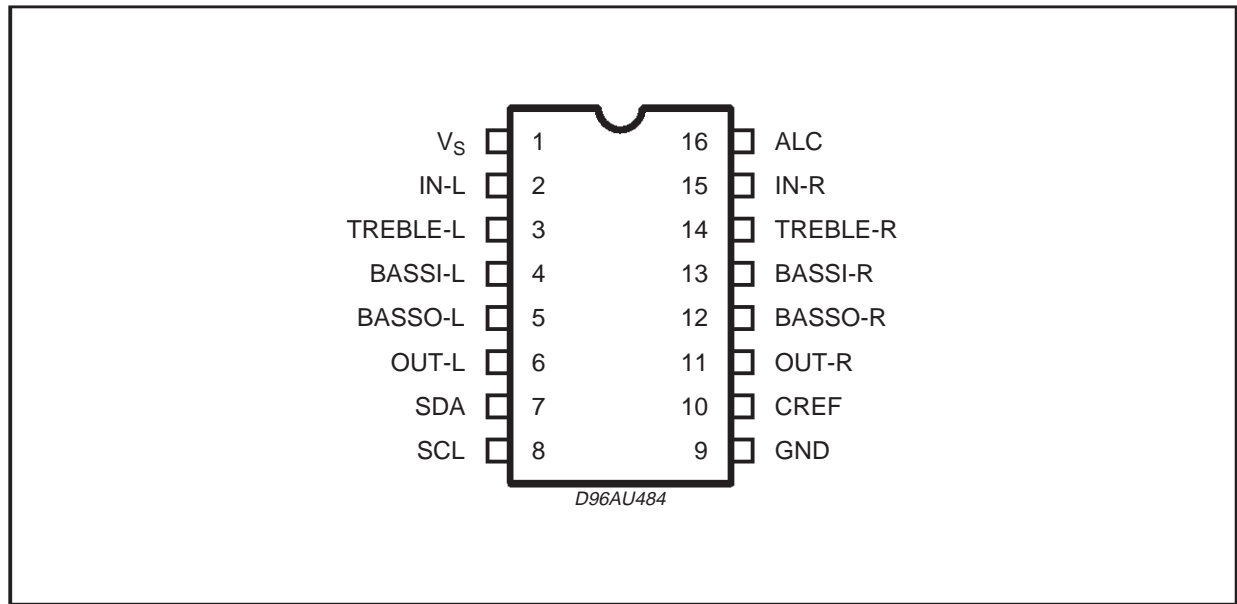


TDA7463D

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------|-------------------------------|------------|------|
| V_S | Operating Supply Voltage | 5 | V |
| T_{amb} | Operating Ambient Temperature | -10 to 85 | °C |
| T_{stg} | Storage Temperature Range | -55 to 150 | °C |

PIN CONNECTION



THERMAL DATA

| Symbol | Parameter | Value | Unit |
|-----------------|----------------------------------|-------|------|
| $R_{th\ j-pin}$ | Thermal Resistance Junction-pins | 85 | °C/W |

QUICK REFERENCE DATA

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|----------|-----------------------------------------------------------|------|------|------|------------------|
| V_S | Supply Voltage | 1.8 | 2.4 | 3 | V |
| V_{CL} | Max. input signal handling | 0.2 | | | V _{rms} |
| THD | Total Harmonic Distortion $V = 0.1V_{rms}$ $f = 1KHz$ | | | 0.1 | % |
| S/N | Signal to Noise Ratio $V_{out} = 0.1V_{rms}$ (mode = OFF) | | 80 | | dB |
| S_C | Channel Separation $f = 1KHz$ | | 80 | | dB |
| | Volume Control (1dB step) | -63 | | 0 | dB |
| | -10dB damping | -10 | | 0 | dB |
| | 14dB | 0 | | 14 | dB |
| | Treble Control | 0 | | 8 | dB |
| | Bass Control | 0 | | 14 | dB |
| | Mute Attenuation | | 100 | | dB |

ELECTRICAL CHARACTERISTICS (refer to the test circuit $T_{amb} = 25^{\circ}\text{C}$, $V_S = 2.4\text{V}$, $R_L = 10\text{K}\Omega$, $R_G = 600\Omega$, all controls flat, unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---------------------------|--------------------------------|-------------------------------------------------------------|-------|--------|-------|--------------------------------|
| SUPPLY | | | | | | |
| V_S | Supply Voltage | | 1.8 | 2.4 | 3 | V |
| I_S | Supply Current | | | 4 | | mA |
| I_{ST-BY} | Stand-By Current | | | 50 | | μA |
| SVR | Ripple Rejection | | | 70 | | dB |
| INPUT STAGE | | | | | | |
| R_{IN} | Input Resistance | | 35 | 50 | 65 | $\text{K}\Omega$ |
| V_{CL} | Clipping Level | THD = 0.3% | 0.2 | | | V_{rms} |
| VOLUME CONTROL | | | | | | |
| C_{RANGE} | Control Range | | | 63 | | dB |
| $A_{V\ MIN}$ | Min Attenuation | | -1 | 0 | 1 | dB |
| $A_{V\ MAX}$ | Max. Attenuation | | 62 | 63 | 64 | dB |
| A_{STEP} | Step Resolution | | | 1 | | dB |
| A_{mute} | Mute Attenuation | | 80 | 100 | | dB |
| A-10dB | -10dB damping | | | 10 | | dB |
| G14dB | 14dB gain | | | 14 | | dB |
| BASS CONTROL (1) | | | | | | |
| G_b | Control Range | Max. Boost/on | | 14 | | dB |
| R_B | Internal Feedback Resistance | | 33.75 | 45 | 56.25 | $\text{K}\Omega$ |
| TREBLE CONTROL (1) | | | | | | |
| G_t | Control Range | Max. Boost on | | 8 | | dB |
| AUDIO OUTPUTS | | | | | | |
| V_{CLIP} | Clipping Level | $d = 0.3\%$ | 0.2 | | | V_{RMS} |
| R_L | Output Load Resistance | | 10 | | | $\text{K}\Omega$ |
| V_{DC} | DC Voltage Level | | | 0.8 | | V |
| GENERAL | | | | | | |
| E_{NO} | Output Noise | Output Muted All gains = 0dB; BW = 20Hz to 20KHz flat | | 5 8 | | μV μV |
| E_t | Total Tracking Error | | | 0 | 1 | dB |
| S/N | Signal to Noise Ratio | All gains 0dB; $V_o = 0.1V_{RMS}$; | | 80 | | dB |
| S_C | Channel Separation Left/Right | | | 80 | | dB |
| d | Distortion | $A_V = 0$; $V_I = 0.1V_{RMS}$; | | | 0.1 | % |
| BUS INPUT | | | | | | |
| V_{IL} | Input Low Voltage | | | | 0.5 | V |
| V_{IH} | Input High Voltage | | 1.9 | | | V |
| I_{IN} | Input Current | $V_{IN} = 0.4\text{V}$ | -5 | | 5 | μA |
| V_O | Output Voltage SDA Acknowledge | $I_O = 1.6\text{mA}$ | | | 0.4 | V |

NOTE1:

1) BASS and TREBLE response: The center frequency and the response quality can be chosen by the external circuitry.

TDA7463D

DATA BYTES

Address = (HEX) 10001000

FUNCTION SELECTION:

The first byte (subaddress)

| MSB | | | | | | | LSB | SUBADDRESS |
|-----|----|----|----|----|----|----|-----|----------------------------|
| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | |
| | X | X | B | 0 | 0 | 0 | 0 | STAND-BY & TREBLE & OTHERS |
| | X | X | B | 0 | 0 | 0 | 1 | BASS |
| | X | X | B | 0 | 0 | 1 | 0 | VOLUME |

B = 1 incremental bus; active

B = 0 no incremental bus;

X = indifferent 0,1

STAND_BY & TREBLE & OTHERS

| MSB | | | | | | | LSB | |
|-----|----|----|----|----|----|----|-----|-------------------------------|
| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | |
| | | | | | | | | STAND-BY |
| | | | | | | | 1 | ALL CIRCUITS STOP |
| | | | | | | | | TREBLE |
| | | | | | | 1 | | STAND-BY (Treble block stops) |
| | | | | | 1 | 0 | | BOOST OFF |
| | | | | | 0 | 0 | | BOOST ON |
| | | | | 1 | 0 | 0 | | High Boost (+8dB) |
| | | | | 0 | 0 | 0 | | Low Boost (+4dB) |
| | | | | | | | | MUTE |
| | | | 1 | | | | | Input Mute ON |
| | | | 0 | | | | | Input Mute OFF |
| | | 1 | | | | | | Output Mute ON |
| | | 0 | | | | | | Output Mute OFF |
| | | | | | | | | BASS |
| | 1 | | | | | | | Release Current Circuit ON |
| | 0 | | | | | | | Release Current Circuit OFF |
| | | | | | | | | INPUT Select |
| 1 | | | | | | | | INPUT 1 |
| 0 | | | | | | | | INPUT 2 |

BASS

| MSB | | | | | | | LSB | BASS |
|-----|----|----|----|----|----|----|-----|-------------------------------------------------------------------------|
| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | |
| | | | | | | | 1 | STAND-BY (Bass block stops) |
| | | | | | | 1 | | BASS (boost OFF) |
| | | | | | | 0 | | BASS (boost ON) |
| | | | | | 1 | 0 | | High boost (Ex. + 14dB) |
| | | | | | 0 | 0 | | Low boost (Ex. + 6dB) |
| | | | | 1 | | | | ALC mode OFF (ALC block stops) |
| | | | | 0 | | | | ALC mode ON |
| | | 0 | 0 | | | | | Attack time resistor (12.5K Ω) Release current (0.4 μ A) |
| | | 0 | 1 | | | | | Attack time resistor (25K Ω) Release current (0.2 μ A) |
| | | 1 | 0 | | | | | Attack time resistor (50K Ω) Release current (0.1 μ A) |
| | | 1 | 1 | | | | | Attack time resistor (100K Ω) Release current (0.05 μ A) |
| 0 | 0 | | | | | | | Threshold1 (0.2Vrms) |
| 0 | 1 | | | | | | | Threshold2 (0.14Vrms) |
| 1 | 0 | | | | | | | Threshold3 (0.1Vrms) |
| 1 | 1 | | | | | | | Threshold4 (0.07Vrms) |

VOLUME

| MSB | | | | | | | LSB | VOLUME |
|-----|----|----|----|----|----|----|-----|---------------------------|
| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | |
| | | | | | 0 | 0 | 0 | 1 dB STEPS 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 |
| | | | | | | | | 8 dB STEPS |
| | | 0 | 0 | 0 | | | | 0 |
| | | 0 | 0 | 1 | | | | -8 |
| | | 0 | 1 | 0 | | | | -16 |
| | | 0 | 1 | 1 | | | | -24 |
| | | 1 | 0 | 0 | | | | -32 |
| | | 1 | 0 | 1 | | | | -40 |
| | | 1 | 1 | 0 | | | | -48 |
| | | 1 | 1 | 1 | | | | -56 |
| | | | | | | | | OUTPUT GAIN |
| | 1 | | | | | | | 0dB |
| | 0 | | | | | | | +14dB |
| | | | | | | | | OUTPUT ATTENUATION |
| 1 | | | | | | | | 0dB |
| 0 | | | | | | | | -10dB |

VOLUME : 0 ~ -63dB

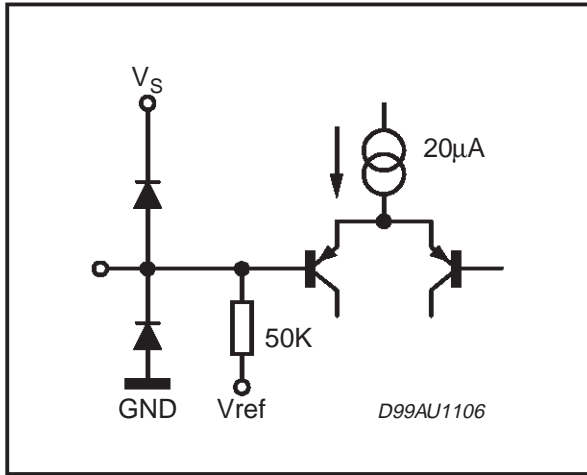
TDA7463D

ALC IN general:

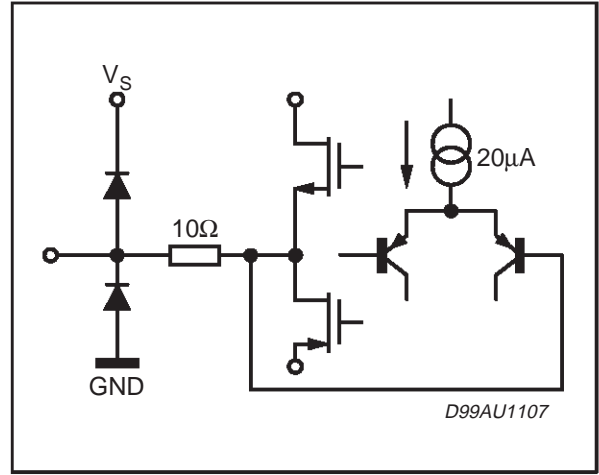
VOLUME setting with ALC

| Target Volume [dB] | Volume [dB] | Output Gain 0/+14dB [dB] | Output Attenuation 0/-10dB [dB] |
|--------------------|-------------|--------------------------|---------------------------------|
| 0 | -14 | +14 | 0 |
| -1 | -15 | | |
| -2 | -16 | | |
| -3 | -17 | | |
| -4 | -18 | | |
| -5 | -19 | | |
| -6 | -20 | | |
| -7 | -21 | | |
| -8 | -22 | | |
| -9 | -23 | | |
| -10 | -24 | | |
| -11 | -25 | | |
| -12 | -26 | | |
| -13 | -27 | | |
| -14 | -14 | 0 | 0 |
| -15 | -15 | | |
| -16 | -16 | | |
| -17 | -17 | | |
| -18 | -18 | | |
| -19 | -19 | | |
| -20 | -20 | | |
| -21 | -21 | | |
| -22 | -22 | | |
| -23 | -23 | | |
| -24 | -14 | 0 | -10 |
| -25 | -15 | | |
| -26 | -16 | | |
| -27 | -17 | | |
| : | : | | |
| : | : | | |
| -70 | -60 | | |
| -71 | -61 | | |
| -72 | -62 | | |
| -73 | -63 | | |

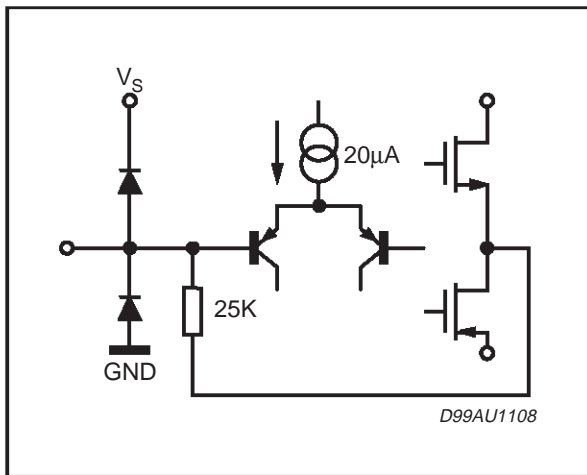
PIN: IN-L, IN-R



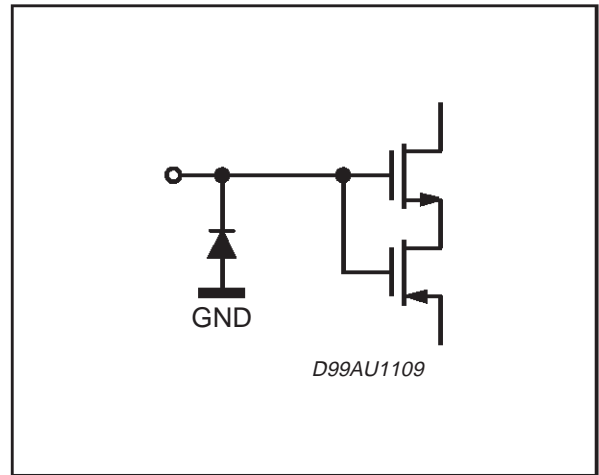
PIN: OUT-L, OUT-R



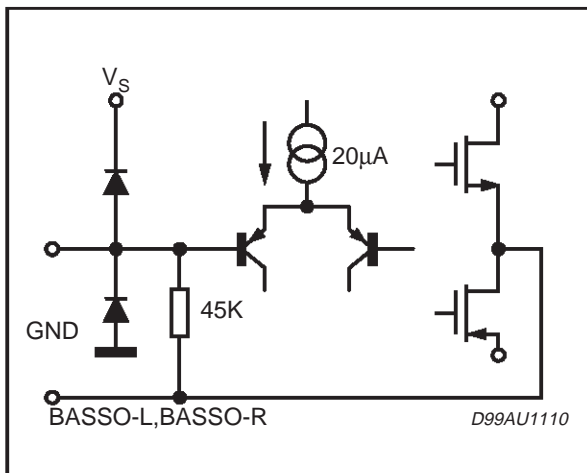
PIN: TREBLE-L, TREBLE-R



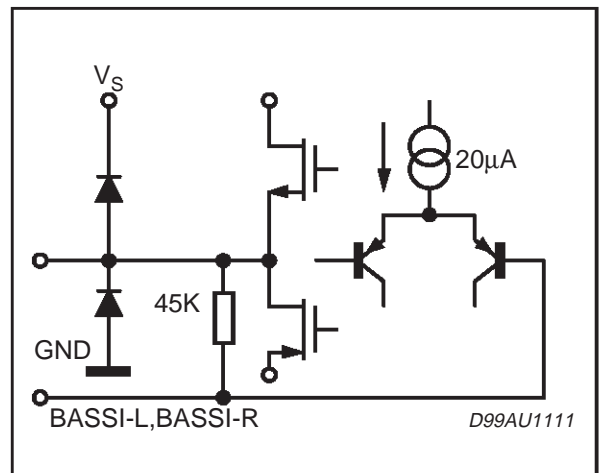
PIN: SCL, SDA



PIN: BASSI-L, BASSI-R

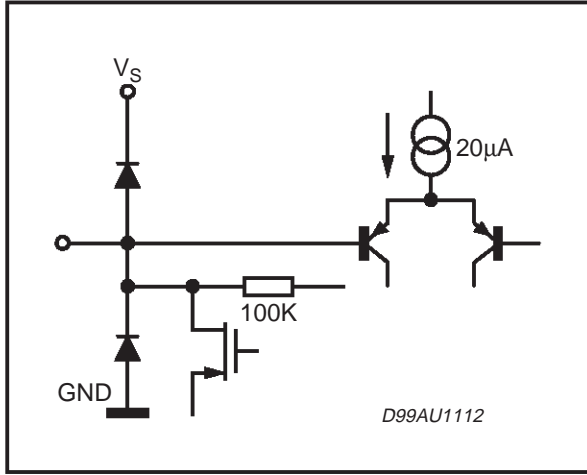


PIN: BASSO-L, BASSO-R

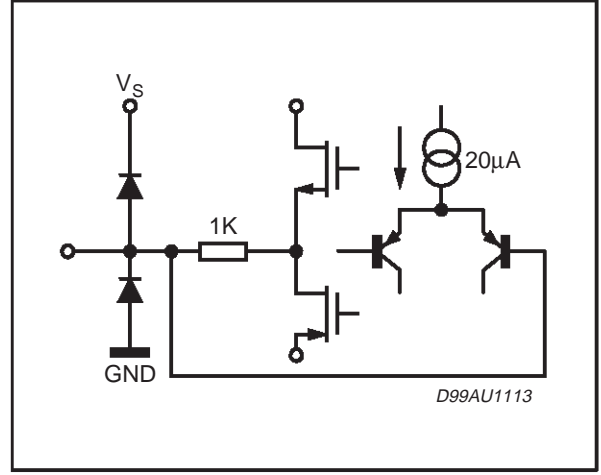


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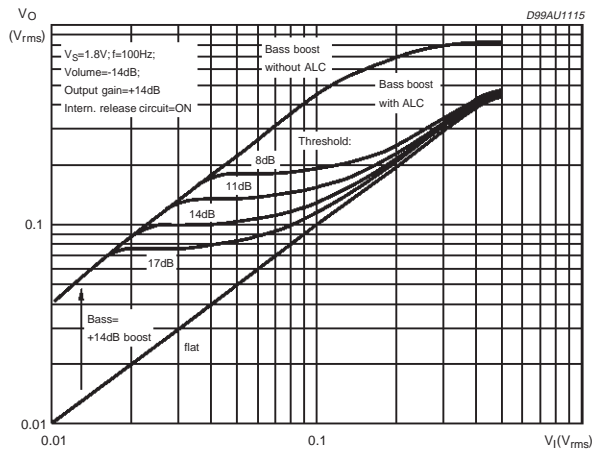
PIN: ALC



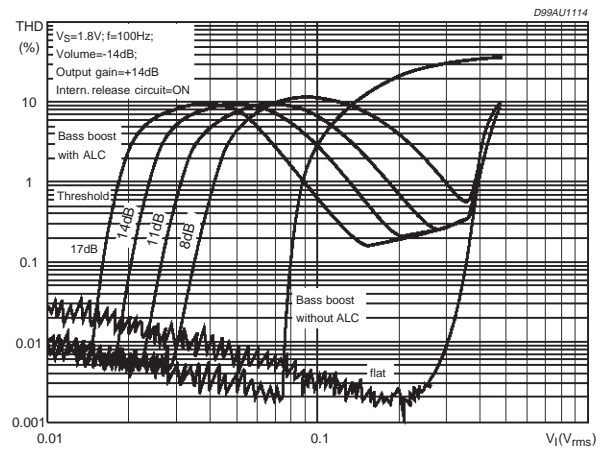
PIN: CREF



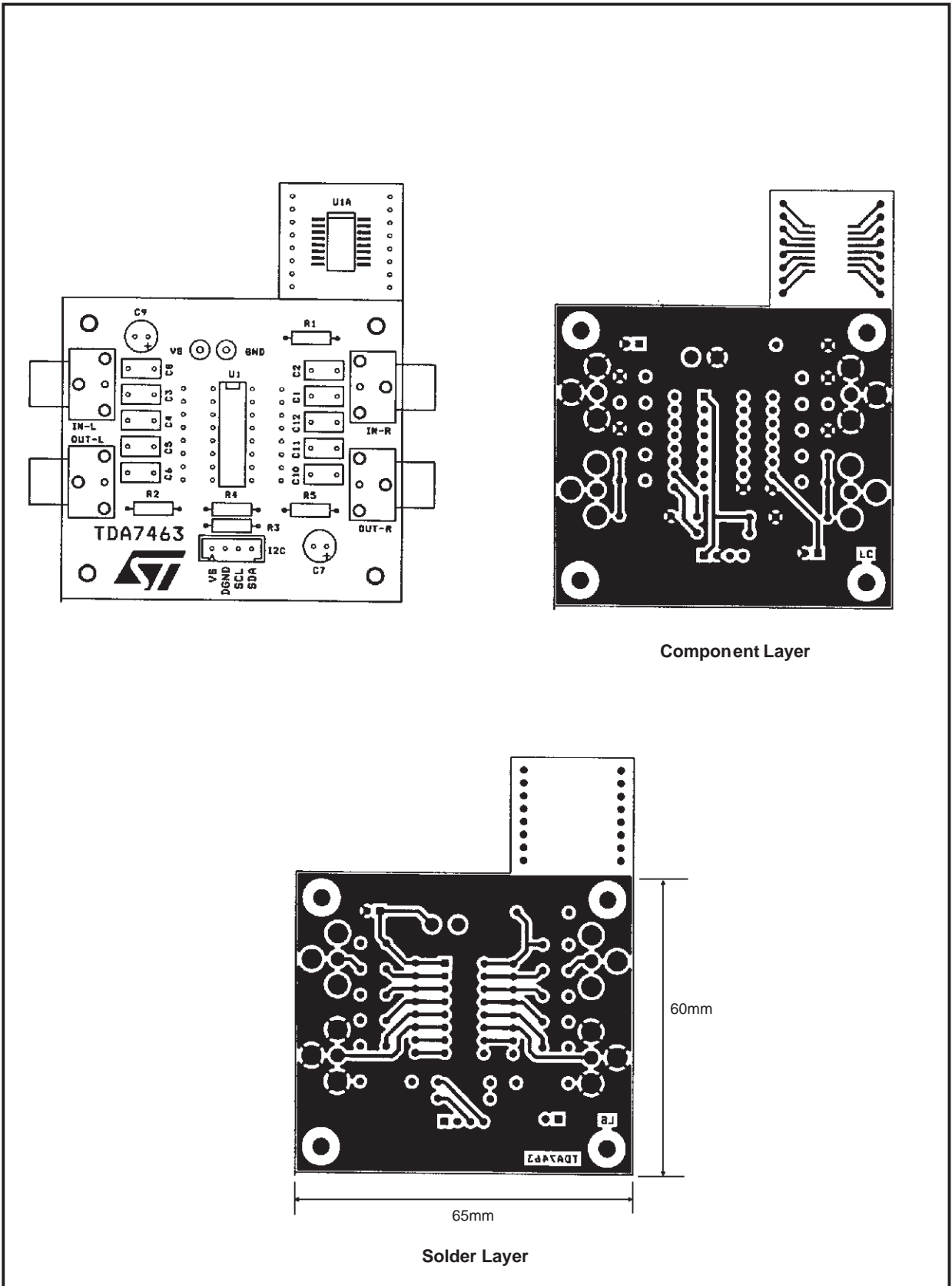
BASS ALC: Threshold curve



BASS ALC: THD



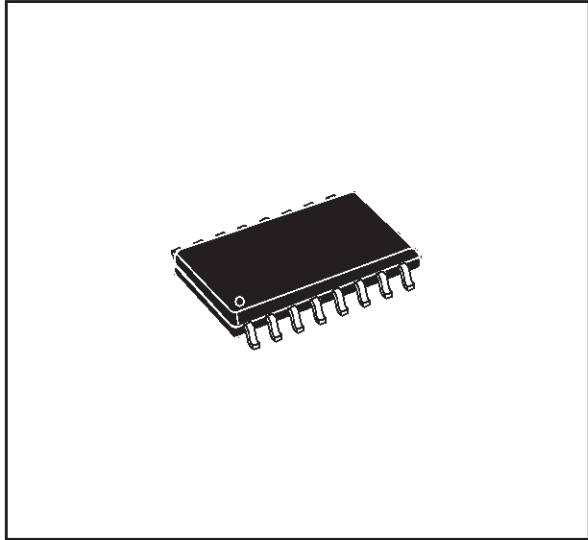
PC Board and Components Layout of the Application & Test Circuit



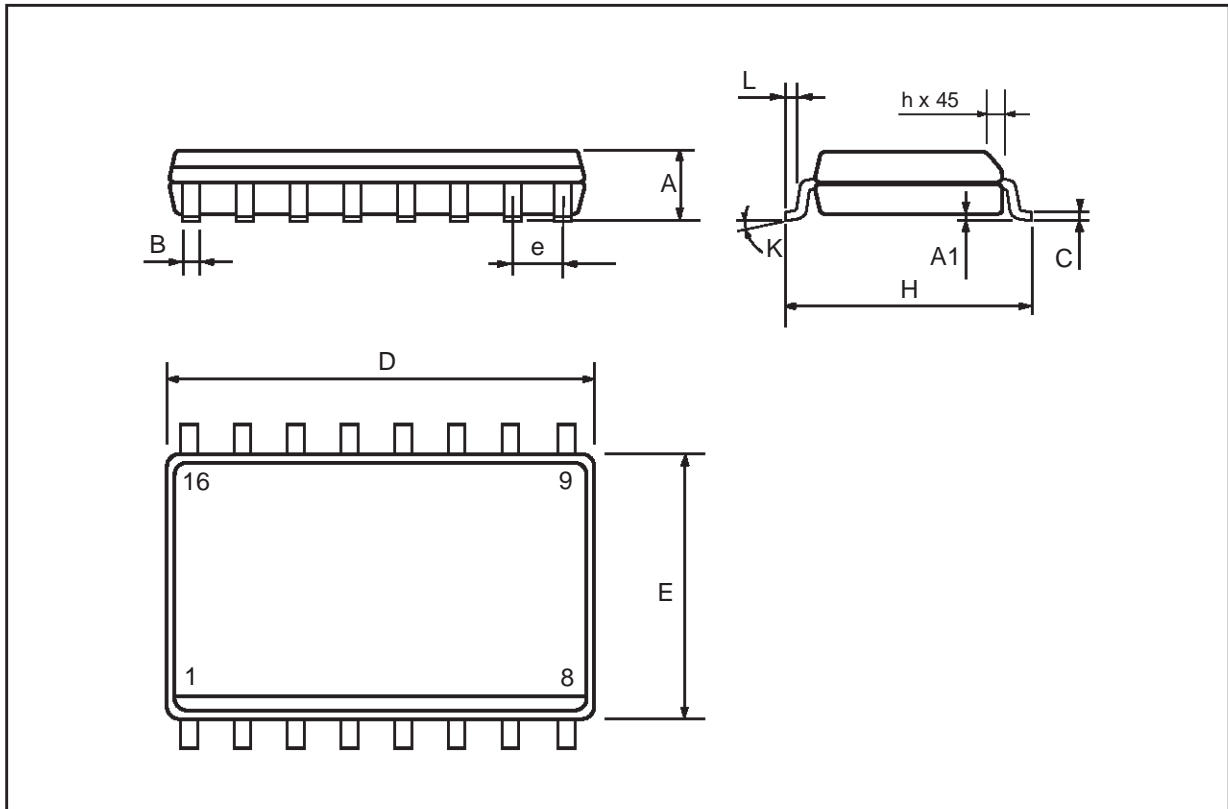
TDA7463D

| DIM. | mm | | | inch | | |
|------|--------------------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.35 | | 2.65 | 0.093 | | 0.104 |
| A1 | 0.1 | | 0.3 | 0.004 | | 0.012 |
| B | 0.33 | | 0.51 | 0.013 | | 0.020 |
| C | 0.23 | | 0.32 | 0.009 | | 0.013 |
| D | 10.1 | | 10.5 | 0.398 | | 0.413 |
| E | 7.4 | | 7.6 | 0.291 | | 0.299 |
| e | | 1.27 | | | 0.050 | |
| H | 10 | | 10.65 | 0.394 | | 0.419 |
| h | 0.25 | | 0.75 | 0.010 | | 0.030 |
| L | 0.4 | | 1.27 | 0.016 | | 0.050 |
| K | 0° (min.)8° (max.) | | | | | |

OUTLINE AND MECHANICAL DATA



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