



TDA7463D

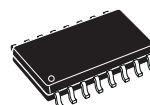
LOW VOLTAGE TONE CONTROL DIGITALLY CONTROLLED AUDIO PROCESSOR

- 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.



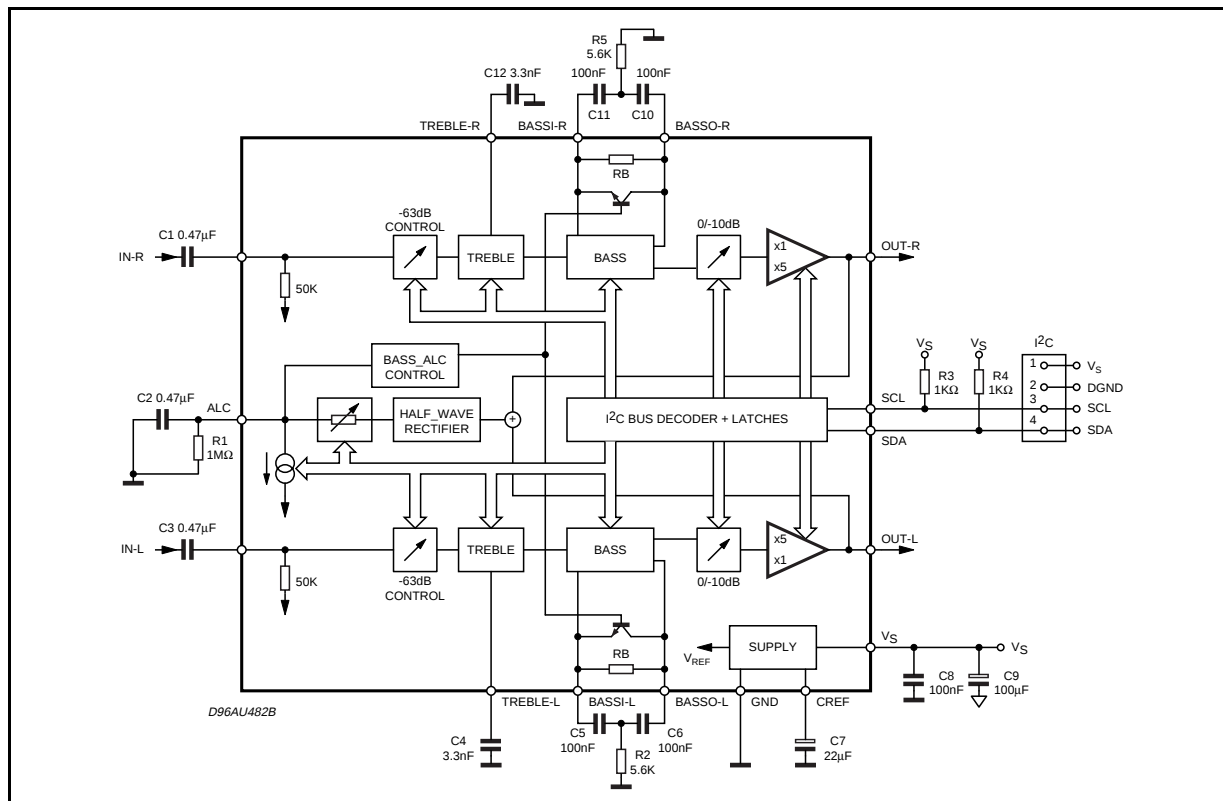
SO16

ORDERING NUMBER: TDA7463D

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.

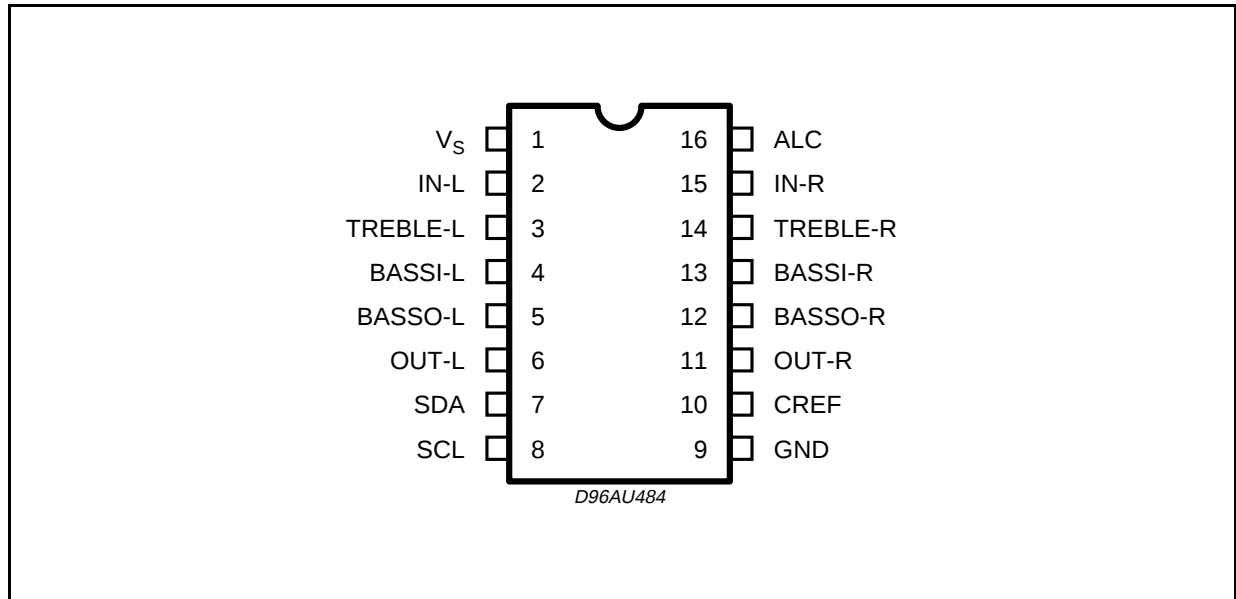
BLOCK DIAGRAM



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			Vrms
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	Outout 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.

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	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
								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

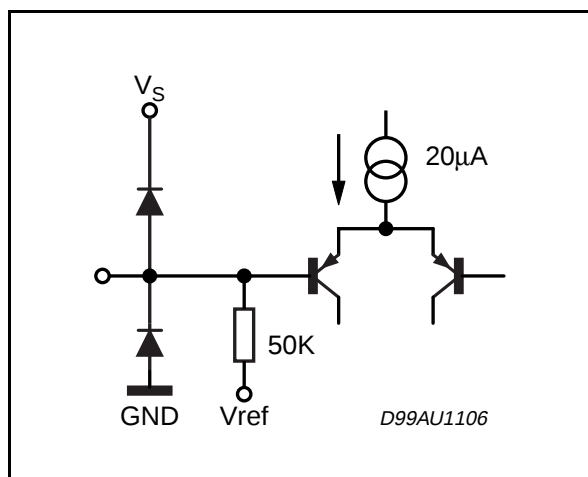
VOLUME : 0 ~ -63dB

ALC IN general:

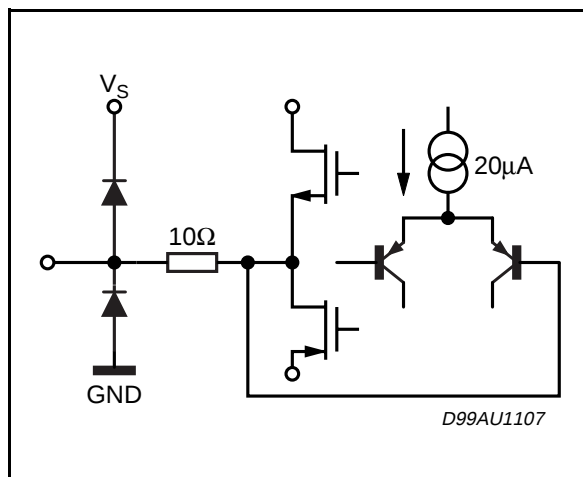
VOLUME setting with ALC

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		

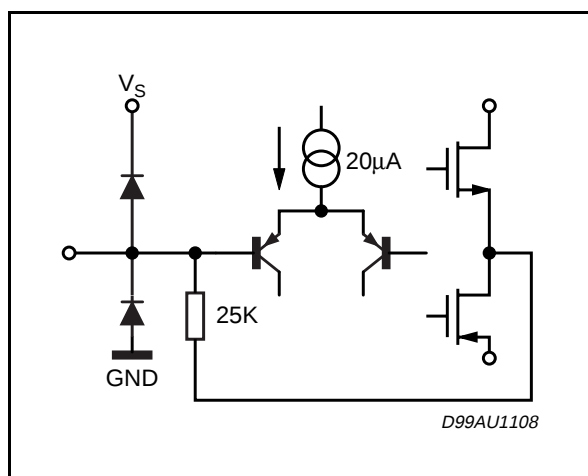
PIN: IN-L, IN-R



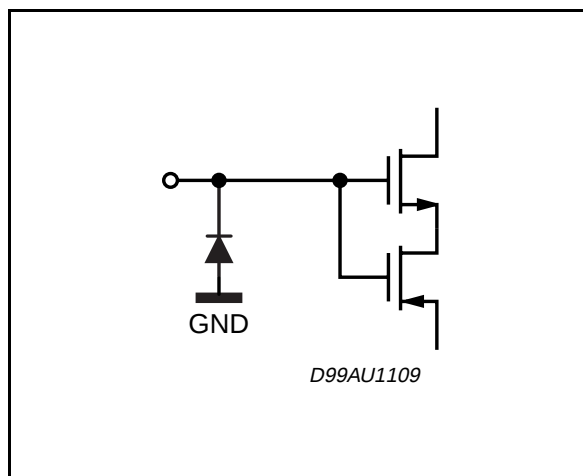
PIN: OUT-L, OUT-R



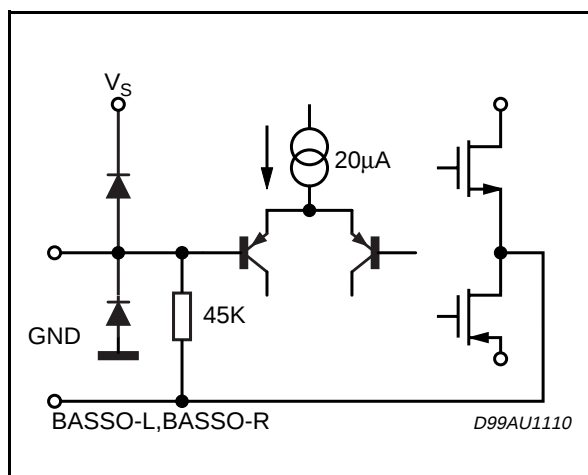
PIN: TREBLE-L, TREBLE-R



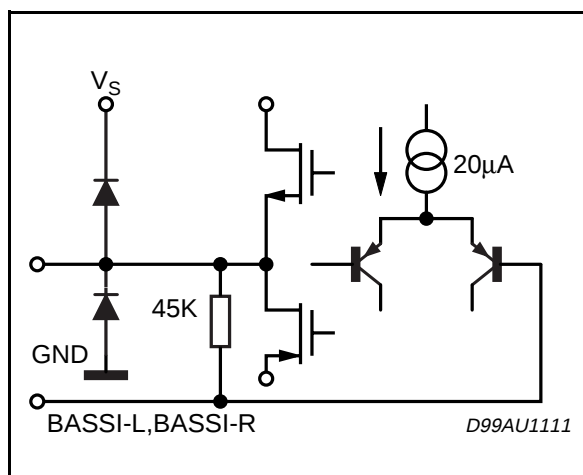
PIN: SCL, SDA



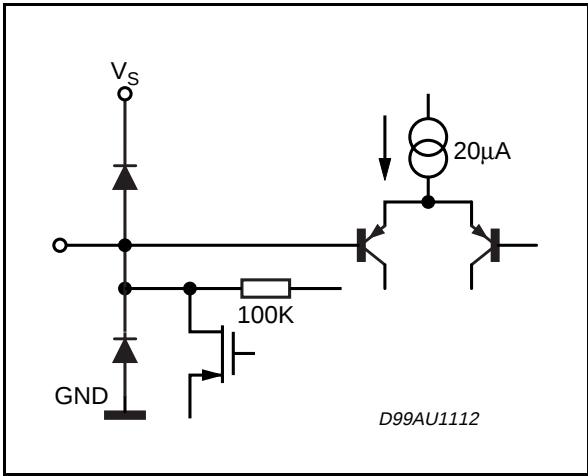
PIN: BASSI-L, BASSI-R



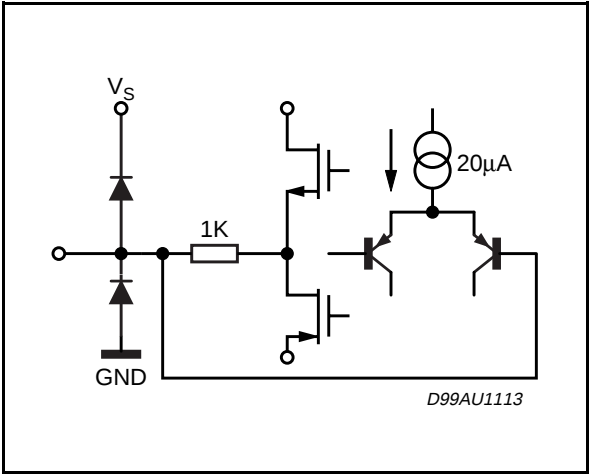
PIN: BASSO-L, BASSO-R



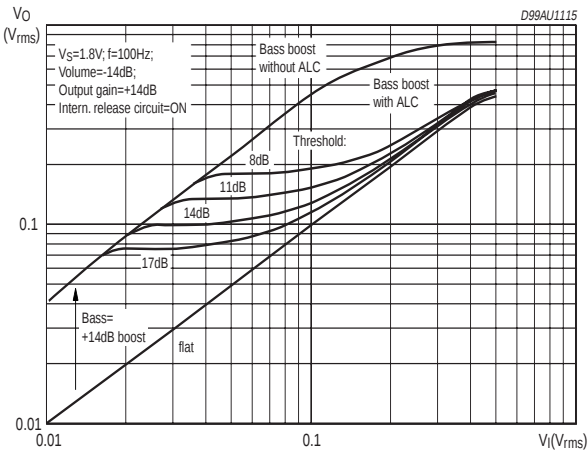
PIN: ALC



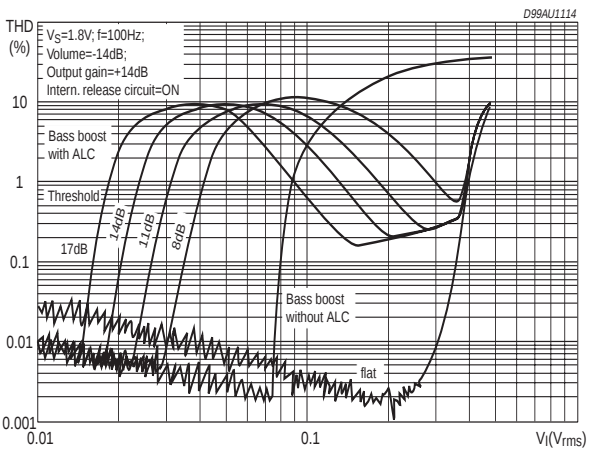
PIN: CREF



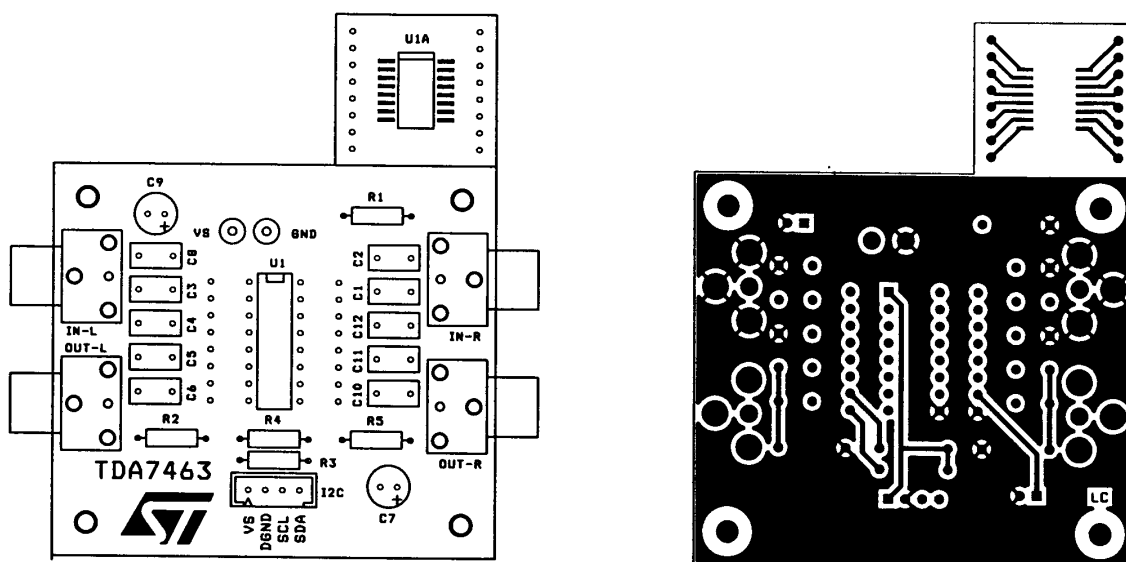
BASS ALC: Threshold curve



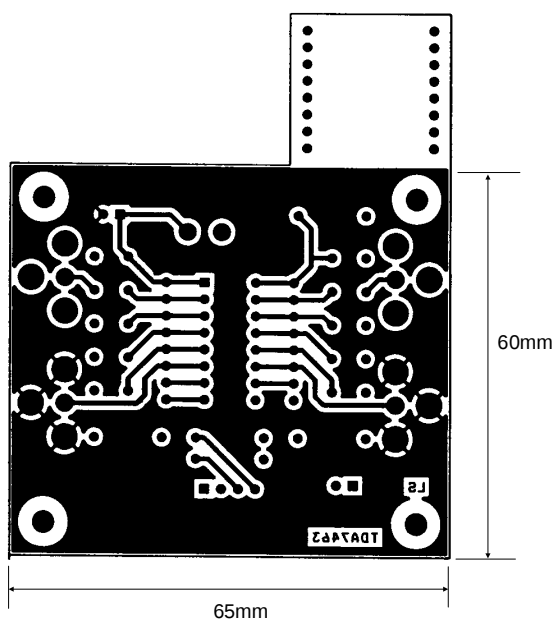
BASS ALC: THD



PC Board and Components Layout of the Application & Test Circuit



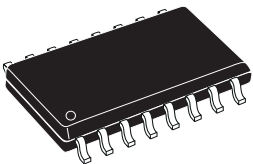
Component Layer



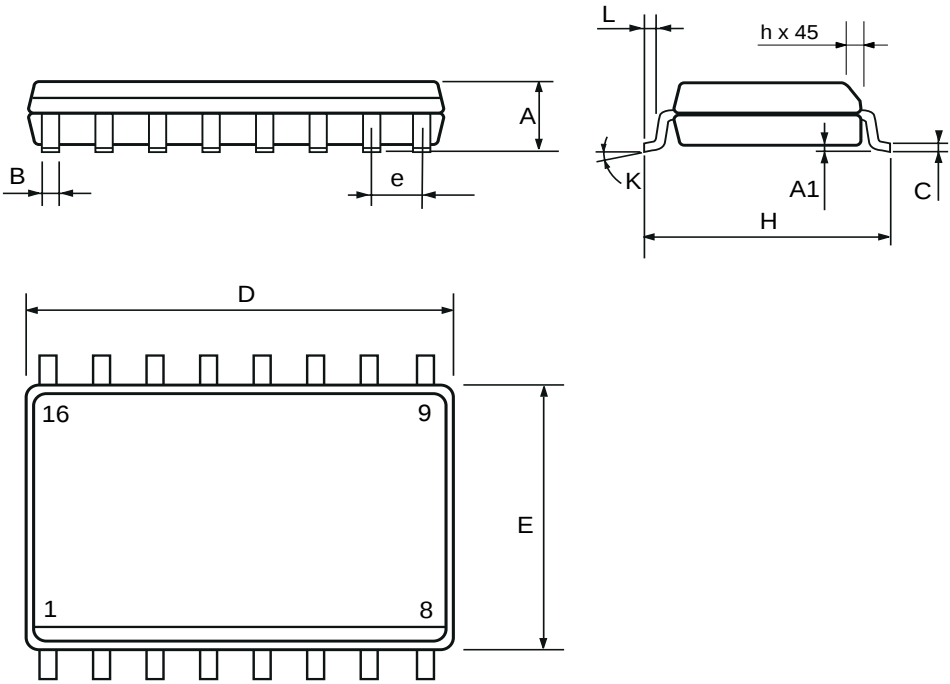
Solder Layer

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



SO16 Wide



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