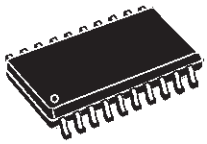
TDA7469

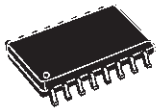
LOW VOLTAGE ANALOG AUDIO PROCESSOR WITH HEADPHONE POWER AMPLIFIER

PRODUCT PREVIEW

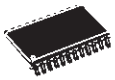
- 2 STEREO INPUT
- 1 STEREO OUTPUT
- TREBLE BOOST
- BASS CONTROL
- BASS AUTOMATIC LEVEL CONTROL
- VOLUME CONTROL IN 1dB STEPS
- MUTE
- STAND-BY FUNCTION SOFTWARE CONTROLLED
- ALL FUNCTION ARE PROGRAMMABLE VIA SERIAL BUS



SO20



SO16



SSOP24

ORDERING NUMBER: TDA7469 (SSOP24)
TDA7469D (SO16)
TDA7469A (SO20)

DESCRIPTION

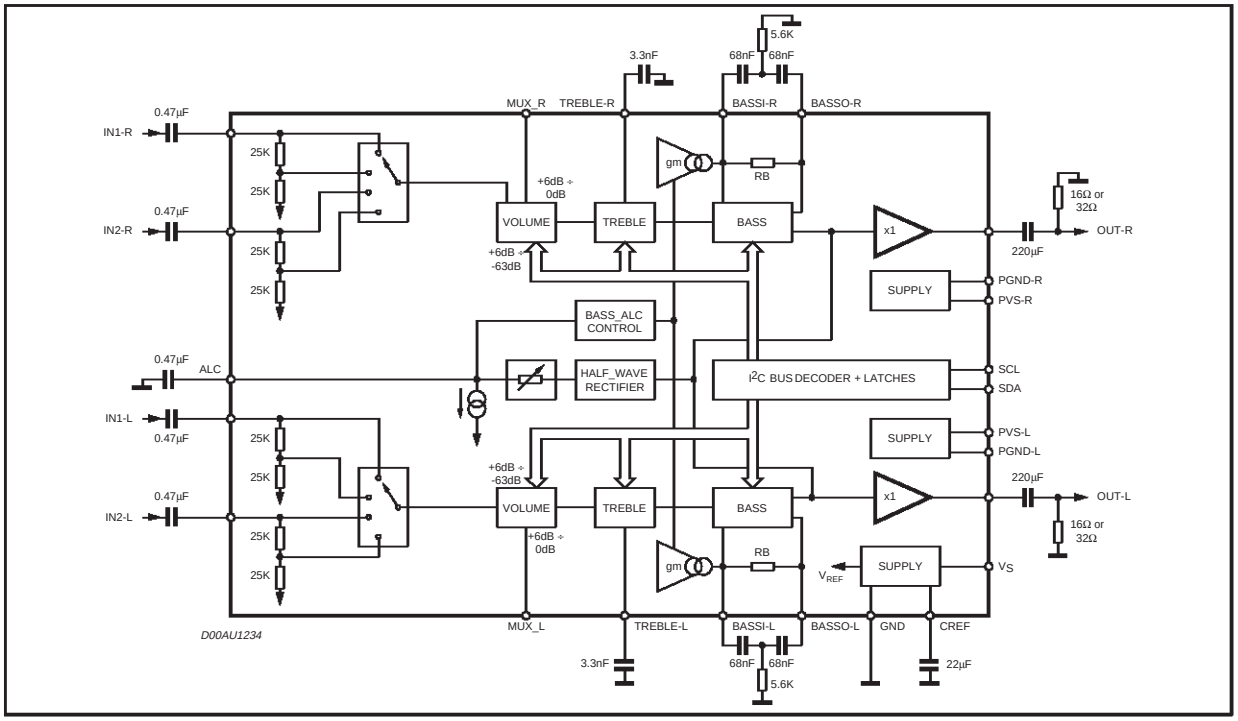
The TDA7469 is a volume tone (bass and treble) processor for quality audio applications in Low voltage supply portable systems.

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 TDA7469 (SSOP24)



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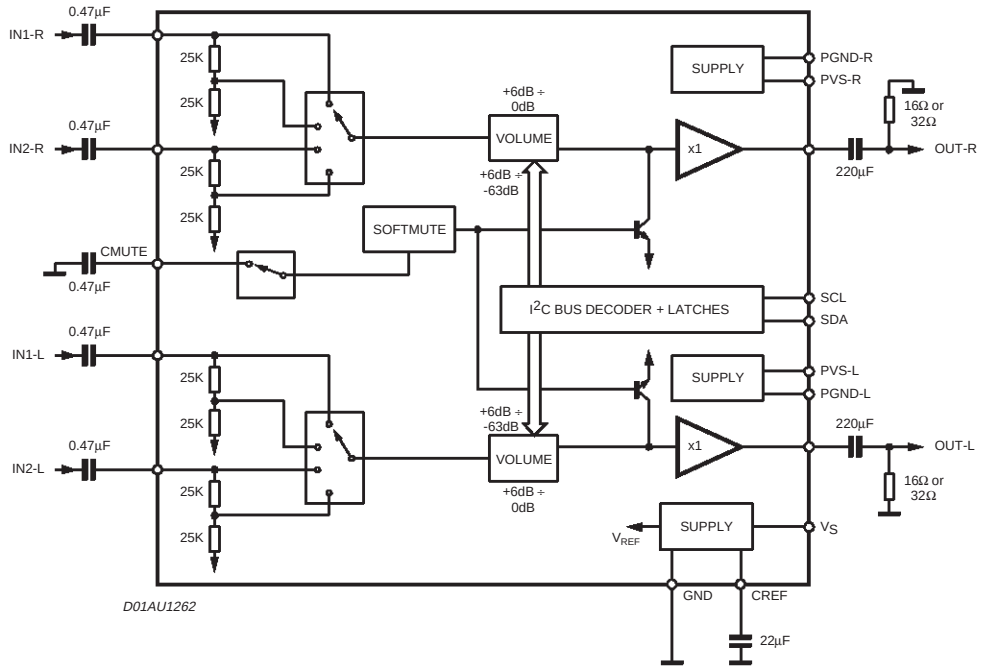

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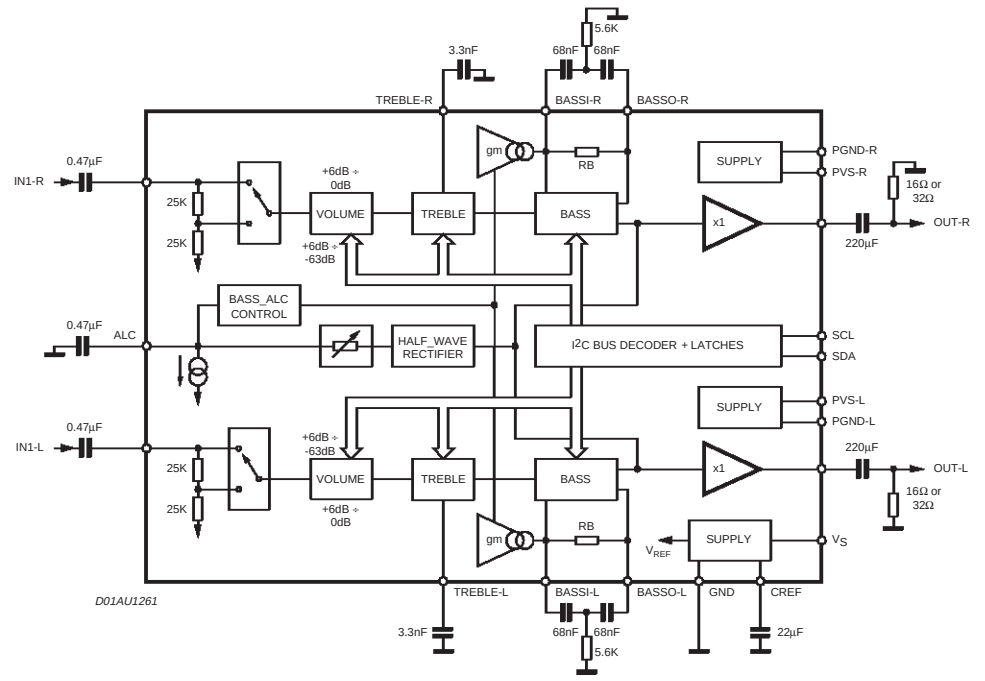
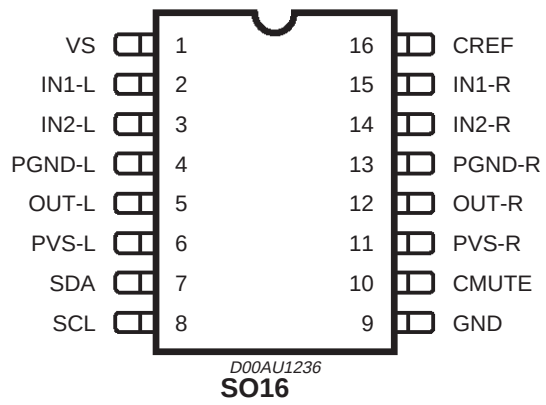


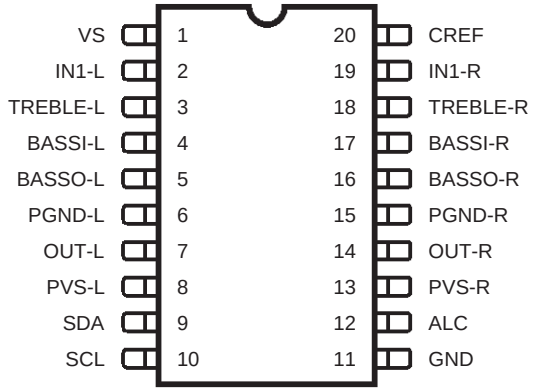
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Operating Supply Voltage	5.5	V
T_{amb}	Operating Ambient Temperature	-10 to 85	°C
T_{stg}	Storage Temperature Range	-55 to 150	°C

PIN CONNECTIONS



SO16



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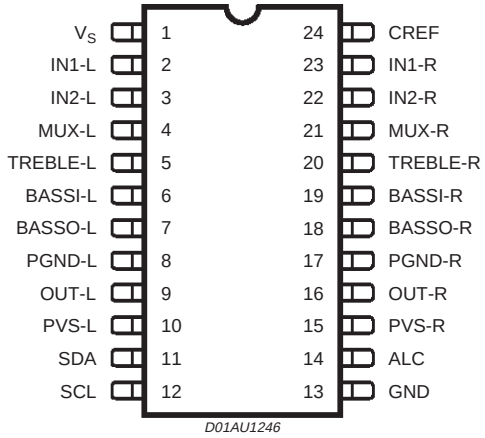


SSO24

THERMAL DATA

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

QUICK REFERENCE DATA

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_S	Supply Voltage	1.8	2.4	5.0	V
V_{ps}	Power Supply Voltage	1.5	2.4	5.0	V
P_{omax}	Maximum output power	5	8		mW
THD	Total Harmonic Distortion V = 0.1Vrms f = 1KHz		0.1	0.5	%
	Volume Control (1dB step)	-63		6	dB
	Treble Control	0		12	dB
	Bass Control	0		14	dB
	Mute Attenuation		90		dB

ELECTRICAL CHARACTERISTICS (refer to the test circuit T_{amb} = 25°C, V_S =2.4V, all controls flat (G = 0dB), f = 1KHz, unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
SUPPLY						
V_S	Supply Voltage		1.8	2.4	5.0	V
V_{PS}	Supply Voltage		1.5	2.4	5.0	V
I_{SQ}	Supply Current			10		µA
I_{PSQ}	Quiscent Current			1		µA
I_S		Po = 0.5mW +0.5mW		8		mA
I_{PS}		Po = 0.5mW +0.5mW		15		mA
INPUT STAGE						
R_{IN}	Input Resistance		35	50	65	KΩ
A_{IN}	Input Attenuation Range		0		6	dB
VOLUME CONTROL						
C_{RANGE}	Control Range		-63		6	dB
A_{MAX}	Max. Attenuation		61	63	65	dB
A_{STEP}	Step Resolution		0.5	1	1.5	dB
G_{MAX}	Max. Gain			6		dB
Gstep	Step Resolution			2		dB
R1	Muxout Load Resistence			10		KΩ
BASS CONTROL						
Gb	Control Range	Max. Boost/on		14		dB
R_B	Internal Feedback Resistance		75.6	100.8	126	KΩ
TREBLE CONTROL						
Gt	Control Range	Max. Boost		12		dB
Rt	Internal Resistance			25		KΩ
HEADPHONE OUTPUTS						
Gout	Output Gain			0		dB
Pomax	Max Output Power	THD = 10%	5	8		mW
GENERAL						
E_{NO}	Output Noise	Outout Muted All gains = 0dB; BW = 20Hz to 20KHz flat		5 10		µV µV
THD	Distortion	Av = 0, V_{in} = 0.1V_{rms}		0.1	0.5	%
S_C	Channel Separation Left/Right			50		dB
RR1	Ripple Rejection	V_S, f = 100Hz		-70		dB
RR2	Ripple Rejection	PVS, f = 100Hz		-75		dB
	Total Tracking Error			0	1	dB
BUS INPUTS						
V_{IL}	Input Low Voltage				0.5	V
V_{IH}	Input High Voltage		1.9			V
I_{IN}	Input Current	V_{IN} = 0.4V	-5		5	µA
V_O	Output Voltage (ACK)	I_O = 1.6mA			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	X	B	0	0	0	0	VOLUME
X	X	X	B	0	0	0	1	TREBLE & BASS
X	X	X	B	0	0	1	0	INPUT & MUTE
X	X	X	B	0	0	1	1	STAND-BY & OTHERS
X	X	X	B	0	1	0	0	BASS ALC
X	X	X	B	0	1	0	1	BASS ALC

B = 1 incremental bus; active
B = 0 no incremental bus;
X = indifferent 0,1

VOLUME

MSB							LSB	VOLUME
D7	D6	D5	D4	D3	D2	D1	D0	GAIN
						0	0	6
						0	1	4
						1	0	2
						1	1	0
								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

VOLUME : +6 x -63dB

TREBLE & BASS

MSB							LSB	
D7	D6	D5	D4	D3	D2	D1	D0	
								TREBLE
						0	0	12dB
						0	1	8dB
						1	0	4dB
						1	1	0dB
								BASS
			0	0	0			14dB
			0	0	1			12dB
			0	1	0			10dB
			0	1	1			8dB
			1	0	0			6dB
			1	0	1			4dB
			1	1	0			2dB
			1	1	1			0dB
								BASS ALC
		0						ALC: VOLUME mode
		1						ALC: BASS mode
	1							ALC: fc shift
	0							ALC: fc nonshift
1								ALC: feedback gain x2
0								ALC: feedback gain x 1

INPUT SELECT & MUTE

MSB							LSB	
D7	D6	D5	D4	D3	D2	D1	D0	**INPUT SELECT**
						0	0	IN1 (0dB)
						0	1	IN1 (-6dB)
						1	0	IN2 (0dB)
						1	1	IN2 (-6dbB)
								MUTE
					1			Input Mute ON
					0			Input Mute OFF
				1				Output SoftMute ON
				0				Output SoftMute OFF
			1					Output Mute ON
			0					Output Mute OFF
								HEADPHONE AMP. STAND-BY
		1						Headphone Amp. OFF
		0						Headphone Amp. ON

STAND_BY & OTHERS

MSB							LSB	
D7	D6	D5	D4	D3	D2	D1	D0	
								STAND-BY
							1	ALL Circuits Stop
							0	ALL Circuits Work
								SOFT MUTE CAPACITOR
						1		Independent Capacitor
						0		Share ALC Capacitor
								REFERENCE LEVEL
					1			adaptive: (VDD-0.7)/2
			0	0	0			1.10V
			0	1	0			0.85V
			1	0	0			0.55V
			1	1	0			0.45V
								ZEROCROSS MODE
		1						ON
		0						OFF
	1							Zerocross Detect Point: Volume
	0							Zerocross Detect Point: Bass
								CREF STAND-BY
1								CREF Circuit Stop
0								CREF Circuit Work

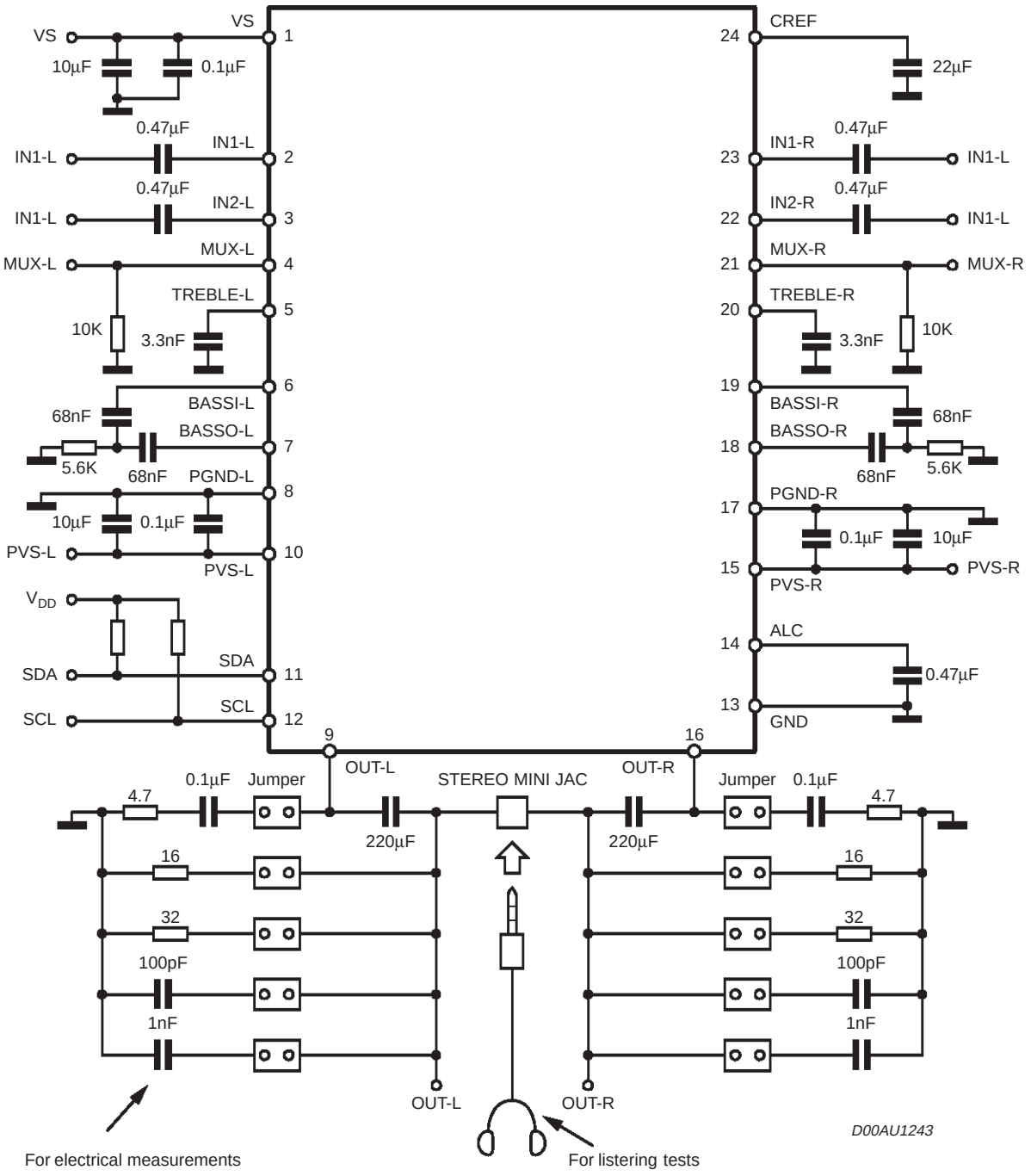
BASS ALC

MSB							LSB	BASS ALC
D7	D6	D5	D4	D3	D2	D1	D0	
								ALC MODE
							1	ON
							0	OFF
								DETECTOR
						1		ON
						0		OFF
								RELEASE CURRENT CIRCUIT
					1			ON
					0			OFF
								ATTACK TIME RESISTOR
			0	0				12.5KΩ
			0	1				25KΩ
			1	0				50KΩ
			1	1				100KΩ
								THRESHOLD
	0	0						THRESHOLD1
	0	1						THRESHOLD2
	1	0						THRESHOLD3
	1	1						THRESHOLD4

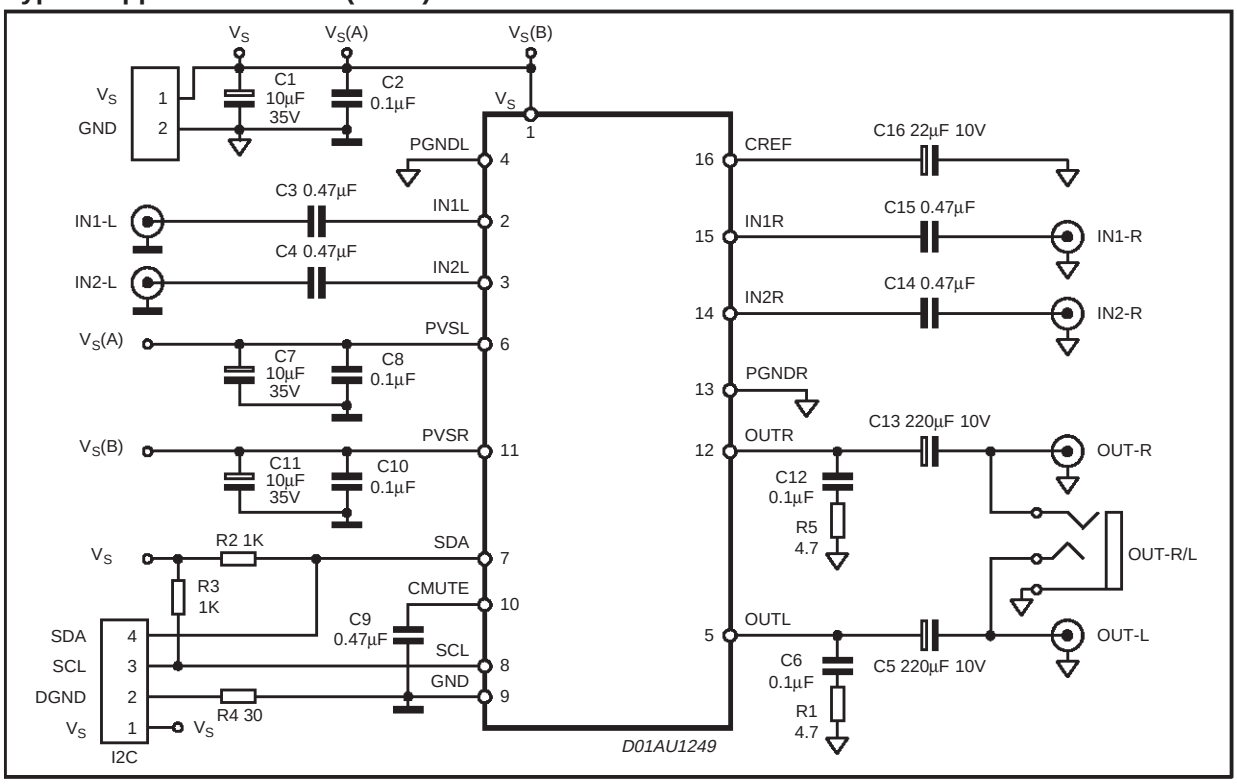
BASS ALC

MSB							LSB	BASS ALC
D7	D6	D5	D4	D3	D2	D1	D0	
								ALC FULL FEEDBACK CURRENT
							1	ON
							0	OFF
								BIG RELEASE CURRENT
						1		ON
						0		OFF

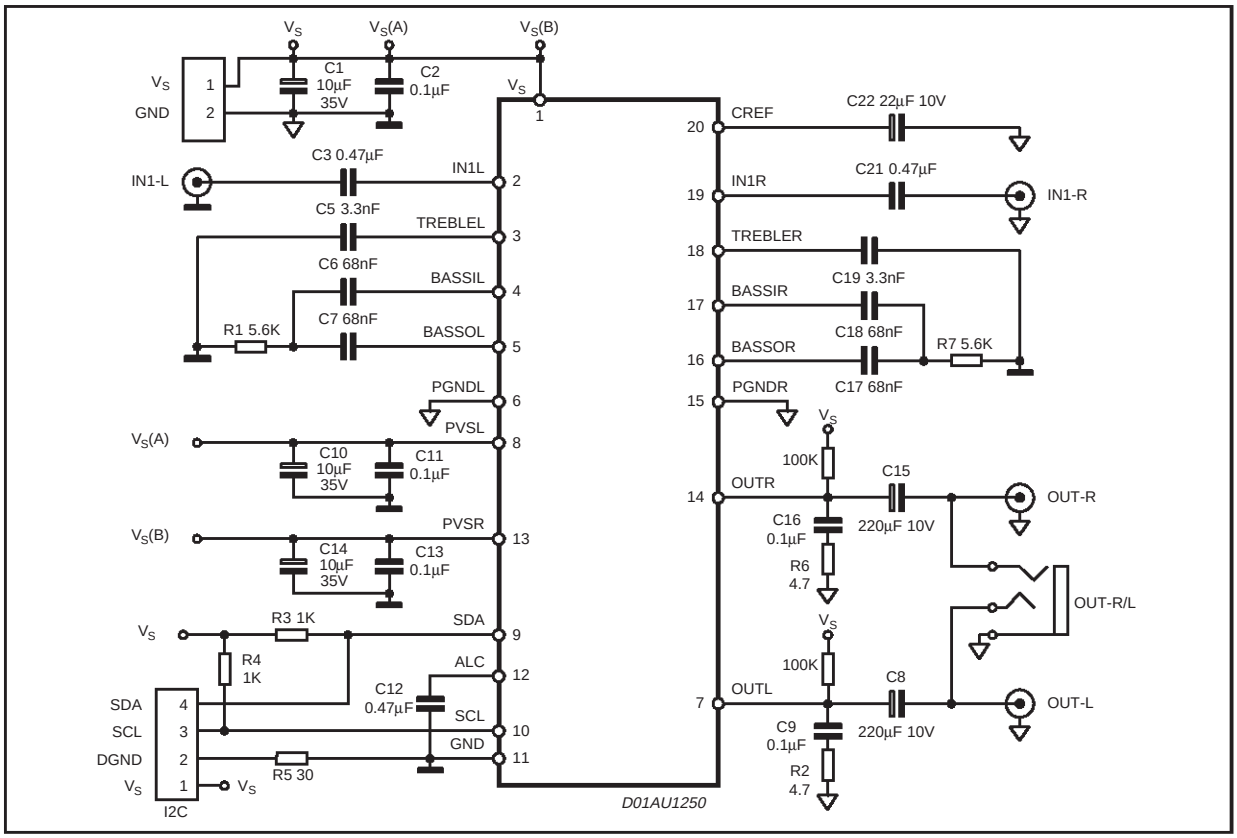
Typical Application Circuit (SSO24)



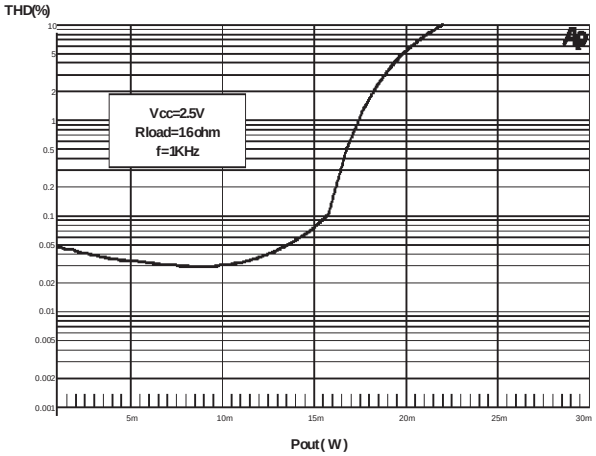
Typical Application Circuit (SO16)



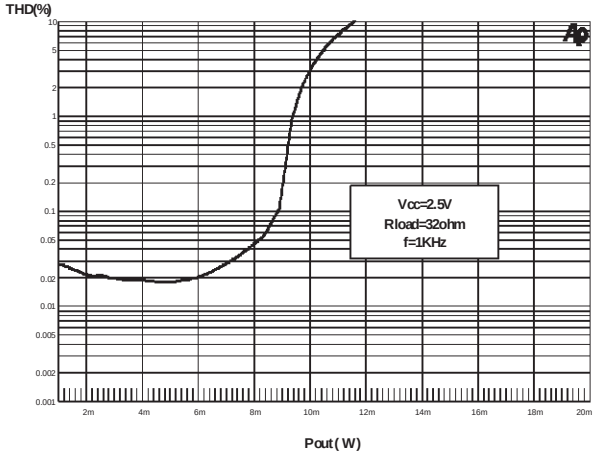
Typical Application Circuit (SO20)



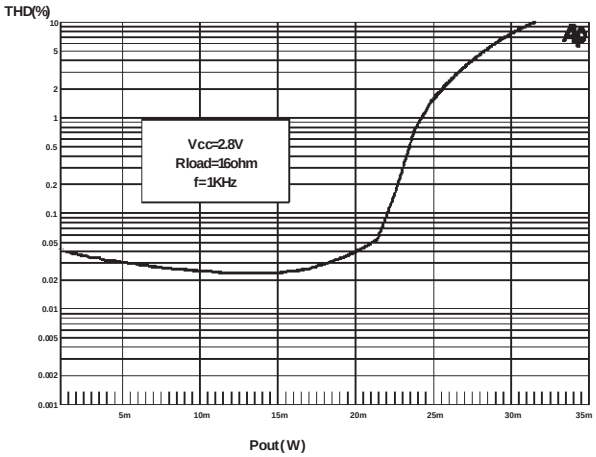
THD+Noise vs Amplitude @Vcc 2.5V, Rload 16Ω



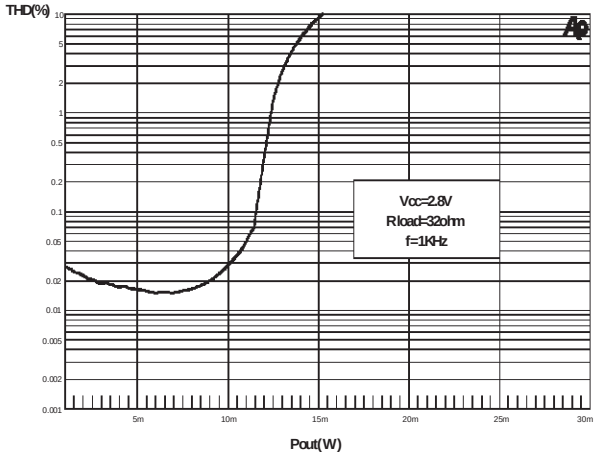
THD+Noise vs Amplitude @Vcc 2.5V, Rload 32Ω



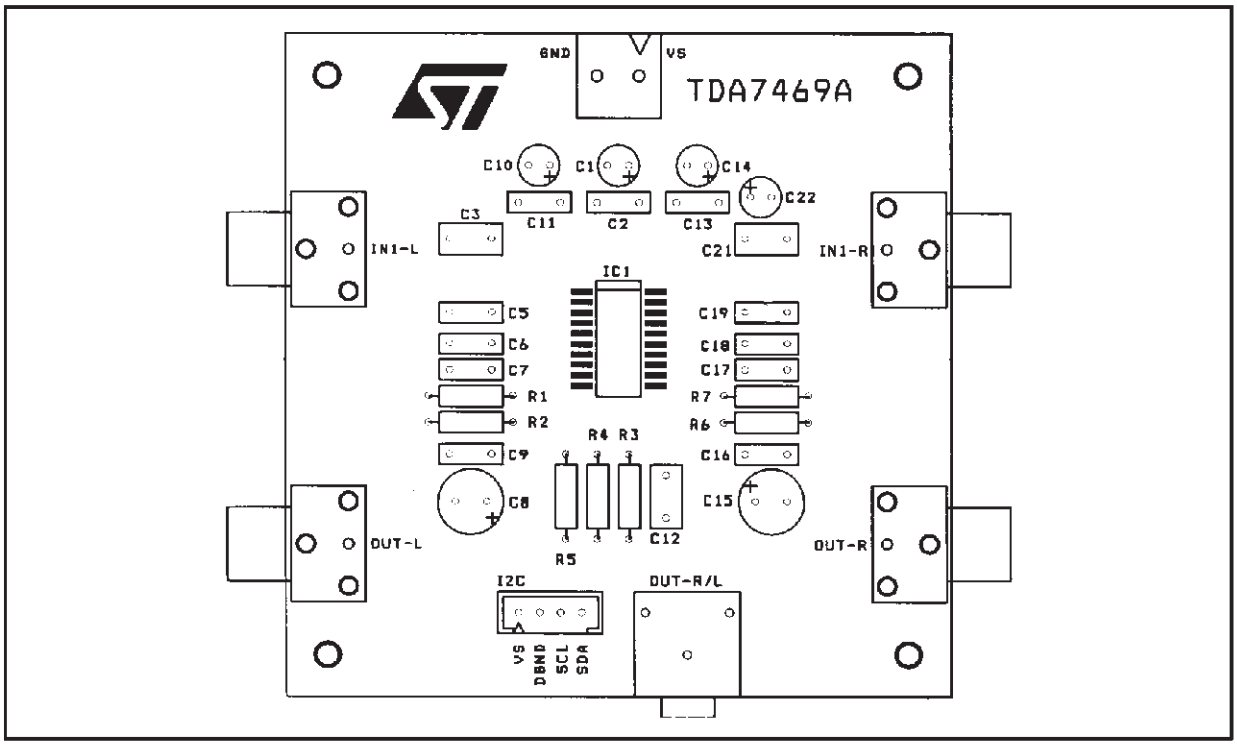
THD+Noise vs Amplitude @Vcc 2.8V, Rload 16Ω



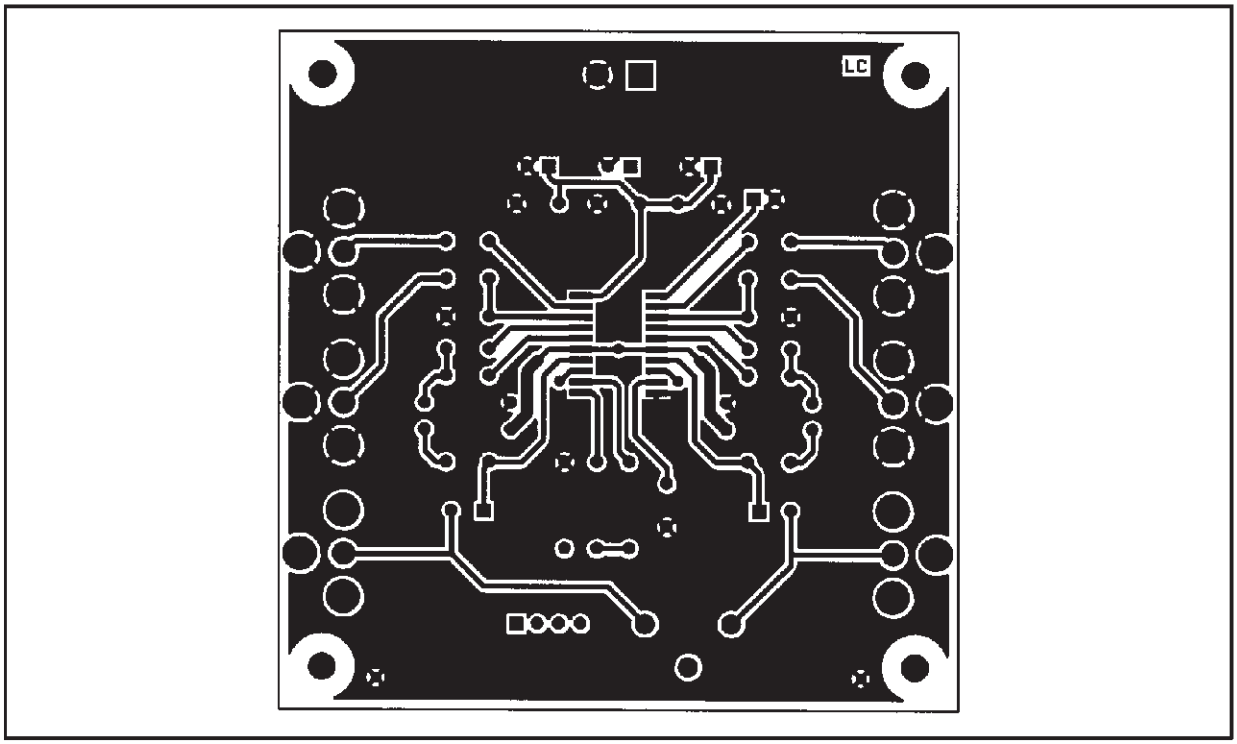
THD+Noise vs Amplitude @Vcc 2.8V, Rload 32Ω



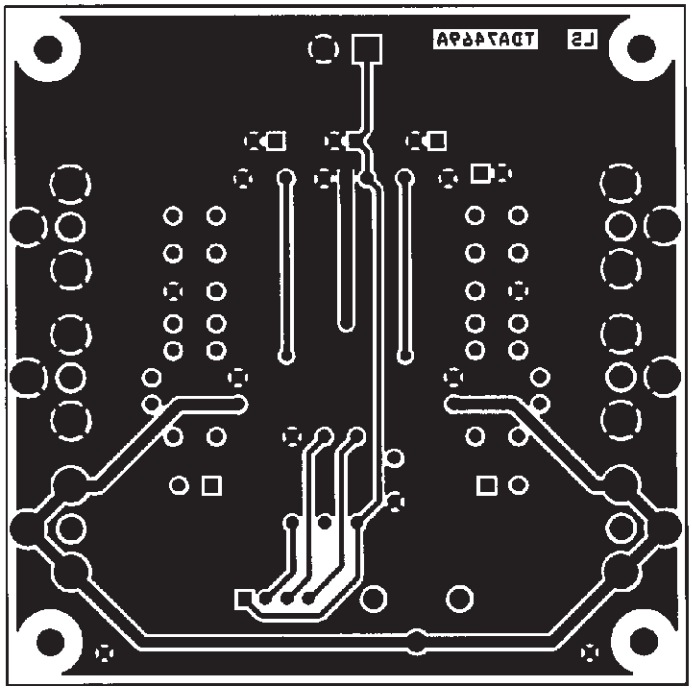
TDA7469A Components Layout



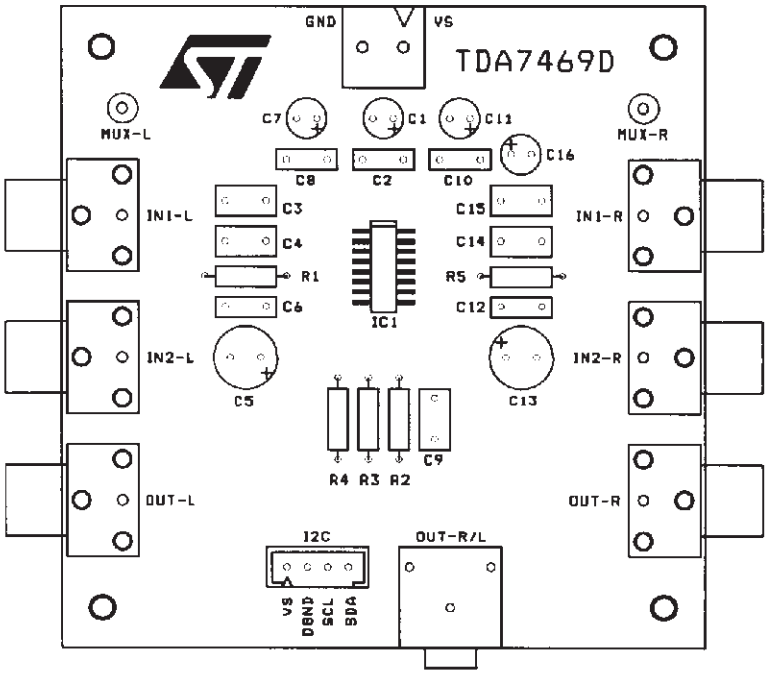
TDA7469A P.C. Board Layout (Top view)



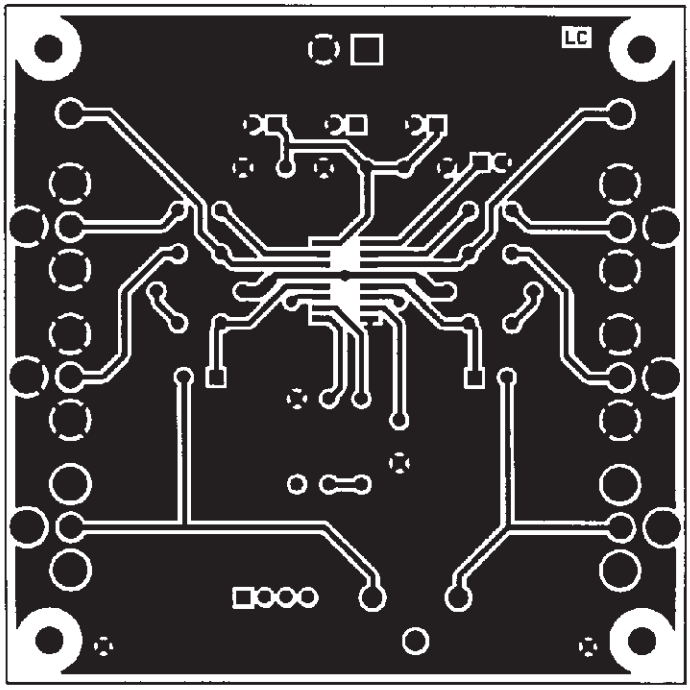
TDA7469A P. C. Board (Backside view)



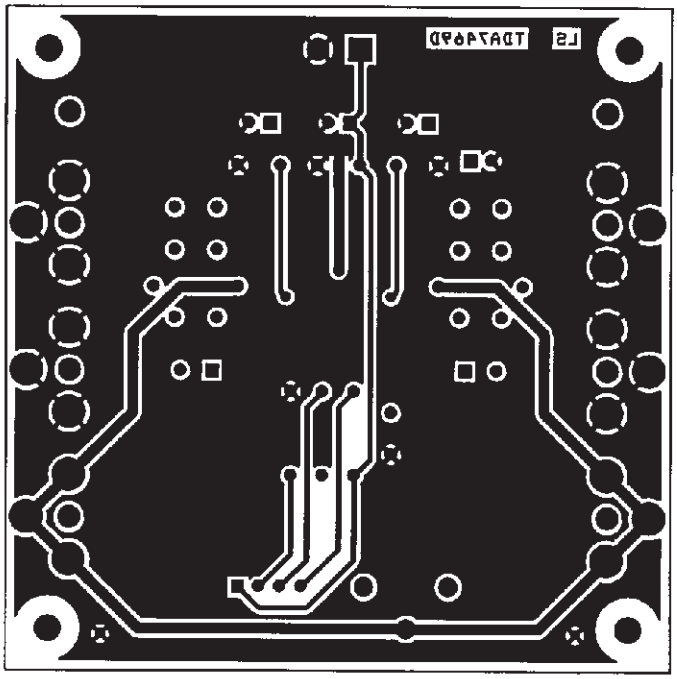
TDA7469D Components Layout



TDA7469D P. C. Board (Top View)



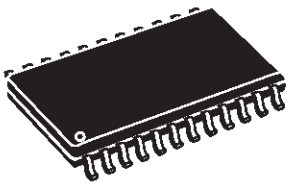
TDA7469D P. C. Board (Backside view)



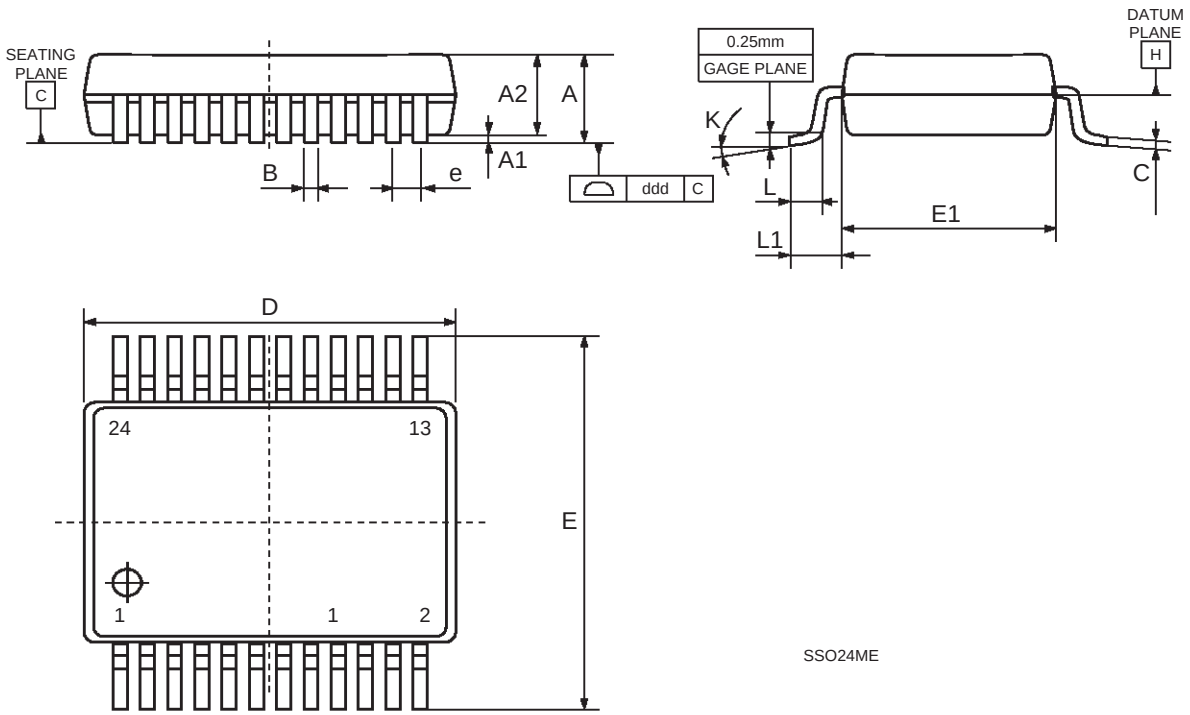
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.00			0.079
A1	0.05			0.002		
A2	1.65	1.75	1.85	0.060		0.079
B (2)	0.22		0.38	0.009		0.015
C	0.09		0.25	0.003		0.01
D (1)	7.9	8.2	8.5	0.31	0.32	0.33
E	7.4	7.8	8.2	0.29	0.30	0.32
E1 (1)	5.0	5.3	5.6	0.20	0.21	0.22
e		0.65			0.025	
L	0.55	0.75	0.95	0.022	0.029	0.004
L1		1.25			0.05	
k	0° (min), 4° (typ), 8° (max)					
ddd			0.1			0.004

(1) "D and E1" dimensions do not include mold flash or protusions, but do include mold mismatch and are mesaured at datum plane "H". Mold flash or protusions shall not exceed 0.20mm in total (both side).
(2) "B" dimension does not include dambar protusion/intrusion.

OUTLINE AND MECHANICAL DATA



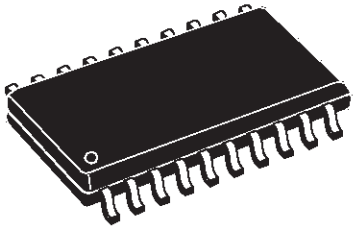
SSO24
Shrink Small Outline Package



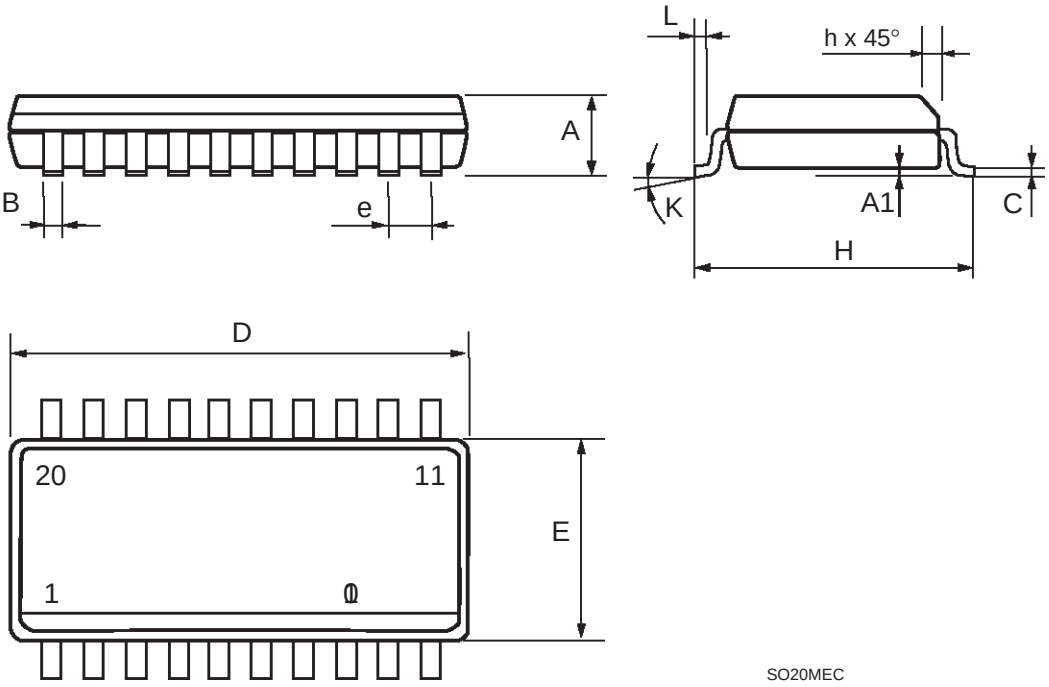
0053237

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	12.6		13	0.496		0.512
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



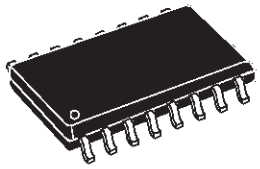
SO20



SO20MEC

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