

**MONITOR AMPLIFIER**

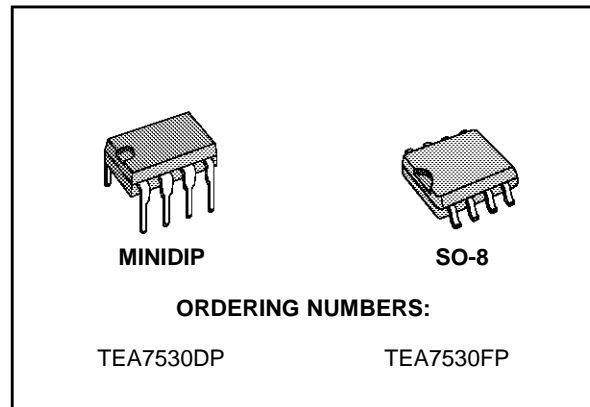
PRELIMINARY DATA

- LOW VOLTAGE
- POWER: 100mW AT 5V
- ANTIDISTORTION SYSTEM FOR LOW CURRENT LINES

**DESCRIPTION**

This 8 pins IC is designed for monitor telephone set and provides:

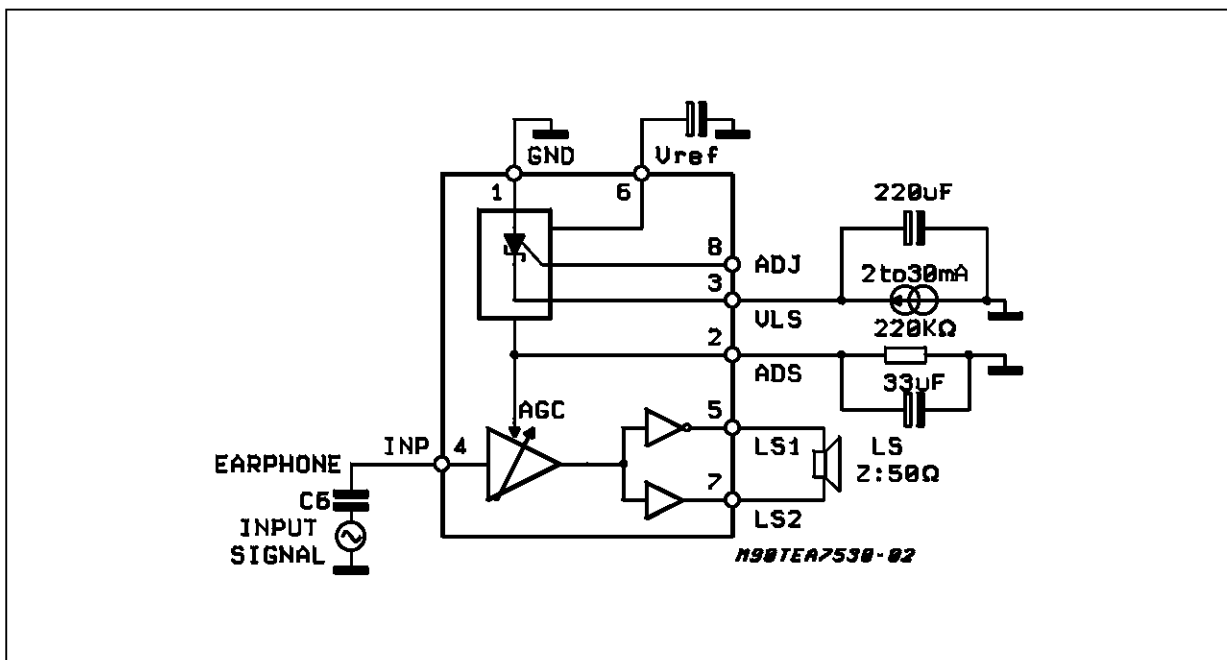
- a) Signal amplification for monitoring
- b) Antidistortion by automatic gain adaptation.



**ABSOLUTE MAXIMUM RATINGS**

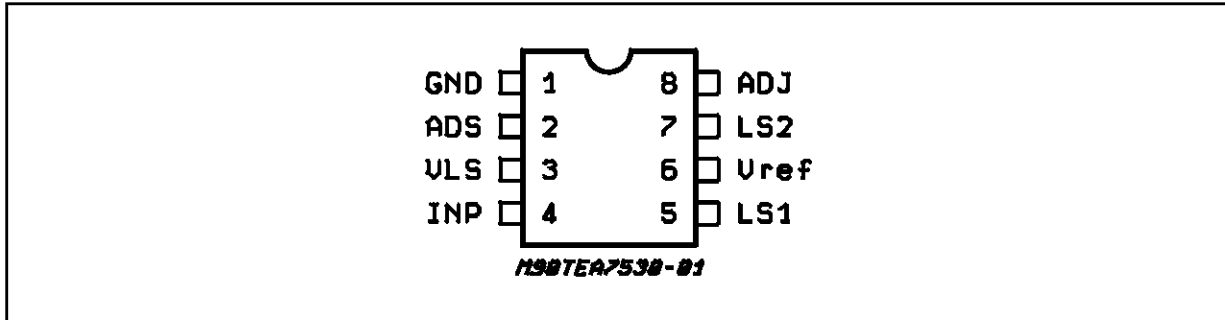
Symbol	Parameter	Value		Unit
		Minidip	SO	
T <sub>op</sub>	Temperature Range	-20 to +70	-20 to +70	°C
V <sub>LS</sub>	Supply Voltage	6	6	V
I <sub>LS</sub>	Supply Current for T > 300ms for T ≤ 300ms	90 150	75 120	mA mA

**BLOCK DIAGRAM**



## TEA7530

### PIN CONNECTION (top view)



### PIN FUNCTION

N°	Symbol	Description
1	GND	Ground
2	ADS	Antidistortion
3	V <sub>LS</sub>	Supply
4	INP	Input Signal
5	LS1	Output Loudspeaker 1
6	V <sub>REF</sub>	Internal Reference Voltage
7	LS2	Output Loudspeaker 2
8	ADJ	Adjust Internal Reference V <sub>LS</sub>

### FUNCTIONAL DESCRIPTION

TEA7530 performs the following functions:

The circuit amplifies the incoming signal and feeds it to the loudspeaker.

♦ The Antidistortion system is incorporated for low current available from line.

♦ The maximum power available on a 50Ω impedance loudspeaker is 25mW at 3V and 100mW at 5V.

### ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25°C, I<sub>LS</sub> = 30mA unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V <sub>LS1</sub>	V <sub>LS1</sub> Supply	I <sub>LS</sub> = 2mA (fig. 5)	2.7	3	3.3	V
		I <sub>LS</sub> = 30mA (fig. 5)		3.15	3.4	V
V <sub>LSM</sub>	V <sub>LS</sub> Maximum	I <sub>pin8</sub> = 40μA (fig. 5; So = closed)			5.7	V
V <sub>ADJ</sub>	Voltage Pin 8	I <sub>LS</sub> = 2 to 30mA (fig. 5)	1.0	1.25	1.5	V
G	Loudspeaker Amplifier Gain = $\frac{V_{(5)} - V_{(7)}}{V_{(4)}}$	I <sub>LS</sub> = 30mA (fig. 6)	30	32	34	dB
THD	Distortion	f = 300Hz to 2KHz V <sub>(5)</sub> - V <sub>(7)</sub> = 0.8Vrms; (fig. 6)			2	%
Z <sub>INPIN</sub>	Earphone Input	(fig. 7)	2.1	2.8	3.5	KΩ
V <sub>OFFS</sub>	Output Offset [V <sub>(5)</sub> - V <sub>(7)</sub> ]	(fig. 6)	-80		80	mV
GATT	Loudspeaker Attenuated Gain = [V <sub>(5)</sub> - V <sub>(7)</sub> ] / V <sub>(4)</sub>	V <sub>(2)</sub> = 0.7V; (fig. 8)		-30	-20	dB
		V <sub>(2)</sub> = 0.4V; (fig. 8)	20	30		dB

Figure 1: Loudspeaker Gain vs. Voltage on Pin 2

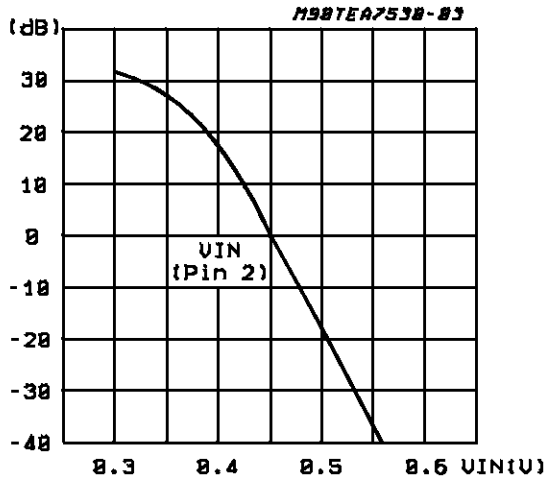


Figure 2: Power Available on Loudspeakers vs. V<sub>LS</sub> Typical Curve. (Voltage Mode)

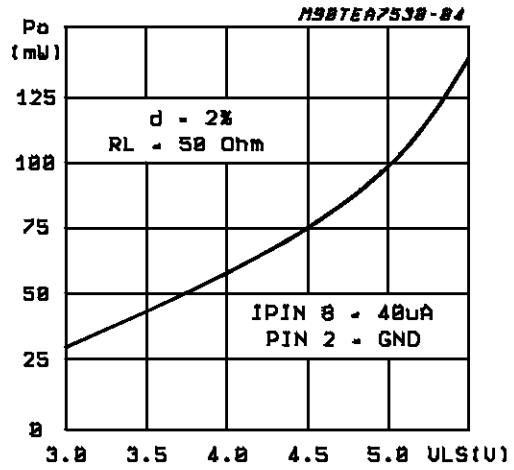


Figure 3: Distortion vs. Output Power

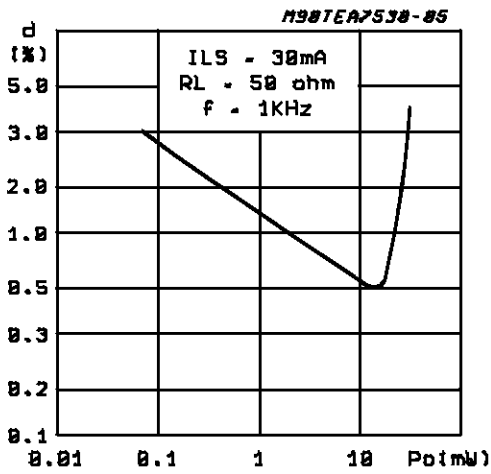
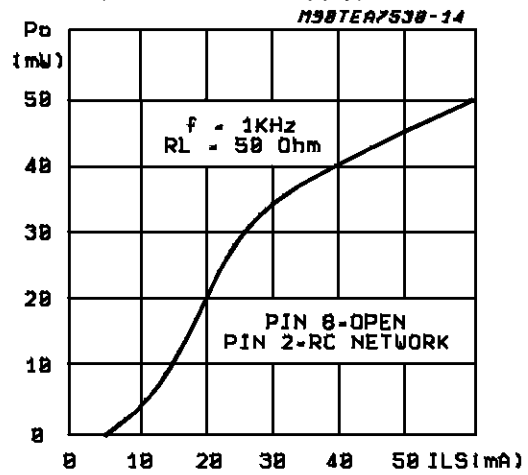


Figure 4: Output Power vs. Supply Current (Current Mode Supply)



TEST CIRCUITS

Figure 5: Shuntvoltage Regulator / Reference Voltage at Pin 8.

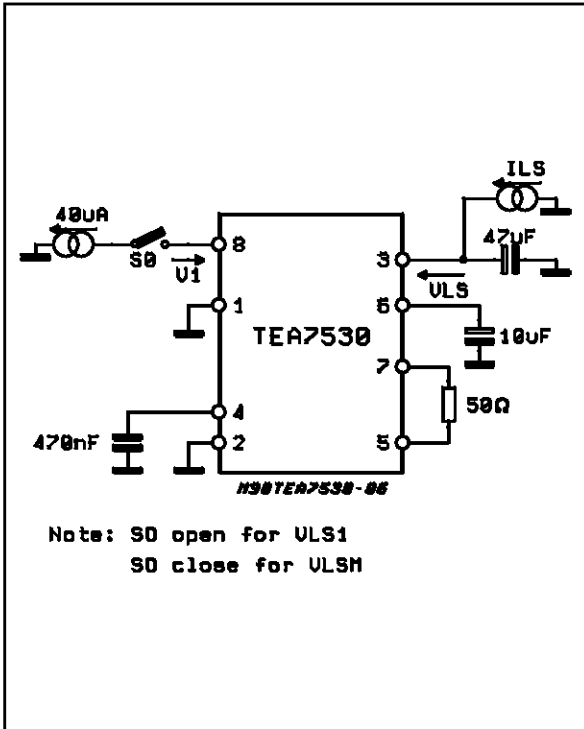


Figure 6: Loudspeaker Amplifier: Gain/Distortion/Output Offset

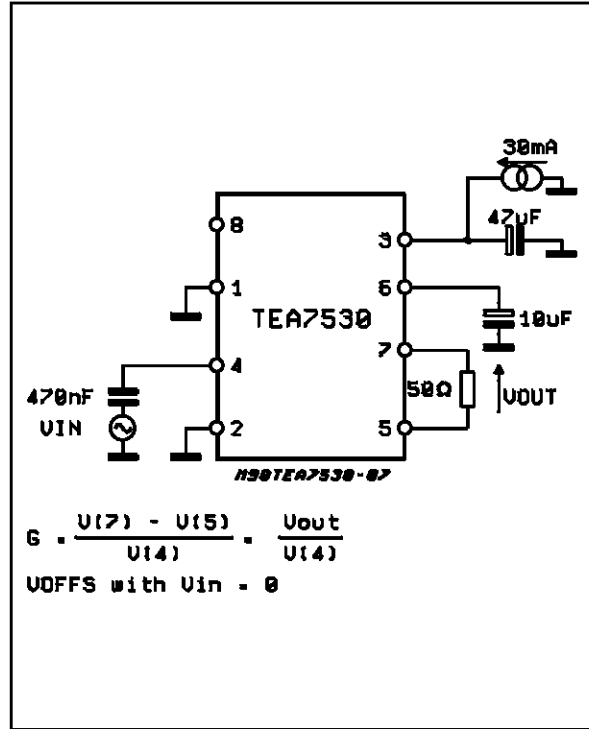


Figure 7: Impedance, ZINP

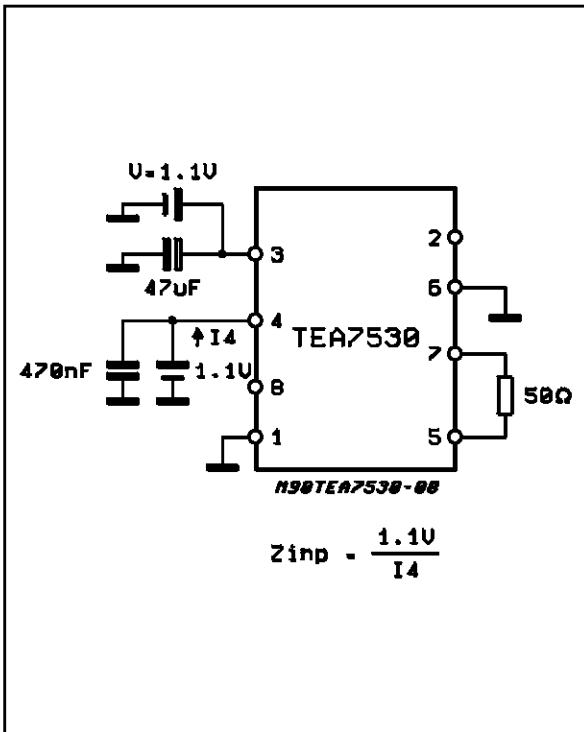
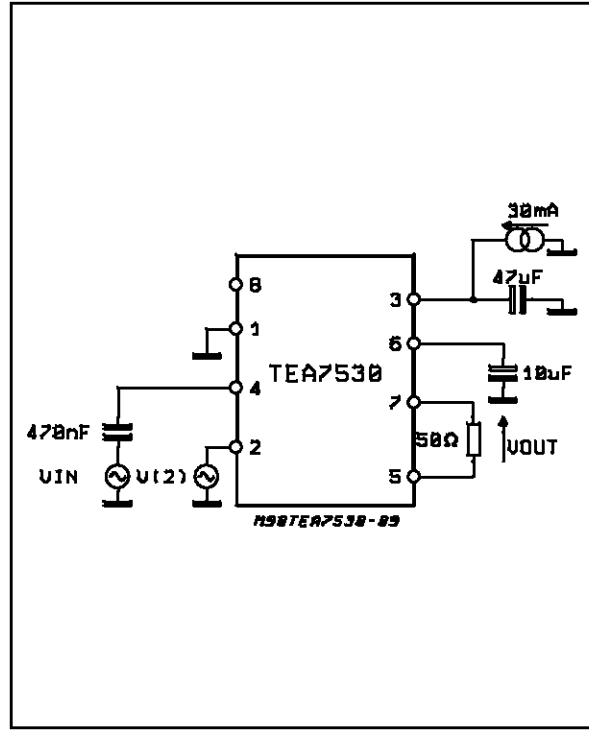


Figure 8: Anti-loading Feedback System at G = GATT



**CIRCUIT DESCRIPTION**

TEA7530 is a 8 pin DIP integrated circuit providing the following facilities:

- ◆ Loudspeaker amplifier
- ◆ Antidistortion feed-back system (limited line current compensation)

**1.1. LOUDSPEAKER AMPLIFIER**

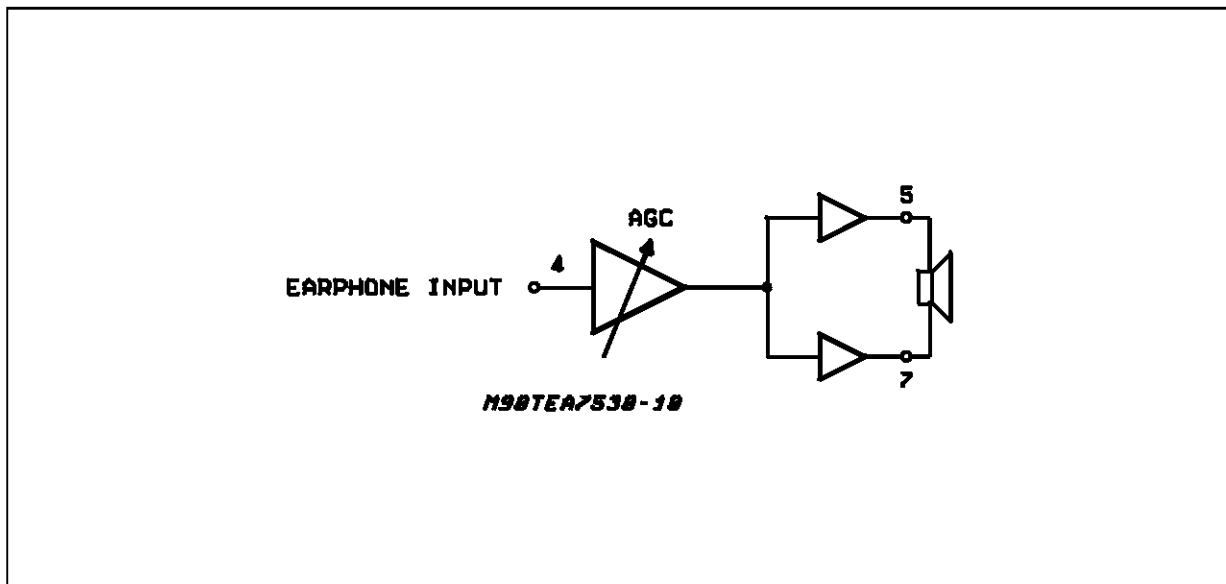
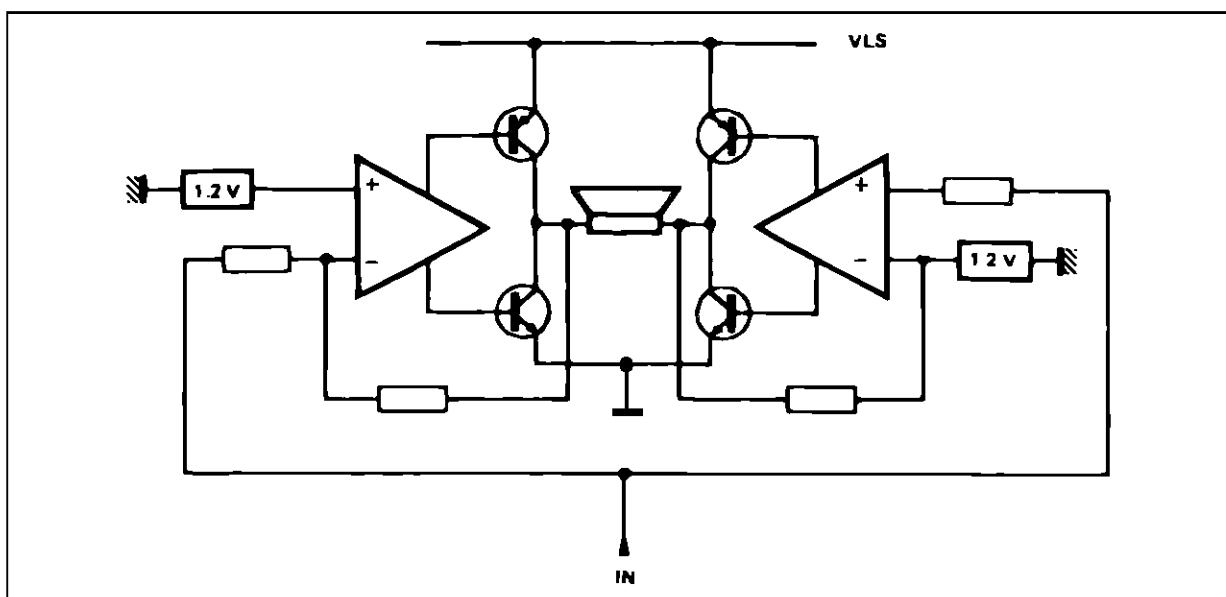
The amplifier is divided into 2 main sections.

- Automatic Gain Control (AGC)
- Push-pull amplifier (bridge structure)

a) The AGC section is used for the antidistortion system.

- ◆ When used in a telephone set to avoid larsen effect the AGC automatically decreases loudspeaker amplifier gain.
- ◆ When the required output level exceeds the capabilities of the available current, the AGC decreases the loudspeaker amplifier gain to avoid distortion.

b) The output amplifier uses a double push-pull configuration (H bridge) to get maximum dynamic range under limited supply conditions.

**Figure 9****Figure 10**

## TEA7530

### Amplifier DC Supply

In transmission mode, the supply voltage is controlled by the internal shunt DC regulator. For this reason, the TEA7530 should be supplied from a current source (see: supply considerations). An antidistortion system is embodied which provides AGC control to avoid loudspeaker distortion under current-limited conditions.

### AGC Circuit action

When the supply  $V_{LS}$  is insufficient, the voltage at pin 8, falls below the reference voltage 1.2V, resulting in transistor (TR) being switched off, resulting zero current flow in resistor R. This state enables the gain control system. Under these conditions, the shunt DC supply will switch at a rate determined by the time constant of the RC network on pin 2.

This switching action accomodates normal speech characteristic under low supply conditions.

The AGC will be switched ON when the level on Pin 2 is greater than a reference voltage of 0.4V.

### Supply Considerations

a) Current MODE - Pin 8 is open ( $V_{LS} = V_{LS1}$ ) or

connected to ground with an external resistor ( $R_{EXT}$ ) higher than 16K $\Omega$ . The typical value of  $V_{LS}$  is:

$$V_{LS} = 1.2V \frac{40.5K\Omega + (27K\Omega / R_{EXT})}{(27K\Omega / R_{EXT})}$$

The AGC section is working as described in the previous paragraph.

b) Voltage MODE - Pin 8 is shorted or connected to GND with a resistor ( $R_{EXT}$ ) lower than 16K $\Omega$ . In this condition the circuit must be supplied with a DC voltage of 3 to 5.5V. In this case the AGC section is permanently ON. Pin 2 must be shorted to GND (in voltage mode only) to avoid permanent attenuation of the signal at audio input

### PIN FUNCTIONS

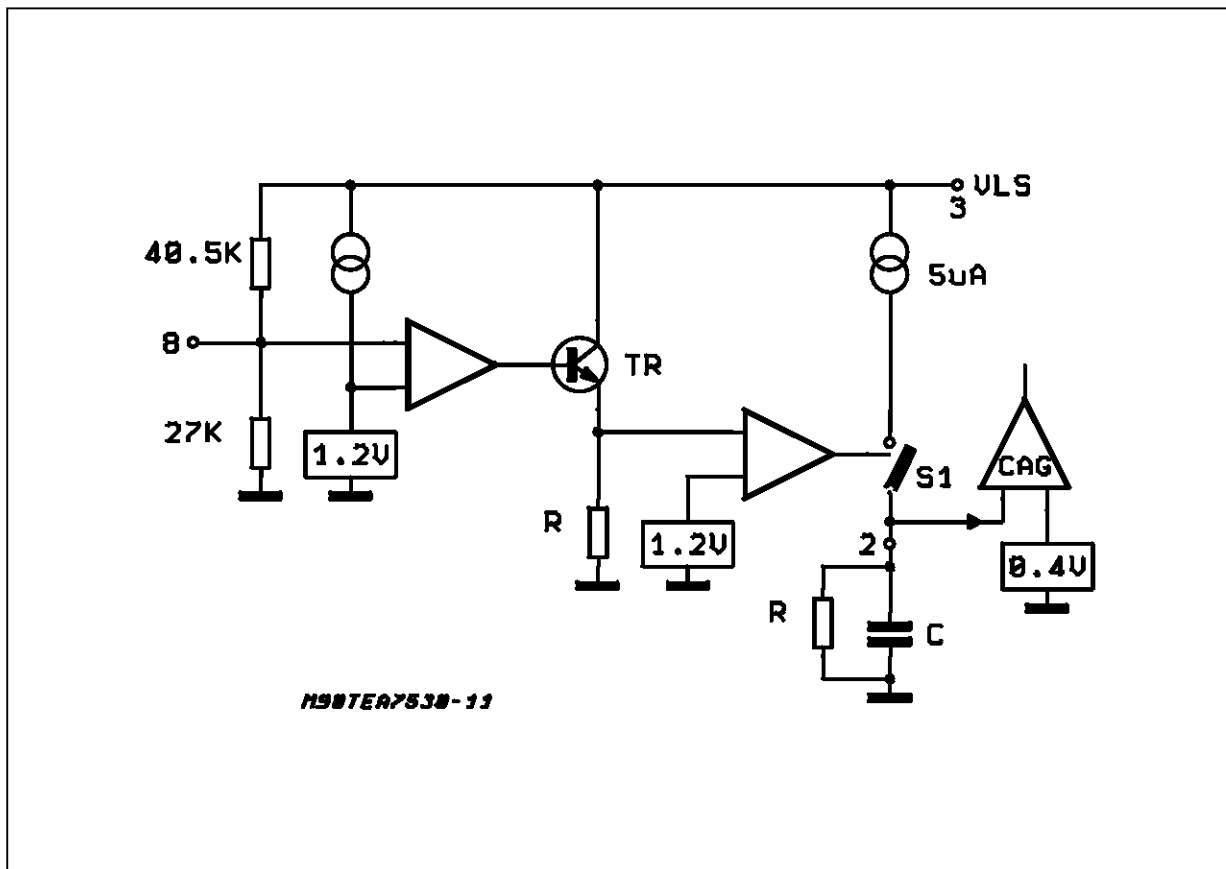
**PIN 1:** GND.

**PIN 2:** AUTOMATIC GAIN CONTROL FILTER

The antidistortion system response is adjusted by the R-C network on this pin.

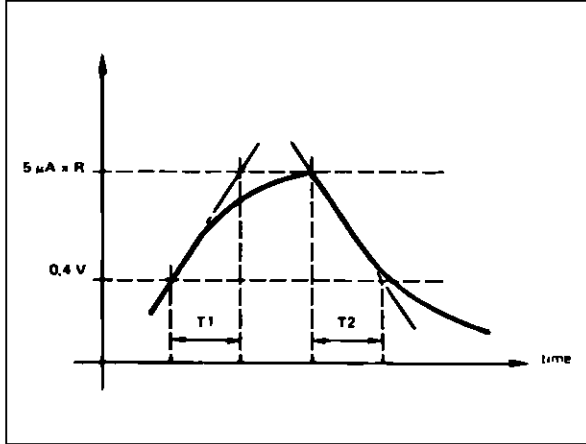
The AGC will be switched ON when the level on pin 2 is greater than a reference voltage of 0.4V, the RC-network charges (current source ON) or discharges (current source OFF) according to supply voltage.

Figure 11



## THEORETICAL VOLTAGE ON PIN 2

Figure 12



- The value of R affects the system time constant and the charge/discharge duty cycle.
- The value of C only affects the system time constant.
- R should be greater or equal to 150KΩ for correct AGC operation.

**PIN 3: CIRCUIT SUPPLY VOLTAGE**

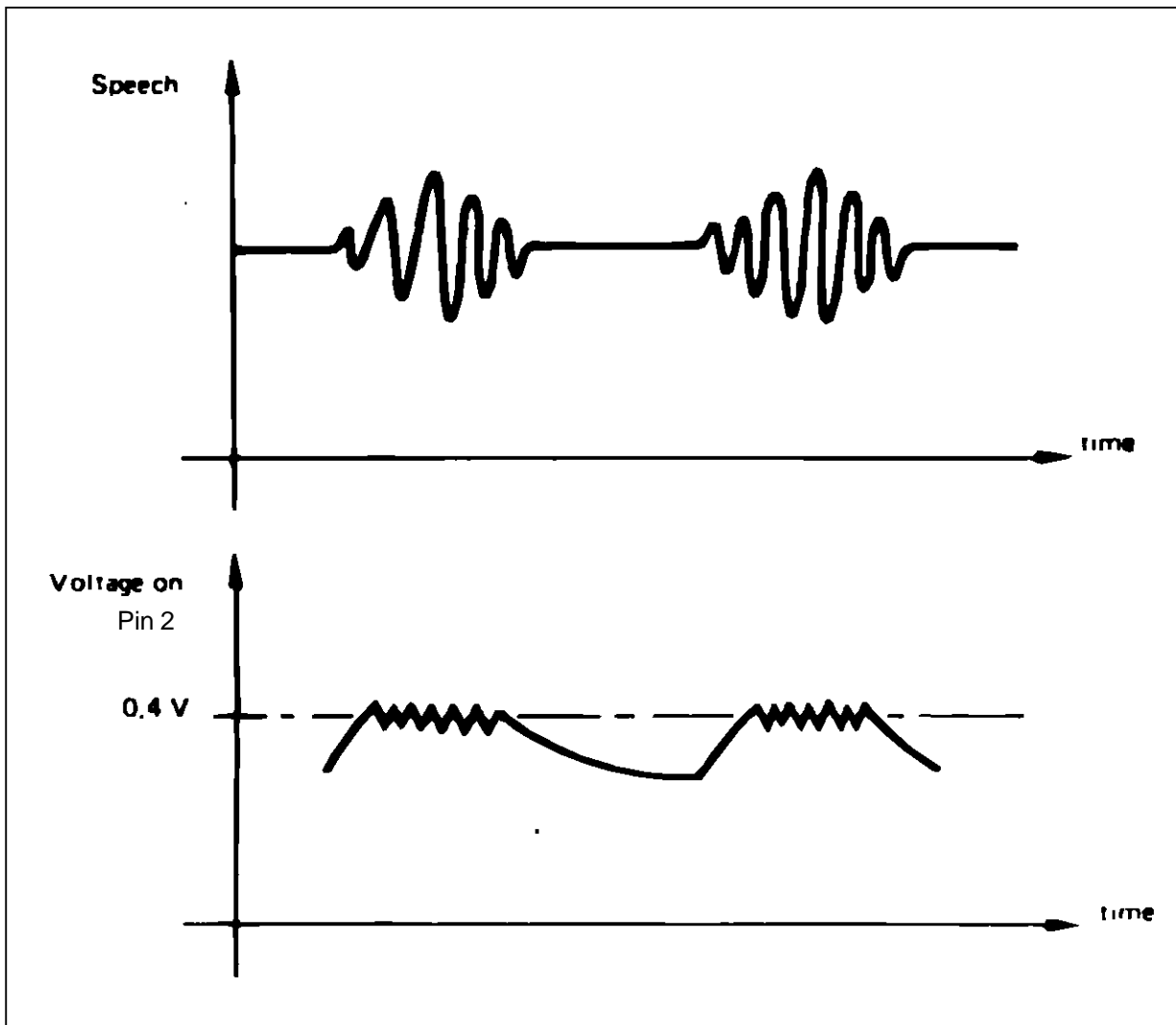
With pin 8 open circuit,  $V_{LS}$  is internally stabilized at 3V.

When the TEA7530 is under AGC control, the voltage on this pin varies slightly (due to AGC action).

**PIN 4: EARPHONE INPUT**

Input for loudspeaker signal

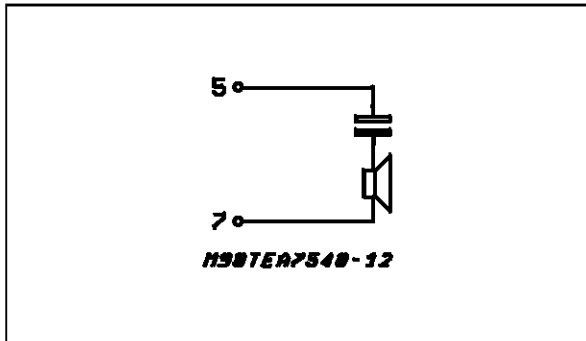
Figure 13



**PIN 5-7: LOUDSPEAKER OUTPUTS**

Maximum output voltage:  $V_{pp} = 2V_{LS} - 2.5V$  (with a gain of 32dB).

Maximum output current: depending of the supply current.

**Figure 14**

Two loudspeaker connection methods are possible, using the amplifier in either symmetrical or asymmetrical mode.

**Note:**

It is advisable to connect a 47nF capacitor in parallel with the loudspeaker (between pins 5 and 7).

**- "Symmetrical" mode**

This is for low voltage working, but at a higher supply current. The highest output power is available in this mode, due to the 5.7V maximum supply voltage restriction, imposed by the TEA7530

Loudspeaker impedance recommended value: 50Ω.

Nominal gain available between earphone input

and loudspeaker outputs: 32dB.

**- "Asymmetrical" Mode**

This allows higher voltage operation, but at a lower supply current.

Loudspeaker impedance recommended value: 25Ω.

Nominal gain available between earphone input and loudspeaker output: 32 - 6 = 26dB.

**Pin 6:  $V_{ref}$ : INTERNAL REFERENCE**

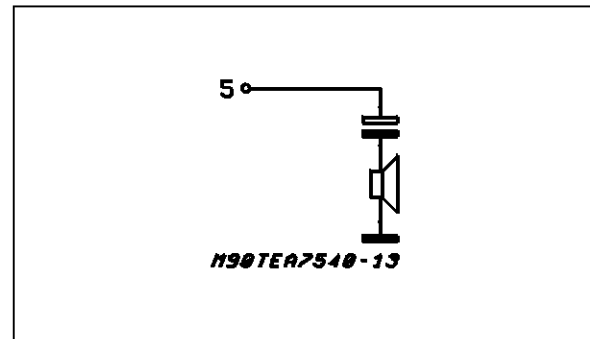
Output which provides an internally regulated reference voltage.

$V_{ref} = 1.2V$  typical

MAXIMUM AVAILABLE CURRENT: 5μA

**Pin 8: ADJUST  $V_{LS}$** 

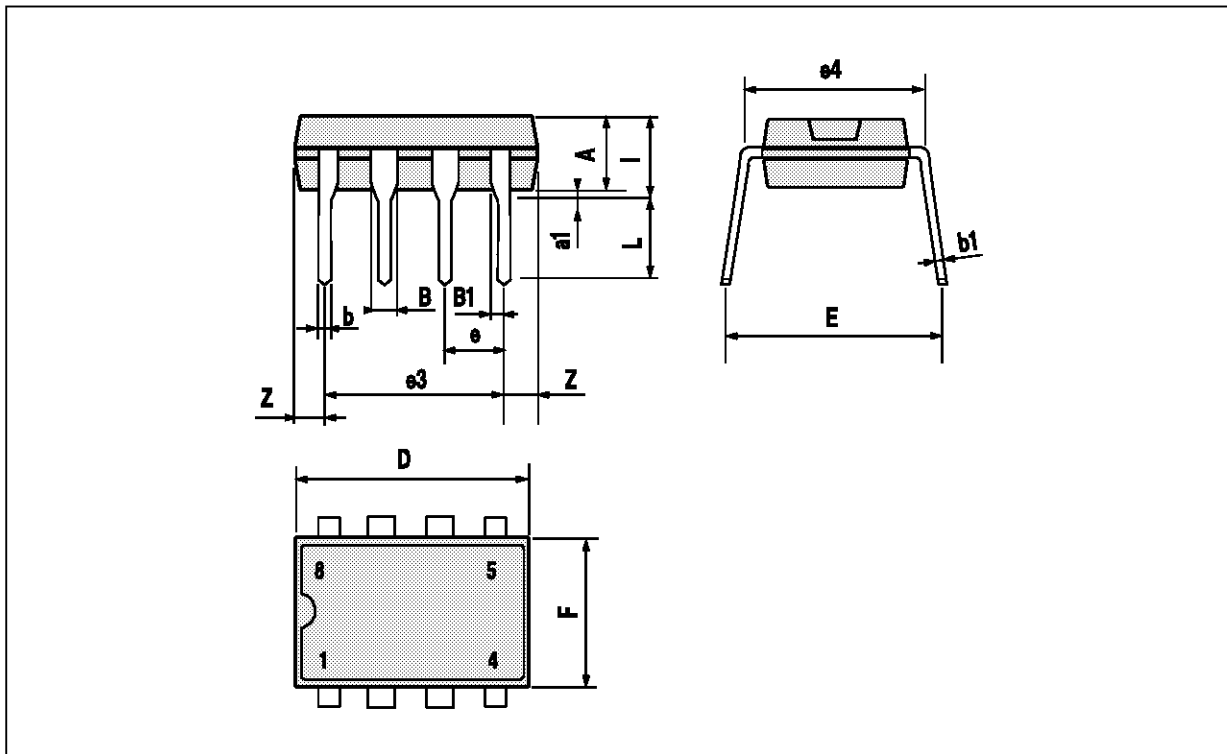
This pin is used to adjust the IC supply voltage.

**Figure 15**



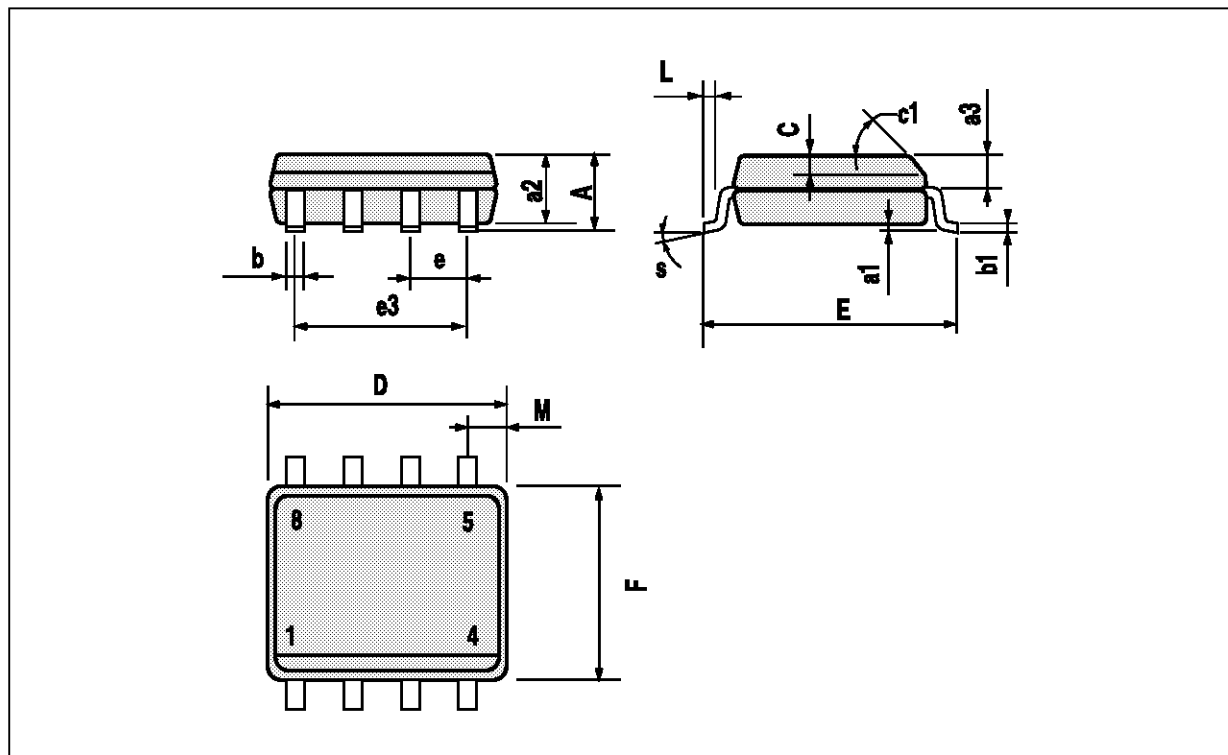
## MINIDIP PACKAGE MECHANICAL DATA

DIM	mm			inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060



## SO8 PACKAGE MECHANICAL DATA

DIM	mm			inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					



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