TS4990

1W AUDIO POWER AMPLIFIER WITH ACTIVE LOW STANDBY MODE

ADVANCE DATA

- OPERATING FROM V_{CC} **= 2.2V to 5.5V**
- **1W** OUTPUT POWER @ Vcc=5V, THD=1%, f=1kHz, with **8**Ω Load
- ULTRA LOW CONSUMPTION IN STANDBY MODE **(10nA)**
- **62dB** PSRR @ 217Hz @ Grounded mode
- **Zero** POP & CLICK
- ULTRA LOW DISTORTION **(0.1%)**
- UNITY GAIN STABLE
- AVAILABLE IN 9 BUMPS **Flip Chip Package**

DESCRIPTION

The TS4990 has been designed for demanding audio applications such as mobile phones and to minimize the number of external components.

This Audio Power Amplifier is capable of delivering 1W of continuous RMS Ouput Power into an 8Ω load @ 5V.

An externally controlled standby mode control reduces the supply current to less than 10nA. It also includes an internal thermal shutdown protection.

The unity-gain stable amplifier can be configured by external gain setting resistors.

APPLICATIONS

- Mobile Phones (Cellular / Cordless)
- Laptop / Notebook Computers
- PDAs
- Portable Audio Devices

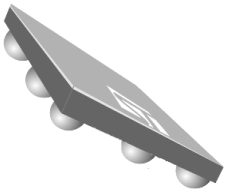
ORDER CODE

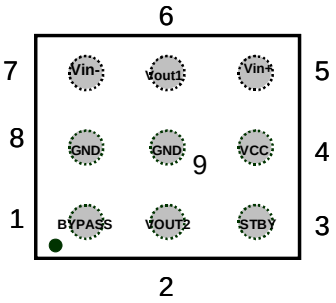
Part Number	Temperature Range	Package	
		J	
TS4990IJT	-40, +85°C	•	

J = Flip Chip Package - only available in Tape & Reel (JT)

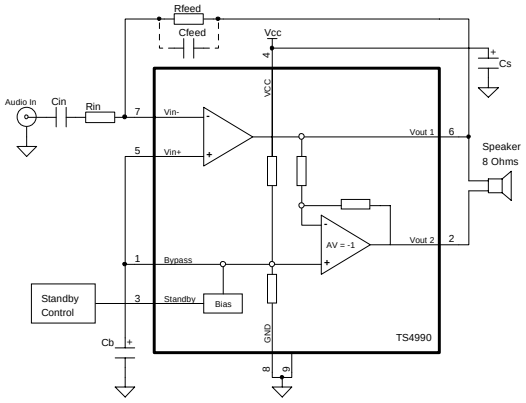
PIN CONNECTIONS (top view)

TS4990JT - FLIP CHIP





TYPICAL APPLICATION SCHEMATIC



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage [1]	6	V
V_i	Input Voltage [2]	G_{ND} to V_{CC}	V
T_{oper}	Operating Free Air Temperature Range	-40 to + 85	°C
T_{stg}	Storage Temperature	-65 to +150	°C
T_j	Maximum Junction Temperature	150	°C
R_{thja}	Thermal Resistance Junction to Ambient[3] Flip Chip	TBD	°C/W
Pd	Power Dissipation	Internally Limited	
ESD	Human Body Model	2	kV
ESD	Machine Model	200	V
	Latch-up Immunity	Class A (200mA)	
	Lead Temperature (soldering, 10sec)	250	°C

1. All voltages values are measured with respect to the ground pin.
2. The magnitude of input signal must never exceed V_{CC} + 0.3V / G_{ND} - 0.3V
3. Device is protected in case of over temperature by a thermal shutdown active @ 150°C.

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	2.2 to 5.5	V
V_{ICM}	Common Mode Input Voltage Range	1.2V to V_{CC}	V
V_{STB}	Standby Voltage Input : Device ON Device OFF	 $1.2 \leq V_{STB} \leq V_{CC}$ $GND \leq V_{STB} \leq 0.4$	V
R_L	Load Resistor	4 - 32	Ω
R_{OUT} GND	Resistor Output to GND	> 1	MΩ
T_{SD}	Thermal Shutdown Temperature	150 min.	°C
R_{thja}	Thermal Resistance Junction to Ambient[1]	TBD	°C/W

1. This thermal resistance can be reduced with a suitable PCB layout .

ELECTRICAL CHARACTERISTICS

V_{CC} = **+5V**, GND = **0V**, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
I_{CC}	Supply Current No input signal, no load		4	6	mA
$I_{STANDBY}$	Standby Current [1] No input signal, Vstdby = G_{ND}, RL = 8Ω		10	1000	nA
Voo	Output Offset Voltage No input signal, RL = 8Ω		5	20	mV
Po	Output Power THD = 1% Max, f = 1kHz, RL = 8Ω	0.8	1		W
THD + N	Total Harmonic Distortion + Noise Po = 250mW rms, Gv = 2, 20Hz < f < 20kHz, RL = 8Ω		0.15		%
PSRR	Power Supply Rejection Ratio[2] RL = 8Ω, Gv = 2, Vripple = 200mVpp, Input Grounded F = 217Hz F = 1kHz	 55 55	 62 66		dB
T_{WU}	Wake-Up Time		100	TBD	ms

1. Standby mode is actived when Vstdby is tied to Gnd
2. Dynamic measurements - 20*log(rms(Vout)/rms(Vripple)). Vripple is the surimposed sinus signal to Vcc.

V_{CC} = **+3.3V**, GND = **0V**, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
I_{CC}	Supply Current No input signal, no load		4	6	mA
$I_{STANDBY}$	Standby Current [1] No input signal, Vstdby = G_{ND}, RL = 8Ω		10	1000	nA
Voo	Output Offset Voltage No input signal, RL = 8Ω		5	20	mV
Po	Output Power THD = 1% Max, f = 1kHz, RL = 8Ω	380	450		mW
THD + N	Total Harmonic Distortion + Noise Po = 250mW rms, Gv = 2, 20Hz < f < 20kHz, RL = 8Ω		0.15		%
PSRR	Power Supply Rejection Ratio[2] RL = 8Ω, Gv = 2, Vripple = 200mVpp, Input Grounded F = 217Hz F = 1kHz	 55 55	 62 66		dB
T_{WU}	Wake-Up Time		130	TBD	ms

1. Standby mode is actived when Vstdby is tied to Vcc
2. Dynamic measurements - 20*log(rms(Vout)/rms(Vripple)). Vripple is the surimposed sinus signal to Vcc.

ELECTRICAL CHARACTERISTICS

V_{CC} = **2.6V**, GND = **0V**, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
I_{CC}	Supply Current No input signal, no load		4	6	mA
$I_{STANDBY}$	Standby Current [1] No input signal, Vstdby = G_{ND}, RL = 8Ω		10	1000	nA
Voo	Output Offset Voltage No input signal, RL = 8Ω		5	20	mV
Po	Output Power THD = 1% Max, f = 1kHz, RL = 8Ω	210	260		mW
THD + N	Total Harmonic Distortion + Noise Po = 200mW rms, Gv = 2, 20Hz < f < 20kHz, RL = 8Ω		0.15		%
PSRR	Power Supply Rejection Ratio[2] RL = 8Ω, Gv = 2, Vripple = 200mVpp, Input Grounded F = 217Hz F = 1kHz	 55 55	 62 66		dB
T_{WU}	Wake-Up Time		130	TBD	ms

1. Standby mode is actived when Vstdby is tied to Vcc
2. Dynamic measurements - 20*log(rms(Vout)/rms(Vripple)). Vripple is the surimposed sinus signal to Vcc.

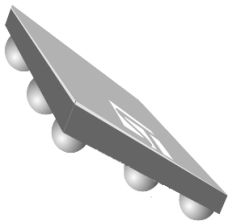
Components	Functional Description
Rin	Inverting input resistor which sets the closed loop gain in conjunction with Rfeed. This resistor also form a high pass filter with Cin (fc = 1 / (2 x Pi x Rin x Cin))
Cin	Input coupling capacitor which blocks the DC voltage at the amplifier input terminal
Rfeed	Feed back resistor which sets the closed loop gain in conjunction with Rin
Cs	Supply Bypass capacitor which provides power supply filtering
Cb	Bypass pin capacitor which provides half supply filtering
Cfeed	Low pass filter capacitor allowing to cut the high frequency (low pass filter cut-off frequency 1 / (2 x Pi x Rfeed x Cfeed))
Gv	Closed loop gain in BTL configuration = 2 x (Rfeed / Rin)

REMARKS

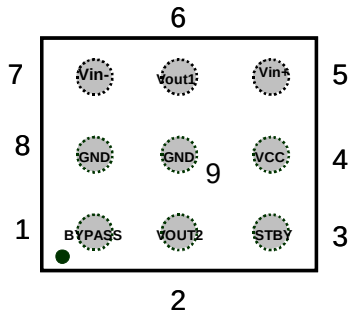
1. All measurements, except PSRR measurements, are made with a supply bypass capacitor Cs = 1µF.

2. The standby response time is about 1µs.

TS4990IJT

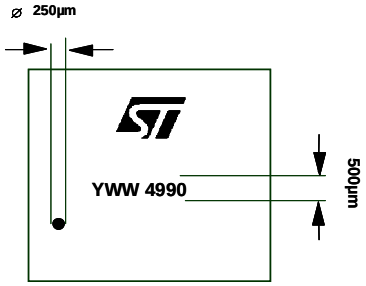


PIN OUT (top view)



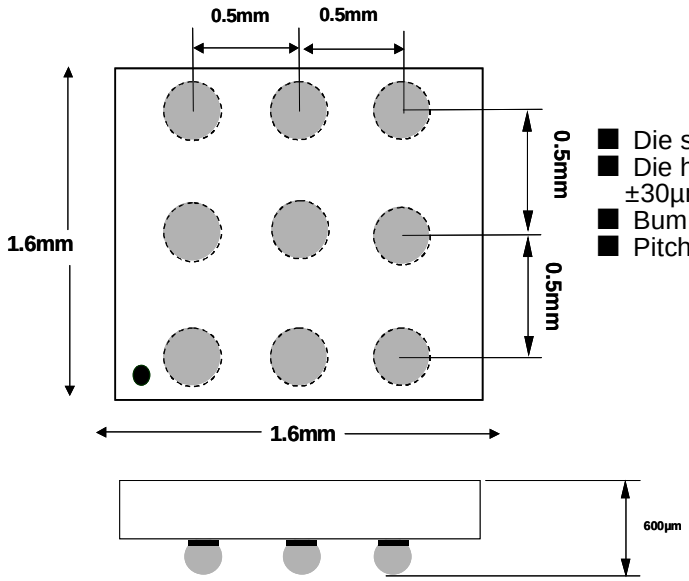
■ Balls are underneath

MARKING (top view)



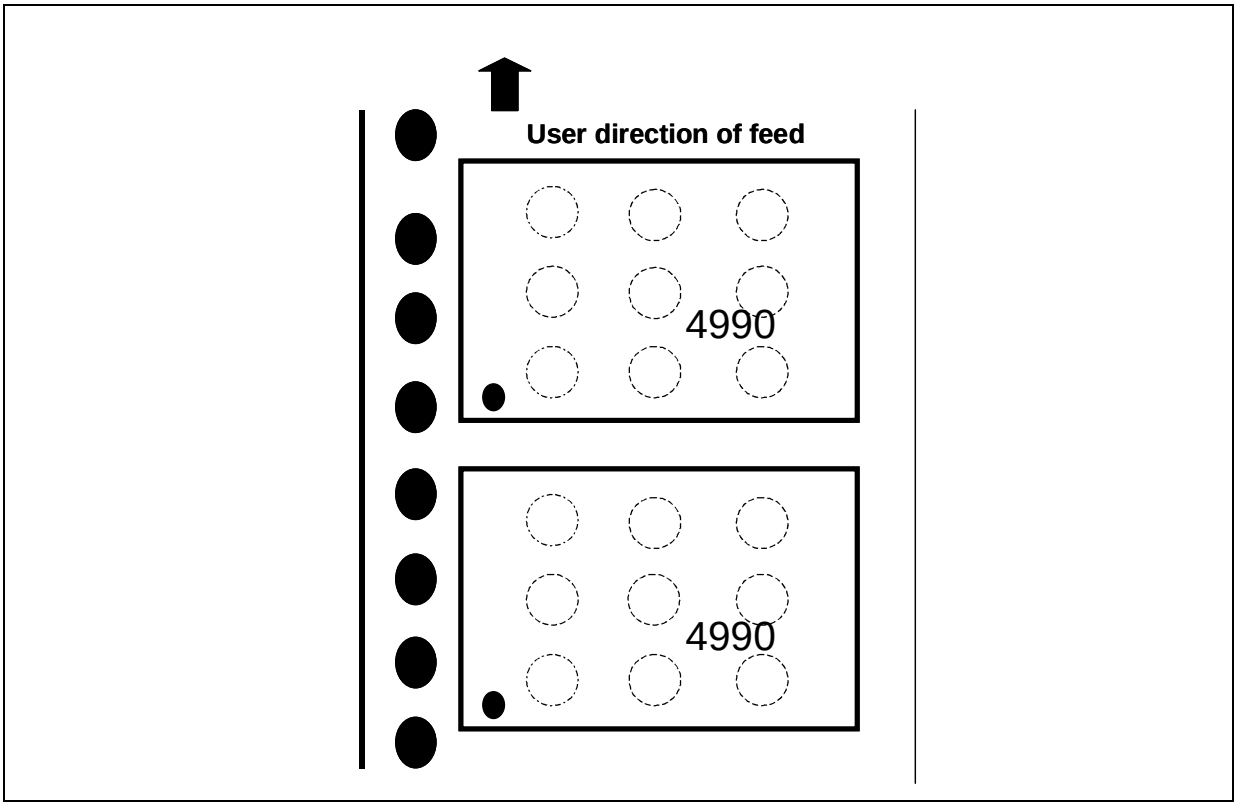
■ ST Logo
■ Part number 4990
■ Three digits Datecode : YWW
■ The dot is for marking pin 1

PACKAGE MECHANICAL DATA
FLIP CHIP - 9 BUMPS



■ Die size : (1.6mm ±10%) x (1.6mm ±10%)
■ Die height (including bumps) : 600µm ±30µm
■ Bumps diameter : 315µm ±15µm
■ Pitch: 500µm ±10µm

TAPE & REEL SPECIFICATION (top view)



DEVICES ORIENTATION

The devices are oriented in the carrier pocket with pin number 1A adjacent to the sprocket holes.