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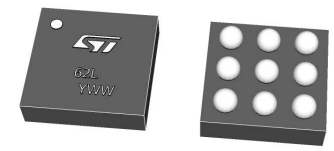
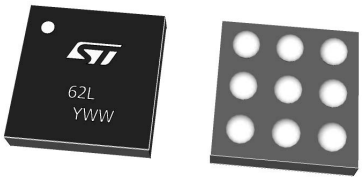
TS4962M

3 W filter-free class D audio power amplifier

Datasheet - production data



TS4962MEIJT



TS4962MEIKJT

Features

- Operating from V_{CC} = 2.4 V to 5.5 V
- Standby mode active low
- Output power: 3 W into 4 Ω and 1.75 W into 8 Ω with 10 % THD+N max and 5 V power supply
- Output power: 2.3 W @5 V or 0.75 W @ 3.0 V into 4 Ω with 1 % THD+N max.
- Output power: 1.4 W @5 V or 0.45 W @ 3.0 V into 8 Ω with 1 % THD+N max
- Adjustable gain via external resistors
- Low current consumption 2 mA @ 3 V
- Efficiency: 88 % typ.
- Signal to noise ratio: 85 dB typ.
- PSRR: 63 dB typ. @217 Hz with 6 dB gain
- PWM base frequency: 250 kHz
- Low pop and click noise
- Thermal shutdown protection
- Available in Flip Chip 9 x 300 µm (Pb-free)

Related products

- See TS2007 for further gain settings e.g. 6 or 12 dB
- See TS2012 for stereo settings

Applications

- Portable gaming consoles
- VR headsets
- Smart phones
- Tablets

Description

The TS4962M is a differential Class-D BTL power amplifier. It is able to drive up to 2.3 W into a 4 Ω load and 1.4 W into a 8 Ω load at 5 V. It achieves outstanding efficiency (88 % typ.) compared to classical Class-AB audio amps.

The gain of the device can be controlled via two external gain-setting resistors. Pop and click reduction circuitry provides low on/off switch noise while allowing the device to start within 5 ms. A standby function (active low) allows the reduction of current consumption to 10 nA typ.

Contents

1 Block diagram and pinout

Figure 1. Block diagram

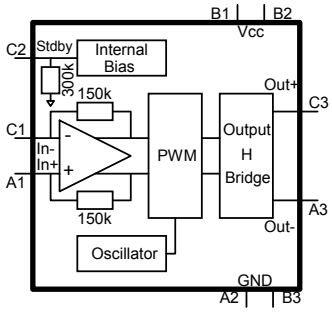
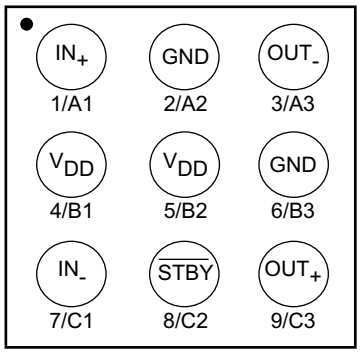


Figure 2. Pinout (top view)



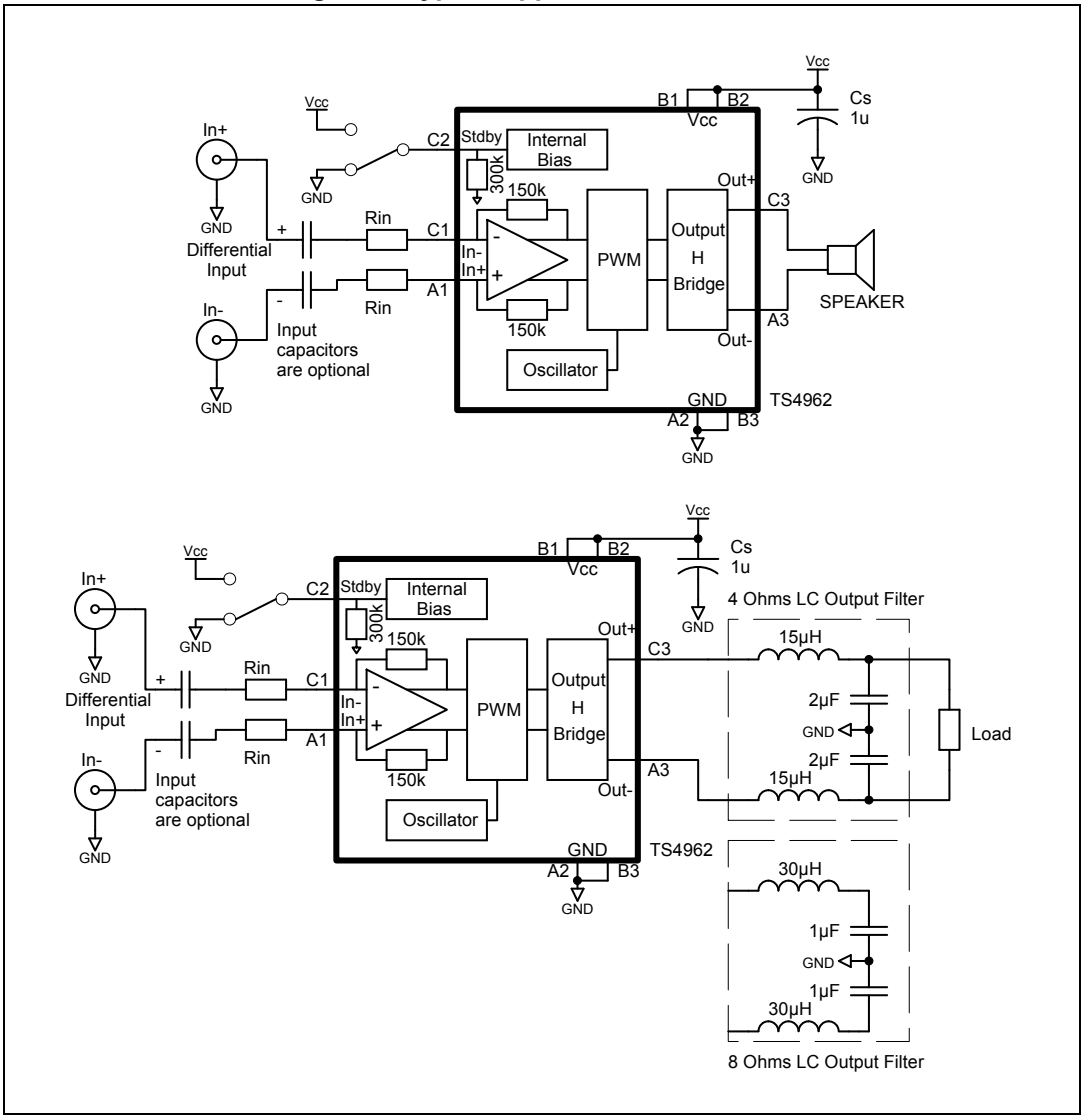
1. Legend:
   IN+ = positive differential input
   IN- = negative differential input
   VDD = analog power supply
   GND = power supply ground
   STBY = standby pin (active low)
   OUT+ = positive differential output
   OUT- = negative differential output
2. Bumps are underneath, bump diameter = 300 µm

2 Application component information

Table 1. Component information

Component	Functional description
C_s	Bypass supply capacitor. Install as close as possible to the TS4962M to minimize high-frequency ripple. A 100nF ceramic capacitor should be added to enhance the power supply filtering at high frequency.
R_{in}	Input resistor to program the TS4962M differential gain (gain = 300kΩ/R_{in} with R_{in} in kΩ).
Input capacitor	Due to common-mode feedback, these input capacitors are optional. However, they can be added to form with R_{in} a 1st order high-pass filter with -3dB cut-off frequency = $1/(2*\pi*R_{in}*C_{in})$.

Figure 3. Typical application schematics



3 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage (1) (2)	6	V
V_{in}	Input voltage (3)	GND to V_{CC}	
T_{oper}	Operating free-air temperature range	-40 to + 85	°C
T_{stg}	Storage temperature	-65 to +150	
T_j	Maximum junction temperature	150	
R_{thja}	Thermal resistance junction to ambient (4)	200	°C/W
P_{diss}	Power dissipation	Internally Limited(5)	
ESD	Human body model	2	kV
ESD	Machine model	200	V
Latch-up	Latch-up immunity	200	mA
V_{STBY}	Standby pin voltage maximum voltage (6)	GND to V_{CC}	V
	Lead temperature (soldering, 10sec)	260	°C

1. Caution: this device is not protected in the event of abnormal operating conditions, such as for example, short-circuiting between any one output pin and ground, between any one output pin and V_{CC}, and between individual output pins.
2. All voltage values are measured with respect to the ground pin.
3. The magnitude of the input signal must never exceed V_{CC} + 0.3V / GND - 0.3V.
4. The device is protected in case of over temperature by a thermal shutdown active @ 150°C.
5. Exceeding the power derating curves during a long period causes abnormal operation.
6. The magnitude of the standby signal must never exceed V_{CC} + 0.3V / GND - 0.3V.

Table 3. Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage (1)	2.4 to 5.5	V
V_{IC}	Common-mode input voltage range (2)	0.5 to V_{CC} - 0.8	
V_{STBY}	Standby voltage input: (3) Device ON Device OFF	 $1.4 \leq V_{STBY} \leq V_{CC}$ $GND \leq V_{STBY} \leq 0.4$ (4)	
R_L	Load resistor	≥ 4	Ω
R_{thja}	Thermal resistance junction to ambient (5)	90	°C/W

1. For V_{CC} from 2.4V to 2.5V, the operating temperature range is reduced to 0°C ≤T_{amb} ≤70°C.
2. For V_{CC} from 2.4V to 2.5V, the common-mode input range must be set at V_{CC}/2.
3. Without any signal on V_{STBY}, the device is in standby.
4. Minimum current consumption is obtained when V_{STBY} = GND.
5. With heat sink surface = 125mm^2.

4 Electrical characteristics

Table 4. V_{CC} = 5V, GND = 0V, V_{IC} = 2.5V, t_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{CC}	Supply current	No input signal, no load		2.3	3.3	mA
I_{STBY}	Standby current (1)	No input signal, V_{STBY} = GND		10	1000	nA
V_{OO}	Output offset voltage	No input signal, R_L = 8Ω		3	25	mV
P_{out}	Output power	G=6dB THD = 1% max, F = 1kHz, R_L = 4Ω THD = 10% max, F = 1kHz, R_L = 4Ω THD = 1% max, F = 1kHz, R_L = 8Ω THD = 10% max, F = 1kHz, R_L = 8Ω		2.3 3 1.4 1.75		W
THD + N	Total harmonic distortion + noise	P_{out} = 900mW$_{RMS}$, G = 6dB, 20Hz < F < 20kHz R_L = 8Ω + 15µH, BW < 30kHz P_{out} = 1W$_{RMS}$, G = 6dB, F = 1kHz, R_L = 8Ω + 15µH, BW < 30kHz		1 0.4		%
Efficiency	Efficiency	P_{out} = 2W$_{RMS}$, R_L = 4Ω +≥ 15µH P_{out} =1.2W$_{RMS}$, R_L = 8Ω+≥ 15µH		78 88		%
PSRR	Power supply rejection ratio with inputs grounded (2)	F = 217Hz, R_L = 8Ω, G=6dB, V_{ripple} = 200mV$_{pp}$		63		dB
CMRR	Common-mode rejection ratio	F = 217Hz, R_L = 8Ω, G = 6dB, ΔV_{icm} = 200mV$_{pp}$		57		dB
Gain	Gain value	R_{in} in kΩ	$\frac{273k\Omega}{R_{in}}$	$\frac{300k\Omega}{R_{in}}$	$\frac{327k\Omega}{R_{in}}$	V/V
R_{STBY}	Internal resistance from Standby to GND		273	300	327	kΩ
F_{PWM}	Pulse width modulator base frequency		180	250	320	kHz
SNR	Signal to noise ratio	A-weighting, P_{out} = 1.2W, R_L = 8Ω		85		dB
t_{WU}	Wake-up time			5	10	ms
t_{STBY}	Standby time			5	10	ms

Table 4. V_{CC} = 5V, GND = 0V, V_{IC} = 2.5V, t_{amb} = 25°C (unless otherwise specified) (continued)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_N	Output voltage noise	F = 20Hz to 20kHz, G = 6dB Unweighted R_L = 4Ω A-weighted R_L = 4Ω		 85 60		μV_{RMS}
		Unweighted R_L = 8Ω A-weighted R_L = 8Ω		86 62		
		Unweighted R_L = 4Ω + 15µH A-weighted R_L = 4Ω + 15µH		83 60		
		Unweighted R_L = 4Ω + 30µH A-weighted R_L = 4Ω + 30µH		88 64		
		Unweighted R_L = 8Ω + 30µH A-weighted R_L = 8Ω + 30µH		78 57		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		87 65		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		82 59		

1. Standby mode is active when V_{STBY} is tied to GND.
2. Dynamic measurements - 20*log(rms(V_{out})/rms(V_{ripple})). V_{ripple} is the superimposed sinusoidal signal to V_{CC} @ F = 217Hz.

Table 5. V_{CC} = 4.2V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified) (1)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{CC}	Supply current	No input signal, no load		2.1	3	mA
I_{STBY}	Standby current (2)	No input signal, V_{STBY} = GND		10	1000	nA
V_{OO}	Output offset voltage	No input signal, R_L = 8Ω		3	25	mV
P_{out}	Output power	G=6dB THD = 1% max, F = 1kHz, R_L = 4Ω THD = 10% max, F = 1kHz, R_L = 4Ω THD = 1% max, F = 1kHz, R_L = 8Ω THD = 10% max, F = 1kHz, R_L = 8Ω		 1.6 2 0.95 1.2		W
THD + N	Total harmonic distortion + noise	P_{out} = 600mW$_{RMS}$, G = 6dB, 20Hz < F < 20kHz R_L = 8Ω + 15µH, BW < 30kHz P_{out} = 700mW$_{RMS}$, G = 6dB, F = 1kHz, R_L = 8Ω + 15µH, BW < 30kHz		 1 0.35		%
Efficiency	Efficiency	P_{out} = 1.45W$_{RMS}$, R_L = 4Ω +≥ 15µH P_{out} =0.9W$_{RMS}$, R_L = 8Ω+≥ 15µH		78 88		%
PSRR	Power supply rejection ratio with inputs grounded (3)	F = 217Hz, R_L = 8Ω, G=6dB, V_{ripple} = 200mV$_{pp}$		63		dB
CMRR	Common-mode rejection ratio	F = 217Hz, R_L = 8Ω, G = 6dB, ΔV_{icm} = 200mV$_{pp}$		57		dB
Gain	Gain value	R_{in} in kΩ	$\frac{273k\Omega}{R_{in}}$	$\frac{300k\Omega}{R_{in}}$	$\frac{327k\Omega}{R_{in}}$	V/V
R_{STBY}	Internal resistance from Standby to GND		273	300	327	kΩ
F_{PWM}	Pulse width modulator base frequency		180	250	320	kHz
SNR	Signal to noise ratio	A-weighting, P_{out} = 0.9W, R_L = 8Ω		85		dB
t_{WU}	Wake-uptime			5	10	ms
t_{STBY}	Standby time			5	10	ms

Table 5. V_{CC} = 4.2V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified) (1) (continued)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_N	Output voltage noise	F = 20Hz to 20kHz, G = 6dB Unweighted R_L = 4Ω A-weighted R_L = 4Ω		 85 60		μV_{RMS}
		Unweighted R_L = 8Ω A-weighted R_L = 8Ω		86 62		
		Unweighted R_L = 4Ω + 15µH A-weighted R_L = 4Ω + 15µH		83 60		
		Unweighted R_L = 4Ω + 30µH A-weighted R_L = 4Ω + 30µH		88 64		
		Unweighted R_L = 8Ω + 30µH A-weighted R_L = 8Ω + 30µH		78 57		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		87 65		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		82 59		

1. All electrical values are guaranteed with correlation measurements at 2.5V and 5V.
2. Standby mode is active when V_{STBY} is tied to GND.
3. Dynamic measurements - 20*log(rms(V_{out})/rms(V_{ripple})). V_{ripple} is the superimposed sinusoidal signal to V_{CC} @ F = 217Hz.

Table 6. V_{CC} = 3.6V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified) (1)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{CC}	Supply current	No input signal, no load		2	2.8	mA
I_{STBY}	Standby current (2)	No input signal, V_{STBY} = GND		10	1000	nA
V_{OO}	Output offset voltage	No input signal, R_L = 8Ω		3	25	mV
P_{out}	Output power	G=6dB THD = 1% max, F = 1kHz, R_L = 4Ω THD = 10% max, F = 1kHz, R_L = 4Ω THD = 1% max, F = 1kHz, R_L = 8Ω THD = 10% max, F = 1kHz, R_L = 8Ω		 1.15 1.51 0.7 0.9		W
THD + N	Total harmonic distortion + noise	P_{out} = 500mW$_{RMS}$, G = 6dB, 20Hz < F< 20kHz R_L = 8Ω + 15µH, BW < 30kHz P_{out} = 500mW$_{RMS}$, G = 6dB, F = 1kHz, R_L = 8Ω + 15µH, BW < 30kHz		 1 0.27		%
Efficiency	Efficiency	P_{out} = 1W$_{RMS}$, R_L = 4Ω +≥ 15µH P_{out} =0.65W$_{RMS}$, R_L = 8Ω+≥ 15µH		78 88		%
PSRR	Power supply rejection ratio with inputs grounded (3)	F = 217Hz, R_L = 8Ω, G=6dB, V_{ripple} = 200mV$_{pp}$		62		dB
CMRR	Common-mode rejection ratio	F = 217Hz, R_L = 8Ω, G = 6dB, ΔV_{icm} = 200mV$_{pp}$		56		dB
Gain	Gain value	R_{in} in kΩ	$\frac{273k\Omega}{R_{in}}$	$\frac{300k\Omega}{R_{in}}$	$\frac{327k\Omega}{R_{in}}$	V/V
R_{STBY}	Internal resistance from Standby to GND		273	300	327	kΩ
F_{PWM}	Pulse width modulator base frequency		180	250	320	kHz
SNR	Signal to noise ratio	A-weighting, P_{out} = 0.6W, R_L = 8Ω		83		dB
t_{WU}	Wake-uptime			5	10	ms
t_{STBY}	Standby time			5	10	ms

Table 6. V_{CC} = 3.6V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified) (1) (continued)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_N	Output voltage noise	F = 20Hz to 20kHz, G = 6dB Unweighted R_L = 4Ω A-weighted R_L = 4Ω		 83 57		μV_{RMS}
		Unweighted R_L = 8Ω A-weighted R_L = 8Ω		83 61		
		Unweighted R_L = 4Ω + 15µH A-weighted R_L = 4Ω + 15µH		81 58		
		Unweighted R_L = 4Ω + 30µH A-weighted R_L = 4Ω + 30µH		87 62		
		Unweighted R_L = 8Ω + 30µH A-weighted R_L = 8Ω + 30µH		77 56		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		85 63		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		80 57		

1. All electrical values are guaranteed with correlation measurements at 2.5V and 5V.
2. Standby mode is active when V_{STBY} is tied to GND.
3. Dynamic measurements - 20*log(rms(V_{out})/rms(V_{ripple})). V_{ripple} is the superimposed sinusoidal signal to V_{CC} @ F = 217Hz.

Table 7. V_{CC} = 3V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified) (1)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{CC}	Supply current	No input signal, no load		1.9	2.7	mA
I_{STBY}	Standby current (2)	No input signal, V_{STBY} = GND		10	1000	nA
V_{OO}	Output offset voltage	No input signal, R_L = 8Ω		3	25	mV
P_{out}	Output power	G=6dB THD = 1% max, F = 1kHz, R_L = 4Ω THD = 10% max, F = 1kHz, R_L = 4Ω THD = 1% max, F = 1kHz, R_L = 8Ω THD = 10% max, F = 1kHz, R_L = 8Ω		0.75 1 0.5 0.6		W
THD + N	Total harmonic distortion + noise	P_{out} = 350mW$_{RMS}$, G = 6dB, 20Hz < F < 20kHz R_L = 8Ω + 15µH, BW < 30kHz P_{out} = 350mW$_{RMS}$, G = 6dB, F = 1kHz, R_L = 8Ω + 15µH, BW < 30kHz		1 0.21		%
Efficiency	Efficiency	P_{out} = 0.7W$_{RMS}$, R_L = 4Ω +≥ 15µH P_{out} = 0.45W$_{RMS}$, R_L = 8Ω+≥ 15µH		78 88		%
PSRR	Power supply rejection ratio with inputs grounded (3)	F = 217Hz, R_L = 8Ω, G=6dB, V_{ripple} = 200mV$_{pp}$		60		dB
CMRR	Common-mode rejection ratio	F = 217Hz, R_L = 8Ω, G = 6dB, ΔV_{icm} = 200mV$_{pp}$		54		dB
Gain	Gain value	R_{in} in kΩ	$\frac{273k\Omega}{R_{in}}$	$\frac{300k\Omega}{R_{in}}$	$\frac{327k\Omega}{R_{in}}$	V/V
R_{STBY}	Internal resistance from Standby to GND		273	300	327	kΩ
F_{PWM}	Pulse width modulator base frequency		180	250	320	kHz
SNR	Signal to noise ratio	A-weighting, P_{out} = 0.4W, R_L = 8Ω		82		dB
t_{WU}	Wake-up time			5	10	ms
t_{STBY}	Standby time			5	10	ms

Table 7. V_{CC} = 3V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified) (1) (continued)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_N	Output Voltage Noise	f = 20Hz to 20kHz, G = 6dB Unweighted R_L = 4Ω A-weighted R_L = 4Ω		 83 57		μV_{RMS}
		Unweighted R_L = 8Ω A-weighted R_L = 8Ω		83 61		
		Unweighted R_L = 4Ω + 15µH A-weighted R_L = 4Ω + 15µH		81 58		
		Unweighted R_L = 4Ω + 30µH A-weighted R_L = 4Ω + 30µH		87 62		
		Unweighted R_L = 8Ω + 30µH A-weighted R_L = 8Ω + 30µH		77 56		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		85 63		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		80 57		

1. All electrical values are guaranteed with correlation measurements at 2.5V and 5V.
2. Standby mode is active when V_{STBY} is tied to GND.
3. Dynamic measurements - 20*log(rms(V_{out})/rms(V_{ripple})). V_{ripple} is the superimposed sinusoidal signal to V_{CC} @ F = 217Hz.

Table 8. V_{CC} = 2.5V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{CC}	Supply current	No input signal, no load		1.7	2.4	mA
I_{STBY}	Standby current (1)	No input signal, V_{STBY} = GND		10	1000	nA
V_{OO}	Output offset voltage	No input signal, R_L = 8Ω		3	25	mV
P_{out}	Output power	G=6dB THD = 1% max, F = 1kHz, R_L = 4Ω THD = 10% max, F = 1kHz, R_L = 4Ω THD = 1% max, F = 1kHz, R_L = 8Ω THD = 10% max, F = 1kHz, R_L = 8Ω		 0.52 0.71 0.33 0.42		W
THD + N	Total harmonic distortion + noise	P_{out} = 200mW_{RMS}, G = 6dB, 20Hz < F< 20kHz R_L = 8Ω + 15µH, BW < 30kHz P_{out} = 200W_{RMS}, G = 6dB, F = 1kHz, R_L = 8Ω + 15µH, BW < 30kHz		1 0.19		%
Efficiency	Efficiency	P_{out} = 0.47W_{RMS}, R_L = 4Ω +≥ 15µH P_{out} = 0.3W_{RMS}, R_L = 8Ω+≥ 15µH		78 88		%
PSRR	Power supply rejection ratio with inputs grounded (2)	F = 217Hz, R_L = 8Ω, G=6dB, V_{ripple} = 200mV_{pp}		60		dB
CMRR	Common-mode rejection ratio	F = 217Hz, R_L = 8Ω, G = 6dB, ΔV_{icm} = 200mV_{pp}		54		dB
Gain	Gain value	R_{in} in kΩ	$\frac{273k\Omega}{R_{in}}$	$\frac{300k\Omega}{R_{in}}$	$\frac{327k\Omega}{R_{in}}$	V/V
R_{STBY}	Internal resistance from Standby to GND		273	300	327	kΩ
F_{PWM}	Pulse width modulator base frequency		180	250	320	kHz
SNR	Signal to noise ratio	A-weighting, P_{out} = 1.2W, R_L = 8Ω		80		dB
t_{WU}	Wake-up time			5	10	ms
t_{STBY}	Standby time			5	10	ms

Table 8. V_{CC} = 2.5V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified) (continued)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_N	Output Voltage Noise	F = 20Hz to 20kHz, G = 6dB Unweighted R_L = 4Ω A-weighted R_L = 4Ω		 85 60		μV_{RMS}
		Unweighted R_L = 8Ω A-weighted R_L = 8Ω		86 62		
		Unweighted R_L = 4Ω + 15µH A-weighted R_L = 4Ω + 15µH		76 56		
		Unweighted R_L = 4Ω + 30µH A-weighted R_L = 4Ω + 30µH		82 60		
		Unweighted R_L = 8Ω + 30µH A-weighted R_L = 8Ω + 30µH		67 53		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		78 57		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		74 54		

1. Standby mode is active when V_{STBY} is tied to GND.
2. Dynamic measurements - 20*log(rms(V_{out})/rms(V_{ripple})). V_{ripple} is the superimposed sinusoidal signal to V_{CC} @ F = 217Hz.

Table 9. V_{CC} = 2.4V, GND = 0V, V_{IC} = 2.5V, T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{CC}	Supply current	No input signal, no load		1.7		mA
I_{STBY}	Standby current (1)	No input signal, V_{STBY} = GND		10		nA
V_{OO}	Output offset voltage	No input signal, R_L = 8Ω		3		mV
P_{out}	Output power	G=6dB THD = 1% max, F = 1kHz, R_L = 4Ω THD = 10% max, F = 1kHz, R_L = 4Ω THD = 1% max, F = 1kHz, R_L = 8Ω THD = 10% max, F = 1kHz, R_L = 8Ω		 0.48 0.65 0.3 0.38		W
THD + N	Total harmonic distortion + noise	P_{out} = 200mW$_{RMS}$, G = 6dB, 20Hz < F< 20kHz R_L = 8Ω + 15µH, BW < 30kHz		1		%
Efficiency	Efficiency	P_{out} = 0.38W$_{RMS}$, R_L = 4Ω +≥ 15µH P_{out} = 0.25W$_{RMS}$, R_L = 8Ω+≥ 15µH		77 86		%
CMRR	Common-mode rejection ratio	F = 217Hz, R_L = 8Ω, G = 6dB, ΔV_{icm} = 200mV$_{pp}$		54		dB
Gain	Gain value	R_{in} in kΩ	$\frac{273k\Omega}{R_{in}}$	$\frac{300k\Omega}{R_{in}}$	$\frac{327k\Omega}{R_{in}}$	V/V
R_{STBY}	Internal resistance from Standby to GND		273	300	327	kΩ
F_{PWM}	Pulse width modulator base frequency			250		kHz
SNR	Signal to noise ratio	A Weighting, P_{out} = 1.2W, R_L = 8Ω		80		dB
t_{WU}	Wake-up time			5		ms
t_{STBY}	Standby time			5		ms
V_N	Output voltage noise	F = 20Hz to 20kHz, G = 6dB Unweighted R_L = 4Ω A-weighted R_L = 4Ω		 85 60		µV$_{RMS}$
		Unweighted R_L = 8Ω A-weighted R_L = 8Ω		86 62		
		Unweighted R_L = 4Ω + 15µH A-weighted R_L = 4Ω + 15µH		76 56		
		Unweighted R_L = 4Ω + 30µH A-weighted R_L = 4Ω + 30µH		82 60		
		Unweighted R_L = 8Ω + 30µH A-weighted R_L = 8Ω + 30µH		67 53		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		78 57		
		Unweighted R_L = 4Ω + Filter A-weighted R_L = 4Ω + Filter		74 54		

1. Standby mode is active when V_{STBY} is tied to GND.

5 Electrical characteristic curves

The graphs included in this section use the following abbreviations:

- R_L + 15µH or 30µH = pure resistor + very low series resistance inductor
- Filter = LC output filter (1µF+30µH for 4Ω and 0.5µF+60µH for 8Ω)
- All measurements made with C_{s1}=1µF and C_{s2}=100nF except for PSRR where Cs1 is removed.

Figure 4. Test diagram for measurements

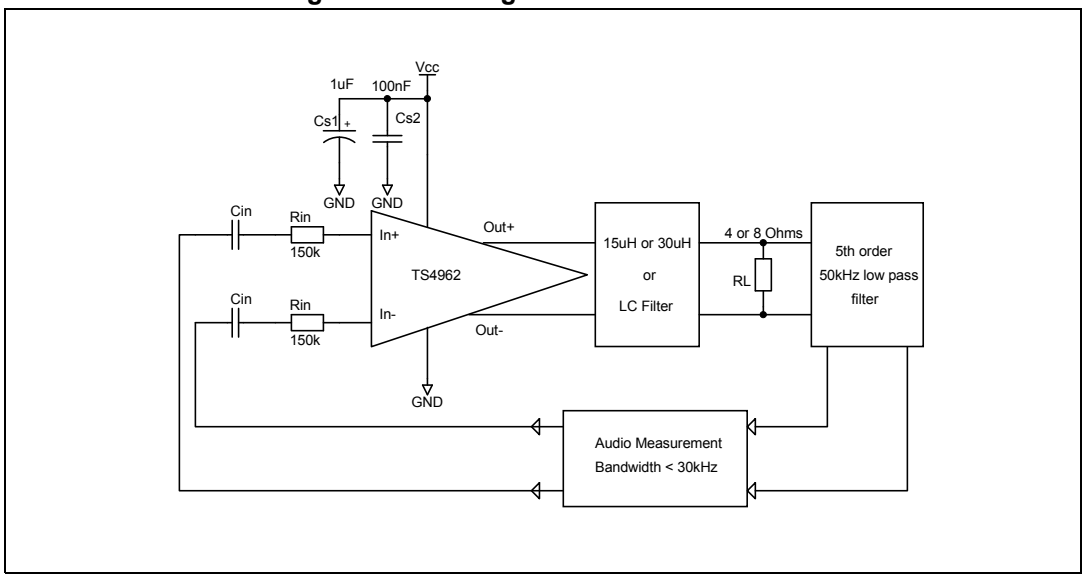


Figure 5. Test diagram for PSRR measurements

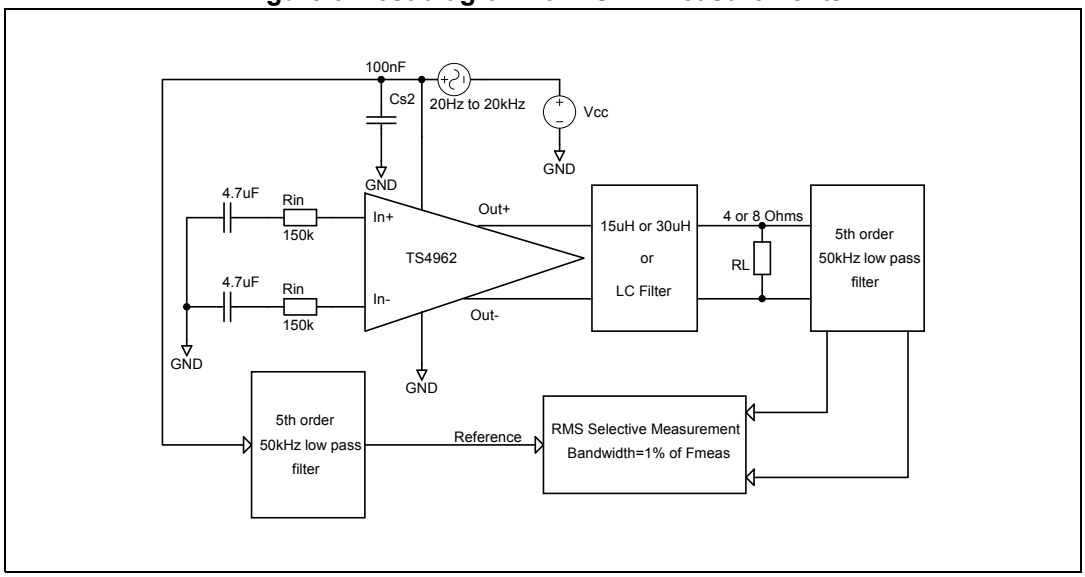


Figure 6. Current consumption vs. power supply voltage

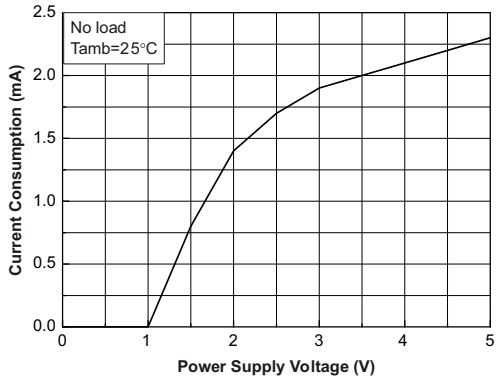


Figure 7. Current consumption vs. standby voltage at V_{CC} = 5V

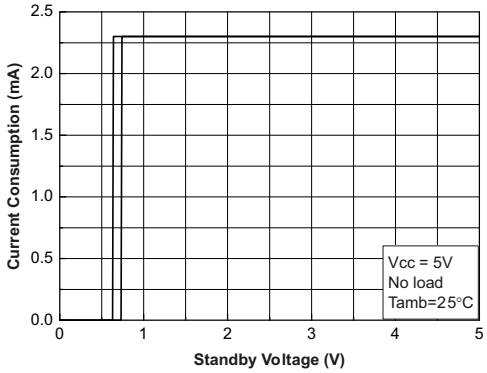


Figure 8. Current consumption vs. standby voltage at V_{CC} = 3V

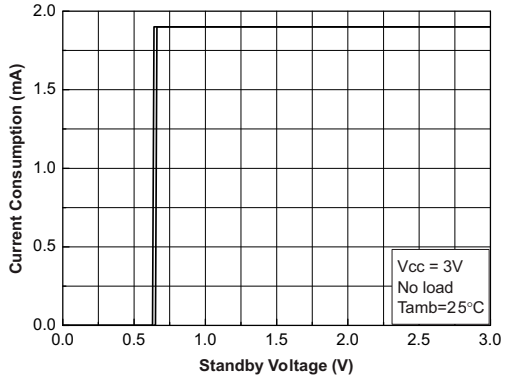


Figure 9. Output offset voltage vs. common-mode input voltage

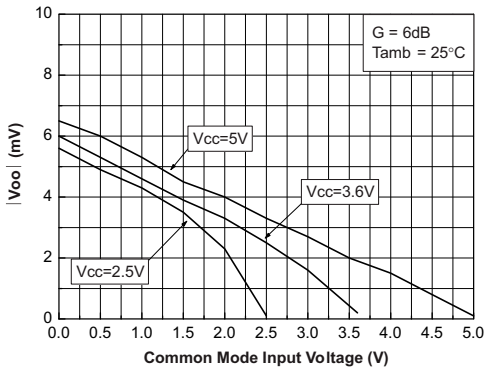


Figure 10. Efficiency vs. output power at V_{CC} = 5V and R_L = 4Ω

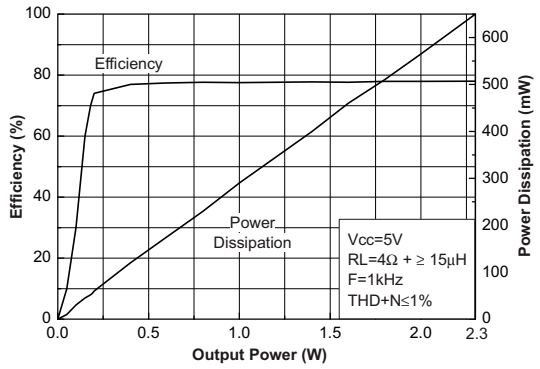


Figure 11. Efficiency vs. output power at V_{CC} = 3V and R_L = 4Ω

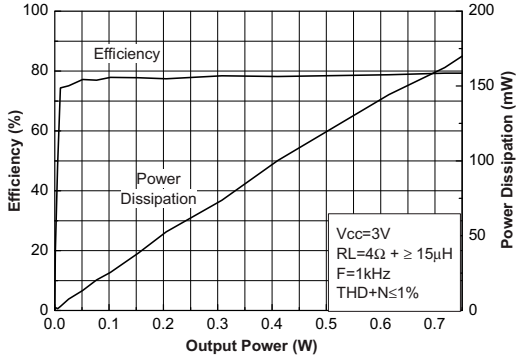


Figure 12. Efficiency vs. output power at V_{CC} = 5V and R_L = 8Ω

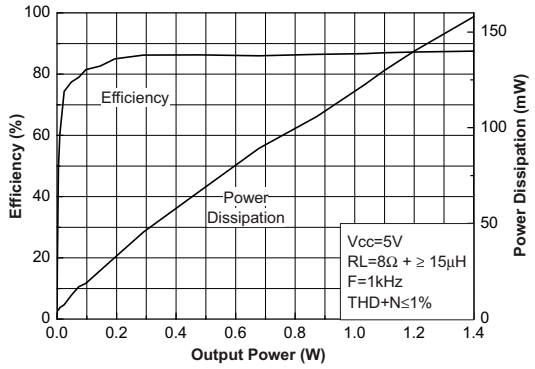


Figure 13. Efficiency vs. output power at V_{CC} = 3V and R_L = 8Ω

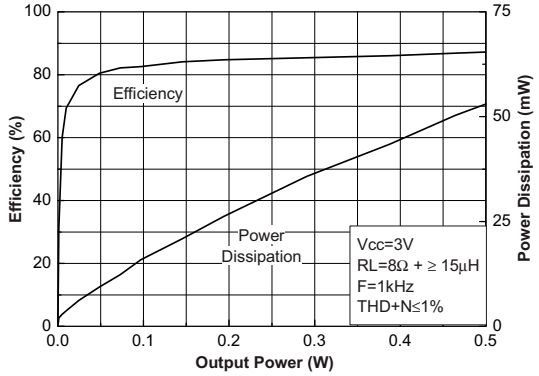


Figure 14. Output power vs. power supply voltage at R_L = 4Ω

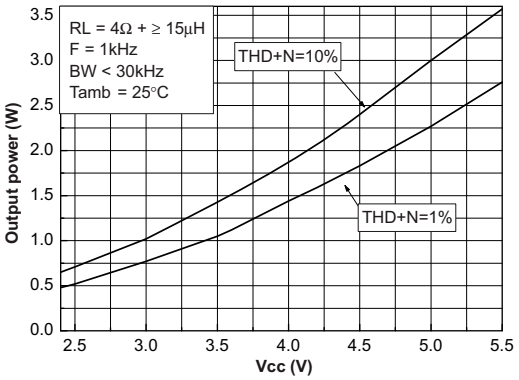


Figure 15. Output power vs. power supply voltage at R_L = 8Ω

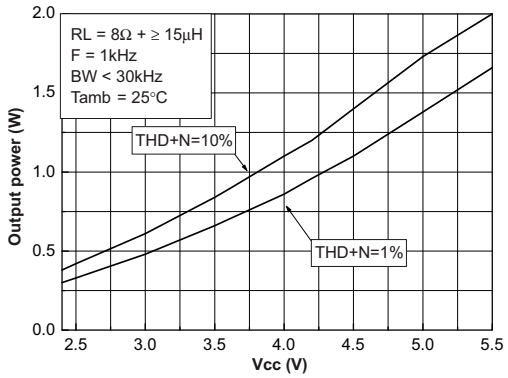


Figure 16. PSRR vs. frequency at R_L = 4Ω + 15µH

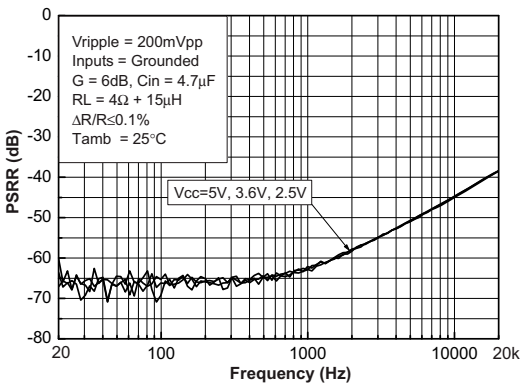


Figure 17. PSRR vs. frequency at R_L = 4Ω + 30µH

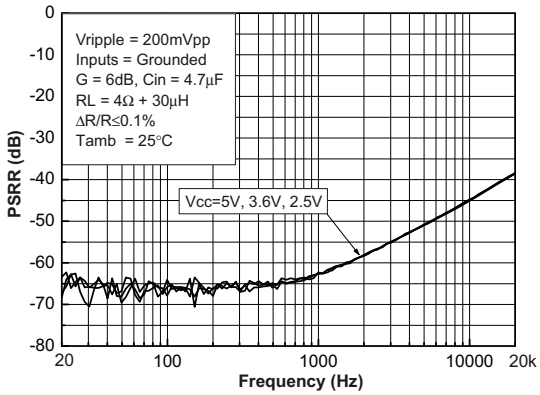


Figure 18. PSRR vs. frequency at R_L = 4Ω + filter

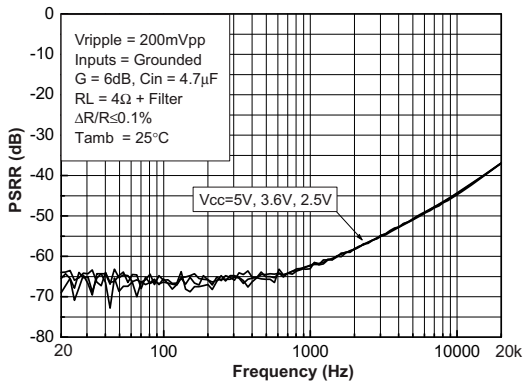


Figure 19. PSRR vs. frequency at R_L = 8Ω + 15µH

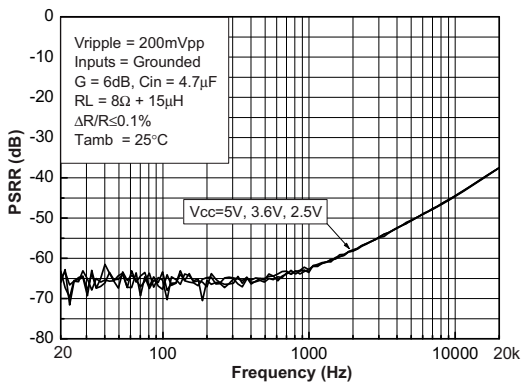


Figure 20. PSRR vs. frequency at R_L = 8Ω + 30µH

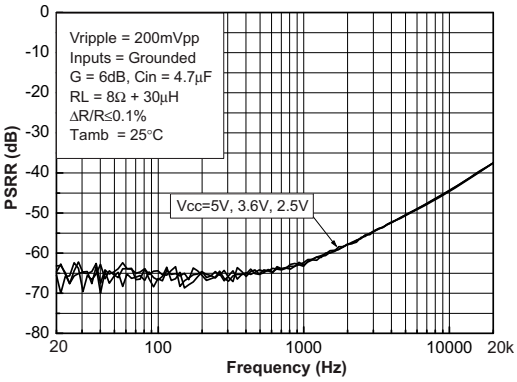


Figure 21. PSRR vs. frequency at R_L = 8Ω + filter

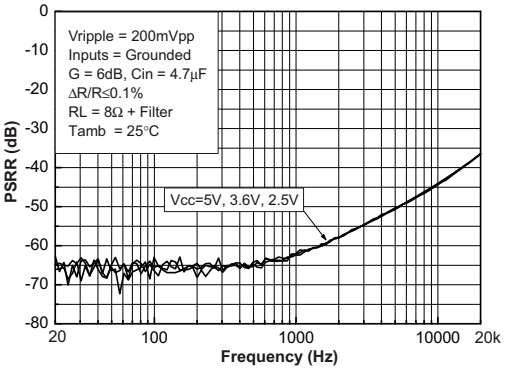


Figure 22. PSRR vs. common-mode input voltage

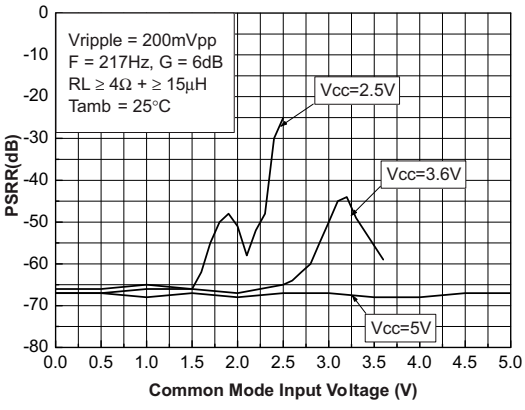


Figure 23. CMRR vs. frequency at R_L = 4Ω + 15µH

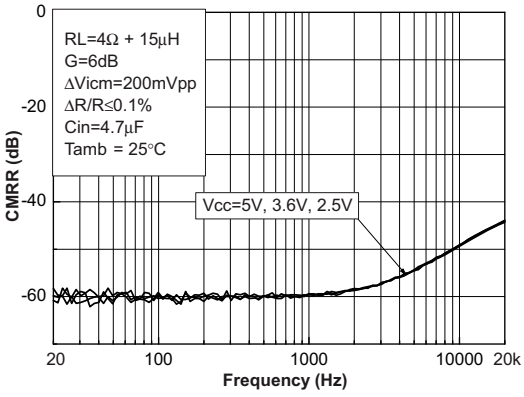


Figure 24. CMRR vs. frequency at R_L = 4Ω + 30µH

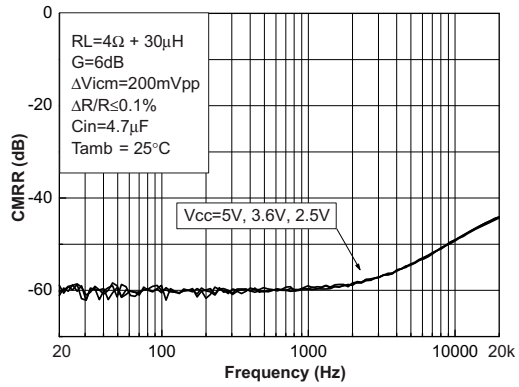


Figure 25. CMRR vs. frequency at R_L = 4Ω + filter

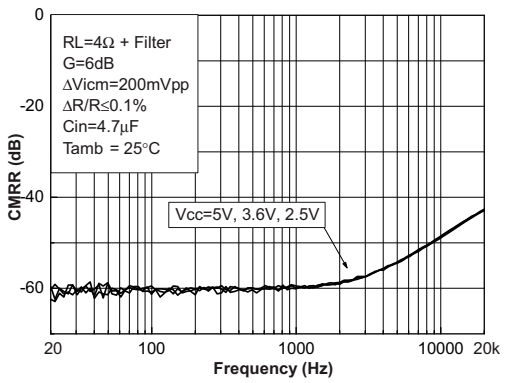


Figure 26. CMRR vs. frequency at R_L = 8Ω + 15µH

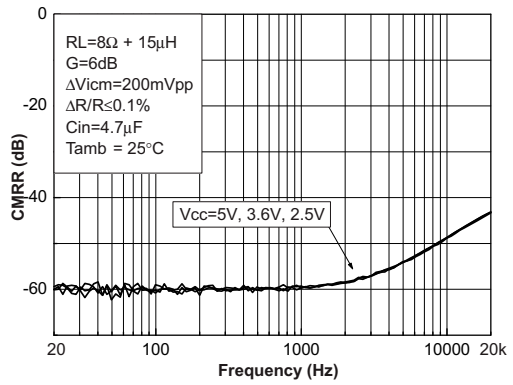


Figure 27. CMRR vs. frequency at R_L = 8Ω + 30µH

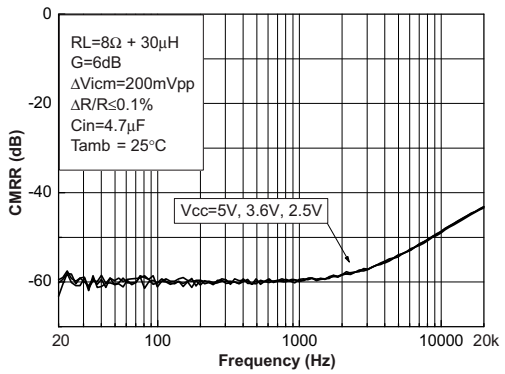


Figure 28. CMRR vs. frequency at R_L = 8Ω + filter

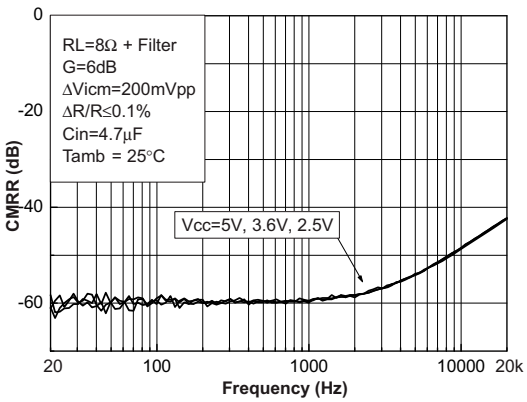


Figure 29. CMRR vs. common-mode input voltage

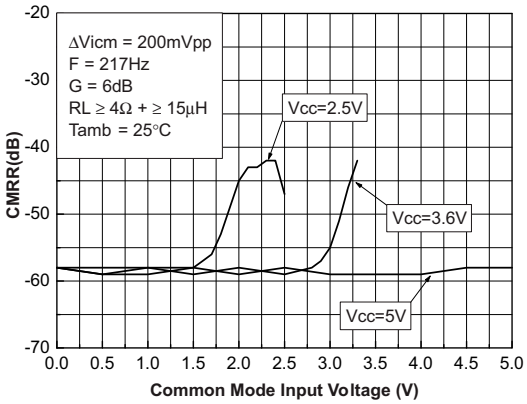


Figure 30. THD+N vs. output power at R_L = 4Ω + 15µH, F = 100Hz

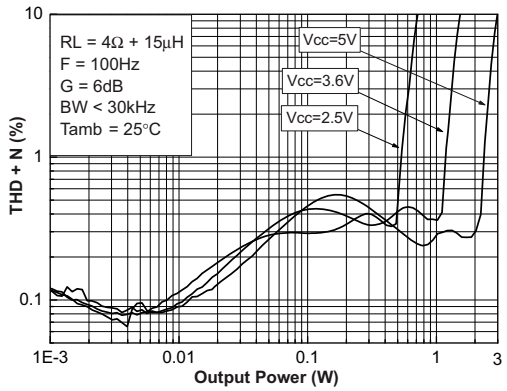


Figure 31. THD+N vs. output power at R_L = 4Ω + 30µH or filter, F = 100Hz

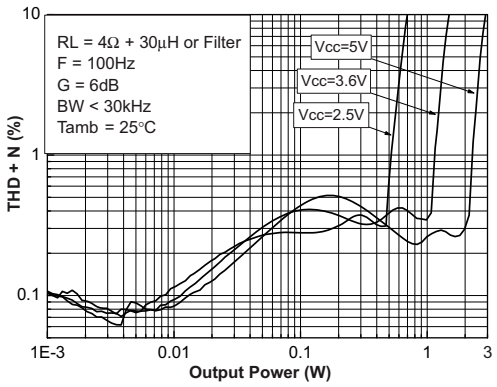


Figure 32. THD+N vs. output power at R_L = 8Ω + 15µH, F = 100Hz

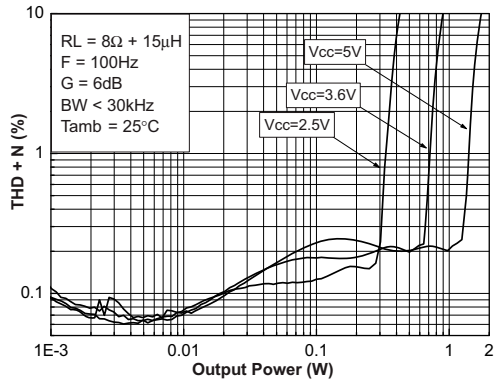


Figure 33. THD+N vs. output power at R_L = 8Ω + 30µH or filter, F = 100Hz

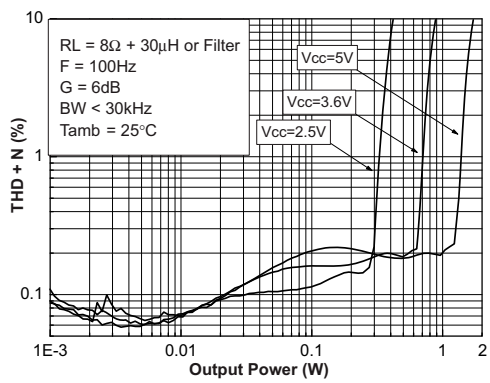


Figure 34. THD+N vs. output power at R_L = 4Ω + 15µH, F = 1kHz

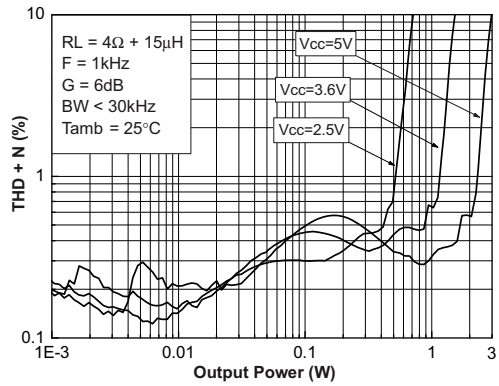


Figure 35. THD+N vs. output power at R_L = 4Ω + 30µH or filter, F = 1kHz

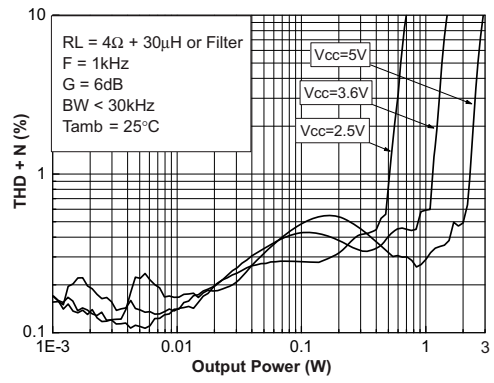


Figure 36. THD+N vs. output power at R_L = 8Ω + 15µH, F = 1kHz

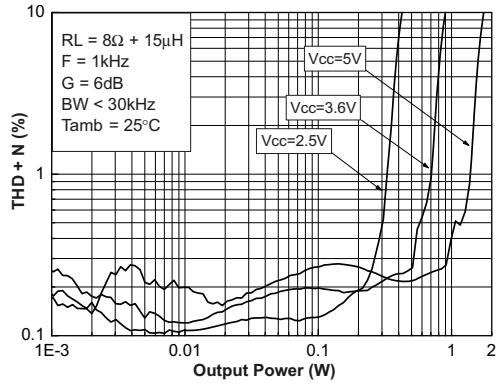


Figure 37. THD+N vs. output power at R_L = 8Ω + 30µH or filter, F = 1kHz

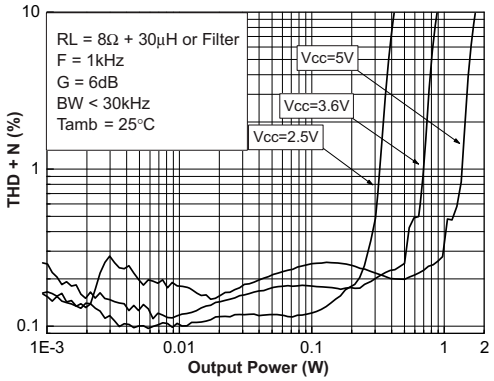


Figure 38. THD+N vs. frequency at R_L = 4Ω + 15µH, V_{CC} = 5V

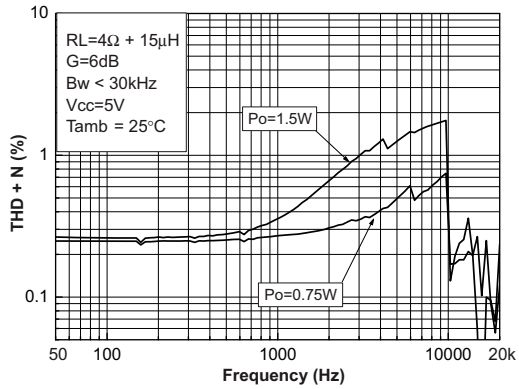


Figure 39. THD+N vs. frequency at R_L = 4Ω + 30µH or filter, V_{CC} = 5V

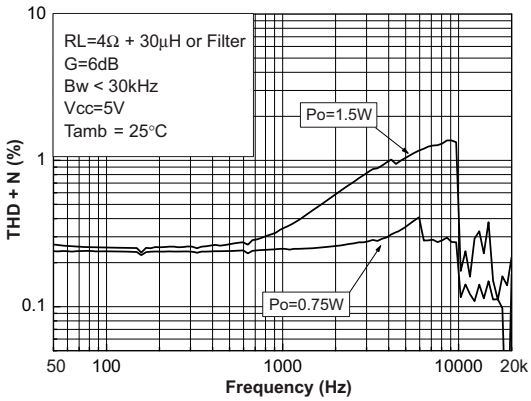


Figure 40. THD+N vs. frequency at R_L = 4Ω + 15µH, V_{CC} = 3.6V

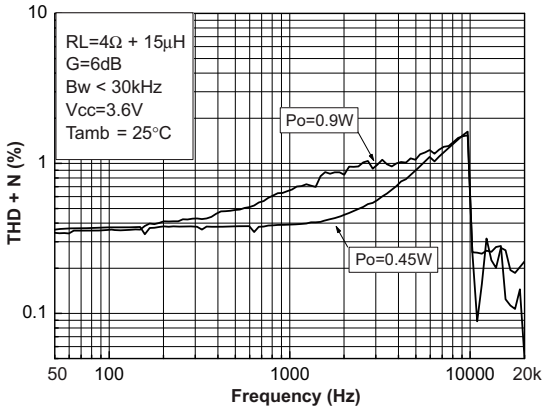


Figure 41. THD+N vs. frequency at R_L = 4Ω + 30µH or filter, V_{CC} = 3.6V

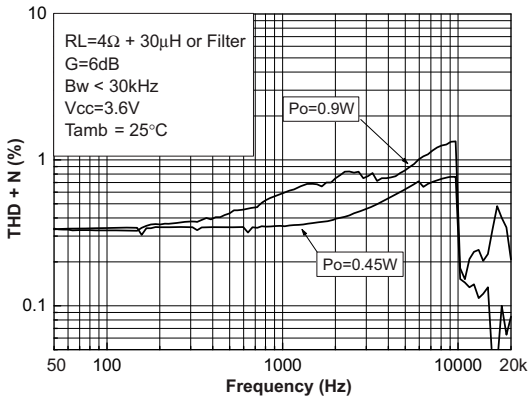


Figure 42. THD+N vs. frequency at R_L = 4Ω + 15µH, V_{CC} = 2.5V

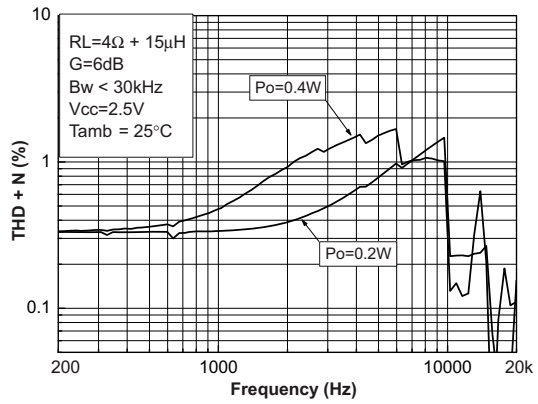


Figure 43. THD+N vs. frequency at R_L = 4Ω + 30µH or filter, V_{CC} = 2.5V

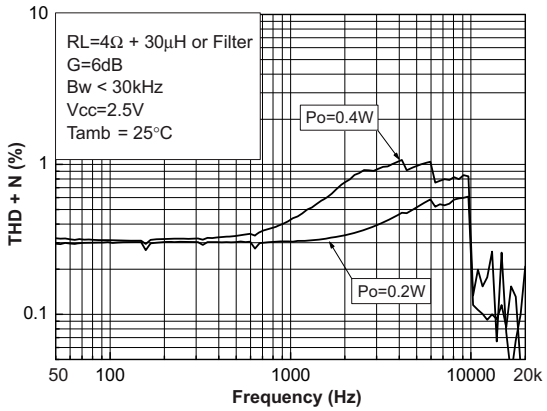


Figure 44. THD+N vs. frequency at R_L = 8Ω + 15µH, V_{CC} = 5V

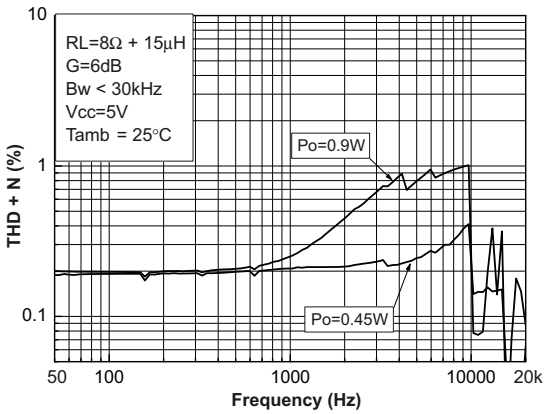


Figure 45. THD+N vs. frequency at R_L = 8Ω + 30µH or filter, V_{CC} = 5V

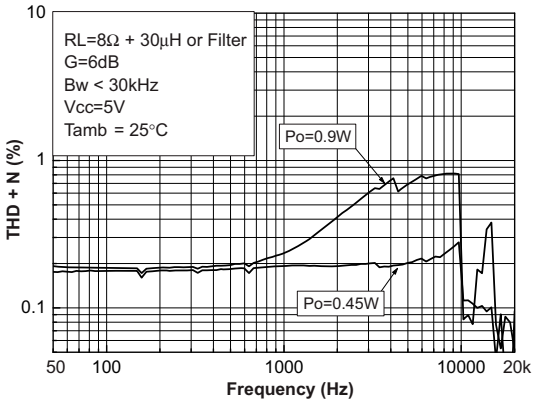


Figure 46. THD+N vs. frequency at R_L = 8Ω + 15µH, V_{CC} = 3.6V

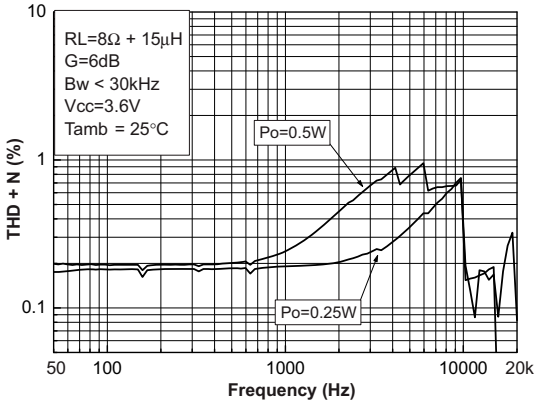


Figure 47. THD+N vs. frequency at R_L = 8Ω + 30µH or filter, V_{CC} = 3.6V

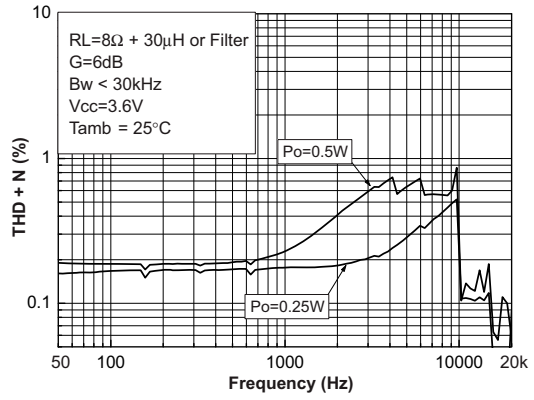


Figure 48. THD+N vs. frequency at R_L = 8Ω + 15µH, V_{CC} = 2.5V

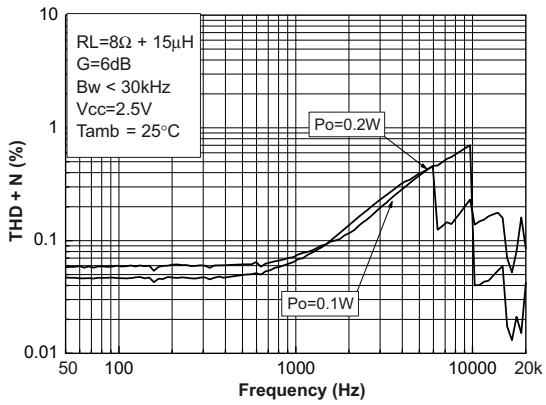


Figure 49. THD+N vs. frequency at R_L = 8Ω + 30µH or filter, V_{CC} = 2.5V

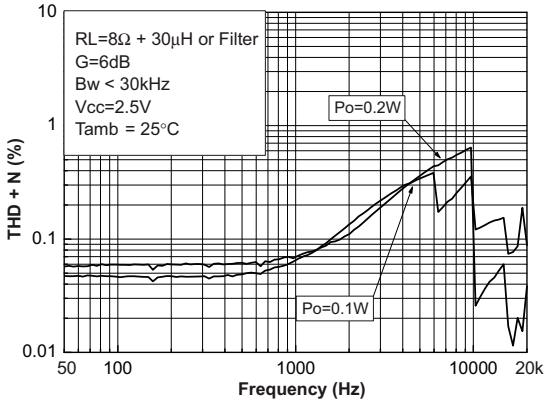


Figure 50. Gain vs. frequency at R_L = 4Ω + 15µH

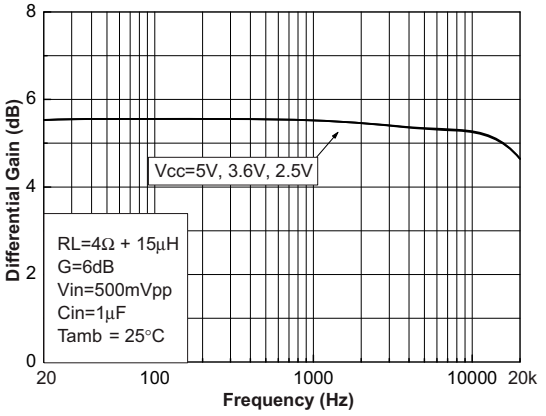


Figure 51. Gain vs. frequency at R_L = 4Ω + 30µH

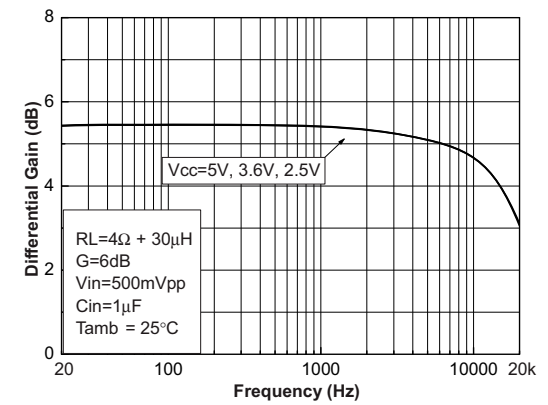


Figure 52. Gain vs. frequency at R_L = 4Ω + filter

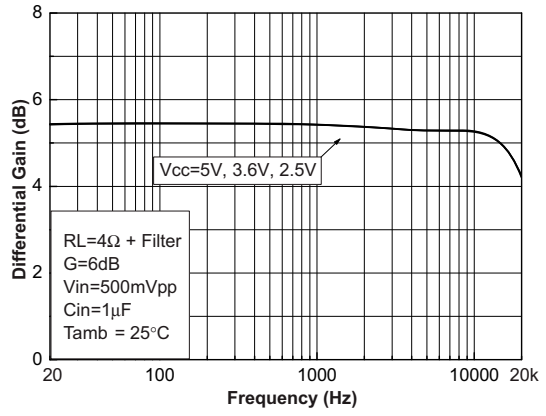


Figure 53. Gain vs. frequency at R_L = 8Ω + 15µH