2.7W STEREO AUDIO POWER AMPLIFIER WITH SHUTDOWN 4 SELECTABLE GAIN SETUPS

Description

The AA4005 is a Class AB audio power amplifier which can deliver 2.7W into 3Ω speakers with 5.0V power supply and THD+N less than 10%. It is designed especially for Notebook PC and portable media player applications.

The AA4005 features stereo full differential input or 2 sets of stereo Single-Ended audio input. There are 4 different gain settings at BTL mode-6dB, 10dB, 15.6dB and 21.6dB, changed by setting GAIN0, GAIN1 pins.

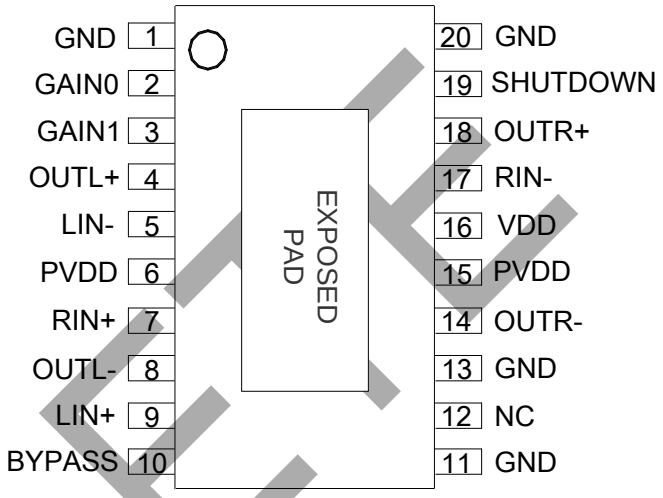
The AA4005 is available in TSSOP-20 (EDP) package.

Features

- Output Power, THD+N = 10%
  - 1.5W at BTL Mode for 8Ω Speaker
  - 2.3W at BTL Mode for 4Ω Speaker
  - 2.7W at BTL Mode for 3Ω Speaker
- Supply Voltage Range: 4.5V to 5.5V
- 4 Selectable Internal Fixed Gain Setups
- Stereo Full Differential Input
- Low Power Consumption at Shutdown Mode 150μA Typical
- Excellent Click/POP Noise Suppression
- Thermal Shutdown Protection

Pin Assignments

(Top View)

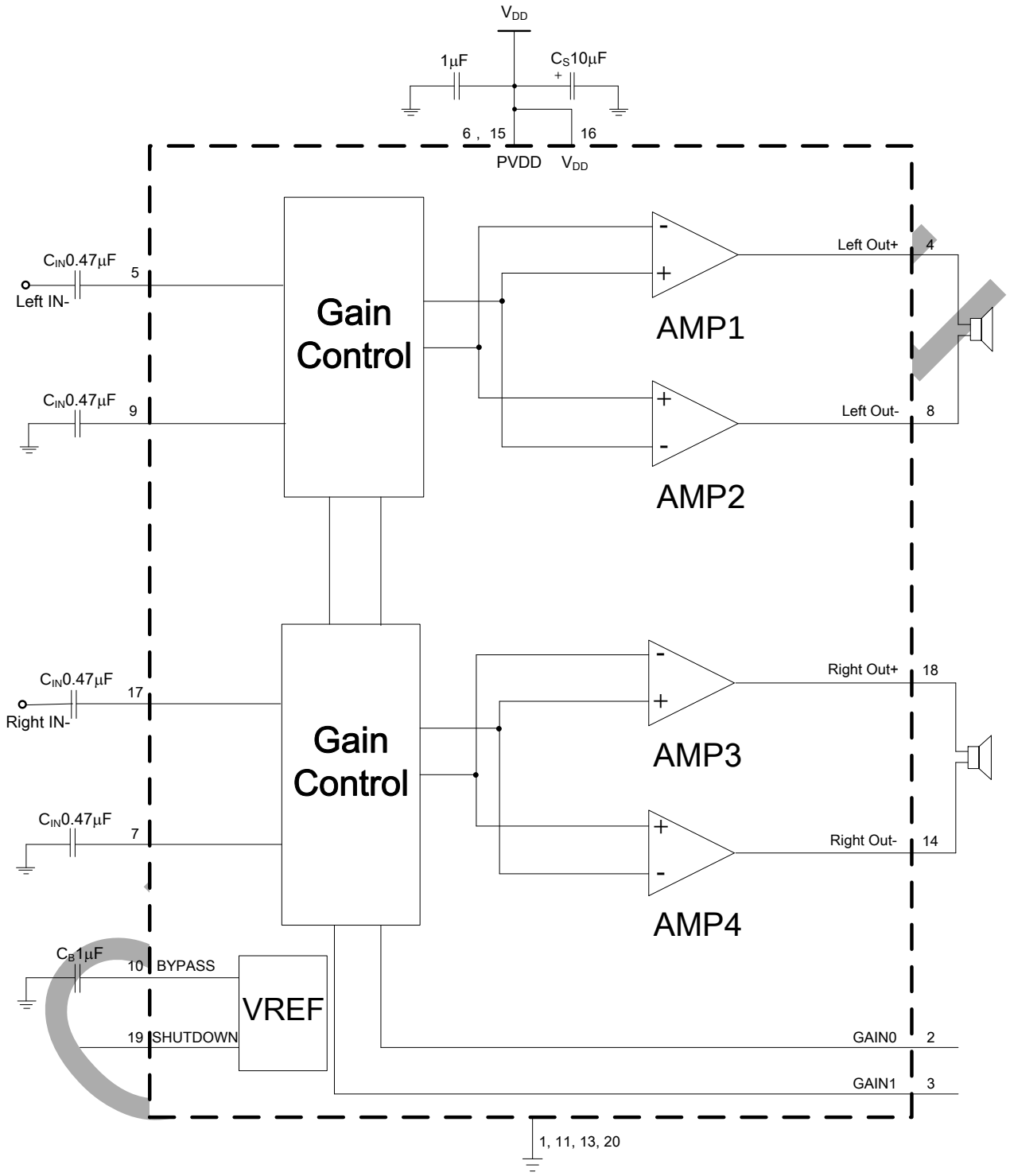


TSSOP-20 (EDP)

Applications

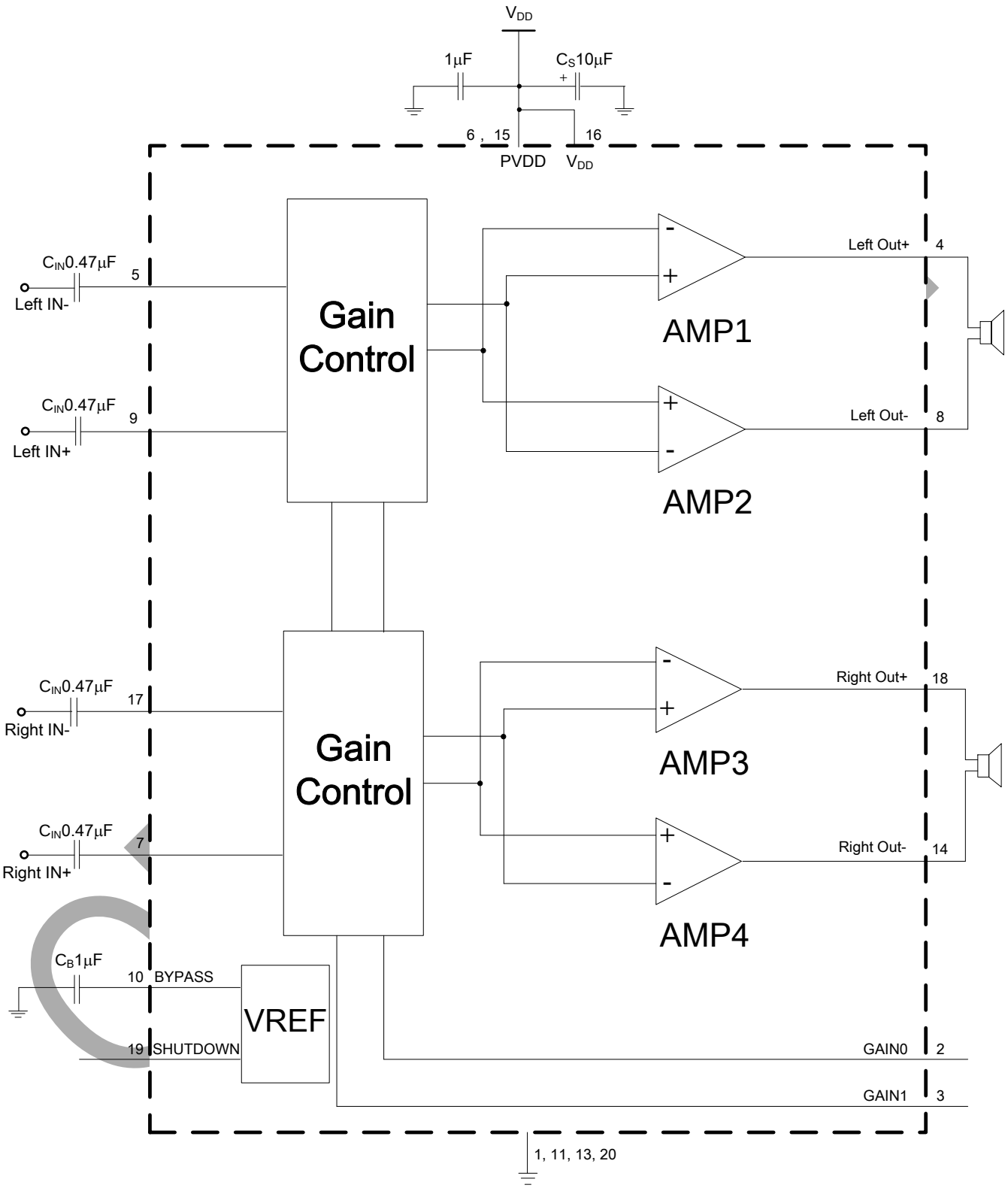
- Notebook PC
- Portable Media Player

Typical Applications Circuit



For Single-Ended Input

Typical Applications Circuit (Cont.)



For Full Differential Input

Pin Descriptions

Pin Number	Pin Name	Function
1, 11, 13, 20	GND	Ground reference, it is better to connect with thermal pad.
2	Gain0	Internal gain setup 0, see table-1 below.
3	Gain1	Internal gain setup 1, see table-1 below.
4	OUTL+	Left channel positive output
5	LIN-	Left channel negative input
6, 15	PVDD	Power supply for output stage
7	RIN+	Right channel positive input for differential input, AC ground for Single-ended input.
8	OUTL-	Left channel negative output
9	LIN+	Left channel positive input for differential input, AC ground for Single-ended input
10	BYPASS	Internal reference voltage pin, connect a 1.0μF ceramic capacitor to GND
12	NC	No connected
14	OUTR-	Right channel negative output
16	VDD	Power supply for analog circuit
17	RIN-	Right channel negative input
18	OUTR+	Right channel positive output
19	SHUTDOWN	Shutdown mode select L - Shutdown enable H - Shutdown disable, normal work

Gain vs. Gain0, Gain1 Logic level

GAIN0	GAIN1	Gain
L	L	6dB
L	H	10dB
H	L	15.6dB
H	H	21.6dB

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Rating	Unit
Power Supply Voltage	V_{DD}	6.0	V
Input Voltage	V_{IN}	-0.3 to V_{DD}+0.3	V
Power Dissipation (Note 2)	P_D	Internally Limited	-
Thermal Resistance	θ_{JA}	35 (Note 3)	°C/W
Operating Junction Temperature	T_J	+150	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	+260	°C
ESD (Machine Model)	ESD	200	V
ESD (Human Body Model)		2000	V

Notes: 1. Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

2. The maximum power dissipation must be derated at elevated temperatures and is dictated by T_{JMAX}, θ_{JA} and the ambient temperature T_A. The maximum allowable power dissipation is $P_{DMAX} = (T_{JMAX}-T_A)/\theta_{JA}$. For the AA4005, T_{JMAX} = +150°C, and the typical junction-to-ambient thermal resistance for TSSOP-20 (EDP) package can be found in the **Absolute Maximum Ratings** section.

3. Chip is soldered to 60mm^2 (4mm×15mm) copper (top side solder mask) of 1oz. on PCB with 8×0.5mm vias.

Recommended Operating Conditions

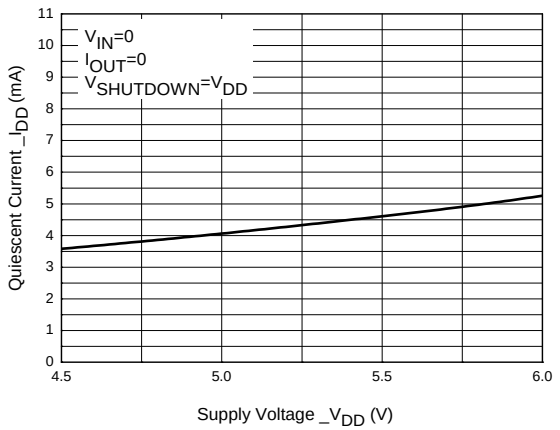
Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{DD}	4.5	5.5	V
Operating Ambient Temperature Range	T_A	-40	+85	°C

Electrical Characteristics (V_{DD} = 5.0V, Gain = 6dB, T_A=+25°C, f =1kHz, 22kHz low pass filter, unless otherwise specified.)

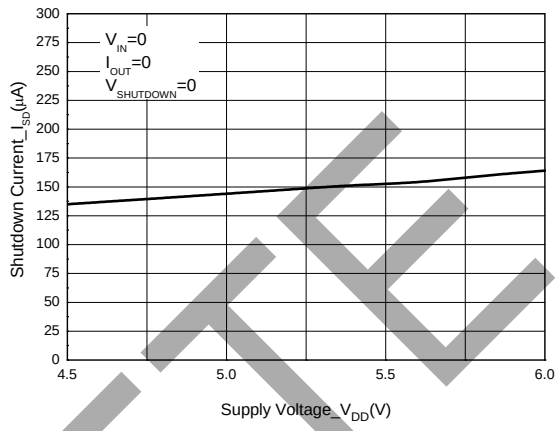
Symbol	Parameter	Condition	Min	Typ	Max	Unit
I_{DD}	Quiescent Current	V_{IN} = 0, I_O = 0	-	6.5	12	mA
I_{SD}	Shutdown Current	$V_{SHUTDOWN}$ = 0	-	150	300	μA
V_{IL}	SHUTDOWN	-	-	-	0.8	V
V_{IH}		-	2.0	-	-	V
-	Thermal Shutdown Temperature	-	-	+165	-	°C
-	Hysteresis Temp Window	-	-	+35	-	°C
-	Output Offset Voltage	V_{IN} = 0, No load	-	±5	±25	mV
P_O	Output Power	THD+N = 1%, R_L = 3Ω,	-	2.1	-	W
		THD+N = 10%, R_L = 3Ω,	-	2.7	-	W
		THD+N = 1%, R_L = 4Ω,	-	1.8	-	W
		THD+N = 10%, R_L = 4Ω,	-	2.3	-	W
		THD+N = 1%, R_L = 8Ω	-	1.2	-	W
		THD+N = 10%, R_L = 8Ω	-	1.5	-	W
THD+N	Total Harmonic Distortion Plus Noise	P_O = 1W, R_L = 4Ω	-	0.08	-	%
S/N	Signal to Noise Ratio	P_O = 1W, R_L = 4Ω	-	100	-	dB
X_{TALK}	Cross Talk	f = 1kHz	-	-100	-	dB
PSRR	Power Supply Rejection Ratio	C_B = 1μF, f = 1kHz, V_{RIPPLE} = 0.2V_{RMS}	-	70	-	dB
V_{NO}	Output Noise	f = 20Hz~20kHz, R_L = 8Ω	-	18	-	μV_{RMS}

Performance Characteristics

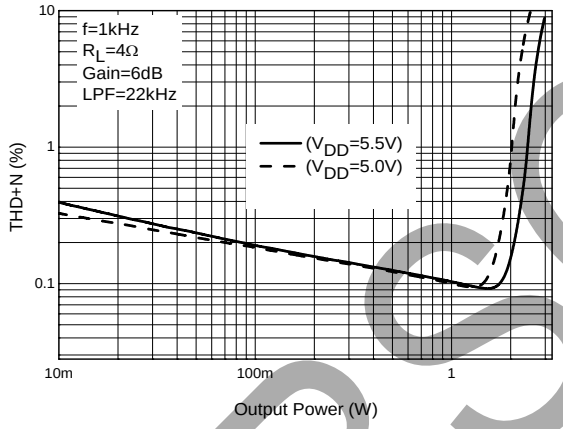
Quiescent Current vs. Supply Voltage



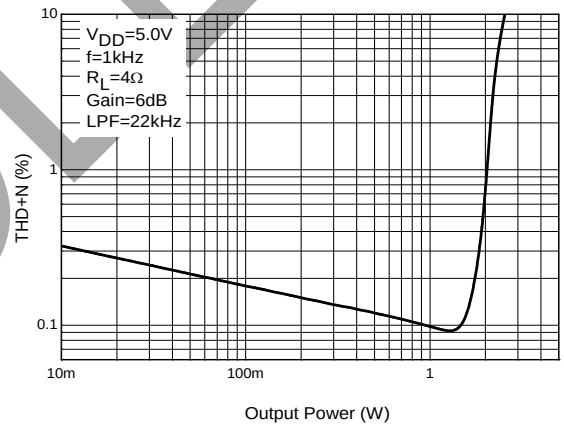
Shutdown Current vs. Supply Voltage



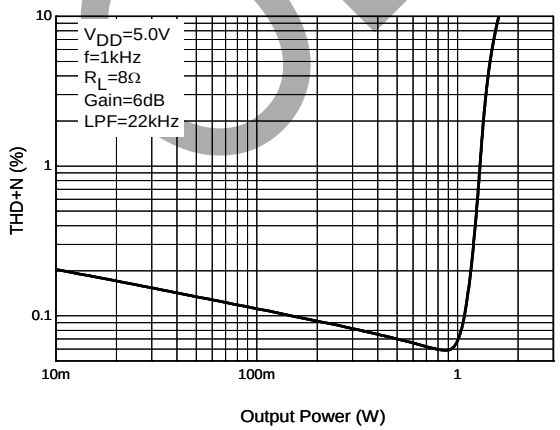
THD+D vs. Output Power



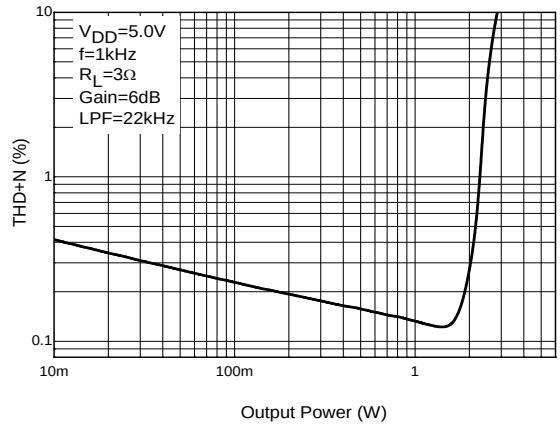
THD+N vs. Output Power



THD+N vs. Output Power

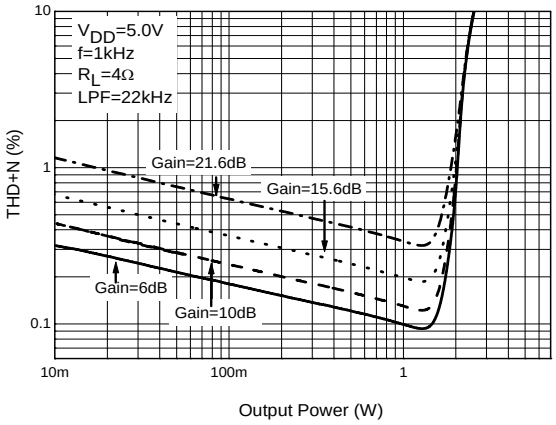


THD+N vs. Output Power

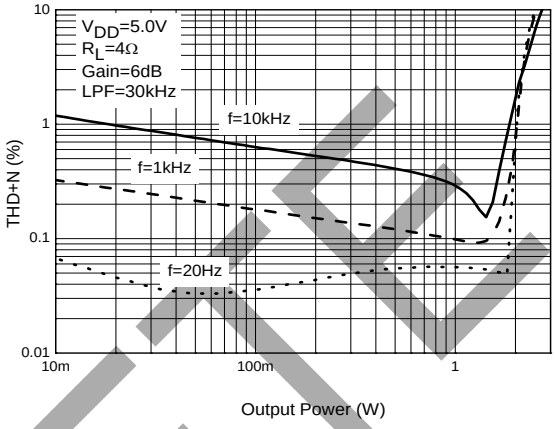


Performance Characteristics (Cont.)

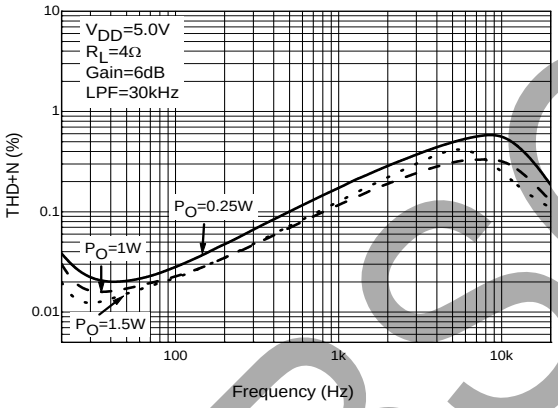
THD+N vs. Output Power



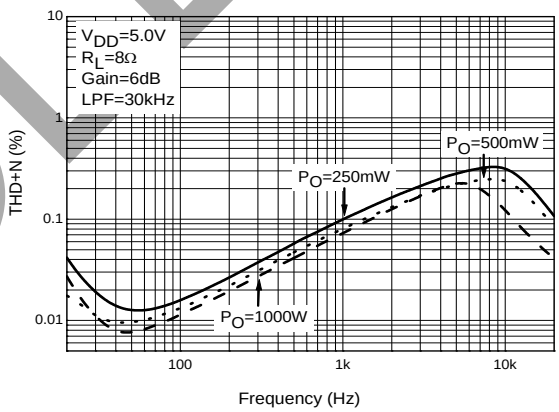
THD+N vs. Output Power



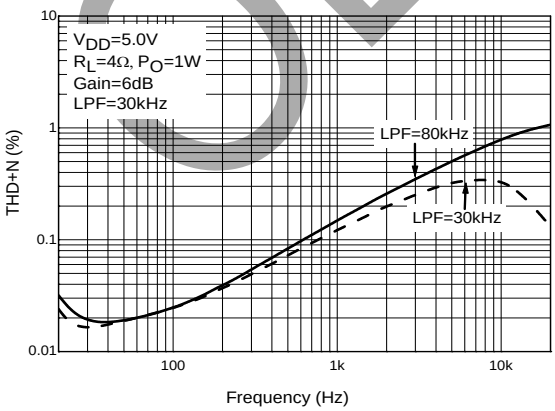
THD+N vs. Frequency



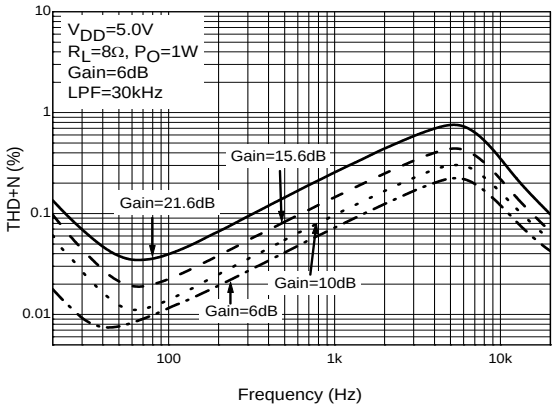
THD+N vs. Frequency



THD+N vs. Frequency

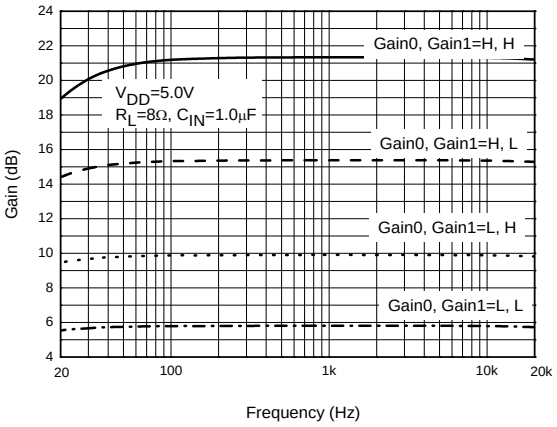


THD+N vs. Frequency

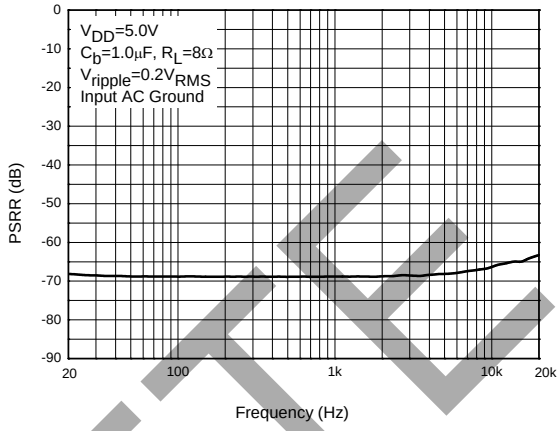


Performance Characteristics (Cont.)

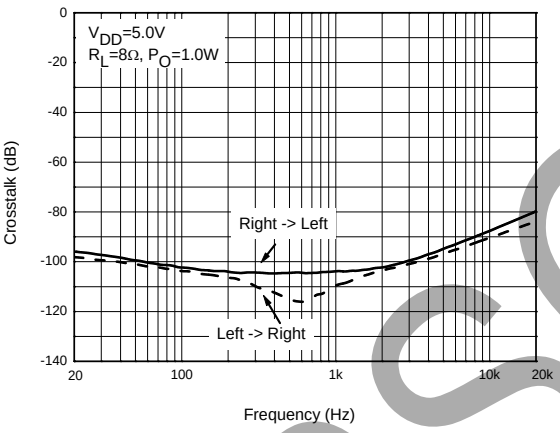
Gain vs. Frequency



PSRR vs. Frequency



Crosstalk vs. Frequency



Ordering Information

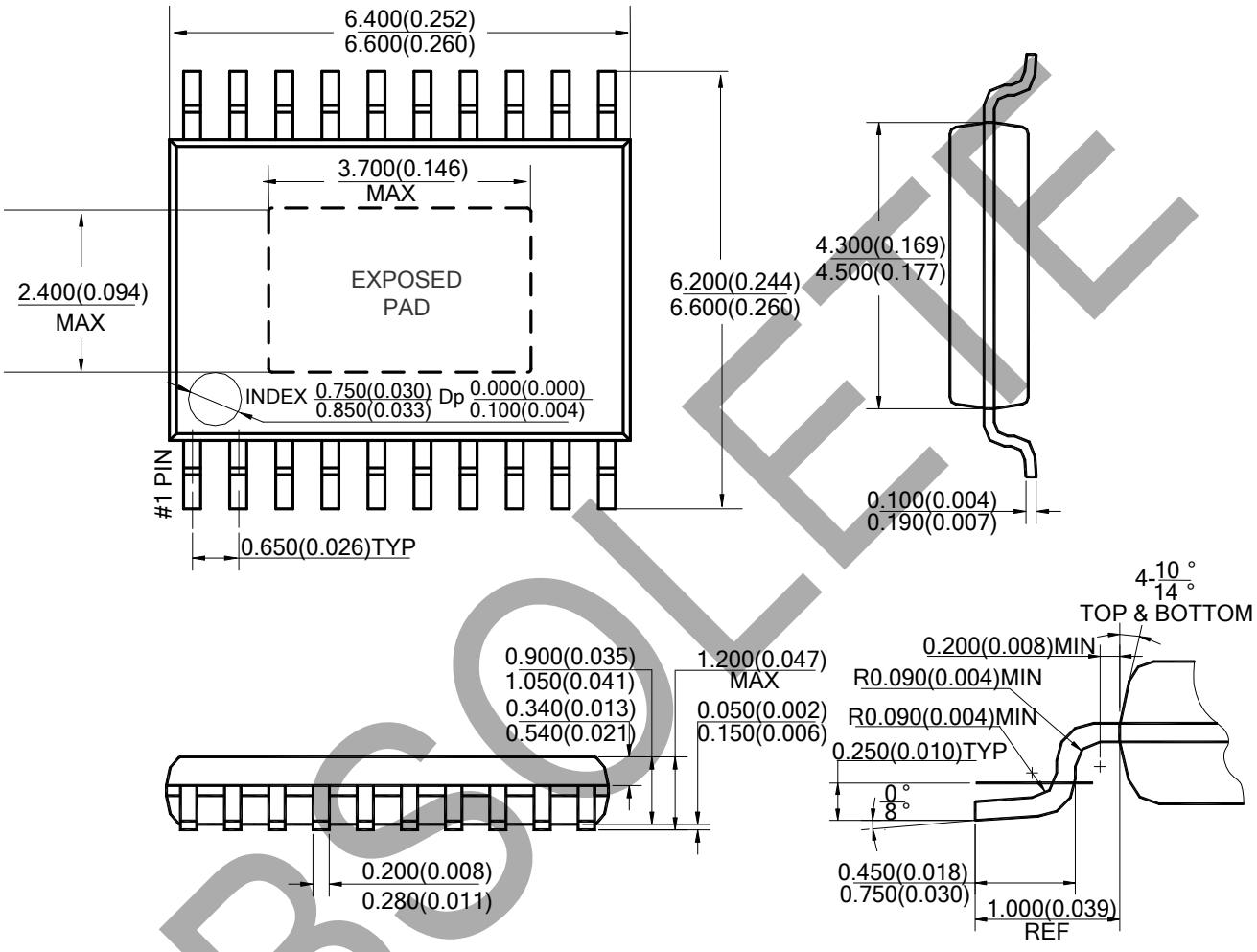
AA4005 X X - X

Product Name	Package	Packing	G1/E1
	G: TSSOP-20(EDP)	TR: Tape & Reel	G1 : RoHS Compliant and Green E1: RoHS Compliant

Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
TSSOP-20(EDP)	-40 to +85°C	AA4005GTR-E1	AA4005GTR-G1	AA4005G	AA4005G-G1	Tape & Reel

Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: TSSOP-20 (EDP)



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