Elektronische Bauelemente

SPEMA2004A

1.7W Mono Fully Differential Audio Power Amplifier

RoHS Compliant Product
A suffix of "-C" specifies halogen or lead -free

DESCRIPTION

The SPEMA2004A is a 1.7W mono fully differential amplifier designed to drive a speaker with at least 8Ω impedance while consuming only 20 mm2 total PCB area in most applications. The device operates from 2.5 V to 5.5 V, drawing only 4mA of quiescent supply current. The SPEMA2004A is available in the space-saving 3 mm x 3 mm FBP package.

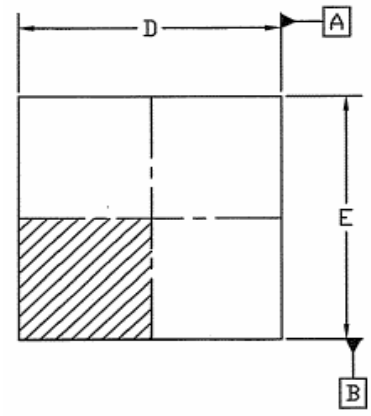
The SPEMA2004A is ideal for PDA/smart phone applications due to features such as -70dB supply voltage rejection from 20 Hz to 2 kHz, improved RF rectification immunity, small PCB area, and a fast startup with minimal pop.

FEATURES

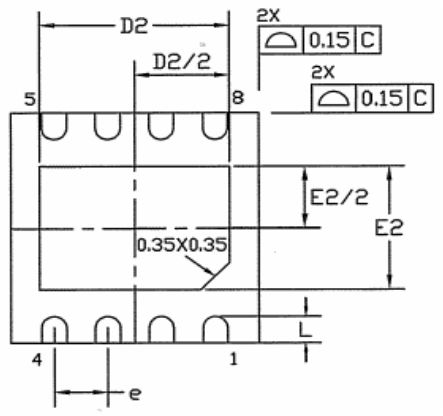
- Designed for Wireless or Cellular Handsets and PDAs
- 1.7 W Into 8Ω From a 5-V Supply at THD = 10% (Typ)
- Low Supply Current: 5mA (Typ) at 5 V
- Shutdown Current: 0.1 µA (Typ)
- Fast Startup With Minimal Pop
- Only Three External Components
- Improved PSRR (-70 dB) and Wide Supply Voltage (2.5 V to 5.5 V) for Direct Battery Operation
- Fully Differential Design Reduces RF Rectification
- -63 dB CMRR Eliminates Two Input Coupling Capacitors
- Pin to Pin Compatible with TPA2005D1 and TPA6211A1 in FBP Package
- Available in 3 mm X 3 mm TDFN Package

PACKAGE DIMENSIONS

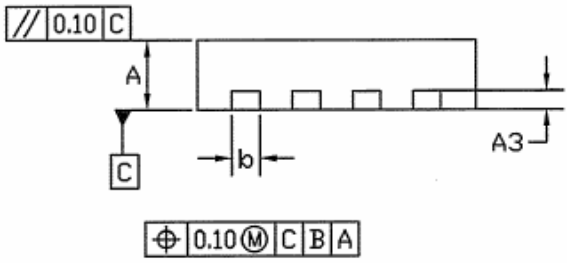
TDFN-8



TOP VIEW



BOTTOM VIEW



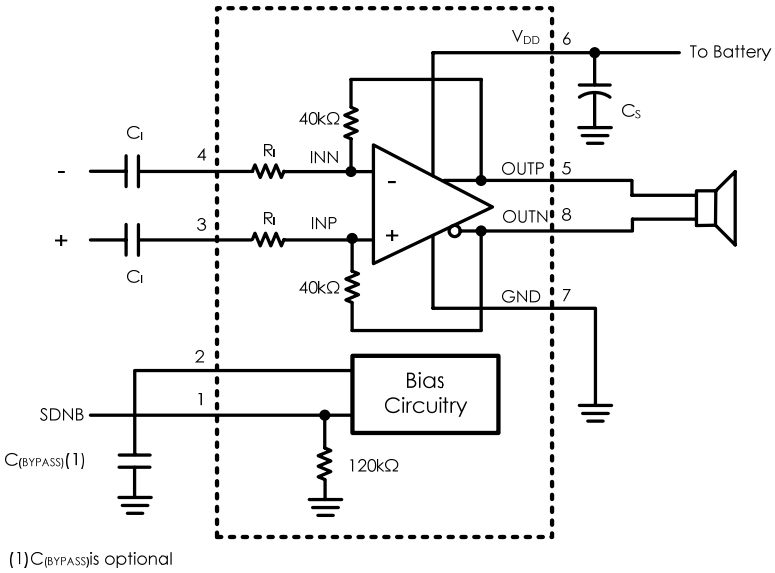
SIDE VIEW

REFERENCE	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	TYP..	MAX.	MIN.	TYP..	MAX.
A	0.70	0.75	0.80	0.027	0.029	0.031
A3	0.203 REF.			0.008 REF.		
b	0.25	0.30	0.35	0.009	0.011	0.013
D	2.85	3.00	3.15	0.111	0.117	0.122
D2	2.20	2.30	2.40	0.085	0.089	0.093
E	2.85	3.00	3.15	0.111	0.117	0.122
E2	1.50	1.60	1.70	0.058	0.062	0.066
e	0.650 REF.			0.024 REF.		
L	0.30	0.35	0.40	0.011	0.013	0.015

APPLICATIONS

- Ideal for Wireless Handsets
- PDAs
- Notebook Computers General Purpose Amplifier

BLOCK DIAGRAMS



(1)$C_{(BYPASS)}$is optional

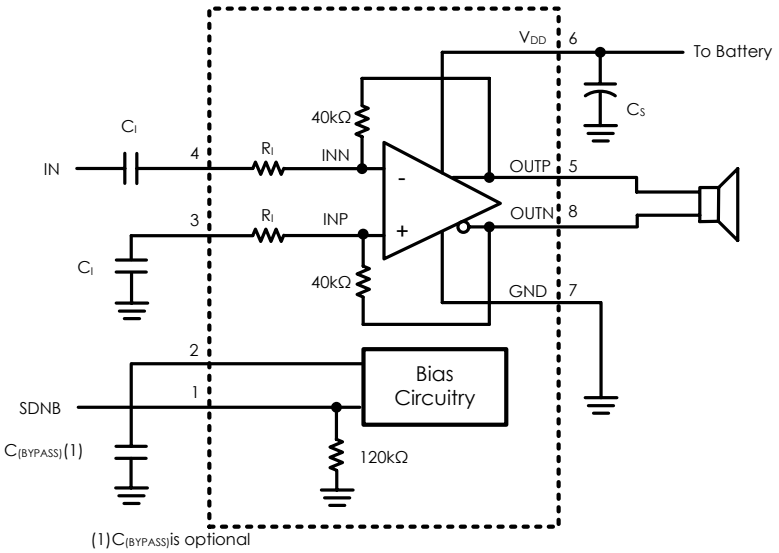
R_I=40kΩ,

C_I=0.39 μF,

C_S=1 μF

$C_{(BYPASS)}$=0.22 μF

FIGURE 1. Typical Audio Amplifier Application Circuit with differential input



(1)$C_{(BYPASS)}$is optional

(2)Due to the fully differential design of this amplifier, the performance is severly degraded if you connect the unused input to BYPASS when using single-ended inputs.

R_I=40kΩ,

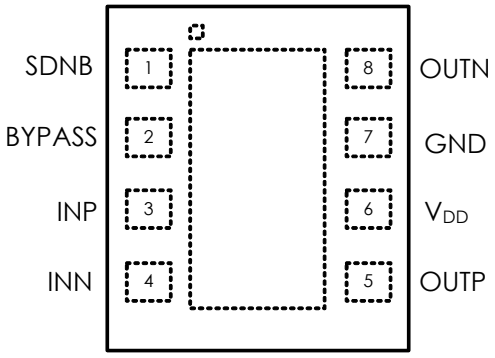
C_I=0.22 μF,

C_S=1 μF

$C_{(BYPASS)}$=0.22 μF

FIGURE 2. Typical Audio Amplifier Application Circuit with single-ended input

TDFN



MAXIMUM RATINGS

Parameter		Value	Units
Supply Voltage		6.0	V
Operating Supply Voltage		2.2 ≦ V_{DD} ≦5.5	V
Input Voltage	V_I	-0.3 to V_{DD} +0.3	V
Power Dissipation	P_D	Internally limited	
ESD Susceptibility		HBM 1.5 MM 200	KV V
Thermal Resistance	$R_{\theta JA}$	63	°C/W
Temperature	Storage (T_{STG})	-65 ~ +150	°C
	Operating (T_{OPR})	-40°C ≦T_A ≦85°C	
	Junction (T_J)	150	

ELECTRICAL CHARACTERISTICS V_{DD} = 5V

The following specifications apply for V_{DD} = 5V, A_V = 1 and R_L = 8Ω, unless otherwise specified. Limits apply for T_A = 25°C

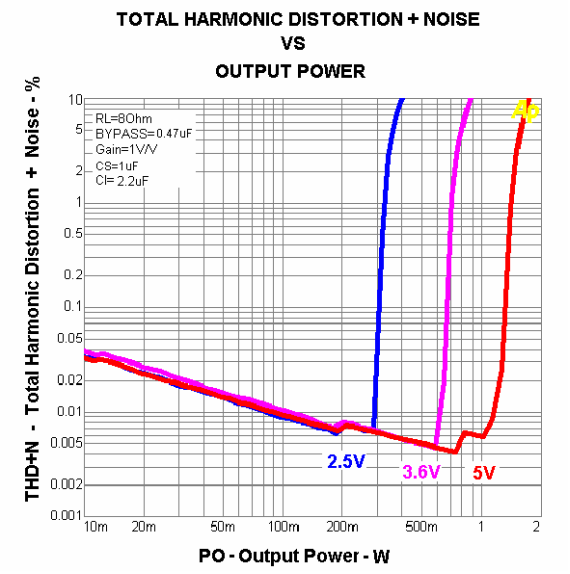
Characteristics	Symbol	Typ.	Limit	Units	Test Conditions
Quiescent Power Supply Current	I_{DD}	5	8	mA	V_{IN} = 0V, Io = 0A
Shutdown Current	I_{SD}	0.1	1	μA	V_{SDNB}=GND
Output offset voltage	V_{OS}	1	5	mV	V_I=0V differential, AV=1 V/V, V_{DD} = 5.5 V
Output Power	P_O	2.7 1.7		W	THD+N = 10 %(max), f = 1kHz R_L = 4Ω R_L = 8Ω
		2.1 1.4			THD+N = 1%(max), f = 1kHz R_L = 4Ω R_L = 8Ω
Total Harmonic Distortion + Noise	THD+N	0.007 0.01 0.017		%	V_{DD} = 3.6V, RL=8Ω, f = 1kHz P_O = 0.6 Wrms P_O= 0.25 Wrms P_O = 0.1 Wrms
Power Supply Rejection Ratio	PSRR			dB	V_{ripple}=200mV sine p-p, input ac-grounded
		-70			f=217Hz
		-65			f=20 to 20kHz
Common Mode Rejection Ratio	CMRR	60		dB	V_{DD} = 3.6V, V_{IC}=1V_{PP}, f = 217Hz

ELECTRICAL CHARACTERISTICS V_{DD} = 2.5V

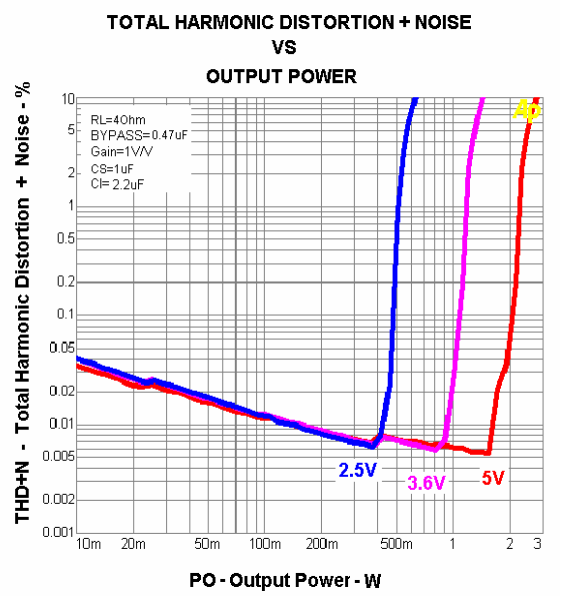
The following specifications apply for V_{DD}=2.5V, A_V = 1 and R_L =8Ω unless otherwise specified. Limits apply for T_A = 25°C

Characteristics	Symbol	Typ.	Limit	Units	Test Conditions
Quiescent Power Supply Current	I_{DD}	4	8	mA	V_{IN} = 0V, Io = 0A
Shutdown Current	I_{SD}	0.1	1	μA	V_{SDNB}=GND
Output Power	P_O	0.62 0.4	-	W	THD+N = 10 %(max), f = 1kHz R_L = 4Ω R_L = 8Ω
		0.5 0.3	-		THD+N = 1%(max), f = 1kHz R_L = 4Ω R_L = 8Ω
Power Supply Rejection Ratio	PSRR	-	-	dB	V_{ripple}=200mV sine p-p, input ac-grounded
		-70	-		f=217Hz
		-65	-		f=20 to 20kHz

CHARACTERISTIC CURVE

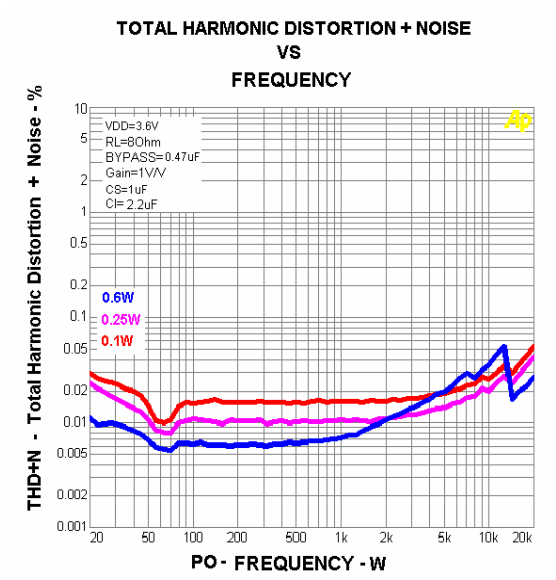


THD + Noise vs Output Power

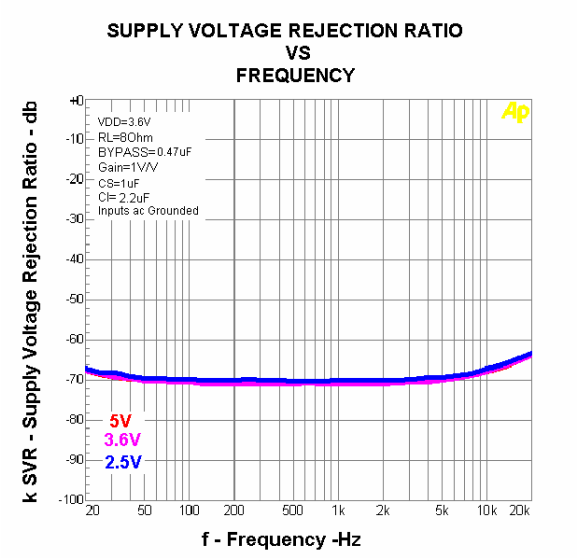


THD + Noise vs Output Power

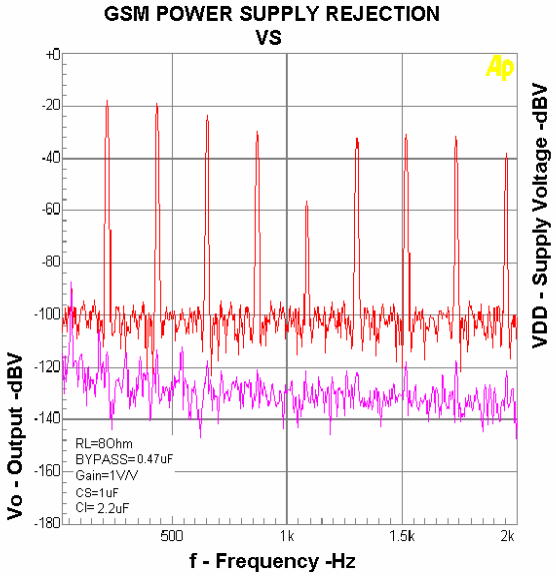
CHARACTERISTIC CURVE (cont'd)



THD + Noise vs Frequency



PSRR



3.6V power supply with

square wave, 500mVp-p, f=217Hz, duty=20%