

1.9W Class-D Audio Amplifier with Integrated Boost Converter and Battery Tracking AGC

PAM8905

Description

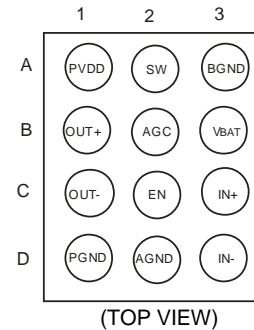
The PAM8905 is a high efficiency Class-D audio power amplifier with an integrated boost converter. It drives up to 1.9W (1% THD+N) into an 8Ω speaker. With 85% typical efficiency, the PAM8905 helps extend battery life when playing audio.

The built-in boost converter generates the voltage rail for the output stage. This provides a louder audio output than a stand-alone amplifier connected directly to the battery. It also maintains a consistent loudness, regardless of battery voltage.

The PAM8905 features battery tracking AGC function which adjusts the Class-D gain to limit battery current at lower battery voltage.

PAM8905 features DC input protection and all outputs are fully protected against output-to-output shorts. The PAM8905 is available in U-WLB1520-12 package.

Pin Assignments



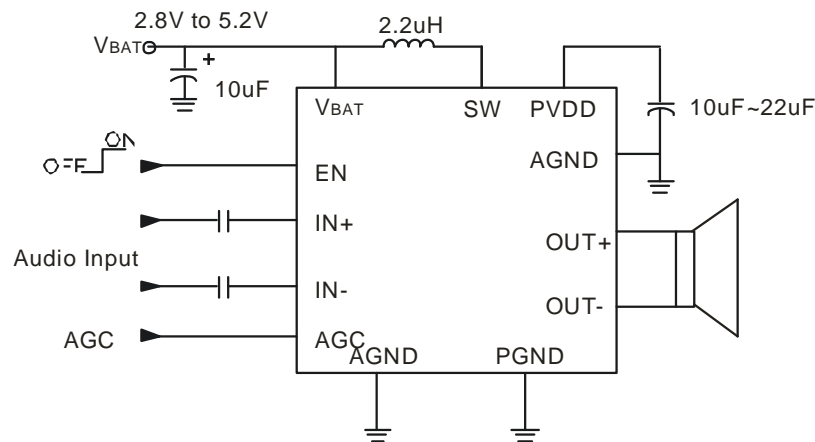
Features

- Built-In Battery Tracking Automatic Gain Control (AGC)
- High Efficiency Integrated Boost Converter Over 85%
- 1.9W into an 8Ω Load from a 3.6V Supply
- Operates from 2.8V to 5.2V
- Efficient Class-D Prolongs Battery Life
- Minimized ON/OFF Pop Noise
- Superior Low Noise
- High PSRR
- DC Input Protection
- Auto-Recovery Short-Circuit Protection
- Thermal Shutdown
- Available in U-WLB1520-12 Package

Applications

- Cell Phones
- PDA
- GPS
- Portable Electronics
- Speakers

Typical Applications Circuit



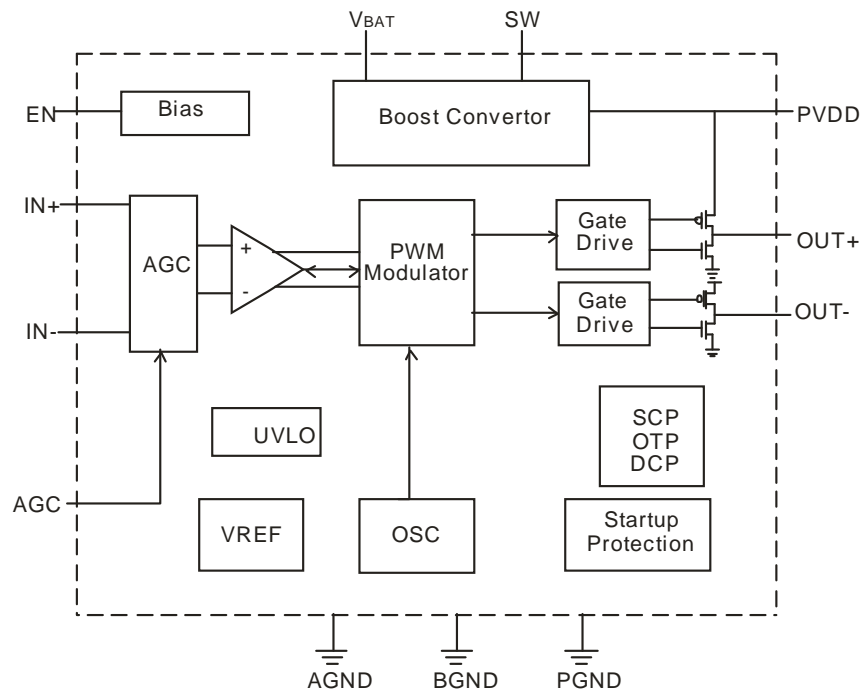
**1.9W Class-D Audio Amplifier with Integrated
Boost Converter and Battery Tracking AGC**

PAM8905

Pin Descriptions

Pin Name	Pin Number	Description
PVDD	A1	Boost Converter Output and Class D Amplifier Power Supply
OUT+	B1	Amplifier Positive Audio Output
OUT-	C1	Amplifier Negative Audio Output
PGND	D1	Class-D Power Ground
SW	A2	Boost Converter Switching
AGC	B2	AGC Inflection Point Select Connect to VBAT, GND or Float. Voltage at AGC pin is only read at device power-up. A power cycle is required to change inflection points.
EN	C2	Device Enable Set to logic high to enable
AGND	D2	Analog Ground
BGND	A3	Boost Converter Power Ground
VBAT	B3	Supply Voltage
IN+	C3	Positive Audio Input
IN-	D3	Negative Audio Input

Block Diagram



**1.9W Class-D Audio Amplifier with Integrated
Boost Converter and Battery Tracking AGC**

PAM8905

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

		VALUE	UNIT
V _{BAT}	Supply voltage	-0.3 to 6.0	V
V _I	Input voltage, EN, IN+, IN-, AGC	-0.3 to V _{BAT} + 0.3	V
T _A	Operating free-air temperature range	-40 to 85	°C
T _J	Operating junction temperature range	-40 to 150	°C
T _{stg}	Storage temperature range	-65 to 150	°C

Recommended Operating Conditions (@T_A = +25°C, unless otherwise specified.)

			MIN	MAX	UNIT
V _{BAT}	Supply voltage		2.8	5.2	V
V _{IH}	High-level input voltage	EN	1.3	V _{BAT}	V
V _{IL}	Low-level input voltage	EN	GND	0.6	V
T _A	Operating free-air temperature		-40	85	°C

Thermal Information

Parameter	Symbol	Package	Maximum	Unit
Thermal Resistance (Junction to Ambient)	θ _{JA}	U-WLB1520-12	85	°C/W

**1.9W Class-D Audio Amplifier with Integrated
Boost Converter and Battery Tracking AGC**

PAM8905

Electrical Characteristics (@VBAT=3.6V, AGC=GND, T_A = +25°C, RL=8Ω+33μH, unless otherwise specified.)

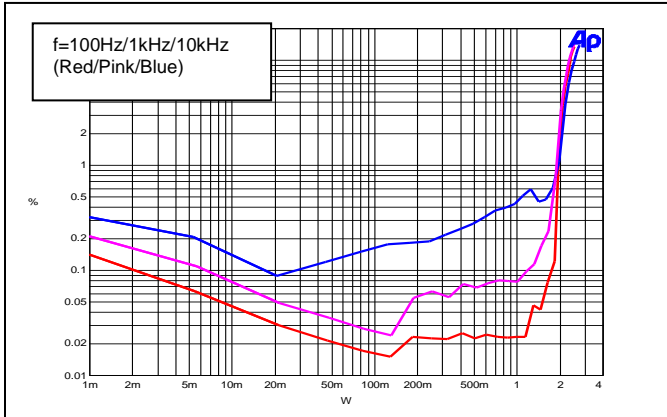
Symbol	Parameter	Test Conditions		MIN	TYP	MAX	UNIT
VBAT	Supply Voltage			2.8	—	5.2	V
Po	Output Power	THD+N=1%,f=1kHz	VBAT=3.6V	—	1900	—	mW
			VBAT=3.0V	—	1750	—	
			VBAT=2.8V	—	1600	—	
THD+N	Total Harmonic Distortion Plus Noise	Po=1.0W,RL=8Ω	f=1kHz	—	0.07	—	%
		Po=2W,RL=4Ω		—	0.15	—	
PSRR	Power Supply Ripple Rejection	VBAT=3.6V, Inputs AC-Grounded with C=1μF	f=217Hz	—	-70	—	dB
			f=1kHz	—	-70	—	
SNR	Signal-to-Noise Ratio	A-Weighting	THD+N=1%	—	95	—	dB
Vop	Peak Output Voltage	VBAT=3.6V	f=1kHz	—	5.75	—	V
Vo_TH	Boost Converter Auto-Pass Through Threshold	—	—	—	2	—	Vpk
Vn	Output Noise	Inputs AC-Grounded	No A-Weighting	—	100	—	μV
			A-Weighting	—	60	—	
η	Efficiency	VBAT=4.2V, Po=1.5W	f=1kHz	—	85	—	%
IQ	Quiescent Current	VBAT=3.6V	No Load	—	4	—	mA
I _{sd}	Shutdown Current	VBAT=2.8V to 5.2V	EN=0V	—	—	1	μA
R _{dson}	Static Drain-to Source On-State Resistor	High Side PMOS,I=500mA	VBAT=5V	—	260	—	mΩ
		Low Side NMOS,I=500mA	VBAT=5V	—	160	—	mΩ
f _{sw}	Switching Frequency	VBAT=2.8V to 5.2V	Boost	—	1200	—	kHz
			Class D	—	300	—	
G _v	Closed-Loop Gain	—	—	—	20	—	dB
R _{IN}	Input Impedance	A _v =20dB	—	—	24	—	KΩ
V _{os}	Output Offset Voltage	Input AC-Ground	—	—	—	10	mV
I _{peak}	Converter SW Peak Current	VBAT=3.6V	—	—	2	—	A
T _{on}	Start-up Time From EN	—	—	—	6	—	mS
V _{IH}	EN Input High Voltage	VBAT=5V	—	1.3	—	—	V
V _{IL}	EN Input Low Voltage	VBAT=5V	—	—	—	0.6	

1.9W Class-D Audio Amplifier with Integrated Boost Converter and Battery Tracking AGC

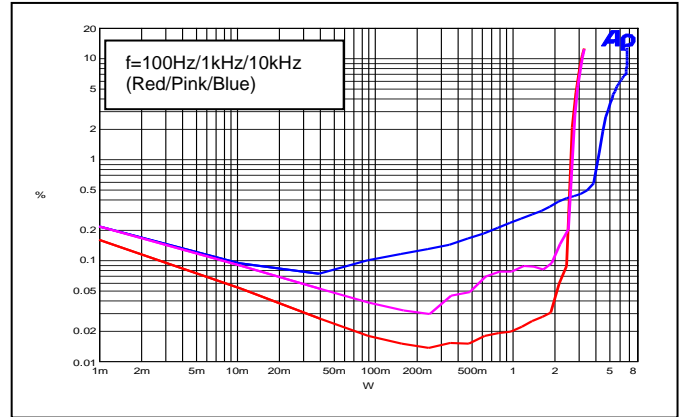
PAM8905

Performance Characteristics (@VBAT=3.6V, AGC=GND, TA = +25°C, RL=8Ω+33μH, unless otherwise specified.)

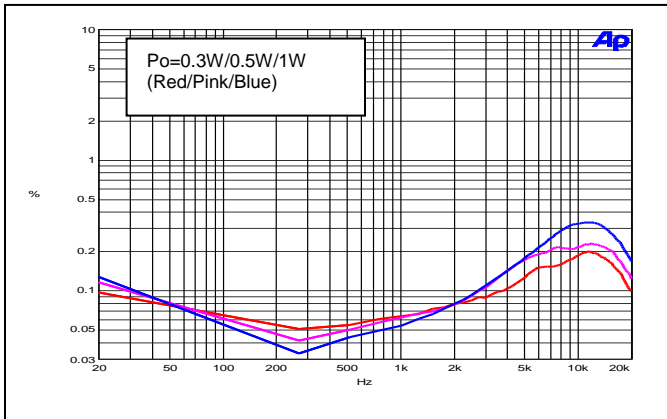
THD+N Vs. Output Power (RL=8Ω)



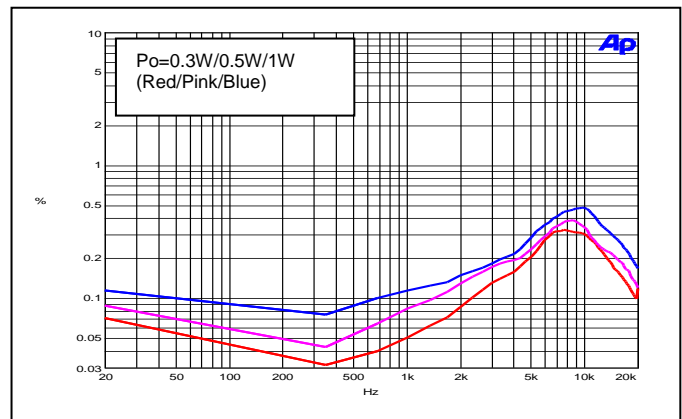
THD+N Vs. Output Power (RL=4Ω)



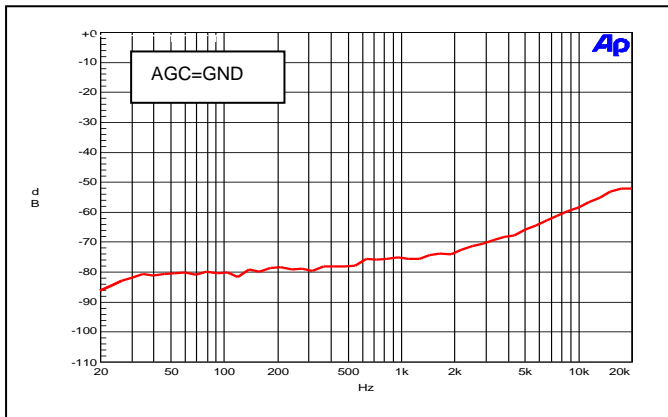
THD+N Vs. Frequency (RL=8Ω)



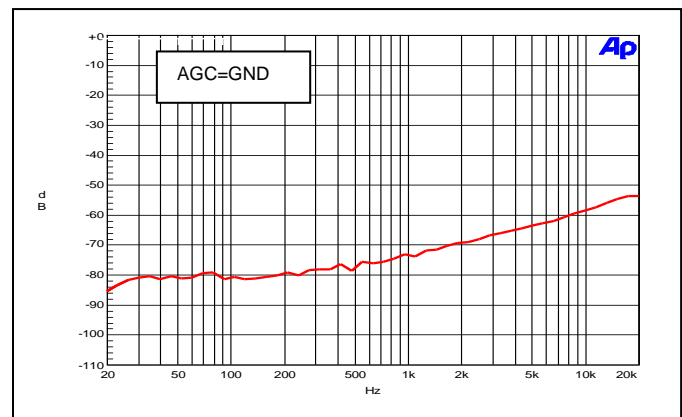
THD+N Vs. Frequency (RL=4Ω)



PSRR Vs. Frequency (RL=8Ω)



PSRR Vs. Frequency (RL=4Ω)

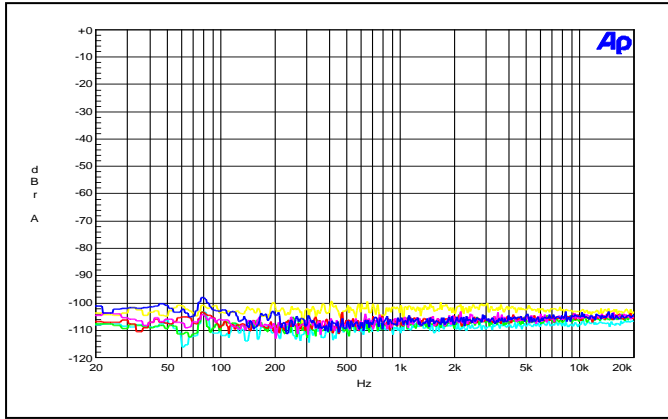


1.9W Class-D Audio Amplifier with Integrated Boost Converter and Battery Tracking AGC

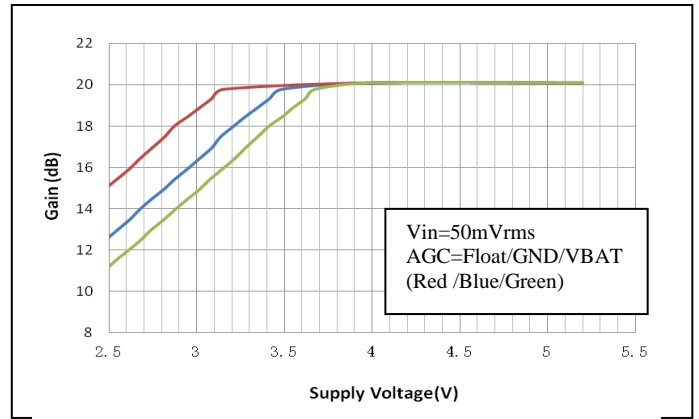
PAM8905

Performance Characteristics (@VBAT=3.6V, AGC=GND, T_A = +25°C, RL=8Ω+33uH, unless otherwise specified.)

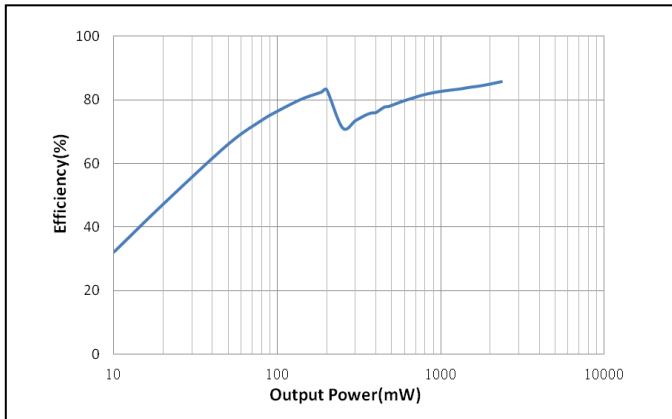
Noise Floor (RL=8Ω)



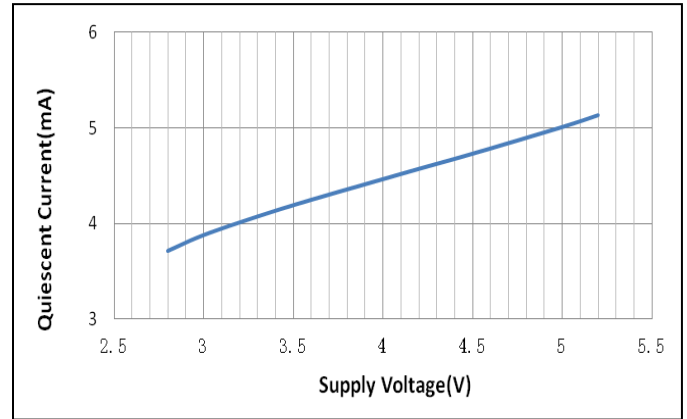
Gain Vs. Supply Voltage



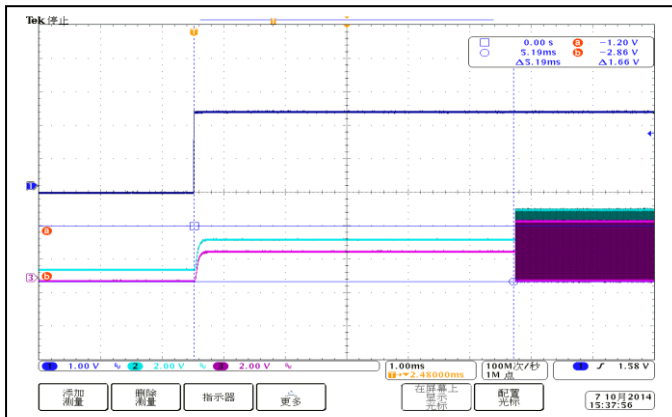
Efficiency Vs. Output Power (RL=8Ω)



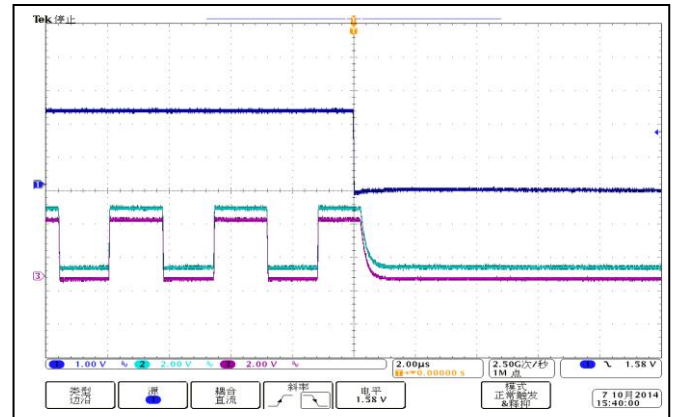
Quiescent Current Vs. Supply Voltage



Start-Up



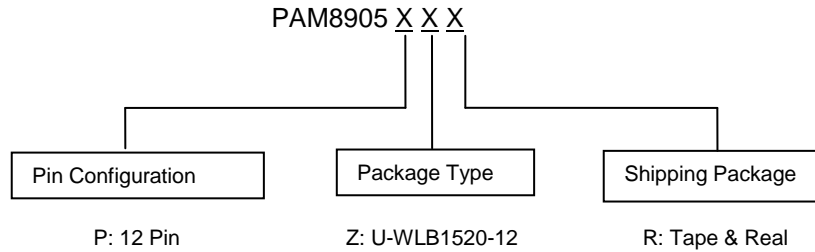
Shutdown



**1.9W Class-D Audio Amplifier with Integrated
Boost Converter and Battery Tracking AGC**

PAM8905

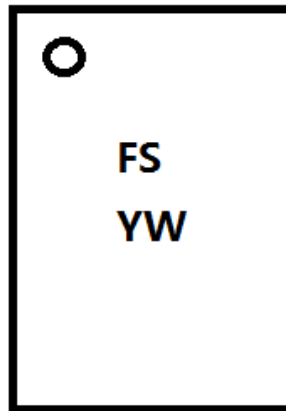
Ordering Information



Part Number	Package	Standard Package
PAM8905PZR	U-WLB1520-12	3,000Units/Tape & Reel

Marking Information

U-WLB1520-12



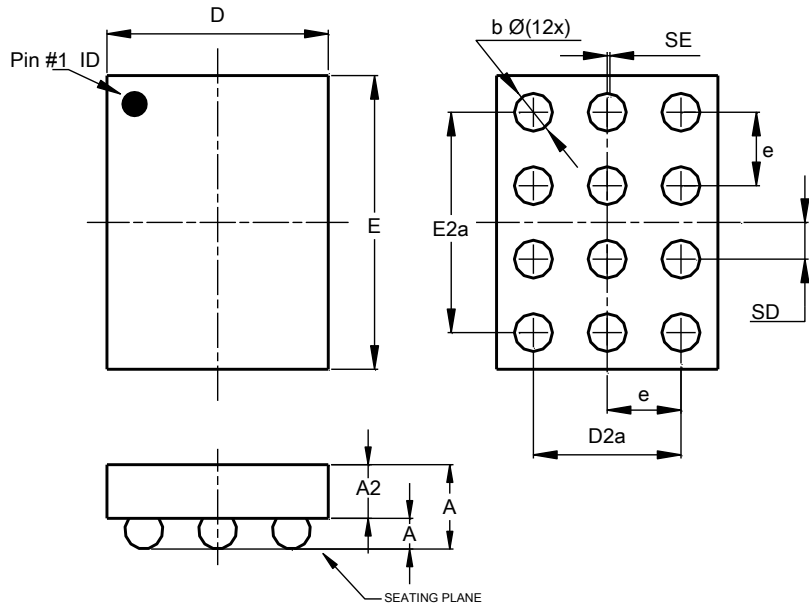
FS: Product Code
Y: Year
W: Week

**1.9W Class-D Audio Amplifier with Integrated
Boost Converter and Battery Tracking AGC**

PAM8905

Package Outline Dimensions (All dimensions in mm.)

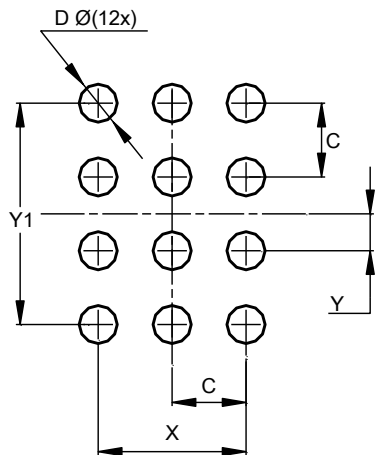
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



U-WLB1520-12			
Dim	Min	Max	Typ
A	0.500	0.600	0.550
A1	0.185	0.235	0.210
A2	0.315	0.365	0.340
b	0.208	0.308	0.258
D	1.420	1.500	--
D2a	0.950	1.050	1.000
E	1.920	2.000	--
E2a	1.450	1.550	1.500
e	0.500 BSC		
SD	0.250 BSC		
SE	0.000 BSC		
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	0.500
D	0.258
X	1.000
Y	0.250
Y1	1.500

**1.9W Class-D Audio Amplifier with Integrated
Boost Converter and Battery Tracking AGC**

PAM8905

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2015, Diodes Incorporated

www.diodes.com