

Inductors for Class-D Audio Amplifiers



Coilcraft

Based on their miniaturized package size and high efficiency, Class-D power amplifiers have become increasingly popular replacements for linear amplifiers in many high-end audio system applications.

For high-power Class-D amplifiers (>50 Watts), selecting the right inductor for the output LC filter plays a critical role in improving the efficiency and overall sound quality of the system.

Dual Inductors for Ultra-low Distortion Class-D Amplifiers

Product Overview:

UA8013-AL / UA8014-AL / RA7231-AL

Coilcraft offers a unique selection of dual inductors that significantly improve the performance of the output LC filter and reduce the board area with a compact single shielded package. Good linearity of the inductors' saturation current and ultra low total losses minimize the impact of total harmonic distortion plus noise (THD+N), greatly improving audio quality.

Applications

- Handheld audio devices & portable docking stations
- High-end TV soundbars
- Active speakers and subwoofers
- Automotive stereo audio systems

Design Features

- Designed into Texas Instruments' TPA3244 (60 W Stereo) and TPA3245 (115 W Stereo) Class-D Amplifier evaluation modules
- Also suitable for TI's TPA3251 (175 W Stereo) Class-D Amplifier
- Dual inductors in a single shielded package to save circuit board space
- Very low coupling coefficient ($k < 0.001$), minimal crosstalk between the two inductors
- Excellent inductance vs. current linearity up to 10 A
- Economical solutions for a wide variety of audio amplifier applications
- RA7231-AL: AEC-Q200 Grade 1 qualified (-40°C to +125°C ambient)



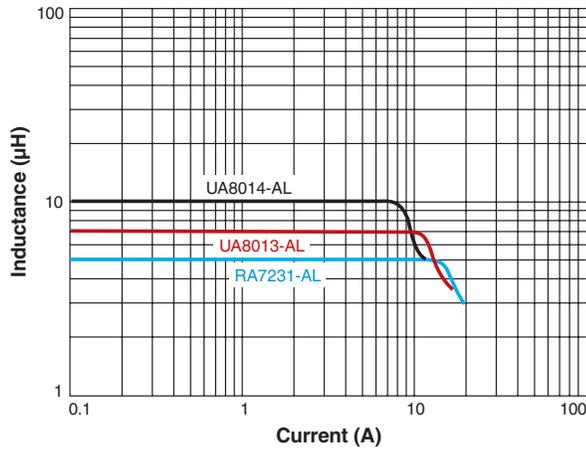
Part Number		Inductance $\pm 10\%$ (μH)	DCR Max (mOhms)	SRF typ (MHz)	Isat (A)			I _{rms} (A)	
					10% drop	20% drop	30% drop	20°C rise	40°C rise
UA8013-AL_	L1	7.0	6.6	40	12.0	12.5	13.2	6.5	9.0
	L2	7.0	6.6	40	12.0	12.5	13.2		
UA8014-AL_	L1	10.0	6.6	28	8.7	9.1	9.4	6.5	9.0
	L2	10.0	6.6	28	8.7	9.1	9.4		
RA7231-AL_	L1	5.0	6.0	34	15.5	16.6	17.6	7.6	10.6
	L2	5.0	6.0	34	15.5	16.6	17.6		

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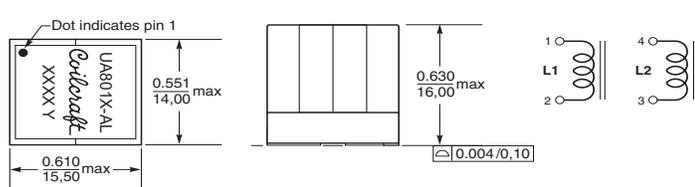


Dual Inductors for Ultra-low Distortion Class-D Amplifiers (continued)

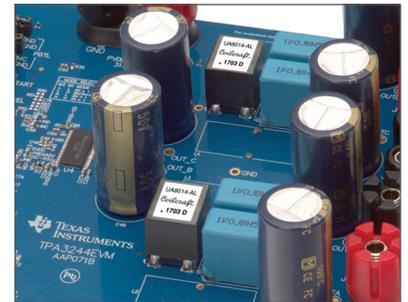
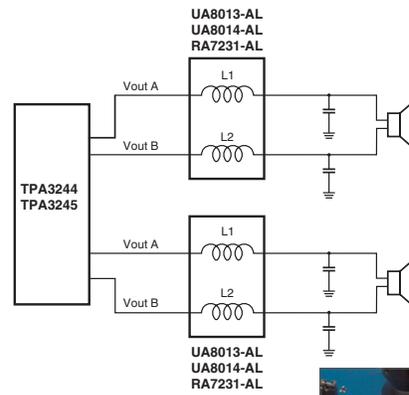
L vs. Current



Dimensions



TI's TPA3244/3245 60W/115W Stereo Pure-Path™ Ultra-HD, Analog-In Class-D Amplifier



Single Power Inductors for TI Automotive Class-D Audio Amplifier

Coilcraft provides a complete solution for the PMP11769 700 Watt automotive Class-D audio amplifier reference design from Texas Instruments. Our SER2918H-103 power inductor is used for the output LC filter which converts the PWM output into a continuous low noise analog signal to achieve great performance. It is also used with other Coilcraft parts in the Buck and Boost power stages (see table).

Design Features

- Easily integrated into automotive systems with 50V load dump and integrated protection system
- Ultra-HD audio for best quality sound for any integrated Class-D amplifier
- 100kHz bandwidth, which enables support for high resolution audio files and formats
- Low noise eliminates “hiss” or “buzz” sounds

Class-D Amplifier Output LC Filter (Left and right channel)	L5_1, L5_2	10 µH	SER2918H-103KL
	L6_1, L6_2	10 µH	SER2918H-103KL
	L7_1, L7_2	10 µH	SER2918H-103KL
	L8_1, L8_2	10 µH	SER2918H-103KL
Buck Power Stage	L1	330 µH	LPS6235-334MLB
	L2, L4	500 nH	XPL2010-501MLB
	L3	1 mH	LPS4012-105MLB
Boost Power Stage	L9	10 µH	SER2918H-103KL
	L11	10 µH	SER2918H-103KL



Photo courtesy of Texas Instruments, Inc.

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