

TPA3138 Transition Guide – from TPA3110, TPA3113

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Summary

Are you thinking about using TPA3110 or TPA3113? Are you interested in reducing your 10W audio system cost without changing your PCB?

If you answered YES to any of these questions, this technical note will help you design a better, more cost-effective system. The purpose of this technical note is to help transition customers from TPA3110 or TPA3113 to TI's next-generation pin-to-pin compatible inductor-less TPA3138.

What is TPA3138?

TPA3138 is TI's new low EMI true inductor-less Class-D Audio Amplifier. TPA3138 is a stereo analog input 10W Class-D amplifier that needs no inductor; instead, it can use low-cost ferrite beads without enabling any EMC issues.

Thanks to its pin-to-pin compatibility to TPA3110 and TPA3113, TPA3138 enable systems designers to easily create smaller, more cost-effective systems with minimum design effort.

How Does TPA3138 Compare to TI's Pin-to-Pin Compatible Legacy Class-D Amplifiers?

For customers transitioning from TPA3110 or TPA3113, TPA3138 offers a smaller solution size and lower cost as the bulky inductor is substituted for a low-cost and smaller ferrite bead.

Table 1. Comparison table for pin-to-pin compatible TPA3110, TPA3113, and TPA3138

	TPA3110	TPA3113	TPA3138 (Cost Optimized)
Number of Channels	2	2	2
Output Power @ 8-Ω, 12-V, 10% THD+N	~10 W	~10 W	~10 W
Output Power @ 8-Ω, 24-V, 10% THD+N	~30 W	~10 W	
Idle Current	15.5 mA @ 12 V	15.5 mA @ 12 V	15.5 mA @ 12 V

	TPA3110	TPA3113	TPA3138 (Cost Optimized)
$R_{\text{DS(on)}}$	240 mΩ	400 mΩ	180 mΩ
Supply Voltage	8 V – 26 V	8 V – 26 V	3.5 V – 14.4 V
Temperature Range	–40°C – 85°C	–40°C – 85°C	–40°C – 85°C
Datasheet Title	15-W Filter-Free Stereo Class-D Audio Power Amplifier With SpeakerGuard [™] M (SLOS528)	6-W Filter-Free Stereo Class-D Audio Power Amplifier With SpeakerGuard [™] M (SLOS650)	10-W Inductor Free Stereo (BTL) Class-D Audio Power Amplifier With Ultra Low EMI, (SLOS993)
Special Features			<ul style="list-style-type: none"> Inductor less: No inductor required, only ferrite bead. Lower cost solution. Low EMI: Passes EMI testing with only ferrite bead.
Package	HTSSOP-28 9.7 x 4.4 Pad-Down	HTSSOP-28 9.7 x 4.4 Pad-Down	HTSSOP-28 9.7 x 4.4 Pad-Down

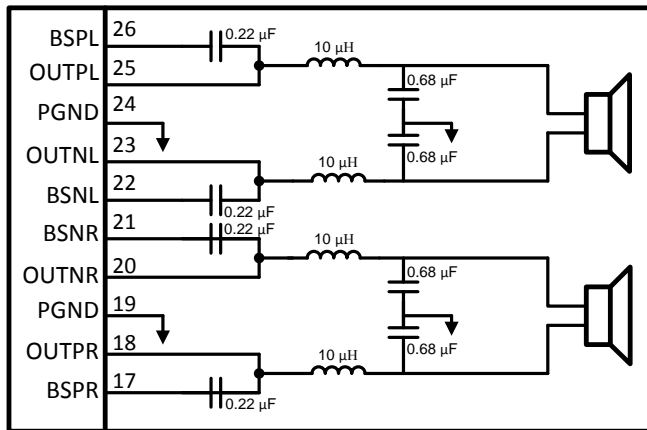
How Can I Transition to TPA3138?

TI's new TPA3138 is fully pin-to-pin compatible to TI's legacy TPA3110 and TPA3113. Systems currently using any of the aforementioned legacy devices can transition to TPA3138 as long as the power needs are met per the tables above with minimum design changes to accommodate a smaller ferrite bead. In [Figure 1](#) below, we show in detail how the output LC filter components are swapped for a ferrite-bead-and-capacitor filter. Note the different values of the components shown. Although not an exclusive list, TI recommends: Sunlord's UPZ2012E331-2R5TF 330 Ohm ferrite bead.

CAUTION

This schematic is shown as a reference only. System designers must verify their design to ensure full compatibility.

TPA3110 Schematic



TPA3138 Schematic

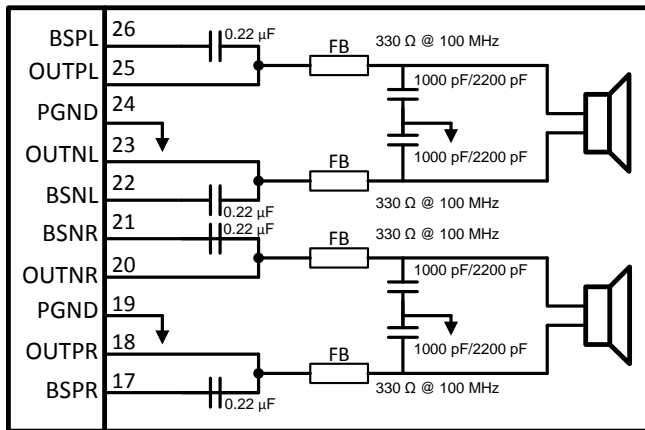


Figure 1. Suggested Transition Schematic

Isn't EMI an Issue when no Inductor is Used?

In the past, inductor-less technology had the downside of increasing EMI system concerns making their implementation impractical.

Today, TPA3138 leverages TI's proprietary technology to maintain ultralow EMI hence eliminating potential EMI issues when using ferrite beads and following proper design and layout guidelines. TI's evaluation module, TPA3138D2EVM, meets EN55002 EMI standards without the use of inductors as shown in Figure 2 below.

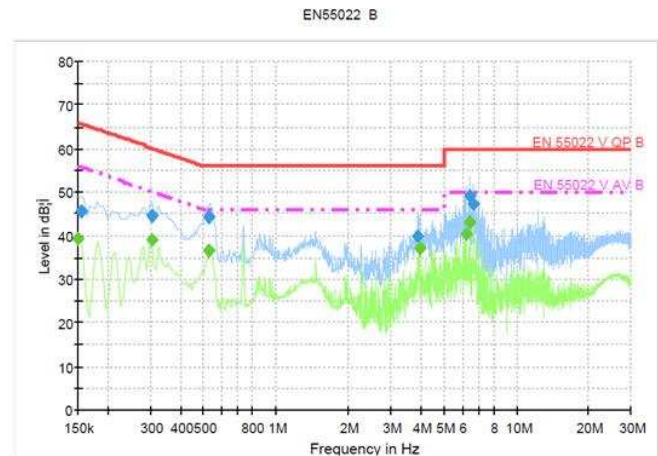


Figure 2. TPA3138 Passes EN55022 EMI Standard Using Only Ferrite Beads

Additional Resources

- Download the TPA3138D2 datasheet ([SLOS993](#)).
- Get started quickly with the TPA3138D2 evaluation module (EVM).
- LC Filter Design application note.
- Visit TI's Smart Speaker portal to learn how TPA3138D2 fits in this application.

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