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Highly Integrated Automotive-Grade Buck Converters Power In-Cabin Electronics

Dialog Semiconductor's DA913X-A product family is a line of highly efficient, high-current, automotive-grade, stepdown dc-dc converters. According to the company, the highly integrated devices require fewer external components than competing solutions, enabling a low system BoM cost and a reduced solution footprint. The devices operate at efficiency levels above 90% (see Fig. 1), reducing the thermal design challenges for powering high-current rails in a wide range of automotive systems, including infotainment, navigation, telemetry, and advanced driver assistance systems (ADASs).

The DA913X-A family is comprised of three devices configured as single- or dual-output buck converters. The DA9130-A operates as a single-channel, dual-phase buck converter, delivering up to a 10-A output current. The DA9131-A integrates two single-phase buck converters, each delivering up to 5 A. The DA9132-A also integrates two single-phase buck converters, each delivering up to 3 A (Fig. 2).

All devices have an input voltage range of 2.5 V to 5.5 V and an output voltage range of 0.3 V to 1.9 V, making them suitable for a wide variety of low-voltage systems. Output voltages above 1.9 V are supported with an external resistor divider.

"Dialog continues to introduce new PMIC solutions that meet the increasing power and thermal efficiency requirements of high-performance, in-cabin automotive electronics systems," said Tom Sandoval, senior vice president, GM Automotive Business Segment, Dialog Semiconductor.

The DA913X-A products include several key features to meet the needs of today's complex automotive electronics systems. For example, remote sensing guarantees the highest accuracy and supports multiple PCB routing scenarios without loss of performance. Another feature, fully programmable soft start, limits the inrush current from the input to give a slope-controlled output voltage.

Meanwhile, dynamic voltage control (DVC) enables adaptive adjustment of the supply voltage dependent on the load. This increases efficiency when the downstream circuitry enters low power or idle mode. Other features include configurable GPIOs, which support a range of features including I^2C, DVC and power good indicator; and optimized BoM cost and footprint—each output requires a very small inductor and capacitor.

The DA9130X-A devices are AEC-Q100 Grade 2 qualified and are available in a 3.3-mm x 4.8-mm 24-pin FC-QFN wettable flank package. The –A indicates the automotive-grade models, which feature an extended operating temperature range of -40°C to +105°C Those without the –A are the industrial/commercial-grade versions, which feature an operating temperature range of -40°C to +85°C. For more information on this product family, visit the pages for the DA9130, DA9131, DA9132, DA9130-A, DA9131-A, and DA9132-A.

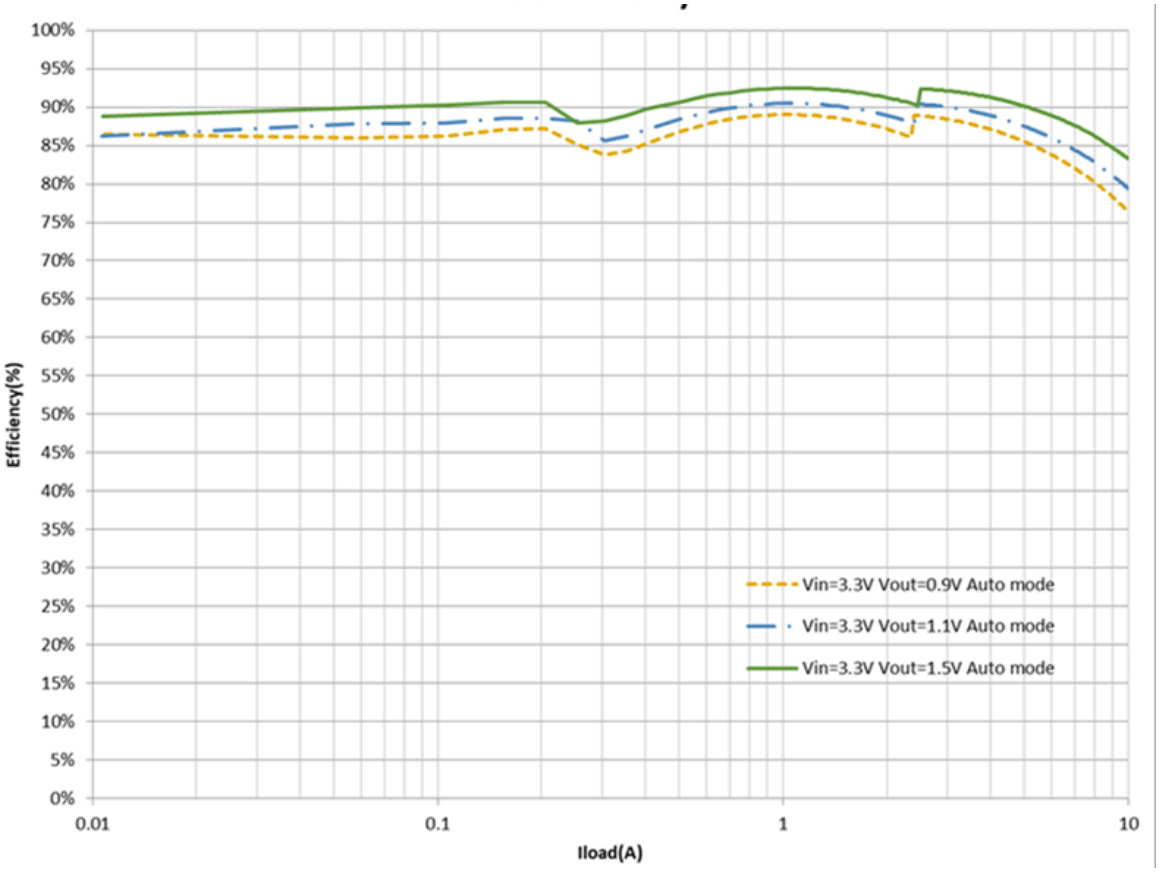
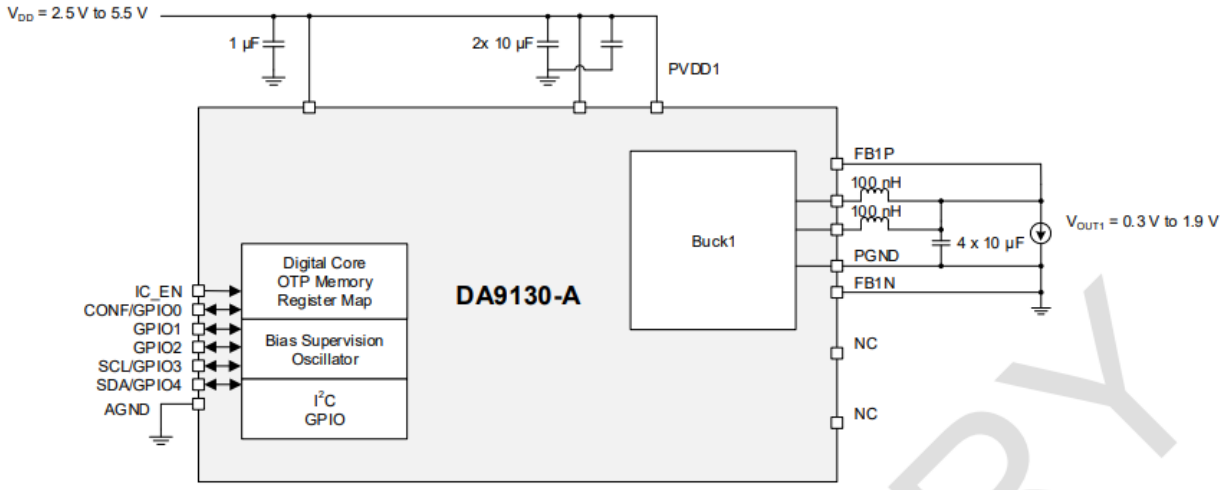
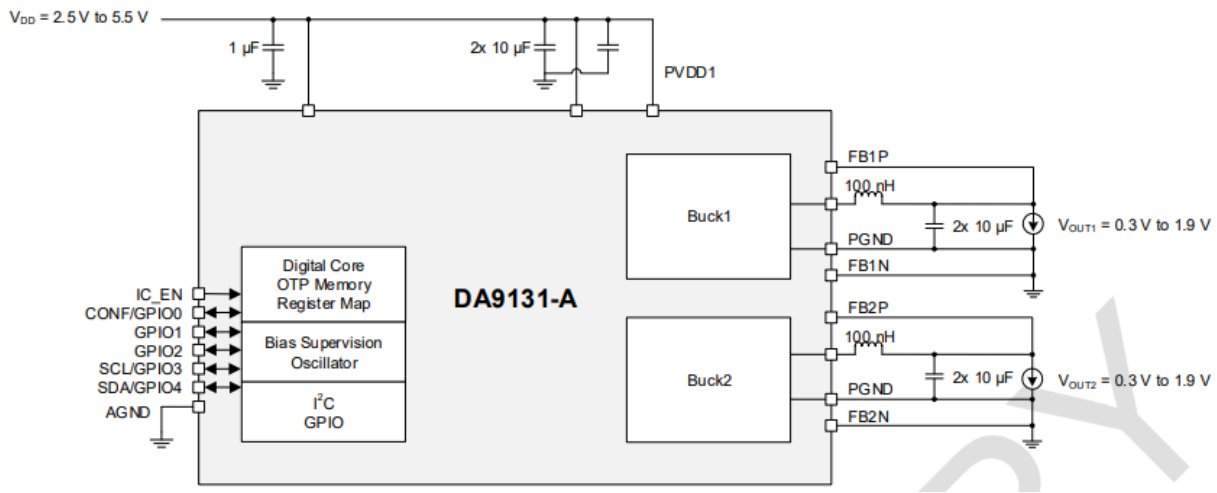


Fig. 1. Efficiency of the DA9130 measured in a default configuration with a 4-MHz switching frequency and including inductor losses. These measurements use the small footprint TDK TFM252012 inductors. If lower DCR inductors are employed, the efficiency can be increased by 1% to 2% over what's shown here. These efficiency curves are also applicable to the DA9131 and DA9132.



(a)



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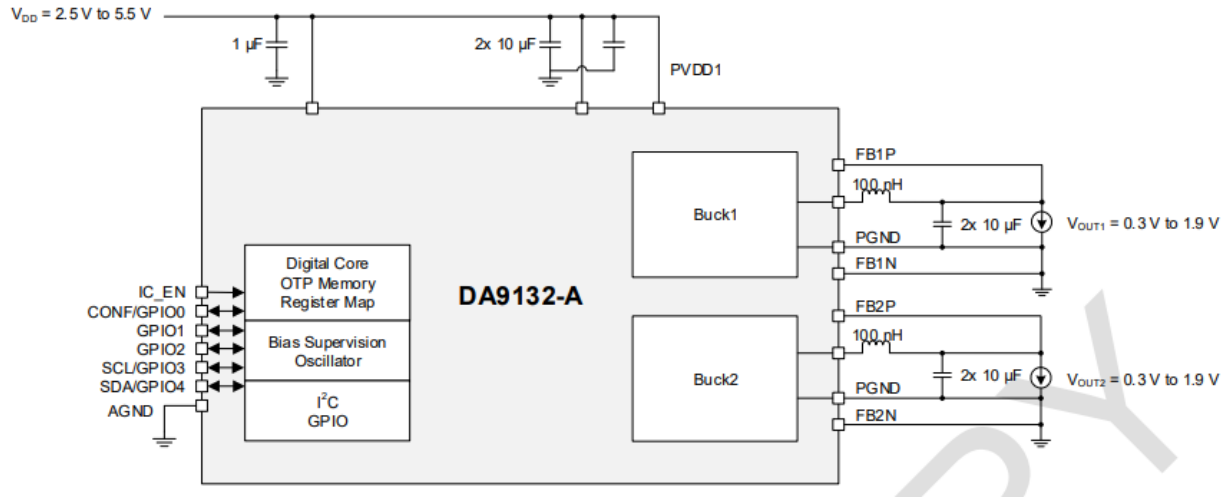

(c)

Fig. 2. Designed to meet the increasing power and thermal efficiency requirements of in-cabin automotive electronics systems, the DA913X-A are highly integrated single- and dual-channel buck converters that deliver up to 10 A on a single output (the DA-9130-A shown in part a), or up to 5 A (the DA9131-A shown in part b) or up to 3 A (the DA9132-A shown in part c) on each of the dual outputs.