User Manual

DA913X-30 Customer EVB

UM-PM-64

Abstract

This document is a user manual for the DA913x-30 Customer EVB for the DA9130, DA9131 and DA9132 PMICs. This board is referred through the document as "EVB". It provides the basic information for configuring and using the EVB.

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1 Terms and Definitions

EVB	Evaluation board
PMIC	Power management integrated circuit
PWM mode	Fixed frequency mode using Pulse Width Modulation
PFM mode	Variable frequency mode improving efficiency at low loads
Auto mode	Automatic mode switching from PFM to PWM depending on load

2 References

[1] DA9130 Datasheet, Dialog Semiconductor.
[2] DA9131 Datasheet, Dialog Semiconductor.
[3] DA9132 Datasheet, Dialog Semiconductor
[4] DA913x-30-A1_sch Schematics, Dialog Semiconductor

Note 1 References are for the latest published version, unless otherwise indicated.

3 Introduction

Dialog Semiconductor's DA9130, DA9131 and DA9132 devices are power management ICs with integrated power FETs, see datasheets [1][2][3]. The DA9130 is configured as a single-channel dual-phase buck converter, while the DA9131/DA9132 are configured as a two channel, one-phase buck converters.

4 Evaluation Board Hardware

The DA913x-30-A Customer Evaluation board referred below as "EVB" enables the measurement and evaluation of the DA9130/DA9131/DA9132 PMIC.

Figure 1: DA913x-30 Evaluation Board

4.1 Quick Start

The EVB allows to use the DA9130 dual-phase 10A buck or DA9131-DA9132 dual-channel 5A bucks.

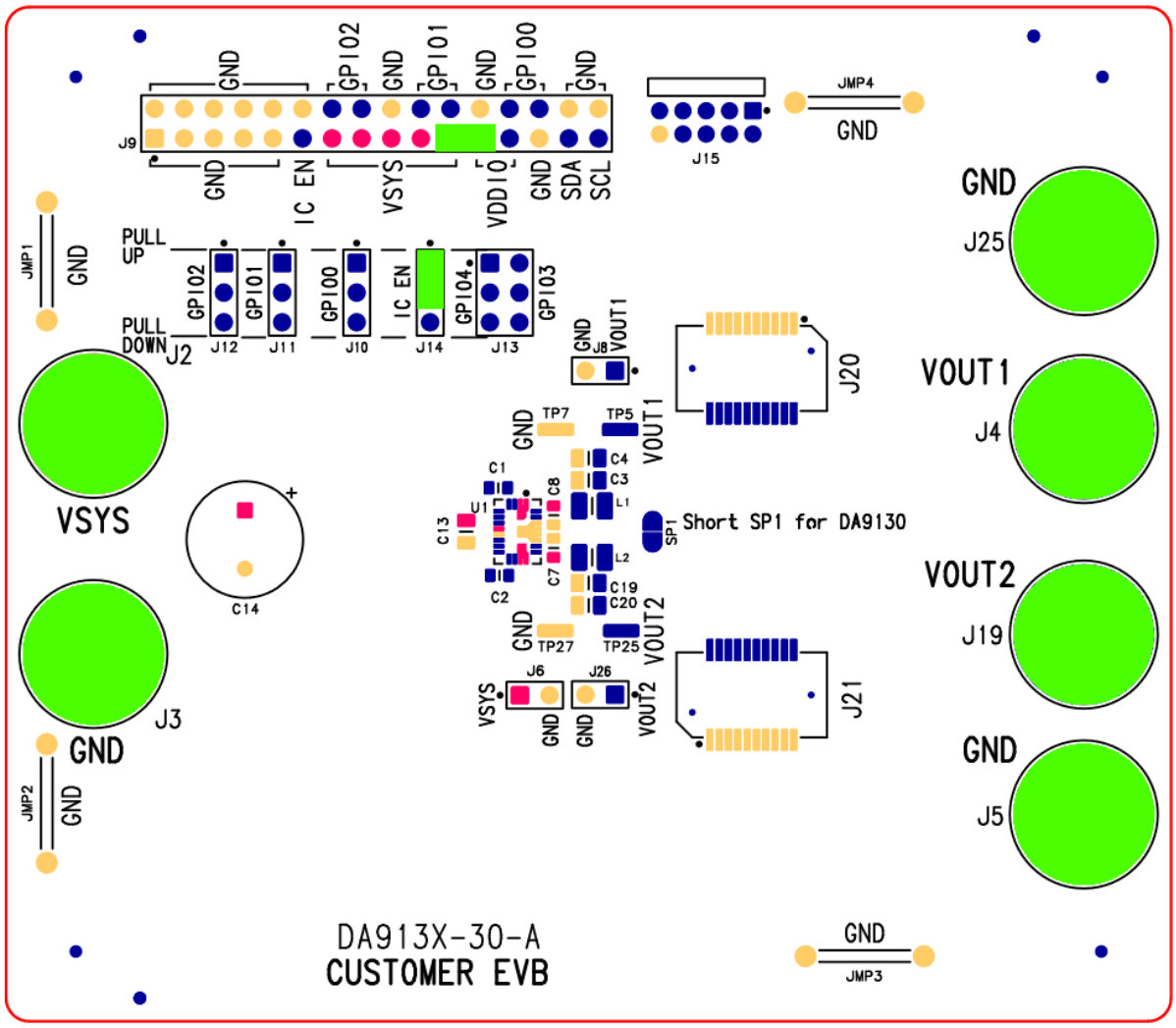

Figure 2: DA913x-30 Jumpers and headers location

Connections from the table below are highlighted in green.

Table 1: Jumpers and headers overview

Connection		Description		Default	Location
J14		IC_EN		Jumper fitted to pull-up position	Top-left, 4th jumper from the left
J9		GPIO header		Jumper between VSYS and VDDIO	TOP left, jumper on positions 21 and 23
J2	J3	VSYS	GND	Supply from PSU, 4V - 5A recommended	Left of EVB
J4	J25	VOUT1	GND	Channel 1 output	Top right of EVB
J5	J19	VOUT2[Note 2]	GND	Channel 2[Note 2] output	Bottom right of EVB

Note 2 VOUT2 is connected to VOUT1 on DA9130 boards.

4.2 Using the Evaluation board

Before going any further, it is recommended to make sure the 4mm banana connectors are properly tightened (150N.cm maximum recommended), as can come loose after shipping and reflow cycles.

The default use case is to connect a PSU to Vsys, with the positive on J2 and the negative/GND on J3. The PSU should be capable of supplying at least 6 A at 3-5.5V and should be capable of remote sensing.

Once the jumpers are set and the PSU is connected, you can switch on the PSU and probe the voltage on the output rails (J4 - J25 and J5 - J19) in order to make sure the setup functions correctly.

4.2.1 Efficiency measurements

It is necessary to use a reliable PSU and load, to use remote sensing as much as possible and to keep the wiring short and tidy to minimize parasitics.

The PSU should supply *Vsys* between J2 and J3 (4mm banana jacks), and its remote sense and input voltage measurement should be connected to J6.

The load can be connected to the output across J4 - J25 (4mm banana jacks), or to J20 (board edge/blade connector), and its remote sense and output voltage measurement should be connected to J8.

For DA9131 and DA9132, the load can also be connected on the second channel across J5 - J19 or J21. Remote sense and output voltage measurement should be connected to J26.

Iin can be measured using an ammeter placed in series between J2 and the PSU.

Iload can be measured using an ammeter placed in series between J4 or J20 and the load (J5 or J21 and the load for the second channel).

Vsys can be measured across J6, which is connected close to the input capacitors.

Vout can be measured across J8 (or J26 for the second channel), which is connected close to the output capacitors.

The efficiency is obtained through this formula for various voltages and loads:

$$Pin = Vsys * Iin$$

$$Pout = Vout * Iload$$

$$\eta = \frac{Pout}{Pin}$$

Note 3 In case of the DA9131 and DA9132 chips, make sure that the load and the load sense are connected to the same channel.

Note 4 In case of the DA9130 chip, it is possible to use the connections from both channels since they are connected in parallel.

4.2.2 Load transient measurements

Just as for the efficiency measurements. it is necessary to use a reliable PSU, to use remote sensing where possible and to keep the wiring short and tidy to minimize parasitics.

The PSU should supply *Vsys* between J2 and J3 (4mm banana jacks), and its remote sense and input voltage measurement should be connected to J6.

The pulse load should be connected to J20 (board edge/blade connector). The wiring impedance is critical here.

For DA9131 and DA9132, the load can also be connected on the second channel on J21.

Iload should be monitored on the pulse load, and *Vout* can be measured across J8 (or J26 for the second channel), which is connected close to the output capacitors. The probes and the oscilloscope should have a bandwidth greater than 20MHz.

4.2.3 Output voltage ripple measurements

It is possible to measure the output voltage ripple using a similar setup as the efficiency, and by measuring the AC voltage across the output capacitors using an oscilloscope. It is recommended to use a differential voltage probe with a bandwidth greater than 20MHz.

The voltage probe can be connected across J8 or TP5 and TP7 depending on the convenience. Those pins and pads are connected to C3 and C4 using kelvin connections.

For the second channel, the voltage probe can be connected across J26 or TP25 and TP27 depending on the convenience. Those pins and pads are connected to C19 or C20 using kelvin connections.

4.3 Jumper configuration

Table 2: Jumpers and headers complete list

Connection		Description		Default	
JMP1 to JMP4		GND points		Available for grounding scope probes	Each corner of board
J2	J3	VSYS	GND	Supply from PSU, 5V recommended	Left of EVB
J4	J25	VOUT1	GND	Channel 1 output	Top right of EVB
J5	J19	VOUT2[Note 5]	GND	Channel 2[Note 5] output	Bottom right of EVB
J9		GPIO header		Available for probing or using GPIOs	Top left of EVB
J15		I2C dongle header		Internal use	Top of EVB
J10 - J11 - J12		GPIO0, 1, 2 pull-up pull-down jumpers		Can be used to pull up or low each individual GPIO	Below J9
J13		GPIO3 and 4 pull-up pull-down jumpers		Can be used to pull up or low each individual GPIO	Below J9
J14		IC_EN		Jumper fitted to pull-up position, can be pulled low to disable the chip	Top-left, 4th jumper from the left
J6		VSYS sense		Available for probing or PSU remote sense	Left of J21
J8		VOUT1 sense		Available for probing or load remote sense	Left of J20
J26		VOUT2* sense		Available for probing or load remote sense	Left of J21
J20		VOUT1		Channel 1 output	Top right of EVB
J21		VOUT2[Note 5]		Channel 2[Note 5] output	Top right of EVB
SP1		Single-dual phase		Shorted on DA9130, open on DA9131/DA9132	Center of EVB
TP5	TP7	VOUT1	GND	Unused, available for probing	Center of EVB
TP25	TP27	VOUT2*	GND	Unused, available for probing	Center of EVB

Note 5 VOUT2 is connected to VOUT1 on DA9130 boards.

4.4 OTP specific configuration

Table 3: DA9130 OTP configuration

OTP	Voltage A	Voltage B	GPIO0	GPIO1[Note 6]	GPIO2 [Note 6]	GPIO3	GPIO4	I2C addr.
02	0.72	0.72V	Output enable	**Power Good output**	NC	SCL	SDA	0x64
07	0.7V	0.75V	Output enable	DVC Pull-up: Vout=0.75V Pull-down: Vout=0.7V	**Power Good output**	SCL	SDA	0xD0
08	0.8V	0.85V	Output enable	DVC Pull-up: Vout=0.85V Pull-down: Vout=0.8V	**Power Good output**	SCL	SDA	0xD0
09	0.9V	0.95V	Output enable	DVC Pull-up: Vout=0.95V Pull-down: Vout=0.9V	**Power Good output**	SCL	SDA	0xD0
10	1.0V	1.05V	Output enable	DVC Pull-up: Vout=1.05V Pull-down: Vout=1.0V	**Power Good output**	SCL	SDA	0xD0

Table 4: DA9131 OTP configuration

OTP	Vout1 A	Vout1 B	Vout2 A	Vout2 B	GPIO0	GPIO1	GPIO2 [Note 6]	GPIO3	GPIO 4	I2C addr.
41	0.85V	0.85V	0.9V	0.9V	Channel 1 output enable, pull-up to enable	Channel 2 output enable, pull-up to enable	**Power Good 1 output**	SCL	SDA	0x66
42	0.8V	0.8V	0.8V	0.8V	Unused	Channel 1 output enable, pull-up to enable	Channel 2 output enable, pull-up to enable	SCL	SDA	0xD0
43	0.8V	1	1.65V	1.65V	Channel 1 DVC Pull-up: Vout=0.8 V Pull-down: Vout=1.0 V	Channel 1 output enable, pull-up to enable	Channel 2 output enable, pull-up to enable	SCL	SDA	0xD2

Note 6 Items in **bold** are output only.

Revision History

Revision	Date	Description
1.1	04-Feb-2022	Update
1	26-Nov-2021	Initial version.

Status Definitions

Status	Definition
DRAFT	The content of this document is under review and subject to formal approval, which may result in modifications or additions.
APPROVED or unmarked	The content of this document has been approved for publication.

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