

---

## PMIC Solution for RZ/N2H and RZ/T2H

### Power Tree

---

This document describes all the register default settings of the RAA215310 and DA9217 for supplying power for the RZ/N2H and RZ/T2H systems.

The RAA215310 is a high-performance, low cost 7-channel PMIC designed for 32-bit and 64-bit MCU/P MPU applications. The internally compensated regulators provide a highly integrated, small footprint power solution for System-On-Module applications.

The DA9217 operates as a single-channel dual-phase buck converter that is capable of delivering up to 6A output current.

### Target Device

- RZ/N2H
- RZ/T2H

## Contents

1. Terms and Definitions .....	2
2. References .....	2
3. Power Tree .....	2
4. Power Requirements .....	3
5. Power-On/Off Sequences .....	3
6. Variant Table and Ordering Information .....	4
7. Detailed Description .....	5
8. Revision History .....	8

# 1. Terms and Definitions

- ABS – Audio Band Suppression
- CH<x> – Channel <x>, where x = 1 to 4
- DVC – Dynamic Voltage Control
- DVS – Dynamic Voltage Scaling
- GPIO – General Purpose Input/Output
- LDO – Low Drop Out linear regulator
- MPIO – Multipurpose Input/Output
- PG – Power Good
- QFN – Quad Flat-pack No-lead (package)
- UVP – Undervoltage Protection
- WLCSP – Wafer Lever Chip Scale Package

# 2. References

- [DA9217 Datasheet](#)
- [DA9217 – Adjusting VOUT above 1.9V Application Note](#)
- [ISL85009 Datasheet](#)

# 3. Power Tree

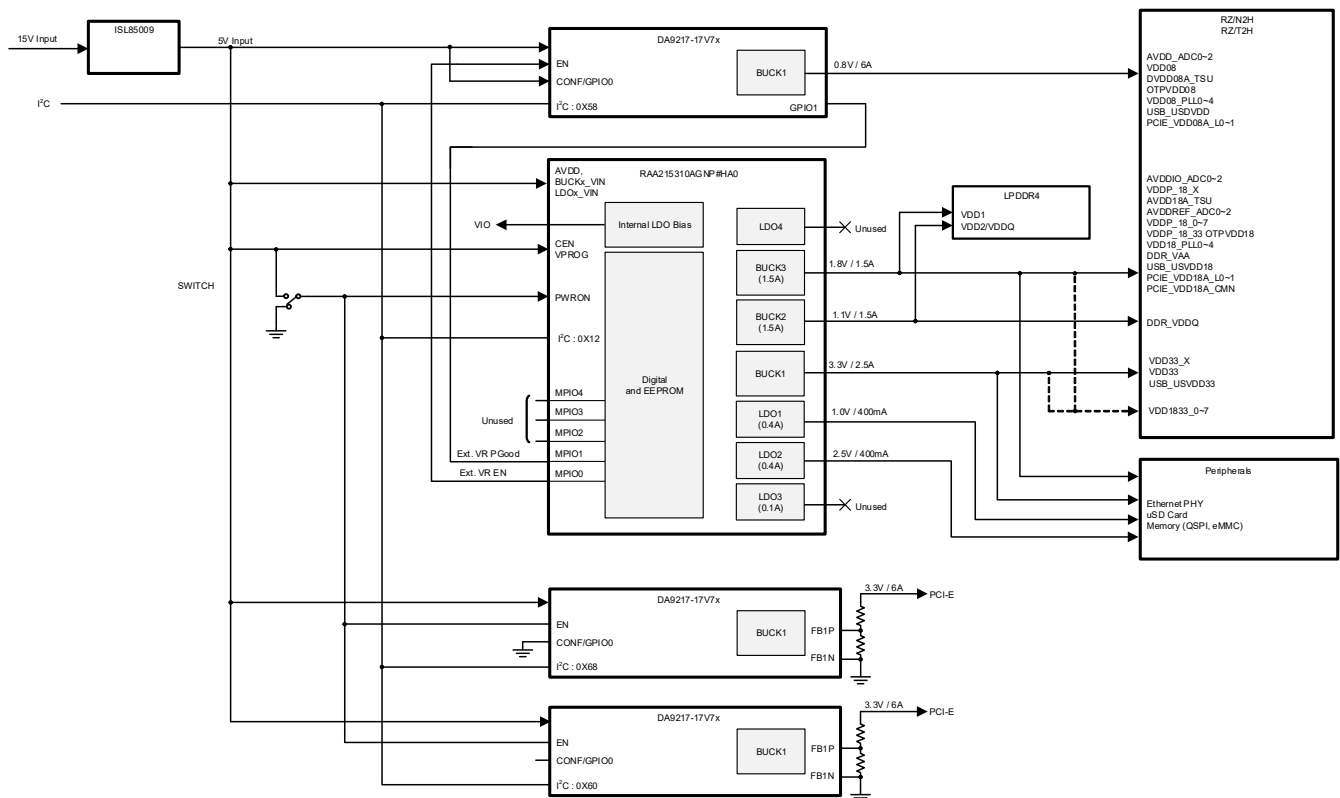


Figure 1. RAA215310 and DA9217 – RZ/N2H and RZ/T2H Power Tree

## 4. Power Requirements

All rails are sequenced from the PMIC\_PWRON signal. The 0.8V rail from DA9217 is the first rail to startup and the final rail to shutdown.

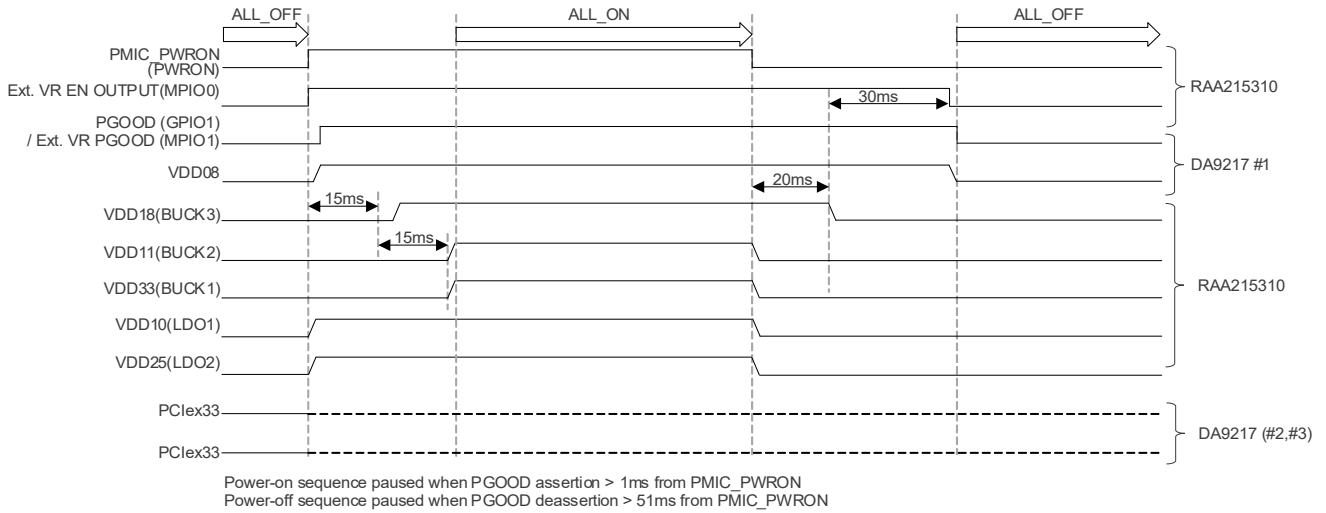


Figure 2. RZ/N2H Power-On/Off Sequence

## 5. Power-On/Off Sequences

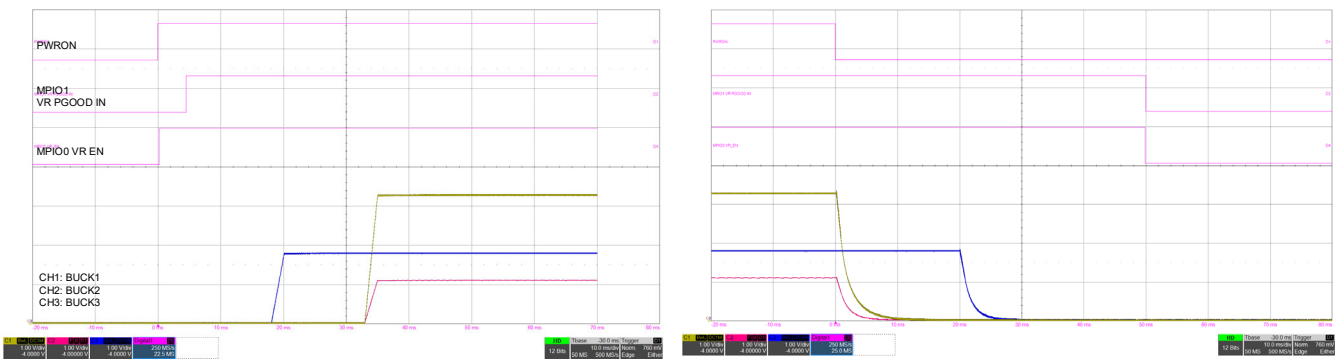


Figure 3. RAA215310 Power-On/Off Sequence

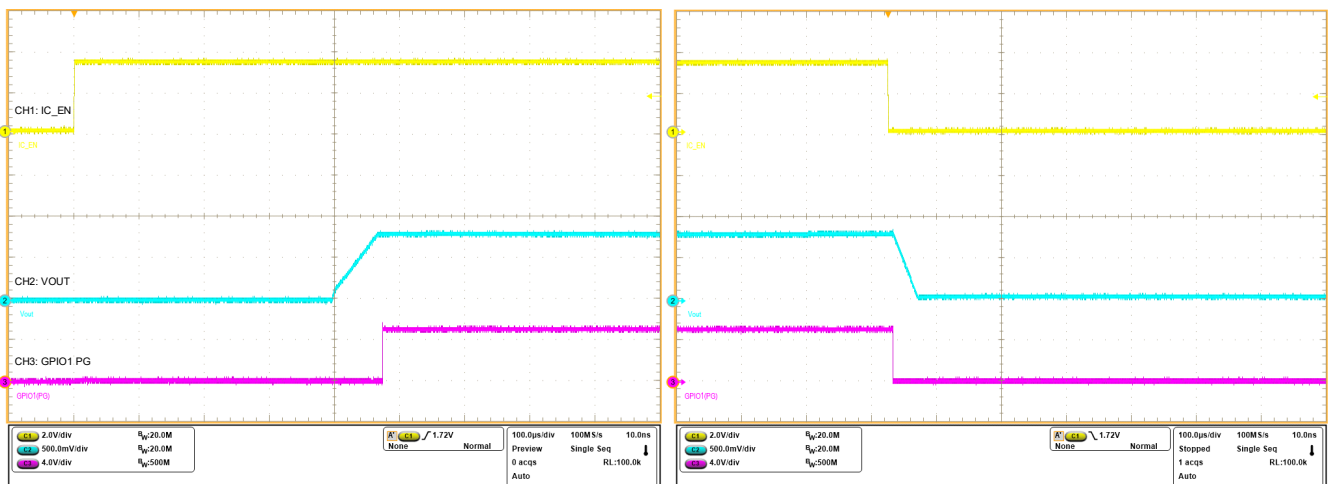


Figure 4. DA9217 (0.8V) Power-On/Off Sequence

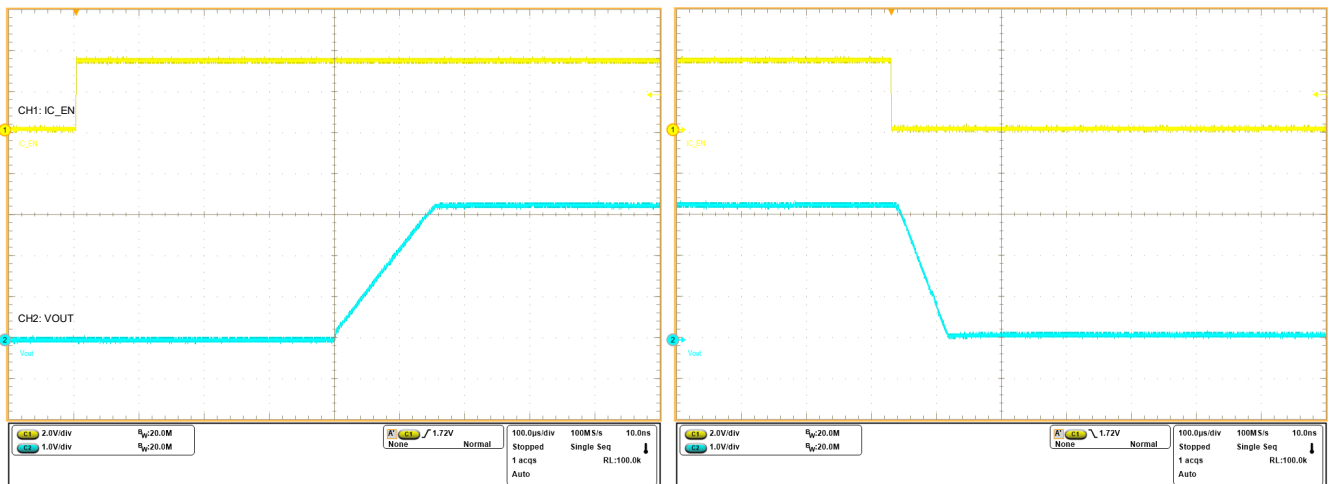


Figure 5. DA9217 (3.3V) Power-On/Off Sequence

## 6. Variant Table and Ordering Information

Table 1. Variant Table

Part Number	Package	Size	Shipment Form	Pack Quantity
DA9217-17V72	24 WLCSP	2.48x1.68	Tape & Reel	4500
DA9217-17V76	24 WLCSP	2.48x1.68	Waffle Tray	140
RAA215310AGNP#HA0	32 QFN	5.0x5.0	Tape & Reel	1000
ISL85009FRZ-T	15 QFN	3.5x3.5	Tape & Reel	6000

## 7. Detailed Description

**Table 2. Register Settings RAA215310AGNP#HA0**

Register Address	Register Name	Default Value	Description
0x1E	Main Slave Address	0x00	Slave Address = 0x12
0x20	Buck1 Enable	0x05	Buck1 Enabled in Active state, disabled in Sleep state. ABS enabled. Phase Sync and Spread Spectrum modes disabled.
0x21	Buck1 ACTIVE	0x2A	Buck1 Output in Active state = 3.3V (Auto)
0x22	Buck1 SLEEP	0x2A	Buck1 Output in Sleep state = 3.3V (Disabled)
0x23	Buck1 Power On	0x1E	Buck1 Power-on Delay = 30ms
0x24	Buck1 Power Off	0x00	Buck1 Power-off Delay = 0
0x25	Buck1 SR	0x5A	Buck1 Start Up and Shutdown time = 2ms DVS ramp-up and ramp-down slew rate = 8mV/μs
0x26	Buck1 Config	0x92	Buck1 Switching frequency = 1MHz Output discharge = Medium
0x27	Buck2 Enable	0x05	Buck2 Enabled in Active state, disabled in Sleep state. ABS enabled, Phase Sync and Spread Spectrum modes disabled.
0x28	Buck2 ACTIVE	0x14	Buck2 Output in Active state = 1.1V (Auto)
0x29	Buck2 SLEEP	0x14	Buck2 Output in Sleep state = 1.1V (Disabled)
0x2A	Buck2 Power On	0x1E	Buck2 Power-on Delay = 30ms
0x2B	Buck2 Power Off	0x00	Buck2 Power-off Delay = 0
0x2C	Buck2 SR	0x55	Buck2 Start Up and Shutdown time = 2ms DVS ramp-up and ramp-down slew rate = 4mV/μs
0x2D	Buck2 Config	0x0E	Buck2 Switching frequency = 0.833MHz Output discharge = Medium
0x2E	Buck3 Enable	0x05	Buck3 Enabled in Active state, disabled in Sleep state. ABS enabled, Phase Sync and Spread Spectrum modes disabled.
0x2F	Buck3 ACTIVE	0x0C	Buck3 Output in Active state = 1.8V (Auto)
0x30	Buck3 SLEEP	0x0C	Buck3 Output in Sleep state = 1.8V (Disabled)
0x31	Buck3 Power On	0x0F	Buck3 Power-on Delay = 15ms
0x32	Buck3 Power Off	0x05	Buck3 Power-off time = 20ms
0x33	Buck3 SR	0x5A	Buck3 Start Up and Shutdown time = 2ms DVS ramp-up and ramp-down slew rate = 8mV/μs
0x34	Buck3 Config	0x9E	Buck3 Switching Frequency = 1.54MHz Output discharge = Medium
0x40	LDO1 ACTIVE0	0x22	LDO1 Active 0 setting = 1.0V Bypass operation disabled.
0x41	LDO1 ACTIVE1	0x02	LDO1 Active 1 setting = 1.0V
0x42	LDO1 SLEEP	0x02	LDO1 Disabled in Sleep state.
0x43	LDO1 Power On	0x00	LDO1 Power-on delay = 0
0x44	LDO1 Power Off	0x00	LDO1 Power-off delay = 0

Table 2. Register Settings RAA215310AGNP#HA0 (Cont.)

Register Address	Register Name	Default Value	Description
0x45	LDO1 SR	0x5A	LDO1 Start Up and Shutdown time = 2ms DVS ramp-up and ramp-down slew rate = 8mV/μs
0x46	LDO2 ACTIVE0	0x31	LDO2 Active 0 setting = 2.5V Bypass operation disabled.
0x47	LDO2 ACTIVE1	0x11	LDO2 Active 1 setting = 2.5V
0x48	LDO2 SLEEP	0x11	LDO2 Disabled in Sleep state.
0x49	LDO2 Power On	0x00	LDO2 Power-on delay = 0
0x4A	LDO2 Power Off	0x00	LDO2 Power-off delay = 0
0x4B	LDO2 SR	0x5A	LDO2 Start Up and Shutdown time = 2ms DVS ramp-up and ramp-down slew rate = 8mV/μs
0x4C	LDO3 ACTIVE	0x00	LDO3 Disabled in Active state.
0x4D	LDO3 SLEEP	0x00	LDO3 Disabled in Sleep state.
0x51	LDO4 ENABLE	0x00	LDO4 Disabled in Active and Sleep states.
0x54	LDOs Config	0xAA	All LDOs discharge = Medium
0x69	Fault Config 1	0x07	A Buck undervoltage fault shuts down ALL rails
0x6A	Fault Config 2	0x00	An LDO undervoltage fault does not shut down any rail
0x6B	Fault Config 3	0x00	A Buck overvoltage fault does not shut down any rail
0x6F	Config 1	0x62	Temp. Warning = 120C AVDD UVP = 2.7V PWRON = ON/OFF Switch
0x72	MPIO0 Power On	0x00	Power-on delay = 0
0x73	MPIO0 Power Off	0x32	Power-off delay = 50ms
0x74	MPIO1 Power On	0x01	Power-on delay = 1ms
0x75	MPIO1 Power Off	0x33	Power-off delay = 51ms
0x8A	MPIO0 Config	0x3E	External VR EN Output, Active High, CMOS Output
0x8B	MPIO1 Config	0x22	External VR PGood Input, Active High
0x90	PWRON Polarity Config	0x01	PWRON = Active High

**Table 3. Register Settings DA9217-17V7x, CONF = Low (I<sup>2</sup>C Target Address is 0x68 for 7-bits, 0xD0 for 8-bits)**

Register Address	Register Name	Default Value	Description
0x07	SYS_MASK_0	0x07	nIRQ interrupt, all masked
0x08	SYS_MASK_1	0xFF	nIRQ interrupt, all masked
0x09	SYS_MASK_2	0x07	nIRQ interrupt, all masked
0x0A	SYS_MASK_3	0x0F	nIRQ interrupt, all masked
0x0D	SYS_CONFIG_2	0x01	Over current latch-off function is disabled. PG is not masked during DVC. 1CH-2PH configuration.
0x0E	SYS_CONFIG_3	0x02	Oscillator tuning (OSC_TUNE) is off. I2C_TIMEOUT is enabled.
0x10	SYS_GPIO0_0	0x00	GPIO0 is set to CONF pin.
0x20	BUCK_BUCK1_0	0x49	CH1 is enabled by default. DVC ramp-up and ramp-down slew rate is set to 20mV/μs.
0x21	BUCK_BUCK1_1	0x46	VOUT discharge resistor is enabled. Soft start slew rate is set to 10mV/μs and shut-down slew rate is set to 20mV/μs.
0x22	BUCK_BUCK1_2	0x05	ILIM is set to 5.5A/phase.
0x23	BUCK_BUCK1_3	0xBE	Maximum output voltage is set to 1.9V.
0x24	BUCK_BUCK1_4	0x0F	Buck is set to auto mode (both CH1_A_MODE and CH1_B_MODE). CH1_A_VOUT is selected by default.
0x25	BUCK_BUCK1_5	0xA5	CH1_A_VOUT = 1.65V
0x26	BUCK_BUCK1_6	0xA5	CH1_B_VOUT = 1.65V

**Table 4. Register Settings DA9217-17V7x, CONF = High (I<sup>2</sup>C Target Address is 0x58 for 7-bits, 0xB0 for 8-bits)**

Register Address	Register Name	Default Value	Description
0x07	SYS_MASK_0	0x07	nIRQ interrupt, all masked
0x08	SYS_MASK_1	0xFF	nIRQ interrupt, all masked
0x09	SYS_MASK_2	0x07	nIRQ interrupt, all masked
0x0A	SYS_MASK_3	0x0F	nIRQ interrupt, all masked
0x0D	SYS_CONFIG_2	0x01	Over current latch-off function is disabled. PG is not masked during DVC. 1CH-2PH configuration.
0x0E	SYS_CONFIG_3	0x02	Oscillator tuning (OSC_TUNE) is off. I2C_TIMEOUT is enabled.
0x10	SYS_GPIO0_0	0x00	GPIO0 is set to CONF pin.
0x12	SYS_GPIO1_0	0x11	GPIO1 is set to power good. Push pull configuration
0x13	SYS_GPIO1_1	0x00	GPIO1 debounce time = 100μs. Pull-up to AVDD, Active High, Dual-edge triggered
0x20	BUCK_BUCK1_0	0x49	CH1 is enabled by default. DVC ramp-up and ramp-down slew rate is set to 20mV/μs.
0x21	BUCK_BUCK1_1	0x46	VOUT discharge resistor is enabled. Soft start slew rate is set to 10mV/μs and shut-down slew rate is set to 20mV/μs.
0x22	BUCK_BUCK1_2	0x05	ILIM is set to 5.5 A/phase.

**Table 4. Register Settings DA9217-17V7x, CONF = High (I<sup>2</sup>C Target Address is 0x58 for 7-bits, 0xB0 for 8-bits) (Cont.)**

Register Address	Register Name	Default Value	Description
0x23	BUCK_BUCK1_3	0xBE	Maximum output voltage is set to 1.9V.
0x24	BUCK_BUCK1_4	0x0F	Buck is set to auto mode (both CH1_A_MODE and CH1_B_MODE). CH1_A_VOUT is selected by default.
0x25	BUCK_BUCK1_5	0x50	CH1_A_VOUT = 0.8V
0x26	BUCK_BUCK1_6	0x50	CH1_B_VOUT = 0.8V

**Table 5. Register Settings DA9217-17V7x, CONF = Hi-Z (I<sup>2</sup>C Target Address is 0x60 for 7-bits, 0xC0 for 8-bits)**

Register Address	Register Name	Default Value	Description
0x07	SYS_MASK_0	0x07	nIRQ interrupt, all masked
0x08	SYS_MASK_1	0xFF	nIRQ interrupt, all masked
0x09	SYS_MASK_2	0x07	nIRQ interrupt, all masked
0x0A	SYS_MASK_3	0x0F	nIRQ interrupt, all masked
0x0D	SYS_CONFIG_2	0x01	Over current latch-off function is disabled. PG is not masked during DVC. 1CH-2PH configuration.
0x0E	SYS_CONFIG_3	0x02	Oscillator tuning (OSC_TUNE) is off. I2C_TIMEOUT is enabled.
0x10	SYS_GPIO0_0	0x00	GPIO0 is set to CONF pin.
0x20	BUCK_BUCK1_0	0x49	CH1 is enabled by default. DVC ramp-up and ramp-down slew rate is set to 20mV/μs.
0x21	BUCK_BUCK1_1	0x46	VOUT discharge resistor is enabled. Soft start slew rate is set to 10mV/μs and shut-down slew rate is set to 20mV/μs.
0x22	BUCK_BUCK1_2	0x05	ILIM is set to 5.5A/phase.
0x23	BUCK_BUCK1_3	0xBE	Maximum output voltage is set to 1.9V.
0x24	BUCK_BUCK1_4	0x0F	Buck is set to auto mode (both CH1_A_MODE and CH1_B_MODE). CH1_A_VOUT is selected by default.
0x25	BUCK_BUCK1_5	0xA5	CH1_A_VOUT = 1.65V
0x26	BUCK_BUCK1_6	0xA5	CH1_B_VOUT = 1.65V

## 8. Revision History

Revision	Date	Description
1.03	Mar 18, 2025	Corrected part number and link in References section.
1.02	Oct 21, 2024	Updated Figure 1.
1.01	Aug 12, 2024	Updated Figure 1.
1.00	Jul 5, 2024	Initial release



## IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01)

### Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,  
Koto-ku, Tokyo 135-0061, Japan  
[www.renesas.com](http://www.renesas.com)

### Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

### Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit [www.renesas.com/contact-us/](http://www.renesas.com/contact-us/).