RAA215300

Custom Configuration Variants

This document describes register settings for the RAA215300 variants for supplying power to different RZ MPU systems. For more information about the device, see the *RAA215300 Datasheet*.

Overview

RAA215300 has six high-efficiency buck regulators and three LDOs to provide a complete power system. The internal device registers and EEPROM can configure and optimize the RAA215300 for different application requirements, for example, power sequences, output voltages, and switching frequencies. Dynamic Voltage Scaling (DVS) and Sleep modes are supported. Table 1 shows a summary of the voltage and current capabilities for each of the analog resources.

The RAA215300 is available in an 8x8mm, 0.5mm pitch 56-lead QFN package and is specified for operation across a -40°C to 105°C ambient and -40°C to 125°C junction temperature range.

Table 1. RAA215300 Power Ratings

-	Input Voltage	Output Voltage	Current Capability	Comments
Buck1	2.7V - 5.5V	0.8V - 1.5V	5A	▪ Programmable power sequencing and output voltages ▪ Auto PFM/PWM and FPWM (including ultrasonic PFM option), with selectable PWM switching frequency ▪ Spread spectrum ▪ Dynamic voltage scaling and sleep modes ▪ Integrated voltage supervisor for undervoltage and overvoltage ▪ Internal compensation
Buck2	2.7V - 5.5V	1.1V - 1.85V	1.5A	
Buck3	2.7V - 5.5V	1.8V - 3.3V	1.5A	
Buck4	2.7V - 5.5V	0.8V - 3.3V	3.5A	
Buck5	2.7V - 5.5V	1.2V - 3.3V	0.6A	
Buck6 (VTTREF Enabled)	2.7V - 5.5V	1.1V - 2.6V (VREFIN/2)	1A	
LDO1	2.7V - 5.5V	0.8V - 3.3V	300mA	▪ Programmable power sequencing and output voltages ▪ Dynamic voltage scaling and sleep modes ▪ Bypass mode ▪ Integrated voltage supervisor for undervoltage
LDO2	2.7V - 5.5V	0.8V - 3.3V	300mA	
LDO3	2.7V - 5.5V	0.8V - 3.3V	50mA	

Variants

There are multiple variants of the RAA215300 PMIC to power different MPUs. Table 2 shows the detailed differences for the available part numbers.

Table 2. RAA215300 Variant Overview

-	Parameter	#HA0/ #HA1	#HA2	#HA3	#HA5	#HA8
Buck1	VOUT {ACTIVE} (V)	1.1	0.9	0.95	1.03	0.8
	VOUT {SLEEP} (V)	1.1	Disabled	Disabled	1.03	Disabled
	Power-On Delay (ms)	2	15	2	7	10
	Power-Off Delay (ms)	60	14	15	50	10
Buck2	VOUT {ACTIVE} (V)	1.2	1.8	1.1	1.5	1.1
	VOUT {SLEEP} (V)	1.2	1.8	1.1	1.5	1.1
	Power-On Delay (ms)	3	2	8	7	11
	Power-Off Delay (ms)	59	50	0	50	9
Buck3	VOUT {ACTIVE} (V)	1.8	1.8	3.3	1.8	1.8
	VOUT {SLEEP} (V)	1.8	Disabled	Disabled	1.8	Disabled
	Power-On Delay (ms)	2	15	8	2	15
	Power-Off Delay (ms)	60	14	0	60	5
Buck4	VOUT {ACTIVE} (V)	3.3	3.3	0.95	3.3	0.9
	VOUT {SLEEP} (V)	3.3	3.3	Disabled	3.3	Disabled
	Power-On Delay (ms)	10	12	0	10	10
	Power-Off Delay (ms)	0	20	20	0	10
Buck5	VOUT {ACTIVE} (V)	1.2	1.2	1.8	1.2	1.2
	VOUT {SLEEP} (V)	1.2	1.2	Disabled	1.2	Disabled
	Power-On Delay (ms)	15	19	6	15	20
	Power-Off Delay (ms)	0	10	5	0	0
Buck6 (May be used as DDR termination regulator when set appropriately.)	VTTREF	Enabled	Enabled	Disabled	Enabled	Enabled
	Soft start	Linked to Buck2	Independent	-	Linked to Buck2	Independent
	{ACTIVE} mode	Forced PWM	Forced PWM	-	Forced PWM	Forced PWM
	{SLEEP} mode	Auto PFM/PWM	Forced PWM	-	Auto PFM/PWM	Forced PWM
	VOUT {ACTIVE} (V)	VREFIN/2	VREFIN/2	Disabled	VREFIN/2	VREFIN/2
	VOUT {SLEEP} (V)	VREFIN/2	VREFIN/2	Disabled	VREFIN/2	VREFIN/2
	Power-On Delay (ms)	10	4	-	10	12
	Power-Off Delay (ms)	0	50	-	0	8
LDO1	VOUT {ACTIVE} (V)	3.3/1.8	3.3/1.8	1.8/1.8	3.3/1.8	0.8/0.8
	VOUT {SLEEP} (V)	1.8	Disabled	Disabled	1.8	Disabled
	Power-On Delay (ms)	10	40	4	10	0
	Power-Off Delay (ms)	0	2	10	0	20

Table 2. RAA215300 Variant Overview (Cont.)

-	Parameter	#HA0/ #HA1	#HA2	#HA3	#HA5	#HA8
LDO2	VOUT {ACTIVE} (V)	3.3/1.8	3.3/1.8	3.3/3.3	3.3/1.8	1.8/1.8
	VOUT {SLEEP} (V)	1.8	Disabled	Disabled	1.8	Disabled
	Power-On Delay (ms)	10	40	8	10	5
	Power-Off Delay (ms)	0	2	0	0	15
LDO3	VOUT {ACTIVE} (V)	2.5	1.2	1.8	1.5	1.8
	VOUT {SLEEP} (V)	2.5	1.2	1.8	1.5	1.8
	Power-On Delay (ms)	2	40	4	10	10
	Power-Off Delay (ms)	70	2	10	0	10
MPIO0	Config	Reset Output Open Drain Active Low	Disabled	Reset Output Open Drain Active Low	Reset Output Open Drain Active Low	PGood Input Active High
	Power-On Delay (ms)	70	-	30	70	7
	Power-Off Delay (ms)	0	-	0	0	13
MPIO1	Config	Reset Output Open Drain Active Low	VR EN Output Open Drain Active High	Reset Output Open Drain Active Low	Disabled	VR EN Output Full CMOS Active High
	Power-On Delay (ms)	20	17	30	-	15
	Power-Off Delay (ms)	0	12	0	-	5
MPIO2	Config	Buck5 PGood Output Open Drain Active High	VR EN Output Open Drain Active High	Buck3 PGood Output Full CMOS Active High	Disabled	VR EN Output Full CMOS Active High
	Power-On Delay (ms)	-	19	-	-	20
	Power-Off Delay (ms)	-	5	-	-	0
MPIO3	Config	Disabled	PGood Input Active High	SLEEP# Input Active Low	Disabled	SLEEP# Input Active Low
	Power-On Delay (ms)	-	10	-	-	-
	Power-Off Delay (ms)	-	60	-	-	-
MPIO4	Config	Disabled	Disabled	VR EN Output Open Drain Active High	Disabled	LDO2 PGood Output Full CMOS Active High
	Power-On Delay (ms)	-	-	9	-	-
	Power-Off Delay (ms)	-	-	0	-	-

Table 2. RAA215300 Variant Overview (Cont.)

-	Parameter	#HA0/ #HA1	#HA2	#HA3	#HA5	#HA8
MPIO5	Config	CRST_IN# Active Low	Disabled	CRST_IN# Active Low	CRST_IN# Active Low	All outputs PGood Output Full CMOS Active High
	Power-On Delay (ms)	-	-	-	-	-
	Power-Off Delay (ms)	-	-	-	-	-
-	PWRON Config	#HA0 - Long Push Button #HA1 - On/Off Switch Active High	On/Off switch Active High	Long Push Button Active High	On/Off Switch Active High	On/Off Switch Active High

MPU Compatibility

Table 3 shows the list of MPU devices that are compatible with the specific variant.

Table 3. Target MPU

Feature	#HA0/ #HA1	#HA2	#HA3	#HA5	#HA8
Target MPU	RZ/G2L RZ/G2LC RZ/V2L	RZ/V2H	RZ/G3S	RZ/G1E	TBD

Ordering Information

Part Number[1][2]	Part Marking	Package Description[3] (RoHS Compliant)	Pkg. Dwg. #	Carrier Type[4]	Temperature Range
RAA215300A2GNP#HA0	215300B00	56 Lead, 8.8mm QFN	L56.8x8I	Reel, 1k	-40°C to +105°C
RAA215300A2GNP#HA1	215300B01				
RAA215300A2GNP#HA2	215300B02				
RAA215300A2GNP#HA3	215300B03				
RAA215300A2GNP#HA5	215300B05				
RAA215300A2GNP#HA8	215300B08				

1. These Pb-free plastic packaged products employ special Pb-free material sets, molding compounds/die attach materials, and 100% matte tin plate plus anneal (e3 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations). Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J-STD-020.
2. For Moisture Sensitivity Level (MSL), see the RAA215300 product page. For more information about MSL, see TB363.
3. For the Pb-Free Reflow Profile, see TB493.
4. See TB347 for details about reel specifications.

Revision History

Revision	Date	Description
1.01	Jan 21, 2025	Minor update in Table 2 for the PWRON Config parameter.
1.00	Sep 25, 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

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/.

Trademarks

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