RAA458100GNP / RAA457100GBM

Reading Method for the Average Input Current of Bridge Circuit in Transmitter System

R19AN0049EJ0100
Rev.1.00
Feb 2, 2018

Introduction

This document describes the reading method for the average input current of bridge circuit in AT2, AT3, AT4 and MC1.

Target device

RAA458100GNP

Note : The contents of this document are provided as a reference and do not guarantee the operation in the system. When designing the actual system, thoroughly evaluate the product in the overall system and apply these contents on your own responsibility.

Contents

Related document

The following documents are related to this application note. Also refer to the document when using this application note.

・Datasheet : RAA458100GNP Wireless Charging System Transmitter IC for Low Power Applications

Abbreviations and the meanings

The following table shows the abbreviations and the meanings used in this document.

Term	Description
TxIC	Wireless charging system transmitter IC RAA458100GNP.
RxIC	Wireless charging system receiver IC RAA457100GBM.
TxROM, EEPROM	EEPROM in transmitter system.
TxMCU	The device connected to TxIC by 2-wire interface. (mainly microcomputer)
RxMCU	The device connected to RxIC by 2-wire interface. (mainly microcomputer)
Tx system	Wireless charging transmitter system. It is constructed by “TxIC only” or “TxIC and TxMCU” or “TxIC and EEPROM”.
Rx system	Wireless charging receiver system. It is constructed by “RxIC only” or “RxIC and RxMCU”.
WPT communication	Communication on wireless power transmission carrier signal.
Tx2Rx WPT communication	WPT communication from TxIC to RxIC.
Rx2Tx WPT communication	WPT communication from RxIC to TxIC.
T_Header	The header of Tx2Rx WPT communication packet.
R_Header	The header of Rx2Tx WPT communication packet.
T_0xXX D[X]	Register address and data bit of TxIC. (Example : T_0x02 D[4:1] means that TxIC register address is 0x02, register data bits are D4, D3, D2, D1)
R_0xXX D[X]	Register address and data bit of RxIC. (Example : R_0x10 D[7:5] means that RxIC register address is 0x10, register data bits are D7, D6, D5)

1. Battery charging system configuration in ATPC Mode and MCU Control Mode

Table 1.1 shows the battery charging system configuration and pin setting by using TxIC and RxIC in ATPC Mode and MCU Control Mode. This document describes the reading method for the average input current of bridge circuit in AT2, AT3, AT4 and MC1.

Table 1.1 Battery charging system configuration, pin setting in ATPC Mode and MCU Control Mode

Operation mode					TxIC pin setting					RxIC pin setting				
No.	Tx system		Rx system		MS	ATPC	DUTY6	DUTY7	DUTY8	MS	ATPC	ATCHG	ATR	WRC
	Master	Slave	Master	Slave										
ATPC Mode														
AT1	TxIC	TxROM	RxIC	-	H	H	L	L	L	H	H	L	X	L
AT2	TxMCU	TxIC	RxIC	-	L	H	L	L	L	H	H	L	X	L
AT3	TxMCU	TxIC	RxIC	RxMCU	L	H	L	L	L	H	H	L	X	L
AT4	TxMCU	TxIC	RxMCU	RxIC	L	H	L	L	L	L	H	H	X	L
MCU Control Mode														
MC1	TxMCU	TxIC	RxMCU	RxIC	L	L	L	L	L	L	L	H	L	L

X: Arbitrary value can be selected.

2. Reading method for the average input current of bridge circuit

2.1 Reading method for the average input current of bridge circuit in ATPC Mode

Table 2.1 shows the reading method for the average input current of bridge circuit by TxMCU in ATPC Mode (AT2, AT3, AT4). Figure 2.1 shows the transmitter configuration for wireless charging system in ATPC Mode (AT2, AT3, AT4).

TxMCU should confirm the status of bridge driver circuit before reading the registers for the average input current of bridge circuit. We recommend that TxMCU doesn't execute reading the registers for average input current of bridge circuit when stopping the bridge driver circuit, because of decreasing the A/D conversion accuracy of the average input current for bridge circuit.

Table 2.1 Reading method for the average input current of bridge circuit in ATPC Mode

No.	Item	Description
1	Confirmation of status of the bridge circuit	TxMCU reads T_0x00 and confirms that D6 (auto_drive_on)=1. When T_0x00 D6=1, the bridge driver circuit works. We recommend that TxMCU doesn't execute reading the registers for average input current of bridge circuit when stopping the bridge driver circuit, because of decreasing the A/D conversion accuracy of the average input current for bridge circuit.
2	Uploading the A/D converted results to the registers	TxMCU writes T_0x20 D0 (adc_upload)=1 and uploads the A/D converted results to the registers.
3	Reading the register for average input current of bridge circuit (upper 8 bit)	TxMCU reads T_0x24 and holds the data of ibridge[11:4].
5	Reading the register for average input current of bridge circuit (lower 4 bit)	TxMCU reads T_0x23 and holds the data of ibridge[3:0]. TxMCU processes the data of ibridge[11:0].
6	-	Similarly, TxMCU confirms the status of bridge driver circuit and executes reading the registers for average input current of bridge circuit.
7	Confirmation of status of the bridge circuit	TxMCU reads T_0x00 and confirms that D6 (auto_drive_on)=1. When T_0x00 D6=1, the bridge driver circuit works. We recommend that TxMCU doesn't execute reading the registers for average input current of bridge circuit when stopping the bridge driver circuit, because of decreasing the A/D conversion accuracy of the average input current for bridge circuit.
8	Uploading the A/D converted results to the registers	TxMCU writes T_0x20 D0 (adc_upload)=1 and uploads the A/D converted results to the registers.
9	Reading the register for average input current of bridge circuit (upper 8 bit)	TxMCU reads T_0x24 and holds the data of ibridge[11:4].
10	Reading the register for average input current of bridge circuit (lower 4 bit)	TxMCU reads T_0x23 and holds the data of ibridge[3:0]. TxMCU processes the data of ibridge[11:0].
11	-	. .

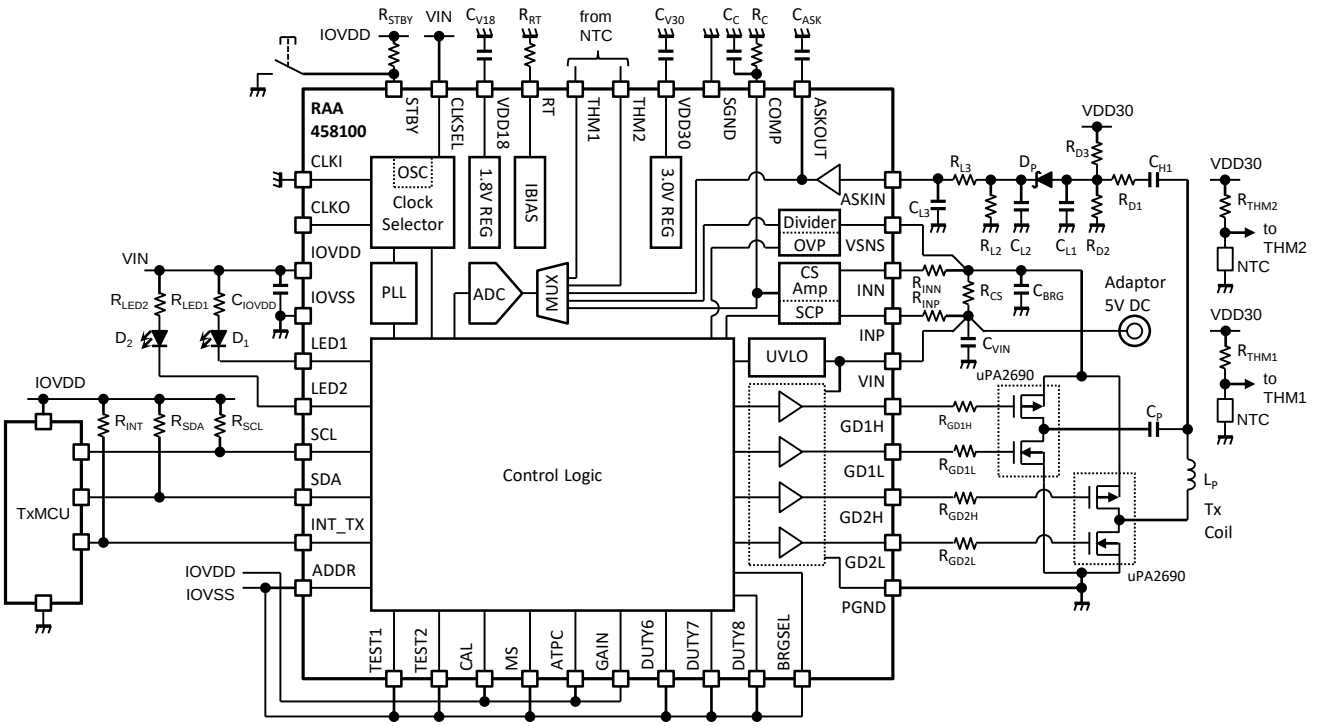

Figure 2.1 Transmitter configuration for wireless charging system in AT2, AT3 and AT4

2.2 Reading method for the average input current of bridge circuit in MCU Control Mode

Table 2.2 shows the reading method for the average input current of bridge circuit by TxMCU in MCU Control Mode (MC1). Figure 2.2 shows the transmitter configuration for wireless charging system in MCU Control Mode (MC1). We recommend that CAL pin of TxIC is set to low level in MCU Control Mode and TxMCU executes the offset calibration. TxIC acquires the offset current of CS amplifier and stores it to the register T_0x2E, T_0x2D at Initial Mode. TxMCU reads these registers and holds the offset current. TxMCU reads the average input current of bridge current after uploading A/D converted results to the registers. After that, TxMCU subtracts the ibridge offset[11:0] from the ibridge[11:0] and executes offset calibration. TxMCU uses this data after offset calibration as the average input current of bridge circuit.

Table 2.2 Reading method for the average input current of bridge circuit in MCU Control Mode

No.	Item	Description
1	Reading the offset current of CS amplifier	TxIC acquires the offset current of CS amplifier and stores it to the register T_0x2E, T_0x2D at Initial Mode. TxMCU reads T_0x2E, T_0x2D and holds the data of ibridge_offset[11:0].
2	Uploading the A/D converted results to the registers	TxMCU writes T_0x20 D0 (adc_upload)=1 and uploads the A/D converted results to the registers.
3	Reading the register for average input current of bridge circuit (upper 8 bit)	TxMCU reads T_0x24 and holds the data of ibridge[11:4].
4	Reading the register for average input current of bridge circuit (lower 4 bit)	TxMCU reads T_0x23 and holds the data of ibridge[3:0].
5	Offset calibration	TxMCU subtracts the ibridge offset[11:0] from the the ibrdge[11:0] and executes offset calibration. TxMCU uses this data after offset calibration as the average input current of bridge circuit.
6	-	Similarly, TxMCU writes T_0x20 D0=1 and reads T_0x24 and T_0x23. TxMCU executes offset calibration and uses this data as the average input current of bridge circuit.
7	Uploading the A/D converted results to the registers	TxMCU writes T_0x20 D0 (adc_upload)=1 and uploads the A/D converted results to the registers.
8	Reading the register for average input current of bridge circuit (upper 8 bit)	TxMCU reads T_0x24 and holds the data of ibridge[11:4].
9	Reading the register for average input current of bridge circuit (lower 4 bit)	TxMCU reads T_0x23 and holds the data of ibridge[3:0].
10	Offset calibration	TxMCU subtracts the ibridge offset[11:0] from the the ibrdge[11:0] and executes offset calibration. TxMCU uses this data after offset calibration as the average input current of bridge circuit.
11	-	. .

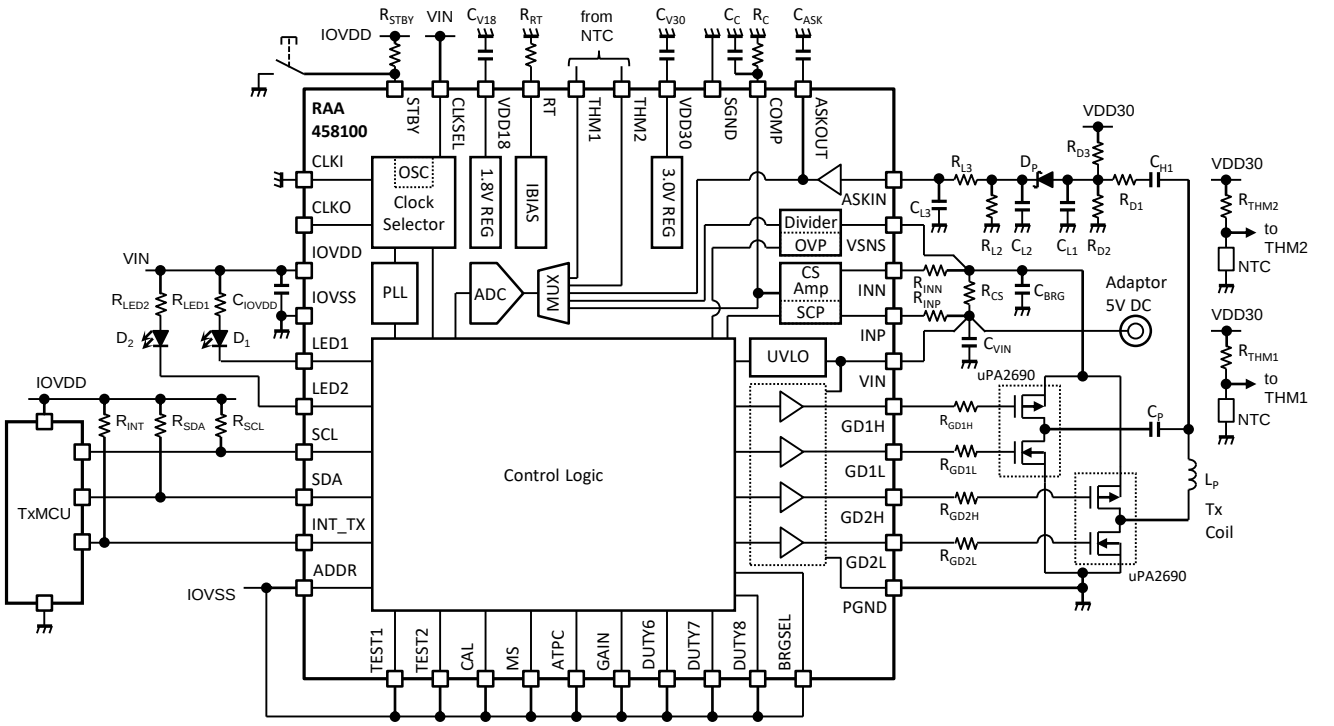

Figure 2.2 Transmitter configuration for wireless charging system in MC1

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Revision Record

Rev.	Date	Description	
		Page	Summary
1.00	Feb. 2, 2018	-	First Edition issued

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(Rev.4.0-1 November 2017)

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Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

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Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5338

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