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RENESAS TECHNICAL UPDATE

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Product Category	MPU/MCU		Document No.	TN-RX*-A0227A/E	Rev.	1.00
Title	Errata to User's Manual: Hardware Regarding the I^2C-bus Interface (RIIC)		Information Category	Technical Notification		
Applicable Product	RX130 Group, RX13T Group, RX230 Group, RX231 Group, RX23W Group, RX23E-A Group, RX65N Group, RX651 Group, RX66T Group, RX72T Group, RX66N Group, RX72N Group, RX72M Group	Lot No. All	Reference Document	User's Manual: Hardware for applicable products (see the table at the last page)		

This document describes corrections to the "I^2C-bus Interface (RIIC)" chapter in User's Manual: Hardware for the applicable products.
Page and section numbers are based on those of the manual for the RX130 Group. Refer to the table on the last page for the corresponding page and section numbers in the other groups.

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The first paragraph of the description for the NACKE bit in section 29.2.6, I^2C-bus Function Enable Register (ICFER) is corrected as follows.

Before correction

This bit is used to specify whether to continue or discontinue the transfer operation when NACK is received from the slave device in transmit mode. Normally, set this bit to 1.

After correction

This bit is used to specify whether to continue or discontinue the data transfer when NACK is received in transmit mode. Normally, set this bit to 1.

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The second paragraph of the description for the AL flag in section 29.2.10, I^2C-bus Status Register 2 (ICSR2) is corrected as follows.

Before correction

The RIIC can also set the flag to indicate the detection of loss of arbitration during NACK transmission in master mode or during data transmission in slave mode.

After correction

The RIIC can also detect loss of arbitration during NACK transmission in receive mode or during data transmission in slave mode.

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The note for the TDRE flag in section 29.2.10, I²C-bus Status Register 2 (ICSR2) is corrected as follows.

Before correction

Note: When the NACKF flag is set to 1 while the ICFER.NACKE bit is 1, the RIIC aborts data transmission/reception. Here, if the TDRE flag is 0 (next transmit data has been written), data is transferred to the ICDRS register and the ICDRT register becomes empty at the rising edge of the ninth clock cycle, but the TDRE flag is not set to 1.

After correction

Note: The NACKF flag becoming 1 while the ICFER.NACKE bit is 1 suspends data transmission and reception by the RIIC. Even if the next data for transmission has already been written to the ICDRT register (the TDRE flag is 0), the data in the ICDRT register is retained but not transferred to the ICDRS register. At this point, the TDRE flag does not become 1.

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The first paragraph of section 29.7.3, Device-ID Address Detection is corrected as follows.

Before correction

The RIIC module has a facility for detecting device-ID addresses conformant with the I²C-bus specification (Rev. 03). When the RIIC receives 1111 100b as the first byte after a start condition or restart condition was issued with the ICSER.DIDE bit set to 1, the RIIC recognizes the address as a device ID, sets the ICSR1.DID flag to 1 on the rising edge of the eighth SCL clock cycle when the following R/W# bit is 0, and then compares the second and subsequent bytes with its own slave address. If the address matches the value in the slave address register, the RIIC sets the corresponding ICSR1.AASy flag (y = 0 to 2) to 1.

After correction

The RIIC module has a function to detect device-ID addresses complying with the I²C-bus specification. When the RIIC receives 1111 100b as the first seven bits of the first byte following a start condition or a restart condition while the ICSER.DIDE bit is set to 1, the RIIC recognizes the address as a device-ID address, sets the ICSR1.DID flag to 1 on the rising edge of the ninth SCL when the following R/W# bit is 0, and then compares the second and following bytes with its own slave address. If the received address matches the value in the slave address register, the RIIC sets the corresponding ICSR1.AASy flag (y = 0 to 2) to 1.

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Figure 29.28 in section 29.7.3, Device-ID Address Detection is corrected as follows.

Before correction

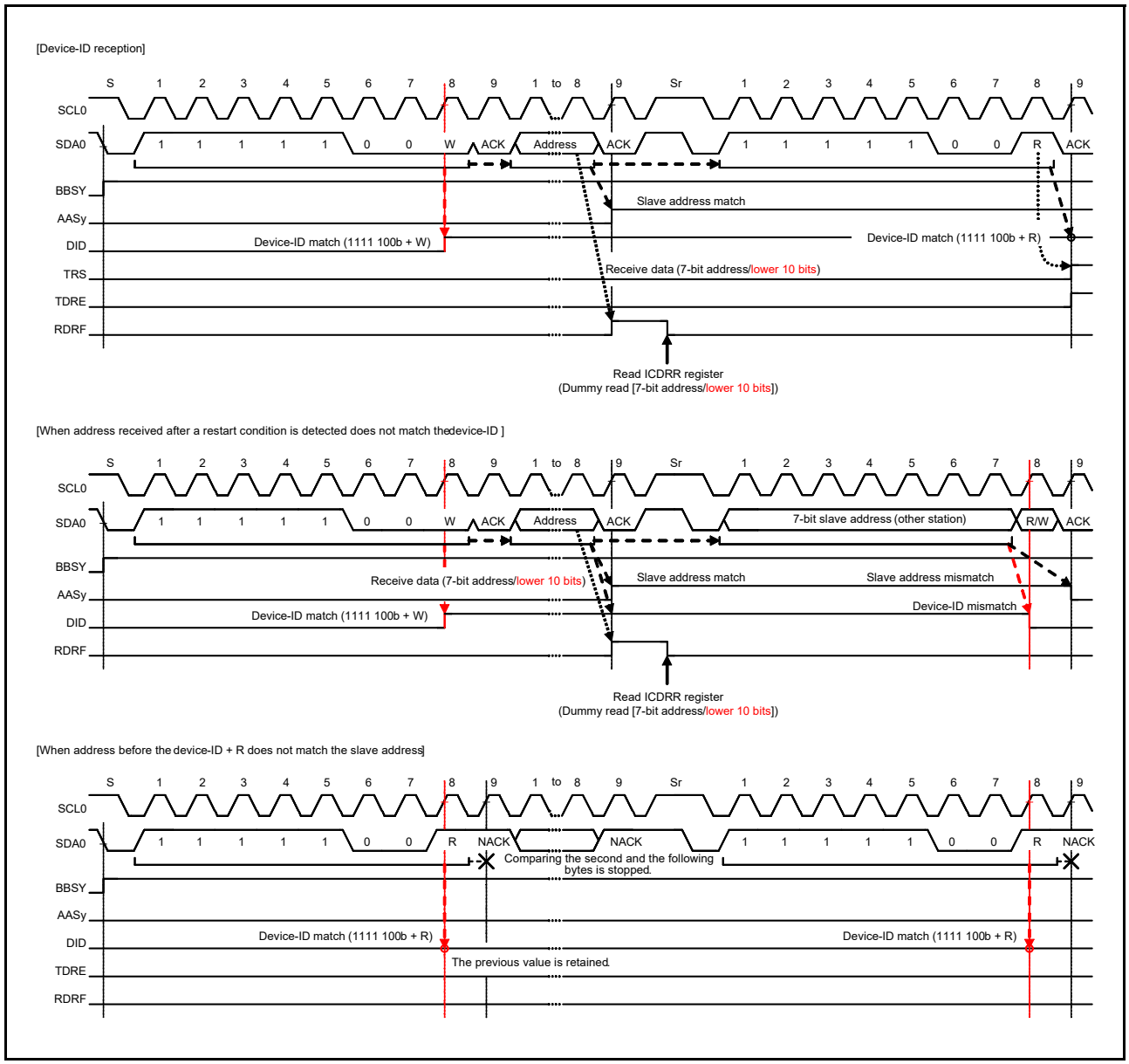
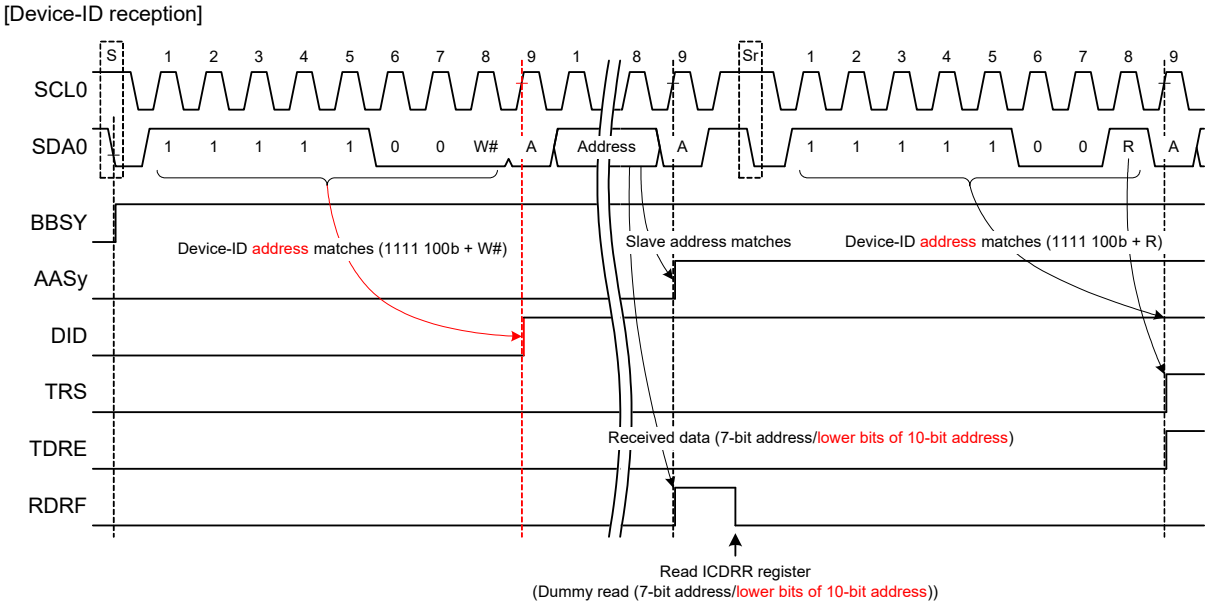
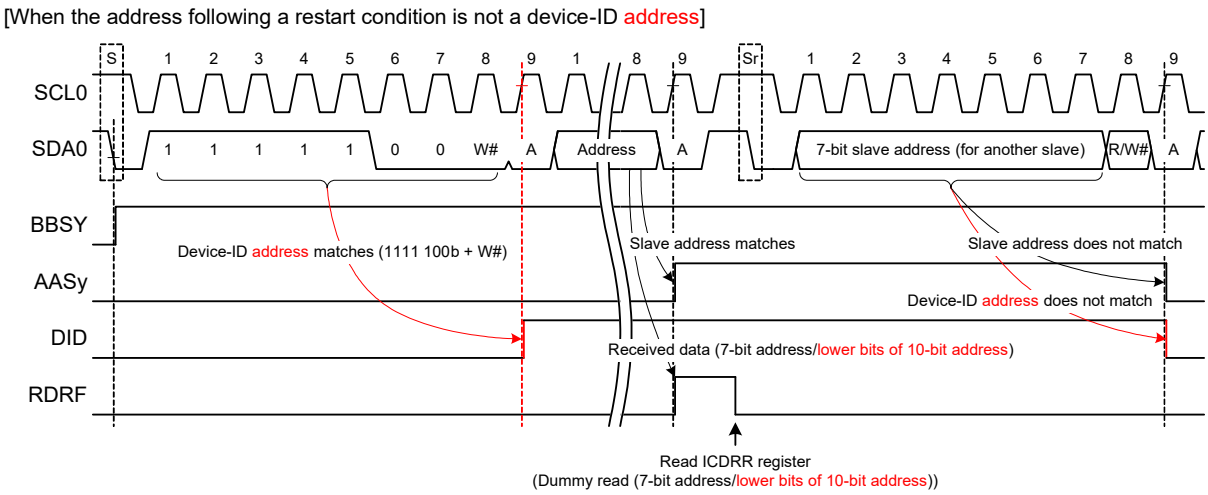


Figure 29.28 AASy/DID Flag Set/Clear Timing during Reception of Device-ID

After correction





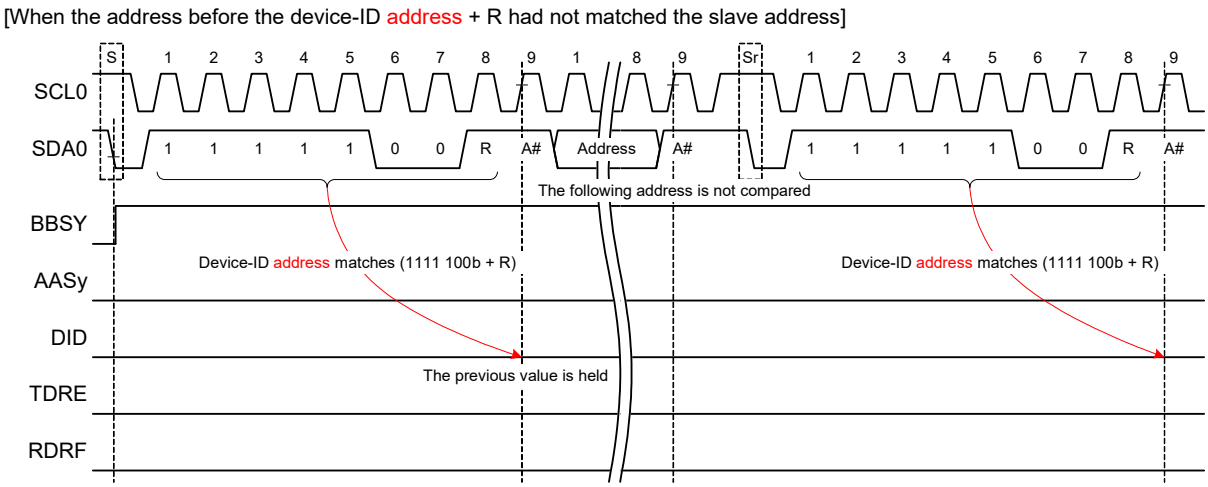


Figure 29.28 Set/Clear Timing of the AASy and DID Flags during Reception of Device-ID Address

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The second paragraph in section 29.8.2, NACK Reception Transfer Abort Function is corrected as follows.

Before correction

If the transfer operation is aborted by this function (ICSR2.NACKF flag is 1), transmit operation and receive operation are discontinued. To restore transmit/receive operation, be sure to set the NACKF flag to 0. In master transmit mode, after setting the NACKF flag to 0, issue a restart condition, or issue a stop condition and then issue a start condition again.

After correction

If the data transmission is suspended (ICSR2.NACKF flag is 1) by this function, the following data transmission and data reception are not started. To resume data transfer, set the NACKF flag to 0. In master transmit mode, restart data transfer by setting the NACKF flag to 0 after generating a restart condition, or restart data transfer from a start condition after generating a stop condition then setting the NACKF flag to 0.

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Figure 29.31 in section 29.8.2, NACK Reception Transfer Abort Function is corrected as follows.

Before correction

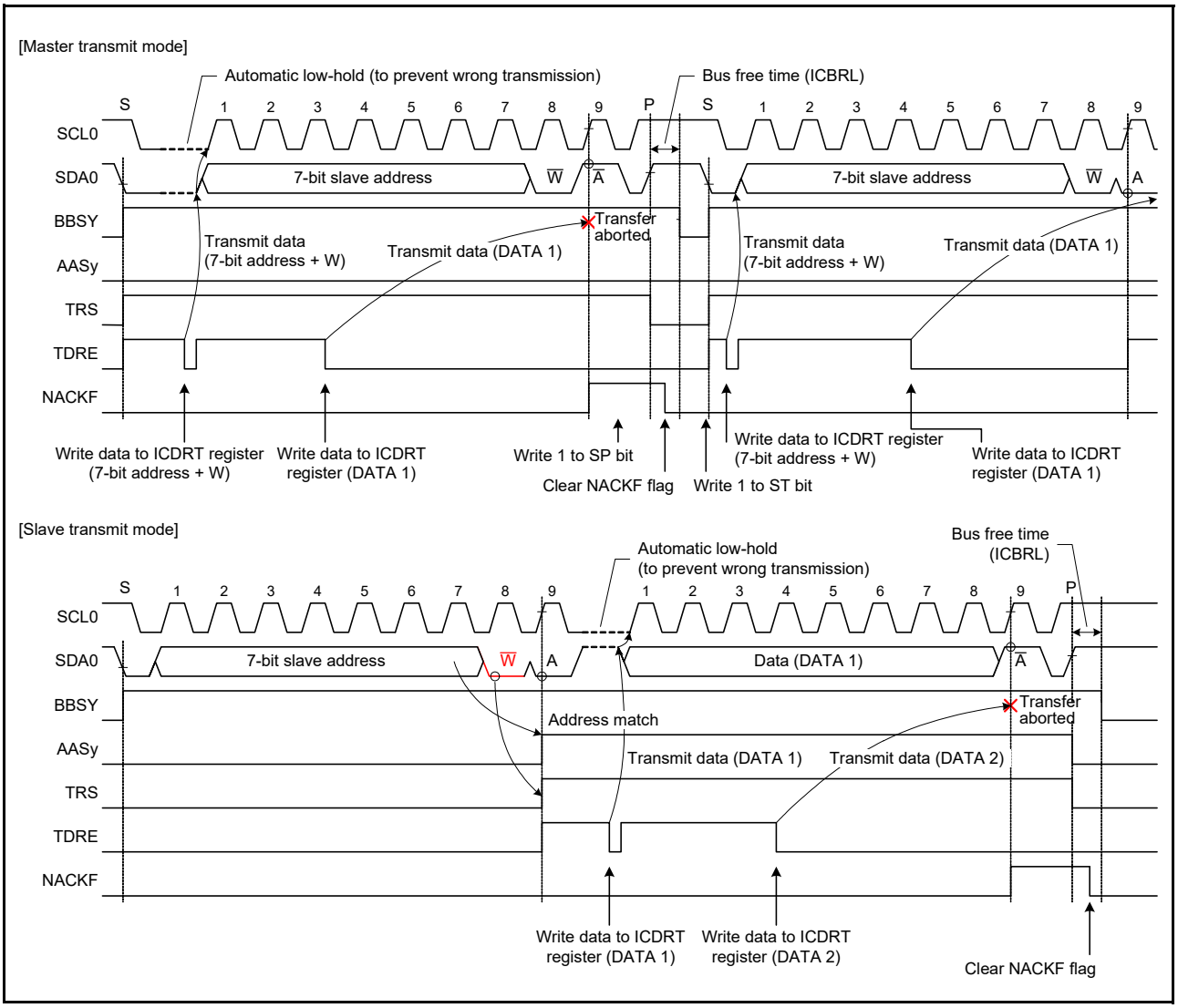

Figure 29.31 Abort of Data Transfer When NACK is Received (NACKE = 1)

After correction

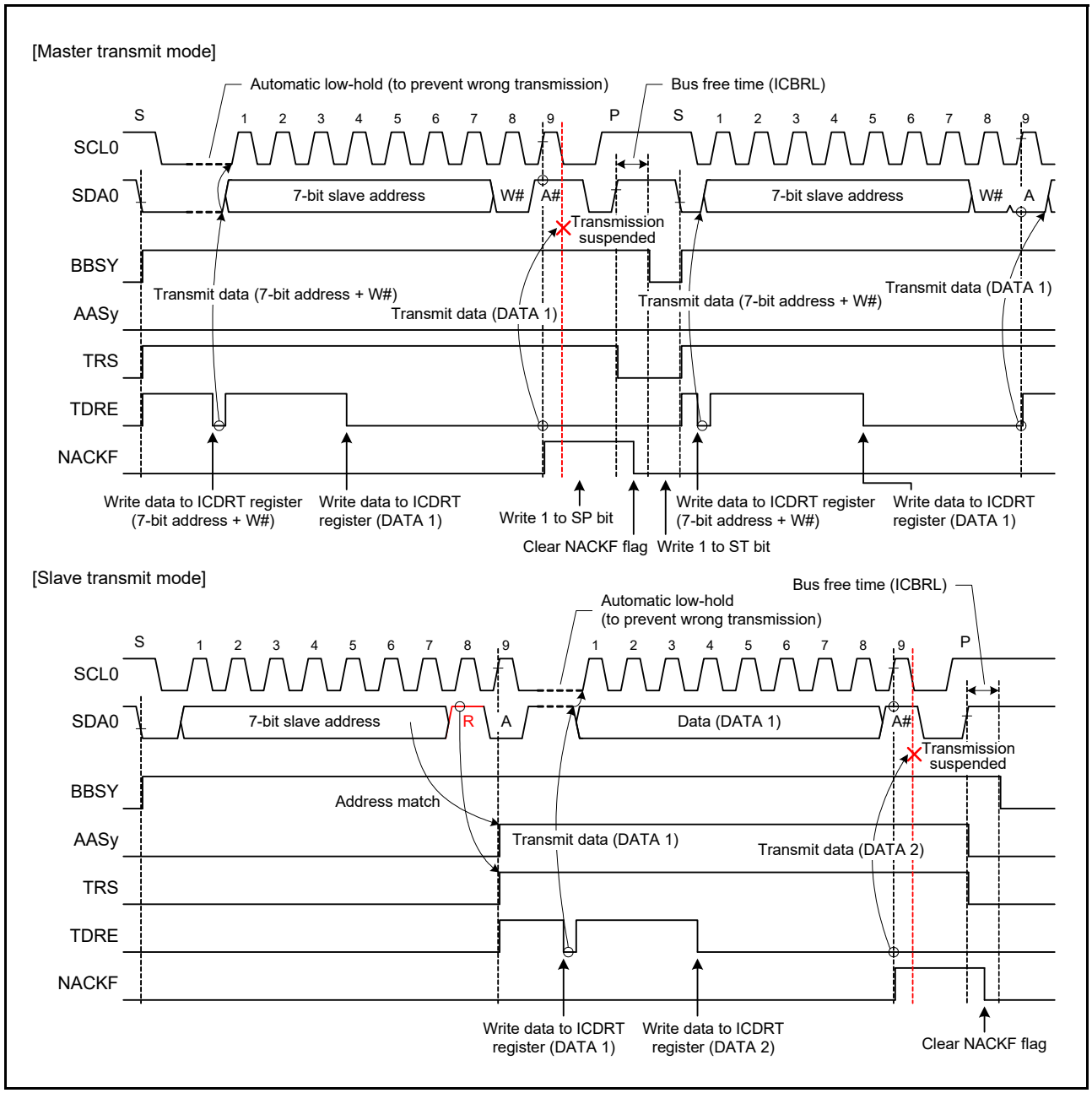

Figure 29.31 Suspension of Data Transmission When NACK is Received (NACKE = 1)

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The third paragraph in section 29.11.2, Extra SCL Clock Cycle Output Function is modified as follows.

Before correction

When the ICCR1.CLO bit is set to 1 in master mode, a single cycle of the SCL clock at the frequency corresponding to the transfer rate settings (settings of the ICMR1.CKS[2:0] bits, and of registers ICBRH and ICBRL) is output as an extra clock cycle. After output of this single cycle of the SCL clock, the CLO bit is automatically set to 0. Therefore, further extra clock cycles can be output consecutively by writing 1 to the CLO bit after confirming the CLO bit to be 0.

After correction

When the ICCR1.CLO bit is set to 1, an additional clock pulse at the frequency set by the ICMR1.CKS[2:0] bits and the ICBRH and ICBRL registers is output from the SCL0 pin. After output of this clock pulse, the CLO bit automatically becomes 0. The SCL0 pin is held low when the ICCR2.BBSY flag is 1 and held high when the BBSY flag is 0. Consecutive additional clock pulses can be output by writing 1 to the CLO bit after confirming the CLO bit to be 0.

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The second sentence in the fifth paragraph of section 29.11.2, Extra SCL Clock Cycle Output Function is deleted as follows.

Before correction

Use this facility with the ICFER.MALE bit (master arbitration-lost detection disabled) set to 0. If the MALE bit is set to 1 (master arbitration-lost detection enabled), arbitration is lost when the value of the ICCR1.SDAO bit does not match the state of the SDA0 line, so take care on this point.

After correction

Use this function with the ICFER.MALE bit set to 0 (master arbitration-lost detection is disabled).

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Figure 29.40 in section 29.11.2, Extra SCL Clock Cycle Output Function is corrected as follows.

Before correction

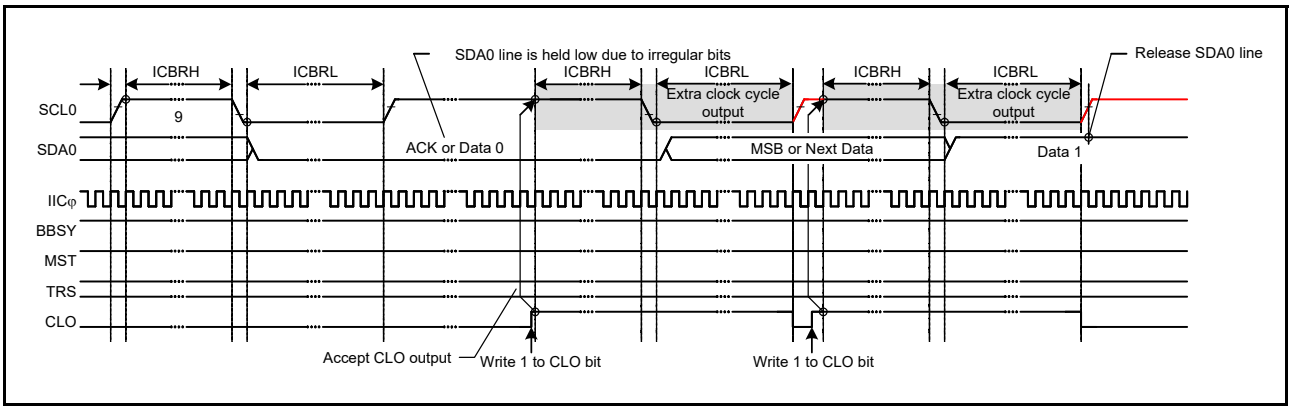

Figure 29.40 Extra SCL Clock Cycle Output Function (CLO Bit)

After correction

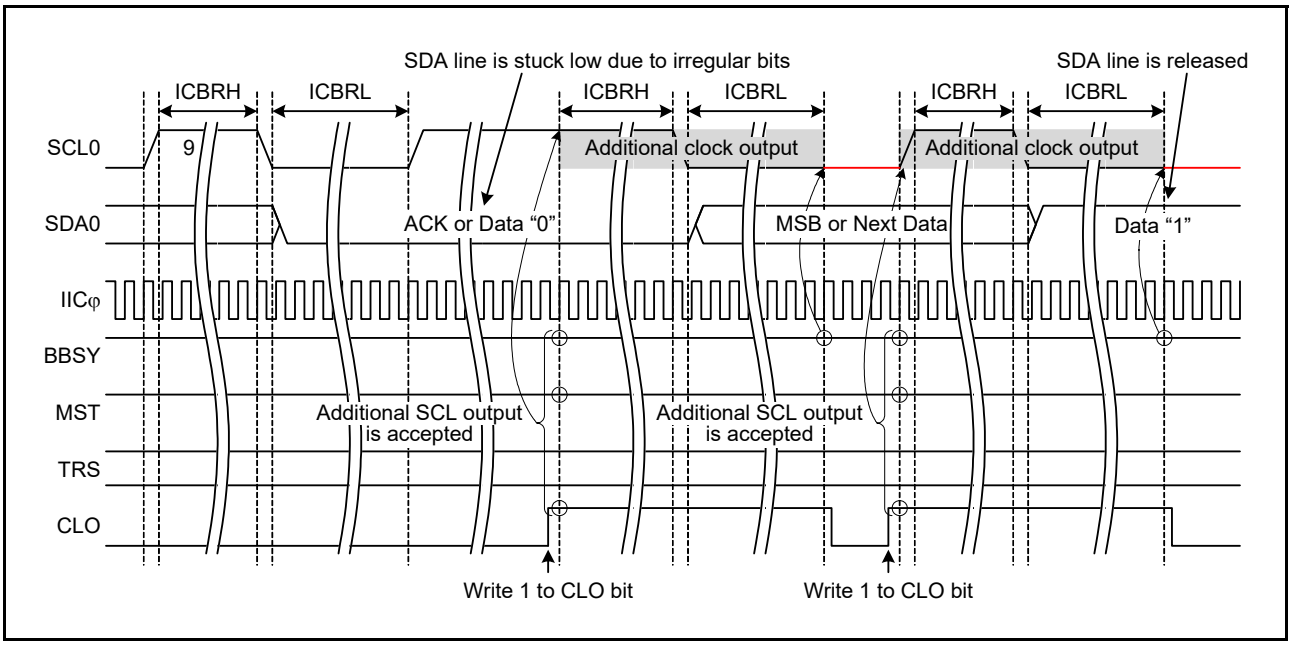

Figure 29.40 Additional SCL Output Function (CLO Bit)

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Table 29.7 in section 29.14, Initialization of Registers and Functions When a Reset is Issued or a Condition is Detected is corrected as follows.

Before correction

Table 29.7 Reset States of Registers and Functions When a Reset is Issued or a Condition is Detected

		MCU Reset	RIIC Reset (ICE = 0, IICRST = 1)	Internal Reset (ICE = 1, IICRST = 1)	Start Condition/ Restart Condition Detection	Stop Condition Detection
ICCR1	ICE, IICRST	To be reset	Retained	Retained	Retained	Retained
	SCLO, SDAO		To be reset	To be reset		
	Others			Retained		
ICCR2	BBSY	To be reset	To be reset	Retained	Retained	Retained
	ST, RS			To be reset	To be reset	
	TRS, MST				Retained	To be reset
	SP				To be reset	
ICMR1	BC[2:0]	To be reset	To be reset	To be reset	To be reset	Retained
	Others			Retained	Retained	
ICMR2		To be reset	To be reset	Retained	Retained	Retained
ICMR3	ACKBT	To be reset	To be reset	Retained	Retained	To be reset
	Others					Retained
ICFER		To be reset	To be reset	Retained	Retained	Retained
ICSER		To be reset	To be reset	Retained	Retained	Retained
ICIER		To be reset	To be reset	Retained	Retained	Retained
ICSR1		To be reset	To be reset	To be reset	Retained	To be reset
ICSR2	TDRE, TEND	To be reset	To be reset	To be reset	Retained	To be reset
	START					
	Others					Retained
SARL0, SARL1, SARL2, SARU0, SARU1, SARU2		To be reset	To be reset	Retained	Retained	Retained
ICBRH, ICBRL		To be reset	To be reset	Retained	Retained	Retained
ICDRT		To be reset	To be reset	Retained	Retained	Retained
ICDRR		To be reset	To be reset	Retained	Retained	Retained
ICDRS		To be reset	To be reset	To be reset	Retained	Retained
Timeout function		To be reset	To be reset	To be reset	Operation	Operation
Bus free time measurement		To be reset	To be reset	Operation	Operation	Operation

To be reset: Registers and functions are initialized.
Retained: Registers and functions are not initialized, but retained or updated according to the state.

After correction

Table 29.7 Reset States of Registers and Functions When a Reset is Applied or a Condition is Detected

		MCU Reset	RIIC Reset (ICE = 0, IICRST = 1)	Internal Reset (ICE = 1, IICRST = 1)	Start Condition/ Restart Condition Detection	Stop Condition Detection
ICCR1	SDAO, SCLO	To be reset	To be reset	To be reset	Retained	Retained
	IICRST, ICE		Retained	Retained		
	Others		To be reset			
ICCR2	ST, RS	To be reset	To be reset	To be reset	To be reset	Retained
	SP					To be reset
	TRS				See note 1	
	MST				See note 1	
	BBSY			Retained	Becomes 1	
ICMR1	BC[2:0]	To be reset	To be reset	To be reset	To be reset	Retained
	Others			Retained	Retained	
ICMR2		To be reset	To be reset	Retained	Retained	Retained
ICMR3	ACKBT	To be reset	To be reset	Retained	Retained	To be reset
	Others					Retained
ICFER		To be reset	To be reset	Retained	Retained	Retained
ICSER		To be reset	To be reset	Retained	Retained	Retained
ICIER		To be reset	To be reset	Retained	Retained	Retained
ICSR1		To be reset	To be reset	To be reset	Retained	To be reset
ICSR2	START	To be reset	To be reset	To be reset	Becomes 1	To be reset
	STOP				Retained	Becomes 1
	TEND					To be reset
	TDRE				See note 1	
	Others				Retained	Retained
SARL0, SARL1, SARL2, SARU0, SARU1, SARU2		To be reset	To be reset	Retained	Retained	Retained
ICBRH, ICBRL		To be reset	To be reset	Retained	Retained	Retained
ICDRT		To be reset	To be reset	Retained	Retained	Retained
ICDRR		To be reset	To be reset	Retained	Retained	Retained
ICDRS		To be reset	To be reset	To be reset	Retained	Retained
Timeout function		To be reset	To be reset	To be reset	Operation	Operation
Bus free time measurement		To be reset	To be reset	Operation	Operation	Operation

Note 1. This bit is not reset. This bit becomes 0 or 1 in accordance with the conditions.

Reference Documents

Applicable Products	Manual Title (Document Number)
RX130 Group	RX130 Group User's Manual: Hardware Rev.3.00 (R01UH0560EJ0300)
RX13T Group	RX13T Group User's Manual: Hardware Rev.1.00 (R01UH0822EJ0100)
RX230 Group, RX231 Group	RX230 Group, RX231 Group User's Manual: Hardware Rev.1.20 (R01UH0496EJ0120)
RX23E-A Group	RX23E-A Group User's Manual: Hardware Rev.1.00 (R01UH0801EJ0100)
RX23W Group	RX23W Group User's Manual: Hardware Rev.1.00 (R01UH0823EJ0100)
RX65N Group, RX651 Group	RX65N Group, RX651 Group User's Manual: Hardware Rev.2.30 (R01UH0590EJ0230)
RX66N Group	RX66N Group User's Manual: Hardware Rev.1.00 (R01UH0825EJ0100)
RX66T Group	RX66T Group User's Manual: Hardware Rev.1.10 (R01UH0749EJ0110)
RX72M Group	RX72M Group User's Manual: Hardware Rev.1.00 (R01UH0804EJ0100)
RX72N Group	RX72N Group User's Manual: Hardware Rev.1.00 (R01UH0824EJ0100)
RX72T Group	RX72T Group User's Manual: Hardware Rev.1.00 (R01UH0803EJ0100)

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