RENESAS TECHNICAL UPDATE

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Product Category	MPU/MCU		Document No.	TN-RA*-A0117A/E	Rev.	1.00
Title	Improve the description of HOCO/MOCO/LOCO User trimming control register		Information Category	Technical Notification		
Applicable Product	RA2L1 Group RA2E1 Group RA2E2 Group RA2E3 Group RA2A2 Group	Lot No.	Reference Document	RA2L1 Group User's Manual: Hardware Rev.1.40 (R01UH0853EJ0140) RA2E1 Group User's Manual: Hardware Rev.1.40 (R01UH0852EJ0140) RA2E2 Group User's Manual: Hardware Rev.1.30 (R01UH0919EJ0130) RA2E3 Group User's Manual: Hardware Rev.1.10 (R01UH0992EJ0110) RA2A2 Group User's Manual: Hardware Rev.1.10 (R01UH1005EJ0110)		
		All				

Improve the description of HOCO/MOCO/LOCO User Trimming Control Register in the User's Manual.

[Before correction of LOCOUTCR: LOCO User Trimming Control Register]

Bit	Symbol	Function	R/W
7:0	LOCOUTRM[7:0]	LOCO User Trimming 0x80: -128 0x81: -127 ⋮ 0xFF: -1 0x00: Center Code 0x01: +1 ⋮ 0x7E: +126 0x7F: +127	R/W

Note: Set the PRCR.PRC0 bit to 1 (write enabled) before rewriting this register.

The LOCOUTCR register is added to the original LOCO trimming data.

MCU operation is not guaranteed when LOCOUTCR is set to a value that causes the LOCO frequency to be outside of the specification range. When LOCOUTCR is modified, the frequency stabilization time corresponds to the frequency stabilization time at the start of MCU operation. When the ratio of the LOCO frequency and the other oscillation frequency is an integer value, changing the LOCOUTCR value is prohibited.

[After correction of LOCOUTCR: LOCO User Trimming Control Register]

Bit	Symbol	Function	R/W
7:0	LOCOUTRM[7:0]	LOCO User Trimming 0xF8: -8 0xF9: -7 ⋮ 0xFF: -1 0x00: 0 0x01: +1 ⋮ 0x06: +6 0x07: +7	R/W

Note: Set the PRCR.PRC0 bit to 1 (write enabled) before rewriting this register.

The LOCOUTCR register is added to the original LOCO trimming data.

The LOCO frequency can be trimmed with a resolution of approximately 3.9% per bit by setting a trimming value in the LOCOUTCR register.
Increasing the trimming value makes the LOCO frequency higher.
Decreasing the trimming value makes the LOCO frequency lower.

MCU operation is not guaranteed when LOCOUTCR is set to a value that causes the LOCO frequency to be outside of the specification range. When LOCOUTCR is modified, the frequency stabilization time corresponds to the frequency stabilization time at the start of MCU operation. When the ratio of the LOCO frequency and the other oscillation frequency is an integer value, changing the LOCOUTCR value is prohibited.

Note. The frequency will vary if the temperature and the power supply voltage change after frequency trimming. In such case, it is essential to perform trimming regularly or before high frequency accuracy is required.

[Before correction of MOCOUTCR: MOCO User Trimming Control Register]

Bit	Symbol	Function	R/W
7:0	MOCOUTRM[7:0]	MOCO User Trimming 0x80: -128 0x81: -127 ⋮ 0xFF: -1 0x00: Center Code 0x01: +1 ⋮ 0x7E: +126 0x7F: +127	R/W

Note: Set the PRCR.PRC0 bit to 1 (write enabled) before rewriting this register.

The MOCOUTCR register is added to the original MOCO trimming data.

MCU operation is not guaranteed when MOCOUTCR is set to a value that causes the MOCO frequency to be outside of the specification range. When MOCOUTCR is modified, the frequency stabilization wait time corresponds to the frequency stabilization wait time at the start of the MCU operation. When the ratio of the MOCO frequency and the other oscillation frequency is an integer value, changing the MOCOUTCR value is prohibited.

[After correction of MOCOUTCR: MOCO User Trimming Control Register]

Bit	Symbol	Function	R/W
7:0	MOCOUTRM[7:0]	MOCO User Trimming 0xF0: -16 0xF1: -15 ⋮ 0xFF: -1 0x00: 0 0x01: +1 ⋮ 0x0E: +14 0x0F: +15	R/W

Note: Set the PRCR.PRC0 bit to 1 (write enabled) before rewriting this register.

The MOCOUTCR register is added to the original MOCO trimming data.

The MOCO frequency can be trimmed with a resolution of approximately 1.2% per bit by setting a trimming value in the MOCOUTCR register.
Increasing the trimming value makes the MOCO frequency higher.
Decreasing the trimming value makes the MOCO frequency lower.

MCU operation is not guaranteed when MOCOUTCR is set to a value that causes the MOCO frequency to be outside of the specification range. When MOCOUTCR is modified, the frequency stabilization wait time corresponds to the frequency stabilization wait time at the start of the MCU operation. When the ratio of the MOCO frequency and the other oscillation frequency is an integer value, changing the MOCOUTCR value is prohibited.

Note. The frequency will vary if the temperature and the power supply voltage change after frequency
       trimming. In such case, it is essential to perform trimming regularly or before high frequency accuracy
       is required.

[Before correction of HOCOUTCR: HOCO User Trimming Control Register]

Bit	Symbol	Function	R/W
7:0	HOCOUTRM[7:0]	HOCO User Trimming 0x80: -128 0x81: -127 ⋮ 0xFF: -1 0x00: Center Code 0x01: +1 ⋮ 0x7E: +126 0x7F: +127	R/W

Note: Set the PRCR.PRC0 bit to 1 (write enabled) before rewriting this register.

The HOCOUTCR register is added to the original HOCO trimming data.

MCU operation is not guaranteed when HOCOUTCR is set to a value that causes the HOCO frequency to be outside of the specification range. When HOCOUTCR is modified, the frequency stabilization wait time corresponds to the frequency stabilization wait time at the start of the MCU operation.

[After correction of HOCOUTCR: HOCO User Trimming Control Register]

Bit	Symbol	Function	R/W
7:0	HOCOUTRM[7:0]	HOCO User Trimming 0xE0: -32 0xE1: -31 ⋮ 0xFF: -1 0x00: 0 0x01: +1 ⋮ 0x1E: +30 0x1F: +31	R/W

Note: Set the PRCR.PRC0 bit to 1 (write enabled) before rewriting this register.

The HOCOUTCR register is added to the original HOCO trimming data.

The HOCO frequency can be trimmed with a resolution of approximately 0.028% per bit by setting a trimming value in the HOCOUTCR register.
Increasing the trimming value makes the HOCO frequency higher.
Decreasing the trimming value makes the HOCO frequency lower.

MCU operation is not guaranteed when HOCOUTCR is set to a value that causes the HOCO frequency to be outside of the specification range. When HOCOUTCR is modified, the frequency stabilization wait time corresponds to the frequency stabilization wait time at the start of the MCU operation.

Note. The frequency will vary if the temperature and the power supply voltage change after frequency
trimming. In such case, it is essential to perform trimming regularly or before high frequency accuracy
is required.

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The following table lists the specific sub-sections and figure in the User's Manual that require correction for each product group:

Product group	Sub-section & figure number	Section title
RA2L1	8.2.18	LOCOUTCR: LOCO User Trimming Control Register
	8.2.19	MOCOUTCR: MOCO User Trimming Control Register
	8.2.20	HOCOUTCR: HOCO User Trimming Control Register
RA2E1	8.2.19	LOCOUTCR: LOCO User Trimming Control Register
	8.2.20	MOCOUTCR: MOCO User Trimming Control Register
	8.2.21	HOCOUTCR: HOCO User Trimming Control Register
RA2E2	8.2.11	LOCOUTCR: LOCO User Trimming Control Register
	8.2.12	MOCOUTCR: MOCO User Trimming Control Register
	8.2.13	HOCOUTCR: HOCO User Trimming Control Register
RA2E3	8.2.19	LOCOUTCR: LOCO User Trimming Control Register
	8.2.20	MOCOUTCR: MOCO User Trimming Control Register
	8.2.21	HOCOUTCR: HOCO User Trimming Control Register
RA2A2	9.2.24	LOCOUTCR: LOCO User Trimming Control Register
	9.2.25	MOCOUTCR: MOCO User Trimming Control Register
	9.2.26	HOCOUTCR: HOCO User Trimming Control Register