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RENESAS TECHNICAL UPDATE

TOYOSU FORESIA, 3-2-24, Toyosu, Koto-ku, Tokyo 135-0061, Japan
Renesas Electronics Corporation

Product Category	MPU/MCU		Document No.	TN-RL*-A087A/E	Rev.	1.00
Title	The usage limitation on RL78/I1C RTC with Independent Power Supply		Information Category	Technical Notification		
Applicable Product	RL78/I1C R5F10Nxx	Lot No. All lots	Reference Document	RL78/I1C User's Manual: Hardware Rev. 2.00 R01UH0587EJ0200 Aug 31, 2018		

We would like to inform you that a problem was found in RTC with independent power supply of the RL78/I1C group products. The following is the report of problem content, usage notes and permanent measures.

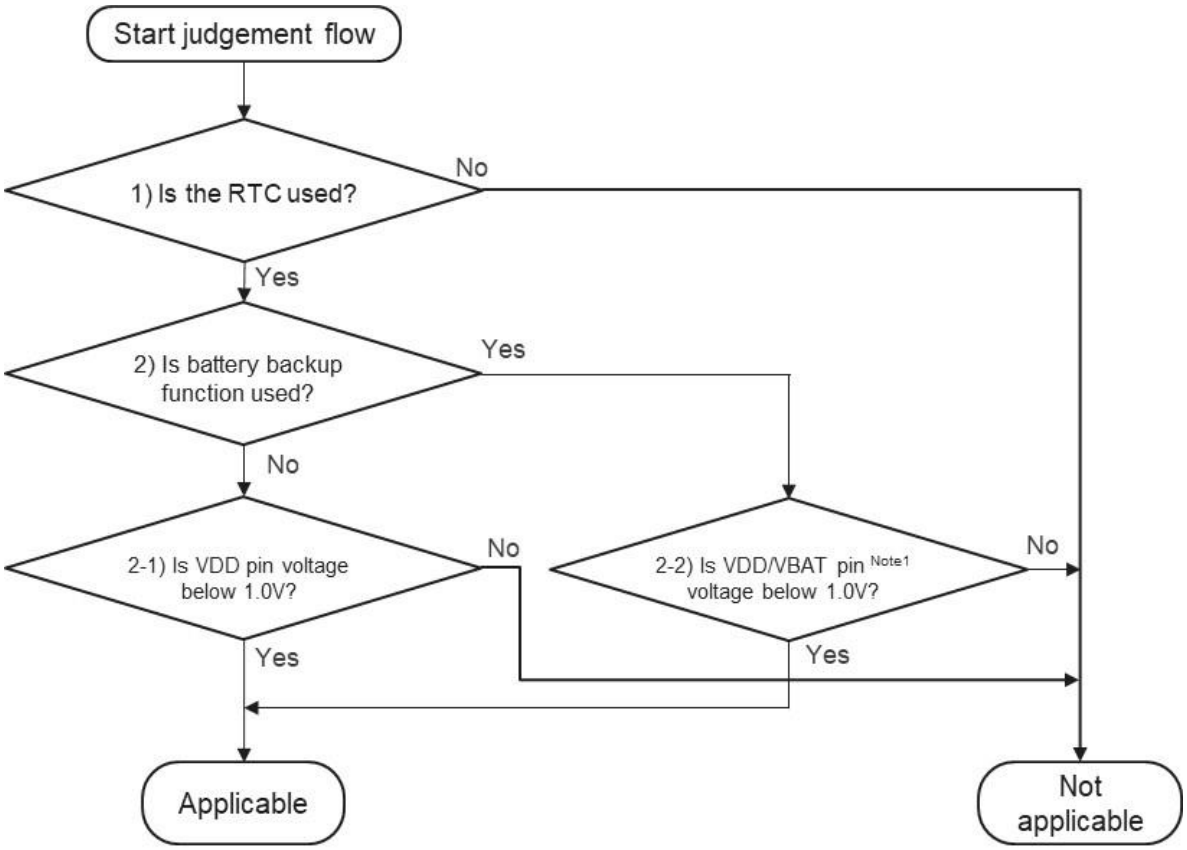
1. Problem Content

For RL78/I1C RTC with independent power supply, a problem is confirmed that RTC registers will be unintentionally changed after VDD power supply is shut-off and then at the period of VDD power supply recovery.

1.1. Problem Judgement Flow

Figure 1 shows the problem judgement flow for RTC with independent power supply usage.

Figure 1. Problem Judgement Flow for RTC with Independent Power Supply Usage



1) If the RTC is not used, the problem is not applicable.

2-1) If the battery backup function is not used (VBATEN=0), and VDD pin voltage is not below 1.0V, the problem is not applicable.

2-2) If the battery backup function is used (VBATEN=1) and VDD/VBAT pin Note1 voltage is not below 1.0V, the problem is not applicable.

Note 1: it is the power supply pin selected by the battery backup function.

1.2. Problem Occurrence Condition and Phenomena

Described as following conditions, the RTC registers may be changed unintentionally.

[Occurrence conditions]

1. The RTC is used.
2. VDD/VBAT pin Note2 voltage falls below 1.0V.
3. If the above condition 1 and condition 2 coincide, VDD/VBAT pin Note2 voltage is recovered.

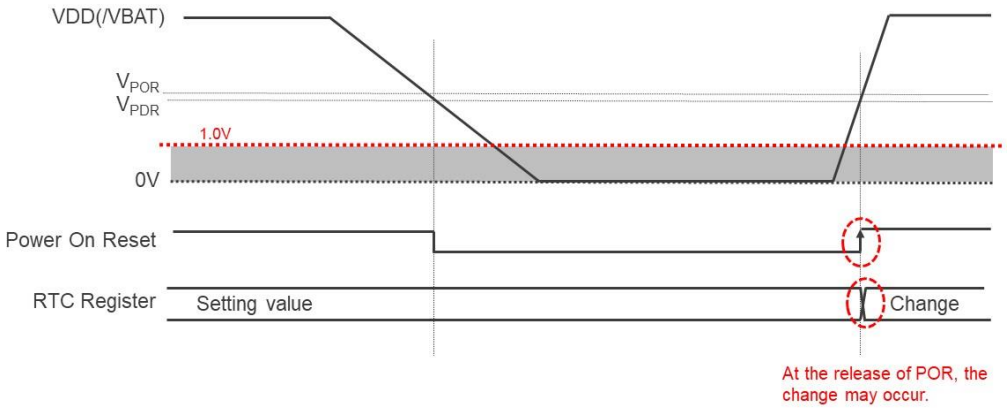
Note 2: If the battery backup function is not used, it is VDD pin.
If the battery backup function is used, it is the power supply pin selected by the battery backup function.

[Problem Phenomena]

Phenomenon 1.)

At the release of Power On Reset (POR) during VDD power supply recovery, RTC registers may be changed.

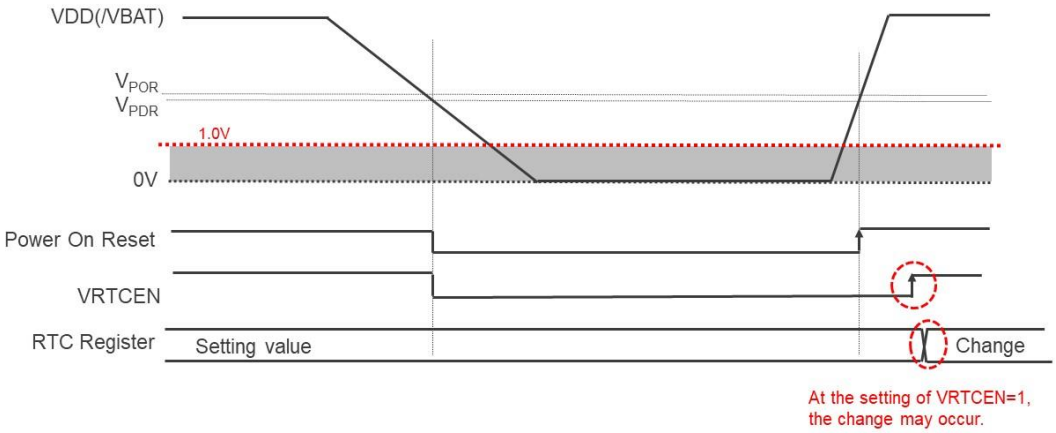
Figure 2. Problem Phenomenon 1



Phenomenon 2.)

After VDD power supply recovery, at the setting of VRTCEN=1, RTC registers may be changed.

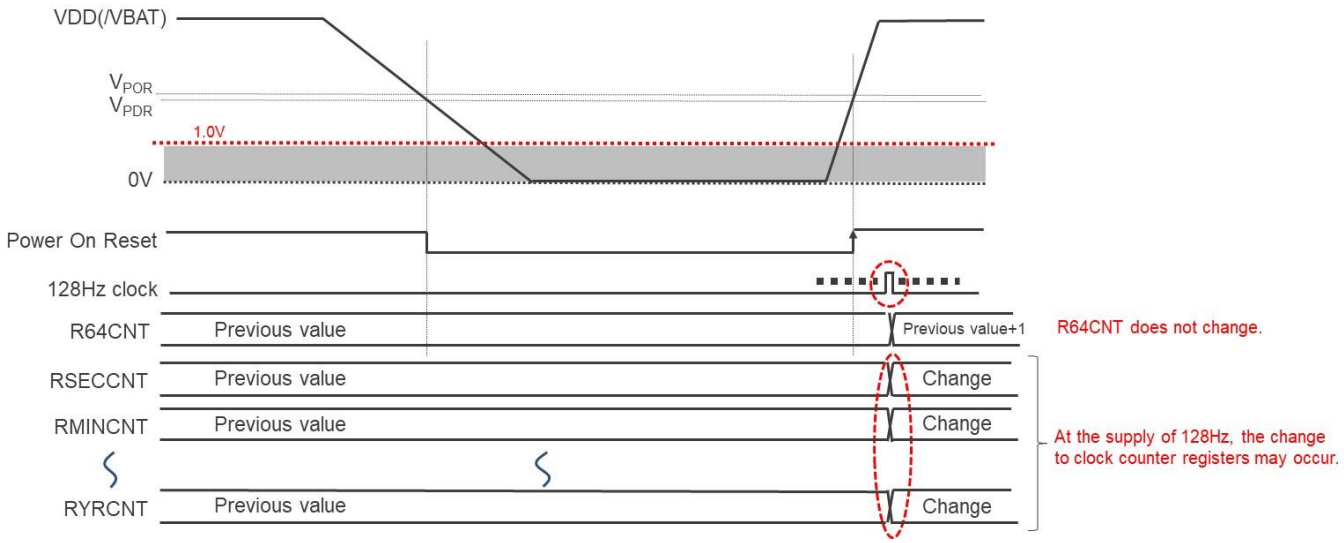
Figure 3. Problem Phenomenon 2



Phenomenon 3.)

After the release of POR during VDD power supply recovery, at the supply of clock counter 128Hz, except for R64CNT, the other RTC counter registers may be changed.

Figure 4. Problem Phenomenon 3



[Applicable Register List]

Function	Register Name	Bit Name	Power domain	Problem applicable
Control Register	RCR1	AIE	VRTC	Applicable
		PIE	VRTC	Applicable
		RTCOS	VDD(*1)	Not applicable
		PES	VRTC	Applicable
	RCR2	START	VRTC	Applicable
		RESET	VDD(*1)	Not applicable
		ADJ30	VDD(*1)	Not applicable
		RTCOE	VDD(*1)	Not applicable
		AADJE	VRTC	Applicable
		AADJP	VRTC	Applicable
		HR24	VRTC	Applicable
		CNTMD	VRTC	Applicable
	RCR3	RTCICEN	VRTC	Applicable
	RCR4	RCKSEL	VRTC	Applicable
	RCR5	-	VRTC	Applicable
	RADJ	-	VRTC	Applicable

*1) Because the register is in VDD power domain, the value is unable to hold at VDD power supply shut-off.

Function	Register Name	Bit Name	Power domain	Problem applicable
Clock Counter	R64CNT	-	VRTC	Not applicable
	RSECCNT/BCNT0	-	VRTC	Applicable
	RMINCNT/BCNT1	-		
	RHRCNT/BCNT2	-		
	RWKCNT/BCNT3	-		
	RDAYCNT	-		
	RMONCNT	-		
	RYRCNT	-		
Alarm Register	RSECAR/BCNT0AR	-	VRTC	Applicable
	RMINAR/BCNT1AR	-		
	RHRAR/BCNT2AR	-		
	RWKAR/BCNT3AR	-		
	RDAYAR/BCNT0AER	-		
	RMONAR/BCNT1AER	-		
	RYRAR/BCNT2AER	-		
	RYRAREN/BCNT3AER	-		
Time Capture Register	RTCCR0	-	VRTC	Applicable (*2)
	RTCCR1	-		
	RTCCR2	-		

*2) In the case of VDD or VBAT power supply shut-off, the tamper detection function (RTCICn) does not work.

1.3. Usage Notes

1) When the battery backup function is not used, please keep VDD pin voltage always above 1.0V by external power supply circuit.
   For example, by the diode Oring connection, in the case of AC off, VDD pin will be power supplied by the battery.

2) When the battery backup function is used, please keep VDD/VBAT pin Note1 voltage always above 1.0V.

Note 1: It is the power supply pin selected by the battery backup function.

2. Permanent Measures

Renesas plans to modify the H/W.

2.1. Product Part Number

The modified devices will change the Packaging specification as following examples:

・64-pin products

R5F10NLEDFB#35, R5F10NLGDFB#35,
R5F10NLEDFB#55, R5F10NLGDFB#55

・80-pin products

R5F10NMEDFB#35, R5F10NMGDFB#35, R5F10NMJDFB#35,
R5F10NMEDFB#55, R5F10NMGDFB#55, R5F10NMJDFB#55

・100-pin products

R5F10NPGDFB#35, R5F10NPJDFB#35,
R5F10NPGDFB#55, R5F10NPJDFB#55

Best Regard