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RENESAS TECHNICAL UPDATE

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Product Category	MPU/MCU		Document No.	TN-RA*-A0158A/E	Rev.	1.00
Title	Notes on AGT/AGTW and ULPT interrupt signals		Information Category	Technical Notification		
Applicable Product	RA2A1、RA2A2、RA2E1、RA2E2、RA2E3、RA2L1、RA2L2、RA2T1、RA4C1、RA4E1、RA4E2、RA4L1、RA4M1、RA4M2、RA4M3、RA4T1、RA4W1、RA6E1、RA6E2、RA6M1、RA6M2、RA6M3、RA6M4、RA6M5、RA6T1、RA6T2、RA6T3 RA8D1、RA8E1、RA8E2、RA8M1、RA8T1、RA8P1、RA8T2	Lot No. All	Reference Document	Refer table at the end of this document		

This document is a note on AGT/AGTW and ULPT interrupt signals in the applicable products.

1. Note

When AGTLCLK(b'100) or AGTSCLK(b'110) is set as the AGT count source clock by AGTMR1.TCK[2:0]bit, an AGT interrupt signal may not be captured in ICU.

Similarly, when ULPTLCLK(b'0) or ULPTSCLK(b'1) are set as the ULPT count source clock by ULPTMR1.TCK1 bit, an ULPT interrupt signal may not be captured in ICU.

2. Cause

If AGTLCLK(b'100) or AGTSCLK(b'110) is set as the AGT count source clock, the AGT interrupt signal and the system clock (PCLKB) in ICU are designed with asynchronous.

Therefore, if the interrupt signal is one cycle and the setup and hold time of the PCLKB in ICU may be insufficient, the interrupt signal may not be captured in ICU.

For ULPT, replace AGTLCLK with ULPTLCLK, AGTSCLK with ULPTSCLK.

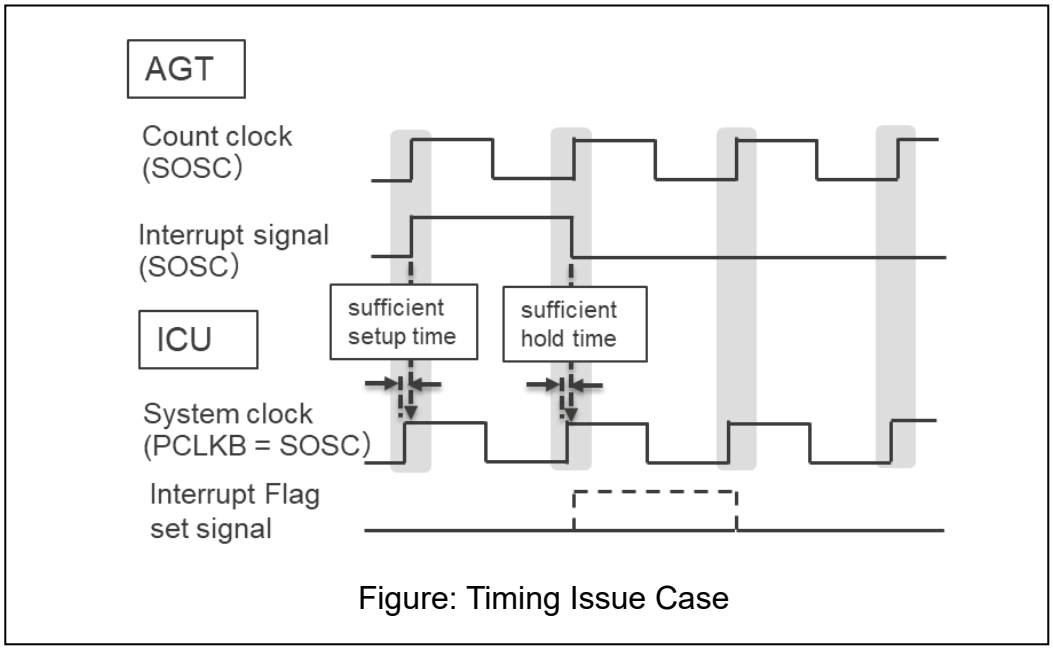

Figure: Timing Issue Case

3. Countermeasure

Due to ensure the interrupt signal period is sampled by PCLKB, set the count source clock frequency to be at least twice slower than the PCLKB frequency with AGTMR2.CKS[2:0].

For ULPT, replace AGTMR2.CKS[2:0] with ULPTMR2.CKS[2:0].

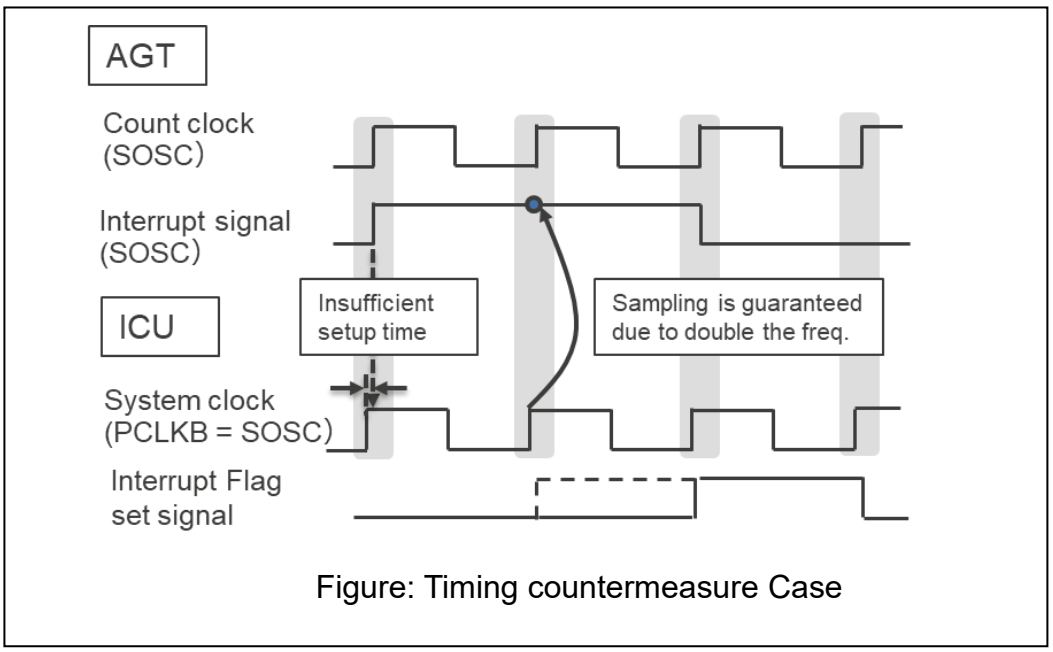

Figure: Timing countermeasure Case

4. Add a note

The following explains using the RA8D1 as an example.

4.1 22. Low Power Asynchronous General Purpose Timer (AGT)

Table 22.1 AGT specifications

Before Correction

Note 2. Satisfy the frequency of the peripheral module clock (PCLKB) ≥ the frequency of the count source clock.

After Correction

Note 2. Satisfy the frequency of the peripheral module clock (PCLKB) ≥ the frequency of the count source clock. But, when selecting AGTLCLK/d or AGTSCLK/d as the count source clock, the frequency of PCLKB should be at least twice that of the count source clock.

4.2 23. Ultra-Low-Power Timer (ULPT)

Table 23.1 ULPT specifications

Before Correction

Note 1. Make sure the frequency of the peripheral module clock (PCLKB) ≥ the frequency of the count source clock.

After Correction

Note 1. Make sure that the frequency of the peripheral module clock (PCLKB) is at least twice the frequency of the count source clock (AGTLCLK/d or AGTSCLK/d).

Reference document

Applicable Product	Manual Title	Document Number	AGT / AGTW Chapter No	ULPT Chapter No
RA2A1	RA2A1 Group User's Manual: Hardware Rev.1.10	R01UH0888EJ0110	22(AGT)	N/A
RA2A2	RA2A2 Group User's Manual: Hardware Rev.1.20	R01UH1005EJ0120	21(AGT)/22(AGTW)	N/A
RA2E1	RA2E1 Group User's Manual: Hardware Rev.1.50	R01UH0852EJ0150	21(AGT)	N/A
RA2E2	RA2E2 Group User's Manual: Hardware Rev.1.40	R01UH0919EJ0140	21(AGTW)	N/A
RA2E3	RA2E3 Group User's Manual: Hardware Rev.1.20	R01UH0992EJ0120	21(AGT)	N/A
RA2L1	RA2L1 Group User's Manual: Hardware Rev.1.50	R01UH0853EJ0150	21(AGT)	N/A
RA2L2	RA2L2 Group User's Manual: Hardware Rev.1.10	R01UH1080EJ0110	21(AGTW)	N/A
RA2T1	RA2T1 Group User's Manual: Hardware Rev.1.00	R01UH1089EJ0100	21(AGTW)	N/A
RA4C1	RA4C1 Group User's Manual: Hardware Rev.1.10	R01UH1137EJ0110	21(AGTW)	N/A
RA4E1	RA4E1 Group User's Manual: Hardware Rev.1.30	R01UH0929EJ0130	22(AGT)	N/A
RA4E2	RA4E2 Group User's Manual: Hardware Rev.1.30	R01UH0996EJ0130	21(AGTW)	N/A
RA4L1	RA4L1 Group User's Manual: Hardware Rev.1.10	R01UH1081EJ0110	21(AGTW)	N/A
RA4M1	RA4M1 Group User's Manual: Hardware Rev.1.10	R01UH0887EJ0110	23(AGT)	N/A
RA4M2	RA4M2 Group User's Manual: Hardware Rev.1.40	R01UH0892EJ0140	22(AGT)	N/A
RA4M3	RA4M3 Group User's Manual: Hardware Rev.1.50	R01UH0893EJ0150	22(AGT)	N/A
RA4T1	RA4T1 Group User's Manual: Hardware Rev.1.20	R01UH0999EJ0120	21(AGTW)	N/A
RA4W1	RA4W1 Group User's Manual: Hardware Rev.1.00	R01UH0883EU0100	24(AGT)	N/A
RA6E1	RA6E1 Group User's Manual: Hardware Rev.1.30	R01UH0930EJ0130	22(AGT)	N/A
RA6E2	RA6E2 Group User's Manual: Hardware Rev.1.30	R01UH0988EJ0130	21(AGTW)	N/A
RA6M1	RA6M1 Group User's Manual: Hardware Rev. 1.20	R01UH0884EJ0120	25(AGT)	N/A
RA6M2	RA6M2 Group User's Manual: Hardware Rev. 1.20	R01UH0885EJ0120	25(AGT)	N/A
RA6M3	RA6M3 Group User's Manual: Hardware Rev. 1.20	R01UH0886EJ0120	25(AGT)	N/A
RA6M4	RA6M4 Group User's Manual: Hardware Rev.1.50	R01UH0890EJ0150	22(AGT)	N/A
RA6M5	RA6M5 Group User's Manual: Hardware Rev.1.40	R01UH0891EJ0140	22(AGT)	N/A
RA6T1	RA6T1 Group User's Manual: Hardware Rev. 1.20	R01UH0897EU0120	24(AGT)	N/A
RA6T2	RA6T2 Group User's Manual: Hardware Rev. 1.50	R01UH0951EJ0150	23(AGTW)	N/A
RA6T3	RA6T3 Group User's Manual: Hardware Rev. 1.20	R01UH0998EJ0120	21(AGTW)	N/A
RA8D1	RA8D1 Group User's Manual: Hardware Rev. 1.20	R01UH0995EJ0120	22(AGT)	23
RA8E1	RA8E1 Group User's Manual: Hardware Rev.1.00	R01UH1129EJ0100	22(AGT)	23
RA8E2	RA8E2 Group User's Manual: Hardware Rev.1.00	R01UH1130EJ0100	22(AGT)	23
RA8M1	RA8M1 Group User's Manual: Hardware Rev. 1.20	R01UH0994EJ0120	22(AGT)	23
RA8T1	RA8T1 Group User's Manual: Hardware Rev. 1.20	R01UH1016EJ0120	21(AGT)	22
RA8P1	RA8P1 Group User's Manual: Hardware Rev. 1.10	R01UH1064EJ0110	25(AGT)	26
RA8T2	RA8T2 Group User's Manual: Hardware Rev. 1.20	R01UH1067EJ0120	24(AGT)	25