

Example MPC5674F eQADC - Streaming Mode

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1 Equipment

Test HW: XPC567XKIT516 - MPC5674ADAT516 Rev.C, MPC567XEVBFXMB Rev.B

MCU: PPC5674FMVYA264

Terminal: 19200-8-no parity-1 stop bit-no flow control on eSCI_A

Fsys: 264/200/150/60 MHz

Debugger: Lauterbach Trace32
PeMicro USB-ML-PPCNEXUS

Target: RAM, internal_FLASH

EVB connection: Potentiometers --> ADC inputs
USER_DEV_RV2(J4-7) --> ANB_0 (J19-3)
USER_DEV_RV3(J4-8) --> ANB_1 (J19-4)
Buttons --> ADC triggers
USER_DEV_1D(J4-2) --> TPU_A0 (J22-1)

2 Example purpose

is to present streaming mode advantage.

Streaming mode is new feature of eQADC that wasn't present in preceding devices (MCP55xx) and its intention is just to reduce a need of DMA data transfers when short sequences is needed to convert repeatedly. The key point is that streaming mode cause lock of commands in CFIFO between REP and PAUSE, in normal mode commands are invalidated after its execution and so must be fed by DMA (or core) again and again.

For this there are 3 new fields in CFCCR[0]:

CFEEE0 - enlarges CFIFO0 to 8 entries

STRME0 - enables streaming mode

AMODE0 - operation mode for advance mode

If streaming mode is enabled, PAUSE exiting causes returning to REPEAT pointer in case advance trigger haven't occurred, or continuance to next entry in case advance trigger have occurred. Note that advance trigger may happen whenever during loop executing, but is is evaluated after execution of command with PAUSE (i.e. on the loop end).

3 Detailed description

Example initializes eQADC module, converts specified command queue and displays results into terminal window. Used analog inputs ANB_0 and ANB_1 requires external connection to converted voltage (potentiometer) to see some valid numbers. For simplicity, ADC module is not calibrated. Following channels are being converted:

CH0 = signal ANB_0 (connect potentiometer to USER_DEV_RV2(J4-7) --> ANB_0 (J19-3))

CH1= signal ANB_1 (connect potentiometer USER_DEV_RV3(J4-8) --> ANB_1 (J19-4))

CH2 = may be left open (example configures the pin to be pulled-up)

CH3 = may be left open (example configures the pin to be pulled-down)

Example use following command queue. For clarity it is also described in Table 1 and Figure 1.

```
uint32_t CQueue_0[] =
{
    ( CHANNEL(0) | B0 | MESSAGE_TAG(RFIFO0) | REP ),
    ( CHANNEL(0) | B0 | MESSAGE_TAG(RFIFO0) | PAUSE ),
    ( CHANNEL(1) | B0 | MESSAGE_TAG(RFIFO1) | REP ),
    ( CHANNEL(1) | B0 | MESSAGE_TAG(RFIFO1) | PAUSE ),
    ( CHANNEL(2) | B0 | MESSAGE_TAG(RFIFO0) | REP ),
    ( CHANNEL(2) | B0 | MESSAGE_TAG(RFIFO0) | PAUSE ),
    ( CHANNEL(3) | B0 | MESSAGE_TAG(RFIFO1) ),
    ( CHANNEL(3) | B0 | MESSAGE_TAG(RFIFO1) | EOQ )
};
```

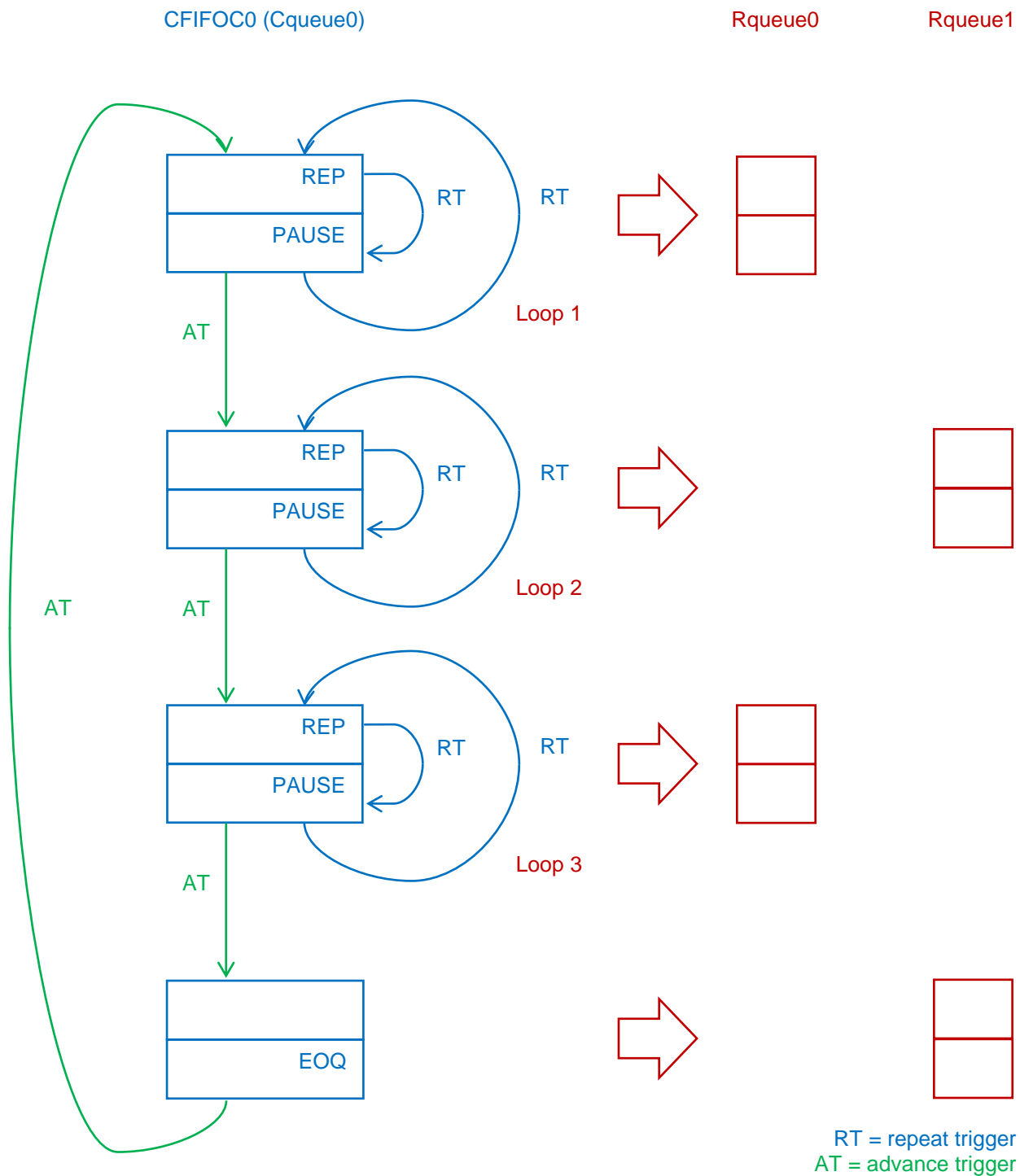


Figure 1. Diagram of triggers used in the example

Result are being filled to 2 result queues to see loop switching in the terminal window when advance trigger occurs (results are displayed in two columns, 1st column is related to Rqueue0, 2nd to Rqueue1).

Notes

Results are being drained and displayed by interrupt service routines. CFIFO to CBuffer copying is performed by eDMA as usual, but streaming mode offers keeping of 8 commands in CBuffer, thus subsequently there is no XBAR traffic caused by eQADC command loading.

Advance trigger occurs when EVB's USER switch 1 is being pressed (considering USER_DEV_1D(J4-2) --> TPU_A0 (J22-1)).

Repeat trigger is initiated automatically by PIT3 timer in approx. 1 sec intervals.

Table 1. Example of CQueue using Streaming mode

		command			
	input channel number	pause	repeat	end of queue	message tag
00	0	no	yes	0	RFIFO0
01	0	yes	no	0	RFIFO0
02	1	no	yes	0	RFIFO1
03	1	yes	no	0	RFIFO1
04	2	no	yes	0	RFIFO0
05	2	yes	no	0	RFIFO0
06	3	no	no	0	RFIFO1
07	3	no	no	1	RFIFO1

Subqueue
Loop1
Loop2
Loop3
single sequence

4 Notes

Streaming mode is only available on eQADC_B on MPC5674F device.

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