

F²MC-16LX FAMILY
16-BIT MICROCONTROLLER
ALL SERIES

**EXTERNAL CLOCK AND
RELOAD COUNTER**

APPLICATION NOTE

Revision History

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2003-04-24	MWi; First version

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0 Introduction

When using an external clock source together with the dedicated reload counter of the LIN-UART not all possible settings are allowed.

This application note gives an overview about most common external clock frequencies in subject to smallest usable reload value and resulting baud rate deviation.

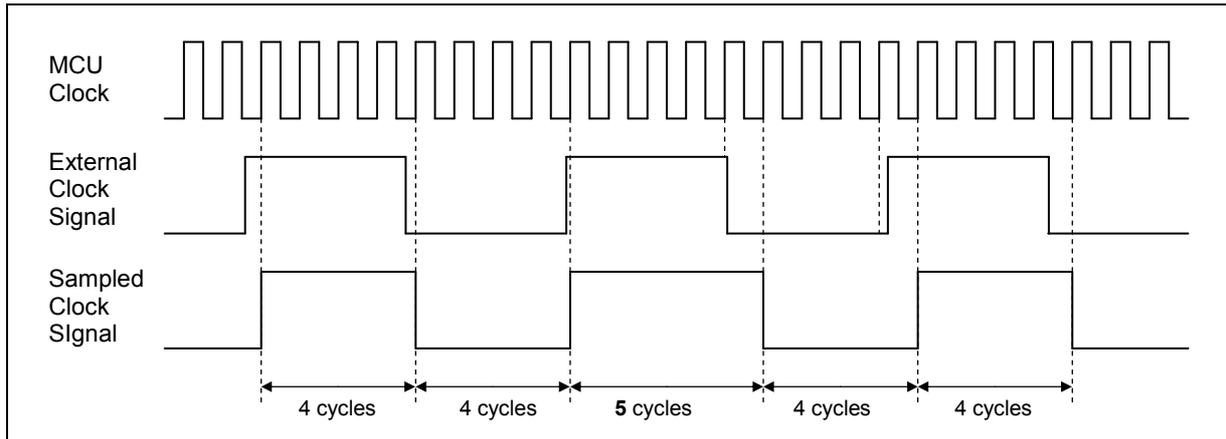
1 Principal Difficulties

DESCRIPTION OF DIFFICULTIES IN SAMPLING EXTERNAL CLOCK SIGNALS

1.1 Clock Sampling

The MCU clock and an independent external clock signal will neither be synchronous nor in phase. Thus some kind of jitter will always occur when the external signal is sampled.

The following graphic illustrates this problem:



In the case above the external clock signal is slightly lower than the MCU clock divided by 8. This causes in subject of the deviation sometimes a sampled clock phase, which is one MCU clock cycle longer. Contrariwise if the external clock would be slightly higher, a 3-cycle sampled clock phase will sometimes occur.

This jitter causes a baud rate deviation which decreases with the used reload value. The limit of the deviation is ± 1 cycle for high reload values.

For some combinations for MCU clock, external clock and reload value the resulting deviation will be so high, that accurate communication is either not guaranteed or not possible.

The following tables in the next chapter give an overview.

2 Reload Value Tables

RELOAD VALUE TABLES IN SUBJECT TO DEVIATION, MCU CLOCK AND EXT. CLOCK

2.1 Deviation <1%

The following table entries contain the smallest usable reload value for resulting baud rates deviation better than 1%.

		MCU Clock (Hz)						
		4M	8M	16M	20M	24M	32M	48M
Ext. Clock (Hz)	7,3728M	*	*	42	32	28	19	13
	6M	*	*	26	21	5	14	5
	5M	*	*	25	5	17	14	9
	3,6864M	*	48	19	13	13	10	7
	3M	*	27	14	11	5	6	5
	1,8432M	42	19	10	8	7	5	5
	1,5M	26	14	6	6	5	5	5

* not possible

2.2 Deviation <2%

The following table entries contain the smallest usable reload value for resulting baud rates deviation better than 2%.

		MCU Clock (Hz)						
		4M	8M	16M	20M	24M	32M	48M
Ext. Clock (Hz)	7,3728M	*	*	19	15	13	10	7
	6M	*	*	15	9	5	6	5
	5M	*	*	12	5	7	5	5
	3,6864M	*	19	10	8	7	5	5
	3M	*	12	6	6	5	5	5
	1,8432M	19	10	5	5	5	5	5
	1,5M	14	6	5	5	5	5	5

* not possible

2.3 Deviation <3%

The following table entries contain the smallest usable reload value for resulting baud rates deviation better than 3%.

		MCU Clock (Hz)						
		4M	8M	16M	20M	24M	32M	48M
Ext. Clock (Hz)	7,3728M	*	*	13	11	9	7	5
	6M	*	*	9	6	5	5	5
	5M	*	*	7	5	5	5	5
	3,6864M	*	13	6	6	5	5	5
	3M	*	9	5	5	5	5	5
	1,8432M	13	7	5	5	5	5	5
	1,5M	9	5	5	5	5	5	5

* not possible

2.4 Deviation <4%

The following table entries contain the smallest usable reload value for resulting baud rates deviation better than 4%.

		MCU Clock (Hz)						
		4M	8M	16M	20M	24M	32M	48M
Ext. Clock (Hz)	7,3728M	*	*	8	8	6	5	5
	6M	*	*	6	5	5	5	5
	5M	*	*	7	5	5	5	5
	3,6864M	*	8	5	5	5	5	5
	3M	*	6	5	5	5	5	5
	1,8432M	8	5	5	5	5	5	5
	1,5M	6	5	5	5	5	5	5

* not possible