

From: [John Monteith](#)
To: mark@whiteboxsolar.com
Cc: [JShen](#)
Subject: RE: GP22: Clock speed
Date: Wednesday, January 16, 2013 9:46:46 AM

Hi Mark,

I'm glad you found the problem and I agree that the documentation is confusing. Yes, DIV_CLKHS 2 and 3 are both $n/4$. This was originally done in the GP2 and carried forward. I would rather see the documentation read that 0x03 is not permitted even if the hardware defaults to $n/4$. I think it would be less confusing.

Best Regards,
John

From: Mark Richards [mailto:mark@whiteboxsolar.com]
Sent: Wednesday, January 16, 2013 9:27 AM
To: John Monteith
Cc: JShen
Subject: Re: GP22: Clock speed

John,

I double-checked. My DIV_CLKHS is 0x00.

My implementation reads:

```
SetGP22CNF(GP22_CFG_DIV_CLKHS, GCFG_DIV_CLKHS_DIV_1);
```

and when I wrote you that I had used 0x01, I somehow translated GCFG_DIV_CLKHS_DIV_1 to 0x01 in my text. *Actually it seems reasonable that a 0x01 would be divide by 1, but ACAM makes 0x00 = $x/1$.* This and their use of the double negative, as in NO_CAL_AUTO which, when set to OFF, means that auto-calibration is enabled!, is confusing.

So the DIV_CLKHS == 0x00 and DIV_FIRE == 0x03 as in:

```
// pulse frequency to transducer
// the dividend for 4 mhz clock of GP22
// GP22_CFG_DIV_CLKHS
#define GCFG_PULSE_FREQ_1MHZ      0x04
#define GCFG_PULSE_FREQ_1_3MHZ    0x03 // in test, this works out to 1 MHz
#define GCFG_PULSE_FREQ_2MHZ      0x02
#define GCFG_PULSE_FREQ_4MHZ      0x01
```

```
SetGP22CNF(GP22_CFG_DIV_FIRE,GCFG_PULSE_FREQ_1_3MHZ);
```

HOWEVER...

The other place people trip up is on the DIV_FIRE setting, where 0x01 is a divide by 2

And there you found it.

Here are the constants I set up:

```
// pulse frequency to transducer
// the dividend for 4 mhz clock of GP22
// GP22_CFG_DIV_FIRE
#define GCFG_PULSE_FREQ_1MHZ      0x04
#define GCFG_PULSE_FREQ_1_3MHZ    0x03 // in test, this works out to 1 MHz
#define GCFG_PULSE_FREQ_2MHZ      0x02
#define GCFG_PULSE_FREQ_4MHZ      0x01
```

And here is ACAM's description:

0 = not permitted 1 = divided by 2

2 = divided by 3

3 = divided by 4

...

15 = divided by 16

1MHz == 4MHz/4 == Acam's 3 == my GCFG_PULSE_FREQ_1_3MHZ

I do think the docs and these settings could use some attention. :)

But I also see that any change to DIV_CLKHS cannot be done that is consistent (0x01 could be n/1 but there is no 0x04).

Still, I would wish to know if a DIV_CLKHS of 2 or 3 are both n/4.

/m

On 01/16/2013 08:55, John Monteith wrote:

Hi Mark,

I may be missing your question, but I think you may be tripped up by a very common problem I see from many developers. The value you are dividing by is 1 more than the hex setting of DIV_FIRE. I will show you in the two examples you site:

From the data sheet: [4 MHz] → [4MHz/DIV_CLKHS] → [f / 0.5 (doubler)] → [f / DIV_FIRE] → fire pulse frequency

Plugging in the values you describe in the first example:

DIV_CLKHS parameter of 0x01 → Divide by 2

DIV_FIRE parameter of 0x03 → Divide by 4

Then running through the formula:

[4 MHz] → [4MHz/2] → [2MHz / 0.5 (doubler)] → [4MHz / 4] → fire pulse frequency → 1MHz

Plugging in the values you describe in the second example:

DIV_CLKHS parameter of 0x01 → Divide by 2

DIV_FIRE parameter of 0x04 → Divide by 5

Then running through the formula:

[4 MHz] → [4MHz/2] → [2MHz / 0.5 (doubler)] → [4MHz / 5] → fire pulse frequency → 800KHz

This is very common and I see this a lot. The other place people trip up is on the DIV_FIRE setting, where 0x01 is a divide by 2. If I am misunderstanding the question, please correct me, but I think this is the problem.

Also, I have an answer back from ACAM on your other question and I will be sending that shortly.

Best Regards,
John

John Monteith

ACAM Product Manager

Transducers Direct, LLC

Precision Measurement Technology

12115 Ellington Ct.

Cincinnati, OH 45249

Office: 513-583-9491

Cell: 513-720-7597

John_Monteith@ACAM-USA.com

www.acam-usa.com



From: Mark Richards [<mailto:mark@whiteboxsolar.com>]

Sent: Wednesday, January 16, 2013 7:17 AM

To: John Monteith

Cc: JShen

Subject: GP22: Clock speed

Hello John Monteith, (copying John Shen on this also)

The 4 MHz crystal in our GP22 prototype measures 4.000143 MHz. Seems close enough for our application. When a pulse train is triggered with a DIV_FIRE parameter of 0x03 and a DIV_CLKHS parameter of 0x01, the period of the pulses is exactly 1.0 MHz. At the expected setting for 1 MHz (0x04) I get 800KHz or so. There seems to be an issue here.

As I read the data sheet the fire pulse frequency is established through the two parameters in this flow:

[4 MHz] --> [4MHz/DIV_CLKHS] --> [f / 0.5 (doubler)] --> [f / DIV_FIRE] --> fire pulse frequency

Perhaps the setting is wrong and/or there is another factor which sets the pulse frequency?

Would you please consider this question and let me know your thoughts?

Thank you,

/mark richards