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MSP430FR6989: What is the maximum number of GPIO in this MCU

SAli BEN SULEIMAN Intellectual 780 points
Community Member

Part Number: MSP430FR6989
Other Parts Discussed in Thread: ENERGIA, , MSP-EXP430FR6989, MSP-TS430PZ100D, MSP430FR5994, MSP432E401Y

Hi,

I am using MSPFR6989 to output 18 signals to the GPIO (through using writeAnalog function in Energia) and read 9 signals through the ADC, the issue I'm facing is I found only 16 pins available , I tried to use extra pins of p1.0 and p9.7, for p1.0 it receives the right voltage when I checked by the voltmeter but p9.7 is not, how can I solve this issue?

Thank you

over 4 years ago

Keith Barkley *over 4 years ago* Guru 29400 points

You are even more limited. AnalogWrite is PWM, which limits the pins even further. My googlefoo did not lead me to an Energia pinmap for this launchpad, so you might have to dive into the boards,txt file to get the answer to your question.

SAli BEN SULEIMAN *over 4 years ago in reply to Keith Barkley* Intellectual 780 points

Thanks for your reply, I have the document for this mcu, but what I meant can I use other pins as GPIO? like LED pins. For PWM I'm using RC filter externally.

Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* Guru 26160 points

Number of GPIOs depends on MCU package.
In case of 6989 numbers of GPIOs varies from 48 to 83.

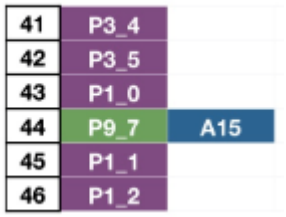
SAli BEN SULEIMAN *over 4 years ago in reply to Tomasz Kocon* Intellectual 780 points

I mean how can I output 18 signals in the same time ?

Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* Guru 26160 points

I do not understand.
Do you have 16 or 18 pins available for output?

SAli BEN SULEIMAN *over 4 years ago in reply to Tomasz Kocon* Intellectual 780 points



I found 16 pins but somewhere I found that I can use LED pins too, but one of them does not receive the right voltage (p9.7)

Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* Guru 26160 points

What are LED pins?
Do we talk about MSP430FR6989 or a some board using 6989 MCU?

Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* Guru 26160 points

By the way.

What are frequencies and resolutions of you PWMs?

SAli BEN SULEIMAN *over 4 years ago in reply to Tomasz Kocon* Intellectual 780 points

The frequency is 10kHz
The resolution I do not know since I'm using Energia not CCS.
I'm using MSP430FR6989 to output 18 signals to an external circuit
The LED pins are 43 and 44.
As I said I found 16 pins and I was thinking to solve my issue by using pins 43 and 44.

Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* Guru 26160 points

There are two issues.

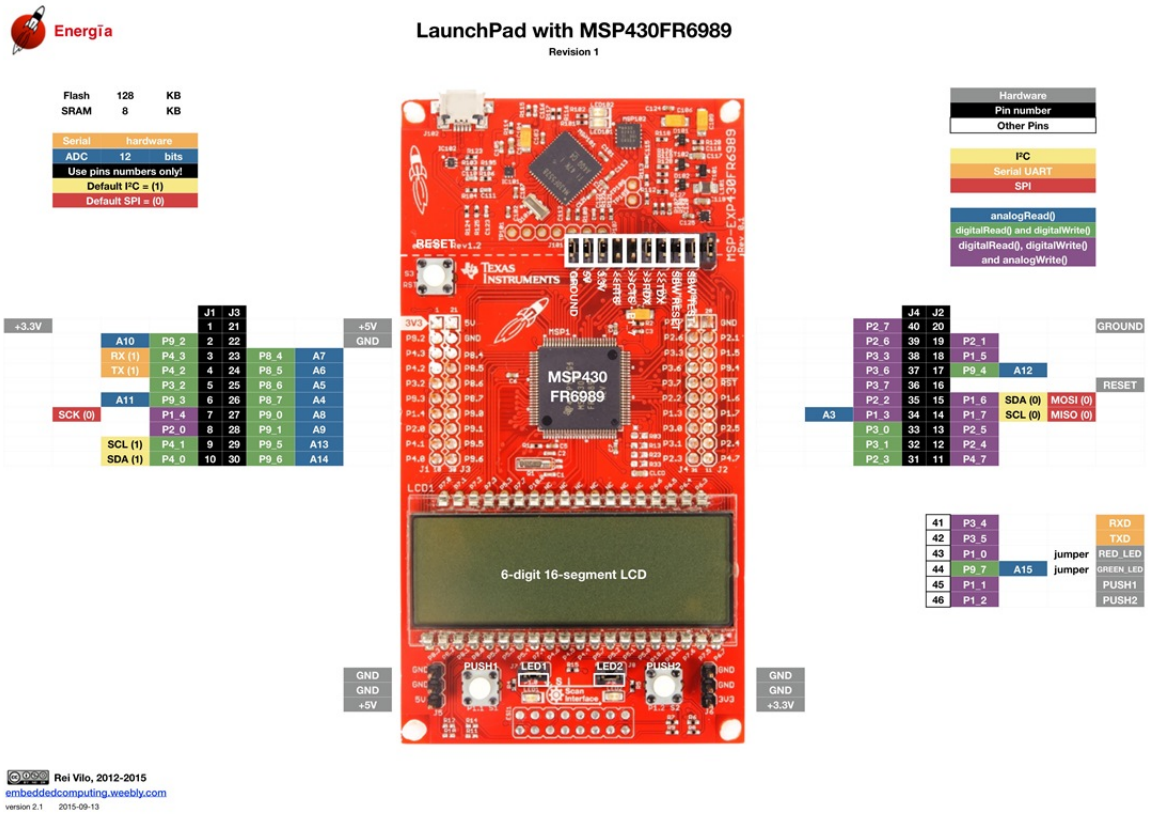
1. Still I do not know what hardware you are using.
Package:
PZ: pin 43 P3.7, pin P8.0
PN: 43 P7.1, 44 P7.2
PM: 43 9.3, 44 P9.4

2. Lets assume 10kHz and 8 bits resolution.
10 kHz means a 100us wave length.
8 bits resolution means that each 0.391us you would need to decide which lines within a bunch of 18 should be turned off.

During 0.391us your MCU can do 6.25 instructions when running at 16MHz and with code and data placed in SRAM.
It is unachievable.

SAli BEN SULEIMAN *over 4 years ago in reply to Tomasz Kocon* Intellectual 780 points

So I am connected the navy pins in the following figure (pins for writing signals) so if you count them they are more than 16 but the thing is the navy pins in the lower right corner in the schematic which includes p9.7 and p1.0 are related to the LED right? can I use them with the other navy pins all in the same time ? at the end each pin is connected to external device that I am testing (I have 18 external devices).



Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* Guru 26160 points

O.K.

Now I see, you do not use MSP430FR6989 but MSP-EXP430FR6989.
That makes a difference.
Using MSP-TS430PZ100D you would have 83 GPIOs.

Your real problem is not related to the number of available pins.
As I wrote in my previous reply you are limited by an MCU speed.
To get 18 PWMs driven by software with 8 bits resolution at 10kHz you would need, lets say, 1GHz MCU.
6989 is 50-100 times to slow to do it.

SAli BEN SULEIMAN *over 4 years ago in reply to Tomasz Kocon* — Intellectual 780 points

ok thanks for your reply, I thought MSP430FR6989 is as the same as MSPEXP430FR6989, so sorry about that.
So I understand that u means generating PWM in the same pin right? but what I want to do is connecting 18 wires to 18 pins in the MCU and get 18 different PWM , all in the same time

Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* — Guru 26160 points

You wrote:
but what I want to do is connecting 18 wires to 18 pins in the MCU and get 18 different PWM , all in the same time.

I do confirm, my understanding is that your goal is to get 18 different PWMs, all at the same time.
I did some calculations to show you that you cannot get 18 different PWMs with 10kHz and 8 bits resolution using the external filters because 6989 is likely 100 times to slow to do it.

Forget about your needs and expectations regarding PWMs drivent by software on 6989.

SAli BEN SULEIMAN *over 4 years ago in reply to Tomasz Kocon* — Intellectual 780 points

Ok which MCU you can suggest it to me to perform this task successfully. Is Tiva C tmc4c123 a good option?

Thanks

Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* — Guru 26160 points

I have no idea.

PWMs should be done by hw or in your case with 1GHz MCU at leaset.
Looks to me that using 6989 15 hw PWMs is achievable but I have not check that carefully.

Danny F *over 4 years ago* — Genius 3850 points

"What is the maximum number of GPIO in this MCU"

in case it is not clear, there is something called "datasheet" for your device. they are quite helpful and most authoritative on questions like yours.

Keith Barkley *over 4 years ago in reply to Tomasz Kocon* — Guru 29400 points

It might be cheaper to get 18 small MCU's rather than a GHz processor which I am not convinced you need. Several timers should be fine.

SAli BEN SULEIMAN *over 4 years ago in reply to Danny F* — Intellectual 780 points

I know there is something called datasheet. the title is a general question but what i want exactly is in my explanation.

Thank you

SAli BEN SULEIMAN *over 4 years ago in reply to Keith Barkley* Intellectual 780 points

Thanks for your reply, I'll think about this option.

Tomasz Kocon *over 4 years ago in reply to SAli BEN SULEIMAN* Guru 26160 points

Looks to me that msp430fr5994 has 15 hw driven PWMs available on external PINs.
How many of them can be accessed on a LaunchPad pins? Please check.

Also look at Ethernet MSP432E401Y MCU LaunchPad™ Development Kit.
Its MCU has sixteen 16- or 32-bit Capture Compare PWM pins (CCP) and looks to me that these pins are available on the LaunchPad connectors.