



Consumer Appliance, Widget, Gadget

Using GP3 as Output

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APPLICATION OPERATION:

Many times when designing with the 12CXXX it would be great to have an additional output. This note shows how the GP3 pin can be used as output with relative high reliability by switching the internal pull-ups on (to get a high level) and off to get a low level through an external resistor connected to ground. The internal pull-ups are switched using the bit 6 of OPTION register.

About the internal pull-ups:

The internal pull-up of GP3 is not a linear resistor, in fact it is a field effect transistor. That means its value varies with the current it is sourcing. This is also valid for the pull-ups of GP0 and GP1.

For the GP3 pin, the internal pull-up value specified in the datasheets is 470Kohm (typ.) @5.5V, 25 °C (parameter **not tested**). This value can be expected when connecting the GP3 pin to ground. But, if it is connected to ground through a 1 Mhm resistor, a value as low as 60 Kohm can be expected.

The circuit:

An external pull-down resistor of 560 Kohm to 1Mohm works well. Higher values makes the circuit very susceptible to noise. With lower values, the high level output voltage can be less than 4.25 Volts. I've chosen 820 Kohm.

A 220 nF capacitor is connected to bypass interferences. This capacitor limits the speed of this output.

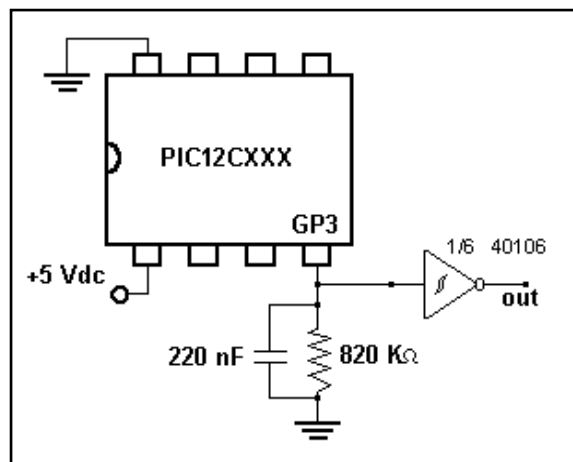
Due to the very low current drive capability, this output must be connected to a CMOS input. Due to the low transition time (up to half a second) and to improve the noise immunity, the CMOS input should be a schmitt-trigger (i.e. 40106 inverting buffer).

Take care if the GP0 or GP1 pin are used as inputs because the internal pull-ups of GP0, GP1 and GP3 are connected or disconnected together.

Conclusion:

This circuit is presented just as an idea of using 'PIC-micro™ microcontrollers at the extreme'.

Graphical hardware representation: (Schematic, PCB layout etc.).



Software listing:

There are three sub-routines which set, reset and invert the GP3 output. It is necessary to keep the original value of OPTION register to maintain the user selected options (prescaler assignment, etc.). In reset OPTION is initialized to '11111111', which means the GP3 output will be in low level.

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APPENDIX A: SOURCE CODE

```
opt          equ  07h          ; Register to store the OPTION value
;
;
start        MOVLW b'11111111' ; Place here the desired value of OPTION
            OPTION
            MOVWF opt

main
;*****
;main program
;*****
;
;
;
clear_GP3    MOVLW b'01000000'
            IORWF opt, W        ; Set bit 6
store        OPTION            ; update OPTION register
            MOVWF opt          ; store new value in 'opt'
            RETLW 0            ; Return

set_GP3      MOVLW b'10111111'
            ANDWF opt, W        ; Clear bit 6
            GOTO store

compl_GP3    MOVLW b'01000000'
            XORWF opt, W        ; Complement bit 6
            GOTO store
```