

### 5.33. HPWM

**HPWM** *Channel, DutyCycle, Frequency*

Output a pulse width modulated pulse train using PWM hardware available on some PIC MCUs. It can run continuously in the background while the program is executing other instructions.

*Channel* specifies which hardware PWM channel to use. Some devices have between 1 and 5 PWM *Channels* that can be used with **HPWM**. The Microchip data sheet for the particular device shows the fixed hardware pin for each *Channel*. For example, for a PIC16F877a, *Channel 1* is CCP1 which is pin PORTC.2. *Channel 2* is CCP2 which is pin PORTC.1.

Some devices, such as the PIC18F452, have alternate pins that may be used for **HPWM**. The following **DEFINES** allow using these pins:

```

DEFINE CCP1_REG    PORTC        \ Channel 1 port
DEFINE CCP1_BIT    2            \ Channel 1 bit
DEFINE CCP2_REG    PORTC        \ Channel 2 port
DEFINE CCP2_BIT    1            \ Channel 2 bit
DEFINE CCP3_REG    PORTG        \ Channel 3 port
DEFINE CCP3_BIT    0            \ Channel 3 bit
DEFINE CCP4_REG    PORTG        \ Channel 4 port
DEFINE CCP4_BIT    3            \ Channel 4 bit
DEFINE CCP5_REG    PORTG        \ Channel 5 port
DEFINE CCP5_BIT    4            \ Channel 5 bit

```

*DutyCycle* specifies the on/off (high/low) ratio of the signal. It ranges from 0 to 255, where 0 is off (low all the time) and 255 is on (high) all the time. A value of 127 gives a 50% duty cycle (square wave).

*Frequency* is the desired frequency of the PWM signal. On devices with 2 channels, the *Frequency* must be the same on both channels. Not all frequencies are available at all oscillator settings. For the non-long versions of PBP (PBP and PBPW), the highest frequency at any oscillator speed is 32767Hz. The lowest usable **HPWM** *Frequency* at each oscillator setting is shown in the following table:

osc	14-bit core and PIC18	PIC17
4MHz	245Hz	3907Hz
8MHz	489Hz	7813Hz
10MHz z	611Hz	9766Hz
12MHz z	733Hz	11719H z
16MHz z	977Hz	15625H z
20MHz z	1221Hz	19531H z
24MHz z	1465Hz	23437H z
25MHz z	1527Hz	24415H z
32MHz z	1953Hz	31249H z
33MHz z	2015Hz	32227H z
40MHz z	2441Hz	na
48MHz z	2929Hz	na
64MHz z	3905Hz	na

The following **DEFINES** specify which timer, 1 or 2, to use with PWM channel 2 and PWM channel 3 for the PIC17C7xx devices. The default is timer 1 if no **DEFINE** is specified.

```
DEFINE HPWM2_TIMER 1      \ Hpwm channel 2 timer
DEFINE HPWM3_TIMER 1      \ Hpwm channel 3 timer
```

After an **HPWM** command, the CCP control register is left in PWM mode. If the CCP pin is to be used as a normal I/O pin after an **HPWM** command, the CCP control register will need to be set to PWM off. See the Microchip data sheet for the particular device for more information.

## PICBASIC PRO Compiler

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**HPWM** 1,127,1000     ` Send a 50% duty cycle PWM  
signal at 1kHz

**HPWM** 1,64,2000     ` Send a 25% duty cycle PWM  
signal at 2kHz