ME218a Smart Product Design

9S12C32 Pulse Width Modulator Interface Module

Purpose:

This module provides a set of interface functions to perform a simplified initialization of the Pulse Width Modulation system on the Freescale MC9S12C32 microcontroller. The initialization function should be called before any use is made of the other functions. After the initialization is complete bits 0, 1 & 2 of Port T are dedicated to the PWM output functions for PWM channels 0, 1 & 2.

Header:

The header file `PWMS12.h` should be included in any module wishing to use the functions provided by this module.

Initialization

Function:

`void PWMS12_Init(void)`

Parameters:

`None`

Returns:

`Nothing`

Description:

Initializes the PWM subsystem for all three channels. Gives the PWM subsystem control of Port T bits 0,1 & 2. Sets the initial PWM period to 2mS. Sets the Duty Cycle resolution to 1% and output duty cycle to 0%.

Notes:

The duty cycle resolution is fixed at 1% for this library.

Usage:

```
PWMS12_Init();
```

would initialize the PWM subsystem.

Set Duty Cycle

Function:

`signed char PWMS12_SetDuty(unsigned char dutyCycle, unsigned char channel)`

Parameters:

`unsigned char dutyCycle`
: a number between 0 & 100, the new duty cycle

unsigned char channel
: `PWMS12_CHAN0`, `PWMS12_CHAN1` or `PWMS12_CHAN2` to specify which channel's duty cycle to set.

Returns:

Signed char
: PWMS12_ERR if requested channel does not exist or the duty cycle is over 100%.
PWMS12_OK otherwise

Description:

Sets the output duty cycle on the specified channel. Setting the duty cycle to 0% (full off) or 100% (full on) allows you to control the PWM channel as if it were a digital output.

Usage:

```
PWMS12_SetDuty(50, PWMS12_CHAN0)
```

Would set channel 0 (Port T bit 0) to output a 50% duty cycle signal at the previously programmed period.

Set PWM Period

Function:

```
signed char PWMS12_SetPeriod(unsigned short newPeriod, unsigned char group)
```

Parameters:

`unsigned char newPeriod`
: a defined constant to specify the new period. **Do not enter a number in mS or any other time units**. This constant encodes the values needed to program the 9S12C32 timer system. Use only the pre-defined constants documented here or in PWMS12.h.

unsigned char group
: PWMS12_GRP0 to specify group 0, which applies to channels 0 & 1 or
PWMS12_GRP1 to specify group 1, which applies to channel 2.

Returns:

Signed char
: PWMS12_ERR if requested group is invalid.
PWMS12_OK otherwise

Description:

Sets the output period on the specified channel group.

Notes:

Takes newPeriod directly. Makes no sanity check on the period being programmed.

Usage:

```
PWMS12_SetPeriod(PWMS12_PERIOD_4MS, PWMS12_GRP0)
```

Would set channel group 0 (channels 0 & 1) to output a duty cycle with a 4mS period.

Disable PWM Subsystem

Function:

```
void PWMS12_End(void)
```

Parameters:

`None`

Returns:

`Nothing`

Description:

Disables the PWM subsystem for all three channels. Gives the control of Port T bits 0,1 & 2 back to the DDR and port registers.

Usage:

```
PWMS12_End();
```

would disbale the PWM subsystem.

Defined Constants For Period

```
#define PWMS12_4000US 20510
#define PWMS12_3300US 8390
#define PWMS12_2500US 8342
#define PWMS12_2000US 16414
#define PWMS12_1950US 4330
#define PWMS12_1650US 4294
#define PWMS12_1250US 4246
#define PWMS12_1000US 12318
#define PWMS12_825US 198
#define PWMS12_650US 4174
#define PWMS12_500US 8222
```