Application Note

Document No.: AN1134

G32R501 SDK SFO Library Function Application Note

Version: V1.0

1 Introduction

This application note describes SFO library function and instructions for its use.

Contents

2 Use of Software

The software library function SFO() is used to calculate the MEP scale factor of PWM modules that support HRPWM. The scale factor is an integer ranging from 1 to 255, representing the number of available micro-step edge positions within a system clock cycle. The value of the scale factor is returned as an integer variable named MEP_ScaleFactor. The specific functions of SFO() software library function are shown in Table 1.

Table 1 Scale Factor Value

Software library function	Functional description	Updated variable
SFO()	Return the MEP scale factor in the HRMSTEP register	MEP_ScaleFactor and HRMSTEP registers

2.1 Step 1 Add the header file

When using the SFO library function, the SFO_V1.h file shall be included.

```
//Example 2.1: How to add the header file

#include "SFO_V1.h"
```

Note: The SFO_V1.h file can be obtained from the following directory:
G32R5xx_SDK\libraries\calibration\hrpwm\include\ SFO_V1.h

2.2 Step 2 Variable declaration

As shown below, declare an integer variable MEP_ScaleFactor as the value of the scale factor.

```
//Example 2.2 Declaration of variable
int MEP_ScaleFactor = 0; // Global variable used by the SFO library
                         // Result can be used for all HRPWM channels
                         // This variable is also copied to HRMSTEP
                         // register by SFO() function.
uint16_t status = SFO_INCOMPLETE;
volatile uint32_t PWM[] = {0, PWM1_BASE, PWM2_BASE...};
```

2.3 Step 3 MEP_ScaleFacto initialization

The SFO() function does not require initialization of the MEP_ScaleFactor scale factor value. Before using the MEP_ScaleFactor variable in application code, SFO() can be called to drive the MEP calibration module to calculate MEP_ScaleFactor and assign it a value.

Before using the MEP_ScaleFactor variable, the following code is part of the one-time initialization code.

```
//Example 2.3 Initialize the scale factor value
while(status == SFO_INCOMPLETE)
```

```
{
   status = SFO();
   if(status == SFO_ERROR)
   {
       //
       // SFO function returns 2 if an error occurs, that MEP
       // steps/coarse step exceeds maximum of 255.
       //
       while(1);
   }
}
```

2.4 Step 4 Application code

When the application is running, the fluctuations in device temperature and supply voltage can be expected. To ensure that each PWM module uses a good scale factor, the SFO function can repeatedly run periodically as part of a slower background loop. The example codes are as follows:

```
//Example 2.4 SFO function call
void main ()
{
   while(1)
   {
       status = SFO();
       if(status == SFO_ERROR)
       {
           //
           // SFO function returns 2 if an error occurs,
           // that MEP steps/coarse step exceeds maximum of 255.
           //
           while(1);
       }
   }
}
```

Note: Please refer to the examples of HRPWM_SFO in the specific C file, readme.txt, and peripheral routines provided in the SDK.

3 Revision

Table 2 Document Revision History

Date	Version	Change History
January, 2025	1.0	New

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