

Application Note

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**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

1	Introduction	1
2	Use of Software	3
2.1	Step 1 Add the header file	3
2.2	Step 2 Variable declaration	3
2.3	Step 3 MEP_ScaleFacto initialization	3
2.4	Step 4 Application code	4
3	Revision	5

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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