

Application Note

Document No.: AN1134

G32R5xx SDK SFO Library Function

Application Note

Version: V1.1

1 **Introduction**

This application note describes the SFO library function and usage guidance.

Contents

1	Introduction	1
2	Use of software.....	3
3	Step 1 Add the static library to the IDE	4
3.1	Keil MDK	4
3.2	IAR Embedded Workbench.....	5
3.3	Eclipse (Clang).....	6
4	Step 2 Add the header file	7
5	Step 3 Variable declaration	8
6	Step 4 MEP_ScaleFactor initialization	9
7	Step 5 Application code.....	10
8	Revision	11

2 Use of software

The software library function “SFO()” calculates the MEP scale factor of PWM modules that support HRPWM. The scale factor is an integer in the range 1–255 and represents the number of available micro-step edge positions within one system clock cycle. The scale factor is returned in the integer variable “MEP_ScaleFactor”. The specific role of “SFO()” is 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

3 Step 1 Add the static library to the IDE

SFO is delivered as a prebuilt static library. Before use, add the matching “.lib” / “.a” for the target device and toolchain. Library directories:

- G32R501: “libraries/calibration/hrpwm/g32r501/lib/”
- G32R502: “libraries/calibration/hrpwm/g32r502/lib/”

Common file names (aligned with the SDK example “hrpwm_ex1_duty_sfo”) are listed in Table 2.

Table 2 SFO static library file names (three platforms)

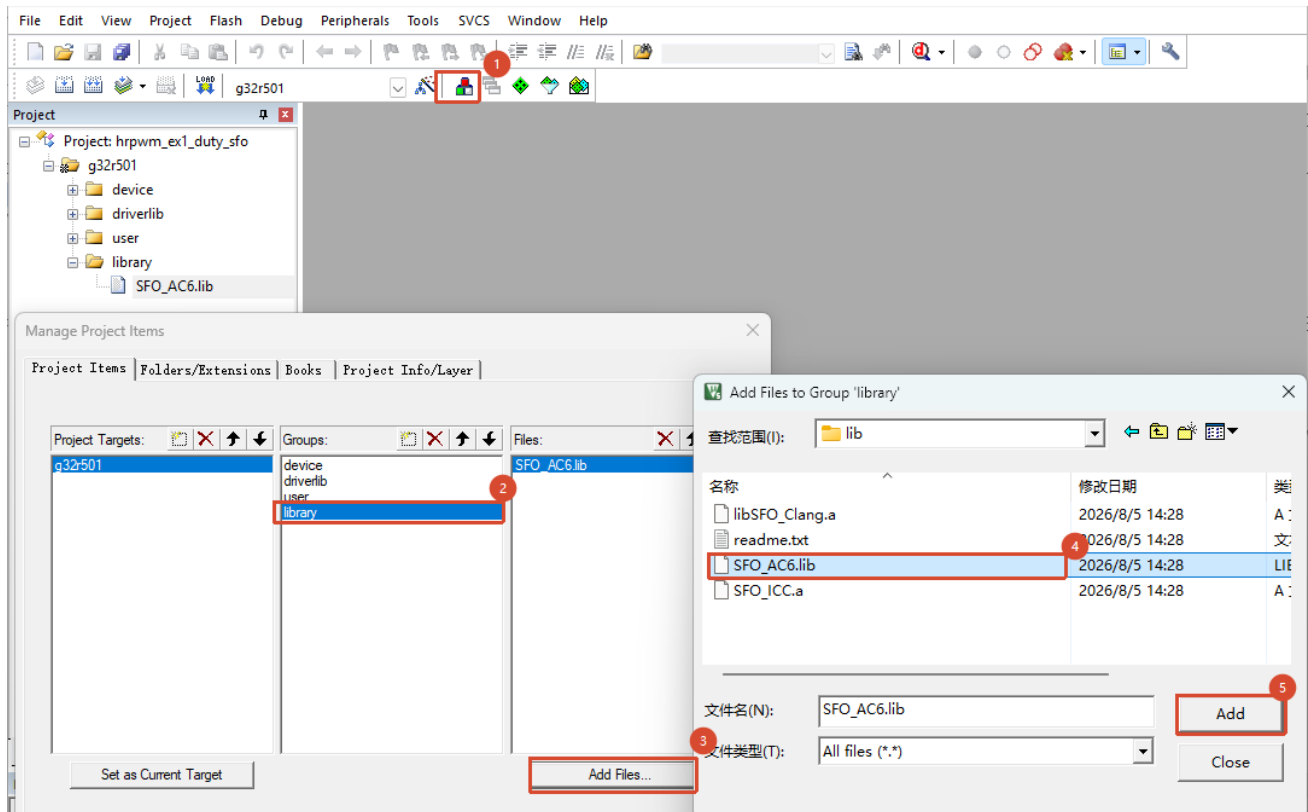
Toolchain	Library file
Keil MDK (Arm Compiler 6)	“SFO_AC6.lib”
IAR	“SFO_ICC.a”
Eclipse (Clang)	Point the library search path to the “lib” directory above; under Libraries enter “SFO_Clang” (without “lib” prefix or extension)

Note: Always select the “g32r501” or “g32r502” subdirectory that matches the device. Do not mix them.

3.1 Keil MDK

1. Open the project. In the Project window, right-click the target and choose **Add Existing Files to Group...** (or drag the library into a Source Group).
2. Browse to “libraries/calibration/hrpwm/<device>/lib/SFO_AC6.lib” and add it.
3. Confirm that Options for Target → Linker does not exclude the library; rebuild.

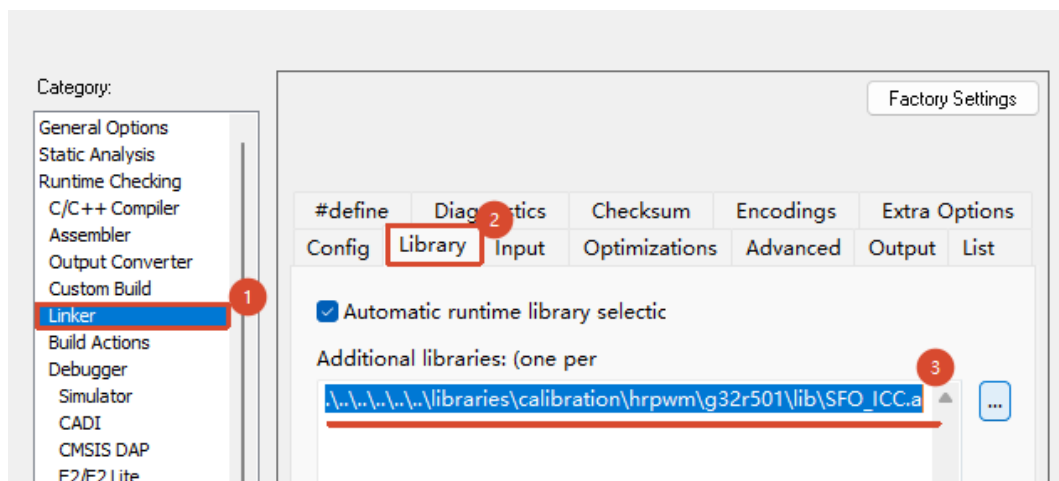
Figure 1 Adding SFOAC6.lib in MDK



3.2 IAR Embedded Workbench

1. Open the project. Under Options → **Linker** → **Library** (or Extra Options), add the full path to the library file.
2. Path example:
 “\$PROJ_DIR\$\\..\\..\\..\\..\\..\\..\\libraries\\calibration\\hrpwm\\g32r502\\lib\\SFO_ICC.a” (relative depth depends on the project; an absolute path is also acceptable).

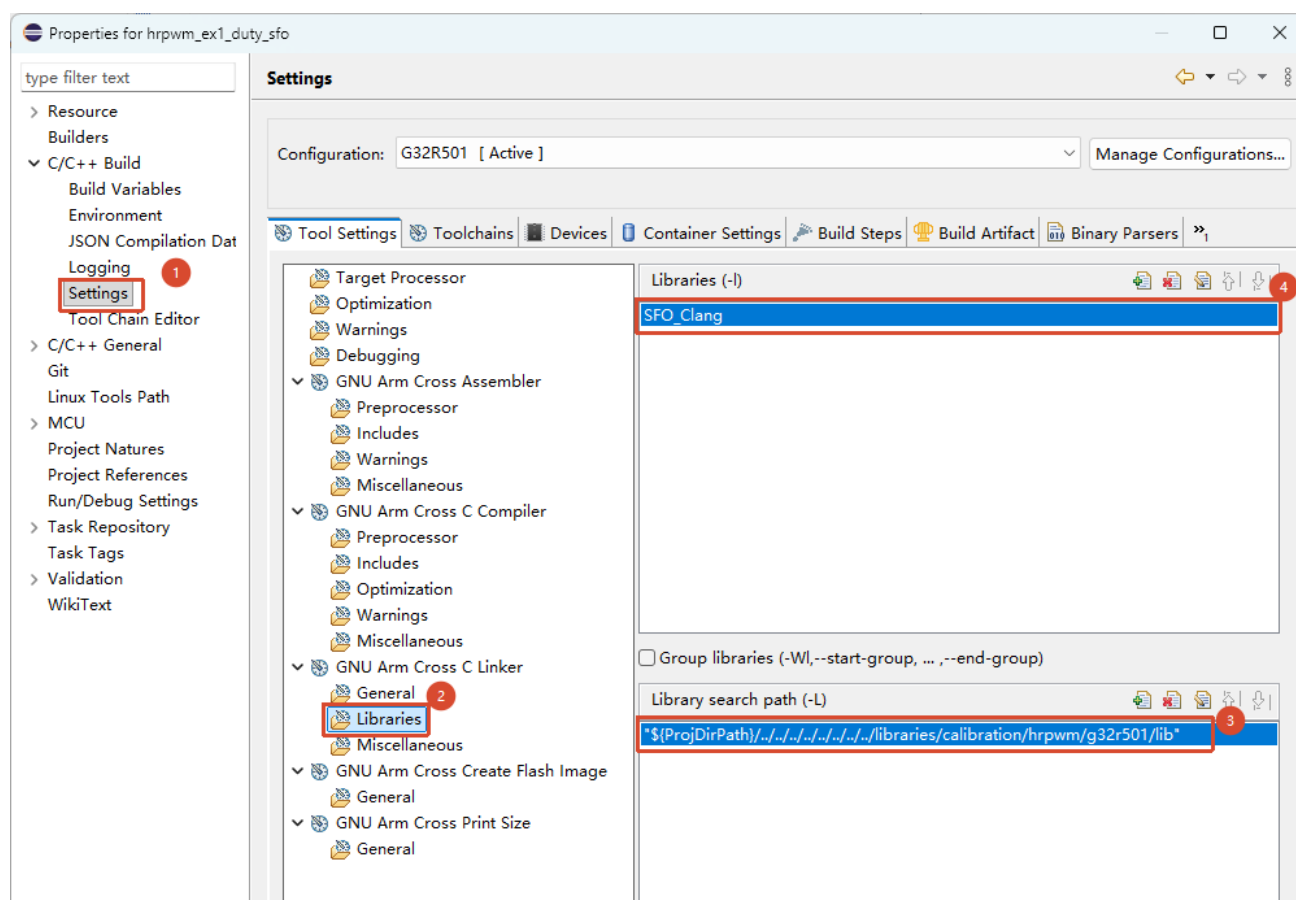
Figure 2 Adding SFOICC.a in IAR



3.3 Eclipse (Clang)

1. Right-click the project → **Properties** → **C/C++ Build** → **Settings** → **Tool Settings** → **GNU Arm Cross C Linker** → **Libraries**.
2. **Library search path (-L)**: add ".../libraries/calibration/hrpwm/<device>/lib".
3. **Libraries (-l)**: add "SFO_Clang" (the on-disk name is typically "libSFO_Clang.a" or the project-agreed "SFO_Clang" name; follow the actual files in that directory).
4. Apply and rebuild.

Figure 3 Adding SFOClang in Eclipse



After the static library is added, continue with the following steps (header, variables, and calls).

4 Step 2 Add the header file

When using the SFO library function, include "SFO_V1.h".

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

```
# include "SFO_V1.h"
```

Note: "SFO_V1.h" is located under "libraries/calibration/hrpwm/g32r501/include/" and "libraries/calibration/hrpwm/g32r502/include/" by device. Add the matching device "include" directory to the IDE header search path.

5 Step 3 Variable declaration

Declare an integer variable “MEP_ScaleFactor” as the scale-factor value, as shown below.

```
// 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 /* ... */};
```

6 Step 4 MEP_ScaleFactor initialization

“SFO()” does not require a pre-initialized “MEP_ScaleFactor” value. Before using “MEP_ScaleFactor” in application code, call “SFO()” to drive the MEP calibration module, compute the factor, and assign it.

The following code is typically part of one-time initialization before “MEP_ScaleFactor” is used:

```
// Example 2.3 Initialize the scale factor value
while (status == SFO_INCOMPLETE)
{
    status = SFO();
    if (status == SFO_ERROR)
    {
        // SFO returns 2 if MEP steps/coarse step exceeds maximum of 255.
        while (1)
        {
        }
    }
}
```

7 Step 5 Application code

While the application runs, device temperature and supply voltage can fluctuate. To keep a good scale factor for each PWM module, “SFO()” can run periodically as part of a slower background loop. Example:

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

Note: SFO-related sources live under “libraries/calibration/hrpwm/” (use the “g32r501” / “g32r502” subdirectories as present in the SDK). Open HRPWM / SFO examples under “driverlib/g32r501/examples/” or “driverlib/g32r502/examples/” and follow the sources step by step.

8 Revision

Table 3 Document revision

Date	Version	Description
2025.1	1.0	● Initial release
2026.8	1.1	● Listed applicable products as G32R501 and G32R502 ● Libraries paths include g32r501 and g32r502 ● Added Step 1 for adding the SFO static library on MDK / IAR / Eclipse.

Statement

This document is formulated and published by Geehy Semiconductor Co., Ltd. (hereinafter referred to as “Geehy”). The contents in this document are protected by laws and regulations of trademark, copyright and software copyright. Geehy reserves the right to make corrections and modifications to this document at any time. Read this document carefully before using Geehy products. Once you use the Geehy product, it means that you (hereinafter referred to as the “users”) have known and accepted all the contents of this document. Users shall use the Geehy product in accordance with relevant laws and regulations and the requirements of this document.

1. Ownership

This document can only be used in connection with the corresponding chip products or software products provided by Geehy. Without the prior permission of Geehy, no unit or individual may copy, transcribe, modify, edit or disseminate all or part of the contents of this document for any reason or in any form.

The “极海” or “Geehy” words or graphics with “®” or “TM” in this document are trademarks of Geehy. Other product or service names displayed on Geehy products are the property of their respective owners.

2. No Intellectual Property License

Geehy owns all rights, ownership and intellectual property rights involved in this document.

Geehy shall not be deemed to grant the license or right of any intellectual property to users explicitly or implicitly due to the sale or distribution of Geehy products or this document.

If any third party's products, services or intellectual property are involved in this document, it shall not be deemed that Geehy authorizes users to use the aforesaid third party's products, services or intellectual property. Any information regarding the application of the product, Geehy

hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party, unless otherwise agreed in sales order or sales contract.

3. Version Update

Users can obtain the latest document of the corresponding models when ordering Geehy products.

If the contents in this document are inconsistent with Geehy products, the agreement in the sales order or the sales contract shall prevail.

4. Information Reliability

The relevant data in this document are obtained from batch test by Geehy Laboratory or cooperative third-party testing organization. However, clerical errors in correction or errors caused by differences in testing environment may occur inevitably. Therefore, users should understand that Geehy does not bear any responsibility for such errors that may occur in this document. The relevant data in this document are only used to guide users as performance parameter reference and do not constitute Geehy's guarantee for any product performance.

Users shall select appropriate Geehy products according to their own needs, and effectively verify and test the applicability of Geehy products to confirm that Geehy products meet their own needs, corresponding standards, safety or other reliability requirements. If losses are caused to users due to user's failure to fully verify and test Geehy products, Geehy will not bear any responsibility.

5. Legality

USERS SHALL ABIDE BY ALL APPLICABLE LOCAL LAWS AND REGULATIONS WHEN USING THIS DOCUMENT AND THE MATCHING GEEHY PRODUCTS. USERS SHALL UNDERSTAND THAT THE PRODUCTS MAY BE RESTRICTED BY THE EXPORT, RE-EXPORT OR OTHER LAWS OF THE COUNTRIES OF THE PRODUCTS SUPPLIERS, GEEHY, GEEHY

DISTRIBUTORS AND USERS. USERS (ON BEHALF OR ITSELF, SUBSIDIARIES AND AFFILIATED ENTERPRISES) SHALL AGREE AND PROMISE TO ABIDE BY ALL APPLICABLE LAWS AND REGULATIONS ON THE EXPORT AND RE-EXPORT OF GEEHY PRODUCTS AND/OR TECHNOLOGIES AND DIRECT PRODUCTS.

6. Disclaimer of Warranty

THIS DOCUMENT IS PROVIDED BY GEEHY "AS IS" AND THERE IS NO WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, TO THE EXTENT PERMITTED BY APPLICABLE LAW.

GEEHY'S PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED FOR USE AS CRITICAL COMPONENTS IN MILITARY, LIFE-SUPPORT, POLLUTION CONTROL, OR HAZARDOUS SUBSTANCES MANAGEMENT SYSTEMS, NOR WHERE FAILURE COULD RESULT IN INJURY, DEATH, PROPERTY OR ENVIRONMENTAL DAMAGE.

IF THE PRODUCT IS NOT LABELED AS "AUTOMOTIVE GRADE," IT SHOULD NOT BE CONSIDERED SUITABLE FOR AUTOMOTIVE APPLICATIONS. GEEHY ASSUMES NO LIABILITY FOR THE USE BEYOND ITS SPECIFICATIONS OR GUIDELINES.

THE USER SHOULD ENSURE THAT THE APPLICATION OF THE PRODUCTS COMPLIES WITH ALL RELEVANT STANDARDS, INCLUDING BUT NOT LIMITED TO SAFETY, INFORMATION SECURITY, AND ENVIRONMENTAL REQUIREMENTS. THE USER ASSUMES FULL RESPONSIBILITY FOR THE SELECTION AND USE OF GEEHY PRODUCTS. GEEHY WILL BEAR NO RESPONSIBILITY FOR ANY DISPUTES ARISING FROM THE SUBSEQUENT DESIGN OR USE BY USERS.

7. Limitation of Liability

IN NO EVENT, UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL GEEHY OR ANY OTHER PARTY WHO PROVIDES THE DOCUMENT AND PRODUCTS

"AS IS", BE LIABLE FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE DOCUMENT AND PRODUCTS (INCLUDING BUT NOT LIMITED TO LOSSES OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY USERS OR THIRD PARTIES). THIS COVERS POTENTIAL DAMAGES TO PERSONAL SAFETY, PROPERTY, OR THE ENVIRONMENT, FOR WHICH GEEHY WILL NOT BE RESPONSIBLE.

8. Scope of Application

The information in this document replaces the information provided in all previous versions of the document.

© 2026 Geehy Semiconductor Co., Ltd. - All Rights Reserved