OmniPreSense

AN-013 Golf Data Analysis – OPS243-A

From time to time, OmniPreSense provides code updates with new features and/or fixes for its radar sensors. The embedded code in the OPS241/OPS242/OPS243 short range radar sensor can be easily updated to take advantage of these enhancements. This application note describes how to update the code on the OPS241/OPS242/OPS243 radar sensors.

Update Tools

To update the code on the OPS241/OPS242/OPS243 radar sensor the user will need a JTAG programmer and a PC based code flashing tool. An example of a low cost JTAG programmer is shown Figure 1. This programmer is relatively inexpensive and available from Adafruit <u>here</u> or other distributors. Other models are available from <u>Segger</u>.



Figure 1. JTAG Programmer

The code flashing tool used by OmniPreSense is XMCFlasher[™] provided by Infineon. This free tool is available <u>here</u>. Scroll down the page to find the Programmers/Flash Tools section (Figure 2) and click on "+" to expand the menu. Scroll down to the Infineon section and download XMCFlasher.

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Home Products Microcontroller (MCU) 32-bit industrial Microcontroller based on ARM® Cortex®-M MIddleware, Libraries, Stacks, File System, GUI								•
	Highlights ☆ Documents							
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	Simulation Videos	XMC Development Tools Ecosystem and Software						
	Partners Training	+ Debug and Test Tools						
Support - Programmers/Flash Tools								
	XMC [™] Programmers and Flash Tools							
		Company Name and Product Name Supported XMC Products						Ŧ

Figure 2. XMCFlasher Download Page

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	Overview Highlights ☆	Company Name and Weblink	Product Name	Supported XMC Products	Tool Description					
•	Documents Boards Tools & Software Simulation Videos Partners	Infineon	MENTOO.	family XMC4000 family	programming tool for on-chip flash programming. MemTool supports all actual Infineon Microcontroller families. Programming of the XMC4000 is supported via <u>DAP MiniWiggler</u> and UART BSL. DOWNLOAD MemTool					
	Training Support		XMC [™] Flasher	XMC1000 family XMC4000 family	XMC [™] Flasher is a tiny, free of charge programming tool for on- chip flash programming. It is written in Java and it supports basic functionalities like erasing, programming and verification (.hex and .srec), plus BMI handling.XMC [™] Flasher requires a J-Link compatible debug-HW to connect to the target (integrated on most of the XMC [™] kits or XMC [™] fink).					

Figure 3. XMCFlasher Download

Updating Code

To update the code in the OPS241/OPS242/OPS243, follow the step-by-step instructions below. You will need to have a JTAG programming tool like the Segger noted above. You may also need to install the J-Link Software and Documentation Pack which can be found <u>here</u>.

Step 1. Download and install the XMCFlasher programming tool from the Infineon website. Follow the installation instructions that come with the download.

Step 2. Connect the JTAG programmer's connector to the JTAG connector on the OPS241/OPS242 (J6) located near the middle of the board (Figure 4). On the OPS243 the JTAG connector is J2 and located to the right side of the board with the antennas positioned at the top or lower left on the version D2 and later boards. The connector is keyed, so it can only connect in one direction.



Figure 4. JTAG Connector (J6 on OPS241)

Step 3. Plug in the USB connector of the JTAG programmer into a USB port on the PC. If the ribbon cable that came with the Segger programmer was not plugged in, connect it. The connector on the programmer is not keyed. On some Seggers, the connector on the cable should be mounted so that the cable goes away from the programmer board as show in (Figure 5). On other boards, the cable may need to point in the other direction. When the sensor is connected to the XMCFlasher tool, if the Unique Chip ID does not populate (Step 7), rotate the connector on the Segger by 180° and hit the Connect button again. Plug in a USB micro cable into the OPS241/OPS242/OPS243 and the other end into another USB port on the PC. This provides power to the OPS241/OPS242/OPS243 during the program update.



Figure 5. USB and JTAG Connections to PC

Step 4. Start XMCFlasher on the PC to get a window like that shown in Figure 6.

Debugger Type:	SEGGER Serial Wire Debug	File name: Size (byte):
Debug clock speed (KHz):	1000	Program
Connection Status: Not connected Selected Emulator Serial Number: Selected Device Name: XMC4500-1024 Unique Chip ID:	Not connected	Verify
	XMC4500-1024	Erase
File Checksum: Device Checksum:	0X0	Dump Flash

Figure 6. XMCFlasher Programming Tool

Step 5. Make sure the XMCFlasher configuration is set for Serial Wire Debug and not JTAG (Figure 7). Some of the OPS243 version D2 boards require setting to JTAG. If you find XMCFlasher does not connect to your OPS243 version D2 or later board, select JTAG as the Debugger Type. The Interface Setup is found under Configuration – Setup... Make sure the "Reset and verify content after programming" box is also checked off.

🗳 XMC™ Flasher		_	
File Configurations BMI Target Log	About	×	-
Co Debugger Type Debug Port Configuration	SEGGER •		
Connectic Debug Clock Speed (KHz) Selected	100 new version is available		
Unique C	fter programming		
infineon	C	lk Cancel	

Figure 7. Serial Interface Setting

Step 6. With the OPS241/OPS242/OPS243 connected to the PC, press the Connect button on XMCFlasher. A pop-up window like that in Figure 8 will appear. For the OPS241/OPS242, scroll down and select the XMC4200-256 and press Ok. For the OPS243, there are two options to choose depending on your board version. Some version D2 and later sensors use the XMC4700 while most others use the XMC4500. Check which processor is used by issuing a ?P API command. Once the processor to select is known, scroll down and select the appropriate sensor as shown in Figure 9 and press Ok.

KMC [™] Flasher	-
List of Targets:	
XMC4100-128	^
XMC4104-128	
XMC4104-64	
XMC4108-64	
XMC4200-256	
XMC4300-256	0
XMC4400-256	
VMC4400 512	×
	Ok
Intineon	
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Figure 8. XMCFlasher Device Selection Window – OPS241/OPS242

XMC [™] Flasher	– 🗆 X
Select Device Name to connect	×
List of Targets:	
XMC4400-256	
XMC4400-512	
XMC4402-256	
XMC4500-1024	
XMC4500-768	
XMC4502-768	
XMC4504-512	
XMC4700-1536	~
	Ok
Infineon	
	1 Miles

Figure 9. XMCFlasher Device Selection - OPS243

Step 7. The window will change and show the Connected Status as Connected (Figure 10). Additional information about the device will be shown including the Unique Chip ID. The Unique Chip ID will be a long line of random numbers and letters. If the Unique Chip ID shows 00, the XMCFlasher is not connected to the sensor and will not program correctly. Check that the Segger is plugged in or reverse the connector cable on the Segger side which is not keyed.

Ž XMC™ Flasher — □ X					
File Configurations BMI Target I	Log About				
Connect	Disconnect	Select File			
Debugger Type:	SEGGER	File name:			
Debugger Port Configuration:	Serial Wire Debug	Size (byte):			
Debug clock speed (KHz):	1000	Program			
Connection Status:	Connected				
Selected Emulator Serial Number:	801032217	Verify			
Selected Device Name:	XMC4500-1024				
Unique Chip ID:	A10000682619B80160B9280C1	Erase			
File Checksum:	0X0				
Device Checksum:	Press verify to recompute	Dump Flash			
Device Checksum: Press verify to recompute					

Figure 10. XMCFlasher Connected State Window

Step 8. Next, click on Select File and browse to the location of the hex file with the code to be updated on the OPS241/OPS242/OPS243. The name of the file will show up under the Select File button (Figure 11). Contact OmniPreSense <u>customer service</u> to obtain the latest code version.

 ✓ XMC[™] Flasher File Configurations BMI Target 	Log About	×		
Connect	Disconnect	Select File		
Debugger Type:	SEGGER Serial Wire Debug	File name: OPS243_CW_v1.2.1_2 Size (byte): 237612		
Debug clock speed (KHz):	1000 Connected	Program		
Selected Emulator Serial Number:	801032217	Verify		
Selected Device Name: Unique Chip ID:	A10000682619B80160B9280C1	Erase		
File Checksum: Device Checksum:	0X9EE9935D Press verify to recompute	Dump Flash		
infineon				

Figure 11. Hex File Selection

Step 9. Press Program to start the flashing process. A pop-up of rolling balls along with a status box will appear while the flashing in process (Figure 12). Typically, it only takes a few seconds to complete the flashing process. <u>Do not</u> press the Erase button. OmniPreSense saves factory settings in some sensors and pressing the Erase button will clear those out as well as any persistent memory settings which have been saved.

	Log About	
Connect	Disconnect.	Select File
Debugger Type:	SEGGER	File name: OPS243_CW_v1.2.1_
Debugger Port Configuration:	Serial Wire Debug	Size (byte): 237612
Debug clock speed (KHz):	1000	Program
Connection Status:	Connected	
Selected Emulator Serial Number:	801032217	Verify
Selected Device Name:	XMC4500-1024	
Unique Chip ID:	A10000682619B80160B9280C1	Erase
File Checksum:	0X9EE9935D	
Dovice Checksum	Press verify	Dump Flash

Figure 12. Sensor Flashing in Process

Step 10. Upon a successful re-flashing, a pop-up window will appear indicating a success (Figure 13). Click Ok and followed by the Disconnect button. The sensor can now be unplugged from the JTAG programmer and PC.

🗳 XMC™ Flasher		-
Connect.,	Disconnect	Select File
Debugger Type: Debugger Port Configur	SEGGER ation: Serial Wire Debug	File name: OPS243_CW_v1.2.1_2 Size (byte): 237612
Debug clock speed (K Connection Status:	Programming succeeded	× bgram
Selected Emulator Ser Selected Device Name	Programming & verification after reset are	successful !
Unique Chip ID:		irase
File Checksum: Device Checksum:		OK pp Flash
Operation completed		and the second se
Cinfineor	1	Contraction of the second
		S.L.M.

Figure 13. Successful Flashing of Sensor

You can check the programming was successful by plugging the board back into the USB port on the PC and using <u>Tera Term</u> to validate the new code is programmed and runs. Start Tera Term and it will automatically detect which port the board is connected to. Select the Serial button with the proper port

selection. You should see speed data (m/s) start to stream from the board while waving your hand above the board. Press ?? to report the board information and note the Version number is correct for the expected code which has been programmed (Figure 14).



Figure 14. Programmed Board Validation

Revision History

Version	Date	Description
A	November 13, 2017	Initial release.
В	November 26, 2018	Updated with newer re-flashing tools.
C	February 26, 2019	Added new step 5 to check for serial setting as
		opposed to JTAG.
D	June 19, 2019	Updated with support for OPS243. Added
		clarification not to use Erase button.
E	July 29, 2022	Updated information about rev D2 boards and
		removed comments about 1 st generation OPS241
		board.
F	February 18, 2025	Corrected Segger connection position
		Added comments about installing J-Link software
		Updated screenshots