

# **Xilinx Standalone Library Documentation**

## ***Xilinx Library v5.11***

UG652 (2018.2) June 6, 2018

# Table of Contents

## Chapter Overview

Supported Devices . . . . .	4
References . . . . .	5

## Chapter XlIsf Library API

Overview . . . . .	6
Function Documentation . . . . .	6
XlIsf_Initialize . . . . .	6
XlIsf_GetStatus . . . . .	8
XlIsf_GetStatusReg2 . . . . .	8
XlIsf_GetDeviceInfo . . . . .	8
XlIsf_Write . . . . .	9
XlIsf_Read . . . . .	12
XlIsf_Erase . . . . .	14
XlIsf_MicronFlashEnter4BAddMode . . . . .	14
XlIsf_MicronFlashExit4BAddMode . . . . .	15
XlIsf_SectorProtect . . . . .	15
XlIsf_Ioctl . . . . .	16
XlIsf_WriteEnable . . . . .	17
XlIsf_RegisterInterface . . . . .	17
XlIsf_SetSpiConfiguration . . . . .	18
XlIsf_SetStatusHandler . . . . .	18
XlIsf_IfaceHandler . . . . .	19

## Chapter Library Parameters in MSS File

## Appendix Additional Resources and Legal Notices

## Overview

The LibXil Isf library:

- Allows you to Write, Read, and Erase the Serial Flash.
- Allows protection of the data stored in the Serial Flash from unwarranted modification by enabling the Sector Protection feature.
- Supports multiple instances of Serial Flash at a time, provided they are of the same device family (Atmel, Intel, STM, Winbond, SST, or Spansion) as the device family is selected at compile time.
- Allows the user application to perform Control operations on Intel, STM, Winbond, SST, and Spansion Serial Flash.
- Requires the underlying hardware platform to contain the axi\_quad\_spi, ps7\_spi, ps7\_qspi, psu\_qspi or psu\_spi device for accessing the Serial Flash.
- Uses the Xilinx® SPI interface drivers in interrupt-driven mode or polled mode for communicating with the Serial Flash. In interrupt mode, the user application must acknowledge any associated interrupts from the Interrupt Controller.

Additional information:

- In interrupt mode, the application is required to register a callback to the library and the library registers an internal status handler to the selected interface driver.
- When the user application requests a library operation, it is initiated and control is given back to the application. The library tracks the status of the interface transfers, and notifies the user application upon completion of the selected library operation.
- Added support in the library for SPI PS and QSPI PS. You must select one of the interfaces at compile time.
- Added support for QSPIPSU and SPIPS flash interface on Zynq® UltraScale+™ MPSoC.
- When the user application requests selection of QSPIPS interface during compilation, the QSPI PS or QSPI PSU interface, based on the hardware platform, are selected. Similarly, if the SPIPS interface is selected during compilation, SPI PS or SPI PSU interface are selected.

## Supported Devices

The table below lists the supported Xilinx in-system and external serial flash memories.

Device Series	Manufacturer
AT45DB011D AT45DB021D AT45DB041D AT45DB081D AT45DB161D AT45DB321D AT45DB642D	Atmel
W25Q16 W25Q32 W25Q64 W25Q80 W25Q128 W25X10 W25X20 W25X40 W25X80 W25X16 W25X32 W25X64	Winbond
S25FL004 S25FL008 S25FL016 S25FL032 S25FL064 S25FL128 S25FL129 S25FL256 S25FL512 S70FL01G	Spansion
SST25WF080	SST

Device Series	Manufacturer
N25Q032 N25Q064 N25Q128 N25Q256 N25Q512 N25Q00AA MT25Q01 MT25Q02 MT25Q512	Micron
IS25LP256D IS25WP256D	ISSI

**Note**

Intel, STM, and Numonyx serial flash devices are now a part of Serial Flash devices provided by Micron.

---

## References

- Spartan-3AN FPGA In-System Flash User Guide (UG333):  
[http://www.xilinx.com/support/documentation/user\\_guides/ug333.pdf](http://www.xilinx.com/support/documentation/user_guides/ug333.pdf)
- Atmel Serial Flash Memory website (AT45XXXD):  
[http://www.atmel.com/dyn/products/devices.asp?family\\_id=616#1802](http://www.atmel.com/dyn/products/devices.asp?family_id=616#1802)
- Intel (Numonyx) S33 Serial Flash Memory website (S33):  
[http://www.numonyx.com/Documents/Datasheets/314822\\_S33\\_Discrete\\_DS.pdf](http://www.numonyx.com/Documents/Datasheets/314822_S33_Discrete_DS.pdf)
- STM (Numonyx) M25PXX Serial Flash Memory website (M25PXX):  
<http://www.numonyx.com/en-US/MemoryProducts/N0Rserial/Pages/M25PTechnicalDocuments.aspx>
- Winbond Serial Flash Page:  
<http://www.winbond-usa.com/hq/enu/ProductAndSales/ProductLines/FlashMemory/SerialFlash/>
- Spansion website:  
<http://www.spansion.com/Support/Pages/DatasheetsIndex.aspx>
- SST SST25WF080:  
<http://www.sst.com/dotAsset/40369.pdf>
- Micron N25Q flash family:  
<http://www.micron.com/products/nor-flash/serial-norflash/n25q#/>

# Xllsf Library API

---

## Overview

This chapter provides a linked summary and detailed descriptions of the Xllsf library APIs.

---

## Functions

- int [Xlsf\\_Initialize](#) (Xlsf \*InstancePtr, Xlsf\_Iface \*SpiInstPtr, u8 SlaveSelect, u8 \*WritePtr)
- int [Xlsf\\_GetStatus](#) (Xlsf \*InstancePtr, u8 \*ReadPtr)
- int [Xlsf\\_GetStatusReg2](#) (Xlsf \*InstancePtr, u8 \*ReadPtr)
- int [Xlsf\\_GetDeviceInfo](#) (Xlsf \*InstancePtr, u8 \*ReadPtr)
- int [Xlsf\\_Write](#) (Xlsf \*InstancePtr, Xlsf\_WriteOperation Operation, void \*OpParamPtr)
- int [Xlsf\\_Read](#) (Xlsf \*InstancePtr, Xlsf\_ReadOperation Operation, void \*OpParamPtr)
- int [Xlsf\\_Erase](#) (Xlsf \*InstancePtr, Xlsf\_EraseOperation Operation, u32 Address)
- int [Xlsf\\_MicronFlashEnter4BAddMode](#) (Xlsf \*InstancePtr)
- int [Xlsf\\_MicronFlashExit4BAddMode](#) (Xlsf \*InstancePtr)
- int [Xlsf\\_SectorProtect](#) (Xlsf \*InstancePtr, Xlsf\_SpOperation Operation, u8 \*BufferPtr)
- int [Xlsf\\_Ioctl](#) (Xlsf \*InstancePtr, Xlsf\_IoctlOperation Operation)
- int [Xlsf\\_WriteEnable](#) (Xlsf \*InstancePtr, u8 WriteEnable)
- void [Xlsf\\_RegisterInterface](#) (Xlsf \*InstancePtr)
- int [Xlsf\\_SetSpiConfiguration](#) (Xlsf \*InstancePtr, Xlsf\_Iface \*SpiInstPtr, u32 Options, u8 PreScaler)
- void [Xlsf\\_SetStatusHandler](#) (Xlsf \*InstancePtr, Xlsf\_Iface \*XlfaceInstancePtr, Xlsf\_StatusHandler Xllsf\_Handler)
- void [Xlsf\\_IfaceHandler](#) (void \*CallbackRef, u32 StatusEvent, unsigned int ByteCount)

---

## Function Documentation

**int Xlsf\_Initialize ( Xlsf \* *InstancePtr*, Xlsf\_Iface \* *SpiInstPtr*, u8 *SlaveSelect*, u8 \* *WritePtr* )**

This API when called initializes the SPI interface with default settings.



With custom settings, user should call [Xlsf\\_SetSpiConfiguration\(\)](#) and then call this API. The geometry of the underlying Serial Flash is determined by reading the Joint Electron Device Engineering Council (JEDEC) Device Information and the Status Register of the Serial Flash.

### Parameters

<i>InstancePtr</i>	Pointer to the Xlsf instance.
<i>SpiInstPtr</i>	Pointer to Xlsf_Iface instance to be worked on.
<i>SlaveSelect</i>	It is a 32-bit mask with a 1 in the bit position of slave being selected. Only one slave can be selected at a time.
<i>WritePtr</i>	<p>Pointer to the buffer allocated by the user to be used by the In-system and Serial Flash Library to perform any read/write operations on the Serial Flash device. User applications must pass the address of this buffer for the Library to work.</p> <ul style="list-style-type: none"><li>• Write operations :<ul style="list-style-type: none"><li>◦ The size of this buffer should be equal to the Number of bytes to be written to the Serial Flash + XISF_CMD_MAX_EXTRA_BYTES.</li><li>◦ The size of this buffer should be large enough for usage across all the applications that use a common instance of the Serial Flash.</li><li>◦ A minimum of one byte and a maximum of ISF_PAGE_SIZE bytes can be written to the Serial Flash, through a single Write operation.</li></ul></li><li>• Read operations :<ul style="list-style-type: none"><li>◦ The size of this buffer should be equal to XISF_CMD_MAX_EXTRA_BYTES, if the application only reads from the Serial Flash (no write operations).</li></ul></li></ul>

### Returns

- XST\_SUCCESS if successful.
- XST\_DEVICE\_IS\_STOPPED if the device must be started before transferring data.
- XST\_FAILURE, otherwise.

### Note

- The [Xlsf\\_Initialize\(\)](#) API is a blocking call (for both polled and interrupt modes of the Spi driver). It reads the JEDEC information of the device and waits till the transfer is complete before checking if the information is valid.
- This library can support multiple instances of Serial Flash at a time, provided they are of the same device family (either Atmel, Intel or STM, Winbond or Spansion) as the device family is selected at compile time.



## **int Xlzf\_GetStatus ( Xlzf \* *InstancePtr*, u8 \* *ReadPtr* )**

This API reads the Serial Flash Status Register.

### **Parameters**

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>ReadPtr</i>	Pointer to the memory where the Status Register content is copied.

### **Returns**

XST\_SUCCESS if successful else XST\_FAILURE.

### **Note**

The contents of the Status Register is stored at second byte pointed by the ReadPtr.

## **int Xlzf\_GetStatusReg2 ( Xlzf \* *InstancePtr*, u8 \* *ReadPtr* )**

This API reads the Serial Flash Status Register 2.

### **Parameters**

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>ReadPtr</i>	Pointer to the memory where the Status Register content is copied.

### **Returns**

XST\_SUCCESS if successful else XST\_FAILURE.

### **Note**

The contents of the Status Register 2 is stored at the second byte pointed by the ReadPtr. This operation is available only in Winbond Serial Flash.

## **int Xlzf\_GetDeviceInfo ( Xlzf \* *InstancePtr*, u8 \* *ReadPtr* )**

This API reads the Joint Electron Device Engineering Council (JEDEC) information of the Serial Flash.

### **Parameters**

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>ReadPtr</i>	Pointer to the buffer where the Device information is copied.





## Returns

XST\_SUCCESS if successful else XST\_FAILURE.

## Note

The Device information is stored at the second byte pointed by the ReadPtr.

**int Xlzf\_Write ( Xlzf \* InstancePtr, Xlzf\_WriteOperation Operation, void \* OpParamPtr )**

This API writes the data to the Serial Flash.

## Parameters

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>Operation</i>	<p>Type of write operation to be performed on the Serial Flash. The different operations are</p> <ul style="list-style-type: none"><li>• XISF_WRITE: Normal Write</li><li>• XISF_DUAL_IP_PAGE_WRITE: Dual Input Fast Program</li><li>• XISF_DUAL_IP_EXT_PAGE_WRITE: Dual Input Extended Fast Program</li><li>• XISF_QUAD_IP_PAGE_WRITE: Quad Input Fast Program</li><li>• XISF_QUAD_IP_EXT_PAGE_WRITE: Quad Input Extended Fast Program</li><li>• XISF_AUTO_PAGE_WRITE: Auto Page Write</li><li>• XISF_BUFFER_WRITE: Buffer Write</li><li>• XISF_BUF_TO_PAGE_WRITE_WITH_ERASE: Buffer to Page Transfer with Erase</li><li>• XISF_BUF_TO_PAGE_WRITE_WITHOUT_ERASE: Buffer to Page Transfer without Erase</li><li>• XISF_WRITE_STATUS_REG: Status Register Write</li><li>• XISF_WRITE_STATUS_REG2: 2 byte Status Register Write</li><li>• XISF_OTP_WRITE: OTP Write.</li></ul>
<i>OpParamPtr</i>	Pointer to a structure variable which contains operational parameters of the specified operation. This parameter type is dependant on value of first argument(Operation). For more details, refer <a href="#">Operations</a> .

## Operations

- Normal Write(XISF\_WRITE), Dual Input Fast Program (XISF\_DUAL\_IP\_PAGE\_WRITE), Dual Input Extended Fast Program(XISF\_DUAL\_IP\_EXT\_PAGE\_WRITE), Quad Input Fast Program(XISF\_QUAD\_IP\_PAGE\_WRITE), Quad Input Extended Fast Program (XISF\_QUAD\_IP\_EXT\_PAGE\_WRITE):
  - The OpParamPtr must be of type struct Xlsf\_WriteParam.
  - OpParamPtr->Address is the start address in the Serial Flash.
  - OpParamPtr->WritePtr is a pointer to the data to be written to the Serial Flash.
  - OpParamPtr->NumBytes is the number of bytes to be written to Serial Flash.
  - This operation is supported for Atmel, Intel, STM, Winbond and Spansion Serial Flash.
- Auto Page Write (XISF\_AUTO\_PAGE\_WRITE):
  - The OpParamPtr must be of 32 bit unsigned integer variable.
  - This is the address of page number in the Serial Flash which is to be refreshed.
  - This operation is only supported for Atmel Serial Flash.
- Buffer Write (XISF\_BUFFER\_WRITE):
  - The OpParamPtr must be of type struct Xlsf\_BufferToFlashWriteParam.
  - OpParamPtr->BufferNum specifies the internal SRAM Buffer of the Serial Flash. The valid values are XISF\_PAGE\_BUFFER1 or XISF\_PAGE\_BUFFER2. XISF\_PAGE\_BUFFER2 is not valid in case of AT45DB011D Flash as it contains a single buffer.
  - OpParamPtr->WritePtr is a pointer to the data to be written to the Serial Flash SRAM Buffer.
  - OpParamPtr->ByteOffset is byte offset in the buffer from where the data is to be written.
  - OpParamPtr->NumBytes is number of bytes to be written to the Buffer. This operation is supported only for Atmel Serial Flash.
- Buffer To Memory Write With Erase (XISF\_BUF\_TO\_PAGE\_WRITE\_WITH\_ERASE)/ Buffer To Memory Write Without Erase (XISF\_BUF\_TO\_PAGE\_WRITE\_WITHOUT\_ERASE):
  - The OpParamPtr must be of type struct Xlsf\_BufferToFlashWriteParam.
  - OpParamPtr->BufferNum specifies the internal SRAM Buffer of the Serial Flash. The valid values are XISF\_PAGE\_BUFFER1 or XISF\_PAGE\_BUFFER2. XISF\_PAGE\_BUFFER2 is not valid in case of AT45DB011D Flash as it contains a single buffer.
  - OpParamPtr->Address is starting address in the Serial Flash memory from where the data is to be written. These operations are only supported for Atmel Serial Flash.
- Write Status Register (XISF\_WRITE\_STATUS\_REG):
  - The OpParamPtr must be of type of 8 bit unsigned integer variable. This is the value to be written to the Status Register.
  - This operation is only supported for Intel, STM Winbond and Spansion Serial Flash.
- Write Status Register2 (XISF\_WRITE\_STATUS\_REG2):



- The OpParamPtr must be of type (u8 \*) and should point to two 8 bit unsigned integer values. This is the value to be written to the 16 bit Status Register. This operation is only supported in Winbond (W25Q) Serial Flash.
- One Time Programmable Area Write(XISF\_OTP\_WRITE):
  - The OpParamPtr must be of type struct Xlzf\_WriteParam.
  - OpParamPtr->Address is the address in the SRAM Buffer of the Serial Flash to which the data is to be written.
  - OpParamPtr->WritePtr is a pointer to the data to be written to the Serial Flash.
  - OpParamPtr->NumBytes should be set to 1 when performing OTPWrite operation. This operation is only supported for Intel Serial Flash.

### Returns

XST\_SUCCESS if successful else XST\_FAILURE.

### Note

- Application must fill the structure elements of the third argument and pass its pointer by type casting it with void pointer.
- For Intel, STM, Winbond and Spansion Serial Flash, the user application must call the [Xlzf\\_WriteEnable\(\)](#) API by passing XISF\_WRITE\_ENABLE as an argument, before calling the [Xlzf\\_Write\(\)](#) API.



```
int Xlzf_Read ( Xlzf * InstancePtr, Xlzf_ReadOperation  
Operation, void * OpParamPtr )
```

This API reads the data from the Serial Flash.

#### Parameters

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>Operation</i>	Type of the read operation to be performed on the Serial Flash. The different operations are <ul style="list-style-type: none"><li>• XISF_READ: Normal Read</li><li>• XISF_FAST_READ: Fast Read</li><li>• XISF_PAGE_TO_BUF_TRANS: Page to Buffer Transfer</li><li>• XISF_BUFFER_READ: Buffer Read</li><li>• XISF_FAST_BUFFER_READ: Fast Buffer Read</li><li>• XISF_OTP_READ: One Time Programmable Area (OTP) Read</li><li>• XISF_DUAL_OP_FAST_READ: Dual Output Fast Read</li><li>• XISF_DUAL_IO_FAST_READ: Dual Input/Output Fast Read</li><li>• XISF_QUAD_OP_FAST_READ: Quad Output Fast Read</li><li>• XISF_QUAD_IO_FAST_READ: Quad Input/Output Fast Read</li></ul>
<i>OpParamPtr</i>	Pointer to structure variable which contains operational parameter of specified Operation. This parameter type is dependant on the type of Operation to be performed. For more details, refer <a href="#">Operations</a> .

#### Operations

- Normal Read (XISF\_READ), Fast Read (XISF\_FAST\_READ), One Time Programmable Area Read (XISF\_OTP\_READ), Dual Output Fast Read (XISF\_CMD\_DUAL\_OP\_FAST\_READ), Dual Input/Output Fast Read (XISF\_CMD\_DUAL\_IO\_FAST\_READ), Quad Output Fast Read (XISF\_CMD\_QUAD\_OP\_FAST\_READ) and Quad Input/Output Fast Read (XISF\_CMD\_QUAD\_IO\_FAST\_READ):
  - The OpParamPtr must be of type struct Xlzf\_ReadParam.
  - OpParamPtr->Address is start address in the Serial Flash.
  - OpParamPtr->ReadPtr is a pointer to the memory where the data read from the Serial Flash is stored.
  - OpParamPtr->NumBytes is number of bytes to read.
  - OpParamPtr->NumDummyBytes is the number of dummy bytes to be transmitted for the Read command. This parameter is only used in case of Dual and Quad reads.

- Normal Read and Fast Read operations are supported for Atmel, Intel, STM, Winbond and Spansion Serial Flash.
- Dual and quad reads are supported for Winbond (W25QXX), Numonyx(N25QXX) and Spansion (S25FL129) quad flash.
- OTP Read operation is only supported in Intel Serial Flash.
- Page To Buffer Transfer (XISF\_PAGE\_TO\_BUF\_TRANS):
  - The OpParamPtr must be of type struct Xlsf\_FlashToBufTransferParam .
  - OpParamPtr->BufferNum specifies the internal SRAM Buffer of the Serial Flash. The valid values are XISF\_PAGE\_BUFFER1 or XISF\_PAGE\_BUFFER2. XISF\_PAGE\_BUFFER2 is not valid in case of AT45DB011D Flash as it contains a single buffer.
  - OpParamPtr->Address is start address in the Serial Flash. This operation is only supported in Atmel Serial Flash.
- Buffer Read (XISF\_BUFFER\_READ) and Fast Buffer Read(XISF\_FAST\_BUFFER\_READ):
  - The OpParamPtr must be of type struct Xlsf\_BufferReadParam.
  - OpParamPtr->BufferNum specifies the internal SRAM Buffer of the Serial Flash. The valid values are XISF\_PAGE\_BUFFER1 or XISF\_PAGE\_BUFFER2. XISF\_PAGE\_BUFFER2 is not valid in case of AT45DB011D Flash as it contains a single buffer.
  - OpParamPtr->ReadPtr is pointer to the memory where data read from the SRAM buffer is to be stored.
  - OpParamPtr->ByteOffset is byte offset in the SRAM buffer from where the first byte is read.
  - OpParamPtr->NumBytes is the number of bytes to be read from the Buffer. These operations are supported only in Atmel Serial Flash.

## Returns

XST\_SUCCESS if successful else XST\_FAILURE.

## Note

- Application must fill the structure elements of the third argument and pass its pointer by type casting it with void pointer.
- The valid data is available from the fourth location pointed to by the ReadPtr for Normal Read and Buffer Read operations.
- The valid data is available from fifth location pointed to by the ReadPtr for Fast Read, Fast Buffer Read and OTP Read operations.
- The valid data is available from the (4 + NumDummyBytes)th location pointed to by ReadPtr for Dual/Quad Read operations.



## **int Xlzf\_Erase ( Xlzf \* InstancePtr, Xlzf\_EraseOperation Operation, u32 Address )**

This API erases the contents of the specified memory in the Serial Flash.

### Parameters

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>Operation</i>	Type of Erase operation to be performed on the Serial Flash. The different operations are <ul style="list-style-type: none"><li>• XISF_PAGE_ERASE: Page Erase</li><li>• XISF_BLOCK_ERASE: Block Erase</li><li>• XISF_SECTOR_ERASE: Sector Erase</li><li>• XISF_BULK_ERASE: Bulk Erase</li></ul>
<i>Address</i>	Address of the Page/Block/Sector to be erased. The address can be either Page address, Block address or Sector address based on the Erase operation to be performed.

### Returns

XST\_SUCCESS if successful else XST\_FAILURE.

### Note

- The erased bytes will read as 0xFF.
- For Intel, STM, Winbond or Spansion Serial Flash the user application must call [Xlzf\\_WriteEnable\(\)](#) API by passing XISF\_WRITE\_ENABLE as an argument before calling [Xlzf\\_Erase\(\)](#) API.
- Atmel Serial Flash support Page/Block/Sector Erase operations.
- Intel, Winbond, Numonyx (N25QXX) and Spansion Serial Flash support Sector/Block/Bulk Erase operations.
- STM (M25PXX) Serial Flash support Sector/Bulk Erase operations.

## **int Xlzf\_MicronFlashEnter4BAddrMode ( Xlzf \* InstancePtr )**

This API enters the Micron flash device into 4 bytes addressing mode.

As per the Micron spec, before issuing the command to enter into 4 byte addr mode, a write enable command is issued.

#### Parameters

<i>InstancePtr</i>	Pointer to the Xlzf instance.
--------------------	-------------------------------

#### Returns

- XST\_SUCCESS if successful.
- XST\_FAILURE if it fails.

#### Note

Applicable only for Micron flash devices

### **int Xlzf\_MicronFlashExit4BAddMode ( Xlzf \* *InstancePtr* )**

This API exits the Micron flash device from 4 bytes addressing mode.

As per the Micron spec, before issuing this command a write enable command is first issued.

#### Parameters

<i>InstancePtr</i>	Pointer to the Xlzf instance.
--------------------	-------------------------------

#### Returns

- XST\_SUCCESS if successful.
- XST\_FAILURE if it fails.

#### Note

Applicable only for Micron flash devices

### **int Xlzf\_SectorProtect ( Xlzf \* *InstancePtr*, Xlzf\_SpOperation *Operation*, u8 \* *BufferPtr* )**

This API is used for performing Sector Protect related operations.

## Parameters

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>Operation</i>	Type of Sector Protect operation to be performed on the Serial Flash. The different operations are <ul style="list-style-type: none"> <li>• XISF_SPR_READ: Read Sector Protection Register</li> <li>• XISF_SPR_WRITE: Write Sector Protection Register</li> <li>• XISF_SPR_ERASE: Erase Sector Protection Register</li> <li>• XISF_SP_ENABLE: Enable Sector Protection</li> <li>• XISF_SP_DISABLE: Disable Sector Protection</li> </ul>
<i>BufferPtr</i>	Pointer to the memory where the SPR content is read to/written from. This argument can be NULL if the Operation is SprErase, SpEnable and SpDisable.

## Returns

XST\_SUCCESS if successful else XST\_FAILURE.

## Note

- The SPR content is stored at the fourth location pointed by the BufferPtr when performing XISF\_SPR\_READ operation.
- For Intel, STM, Winbond and Spansion Serial Flash, the user application must call the [Xlzf\\_WriteEnable\(\)](#) API by passing XISF\_WRITE\_ENABLE as an argument, before calling the [Xlzf\\_SectorProtect\(\)](#) API, for Sector Protect Register Write (XISF\_SPR\_WRITE) operation.
- Atmel Flash supports all these Sector Protect operations.
- Intel, STM, Winbond and Spansion Flash support only Sector Protect Read and Sector Protect Write operations.

**int Xlzf\_ioctl ( Xlzf \* InstancePtr, Xlzf\_ioctlOperation Operation )**

This API configures and controls the Intel, STM, Winbond and Spansion Serial Flash.



## Parameters

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>Operation</i>	Type of Control operation to be performed on the Serial Flash. The different control operations are <ul style="list-style-type: none"> <li>• XISF_RELEASE_DPD: Release from Deep Power Down (DPD) Mode</li> <li>• XISF_ENTER_DPD: Enter DPD Mode</li> <li>• XISF_CLEAR_SR_FAIL_FLAGS: Clear Status Register Fail Flags</li> </ul>

## Returns

XST\_SUCCESS if successful else XST\_FAILURE.

## Note

- Atmel Serial Flash does not support any of these operations.
- Intel Serial Flash support Enter/Release from DPD Mode and Clear Status Register Fail Flags.
- STM, Winbond and Spansion Serial Flash support Enter/Release from DPD Mode.
- Winbond (W25QXX) Serial Flash support Enable High Performance mode.

## int Xlzf\_WriteEnable ( Xlzf \* *InstancePtr*, u8 *WriteEnable* )

This API Enables/Disables writes to the Intel, STM, Winbond and Spansion Serial Flash.

## Parameters

<i>InstancePtr</i>	Pointer to the Xlzf instance.
<i>WriteEnable</i>	Specifies whether to Enable (XISF_CMD_ENABLE_WRITE) or Disable (XISF_CMD_DISABLE_WRITE) the writes to the Serial Flash.

## Returns

XST\_SUCCESS if successful else XST\_FAILURE.

## Note

This API works only for Intel, STM, Winbond and Spansion Serial Flash. If this API is called for Atmel Flash, XST\_FAILURE is returned.

## void Xlzf\_RegisterInterface ( Xlzf \* *InstancePtr* )

This API registers the interface SPI/SPI PS/QSPI PS.

## Parameters

<i>InstancePtr</i>	Pointer to the Xlsf instance.
--------------------	-------------------------------

## Returns

None

**int Xlsf\_SetSpiConfiguration ( Xlsf \* *InstancePtr*, Xlsf\_Iface \* *SpilnstPtr*, u32 *Options*, u8 *PreScaler* )**

This API sets the configuration of SPI.

This will set the options and clock prescaler (if applicable).

## Parameters

<i>InstancePtr</i>	Pointer to the Xlsf instance.
<i>SpilnstPtr</i>	Pointer to Xlsf_Iface instance to be worked on.
<i>Options</i>	Specified options to be set.
<i>PreScaler</i>	Value of the clock prescaler to set.

## Returns

XST\_SUCCESS if successful else XST\_FAILURE.

## Note

This API can be called before calling [Xlsf\\_Initialize\(\)](#) to initialize the SPI interface in other than default options mode. PreScaler is only applicable to PS SPI/QSPI.

**void Xlsf\_SetStatusHandler ( Xlsf \* *InstancePtr*, Xlsf\_Iface \* *XlfaceInstancePtr*, Xlsf\_StatusHandler *Xllsf\_Handler* )**

This API is to set the Status Handler when an interrupt is registered.

## Parameters

<i>InstancePtr</i>	Pointer to the Xlsf Instance.
<i>QspiInstancePtr</i>	Pointer to the Xlsf_Iface instance to be worked on.
<i>Xllsf_Handler</i>	Status handler for the application.



#### Returns

None

#### Note

None.

### **void Xlzf\_ifaceHandler ( void \* *CallbackRef*, u32 *StatusEvent*, unsigned int *ByteCount* )**

This API is the handler which performs processing for the QSPI driver.

It is called from an interrupt context such that the amount of processing performed should be minimized. It is called when a transfer of QSPI data completes or an error occurs.

This handler provides an example of how to handle QSPI interrupts but is application specific.

#### Parameters

<i>CallbackRef</i>	Reference passed to the handler.
<i>StatusEvent</i>	Status of the QSPI .
<i>ByteCount</i>	Number of bytes transferred.

#### Returns

None

#### Note

None.

## Library Parameters in MSS File

Xilissf Library can be integrated with a system using the following snippet in the Microprocessor Software Specification (MSS) file:

```
BEGIN LIBRARY
PARAMETER LIBRARY_NAME = xilissf
PARAMETER LIBRARY_VER = 5.11
PARAMETER serial_flash_family = 1
PARAMETER serial_flash_interface = 1
END
```

The table below describes the libgen customization parameters.

Parameter	Default Value	Description
LIBRARY_NAME	xilissf	Specifies the library name.
LIBRARY_VER	5.11	Specifies the library version.
serial_flash_family	1	Specifies the serial flash family. Supported numerical values are: 1 = Xilinx In-system Flash or Atmel Serial Flash 2 = Intel (Numonyx) S33 Serial Flash 3 = STM (Numonyx) M25PXX/N25QXX Serial Flash 4 = Winbond Serial Flash 5 = Spansion Serial Flash/Micron Serial Flash/Cypress Serial Flash 6 = SST Serial Flash
Serial_flash_interface	1	Specifies the serial flash interface. Supported numerical values are: 1 = AXI QSPI Interface 2 = SPI PS Interface 3 = QSPI PS Interface or QSPI PSU Interface



#### Note

Intel, STM, and Numonyx serial flash devices are now a part of Serial Flash devices provided by Micron.

# Additional Resources and Legal Notices

---

## Xilinx Resources

For support resources such as Answers, Documentation, Downloads, and Forums, see [Xilinx Support](#) .

---

## Solution Centers

See the [Xilinx Solution Centers](#) for support on devices, software tools, and intellectual property at all stages of the design cycle. Topics include design assistance, advisories, and troubleshooting tips.

---

## Please Read: Important Legal Notices

The information disclosed to you hereunder (the "Materials") is provided solely for the selection and use of Xilinx products. To the maximum extent permitted by applicable law: (1) Materials are made available "AS IS" and with all faults, Xilinx hereby DISCLAIMS ALL WARRANTIES AND CONDITIONS, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, OR FITNESS FOR ANY PARTICULAR PURPOSE; and (2) Xilinx shall not be liable (whether in contract or tort, including negligence, or under any other theory of liability) for any loss or damage of any kind or nature related to, arising under, or in connection with, the Materials (including your use of the Materials), including for any direct, indirect, special, incidental, or consequential loss or damage (including loss of data, profits, goodwill, or any type of loss or damage suffered as a result of any action brought by a third party) even if such damage or loss was reasonably foreseeable or Xilinx had been advised of the possibility of the same. Xilinx assumes no obligation to correct any errors contained in the Materials or to notify you of updates to the Materials or to product specifications. You may not reproduce, modify, distribute, or publicly display the Materials without prior written consent. Certain products are subject to the terms and conditions of Xilinx's limited warranty, please refer to Xilinx's Terms of Sale which can be viewed at <http://www.xilinx.com/legal.htm#tos>; IP cores may be subject to warranty and support terms contained in a license issued to you by Xilinx. Xilinx products are not designed or intended to be fail-safe or for use in any application requiring fail-safe performance; you assume sole risk and liability for use of Xilinx products in such critical applications, please refer to Xilinx's Terms of Sale which can be viewed at <http://www.xilinx.com/legal.htm#tos>.



### **Automotive Applications Disclaimer**

AUTOMOTIVE PRODUCTS (IDENTIFIED AS "XA" IN THE PART NUMBER) ARE NOT WARRANTED FOR USE IN THE DEPLOYMENT OF AIRBAGS OR FOR USE IN APPLICATIONS THAT AFFECT CONTROL OF A VEHICLE ("SAFETY APPLICATION") UNLESS THERE IS A SAFETY CONCEPT OR REDUNDANCY FEATURE CONSISTENT WITH THE ISO 26262 AUTOMOTIVE SAFETY STANDARD ("SAFETY DESIGN"). CUSTOMER SHALL, PRIOR TO USING OR DISTRIBUTING ANY SYSTEMS THAT INCORPORATE PRODUCTS, THOROUGHLY TEST SUCH SYSTEMS FOR SAFETY PURPOSES. USE OF PRODUCTS IN A SAFETY APPLICATION WITHOUT A SAFETY DESIGN IS FULLY AT THE RISK OF CUSTOMER, SUBJECT ONLY TO APPLICABLE LAWS AND REGULATIONS GOVERNING LIMITATIONS ON PRODUCT LIABILITY.

© Copyright 2018 Xilinx, Inc. Xilinx, the Xilinx logo, Artix, ISE, Kintex, Spartan, Virtex, Vivado, Zynq, and other designated brands included herein are trademarks of Xilinx in the United States and other countries. All other trademarks are the property of their respective owners.