



## USB1 to USB4 Upgrade Guide

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This guide provides a brief summary of the hardware and software differences between the USB1 and the USB4 device and will help assist those users who wish to migrate from a USB1 device to the USB4 device.

### Hardware differences:

- existing LEDs replaced with surface mount LEDs
- added surface mount LEDs for I/O pins and ESTOP
- added surface mount LED for high speed vs. low speed USB support indicator
- added 4 analog to digital input ports
- added 4 digital to analog output ports
- added 32 MBytes of internal FIFO buffer
- increased sample rate from 1 millisecond to 2 microseconds

The USB1 has maximum data capture rate of 1 sample per millisecond. The USB4 has a maximum data capture rate of 1 sample every 2 microseconds. The sample clock is programmable for sample periods ranging from 2  $\mu$ sec to approximately 2.39 hours. At 2  $\mu$ sec per sample, the FIFO buffer would be filled in approximately 1.6 seconds. At 2.39 hours per sample, the FIFO buffer would be filled in approximately 209 years.

- removed SEI Bus port

### Software differences:

The `usd_usb.dll` has been modified to allow existing USB1 applications to use the USB4 device without any significant software changes. In fact, most applications will be able to run without any software modifications. The `usd_usb.dll` is written as a wrapper around the `usb4.dll`. If you wish to eliminate having to use the `usd_usb.dll`, then modify your application code to make the appropriate USB4 functions calls. See the USB1 to USB4 function mapping on the following page.



Refer to the USB4 Manual for a complete list of all USB4 functions and examples.

USB1 Function	USB4 Function
USB1Init	USB4_Initialize
USB1IO	Not implemented.
USB1ReturnModuleAddress	USB4_GetModuleAddress
USB1GetIncPosition	USB4_GetCount
USB1GetAllPosition	USB4_ReadUnlatchedTimeAndCounts USB4_ReadInputPortRegister
USB1GetBufferedPosition	USB4_ReadFIFOBufferStruct
USB1GetAllBuffered	USB4_ReadFIFOBufferStruct
USB1GetIncPositionExtended	USB4_ReadRegister(COUNTER_REGISTER) USB4_GetPresetValue USB4_ReadRegister USB4_GetControlMode USB4_GetStatus
USB1ResetIncPosition	USB4_ResetCount
USB1ResetAllIncPositions	USB4_ResetCount for each encoder channel
USB1SetIncPosition	USB4_SetCount
USB1SetIncMaxCount	USB4_SetPresetValue
USB1SetIncMode	USB4_GetControlMode USB4_SetControlMode
USB1SetSEIBaudRate	Not implemented.
USB1ResetSEI	Not implemented.
USB1GetSEIStatus	Not implemented.
USB1GetFactoryInfo	USB4_GetFactoryInfo
USB1GetIndexRegister	USB4_GetEnableIndex
USB1SetIndexRegister	USB4_SetEnableIndex
USB1SaveParameters	USB4_SaveParameters
USB1GetInputPort	USB4_ReadInputPortRegister
USB1SetOutputPort	USB4_WriteOutputPortRegister
USB1SetModuleAddress	USB4_SetModuleAddress
USB1GetLastErrorAnsi	Not implemented.
USB1GetLastErrorVB	Not implemented.
USB1FlushHistoryBuffer	USB4_ClearFIFOBuffer
USB1GetHistoryBufferStatus	USB4_IsFIFOBufferFull USB4_ReadRegister( AQUISITION_CONTROL_REGISTER)
USB1SetHistoryBufferRate	USB4_SetSamplingRateMultiplier
USB1GetOutputPort	USB4_ReadOutputPortRegister
USB1ReadUserEEPROM	USB4_ReadUserEEPROM
USB1WriteUserEEPROM	USB4_WriteUserEEPROM



USB1 Function	USB4 Function
USB1SetOutputBits	USB4_ReadOutputPortRegister USB4_WriteOutputPortRegister
USB1ClearOutputBits	USB4_ReadOutputPortRegister USB4_WriteOutputPortRegister
USB1GetHistoryBufferRate	USB4_GetSamplingRateMultiplier
USB1SetEvents	USB4_ReadRegister(AQUISITION_CONTROL_REGISTER) USB4_SetTimeBasedLogSettings
USB1GetEvents	USB4_GetTimeBasedLogSettings
USB1StartAcquisition	USB4_StartAcquisition
USB1StopAcquisition	USB4_StopAcquisition
USB1GetAcquisitionStatus	USB4_GetSamplesToCollect USB4_GetSamplesRemaining USB4_ReadRegister(AQUISITION_CONTROL_REGISTER)
USB1GetDllVersion	Not implemented
USB1CommandResponseSEI	Not implemented
USB1SetTimeStamp	USB4_ResetTimeStamp
USB1GetPositionQual	USB4_ReadRegister(AQUISITION_CONTROL_REGISTER)
USB1SetPositionQual	USB4_ReadRegister(AQUISITION_CONTROL_REGISTER) USB4_ReadRegister(INPUT_TRIGGER_CONTROL_REGISTER)
USB1SetAcquireMode	Not implemented