



Application Note

AN_428

D2XX EEPROM Programming Examples

Version 1.0

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This application note demonstrates how to program the EEPROM using the D2XX Drivers with the following USB devices: FT232R, FT-X Series, FT232H, FT2232H and FT4232H.

Use of FTDI devices in life support and/or safety applications is entirely at the user's risk, and the user agrees to defend, indemnify and hold FTDI harmless from any and all damages, claims, suits or expense resulting from such use.

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1 Introduction

This application note and example code demonstrates how to program the EEPROM using the [D2XX Drivers](#) with the following USB devices: [FT232R](#), [FT-X Series](#), [FT232H](#), [FT2232H](#) and [FT4232H](#).

Since only newer generations of devices are demonstrated in this application note, FT232B and FT2232D are not covered.

[FT_PROG](#) can also be used. This is a free Windows-based GUI EEPROM programming utility for use with FTDI devices. See [AN_124 User Guide for FTDI FT_PROG Utility](#) for more information.

1.1 Overview

FTDI's [D2XX Drivers](#) allow for users to read and program the EEPROM directly. Refer to [D2XX Programmer's Guide](#) section 4 EEPROM Programming Interface Functions. The D2XX drivers should be installed on the PC for these examples to work. These programming functions could be used in a production environment.

1.2 Scope

Example code to read and write to EEPROM is provided in this application note. Only the following programming functions are demonstrated:

- FT_EE_Read
- FT_EE_Program
- FT_EEPROM_Read: must be used for the FT-X series
- FT_EEPROM_Program: must be used for the FT-X series

FT_ReadEE and FT_WriteEE are not covered here and require knowledge of the EEPROM structure. This is available for the FT-X Series as detailed in [AN_201 FT-X MTP memory Configuration](#), but for other ICs an NDA is required to receive this information. [Contact us](#) for more information.

The User Area of the EEPROM is already covered in [AN_121 Accessing The EEPROM User Area Of FTDI Devices](#).

It is possible to corrupt the EEPROM, rendering the device unusable, so caution is advised. Refer to [AN_136 Hi-Speed Mini Module EEPROM Disaster Recovery](#) for help to recover [FT2232H Mini-Module](#) and [FT4232H Mini-Module](#).

1.2.1 Features

Internal and external EEPROM access is demonstrated:

- ICs with Internal EEPROM: FT232R, FT-X Series
- ICs with External EEPROM: FT232H, FT2232H and FT4232H

1.2.2 Enhancement

The code examples provided are examples only and can be enhanced by users to meet specific needs. For example, the devices are opened by a particular description which can be changed.

Note: the example code should be treated as an example and is not guaranteed or supported by FTDI. If customers choose to use this code as a base, then it should be tested thoroughly.

The example projects referenced in this App Note can be downloaded [here](#).

To open the project with Microsoft Visual Studio, double-click on the .sln project file. The projects were created using Microsoft Visual Studio 2015. To build with earlier versions, the Platform Toolset version would need to be changed in the project settings.

These are Windows console projects where text is printed to the console window.

2 FT232R EEPROM Example

The example code can be used with FT232R based hardware:

- [Cables](#) such as US232R
- [Development Modules](#) such as [UM232R](#)
- [USB - RS232/422/485](#) such as [USB-COM232-PLUS1](#)

FT_EE_Read and FT_EE_Program D2XX EEPROM functions are used in this example.

The FT232R device in the US232R is used in this example. Similar code could be used with [FT245R](#).

Note: FT_EEPROM_Program should not be used with FT245R when using older driver versions than 2.12.26.

The example code does the following:

- Defines the FT_PROGRAM_DATA structure for FT232R.
Version is set to 2 for FT232R extensions (same for FT245R)
- Lists All FTDI Devices connected to the PC using FT_CreateDeviceInfoList and FT_GetDeviceInfoList
- For the first FT232R device found:
 - Open the device by description which can either be:
 - USB <-> Serial Converter (typical value for FT232 based cables)
 - FT232R USB UART (default IC factory programmed value)
 - Read the EEPROM using FT_EE_Read
 - Modify the serial number
 - Write to the EEPROM using FT_EE_Program
 - Read the EEPROM again using FT_EE_Read. The modified serial number should be shown.
 - Performs FT_Close.

Since the serial number is changed, the USB device will need to be re-enumerated by the USB Host for the changes to be seen on the PC. This can be done by unplug/replug or using the FT_CyclePort function.

The example program flowchart is shown in Figure 2.1.

The example program Windows console output is shown in Figure 2.2.

The example source code can be downloaded [here](#).

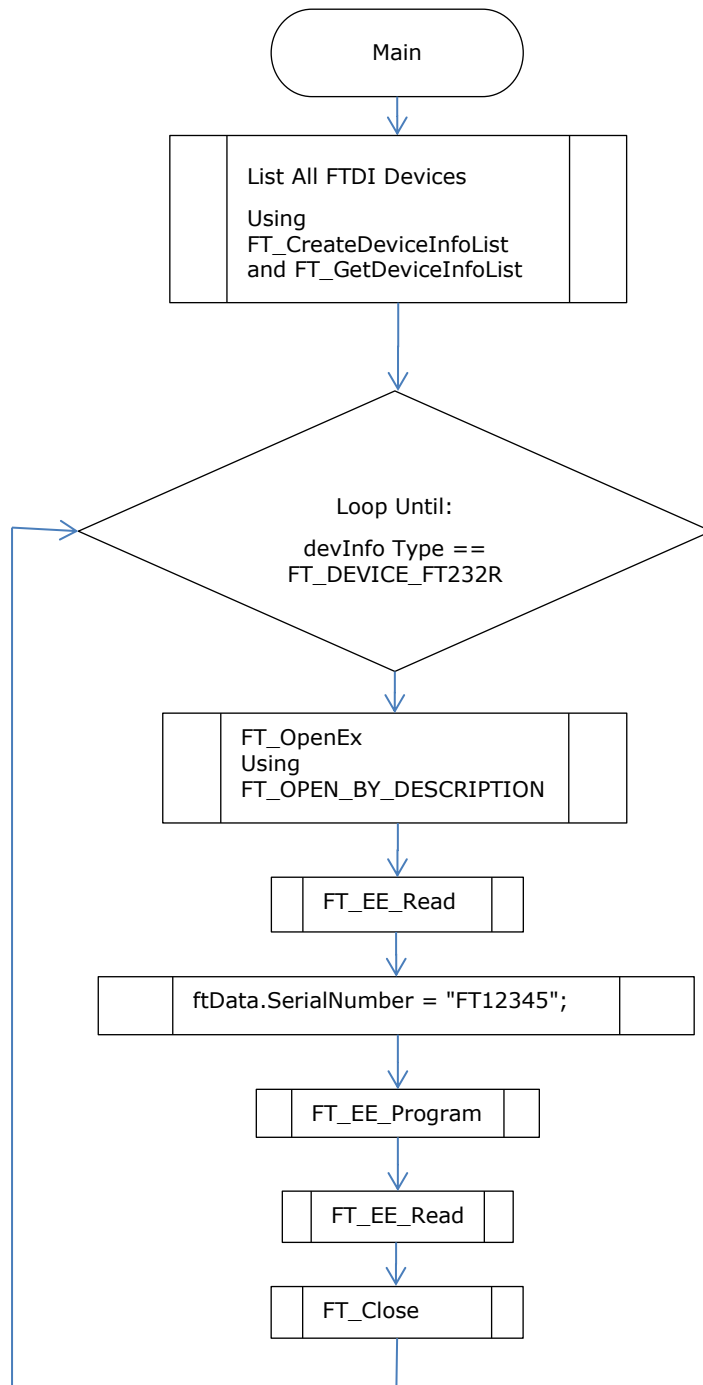


Figure 2.1 FT232R EEPROM Example Flowchart

```
Number of devices is 1
Dev 0:
Flags=0x0
Type=0x5
ID=0x4036001
LocId=0x113
SerialNumber=FTIEXT8
Description=USB <-> Serial Converter

Open status OK 0

Signature1 = 0x0000
Signature2 = 0xffffffff
Version = 0x0002
VendorID = 0x0403
ProductID = 0x6001
Manufacturer = FTDI
ManufacturerID = FT
Description = USB <-> Serial Converter
SerialNumber = FTIEXT8
MaxPower = 100
PnP = 1
SelfPowered = 0
RemoteWakeup = 1
UseExtOsc = 0
HighDriveIOs = 0
EndpointSize = 40
PullDownEnableR = 0
SerNumEnableR = 1
InvertTXD = 0
InvertRXD = 0
InvertRTS = 0
InvertCTS = 0
InvertDTR = 0
InvertDSR = 0
InvertDCD = 0
InvertRI = 0
CBUS0 = 2
CBUS1 = 3
CBUS2 = 1
CBUS3 = 1
CBUS4 = 5
RIsD2XX = 0

EE_Program status ok 0

Signature1 = 0x0000
Signature2 = 0xffffffff
Version = 0x0002
VendorID = 0x0403
ProductID = 0x6001
Manufacturer = FTDI
ManufacturerID = FT
Description = USB <-> Serial Converter
SerialNumber = FT12345
MaxPower = 100
PnP = 1
SelfPowered = 0
RemoteWakeup = 1
UseExtOsc = 0
HighDriveIOs = 0
EndpointSize = 40
```

```
PullDownEnableR = 0  
SerNumEnableR = 1  
InvertTXD = 0  
InvertRXD = 0  
InvertRTS = 0  
InvertCTS = 0  
InvertDTR = 0  
InvertDSR = 0  
InvertDCD = 0  
InvertRI = 0  
CBUS0 = 2  
CBUS1 = 3  
CBUS2 = 1  
CBUS3 = 1  
CBUS4 = 5  
RIsD2XX = 0
```

```
Press Return To End Program
```

Figure 2.2 FT232R EEPROM Example Console Output

3 FT-X EEPROM Example

The example code can be used with FT-X based hardware:

- [Cables](#) such as Chipi-X10,
- [Development Modules](#) such as:
 - [FT-X Breakout Modules](#)
 - [FT-X Development Modules](#)

FT_EEPROM_Read and FT_EEPROM_Program D2XX EEPROM functions are used in this example and must be used with the FT-X series.

Note: FT_EE_Read and FT_EE_Program D2XX EEPROM functions cannot be used with FT-X Series.

The FT231X device in the [Chipi-X10 Cable](#) is used in this example.

The example code does the following:

- Defines the FT_EEPROM_X_SERIES structure for FT-X.
Note: Not all FT_EEPROM_X_SERIES structure entries apply to all FT-X devices.
- Lists All FTDI Devices connected to the PC using FT_CreateDeviceInfoList and FT_GetDeviceInfoList
- For the first FT-X device found:
 - Open the device by description which can either be:
 - Chipi-X (Value for the FT-X based cable)
 - FT231X USB UART (default IC factory programmed value)
 - Read the EEPROM using FT_EEPROM_Read
 - Modify the serial number
 - Write to the EEPROM using FT_EEPROM_Program
 - Read the EEPROM again using FT_EEPROM_Read. The modified serial number should be shown.
 - Performs FT_Close.

Since the serial number is changed, the USB device will need to be re-enumerated by the USB Host for the changes to be seen on the PC. This can be done by unplug/replug or using the FT_CyclePort function.

The example program flowchart is shown in Figure 3.1.

The example program Windows console output is shown in Figure 3.2.

The example source code can be downloaded [here](#).

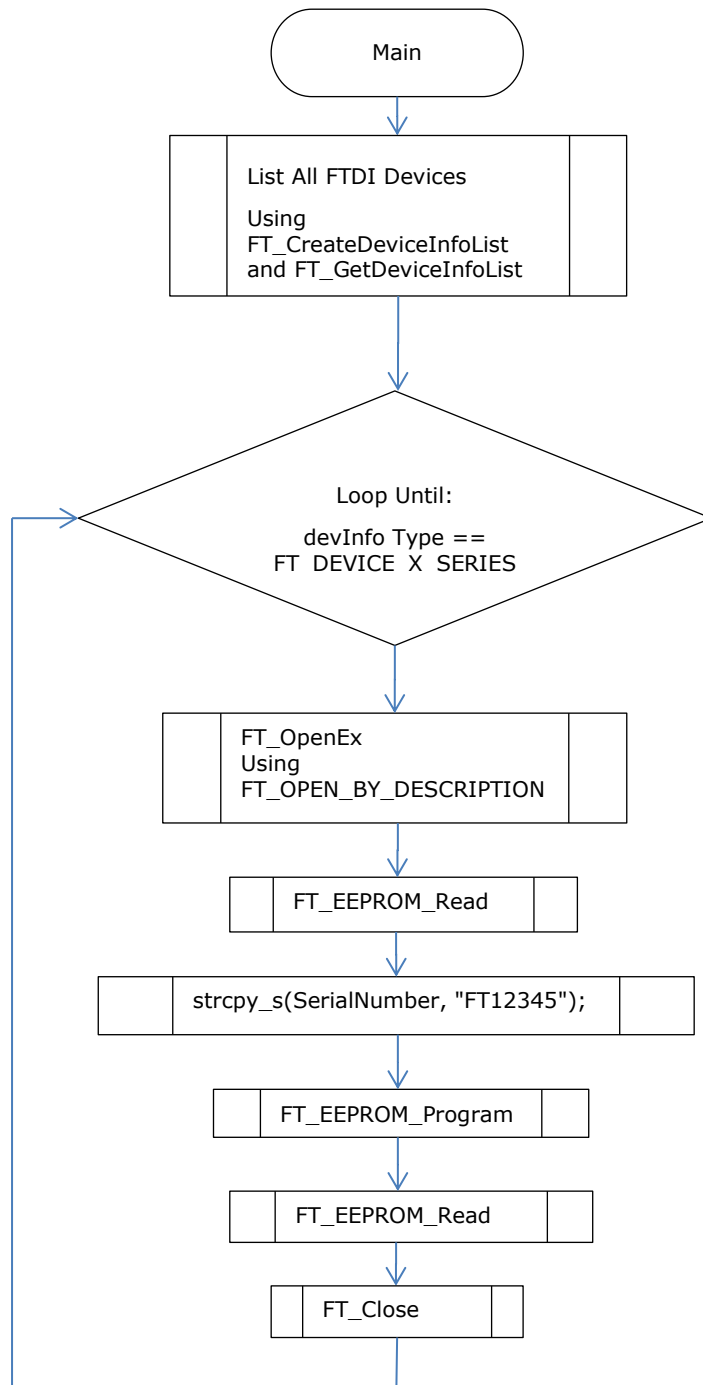


Figure 3.1 FT-X EEPROM Example Flowchart

```
Number of devices is 1
Dev 0:
Flags=0x0
Type=0x9
ID=0x4036015
LocId=0x113
SerialNumber=FTLT10
Description=Chipi-X

Open status OK 0

Manufacturer FTDI
ManufacturerId FT
Description Chipi-X
SerialNumber FTLTY10
deviceType 9
VendorId 0403
ProductId 6015
MaxPower 90
SelfPowered 0
RemoteWakeup 0
PullDownEnable 0
ACSlowSlew 0
ACSchmittInput 0
ACDriveCurrent 4
ADSlowSlew 0
ADSchmittInput 0
ADDriveCurrent 4
Cbus0 4
Cbus1 4
Cbus2 0
Cbus3 5
Cbus4 0
Cbus5 0
Cbus6 0
InvertTXD 0
InvertRXD 0
InvertRTS 0
InvertCTS 0
InvertDTR 0
InvertDSR 0
InvertDCD 0
InvertRI 0
BCDEnable 0
BCDForceCbusPWREN 0
BCDDisableSleep 0
I2CSlaveAddress 0
I2CDeviceId 0
I2CDisableSchmitt 0
FT1248Cpol 0
FT1248Lsb 0
FT1248FlowControl 0
RS485EchoSuppress 0
PowerSaveEnable 0
DriverType 1

FT_EEPROM_Program status ok 0

Manufacturer FTDI
ManufacturerId FT
Description Chipi-X
SerialNumber FT12345
deviceType 9
```

```
VendorId 0403
ProductId 6015
MaxPower 90
SelfPowered 0
RemoteWakeup 0
PullDownEnable 0
ACSlowSlew 0
ACSchmittInput 0
ACDriveCurrent 4
ADSlowSlew 0
ADSchmittInput 0
ADDriveCurrent 4
Cbus0 4
Cbus1 4
Cbus2 0
Cbus3 5
Cbus4 0
Cbus5 0
Cbus6 0
InvertTXD 0
InvertRXD 0
InvertRTS 0
InvertCTS 0
InvertDTR 0
InvertDSR 0
InvertDCD 0
InvertRI 0
BCDEnable 0
BCDForceCbusPWREN 0
BCDDisableSleep 0
I2CSlaveAddress 0
I2CDeviceId 0
I2CDisableSchmitt 0
FT1248Cpol 0
FT1248Lsb 0
FT1248FlowControl 0
RS485EchoSuppress 0
PowerSaveEnable 0
DriverType 1

Press Return To End Program
```

Figure 3.2 FT-X EEPROM Example Console Output

4 FT232H EEPROM Example

The example code can be used with FT232H based hardware:

- [USB Hi-Speed](#) cables
- [Development Module](#):
 - [UM232H](#)

FT_EE_Read and FT_EE_Program D2XX EEPROM functions are used in this example. However FT_EEPROM_Read and FT_EEPROM_Program could also be used with the associated structure for FT232H. See Section 3 FT-X EEPROM Example which uses these functions.

The [UM232H](#) is used in this example.

The example code does the following:

- Defines the FT_PROGRAM_DATA structure for FT232H. Version is set to 5 for FT232H extensions.
- Lists All FTDI Devices connected to the PC using FT_CreateDeviceInfoList and FT_GetDeviceInfoList
- For the first FT232H device found:
 - Open the device by description which can either be:
 - UM232H (UM232H Module programmed value)
 - Single RS232-HS (default IC factory value)
 - Read the EEPROM using FT_EE_Read
 - If the external EEPROM is blank (return value is FT_EEPROM_NOT_PROGRAMMED), perform a programming routine initially with preset values using FT_EE_Program
 - Modify the serial number
 - Write to the EEPROM using FT_EE_Program
 - Read the EEPROM again using FT_EE_Read. The modified serial number should be shown.
 - Performs FT_Close.

Since the serial number is changed, the USB device will need to be re-enumerated by the USB Host for the changes to be seen on the PC. This can be done by unplug/replug or using the FT_CyclePort function.

The example program flowchart is shown in Figure 4.1.

The example program Windows console output is shown in Figure 4.2, when the EEPROM has already been programmed (non-blank) when the UM232H Module is used.

The example source code can be downloaded [here](#).

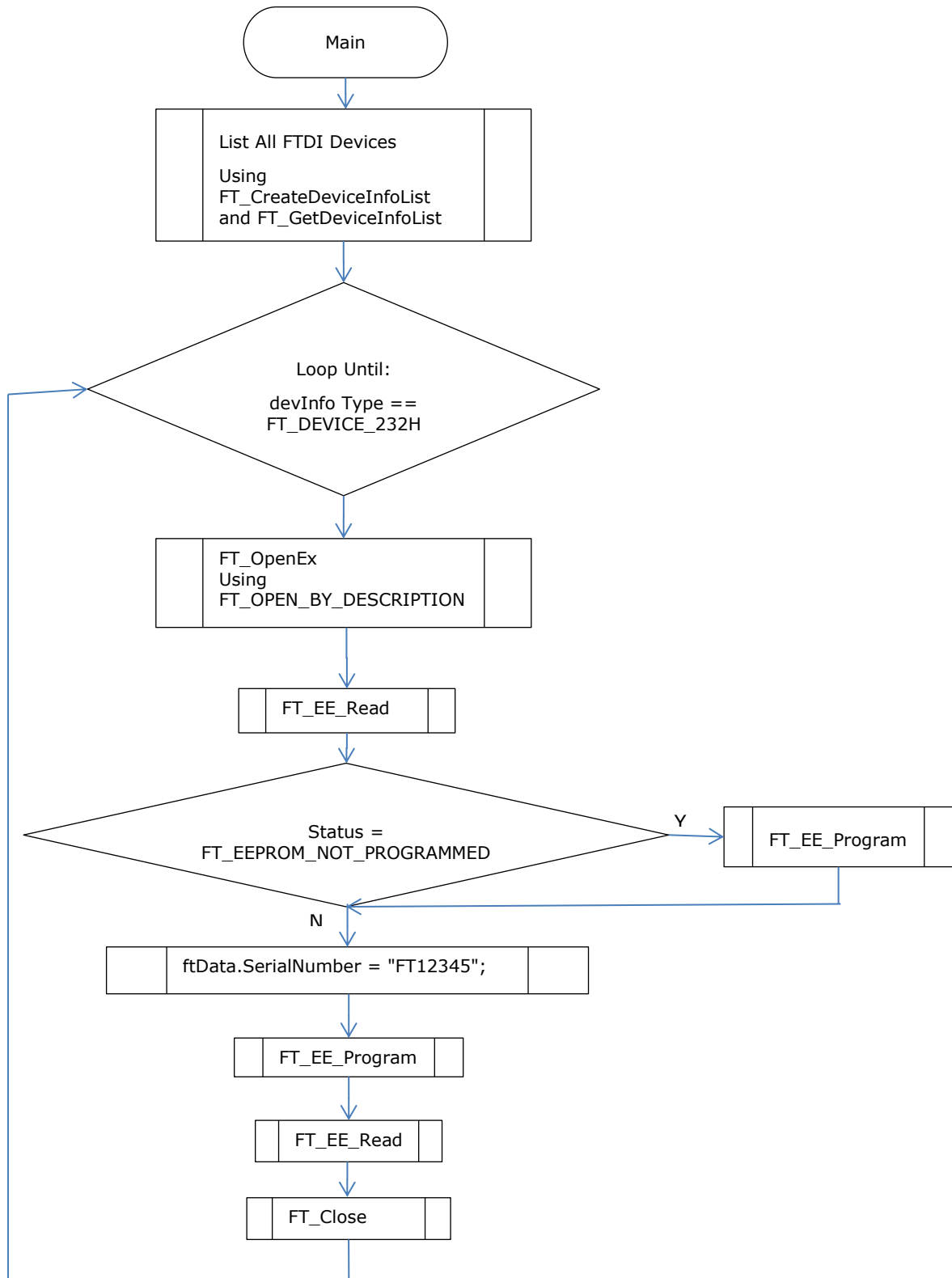


Figure 4.1 FT232H EEPROM Example Flowchart

```
Number of devices is 1
Dev 0:
Flags=0x2
Type=0x8
ID=0x4036014
LocId=0x113
SerialNumber=FT12345
Description=UM232H

Open status OK 0

EEPROM is already programmed! Reading EEPROM.

Signature1 = 0x0000
Signature2 = 0xffffffff
Version = 0x0005
VendorID = 0x0403
ProductID = 0x6014
Manufacturer = FTDI
ManufacturerID = FT
Description = UM232H
SerialNumber = FT12345
MaxPower = 90
PnP = 1
SelfPowered = 0
RemoteWakeup = 0
PullDownEnableH = 0
SerNumEnableH = 1
ACSlowSlewH = 0
ACSchmittInputH = 0
ACDriveCurrentH = 4
ADSlowSlewH = 0
ADSchmittInputH = 0
ADDriveCurrentH = 4
Cbus0H = 0
Cbus1H = 0
Cbus2H = 0
Cbus3H = 0
Cbus4H = 0
Cbus5H = 0
Cbus6H = 0
Cbus7H = 0
Cbus8H = 0
Cbus9H = 0
IsFifoH = 0
IsFifoTarH = 0
IsFastSerH = 0
IsFT1248H = 0
FT1248Cpo1H = 0
FT1248LsbH = 0
FT1248FlowControlH = 0
IsVCPH = 1
PowerSaveEnableH = 0

EE_Program status ok 0

Reading EEPROM to check changed values!

Signature1 = 0x0000
Signature2 = 0xffffffff
Version = 0x0005
VendorID = 0x0403
ProductID = 0x6014
```

```
Manufacturer = FTDI
ManufacturerID = FT
Description = UM232H
SerialNumber = FT12345
MaxPower = 90
PnP = 1
SelfPowered = 0
RemoteWakeup = 0
PullDownEnableH = 0
SerNumEnableH = 1
ACSlowSlewH = 0
ACSchmittInputH = 0
ACDriveCurrentH = 4
ADSlowSlewH = 0
ADSchmittInputH = 0
ADDriveCurrentH = 4
Cbus0H = 0
Cbus1H = 0
Cbus2H = 0
Cbus3H = 0
Cbus4H = 0
Cbus5H = 0
Cbus6H = 0
Cbus7H = 0
Cbus8H = 0
Cbus9H = 0
IsFifoH = 0
IsFifoTarH = 0
IsFastSerH = 0
IsFT1248H = 0
FT1248CpolH = 0
FT1248LsbH = 0
FT1248FlowControlH = 0
IsVCPH = 1
PowerSaveEnableH = 0

Press Return To End Program
```

Figure 4.2 FT232H EEPROM Example Console Output

5 FT2232H EEPROM Example

The example code can be used with FT2232H based hardware:

- [Development Modules](#):
 - [FT2232H Mini-Module](#)
 - [FT2232H-56 Mini-Module](#)
- [USB - RS232/422/485](#) modules:
 - [USB-COM232-PLUS2](#)
 - [USB-COM422-PLUS2](#)
 - [USB-COM485-PLUS2](#)
- [RPI-HUB-MODULE](#)

FT_EE_Read and FT_EE_Program D2XX EEPROM functions are used in this example. However FT_EEPROM_Read and FT_EEPROM_Program could also be used with the associated structure for FT2232H. See Section 3 FT-X EEPROM Example which uses these functions.

The [FT2232H Mini-Module](#) is used in this example.

The example code does the following:

- Defines the FT_PROGRAM_DATA structure for FT2232H. Version is set to 3 for FT2232H extensions.
- Lists All FTDI Devices connected to the PC using FT_CreateDeviceInfoList and FT_GetDeviceInfoList
- For the first FT2232H device found:
 - Open the device by description which can either be:
 - FT2232H_MM A (FT2232H Mini-Module programmed value)
 - Dual RS232-HS A (default IC factory value)
 - Read the EEPROM using FT_EE_Read
 - If the external EEPROM is blank (return value is FT_EEPROM_NOT_PROGRAMMED), perform a programming routine initially with preset values using FT_EE_Program
 - Modify the serial number
 - Write to the EEPROM using FT_EE_Program
 - Read the EEPROM again using FT_EE_Read. The modified serial number should be shown.
 - Performs FT_Close.

Since the serial number is changed, the USB device will need to be re-enumerated by the USB Host for the changes to be seen on the PC. This can be done by unplug/replug or using the FT_CyclePort function.

The example program flowchart is shown in Figure 5.1.

The example program Windows console output is shown in Figure 5.2, when the EEPROM has already been programmed (non-blank) when the FT2232H Mini-Module is used.

The example source code can be downloaded [here](#).

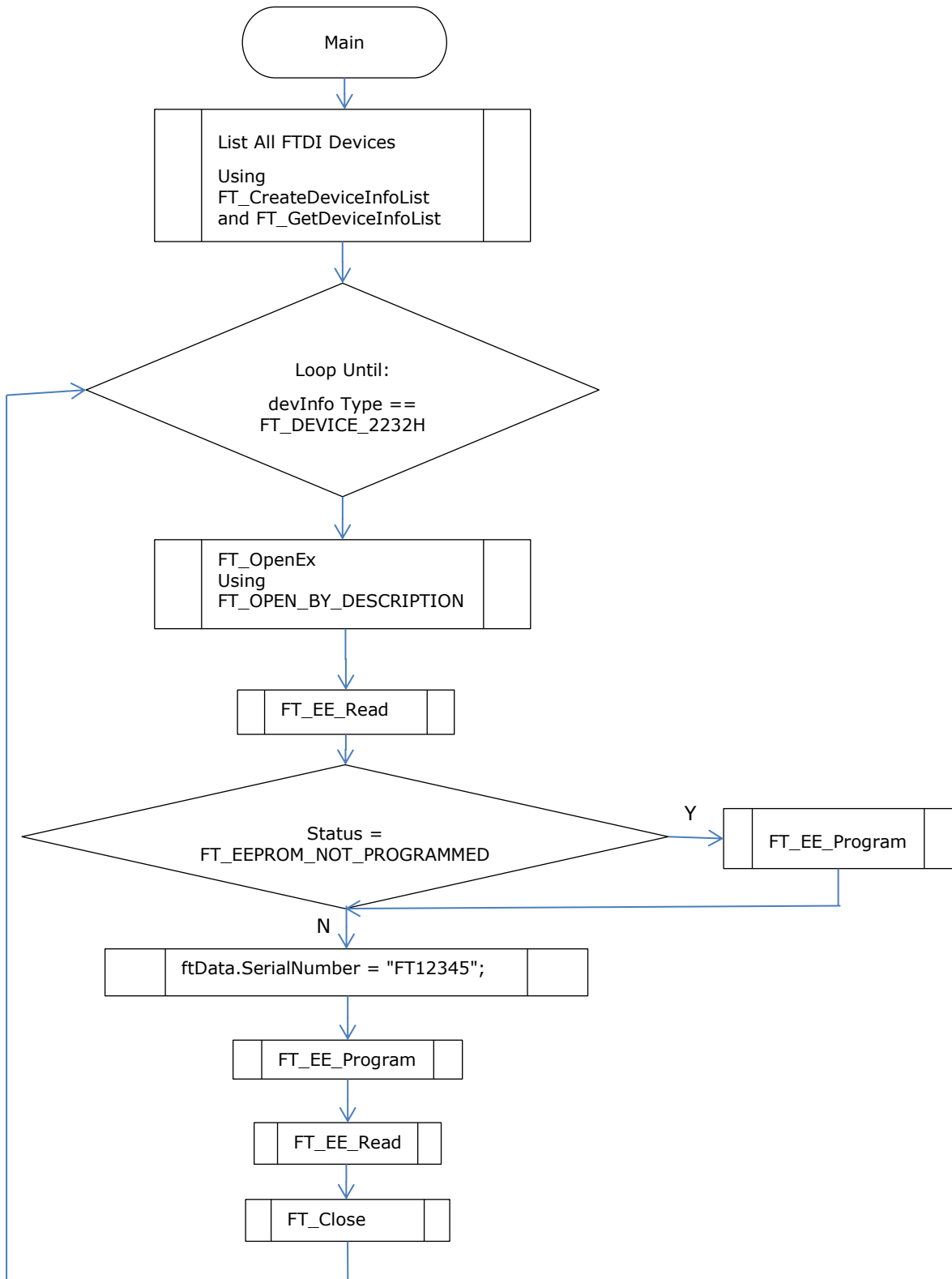


Figure 5.1 FT2232H EEPROM Example Flowchart

```
Number of devices is 2
Dev 0:
Flags=0x2
Type=0x6
ID=0x4036010
LocId=0x1131
SerialNumber=FTLIZK5A
Description=FT2232H_MM A

Dev 1:
Flags=0x2
Type=0x6
ID=0x4036010
LocId=0x1132
SerialNumber=FTLIZK5B
Description=FT2232H_MM B

Open status OK 0

EEPROM is already programmed! Reading EEPROM.

Signature1 = 0x0000
Signature2 = 0xffffffff
Version = 0x0003
VendorID = 0x0403
ProductID = 0x6010
Manufacturer = FTDI
ManufacturerID = FT
Description = FT2232H_MM
SerialNumber = FTLIZK5
MaxPower = 90
PnP = 1
SelfPowered = 0
RemoteWakeup = 0
PullDownEnable7 = 0
SerNumEnable7 = 1
ALSlowSlew = 0
ALSchmittInput = 0
ALDriveCurrent = 4
AHSlowSlew = 0
AHSchmittInput = 0
AHDdriveCurrent = 4
BLSlowSlew = 0
BLSchmittInput = 0
BLDriveCurrent = 4
BHSlowSlew = 0
BHSchmittInput = 0
BHDriveCurrent = 4
IFAIIsFifo7 = 0
IFAIIsFifoTar7 = 0
IFAIIsFastSer7 = 0
AIsVCP7 = 1
IFBIIsFifo7 = 0
IFBIIsFifoTar7 = 0
IFBIIsFastSer7 = 0
BIIsVCP7 = 1
PowerSaveEnable = 0

EE_Program status ok 0

Reading EEPROM to check changed values!

Signature1 = 0x0000
```

```
Signature2 = 0xffffffff
Version = 0x0003
VendorID = 0x0403
ProductID = 0x6010
Manufacturer = FTDI
ManufacturerID = FT
Description = FT2232H_MM
SerialNumber = FT12345
MaxPower = 90
PnP = 1
SelfPowered = 0
RemoteWakeup = 0
PullDownEnable7 = 0
SerNumEnable7 = 1
ALSlowSlew = 0
ALSchmittInput = 0
ALDriveCurrent = 4
AHSlew = 0
AHSchmittInput = 0
AHDdriveCurrent = 4
BLSlew = 0
BLSchmittInput = 0
BLDriveCurrent = 4
BHSlew = 0
BHSchmittInput = 0
BHDriveCurrent = 4
IFAIIsFifo7 = 0
IFAIIsFifoTar7 = 0
IFAIIsFastSer7 = 0
AIsVCP7 = 1
IFBIIsFifo7 = 0
IFBIIsFifoTar7 = 0
IFBIIsFastSer7 = 0
BIIsVCP7 = 1
PowerSaveEnable = 0

Press Return To End Program
```

Figure 5.2 FT2232H EEPROM Example Console Output

6 FT4232H EEPROM Example

The example code can be used with FT4232H based hardware:

- [Development Modules](#):
 - [FT4232H Mini-Module](#)
 - [FT4232H-56 Mini-Module](#)
- [USB - RS232/422/485](#) modules:
 - [USB-COM232-PLUS4](#)
 - [USB-COM422-PLUS4](#)
 - [USB-COM485-PLUS4](#)

FT_EE_Read and FT_EE_Program D2XX EEPROM functions are used in this example. However FT_EEPROM_Read and FT_EEPROM_Program could also be used with the associated structure for FT4232H. See Section 3 FT-X EEPROM Example which uses these functions.

The [FT4232H Mini-Module](#) is used in this example.

The example code does the following:

- Defines the FT_PROGRAM_DATA structure for FT4232H. Version is set to 4 for FT4232H extensions.
- Lists All FTDI Devices connected to the PC using FT_CreateDeviceInfoList and FT_GetDeviceInfoList
- For the first FT4232H device found:
 - Open the device by description which can either be:
 - FT4232H_MM A (FT4232H Mini-Module programmed value)
 - Quad RS232-HS A (default IC factory value)
 - Read the EEPROM using FT_EE_Read
 - If the external EEPROM is blank (return value is FT_EEPROM_NOT_PROGRAMMED), perform a programming routine initially with preset values using FT_EE_Program
 - Modify the serial number
 - Write to the EEPROM using FT_EE_Program
 - Read the EEPROM again using FT_EE_Read. The modified serial number should be shown.
 - Performs FT_Close.

Since the serial number is changed, the USB device will need to be re-enumerated by the USB Host for the changes to be seen on the PC. This can be done by unplug/replug or using the FT_CyclePort function.

The example program flowchart is shown in Figure 6.1.

The example program Windows console output is shown in Figure 6.2, when the EEPROM has already been programmed (non-blank). This is the case when the FT4232H Mini-Module is used.

The example source code can be downloaded [here](#).

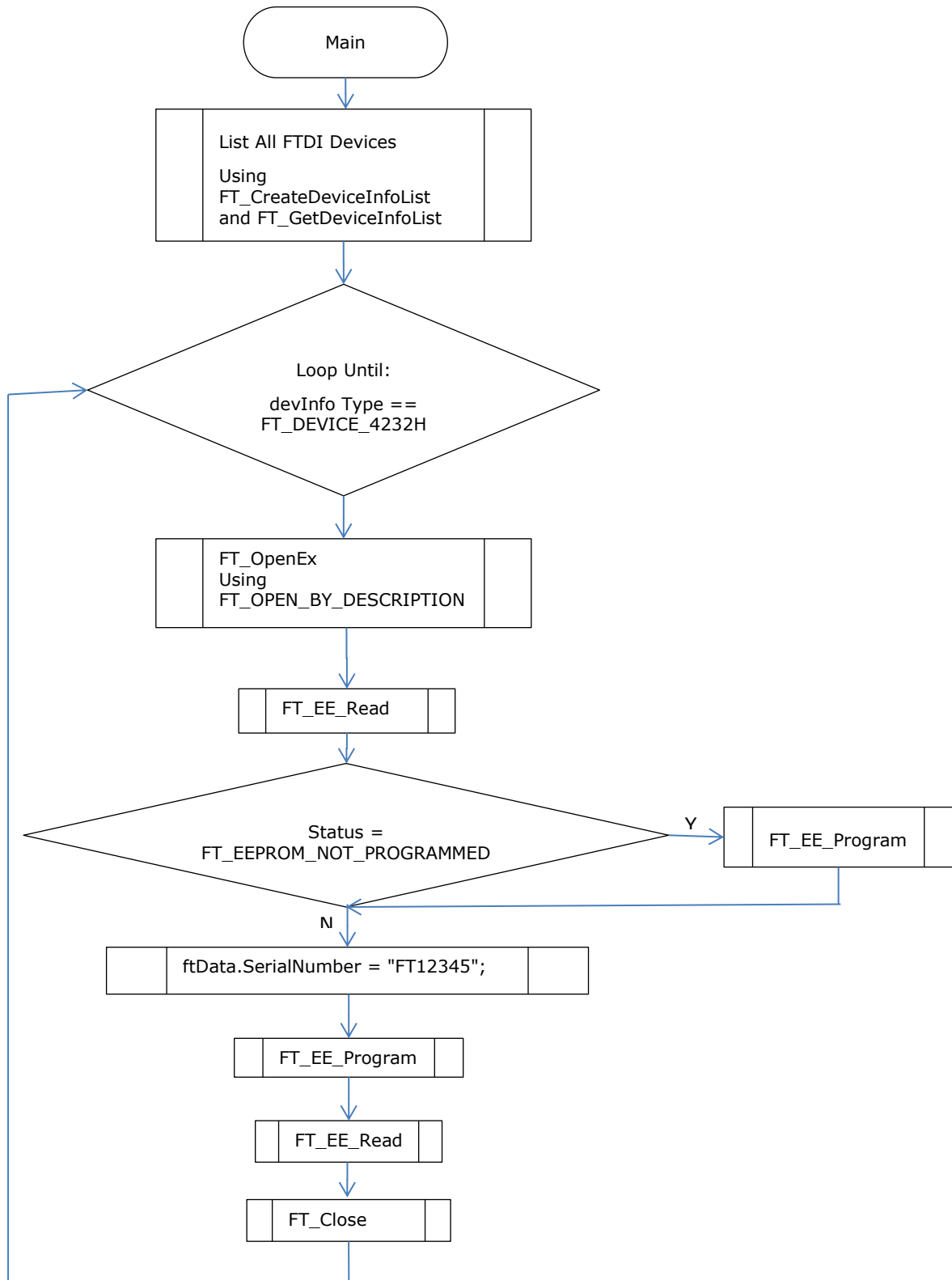


Figure 6.1 FT4232H EEPROM Example Flowchart

```
Number of devices is 4
Dev 0:
Flags=0x2
Type=0x7
ID=0x4036011
LocId=0x1131
SerialNumber=FT12345A
Description=FT4232H_MM A

Dev 1:
Flags=0x2
Type=0x7
ID=0x4036011
LocId=0x1132
SerialNumber=FT12345B
Description=FT4232H_MM B

Dev 2:
Flags=0x2
Type=0x7
ID=0x4036011
LocId=0x1133
SerialNumber=FT12345C
Description=FT4232H_MM C

Dev 3:
Flags=0x2
Type=0x7
ID=0x4036011
LocId=0x1134
SerialNumber=FT12345D
Description=FT4232H_MM D

Open status OK 0

EEPROM is already programmed! Reading EEPROM.
Signature1 = 0x0000
Signature2 = 0xffffffff
Version = 0x0004
VendorID = 0x0403
ProductID = 0x6011
Manufacturer = FTDI
ManufacturerID = FT
Description = FT4232H_MM
SerialNumber = FT12345
MaxPower = 90
PnP = 1
SelfPowered = 0
RemoteWakeup = 0
PullDownEnable8 = 0
SerNumEnable8 = 1
ASlowSlew = 0
ASchmittInput = 0
ADriveCurrent = 4
BSlowSlew = 0
BSchmittInput = 0
BDriveCurrent = 4
CSlowSlew = 0
CSchmittInput = 0
CDriveCurrent = 4
DSlowSlew = 0
DSchmittInput = 0
DDriveCurrent = 4
```

```
ARIIsTXDEN = 0
BRIIsTXDEN = 0
CRIIsTXDEN = 0
DRIIsTXDEN = 0
AIsVCP8 = 1
BIsVCP8 = 1
CIsVCP8 = 1
DIsVCP8 = 1

EE_Program status ok 0

Reading EEPROM to check changed values!

Signature1 = 0x0000
Signature2 = 0xffffffff
Version = 0x0004
VendorID = 0x0403
ProductID = 0x6011
Manufacturer = FTDI
ManufacturerID = FT
Description = FT4232H_MM
SerialNumber = FT12345
MaxPower = 90
PnP = 1
SelfPowered = 0
RemoteWakeup = 0
PullDownEnable8 = 0
SerNumEnable8 = 1
ASlowSlew = 0
ASchmittInput = 0
ADriveCurrent = 4
BSlowSlew = 0
BSchmittInput = 0
BDriveCurrent = 4
CSlowSlew = 0
CSchmittInput = 0
CDriveCurrent = 4
DSlowSlew = 0
DSchmittInput = 0
DDriveCurrent = 4
ARIIsTXDEN = 0
BRIIsTXDEN = 0
CRIIsTXDEN = 0
DRIIsTXDEN = 0
AIsVCP8 = 1
BIsVCP8 = 1
CIsVCP8 = 1
DIsVCP8 = 1

Press Return To End Program
```

Figure 6.2 FT4232H EEPROM Example Console Output

7 Conclusion

FTDI's [D2XX Drivers](#) allow for users to read and program the EEPROM directly.

This could be used in production type environments to quickly read and program EEPROM connected internally or external to FTDI USB devices.

The code examples provided are examples only and can be enhanced by users to meet specific needs.

8 Contact Information

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Appendix A – References

Document References

[FT232R](#) Product Page

[FT-X Series](#) found in Product ICs page

[FT232H](#) Product Page

[FT2232H](#) Product Page

[FT4232H](#) Product Page

[D2XX Drivers](#)

[D2XX Programmer's Guide](#)

[FT_PROG](#)

[Cables](#)

[Development Modules](#)

[USB - RS232/422/485 Modules](#)

[AN_201 FT-X MTP memory Configuration](#)

[AN_121 Accessing The EEPROM User Area Of FTDI Devices](#)

[AN_136 Hi-Speed Mini Module EEPROM Disaster Recovery](#)

[AN_124 User Guide for FTDI FT_PROG Utility](#)

EEPROM Examples Source Code:

http://www.ftdichip.com/Support/SoftwareExamples/CodeExamples/VC++/AN_428_D2XX_EEPROM_Programming_Examples.zip

Acronyms and Abbreviations

Terms	Description
EEPROM	Electrically Erasable Programmable Read-Only Memory
GUI	Graphical User Interface
IC	Integrated Circuit
NDA	Non-Disclosure Agreement
USB	Universal Serial Bus

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Appendix C – Revision History

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