



Application Note

AN_445

Using FT4222H with Standard FTDI Devices

Version 1.0

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This document shows how to easily integrate FT4222H into existing applications with standard FTDI devices like FT232R, FT-X, FT232H, etc.

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

The FT4222H is a High/Full Speed USB2.0-to-Quad SPI/I2C device controller and can be easily integrated into existing applications using standard FTDI devices like FT232R, FT-X, FT232H, etc.

FT4222H must be used with the [D2XX drivers](#) and [LibFT4222](#), but standard FTDI devices use the D2XX drivers directly (no additional library required). Note that there are some restrictions on which D2XX APIs can be used with FT4222H directly and this is detailed in Section 2.

This document focuses on D2XX applications however VCP applications could also be integrated with FT4222H, though FT4222H is incompatible with VCP APIs. Such an application would continue to use VCP APIs for the standard FTDI device, and integrate D2XX and LibFT4222 APIs for the FT4222H device.

[AN 329 User Guide for LibFT4222](#) details the APIs to be used with FT4222H and the [D2XX Programmer's Guide](#) details the standard D2XX APIs.

The overall system architecture for such a development is shown in Figure 1.1.

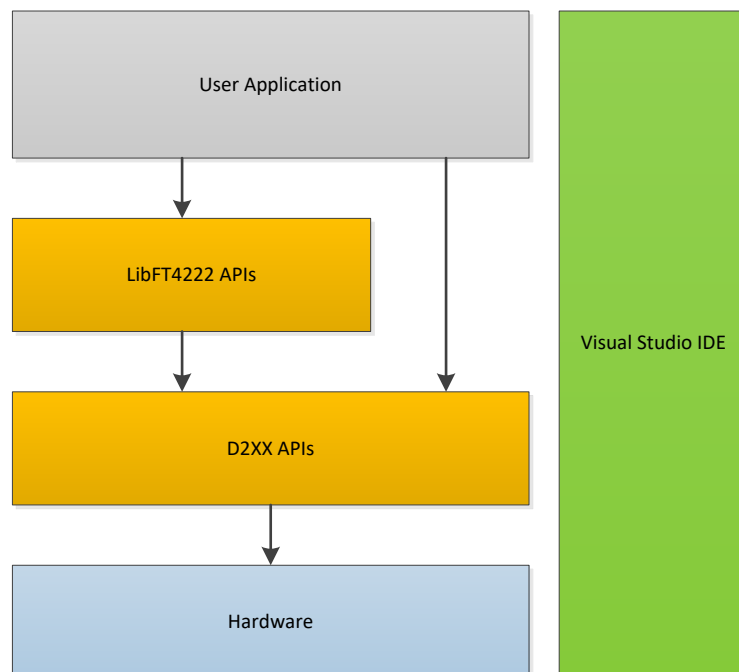


Figure 1.1 System Architecture

2 FT4222H D2XX supported APIs

Some standard D2XX APIs can be used with FT4222H. These are listed below.

Otherwise, the APIs detailed in [AN_329 User Guide for LibFT4222](#) must be used with FT4222H.

- FT_CreateDeviceInfoList
- FT_GetDeviceInfoList
- FT_GetDeviceInfoDetail
- FT_ListDevices
- FT_Open
- FT_OpenEx
- FT_Close
- FT_SetTimeouts
- FT_SetLatencyTimer
- FT_GetLatencyTimer
- FT_GetDeviceInfo
- FT_SetBitMode
- FT_SetUSBParameters
- FT_VendorCmdSet
- FT_VendorCmdGet
- FT_VendorCmdGetEx
- FT_Purge
- FT_ResetDevice
- FT_SetEventNotification
- FT_GetStatus
- FT_ResetPort
- FT_Rescan
- FT_Reload
- FT_StopInTask
- FT_RestartInTask
- FT_CyclePort

Do not use any other D2XX APIs with FT4222H as they may conflict with LibFT4222.

3 Example Code

In this particular example, the [UMFT4222EV](#) and [UM232H-B](#) modules were used to list, open and close. The code example in section 3.1 uses the D2XX direct API commands to list all FTDI devices connected to the PC using `FT_CreateDeviceInfoList` and `FT_GetDeviceInfoDetail`. This will list all FT4222H and standard FTDI devices.

It opens FT4222H and FT232H devices by description using `FT_OpenEx`.

Then the user can write the rest of their application before closing both handles.

When writing the application, the FT4222H must use LibFT4222 APIs and the other FTDI device(s) must use the D2XX direct API commands.

The code can be compiled and executed using Visual Studio or other compatible IDE. See [TN 153 Instructions on Including the D2XX Driver in a Visual Studio Express 2013 Project](#) for more information. Also ensure that the latest `ftd2xx` and `LibFT4222` libraries and header files are included into the project. The `LibFT4222.dll` should also be copied to the `system32` or in the same place as the application executable otherwise the error shown in Figure 3.1 will be seen.

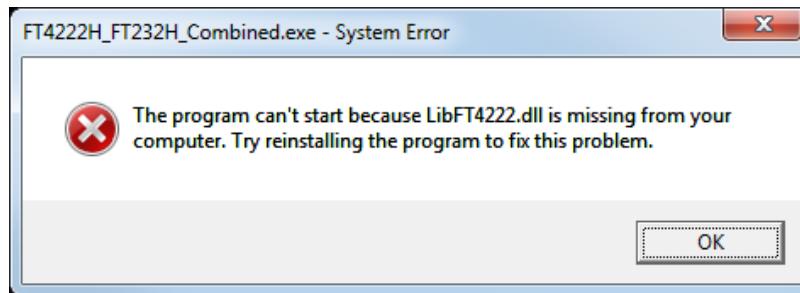


Figure 3.1 System Error

3.1 Code Listing

```
//-----  
// include Standard libraries  
  
#include <windows.h>  
  
#include <stdio.h>  
#include <stdlib.h>  
#include <vector>  
#include <string>  
  
//-----  
// include FTDI libraries  
//  
#include "ftd2xx.h"  
#include "LibFT4222.h"  
  
DWORD loopcount = 0;  
  
//-----  
// Function to convert flags to text  
//  
inline std::string DeviceFlagToString(DWORD flags)  
{  
    std::string msg;  
    msg += (flags & 0x1)? "DEVICE_OPEN" : "DEVICE_CLOSED";  
    msg += ", ";  
    msg += (flags & 0x2)? "High-speed USB" : "Full-speed USB";  
    return msg;  
}  
  
void ListFtUsbDevices()  
{  
    FT_STATUS ftStatus = 0;  
  
    DWORD numofDevices = 0;  
  
    ftStatus = FT_CreateDeviceInfoList(&numofDevices);  
  
    for(DWORD iDev=0; iDev<numofDevices; ++iDev)  
    {  
        FT_DEVICE_LIST_INFO_NODE devInfo;  
        memset(&devInfo, 0, sizeof(devInfo));  
  
        ftStatus = FT_GetDeviceInfoDetail(iDev, &devInfo.Flags, &devInfo.Type,  
        &devInfo.ID, &devInfo.LocId, devInfo.SerialNumber, devInfo.Description,  
        &devInfo.ftHandle);  
  
        if (FT_OK == ftStatus)  
        {  
            printf("Dev %d:\n", iDev);  
            printf("  Flags= 0x%x, (%s)\n", devInfo.Flags,  
            DeviceFlagToString(devInfo.Flags).c_str());  
            printf("  Type= 0x%x\n", devInfo.Type);  
            printf("  ID= 0x%x\n", devInfo.ID);  
            printf("  LocId= 0x%x\n", devInfo.LocId);  
            printf("  SerialNumber= %s\n", devInfo.SerialNumber);  
            printf("  Description= %s\n", devInfo.Description);  
        }  
    }  
}
```

```
        printf("  ftHandle= 0x%x\n",    devInfo.ftHandle);
    }
}

//-----
// main
//-----
int main(int argc, char const *argv[])
{
    ListFtUsbDevices();

    FT_HANDLE ftHandle = NULL;
    FT_HANDLE ftHandle1 = NULL;

    /* Open FT4222H */
    FT_STATUS ftStatus;
    ftStatus = FT_OpenEx("FT4222 A", FT_OPEN_BY_DESCRIPTION, &ftHandle);
    if (FT_OK != ftStatus)
    {
        printf("\nOpen a FT4222H device failed!\n");
        return 0;
    }
    else
    {
        printf("\nOpen a FT4222H device passed!\n");
    }

    /* Open FT232H */
    ftStatus = FT_OpenEx("UM232H-B", FT_OPEN_BY_DESCRIPTION, &ftHandle1);
    if (FT_OK != ftStatus)
    {
        printf("\nOpen a UM232H device failed!\n");
        return 0;
    }
    else
    {
        printf("\nOpen a UM232H device passed!\n");
    }

    /* Application Code Here */
    printf("\nInsert Application code here!\n");

    /* Close FT4222 and FT232H devices */
    printf("\nUnInitialize FT4222H\n");
    FT4222_UnInitialize(ftHandle);

    printf("\nClose FT4222H and FT232H devices\n");
    FT_Close(ftHandle);
    FT_Close(ftHandle1);

    printf("\n");

    return 0;
}
```

3.2 Program Execution

The output of the program execution is shown in **Figure 3.2**.

It lists the UM232H-B and 2 x FT4222H interfaces since the FT4222H is configured in MODE0. See the [FT4222H Datasheet](#) for more information on the different FT4222H modes which will affect the number of interfaces seen.

```
Dev 0:

Flags= 0x2, (DEVICE_CLOSED, High-speed USB)

Type= 0x8

ID= 0x4036014

LocId= 0x2131

SerialNumber= FTVN798K

Description= UM232H-B

ftHandle= 0x0

Dev 1:

Flags= 0x2, (DEVICE_CLOSED, High-speed USB)

Type= 0xa

ID= 0x403601c

LocId= 0x21321

SerialNumber= A

Description= FT4222 A

ftHandle= 0x0

Dev 2:

Flags= 0x2, (DEVICE_CLOSED, High-speed USB)

Type= 0xa

ID= 0x403601c

LocId= 0x21322

SerialNumber= B

Description= FT4222 B

ftHandle= 0x0

Open a FT4222H device passed!
```



```
Open a UM232H device passed!  
  
Insert Application code here!  
  
UnInitialize FT4222H  
  
Close FT4222H and FT232H devices  
  
Press any key to continue . . .
```

Figure 3.2 Program Execution

4 Conclusion

This application note has shown how easily FT4222H can be integrated into existing applications which are already using standard FTDI D2XX devices.

5 Contact Information

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Appendix A – References

Document References

[D2XX Drivers](#)

[D2XX Programmer's Guide](#)

[FT4222H](#) Product Page

[LibFT4222](#)

[UMFT4222EV](#) Development Module

[UM232H-B](#) Development Module

TN_153 [Instructions on Including the D2XX Driver in a Visual Studio Express 2013 Project](#)

Acronyms and Abbreviations

Terms	Description
API	Application Programming Interface
D2XX	D2XX direct (driver)
I2C	Inter-Integrated Circuit
IDE	Integrated Development Environment
PC	Personal Computer
SPI	Serial Peripheral Interface
USB	Universal Serial Bus
VCP	Virtual COM Port (driver)

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Appendix C – Revision History

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