

CP2501 EVALUATION KIT USER'S GUIDE

1. Kit Contents

The CP2501 Evaluation Kit contains the following items:

- CP2501 Evaluation Board
- USB cable
- Evaluation Kit CD which includes the following:
 - CP2501 Bootloader
 - Single_Touch_Mode and Mouse_Mode image files

2. Introduction

The CP2501 is a programmable, 8051-based bridge device that adds a HID-compliant USB touch-screen interface to multi-touch devices such as digitizers, touch screens and pens. The CP2501 devices are pre-programmed with an easy-to-use firmware API, called the System Firmware, to perform USB communication and interface to touch modules using UART, SPI, or SMBus.

The purpose of the CP2501 evaluation board is to demonstrate the interface capabilities of the CP2501 devices. The CP2501 evaluation board enumerates as a touch-screen device on Windows machines and supports two-finger multi-touch operation. The CP2501 evaluation board is shown in Figure 1.



Figure 1. CP2501 Evaluation Board

2.1. How To Use The Evaluation Board

Connect the USB cable to the bottom-left USB connector (P2) and then to a Windows PC that supports touch-screens. The touch-screen is mapped directly to the desktop. Placing a finger on a location on the evaluation board screen translates to touching the same point on your desktop. Since the evaluation board touch-screen is a different size than your monitor and not directly overlaid, it might take some time to get adjusted. Applications such as Internet Explorer that support gestures for scrolling the page are good for testing the evaluation board. The evaluation board is meant to show how a CP2501 can provide an HID touch-screen interface for any touch-screen module. See Section 6 for a listing of Windows operating system versions that support touch-screens.

CP2501-EK

3. Hardware Overview

The CP2501 evaluation board has three main sections. The bottom-left side of the board includes the CP2501 and the USB interface. The right half of the board includes the indium-tin oxide (ITO) touch screen and the touch-screen sensing IC, which is a Silicon Labs C8051F700 MCU. The top-left of the board includes the programming/debug interface for both devices.

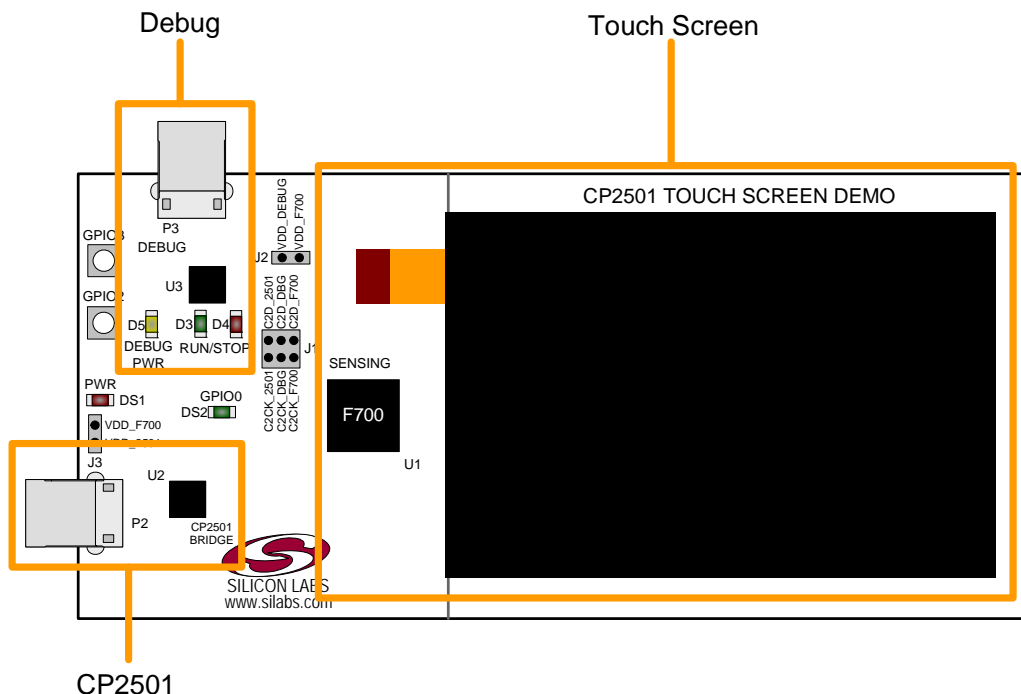


Figure 2. CP2501 Evaluation Board Hardware Overview

To connect the board to a PC, connect one end of the USB cable to the bottom-left USB connector and the other end to Windows PC. Ensure that a shorting block is placed on the J3 shorting block header. This connects the power supply pins of the CP2501 and the C8051F700 pins together and powers the entire evaluation board.

Two mechanical switches, GPIO2 and GPIO3, are connected to both the CP2501 and C8051F700. These switches are used as the left-mouse button and the right-mouse button when the evaluation board is operating in USB mouse mode.

To download new firmware to the CP2501 through the Silicon Labs IDE, connect a USB cable to the Debug USB connector which is located on the top-side of the board. The firmware is also updateable using the CP2501 Boot loader which is described in Section 7. If a shorting block is placed on the J2 header, the C8051F700 is powered from the Debug USB connector.

The J1 header selects which device (CP2501 or C8051F700) is connected to the programming/debug circuitry. For the CP2501, connect C2CK_DBG to C2CK_2501 and C2D_DBG to C2D_2501. For the C8051F700, connect C2CK_DBG to C2CK_F700 and C2D_DBG to C2D_F700.

4. Software Overview

The system firmware overview diagram is shown in Figure 3. The C8051F700 MCU samples the touch-screen and sends X-Y coordinate information to the CP2501 over the UART interface at a periodic rate. The CP2501 firmware creates USB touch-screen packets using the X-Y coordinate data and sends them to the USB host.

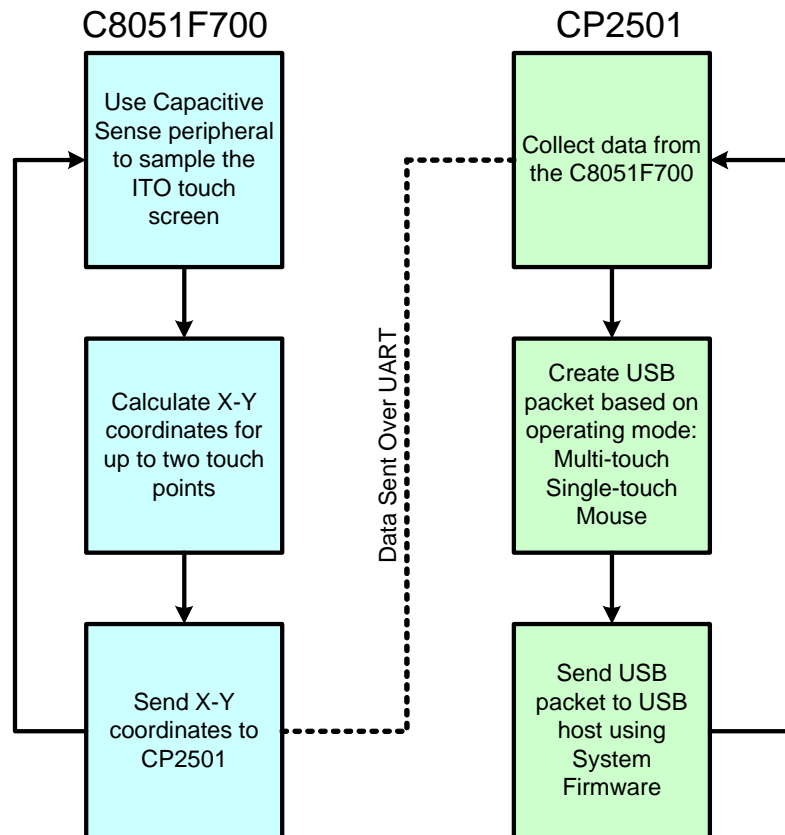


Figure 3. CP2501 System Firmware Overview

The source code for the CP2501 evaluation kit project is installed from the evaluation kit CD to the C:\Silabs\MCU\CP2501EK\Firmware\default directory.

5. Additional Information

The following documents are available online at www.silabs.com and provide more information about CP2501 devices:

- CP2501 Data Sheet
- Application Note AN464: CP2501 Programmer's Guide and API Specification

These documents are also available on the evaluation kit CD.

6. Operating System Support

The CP2501 enumerates as a standard HID class USB device and does not require custom drivers. The different versions of Windows have different levels of support for the standard touch-screen class. The level of support for the default installation of the operating system is shown below in Table 1. Extra touch-screen support is available for some versions through Windows service packs and other upgrades.

Table 1: Windows Touch-Screen Support

Operating System	Default Touch Screen Support
Windows 7—Home Premium, Professional, Ultimate, Enterprise	Supported
Windows 7—Starter	No native support
Windows Vista—Home Premium, Business, Ultimate	Supported
Windows Vista—Home Basic	No native support
Windows XP Tablet PC Edition	Supported
Windows XP	No native support
Windows 2000/98/ME	No native support

When a touch-screen device is connected to a Windows 7 PC, the CP2501 reports to the USB host the number of touch points and the number of pen inputs that it supports. In the case of the evaluation board firmware, it reports support for two touch points and zero pen inputs. The Windows 7 USB host then responds with the number of points it is willing to support. Until this negotiation is complete, the CP2501 operates in Mouse mode and touch data from the screen is sent as absolute mouse positions. The GPIO2 and GPIO3 mechanical switches operate as the left-mouse button and right-mouse button respectively.

When a CP2501 device is connected to Windows Vista or Windows XP, the same negotiation is not performed. When connecting to these operating systems, the system designer must configure the CP2501 firmware to use a specific mode of operation—mouse mode or single-point touch mode. The default firmware loaded on the CP2501 is configured for mouse mode operation. This means that even when connected to a Windows Vista system that supports touch screens, the default CP2501 evaluation board operates as an absolute-position HID mouse.

A CP2501 firmware image that defaults to single-point touch mode is included on the evaluation kit CD. This firmware image is bootloadable over USB to the CP2501 using the CP2501 Bootloader PC application. See Section 7 for more information about using this application. Bootloading the new image allows the CP2501 evaluation board to operate as a single-point touch device under Windows Vista.

7. CP2501 Bootloader PC application

After installation, the CP2501 Bootloader PC application is located in the following default directory:

C:\SiLabs\MCU\CP2501EK\Software\CP2501_Bootloader.exe

The initial screen is shown in Figure 4.

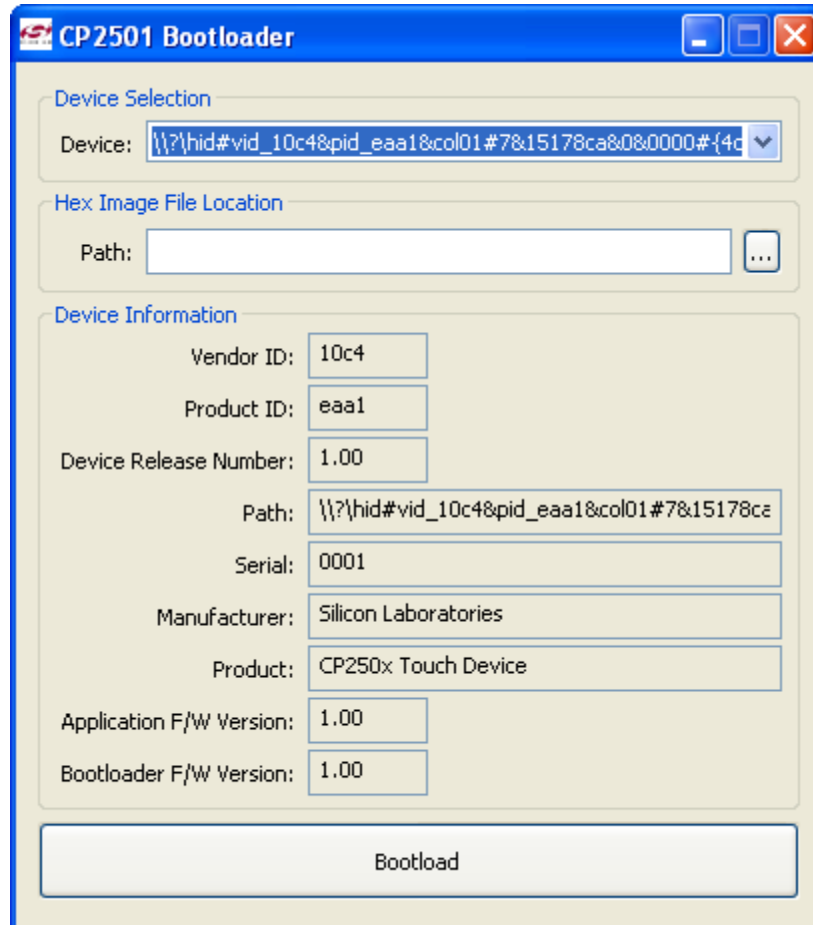


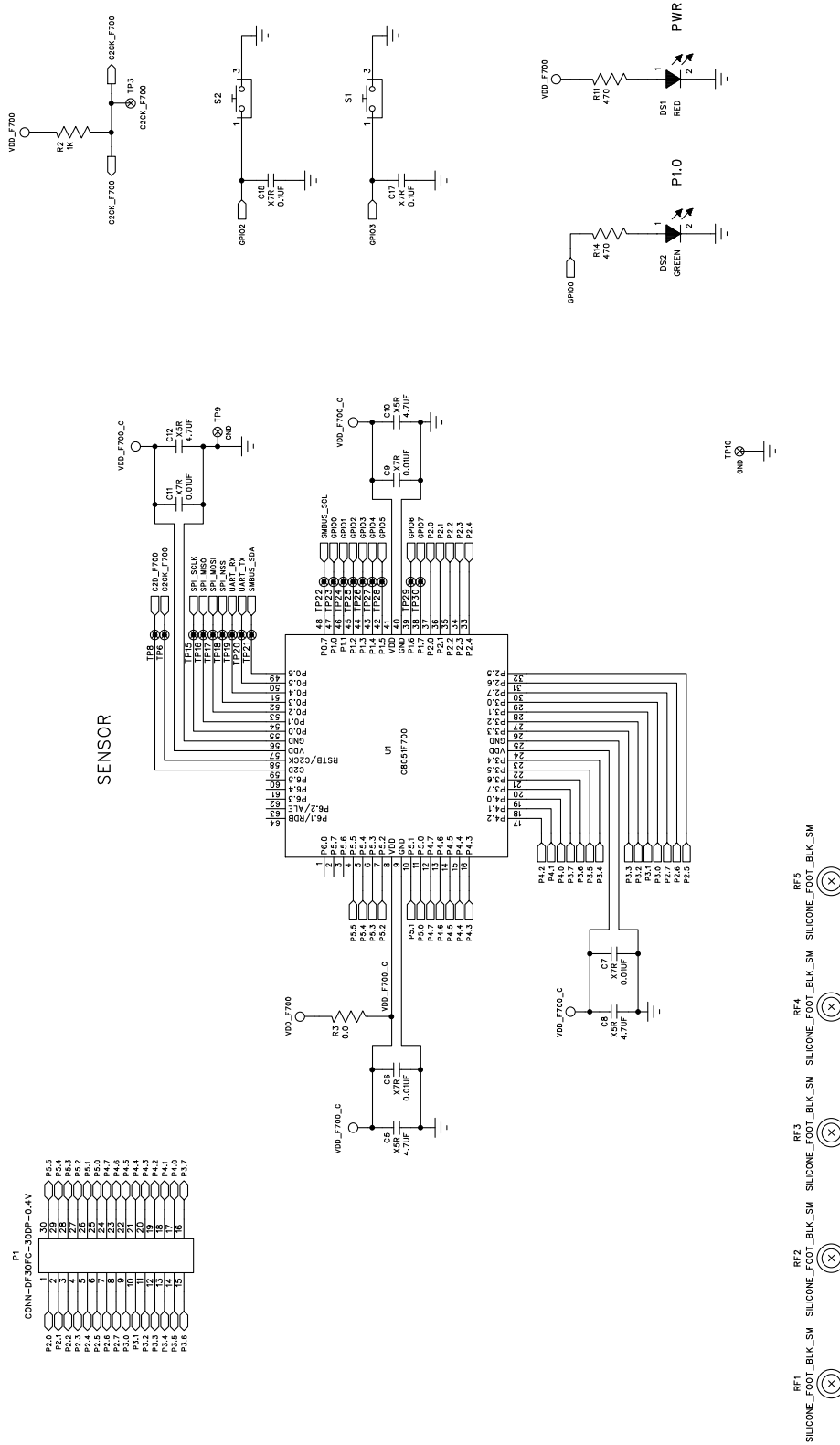
Figure 4. CP2501 Bootloader PC Application

Once the application is loaded, all available HID devices in the system are listed in the Device Selection drop-down menu. **Search** for the first instance that matches the desired CP2501 device. Once selected, the relevant device information is populated the Device Information section.

Next, **select** the hex image file under Hex Image File Location and **click Bootload**. The CP2501 Bootloader application will automatically put the device in bootloader mode, update the user firmware image, and reset the device once the update is complete.

The two firmware images, CP2501EK_SINGLE_POINT_DEFAULT.hex and CP2501EK_MOUSE_DEFAULT.hex, are available in the C:\Silabs\MCU\CP2501EK\Images\default directory.

8. Schematic



TOUCH BRIDGE

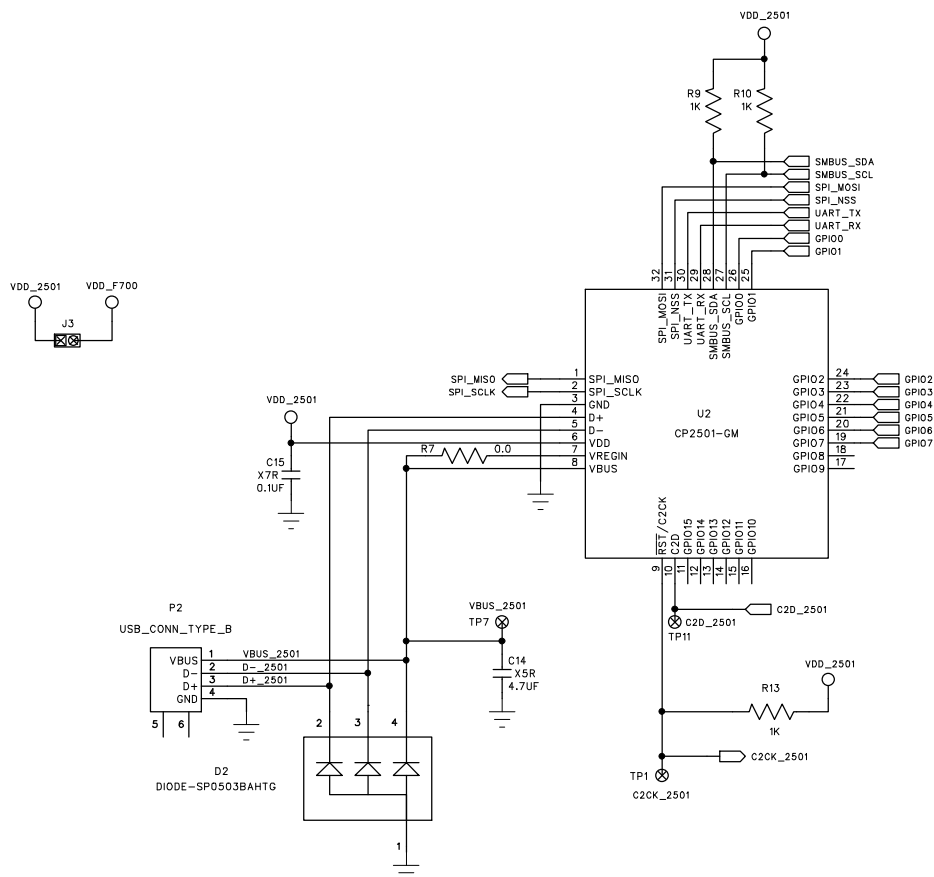


Figure 6. CP2501-EK Schematic (Page 2 of 3)

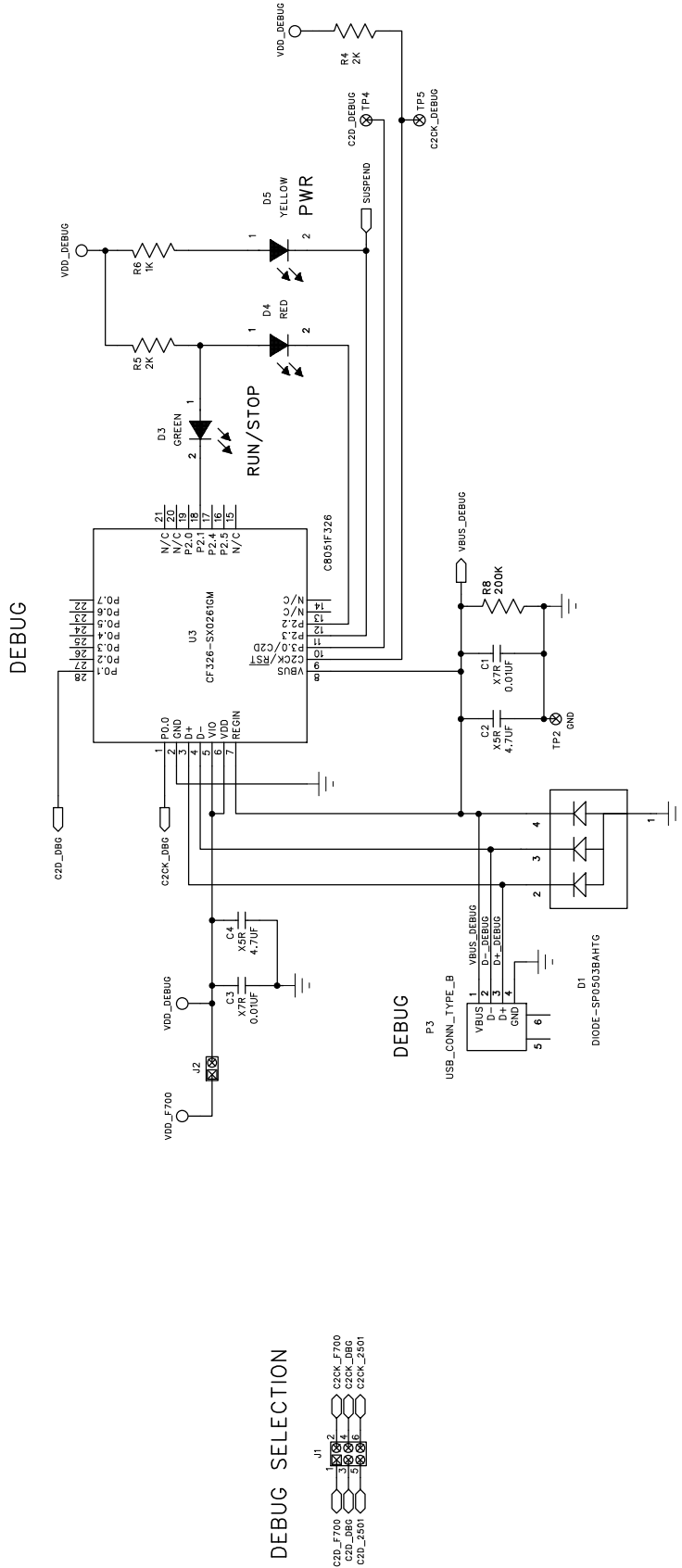


Figure 7. CP2501-EK Schematic (Page 3 of 3)

NOTES:

CONTACT INFORMATION

Silicon Laboratories Inc.

400 West Cesar Chavez
Austin, TX 78701
Tel: 1+(512) 416-8500
Fax: 1+(512) 416-9669
Toll Free: 1+(877) 444-3032

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