



# **VINCULUM**

## BINDING USB TECHNOLOGIES

**Future Technology Devices International Ltd**

# **Vinco Touch-Key Shield**

## **Datasheet**

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**Version 1.0**

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Vinco Touch-Key Shield is designed to interface to the FTDI Vinco USB development module to demonstrate how the VNC2 device can enable the Open Accessory Mode in compatible Android devices and transfer data to and from the Android device over USB to allow touch key pad operation.

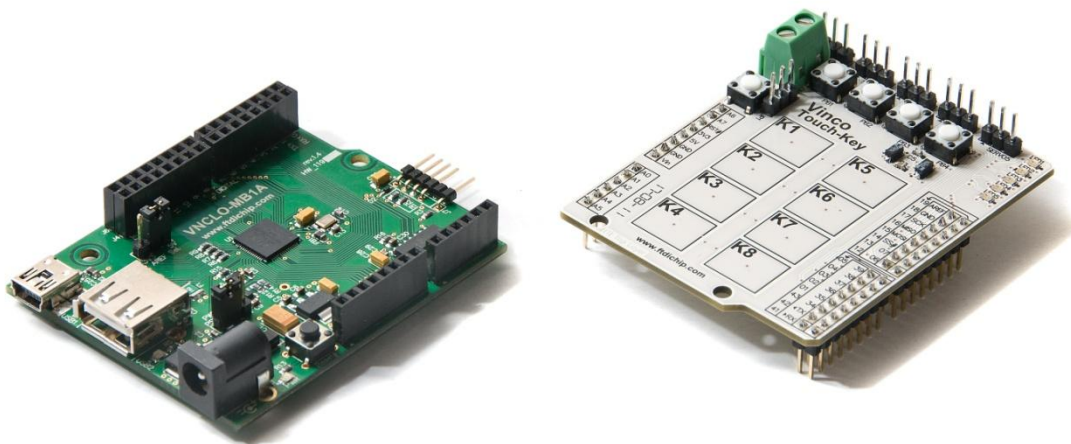
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## 1 Introduction

The Vinco Touch-Key is a shield that mates with the FTDI Vinco development module to allow touch pad operation. The shield includes an STMPE821 device, which is an 8-channel GPIO capacitive touch-key sensor. The sensor communicates to the Vinculum-II (VNC2) (on the Vinco module) via I<sup>2</sup>C protocol.

Vinco is a development module inspired by the Arduino concept and uses the Vinculum-II (VNC2) dual port USB Host/device IC. Vinco uses a VNC2-64Q package to facilitate 38 GPIO options on 0.1" pitch sockets. Vinco is designed as a prototyping platform for VNC2 based designs and applications.

Software libraries for I<sup>2</sup>C are available with the free with the free [VNC2 IDE](#).



**Figure 1.1 – VINCO Development Module and the Touch-Key Shield**

### 1.1 VNC2

VNC2 is the second of FTDI's Vinculum family of embedded dual USB host controller devices. The VNC2 device provides USB host interfacing capability for a variety of different USB device classes including support for BOMS (bulk only mass storage), Printer and HID (human interface devices). For mass storage devices such as USB Flash drives, VNC2 transparently handles the FAT file structure.

Communication with non USB devices, such as a low cost microcontroller, is accomplished via either UART, SPI or parallel FIFO interfaces. VNC2 provides a new, cost effective solution for providing USB Host capability into products that previously did not have the hardware resources available.

VNC2 allows customers to develop their own firmware using the Vinculum II software development tool suite. These development tools provide compiler, assembler, linker and debugger tools complete within an integrated development environment (IDE).

The Vinculum-II VNC2 family of devices are available in Pb-free (RoHS compliant) 32-lead LQFP, 32-lead QFN, 48-lead LQFP, 48-lead QFN, 64-Lead LQFP and 64-lead QFN packages For more information on the ICs refer to [VNC2](#).

### 1.2 Key Features

**The Vinco Touch-Key shield incorporates the following features:**

- Utilise STMPE821 chipset with 8 capacitive touch key or GPIOs
- Eight Touch-key capacitance pads operation.
- Four push button switches.
- Five LED's.
- I<sup>2</sup>C interface with digital controller (VNC2 device) via pin headers
- Mates with the [Vinco Development Platform](#) to enable Open Accessory Mode in Android devices
- Reset switch.
- PWM outputs available
- 5V External/ Internal operation selected by jumper.
- Six I/O pin headers – set as high or low.
- Free software libraries, source codes and drivers are available for customisation purposes
- FTDI Integrated Development Environment (IDE) including code editor, compiler and debugger, which is available as a free download from the [FTDI website](#).

### 1.3 Part Numbers

**Table 1.1 – Vinco Shield Part Numbers**

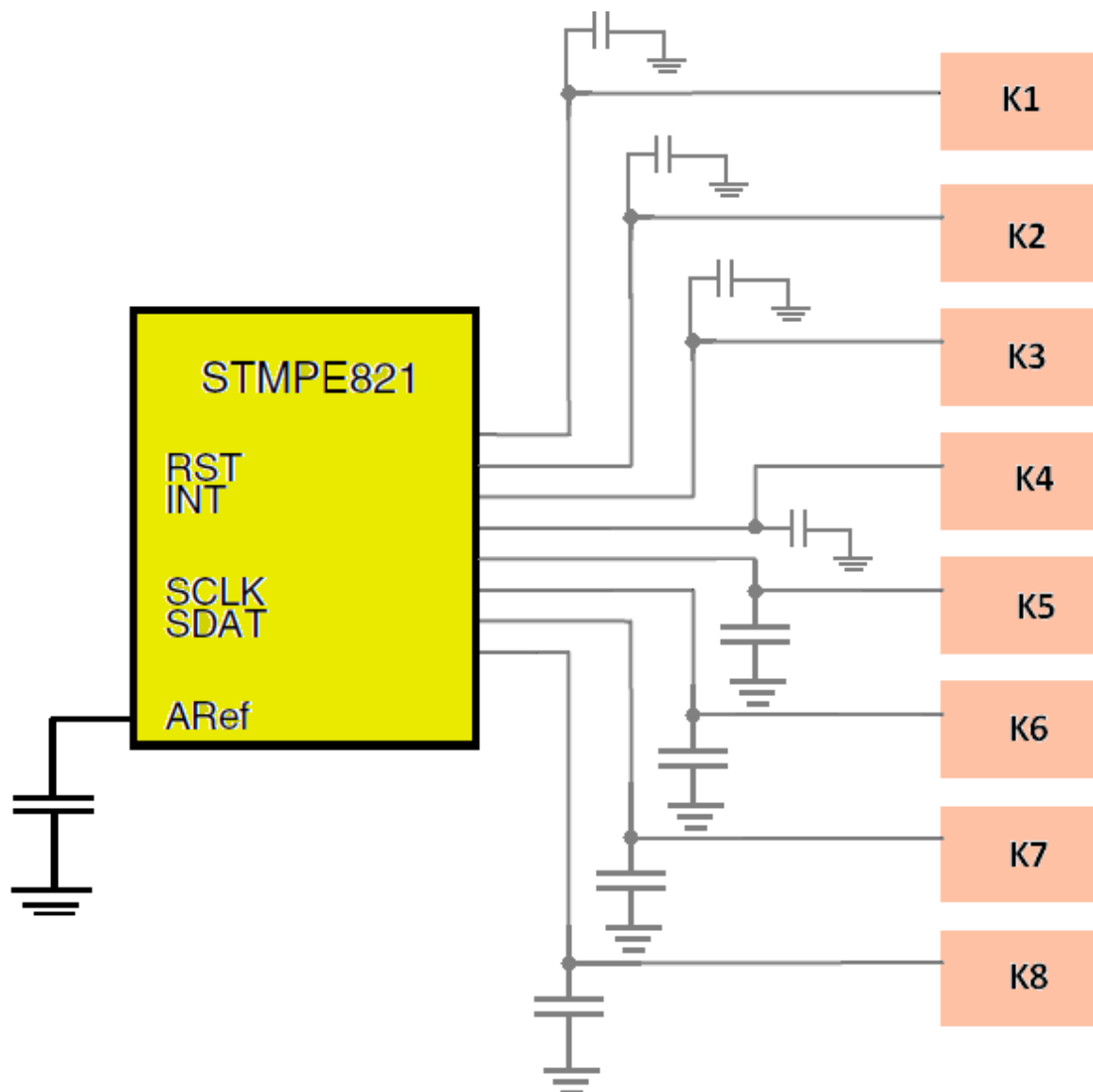
| Part Number | Description            |
|-------------|------------------------|
| VINCO-TOUCH | Vinco Touch-Key shield |

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## 2 Touch- Key Block Diagram

Eight capacitive touch inputs K1 to K8 which connects directly to the STMPE1208S device.



**Figure 2.1 Touch-Keys K1:K8 Block Diagram**

## 3 Functionality

### 3.1 Power

The shield requires a 5V supply to power the PCB. The 5 volts can be provided either from an external supply or from the [Vinco](#) board connections. This selection is made using jumper – JP1:

| Jumper Pin | Description                                              |
|------------|----------------------------------------------------------|
| JP1: 1-2   | +5V supplied by external VCC via wires connected to CN1. |
| JP1: 2-3   | +5V supplied by connection from the Vinco board.         |

**Table 3.1 – Power control Jumper 1**

### 3.2 Pulse Width Modulation Outputs

Five PWM outputs are available SERV01 to SEV05, each is a three pin header (5V, GND and PWM output from the VNC2)

The PWM can be used to control lamp brightness, electric motor control and servo control etc.

### 3.3 LEDs

Five LEDs (LED1:LED5) on the Vinco Touch-Key shield are driven from the [Vinco Development Platform](#) through header pins. Each LED is connected via a 470Ω resistor to VCC3V3.

### 3.4 Switches

SW1 is used to reset the STMPE821 chip.

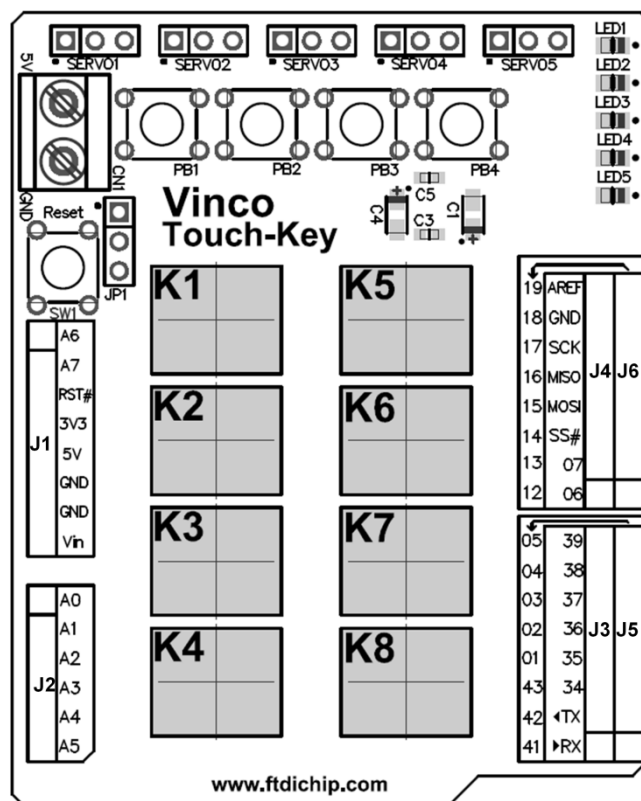
Four push button switches, PB1 to PB4 provide interrupts to the Vinco board and control LED1:LED4 and 4 LEDs on Android target. There are also 4 push buttons created on Android Tablet.

When a push button is pressed on the Vinco Touch-Key Shield or Android Tablet application, toggles the corresponding LED on the Vinco Touch-Key board and on the Android application.

PWM is implemented on LED5 on the shield. This LED is controlled by Volume control bar on the Android Tablet and demonstrates volume up/down characteristic with varying brightness

## 4 Pin Out and Signal Description

### 4.1 Module Connector Descriptions



**Figure 4.1 – Vinco Touch-Key Layout Diagram**

A detailed description of each pin out is given in the next section.

| CONNECTOR        | FUNCTION                                                                       |
|------------------|--------------------------------------------------------------------------------|
| CN1              | 5 Volt Power Supply – VCC5VEXT                                                 |
| SW1              | Reset Switch                                                                   |
| PB1 to PB4       | Push Button switches 1 to 4 controls LED1 to LED4 and 4 LEDs on Android target |
| JP1              | External/Internal VCC jumper                                                   |
| K1 to K8         | Touch keys 1 to 8                                                              |
| SERV01 to SERV05 | PWM outputs either logic 1 or logic 0                                          |
| LED1 to LED5     | Light emitting diodes 1 to 5                                                   |
| J1               | I/O to the Vinco board                                                         |
| J2               | I/O to the Vinco board                                                         |
| J3               | I/O to the Vinco board                                                         |
| J4               | I/O to the Vinco board                                                         |
| J5               | I/O to the Vinco board                                                         |
| J6               | I/O to the Vinco board                                                         |

**Table 4.1 – Vinco Touch-Key Connector Descriptions**

## 4.2 Vinco Touch-Key Shield Connectors : Pins and Signal Description

The following **Table 4.2** detailed signal description of each pin out

| Touch-Key Pin No. | Name        | Type         | Description              | Routed to VNC2 Pin on VINCO Module |
|-------------------|-------------|--------------|--------------------------|------------------------------------|
| CN1-1             | A6          | Input        | 5 Volt supply            | N/A                                |
| CN1-2             | A7          | Input        | Gnd                      | N/A                                |
| SW1-1             | RESET#      | Input        | Reset                    | N/A                                |
| SW1-2             | Gnd         |              | Gnd                      | N/A                                |
| JP1-1             | VCC5EXT     |              | Shield external powered  | N/A                                |
| JP1-2             | VCC5V       |              | Shield USB powered       | N/A                                |
| JP1-3             | VINCO-VCC5V |              | Shield VINCO powered     | N/A                                |
| J1-1              | A6          | I/O          | NOT IN USE               |                                    |
| J1-2              | A7          | I/O          | NOT IN USE               |                                    |
| J1-3              | RESET#      | Output       | Reset for the VNC2-64Q   | 9                                  |
| J1-4              | VCC3V3      | PWR input    | NOT IN USE               |                                    |
| J1-5              | VCC5V       | Power output | 5V input to power shield | N/A                                |
| J1-6              | GND         | GND          | GND for PCB              | 1, 6, 8, 30, 35, 53, 64            |
| J1-7              | GND         | GND          | GND for PCB              | 1, 6, 8, 30, 35, 53, 64            |
| J1-8              | VCCIN       | PWR Input    | NOT IN USE               |                                    |
| J2-1              | -           | -            | NOT IN USE               |                                    |
| J2-2              | -           |              | NOT IN USE               |                                    |
| J2-3              | -           | -            | NOT IN USE               |                                    |
| J2-4              | -           | -            | NOT IN USE               |                                    |
| J2-5              | -           | -            | NOT IN USE               |                                    |
| J2-6              | -           | -            | NOT IN USE               |                                    |
| J3-1              | IOBUS33     | I/O          | NOT IN USE               |                                    |
| J3-2              | IOBUS32     | I/O          | NOT IN USE               |                                    |
| J3-3              | IOBUS34     | I/O          | NOT IN USE               |                                    |
| J3-4              | IOBUS35     | I/O          | NOT IN USE               |                                    |
| J3-5              | IOBUS36     | Output       | LED4                     |                                    |
| J3-6              | IOBUS37     | Output       | LED3                     |                                    |
| J3-7              | IOBUS38     | Output       | LED2                     |                                    |
| J3-8              | IOBUS39     | Output       | LED1                     |                                    |
| J4-1              | IOBUS6      | Output       | SERV05                   |                                    |
| J4-2              | IOBUS7      | I/O          | NOT IN USE               |                                    |
| J4-3              | SS#         | I/O          | NOT IN USE               |                                    |



| Touch-Key Pin No. | Name    | Type         | Description            | Routed to VNC2 Pin on VINCO Module |
|-------------------|---------|--------------|------------------------|------------------------------------|
| J4-4              | MOSI    | Input        | NOT IN USE             | 20                                 |
| J4-5              | MISO    | Output       | NOT IN USE             | 22                                 |
| J4-6              | SCLK    | Input        | NOT IN USE             | 19                                 |
| J4-7              | GND     | GND          | GND for PCB            | 1, 6, 8, 30, 35, 53, 64            |
| J4-8              | AREF    | I/O          | NOT IN USE             |                                    |
| J5-1              | IOBUS41 | I/O          | NOT IN USE             |                                    |
| J5-2              | IOBUS42 | I/O          | NOT IN USE             |                                    |
| J5-3              | IOBUS43 | I/O          | NOT IN USE             |                                    |
| J5-4              | IOBUS1  | Output       | LED5                   |                                    |
| J5-5              | IOBUS2  | Output       | SERV01                 |                                    |
| J5-6              | IOBUS3  | Output       | SERV02                 |                                    |
| J5-7              | IOBUS4  | Output       | SERV03                 |                                    |
| J5-8              | IOBUS5  | Output       | SERV04                 |                                    |
| J6-1              | IOBUS12 | Output       | INT#                   |                                    |
| J6-2              | IOBUS13 | Output       | SCL – I2C Clock        |                                    |
| J6-3              | IOBUS14 | Input/Output | SDA – I2C Data         |                                    |
| J6-4              | IOBUS15 | Input        | Reset for the STMPE821 |                                    |
| J6-5              | IOBUS16 | Input        | Push Button 1          |                                    |
| J6-6              | IOBUS17 | Input        | Push Button 2          |                                    |
| J6-7              | IOBUS18 | Input        | Push Button3           |                                    |
| J6-8              | IOBUS19 | Input        | Push Button 4          |                                    |

**Table 4.2 – Pin Signal Descriptions**

## **5 Firmware /Software**

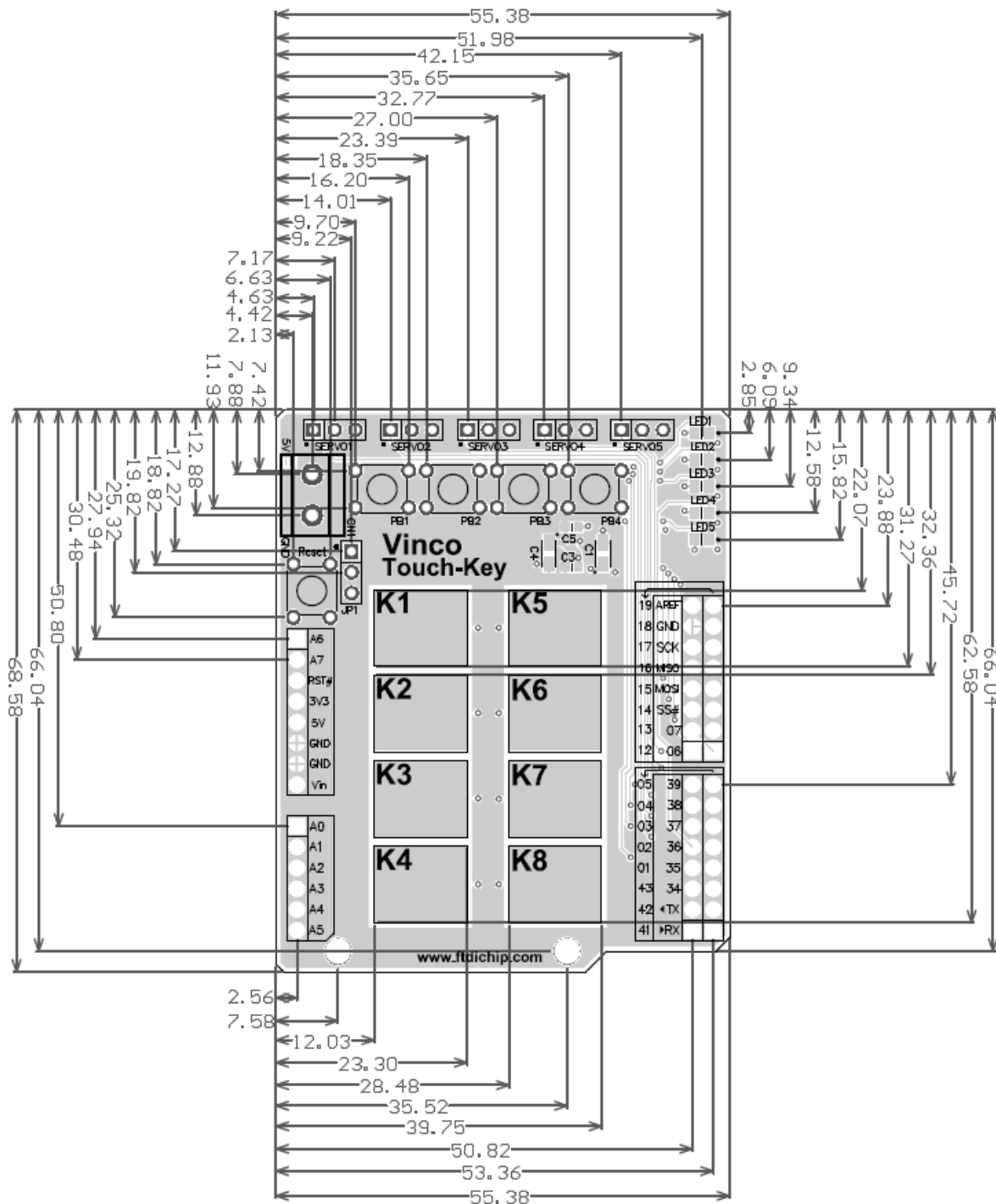
### **5.1 Firmware Support**

Firmware libraries and example applications to demonstrate using this shield with the Vinco module are available for download with the VNC2 IDE from Toolchain revision 1.4.2 onwards ([VNC2 tools](#)).

### **5.2 Software Example**

The principal reason that the Vinco Touch-Key shield was designed was to demonstrate how the VNC2 device can enable the Open Accessory Mode in compatible Android devices and transfer data to and from the Android device over USB. The full code and explanation of the project is available in the application note AN\_196 Accessing Android Open Accessory Mode with Vinco Development Platform.

## 6 Mechanical Dimensions

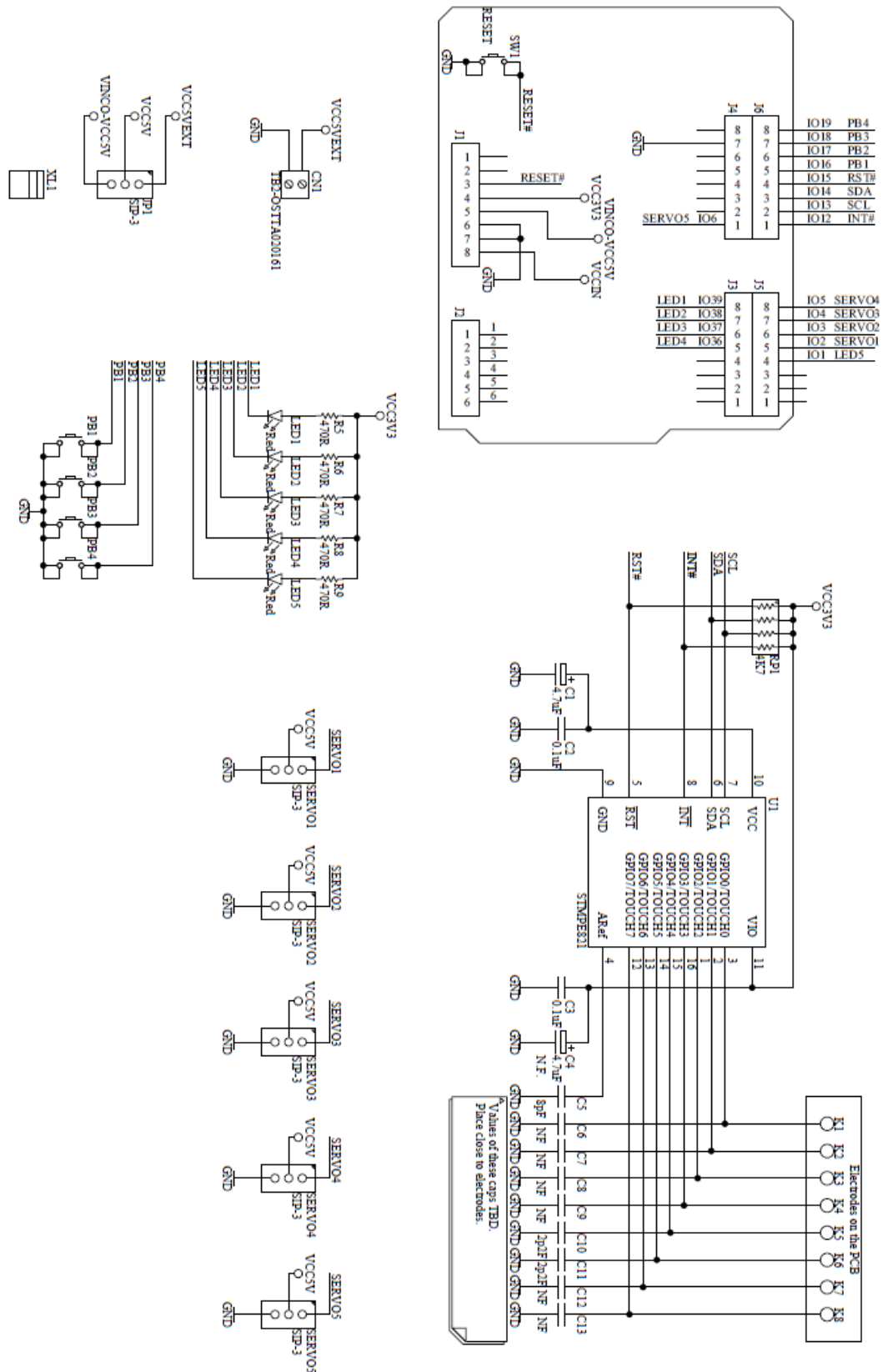


**Figure 6.1 – Vinco Touch-Key Dimensions**

All dimensions are in mm

PCB Tolerance +/- 0.10

## 7 Schematic Diagram



### Figure 7.1 – Vinco Touch-Schematic Diagram

## 8 Contact Information

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## Appendix A – References

The following VNC2 documents and the full Vinculum-II Toolchain software suite can be downloaded by clicking on the appropriate links below:

|                         |                                                                       |
|-------------------------|-----------------------------------------------------------------------|
| Application note AN_196 | Accessing Android Open Accessory Mode with Vinco Development Platform |
| Application note AN_181 | <a href="#">Accessing Android Open Accessory with Vinculum-II</a>     |
| Technical note TN_108   | <a href="#">Vinculum Chipset Feature Comparison</a>                   |
| Technical note TN_118   | <a href="#">Vinculum-II Errata Technical Note</a>                     |
| Application note AN_118 | <a href="#">Migrating Vinculum Designs From VNC1L to VNC2-48L1A</a>   |
| Application note AN_137 | <a href="#">Vinculum-II IO Cell Description</a>                       |
| Application note AN_138 | <a href="#">Vinculum-II Debug Interface Description</a>               |
| Application note AN_139 | <a href="#">Vinculum-II IO Mux Explained</a>                          |
| Application note AN_140 | <a href="#">Vinculum-II PWM Example</a>                               |
| Application note AN_142 | <a href="#">Vinculum-II Toolchain Getting Started Guide</a>           |
| Application note AN_144 | <a href="#">Vinculum-II IO Mux Configuration Utility User Guide</a>   |
| Application note AN_145 | <a href="#">Vinculum-II Toolchain Installation Guide</a>              |
| Application note AN_151 | <a href="#">Vinculum-II User Guide</a>                                |
| VNC2 FTDI Web Page      | <a href="#">Vinculum-II Web Page</a>                                  |
| STMPE821 datasheet      | <a href="#">DATASHEET CD00186453</a>                                  |
| Vinco datasheet         | <a href="#">Vinco Datasheet</a>                                       |
| VNC2 datasheet          | <a href="#">Vinculum-II Datasheet</a>                                 |
| IDE Toolchain           | <a href="#">Vinculum-II Toolchain</a>                                 |

## Acronyms and Abbreviations

| Terms | Description                                 |
|-------|---------------------------------------------|
| USB   | Universal Serial Bus                        |
| FIFO  | First In First Out                          |
| SPI   | Serial Peripheral Interface                 |
| PWM   | Pulse Width Modulation                      |
| GPIO  | General Purpose Input Output                |
| I/O   | Input / Output                              |
| VNC1L | Vinculum-I                                  |
| VNC2  | Vinculum-II                                 |
| DMA   | Direct Memory Access                        |
| IDE   | Integrated Development Environment          |
| BOMS  | Bulk Only Mass Storage                      |
| UART  | Universal Asynchronous Receiver/Transmitter |
| SIE   | Serial Interface Engine                     |
| CPU   | Central Processing Unit                     |
| SoC   | System-on-a-chip                            |
| FAT   | File Allocation Table                       |
| RTOS  | Real Time Operating System                  |
| VOS   | Vinculum Operating System                   |
| OSI   | Open System Interconnection                 |
| MOSI  | Master Out Slave In                         |
| MISO  | Master In Slave Out                         |
| SE0   | Single Ended Zero                           |
| EMCU  | Embedded Micro Central Processing Unit      |
| FPGA  | Field Programmable Gate Array               |

## Appendix B – List of Figures and Tables

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## Appendix C – Revision History

Document Title: Vinco Touch-Key Datasheet  
Document Reference No.: FT\_000514  
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Document Folder: [Vinculum-II](#)  
Document Feedback: [Send Feedback](#)

| Revision | Changes       | Date       |
|----------|---------------|------------|
| 1.0      | First release | 2011-12-21 |
|          |               |            |
|          |               |            |
|          |               |            |
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