World Leader in Capacitive Proximity Sensing

IQS525-TP43-HID Track-pad Evaluation Kit

Azoteq introduces the IQS525-TP43-HID Evaluation Kit. The kit allows designers to easily evaluate the IQS525-TP43 track-pad module. The IQS525-TP43 is the first compact trackpad module with tactile feedback keys.

Introduction

The IQS525-TP43-HID evaluation kit combines the IQS525-TP43 track-pad module and a HID interface board. Users can connect the kit to a PC or MAC via USB, and use as a mouse pointer and navigation keys. The EV-Kit can be used as a basis for the development for a wide range of applications such as remote controls, industrial interfaces, and appliances.

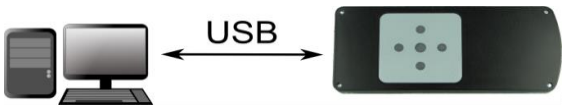

Figure 1: The IQS525-TP43-HID-EVKIT connects to a PC through the USB.

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To enable next generation capacitive user interfaces and intelligent switch applications for users to interact naturally with products through capacitive proximity and touch

The need for Radiated-Immunity

Wireless data transfer has increased significantly in recent years, be it with cellular telephones, WiFi networking, gaming consoles etc. This fact increases the probability of ProxSense based designs to be exposed to high levels of RF-radiation greatly. In addition, a large number of unintentional RF transmitters exist in the real world, such as lightning, arcing of contactors and of brushes on electrical motors, spark plugs and products not conforming to EMC standards.

To ensure market acceptance and a low percentage of RF-related problems in the field, a certain amount of immunity to RF-radiation is required. ProxSense devices have been designed to ensure fairly high inherent Radiated-Immunity.

However, this does not immediately guarantee Radiated-Immunity for the whole system in which the ProxSense device is used. A holistic Radiated-Immunity design approach is required to ensure the best chances of achieving the required level of immunity, with the ProxSense device but one part. Guidelines are available to help our clients design for Radiated-Immunity, and also give some background information.

RF Immunity necessary for a wide array of applications.

Full Application Note Available Here.

Low cost in-house test methods for RF Immunity

- Cellular telephones. These typically emit up to 2W of RF-power. Close field can be > 30V/m.
- WiFi routers - 2.45GHz.
- Zigbee or Bluetooth transceivers - 2.45GHz band. Higher power Zigbee - 100mW.
- ISM band transmitters – typically emit in the mW range, useful for 370Mhz and 433MHz.
- Two way radios - typically emit a few Watt of RF-power
- Transmitters should be placed in many positions relative to product. Includes height variation
- and change in product orientation.
- E-field and H-field probes to inject fields into specific sections of the circuit under test.

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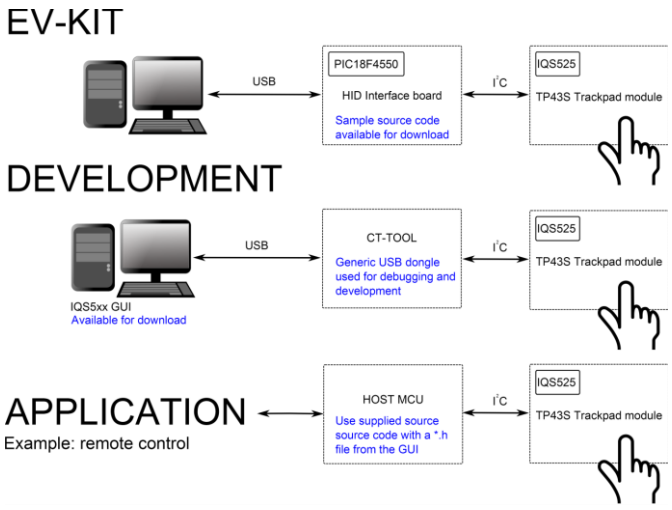

Figure 2: TP43S development stages

The EVKIT is shown in Figures 3 and 4. The EV-Kit contains a track-pad with 5 imbedded keys.

The EV-Kit can be connected to a computer using a USB cable and provides the following functionality:

- The user can slide the tip of his finger on the track-pad to move the mouse pointer.
- Mouse clicks are generated with finger taps.
- The user can press the following keys:
  - Up arrow
  - Down arrow
  - Left arrow
  - Right arrow
  - Enter

The locations of the keys are illustrated in Figure 5. The purpose of the HID module is to illustrate the capabilities of the IQS525-TP43 module and to serve as a design example of how such a track-pad module can be used in conjunction with a Microchip MCU. The HID sample code is available for download.

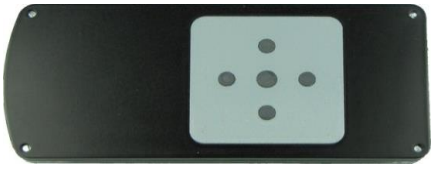

Figure 3: Top view of IQS525-TP43-HID evaluation kit.

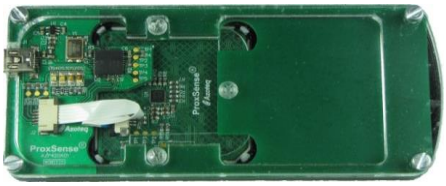

Figure 4: Bottom view of IQS525-TP43-HID evaluation kit.

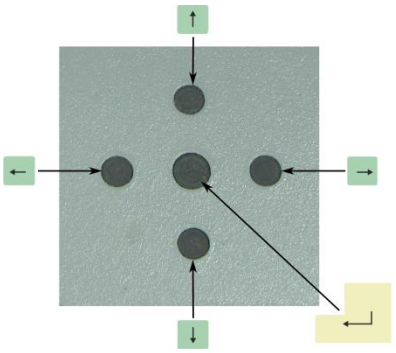

Figure 5: The locations of the keyboard keys on the track-pad are illustrated above.

HID interface board

The HID interface board contains a PIC18F4550 MCU and can interface to a TP43 module using I2C and to a computer using USB. The HID interface board with its connection to the track-pad module is shown in Figure 7. A schematic of the HID interface board is provided for reference in Figure 11.

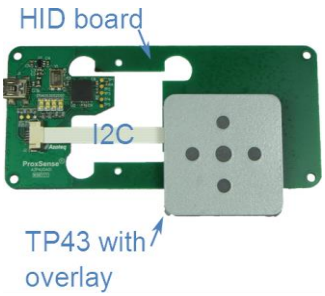

Figure 7: HID interface board connected to the IQS525 TP43 module using the I2C protocol on a flex cable.

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TP43 Track-pad Module

The TP43 track-pad module boasts a 5x5 sensor array managed by an IQS525 track-pad controller. The track-pad module can be seen in Figure 8. The IQS525 TP43 module specifications are provided in Table 1. The track-pad has a 2mm thick overlay with 5 embedded buttons. The buttons press down on snap domes. A schematic of the IQS525 TP43 track-pad circuit can also be provided upon request. This schematic can serve as a reference design for users who want to design their own custom track-pads. The steps for designing a custom track-pad application are outlined in Figure 6.

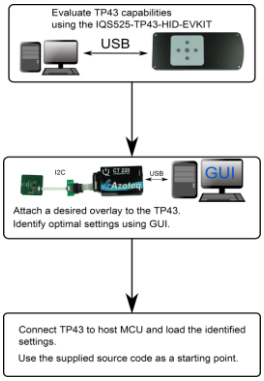


Figure 6: Steps for designing a custom track-pad.

The basic procedure is as follows:

- Fit the desired overlay on the TP43 track-pad module.
- Connect the track-pad module to a PC using an AZP216D01 interface board and a CT-tool.
- Download Azoteq's IQS5xx GUI (www.azoteq.com) from the Soft-ware & Tools section and identify the optimal track-pad settings.
- Include the TP43 module in a custom design that has its own host MCU.
- Replicate the track-pad performance on the host MCU.

Full User Manual available soon

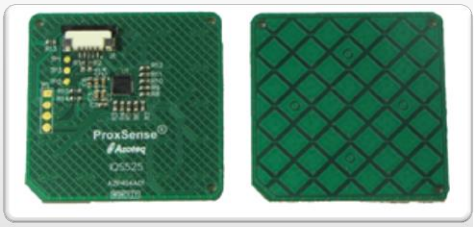


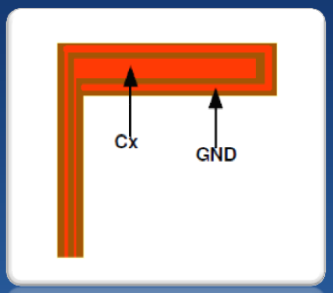
Figure 8: TP43 Module

Left: Circuit of TP43 module containing an IQS525 chip. Right: Track-pad sensor pattern with 25 channels.

Tips & Tricks:
Directional Sensing

Capacitive proximity and touch senses changes in capacitance all around it. So what do you do when you want to sense only in one direction? A couple of suggestions for design are:

- Use of a ground trace/plane
- Use of a block channel (only activates when just the desired channel is activated)



Use of a ground trace to only activate in one direction.

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