

# Snaptron's DT-Series Domes Provide Dual-Touch Functionality

## WHITE PAPER

Prepared by: Kevin Albertsen and Ashley Steinbach  
Issue Date: March 8, 2021

## Introduction

With advancements in technology, designs are getting smaller and more sophisticated. This trend is requiring engineers to do more with limited space, presenting the need for multi-functional components.

Improvements in product design show a need for devices to recognize multiple points of contact. One button can provide multiple user-selectable outcomes. The DT series tactile dome is a one-of-a-kind switch designed to maximize functionality while maintaining a small profile.

The DT dome is similar to a standard four-legged metal dome, except one foot is shorter. The design of the DT-Series domes, otherwise known as the dual-touch switch dome, offers many benefits over other dome types.

# Benefits

## DETECT DIFFERENT USER INPUTS

The DT dome can pick up two different user inputs levels--meaning users can detect two different force levels or actuation positions. The first position provides no tactile sensation but makes electrical contact. While the second position gives the tactile feedback synonymous with traditional domes switches. Designers can use this functionality in applications that need to detect light pressure for one outcome and hard pressure for another.

Examples would include focusing a camera before taking a photo or aiming with a scope before taking the shot. You could also monitor two different fluid or gas pressures with this component.

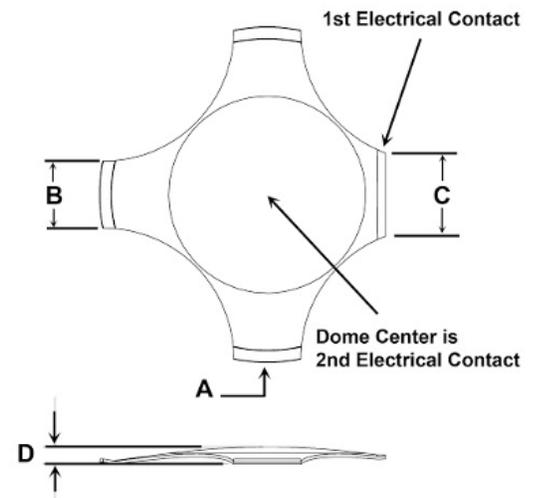


Figure 1: Shows the positions of the first and second electrical contacts. The force for the first contact is approximately 20% of the dome's total force and total travel.

## TWO PROGRESSIVE SWITCH CLOSURES WITH ONE METAL DOME

The DT series allows for two progressive switch closures with a single button. To further extend the switch's functionality, the firmware can be designed such that this switch closure can provide dependent or independent electrical connections. In a dependent system, the second electrical contact would rely on the first, whereas an independent system would perform two separate functions regardless of the other making or maintaining contact.

In the example below, the first contact occurs at the dome's short foot, which illuminates the green light (see Figure 3). The first contact does not provide any tactile feedback. The second contact occurs at the dome's center, illuminating the red light (see Figure 4) and provides tactile feedback.

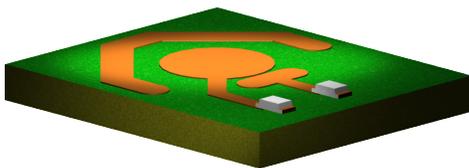


Figure 2: Contact pad layout shows two progressive switch closures.

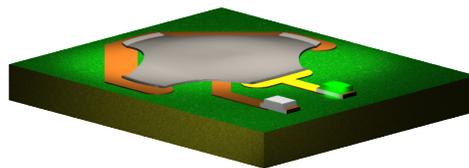


Figure 3: The first contact occurs at the foot of the dome but has no tactile feedback.

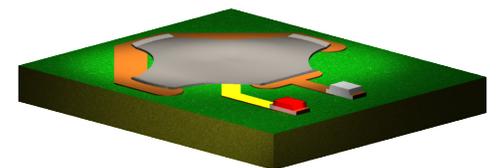


Figure 4: The second contact occurs at the center of the dome independent of the first contact.

# Features

## CONTINUOUS DUAL-TOUCH

Indicated as DTSD in the part number, this feature is for applications that need to maintain contact through both actuations. The dome's design has two dimples located on the short foot, which provides two key benefits:

1. This design allows for maintained switch closure of both contacts even past the first actuation. Continuous dual-touch is beneficial when the first actuation plays a critical part in the full function of the switch, the second actuation is dependent on the first maintaining contact or if both electrical contacts detect the state of a system.

For example, designers may want to monitor a threshold. Using the dome with continuous dual-touch would allow the first actuation to detect a prespecified pressure level. The second actuation could be set up to detect an upper pressure threshold. Together, the two electrical contacts could monitor the system's pressure and provide a warning if the pressure becomes too low or too high.

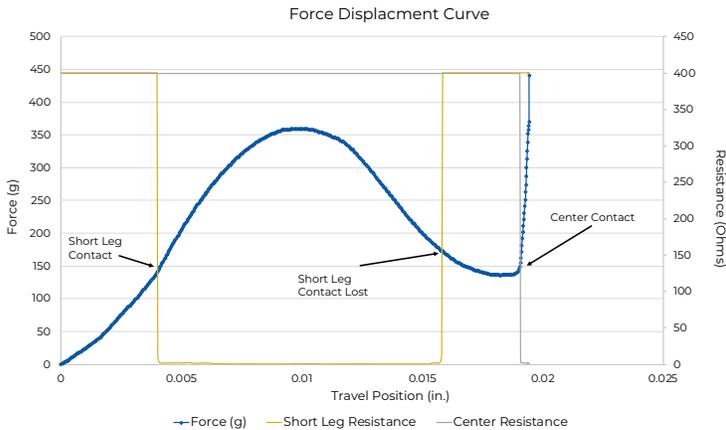


Figure 5: Example of a dome not maintaining the first electrical contact through the second actuation.

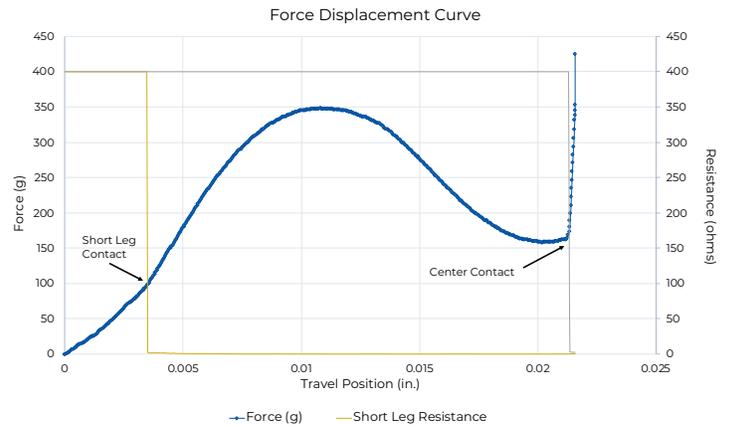


Figure 6: Example of the DTSD dome maintaining both electrical contacts through the first and second actuation.

2. The short foot dimple design of the DTSD dome also assists with off center actuations while maintaining a consistent trip force. This design allows the first contact to work consistently, even when pressed at an angle or off-center.

The example to the right (Figure 7), shows the loss of the first electrical contact with off center actuations. Even with off-center actuations at 0.1" from center, the 12mm DTSD maintains the first and second electrical connections.

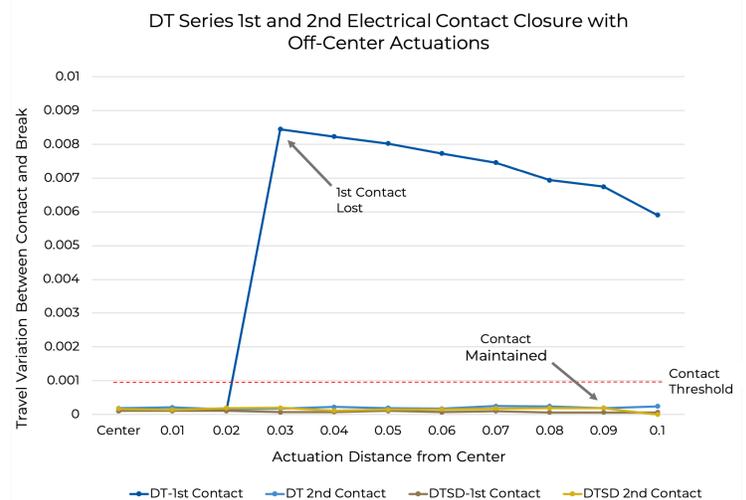


Figure 7: Shows that the first electrical contact maintains contact with off-centered actuations.

# Features

## BACKLIGHTING

Adding a hole to the center of the dome provides backlighting, indicated as DTBLXXXXX in the part number. By adding backlighting, you can design the system with an integrated LED. The dome maintains all of the functionality of the DT series but adds visual feedback of a connection. The hole in the center of the dome allows you to place an LED directly behind the dome switch rather than off to the side. The result is a more intense lighting effect. Adding this option can provide another level of feedback to the user. The LED can be used to indicate many different functions, depending on the design.

## CUSTOM OPTIONS

Different forces and travel properties are available to assist with end product design. The final assembly can change the sound and feel of the dome. Your force and travel requirements will help you achieve the product design results you desire. Contact Snaptron today to discuss different options such as size, force, dimples, plating, or other additional features.

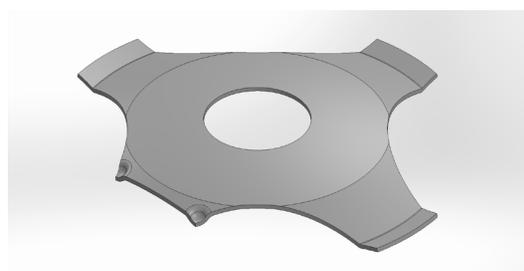


Figure 8: Custom DTSDBL dome with a hole in the center for LED integration and continuous dual-touch functionality.

## Packaging

Domes can be packaged loose, in a pocketed reel, or in an adhesive array for ease of placement on the circuit board, flex circuit, or membrane switch.

## DT-Series Overview

<b>Target Industries</b>	Consumer, Medical, Automotive, Firearms, Security, Aviation, Military
<b>Packaging</b>	Bulk, Polyester Adhesive-Backed Tape, Pocketed Reel
<b>Diameters</b>	6mm, 7mm, 8.5mm, 10mm, 12mm
<b>Forces</b>	180g, 200g, 260g, 320g, 340g, 450g
<b>Life Cycle Ratings</b>	up to 5,000,000
<b>Add-on Features</b>	Continuous Dual-Touch, Backlighting, Plating, Force Concentrator, Dimples