Quantum Capacitive Touch IC Calibration Using Multiple Probes

Applies to QTouch™ devices using Cs for sensitivity such as QT1xx, QT240, and QT1xxx ICs

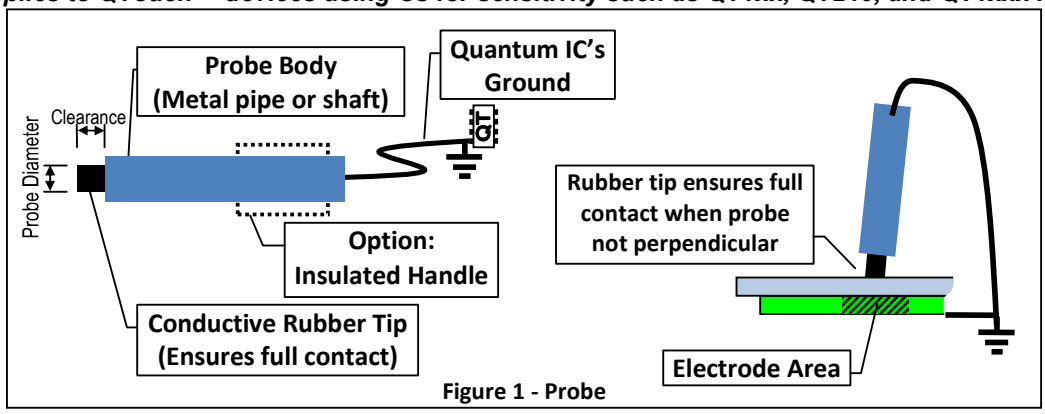

Figure 1 - Probe

Design a probe that represents the fingers used with the product.
Depending on desired sensitivity a 6mm to 8mm diameter Threshold Probe is often appropriate.
For calibrating Quantum ICs that use a capacitor (Cs) to control sensitivity a set of probes is required.

Every finger is a bit different. Also people touch with different portions of their fingers. Touching with the tip presents a small surface area, touching with the flat presents more area. Applying more pressure flattens the finger to present even more contact area.

Probes:

- A full set of probes would be 2mm to 14mm in 0.5mm increments, but a subset starting at 2mm below threshold and ending at 2mm above threshold should be sufficient for most projects.
- Threshold probe size depends on touch panel construction and customer sensitivity preference.
- The Probe's ground lead should be connected to the same ground as the Quantum Touch IC during this procedure (This removes effects of different people holding probe).
- A rubber tip allows for full contact even when probe not held perfectly straight.
- Any portion of the probe thicker than the Tip should have sufficient clearance so as not to affect the electric field. The hand holding the probe or the body of any automated tester should be kept well away from the panel (>10cm) to prevent affecting the test.

Determine appropriate sensitivity for product:

Using some test samples, by trial and error adjust them so that for several people the samples give the desired feel for the target product. Check the samples with various size probes to determine the desired probe to use as a Threshold Probe or Reference. You must decide whether you will use [intermittent, 50%, or always] as your Detection Rule for further probe tests.

Calibrating the Product:

Final sensitivity settings should be based on a review of data from several samples that were prepared as per production specification.
Flux residue can affect sensitivity. Ensure that all samples used for calibration are properly cleaned and dried before each test, and after any component changes.

According to Detection Rule chosen above probe each key with the set of probes to determine at which size it detects (Detect Probe). Ensure that you back off between probing for several seconds to allow keys to return to full sensitivity, as some QT ICs can be set to slowly compensate if hand or probe is nearby for extended periods.

If the Detect Probe is smaller than the Threshold Probe, decrease Cs (Reduce Sensitivity).
If the Detect Probe is larger than the Threshold Probe, increase Cs (Increase Sensitivity).
Keep Cs within spec limits (Cs limits may be tighter than spec depending on construction).
Some Quantum ICs have a Gain option. You may adjust Gain to keep Cs within limits, to preserve response time, or to set debounce samples (Gain specified as number of counts/samples).

Mechanical Stability Check:

Use a Non-Conductive Probe (long, thin, low mass) with hand positioned >200mm from panel.
i.e. Plastic or Wooden Chop Stick
Probe all over panel with both strong and light pressure (key positions, between keys, over display ...).
Any false touch detects indicate mechanical support is an issue.

Production Tests:

A larger probe may be used for Production "Always Detect Tests" (typically >8mm).
As an option a smaller probe may be used for "Never Detect Tests" (typically <2mm).

