

Case Design for Optimal Fingerprint Scanning and Optimal Auto-On™ Finger Detection

Applicable Models: U20, U20-WR

The following application notes are highly recommended when designing your case to embed a U20 or U20-WR fingerprint module.

- Avoid recessed fingerprint platen
- Orient the fingerprint module properly
- Cover all edges of the glass platen
- Avoid interference with the touch chip sensor

Avoid recessed fingerprint platen

Make the glass contact surface (platen) of the fingerprint sensor **flush with the case** (Fig. 1) as much as possible and **not recessed** (Fig. 2) by making the case opening around the platen tapered.

This helps the finger contact the sensor with a larger contact area. A larger contact area is desirable because it ensures that a larger part of the fingerprint is scanned, which improves matching accuracy and lowers false rejection rates.

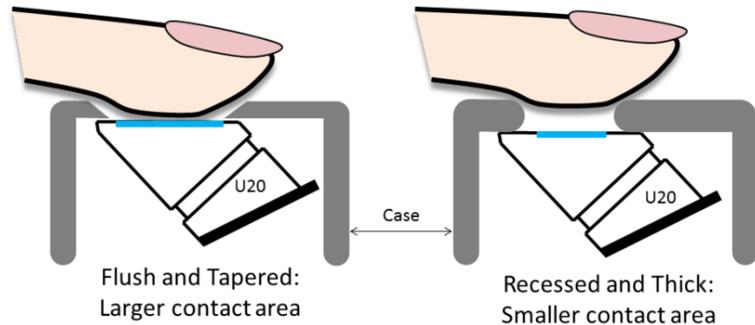


Fig. 1 Recommended.

Fig. 2 Not recommended.

Orient the fingerprint module properly

Position the module so that the “SecuGen” imprint is **closer to the user** (Fig. 3) and **not farther away from the user** (Fig. 4).

This provides better performance. Also, the firmware is set to read the image in this orientation; otherwise, if the module is reversed, the image will appear upside-down.

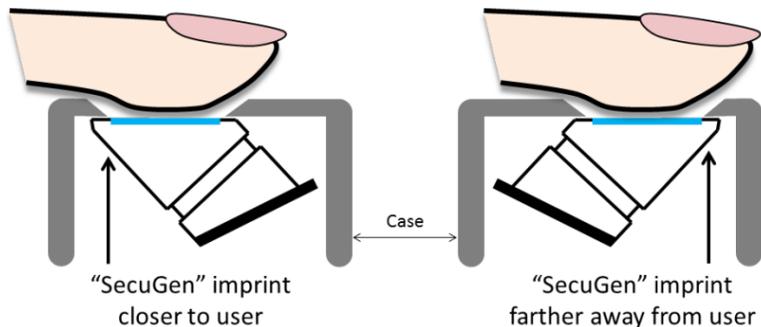


Fig. 3 Recommended.

Fig. 4 Not recommended.

Cover all edges of the glass platen (U20 only)

Ensure that the opening of your case **fully covers the edges of the glass on all sides and completely covers the U20 module housing**.

The glass prism is not secured within the module housing except for nominal glue to hold it in place during shipping.

The case opening dimensions in Fig. 5 are recommended to prevent the prism from falling out of the module housing and to provide optimal imaging. A larger or smaller case opening can affect the optical properties of the fingerprint module.

Appropriate adhesive, such as the double-sided tape supplied with the U20, must be applied between the U20 and the case to secure the U20 and prism. If water-proofing is required, use waterproof double-sided tape or use the U20-WR model instead.

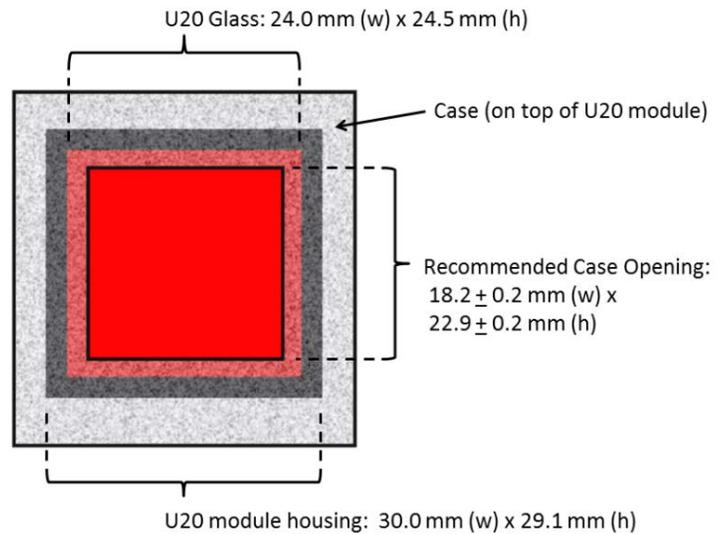


Fig. 5 Recommended.

Avoid interference with the touch chip sensor

The housing should be designed to prevent interference from the external environment near the **critical touch chip sensing areas** (Fig. 6). These are the critical areas of the U20 module: the sides of the prism and the area from the “SecuGen” imprint down to the LED board. The U20 is designed with an Auto-On™ function in which a **touch chip sensor** detects the presence of a finger placed on the platen. Due to the touch chip characteristics – its ability to detect anything with conductive or dielectric properties, the U20 module requires special consideration when embedding into your devices.



Fig. 6 Touch chip sensing areas in blue.

The main factors that can interfere with the touch chip sensor are:

- **Material used for mounting the module** – Do not use metal as a mounting bracket around the touch chip sensing area. The touch chip sensor is influenced by metal. If the touch chip sensing area of the module is located near metal, it may not work properly. If the mounting bracket is made of conductive material, it should be loose around the touch chip sensing area so that it does not interfere with the touch chip sensor.
- **Wiring around or near the touch chip sensor areas** – Do not place wires around the touch chip sensing area
- **RF cards and wireless devices near the module** – Do not place the fingerprint module near RF card or wireless devices
- **User behavior** – See User guidelines below for best results

How the touch chip sensor works

The touch chip sensor is located on one side of the fingerprint module and directly below the “SecuGen” imprint (Fig. 7). The touch chip sensor is initialized when the main power is turned on. The touch chip sensor continually measures the input capacitance every second and compares it with a programmed default threshold value (i.e. a reference capacitance).

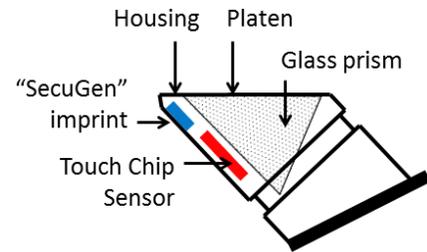


Fig. 7 Side view of U20.

If the capacitance is higher than the threshold, the sensor will send the Auto-On™ signal to turn on the LED. If a finger is placed on the platen, the touch chip sensor will detect an increase in input capacitance; if it is higher than the threshold value, then the fingerprint will be captured.

Due to the fact that the touch chip sensor re-calibrates its threshold value every second, occasionally the threshold value could change due a variety of factors in the external environment. Such interfere with the touch chip sensor could cause it to temporarily not detect the presence of a finger on the platen.

User guidelines for Auto-On™

In addition to the physical environment, user behavior can sometimes interfere with the touch chip sensor. For example, if a user places his or her finger on the platen too lightly or slowly, this could cause the input capacitance to be lower than the threshold value, making the touch sensor re-calibrate and increase its threshold value. As a result, the touch sensor would not detect the finger.

For best results when scanning a fingerprint, the following is recommended.

1. Make sure the finger covers at least the middle of the platen (Fig. 8).
2. Place the finger firmly on the platen but not too slowly or too lightly. This could cause the touch chip sensor to re-calibrate to a higher threshold value and not detect the finger.
3. Do not wrap fingers around the touch chip sensor areas. Do not grasp the back of the module near the touch chip sensor area.

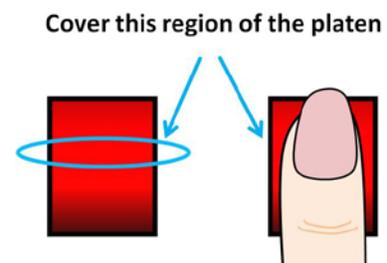


Fig. 8 The touch chip sensor is located below the glass prism, approximately near the middle of the platen. Place finger to cover the central region of the platen.

Troubleshooting:

If your finger is not detected when placed on the platen, remove your finger, wait for 5 seconds, and then try again. Wait 5 seconds to allow the touch chip sensor to reset the threshold value to default.

Suggested Case Designs for U20-WR

The U20-WR features a module cover that is sealed onto the edges of the fingerprint platen of the U20. The case can be designed so that the module cover lies flush with the case as shown in the following figures.

