

# Personal Identity Verification Made Possible by Advanced Materials

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Even though biometric technology has been used for decades for security purposes, it wasn't until the recent introduction of smartphone point of sale payment capability that it became part of the mainstream population culture. "Biometrics" as defined by Merriam-Webster, is the measurement and analysis of unique physical or behavioral characteristics (as fingerprint or voice patterns), especially as a means of verifying personal identity. In short, biometrics offers an exceptionally high degree of security, preventing identity theft and ensuring personal information confidentiality -- the perfect solution for mobile transaction safeguarding.

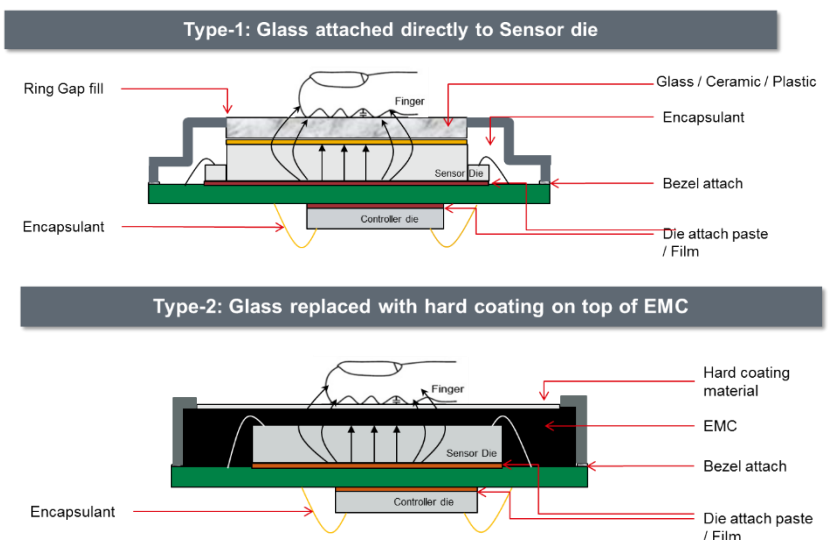


Active Capacitive Measurement

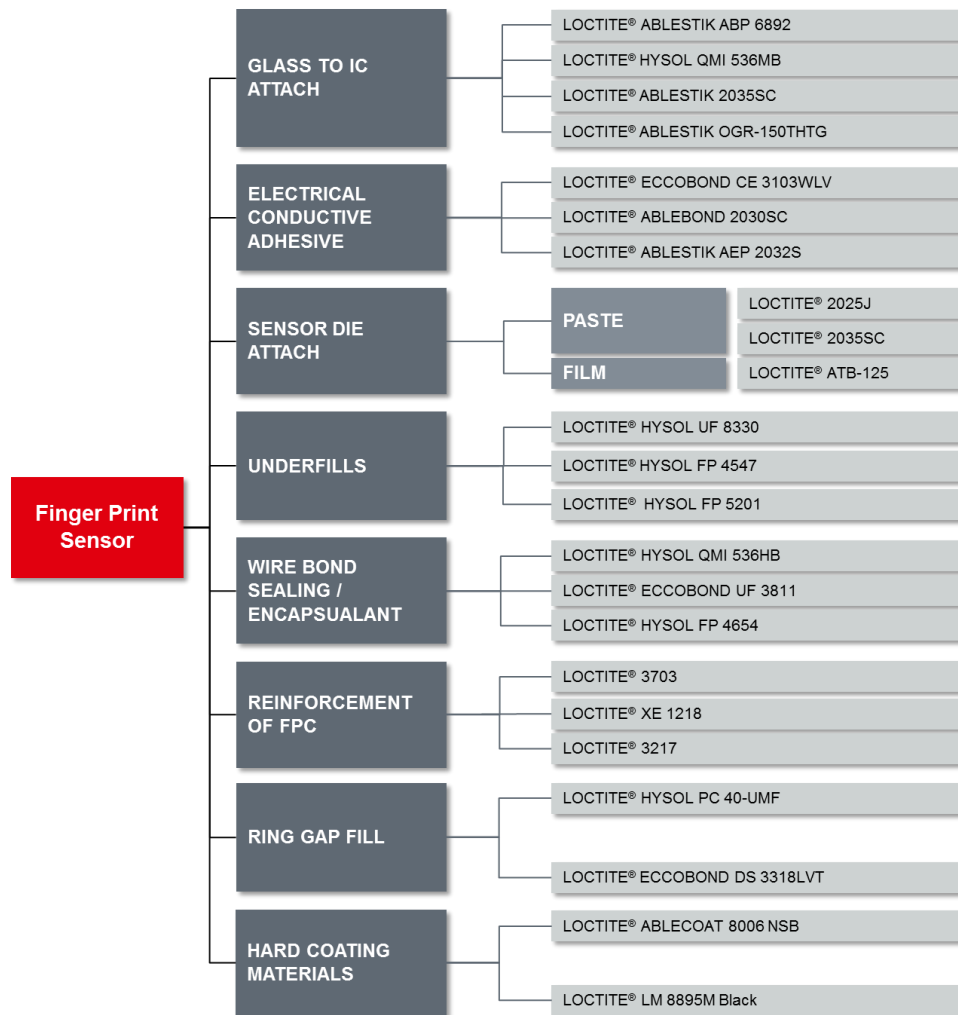
There are many forms of biometric technology, either physical or behavioral, with the fastest growing method being contact biometrics – specifically, fingerprint recognition. In fact, fingerprint sensing technology has been successfully employed in numerous market sectors including government, defense, travel (immigration), banking and healthcare, among others. And, just as varied as

the market sectors are the types of sensor technologies used to identify fingerprint features, ranging from optical to thermal to capacitive and ultrasound. Optical sensors offer a high confidence level for security-enabled applications such as immigration, but are too large to be successfully employed within small, thin handheld devices and, because of this, capacitive sensors have emerged as the current solution for mobile applications. With capacitive sensing, the placement of the finger on the display interface reads the ridges and valleys of the fingerprint to create the unique image. In addition to their highly capable function, capacitive sensors are also quite cost-effective, as they can be manufactured on a silicon wafer in high volume.

Today, there are two types of fingerprint sensor structures used in mobile applications: one in which the glass is attached directly to the sensor die and another design where the glass is replaced by a hard coating and positioned directly on top of the electronic mold compound that surrounds the sensor die. For each structure, there are multiple materials required to facilitate construction of the fingerprint sensor, including: die attach pastes or films, encapsulants,



electrically conductive adhesives, ring gap fillers, adhesives for bezel attach, underfill materials and the hard coating material. With a complete understanding of material interactions and requirements, Henkel has developed a comprehensive portfolio of products to address all of the demands of fingerprint sensor manufacture. Adhesives to attach the glass to the IC offer high adhesion, low temperature cure and thin bond line control for ever-decreasing form factors. Sensor die attach to FR4, ceramic or the PCB is enabled by Henkel’s high-performance die attach adhesives. Flip-chip die bonding and rigid substrate connection are made possible with LOCTITE® underfills that provide superior reinforcement protection, stress accommodation and high reliability for long-term performance. Robust encapsulants provide additional protection and low-stress solution to protect delicate wire bonds. Electrically conductive adhesives provide an excellent alternative to solder, and the ring attachment to the glass is enabled by Henkel’s ring gap filler. All of these materials combine to deliver a total solutions approach for fingerprint sensor manufacture – regardless of the type.



The fingerprint sensor market is exploding, with projections that it will balloon from 512 million units (with approximately 70% of the units in laptops) in 2013 to nearly 2.7 billion units in 2020, primarily driven by smartphones and tablets, which will account for over 50% of the units sold. (Source: IHS, O-S-D). Henkel’s current portfolio of materials for fingerprint sensors is in use at manufacturers worldwide and enabling today’s latest technology. We haven’t stopped there, however, and are already working on

the next innovation – ultrasonic fingerprint technology. In this dynamic market, experience counts and innovative vision is critical: Henkel provides both along with global manufacturing, R&D and support that are unmatched.

For more information on Henkel's fingerprint sensor technologies, visit [www.henkel.com/electronics](http://www.henkel.com/electronics), e-mail [raj.peddi@henkel.com](mailto:raj.peddi@henkel.com) or call +1-714-368-8000.