

ElectroSkin

ElectroSkin is Nanoleq's line of dry electrodes for smart textiles. ElectroSkin is the most reliable and convenient dry electrode in the market (Fig 1 and Fig 2), and the optimal solution for companies willing to differentiate themselves in their industry, whether this is MedTech, workwear, safety, or sports. ElectroSkin electrodes are built with a biocompatible silicone surface with optimal skin-electrode impedance which enables the highest signal quality and electrostimulation feeling in dry-state. Integration of textiles and electrical connections is fast and reliable thanks to a smart connection interface. Textile manufacturers can now easily form electrical connections, without electronics expertise and without the need for crimping or soldering.

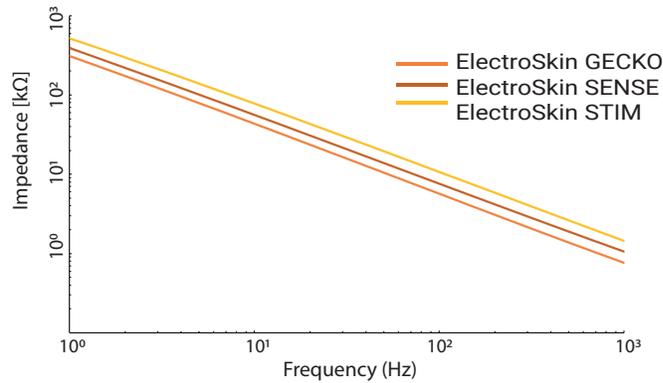
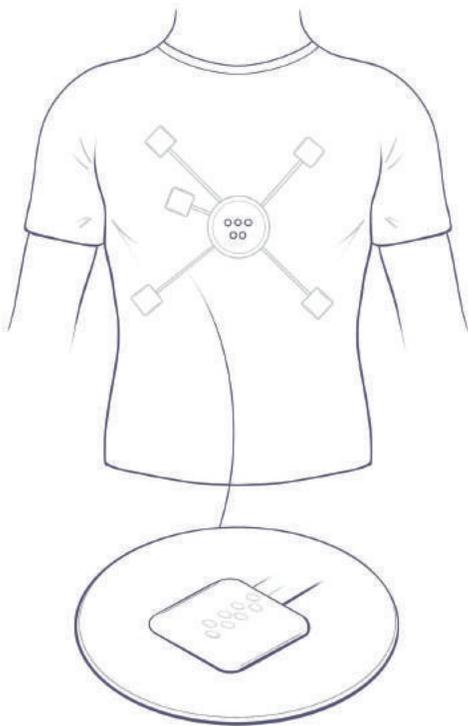


Fig 1. Skin-electrode impedance measurement of ElectroSkin electrodes over a wide range of frequency.

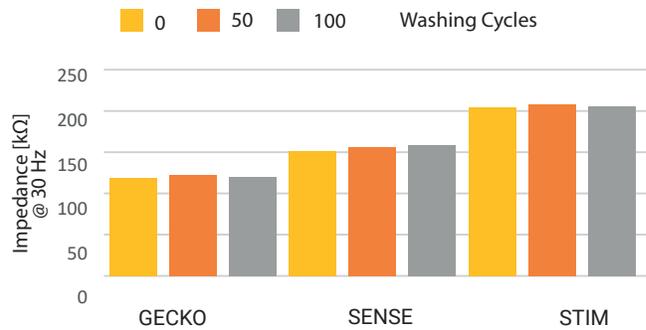


Fig 2. Effect of 0-50-100 washing cycles on the skin-electrode impedance of ElectroSkin STIM, SENSE and GECKO. Values obtained at 30 Hz. The effect of washing is negligible on the skin-electrode impedance.



High SNR



Light Weight



Stretchable



Washable



Easy to Laminate



Optimal Skin Adhesion

GECKO

Enhanced adhesion to the skin and ultra-low skin-electrode impedance. No need for compressed garments to achieve your goal. When it comes to biosignal monitoring or electrical stimulation, GECKO provides the best experience.

Sports

MedTech - Workwear - Wellbeing



SENSE

A high-quality dry electrode with low skin-electrode impedance. SENSE maximizes the signal quality in biosignal monitoring applications, without the need for wetting and after many times washing and wearing.

Sports - MedTech - Workwear - Wellbeing



STIM

A dry electrode optimized for electrical stimulation in the sports industry. Its skin-surface contact and elastic modulus, are optimal for comfortable electrostimulation on dry-state after many times washing and wearing.

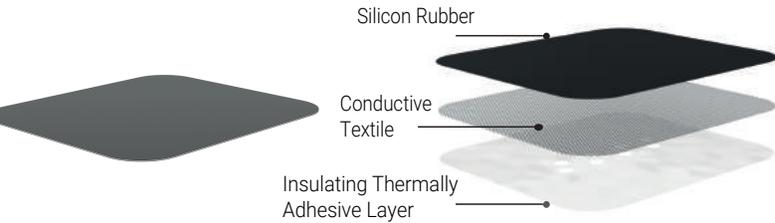
MedTech - Wellbeing - Sports



ElectroSkin SENSE

Electrode Structure

Our electrodes consist of a biocompatible silicon surface that interfaces with the skin, a conductive layer in the core, and a thermo-adhesive backside with a designated contact spot for electrical connections.



Simple Textile Integration

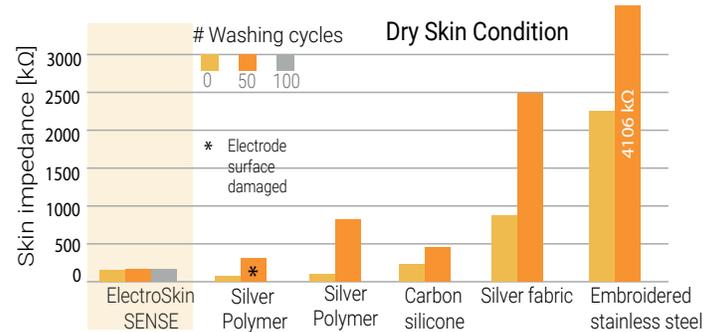
ElectroSkin electrodes contain a thermo-adhesive backing and can be hot-pressed to the garment in a single step. The electrical connection can be established easily and reliably, e.g. to magnetic or snap buttons, via Nanoleq's PhantomLink connection patch. For electrodes that are placed further away from the electronic module, we recommend textile wires and connectors from our PhantomTape product line for optimal durability.



Lamination temperature	130 - 150 °C
Lamination time	20 - 30 s
Electrical connection to: (instructions available)	PhantomTape X, PhantomLink, textile connectors.

Fully Washable Electrodes

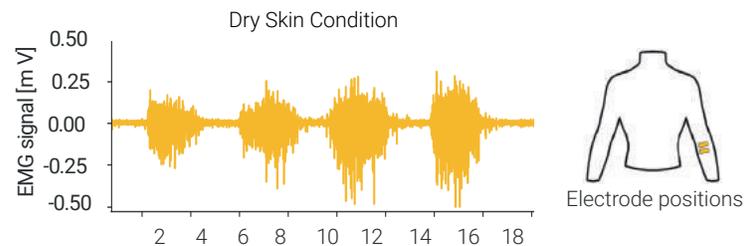
Garments using ElectroSkin SENSE can be washed without a noticeable loss of quality. In general, dry electrodes based on polymer coatings with silver, show a signal quality and stimulation feeling when worn the first time. However, this behavior changes dramatically with washing and wearing or, in the case of products with high silver load, the electrode surface simply does not survive the washing process. Likewise, silver-and steel-based fabrics and embroidery are a no-go for high-quality e-textiles due to their poor quality after washing and wearing. ElectroSkin SENSE consistently provides reliable skin-electrode impedance even after 100 washing cycles.



Impedance measurements at 30 Hz taken immediately after applying the electrodes, without wetting. Measurements are from a test person with average skin conductivity, no skin treatment, no sweat, on the forearm. Size of all electrodes: 4x4 cm. Washing method: Miele WT1, express program at 30 °C, Persil Color Gel liquid detergent, air drying.

High Signal Quality

Suitable for biosignal monitoring in applications that demand high signal quality in dry-state, due to physical activity and sweat levels. The following graph shows a typical unfiltered EMG signal obtained in a 2-electrode arrangement on the forearm, without wetting. The SNR is comparable to medical gel electrodes.



High Durability, Suitable for Long-Term Monitoring

ElectroSkin SENSE is resistant to sweat and prolonged wearing. The wearing test rules out additional potential damage sources like sebum on the skin, UV exposure, detergents, and creams, as well as repetitive friction.

Sweat test ISO 3160-2	passed
Change in skin impedance after 200 hours of continuous wearing	+/- 20 %

ElectroSkin Biocompatibility

ISO 10993-5:2009 (cytotoxicity)	passed
ISO 10993-10:2021 (skin sensitization)	passed
ISO 10993-23:2021 (skin irritation)	passed

Applications

