



Operational Description

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NeuroStrip is a body-worn, battery-powered device for reading physiological signals (e.g., surface electromyography [EMG]) and transmitting these readings via Bluetooth® Low Energy (BLE) to an off-the-shelf device (e.g., a Windows Surface Tablet) running an App from Control Bionics to receive the telemetry and present it to the user graphically or in some other format.

(The italicized terms in this document reference blocks in the NeuroStrip Block Diagram.)

The *Electrode Array* is composed of three plates, integral to the circuit board, that contact an electrode patch that adheres to the skin. The total weight of the NeuroStrip with the electrode patch is approximately 4 grams.

The *Analog Front End* (AFE) uses an instrumentation amplifier specifically designed to monitor physiological signals such as EMG. The NeuroStrip design allows for a bandpass range of 0.1Hz to 1,000Hz.

The *Analog Back End* (ABE) amplifies the physiological signal captured by the AFE and provides an integrated output to the *Processor* of NeuroStrip. In addition, the ABE provides the Processor with an amplified full-spectrum representation of the physiological signal captured by the AFE. This full-spectrum signal is optionally available via Bluetooth transmission to the App running on the off-the-shelf receiving device.

The power management section consists of a lithium-ion battery that is fed directly to the *Battery Management* section of the circuit. The 3.7 VDC nominal battery is charged via a USB-C 5.0 VDC connection interface between the Charger bay and the NeuroStrip.

The *Battery Management* section maintains battery health through automatic battery disconnect in the event of short-circuits or under/over voltage conditions.

In addition, the *Battery Management* output feeds a *3.0V LDO Regulator* to supply the operating voltage for the digital section of NeuroStrip, which is composed of the *Processor*, *Sensors*, *UI*, and *Bluetooth* modules.

The Battery Management output also feeds a 3.0 VDC regulator directly on the AFE/ABE module. This power supply for the AFE/ABE can be powered on and off programmatically through Processor control of the *Load Switch*.



The NeuroStrip *Processor* is built around a Nordic Semiconductor Arm® Cortex™-M4 CPU.

The *UI* consists of a green charging light administered by the Battery Management module, and a push button and RGB LED that interface directly to the Processor.

NeuroStrip *Bluetooth* functionality is enabled by a 2.4 GHz transceiver with –96 dBm sensitivity in Bluetooth Low Energy mode. Supported data rates are 1 Mbps (Bluetooth 4.2) and 2 Mbps (Bluetooth 5.0).

The *Sensors* module consists of an accelerometer with static and dynamic readings along the x, y, and z axes that are transmitted in the same telemetry as the physiological data.