Niraxx Smart Headband System Specification

Version 2.01

Version History

Version #	Author	Revision Date	Approval	Approval Date	Reason
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1. Product Description

1.1 The Niraxx Smart Headband includes unique wavelengths of near-infrared light to activate your brain's natural calming and regenerative processes (such as Reduce Stress, Improve Sleep, Increase Energy and more) by using IR LEDs (55 mW x 54 LEDs) integrated into a headband to penetrate the human dermis to promote blood circulation.

1.2 It has different treatment programs (Alpha, Gamma and Neutral) that can be selected by changing treatment parameters via the Niraxx Life App.

1.3 It can measure human heart rate and body temperature in real time.

1.4 It supports up to 20 treatment programs, which requires Niraxx Life App to support.

1.5 It uses the MCU Nordic nRF52832 RAM cortex –M4 64MHz 32bit processor BLE SOC.

1.6 It includes a Pod Module with Li-polymer battery to supply power for this system.

1.7 Pod Module connects to Niraxx Life App that will run on Android.

1.8 Pod Module can update its firmware via nRF Toolbox App that runs on iOS and Android.

2. Scope

This document contains general requirements for the electrical and mechanical elements. The App is detailed in a separate specification.

3. Materials

3.1 Pod Module: ABS (black)

3.2 Pod Module Cover: ABS (black)

3.3 Connection Terminal Top Housing: ABS (black)

3.4 Connection Terminal bottom Housing: PP (black)

3.5 Headband: Black 46% Polyester + 45% Nylon + 9% Spandex

4. Part Numbers

Pod Module	G1
Smart Headband	G1
USB Charge Cable	G1

5. Pod Module Electronics Characteristics

Working Voltage		5V±5%
Working Current Max		1500mA
Bluetooth Work Mode		BLE 4.0
Standby Current Max		<70μA
Charging Current		1000mA
Battery Charging Time		<2.5 hours
Battery Life (continuous working time)	Alpha (High – 10Hz)	Avg. 3600mW/1hour 40mins
	Gamma (High – 40Hz)	Avg. 5346mW/1hour 20mins
	Neutral (Low)	Avg. 2700mW/2hours
Treatment Temperature Max (on the forehead)		<41°C
IR LED Working Temperature Max		50°C
Temperature Accuracy		±1°C
Heart Rate Accuracy		±5
ESD Protect		5kv
BLE Communication Distance		10 ~ 15m

6. Battery Specification & Features

Mechanical Form Factor	50 x 40 x 8.5mm
Battery Type	Lithium polymer battery
Battery Capacity	3.7V DC, 2000mAh
Protection	Over current and short
Working Environment	-20°C ~ 60°C

7. Bluetooth Specification

7.1 Work Frequency: 2402Mhz ~ 2480Mhz
7.2 Transmit Power: -20 to +4dBm TX power, configurable in 4dB steps
7.3 Receive Sensitivity: -96dBm sensitivity in Bluetooth® low energy mode
7.4 Supported Data Rates: 1 Mbps, 2 Mbps Bluetooth® low energy mode
7.5 Working Temperature: -20°C ~ 60°C
7.6 Storage Temperature: -40°C ~ 85°C
7.7 Receive Current: 5.4mA peak current
7.8 Transmit Current: 5.3mA peak current in TX (0dBm)

8. Pod Module Operation & Features

8.1 POWER OFF State

8.1.1 The Pod Module default state is POWER OFF. Under this state, all the peripherals and functions for the system micro power consumption are closed.

8.2 POWER ON State

8.2.1 From the POWER OFF state, press and hold the module button for 3 seconds to power on the system. Once POWER ON, the system will perform the following functions:

a) Initialize and configure firmware

b) Start Bluetooth

c) Check if internal hardware, Bluetooth and Battery power are in normal working state or not. If working improperly, the system will enter into the WARNING state.

8.3 WAIT State

8.3.1 When the system powers on, it will automatically check if the system connects to App and the headband is worn successfully or not. If the headband is connected and is being worn, the system will enter into the HEADBAND STATUS UPDATE & TREATMENT MANAGEMENT State or else it will enter into WAIT state and then power off automatically in 2 minutes.

8.4 HEADBAND STATUS UPDATE & TREATMENT MANAGEMENT State

8.4.1 The system will enter into the HEADBAND STATUS UPDATE & TREATMENT MANAGEMENT State and perform the following functions after it connects to App:

a) Update the headband status every 100ms.

b) Send the headband status to the App via the BLE service every 500ms.

c) Receive the command from the App.

d) Control IR LED to perform the treatment.

8.4.2 The system will keep treatment running even though Pod Module is out of BLE range of the phone or the App is turned off during the treatment.

8.5 CHARGING State

8.5.1 The system will enter into CHARGING state when it connects with charge cable and power off automatically if disconnect the charge cable.

8.5.2 In CHARGING state, the system still can be power on and perform treatments.

8.6 SYSTEM HARDWARE RESET State

8.6.1 When a system error occurs, please press and hold the module button for 7 seconds to reset the system hardware (white LED will flash once and then power off).

9. LED Functions

Headband System State		LED Status
Power ON		Blue LED fast flash 0.2S on/off, fast flash twice
Power Off		Red LED fast flash 0.2S on/off, fast flash twice
Wait		Blue and Red LED alternately flash 0.5S on/off
Headband Status Update		Blue LED flash 0.3S on, 2S off
Treatment	Pause / Stop	White LED fade on/off
	Alpha setting	White LED 0.5S on, 5.5S off
	Gamma setting	White LED 0.5S on, 1S off
	Neutral setting	White LED always ON
Charging	Battery Level <33%	3 blue LEDs flash
	33%≤Battery Level<60%	1 blue LED on, 2 blue LEDs flash
	60%≤Battery Level<100%	2 blue LEDs on, 1 blue LED flash
	Battery Level=100%	3 blue LEDs on
System Hardware Reset		White LED fast flash once

10. System Drawing

FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.