

Evolv DNA 25

25 Watt Variable Power Module with Temperature Protection

The DNA 25 is a power regulated digital switch-mode DC-DC converter for personal vaporizers. It features Evolv's patented Wattage Control, Temperature Protection, Preheat, Step Up/Step Down Topology, Digital User Controls, OLED Screen, Onboard Buttons and Synchronous Rectification for maximum battery life and minimal heat generation. It is the most advanced personal vaporizer controller ever made.

Specifications			
	Minimum	Typical	Max
Output Power	1 Watt		25 Watts
Output Voltage	1 Volt		7.0 Volts
Output Current, continuous			10.0 Amps
Output Current, instantaneous peak			16.0 Amps
Atomizer Resistance, standard wire	.25 Ohm	.7 Ohm	2.0 Ohms
Atomizer Resistance, temperature sensing wire, cold	.15 Ohm	.4 Ohm	1.0 Ohm
Temperature Limit	200°F	450°F	600°F
Input Voltage	3.1 Volts	3.7 Volts	4.3 Volts
Input Current	.5 Amps	6.0 Amps	10.0 Amps
Screen On Current		25mA	
Quiescent Current		1 mA	
Power Down Current			5uA
Efficiency		92%	
Weight		6g	
Footprint		.65" x 1.30"	.80" x 1.30"
Thickness		.32"	
Screen size		.69" OLED	

Contents

Specifications	1
Temperature Protection	3
Preheat.....	3
Attaching a New Atomizer	4
Operation	5
Display.....	5
Temperature Protected	5
Non-temperature Protected	5
Modes	6
Error Messages	7
Auto power down	7
Pinout.....	8
Wiring.....	9
Recommended wire sizes	9
External component recommendations	10
Mounting.....	11
Mechanical Dimensions	12

Temperature Protection

The DNA 25 is the second power supply for electronic cigarettes to directly measure and limit the temperature of the heating coil during operation. By preventing the coil from becoming too hot regardless of fluid, wicking or airflow, a variety of undesirable situations can be prevented. For example, appropriate temperature settings will prevent the wicking material from charring, which compromises taste and introduces unintended chemicals into the vapor. Appropriate temperature settings will also reduce the breakdown of flavoring and base liquid components, which could impact taste or safety.

Evolv's Temperature Protection Technology requires a heating coil made from Nickel 200 alloy, rather than Nickel Chromium or Kanthal alloys. Nickel 200 is commercially pure nickel. It is often sold in vapor shops and online as "non-resistance wire." If the temperature reaches the maximum value, the wattage applied to the atomizer coil is reduced to prevent overheating. Please note that the temperature reading is the average temperature of the atomizer coil, and care should be taken to construct the heating coil so that the temperature is uniform, without hot or cold spots. Ensure that the coil does not short to itself.

Because wattage, not temperature controls vapor volume, large vapor volumes can be produced without unnecessarily high temperatures. Temperature Protection is most helpful if the atomizer begins to dry out, the user pauses during a puff, the beginning or end of the puff, or if the wattage setting is inappropriate for the attached atomizer.

In normal operation, when the device is not firing the maximum temperature setting is displayed on the screen. When the device is firing, the actual average temperature of the coil is displayed on the screen.

By default, the Temperature Protection setting is 450° Fahrenheit. To change the limit

- 1) Lock the device by pressing the Fire button five times.
- 2) Hold down the UP and DOWN adjust buttons for two seconds.
- 3) After two seconds, the maximum temperature will be displayed, and the UP and DOWN buttons should be released.
- 4) Use the UP and DOWN buttons to adjust the maximum temperature
- 5) When the display shows the desired maximum temperature, press the Fire button to exit temperature adjust mode.

The maximum temperature is adjustable between 200° Fahrenheit and 600° Fahrenheit. To disable the temperature protection entirely, adjust the limit up to 600 degrees, then press the UP button one additional time. The temperature limit will read OFF. This will also disable the prompt when a new atomizer is attached.

Preheat

When the DNA 25 is used with a temperature sensing atomizer, an additional feature called Preheat is activated. No vapor is produced when the temperature is below the boiling point of the liquid. Preheat applies extra power until the heating coil is up to operating temperature to shorten the

delay between pressing the fire button and generating vapor. Because the preheat is temperature based, it will not overheat or burn the vapor.

Attaching a New Atomizer

The DNA 25 uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature to the device. If a new atomizer is attached to the DNA 25 before it has cooled down, the temperature may read and protect incorrectly until the new atomizer cools.

When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 25 will prompt you to confirm this change. When you fire the first time, before activating the DNA 25 will prompt “New Coil? UP YES/DOWN NO”. When you see this prompt, if you have attached a new atomizer, press the UP button. If you have disconnected and reconnected the same atomizer, press the DOWN button.

For manufacturers outside the United States, the DNA 25 is available as a special order with Celsius units instead of Fahrenheit. Minimum quantities apply. Contact Evolv for details.

Operation

Basic operation of the DNA 25 is as follows. To wake the device from power off state, tap the Fire button. To generate vapor, press the Fire button. To change the wattage setting for more or less vapor, click or hold the Up and Down buttons.

Display

The DNA 25 has a small .69" diagonal blue OLED screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation. The normal and special operating modes shown on the display are discussed below. The DNA 25 will automatically detect whether a temperature sensing (Nickel 200) or standard (Kanthal etc) coil is attached.

Temperature Protected



Watt setting: The power level currently set on the DNA 25.

Battery indicator: The current state of charge of the battery.

Temperature display: When not firing, the maximum heating coil temperature setting. While firing, the actual temperature of the heating coil is displayed.

Ohms display: The resistance of the atomizer attached to the device. This is measured only when the unit is supplying power to the atomizer. At other times, it shows the most recent measurement.

Non-temperature Protected



Watt setting: The power level currently set on the DNA 25.

Battery indicator: The current state of charge of the battery.

Volts display: The output voltage being supplied to the atomizer.

Ohms display: The resistance of the atomizer attached to the device. This is measured only when the unit is supplying power to the atomizer. At other times, it shows the most recent measurement.

Modes

Locked mode: Pressing the fire button five times with less than .7 seconds between presses will cause the device to enter Locked mode. In Locked mode, the device will not fire and the output power will not adjust accidentally. While in Locked mode, the screen will be off, except that pressing a button will show “Locked, Click 5X”. To exit Locked mode, press the fire button 5 times.

Stealth mode: While locked, holding the fire and down buttons simultaneously for five seconds will switch to stealth mode. In this mode the display is off. It will still show error and lock messages. To switch back to normal display mode, hold down the fire and down buttons simultaneously for 5 seconds. This setting is stored to internal flash memory, and remains if power is removed.

Right Mode and Left Mode: While locked, holding the fire and up buttons simultaneously for 5 seconds flips the display. This allows for maximum flexibility in designing the mod, as well as accommodating left handed use. This setting is stored to internal flash memory, and remains if power is removed.

Power Locked mode: Holding down both the up and down buttons for two seconds will place the device in Power Locked mode. In this mode, the mod will operate normally, but you will not be able to change the power setting. This mode prevents accidental power level changes due to the buttons being pressed while in a pocket. To exit Power Locked mode, hold the up and down buttons for two seconds.

Max Temperature Adjust: From Locked Mode, holding down both the up and down buttons for two seconds will place the device in Max Temperature Adjust mode. Once this mode is entered, the max temperature will be displayed. The up and down buttons are used to adjust the max temperature. To save the new temperature setting and exit, press the Fire button.

Error Messages

The DNA 25 will indicate a variety of error states.

Check Atomizer: The DNA 25 does not detect an atomizer, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Shorted: The atomizer or wiring are short circuited.

Weak Battery: The battery needs to be charged, or a higher rate battery needs to be used. If this happens, the DNA 25 will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to flash for a few seconds after the end of puff.

Temperature Protection: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 25 will continue to fire, but will not be able to provide the desired wattage.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 25 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to flash for a few seconds after the end of puff.

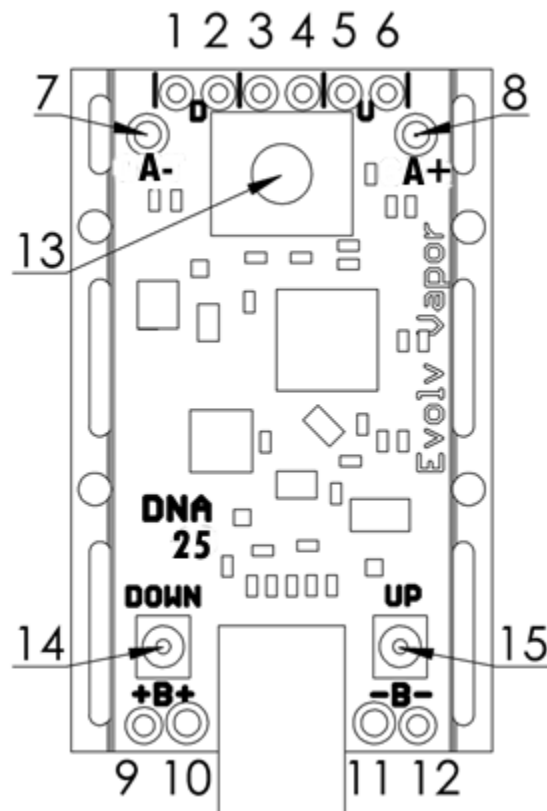
Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA 25 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to flash for a few seconds after the end of puff.

Too Hot: The DNA 25 has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

Auto power down

The screen will be at full brightness while firing. After 10 seconds with no button presses, the screen will dim. 30 seconds after the last button press, the screen will fade out and the device will go into sleep mode. To wake the device, press the fire button.

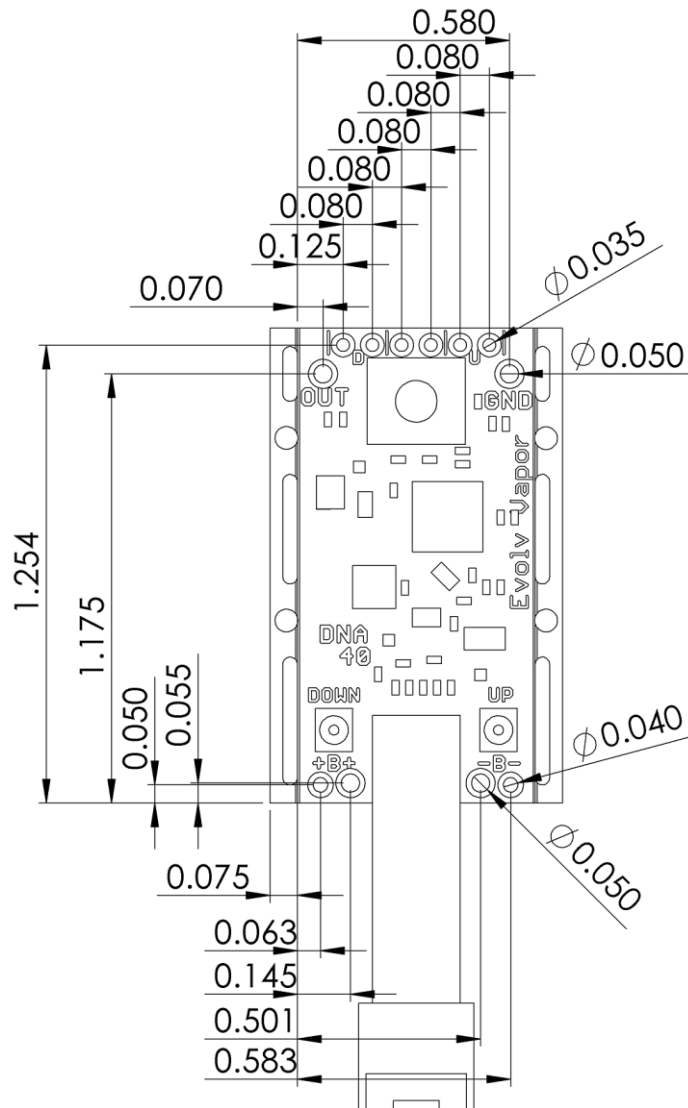
Pinout



Pin Number	Pin Name	Function
1	Down +	Positive side of the power down button.
2	Down -	Negative side of the power down switch. Does not connect to GND or B-
3	Fire +	Positive side of the fire button. Connects internally to B+
4	Fire-	Negative side of the fire button. Does not connect to GND or B-
5	Up-	Negative side of the power up button. Does not connect to GND or B-
6	Up+	Positive side of the power up button.
7	A-	Power output. Power output is a negative voltage. Connect to atomizer.
8	A+	Power output. A+ is the ground return for the atomizer. It is connected internally to B-.
9	B+	Positive battery terminal. Smaller terminal is for connecting a charger.
10	B+	Positive battery terminal. Larger terminal is the main power connection for the battery.
11	B-	Negative battery terminal. Larger terminal is the main power connection for the battery. It is connected internally to GND
12	B-	Negative battery terminal. Smaller terminal is for connecting a charger. It is connected internally to GND
13	FIRE	Onboard fire button
14	DOWN	Onboard power down button
15	UP	Onboard power up button

Wiring

The atomizer is connected to the OUT connection in the center, and the GND connection on the outside. The battery connects to the B+ and B- terminals. The optional remote charger also connects to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA. Too small wire will not perform well, and significantly undersized wire can burn out. High temperature insulation is preferred.



Recommended wire sizes

	Minimum size	Recommended size	Maximum size
Battery	22 gauge	20 gauge	18 gauge
Output	22 gauge	20 gauge	18 gauge
Charger, if used	26 gauge	24 gauge	20 gauge
Switches, if used	28 gauge	24 gauge	22 gauge

External component recommendations

The DNA 25 is a self-contained power regulator which does not require external components for its user interface. However, it does support the use of external interface components if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended.

Up/Down buttons:

The small onboard buttons labeled UP and DOWN allow the user to increase or decrease the power level in .1 Watt increments. The onboard tactile switches are waterproof and rated for 300,000 actuations. However, they are designed to always be used with external actuators, not pressed directly with the fingers. Please make sure the actuator presses down on the button only, and does not rotate or drag the top surface. Alternatively, remote normally open type switches or buttons can be attached to the UP and DOWN mounting holes for customization.

Battery:

A single cell rechargeable lithium chemistry battery is recommended. Either a lithium ion or a lithium polymer type can be used. Any battery used should be rated for a **MINIMUM** of 10 amps continuous discharge current. High C rated lithium polymer or IMR cylindrical cells are strongly preferred. Make sure that all contacts and connections are capable of handling at least 10 amps.

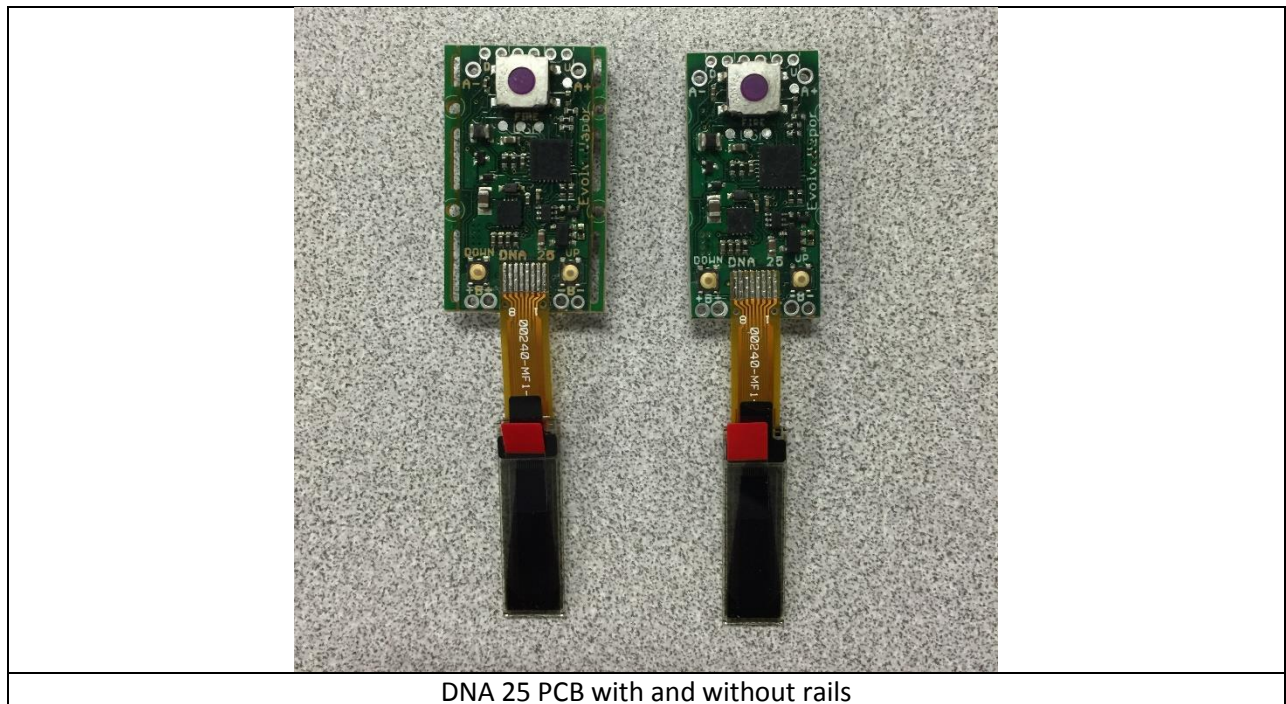
Charger:

Evolv offers an accessory DNA Charger which is USB powered and provides a 500 milliamp charge current. Other chargers can also be used. The use on an onboard charger is optional – a removable battery will also work.

Mounting

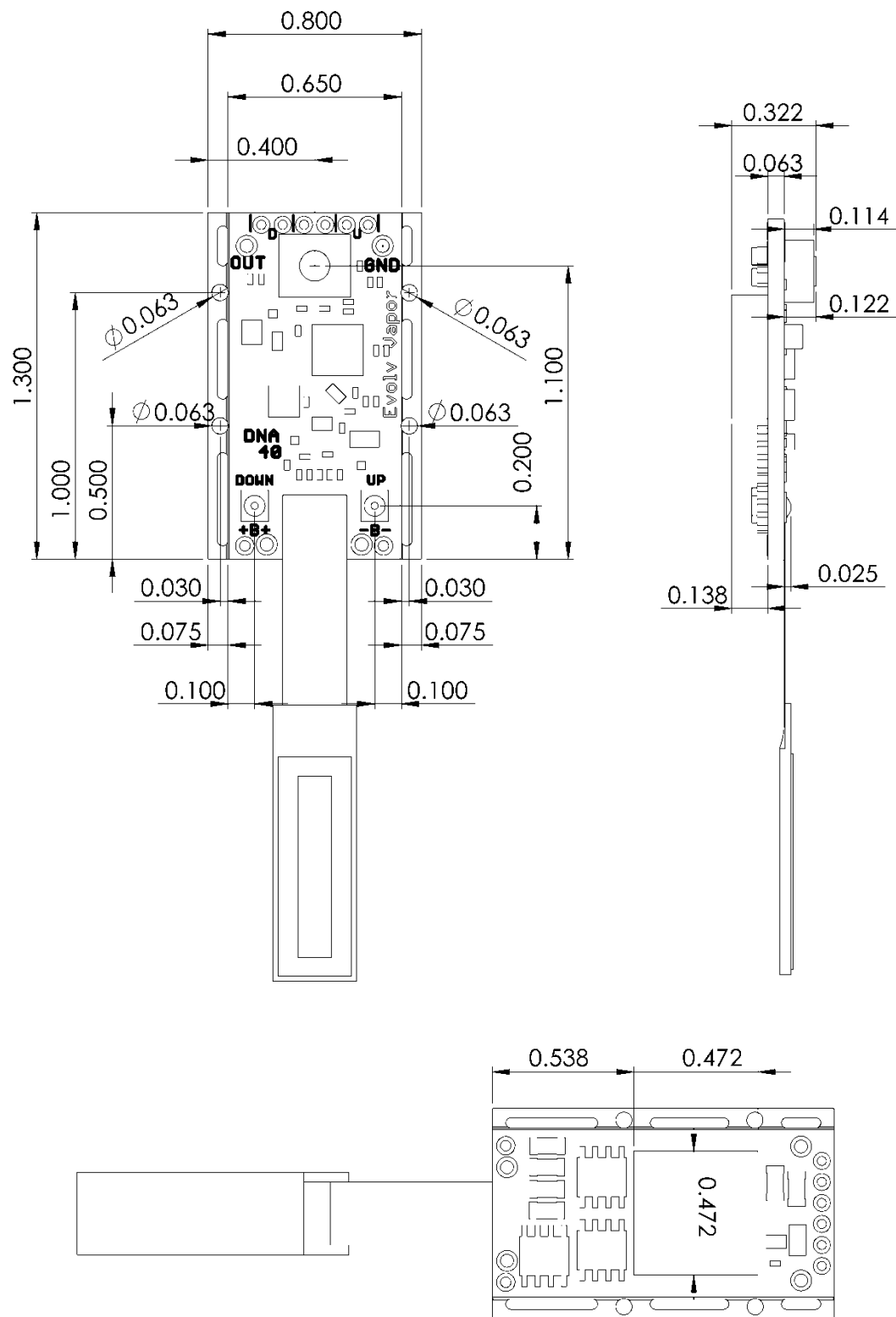
The DNA 25 has onboard switches for adjusting the power level and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

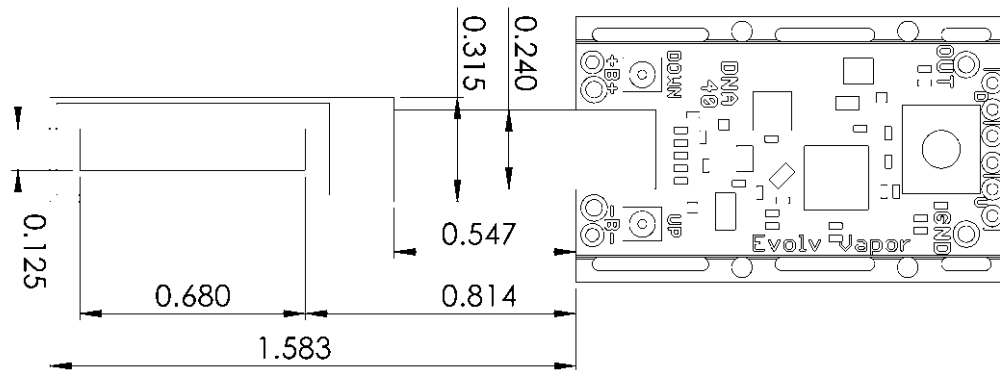
The DNA 25 features mounting rails. This allows the DNA 25 to be screwed, clamped or slotted into a device. The mounting rails are .075" wide and are removable. If the mounting rails are removed, the outline of the DNA 25 is identical to the DNA 30D and DNA 20. To remove the mounting rails, use sharp flush cutting clippers and trim the rail away one section at a time. A PCB de-paneling tool is ideal to remove the rails in volume production. Breaking the mounting rails off by bending could damage the board and should be avoided if possible.



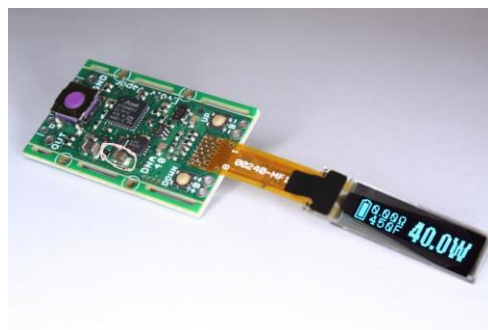
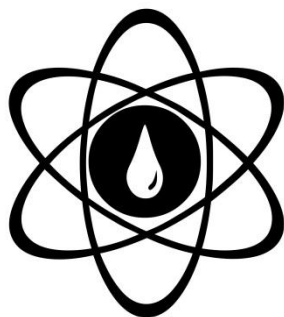
The mounting rails have .063" diameter holes drilled for mounting screws. #0 or M1.6 screws are recommended.

Mechanical Dimensions





Evolv has 3D models of the DNA 25 available on their website in IGES, STL and Solidworks format.



Evolv DNA 40

40 Watt Variable Power Module with Temperature Protection

The DNA 40 is a power regulated digital switch-mode DC-DC converter for personal vaporizers. It features Evolv's patented Wattage Control, Temperature Protection, Preheat, Step Up/Step Down Topology, Digital User Controls, OLED Screen, Onboard Buttons and Synchronous Rectification for maximum battery life and minimal heat generation. It is the most advanced personal vaporizer controller ever made.

Specifications			
	Minimum	Typical	Max
Output Power	1 Watt		40 Watts
Output Voltage	1 Volt		9.0 Volts
Output Current, continuous			16.0 Amps
Output Current, instantaneous peak			23.0 Amps
Atomizer Resistance, standard wire	.16 Ohm	.7 Ohm	2.0 Ohms
Atomizer Resistance, temperature sensing wire, cold	.10 Ohm	.4 Ohm	1.0 Ohm
Temperature Limit	200°F	450°F	600°F
Input Voltage	3.1 Volts	3.7 Volts	4.3 Volts
Input Current	.5 Amps	8.0 Amps	16.0 Amps
Screen On Current		25mA	
Quiescent Current		1 mA	
Power Down Current			5uA
Efficiency		92%	
Weight		6g	
Footprint		.65" x 1.30"	.80" x 1.30"
Thickness		.32"	
Screen size		.69" OLED	

Contents

Specifications	1
Temperature Protection	3
Preheat.....	3
Attaching a New Atomizer	4
Operation	5
Display.....	5
Temperature Protected	5
Non-temperature Protected	5
Modes	6
Error Messages	7
Auto power down	7
Pinout.....	8
Wiring.....	9
Recommended wire sizes	9
External component recommendations	10
Mounting.....	11
Mechanical Dimensions	12

Temperature Protection

The DNA 40 is the first power supply for electronic cigarettes to directly measure and limit the temperature of the heating coil during operation. By preventing the coil from becoming too hot regardless of fluid, wicking or airflow, a variety of undesirable situations can be prevented. For example, appropriate temperature settings will prevent the wicking material from charring, which compromises taste and introduces unintended chemicals into the vapor. Appropriate temperature settings will also reduce the breakdown of flavoring and base liquid components, which could impact taste or safety.

Evolv's Temperature Protection Technology requires a heating coil made from Nickel 200 alloy, rather than Nickel Chromium or Kanthal alloys. Nickel 200 is commercially pure nickel. It is often sold in vapor shops and online as "non-resistance wire." If the temperature reaches the maximum value, the wattage applied to the atomizer coil is reduced to prevent overheating. Please note that the temperature reading is the average temperature of the atomizer coil, and care should be taken to construct the heating coil so that the temperature is uniform, without hot or cold spots. Ensure that the coil does not short to itself.

Because wattage, not temperature controls vapor volume, large vapor volumes can be produced without unnecessarily high temperatures. Temperature Protection is most helpful if the atomizer begins to dry out, the user pauses during a puff, the beginning or end of the puff, or if the wattage setting is inappropriate for the attached atomizer.

In normal operation, when the device is not firing the maximum temperature setting is displayed on the screen. When the device is firing, the actual average temperature of the coil is displayed on the screen.

By default, the Temperature Protection setting is 450° Fahrenheit. To change the limit

- 1) Lock the device by pressing the Fire button five times.
- 2) Hold down the UP and DOWN adjust buttons for two seconds.
- 3) After two seconds, the maximum temperature will be displayed, and the UP and DOWN buttons should be released.
- 4) Use the UP and DOWN buttons to adjust the maximum temperature
- 5) When the display shows the desired maximum temperature, press the Fire button to exit temperature adjust mode.

The maximum temperature is adjustable between 200° Fahrenheit and 600° Fahrenheit. To disable the temperature protection entirely, adjust the limit up to 600 degrees, then press the UP button one additional time. The temperature limit will read OFF. This will also disable the prompt when a new atomizer is attached.

Preheat

When the DNA 40 is used with a temperature sensing atomizer, an additional feature called Preheat is activated. No vapor is produced when the temperature is below the boiling point of the liquid. Preheat applies extra power until the heating coil is up to operating temperature to shorten the

delay between pressing the fire button and generating vapor. Because the preheat is temperature based, it will not overheat or burn the vapor.

Attaching a New Atomizer

The DNA 40 uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature to the device. If a new atomizer is attached to the DNA 40 before it has cooled down, the temperature may read and protect incorrectly until the new atomizer cools.

When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 40 will prompt you to confirm this change. When you fire the first time, before activating the DNA 40 will prompt “New Coil? UP YES/DOWN NO”. When you see this prompt, if you have attached a new atomizer, press the UP button. If you have disconnected and reconnected the same atomizer, press the DOWN button.

For manufacturers outside the United States, the DNA 40 is available as a special order with Celsius units instead of Fahrenheit. Minimum quantities apply. Contact Evolv for details.

Operation

Basic operation of the DNA 40 is as follows. To wake the device from power off state, tap the Fire button. To generate vapor, press the Fire button. To change the wattage setting for more or less vapor, click or hold the Up and Down buttons.

Display

The DNA 40 has a small .69" diagonal blue OLED screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation. The normal and special operating modes shown on the display are discussed below. The DNA 40 will automatically detect whether a temperature sensing (Nickel 200) or standard (Kanthal etc) coil is attached.

Temperature Protected



Watt setting: The power level currently set on the DNA 40.

Battery indicator: The current state of charge of the battery.

Temperature display: When not firing, the maximum heating coil temperature setting. While firing, the actual temperature of the heating coil is displayed.

Ohms display: The resistance of the atomizer attached to the device. This is measured only when the unit is supplying power to the atomizer. At other times, it shows the most recent measurement.

Non-temperature Protected



Watt setting: The power level currently set on the DNA 40.

Battery indicator: The current state of charge of the battery.

Volts display: The output voltage being supplied to the atomizer.

Ohms display: The resistance of the atomizer attached to the device. This is measured only when the unit is supplying power to the atomizer. At other times, it shows the most recent measurement.

Modes

Locked mode: Pressing the fire button five times with less than .7 seconds between presses will cause the device to enter Locked mode. In Locked mode, the device will not fire and the output power will not adjust accidentally. While in Locked mode, the screen will be off, except that pressing a button will show “Locked, Click 5X”. To exit Locked mode, press the fire button 5 times.

Stealth mode: While locked, holding the fire and down buttons simultaneously for five seconds will switch to stealth mode. In this mode the display is off. It will still show error and lock messages. To switch back to normal display mode, hold down the fire and down buttons simultaneously for 5 seconds. This setting is stored to internal flash memory, and remains if power is removed.

Right Mode and Left Mode: While locked, holding the fire and up buttons simultaneously for 5 seconds flips the display. This allows for maximum flexibility in designing the mod, as well as accommodating left handed use. This setting is stored to internal flash memory, and remains if power is removed.

Power Locked mode: Holding down both the up and down buttons for two seconds will place the device in Power Locked mode. In this mode, the mod will operate normally, but you will not be able to change the power setting. This mode prevents accidental power level changes due to the buttons being pressed while in a pocket. To exit Power Locked mode, hold the up and down buttons for two seconds.

Max Temperature Adjust: From Locked Mode, holding down both the up and down buttons for two seconds will place the device in Max Temperature Adjust mode. Once this mode is entered, the max temperature will be displayed. The up and down buttons are used to adjust the max temperature. To save the new temperature setting and exit, press the Fire button.

To access the Celsius mode:

From Locked Mode, holding down both the up and down buttons for two seconds will place the device in Max Temperature Adjust mode. Once this mode is entered, the max temperature will be displayed. The up and down buttons are used to adjust the max temperature. To switch from Fahrenheit mode to Celsius mode, adjust the temperature down below 200F and the DNA 40 will display degrees in Celsius. Once in Celsius mode, use the same procedure to switch back to Fahrenheit.

Error Messages

The DNA 40 will indicate a variety of error states.

Check Atomizer: The DNA does not detect an atomizer, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Shorted: The atomizer or wiring are short circuited.

Weak Battery: The battery needs to be charged, or a higher rate battery needs to be used. If this happens, the DNA 40 will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to flash for a few seconds after the end of puff.

Temperature Protection: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 40 will continue to fire, but will not be able to provide the desired wattage.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 40 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to flash for a few seconds after the end of puff.

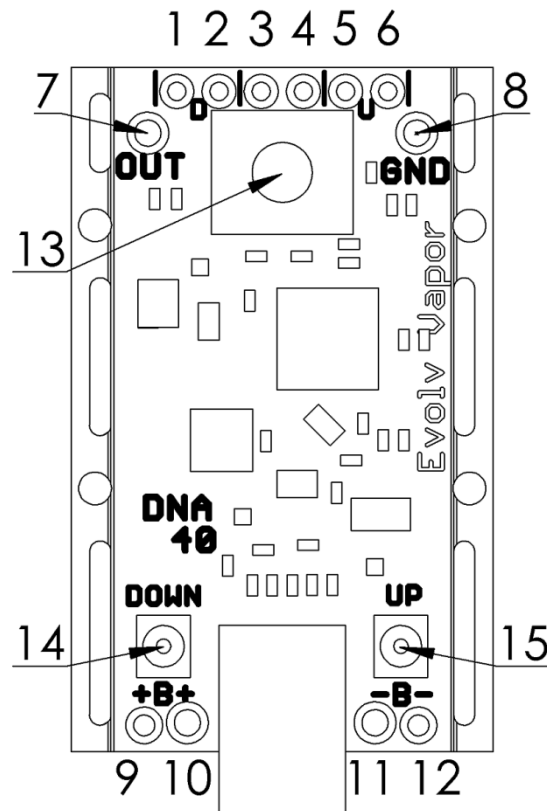
Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA 40 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to flash for a few seconds after the end of puff.

Too Hot: The DNA 40 has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

Auto power down

The screen will be at full brightness while firing. After 10 seconds with no button presses, the screen will dim. 30 seconds after the last button press, the screen will fade out and the device will go into sleep mode. To wake the device, press the fire button.

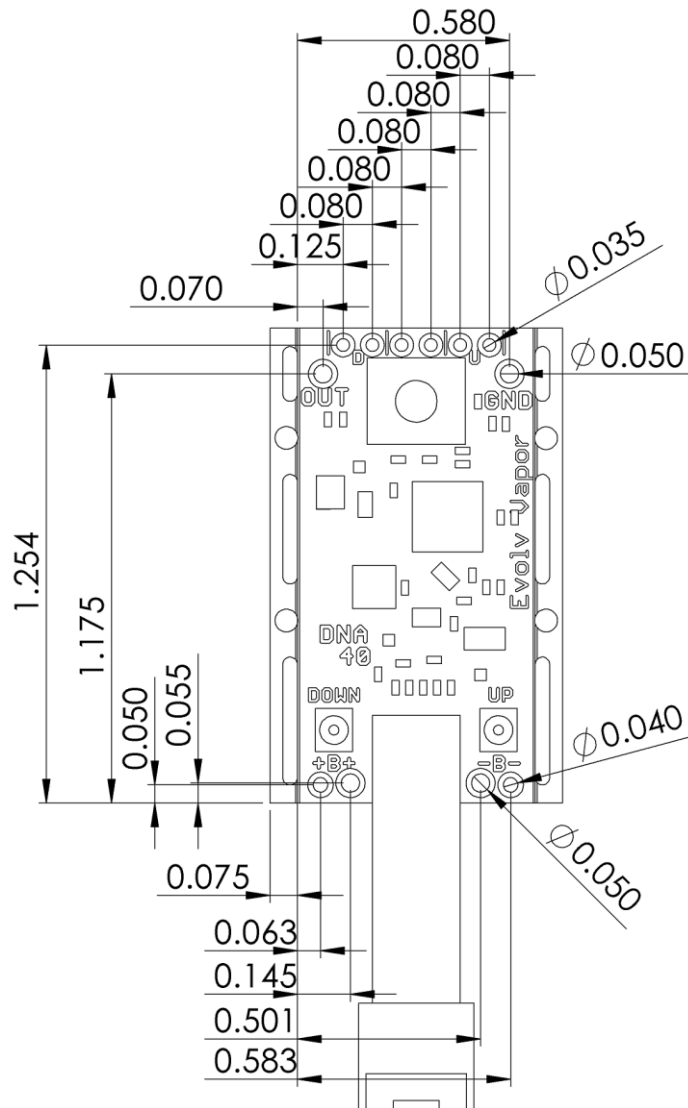
Pinout



Pin Number	Pin Name	Function
1	Down +	Positive side of the power down button.
2	Down -	Negative side of the power down switch. Does not connect to GND or B-
3	Fire +	Positive side of the fire button. Connects internally to B+
4	Fire-	Negative side of the fire button. Does not connect to GND or B-
5	Up-	Negative side of the power up button. Does not connect to GND or B-
6	Up+	Positive side of the power up button.
7	OUT	Power output. Power output is a negative voltage. Connect to atomizer.
8	GND	Power output. GND is the ground return for the atomizer. It is connected internally to B-.
9	B+	Positive battery terminal. Smaller terminal is for connecting a charger.
10	B+	Positive battery terminal. Larger terminal is the main power connection for the battery.
11	B-	Negative battery terminal. Larger terminal is the main power connection for the battery. It is connected internally to GND
12	B-	Negative battery terminal. Smaller terminal is for connecting a charger. It is connected internally to GND
13	FIRE	Onboard fire button
14	DOWN	Onboard power down button
15	UP	Onboard power up button

Wiring

The atomizer is connected to the OUT connection in the center, and the GND connection on the outside. The battery connects to the B+ and B- terminals. The optional remote charger also connects to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA. Too small wire will not perform well, and significantly undersized wire can burn out. High temperature insulation is preferred.



Recommended wire sizes			
	Minimum size	Recommended size	Maximum size
Battery	22 gauge	18 gauge	18 gauge
Output	22 gauge	18 gauge	18 gauge
Charger, if used	26 gauge	24 gauge	20 gauge
Switches, if used	28 gauge	24 gauge	22 gauge

External component recommendations

The DNA 40 is a self-contained power regulator which does not require external components for its user interface. However, it does support the use of external interface components if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended.

Up/Down buttons:

The small onboard buttons labeled UP and DOWN allow the user to increase or decrease the power level in .1 Watt increments. The onboard tactile switches are waterproof and rated for 300,000 actuations. However, they are designed to always be used with external actuators, not pressed directly with the fingers. Please make sure the actuator presses down on the button only, and does not rotate or drag the top surface. Alternatively, remote normally open type switches or buttons can be attached to the UP and DOWN mounting holes for customization.

Battery:

A single cell rechargeable lithium chemistry battery is recommended. Either a lithium ion or a lithium polymer type can be used. Any battery used should be rated for a **MINIMUM** of 16 amps continuous discharge current. High C rated lithium polymer or IMR cylindrical cells are strongly preferred. Make sure that all contacts and connections are capable of handling at least 16 amps.

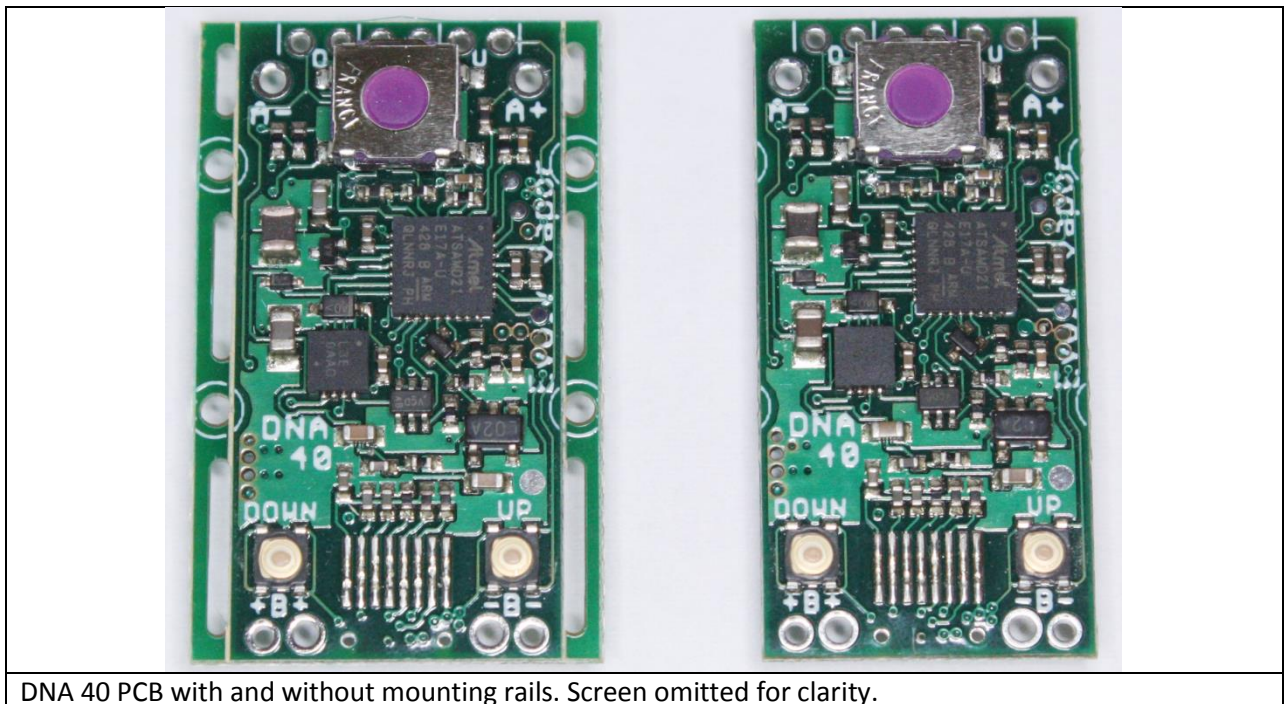
Charger:

Evolv offers an accessory DNA Charger which is USB powered and provides a 500 milliamp charge current. Other chargers can also be used. The use on an onboard charger is optional – a removable battery will also work.

Mounting

The DNA 40 has onboard switches for adjusting the power level and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

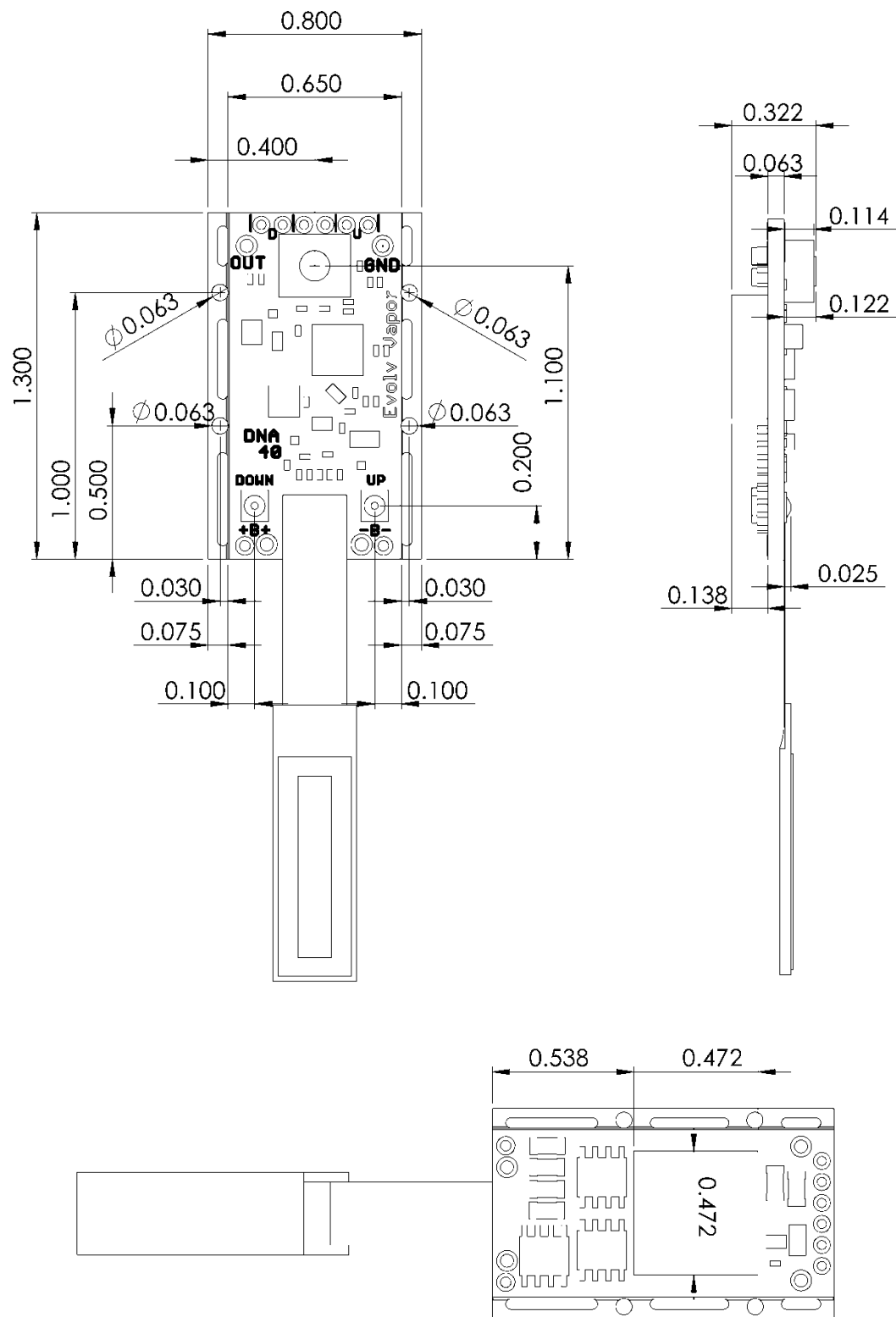
The DNA 40 features mounting rails. This allows the DNA 40 to be screwed, clamped or slotted into a device. The mounting rails are .075" wide and are removable. If the mounting rails are removed, the outline of the DNA 40 is identical to the DNA 30D and DNA 20. To remove the mounting rails, use sharp flush cutting clippers and trim the rail away one section at a time. A PCB de-paneling tool is ideal to remove the rails in volume production. Breaking the mounting rails off by bending could damage the board and should be avoided if possible.

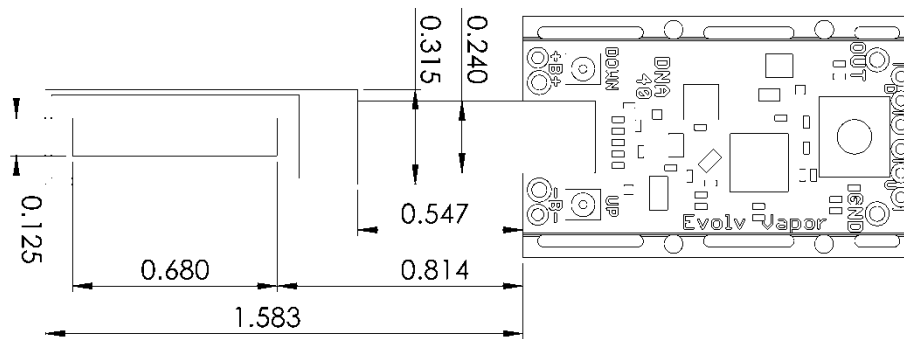


DNA 40 PCB with and without mounting rails. Screen omitted for clarity.

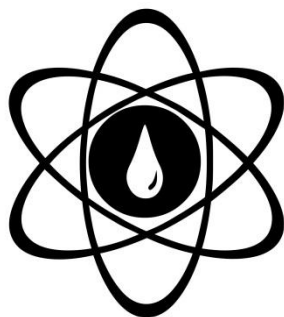
The mounting rails have .063" diameter holes drilled for mounting screws. #0 or M1.6 screws are recommended.

Mechanical Dimensions





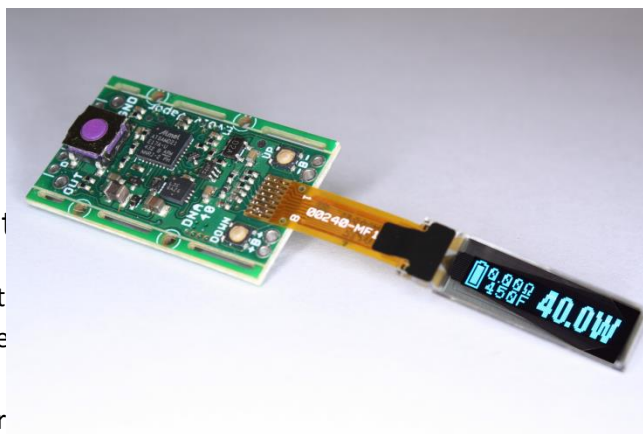
Evolv has 3D models of the DNA 40 available on their website in IGES, STL and Solidworks format.



Evolv DNA 40

40 Watt Variable Power Module with

The DNA 40 is a power regulated digital features Evolv's patented Wattage Control, Temperature Topology, Digital User Controls, OLED Screen, maximum battery life and minimal heat generation controller ever made.



rs. It

Specifications

	Minimum	Typical	Max
Output Power	1 Watt		40 Watts
Output Voltage	1 Volt		9.0 Volts
Output Current, continuous			16.0 Amps
Output Current, instantaneous peak			23.0 Amps
Atomizer Resistance, standard wire	.16 Ohm	.7 Ohm	2.0 Ohms
Atomizer Resistance, temperature sensing wire, cold	.10 Ohm	.4 Ohm	1.0 Ohm
Temperature Limit	200°F	450°F	600°F
Input Voltage	3.1 Volts	3.7 Volts	4.3 Volts
Input Current	.5 Amps	8.0 Amps	16.0 Amps
Screen On Current		25mA	
Quiescent Current		1 mA	
Power Down Current			5uA
Efficiency		92%	
Weight		6g	
Footprint		.65" x 1.30"	.80" x 1.30"
Thickness		.32"	
Screen size		.69" OLED	

Contents

Specifications	1
Temperature Protection	3
Preheat.....	3
Attaching a New Atomizer	4
Operation	5
Display.....	5
Temperature Protected	5
Non-temperature Protected	5
Modes	6
Error Messages	7
Auto power down	7
Pinout.....	8
Wiring.....	9
Recommended wire sizes	9
External component recommendations	10
Mounting.....	11
Mechanical Dimensions	12

Temperature Protection

The DNA 40 is the first power supply for electronic cigarettes to directly measure and limit the temperature of the heating coil during operation. By preventing the coil from becoming too hot regardless of fluid, wicking or airflow, a variety of undesirable situations can be prevented. For example, appropriate temperature settings will prevent the wicking material from charring, which compromises taste and introduces unintended chemicals into the vapor. Appropriate temperature settings will also reduce the breakdown of flavoring and base liquid components, which could impact taste or safety.

Evolv's Temperature Protection Technology requires a heating coil made from Nickel 200 alloy, rather than Nickel Chromium or Kanthal alloys. Nickel 200 is commercially pure nickel. It is often sold in vapor shops and online as "non-resistance wire." If the temperature reaches the maximum value, the wattage applied to the atomizer coil is reduced to prevent overheating. Please note that the temperature reading is the average temperature of the atomizer coil, and care should be taken to construct the heating coil so that the temperature is uniform, without hot or cold spots. Ensure that the coil does not short to itself.

Because wattage, not temperature controls vapor volume, large vapor volumes can be produced without unnecessarily high temperatures. Temperature Protection is most helpful if the atomizer begins to dry out, the user pauses during a puff, the beginning or end of the puff, or if the wattage setting is inappropriate for the attached atomizer.

In normal operation, when the device is not firing the maximum temperature setting is displayed on the screen. When the device is firing, the actual average temperature of the coil is displayed on the screen.

By default, the Temperature Protection setting is 450° Fahrenheit. To change the limit

- 1) Lock the device by pressing the Fire button five times.
- 2) Hold down the UP and DOWN adjust buttons for two seconds.
- 3) After two seconds, the maximum temperature will be displayed, and the UP and DOWN buttons should be released.
- 4) Use the UP and DOWN buttons to adjust the maximum temperature
- 5) When the display shows the desired maximum temperature, press the Fire button to exit temperature adjust mode.

The maximum temperature is adjustable between 200° Fahrenheit and 600° Fahrenheit. To disable the temperature protection entirely, adjust the limit up to 600 degrees, then press the UP button one additional time. The temperature limit will read OFF. This will also disable the prompt when a new atomizer is attached.

Preheat

When the DNA 40 is used with a temperature sensing atomizer, an additional feature called Preheat is activated. No vapor is produced when the temperature is below the boiling point of the liquid. Preheat applies extra power until the heating coil is up to operating temperature to shorten the

delay between pressing the fire button and generating vapor. Because the preheat is temperature based, it will not overheat or burn the vapor.

Attaching a New Atomizer

The DNA 40 uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature to the device. If a new atomizer is attached to the DNA 40 before it has cooled down, the temperature may read and protect incorrectly until the new atomizer cools.

When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 40 will prompt you to confirm this change. When you fire the first time, before activating the DNA 40 will prompt “New Coil? UP YES/DOWN NO”. When you see this prompt, if you have attached a new atomizer, press the UP button. If you have disconnected and reconnected the same atomizer, press the DOWN button.

For manufacturers outside the United States, the DNA 40 is available as a special order with Celsius units instead of Fahrenheit. Minimum quantities apply. Contact Evolv for details.

Operation

Basic operation of the DNA 40 is as follows. To wake the device from power off state, tap the Fire button. To generate vapor, press the Fire button. To change the wattage setting for more or less vapor, click or hold the Up and Down buttons.

Display

The DNA 40 has a small .69" diagonal blue OLED screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation. The normal and special operating modes shown on the display are discussed below. The DNA 40 will automatically detect whether a temperature sensing (Nickel 200) or standard (Kanthal etc) coil is attached.

Temperature Protected



Watt setting: The power level currently set on the DNA 40.

Battery indicator: The current state of charge of the battery.

Temperature display: When not firing, the maximum heating coil temperature setting. While firing, the actual temperature of the heating coil is displayed.

Ohms display: The resistance of the atomizer attached to the device. This is measured only when the unit is supplying power to the atomizer. At other times, it shows the most recent measurement.

Non-temperature Protected



Watt setting: The power level currently set on the DNA 40.

Battery indicator: The current state of charge of the battery.

Volts display: The output voltage being supplied to the atomizer.

Ohms display: The resistance of the atomizer attached to the device. This is measured only when the unit is supplying power to the atomizer. At other times, it shows the most recent measurement.

Modes

Locked mode: Pressing the fire button five times with less than .7 seconds between presses will cause the device to enter Locked mode. In Locked mode, the device will not fire and the output power will not adjust accidentally. While in Locked mode, the screen will be off, except that pressing a button will show “Locked, Click 5X”. To exit Locked mode, press the fire button 5 times.

Stealth mode: While locked, holding the fire and down buttons simultaneously for five seconds will switch to stealth mode. In this mode the display is off. It will still show error and lock messages. To switch back to normal display mode, hold down the fire and down buttons simultaneously for 5 seconds. This setting is stored to internal flash memory, and remains if power is removed.

Right Mode and Left Mode: While locked, holding the fire and up buttons simultaneously for 5 seconds flips the display. This allows for maximum flexibility in designing the mod, as well as accommodating left handed use. This setting is stored to internal flash memory, and remains if power is removed.

Power Locked mode: Holding down both the up and down buttons for two seconds will place the device in Power Locked mode. In this mode, the mod will operate normally, but you will not be able to change the power setting. This mode prevents accidental power level changes due to the buttons being pressed while in a pocket. To exit Power Locked mode, hold the up and down buttons for two seconds.

Max Temperature Adjust: From Locked Mode, holding down both the up and down buttons for two seconds will place the device in Max Temperature Adjust mode. Once this mode is entered, the max temperature will be displayed. The up and down buttons are used to adjust the max temperature. To save the new temperature setting and exit, press the Fire button.

Error Messages

The DNA 40 will indicate a variety of error states.

Check Atomizer: The DNA does not detect an atomizer, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Shorted: The atomizer or wiring are short circuited.

Weak Battery: The battery needs to be charged, or a higher rate battery needs to be used. If this happens, the DNA 40 will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to flash for a few seconds after the end of puff.

Temperature Protection: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 40 will continue to fire, but will not be able to provide the desired wattage.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 40 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to flash for a few seconds after the end of puff.

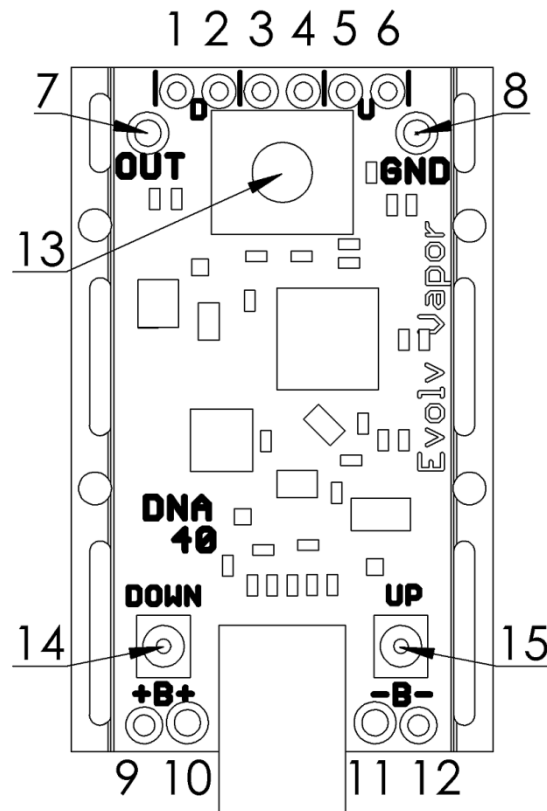
Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA 40 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to flash for a few seconds after the end of puff.

Too Hot: The DNA 40 has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

Auto power down

The screen will be at full brightness while firing. After 10 seconds with no button presses, the screen will dim. 30 seconds after the last button press, the screen will fade out and the device will go into sleep mode. To wake the device, press the fire button.

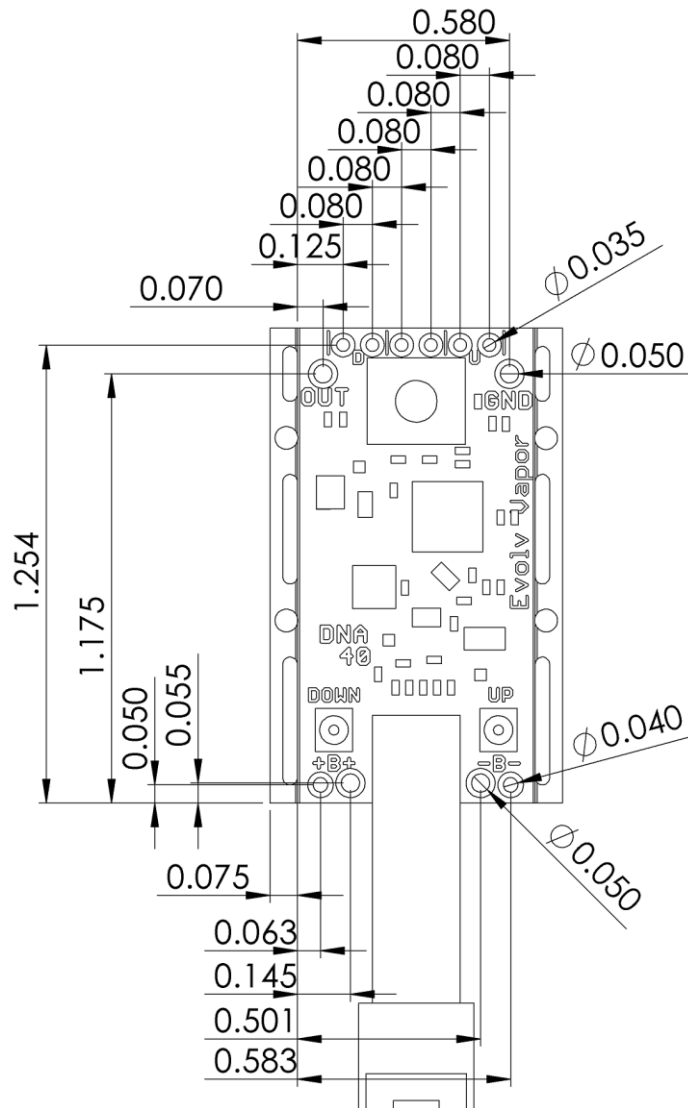
Pinout



Pin Number	Pin Name	Function
1	Down +	Positive side of the power down button.
2	Down -	Negative side of the power down switch. Does not connect to GND or B-
3	Fire +	Positive side of the fire button. Connects internally to B+
4	Fire-	Negative side of the fire button. Does not connect to GND or B-
5	Up-	Negative side of the power up button. Does not connect to GND or B-
6	Up+	Positive side of the power up button.
7	OUT	Power output. Power output is a negative voltage. Connect to atomizer.
8	GND	Power output. GND is the ground return for the atomizer. It is connected internally to B-.
9	B+	Positive battery terminal. Smaller terminal is for connecting a charger.
10	B+	Positive battery terminal. Larger terminal is the main power connection for the battery.
11	B-	Negative battery terminal. Larger terminal is the main power connection for the battery. It is connected internally to GND
12	B-	Negative battery terminal. Smaller terminal is for connecting a charger. It is connected internally to GND
13	FIRE	Onboard fire button
14	DOWN	Onboard power down button
15	UP	Onboard power up button

Wiring

The atomizer is connected to the OUT connection in the center, and the GND connection on the outside. The battery connects to the B+ and B- terminals. The optional remote charger also connects to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA. Too small wire will not perform well, and significantly undersized wire can burn out. High temperature insulation is preferred.



Recommended wire sizes			
	Minimum size	Recommended size	Maximum size
Battery	22 gauge	18 gauge	18 gauge
Output	22 gauge	18 gauge	18 gauge
Charger, if used	26 gauge	24 gauge	20 gauge
Switches, if used	28 gauge	24 gauge	22 gauge

External component recommendations

The DNA 40 is a self-contained power regulator which does not require external components for its user interface. However, it does support the use of external interface components if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended.

Up/Down buttons:

The small onboard buttons labeled UP and DOWN allow the user to increase or decrease the power level in .1 Watt increments. The onboard tactile switches are waterproof and rated for 300,000 actuations. However, they are designed to always be used with external actuators, not pressed directly with the fingers. Please make sure the actuator presses down on the button only, and does not rotate or drag the top surface. Alternatively, remote normally open type switches or buttons can be attached to the UP and DOWN mounting holes for customization.

Battery:

A single cell rechargeable lithium chemistry battery is recommended. Either a lithium ion or a lithium polymer type can be used. Any battery used should be rated for a **MINIMUM** of 16 amps continuous discharge current. High C rated lithium polymer or IMR cylindrical cells are strongly preferred. Make sure that all contacts and connections are capable of handling at least 16 amps.

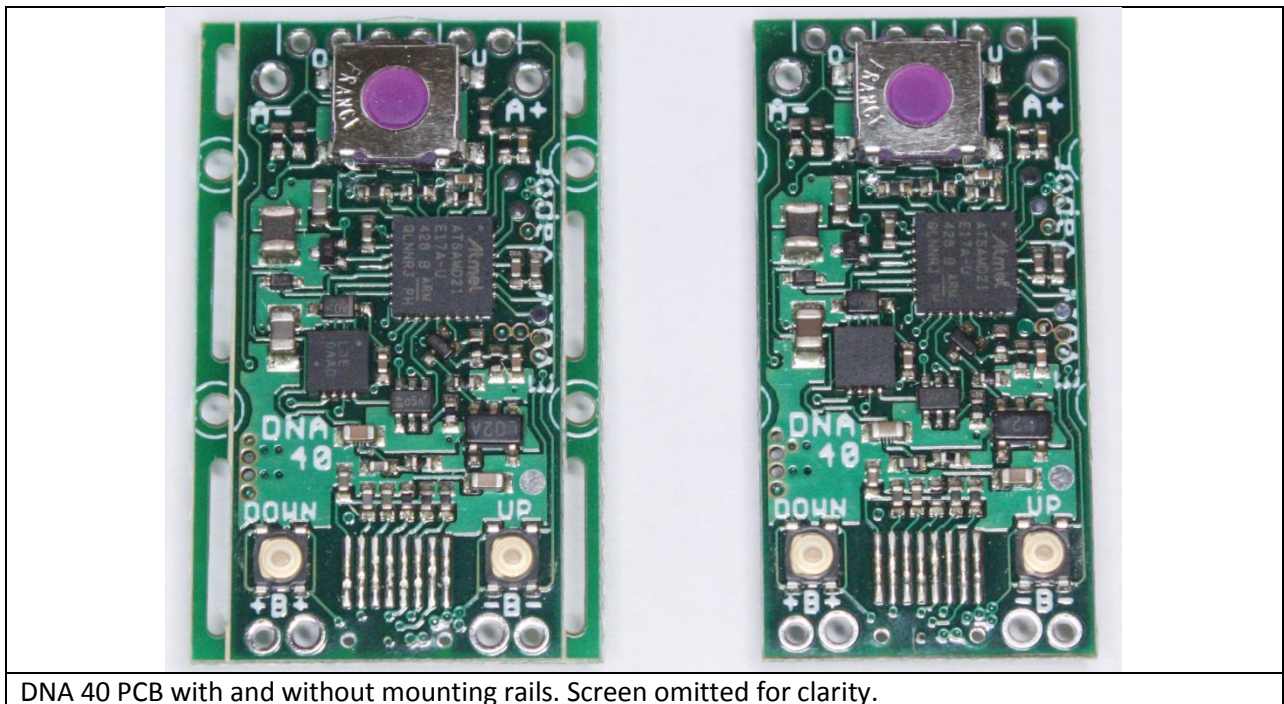
Charger:

Evolv offers an accessory DNA Charger which is USB powered and provides a 500 milliamp charge current. Other chargers can also be used. The use on an onboard charger is optional – a removable battery will also work.

Mounting

The DNA 40 has onboard switches for adjusting the power level and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

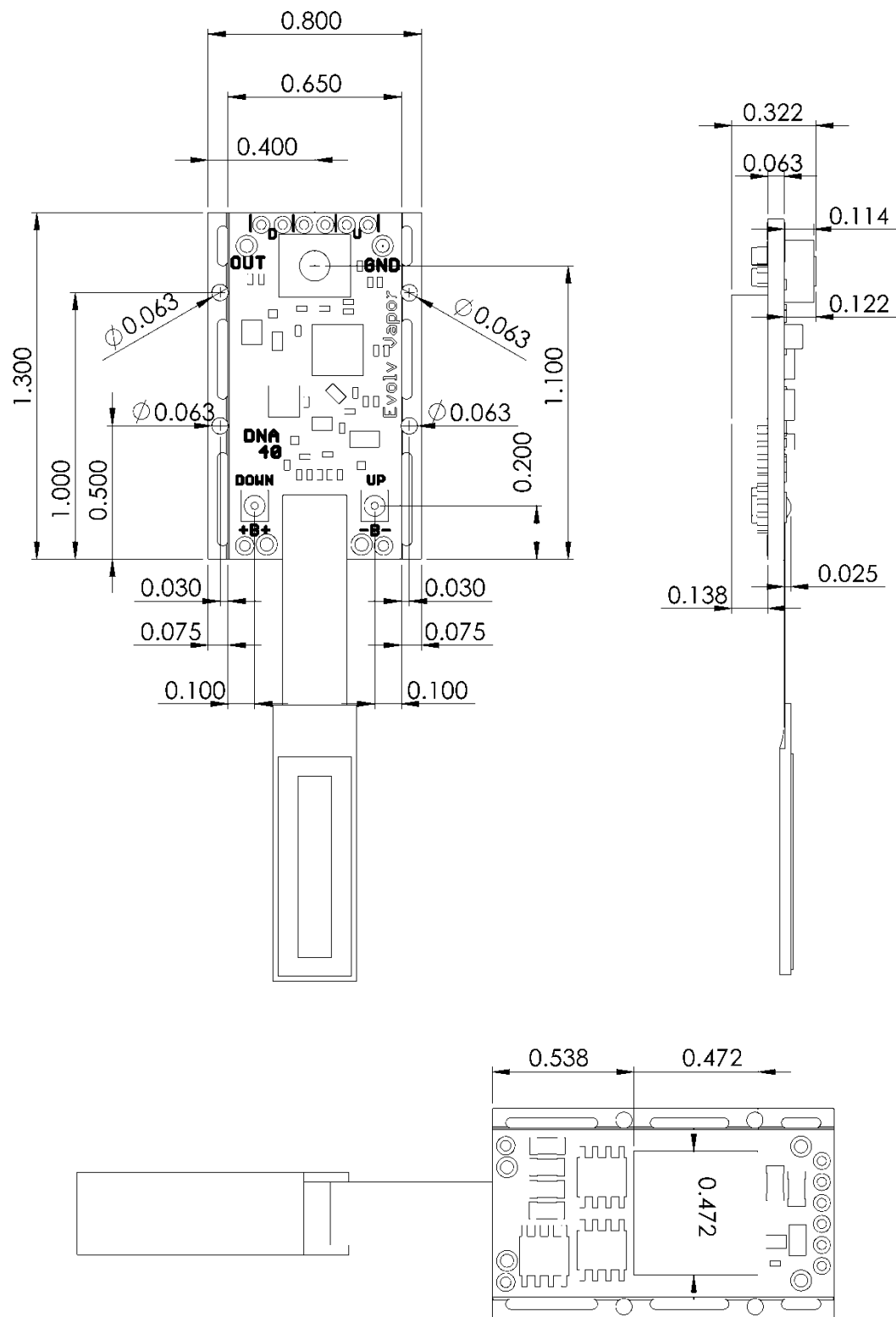
The DNA 40 features mounting rails. This allows the DNA 40 to be screwed, clamped or slotted into a device. The mounting rails are .075" wide and are removable. If the mounting rails are removed, the outline of the DNA 40 is identical to the DNA 30D and DNA 20. To remove the mounting rails, use sharp flush cutting clippers and trim the rail away one section at a time. A PCB de-paneling tool is ideal to remove the rails in volume production. Breaking the mounting rails off by bending could damage the board and should be avoided if possible.

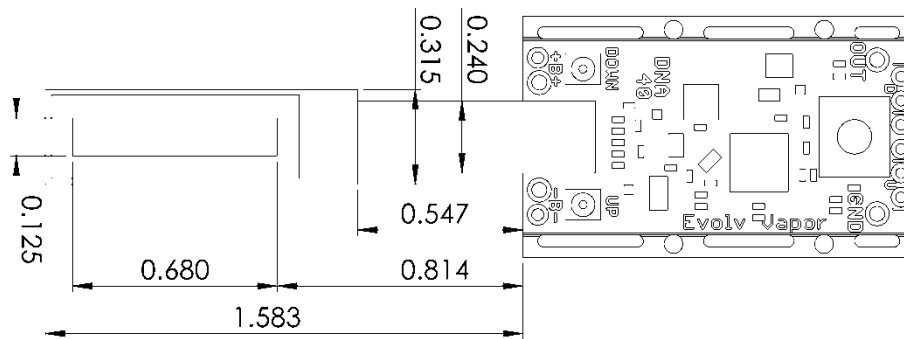


DNA 40 PCB with and without mounting rails. Screen omitted for clarity.

The mounting rails have .063" diameter holes drilled for mounting screws. #0 or M1.6 screws are recommended.

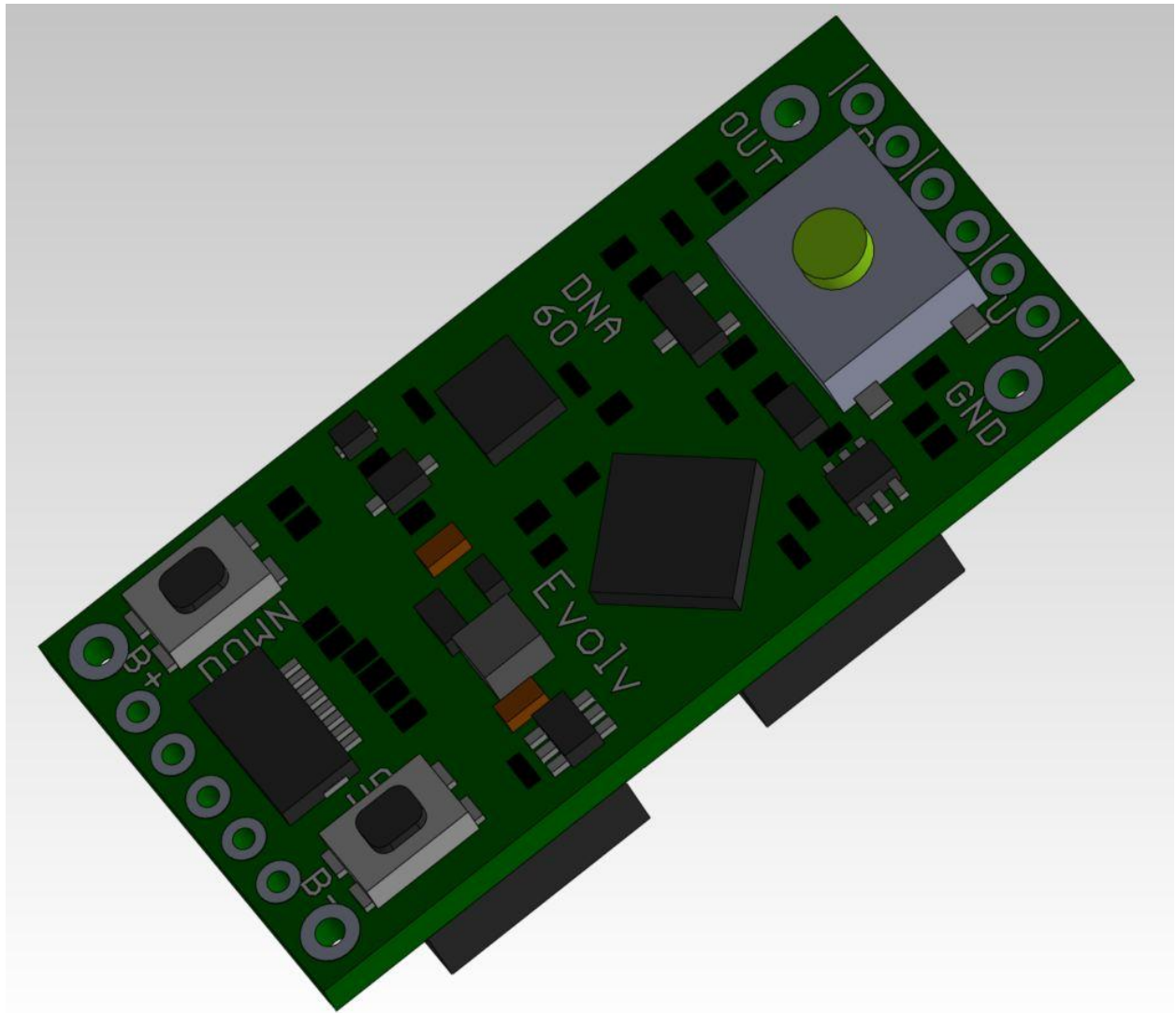
Mechanical Dimensions





Evolv has 3D models of the DNA 40 available on their website in IGES, STL and Solidworks format.

Evolv DNA 60



60 Watt Variable Power Module with Temperature Protection and USB

The DNA 60 is a power regulated digital switch-mode DC-DC converter for personal vaporizers. It features Evolv's patented Wattage Control, Temperature Protection, Preheat, OLED Screen, Reverse Polarity Protection, and waterproof onboard buttons. The DNA 60 runs from a single lithium polymer or lithium ion battery, and features battery monitoring. A Micro USB satellite board for 1 Amp charging and data connection to customize or monitor the user experience via EWrite is also available separately.

Specifications

	Minimum	Typical	Max
Output Power	1 Watt		60 Watts
Output Voltage	.2 Volt		9 Volts
Output Current, continuous			22.0 Amps
Output Current, instantaneous peak			
Atomizer Resistance, temperature sensing wire, cold	See Graph	.15 Ohm	See Graph
Atomizer Resistance, Kanthal wire	See Graph	.25 Ohm	See Graph
Temperature Limit	200°F	450°F	600°F
Input Voltage	3.0 Volts	3.7 Volts	4.2 Volts
Input Current	.5 Amps	12.0 Amps	25.0 Amps
Input Current, pulse			32.0 Amps
Screen On Current		26mA	
Quiescent Current		7mA	
Power Down Current		0mA	
Efficiency		85%	
Weight		15g	
Footprint		.65" x 1.30"	
Thickness		.35"	
Screen size		.91" OLED	

Contents

Specifications	2
Temperature Protection	4
Preheat.....	4
Attaching a New Atomizer	5
Output Power.....	5
Operation	6
Display.....	6
Alternate display items	6
Modes	7
Profiles	8
Coil Materials	8
Error Messages	9
Auto power down	9
Charger.....	10
Battery monitoring.....	10
Escribe.....	10
Pinout (shown bottom side)	11
Wiring.....	13
Recommended wire sizes	13
Reverse Polarity Protection	13
External component recommendations	13
Mounting.....	14
Mechanical Dimensions	15

Temperature Protection

The DNA 60 directly measures and limits the temperature of the heating coil during operation. By preventing the coil from becoming too hot regardless of fluid, wicking or airflow, a variety of undesirable situations can be prevented. For example, appropriate temperature settings will prevent the wicking material from charring, which compromises taste and introduces unintended chemicals into the vapor. Appropriate temperature settings will also reduce the breakdown of flavoring and base liquid components, which could impact taste or safety.

Evolv's Temperature Protection Technology requires a heating coil made from Nickel 200 alloy or other materials with a well-defined temperature coefficient of resistance, rather than Nickel Chromium or Kanthal alloys. If the temperature reaches the maximum value, the wattage applied to the atomizer coil is reduced to prevent overheating. Please note that the temperature reading is the average temperature of the atomizer coil, and care should be taken to construct the heating coil so that the temperature is uniform, without hot or cold spots.

Because wattage, not temperature controls vapor volume, large vapor volumes can be produced without unnecessarily high temperatures. Temperature Protection is most helpful if the atomizer begins to dry out, the user pauses during a puff, the beginning or end of the puff, or if the wattage setting is inappropriate for the attached atomizer.

In normal operation, when the device is not firing the maximum temperature setting is displayed on the screen. When the device is firing, the actual average temperature of the coil is displayed on the screen.

By default, the Temperature Protection setting is 450° Fahrenheit. To change the limit

- 1) Lock the device by pressing the Fire button five times.
- 2) Hold down the UP and DOWN adjust buttons for two seconds.
- 3) After two seconds, the maximum temperature will be displayed, and the UP and DOWN buttons should be released.
- 4) Use the UP and DOWN buttons to adjust the maximum temperature
- 5) When the display shows the desired maximum temperature, press the Fire button to exit temperature adjust mode.

The maximum temperature is adjustable between 200° Fahrenheit and 600° Fahrenheit. To disable the temperature protection entirely, adjust the limit up to 600 degrees, then press the UP button one additional time. The temperature limit will read OFF.

To switch to Celsius temperature, adjust temperature down to 200° Fahrenheit, then press the DOWN button one additional time. The temperature will switch to reading and adjusting in Celsius.

Preheat

When the DNA 60 is used with a temperature sensing atomizer, an additional feature called Preheat is activated. No vapor is produced when the temperature is below the boiling point of the liquid. Preheat applies extra power until the heating coil is up to operating temperature to shorten the

delay between pressing the fire button and generating vapor. Because preheat is temperature based, it will not overheat or burn the vapor.

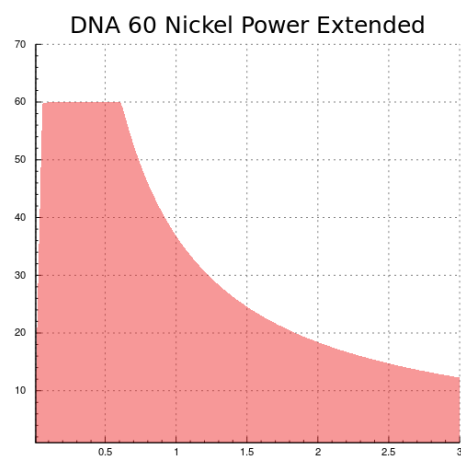
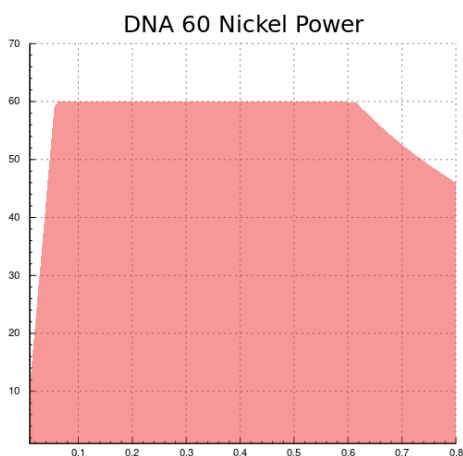
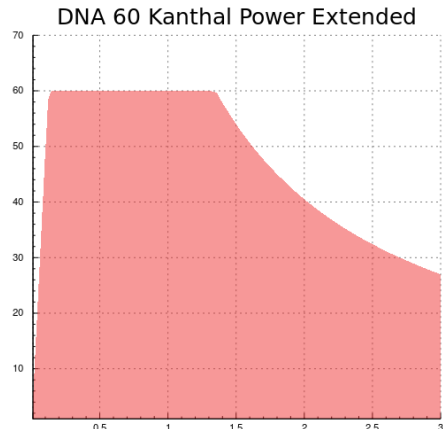
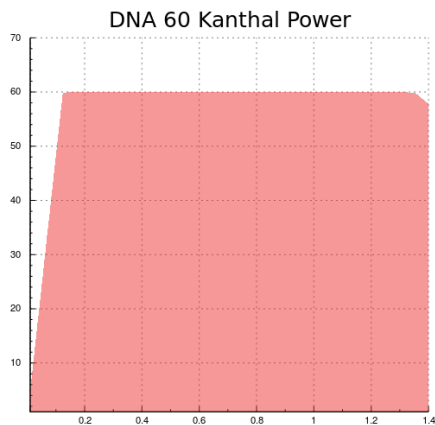
Attaching a New Atomizer

The DNA 60 uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature. If a new atomizer is attached to the DNA 60 before it has cooled down, the temperature may read and protect incorrectly until the new atomizer cools.

When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 60 will prompt you to confirm this change. When you fire the first time, before activating the DNA 60 will prompt “New Coil? UP YES/DOWN NO”. When you see this prompt, if you have attached a new atomizer, press the UP button. If you have disconnected and reconnected the same atomizer, press the DOWN button.

Output Power

The following graphs show the output power range of the DNA 60 as a function of the coil resistance.



Operation

Basic operation of the DNA 60 is as follows. To wake the device from power off state, tap the Fire button. To generate vapor, press the Fire button. To change the wattage setting for more or less vapor, click or hold the Up and Down buttons.

Display

The DNA 60 has a small .91" diagonal OLED screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. The screen's default position is on top of the board, between the fire and adjust buttons. This allows for easy assembly. The screen connects to the board with a ZIF connector, so alternate placement is possible. It is also possible to order screens with custom length and shape flexible cables, allowing screen placement anywhere in the device. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation.

Watt setting: The power level currently set on the DNA 60.

Battery indicator: The current state of charge of the battery.

Temperature display: When not firing, the maximum heating coil temperature setting. While firing, the actual temperature of the heating coil is displayed.

Volts display: The output voltage being supplied to the atomizer.

Ohms display: The resistance of the atomizer attached to the device. When using a temperature sensing coil, this is the normalized resistance of the coil at 70°F

Alternate display items

Any of the following items can be displayed during operation or charging in lieu of the standard Ohms, Profile Name or Temperature displays. The Escribe PC software is used to change the display settings. A detailed description of each item can be found in the Escribe manual

Battery Charge	Output Current	Average Output Power of the most recent puff
Battery Pack Voltage	Output Voltage	Average Temperature of the most recent puff
Room Temperature	Material Name	Total Energy of the most recent puff
Puff Count	Board Temperature	Duration of the most recent puff

Modes

Locked mode: Pressing the fire button five times with less than .7 seconds between presses will cause the device to enter Locked mode. In Locked mode, the device will not fire and the output power will not adjust accidentally. While in Locked mode, the screen will be off, except that pressing a button will show “Locked, Click 5X”. To exit Locked mode, press the fire button 5 times.

Stealth mode: While locked, holding the fire and down buttons simultaneously for five seconds will switch to stealth mode. In this mode the display is off. It will still show error and lock messages. To switch back to normal display mode, hold down the fire and down buttons simultaneously for 5 seconds. This setting is stored to internal flash memory, and remains if power is removed.

Power Locked mode: Holding down both the up and down buttons for two seconds will place the device in Power Locked mode. In this mode, the mod will operate normally, but you will not be able to change the power setting. This mode prevents accidental power level changes due to the buttons being pressed while in a pocket. To exit Power Locked mode, hold the up and down buttons for two seconds.

Resistance lock: The DNA 60 relies on the cold resistance of the atomizer to measure temperature accurately. If the connection is not stable or if you find the measured resistance drifts with time, it may be desirable to lock the atomizer resistance. To do so, while locked hold both the Fire and Up buttons for two seconds to enter Resistance Lock mode. In this mode, the DNA 60 will use the present atomizer cold resistance without refinement until the atomizer is disconnected or the resistance lock is disabled. A lock symbol will replace the ohm symbol on the display. To disable resistance lock, repeat the procedure to lock it.

Max Temperature Adjust: From Locked Mode, holding down both the up and down buttons for two seconds will place the device in Max Temperature Adjust mode. Once this mode is entered, the max temperature will be displayed. The up and down buttons are used to adjust the max temperature. To save the new temperature setting and exit, press the Fire button.

Profiles

The DNA 60 allows you to save and select between eight groups of output settings. Each group of output settings is called a Profile. To switch between profiles, put the DNA 60 into Power Locked mode by pressing and holding both the up and down buttons simultaneously for two seconds. From power locked mode, to cycle between profiles, double click the Up or Down button. To select the displayed profile, press the fire button.

The coil material for each Profile can be changed directly on the device for any material that exists in the Materials Repository. To change the currently selected Profile's material, press the Fire button five times to Lock the device. With the device Locked, hold the Up, Down, and Fire buttons simultaneously for two seconds. Then, use the Up and Down buttons to cycle through materials, when the desired material is displayed press the Fire button to confirm your selection.

Evolv recommends setting up one profile for each atomizer that you regularly use with the DNA 60. It is much faster to switch profiles than it is to set up the settings for the atomizer again.

Coil Materials

Each profile contains an output power setting and a maximum temperature setting. These can be adjusted on the device, and will be saved when a different profile is selected. Additionally, the resistance lock setting and value for each atomizer is saved in the profile, which can alleviate temperature inaccuracies stemming from attaching atomizers before they have completely cooled. Many more output settings, including the coil material and preheat settings can be adjusted on a per-profile basis using the Escribe PC software.

Error Messages

The DNA 60 will indicate a variety of error states.

Check Atomizer: The DNA does not detect an atomizer, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Shorted: The atomizer or wiring are short circuited.

Weak Battery: The battery needs to be charged, or a higher amp rate battery needs to be used. If this happens, the DNA 60 will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to flash for a few seconds after the end of puff.

Check Battery: The battery is deeply discharged and needs to be charged, or is damaged. If this happens, the DNA 60 will not fire the atomizer. The Check Battery message will continue to flash for a few seconds after attempting to fire the device. User should remove and replace the battery.

Temperature Protected: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 60 will continue to fire, but will not be able to provide the desired wattage.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 60 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to flash for a few seconds after the end of puff.

Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA 60 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to flash for a few seconds after the end of puff.

Too Hot: The DNA 60 has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

Auto power down

The screen will be at full brightness while firing. After 10 seconds with no button presses, the screen will dim. 30 seconds after the last button press, the screen will fade out and the device will go into sleep mode. To wake the device, press the fire button.

Charger

An external 1A Micro USB charger for the DNA 60 is available separately. It automatically detects the type of USB power supply it is connected to, so it can be plugged into standard PC USB ports or higher power chargers. It also includes pinouts for a data connection to utilize EScribe. Please see the Evolv website for more information.

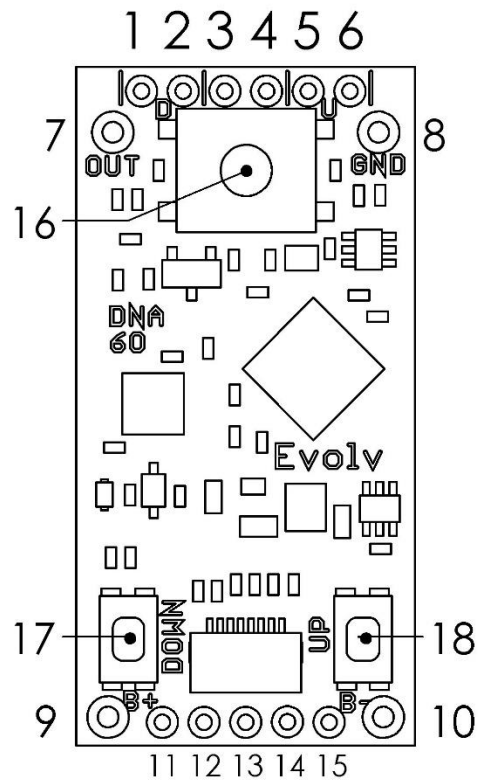
Battery monitoring

The DNA 60 contains a battery management system that continuously monitors the state and health of the battery both under load and while idle.

EScribe

EScribe is a software package used to configure, monitor and modify the operation of your DNA 60. It installs on a Windows PC and connects to your DNA 60 using the USB port. EScribe has a separate manual and tutorials which can be found on Evolv's site.

Pinout (shown bottom side)



Pin Number	Pin Name	Function
1	Down +	Positive side of the power down button.
2	Down -	Negative side of the power down button.
3	Fire +	Positive side of the fire button.
4	Fire -	Negative side of the fire button.
5	Up -	Negative side of the power up button.
6	Up +	Positive side of the power up button.
7	Power Output	Atomizer output
8	Output Ground	Atomizer ground (Connects internally to 10)
9	Battery Input +	Battery positive
10	Battery Input -	Battery negative
11	Charger Output +	USB power positive
12	Charger/USB -	USB power negative
13	USB DM	USB data negative
14	USB DP	USB data positive
15	USB Vdetect	Connect to USB Vbus though a 10k ohm resistor if not using Evolv's charger board
16	Fire Button	
17	Down Button	
18	Up Button	

Wiring

The atomizer positive is connected to OUT, and the atomizer negative to GND. The battery is connected to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA. Too small wire will not perform well, and significantly undersized wire can burn out.

Recommended wire sizes			
	Minimum size	Recommended size	Maximum size
Battery, silicone insulated	20 gauge	18 gauge	16 gauge
Battery, PVC Insulated	18 gauge	16 gauge	14 gauge
Output, silicone insulated	16 gauge	14 gauge	12 gauge
Switches, if used	28 gauge	24 gauge	22 gauge

Reverse Polarity Protection

The DNA 60 includes built in Reverse Polarity Protection to protect the user, board, device, and battery in the event that a battery is inserted backwards.

External component recommendations

The DNA 60 is a self-contained power regulator which does not require external components for its user interface. However, it does support the use of external interface components if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended. Please use caution, as the positive side of the fire button connects directly to positive battery voltage.

Up/Down buttons:

The small onboard buttons labeled UP and DOWN allow the user to increase or decrease the power level in .1 Watt increments. Alternatively, remote normally open type switches or buttons can be attached to the UP and DOWN mounting holes for customization.

Battery:

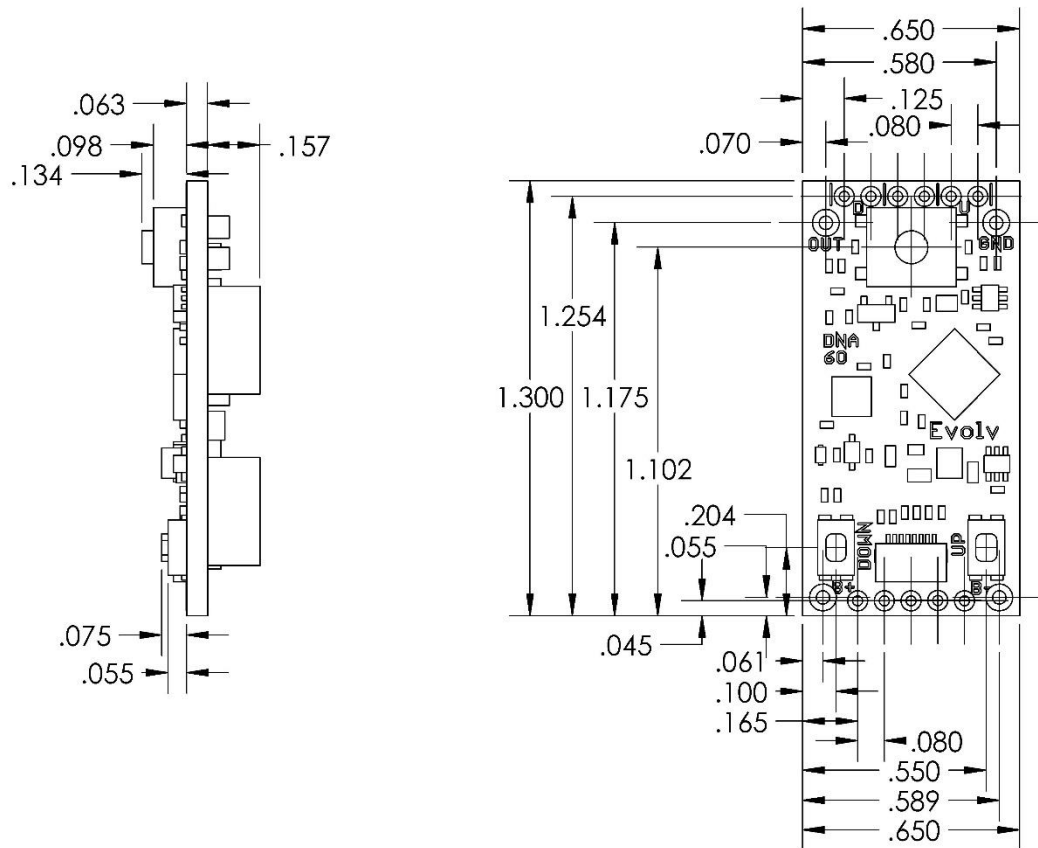
The DNA 60 runs from a single lithium polymer type battery pack or round lithium ion type battery. The DNA 60 can use multiple cells in a parallel type wiring configuration as long as the maximum input voltage is 4.2v.

Mounting

The DNA 60 has onboard switches for adjusting the power level and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

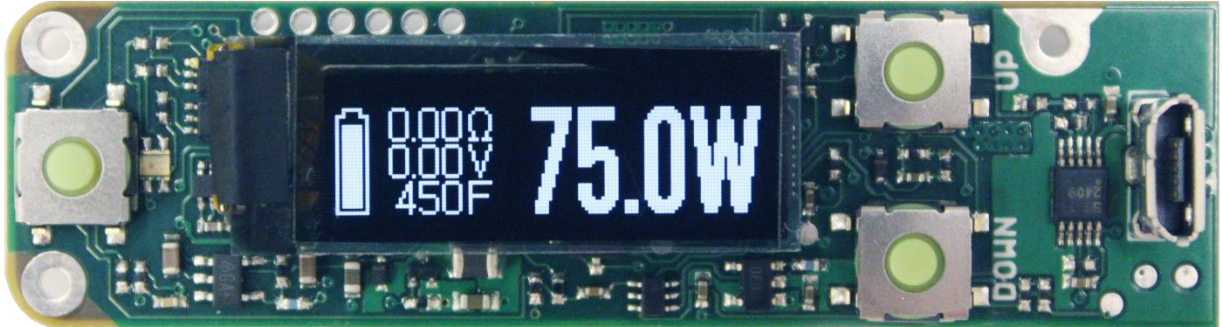
The DNA 60 should be mounted in a way that retains the board firmly in place with no movement possible. This will reduce or eliminate the possibility of any connections failing over time.

Mechanical Dimensions



Evolv has 3D models of the DNA 60 available on their website in IGES, STP and Solidworks format.

Evolv DNA 75



75 Watt Variable Power Module with Temperature Protection and USB

The DNA 75 is a power regulated digital switch-mode DC-DC converter for personal vaporizers. It features Evolv's patented Wattage Control, Temperature Protection, Preheat, OLED Screen, Reverse Polarity Protection, onboard programmable multicolor LED and waterproof onboard buttons. The USB port and Evolv's EWrite software can be used to customize or monitor the user experience. The DNA 75 runs from a single lithium polymer or lithium ion battery, and features battery monitoring and integrated 1A charger.

Specifications

	Minimum	Typical	Max
Output Power	1 Watt		75 Watts
Output Voltage	.2 Volt		6.2 Volts
Output Current, continuous			30.0 Amps
Output Current, instantaneous peak			40.0 Amps
Atomizer Resistance, temperature sensing wire, cold	See Graph	.15 Ohm	See Graph
Atomizer Resistance, Kanthal wire	See Graph	.25 Ohm	See Graph
Temperature Limit	200°F	450°F	600°F
Input Voltage	3.0 Volts	3.7 Volts	4.2 Volts
Input Current	.5 Amps	12.0 Amps	28.0 Amps
Input Current, pulse			32.0 Amps
Screen On Current		26mA	
Quiescent Current		7mA	
Power Down Current		0mA	
Efficiency		85%	
Weight		15g	
Footprint	.71" x 2.60"		18mm x 66mm
Thickness		.32"	
Screen size		.91" OLED	

Contents

Specifications	1
Temperature Protection	3
Preheat.....	3
Attaching a New Atomizer	4
Output Power.....	4
Operation	5
Display.....	5
Alternate display items	5
Modes	6
Profiles	7
Error Messages	8
Auto power down	8
Charger.....	9
Battery monitoring.....	9
Escribe.....	9
Pinout (shown bottom side)	10
Wiring.....	11
Recommended wire sizes	11
Reverse Polarity Protection	11
External component recommendations	11
Assembly	12
Installing the Screen.....	12
Mounting.....	13
Mechanical Dimensions	14

Temperature Protection

The DNA 75 directly measures and limits the temperature of the heating coil during operation. By preventing the coil from becoming too hot regardless of fluid, wicking or airflow, a variety of undesirable situations can be prevented. For example, appropriate temperature settings will prevent the wicking material from charring, which compromises taste and introduces unintended chemicals into the vapor. Appropriate temperature settings will also reduce the breakdown of flavoring and base liquid components, which could impact taste or safety.

Evolv's Temperature Protection Technology requires a heating coil made from Nickel 200 alloy or other materials with a well-defined temperature coefficient of resistance, rather than Nickel Chromium or Kanthal alloys. If the temperature reaches the maximum value, the wattage applied to the atomizer coil is reduced to prevent overheating. Please note that the temperature reading is the average temperature of the atomizer coil, and care should be taken to construct the heating coil so that the temperature is uniform, without hot or cold spots.

Because wattage, not temperature controls vapor volume, large vapor volumes can be produced without unnecessarily high temperatures. Temperature Protection is most helpful if the atomizer begins to dry out, the user pauses during a puff, the beginning or end of the puff, or if the wattage setting is inappropriate for the attached atomizer.

In normal operation, when the device is not firing the maximum temperature setting is displayed on the screen. When the device is firing, the actual average temperature of the coil is displayed on the screen.

By default, the Temperature Protection setting is 450° Fahrenheit. To change the limit

- 1) Lock the device by pressing the Fire button five times.
- 2) Hold down the UP and DOWN adjust buttons for two seconds.
- 3) After two seconds, the maximum temperature will be displayed, and the UP and DOWN buttons should be released.
- 4) Use the UP and DOWN buttons to adjust the maximum temperature
- 5) When the display shows the desired maximum temperature, press the Fire button to exit temperature adjust mode.

The maximum temperature is adjustable between 200° Fahrenheit and 600° Fahrenheit. To disable the temperature protection entirely, adjust the limit up to 600 degrees, then press the UP button one additional time. The temperature limit will read OFF.

To switch to Celsius temperature, adjust temperature down to 200° Fahrenheit, then press the DOWN button one additional time. The temperature will switch to reading and adjusting in Celsius.

Preheat

When the DNA 75 is used with a temperature sensing atomizer, an additional feature called Preheat is activated. No vapor is produced when the temperature is below the boiling point of the liquid. Preheat applies extra power until the heating coil is up to operating temperature to shorten the

delay between pressing the fire button and generating vapor. Because preheat is temperature based, it will not overheat or burn the vapor.

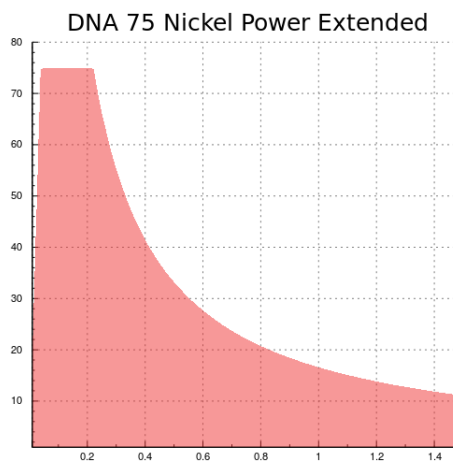
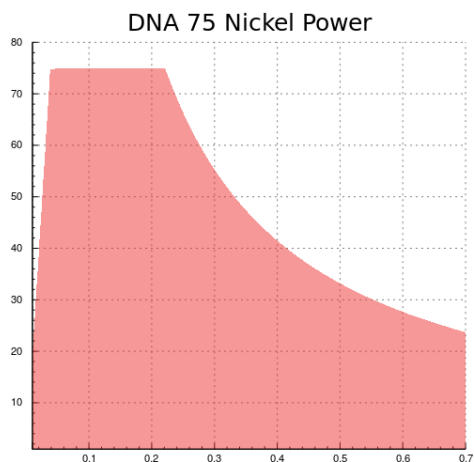
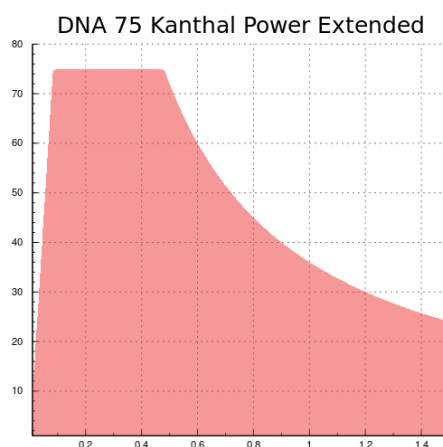
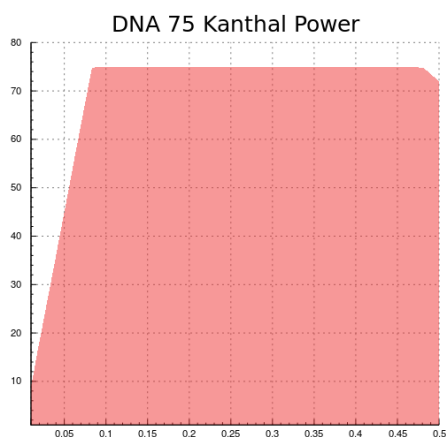
Attaching a New Atomizer

The DNA 75 uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature. If a new atomizer is attached to the DNA 75 before it has cooled down, the temperature may read and protect incorrectly until the new atomizer cools.

When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 75 will prompt you to confirm this change. When you fire the first time, before activating the DNA 75 will prompt “New Coil? UP YES/DOWN NO”. When you see this prompt, if you have attached a new atomizer, press the UP button. If you have disconnected and reconnected the same atomizer, press the DOWN button.

Output Power

The following graphs show the output power range of the DNA 75 as a function of the coil resistance.



Operation

Basic operation of the DNA 75 is as follows. To wake the device from power off state, tap the Fire button. To generate vapor, press the Fire button. To change the wattage setting for more or less vapor, click or hold the Up and Down buttons.

Display

The DNA 75 has a small .91" diagonal white OLED screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. The screen's default position is on top of the board, between the fire and adjust buttons. This allows for easy assembly. The screen connects to the board with a ZIF connector, so alternate placement is possible. It is also possible to order screens with custom length and shape flexible cables, allowing screen placement anywhere in the device. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation.

Watt setting: The power level currently set on the DNA 75.

Battery indicator: The current state of charge of the battery.

Temperature display: When not firing, the maximum heating coil temperature setting. While firing, the actual temperature of the heating coil is displayed.

Volts display: The output voltage being supplied to the atomizer.

Ohms display: The resistance of the atomizer attached to the device. When using a temperature sensing coil, this is the normalized resistance of the coil at 70°F

Alternate display items

Any of the following items can be displayed during operation or charging in lieu of the standard Ohms, Profile Name or Temperature displays. The Escribe PC software is used to change the display settings. A detailed description of each item can be found in the Escribe manual

Battery Charge	Output Current	Average Output Power of the most recent puff
Battery Pack Voltage	Output Voltage	Average Temperature of the most recent puff
Room Temperature	Material Name	Total Energy of the most recent puff
Puff Count	Board Temperature	Duration of the most recent puff

Modes

Locked mode: Pressing the fire button five times with less than .7 seconds between presses will cause the device to enter Locked mode. In Locked mode, the device will not fire and the output power will not adjust accidentally. While in Locked mode, the screen will be off, except that pressing a button will show “Locked, Click 5X”. To exit Locked mode, press the fire button 5 times.

Stealth mode: While locked, holding the fire and down buttons simultaneously for five seconds will switch to stealth mode. In this mode the display is off. It will still show error and lock messages. To switch back to normal display mode, hold down the fire and down buttons simultaneously for 5 seconds. This setting is stored to internal flash memory, and remains if power is removed.

Power Locked mode: Holding down both the up and down buttons for two seconds will place the device in Power Locked mode. In this mode, the mod will operate normally, but you will not be able to change the power setting. This mode prevents accidental power level changes due to the buttons being pressed while in a pocket. To exit Power Locked mode, hold the up and down buttons for two seconds.

Resistance lock: The DNA 75 relies on the cold resistance of the atomizer to measure temperature accurately. If the connection is not stable or if you find the measured resistance drifts with time, it may be desirable to lock the atomizer resistance. To do so, while locked hold both the Fire and Up buttons for two seconds to enter Resistance Lock mode. In this mode, the DNA 75 will use the present atomizer cold resistance without refinement until the atomizer is disconnected or the resistance lock is disabled. A lock symbol will replace the ohm symbol on the display. To disable resistance lock, repeat the procedure to lock it.

Max Temperature Adjust: From Locked Mode, holding down both the up and down buttons for two seconds will place the device in Max Temperature Adjust mode. Once this mode is entered, the max temperature will be displayed. The up and down buttons are used to adjust the max temperature. To save the new temperature setting and exit, press the Fire button.

Profiles

The DNA 75 allows you to save and select between eight groups of output settings. Each group of output settings is called a Profile. To switch between profiles, put the DNA 75 into Power Locked mode by pressing and holding both the up and down buttons simultaneously for two seconds. From power locked mode, to cycle between profiles, double click the Up or Down button. To select the displayed profile, press the fire button.

The coil material for each Profile can be changed directly on the device for any material that exists in the Materials Repository. To change the currently selected Profile's material, press the Fire button five times to Lock the device. With the device Locked, hold the Up, Down, and Fire buttons simultaneously for two seconds. Then, use the Up and Down buttons to cycle through materials, when the desired material is displayed press the Fire button to confirm your selection.

Each profile contains an output power setting and a maximum temperature setting. These can be adjusted on the device, and will be saved when a different profile is selected. Additionally, the resistance lock setting and value for each atomizer is saved in the profile, which can alleviate temperature inaccuracies stemming from attaching atomizers before they have completely cooled. Many more output settings, including the coil material and preheat settings can be adjusted on a per-profile basis using the Escribe PC software.

Evolv recommends setting up one profile for each atomizer that you regularly use with the DNA 75. It is much faster to switch profiles than it is to set up the settings for the atomizer again.

Error Messages

The DNA 75 will indicate a variety of error states.

Check Atomizer: The DNA does not detect an atomizer, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Shorted: The atomizer or wiring are short circuited.

Weak Battery: The battery needs to be charged, or a higher rate battery needs to be used. If this happens, the DNA 75 will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to flash for a few seconds after the end of puff.

Check Battery: The battery is deeply discharged and needs to be charged, or is damaged. If this happens, the DNA 75 will not fire the atomizer. The Check Battery message will continue to flash for a few seconds after attempting to fire the device. User should remove and replace the battery.

Temperature Protected: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 75 will continue to fire, but will not be able to provide the desired wattage.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 75 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to flash for a few seconds after the end of puff.

Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA 75 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to flash for a few seconds after the end of puff.

Too Hot: The DNA 75 has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

Auto power down

The screen will be at full brightness while firing. After 10 seconds with no button presses, the screen will dim. 30 seconds after the last button press, the screen will fade out and the device will go into sleep mode. To wake the device, press the fire button.

Charger

The DNA 75 has a built in 1A USB charger. It automatically detects the type of USB power supply it is connected to, so it can be plugged into standard PC USB ports or higher power chargers.

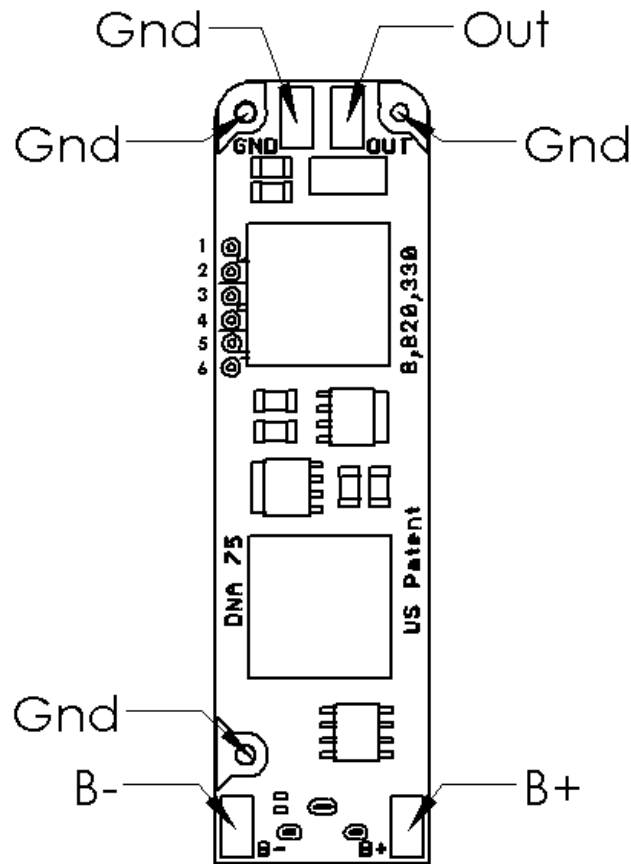
Battery monitoring

The DNA 75 contains a full battery management system that continuously monitors the state and health of the battery both under load and while idle.

Escribe

Escribe is a software package used to configure, monitor and modify the operation of your DNA 75. It installs on a Windows PC and connects to your DNA 75 using the USB port. Escribe has a separate manual and tutorials which can be found on Evolv's site.

Pinout (shown bottom side)



Pin Number	Pin Name	Function
Out	Out	Power output.
1	Fire +	Positive side of the fire button.
2	Fire-	Negative side of the fire button.
3	Up-	Negative side of the power down button.
4	Up+	Positive side of the power down button.
5	Down +	Positive side of the power up button.
6	Down -	Negative side of the power up button.
GND	GND	Power output. GND is the ground return for the atomizer. It is connected internally to B-. There are three ground lugs and one ground pad.
B+	B+	Positive battery terminal.
B-	B-	Negative battery terminal. Internally connected to Gnd

Wiring

The atomizer is connected to the OUT pad. If the DNA 75 is not being grounded through the mounting screws, the GND pad should connect to the negative side of the connector. The battery is connected to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA. Too small wire will not perform well, and significantly undersized wire can burn out. The output wires should be silicone or Teflon insulated only, and at least 14 gauge. The input wire carries less current, and can be as small as 20 gauge wire if silicone or Teflon insulated.

Recommended wire sizes			
	Minimum size	Recommended size	Maximum size
Battery, silicone insulated	20 gauge	18 gauge	16 gauge
Battery, PVC Insulated	18 gauge	16 gauge	14 gauge
Output, silicone insulated	16 gauge	14 gauge	12 gauge
Switches, if used	28 gauge	24 gauge	22 gauge

Reverse Polarity Protection

The DNA 75 includes built in Reverse Polarity Protection to protect the user, board, device, and battery in the event that a battery is inserted backwards.

External component recommendations

The DNA 75 is a self-contained power regulator which does not require external components for its user interface. However, it does support the use of external interface components if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended. Please use caution, as the positive side of the fire button connects directly to positive battery voltage.

Up/Down buttons:

The small onboard buttons labeled UP and DOWN allow the user to increase or decrease the power level in .1 Watt increments. Alternatively, remote normally open type switches or buttons can be attached to the UP and DOWN mounting holes for customization.

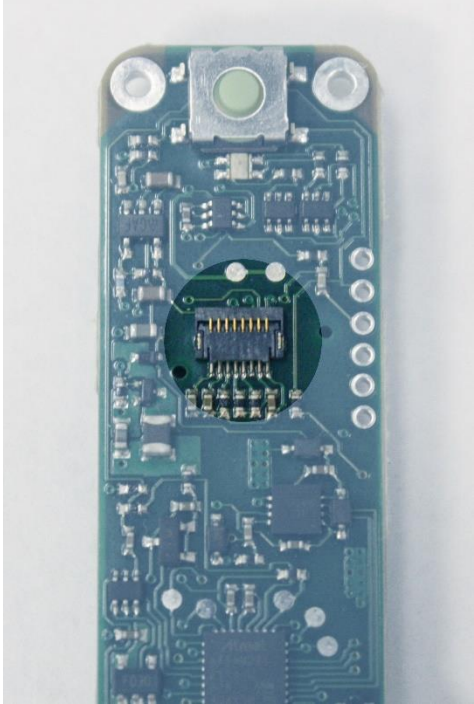
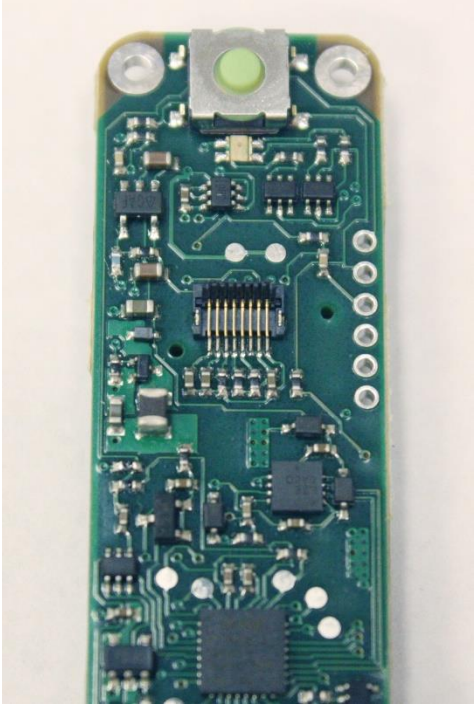
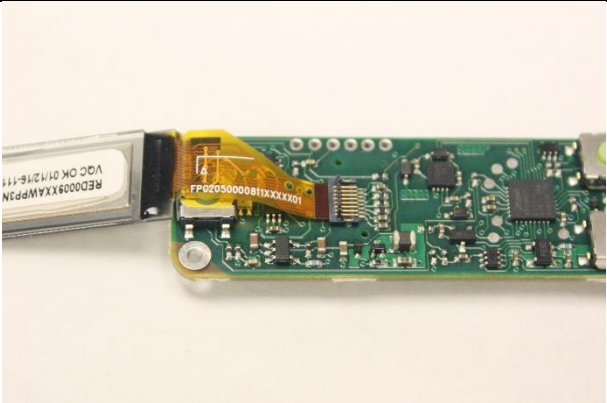
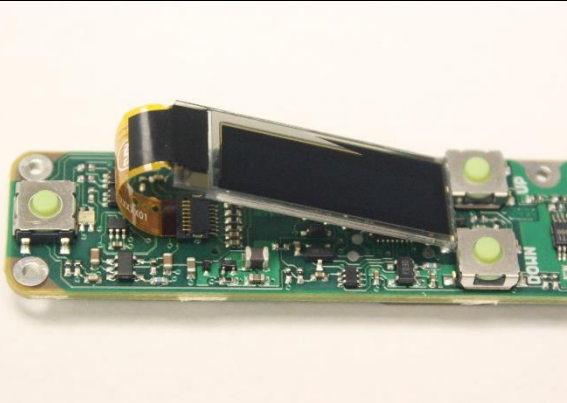
Battery:

The DNA 75 runs from a single lithium polymer type battery pack or round lithium ion 18650 type battery. The DNA 75 can use multiple cells in a parallel type wiring configuration as long as the maximum input voltage is 4.2v.

Assembly

Installing the Screen

The OLED screen mounts to the DNA 75 using an 8 pin ZIF socket and a flexible cable to allow for design flexibility. The cable can be bent or folded (once) but care should be taken to not apply tension or strain to the area where the cable attaches to the screen itself.

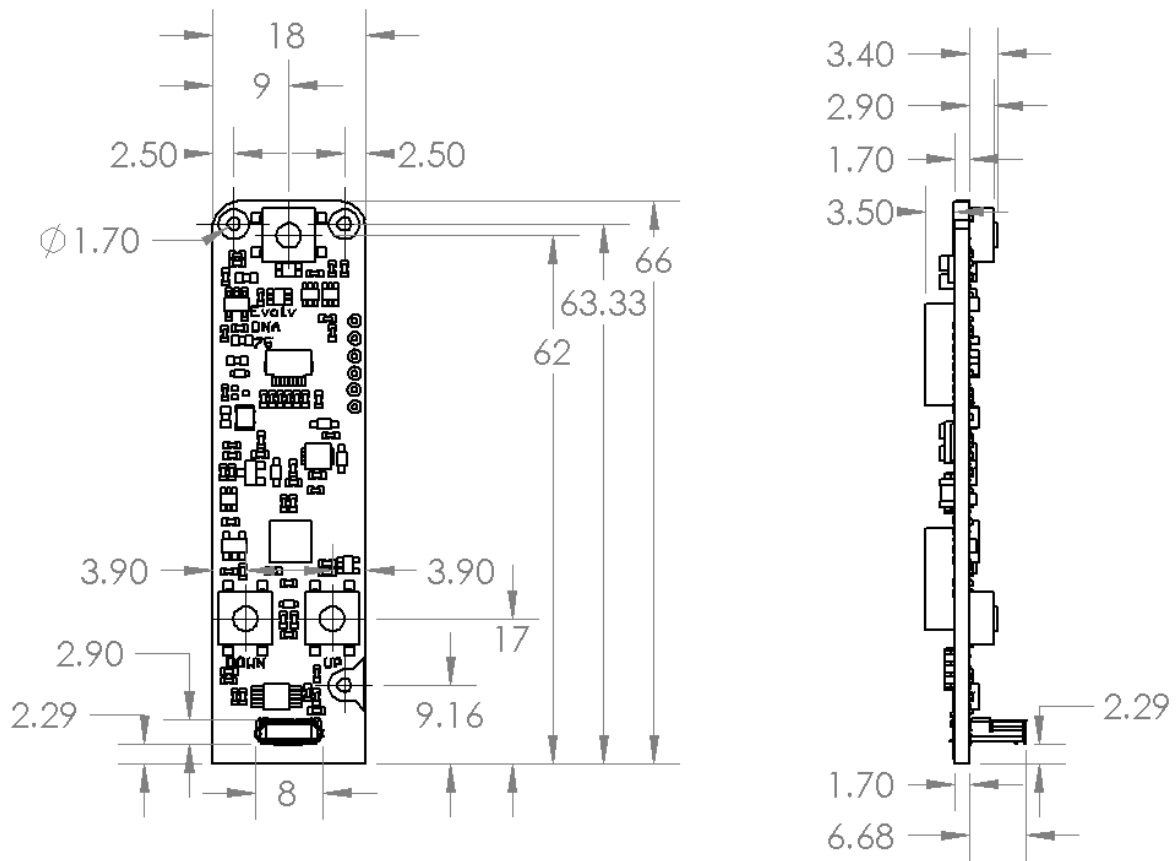
	
Step 1: Locate the ZIF connector on the DNA 75 PCB	Step 2: Carefully and gently lift the locking tab on the rear of the connector to vertical
	
Step 3: Fully insert the flexible cable into the front of the socket with the contact side towards the PCB	Step 4: Close the locking tab and press until the connector gently clicks. Remove the clear screen protector by pulling on the colored tab.

Mounting

The DNA 75 has onboard switches for adjusting the power level and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

The DNA 75 has three mounting holes on the PCB. These holes are designed for #0 screws. There is an extended mounting pad of .125" diameter around each. These holes are electrically connected to each other and to ground. With careful design, the mounting pads can be used to ground the chassis to the DNA 75, and pass the output current through chassis to the connector. However, if using this method, ensure that the PCB remains in good contact with the board at all times. Split lock washers and a RoHS chromate conversion coating on the chassis are recommended.

Mechanical Dimensions



Evolv has 3D models of the DNA 75 available on their website in IGES, STP and Solidworks format.

Evolv DNA 75 Color



75 Watt Variable Power Module with Temperature Protection and USB

The DNA 75C is a power regulated digital switch-mode DC-DC converter for personal vaporizers. It features Evolv's patented Wattage Control, Temperature Protection, Preheat, a full color TFT screen, Reverse Polarity Protection, an onboard programmable multicolor LED, waterproof onboard buttons and a real-time clock. Evolv's EScribe software and Theme Designer software can be used to fully customize all aspects of the interface and monitor the user experience. The DNA 75C runs from a single lithium polymer or lithium ion battery, and features battery monitoring and an integrated 1A charger.

Operating Range

	Minimum	Typical	Max
Output Power	1 Watt		75 Watts
Output Voltage	.2 Volts		9.0 Volts
Output Current, continuous	.5 Amps		30.0 Amps
Atomizer Resistance, temperature sensing wire, cold	See Graph	.15 Ohm	See Graph
Atomizer Resistance, Kanthal wire	See Graph	.25 Ohm	See Graph
Temperature Limit	200°F	450°F	600°F
Input Voltage, unloaded	3.0 Volts	3.7 Volts	4.2 Volts
Input Current		12.0 Amps	30.0 Amps
Screen On Current		50mA	
Quiescent Current		30mA	
Power Down Current		1uA	
Efficiency		85%	

Specifications

Footprint	.71" x 2.60" / 18mm x 66mm
Thickness	.32"
Screen	.9" 80 x 160 pixel Full Color TFT
Weight	15.2g

Absolute Limits

	Minimum	Max
Output Current, instantaneous peak		40.0 Amps
Atomizer Resistance, cold	.02 Ohm	8.0 Ohm
Input Voltage	2.5 Volts	5.0 Volts
Input Current, pulse		32.0 Amps

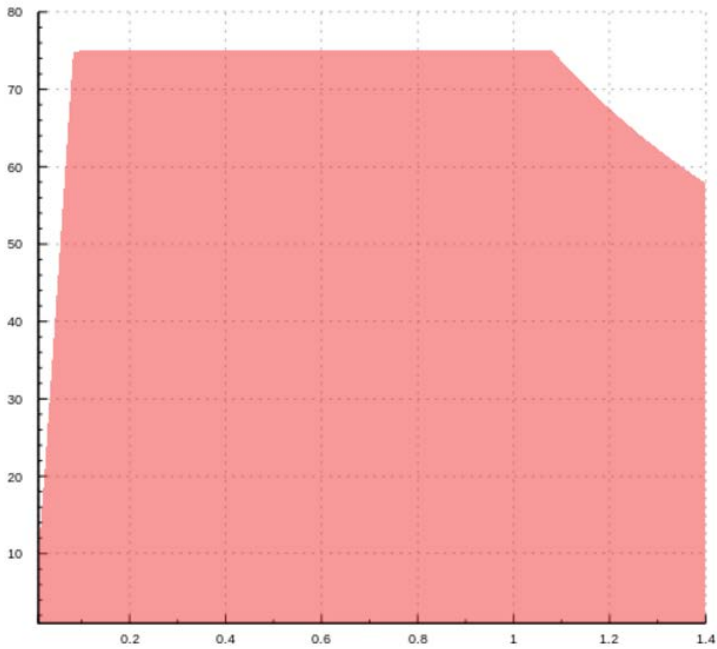
Contents

Operating Range	2
Output Power.....	4
Display.....	5
Error Messages	5
Charger.....	6
Battery monitoring.....	6
Pinout (bottom side shown)	6
Wiring.....	7
Recommended wire sizes	7
Reverse Polarity Protection	7
External component recommendations	7
Assembly	8
Installing the Screen.....	8
Mounting.....	9
Mechanical Dimensions	10

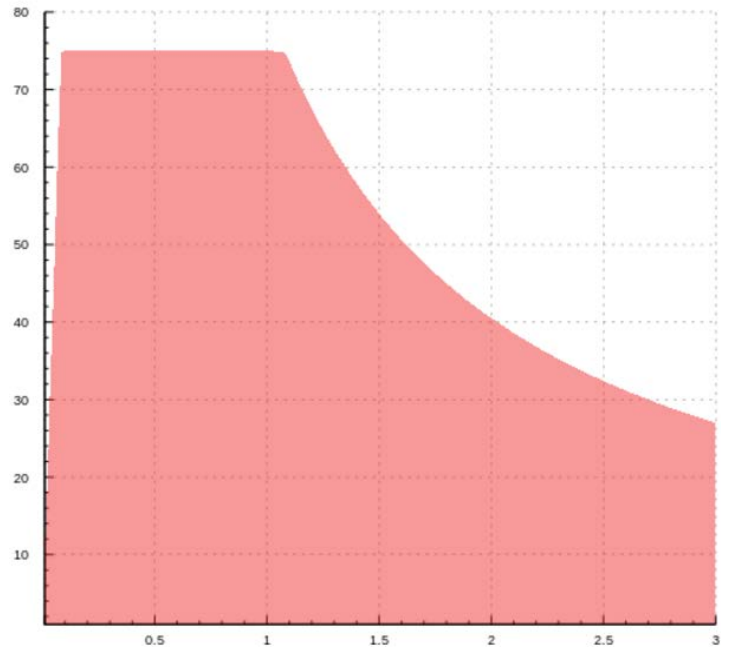
Output Power

The following graphs show the output power range of the DNA 75C as a function of the coil resistance.

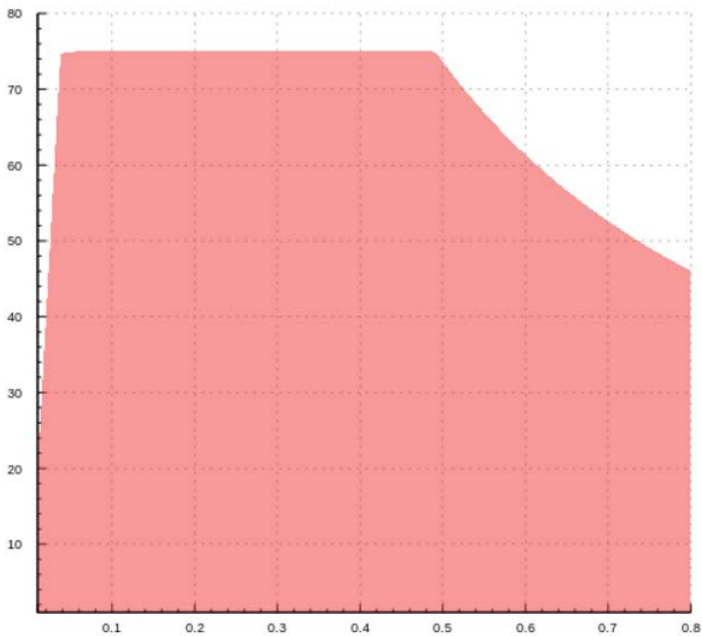
DNA 75C Kanthal Power



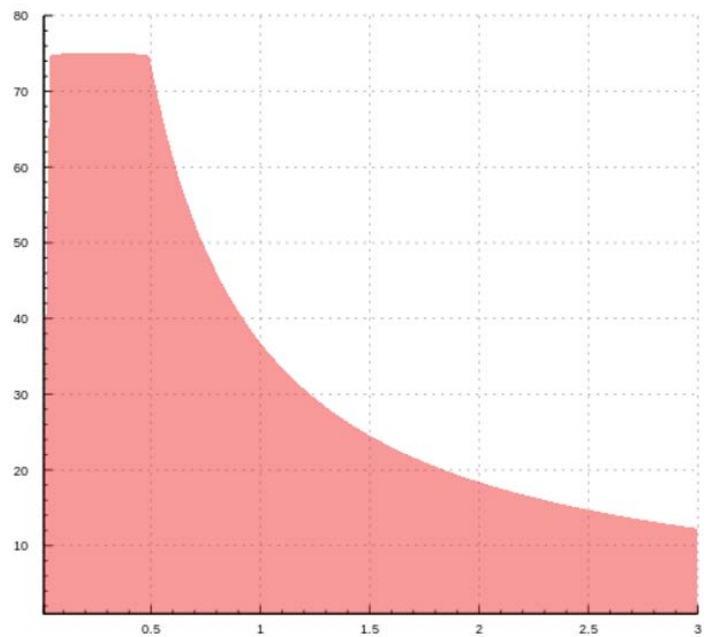
DNA 75C Kanthal Power Extended



DNA 75C Nickel Power



DNA 75C Nickel Power Extended



Display

The DNA 75C has a full color 80 x 160 pixel TFT screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. The screen's default position is on top of the board, between the fire and adjust buttons. This allows for easy assembly. The screen connects to the board with a ZIF connector, so alternate placement is possible. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation. The two notches along each side of the PCB are designed to accommodate a screen holder. A 3D model is included with the models on the Evolv website to 3D print or injection mold screen holders for the DNA 75C.

Error Messages

The DNA 75C will indicate a variety of error states.

No Atomizer: The DNA does not detect an atomizer.

Check Atomizer: The DNA does not detect an atomizer, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Check Battery: The battery is deeply discharged and needs to be charged, or is damaged. If this happens, the DNA 75C will not fire the atomizer. The Check Battery message will continue to display for a few seconds after attempting to fire the device. User should remove and replace the battery.

Shorted: The atomizer or wiring are short circuited.

Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA 75C will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to display for a few seconds after the end of puff.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 75C will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to display for a few seconds after the end of puff.

Temperature Protected: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 75C will continue to fire, but will not be able to provide the desired wattage.

Weak Battery: The battery needs to be charged, or a higher amp rated battery needs to be used. If this happens, the DNA 75C will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to display for a few seconds after the end of the puff.

Return To Researcher: The DNA has reached a limit configured by a researcher.

Too Hot: The DNA 75C has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

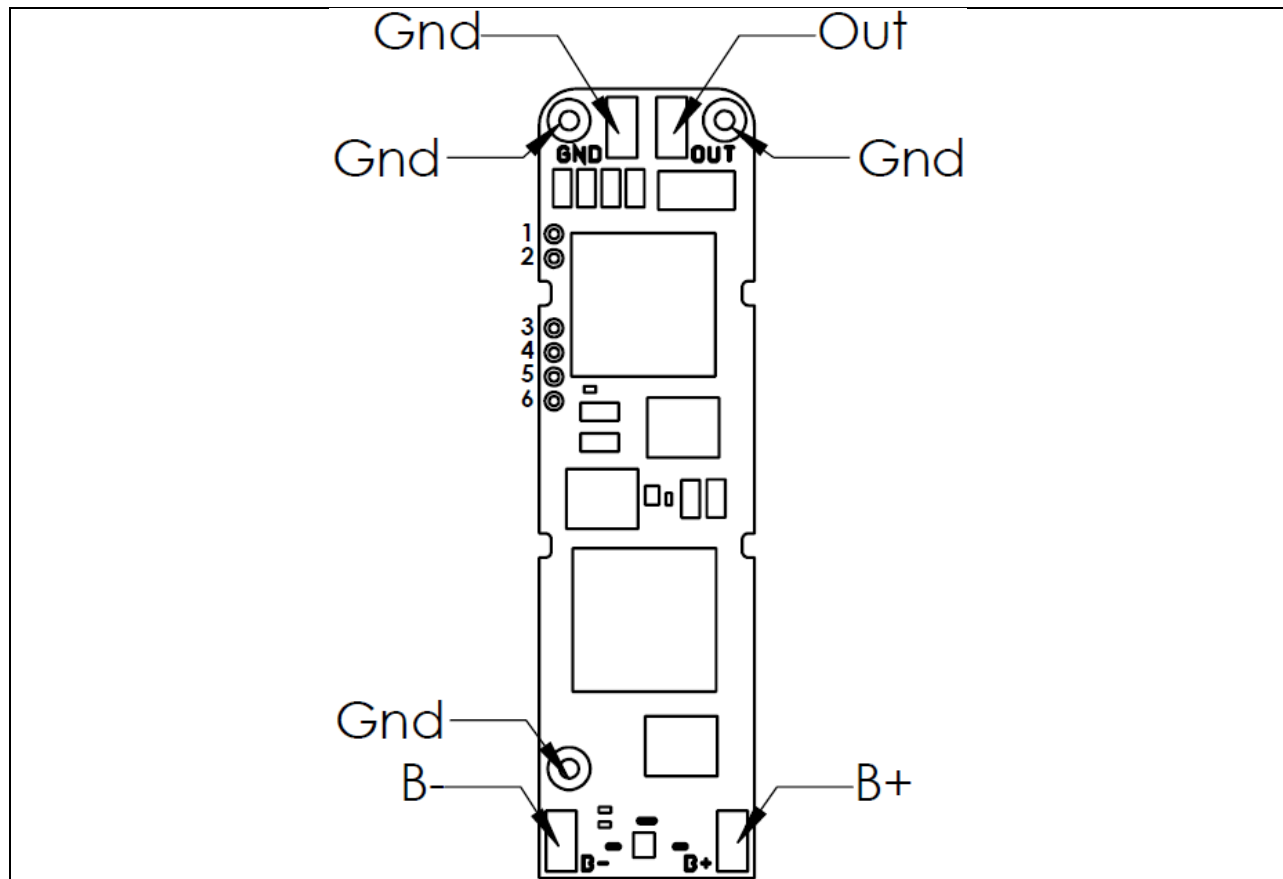
Charger

The DNA 75C has a built in 1A USB charger. It automatically detects the type of USB power supply it is connected to, so it can be plugged into standard PC USB ports or higher power chargers.

Battery monitoring

The DNA 75C contains a full battery management system that continuously monitors the state and health of the battery both under load and while idle.

Pinout (bottom side shown)

		
Pin Number	Pin Name	Function
Out	Out	Power output.
1	Fire-	Negative side of the fire button.
2	Fire+	Positive side of the fire button.
3	Up+	Positive side of the up button.
4	Select+	Positive side of the select button.
5	Down+	Positive side of the down button.
6	Logic-	Logic ground. Negative side of the up, select, and down buttons.
Gnd	Gnd	Power output. Gnd is the ground return for the atomizer. It is connected internally to B-. There are three ground lugs and one ground pad.
B+	B+	Positive battery terminal.
B-	B-	Negative battery terminal. Internally connected to Gnd.

Wiring

The atomizer is connected to the Out pad. If the DNA 75C is not being grounded through the mounting screws, the Gnd pad should connect to the negative side of the connector. The battery is connected to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA. Too small wire will not perform well, and significantly undersized wire can burn out. The output wires should be silicone or Teflon insulated only, and at least 14 gauge. The input wire carries less current, and can be as small as 20 gauge wire if silicone or Teflon insulated.

Recommended wire sizes			
	Minimum size	Recommended size	Maximum size
Battery, silicone insulated	20 gauge	18 gauge	16 gauge
Battery, PVC insulated	18 gauge	16 gauge	14 gauge
Output, silicone insulated	16 gauge	14 gauge	12 gauge
Switches, if used	28 gauge	24 gauge	22 gauge

Reverse Polarity Protection

The DNA 75C includes built in Reverse Polarity Protection to protect the user, board, device, and battery in the event that a battery is inserted backwards.

External component recommendations

The DNA 75C is a self-contained power regulator which does not require external buttons for its user interface. However, it does support the use of external buttons if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended. Please use caution, as the positive side of the fire button connects directly to positive battery voltage.

Up/Select/Down buttons:

The small onboard buttons allow the user to navigate the interface and modify device settings. Alternatively, remote normally open type switches or buttons can be attached to the UP, SELECT and DOWN mounting holes for customization.

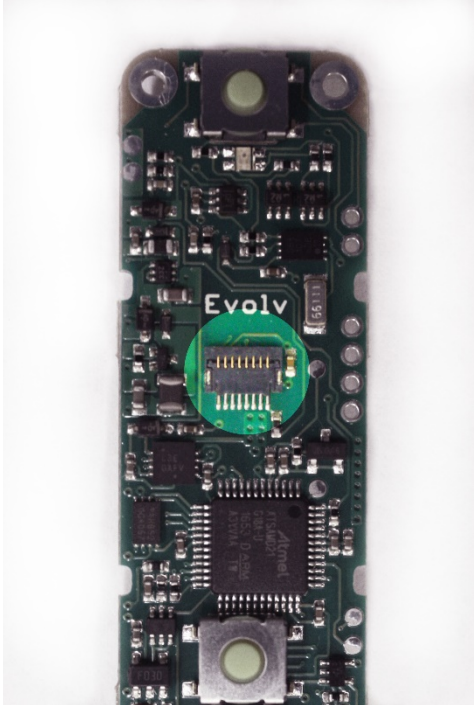
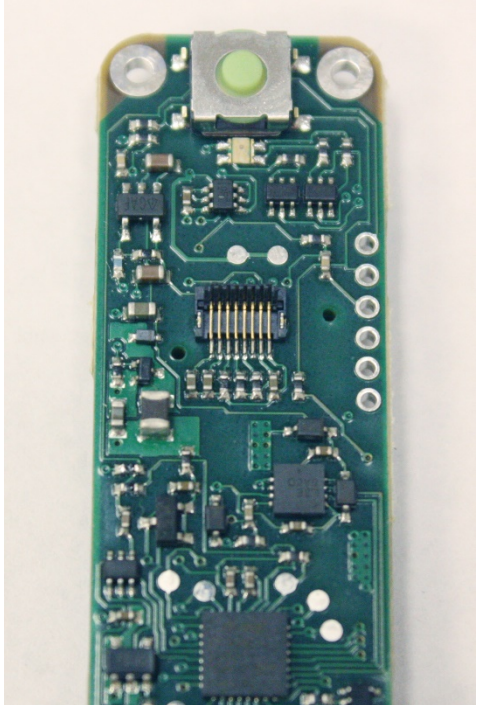
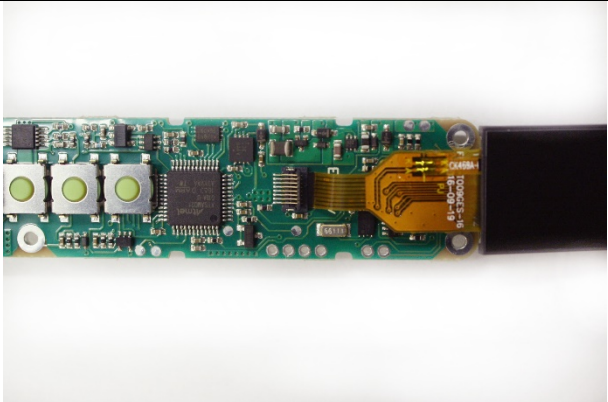
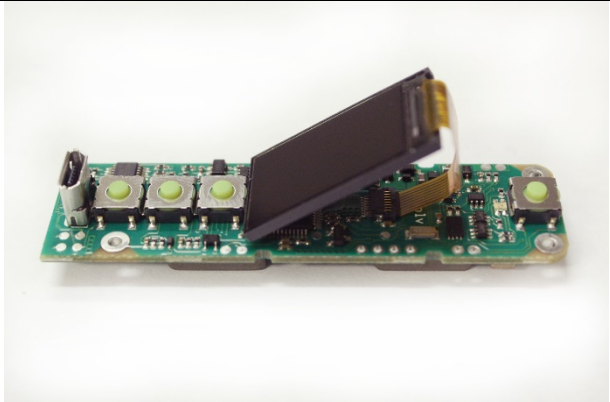
Battery:

The DNA 75C runs from a single lithium polymer type battery pack or round lithium ion 18650 type battery. The DNA 75C can use multiple cells in a parallel type wiring configuration as long as the maximum input voltage is 4.2 Volts.

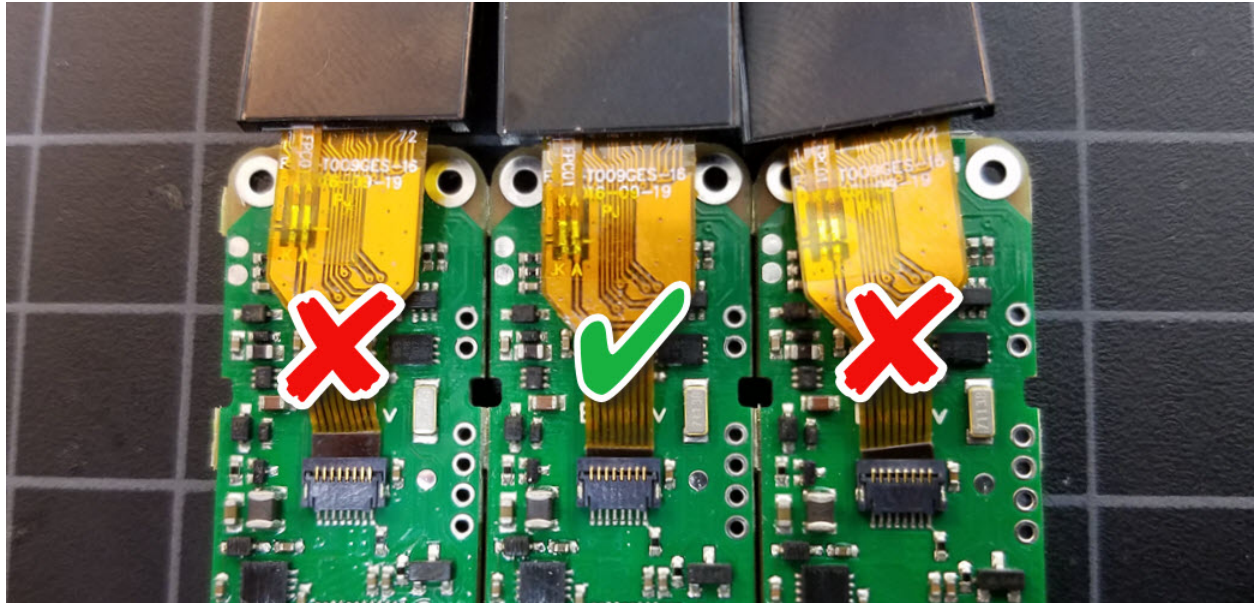
Assembly

Installing the Screen

The TFT screen connects to the DNA 75C using an 8 pin ZIF socket and a flexible cable to allow for design flexibility. The cable can be bent or folded (once) but care should be taken to not apply tension or strain to the area where the cable attaches to the screen itself. Once the screen is mounted the cable should be tucked up under the screen and not out towards the fire button. Positioning the cable near the fire button can allow the mods fire button to contact the cable when pressed which will cause eventual screen failure. Only insert or remove the screen before the board is powered on.

 A photograph of the DNA 75C printed circuit board (PCB) showing various electronic components. A green circular highlight is drawn around the ZIF (Zero Insertion Force) connector located near the top center of the board. The word "Evolv" is visible on the PCB.	 A photograph of the DNA 75C PCB showing the ZIF connector. The locking tab on the rear of the connector is being lifted vertically, as indicated by a green arrow pointing upwards.
Step 1: Locate the ZIF connector on the DNA 75C PCB.	Step 2: Carefully and gently lift the locking tab on the rear of the connector to vertical.
 A photograph showing a close-up of the ZIF connector on the DNA 75C PCB. A flexible cable with a gold-colored connector is being inserted into the front of the socket. The contact side of the cable is facing the PCB.	 A photograph showing the DNA 75C PCB with the screen protector removed. The screen is tilted upwards, and a colored tab is visible, which is used to pull the protector away from the screen.
Step 3: Fully insert the flexible cable into the front of the socket with the contact side towards the PCB.	Step 4: Close the locking tab and press until the connector gently clicks. Remove the clear screen protector by pulling on the colored tab.

Screen issues can occur if the screen is inserted incorrectly. If you are experiencing a white screen or intermittent display issues confirm the screen is correctly seated in the ZIF socket as shown below.



Mounting

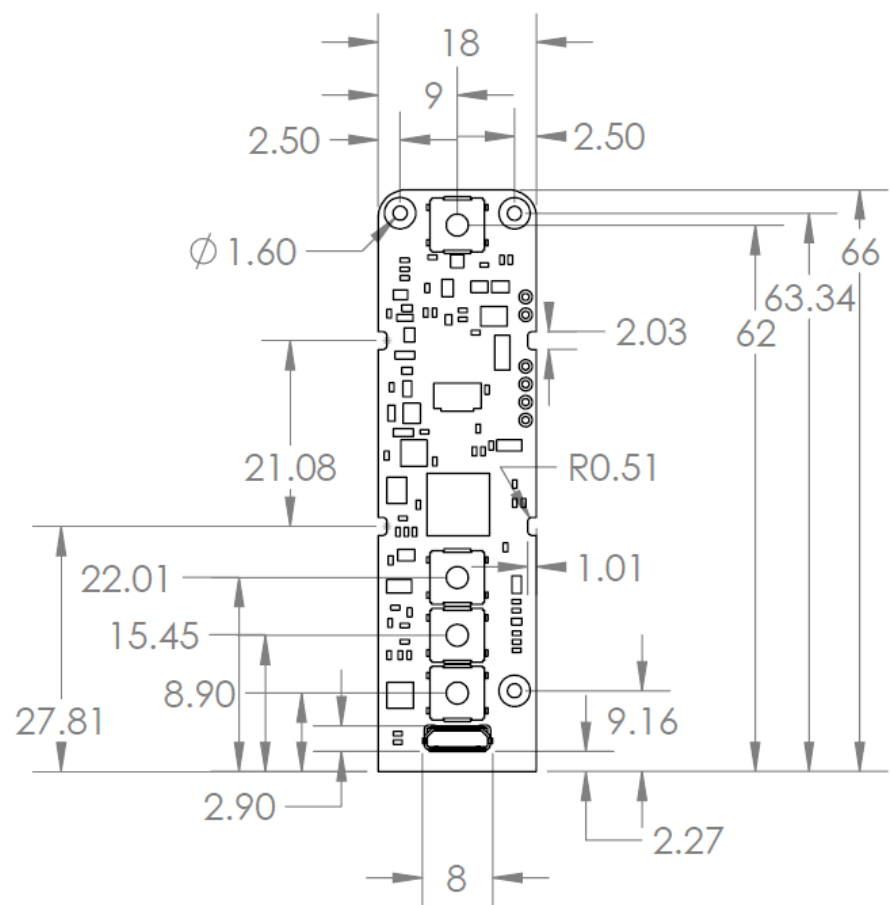
The DNA 75C has onboard switches for adjusting the power level, navigating the interface and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

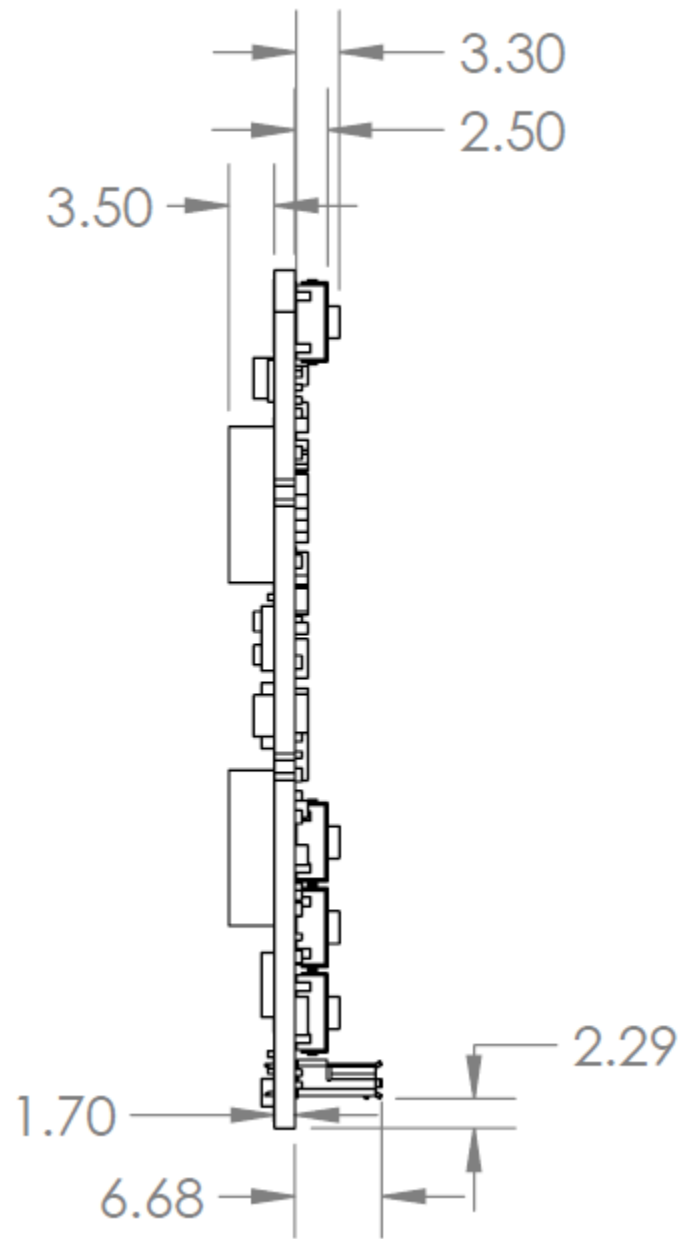
The DNA 75C has three mounting holes on the PCB. These holes are designed for #0 screws. There is an extended mounting pad of .125" diameter around each. These holes are electrically connected to each other and to ground. With careful design, the mounting pads can be used to ground the chassis to the DNA 75C, and pass the output current through chassis to the connector. However, if using this method, ensure that the PCB remains in good contact with the board at all times. Split lock washers and a RoHS chromate conversion coating on the chassis are recommended.

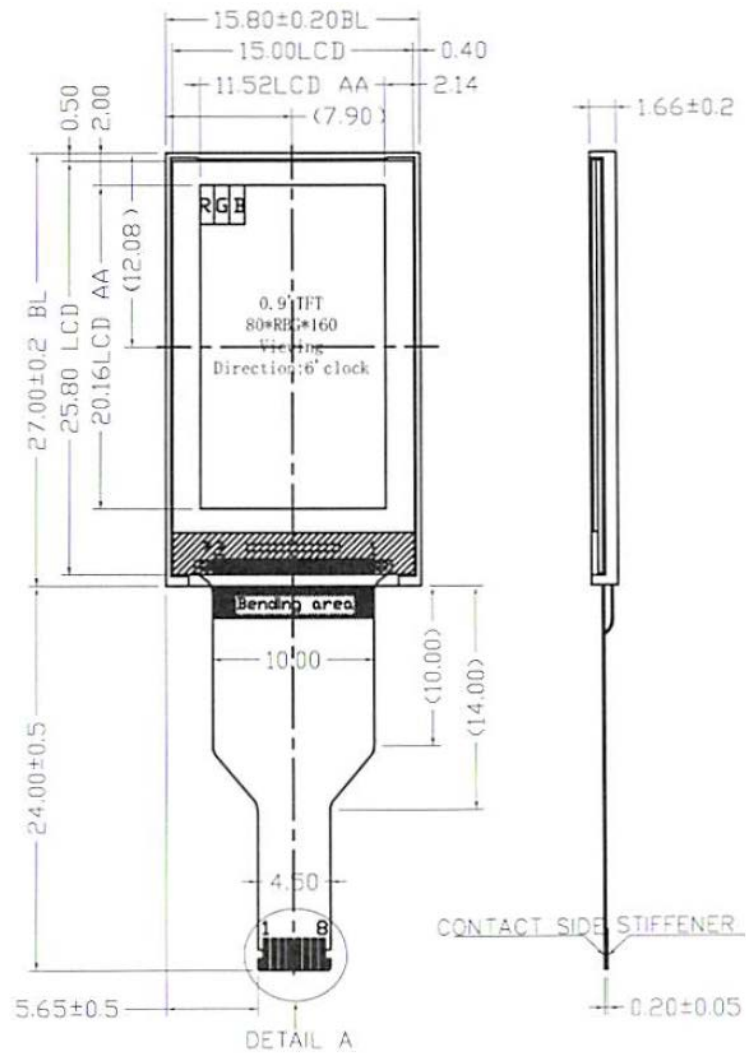
It is recommended that DNA boards be secured using the provided holes to mechanically mount them to the device. Use of glues are not suggested including hot glue, epoxy, superglue, hobby cement, etc. The only adhesive approved for contact with the board is non-corrosive Silicone adhesive such as the kind available from MG Chemicals.

DNA boards are complex, utilizing multilayer PCBs, and are designed with safety and reliability in mind. Please do not modify components on the boards, remove onboard buttons, shave, cut or trim the PCB or enlarge the mounting holes. Doing so creates the potential to expose layers in the PCB and could cause a safety and/or reliability issue. Evolv reserves the right to deny a warranty claim for any and all board modifications or improper use.

Mechanical Dimensions

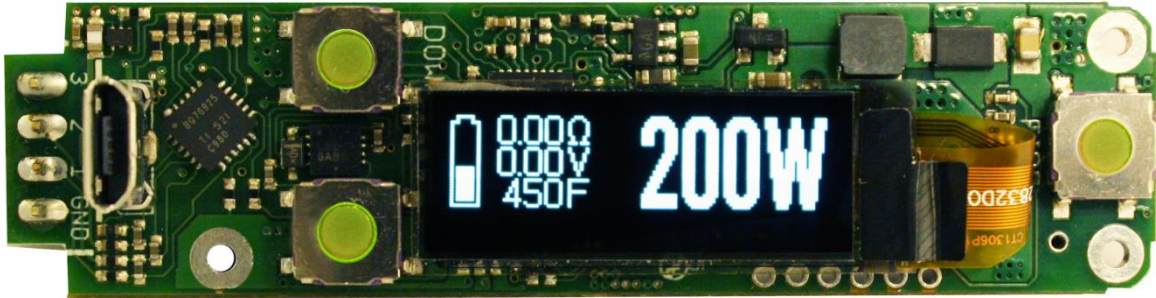






3D models of the DNA 75C available on our website in IGES, STEP, and Solidworks formats.

Evolv DNA 200



200 Watt Variable Power Module with Temperature Protection and USB

The DNA 200 is a power regulated digital switch-mode DC-DC converter for personal vaporizers. It features Evolv's patented Wattage Control, Temperature Protection, Preheat, OLED Screen, and waterproof onboard buttons. The USB port and Evolv's EScribe software can be used to customize or monitor the user experience. The DNA 200 runs from a 3 cell lithium polymer battery, and features cell-by-cell battery monitoring and integrated 1A balance charger. It is the most advanced personal vaporizer controller ever made.

Specifications

	Minimum	Typical	Max
Output Power	1 Watt		200 Watts
Output Voltage	.5 Volt		9.0 Volts
Output Current, continuous			50.0 Amps
Output Current, instantaneous peak			55.0 Amps
Atomizer Resistance, temperature sensing wire, cold	See Graph	.10 Ohm	See Graph
Atomizer Resistance, kanthal wire	See Graph	.20 Ohm	See Graph
Temperature Limit	200°F	450°F	600°F
Input Voltage	9.0 Volts	11.1 Volts	12.6 Volts
Input Current	.5 Amps	9.0 Amps	23.0 Amps
Screen On Current		18mA	
Quiescent Current		4.5 mA	
Power Down Current			25uA
Efficiency		97%	
Weight		15g	
Footprint	.71" x 2.80"		18mm x 71mm
Thickness		.32"	
Screen size		.91" OLED	

Contents

Specifications	1
Temperature Protection	3
Preheat.....	3
Attaching a New Atomizer	4
Output Power.....	4
Operation	5
Display.....	5
Alternate display items	5
Modes	6
Profiles	7
Error Messages	8
Auto power down	8
Charger.....	9
Cell-by-cell monitoring.....	9
Cell Balancer.....	9
Fuse	10
Escribe	11
Pinout (shown bottom side)	12
Wiring.....	13
Recommended wire sizes	13
External component recommendations	13
Assembly	14
Installing the Screen.....	14
Installing the Balance Connector	15
Mounting.....	16
Mechanical Dimensions	17

Temperature Protection

The DNA 200 directly measures and limits the temperature of the heating coil during operation. By preventing the coil from becoming too hot regardless of fluid, wicking or airflow, a variety of undesirable situations can be prevented. For example, appropriate temperature settings will prevent the wicking material from charring, which compromises taste and introduces unintended chemicals into the vapor. Appropriate temperature settings will also reduce the breakdown of flavoring and base liquid components, which could impact taste or safety.

Evolv's Temperature Protection Technology requires a heating coil made from Nickel 200 alloy or other materials with a well-defined temperature coefficient of resistance, rather than Nickel Chromium or Kanthal alloys. If the temperature reaches the maximum value, the wattage applied to the atomizer coil is reduced to prevent overheating. Please note that the temperature reading is the average temperature of the atomizer coil, and care should be taken to construct the heating coil so that the temperature is uniform, without hot or cold spots.

Because wattage, not temperature controls vapor volume, large vapor volumes can be produced without unnecessarily high temperatures. Temperature Protection is most helpful if the atomizer begins to dry out, the user pauses during a puff, the beginning or end of the puff, or if the wattage setting is inappropriate for the attached atomizer.

In normal operation, when the device is not firing the maximum temperature setting is displayed on the screen. When the device is firing, the actual average temperature of the coil is displayed on the screen.

By default, the Temperature Protection setting is 450° Fahrenheit. To change the limit

- 1) Lock the device by pressing the Fire button five times.
- 2) Hold down the UP and DOWN adjust buttons for two seconds.
- 3) After two seconds, the maximum temperature will be displayed, and the UP and DOWN buttons should be released.
- 4) Use the UP and DOWN buttons to adjust the maximum temperature
- 5) When the display shows the desired maximum temperature, press the Fire button to exit temperature adjust mode.

The maximum temperature is adjustable between 200° Fahrenheit and 600° Fahrenheit. To disable the temperature protection entirely, adjust the limit up to 600 degrees, then press the UP button one additional time. The temperature limit will read OFF.

To switch to Celsius temperature, adjust temperature down to 200° Fahrenheit, then press the DOWN one button one additional time. The temperature will switch to reading and adjusting in Celsius.

Preheat

When the DNA 200 is used with a temperature sensing atomizer, an additional feature called Preheat is activated. No vapor is produced when the temperature is below the boiling point of the liquid. Preheat applies extra power until the heating coil is up to operating temperature to shorten the

delay between pressing the fire button and generating vapor. Because preheat is temperature based, it will not overheat or burn the vapor.

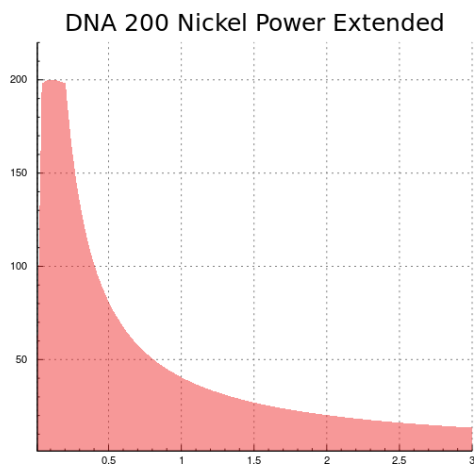
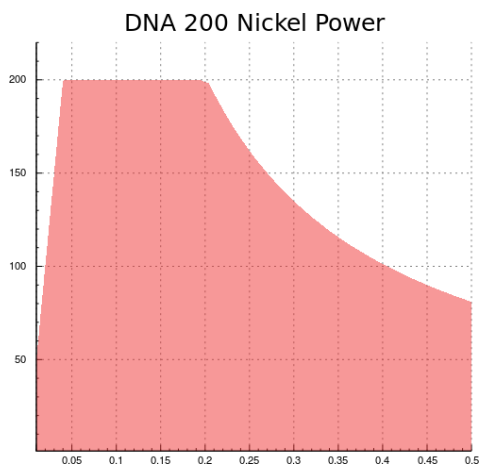
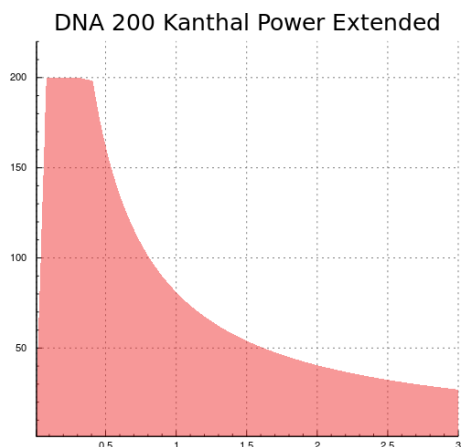
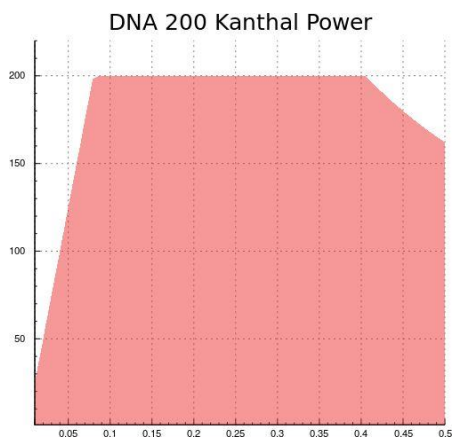
Attaching a New Atomizer

The DNA 200 uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature. If a new atomizer is attached to the DNA 200 before it has cooled down, the temperature may read and protect incorrectly until the new atomizer cools.

When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 200 will prompt you to confirm this change. When you fire the first time, before activating the DNA 200 will prompt “New Coil? UP YES/DOWN NO”. When you see this prompt, if you have attached a new atomizer, press the UP button. If you have disconnected and reconnected the same atomizer, press the DOWN button.

Output Power

The following graphs show the output power range of the DNA 200 as a function of the coil resistance.



Operation

Basic operation of the DNA 200 is as follows. To wake the device from power off state, tap the Fire button. To generate vapor, press the Fire button. To change the wattage setting for more or less vapor, click or hold the Up and Down buttons.

Display

The DNA 200 has a small .91" diagonal white OLED screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. The screen's default position is on top of the board, between the fire and adjust buttons. This allows for easy assembly. The screen connects to the board with a ZIF connector, so alternate placement is possible. It is also possible to order screens with custom length and shape flexible cables, allowing screen placement anywhere in the device. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation.

Watt setting: The power level currently set on the DNA 200.

Battery indicator: The current state of charge of the battery.

Temperature display: When not firing, the maximum heating coil temperature setting. While firing, the actual temperature of the heating coil is displayed.

Volts display: The output voltage being supplied to the atomizer.

Ohms display: The resistance of the atomizer attached to the device. When using a temperature sensing coil, this is the normalized resistance of the coil at 70°F

Alternate display items

Any of the following items can be displayed during operation or charging in lieu of the standard Ohms, Volts or Temperature displays. The Escribe PC software is used to change the display settings. A detailed description of each item can be found in the Escribe manual

Battery Charge	Output Current	Average Output Power of the most recent puff
Battery Pack Voltage	USB Voltage	Average Temperature of the most recent puff
Cell 1 Voltage	USB Current	Total Energy of the most recent puff
Cell 2 Voltage	Board Temperature	Duration of the most recent puff
Cell 3 Voltage	Room Temperatur	Puff Count

Modes

Locked mode: Pressing the fire button five times with less than .7 seconds between presses will cause the device to enter Locked mode. In Locked mode, the device will not fire and the output power will not adjust accidentally. While in Locked mode, the screen will be off, except that pressing a button will show “Locked, Click 5X”. To exit Locked mode, press the fire button 5 times.

Stealth mode: While locked, holding the fire and down buttons simultaneously for five seconds will switch to stealth mode. In this mode the display is off. It will still show error and lock messages. To switch back to normal display mode, hold down the fire and down buttons simultaneously for 5 seconds. This setting is stored to internal flash memory, and remains if power is removed.

Power Locked mode: Holding down both the up and down buttons for two seconds will place the device in Power Locked mode. In this mode, the mod will operate normally, but you will not be able to change the power setting. This mode prevents accidental power level changes due to the buttons being pressed while in a pocket. To exit Power Locked mode, hold the up and down buttons for two seconds.

Resistance lock: The DNA 200 relies on the cold resistance of the atomizer to measure temperature accurately. If the connection is not stable or if you find the measured resistance drifts with time, it may be desirable to lock the atomizer resistance. To do so, while locked hold both the Fire and Up buttons for two seconds to enter Resistance Lock mode. In this mode, the DNA 200 will use the present atomizer cold resistance without refinement until the atomizer is disconnected or the resistance lock is disabled. A lock symbol will replace the ohm symbol on the display. To disable resistance lock, repeat the procedure to lock it.

Max Temperature Adjust: From Locked Mode, holding down both the up and down buttons for two seconds will place the device in Max Temperature Adjust mode. Once this mode is entered, the max temperature will be displayed. The up and down buttons are used to adjust the max temperature. To save the new temperature setting and exit, press the Fire button.

Profiles

The DNA 200 allows you to save and select between eight groups of output settings. Each group of output settings is called a Profile. To switch between profiles, put the DNA 200 into Power Locked mode by pressing and holding both the up and down buttons for two seconds. From power locked mode, to cycle between profiles, double click the Up or Down button. To select the displayed profile, press the fire button.

Each profile contains an output power setting and a maximum temperature setting. These can be adjusted on the device, and will be saved when a different profile is selected. Additionally, the resistance lock setting and value for each atomizer is saved in the profile, which can alleviate temperature inaccuracies stemming from attaching atomizers before they have completely cooled. Many more output settings, including the coil material and preheat settings can be adjusted on a per-profile basis using the Escribe PC software.

Evolv recommends setting up one profile for each atomizer that you regularly use with the DNA 200. It is much faster to switch profiles than it is to set up the settings for the atomizer again.

Error Messages

The DNA 200 will indicate a variety of error states.

Check Atomizer: The DNA does not detect an atomizer, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Shorted: The atomizer or wiring are short circuited.

Weak Battery: The battery needs to be charged, or a higher rate battery needs to be used. If this happens, the DNA 200 will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to flash for a few seconds after the end of puff.

Temperature Protected: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 200 will continue to fire, but will not be able to provide the desired wattage.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 200 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to flash for a few seconds after the end of puff.

Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA200 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to flash for a few seconds after the end of puff.

Too Hot: The DNA 200 has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

Auto power down

The screen will be at full brightness while firing. After 10 seconds with no button presses, the screen will dim. 30 seconds after the last button press, the screen will fade out and the device will go into sleep mode. To wake the device, press the fire button.

Charger

The DNA 200 has a built in 1A USB charger. It automatically detects the type of USB power supply it is connected to, so it can be plugged into standard PC USB ports or higher power chargers. The max charge current is based on the cell capacity as programmed in EScript.

Cell-by-cell monitoring

The DNA 200 runs from a three cell battery. Because lithium polymer cells can be damaged by excessive discharge, with multi-cell series batteries it is important to measure each cell in the battery independently and stop firing the atomizer when any of the cells reaches the cutoff voltage. The DNA 200 uses the battery pack taps to monitor each cell.

Cell Balancer

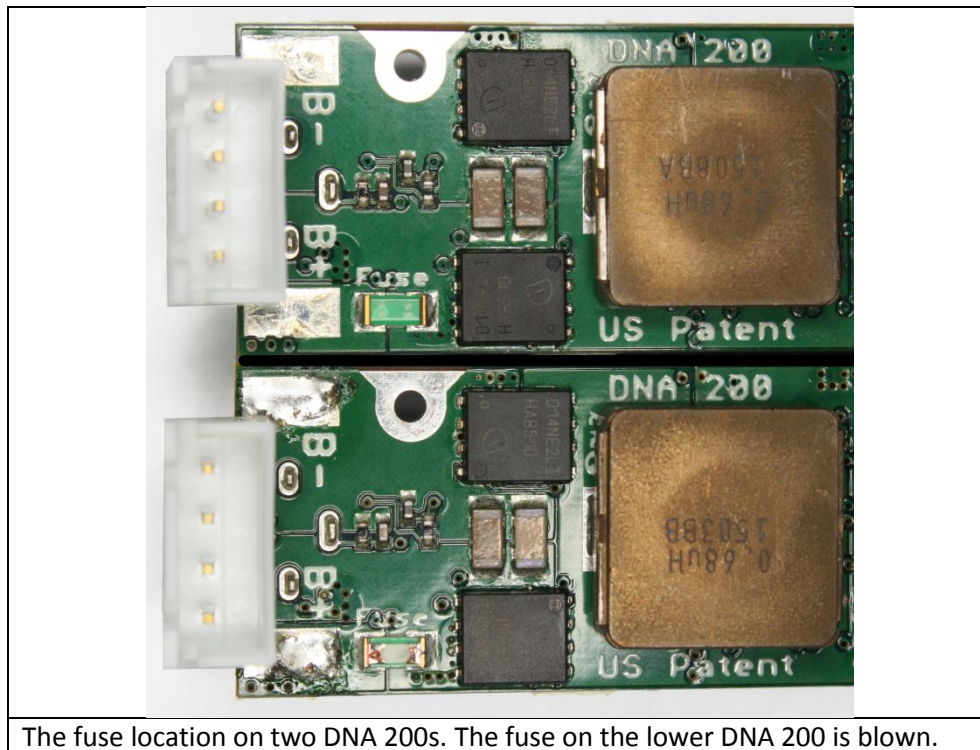
During charging, it is vital that none of the batteries charge beyond 4.2 volts per cell. If one of the cells in the battery has more charge than the others, its voltage will be higher. During charging, the DNA 200 will turn on a “balancer” to charge that cell more slowly, to allow the less charged cells to catch up.

By monitoring and charging each cell individually, the safety of a multi-cell pack is equivalent to using a single cell. Many products, from power tools to laptops to electric vehicles, use multi-cell packs. All responsible multi-cell lithium based designs use cell by cell monitoring and balancing to operate safely.

Fuse

Because of the energy and power stored in the battery, the DNA 200 includes an onboard 25 amp SMT fuse. The fuse is located on the underside of the PCB near the B+ battery terminal, and is labelled “Fuse”. In normal operation the fuse should never blow. However, in the event of an error or short circuit on the board, the fuse will protect the battery. Should it need to be replaced, the fuse is manufactured by Schurter, part number 3413.0332.22

Replacement is accomplished by de-soldering the blown fuse from the board and soldering on a new fuse.



The fuse location on two DNA 200s. The fuse on the lower DNA 200 is blown.

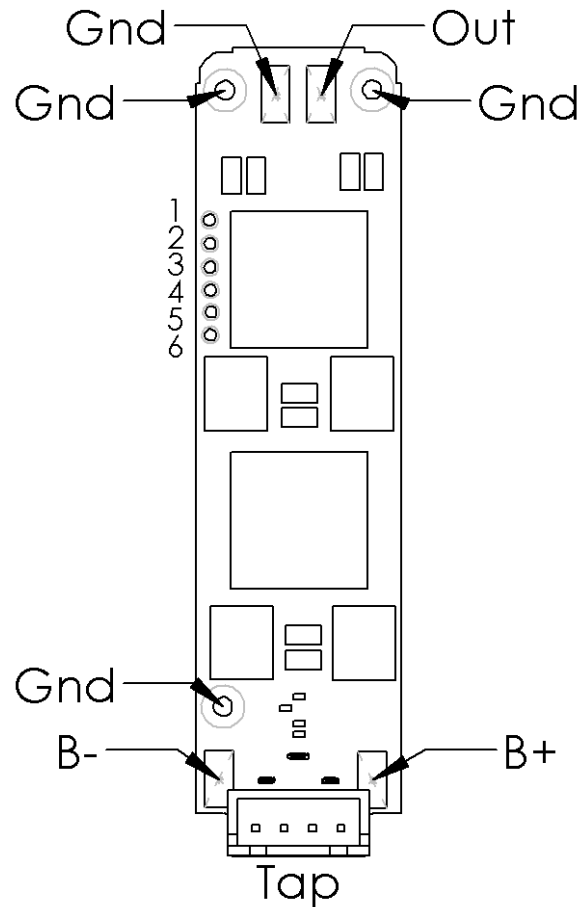
DNA 200 is designed for battery packs that are permanently installed into the device, or battery packs that install using an insulated, polarized connector rated for at least 25 amps. If the battery pack is installed with the polarity reversed, the fuse will blow to protect the battery pack, board and user.

If you are manufacturing a device that is designed to be used with three individual replaceable 18650 cells, an accessory board is available from Evolv to adapt from three individual cells to a pack and tap connector pinout, as well as provide cell-by-cell protection against incorrectly installed or reversed cells.

Escribe

Escribe is a software package used to configure, monitor and modify the operation of your DNA 200. It installs on a Windows PC and connects to your DNA 200 using the USB port. Escribe has a separate manual and tutorials which can be found on Evolv's site.

Pinout (shown bottom side)



Pin Number	Pin Name	Function
Out	Out	Power output.
1	Fire +	Positive side of the fire button.
2	Fire-	Negative side of the fire button.
3	Up-	Negative side of the power up button.
4	Up+	Positive side of the power up button.
5	Down +	Positive side of the power down button.
6	Down -	Negative side of the power down button.
GND	GND	Power output. GND is the ground return for the atomizer. It is connected internally to B-. There are three ground lugs and one ground pad.
B+	B+	Positive battery terminal.
B-	B-	Negative battery terminal. Internally connected to Gnd
Tap	Tap	Positive battery terminal. Larger terminal is the main power connection for the battery.

Wiring

The atomizer is connected to the OUT pad. If the DNA 200 is not being grounded through the mounting screws, the GND pad should connect to the negative side of the connector. The battery is connected to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA. Too small wire will not perform well, and significantly undersized wire can burn out. The output wires should be silicone or Teflon insulated only, and at least 14 gauge. The input wire carries less current, and can be as small as 20 gauge wire if silicone or Teflon insulated.

Recommended wire sizes			
	Minimum size	Recommended size	Maximum size
Battery, silicone insulated	20 gauge	18 gauge	16 gauge
Battery, PVC Insulated	18 gauge	16 gauge	14 gauge
Output, silicone insulated	16 gauge	14 gauge	12 gauge
Switches, if used	28 gauge	24 gauge	22 gauge

External component recommendations

The DNA 200 is a self-contained power regulator which does not require external components for its user interface. However, it does support the use of external interface components if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended. Please use caution, as the positive side of the fire button connects directly to positive battery voltage.

Up/Down buttons:

The small onboard buttons labeled UP and DOWN allow the user to increase or decrease the power level in .1 Watt increments. Alternatively, remote normally open type switches or buttons can be attached to the UP and DOWN mounting holes for customization.


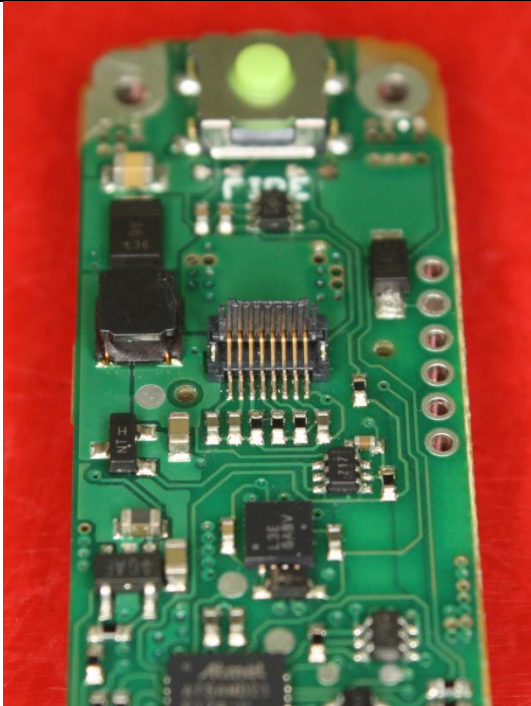
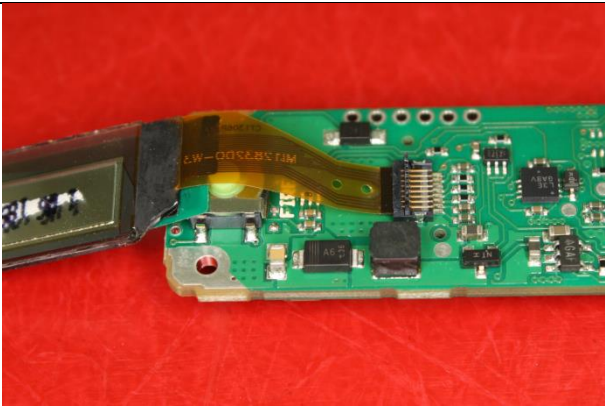
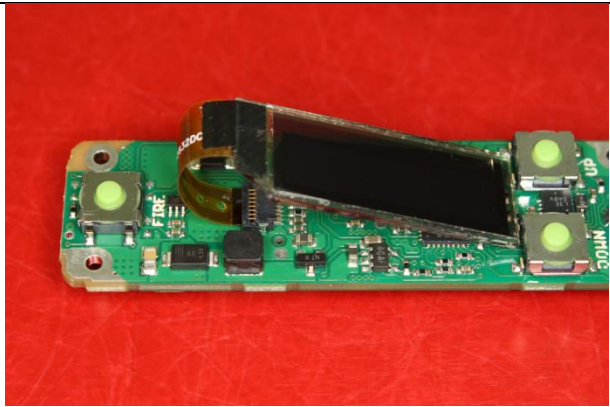
Battery:

The DNA 200 runs from a 3s lithium polymer type battery pack. This type of battery requires cell-by-cell battery monitoring and balance charging to operate safely. The DNA 200 connects to the cell taps on the battery pack with a four position JST-XH connector. The tap connector must be connected for the DNA 200 to run.

Assembly

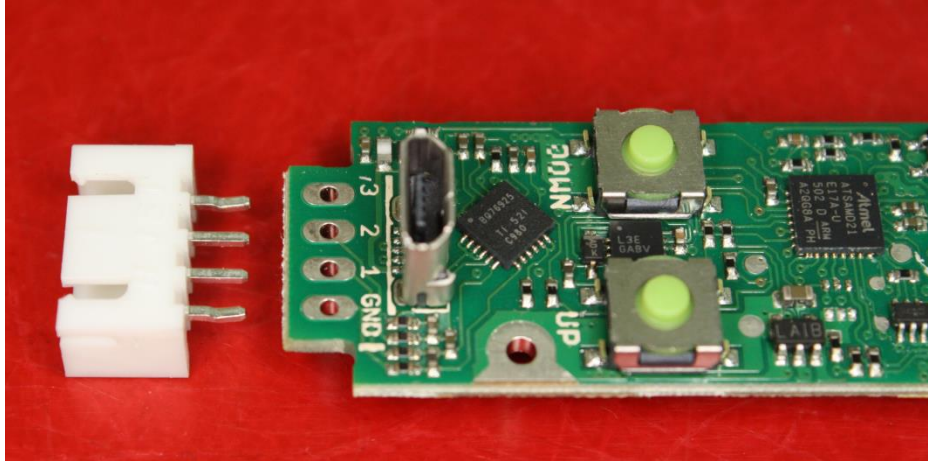
Installing the Screen

The OLED screen mounts to the DNA 200 using an 8 pin ZIF socket and a flexible cable to allow for design flexibility. The cable can be bent or folded (once) but care should be taken to not apply tension or strain to the area where the cable attaches to the screen itself.


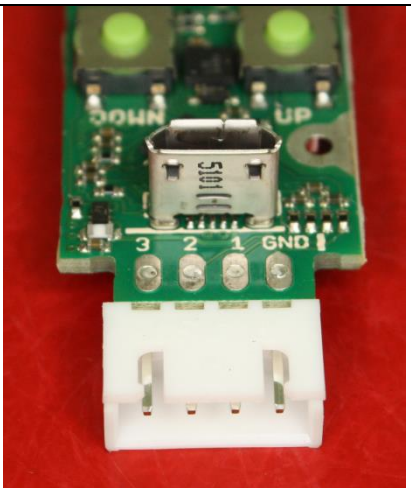
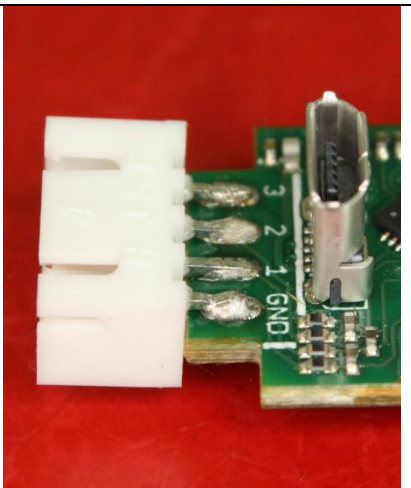
	
Step 1: Locate the ZIF connector on the DNA 200 PCB	Step 2: Carefully and gently lift the locking tab on the rear of the connector to vertical
	
Step 3: Fully insert the flexible cable into the front of the socket with the contact side towards the PCB	Step 4: Close the locking tab and press until the connector gently clicks. Remove the clear screen protector by pulling on the green tab.

Installing the Balance Connector

Step 1: Locate the balance connector in your packaging. The balance connector is made by JST and is part number B4B-XH-A. Ensure that the battery to be used has a matching XH series connector. If it does not, procure an appropriate connector for the board or battery pack.



Step 2: The balance connector can be installed a number of different ways to best fit the device. Some options are shown below. However the connector is mounted, is critical to keep the balance wires in the proper orientation and sequence.

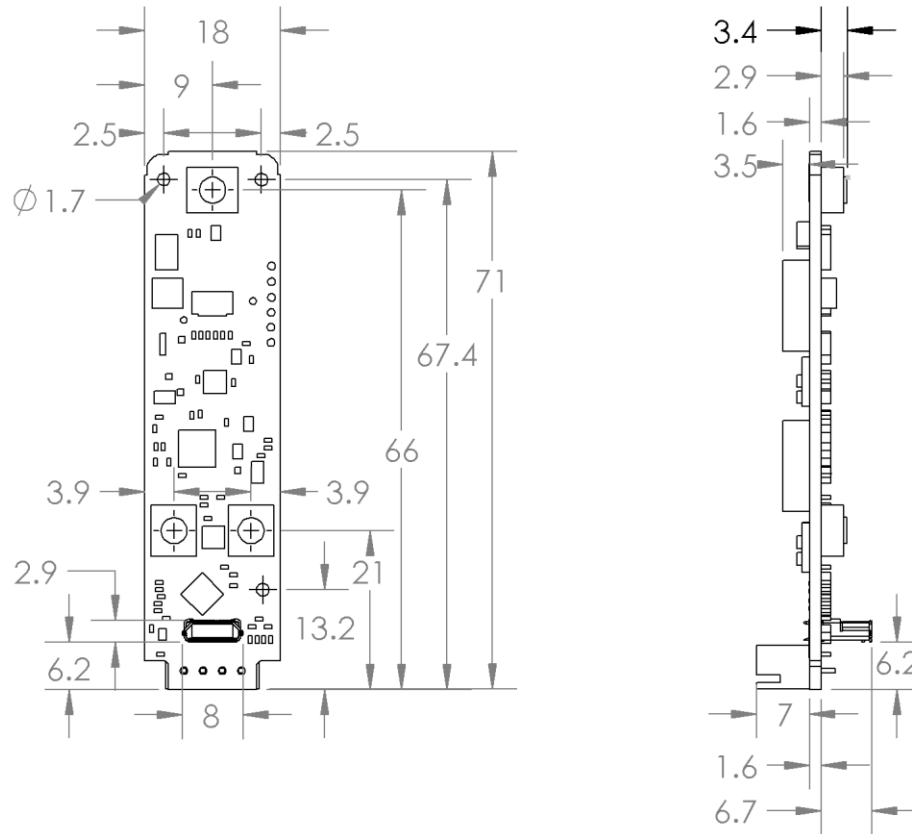
		
Option 1: Through hole soldered	Option 2: Surface mounted below the board	Option 3: Surface Mounted above the board

Mounting

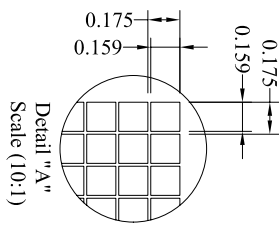
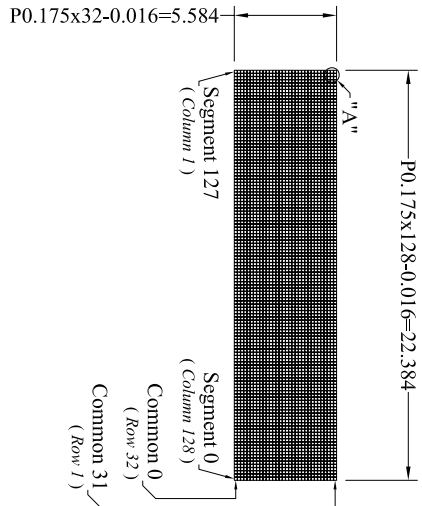
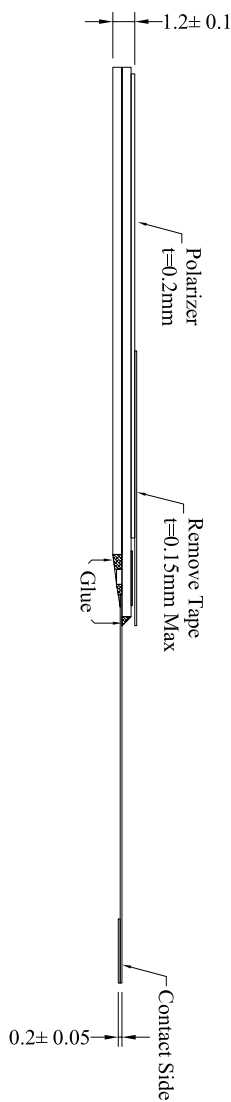
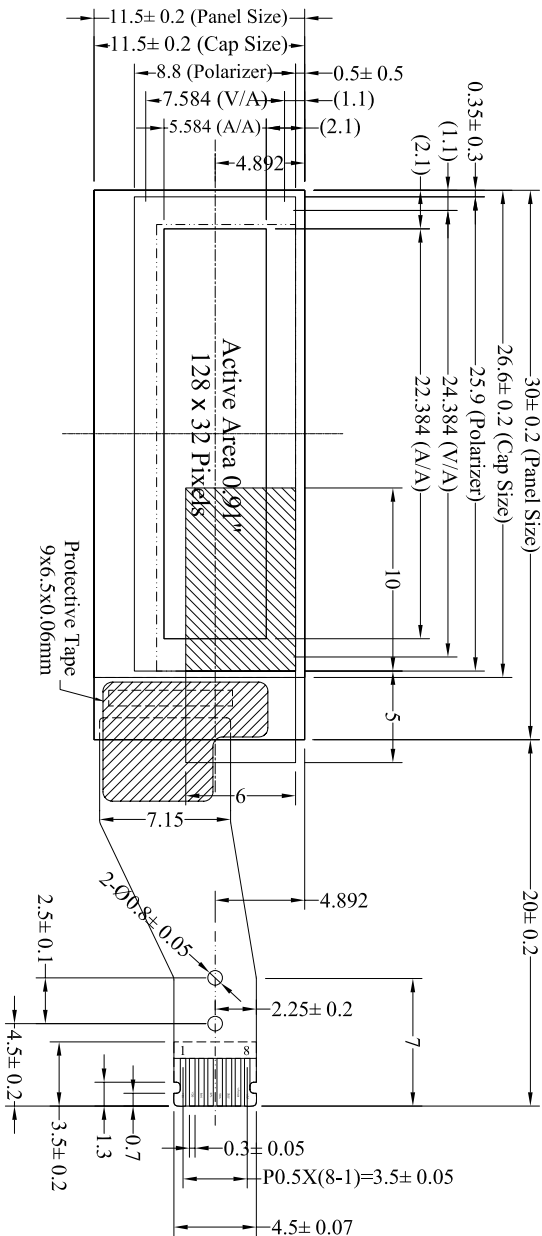
The DNA 200 has onboard switches for adjusting the power level and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

The DNA 200 has three mounting holes on the PCB. These holes are designed for #0 screws. There is an extended mounting pad of .125" diameter around each. These holes are electrically connected to each other and to ground. With careful design, the mounting pads can be used to ground the chassis to the DNA 200, and pass the output current through chassis to the connector. However, if using this method, ensure that the PCB remains in good contact with the board at all times. Split lock washers and a RoHS chromate conversion coating on the chassis are recommended.

Mechanical Dimensions



Evolv has 3D models of the DNA 200 available on their website in IGES, STP and Solidworks format.

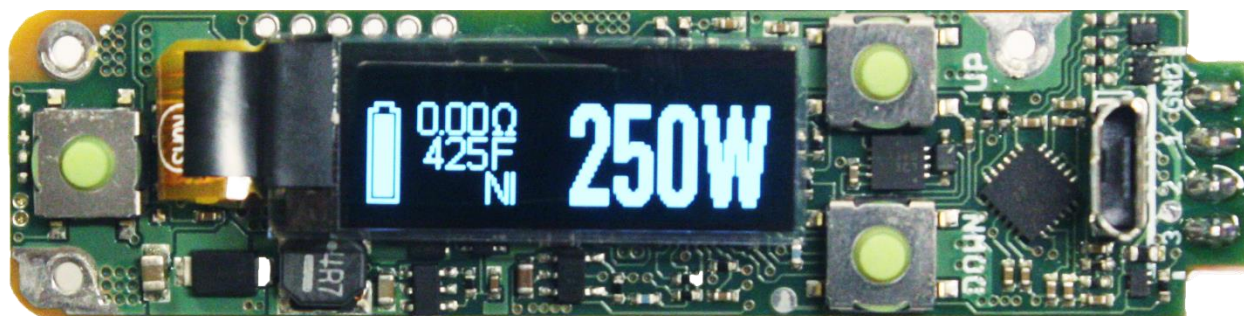


Pin	Symbol
1	VSS
2	VDD
3	RES
4	SCL
5	SDA
6	IREF
7	WGMH
8	VCC

- Notes:
1. Color: White
 2. Driver IC: SSD1306
 3. FPC Number: TBD
 4. Interface: I² C
 5. General Tolerance: ± 0.30



Evolv DNA 250



250 Watt Variable Power Module with Temperature Protection and USB

The DNA 250 is a power regulated digital switch-mode DC-DC converter for personal vaporizers. It features Evolv's patented Wattage Control, Temperature Protection, Preheat, OLED Screen, and waterproof onboard buttons. The USB port and Evolv's EScribe software can be used to customize or monitor the user experience. The DNA 250 runs from a 3 cell lithium polymer battery, and features cell-by-cell battery monitoring and integrated 2A balance charger.

Specifications

	Minimum	Typical	Max
Output Power	1 Watt		250 Watts
Output Voltage	.5 Volt		9.3 Volts
Output Current, continuous			55.0 Amps
Output Current, instantaneous peak			60.0 Amps
Atomizer Resistance, temperature sensing wire, cold	See Graph	.10 Ohm	See Graph
Atomizer Resistance, kanthal wire	See Graph	.20 Ohm	See Graph
Temperature Limit	200°F	450°F	600°F
Input Voltage	9.0 Volts	11.1 Volts	12.6 Volts
Input Current	.5 Amps	9.0 Amps	28.0 Amps
Screen On Current		21mA	
Quiescent Current		3.5 mA	
Power Down Current			25uA
Efficiency		97%	
Weight		15g	
Footprint	.71" x 2.80"		18mm x 71mm
Thickness		.32"	
Screen size		.91" OLED	

Contents

Specifications	1
Temperature Protection	4
Preheat.....	4
Attaching a New Atomizer	5
Output Power.....	5
Operation	6
Display.....	6
Alternate display items	6
Modes	7
Profiles	8
Coil Materials	8
Error Messages	9
Auto power down	9
Charger.....	10
Cell-by-cell monitoring.....	10
Cell Balancer.....	10
Fuse.....	11
Escribe.....	12
Pinout (shown bottom side)	13
Wiring.....	14
Recommended wire sizes	14
External component recommendations	14
Assembly	15
Installing the Screen.....	15
Installing the Balance Connector	16
Mounting.....	17
Mechanical Dimensions	18

Temperature Protection

The DNA 250 directly measures and limits the temperature of the heating coil during operation. By preventing the coil from becoming too hot regardless of fluid, wicking or airflow, a variety of undesirable situations can be prevented. For example, appropriate temperature settings will prevent the wicking material from charring, which compromises taste and introduces unintended chemicals into the vapor. Appropriate temperature settings will also reduce the breakdown of flavoring and base liquid components, which could impact taste or safety.

Evolv's Temperature Protection Technology requires a heating coil made from Nickel 200 alloy or other materials with a well-defined temperature coefficient of resistance, rather than Nickel Chromium or Kanthal alloys. If the temperature reaches the maximum value, the wattage applied to the atomizer coil is reduced to prevent overheating. Please note that the temperature reading is the average temperature of the atomizer coil, and care should be taken to construct the heating coil so that the temperature is uniform, without hot or cold spots.

Because wattage, not temperature controls vapor volume, large vapor volumes can be produced without unnecessarily high temperatures. Temperature Protection is most helpful if the atomizer begins to dry out, the user pauses during a puff, the beginning or end of the puff, or if the wattage setting is inappropriate for the attached atomizer.

In normal operation, when the device is not firing the maximum temperature setting is displayed on the screen. When the device is firing, the actual average temperature of the coil is displayed on the screen.

By default, the Temperature Protection setting is 450° Fahrenheit. To change the limit

- 1) Lock the device by pressing the Fire button five times.
- 2) Hold down the UP and DOWN adjust buttons for two seconds.
- 3) After two seconds, the maximum temperature will be displayed, and the UP and DOWN buttons should be released.
- 4) Use the UP and DOWN buttons to adjust the maximum temperature
- 5) When the display shows the desired maximum temperature, press the Fire button to exit temperature adjust mode.

The maximum temperature is adjustable between 200° Fahrenheit and 600° Fahrenheit. To disable the temperature protection entirely, adjust the limit up to 600 degrees, then press the UP button one additional time. The temperature limit will read OFF.

To switch to Celsius temperature, adjust temperature down to 200° Fahrenheit, then press the DOWN one button one additional time. The temperature will switch to reading and adjusting in Celsius.

Preheat

When the DNA 250 is used with a temperature sensing atomizer, an additional feature called Preheat is activated. No vapor is produced when the temperature is below the boiling point of the liquid. Preheat applies extra power until the heating coil is up to operating temperature to shorten the

delay between pressing the fire button and generating vapor. Because preheat is temperature based, it will not overheat or burn the vapor.

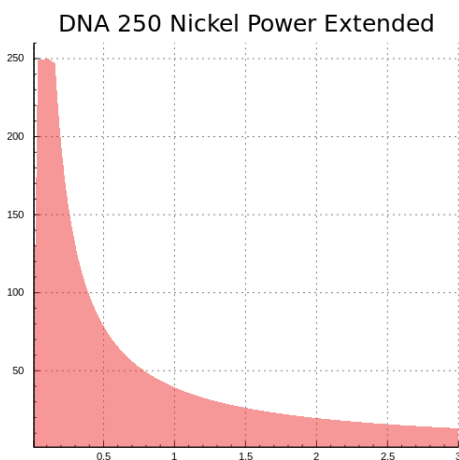
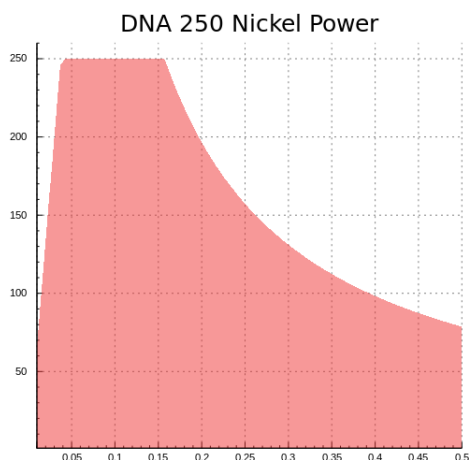
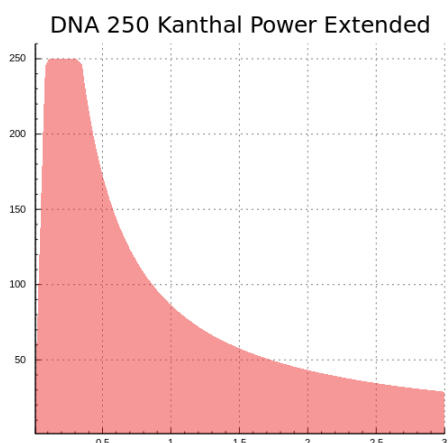
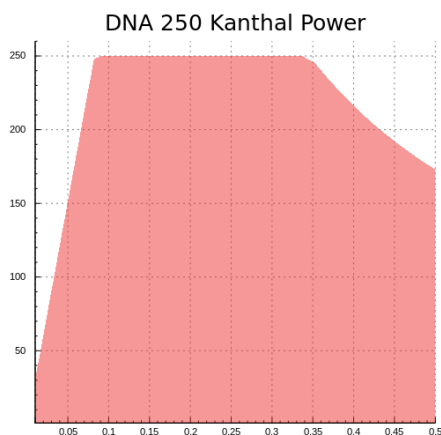
Attaching a New Atomizer

The DNA 250 uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature. If a new atomizer is attached to the DNA 250 before it has cooled down, the temperature may read and protect incorrectly until the new atomizer cools.

When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 250 will prompt you to confirm this change. When you fire the first time, before activating the DNA 250 will prompt “New Coil? UP YES/DOWN NO”. When you see this prompt, if you have attached a new atomizer, press the UP button. If you have disconnected and reconnected the same atomizer, press the DOWN button.

Output Power

The following graphs show the output power range of the DNA 250 as a function of the coil resistance.



Operation

Basic operation of the DNA 250 is as follows. To wake the device from power off state, tap the Fire button. To generate vapor, press the Fire button. To change the wattage setting for more or less vapor, click or hold the Up and Down buttons.

Display

The DNA 250 has a small .91" diagonal white OLED screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. The screen's default position is on top of the board, between the fire and adjust buttons. This allows for easy assembly. The screen connects to the board with a ZIF connector, so alternate placement is possible. It is also possible to order screens with custom length and shape flexible cables, allowing screen placement anywhere in the device. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation.

Watt setting: The power level currently set on the DNA 250.

Battery indicator: The current state of charge of the battery.

Temperature display: When not firing, the maximum heating coil temperature setting. While firing, the actual temperature of the heating coil is displayed.

Volts display: The output voltage being supplied to the atomizer.

Ohms display: The resistance of the atomizer attached to the device. When using a temperature sensing coil, this is the normalized resistance of the coil at 70°F

Alternate display items

Any of the following items can be displayed during operation or charging in lieu of the standard Ohms, Volts or Temperature displays. The Escribe PC software is used to change the display settings. A detailed description of each item can be found in the Escribe manual

Battery Charge	Output Current	Average Output Power of the most recent puff
Battery Pack Voltage	USB Voltage	Average Temperature of the most recent puff
Cell 1 Voltage	USB Current	Total Energy of the most recent puff
Cell 2 Voltage	Board Temperature	Duration of the most recent puff
Cell 3 Voltage	Room Temperature	Puff Count
Profile Name	Material Name	

Modes

Locked mode: Pressing the fire button five times with less than .7 seconds between presses will cause the device to enter Locked mode. In Locked mode, the device will not fire and the output power will not adjust accidentally. While in Locked mode, the screen will be off, except that pressing a button will show “Locked, Click 5X”. To exit Locked mode, press the fire button 5 times.

Stealth mode: While locked, holding the fire and down buttons simultaneously for five seconds will switch to stealth mode. In this mode the display is off. It will still show error and lock messages. To switch back to normal display mode, hold down the fire and down buttons simultaneously for 5 seconds. This setting is stored to internal flash memory, and remains if power is removed.

Power Locked mode: Holding down both the up and down buttons for two seconds will place the device in Power Locked mode. In this mode, the mod will operate normally, but you will not be able to change the power setting. This mode prevents accidental power level changes due to the buttons being pressed while in a pocket. To exit Power Locked mode, hold the up and down buttons for two seconds.

Resistance lock: The DNA 250 relies on the cold resistance of the atomizer to measure temperature accurately. If the connection is not stable or if you find the measured resistance drifts with time, it may be desirable to lock the atomizer resistance. To do so, while locked hold both the Fire and Up buttons for two seconds to enter Resistance Lock mode. In this mode, the DNA 250 will use the present atomizer cold resistance without refinement until the atomizer is disconnected or the resistance lock is disabled. A lock symbol will replace the ohm symbol on the display. To disable resistance lock, repeat the procedure to lock it.

Max Temperature Adjust: From Locked Mode, holding down both the up and down buttons for two seconds will place the device in Max Temperature Adjust mode. Once this mode is entered, the max temperature will be displayed. The up and down buttons are used to adjust the max temperature. To save the new temperature setting and exit, press the Fire button.

Profiles

The DNA 250 allows you to save and select between eight groups of output settings. Each group of output settings is called a Profile. To switch between profiles, put the DNA 250 into Power Locked mode by pressing and holding both the up and down buttons for two seconds. From power locked mode, to cycle between profiles, double click the Up or Down button. To select the displayed profile, press the fire button.

Each profile contains an output power setting and a maximum temperature setting. These can be adjusted on the device, and will be saved when a different profile is selected. Additionally, the resistance lock setting and value for each atomizer is saved in the profile, which can alleviate temperature inaccuracies stemming from attaching atomizers before they have completely cooled. Many more output settings, including the coil material and preheat settings can be adjusted on a per-profile basis using the Escribe PC software.

Evolv recommends setting up one profile for each atomizer that you regularly use with the DNA 250. It is much faster to switch profiles than it is to set up the settings for the atomizer again.

Coil Materials

The coil material for each Profile can be changed directly on the device for any material that exists in the Materials Repository. To change the currently selected Profile's material, press the Fire button five times to Lock the device. With the device Locked, hold the Up, Down, and Fire buttons simultaneously for two seconds. Then, use the Up and Down buttons to cycle through materials, when the desired material is displayed press the Fire button to confirm your selection.

Error Messages

The DNA 250 will indicate a variety of error states.

Check Atomizer: The DNA does not detect an atomizer, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Shorted: The atomizer or wiring are short circuited.

Weak Battery: The battery needs to be charged, or a higher rate battery needs to be used. If this happens, the DNA 250 will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to flash for a few seconds after the end of puff.

Temperature Protected: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 250 will continue to fire, but will not be able to provide the desired wattage.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 250 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to flash for a few seconds after the end of puff.

Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA250 will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to flash for a few seconds after the end of puff.

Too Hot: The DNA 250 has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

Auto power down

The screen will be at full brightness while firing. After 10 seconds with no button presses, the screen will dim. 30 seconds after the last button press, the screen will fade out and the device will go into sleep mode. To wake the device, press the fire button.

Charger

The DNA 250 has a built in 2A USB charger. It automatically detects the type of USB power supply it is connected to, so it can be plugged into standard PC USB ports or higher power chargers. The max charge current is based on the cell capacity as programmed in EScript.

Cell-by-cell monitoring

The DNA 250 runs from a three cell battery. Because lithium polymer cells can be damaged by excessive discharge, with multi-cell series batteries it is important to measure each cell in the battery independently and stop firing the atomizer when any of the cells reaches the cutoff voltage. The DNA 250 uses the battery pack taps to monitor each cell.

Cell Balancer

During charging, it is vital that none of the batteries charge beyond 4.2 volts per cell. If one of the cells in the battery has more charge than the others, its voltage will be higher. During charging, the DNA 250 will turn on a “balancer” to charge that cell more slowly, to allow the less charged cells to catch up.

By monitoring and charging each cell individually, the safety of a multi-cell pack is equivalent to using a single cell. Many products, from power tools to laptops to electric vehicles, use multi-cell packs. All responsible multi-cell lithium based designs use cell by cell monitoring and balancing to operate safely.

Fuse

Because of the energy and power stored in the battery, the DNA 250 includes an onboard 30 amp SMT fuse. The fuse is located on the underside of the PCB near the B+ battery terminal, and is labelled “Fuse” In normal operation the fuse should never blow. However, in the event of an error or short circuit on the board, the fuse will protect the battery. Should it need to be replaced, the fuse is manufactured by Bel Power Solutions, part number C1H30.

If you suspect your fuse is blown, check continuity across the fuse to verify using a Multimeter.

Replacement is accomplished by de-soldering the blown fuse from the board and soldering on a new fuse.

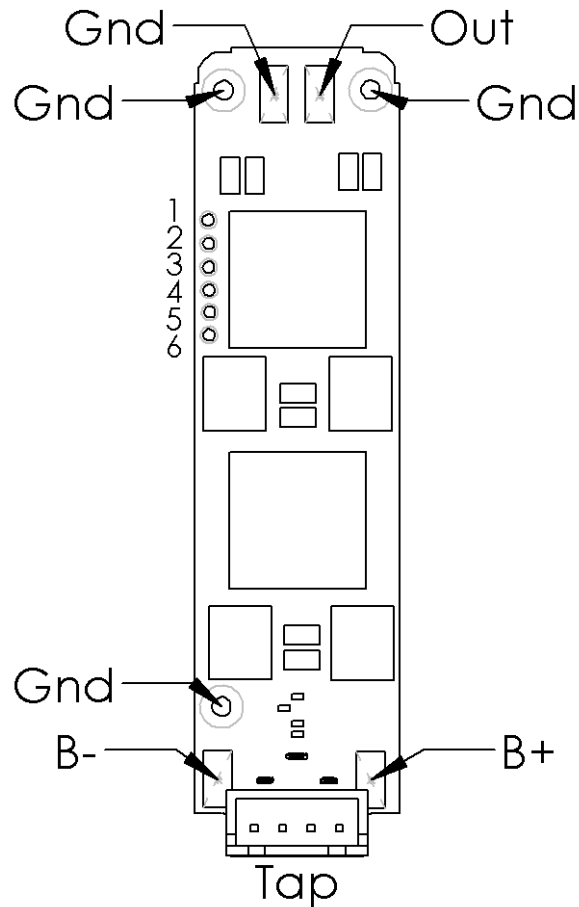
DNA 250 is designed for battery packs that are permanently installed into the device, or battery packs that install using an insulated, polarized connector rated for at least 30 amps. If the battery pack is installed with the polarity reversed, the fuse will blow to protect the battery pack, board and user.

If you are manufacturing a device that is designed to be used with three individual replaceable 18650 cells, the DNA250 now offers reverse polarity protection.

Escribe

Escribe is a software package used to configure, monitor and modify the operation of your DNA 250. It installs on a Windows PC and connects to your DNA 250 using the USB port. Escribe has a separate manual and tutorials which can be found on Evolv's site.

Pinout (shown bottom side)



Pin Number	Pin Name	Function
Out	Out	Power output.
1	Fire +	Positive side of the fire button.
2	Fire-	Negative side of the fire button.
3	Up-	Negative side of the power up button.
4	Up+	Positive side of the power up button.
5	Down +	Positive side of the power down button.
6	Down -	Negative side of the power down button.
GND	GND	Power output. GND is the ground return for the atomizer. It is connected internally to B-. There are three ground lugs and one ground pad.
B+	B+	Positive battery terminal.
B-	B-	Negative battery terminal. Internally connected to Gnd
Tap	Tap	Positive battery terminal. Larger terminal is the main power connection for the battery.

Wiring

The atomizer is connected to the OUT pad. If the DNA 250 is not being grounded through the mounting screws, the GND pad should connect to the negative side of the connector. The battery is connected to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA 250. Too small wire will not perform well, and significantly undersized wire can burn out. The output wires should be silicone or Teflon insulated only, and at least 14 gauge. The input wire carries less current, and can be as small as 20 gauge wire if silicone or Teflon insulated.

Recommended wire sizes			
	Minimum size	Recommended size	Maximum size
Battery, silicone insulated	20 gauge	18 gauge	16 gauge
Battery, PVC Insulated	18 gauge	16 gauge	14 gauge
Output, silicone insulated	16 gauge	14 gauge	12 gauge
Switches, if used	28 gauge	24 gauge	22 gauge

External component recommendations

The DNA 250 is a self-contained power regulator which does not require external components for its user interface. However, it does support the use of external interface components if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended. Please use caution, as the positive side of the fire button connects directly to positive battery voltage.

Up/Down buttons:

The small onboard buttons labeled UP and DOWN allow the user to increase or decrease the power level in .1 Watt increments. Alternatively, remote normally open type switches or buttons can be attached to the UP and DOWN mounting holes for customization.


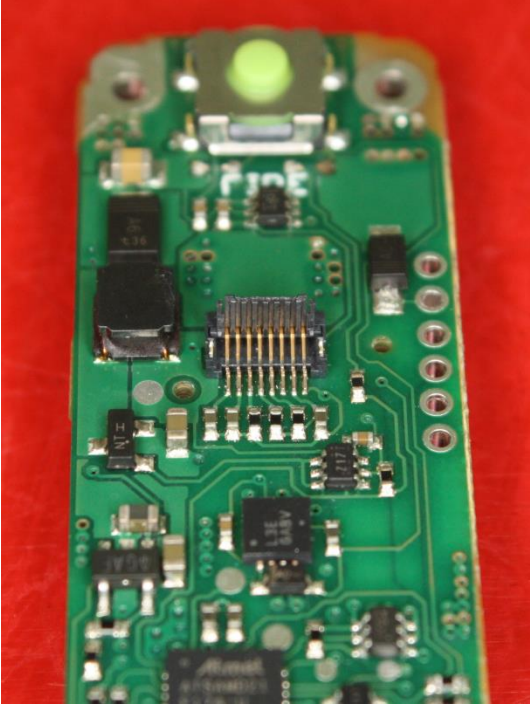
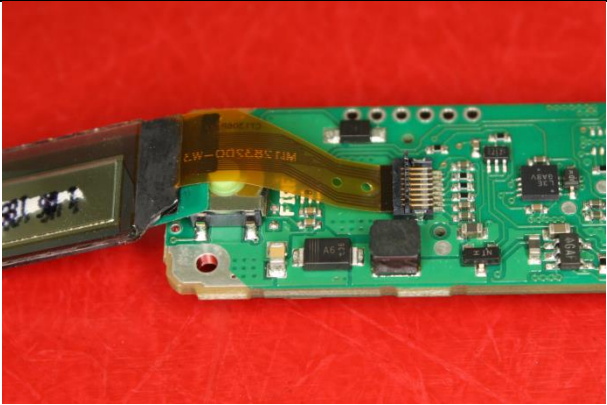

Battery:

The DNA 250 runs from a 3s lithium polymer type battery pack. This type of battery requires cell-by-cell battery monitoring and balance charging to operate safely. The DNA 250 connects to the cell taps on the battery pack with a four position JST-XH connector. The tap connector must be connected for the DNA 250 to run.

Assembly

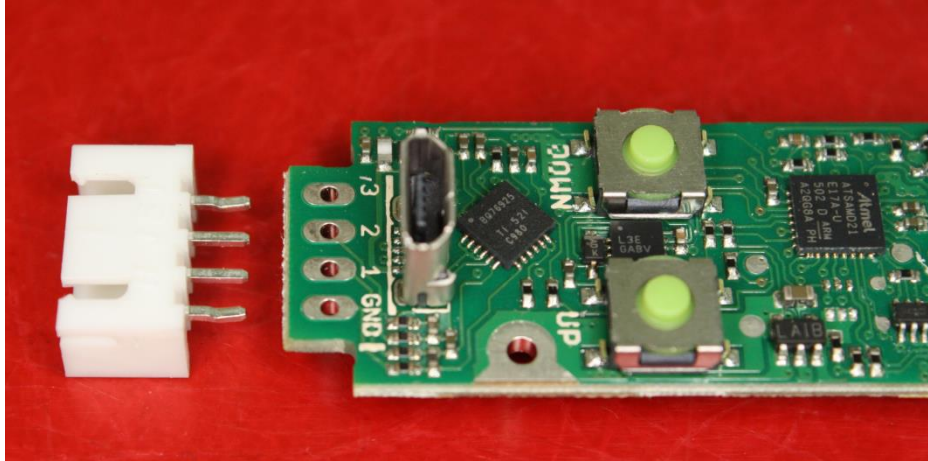
Installing the Screen

The OLED screen mounts to the DNA 250 using an 8 pin ZIF socket and a flexible cable to allow for design flexibility. The cable can be bent or folded (once) but care should be taken to not apply tension or strain to the area where the cable attaches to the screen itself.

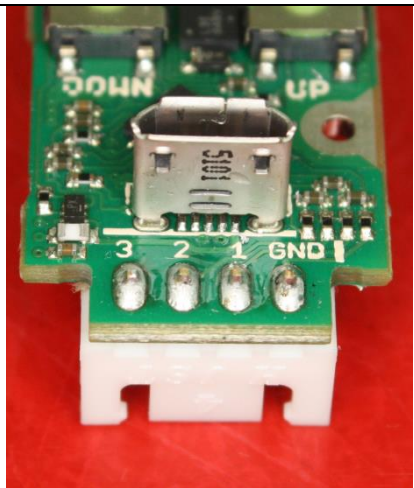
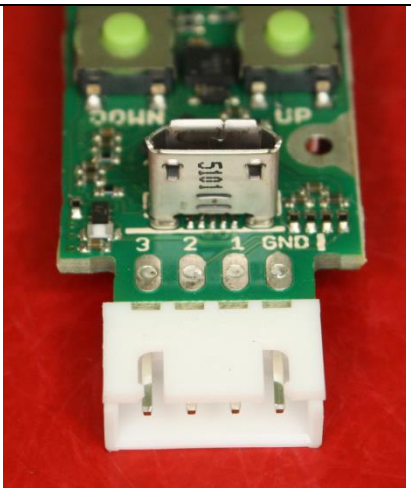
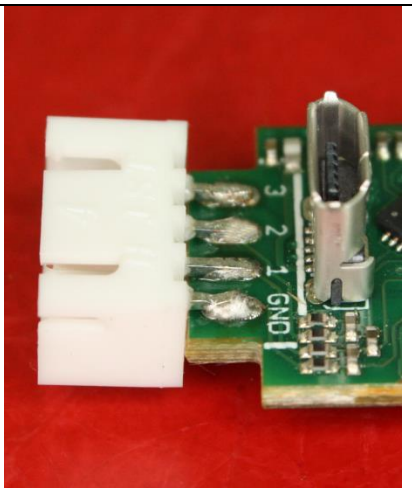
	
Step 1: Locate the ZIF connector on the DNA 250 PCB	Step 2: Carefully and gently lift the locking tab on the rear of the connector to vertical
	
Step 3: Fully insert the flexible cable into the front of the socket with the contact side towards the PCB	Step 4: Close the locking tab and press until the connector gently clicks. Remove the clear screen protector by pulling on the green tab.

Installing the Balance Connector

Step 1: Locate the balance connector in your packaging. The balance connector is made by JST and is part number B4B-XH-A. Ensure that the battery to be used has a matching XH series connector. If it does not, procure an appropriate connector for the board or battery pack.



Step 2: The balance connector can be installed a number of different ways to best fit the device. Some options are shown below. However the connector is mounted, is critical to keep the balance wires in the proper orientation and sequence.

		
Option 1: Through hole soldered	Option 2: Surface mounted below the board	Option 3: Surface Mounted above the board

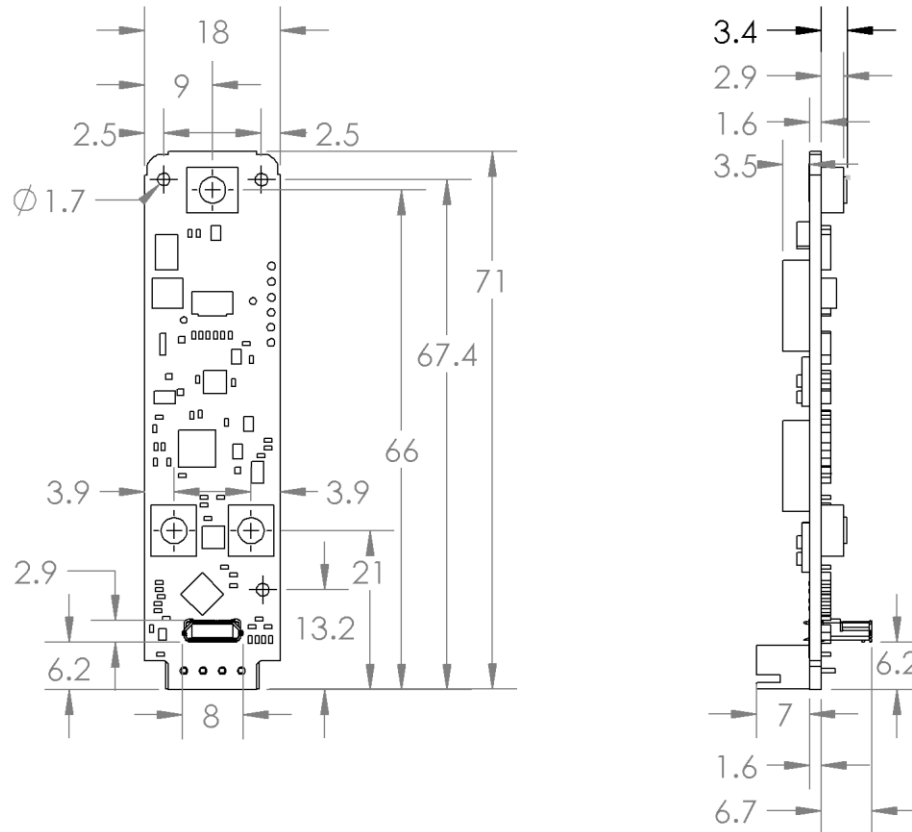
Mounting

The DNA 250 has onboard switches for adjusting the power level and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

The DNA 250 has three mounting holes on the PCB. These holes are designed for #0 screws. There is an extended mounting pad of .125" diameter around each. These holes are electrically connected to each other and to ground. With careful design, the mounting pads can be used to ground the chassis to the DNA 250, and pass the output current through chassis to the connector. However, if using this method, ensure that the PCB remains in good contact with the board at all times. Split lock washers and a RoHS chromate conversion coating on the chassis are recommended.

The DNA 250 was designed to be drop-in compatible for any design currently utilizing a DNA 200.

Mechanical Dimensions



Evolv has 3D models of the DNA 250 available on their website in IGES, STP and Solidworks format.

Evolv DNA 250 Color



400 Watt Variable Power Module with Temperature Protection, Replay, and USB

The DNA 250C is a power regulated digital switch-mode DC-DC converter for personal vaporizers. It features Evolv's patented Wattage Control, Temperature Protection, Replay, Preheat, full color TFT screen, USB On-The-Go, Reverse Polarity Protection, an onboard programmable multicolor LED, waterproof onboard buttons, and a real-time clock. Evolv's EScribe software and Theme Designer software can be used to fully customize all aspects of the interface and monitor the user experience. The DNA 250C runs on two, three, or four series voltage from lithium polymer or lithium ion batteries, and features battery monitoring and an integrated 2A charger.

Operating Range

	Minimum	Typical	Max	Peak
Output Power	1 Watt		400 Watts	
Output Voltage	.2 Volts		10.0 Volts	
Output Current	.5 Amps		65.0 Amps	70.0 Amps
Atomizer Resistance, temperature sensing wire, cold	See Graph	.15 Ohm	See Graph	
Atomizer Resistance, Kanthal wire	See Graph	.25 Ohm	See Graph	
Atomizer Resistance, cold	.02 Ohm		8.0 Ohm	
Temperature Limit	200°F	450°F	600°F	
Input Voltage, unloaded	6.0 Volts	14.8 Volts	16.8 Volts	
Input Current		12.0 Amps	30.0 Amps	32.0 Amps
Screen On Current		21mA		
Quiescent Current		10mA		
Power Down Current		20uA		
Efficiency		98%		

Specifications

Footprint	.79" x 2.75" / 20mm x 70mm
Thickness	.33" / 8.5mm
Screen	.9" 80 x 160 pixel Full Color TFT
Weight	15.85g

Contents

Operating Range	2
Temperature Protection	4
Replay.....	5
Preheat.....	5
Boost	5
Attaching a New Atomizer	5
Output Power.....	6
Display.....	10
Error Messages	10
Charger.....	11
Cell-by-cell Monitoring.....	11
Cell Balancer.....	11
USB On-The-Go	11
Fuse	12
Escribe.....	12
Pinout (bottom side shown)	13
Wiring.....	14
Recommended wire sizes	14
2s Wiring	14
3s Wiring	15
4s Wiring	16
Reverse Polarity Protection	17
External component recommendations	17
Assembly	18
Installing the Balance Connector	18
Installing the Screen.....	19
Mounting.....	20
Mechanical Dimensions	21

Temperature Protection¹

The DNA 250C directly measures and limits the temperature of the heating coil during operation. By preventing the coil from becoming too hot regardless of fluid, wicking or airflow, a variety of undesirable situations can be prevented. For example, appropriate temperature settings will prevent the wicking material from charring, which compromises taste and introduces unintended chemicals into the vapor. Appropriate temperature settings will also reduce the breakdown of flavoring and base liquid components, which could impact taste or safety.

Evolv's Temperature Protection Technology requires a heating coil made from Nickel 200 alloy or other materials with a well-defined temperature coefficient of resistance, rather than Nickel Chromium or Kanthal alloys. If the temperature reaches the maximum value, the wattage applied to the atomizer coil is reduced to prevent overheating. Please note that the temperature reading is the average temperature of the atomizer coil, and care should be taken to construct the heating coil so that the temperature is uniform, without hot or cold spots.

Because wattage, not temperature, controls vapor volume, large vapor volumes can be produced without unnecessarily high temperatures. Temperature Protection is most helpful if the atomizer begins to dry out, the user pauses during a puff, the beginning or end of the puff, or if the wattage setting is inappropriate for the attached atomizer.

In normal operation, when the device is not firing the maximum temperature setting is displayed on the screen.

By default, the Temperature Protection setting is 450° Fahrenheit. To change the limit on the default interface:

- 1) Using the up and down buttons highlight the temperature value.
- 2) Press the select button.
- 3) Using the up and down buttons adjust the temperature to the desired value and press the select button to confirm.
- 4) Use the up and down buttons to adjust the maximum temperature
- 5) When the display shows the desired maximum temperature, press the Fire button to exit temperature adjust mode.

The maximum temperature is adjustable between 200° Fahrenheit and 600° Fahrenheit. To disable the temperature protection entirely, change to a profile that does not support temperature protection such as the 'Watts' profile.

¹ Please note all instructions in this document reference the default Evolv theme. Interface design may vary between devices and manufacturers.

Replay

Replay is a new feature introduced on the DNA 250C. Replay is intended to capture the flavor and satisfaction of the “perfect puff” and provide the same level of performance and consistency on all subsequent puffs. The use of Nickel, Stainless, Titanium, or other material that increases in resistance when heated is required. In addition, Replay will also prevent dry hits when used with wattage control.

To use Replay set the device to the desired power level and operate it normally. Once a satisfying puff is achieved, activate the feature to save and replay the saved puff each time the device is fired. Puff length is not a factor and the user will not be limited to the length of the previous puff. Disable Replay to resume normal operation or find a new puff to save. If Replay cannot be enabled the coil is not compatible.

Preheat

When the DNA 250C is used with a temperature sensing atomizer, an additional feature called Preheat is activated. No vapor is produced when the temperature is below the boiling point of the liquid. Preheat applies extra power until the heating coil is up to operating temperature to shorten the delay between pressing the fire button and generating vapor. Because preheat is temperature based, it will not overheat or burn the vapor. The Preheat settings can be adjusted from the device.

Boost

The DNA 250C supports Boost functionality when not used with a temperature sensing atomizer to briefly increase the initial power output at the start of a puff. This can be useful to allow higher mass coils to reach the point where they produce vapor quicker. Boost can be toggled on or off from the device. The Boost value is adjustable from 1 to 11 with a higher value giving a stronger Boost.

Attaching a New Atomizer

The DNA 250C uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature. If a new atomizer is attached to the DNA 250C before it has cooled down, the temperature may read and protect incorrectly until the new atomizer cools.

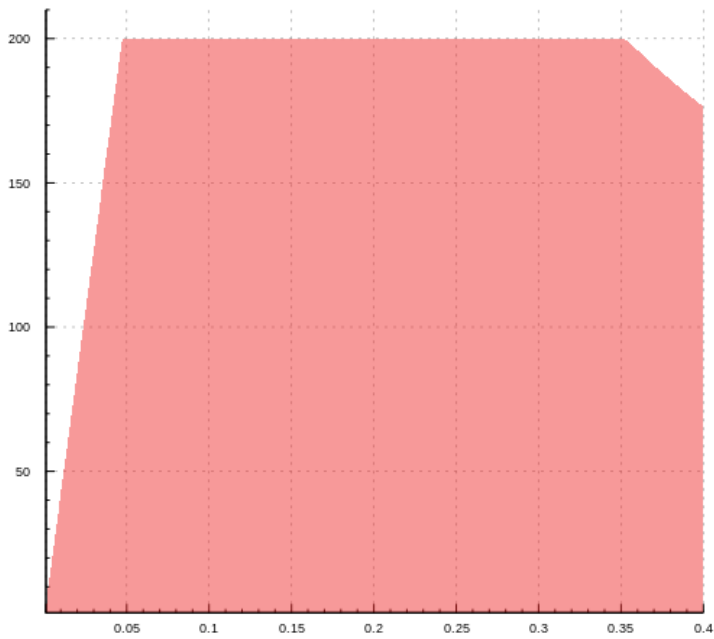
When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 250C will prompt you to confirm this change. When you fire the first time, before activating the DNA 250C will display the ‘New Coil’ screen. When you see this screen, if you have attached a new atomizer, highlight the ‘Yes’ option and press the select button to confirm. If you have disconnected and reconnected the same atomizer, highlight the ‘No’ option and press the select button to confirm. If you believe the sample resistance shown is incorrect you may highlight and select ‘Measure Again’ to take another resistance reading.

Output Power

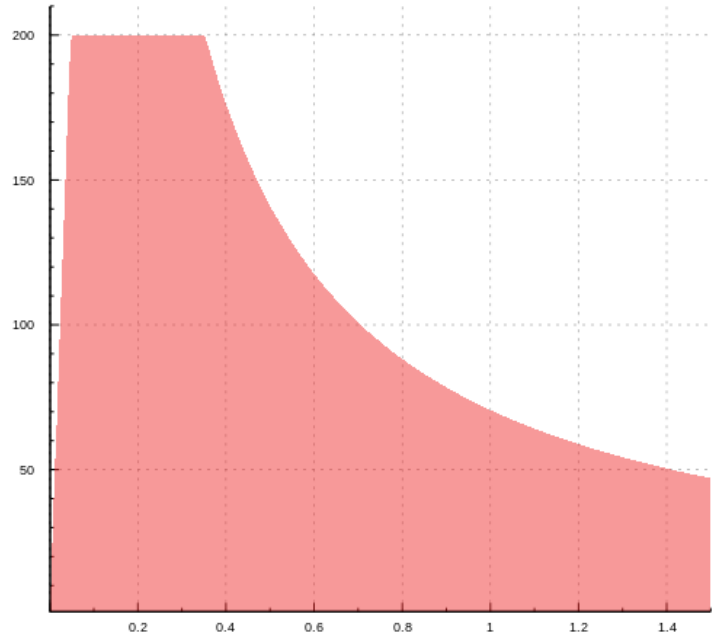
The following graphs show the output power range of the DNA 250C for the various cell configurations as a function of the coil resistance.

2s Output Power

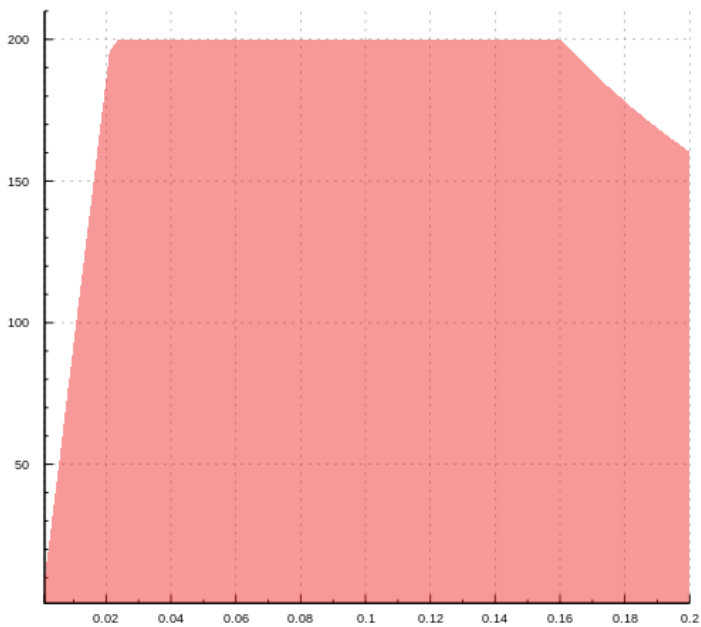
DNA 250C Kanthal Power



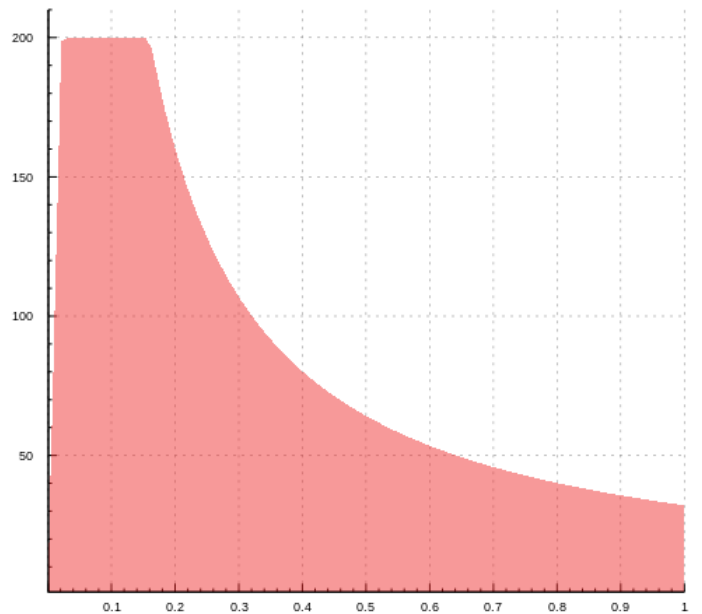
DNA 250C Kanthal Power Extended



DNA 250C Nickel Power

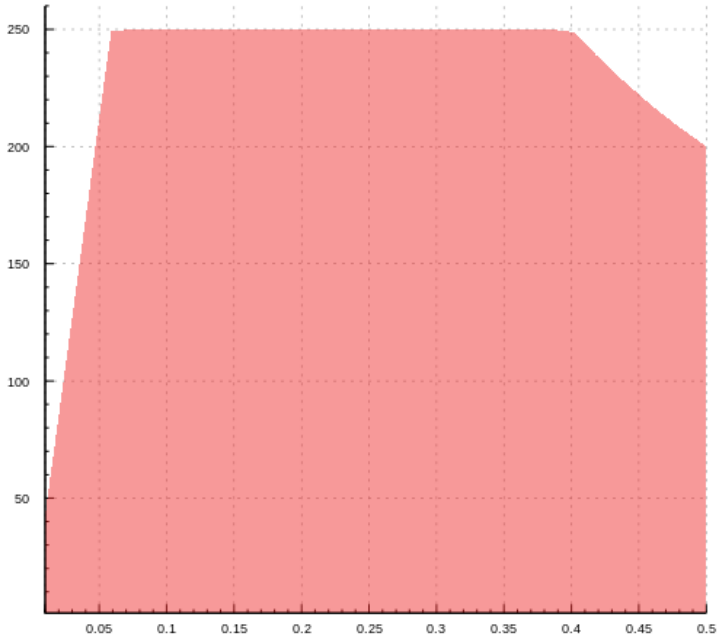


DNA 250C Nickel Power Extended

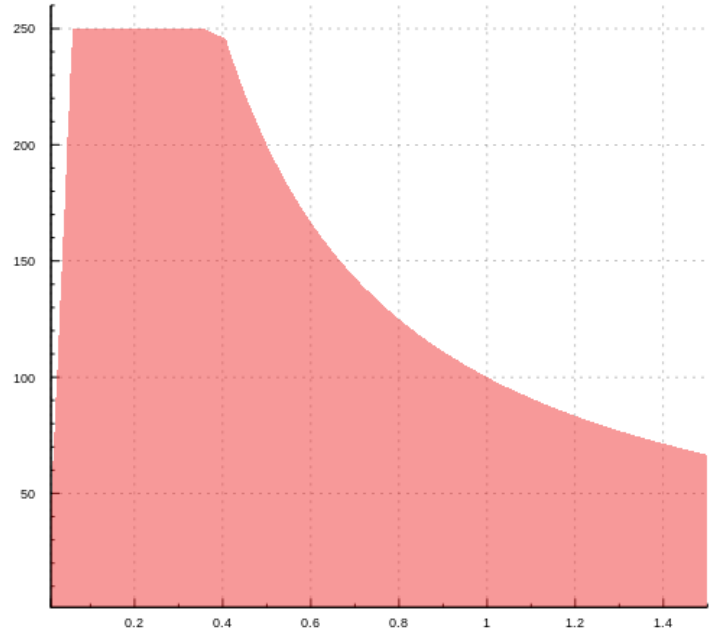


3s Output Power

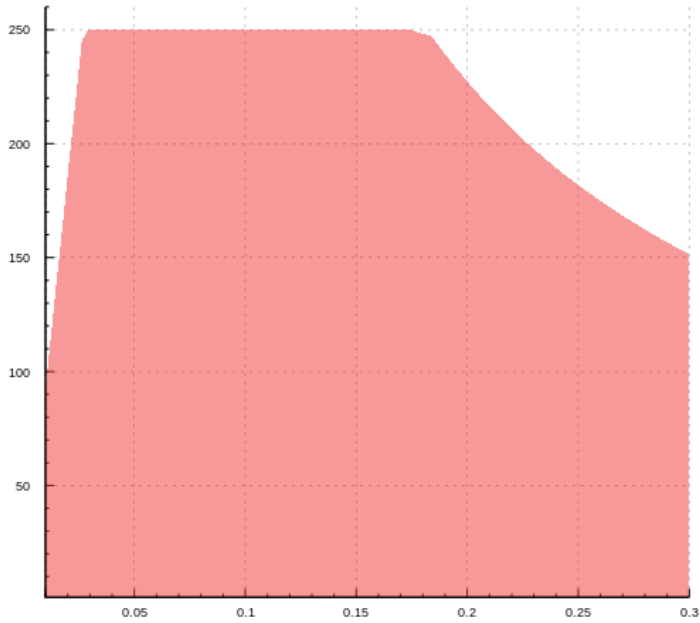
DNA 250C Kanthal Power



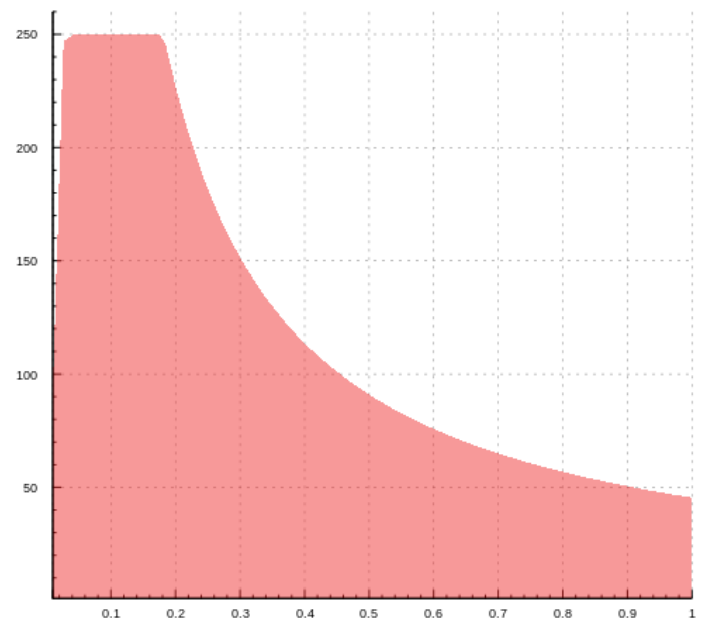
DNA 250C Kanthal Power Extended



DNA 250C Nickel Power

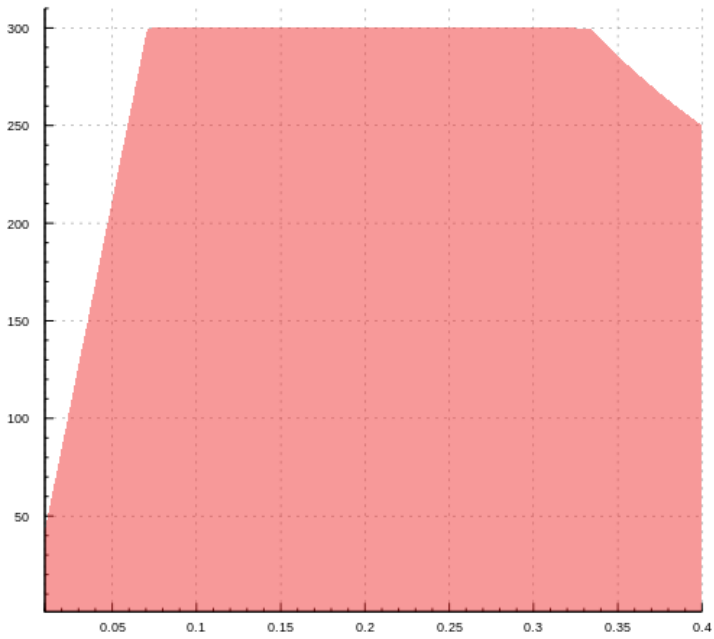


DNA 250C Nickel Power Extended

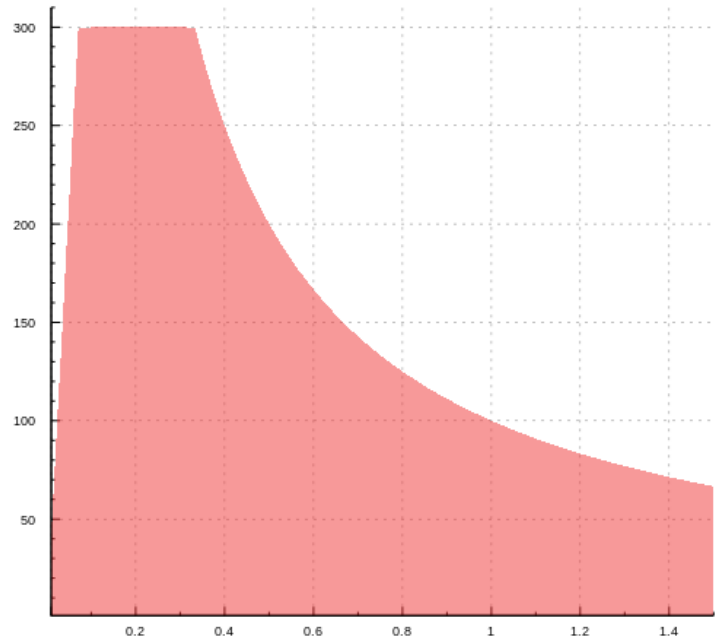


3s Output Power (International)

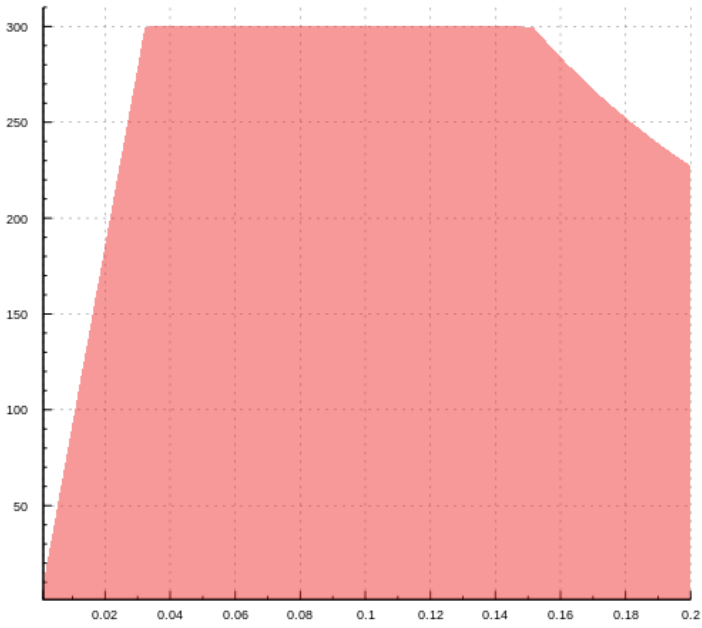
DNA 250C Kanthal Power



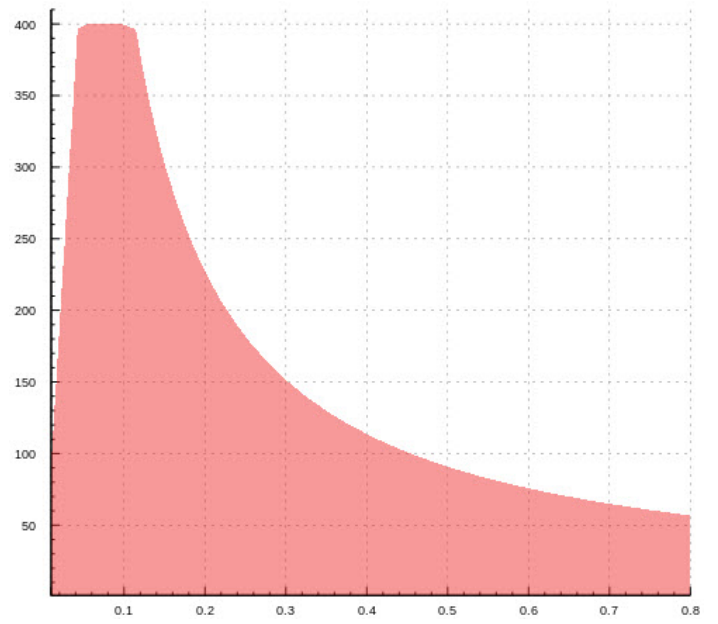
DNA 250C Kanthal Power Extended



DNA 250C Nickel Power

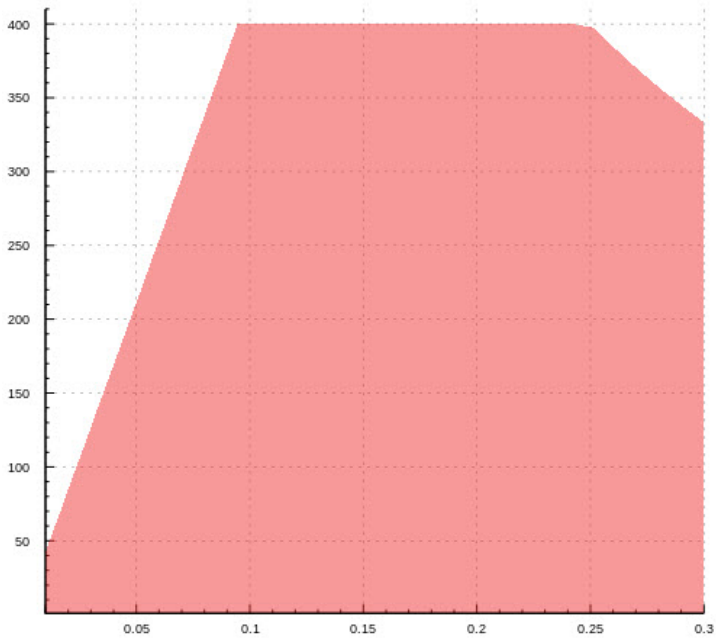


DNA 250C Nickel Power Extended

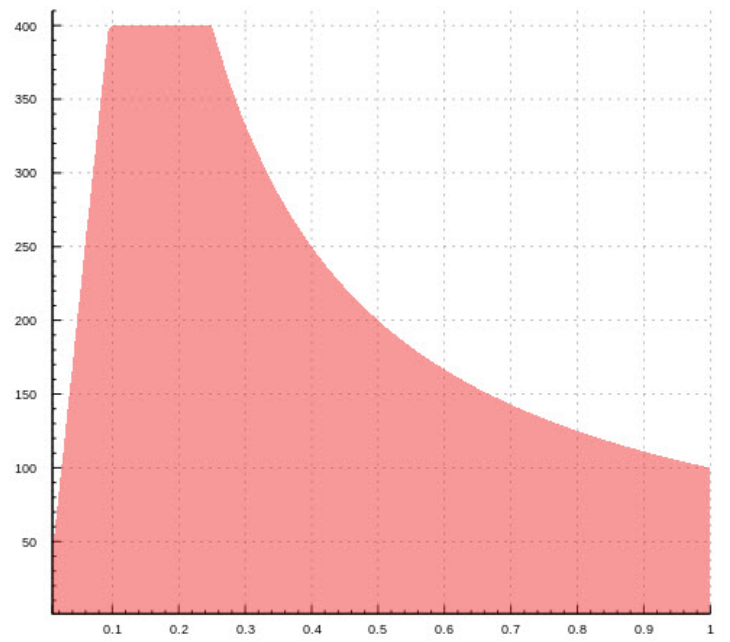


4s Output Power

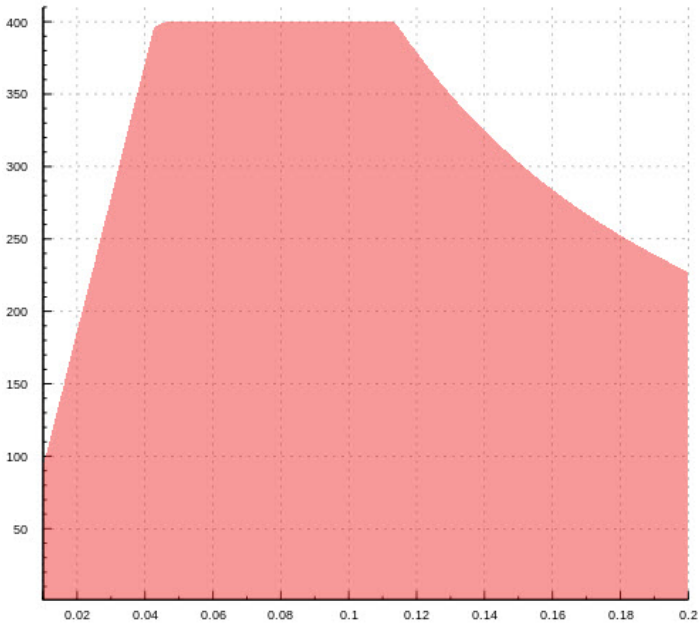
DNA 250C Kanthal Power



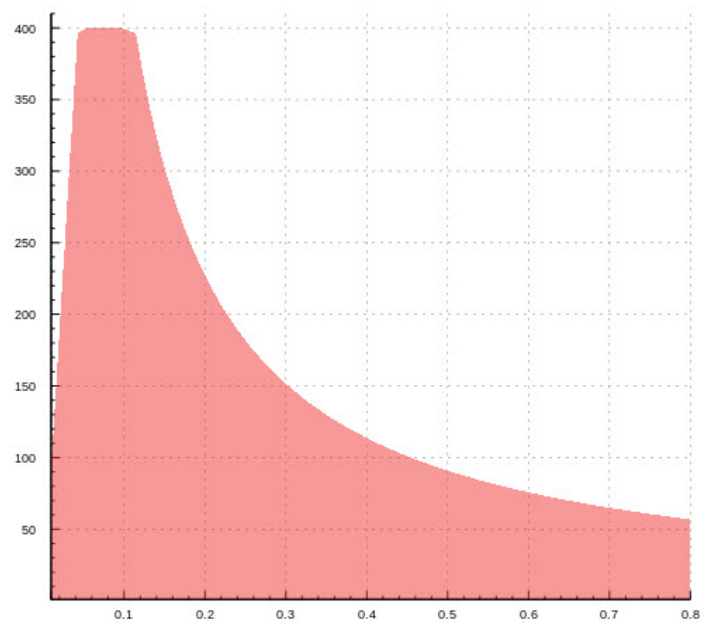
DNA 250C Kanthal Power Extended



DNA 250C Nickel Power



DNA 250C Nickel Power Extended



Display

The DNA 250C has a full color 80 x 160 pixel TFT screen. The screen is attached to the main board by a flexible cable, allowing freedom in the design of your device. The screen's default position is on top of the board, between the fire and adjust buttons. This allows for easy assembly. The screen connects to the board with a ZIF connector, so alternate placement is possible. Please use caution when handling the screen and design the device so that the cable will be secured or strain relieved in operation. The two notches along each side of the PCB are designed to accommodate a screen holder. A 3D model is available to 3D print or injection mold screen holders for the DNA 250C.

When installing the screen connector into the ZIF connector care should be taken to not bend the cable or apply excessive force when inserted. A sharp right angle bend in the cable can ruin the screen and break the connections in the ribbon cable. The proper way to install the screen is to firmly grasp the ribbon with a pair of tweezers and slide it directly into the connector without bending the cable.

Error Messages

The DNA 250C will indicate a variety of error states.

No Atomizer: The DNA does not detect an atomizer.

Check Atomizer: The DNA has detected a large resistance change during operation, the atomizer has shorted out, or the atomizer resistance is incorrect for the power setting.

Check Battery: The battery is deeply discharged and needs to be charged, or is damaged. If this happens, the DNA 250C will not fire the atomizer. The Check Battery message will continue to display for a few seconds after attempting to fire the device. User should remove and replace the battery.

Shorted: The atomizer or wiring are short circuited.

Ohms Too Low: The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA 250C will continue to fire, but will not be able to provide the desired wattage. The Ohms Too Low message will continue to display for a few seconds after the end of puff.

Ohms Too High: The resistance of the atomizer coil is too high for the current wattage setting. If this happens, the DNA 250C will continue to fire, but will not be able to provide the desired wattage. The Ohms Too High message will continue to display for a few seconds after the end of puff.

Temperature Protected: The heating coil reached the maximum allowed temperature during the puff. If this happens, the DNA 250C will continue to fire, but will not be able to provide the desired wattage.

Weak Battery: The battery needs to be charged, or a higher amp rated battery needs to be used. If this happens, the DNA 250C will continue to fire the atomizer, but will not be able to provide the desired wattage. The Weak Battery message will continue to display for a few seconds after the end of the puff.

Return To Researcher: The DNA has reached a limit configured by a researcher. Contact the research institution that issued the device.

Too Hot: The DNA 250C has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

Charger

The DNA 250C has a built in 2A USB charger. It automatically detects the type of USB power supply it is connected to, so it can be plugged into standard PC USB ports or higher power chargers. The max charge current is based on the cell capacity as programmed in EScribe.

Cell-by-cell Monitoring

The DNA 250C runs from up to a four cell battery. Because lithium polymer cells can be damaged by excessive discharge, with multi-cell series batteries it is important to measure each cell in the battery independently and stop firing the atomizer when any of the cells reaches the cutoff voltage. The DNA 250C uses the battery pack taps to monitor each cell.

Cell Balancer

During charging, it is vital that none of the batteries charge beyond 4.2 volts per cell. If one of the cells in the battery has more charge than the others, its voltage will be higher. During charging, the DNA 250C will turn on a “balancer” to charge that cell more slowly, allowing the less charged cells to catch up.

By monitoring and charging each cell individually, the safety of a multi-cell pack is equivalent to using a single cell. Many products, from power tools to laptops to electric vehicles, use multi-cell packs. All responsible multi-cell lithium based designs use cell by cell monitoring and balancing to operate safely.

USB On-The-Go

The DNA 250C supports USB On-The-Go. An OTG adapter may be plugged into the Micro USB port on the device to charge any other device capable of charging via USB. By default OTG charging must be toggled on manually from the device. OTG charging can be configured to begin automatically using the Power Bank option in EScribe on the Display tab. OTG charging will not over-drain the DNA 250C.

Fuse

Because of the energy and power stored in the battery, the DNA 250C includes an onboard 30 amp SMT fuse. The fuse is located on the underside of the PCB near the B+ battery terminal, and is labelled "Fuse". In normal operation the fuse should never blow. However, in the event of an error or short circuit on the board, the fuse will protect the battery. Should it need to be replaced, the fuse is manufactured by Bel Power Solutions, part number C1H30.

If you suspect your fuse is blown, check continuity across the fuse to verify using a Multimeter. Replacement is accomplished by de-soldering the blown fuse from the board and soldering on a new fuse.

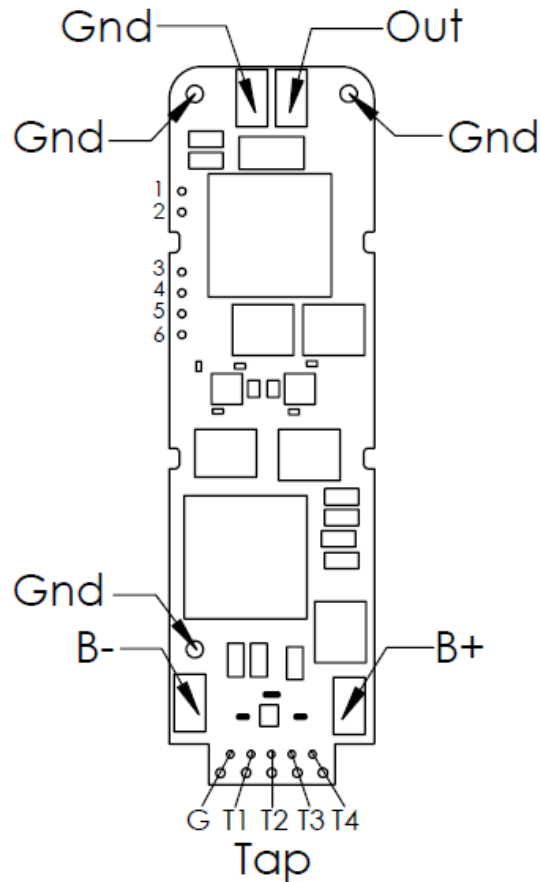
DNA 250C is designed for battery packs that are permanently installed into the device, or battery packs that install using an insulated, polarized connector rated for at least 30 amps. If the battery pack is installed with the polarity reversed, the fuse will blow to protect the battery pack, board and user.

If you are manufacturing a device that is designed to be used with individual replaceable 18650 cells, the DNA250C offers reverse polarity protection.

Escribe

Escribe is a software package used to configure, monitor and modify the operation of your DNA 250C. It installs on a Windows or Mac computer and connects to your DNA 250C using the USB port. Escribe has a separate manual and tutorials which can be found on Evolv's site.

Pinout (bottom side shown)



Pin Number	Pin Name	Function
Out	Out	Power output.
1	Fire-	Negative side of the fire button.
2	Fire+	Positive side of the fire button.
3	Up+	Positive side of the up button.
4	Select+	Positive side of the select button.
5	Down+	Positive side of the down button.
6	Logic-	Logic ground. Negative side of the up, select, and down buttons.
Gnd	Gnd	Gnd is the ground return for the atomizer. Connected internally to B-. There are three ground lugs and one ground pad.
B+	B+	Positive battery terminal.
B-	B-	Negative battery terminal. Internally connected to Gnd.
Tap	Tap	Positive battery terminals for cell voltage monitoring. Designed to accept a JST PH connector on the top row or XH connector on the bottom row.
G	Ground	Battery balance tap ground.
T1	Cell 1	Cell 1 balance tap pinout.
T2	Cell 2	Cell 2 balance tap pinout.
T3	Cell 3	Cell 3 balance tap pinout.
T4	Cell 4	Cell 4 balance tap pinout.

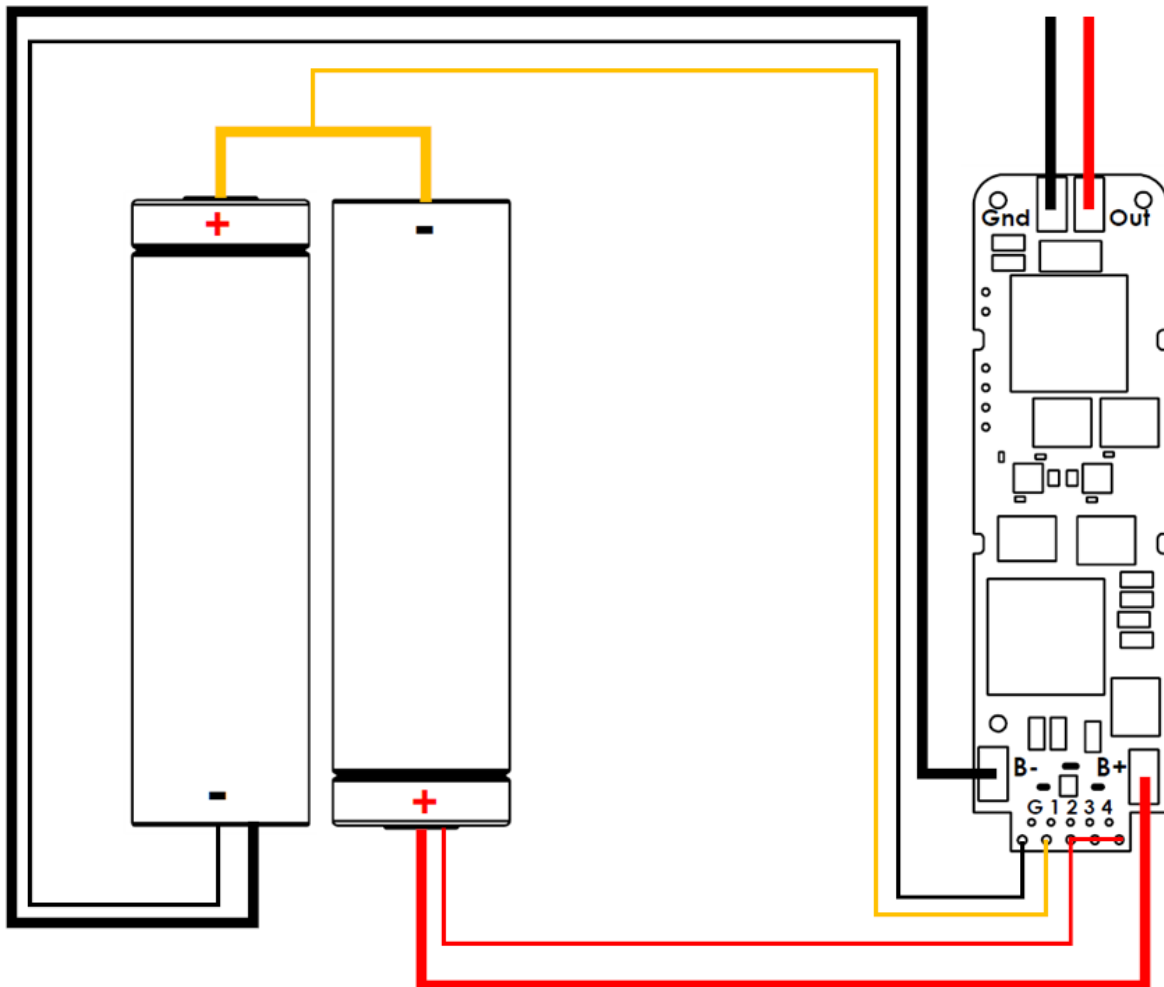
Wiring

The atomizer is connected to the Out pad. If the DNA 250C is not being grounded through the mounting screws, the Gnd pad should connect to the negative side of the 510 connector. The battery is connected to the B+ and B- terminals. It is important to use appropriately sized wire when using the DNA 250C. Too small wire will not perform well, and significantly undersized wire can burn out. The output wires should be silicone or Teflon insulated only, and at least 12 gauge if used in a 4s device. The input wire carries less current, and can be as small as 20 gauge wire if silicone or Teflon insulated.

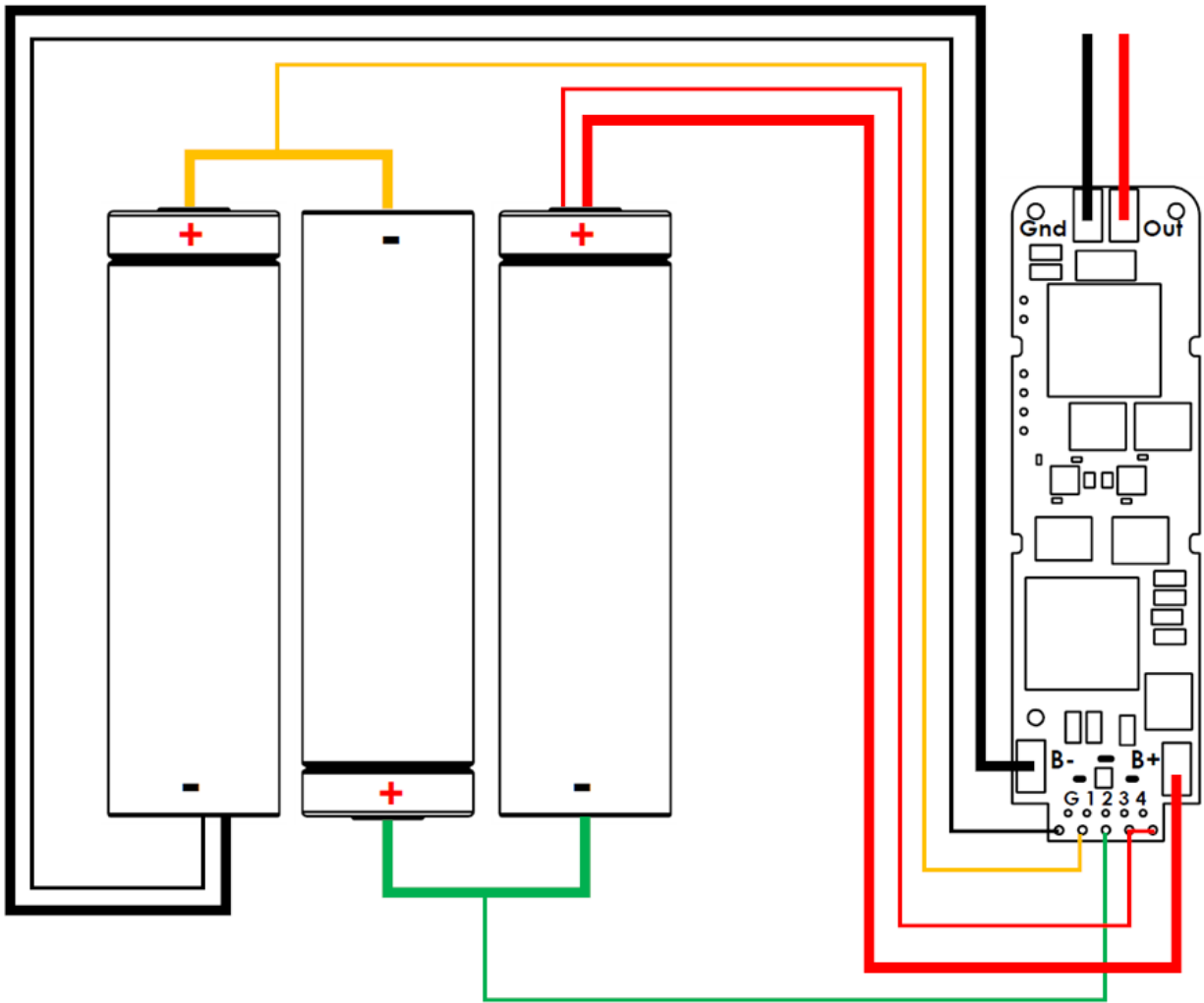
Recommended wire sizes

	Minimum size	Recommended size	Maximum size
Battery, silicone insulated	20 gauge	18 gauge	14 gauge
Battery, PVC insulated	18 gauge	16 gauge	14 gauge
Output, silicone insulated	14 gauge	12 gauge	12 gauge
Switches, if used	28 gauge	24 gauge	22 gauge
Battery tap, silicone insulated	26 gauge	24 gauge	22 gauge

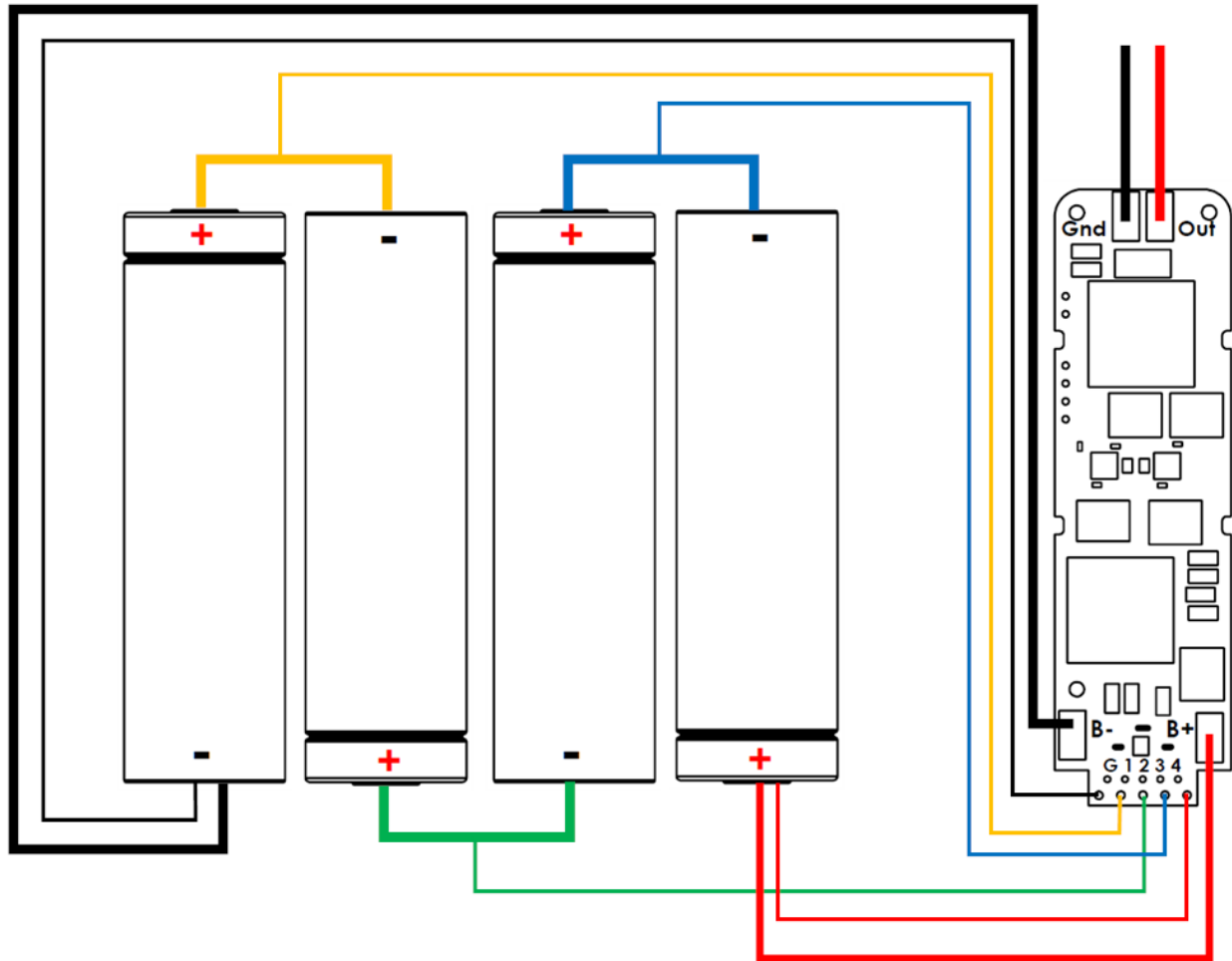
2s Wiring



3s Wiring



4s Wiring



Reverse Polarity Protection

The DNA 250C includes built in Reverse Polarity Protection to protect the user, board, device, and battery in the event that a battery is inserted backwards.

External component recommendations

The DNA 250C is a self-contained power regulator which does not require external buttons for its user interface. However, it does support the use of external buttons if desired.

Fire button:

Use a momentary on, normally open type switch or button. A standard pushbutton switch is appropriate. The switch is a logic function – all power switching is handled with transistors inside the DNA module, so the switch does not need to be rated for power. A waterproof or processed sealed switch is recommended. Please use caution, as the positive side of the fire button connects directly to positive battery voltage.

Up/Select/Down buttons:

The small onboard buttons allow the user to navigate the interface and modify device settings. Alternatively, remote normally open type switches or buttons can be attached to the UP, SELECT and DOWN mounting holes for customization.

Battery:

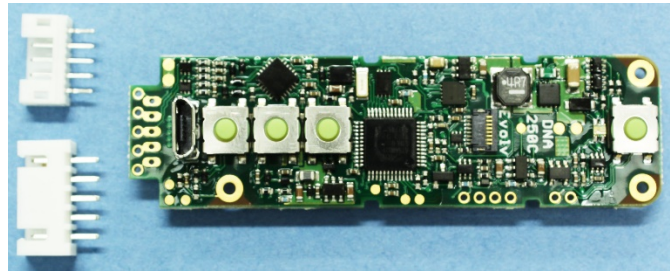
The DNA 250C runs from up to a 4s lithium polymer type battery pack or round lithium ion 18650 type batteries wired in series. Maximum power output is as follows for various battery configurations:

Battery Configuration	Power Output
2s (8.4v)	200 Watts
3s (12.6v) (US Firmware)	250 Watts
3s (12.6v) (International Firmware)	300 Watts
4s(16.8v)	400 Watts

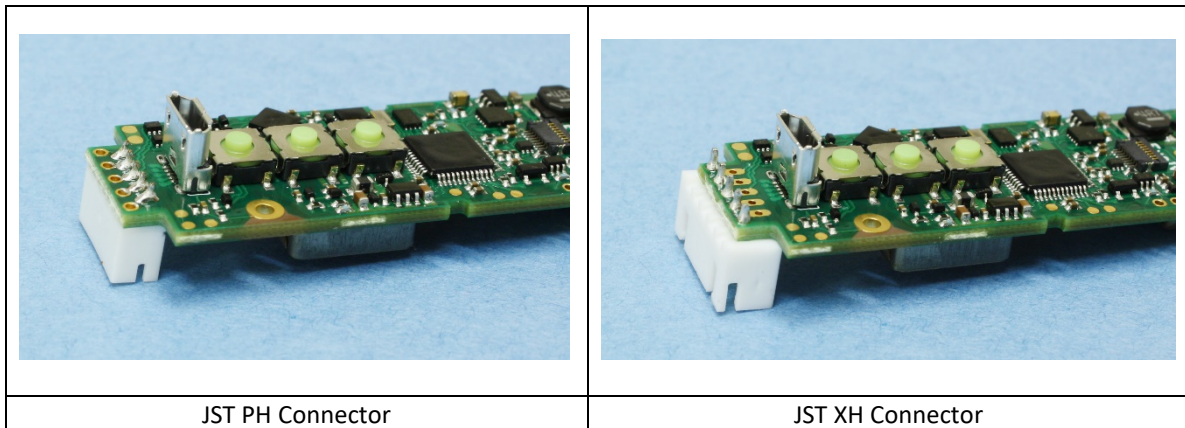
Assembly

Installing the Balance Connector

Step 1: Locate the balance connector in your packaging. The DNA 250C includes a 5 pin JST XH connector. The balance connectors intended for use are made by JST and are the XH and PH Connectors. Compatible part numbers are B5B-XH-A and PHR-5. Ensure that the battery to be used has a matching XH or PH series connector. If it does not, procure an appropriate connector for the board or battery pack. Due to the design of the balance tap area Evolv recommends only installing balance connectors via the through holes.

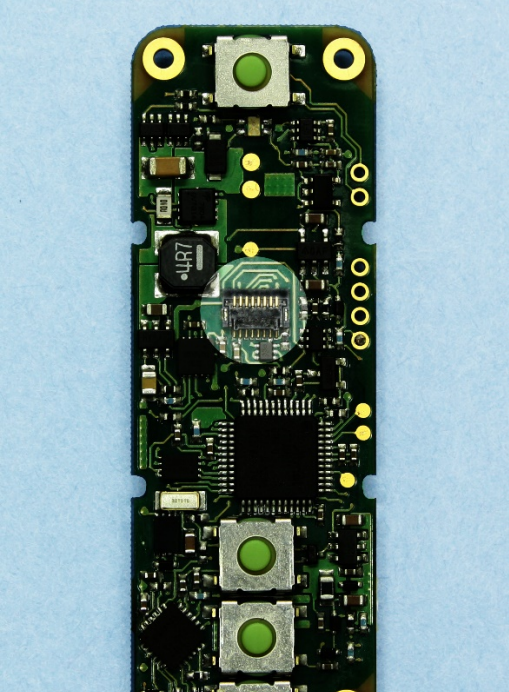
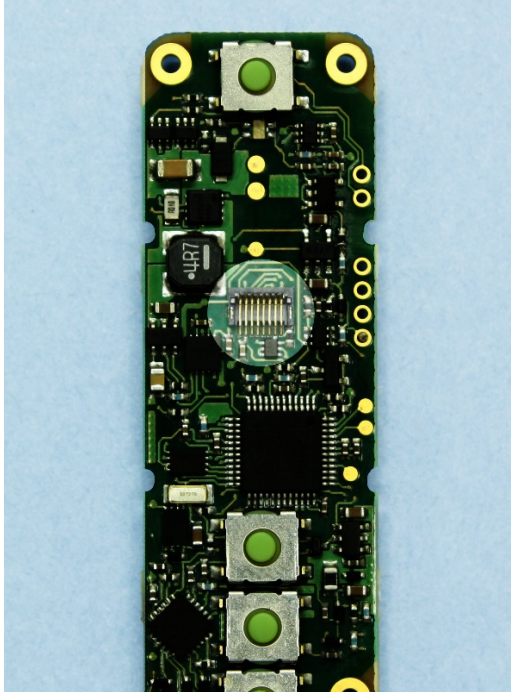
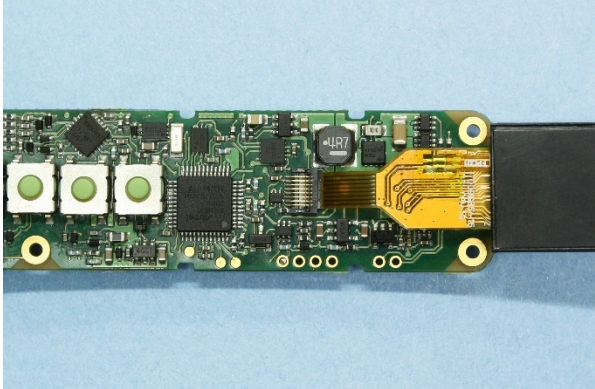
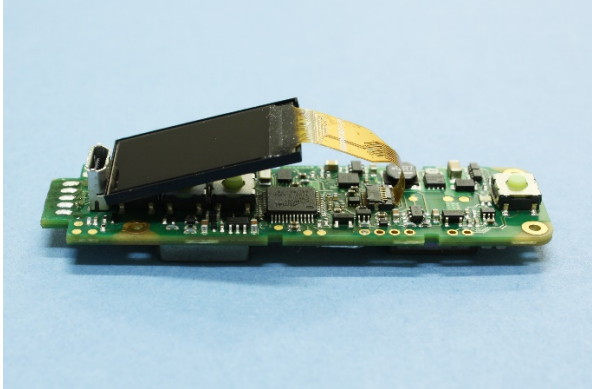


Step 2: The balance connectors are inserted in the appropriate holes on the back side of the board opposite the buttons and soldered in place. PH connectors will fit the row closest to the USB connection and XH series connectors will fit the row furthest from the USB connection.

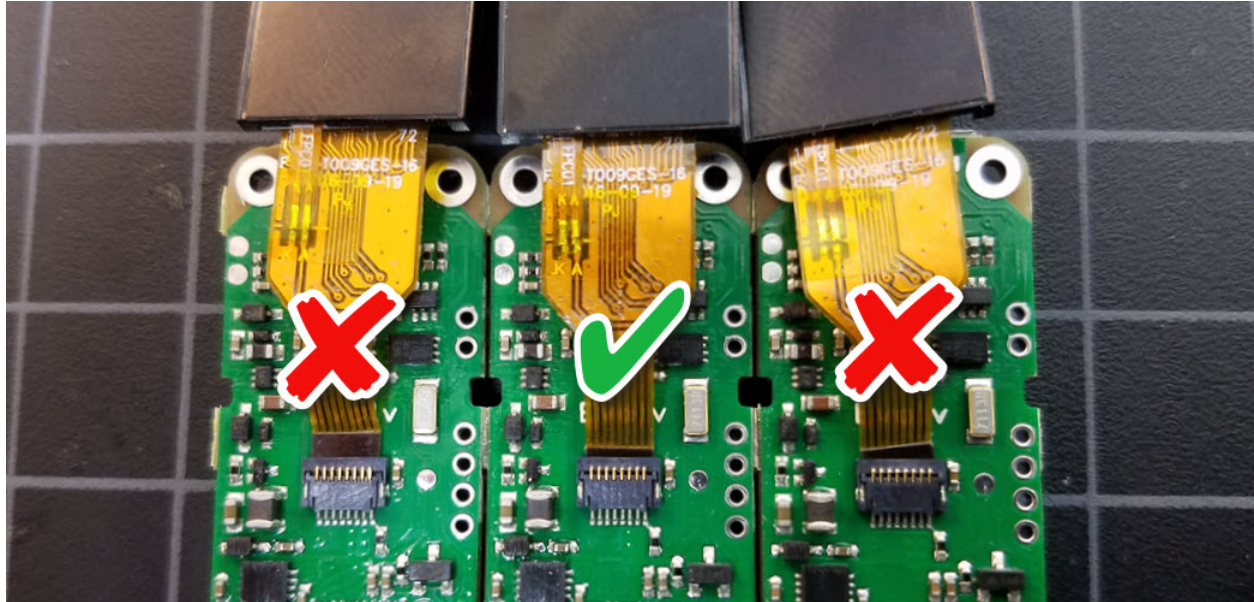


Installing the Screen

The TFT screen connects to the DNA 250C using an 8 pin ZIF socket and a flexible cable to allow for design flexibility. The cable can be bent or folded (once) but care should be taken to not apply tension or strain to the area where the cable attaches to the screen itself. Once the screen is mounted the cable should be tucked up under the screen and not out towards the fire button. Positioning the cable near the fire button can allow the mods fire button to contact the cable when pressed which will cause eventual screen failure. Only insert or remove the screen before the board is powered on.

	
Step 1: Locate the ZIF connector on the DNA 250C PCB.	Step 2: Carefully and gently lift the locking tab on the rear of the connector to vertical.
	
Step 3: Fully insert the flexible cable into the front of the socket with the contact side towards the PCB. Do not bend the end of the cable at a right angle and force it into the ZIF socket. Grasp the cable with a pair of ESD tweezers and slide it directly into the ZIF socket.	Step 4: Close the locking tab and press until the connector gently clicks. Remove the clear screen protector by pulling on the colored tab.

Screen issues can occur if the screen is inserted incorrectly. If you are experiencing a white screen or intermittent display issues confirm the screen is correctly seated in the ZIF socket as shown below.



Mounting

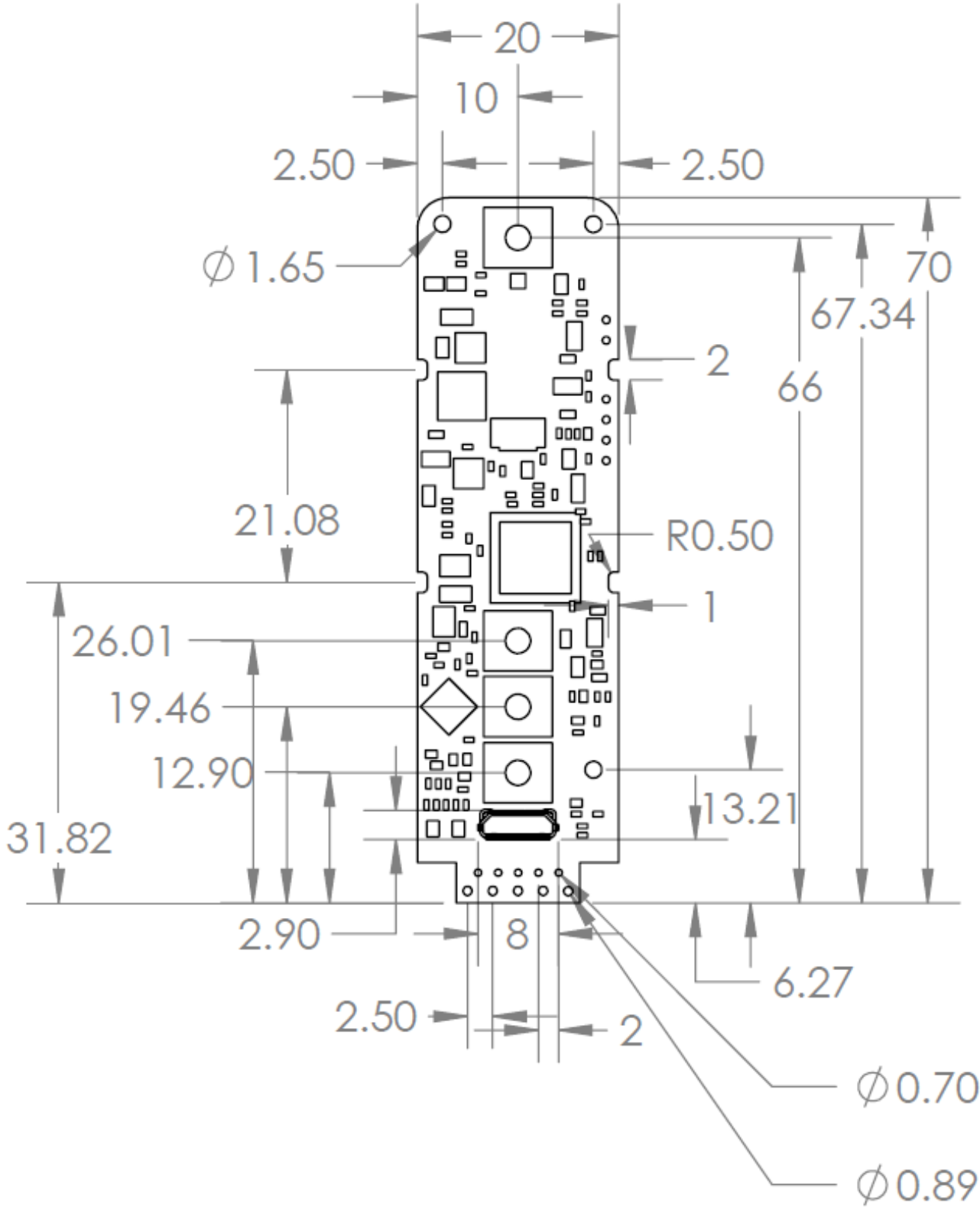
The DNA 250C has onboard switches for adjusting the power level, navigating the interface and activating the output. Each of these functions also has optional through-hole pads for using remote buttons.

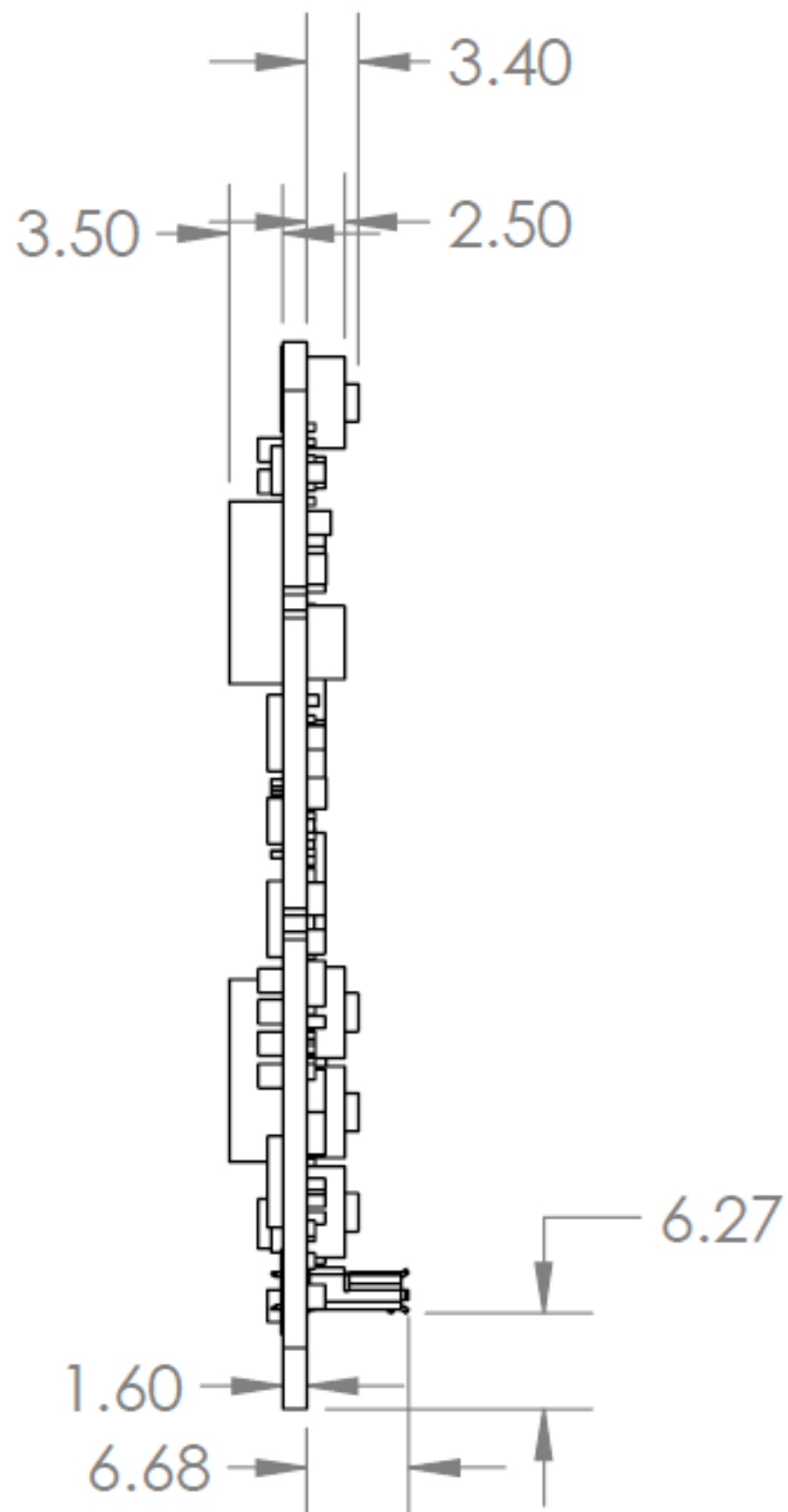
The DNA 250C has three mounting holes on the PCB. These holes are designed for #0 screws. There is an extended mounting pad of .125" diameter around each. These holes are electrically connected to each other and to ground. With careful design, the mounting pads can be used to ground the chassis to the DNA 250C and pass the output current through chassis to the connector. However, if using this method, ensure that the PCB remains in good contact with the chassis at all times. Split lock washers and a RoHS chromate conversion coating on the chassis are recommended.

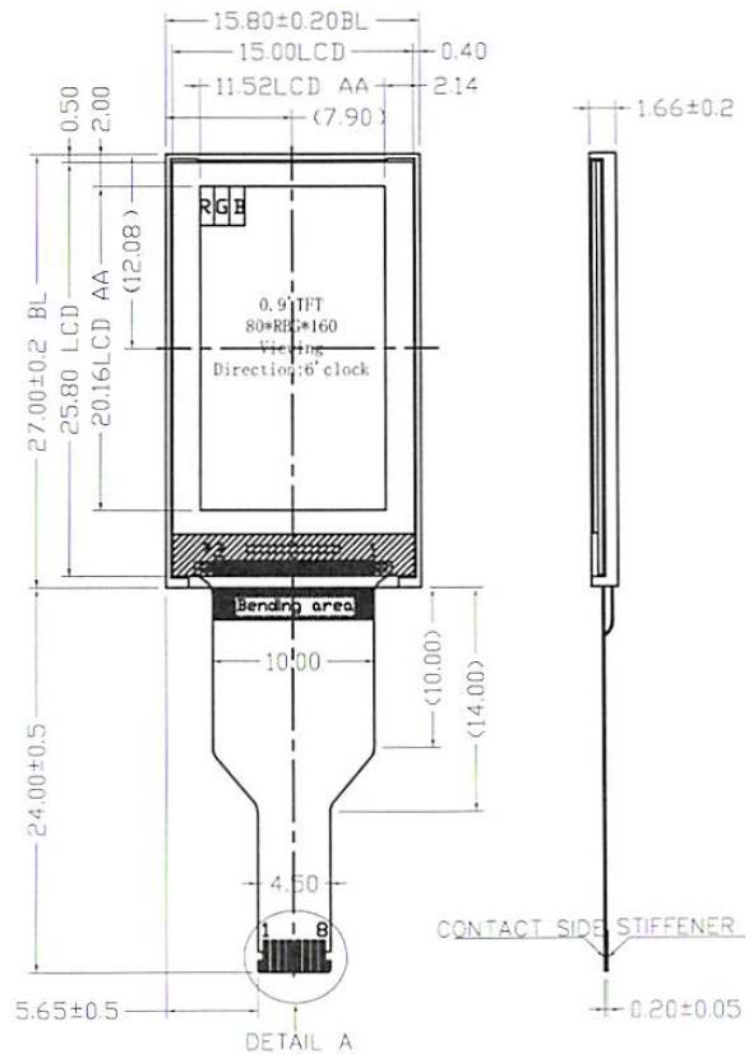
It is recommended that DNA boards be secured using the provided holes to mechanically mount them to the device. Use of glues are not suggested including hot glue, epoxy, superglue, hobby cement, etc. The only adhesive approved for contact with the board is non-corrosive Silicone adhesive such as the kind available from MG Chemicals.

DNA boards are complex, utilizing multilayer PCBs, and are designed with safety and reliability in mind. Please do not modify components on the boards, remove onboard buttons, shave, cut or trim the PCB or enlarge the mounting holes. Doing so creates the potential to expose layers in the PCB and could cause a safety and/or reliability issue.

Mechanical Dimensions







3D models of the DNA 250C available on our website in IGES, STEP, and Solidworks formats.