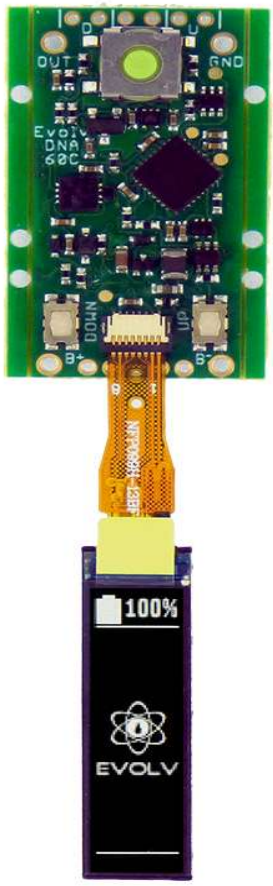
# Evolv DNA 60 Color




## 60C Watt Variable Power Module with Temperature Protection, Replay, Color Screen and 2a USB Type C Fast Charge

The Evolv DNA60C is a 60 watt power regulated digital switch-mode DC-DC converter for personal vaporizers and the successor to the industry shaping DNA60. As before it features Evolv's patented Wattage Control, patented Temperature Protection, Preheat, Digital User Controls, Onboard Buttons and Synchronous Rectification for maximum battery life and minimal heat generation. In addition to this the board has been updated with a Colour TFT Screen and Replay. A USB-C satellite board for 2 Amp charging and data connection to customize or monitor the user experience via EScribe 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 | | 24mA | |
| Quiescent Current | | 7mA | |
| Power Down Current | | 0mA | |
| Efficiency | | 85% | |
| Weight | | 15g | |
| Footprint | | .65” x 1.30” | |
| Thickness | | .35” | |
| Screen size | | .99” TFT | |

# Contents

## Temperature Protection

The DNA 60c 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 60c. 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 60c 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 60c 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.

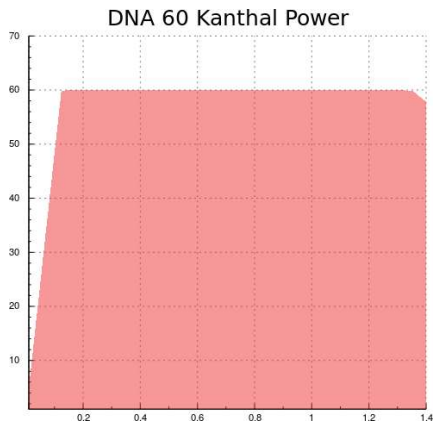
## Attaching a New Atomizer

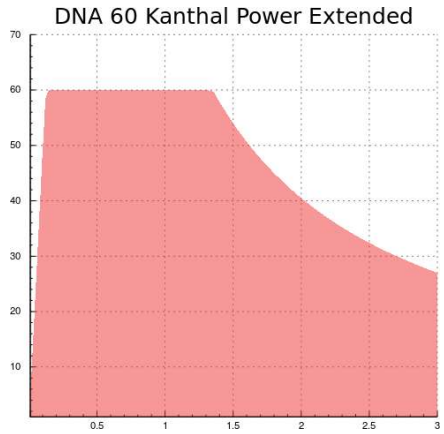
The DNA 60c uses the resistance of the atomizer to calculate the temperature of the heating coil. It continually looks to see whether a new or changed atomizer has been connected. If you are using temperature protection, be careful to only attach new atomizers that have cooled to room temperature. If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

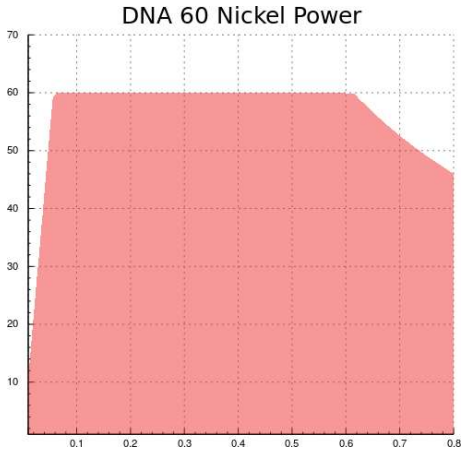
When you connect a new atomizer or disconnect and reconnect your existing atomizer, the DNA 60c will prompt you to confirm this change. When you fire the first time, before activating the DNA 60c will display the ‘New Coil’ screen. When you see this screen, if you have attached a new atomizer, highlight 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.

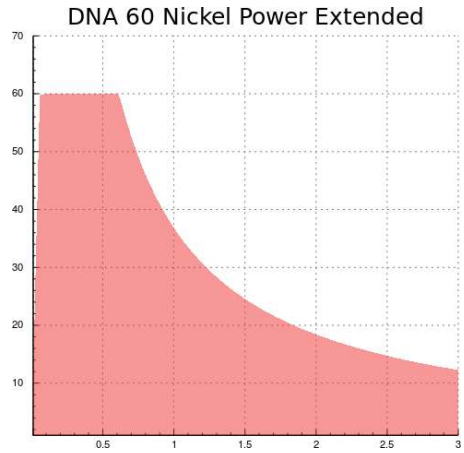
## Output Power

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



## Operation

Basic operation of the DNA 60C 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 60C has a small .99" diagonal 40x160 color 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. 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.

## Error Messages

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

## Profiles

The DNA 60C 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 60C 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 60C. 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 60C will indicate a variety of error states.

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**Ohms Too Low:** The resistance of the atomizer coil is too low for the current wattage setting. If this happens, the DNA 60C 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 60C has onboard temperature sensing. It will shut down and display this message if the internal board temperature becomes excessive.

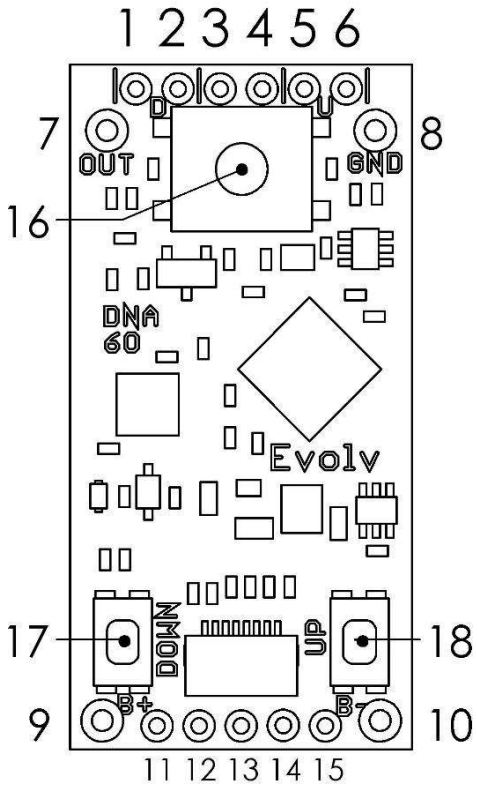
## Auto power down

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.

## Escribe

Escribe is a software package used to configure, monitor and modify the operation of your DNA 60C. It installs on a Windows PC and connects to your DNA 60C using the optional USB-C 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 60C 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 60C 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:**

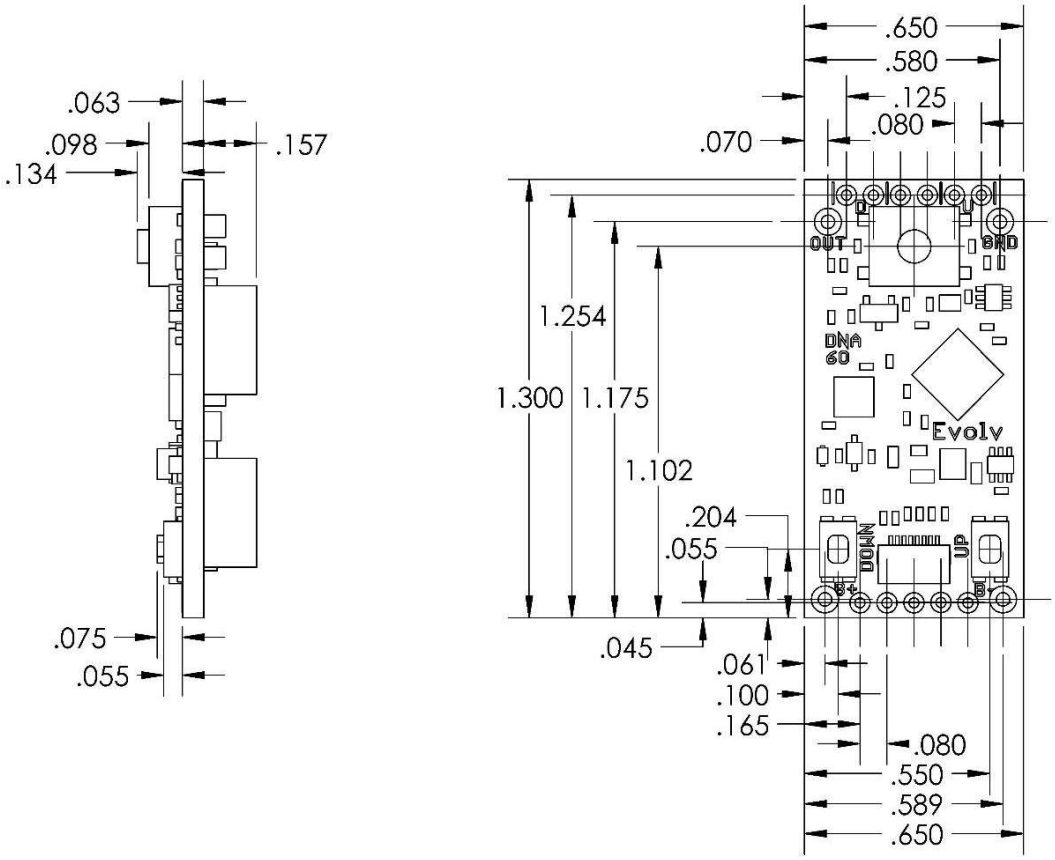
The DNA 60C runs from a single lithium polymer type battery pack or round lithium ion type battery. The DNA 60C can use multiple cells in a parallel type wiring configuration as long as the maximum input voltage is 4.2v.

## Mounting

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

## Mechanical Dimensions




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