DD Milli User Guide

G18 - alpha

DD Dev. Group

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Product Overview

DDMilli is the second released product of DD series Keyboard. From the name you can see it is DDMicro's bigger brother, 60% size. It is sharing the mechanical layout with the most popular 60% PCB - GH60, with a lot more optional key positions. This means you can easily fit is in most of GH60 cases and plates. And not like DDMicro, you can purchase the PCB individually.

The firmware is developed based on DDMicro, with a lot of new features.

- Bluetooth Low Energy 4.0 connection, supporting up to 8 paired devices, user can define customised hot key to switch between devices, also support to define hot keys to reset/ add devices.
- USB Type C connection. You can connect the keyboard directly to your computer's USB Type C port.
- Lithium-ion battery connector onboard, also connected to a build-in charging circuit.
- Fully NKRO support(Max report keys are limited by USB protocol of 6).
- Standard Cherry MX switch footprint fit most of the switches in the market.
- Individual surface mounted RGB backlights, up to nine light effects, and configurable color setting. Brightness and effects can be adjusted with customised hot keys.
- 6 bottom RGB backlight mounting pads, with an extra RGB light strip port for extension, support up to 60 SK6812 or equivalent light strip module.
- Up to 8 layers of fully configurable key mapping on all key positions. Support layer switch/lock/reset with customised hot keys.
- Support most of GH60 layouts, with extra 0.25u shifted forth row and split space layout on last row.
- Easy configuration tool with DDConf. The new version of DDConf can change the configuration without rebooting the keyboard. You can update the key definition at any time when USB cable is connected.
- Support mouse control and volume control hot keys.

Out Looking

DDMilli's layout is based on GH60. The top left corner has a USB Type C connector, that can be connected to a USB 1.1/2.0/3.0/3.1 port. On the left of the USB connecter.

ATTENTION: do not connect DDMilli to USB Type C PD charger. Voltage over 5.0V might cause damage on PCB hardware!

There is a red LED as charging indicator. It will lit up while it is charging, and turns off when battery is full.

In the middle left, there is a power switch position. It is using 6pin footprint, and can be soldered with self-lock switch, or standard SMT slide switch. It will turn on/off the battery connection. If you don't want to use a switch, please solder a short wire between the middle hole of two rows. Then the battery will permanently connected.

The battery connector is right above the power switch, provided as a PH2.0 connector.

Please notice that the antenna is on the left side of PCB. The area close to the antenna should not be completely covered with metal or carbon fibre material. Otherwise the signal quality will be affected.

Because of more processors are used on board, DDMilli may not fit in some cases that has critical PCB thickness requirement.

Reserved Keys

The first key on top row('Esc' key in default definition) is Bluetooth Erase Band Key. Turn on keyboard while holding this key can reset paired device list and re-enable Bluetooth advertising.

The second key on top row('q' key in default definitions) is Bluetooth Add Band Key. Turn on keyboard while holding this key can temporarily enable Bluetooth advertising for adding a new device to paired list.

The forth key on top row('e' key in default definitions) is Test Mode Key. Turn on keyboard while holding this key can switch keyboard into test mode. This mode is used to detect any shortcut happened on switches, and all RGB LED are working correctly.

The first key on second row('Tab' key in default definitions) is Wakeup Key. If there is no connection in Bluetooth mode for 3 minutes, the keyboard will switch to sleep mode to save power. Then press this key can wakeup the keyboard again.

Battery

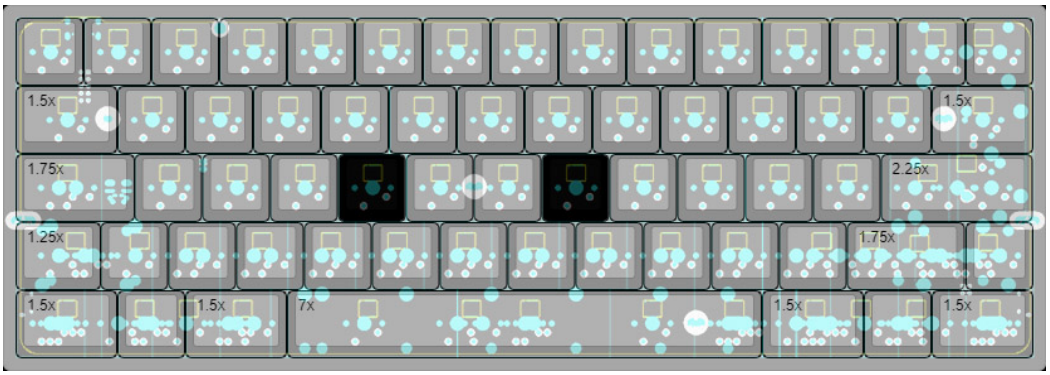
DDMilli PCB supports to connect a Lithium-ion rechargeable battery. We recommend you to select a battery with build-in safety protection IC. When assemble your keyboard, please pay enough attention on battery protection from the switch pins. Don't screw too tight with extra pressure on the pins. Any packaging damage on battery is very dangerous.

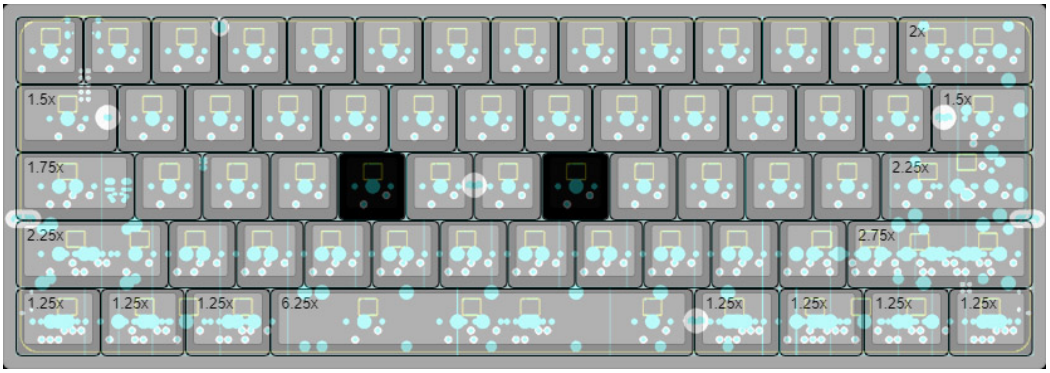
When the battery voltage becomes too low, the keyboard will automatically switch off. Please connect the USB cable to charge the battery. Don't forget to turn on the power switch while charging, otherwise the battery will not be connected to power. The keyboard is designed in dual modes. Connecting USB cable to your computer, the keyboard can be used in USB mode while charging.

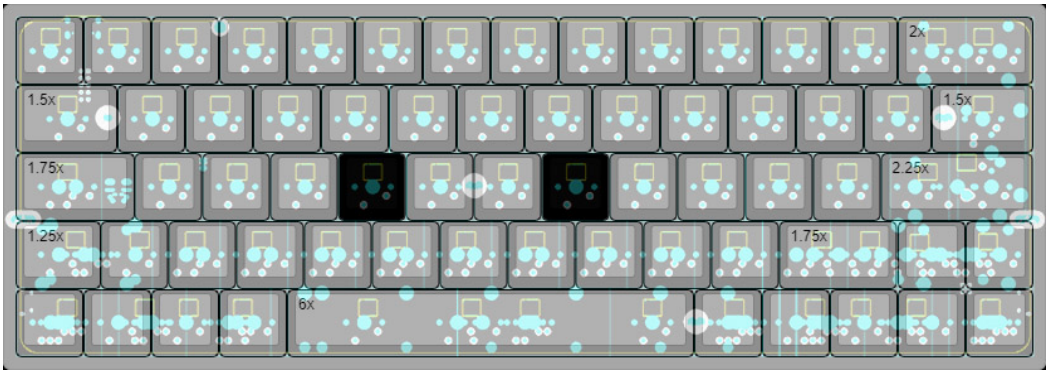
A red LED indicator close to the USB port can show the charging status.It will turn on while charging, and switch off after the battery is full.

Keys Layout

DDMilli supports may layout options, only some popular ones are listed below. Feel free to switch them and create your own layout.



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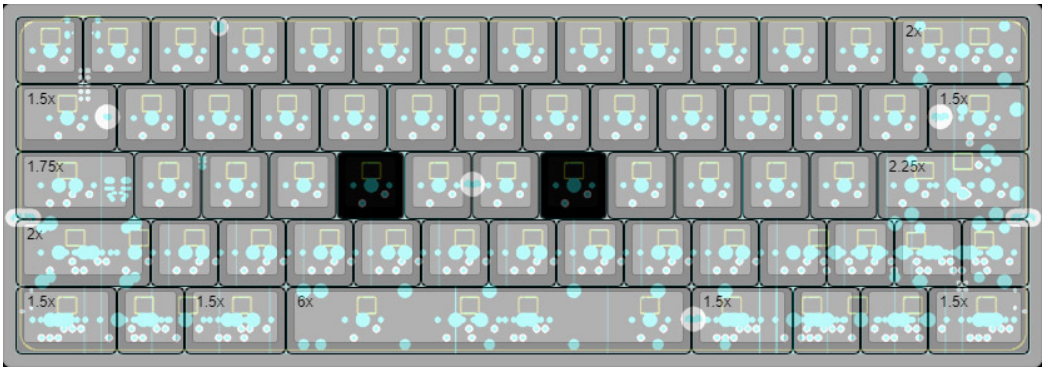
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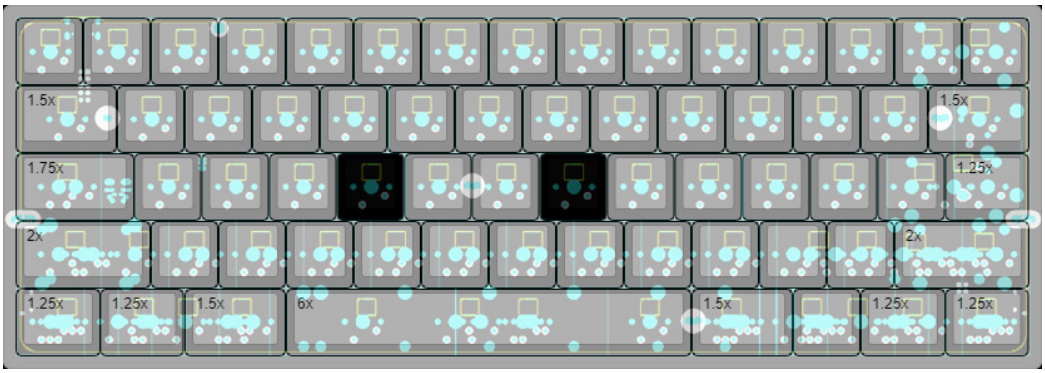
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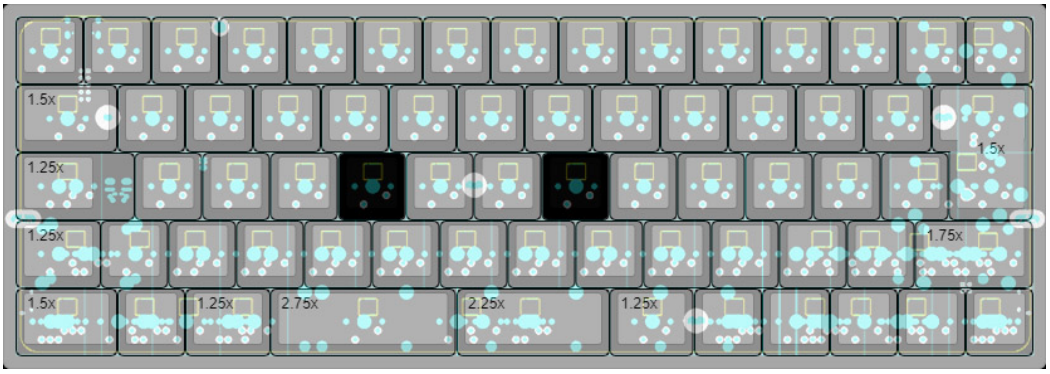
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Bluetooth Pairing

Following the steps below to connect DDMilli to a host device.

1. Make sure the battery has not run out. Turn off power switch, and make sure that USB cable is not plugged.

2. Hold on Bluetooth Erase Band Key(the most left key in top row), or Bluetooth Add Band Key(the second left key in top row), and turn on power switch.

3. Turn on Bluetooth searching on your host device (smartphone/Laptop/PC).

4. Wait for seconds and a device named as “DD Milli Keyboard” will show up in the list. Select it to connect.

5. If the device is not visible after 10 seconds, please re-do step 1-2, and check your Bluetooth setup in host device. If you have any other paired host device, may need to turn their Bluetooth off first for pairing a new device.

PS: If you have configured Bluetooth device erase/add hot keys, you can replace step 1&2 with press or trigger that hot key.

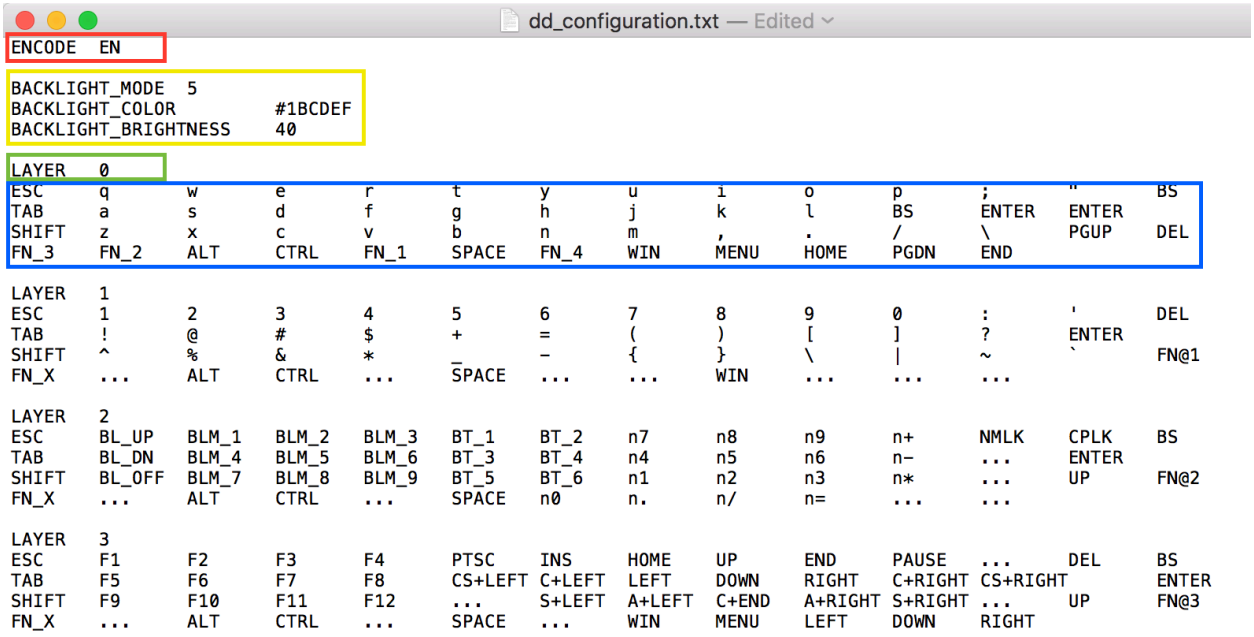
Customize Your Key Definition

DDMilli supports up to eight independent key definitions on every key position. They are organised based on “Definition Layers”. The key definitions for DDMilli can be single key codes (characters, symbols, function keys, etc), and also support simple micro key combinations (modifier keys + a basic key, for example Ctrl + v).

To customize your key definitions, you need to download DD series keyboard configuration application called “DDConf” and run it on a Windows/Mac computer. It does not require installation nor any driver. It is provided as a Zip file. Unzip it to any place, you will get three files in the folder:

- dd_configuration.txt: key definition file. You could change key definitions by editing this file in text editor, like Notepad. (UTF-8 encoding is required)
- ddconf.exe: a Windows command line tool for downloading dd_configuration.txt content to your DDMilli keyboard via USB port.
- ddconf: a Mac OSX command line tool for downloading dd_configuration.txt content to your DDMilli keyboard via USB port.

The file dd_configuration.txt should be written in a specific structure, otherwise the configuration tool cannot parse it correctly. This configuration file is case sensitive, which means ‘a’ and ‘A’ give different result. And this file is parsed based on each line. One line to present a case description, or a set of key definitions for a keyboard row. Use one or more whitespace or TAB mark to separate description segments or the definition for each key position. Here a screenshot shows the typical content of it.



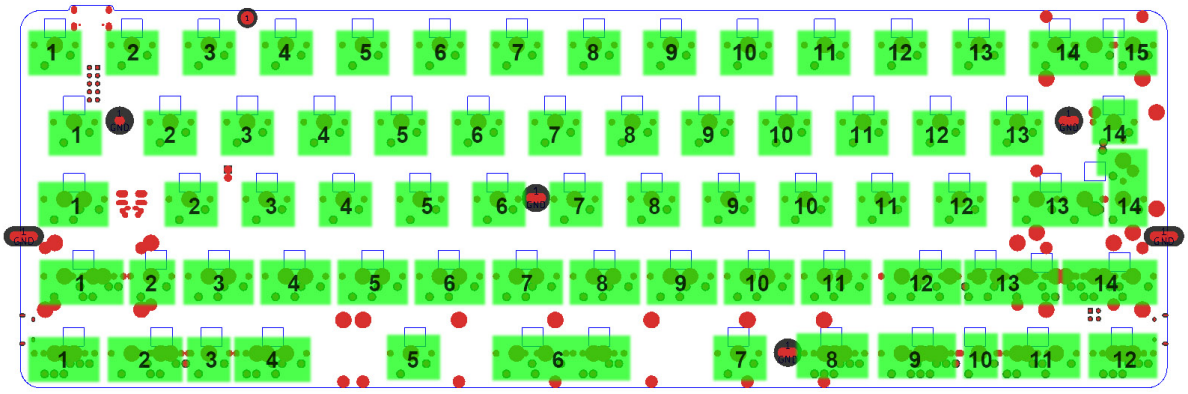
The first line is always tagged with “ENCODE”. It describes the keyboard language layout of this configuration. Currently it supports “EN” (US standard layout) and “SV” (Swedish layout). This is marked in red box in the screenshot.

The lines in yellow box are backlight configuration. The backlight default mode (with tag “BACKLIGHT_MODE”), backlight color (with tag “BACKLIGHT_COLOR”) and backlight default brightness(with tag “BACKLIGHT_BRIGHTNESS”) can be set separately. backlight color is only used in single color modes. With rainbow modes, the color will enumerate all RGB colors. The default mode should be set to a mode ID 1 ~ 9. It will be set after the keyboard is powered on. The backlight color is set with a standard RGB color code, use a 6-digit HEX number starts with a ‘#’ symbol to indicate the color. Please check the actual value with RGB color picker.

The green box in the screenshot is layer declaration. They should start with tag “LAYER” and followed by a number from 0 to 7. Layer 0 is default layer, which means after power on, or reset layer, DDMilli will switch to this layer.

The lines marked in blue box are key definition lines. Each line refers to a row of keys on DDMilli. Attention that in this file, all possible key positions should be explicitly defined. It might be not mounted to a dedicated key in your setup, but you still have to define it in dd_configuration.txt file. You could use the empty tag(…) as place holder for the empty positions. For how to set the definition for each key position, please refer the “Tag list in configuration file” chapter and “What’s more you should know” chapter.

The image below shows the key position groups. The positions in the same green box shares the same key definition in configuration file.



Download Your Key Configuration

After preparing dd_configuration.txt file, you could follow the steps below to download it to your DDMilli keyboard:

1.Connect keyboard with USB cable to computer.

2.Double click ddconf.exe (or ddconf file in Mac OSX) to run the download tool. Or type in the application name in Command Line(or Terminal in Mac OSX) to execute it, but this requires you to browse to the executable file's folder first. Make sure the dd_configuration.txt file is saved in the same folder with ddconf application.

3.Following the instructions shown on your screen. You may need another keyboard to help you press any key to continue, or use the on screen keyboard or any tools to simulate some key press events.

4.The download progress may take about 2-5 seconds, this is based on how many layers you have. Do not type the keyboard while flashing the configuration, it might has risk to interrupt the download procedure.

5.After download progress finishes, DDMilli will switch to keyboard mode automatically. Press any key to exit download tool and try with your new key definitions!

Tag List in Configuration File

Tag Name	Tag	Comment
Empty key position	…	do nothing
Change layer	FN_?	replace '?' with 0-7
Stick on layer	FN@?	replace '?' with 0-7
Reset to default layer	FN_X	reset to default layer
Alt	ALT	
Control	CTRL	
Win/Command	WIN	
Shift key	SHIFT	
Tab key	TAB	
Backspace	BS	
Delete	DEL	
Escape key	ESC	
Space	SPACE	white space bar
Enter	ENTER	
Up	UP	arrow key '↑'
Down	DOWN	arrow key '↓'
Left	LEFT	arrow key '←'
Right	RIGHT	arrow key '→'
Page up	PGUP	
Page down	PGDN	
Home	HOME	
End	END	
Insert	INS	
Print screen	PTSC	
Pause	PAUSE	
F1 – F12	F1 – F12	Function key 1-12

Caps Lock	CPLK	
Num Lock	NMLK	
Scroll Lock	SCLK	
Backlight Mode	BLM_?	replace '?' with 1-9
Backlight Brightness Up	BL_UP	Increase brightness 1 step
Backlight Brightness Down	BL_DN	Decrease brightness 1 step
Backlight Brightness Off	BL_OFF	
Numpad operator	n?	replace '?' with + - * /
Numpad number	n?	replace '?' with 0-9
Numpad Enter	n=	
Numpad dot	n.	
Numpad operator	n?	replace '?' with + - * /
BLE Device Selection	BT_?	replace '?' with 1-8
Swap CTRL/WIN keys	SWAP_CW	
Erase Bluetooth Paired Devices	BTRST	
Add New Bluetooth Device	BTADD	
Mouse left key	MOSKL	
Mouse middle key	MOSKM	
Mouse right key	MOSKR	
Mouse forward key	MOSKF	
Mouse backward key	MOSKB	
Mouse scroll up	MOSSU	
Mouse scroll down	MOSSD	
Mouse scroll left	MOSSL	

Mouse scroll right	MOSSR	
Mouse move up	MOSMU	
Mouse move down	MOSMD	
Mouse move left	MOSML	
Mouse move right	MOSMR	
Volume Up	MMAVUP	
Volume Down	MMAVDN	
Mute	MMAMUT	

What's More You Should Know

- Because the macro key definitions are supported, so the configuration file is case sensitive. Which means the definition 'a' and 'A' will give different output. 'a' equals press key 'a' on ordinary keyboard. And 'A' equals press 'Shift' and 'a' at the same time.

- If you want to type micro key definition with modifier keys, use a character '+' to combine them. In micro definition, modifier keys should use their short names. You could combine one or more modifier keys to one character/number/function/arrow key.

    - Short names: C (Control), A(Alt), S(Shift), W(Win/Command)

    - Example: 'CR+RIGHT' means press Control, Alt and right arrow keys at the same time. Modifier keys' sequence can be shuffled, this equals to 'AC+RIGHT'.

- With the micro key definitions, you could define symbol keys individually. Which means you could map number key '1' with symbol key '!' to different key positions. Firmware will help you to press 'Shift' if needed.

- Because the keyboard typing mechanism applied for computer, the modifier key's state will be inherited until all keys are released. So please pay extra attention when typing micro key definitions. We recommend to leave a clean time between typing micro keys and other keys. You might saw some wrong characters send out while typing micro keys to fast.

    - Example: When typing key definition '!', actually keyboard send out key combination with '1' and a 'Shift' press. If you type 'a' before you release key '!', the 'Shift' key will be automatically inherited by your driver, then you will get an 'A' instead. So we strongly recommend you to slow down while using micro keys.