

# TADAO TECHNOLOGIES TENGU USB INTERFACE

Tengu Graphical Pixel Editor by Tadao Technologies LLC, pat. Pend.

## Introduction

The Tengu USB interface is a PC application that allows you to interact directly with your Yakuza USB board. It provides the capability to update the firmware on the board, customize the boot screen graphics, and load/modify/save settings. As with other Tadao products, additional features will be continually added to correspond with new releases of board firmware.

## Requirements

- 'Mini-B' to 'A' USB Cable
- Computer with a USB port running Microsoft Windows XP or Windows Vista
- XP users will need the Microsoft .NET Framework, available from: <http://msdn.microsoft.com/en-us/netframework/default.aspx>. Specifically, download and install .NET Framework 3.5 Service Pack 1 (approx. 2.8 MB). Windows Vista includes the .NET Framework by default; nothing else is needed to utilize Tengu.

## Tengu Installation

Download the latest version of the Tengu USB interface from <http://www.tadaotechnologies.com>. The executable can be placed anywhere on your computer, and does not require an installation routine or any drivers if you already have the .NET Framework.

**WARNING: Only download Tengu directly from the Tadao website.. If you download the Tengu executable from any other source, it may be compromised and contain a virus or malware.**

## Yakuza Series USB Board Installation

1. Power off the Yakuza USB board.
2. Remove/disconnect the battery.
3. Using a mini-B USB cable, connect the board to the computer.
4. The board will automatically be recognized as an HID USB device. Wait patiently while Windows finds and installs the necessary drivers.
5. Windows may notify you that a reboot is required to finish installation.

## How It Works

The new Yakuza USB boards are designed around the Microchip PIC18F2550, which is a special microcontroller that has full-speed USB 2.0 support, and can directly interface with a PC as a human interface device (HID). It is a true USB implementation and not just a USB-to-serial converter found on competing products. Since it is recognized as an HID, the drivers are built into Windows, which makes it very easy to install.

There are 2 sides to Tengu. One side is in the microcontroller on your Yakuza USB board and is called the bootloader. The other side is the user interface that you see when you run the Tengu application on your computer.

The bootloader is a permanent program that occupies a small portion of the memory on the microcontroller, and is able to rewrite the code that runs your paintball marker. It communicates over the USB bus to the Tengu interface. The Tengu interface is thus able to send updated firmware to the board or modify the boot screen and settings.

The firmware files are encrypted using 192 bit AES, which is the current encryption standard for the U.S. government. The files are sent in encrypted form over the USB bus to the microcontroller, where they are decrypted before being written to program memory. Encryption protects the intellectual property of Tadao Technologies,. It also prevents abuse of the USB interface, such as players trying to write their own cheater software.

## The Tengu Interface

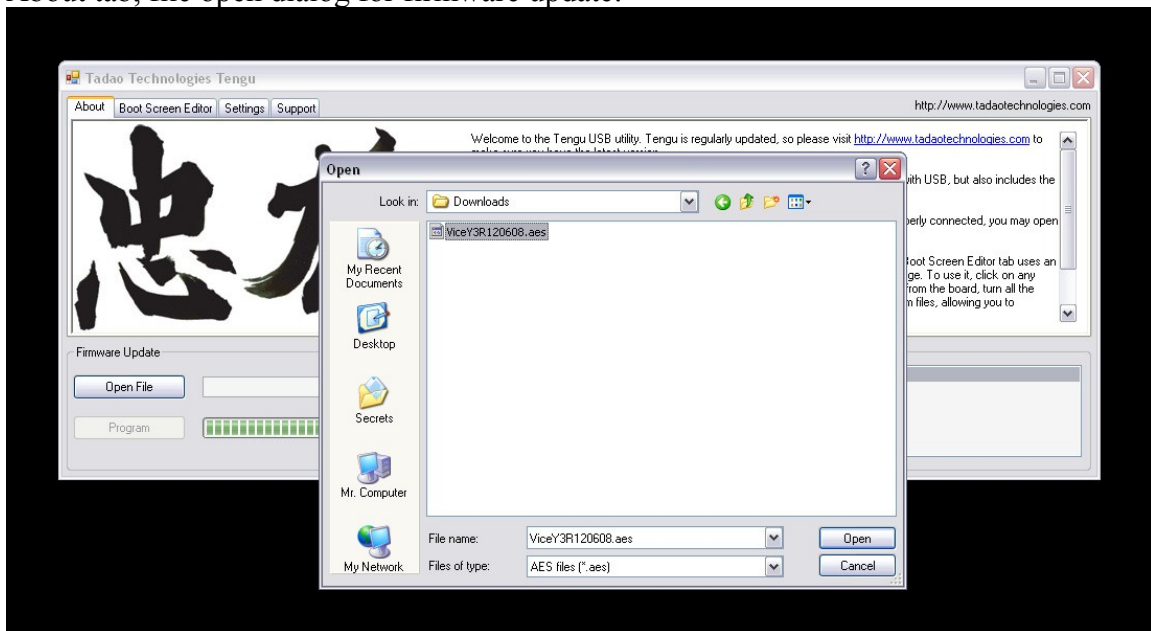
Start the Tengu executable. The main window is shown, displaying the About tab, firmware update section, and USB status message box. The tabs along the top of the window will display specific customization features of Tengu. The firmware update box and USB status message box are always displayed, regardless of the selected tab.



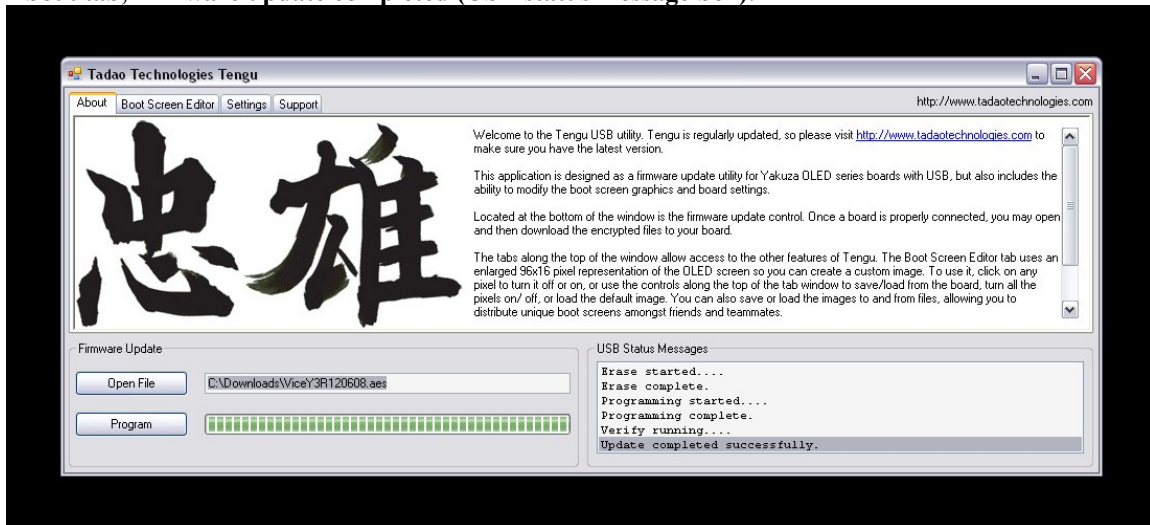
### Updating Your Board's Firmware

1. Turn off your board.
2. Connect the board to the PC with the mini-B USB cable.
3. The USB status message box will display that a board has been connected.
4. Click the “Open File” button. An open file dialog window will appear.
5. Navigate to the location of the new firmware file (.aes file extension) you want to download to your board. Select it.
6. Click the “Program” button. The update will begin, with the USB status message box showing the various steps of the programming sequence.
7. When finished you may unplug the board from the computer or use other TengU features.

About tab, file open dialog for firmware update:



## About tab, firmware update completed (USB status message box):



## Using The Boot Screen Editor

The boot screen editor lets you create a customized boot screen, which is displayed every time you turn on your board. The boot screen editor tab displays an enlarged 96x16 pixel representation of the OLED screen. The buttons along the top allow you to:

1. Save the current image displayed in Tengu to your board.
2. Load the current image stored on the board to Tengu.
3. Load the default kanji/Tadao image.
4. Turn all pixels on.
5. Turn all pixels off.
6. Mirror the pixels (every pixel lit is turned off, and vice versa).
7. Save the current image displayed in Tengu to a bitmap image file on your computer.
8. Load an image into Tengu from a bitmap image file on your computer.

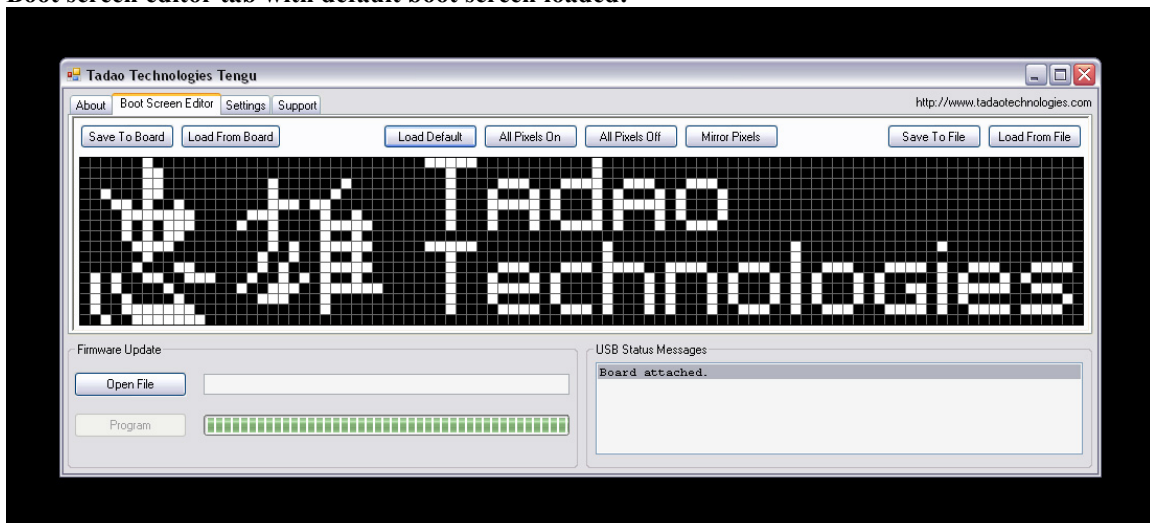
### File formats supported:

Tengu will load any type of bitmap image that is exactly 96 pixels wide and 16 pixels in height. The OLED screen is monochrome, so when you design images in applications such as Photoshop, you should create 1 bpp bitmaps, or only use absolute black and white.

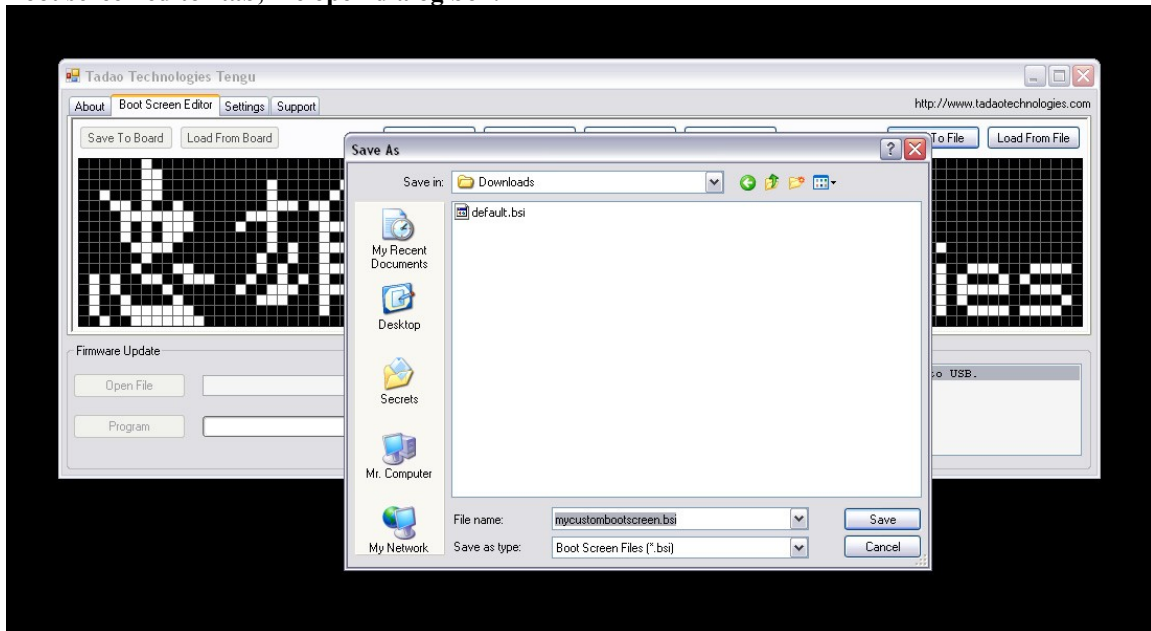
Tengu will reject bitmaps that are not 96x16 pixels. Images that contain colors other than absolute black and white may not load correctly.

Do not use image editing tools to resize an image down to 96x16 pixels. You will lose image quality, and the pixel colors may change, resulting in poor translation when loaded into Tengu.

### Boot screen editor tab with default boot screen loaded:



## Boot screen editor tab, file open dialog box:



## Modifying Board Settings With Tengu

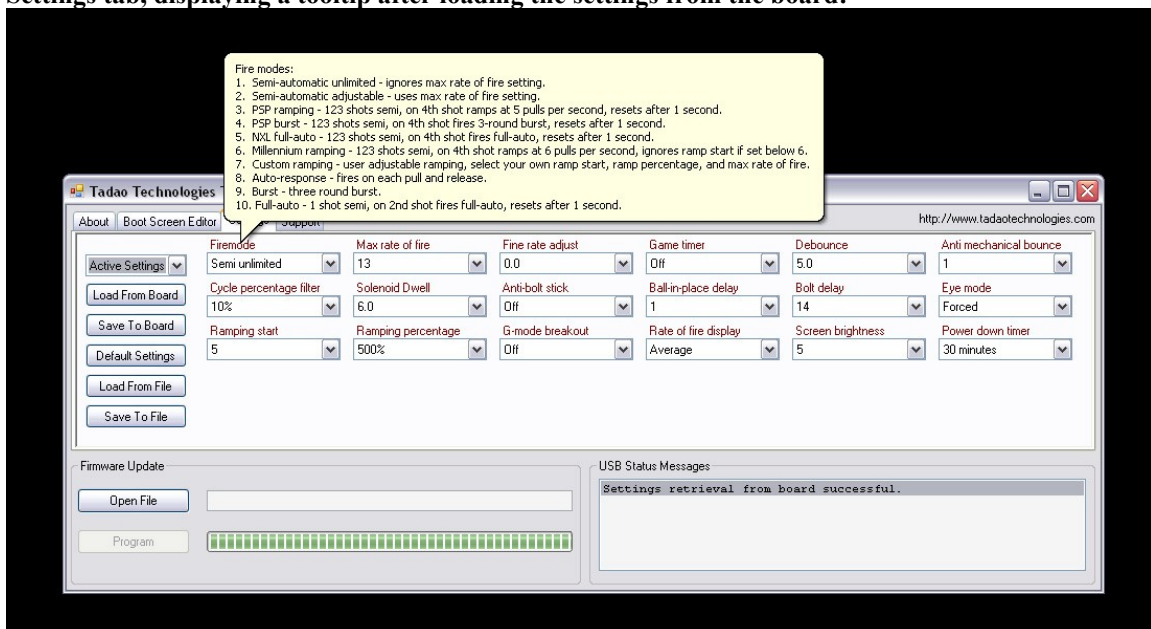
The settings tab lets you adjust settings on the board. The buttons along the left side allow you to:

1. Select the location on the board from which to read or save settings.
2. Load settings from the selected location to Tengu.
3. Save the current settings displayed in Tengu to the selected location on the board.
4. Load the default settings into Tengu.
5. Load settings into Tengu from a file on your computer.
6. Save the current settings displayed in Tengu to a file on your computer.

Note: Each version of Tengu supports specific firmware for all of the Yakuza USB boards. As new features and their corresponding settings are added to the firmware, Tengu must also be updated so that these settings can be manipulated from within its interface.

Every release of Tengu is capable of updating the firmware on any of the Yakuza USB boards. However, only specific versions of Tengu will be able to correctly load, save, and modify the settings for each revision of firmware. The Tengu page at [www.tadaotechnologies.com](http://www.tadaotechnologies.com) contains a list of compatible firmware and Tengu versions. You should always update Tengu when you update your board firmware.

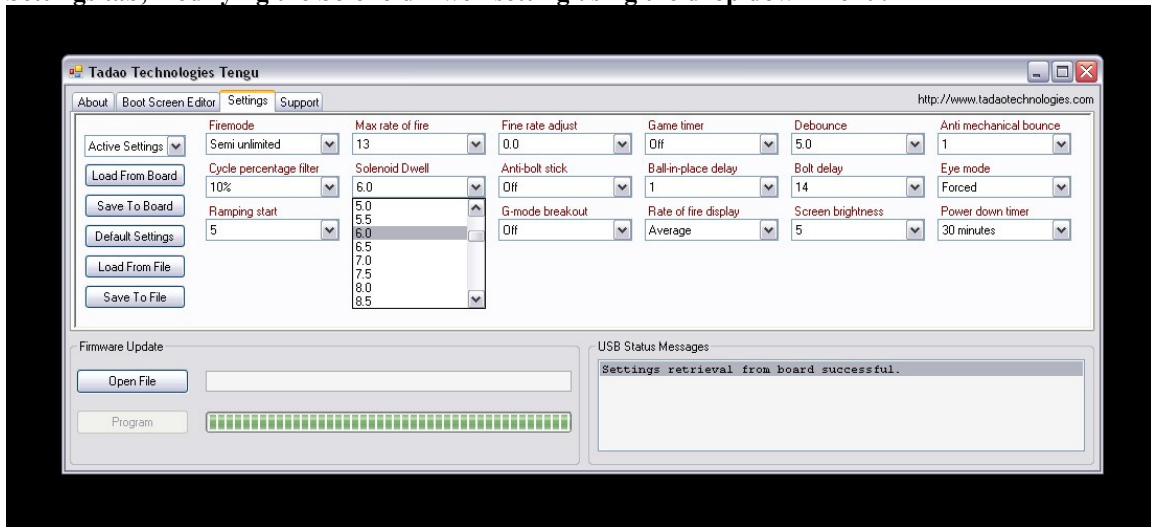
## Settings tab, displaying a tooltip after loading the settings from the board:



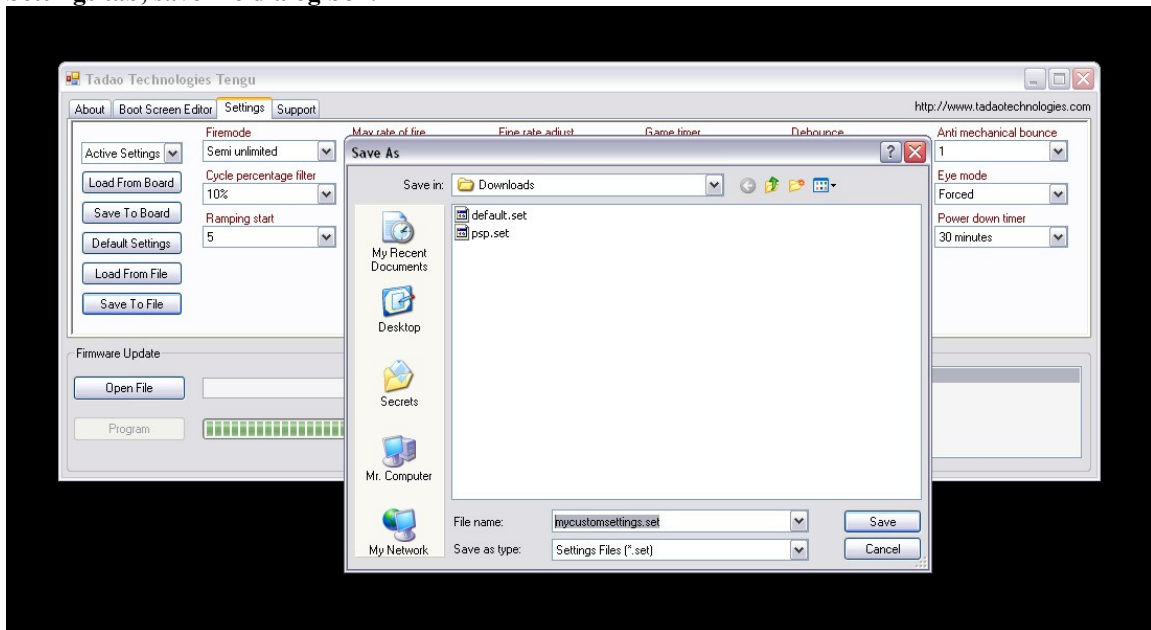
### Fire modes:

1. Semi-automatic unlimited - ignores max rate of fire setting.
2. Semi-automatic adjustable - uses max rate of fire setting.
3. PSP ramping - 123 shots semi, on 4th shot ramps at 5 pulls per second, resets after 1 second.
4. PSP burst - 123 shots semi, on 4th shot fires 3-round burst, resets after 1 second.
5. NXL full-auto - 123 shots semi, on 4th shot fires full-auto, resets after 1 second.
6. Millennium ramping - 123 shots semi, on 4th shot ramps at 6 pulls per second, ignores ramp start if set below 6.
7. Custom ramping - user adjustable ramping, select your own ramp start, ramp percentage, and max rate of fire.
8. Auto-response - fires on each pull and release.
9. Burst - three round burst.
10. Full-auto - 1 shot semi, on 2nd shot fires full-auto, resets after 1 second.

## Settings tab, modifying the Solenoid Dwell setting using the drop down menu:

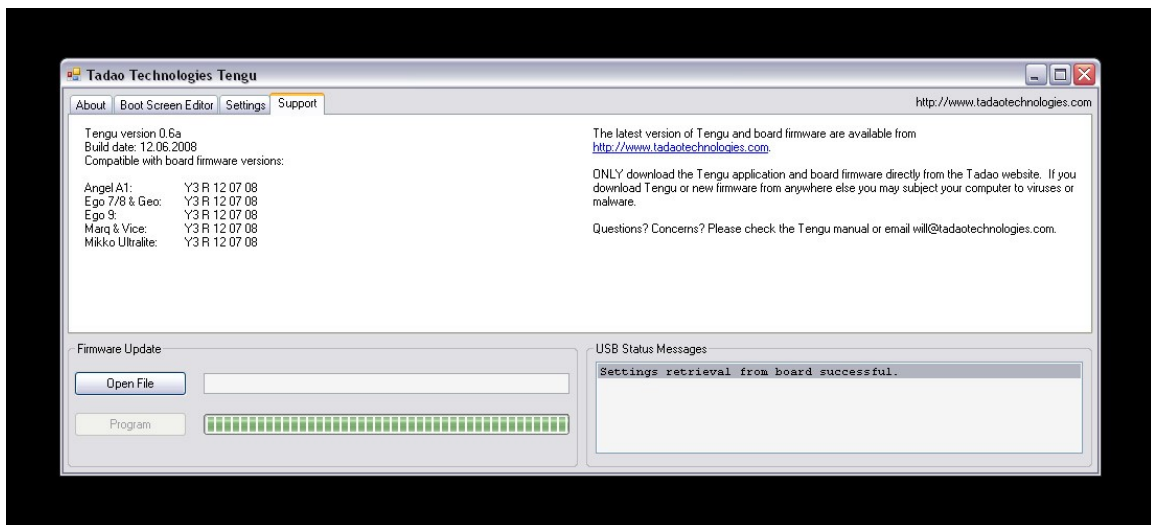


## Settings tab, save file dialog box:



## The Support Tab

The support tab lists the Tengu version, build date, and contact information. The End User Licensing Agreement is also displayed.



### **Additional Information**

**Versions** – Due to the addition of new settings or features in either program, a specific version of Tengu must be used with each firmware release for a board. Firmware compatible with Tengu versions are listed on the website.

**Power on/off** – The board must be turned off before connecting to the PC or it will not be properly recognized. While plugged into the USB cable, the board cannot be manually turned on. Input from the power switch will be ignored until it is removed from the USB cable. The battery can be left plugged in while using the USB as long as the board is first turned off.

If you accidentally flash the wrong firmware to your board (i.e. putting the Ego board firmware on your Ultralite board), remove the battery and flash the correct firmware.

### **End User License Agreement (EULA)**

1. Under this End User License Agreement (the Agreement), Tadao Technologies (the Vendor) grants to user (the Licensee) a non-exclusive and non-transferable license (the License) to use the Tengu USB interface (the Software).
2. “Software” includes the executable computer programs, encrypted firmware files, and any related printed, electronic, or online documentation and files.
3. Title, copyright, intellectual property rights and distribution rights of the Software remain exclusively with Vendor. Intellectual property rights include the look and feel of the Software. This Agreement constitutes a license for use only and is not in any way a transfer of ownership rights to the Software.
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