

## Introduction

This document provides a summary of the process methodologies and necessary steps for loading a configuration file into the non-volatile memory of a Zilker Labs Digital-DC™ power controller.

This document is specific to products produced by Zilker Labs, Inc. The information contained herein is presented as recommended methodologies and is supported by software and hardware tools developed by Zilker Labs in support of user requirements for production level configuration of Zilker Labs Digital-DC power controllers.

## Summary of Requirements

The methodology for loading a configuration file into a Zilker Labs Digital-DC device during low-volume engineering / validation phase and for the high-volume production phase is the same except for the hardware used to load the data into the devices.

For the low-volume / validation phase, Zilker Labs has developed a socketed programming station called ZLProgrammer for loading configuration files. For high-volume production, industry standard programmers, such as BP Microsystems programmers, are used to load configuration files. Please refer to Figure 1 for a flow chart of the process flow. The available software tools and associated hardware are described later in this document.

In general, the steps for loading a configuration file into a Zilker Labs device are:

1. Using the PowerNavigator™ evaluation software, configure and optimize the design.
2. Save the configuration file (Figure 2 shows the format of an example Configuration File).
3. Edit the configuration file using any text editor, adding Password and Operation commands, if required. See AN33 for use of the Password and Operation commands.
4. If using a ZLProgrammer, use the ConfigZL™ software to load the configuration file and configure devices. If using a commercial programmer, follow step 5 below.
5. If using an industry standard production programming system, convert the configuration file to ASCII Hex using ZLHLD Generator (Figure 5 shows a screen shot of the ZLHLD Generator and Figure 3 shows an example of an output file).
6. In the event of a communication error, commercial programmer or ZLProgrammer will provide an error message.

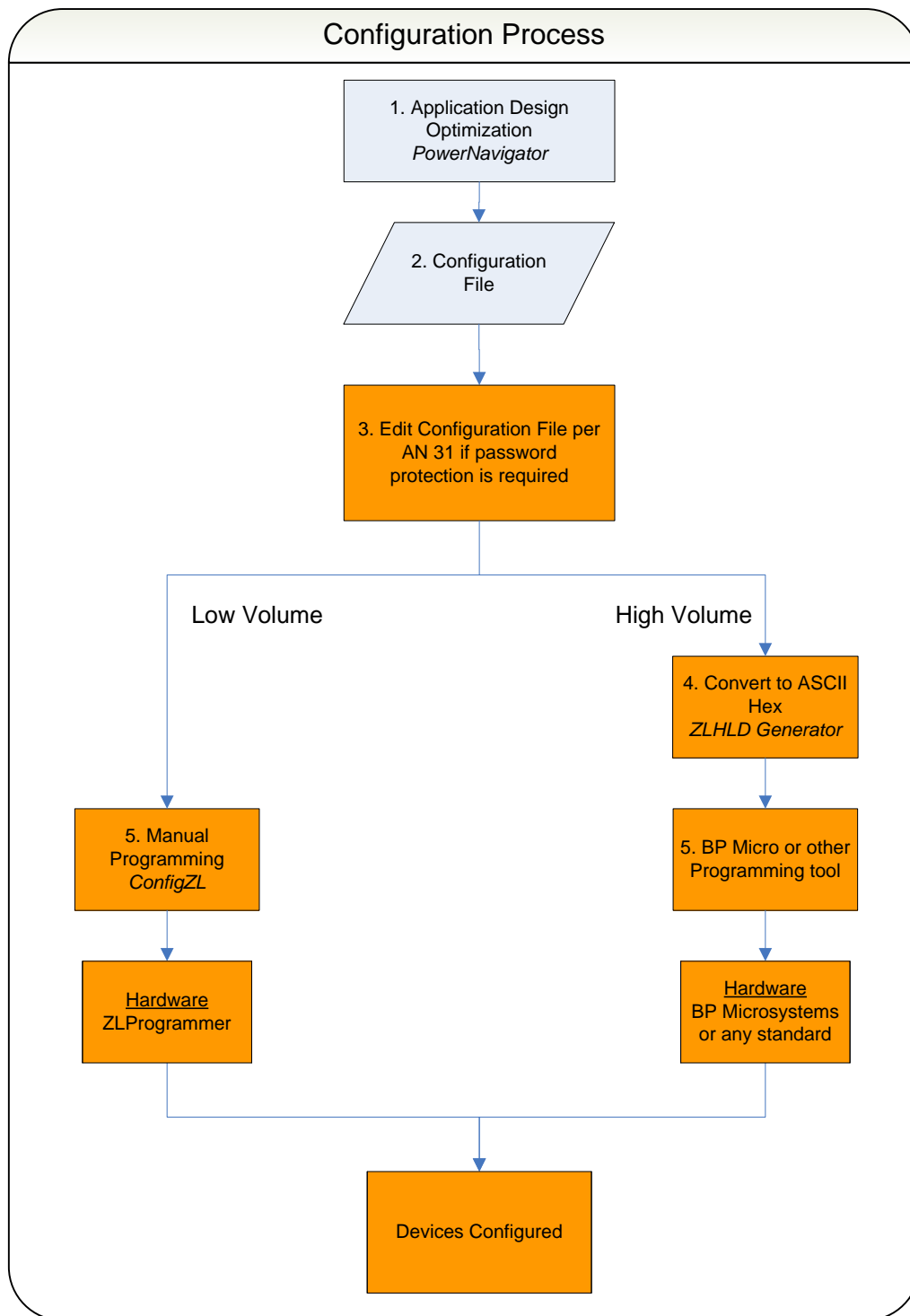


Figure 1. Flow Chart for Generating Configuration File and Programming ZL Devices

## The Configuration File

A typical configuration file is a text file composed of a series of PMBus commands. Depending upon the requirements of the application, the sequence may start by restoring the device to factory settings. The sequence always ends with a store of the new configuration to default or user memory. When the device is next powered on, it reads the pin-strap settings and then updates the configuration (possibly overriding some pin-strap settings) from the default or user store memory location in the non-volatile memory.

### Example of a Configuration File in Text Format

```
#-----
# Configuration file for ZL2005EV4 10A design
# The next three lines clear the Default Store & User Store
RESTORE_FACTORY
STORE_DEFAULT_ALL
STORE_USER_ALL
RESTORE_DEFAULT_ALL
MFR_SERIAL          SSSNNN
MFR_ID              ZilkerLabs
MFR_MODEL            ZL2005EV4_Config
MFR_REVISION         Rev1.3
MFR_LOCATION         Austin_TX
VOUT_COMMAND         1.2 #V
FREQUENCY_SWITCH     600 #kHz
POWER_GOOD_DELAY     1 #ms
TON_DELAY            15 #ms
TON_RISE             5 #ms
TOFF_DELAY           15 #ms
TOFF_FALL            5 #ms
SEQUENCE             0x0000
MFR_CONFIG           0xABCD
USER_CONFIG          0x0000
PID_TAPS             A=1993.25, B=-3688.31, C=1795.06
OVUV_CONFIG          0x01
IOUT_SCALE           3.5 #mOhms
IOUT_CAL_OFFSET      0
TEMPCO_CONFIG        0xAC
NLR_CONFIG           0xA250
# Set Null PRIVATE_PASSWORD (to get correct security level even on used-but-erased part)
PRIVATE_PASSWORD     0x0000000000000000
# Set PRIVATE_PASSWORD
PRIVATE_PASSWORD     ExamplePW
#replace "ExamplePW" nine-character password
# Set UNPROTECT bits
UNPROTECT            0xFFFFFDFDFDFDFDF7FCBFF7FFFFCCFFFFFFFFFFFFFA1FFFFFFFFFFFF4CEE7EFEEFFF
STORE_DEFAULT_ALL
# User Store Data
# Set PRIVATE_PASSWORD, to change SECURITY_LEVEL to 3, in order to do a RESTORE_FACTORY
PRIVATE_PASSWORD     ExamplePW
RESTORE_FACTORY
# Set PUBLIC_PASSWORD
PUBLIC_PASSWORD      MyPW
#replace "MyPW" with your own four-character password
# Set PRIVATE_PASSWORD to NULL (USER_STORE Private password),
PRIVATE_PASSWORD     0x0000000000000000
# Set PRIVATE_PASSWORD
PRIVATE_PASSWORD     ExampleP2
#replace "ExampleP2" with your own nine-character password
UNPROTECT            0xFFFFD9FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
STORE_USER_ALL
```

Figure 2. Example of a Configuration File

### Example of a Configuration File in ZLHLD (Zilker Labs Hex Line Delimited) Format

```
000340F499
000440F10087
000340112C
000440F10087
0003401530
000440F10087
0003401225
000440F10087
000B409E075353534E4E4EF4
000E40990A5A696C6B65724C6162732D
0014409A105A4C323030354556345F436F6E66696729
000A409B06526576312E3325
000D409C0941757374696E5F5458B7
000540216626CA
0005403358026D
000540D400BA30
00054060C0D384
0005406180CAFB
00054064C0D32F
0005406580CA50
000540E0000055
000540D0C1AB14
000540D10000DF
000D40D50928F97B85E6FC62E07BE2
0005404680DADE
000540E7C0D399
0005404B80D562
000540E800CC6E
000440D80193
0005403880C3DA
00054039000040
000440DCAC8D
000540D750A2C9
000D40FB09000000000000000000BB
000D40FB094578616D706C6550571A
002440FD20FFFFDFFFDF7FCBFF7FFFCCFFFFFFFFFA1FFFFFFFFFF4CEE7EFEEFFF7B
000340112C
000440F10087
000D40FB094578616D706C6550571A
000340F499
000440F10087
000840FC044D79505788
000D40FB09000000000000000000BB
000D40FB094578616D706C65503226
002440FD20FFFFD9FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF73
0003401530
000440F10087
```

**Figure 3. Example a Hex Format Configuration File**

## The PowerNavigator Evaluation Software

The PowerNavigator software is a graphical user interface (GUI) for controlling and configuring Zilker Labs Digital-DC devices through the SMBus/I<sup>2</sup>C interface. The design engineer can use this software for system development. The configuration file can be generated with this software.

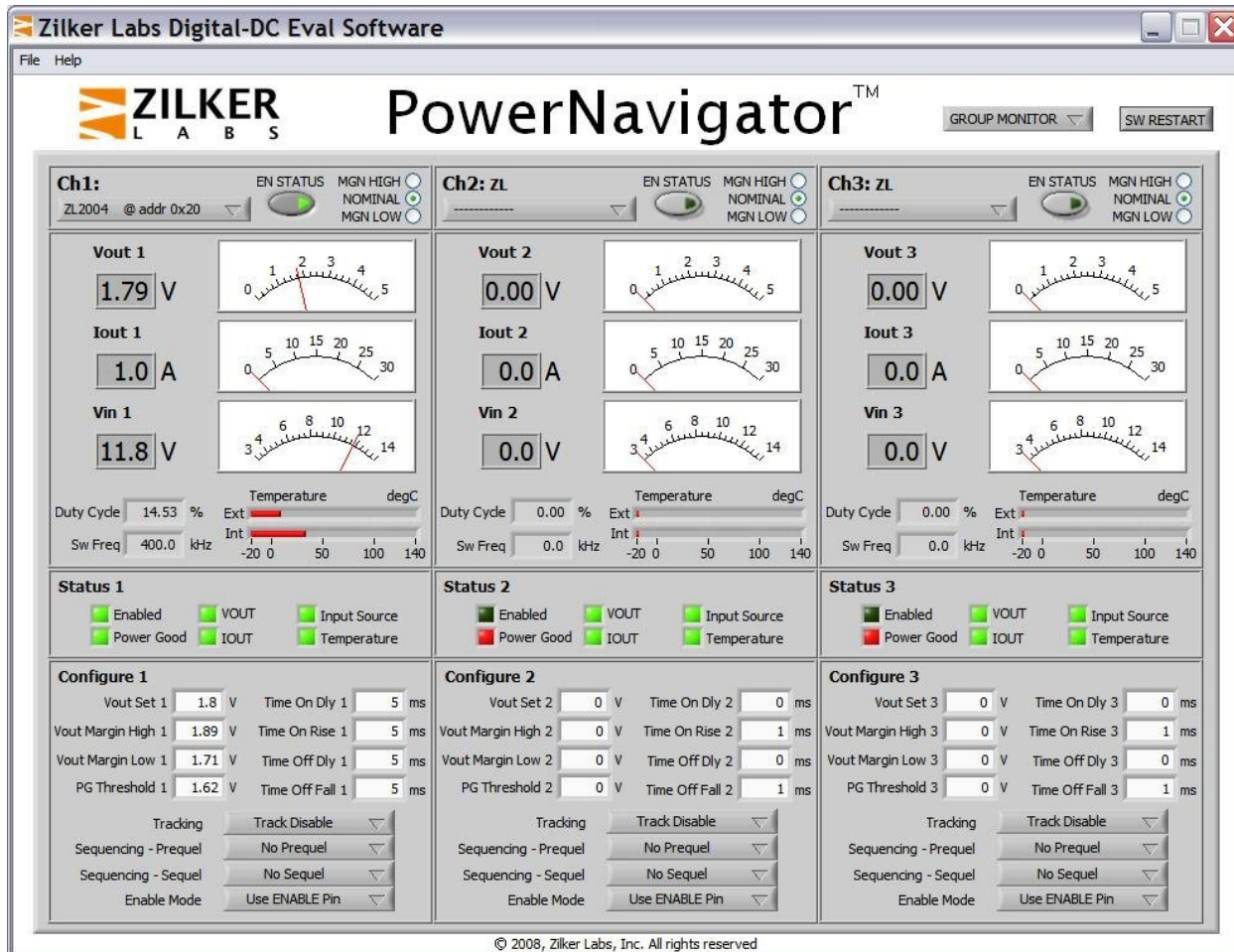


Figure 4. Group Configuration Screen of PowerNavigator

## The ZLHLD Generator Software

The ZLHLD Generator converts a configuration file into ASCII Hex.

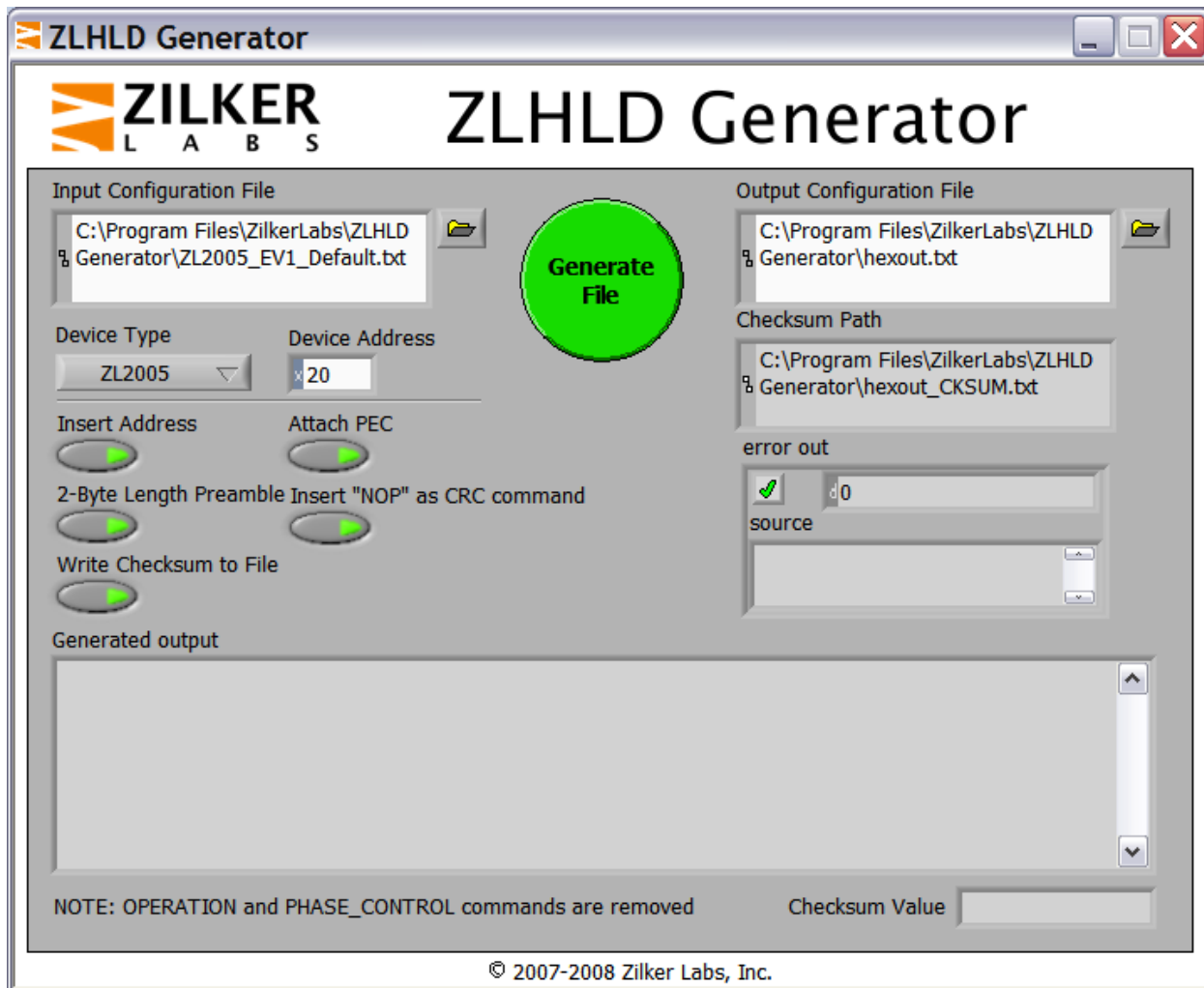


Figure 5. Screen Shot of ZLHLD Generator

## ConfigZL

The ConfigZL application was developed by Zilker Labs to assist users in loading their configuration files onto single devices. This program works in conjunction with the ZLProgrammer. The ConfigZL program can be configured to automatically insert a serial number into the configuration file.

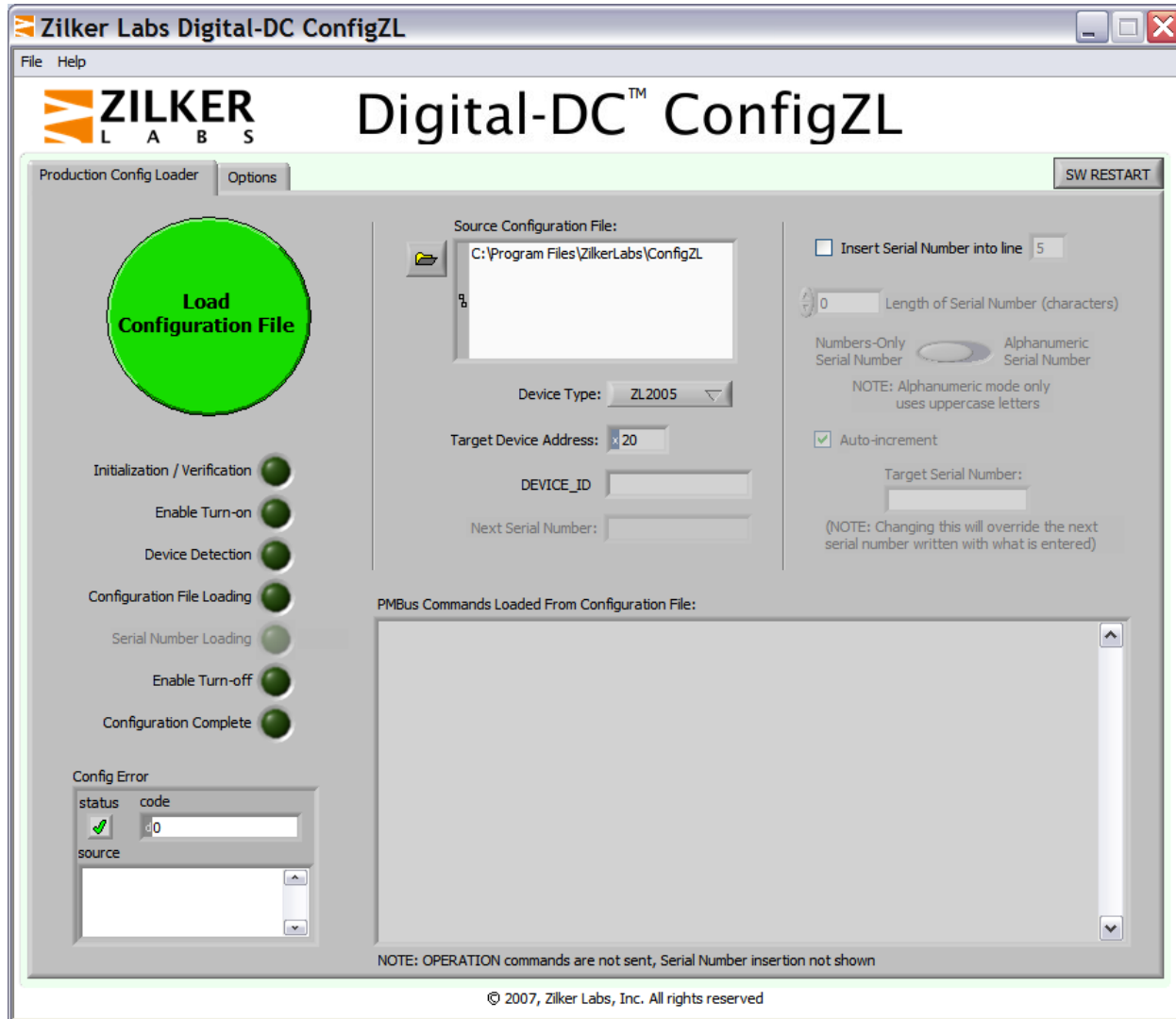


Figure 6. Screenshot of ConfigZL

## The ZLProgrammer Hardware

The ZLProgrammer is intended for low to medium production volumes or for initial board bring-up and is used to connect a Windows based PC running the ConfigZL software to the Device Under Test (DUT). There are a pair of banana jacks for connecting power to the target device. The clam shell socket accepts the 36 pin 6x6 mm QFN package. The sockets are rated for 15,000 insertions.



Figure 7. The ZLProgrammer



## Operating the ZLProgrammer

---

The solution is easy to implement and involves manual insertion and loading. The user is required to provide a configuration file, a Windows based PC, a power supply and the ZLProgrammer.

The ZLProgrammer requires the ConfigZL software tool which provides the user the following options for loading of the configuration file:

- ☐ Select the device type and address
- ☐ Point to the configuration file
- ☐ Select optional inclusion of a serial number
- ☐ Select optional inclusion of automatic incrementing of the serial number
- ☐ Set the starting serial number if automatic incrementing is enabled
- ☐ Monitor loading progress and status

The procedure is to connect the ZLProgrammer to the PC operating under Windows and launch the ConfigZL software, point to the configuration file, select the options, insert the device, and press the *Load Configuration* button.

## **Summary**

Zilker Labs supports two methods for loading a configuration file into the non-volatile memory of a Zilker Labs Digital-DC Controller.

For low to mid volume production, a complete solution is available that incorporates the Windows based ConfigZL control program and the ZLProgrammer. An industry standard solution from BP Microsystems is an example for high-volume production.

## **References**

- [1] *AN2031 Writing Configuration Files*, Zilker Labs, Inc. 2008.

**Revision History**

Date	Rev. #	Description
August 2008	1.0	Initial Release
May 2009	AN2028.0	Assigned file number AN2028 to app note as this will be the first release with an Intersil file number. Replaced header and footer with Intersil header and footer. Updated disclaimer information to read "Intersil and it's subsidiaries including Zilker Labs, Inc." No changes in application content.

## Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)



### SALES OFFICES

### Renesas Electronics Corporation

<http://www.renesas.com>

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

#### **Renesas Electronics America Inc.**

1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.  
Tel: +1-408-432-8888, Fax: +1-408-434-5351

#### **Renesas Electronics Canada Limited**

9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3  
Tel: +1-905-237-2004

#### **Renesas Electronics Europe Limited**

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
Tel: +44-1628-651-700, Fax: +44-1628-651-804

#### **Renesas Electronics Europe GmbH**

Arcadiastrasse 10, 40472 Düsseldorf, Germany  
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

#### **Renesas Electronics (China) Co., Ltd.**

Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China  
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

#### **Renesas Electronics (Shanghai) Co., Ltd.**

Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China  
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

#### **Renesas Electronics Hong Kong Limited**

Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong  
Tel: +852-2265-6688, Fax: +852 2886-9022

#### **Renesas Electronics Taiwan Co., Ltd.**

13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan  
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

#### **Renesas Electronics Singapore Pte. Ltd.**

80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949  
Tel: +65-6213-0200, Fax: +65-6213-0300

#### **Renesas Electronics Malaysia Sdn.Bhd.**

Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia  
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

#### **Renesas Electronics India Pvt. Ltd.**

No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India  
Tel: +91-80-67208700, Fax: +91-80-67208777

#### **Renesas Electronics Korea Co., Ltd.**

17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea  
Tel: +82-2-558-3737, Fax: +82-2-558-5338