

## 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.

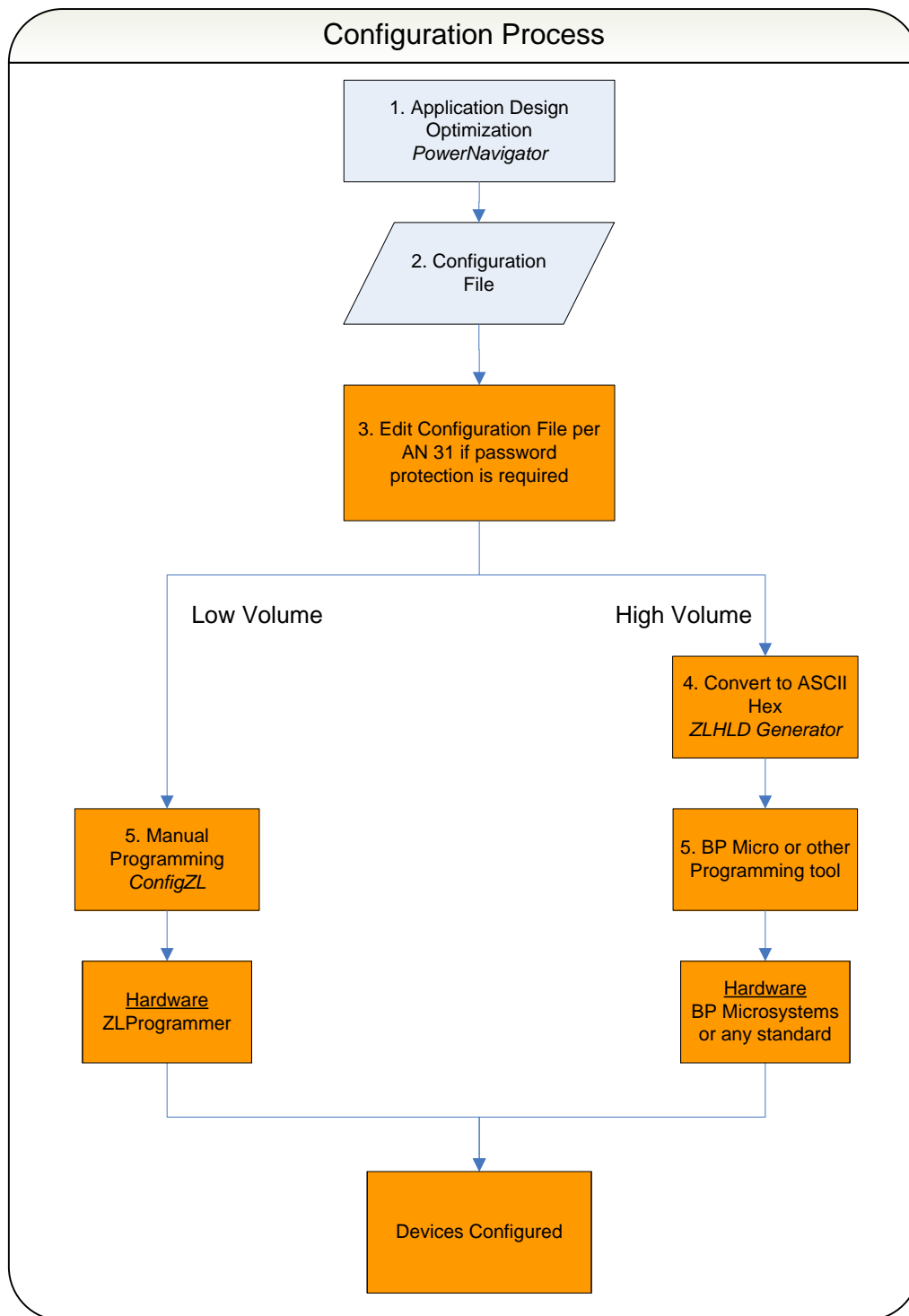


Figure 1. Flow Chart for Generating Configuration File and Programming ZL Devices

## 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          0xABC1
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    0x000000000000000000
# Set PRIVATE_PASSWORD
PRIVATE_PASSWORD    ExamplePW
#replace "ExamplePW" nine-character password
# Set UNPROTECT bits
UNPROTECT           0xFFFFFFFFFFFFFFFFFCBFF7FFFFFFCFFFFFFFFFFFFFFFA1FFFFFFFFFFFF4CEE7EFEEFFF
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    0x000000000000000000
# Set PRIVATE_PASSWORD
PRIVATE_PASSWORD    ExampleP2
#replace "ExampleP2" with your own nine-character password
UNPROTECT           0xFFFFD9FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
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
002440FD20FFFFFFDFFFDF7FCBFF7FFFCCFFFFFFFFFFFFFFFA1FFFFFFFFFFFF4CEE7EFEEFFF7B
000340112C
000440F10087
000D40FB094578616D706C6550571A
000340F499
000440F10087
000840FC044D79505788
000D40FB09000000000000000000BB
000D40FB094578616D706C65503226
002440FD20FFFFFFD9FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF73
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.

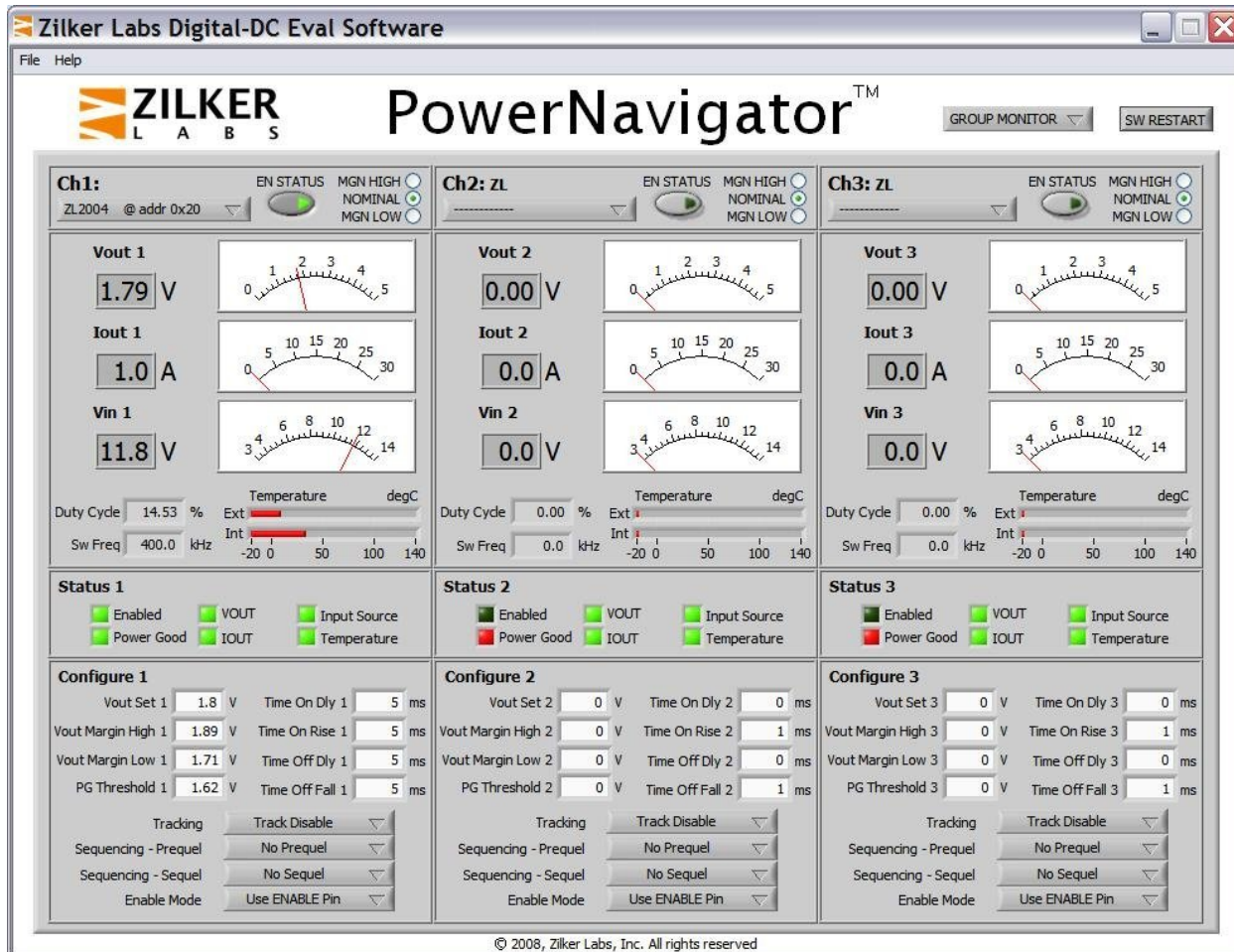


Figure 4. Group Configuration Screen of PowerNavigator

## The ZLHLD Generator Software

The ZLHLD Generator converts a configuration file into ASCII Hex.

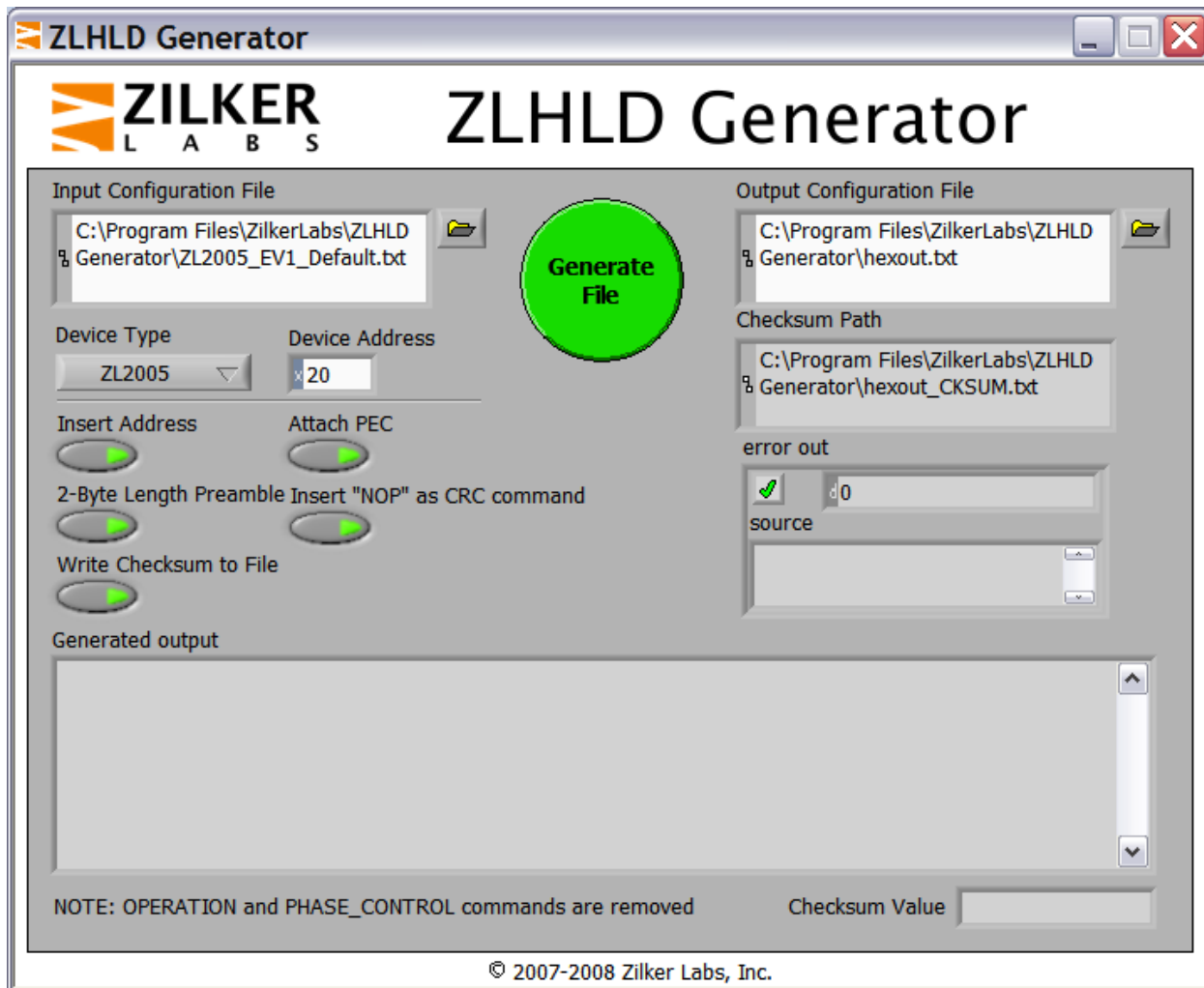


Figure 5. Screen Shot of ZLHLD Generator

## 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.

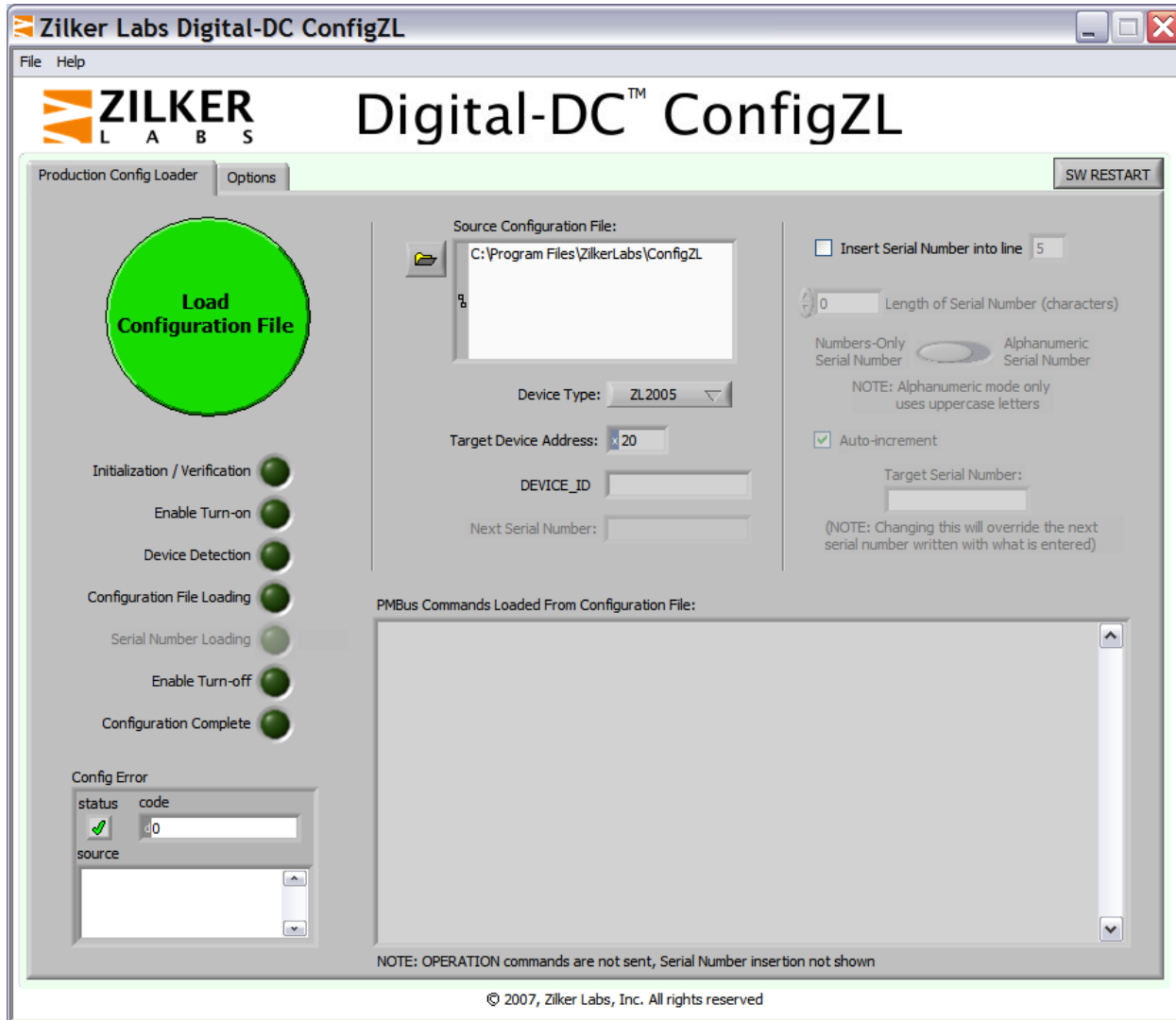


Figure 6. Screenshot of ConfigZL

## 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

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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.

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(Rev.4.0-1 November 2017)



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