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APPLICATION NOTE 99: UniqueWare Project Setup Manual Revision 2.00B

UniqueWare™ is a way to customize EPROM iButtons® and 1-Wire® devices at the factory. It represents a convenient and affordable way to electronically label items with a unique serialization and to optionally add some text information around the serialization field. This manual shows how to setup a custom Uniqueware Project with a software utility downloadable from Dallas Semiconductor/Maxim's FTP site. The manual also covers the many options available for customization.

Introduction

UniqueWare™ is a convenient and affordable way to electronically label items with a unique serialization and to optionally add some text information around the serialization Field.

There are several options that allow customization of what is programmed into UniqueWare devices. This manual progresses through filling out the data fields of the programming software and explains the effect of these entries. The data entered is used directly as a master to program the UniqueWare devices. Therefore it is important that it is understood how the data is used and what can be expected to be programmed in the UniqueWare devices.

Device Data Structure

A. Structure of the ROM Section

Like all Dallas Semiconductor Automatic Information products, UniqueWare devices have a factory-lasered ROM ID number (Table 1) that serves several purposes:

1. It identifies the logical behavior of the device by its family code.
2. It stores the device's unique serial number.
3. It validates that a device is genuine as only UniqueWare devices have the special identifier code 5E7. Other devices have a different code stored in this location.
4. It provides an 8-bit Cyclic Redundancy Check (CRC) to verify the integrity of the complete ROM section.
5. It acts as the node address to communicate with one specific device if several Automatic Information devices are connected in the 1-Wire® network.

Table 1. UniqueWare Devices ROM Section

Memory Size	64-Bit ROM Registration Number					
	8-bit CRC	UniqueWare Identifier			Device Serial Number	Family Code
1kb		5	E	7	MSB (hex format) LSB	89
16kb		5	E	7	MSB (hex format) LSB	8B
64kb		5	E	7	MSB (hex format) LSB	8F
	1 byte	12 bits			36 bits	1 byte
	High address					Low address

In addition to the ROM, UniqueWare devices have 128 bytes (1024-bit devices DS2502- UNW/DS1982U), 2048 bytes (16K-bit devices DS2505-UNW/DS1985U), or 8192 bytes (64K-bit devices DS2506-UNW/DS1986U) of one-time programmable data memory organized as pages of 32 bytes each. Up to four of these pages can be factory programmed with a unique Project ID Number, a customer-specified serialization and additional constant data patterns. The UniqueWare identifier in the ROM section together with a unique Project ID number guarantees the authenticity of original UniqueWare parts that are only sold to the owner of the Project ID or his authorized agents. Once programmed, the protected pages of UniqueWare devices cannot be altered.

B. Structure of the Data Memory

This section explains how data within the EPROM memory of UniqueWare is organized. There are basically two options (Table 2):

1. Combine all pages into a single unnamed file (Default Data Structure) containing UniqueWare data; advantage: up to 121 bytes of user data* available
2. Use one page as a directory and store the UniqueWare data as a named file (1-Wire File Structure); advantages of 1-Wire File Structure:
    1. Up to 80 bytes of user data* available
    2. Give the UniqueWare data a file name
    3. Use high level API functions to read the UniqueWare file

* User data includes the customer specified serialization field.

Table 2. Data Organization Options

	Default Data Structure	1-Wire File Structure
Page 0	UniqueWare Data	Device Directory
Page 1	UniqueWare Data (cont.) or blank	UniqueWare File
Page 2	UniqueWare Data (cont.) or blank	UniqueWare File (cont.) or blank
Page 3	UniqueWare Data (cont.) or blank	UniqueWare File (cont.) or blank

Regardless of which data structure is chosen, the format of the UniqueWare file is very similar. With Default Data Structure it always starts at physical address 0000h, with 1-Wire File Structure it starts at address 0020h. Table 3 shows the general structure of the UniqueWare file in case of Default Data Structure. With 1-Wire File Structure the UniqueWare file may occupy up to three pages. Each page begins with a length byte and ends with a control byte and a CRC16, leaving up to 28 bytes per page for data. For more details please refer to Application Note 114. As with Default Data Structure the Project ID is stored in the beginning of the UniqueWare file. Pages not occupied by the UniqueWare file or device directory are available for programming by the user.

Table 3. UniqueWare Application Data

Length	Project ID	Text 1	Serialization Number	Text 2	CRC16
	LSB MSB	const. data	LSB (hex. or BCD) MSB MSB (Character format) LSB	const. data	LSB MSB
1 byte	4 bytes assigned by DS	Up to 121 bytes (no filename) Extending over adjacent pages			2 bytes
Low address					High address

With 1-Wire File Structure there is a device directory starting at address 0000h. Details are shown in Table 4. According to 1-Wire File Structure rules, the most significant bit of the 1-byte file extension will be set to 1 to indicate that the UniqueWare file is write protected.

Table 4. UniqueWare Device Directory (1-Wire File Structure)

Length	Device Control Field							File Entry				Control	CRC16	
	AA	00	00	00	00	xx*	yy*	Name	Ext.	Address	Length	00	LSB	MSB
1 byte	7 bytes							5 bytes		2 bytes		2 bytes	2 bytes	
Low address														High address

* The codes "xx yy" in the device control field represent the starting page address and length of the bitmap file of used pages, as explained in Application Note 114. The codes are as follows: 1024-bit devices: 00 01; 16kb devices: 08 01; 64kb devices: 08 04.

Skipping Number Ranges

During the lifetime of a UniqueWare project it may be necessary to jump forward in the serialization and start at a significantly higher number to indicate a major revision of the product the UniqueWare is embedded in. In such a situation please send an email to AutoID.support@dalsemi.com or send a fax to 972-371-3715 specifying your company name, Project ID, and the new starting number. The Project ID will not be affected by skipping a number range. **Ranges that once have been skipped cannot be reused later. Changes to the text data or serialization style will require a new data file and a new a Project ID.**

Ordering Information

Technical information on UniqueWare devices is found in the DS1982/5/6U and the DS2502/5/6-UNW data sheets, which can be downloaded from the Dallas Semiconductor web site at http://www.maxim-ic.com/1-Wire.cfm.

There is a software setup fee of $2K on each device. The minimum order quantity is 2K pcs and higher quantities are available in multiples of 1000 pcs in bulk form. For Tape and Reel orders (1-Wire chips only), MOQ is the reel size with higher quantities available in multiples of the reel size. The shipment quantity can be plus or minus 10% of the order quantity. Only the quantity shipped will be billed.

The iButtons can only be purchased in bulk form, delivered in bags. The 1-Wire chips can be shipped in bulk bags, tubes, or on Tape & Reel as per package type.

Table 5. Tape-And-Reel Quantities

	TO-92	TSOC	SO
DS2502	2k	4k	2.5k
DS2505	2k	4k	
DS2506			2.5k

Computer-Aided Data Setup

A. Overview

Several pieces of information are required to program UniqueWare devices for your application. To simplify the process and avoid misunderstanding and errors introduced by retyping data from paper forms, Dallas

Semiconductor provides software that prompts for all relevant information, does error checking and writes the result to a file. Using this program to specify your special UniqueWare device is called a *Project Setup Session*.

The Project Setup program is located at the following website: ftp://ftp.dalsemi.com/pub/auto_id/licensed/unips.zip

Download the above file, unzip it into a known folder. Double click on the file.

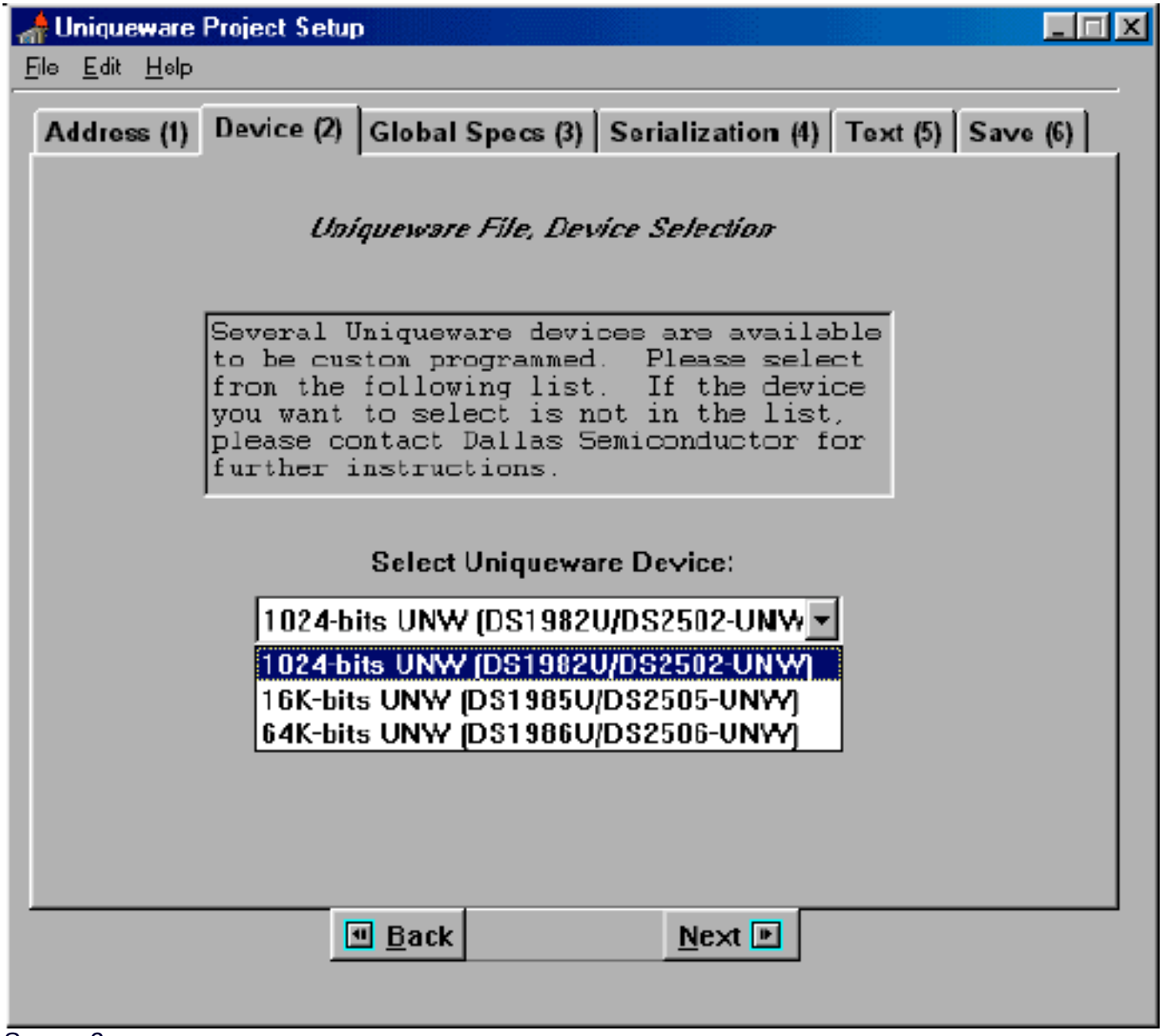
A session to create a set of UniqueWare data consists of six steps, each having its own screen:

Screen 1	Address: The company's name and address, etc.
Screen 2	Device Selection: Which part to use?
Screen 3	Global Specification: Data structure and file name.
Screen 4	Serialization: Length, counting style, starting number
Screen 5	Text: Optional text around the serialization field
Screen 6	Save: Saving session data to file.

The required data must be filled in the before you can proceed to the next screen.

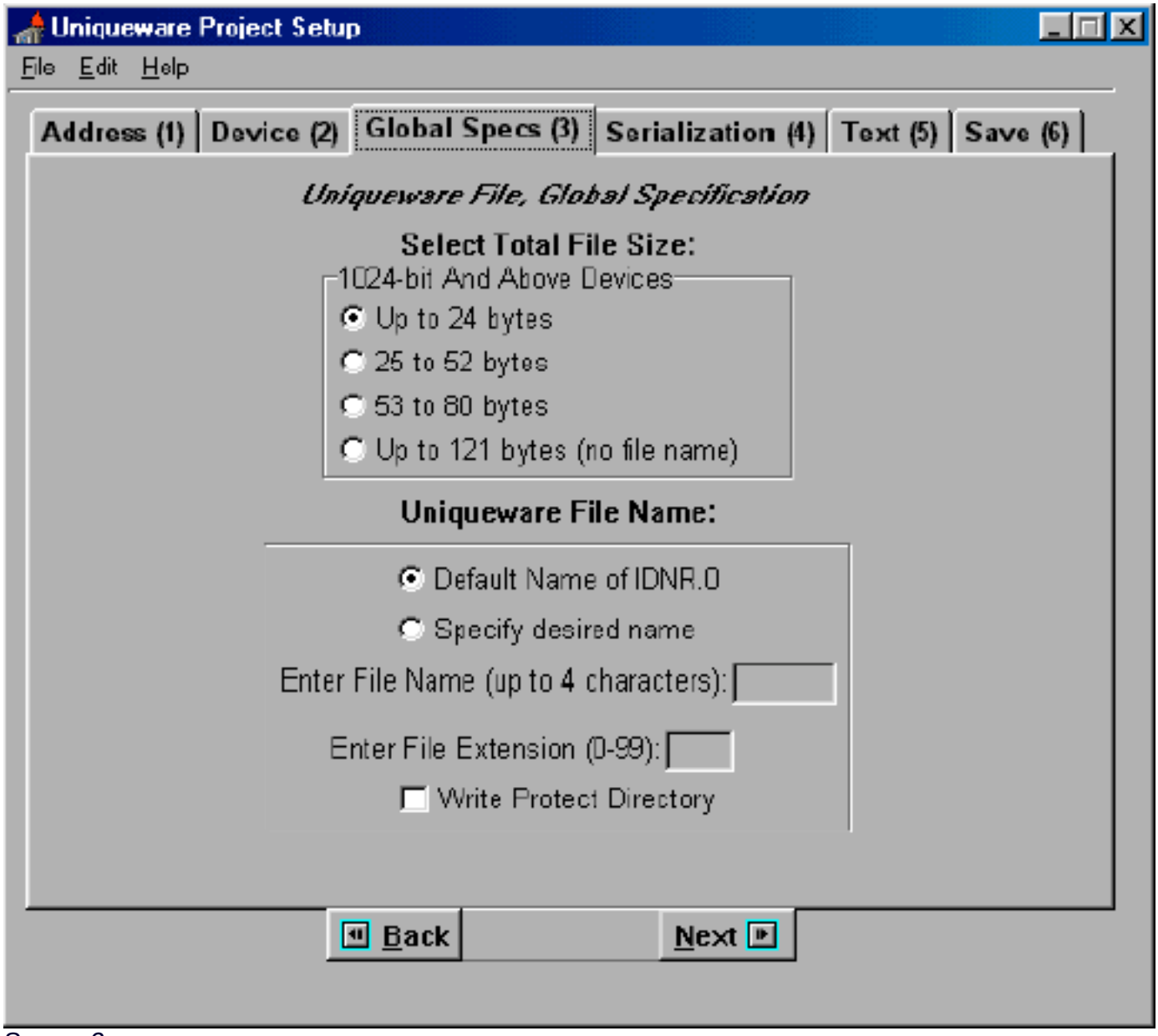
Screen 1

The *Next* button will advance the program to the next screen. The *Back* button allows the program to the return to a past screen. The *Back* button can be used at any time on the following screens.



Screen 2

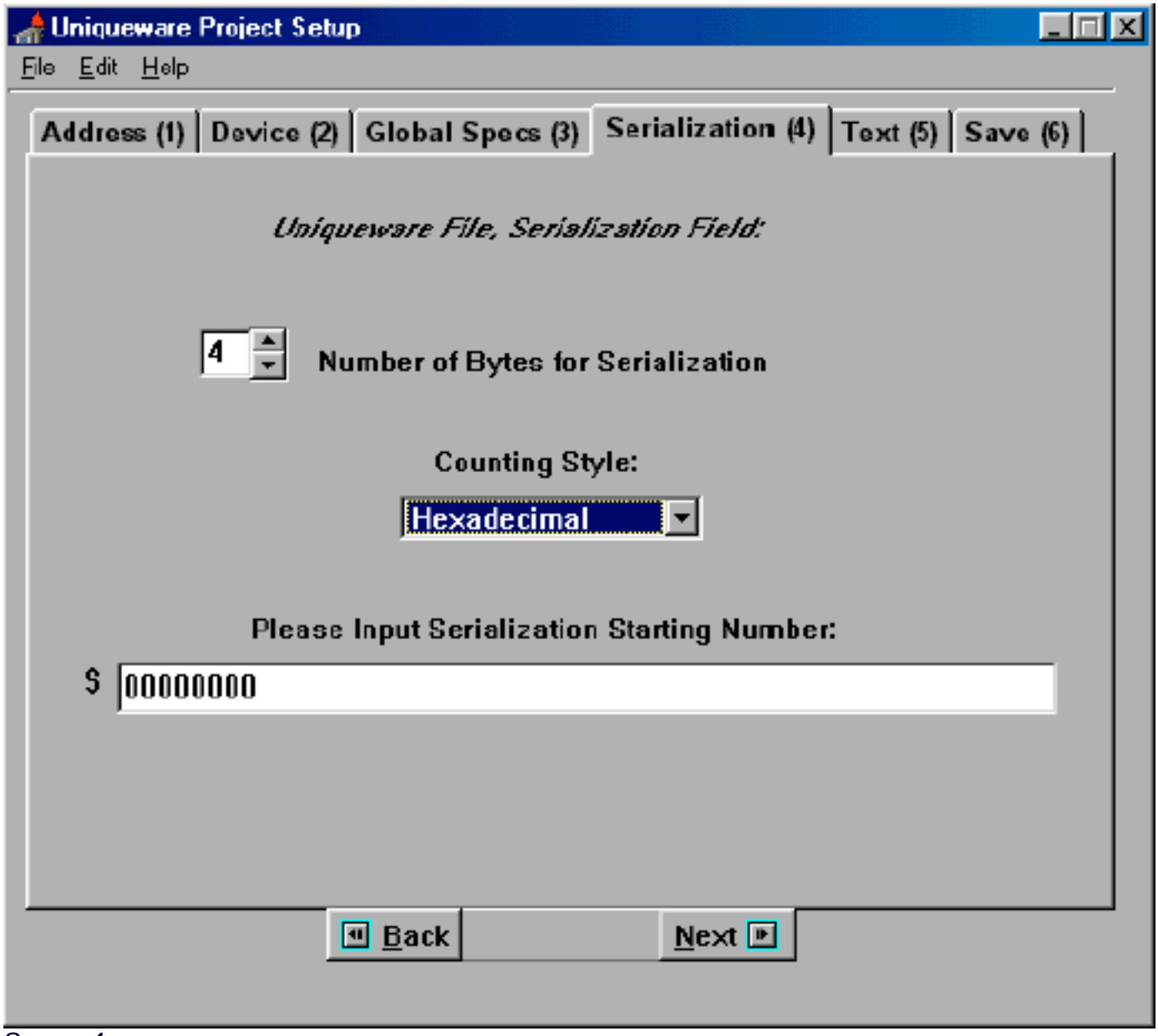
The drop-down menu allows selection of one of three available sizes of UniqueWare memory devices. Note that next to the memory size is the iButton/1-Wire chip part number for the confirmation of the correct selection.



Screen 3

The *Global Specs* screen selects whether the device will use the default data structure or the 1-Wire file structure. For the default data structure select the *Up to 121 bytes* button from the *Select Total File Size* window. All other selections refer to the 1-Wire file structure.

The 1-Wire file structure requires either a specified file name (up to four characters) and a file extension (0-99), or the default file name of IDNR.0. This is done in the *UniqueWare File Name* window. The name specified here or the IDNR.0 default will be the file name used in the device. There is no file name with the default data structure.



Screen 4

The *Serialization* window sets up the Serialization field of the UniqueWare file. Three counting styles are available: Hexadecimal; Binary Coded Decimal (BCD); Decimal (ASCII).

The value specified for *Number of Bytes for Serialization* directly determines the highest number and with it the maximum possible number range for serialization. After deciding on the counting style (:Hexadecimal; Binary Coded Decimal; or Decimal), then the number of bytes required for the application can be calculated.

As an example, if up to but no more than a million different serial numbers are needed, the maximum number to be represented is 999 999.

- Counting in decimal (ASC II) style, each of these digits takes 1 byte of memory. The number of bytes for serialization will be 6 in this case.
- The Binary Coded Decimal (BCD) style (which also implies decimal counting) then two digits fit into one byte. You will only need three bytes for serialization for the same number range.
- The hexadecimal style (which implies binary number representation) can distinguish 256 different numbers with one byte. Although it will again need three bytes for serialization, the highest possible number in this

case will be as high as 16.777216 million.

Table 6 shows more examples for the maximum serialization number depending on the number of bytes reserved and the code selected. The maximum supported size for the serialization field is 24 bytes. When using decimal (ASC II) style for serialization the serialization field must be at least four bytes.

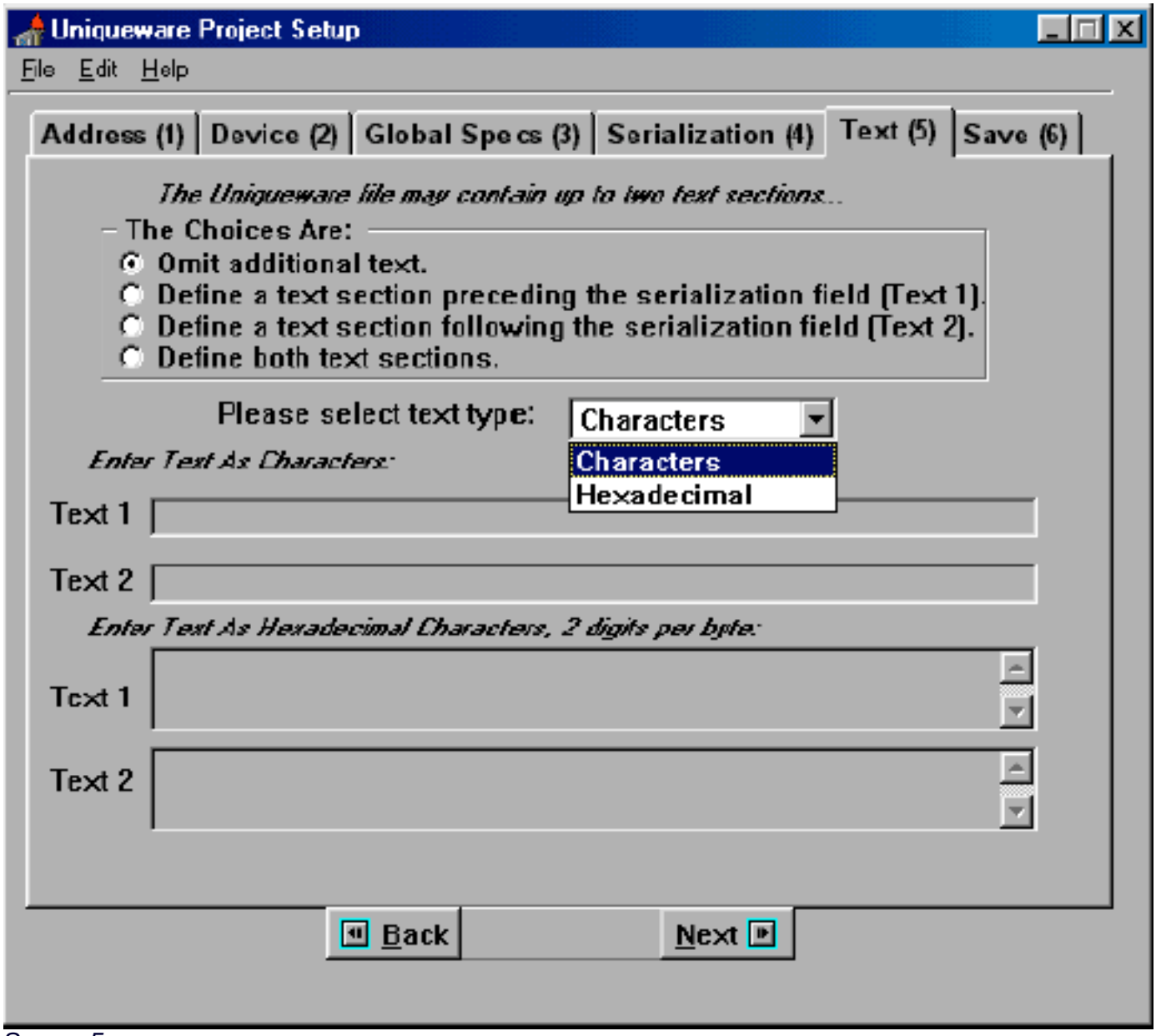
Table 6. Examples For The Maximum Serial Number

Number of Bytes	2	3	4	5	6
Hexadecimal	$65.535*10^3$	$16.777*10^6$	$4.294*10^9$	$1.099*10^{12}$	$281.474*10^{12}$
BCD	9 999	999 999	99 999 999	9 999 999 999	999 999 999 999
Decimal (ASC II)	N/A (99)	N/A (999)	9 999	99 999	999 999

The *Number of Bytes for Serialization* field will determine the number of parts that will be available, and affect the amount of text that can be written. Be sure to select a high enough number.

The serialization starting number may be specified. If the counting style is hexadecimal, the starting number also needs to be specified in hexadecimal (0-9, A-F). If not otherwise specified, the serialization number starts with all zeros.

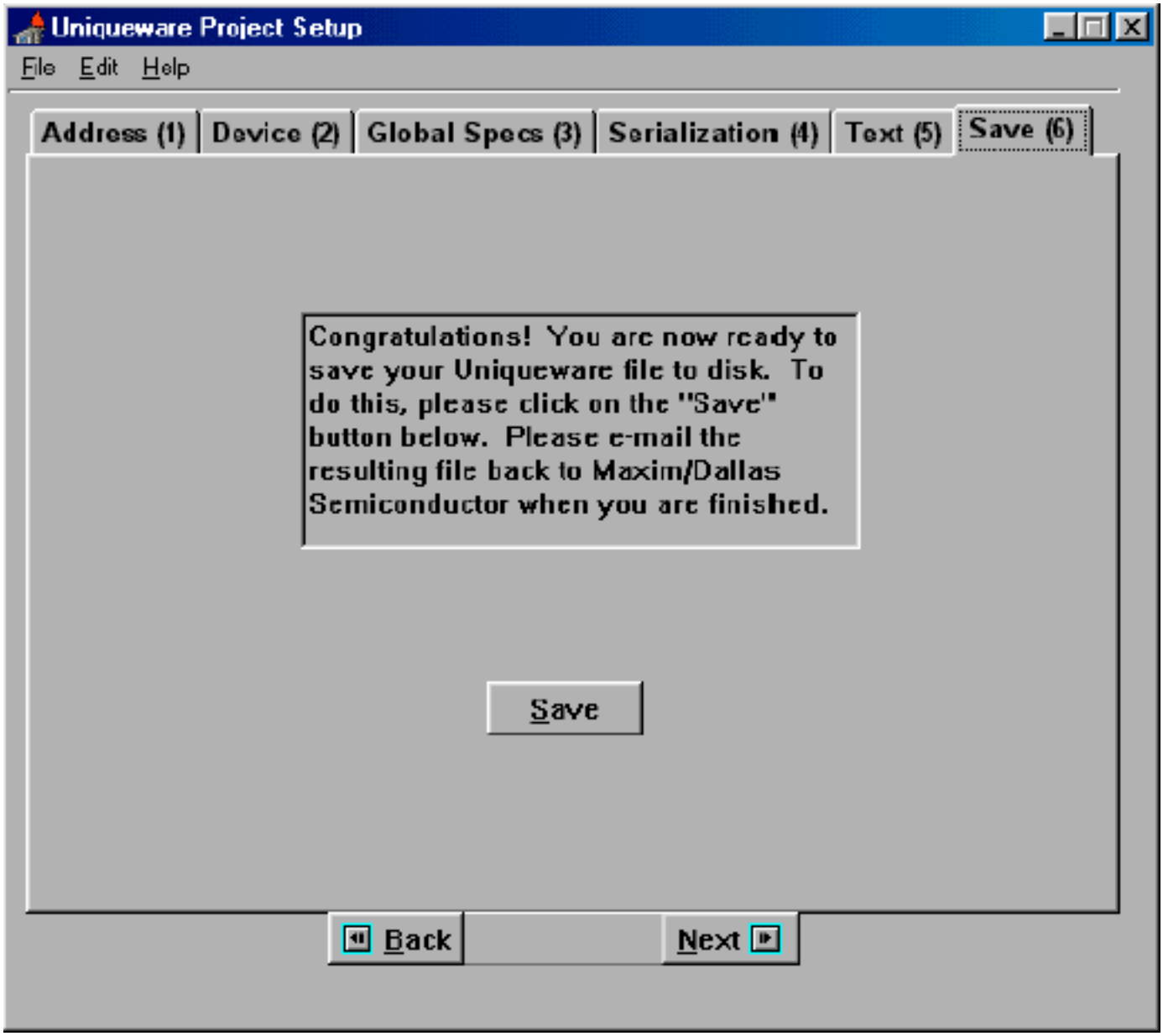
The starting serialization number should be as low as possible. Once a starting number is chosen, lower value numbers can never be recovered.



Screen 5

In the *Text* window, it is possible to specific text preceding the serialization field, text following the serialization field, text both preceding and following the serialization field or omit additional text completely.

The text can be in character or hexadecimal format. The hexadecimal format allows only characters 0-9 and a-f (capitalization is not necessary).



Screen 6

By clicking the *Save* button, the information will be saved. Be sure to note the folder where the file is being saved and the file name. The file can be viewed using this program by using the drop-down menu under the File heading. WARNING: Do not open and then save this file using a text editor as this will corrupt the data pattern that was created.

The file can now be emailed to AutoID.support@dalsemi.com. Use the subject line *UniqueWare data file.*

More Information

DS1982U:	QuickView	-- Full (PDF) Data Sheet
DS1985U:	QuickView	-- Full (PDF) Data Sheet
DS1986U:	QuickView	-- Full (PDF) Data Sheet
DS2502-UNW:	QuickView	-- Full (PDF) Data Sheet
DS2505-UNW:	QuickView	-- Full (PDF) Data Sheet
DS2506-UNW:	QuickView	-- Full (PDF) Data Sheet