Keywords: DS2431,DS2430A,EEPROM,1K-bit,replacement

APPLICATION NOTE 3697

Transition Guide: Replacing the DS2430A with the DS2431

Dec 19, 2005

Abstract: The DS2431 is an advanced 1-Wire® 1k-bit EEPROM replacement device for the older 256-bit DS2430A. This document discusses the differences in the command structure and memory map of the two devices. Particular attention is given to changes needed for applications that are transitioning to the larger DS2431 device. This application note also describes other important differences between the devices, specifically the DS2430A's Application Register and how to use the DS2431 in a write-protected, simulated EPROM mode.

Introduction

The DS2431 is an advanced 1-Wire 1k-bit EEPROM replacement device for the 256-bit DS2430A. There are several differences in the DS2431's command structure and memory map that require changes to applications transitioning to the newer, larger device. Each 1-Wire device, however, contains a unique 64-bit ROM identification number with 8 of the 64 bits representing the devices' common 'Family Code'. This 8-bit common code allows an application to recognize a different device, thus enabling a seamless transition between devices.

The DS2430A has a 64-bit Application Register that is write-once, and is in a separate memory space controlled with different commands. The DS2431 does not have the equivalent register. However, any of its four 32-byte pages can be individually write-protected or set into a simulated EPROM mode. EPROM mode allows a bit to be written from a logic one to a logic zero, but not back the other way. This technique can be useful in applications that require tracking of usage.

Both of these 1-Wire devices are offered in TO-92 and TSOC packages with the same pinout. Additionally, the DS2431 is available in SFN, TDFN, and chip-scale package (UCSP™). **Table 1** summarizes the fundamental differences between the devices' command structure and memory map.

Table 1. Feature Comparison of the DS2430A and the DS2431

Category	DS2430A	DS2431
Family code	14h	2Dh
Address bytes	1	2
Write protection	8-byte Application Register only	Any of four 32-byte pages
Scratchpad size	32	8
Copy scratchpad authorization code	Fixed A5h	3-byte sequence based on address: TA1, TA2, ES
Memory size	32 bytes	128 bytes
Memory map	00h to 1Fh (R/W memory) 00h to 07h (Application Register, different address space)	0000h to 007Fh (R/W memory), 0080h to 0087h (register controls)
Communication speed	Standard	Standard and Overdrive

Memory Operations

The following **Tables 2** through **Table 5** detail common memory operations. The yellow highlighted sections show the differences between the two devices. Note that these operations use the 'Skip ROM' command to select the device. Alternatively, any of the ROM level commands and supporting data can be used. All data is read and written least significant bit first.

Table 2. Read Memory

MASTER MODE	DS2430A	DS2431	COMMENTS
TX	(Reset)	(Reset)	Reset pulse
RX	(Presence)	(Presence)	Presence pulse
TX	CCh	CCh	Issue 'Skip ROM' command
TX	F0h	F0h	Issue 'Read Memory' command
TX	00h	00h	TA1, beginning offset = 00h
TX		00h	TA2, address = 0000h
RX	<32 data bytes>	<144 data bytes>	Read the entire memory
TX	(Reset)	(Reset)	Reset pulse
RX	(Presence)	(Presence)	Presence pulse

Table 3. Write Scratchpad

MASTER MODE	DS2430A	DS2431	COMMENTS
TX	(Reset)	(Reset)	Reset pulse
RX	(Presence)	(Presence)	Presence pulse
TX	CCh	CCh	Issue 'Skip ROM' command
TX	0Fh	0Fh	Issue 'Write Scratchpad' command
TX	00h	00h	TA1, beginning offset = 00h
TX		00h	TA2, address = 0000h
TX	<32 data bytes>	<8 data bytes>	Write data to scratchpad
RX		<2 bytes CRC16\>	Read CRC to check for data integrity

Table 4. Read Scratchpad

MASTER MODE	DS2430A	DS2431	COMMENTS
TX	(Reset)	(Reset)	Reset pulse
RX	(Presence)	(Presence)	Presence pulse
TX	CCh	CCh	Issue 'Skip ROM' command
TX	Aah	AAh	Issue 'Read Scratchpad' command
RX	00h	00h	TA1, beginning offset = 00h
RX		00h	TA2, address = 0000h
RX		07h	Read E/S, ending offset = 07h, flags = 0h
RX	<32 data bytes>	<8 data bytes>	Read data from scratchpad
RX		<2 bytes CRC16\>	Read CRC to check for data integrity

Table 5. Copy Scratchpad

MASTER MODE	DS2430A	DS2431	COMMENTS
TX	(Reset)	(Reset)	Reset pulse
RX	(Presence)	(Presence)	Presence pulse
TX	CCh	CCh	Issue 'Skip ROM' command
TX	55h	55h	Issue 'Copy Scratchpad' command
TX	A5h		Authorization code
TX		00h	TA1
TX		00h	TA2 (AUTHORIZATION CODE)
TX		07h	E/S
----	<1-Wire idle high>	<1-Wire idle high>	Wait 10ms for the copy function to complete
RX		AAh	Read copy status, AAh = success

The DS2430A is no longer recommended for new designs.

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Related Parts		
DS2430A	256-Bit 1-Wire EEPROM	
DS2431	1024-Bit 1-Wire EEPROM	Free Samples

More Information
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