

## AN206

### Migrating from FM24L256 to FM24V02

**Author: Girija Chougala**

**Associated Project: No**

**Associated Part Family: FM24L256, FM24V02**

**Software Version: None**

**Related Documents: For a complete list, [click here](#)**

AN206 discusses the key differences that need to be considered when migrating from FM24L256 to FM24V02. FM24L256 is now obsolete and this application note explains how FM24V02 is a replacement for FM24L256.

### Introduction

FM24V02, a 256-Kbit I<sup>2</sup>C F-RAM™, is a replacement device for FM24L256, which is now obsolete. The two devices are identical in terms of pinout, package composition and dimensions, read/write functionality, Write Protect operation, and address pin functionality. This application note discusses the key differences between the two devices that need to be considered when migrating from FM24L256 to FM24V02.

### Drop-In Replacement or Not?

For most designs, FM24L256 is a drop-in replacement for FM24V02. From a software point of view, the two devices are identical. From a hardware point of view, FM24V02 has higher standby current. The FM24V02 adds many features like operation down to 2.0 V, sleep mode capability and Device ID feature. The FM24V02 incorporates a HS-mode that allows read/write operations up to 3.4 MHz. The sleep mode feature effectively lowers the standby/idle current to 8 µA.

### Ordering Part Numbers

[Table 2](#) gives the recommended FM24V02 ordering part numbers that correspond to the now obsolete FM24L256 ordering part numbers.

Table 2. Recommended Ordering Part Numbers for Migration

FM24L256		FM24V02		Comments
Ordering Part Number	Status	Ordering Part Number	Status	
FM24L256-G	Obsolete	FM24V02-G	In production	No hardware or software change is required. System software update is required if you wish to use the additional Device ID feature supported in FM24V02.
FM24L256-GTR		FM24V02-GTR		

[Table 1](#) shows the compatibility chart of FM24L256 and FM24V02. For a detailed comparison, see [Table 3](#).

Table 1. Compatibility Chart

FM24L256 Feature or Spec	Is FM24V02 compatible?
Package	Yes
Pinout	Yes
Temperature Range	Yes
Operating Voltage	Yes
Operating Current	Yes
Standby Current	No
Read / Write Function	Yes
Timing / Frequency	Yes
Data Retention	Yes
Endurance	Yes

## Comparison of FM24L256 and FM24V02

Table 3 gives a detailed comparison of the two devices.

Table 3. Detailed Comparison

	FM24L256	FM24V02	Comments
Package Types	-G	-G	Identical, "green" SOIC
Package Outlines	SOIC-8	SOIC-8	Identical outline and board footprint
Pinout	-	-	Identical
Temperature Range	-40 °C to +85 °C	-40 °C to +85 °C	Identical
Operating Voltage Range	2.7 V to 3.6 V	2.0 V to 3.6 V	FM24V02 allows operation down to 2.0 V
Active Supply Current	70 $\mu$ A @ 100 kHz 600 $\mu$ A @ 1 MHz	175 $\mu$ A @ 100 kHz 400 $\mu$ A @ 1 MHz	FM24V02 offers lower active current at 1 MHz.
Standby Current	12 $\mu$ A	150 $\mu$ A	FM24V02 has higher standby current
Sleep Mode Current	-	8 $\mu$ A	FM24V02 offers a sleep mode which can be used to reduce the standby/idle current. During wake-up from sleep mode, the device has a recovery time of 400 $\mu$ s.
Output LOW Voltage ( $V_{OL}$ )	0.4 V @ $I_{OL} = 3$ mA	0.4 V @ $I_{OL} = 2$ mA	FM24L256 has better output LOW specification
Read / Write Function	-	-	Identical 2-byte addressing, Identical Slave IDs, Identical device select bits
Clock Frequency	1 MHz	1 MHz	Identical
Data Retention	10 years (+85 °C)	10 years (+85 °C) 38 years (+75 °C) 151 years (+65 °C)	Identical
Endurance (Write/Read Cycles)	Unlimited	1E+14	FM24V02's endurance is large enough to be considered as unlimited for all practical applications. For a 64-byte loop at 1 MHz, FM24V02's endurance is 1700 years.
$V_{DD}$ Power-up Ramp Rate ( $t_{VR}$ )	50 $\mu$ s / V	50 $\mu$ s / V	Identical
$V_{DD}$ Power-down Ramp Rate ( $t_{VF}$ )	100 $\mu$ s / V	100 $\mu$ s / V	Identical
Power-up to First Access ( $t_{PU}$ )	5 ms	0.25 ms	FM24V02 is faster to first access
HS-mode Clock Frequency	-	3.4 MHz	FM24V02 supports higher clock frequency of 3.4 MHz through a new command
Device ID Feature	-	Yes	Additional feature in FM25V02

## Critical Considerations

You should consider all the parameter differences mentioned in Table 3 during the migration to FM24V02. This section discusses the critical differences. System designers should also review the [datasheet](#) when migrating to the new part.

### Standby Current / Sleep Mode Current

The FM24V02 has higher standby current of 150  $\mu$ A compared to 12  $\mu$ A of FM24L256. But FM24V02 offers an additional sleep mode feature which can be used to reduce the standby/idle current. The sleep mode current is as low as 8  $\mu$ A. Note that during wake-up from sleep mode, the device needs a recovery time of 400  $\mu$ s.

## New Feature

This section discusses the additional Device ID feature supported in FM25V02. System designers should also review the [datasheet](#) for more details on the device ID feature.

### Device ID Feature

The FM25V02 incorporates a 9-byte read only Device ID (004200h) to identify the product uniquely. The Device ID allows the host to determine the manufacturer, product density, and product revision. System firmware update is required when you wish to use this feature in FM25V02.

### Summary

AN206 discussed the differences between FM24L256 and FM24V02 that need to be considered during migration to the FM24V02.

## Related Documents

### Datasheet

[FM24V02: 256-Kbit \(32 K × 8\) Serial \(I<sup>2</sup>C\) F-RAM datasheet](#)

## Document History

Document Title: Migrating from FM24L256 to FM24V02 - AN206

Document Number: 001-86827

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	3944550	GVCH	03/26/2013	New Spec.
*A	4281483	MEDU	03/05/2014	Updated to Cypress Template. Removed $V_{IH(max)}$ specification from Table 2.
*B	4498650	GVCH	09/10/2014	Changed title from "Differences between FM24L256 and FM24V02" to "Migrating from FM24L256 to FM24V02." Updated abstract. Added "Ordering Part Numbers" section. Added title for Table 3. Added "New Feature" section. Added "Related Documents" section.

## Worldwide Sales and Design Support

Cypress maintains a worldwide network of offices, solution centers, manufacturer's representatives, and distributors. To find the office closest to you, visit us at [Cypress Locations](#).

### Products

Automotive	<a href="http://cypress.com/go/automotive">cypress.com/go/automotive</a>
Clocks & Buffers	<a href="http://cypress.com/go/clocks">cypress.com/go/clocks</a>
Interface	<a href="http://cypress.com/go/interface">cypress.com/go/interface</a>
Lighting & Power Control	<a href="http://cypress.com/go/powerpsoc">cypress.com/go/powerpsoc</a> <a href="http://cypress.com/go/plc">cypress.com/go/plc</a>
Memory	<a href="http://cypress.com/go/memory">cypress.com/go/memory</a>
PSoC	<a href="http://cypress.com/go/psoc">cypress.com/go/psoc</a>
Touch Sensing	<a href="http://cypress.com/go/touch">cypress.com/go/touch</a>
USB Controllers	<a href="http://cypress.com/go/usb">cypress.com/go/usb</a>
Wireless/RF	<a href="http://cypress.com/go/wireless">cypress.com/go/wireless</a>

### PSoC® Solutions

[psoc.cypress.com/solutions](http://psoc.cypress.com/solutions)

[PSoC 1](#) | [PSoC 3](#) | [PSoC 4](#) | [PSoC 5LP](#)

### Cypress Developer Community

[Community](#) | [Forums](#) | [Blogs](#) | [Video](#) | [Training](#)

### Technical Support

[cypress.com/go/support](http://cypress.com/go/support)

PSoC is a registered trademark of Cypress Semiconductor Corp. All other trademarks or registered trademarks referenced herein are the property of their respective owners.



Cypress Semiconductor    Phone : 408-943-2600  
198 Champion Court    Fax : 408-943-4730  
San Jose, CA 95134-1709    Website : [www.cypress.com](http://www.cypress.com)

© Cypress Semiconductor Corporation, 2013-2014. The information contained herein is subject to change without notice. Cypress Semiconductor Corporation assumes no responsibility for the use of any circuitry other than circuitry embodied in a Cypress product. Nor does it convey or imply any license under patent or other rights. Cypress products are not warranted nor intended to be used for medical, life support, life saving, critical control or safety applications, unless pursuant to an express written agreement with Cypress. Furthermore, Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress products in life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

This Source Code (software and/or firmware) is owned by Cypress Semiconductor Corporation (Cypress) and is protected by and subject to worldwide patent protection (United States and foreign), United States copyright laws and international treaty provisions. Cypress hereby grants to licensee a personal, non-exclusive, non-transferable license to copy, use, modify, create derivative works of, and compile the Cypress Source Code and derivative works for the sole purpose of creating custom software and or firmware in support of licensee product to be used only in conjunction with a Cypress integrated circuit as specified in the applicable agreement. Any reproduction, modification, translation, compilation, or representation of this Source Code except as specified above is prohibited without the express written permission of Cypress.

Disclaimer: CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Cypress reserves the right to make changes without further notice to the materials described herein. Cypress does not assume any liability arising out of the application or use of any product or circuit described herein. Cypress does not authorize its products for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of Cypress' product in a life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies Cypress against all charges.

Use may be limited by and subject to the applicable Cypress software license agreement.