AN309

Migrating from FM25L512 to FM25V05

Author: Girija Chougala
Associated Project: No
Associated Part Family: FM25L512, FM25V05
Software Version: None
Related Documents: For a complete list, click here

AN309 discusses the key differences that need to be considered when migrating from FM25L512 to FM25V05. FM25L512 is now obsolete and this application note explains how FM25V05 is a replacement for FM25L512.

Introduction

FM25V05, a 512-Kbit SPI F-RAM™, is a replacement device for FM25L512, which is now obsolete. For most designs, the FM25V05 device can be considered a superset of the FM25L512. The two devices are identical in terms of pinout and read/write functionality. This application note discusses the key differences between the two devices that need to be considered when migrating from FM25L512 to FM25V05.

Drop-In Replacement or Not?

From a software point of view, the two devices are identical. From a hardware point of view, the key differences between the two devices are the FM25V05's package and higher standby current. The FM25V05 adds many features like operation down to 2.0 V, sleep mode, Device ID and higher speed capability.

Table 1 shows the compatibility chart of FM25L512 and FM25V05. For a detailed comparison, see Table 3.

Table 1. Compatibility Chart

FM25L512 Feature or Spec	Is FM25V05 compatible?
Package	Yes[1]
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

Note:
1. PCB footprint is compatible.

Ordering Part Numbers

Table 2 gives the recommended FM25V05 ordering part numbers that correspond to the now obsolete FM25L512 ordering part numbers.

Table 2. Recommended Ordering Part Numbers for Migration

FM25L512		FM25V05		Comments
Ordering Part Number	Status	Ordering Part Number	Status	
FM25L512-DG	Obsolete	FM25V05-G	In production	No hardware or software change is required. Software update is required if you wish to use the additional Sleep Mode and Device ID feature supported in FM25V05.
FM25L512-DGTR		FM25V05-GTR		

Comparison of FM25L512 and FM25V05

Table 3 gives a detailed comparison of the two devices.

Table 3. Detailed Comparison

	FM25L512	FM25V05	Comments
Package Type	-DG	-G	"Green" packages. TDFN vs. SOIC, but are footprint compatible (5 mm x 6 mm TDFN).
Package Outline	TDFN-8	SOIC-8	Outline is different but the board footprint is Identical
Pinout	-	-	Identical
Temperature Range	–40 ºC to +85 ºC	–40 ºC to +85 ºC	Identical
Operating Voltage Range	3.0 V to 3.6 V	2.0 V to 3.6 V	FM25V05 allows operation down to 2.0 V
Active Supply Current	600 µA @ 1 MHz 12.0 mA @ 20 MHz	300 µA @ 1 MHz 3.0 mA @ 40 MHz	FM25V05 offers lower active current even at low frequency
Standby Current	20 µA	150 µA	FM25V05 has higher standby current
Sleep Mode Current	-	8 µA	FM25V05 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 µs.
Read / Write Function	-	-	Identical 2-byte addressing, Identical op-codes
Clock Frequency	20 MHz	40 MHz	FM25V05 offers higher speed
Data Retention	10 years (+85 ºC)	10 years (+85 ºC) 38 years (+75 ºC) 151 years (+65 ºC)	Identical
Endurance (Write/Read Cycles)	Unlimited	1E+14	FM25V05's endurance is large enough to be considered as unlimited for all practical applications. For a 64-byte loop, at 20 MHz, FM25V05's endurance is 85 years.
V_{DD} Power-Up Ramp Rate (t_{VR})	50 µs / V	50 µs / V	Identical
V_{DD} Power-Down Ramp Rate (t_{VF})	1000 µs / V (V_{DD} less than 2 V)	100 µs / V	
Power-Up to First Access (t_{PU})	10 ms	0.25 ms	FM25V05 is faster to first access
$\overline{HOLD}$ pin pull-up	-	Internal pull-up	FM25V05 does not require any external pull-up resistor
Device ID Feature	-	Yes	Additional feature in FM25V05

Critical Considerations

You should consider all the parameter differences mentioned in Table 3 during the migration to FM25V05. This section discusses the critical differences. System designers should also review the datasheet when migrating to the new part.

Package Outline

The FM25V05 is offered in SOIC-8 package while the FM25L512 is offered in TDFN-8 package. But both the packages have compatible footprint (5 mm x 6 mm). However this package difference should be considered while migrating.

Standby Current / Sleep Mode Current

FM25V05 has higher standby current of 150 µA compared to FM25L512. But FM25V05 offers an additional sleep mode which can be used to reduce the standby/idle current. The sleep mode current is as low as 8 µA. Note that during wake-up from the sleep mode, device needs a recovery time of 400 µs.

New Feature: Device ID

The FM25V05 incorporates a 9-byte read only Device ID (7F7F7F7F7F7FC22300h) to identify the product uniquely. The Device ID allows the host to determine the manufacturer, product density, and product revision. Software update is required when you wish to use this feature in FM25V05.

Summary

AN309 discussed the differences between FM25L512 and FM25V05 that need to be considered during migration to the FM25V05.

Related Documents

Datasheet

FM25V05: 512-Kbit (64 K × 8) Serial (SPI) F-RAM datasheet

Application Note

AN304 – SPI GUIDE FOR F-RAM

Document History

Document Title: Migrating from FM25L512 to FM25V05 - AN309

Document Number: 001-86832

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	3944550	GVCH	03/26/2013	New Spec
*A	4278908	MEDU	03/07/2014	Updated to Cypress Template. Updated operating voltage for FM25L512 from “2.7 V to 3.6 V” to “3.0 V to 3.6 V”.
*B	4498652	GVCH	09/19/2014	Changed title from “Differences between FM25L512 and FM25V05” to “Migrating from FM25L512 to FM25V05.” Updated abstract. Added “Ordering Part Numbers” section. Added title for Table 3. 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	cypress.com/go/automotive
Clocks & Buffers	cypress.com/go/clocks
Interface	cypress.com/go/interface
Lighting & Power Control	cypress.com/go/powerpsoc cypress.com/go/plc
Memory	cypress.com/go/memory
PSoC	cypress.com/go/psoc
Touch Sensing	cypress.com/go/touch
USB Controllers	cypress.com/go/usb
Wireless/RF	cypress.com/go/wireless

PSoC® Solutions

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

Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709

Phone : 408-943-2600
Fax : 408-943-4730
Website : www.cypress.com