

AN323

Migrating from Grade 1 version of FM25C160 to Grade 1 version of FM25C160B

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Associated Project: No

Associated Part Family: FM25C160-GA, FM25C160B-GA

Software Version: None

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

AN323 discusses the key differences that need to be considered when migrating from Grade 1 version of FM25C160 to Grade 1 version of FM25C160B. FM25C160 is now obsolete and this application note explains how FM25C160B is a replacement for FM25C160.

Introduction

FM25C160B-GA, a 16-Kbit SPI Grade 1 F-RAM™, is a replacement device for FM25C160-GA, which is now obsolete. The two devices are identical in terms of package, pinout, DC / AC parameters, and read / write functionality. This application note discusses the key differences between the two devices that need to be considered when migrating from FM25C160-GA to FM25C160B-GA.

Drop-In Replacement or Not?

From a software point of view, the two devices are identical. Both the devices are read / write compatible and use the same two-byte address. From a hardware point of view, the key difference between the two devices is the FM25160B-GA's lower operating current. Additionally, FM25160B-GA datasheet adds a power-up ramp rate, power-down ramp rate and first-access time specification.

[Table 1](#) shows the compatibility chart of FM25C160-GA and FM25C160B-GA. For a detailed comparison, see [Table 3](#).

Table 1. Compatibility Chart

FM25C160-GA Feature or Spec	Is FM25C160B-GA compatible?
Package	Yes
Pinout	Yes
Temperature Range	Yes
Operating Voltage	Yes
Operating Current	Yes
Standby Current	Yes
Read / Write Function	Yes
Timing / Frequency	Yes
Data Retention	Yes
Endurance	Yes

Ordering Part Numbers

[Table 2](#) gives the recommended FM25C160B-GA ordering part numbers that correspond to the now obsolete FM25C160-GA ordering part numbers.

Table 2. Recommended Ordering Part Numbers for Migration

FM25C160-GA		FM25C160B-GA		Comments
Ordering Part Number	Status	Ordering Part Number	Status	
FM25C160-GA	Obsolete	FM25C160B-GA	In production	No hardware or software change is required
FM25C160-GATR		FM25C160B-GATR		

Comparison of FM25C160 and FM25C160B

Table 3 gives a detailed comparison of the two devices.

Table 3. Detailed Comparison

	FM25C160-GA	FM25C160B-GA	Comments
Package Types	-GA	-GA	Identical "green" SOIC package
Package Outlines	SOIC-8	SOIC-8	Identical outline and board footprint
Pinout	-	-	Identical
Temperature Range	-40 °C to +125 °C	-40 °C to +125 °C	Identical
Operating Voltage Range	4.5 V to 5.5 V	4.5 V to 5.5 V	Identical
Active Supply Current	500 µA @ 1 MHz 6.5 mA @ 15 MHz	300 µA @ 1 MHz 3.0 mA @ 15 MHz	FM25C160B-GA offers lower active current
Standby Current	10 µA (+85 °C) 30 µA (+125 °C)	10 µA (+85 °C) 30 µA (+125 °C)	Identical
Read / Write Function	-	-	Identical 2-byte addressing, Identical op-codes
Clock Frequency	15 MHz	15 MHz	Identical
AC Timing Parameters	-	-	All specification limits are the Identical
Data Retention	9000 hours (+125 °C) after 17 years (+55 °C)	11000 hours (+125 °C) 11 years (+105 °C) 121 years (+85 °C)	FM25C160B-GA offers better data retention
Endurance (Write/Read Cycles)	1E+12	1E+13	FM25C160B-GA offers improved endurance
V _{DD} Power-Up Ramp Rate (t _{VR})	-	30 µs / V	Power-up ramp rate should be slower than 30 µs / V for FM25C160B-GA
V _{DD} Power-Down Ramp Rate (t _{VF})	-	20 µs / V	Power-down ramp rate should be slower than 20 µs / V for FM25C160B-GA
Power-Up to First Access (t _{PU})	-	1 ms	After power-up, the first access of FM25C160B-GA should be after 1 ms

Critical Considerations

You should consider all the parameter differences mentioned in Table 3 during the migration to FM25C160B-GA. This section discusses the critical differences. System designers should also review the [datasheet](#) when migrating to the new part.

V_{DD} Ramp Rate

V_{DD} power-up and power-down ramp rate specifications are added in FM25C160B-GA device. Ensure that the power-up ramp rate is slower than 30 µs / V and power-down ramp rate is slower than 20 µs / V in your system.

Power-Up to First Access

Power-up to first access specification is added in FM25C160B-GA device. Ensure that the FM25C160B-GA device is accessed only after 1 ms from power-up.

Summary

AN323 discussed the differences between the Grade 1 versions of FM25C160 and FM25C160B that need to be considered during migration to the FM25C160B.



Related Documents

Datasheet

[FM25C160B: 16-Kbit \(2 K × 8\) Serial \(SPI\) Automotive F-RAM datasheet](#)

Application Note

[AN304 – SPI GUIDE FOR F-RAM](#)

Document History

Document Title: Migrating from Grade 1 version of FM25C160 to Grade 1 version of FM25C160B - AN323

Document Number: 001-86846

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	3944550	GVCH	03/26/2013	New Spec.
*A	4279208	MEDU	03/05/2014	Updated to Cypress Template. Updated "Active Supply Current" from "6.0 mA @ 14 MHz" to "6.5 mA @ 15 MHz". Updated Clock Frequency from 14 MHz to 15 MHz. Updated data retention for FM25C160B-GA. Updated "V _{DD} Power-Down Ramp Rate" for FM25C160B-GA from 100 μ s / V to 20 μ s / V. Updated "Power-Up to First Access" for FM25C160B-GA from 10 ms to 1 ms.
*B	4498656	GVCH	09/23/2014	Changed title from "Differences between Grade 1 versions of FM25C160 and FM25C160B" to "Migrating from Grade 1 version of FM25C160 to Grade 1 version of FM25C160B." Updated abstract. Added " Ordering Part Numbers " section. Added title for Table 3 . Added " Related Documents " section.

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