Migrating from FM24CL16 to FM24CL16B

About this document

Scope and purpose

AN211 discusses the key differences which need to be considered when migrating from FM24CL16 to FM24CL16B. FM24CL16 is now obsolete and this application note explains how FM24CL16B is a replacement for FM24CL16.

Associated part family

FM24CL16, FM24CL16B

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1 Introduction

FM24CL16B, a 16-Kbit I^2C F-RAM, is a replacement device for FM24CL16, which is now obsolete. The two devices are identical in terms of pinout, 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 FM24CL16 to FM24CL16B.

2 Drop-in replacement or not?

From a software point of view, the two devices are identical. From a hardware point of view, FM24CL16B has slightly higher standby current compared to FM24CL16. Additionally, FM24CL16B datasheet adds a power-up and power-down ramp rate specification of 30 µs / V and a power-up to first-access specification of 1 ms. Also, the footprint for the TDFN package of the FM24CL16B is different compared to that of FM24CL16 and hence would need hardware change when migrating.

Table 1 shows the compatibility chart of FM24CL16 and FM24CL16B. For a detailed comparison, see Table 3.

Table 1 Compatibility chart

FM24CL16 feature or spec	Is FM24CL16B compatible?
Package	Yes (SOIC) No (TDFN)
Pinout	Yes
Temperature Range	Yes
Operating Voltage	Yes
Operating Current	Yes
Standby Current	No
Read / Write Function	Yes
Timing / Frequency	Yes
Data Retention	Refer to Table 3
Endurance	Yes

3 Ordering part numbers

Table 2 gives the recommended FM24CL16B ordering part numbers that correspond to the now obsolete FM24CL16 ordering part numbers.

Table 2 Recommended ordering part numbers for migration

FM24CL16		FM24CL16B		Comments
Ordering part number	**Status**	**Ordering part number**	**Status**	
FM24CL16-G	Obsolete	FM24CL16B-G	In production	No hardware or software change is required.
FM24CL16-GTR		FM24CL16B-GTR		
FM24CL16-DG	Obsolete	FM24CL16B-DG	In production	Hardware change is required.
FM24CL16-DGTR		FM24CL16B-DGTR		

4 Comparison of FM24CL16 and FM24CL16B

Table 3 gives a detailed comparison of the two devices.

Table 3 Detailed comparison

	FM24CL16	FM24CL16B	Comments
Package types	-G, -DG	-G, -DG	Identical “green” SOIC package, different “Green” TDFN package
Package outlines	SOIC-8, TDFN-8 (3 mm x 6.4 mm)	SOIC-8, TDFN-8 (4 mm x 4.5 mm)	Package outline and board footprint are Identical for SOIC but different for TDFN
Pinout	-	-	Identical
Temperature range	–40°C to +85°C	–40°C to +85°C	Identical
Operating voltage range	2.7 V to 3.65 V	2.0 V to 3.65 V	FM24CL16B offers a wider operating range
Active supply current	75 µA @ 100 kHz 450 µA @ 1 MHz	100 µA @ 100 kHz 300 µA @ 1 MHz	FM24CL16B offers lower active current at 1 MHz
Standby current	1 µA (max)	6 µA (max) 3 µA (typical)	FM24CL16B has higher standby current
Read / Write function	-	-	Identical 1-byte addressing, Identical Slave IDs
Clock frequency	1 MHz	1 MHz	Identical
Data retention	45 years (+85°C)	10 years (+85°C) 38 years (+75°C) 151 years (+65°C)	Data retention is lower
Endurance (Write/Read cycles)	Unlimited	1E+14	FM24CL16B’s endurance is large enough to be considered as unlimited for all practical applications. For a 64-byte loop, at 1 MHz, FM24CL16B’s endurance is 1700 years.
V_{DD} Power-Up Ramp Rate (t_{VR})	-	30 µs / V	Power-up ramp rate should be slower than 30 µs / V for FM24CL16B
V_{DD} Power-Down Ramp Rate (t_{VF})	-	30 µs / V	Power-down ramp rate should be slower than 30 µs / V for FM24CL16B
Power-up to first access (t_{PU})	-	1 ms	After power-up, the first access of FM24CL16B should be after 1 ms

5 Critical considerations

You should consider all the parameter differences mentioned in Table 3 during the migration to FM24C16B. This section discusses the critical differences. System designers should also review the datasheet when migrating to the new part.

6 Package outline

Both FM24CL16 and FM24CL16B are offered in SOIC and TDFN packages. While the SOIC package dimensions are Identical, there is a difference in TDFN package dimensions. The FM24CL16 package dimensions are 3 mm x 6.4 mm and the FM24CL16B package dimensions are 4 mm x 4.5 mm. Hence the package footprints will be different. Though the package type (-DG) is Identical for the two devices, this difference in package footprints should be considered during migration.

7 V_{DD} Ramp Rate

V_{DD} power-up and power-down ramp rate specifications are added in FM24CL16B device. Ensure that the power-up and power-down ramp rates are slower than 30 µs / V in your system.

8 Power-up to first access

Power-up to first access specification is added in FM24CL16B device. Ensure that the FM24CL16B device is accessed only after 1 ms from power-up.

9 Summary

AN211 discussed the differences between FM24CL16 and FM24CL16B which need to be considered during migration.

Related documents

Datasheet

FM24CL16B: 16-Kbit (2 K × 8) Serial (I^2C) F-RAM datasheet

Revision history

Document version	Date of release	Description of changes
**	2013-03-26	New spec.
*A	2014-03-07	• Updated to Cypress Template. • Updated Active Supply Current for FM24CL16 from “70 µA @ 100 kHz, 400 µA @ 1 MHz” to “75 µA @ 100 kHz, 450 µA @ 1 MHz”. • Added data retention spec to FM24CL16B at 85 °C. Updated "Power-up to First Access" for FM24CL16B from 10 ms to 1 ms. • Updated "V_{DD} Power-down Ramp Rate" for FM24CL16B from 100 µs / V to 30 µs / V. • Removed V_{IH}(max) spec from Table 2.
*B	2014-09-10	• Changed title from “Differences between FM24CL16 and FM24CL16B” to “Migrating from FM24CL16 to FM24CL16B.” • Updated abstract. Added “Ordering Part Numbers” section. • Added title for Table 3. • Added “Related Documents” section.
*C	2026-07-16	Template update; no content update

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