FM24V01 replaces two FM24CL64s

About this document

Scope and purpose

AN207b discusses the key differences which need to be considered when migrating from FM24CL64 to FM24V01.

Associated part family

FM24V01, FM24CL64

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1 Description

The FM24V01, a 128-Kbit I^2C F-RAM, is a potential replacement for two FM24CL64 (64-Kbit) devices; FM24CL64 is now obsolete. For most designs, the FM24V01 device can be considered a superset of the FM24CL64. The two devices are identical in terms of pinout, package dimensions, and read/write functionality. This application note discusses the key differences between the two devices apart from density, which need to be considered when migrating from FM24CL64 to FM24V01.

2 Upward compatible

From a software point of view, the two devices are compatible. Aside from the additional address bit to access twice the memory, the two devices are read / write compatible. Both devices use the same two-byte address. Remember that the 128-Kbit device address wraps at 0x3FFF while the 64-Kbit wraps at 0x1FFF. For systems that use a single FM24CL64 device, the transition to the FM24V01 could be as straightforward as changing your firmware to hold the address bit A13 LOW during SRAM read/writes. For systems that use two FM24CL64s, firmware needs to be modified to use the address bit A13 to access the full 128-Kbit memory.

From a hardware point of view, the key differences between the two devices are the added features of FM24V01, like operation down to 2.0 V and Device ID. In terms of speed, both operate up to 1 MHz but the FM24V01 extends the speed to 3.4 MHz. A memory write sequence for the FM24V01 device is shown in Figure 1. Note the addition of address bit A13 in the serial address stream. This is the MSB bit for the 128-Kbit devices. A compatibility chart for the two devices is given in Table 1. A detailed comparison is shown in Table 2.

Table 1 Compatibility chart

FM24CL64 feature or spec	Is FM24V01 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	Refer to Table 2
Endurance	Yes

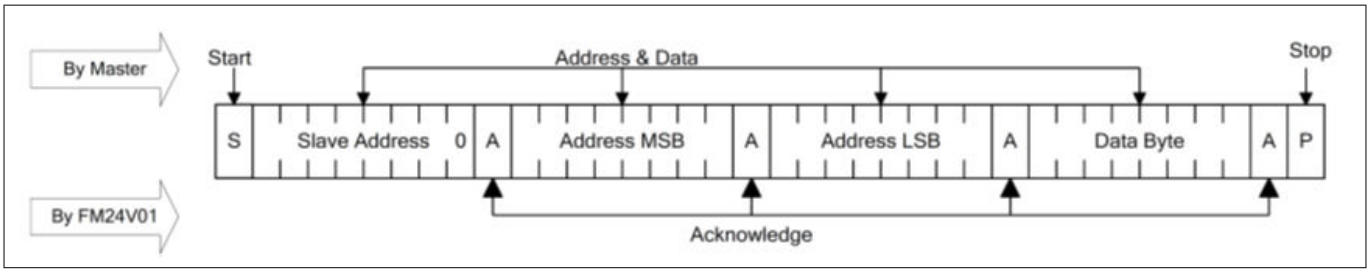

Figure 1 FM24V01 Write sequence

Table 2 Detailed comparison

	FM24CL64	FM24V01	Comments
Package types	-G, -DG	-G	Same, “green” SOIC package. FM24V01 is not offered in DFN package.
Package outlines	SOIC-8, DFN-8	SOIC-8	Same SOIC outline and board footprint. FM24V01 is not offered in DFN package.

(table continues...)

2 Upward compatible

Table 2 (continued) Detailed comparison

	FM24CL64	FM24V01	Comments
Pinout	-	-	Same
Temperature range	–40°C to +85°C	–40°C to +85°C	Same
Operating voltage range	2.7 V to 3.65 V	2.0 V to 3.6 V	FM24V01 offers a wider operating range
Active supply current	75 µA @ 100 kHz 400 µA @ 1 MHz	175 µA @ 100 kHz 400 µA @ 1 MHz	FM24V01 offers the same active current at 1 MHz
Standby current	1 µA	150 µA (max) 80 µA (typical)	FM24V01 has higher standby current
Output LOW Voltage (V_{OL})	0.4 V @ I_{OL} = 3 mA	0.4 V @ I_{OL} = 2 mA	FM24CL64 has better output LOW specification
Read / Write function	-	-	Same 2-byte addressing, same Slave IDs, same device select bits, A13 must be low
Clock frequency	1 MHz	3.4 MHz	FM24V01 offers higher speed
Data retention	45 years (+85°C)	10 years (+85°C) 38 years (+75°C)	
Endurance	Unlimited	1E+14	FM24V01's endurance is large enough to be considered as unlimited for all practical applications. For a 64-byte loop, at 1 MHz, FM24V01's endurance is 1700 years.
V_{DD} Power-Up Ramp Rate (t_{VR})	-	50 µs / V	Power-up ramp rate should be slower than 50 µs / V for FM24V01
V_{DD} Power-Down Ramp Rate (t_{VF})	-	100 µs / V	Power-down ramp rate should be slower than 100 µs / V for FM24V01
Power-Up to First Access (t_{PU})	-	0.25 ms	After power-up, the first access of FM24V01 should be after 0.25 ms

3 Critical considerations

All the parameter differences in Table 2 should be considered during the migration to FM24V01. The critical differences are discussed in this section. System designers are also recommended to review the detailed datasheets when migrating to the new part.

3.1 Read / Write function

The FM24V01 device has an extra address bit, A13, to support the additional 64-Kbit memory when compared to the FM24CL64. Setting A13 to a 0 level will address the 64-Kbits of your current FM24CL64 application. Setting A13 to a 1 level will address the additional 64-Kbits of the FM24V01. Note that roll over will not happen at 0x1FFF in FM24V01; instead it will roll over at 0x3FFF.

3.2 V_{DD} Ramp Rate

V_{DD} power-up and power-down ramp rate specifications are added in FM24V01 device. Ensure that the power-up ramp rate is slower than 50 µs / V and power-down ramp rate is slower than 100 µs / V in your system.

3.3 Power-up to first access

Power-up to first access specification is added in FM24V01 device. Ensure that the FM24V01 device is accessed only after 0.25 ms from power-up.

4 Conclusion

AN207b discusses the differences between FM24CL64 and FM24V01 which need to be considered during migration.

Revision history

Document version	Date of release	Description of changes
**	2013-03-26	New spec.
*A	2014-03-07	• Updated to Cypress Template. • Updated package outline for FM24CL64. • Updated operating voltage range for FM24CL64 from “2.7 V to 3.6 V” to “2.7 V to 3.65 V”. • Updated Active Supply Current for FM24CL64 from "70 µA @ 100 kHz" to "75 µA @ 100 kHz". • Added data retention spec to FM24V01 at 85ºC. Removed V_{IH}(max) spec from Table 2.
*B	2026-07-16	Template update; no content update

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