

Differences between FM25040 and FM25040A

4Kb 5V SPI FRAM Devices



DESCRIPTION

The FM25040 was declared “obsolete” in December 2004, and the alternative device was the FM25040A device. Functionally the two devices are the same. The command set (op-codes), the addressing, and the write-protection scheme are the same. Therefore, the firmware should be compatible between the two devices. Because the package/pinout are no different between the original and “A” part, system hardware does not need to be changed. The FM25040A device is offered in the “green”/RoHS package. This lead-free package is compatible with standard tin-lead solder systems.

The FM25040A is an improved part over the original device, and with improvements come changes. The “A” part operates at clock rates up to 20MHz and supports Modes 0 and 3 clocking, whereas the FM25040 operates up to 1.8MHz and supports only Mode 0. However, the AC timing specs are different largely due to the clock speed differences. In particular, the data setup and hold times are different. Aside from the fact that the “A” part has much shorter setup/hold times, the 25040’s setup/hold timings were skewed such that the device would appear to operate properly under conditions that violate the spec. For example, if the controller drives both clock and data from the SCK rising edge, the 25040 seems to operate properly whereas the “A” device does not. In this case, the controller was operating in Modes 1 or 2, which are not supported by either device.

The “A” part is improved in other areas including data retention time (45 years) and endurance (1E+12 cycles). ESD ratings were added to the “A” part.

COMPARISON TABLE

Differences are highlighted in yellow.

	FM25040	FM25040A	Comments
Temp. Range	-40C to +85C	-40C to +85C	Same range
Operating Voltage Range	4.5 to 5.5V	4.5 to 5.5V	Same range
Package Outlines	SOIC-8	SOIC-8	Same outline and board footprint
Function	All op-codes, 1-byte addressing	All op-codes, 1-byte addressing	Same
Clock Mode Support	Mode 0	Mode 0, 3	Improved
Endurance	1E+10 cycles	1E+12 cycles	Improved
Data Retention	10 years	45 years	Improved
Clock Freq	1.8 MHz	20 MHz	Improved
Active Supply Current	1.2mA @ 1MHz 2.5mA @ 1.8MHz	0.4mA @ 1MHz 8.0mA @ 20MHz	Improved. FM25040A is lower current at a given freq.
Standby Current	10µA	10µA	Same
Package Types	-P, -S	-S, -G	Added lead-free “green” package to “A” part. No PDIP on “A” part.

ESD STRUCTURES

The FM25040 was fabricated on a 1µm process. The primary ESD protection device is an SCR, which does not conduct until >8V on an input pin. It will conduct if a pin is taken below V_{SS} . The secondary ESD device is a field plate diode. Notice there is no structure connected to V_{DD} .

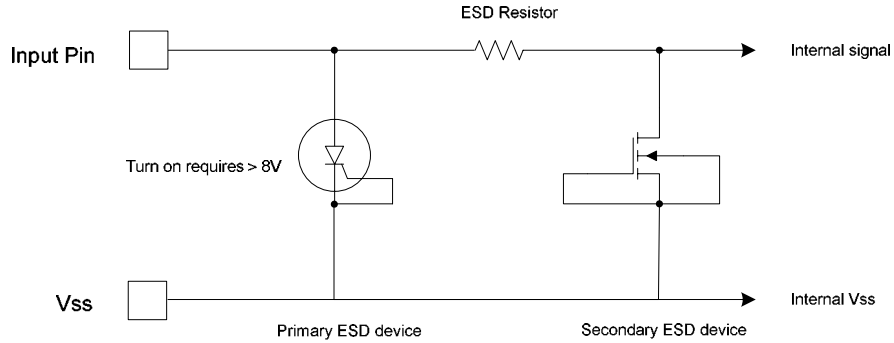


Figure 1. FM25040 Input ESD Protection

The FM25040A is being fabricated on a 0.5µm process. The primary ESD protection devices are industry standard protection diodes. The N-channel protects against inputs going below V_{SS} and the P-channel protects against inputs going above V_{DD} . When switching to the FM25040A device from the FM25040, the system designer should note the addition of the V_{DD} -connected diode on input pins. The system may have relied on the lack of a topline diode when using the original FM25040. If any pin is driven more than 0.7V above V_{DD} , the “A” device will draw significant current and the FM25040 will not. This might not be obvious when looking at the specifications since both product datasheets show $V_{IH} \text{ max} = V_{DD} + 0.5V$.

Note: if the system design complies with the V_{IH} specification, then the FM25040 and the FM25040A devices are equivalent in this regard.

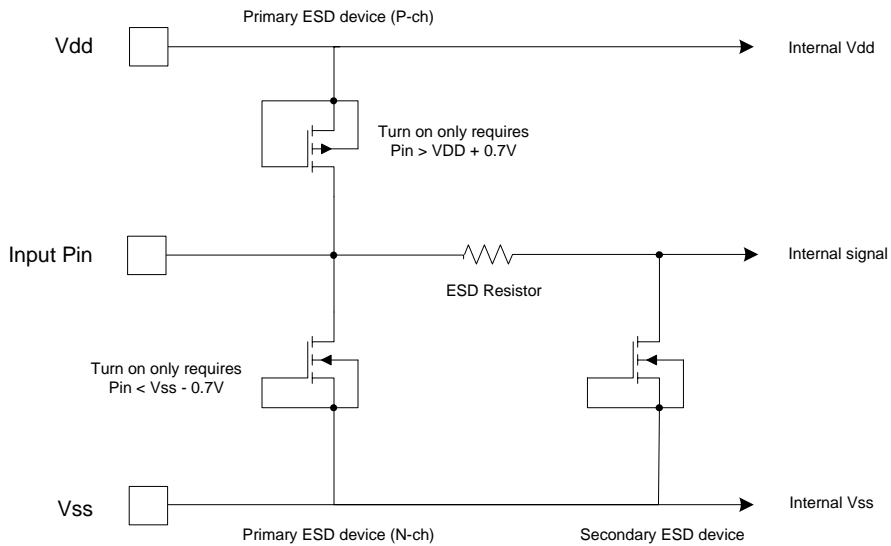


Figure 2. FM25040A Input ESD Protection