Comparison of FM25L256B, FM25V02, and FM25W256

Applies to 256Kb SPI F-RAM Devices

DESCRIPTION

This document points out the differences the FM25L256B, FM25V02, and FM25W256 F-RAM devices. For most designs, the FM25V02 and FM25W256 devices can be considered equivalent or better than the FM25L256B. The three devices are identical in terms of pinout, package dimensions and composition, and read/write functionality. In terms of speed, both operate up to 20MHz but the FM25V02 allows read/write operations up to 40MHz. It also adds a sleep mode feature which effectively lowers the standby/idle current to 8µA.

DROP-IN REPLACEMENT OR NOT

From a software point of view, the three devices are identical. From a hardware point of view, the key difference between the devices is the higher standby current. The FM25V02 adds many features: operates to down to 2.0V, sleep mode capability, Device ID feature, and higher speed capability. The FM25W256 offers wide voltage operation and lower standby current than the FM25V02. The summary table below highlights the differences.

COMPATIBILITY CHART

		Potential Replacements	
FM25L256B Feature or Spec		**… is FM25V02 compatible?**	**… is FM25W256 compatible?**
Package		Yes	Yes
Pinout		Yes	Yes
Temperature Range		Yes	Yes
Operating Voltage		Yes	Yes
Operating Current		Yes	Yes
Standby Current		No	No
R/W Function		Yes	Yes
Status Register		Yes	Yes
Timing/Freq		Yes	Yes
Data Retention		Yes	Yes
Endurance		Yes*	Yes*

Ramtron International Corporation
1850 Ramtron Drive, Colorado Springs, CO 80921
(800) 545-FRAM, (719) 481-7000

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DETAILED COMPARISON TABLE

Differences are highlighted in yellow.

	FM25L256B	FM25V02	FM25W256	Comments
Package Types	-G, -DG	-G, -DG	-G	Same but no DFN for W part
Package Outlines	SOIC-8, TDFN-8	SOIC-8, TDFN-8	SOIC-8	Same
Pinout	-	-	-	Same
Temperature Range	-40C to +85C	-40C to +85C	-40C to +85C	Same
Operating Voltage Range	2.7 to 3.6V	2.0 to 3.6V	2.7 to 5.5V	FM25V02 allows operation down to 2V, FM25W256 allows operation up to 5.5V
Active Supply Current	500µA @ 1MHz 10.0mA @ 20MHz	220µA @ 1MHz 2.5mA @ 40MHz	250µA @ 1MHz 2.0mA @ 20MHz	The 25V02 and 25W256 both offer lower active current even at low freq.
Standby Current	10µA	150µA	30µA	FM25V02 has higher I_{SB}, 25W256 has slightly higher I_{SB}.
Sleep Mode Current	-	8µA	-	FM25V02 offers a sleep mode which reduces the "idle" current
Read/Write Function	-	-	-	Same 2-byte addressing, same op-codes
Status Register	Bit 6 = 0	Bit 6 = 0, however Bit 6 = 1 on older date codes (1007 and prior)	Bit 6 = 0	RDSR opcode will return the same data for all three devices.
Clock Freq	20 MHz	40 MHz	20 MHz	FM25V02 offers higher speed
Data Retention	10 yrs	10 yrs	10 yrs	Same at +85C (worst case)
Endurance	Unlimited	1E+14	1E+14	FM25V02 and 25W256 are both unlimited at 20MHz (85 yrs for a 64-byte loop)

OTHER				
V_{DD} Rise/Fall Time	50µs/V, 100µs/V	50µs/V, 100µs/V	30µs/V, 100µs/V	Improved Vdd rise time spec
t_{PU} Power Up to First Access Time	10 ms	0.25 ms	10 ms	FM25V02 faster to first access, 25W256 is same as 25L256B
/HOLD pin pullup	-	Internal pullup	-	Most systems tie /HOLD to V_{DD} but this should be checked in your design.
Device ID Feature	-	Yes	-	
Fast Read Op-code	-	Yes	-	