

Differences in FM25CL04 and FM25L04

4K SPI FRAM Devices



DESCRIPTION

There are differences between the FM25CL04 and FM25L04 SPI 4Kb FRAM devices. As of May 2005, the FM25CL04 was not recommended for new designs, and the replacement device is the FM25L04. The FM25CL04 operated up to 20MHz, whereas the FM25L04 operates at speeds up to 14MHz. The data retention time on the newer FM25L04 device is 45 years.

The operating voltage, operating temperature, the command set (op-codes), the addressing, the write-protection scheme, the package/pinout are no different between the two parts. The primary difference between the two parts is operating frequency.

NOTE: The FM25L04 device is offered only in the “green” SOIC package (-G). This lead-free package is compatible with standard Sn-Pb solder systems.

DROP-IN REPLACEMENT OR NOT

The FM25L04 can be considered a direct replacement for the FM25CL04 if your system clock frequency is 10MHz or less. If the clock frequency is above 10MHz ($V_{DD} < 3.0V$) or 14MHz ($V_{DD} > 3.0V$), then you should review the AC timing tables. The FM25CL04 was specified to 20MHz across the V_{DD} voltage range. Note that the FM25L04 AC timing table shows two regions of operation: when V_{DD} is above 3.0V and when V_{DD} is below 3.0V. The tables are shown below.

AC TIMING TABLES

Differences are highlighted in yellow.

FM25L04 AC Parameters

Symbol	Parameter	V_{DD} 2.7 to 3.0V		V_{DD} 3.0 to 3.6V		Units	Notes
		Min	Max	Min	Max		
f_{CK}	SCK Clock Frequency	0	10	0	14	MHz	
t_{CH}	Clock High Time	40		30		ns	1, 2
t_{CL}	Clock Low Time	40		30		ns	1
t_{CSU}	Chip Select Setup	10		10		ns	
t_{CSH}	Chip Select Hold	10		10		ns	
t_{OD}	Output Disable Time		30		25	ns	3
t_{ODV}	Output Data Valid Time		40		30	ns	2
t_{OH}	Output Hold Time	0		0		ns	
t_D	Deselect Time	100		80		ns	
t_R	Data In Rise Time		50		50	ns	4
t_F	Data In Fall Time		50		50	ns	4
t_{SU}	Data Setup Time	5		5		ns	
t_H	Data Hold Time	5		5		ns	
t_{HS}	/Hold Setup Time	10		10		ns	
t_{HH}	/Hold Hold Time	10		10		ns	
t_{HZ}	/Hold Low to Hi-Z		30		25	ns	3
t_{LZ}	/Hold High to Data Active		30		25	ns	3

FM25CL04 AC Parameters

Symbol	Parameter	Min	Max	Units	Notes
f _{CK}	SCK Clock Frequency	0	20	MHz	
t _{CH}	Clock High Time	22		ns	1
t _{CL}	Clock Low Time	22		ns	1
t _{CSU}	Chip Select Setup	10		ns	
t _{CSH}	Chip Select Hold	10		ns	
t _{OD}	Output Disable Time		20	ns	2
t _{ODV}	Output Data Valid Time		20	ns	
t _{OH}	Output Hold Time	0		ns	
t _D	Deselect Time	60		ns	
t _R	Data In Rise Time		50	ns	1,3
t _F	Data In Fall Time		50	ns	1,3
t _{SU}	Data Setup Time	5		ns	
t _H	Data Hold Time	5		ns	
t _{HS}	/Hold Setup Time	10		ns	
t _{HH}	/Hold Hold Time	10		ns	
t _{HZ}	/Hold Low to Hi-Z		20	ns	2
t _{LZ}	/Hold High to Data Active		20	ns	2