

MN54F413-X REV 1A0

 Original Creation Date: 05/06/96
 Last Update Date: 07/30/96
 Last Major Revision Date: 05/06/96

64 X 4 FIRST-IN FIRST OUT BUFFER MEMORY WITH PARALLEL I/O
General Description

The F413 is an expandable fall-through type high-speed First-In First-Out (FIFO) buffer memory organized as 64 words by four bits. The 4-bit input and output registers record and transmit, respectively, asynchronous data in parallel form. Control pins on the input and output allow for handshaking and expansion. The 4-bit wide, 62-bit deep fall-through stack has self-contained control logic.

Industry Part Number

54F413

NS Part Numbers

 54F413DMQB
 54F413FMQB
 54F413LMQB

Prime Die

M413

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Separate input and output clocks
- Parallel input and output
- Expandable without external logic
- 15MHz data rate
- Supply current 160 mA max
- Available in SOIC, (300 mil only)

(Absolute Maximum Ratings)

(Note 1)

Storage Temperature	-65C to +150C
Ambient Temperature under Bias	-55C to +125C
Junction Temperature under Bias	-55C to +175C
Vcc Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30mA to +5.0mA
Voltage Applied to Output in HIGH State (with Vcc=0V)	
Standard Output	-0.5V to Vcc
TRI-STATE Output	-0.5V to +7.0V
Current Applied to Output in LOW State (Max)	twice the rated Iol(mA)

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

Free Air Ambient Temperature	
Commercial	0 C to +70 C
Military	-55 C to +125 C
Supply Voltage	
Military	+4.5V to +5.5V
Commercial	+4.5V to +5.5V

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC 4.5V to 5.5V, Temp range: -55C to 125C

AC:

FIGS.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	Input High Current	VCC=5.5V, VM=2.7V, VINH=5.5V, VINL=0.0V	1, 3	INPUTS		20	uA	1, 2, 3
IBVI	Input High Current	VCC=5.5V, VM=7.0V, VINH=5.5V, VINL=0.0V	1, 3	INPUTS		100	uA	1, 2, 3
IIL	Input LOW Current	VCC=5.5V, VM=0.5V, VINH=5.5V, VINL=0.0V	1, 3	INPUTS		-0.4	mA	1, 2, 3
VOL	Output LOW Voltage	VCC=4.5V, VIL=0.8V, IOL=8.0mA, VIH=2.0V, VINH=5.5V, VINL=0.0V	1, 3	OUTPUTS		0.5	V	1, 2, 3
VOH	Output HIGH Voltage	VCC=4.5V, VIH=2.0V, IOH=-1.0mA, VIL=0.8V, VINL=0.0V, VINH=5.5	1, 3	OUTPUTS	2.4		V	1, 2, 3
IOS	Output Short-Circuit Current	VCC=5.5V, VINH=5.5V, VM=0.0V, VINL=0.0V	1, 3	OUTPUTS	-20	-130	mA	1, 2, 3
VCD	Input Clamp Diode Voltage	VCC=4.5V, IM=-18mA, VINH=5.5V, VINL=0.0V	1, 3	INPUTS		-1.5	V	1, 2, 3
ICC	Power Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 3	VCC		160	mA	1, 2, 3
ICEX	Output HIGH Leakage Current	VCC=5.5V, VINH=5.5V, VINL=0.0V, VM=5.5V	1, 3	OUTPUTS		250	uA	1, 2, 3

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS

FIGS.

tpLH(1)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	SI to IR	1.5	44.0	ns	9
			2, 4	SI to IR	1.5	50.0	ns	10, 11
tpHL(1)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	SI to IR	1.5	31.0	ns	9
			2, 4	SI to IR	1.5	37.0	ns	10, 11
tpLH(2)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	SO to OR	1.5	52.0	ns	9
			2, 4	SO to OR	1.5	57.0	ns	10, 11
tpHL(2)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	SO to OR	1.5	31.0	ns	9
			2, 4	SO to OR	1.5	37.0	ns	10, 11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
 AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS FIGS.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH(3)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	S0 to On	1.5	46.0	ns	9
			2, 4	S0 to On	1.5	52.0	ns	10, 11
tpHL(3)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	S0 to On	1.5	34.0	ns	9
			2, 4	S0 to On	1.5	39.0	ns	10, 11
tpLH(4)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	MR to IR	1.5	27.0	ns	9
			2, 4	MR to IR	1.5	33.0	ns	10, 11
tpHL(4)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	MR to OR	1.5	30.0	ns	9
			2, 4	MR to OR	1.5	34.0	ns	10, 11
ts(H/L)	Setup Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	Dn to SI	1.0		ns	9, 10, 11
th(H/L)	Hold Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	Dn to SI	10.0		ns	9, 10, 11
tw(H)(1)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	SI Pulse Width	5.0		ns	9, 10, 11
tw(L)(1)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	SI Pulse Width	10.0		ns	9, 10, 11
tw(H)(2)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	S0 Pulse Width	7.5		ns	9
			5	S0 Pulse Width	8.5		ns	10, 11
tw(L)(2)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	S0 Pulse Width	10.0		ns	9, 10, 11
tw(H)(3)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	IR Pulse Width	7.5		ns	9
			5	IR Pulse Width	8.5		ns	10, 11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS FIGS.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tw(H)(4)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	OR Pulse Width	5.0		ns	9, 10, 11
tw(L)(4)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	MR Pulse Width	10.0		ns	9, 10, 11
trec	Recovery Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	MR to SI	32.0		ns	9
			5	MR to SI	35.0		ns	10, 11
tpT	Data Through-put Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4			0.9	us	9
			2, 4			1.0	us	10, 11
tbu	Bubble-Up Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	Bubble-Up Time		0.9	us	9
			2, 4	Bubble-Up Time		1.0	us	10, 11
Fmax	Shift in Rate	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	Shift In Rate	10		MHz	9
			5	Shift In Rate	8		MHz	10, 11
Fmax	Shift Out Rate	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	Shift Out Rate	10		MHz	9
			5	Shift Out Rate	8		MHz	10, 11

Note 1: Screen tested 100% on each device at -55 C, +25 C & +125 C temperature, Subgroups A1, 2, 3, 7 & 8.

Note 2: Screen tested 100% on each device at +25 C temperature only, Subgroup A9.

Note 3: Sample tested (Method 5005, Table 1) on each MFG. lot at +25 C, +125 C & -55 C temp., Subgroups A1, 2, 3, 7 & 8.

Note 4: Sample Tested (Method 5005, Table 1) on each MFG. lot at +25 C Subgroup A9, & periodically at +125 C & -55 C temp., Subgroups 10 & 11.

Note 5: Not tested at +25 C, +125 C & -55 C temperature. (DESIGN CHARACTERIZATION DATA).