



## MILITARY DATA SHEET

**MN54F323-X REV 1A0**

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### OCTAL UNIVERSAL SHIFT/STORAGE REGISTER WITH SYNCHRONOUS RESET AND COMMON I/O PINS

#### General Description

The F323 is an 8-bit universal shift/storage register with TRI-STATE outputs. Its function is similar to the F299 with the exception of Synchronous Reset. Parallel load inputs and flip-flop outputs are multiplexed to minimize pin count. Separate serial inputs and outputs are provided for Q0 and Q7 to allow easy cascading. Four operation modes are possible: hold (store), shift left, shift right and parallel load.

#### Industry Part Number

54F323

#### Prime Die

M323

#### NS Part Numbers

54F323DMQB  
54F323FMQB  
54F323LMQB

#### 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**

- Common Parallel I/O for Reduced Pin Count
- Additional Serial inputs and Outputs for Expansion
- Four Operating Modes: Shift Left, Shift Right, Load and Store
- 3-State Outputs for Bus-Oriented Applications

**(Absolute Maximum Ratings)**

(Note 1)

Storage Temperature	-65 C to +150 C
Ambient Temperature under Bias	-55 C to +125 C
Junction Temperature under Bias	-55 C to +175 C
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 +5.5V
Current Applied to Output in LOW State (Max)	twice the rated Iol(mA)
ESD Last Passing Voltage (Min)	4000V

Note 1: Absolute Maximum ratings are those 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

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	Input High Current	VCC=5.5V, VM=2.7V, VINH=5.5V	1, 3	INPUTS		20	uA	1, 2, 3
IBVI	Input High Current	VCC=5.5V, VM=7.0V, VINH=5.5V	1, 3	INPUTS		100	uA	1, 2, 3
IBVIT	Input High Current	VCC=5.5V, VM=5.5V, VINH=5.5V	1, 3	I/O INPUTS		1.0	mA	1, 2, 3
IIL	Input LOW Current	VCC=5.5V, VM=0.5V, VINH=5.5V	1, 3	ALL OTHER INPUTS		-0.6	mA	1, 2, 3
IIL2	Input LOW Current	VCC=5.5V, VM=0.5V, VINH=5.5V	1, 3	S0/S1 INPUTS ONLY		-1.2	mA	1, 2, 3
VOL	Output LOW Voltage (I/On, Q0 & Q7)	VCC=4.5V, VIL=0.8V, IOL=20mA, VIH=2.0V, VINH=5.5V	1, 3	OUTPUTS		0.5	V	1, 2, 3
VOH	Output HIGH Voltage	VCC=4.5V, VIH=2.0V, IOH=-1.0mA, VINH=5.5V	1, 3	Q0, Q7 OUTPUTS	2.5		V	1, 2, 3
VOH3	Output HIGH Voltage	VCC=4.5V, VIH=2.0V, IOH=-3.0mA, VINH=5.5V	1, 3	I/O OUTPUTS	2.4		V	1, 2, 3
IOS	Short Circuit Current	VCC=5.5V, VINH=5.5V, VM=0.0V	1, 3	Q0 & I/O OUTPUTS	-60	-150	mA	1, 2, 3
VCD	Input Clamp Diode Voltage	VCC=4.5V, IM=-18mA, VINH=5.5V	1, 3	INPUTS-I/O OUTPUTS		-1.2	V	1, 2, 3
ICC	Supply Voltage	VCC=5.5V, VINL=0.0V, VINH=5.5V	1, 3	VCC		95	mA	1, 2, 3
ICEX	Output HIGH Leakage Current	VCC=5.5V, VINL=0.0V, VINH=5.5V, VM=5.5V	1, 3	OUTPUTS		250	uA	1, 2, 3
IOZHT	Output Leakage Current	VCC=5.5V, VM=2.7V, VIH=2.0V, VIL=0.8V, VINH=5.5V	1, 3	I/O INPUTS		70	uA	1, 2, 3
IOZLT	Output Leakage Current	VCC=5.5V, VM=0.5V, VIH=2.0V, VIL=0.8V, VINH=5.5V	1, 3	I/O INPUTS		-650	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

tpLH(1)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to I/O	3.0	9.0	ns	9
			2, 4	CP to I/O	3.0	10.0	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

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL(1)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to I/O	4.0	9.0	ns	9
			2, 4	CP to I/O	4.0	10.0	ns	10, 11
tpLH(2)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to Q0/Q7	4.0	8.0	ns	9
			2, 4	CP to Q0/Q7	4.0	9.0	ns	10, 11
tpHL(2)	Propagation Delay	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to Q0/Q7	4.5	8.0	ns	9
			2, 4	CP to Q0/Q7	4.5	8.5	ns	10, 11
tpZH	Output Enable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	$\overline{OE}$ to I/On	3.0	8.0	ns	9
			2, 4	$\overline{OE}$ to I/On	3.0	9.0	ns	10, 11
tpZL	Output Enable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	$\overline{OE}$ to I/On	4.0	10.0	ns	9
			2, 4	$\overline{OE}$ to I/On	4.0	11.0	ns	10, 11
tpHZ	Output Disable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	$\overline{OE}$ to I/On	1.0	6.0	ns	9
			2, 4	$\overline{OE}$ to I/On	1.0	7.0	ns	10, 11
tpLZ	Output Disable Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	2, 4	$\overline{OE}$ to I/On	1.0	5.5	ns	9
			2, 4	$\overline{OE}$ to I/On	1.0	6.5	ns	10, 11
ts(H)(1)	Setup Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	Sn to CP	9.0		ns	9, 10, 11
ts(L)(1)	Setup Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	Sn to CP	8.5		ns	9, 10, 11
th(H/L)(1)	Hold Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	Sn to CP	0		ns	9, 10, 11
ts(H/L)(2)	Setup Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	I/On, DSn to CP	4.0		ns	9, 10, 11
th(H/L)(2)	Hold Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	I/On, DSn to CP	2.0		ns	9, 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

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ts(H)(3)	Setup Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	SR to CP	9.0		ns	9, 10, 11
ts(L)(3)	Setup Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	SR to CP	8.5		ns	9, 10, 11
th(H/L)(3)	Hold Time	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	SR to CP	0.0		ns	9, 10, 11
tw(H/L)	Pulse Width	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5	CP Pulse Width	5.0		ns	9, 10, 11
fMAX	Maximum Clock Frequency	VCC=5.0V @25C, VCC=4.5V & 5.5V @-55/125C	5		100		MHZ	9
			5		90		MHZ	10, 11

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

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

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

Note 4: Sample tested (Method 5005, Table 1) on each MFG. lot at +25C subgroup A9, and at +125C & -55C temperature, subgroups 10 & 11.

Note 5: GUARANTEED BUT NOT TESTED. (Design characterization data)