



MICROCIRCUIT DATA SHEET

CN54F189-X REV 0A0

Original Creation Date: 07/15/98
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64-BIT RANDOM ACCESS MEMORY WITH 3-STATE OUTPUTS

General Description

The F189 is a high-speed 64-bit RAM organized as a 16-word by 4-bit array. Address inputs are buffered to minimize loading and are fully decoded on-chip. The outputs are 3-state and are in the high impedance state whenever the Chip Select (\overline{CS}) input is HIGH. The outputs are active only in the Read mode and the output data is the complement of the stored data.

Industry Part Number

54F189

NS Part Numbers

54F189DC

Prime Die

M189

Processing

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Quality Conformance Inspection

(blank)

Subgrp Description

Temp (°C)

1	Static tests at	+25
2	Static tests at	+70
3	Static tests at	0
4	Dynamic tests at	+25
5	Dynamic tests at	+70
6	Dynamic tests at	0
7	Functional tests at	+25
8A	Functional tests at	+70
8B	Functional tests at	0
9	Switching tests at	+25
10	Switching tests at	+70
11	Switching tests at	0

Features

- 3-State Outputs for Data Bus Applications
- Buffered Inputs Minimize Loading
- Diode Clamped Inputs Minimize Ringing
- Address Decoding On-Chip

(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)	-30 mA 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)

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	0C to +70C
Supply Voltage	+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: 0C to +70C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	Input High Current	VCC=5.5V, VM=2.7V, VINH=5.5V	2, 3	INPUTS		5.0	uA	1, 2, 3
IBVI	Input High Current	VCC=5.5V, VM=7.0V, VINH=5.5V	2, 3	INPUTS		7.0	uA	1, 2, 3
IIL	Input LOW Current	VCC=5.5V, VM=0.5V	2, 3	An, Dn WE		-0.6	mA	1, 2, 3
IIL2	Input LOW Current	VCC= 5.5V, VM=0.5V	2, 3	INPUTS CS		-1.2	mA	1, 2, 3
VID	Input Leakage Test	VCC= 0V, IID=1.9uA, All other pins grounded	2, 3	INPUTS	4.75		V	1, 2, 3
VOL	Output LOW Voltage	VCC=4.5V, VIL=0.8V, IOL=24mA, VINH=5.5V	2, 3	OUTPUTS		0.5	V	1, 2, 3
VOH	Output High Voltage	VCC=4.5V, VINH=5.5, VINL=0.0V, IOH=-1.0mA	2, 3	OUTPUTS	2.5		V	1, 2, 3
		VCC=4.75V, VINH=5.5, VINL=0.0V, IOH=-1.0mA	2, 3	OUTPUTS	2.7		V	1, 2, 3
VOH3	Output HIGH Voltage	VCC=4.5V, VINH=5.5V, VINL=0.0V, IOH3=-3.0mA, VIH=2.0V	2, 3	OUTPUTS	2.4		V	1, 2, 3
		VCC=4.75V, VINH=5.5V, VINL=0.0V, IOH3=-3.0mA, VIH=2.0V	2, 3	OUTPUTS	2.7		V	1, 2, 3
IOS	Short Circuit Current	VCC=5.5V, VINH=5.5V, VM=0.0V, VINL=0.0V	2, 3	OUTPUTS	-60	-150	mA	1, 2, 3
IOD	Output Leakage Circuit Current	VCC=0V, VIOD=150mV, All other pins grounded	2, 3	OUTPUTS		4.75	V	1, 2, 3
VCD	Input Clamp Diode Voltage	VCC=4.5V, IM=-18mA, VINH=5.5V	2, 3	INPUTS		-1.2	V	1, 2, 3
ICCZ	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V, Outputs tri-state	2, 3	VCC		55	mA	1, 2, 3
ICEX	Output HIGH Leakage Current	VCC=5.5V, VINH=5.5V, VINL=0.0V, VM=5.5V	2, 3	OUTPUTS		100	uA	1, 2, 3
IOZH	Output Leakage Current	VCC=5.5V, VM=2.7V, VINH=5.5V, VINL=0.0V, VIH=2.0V	2, 3	OUTPUTS		50	uA	1, 2, 3
IOZL	Output Leakage Current	VCC=5.5V, VM=0.5V, VINH=5.5V, VINL=0.0V, VIH=2.0V	2, 3	OUTPUTS		-50	uA	1, 2, 3
IZZ	Buss Drainage Test	VCC=0V, VM=5.25V	2, 3	OUTPUTS		500	uA	1, 2, 3
VIH	Input High Voltage	Recognized as a HIGH Signal	1	INPUTS	2.0		V	1, 2, 3
VIL	Input Low Voltage	Recognized as a LOW Signal	1	INPUTS		0.8	V	1, 2, 3

Electrical Characteristics

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, Temp Range: 0C to +70C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH	Access Time, HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3	An to On	10.0	26.0	ns	9
			2, 3	An to On	10.0	27.0	ns	10, 11
tpHL	Access Time, HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3	An to On	8.0	19.0	ns	9
			2, 3	An to On	8.0	20.0	ns	10, 11
tpZH(1)	Access Time HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3	CS to On	3.5	8.5	ns	9
			2, 3	CS to On	3.5	9.5	ns	10, 11
tpZL(1)	Access Time HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3	CS to On	5.0	13.0	ns	9
			2, 3	CS to On	5.0	14.0	ns	10, 11
tpHZ(1)	Disable Time HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3	CS to On	2.0	6.0	ns	9
			2, 3	CS to On	2.0	7.0	ns	10, 11
tpLZ(1)	Disable Time HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3	CS to On	3.0	8.0	ns	9
			2, 3	CS to On	3.0	9.0	ns	10, 11
tpZH(2)	Write Recovery Time HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3, 5	WE to On	6.5	28.0	ns	9
			2, 3, 5	WE to On	6.5	29.0	ns	10, 11
tpZL(2)	Write Recovery Time HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3, 5	WE to On	6.5	15.5	ns	9
			2, 3, 5	WE to On	6.5	16.5	ns	10, 11
tpHZ(2)	Disable Time HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3, 5	WE to On	4.0	10.0	ns	9
			2, 3, 5	WE to On	4.0	11.0	ns	10, 11
tpLZ(2)	Disable Time HIGH or LOW	VCC=5.0V @ +25C, VCC=4.5V & 5.5V @ 0C/+70C	2, 3, 5	WE to On	5.0	13.0	ns	9
			2, 3, 5	WE to On	5.0	14.0	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, Temp Range: 0C to +70C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ts(L/H)(1)	Setup Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5 & 5.5V @ 0C / +70C	4	Dn to WE	10.0		ns	9, 10, 11
th(L/H)(1)	Hold Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5 & 5.5V @ 0C / +70C	4	Dn to WE	0		ns	9, 10, 11
ts(L/H)(2)	Setup Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5 & 5.5V @ 0C / +70C	4	An to WE	0		ns	9, 10, 11
th(L/H)(2)	Hold Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5 & 5.5V @ 0C / +70C	4	An to WE	2.0		ns	9, 10, 11
ts(L)(3)	Setup Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5 & 5.5V @ 0C / +70C	4	CS to WE	0		ns	9, 10, 11
th(L)(3)	Hold Time HIGH or LOW	VCC=5.0V @25C, VCC=4.5 & 5.5V @ 0C / +70C	4	CS to WE	6.0		ns	9, 10, 11
tw(L)	Pulse Width	VCC=5.0V @25C, VCC=4.5 & 5.5V @ 0C / +70C TR/TF=1.0ns	4	WE	6.0		ns	9, 10, 11

Note 1: Guaranteed by applying specific input condition and testing VOL & VOH.

Note 2: Screen tested 100% on each device at +75C temperature only, subgroups A2 & A10.

Note 3: Sample tested (Method 5005, Table 1) on each MFG. lot at +75C temperature only, subgroups A2 & A10.

Note 4: Guaranteed but not tested.

Note 5: Spurious transitions may occur on the OX outputs prior to specified access time during the write enable cycles.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0002939	08/24/98	Donald B. Miller	Initial MDS Release