

April 1988 Revised January 2004

74F189

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 (CS) input is HIGH. The outputs are active only in the Read mode and the output data is the complement of the stored data.

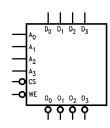
Features

- 3-STATE outputs for data bus applications
- Buffered inputs minimize loading
- Address decoding on-chip
- Diode clamped inputs minimize ringing

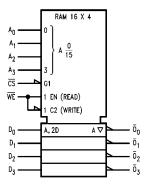
Ordering Code:

Order Number	Package Number	Package Description
74F189PC	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

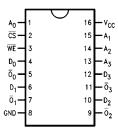
Logic Symbols



IEEE/IEC



Connection Diagram



Unit Loading/Fan Out

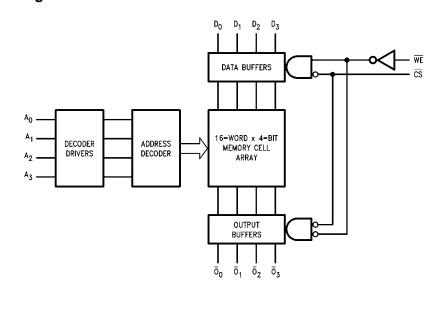
Pin Names	Decemention	U.L.	Input I _{IH} /I _{IL}		
Pin Names	Description	HIGH/LOW	Output I _{OH} /I _{OL}		
A ₀ -A ₃	Address Inputs	1.0/1.0	20 μA/–0.6 mA		
CS	Chip Select Input (Active LOW)	1.0/1.0	20 μA/–1.2 mA		
WE	Write Enable Input (Active LOW)	1.0/1.0	20 μA/–0.6 mA		
D ₀ -D ₃	Data Inputs	1.0/1.0	20 μA/–0.6 mA		
$\overline{O}_0 - \overline{O}_3$	Inverted Data Outputs	150/40 (33.3)	-3.0 mA/24 mA (20 mA)		

Function Table

Inp	outs	0	Condition of Outputs			
CS WE		Operation	Condition of Outputs			
L	L	Write	High Impedance			
L	Н	Read	Complement of Stored Data			
Н	X	Inhibit	High Impedance			

- H = HIGH Voltage Level L = LOW Voltage Level X = Immaterial

Block Diagram



0°C to +70°C

+4.5V to +5.5V

Absolute Maximum Ratings(Note 1)

Recommended Operating Conditions

Free Air Ambient Temperature

Supply Voltage

-65°C to +150°C Storage Temperature Ambient Temperature under Bias -55°C to +125°C

-55°C to +175°C Junction Temperature under Bias

V_{CC} Pin Potential to

Ground Pin -0.5V to +7.0VInput Voltage (Note 2) -0.5V to +7.0V Input Current (Note 2) -30 mA to +5.0 mA

Voltage Applied to Output

in LOW State (Max)

in HIGH State (with $V_{CC} = 0V$)

Standard Output

3-STATE Output Current Applied to Output

Note 1: Absolute maximum ratings are values beyond which the device -0.5V to V_{CC} may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

 $-0.5V\ to\ +5.5V \\ {\color{red}\textbf{Note 2:}} \ \textbf{Either voltage limit or current limit is sufficient to protect inputs.}$

DC Electrical Characteristics

Symbol	Symbol Parameter		Min Typ		Max	Units	V _{CC}	Conditions		
V _{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal		
V _{IL}	Input LOW Voltage				0.8	V		Recognized as a LOW Signal		
V _{CD}	Input Clamp Diode Voltage				-1.2	V	Min	I _{IN} = -18 mA		
V _{OH}	Output HIGH	10% V _{CC}	2.5					$I_{OH} = -1 \text{ mA}$		
	Voltage	10% V _{CC}	2.4			V	Min	$I_{OH} = -3 \text{ mA}$		
		5% V _{CC}	2.7			V	IVIIN	$I_{OH} = -1 \text{ mA}$		
		5% V _{CC}	2.7					$I_{OH} = -3 \text{ mA}$		
V _{OL}	Output LOW Voltage	10% V _{CC}			0.5	V	Min	I _{OL} = 24 mA		
I _{IH}	Input HIGH Current				5.0	μА	Mov	V _{IN} = 2.7V		
					5.0	μА	Max	VIN - 2.7 V		
I _{BVI}	Input HIGH Current				7.0	μА	Max	V _{IN} = 7.0V		
	Breakdown Test				7.0	μΑ	IVIAX	VIN - 7.0 V		
I _{CEX}	Output HIGH				50	μА	Max	V _{OUT} = V _{CC}		
	Leakage Current				30	μΑ	IVIAX	VOUT - VCC		
V_{ID}	Input Leakage	4.75			V	0.0	$I_{ID} = 1.9 \mu\text{A}$			
	Test		4.73			V	0.0	All Other Pins Grounded		
I _{OD}	Output Leakage			3.75	μА	0.0	V _{IOD} = 150 mV			
	Circuit Current			3.73			All Other Pins Grounded			
I _{IL}	Input LOW Current				-0.6			$V_{IN} = 0.5V \text{ (except } \overline{CS)}$		
				-1.2	-1.2 mA	Max	$V_{IN} = 0.5V (\overline{CS})$			
I _{OZH}	Output Leakage Current				50	μΑ	Max	V _{OUT} = 2.7V		
I _{OZL}	Output Leakage Current				-50	μΑ	Max	V _{OUT} = 0.5V		
Ios	Output Short-Circuit Currer	t	-60		-150	mA	Max	V _{OUT} = 0V		
I _{ZZ}	Bus Drainage Test				500	μΑ	0.0V	V _{OUT} = 5.25V		
I _{CCZ}	Power Supply Current			37	55	mA	Max	$V_O = HIGH Z$		

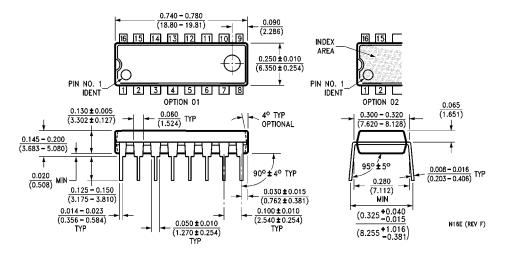
AC Electrical Characteristics

		$T_A = +25^{\circ}C$ $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$			$T_{A} = -55^{\circ}C \text{ to } +125^{\circ}C$ $V_{CC} = +5.0V$ $C_{L} = 50 \text{ pF}$		$T_A = 0^{\circ}C \text{ to } +70^{\circ}C$ $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$		Units
Oh al	Parameter								
Symbol									
		Min	Тур	Max	Min	Max	Min	Max	
t _{PLH}	Access Time, HIGH or LOW	10.0	18.5	26.0	9.0	32.0	10.0	27.0	ns
t _{PHL}	A_n to \overline{O}_n	8.0	13.5	19.0	8.0	23.0	8.0	20.0	115
t _{PZH}	Access Time, HIGH or LOW	3.5	6.0	8.5	3.5	10.5	3.5	9.5	
t _{PZL}	CS to O _n	5.0	9.0	13.0	5.0	15.0	5.0	14.0	ns
t _{PHZ}	Disable Time, HIGH or LOW	2.0	4.0	6.0	2.0	8.0	2.0	7.0	
t _{PLZ}	CS to On	3.0	5.5	8.0	2.5	10.0	3.0	9.0	ns
t _{PZH}	Write Recovery Time,	6.5	15.0	28.0	6.5	37.5	6.5	29.0	
t _{PZL}	HIGH or LOW $\overline{\text{WE}}$ to $\overline{\text{O}}_{\text{n}}$	6.5	11.0	15.5	6.5	17.5	6.5	16.5	ns
t _{PHZ}	Disable Time, HIGH or LOW	4.0	7.0	10.0	3.5	12.0	4.0	11.0	20
t _{PLZ}	WE to \overline{O}_n	5.0	9.0	13.0	5.0	15.0	5.0	14.0	ns

AC Operating Requirements

	ol Parameter	$T_A = +25^{\circ}C$ $V_{CC} = +5.0V$		$T_A = -55^{\circ}C$	to +125°C	$T_A = 0^{\circ}C$ to $+70^{\circ}C$			
Symbol				$V_{CC} = +5.0V$		$V_{CC} = +5.0V$		Units	
		Min	Max	Min	Max	Min	Max		
t _S (H)	Setup Time, HIGH or LOW	0		0		0			
$t_S(L)$	A _n to WE	0		0		0			
t _H (H)	Hold Time, HIGH or LOW	2.0		2.0		2.0		ns	
$t_H(L)$	A _n to WE	2.0		2.0		2.0			
t _S (H)	Setup Time, HIGH or LOW	10.0		11.0		10.0			
$t_S(L)$	D _n to WE	10.0		11.0		10.0			
t _H (H)	Hold Time, HIGH or LOW	0		2.0		0		ns	
t _H (L)	D _n to WE	0		2.0		0			
t _S (L)	Setup Time, LOW	0		0		0			
	CS to WE								
t _H (L)	Hold Time, LOW	6.0		7.5		6.0		ns	
	CS to WE								
t _W (L)	WE Pulse Width, LOW	6.0		15.0		6.0		ns	

Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide Package Number N16E

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