

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.

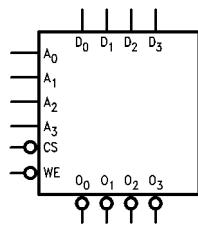
Features

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

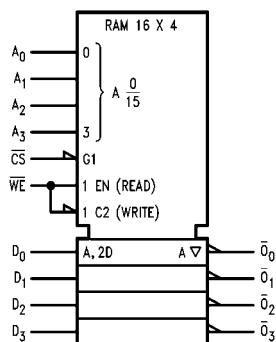
Ordering Code:

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

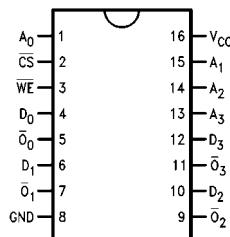
Logic Symbols



IEEE/IEC



Connection Diagram



Unit Loading/Fan Out

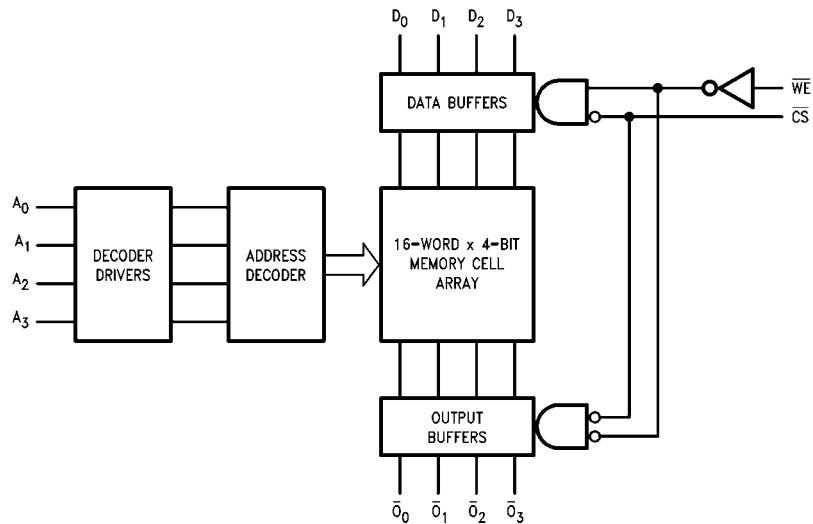
Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
A_0-A_3	Address Inputs	1.0/1.0	$20\ \mu A/0.6\ mA$
\overline{CS}	Chip Select Input (Active LOW)	1.0/1.0	$20\ \mu A/1.2\ mA$
\overline{WE}	Write Enable Input (Active LOW)	1.0/1.0	$20\ \mu A/0.6\ mA$
D_0-D_3	Data Inputs	1.0/1.0	$20\ \mu A/0.6\ mA$
$\overline{O}_0-\overline{O}_3$	Inverted Data Outputs	150/40 (33.3)	$-3.0\ mA/24\ mA\ (20\ mA)$

Function Table

Inputs		Operation	Condition of Outputs
\overline{CS}	\overline{WE}		
L	L	Write	High Impedance
L	H	Read	Complement of Stored Data
H	X	Inhibit	High Impedance

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

Block Diagram



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
V _{CC} 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 +5.0 mA
Voltage Applied to Output in HIGH State (with V _{CC} = 0V)	-0.5V to V _{CC}
Standard Output	-0.5V to V _{CC}
3-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	

**Recommended Operating
Conditions**

Free Air Ambient Temperature	0°C to +70°C
Supply Voltage	+4.5V to +5.5V

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.

DC Electrical Characteristics

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 Voltage	10% V _{CC}	2.5				I _{OH} = -1 mA
		10% V _{CC}	2.4				I _{OH} = -3 mA
		5% V _{CC}	2.7		V	Min	I _{OH} = -1 mA
		5% V _{CC}	2.7				I _{OH} = -3 mA
V _{OL}	Output LOW Voltage	10% V _{CC}		0.5	V	Min	I _{OL} = 24 mA
I _{IH}	Input HIGH Current			5.0	µA	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test			7.0	µA	Max	V _{IN} = 7.0V
I _{CEx}	Output HIGH Leakage Current			50	µA	Max	V _{OUT} = V _{CC}
V _{ID}	Input Leakage Test		4.75		V	0.0	I _{ID} = 1.9 µA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current			3.75	µA	0.0	V _{IOD} = 150 mV All Other Pins Grounded
I _{IL}	Input LOW Current			-0.6 -1.2	mA	Max	V _{IN} = 0.5V (except CS) V _{IN} = 0.5V (CS)
I _{OZH}	Output Leakage Current			50	µA	Max	V _{OUT} = 2.7V
I _{OZL}	Output Leakage Current			-50	µA	Max	V _{OUT} = 0.5V
I _{os}	Output Short-Circuit Current	-60		-150	mA	Max	V _{OUT} = 0V
I _{zz}	Bus Drainage Test			500	µA	0.0V	V _{OUT} = 5.25V
I _{ccz}	Power Supply Current		37	55	mA	Max	V _O = HIGH Z

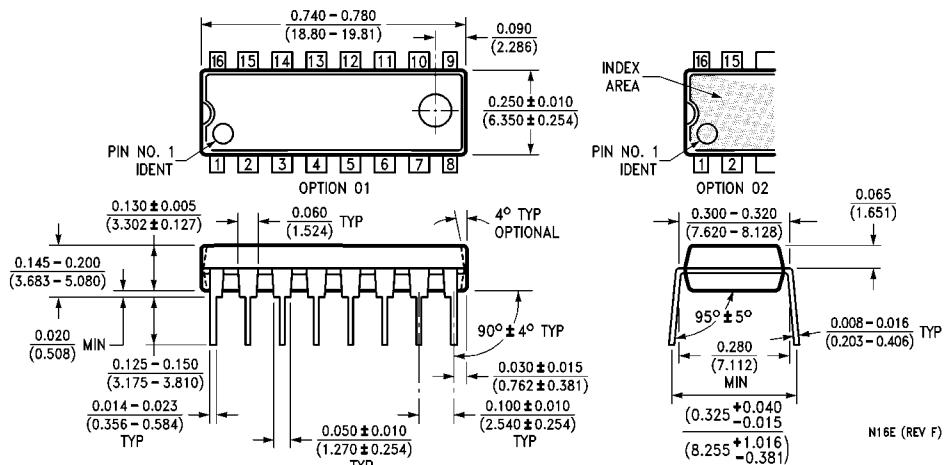
AC Electrical Characteristics

Symbol	Parameter	$T_A = +25^\circ C$			$T_A = -55^\circ C \text{ to } +125^\circ C$		$T_A = 0^\circ C \text{ to } +70^\circ C$		Units
		Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}	Access Time, HIGH or LOW A_n to \bar{O}_n	10.0	18.5	26.0	9.0	32.0	10.0	27.0	ns
t_{PHL}		8.0	13.5	19.0	8.0	23.0	8.0	20.0	
t_{PZH}	Access Time, HIGH or LOW \bar{CS} to \bar{O}_n	3.5	6.0	8.5	3.5	10.5	3.5	9.5	ns
t_{PZL}		5.0	9.0	13.0	5.0	15.0	5.0	14.0	
t_{PHZ}	Disable Time, HIGH or LOW \bar{CS} to \bar{O}_n	2.0	4.0	6.0	2.0	8.0	2.0	7.0	ns
t_{PLZ}		3.0	5.5	8.0	2.5	10.0	3.0	9.0	
t_{PZH}	Write Recovery Time, HIGH or LOW \bar{WE} to \bar{O}_n	6.5	15.0	28.0	6.5	37.5	6.5	29.0	ns
t_{PZL}		6.5	11.0	15.5	6.5	17.5	6.5	16.5	
t_{PHZ}	Disable Time, HIGH or LOW \bar{WE} to \bar{O}_n	4.0	7.0	10.0	3.5	12.0	4.0	11.0	ns
t_{PLZ}		5.0	9.0	13.0	5.0	15.0	5.0	14.0	

AC Operating Requirements

Symbol	Parameter	$T_A = +25^\circ C$		$T_A = -55^\circ C \text{ to } +125^\circ C$		$T_A = 0^\circ C \text{ to } +70^\circ C$		Units
		Min	Max	Min	Max	Min	Max	
$t_S(H)$	Setup Time, HIGH or LOW A_n to \bar{WE}	0	0	0	0	0	0	ns
$t_S(L)$		0	0	0	0	0	0	
$t_H(H)$	Hold Time, HIGH or LOW A_n to \bar{WE}	2.0	2.0	2.0	2.0	2.0	2.0	ns
$t_H(L)$		2.0	2.0	2.0	2.0	2.0	2.0	
$t_S(H)$	Setup Time, HIGH or LOW D_n to \bar{WE}	10.0	10.0	11.0	11.0	10.0	10.0	ns
$t_S(L)$		10.0	10.0	11.0	11.0	10.0	10.0	
$t_H(H)$	Hold Time, HIGH or LOW D_n to \bar{WE}	0	0	2.0	2.0	0	0	ns
$t_H(L)$		0	0	2.0	2.0	0	0	
$t_S(L)$	Setup Time, LOW \bar{CS} to \bar{WE}	0	0	0	0	0	0	ns
$t_H(L)$	Hold Time, LOW \bar{CS} to \bar{WE}	6.0	6.0	7.5	7.5	6.0	6.0	
$t_W(L)$	\bar{WE} Pulse Width, LOW	6.0	6.0	15.0	15.0	6.0	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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