

54S/74S189 54LS/74LS189

64-BIT RANDOM ACCESS MEMORY (With 3-State Outputs)

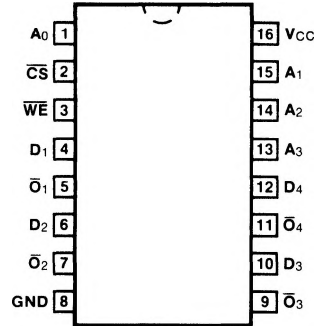
DESCRIPTION — The '189 is a high speed 64-bit RAM organized as a 16-word by 4-bit array. Address inputs are buffered to minimize loading and are fully decoded on-chip. The outputs are 3-state and are in the high impedance state whenever the Chip Select ($\overline{CS}$) input is HIGH. The outputs are active only in the Read mode and the output data is the complement of the stored data.

- 3-STATE OUTPUTS FOR DATA BUS APPLICATIONS
- BUFFERED INPUTS MINIMIZE LOADING
- ADDRESS DECODING ON-CHIP
- DIODE CLAMPED INPUTS MINIMIZE RINGING

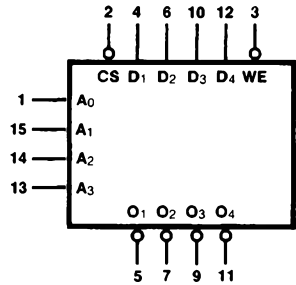
ORDERING CODE: See Section 9

PKGS	PIN OUT	COMMERCIAL GRADE	MILITARY GRADE	PKG TYPE
		$V_{CC} = +5.0\text{ V} \pm 5\%$, $T_A = 0^\circ\text{C to } +70^\circ\text{C}$	$V_{CC} = +5.0\text{ V} \pm 10\%$, $T_A = -55^\circ\text{C to } +125^\circ\text{C}$	
Plastic DIP (P)	A	74S189PC, 74LS189PC		9B
Ceramic DIP (D)	A	74S189DC, 74LS189DC	54S189DM, 54LS189DM	6B
Flatpak (F)	A	74S189FC, 74LS189FC	54S189FM, 54LS189FM	4L

CONNECTION DIAGRAM PINOUT A



LOGIC SYMBOL



V_{CC} = Pin 16
GND = Pin 8

INPUT LOADING/FAN-OUT: See Section 3 for U.L. definitions

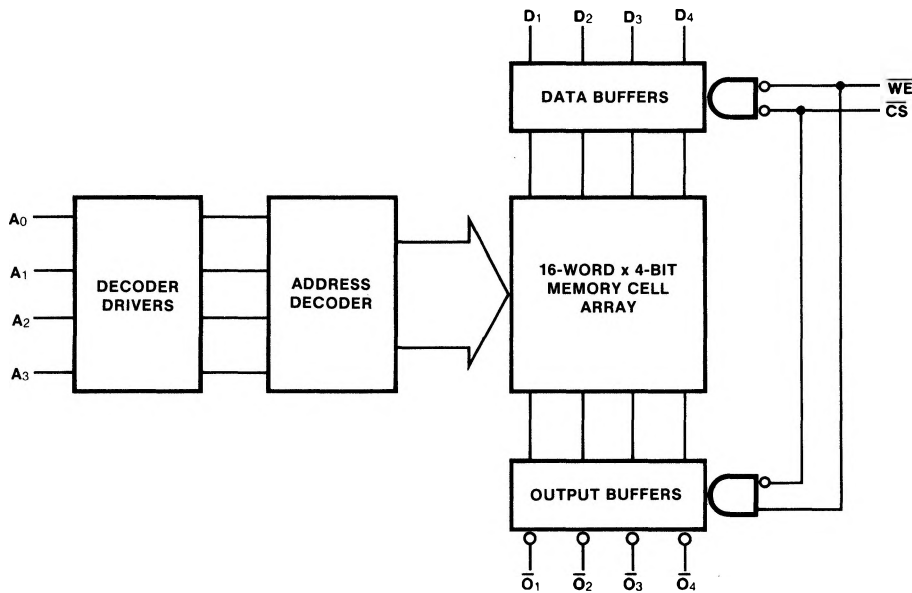
PIN NAMES	DESCRIPTION	54/74S (U.L.) HIGH/LOW	54/74LS (U.L.) HIGH/LOW
$A_0 - A_3$	Address Inputs	0.63/0.16	0.5/0.013
$\overline{CS}$	Chip Select Input (Active LOW)	0.63/0.16	0.5/0.013
$\overline{WE}$	Write Enable Input (Active LOW)	0.63/0.16	0.5/0.013
$D_1 - D_4$	Data Inputs	0.63/0.16	0.5/0.013
$\overline{O}_1 - \overline{O}_4$	Inverted Data Outputs	162/10 (50)	10/10 (5.0)

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

LOGIC DIAGRAM



DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

SYMBOL	PARAMETER		54/74S		54/74LS		UNITS	CONDITIONS
			Min	Max	Min	Max		
VOL	Output LOW Voltage	XM	0.5		0.4		V	V _{CC} = Min I _{OL} = 16 mA ('S189) I _{OL} = 8.0 mA (54LS189) I _{OL} = 16 mA (74LS189)
		XC	0.45		0.5			
VOH	Output HIGH Voltage	XM	2.4		2.8		V	V _{CC} = Min I _{OH} = 2.0 mA (54S189) I _{OH} = 6.5 mA (74S189) I _{OH} = 0.4 mA ('LS189)
		XC	2.4		2.8			
Ios	Output Short Circuit Current		-30	-100	-80*		mA	V _{CC} = Max
Icc	Power Supply Current		110		40		mA	V _{CC} = Max; $\overline{WE}$, $\overline{CS}$, Gnd

*Typical Value

AC CHARACTERISTICS OVER RECOMMENDED V_{CC} AND T_A RANGE (unless otherwise specified)

SYMBOL	PARAMETER		54/74S		54/74LS		UNITS	CONDITIONS
			$C_L = 30 \text{ pF}$ $R_L = 300 \Omega$		$C_L = 15 \text{ pF}$			
			Min	Max	Min	Max		
tPLH	Access Time, HIGH or LOW, A_n to $\overline{O}_n$	XM	50	37*	ns	Figs. 3-1, 3-20		
tPHL		XC	35	37*				
tPZH	Access Time, HIGH or LOW, $\overline{CS}$ to $\overline{O}_n$	XM	32	10*	ns	Figs. 3-3, 3-11, 3-12 $R_L = 2 \text{ k}\Omega$ ('LS189)		
tPZL		XC	22	10*				
tPHZ	Disable Time $\overline{CS}$ to $\overline{O}_n$	XM	25		ns	Figs. 3-3, 3-11, 3-12 $R_L = 2 \text{ k}\Omega$ ('LS189) $C_L = 5 \text{ pF}$		
		XC	25					
tPLZ	Disable Time $\overline{CS}$ to $\overline{O}_n$	XM	25					
		XC	17					
tPZH	Access Time, HIGH or LOW, $\overline{WE}$ to $\overline{O}_n$	XM	40		ns	Figs. 3-3, 3-11, 3-12 $R_L = 2 \text{ k}\Omega$ ('LS189)		
tPZL		XC	30					
tPHZ	Disable Time $\overline{WE}$ to $\overline{O}_n$	XM	30		ns	Figs. 3-3, 3-11, 3-12 $R_L = 2 \text{ k}\Omega$ ('LS189) $C_L = 5 \text{ pF}$		
		XC	20					
tPLZ	Disable Time $\overline{WE}$ to $\overline{O}_n$	XM	32					
		XC	20					

AC OPERATING REQUIREMENTS OVER RECOMMENDED V_{CC} AND T_A RANGE (unless otherwise specified)

SYMBOL	PARAMETER	54/74S		54/74LS		UNITS	CONDITIONS
		Min	Max	Min	Max		
t _s (H) t _s (L)	Setup Time HIGH or LOW A _n to $\overline{WE}$	0 0		10* 10*		ns	Fig. 3-21
t _h (H) t _h (L)	Hold Time HIGH or LOW A _n to $\overline{WE}$	0 0		0* 0*		ns	
t _s (H) t _s (L)	Setup Time HIGH or LOW D _n to $\overline{WE}$	20 20		25* 25*		ns	Fig. 3-13
t _h (H) t _h (L)	Hold Time HIGH or LOW D _n to $\overline{WE}$	0 0		0* 0*		ns	
t _s (L)	Setup Time LOW CS to $\overline{WE}$	0				ns	Fig. 3-14
t _h (L)	Hold Time LOW CS to $\overline{WE}$	0				ns	Fig. 3-13
t _w (L)	$\overline{WE}$ Pulse Width LOW	20		25*		ns	Fig. 3-14

*Typical Value