

54F/74F219

64-Bit Random Access Memory with TRI-STATE® Outputs

General Description

The 'F219 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 TRI-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. This device is similar to the 'F189 but features non-inverting, rather than inverting, data outputs.

Features

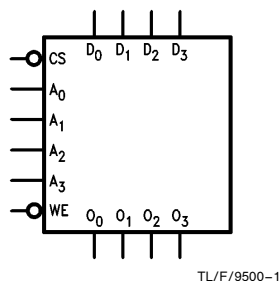
- TRI-STATE outputs for data bus applications
- Buffered inputs minimize loading
- Address decoding on-chip
- Diode clamped inputs minimize ringing
- Available in SOIC (300 mil only)

Commercial	Military	Package Number	Package Description
74F219PC		N16E	16-Lead (0.300" Wide) Molded Dual-In-Line
	54F219DL (Note 2)	J16A	16-Lead Ceramic Dual-In-Line
74F219SC (Note 1)		M16B	16-Lead (0.300" Wide) Molded Small Outline, JEDEC
74F219SJ (Note 1)		M16D	16-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F219FL (Note 2)	W16A	16-Lead Cerpack
	54F219LL (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

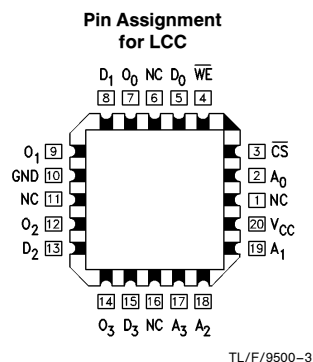
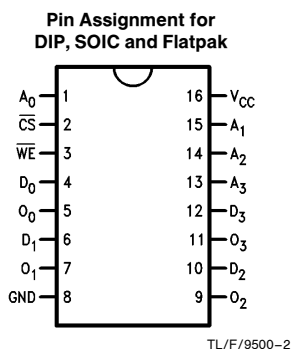
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DLQB, FLQB and LLQB.

Logic Symbol



Connection Diagrams



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Unit Loading/Fan Out

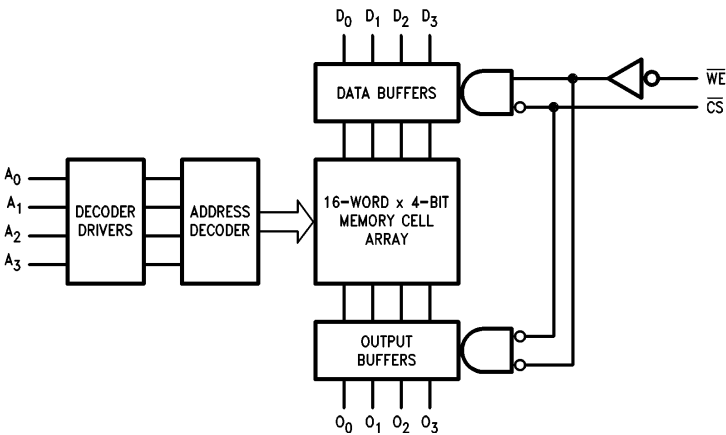
Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I _{IH} /I _{IL} Output I _{OH} /I _{OL}
A ₀ –A ₃	Address Inputs	1.0/1.0	20 μA/ –0.6 mA
$\overline{\text{CS}}$	Chip Select Input (Active LOW)	1.0/2.0	20 μA/ –1.2 mA
$\overline{\text{WE}}$	Write Enable Input (Active LOW)	1.0/1.0	20 μA/ –0.6 mA
D ₀ –D ₃	Data Inputs	1.0/1.0	20 μA/ –0.6 mA
O ₀ –O ₃	TRI-STATE Data Outputs	150/40 (33.3)	–3 mA/24 mA (20 mA)

Function Table

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

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

Block Diagram



TL/F/9500-4

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

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
Plastic	−55°C to +150°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)	
Standard Output	−0.5V to V _{CC}
TRI-STATE Output	−0.5V to +5.5V

Current Applied to Output in LOW State (Max) twice the rated I_{OL} (mA)

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.

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	−55°C to +100°C
Commercial	0°C to +70°C
Supply Voltage	
Military	+4.5V to +5.5V
Commercial	+4.5V to +5.5V

DC Electrical Characteristics

Symbol	Parameter		54F/74F			Units	V _{CC}	Conditions
			Min	Typ	Max			
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	54F 10% V _{CC} 54F 10% V _{CC} 74F 10% V _{CC} 74F 10% V _{CC} 74F 5% V _{CC} 74F 5% V _{CC}	2.5 2.4 2.5 2.4 2.7 2.7			V	Min	I _{OH} = −1 mA I _{OH} = −3 mA I _{OH} = −1 mA I _{OH} = −3 mA I _{OH} = −1 mA I _{OH} = −3 mA
V _{OL}	Output LOW Voltage	54F 10% V _{CC} 74F 10% V _{CC}			0.5 0.5	V	Min	I _{OL} = 20 mA I _{OL} = 24 mA
I _{IH}	Input HIGH Current	54F 74F			20.0 5.0	μA	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test	54F 74F			100 7.0	μA	Max	V _{IN} = 7.0V
I _{CEX}	Output HIGH Leakage Current	54F 74F			250 50	μA	Max	V _{OUT} = V _{CC}
V _{ID}	Input Leakage Test	74F	4.75			V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current	74F			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 (A _n , \overline{WE} , D _n) 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 _{CC}	Power Supply Current			37	55	mA	Max	

AC Electrical Characteristics

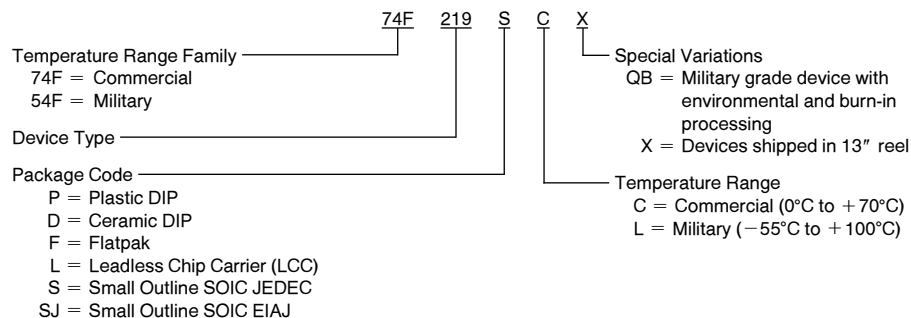
Symbol	Parameter	74F			54F		74F		Units
		T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A = +100°C V _{CC} = Mil C _L = 50 pF		T _A , V _{CC} = Com C _L = 50 pF		
		Min	Typ	Max	Min	Max	Min	Max	
t _{PLH} t _{PHL}	Access Time, HIGH or LOW A _n to O _n	10.0 8.0	18.5 13.5	26.0 19.0	9.0 8.0	32.0 23.0	10.0 8.0	27.0 20.0	ns
t _{PZH} t _{PZL}	Access Time, HIGH or LOW \overline{CS} to O _n	3.5 5.0	6.0 9.0	8.5 13.0	3.5 5.0	10.5 15.0	3.5 5.0	9.5 14.0	ns
t _{PHZ} t _{PLZ}	Disable Time, HIGH or LOW \overline{CS} to O _n	2.0 3.0	4.0 5.5	6.0 8.0	2.0 2.5	8.0 10.0	2.0 3.0	7.0 9.0	
t _{PZH} t _{PZL}	Write Recovery Time HIGH or LOW, \overline{WE} to O _n	6.5 6.5	20.0 11.0	28.0 15.5	6.5 6.5	37.5 17.5	6.5 6.5	29.0 16.5	ns
t _{PHZ} t _{PLZ}	Disable Time, HIGH or LOW \overline{WE} to O _n	4.0 5.0	7.0 9.0	10.0 13.0	3.5 5.0	12.0 15.0	4.0 5.0	11.0 14.0	

AC Operating Requirements

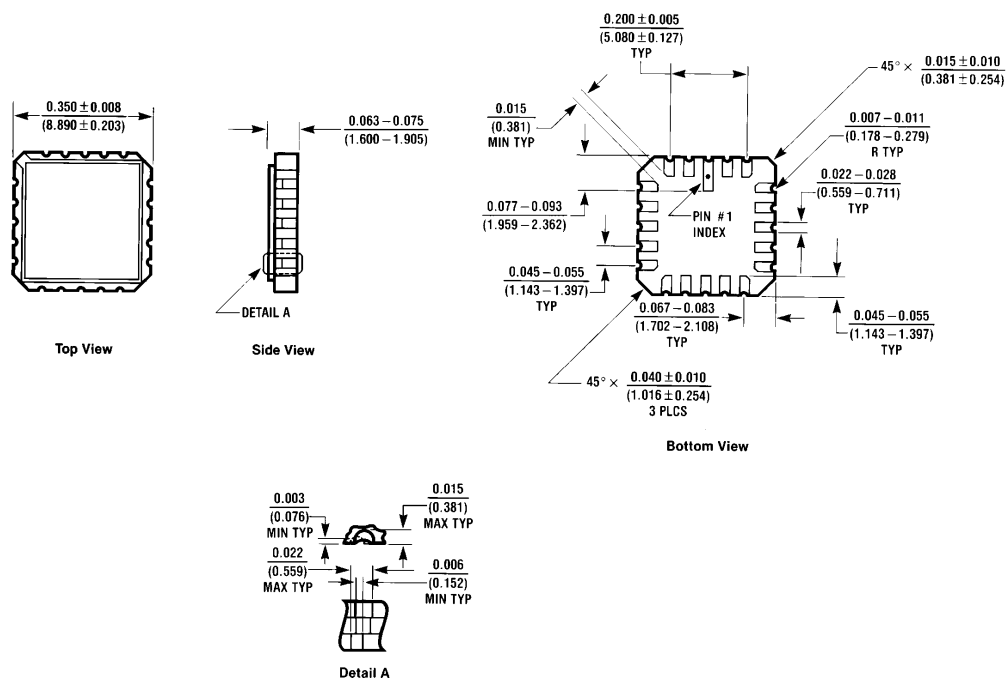
Symbol	Parameter	74F		54F		74F		Units
		T _A = +25°C V _{CC} = +5.0V		T _A = +100°C V _{CC} = Mil		T _A , V _{CC} = Com		
		Min	Max	Min	Max	Min	Max	
t _S (H) t _S (L)	Setup Time, HIGH or LOW A _n to \overline{WE}	0 0		0 0		0 0		ns
t _H (H) t _H (L)	Hold Time, HIGH or LOW A _n to \overline{WE}	2.0 2.0		2.0 2.0		2.0 2.0		
t _S (H) t _S (L)	Setup Time, HIGH or LOW D _n to \overline{WE}	10.0 10.0		11.0 11.0		10.0 10.0		ns
t _H (H) t _H (L)	Hold Time, HIGH or LOW D _n to \overline{WE}	0 0		2.0 2.0		0 0		
t _S (L)	Setup Time, LOW \overline{CS} to \overline{WE}	0		0		0		ns
t _H (L)	Hold Time, LOW \overline{CS} to \overline{WE}	6.0		7.5		6.0		
t _w (L)	\overline{WE} Pulse Width, LOW	6.0		15.0		6.0		ns

Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



Physical Dimensions inches (millimeters)



20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

E20A (REV D)

Technical drawing of a 16-pin connector showing top, side, and detail views with dimensions in inches and millimeters.

Top View:

- Pin numbers 1 through 16 are arranged in two rows (9-16 on top, 1-8 on bottom).
- Overall width: $0.3977-0.4133$ inches / $10.10-10.50$ mm.
- Overall height: $0.3940-0.4190$ inches / $10.00-10.65$ mm.
- Internal width: $0.2914-0.2992$ inches / $7.4-7.6$ mm.
- Lead No. 1 Identification: Indicated by a circle with a crosshair.
- Pin 1 location: 0.050 inches / 1.27 mm from the left edge.
- Pin pitch: $0.0138-0.0200$ inches / $0.350-0.508$ mm TYP.
- Feature Callouts: M , A , C , S , B .

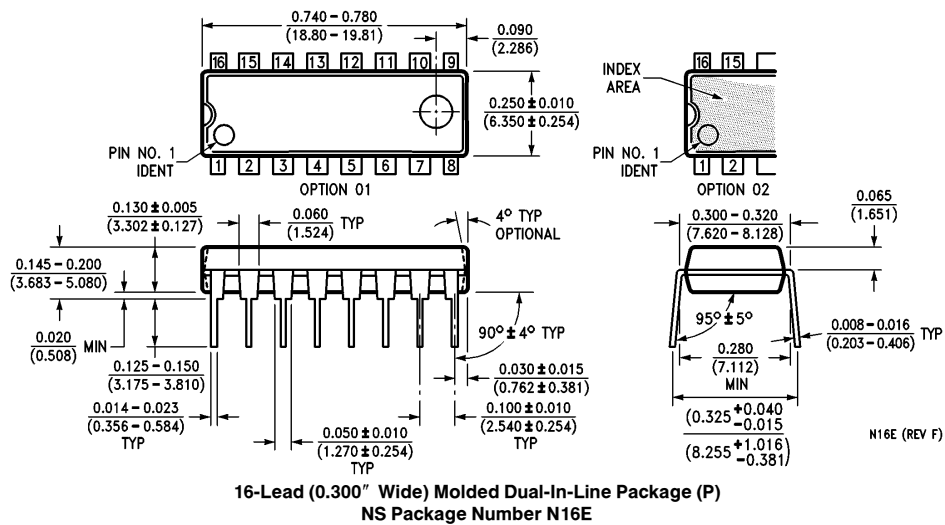
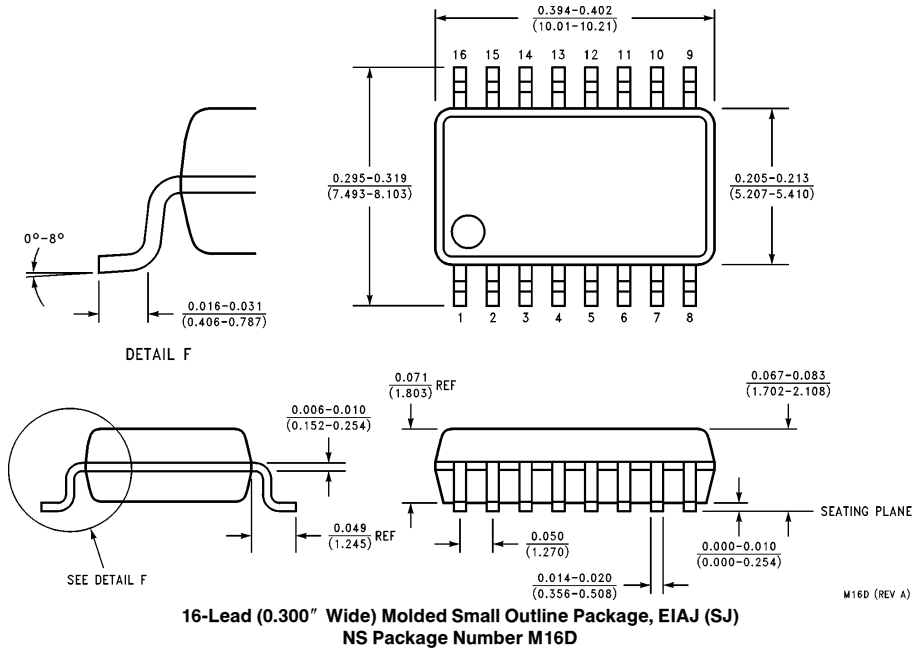
Side View:

- Overall height: 0.1043 inches / 2.65 mm.
- Seating Plane: Indicated by a dashed line.
- Pin height: 0.014 inches / 0.35 mm.
- Internal width: $0.0040-0.0118$ inches / $0.1-0.3$ mm.
- Feature Callout: A .

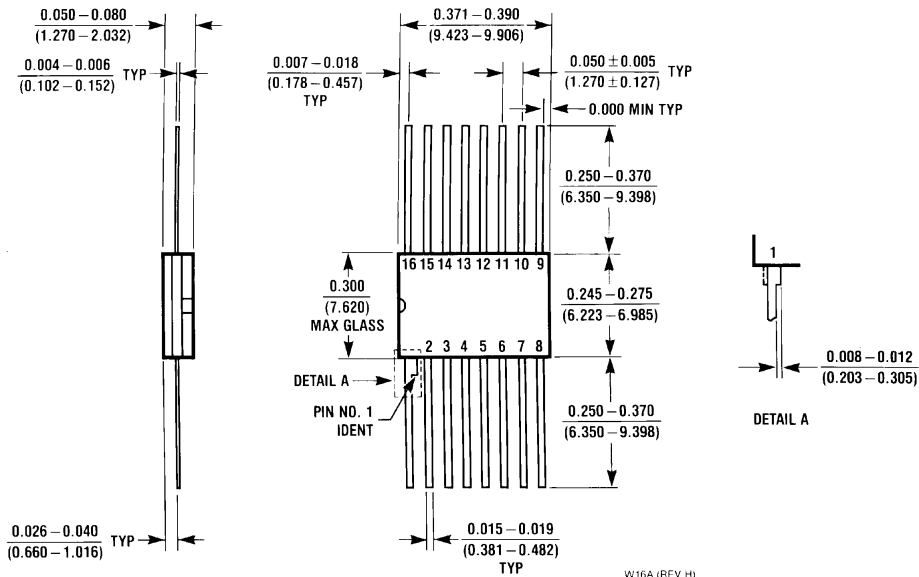
Detail View (Lead Tip):

- Lead tip angle: 45° .
- Lead tip width: $0.010-0.029$ inches / $0.25-0.75$ mm.
- Lead tip height: $0.0091-0.0125$ inches / $0.23-0.32$ mm TYP ALL LEADS.
- Lead tip radius: $0.0160-0.0500$ inches / $0.40-1.27$ mm TYP ALL LEADS.
- Feature Callouts: B MAX TYP ALL LEADS, A .

Physical Dimensions inches (millimeters) (Continued)



Physical Dimensions inches (millimeters) (Continued)



16-Lead Ceramic Flatpak (F)
NS Package Number W16A

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