82LS180-F,N • 82LS181-F,N

DESCRIPTION

The 82LS180 and 82LS181 are field programmable, which means that custom patterns are immediately available by following the fusing procedure given in this data sheet. The standard 82LS180 and 82LS181 are supplied with all outputs at logical low. Outputs are programmed to a logic high level at any specified address by fusing a Ni-Cr link matrix.

These devices include on-chip decoding and 4 chip enable inputs for ease of memory expansion. They feature either open collector or 3-state outputs for optimization of word expansion in bused organizations.

The 82LS180 and 82LS181 are available in both the commercial and military temperature ranges. For the commercial temperature range (0°C to +75°C) specify N82LS180/181, F or N, and for the military temperature range (−55°C to +125°C) specify S82LS180/181, F.

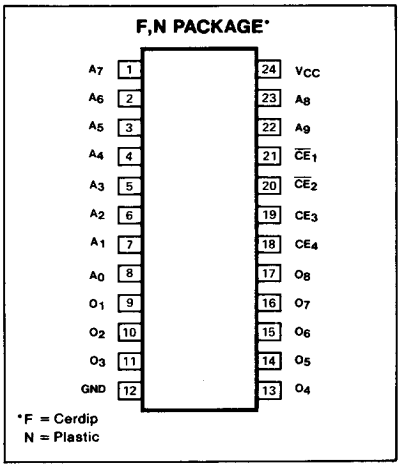
FEATURES

- **Address access time:**
  N82LS180/181: 175ns max
  S82LS180/181: 225ns max
- **Power dissipation: 37μW/bit typ**
- **Input loading:**
  N82LS180/181: −100μA max
  S82LS180/181: −150μA max
- **On-chip address decoding**
- **Output options:**
  82LS180: Open collector
  82LS181: 3-state
- **No separate fusing pins**
- **Unprogrammed outputs are low level**
- **Fully TTL compatible**

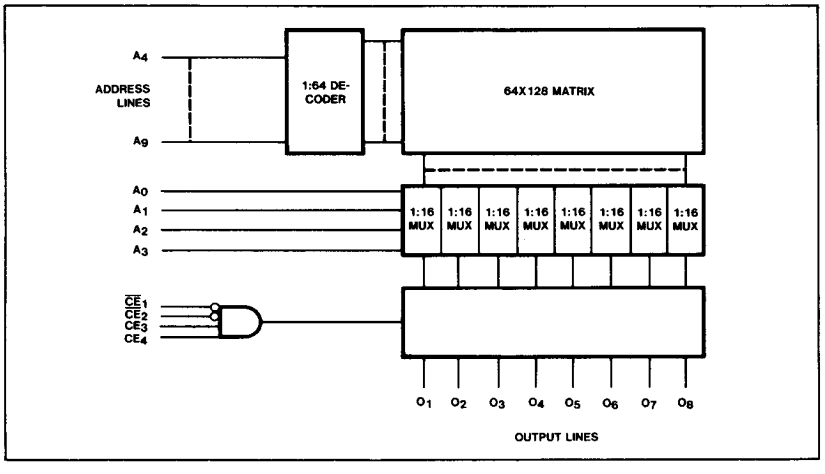
APPLICATIONS

- **Prototyping/volume production**
- **Sequential controllers**
- **Microprogramming**
- **Hardwired algorithms**
- **Control store**
- **Random logic**
- **Code conversion**

PIN CONFIGURATION



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage	+7	Vdc
V_{IN}	Input voltage	+5.5	Vdc
	Output voltage		Vdc
V_{OH}	High (82LS180)	+5.5	
V_O	Off-state (82LS181)	+5.5	
	Temperature range		°C
T_A	Operating		
	N82LS180/181	0 to +75	
	S82LS180/181	−55 to +125	
T_{STG}	Storage	−65 to +150	

DC ELECTRICAL CHARACTERISTICS

N82LS180/181: 0°C ≤ T_A ≤ +75°C, 4.75V ≤ V_{CC} ≤ 5.25V
S82LS180/181: −55°C ≤ T_A ≤ +125°C, 4.5V ≤ V_{CC} ≤ 5.5V

PARAMETER	TEST CONDITIONS[1]		N82LS180/181			S82LS180/181			UNIT
			Min	Typ[2]	Max	Min	Typ[2]	Max	
Input voltage									V
V_{IL} Low					.85			.80	
V_{IH} High			2.0			2.0			
V_{IC} Clamp	I_{IN} = −18mA			−0.8	−1.2		−0.8	−1.2	
Output voltage									V
V_{OL} Low	I_{OUT} = 4.8mA				0.45			0.5	
V_{OH} High (82LS181)	$\overline{CE}_1$ = low, I_{OUT} = −1mA, CE_2 = low, CE_2 = high, $\overline{CE}_4$ = high, high stored		2.4			2.4			
Input current									µA
I_{IL} Low	V_{IN} = 0.45V				−100			−150	
I_{IH} High	V_{IN} = 5.5V				40			50	
Output current									
I_{OLK} Leakage (82LS180)	$\overline{CE}_1 = \overline{CE}_2$ = HIGH, $CE_3 = CE_4$ = LOW	V_{OUT} = 5.5V			40			60	µA
$I_{O(OFF)}$ Hi-Z state (82LS181)		V_{OUT} = 0.5V			−40			−60	µA
		V_{OUT} = 5.5V			40			60	µA
I_{OS} Short circuit (82LS181)	$\overline{CE}_1 = \overline{CE}_2$ = LOW, $CE_2 = CE_3$ = HIGH	V_{OUT} = 0V	−10		−70	−10		−85	mA
I_{CC} V_{CC} supply current				60	80		60	85	mA
Capacitance	V_{CC} = 5.0V								pF
C_{IN} Input	V_{IN} = 2.0V			5			5		
C_{OUT} Output	V_{OUT} = 2.0V			8			8		

AC ELECTRICAL CHARACTERISTICS

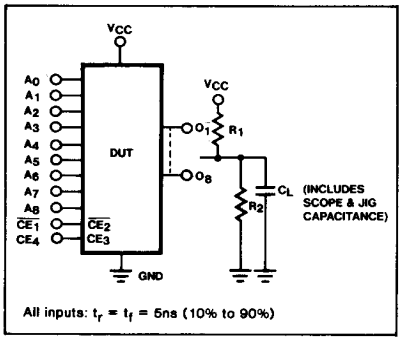
R_1 = 1kΩ, R_2 = 2kΩ, C_L = 30pF
N82LS180/181: 0°C ≤ T_A ≤ +75°C, 4.75V ≤ V_{CC} ≤ 5.25V
S82LS180/181: −55°C ≤ T_A ≤ +125°C, 4.5V ≤ V_{CC} ≤ 5.5V

PARAMETER	TO	FROM	N82LS180/181			S82LS180/181			UNIT
			Min	Typ[2]	Max	Min	Typ[2]	Max	
Access time									ns
T_{AA}	Output	Address		100	175		100	225	
T_{CE}	Output	Chip enable		35	60		35	80	
Disable time									ns
T_{CD}	Output	Chip disable		35	50		35	70	

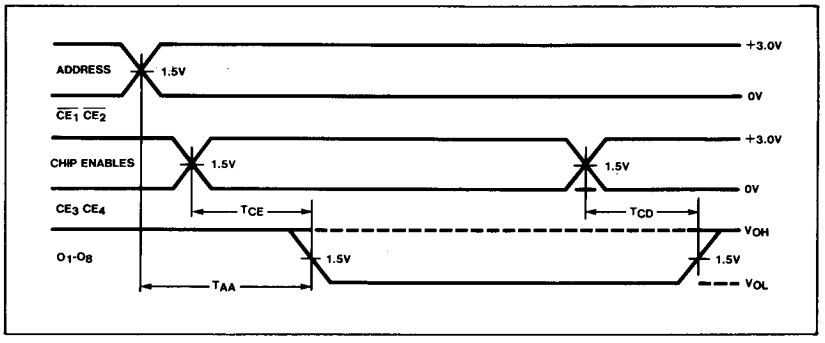
NOTES

1. Positive current is defined as into the terminal referenced.
2. Typical values are at V_{CC} = 5.0V, T_A = +25°C.

TEST LOAD CIRCUIT



VOLTAGE WAVEFORM



PROGRAMMING SYSTEM SPECIFICATIONS[4] (Testing of these limits may cause programming of device.) T_A = +25°C

PARAMETER		TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
	Power supply voltage					V
V_{CCP}	To program[1]	I_{CCP} = 425 ±75mA, Transient or steady state	8.5		9.0	
	Verify limit					V
V_{CCVH}	Upper		5.3		5.7	
V_{CCVL}	Lower		4.3		4.7	
V_S	Verify threshold[2]		1.4		1.6	V
I_{CCP}	Programming supply current	V_{CCP} = +8.75 ±.25V	350		500	mA
	Input voltage					V
V_{IH}	High		2.4		5.5	
V_{IL}	Low		0		0.8	
	Input current					µA
I_{IH}	High	V_{IH} = +5.5V			50	
I_{IL}	Low	V_{IL} = +0.4V			−500	
V_{OPF}	Forced output voltage[3] (program)	I_{OPF} = 200 ±20mA, Transient or steady state	16.0		18.0	V
I_{OPF}	Forced output current (program)	V_{OPF} = +17 ±1V	180		220	mA
T_R	Output pulse rise time		10			µs
t_p	$\overline{CE}$ programming pulse width		100		125	µs
t_D	Pulse sequence delay		5			µs
t_V	$\overline{CE}$ verify pulse width		1			µs
T_{PVA}	Address program verify cycle				1	ms
T_{PVM}	Memory program verify time (continuous)				20	sec
F_L	Fusing attempts per link				1	cycle

NOTES

1. Bypass V_{CC} to GND with a 0.01µF capacitor to reduce voltage spikes. For a transient current of 150mA, limit voltage spikes to a maximum slew rate of 2V/µs, and 10µs maximum recovery.
2. V_S is the sensing threshold of the PROM output voltage for a programmed bit. It normally constitutes the reference voltage applied to a comparator circuit to verify a successful fusing attempt.
3. This voltage should be maintained within specified limits during the entire fusing cycle.
4. These are specifications which a Programming System must satisfy in order to be qualified by Signetics. They contain new limits for minimizing total device programming time, which supersede, but do not obsolete the performance requirements of previously manufactured programming equipment.

PROGRAMMING PROCEDURE

1. Terminate all device outputs with a 10kΩ resistor to V_{CC}. Apply $\overline{CE}_1$ = Low, $\overline{CE}_2$ = High, CE_3 = High, CE_4 = High.
2. Select the Address to be programmed, and raise V_{CC} to V_{CCP}.
3. After t_D delay, apply V_{OPF} to the output to be programmed. Program one output at the time.
4. After t_D delay, pulse the $\overline{CE}_2$ input to logic low for a time t_p.
5. After t_D delay, remove V_{OPF} from the programmed output.
6. Repeat steps 3 through 5 to program other bits at the same address.
7. To verify programming of all bits at the same address after t_D delay, lower V_{CC} to V_{CCVL} and apply a logic low level to the $\overline{CE}_2$ input. All programmed outputs should remain in the logic high state.
8. After t_D delay, repeat steps 2 through 7 to program and verify all other address locations.
9. After t_D delay, raise V_{CC} to V_{CCVH} and verify all memory locations by applying a logic low level to $\overline{CE}_2$, and cycling through all device addresses.

TYPICAL PROGRAMMING SEQUENCE