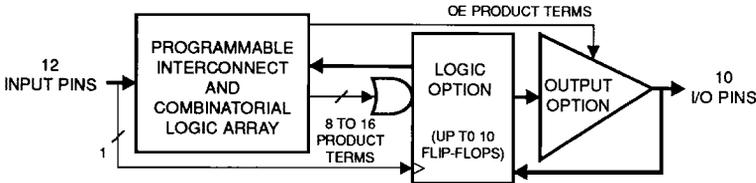


Features

- High Speed Electrically Erasable Programmable Logic Device
7.5 ns Max Propagation Delay
5 V ±10% Operation
- Low Power ATF22V10BL - 10 mA Standby
- CMOS and TTL Compatible Inputs and Outputs
150 µA Leakage Maximum
- Reprogrammable - 100% Tested
- High Reliability CMOS Technology
2000 V ESD Protection
200 mA Latchup Immunity
- Full Military, Commercial and Industrial Temperature Ranges
- Dual-In-Line and Surface Mount Packages in Standard Pinouts

High Performance Flash PLD

Logic Diagram



Description

The ATF22V10B and ATF22V10BL are high performance CMOS (Electrically Erasable) Programmable Logic Devices (PLDs) which utilize Atmel's proven electrically erasable Flash memory technology. Speeds down to 7.5 ns and power dissipation as low as 10 mA are offered. All speed ranges are specified over the full 5 V ±10% range for military and industrial temperature ranges, and 5V ±5% for commercial ranges.

The ATF22V10BL provides the fastest low power CMOS PLD solution, with low DC power (5.0 mA typical). The ATF22V10BL significantly reduces total system power and enhances system reliability.

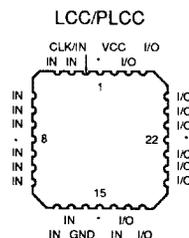
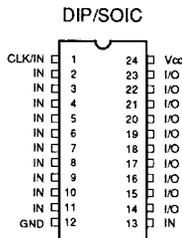
The ATF22V10B and ATF22V10BL incorporate a variable product term architecture. Each output is allocated from eight to 16 product terms, which allows highly complex logic functions to be realized.

Two additional product terms are included to provide synchronous preset and asynchronous reset. These terms are common to all 10 registers. All registers are automatically cleared upon power up.

Register Preload simplifies testing. A Security Fuse prevents unauthorized copying of programmed fuse patterns.

Pin Configurations

Pin Name	Function
CLK/IN	Clock and Logic Input
IN	Logic Inputs
I/O	Bidirectional Buffers
*	No Internal Connection
VCC	+5 V Supply



Absolute Maximum Ratings*

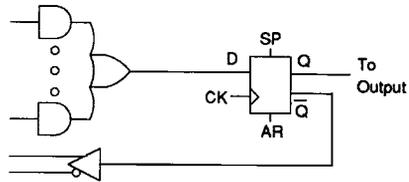
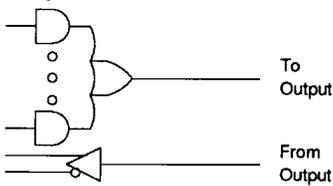
Temperature Under Bias.....	-55°C to +125°C
Storage Temperature.....	-65°C to +150°C
Voltage on Any Pin with Respect to Ground.....	-2.0 V to +7.0 V ⁽¹⁾
Voltage on Input Pins with Respect to Ground During Programming.....	-2.0 V to +14.0 V ⁽¹⁾
Programming Voltage with Respect to Ground.....	-2.0 V to +14.0 V ⁽¹⁾

*NOTICE: Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

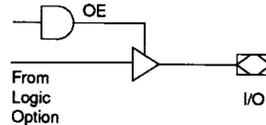
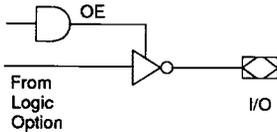
Note:

1. Minimum voltage is -0.6 V dc which may undershoot to -2.0 V for pulses of less than 20 ns. Maximum output pin voltage is $V_{CC}+0.75$ V dc which may overshoot to +7.0 V for pulses of less than 20 ns.

Logic Options



Output Options



D.C. and A.C. Operating Conditions

	Commercial ATF22V10B/L -7, -10, -15, -25	Industrial ATF22V10B/L -10, -15, -25	Military ATF22V10B/L -10, -15, -25
Operating Temperature (Case)	0°C - 70°C	-40°C - 85°C	-55°C - 125°C
V _{CC} Power Supply	5 V ± 5%	5 V ± 10%	5 V ± 10%

D.C. Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Units	
I_{LI}	Input or I/O Low Leakage Current	$0 \leq V_{IN} \leq V_{IL}(MAX)$			150	μA	
I_{LO}	Input or I/O High Leakage Current	$3.5 \leq V_{IN} \leq V_{CC}$			10	μA	
I_{CC}	Power Supply Current	$V_{CC} = MAX,$ $V_{IN} = MAX,$ Outputs Open	ATF22V10B	Com.	90	120	mA
				Ind., Mil.	100	130	mA
			ATF22V10BL	Com.	5.0	10	mA
				Ind., Mil.	10	15	mA
I_{CC2}	Clocked Power Supply Current	$V_{CC} = MAX,$ Outputs Open, $f = 1$ MHz	ATF22V10BL	Com.	15	mA	
				Ind., Mil.	20	mA	
$I_{OS}^{(1)}$	Output Short Circuit Current	$V_{OUT} = 0.5$ V			-130	mA	
V_{IL}	Input Low Voltage		-0.5		0.8	V	
V_{IH}	Input High Voltage		2.0		$V_{CC}+0.75$	V	
V_{OL}	Output Low Voltage	$V_{IN} = V_{IH}$ or $V_{IL},$ $V_{CC} = MIN$	$I_{OL} = 16$ mA	Com., Ind.	0.5	V	
			$I_{OL} = 12$ mA	Mil.	0.5	V	
			$I_{OL} = 24$ mA	Com.	0.8	V	
V_{OH}	Output High Voltage	$V_{IN} = V_{IH}$ or $V_{IL},$ $V_{CC} = MIN$	$I_{OH} = -100$ μA	$V_{CC}-0.3$		V	
			$I_{OH} = -4.0$ mA	2.4		V	

Notes: 1. Not more than one output at a time should be shorted. Duration of short circuit test should not exceed 30 sec.



A.C. Characteristics, Commercial

Symbol	Parameter	ATF22V10B -7		ATF22V10B/L -10		ATF22V10B/L -15		ATF22V10B/L -25		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
t _{PD}	Input or I/O to Combinatorial Output	3	7.5	3	10	3	15	3	25	ns
t _{CO}	Clock to Output Delay	2	5	2	7	2	8	2	15	ns
t _{CF}	Clock to Feedback Delay		2.5		2.5		2.5		13	ns
t _{SU1}	Setup Time, Input or Feedback Before Clock	6.5		7		10		15		ns
t _{SU2}	Setup Time, SP Before Clock	10		10		10		15		ns
t _H	Hold Time, Input or Feedback After Clock	0		0		0		0		ns
F _{MAX}	Maximum Clock Frequency with External Feedback 1/(t _{SU} +t _{CO})	87		71.4		55.5		33.3		MHz
	Maximum Clock Frequency with Internal Feedback 1/(t _{SU} + t _{CF})	111		105		80		35.7		MHz
	Maximum Clock Frequency with No Feedback	111		105		83.3		38.5		MHz
t _{WH}	Clock Pulse Duration, High	4		4		6		13		ns
t _{WL}	Clock Pulse Duration, Low	4		4		6		13		ns
t _{EA}	Input or I/O to Output Enable	3	8	3	10	3	15	3	25	ns
t _{ER}	Input or I/O to Output Disable	3	8	3	9	3	15	3	25	ns
t _{AP}	Input or I/O to Asynchronous Reset of Register	3	13	3	13	3	20	3	25	ns
t _{AW}	Asynchronous Reset Width	8		8		15		25		ns
t _{AR}	Asynchronous Reset Recovery Time	8		8		10		25		ns
t _{SPR}	Synchronous Preset to Clock Recovery Time	10		10		10		15		ns

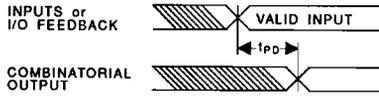
A.C. Characteristics, Industrial and Military

Symbol	Parameter	ATF22V10B -10		ATF22V10B/L -15		ATF22V10B/L -25		Units
		Min	Max	Min	Max	Min	Max	
t _{PD}	Input or I/O to Combinatorial Output	3	10	3	15		25	ns
t _{CO}	Clock to Output Delay	2	7	2	8		15	ns
t _{CF}	Clock to Feedback Delay		2.5		5		13	ns
t _{SU1}	Setup Time, Input or Feedback Before Clock	7		10		15		ns
t _{SU2}	Setup Time, SP Before Clock	10		12		15		ns
t _H	Hold Time, Input or Feedback After Clock	0		0		0		ns
F _{MAX}	Maximum Clock Frequency with External Feedback 1/(t _{SU} +t _{CO})	71.4		55.5		33.3		MHz
	Maximum Clock Frequency with Internal Feedback 1/(t _{SU} + t _{CF})	105		66.6		35.7		MHz
	Maximum Clock Frequency with No Feedback	105		66.6		38.5		MHz
t _{WH}	Clock Pulse Duration, High	5		6		13		ns
t _{WL}	Clock Pulse Duration, Low	5		6		13		ns
t _{EA}	Input or I/O to Output Enable	3	10	3	15		25	ns
t _{ER}	Input or I/O to Output Disable	3	9	3	15		25	ns
t _{AP}	Input or I/O to Asynchronous Reset of Register	3	13	3	20		25	ns
t _{AW}	Asynchronous Reset Width	8		15		25		ns
t _{AR}	Asynchronous Reset Recovery Time	8		10		25		ns
t _{SPR}	Synchronous Preset to Clock Recovery Time	10		12		15		ns

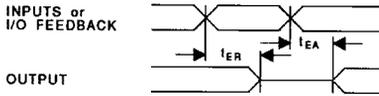
2

A.C. Waveforms

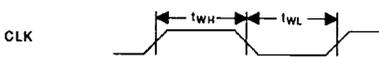
Combinatorial Output



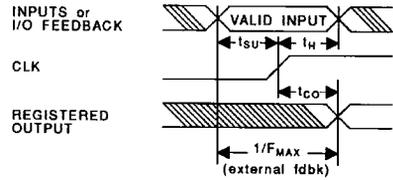
Input or I/O to Output Enable/Disable



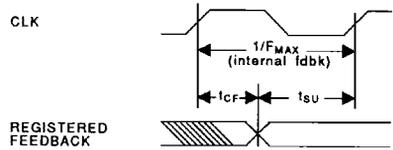
Clock Width



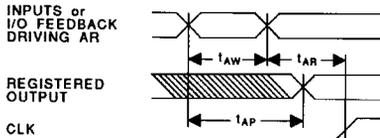
Registered Output



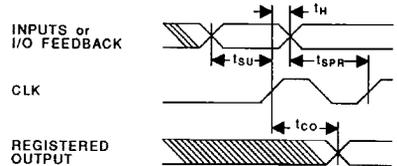
f_MAX with Feedback



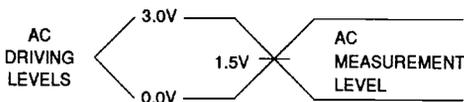
Asynchronous Reset



Synchronous Preset

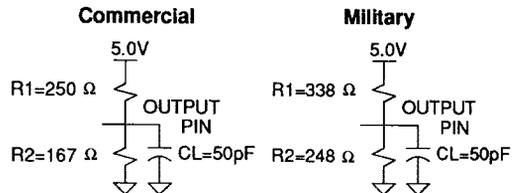


Input Test Waveforms and Measurement Levels

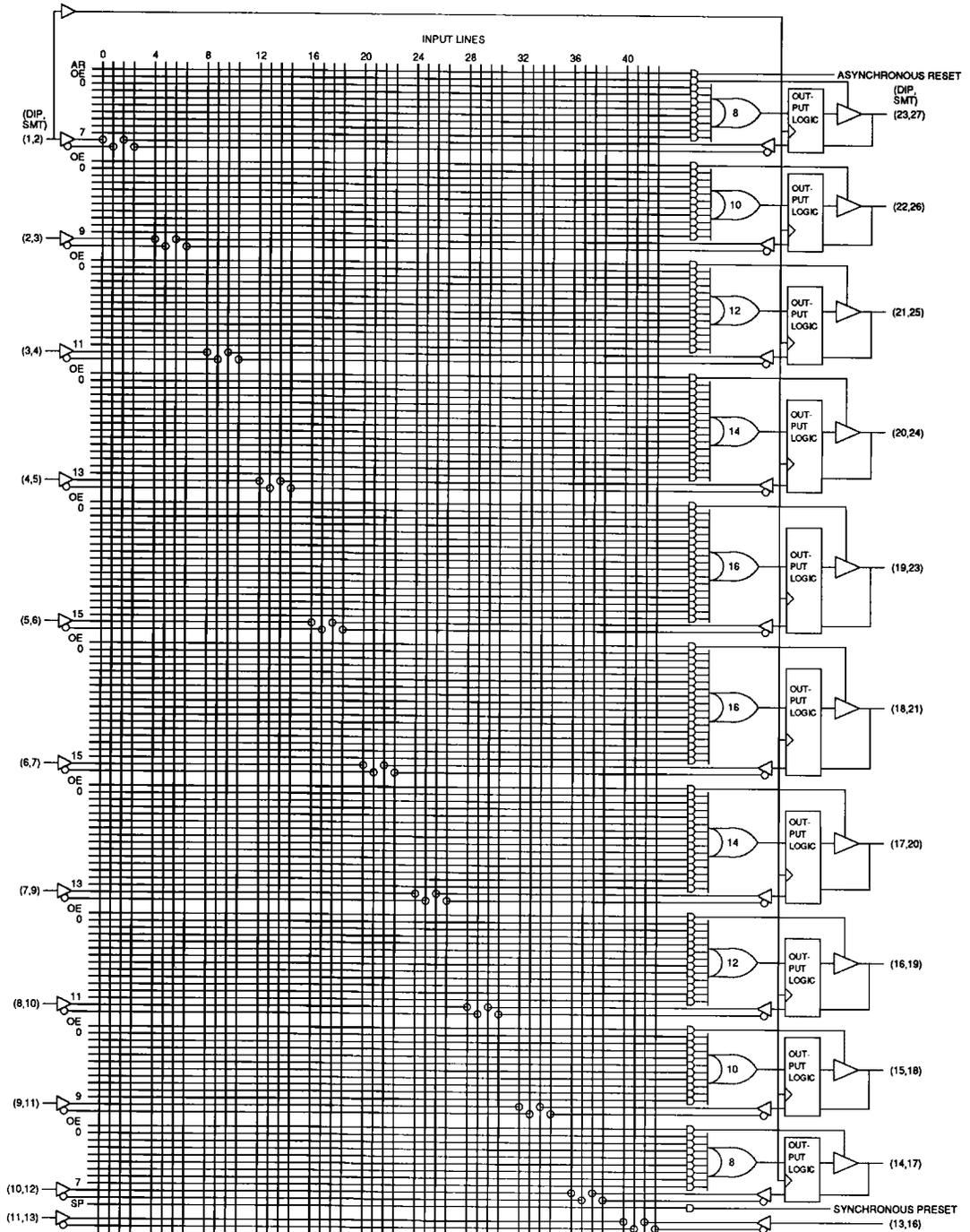


$t_R, t_F < 3 \text{ ns}$ (10% to 90%)

Output Test Loads:



Functional Logic Diagram ATF22V10B/L



2

Preload of Registered Outputs

When testing state machine designs, all possible states and state transitions must be verified in the design, not just those required in the normal machine operations. This is because certain events may occur during system operation that throw the logic into an illegal state (power-up, line voltage glitches, brown-outs, etc.). To test a design for proper treatment of these conditions, a way must be provided to break the feedback paths, and force any desired (i.e., illegal) state into the registers. Then the machine

can be sequenced and the outputs tested for correct next state conditions.

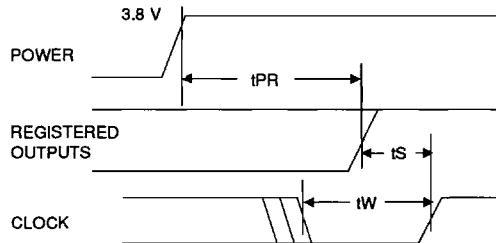
The ATF22V10B/L device includes circuitry that allows each registered output to be synchronously set either high or low. Thus, any present state condition can be forced for test sequencing. If necessary, approved programmers capable of executing test vectors perform output register preload automatically.

Power Up Reset

The registers in the ATF22V10B and ATF22V10BL are designed to reset during power up. At a point delayed slightly from VCC crossing 3.8 V, all registers will be reset to the low state. The output state will depend on the polarity of the output buffer.

This feature is critical for state machine initialization. However, due to the asynchronous nature of reset and the uncertainty of how VCC actually rises in the system, the following conditions are required:

- 1) The VCC rise must be monotonic,
- 2) After reset occurs, all input and feedback setup times must be met before driving the clock pin high, and
- 3) The clock must remain stable during t_{PR}.



Parameter	Description	Min	Typ	Max	Units
t _{PR}	Power-Up Reset Time		600	1000	ns

Pin Capacitance (f = 1 MHz, T = 25°C) ⁽¹⁾

	Typ	Max	Units	Conditions
C _{IN}	5	8	pF	V _{IN} = 0 V
C _{OUT}	6	8	pF	V _{OUT} = 0 V

Note: 1. Typical values for nominal supply voltage. This parameter is only sampled and is not 100% tested.

Device Programming

ATF22V10B/L devices are programmed using an Atmel-approved logic programmer, available from a number of manufacturers. Complete programming of the device takes only a few

seconds. Erasing of the device is transparent to the user, and is done automatically as part of the programming cycle.

Ordering Information

tpd (ns)	ts (ns)	tco (ns)	Ordering Code	Package	Operation Range
7.5	6.5	5	ATF22V10B-7GC	24D3	Commercial (0°C to 70°C)
			ATF22V10B-7JC	28J	
			ATF22V10B-7NC	28L	
			ATF22V10B-7PC	24P3	
			ATF22V10B-7SC	24S	
10	7	7	ATF22V10B-10GC	24D3	Commercial (0°C to 70°C)
			ATF22V10B-10JC	28J	
			ATF22V10B-10NC	28L	
			ATF22V10B-10PC	24P3	
		ATF22V10B-10SC	24S	Industrial (-40°C to 85°C)	
		ATF22V10B-10GI	24D3		
		ATF22V10B-10JI	28J		
		ATF22V10B-10NI	28L		
		ATF22V10B-10PI	24P3		
		ATF22V10B-10SI	24S	Military (-55°C to 125°C)	
		ATF22V10B-10GM	24D3		
		ATF22V10B-10NM	28L		
		ATF22V10B-10GM/883	24D3		
ATF22V10B-10NM/883	28L	Military/883C (-55°C to 125°C) Class B, Fully Compliant			
15	10	8	ATF22V10B-15GC	24D3	Commercial (0°C to 70°C)
			ATF22V10B-15JC	28J	
			ATF22V10B-15NC	28L	
			ATF22V10B-15PC	24P3	
			ATF22V10B-15SC	24S	Industrial (-40°C to 85°C)
			ATF22V10B-15GI	24D3	
			ATF22V10B-15JI	28J	
			ATF22V10B-15NI	28L	
		ATF22V10B-15PI	24P3		
		ATF22V10B-15SI	24S	Military (-55°C to 125°C)	
		ATF22V10B-15GM	24D3		
		ATF22V10B-15NM	28L		
		ATF22V10B-15GM/883	24D3		
ATF22V10B-15NM/883	28L	Military/883C (-55°C to 125°C) Class B, Fully Compliant			
25	15	15	ATF22V10B-25GC	24D3	Commercial (0°C to 70°C)
			ATF22V10B-25JC	28J	
			ATF22V10B-25NC	28L	
			ATF22V10B-25PC	24P3	
			ATF22V10B-25SC	24S	

2



Ordering Information

t _{PD} (ns)	t _s (ns)	t _{CO} (ns)	Ordering Code	Package	Operation Range
25	15	15	ATF22V10B-25GI ATF22V10B-25JI ATF22V10B-25NI ATF22V10B-25PI ATF22V10B-25SI	24D3 28J 28L 24P3 24S	Industrial (-40°C to 85°C)
			ATF22V10B-25GM ATF22V10B-25NM	24D3 28L	Military (-55°C to 125°C)
			ATF22V10B-25GM/883 ATF22V10B-25NM/883	24D3 28L	Military/883C (-55°C to 125°C) Class B, Fully Compliant

Ordering Information

t _{PD} (ns)	t _s (ns)	t _{CO} (ns)	Ordering Code	Package	Operation Range
10	7	7	ATF22V10BL-10GC	24D3	Commercial (0°C to 70°C)
			ATF22V10BL-10JC	28J	
			ATF22V10BL-10NC	28L	
			ATF22V10BL-10PC	24P3	
			ATF22V10BL-10SC	24S	
15	10	8	ATF22V10BL-15GC	24D3	Commercial (0°C to 70°C)
			ATF22V10BL-15JC	28J	
			ATF22V10BL-15NC	28L	
			ATF22V10BL-15PC	24P3	
		ATF22V10BL-15SC	24S		
		ATF22V10BL-15GI	24D3	Industrial (-40°C to 85°C)	
		ATF22V10BL-15JI	28J		
		ATF22V10BL-15NI	28L		
		ATF22V10BL-15PI	24P3		
		ATF22V10BL-15SI	24S		
		ATF22V10BL-15GM	24D3	Military (-55°C to 125°C)	
		ATF22V10BL-15NM	28L		
ATF22V10BL-15GM/883	24D3	Military/883C (-55°C to 125°C) Class B, Fully Compliant			
ATF22V10BL-15NM/883	28L				
25	15	15	ATF22V10BL-25GC	24D3	Commercial (0°C to 70°C)
			ATF22V10BL-25JC	28J	
			ATF22V10BL-25NC	28L	
			ATF22V10BL-25PC	24P3	
		ATF22V10BL-25SC	24S		
		ATF22V10BL-25GI	24D3	Industrial (-40°C to 85°C)	
		ATF22V10BL-25JI	28J		
		ATF22V10BL-25NI	28L		
		ATF22V10BL-25PI	24P3		
		ATF22V10BL-25SI	24S		
		ATF22V10BL-15GM	24D3	Military (-55°C to 125°C)	
		ATF22V10BL-15NM	28L		
ATF22V10BL-25GM/883	24D3	Military/883C (-55°C to 125°C) Class B, Fully Compliant			
ATF22V10BL-25NM/883	28L				

2

Package Type	
24D3	24 Lead, 0.300" Wide, Ceramic Dual Inline Package (Cerdip)
28J	28 Lead, Plastic J-Leaded Chip Carrier (PLCC)
28L	28 Pad, Ceramic Leadless Chip Carrier (LCC)
24P3	24 Lead, 0.300" Wide, Plastic Dual Inline Package (PDIP)
24S	24 Lead, 0.300" Wide, Plastic Gull Wing Small Outline (SOIC)



