

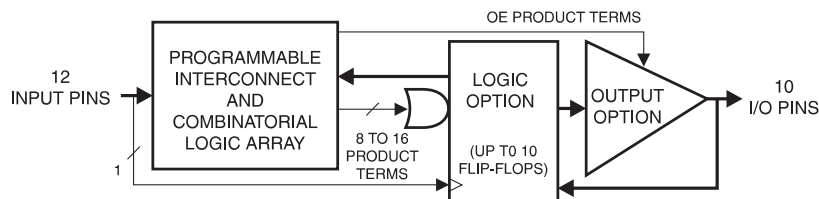
## Features

- Industry Standard Architecture
  - Low Cost Easy-to-Use Software Tools
- High-Speed, Electrically-Erasable Programmable Logic Devices
  - 7.5 ns Maximum Pin-to-Pin Delay
- Several Power Saving Options

Device	I <sub>CC</sub> , Stand-By	I <sub>CC</sub> , Active
ATF22V10B	85 mA	90 mA
ATF22V10BQ	35 mA	40 mA
ATF22V10BQL	5 mA	20 mA

- CMOS and TTL Compatible Inputs and Outputs
  - Input and I/O Pull-Up Resistors
- Advanced Flash Technology
  - Reprogrammable
  - 100% Tested
- High Reliability CMOS Process
  - 20 Year Data Retention
  - 100 Erase/Write Cycles
  - 2,000V ESD Protection
  - 200 mA Latchup Immunity
- Full Military, Commercial, and Industrial Temperature Ranges
- Dual-in-Line and Surface Mount Packages in Standard Pinouts

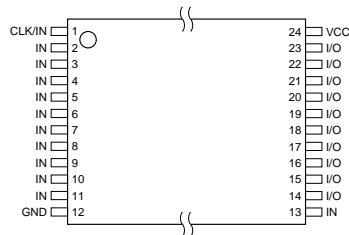
## Logic Diagram



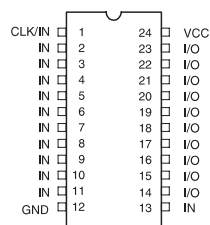
## Pin Configurations

Pin Name	Function
CLK	Clock
IN	Logic Inputs
I/O	Bidirectional Buffers
*	No Internal Connection
V <sub>CC</sub>	+5V Supply

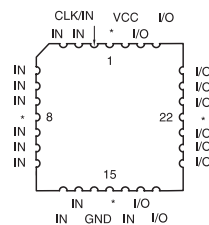
TSSOP Top View



DIP/SOIC



LCC/PLCC



Top View



## High-Performance EE PLD

## ATF22V10B





## Description

The ATF22V10B is a high performance CMOS (Electrically Erasable) Programmable Logic Device (PLD) which utilizes 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  $5V \pm 10\%$  range for military and industrial tempera-

ture ranges, and  $5V \pm 5\%$  for commercial temperature ranges.

Several low power options allow selection of the best solution for various types of power-limited applications. Each of these options significantly reduces total system power and enhances system reliability.

## 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 .....	-2.0V to +7.0V <sup>(1)</sup>
Voltage on Input Pins with Respect to Ground During Programming.....	-2.0V to +14.0V <sup>(1)</sup>
Programming Voltage with Respect to Ground .....	-2.0V to +14.0V <sup>(1)</sup>

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

## DC and AC Operating Conditions

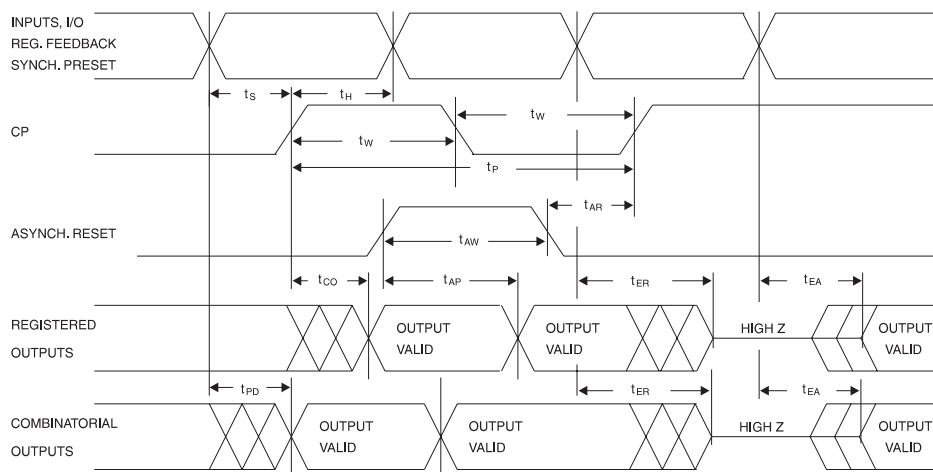
	Commercial	Industrial	Military
Operating Temperature (Case)	0°C - 70°C	-40°C - 85°C	-55°C - 125°C
$V_{CC}$ Power Supply	$5V \pm 5\%$	$5V \pm 10\%$	$5V \pm 10\%$

## DC Characteristics

Symbol	Parameter	Condition			Min	Typ	Max	Units
I <sub>IL</sub>	Input or I/O Low Leakage Current	0 ≤ V <sub>IN</sub> ≤ V <sub>IL</sub> (MAX)				-35	-100	μA
I <sub>IH</sub>	Input or I/O High Leakage Current	3.5 ≤ V <sub>IN</sub> ≤ V <sub>CC</sub>					10	μA
I <sub>CC</sub>	Power Supply Current, Standby	V <sub>CC</sub> = MAX, V <sub>IN</sub> = MAX, Outputs Open	B-7, -10	Com.		85	120	mA
				Ind., Mil.		85	140	mA
			B-15, -25	Com.		65	90	mA
				Ind., Mil.		65	115	mA
			BQ-15	Com.		35	55	mA
			BQL-20, -25	Com.		5	10	mA
				Ind., Mil.		5	15	mA
I <sub>CC2</sub>	Clocked Power Supply Current	V <sub>CC</sub> = MAX, Outputs Open, f = 15 MHz	B-7, -10	Com.		90	120	mA
				Ind., Mil.		90	145	mA
			B-15, -25	Com.		65	90	mA
				Ind., Mil.		65	120	mA
			BQ-15	Com.		40	60	mA
			BQL-20, -25	Com.		20	50	mA
				Ind., Mil.		20	70	mA
I <sub>OS</sub> <sup>(1)</sup>	Output Short Circuit Current	V <sub>OUT</sub> = 0.5V					-130	mA
V <sub>IL</sub>	Input Low Voltage				-0.5		0.8	V
V <sub>IH</sub>	Input High Voltage				2.0		V <sub>CC</sub> + 0.75	V
V <sub>OL</sub>	Output Low Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>CC</sub> = MIN	I <sub>OL</sub> = 16 mA	Com., Ind.			0.5	V
			I <sub>OL</sub> = 12 mA	Mil.			0.5	V
V <sub>OH</sub>	Output High Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>CC</sub> = MIN	I <sub>OH</sub> = -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.

## AC Waveforms<sup>(1)</sup>



Note: 1. Timing measurement reference is 1.5V. Input AC driving levels are 0.0V and 3.0V, unless otherwise specified.

## AC Characteristics<sup>(1)</sup>

Symbol	Parameter	-7		-10		-15		-20		-25		Units
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
$t_{PD}$	Input or Feedback to Combinatorial Output	3	7.5	3	10	3	15	3	20	3	25	ns
$t_{CO}$	Clock to Output	2	4.5 <sup>(2)</sup>	2	6.5	2	8	2	12	2	15	ns
$t_{CF}$	Clock to Feedback		2.5		2.5		2.5		8		13	ns
$t_S$	Input or Feedback Setup Time	3.5		4.5		10			14	15		ns
$t_H$	Hold Time	0		0		0		0		0		ns
$F_{MAX}$	External Feedback $1/(t_S + t_{CO})$	125 <sup>(3)</sup>		90		55.5		38.5		33.3		MHz
	Internal Feedback $1/(t_S + t_{CF})$	166		142		69		45.5		40		MHz
	No Feedback $1/(t_{WH} + t_{WL})$	166		142		83.3				38.5		MHz
$t_W$	Clock Width ( $t_{WL}$ and $t_{WH}$ )	3		3.5		6		10		13		ns
$t_{EA}$	Input or I/O to Output Enable	3	7.5	3	10	3	15	3	20	3	25	ns
$t_{ER}$	Input or I/O to Output Disable	3	7.5	3	9	3	15	3	20	3	25	ns
$t_{AP}$	Input or I/O to Asynchronous Reset of Register	3	10	3	12	3	20	3	22	3	25	ns
$t_{AW}$	Asynchronous Reset Width	7		8		15		20		25		ns
$t_{AR}$	Asynchronous Reset Recovery Time	5		6		10		20		25		ns
$t_{SP}$	Setup Time, Synchronous Preset	4.5		6		10		14		15		ns
$t_{SPR}$	Synchronous Preset to Clock Recovery Time	5		8		10		14		15		ns

Notes: 1. See ordering information for valid part numbers.

2. 5.5 ns for DIP package devices.

3. 111 MHz for DIP package devices.



## Electronic Signature Word

There are 64 bits of programmable memory that are always available to the user, even if the device is secured. These bits can be used for user-specific data.

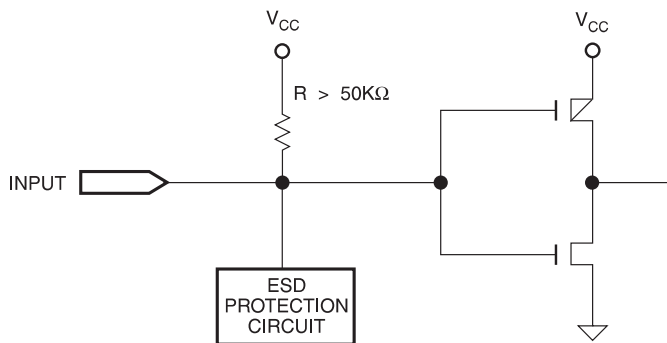
## Programming/Erasing

Programming/erasing is performed using standard PLD programmers. See *CMOS PLD Programming Hardware and Software Support* for information on software/programming.

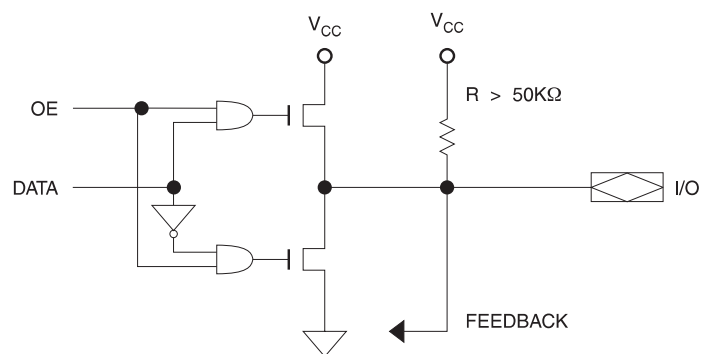
## Input and I/O Pull-Ups

All ATF22V10B family members have internal input and I/O pull-up resistors. Therefore, whenever inputs or I/Os are not being driven externally, they will float to  $V_{CC}$ . This ensures that all logic array inputs are at known states. These are relatively weak active pull-ups that can easily be overdriven by TTL-compatible drivers (see input and I/O diagrams below).

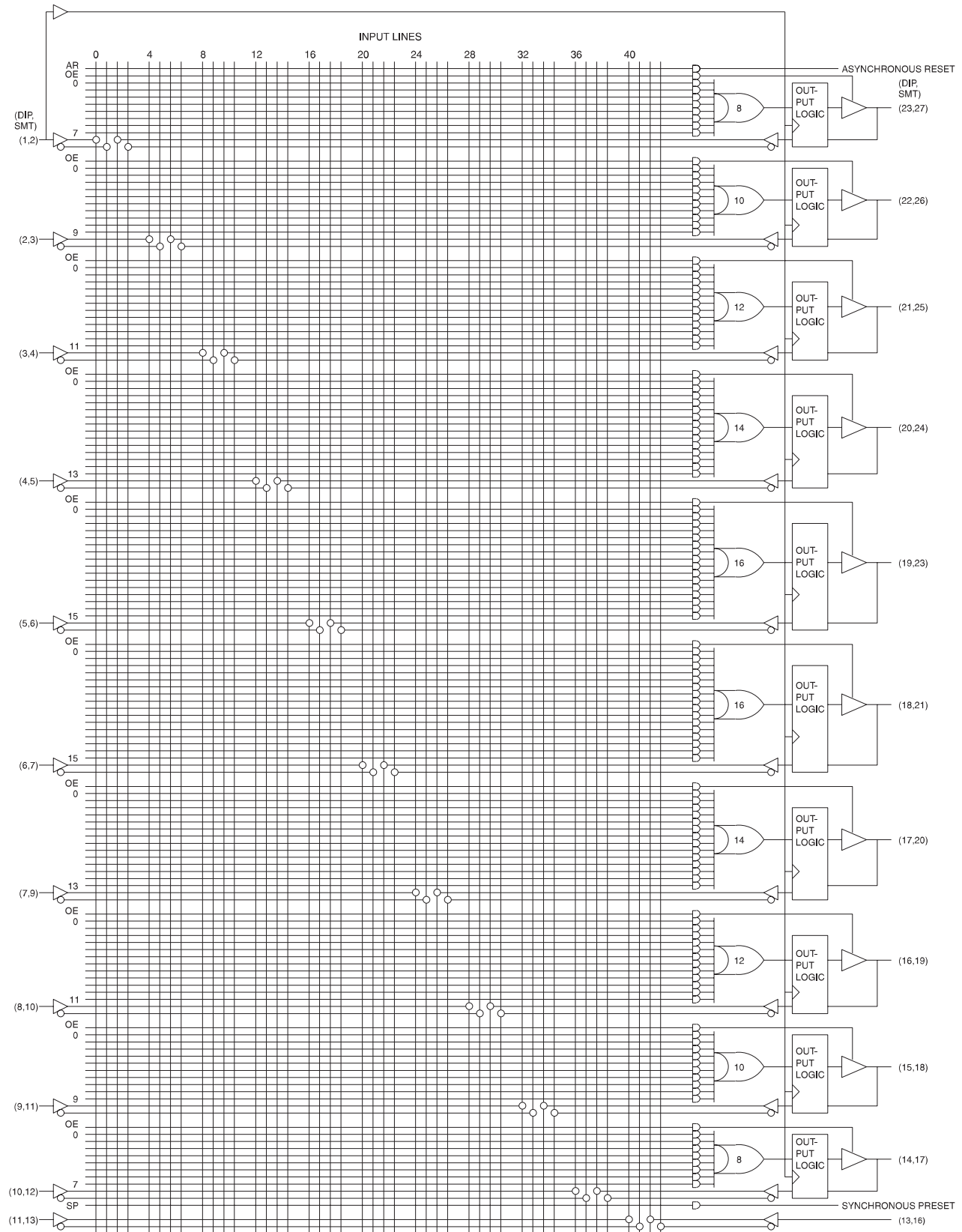
## Input Diagram



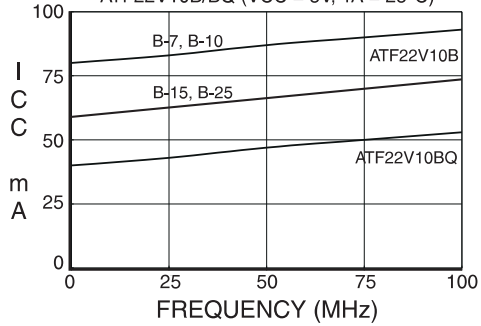
## I/O Diagram



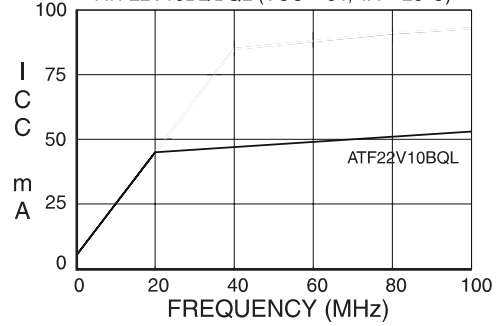
## Functional Logic Diagram ATF22V10B



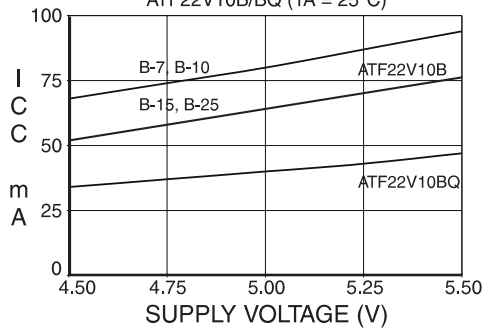
**SUPPLY CURRENT vs. INPUT FREQUENCY**  
ATF22V10B/BQ (VCC = 5V, TA = 25°C)



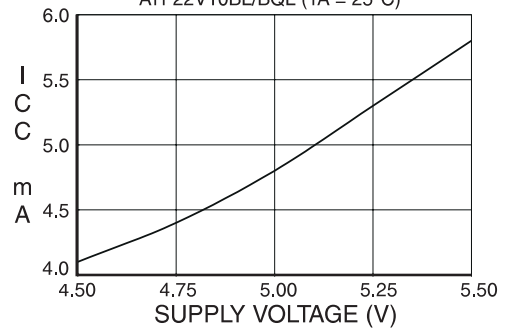
**SUPPLY CURRENT vs. INPUT FREQUENCY**  
ATF22V10BL/BQL (VCC = 5V, TA = 25°C)



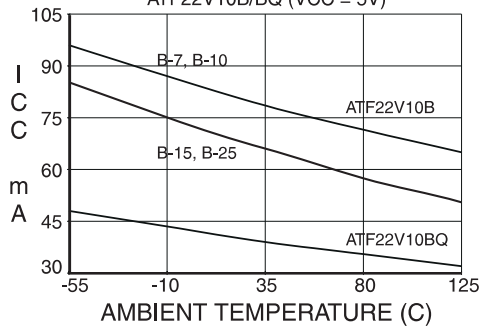
**SUPPLY CURRENT vs. SUPPLY VOLTAGE**  
ATF22V10B/BQ (TA = 25°C)



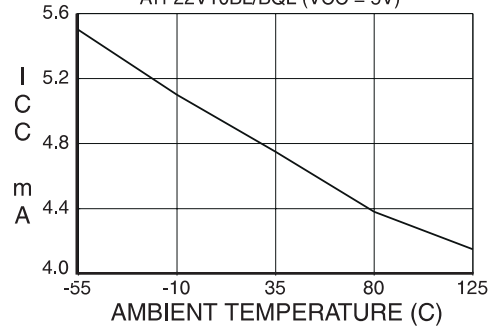
**SUPPLY CURRENT vs. SUPPLY VOLTAGE**  
ATF22V10BL/BQL (TA = 25°C)



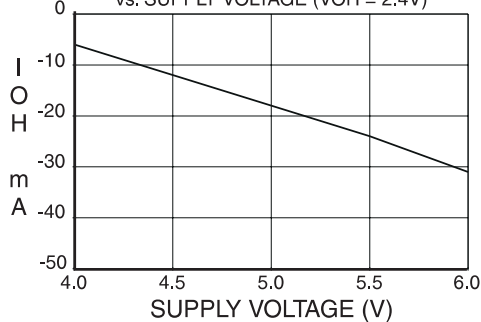
**SUPPLY CURRENT vs. AMBIENT TEMPERATURE**  
ATF22V10B/BQ (VCC = 5V)



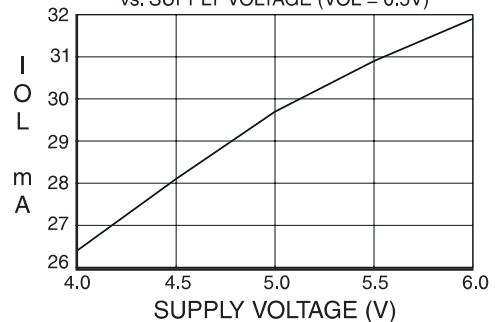
**SUPPLY CURRENT vs. AMBIENT TEMPERATURE**  
ATF22V10BL/BQL (VCC = 5V)

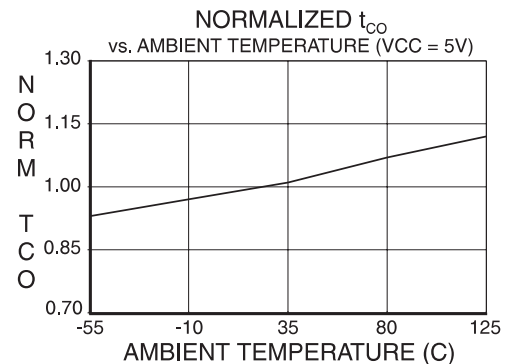
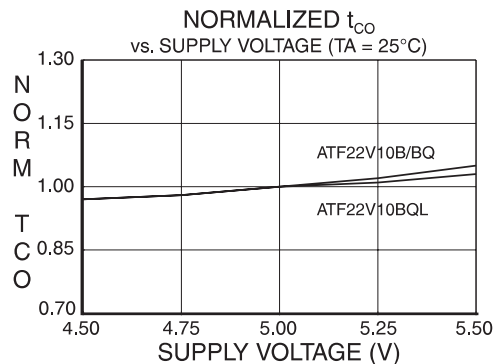
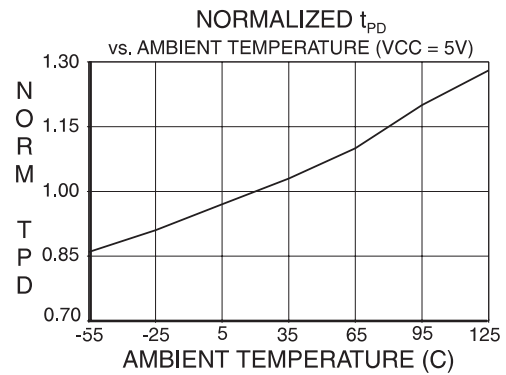
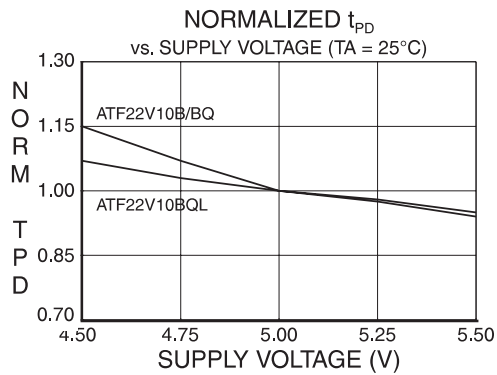
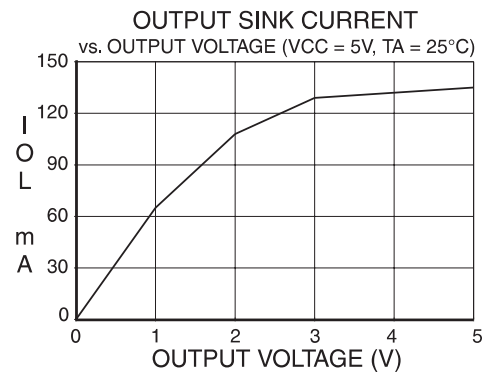
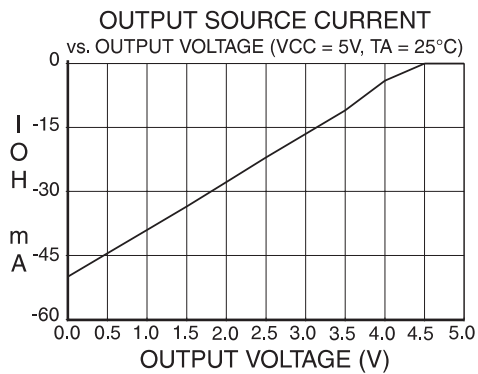
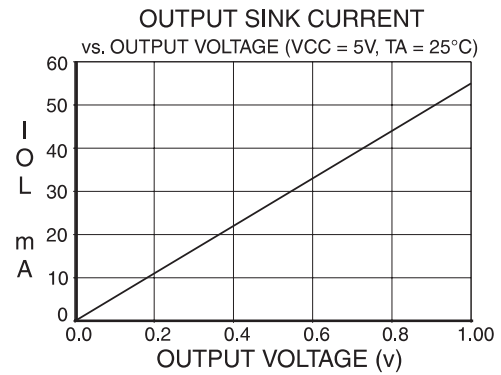
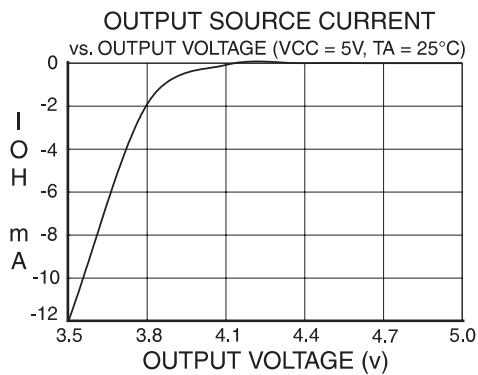


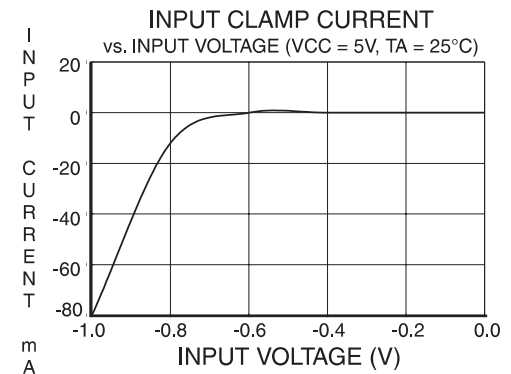
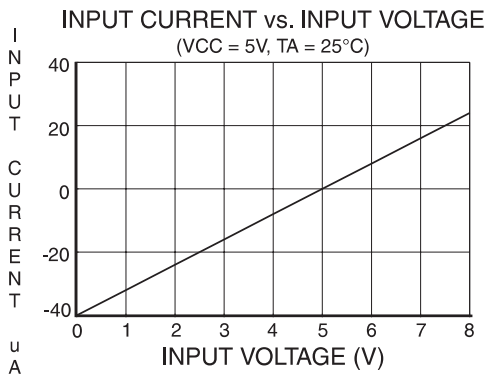
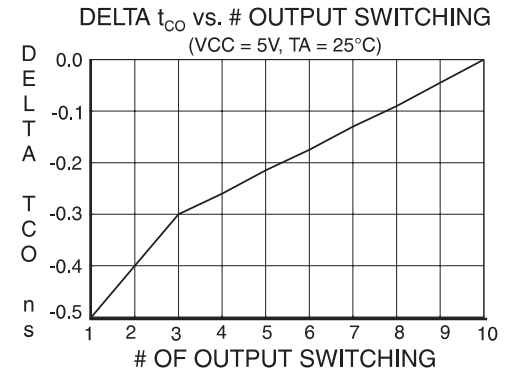
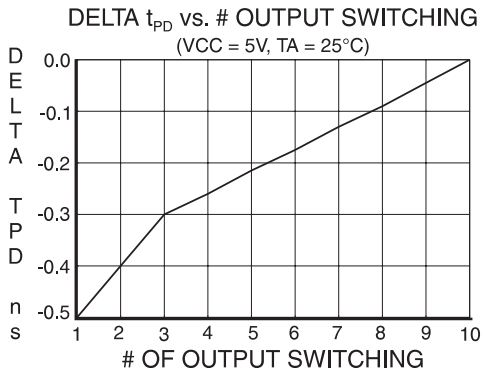
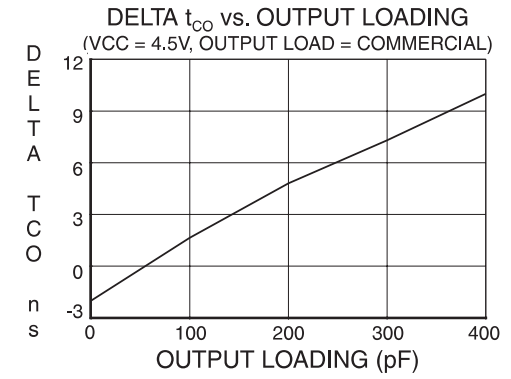
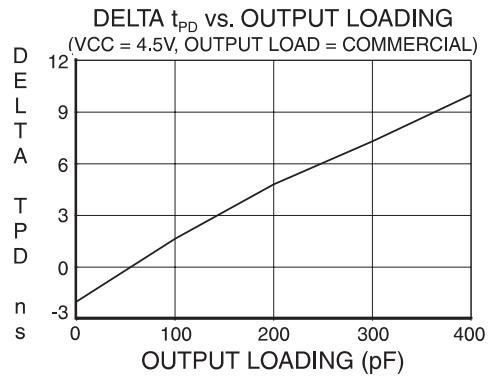
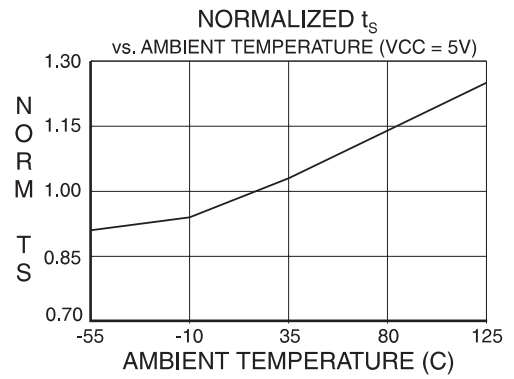
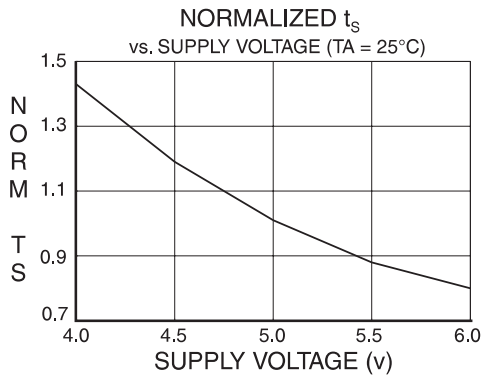
**OUTPUT SOURCE CURRENT**  
vs. SUPPLY VOLTAGE (VOH = 2.4V)



**OUTPUT SINK CURRENT**  
vs. SUPPLY VOLTAGE (VOL = 0.5V)







## Ordering Information

$t_{PD}$ (ns)	$t_S$ (ns)	$t_{CO}$ (ns)	Ordering Code	Package	Operation Range
7.5	3.5	4.5	ATF22V10B-7JC <sup>(1)</sup> ATF22V10B-7PC <sup>(1)</sup> ATF22V10B-7SC <sup>(1)</sup> ATF22V10B-7XC <sup>(1)</sup>	28J 24P3 24S 24X	Commercial (0°C to 70°C)
10	4.5	6.5	ATF22V10B-10JC <sup>(1)</sup> ATF22V10B-10PC <sup>(1)</sup> ATF22V10B-10SC <sup>(1)</sup> ATF22V10B-10XC <sup>(1)</sup>	28J 24P3 24S 24X	Commercial (0°C to 70°C)
			ATF22V10B-10JI <sup>(1)</sup> ATF22V10B-10PI <sup>(1)</sup> ATF22V10B-10SI <sup>(1)</sup> ATF22V10B-10XI <sup>(1)</sup>	28J 24P3 24S 24X	Industrial (-40°C to 85°C)
			ATF22V10B-10GM/883 ATF22V10B-10NM/883	24D3 28L	Military/883C (-55°C to 125°C) Class B, Fully Compliant
15	10	8	ATF22V10B-15JC ATF22V10B-15PC ATF22V10B-15SC ATF22V10B-15XC	28J 24P3 24S 24X	Commercial (0°C to 70°C)
			ATF22V10B-15JI ATF22V10B-15PI ATF22V10B-15SI ATF22V10B-15XI	28J 24P3 24S 24X	Industrial (-40°C to 85°C)
			ATF22V10B-15GM/883 ATF22V10B-15NM/883	24D3 28L	Military/883C (-55°C to 125°C) Class B, Fully Compliant
25	15	15	ATF22V10B-25JC ATF22V10B-25PC ATF22V10B-25SC ATF22V10B-25XC	28J 24P3 24S 24X	Commercial (0°C to 70°C)
			ATF22V10B-25JI ATF22V10B-25PI ATF22V10B-25SI ATF22V10B-25XI	28J 24P3 24S 24X	Industrial (-40°C to 85°C)
10	4.5	6.5	5962-89841 06LA 5962-89841 063X	24D3 28L	Military (-55°C to 125°C) Class B, Fully Compliant
15	10	8	5962-89841 03LA <sup>(2)</sup> 5962-89841 033X <sup>(2)</sup> 5962-89841 05LA 5962-89841 053X	24D3 28L 24D3 28L	Military (-55°C to 125°C) Class B, Fully Compliant

Notes: 1. Recommend ATF22V10C versions.

2. Difference between 03 and 05 is that 05 has a relaxed  $t_{CO} = 12$  ns and  $f_{MAX}$  (with external feedback) = 42 MHz.



## Ordering Information

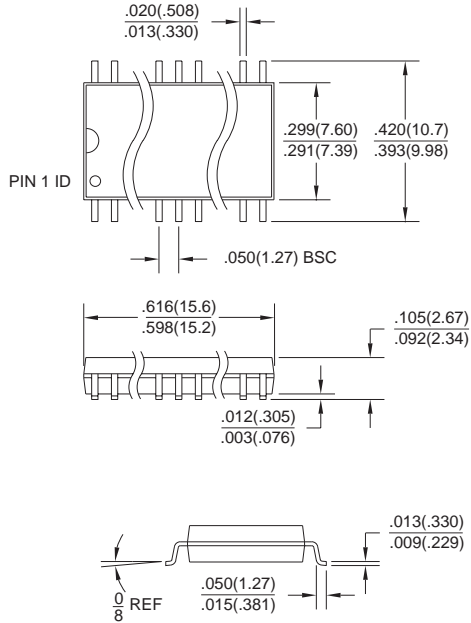
$t_{PD}$ (ns)	$t_S$ (ns)	$t_{CO}$ (ns)	Ordering Code	Package	Operation Range
15	10	8	ATF22V10BQ-15JC ATF22V10BQ-15PC ATF22V10BQ-15SC ATF22V10BQ-15XC	28J 24P3 24S 24X	Commercial (0°C to 70°C)
20	14	12	ATF22V10BQL-20JC ATF22V10BQL-20PC ATF22V10BQL-20SC ATF22V10BQL-20XC	28J 24P3 24S 24X	Commercial (0°C to 70°C)
			ATF22V10BQL-20JI ATF22V10BQL-20PI ATF22V10BQL-20SI ATF22V10BQL-20XI	28J 24P3 24S 24X	Industrial (-40°C to 85°C)
			ATF22V10BQL-20GM/883 ATF22V10BQL-20GM/883	24D3 28L	Military/883C (-55°C to 125°C) Class B, Fully Compliant
25	15	15	ATF22V10BQL-25JC ATF22V10BQL-25PC ATF22V10BQL-25SC ATF22V10BQL-25XC	28J 24P3 24S 24X	Commercial (0°C to 70°C)
			ATF22V10BQL-25JI ATF22V10BQL-25PI ATF22V10BQL-25SI ATF22V10BQL-25XI	28J 24P3 24S 24X	Industrial (-40°C to 85°C)
			ATF22V10BQL-25GM/883 ATF22V10BQL-25NM/883	24D3 28L	Military/883C (-55°C to 125°C) Class B, Fully Compliant
20	14	12	5962-89841 14 LA 5962-89841 14 3X	24D3 28L	
25	15	15	5962-89841 13 LA 5962-89841 13 3X	24D3 28L	

Package Type	
<b>24D3</b>	24-Lead, 0.300" Wide, Ceramic Dual Inline Package (Cerdip)
<b>28J</b>	28-Lead, Plastic J-Leaded Chip Carrier (PLCC)
<b>28L</b>	28-Pad, Ceramic Leadless Chip Carrier (LCC)
<b>24P3</b>	24-Lead, 0.300" Wide, Plastic Dual Inline Package (PDIP)
<b>24S</b>	24-Lead, 0.300" Wide, Plastic Gull Wing Small Outline (SOIC)
<b>24X</b>	24-Lead, 4.4 mm Wide, Plastic Thin Shrink Small Outline (TSSOP)



## Packaging Information

**24S**, 24-Lead, 0.300" Wide, Plastic Gull Wing Small Outline (SOIC)  
Dimensions in Inches and (Millimeters)



**24X**, 24-Lead, 4.4 mm Wide, Plastic Thin Shrink Small Outline (TSSOP)  
Dimensions in Millimeters and (Inches)

