FAMILY DESCRIPTION

ALVT is the world's fastest low-voltage BiCMOS standard logic family. Fabricated using the advanced QUBiC-LP process, ALVT is specified to operate with the 3.3V power supply range and the new JEDEC standard 2.5V range. Both ranges of operation offer input and output compatibility with 5V logic products, and pin for pin compatibility with existing ABT and LVT families.

The speed of ALVT extends TTL well into the 100MHz operating range while providing the power savings of low voltage. ALVT provides a 20% speed enhancement over LVT operating at 3.3V and equals LVT speeds when used at 2.5V

HANDLING BICMOS DEVICES

Inputs and outputs are protected against electrostatic effects in a wide variety of device-handling situations.

ABSOLUTE MAXIMUM RATINGS[1, 2]

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		–0.5 to +4.6	V
I_{IK}	DC input diode current	$V_I < 0$	–50	mA
V_I	DC input voltage[3]		–1.2 to +7.0	V
I_{OK}	DC output diode current	$V_O < 0$	–50	mA
V_{OUT}	DC output voltage[3]	Output in Off or High state	–0.5 to +7.0	V
I_{OUT}	DC output current	Output in Low state	128	mA
		Output in High state	–64	
T_{stg}	Storage temperature range		–65 to 150	°C

NOTES:

1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
3. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	2.5V RANGE LIMITS		3.3V RANGE LIMITS		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	DC supply voltage	2.3	2.7	3.0	3.6	V
V_I	Input voltage	0	5.5	0	5.5	V
V_{IH}	High-level input voltage	1.7		2.0		V
V_{IL}	Input voltage		0.7		0.8	V
I_{OH}	High-level output current		–8		–12	mA
I_{OL}	Low-level output current		12		12	mA
$\Delta t/\Delta v$	Input transition rise or fall rate; Outputs enabled		10		10	ns/V
T_{amb}	Operating free-air temperature range	–40	+85	–40	+85	°C

DC ELECTRICAL CHARACTERISTICS (3.3V ±0.3V RANGE)

SYMBOL	PARAMETER	TEST CONDITIONS		LIMITS			UNIT
				Temp = -40°C to +85°C			
				MIN	TYP[1]	MAX	
V_{IK}	Input clamp voltage	V_{CC} = 3.0V; I_{IK} = –18mA			–0.85	–1.2	V
V_{OH}	High-level output voltage	V_{CC} = 3.0V; I_{OH} = –12mA		2.0	2.3		V
V_{OL}	Low–level output voltage	V_{CC} = 3.0V; I_{OL} = 12mA			0.5	0.8	V
I_I	Input leakage current	V_{CC} = 3.6V; V_I = V_{CC} or GND	Control pins		0.1	±1	µA
		V_{CC} = 0 or 3.6V; V_I = 5.5V	Control pins		0.1	10	
		V_{CC} = 3.6V; V_I = 5.5V	I/O Data pins[4]		0.1	20	
		V_{CC} = 3.6V; V_I = V_{CC}	I/O Data pins[4]		0.5	10	
		V_{CC} = 3.6V; V_I = 0	I/O Data pins[4]		0.1	-5	
I_{OFF}	Output off current	V_{CC} = 0V; V_I or V_O = 0 to 4.5V			0.1	±100	µA
I_{HOLD}	Bus Hold current	V_{CC} = 3.0V; V_I = 0.8V		75	120		µA
	A or B outputs	V_{CC} = 3.0V; V_I = 2.0V		–75	–130		µA
I_{EX}	Current into an output in the High state when $V_O > V_{CC}$	V_O = 5.5V; V_{CC} = 3.0V			10	125	µA
$I_{PU/PD}$	Power up/down 3-State output current[3]	$V_{CC} \leq$ 1.2V; V_O = 0.5V to V_{CC}; V_I = GND or V_{CC} OE/$\overline{OE}$ = Don't care			1	±100	µA
I_{OZH}	3-State output High current	V_{CC} = 2.7V; V_O = 2.3V; V_I = V_{IL} or V_{IH}			0.5	5	µA
I_{OZL}	3-State output Low current	V_{CC} = 2.7V; V_O = 0.5V; V_I = V_{IL} or V_{IH}			0.5	–5	µA
I_{CCH}	Quiescent supply current	V_{CC} = 3.6V; Outputs High, V_I = GND or V_{CC}, I_O = 0			0.07	0.1	mA
I_{CCL}		V_{CC} = 3.6V; Outputs Low, V_I = GND or V_{CC}, I_O = 0			4.3	7	
I_{CCZ}		V_{CC} = 3.6V; Outputs Disabled; V_I = GND or V_{CC}, I_O = 0[5]			0.07	0.1	
ΔI_{CC}	Additional supply current per input pin[2]	V_{CC} = 3V to 3.6V; One input at V_{CC}–0.6V, Other inputs at V_{CC} or GND			0.04	0.2	mA

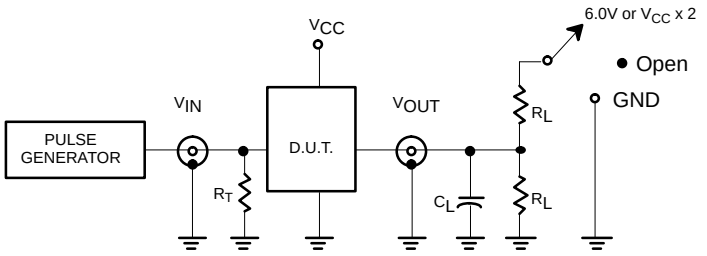
NOTES:
1. All typical values are at V_{CC} = 3.3V and T_{amb} = 25°C.
2. This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND
3. This parameter is valid for any V_{CC} between 0V and 1.2V with a transition time of up to 10msec. From V_{CC} = 1.2V to V_{CC} = 3.3V ± 0.2V a transition time of 100µsec is permitted. This parameter is valid for T_{amb} = 25°C only.
4. Unused pins at V_{CC} or GND.
5. I_{CCZ} is measured with outputs pulled up to V_{CC} or pulled down to ground.

DC ELECTRICAL CHARACTERISTICS (2.5V ±0.2V RANGE)

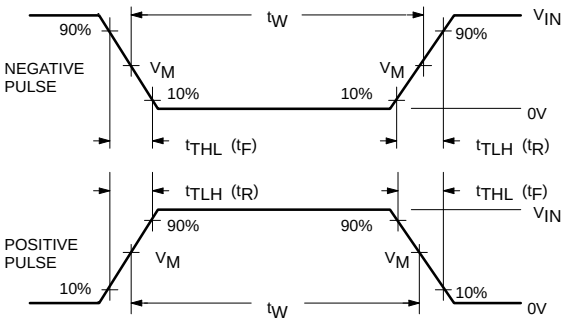
SYMBOL	PARAMETER	TEST CONDITIONS		LIMITS			UNIT
				Temp = -40°C to +85°C			
				MIN	TYP NO TAG	MAX	
V_{IK}	Input clamp voltage	V_{CC} = 2.3V; I_{IK} = –18mA			–0.85	–1.2	V
V_{OH}	High-level output voltage	V_{CC} = 2.3V; I_{OH} = –8mA		2.0	2.3		V
V_{OL}	Low-level output voltage	V_{CC} = 2.3V; I_{OL} = 12mA			0.5	0.8	V
I_I	Input leakage current	V_{CC} = 2.7V; V_I = GND	Control pins		0.1	±1	µA
		V_{CC} = 0 or 2.7V; V_I = 5.5V			0.1	10	
		V_{CC} = 2.7V; V_I = 5.5V	I/O Data pins NO TAG		0.1	20	
		V_{CC} = 2.7V; V_I = V_{CC}			0.1	10	
		V_{CC} = 2.7V; V_I = 0			0.1	-5	
I_{OFF}	Output off current	V_{CC} = 0V; V_I or V_O = 0 to 4.5V			0.1	±100	µA
I_{HOLD} NO TAG	Bus Hold current A or B outputs	V_{CC} = 2.5V; V_I = 0.8V			90		µA
		V_{CC} = 2.5V; V_I = 2.0V			–75		µA
I_{EX}	Current into an output in the High state when $V_O > V_{CC}$	V_O = 5.5V; V_{CC} = 2.3V			10	125	µA
$I_{PU/PD}$	Power up/down 3-State output current NO TAG	$V_{CC} \leq$ 1.2V; V_O = 0.5V to V_{CC}; V_I = GND or V_{CC} $\overline{OE}$ = Don't care			1	±100	µA
I_{OZH}	3-State output High current	V_{CC} = 2.7V; V_O = 2.3V; V_I = V_{IL} or V_{IH}			0.5	5	µA
I_{OZL}	3-State output Low current	V_{CC} = 2.7V; V_O = 0.5V; V_I = V_{IL} or V_{IH}			0.5	–5	µA
I_{CCH}	Quiescent supply current	V_{CC} = 2.7V; Outputs High, V_I = GND or V_{CC}, I_O = 0			0.05	0.09	mA
I_{CCL}		V_{CC} = 2.7V; Outputs Low, V_I = GND or V_{CC}, I_O = 0			3.0	4.5	
I_{CCZ}		V_{CC} = 2.7V; Outputs Disabled; V_I = GND or V_{CC}, I_O = 0 NO TAG			0.04	0.09	
ΔI_{CC}	Additional supply current per input pin NO TAG	V_{CC} = 2.3V to 2.7V; One input at V_{CC}–0.6V, Other inputs at V_{CC} or GND			0.04	0.2	mA

NOTES:
1. All typical values are at V_{CC} = 2.5V and T_{amb} = 25°C.
2. This is the increase in supply current for each input at the specified voltage level other than V_{CC} or GND
3. This parameter is valid for any V_{CC} between 0V and 1.2V with a transition time of up to 10msec. From V_{CC} = 1.2V to V_{CC} = 2.5V ± 0.3V a transition time of 100µsec is permitted. This parameter is valid for T_{amb} = 25°C only.
4. Unused pins at V_{CC} or GND.
5. I_{CCZ} is measured with outputs pulled up to V_{CC} or pulled down to ground.
6. Not guaranteed.

TEST CIRCUIT AND WAVEFORM



Test Circuit for 3-State Outputs



SWITCH POSITION

TEST	SWITCH
t_{PLZ}/t_{PZL}	6V or $V_{CC\ x\ 2}$
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND

DEFINITIONS

R_L = Load resistor; see AC CHARACTERISTICS for value.

C_L = Load capacitance includes jig and probe capacitance: See AC CHARACTERISTICS for value.

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_R	t_F
74ALVT16	3.0V or V_{CC} whichever is less	≤ 10MHz	500ns	≤ 2.5ns	≤ 2.5ns

SW00025