

## FBL family characteristics

## Family specifications

### GENERAL

These family specifications cover the common electrical ratings and characteristics of the entire FBL family, unless otherwise specified in the individual device data sheet.

### INTRODUCTION

The FBL Advanced BiCMOS family combines the low power dissipation and low noise of BiCMOS with the high speed and high output drive of bipolar products.

The basic family of devices designated as FBL will operate at TTL logic input levels or CMOS logic input levels. The devices operate from a power supply of 4.5 to 5.5V.

### HANDLING BICMOS DEVICES

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

### ABSOLUTE MAXIMUM RATINGS

Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.

SYMBOL	PARAMETER		RATING	UNIT
$V_{CC}$	Supply voltage		-0.5 to +4.6	V
$V_{IN}$	Input voltage	A10 – A16, OEB0, $\overline{OEBn}$ , OEAn	-0.5 to +7.0	V
		$\overline{B0} - \overline{B6}$	-0.5 to +3.5	
$I_{IN}$	Input current	$V_{IN} < 0$	-50	
$V_{OUT}$	Voltage applied to output in High output state		-0.5 to +7.0	V
$I_{OUT}$	Current applied to output in Low output state/High output state	AO0 – AO6	64, -64	mA
		$\overline{B0} - \overline{B6}$	200	
$T_{STG}$	Storage temperature		-65 to +150	°C

### RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER		COMMERCIAL LIMITS $V_{CC} = 3.3V \pm 10\%$ ; $T_{amb} = 0 \text{ to } +70^\circ\text{C}$			INDUSTRIAL LIMITS $V_{CC} = 3.3V \pm 10\%$ ; $T_{amb} = -40 \text{ to } +85^\circ\text{C}$			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$V_{CC}$	Supply voltage		3.0	3.3	3.6	3.0	3.3	3.6	V
$V_{IH}$	High-level input voltage	Except $\overline{B0} - \overline{B6}$	2.0			2.0			V
		$\overline{B0} - \overline{B6}$	1.62	1.55		1.62	1.55		
$V_{IL}$	Low-level input voltage	Except $\overline{B0} - \overline{B6}$			0.8			0.8	V
		$\overline{B0} - \overline{B6}$			1.47			1.47	
$I_{IK}$	Input clamp current				-18			-18	mA
$I_{OH}$	High-level output current	AO0 – AO6			-32			-32	mA
$I_{OL}$	Low-level output current	AO0 – AO6			+32			+32	mA
		$\overline{B0} - \overline{B6}$			100			100	
$C_{OB}$	Output capacitance on B port			6	7		6	7	pF
$T_{amb}$	Operating free-air temperature range		0		+70	-40		+85	°C

**DC ELECTRICAL CHARACTERISTICS**

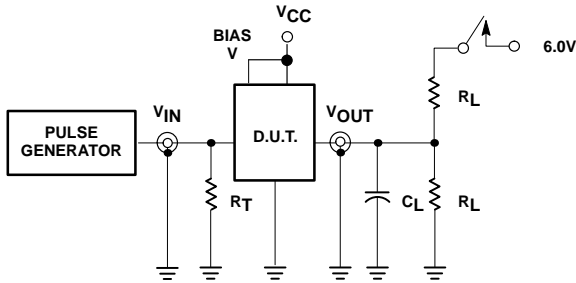
Over recommended operating free-air temperature range unless otherwise noted.

SYMBOL	PARAMETER		TEST CONDITIONS <sup>NO TAG</sup>	LIMITS			UNIT
				MIN	TYP NO TAG	MAX	
I <sub>OH</sub>	High level output current	$\overline{B0} - \overline{B6}$	V <sub>CC</sub> = MAX, V <sub>IL</sub> = MAX, V <sub>OH</sub> = 1.9V			100	μA
I <sub>OFF</sub>	Power-off output current	$\overline{B0} - \overline{B6}$	V <sub>CC</sub> = 0V, V <sub>IL</sub> = MAX, V <sub>OH</sub> = 1.9V			100	μA
V <sub>OH</sub>	High-level output voltage	AO0 – AO6 <sup>NO TAG</sup>	V <sub>CC</sub> = MIN to MAX; I <sub>OH</sub> = -100μA	V <sub>CC</sub>			V
			V <sub>CC</sub> = MIN; I <sub>OH</sub> = -8mA	2.4			V
			V <sub>CC</sub> = MIN; I <sub>OH</sub> = -32mA	2.0			V
V <sub>OL</sub>	Low-level output voltage	AO0 – AO6 <sup>NO TAG</sup>	V <sub>CC</sub> = MIN; I <sub>OL</sub> = 16mA			0.4	V
			V <sub>CC</sub> = MIN; I <sub>OL</sub> = 32mA			0.5	V
		$\overline{B0} - \overline{B6}$	V <sub>CC</sub> = MIN, I <sub>OL</sub> = 4mA	0.5			V
			V <sub>CC</sub> = MIN, I <sub>OL</sub> = 100mA	0.75	1.0	1.20	V
V <sub>IK</sub>	Input clamp voltage		V <sub>CC</sub> = MIN, I <sub>I</sub> = I <sub>IK</sub> = -18mA		-0.85	-1.2	V
I <sub>I</sub>	Input leakage current	Control pins	V <sub>CC</sub> = 3.6V; V <sub>I</sub> = V <sub>CC</sub> or GND			±1.0	μA
		Control/AI0 – AI6	V <sub>CC</sub> = 0V or 3.6V; V <sub>I</sub> = 5.5V			10	
		AI0 – AI6	V <sub>CC</sub> = 3.6V; V <sub>I</sub> = V <sub>CC</sub>			1	
		Note NO TAG	V <sub>CC</sub> = 3.6V; V <sub>I</sub> = 0V			-5	
I <sub>IH</sub>	High-level input current	$\overline{B0} - \overline{B6}$	V <sub>CC</sub> = MAX, V <sub>I</sub> = 1.9V			100	μA
I <sub>IH</sub>	High-level input current	$\overline{B0} - \overline{B6}$	V <sub>CC</sub> = MAX, V <sub>I</sub> = 3.5V, note NO TAG	100			mA
I <sub>IL</sub>	Low-level input current	$\overline{B0} - \overline{B6}$	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.75V			-100	μA
I <sub>OZH</sub>	Off-state output current	AO0 – AO6	V <sub>CC</sub> = MAX, V <sub>O</sub> = 3V			5	μA
I <sub>OZL</sub>	Off-state output current	AO0 – AO6	V <sub>CC</sub> = MAX, V <sub>O</sub> = 0.5V			-5	μA
I <sub>CC</sub>	Supply current (total)	I <sub>CCZ</sub>	V <sub>CC</sub> = MAX		5.2	13.5	mA
		I <sub>CCB</sub>	V <sub>CC</sub> = MAX, outputs Low or High		3.2	9.0	
		I <sub>CCCL</sub> A3	V <sub>CC</sub> = MAX, outputs Low		13.5	19.5	
		I <sub>CCCH</sub> A5	V <sub>CC</sub> = MAX, outputs High		10.7	16.0	

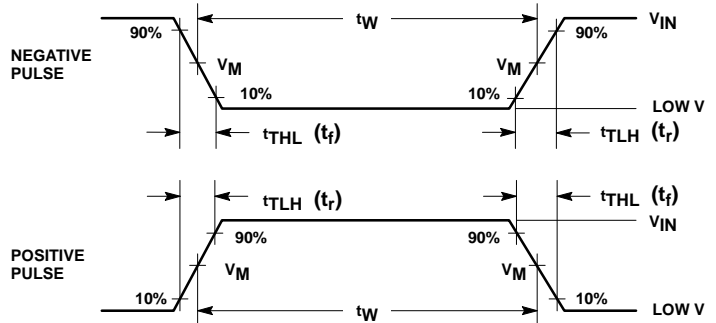
**NOTES:**

1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operation conditions for the applicable type.
2. All typical values are at V<sub>CC</sub> = 3.3V, T<sub>A</sub> = 25°C.
3. Due to test equipment limitations, actual test conditions are V<sub>IH</sub> = 1.8V and V<sub>IL</sub> = 1.3V for the B side.
4. Unused pins are at V<sub>CC</sub> or GND.
5. For B port input voltage between 3 and 5 volt; I<sub>IH</sub> will be greater than 100mA but the part will continue to function normally (clamping circuit is active).

TEST CIRCUIT AND WAVEFORMS



Test Circuit for 3-State Outputs on A Port

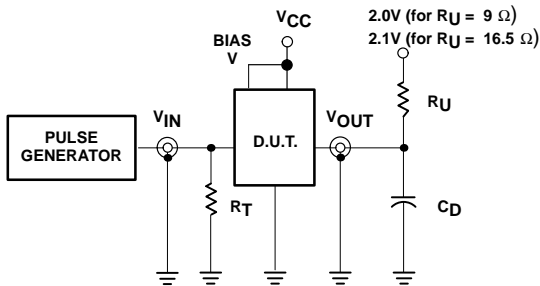


$V_M = 1.55V$  for  $\overline{Bn}$ ,  $V_M = 1.5V$  for all others.  
Input Pulse Definitions

SWITCH POSITION FOR ALL A-PORTS

TEST	SWITCH
$t_{PLH}$ , $t_{PHL}$	OPEN
$t_{PLZ}$ , $t_{PZL}$	CLOSED
$t_{PHZ}$ , $t_{PZH}$	GND

Family FB+	INPUT PULSE REQUIREMENTS					
	Amplitude	Low V	Rep. Rate	$t_W$	$t_{TLH}$	$t_{THL}$
A Port	3.0V	0.0V	1MHz	500ns	2.5ns	2.5ns
B Port	2.0V	1.0V	1MHz	500ns	2.5ns	2.5ns



Test Circuit for Outputs on B Port

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.
- $C_D$  = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.
- $R_U$  = Pull up resistor; see AC CHARACTERISTICS for value.

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