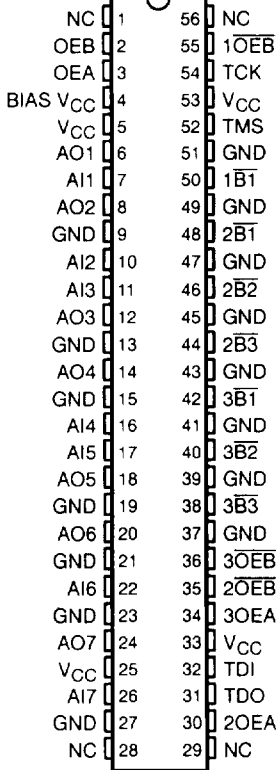


SN54FB2041, SN74FB2041 7-BIT TTL/BTL TRANSCEIVERS

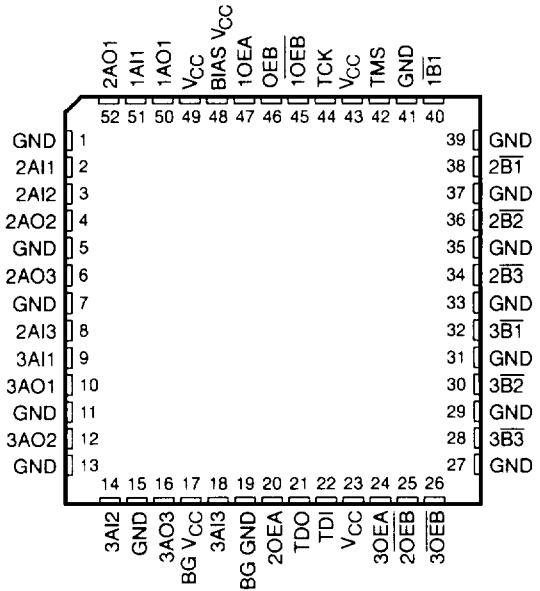
SCBS172B – NOVEMBER 1991 – REVISED SEPTEMBER 1994

- **Compatible With IEEE 1194.1-1991 (BTL) Standard**
- **TTL A Port, Backplane Transceiver Logic \bar{B} Port**
- **Open-Collector \bar{B} -Port Outputs Sink 100 mA**
- **Isolated Logic-Ground and Bus-Ground Reduces Noise**
- **BIAS V_{CC} Pin Minimizes Signal Distortion During Live Insertion/Withdrawal**
- **\bar{B} -Port Biasing Network Preconditions the Connector and PC Trace to the Backplane Transceiver Logic High-Level Voltage**
- **Package Options Include Plastic Quad Flat (RC) Package and Ceramic Flat (WD) Package**

SN54FB2041 . . . WD PACKAGE
(TOP VIEW)



SN74FB2041 . . . RC PACKAGE
(TOP VIEW)



NC – No internal connection

description

The 'FB2041 are 7-bit transceivers designed to translate signals between TTL and backplane transceiver logic (BTL) environments.

The \bar{B} port operates at BTL-signal levels. The open-collector \bar{B} ports are specified to sink 100 mA. Two output enables, OEB and \bar{OEB} , are provided for the \bar{B} outputs. When OEB is high and \bar{OEB} is low, the \bar{B} port is active and reflects the inverse of the data present at the A-input pins. When OEB is low, \bar{OEB} is high, or V_{CC} is typically less than 2.5 V, the \bar{B} port is turned off. The enable/disable logic partitions the device as two 3-bit sections and one 1-bit section.

UNLESS OTHERWISE NOTED this document contains PRODUCTION DATA information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



Copyright © 1994, Texas Instruments Incorporated

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54FB2041, SN74FB2041 7-BIT TTL/BTL TRANSCEIVERS

SCBS172B – NOVEMBER 1991 – REVISED SEPTEMBER 1994

description (continued)

The A port operates at TTL-signal levels and has split input and output pins. The A outputs reflect the inverse of the data at the \bar{B} port when the A-port output enable, OEA, is high. When OEA is low or when V_{CC} is typically less than 2.5 V, the A outputs are in the high-impedance state.

Pins are allocated for the four-wire IEEE 1149.1 (JTAG) test bus. Currently, TMS and TCK are not connected and TDI is shorted to TDO.

BIAS V_{CC} establishes a voltage between 1.62 V and 2.1 V on the BTL outputs when V_{CC} is not connected.

The SN54FB2041 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74FB2041 is characterized for operation from 0°C to 70°C .

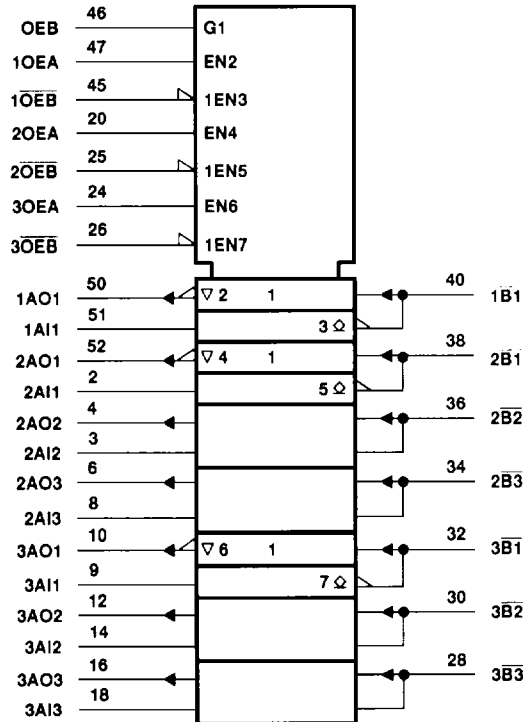
FUNCTION TABLE

INPUTS			FUNCTION
OEB	$\bar{\text{OEB}}$	OEA	
L	X	L	Isolation
X	H	L	
L	X	H	\bar{B} data to AO bus
X	H	H	
H	L	L	\bar{A} I data to B bus
H	L	H	\bar{A} I data to B bus, \bar{B} data to AO bus

SN54FB2041, SN74FB2041 7-BIT TTL/BTL TRANSCEIVERS

SCBS172B – NOVEMBER 1991 – REVISED SEPTEMBER 1994

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the RC package.

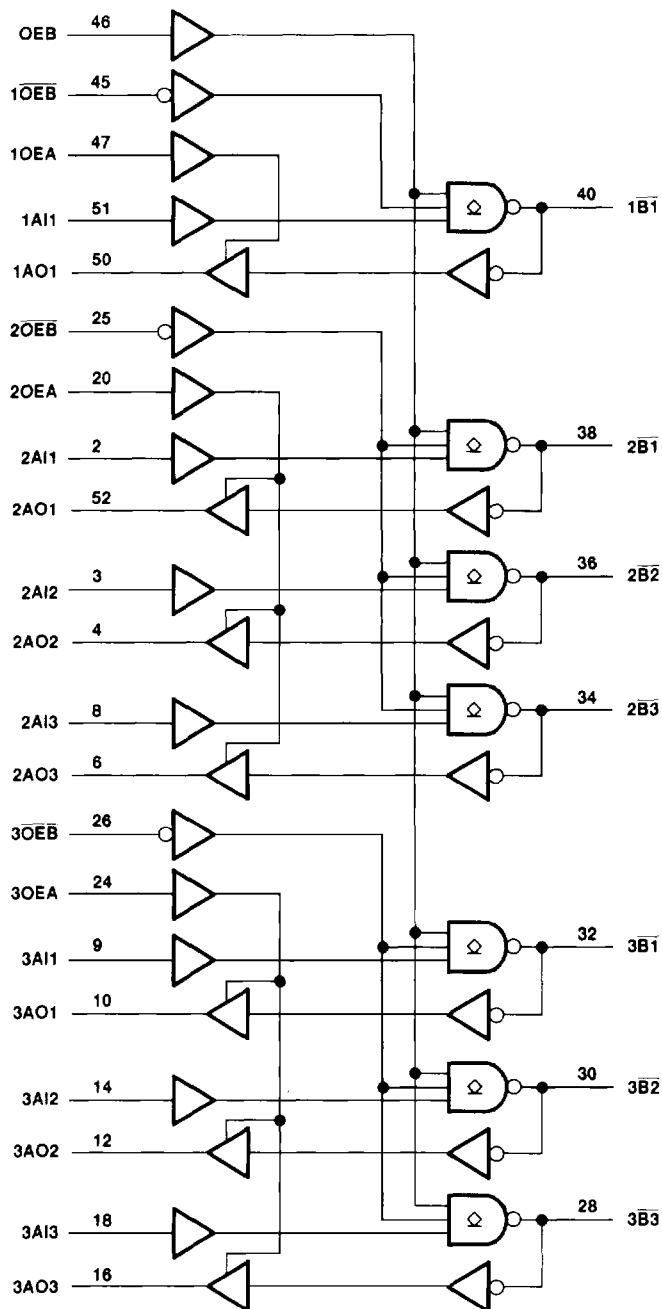
 **TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54FB2041, SN74FB2041 7-BIT TTL/BTL TRANSCEIVERS

SCBS172B - NOVEMBER 1991 - REVISED SEPTEMBER 1994

functional block diagram



Pin numbers shown are for the RC package.

 **TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54FB2041, SN74FB2041 7-BIT TTL/BTL TRANSCEIVERS

SCBS172B – NOVEMBER 1991 – REVISED SEPTEMBER 1994

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC}	–0.5 V to 7 V
Input voltage range, V_I : except \bar{B} port	–1.2 V to 7 V
\bar{B} port	–1.2 V to 3.5 V
Input current range (except \bar{B} port)	–40 mA to 5 mA
Voltage range applied to any \bar{B} output in the disabled or power-off state	–0.5 V to 5.5 V
Voltage range applied to any output in the high state	–0.5 V to V_{CC}
Current applied to any single output in the low state: A port	48 mA
\bar{B} port	200 mA
Operating free-air temperature range, T_A : SN54FB2041	–55°C to 125°C
SN74FB2041	0°C to 70°C
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 1): RC package	1.4 W
Storage temperature range	–65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" 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.

NOTE 1: The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 75 mils. For more information, refer to the *Package Thermal Considerations* application note in the 1994 *ABT Advanced BiCMOS Technology Data Book*, literature number SCBD002B.

recommended operating conditions (see Note 2)

		SN54FB2041			SN74FB2041			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
V_{CC} , BIAS V_{CC} , BG V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V		
V_{IH}	High-level input voltage	\bar{B} port		1.62	2.3	\bar{B} port		1.62	2.3	V
		Except \bar{B} port		2		2				
V_{IL}	Low-level input voltage	\bar{B} port		0.75	1.47	\bar{B} port		0.75	1.47	V
		Except \bar{B} port		0.8		0.8				
I_{IK}	Input clamp current	–18			–18			mA		
I_{OH}	High-level output current	AO port		–3		–3		mA		
		\bar{B} port		24		24				
I_{OL}	Low-level output current	AO port		100		\bar{B} port		100	mA	
		\bar{B} port		100		100				
T_A	Operating free-air temperature	–55	125	0	70			°C		

NOTE 2: Unused or floating pins (input or I/O) must be held high or low.

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54FB2041, SN74FB2041

7-BIT TTL/BTL TRANSCEIVERS

SCBS172B – NOVEMBER 1991 – REVISED SEPTEMBER 1994

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS		SN54FB2041			SN74FB2041			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V _{IK}	\bar{B} port	V _{CC} = 4.5 V	I _I = -18 mA			-1.2			V	
	Except \bar{B} port		I _I = -40 mA			-0.5		-0.5		
V _{OH}	AO port	V _{CC} = 4.5 V	I _{OH} = -1 mA						V	
			I _{OH} = -3 mA	2.5	3.3	2.5	3.3			
V _{OL}	AO port	V _{CC} = 4.5 V	I _{OL} = 20 mA						V	
			I _{OL} = 24 mA		0.35	0.5	0.35	0.5		
	\bar{B} port	V _{CC} = 4.5 V	I _{OL} = 80 mA	0.75		1.1	0.75			1.1
			I _{OL} = 100 mA			1.15				1.15
I _I	Except \bar{B} port	V _{CC} = 5.5 V,	V _I = 5.5 V			50		50	μA	
I _{IH} ‡	Except \bar{B} port	V _{CC} = 5.5 V,	V _I = 2.7 V			50		50	μA	
I _{IL} ‡	Except \bar{B} port	V _{CC} = 5.5 V	V _I = 0.5 V			-50		-50	μA	
	\bar{B} port		V _I = 0.75 V			-100		-100		
I _{OH}	\bar{B} port	V _{CC} = 0 to 5.5 V,	V _O = 2.1 V			100		100	μA	
I _{OZH}	AO port	V _{CC} = 5.5 V,	V _O = 2.7 V			50		50	μA	
I _{OZL}	AO port	V _{CC} = 5.5 V,	V _O = 0.5 V			-50		-50	μA	
I _{OS} §	AO port	V _{CC} = 5.5 V,	V _O = 0	-30		-150	-30		-180	mA
I _{CC}	AI port to \bar{B} port	V _{CC} = 5.5 V,	I _O = 0			25		40	mA	
	\bar{B} port to AO port					65		65		
C _i	AI port	V _I = V _{CC} or GND						3.5	pF	
	Control inputs						3			
C _o	AO port	V _O = V _{CC} or GND						6	pF	
C _{io}	\bar{B} port per P1194.0	V _{CC} = 0 to 4.5 V				6		5	pF	
		V _{CC} = 4.5 V to 5.5 V				5		5		

† All typical values are at V_{CC} = 5 V, T_A = 25°C.

‡ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

live-insertion specifications over recommended operating free-air temperature range

PARAMETER		TEST CONDITIONS		SN54FB2041		SN74FB2041		UNIT
				MIN	MAX	MIN	MAX	
I _{CC} (BIAS V _{CC})		V _{CC} = 0 to 4.5 V	V _B = 0 to 2 V,		460		450	μA
		V _{CC} = 4.5 V to 5.5 V	V _I (BIAS V _{CC}) = 4.5 V to 5.5 V		10		10	
V _O	\bar{B} port	V _{CC} = 0,	V _I (BIAS V _{CC}) = 4.5 V to 5.5 V	1.62	2.1	1.62	2.1	V
I _O	\bar{B} port	V _{CC} = 0,	V _B = 1 V,		-1		-1	μA
		V _I (BIAS V _{CC}) = 4.5 V to 5.5 V						
		V _{CC} = 0 to 5.5 V,	OEB = 0 to 0.8 V		100		100	
		V _{CC} = 0 to 2.2 V,	OEB = 0 to 5 V		100		100	

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54FB2041, SN74FB2041 7-BIT TTL/BTL TRANSCEIVERS

SCBS172B – NOVEMBER 1991 – REVISED SEPTEMBER 1994

switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, T _A = 25°C			SN54FB2041		SN74FB2041		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A1	\bar{B}	3	4.6	6			2.7	6.5	ns
t _{PHL}			2.7	4.2	5.6			2.5	5.8	
t _{PLH}	\bar{B}	AO	2.2	3.7	5.5			1.8	6	ns
t _{PHL}			2.6	4.1	5.9			2.2	7.9	
t _{PLH}	OEB	\bar{B}	3.8	5.3	7.1			3.3	7.4	ns
t _{PHL}			3.4	4.9	6.5			3.2	6.7	
t _{PLH}	OEB	B	3.7	5.1	6.8			3.4	7	ns
t _{PHL}			2.9	4.4	6.2			2.4	6.4	
t _{PZH}	OEA	AO	1.8	3.3	5.1			1.5	5.6	ns
t _{PZL}			1.7	3.1	4.7			1.6	5	
t _{PHZ}	OEA	AO	1.9	3.3	5			1.3	5.3	ns
t _{PLZ}			1.1	2.6	4.3			0.9	4.7	
t _{sk(p)}	Skew for any single channel t _{PHL} - t _{PLH}		0.5							ns
t _{sk(o)}	Skew between drivers in the same package		0.4							ns
t _t	Rise time, 1.3 V to 1.8 V		2.4	3.5	4.6			2.2	5.2	
	Fall time, 1.8 V to 1.3 V		1	2	3			1	3.4	
t _{PR}	\bar{B} -port input pulse rejection					1		1		ns

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.

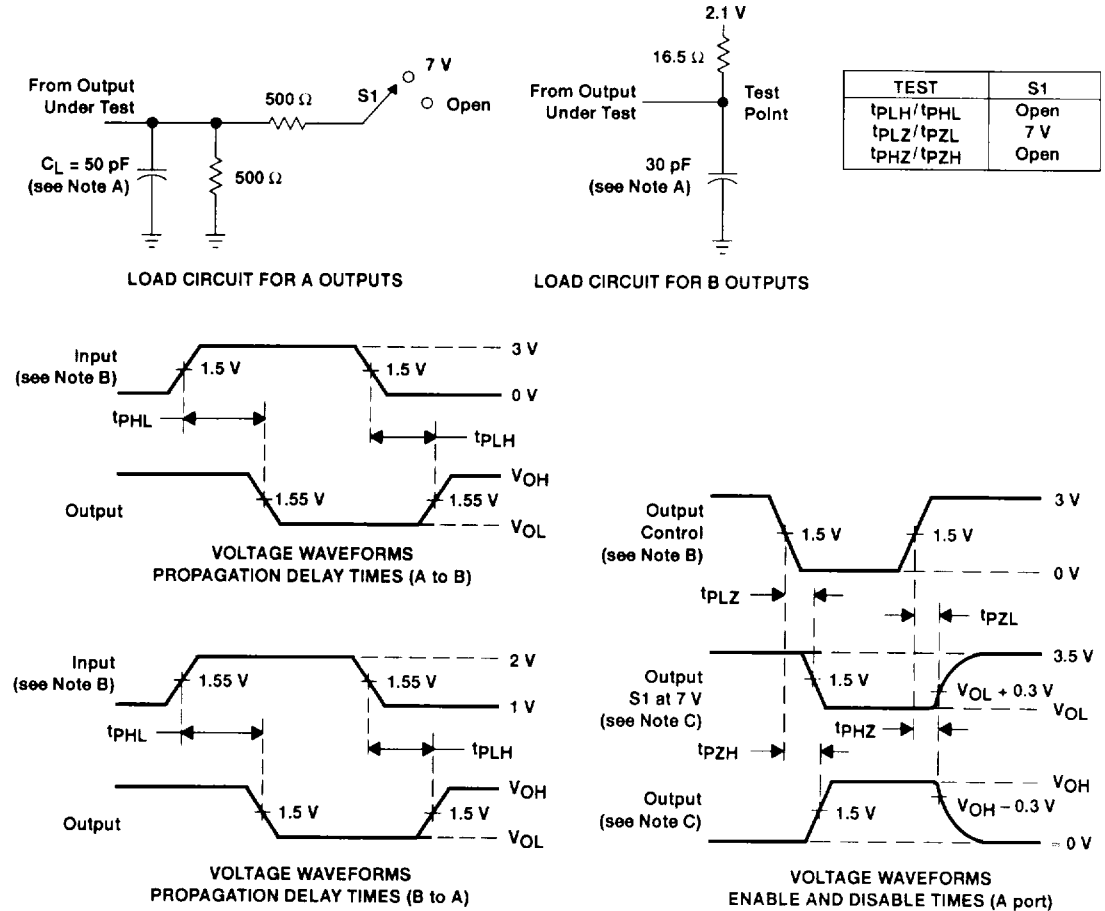


POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54FB2041, SN74FB2041 7-BIT TTL/BTL TRANSCEIVERS

SCBS172B – NOVEMBER 1991 – REVISED SEPTEMBER 1994

PARAMETER MEASUREMENT INFORMATION



- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. All input pulses are supplied by generators having the following characteristics: TTL inputs – PRR $\leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$. BTL inputs – PRR $\leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
 - C. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 - D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms