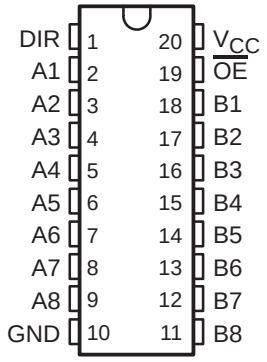
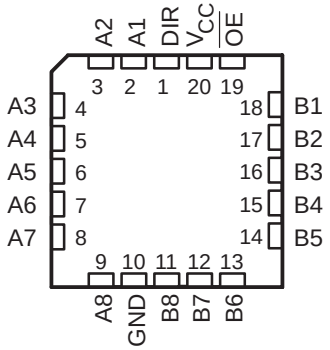
- **State-of-the-Art BiCMOS Design Substantially Reduces Standby Current**
- **Outputs Have Undershoot-Protection Circuitry**
- **Power-Up High-Impedance State**
- **Buffered Control Inputs to Reduce DC Loading Effects**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015**
- **Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Plastic and Ceramic 300-mil DIPs (J, N)**

SN54BCT640 . . . J OR W PACKAGE
SN74BCT640 . . . DW OR N PACKAGE
(TOP VIEW)



SN54BCT640 . . . FK PACKAGE
(TOP VIEW)



description

The ′BCT640 bus transceiver is designed for asynchronous communication between data buses. These devices transmit data from the A bus to the B bus or from the B bus to the A bus depending upon the level at the direction-control (DIR) input. The output-enable ($\overline{OE}$) input can be used to disable the device so that the buses are effectively isolated.

The SN54BCT640 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74BCT640 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	$\overline{B}$ data to A bus
L	H	$\overline{A}$ data to B bus
H	X	Isolation

PRODUCTION DATA information is 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.

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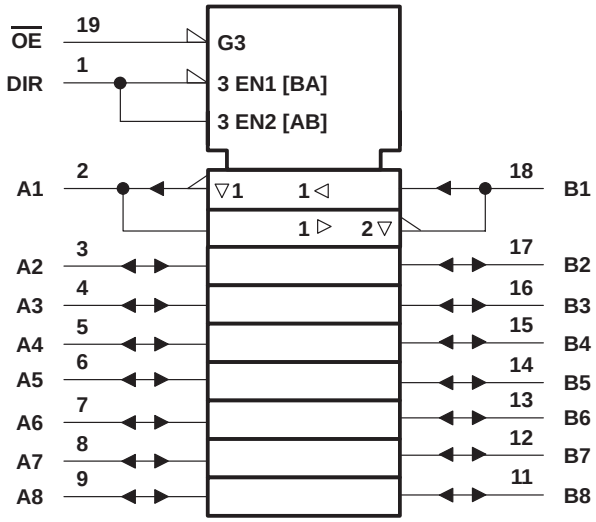
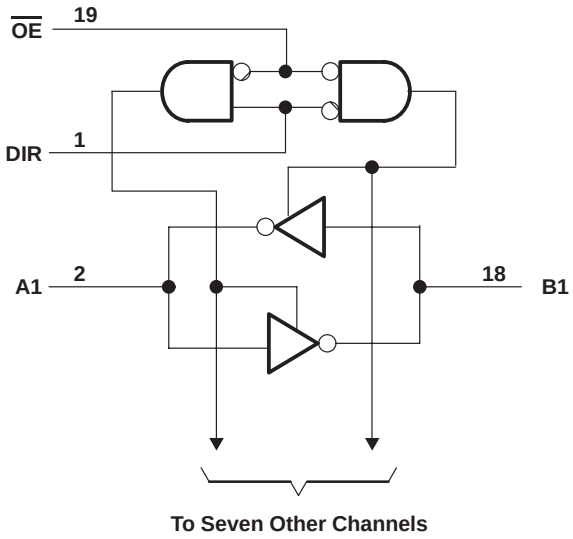
logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



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: Control inputs (see Note 1) . . . . . – 0.5 V to 7 V
I/O ports (see Note 1) . . . . . – 0.5 V to 5.5 V
Voltage range applied to any output in the disabled or power-off state, V_O . . . . . – 0.5 V to 5.5 V
Voltage range applied to any output in the high state, V_O . . . . . – 0.5 V to V_{CC}
Input clamp current, I_{IK} . . . . . –30 mA
Current into any output in the low state: SN54BCT640 . . . . . 96 mA
SN74BCT640 . . . . . 128 mA
Operating free-air temperature range: SN54BCT640 . . . . . – 55°C to 125°C
SN74BCT640 . . . . . 0°C to 70°C
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 input and output voltage ratings may be exceeded if the input and output current ratings are observed.

recommended operating conditions

			SN54BCT640			SN74BCT640			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage		2			2			V
V_{IL}	Low-level input voltage				0.8			0.8	V
I_{IK}	Input clamp current				–18			–18	mA
I_{OH}	High-level output current	A port			–3			–3	mA
		B port			–12			–15	
I_{OL}	Low-level output current	A port			20			24	mA
		B port			48			64	
T_A	Operating free-air temperature		–55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS		SN54BCT640			SN74BCT640			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA			–1.2			–1.2	V
V_{OH}	A port	V_{CC} = 4.5 V	I_{OH} = –1 mA	2.5	3.4		2.5	3.4		V
			I_{OH} = –3 mA	2.4	3.3		2.4	3.3		
	B port	V_{CC} = 4.5 V	I_{OH} = –3 mA	2.4	3.3		2.4	3.3		
			I_{OH} = –12 mA	2	3.2					
			I_{OH} = –15 mA				2	3.1		
V_{OL}	A port	V_{CC} = 4.5 V	I_{OL} = 20 mA		0.3	0.5				V
			I_{OL} = 24 mA					0.35	0.5	
	B port	V_{CC} = 4.5 V	I_{OL} = 48 mA		0.38	0.55				
			I_{OL} = 64 mA					0.42	0.55	
I_I	A or B port	V_{CC} = 5.5 V,	V_I = 5.5 V			1			1	mA
	Control inputs					0.1			0.1	
I_{IH}‡	A or B port	V_{CC} = 5.5 V,	V_I = 2.7 V			70			70	µA
	Control inputs					20			20	
I_{IL}‡	A or B port	V_{CC} = 5.5 V,	V_I = 0.5 V			–0.6			–0.6	mA
	Control inputs					–0.65			–0.65	
I_{OS}§	A port	V_{CC} = 5.5 V,	V_O = 0	–60		–150	–60		–150	mA
	B port			–100		–225	–100		–225	
I_{CCL}	A to B	V_{CC} = 5.5 V			53	84		53	94	mA
I_{CCH}	A to B	V_{CC} = 5.5 V			23	37		23	41	mA
I_{CCZ}		V_{CC} = 5.5 V			4	10		4	11	mA

† 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 tested at a time, and the duration of the test should not exceed one second.

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			′BCT640			SN54BCT640		SN74BCT640		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	B or A	0.5	3.6	5.6	0.5	7	0.5	6.5	ns
t_{PHL}			0.5	1.9	3.4	0.5	3.8	0.5	3.7	
t_{PZH}	$\overline{OE}$	A or B	3.1	6.4	8.9	2.6	10.5	2.6	10.2	ns
t_{PZL}			4.1	6.9	9.5	3.5	12.3	3.5	10.7	
t_{PHZ}	$\overline{OE}$	A or B	1.9	5	7.9	1.4	12.2	1.4	10.2	ns
t_{PLZ}			1.8	4.3	6.8	1.5	8.3	1.5	7.8	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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