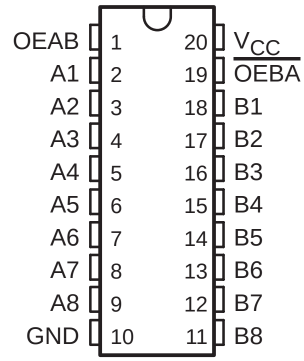
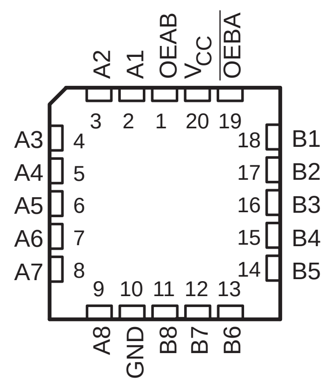
SCBS001B − SEPTEMBER 1987 − REVISED NOVEMBER 1993

- **State-of-the-Art BiCMOS Design Significantly Reduces I_{CCZ}**
- **P-N-P Inputs Reduce DC Loading**
- **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)**

SN54BCT620A . . . J OR W PACKAGE
SN74BCT620A . . . DW OR N PACKAGE
(TOP VIEW)



SN54BCT620A . . . FK PACKAGE
(TOP VIEW)



description

The ′BCT620A bus transceiver is designed for asynchronous communication between data buses. The control function implementation allows for maximum flexibility in timing. The ′BCT620A provides inverted data at its outputs.

These devices allow data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic levels at the output-enable (OEAB and $\overline{\text{OEBA}}$) inputs.

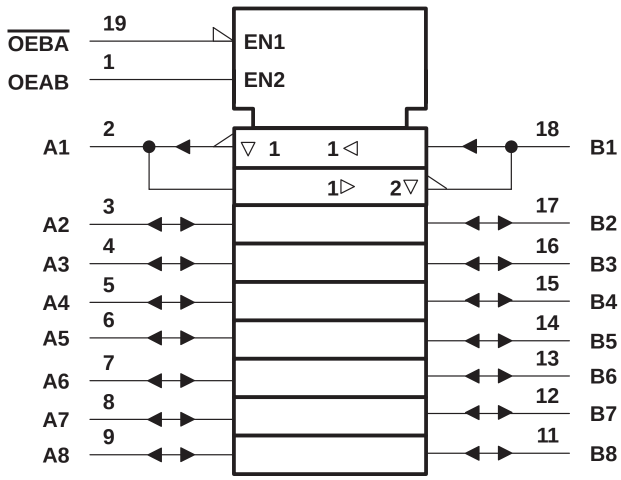
The output-enable inputs can be used to disable the device so that the buses are effectively isolated. The dual-enable configuration gives the transceivers the capability of storing data by simultaneously enabling OEAB and $\overline{\text{OEBA}}$. When both OEAB and $\overline{\text{OEBA}}$ are enabled and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (16 in all) will remain at their last states. In this way, each output reinforces its input in this configuration.

The SN54BCT620A is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74BCT620A is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

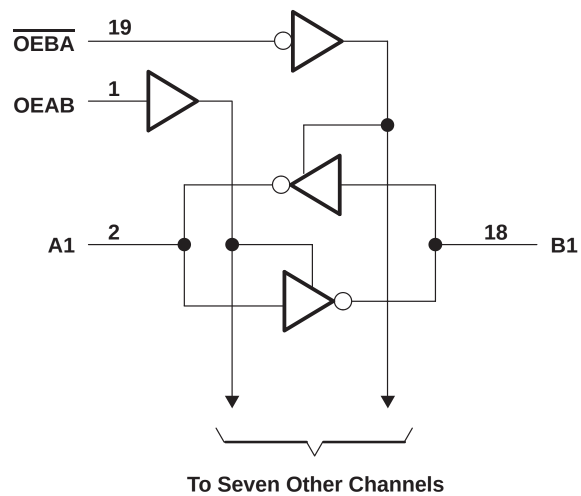
INPUTS		OPERATION
$\overline{\text{OEBA}}$	OEAB	
L	L	$\overline{\text{B}}$ data to A bus
L	H	$\overline{\text{B}}$ data to A bus, $\overline{\text{A}}$ data to B bus
H	L	Isolation
H	H	$\overline{\text{A}}$ data to B bus

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: SN54BCT620A . . . . 96 mA
SN74BCT620A . . . . 128 mA
Operating free-air temperature range: SN54BCT620A . . . . − 55°C to 125°C
SN74BCT620A . . . . 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

			SN54BCT620A			SN74BCT620A			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		SN54BCT620A			SN74BCT620A			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
	OEAB or $\overline{OEBA}$					0.1			0.1	
I_{IH}‡	A or B port	V_{CC} = 5.5 V,	V_I = 2.7 V			70			70	µA
	OEAB or $\overline{OEBA}$					20			20	
I_{IL}‡	A or B port	V_{CC} = 5.5 V,	V_I = 0.5 V			−0.65			−0.65	mA
	OEAB or $\overline{OEBA}$					−0.6			−0.6	
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	84	mA
I_{CCH}	A to B	V_{CC} = 5.5 V			23	37		23	37	mA
I_{CCZ}		V_{CC} = 5.5 V			4	10		4	10	mA
C_i	OEAB or $\overline{OEBA}$	V_{CC} = 5 V,	V_I = 2.5 V or 0.5 V		5			5		pF
C_{io}	A to B	V_{CC} = 5 V,	V_O = 2.5 V or 0.5 V		9			9		pF
	B to A				12			12		

† 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
			′BCT620A			SN54BCT620A		SN74BCT620A		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	B	0.6	3.4	5.2	0.6	6.2	0.6	5.8	ns
t_{PHL}			0.1	1.9	3.4	0.1	3.7	0.1	3.6	
t_{PLH}	B	A	0.9	4.1	6	0.9	7.2	0.9	6.9	ns
t_{PHL}			0.1	2	3.7	0.1	4	0.1	3.9	
t_{PZH}	$\overline{OEBA}$	A	3.5	7.2	9.2	3.5	10.9	3.5	10.6	ns
t_{PZL}			3.7	7.6	9.9	3.7	11.5	3.7	11.1	
t_{PHZ}	$\overline{OEBA}$	A	3.1	5.3	8.6	3.1	10.8	3.1	10	ns
t_{PLZ}			1.3	4.4	6.9	1.3	8.3	1.3	7.8	
t_{PZH}	OEAB	B	2	5.3	6.7	2	7.9	2	7.4	ns
t_{PZL}			2.9	6.1	8.1	2.9	9.2	2.9	9	
t_{PHZ}	OEAB	B	2.1	5.2	7	2.1	8.5	2.1	8.1	ns
t_{PLZ}			0.1	3.7	5.3	0.1	6	0.1	5.9	

† 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.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9075001M2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9075001M2A SNJ54BCT 620AFK	Samples
5962-9075001MRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-9075001MR A SNJ54BCT620AJ	Samples
5962-9075001MRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-9075001MR A SNJ54BCT620AJ	Samples
SNJ54BCT620AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9075001M2A SNJ54BCT 620AFK	Samples
SNJ54BCT620AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962-9075001M2A SNJ54BCT 620AFK	Samples
SNJ54BCT620AJ	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-9075001MR A SNJ54BCT620AJ	Samples
SNJ54BCT620AJ	ACTIVE	CDIP	J	20	1	TBD	Call TI	N / A for Pkg Type	-55 to 125	5962-9075001MR A SNJ54BCT620AJ	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

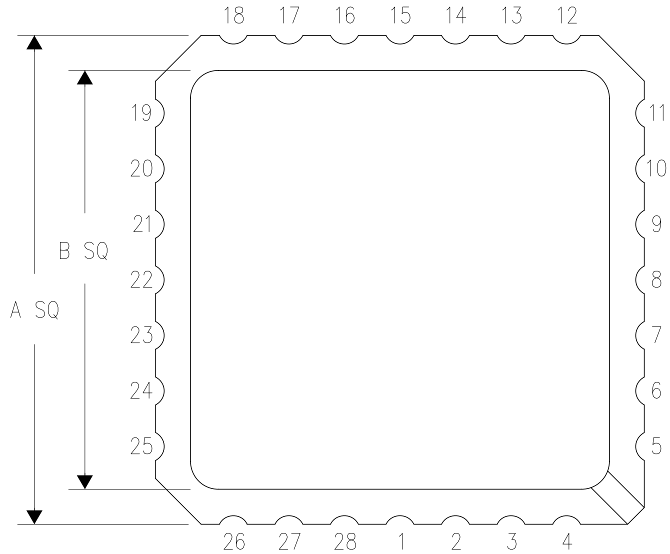
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

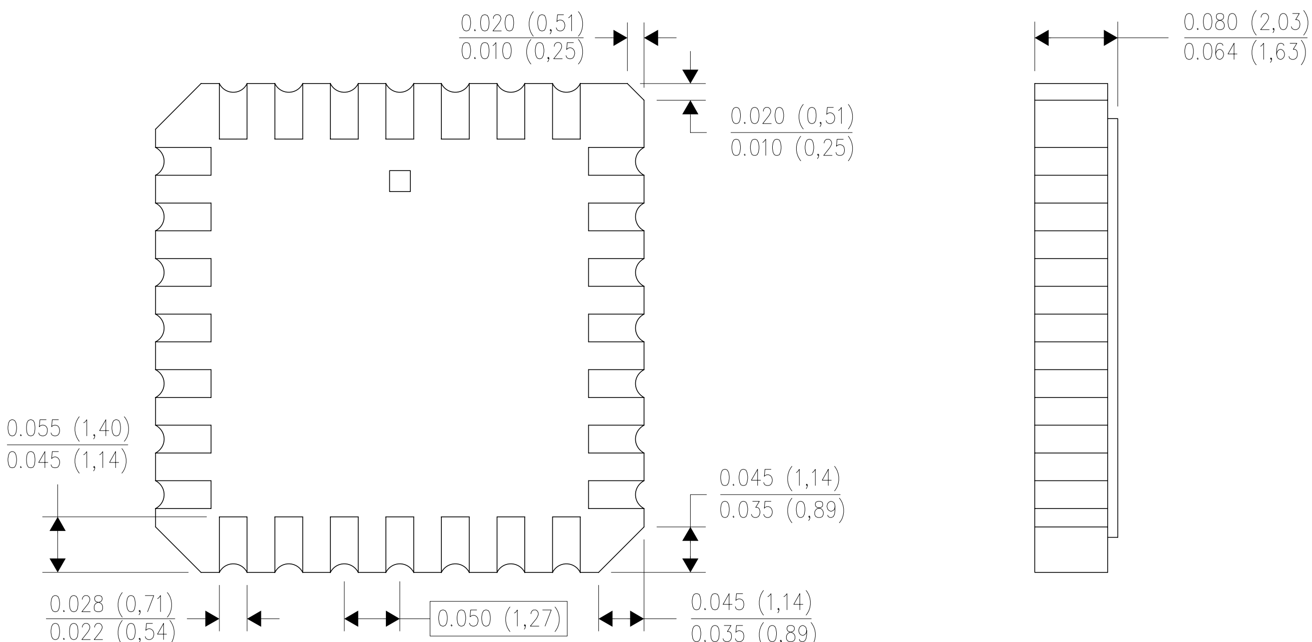
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

FK (S-CQCC-N**) LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)

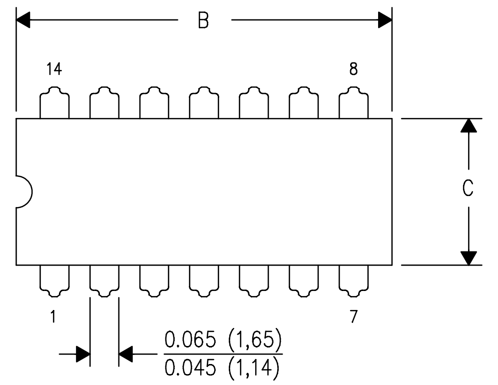


4040140/D 01/11

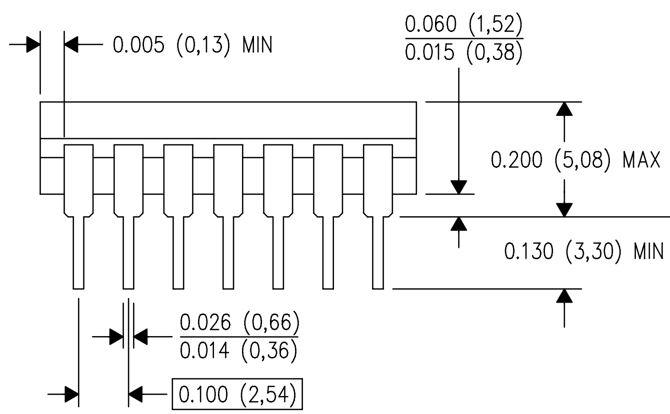
NOTES:
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a metal lid.
- D. Falls within JEDEC MS-004

J (R–GDIP–T**) CERAMIC DUAL IN–LINE PACKAGE

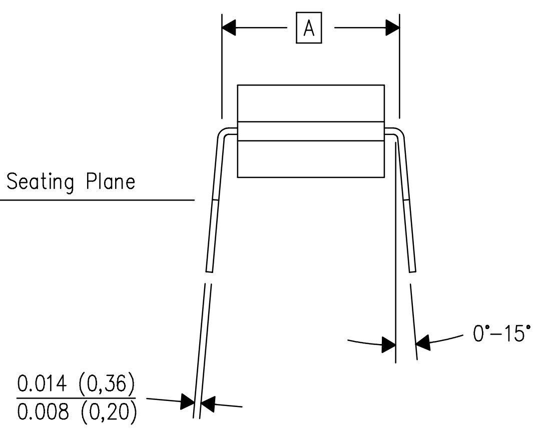
14 LEADS SHOWN



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



Seating Plane



4040083/F 03/03

NOTES:
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1–T14, GDIP1–T16, GDIP1–T18 and GDIP1–T20.