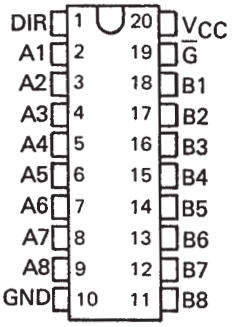
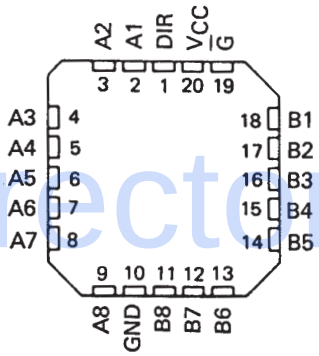
- **SN74LS64X-1 Versions Rated at I_{OL} of 48 mA**
- **Bi-directional Bus Transceivers in High-Density 20-Pin Packages**
- **Hysteresis at Bus Inputs Improves Noise Margins**
- **Choice of True or Inverting Logic**
- **Choice of 3-State or Open-Collector Outputs**

DEVICE	OUTPUT	LOGIC
'LS640	3-State	Inverting
'LS641	Open-Collector	True
'LS642	Open-Collector	Inverting
'LS644	Open-Collector	True and inverting
'LS645	3-State	True

SN54LS' . . . J PACKAGE
SN74LS' . . . DW OR N PACKAGE
(TOP VIEW)



SN54LS' . . . FK PACKAGE
(TOP VIEW)



description

These octal bus transceivers are designed for asynchronous two-way communication between data buses. The 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 enable input ($\overline{G}$) can be used to disable the device so the buses are effectively isolated.

The -1 versions of the SN74LS640 thru SN74LS642, SN74LS644, and SN74LS645 are identical to the standard versions except that the recommended maximum I_{OL} is increased to 48 milliamperes. There are no -1 versions of the SN54LS640 thru SN54LS642, SN54LS644, and SN54LS645.

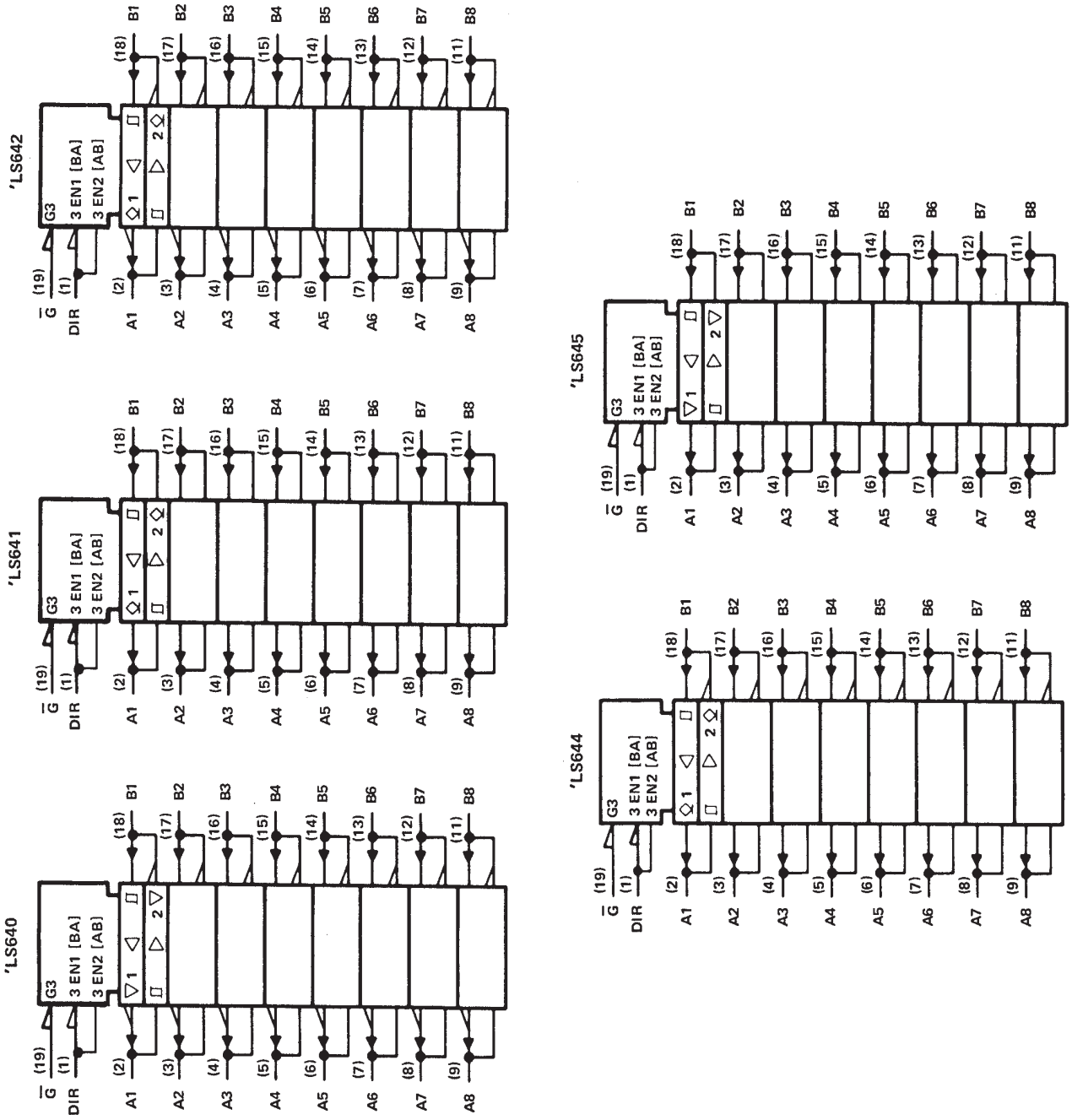
The SN54LS640 thru SN54LS642, SN54LS644, and SN54LS645 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74LS640 thru SN74LS642, SN74LS644, and SN74LS645 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE

CONTROL INPUTS		OPERATION		
$\overline{G}$	DIR	'LS640 'LS642	'LS641 'LS645	'LS644
L	L	$\overline{B}$ data to A bus	B data to A bus	B data to A bus
L	H	$\overline{A}$ data to B bus	A data to B bus	$\overline{A}$ data to B bus
H	X	Isolation	Isolation	Isolation

H = high level, L = low level, X = irrelevant

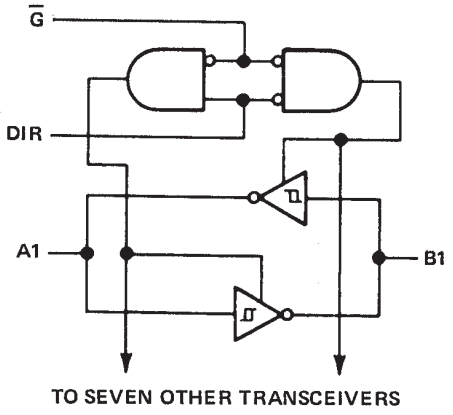
logic symbols†



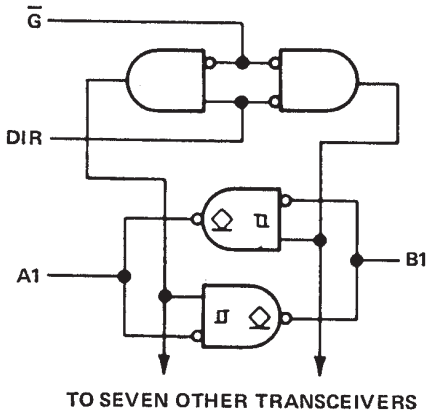
† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, J, and N packages.

logic diagrams (positive logic)

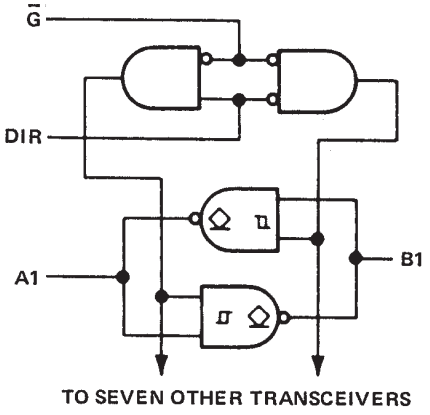
'LS640



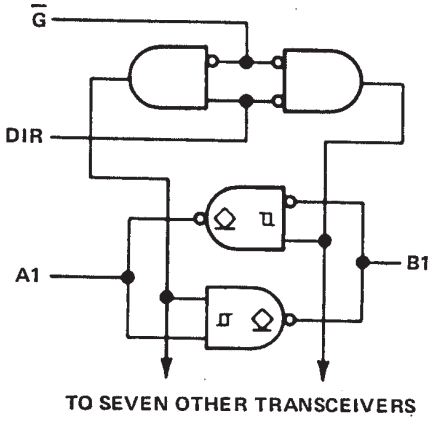
'LS641



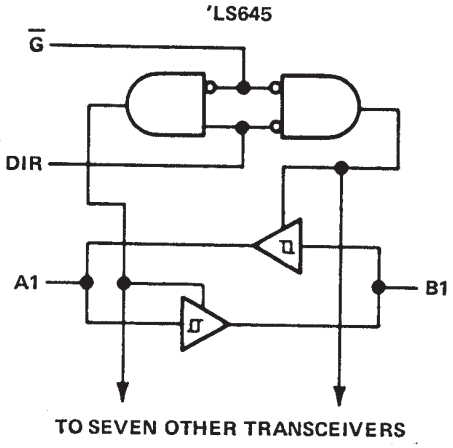
'LS642



'LS644



'LS645



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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage: All inputs . . . . . 7 V
I/O ports . . . . . 5.5 V
Operating free-air temperature range: SN54LS640, SN54LS645 . . . . . −55°C to 125°C
SN74LS640, SN74LS645 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

PARAMETER		SN54LS640 SN54LS645			SN74LS640 SN74LS645			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-lvel input voltage	2			2			V
V_{IL}	Low-level input voltage			0.5			0.6	V
I_{OH}	High-level output current			−12			−15	mA
I_{OL}	Low-level output current			12			24	mA
							48†	
T_A	Operating free-air temperature	−55		125	0		70	°C

†The 48-mA limit applies for the SN74LS640-1 and SN74LS645-1 only.

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

PARAMETER		TEST CONDITIONS‡			SN54LS640 SN54LS645			SN74LS640 SN74LS645			UNIT
					MIN	TYP§	MAX	MIN	TYP§	MAX	
V_{IK}		V_{CC} = MIN, I_I = −18 mA					−1.5			−1.5	V
Hysteresis ($V_{T+} - V_{T-}$)		V_{CC} = MIN,		A or B input	0.1	0.4		0.2	0.4		V
V_{OH}		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX		I_{OH} = −3 mA	2.4	3.4		2.4	3.4		
				I_{OH} = MAX	2			2			
V_{OL}		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX		I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
				I_{OL} = 24 mA					0.35	0.5	
				I_{OL} = 48 mA#					0.4	0.5	
I_{OZH}		V_{CC} = MAX, $\overline{G}$ at 2 V,		V_O = 2.7 V			20			20	μA
I_{OZL}		V_{CC} = MAX, $\overline{G}$ at 2 V,		V_O = 0.4 V			−0.4			−0.4	mA
I_I	A or B	V_{CC} = MAX		V_I = 5.5 V			0.1			0.1	mA
	DIR or $\overline{G}$			V_I = 7 V			0.1			0.1	
I_{IH}		V_{CC} = MAX, V_{IH} = 2.7 V					20			20	μA
I_{IL}		V_{CC} = MAX, V_{IL} = 0.4 V					−0.4			−0.4	mA
I_{OS}¶		V_{CC} = MAX			−40		−225	−40		−225	mA
I_{CC}	Outputs high	V_{CC} = MAX, Outputs open				48	70		48	70	mA
	Outputs low					62	90		62	90	
	Outputs at Hi-Z					64	95		64	95	

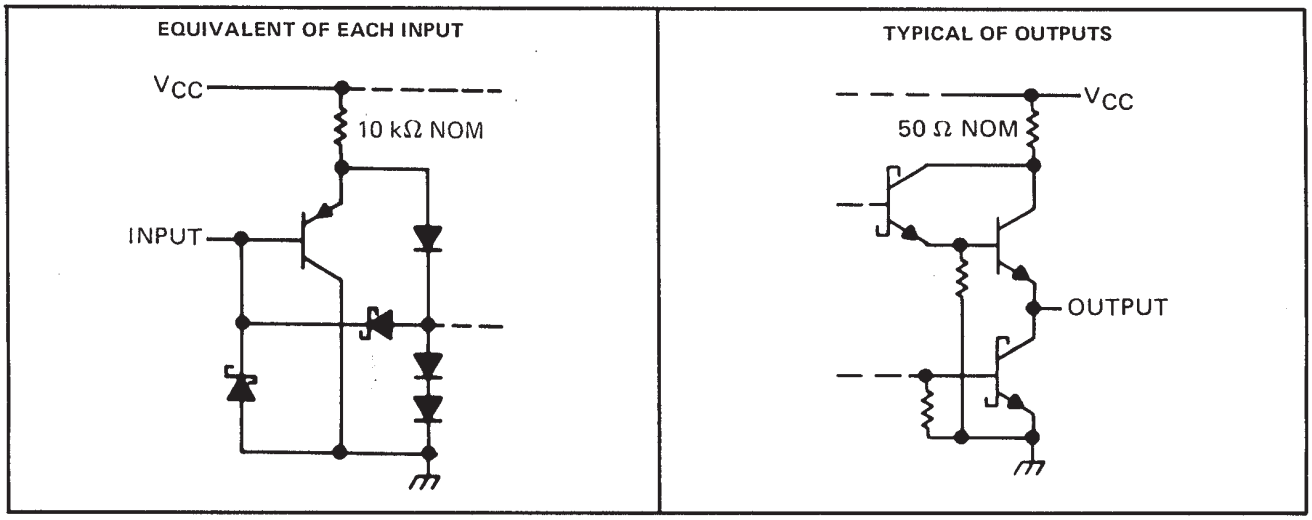
†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
§All typical values are at V_{CC} = 5 V, T_A = 25°C.
¶Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.
#The 48-mA condition applies for the SN74LS640-1 and SN74LS645-1 only.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS640, 'LS640-1			'LS645, 'LS645-1			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	A	B	C_L = 45 pF, R_L = 667 Ω, See Note 2		6	10		8	15	ns
		B	A			6	10		8	15	
t_{PHL}	Propagation delay time, high-to-low-level output	A	B			8	15		11	15	ns
		B	A			8	15		11	15	
t_{PZL}	Output enable time to low level	$\overline{G}$	A			31	40		31	40	ns
		$\overline{G}$	B			31	40		31	40	
t_{PZH}	Output enable time to high level	$\overline{G}$	A			23	40		26	40	ns
		$\overline{G}$	B			23	40		26	40	
t_{PLZ}	Output disable time from low level	$\overline{G}$	A	C_L = 5 pF, R_L = 667 Ω, See Note 2		15	25		15	25	ns
		$\overline{G}$	B			15	25		15	25	
t_{PHZ}	Output disable time from high level	$\overline{G}$	A			15	25		15	25	ns
		$\overline{G}$	B			15	25		15	25	

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

schematics of inputs and outputs



TYPICAL CHARACTERISTICS

SN54LS'
INVERTING OUTPUT VOLTAGE
vs
INPUT VOLTAGE

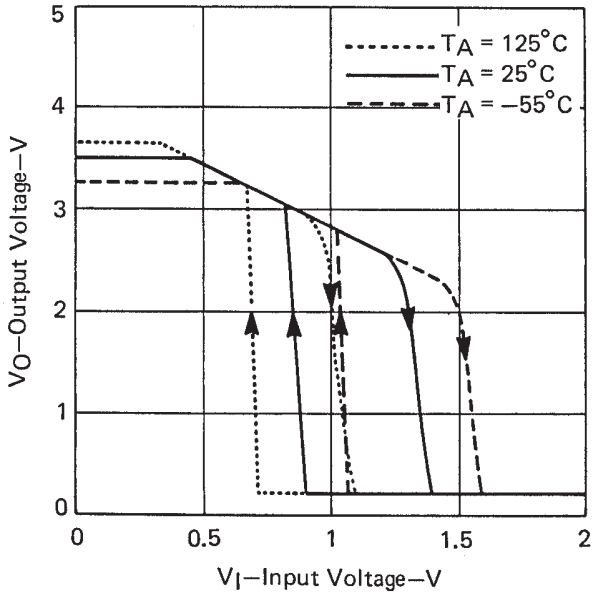


FIGURE 1

SN74LS'
INVERTING OUTPUT VOLTAGE
vs
INPUT VOLTAGE

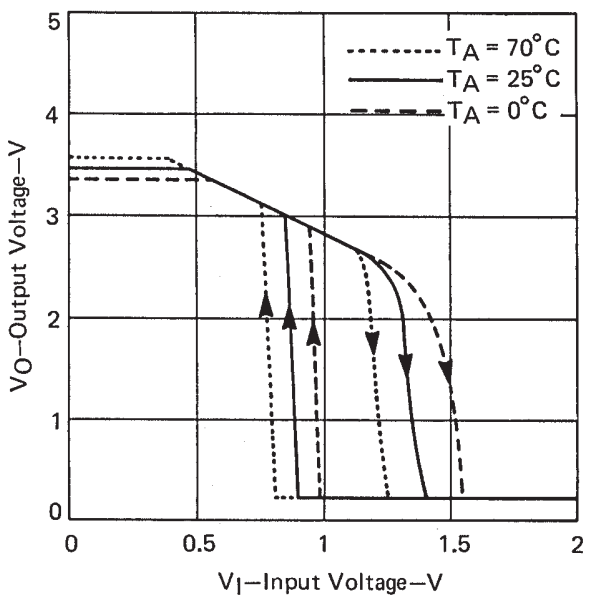


FIGURE 2

SN54LS'
NONINVERTING OUTPUT VOLTAGE
vs
INPUT VOLTAGE

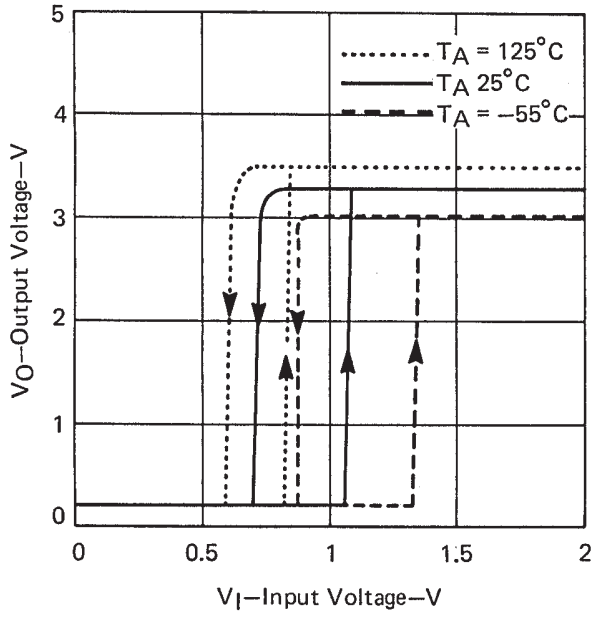


FIGURE 3

SN74LS'
NONINVERTING OUTPUT VOLTAGE
vs
INPUT VOLTAGE

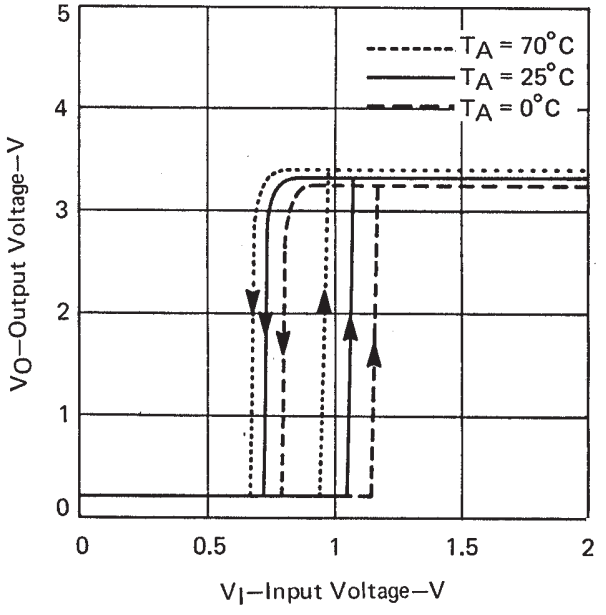


FIGURE 4

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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage: All inputs and I/O ports . . . . . 7 V
Operating free-air temperature range: SN54LS641, SN54LS642, SN54LS644 . . . . . – 55°C to 125°C
SN74LS641, SN74LS642, SN74LS644 . . . . . 0°C to 70°C
Storage temperature range . . . . . – 65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

PARAMETER		SN54LS641 SN54LS642 SN54LS644			SN74LS641 SN74LS642 SN74LS644			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.5			0.6	V
V_{OH}	High-level output voltage			5.5			5.5	V
I_{OL}	Low-level output current			12			24	mA
							48§	
T_A	Operating free-air temperature	– 55		125	0		70	°C

§The 48 mA limit applies for the SN74LS641-1, SN74LS642-1, and SN74LS644-1 only.

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

PARAMETER		TEST CONDITIONS†		SN54LS641 SN54LS642 SN54LS644			SN74LS641 SN74LS642 SN74LS644			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		V_{CC} = MIN,	I_I = – 18 mA			– 1.5			– 1.5	V
Hysteresis ($V_{T+} - V_{T-}$)		V_{CC} = MIN,	A or B input	0.1	0.4		0.2	0.4		V
I_{OH}		V_{CC} = MIN, V_{IL} = MAX,	V_{IH} = 2 V, V_{OH} = 5.5 V			0.1			0.1	mA
V_{OL}		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
			I_{OL} = 24 mA					0.35	0.5	
			I_{OL} = 48 mA§					0.4	0.5	
I_I	A or B	V_{CC} = MAX	V_I = 5.5 V			0.1			0.1	mA
	DIR or $\overline{G}$		V_I = 7 V			0.1			0.1	
I_{IH}		V_{CC} = MAX,	V_I = 2.7 V			20			20	μA
I_{IL}		V_{CC} = MAX,	V_I = 0.4 V			– 0.4			– 0.4	mA
I_{CC}	Outputs high	V_{CC} = MAX,	Outputs open		48	70		48	70	mA
	Outputs low				62	90		62	90	
	Outputs at Hi-Z				64	95		64	95	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§The 48 mA condition applies for the SN74LS641-1, SN74LS642-1, and SN74LS644-1 only.

switching characteristics at V_{CC} = 5 V, T_A = 25°C

PARAMETER		FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS641, 'LS641–1			'LS642, 'LS642–1			'LS644, 'LS644–1			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	A	B	C_L = 45 pF, R_L = 667 Ω, See Note 2		17	25		19	25		17	25	ns
		B	A			17	25		19	25		19	25	
t_{PHL}	Propagation delay time, high-to-low-level output	A	B			16	25		14	25		14	25	ns
		B	A			16	25		14	25		16	25	
t_{PLH}	Output disable time from low level	$\overline{G}$, DIR	A			23	40		26	40		26	40	ns
		$\overline{G}$, DIR	B			25	40		28	40		25	40	
t_{PHL}	Output enable time from high level	$\overline{G}$, DIR	A			34	50		43	60		43	60	ns
		$\overline{G}$, DIR	B			37	50		39	60		37	50	

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

schematics of inputs and outputs

EQUIVALENT OF EACH INPUT

TYPICAL OF OUTPUTS

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
5962-8416101VRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
5962-8416101VSA	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC
84161012A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
8416101RA	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
8416101SA	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC
SN54LS640J	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
SN54LS645J	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
SN74LS640-1DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640-1DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640-1DWR	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI
SN74LS640-1N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS640-1NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS640-1NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640-1NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS640N3	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74LS640NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS640NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS640NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641-1DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641-1DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641-1DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641-1DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641-1N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS641-1N3	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
SN74LS641-1NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS641DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS641N3	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74LS641NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS641NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS641NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS642-1DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS642-1DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS642-1N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS642-1NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS642DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS642DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS642N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS642NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS642NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS642NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS644-1N	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74LS644N	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74LS645-1DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645-1DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645-1DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645-1DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645-1N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
SN74LS645-1N3	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74LS645-1NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS645-1NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645-1NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645DWR	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI
SN74LS645N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS645N3	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74LS645NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS645NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS645NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ54LS640FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS640J	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS640W	ACTIVE	CFP	W	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS645FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS645J	ACTIVE	CDIP	J	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS645W	OBSOLETE	CFP	W	20		TBD	Call TI	Call TI

[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] Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

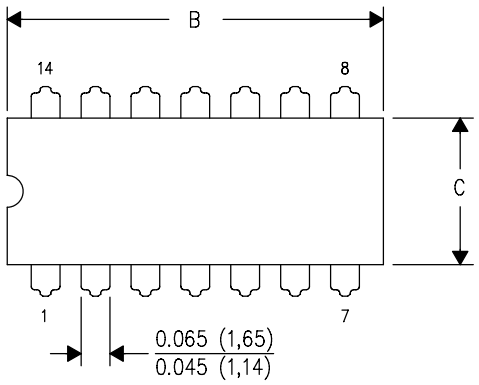
[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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.

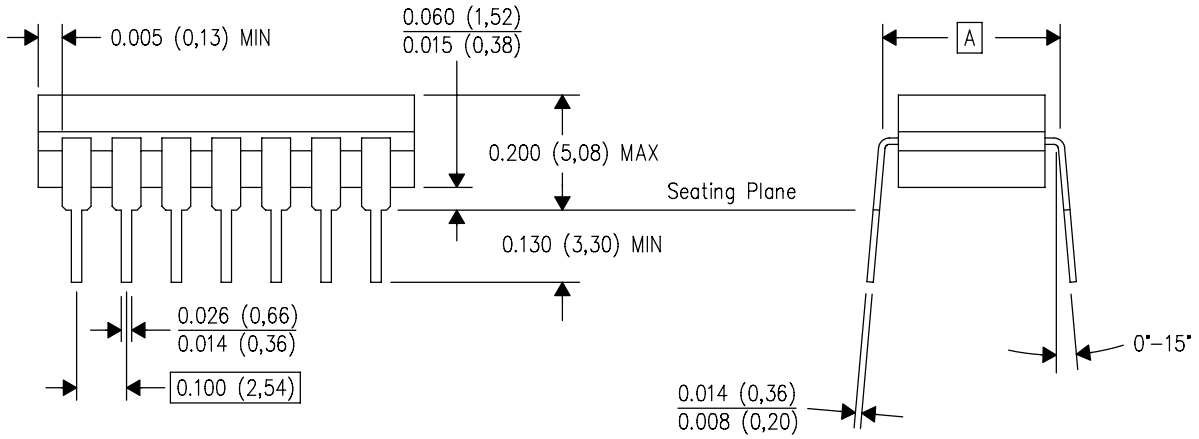
J (R–GDIP–T**)

14 LEADS SHOWN

CERAMIC DUAL IN–LINE PACKAGE



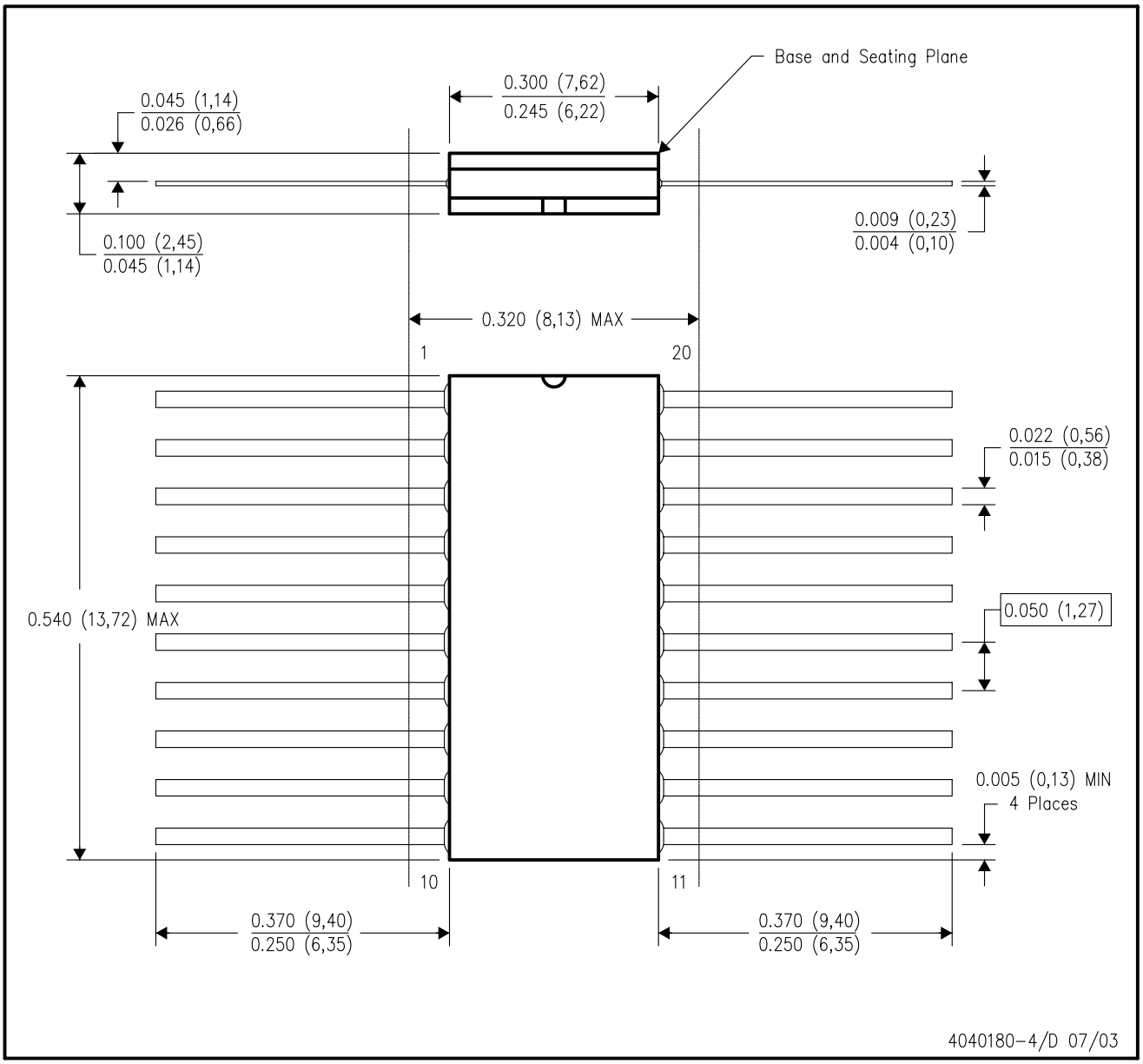
DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



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.

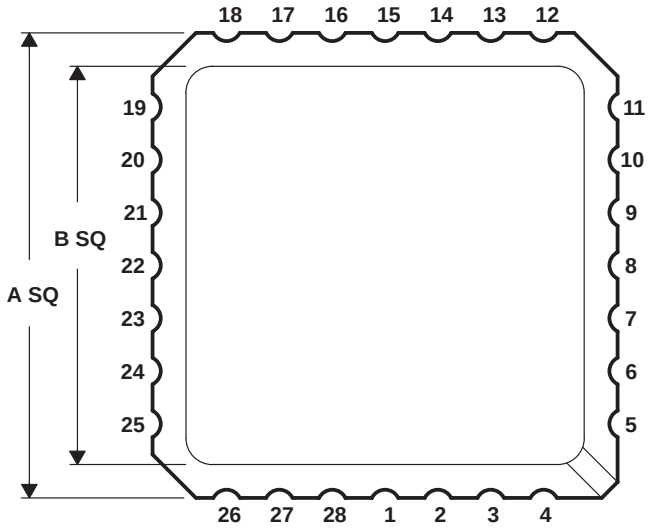
W (R–GDFP–F20) CERAMIC DUAL FLATPACK



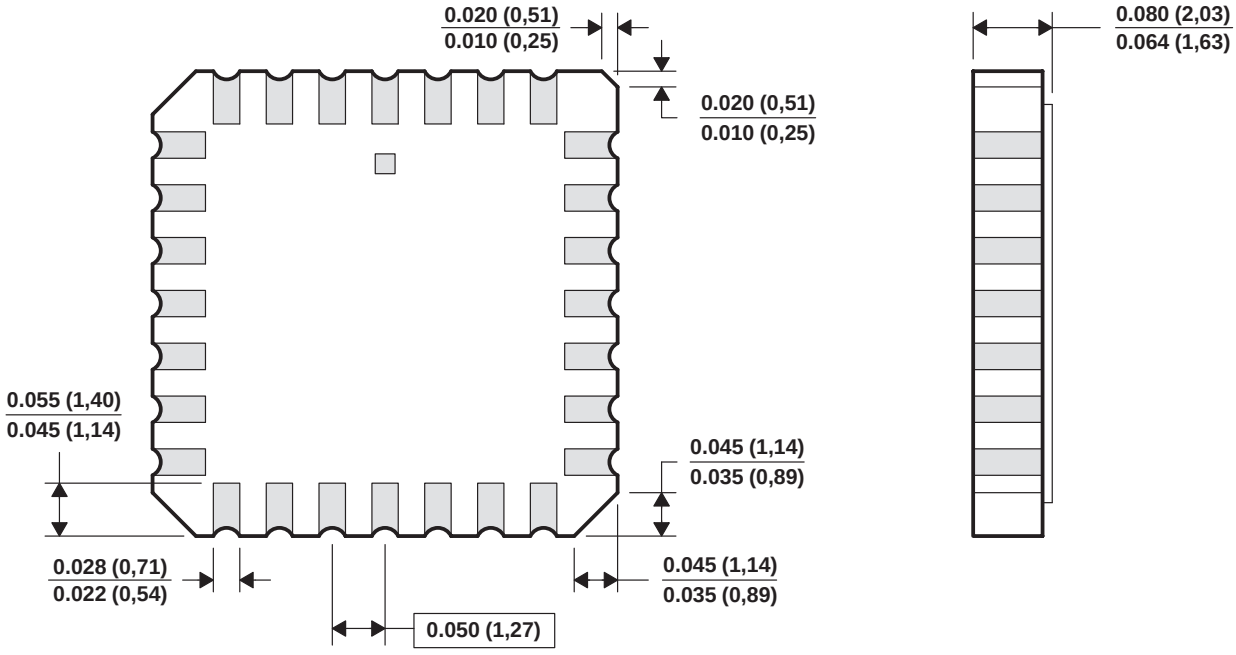
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within Mil–Std 1835 GDFP2–F20

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	0.739 (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)



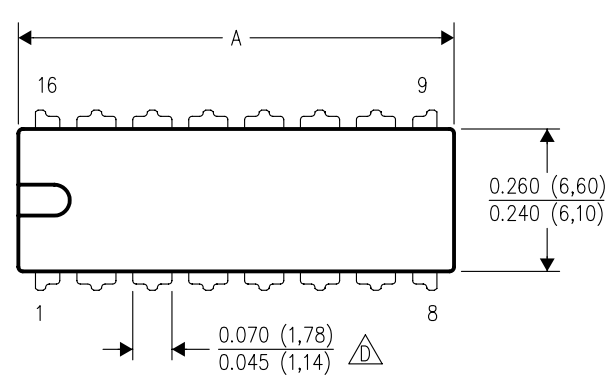
4040140/D 10/96

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. The terminals are gold plated.
E. Falls within JEDEC MS-004

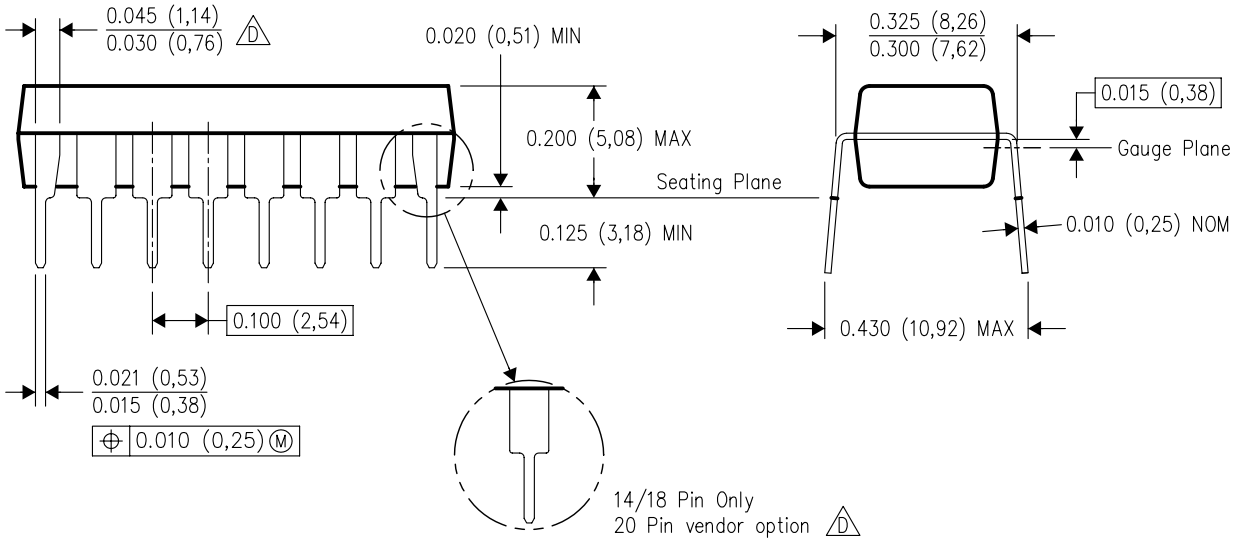
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



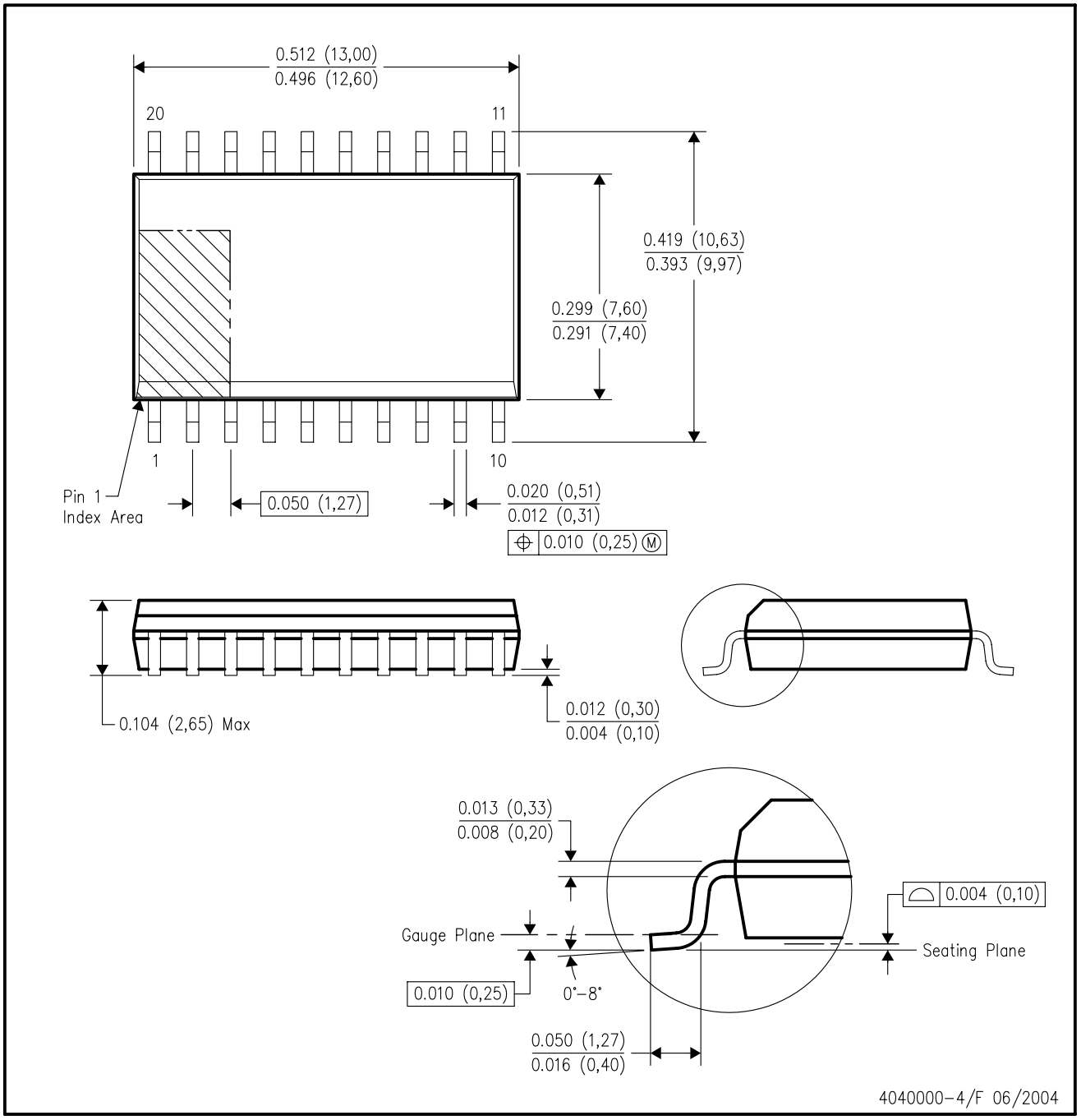
DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



4040049/E 12/2002

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

DW (R–PDSO–G20) PLASTIC SMALL–OUTLINE PACKAGE

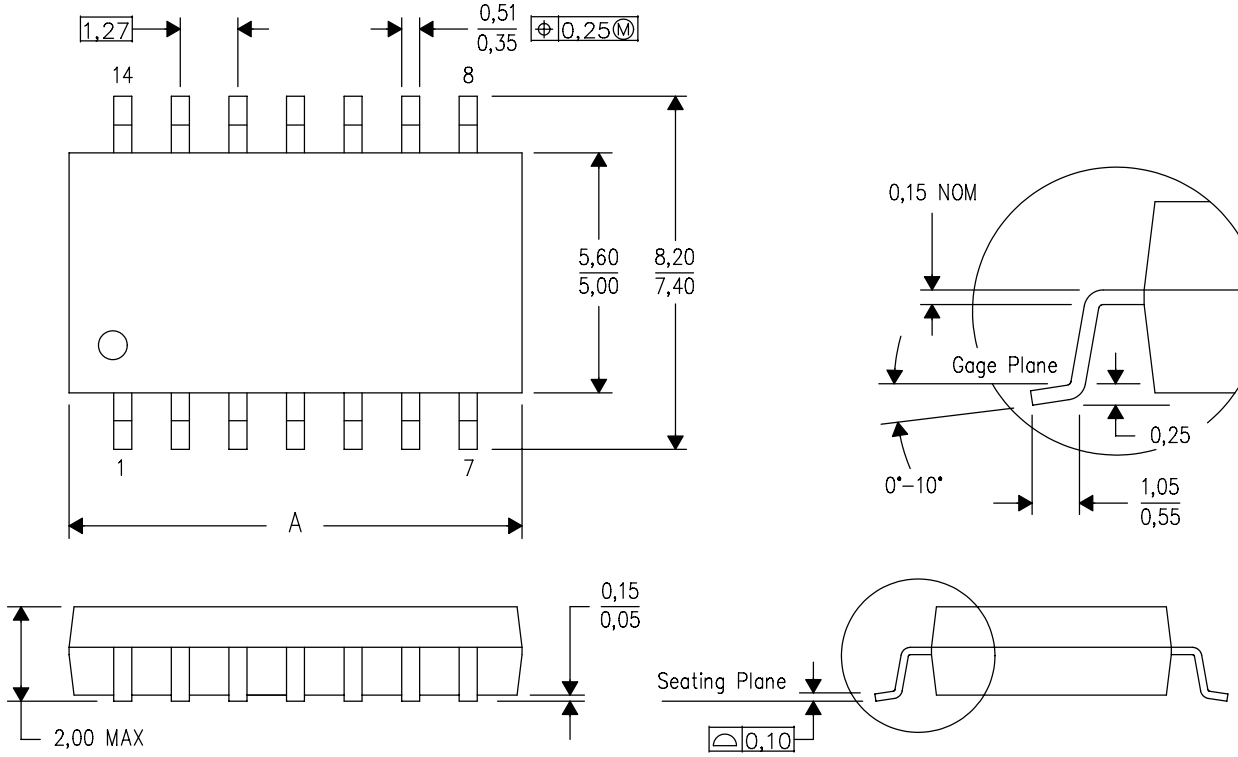


NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–013 variation AC.

MECHANICAL DATA

NS (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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SN74LS640, Status: ACTIVE
Octal bus transceivers

clear gif

Features | Samples | Technical Documents
Quality & Pb-Free Data | Pricing/Packaging | Applications Notes
Related Products | Inventory | Simulation Models
Tools & Software | Symbols/Footprints | Reference Designs

Refine Your Selection
- Logic: Standard Transc

Support
- KnowledgeBase
- Contact Technical Supp
- TI Cross Reference
- Training
- Part Marking Lookup
- Part Number Nomencla

Datasheet

Download Datasheet **Octal Bus Transceivers** (sn74ls640.pdf, 744 KB)
01 Mar 1988 Download

	SN54LS640	SN74LS640
Voltage Nodes(V)	5	5
Vcc range(V)	4.5 to 5.5	4.75 to 5.25
Input Level	TTL	TTL
Output Level	TTL	TTL
Output Drive(mA)		-15/24
No. of Outputs	8	8
Logic	Inv	Inv
Static Current		80
tpd max(ns)		15
	Samples	Samples
	Inventory	Inventory

Product Information

Features — **Save this to your personal library**

SN74LS64X-1 Versions Rated at I_{OL} of 48 mA
Bi-directional Bus Transceivers in High-Density 20-Pin Packages
Hysteresis at Bus Inputs Improves Noise Margins
Choice of True or Inverting Logic
Choice of 3-State or Open-Collector Outputs

Description

These octal bus transceivers are designed for asynchronous two-way communication between data buses. The 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 enable input (G\) can be used to disable the device so the buses are effectively isolated.

The -1 versions of the SN74LS640 thru SN74LS642, SN74LS644, and SN74LS645 are identical to the standard versions except that the recommended maximum I_{OL} is increased to 48 milliamperes. There are no -1 versions of the SN54LS640 thru SN54LS642, SN54LS644, and SN54LS645.

The SN54LS640 thru SN54LS642, SN54LS644, and SN54LS645 are characterized for operation over the full military temperature range of -55°C to 125°C. The SN74LS640 thru SN74LS642, SN74LS644, and SN74LS645 are characterized for operation from 0°C to 70°C.

Pricing/Packaging/CAD Design Tools/Samples

			Price	Packaging			CAD Design Tools	Samples
Device	Status	Temp (°C)	Budget Price ($US) | QTY	Industry Standard (TI Pkg) | Pins	Top Side Marking	Standard Pack Quantity	Footprints	Samples
SN74LS640-1DW	ACTIVE	0 to 70	2.64 | 1KU	SOIC (DW) | 20	View	25		Purchase Samples
SN74LS640-1DWE4	ACTIVE	0 to 70	2.64 | 1KU	SOIC (DW) | 20	View	25		Purchase Samples
SN74LS640-1DWR	OBSOLETE	0 to 70		SOIC (DW) | 20	View			Not Available
SN74LS640-1N	ACTIVE	0 to 70	2.64 | 1KU	PDIP (N) | 20	View	20		Purchase Samples
SN74LS640-1NE4	ACTIVE	0 to 70	2.64 | 1KU	PDIP (N) | 20	View	20		Purchase Samples
SN74LS640-1NSR	ACTIVE	0 to 70	2.64 | 1KU	SO (NS) | 20	View	2000		Purchase Samples
SN74LS640-1NSRE4	ACTIVE	0 to 70	2.64 | 1KU	SO (NS) | 20	View	2000		Purchase Samples
SN74LS640DW	ACTIVE	0 to 70	0.95 | 1KU	SOIC (DW) | 20	View	25		Purchase Samples
SN74LS640DWE4	ACTIVE	0 to 70	0.95 | 1KU	SOIC (DW) | 20	View	25		Purchase Samples
SN74LS640DWR	ACTIVE	0 to 70	0.95 | 1KU	SOIC (DW) | 20	View	2000		Purchase Samples
SN74LS640DWRE4	ACTIVE	0 to 70	0.95 | 1KU	SOIC (DW) | 20	View	2000		Purchase Samples
SN74LS640N	ACTIVE	0 to 70	0.95 | 1KU	PDIP (N) | 20	View	20		Contact TI Distributor or Sales Office
SN74LS640N3	OBSOLETE	0 to 70		PDIP (N) | 20	View			Not Available
SN74LS640NE4	ACTIVE	0 to 70	0.95 | 1KU	PDIP (N) | 20	View	20		Request Free Samples
SN74LS640NSR	ACTIVE	0 to 70	0.95 | 1KU	SO (NS) | 20	View	2000		Purchase Samples
SN74LS640NSRE4	ACTIVE	0 to 70	0.95 | 1KU	SO (NS) | 20	View	2000		Purchase Samples

Inventory

View all Distributors

Choose a Region

	TI Inventory Status			Reported Distributor Inventory			
SN74LS640-1DW	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	In Progress QTY | Date	Lead Time	Region	Company	In Stock	Purchase
	0*	4025 | 12 Dec	8 Weeks	Americas	Avnet	75	
		>10k | 30 Jan		Europe	Arrow Northern Europe	200	
					Avnet-SILICA	500	
					EBV Elektronik	975	
SN74LS640-1DWE4	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	In Progress QTY | Date	Lead Time	Region	Company	In Stock	Purchase
	0*	4025 | 12 Dec	8 Weeks	None Reported View Distributors			
		>10k | 30 Jan					
SN74LS640-1N	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	In Progress QTY | Date	Lead Time	Region	Company	In Stock	Purchase

	0*	60 | 26 Jan	10 Weeks	Americas	Avnet	280	
		>10k | 30 Jan		Europe	Abacus Polar	817	
					Arrow Northern Europe	60	
					Avnet-SILICA	120	
					EBV Elektronik	400	
SN74LS640-1NE4	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	0*	60 | 26 Jan	10 Weeks	None Reported View Distributors			
		>10k | 30 Jan					
SN74LS640-1NSR	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	0*	1399 | 1 Dec	8 Weeks	None Reported View Distributors			
		2000 | 5 Dec					
		>10k | 3 Feb					
SN74LS640-1NSRE4	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	0*	1399 | 1 Dec	8 Weeks	None Reported View Distributors			
		2000 | 5 Dec					
		>10k | 3 Feb					
SN74LS640DW	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	0*	7800 | 12 Dec	8 Weeks	Americas	Avnet	5	
		>10k | 30 Jan		Europe	Arrow Southern Europe	70	
					Avnet-SILICA	75	
					EBV Elektronik	200	
					Spoerle	25	
SN74LS640DWE4	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	0*	7800 | 12 Dec	8 Weeks	None Reported View Distributors			
		>10k | 30 Jan					
SN74LS640DWR	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	2000*	>10k | 30 Jan	8 Weeks	None Reported View Distributors			
SN74LS640DWRE4	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	2000*	>10k | 30 Jan	8 Weeks	None Reported View Distributors			
SN74LS640N	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**

	0*	1600 | 26 Jan	10 Weeks	Americas	DigiKey	248	
		>10k | 30 Jan		Europe	Avnet-SILICA	80	
					EBV Elektronik	880	
					Spoerle	1k	
SN74LS640NE4	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	0*	1600 | 26 Jan	10 Weeks	None Reported View Distributors			
		>10k | 30 Jan					
SN74LS640NSR	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	0*	886 | 12 Dec	10 Weeks	None Reported View Distributors			
		>10k | 6 Feb					
SN74LS640NSRE4	As of 9:09 AM GMT, 29 Nov 2005			As of 9:09 AM GMT, 29 Nov 2005			
	In Stock	**In Progress QTY | Date**	**Lead Time**	**Region**	**Company**	**In Stock**	**Purchase**
	0*	886 | 12 Dec	10 Weeks	None Reported View Distributors			
		>10k | 6 Feb					

* Our information is updated daily, so please check back with us soon if this does not meet your needs. You may also contact your TI Authorized Distributor, including those listed above, for real time stock information.

** Lead time information is not available at this time. However, our information is updated daily so please check back with us soon. Please contact your preferred TI Authorized Distributor for additional information.

Quality & Lead (Pb)-Free Data

	Product Content				MTBF/FIT Rate
Device	**Eco Plan***	**Lead/Ball Finish**	**MSL Rating/Peak Reflow**	**Details**	**Details**
SN74LS640-1DW	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640-1DWE4	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640-1N	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC	View	View
SN74LS640-1NE4	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC	View	View
SN74LS640-1NSR	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640-1NSRE4	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640DW	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640DWE4	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640DWR	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640DWRE4	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640N	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC	View	View
SN74LS640NE4	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC	View	View
SN74LS640NSR	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View
SN74LS640NSRE4	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	View	View

* The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please click on the Product Content Details "View" link in the table above for the latest availability information and additional product content details.

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