SLLS074C – SEPTEMBER 1973 – REVISED MAY 1998

- **Designed for Digital Data Transmission Over 50-Ω to 500-Ω Coaxial Cable, Strip Line, or Twisted Pair**
- **High Speed**
  t_{pd} = 20 ns Maximum at C_L = 15 pF
- **TTL Compatible With Single 5-V Supply**
- **2.4-V Output at I_{OH} = −75 mA**
- **Uncommitted Emitter-Follower Output Structure for Party-Line Operation**
- **Short-Circuit Protection**
- **AND-OR Logic Configuration**
- **Designed for Use With Triple Line Receivers SN55122, SN75122**
- **Designed to Be Interchangeable With Signetics N8T13**

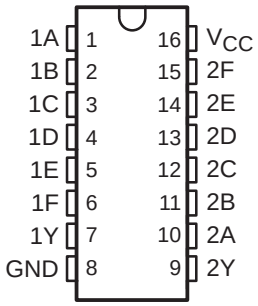
description

The SN55121 and SN75121 dual line drivers are designed for digital data transmission over lines having impedances from 50 to 500 Ω. They are also compatible with standard TTL logic and supply-voltage levels.

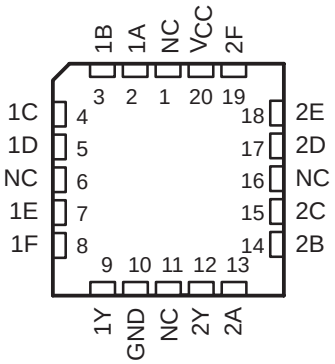
The low-impedance emitter-follower outputs of the SN55121 and SN75121 can drive terminated lines such as coaxial cable or twisted pair. Having the outputs uncommitted allows wired-OR logic to be performed in party-line applications. Output short-circuit protection is provided by an internal clamping network that turns on when the output voltage drops below approximately 1.5 V. All of the inputs are in conventional TTL configuration and the gating can be used during power-up and power-down sequences to ensure that no noise is introduced to the line.

The SN55121 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN75121 is characterized for operation from 0°C to 70°C.

SN55121 . . . J PACKAGE
SN75121 . . . D OR N PACKAGE
(TOP VIEW)



SN55121 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

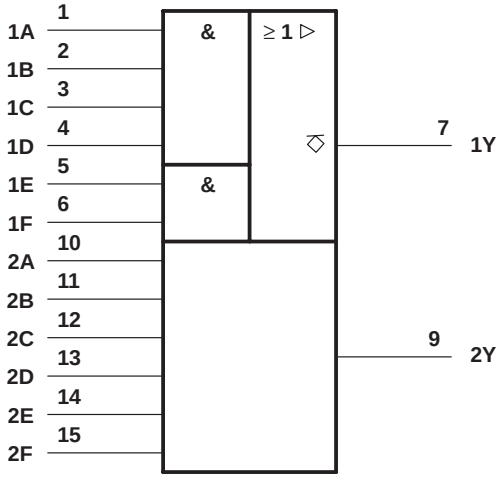
THE SN75121 IS NOT RECOMMENDED FOR NEW DESIGNS

FUNCTION TABLE

INPUTS						OUTPUT
A	B	C	D	E	F	Y
H	H	H	H	X	X	H
X	X	X	X	H	H	H
All other input combinations						L

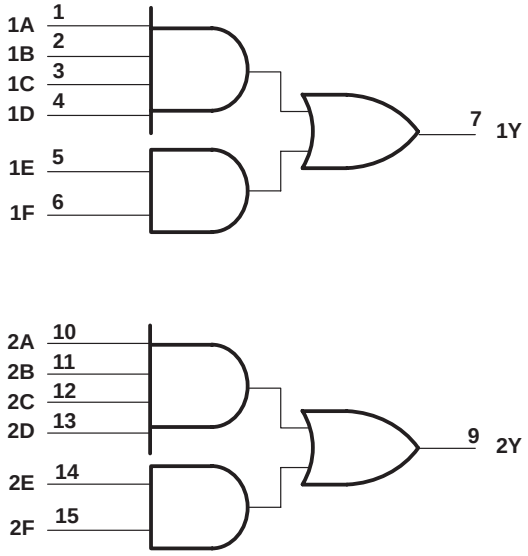
H = high level, L = low level, X = irrelevant

logic symbol†

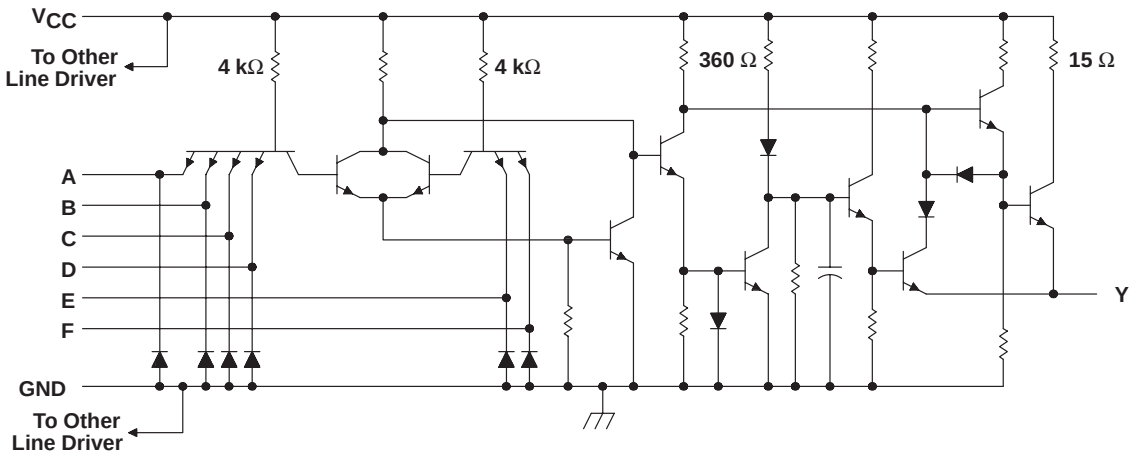


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the D, J, and N packages.

logic diagram (positive logic)



schematic (each driver)



All resistor values shown are nominal.

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

Supply voltage, V_{CC} (see Note 1) . . . . . 6 V
Input voltage . . . . . 6 V
Output voltage . . . . . 6 V
Continuous total power dissipation . . . . . See Dissipation Rating Table
Storage temperature range, T_{stg} . . . . . –65°C to 150°C
Case temperature for 60 seconds: FK package . . . . . 260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J package . . . . . 300°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or N package . . . . . 260°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: All voltage values are with respect to both ground terminals connected together.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 125°C$ POWER RATING
D	950 mW	7.6 mW/°C	608 mW	—
FK‡	1375 mW	11.0 mW/°C	880 mW	275 mW
J‡	1375 mW	11.0 mW/°C	880 mW	275 mW
N	1150 mW	9.2 mW/°C	736 mW	—

‡ In the FK and J packages, SN55121 chips are either silver glass or alloy mounted.

recommended operating conditions

	SN55121			SN75121			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.75	5	5.25	4.75	5	5.25	V
High-level input voltage, V_{IH}	2			2			V
Low-level input voltage, V_{IL}			0.8			0.8	V
High-level output current, I_{OH}			–75			–75	mA
Operating free-air temperature, T_A	–55		125	0		70	°C

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS			MIN	MAX	UNIT
V_{IK}	Input clamp voltage	V_{CC} = 5 V,	I_I = –12 mA			–1.5	V
$V_{(BR)}$	Breakdown voltage	V_{CC} = 5 V,	I_I = 10 mA		5.5		V
V_{OH}	High-level output voltage	V_{IH} = 2 V,	I_{OH} = –75 mA,	See Note 2	2.4		V
I_{OH}	High-level output current	V_{CC} = 5 V, T_A = 25°C,	V_{IH} = 4.5 V, See Note 2	V_{OH} = 2 V,	–100	–250	mA
I_{OL}	Low-level output current	V_{IL} = 0.8 V,	V_{OL} = 0.4 V,	See Note 2		–800	μA
$I_{O(off)}$	Off-state output current	V_{CC} = 3 V,	V_O = 3 V			500	μA
I_{IH}	High-level output current	V_I = 4.5 V				40	μA
I_{IL}	Low-level output current	V_I = 0.4 V			–0.1	–1.6	mA
I_{OS}	Short-circuit output current†	V_{CC} = 5 V,	T_A = 25°C			–30	mA
I_{CCH}	Supply current, outputs high	V_{CC} = 5.25 V,	All inputs at 2 V,	Outputs open		28	mA
I_{CCL}	Supply current, outputs low	V_{CC} = 5.25 V,	All inputs at 0.8 V,	Outputs open		60	mA

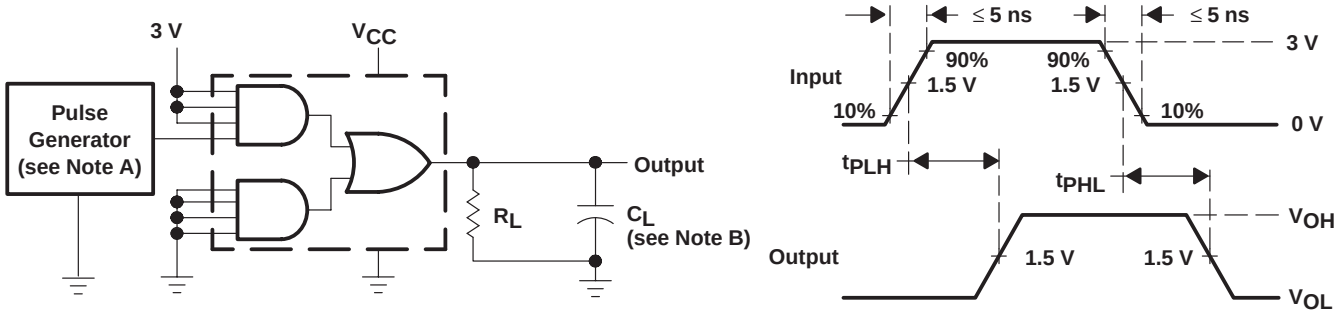
† Not more than one output should be shorted at a time.

NOTE 2: The output voltage and current limits are valid for any appropriate combination of high and low inputs specified by the function table for the desired output.

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

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high level output	R_L = 37 Ω,	C_L = 15 pF,	See Figure 1		11	20	ns
t_{PHL}	Propagation delay time, high-to-low level output					8	20	
t_{PLH}	Propagation delay time, low-to-high level output	R_L = 37 Ω,	C_L = 1000 pF,	See Figure 1		22	50	ns
t_{PHL}	Propagation delay time, high-to-low level output					20	50	

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT VOLTAGE WAVEFORMS

NOTES: A. The pulse generator has the following characteristics: $Z_O \approx 50\ \Omega$, t_W = 200 ns, duty cycle ≤ 50%, PRR ≤ 500 kHz.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

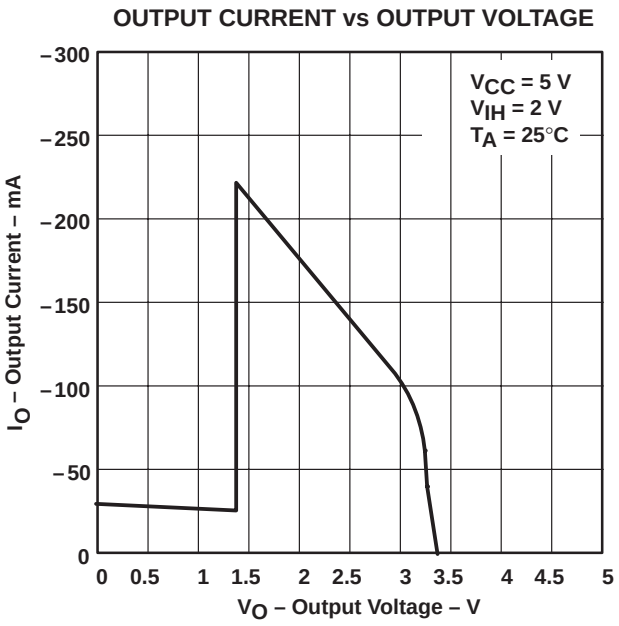


Figure 2

APPLICATION INFORMATION

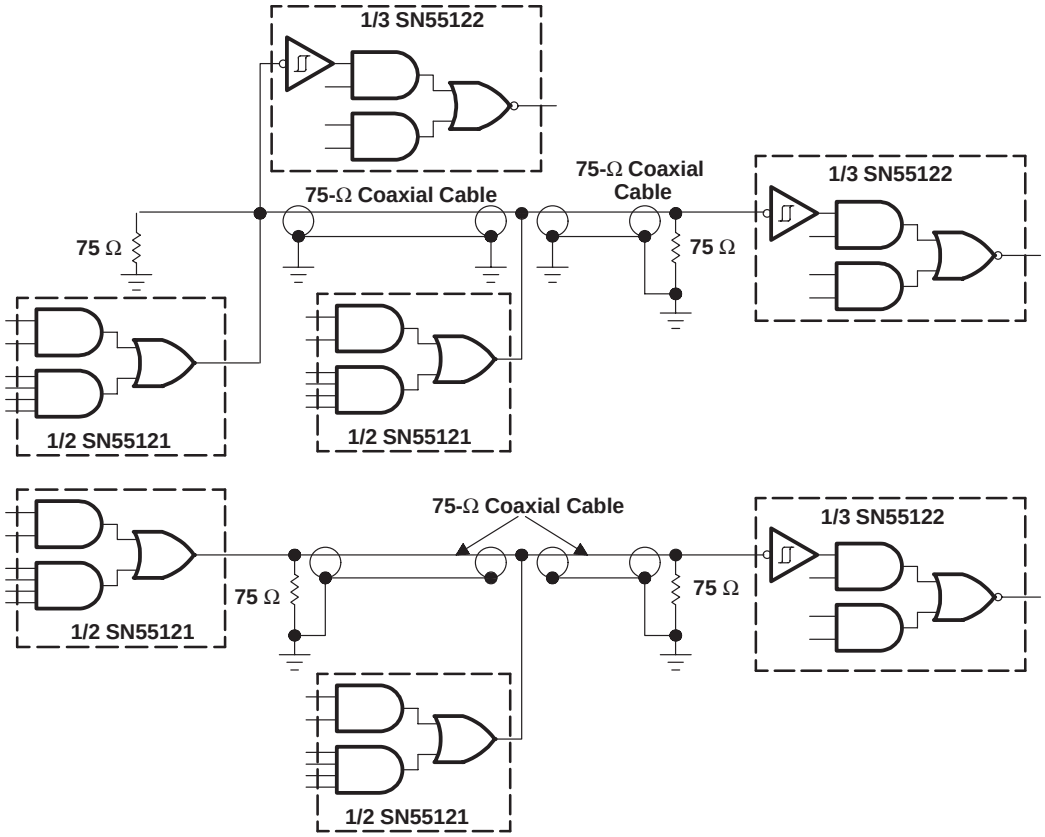


Figure 3. Single-Ended Party-Line Circuits

10-Jun-2014

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
SN55121J	OBSOLETE	CDIP	J	16		TBD	Call TI	Call TI	-55 to 125		
SN75121D	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70		
SN75121N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN75121N	Samples
SN75121NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75121	Samples
SNJ55121FK	OBSOLETE	LCCC	FK	20		TBD	Call TI	Call TI	-55 to 125		
SNJ55121J	OBSOLETE	CDIP	J	16		TBD	Call TI	Call TI	-55 to 125		

(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), Pb-Free (RoHS Exempt), 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.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
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.

(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.

OTHER QUALIFIED VERSIONS OF SN55121, SN75121 :

- Catalog: SN75121
- Military: SN55121

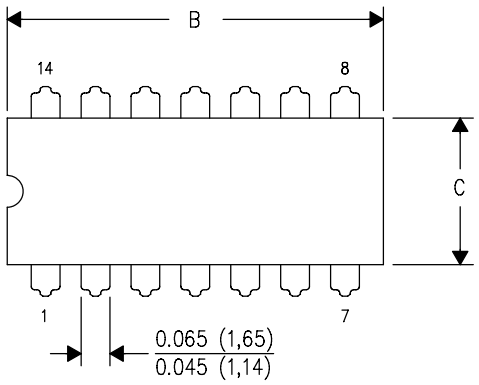
NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

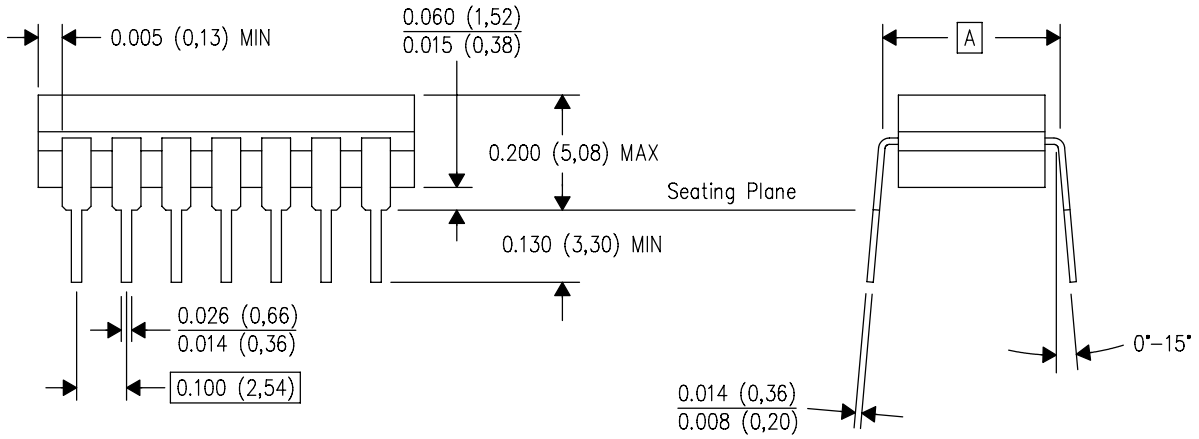
J (R–GDIP–T**)

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)

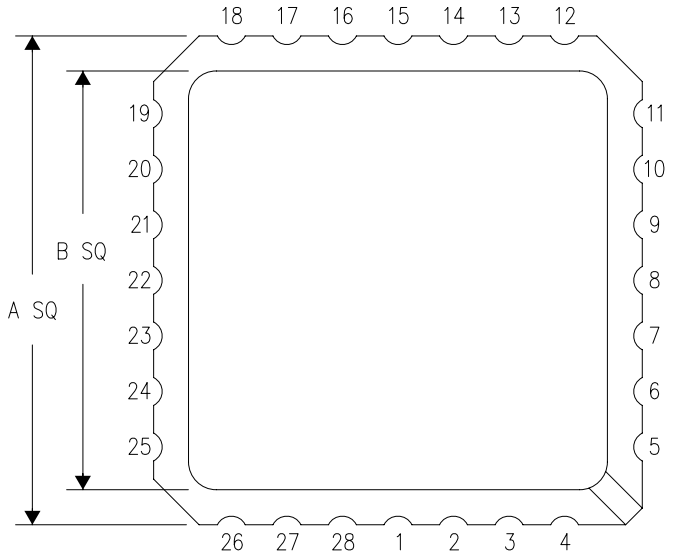


4040083/F 03/03

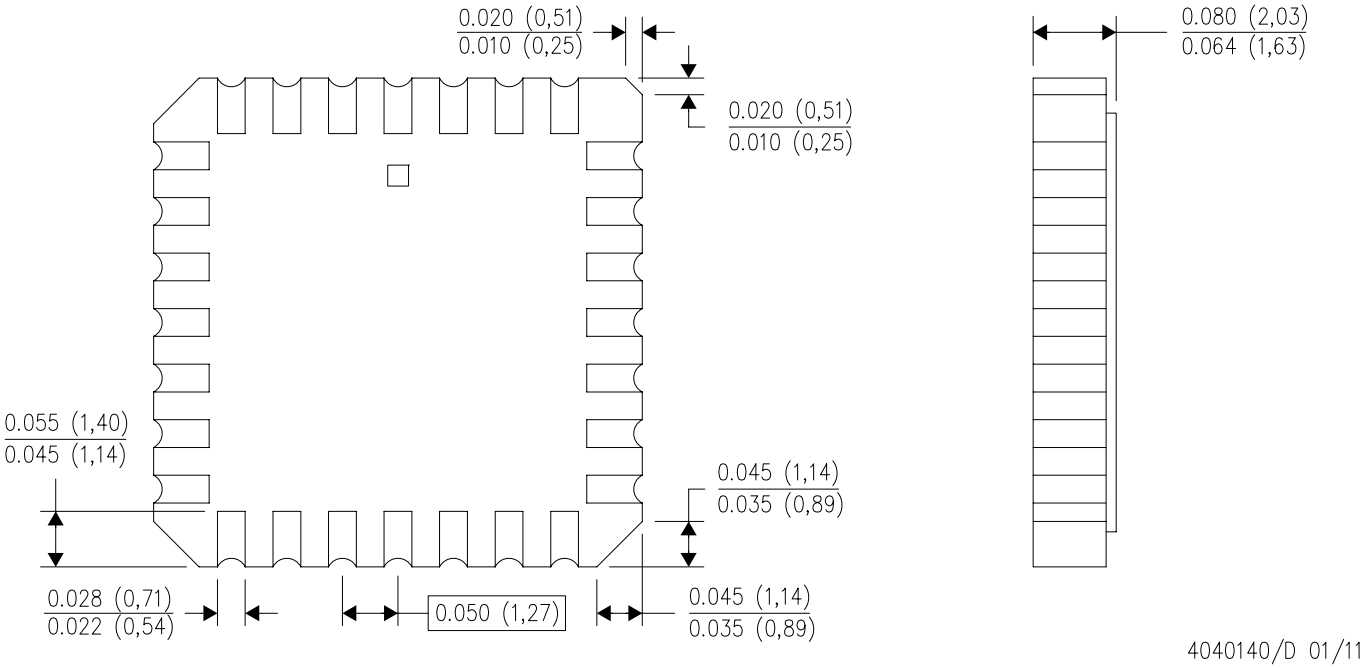
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package is hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
E. Falls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

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)



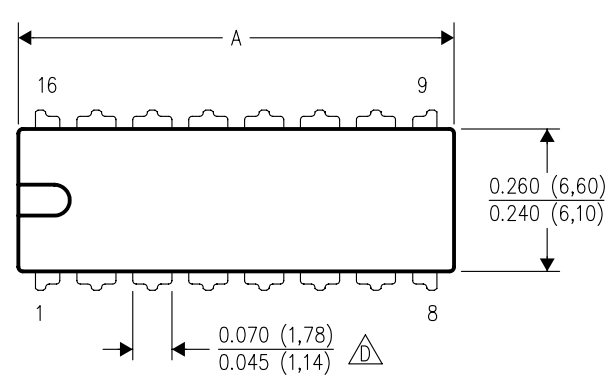
4040140/D 01/11

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

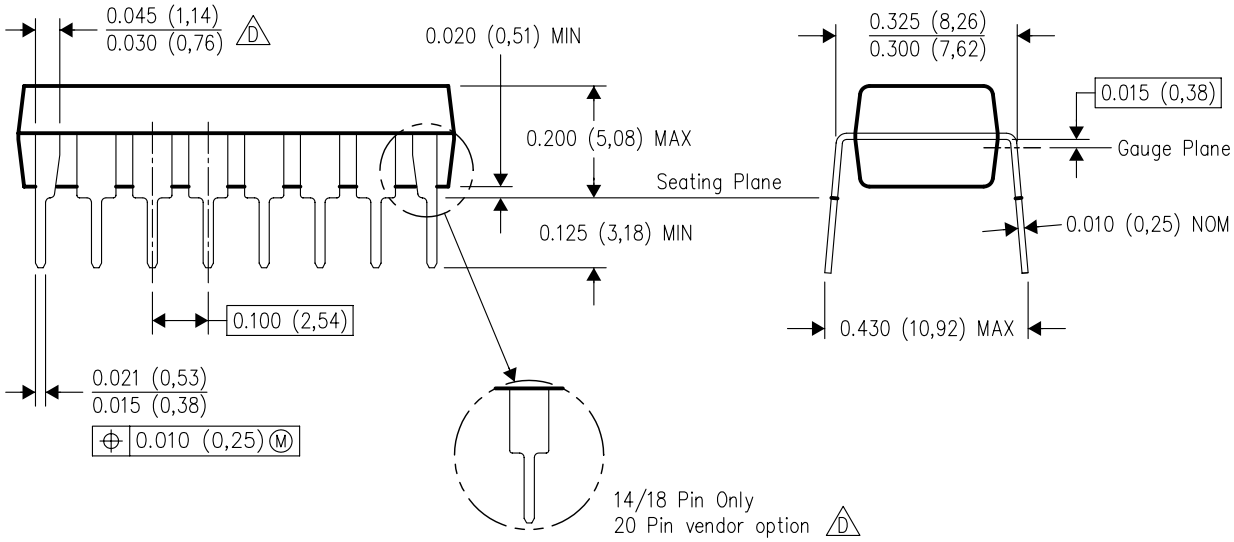
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



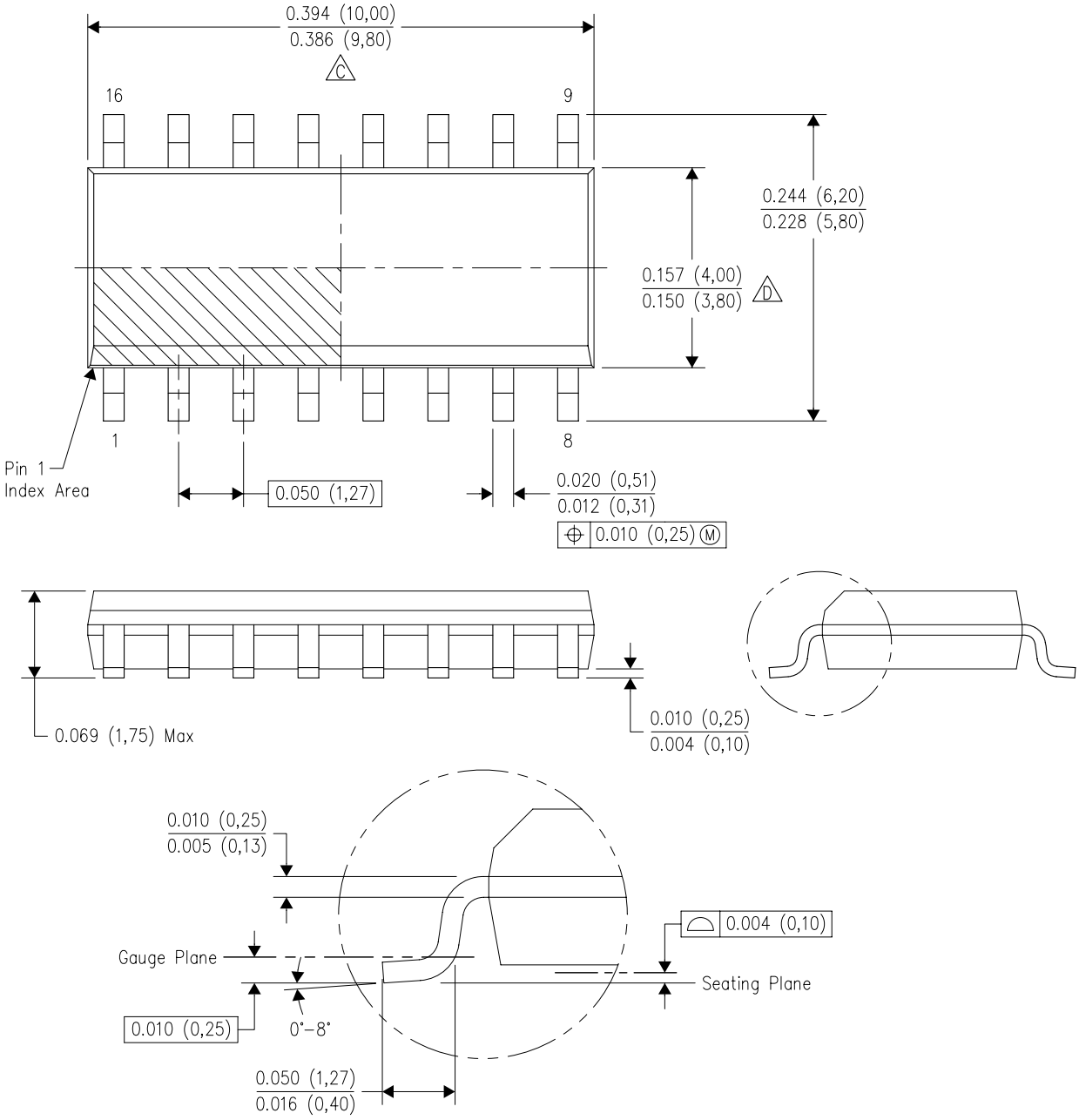
DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



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.

D (R–PDSO–G16) PLASTIC SMALL OUTLINE

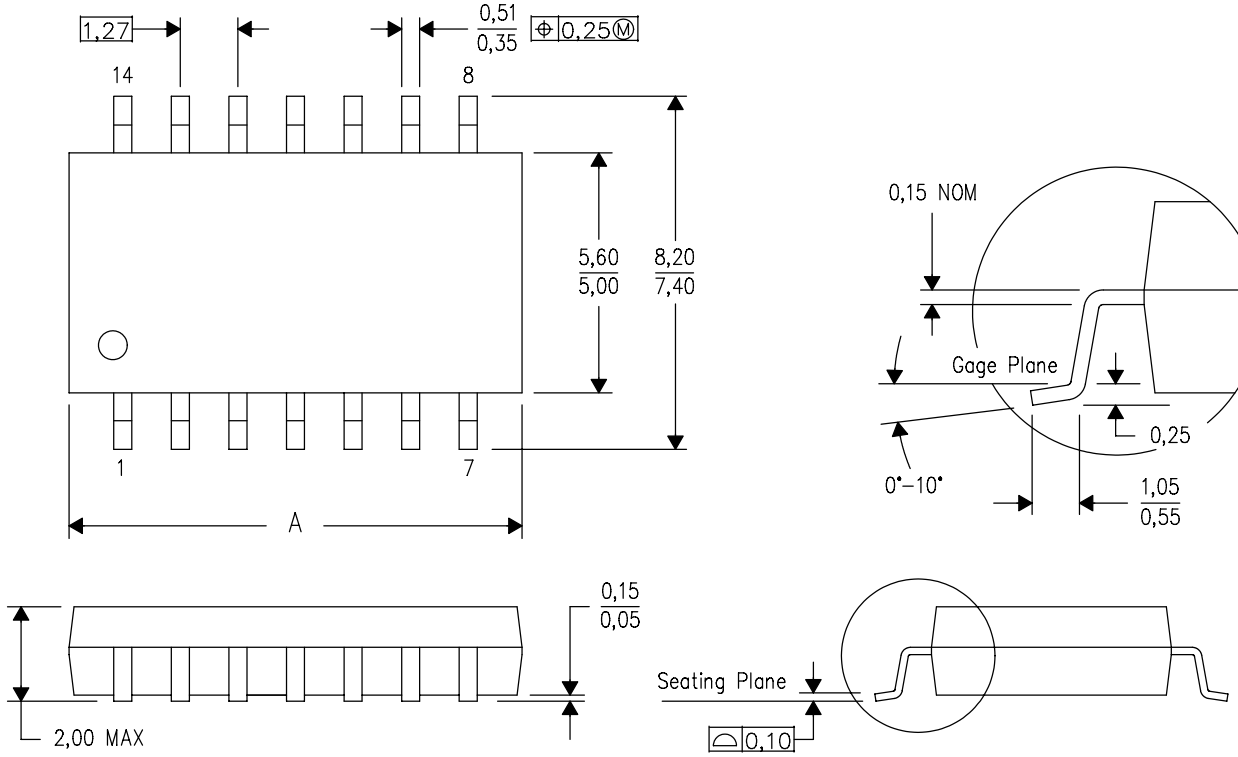


NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
E. Reference JEDEC MS–012 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.