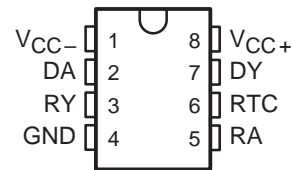


SN75155 LINE DRIVER AND RECEIVER

SLLS017C – JULY 1986 – REVISED MAY 1995

- Meets or Exceeds the Requirements of ANSI EIA/TIA-232-E and ITU Recommendation V.28
- 10-mA Current Limited Output
- Wide Range of Supply Voltage
 $V_{CC} = 4.5 \text{ V to } 15 \text{ V}$
- Low Power . . . 130 mW
- Built-In 5-V Regulator
- Response Control Provides:
Input Threshold Shifting
Input Noise Filtering
- Power-Off Output Resistance . . . 300 Ω Typ
- Driver Input TTL Compatible

D OR P PACKAGE
TOP VIEW

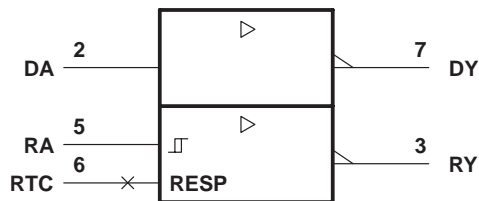


description

The SN75155 monolithic line driver and receiver is designed to satisfy the requirements of the standard interface between data terminal equipment and data communication equipment as defined by ANSI EIA/TIA-232-E. A response control input is provided for the receiver. A resistor or a resistor and a bias voltage can be connected between the response control input and ground to provide noise filtering. The driver used is similar to the SN75188. The receiver used is similar to the SN75189A.

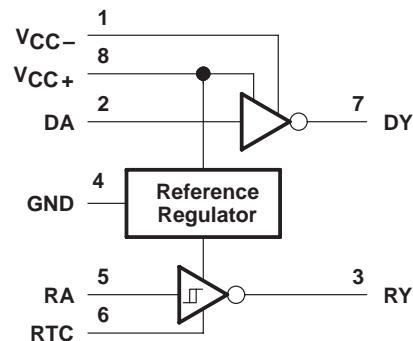
The SN75155 is characterized for operation from 0°C to 70°C.

logic symbol†



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

logic diagram



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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 **TEXAS
INSTRUMENTS**

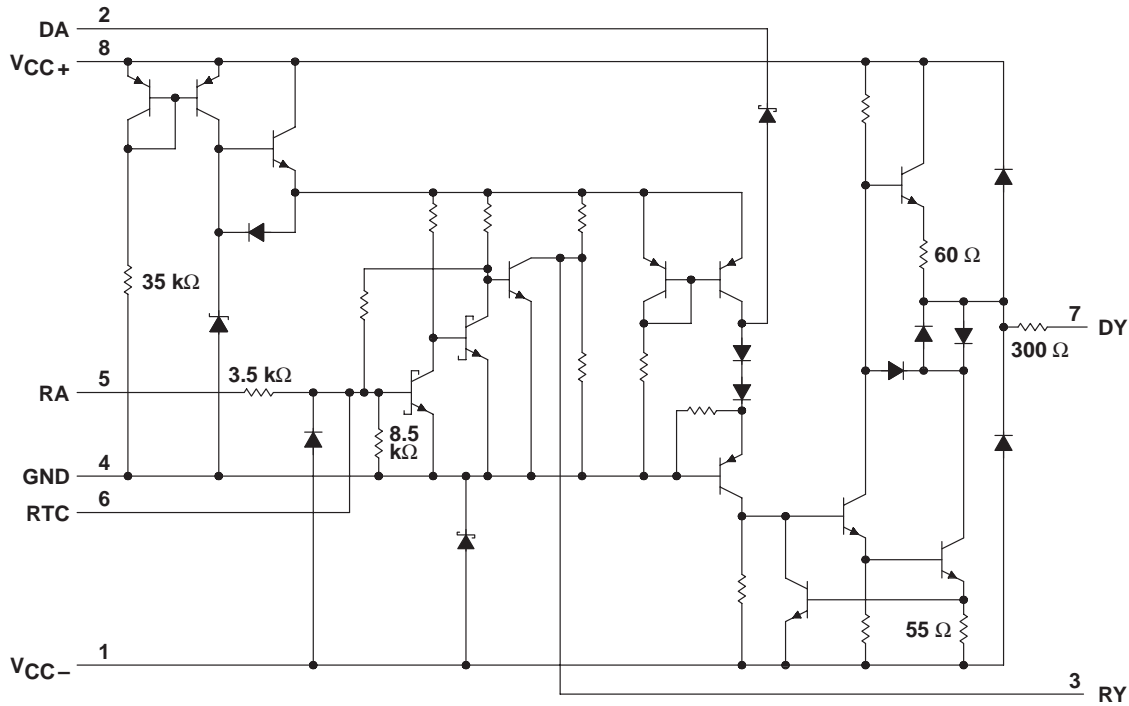
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SN75155 LINE DRIVER AND RECEIVER

SLLS017C – JULY 1986 – REVISED MAY 1995

schematic



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

Supply voltage, V_{CC+} (see Note 1)	15 V
Supply voltage, V_{CC-} (see Note 1)	-15 V
Input voltage range, V_i : Driver	-15 V to 15 V
Receiver	-30 V to 30 V
Output voltage range (driver), V_o	-15 V to 15 V
Continuous total power dissipation	See Dissipation Rating Table
Operating free-air temperature range, T_A	0°C to 70°C
Storage temperature range, T_{stg}	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	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 network ground terminal.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING
D	725 mW	5.8 mW/°C	464 mW
P	1000 mW	8.0 mW/°C	640 mW

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC+}	4.5	12	15	V
Supply voltage, V_{CC-}	-4.5	-12	-15	V
Output voltage, driver, $V_{O(D)}$			±15	V
Input voltage, receiver, $V_{I(R)}$	-25		25	V
High-level input voltage, driver, V_{IH}	2			V
Low-level input voltage, driver, V_{IL}			0.8	V
Response control current			±5.5	mA
Output current, receiver, $I_{O(R)}$			24	mA
Operating free-air temperature, T_A	0		70	°C

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

total device

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
I_{CCH+} High-level supply current	$V_{CC+} = 5\text{ V}, V_{CC-} = -5\text{ V}$		6.3	8.1	mA
	$V_{CC+} = 9\text{ V}, V_{CC-} = -9\text{ V}$		9.1	11.9	
	$V_{CC+} = 12\text{ V}, V_{CC-} = -12\text{ V}$		10.4	14	
I_{CCL+} Low-level supply current	$V_{CC+} = 5\text{ V}, V_{CC-} = -5\text{ V}$		2.5	3.4	mA
	$V_{CC+} = 9\text{ V}, V_{CC-} = -9\text{ V}$		3.7	5.1	
	$V_{CC+} = 12\text{ V}, V_{CC-} = -12\text{ V}$		4.1	5.6	
I_{CC+} Supply current	$V_{CC+} = 5\text{ V}, V_{CC-} = 0$		4.8	6.4	mA
	$V_{CC+} = 9\text{ V}, V_{CC-} = 0$		6.7	9.1	
I_{CCH-} High-level supply current	$V_{CC+} = 5\text{ V}, V_{CC-} = -5\text{ V}$		-2.4	-3.1	mA
	$V_{CC+} = 9\text{ V}, V_{CC-} = -9\text{ V}$		-3.9	-4.9	
	$V_{CC+} = 12\text{ V}, V_{CC-} = -12\text{ V}$		-4.8	-6.1	
I_{CCL-} Low-level supply current	$V_{CC+} = 5\text{ V}, V_{CC-} = -5\text{ V}$		-0.2	-0.35	mA
	$V_{CC+} = 9\text{ V}, V_{CC-} = -9\text{ V}$		-0.25	-0.4	
	$V_{CC+} = 12\text{ V}, V_{CC-} = -12\text{ V}$		-0.27	-0.45	

† All typical values are at $T_A = 25^\circ\text{C}$.

SN75155 LINE DRIVER AND RECEIVER

SLLS017C – JULY 1986 – REVISED MAY 1995

electrical characteristics over recommended operating free-air temperature range, $V_{CC+} = 12\text{ V}$, $V_{CC-} = -12\text{ V}$ (unless otherwise noted)

driver section

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT	
V_{OH} High-level output voltage	$V_{IL} = 0.8\text{ V}$, $R_L = 3\text{ k}\Omega$	$V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$	3.2	3.7	V	
		$V_{CC+} = 9\text{ V}$, $V_{CC-} = -9\text{ V}$	6.5	7.2		
		$V_{CC+} = 12\text{ V}$, $V_{CC-} = -12\text{ V}$	8.9	9.8		
V_{OL} Low-level output voltage (see Note 2)	$V_{IH} = 2\text{ V}$, $R_L = 3\text{ k}\Omega$	$V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$	-3.6	-3.2	V	
		$V_{CC+} = 9\text{ V}$, $V_{CC-} = -9\text{ V}$	-7.1	-6.4		
		$V_{CC+} = 12\text{ V}$, $V_{CC-} = -12\text{ V}$	-9.7	-8.8		
I_{IH} High-level input current	$V_I = 7\text{ V}$			5	μA	
I_{IL} Low-level input current	$V_I = 0$			-0.73	-1.2	mA
$I_{OS(H)}$ High-level short-circuit output current	$V_I = 0.8\text{ V}$, $V_O = 0$	-7	-12	-14.5	mA	
$I_{OS(L)}$ Low-level short-circuit output current	$V_I = 2\text{ V}$, $V_O = 0$	6.5	11.5	15	mA	
r_O Output resistance with power off	$V_O = -2\text{ V}$ to 2 V		300		Ω	

receiver section (see Figure 1)

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT	
V_{IT+} Positive-going input threshold voltage		1.2	1.9	2.3	V	
V_{IT-} Negative-going input threshold voltage		0.6	0.95	1.2	V	
V_{hys} Hysteresis voltage ($V_{IT+} - V_{IT-}$)		0.6			V	
$V_{O(H)}$ High-level output voltage	$V_I = 0.6\text{ V}$, $I_{OH} = 10\text{ }\mu\text{A}$	$V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$	3.7	4.1	4.5	V
		$V_{CC+} = 12\text{ V}$, $V_{CC-} = -12\text{ V}$	4.4	4.7	5.2	
	$V_I = 0.6\text{ V}$, $I_{OH} = 0.4\text{ mA}$	$V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$	3.1	3.4	3.8	
		$V_{CC+} = 12\text{ V}$, $V_{CC-} = -12\text{ V}$	3.6	4	4.5	
$V_{O(L)}$ Low-level output voltage	$V_I = 2.3\text{ V}$, $I_{OL} = 24\text{ mA}$		0.2	0.3	V	
I_{IH} High-level input current	$V_I = 2.5\text{ V}$	3.6	6.7	10	mA	
	$V_I = 3\text{ V}$	0.43	0.67	1	mA	
I_{IL} Low-level input current	$V_I = -25\text{ V}$	-3.6	-6.7	-10	mA	
	$V_I = -3\text{ V}$	-0.43	-0.67	-1	mA	
I_{OS} Short-circuit output current	$V_I = 0.6\text{ V}$		-2.8	-3.7	mA	

† All typical values are at $T_A = 25^\circ\text{C}$.

NOTE 2: The algebraic limit system, in which the more positive (less negative) limit is designated as maximum, is used in this data sheet for logic voltage levels only (e.g., if -8.8 V is the maximum, the typical value is a more negative value).



switching characteristics over recommended operating free-air temperature range, $V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$, $C_L = 50\text{ pF}$ (unless otherwise noted)

driver section (see Figure 2)

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
t_{PLH} Propagation delay time, low- to high level output	$R_L = 3\text{ k}\Omega$		250	480	ns
t_{PHL} Propagation delay time, high- to low level output			80	150	
t_r Output rise time	$R_L = 3\text{ k}\Omega$		67	180	ns
	$R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$, $C_L = 2500\text{ pF}$		2.4	3	μs
t_f Output fall time	$R_L = 3\text{ k}\Omega$		48	160	ns
	$R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$, $C_L = 2500\text{ pF}$		1.9	3	μs

receiver section (see Figure 3)

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
t_{PLH} Propagation delay time, low- to high level output	$R_L = 400\ \Omega$		175	245	ns
t_{PHL} Propagation delay time, high- to low level output			37	100	
t_r Output rise time	$R_L = 400\ \Omega$		255	360	ns
t_f Output fall time	$R_L = 400\ \Omega$		23	50	ns

† All typical values are at $T_A = 25^\circ\text{C}$.

PARAMETER MEASUREMENT INFORMATION

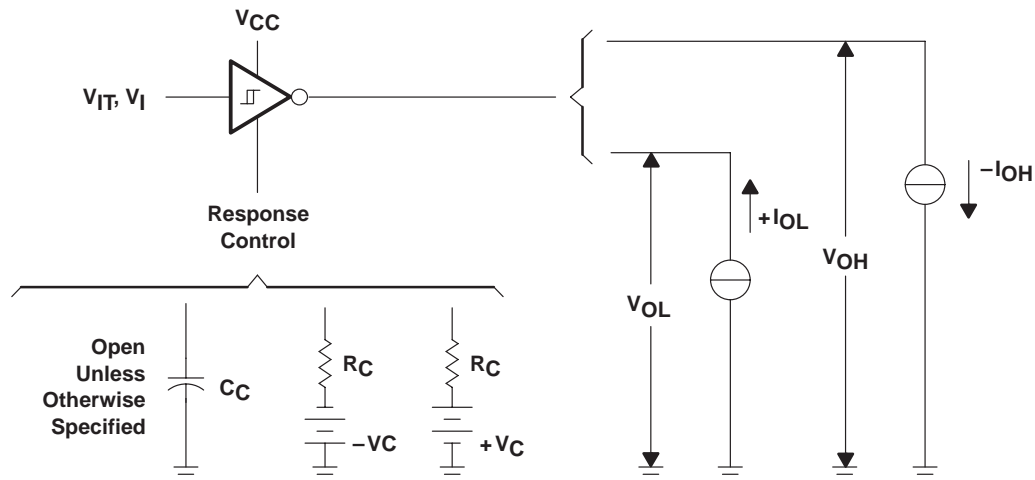
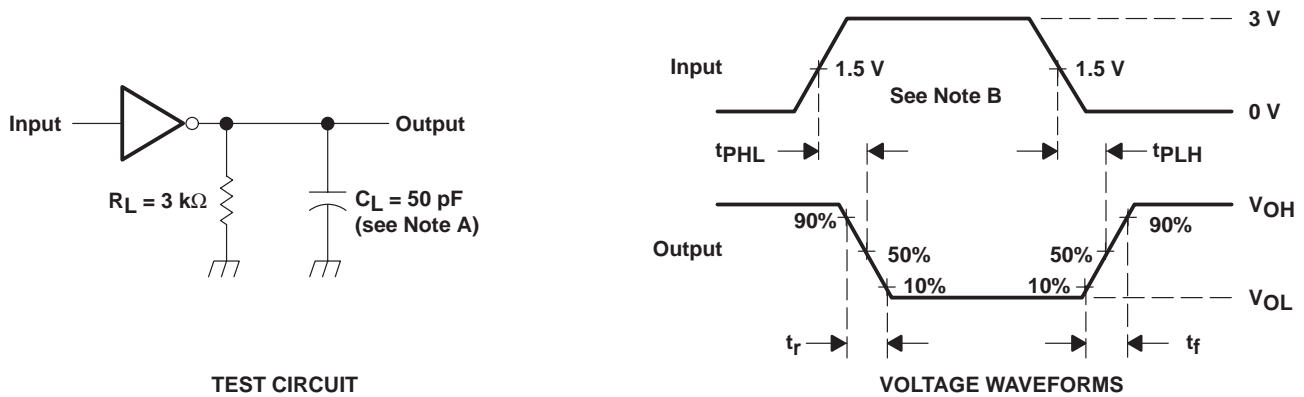


Figure 1. Receiver Section Test Circuit (V_{IT+} , V_{IT-} , V_{OH} , V_{OL})

SN75155 LINE DRIVER AND RECEIVER

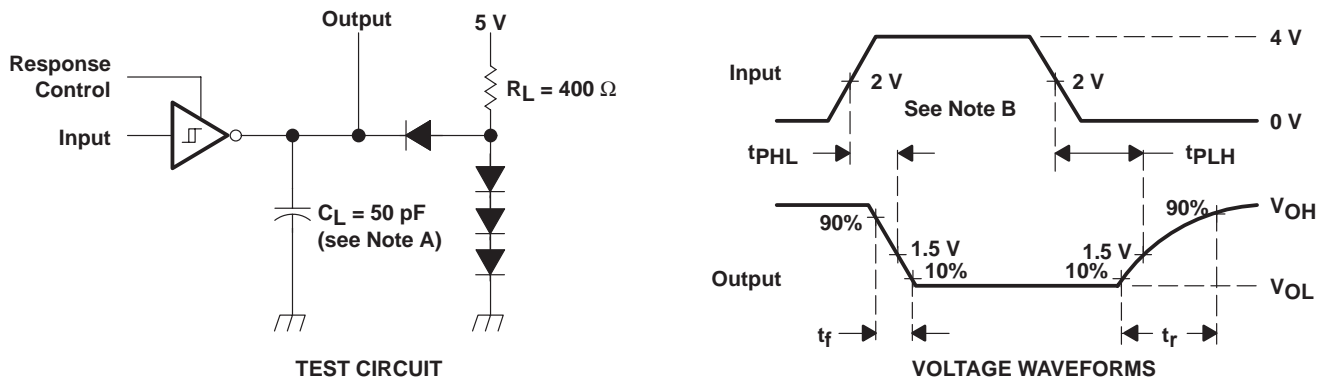
SLLS017C – JULY 1986 – REVISED MAY 1995

PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and jig capacitance.
 B. The input waveform is supplied by a generator with the following characteristics: $Z_O = 50 \Omega$, $t_W = 1 \mu s$, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

Figure 2. Driver Section Switching Test Circuit and Voltage Waveforms



- NOTES: A. C_L includes probe and jig capacitance.
 B. The input waveform is supplied by a generator with the following characteristics: $Z_O = 50 \Omega$, $t_W = 1 \mu s$, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

Figure 3. Receiver Section Switching Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

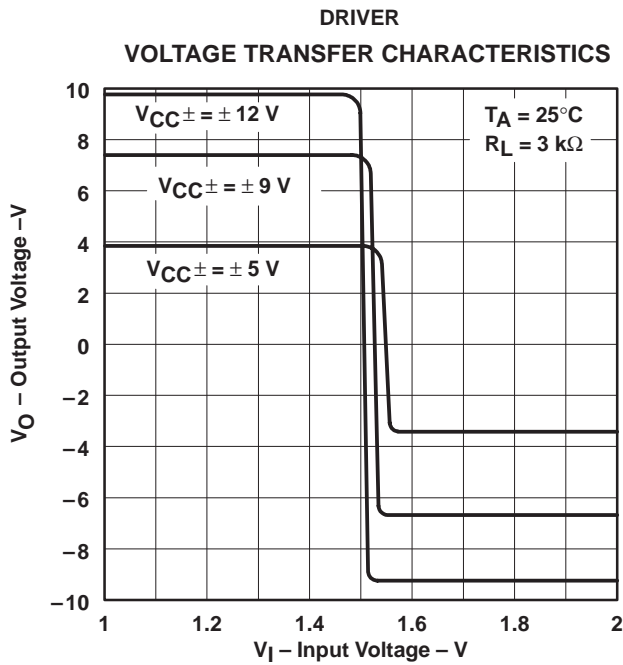


Figure 4

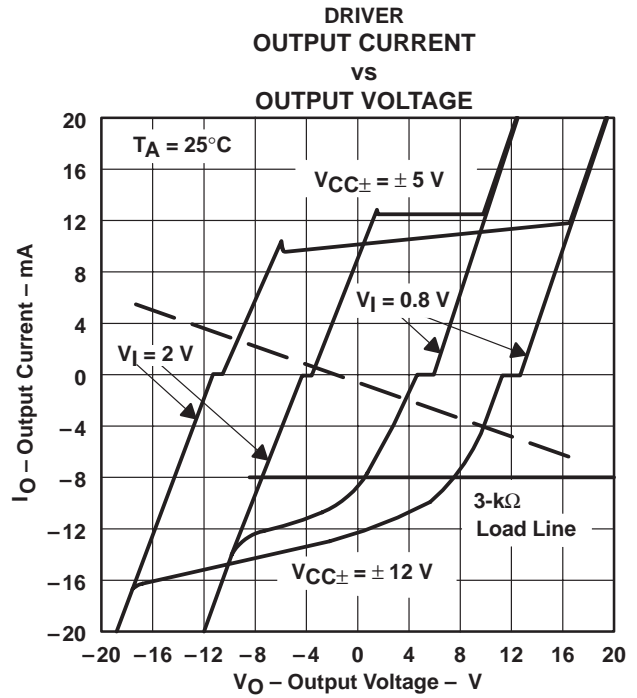


Figure 5

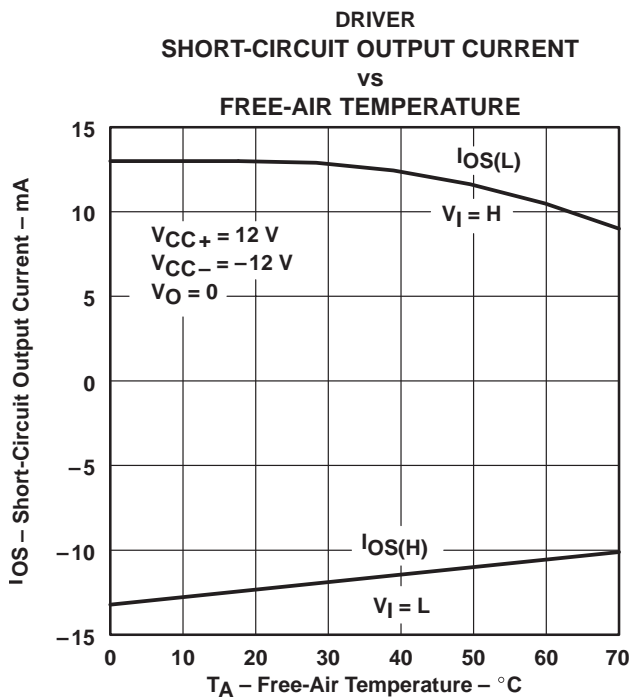


Figure 6

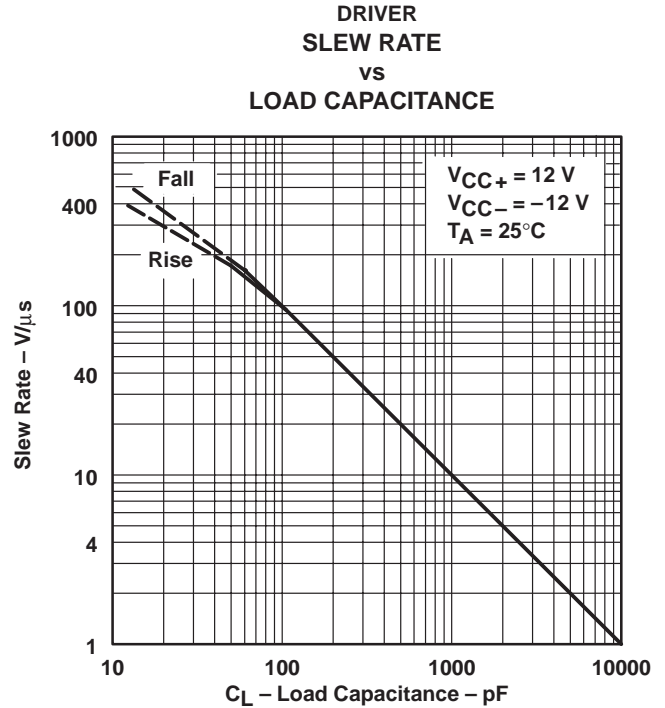


Figure 7

SN75155 LINE DRIVER AND RECEIVER

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TYPICAL CHARACTERISTICS

RECEIVER
OUTPUT VOLTAGE
vs
INPUT VOLTAGE

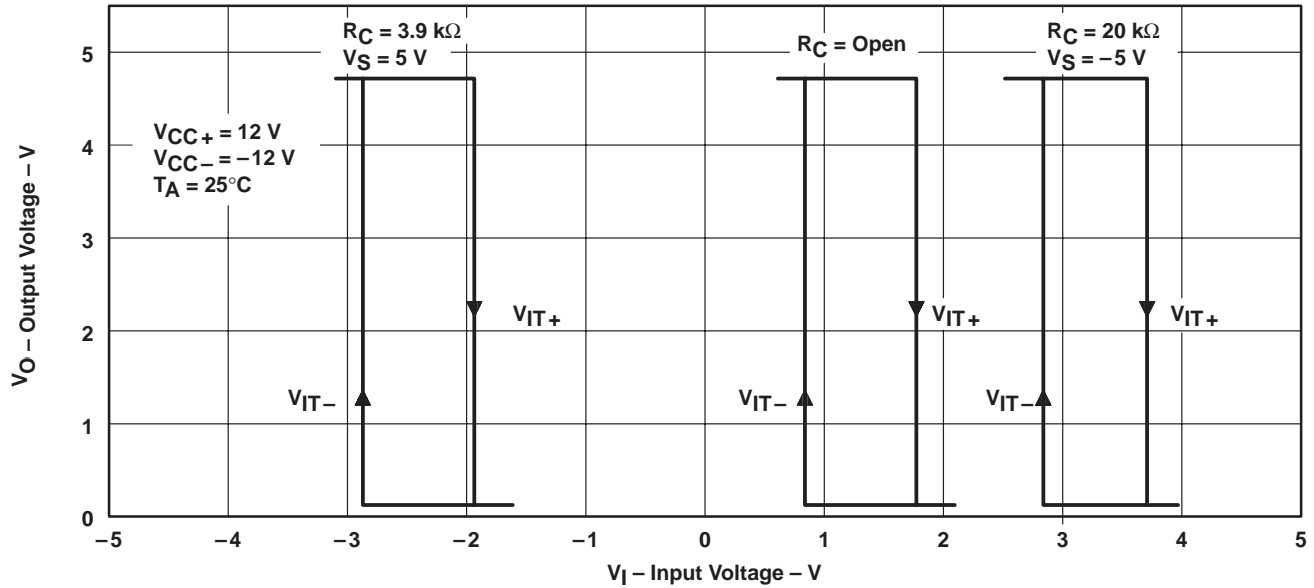


Figure 8

RECEIVER
OUTPUT VOLTAGE
vs
INPUT VOLTAGE

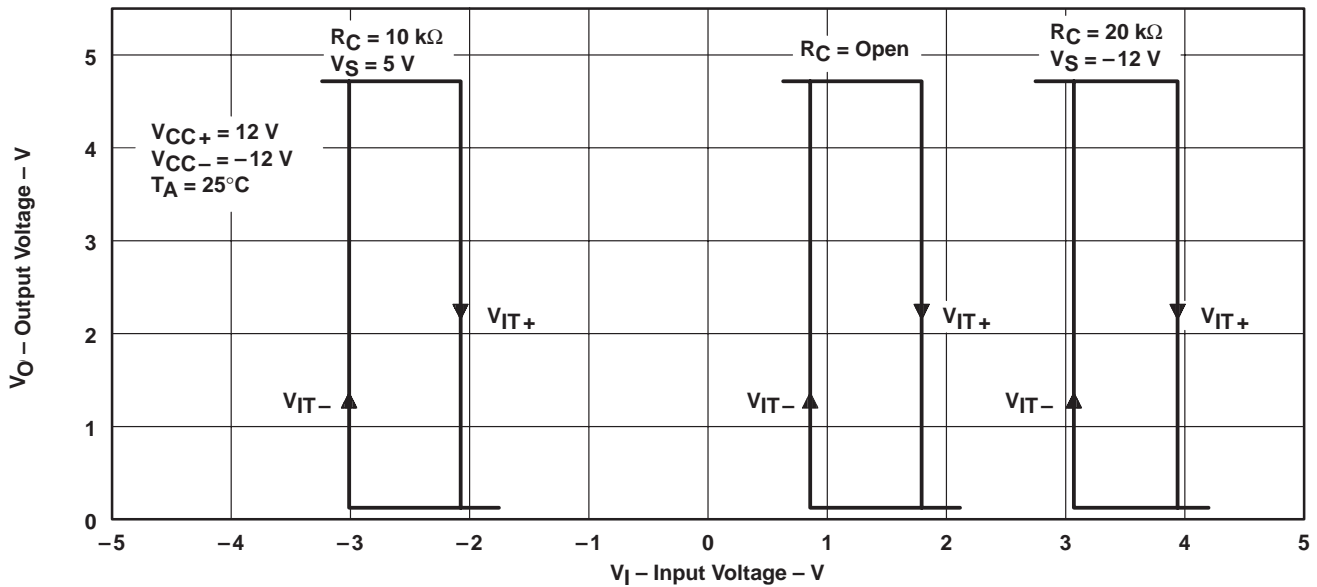


Figure 9



TYPICAL CHARACTERISTICS

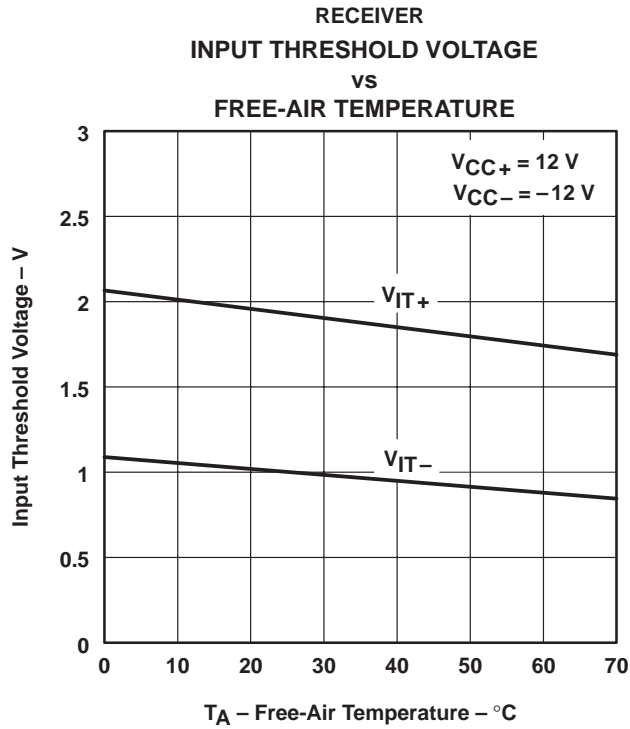


Figure 10

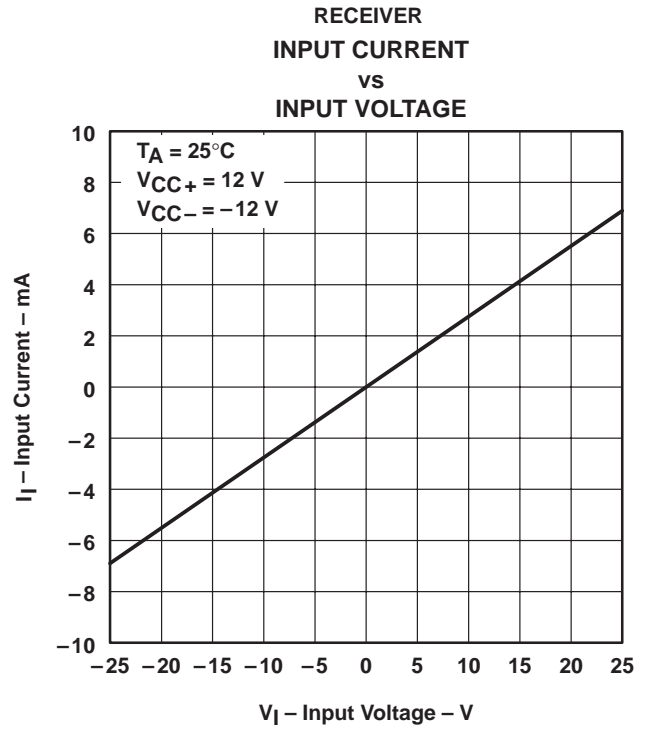


Figure 11

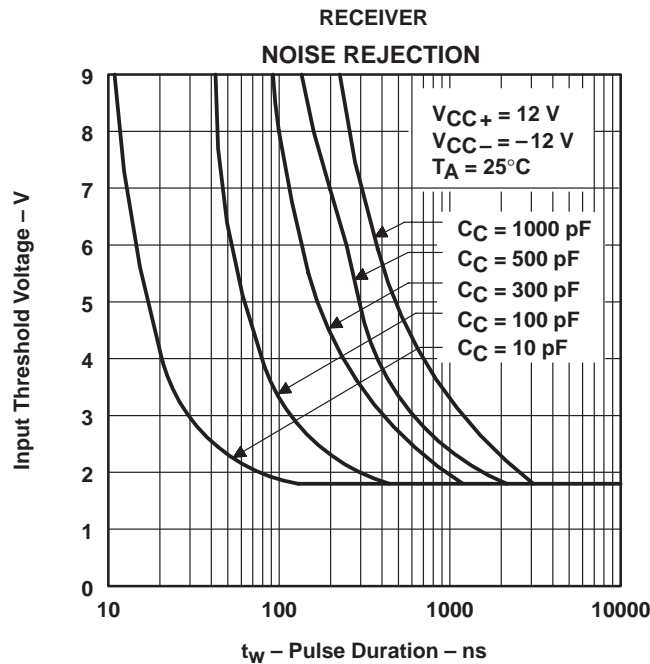


Figure 12

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PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN75155D	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75155DE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75155DG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75155DR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75155DRE4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75155DRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75155P	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75155PE4	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type

⁽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.

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TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75155DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS

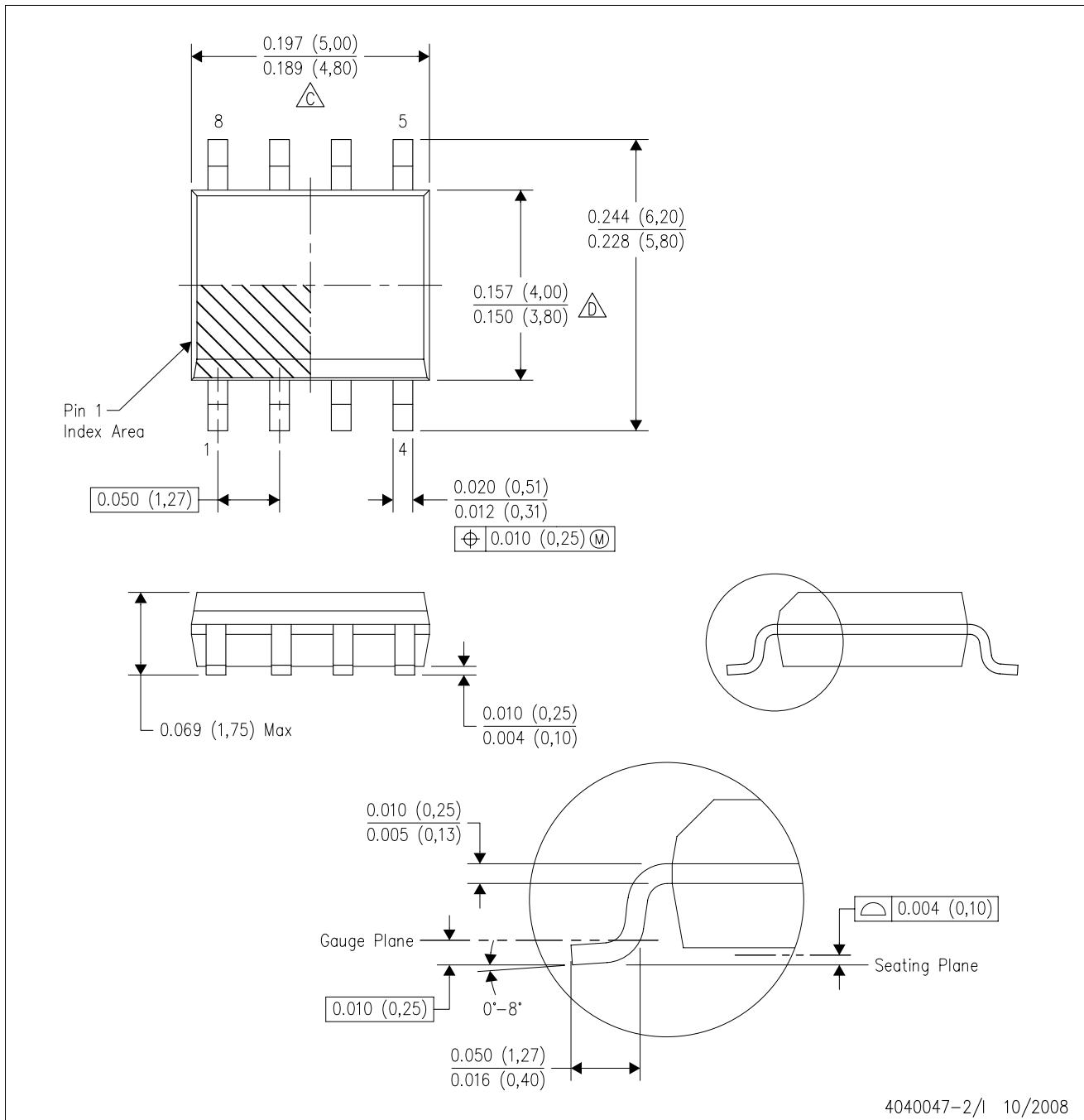


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75155DR	SOIC	D	8	2500	340.5	338.1	20.6

D (R-PDSO-G8)

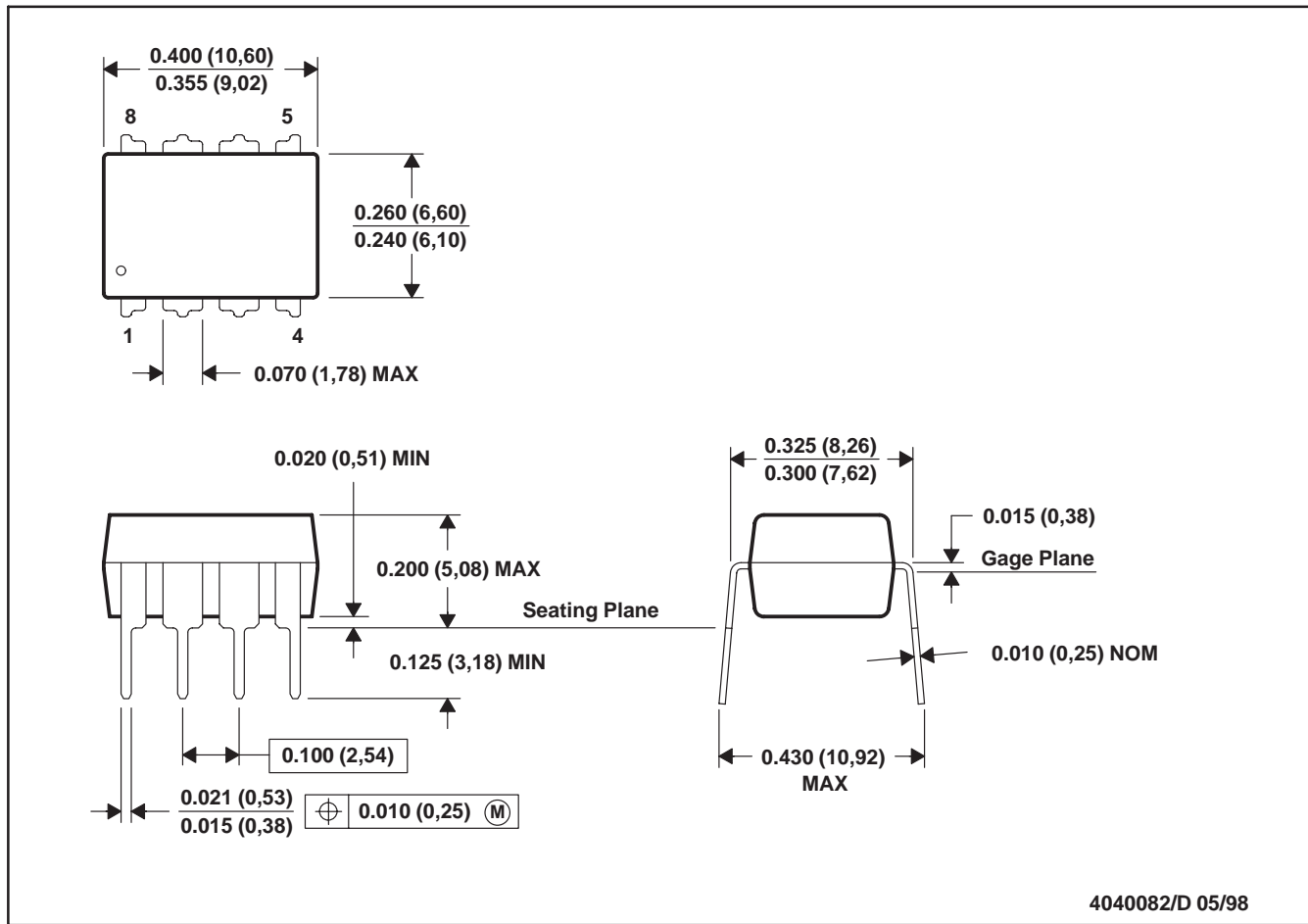
PLASTIC SMALL-OUTLINE PACKAGE



- 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 .006 (0,15) per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AA.

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



4040082/D 05/98

- NOTES: A. All linear dimensions are in inches (millimeters).
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 C. Falls within JEDEC MS-001

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