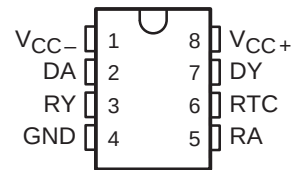


SN75155 LINE DRIVER AND RECEIVER

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

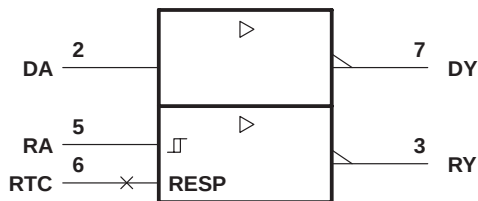


description

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.

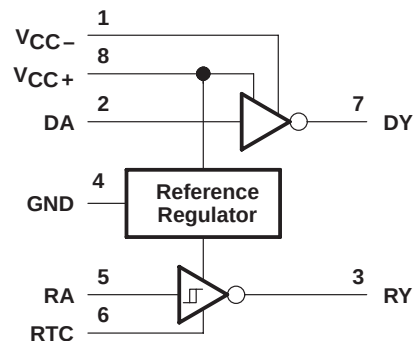
The SN75155 is characterized for operation from 0°C to 70°C.

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.

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.

**TEXAS
INSTRUMENTS**

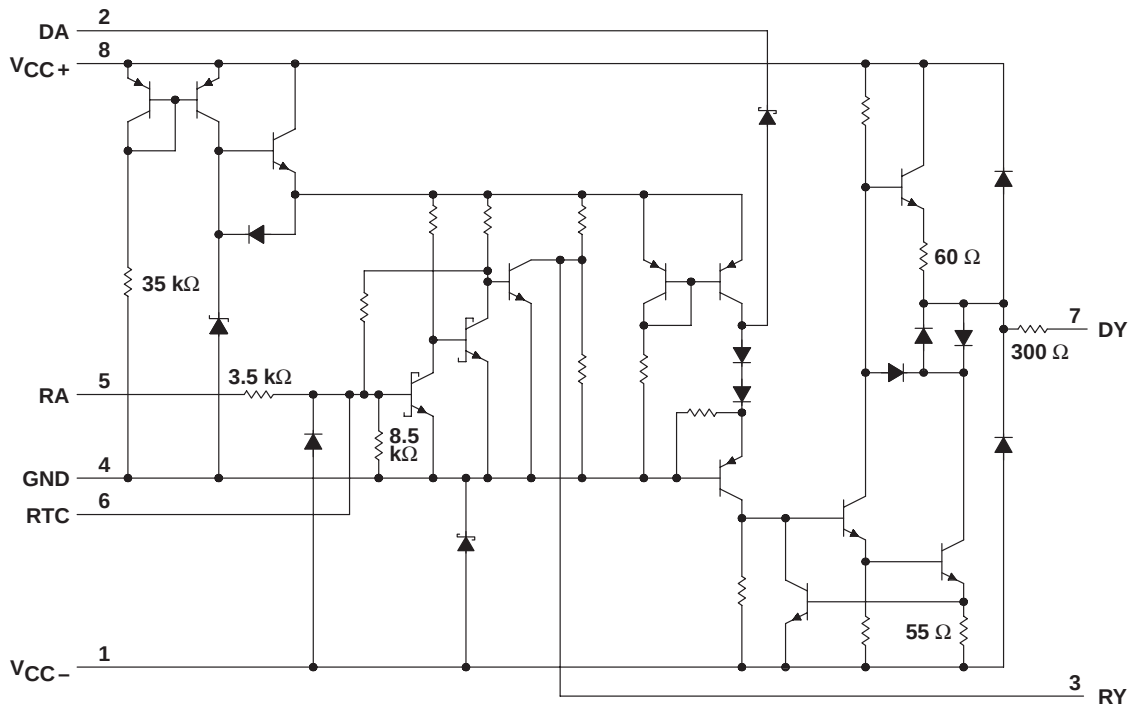
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1995, Texas Instruments Incorporated

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	$V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$	$V_{I(D)} = 2\text{ V}$, $V_{I(R)} = 2.3\text{ V}$, Output open		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	$V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$	$V_{I(D)} = 0.8\text{ V}$, $V_{I(R)} = 0.6\text{ V}$, Output open		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	$V_{CC+} = 5\text{ V}$, $V_{CC-} = 0$	$V_{I(R)} = 2.3\text{ V}$, $V_{I(D)} = 0$		4.8	6.4	mA
	$V_{CC+} = 9\text{ V}$, $V_{CC-} = 0$			6.7	9.1	
I_{CCH-} High-level supply current	$V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$	$V_{I(D)} = 2\text{ V}$, $V_{I(R)} = 2.3\text{ V}$, Output open		-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	$V_{CC+} = 5\text{ V}$, $V_{CC-} = -5\text{ V}$	$V_{I(D)} = 0.8\text{ V}$, $V_{I(R)} = 0.6\text{ V}$, Output open		-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}	Hystresis voltage (V _{IT+} + − V _{IT−})			0.6			V
V _{O(H)}	High-level output voltage	V _I = 0.6 V, I _{OH} = 10 μA	V _{CC+} = 5 V, V _{CC−} = −5 V	3.7	4.1	4.5	V
			V _{CC+} = 12 V, V _{CC−} = −12 V	4.4	4.7	5.2	
		V _I = 0.6 V, I _{OH} = 0.4 mA	V _{CC+} = 5 V, V _{CC−} = −5 V	3.1	3.4	3.8	
			V _{CC+} = 12 V, V _{CC−} = −12 V	3.6	4	4.5	
V _{O(L)}	Low-level output voltage	V _I = 2.3 V, I _{OL} = 24 mA	0.2			0.3	V
I _{IH}	High-level input current	V _I = 2.5 V	3.6	6.7	10	mA	
		V _I = 3 V	0.43	0.67	1	mA	
I _{IL}	Low-level input current	V _I = −25 V	−3.6	−6.7	−10	mA	
		V _I = −3 V	−0.43	−0.67	−1	mA	
I _{OS}	Short-circuit output current	V _I = 0.6 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).



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

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	$R_L = 400\text{ }\Omega$		175	245	ns
t_{PHL} Propagation delay time, high- to low level output			37	100	
t_r Output rise time	$R_L = 400\text{ }\Omega$		255	360	ns
t_f Output fall time	$R_L = 400\text{ }\Omega$		23	50	ns

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

PARAMETER MEASUREMENT INFORMATION

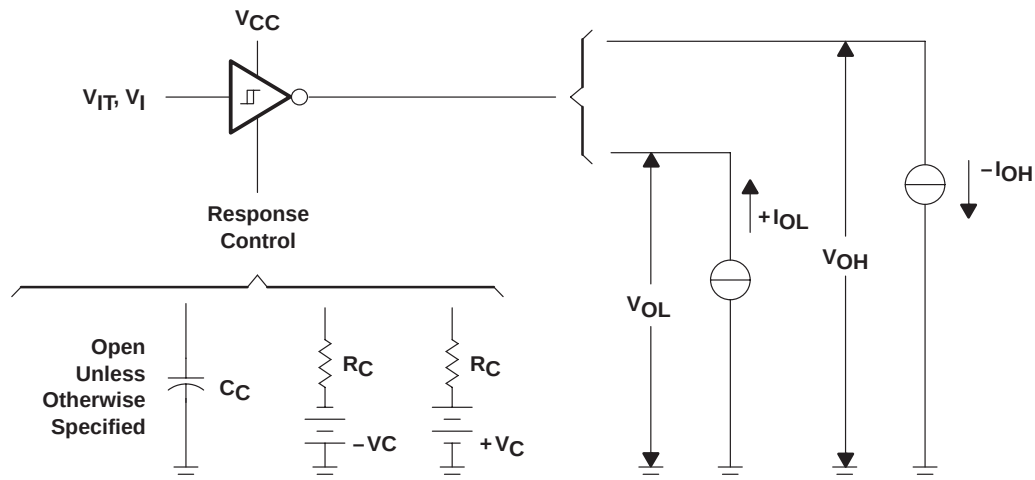
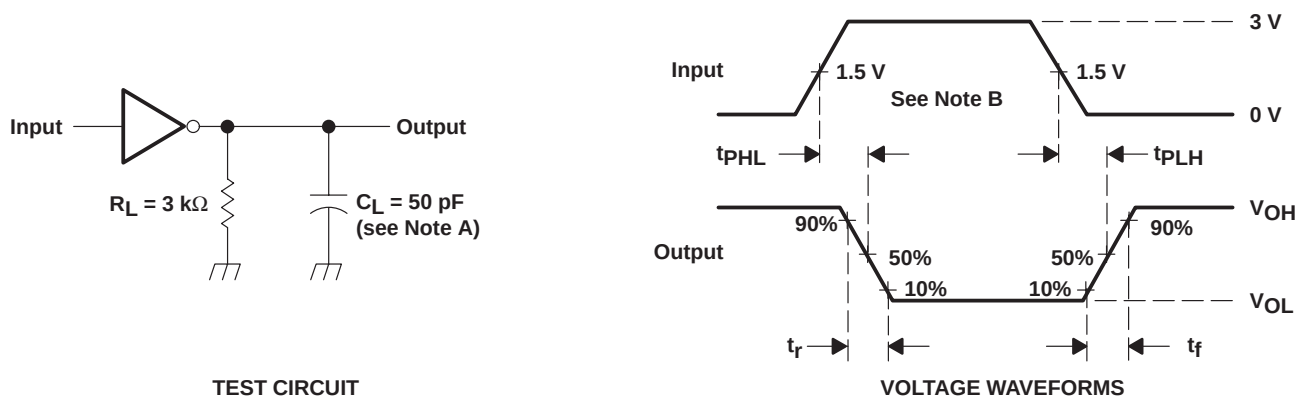


Figure 1. Receiver Section Test Circuit (V_{IT+} , V_{IT-} , V_{OH} , V_{OL})

SN75155 LINE DRIVER AND RECEIVER

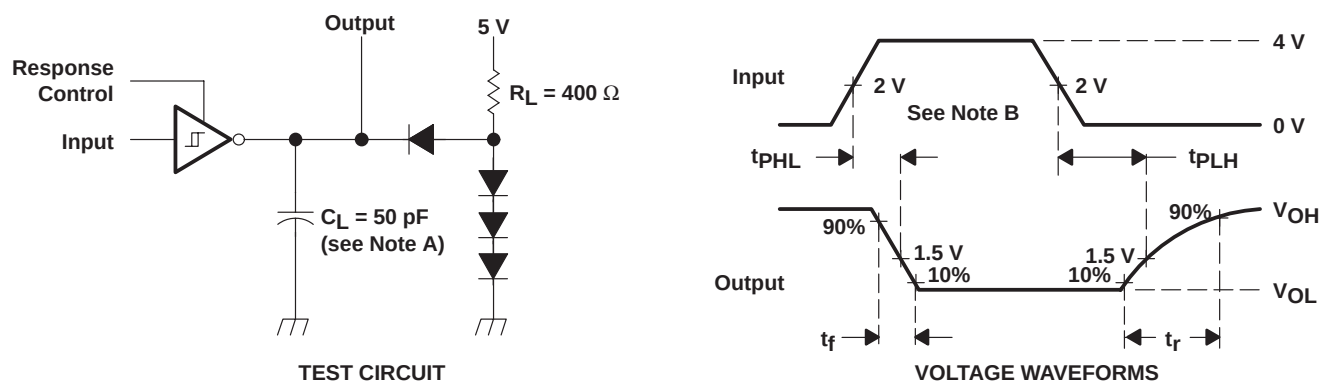
SLLS017C – JULY 1986 – REVISED MAY 1995

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: $Z_O = 50 \Omega$, $t_W = 1 \mu\text{s}$, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

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: $Z_O = 50 \Omega$, $t_W = 1 \mu\text{s}$, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

Figure 3. Receiver Section Switching Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

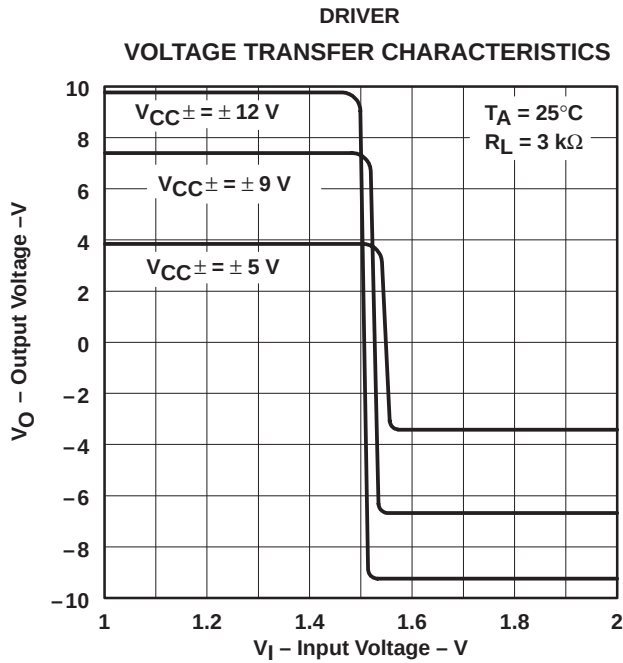


Figure 4

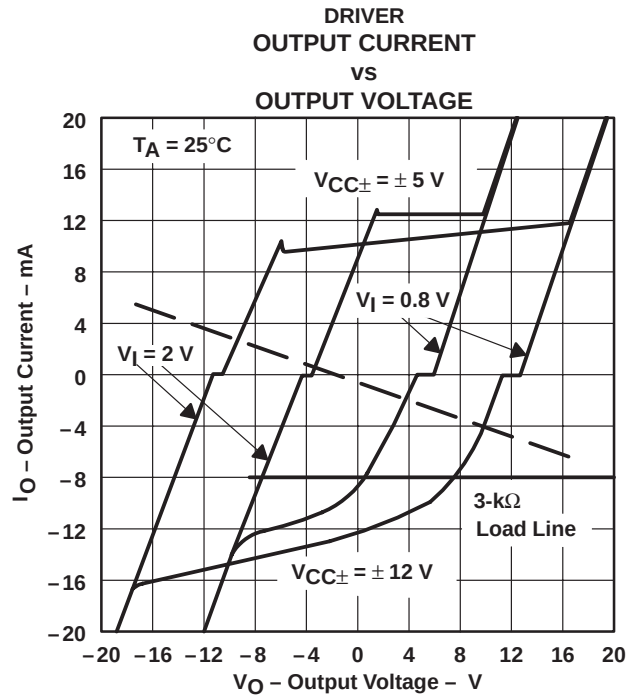


Figure 5

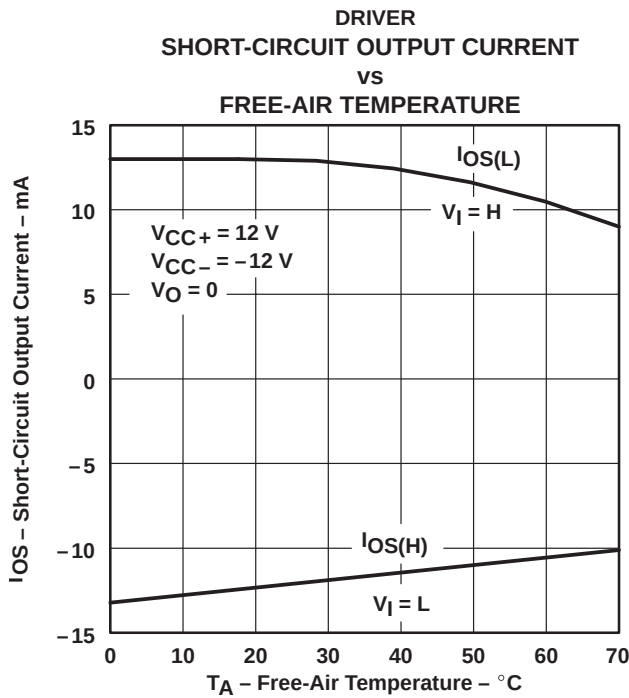


Figure 6

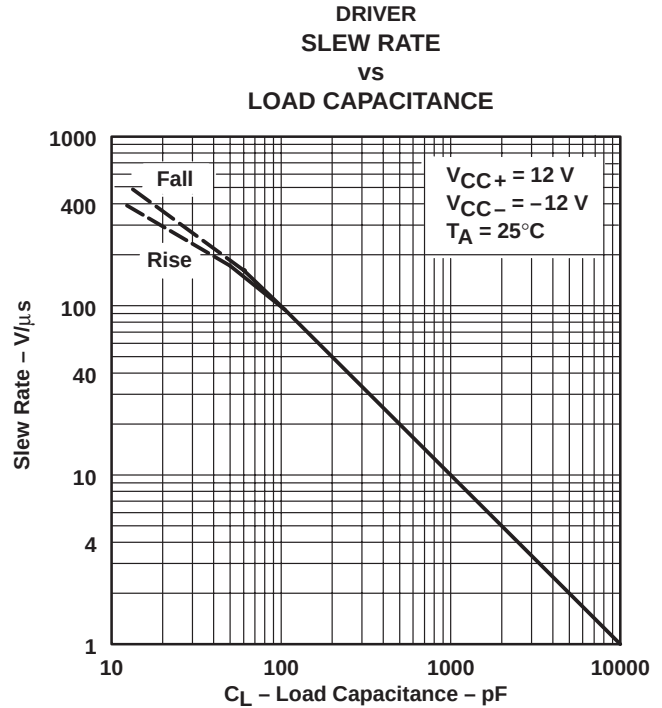


Figure 7

TYPICAL CHARACTERISTICS

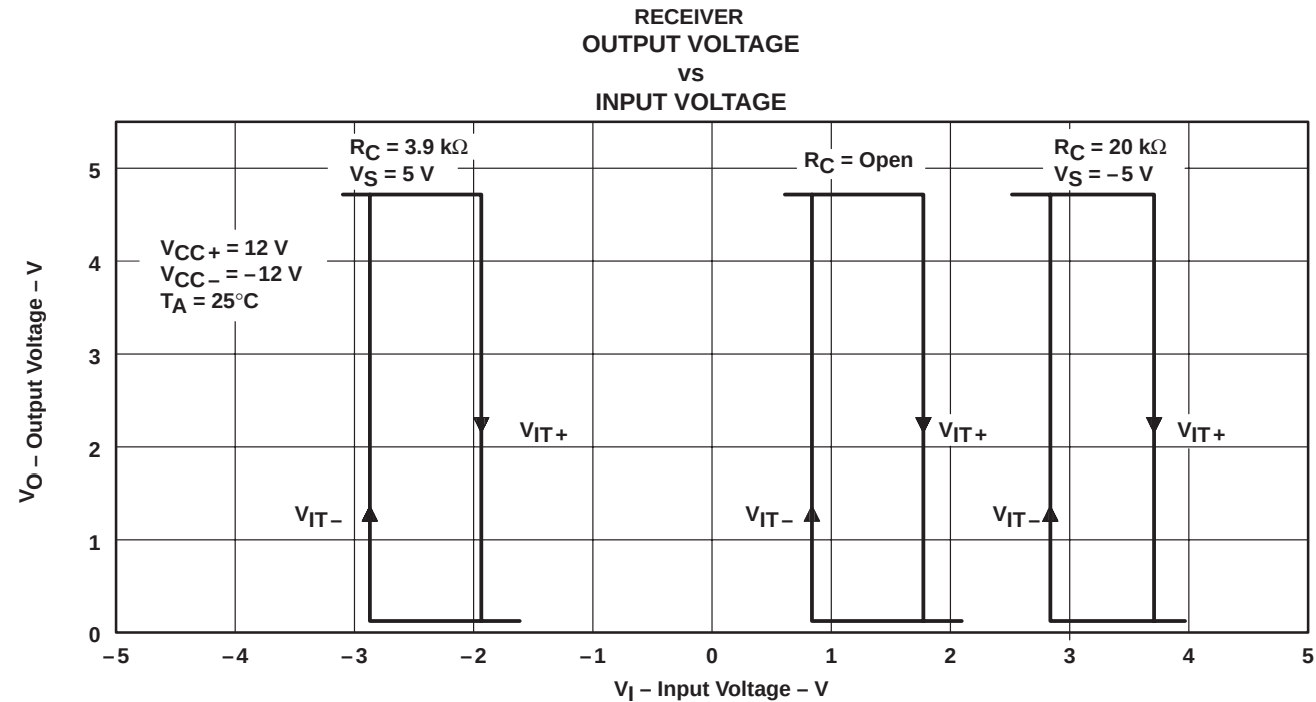


Figure 8

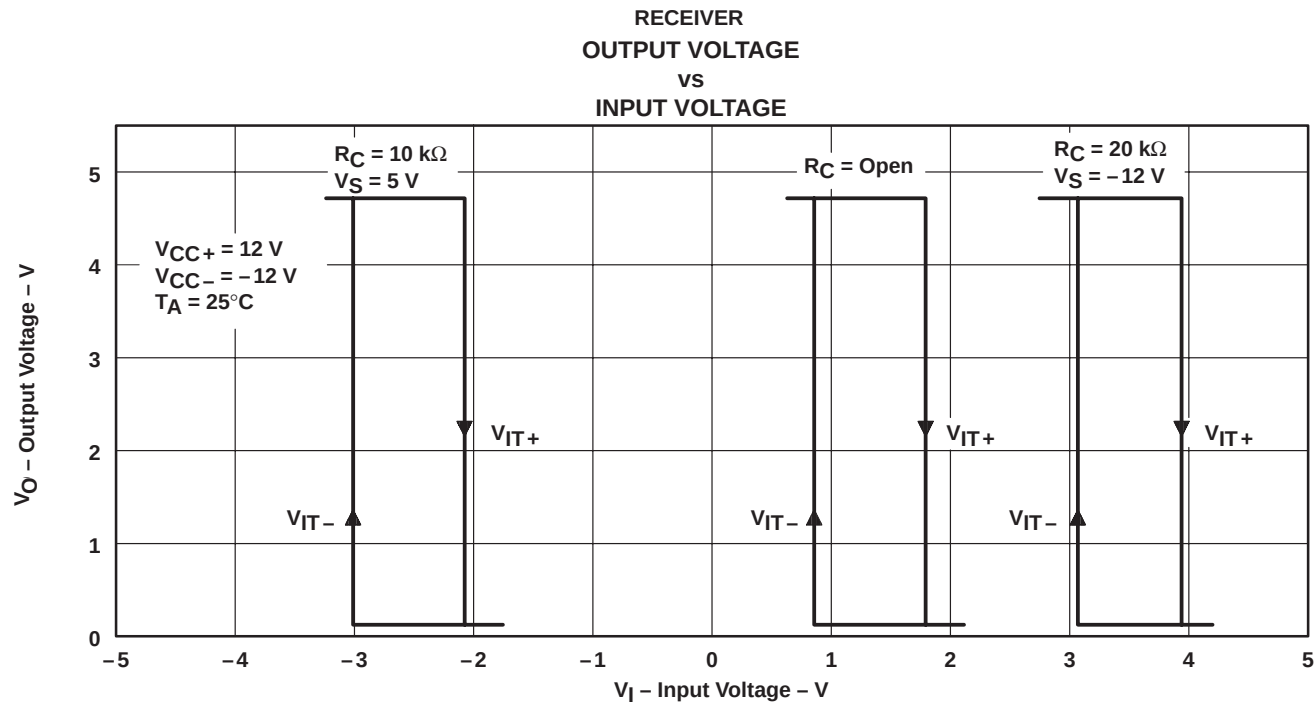


Figure 9

TYPICAL CHARACTERISTICS

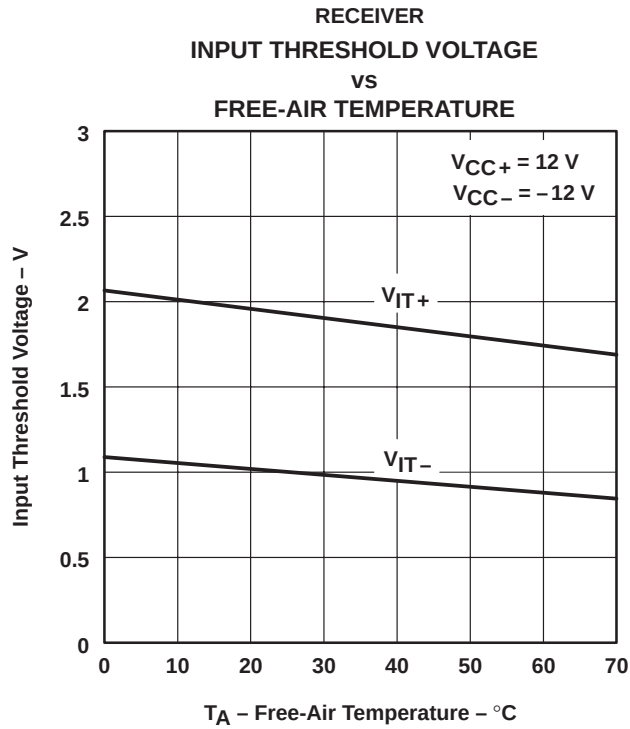


Figure 10

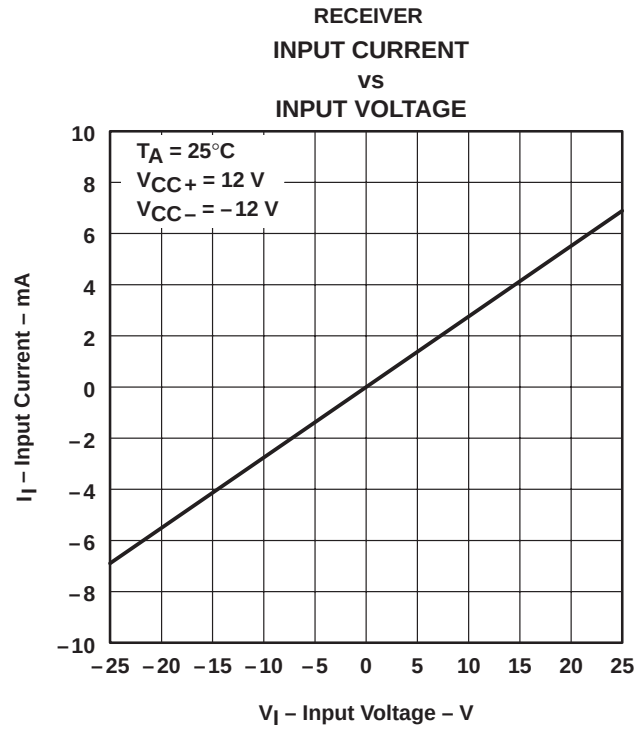


Figure 11

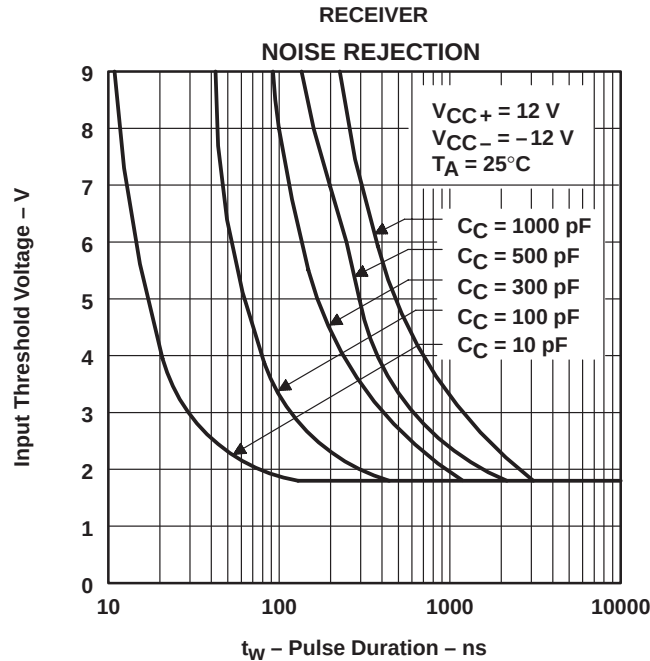


Figure 12

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
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
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)

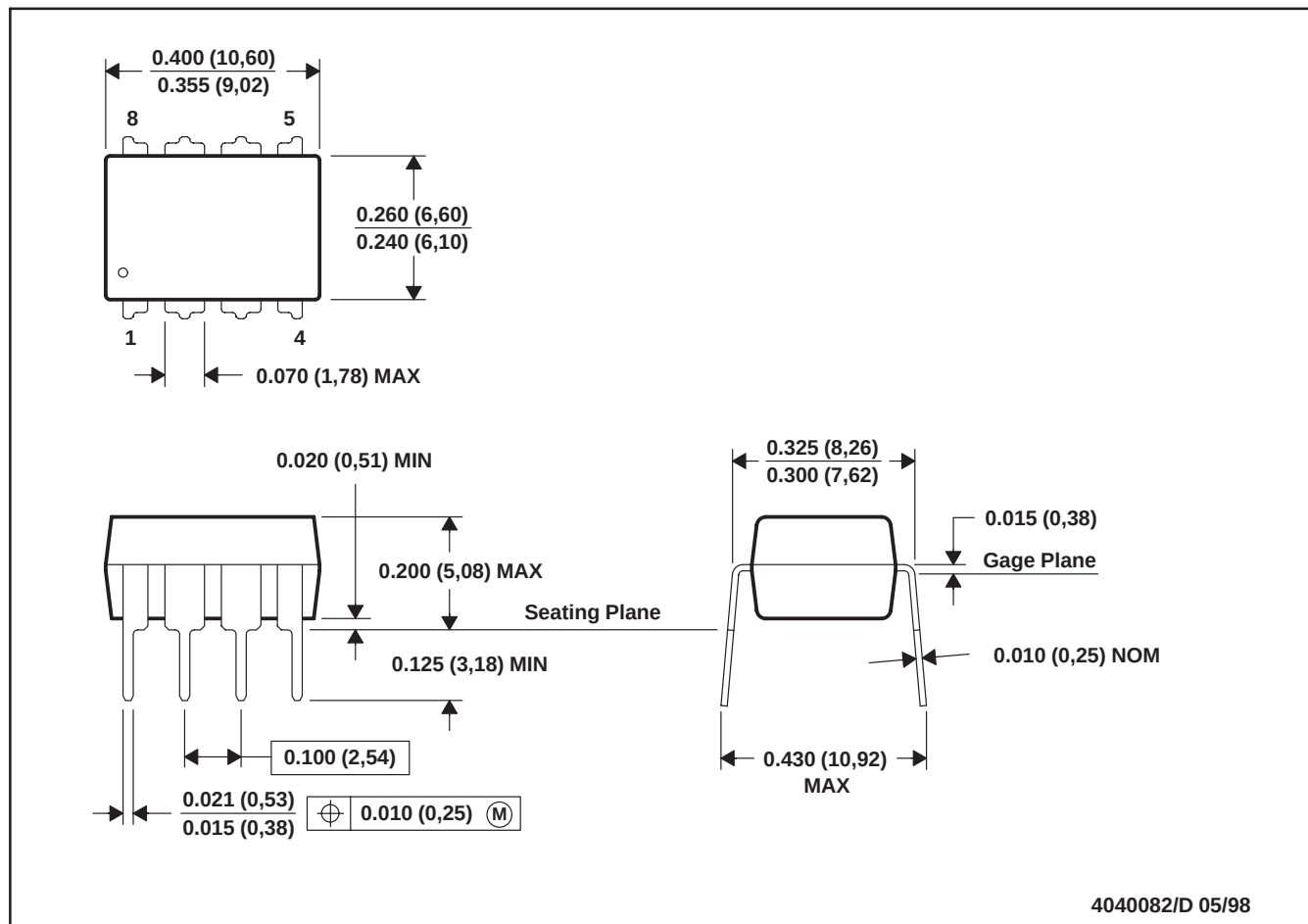
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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.

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



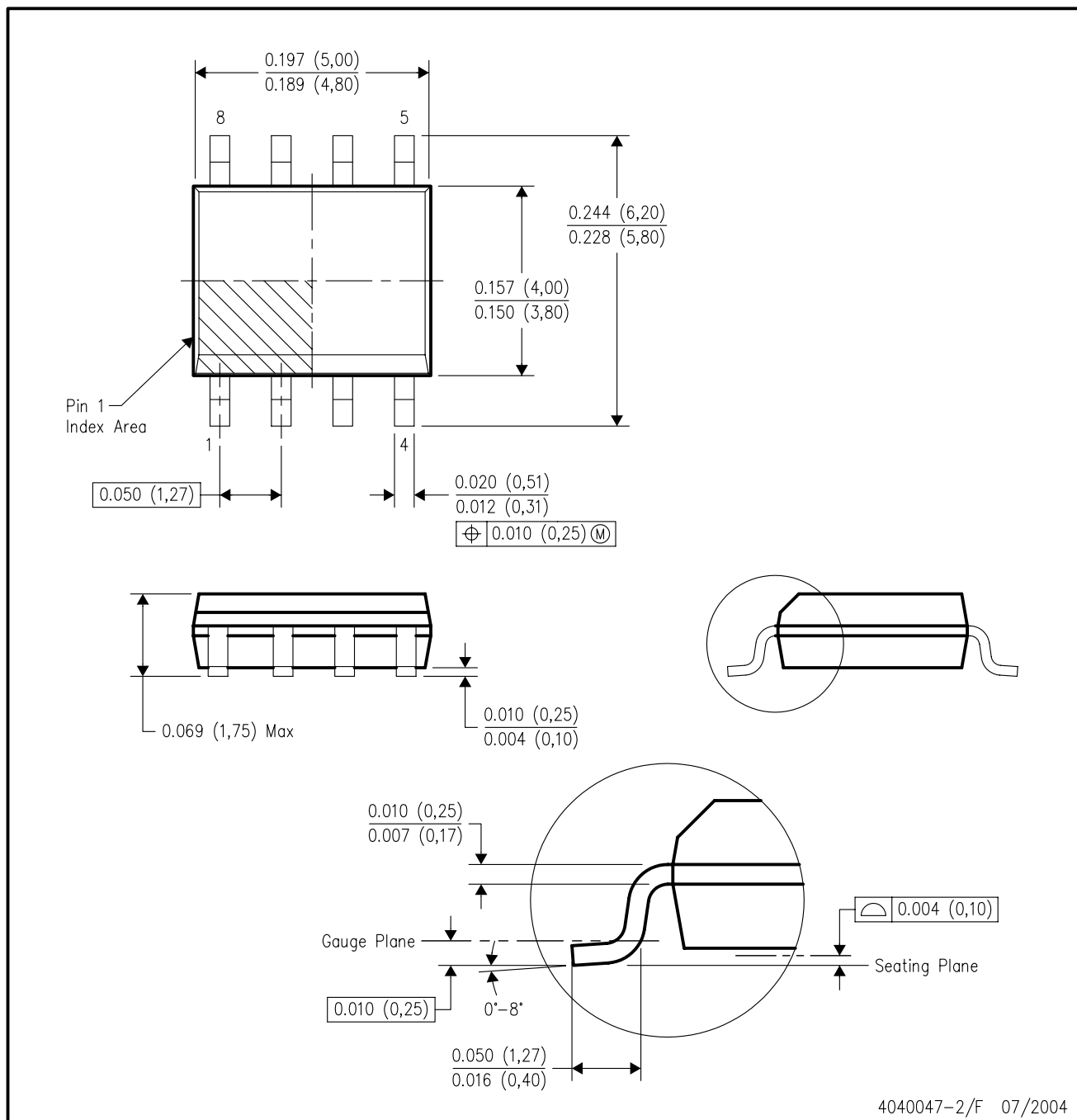
- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-001

For the latest package information, go to http://www.ti.com/sc/docs/package/pkg_info.htm



D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - Falls within JEDEC MS-012 variation AA.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
		Telephony	www.ti.com/telephony
		Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265

Copyright © 2006, Texas Instruments Incorporated