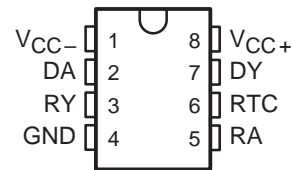


# SN75155 LINE DRIVER AND RECEIVER

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- 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  $\Omega$  Typ
- Driver Input TTL Compatible

D OR P PACKAGE  
TOP VIEW

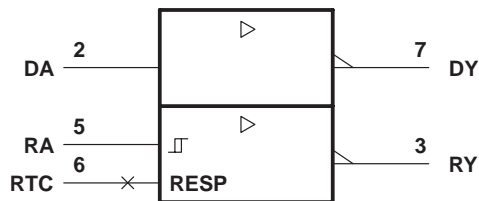


## description

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.

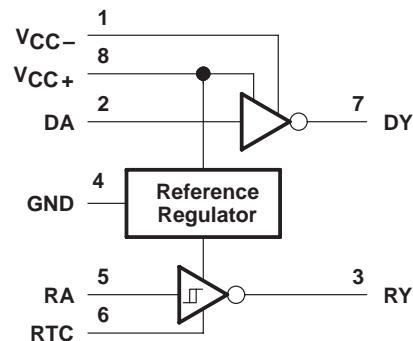
The SN75155 is characterized for operation from 0°C to 70°C.

## logic symbol†



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

## logic diagram



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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**

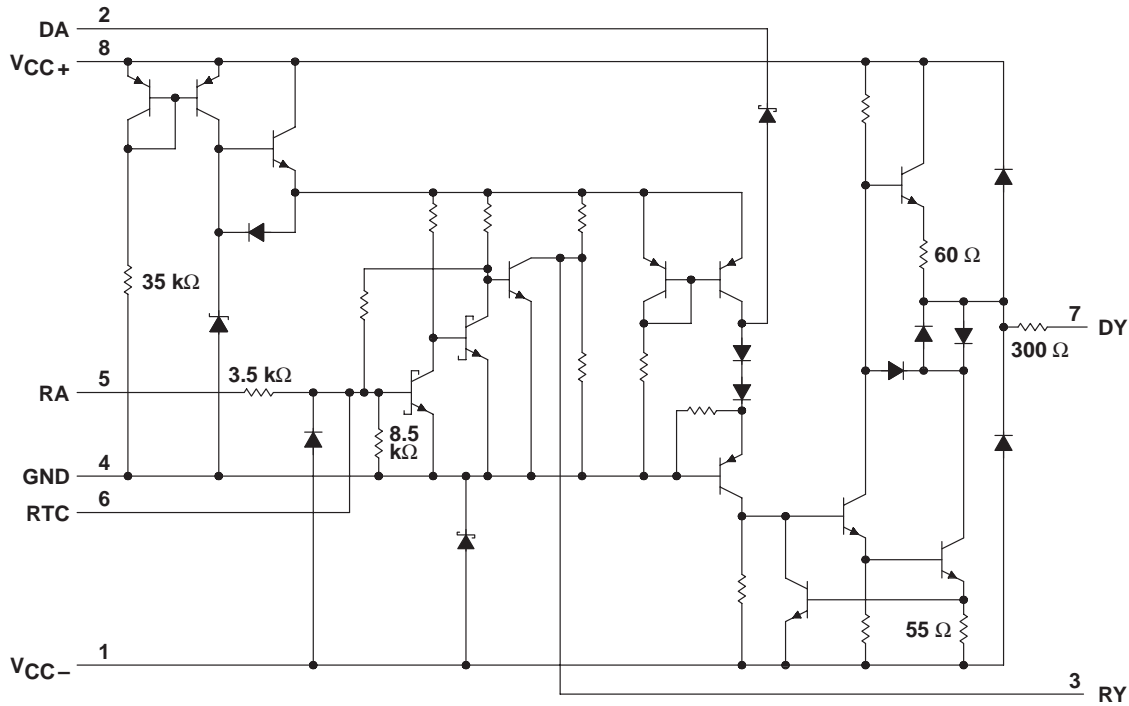
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# SN75155 LINE DRIVER AND RECEIVER

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## 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



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**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

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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	$\mu\text{A}$
$I_{IL}$ Low-level input current	$V_I = 0$			-0.73	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 $2\text{ V}$		300		$\Omega$

## 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  $-8.8\text{ V}$  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	$\mu\text{s}$
$t_f$ 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	$\mu\text{s}$

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

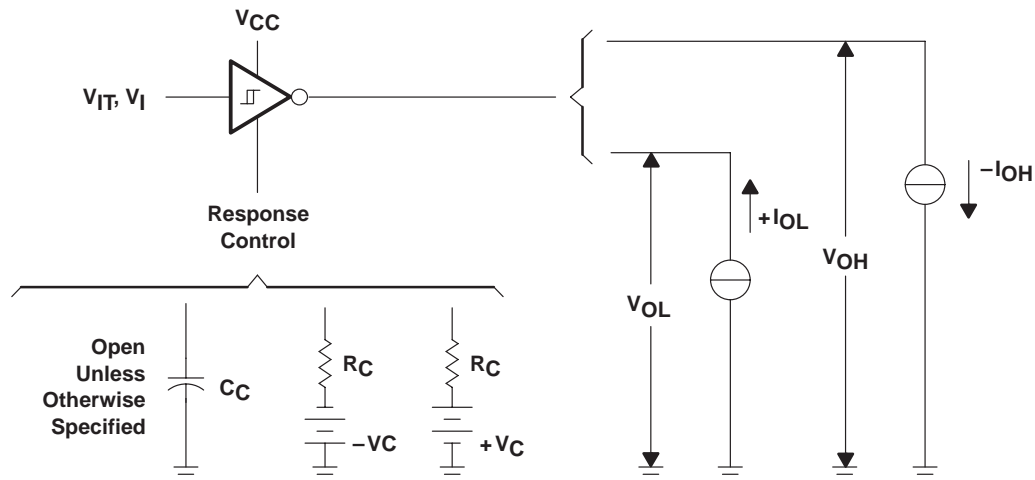
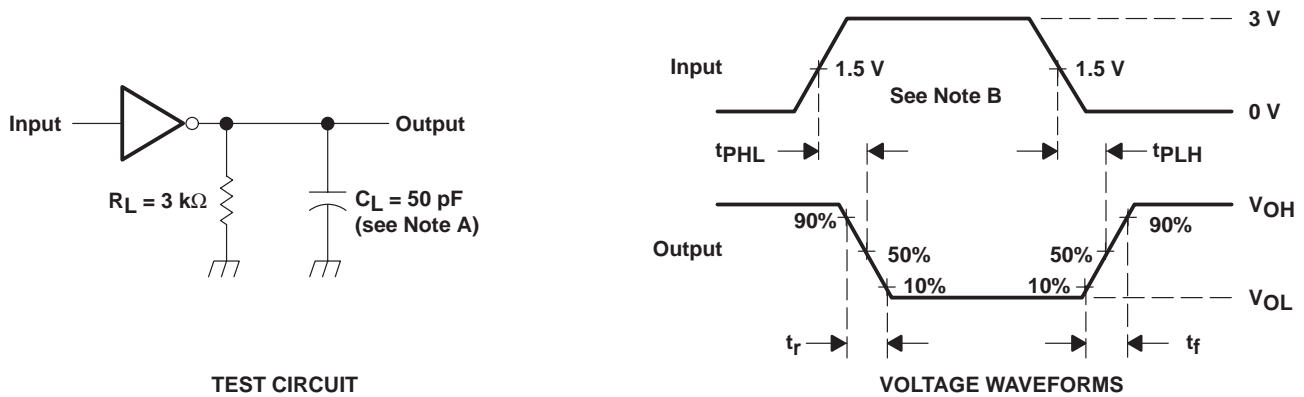


Figure 1. Receiver Section Test Circuit ( $V_{IT+}$ ,  $V_{IT-}$ ,  $V_{OH}$ ,  $V_{OL}$ )

# SN75155 LINE DRIVER AND RECEIVER

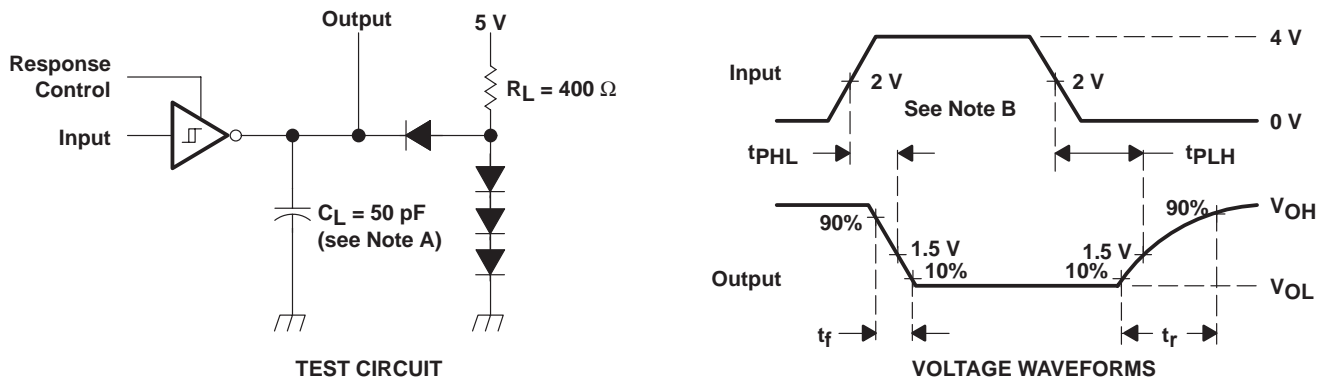
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## PARAMETER MEASUREMENT INFORMATION



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

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

**Figure 3. Receiver Section Switching Test Circuit and Voltage Waveforms**

TYPICAL CHARACTERISTICS

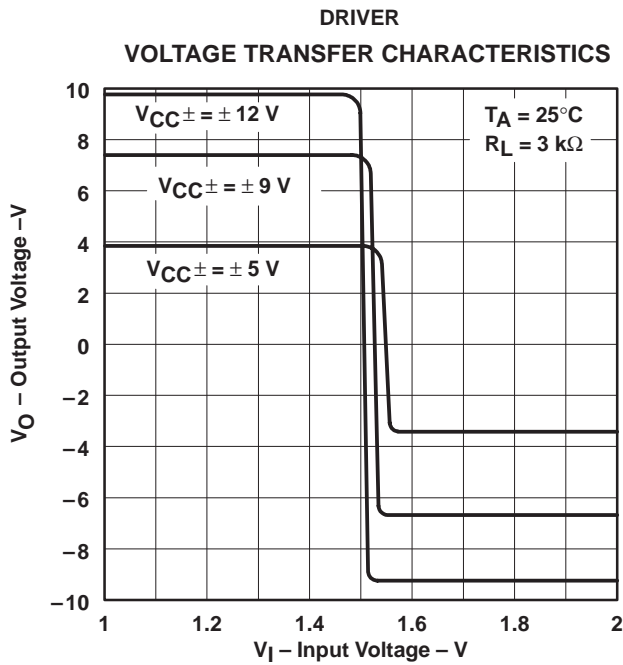


Figure 4

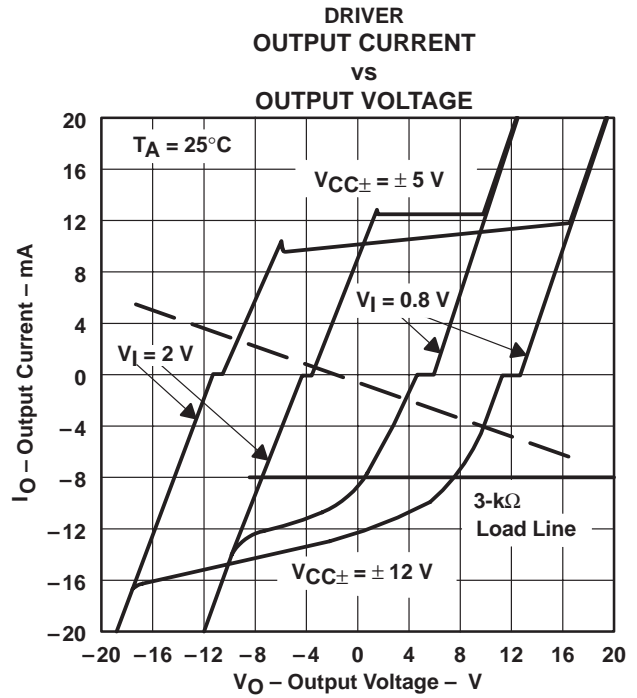


Figure 5

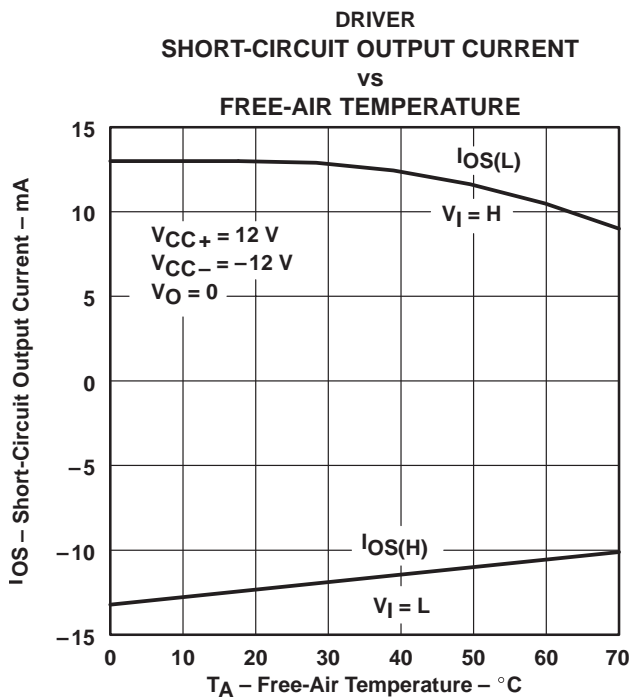


Figure 6

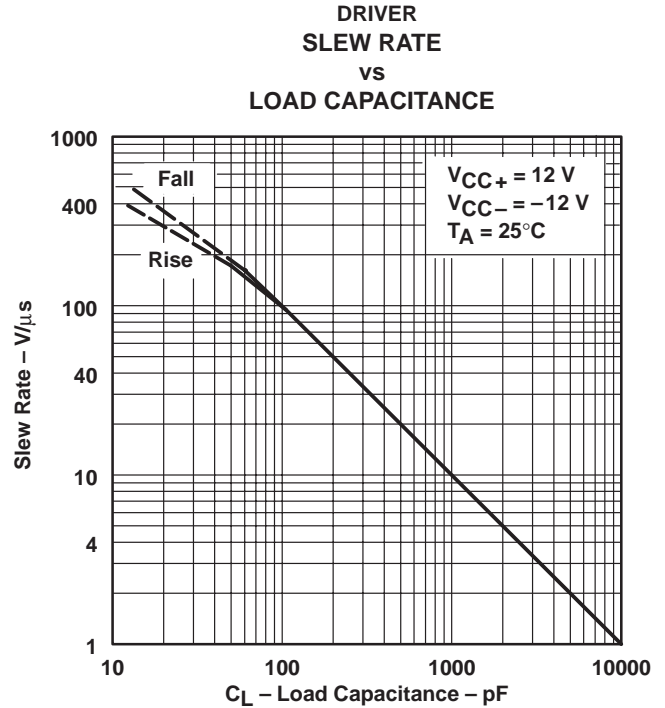


Figure 7

# SN75155 LINE DRIVER AND RECEIVER

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## TYPICAL CHARACTERISTICS

RECEIVER  
OUTPUT VOLTAGE  
vs  
INPUT VOLTAGE

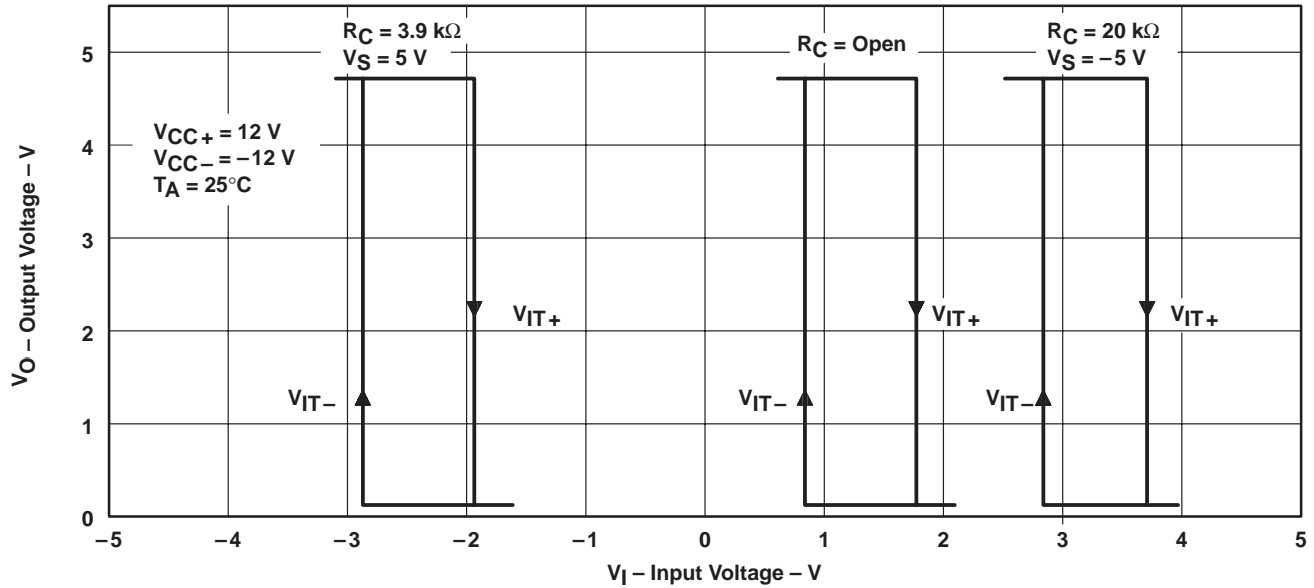


Figure 8

RECEIVER  
OUTPUT VOLTAGE  
vs  
INPUT VOLTAGE

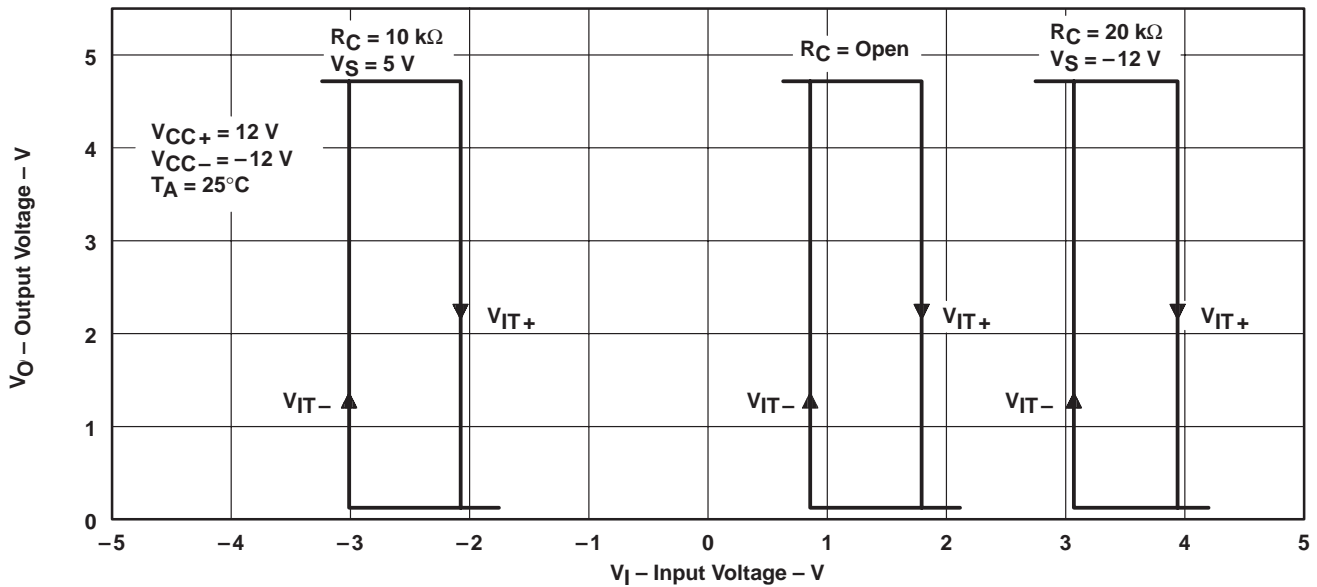


Figure 9





TYPICAL CHARACTERISTICS

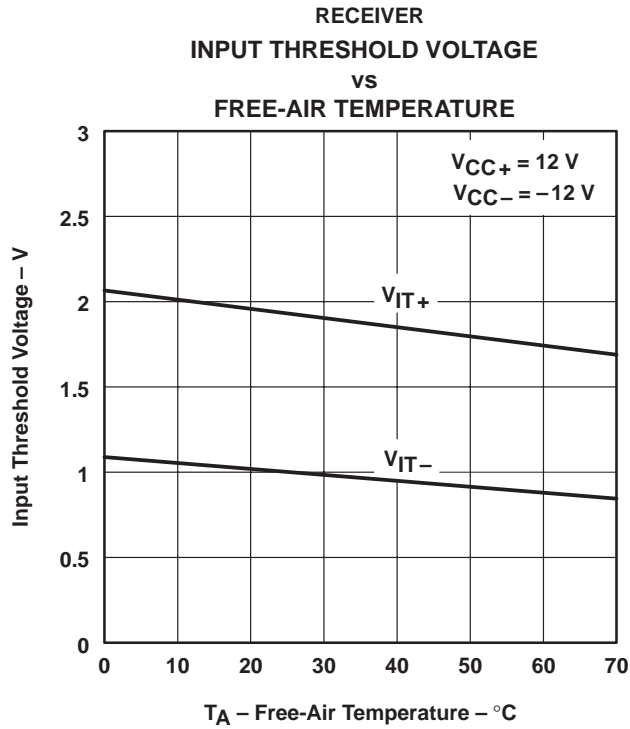


Figure 10

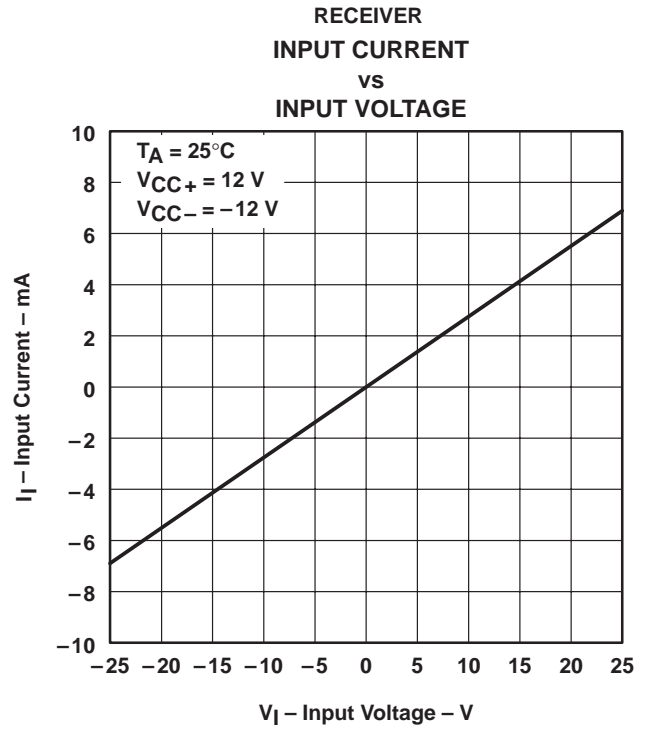


Figure 11

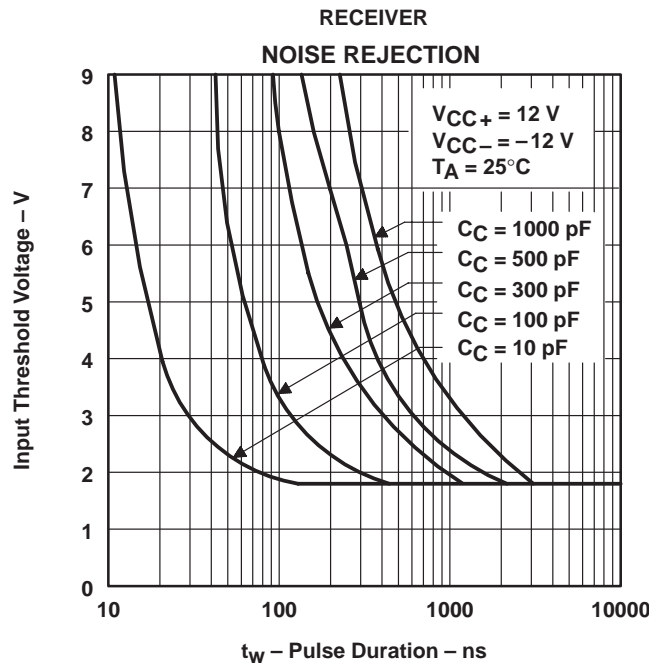


Figure 12

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