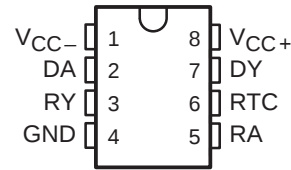


SN75155 LINE DRIVER AND RECEIVER

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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 Ω Typ
- Driver Input TTL Compatible

D OR P PACKAGE
TOP VIEW

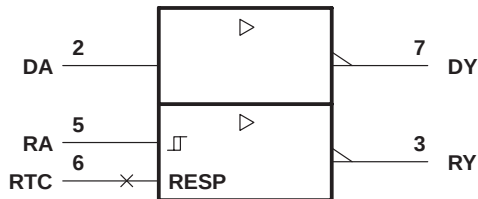


description

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.

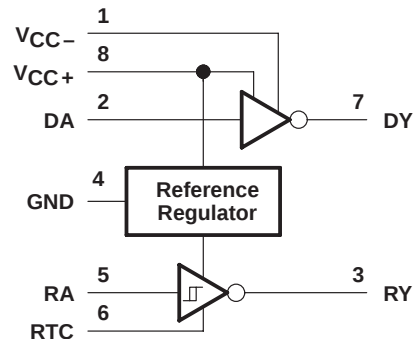
The SN75155 is characterized for operation from 0°C to 70°C.

logic symbol†



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

logic diagram



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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**

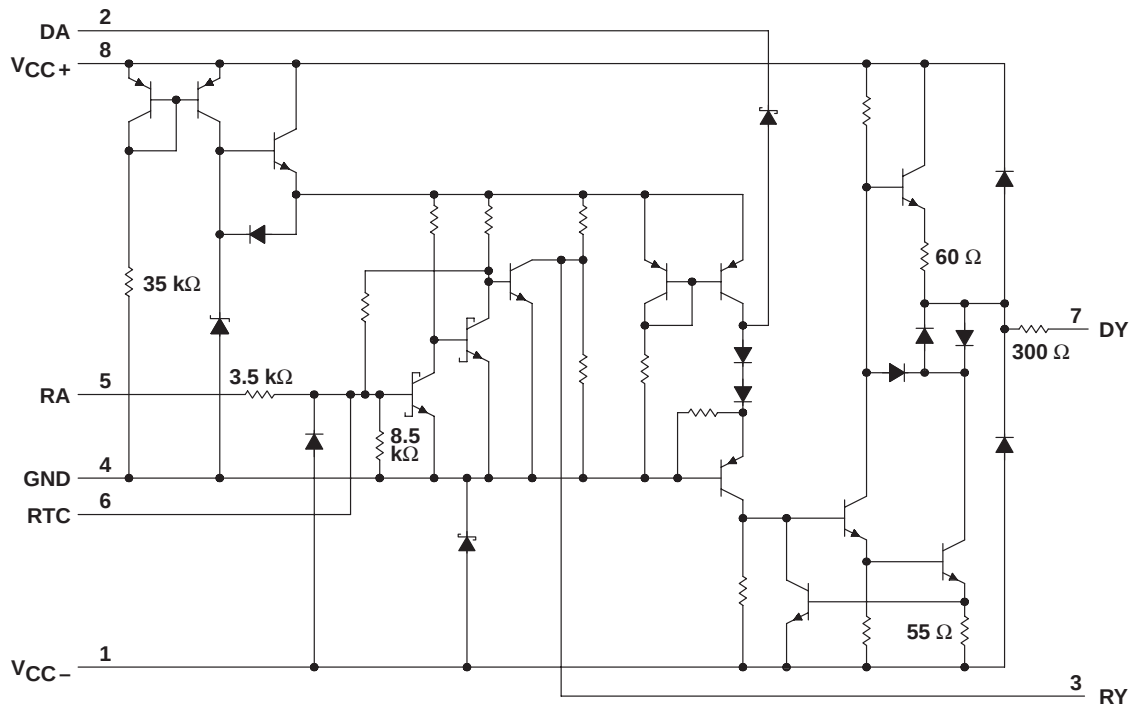
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SN75155
LINE DRIVER AND RECEIVER

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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

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 $T_A = 25^\circ\text{C}$.

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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	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).

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

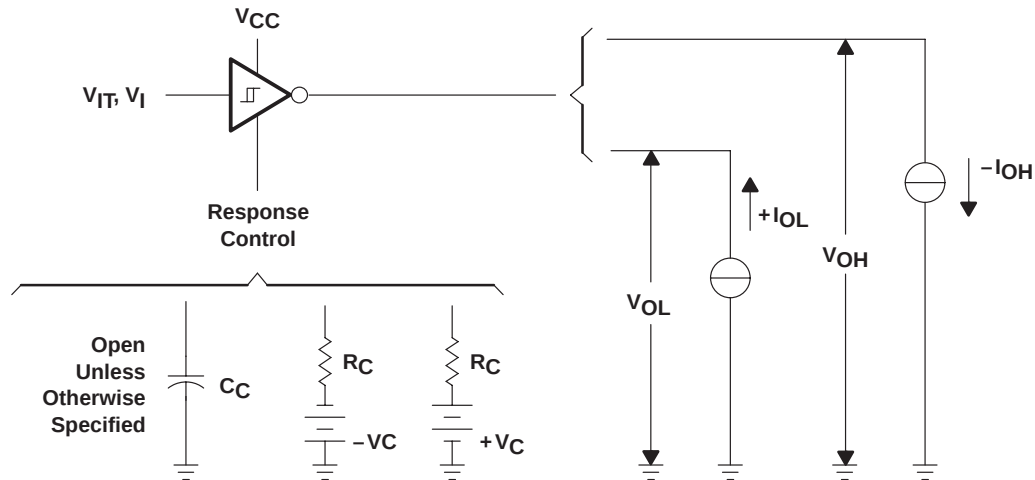
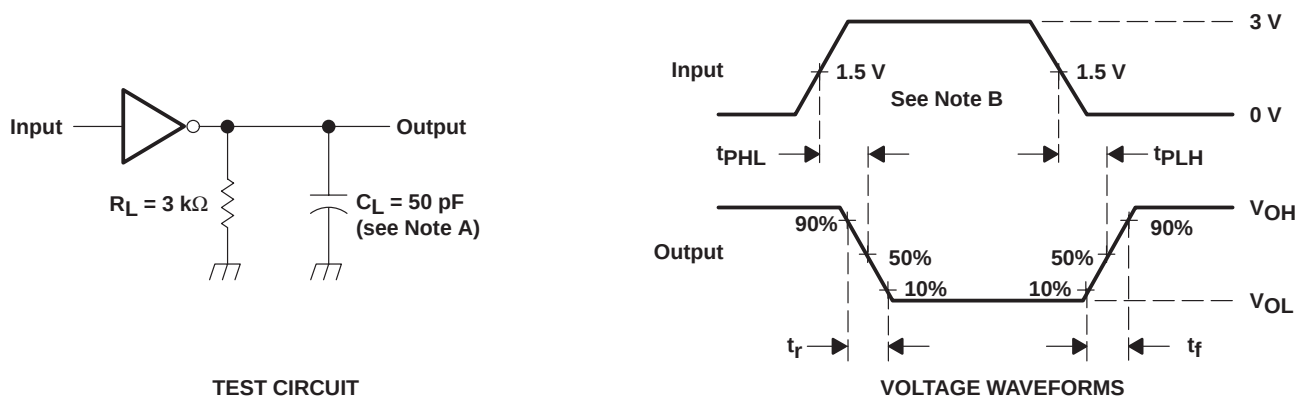


Figure 1. Receiver Section Test Circuit (V_{IT+} , V_{IT-} , V_{OH} , V_{OL})

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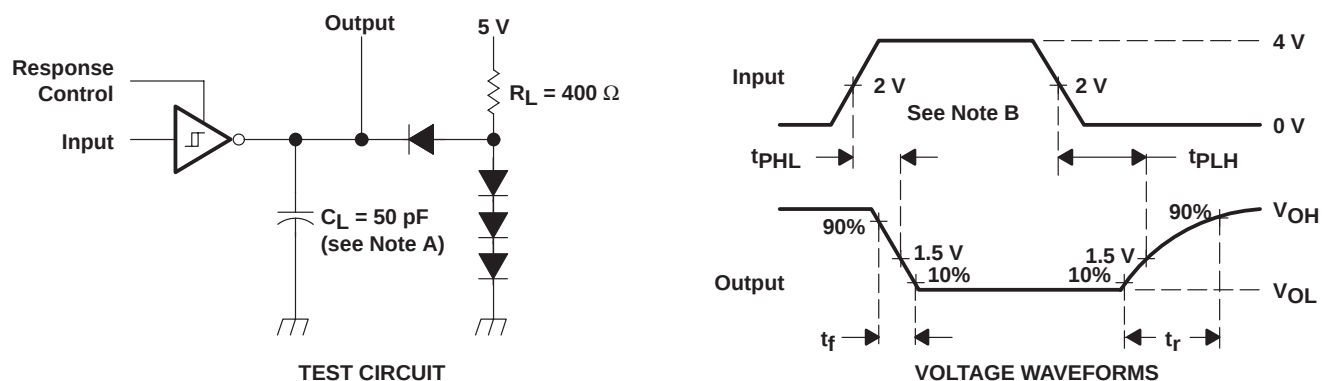
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PARAMETER MEASUREMENT INFORMATION



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

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

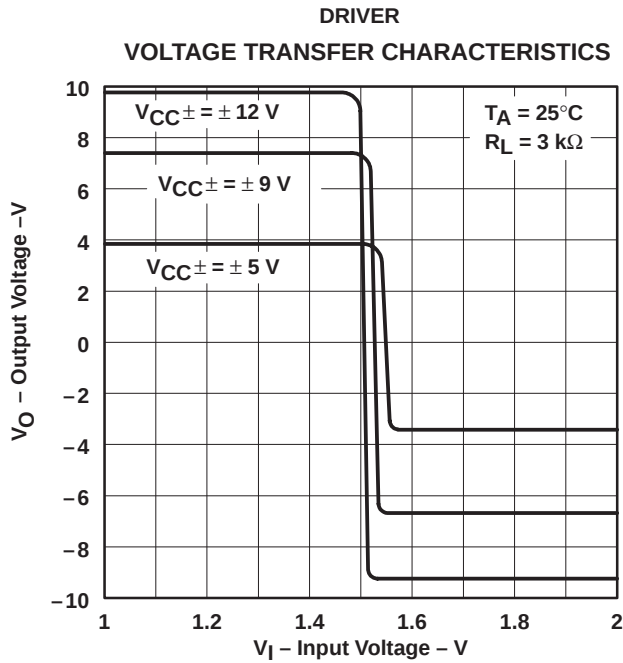


Figure 4

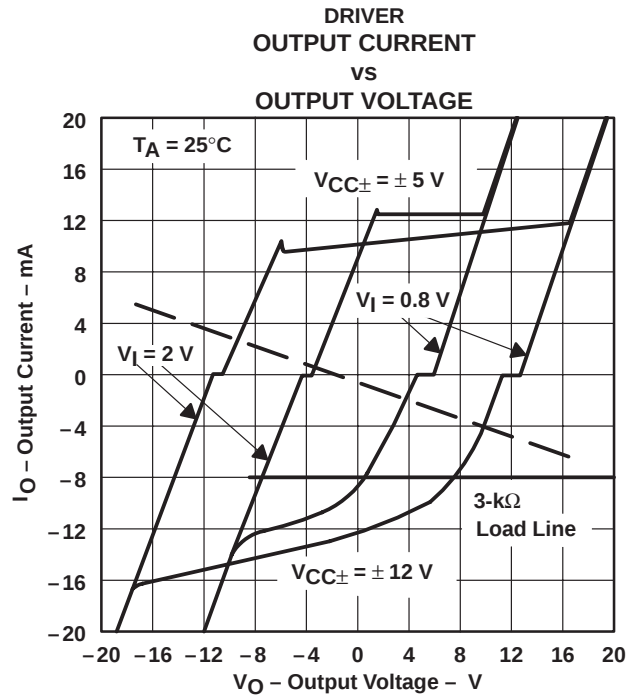


Figure 5

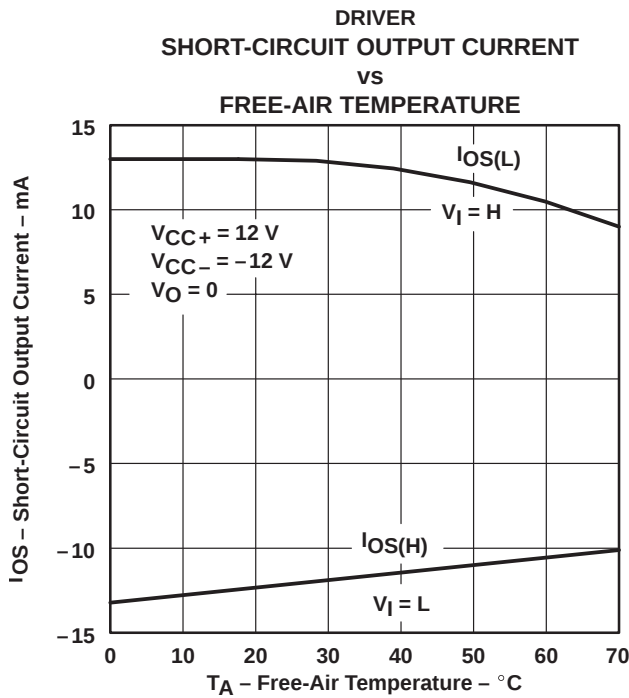


Figure 6

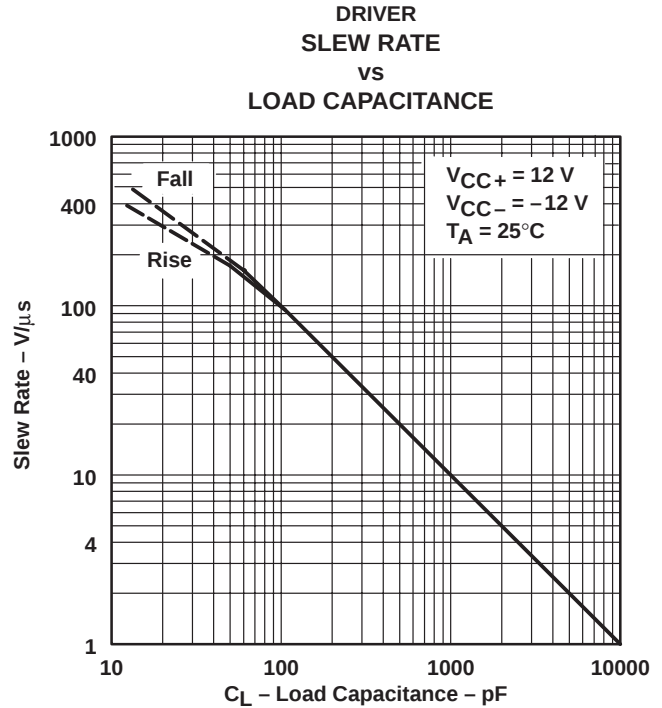


Figure 7

TYPICAL CHARACTERISTICS

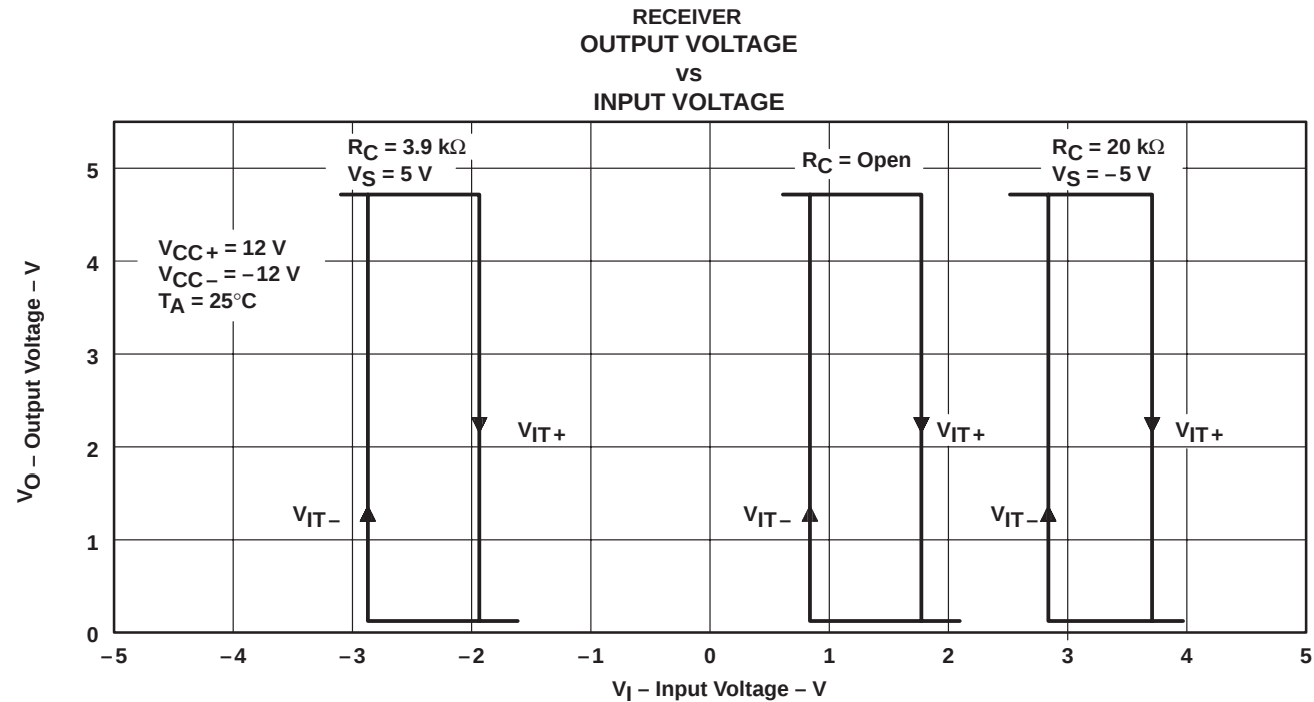


Figure 8

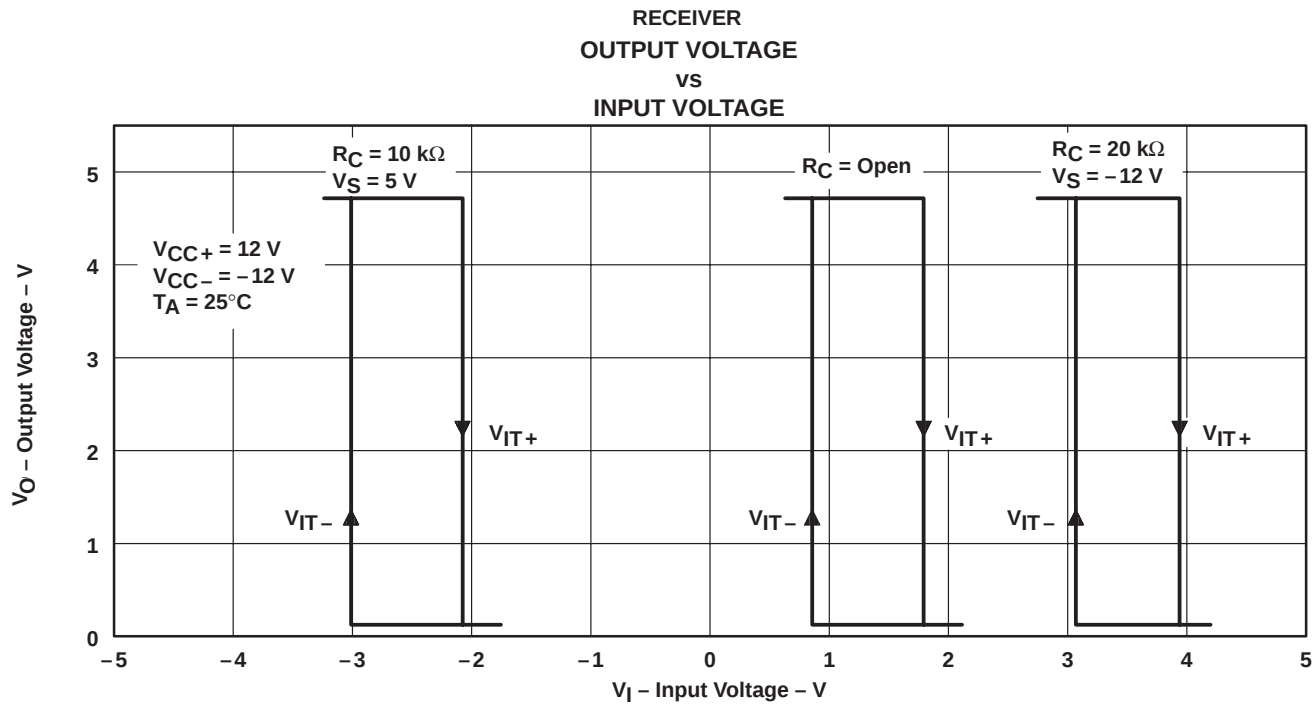


Figure 9

TYPICAL CHARACTERISTICS

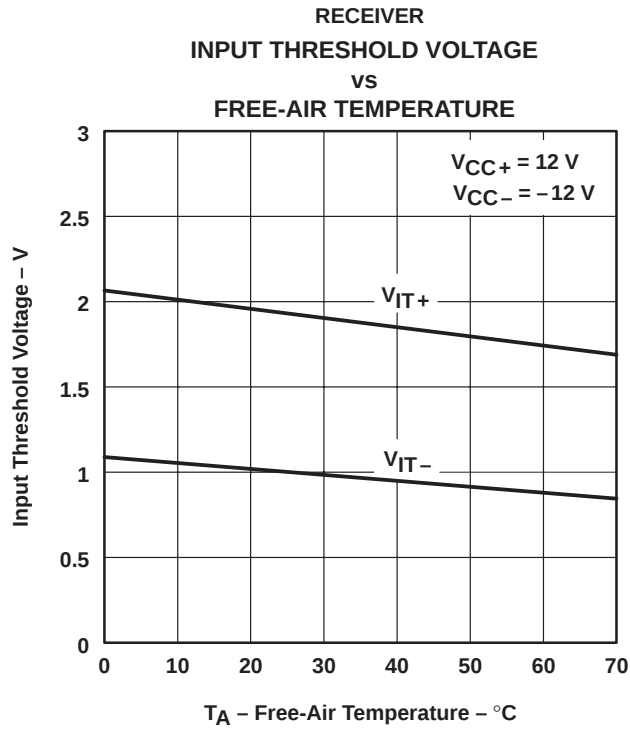


Figure 10

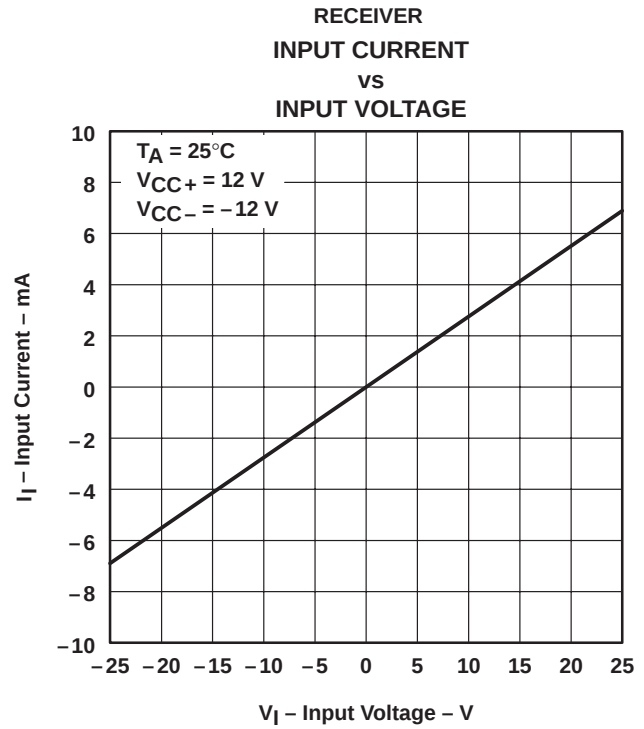


Figure 11

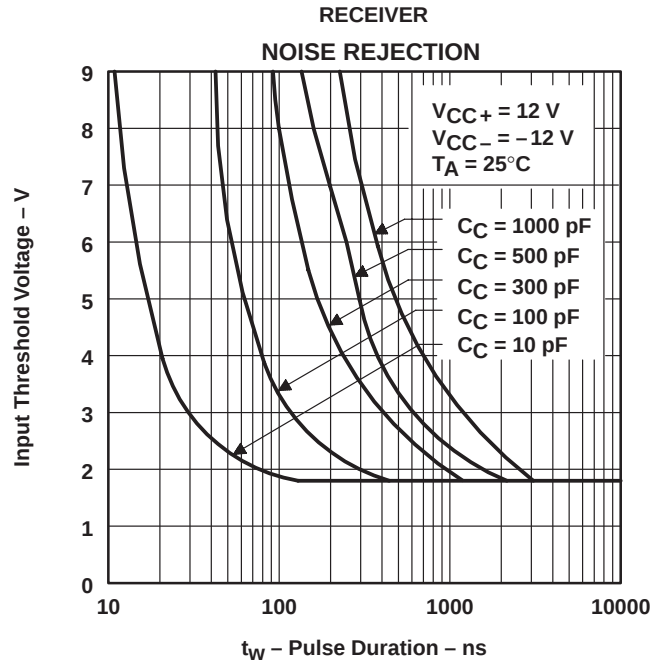


Figure 12

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