

MC3450, MC3452, MC3550, MC3552 QUAD DIFFERENTIAL LINE RECEIVERS

SLLS012B – FEBRUARY 1986 – REVISED FEBRUARY 1993

- Four Independent Receivers With Common Enable Input
- High Input Sensitivity . . . 25 mV Max
- High Input Impedance
- MC3450 and MC3550 Have 3-State Outputs
- MC3452 Has Open-Collector Outputs
- Glitch-Free Power-Up/Power-Down Operation

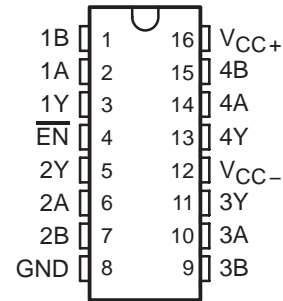
description

The MC3450, MC3550, MC3452, and MC3552 are quad differential line receivers designed for use in balanced and unbalanced digital data transmission. The MC34/3550 and MC34/3552 are the same except that the MC3450 and MC3550 have 3-state outputs whereas the MC3452 and MC3552 have open-collector outputs, which permit the wire-AND function with similar output devices. The 3-state and open-collector outputs permit connection directly to a bus-organized system.

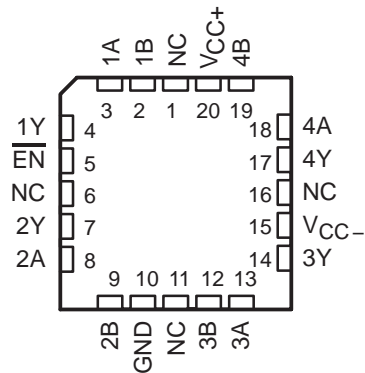
The MC3450, MC3550, MC3452, and MC3550 are designed for optimum performance when used with either the MC3453 or MC3553 quad differential line driver or SN75109A, SN75110A, and SN75112 dual differential drivers.

The MC3450 and MC3452 are characterized for operation from 0°C to 70°C. The MC3550 and MC3552 are characterized for operation over the full military temperature range of -55°C to 125°C.

MC3450, MC3452 . . . D OR N PACKAGE
MC3550, MC3552 . . . J PACKAGE
(TOP VIEW)



MC3550, MC3552 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

**THE MC3452 IS NOT
RECOMMENDED FOR NEW DESIGN**

FUNCTION TABLE

DIFFERENTIAL INPUTS A – B	ENABLE \overline{EN}	OUTPUT Y
$V_{ID} \geq 25 \text{ mV}$	L	H
$-25 \text{ mV} < V_{ID} < 25 \text{ mV}$	L	?
$V_{ID} \leq 25 \text{ mV}$	L	L
X	H	Z

H = high level, L = low level, ? = indeterminate,
X = impedance (off)

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.



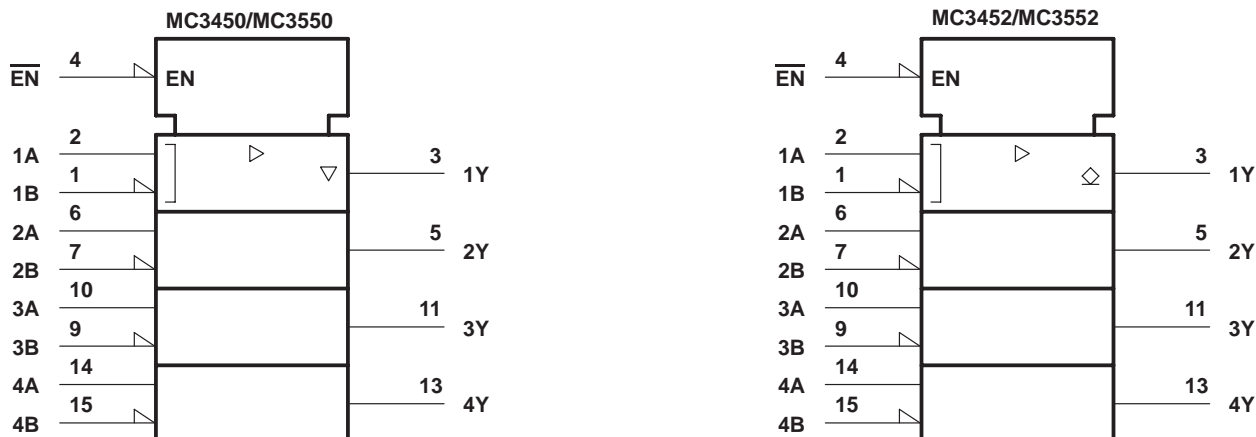
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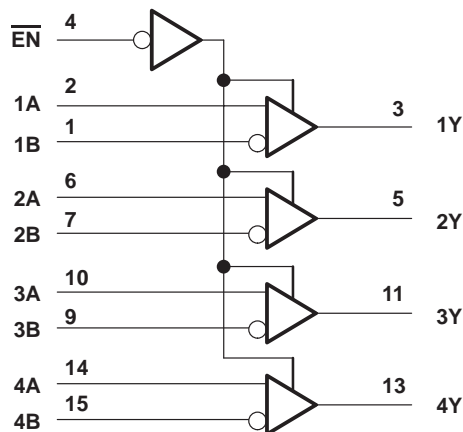
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logic symbols†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

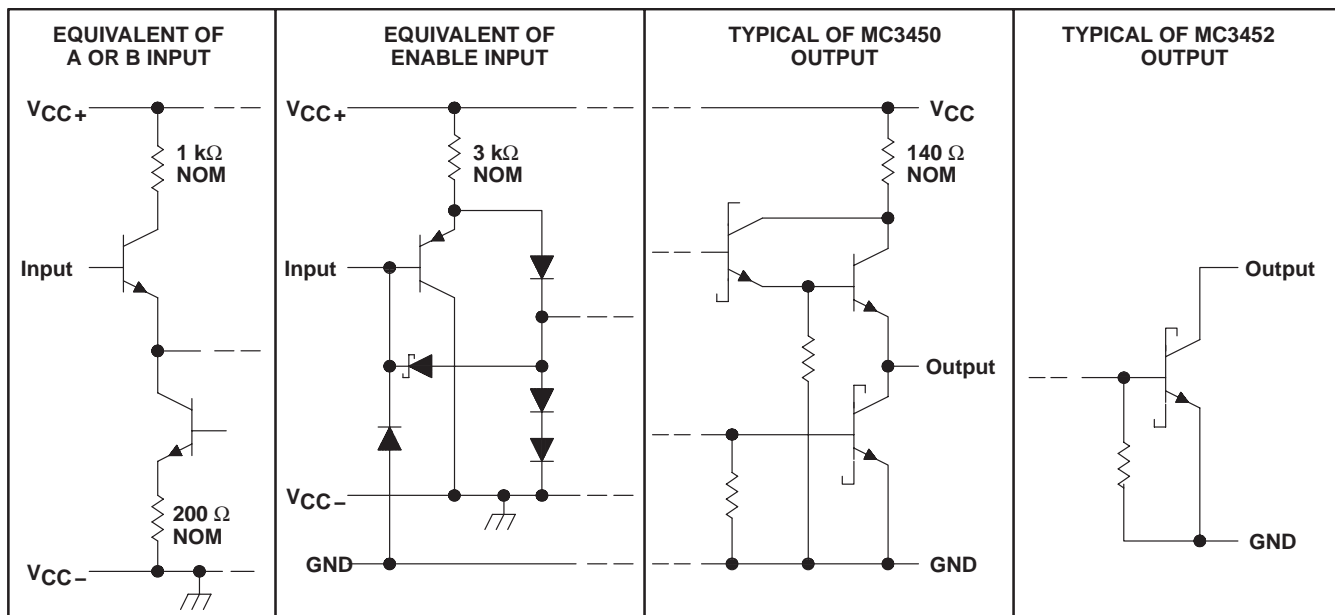
logic diagram (positive logic)



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schematics of inputs and outputs



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

Supply voltage, V_{CC+} (see Note 1)	7 V
Supply voltage, V_{CC-}	-7 V
Differential input voltage (see Note 2)	± 6 V
Common-mode input voltage (see Note 3)	± 5 V
Enable input voltage	5.5 V
Continuous total dissipation	See Dissipation Rating Table
Operating free-air temperature range	0°C to 70°C
Storage temperature range	-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 10 seconds: D or N package	260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J package	300°C

- NOTES: 1. All voltage values, except differential input voltage, are with respect to network ground terminal.
 2. Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input.
 3. Common-mode input voltage is the average of the voltages at the A and B inputs.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	OPERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 125^\circ\text{C}$ 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	—



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recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC+}	$T_A \geq 25^\circ\text{C}$	4.5	5	5.5	V
	$T_A < 25^\circ\text{C}$	4.75	5	5.5	
Supply voltage, V_{CC-}	$T_A \geq 25^\circ\text{C}$	-4.5	-5	-5.5	V
	$T_A < 25^\circ\text{C}$	-4.75	-5	-5.5	
High-level enable input voltage, V_{IH}		2			V
Low-level enable input voltage, V_{IL}		0.8			V
Low-level output current, I_{OL}		-16			mA
Differential input voltage, V_{ID} (see Note 4)		-5 [†]	5		V
Common-mode input voltage, V_{IC} (see Note 4)		-3 [†]	3		V
Input voltage range, any different input to GND		-5 [†]	3		V
Operating free-air temperature, T_A	MC3450, MC3452	0		70	°C
	MC3550, MC3552	-55		125	

[†] The algebraic convention, in which the less positive (more negative) limit is designated minimum, is used in this data sheet for common-mode input voltage.

NOTE 4: The recommended combinations of input voltages fall within the shaded area of Figure 1.

RECOMMENDED COMBINATIONS OF INPUT VOLTAGES

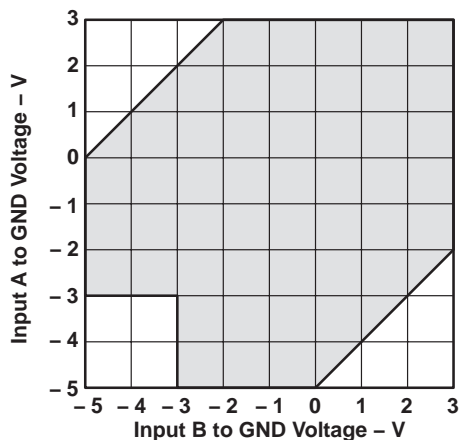


Figure 1



MC3450, MC3452, MC3550, MC3552 QUAD DIFFERENTIAL LINE RECEIVERS

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

PARAMETER		TEST CONDITIONS	MC3450, MC3550			MC3452, MC3552			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{OH}	High-level output voltage	$V_{CC\pm} = \pm 4.75 \text{ V}$, $V_{ID} = 25 \text{ mV}$, $\overline{\text{EN}}$ at 0.8 V, $I_{OH} = -400 \mu\text{A}$, $V_{IC} = -3 \text{ V to } 3 \text{ V}$	2.4						V
V_{OL}	Low-level output voltage	$V_{CC\pm} = \pm 4.75 \text{ V}$, $V_{ID} = -25 \text{ mV}$, $\overline{\text{EN}}$ at 2 V, $I_{OL} = 16 \text{ mA}$, $V_{IC} = -3 \text{ V to } 3 \text{ V}$	0.5			0.5			V
I_{OH}	High-level output current	$V_{CC\pm} = \pm 4.75 \text{ V}$, $V_{OH} = 5.25 \text{ V}$				250			μA
I_{IH}	High-level input current	A inputs	$V_{ID} = -2 \text{ V}$			30 75			μA
		B inputs	$V_{ID} = -2 \text{ V}$			30 75			μA
		$\overline{\text{EN}}$	$V_{IH} = 2.4 \text{ V}$			40			μA
		$\overline{\text{EN}}$	$V_{IH} = 5.25 \text{ V}$			1			mA
I_{IL}	Low-level input current	A inputs	$V_{ID} = 2 \text{ V}$			-10			μA
		B inputs	$V_{ID} = 2 \text{ V}$			-10			μA
		$\overline{\text{EN}}$	$V_{IL} = 0.4 \text{ V}$			-1.6			mA
I_{OZ}	High-impedance state output current	$V_O = 2.4 \text{ V}$	40						μA
		$V_O = 0.4 \text{ V}$	-40						μA
I_{OS}	Short-circuit output current‡	$V_{ID} = 25 \text{ mV}$, $V_O = 0$, $\overline{\text{EN}}$ at 0.8 V	-18			-70			mA
I_{CCH+}	Supply current from V_{CC+} , outputs high	A inputs at GND, B inputs at 3 V, $\overline{\text{EN}}$ at 3 V	60			60			mA
I_{CCH-}	Supply current from V_{CC-} , outputs high		-30			-30			mA

† All typical values are at $V_{CC+} = 5 \text{ V}$, $V_{CC-} = -5 \text{ V}$, $T_A = 25^\circ\text{C}$.

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

switching characteristics, $V_{CC\pm} = \pm 5 \text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MC3450, MC3550			MC3452, MC3552			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
t_{PLH}	A and B	Y	$C_L = 50 \text{ pF}$, See Figure 2	17 25						ns
			$C_L = 15 \text{ pF}$, See Figure 2				19 25			
t_{PHL}	A and B	Y	$C_L = 50 \text{ pF}$, See Figure 2	17 25						ns
			$C_L = 15 \text{ pF}$, See Figure 2				19 25			
t_{PZH}	$\overline{\text{EN}}$	Y	$C_L = 50 \text{ pF}$, See Figure 2	21						ns
t_{PZL}	$\overline{\text{EN}}$	Y		27						
t_{PHZ}	$\overline{\text{EN}}$	Y	$C_L = 15 \text{ pF}$, See Figure 3	18						ns
t_{PLZ}	$\overline{\text{EN}}$	Y		29						
t_{PLH}	$\overline{\text{EN}}$	Y	$C_L = 15 \text{ pF}$, See Figure 4				25			ns
t_{PHL}	$\overline{\text{EN}}$	Y	$C_L = 15 \text{ pF}$, See Figure 4				25			ns

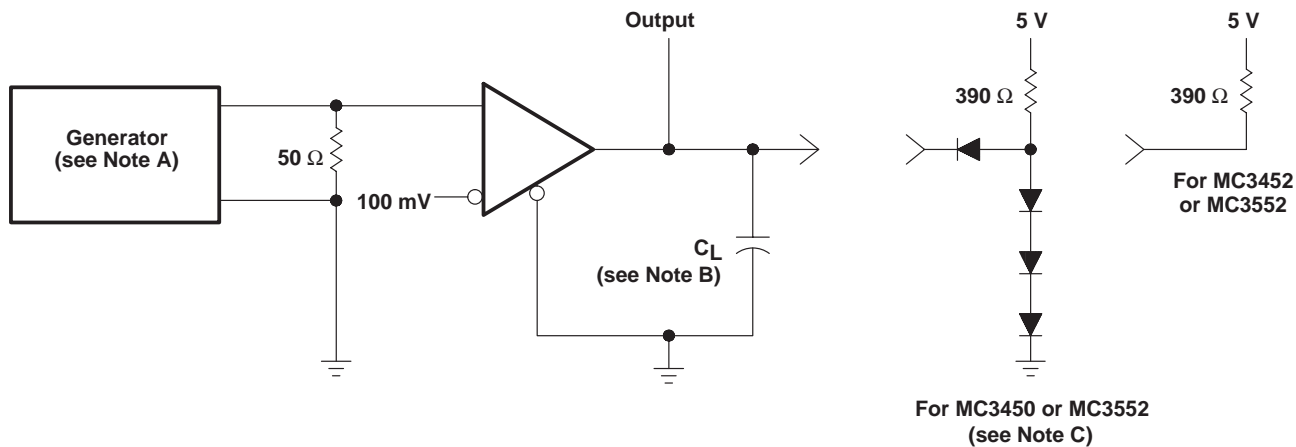
† All typical values are at $V_{CC+} = 5 \text{ V}$, $V_{CC-} = -5 \text{ V}$, $T_A = 25^\circ\text{C}$.



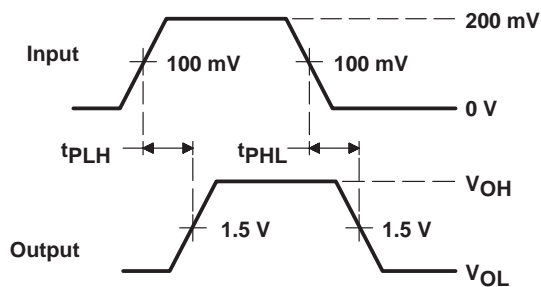
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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



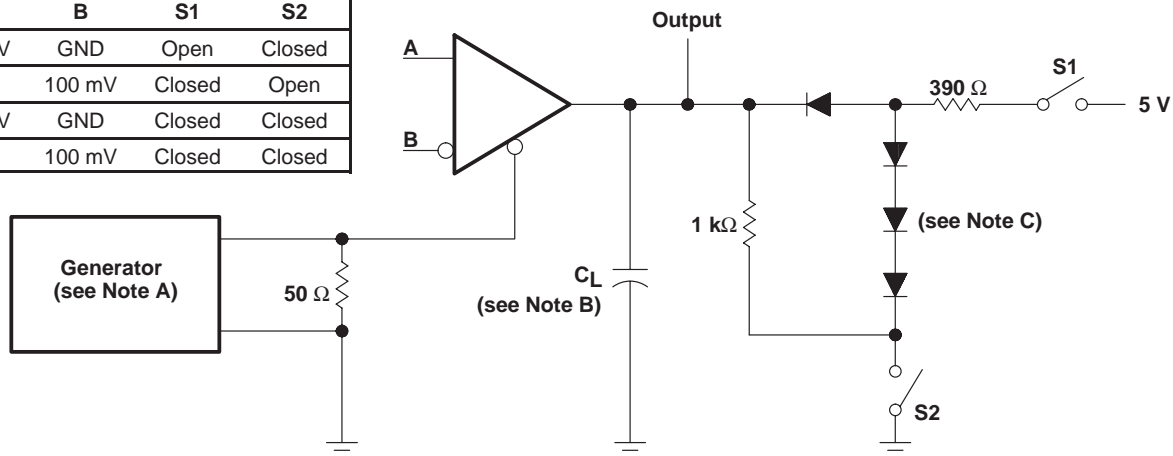
VOLTAGE WAVEFORMS

- NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 1 MHz, duty cycle = 50%, $t_r \leq$ 6 ns, $t_f \leq$ 6 ns.
 B. C_L includes probe and jig capacitance.
 C. All diodes are 1N916 or equivalent.

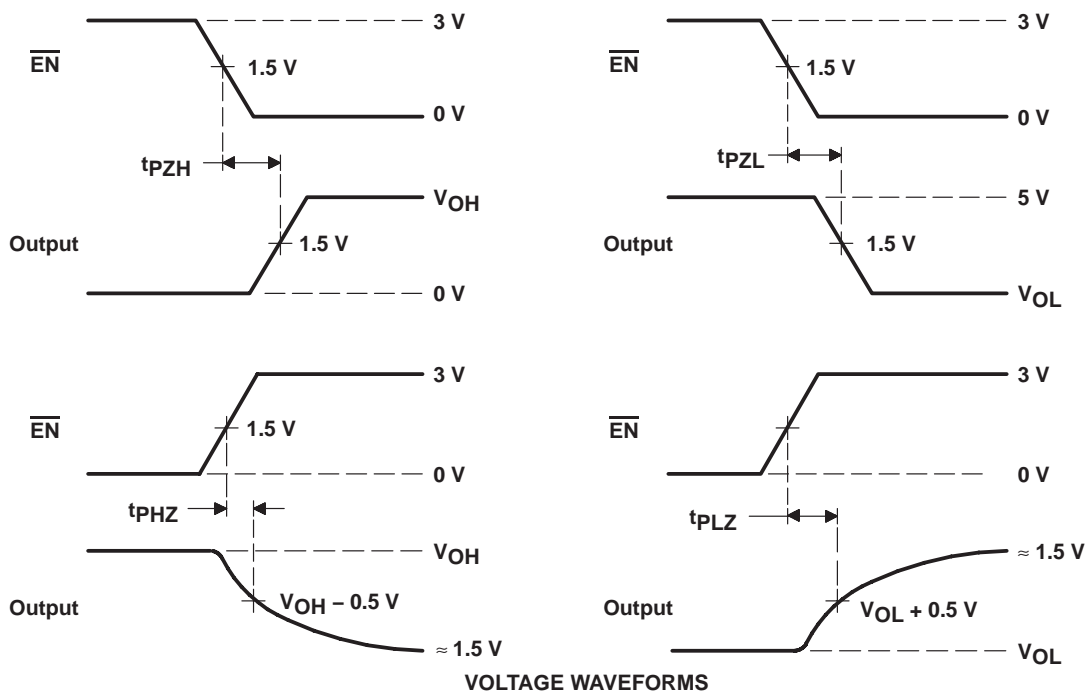
Figure 2. Test Circuit and Voltage Waveforms

PARAMETER MEASUREMENT INFORMATION

	A	B	S1	S2
t _{PZH}	100 mV	GND	Open	Closed
t _{PZL}	GND	100 mV	Closed	Open
t _{PHZ}	100 mV	GND	Closed	Closed
t _{PLZ}	GND	100 mV	Closed	Closed



TEST CIRCUIT



VOLTAGE WAVEFORMS

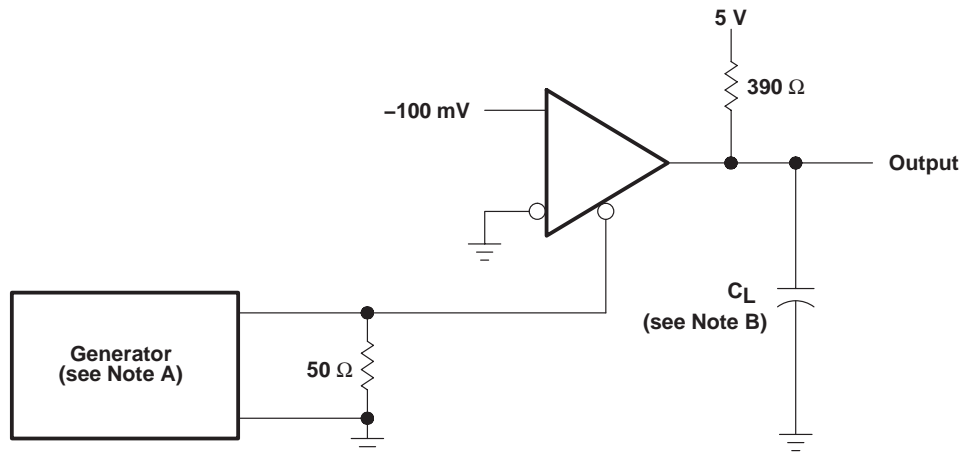
NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 1 MHz, duty cycle = 50%, t_r ≤ 6 ns, t_f ≤ 6 ns.
B. C_L includes probe and jig capacitance.
C. All diodes are 1N916 or equivalent.

Figure 3. MC3450 and MC3550 Test Circuit and Voltage Waveforms

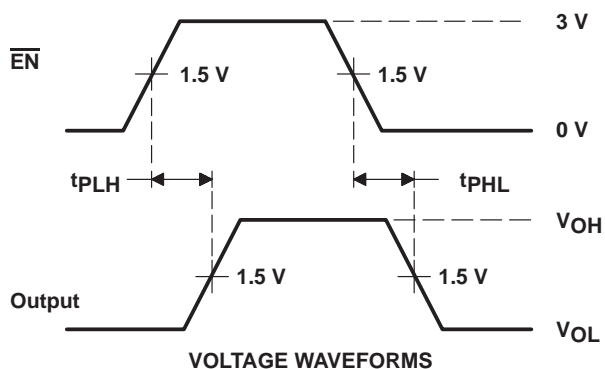
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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

- NOTES: A. The input pulse is supplied by a generator having the following characteristics: $\text{PRR} \leq 1\ \text{MHz}$, duty cycle = 50%, $t_r \leq 6\ \text{ns}$, $t_f \leq 6\ \text{ns}$.
 B. C_L includes probe and jig capacitance.

Figure 4. MC3452 and MC3552 Test Circuit and Voltage Waveforms

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