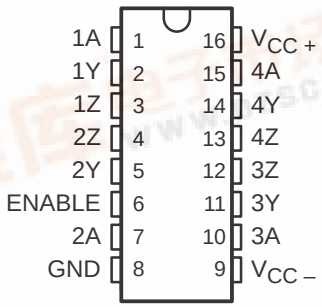
QUAD LINE DRIVERS WITH COMMON ENABLE

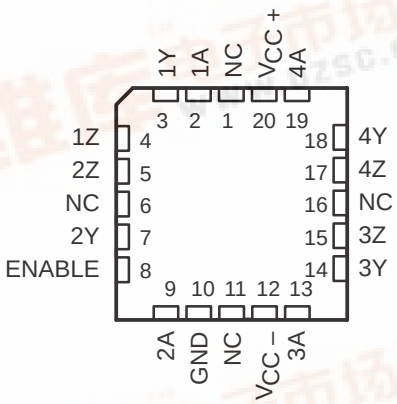
SLLS119A – FEBRUARY 1986 – REVISED FEBRUARY 1993

- **Similar to a Dual Version of SN55/75110A Line Driver**
- **Improved Stability Over Supply Voltage and Temperature Ranges**
- **Constant-Current Outputs**
- **High Output Impedance**
- **High Common-Mode Output Voltage Range –3 V to 10 V**
- **Glitch-Free Power-Up/Power-Down Operation**
- **TTL-Input Compatibility**
- **Common-Enable Circuit**
- **Designed to Be Interchangeable With Motorola MC3453 and Military-Temperature-Range Version of MC3553**

D, J, OR N . . . PACKAGE
(TOP VIEW)



FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The MC3453 and MC3553 feature four line drivers with a common-enable input. When the ENABLE input is high, a constant output current is switched between each pair of output terminals in response to the logic level at that channel input. When the ENABLE is low, all channel outputs are nonconductive (transistors biased to cutoff). This minimizes loading in party-line systems where a large number of drivers share the same line.

The driver outputs have a common-mode voltage range of –3 V to 10 V, allowing common-mode voltages on the line without affecting driver performance.

All outputs should be maintained within the recommended common-mode output voltage range to ensure that the channels do not interact with each other. To minimize power dissipation, all unused outputs should be grounded.

FUNCTION TABLE

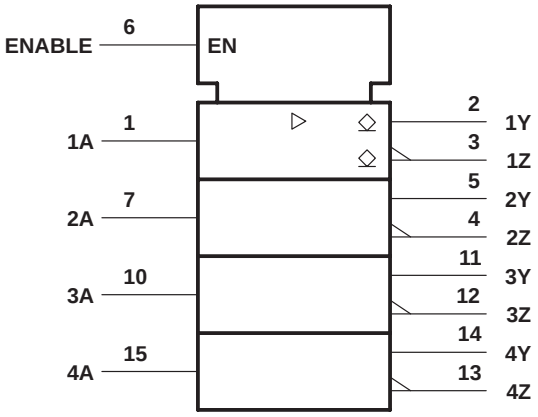
LOGIC INPUT	ENABLE INPUT	OUTPUT CURRENT Z	OUTPUT CURRENT Y
H	H	On	Off
L	H	Off	On
H	L	Off	Off
L	L	Off	Off

L = low logic level, H = high logic level

All inputs are diode clamped and are designed to satisfy TTL-system requirements. The inputs are tested at 2 V for high-logic-level input conditions and 0.8 V for low-logic-level input conditions. These tests ensure 400 mV of noise margin when interfaced with Series 54/74 TTL.

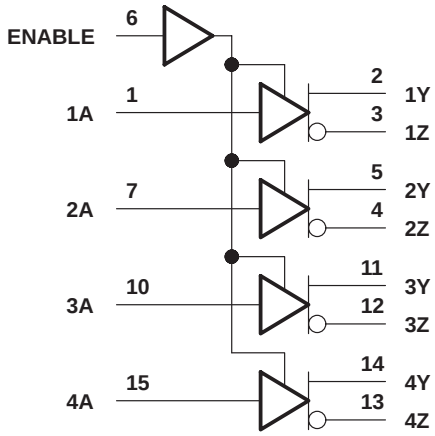
The MC3453 is characterized for operation from 0°C to 70°C. The MC3553 is characterized for operation over the full military temperature range of –55°C to 125°C.

logic symbol†

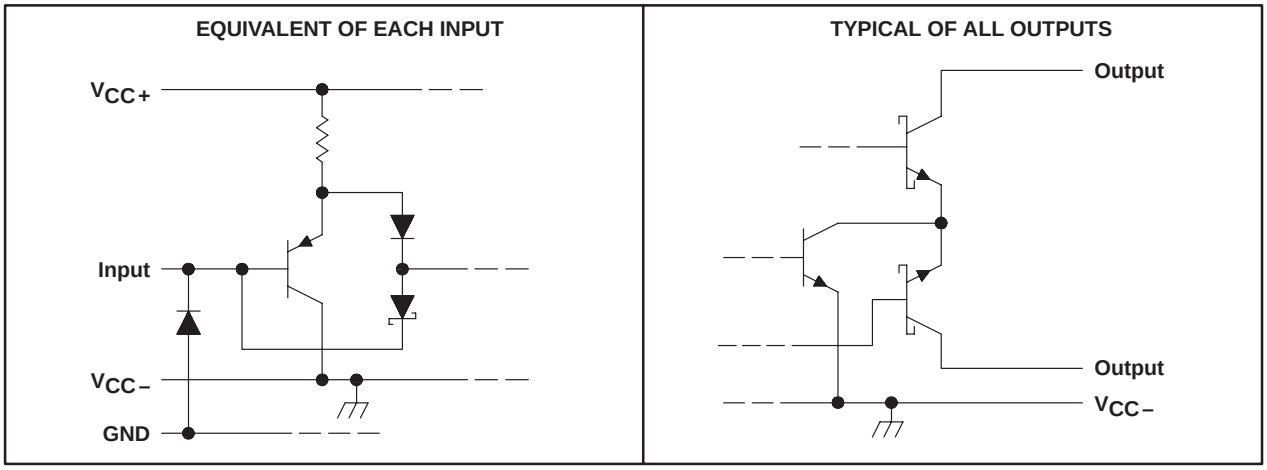


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



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
Input voltage (any input) . . . . . 5.5 V
Output voltage range (any output) . . . . . –5 V to 12 V
Continuous total dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range: MC3453 . . . . . 0°C to 70°C
MC3553 . . . . . –55°C to 125°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

NOTE 1: All voltage values are with respect to network ground terminal.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	OPERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 125°C$ 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	—

recommended operating conditions

		MIN	TYP	MAX	UNIT
Supply voltage, V_{CC+}	$T_A \ge 25°C$	4.5	5	5.5	V
	$T_A < 25°C$	4.75	5	5.5	
Supply voltage, V_{CC-}	$T_A \ge 25°C$	−4.5	−5	−5.5	V
	$T_A < 25°C$	−4.75	−5	−5.5	
High-level input voltage, V_{IH}		2		5.5	V
Low-level input voltage, V_{IL}		0		0.8	V
Common-mode output voltage range	V_{OCR+}	0		10	V
	V_{OCR-}	0		−3	V
Operating free-air temperature, T_A	MC3453	0		70	°C
	MC3553	−55		125	

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

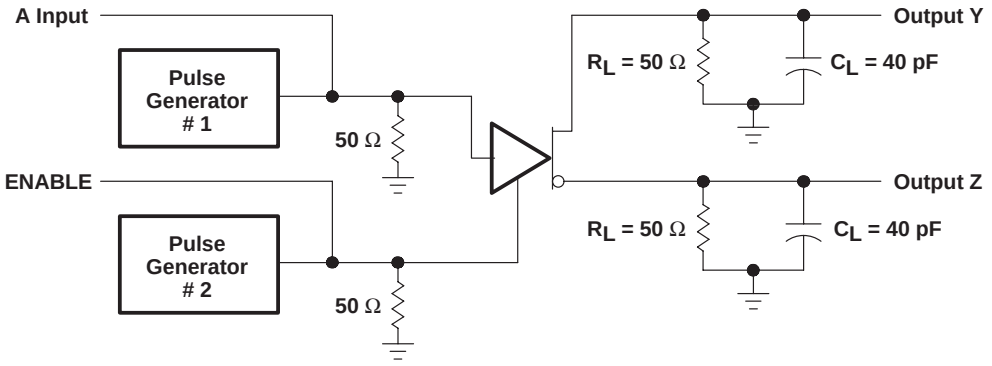
PARAMETER		TEST CONDITIONS†		MIN	TYP‡	MAX	UNIT
V_{IK}	Input clamp voltage	$I_I = -12$ mA			−0.9	−1.5	V
$I_{O(on)}$	On-state output current	V_{CC+} = MAX, V_{CC-} = MAX			11	15	mA
		V_{CC+} = MIN, V_{CC-} = MIN		6.5	11		
$I_{O(off)}$	Off-state output current	V_{CC+} = MIN, V_{CC-} = MIN, V_O = 10 V				100	μA
I_{IH}	High-level input current	V_I = 2.4 V				40	μA
		$V_I = V_{CC+}$ max				1	mA
I_{IL}	Low-level input current	V_I = 0.4 V				−1.6	mA
I_{CC+}	Supply current from V_{CC+}	A inputs at 0.4 V	ENABLE at 2 V		33	50	mA
			ENABLE at 0.4 V		33	50	
I_{CC-}	Supply current from V_{CC-}	A inputs at 0.4 V	ENABLE at 2 V		−68	−90	mA
			ENABLE at 0.4 V		−31	−40	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC+} = 5 V, V_{CC-} = −5 V, and T_A = 25°C.

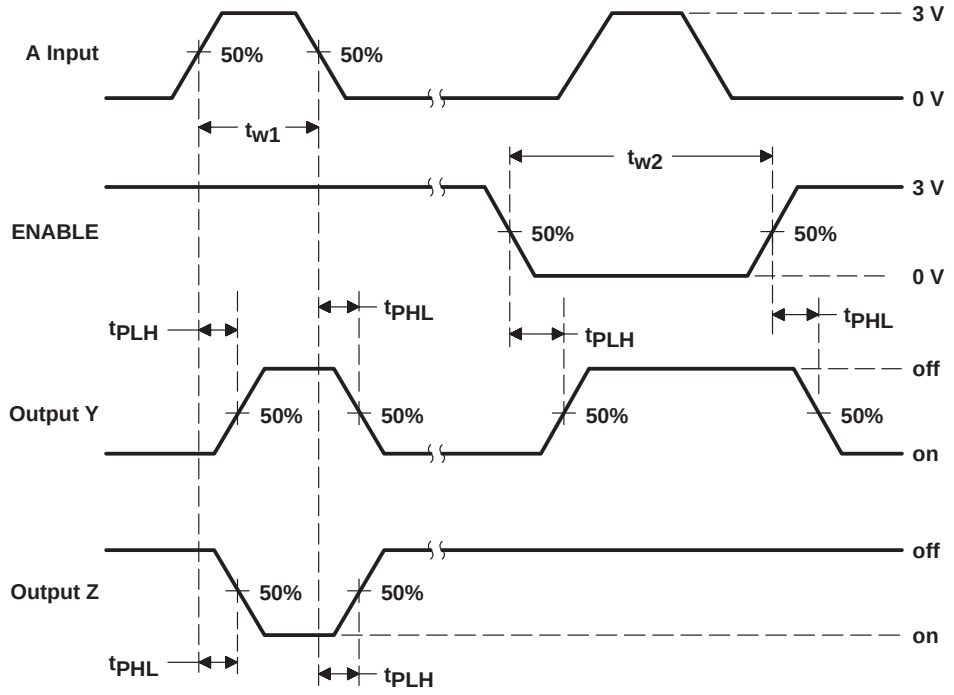
switching characteristics, V_{CC+} = 5 V, V_{CC-} = −5 V, R_L = 50 Ω, C_L = 40 pF, T_A = 25°C

PARAMETER		FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high level output	A	Y or Z	See Figure 1		9	15	ns
t_{PHL}	Propagation delay time, high-to-low level output	A	Y or Z			7	15	ns
t_{PLH}	Propagation delay time, low-to-high level output	ENABLE	Y or Z			14	25	ns
t_{PHL}	Propagation delay time, high-to-low level output	ENABLE	Y or Z			15	25	ns

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

NOTES: A. The pulse generators have the following characteristics: Z_O = 50 Ω, $t_r = t_f$ = 10 ± 5 ns, t_{W1} = 200 ns, PRR ≤ 1 MHz, t_{W2} = 1 µs, PRR ≤ 500 kHz.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

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