

MC3453, MC3553 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

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.

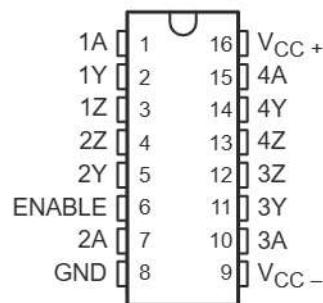
The driver outputs have a common-mode voltage range of –3 V to 10 V, allowing common-mode voltages on the line without affecting driver performance.

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.

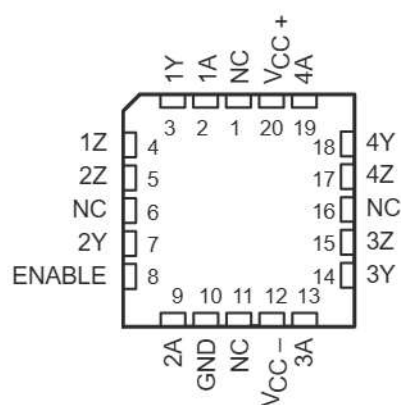
All inputs are diode clamped and are designed to satisfy TTL-system requirements. The inputs are tested at 2 V for high-logic-level input conditions and 0.8 V for low-logic-level input conditions. These tests ensure 400 mV of noise margin when interfaced with Series 54/74 TTL.

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.

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



FK PACKAGE
(TOP VIEW)



NC—No internal connection

FUNCTION TABLE

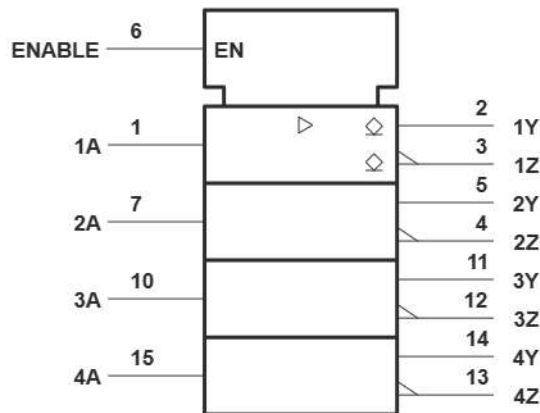
LOGIC INPUT	ENABLE INPUT	OUTPUT CURRENT	
		Z	Y
H	H	On	Off
L	H	Off	On
H	L	Off	Off
L	L	Off	Off

L = low logic level, H = high logic level

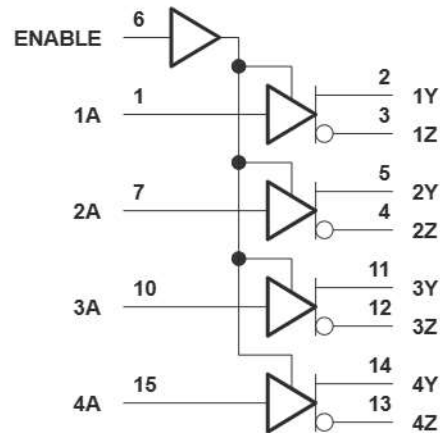
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logic symbol†

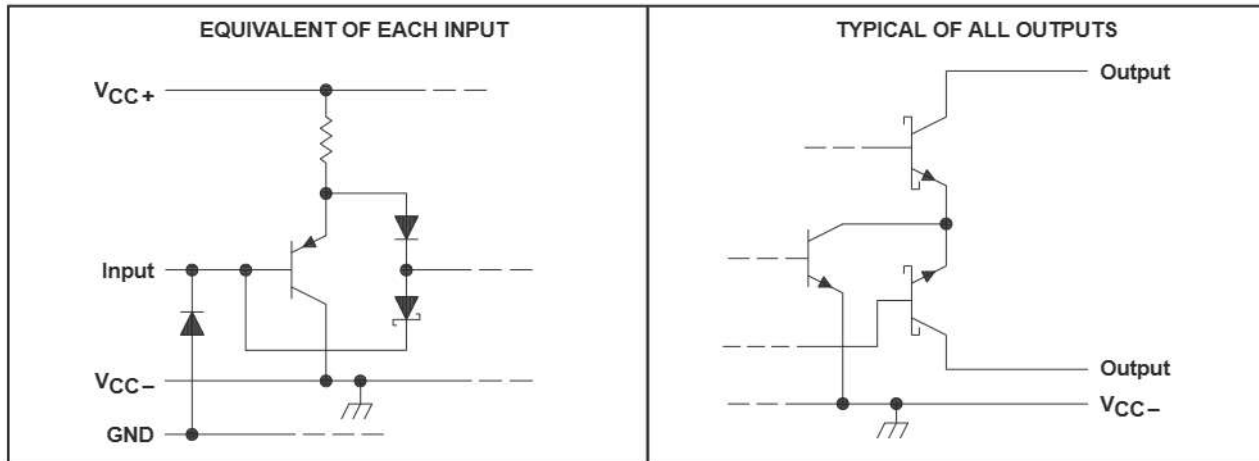


logic diagram (positive logic)



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

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.

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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	—

recommended operating conditions

		MIN	TYP	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 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, $V_{CC\pm} = \text{MAX}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	MIN	TYP‡	MAX	UNIT
V_{IK}	Input clamp voltage	$I_I = -12 \text{ mA}$		-0.9	-1.5	V
$I_{O(on)}$	On-state output current	$V_{CC+} = \text{MAX}, V_{CC-} = \text{MAX}$		11	15	mA
		$V_{CC+} = \text{MIN}, V_{CC-} = \text{MIN}$	6.5	11		
$I_{O(off)}$	Off-state output current	$V_{CC+} = \text{MIN}, V_{CC-} = \text{MIN}, V_O = 10 \text{ V}$			100	μA
I_{IH}	High-level input current	$V_I = 2.4 \text{ V}$			40	μA
		$V_I = V_{CC+} \text{ max}$			1	mA
I_{IL}	Low-level input current	$V_I = 0.4 \text{ V}$			-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 $V_{CC+} = 5 \text{ V}, V_{CC-} = -5 \text{ V},$ and $T_A = 25^\circ\text{C}$.

switching characteristics, $V_{CC+} = 5 \text{ V}, V_{CC-} = -5 \text{ V}, R_L = 50 \Omega, C_L = 40 \text{ pF}, T_A = 25^\circ\text{C}$

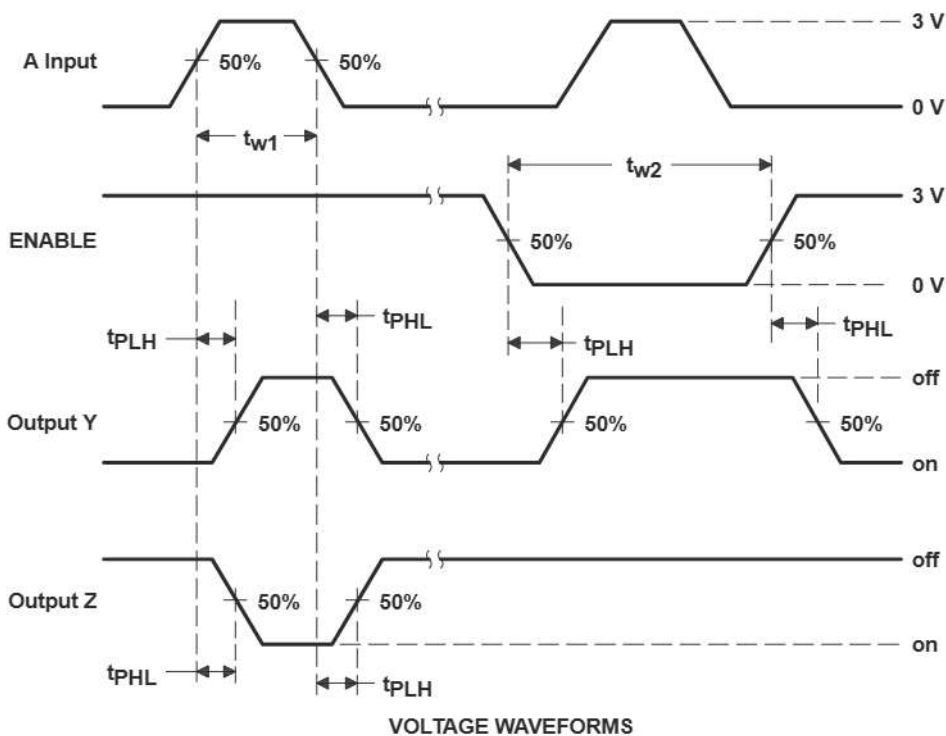
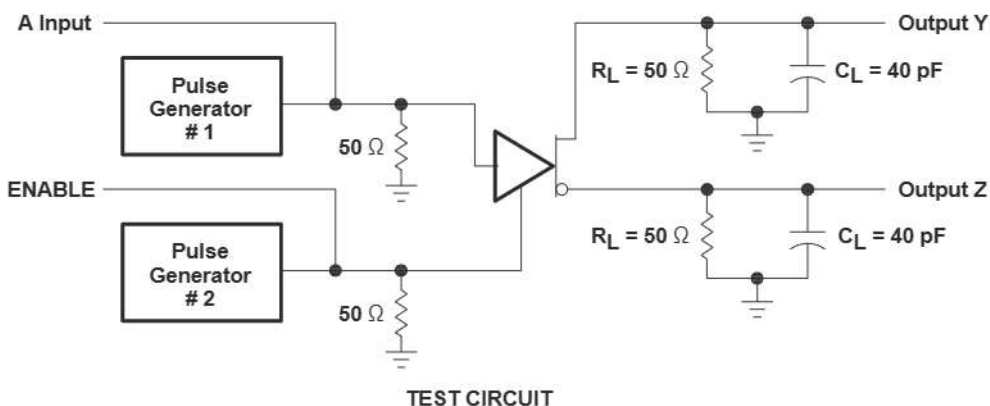
PARAMETER		FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high level output	A	Y or Z	See Figure 1		9	15	ns
t_{PHL}	Propagation delay time, high-to-low level output	A	Y or Z			7	15	ns
t_{PLH}	Propagation delay time, low-to-high level output	ENABLE	Y or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



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PARAMETER MEASUREMENT INFORMATION



- NOTES: A. The pulse generators have the following characteristics: $Z_0 = 50 \Omega$, $t_r = t_f = 10 \pm 5 \text{ ns}$, $t_{w1} = 200 \text{ ns}$, $\text{PRR} \leq 1 \text{ MHz}$, $t_{w2} = 1 \mu\text{s}$, $\text{PRR} \leq 500 \text{ kHz}$.
 B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
MC3453D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI

⁽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) 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.

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.

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