Octal Line Driver

FEATURES

- Eight Single-Ended Line Drivers in One Package
- Meets Standards EIA232E/CCITT V.28, and EIA423A/CCITT V.10/X.26
- Single External Resistor Controls Slew Rate
- Wide Supply Voltage Range
- Tri-State Outputs
- Output Short-Circuit Protection
- Low Power Consumption
- 2kV ESD Protection on all Pins
- EOS on all Output Pins 35V under all Output Conditions
- High Current Output for Long Line Drive, Exceeds Standards

DESCRIPTION

The UC5172 is a single-ended octal line driver designed to meet both standard modem control applications (EIA232E/V.28), and long line drive applications (EIA423A/V.10/X.26). The slew rate for all 8 drivers is controlled by a single external resistor. The slew rate and output levels are independent of the power variations.

The UC5172 has high output current, and current balance for long line drive applications. EOS - Output parasitic SCRs powered on and off are 35V, well above signal levels, allowing protection devices to work.

Inputs are compatible TTL+MOS logic families and are diode protected against negative transients.

FUNCTIONAL TABLE

INPUTS		OUTPUT
$\overline{EN}$	DATA	EIA232E/EIA423A
0	0	5V to 6V
0	1	-5V to -6V
1	X	High Z

Note 2: Minimum output swings.

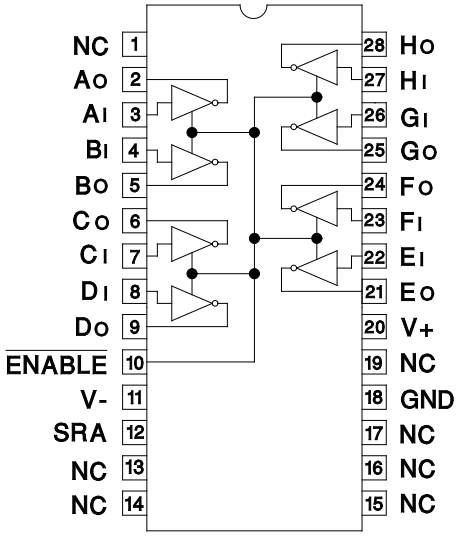
ABSOLUTE MAXIMUM RATINGS (Note 1)

V+ (Pin 20) 15V
V- (Pin 11) . . . . . -15V
PLCC Power Dissipation, T_A=25°C (Note 3) . . . . . 1000 mW
DIP Power Dissipation, T_A=25°C (Note 3) . . . . . 1250 mW
Input Voltage . . . . . -1.5V to +7V
Output Voltage . . . . . -6V to +6V
Slew Rate Resistor . . . . . 2k to 10kΩ
Storage Temperature . . . . . -65°C to +150°C

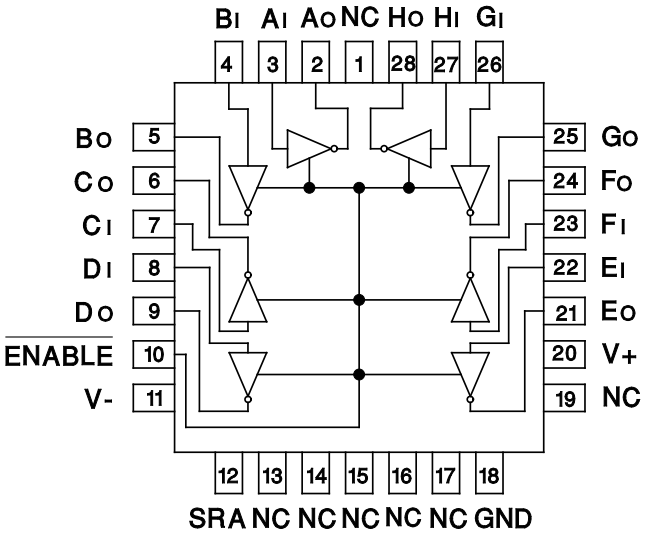
Note 1: All voltages are with respect to ground, pin 18.
Note 3: Consult Packaging section of Databook for thermal limitations and considerations of package.

CONNECTION DIAGRAMS

N PACKAGE (TOP VIEW)



Q PACKAGE (TOP VIEW)



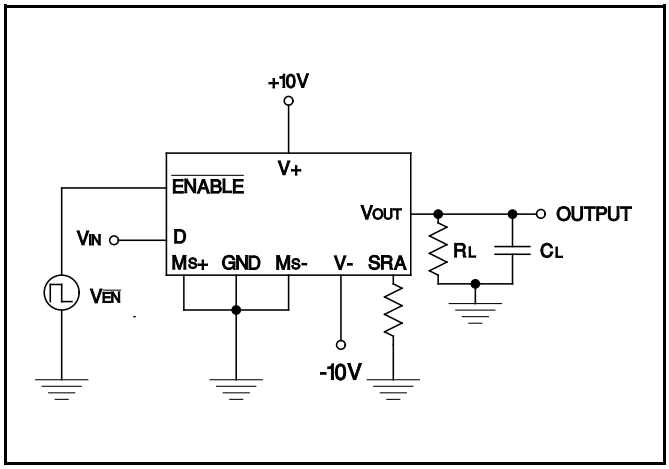
DC ELECTRICAL CHARACTERISTICS: Unless otherwise stated these specifications hold for |V+| = |V-| = 10V, 0°C < T_A < +70°C, R_{SRA} = +10k, T_A =T_J.

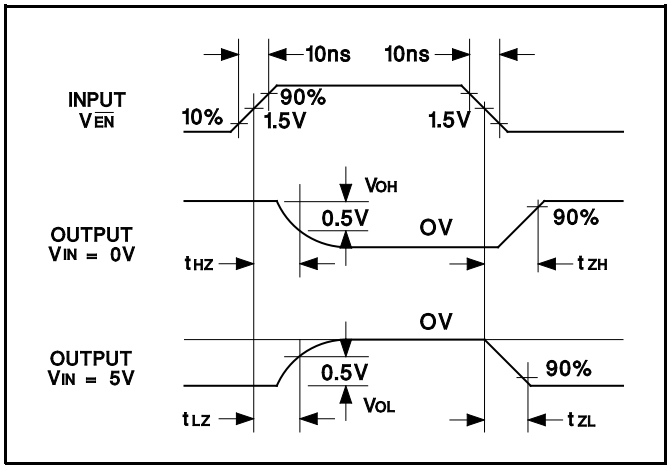
PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
POWER SUPPLY REQUIREMENTS							
V+ Range				9		15	V
V- Range				-9		-15	V
V+ Supply Current	I+	R_L = Infinite $\overline{En}$ = 0V			15	25	mA
V- Supply Current	I-	R_L = Infinite $\overline{En}$ = 0V			-17	-25	mA
INPUTS							
High-Level Input Voltage	V_{IH}			2.0			V
Low-Level Input Voltage	V_{IL}					0.8	V
Input Clamp Voltage	V_{IK}	I_I = -15 mA			-1.1	-18	V
High Level Input Current	I_{IH}	V_{IH} = 2.4V		-2	0.25	40	µA
Low Level Input Current	I_{IL}	V_{IL} = 0.4V		-200	-8.0		µA
OUTPUTS							
High Level Output Voltage	V_{OH}	V_{IN} = 0.8V	R_L = Inf.	5.0	5.3	6.0	V
EIA232E		$\overline{En}$ = 0.8V	R_L = 3k	5.0	5.3	6.0	V
(EIA-423A)			R_L = 450	4.5	5.2	6.0	V
Low Level Output Voltage	V_{OL}	V_{IN} = 2.0V	R_L = Inf.	-5.0	-5.3	-6.0	V
EIA232E		$\overline{En}$ = 0.8V	R_L = 3k	-5.0	-5.6	-6.0	V
(EIA-423A)			R_L = 450	-4.5	-5.4	-6.0	V
Output Balance (EIA-423A)	V_{BAL}	R_L = 450, V_{OH} - V_{OL} = V_{BAL}			0.2	0.4	V
Off-State Output Current	I_{OZ}	$\overline{En}$ = 2.0V, V_O = ±6V, V+ = 15V, V– = -15V		-100		100	µA
Short-Circuit Current	I_{OS}	$\overline{En}$ = 0V	V_{IN} = 0V	25	65		mA
			V_{IN} = 5V	25	70		mA
Power Off Output Current	I_{PO}	V_O = ±6V, V+ = V– = 0V		-100		100	mA

AC ELECTRICAL CHARACTERISTICS: at |V+| = |V-| = +10V, 0°C < T_A < +70°C, T_A = T_J.

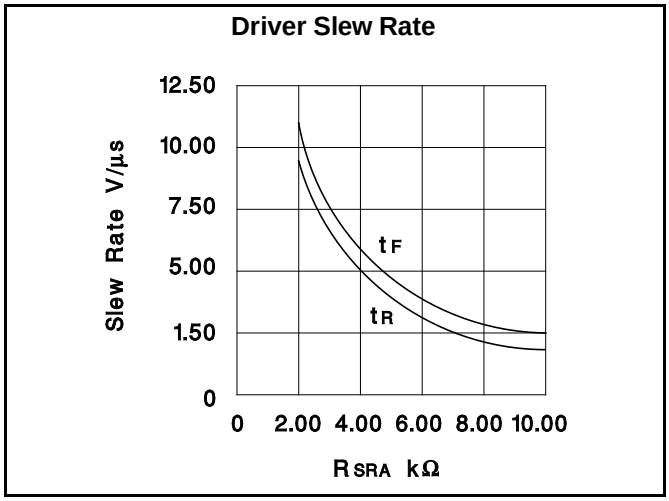
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Output Slew Rate	t_R	R_{SRA} = 2k	7.6	8.5	9.4	V/µs
	t_F	R_L = 450, C_L = 50pF	7.6	8.5	9.4	V/µs
Output Slew Rate	t_R	R_{SRA} = 10k	1.5	1.7	1.9	Vµs
	t_F	R_L = 450, C_L = 50pF	1.5	1.7	1.9	V/µs
Propagation Output to High Impedance	t_{Hz}	R_{SRA} = 10k		0.8	2.0	µs
	t_{Lz}	R_L = 450, C_L = 50pF		0.5	2.0	µs
Propagation High Impedance to Output	t_{zH}	R_{SRA} = 10k		2.0	7.0	ms
	t_{zL}	R_L = 450, C_L = 50pF		1.0	7.0	µs

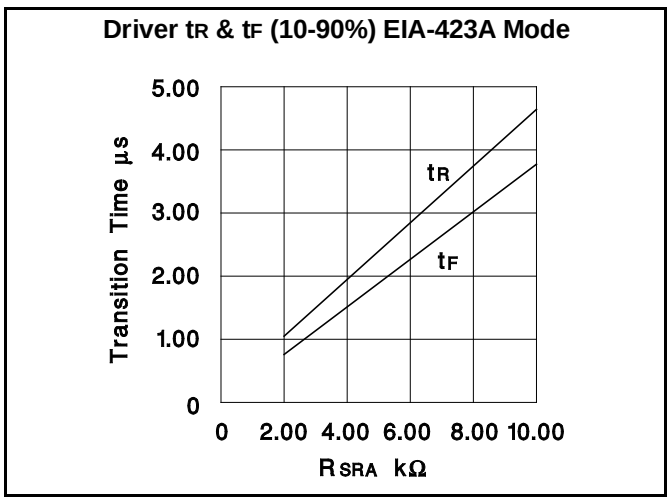
AC PARAMETER TEST CIRCUIT AND WAVEFORMS





AC CHARACTERISTICS





APPLICATIONS

Slew Rate Programming

Slew rate for the UC5172 is set up by a single external resistor connected between the SRA pin and ground. Slew rate adjustments can be approximated by using the following formula:

$$V/\mu s = \frac{20}{R_{SRA}} \text{ (RSRA in k}\Omega\text{)}$$

The slew rate resistor can vary between 2k and 10kΩ which allows slew rates between 10 to 2.2V/µs, respectively. The relationship between slew rate and RSRA is shown in the typical characteristics.

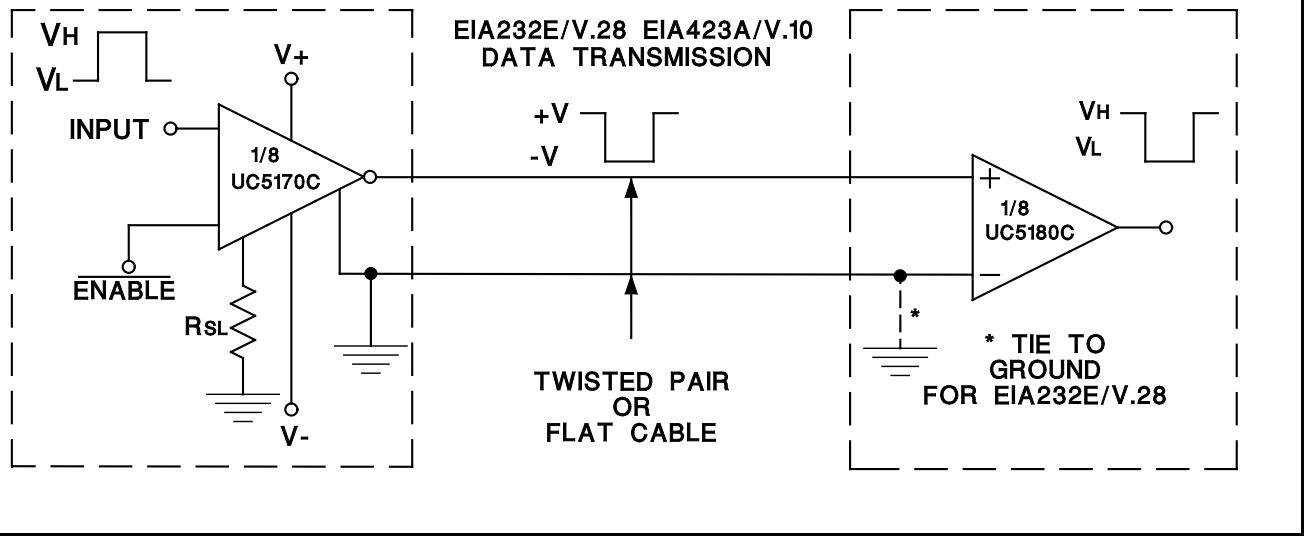
Waveshaping of the output lets the user control the level of interference (near-end crosstalk) that may be coupled to adjacent circuits in an interconnection. The recommended output characteristics for cable length and data rates can be found in EIA standard EIA-423A. Approximations of these standards are given by the following equations:

Max. Data Rate = 300/t (For data rates 1k to 100k bit/s)
Max. Cable Length (feet) = 100 x t (Max. length 4000 feet)

where t is the transition time from 10% to 90% of the output swing in microseconds. For data rates below 1k bit/s, t may be up to 300 microseconds.

The UC5172 has been used in applications up to 460KBPS.

APPLICATIONS



Specific Layout Notes

The UC5172 layout must have bulk bypassing close to the device. Peak slew current is greater than 500mA when all eight drivers slew at once in the same direction. Some applications mount the UC5172 on a bulkhead or isolated plane for RFI/FCC/VDE reasons. If bulk bypassing is not used, the -10V supply may go above -8.5 volts, causing the slew rate control circuit to become unstable.

The UC5172 can have output oscillation at 100kHz if the +10V supply is applied before the -10V supply. This has been a problem in some terminal designs where the +10V was developed from the flyback, which can result in a 500ms difference in the application of the supplies at power up.

General Layout Notes

The drivers and receivers should be mounted close to the system common ground point, with the ground reference tied to the common point to reduce RFI/EMI.

Filter connectors or transzorbs should be used to reduce the RFI/EMI, protecting the system from static (ESD), and electrical overstress (EOS). A filter connector or capacitor will reduce the ESD pulse by 90% typically. A cable dragged across a carpet and connected to a system can easily be charged to over 25,000 volts. This is a metal to metal contact when the cable is connected to the system (no resistance), currents exceed 80 amps with less than a nanosecond rise time. A transzorb provides two functions, the device capacitance inherently acts as a filter capacitor, and the device clamps the ESD and EOS pulses which would pass through the capacitor and destroy the devices. The recommended transzorb for the UC5172 is P6KEIOCA.

*Transzorb is a trademark of General Semiconductor Industries.

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