

ADM5170—SPECIFICATIONS ($V_{DD} = +10\text{ V} \pm 10\%$, $V_{SS} = -10\text{ V} \pm 10\%$, $MS+ = MS- = 0\text{ V}$, $R_{SRA} = 10\text{ k}\Omega$. All Specifications T_{MIN} to T_{MAX} unless otherwise noted.)

Parameter	Min	Typ	Max	Units	Test Conditions/Comments
POWER REQUIREMENTS					
V_{DD} Range	9		15	V	
V_{SS} Range	-9		-15	V	
I_{DD} (Disabled)		2	4	mA	$\overline{EN} = \text{High}$,
I_{DD} (Enabled)		25	36	mA	$R_L = \infty$, $\overline{EN} = 0\text{ V}$
I_{SS} (Disabled)		-2	-4	mA	$\overline{EN} = \text{High}$
I_{SS} (Enabled)		-23	-36	mA	$R_L = \infty$, $\overline{EN} = 0\text{ V}$
DIGITAL INPUTS					
Input Logic Threshold High, V_{INH}	2.0			V	
Input Logic Threshold Low, V_{INL}			0.8	V	
Input Clamp Voltage, V_{INK}		-1.1	-1.8	V	$I_{IN} = -15\text{ mA}$
Input High Level Current, I_{INH}			1	μA	$V_{INH} = 2.4\text{ V}$
Input Low Level Current, I_{INL}	-1			μA	$V_{INL} = 0.4\text{ V}$
OUTPUTS					
RS-423A Outputs					
High Level Output Voltage					
	5.0	5.3	6.0	V	$\overline{EN} = 0.8\text{ V}$, $MS+ = MS- = 0\text{ V}$
	5.0	5.3	6.0	V	$R_L = \infty$, $V_{IN} = 0.8\text{ V}$
	4.5	5.2	6.0	V	$R_L = 3\text{ k}\Omega$, $V_{IN} = 0.8\text{ V}$
Low Level Output Voltage					
	-5.0	-5.3	-6.0	V	$R_L = 450\text{ }\Omega$, $V_{IN} = 0.8\text{ V}$
	-5.0	-5.6	-6.0	V	$R_L = \infty$, $V_{IN} = 2.0\text{ V}$
	-4.5	-5.4	-6.0	V	$R_L = 3\text{ k}\Omega$, $V_{IN} = 2.0\text{ V}$
Output Balance, V_{BAL}					
		0.05	0.4	V	$R_L = 450\text{ }\Omega$, $V_{BAL} = V_{OH} - V_{OL}$
RS-232 Outputs					
High Level Output Voltage					
	7.0	7.6	V_{DD}	V	$\overline{EN} = 0.8\text{ V}$, $MS+ = V_{DD}$, $MS- = V_{SS}$
	7.0	7.6	V_{DD}	V	$R_L = \infty$, $V_{IN} = 0.8\text{ V}$
Low Level Output Voltage					
	-7.0	-7.7	V_{SS}	V	$R_L = 3\text{ k}\Omega$, $V_{IN} = 0.8\text{ V}$
	-7.0	-7.7	V_{SS}	V	$R_L = \infty$, $V_{IN} = 2.0\text{ V}$
Off-State Output Current, I_{OZ}					
	-100		100	μA	$R_L = 3\text{ k}\Omega$, $V_{IN} = 2.0\text{ V}$
Short Circuit Current, I_{OS}					
	15	50	100	mA	$\overline{EN} = 2.0\text{ V}$, $V_O = \pm 6\text{ V}$, $V_{DD} = 15\text{ V}$, $V_{SS} = -15\text{ V}$
	15	40	100	mA	$V_{IN} = 0\text{ V}$, $\overline{EN} = 0\text{ V}$
					$V_{IN} = 5\text{ V}$, $\overline{EN} = 0\text{ V}$

Specifications subject to change without notice.

TIMING CHARACTERISTICS ($V_{DD} = +10\text{ V} \pm 10\%$, $V_{SS} = -10\text{ V} \pm 10\%$, $MS+ = MS- = 0\text{ V}$. All Specifications T_{MIN} to T_{MAX} unless otherwise noted.)

Parameter	Min	Typ	Max	Units	Test Conditions/Comments
Output Slew Rate	6.65	10	14	V/ μs	Fig 1, Fig 2. $R_{SRA} = 2\text{ k}\Omega$, $R_L = 450\text{ }\Omega$, $C_L = 50\text{ pF}$ Rising/Falling Edge, t_R , t_F
Output Slew Rate	1.33	2.0	3	V/ μs	Fig 1, Fig 2. $R_{SRA} = 10\text{ k}\Omega$, $R_L = 450\text{ }\Omega$, $C_L = 50\text{ pF}$ Rising/Falling Edge, t_R , t_F
Output to Hi-Z Propagation Delay (Disable)		0.3	1.0	μs	Fig 1, Fig 3. $R_{SRA} = 10\text{ k}\Omega$, $R_L = 450\text{ }\Omega$, $C_L = 50\text{ pF}$ t_{HZ}
		0.5	1.0	μs	t_{LZ}
Hi-Z to Valid Output Propagation Delay (Enable)		6.0	15	μs	Fig 1, Fig 3. $R_{SRA} = 10\text{ k}\Omega$, $R_L = 450\text{ }\Omega$, $C_L = 50\text{ pF}$ t_{ZH}
		7.0	15	μs	t_{ZL}

Specifications subject to change without notice.

ORDERING GUIDE

V_{DD}	.....	+15 V
V_{SS}	.....	-15 V

V_{DD}	.....	+15 V
V_{SS}	.....	-15 V

V _{SS}	.....	10 V
Input Voltages		
V _{IN}	.....	-0.3 to (V _{DD} + 0.3 V)

Output Voltages
 V_{OUT} -12 V to +12 V

Output Short Circuit Duration Continuous

Power Dissipation Plastic DIP	1250 mW
(Derate at 12.5 mW/°C above +50°C)	

 θ_{IA} , Thermal Impedance 75°C/W

Power Dissipation PLCC	1000 mW
(Derate at 10 mW/°C above +50°C)	

 θ_{JA} , Thermal Impedance 80°C/W

Operating Temperature Range

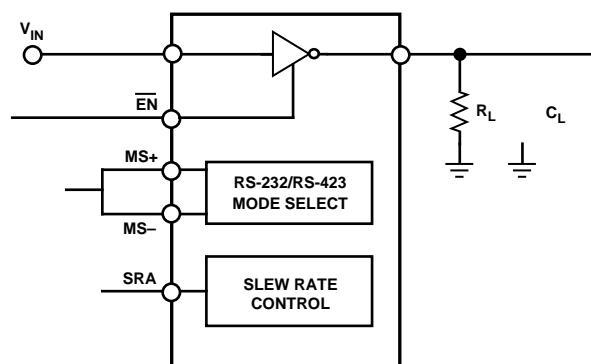
Commercial (J Version) 0°C to +70°C

Industrial (A Version) -40°C to +85°C

Lead Temperature (Soldering 10 sec) +300°C

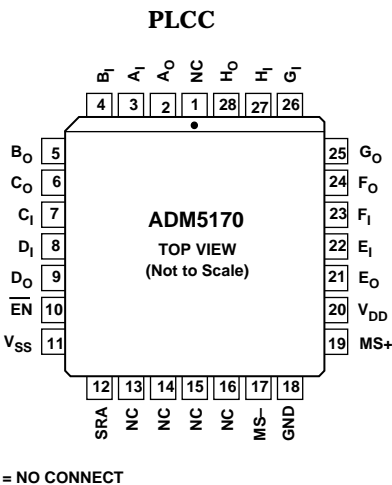
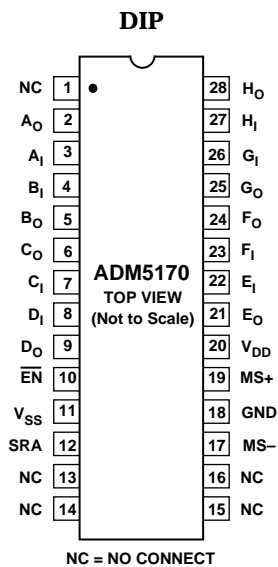
Vapour Phase (60 sec) +215°C

Infrared (15 sec) +220°C



ADM5170

PIN CONFIGURATIONS



PIN FUNCTION DESCRIPTION

Mnemonic	Function
V _{DD}	Power Supply Input, +10 V ± 10%.
V _{SS}	Power Supply Input, -10 V ± 10%.
GND	Ground Pin. Must be connected to 0 V.
A ₁ . . . H ₁	Digital Input to Drivers A to H.
A ₀ . . . H ₀	RS-232/RS-423 Output from Drivers A to H.
EN	Enable Pin. When high, all outputs are 3-stated.
MS+, MS-	Mode Select Inputs. Used to control the output level swing. With MS+ & MS- connected to GND, RS-423A output levels are selected. With MS+ connected to V _{DD} and MS- connected to V _{SS} , RS-232 output levels are developed.
SRA	Slew Rate Adjust Input. An external resistor (2 kΩ to 10 kΩ) connected between this pin and GND is used to control the Output Slew Rate (10 V/μs to 2.2 V/μs).

Slew Rate Programming

The slew rate for the ADM5170 is controlled by a single resistor connected between the SRA pin and GND. The slew rate is approximately.

$Slew\ Rate\ (V/\mu s) = 20/R_{SRA}\ (k\Omega)$

Resistors between 2 kΩ and 10 kΩ may be used providing a slew rate which may be varied from 10 V/μs to 2.2 V/μs. Figure 5 in the Typical Performance Characteristics section shows how the slew rate varies with R_{SRA} while Figure 8 shows how the transition time (10% to 90%) varies with R_{SRA}. Waveshaping of the output allows the user to control the level of interference (near-end crosstalk) which may be coupled to adjacent circuits in an interconnection. The recommended output characteristics for cable length and data rate are given in the EIA RS-423A specifications.

Maximum Data Rate (kB/s) = 300/t (for rates from 1 kB/s to 100 kB/s).

$Cable\ Length\ (feet) = 100\ X\ t\ (Max\ Length = 4000\ ft.)$

where t is the transition time (in μs) for the output to swing from 10% to 90% of its steady state values. The absolute maximum data rate is 100 kB/s and the maximum cable length is limited to 4000 ft.

Output Mode Programming

The ADM5170 has two programmable output modes which provide different output voltage levels. The low output mode meets the specifications of EIA standards RS-423A while the high output mode meets the RS-232 specifications. The high output mode provides greater output swings and is suitable for driving lines where higher attenuation levels must be tolerated. This mode is selected by connecting the mode select pins to the supplies, MS+ to V_{DD} and MS- to V_{SS}. The low output mode is selected by connecting both mode select pins MS+ and MS- to GND. This mode provides a controlled output swing with lower output levels.

Inputs				Outputs
MS+	MS-	EN	Data	Output
GND	GND	0	0	5 V to 6 V (RS-423)
GND	GND	0	1	-5 V to -6 V (RS-423)
V _{DD}	V _{SS}	0	0	(V _{DD} - 3 V) (RS-232) ¹
V _{DD}	V _{SS}	0	1	(V _{SS} + 3 V) (RS-232) ¹
X	X	1	X	High Z

¹Minimum Output Level.

Typical Application Circuit

A typical application circuit using a single driver in the ADM5170 is shown in Figure 4. This circuit is suitable for either RS-232 or RS-423 communication. An ADM5180 octal receiver is used to translate the signal back to CMOS logic level at the receiving end.

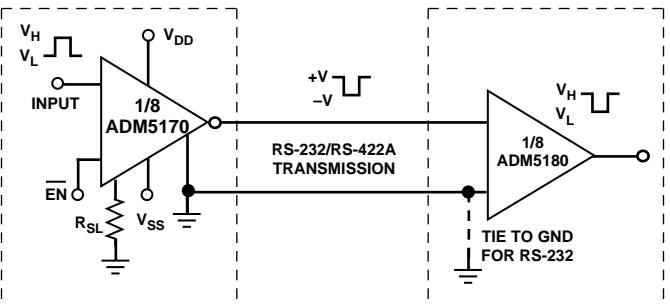


Figure 4. RS-232/RS-423A Typical Application Circuit

Typical Performance Characteristics–ADM5170

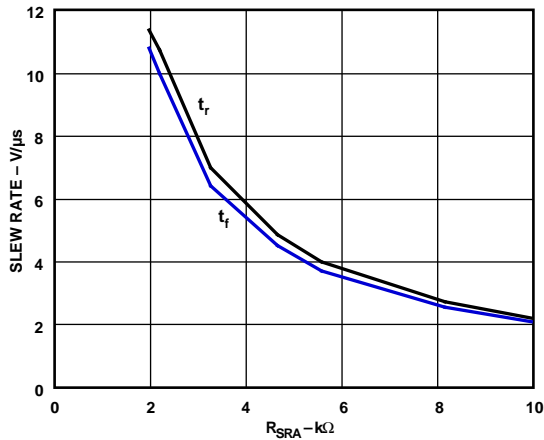


Figure 5. Typical Slew Rate vs. R_{SRA}

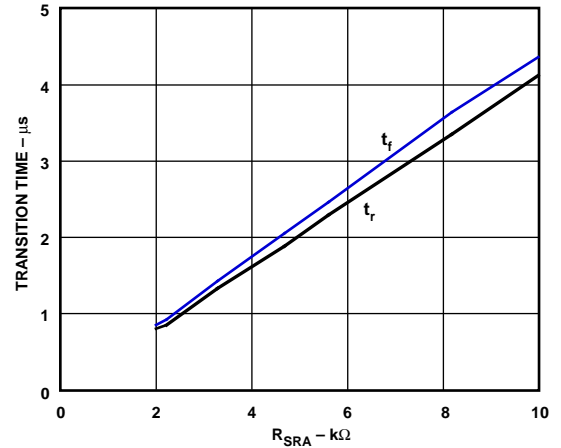


Figure 8. Typical Rise/Fall Times (RS-423A Mode) vs. R_{SRA}

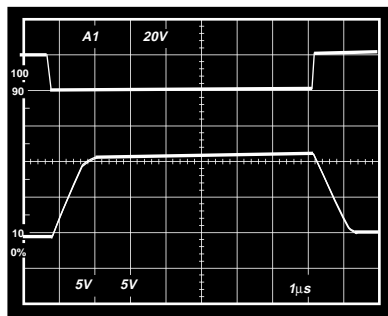


Figure 6. Slew Rate ($R_{SRA} = 2 \text{ k}\Omega$)

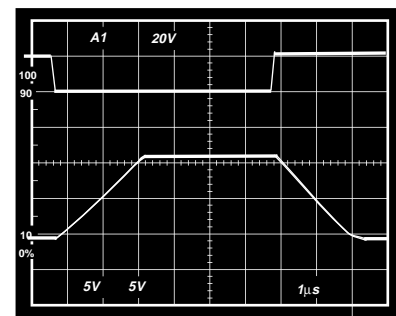


Figure 9. Slew Rate ($R_{SRA} = 10 \text{ k}\Omega$)

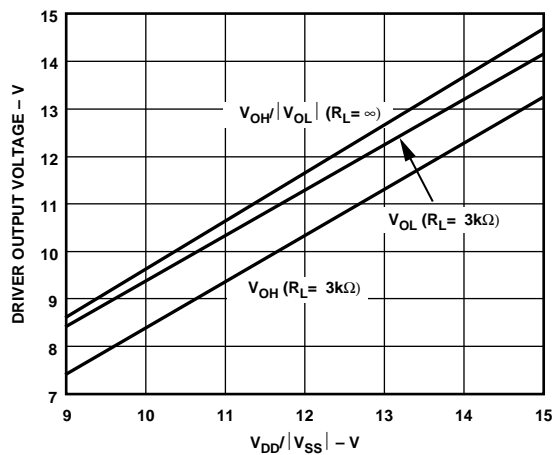


Figure 7. V_{OH}/V_{OL} vs. V_{DD}/V_{SS} (RS-232 Mode)

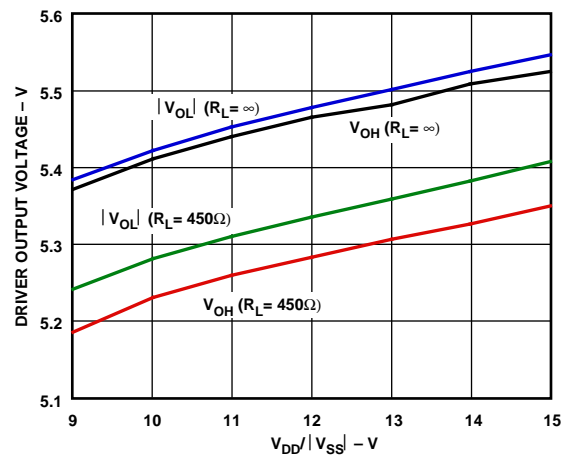


Figure 10. V_{OH}/V_{OL} vs. V_{DD}/V_{SS} (RS-423 Mode)

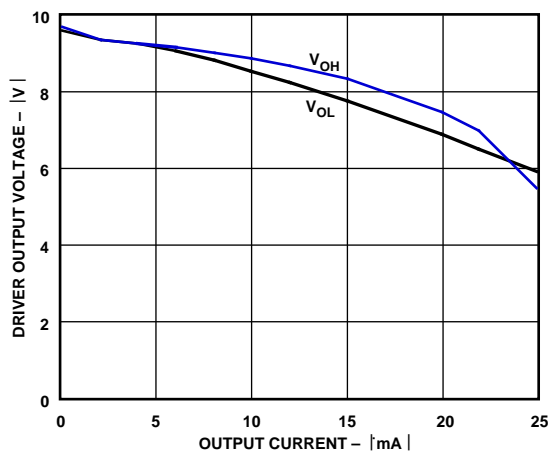


Figure 11. Driver Output Voltage vs. Output Current (RS-232 Mode)

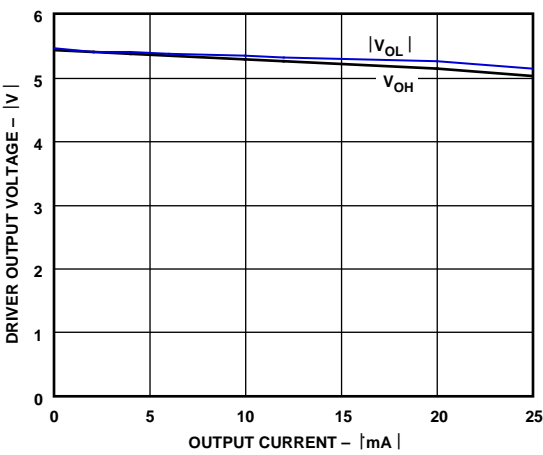
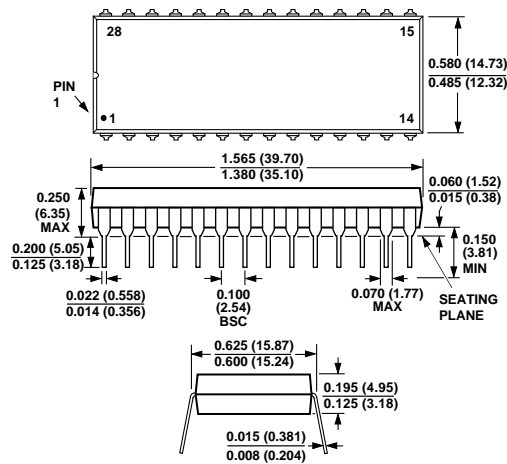


Figure 12. Driver Output Voltage vs. Output Current (RS-423 Mode)

OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).

28-Lead Plastic DIP
(N Suffix)



28-Lead Plastic Leaded Chip Carrier (PLCC)
(P Suffix)

