

SN55109A, SN55110A
SN75109A, SN75110A, SN75112
DUAL LINE DRIVERS

SLLS106B – DECEMBER 1975 – REVISED MAY 1995

description (continued)

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

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 noise margin when interfaced with TTL Series 54/74.

The SN55109A and SN55110A are characterized for operation over the full military temperature range of -55°C to 125°C . The SN75109A, SN75110A, and SN75112 are characterized for operation from 0°C to 70°C .

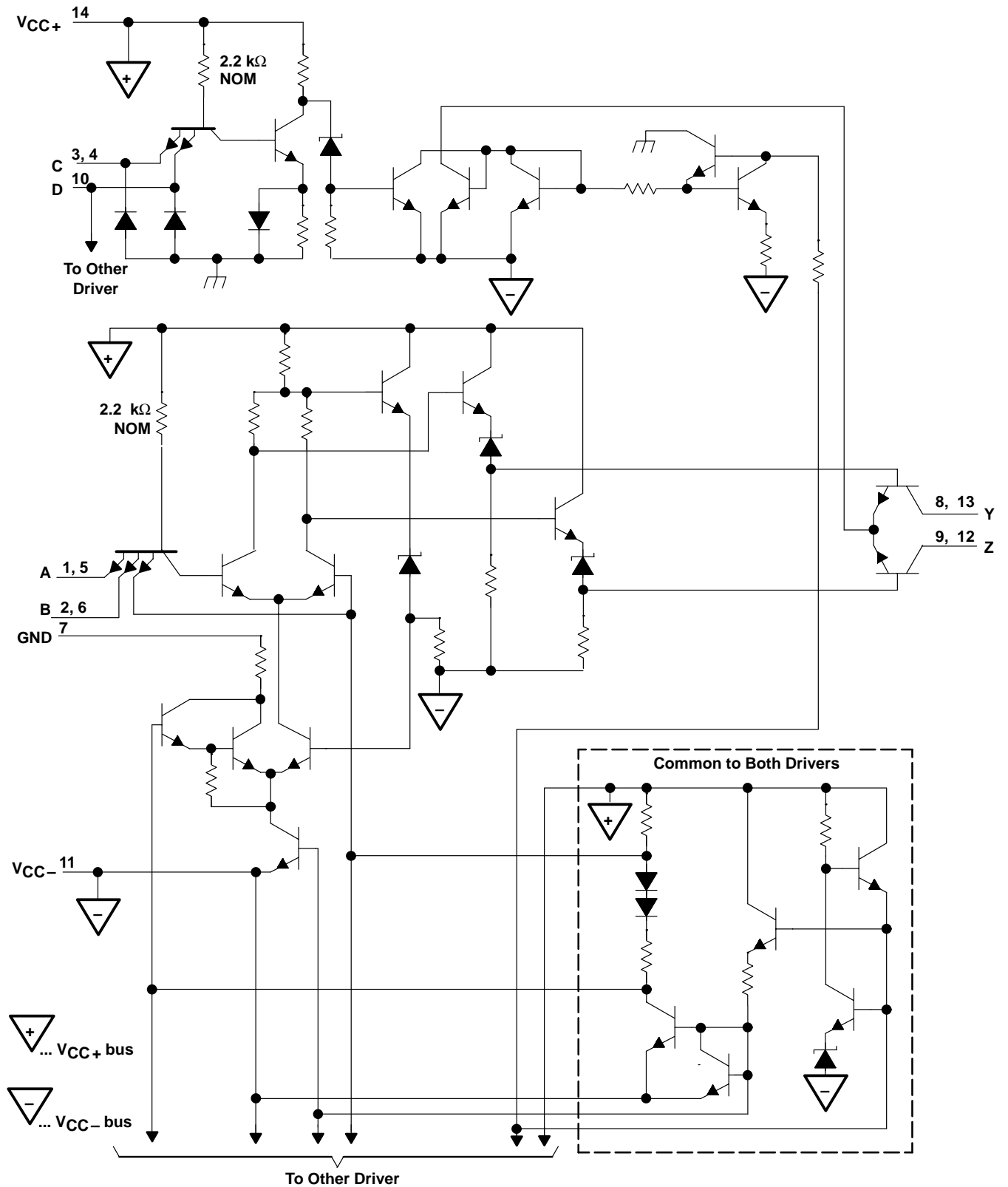
FUNCTION TABLE
(each driver)

LOGIC INPUTS		ENABLE INPUTS		OUTPUTS†	
A	B	C	D	Y	Z
X	X	L	X	Off	Off
X	X	X	L	Off	Off
L	X	H	H	On	Off
X	L	H	H	On	Off
H	H	H	H	Off	On

H = high level, L = low level, X = irrelevant

† When using only one channel of the line drivers, the other channel should be inhibited and/or have its outputs grounded.

schematic (each driver)



Pin numbers shown are for D, J, N, and W packages.

SN55109A, SN55110A
SN75109A, SN75110A, SN75112
DUAL LINE DRIVERS

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

	SN55109A SN55110A	SN75109A SN75110A	SN75112	UNIT	
Supply voltage, V_{CC+} (see Note 1)	7	7	7	V	
Supply voltage, V_{CC-}	-7	-7	-7	V	
Input voltage, V_I	5.5	5.5	5.5	V	
Output voltage range, V_O	-5 to 12	-5 to 12	-5 to 12	V	
Continuous total power dissipation (see Note 2)	See Dissipation Rating Table				
Operating free-air temperature range, T_A	-55 to 125	0 to 70	0 to 70	°C	
Storage temperature range, T_{stg}	-65 to 150	-65 to 150	-65 to 150	°C	
Case temperature for 60 seconds: FK package	260			°C	
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	J or W package	300		°C	
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D or N package		260	260	°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. Voltage values are with respect to network ground terminal.
2. In the FK, J, or W package, SN55109A and SN55110A chips are either silver glass or alloy mounted, and SN75109A, SN75110A, and SN75112 chips are glass mounted.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING 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	—
W	1000 mW	8.0 mW/°C	640 mW	200 mW

recommended operating conditions (see Note 3)

	SN55109A SN55110A			SN75109A SN75110A SN75112			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC+}	4.5	5	5.5	4.75	5	5.25	V
Supply voltage, V_{CC-}	-4.5	-5	-5.5	-4.75	-5	-5.25	V
Positive common-mode output voltage	0		10	0		10	V
Negative common-mode output voltage	0		-3	0		-3	V
High-level input voltage, V_{IH}	2			2			V
Low-level output current, V_{IL}			0.8			0.8	V
Operating free-air temperature, T_A	-55		125	0		70	°C

NOTE 3: When using only one channel of the line drivers, the other channel should be inhibited and/or have its outputs grounded.



electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	SN55109A SN75109A			SN55110A SN75110A			SN75112			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V _{IK}	Input clamp voltage	V _{CC±} = MIN, I _L = -12 mA	-0.9	-1.5		-0.9	-1.5		-0.9	-1.5	V	
I _{O(on)}	On-state output current	V _{CC±} = MAX, V _O = 10 V	6	7		12	15		27	36	mA	
		V _{CC} = MIN to MAX, V _O = -1 V to 1 V, T _A = 25°C							24	28		32
		V _{CC±} = MIN, V _O = -3 V	3.5	6		6.5	12		18	27		
I _{O(off)}	Off-state output current	V _{CC±} = MIN, V _O = 10 V			100			100			μA	
I _I	Input current at maximum input voltage	A, B, or C inputs			1			1			1	mA
		D input			2			2			2	
I _{IH}	High-level input current	A, B, or C inputs			40			40			40	μA
		D input			80			80			80	
I _{IL}	Low-level input current	A, B, or C inputs			-3			-3			-3	mA
		D input			-6			-6			-6	
I _{CC+(on)}	Supply current from V _{CC+} with driver enabled	V _{CC±} = MAX, A and B inputs at 0.4 V, C and D inputs at 2 V	18	30		23	35		25	40	mA	
I _{CC-(on)}	Supply current from V _{CC-} with driver enabled		-18	-30		-34	-50		-65	-100		
I _{CC+(off)}	Supply current from V _{CC-} with driver inhibited	V _{CC±} = MAX, A, B, C, and D inputs at 0.4 V	18			21			30		mA	
I _{CC-(off)}	Supply current from V _{CC±} with driver inhibited		-10			-17			-32			

† For conditions shown as MIN or MAX, use appropriate value specified under recommended operating conditions.

‡ All typical values are at V_{CC+} = 5 V, V_{CC-} = -5 V, T_A = 25°C.

SN55109A, SN55110A SN75109A, SN75110A, SN75112 DUAL LINE DRIVERS

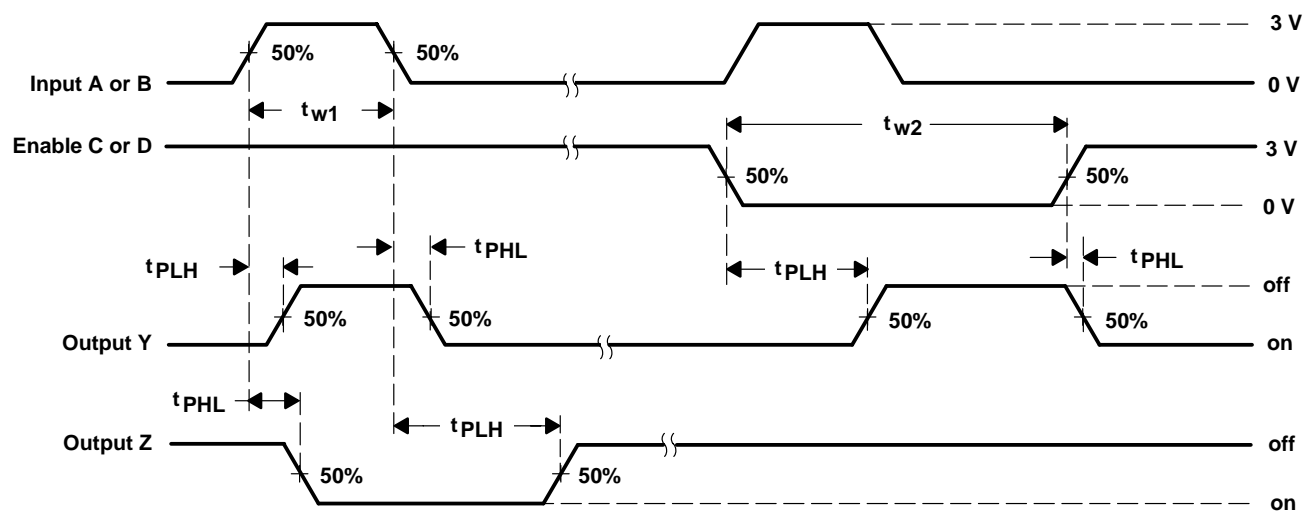
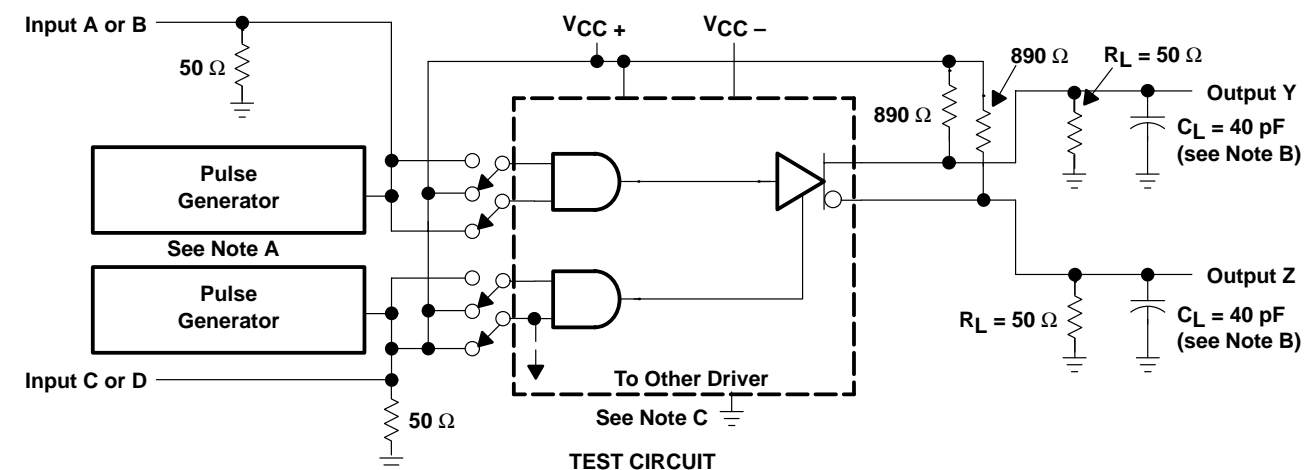
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switching characteristics, $V_{CC\pm} = \pm 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER †	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Y or Z	$C_L = 40\text{ pF}$, $R_L = 50\ \Omega$, See Figure 1		9	15	ns
t_{PHL}					9	15	ns
t_{PLH}	C or D	Y or Z			16	25	ns
t_{PHL}					13	25	ns

† t_{PLH} = Propagation delay time, low-to-high-level output
 t_{PHL} = Propagation delay time, high-to-low-level output

PARAMETER MEASUREMENT INFORMATION



VOLTAGE WAVEFORMS

- NOTES: A. The pulse generators have the following characteristics: $Z_O = 50\ \Omega$, $t_r = t_f = 10 \pm 5\text{ ns}$, $t_{w1} = 500\text{ ns}$, $\text{PRR} \leq 1\text{ MHz}$, $t_{w2} = 1\ \mu\text{s}$, $\text{PRR} \leq 500\text{ kHz}$.
 B. C_L includes probe and jig capacitance.
 C. For simplicity, only one channel and the enable connections are shown.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

SN55109A, SN75109A
 ON-STATE OUTPUT CURRENT
 vs
 NEGATIVE SUPPLY VOLTAGE

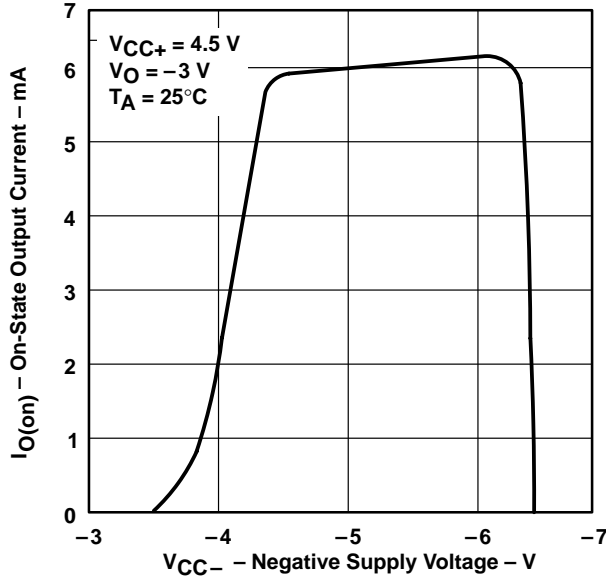


Figure 2

SN55110A, SN75110A
 ON-STATE OUTPUT CURRENT
 vs
 NEGATIVE SUPPLY VOLTAGE

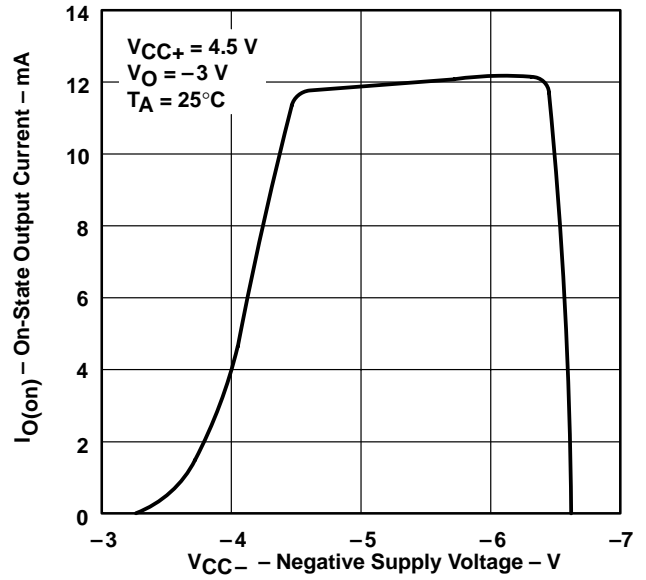


Figure 3

SN75112
 ON-STATE OUTPUT CURRENT
 vs
 NEGATIVE SUPPLY VOLTAGE

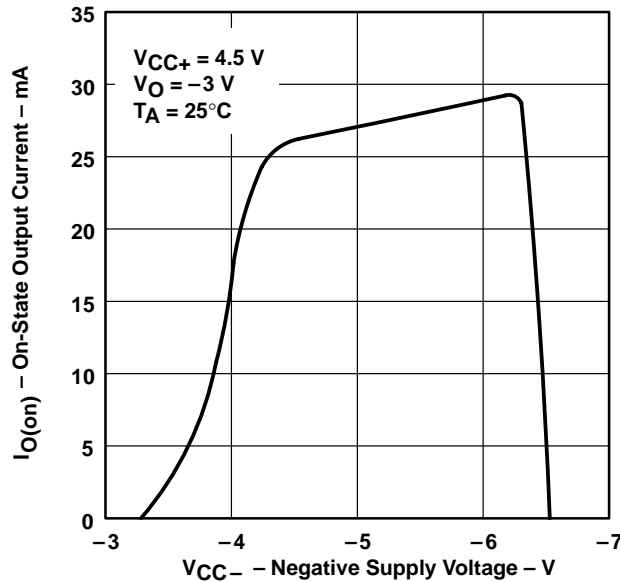


Figure 4

APPLICATION INFORMATION

special pulse-control circuit

Figure 5 shows a circuit that may be used as a pulse generator output or in many other testing applications.

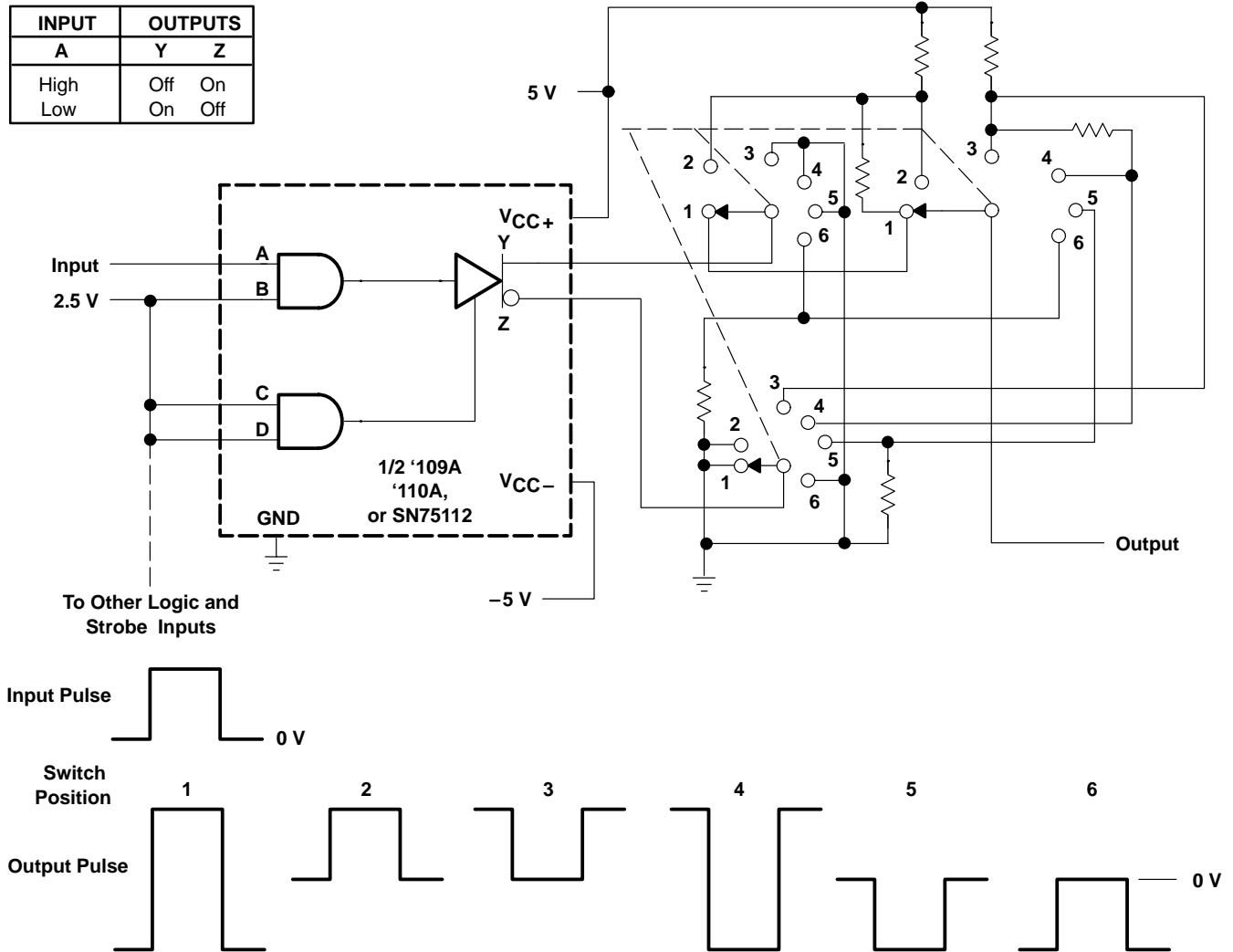


Figure 5. Pulse-Control Circuit

APPLICATION INFORMATION

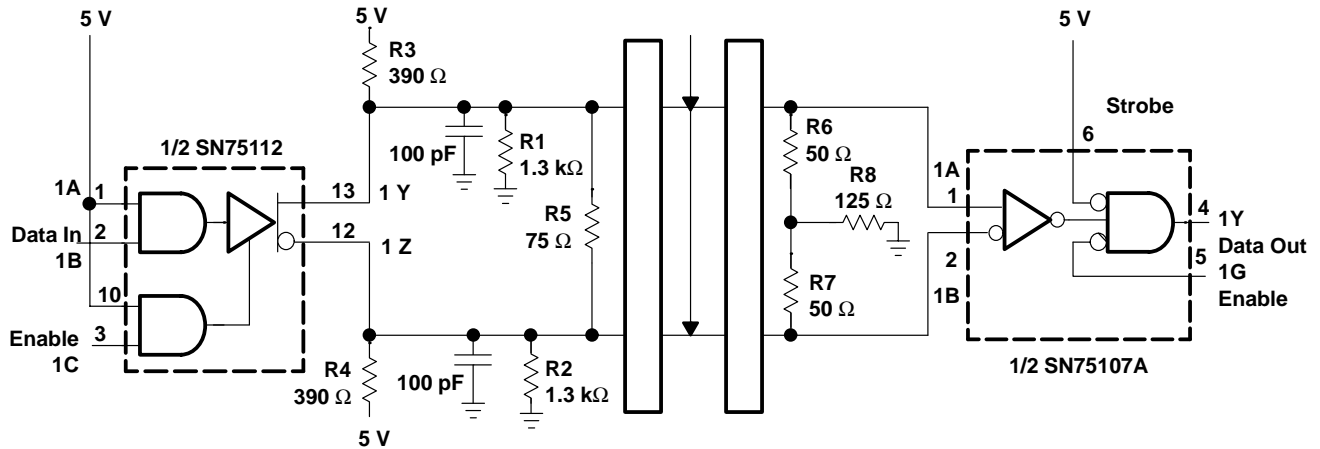
using the SN75112 as a CCITT recommended V.35 line driver

The SN75112 dual line driver, the SN75107A dual line receiver, and some external resistors can be used to implement the data interchange circuit of CCITT recommendation V.35 (1976) modem specification. The circuit of one channel is shown in Figure 1 and meets the requirement of the interface as specified by Appendix 11 of CCITT V.35 and summarized in Table 1 (V.35 has been replaced by ITU V.11).

Table 1. CCITT V.35 Electrical Requirements

	MIN	MAX	UNIT
GENERATOR			
Source impedance, Z_{source}	50	150	Ω
Resistance to ground, R	135	165	Ω
Differential output voltage, V_{OD}	440	660	mV
10% to 90% rise time, t_r	40		ns
or		$0.01 \times u_i \dagger$	
Common-mode output voltage, V_{OC}	-0.6	0.6	V
LOAD (RECEIVER)			
Input impedance, Z_I	90	110	Ω
Resistance to ground, R	135	165	Ω

$\dagger u_i$ = unit interval or minimum signal element pulse width



All resistors are 5%, 1/4 W.

Figure 6. CCITT Recommended V.35 Interface Using the SN75112 and SN75107A

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