

DS75110A Dual Line Drivers

General Description

The DS75110A is a dual line driver with independent channels, common supply and ground terminals featuring constant current outputs. These drivers are designed for optimum performance when used with the DS75107, DS75108 line receivers.

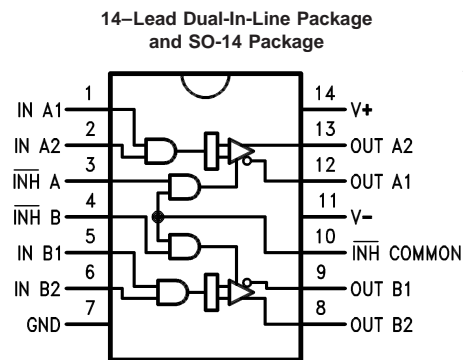
The output current of the DS75110A is nominally 12 mA and may be switched to either of two output terminals with the appropriate logic levels at the driver input.

Separate or common control inputs are provided for increased logic versatility. These control or inhibit inputs allow the output current to be switched off (inhibited) by applying low logic levels to the control inputs. The output current in the inhibit mode, $I_{Q(OFF)}$, is specified so that minimum line loading is induced. This is highly desirable in system applications using party line data communications.

Features

- Improved stability over supply voltage and temperature ranges
- Constant current, high impedance outputs
- High speed: 15 ns max propagation delay
- Standard supply voltages
- Inhibitor available for driver selection
- High common mode output voltage range (-3.0V to 10V)
- TTL input compatibility

Connection Diagram



Top View
Order Number **DS75110AM** or **DS75110AN**
See NS Package Number **M14A** or **N14A**

Function Table

Inputs				Outputs	
Logic		Inhibitor		A1/B1	A2/B2
1	2	A/B	$\overline{\text{INH}}$		
X	X	L	X	Off	Off
X	X	X	L	Off	Off
L	X	H	H	Off	On
X	L	H	H	Off	On
H	H	H	H	On	Off

H = High
L = Low
X = Don't Care

Absolute Maximum Ratings (Note 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature Range	
Ceramic DIP	-65°C to +175°C
Molded DIP and SO-14	-65°C to +150°C
Lead Temperature	
Ceramic DIP (Soldering, 60 sec.)	300°C

Molded DIP and SO-14 (Soldering, 10 sec.)	265°C
Maximum Power Dissipation (Note 1) at 25°C	
Molded Package	1040 mW
SO Package	930 mW
Supply Voltage	±7.0V
Input Voltage (Any Input)	5.5V
Output Voltage (Any Output)	-5.0V to +12V

Recommended Operating Conditions

	DS75110A			Units
	Min	Typ	Max	
Positive Supply Voltage (V ⁺)	4.75	5.0	5.25	V
Negative Supply Voltage (V ⁻)	-4.75	-5.0	-5.25	V
Positive Common Mode Voltage (V _{CM+})	0		10	V
Negative Common Mode Voltage (V _{CM-})	0		-3.0	V
Operating Temperature (T _A)	0	25	70	°C

Note 1: Derate molded DIP package 8.3 mW/°C above 25°C, derate SO package 7.5 mW/°C above 25°C.

Electrical Characteristics (Notes 3, 4)

Over recommended operating temperature range, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V _{IH}	Input Voltage HIGH		2.0			V
V _{IL}	Input Voltage LOW				0.8	V
V _{IC}	Input Clamp Voltage	V _{CC} = Min, I _I = -12 mA		-0.9	-1.5	V
I _{O(On)}	On-State Output Current	V _{CC} = Max, V _O = 10V		12	15	mA
		V _{CC} = Min, V _O = -3.0V	6.5	12		
I _{O(Off)}	Off-State Output Current (Inhibited Only)	V _{CC} = Min, V _O = 10V			100	μA
I _I	Input Current At Maximum Input Voltage	A, B or C Inputs D Input	V _{CC} = Max, V _I = 5.5V		1.0 2.0	mA
I _{IH}	Input Current HIGH	A, B or C Input D Input	V _{CC} = Max, V _I = 2.4V		40 80	μA
I _{IL}	Input Current LOW	A, B or C Input D Input	V _{CC} = Max, V _I = 0.4V		-3.0 -6.0	mA
I _{+ (On)}	Positive Supply Current with Driver Enabled	V _{CC} = Max, A & B Inputs at 0.4V, C & D Inputs at 2.0V		23	35	mA
I _{- (On)}	Negative Supply Current with Driver Enabled			-34	-50	mA
I _{+ (Off)}	Positive Supply Current with Driver Inhibited	V _{CC} = Max, A, B, C & D Inputs at 0.4V		21		mA
I _{- (Off)}	Negative Supply Current with Driver Inhibited			-17		mA

Note 2: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of "Electrical Characteristics" provide conditions for actual device operation.

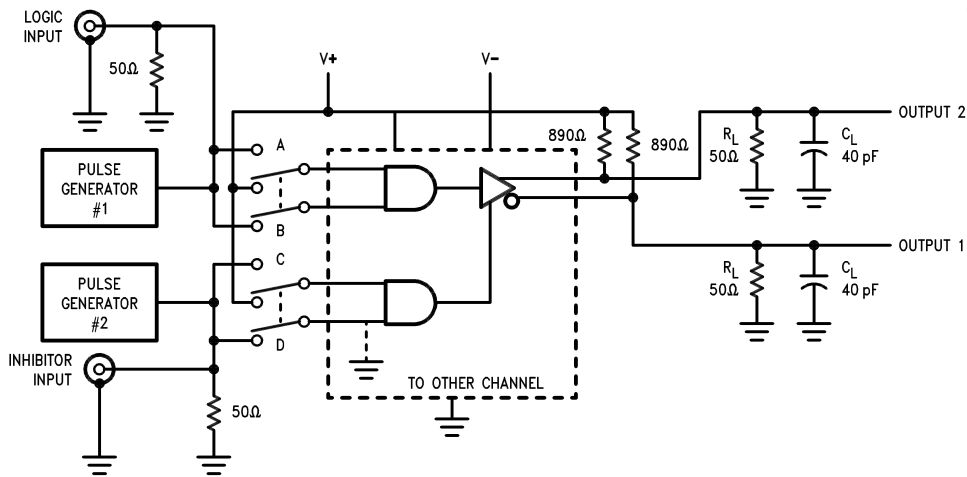
Note 3: Unless otherwise specified min/max limits apply across 0°C to +70°C range for the DS75110. All typicals are given for V_{CC} = 5V and T_A = 25°C.

Note 4: When using only one channel of the line drivers, the other channel should be inhibited and/or its outputs grounded.

Switching Characteristics

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

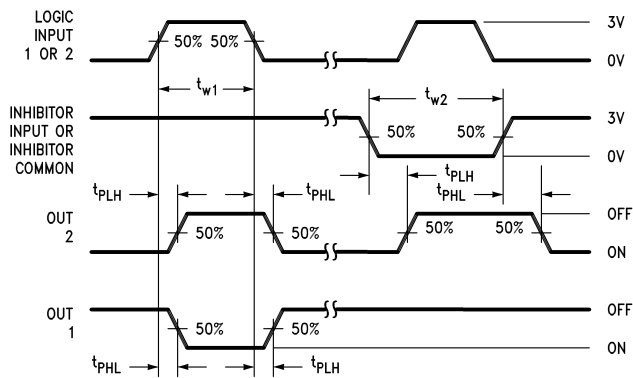
Symbol	Parameter	Conditions	From (Input)	To (Output)	Min	Typ	Max	Units
t_{PLH}	Propagation Delay Time, LOW to HIGH	$C_L = 40 \text{ pF}$,	A or B	1 or 2		9.0	15	ns
t_{PHL}	Propagation Delay Time, HIGH to LOW	$R_L = 50\Omega$				9.0	15	ns
t_{PLH}	Propagation Delay Time, LOW to HIGH	See Test Circuit	C or D	1 or 2		16	25	ns
t_{PHL}	Propagation Delay Time, HIGH to LOW					13	25	ns



DS009619-3

The pulse generators have the following characteristics:
 $t_r = t_f = 10 \text{ ns} \pm 5.0 \text{ ns}$, $t_{w1} = 500 \text{ ns}$, $\text{PRR} = 1.0 \text{ MHz}$, $t_{w2} = 1.0 \mu\text{s}$, $\text{PRR} = 500 \text{ kHz}$, $Z_0 = 50\Omega$.
 C_L includes probe and jig capacitance.
 For simplicity, only one channel and the inhibitor connections are shown.

FIGURE 1. AC Test Circuit



DS009619-4

FIGURE 2. AC Waveforms

Equivalent Circuit

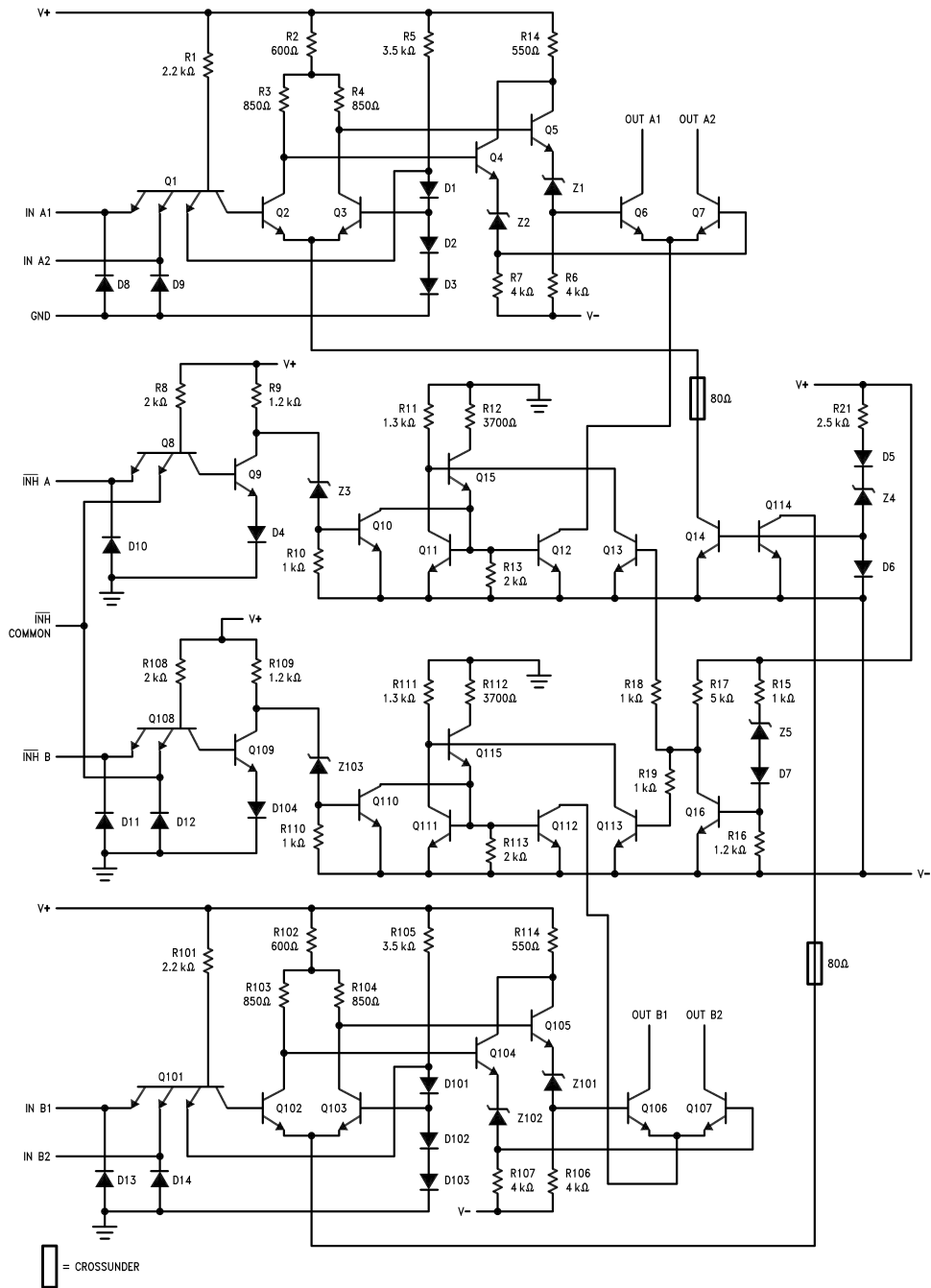
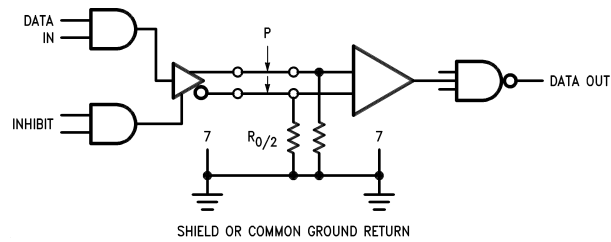


FIGURE 3. Equivalent Circuit

DS009619-2

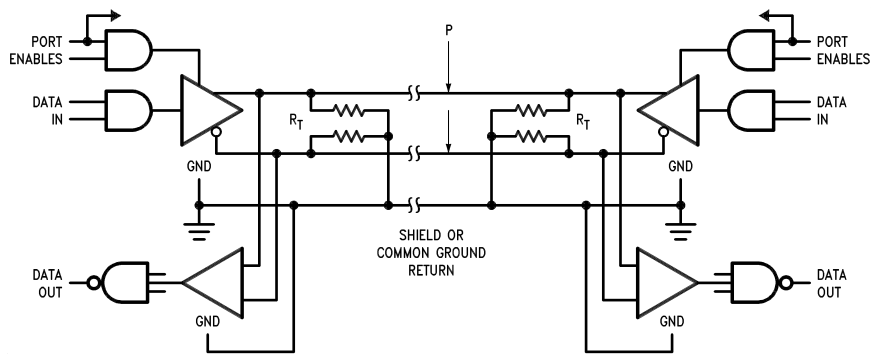
Typical Applications



SHIELD OR COMMON GROUND RETURN

DS009619-5

FIGURE 4. Simplex Operation



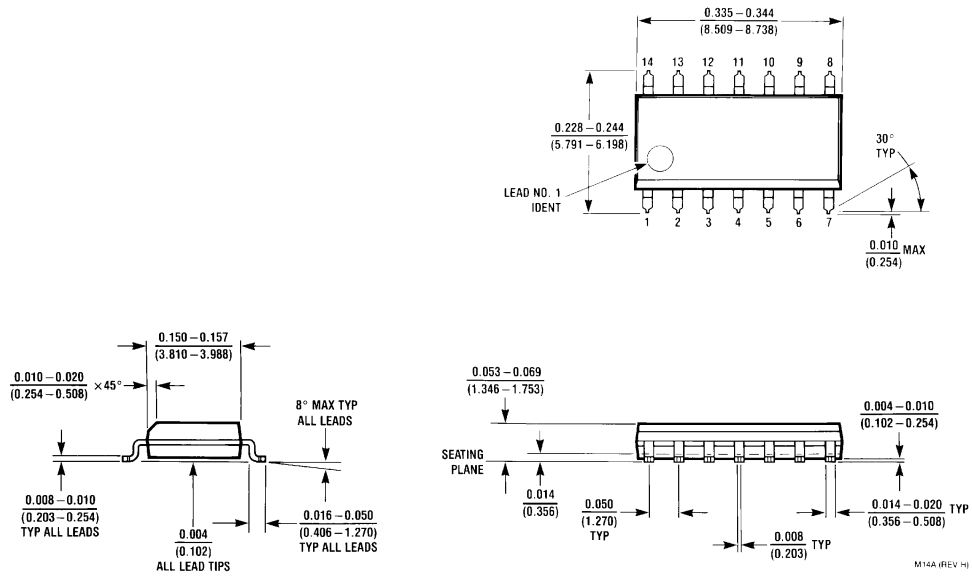
SHIELD OR COMMON GROUND RETURN

DS009619-6

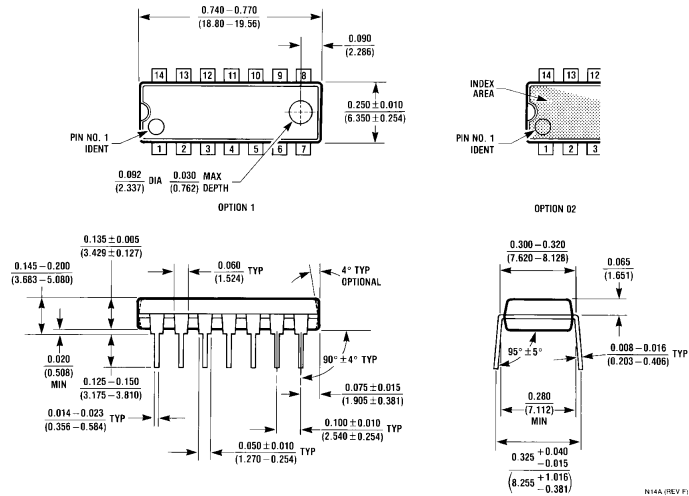
All drivers are DS75110A. Receivers are DS75107 or DS75108. Twisted-pair or coaxial transmission line should be used for minimum noise and cross talk. When only one driver in a package is being used, the outputs of the other driver should either be grounded or inhibited to reduce power dissipation.

FIGURE 5. Half-Duplex Operation

Physical Dimensions inches (millimeters) unless otherwise noted



Molded Surface Mount Package (M)
Order Number DS75110AM
NS Package Number M14A



Molded Dual-In-Line Package (N)
Order Number DS75110AN
NS Package Number N14A

Notes

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

www.national.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5639-7560
Fax: 81-3-5639-7507