National Semiconductor

93L21
Dual 1-of-4 Decoder

General Description

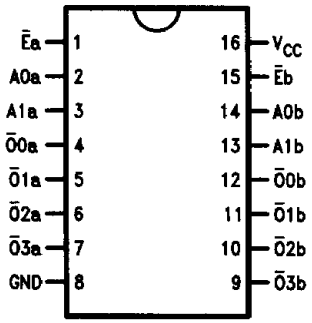
The 93L21 consists of two independent multipurpose decoders, each designed to accept two inputs and provide four mutually exclusive outputs. In addition an active LOW enable input, which gives demultiplexing capability, is provided for each decoder.

Features

- Multifunction capability
- Mutually exclusive outputs
- Demultiplexing capability
- Active low enable for each decoder

Connection Diagram

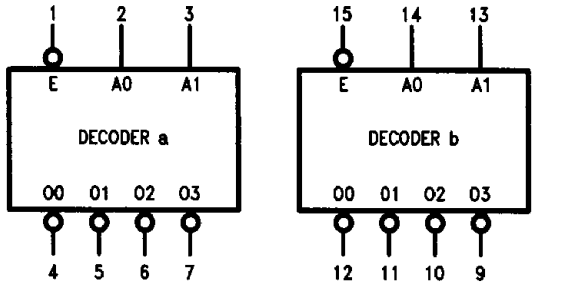
Dual-In-Line Package



TL/F/10197–1

Order Number 93L21DMQB or 93L21FMQB
See NS Package Number J16A or W16A

Logic Symbol



TL/F/10197–2

V_{CC} = Pin 16
GND = Pin 8

Pin Names	Description
Ēa, Ēb	Enable Inputs (Active LOW)
A0a, A1a, A0b, A1b	Address Inputs
Ō0a–Ō3a, Ō0b–Ō3b	Decoder Outputs (Active LOW)

Absolute Maximum Ratings (Note)

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

Supply Voltage	7V
Input Voltage	5.5V
Operating Free Air Temperature Range	
MIL	−55°C to +125°C
Storage Temperature Range	−65°C to +150°C

Note: *The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.*

Recommended Operating Conditions

Symbol	Parameter	93L12 (MIL)			Units
		Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	V
V_{IH}	High Level Input Voltage	2			V
V_{IL}	Low Level Input Voltage			0.7	V
I_{OH}	High Level Output Current			−400	μA
I_{OL}	Low Level Output Current			4.8	mA
T_A	Free Air Operating	−55		125	°C

Electrical Characteristics over recommended operating free air temperature (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, II = −10 mA			−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max, V_{IH} = Min	2.4			V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min, V_{IL} = Max			0.3	V
II	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 5.5V			1	mA
IIH	High Level Input Current	V_{CC} = Max, V_I = 2.4V			20	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.3V			−400	μA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	−2.5		−25	mA
I_{CC}	Supply Current	V_{CC} = Max (Note 3)			13.2	mA

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Note 3: I_{CC} is measured with all outputs open and all inputs grounded.

Functional Description

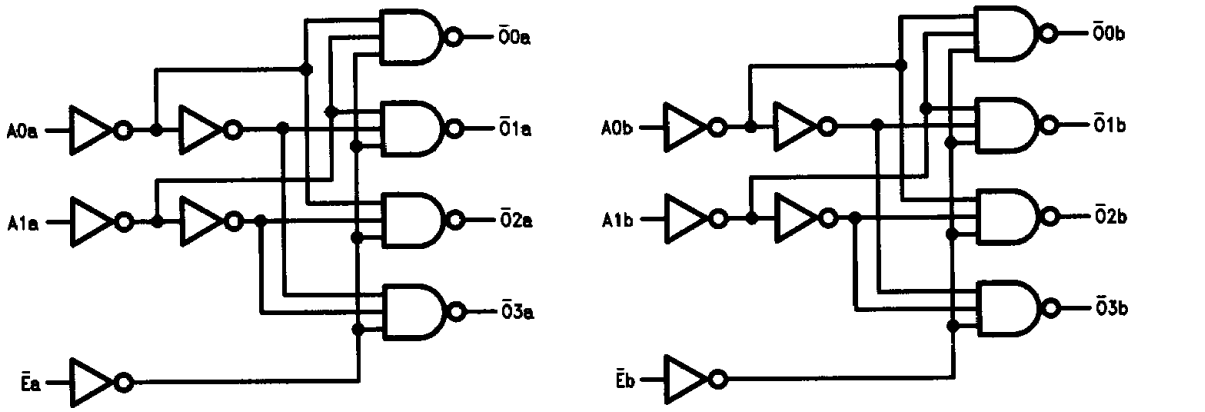
The 93L21 consists of two separate decoders each designed to accept two binary weighted inputs and provide four mutually exclusive active LOW outputs as shown in the logic symbol. Each decoder can be used as a 4-output demultiplexer by using the enable as a data input.

Truth Table (Each Decoder)

Inputs			Outputs			
$\overline{E}$	A0	A1	$\overline{O}0$	$\overline{O}1$	$\overline{O}2$	$\overline{O}3$
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L
H	X	X	H	H	H	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Logic Diagram



TL/F/10197–3

Switching Characteristics V_{CC} = +5.0V, T_A = +25°C (See Section 1 for test waveforms and output load.)

Symbol	Parameter	C_L = 15 pF		Units
		Min	Max	
tPLH tPHL	Propagation Delay An to $\overline{O}$n		50 65	ns
tPLH tPHL	Propagation Delay $\overline{E}$n to $\overline{O}$n		40 52	ns