

HD74LVC138

3-to-8-line Decoder / Demultiplexer

REJ03D0349-0300Z
(Previous ADE-205-068B (Z))
Rev.3.00
Jul. 23, 2004

Description

The HD74LVC138 has three binary select inputs in a 16 pin package. If the device is enabled these inputs determine which one of the eight normally high outputs will go low. Two active low and one active high enables are provided to ease the cascading of decoders. Low voltage and high-speed operation is suitable at the battery drive product (note type personal computer) and low power consumption extends the life of a battery for long time operation.

Features

- $V_{CC} = 2.0 \text{ V to } 5.5 \text{ V}$
- All inputs $V_{IH} (\text{Max.}) = 5.5 \text{ V} (@V_{CC} = 0 \text{ V to } 5.5 \text{ V})$
- Typical V_{OL} ground bounce $< 0.8 \text{ V} (@V_{CC} = 3.3 \text{ V}, T_a = 25^\circ\text{C})$
- Typical V_{OH} undershoot $> 2.0 \text{ V} (@V_{CC} = 3.3 \text{ V}, T_a = 25^\circ\text{C})$
- High output current $\pm 24 \text{ mA} (@V_{CC} = 3.0 \text{ V to } 5.5 \text{ V})$
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LVC138FPEL	SOP-16 pin (JEITA)	FP-16DAV	FP	EL (2,000 pcs/reel)
HD74LVC138TELL	TSSOP-16 pin	TTP-16DAV	T	ELL (2,000 pcs/reel)

Note: Please consult the sales office for the above package availability.

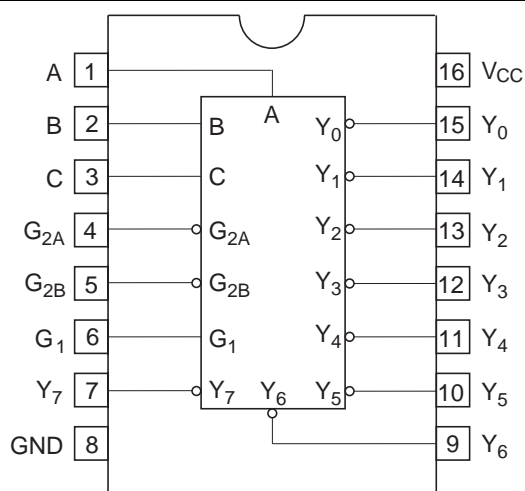
Function Table

Inputs

Enable			Select			Outputs							
G_1	G_{2A}	G_{2B}	C	B	A	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	H	L	H	H	H	H
H	L	L	H	L	L	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	H	H	L	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

H: High level
L: Low level
X: Immaterial

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V _{CC}	-0.5 to 6.0	V	
Input diode current	I _{IK}	-50	mA	V _I = -0.5 V
Input voltage	V _I	-0.5 to 6.0	V	
Output diode current	I _{OK}	-50	mA	V _O = -0.5 V
		50		V _O = V _{CC} + 0.5 V
Output voltage	V _O	-0.5 to V _{CC} + 0.5	V	
Output current	I _O	±50	mA	
V _{CC} , GND current / pin	I _{CC} or I _{GND}	100	mA	
Storage temperature	T _{stg}	-65 to +150	°C	

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	1.5 to 5.5	V	Data retention
		2.0 to 5.5		At operation
Input / output voltage	V_I	0 to 5.5	V	G, A, B, C
	V_O	0 to V_{CC}	V	Y_0 to Y_7
Operating temperature	T_a	-40 to 85	°C	
Output current	I_{OH}	-12	mA	$V_{CC} = 2.7$ V
		-24 ^{*2}		$V_{CC} = 3.0$ V to 5.5 V
	I_{OL}	12	mA	$V_{CC} = 2.7$ V
		24 ^{*2}		$V_{CC} = 3.0$ V to 5.5 V
Input rise / fall time ^{*1}	t_r, t_f	10	ns/V	

Notes: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

2. Duty cycle $\leq 50\%$

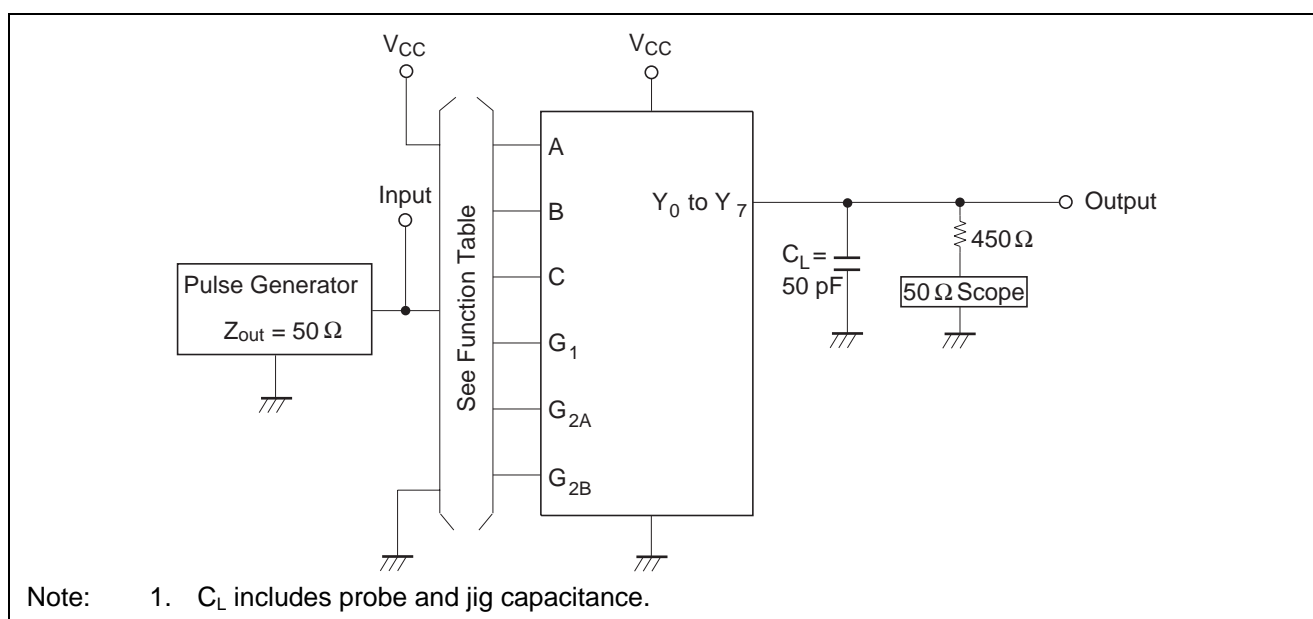
Electrical Characteristics

Item	Symbol	V _{CC} (V)	Ta = −40 to 85°C		Unit	Test Conditions
			Min	Max		
Input voltage	V _{IH}	2.7 to 3.6	2.0	—	V	
		4.5 to 5.5	V _{CC} ×0.7	—		
	V _{IL}	2.7 to 3.6	—	0.8	V	
		4.5 to 5.5	—	V _{CC} ×0.3		
Output voltage	V _{OH}	2.7 to 5.5	V _{CC} −0.2	—	V	I _{OH} = −100 μA
		2.7	2.2	—		I _{OH} = −12 mA
		3.0	2.4	—		I _{OH} = −24 mA
		3.0	2.0	—		
		4.5	3.8	—		
	V _{OL}	2.7 to 5.5	—	0.2	V	I _{OL} = 100 μA
		2.7	—	0.4		I _{OL} = 12 mA
		3.0	—	0.55		I _{OL} = 24 mA
		4.5	—	0.55		
Input current	I _{IN}	0 to 5.5	—	±5.0	μA	V _{IN} = 5.5 V or GND
Quiescent supply current	I _{CC}	5.5	—	20	μA	V _{IN} = V _{CC} or GND
	ΔI _{CC}	3.0 to 3.6	—	500	μA	V _{IN} = one input at (V _{CC} −0.6)V, other inputs at V _{CC} or GND

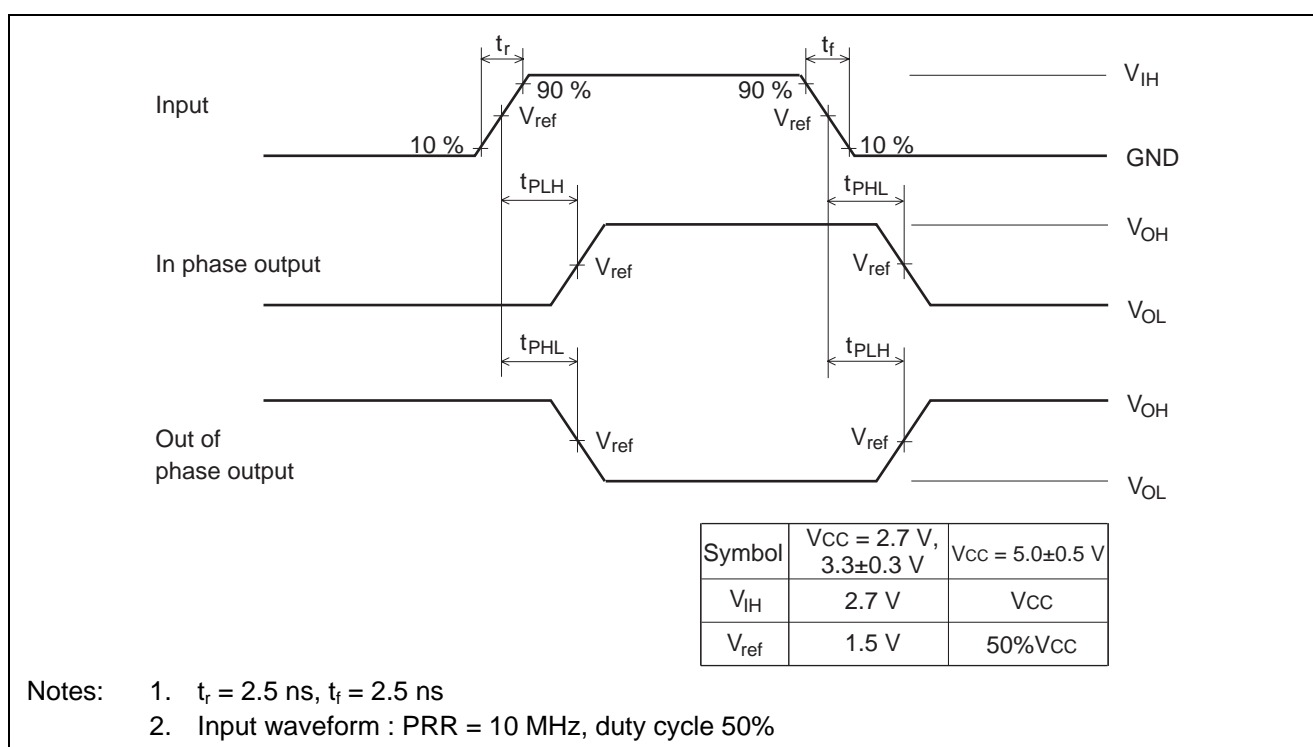
Switching Characteristics

Item	Symbol	V_{CC} (V)	$T_a = -40$ to 85°C			Unit	From (Input)	To (Output)
			Min	Typ	Max			
Propagation delay time	t_{PLH}	2.7	—	7.0	10.0	ns	G, A, B, C	Y_0 to Y_7
	t_{PHL}	3.3 \pm 0.3	1.5	5.0	9.0			
		5.0 \pm 0.5	—	3.5	7.5			
Input capacitance	C_{IN}	2.7	—	3.0	—	pF		
Output capacitance	C_O	2.7	—	15.0	—	pF		

Test Circuit



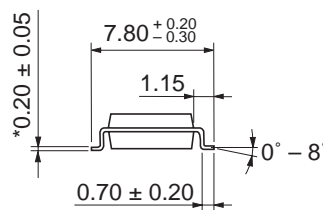
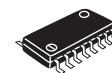
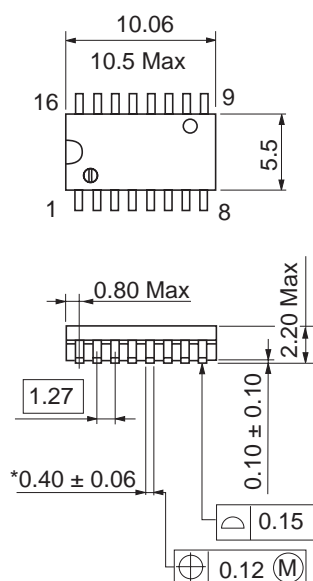
Waveforms



Package Dimensions

As of January, 2003

Unit: mm

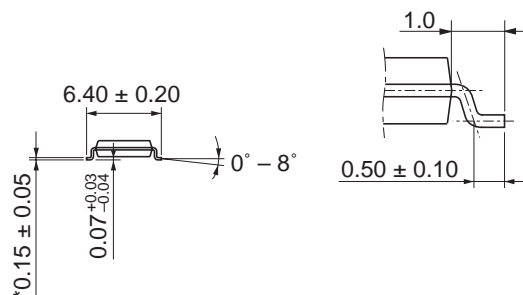
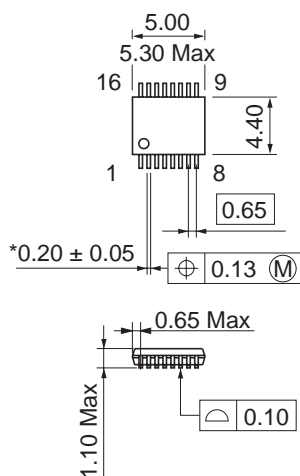


*Ni/Pd/Au plating

Package Code	FP-16DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.24 g

As of January, 2003

Unit: mm



*Ni/Pd/Au plating

Package Code	TTP-16DAV
JEDEC	—
JEITA	—
Mass (reference value)	0.05 g

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