

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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Not recommended  
for new design

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The logo for Renesas, featuring the word "RENESAS" in a bold, sans-serif font with a stylized "R" that has a horizontal bar extending to the left.

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# 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)

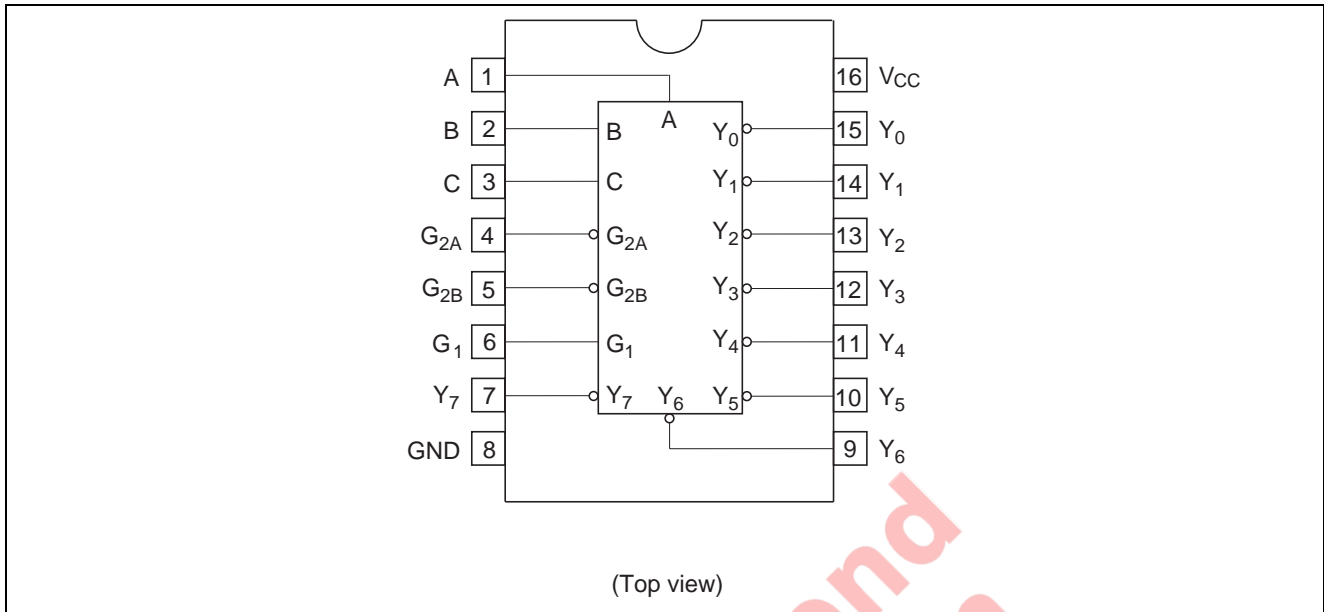
Note: Please consult the sales office for the above package availability.

### Function Table

Inputs			Select		Outputs									
Enable	$G_1$	$G_{2A}$	$G_{2B}$	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	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	H	H	L	H	H	H	H
H	L	L	H	L	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
H	L	L	H	H	L	L	H	H	H	H	H	L	H	H
H	L	L	H	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	$V_I = -0.5\text{ V}$
Input voltage	$V_I$	-0.5 to 6.0	V	
Output diode current	$I_{OK}$	-50	mA	$V_O = -0.5\text{ V}$
		50		$V_O = V_{CC} + 0.5\text{ V}$
Output voltage	$V_O$	-0.5 to $V_{CC} + 0.5$	V	
Output current	$I_O$	$\pm 50$	mA	
$V_{CC}$ , GND current / pin	$I_{CC}$ or $I_{GND}$	100	mA	
Storage temperature	$T_{stg}$	-65 to +150	$^{\circ}\text{C}$	

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 <sub>CC</sub>	1.5 to 5.5	V	Data retention
		2.0 to 5.5		At operation
Input / output voltage	V <sub>I</sub>	0 to 5.5	V	G, A, B, C
	V <sub>O</sub>	0 to V <sub>CC</sub>	V	Y <sub>0</sub> to Y <sub>7</sub>
Operating temperature	T <sub>a</sub>	-40 to 85	°C	
Output current	I <sub>OH</sub>	-12	mA	V <sub>CC</sub> = 2.7 V
		-24 <sup>*2</sup>		V <sub>CC</sub> = 3.0 V to 5.5 V
	I <sub>OL</sub>	12	mA	V <sub>CC</sub> = 2.7 V
		24 <sup>*2</sup>		V <sub>CC</sub> = 3.0 V to 5.5 V
Input rise / fall time <sup>*1</sup>	t <sub>r</sub> , t <sub>f</sub>	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 ≤ 50%

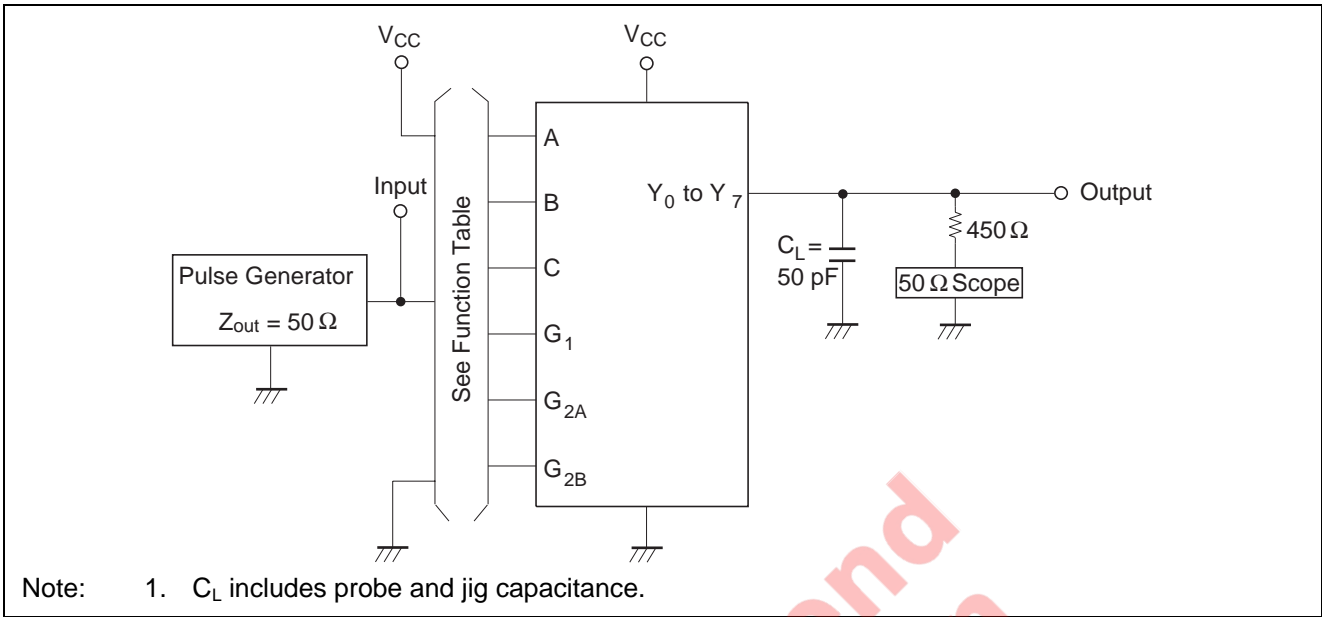
**Electrical Characteristics**

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

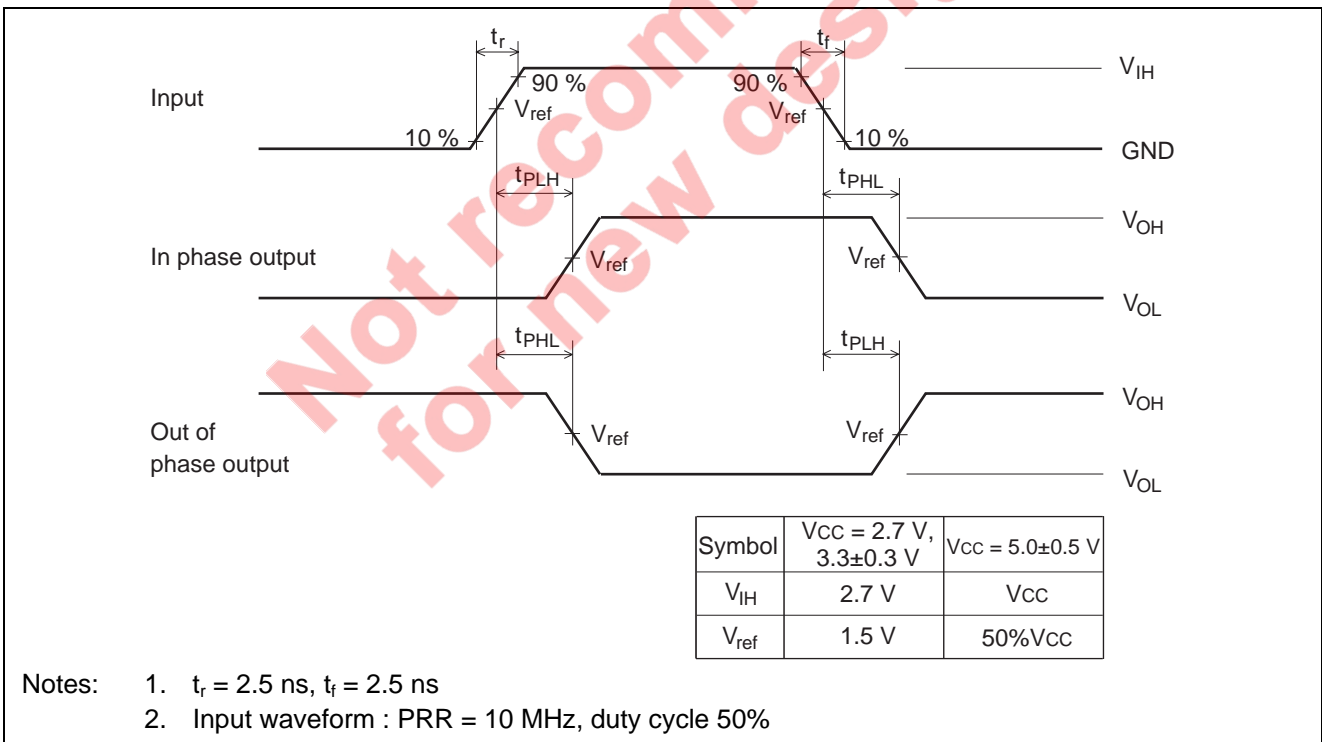
**Switching Characteristics**

Item	Symbol	V <sub>CC</sub> (V)	Ta = -40 to 85°C			Unit	From (Input)	To (Output)
			Min	Typ	Max			
Propagation delay time	t <sub>PLH</sub>	2.7	—	7.0	10.0	ns	G, A, B, C	Y <sub>0</sub> to Y <sub>7</sub>
	t <sub>PHL</sub>	3.3±0.3	1.5	5.0	9.0			
		5.0±0.5	—	3.5	7.5			
Input capacitance	C <sub>IN</sub>	2.7	—	3.0	—	pF		
Output capacitance	C <sub>O</sub>	2.7	—	15.0	—	pF		

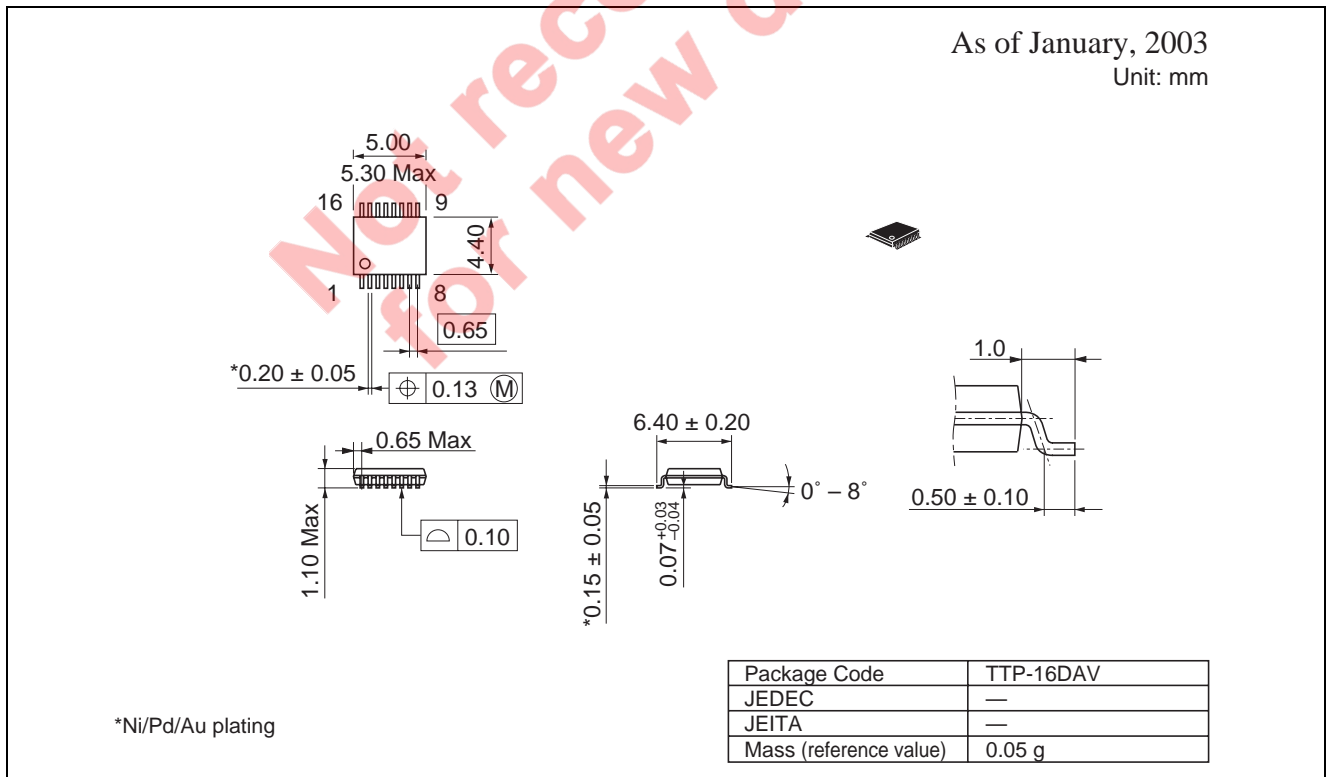
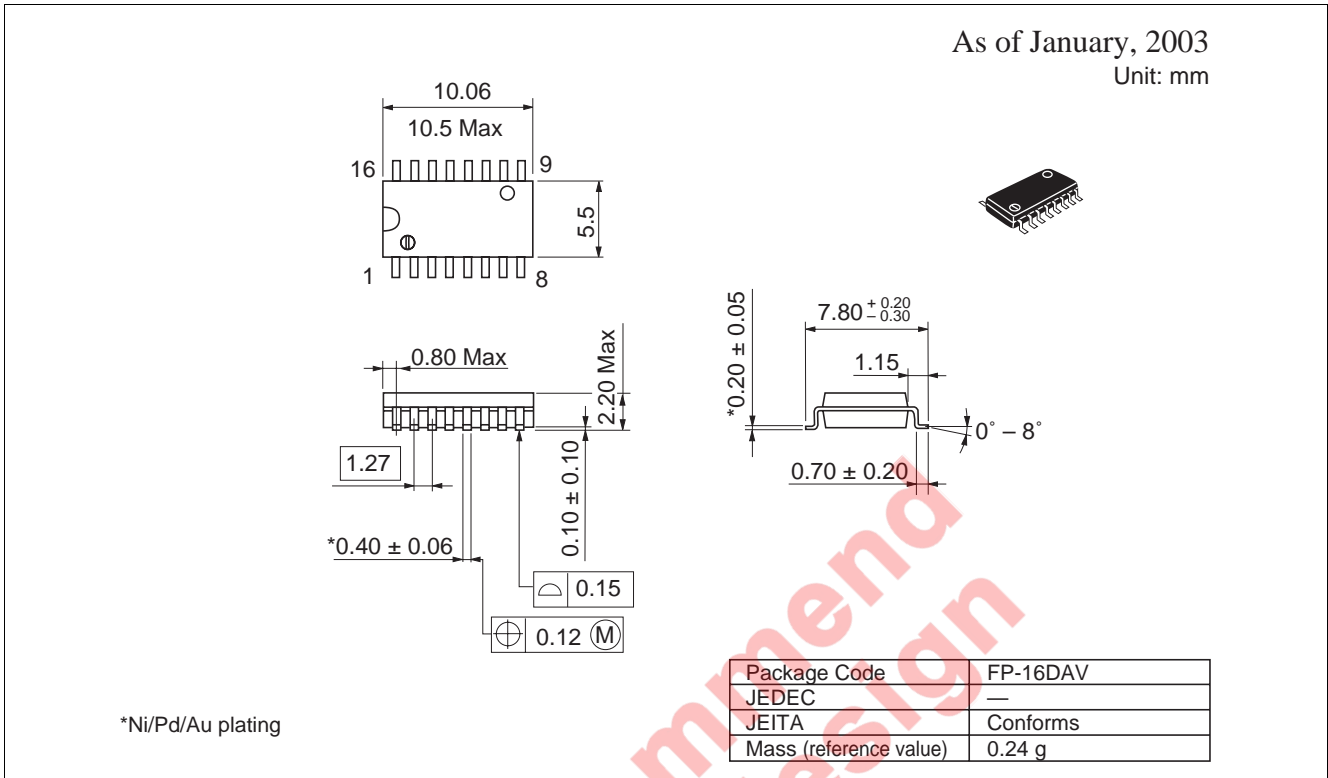
Test Circuit



Waveforms



Package Dimensions



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