

HD74HCT238

3-to-8-line Decoder/Demultiplexer

REJ03D0661-0200
 (Previous ADE-205-549)
 Rev.2.00
 Mar 30, 2006

Description

The HD74HCT238 has 3 binary select inputs (A, B, and C). If the device is enabled these inputs determined which one of the eight normally high outputs will go low. Two active low and one active high enables ($\overline{G_1}$, $\overline{G_{2A}}$ and $\overline{G_{2B}}$) are provided to ease the cascading of decoders.

Features

- High Speed Operation: t_{pd} (A, B, C to Y) = 16.5 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ V to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HCT238FPEL	SOP-16 pin (JEITA)	PRSP0016 DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)
HD74HCT238RPEL	SOP-16 pin (JEDEC)	PRSP0016 DG-A (FP-16DNV)	RP	EL (2,500 pcs/reel)

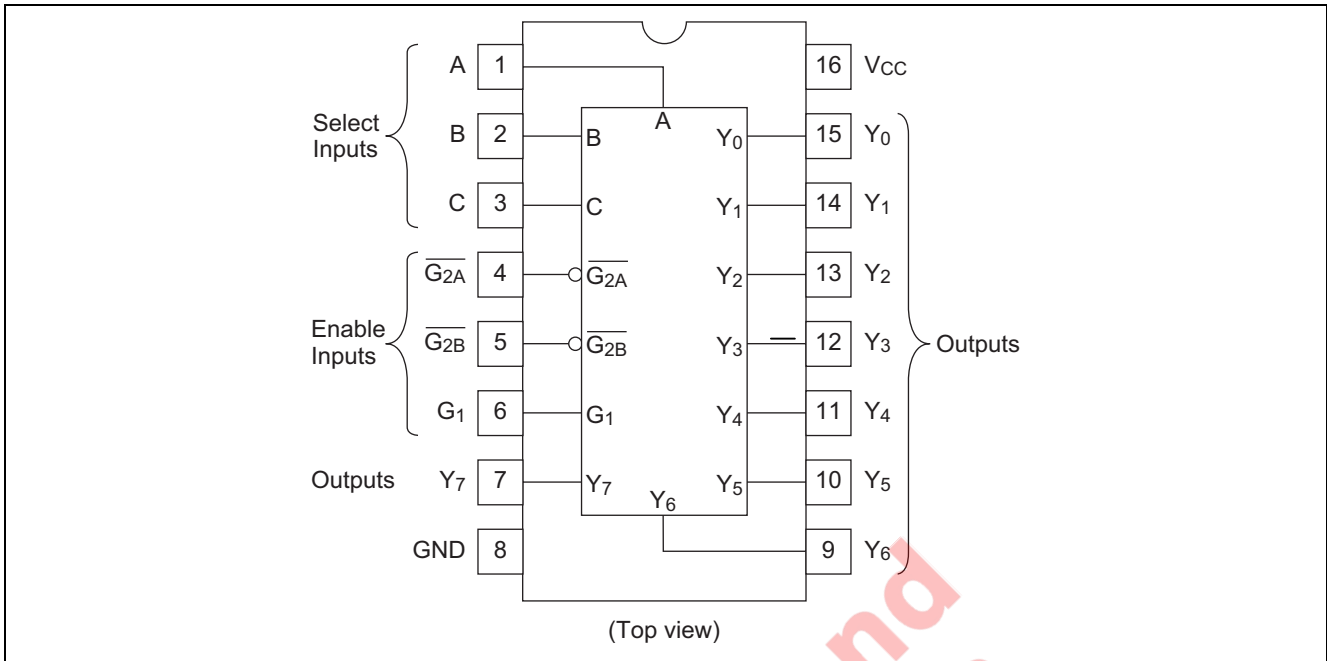
Note: Please consult the sales office for the above package availability.

Function Table

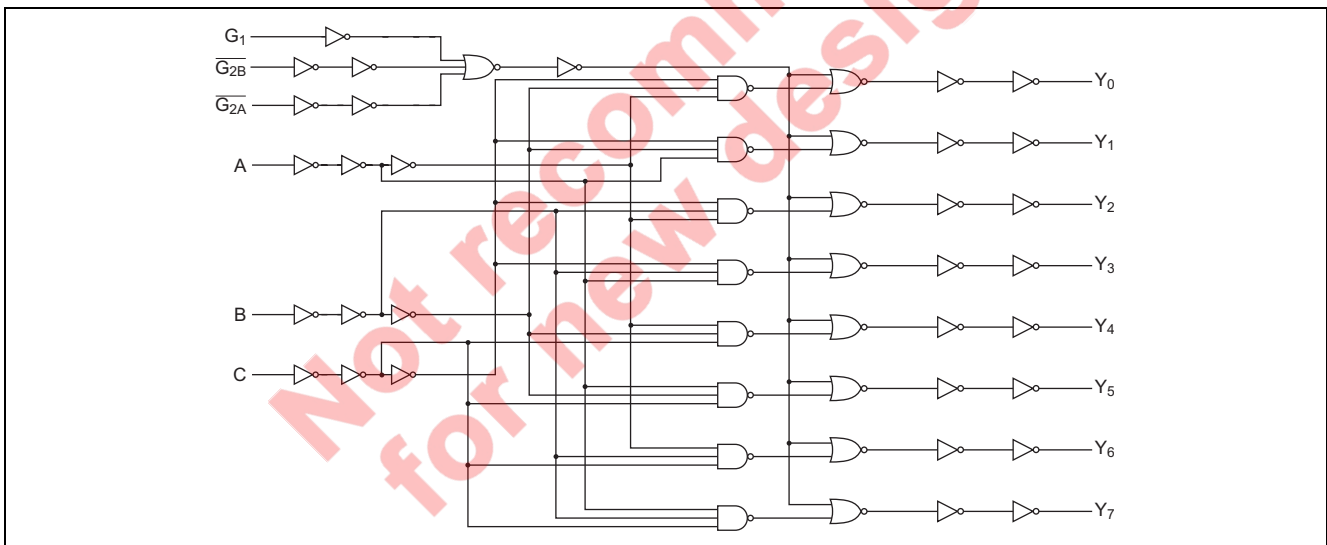
Inputs						Outputs							
Enable			Select										
$\overline{G_1}$	$\overline{G_{2A}}$	$\overline{G_{2B}}$	C	B	A	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7
X	X	H	X	X	X	L	L	L	L	L	L	L	L
X	H	X	X	X	X	L	L	L	L	L	L	L	L
L	X	X	X	X	X	L	L	L	L	L	L	L	L
H	L	L	L	L	L	H	L	L	L	L	L	L	L
H	L	L	L	L	H	L	H	L	L	L	L	L	L
H	L	L	L	H	L	L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

H: High level
 L: Low level
 X: Irrelevant

Pin Arrangement



Logic Diagram



Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to +7.0	V
Input voltage	V_{IN}	-0.5 to $V_{CC} + 0.5$	V
Output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Output current	I_{OUT}	± 25	mA
DC current drain per V_{CC} , GND	I_{CC} , I_{GND}	± 50	mA
DC input diode current	I_{IK}	± 20	mA
DC output diode current	I_{OK}	± 20	mA
Power dissipation per package	P_T	500	mW
Storage temperature	T_{stg}	-65 to +150	$^{\circ}C$

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}	4.5 to 5.5	V	
Input / Output voltage	V_{IN}, V_{OUT}	0 to V_{CC}	V	
Operating temperature	T_a	-40 to 85	°C	
Input rise / fall time ^{*1}	t_r, t_f	0 to 500	ns	$V_{CC} = 4.5 V$

Notes: 1. This item guarantees maximum limit when one input switches.
 Waveform: Refer to test circuit of switching characteristics.

Electrical Characteristics

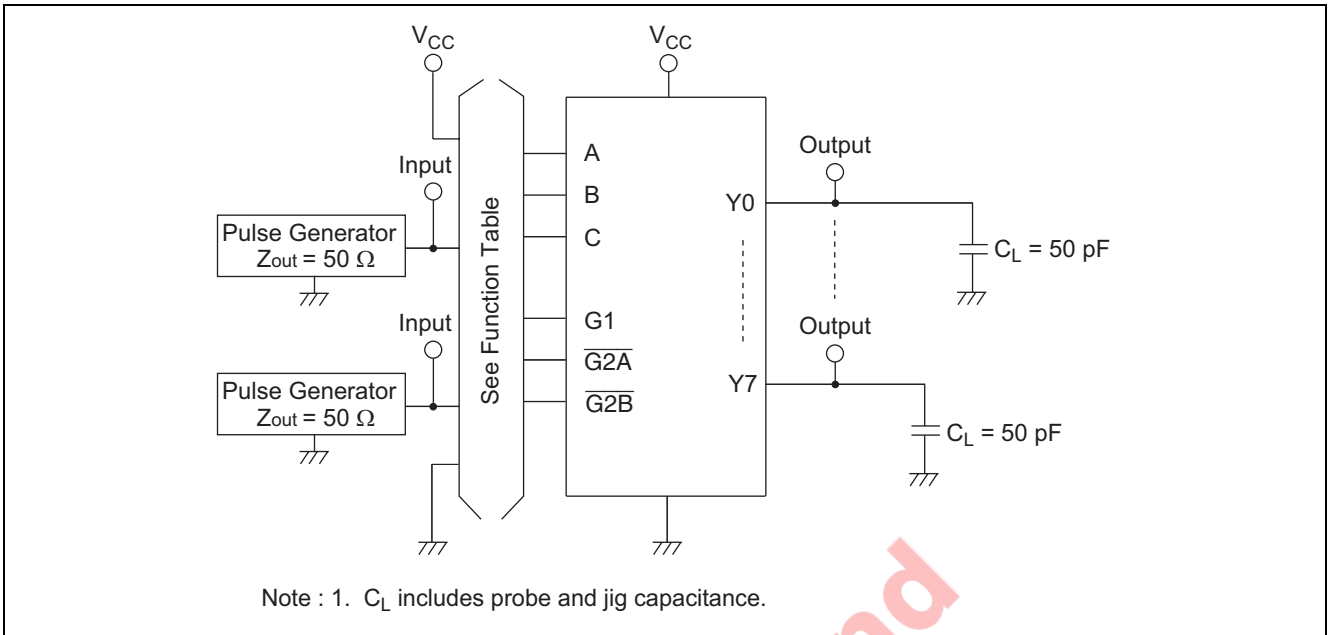
Item	Symbol	V_{CC} (V)	$T_a = 25^\circ C$			$T_a = -40 \text{ to } +85^\circ C$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V_{IH}	4.5 to 5.5	2.0	—	—	2.0	—	V		
	V_{IL}	4.5 to 5.5	—	—	0.8	—	0.8	V		
Output voltage	V_{OH}	4.5	4.4	—	—	4.4	—	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20 \mu A$
		4.5	4.18	—	—	4.13	—	V		$I_{OH} = -4 \text{ mA}$
	V_{OL}	4.5	—	—	0.1	—	0.1	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20 \mu A$
		4.5	—	—	0.26	—	0.33	V		$I_{OL} = 4 \text{ mA}$
Input current	I_{in}	5.5	—	—	± 0.1	—	± 1.0	μA	$V_{in} = V_{CC} \text{ or } GND$	
Quiescent supply current	I_{CC}	5.5	—	—	4.0	—	40	μA	$V_{in} = V_{CC} \text{ or } GND, I_{out} = 0 \mu A$	

Switching Characteristics

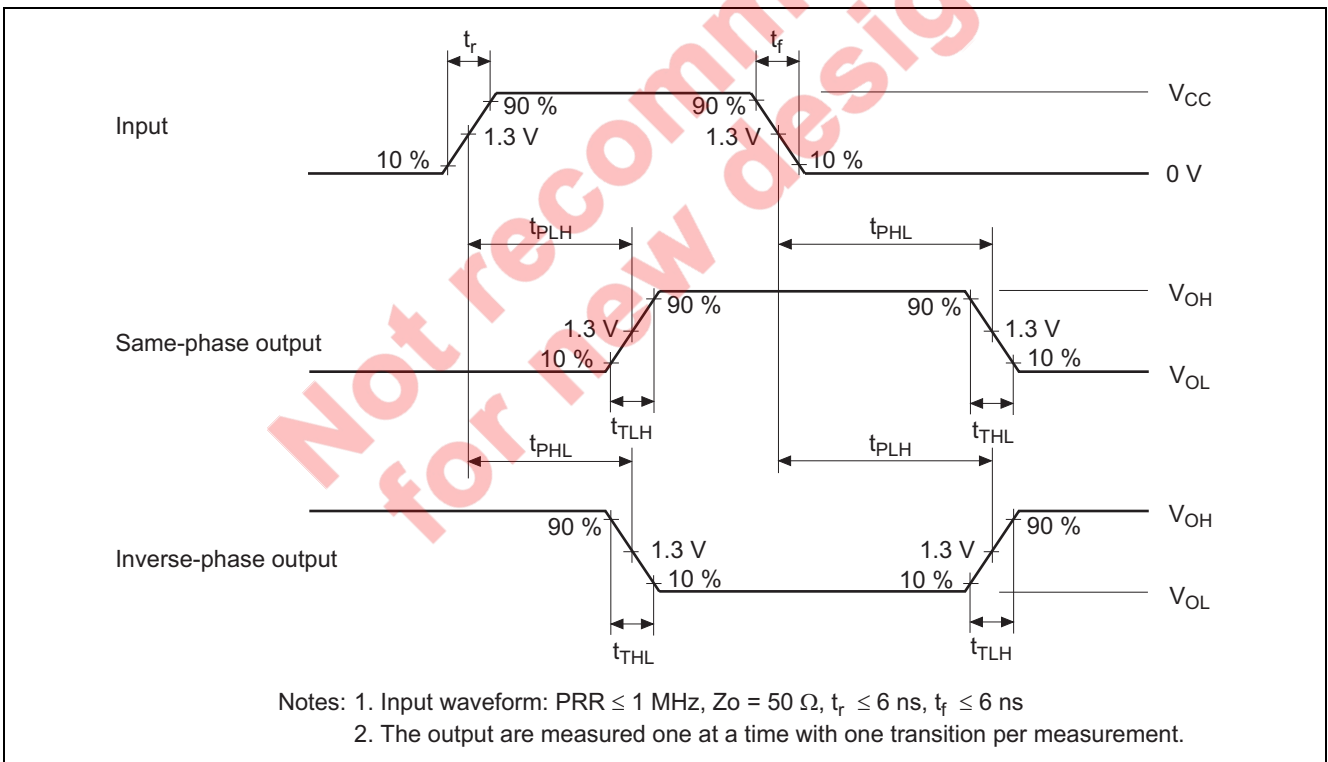
($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

Item	Symbol	V_{CC} (V)	$T_a = 25^\circ C$			$T_a = -40 \text{ to } +85^\circ C$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Propagation delay time	t_{PLH}	4.5	—	18	30	—	38	ns	A, B or C to Y	
	t_{PHL}	4.5	—	19	30	—	38	ns		
	t_{PLH}	4.5	—	17	30	—	38	ns	G _{2A} to Y	
	t_{PHL}	4.5	—	17	30	—	39	ns		
	t_{PLH}	4.5	—	17	30	—	38	ns	G _{2B} to Y	
	t_{PHL}	4.5	—	17	30	—	38	ns		
	t_{PLH}	4.5	—	17	30	—	38	ns	G ₁ to Y	
	t_{PHL}	4.5	—	17	30	—	38	ns		
Output rise/fall time	t_{TLH} t_{THL}	4.5	—	5	15	—	19	ns		
Input capacitance	C_{in}	—	—	5	10	—	10	pF		

Test Circuit

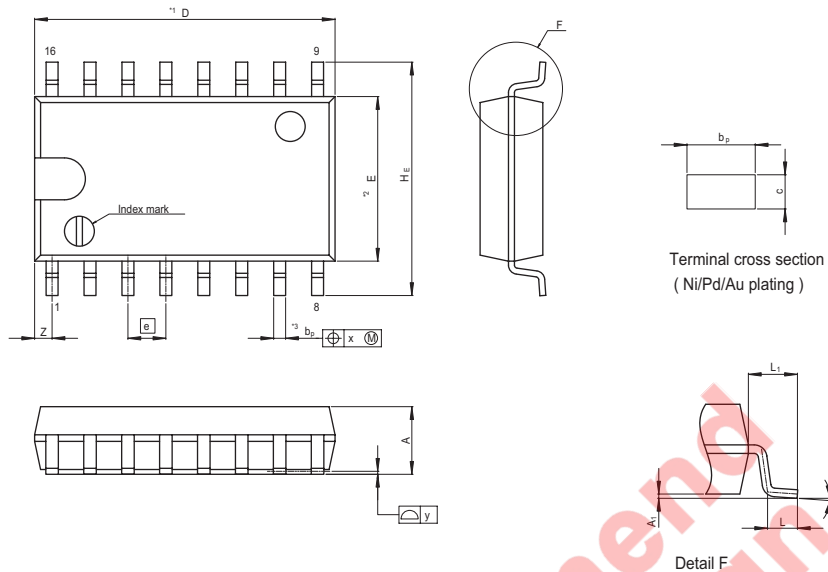


Waveforms



Package Dimensions

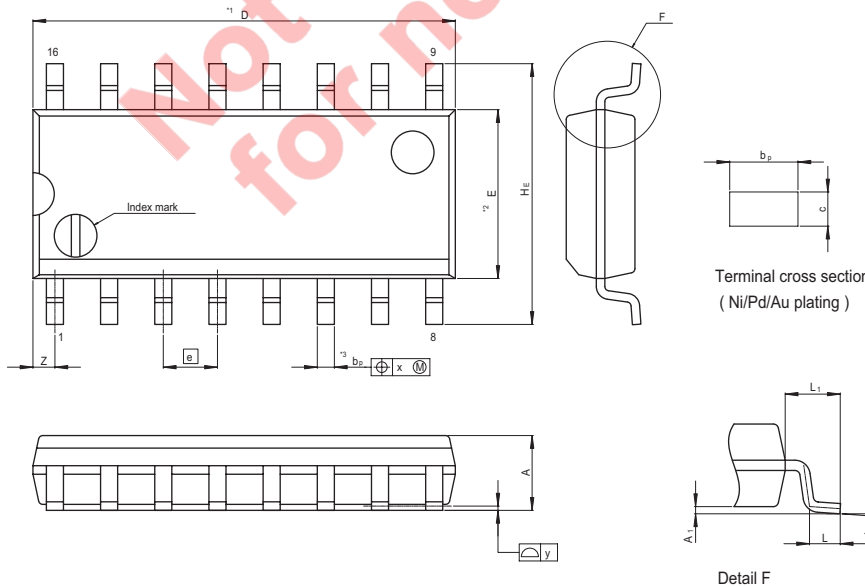
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP16-5.5x10.06-1.27	PRSP0016DH-B	FP-16DAV	0.24g



NOTE)
 1. DIMENSIONS**1 (Nom)**AND**2*
 DO NOT INCLUDE MOLD FLASH.
 2. DIMENSION**3*DOES NOT
 INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	10.06	10.5
E	—	5.50	—
A ₂	—	—	—
A ₁	0.00	0.10	0.20
A	—	—	2.20
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	7.50	7.80	8.00
ϕ	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.80
L	0.50	0.70	0.90
L ₁	—	1.15	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP16-3.95x9.9-1.27	PRSP0016DG-A	FP-16DNV	0.15g



NOTE)
 1. DIMENSIONS**1 (Nom)**AND**2*
 DO NOT INCLUDE MOLD FLASH.
 2. DIMENSION**3*DOES NOT
 INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	9.90	10.30
E	—	3.95	—
A ₂	—	—	—
A ₁	0.10	0.14	0.25
A	—	—	1.75
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	5.80	6.10	6.20
ϕ	—	1.27	—
x	—	—	0.25
y	—	—	0.15
Z	—	—	0.635
L	0.40	0.60	1.27
L ₁	—	1.08	—

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