This four bit magnitude comparator performs comparison of straight binary and straight BCD (8-4-2-1) codes. Three fully decoded decisions about two 4-bit words (A, B) are made and are externally available at three outputs. This device is fully expandable to any number of bits without external gates. Words of greater length may be compared by connecting comparators in cascade. The A > B, A < B, and A = B outputs of a stage handling less-significant bits. The stage handling the least- significant bits must have a high-level voltage applied to the A β B input. The cascading path is implemented with only a two-gate-level delay to reduce overall comparison times for long words.

Pin Arrangement

(Top view)
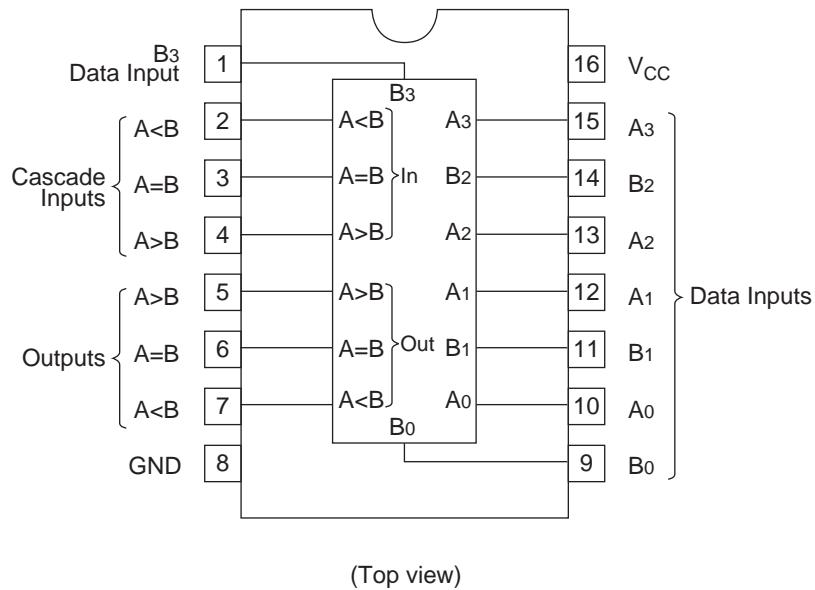
Function Table

Inputs				Cascading Inputs			Outputs		
A_3, B_3	A_2, B_2	A_1, B_1	A_0, B_0	A > B	A < B	A = B	A > B	A < B	A = B
$A_3 > B_3$	X	X	X	X	X	X	H	L	L
$A_3 < B_3$	X	X	X	X	X	X	L	H	L
$A_3 = B_3$	$A_2 > B_2$	X	X	X	X	X	H	L	L
$A_3 = B_3$	$A_2 < B_2$	X	X	X	X	X	L	H	L
$A_3 = B_3$	$A_2 = B_2$	$A_1 > B_1$	X	X	X	X	H	L	L
$A_3 = B_3$	$A_2 = B_2$	$A_1 < B_1$	X	X	X	X	L	H	L
$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	$A_0 > B_0$	X	X	X	H	L	L
$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	$A_0 < B_0$	X	X	X	L	H	L
$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	$A_0 = B_0$	H	L	L	H	L	L
$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	$A_0 = B_0$	L	H	L	L	H	L
$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	$A_0 = B_0$	X	X	H	L	L	H
$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	$A_0 = B_0$	H	H	L	L	L	L
$A_3 = B_3$	$A_2 = B_2$	$A_1 = B_1$	$A_0 = B_0$	L	L	L	H	H	L

H; high level, L; low level, X; irrelevant

Block Diagram
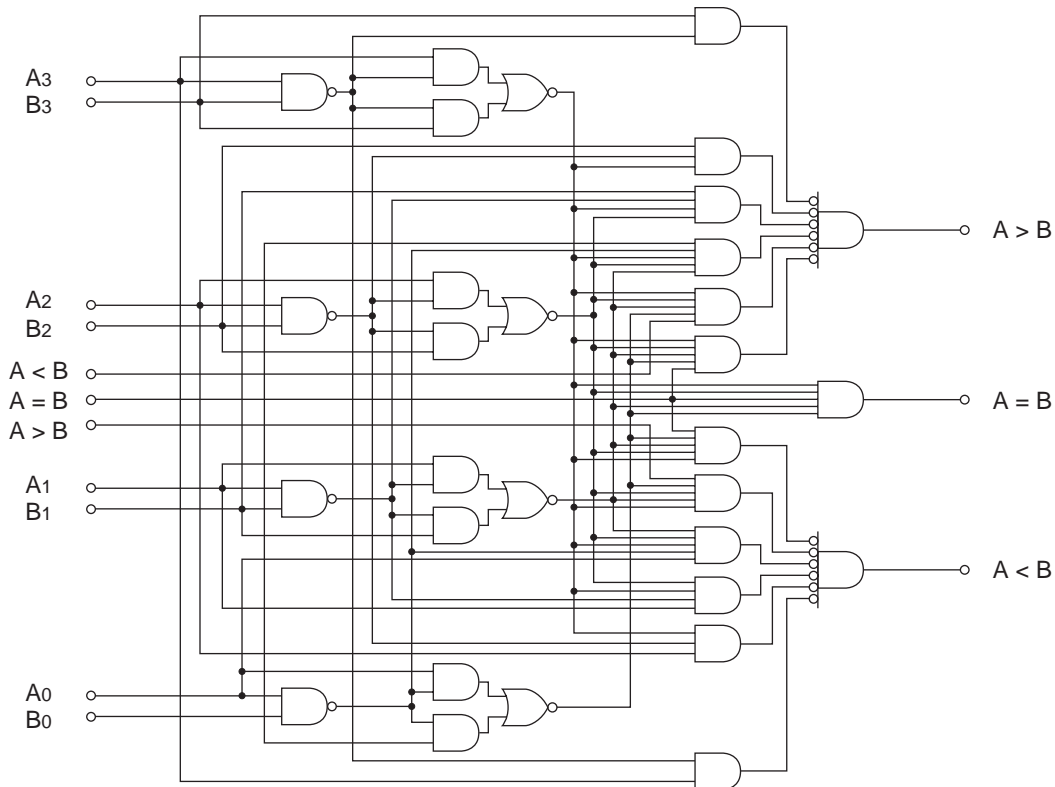
Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	7	V
Input voltage	V_{IN}	7	V
Power dissipation	P_T	400	mW
Storage temperature	Tstg	−65 to +150	°C

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	4.75	5.00	5.25	V
Output current	I_{OH}	—	—	−400	µA
	I_{OL}	—	—	8	mA
Operating temperature	Topr	−20	25	75	°C

Electrical Characteristics

(Ta = −20 to +75 °C)

Item		Symbol	min.	typ.*	max.	Unit	Condition
Input voltage		V_{IH}	2.0	—	—	V	
		V_{IL}	—	—	0.8	V	
Output voltage		V_{OH}	2.7	—	—	V	V_{CC} = 4.75 V, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = −400 µA
		V_{OL}	—	—	0.4	V	I_{OL} = 4 mA $\quad$ V_{CC} = 4.75 V, V_{IH} = 2 V,
			—	—	0.5		I_{OL} = 8 mA $\quad$ V_{IL} = 0.8 V
Input current	A < B, A > B inputs	I_{IH}	—	—	20	µA	V_{CC} = 5.25 V, V_I = 2.7 V
	Other inputs		—	—	60		
	A < B, A > B inputs	I_{IL}	—	—	−0.4	mA	V_{CC} = 5.25 V, V_I = 0.4 V
	Other inputs		—	—	−1.2		
	A < B, A > B inputs	I_I	—	—	0.1	mA	V_{CC} = 5.25 V, V_I = 7 V
	Other inputs		—	—	0.3		
Short-circuit output current		I_{OS}	−20	—	−100	mA	V_{CC} = 5.25 V
Supply current**		I_{CC}	—	10.4	20	mA	V_{CC} = 5.25 V
Input clamp voltage		V_{IK}	—	—	−1.5	V	V_{CC} = 4.75 V, I_{IN} = −18 mA

Note:　* V_{CC} = 5 V, Ta = 25°C

　　　　** I_{CC} is measured with outputs open, A = B grounded, and all other inputs at 4.5 V.

Switching Characteristics

(V_{CC} = 5 V, Ta = 25°C)

| Item	Symbol	Inputs	Outputs	Number of gate levels	min.	typ.	max.	Unit	Condition
Propagation delay time	t_{PLH}	Any A or B data input	A < B, A > B	1	—	14	—	ns	C_L = 15 pF, R_L = 2 kΩ
				2	—	19	—		
				3	—	24	36		
			A = B	4	—	27	45		
	t_{PHL}	Any A or B data input	A < B, A > B	1	—	11	—		
				2	—	15	—		
				3	—	20	30		
			A = B	4	—	23	45		
	t_{PHL}	A < B or A = B	A > B	1	—	14	22		
	t_{PHL}			1	—	11	17		
	t_{PLH}	A = B	A = B	2	—	13	20		
	t_{PHL}			2	—	13	26		
	t_{PLH}	A > B or A = B	A < B	1	—	14	22		
	t_{PHL}			1	—	11	17		

Testing Method

Test Circuit
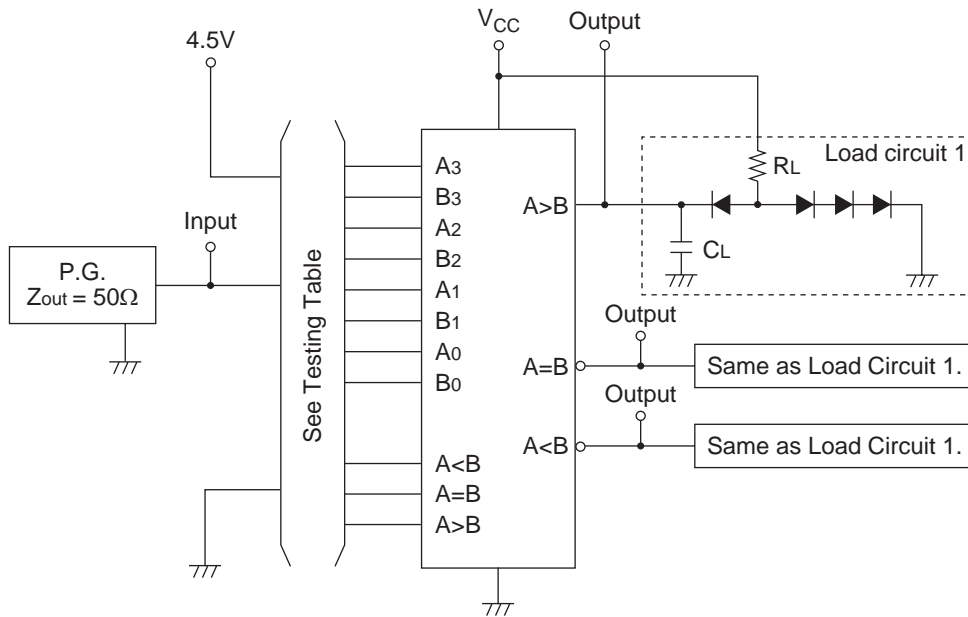
Notes: 1. C_L includes probe and jig capacitance.
2. All diodes are 1S2074(H).

Waveform
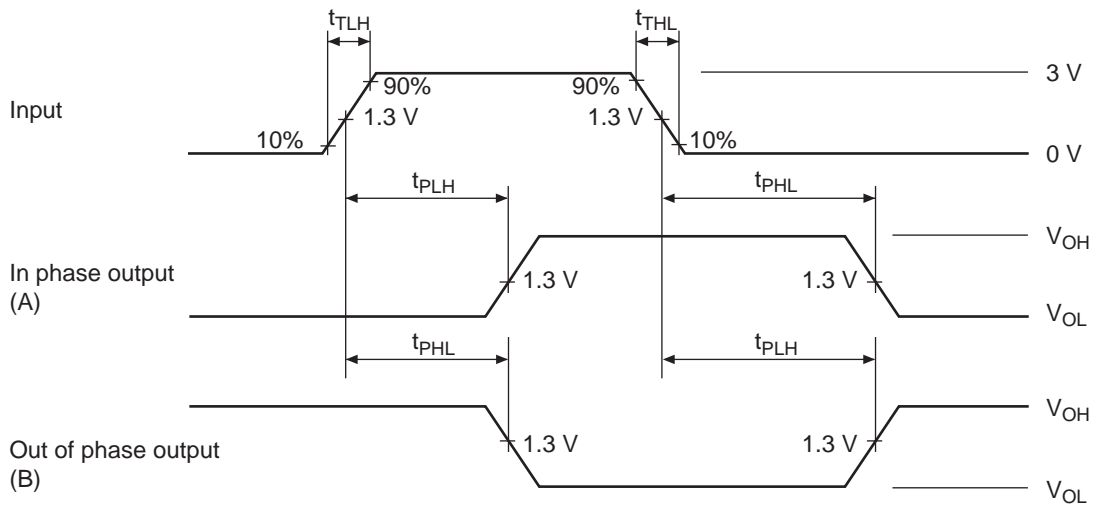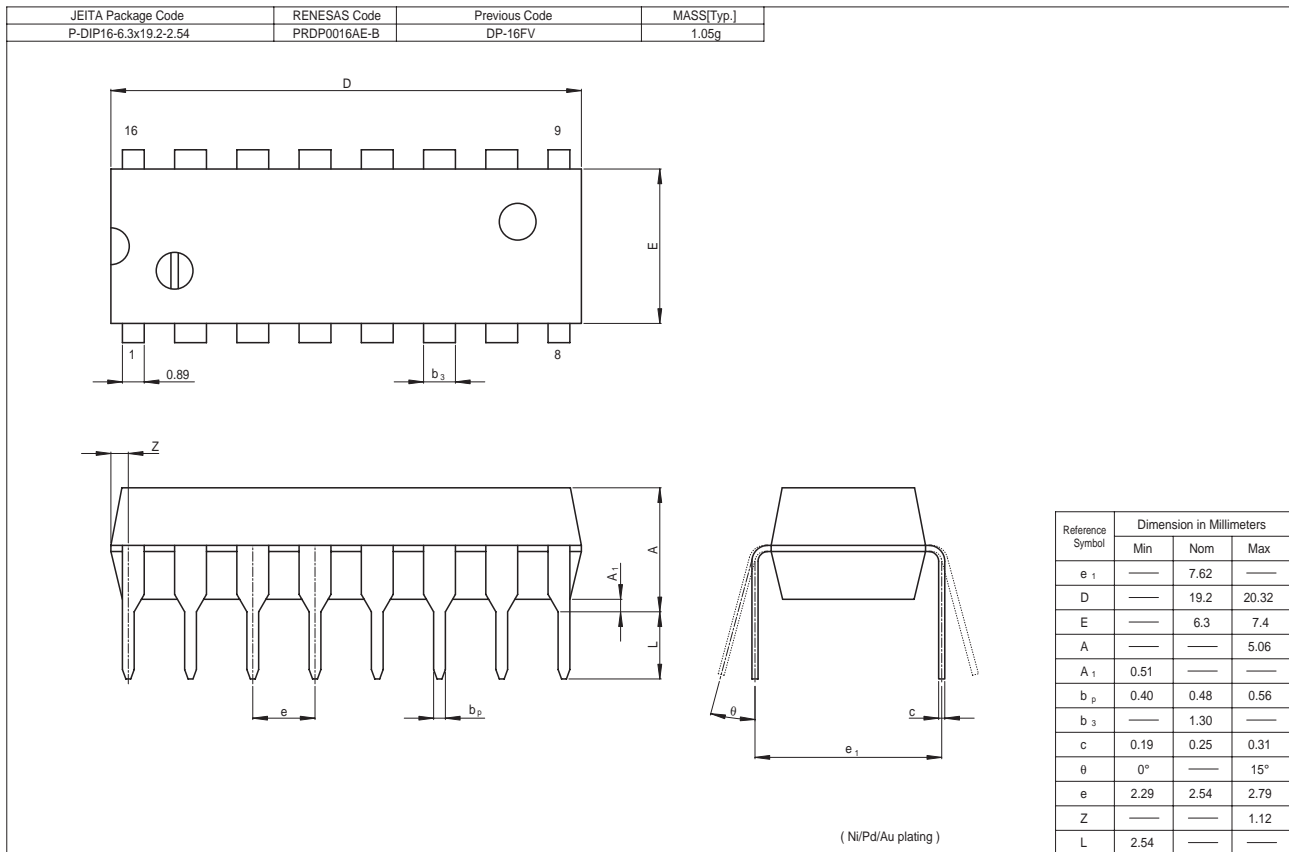

Note: Input pulse; $t_{TLH} \leq 15$ ns, $t_{THL} \leq 6$ ns, PRR = 1 MHz, duty cycle = 50%

4

Testing Table

Item	Inputs											Output waveforms		
	A_3	B_3	A_2	B_2	A_1	B_1	A_0	B_0	A > B	A = B	A < B	A > B	A = B	A < B
t_{PLH} t_{PHL}	IN	4.5 v	4.5 v	GND	GND	GND	GND	GND	GND	GND	GND	A	—	B
	4.5 v	IN	GND	4.5 v	GND	GND	GND	GND	GND	GND	GND	B	—	A
	GND	GND	IN	4.5 v	4.5 v	GND	GND	GND	GND	GND	GND	A	—	B
	GND	GND	4.5 v	IN	GND	4.5 v	GND	GND	GND	GND	GND	B	—	A
	GND	GND	GND	GND	IN	4.5 v	4.5 v	GND	GND	GND	GND	A	—	B
	GND	GND	GND	GND	4.5 v	IN	GND	4.5 v	GND	GND	GND	B	—	A
	GND	GND	GND	GND	GND	GND	IN	4.5 v	4.5 v	GND	GND	A	—	B
	GND	GND	GND	GND	GND	GND	4.5 v	IN	GND	GND	4.5 v	B	—	A
	GND	GND	GND	GND	GND	GND	IN	4.5 v	GND	4.5 v	GND	—	A	B
	GND	GND	GND	GND	GND	GND	4.5 v	IN	GND	4.5 v	GND	B	A	—
	GND	GND	GND	GND	GND	GND	GND	GND	IN	GND	GND	—	—	B
	GND	GND	GND	GND	GND	GND	GND	GND	GND	IN	GND	B	A	B
	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	IN	B	—	—

Package Dimensions

DIP

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP16-6.3x19.2-2.54	PRDP0016AE-B	DP-16FV	1.05g

(Ni/Pd/Au plating)

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e_1	——	7.62	——
D	——	19.2	20.32
E	——	6.3	7.4
A	——	——	5.06
A_1	0.51	——	——
b_p	0.40	0.48	0.56
b_3	——	1.30	——
c	0.19	0.25	0.31
θ	0°	——	15°
e	2.29	2.54	2.79
Z	——	——	1.12
L	2.54	——	——

以上信息仅供参考. 如需帮助联系客服人员。谢谢 XINLUDA