

# HD74LV1G02A

R04DS0018EJ0800

## 2-input NOR Gate

Rev.8.00

Jan 10, 2014

### Description

The HD74LV1G02A has two-input NOR gate in a 5 pin package. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

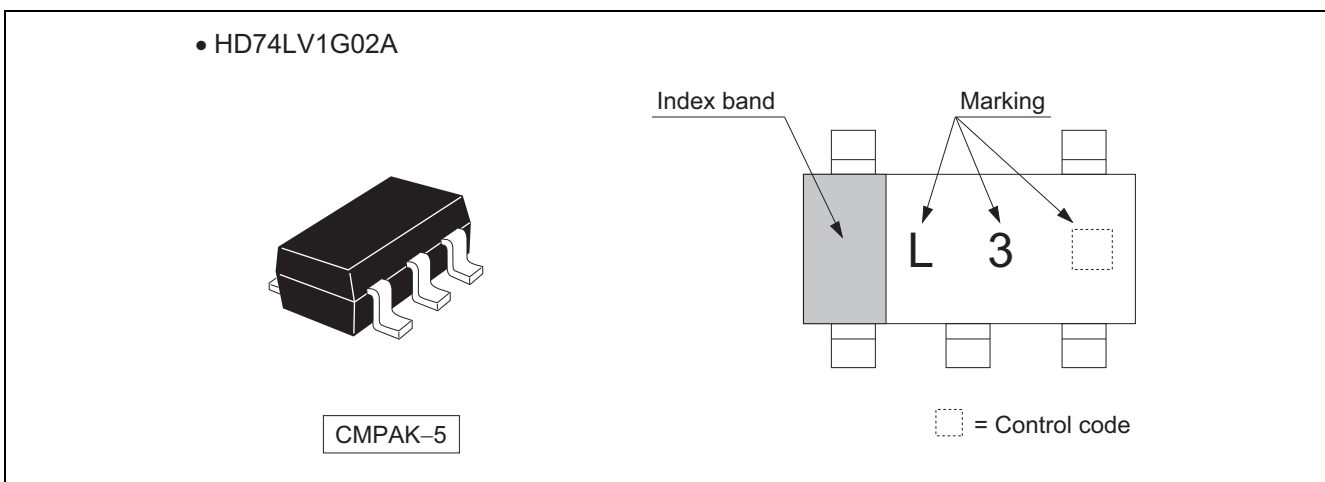
### Features

- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Electrical characteristics equivalent to the HD74LV02A  
 Supply voltage range : 1.65 to 5.5 V  
 Operating temperature range : -40 to +85°C
- All inputs  $V_{IH}$  (Max.) = 5.5 V (@ $V_{CC}$  = 0 V to 5.5 V)  
 All outputs  $V_O$  (Max.) = 5.5 V (@ $V_{CC}$  = 0 V)
- Output current  $\pm 6$  mA (@ $V_{CC}$  = 3.0 V to 3.6 V),  $\pm 12$  mA (@ $V_{CC}$  = 4.5 V to 5.5 V)
- All the logical input has hysteresis voltage for the slow transition.
- Ordering Information

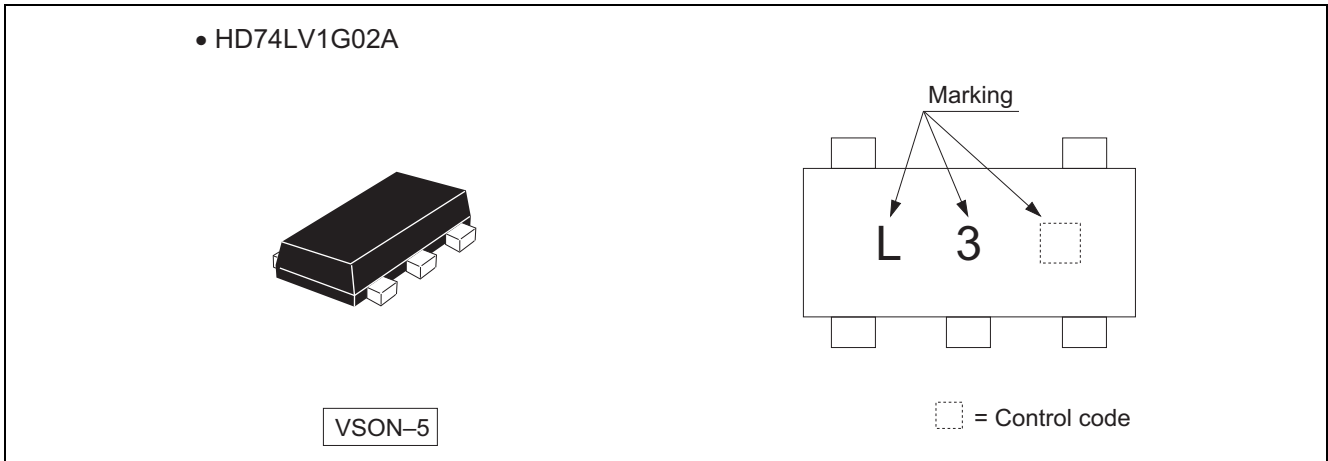
Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV1G02ACME	CMPAK-5 pin	PTSP0005ZC-A (CMPAK-5V)	CM	E (3000 pcs/reel)
HD74LV1G02AVSE	VSON-5 pin	PUSN0005KA-A (TNP-5DV)	VS	E (3000 pcs/reel)

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

### Outline and Article Indication



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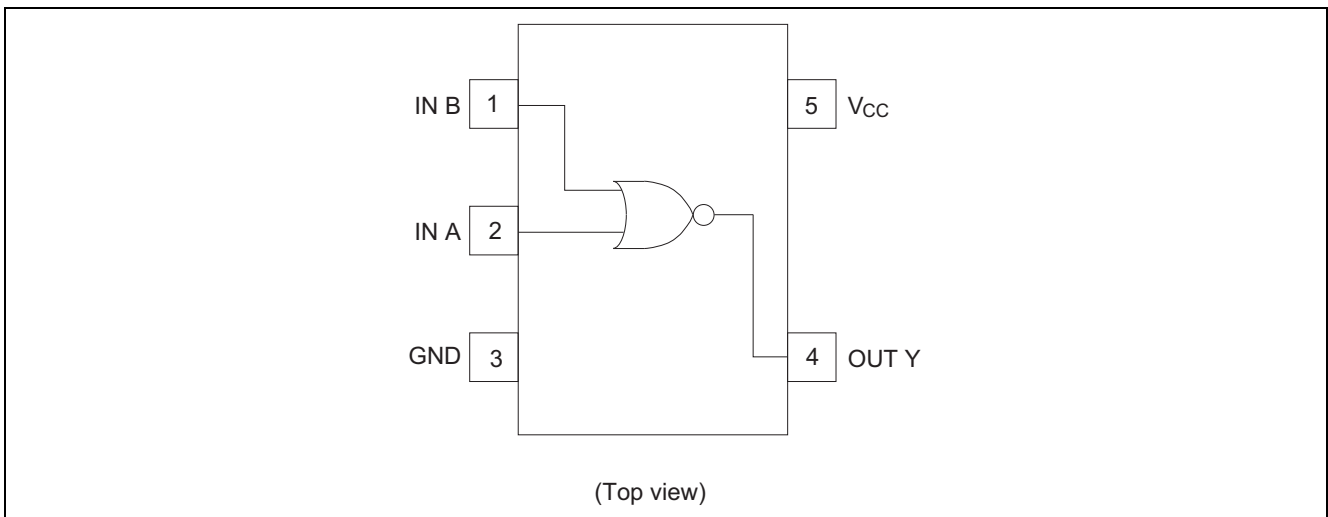
### Function Table

Inputs		Output Y
A	B	
L	L	H
L	H	L
H	L	L
H	H	L

H : High level

L : Low level

### Pin Arrangement



## Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	$V_{CC}$	-0.5 to 7.0	V	
Input voltage range <sup>*1</sup>	$V_I$	-0.5 to 7.0	V	
Output voltage range <sup>*1, 2</sup>	$V_O$	-0.5 to $V_{CC} + 0.5$	V	Output : H or L
		-0.5 to 7.0		$V_{CC} : OFF$
Input clamp current	$I_{IK}$	-20	mA	$V_I < 0$
Output clamp current	$I_{OK}$	$\pm 50$	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	$I_O$	$\pm 25$	mA	$V_O = 0$ to $V_{CC}$
Continuous current through $V_{CC}$ or GND	$I_{CC}$ or $I_{GND}$	$\pm 50$	mA	
Maximum power dissipation at $T_a = 25^\circ C$ (in still air) <sup>*3</sup>	$P_T$	200	mW	
Storage temperature	$T_{stg}$	-65 to 150	$^\circ C$	

Notes: 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.

1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 5.5 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150 $^\circ C$ .

## Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	$V_{CC}$	1.65	5.5	V	
Input voltage range	$V_I$	0	5.5	V	
Output voltage range	$V_O$	0	$V_{CC}$	V	
Output current	$I_{OL}$	—	1	mA	$V_{CC} = 1.65$ to $1.95$ V
		—	2		$V_{CC} = 2.3$ to $2.7$ V
		—	6		$V_{CC} = 3.0$ to $3.6$ V
		—	12		$V_{CC} = 4.5$ to $5.5$ V
	$I_{OH}$	—	-1		$V_{CC} = 1.65$ to $1.95$ V
		—	-2		$V_{CC} = 2.3$ to $2.7$ V
		—	-6		$V_{CC} = 3.0$ to $3.6$ V
		—	-12		$V_{CC} = 4.5$ to $5.5$ V
Input transition rise or fall rate	$\Delta t / \Delta v$	0	300	ns / V	$V_{CC} = 1.65$ to $1.95$ V
		0	200		$V_{CC} = 2.3$ to $2.7$ V
		0	100		$V_{CC} = 3.0$ to $3.6$ V
		0	20		$V_{CC} = 4.5$ to $5.5$ V
Operating free-air temperature	$T_a$	-40	85	$^\circ C$	

Note: Unused or floating inputs must be held high or low.

## Electrical Characteristics

- $T_a = -40$  to  $85^\circ\text{C}$

Item	Symbol	V <sub>CC</sub> (V) *	Min	Typ	Max	Unit	Test condition
Input voltage	V <sub>IH</sub>	1.65 to 1.95	V <sub>CC</sub> ×0.75	—	—	V	
		2.3 to 2.7	V <sub>CC</sub> ×0.7	—	—		
		3.0 to 3.6	V <sub>CC</sub> ×0.7	—	—		
		4.5 to 5.5	V <sub>CC</sub> ×0.7	—	—		
	V <sub>IL</sub>	1.65 to 1.95	—	—	V <sub>CC</sub> ×0.25		
		2.3 to 2.7	—	—	V <sub>CC</sub> ×0.3		
		3.0 to 3.6	—	—	V <sub>CC</sub> ×0.3		
		4.5 to 5.5	—	—	V <sub>CC</sub> ×0.3		
Hysteresis voltage	V <sub>H</sub>	1.8	—	0.25	—	V	V <sub>T</sub> <sup>+</sup> - V <sub>T</sub> <sup>-</sup>
		2.5	—	0.30	—		
		3.3	—	0.35	—		
		5.0	—	0.45	—		
Output voltage	V <sub>OH</sub>	Min to Max	V <sub>CC</sub> -0.1	—	—	V	I <sub>OH</sub> = -50 μA
		1.65	1.4	—	—		I <sub>OH</sub> = -1 mA
		2.3	2.0	—	—		I <sub>OH</sub> = -2 mA
		3.0	2.48	—	—		I <sub>OH</sub> = -6 mA
		4.5	3.8	—	—		I <sub>OH</sub> = -12 mA
	V <sub>OL</sub>	Min to Max	—	—	0.1		I <sub>OL</sub> = 50 μA
		1.65	—	—	0.3		I <sub>OL</sub> = 1 mA
		2.3	—	—	0.4		I <sub>OL</sub> = 2 mA
		3.0	—	—	0.44		I <sub>OL</sub> = 6 mA
		4.5	—	—	0.55		I <sub>OL</sub> = 12 mA
Input current	I <sub>IN</sub>	0 to 5.5	—	—	±1	μA	V <sub>IN</sub> = 5.5 V or GND
Quiescent supply current	I <sub>CC</sub>	5.5	—	—	10	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0
Output leakage current	I <sub>OFF</sub>	0	—	—	5	μA	V <sub>IN</sub> or V <sub>O</sub> = 0 to 5.5 V
Input capacitance	C <sub>IN</sub>	3.3	—	2.5	—	pF	V <sub>IN</sub> = V <sub>CC</sub> or GND

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

## Switching Characteristics

- $V_{CC} = 1.8 \pm 0.15$  V

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t <sub>PLH</sub>	—	14.2	23.3	1.0	26.0	ns	C <sub>L</sub> = 15 pF	A or B	Y
	t <sub>PHL</sub>	—	20.5	33.5	1.0	36.5		C <sub>L</sub> = 50 pF		

- $V_{CC} = 2.5 \pm 0.2$  V

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t <sub>PLH</sub>	—	8.3	12.4	1.0	15.0	ns	C <sub>L</sub> = 15 pF	A or B	Y
	t <sub>PHL</sub>	—	11.0	16.1	1.0	19.0		C <sub>L</sub> = 50 pF		

- $V_{CC} = 3.3 \pm 0.3$  V

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t <sub>PLH</sub>	—	5.6	7.9	1.0	9.5	ns	C <sub>L</sub> = 15 pF	A or B	Y
	t <sub>PHL</sub>	—	7.6	11.4	1.0	13.0		C <sub>L</sub> = 50 pF		

- $V_{CC} = 5.0 \pm 0.5$  V

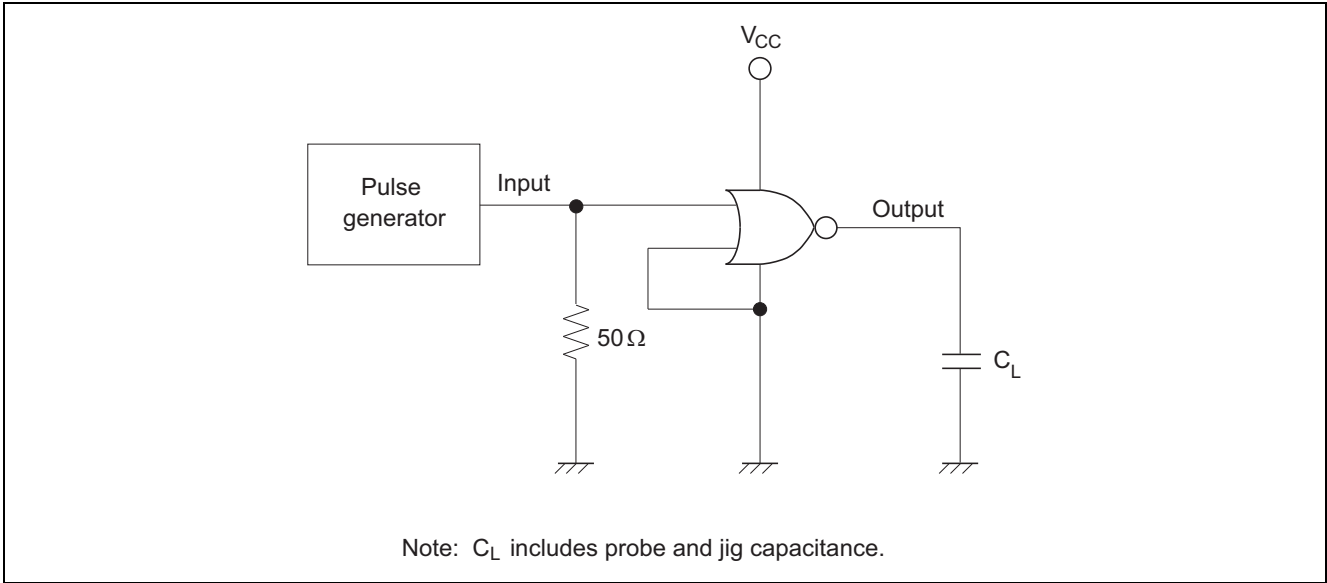
Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t <sub>PLH</sub>	—	3.9	5.5	1.0	6.5	ns	C <sub>L</sub> = 15 pF	A or B	Y
	t <sub>PHL</sub>	—	5.3	7.5	1.0	8.5		C <sub>L</sub> = 50 pF		

## Operating Characteristics

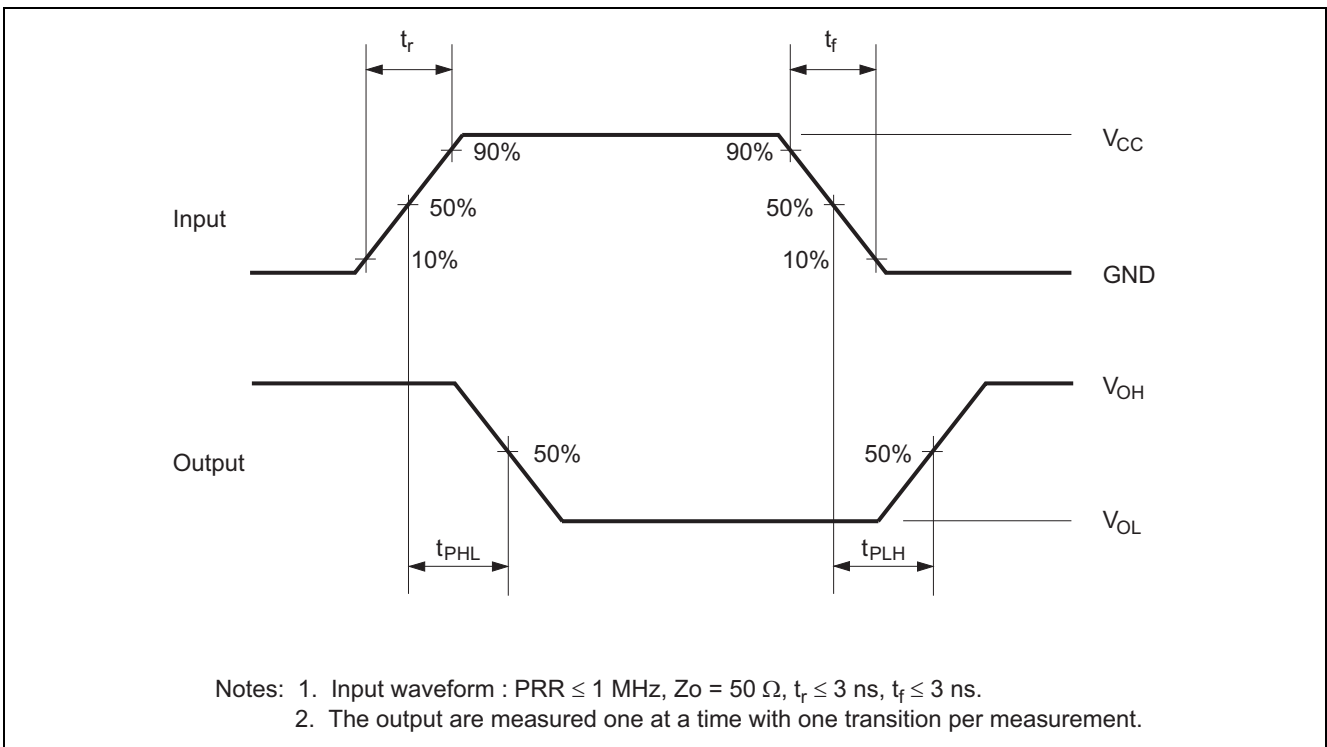
- C<sub>L</sub> = 50 pF

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C <sub>PD</sub>	3.3	—	8.9	—	pF	f = 10 MHz
		5.0	—	10.3	—		

**Test Circuit**

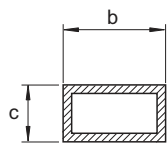
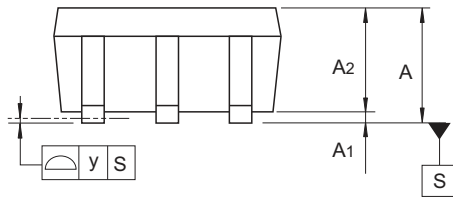
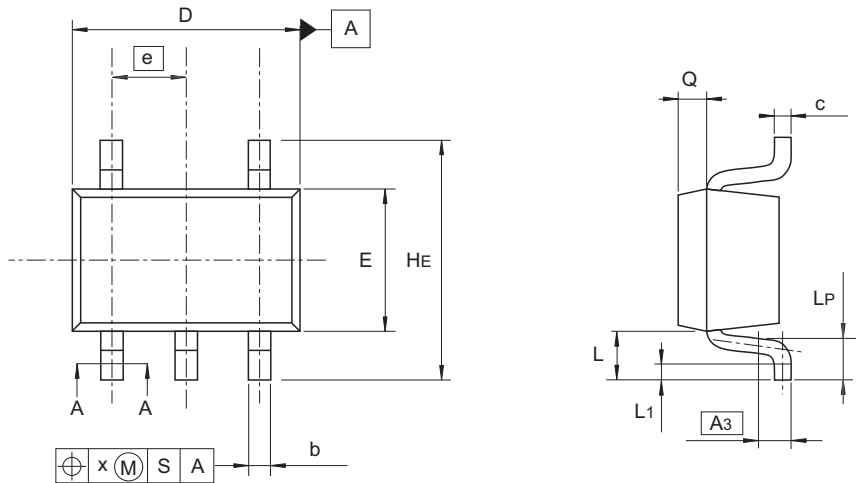


**Waveforms**



### Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS (Typ) [g]
SC-88A	PTSP0005ZC-A	CMPAK-5 / CMPAK-5V	0.006

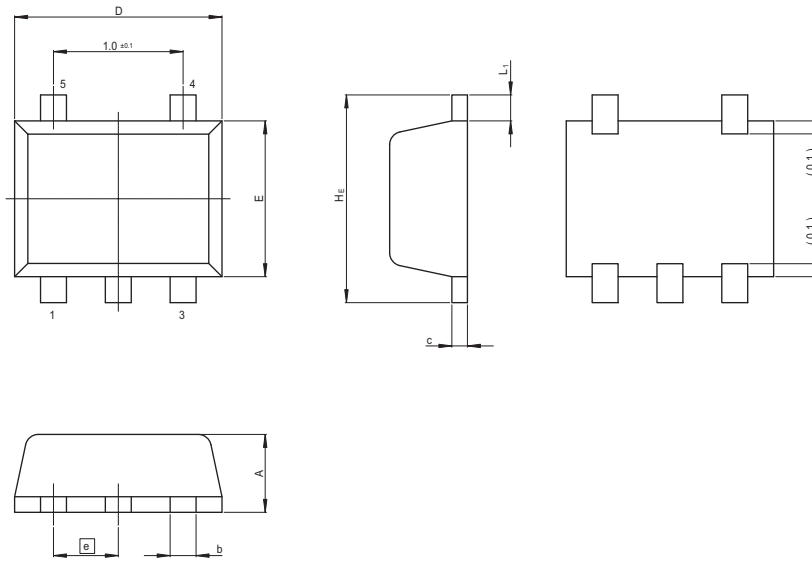


A-A Section

Reference Symbol	Dimensions in millimeters		
	Min	Nom	Max
A	0.8	—	1.1
A <sub>1</sub>	0	—	0.1
A <sub>2</sub>	0.8	0.9	1.0
A <sub>3</sub>	—	0.25	—
b	0.15	0.22	0.3
c	0.1	0.13	0.15
D	1.8	2.0	2.2
E	1.15	1.25	1.35
e	—	0.65	—
H <sub>E</sub>	1.8	2.1	2.4
L	0.3	—	0.7
L <sub>1</sub>	0.1	—	0.5
L <sub>P</sub>	0.2	—	0.6
x	—	—	0.05
y	—	—	0.05
Q	—	0.25	—

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JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-USON5-1.2x1.6-0.50	PUSN0005KA-A	TNP-5D/TNP-5DV	0.002g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	1.55	1.6	1.65
E	1.1	1.2	1.3
A	—	—	0.6
A <sub>1</sub>	—	—	—
A <sub>2</sub>	—	—	—
b	0.15	0.2	0.3
b <sub>1</sub>	—	—	—
Ⓜ	—	0.5	—
L <sub>p</sub>	—	—	—
x	—	—	—
y	—	—	—
Z <sub>D</sub>	—	—	—
c	0.07	0.12	0.22
c <sub>1</sub>	—	—	—
H <sub>E</sub>	1.55	1.6	1.65
L <sub>1</sub>	—	0.2	—



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