

# HD74LV1GW53A

## 2-channel Analog Multiplexer / Demultiplexer

REJ03D0080-0200

Rev.2.00

May 19, 2006

### Description

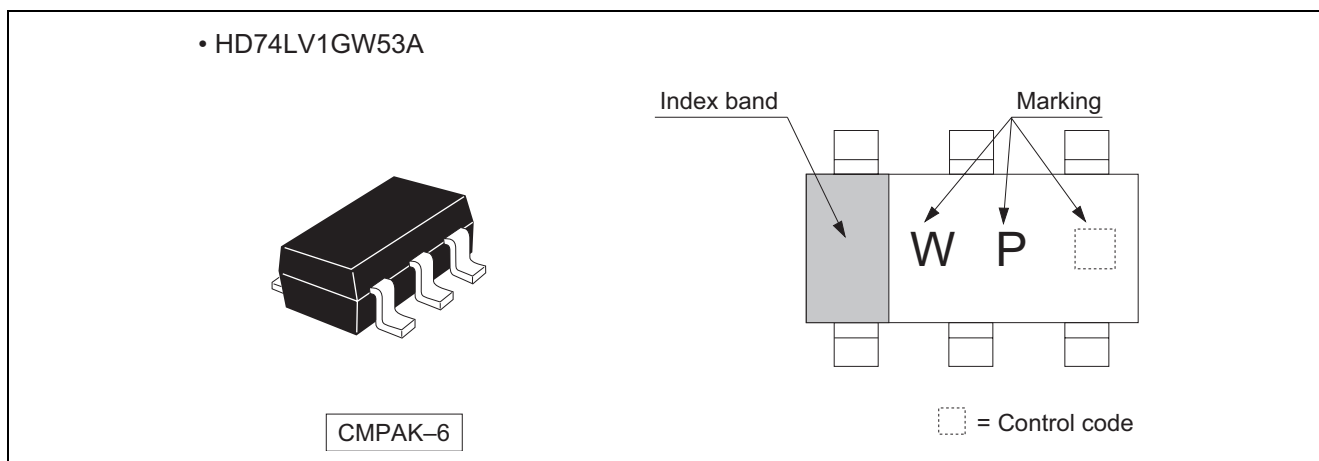
The HD74LV1GW53A has 2-channel analog multiplexer / demultiplexer in a 6 pin package. Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog to digital and digital to analog conversion systems. Low voltage and high-speed operation is suitable 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.
- Supply voltage range : 1.65 to 5.5 V  
Operating temperature range : -40 to +85°C
- Control inputs  $V_{IH}$  (Max.) = 5.5 V (@  $V_{CC}$  = 0 V to 5.5 V)
- Control inputs have hysteretic voltage for the slow transition.
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV1GW53ACME	CMPAK-6 pin	PTSP0006JA-A (CMPAK-6V)	CM	E (3,000 pcs / Reel)

### Outline and Article Indication



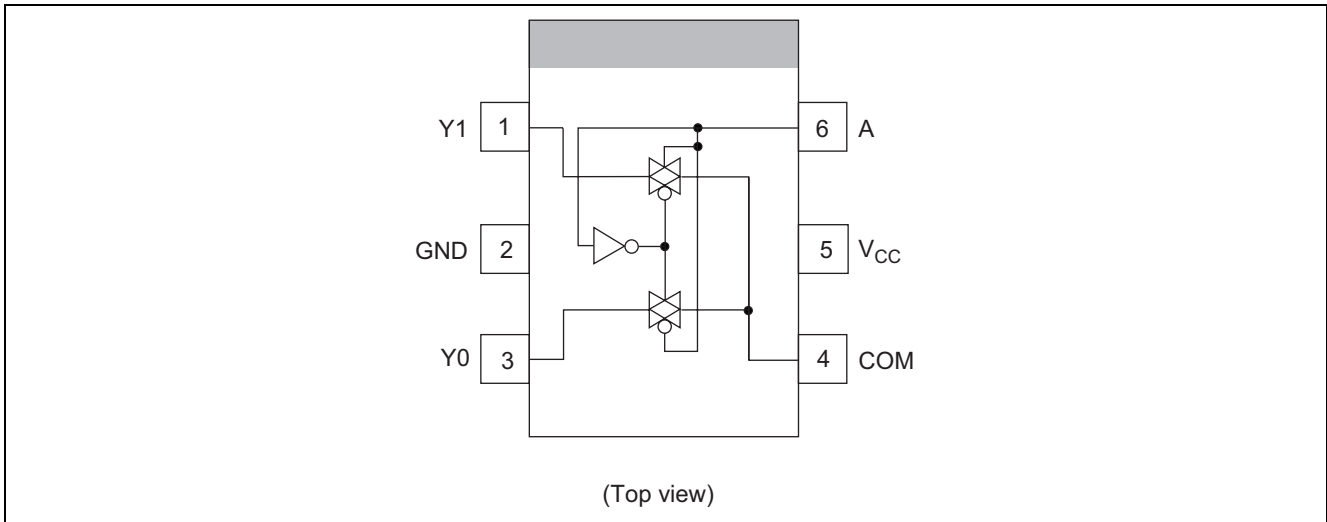
### Function Table

Control inputs	On channel
L	$Y_0$
H	$Y_1$

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
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 $T_a = 25^\circ\text{C}$ (in still air) <sup>*3</sup>	$P_T$	200	mW	
Storage temperature	$T_{stg}$	-65 to 150	$^\circ\text{C}$	

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 $^\circ\text{C}$ .

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	
Input / output voltage range	$V_{IO}$	0	$V_{CC}$	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	$^\circ\text{C}$	

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

Electrical Characteristic

Item	Symbol	V <sub>CC</sub> (V) *	T <sub>a</sub> = 25°C			T <sub>a</sub> = -40 to 85°C			Unit	Test Conditions
			Min	Typ	Max	Min	Typ	Max		
Input voltage	V <sub>IH</sub>	1.65 to 1.95	—	—	—	V <sub>CC</sub> ×0.75	—	—	V	Control input only
		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		
Hysteretic 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	—		
On-state switch resistance	R <sub>ON</sub>	1.65	—	120	360	—	—	450	Ω	V <sub>IN</sub> = V <sub>CC</sub> or GND V <sub>A</sub> = V <sub>IH</sub> , V <sub>IL</sub> I <sub>T</sub> = 2 mA
		2.3	—	60	180	—	—	225		
		3.0	—	50	150	—	—	190		
		4.5	—	40	75	—	—	100		
Peak on resistance	R <sub>ON(P)</sub>	1.65	—	400	1100	—	—	1400	Ω	V <sub>IN</sub> = V <sub>CC</sub> to GND V <sub>A</sub> = V <sub>IH</sub> , V <sub>IL</sub> I <sub>T</sub> = 2 mA
		2.3	—	200	500	—	—	600		
		3.0	—	90	180	—	—	225		
		4.5	—	50	100	—	—	125		
Difference of on- state resistance between switches	ΔR <sub>ON</sub>	1.65	—	40	120	—	—	160	Ω	V <sub>IN</sub> = V <sub>CC</sub> to GND V <sub>A</sub> = V <sub>IH</sub> , V <sub>IL</sub> I <sub>T</sub> = 2 mA
		2.3	—	20	30	—	—	40		
		3.0	—	10	20	—	—	30		
		4.5	—	7	15	—	—	20		
Off-state switch leakage current	I <sub>s(OFF)</sub>	5.5	—	—	±0.1	—	—	±1.0	μA	V <sub>IN</sub> = V <sub>CC</sub> , V <sub>OUT</sub> = GND or V <sub>IN</sub> = GND, V <sub>O</sub> = V <sub>CC</sub> , V <sub>A</sub> = V <sub>IH</sub> , V <sub>IL</sub>
On-state switch leakage current	I <sub>s(ON)</sub>	5.5	—	—	±0.1	—	—	±1.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND V <sub>A</sub> = V <sub>IH</sub> , V <sub>IL</sub>
Input current	I <sub>IN</sub>	0 to 5.5	—	—	±0.1	—	—	±1.0	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
Control input capacitance	C <sub>IC</sub>	—	—	3.5	—	—	—	—	pF	
Switch terminal capacitance	C <sub>IN / OUT</sub>	—	—	6.0	—	—	—	—	pF	

## Switching Characteristics

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

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	4.5	13.0	—	19.0	ns	$C_L = 15 \text{ pF}$	COM or Yn	Yn or COM
	$t_{PHL}$	—	11.0	23.0	—	29.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	13.0	30.0	—	35.0	ns	$C_L = 15 \text{ pF}$	A	Yn
	$t_{ZL}$	—	18.0	47.0	—	54.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	13.0	25.0	—	30.0	ns	$C_L = 15 \text{ pF}$	A	Yn
	$t_{LZ}$	—	20.0	38.0	—	45.0		$C_L = 50 \text{ pF}$		

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

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	2.5	10.0	—	16.0	ns	$C_L = 15 \text{ pF}$	COM or Yn	Yn or COM
	$t_{PHL}$	—	5.0	12.0	—	18.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	7.0	18.0	—	23.0	ns	$C_L = 15 \text{ pF}$	A	Yn
	$t_{ZL}$	—	9.0	28.0	—	35.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	9.0	18.0	—	23.0	ns	$C_L = 15 \text{ pF}$	A	Yn
	$t_{LZ}$	—	13.0	28.0	—	35.0		$C_L = 50 \text{ pF}$		

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

Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	2.0	6.0	—	10.0	ns	$C_L = 15 \text{ pF}$	COM or Yn	Yn or COM
	$t_{PHL}$	—	4.0	9.0	—	12.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	5.0	12.0	—	15.0	ns	$C_L = 15 \text{ pF}$	A	Yn
	$t_{ZL}$	—	7.0	20.0	—	25.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	7.0	12.0	—	15.0	ns	$C_L = 15 \text{ pF}$	A	Yn
	$t_{LZ}$	—	10.0	20.0	—	25.0		$C_L = 50 \text{ pF}$		

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

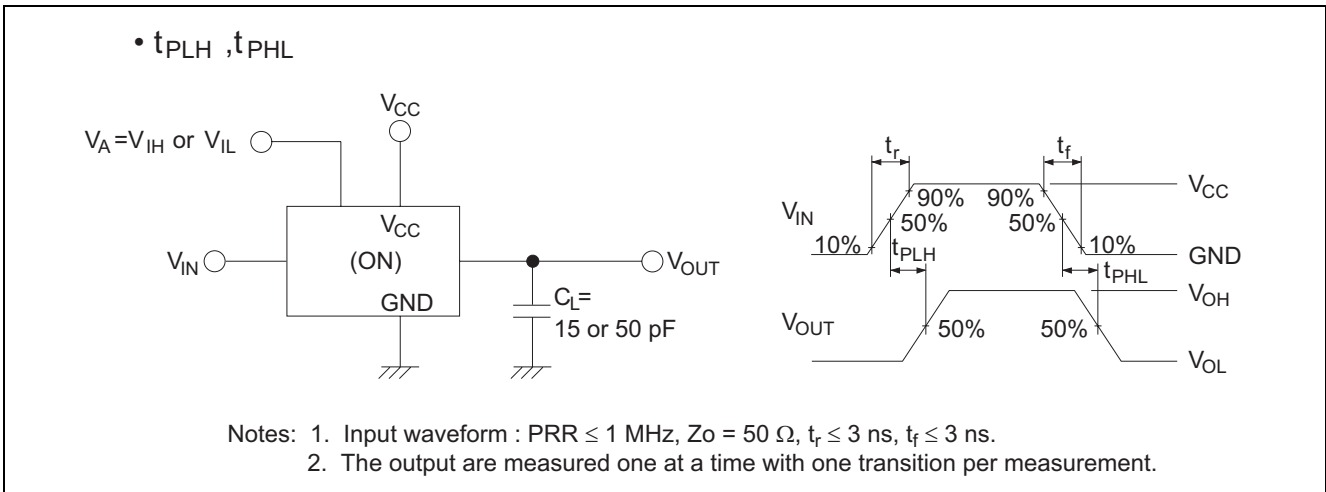
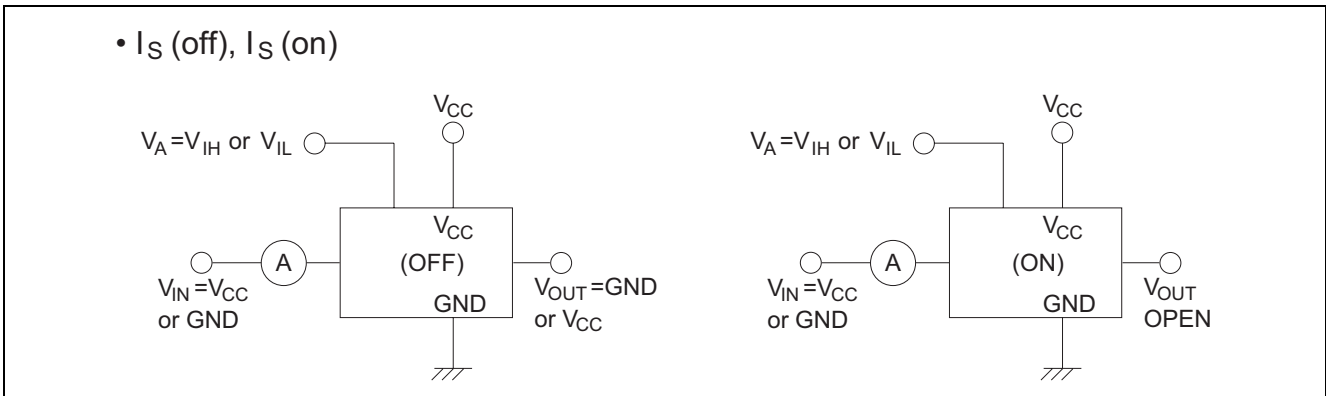
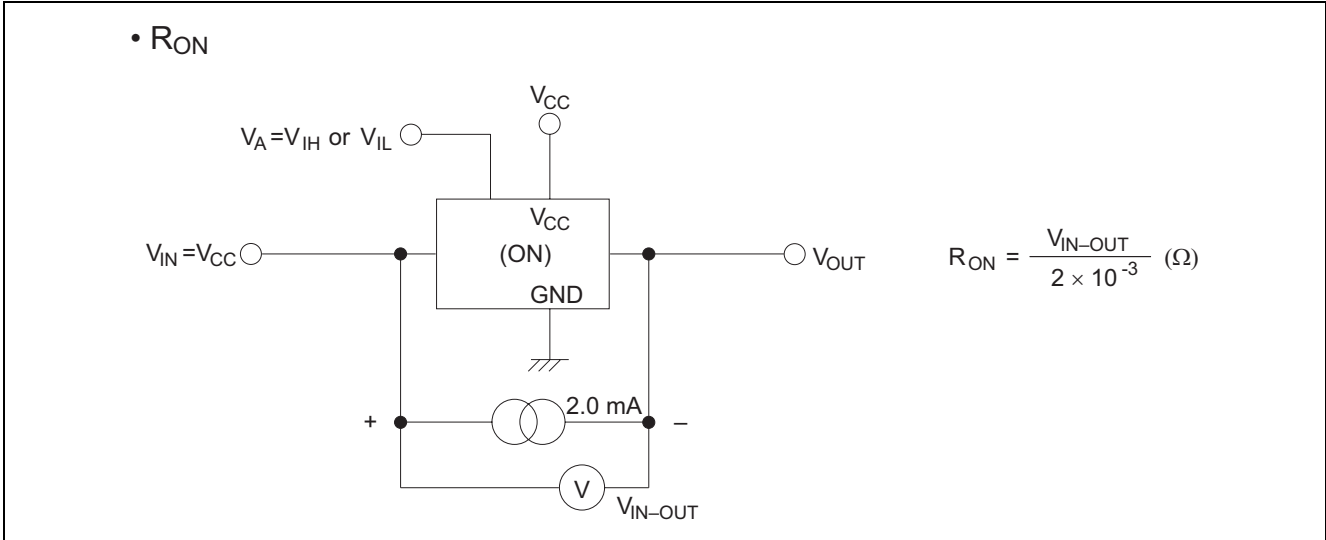
Item	Symbol	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	$t_{PLH}$	—	1.5	4.0	—	7.0	ns	$C_L = 15 \text{ pF}$	COM or Yn	Yn or COM
	$t_{PHL}$	—	3.0	6.0	—	8.0		$C_L = 50 \text{ pF}$		
Enable time	$t_{ZH}$	—	4.0	8.0	—	10.0	ns	$C_L = 15 \text{ pF}$	A	Yn
	$t_{ZL}$	—	5.0	14.0	—	18.0		$C_L = 50 \text{ pF}$		
Disable time	$t_{HZ}$	—	5.0	8.0	—	10.0	ns	$C_L = 15 \text{ pF}$	A	Yn
	$t_{LZ}$	—	8.0	14.0	—	18.0		$C_L = 50 \text{ pF}$		

## Operating Characteristics

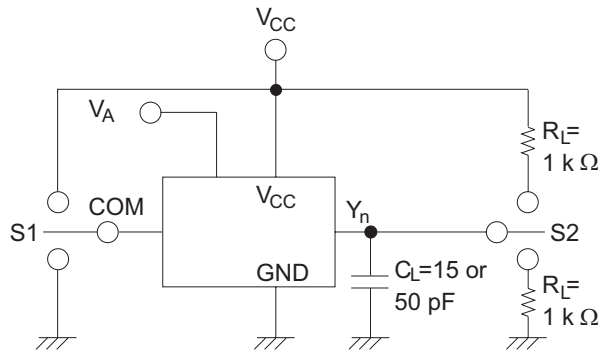
$C_L = 50 \text{ pF}$

Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	$C_{PD}$	3.3	—	7.5	—	pF	$f = 10 \text{ MHz}$
		5.0	—	8.0	—		

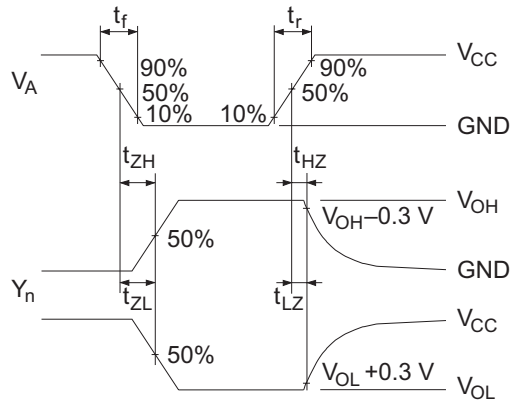
Test Circuit



•  $t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}$

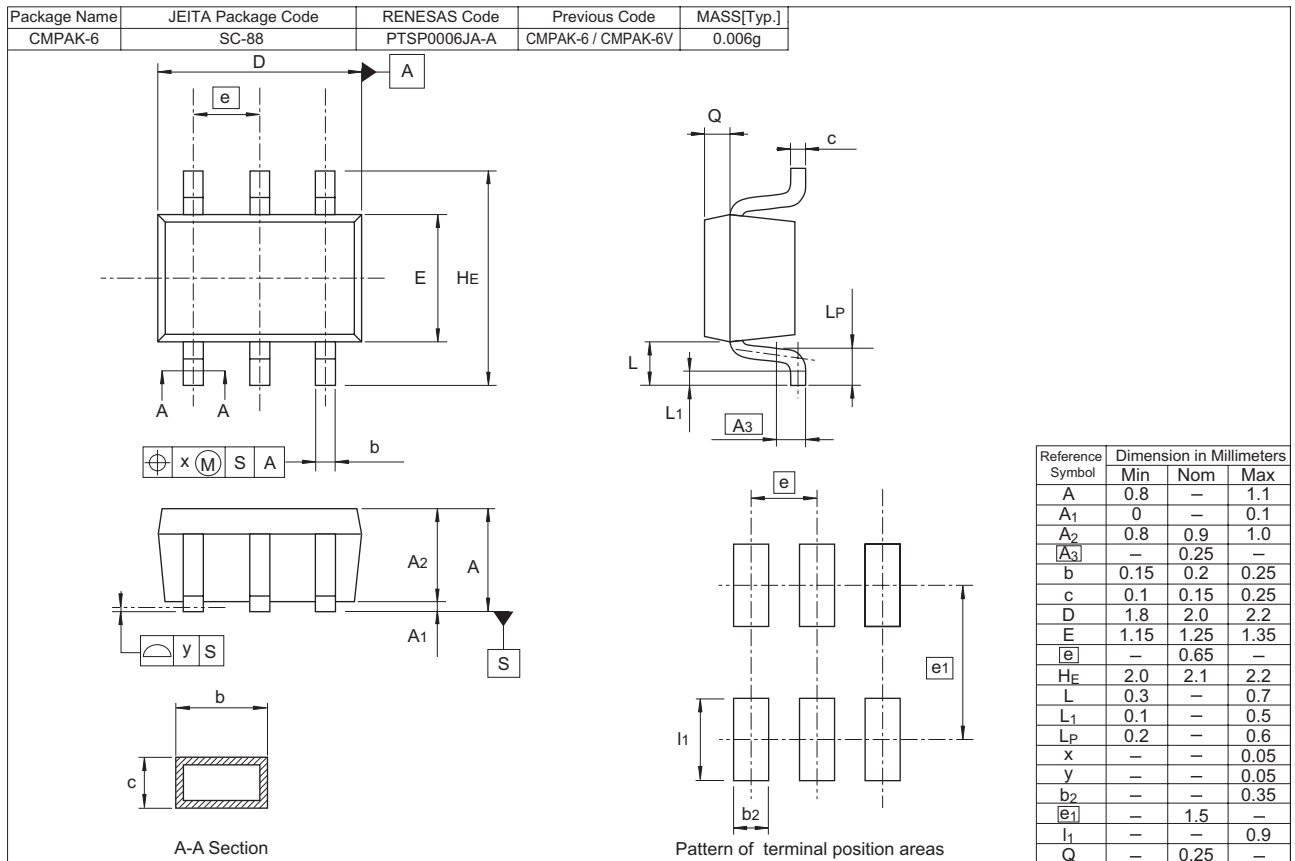


Item	S1	S2
$t_{ZH}$	VCC	GND
$t_{ZL}$	GND	VCC
$t_{HZ}$	VCC	GND
$t_{LZ}$	GND	VCC



- Notes:
1. Input waveform :  $PRR \leq 1 \text{ MHz}$ ,  $Z_o = 50 \Omega$ ,  $t_r \leq 3 \text{ ns}$ ,  $t_f \leq 3 \text{ ns}$ .
  2. Waveform – A is for an output with internal conditions such that the output is low except when disabled by the output control.
  3. Waveform – B is for an output with internal conditions such that the output is high except when disabled by the output control.
  4. The output are measured one at a time with one transition per measurement.

### Package Dimensions



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