HD74LV1G66A

Analog Switch

REJ03D0069-0700
Rev.7.00
Mar 21, 2008

Description

The HD74LV1G66A has an analog switch in a 5 pin package. Switch section has its enable input control (C). High-level voltage applied to C turns on the switch section. 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

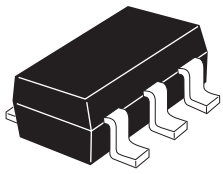
- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Electrical characteristics equivalent to the HD74LV4066A
  Supply voltage range : 1.65 to 5.5 V
  Operating temperature range : –40 to +85°C
- Control inputs V_{IH} (Max.) = 5.5 V (@V_{CC} = 0 V to 5.5 V)
- Control inputs has hysteresis voltage for the slow transition.
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV1G66ACME	CMPAK–5 pin	PTSP0005ZC-A (CMPAK-5V)	CM	E (3000 pcs/reel)
HD74LV1G66AVSE	VSON–5 pin	PUSN0005KA-A (TNP-5DV)	VS	E (3000 pcs/reel)

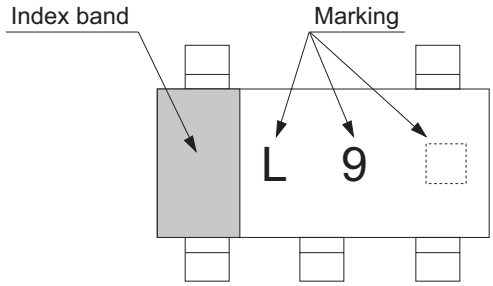
Note: Please consult the sales office for the above package availability.

Outline and Article Indication

• HD74LV1G66A



CMPAK–5



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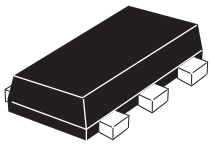
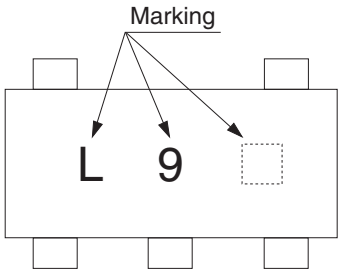


VSON–5



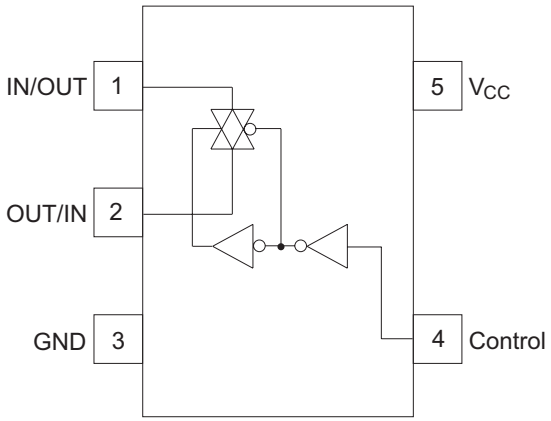
= Control code

Function Table

Control	Switch
L	OFF
H	ON

H : High level
L : Low level

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	V_{CC}	–0.5 to 7.0	V	
Input voltage range [*1]	V_I	–0.5 to 7.0	V	
Output voltage range [*1, 2]	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}	±50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	±25	mA	V_O = 0 to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±50	mA	
Maximum power dissipation at Ta = 25°C (in still air) [*3]	P_T	200	mW	
Storage temperature	Tstg	–65 to 150	°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°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	$V_{I/O}$	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	°C	

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

Electrical Characteristics

Item	Symbol	V_{CC} (V)	T_a = 25°C			T_a = –40 to 85°C			Unit	Test Conditions
			Min	Typ	Max	Min	Typ	Max		
Input voltage	V_{IH}	1.65 to 1.95	—	—	—	V_{CC}×0.75	—	—	V	Control input only
		2.3 to 2.7	—	—	—	V_{CC}×0.7	—	—		
		3.0 to 3.6	—	—	—	V_{CC}×0.7	—	—		
		4.5 to 5.5	—	—	—	V_{CC}×0.7	—	—		
	V_{IL}	1.65 to 1.95	—	—	—	—	—	V_{CC}×0.25		
		2.3 to 2.7	—	—	—	—	—	V_{CC}×0.3		
		3.0 to 3.6	—	—	—	—	—	V_{CC}×0.3		
		4.5 to 5.5	—	—	—	—	—	V_{CC}×0.3		
Hysteresis voltage	V_H	1.8	—	—	—	—	0.25	—	V	$V_T^+ - V_T^-$
		2.5	—	—	—	—	0.30	—		
		3.3	—	—	—	—	0.35	—		
		5.0	—	—	—	—	0.45	—		
On-state switch resistance	R_{ON}	1.65	—	120	360	—	—	450	Ω	V_{IN} = V_{CC} or GND V_C = V_{IH} I_T = 1 mA
		2.3	—	60	180	—	—	225		
		3.0	—	50	150	—	—	190		
		4.5	—	40	75	—	—	100		
Peak on resistance	$R_{ON (P)}$	1.65	—	700	1100	—	—	1400	Ω	V_{IN} = V_{CC} to GND V_C = V_{IH} I_T = 1 mA
		2.3	—	250	500	—	—	600		
		3.0	—	100	180	—	—	225		
		4.5	—	50	100	—	—	125		
Off-state switch leakage current	$I_{s (OFF)}$	5.5	—	—	±0.1	—	—	±1.0	µA	V_{IN} = V_{CC}, V_{OUT} = GND or V_{IN} = GND, V_O = V_{CC}, V_C = V_{IL}
On-state switch leakage current	$I_{s (ON)}$	5.5	—	—	±0.1	—	—	±1.0	µA	V_{IN} = V_{CC} or GND V_C = V_{IH}
Input current	I_{IN}	0 to 5.5	—	—	±0.1	—	—	±1.0	µA	V_{IN} = 5.5 V or GND
Quiescent supply current	I_{CC}	5.5	—	—	—	—	—	10	µA	V_{IN} = V_{CC} or GND
Control input capacitance	C_{IC}	—	—	3.5	—	—	—	—	pF	
Switch terminal capacitance	$C_{IN / OUT}$	—	—	4.0	—	—	—	—	pF	
Feed through capacitance	$C_{IN–OUT}$	—	—	0.5	—	—	—	—	pF	

Switching Characteristics

- V_{CC} = 1.8 ± 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_{PLH}	—	4.0	13.0	—	19.0	ns	C_L = 15 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
	t_{PHL}	—	11.0	23.0	—	29.0		C_L = 50 pF		
Enable time	t_{ZH}	—	11.0	24.0	—	29.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
	t_{ZL}	—	18.0	44.0	—	51.0		C_L = 50 pF		
Disable time	t_{HZ}	—	11.0	21.0	—	29.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
	t_{LZ}	—	18.0	46.0	—	53.0		C_L = 50 pF		

- V_{CC} = 2.5 ± 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_{PLH}	—	2.0	10.0	—	16.0	ns	C_L = 15 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
	t_{PHL}	—	5.0	12.0	—	18.0		C_L = 50 pF		
Enable time	t_{ZH}	—	6.0	15.0	—	20.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
	t_{ZL}	—	8.0	25.0	—	32.0		C_L = 50 pF		
Disable time	t_{HZ}	—	7.0	15.0	—	23.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
	t_{LZ}	—	11.0	25.0	—	32.0		C_L = 50 pF		

- V_{CC} = 3.3 ± 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_{PLH}	—	1.5	6.0	—	10.0	ns	C_L = 15 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
	t_{PHL}	—	4.0	9.0	—	12.0		C_L = 50 pF		
Enable time	t_{ZH}	—	4.0	11.0	—	15.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
	t_{ZL}	—	6.0	18.0	—	22.0		C_L = 50 pF		
Disable time	t_{HZ}	—	5.0	11.0	—	15.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
	t_{LZ}	—	8.0	18.0	—	22.0		C_L = 50 pF		

Switching Characteristics (cont)

- V_{CC} = 5.0 ± 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_{PLH}	—	1.0	4.0	—	7.0	ns	C_L = 15 pF	IN/OUT or OUT/IN	OUT/IN or IN/OUT
	t_{PHL}	—	3.0	6.0	—	8.0		C_L = 50 pF		
Enable time	t_{ZH}	—	3.0	7.0	—	10.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
	t_{ZL}	—	5.0	12.0	—	16.0		C_L = 50 pF		
Disable time	t_{HZ}	—	4.0	7.0	—	10.0	ns	C_L = 15 pF	C	IN/OUT or OUT/IN
	t_{LZ}	—	6.0	12.0	—	16.0		C_L = 50 pF		

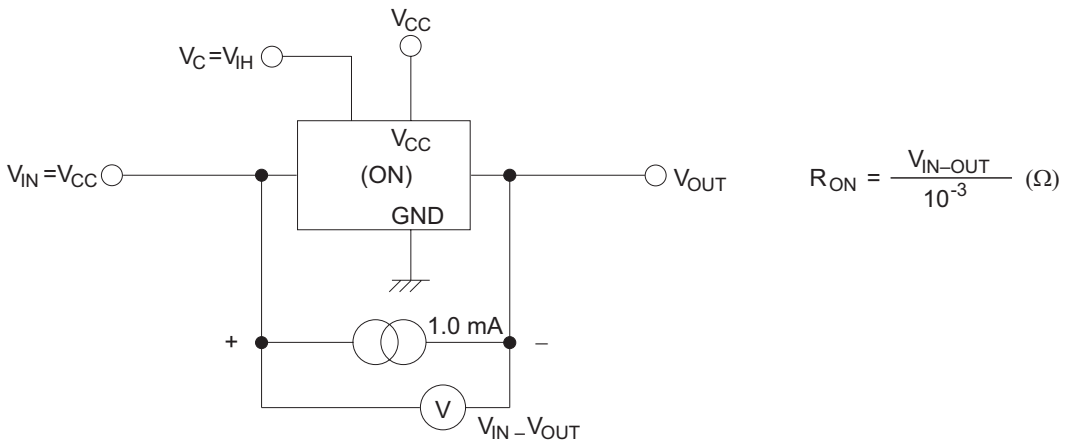
Operating Characteristics

- C_L = 50 pF

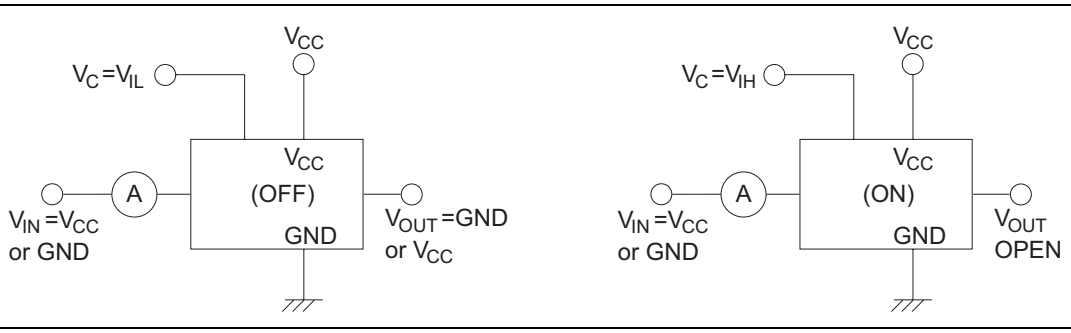
Item	Symbol	V_{CC} (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	3.3	—	3.5	—	pF	f = 10 MHz
		5.0	—	4.0	—		

Test Circuit

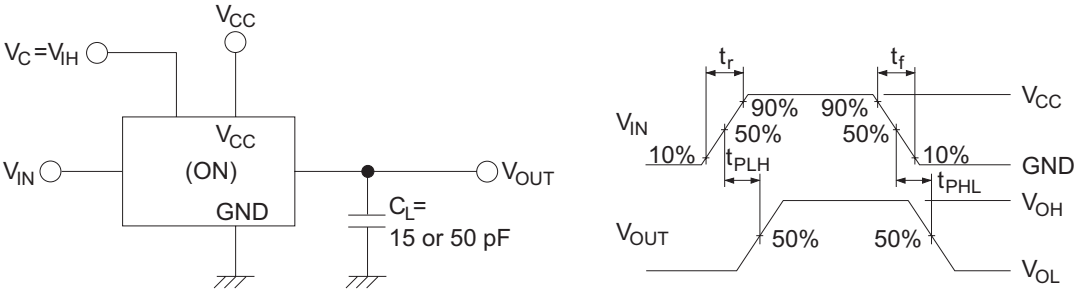
- R_{ON}



- $I_{S(off)}$, $I_{S(on)}$

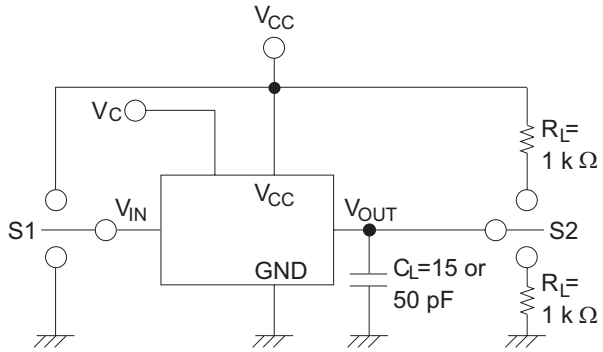


- t_{PLH}, t_{PHL}

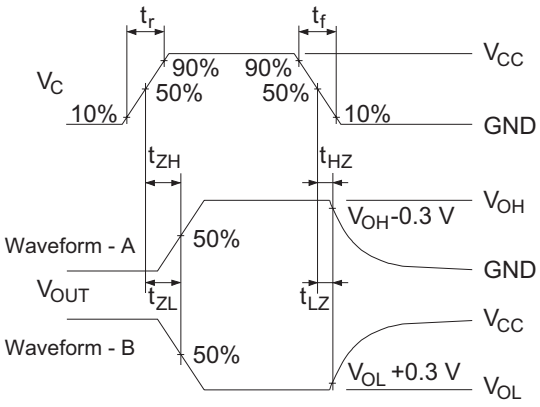


Notes: 1. Input waveform : PRR ≤ 1 MHz, Zo = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
2. The output are measured one at a time with one transition per measurement.

- t_{ZH}, t_{ZL} / t_{HZ}, t_{LZ}

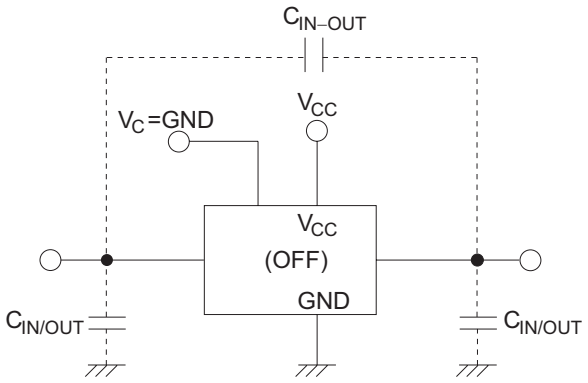


Item	S1	S2
t_{ZH}	V_{CC}	GND
t_{ZL}	GND	V_{CC}
t_{HZ}	V_{CC}	GND
t_{LZ}	GND	V_{CC}



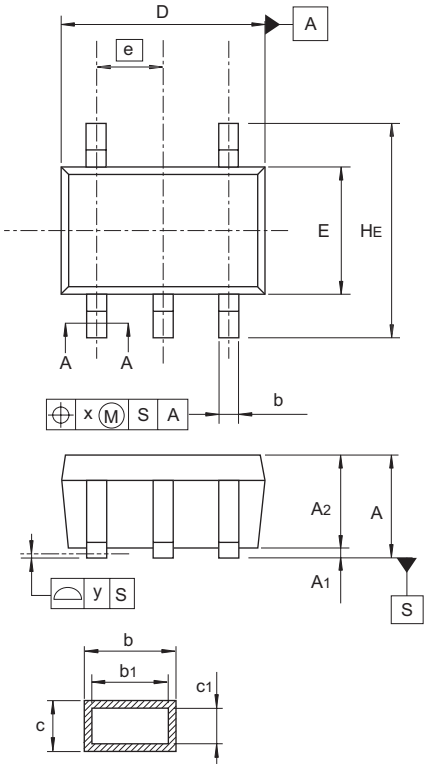
Notes: 1. Input waveform : PRR ≤ 1 MHz, Zo = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns.
2. Waveform - A is for an output with internal conditions such that the output is high except when disabled by the output control.
3. Waveform - B is for an output with internal conditions such that the output is low except when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

- $C_{IN/OUT}$, C_{IN-OUT}

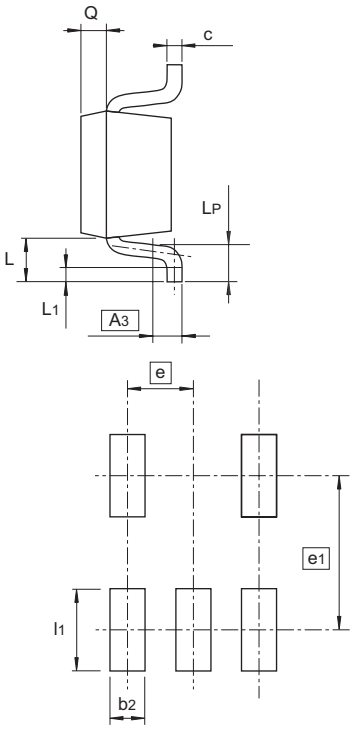


Package Dimensions

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



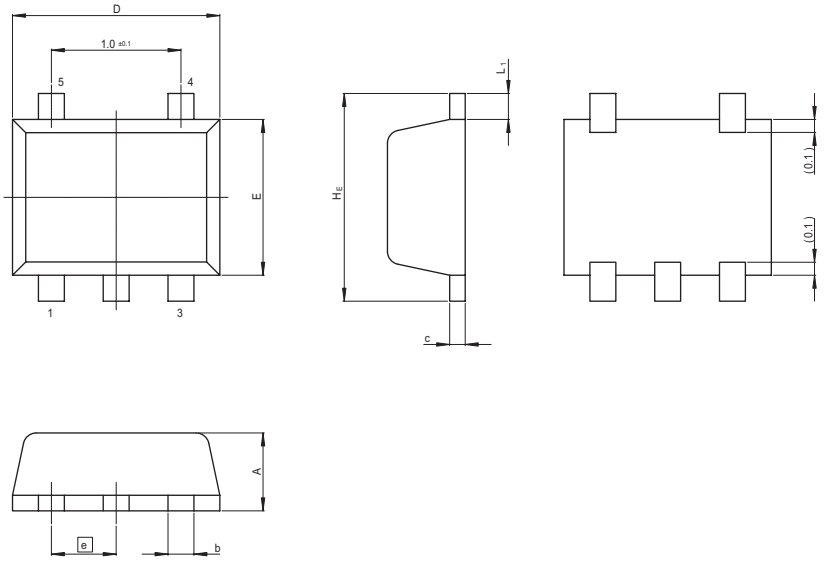
A-A Section



Pattern of terminal position areas

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	0.8	—	1.1
A_1	0	—	0.1
A_2	0.8	0.9	1.0
A_3	—	0.25	—
b	0.15	0.22	0.3
b_1	—	0.2	—
c	0.1	0.13	0.15
c_1	—	0.11	—
D	1.8	2.0	2.2
E	1.15	1.25	1.35
e	—	0.65	—
H_E	1.8	2.1	2.4
L	0.3	—	0.7
L_1	0.1	—	0.5
L_P	0.2	—	0.6
x	—	—	0.05
y	—	—	0.05
b_2	—	—	0.35
e_1	—	1.5	—
l_1	—	—	0.9
Q	—	0.25	—

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_1	—	—	—
A_2	—	—	—
b	0.15	0.2	0.3
b_1	—	—	—
e	—	0.5	—
L_p	—	—	—
x	—	—	—
y	—	—	—
Z_D	—	—	—
c	0.07	0.12	0.22
c_1	—	—	—
H_E	1.55	1.6	1.65
L_1	—	0.2	—

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

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Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.
Unit 204, 205, AZIACenter, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7858/7898

Renesas Technology Hong Kong Ltd.
7th Floor, North Tower, World Finance Centre, Harbour City, Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2377-3473

Renesas Technology Taiwan Co., Ltd.
10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 3518-3399

Renesas Technology Singapore Pte. Ltd.
1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.
Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510

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