

RD74LVC1G79

Single Positive Edge-triggered D-type Flip Flop

REJ03D0695-0100

Rev.1.00

Feb 23, 2006

Description

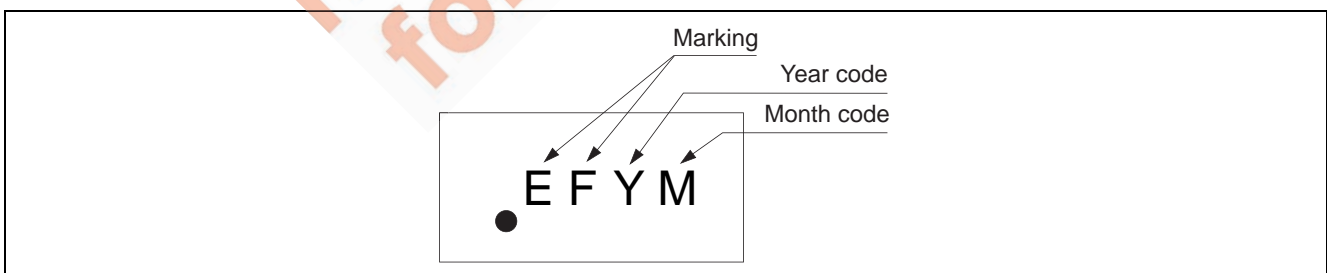
The RD74LVC1G79 has D-type flip flop in a 5-pin package. The input data is transferred to the output at the rising edge of clock pulse CLK. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

Features

- The basic gate function is lined up as Renesas uni logic series.
- Supply voltage range: 1.65 to 5.5 V
- Operating temperature range: -40 to +85°C
- All inputs: $V_{IH} (\text{Max.}) = 5.5 \text{ V} (@V_{CC} = 0 \text{ V to } 5.5 \text{ V})$
- All outputs: $V_O (\text{Max.}) = 5.5 \text{ V} (@V_{CC} = 0 \text{ V})$
- Output current:
 - $\pm 4 \text{ mA} (@V_{CC} = 1.65 \text{ V})$
 - $\pm 8 \text{ mA} (@V_{CC} = 2.3 \text{ V})$
 - $\pm 24 \text{ mA} (@V_{CC} = 3.0 \text{ V})$
 - $\pm 32 \text{ mA} (@V_{CC} = 4.5 \text{ V})$
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
RD74LVC1G79WPE	WCSP-5 pin	SXBG0005LB-A (TBS-5CV)	WP	E (3,000 pcs/reel)

Article Indication

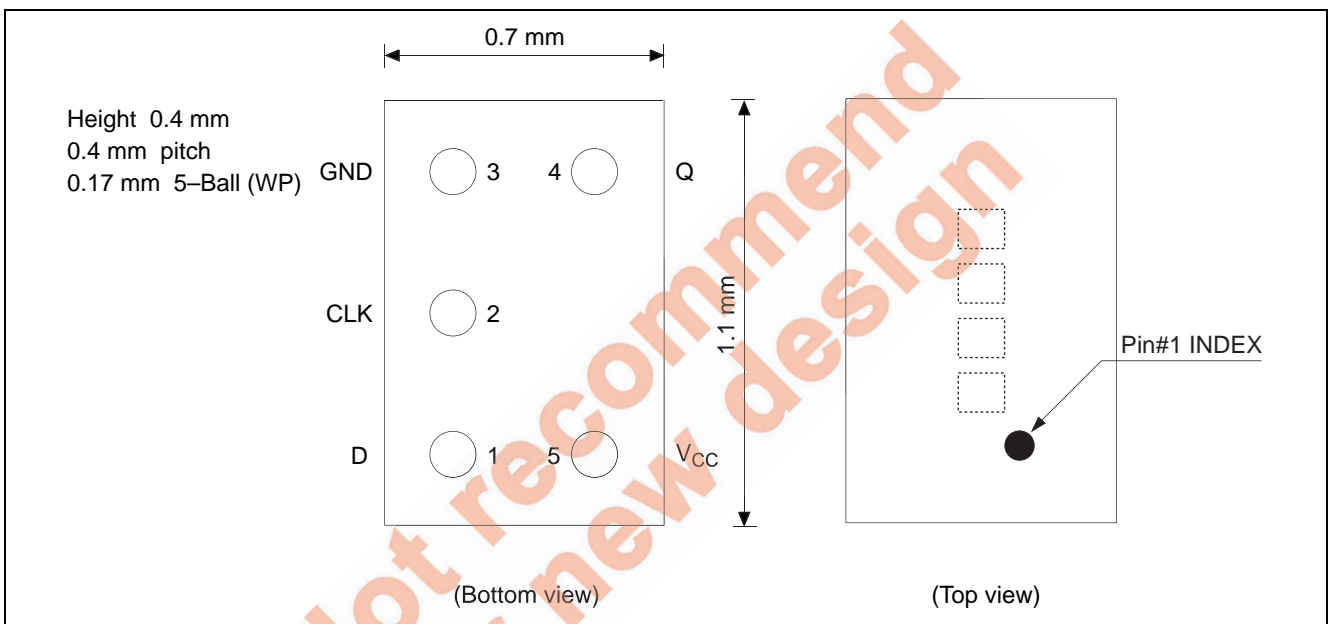


Function Table

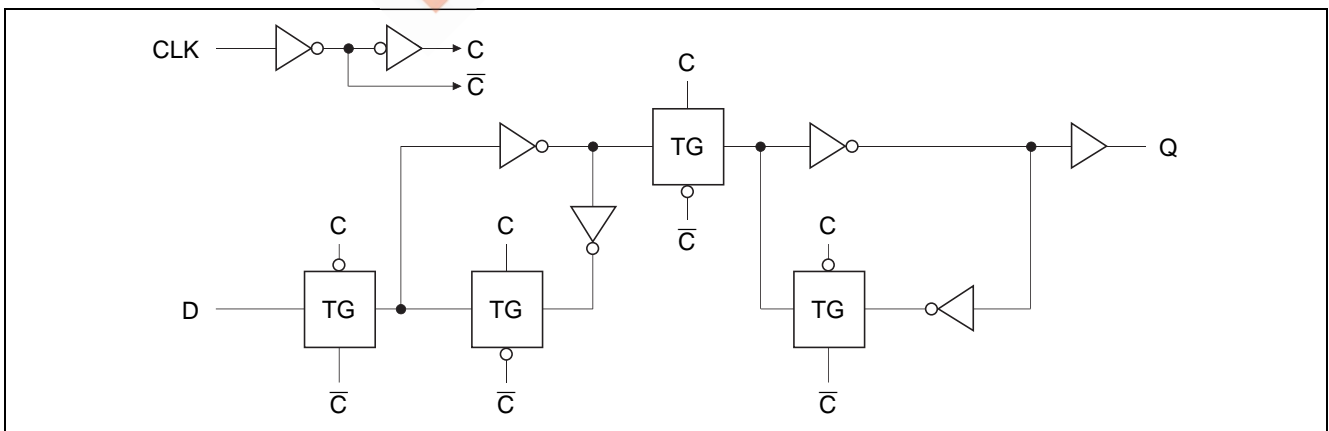
Inputs		Output Q
CLK	D	
↑	H	H
↑	L	L
L	X	Q ₀

- H: High level
- L: Low level
- X: Immaterial
- ↑: Low to high transition
- Q₀: Level of Q before the indicated steady input conditions was established.

Pin Arrangement



Logic Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	V_{CC}	-0.5 to 6.5	V	
Input voltage range ^{*1}	V_I	-0.5 to 6.5	V	
Output voltage range ^{*1,2}	V_O	-0.5 to $V_{CC} + 0.5$	V	Output: H or L
		-0.5 to 6.5		V_{CC} : OFF
Input clamp current	I_{IK}	-50	mA	$V_I < 0$
Output clamp current	I_{OK}	-50	mA	$V_O < 0$
Continuous output current	I_O	± 50	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	± 100	mA	
Package Thermal impedance	θ_{ja}	200	°C/W	WP
Storage temperature	T_{stg}	-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.

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}	—	4	mA	$V_{CC} = 1.65$ V
		—	8		$V_{CC} = 2.3$ V
		—	16		$V_{CC} = 3.0$ V
		—	24		
		—	32		$V_{CC} = 4.5$ V
	I_{OH}	—	-4	mA	$V_{CC} = 1.65$ V
		—	-8		$V_{CC} = 2.3$ V
		—	-16		$V_{CC} = 3.0$ V
		—	-24		
		—	-32		$V_{CC} = 4.5$ V
Operating free-air temperature	T_a	-40	85	°C	

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

Electrical Characteristics

Ta = -40 to 85°C

Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test condition			
Input voltage	V _{IH}	1.65 to 1.95	V _{CC} ×0.65	—	—	V				
		2.3 to 2.7	1.7	—	—					
		3.0 to 3.6	2.0	—	—					
		4.5 to 5.5	V _{CC} ×0.7	—	—					
	V _{IL}	1.65 to 1.95	—	—	V _{CC} ×0.35					
		2.3 to 2.7	—	—	0.7					
		3.0 to 3.6	—	—	0.8					
		4.5 to 5.5	—	—	V _{CC} ×0.3					
Output voltage	V _{OH}	1.65 to 5.5	V _{CC} -0.1	—	—	V	I _{OH} = -100 μA			
		1.65	1.2	—	—		I _{OH} = -4 mA			
		2.3	1.9	—	—		I _{OH} = -8 mA			
		3.0	2.4	—	—		I _{OH} = -16 mA			
			2.3	—	—		I _{OH} = -24 mA			
		4.5	3.8	—	—		I _{OH} = -32 mA			
	V _{OL}	Min to Max	—	—	0.1		I _{OL} = 100 μA			
		1.65	—	—	0.45		I _{OL} = 4 mA			
		2.3	—	—	0.3		I _{OL} = 8 mA			
		3.0	—	—	0.4		I _{OL} = 16 mA			
			—	—	0.55		I _{OL} = 24 mA			
		4.5	—	—	0.55		I _{OL} = 32 mA			
		Input current	I _{IN}	0 to 5.5	—		—	±5	μA	V _{IN} = 5.5 V or GND
		Quiescent supply current	I _{CC}	5.5	—		—	10	μA	V _{IN} = V _{CC} or GND, I _O = 0
ΔI _{CC}	3 to 5.5		—	—	500	One input at V _{CC} -0.6 V, Other input at V _{CC} or GND				
Output leakage current	I _{OFF}	0	—	—	±10	μA	V _{IN} or V _O = 0 to 5.5 V			
Input capacitance	C _{IN}	3.3	—	3.5	—	pF	V _{IN} = V _{CC} or GND			

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

Switching Characteristics

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Maximum clock frequency	f_{max}	160	—	—	MHz	$C_L = 30 \text{ pF}$		
Propagation delay time	t_{PLH}, t_{PHL}	4.4	—	9.9	ns	$C_L = 30 \text{ pF}$	CLK	Q
Setup time	t_{su}	2.2	—	—	ns		D	
Hold time	t_h	0.3	—	—	ns			
Pulse width	t_w	2.5	—	—	ns		CLK "H" or "L"	

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Maximum clock frequency	f_{max}	160	—	—	MHz	$C_L = 30 \text{ pF}$		
Propagation delay time	t_{PLH}, t_{PHL}	2.3	—	7.0	ns	$C_L = 30 \text{ pF}$	CLK	Q
Setup time	t_{su}	1.4	—	—	ns		D	
Hold time	t_h	0.4	—	—	ns			
Pulse width	t_w	2.5	—	—	ns		CLK "H" or "L"	

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

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Maximum clock frequency	f_{max}	160	—	—	MHz	$C_L = 50 \text{ pF}$		
Propagation delay time	t_{PLH}, t_{PHL}	2.0	—	5.0	ns	$C_L = 50 \text{ pF}$	CLK	Q
Setup time	t_{su}	1.3	—	—	ns		D	
Hold time	t_h	1.0	—	—	ns			
Pulse width	t_w	2.5	—	—	ns		CLK "H" or "L"	

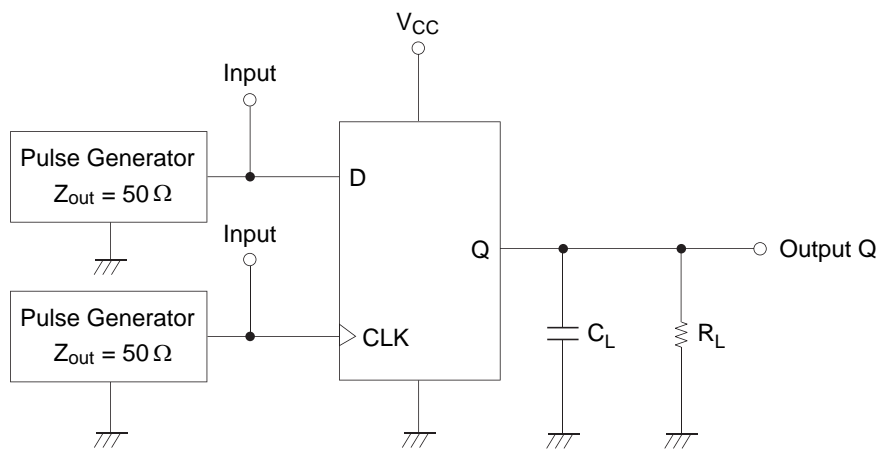
 $V_{CC} = 5.0 \pm 0.5 \text{ V}$

Item	Symbol	Min	Typ	Max	Unit	Test conditions	FROM (Input)	TO (Output)
Maximum clock frequency	f_{max}	160	—	—	MHz	$C_L = 50 \text{ pF}$		
Propagation delay time	t_{PLH}, t_{PHL}	1.3	—	4.5	ns	$C_L = 50 \text{ pF}$	CLK	Q
Setup time	t_{su}	1.2	—	—	ns		D	
Hold time	t_h	0.5	—	—	ns			
Pulse width	t_w	2.5	—	—	ns		CLK "H" or "L"	

Operating Characteristics

Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	1.8	—	20	—	pF	$f = 10 \text{ MHz}$
		2.5	—	21	—		
		3.3	—	22	—		
		5.0	—	26	—		

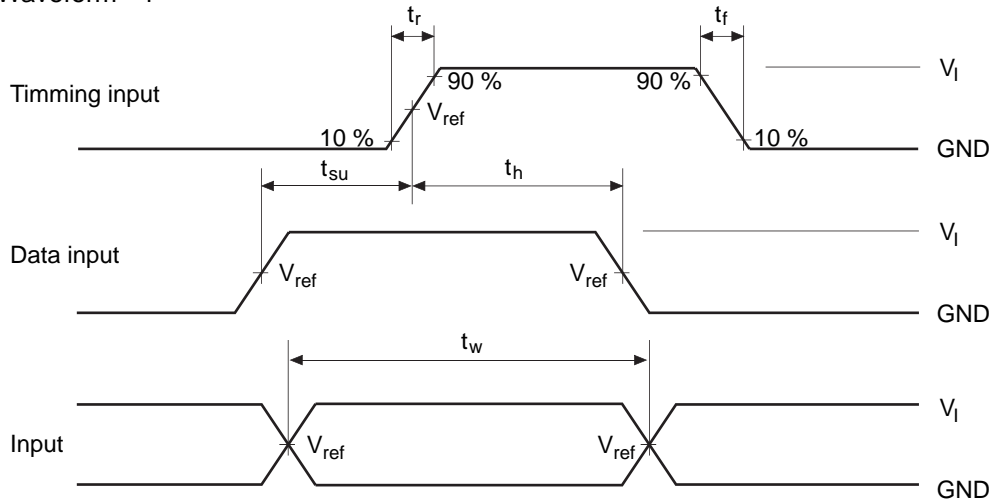
Test Circuit



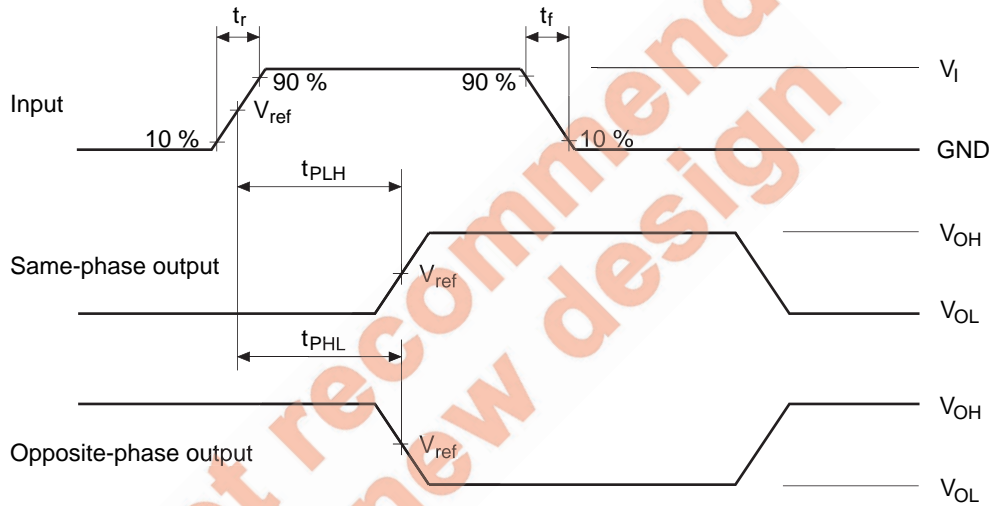
Note: C_L includes probe and jig capacitance.

Not recommend
for new design

• Waveform - 1



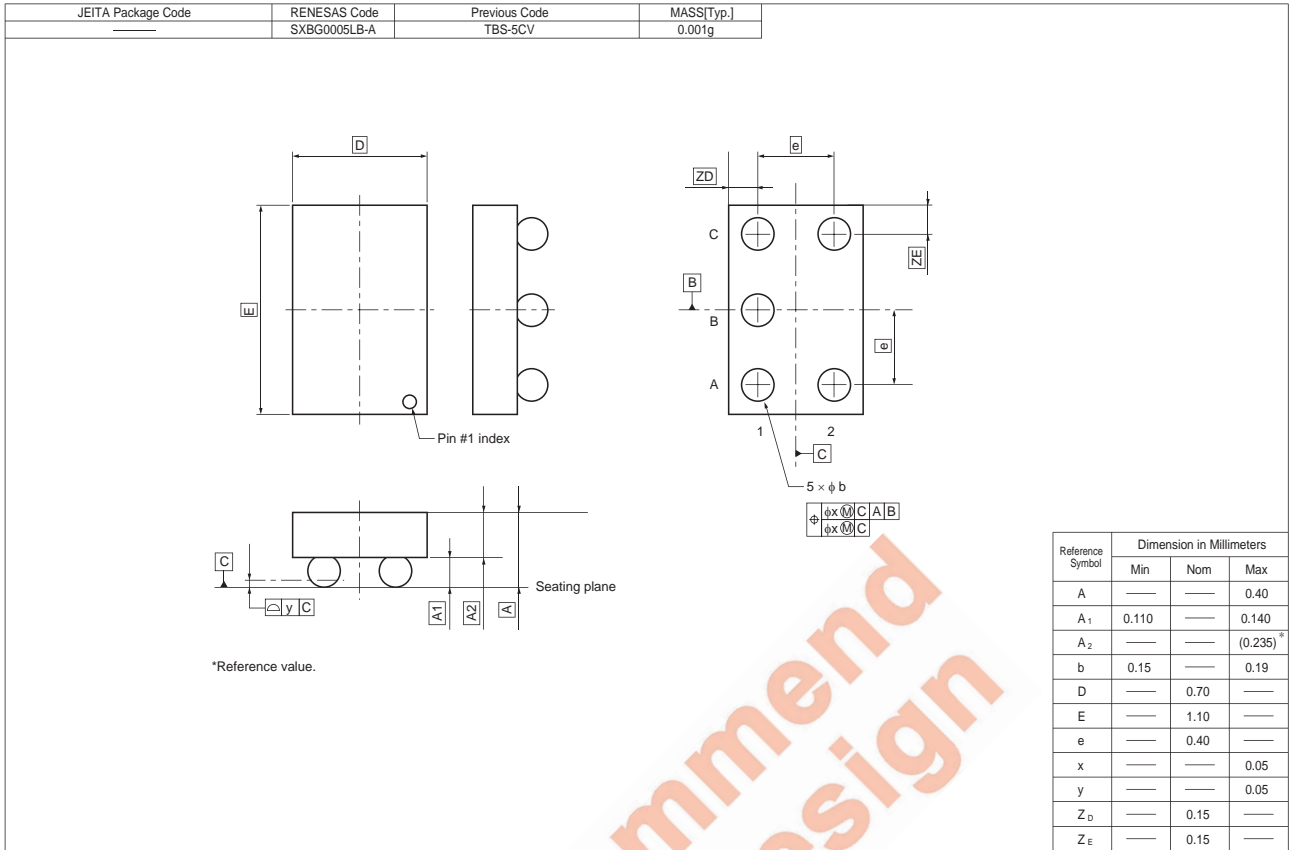
• Waveform - 2



V_{CC} (V)	INPUTS		V_{ref}	C_L	R_L
	V_I	t_r / t_f			
1.8 ± 0.15	V_{CC}	≤ 2 ns	$V_{CC} / 2$	30 pF	1.0 k Ω
2.5 ± 0.2	V_{CC}	≤ 2 ns	$V_{CC} / 2$	30 pF	500 Ω
3.3 ± 0.3	3 V	≤ 2.5 ns	1.5 V	50 pF	500 Ω
5.0 ± 0.5	V_{CC}	≤ 2.5 ns	$V_{CC} / 2$	50 pF	500 Ω

Notes: 1. Input waveform: PRR \leq 10 MHz, $Z_o = 50 \Omega$.
 2. The output are measured one at a time with one transition per measurement.

Package Dimensions



Not recommend
for new design

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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) 6887-7898

Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

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, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510