

REAR56953A,BG

R03DS0169EJ0100

Rev.1.00

2021.10.4

Voltage Detecting, System Resetting IC Series

Description

REAR56953A,B are semiconductor integrated circuits designed for detecting supply voltage and resetting all types of logic circuits such as CPUs.

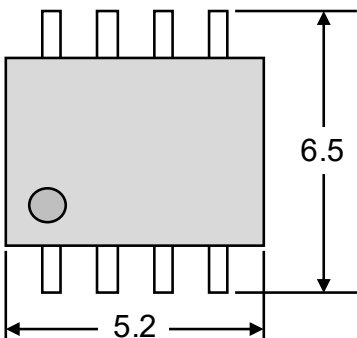
They include a built-in delay circuit to provide the desired retardation time simply by adding an external capacitor.

They find extensive applications, including battery checking circuit, level detecting circuit and waveform shaping circuit.

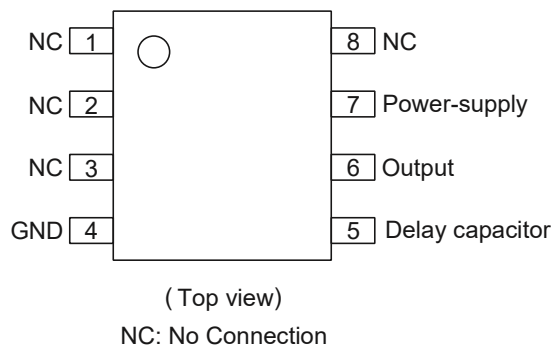
Features

- Few external parts
- Large delay time with a capacitor of small capacitance ($t_d \approx 100\text{ms}$, at $0.33\mu\text{F}$)
- Low threshold operating voltage (Supply voltage to keep low-state at low supply voltage):
0.6V (Typ.) at $R_L = 22\text{k}\Omega$
- Wide supply voltage range: 2V to 17V
- Wide application range

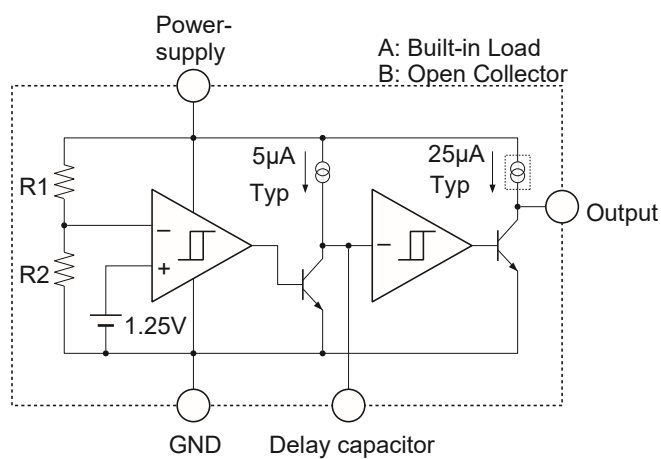
Ordering Information

Package Type	SOP	
Part Name	REAR56953AGSM	REAR56953BGSM
Product Type	Normal Quality Level	
Quality Level		
Outline	Unit : mm 	

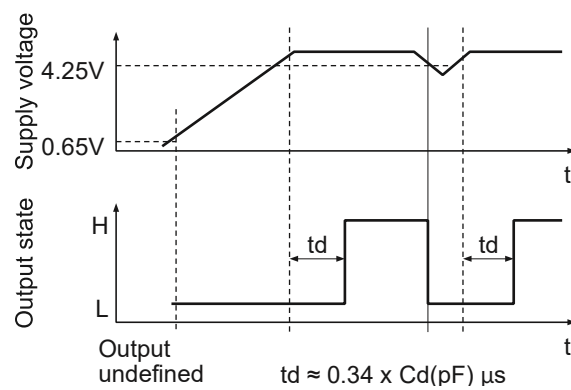
Pin Arrangement



Block Diagram



Operating Waveform



Absolute Maximum Ratings

(T_a = 25°C, unless otherwise noted)

Item	Symbol	Ratings	Unit	Conditions
Supply Voltage	V _{CC}	-0.3 to +18	V	
Output Sink Current	I _{SINK}	6	mA	
Output Applied Voltage	V _O	-0.3 to V _{CC}	V	Type A (Output with constant current load)
		-0.3 to +18		Type B (Open collector output)
Total Power Dissipation	P _d	440	mW	
Thermal Derating	K _θ	4.4	mW/°C	Refer to the thermal derating curve.
Operating Temperature	T _{opr}	-40 to +85	°C	
Storage Temperature	T _{stg}	-55 to +125	°C	

Recommended Operating Condition

Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V _{CC}	2		17	V

Electrical Characteristics

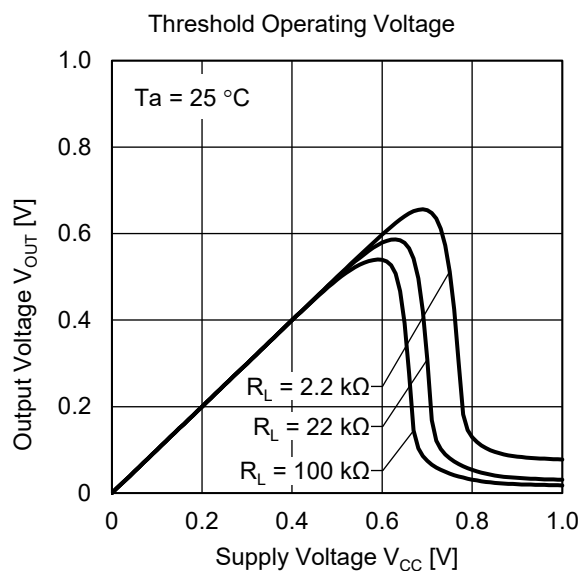
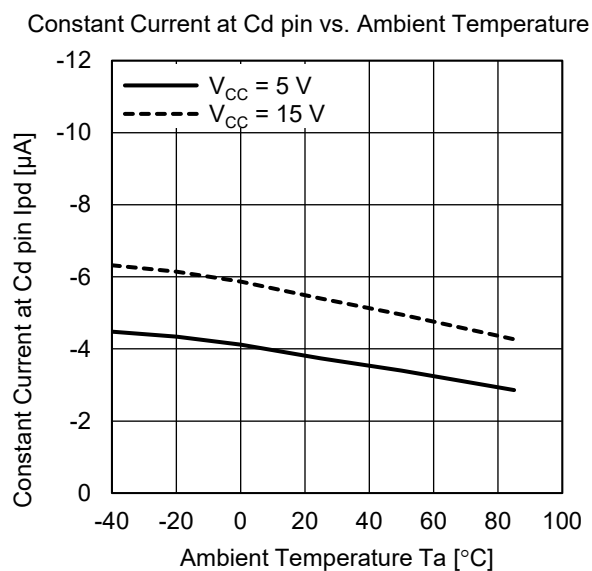
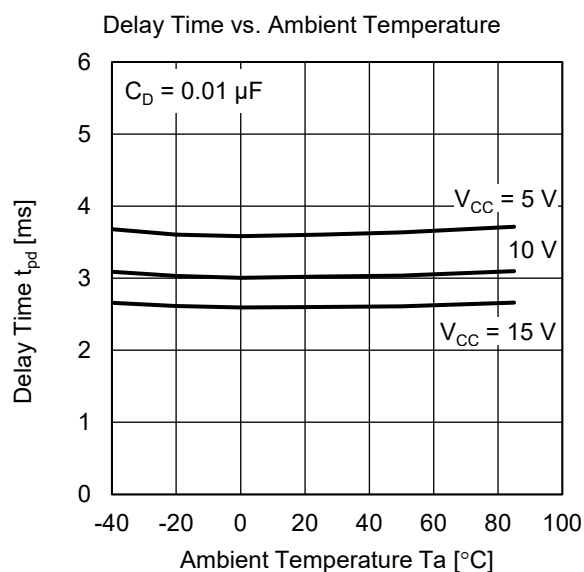
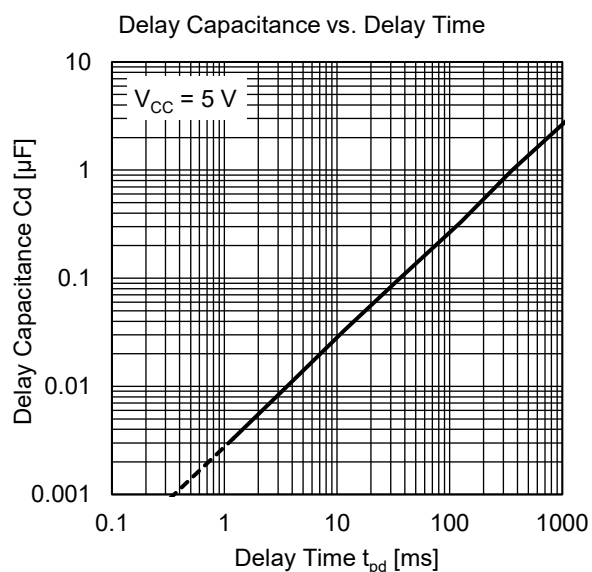
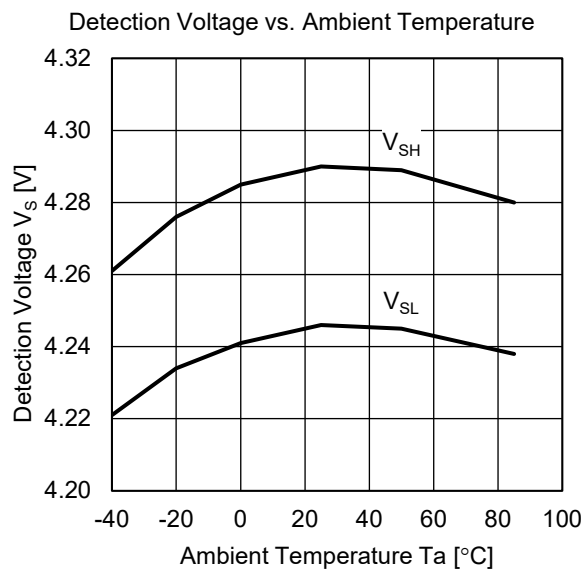
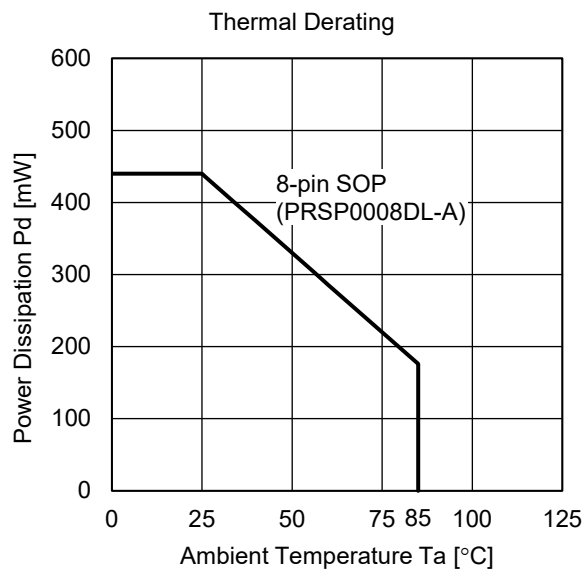
(T_a = 25°C, unless otherwise noted)

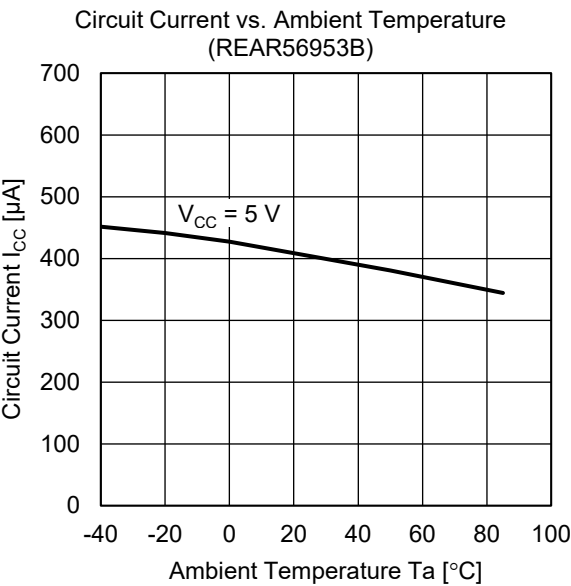
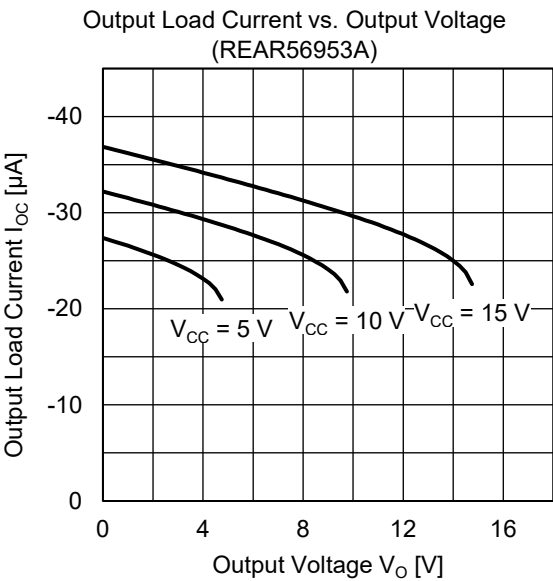
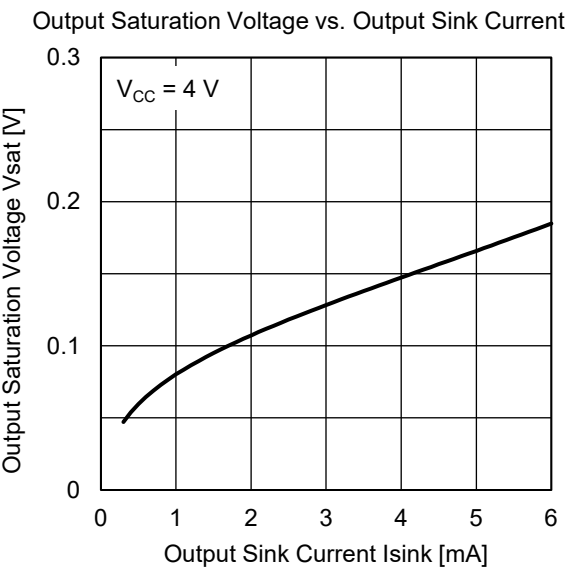
● “L” Reset Type

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Detecting Voltage	V _S	4.05	4.25	4.45	V	
Hysteresis Voltage	ΔV _S	30	50	80	mV	
Detecting Voltage Temperature Coefficient	V _S /ΔT		0.01		%/°C	
Circuit Current	I _{CC}		450	680	μA	Type A, V _{CC} = 5V
			420	630		Type B, V _{CC} = 5V
Delay Time	t _{pd}	1.6	3.4	7.0	ms	Cd = 0.01μF ^{Note.1}
Constant Current	I _{pd}	-8	-5	-3	μA	V _{CC} = 5V
Output Saturation Voltage	V _{sat}		0.2	0.4	V	V _{CC} = 4V, I _{SINK} = 4mA
Threshold Operating Voltage	V _{OPL}		0.67	0.9	V	L reset type minimum supply voltage for IC operation
			0.55	0.8		R _L = 2.2kΩ, V _{sat} ≤ 0.4V R _L = 100kΩ, V _{sat} ≤ 0.4V
Output Leakage Current	I _{OH}			30	nA	Type B, V _{out} ≤ 17V
Output Load Current	I _{OC}	-40	-25	-17	μA	Type A, V _{CC} = 5V, V _O = 1/2 × V _{CC}
Output High Voltage	V _{OH}	V _{CC} -0.2	V _{CC} -0.06		V	Type A

【Note】 1. Please set the desired delay time by attaching capacitor of the range between 4700pF and 10μF.

Typical Characteristics



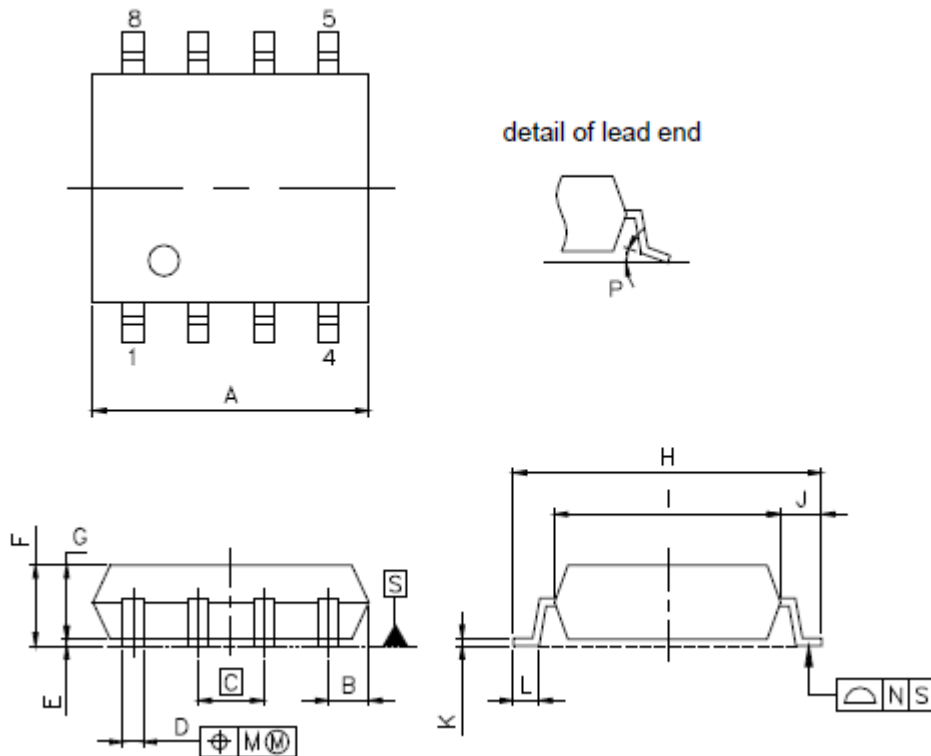


Package Drawing

8-PIN PLASTIC SOP

JEITA Package code	RENESAS code	Previous code	MASS (TYP.) [g]
P-SOP8-0225-1.27	PRSP0008DL-A	S8GM-50-225B	0.08

Unit: mm

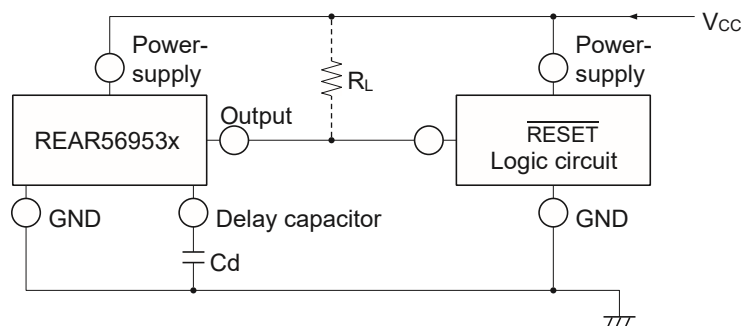
**NOTE**

Each lead centerline is located within 0.12 mm of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS
A	5.2 $^{+0.17}_{-0.20}$
B	0.78 MAX
C	1.27 (T.P)
D	0.42 $^{+0.08}_{-0.07}$
E	0.1 ± 0.1
F	1.59 ± 0.21
G	1.49
H	6.5 ± 0.3
I	4.4 ± 0.15
J	1.1 ± 0.2
K	0.17 $^{+0.08}_{-0.07}$
L	0.6 ± 0.2
M	0.12
N	0.10
P	3° $^{+7}_{-3}$

Example of Application Circuit

Reset Circuit of REAR56953

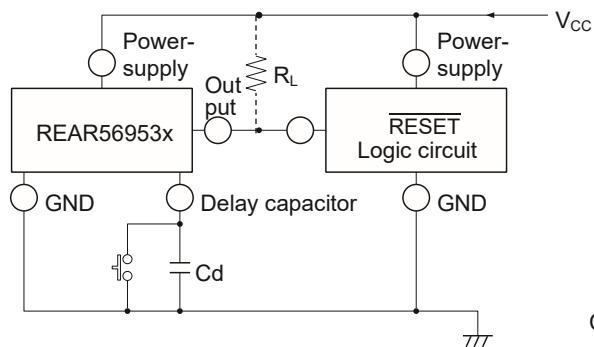


Reset Circuit of REAR56953

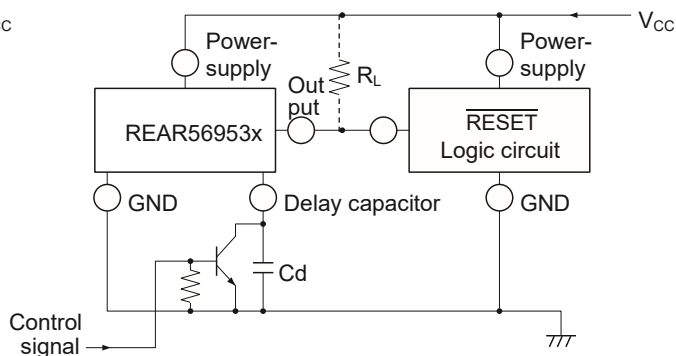
- Notes:
1. The delay time is about $0.34 \times C_d$ (pF) μ s.
 2. If the REAR56953 and the logic circuit share a common power source, type A (built-in load type) can be used whether a pull-up resistor is included in the logic circuit or not.
 3. The logic circuit preferably should not have a pull-down resistor, but if one is present, add load resistor R_L to overcome the pull-down resistor.
 4. When a negative supply voltage is used, the supply voltage side of REAR56953 and the GND side are connected to negative supply voltage respectively.

Case of Using Reset Signal except Supply Voltage in the REAR56953

(a) Reset at ON



(b) Reset at transistor ON



Case of Using Reset Signal except Supply Voltage in the REAR56953

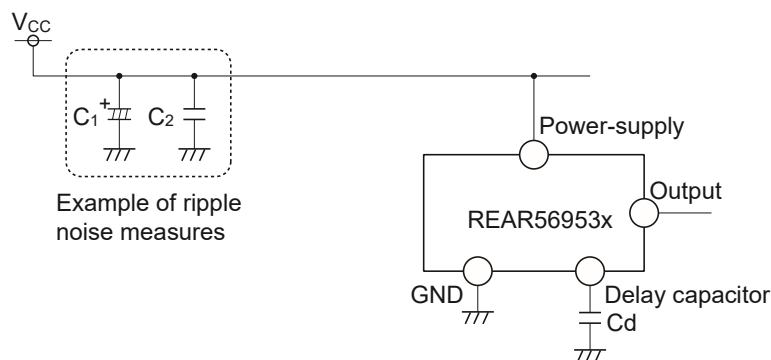
Notice for use

About the Power Supply Line

1. About bypass capacitor

Because the ripple and the spike of the high frequency noise and the low frequency are superimposed to the power supply line, it is necessary to remove these.

Therefore, please install C_1 and C_2 for the low frequency and for the high frequency between the power supply line and the GND line as shown in following figure.

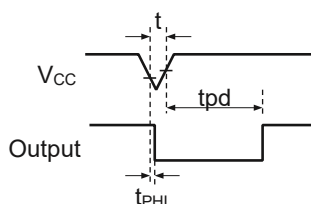


Example of Ripple Noise Measures

Setting of Delay Capacity

Please use capacitor C_d for the delay within the range of 10 μ F or less.

When a value that is bigger than this is set, the problem such as following (1), (2), and (3) becomes remarkable.



Time Chart at Momentary Voltage-Decrease

(1) The difference at delay time becomes remarkable.

A long delay setting of tens of seconds is fundamentally possible. However, when set delay time is lengthened, the range of the difference relatively grows, too. When a set value is assumed to be ' t_{pd} ', the difference occurs in the range from $0.47 \times t_{pd}$ to $2.05 \times t_{pd}$. For instance, 34 seconds can be calculated at 100 μ F. However, it is likely to vary within the ranges of 16-70 seconds.

(2) Difficulty to react to a momentary voltage decrease.

For example, the reaction time t_{PHL} is 10 μ s when delay capacitor $C_d = 0.1 \mu$ F.

The momentary voltage-decrease that is longer than such t_{PHL} occurs, the detection becomes possible. When the delay capacitance is enlarged, t_{PHL} also becomes long. For instance, it becomes about 100 to 200 μ s in case of circuit constant $C_1 = 100 \mu$ F.

(Characteristic graph 1 is used and extrapolation in case of $C_d = 100 \mu$ F.)

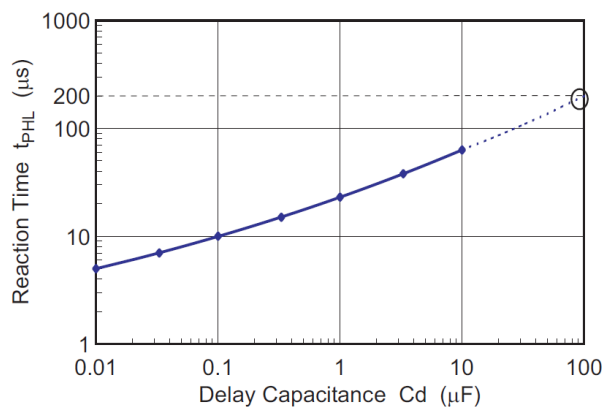
Therefore, it doesn't react to momentary voltage-decrease that is shorter than this.

(3) Original delay time is not obtained.

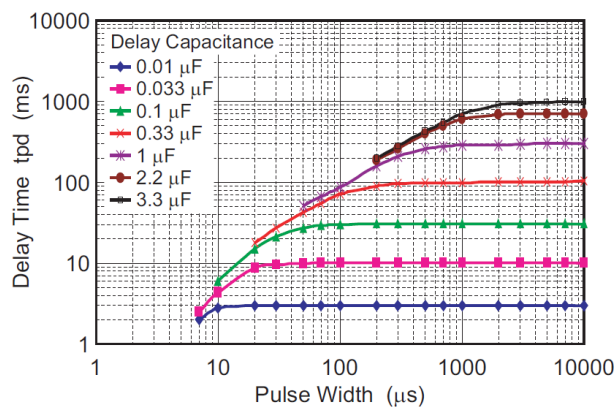
When the momentary voltage-decrease time ' t ' is equivalent to t_{PHL} , the discharge becomes insufficient and the charge starts at that state. This phenomenon occurs at large capacitance. And, original delay time t_{pd} is not obtained.

Please refer to characteristic graph 2. (Delay time versus input pulse width)

Characteristic Graph 1
Reaction Time vs. Delay Capacitance
(Example data)



Characteristic Graph 2
Delay Time vs. Momentary Voltage Decrease Pulse Width
(Example data)

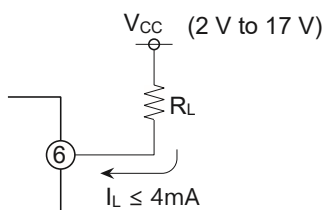


Characteristic Graph

Setting of Output Load Resistance (REAR56953B)

High level output voltage can be set without depending on the power-supply voltage because the output terminal is an open collector type. However, please guard the following notes.

1. Please set it in value (2 V to 17 V) within the range of the power-supply voltage recommendation. Moreover, please never impress the voltage of maximum ratings 18 V or more even momentarily either.
2. Please set output load resistance (pull-up resistance) R_L so that the output current (output inflow current I_L) at L level may become 4 mA or less. Moreover, please never exceed absolute maximum rating (6 mA).



Output Load Resistance R_L

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(Rev.4.0-1 November 2017)



SALES OFFICES

Renesas Electronics Corporation

<http://www.renesas.com>

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Renesas Electronics Corporation
TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 101-T01, Floor 1, Building 7, Yard No. 7, 8th Street, Shangdi, Haidian District, Beijing 100085, China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Lango Road, Putuo District, Shanghai 200333, China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0599

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852-2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886-2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #03-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit No 3A-1 Level 3A Tower 8 UOA Business Park, No 1 Jalan Pengaturcara U1/51A, Seksyen U1, 40150 Shah Alam, Selangor, Malaysia
Tel: +60-3-5022-1298, Fax: +60-3-5022-1290

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5338

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