

RNA51955A, B

R03DS0004EJ0300

Rev.3.00

Jun 19, 2012

Voltage Detecting, System Resetting IC Series

Description

RNA51955A,B are semiconductor integrated circuits for resetting of all types of logic circuits such as CPUs, and has the feature of setting the detection voltage by adding external resistance.

They include a built-in delay circuit to provide a retardation time (200 μ s Typ).

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

Features

- Few external parts
- Low threshold operating voltage (Supply voltage to keep low-state at low supply voltage): 0.6 V (Typ) at $R_L = 22 \text{ k}\Omega$
- Wide supply voltage range: 2 V to 17 V
- Wide application range
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)	Surface Treatment
RNA51955AFPH0	SOP-8 pin	PRSP0008DE-C	FP	H (2,500 pcs / Reel)	0 (Ni/Pd/Au)
RNA51955APT0	DIP-8 pin	PRDP0008AF-B	P	T (1,000 pcs / Box)	0 (Ni/Pd/Au)
RNA51955BFPH0	SOP-8 pin	PRSP0008DE-C	FP	H (2,500 pcs / Reel)	0 (Ni/Pd/Au)
RNA51955BPT0	DIP-8 pin	PRDP0008AF-B	P	T (1,000 pcs / Box)	0 (Ni/Pd/Au)

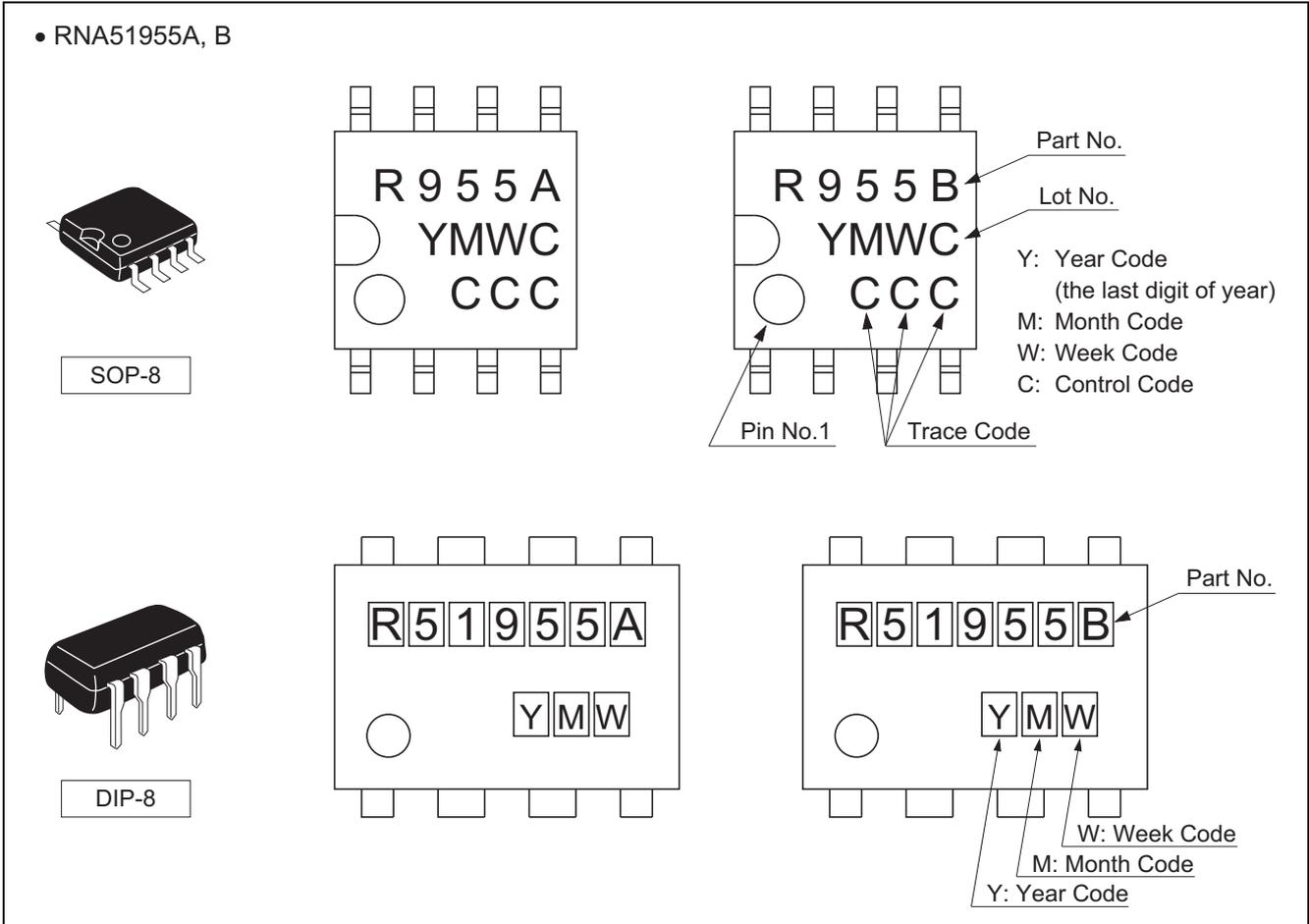
Application

- Reset circuit of Pch, Nch, CMOS, microcomputer, CPU and MCU, Reset of logic circuit, Battery check circuit, switching circuit back-up voltage, level detecting circuit, waveform shaping circuit, delay waveform generating circuit, DC/DC converter, over voltage protection circuit

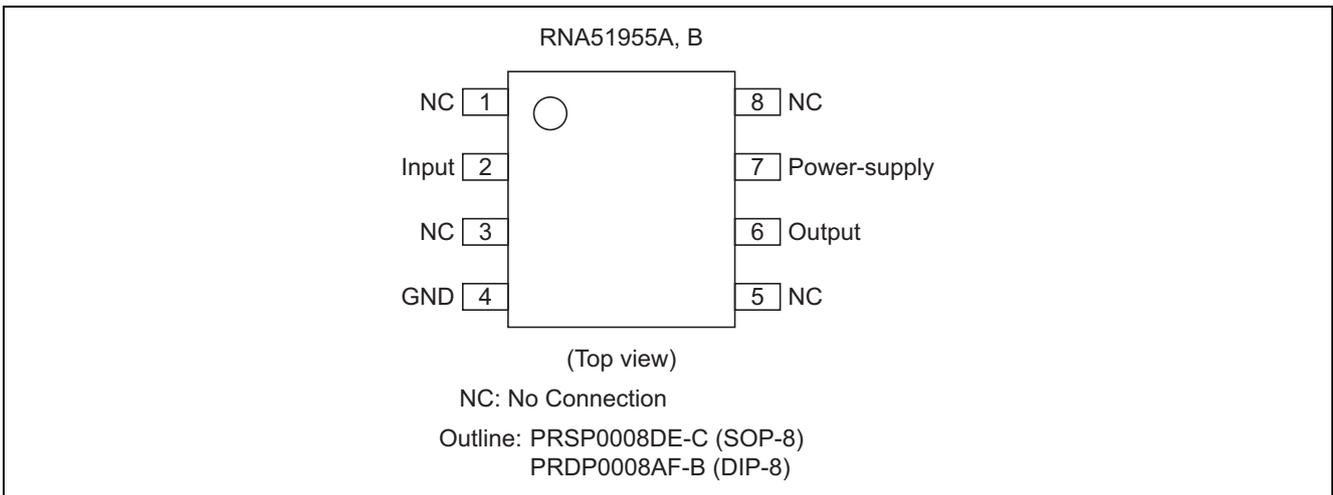
Recommended Operating Condition

- Supply voltage range: 2 V to 17 V

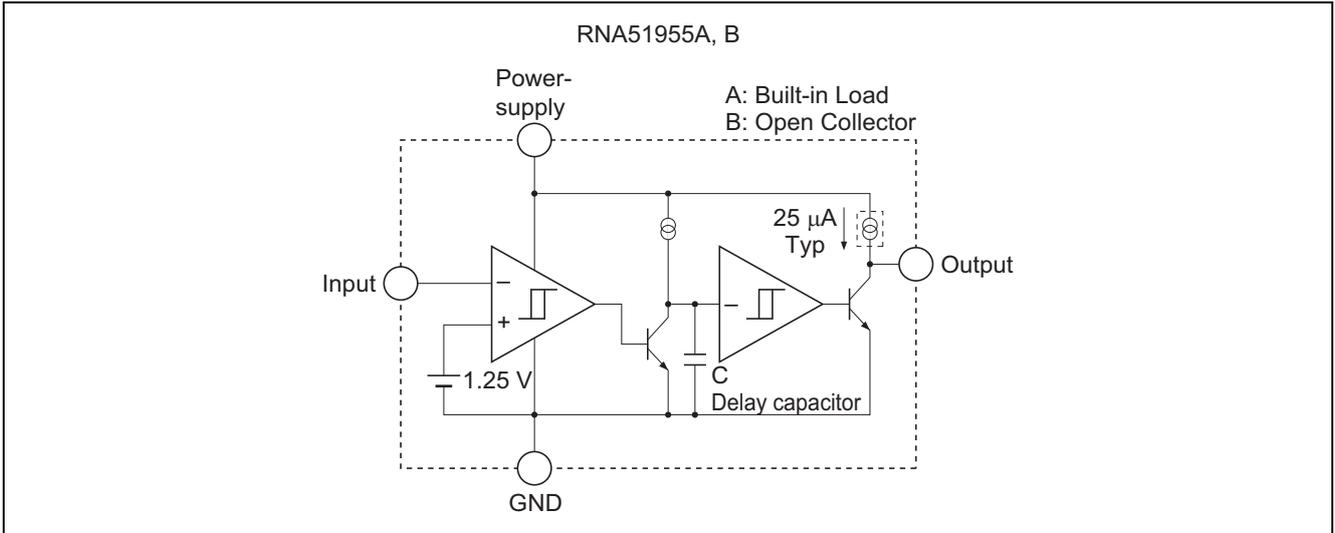
Outline and Article Indication



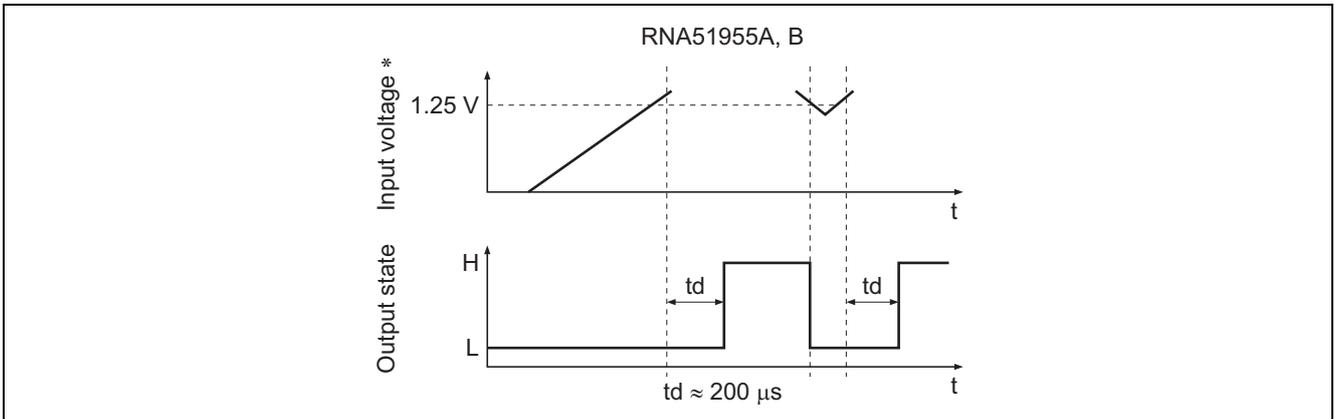
Pin Arrangement



Block Diagram



Operating Waveform



Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V _{CC}	18	V	
Output sink current	I _{sink}	6	mA	
Output voltage	V _O	V _{CC}	V	Type A (output with constant current load)
		18		Type B (open collector output)
Power dissipation	P _d	400	mW	8-pin SOP (PRSP0008DE-C)
		570		8-pin DIP (PRDP0008AF-B)
Thermal derating	K _θ	4.4	mW/°C	8-pin SOP (PRSP0008DE-C)
		8.3		8-pin DIP (PRDP0008AF-B)
Operating temperature	T _{opr}	-40 to +85	°C	
Storage temperature	T _{stg}	-55 to +125	°C	
Input voltage range	V _{IN}	-0.3 to V _{CC}	V	V _{CC} ≤ 7 V
		-0.3 to +7		V _{CC} > 7 V

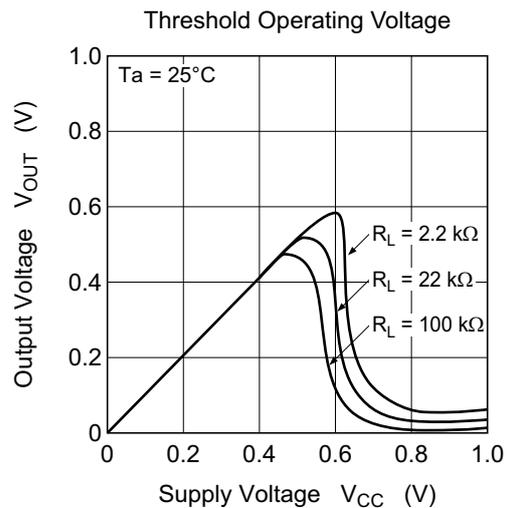
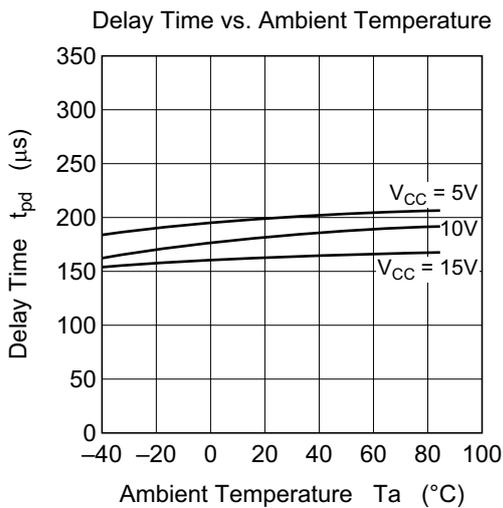
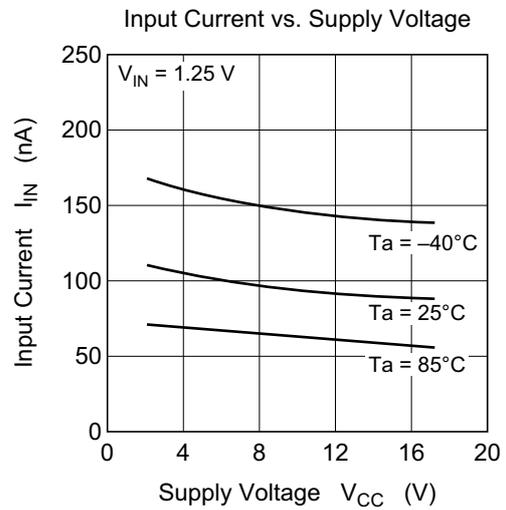
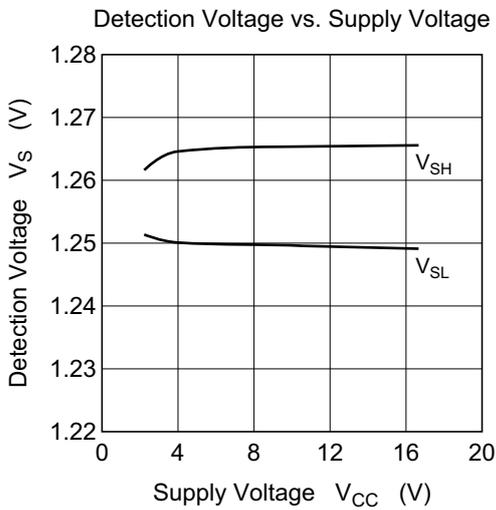
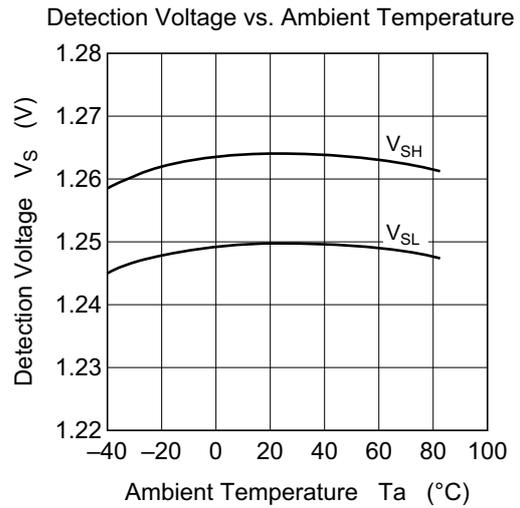
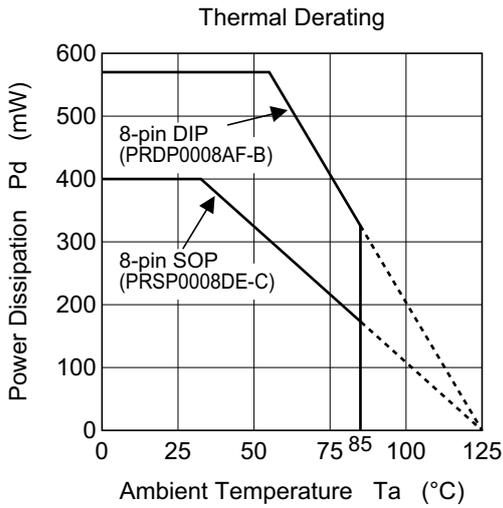
Electrical Characteristics

(Ta = 25°C, unless otherwise noted)

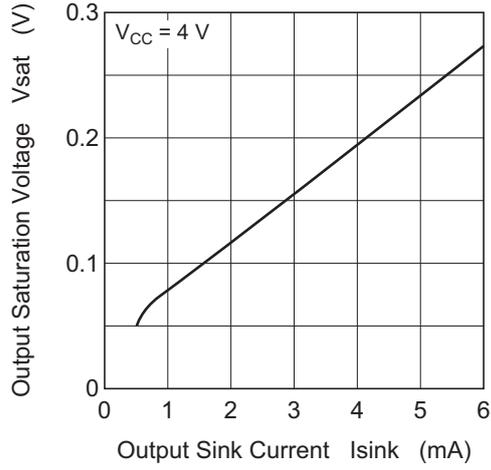
- “L” reset type

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Detecting voltage	V _S	1.20	1.25	1.30	V	
Hysteresis voltage	ΔV _S	9	15	23	mV	V _{CC} = 5V
Detecting voltage temperature coefficient	V _S /ΔT	—	0.01	—	%/°C	
Supply voltage range	V _{CC}	2	—	17	V	
Input voltage range	V _{in}	-0.3	—	V _{CC}	V	V _{CC} ≤ 7V
		-0.3	—	7.0		V _{CC} > 7V
Input current	I _{IN}	—	100	500	nA	V _{IN} = 1.25V
Circuit current	I _{CC}	—	390	590	μA	Type A, V _{CC} = 5V
		—	360	540		Type B, V _{CC} = 5V
Delay time	t _{pd}	80	200	500	μs	
Output saturation voltage	V _{sat}	—	0.2	0.4	V	L reset type, V _{CC} = 5V, V _{IN} < 1.2V, I _{sink} = 4mA
Threshold operating voltage	V _{OPL}	—	0.67	0.8	V	L reset type minimum supply voltage for IC operation
		—	0.55	0.7		
Output leakage current	I _{OH}	—	—	30	nA	Type B
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

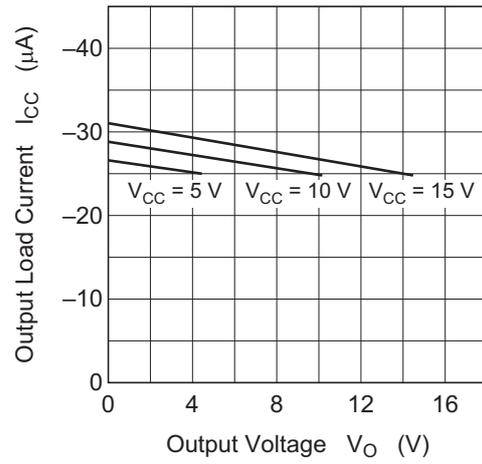
Typical Characteristics



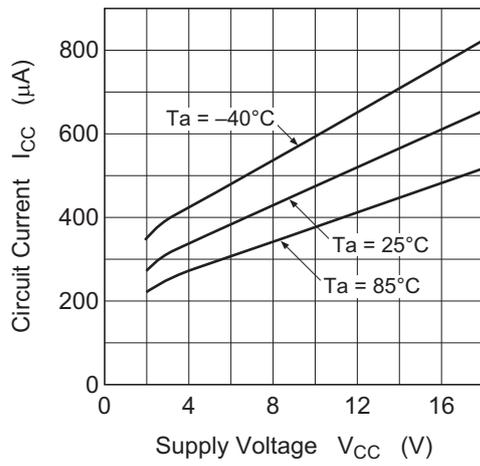
Output Saturation Voltage vs. Output Sink Current



Output Load Current vs. Output Voltage (RNA51955A)



Circuit Current vs. Supply Voltage (RNA51955B)



Example of Application Circuit

Reset Circuit of RNA51955

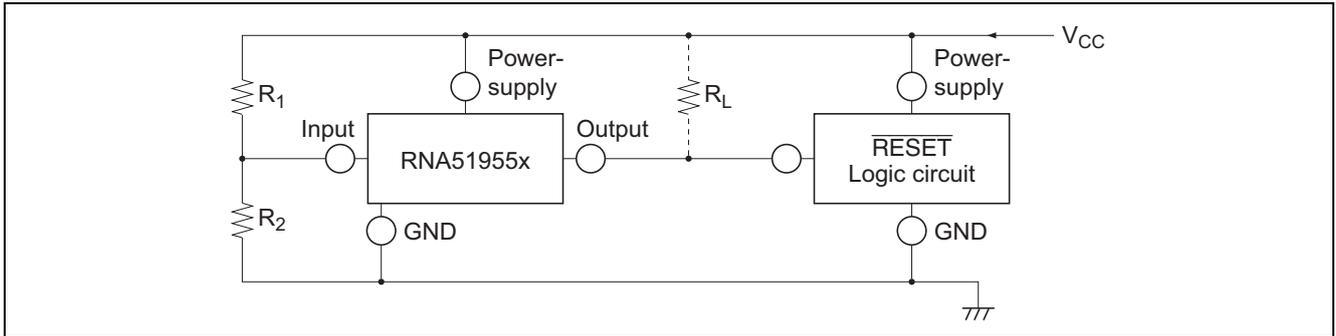


Figure 1 Reset Circuit of RNA51955

- Notes:
1. The detecting supply voltage is $V_S \times (R_1 + R_2)/R_2$ (V) approximately. $V_S = 1.25$ V (Typ)
The detecting supply voltage can be set between 2 V and 15 V.
 2. Delay time must be longer than 200 μ s, RNA51953, RNA51957, and RNA51958 are used. In this case, the delay time is about $0.34 \times C_d$ (pF) μ s.
 3. If the RNA5195xx 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.
 4. 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.
 5. When a negative supply voltage is used, the supply voltage side of RNA5195xx and the GND side are connected to negative supply voltage respectively.

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 2.

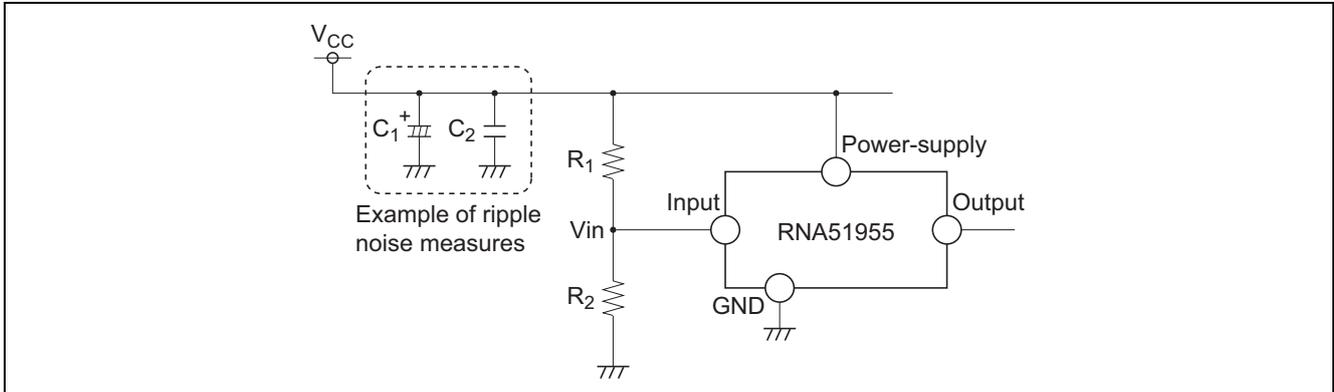


Figure 2 Example of Ripple Noise Measures

2. The sequence of voltage impression

Please do not impress the voltages to the input terminals earlier than the power supply terminal. Moreover, please do not open the power supply terminal with the voltage impressed to the input terminal.

(The setting of the bias of an internal circuit collapses, and a parasitic element might operate.)

About the Input Terminal

1. Setting range of input voltage

The following voltage is recommended to be input to the input terminal (pin 2).

$$\text{about } 0.8 \text{ (V)} < V_{in} < V_{CC} - 0.3 \text{ (V)} \dots \text{ at } V_{CC} \leq 7 \text{ V}$$

$$\text{about } 0.8 \text{ (V)} < V_{in} < 6.7 \text{ (V)} \dots \text{ at } V_{CC} > 7 \text{ V}$$

2. About using input terminal

Please do an enough verification to the transition characteristic etc. of the power supply when using independent power supply to input terminal (pin 2).

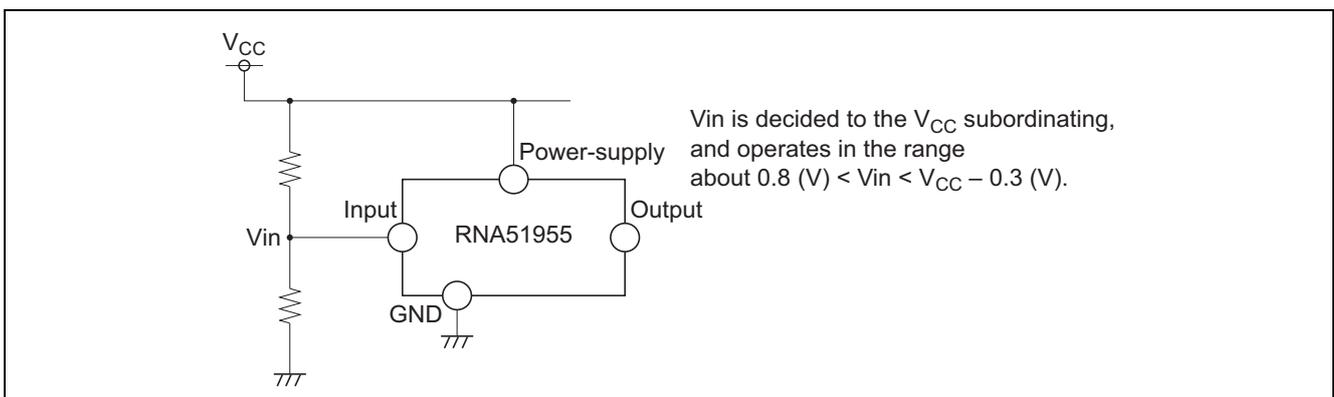


Figure 3 Recommended Example

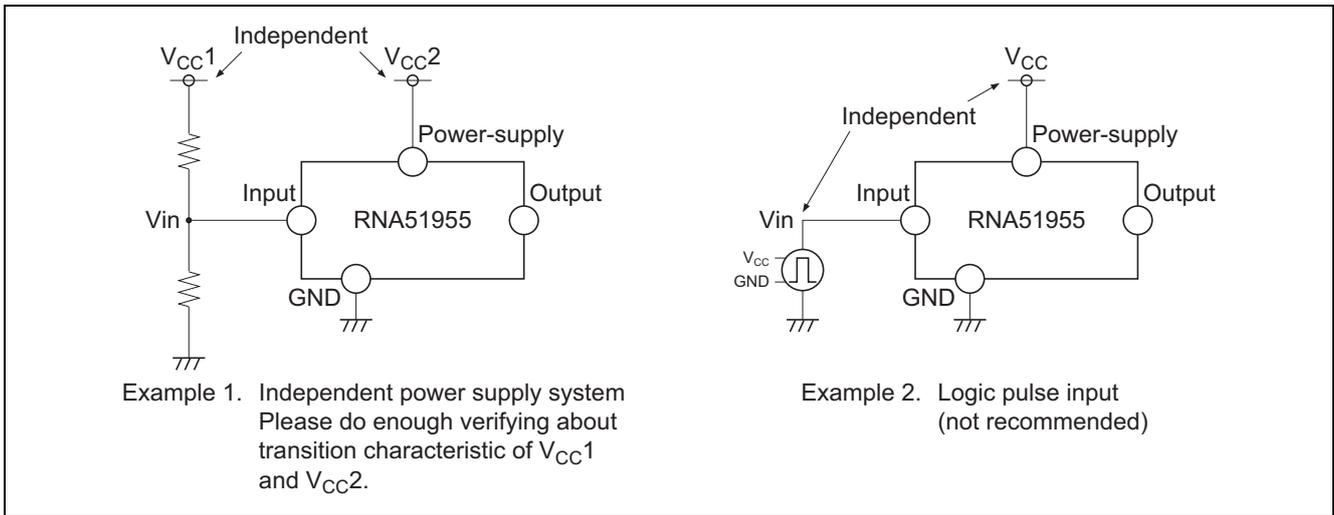


Figure 4

3. Calculation of detecting voltage

Detecting voltage V_S can be calculated by the following expression.

However, the error margin is caused in the detecting voltage because input current I_{in} (standard 100 nA) exists if it sets too big resistance.

Please set the constant to disregard this error margin.

$$V_S = 1.25 \times \left(\frac{R_1 + R_2}{R_2} \right) + \frac{I_{in} \times R_1}{\text{error margin}}$$

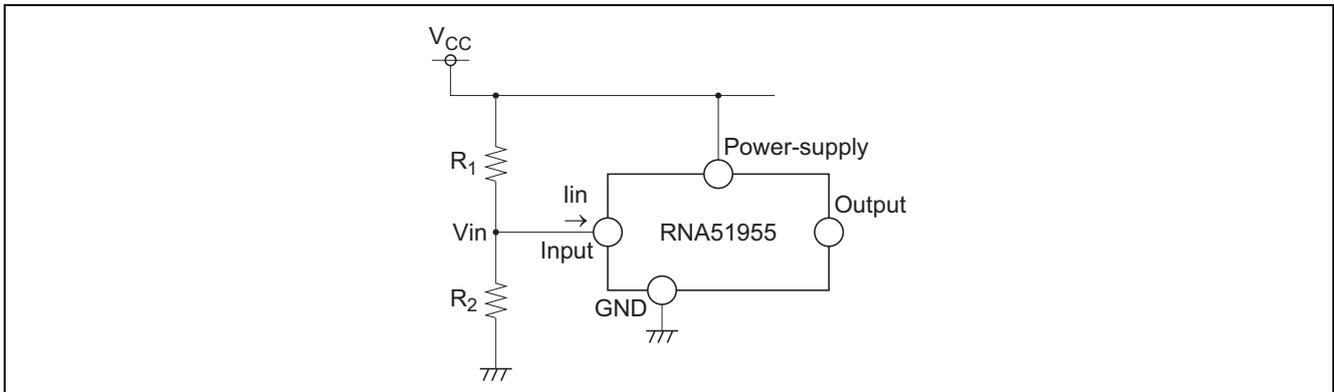


Figure 5 Influence of Input Current

4. About the voltage input outside ratings

Please do not input the voltage outside ratings to the input terminal.

An internal protection diode becomes order bias, and a large current flows.

Setting of Output Load Resistance (RNA51955B)

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).

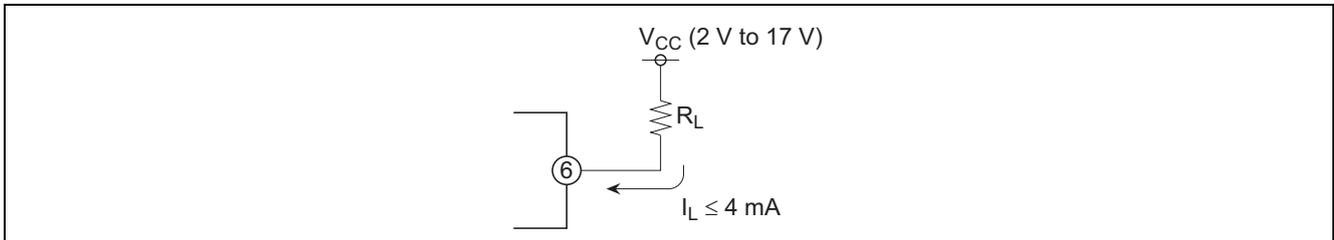


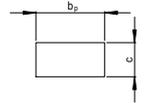
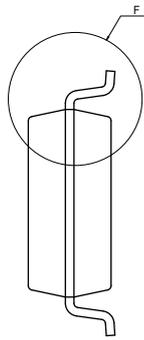
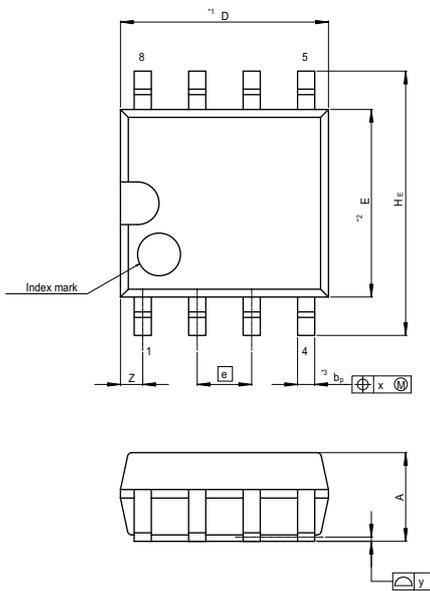
Figure 6 Output Load Resistance R_L

Others

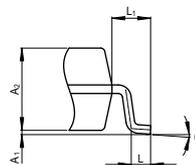
1. Notes when IC is handled are published in our reliability handbook, and please refer it. The reliability handbook can be downloaded from our homepage (following URL).
http://www.renesas.com/products/common_info/reliability/index.jsp
2. Additionally, please inquire of our company when there is an uncertain point on use.

Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x4.85-1.27	PRSP0008DE-C	—	0.1g



Terminal cross section
(Ni/Pd/Au plating)

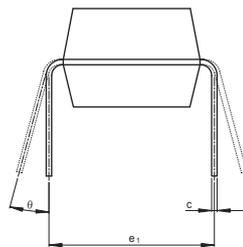
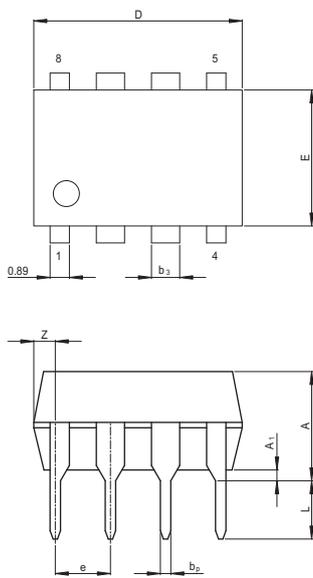


Detail F

NOTE)
1. DIMENSIONS**1 (Nom)**AND**2*
DO NOT INCLUDE MOLD FLASH.
2. DIMENSION**3*DOES NOT
INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.65	4.85	5.05
E	4.2	4.4	4.6
A ₂	—	1.85	—
A ₁	0.00	0.1	0.20
A	—	—	2.03
b _p	0.34	0.4	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	5.7	6.2	6.5
⊕	1.12	1.27	1.42
x	—	—	0.12
y	—	—	0.10
Z	—	—	0.75
L	0.25	0.45	0.65
L ₁	—	0.90	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP8-6.3x9.6-2.54	PRDP0008AF-B	DP-8FV	0.54g



(Ni/Pd/Au plating)

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e ₁	—	7.62	—
D	—	9.60	10.6
E	—	6.30	7.4
A	—	—	5.06
A ₁	0.5	—	—
b _p	0.40	0.48	0.56
b ₃	—	1.30	—
c	0.19	0.25	0.31
θ	0°	—	15°
e	2.29	2.54	2.79
Z	—	—	1.27
L	2.54	—	—

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