

# M62055FP

## 3 V Power Supply with Watchdog Timer

REJ03D0808-0200

Rev.2.00

Mar 10, 2006

### Description

M62055FP is a 3 V power supply featuring a watchdog timer function for a microcontroller system.

It can be a power source of  $3\text{ V} \pm 5\%$  by utilizing the reference voltage and amplifier.

It can also generate a reset pulse for the applied systems during power-on, moreover it includes the watchdog timer for a self diagnostics of the system, which can prevent system erroneous functions.

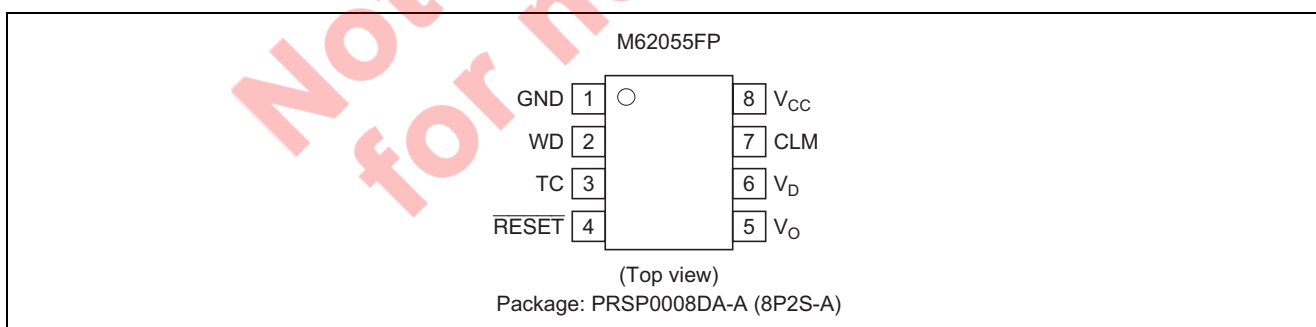
### Features

- Power-on reset
- Watchdog timer
- High accuracy voltage source of  $3\text{ V} \pm 5\%$  (Max)
- Over current protection circuit
- The voltage detection accuracy of  $\pm 5\%$  (Max)
- Output power ( $V_O$ ) cutoff function at erroneous conditions
- Backward voltage protection circuits for inputs and outputs

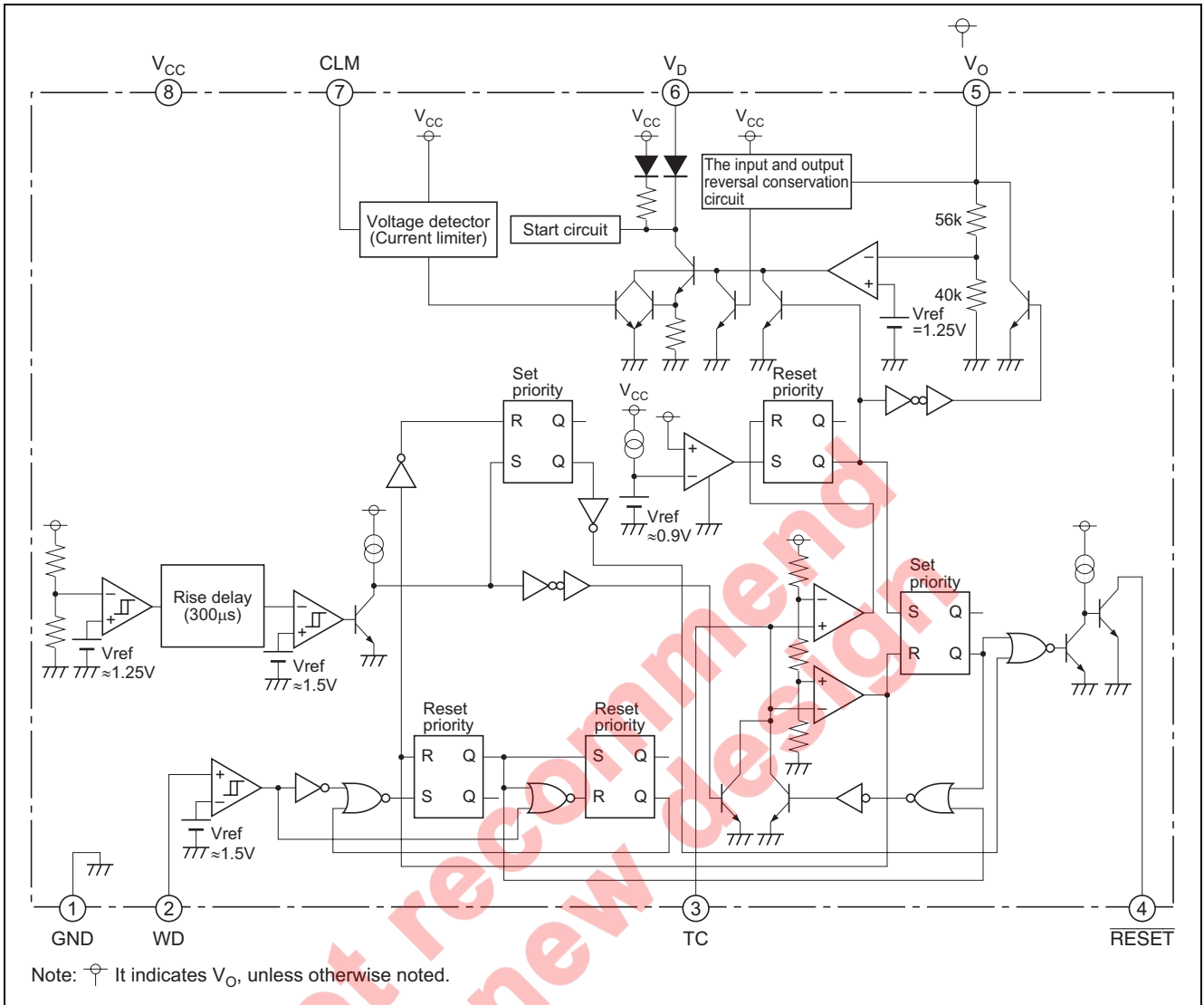
### Application

- Handy information terminal equipment, CD-ROM, Portable audio equipment

### Pin Arrangement



Block Diagram



Pin Functional Description

Pin No.	Symbol	Functional Description
1	GND	Ground
2	WD	Input for watchdog timer
3	TC	Setting up reset timer and watchdog timer
4	RESET	Reset signal output
5	$V_o$	Feedback to a power supply for a MCU
6	$V_d$	Controlling the stability of an output voltage with a PNP transistor connected externally
7	CLM	Current limiting
8	$V_{cc}$	Power supply voltage

## Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V <sub>CC</sub>	13	V	
Reset pin	Output voltage	V <sub>RM</sub>	V	
	Output current	I <sub>RM</sub>	10	mA
Watchdog pin input voltage	V <sub>WDM</sub>	3	V	
Thermal derating	K $\theta$	4.0	mV/°C	Ta $\geq$ 25°C
Operating temperature	Topr	-20 to +75	°C	
Storage temperature	Tstg	-55 to +150	°C	

## Electrical Characteristics

(Ta = 25°C, unless otherwise noted)

### DC Characteristics

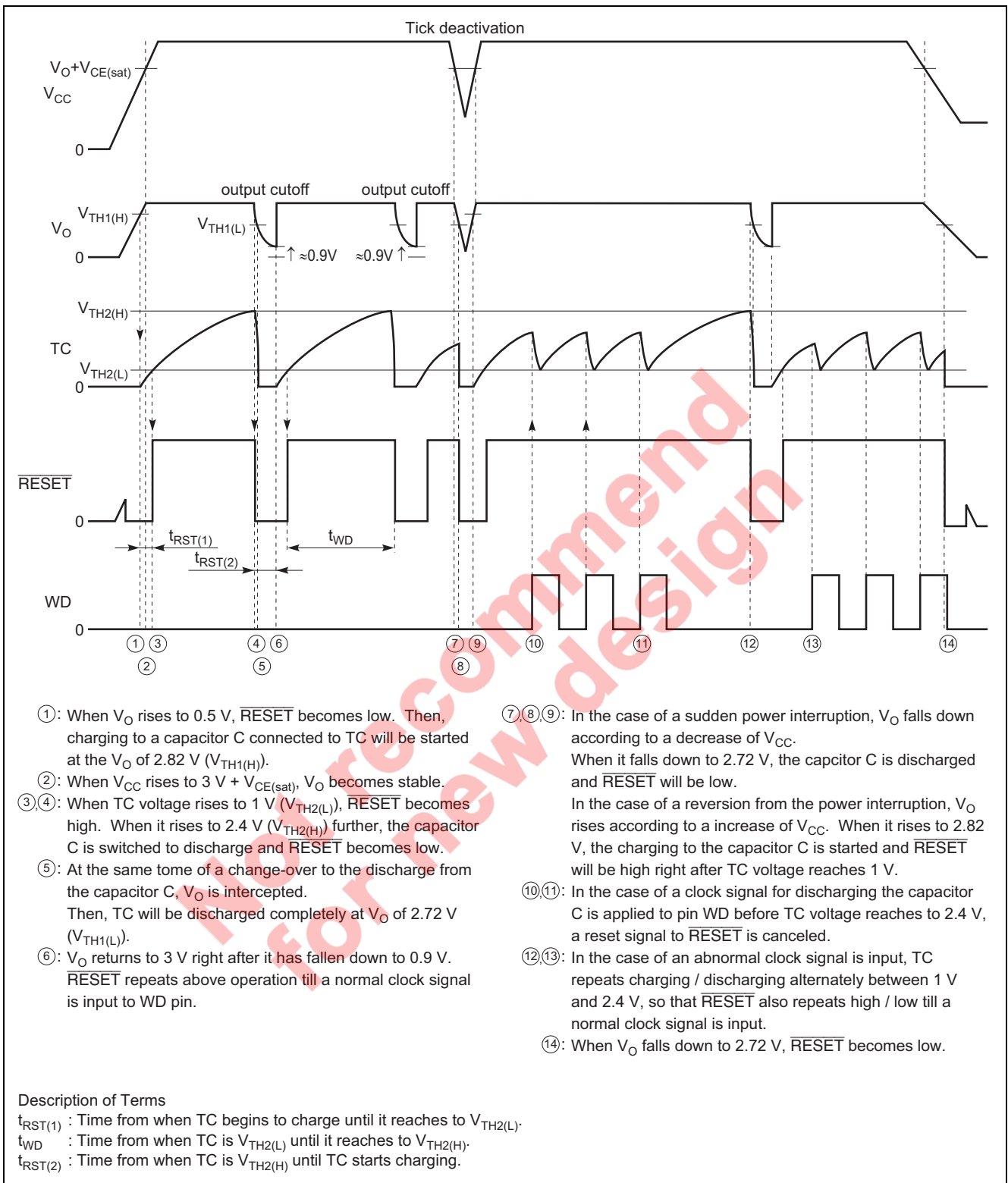
Item		Symbol	Min	Typ	Max	Unit	Test Conditions	
Battery backup regulator	Supply voltage	V <sub>CC</sub>	3.5	—	13	V		
	Circuitry current	I <sub>CC</sub>	—	500	900	$\mu$ A		
	Output voltage	V <sub>O</sub>	2.85	3.00	3.15	V		
	Bias current	I <sub>Bmax</sub>	—	10	—	mA		
	Listing short-circuit bias current	I <sub>BSC</sub>	—	1	—	mA		
	Input voltage regulation	Reg-in	—	0.02	—	%/V	V <sub>CC</sub> = 3.5V to 13V	
	Loading voltage regulation	Reg-lo	—	20	—	mV	I <sub>O</sub> = 10mA to 100mA	
	Output voltage thermal coefficient	$\Delta V_O/\Delta T$	—	0.02	—	%/T		
CLM threshold voltage	V <sub>THCLM</sub>	—	200	—	mV			
Reset, watchdog timer	V <sub>O</sub> detection voltage	V <sub>TH1(H)</sub>	2.68	2.82	2.96	V		
		V <sub>TH1(L)</sub>	2.58	2.72	2.86	V		
		$\Delta V_{TH1}$	—	0.1	—	V		
	Output voltage	Reset pin	V <sub>OL(RST)</sub>	—	0.2	0.4	V	I <sub>sink</sub> = 4mA
	Output leakage current		I <sub>leak</sub>	—	—	5	$\mu$ A	
	Watchdog timer threshold voltage	V <sub>TH2(H)</sub>	2.28	2.40	2.52	V		
		V <sub>TH2(L)</sub>	0.95	1.00	1.05	V		
	WD input current	I <sub>WD</sub>	—	—	1	$\mu$ A	V <sub>IN</sub> = 3V	
	WD input threshold voltage	V <sub>TH(WD)</sub>	—	1.5	—	V		
	TC output current	I <sub>tco</sub>	—	—	-1	$\mu$ A	V <sub>IN</sub> = 0.8V	
	TC input current	I <sub>tc1</sub>	—	2.0	—	mA	V <sub>IN</sub> = 2.4V	
		I <sub>tc2</sub>	8.0	—	—	mA	In the output cutoff transmission mode	
V <sub>CC</sub> min operating voltage	V <sub>CCMIN</sub>	—	—	2.0	V	*1		

Note: 1. The V<sub>CC</sub> minimum operating voltage at which the RESET output is low.

### AC Characteristics

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Watchdog timer	t <sub>WD</sub>	0.5	1.2	1.7	ms	C = 0.1 $\mu$ F, R <sub>1</sub> = 10k $\Omega$
Reset timer (1)	t <sub>RST(1)</sub>	0.2	0.5	1.1	ms	C = 0.1 $\mu$ F, R <sub>1</sub> = 10k $\Omega$
Reset timer (2)	t <sub>RST(2)</sub>	—	—	10	ms	C <sub>O</sub> = 10 $\mu$ F, R <sub>1</sub> = 10k $\Omega$ , I <sub>L</sub> = 0
Input pulse width	t <sub>WDIN</sub>	3	—	—	$\mu$ s	
Transmission delay time	t <sub>d</sub>	—	20	—	$\mu$ s	

## Timing Chart



1. Pin (3) (TC pin) Charging and Discharging Time

When an error is occurred in RD input, TC waveform is as shown in figure 1.

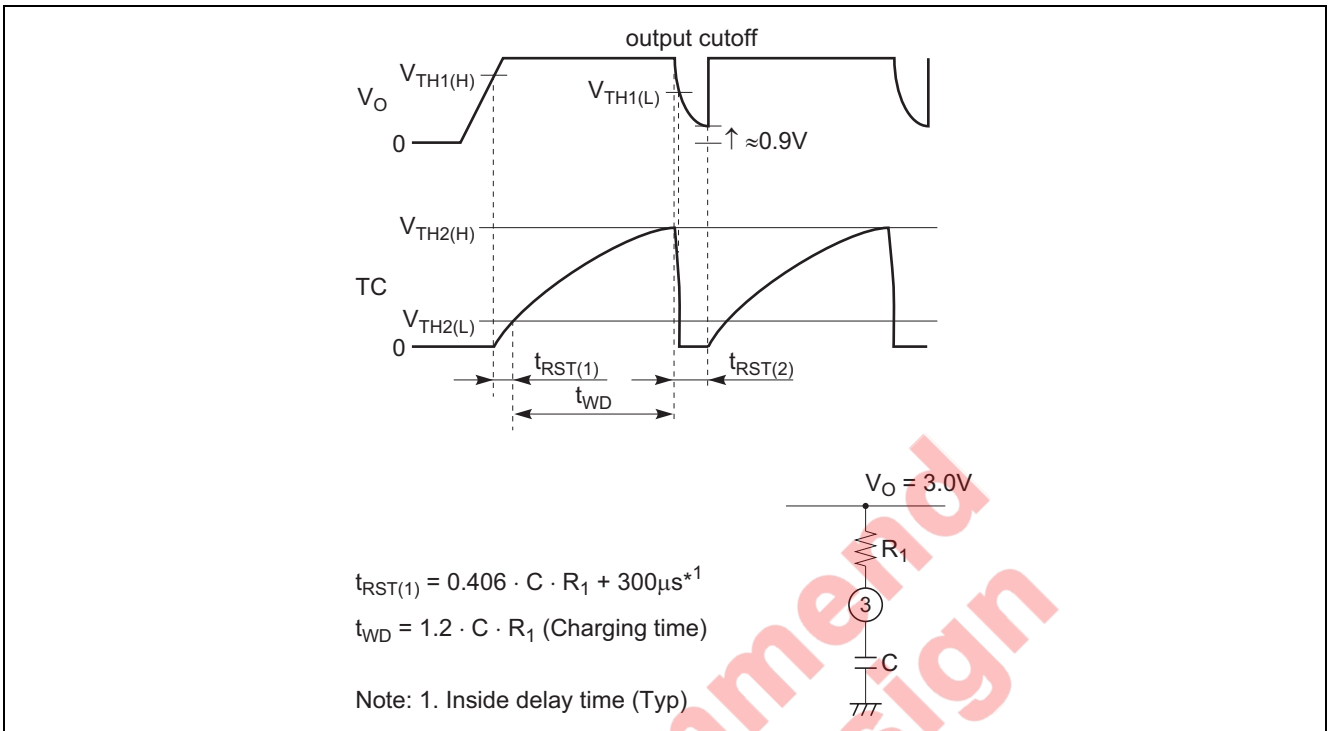


Figure 1

The following formula can be obtained because  $t_{RST(2)}$  is equal to the duration of  $V_O$  cutoff.

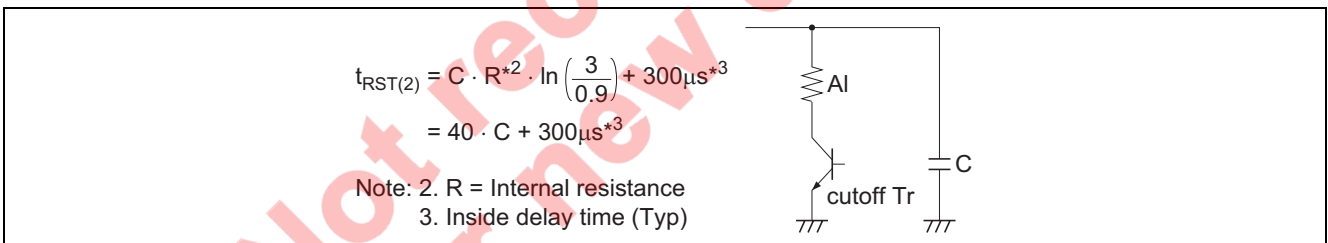


Figure 2

## 2. Pin (2) (WD pin) Input Frequency, Input Pulse Width, Charge/Discharge Time

When input of (2) WD is normal, TC waveform (3) is as shown in figure 3.

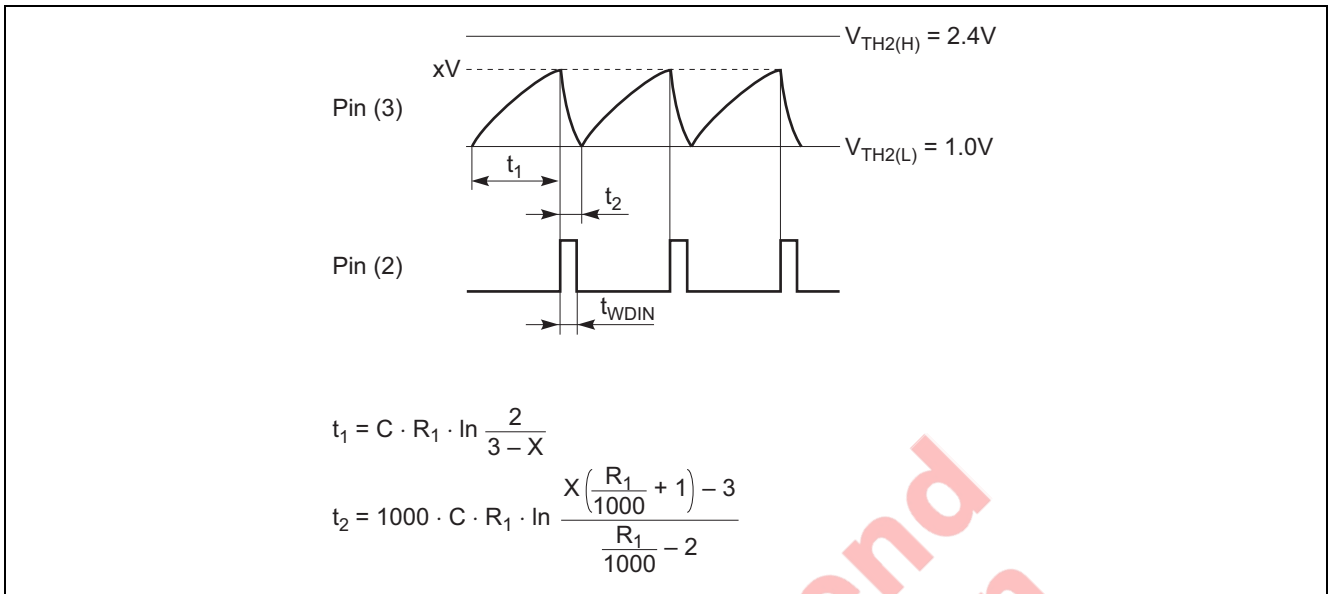


Figure 3

- Conditions of an input to pin (2) (WD pin)

(1) Input period should be  $t_{WD}$  or less. (Pin discharge is completed before the arrival of  $V_{TH2(H)} = 2.4 V$ )

$$\frac{1}{1.2 \cdot C \cdot R_1} < f$$

(2) Input pulse width  $t_{WDIN}$  should be  $t_2$  or less.

3. Relationship between the Input Pulse Width and the Low Pass Filter

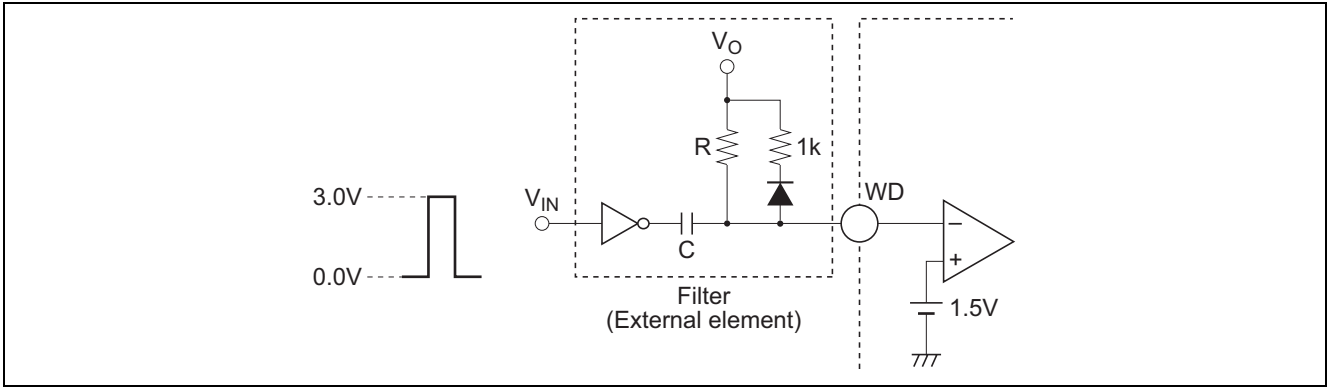


Figure 4

Addition of a low pass filter makes input waveform dull. An input pulse width and CR of a low pass filter is determined referring to the figure 5.

$$t_3 = -C \cdot R \cdot \ln \frac{1.5V}{V_{IN}}$$

$\overline{\text{RESET}}$  is output in the case of  $t_4 > t_{WD}$ .

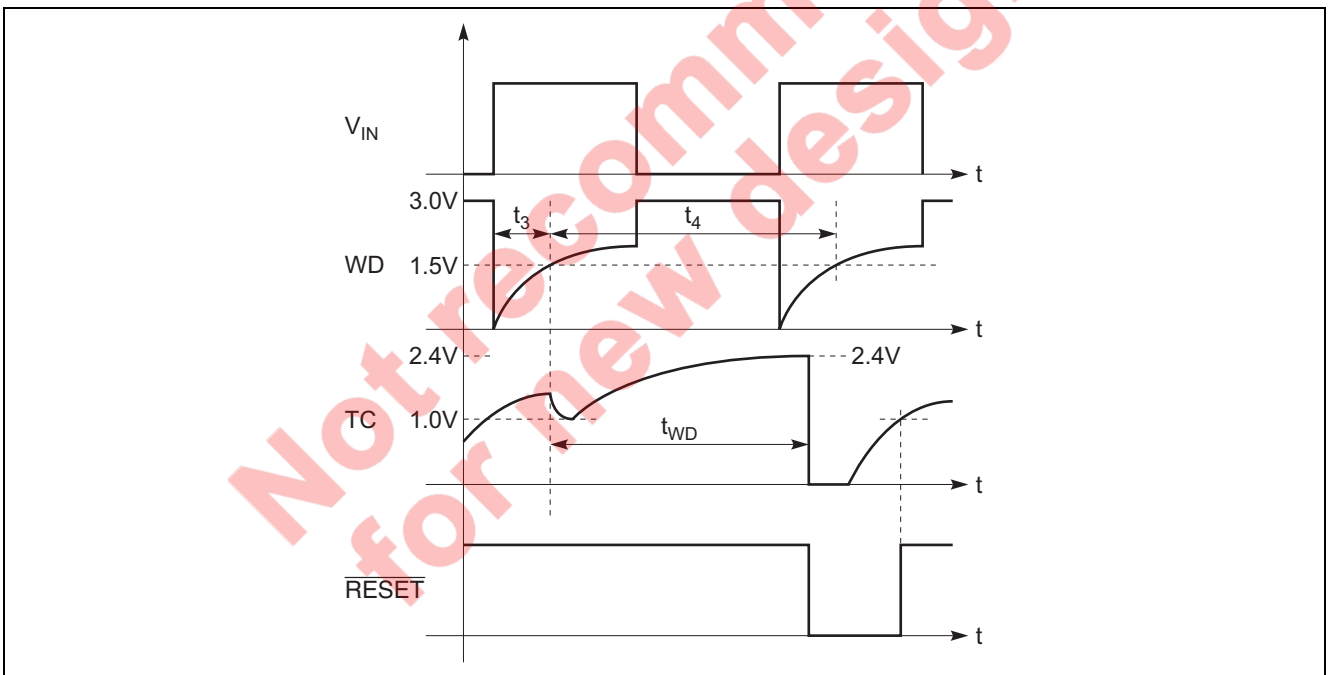


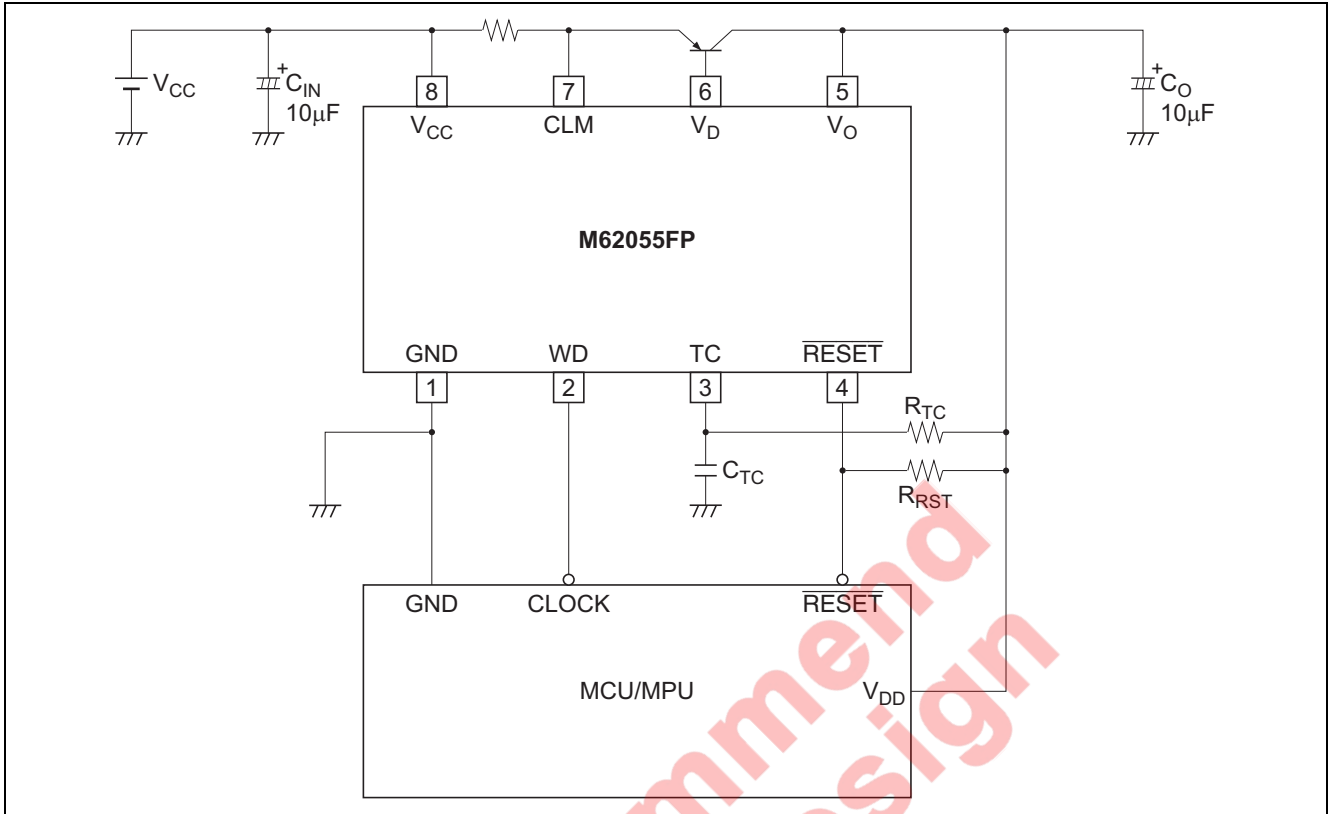
Figure 5

If  $t_3$  is too long, the TC waveform changes as shown in figure5.

$t_3$  is set as follows:

$t_{WDIN}$  (3  $\mu$ s) or more and  $t_2$  (charging time) or less. ( $t_2$  is a discharge time while an input is normal)

### Application Circuit Example

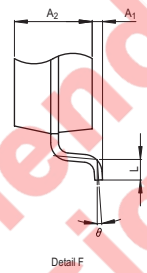
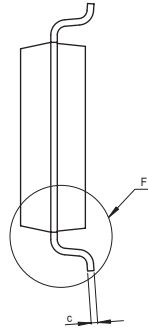
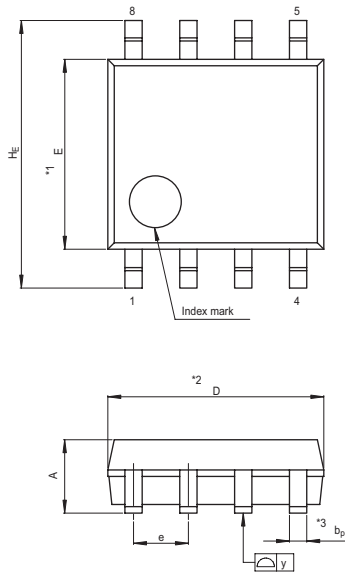


Not recommended for new design



Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x5-1.27	PRSP0008DA-A	8P2S-A	0.07g



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

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.8	5.0	5.2
E	4.2	4.4	4.6
A <sub>2</sub>	—	1.5	—
A <sub>1</sub>	0.05	—	—
A	—	—	1.9
b <sub>p</sub>	0.35	0.4	0.5
c	0.13	0.15	0.2
θ	0°	—	10°
H <sub>E</sub>	5.9	6.2	6.5
e	1.12	1.27	1.42
y	—	—	0.1
L	0.2	0.4	0.6

Not recommended for new design

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