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April 1st, 2010
Renesas Electronics Corporation

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M62050P/FP

3 V Supply System Reset with Watchdog Timer

REJ03D0786-0200

Rev.2.00

Jun 15, 2007

Description

The M62050P/FP is a voltage threshold detector designed for detection of 3 V supply voltage and generation of a system reset pulse. It is suitable for microcontroller systems.

The IC, a supervisor of the MCU operations, dissipates low current of 0.6 mA (Typ) during normal operations of the MCU systems.

It has two selectable threshold voltages, which allows applying it to a high precision system design.

Features

- Watchdog timer (supervisor for two system voltages)
- Power-on reset timer
- Low current consumption: 0.6 mA (Typ, $V_{CC} = 3\text{ V}$)
- Wide supply voltage range: $V_{CC(max)} = 7\text{ V}$

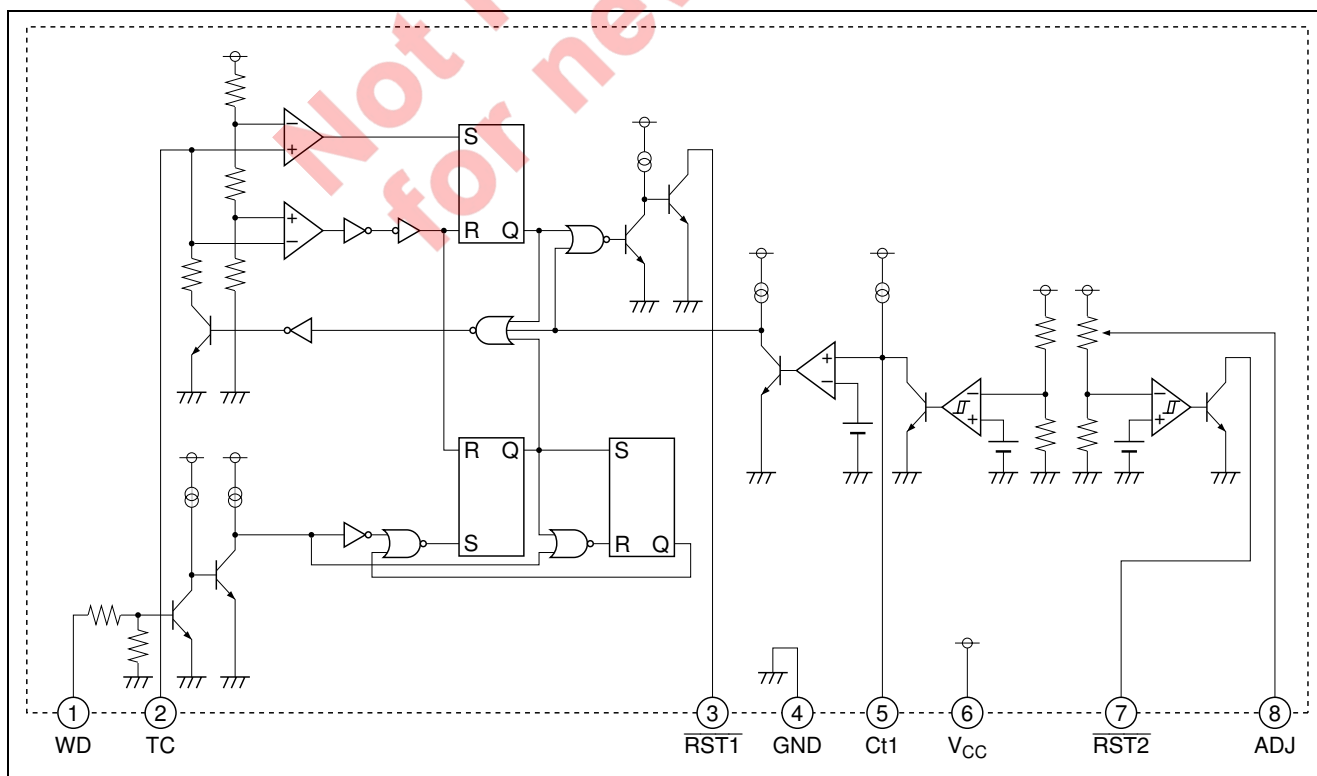
Application

- Supervisor for microcontroller systems

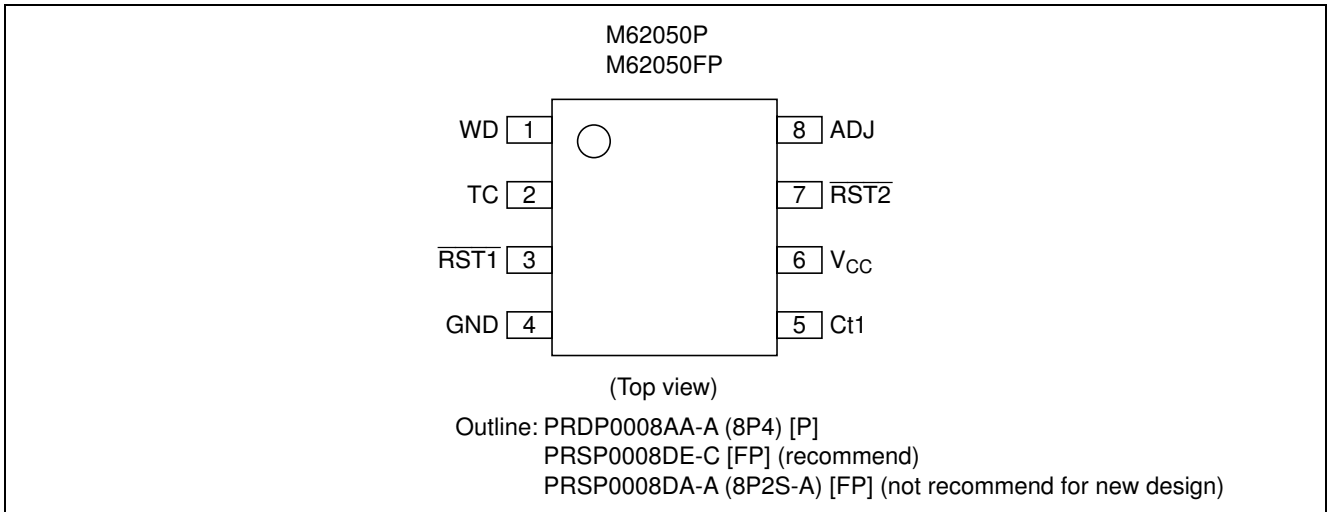
Recommended Operating Condition

- Recommended supply voltage: 3 V

Block Diagram



Pin Arrangement



Pin Description

Pin No.	Symbol	Functional Description
1	WD	Input for watchdog timer
2	TC	Time set for reset timer and watchdog timer
3	RST1	Pin that outputs reset signal when abnormal signal is input to WD pin
4	GND	GND
5	Ct1	Capacitor installation pin for delay time setting
6	V _{CC}	Power supply
7	RST2	Pin that outputs reset signal when power supply voltage becomes abnormal
8	ADJ	Selection between two detection voltages

Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

Item	Symbol	Rating	Unit	Conditions	
Supply voltage	V _{CC}	7	V		
Input voltage	V _{IN}	-0.3 to +7	V		
Output voltage	V _{OUT}	15	V		
Output current	I _{OUT}	10	mA		
Power dissipation	Pd	625	mW	8-pin DIP	
		440		8-pin SOP	
Thermal derating	Kθ	6.25	mW/°C	Ta ≥ 25°C	8-pin DIP
		4.4			8-pin SOP
Operating temperature	Topr	-20 to +75	°C		
Storage temperature	Tstg	-55 to +125	°C		

Electrical Characteristics

(Ta = -25°C, V_{CC} = 3 V, unless otherwise noted)

DC Characteristics

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	
						Pin	
WD input current	I _{WD}	60	140	250	μA	WD	V _{IN} = 3V
WD input voltage	V _{IH}	1.5	—	3.0	V	WD	
	V _{IL}	-0.3	—	0.8			
TC output current	I _{OUT}	—	—	-1	μA	TC	V _{IN} = 1.0V
TC input current	I _{IN}	—	2.5	3.5	mA	TC	V _{OUT} = 2.6V
Watchdog timer threshold voltage	V _{TH3(H)}	—	2.4	—	V	TC	
	V _{TH3(L)}	—	1.2	—			
Output voltage	V _{OL}	—	0.2	0.5	V	RST1	I _{OUT} = 1mA
Output leakage current	I _{leak}	—	—	5.0	μA	RST2	V _{OUT} = 3V
V _{CC} detection voltage (1)	V _{TH1(H)}	2.13	2.25	2.42	V	V _{CC(1)}	V _{CC} L→H
	V _{TH1(L)}	2.10	2.20	2.30			V _{CC} H→L
	ΔV _{TH1}	30	50	120			ΔV _{TH1} = V _{TH1(H)} - V _{TH1(L)}
V _{CC} detection voltage (2)	V _{TH2(H)}	2.43	2.55	2.72	V	V _{CC(2)}	V _{CC} L→H
	V _{TH2(L)}	2.40	2.50	2.60			V _{CC} H→L
	ΔV _{TH2}	30	50	120			ΔV _{TH2} = V _{TH2(H)} - V _{TH2(L)}
V _{CC} detection voltage (4)	V _{TH4(H)}	2.23	2.35	2.52	V	V _{CC(4)}	V _{CC} L→H
	V _{TH4(L)}	2.20	2.30	2.40			V _{CC} H→L
	ΔV _{TH4}	30	50	120			ΔV _{TH4} = V _{TH4(H)} - V _{TH4(L)}
RST1 ON voltage	RST1	—	—	0.5	V	RST1	V _{CC} = 1.2V, R _L = 4.7kΩ
RST2 ON voltage	RST2	—	—	0.5	V	RST2	V _{CC} = 1.2V, R _L = 4.7kΩ
Circuit current	I _{CC}	—	600	950	μA	V _{CC}	

AC Characteristics

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	
						Pin	
Watchdog timer	t _{WD}	C × 1.1 × R _t			s	RST1	C = 0.1μF, R ₁ = 10kΩ
		0.5	1.1	1.7	ms		
Reset timer (1)	t _{RST(1)}	C × 0.5 × R _t			s	RST1	C = 0.1μF, R ₁ = 10kΩ
		0.2	0.5	1.1	ms		
Reset timer (2)	t _{RST(2)}	830 × C			s	RST1	C = 0.1μF, R ₁ = 10kΩ
		40	83	220	μs		
Reset timer delay time	t _{dRST(1)}	290 × 10 ³ × C _d *			s	RST1	C _d = 0.001μF
		140	290	790	μs		
Input pulse width	t _{WDIN}	3	—	—	μs	WD	
Propagation delay	t _{d1}	—	4	—	μs	RST1	
	t _{d2}	—	2	—		RST2	

Note: * C_d: Delay capacitor connected with Ct1 pin

Operating Description

Timing Chart 1 (When the delay capacitor is not connected with Ct1 pin)

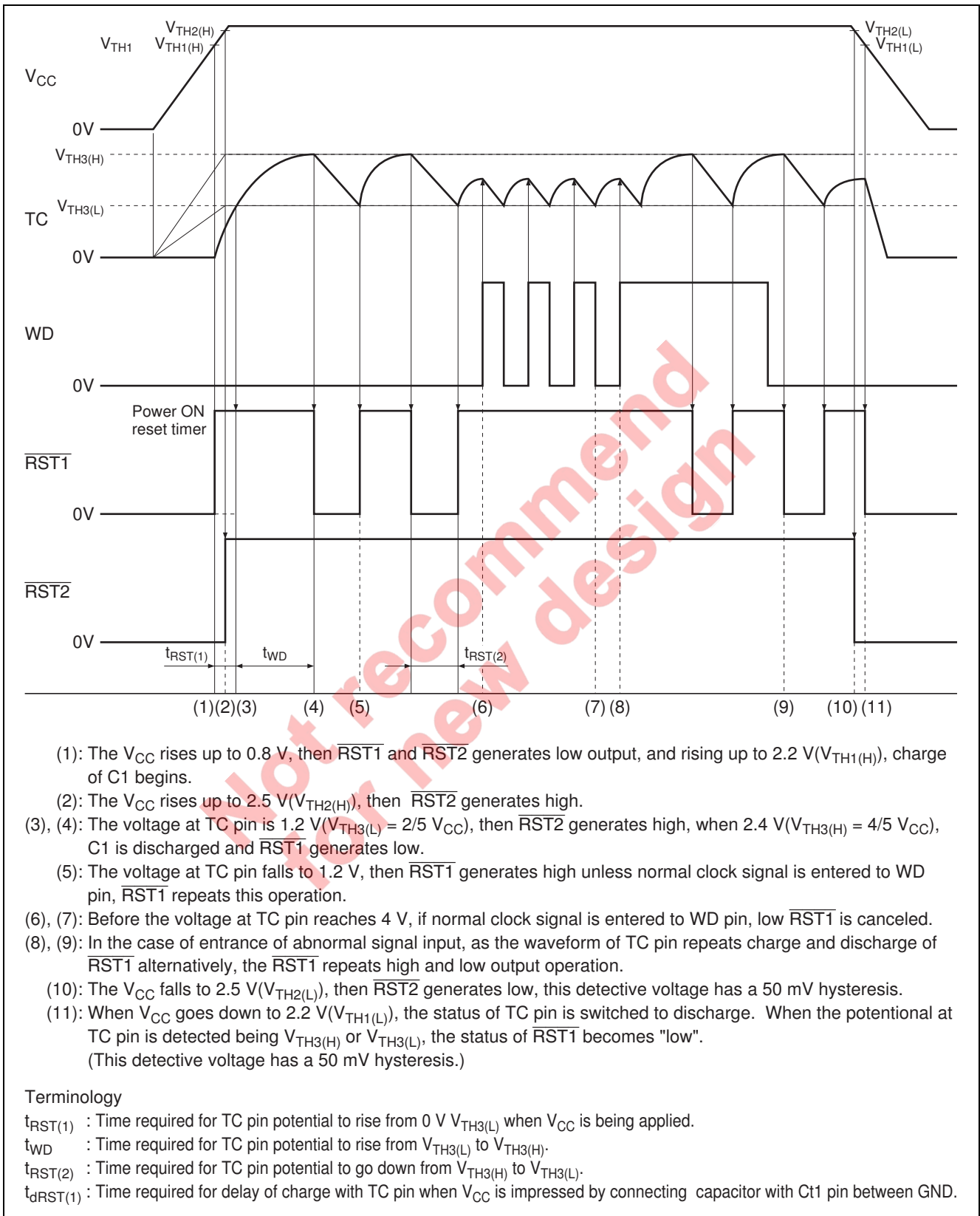


Figure 1 Timing Chart 1

Timing Chart 2 (When the delay capacitor is connected with Ct1 pin)

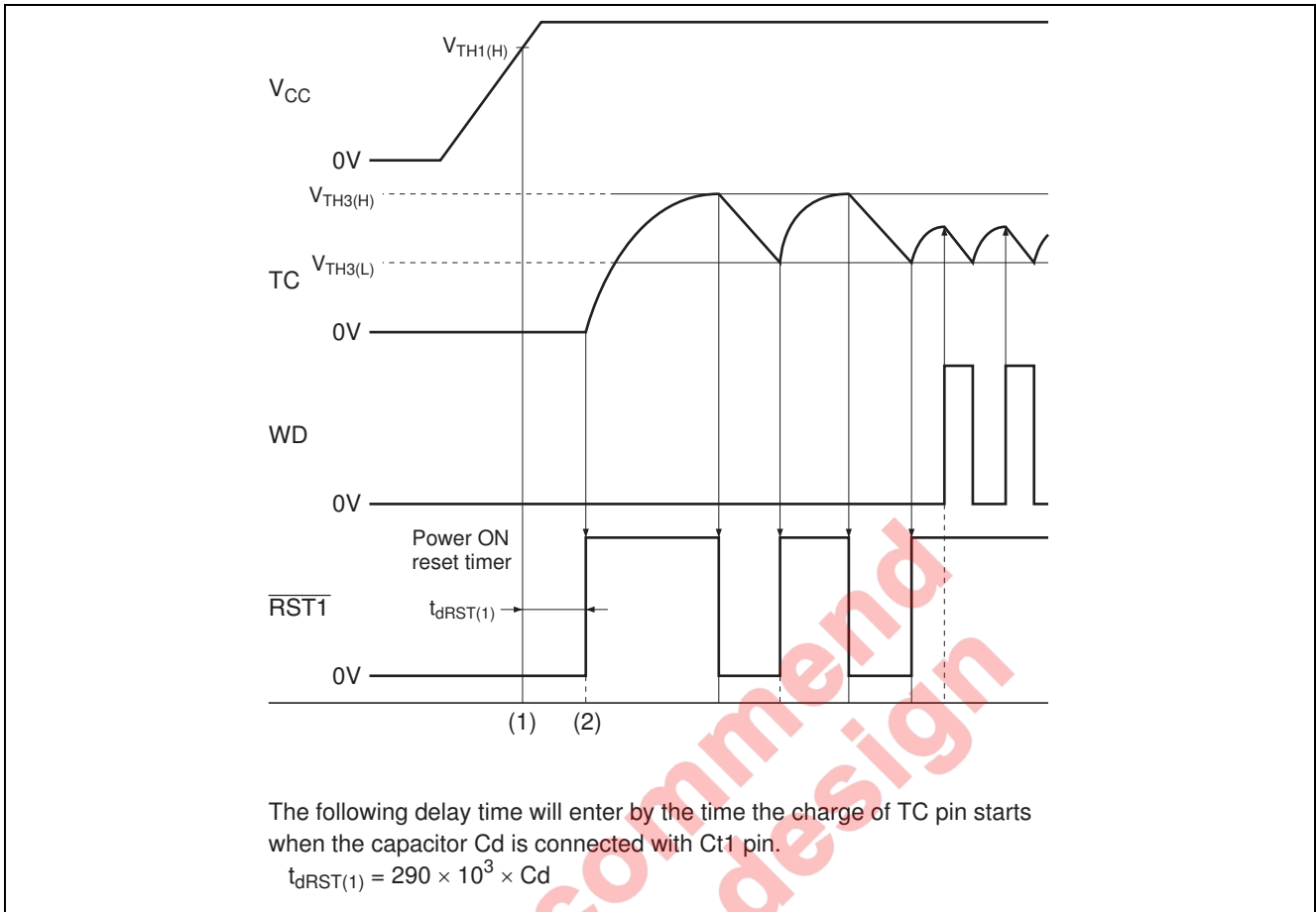


Figure 2 Timing Chart 2

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1. Pin(2) (TC pin) charge time and discharge time

When input to WD pin is abnormal, TC pin output waveform is as shown below:

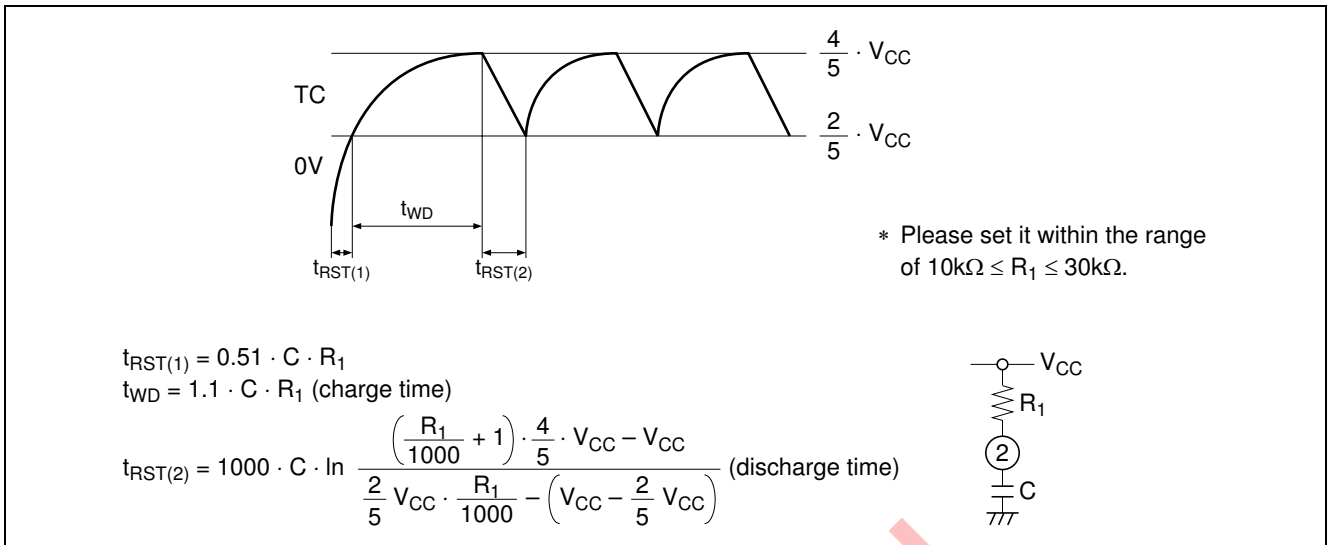


Figure 3

Please set the time of t_{WD} and $t_{RST(2)}$ within the following range.

$$110 \mu\text{s} \leq t_{WD} \leq 1.1 \text{ s}$$

$$8.3 \mu\text{s} \leq t_{RST(2)} \leq 83 \text{ ms}$$

2. Pin (1) (WD pin) input frequency, input pulse width, charge time and discharge time

When input to WD pin is normal, TC pin output waveform is as shown below:

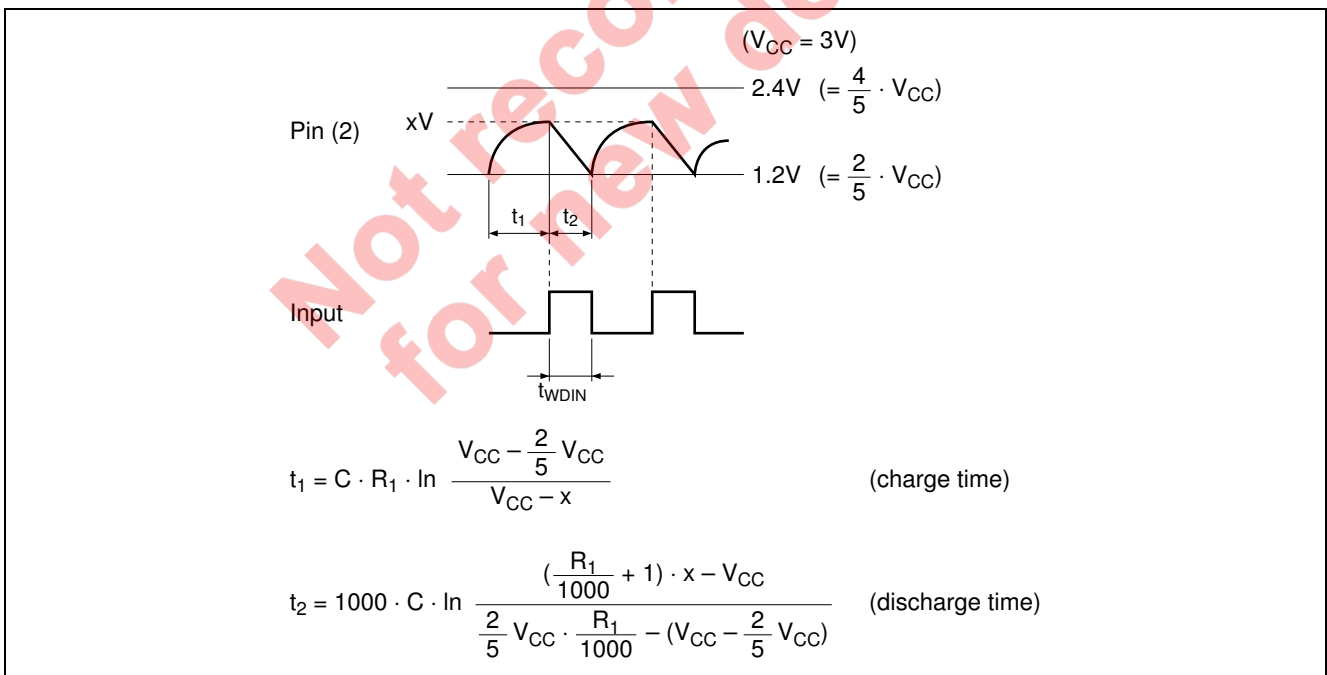


Figure 4

• Pin (1) (WD pin) input requirements

(1) Input cycle: t_{WD} or less (discharge should start before voltage at WD pin reaches 2.4 V.)

$$\frac{1}{1.1 \cdot C \cdot R_1} < f$$

(2) Input pulse width t_{WDIN} : t_2 or less

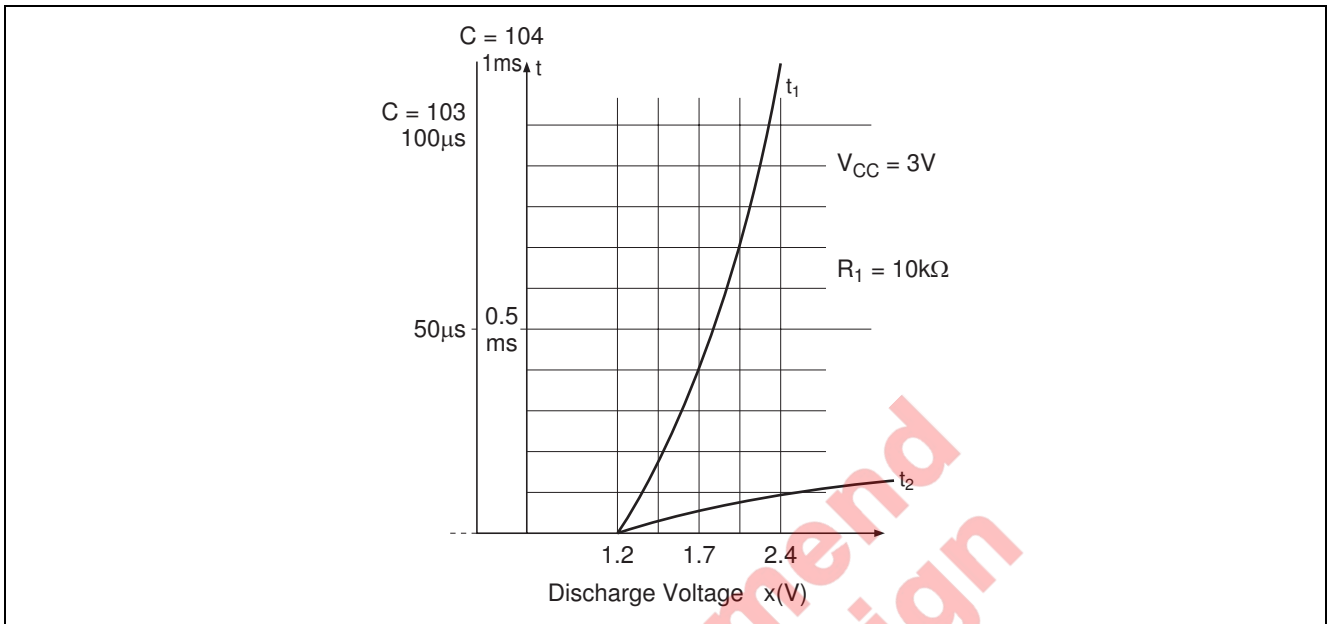


Figure 5

3. V_{CC} detection voltage adjustment

The detection voltage 2 (V_{TH2}) can be set as shown in Table 1 by connecting ADJ pin with opening or V_{CC} .

Table 1 Detection Voltage 2 (ADJ pin)

Detection Voltage 2	at Opening (V)	at V_{CC} (V)
$V_{TH2(H)}$	2.55	2.35
$V_{TH2(L)}$	2.50	2.30

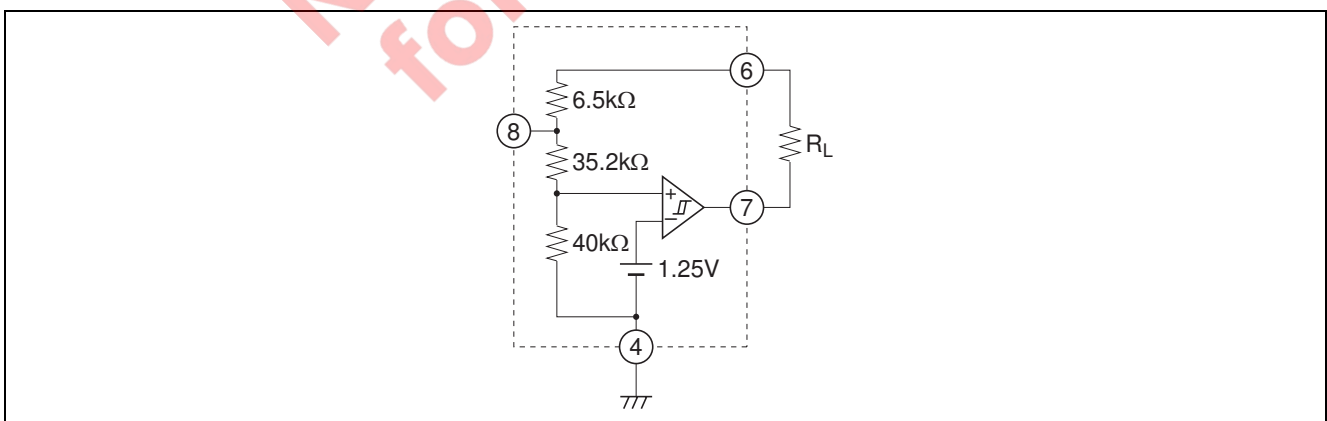


Figure 6

Application Example

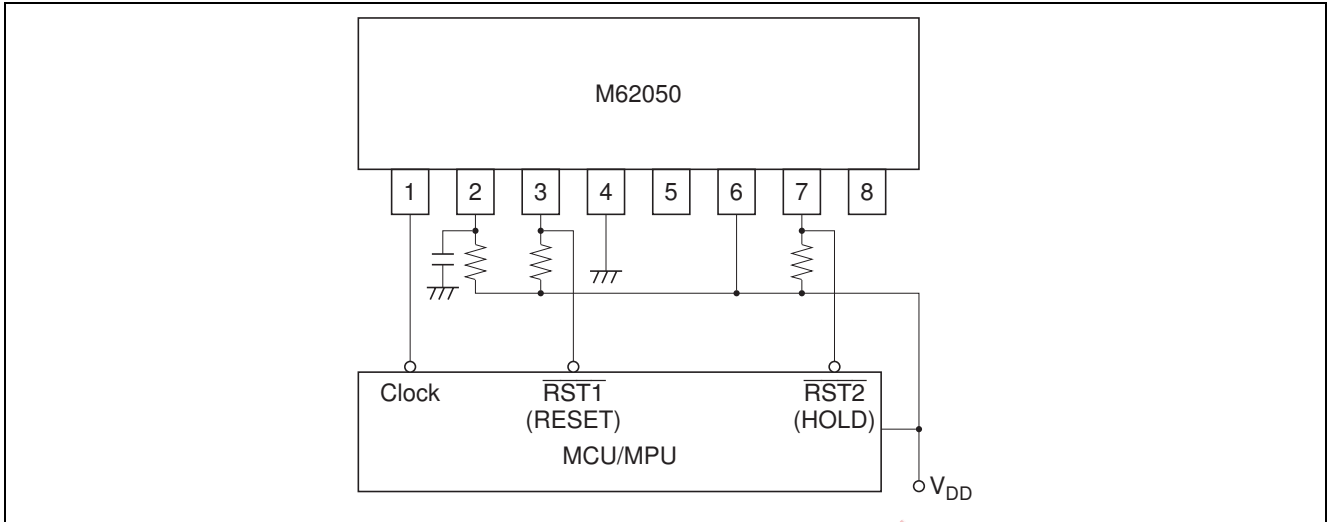
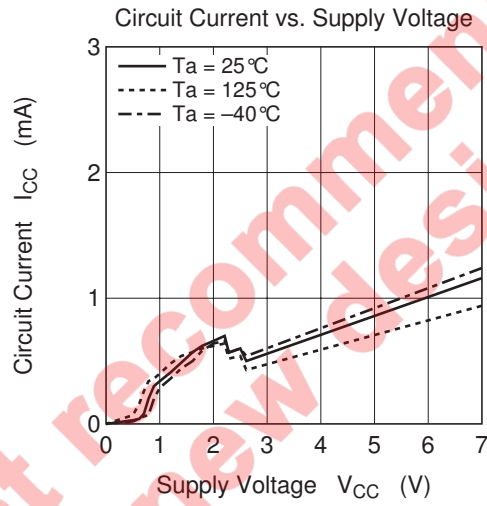
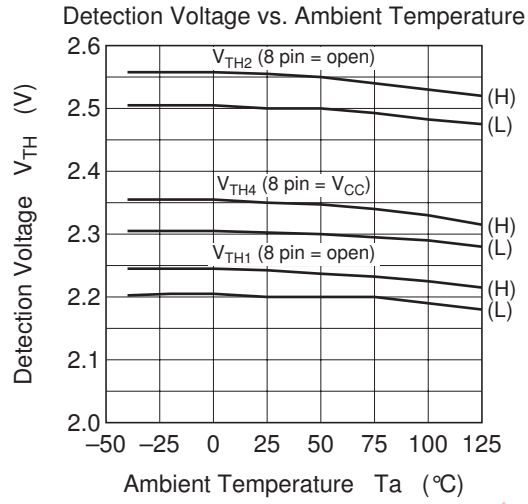


Figure 7 Application Example

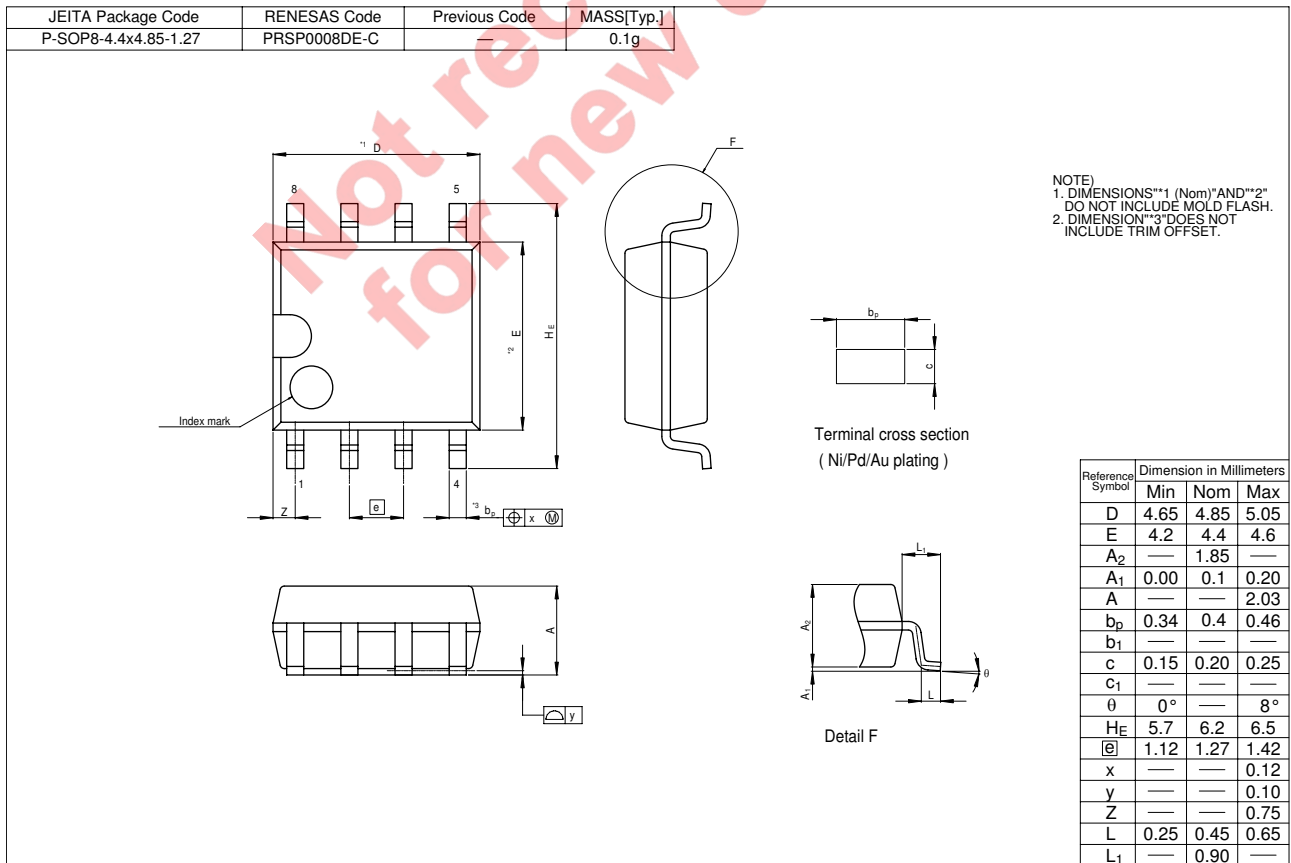
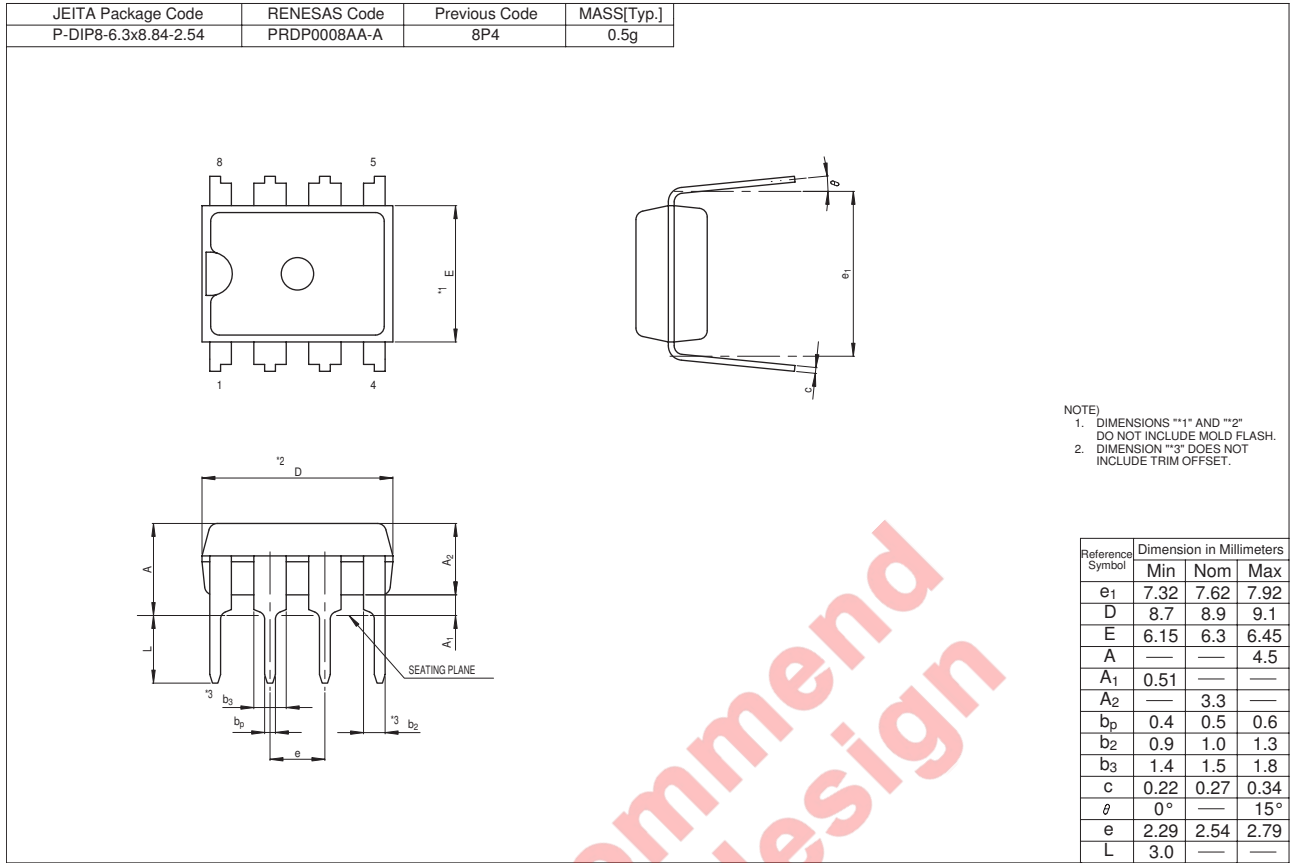
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Typical Characteristics

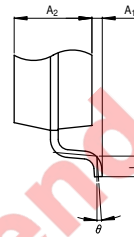
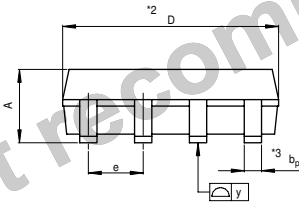
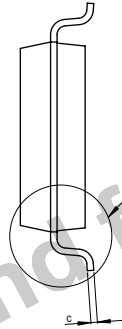
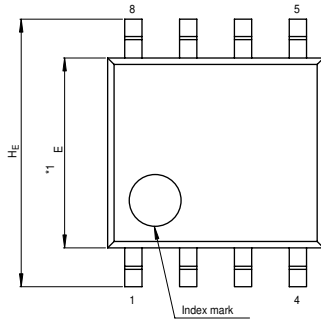


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Package Dimensions



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_2	—	1.5	—
A_1	0.05	—	—
A	—	—	1.9
b_p	0.35	0.4	0.5
c	0.13	0.15	0.2
θ	0°	—	10°
H_E	5.9	6.2	6.5
e	1.12	1.27	1.42
y	—	—	0.1
L	0.2	0.4	0.6

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