To all our customers

Regarding the change of names mentioned in the document, such as Mitsubishi Electric and Mitsubishi XX, to Renesas Technology Corp.

The semiconductor operations of Hitachi and Mitsubishi Electric were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Mitsubishi Electric, Mitsubishi Electric Corporation, Mitsubishi Semiconductors, and other Mitsubishi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Note : Mitsubishi Electric will continue the business operations of high frequency & optical devices and power devices.

Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

RENESAS
RenesasTechnologyCorp.

M51953A,B/M51954A,B

VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES

DESCRIPTION

M51953A,B/M51954A,B are semiconductor integrated circuits ideal 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 circuits for battery checking, level detecting and waveform shaping.

FEATURES

- Few external parts
- Large delay time with a capacitor of small capacitance ($t_d \approx 100ms$, at $0.33\mu F$) (M51953, M51954)
- Low threshold operating voltage (Supply voltage to keep low-state at low supply voltage)
  .... 0.6V (TYP.) at $R_L = 22k\Omega$
- Wide supply voltage range .... 2 ～ 17V
- Sudden change in power supply has minimal effect on the ICs
- Wide application range
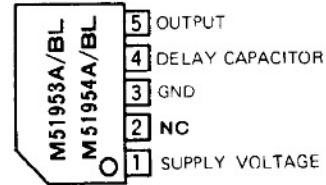- SIL package of the same height as DIP (5-pin SIP)

APPLICATION

Reset circuit of Pch, Nch, CMOS, microcomputer, CPU and microcomputer, 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.
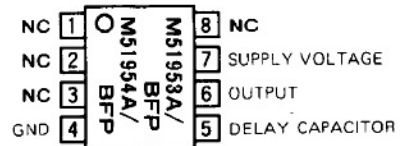
RECOMMENDED OPERATING CONDITION

Supply voltage range .... 2 ～ 17V

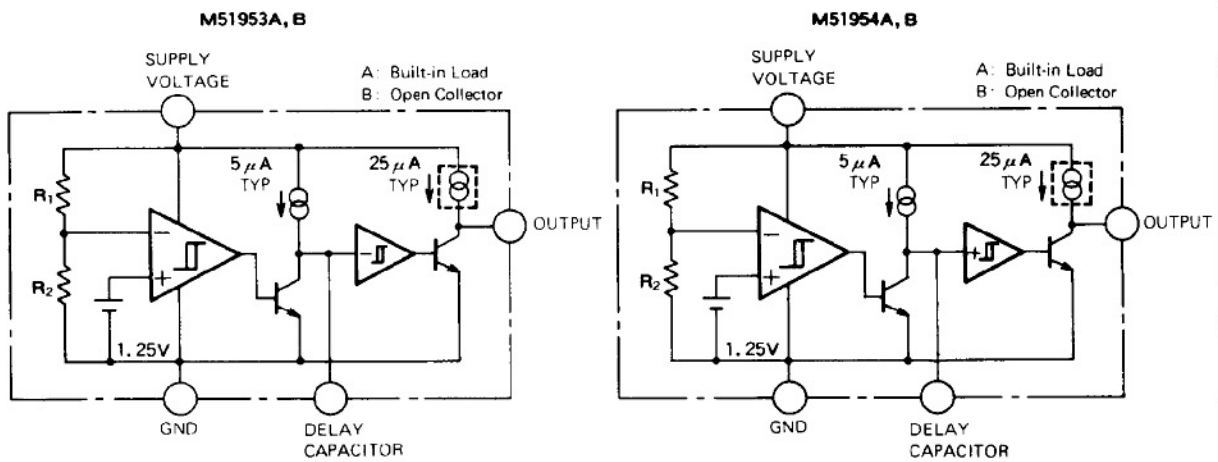## PIN CONFIGURATION (TOP VIEW)

M51953A/BL
M51954A/BL

Pin	
5	OUTPUT
4	DELAY CAPACITOR
3	GND
2	NC
1	SUPPLY VOLTAGE

Outline 5P5T

M51953A/BFP
M51954A/BFP

NC	1		8	NC
NC	2		7	SUPPLY VOLTAGE
NC	3		6	OUTPUT
GND	4		5	DELAY CAPACITOR

Outline 8P2S-A

NC: NO CONNECTION

BLOCK DIAGRAM

M51953A, B

SUPPLY VOLTAGE

A: Built-in Load
B: Open Collector

$5\mu A$ TYP
$25\mu A$ TYP

R_1
R_2
1.25V

OUTPUT

GND
DELAY CAPACITOR

M51954A, B

SUPPLY VOLTAGE

A: Built-in Load
B: Open Collector

$5\mu A$ TYP
$25\mu A$ TYP

R_1
R_2
1.25V

OUTPUT

GND
DELAY CAPACITOR

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VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES

FUNCTION DIAGRAM

M51953A, B

$t_d \approx 0.34 \times C_d(pF) \, \mu sec$

M51954A, B

$t_d \approx 0.34 \times C_d(pF) \, \mu sec$
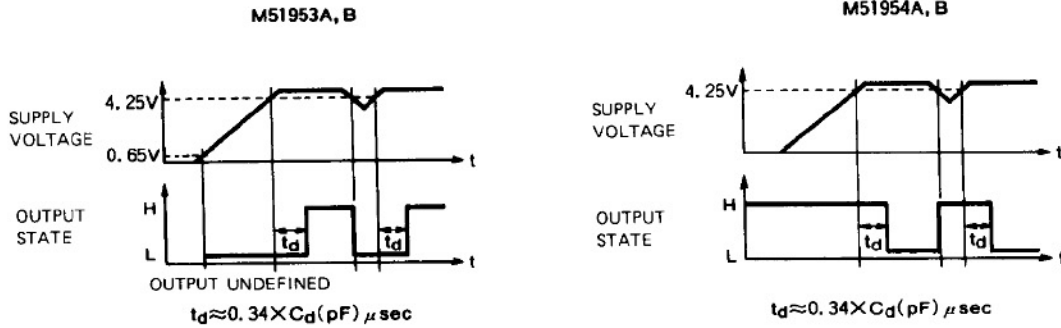
ABSOLUTE MAXIMUM RATINGS (Ta = 25℃, unless otherwise noted)

Symbol	Parameter	Conditions		Ratings	Unit
Vcc	Supply voltage			18	V
Isink	Output Sink Current			6	mA
Vo	Output voltage	A Type (Output with constant current load)		Vcc	V
		B Type (Open collector output)		18	
Pd	Power dissipation	5P SIL		450	mW
		8P FLAT		300	
Kθ	Thermal Derating	Ta ≧ 25℃	5P SIL	4.5	mW/℃
			8P FLAT	3	
Topr	Operating temperature			− 30 ~ + 85	℃
Tstg	Storage temperature			− 40 ~ + 125	℃

ELECTRICAL CHARACTERISTICS (Ta = 25℃, unless otherwise noted)

"L" reset type	"H" reset type
M51953A	M51954A
M51953B	M51954B

Symbol	Parameter	Test conditions		Min	Typ	Max	Unit
Vs	Detecting voltage			4.05	4.25	4.45	V
ΔVs	Hysterisis voltage			30	50	80	mV
Vs/ΔT	Detecting voltage Temperature Coefficient			—	0.01	—	%/℃
Icc	Circuit Current	Type A Vcc = 5V		—	450	680	μA
		Type B Vcc = 5V		—	420	630	
tpd	Delay Time	Ta = − 30 ~ + 85℃, Cd = 0.01μF (Note)		1.6	3.4	7	ms
Ipd	Constant Current	Vcc = 5V		− 8	− 5	− 3	μA
Vsat	Output Saturation Voltage	L reset type Vcc = 4V, Isink = 4mA		—	0.2	0.4	V
		H reset type Vcc = 5V, Isink = 4mA					
VOPL	Threshold Operating Voltage	L reset type Minimum supply voltage for IC operation	RL = 2.2kΩ, Vsat ≦ 0.4V	—	0.67	0.8	V
			RL = 100kΩ, Vsat ≦ 0.4V	—	0.55	0.7	
IOH	Output Leak Current	Type B		—	—	30	nA
		Type B, Ta = − 30 ~ + 85℃		—	—	1	μA
IOC	Output Load Current	Type A Vcc = 5V, Vo = 1/2Vcc		− 40	− 25	− 17	μA
VOH	Output High Voltage	Type A		Vcc − 0.2	Vcc − 0.06	—	V

Note: Delay time can be changed by changing delay capacitor for external capacitor types.
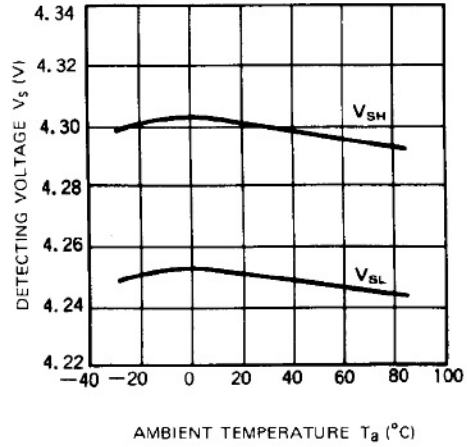(Please refer to typical characteristics)

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VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES

TYPICAL CHARACTERISTICS

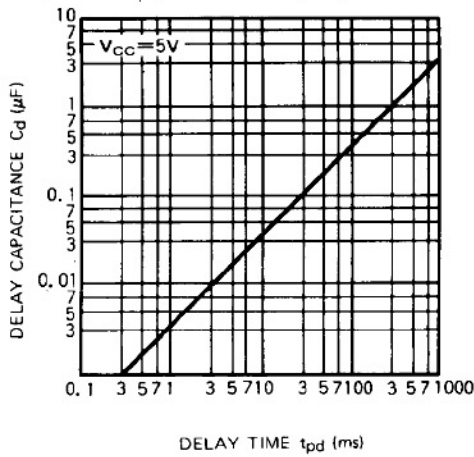#### TYPICAL CHARACTERISTICS THERMAL DERATING (MAXIMUM RATING)
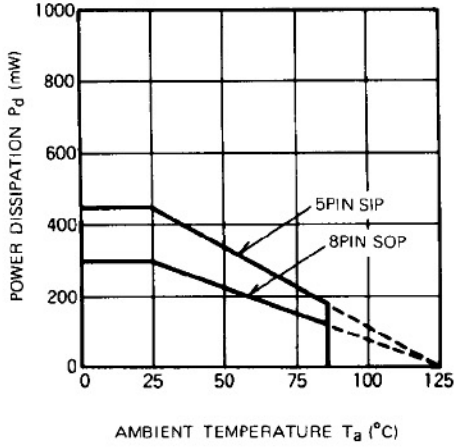
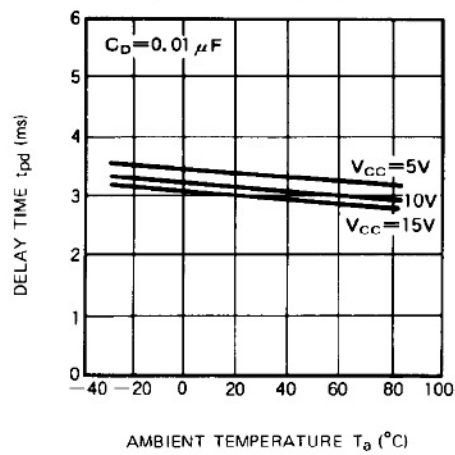#### DETECTING VOLTAGE VS. AMBIENT TEMPERATURE (Supply voltage detecting series)

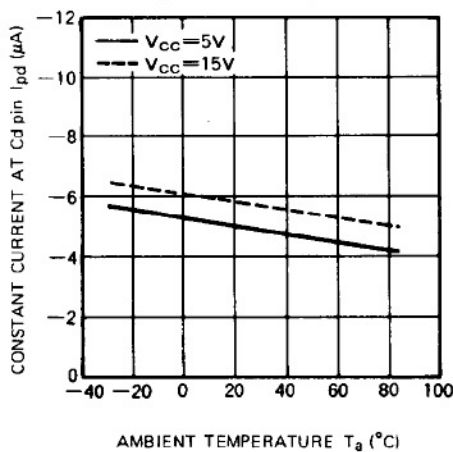#### DELAY CAPACITANCE VS. DELAY TIME (M5195XX, External delay capacitor type)

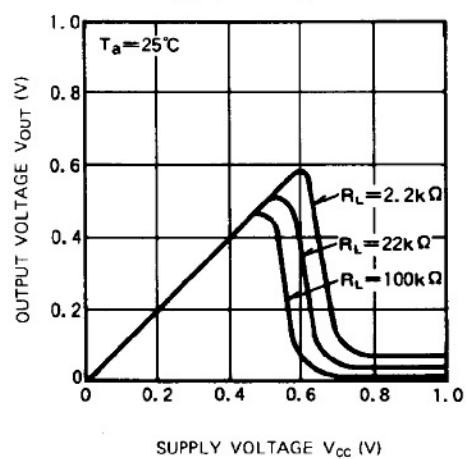#### DELAY TIME VS. AMBIENT TEMPERATURE (M5195XX, External delay capacitor type)

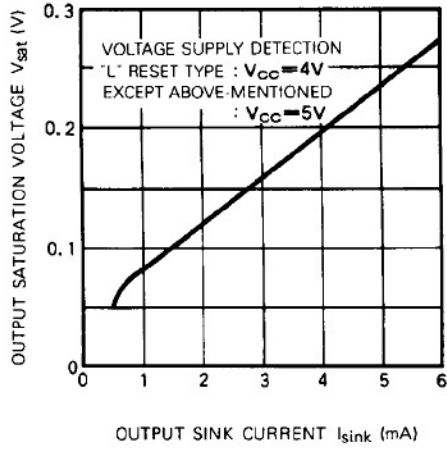#### CONSTANT CURRENT AT Cd PIN VS. AMBIENT TEMPERATURE (M5195XX, External delay capacitor type)
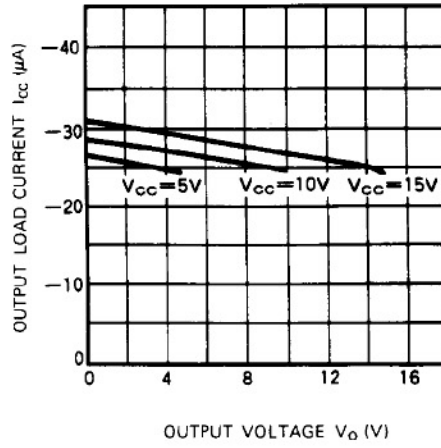

THRESHOLD OPERATING VOLTAGE ([L] reset type)

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OUTPUT SATURATION VOLTAGE VS. OUTPUT SINK CURRENT

VOLTAGE SUPPLY DETECTION
"L" RESET TYPE : V_{CC}=4V
EXCEPT ABOVE-MENTIONED
: V_{CC}=5V

OUTPUT SATURATION VOLTAGE V_{sat} (V)

OUTPUT SINK CURRENT I_{sink} (mA)

OUTPUT LOAD CURRENT VS. OUTPUT VOLTAGE (M519XXA)

OUTPUT LOAD CURRENT I_{CC} (μA)

V_{CC}=5V V_{CC}=10V V_{CC}=15V

OUTPUT VOLTAGE V_O (V)

CIRCUIT CURRENT VS. AMBIENT TEMPERATURE (M51953B, M51954B)

CIRCUIT CURRENT I_{CC} (μA)

V_{CC}=5V

AMBIENT TEMPERATURE T_a (°C)
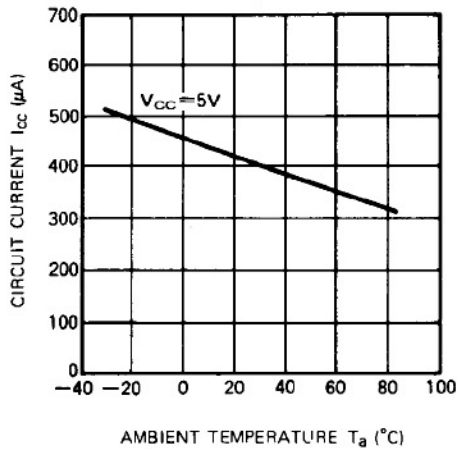
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EXAMPLE OF APPLICATION CIRCUIT
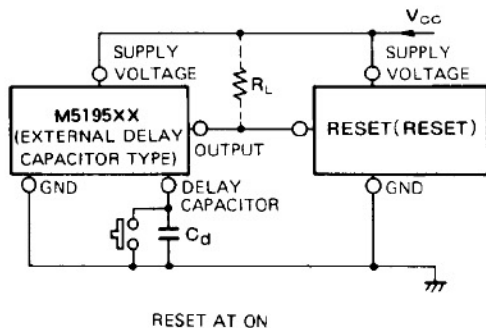### M5195XX Series Reset Circuit
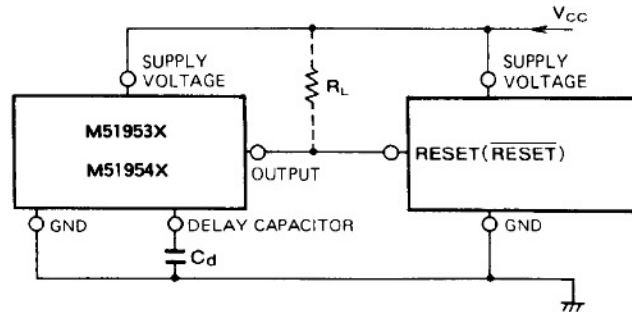
Note 1. When the detecting supply voltage is 4.25V, M51951, M51952, M51953 and M51954 are used. In this case, R_1 and R_2 are not necessary.
When the voltage is anything except 4.25V, M51955, M51956, M51957 and M51958 are used. In this case, the detecting supply voltage is $1.25 \times \dfrac{(R_1 + R_2)}{R_2}$ (V) approximately. The detecting supply voltage can be set between 2V and 15V.

Note 2. When the delay time is short, M51951, M51952, M51955 and M51956 are available. These ICs have a delay capacity and the delay time is about 200μs.
If a longer delay time is necessary, M51953, M51954, M51957 and M51958 are used. In this case, the delay time is about 0.34 x Cd (pF)μsec.

Note 3. If M5195XX and the logic circuit have a common power supply, type A (built-in load type) can be applied whether a pull-up resister is included in the logic circuit or not.

Note 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.

Note 5. When the reset terminal in the logic circuit is of the low reset type, M51951, M51953, M51955 and M51957 are used and when the terminal is of the high reset type, M51952, M51954, M51956 and M51958 are used.

Note 6. When a negative supply voltage is used, supply voltage side of M5195XX and the GND side are connected to negative supply voltage respectively.

Case of Using Other Reset Signal except Supply Voltage in the M5195XX Series

(a) Reset at ON

(b) Reset at transistor ON

RESET AT ON

RESET AT TRANSISTOR ON

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