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

VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES

DESCRIPTION

M51951A,B/M51952A,B are semiconductor integrated circuits suited for detecting supply voltage and resetting all types of logic circuits such as CPUs.

They include a built-in delay circuit to provide a retardation time (200 μsec typ.).

They find extensive applications, including circuits for battery checking, level detecting and waveform shaping.
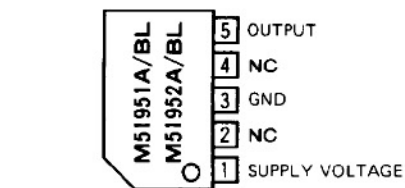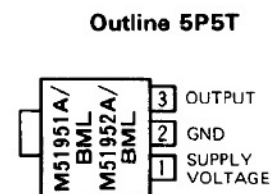
FEATURES

- Few external parts
- 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)
- Extra-small 3-pin package (3-pin FLAT)

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.
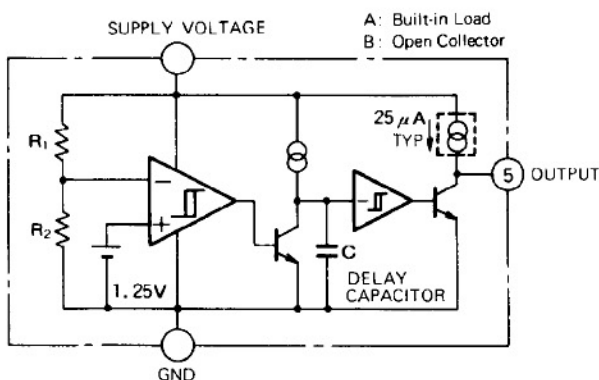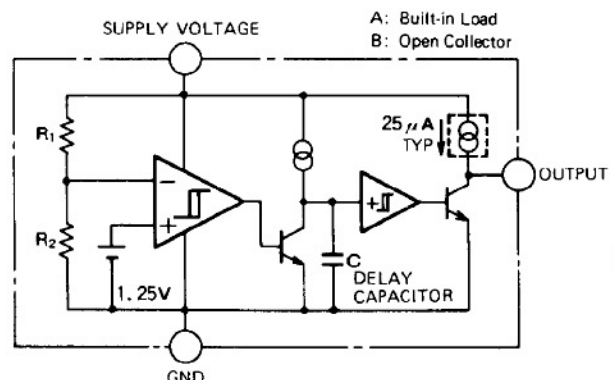
RECOMMENDED OPERATING CONDITION

Supply voltage range .... 2 ~ 17V

PIN CONFIGURATION (TOP VIEW)

M51951A/BL
M51952A/BL

5 OUTPUT
4 NC
3 GND
2 NC
1 SUPPLY VOLTAGE

Outline 5P5T

M51951A/BML
M51952A/BML

3 OUTPUT
2 GND
1 SUPPLY VOLTAGE

Outline SOT-89

M51951A/BSL
M51952A/BSL

① SUPPLY VOLTAGE
② GND
③ OUTPUT

① ② ③

Outline TO-92L

NC: NO CONNECTION

BLOCK DIAGRAM

M51951A, B

SUPPLY VOLTAGE

A: Built-in Load
B: Open Collector

R_1
R_2
1.25V
$25\mu A$ TYP
C
DELAY CAPACITOR
5 OUTPUT
GND

M51952A, B

SUPPLY VOLTAGE

A: Built-in Load
B: Open Collector

R_1
R_2
1.25V
$25\mu A$ TYP
C
DELAY CAPACITOR
OUTPUT
GND

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VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES

FUNCTION DIAGRAM

M51951A, B

M51952A, B
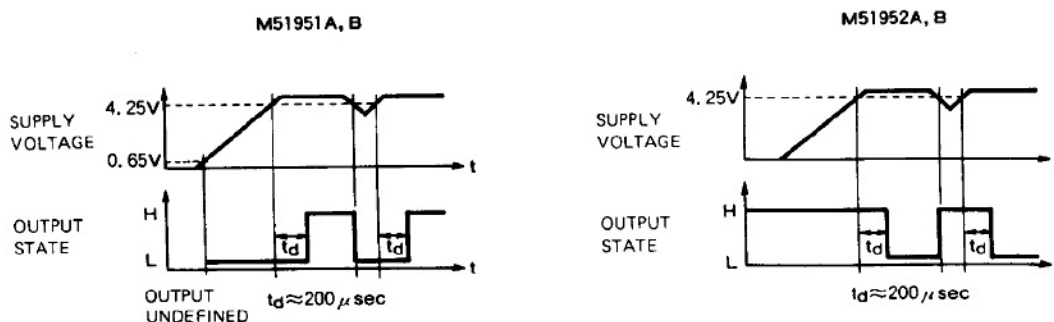
ABSOLUTE MAXIMUM RATINGS (Ta = 25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions		Ratings	Unit
V_{CC}	Supply voltage			18	V
Isink	Output Sink Current			6	mA
V_O	Output voltage	A Type (Output with constant current load)		V_{CC}	V
		B Type (Open collector output)		18	
Pd	Power dissipation	5P SIL		450	mW
		3P SIL		700	
		3P FLAT		500	
K_θ	Thermal Derating	Ta ≧ 25 ℃	5P SIL	4.5	mW/℃
			3P SIL	7	
			3P FLAT	5	
Topr	Operating temperature			−30 ~ +85	℃
Tstg	Storage temperature			−40 ~ +125	℃

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

"L" reset type	"H" reset type
M51951A	M51952A
M51951B	M51952B

Symbol	Parameter	Test conditions		Limits			Unit
				Min	Typ	Max	
V_S	Detecting voltage			4.05	4.25	4.45	V
ΔV_S	Hysterisis voltage			30	50	80	mV
$V_S/\Delta T$	Detecting voltage Temperature Coefficient			—	0.01	—	%/℃
Icc	Circuit Current	Type A V_{CC} = 5V		—	450	680	μA
		Type B V_{CC} = 5V		—	420	630	
tpd	Delay Time	Ta = −30 ~ +85 ℃ (Note)		80	200	500	μs
Vsat	Output Saturation Voltage	L reset type V_{CC} = 4V, Isink = 4mA		—	0.2	0.4	V
		H reset type V_{CC} = 5V, Isink = 4mA					
V_{OPL}	Threshold Operating Voltage	L reset type Minimum supply voltage for IC operation	R_L = 2.2kΩ, Vsat ≦ 0.4V	—	0.67	0.8	V
			R_L = 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 V_{CC} = 5V, V_O = 1/2V_{CC}		−40	−25	−17	μA
V_{OH}	Output High Voltage	Type A		V_{CC}−0.2	V_{CC}−0.06	—	V

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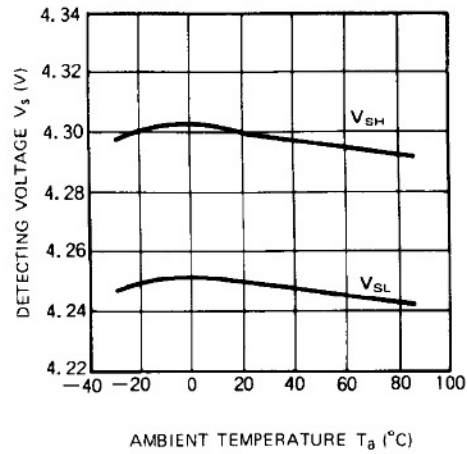(Please refer to typical characteristics)
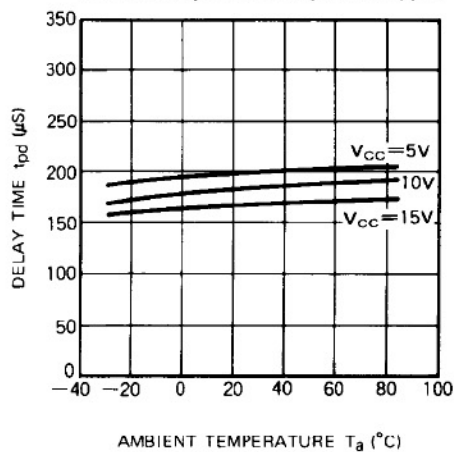
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TYPICAL CHARACTERISTICS

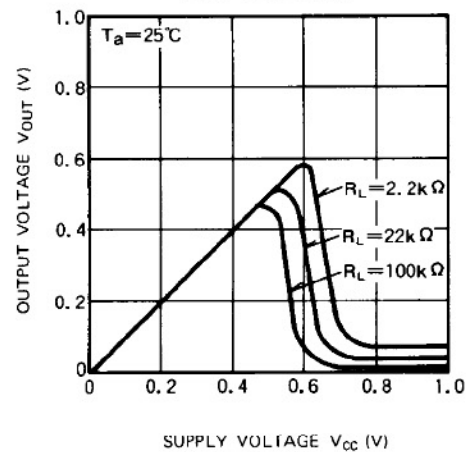### TYPICAL CHARACTERISTICS THERMAL DERATING (MAXIMUM RATING)
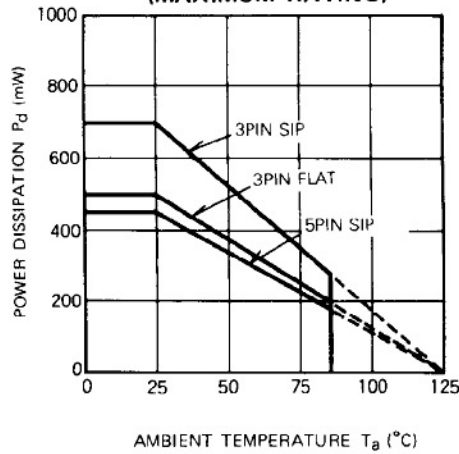
DETECTING VOLTAGE VS. AMBIENT TEMPERATURE
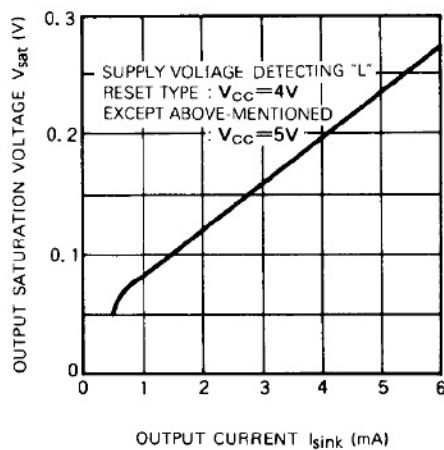(Supply voltage detecting series)

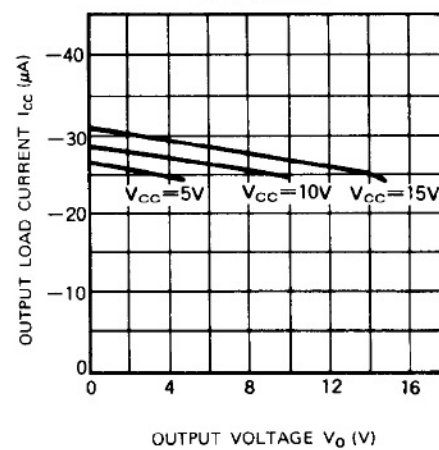### DELAY TIME VS. AMBIENT TEMPERATURE
(M5195XX, Built-in capacitor type)

THRESHOLD OPERATING VOLTAGE
([L] reset type)
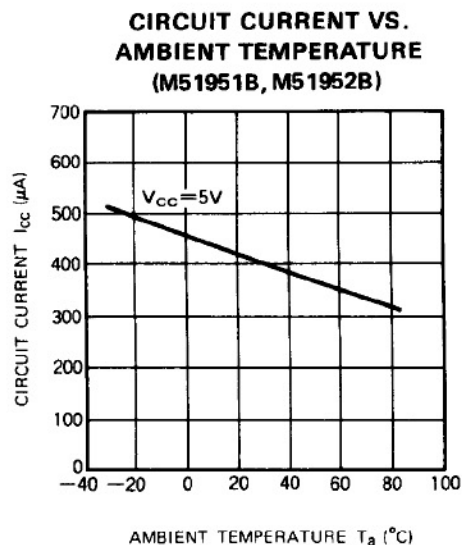

OUTPUT SATURATION VOLTAGE VS. OUTPUT SINK CURRENT
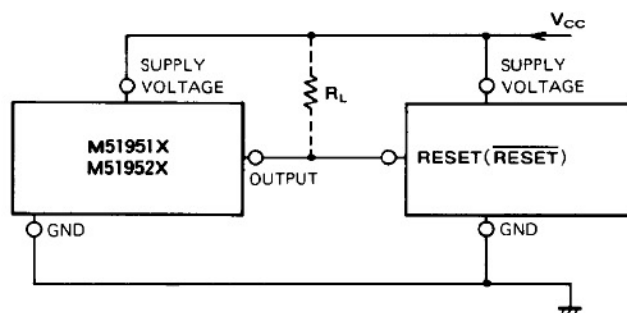

OUTPUT LOAD CURRENT VS. OUTPUT VOLTAGE
(M519XXA)

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**CIRCUIT CURRENT VS.
AMBIENT TEMPERATURE
(M51951B, M51952B)**

AMBIENT TEMPERATURE T_a (°C)

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.

When the voltage is anything except 4.25V, M51955, M51956, M51957 and M51958 are used.

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 $200\mu s$.

If a longer delay time is necessary, M51953, M51954, M51957 and M51958 are used.

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.