

To all our customers

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

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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

# M51943A,B/M51944A,B

## VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES

### DESCRIPTION

M51943A,B/M51944A,B are semiconductor integrated circuits designed for detecting supply voltage and resetting all types of logic circuits such as CPUs.

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)
  - ..... 0.6V (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 FALT)

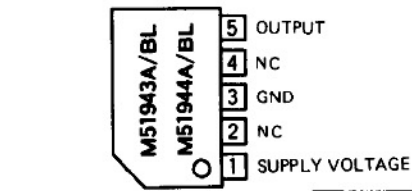
### APPLICATION

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.

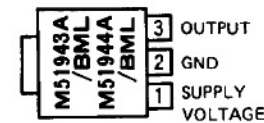
### RECOMMENDED OPERATING CONDITION

Supply voltage range ..... 2 ~ 17V

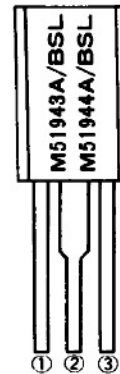
### PIN CONFIGURATION



Outline 5P5T



Outline SOT-89

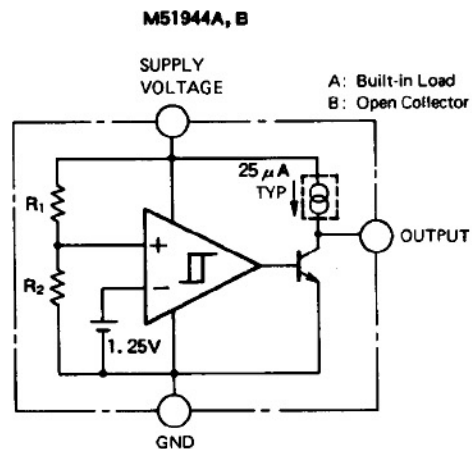
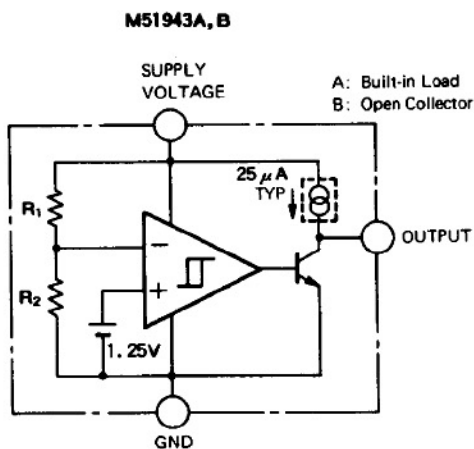


Outline TO-92L

- ① SUPPLY VOLTAGE
- ② GND
- ③ OUTPUT

NC: NO CONNECTION

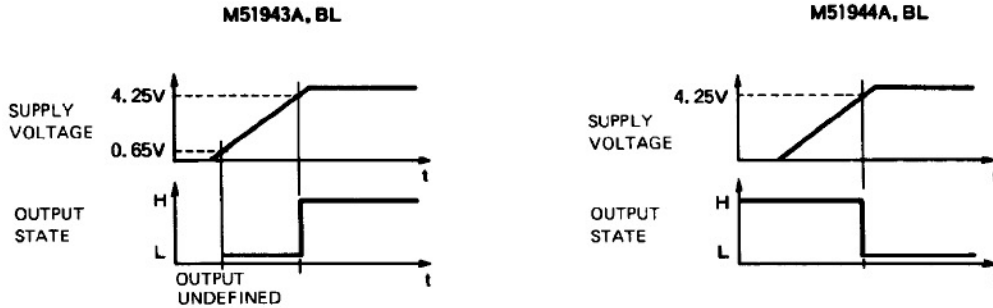
### BLOCK DIAGRAM



MITSUBISHI <Dig./Ana. INTERFACE>  
**M51943A,B/M51944A,B**

**VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES**

**FUNCTION DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit	
$V_{CC}$	Supply voltage		18	V	
$I_{sink}$	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		
$P_d$	Power dissipation	5P SIL	450	mW	
		3P SIL	700		
		3P FLAT	500		
$K_\theta$	Thermal Derating	$T_a \geq 25^\circ\text{C}$	5P SIL	4.5	mW/ $^\circ\text{C}$
			3P SIL	7	
			3P FLAT	5	
$T_{opr}$	Operating temperature		$-30 \sim +85$	$^\circ\text{C}$	
$T_{stg}$	Storage temperature		$-40 \sim +125$	$^\circ\text{C}$	

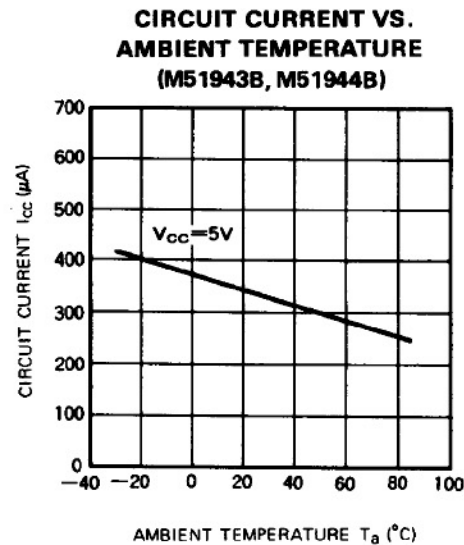
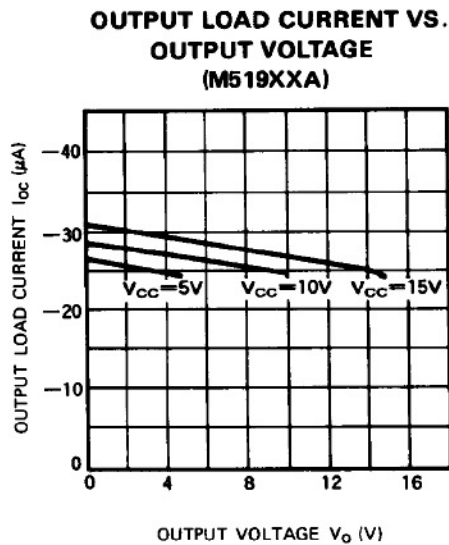
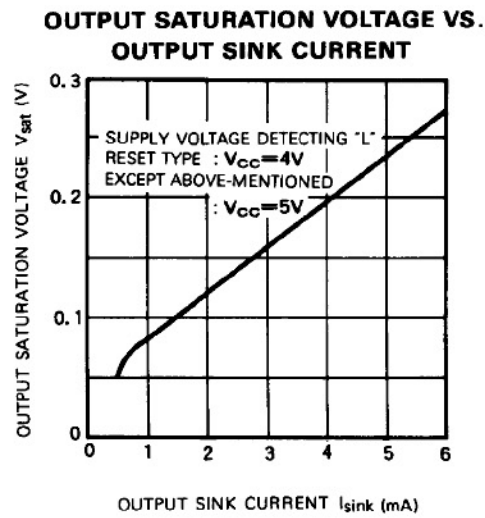
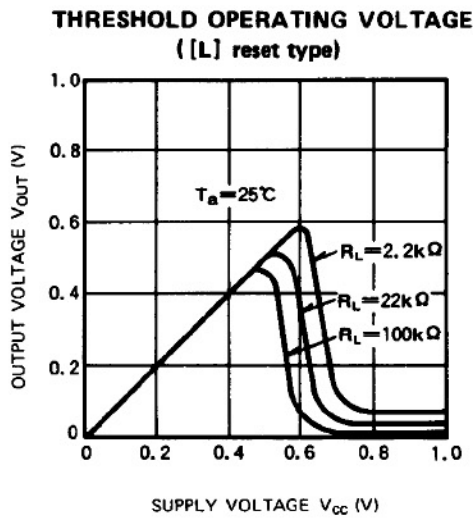
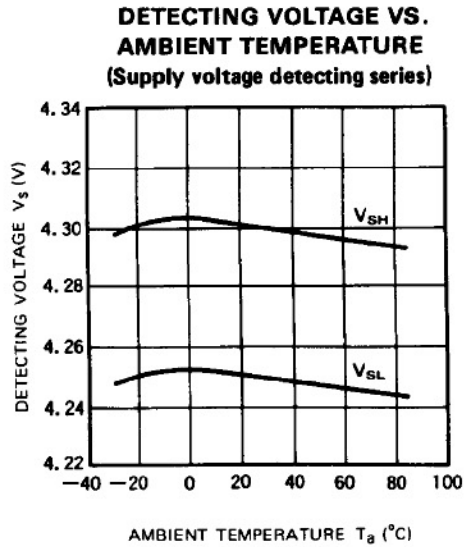
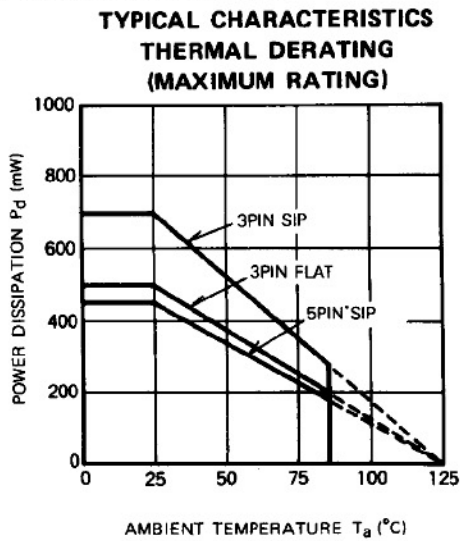
**ELECTRICAL CHARACTERISTICS** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

"L" reset type	"H" reset type
<b>M51943A</b>	<b>M51944A</b>
<b>M51943B</b>	<b>M51944B</b>

Symbol	Parameter	Test conditions	Limits			Unit	
			Min	Typ	Max		
$V_S$	Detecting voltage		4.05	4.25	4.45	V	
$\Delta V_S$	Hysteresis voltage		30	50	80	mV	
$V_S/\Delta T$	Detecting voltage Temperature Coefficient		—	0.01	—	%/ $^\circ\text{C}$	
$I_{CC}$	Circuit Current	A type $V_{CC} = 5V$	—	370	560	$\mu\text{A}$	
		B type $V_{CC} = 5V$	—	370	510		
$V_{sat}$	Output Saturation Voltage	L reset type $V_{CC} = 4V, I_{sink} = 4mA$	—	0.2	0.4	V	
		H reset type $V_{CC} = 5V, I_{sink} = 4mA$	—	0.2	0.4		
$V_{OPL}$	Threshold Operating voltage	L reset type Minimum supply voltage for IC operation	$R_L = 2.2k\Omega, V_{sat} \leq 0.4V$	—	0.67	0.8	V
			$R_L = 100k\Omega, V_{sat} \leq 0.4V$	—	0.55	0.7	
$I_{OH}$	Output Leakage Current	B type	—	—	30	nA	
		B Type $T_a = -30 \sim +85^\circ\text{C}$	—	—	1		
$I_{OC}$	Output Load Current	A type $V_{CC} = 5V, V_O = 1/2 \times V_{CC}$	-40	-25	-17	$\mu\text{A}$	
$V_{OH}$	Output High Voltage	A type	$V_{CC} - 0.2$	$V_{CC} - 0.06$	—	V	
$t_{PHL}$	Propagation Delay Time	Response time when $V_{CC}$ changes H $\rightarrow$ L	—	6	—	$\mu\text{s}$	
$t_{PLH}$		Response time when $V_{CC}$ changes L $\rightarrow$ H	—	3	—	$\mu\text{s}$	

**VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES**

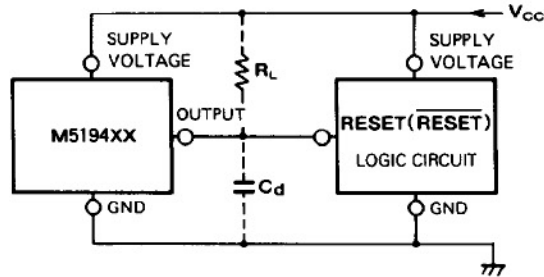
**TYPICAL CHARACTERISTICS**



**VOLTAGE DETECTING, SYSTEM RESETTING IC SERIES**

**EXAMPLE OF APPLICATION CIRCUIT**

**Reset Circuit of M5194XX Series**



Note 1. When the detecting supply voltage is 4.25V, M51943 and M51944 are used. When the voltage is anything except 4.25V, M51945 and M51946 are used.

Note 2. If the M5194XX 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.

Note 3. 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 4. It is better to use the M5195XX series to cause a delay, but if the delay is caused by the M5194XX series, the delay capacitor  $C_d$  is applied between the output and GND.

Note 5. When the reset terminal in the logic circuit is of the low reset type, M51943 and M51945 are used and when the terminal is of the high reset type, M51944 and M51946 are used.

Note 6. When a negative supply voltage is used, the supply voltage side of M5194XX and the GND side are connected to GND and the negative supply voltage respectively.