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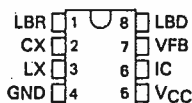
## LINEAR INTEGRATED CIRCUITS

## TYPES RM4193, RC4193 MICROPOWER SWITCHING REGULATOR

D2718, SEPTEMBER 1983

- High Efficiency . . . 80% Typ
- Low Bias Current . . . 135  $\mu$ A
- Adjustable Output . . . 2.5 V to 24 V
- Output Current . . . 150 mA
- Internal Reference . . . 1.3 V  $\pm$  5%
- Remote Shutdown Capabilities
- Interchangeable with Raytheon RM4193 and RC4193

RM4193 . . . JG  
RC4193 . . . JG OR P  
DUAL-IN-LINE PACKAGE  
(TOP VIEW)



### description

The RM4193 and RC4193 are monolithic micropower switching regulators designed to provide all the functions required to make a complete low-power switching regulator primarily for battery operated instruments. The RM4193 and RC4193 offer the system designer the flexibility of tailoring the circuit to the application. Typical applications include step-up switching regulation, step-down switching regulation, and inverting switch regulation. The devices each contain a 1.3-volt temperature-compensated band-gap reference, an adjustable free-running oscillator, voltage comparator, low battery detection circuitry, and a 150-milliampere output-switch transistor.

### FUNCTION TABLE

PIN	FUNCTION	DESCRIPTION
1	LBR	Low battery resistor
2	CX	External capacitor
3	LX	External inductor
4	GND	Ground
5	VCC	Supply voltage
6	IC	Reference set control
7	VFB	Feedback voltage
8	LBD	Low battery detector

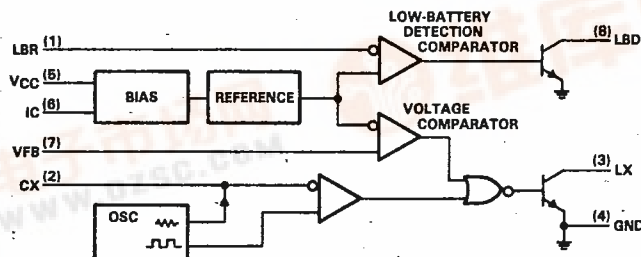
For most applications, these regulators can achieve up to 80% efficiency while operating over a wide supply voltage range from 2.4 volts to 24 volts at an ultra-low bias current drain of 135 microamperes. The RM4193 and RC4193 have an adjustable 100-hertz to 160-kilohertz free-running oscillator that provides the drive circuitry for the on-chip 150-milliampere output-switch transistor. An external capacitor on pin 2 determines the oscillator frequency.

The low-battery detection circuitry contains an open-collector output transistor that can be used to activate a liquid crystal display whenever the battery voltage drops below a programmed level. This programmed level is determined by the selection of external resistors connected to pin 1.

The regulator will shut off when pin 6 (IC) is below 0.5 volt. The shut-off feature is useful in battery-backup applications requiring operation only when the line power is removed. Another use of this feature is connecting a zener diode between pin 6 and the battery line to shut down the regulator whenever the battery voltage drops below a predetermined level.

The RM4193 will be characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The RC4193 will be characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

### functional block diagram



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### PRODUCT PREVIEW

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Voltage Regulators

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