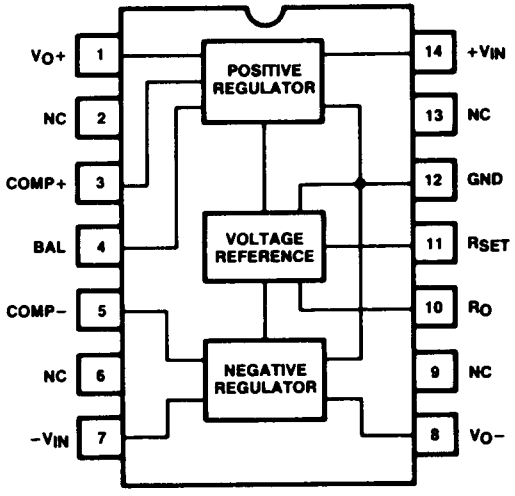
Dual-Tracking Voltage Regulator

GENERAL DESCRIPTION

The XR-4194 is a dual-polarity tracking regulator designed to provide balanced or unbalanced positive and negative output voltages at currents of up to 200 mA. A single resistor can be used to adjust both outputs between the limits of ±50mV and ±42 V. The device is ideal for local on-card regulation, which eliminates the distribution problems associated with single-point regulation. The XR-4194 is available in a 14-pin ceramic dual-in-line package, which has a 900 mW rating.

FUNCTIONAL BLOCK DIAGRAM



FEATURES

Direct Replacement for RM/RC 4194
Both Outputs Adjust with Single Resistor
Load Current to ±200 mA with 0.2% Load Regulation
Low External Parts Count
Internal Thermal Shutdown at T_J = 175°C
External Adjustment for ± V_O Unbalancing

APPLICATIONS

On-Card Regulation
Adjustable Regulator

ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-4194CN	Ceramic DIP	0°C to +70°C
XR-4194M*	Ceramic DIP	−55°C to +125°C

*Consult factory for availability

ABSOLUTE MAXIMUM RATINGS

Input Voltage ± V to Ground	
XR-4194M	±45 V
XR-4194CN	±35 V
Input/Output Voltage Differential	±45 V
Power Dissipation at T_A = 25°C	900 mW
Load Current	30 mA
Operating Junction Temperature Range	
XR-4194M	−55°C to +150°C
XR-4194CN	0°C to +125°C
Storage Temperature Range	−65°C to +150°C

SYSTEM DESCRIPTION

The XR-4194 is a dual polarity tracking voltage regulator. An on board reference, set by a single resistor, determines both output voltages. Tracking accuracy is better than 1%. Non-symmetrical output voltages are obtained by connecting a resistor to the balance adjust (Pin 4). Internal protection circuits include thermal shutdown and active current limiting.

ELECTRICAL CHARACTERISTICS

Test Conditions: $\pm 5 \leq V_{OUT} \leq V_{MAX}$; XR-4194M $-55°C \leq +125°C$; XR-4194CN $0°C \leq T_J \leq +70°C$

$-55°C \leq T_J \leq +125°C$	XR-4194M			XR-4194CN				
PARAMETERS	**MIN**	**TYP**	**MAX**	**MIN**	**TYP**	**MAX**	**UNIT**	**CONDITIONS**
Line Regulation		0.02	0.1		0.02	0.1	$\%V_{OUT}$	$\Delta V_{IN} = 0.1\ V_{IN}$
Load Regulation		0.001	0.0025		0.001	0.004	$\%V_O/mA$	XR-4194CN, M: I_L = 5 to 100 mA
TC of Output Voltage		0.002	0.020		0.003	0.015	%/°C	
*Stand-by Current Drain from		+0.3	+1.0		+0.3	+1.5	mA	$V_{IN} = V_{MAX}$, $V_O = 0V$
to		−1.2	−2.0		−1.2	−2.0		$V_{IN} = V_{MAX}$, $V_O = 0V$
Input Voltage Range	±9.5		±45	±9.5		±35	V	
Output Voltage Scale Factor	2.45	2.5	2.55	2.38	2.5	2.62	KΩ/V	R_{SET} = 71.5 K, T_J = 25°C
Output Voltage Range	0.05		+42	0.05		±32	V	R_{SET} = 71.5 K
Output Voltage Tracking			1.0			2.0	%	
Ripple Rejection		70			70		dB	f = 120 Hz, T_J = 25°C
Input-Output Voltage Differential	3.0			3.0			V	I_L = 50mA
Output Short Circuit Current		300			300		mA	V_{IN} = ±30 V Max
Output Noise Voltage		250			250		μV RMS	C_L = 4.7 μF, V_O = ±15 V, f = 10 Hz to 100 KHz
Internal Thermal Shutdown		175			175		°C	

* $\pm I_{Quiescent}$ will increase by 50 $\mu A/V_{OUT}$ on positive side and 100 $\mu A/V_{OUT}$ on negative side.

THERMAL CHARACTERISTICS

	XR-4194M			XR-4194CN			
PARAMETERS	**MIN**	**TYP**	**MAX**	**MIN**	**TYP**	**MAX**	**CONDITIONS**
Power Dissipation			900 mW 2.2 W			900 mW 2.2 W	T_A = 25°C T_C = 25°C
Thermal Resistance Junction to Ambient Junction to Case		128°C/W 55°C/W			128°C/W 55°C/W		

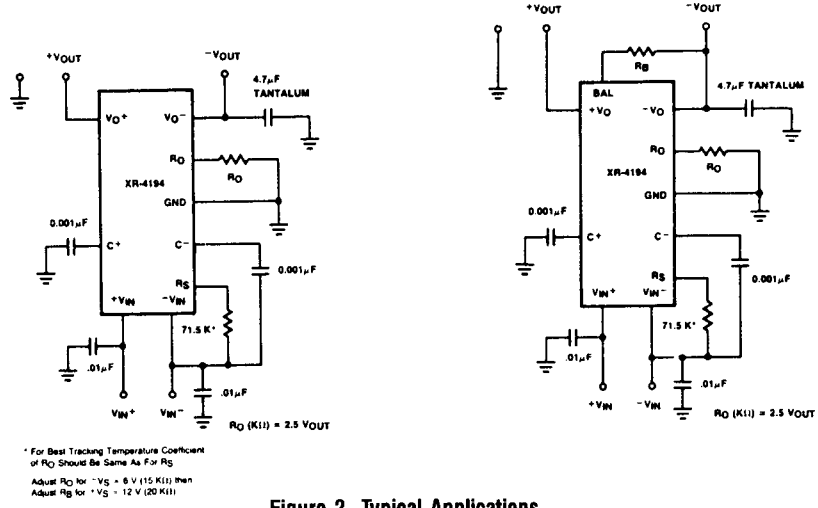
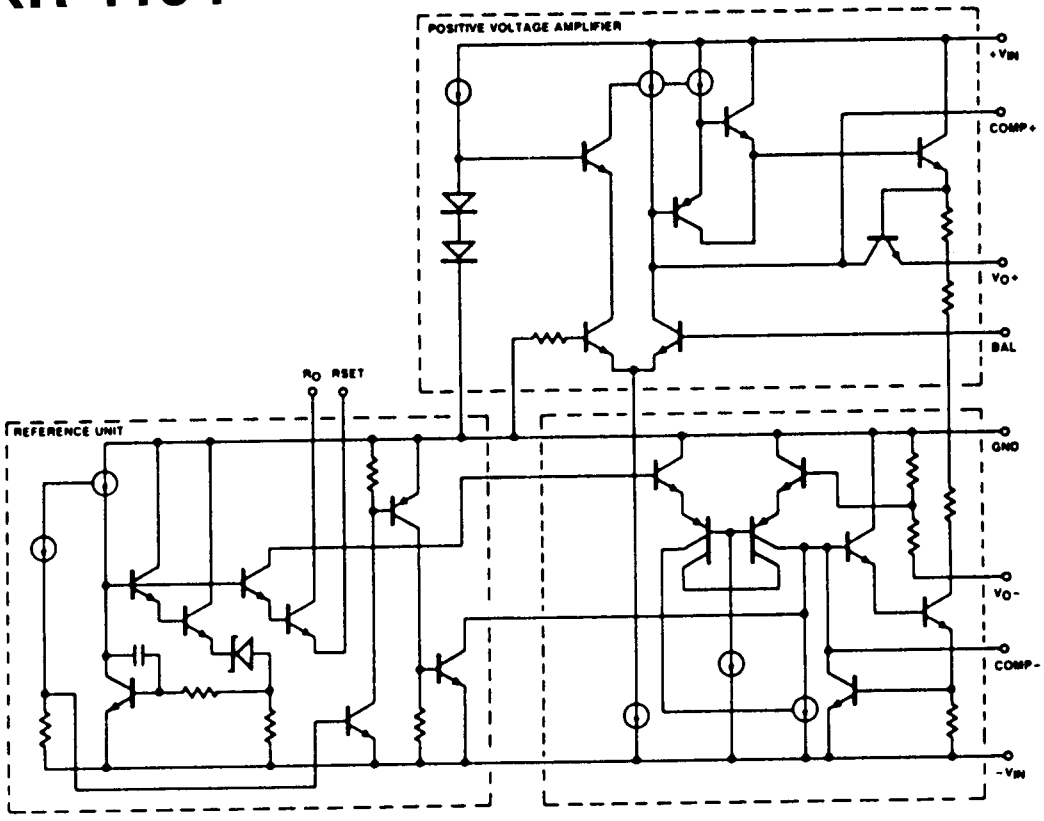


Figure 2. Typical Applications



EQUIVALENT SCHEMATIC DIAGRAM

Pin	Name	Description
1	V_O+	The positive output of the regulator. It can source up to 200 mA. Please check on the limitation of the package dissipation with respect to the voltage drop and current requirements.
2	NC	No Connection: This is grounded to allow better dissipation of heat.
3	COMP+	Compensation for the positive regulator. A 1 nF capacitor is tied from here to ground.
4	BAL	Balance: This controls the amount of difference between V_O+ and $\|V_O-\|$.
5	COMP−	Compensation for the negative regulator, normally a 1 nF capacitor from this pin to $V_{IN}-$.
6	NC	No Connection: This can be tied to ground to allow better dissipation of the heat.
7	$V_{IN}-$	Negative Regulator Input: A 0.01μF capacitor from this pin to ground should be tied. This prevents any high frequency noise on the unregulated supply from affecting the regulation.
8	$V_{OUT}-$	Negative Regulator Output: A 4.7μF tantalum capacitor from this pin to ground should be tied.
9	NC	No Connection: This pin can be tied to ground for better heat dissipation.

10	R_O	Output Voltage Set Resistor: The output voltage of both the positive and negative regulators is set by this pin. The formula is: $R_O(k\Omega)=2.5V_{OUT}$ where $V_{OUT}=V_O+$ or $\|V_O-\|$
11	R_{SET}	Setting Resistor: In all applications this resistor should be 71.5 kilohm tied from this pin to $V_{IN}-$ (pin 7).
12	GROUND	This is ground for the device. The outputs will be centered around this voltage.
13.	NC	No Connection: This pin can be grounded for better heat dissipation.
14.	$V_{IN}+$	Positive Regulator Input: A 0.01µF capacitor from this input to ground should be used. The minimum voltage drop from $V_{IN}+$ to V_O+ is $3V_{DC}$. The maximum is limited by P_D of the device.

EXAR

XR-1488/1489A

Quad Line Driver/Receiver

GENERAL DESCRIPTION

The XR-1488 is a monolithic quad line driver designed to interface data terminal equipment with data communications equipment in conformance with the specifications of EIA Standard No. RS232C. This extremely versatile integrated circuit can be used to perform a wide range of applications. Features such as output current limiting, independent positive and negative power supply driving elements, and compatibility with all DTL and TTL logic families greatly enhance the versatility of the circuit.

The XR-1489A is a monolithic quad line receiver designed to interface data terminal equipment with data communications equipment. the XR-1489A quad receiver along with its companion circuit, the XR-1488 quad driver, provide a complete interface system between DTL or TTL logic levels and the RS232C defined voltage and impedance levels.

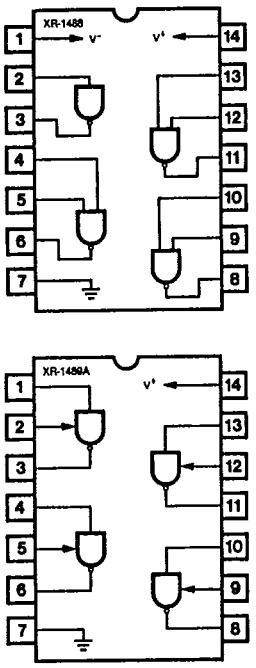
ABSOLUTE MAXIMUM RATINGS

Power Supply	
XR-1488	±15 Vdc
XR-1489A	+10 Vdc
Power Dissipation	
Ceramic Package	1000 mW
Derate above +25°C	6.7 mW/°C
Plastic Package	650 mW/°C
Derate above +25°C	5 mW/°C

ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-1488N	Ceramic	0°C to +70°C
XR-1488P	Plastic	0°C to +70°C
XR-1489AN	Ceramic	0°C to +70°C
XR-1489AP	Plastic	0°C to +70°C

FUNCTIONAL BLOCK DIAGRAMS



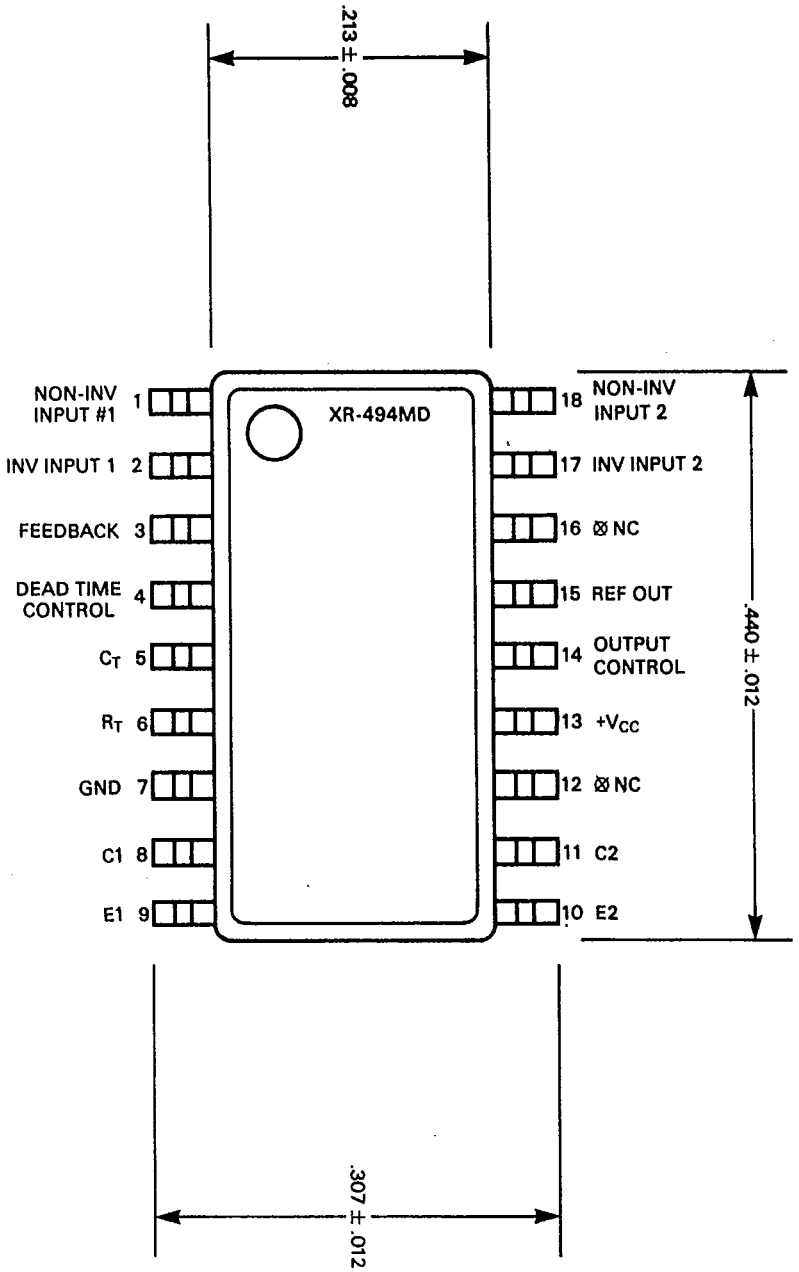
SYSTEM DESCRIPTION

The XR-1488 and XR-1489A are a matched set of quad line drivers and line receivers designed for interfacing between TTL/DTL and RS232C data communication lines.

The XR-1488 contains four independent split supply line drivers, each with a ±10 mA current limited output. For RS232C applications, the slew rate can be reduced to the 30 V/μS limit by shunting the output to ground with a 410 pF capacitor. The XR-1489A contains four independent line receivers, designed for interfacing RS232C to TTL/DTL. Each receiver features independently programmable switching thresholds with hysteresis, and input protection to ±30 V. The output can typically source 3 mA and sink 20 mA.

XR-494

T-58-11-31



EXAR

XR-1468/1568

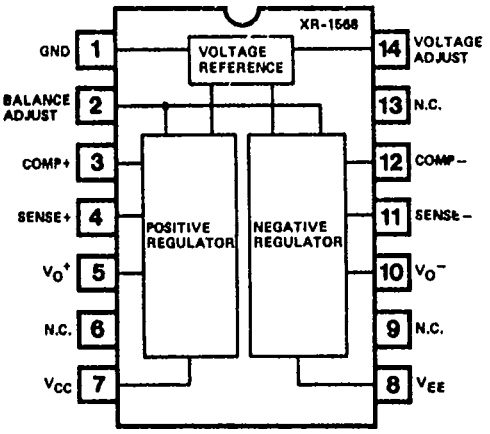
Dual-Polarity Tracking Voltage Regulator

GENERAL DESCRIPTION

The XR-1468/1568 is a dual polarity tracking voltage regulator, internally trimmed for symmetrical positive and negative 15V outputs. Current output capability is 100 mA, and may be increased by adding external pass transistors. The device is intended for local "on-card" regulation, which eliminates the distribution problems associated with single point regulation.

The XR-1468CN and XR-1568N are guaranteed over the 0°C to 70°C commercial temperature range. The XR-1568M is rated over the full military temperature range of −55°C to +125°C.

FUNCTIONAL BLOCK DIAGRAM



FEATURES

Internally Set for ±15V Outputs
±100 mA Peak Output Current
Output Voltages Balanced Within 1% (XR-1568)
0.06% Line and Load Regulation
Low Stand-By Current
Output Externally Adjustable from ±8 to ±20 Volts
Externally Adjustable Current Limiting
Remote Sensing

APPLICATIONS

Main Regulation in Small Instruments
On-Card Regulation in Analog and Digital Systems
Point-of-Load Precision Regulation

ORDERING INFORMATION

Part Number	Temperature	Output Offset	Package
XR-1568M	−55°C to +125°C	±150 mV max	Ceramic
XR-1568N	0°C to +70°C	±150 mV max	Ceramic
XR-1468CN	0°C to +70°C	±300 mV max	Ceramic

ABSOLUTE MAXIMUM RATINGS

Power Supply	±30 Volts
Minimum Short-Circuit Resistance	4.0 Ohms
Load Current, Peak	±100 mA
Power Dissipation	
Ceramic (N) Package	1.0 Watt
Derate Above +25°C	6.7 mW/°C
Operating Temperature	
XR-1568M	−55°C to +125°C
XR-1568/XR-1468C	0°C to +70°C
Storage Temperature	−65°C to +150°C

SYSTEM DESCRIPTION

The XR-1468/1568 is a dual polarity tracking voltage regulator combining two separate regulators with a common reference element in a single monolithic circuit, thus providing a very close balance between the positive and negative output voltages. Outputs are internally set to ±15 Volts but can be externally adjusted between ±8.0 to ±20 Volts with a single control. The circuit features ±100 mA output current, with externally adjustable current limiting, and provision for remote voltage sensing.

5