

Pulse-Width Modulating Regulator

GENERAL DESCRIPTION

The XR-1524 family of monolithic integrated circuits contain all the control circuitry for a regulating power supply inverter or switching regulator. Included in a 16-pin dual-in-line package is the voltage reference, error amplifier, oscillator, pulse width modulator, pulse steering flip-flop, dual alternating output switches and current limiting and shut-down circuitry. This device can be used for switching regulators of either polarity, transformer coupled DC to DC converters, transformerless voltage doublers and polarity converters, as well as other power control applications. The XR-1524 is specified for operation over the full military temperature range of -55°C to $+125^{\circ}\text{C}$.

FEATURES

- Pin-for-Pin Replacement for SG-1524/2524/3524
- Complete PWM power control circuitry
- Single ended or push-pull outputs
- Line and load regulation of 0.2%
- Total supply current less than 10 mA
- Operation beyond 100 kHz

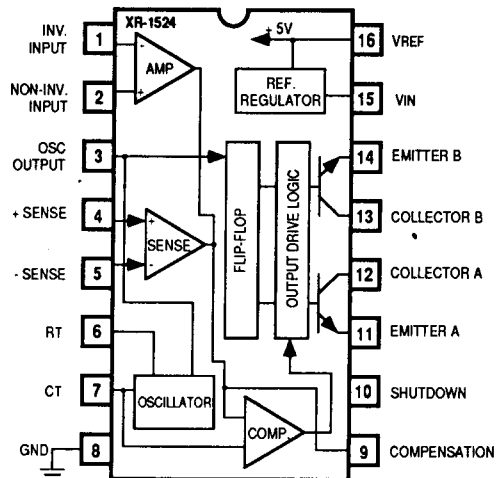
APPLICATIONS

- Switching Regulators
- Pulse-width Modulated Power Control Systems

ABSOLUTE MAXIMUM RATINGS

Input Voltage	40V
Output Current (each output)	100 mA
Reference Output Current	50 mA
Oscillator Charging Current	5 mA
Power Dissipation	
Ceramic Package	1000 mW
Derate above $+25^{\circ}\text{C}$	8 mW/ $^{\circ}\text{C}$
Operating Temperature Range	
XR-1524	-55°C to $+125^{\circ}\text{C}$
Storage Temperature Range	-65°C to $+150^{\circ}\text{C}$

FUNCTIONAL BLOCK DIAGRAM



SYSTEM DESCRIPTION

The XR-1524 pulse width modulating regulator is a complete monolithic switching regulator. An internal 5V reference, capable of supplying up to 50 mA to external loads, provides an on-board operating standard. The oscillator frequency and duty cycle are adjusted by an external RC network. Regulation is controlled by an error amplifier which, combined with the sense amplifier, also allows current limiting and remote shutdown functions. The outputs of the XR-1524 are two identical NPN transistors with both emitters and collectors uncommitted. Each output transistor has antisaturation circuitry for fast response and local current limiting set at 100mA.

XR-1524

XR-1524 ELECTRICAL PERFORMANCE CHARACTERISTICS

TEST	SYMBOL	CONDITIONS		LIMITS		UNIT	GROUP A SUBGROUP
		CONDITIONS	TEMPERATURE	MIN	MAX		
REFERENCE SECTION							
Output Voltage	VREF	VIN = 20V	TA = 25°C -55°C ≤ TA ≤ +125°C	4.8 4.8	5.2 5.2	V V	1 2,3
Line Regulation	VRLINE	8V ≤ VIN ≤ 40V	TA = 25°C -55°C ≤ TA ≤ +125°C		20 20	mV mV	1 2,3
Load Regulation	VRLOAD	0mA ≤ IL ≤ 20mA	TA = 25°C -55°C ≤ TA ≤ +125°C		50 50	mV mV	1 2,3
Short Circuit Current Limit	I _{OS}	VREF = 0	TA = 25°C -55°C ≤ TA ≤ +125°C		150 150	mA mA	1 2,3
OSCILLATOR SECTION							
Voltage Stability	Δf _{OSC}	8V ≤ VIN ≤ 40V	TA = 25°C -55°C ≤ TA ≤ +125°C		1 1	% %	1 2,3
ERROR AMPLIFIER SECTION							
Input Offset Voltage	V _{IO}		TA = 25°C -55°C ≤ TA ≤ +125°C		5 5	mV mV	1 2,3
Input Bias Current	I _{IB}		TA = 25°C -55°C ≤ TA ≤ +125°C		10 10	μA μA	1 2,3
Open Loop Gain	A _{VS}		TA = 25°C -55°C ≤ TA ≤ +125°C	72 72		db db	4 5,6
Common Mode Rejection Ratio	CMRR	1.8 ≤ CM ≤ 3.4V	TA = 25°C -55°C ≤ TA ≤ +125°C	46 46		db db	4 5,6
Output High Level	V _{HI}		TA = 25°C -55°C ≤ TA ≤ +125°C	3.8 3.8		V V	1 2,3
Output Low Level	V _{LO}		TA = 25°C -55°C ≤ TA ≤ +125°C		0.5 0.5	V V	1 2,3
CURRENT LIMITING SECTION							
Sense Voltage	V _{SEN}		TA = 25°C	190	210	mV	1
OUTPUT SECTION							
Emitter Output Voltage	V _{EO}	V _{IN} = 20V	TA = 25°C -55°C ≤ TA ≤ +125°C	17 17		V V	1 2,3
Saturation Voltage	V _{CE(SAT)}	I _C = 50mA	TA = 25°C -55°C ≤ TA ≤ +125°C		2 2	V V	1 2,3
Collector Leakage Current	I _{CEX}	V _{CE} = 40V	TA = 25°C -55°C ≤ TA ≤ +125°C		50 50	μA μA	1 2,3
Standby Current	I _{IN}	V _{IN} = 40V	TA = 25°C -55°C ≤ TA ≤ +125°C		10 10	mA mA	1 2,3

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XR-1488/1489A

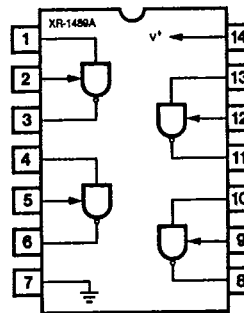
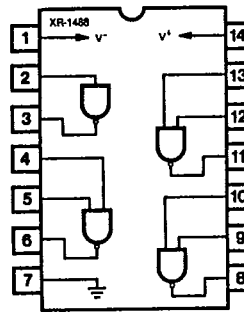
Quad Line Driver/Receiver

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.

FUNCTIONAL BLOCK DIAGRAMS



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

SYSTEM DESCRIPTION

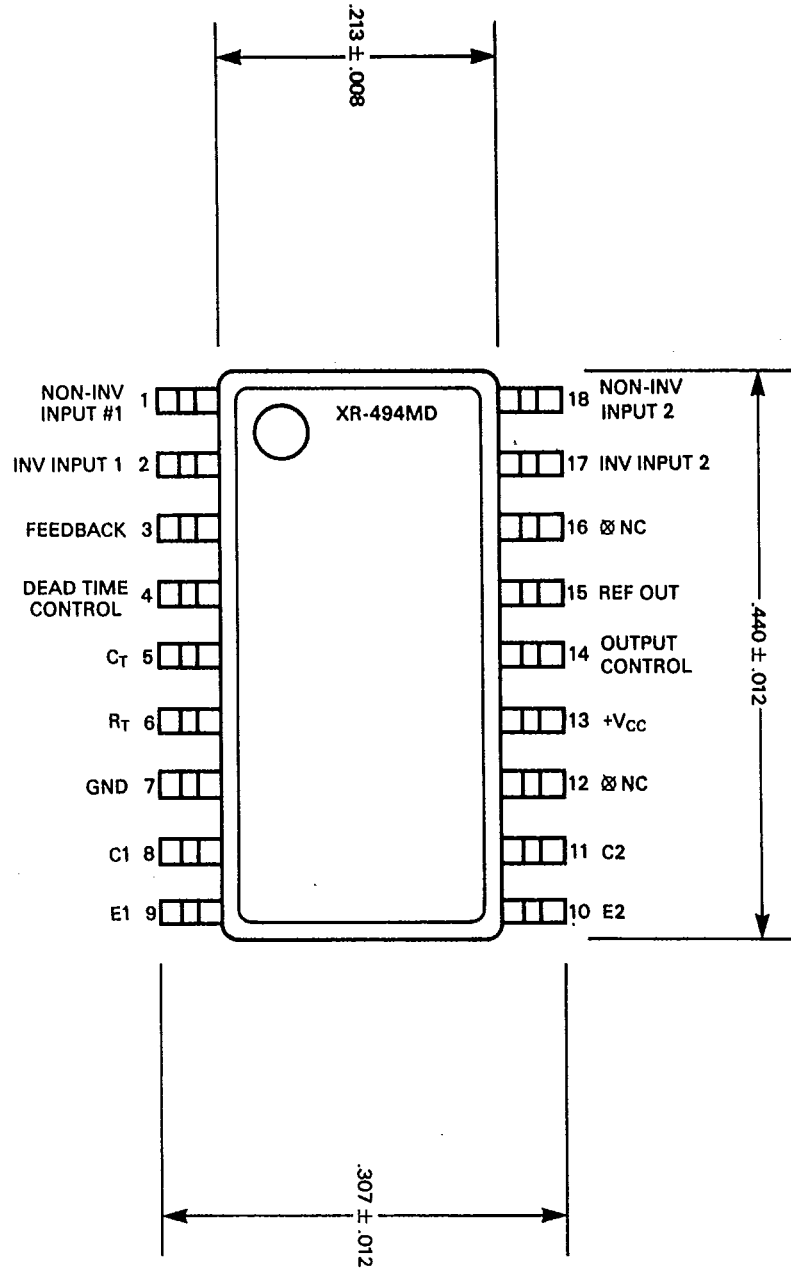
The XR-1488 and XR-1489A are a matched set of quad line drivers and line receivers designed for interfacing between TTL/DTL and RS232C data communication lines.

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.

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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.

FEATURES

- Internally Set for $\pm 15V$ 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

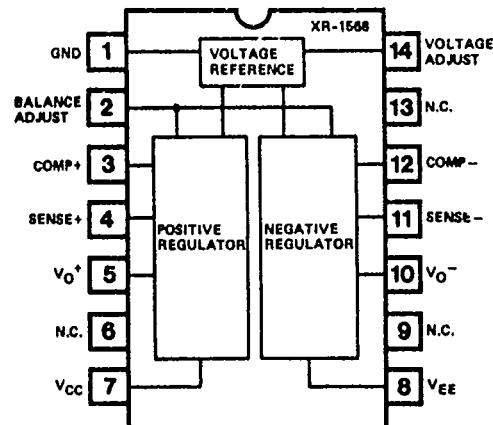
APPLICATIONS

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

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

FUNCTIONAL BLOCK DIAGRAM



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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

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.