

# Precision Analog Controller

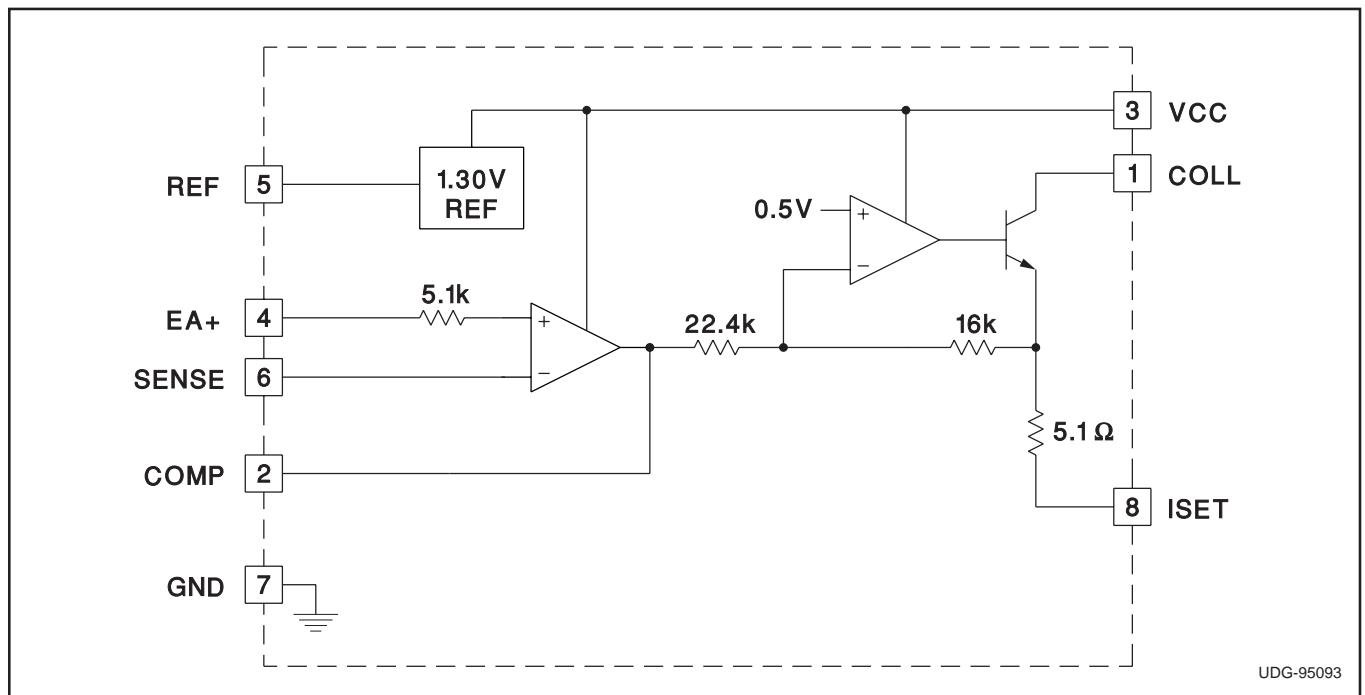
## FEATURES

- Programmable Transconductance for Optimum Current Drive
- Accessible 1.3V Precision Reference
- Both Error Amplifier Inputs Available
- 0.7% Overall Reference Tolerance
- 0.4% Initial Accuracy
- 2.2V to 36.0V Operating Supply Voltage and User Programmable Reference
- Reference Accuracy Maintained for Entire Range of Supply Voltage
- Superior Accuracy and Easier Compensation for Optoisolator Application
- Low Quiescent Current (0.50mA Typ)

## DESCRIPTION

The UC39432 is an adjustable precision analog controller with 100mA sink capability if the ISET pin is grounded. A resistor between ISET and ground will modify the transconductance while decreasing the maximum current sink. This will add further control in the optocoupler configuration. The trimmed precision reference along with the non-inverting error amplifier inputs are accessible for custom configuration. A sister device, the UC39431 adjustable shunt regulator, has an on-board resistor network providing six preprogrammed voltage levels, as well as external programming capability.

## BLOCK DIAGRAM

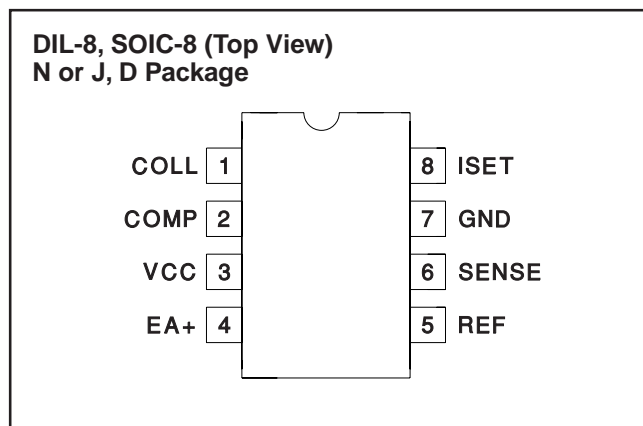


CONNECTION DIAGRAM

ABSOLUTE MAXIMUM RATINGS

Supply Voltage: VCC . . . . . 36V  
 Regulated Output: V<sub>COLL</sub> . . . . . 36V  
 EA Input: SENSE, EA+ . . . . . 6V  
 EA Compensation: COMP . . . . . 6V  
 Reference Output: REF . . . . . 6V  
 Output Sink Current: I<sub>COLL</sub> . . . . . 140mA  
 Output Source Current: ISET . . . . . -140mA  
 Power Dissipation at T<sub>A</sub> ≤ 25°C (DIL-8) . . . . . 1W  
 Derate 8mW/°C for T<sub>A</sub> > 25°C  
 Storage Temperature Range . . . . . -65°C to +150°C  
 Junction Temperature . . . . . -55°C to +150°C  
 Lead Temperature (Soldering, 10 sec.) . . . . . +300°C

*Currents are positive into, negative out of the specified terminal. Consult Packaging Section of Databook for thermal limitations and considerations of packages.*



**ELECTRICAL CHARACTERISTICS:** Unless otherwise stated, these specifications apply for T<sub>A</sub> = -55°C to +125°C and COLL Output = 2.4V to 36.0V for the UC19432, T<sub>A</sub> = -25°C to +85°C and COLL Output = 2.3V to 36.0V for the UC29432, and T<sub>A</sub> = 0°C to +70°C and COLL Output = 2.3V to 36.0V for the UC39432, VCC = 15V, I<sub>COLL</sub> = 10mA, T<sub>A</sub> = T<sub>J</sub>.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS	
Reference Voltage Tolerance	T <sub>A</sub> = 25°C	19432*	1.295	1.3	1.305	V
		39432B	1.29	1.3	1.31	V
Reference Temperature Tolerance	V <sub>COLL</sub> = 5.0V	19432*	1.291	1.3	1.309	V
		39432B	1.286	1.3	1.314	V
Reference Line Regulation	VCC = 2.4V to 36.0V, V <sub>COLL</sub> = 5V	19432*		10	38	mV
		39432B		10	57	mV
Reference Load Regulation	I <sub>COLL</sub> = 10mA to 50mA, V <sub>COLL</sub> = 5V	19432*		10	38	mV
		39432B		10	57	mV
Reference Sink Current				10	μA	
Reference Source Current				-10	μA	
EA Input Bias Current		-0.5	-0.2		μA	
EA Input Offset Voltage	19432*			4.0	mV	
	39432B			4.0	mV	
EA Output Current Sink (Internally Limited)				16	μA	
EA Output Current Source				-1	mA	
Minimum Operating Current	VCC = 36.0V, V <sub>COLL</sub> = 5V		0.50	0.80	mA	
Collector Current Limit (Note)	V <sub>COLL</sub> = VCC = 36.0V, Ref = 1.35V ISET = GND		130	145	mA	
Collector Saturation	I <sub>COLL</sub> = 20mA	0.7	1.1	1.5	V	
Transconductance (gm) (Note)	VCC = 2.4V to 36.0V, V <sub>COL</sub> = 3V, I <sub>COLL</sub> = 20mA ISET = GND	19432*	-170	-140	-110	mS
		39432B	-180	-140	-100	mS
Error Amplifier AVOL		60	90		dB	
Error Amplifier GBW	(Note 1)	3.0	5		MHz	
Transconductance Amplifier GBW			3		MHz	

\* Also applies to the UC29432 and UC39432

**Note:** Programmed transconductance and collector current limit equations are specified in the ISET pin description.

**Note 1:** Guaranteed by design. Not 100% tested in production.



### OVERVOLTAGE COMPARATOR APPLICATION

The signal  $V_{IN}$  senses the input voltage. As long as the input voltage is less than 5.5V, the output is equal to the voltage on  $V_{IN}$ . During this region of operation, the diode is reversed biased which keeps the EA+ pin at 1.3V. When  $V_{IN}$  exceeds the over voltage threshold of 5.5V, the output is driven low. This forward biases the diode and creates hysteresis by changing the threshold to 4.5V.

### OPTOCOUPLER APPLICATION

The optocoupler application shown takes advantage of the accessible pins REF and ISET. The ISET pin has a 33 ohm resistor to ground that protects the opto-coupler by limiting the current to about 16mA. This also lowers the transconductance to approximately 19mS. The ability to adjust the transconductance gives the designer further control of the loop gain. The REF pin is available to satisfy any high precision voltage requirements.

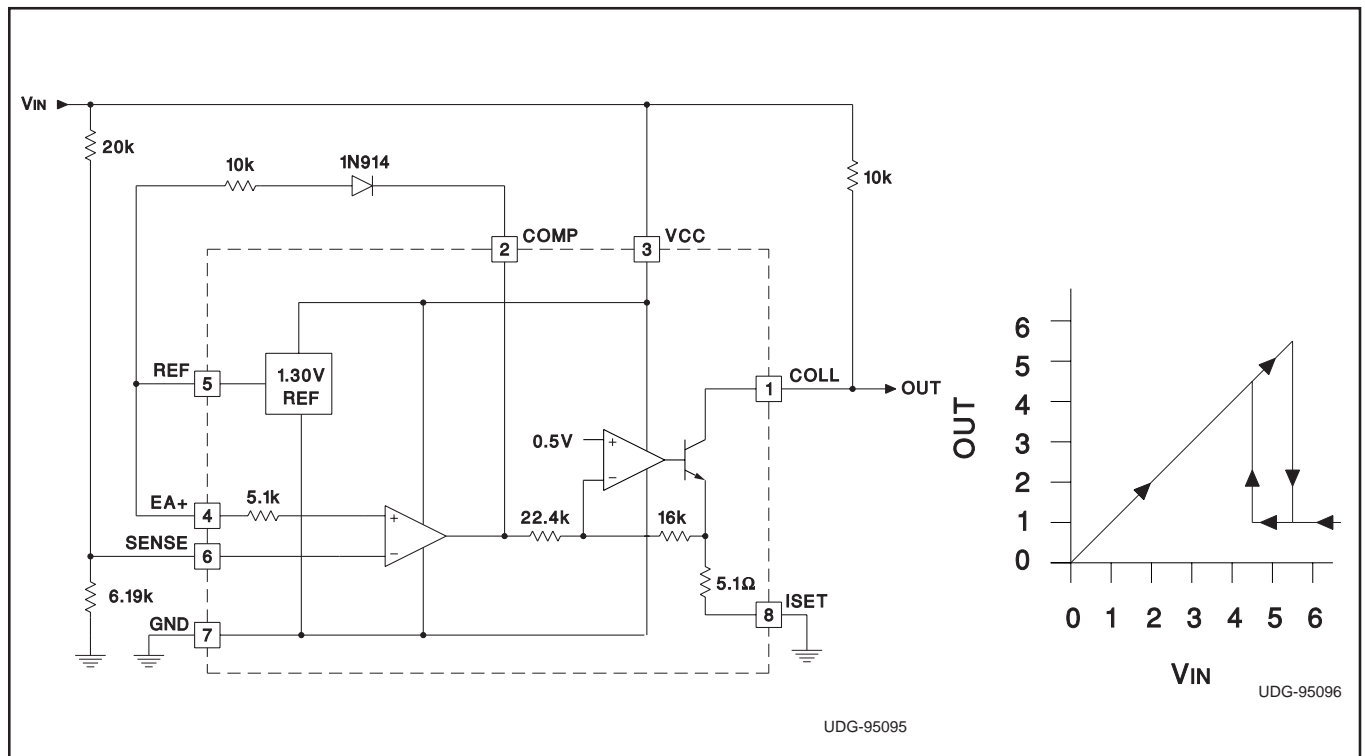


Figure 2. 5.5V Overvoltage comparator with hysteresis.

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