

# FAN4230

## Dual, High Speed, 2.5V to 12V, Rail-to-Rail Amplifier

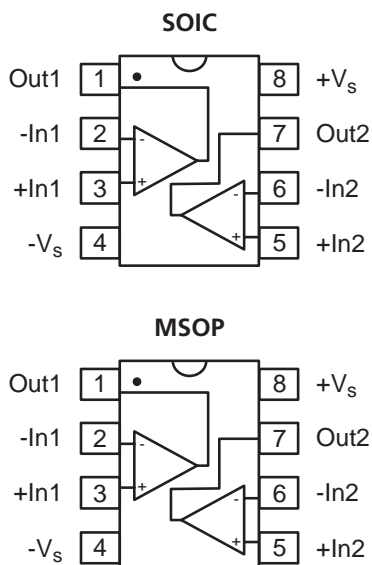
### Features at ±5V

- 2.5mA supply current per amplifier
- 358MHz bandwidth
- Output voltage range at  $R_L = 150\Omega$ : -4.9V to 4.81V
- Input includes negative rail
- 217V/ $\mu$ s slew rate
- $\pm 130$ mA output short circuit current
- 12nV/ $\sqrt{\text{Hz}}$  input voltage noise
- Competes with AD8052 and LMH6643
- Package options (MSOP-8 and SOIC-8)
- Fully specified at +3V, +5V, and  $\pm 5$ V supplies

### Applications

- A/D driver
- Active filters
- CCD imaging systems
- CD/DVD ROM
- Coaxial cable drivers
- Portable/battery-powered applications
- Twisted pair driver
- Video driver

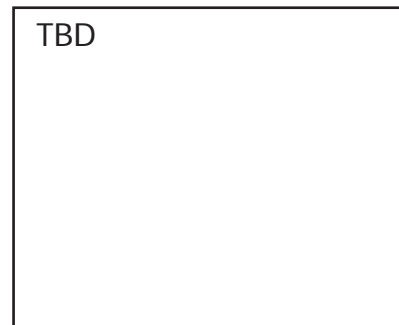
### Pin Assignments



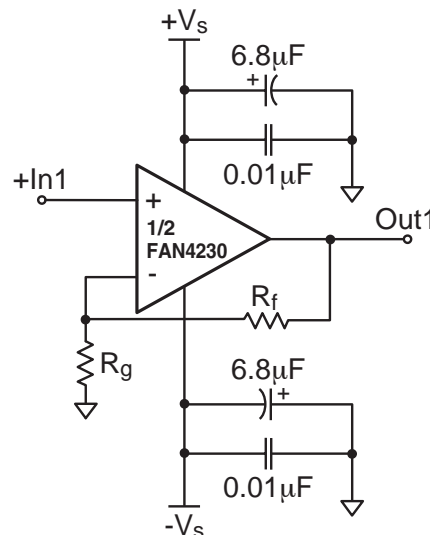
### Description

The FAN4230 is a dual, low cost, high performance, voltage feedback amplifier that consumes only 2.5mA of supply current while providing  $\pm 130$ mA of output short circuit current. The FAN4230 is designed to operate from 2.5V to 12V ( $\pm 6$ V) supplies. The common mode voltage range extends below the negative rail and the output provides rail-to-rail performance.

The FAN4230 is designed on a complimentary bipolar process and provides 358MHz of bandwidth and 217V/ $\mu$ s of slew rate at a supply voltage of  $\pm 5$ V. The combination of low power, rail-to-rail performance, low voltage operation, and tiny package options make the FAN4230 well suited for use in many general purpose high speed applications.



### Typical Application



## Electrical Characteristics ( $V_s = +3V$ , $G = 2$ , $R_L = 2k\Omega$ to $V_s/2$ ; unless noted)

Parameters	Conditions	TYP	Min & Max	UNITS	NOTES
Case Temperature		+25°C	+25°C		
<b>Frequency Domain Response</b>					
-3dB bandwidth	$G = +1$ , $V_O = 0.2V_{pp}$	295		MHz	
	$G = +2$ , $V_O = 0.2V_{pp}$	119		MHz	
full power bandwidth	$G = +2$ , $V_O = 2V_{pp}$	75		MHz	
gain bandwidth product		155		MHz	
<b>Time Domain Response</b>					
rise and fall time	0.2V step	2.74		ns	
settling time to 0.1%	2V step	TBD		ns	
overshoot	0.2V step,	8		%	
slew rate	3V step, $G = -1$	215		V/ $\mu$ s	
<b>Distortion and Noise Response</b>					
2nd harmonic distortion	$1V_{pp}$ , 5MHz	-80		dBc	
3rd harmonic distortion	$1V_{pp}$ , 5MHz	-80		dBc	
THD	$1V_{pp}$ , 5MHz	75		dB	
input voltage noise	>1MHz	12.45		nV/ $\sqrt$ Hz	
crosstalk	10MHz	TBD		dB	
<b>DC Performance</b>					
input offset voltage		1		mV	1
average drift		TBD		$\mu$ V/ $^{\circ}$ C	
input bias current		-5		$\mu$ A	1
average drift		TBD		nA/ $^{\circ}$ C	
input offset current		TBD		$\mu$ A	1
power supply rejection ratio	DC	73		dB	1
open loop gain		82		dB	1
quiescent current per amplifier		2.5		mA	1
<b>Input Characteristics</b>					
input resistance		TBD		M $\Omega$	
input capacitance		TBD		pF	
input common mode voltage range		-0.3 to 1.8		V	
common mode rejection ratio	DC, $V_{cm} = 0V$ to $V_s - 1.5$	82		dB	1
<b>Output Characteristics</b>					
output voltage swing	$R_L = 2k\Omega$ to $V_s/2$ $R_L = 150\Omega$ to $V_s/2$	0.02 to 2.97 0.05 to 2.93		V V	1 1
linear output current		+99/-99		mA	
short circuit output current		$\pm 130$		mA	
power supply operating range		3	2.5 to 12	V	

Min/max ratings are based on product characterization and simulation. Individual parameters are tested as noted. Outgoing quality levels are determined from tested parameters.

### NOTES:

1) 100% tested at +25°C.

## Electrical Characteristics ( $V_s = +5V$ , $G = 2$ , $R_L = 2k\Omega$ to $V_s/2$ ; unless noted)

Parameters	Conditions	TYP	Min & Max	UNITS	NOTES
Case Temperature		+25°C	+25°C		
<b>Frequency Domain Response</b>					
-3dB bandwidth	$G = +1$ , $V_O = 0.2V_{pp}$	325		MHz	
	$G = +2$ , $V_O = 0.2V_{pp}$	122		MHz	
full power bandwidth	$G = +2$ , $V_O = 2V_{pp}$	75		MHz	
gain bandwidth product		155		MHz	
<b>Time Domain Response</b>					
rise and fall time	0.2V step	2.71		ns	
settling time to 0.1%	2V step	TBD		ns	
overshoot	0.2V step,	5.9		%	
slew rate	5V step, $G = -1$	217		V/ $\mu$ s	
<b>Distortion and Noise Response</b>					
2nd harmonic distortion	$2V_{pp}$ , 5MHz	-76		dBc	
3rd harmonic distortion	$2V_{pp}$ , 5MHz	-77		dBc	
THD	$2V_{pp}$ , 5MHz	73		dB	
input voltage noise	>1MHz	12.36		nV/ $\sqrt{Hz}$	
crosstalk	10MHz	TBD		dB	
<b>DC Performance</b>					
input offset voltage		1		mV	1
average drift		TBD		$\mu$ V/ $^{\circ}$ C	
input bias current		-4.9		$\mu$ A	1
average drift		TBD		nA/ $^{\circ}$ C	
input offset current		TBD		$\mu$ A	1
power supply rejection ratio	DC	73		dB	1
open loop gain		85		dB	1
quiescent current per amplifier		2.5		mA	1
<b>Input Characteristics</b>					
input resistance		TBD		M $\Omega$	
input capacitance		TBD		pF	
input common mode voltage range		-0.3 to 3.8		V	
common mode rejection ratio	DC, $V_{cm} = 0V$ to $V_s - 1.5$	85		dB	1
<b>Output Characteristics</b>					
output voltage swing	$R_L = 2k\Omega$ to $V_s/2$ $R_L = 150\Omega$ to $V_s/2$	0.02 to 4.96 0.07 to 4.89		V V	1 1
linear output current		+99/-99		mA	
short circuit output current		$\pm 130$		mA	
power supply operating range		5	2.5 to 12	V	

Min/max ratings are based on product characterization and simulation. Individual parameters are tested as noted. Outgoing quality levels are determined from tested parameters.

### NOTES:

1) 100% tested at +25°C.

## Electrical Characteristics ( $V_s = \pm 5V$ , $G = 2$ , $R_L = 2k\Omega$ to $V_s/2$ ; unless noted)

PARAMETERS	CONDITIONS	TYP	MIN & MAX	UNITS	NOTES
Case Temperature		+25°C	+25°C		
<b>Frequency Domain Response</b>					
-3dB bandwidth	$G = +1, V_O = 0.2V_{pp}$	358		MHz	
	$G = +2, V_O = 0.2V_{pp}$	123		MHz	
full power bandwidth	$G = +2, V_O = 2V_{pp}$	77		MHz	
gain bandwidth product		155		MHz	
<b>Time Domain Response</b>					
rise and fall time	0.2V step	2.7		ns	
settling time to 0.1%	1V step	TBD		ns	
overshoot	0.2V step,	3.8		%	
slew rate	10V step, $G = -1$	217		V/ $\mu$ s	
<b>Distortion and Noise Response</b>					
2nd harmonic distortion	$2V_{pp}, 5MHz$	-73		dBc	
3rd harmonic distortion	$2V_{pp}, 5MHz$	-77		dBc	
THD	$2V_{pp}, 5MHz$	72		dB	
input voltage noise	>1MHz	12.29		nV/ $\sqrt{Hz}$	
crosstalk	10MHz	TBD		dB	
<b>DC Performance</b>					
input offset voltage		-1		mV	1
average drift		TBD		$\mu$ V/ $^{\circ}C$	
input bias current		-4.5		$\mu$ A	1
average drift		TBD		nA/ $^{\circ}C$	
input offset current		TBD		$\mu$ A	1
power supply rejection ratio	DC	73		dB	1
open loop gain		92		dB	1
quiescent current per amplifier		2.5		mA	1
<b>Input Characteristics</b>					
input resistance		TBD		M $\Omega$	
input capacitance		TBD		pF	
input common mode voltage range		-5.3 to +3.8		V	
common mode rejection ratio	DC, $V_{cm} = 0V$ to $V_s - 1.5$	92		dB	1
<b>Output Characteristics</b>					
output voltage swing	$R_L = 2k\Omega$ to $V_s/2$	-4.94 to 4.93		V	1
	$R_L = 150\Omega$ to $V_s/2$	-4.9 to 4.81		V	1
linear output current		+99/-99		mA	
short circuit output current		$\pm 130$		mA	
power supply operating range		$\pm 5$	2.5 to 12	V	

Min/max ratings are based on product characterization and simulation. Individual parameters are tested as noted. Outgoing quality levels are determined from tested parameters.

### NOTES:

1) 100% tested at +25°C.

## Absolute Maximum Ratings

supply voltage	0 to +12V
maximum junction temperature	+175°C
storage temperature range	-65°C to +150°C
lead temperature (10 sec)	+300°C
operating temperature range (recommended)	-40°C to +85°C
input voltage range	+ $V_s$ +0.5V; - $V_s$ -0.5V
internal power dissipation	see power derating curves

## Package Thermal Resistance

Package	$\theta_{JA}$
8 lead SOIC	152°C/W
8 lead MSOP	206°C/W

## Ordering Information

Model	Part Number	Package	Container	Pack Qty
FAN4230	FAN4230IMU8X	MSOP-8	Reel	3000
FAN4230	FAN4230IM8X	SOIC-8	Reel	2500

Temperature range for all parts: -40°C to +85°C.

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