

UAF42

ADVANCE INFORMATION
SUBJECT TO CHANGE

UNIVERSAL ACTIVE FILTER

FEATURES

- VERSATILE FUNCTION
LOW-PASS, HIGH-PASS
BAND-PASS, BAND-REJECT
- SIMPLE DESIGN PROCEDURE
- ACCURATE FREQUENCY AND Q
INCLUDES ON-CHIP 1000pF ±0.5%
CAPACITORS

APPLICATIONS

- TEST EQUIPMENT
- COMMUNICATIONS EQUIPMENT
- MEDICAL INSTRUMENTATION
- DATA ACQUISITION SYSTEMS
- MONOLITHIC REPLACEMENT FOR UAF41

DESCRIPTION

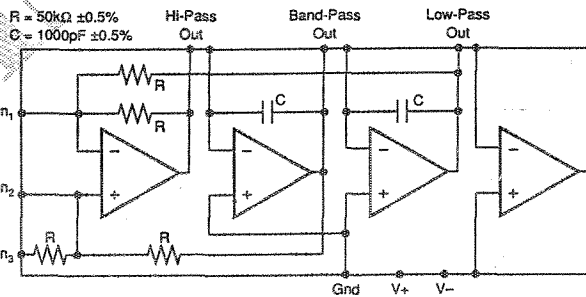
The UAF42 is a universal active filter which can be configured for a wide range of low-pass, high-pass, and band-pass filters. It uses a classical state-variable analog architecture with an inverting amplifier and two integrators. The integrators include on-chip 1000pF capacitors trimmed to 0.5%. This solves one of the most difficult problems of active filter design—obtaining tight tolerance, low-loss capacitors.

Simple design procedures allow easy implementation of many filter types such as Butterworth, Bessel, Chebyshev and Gaussian. A fourth, uncommitted FET-

input op amp (identical to the other three) can be used to form additional stages, or for special filter types such as band-reject and elliptic.

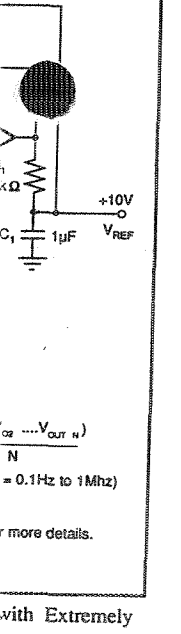
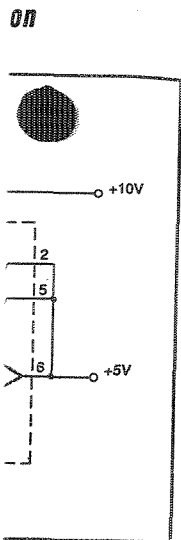
The classical topology of the UAF42 forms a continuous filter, free from the anomalies and switching noise associated with switched-capacitor filter types.

The UAF42 is available in a 14-pin plastic DIP and side-brazed ceramic packages, specified for the -25°C to +85°C temperature range.



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PDS-1070



SPECIFICATIONS

$T_A = +25^\circ\text{C}$, $V_S = \pm 15\text{V}$ unless otherwise noted.

PARAMETER	CONDITION	UAF42AP, AG			UNITS
		MIN	TYP	MAX	
FILTER PERFORMANCE					
Frequency Range			0 to 100		kHz
Frequency Accuracy vs Temperature			0.01	1	%/°C
Maximum Q			500		—
Maximum (Q • Frequency) Product			500		kHz
Q vs Temperature			0.01		%/°C
Q Repeatability	$(f_0 \cdot Q) < 10^4$		0.025		%/°C
Offset Voltage, Low-Pass Output	$(f_0 \cdot Q) < 10^3$		10	±5	mV
Resistor Accuracy	$(f_0 \cdot Q) < 10^3$		0.5		%
OFFSET VOLTAGE⁽¹⁾					
Input Offset Voltage vs Temperature			±0.5	±5	mV
Input Offset Voltage vs Power Supply	$V_S = \pm 6$ to $\pm 15\text{V}$	80	96		$\mu\text{V}/^\circ\text{C}$ dB
INPUT BIAS CURRENT⁽¹⁾					
Input Bias Current	$V_{in} = 0\text{V}$		10	50	pA
Input Offset Current	$V_{in} = 0\text{V}$		5		pA
NOISE⁽¹⁾					
Input Voltage Noise					
Noise Density: $f = 10\text{Hz}$			50		nV/√Hz
Noise Density: $f = 10\text{kHz}$			18		nV/√Hz
Voltage Noise: BW = 0.1 to 10Hz			2		$\mu\text{V-p-p}$
Input Bias Current Noise					
Noise Density: $f = 10\text{kHz}$			2		fA/√Hz
INPUT VOLTAGE RANGE⁽¹⁾					
Common-Mode Input Range			±11.5		V
Common-Mode Rejection	$V_{CM} = \pm 10\text{V}$	80	96		dB
INPUT IMPEDANCE⁽¹⁾					
Differential			$10^{10} \parallel 2$		$\Omega \parallel \text{pF}$
Common-Mode			$10^{10} \parallel 6$		$\Omega \parallel \text{pF}$
OPEN-LOOP GAIN⁽¹⁾					
Open-loop Voltage Gain	$V_S = \pm 10\text{V}$, $R_L = 2\text{k}\Omega$	90	120		dB
FREQUENCY RESPONSE⁽¹⁾					
Slew Rate			10		V/μs
Gain-Bandwidth Product	$G = +1$		4		MHz
Total Harmonic Distortion	$G = +1$, $f = 1\text{kHz}$		0.0004		%
OUTPUT⁽¹⁾					
Voltage Output	$R_L = 2\text{k}\Omega$	±11	±11.5		V
Short Circuit Current			±25		mA
POWER SUPPLY					
Specified Operating Voltage			±15		V
Operating Voltage Range		±6	±6	±18	V
Current			±6	±7	mA
TEMPERATURE RANGE					
Specification					
AP, AG		-25		+95	°C
Operating, AG		-65		+125	°C
Storage					
AP		-40		+125	°C
AG		-60		+150	°C
Thermal Resistance, θ_{JA}			100		°C/W

NOTES: (1) Specifications apply to uncommitted op amp, A4. The three op amps forming the filter are identical to A4 and are tested as a complete filter.