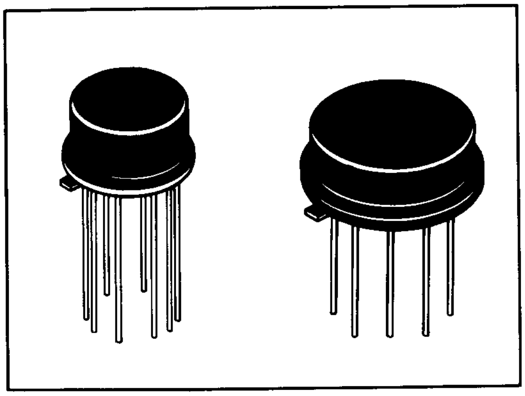
1437/38

Wideband Fast-Settling Operational Amplifiers



The 1437 and 1438 are hybrid op amps designed to offer versatility in wideband steady state and fast transient applications. The absence of large transients and oscillations in the settling waveform makes these op amps dependable system elements that help solve settling problems associated with A/Ds, D/As, and sampling circuits. Among their competitors, the 1437 and 1438 stand out for their speed and predictability, exemplified by their fast and smooth settling.

The 1437 and 1438 have excellent DC characteristics with ±200pA input bias currents, 95dB open loop gains, and ±0.5mV input offset voltages. The choice of a single external compensation capacitor allows for maintenance of a 40MHz bandwidth over a variety of gains. A true differential input ensures equally superior performance in all system configurations whether they are inverting, non-inverting, or differential. With their attractive price/performance ratios, the 1437 and 1438 should prove to be new industry workhorses in the fields of data acquisition and high-speed, high-accuracy signal processing.

The 1437 is packaged in a TO-99 can and has a guaranteed ±20mA output. The 1438 is packaged in a TO-8 can and has a guaranteed ±50mA output. Standard devices are fully specified for 0°C to +70°C operation. The -83 versions of these products are specified over the -55°C to +125°C temperature range and meet the high reliability requirements of MIL-STD-883C Class "B". These devices may also be ordered screened to Class "S".

FEATURES

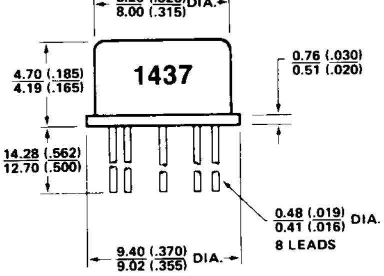
- 350MHz Gain-Bandwidth Product
- FET Input
- 40MHz Operating Bandwidth
- 85ns Settling Time to 0.1%
- ±20mA and ±50mA Outputs
- Small TO-99 and TO-8 Packages
- Single External Compensation Capacitor

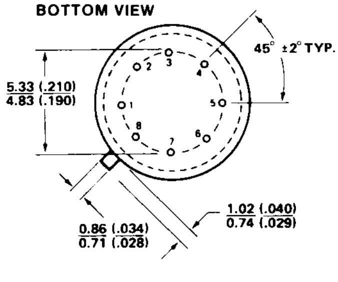
APPLICATIONS

- Current to Voltage DACs
- Pulse Amplifiers
- Radar and Sonar Signal Processing
- Graphic CRT Displays
- Video A/D, D/A, and S/Hs

PACKAGE DIMENSIONS

DIMENSIONS ARE IN MM. THOSE IN PARENTHESES ARE IN INCHES.





PIN DESIGNATIONS
1. OFFSET TRIM
2. INVERTING INPUT
3. NON-INVERTING INPUT
4. $-V_{CC}$
5. OFFSET TRIM
6. OUTPUT
7. $+V_{CC}$
8. COMPENSATION

SPECIFICATIONS (T_c = +25°C; V_{cc} = ±15V; 1437: R_L = 500Ω; 1438: R_L = 200Ω)

	TYPICAL	GUARANTEED
OUTPUT RANGE		
Voltage (Peak) (5)	±12V	±10V
Current (5): 1437	±24mA	±20mA
1438	±60mA	±50mA
VOLTAGE GAIN (Open Loop @ f = 10Hz) (4)(5)		
Rated Load	95dB	88dB
FREQUENCY RESPONSE		
Gain-Bandwidth Product (1)	350MHz	---
Unity-Gain Bandwidth	40MHz	---
Full Power Bandwidth		
C_c = 0pF	6.0MHz	---
C_c = 15pF	3.1MHz	---
TIME RESPONSE		
Settling Time (2)		
10V Step to 1%	65ns	---
10V Step to 0.1% (5)	85ns	120ns
10V Step to 0.025%	150ns	---
10V Step to 0.01%	180ns	---
Small Signal Rise Time (C_c = 15pF)	9ns	---
Slew Rate		
C_c = 0pF	400V/μs	---
C_c = 15pF	225V/μs	---
INPUT VOLTAGE RANGE/CMRR/IMPEDANCE		
Common Mode for DC Linear Operation (5)	±12V	±10V
Absolute Max. Differential Between Inputs	---	±20V
CMRR @ DC (3)(5)	78dB	60dB
PSRR @ DC	76dB	---
Input Impedance @ DC (Differential)	10MΩ‖3pF	---
Output Impedance (Open Loop)	90Ω	---
INPUT OFFSET VOLTAGE		
Initial (Without External Trim) (5)	±0.5mV	±2mV
Vs. Temperature (R_L = ∞) (5)	±15μV/°C	±50μV/°C
INPUT BIAS CURRENT		
Initial (Without External Trim)	±200pA	---
Bias Current over Rated Temperature	Doubles every 10°C	---
Offset Current	±20pA	---
NOISE (Referred to Input)		
0.1Hz to 100Hz	4μVp-p	---
	0.5μV (RMS)	---
100Hz to 10kHz	5μVp-p	---
	1μV (RMS)	---
10kHz to 1MHz	50μVp-p	---
	6μV (RMS)	---
POWER REQUIREMENTS		
Nominal Power Supply Voltage	±15V	---
Supply Voltage Range	---	±12V to ±20V
Quiescent Current @ V_{cc} = ±15V (4)(5)	±12mA	±15mA
Short Circuit Current (4)(5)(6): 1437	50mA	---
1438	125mA	---
TEMPERATURE RANGE		
Operating		
1437, 1438	---	0°C to +70°C
1437-83, 1438-83	---	−55°C to +125°C
Overall Thermal Resistance (θ_{JC}) (7): 1437	---	32°C/W
1438	---	19°C/W
Output Transistor Thermal Resistance (θ_{JC}) (8): 1437	---	65°C/W
1438	---	35°C/W
Case to Ambient Thermal Resistance θ_{JC}: 1437	125°C/W	---
θ_{JA} 1438	75°C/W	---
Storage		
All Units	---	−65°C to +150°C

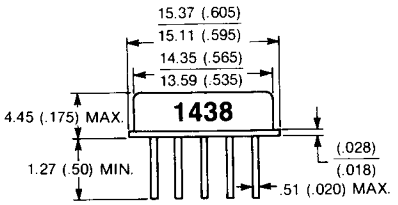
See notes on following page.

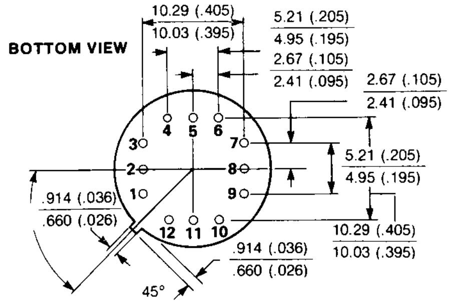
NOTES

1. Measured at 10MHz. $C_c = 0$.
2. Settling time measured in circuit of Figure 1.
3. See Figure 8 for plot of CMRR vs. frequency.
4. 100% interim tested for Military version.
5. 100% final electrical tested for Military version.
6. Finned heat sink use recommended if long term short circuits can occur. Without finned heat sink, short-circuited duration should be limited to <10s.
7. Overall thermal resistance during normal operating conditions. Multiply this value by the power dissipation of the entire 1437 (1438) to determine maximum temperature rise case to junction in the hybrid.
8. Individual thermal resistance of the output stage. The 1437 (1438) is a class AB amplifier. To calculate the output transistor temperature rise case to junction, multiply this figure by the power dissipation of the output transistor. At AC frequencies above 100Hz, the effective thermal resistance of the output stage will drop 32.5°C/W for the 1437, 17.5°C/W for the 1438.

PACKAGE DIMENSIONS

DIMENSIONS ARE IN MM. THOSE IN PARENTHESES ARE IN INCHES





PIN DESIGNATION	
1. N/C	7. N/C
2. OFFSET ADJ.	8. OFFSET ADJ.
3. INVERTING IN	9. OUTPUT
4. NON-INVERTING IN	10. $+V_{CC}$
5. $-V_{CC}$	11. COMPENSATION
6. N/C	12. N/C

TYPICAL PERFORMANCE CURVES

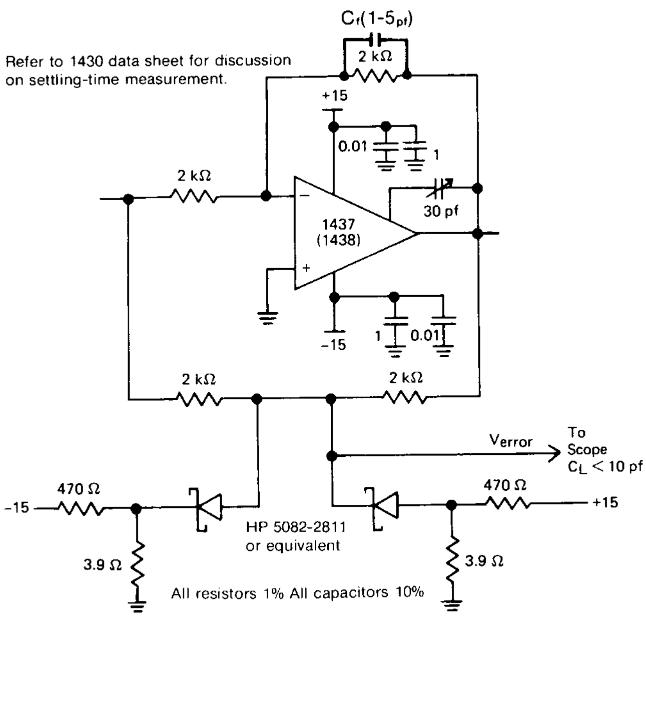


Figure 1. Settling Time Test Circuit

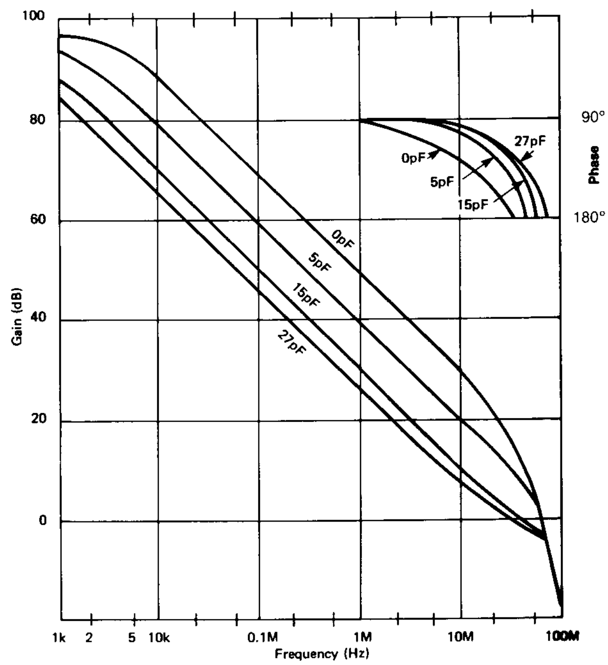


Figure 2. Open Loop Gain and Phase vs. Frequency

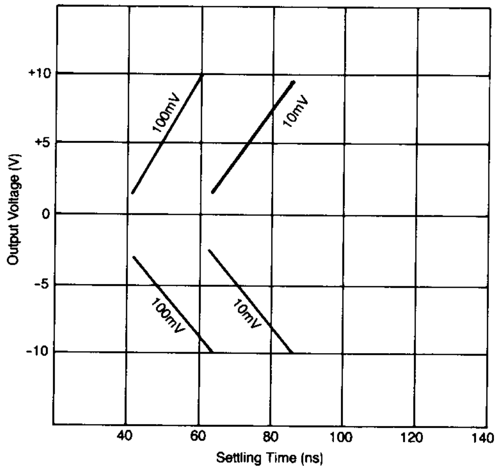


Figure 3. Settling Time vs. Output Voltage Change

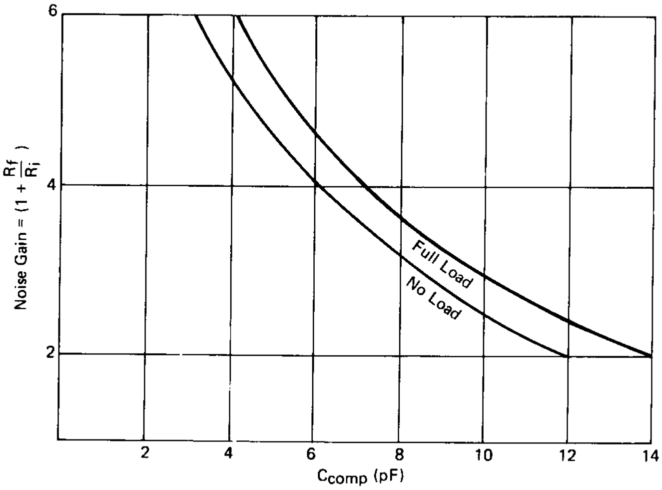


Figure 4. Noise Gain vs. Ccomp for 16% Overshoot

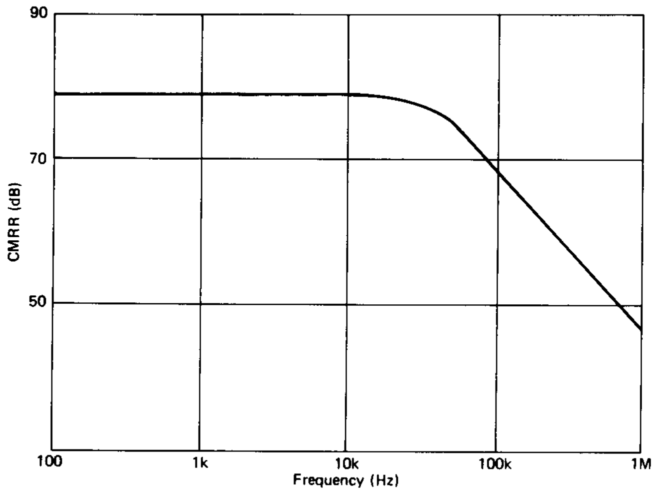


Figure 5. CMRR vs. Frequency

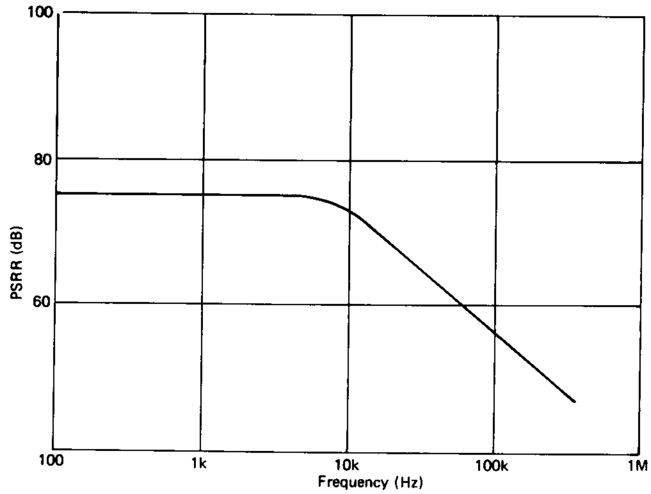


Figure 6. PSRR vs. Frequency, ΔPS = 1%