

# 155 156 157

# Monolithic JFET Input Operational Amplifiers

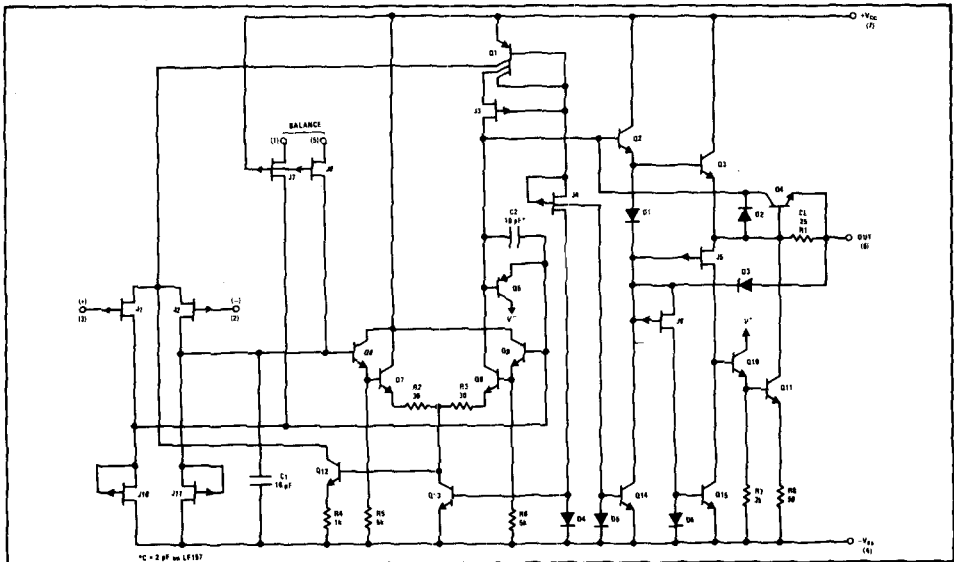
## GENERAL DESCRIPTION

The LF155A, 156A and 157A family is composed of JFET input operational amplifiers which by using advanced processing techniques, contain both bipolar transistors and closely matched JFET's on the same chip. The resulting amplifiers feature low input offset voltage and offset voltage drift, low input bias and offset current, and low noise. These devices also feature wide bandwidth, high slew rate and fast settling time making them extremely versatile in such applications as A/D and D/A conversion, sample and hold circuits; analog function circuits, active filters and instrumentation circuits.

## DESIGN FEATURES

- Low input offset voltage — 1 mV
- Low input offset current — 3 pA
- Low input bias current — 30 pA
- Low input noise voltage —  $12 \text{ nV}\sqrt{\text{Hz}}$  156A, 157A  
 $20 \text{ nV}\sqrt{\text{Hz}}$  155A
- Low input noise current —  $0.01 \text{ pA}\sqrt{\text{Hz}}$
- High DC voltage gain — 200,000 V/V

## SCHEMATIC DIAGRAM



## CONNECTION INFORMATION

Package Type	Pinout Diagram	Order Part Nos.
<b>CQ Flat Package (Top View)</b>		LF155AF, LF155F, LF156AF, LF156F, LF157AF, LF157F
<b>T (TO-99) Metal Can Package (Top View)</b>		LF155AH, LF355AH, LF156AH, LF356AH, LF157AH, LF357AH, LF155H, LF255H, LF355H, LF156H, LF256H, LF356H, LF157H, LF257H, LF357H
<b>DE and NB Dual In-line Packages (Top View)</b>		LF155ADE, LF355ADE, LF156ADE, LF356ADE, LF157ADE, LF357ADE, LF155DE, LF255DE, LF355DE, LF156DE, LF256DE, LF356DE, LF157DE, LF257DE, LF357DE, LF355AN, LF356AN, LF357AN, LF355N, LF356N, LF357N

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## ABSOLUTE MAXIMUM RATINGS

	LF155A/6A/7A	LF355A/6A/7A	LF155/6/7	LF255/6/7	LF355/6/7
Supply Voltage	±22V	±22V	±22V	±22V	±18V
Power Dissipation (Note 1) TO-99 (H package)	670 mW	500 mW	670 mW	570 mW	500 mW
Operating Temperature Range	-55 to +125°C	0 to +70°C	-55 to +125°C	-25 to +85°C	0 to +70°C
T <sub>J</sub> (MAX)	150°C	100°C	150°C	110°C	100°C
Differential Input Voltage	±40V	±40V	±40V	±40V	±30V
Input Voltage Range (Note 2)	±20V	±20V	±20V	±20V	±16V
Output Short Circuit Duration	Continuous	Continuous	Continuous	Continuous	Continuous
Storage Temperature Range	-65 to +150°C	-65 to +150°C	-65 to +150°C	-65 to +150°C	-65 to +150°C
Lead Temperature (Soldering, 10 seconds)	300°C	300°C	300°C	300°C	300°C

Note: LF157A, 357A, 157, 257, 357 are decompensated for use in circuits with A<sub>V</sub> > 5 only.

## DC ELECTRICAL CHARACTERISTICS V<sub>CC</sub> ±15V T<sub>A</sub> +25°C unless otherwise specified

PARAMETER	CONDITIONS	LF155A/156A/157A			LF355A/356A/357A			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
Input Offset Voltage	R <sub>S</sub> < 10 KΩ		1.0	2.0		1.0	2.0	mV
Input Offset Current			3	10		3	10	pA
Input Bias Current			30	50		30	50	pA
Input Resistance			10 <sup>6</sup>			10 <sup>6</sup>		MΩ
Large Signal Voltage Gain	R <sub>L</sub> > 2 KΩ V <sub>OUT</sub> ±10V	50K	200K		50K	200K		V/V
The following specifications apply for -55°C < T <sub>A</sub> < +125°C for LF155A/156A/157A; 0°C < T <sub>A</sub> < +70°C for LF355A/356A/357A.								
Input Offset Voltage	R <sub>S</sub> < 10 KΩ			2.5			2.3	mV
Input Offset Current				10			1.0	nA
Input Bias Current				25			5	nA
Large Signal Voltage Gain	R <sub>L</sub> > 2 KΩ V <sub>OUT</sub> ±10V	25K			25K			V/V
Output Voltage Swing	R <sub>L</sub> > 10 KΩ	±12	±13		±12	±13		V
Average Offset Voltage Drift			3	5		3	5	μV/°C
Common Mode Rejection Ratio	R <sub>S</sub> < 10 KΩ ΔV ±5V	85	100		85	100		dB
Power Supply Rejection Ratio	R <sub>S</sub> < 10 KΩ ΔV ±5V	85	100		85	100		dB
Input Voltage Range		±11	+15.1		±11	+15.1		V
			-12			-12		

## AC ELECTRICAL CHARACTERISTICS V<sub>CC</sub> ±15V T<sub>A</sub> +25°C unless otherwise specified

PARAMETER	CONDITIONS	LF155A/355A			LF156A/356A			LF157A/357A			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Gain Bandwidth Product			2.5		4.0	4.5		15	20		MHz
Settling Time	To 0.01%		4			1.5			1.5		μs
Slew Rate	LF155A/156A: A <sub>V</sub> = 1 LF157A: A <sub>V</sub> = 5	3	5		10	12		40	50		V/μs
Input Capacitance			3			3			3		pF
Input Noise Current	F = 100 Hz		0.01			0.01			0.01		pA/√Hz
	F = 1 kHz		0.01			0.01			0.01		pA/√Hz
Input Noise Voltage (R <sub>S</sub> = 100Ω)	F = 100 Hz		25			15			15		nV/√Hz
	F = 1 kHz		20			12			12		nV/√Hz