μA735
MICROPOWER OPERATIONAL AMPLIFIER
FAIRCHILD LINEAR INTEGRATED CIRCUITS

FEATURES

- **LOW POWER CONSUMPTION** . . . . . **100 μW**
- **LOW INPUT OFFSET CURRENT** . . . . . **2 nA**
- **LOW NOISE** . . . . . **0.4 pA/$\sqrt{Hz}$**
- **OPERATION OVER WIDE SUPPLY RANGE** . . . **±3 V TO ±18 V**
- **PIN COMPATIBLE WITH POPULAR μA741**

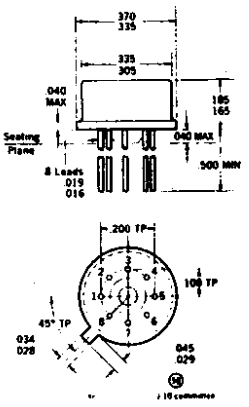
GENERAL DESCRIPTION — The μA735 is a low standby power consumption monolithic operational amplifier constructed on a single silicon chip using compatible thin film resistors and the Fairchild Planar* epitaxial process. It is designed for use in a wide variety of applications where very low system power consumption, low system heating, low battery drain or low input currents are required. The μA735 features very low power consumption, high input impedance, low offset voltage, low input currents, and low noise. The device has excellent common mode and power supply rejection and will operate over a wide range of supplies. In addition, it is pin compatible with the popular μA741 operational amplifier. The μA735 is ideally suited for control or telemetry applications in medical electronics, portable electronic systems, airborne systems, and missile and spacecraft systems.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±18 V
Internal Power Dissipation (Note 1)	300 mW
Differential Input Voltage	±5 V
Input Voltage (Note 2)	±15 V
Peak Output Current	10 mA
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−55°C to +125°C
Lead Temperature (Soldering, 60 seconds)	300°C

PHYSICAL DIMENSIONS

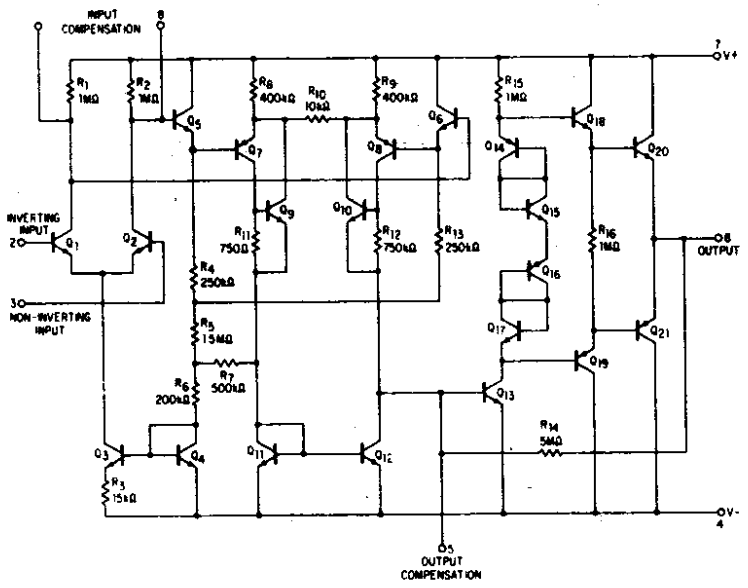
In accordance with JEDEC (TO-99) outline



NOTES:
All dimensions in inches
Leads are gold-plated Kovar
Package weight is 1.22 grams

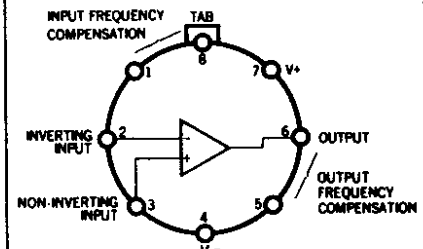
ORDER PART NO. U5B7735312

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM

(TOP VIEW)



NOTE: Pin 4 connected to case

Notes on Page 2

*Planar is a patented Fairchild process.

FAIRCHILD
SEMICONDUCTOR

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

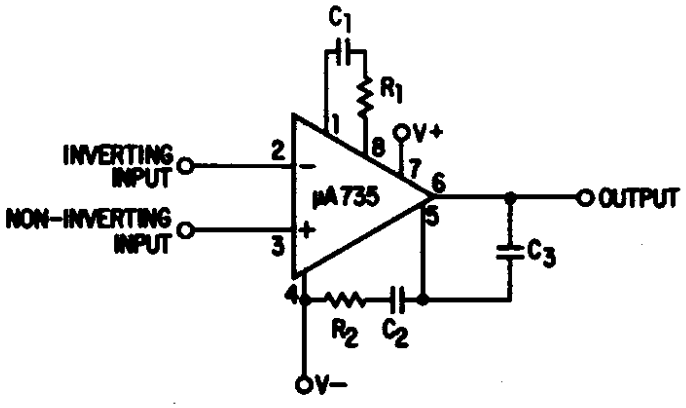
PARAMETER	CONDITIONS	V_S = ±3.0 V MIN.	TYP.	MAX.	V_S = ±15 V MIN.	TYP.	MAX.	UNITS
Input Offset Voltage	$R_S \leq 100$ kΩ		1.0			1.0		mV
Input Offset Current			2.0			4.0		nA
Input Bias Current			5.0			10		nA
Common Mode Rejection Ratio	$R_S \leq 100$ kΩ		30			30		μV/V
Supply Voltage Rejection Ratio	$R_S \leq 100$ kΩ		25			25		μV/V
Large Signal Voltage Gain	R_L = 5.0 kΩ, V_{OUT} = ±1.0 V		20,000					
	R_L = 10 kΩ, V_{OUT} = ±10 V					40,000		
Output Voltage Swing	R_L = 5.0 kΩ		±1.2					V
	R_L = 10 kΩ					±12		V
Input Resistance			10			5.0		MΩ
Output Resistance			220			10		Ω
Power Consumption			100			6,000		μW
The following specifications apply for −55°C ≤ T_A ≤ +125°C.								
Input Offset Voltage	$R_S \leq 100$ kΩ		3.0			3.0		mV
Input Offset Current	T_A = −55°C		5.0			12		nA
Input Bias Current	T_A = −55°C		15			30		nA
Supply Voltage Rejection Ratio	$R_S \leq 100$ kΩ		50			50		μV/V
Common Mode Rejection Ratio	$R_S \leq 100$ kΩ		60			60		μV/V
Large Signal Voltage Gain	R_L = 5.0 kΩ, V_{OUT} = ±1.0 V		20,000					
	R_L = 10 kΩ, V_{OUT} = ±10 V					40,000		

NOTES:
(1) Ratings apply for case temperatures to +125°C, derate linearly at 5.6 mW/°C for ambient temperatures above 95°C.
(2) For supply voltages less than ±15 V, the absolute maximum input voltage is equal to the supply voltage.

FREQUENCY COMPENSATION FOR VARIOUS CLOSED LOOP GAINS

CLOSED LOOP GAIN	V_S (VOLTS)	R_1 (kΩ)	C_1 (μF)	R_2 (kΩ)	C_2 (μF)	C_3 (pF)
1	±3	39	.001	12	.01	
1	±15	39	.02	100	.0047	220
10	±3	39	.002	12	.001	
10	±15	39	.002	1	180 pF	22
100	±3			.390	.04	
100	±15	39	220 pF	1	180 pF	22
1000	±3			5.6	.002	
1000	±15	56	82 pF	SHORT	10 pF	

FREQUENCY COMPENSATION



μA735B
MICROPOWER OPERATIONAL AMPLIFIER
FAIRCHILD LINEAR INTEGRATED CIRCUITS

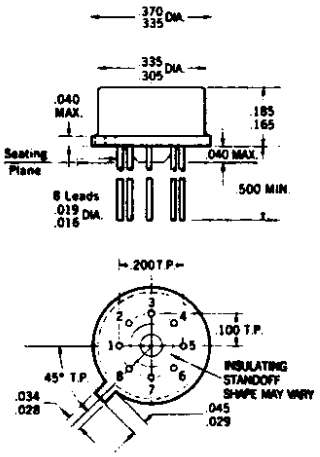
- **LOW POWER CONSUMPTION** . . . . . 100 μW
- **LOW INPUT OFFSET CURRENT** . . . . . 2 nA
- **LOW NOISE** . . . . . 0.4 pA/$\sqrt{Hz}$
- **OPERATION OVER WIDE SUPPLY RANGE** . . . ±3 V TO ±18 V
- **PIN COMPATIBLE WITH POPULAR μA741**

GENERAL DESCRIPTION — The μA735B is a low standby power consumption monolithic operational amplifier constructed on a single silicon chip using compatible thin film resistors and the Fairchild Planar* epitaxial process. It is designed for use in a wide variety of applications where very low system power consumption, low system heating, low battery drain or low input currents are required. The μA735B features very low power consumption, high input impedance, low offset voltage, low input currents, and low noise. The device has excellent common mode and power supply rejection and will operate over a wide range of supplies. In addition, it is pin compatible with the popular μA741 operational amplifier. The μA735B is ideally suited for control or telemetry applications in medical electronics, portable electronic systems, airborne systems, and missile and spacecraft systems. For full temperature range operation (−55°C to +125°C) see μA735 data sheet. (For other Fairchild Operational Amplifiers, see listing on back page.)

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±18 V
Internal Power Dissipation (Note 1)	300 mW
Differential Input Voltage	±5 V
Input Voltage (Note 2)	±15 V
Peak Output Current	10 mA
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−20°C to +85°C
Lead Temperature (Soldering, 60 seconds)	300°C

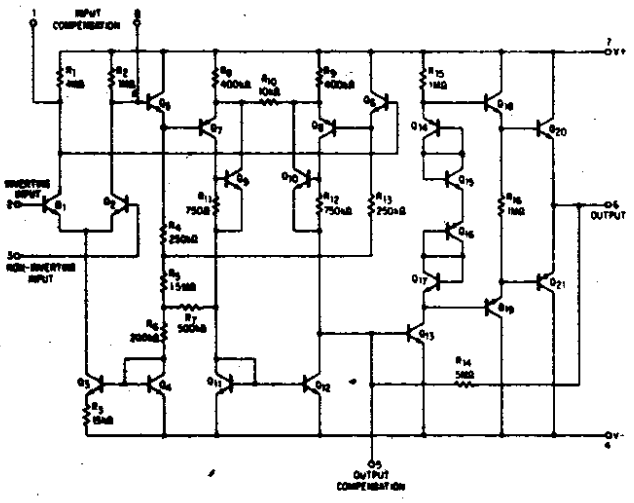
PHYSICAL DIMENSIONS
in accordance with JEDEC (TO-99) outline



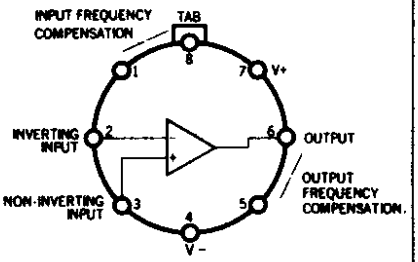
NOTES:
All dimensions in inches
Leads are gold-plated Kovar
Package weight is 1.22 grams

ORDER PART NO. U5B7735333

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM
(TOP VIEW)



NOTE: Pin 4 connected to case

*Planar is a patented Fairchild process.

FAIRCHILD
SEMICONDUCTOR

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

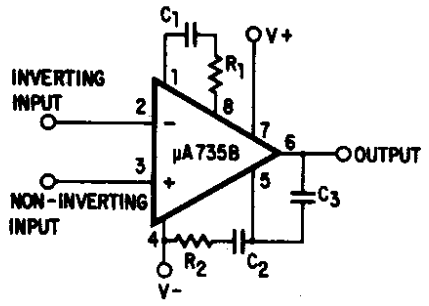
PARAMETER	CONDITIONS	V_S = ±3.0 V MIN.	TYP.	MAX.	V_S = ±15 V MIN.	TYP.	MAX.	UNITS
Input Offset Voltage	$R_S \leq 100$ kΩ		1.0	3.0		1.0	3.0	mV
Input Offset Current			2.0	10		4.0	20	nA
Input Bias Current			5.0	30		10	50	nA
Common Mode Rejection Ratio	$R_S \leq 100$ kΩ		30	90		30	90	μV/V
Supply Voltage Rejection Ratio	$R_S \leq 100$ kΩ		25	150		25	150	μV/V
Large Signal Voltage Gain	R_L = 5.0 kΩ, V_{OUT} = ±1.0 V	10,000	20,000					
	R_L = 2.0 kΩ, V_{OUT} = ±10 V				25,000	40,000		
Output Voltage Swing	R_L = 5.0 kΩ	±1.2	±1.8					V
	R_L = 2.0 kΩ				±10	±12		V
Input Resistance			10			5.0		MΩ
Output Resistance			220			10		Ω
Power Consumption			150	500		6000		μW
The following specifications apply for −20°C ≤ T_A ≤ +85°C								
Input Offset Voltage	$R_S \leq 100$ kΩ		3.0	5.0		3.0	5.0	mV
Average Input Offset Voltage Drift	R_S = 50 Ω		3.0			3.0		μV/°C
Input Offset Current	T_A = −20°C		10	60		12	60	nA
Average Input Offset Current Drift			20			20		pA/°C
Input Bias Current	T_A = −20°C		15	75		30	75	nA
Supply Voltage Rejection Ratio	$R_S \leq 100$ kΩ		50			50		μV/V
Common Mode Rejection Ratio	$R_S \leq 100$ kΩ		60			60		μV/V
Large Signal Voltage Gain	R_L = 5.0 kΩ, V_{OUT} = ±1.0 V	3,000	20,000					
	R_L = 2.0 kΩ, V_{OUT} = ±10 V				16,000	40,000		

NOTES:
(1) Ratings apply for case temperatures to +85°C.
(2) For supply voltages less than ±15 V, the absolute maximum input voltage is equal to the supply voltage.

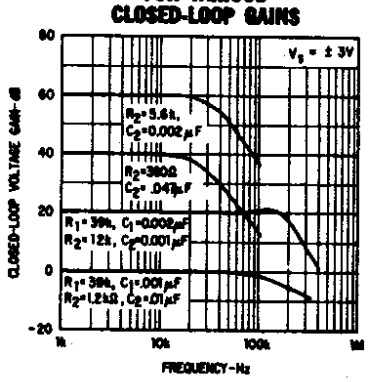
FREQUENCY COMPENSATION FOR VARIOUS CLOSED LOOP GAINS

CLOSED LOOP GAIN	V_S (VOLTS)	R_1 (kΩ)	C_1 (μF)	R_2 (kΩ)	C_2 (μF)	C_3 (pF)
1	±3	39	.001	1.2	.01	
1	±15	39	.02	0.1	.0047	220
10	±3	39	.002	12	.001	
10	±15	39	.002	1.0	180 pF	22
100	±3			.390	.047	
100	±15	39	220 pF	1.0	180 pF	22
1000	±3			5.6	.002	
1000	±15	56	82 pF	SHORT	10 pF	

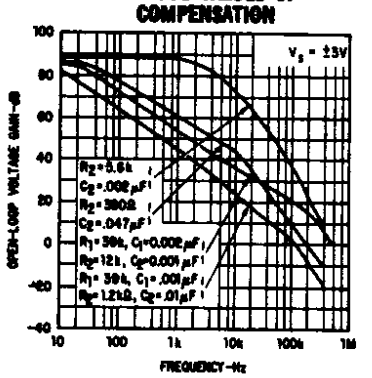
FREQUENCY COMPENSATION



FREQUENCY RESPONSE FOR VARIOUS CLOSED-LOOP GAINS



OPEN-LOOP RESPONSE FOR VARIOUS VALUES OF COMPENSATION



NOTES:
1. FOR OTHER FAIRCHILD OPERATIONAL AMPLIFIERS, SEE THE FOLLOWING DATA SHEETS:

HIGH SPEED — μA715, μA715C
INSTRUMENTATION — μA725, μA725B, μA725C
TEMPERATURE STABLE PREAMPS — μA727, μA727B
FET INPUT — μA740C
FREQUENCY COMPENSATED — μA741, μA741C
DUALS — μA739C, μA749, μA749C, μA747, μA747C
HIGH PERFORMANCE — μA748, μA748C
PRECISION — μA777, μA777B, μA777C

μA735C
MICROPOWER OPERATIONAL AMPLIFIER
FAIRCHILD LINEAR INTEGRATED CIRCUITS

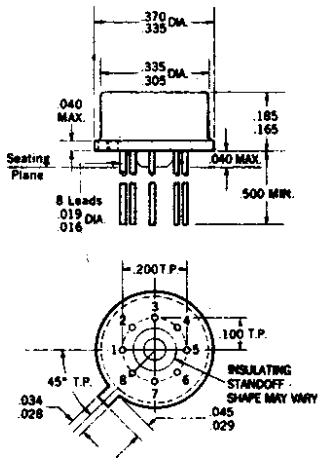
- **LOW POWER CONSUMPTION** . . . . . 100 μW
- **LOW INPUT OFFSET CURRENT** . . . . . 2 nA
- **LOW NOISE** . . . . . 0.4 pA/$\sqrt{Hz}$
- **OPERATION OVER WIDE SUPPLY RANGE** . . . ±3 V TO ±18 V
- **PIN COMPATIBLE WITH POPULAR μA741**

GENERAL DESCRIPTION — The μA735C is a low standby power consumption monolithic operational amplifier constructed on a single silicon chip using compatible thin film resistors and the Fairchild Planar* epitaxial process. It is designed for use in a wide variety of applications where very low system power consumption, low system heating, low battery drain or low input currents are required. The μA735C features very low power consumption, high input impedance, low offset voltage, low input currents, and low noise. The device has excellent common mode and power supply rejection and will operate over a wide range of supplies. In addition, it is pin compatible with the popular μA741 operational amplifier. The μA735C is ideally suited for control or telemetry applications in medical electronics, portable electronic systems, airborne systems, and missile and spacecraft systems. For full temperature range operation (−55°C to +125°C) see μA735 data sheet. (For other Fairchild Operational Amplifiers, see listing on back page.)

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±18 V
Internal Power Dissipation (Note 1)	300 mW
Differential Input Voltage	±5 V
Input Voltage (Note 2)	±15 V
Peak Output Current	10 mA
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	0°C to +70°C
Lead Temperature (Soldering, 60 seconds)	300°C

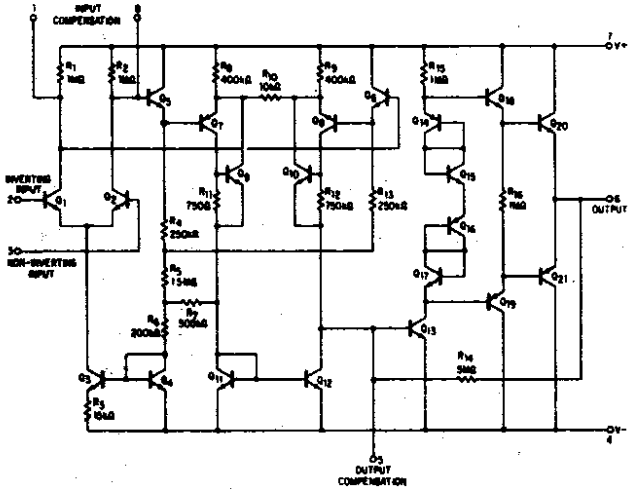
PHYSICAL DIMENSIONS
In accordance with JEDEC (TO-99) outline



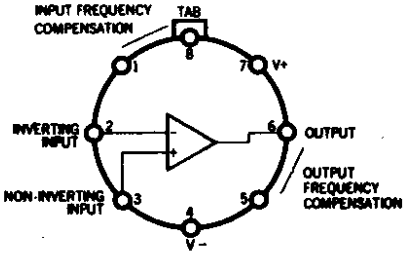
NOTES:
All dimensions in inches
Leads are gold-plated Kovar
Package weight is 1.22 grams

ORDER PART NO. U5B7735393

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM
(TOP VIEW)



NOTE: Pin 4 connected to case

*Planar is a patented Fairchild process.

FAIRCHILD
SEMICONDUCTOR

FAIRCHILD LINEAR INTEGRATED CIRCUITS μA735C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

PARAMETER	TEST CONDITIONS	V_S = ±3.0 V MIN.	V_S = ±3.0 V TYP.	V_S = ±3.0 V MAX.	V_S = ±15 V MIN.	V_S = ±15 V TYP.	V_S = ±15 V MAX.	UNITS
Input Offset Voltage	$R_S \leq 100$ kΩ		1.0	4.0		1.0	4.0	mV
Input Offset Current			2.0	20		4.0	40	nA
Input Bias Current			5.0	60		10	110	nA
Common Mode Rejection Ratio	$R_S \leq 100$ kΩ		30	90		30	90	μV/V
Supply Voltage Rejection Ratio	$R_S \leq 100$ kΩ		25	250		25	250	μV/V
Large Signal Voltage Gain	R_L = 5.0 kΩ, V_{OUT} = ±1.0 V	5,000	20,000					
	R_L = 2.0 kΩ, V_{OUT} = ±10 V				25,000	40,000		
Output Voltage Swing	R_L = 5.0 kΩ	±1.2	±1.8					V
	R_L = 2.0 kΩ				±10	±12		V
Input Resistance			10			5.0		MΩ
Output Resistance			220			10		Ω
Power Consumption			150	750		6000		μW
The following specifications apply for 0°C ≤ T_A ≤ +70°C:								
Input Offset Voltage	$R_S \leq 100$ kΩ		3.0	7.5		3.0	7.5	mV
Average Input Offset Voltage Drift	R_S = 50 Ω		3.0			3.0		μV/°C
Input Offset Current	T_A = 0°C		10	60		12	60	nA
Average Input Offset Current Drift			20			20		pA/°C
Input Bias Current	T_A = 0°C		15	75		30	110	nA
Supply Voltage Rejection Ratio	$R_S \leq 100$ kΩ		50			50		μV/V
Common Mode Rejection Ratio	$R_S \leq 100$ kΩ		60			60		μV/V
Large Signal Voltage Gain	R_L = 5.0 kΩ, V_{OUT} = ±1.0 V		20,000					
	R_L = 2.0 kΩ, V_{OUT} = ±10 V					40,000		

NOTES:

(1) Ratings apply for case temperatures to +70°C.

(2) For supply voltages less than ±15 V, the absolute maximum input voltage is equal to the supply voltage.

FREQUENCY COMPENSATION FOR VARIOUS CLOSED LOOP GAINS

CLOSED LOOP GAIN	V_S (VOLTS)	R_1 (kΩ)	C_1 (μF)	R_2 (kΩ)	C_2 (μF)	C_3 (pF)
1	±3	39	.001	1.2	.01	
1	±15	39	.02	0.1	.0047	220
10	±3	39	.002	12	.001	
10	±15	39	.002	1.0	180 pF	22
100	±3			.390	.047	
100	±15	39	220 pF	1.0	180 pF	22
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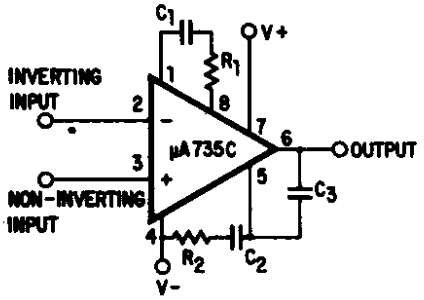
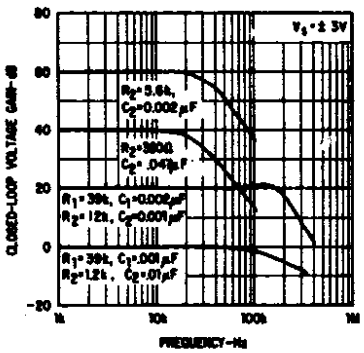
1000	±15	56	82 pF	SHORT	10 pF	

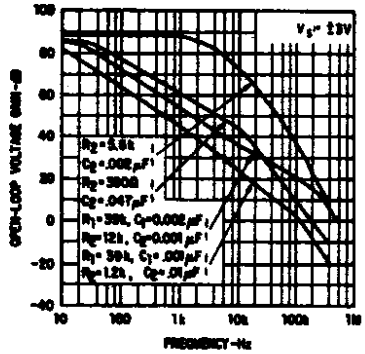
FREQUENCY COMPENSATION



FREQUENCY RESPONSE FOR VARIOUS CLOSED-LOOP GAINS



OPEN-LOOP RESPONSE FOR VARIOUS VALUES OF COMPENSATION



MORE:

FOR OTHER FAIRCHILD OPERATIONAL AMPLIFIERS, SEE THE FOLLOWING DATA SHEETS:

HIGH SPEED — μA715, μA715C
INSTRUMENTATION — μA725, μA725B, μA725C
TEMPERATURE STABLE PREAMPS — μA727, μA727B
FET INPUT — μA740C
FREQUENCY COMPENSATED — μA741, μA741C
DUALS — μA739C, μA749, μA749C, μA747, μA747C
HIGH PERFORMANCE — μA748, μA748C
PRECISION — μA777, μA777B, μA777C