μA741A • μA741E
FREQUENCY COMPENSATED OPERATIONAL AMPLIFIER
FAIRCHILD LINEAR INTEGRATED CIRCUITS

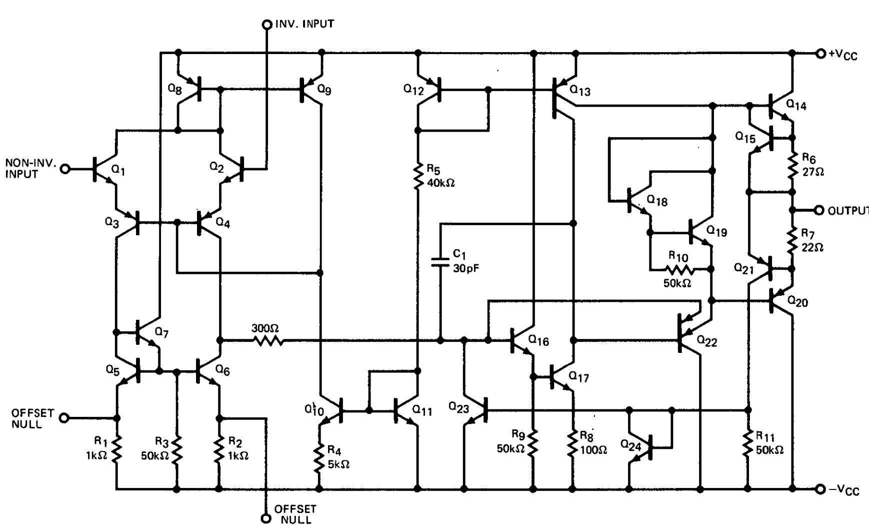
GENERAL DESCRIPTION — The μA741A and E are high performance monolithic Operational Amplifiers constructed using the Fairchild Planar* epitaxial process. They are intended for a wide range of analog applications. High common mode voltage range and absence of "latch-up" tendencies make the μA741A and E ideal for use as voltage followers. The high gain and wide range of operating voltage provides superior performance in integrator, summing amplifier, and general feedback applications. Electrical characteristics are identical to MIL-M-38510/10101.

- **NO FREQUENCY COMPENSATION REQUIRED**
- **SHORT-CIRCUIT PROTECTION**
- **OFFSET VOLTAGE NULL CAPABILITY**
- **LARGE COMMON-MODE AND DIFFERENTIAL VOLTAGE RANGES**
- **LOW POWER CONSUMPTION**
- **NO LATCH UP**

ABSOLUTE MAXIMUM RATINGS

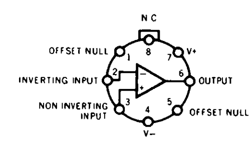
Supply Voltage	±22V
Internal Power Dissipation (Note 1)	
Metal Can	500 mW
DIP	670 mW
Flatpak	570 mW
Differential Input Voltage	±30V
Input Voltage (Note 2)	±15V
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	
Military (741A)	−55°C to +125°C
Commercial (741E)	0°C to +70°C
Lead Temperature (Soldering, 60 seconds)	300°C
Output Short Circuit Duration (Note 3)	Indefinite

EQUIVALENT CIRCUIT



Notes on following pages.

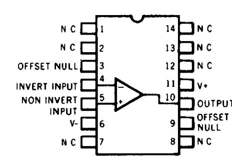
CONNECTION DIAGRAMS
8-LEAD METAL CAN
(TOP VIEW)
PACKAGE OUTLINE 5B



ORDER INFORMATION

TYPE	PART NO.
741A	741AHM
741EC	741EHC

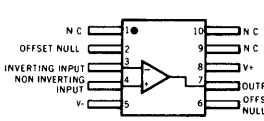
14-LEAD DIP
(TOP VIEW)
PACKAGE OUTLINE 6A



ORDER INFORMATION

TYPE	PART NO.
741A	741ADM
741EC	741EDC

10-LEAD FLATPAK
(TOP VIEW)
PACKAGE OUTLINE 3F



ORDER INFORMATION

TYPE	PART NO.
741A	741AFM

*Planar is a patented Fairchild process.

741A

ELECTRICAL CHARACTERISTICS (V_S = ±15V, T_A = 25°C unless otherwise specified)

PARAMETERS (see definitions)		CONDITIONS		MIN.	TYP.	MAX.	UNITS
Input Offset Voltage		$R_S \leq 50\Omega$			0.8	3.0	mV
Average Input Offset Voltage Drift						15	μV/°C
Input Offset Current					3.0	30	nA
Average Input Offset Current Drift						0.5	nA/°C
Input Bias Current					30	80	nA
Power Supply Rejection Ratio		V_S = +10, −20; V_S = +20, −10V, R_S = 50Ω			15	50	μV/V
Output Short Circuit Current				10	25	35	mA
Power Dissipation		V_S = ±20V			80	150	mW
Input Impedance		V_S = ±20V		1.0	6.0		MΩ
Large Signal Voltage Gain		V_S = ±20V, R_L = 2kΩ, V_{OUT} = ±15V		50			V/mV
Transient Response	Rise Time				0.25	0.8	μs
(Unity Gain)	Overshoot				6.0	20	%
Bandwidth (Note 4)				.437	1.5		MHz
Slew Rate (Unity Gain)		V_{IN} = ±10V		0.3	0.7		V/μs
The following specifications apply for −55°C ≤ T_A ≤ +125°C							
Input Offset Voltage						4.0	mV
Input Offset Current						70	nA
Input Bias Current						210	nA
Common Mode Rejection Ratio		V_S = ±20V, V_{IN} = ±15V, R_S = 50Ω		80	95		dB
Adjustment For Input Offset Voltage		V_S = ±20V		10			mV
Output Short Circuit Current				10		40	mA
Power Dissipation		V_S = ±20V	−55°C			165	mW
			+125°C			135	mW
Input Impedance		V_S = ±20V		0.5			MΩ
Output Voltage Swing		V_S = ±20V,	R_L = 10kΩ	±16			V
			R_L = 2kΩ	±15			V
Large Signal Voltage Gain		V_S = ±20V, R_L = 2kΩ, V_{OUT} = ±15V		32			V/mV
		V_S = ±5V, R_L = 2kΩ, V_{OUT} = ±2 V		10			V/mV

NOTES

1. Rating applies to ambient temperatures up to 70°C. Above 70°C ambient derate linearly at 6.3mW/°C for the Metal Can, 8.3mW/°C for the DIP and 7.1mW/°C for the Flatpak.
2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
3. Short circuit may be to ground or either supply. Rating applies to +125°C case temperature or 75°C ambient temperature.
4. Calculated value from: $BW(MHz) = \frac{0.35}{\text{Rise Time } (\mu s)}$

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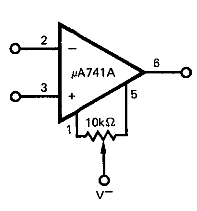
741E

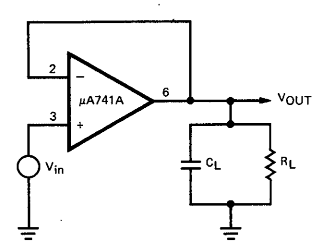
ELECTRICAL CHARACTERISTICS (V_S = ±15V, T_A = 25°C unless otherwise specified)

PARAMETERS (see definitions)		CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Offset Voltage		$R_S \leqslant 50\Omega$		0.8	3.0	mV
Average Input Offset Voltage Drift					15	μV/°C
Input Offset Current				3.0	30	nA
Average Input Offset Current Drift					0.5	nA/°C
Input Bias Current				30	80	nA
Power Supply Rejection Ratio		V_S = +10, −20; V_S = +20, −10V, R_S = 50Ω		15	50	μV/V
Output Short Circuit Current			10	25	35	mA
Power Dissipation		V_S = ±20V		80	150	mW
Input Impedance		V_S = ±20V	1.0	6.0		MΩ
Large Signal Voltage Gain		V_S = ±20V, R_L = 2kΩ, V_{OUT} = ±15V	50			V/mV
Transient Response	Rise Time			0.25	0.8	μs
(Unity Gain)	Overshoot			6.0	20	%
Bandwidth (Note 4)			.437	1.5		MHz
Slew Rate (Unity Gain)		V_{IN} = ±10V	0.3	0.7		V/μs
The following specifications apply for 0°C ⩽ T_A ⩽ 70°C						
Input Offset Voltage					4.0	mV
Input Offset Current					70	nA
Input Bias Current					210	nA
Common Mode Rejection Ratio		V_S = ±20V, V_{IN} = ±15V, R_S = 50Ω	80	95		dB
Adjustment For Input Offset Voltage		V_S = ±20V	10			mV
Output Short Circuit Current			10		40	mA
Power Dissipation		V_S = ±20V			150	mW
Input Impedance		V_S = ±20V	0.5			MΩ
Output Voltage Swing		V_S = ±20V, R_L = 10kΩ	±16			V
		V_S = ±20V, R_L = 2kΩ	±15			V
Large Signal Voltage Gain		V_S = ±20V, R_L = 2kΩ, V_{OUT} = ±15V	32			V/mV
		V_S = ±5V, R_L = 2kΩ, V_{OUT} = ±2 V	10			V/mV

VOLTAGE OFFSET NULL CIRCUIT

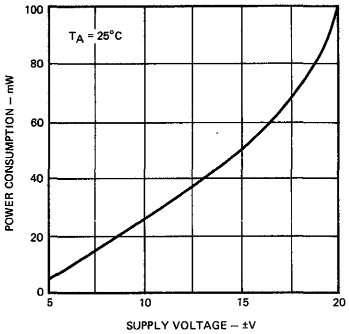


TRANSIENT RESPONSE TEST CIRCUIT

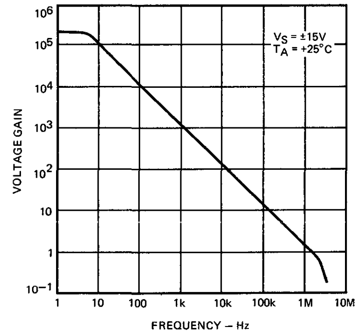


TYPICAL PERFORMANCE CURVES FOR 741A AND 741E

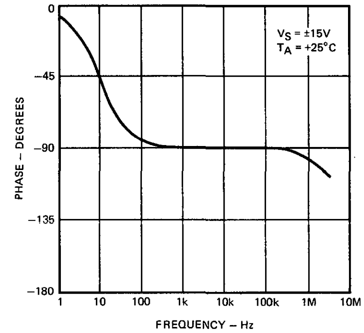
POWER CONSUMPTION AS A FUNCTION OF SUPPLY VOLTAGE



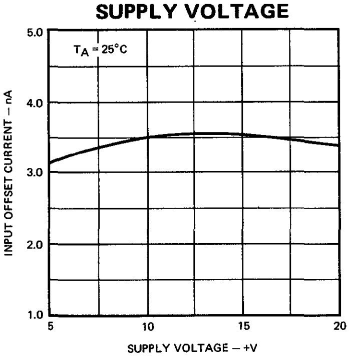
OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF FREQUENCY



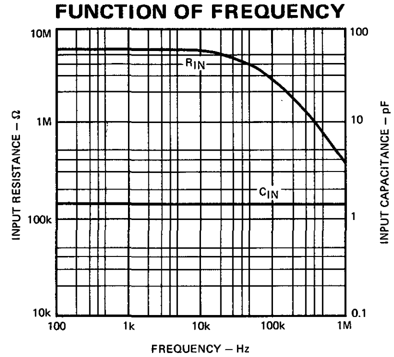
OPEN LOOP PHASE RESPONSE AS A FUNCTION OF FREQUENCY



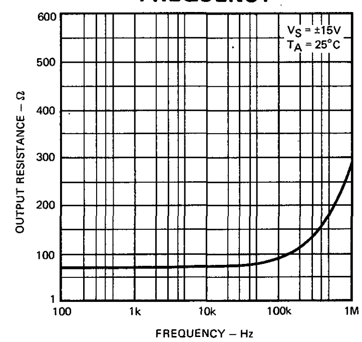
INPUT OFFSET CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



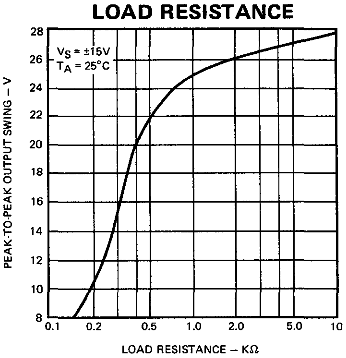
INPUT RESISTANCE AND INPUT CAPACITANCE AS A FUNCTION OF FREQUENCY



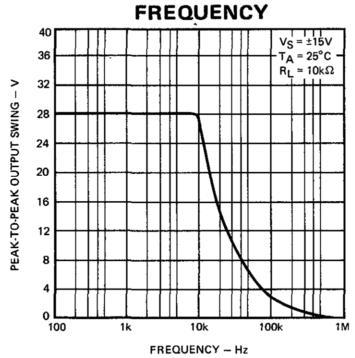
OUTPUT RESISTANCE AS A FUNCTION OF FREQUENCY



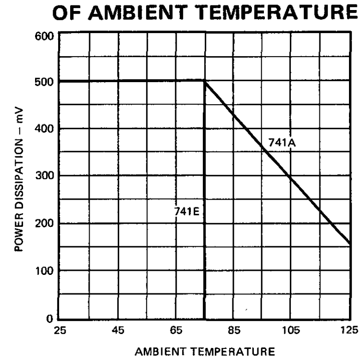
OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



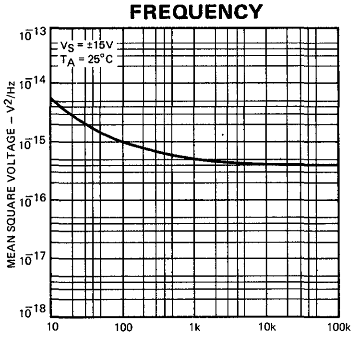
OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY



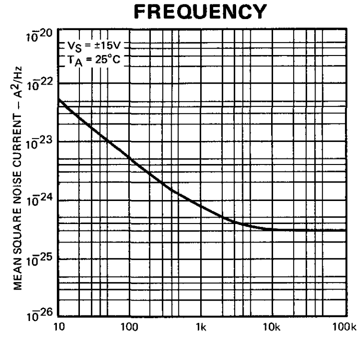
ABSOLUTE MAXIMUM POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE



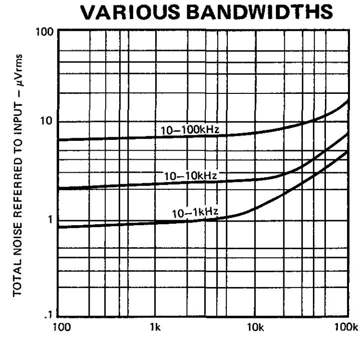
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



BROADBAND NOISE FOR VARIOUS BANDWIDTHS



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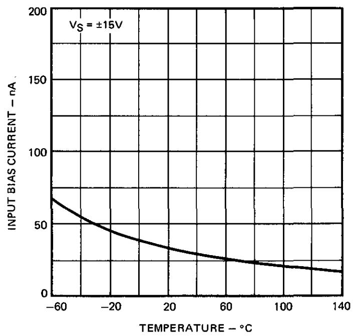
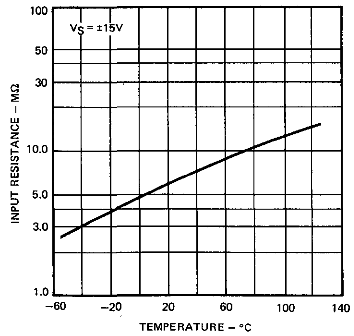
TYPICAL PERFORMANCE CURVES FOR 741A

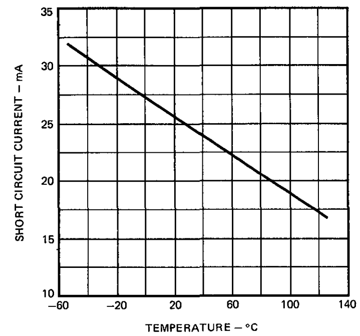
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



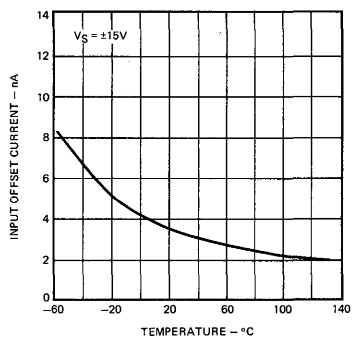
INPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



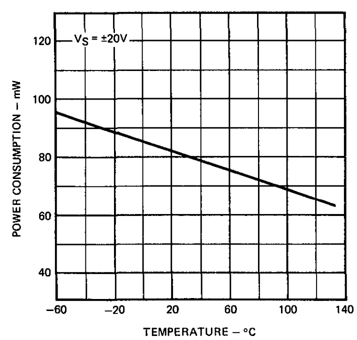
OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



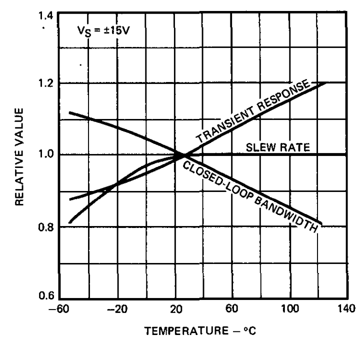
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE

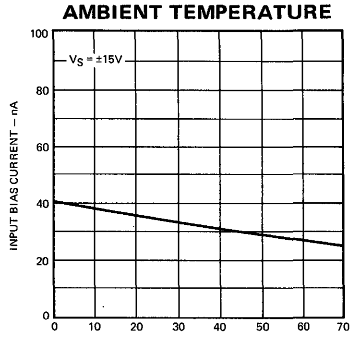


FREQUENCY CHARACTERISTICS AS A FUNCTION OF AMBIENT TEMPERATURE

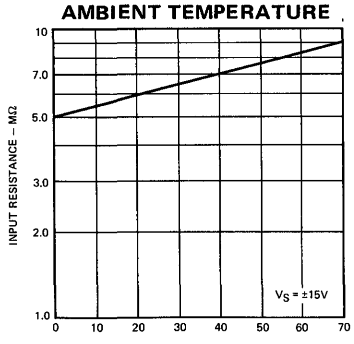


TYPICAL PERFORMANCE CURVES FOR 741E

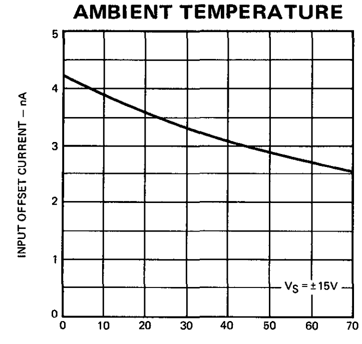
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



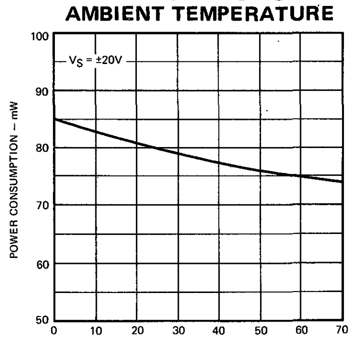
INPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



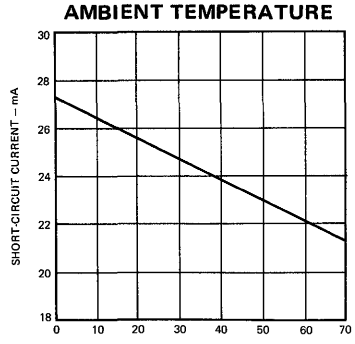
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



OUTPUT SHORT-CIRCUIT CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



FREQUENCY CHARACTERISTICS AS A FUNCTION OF AMBIENT TEMPERATURE