FAIRCHILD
A Schlumberger Company

μA741
Operational Amplifier

Linear Division Operational Amplifiers

Description

The μA741 is a high performance monolithic operational amplifier constructed using the Fairchild Planar Epitaxial process. It is intended for a wide range of analog applications. High common mode voltage range and absence of latch up tendencies make the μA741 ideal for use as a voltage follower. The high gain and wide range of operating voltage provide superior performance in integrator, summing amplifier, and general feedback applications.

- **No Frequency Compensation Required**
- **Short Circuit Protection**
- **Offset Voltage Null Capability**
- **Large Common Mode And Differential Voltage Ranges**
- **Low Power Consumption**
- **No Latch Up**

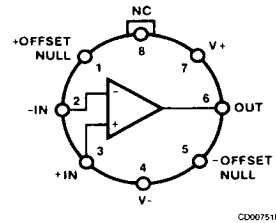
Absolute Maximum Ratings

Storage Temperature Range	
Metal Can and Ceramic DIP	−65°C to +175°C
Molded DIP and SO-8	−65°C to +150°C
Operating Temperature Range	
Extended (μA741AM, μA741M)	−55°C to +125°C
Commercial (μA741EC, μA741C)	0°C to +70°C
Lead Temperature	
Metal Can and Ceramic DIP (soldering, 60 s)	300°C
Molded DIP and SO-8 (soldering, 10 s)	265°C
Internal Power Dissipation[1, 2]	
8L-Metal Can	1.00 W
8L-Molded DIP	0.93 W
8L-Ceramic DIP	1.30 W
SO-8	0.81 W
Supply Voltage	
μA741A, μA741, μA741E	±22 V
μA741C	±18 V
Differential Input Voltage	±30 V
Input Voltage[3]	±15 V
Output Short Circuit Duration[4]	Indefinite

Notes

1. $T_{J\ Max}$ = 150°C for the Molded DIP and SO-8, and 175°C for the Metal Can and Ceramic DIP.
2. Ratings apply to ambient temperature at 25°C. Above this temperature, derate the 8L-Metal Can at 6.7 mW/°C, the 8L-Molded DIP at 7.5 mW/°C, the 8L-Ceramic DIP at 8.7 mW/°C, and the SO-8 at 6.5 mW/°C.
3. For supply voltages less than ±15 V, the absolute maximum input voltage is equal to the supply voltage.
4. Short circuit may be to ground or either supply. Rating applies to 125°C case temperature or 75°C ambient temperature.

Connection Diagram
8-Lead Metal Package
(Top View)



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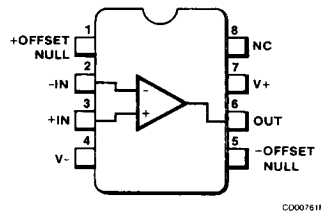
Lead 4 connected to case.

Order Information

Device Code	Package Code	Package Description
μA741HM	5W	Metal
μA741HC	5W	Metal
μA741AHM	5W	Metal
μA741EHC	5W	Metal

Connection Diagram
8-Lead DIP and SO-8 Package
(Top View)



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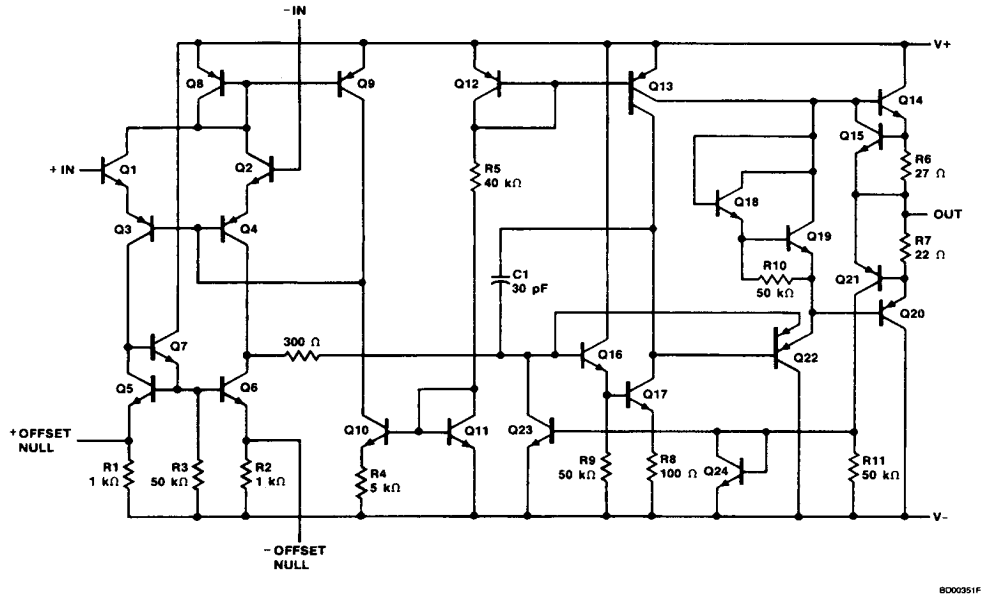
Order Information

Device Code	Package Code	Package Description
μA741RM	6T	Ceramic DIP
μA741RC	6T	Ceramic DIP
μA741SC	KC	Molded Surface Mount
μA741TC	9T	Molded DIP
μA741ARM	6T	Ceramic DIP
μA741ERC	6T	Ceramic DIP
μA741ETC	9T	Molded DIP

Equivalent Circuit



μA741 and μA741C
Electrical Characteristics $T_A = 25°C$, $V_{CC} = \pm 15$ V, unless otherwise specified.

Symbol	Characteristic		Condition	μA741			μA741C			Unit
				Min	Typ	Max	Min	Typ	Max	
V_{IO}	Input Offset Voltage		$R_S \leq 10$ kΩ		1.0	5.0		2.0	6.0	mV
$V_{IO\ adj}$	Input Offset Voltage Adjustment Range				± 15			± 15		mV
I_{IO}	Input Offset Current				20	200		20	200	nA
I_{IB}	Input Bias Current				80	500		80	500	nA
Z_I	Input Impedance			0.3	2.0		0.3	2.0		MΩ
I_{CC}	Supply Current				1.7	2.8		1.7	2.8	mA
P_c	Power Consumption				50	85		50	85	mW
CMR	Common Mode Rejection			70			70	90		dB
V_{IR}	Input Voltage Range			± 12	± 13		± 12	± 13		V
PSRR	Power Supply Rejection Ratio				30	150				μV/V
			$V_{CC} = \pm 5.0$ V to ± 18 V					30	150	
I_{OS}	Output Short Circuit Current				25			25		mA
A_{VS}	Large Signal Voltage Gain		$R_L \geq 2.0$ kΩ, $V_O = \pm 10$ V	50	200		20	200		V/mV
V_{OP}	Output Voltage Swing		$R_L = 10$ kΩ	± 12			± 12	± 14		V
			$R_L = 2.0$ kΩ	± 10			± 10	± 13		
TR	Transient Response	Rise time	$V_I = 20$ mV, $R_L = 2.0$ kΩ, $C_L = 100$ pF, $A_V = 1.0$		0.3			0.3		μs
		Overshoot			5.0			5.0		%
BW	Bandwidth				1.0			1.0		MHz
SR	Slew Rate		$R_L \geq 2.0$ kΩ, $A_V = 1.0$		0.5			0.5		V/μs

μA741 and μA741C (Cont.)
Electrical Characteristics Over the range of $-55°C \leq T_A \leq +125°C$ for μA741, $0°C \leq T_A \leq +70°C$ for μA741C, unless otherwise specified.

Symbol	Characteristic	Condition	μA741			μA741C			Unit
			Min	Typ	Max	Min	Typ	Max	
V_{IO}	Input Offset Voltage							7.5	mV
		$R_S \leq 10$ kΩ		1.0	6.0				
$V_{IO\ adj}$	Input Offset Voltage Adjustment Range			± 15			± 15		mV
I_{IO}	Input Offset Current							300	nA
		$T_A = +125°C$		7.0	200				
		$T_A = -55°C$		85	500				
I_{IB}	Input Bias Current							800	nA
		$T_A = +125°C$		0.03	0.5				μA
		$T_A = -55°C$		0.3	1.5				
I_{CC}	Supply Current	$T_A = +125°C$		1.5	2.5				mA
		$T_A = -55°C$		2.0	3.3				
P_c	Power Consumption	$T_A = +125°C$		45	75				mW
		$T_A = -55°C$		60	100				
CMR	Common Mode Rejection	$R_S \leq 10$ kΩ	70	90					dB
V_{IR}	Input Voltage Range		± 12	± 13					V
PSRR	Power Supply Rejection Ratio			30	150				μV/V
A_{VS}	Large Signal Voltage Gain	$R_L \geq 2.0$ kΩ, $V_O = \pm 10$ V	25			15			V/mV
V_{OP}	Output Voltage Swing	$R_L = 10$ kΩ	± 12	± 14					V
		$R_L = 2.0$ kΩ	± 10	± 13		± 10	± 13		

μA741A and μA741E
Electrical Characteristics $T_A = 25°C$, $V_{CC} = \pm 15$ V, unless otherwise specified.

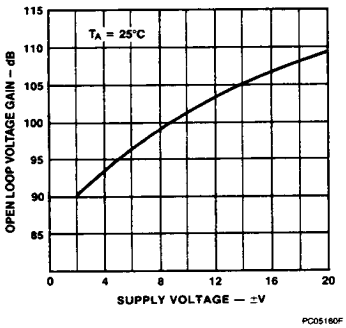
Symbol	Characteristic	Condition	Min	Typ	Max	Unit
V_{IO}	Input Offset Voltage	$R_S \leq 50\ \Omega$		0.8	3.0	mV
I_{IO}	Input Offset Current			3.0	30	nA
I_{IB}	Input Bias Current			30	80	nA
Z_I	Input Impedance	$V_{CC} = \pm 20$ V	1.0	6.0		MΩ
P_c	Power Consumption	$V_{CC} = \pm 20$ V		80	150	mW
PSRR	Power Supply Rejection Ratio	$V_{CC} = +10$ V, -20 V to $V_{CC} = +20$ V, -10 V, $R_S = 50\ \Omega$		15	50	μV/V
I_{OS}	Output Short Circuit Current		10	25	40	mA
A_{VS}	Large Signal Voltage Gain	$V_{CC} = \pm 20$ V, $R_L \geq 2.0$ kΩ, $V_O = \pm 15$ V	50	200		V/mV
TR	Transient Response — Rise time	$A_V = 1.0$, $V_{CC} = \pm 20$ V, $V_I = 50$ mV, $R_L = 2.0$ kΩ, $C_L = 100$ pF		0.25	0.8	μs
	Transient Response — Overshoot			6.0	20	%
BW	Bandwidth		0.437	1.5		MHz
SR	Slew Rate	$V_I = \pm 10$ V, $A_V = 1.0$	0.3	0.7		V/μs

The following specifications apply over the range of $-55°C \leq T_A \leq +125°C$ for the μA741A, and $0°C \leq T_A \leq +70°C$ for the μA741E.

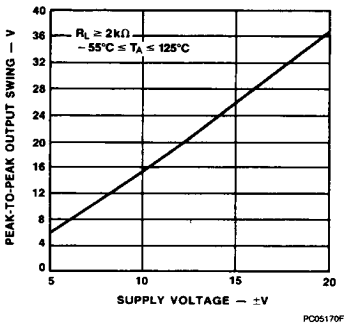
V_{IO}	Input Offset Voltage					4.0	mV
$\Delta V_{IO}/\Delta T$	Input Offset Voltage Temperature Sensitivity					15	μV/°C
$V_{IO\ adj}$	Input Offset Voltage Adjustment Range	$V_{CC} = \pm 20$ V		10			mV
I_{IO}	Input Offset Current					70	nA
$\Delta I_{IO}/\Delta T$	Input Offset Current Temperature Sensitivity					0.5	nA/°C
I_{IB}	Input Bias Current					210	nA
Z_I	Input Impedance			0.5			MΩ
P_c	Power Consumption	$V_{CC} = \pm 20$ V, μA741A, −55°C				165	mW
		$V_{CC} = \pm 20$ V, μA741A, +125°C				135	
		$V_{CC} = \pm 20$ V, μA741E				150	
CMR	Common Mode Rejection	$V_{CC} = \pm 20$ V, $V_I = \pm 15$ V, $R_S = 50\ \Omega$		80	95		dB
I_{OS}	Output Short Circuit Current			10		40	mA
A_{VS}	Large Signal Voltage Gain	$V_{CC} = \pm 20$ V, $R_L \geq 2.0$ kΩ, $V_O = \pm 15$ V		32			V/mV
		$V_{CC} = \pm 5.0$ V, $R_L \geq 2.0$ kΩ, $V_O = \pm 2.0$ V		10			
V_{OP}	Output Voltage Swing	$V_{CC} = \pm 20$ V, $R_L = 10$ kΩ		±16			V
		$V_{CC} = \pm 20$ V, $R_L = 2.0$ kΩ		±15			

Typical Performance Curves

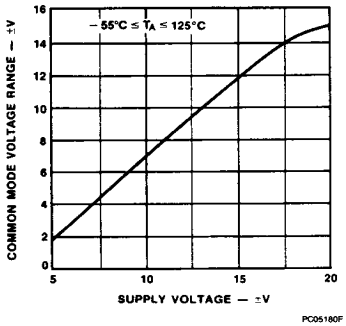
Voltage Gain vs Supply Voltage for μA741/A



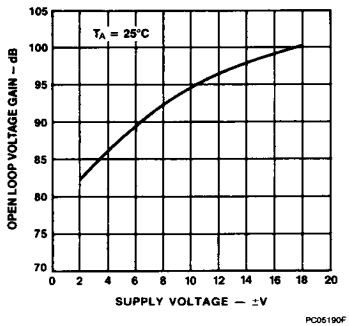
Output Voltage Swing vs Supply Voltage for μA741/A



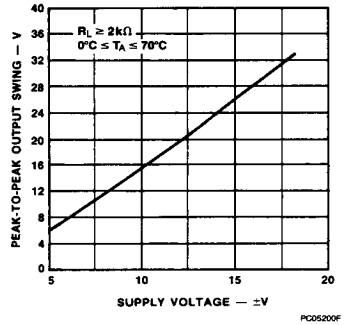
Input Common Mode Voltage vs Supply Voltage for μA741/A



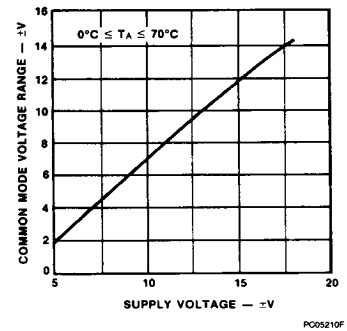
Voltage Gain vs Supply Voltage for μA741C/E



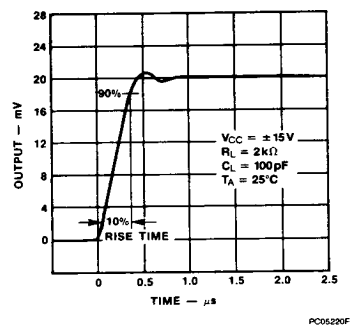
Output Voltage Swing vs Supply Voltage for μA741C/E



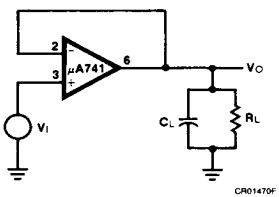
Input Common Mode Voltage Range vs Supply Voltage for μA741C/E



Transient Response for μA741C/E

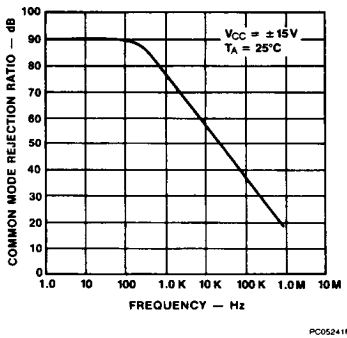


Transient Response Test Circuit for μA741C/E



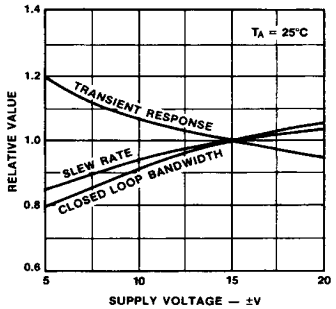
Lead numbers are shown for metal package only

Common Mode Rejection Ratio vs Frequency for μA741C/E

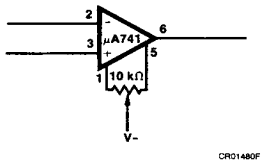


Typical Performance Curves (Cont.)

Frequency Characteristics vs Supply Voltage for μA741C/E

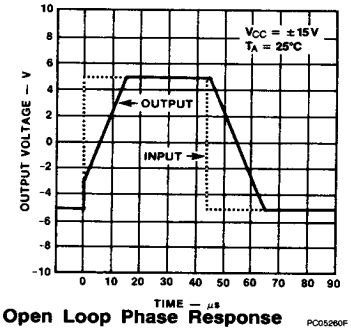


Voltage Offset Null Circuit for μA741C/E



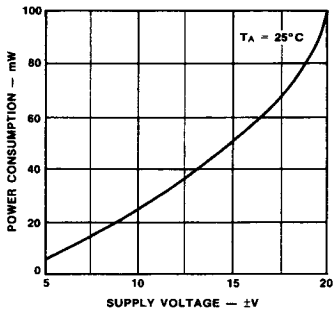
Lead numbers are shown for metal package only

Voltage Follower Large Signal Pulse Response for μA741C/E



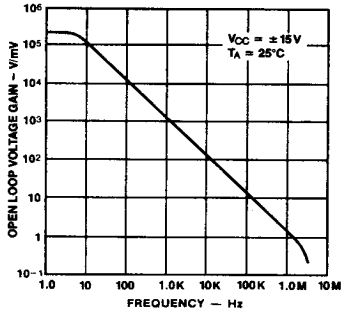
PC05260F

Power Consumption vs Supply Voltage



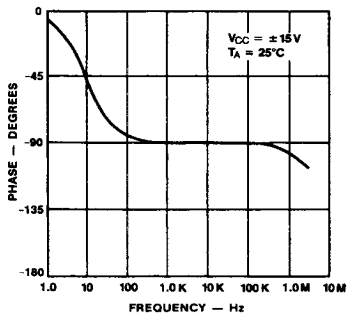
PC05271F

Open Loop Frequency Response



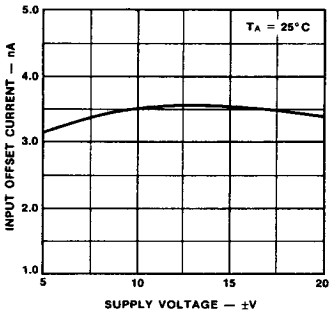
PC05281F

Open Loop Phase Response vs Frequency



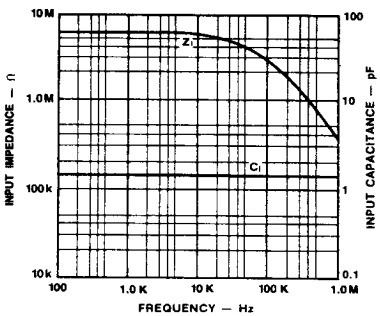
PC05291F

Input Offset Current vs Supply Voltage



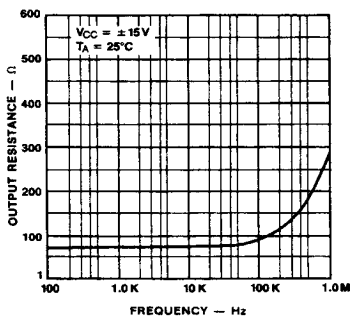
PC05301F

Input Impedance and Input Capacitance vs Frequency



PC05311F

Output Resistance vs Frequency



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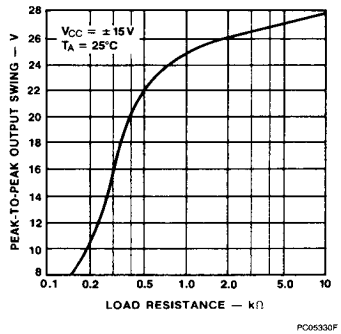
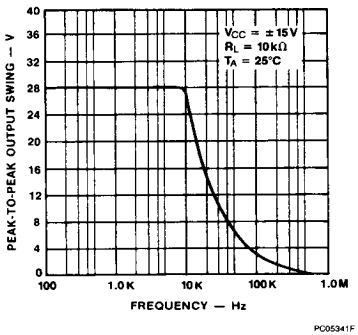
Typical Performance Curves (Cont.)

Output Voltage Swing vs Load Resistance



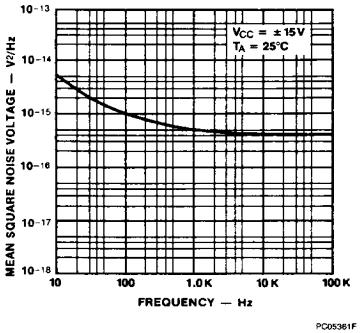
PC05330F

Output Voltage Swing vs Frequency



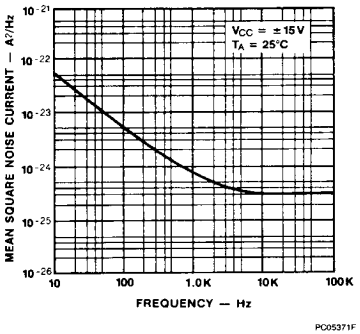
PC05341F

Input Noise Voltage vs Frequency



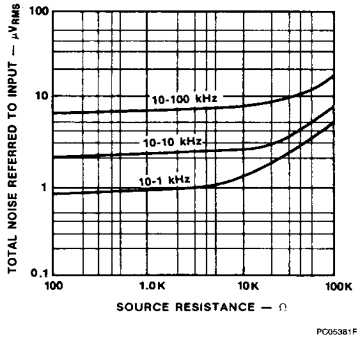
PC05361F

Input Noise Current vs Frequency



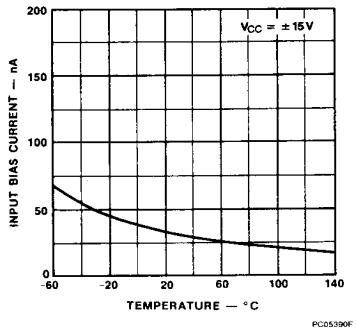
PC05371F

Broadband Noise for Various Bandwidths



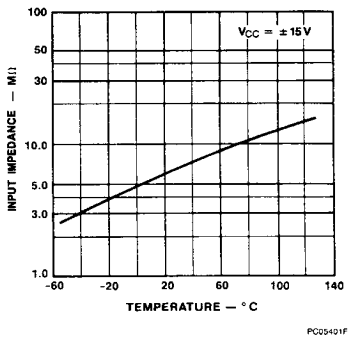
PC05381F

Input Bias Current vs Temperature for μA741/A



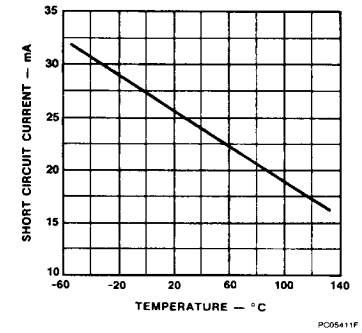
PC05390F

Input Impedance vs Temperature for μA741/A



PC05401F

Short Circuit Current vs Temperature for μA741/A



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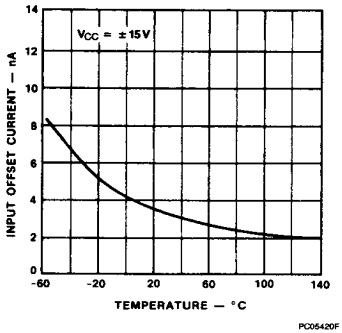
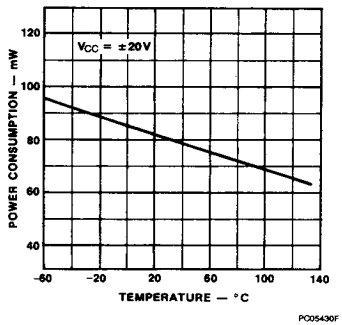
Typical Performance Curves (Cont.)

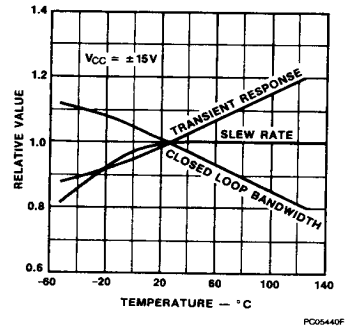
Input Offset Current vs Temperature for μA741/A



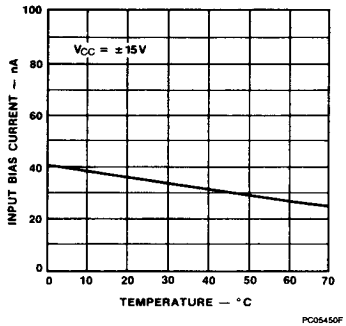
Power Consumption vs Temperature for μA741/A



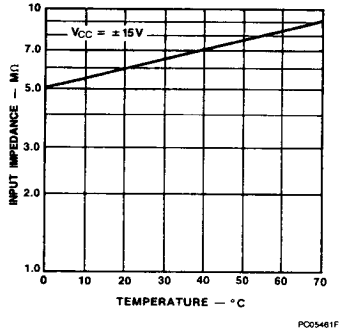
Frequency Characteristics vs Temperature for μA741/A



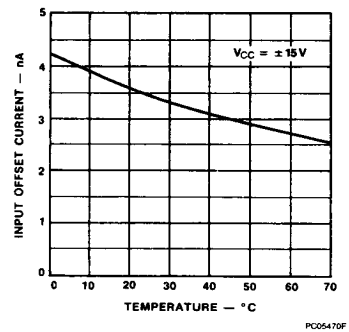
Input Bias Current vs Temperature for μA741C/E



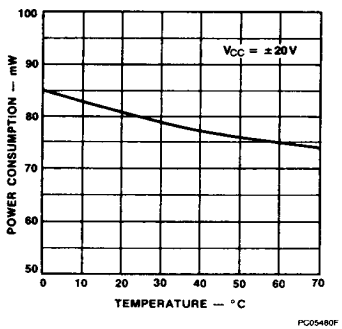
Input Impedance vs Temperature for μA741C/E



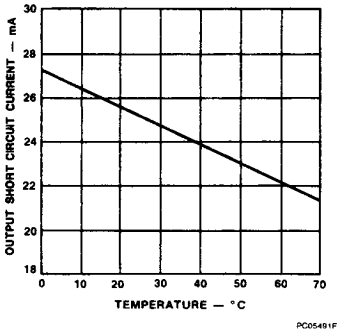
Input Offset Current vs Temperature for μA741C/E



Power Consumption vs Temperature for μA741C/E



Short Circuit Current vs Temperature for μA741C/E



Frequency Characteristics vs Temperature for μA741C/E