μA730

DIFFERENTIAL AMPLIFIER

FAIRCHILD LINEAR INTEGRATED CIRCUITS

GENERAL DESCRIPTION — The μA730 is a Differential Amplifier constructed on a single silicon chip using the Fairchild Planar* epitaxial process. This device has a wide range of applications since it has both a differential input and output; any combination of single-ended or differential configurations can be employed at its input and output. The emitter follower output stage gives this device a low output impedance making it useful as a preamplifier.

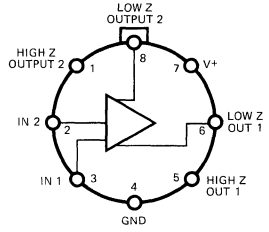
ABSOLUTE MAXIMUM RATINGS

Supply Voltage	15 V
Differential Input Voltage	±5 V
Common Mode Input Voltage	2.5 to 5.5 V
Internal Power Dissipation (Note 1)	500 mW
Operating Temperature Range	
Military (μA730)	−55°C to +125°C
Commercial (μA730C)	0°C to +70°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 60 s)	300°C

NOTE:

1. Rating applies for ambient temperature to +70°C; derate linearly at 6.3 mW/°C for ambient temperatures above +70°C.

CONNECTION DIAGRAM
8-LEAD METAL CAN
(TOP VIEW)
PACKAGE OUTLINE 5S
PACKAGE CODE H



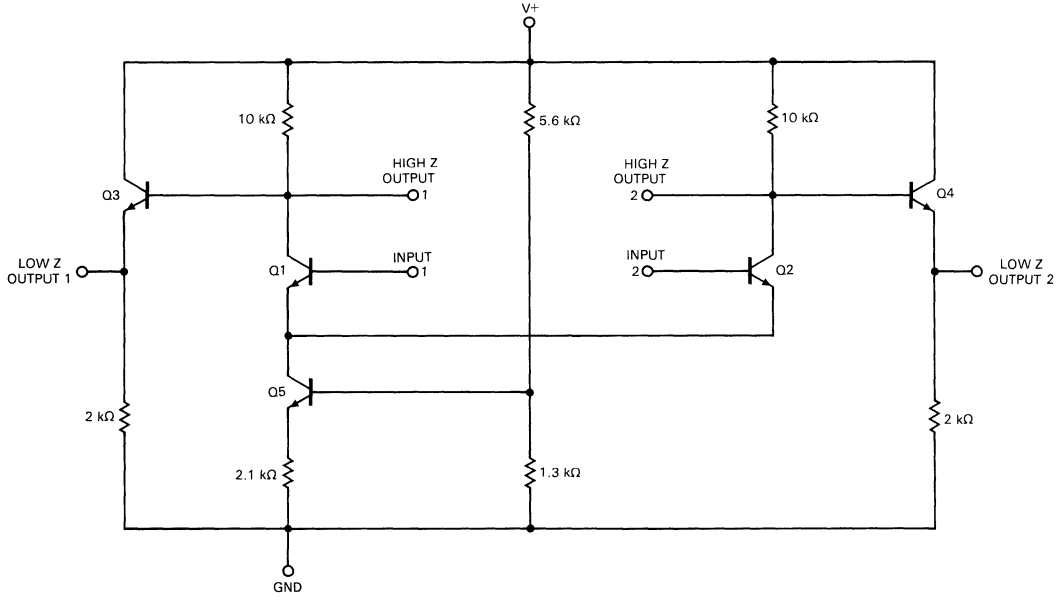
NOTE: Pin 4 connected to case.

ORDER INFORMATION

TYPE	PART NO.
μA730	μA730HM
μA730C	μA730HC

*Planar is a patented Fairchild process.

EQUIVALENT CIRCUIT



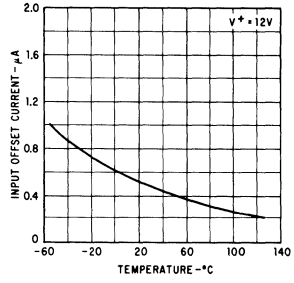
μA730

ELECTRICAL CHARACTERISTICS (T_A = 25°C, V+ = 12.0 V, and V_{CM} = 3.5 V unless otherwise specified)

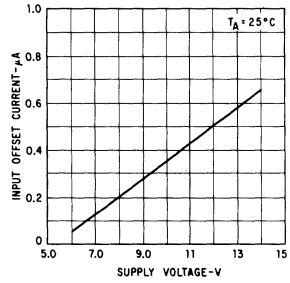
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$R_S \leq 50\Omega$		1.0	2.5	mV
Input Offset Current			0.5	1.5	μA
Input Bias Current			3.5	7.5	μA
Input Resistance		5.0	20		kΩ
Differential Voltage Gain	$R_L \geq 100$ kΩ	100	145	160	
Differential Distortion	$R_L \geq 100$ kΩ		80	300	mV_{pk-pk}
Bandwidth		1.0	1.5		MHz
Single-Ended Output Resistance			70	500	Ω
Output Voltage Swing	$R_L \geq 100$ kΩ	5.0	8.0		V_{pk-pk}
Supply Current	$R_L \geq 100$ kΩ		9.5	13	mA
Power Consumption	$R_L \geq 100$ kΩ		114	156	mW
The following specifications apply for $-55°C \leq T_A \leq 125°C$:					
Input Offset Voltage	$R_S \leq 50\Omega$			3.5	mV
Input Offset Current	$T_A = +125°C$		0.2	1.5	μA
	$T_A = -55°C$		1.0	3.0	μA
Input Bias Current	$T_A = -55°C$		6.5	15	μA
Input Resistance		0.9			kΩ
Input Voltage Range		3.5		5.2	V
Common Mode Rejection Ratio	$R_S \leq 50\Omega$, f ≤ 1.0 kHz, $+3.5V \leq V_{CM} \leq +5.2V$	70	85		dB
Differential Voltage Gain	$R_L \geq 100$ kΩ	90		175	
Common Mode Output Voltage		5.5	7.0	7.75	V
Output Resistance				600	Ω
Output Voltage Swing		4.5	6.8		V_{pk-pk}
Supply Current	$T_A = -55°C$		10	15	mA
	$T_A = 125°C$		8.0	11	mA
Power Consumption	$T_A = -55°C$		120	180	mW
	$T_A = 125°C$		96	121	mW

TYPICAL PERFORMANCE CURVES FOR μA730

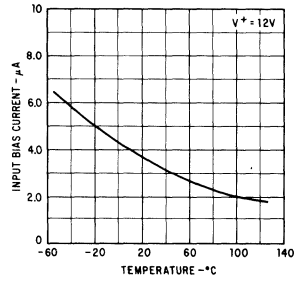
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



INPUT OFFSET CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



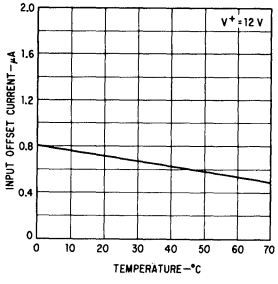
μA730C

ELECTRICAL CHARACTERISTICS (T_A = 25°C, V+ = 12.0 V, and V_{CM} = 3.5 V unless otherwise specified)

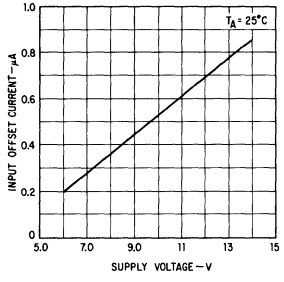
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$R_S \leq 50\Omega$		2.0	5.0	mV
Input Offset Current			0.7	3.0	μA
Input Bias Current			4.5	16.0	μA
Input Resistance		2.5	15		kΩ
Differential Voltage Gain	$R_L \geq 100\ k\Omega$	100	135	160	
Differential Distortion	$R_L \geq 100\ k\Omega$		85	300	mVp-p
Bandwidth		1.0	1.5		MHz
Single-Ended Output Resistance			70	500	Ω
Output Voltage Swing	$R_L \geq 100\ k\Omega$	5.0	8.0		V_{pk-pk}
Supply Current	$R_L \geq 100\ k\Omega$		9.5	13	mA
Power Consumption	$R_L \geq 100\ k\Omega$		114	156	mW
The following specifications apply for $0°C \leq T_A \leq +70°C$					
Input Offset Voltage	$R_S \leq 50\Omega$			7.5	mV
Input Offset Current	$T_A = +70°C$		0.5	3.0	μA
	$T_A = 0°C$		0.8	5.0	μA
Input Bias Current	$T_A = 0°C$		5.0	20	μA
Input Resistance		1.8			kΩ
Input Voltage Range		+3.5		+5.2	
Common Mode Rejection Ratio	$R_S \leq 50\Omega$, f ≤ 1.0 kHz, $+3.5V \leq V_{CM} \leq +5.2V$	60	80		dB
Differential Voltage Gain	$R_L \geq 100\ k\Omega$	80		190	
Common Mode Output Voltage		5.0	7.0	8.0	V
Output Resistance				600	Ω
Output Voltage Swing		4.5	7.5		V_{pk-pk}
Supply Current	$T_A = 0°C$		10	15	mA
	$T_A = +70°C$		8.8	13	mA
Power Consumption	$T_A = 0°C$		120	180	mW
	$T_A = +70°C$		106	156	mW

TYPICAL PERFORMANCE CURVES FOR μA730C

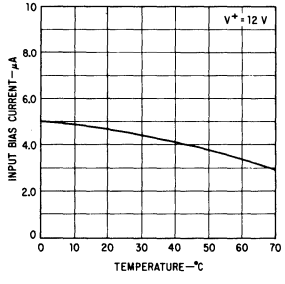
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



INPUT OFFSET CURRENT AS A FUNCTION OF SUPPLY VOLTAGE

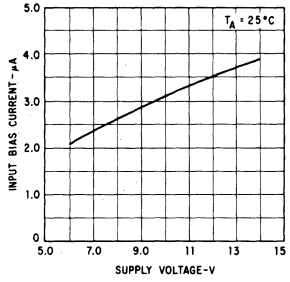


INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE

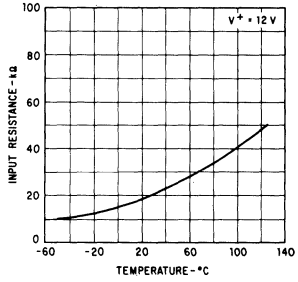


TYPICAL PERFORMANCE CURVES FOR μA730

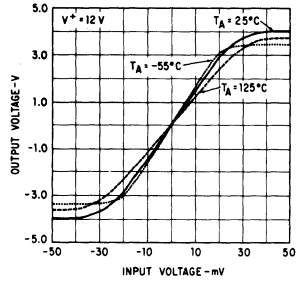
INPUT BIAS CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



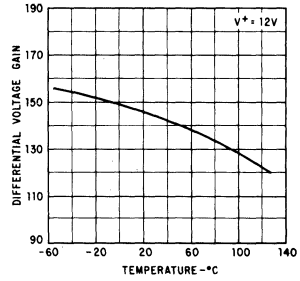
INPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



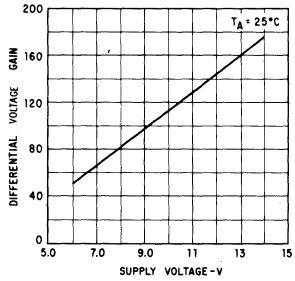
VOLTAGE TRANSFER CHARACTERISTICS



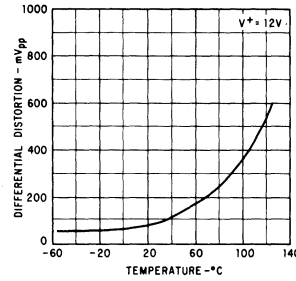
DIFFERENTIAL VOLTAGE GAIN AS A FUNCTION OF AMBIENT TEMPERATURE



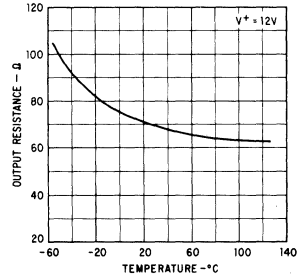
DIFFERENTIAL VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGE



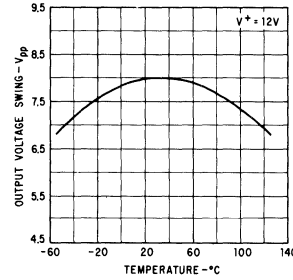
DIFFERENTIAL DISTORTION AS A FUNCTION OF AMBIENT TEMPERATURE



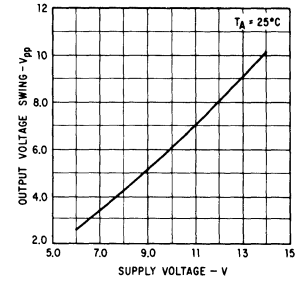
OUTPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



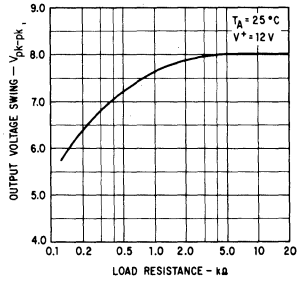
OUTPUT VOLTAGE SWING AS A FUNCTION OF AMBIENT TEMPERATURE



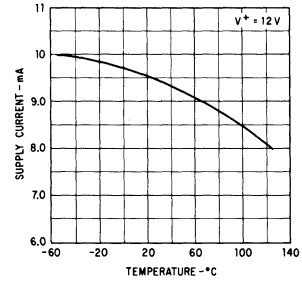
OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE



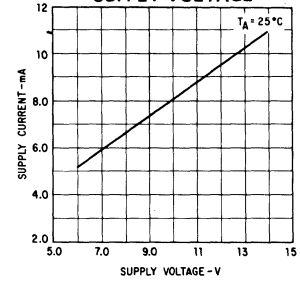
OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



SUPPLY CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE

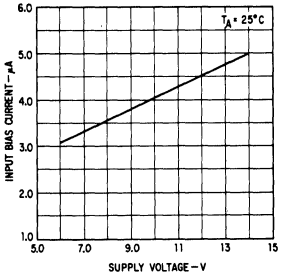


SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE

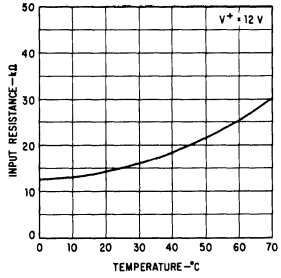


TYPICAL PERFORMANCE CURVES FOR μA730C

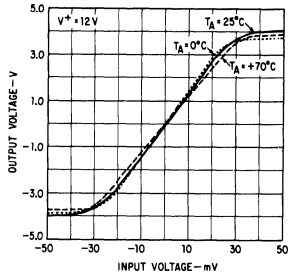
INPUT BIAS CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



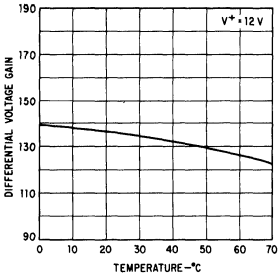
INPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



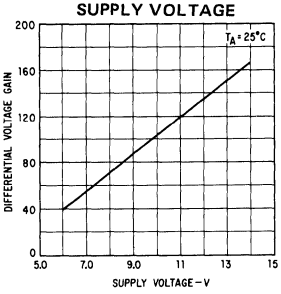
VOLTAGE TRANSFER CHARACTERISTICS



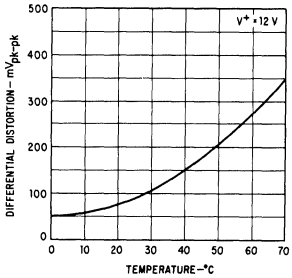
DIFFERENTIAL VOLTAGE GAIN AS A FUNCTION OF AMBIENT TEMPERATURE



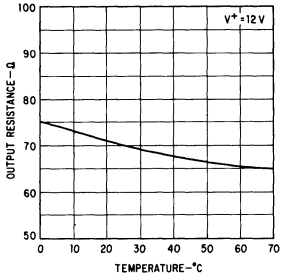
DIFFERENTIAL VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGE



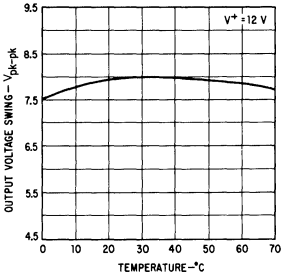
DIFFERENTIAL DISTORTION AS A FUNCTION OF AMBIENT TEMPERATURE



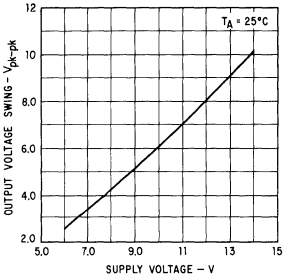
OUTPUT RESISTANCE AS A FUNCTION OF AMBIENT TEMPERATURE



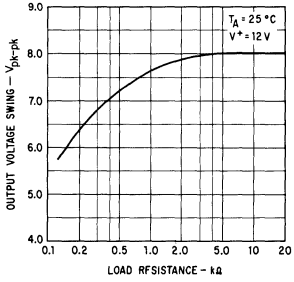
OUTPUT VOLTAGE SWING AS A FUNCTION OF AMBIENT TEMPERATURE



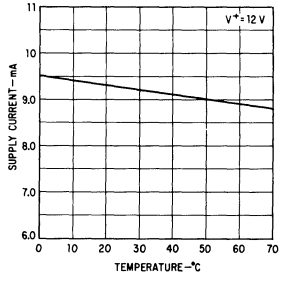
OUTPUT VOLTAGE SWING AS A FUNCTION OF SUPPLY VOLTAGE



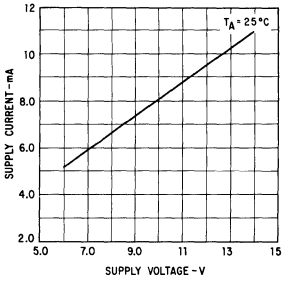
OUTPUT VOLTAGE SWING AS A FUNCTION OF LOAD RESISTANCE



SUPPLY CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



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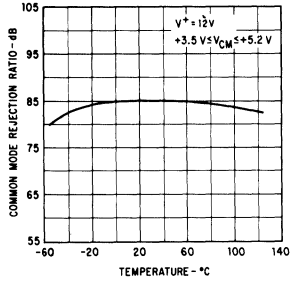
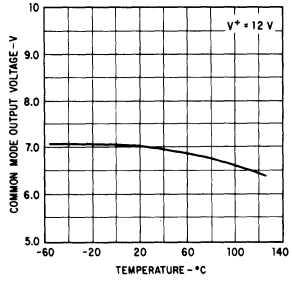
TYPICAL PERFORMANCE CURVES FOR μA730 AND μA730C

COMMON MODE REJECTION RATIO AS A FUNCTION OF AMBIENT TEMPERATURE



COMMON MODE OUTPUT VOLTAGE AS A FUNCTION OF AMBIENT TEMPERATURE



COMMON MODE OUTPUT VOLTAGE AS A FUNCTION OF SUPPLY VOLTAGE