

Am725/725C

Instrumentation Operational Amplifiers

Description:

The Am725 and Am725C monolithic operational amplifiers are functionally, electrically and pin-for-pin equivalent to the Fairchild 725 and 725C. They are available in the hermetic metal can and DIP packages.

Distinctive Characteristics: 100% reliability assurance testing including high-temperature bake, temperature cycling, centrifuge and fine leak hermeticity testing in compliance with MIL STD 883.

Electrically tested and optically inspected dice for the assemblers of hybrid products.

FUNCTIONAL DESCRIPTION

The 725/725C are instrumentation operational amplifiers. Device design has been optimized to provide low noise voltage, low offset voltage, low offset voltage drift and high common mode rejection. The 725 is offset voltage adjustable and is pin-for-pin compatible with the 108 and 101A amplifiers. However, additional frequency compensation components are required and should be determined by the desired closed loop gain.

FUNCTIONAL DIAGRAM

Compensation Component Values				
A _v	R ₁ (Ω)	C ₁ (pF)	R ₂ (Ω)	C ₂ (pF)
1000	470	10	—	—
100	47	10	—	—
10	27	50	270	1.5
1	10	50	39	20

*Use R₂ = 51Ω when the amplifier is operated with capacitive loads.

LIC-741

APPLICATION

Thermocouple Amplifier

LIC-742

ORDERING INFORMATION

Part Number	Package Type	Temperature Range	Order Number
Am725C	TO 99	0°C to +70°C	725HC
	DIP	0°C to +70°C	725DC
	Molded DIP	0°C to +70°C	725CN
	Dice	0°C to +70°C	725XC
Am725	TO-99	-55°C to +125°C	725HM
	DIP	-55°C to +125°C	725DM
	Dice	-55°C to +125°C	725XM

CONNECTION DIAGRAMS

Top Views

Dual-In-Line

Dual-In-Line

Metal Can

NOTES:

- (1) On Metal Can, pin 4 is connected to case.
- (2) On DIP, pin 6 is connected to bottom of package

LIC-743

6

Am725/725C

MAXIMUM RATINGS

Supply Voltage	±22V
Internal Power Dissipation (Note 1)	500 mW
Differential Input Voltage	±5V
Input Voltage (Note 2)	±22V
Operating Temperature Range	
Am725	−55°C to +125°C
Am725C	0°C to +70°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 60 sec.)	300°C

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

Parameter	Test Conditions	Am725C			Am725			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage (Without external trim)	R _S ≤ 10 kΩ		0.5	2.5		0.5	1.0	mV
Input Offset Current			3.0	35		2.0	20	nA
Input Bias Current			50	125		42	100	nA
Input Noise Voltage	f _o = 10Hz		15			15		nV/√Hz
	f _o = 100Hz		12			9.0		nV/√Hz
	f _o = 1kHz		8.0			8.0		nV/√Hz
Input Noise Current	f _o = 10Hz		1.0			1.0		pA/√Hz
	f _o = 100Hz		0.8			0.3		pA/√Hz
	f _o = 1kHz		0.6			0.15		pA/√Hz
Input Resistance			3.0			1.5		MΩ
Input Voltage Range		±13.5	±14		±13.5	±14		V
Large Signal Voltage Gain	R _L ≥ 2kΩ V _{OUT} = ±10V	0.25	3.0		1.0	3.0		V/μV
Common Mode Rejection Ratio	R _S ≤ 10kΩ	96	120		110	120		dB
Power Supply Rejection Ratio	R _S ≤ 10kΩ		2.0	35		2.0	10	μV/V
Output Voltage Swing	R _L ≥ 10kΩ	±12	±13		±12	±13.5		V
	R _L ≥ 2kΩ	±10	±13		±12	±13.5		V
Output Resistance			150			150		Ω
Power Consumption			80	150		80	105	mW

The Following Specifications Apply Over The Operating Temperature Ranges

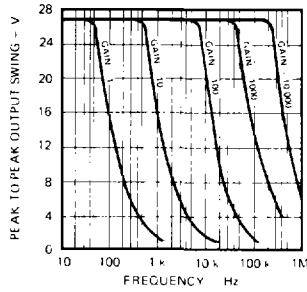
Input Offset Voltage (Without external trim)	R _S ≤ 10kΩ		0.8	3.5			1.5	mV
Average Temperature Coefficient of Input Offset Voltage (Without external trim)	R _S = 50Ω		1.2			2.0	5.0	μV/°C
Average Temperature Coefficient of Input Offset Voltage (With external trim)	R _S = 50Ω		0.5			0.6		μV/°C
Input Offset Current	T _A (max) T _A (min)		1.2	35		1.2	20	nA
			4.0	50		7.5	40	nA
Average Temperature Coefficient of Input Offset Current			25			25	150	pA/°C
Input Bias Current	T _A (max) T _A (min)		25	125		20	100	nA
			100	250		80	200	nA
Large Signal Voltage Gain	R _L ≥ 2kΩ, T _A (max) R _L ≥ 2kΩ, T _A (min)	0.125 0.125			1.0 0.25			V/μV
Common Mode Rejection Ratio	R _S ≤ 10kΩ		115		100			dB
Power Supply Rejection Ratio	R _S ≤ 10kΩ		20				20	μV/V
Output Voltage Swing	R _L ≥ 2kΩ	±10	±13		±10			V

Notes: 1. Derate at 6.8 mW/°C for operation at ambient temperatures above 75°C.

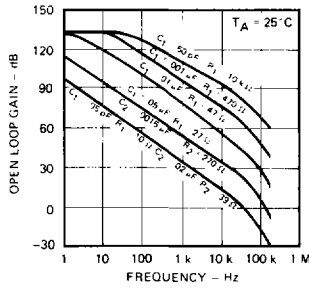
2. For supply voltages less than ±22 V, the absolute maximum input voltage is equal to the supply voltage.

PERFORMANCE CURVES

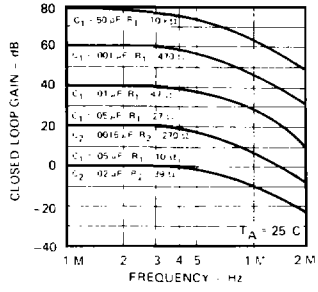
Maximum Undistorted Sinusoidal Output Versus Frequency



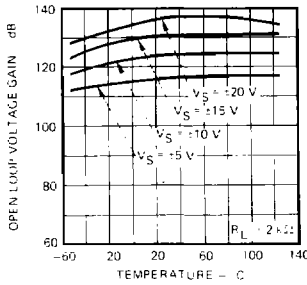
Open Loop Response For Various Values Of Compensation



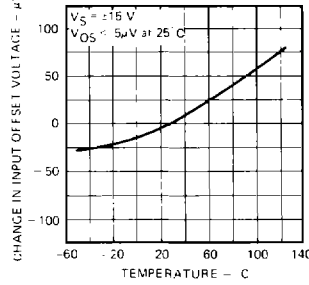
Frequency Response For Various Closed Loop Gains



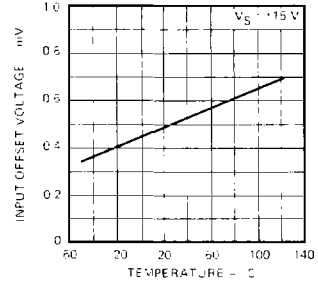
Open Loop Voltage Gain As A Function Of Temperature For Various Supply Voltages



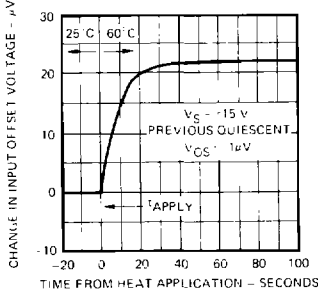
Nullified Input Offset Voltage As A Function Of Temperature



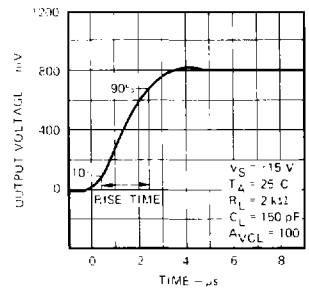
Unnullified Input Offset Voltage As A Function Of Temperature



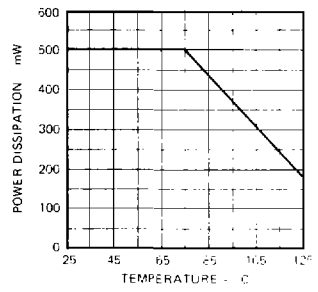
Change in Input Offset Voltage Due To Thermal Shock As A Function Of Time



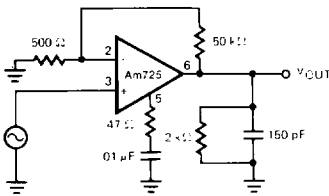
Transient Response



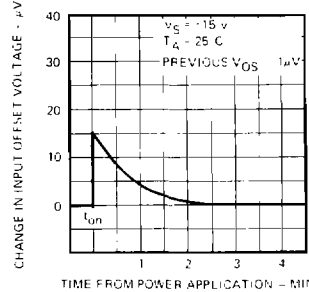
Absolute Maximum Power Dissipation As A Function Of Ambient Temperature



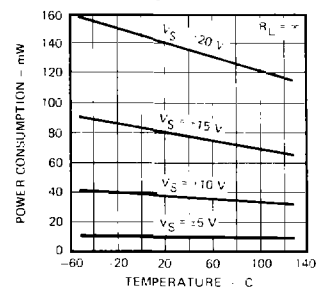
Transient Response Test Circuit



Stabilization Time Of Input Offset Voltage From Power Turn-On



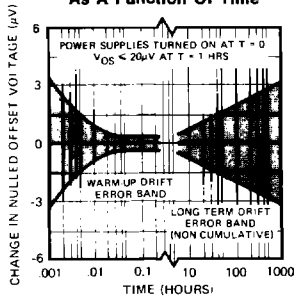
Power Consumption As A Function Of Temperature



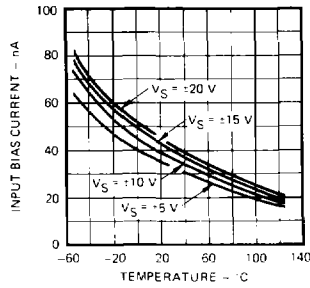
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PERFORMANCE CURVES

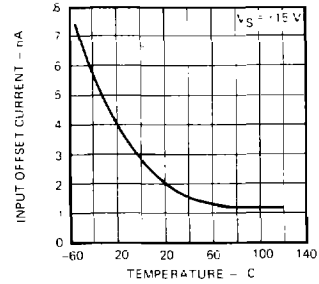
Input Offset Voltage Drift As A Function Of Time



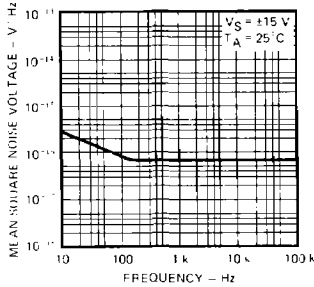
Input Bias Current As A Function Of Temperature



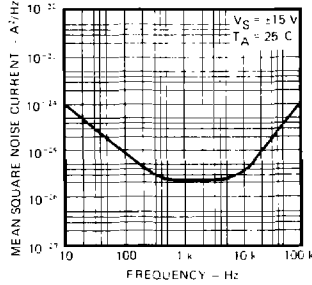
Input Offset Current As A Function Of Temperature



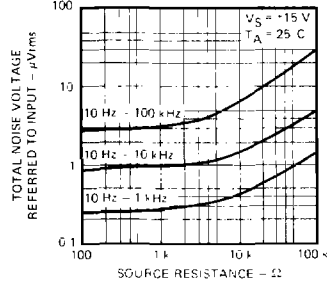
Input Noise Voltage As A Function Of Frequency



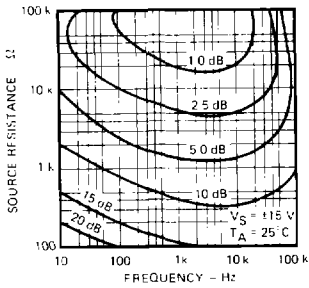
Input Noise Current As A Function Of Frequency



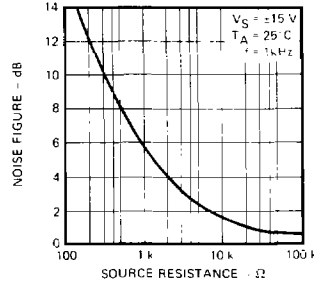
Broadband Noise For Various Bandwidths



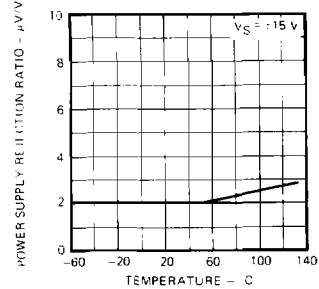
Narrow Band Spot Noise Figure Contours



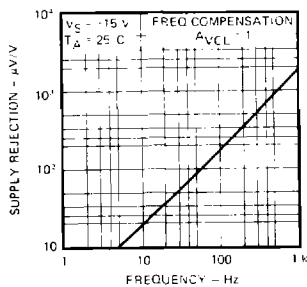
Noise Figure As A Function Of Source Resistance



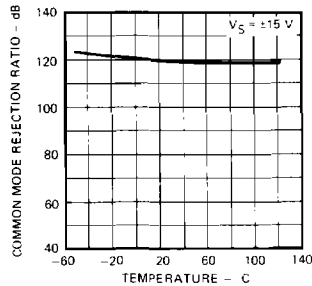
Supply Voltage Rejection Ratio As A Function Of Temperature



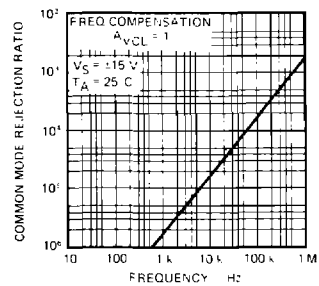
Supply Rejection As A Function Of Frequency



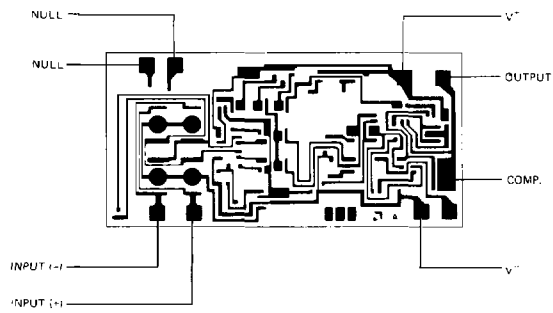
Common Mode Rejection Ratio As A Function Of Temperature



Common Mode Rejection Ratio As A Function Of Frequency



Metallization and Pad Layout



50 x 95 Mils