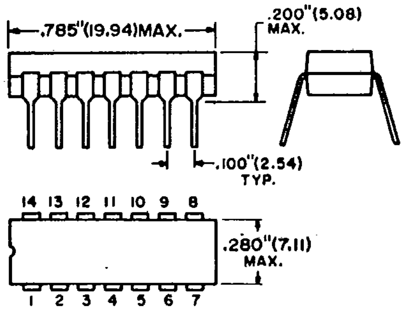
ECG® Semiconductors

ECG725

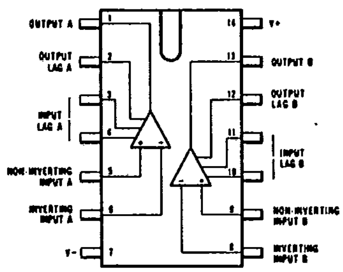
Dual Low-Noise Operational Amplifier

FEATURES
- SINGLE OR DUAL SUPPLY OPERATION
- LOW NOISE FIGURE, 2.0 dB
- HIGH GAIN, 20,000 V/V
- LARGE COMMON MODE RANGE, ±11 V
- EXCELLENT GAIN STABILITY VS. SUPPLY VOLTAGE
- NO LATCH-UP
- OUTPUT SHORT CIRCUIT PROTECTED

TYPICAL APPLICATIONS
- DUAL OPERATIONAL AMPLIFIER
- PHONO AND TAPE STEREO PREAMPLIFIER
- TV REMOTE CONTROL RECEIVER
- DUAL COMPARATOR
- SENSE AMPLIFIER
- OSCILLATOR
- ACTIVE FILTER



The ECG725 consists of two identical operational amplifiers constructed on a single silicon chip. These low-noise, high-gain amplifiers exhibit extremely stable operating characteristics over a wide range of supply voltage and temperatures. The device is intended for a variety of applications requiring two high performance operational amplifiers.

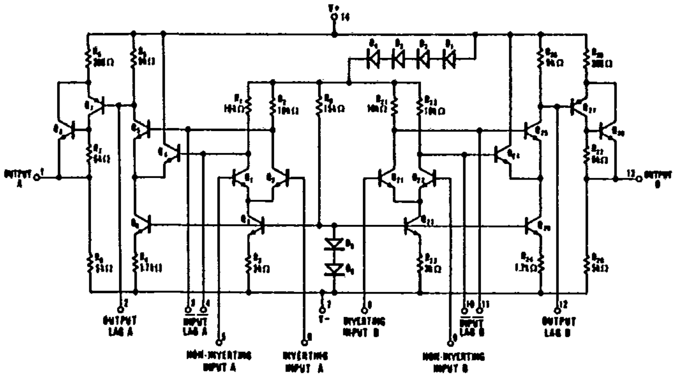


ELECTRICAL CHARACTERISTICS (V_S = ±15 V, R_L = 50 kΩ to Pin 7, T_A = 25°C unless otherwise specified)

PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Offset Voltage	$R_S \le 200\ \Omega$		1.0	6.0	mV
Input Offset Current			50	1000	nA
Input Bias Current			300	2000	nA
Input Resistance		37	150		kΩ
Large-Signal Voltage Gain	V_{OUT} = ±5.0 V	6500	20,000		V/V
Positive Output Voltage Swing		+12	+13		V
Negative Output Voltage Swing		−14	−15		V
Output Resistance	f = 1.0 kHz		5.0		kΩ
Input Voltage Range		±10	±11		V
Common Mode Rejection Ratio	$R_S \le 10$ kΩ	70	90		dB
Supply Voltage Rejection Ratio	$R_S \le 10$ kΩ		50		μV/V
Power Consumption	V_{OUT} = 0		270	420	mW
Supply Current	V_{OUT} = 0		9.0	14	mA
Broadband Noise Figure	R_S = 10 kΩ, BW = 10 Hz to 10 kHz		2.0		dB
Turn On Delay (See Figure 1)	Open Loop, V_{IN} = ±20 mV		0.2		μs
Turn Off Delay (See Figure 1)	Open Loop, V_{IN} = ±20 mV		0.3		μs
Slew Rate (unity gain) (See Figure 2)	C_1 = 0.1 μF, R_1 = 4.7 Ω		1.0		V/μs
Channel Separation (See Figure 3)	$R_S \le 10$ kΩ, f = 10 kHz		140		dB
The following specifications apply for V_S = ±4.0 V, T_A = 25°C					
Input Offset Voltage	$R_S \le 200\ \Omega$		1.0	6.0	mV
Input Offset Current			50	1000	nA
Input Bias Current			300		nA
Supply Current	V_{OUT} = 0		2.5		mA
Power Consumption	V_{OUT} = 0		20		mW
Large-Signal Voltage Gain	V_{OUT} = ±1.0 V	2500	15,000		V/V
Positive Output Voltage Swing		+2.5	+2.8		V
Negative Output Voltage Swing		−3.6	−4.0		V

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±18 V
Internal Power Dissipation (Note 1)	500 mW
Differential Input Voltage	±5 V
Input Voltage (Note 2)	±15 V
Storage Temperature Range	−55°C to +125°C
Operating Temperature Range	0°C to +70°C
Lead Temperature (Soldering, 10 seconds)	260°C
Output Short-Circuit Duration, $T_A = 25°C$ (Note 3)	30 seconds



SCHEMATIC DIAGRAM

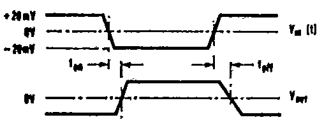


Figure 1

PULSE RESPONSE WAVEFORMS

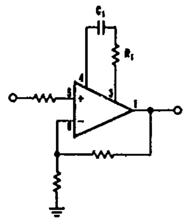


Figure 2

FREQUENCY RESPONSE TEST CIRCUIT

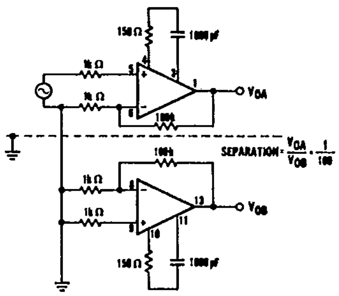
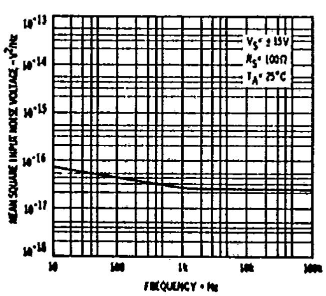


Figure 3

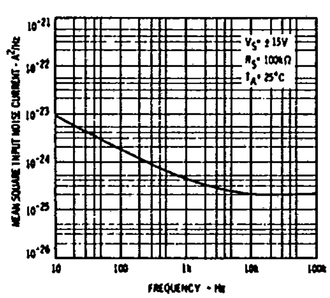
CHANNEL SEPARATION TEST CIRCUIT

TYPICAL PERFORMANCE CURVES

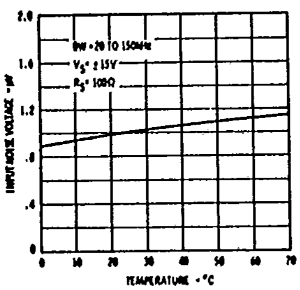
INPUT NOISE VOLTAGE AS A FUNCTION OF FREQUENCY



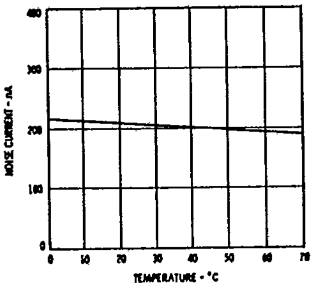
INPUT NOISE CURRENT AS A FUNCTION OF FREQUENCY



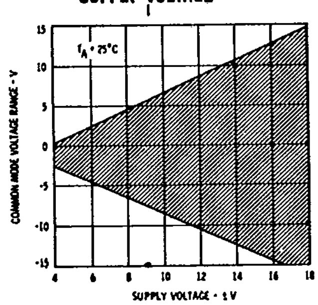
WIDE BAND INPUT NOISE VOLTAGE AS A FUNCTION OF TEMPERATURE



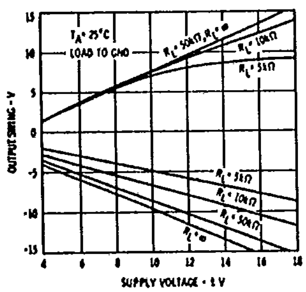
WIDE BAND INPUT NOISE CURRENT AS A FUNCTION OF TEMPERATURE



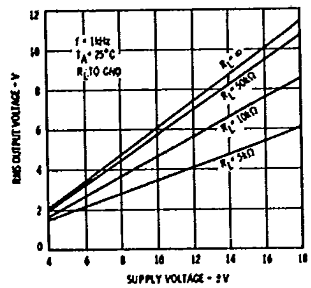
COMMON MODE RANGE AS A FUNCTION OF SUPPLY VOLTAGE



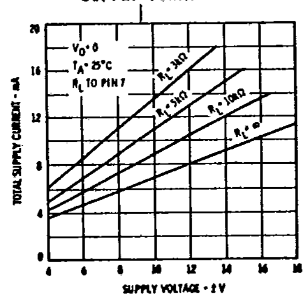
TYPICAL OUTPUT VOLTAGE AS A FUNCTION OF SUPPLY VOLTAGE



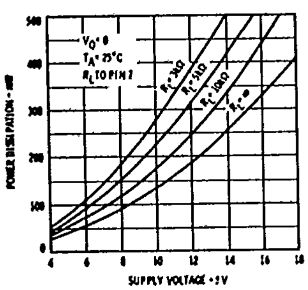
OUTPUT CAPABILITY AS A FUNCTION OF SUPPLY VOLTAGE



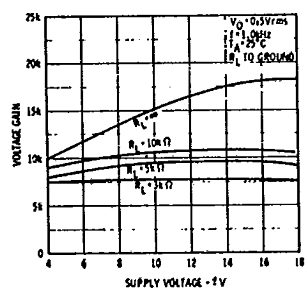
TOTAL SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



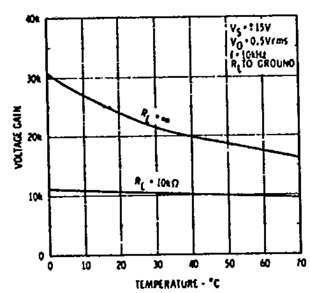
TOTAL POWER DISSIPATION AS A FUNCTION OF SUPPLY VOLTAGE AND LOAD



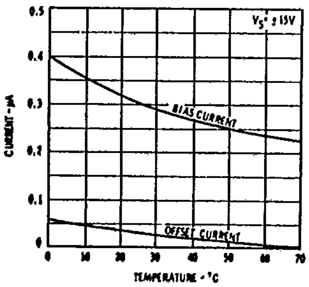
OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGE



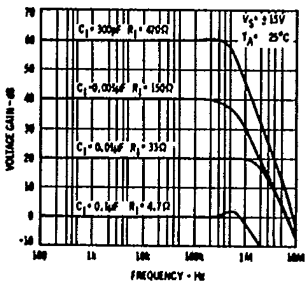
OPEN LOOP GAIN AS A FUNCTION OF TEMPERATURE



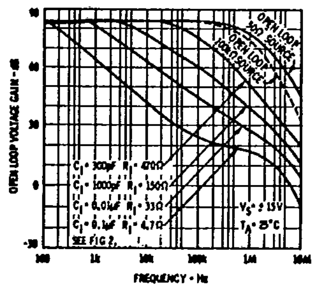
INPUT OFFSET CURRENT AND BIAS CURRENT AS FUNCTIONS OF TEMPERATURE



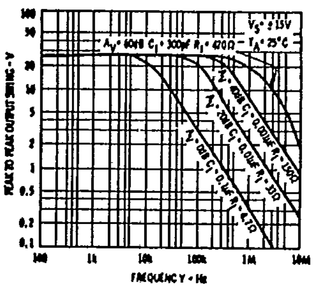
CLOSED LOOP GAIN AS A FUNCTION OF FREQUENCY



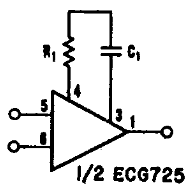
OPEN LOOP FREQUENCY RESPONSE USING RECOMMENDED COMPENSATION NETWORKS



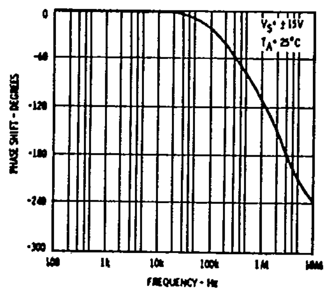
OUTPUT VOLTAGE SWING AS A FUNCTION OF FREQUENCY FOR VARIOUS COMPENSATION NETWORKS



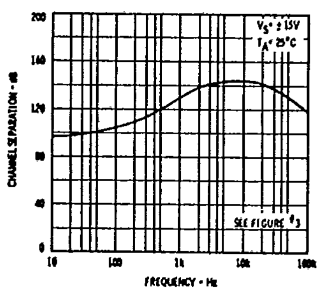
FREQUENCY COMPENSATION NETWORK



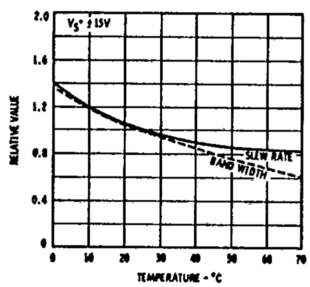
OPEN LOOP PHASE SHIFT WITHOUT COMPENSATION



CHANNEL SEPARATION AS A FUNCTION OF FREQUENCY

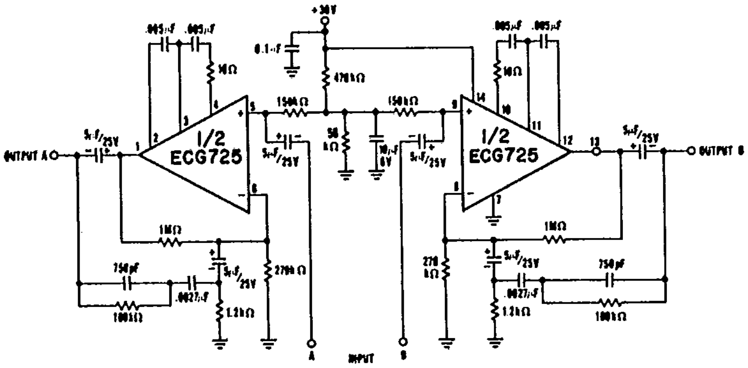


CHANGE OF A.C. CHARACTERISTICS WITH TEMPERATURE



TYPICAL APPLICATION

STEREO PHONO PREAMPLIFIER—RIAA EQUALIZED



TYPICAL PERFORMANCE

Gain 40 dB at 1 kHz, RIAA equalized
Input overload point, 80 mV rms
Noise level, 2μV referred to input
Signal to noise ratio, 74 dB below 10 mV
Channel separation @ 1 kHz, 80 dB