Am715/715C

High-Speed Operational Amplifier

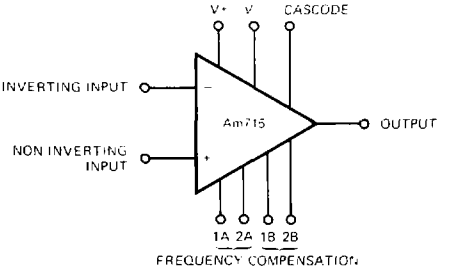
Description: The Am715 and Am715C high-speed operational amplifiers are functionally, electrically, and pin-for-pin equivalent to the Fairchild μA715 and μA715C. Both are available in the hermetic metal can, dual-in-line, and flat packages.

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 Am is a differential input, single-ended output operational amplifier having wide bandwidth and high slew rate. It has internal lead compensation and four points for external lag compensation networks, providing many possible combinations of frequency compensation. In addition, a point is brought out for use with an external diode to prevent latch-up in voltage follower applications.

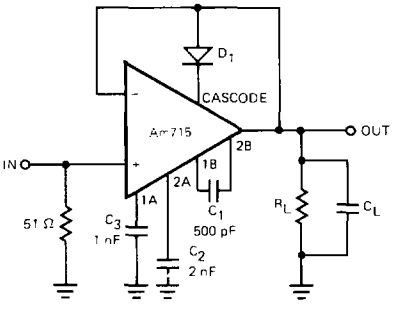
FUNCTIONAL DIAGRAM



LIC-731

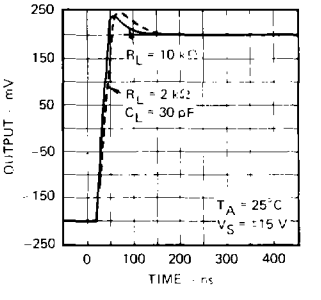
APPLICATIONS

Voltage Follower



LIC-732

Voltage Follower Small-Signal Pulse Response



LIC-733

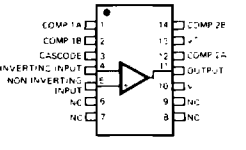
ORDERING INFORMATION

Part Number	Package Type	Temperature Range	Order Number
Am715C	Metal Can	0°C to +70°C	715HC
	DIP	0°C to +70°C	715DC
	Dice	0°C to +70°C	715XC
Am715	Metal Can	−55°C to +125°C	715HM
	DIP	−55°C to +125°C	715DM
	Flat Pak	−55°C to +125°C	715FM
	Dice	−55°C to +125°C	715XM

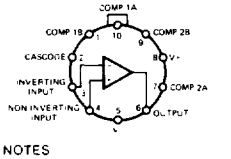
CONNECTION DIAGRAMS

Top Views

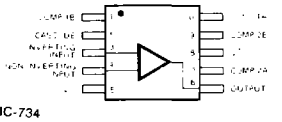
Dual-In-Line



Metal Can



Flat Package



NOTES
(1) On Metal Can, pin 5 is connected to case
(2) On DIP, pin 10 is connected to bottom of package
(3) On Flat Package pin is connected to bottom of package

LIC-734

6

MAXIMUM RATINGS

Supply Voltage	±18 V
Internal Power Dissipation (Note 1)	500 mW
Differential Input Voltage	±6 V
Input Voltage (Note 2)	±15 V
Operating Temperature Range	
Am715C	0°C to +70°C
Am715	−55°C to +125°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 60 sec.)	300°C

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

Parameter (see definitions)	Conditions	Am715C Min	Am715C Typ	Am715C Max	Am715 Min	Am715 Typ	Am715 Max	Units
Input Offset Voltage	$R_S \leq 10$ kΩ		2.0	7.5		2.0	5.0	mV
Input Offset Current			70	250		70	250	nA
Input Bias Current			0.4	1.5		0.4	0.75	μA
Input Resistance			1.0			1.0		MΩ
Input Voltage Range		±10	±12		±10	±12		V
Common Mode Rejection Ratio	$R_S \leq 10$ kΩ	74	92		74	92		dB
Supply Voltage Rejection Ratio	$R_S \leq 10$ kΩ		70	400		70	300	μV/V
Large Signal Voltage Gain	$R_L \geq 2$ kΩ, $V_{out} = \pm 10$ V	10	30		15	30		V/mV
Output Voltage Swing	$R_L \geq 2$ kΩ	±10	±13		±10	±13		V
Output Resistance			75			75		Ω
Supply Current			5.5	10		5.5	7.0	mA
Power Consumption			165	300		165	210	mW
Transient Response (Voltage Follower) Risetime	$V_{out} = \pm 200$ mV, $R_L = 2$ kΩ, $C_L = 30$ pF		30	75		30	60	ns
Overshoot			30	50		30	40	%
Slew Rate	Av = 100 (Fig. 8) $V_{out} = 0$ to +10 V,		65			65		V/μs
	Av = 10 (Fig. 7) $R_L = 2$ kΩ,		40			40		V/μs
	Av = 1 (Figs. 1 & 2) $C_L = 30$ pF	10	20		15	20		V/μs
The Following Specifications Apply Over The Operating Temperature Ranges								
Input Offset Voltage	$R_S \leq 10$ kΩ			10			7.5	mV
Input Offset Current	$T_A = T_{A\,max}$			250			250	nA
	$T_A = T_{A\,min}$			750			800	nA
Input Bias Current	$T_A = T_{A\,max}$			1.5			0.75	μA
	$T_A = T_{A\,min}$			7.5			4.0	μA
Common Mode Rejection Ratio	$R_S \leq 10$ kΩ	74			74			dB
Supply Voltage Rejection Ratio	$R_S \leq 10$ kΩ			400			300	μV/V
Large Signal Voltage Gain	$R_L \geq 2$ kΩ, $V_{out} = \pm 10$ V	8.0			10			V/mV
Output Voltage Swing	$R_L \geq 2$ kΩ	±10			±10			V

Notes: 1. Derate Metal Can package at 6.8 mW/°C for operation at ambient temperatures above 75°C and the Dual-In-Line package at 9 mW/°C for operation at ambient temperatures above 95°C, the Flat Package at 5.4 mW/°C for operation at ambient temperatures above 57°C.
2. For supply voltages less than ±15 V, the maximum input voltage is equal to the supply voltage.

PERFORMANCE CURVES

Voltage Follower

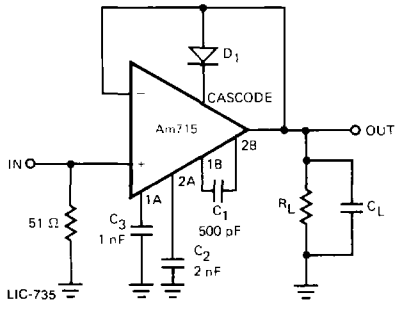


Figure 1

X1 Inverting Amplifier

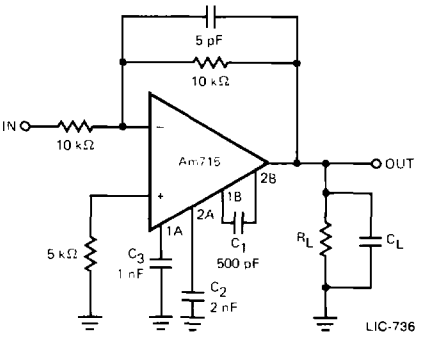
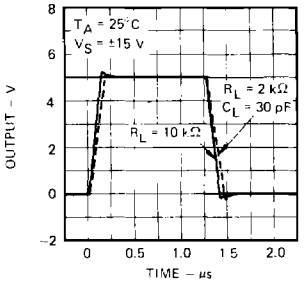


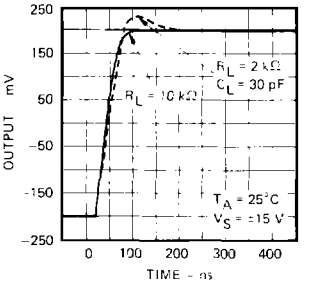
Figure 2

The high gain and large bandwidth of the Am715 make it mandatory to observe the following precautions in using the device, as is the case with any high frequency amplifier. Circuit layout should be arranged to keep all lead lengths as short as possible and the output separated from the inputs and frequency compensation pins. The values of the feedback and source impedances should be kept small to reduce the effect of stray capacitance of the inputs. The power supplies must be bypassed to ground at the supply leads of the amplifier with low inductance capacitors. Capacitive loading must be kept to an absolute minimum, since the amplifier cannot tolerate more than 30 pF directly at its output with full feedback.

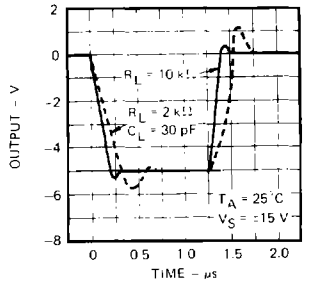
Follower & X1 Inverter
Positive Large-Signal
Pulse Response



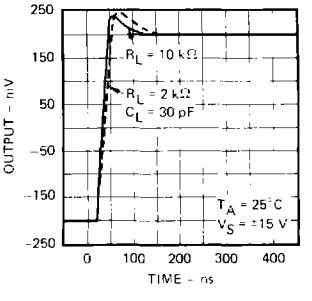
X1 Inverter
Small-Signal
Pulse Response



Follower & X1 Inverter
Negative Large-Signal
Pulse Response



Voltage Follower
Small-Signal
Pulse Response



LIC-737

6

X10 Amplifier

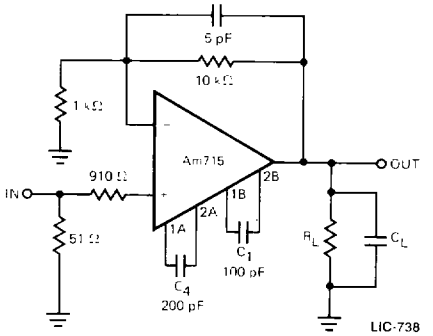


Figure 3

X100 Amplifier

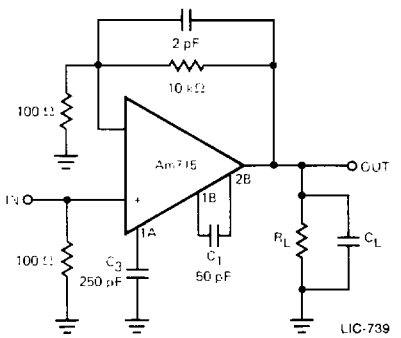
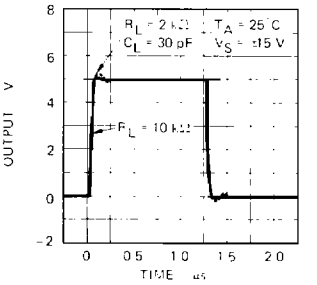


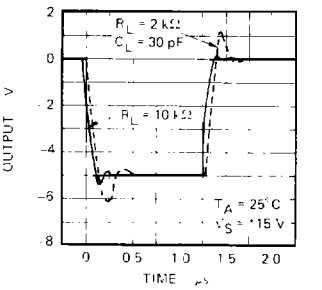
Figure 4

PERFORMANCE CURVES

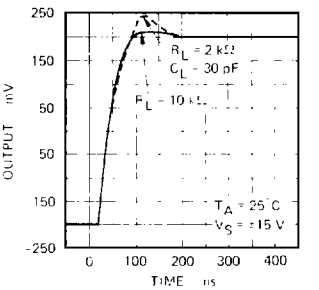
X10 Amplifier Positive Large-Signal Pulse Response



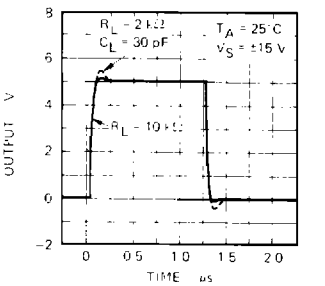
X10 Amplifier Negative Large-Signal Pulse Response



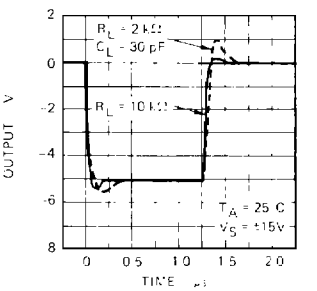
X10 Amplifier Small-Signal Pulse Response



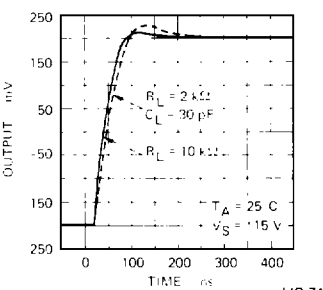
X100 Amplifier Positive Large-Signal Pulse Response



X100 Amplifier Negative Large-Signal Pulse Response

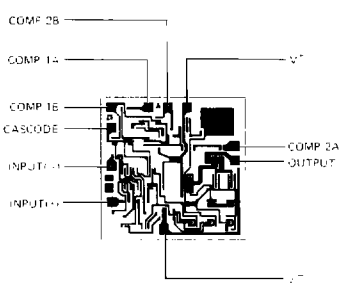


X100 Amplifier Small-Signal Pulse Response



LIC-740

Metallization and Pad Layout



62 x 62 Mils