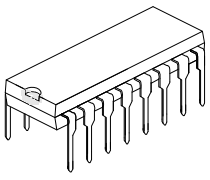
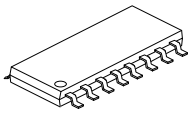
UM604A

LINEAR INTEGRATED CIRCUIT

QUAD OPERATIONAL AMPLIFIER AND PROGRAMMABLE VOLTAGE REFERENCE



DIP-16



SOP-16

■ DESCRIPTION

The UTC **UM604A** is a monolithic IC that includes four op-amps and an adjustable shunt voltage reference. This device is offering space and cost saving in many applications like power supply management or data acquisition systems.

■ FEATURES

OPERATIONAL AMPLIFIER

* Low supply current : 375μA/op. (@ V_{CC}= 5 V)
* Low input bias current : 20nA
* Medium speed : 0.9MHz
* Low input offset voltage : 0.5mV typ for UM604
* Wide power supply range: ±1.5 ~ ±15V

VOLTAGE REFERENCE

* Adjustable output voltage : V_{REF} to 36V
* Reference voltage tolerance
  UM604A-1: ±0.4%
  UM604A-2: ±1%
* Sink current capability : 1 ~ 100mA
* Typical output impedance : 0.2Ω

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UM604AL-D16-T	UM604AG-D16-T	DIP-16	Tube
UM604AL-S16-R	UM604AG-S16-R	SOP-16	Tape Reel

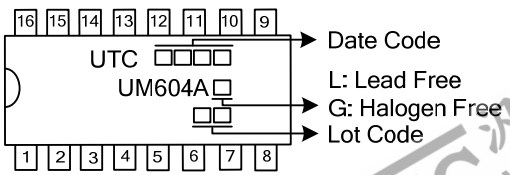
UM604AL-D16-T

(1) Packing Type
(2) Package Type
(3) Green Package

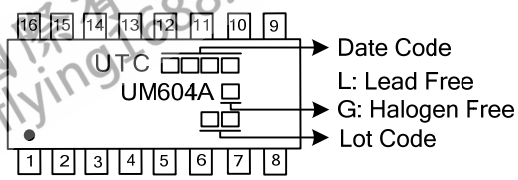
(1) T: Tube, R: Tape Reel
(2) D16: DIP-16, S16: SOP-16
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

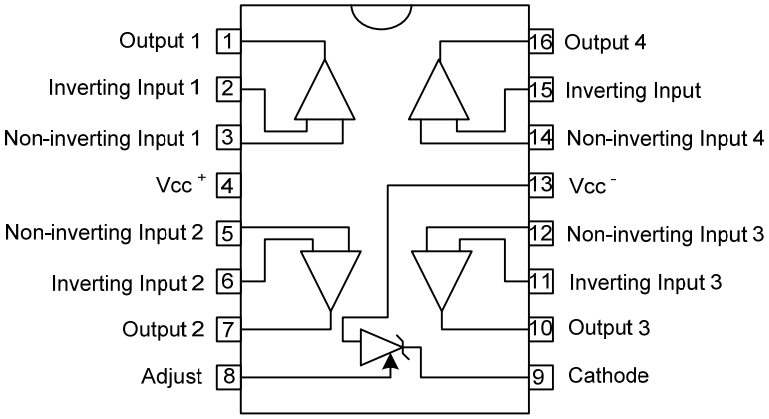
DIP-16



SOP-16



■ PIN CONFIGURATION



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	36	V
Differential Input Voltage	V_{DIFF}	36	V
Input Voltage	V_{IN}	-0.3 ~ +36	V
Output Short-Circuit Duration	I_D	Infinite	
Junction Temperature	T_J	+150	°C
Operating Temperature	T_{OPR}	-55 ~ +125	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS

(V_{CC}^+=5V, V_{CC}^-=0V, T_A=25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Total Supply Current, Excluding Current In The Voltage Reference	I_{CC}	V_{CC}^+=5V, no load, T_{MIN}<T_A<T_{MAX}	1.4		2.4	mA
		V_{CC}^+=30V, no load, T_{MIN}<T_A<T_{MAX}			4	mA

■ ELECTRICAL CHARACTERISTICS

(V_{CC}^+ =5V, V_{CC}^- =Ground, V_{OUT}=1.4V, T_A=25°C unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Input Offset Voltage	UM604A-1	$V_{I(OFF)}$	T_A=25°C			0.5	3	mV
			T_{MIN}≤T_A≤ T_{MAX}				4	mV
	UM604A-2		T_A=25°C			1	5	mV
			T_{MIN}≤T_A≤ T_{MAX}				6	mV
Input Offset Voltage Drift		$\triangle V_{I(OFF)}$				7		μV/°C
Input Offset Current.		$I_{I(OFF)}$	T_A=25°C			2	30	nA
			T_{MIN}≤T_A≤ T_{MAX}				50	nA
Input Bias Current		$I_{I(BIAS)}$	T_A=25°C			20	150	nA
			T_{MIN}≤T_A≤ T_{MAX}				200	nA
Large Signal Voltage Gain		G_V	V_{CC}=15V, R_L=2k, V_{OUT}=1.4V ~11.4V		50	100		V/mV
			T_{MIN}≤T_A≤ T_{MAX}		25			V/mV
Supply Voltage Rejection Ratio		SVR	V_{CC}=5V ~ 30V		65	100		dB
Input Common Mode Voltage Range		$V_{I(CM)}$	V_{CC}=+30V (see Note 1)		0		(V_{CC}+)-1.5	V
			T_{MIN}≤T_A≤ T_{MAX}		0		(V_{CC}+)-2	V
Common Mode Rejection Ratio		CMRR	T_A=25°C		70	85		dB
			T_{MIN}≤T_A≤ T_{MAX}		60			dB
Output Current Source		$I_{O(SOUR)}$	V_{OUT}=2V, V_{CC}=+15V, V_{ID}=+1V		20	40		mA
Output Short Circuit to Ground		$I_{O(SC)}$	V_{CC}=+15V			40	60	mA
Output Current Sink		$I_{O(SINK)}$	V_{ID}= -1V, V_{CC}=+15V, V_{OUT}=+2V		10	20		mA
High Level Output Voltage		V_{OH}	R_L=10k , V_{CC}^+=30V	T_A=25°C	27	28		V
				T_{MIN}≤T_A≤ T_{MAX}	27			V
Low Level Output Voltage		V_{OL}	R_L=10k			5	20	mV
			T_{MIN}≤T_A≤ T_{MAX}				20	mV
Slew Rate at Unity Gain		SR	V_{IN}=0.5 ~ 3V, V_{CC}=15V R_L=2kΩ, C_L=100pF, unity gain		0.1	0.3		V/μs
Gain Bandwidth Product		GBP	V_{CC}=30V, R_L=2K, C_L=100pF f=100kHz, V_{IN}=10mV		0.5	0.9		MHz
Total Harmonic Distortion		THD	f=1kHz G_V=20dB, R_L=2, V_{CC}=30V C_L=100pF, V_O=2Vpp			0.02		%

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Equivalent Input Noise Voltage	eN	F=1kHz, V_{CC}=30V, R_S=100Ω		50		$\frac{nV}{\sqrt{Hz}}$
Channel Separation	CS	1kHz<f<20kHz		120		dB

Note 1: The input common-mode voltage of either input signal voltage should not be allowed to go negative by more than 0.3V, the upper end of the common-mode voltage range is Vcc^+-1.5V. But either of both inputs can go to +36V without damage.

■ VOLTAGE REFERENCE

PARAMETER	SYMBOL	RATING	UNIT
Cathode Current	I_K	1 ~ 100	mA

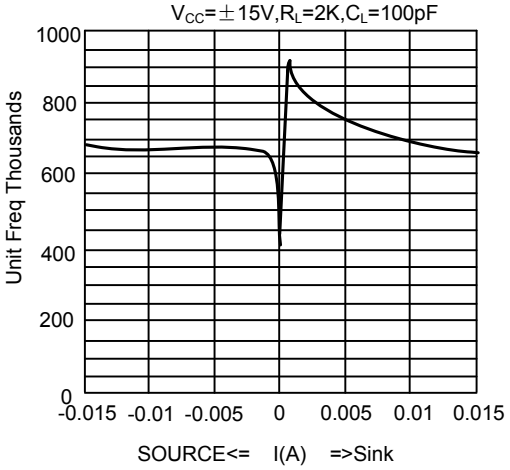
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Input Voltage	UM604A-1	V_{REF}	±0.4%, T_A=25°C	2.49	2.5	2.51	V
			T_{MIN}≤T_A≤ T_{MAX}	2.48		2.52	V
	UM604A-2		±1%, T_A=25°C	2.475	2.5	2.525	V
			T_{MIN}≤T_A≤ T_{MAX}	2.45		2.55	V
Reference Input Voltage Deviation Over Temperature Range		$\triangle V_{REF}$	V_{KA}=V_{REF}; I_K=10mA, T_{MIN}≤T_A≤ T_{MAX}		7	30	mV
Ratio of Change in Reference Input Voltage to Charge in Cathode to Anode Voltage		$\frac{\triangle V_{REF}}{\triangle V_{KA}}$	I_K=10mA, $\triangle V_{KA}$=36V ~ 3V	-2	-1.1		MV/V
Reference Input Current		I_{REF}	I_K=10mA		1.5	2.5	μA
			T_{MIN}≤T_A≤ T_{MAX}			3	μA
Reference Input Current Deviation over T°Range					0.8	1.2	μA
Minimum Cathode Current for Regulation		I_{MIN}	V_{KA}= V_{REF}		0.5	1	mA
Off-State Cathode current		I_{OFF}			180	500	nA
Dynamic Impedance-note[1)]		「ZKA」	V_{KA}= V_{REF}, $\triangle I_k$=1 ~ 100mA, f<1kHz		0.2	0.5	Ω

Note: The dynamic impedance is defined as $「Z_{KA}」 = \frac{\triangle V_{KA}}{\triangle V_{IK}}$.

■ OPERATIONAL AMPLIFIERS

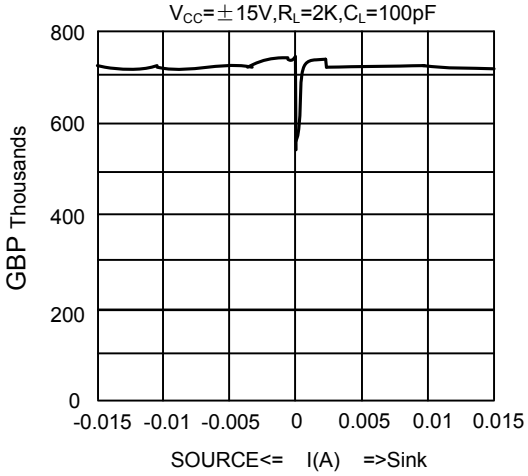
Unit Frequency=F(I)

V_{CC}=±15V,R_L=2K,C_L=100pF



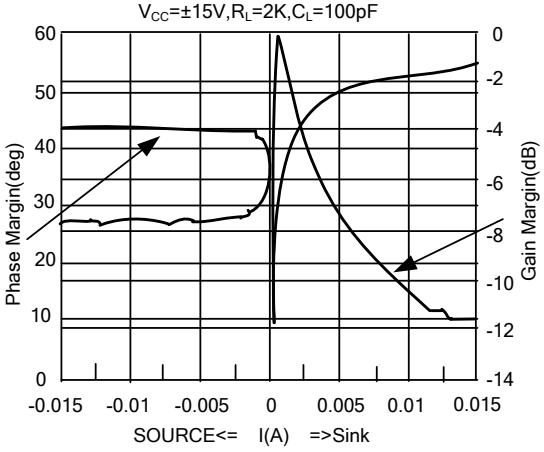
GBP=F(I)

V_{CC}=±15V,R_L=2K,C_L=100pF



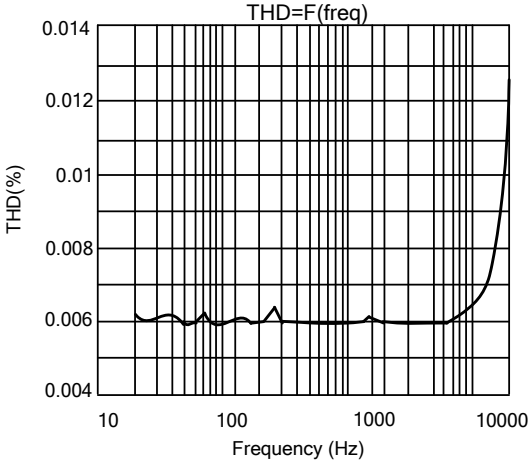
phase and Gain Margin=F(I)

V_{CC}=±15V,R_L=2K,C_L=100pF

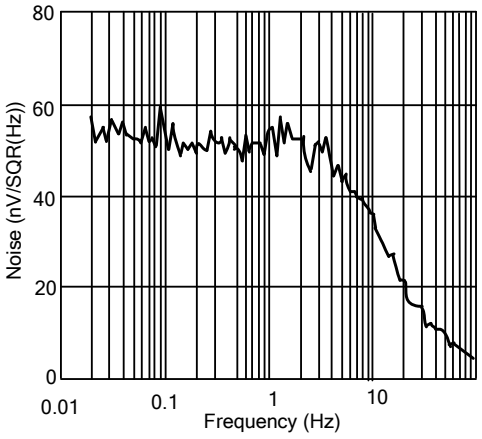


Total Harmonic Distorsion

THD=F(freq)

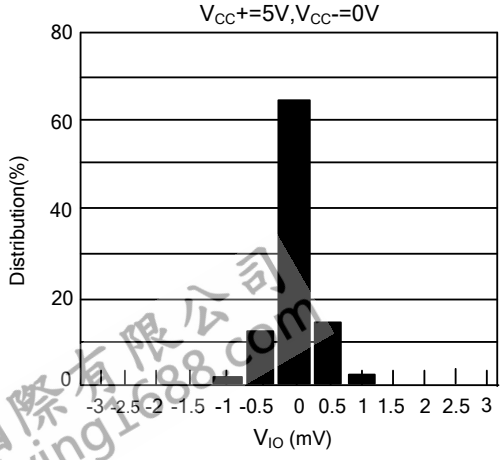


Noise = F (frequency)



V_{IO} Distribution-Operator 1

V_{CC}+=5V,V_{CC}-=0V



■ OPERATIONAL AMPLIFIERS(Cont.)