

UTC UM604/A

QUAD OPERATIONAL AMPLIFIER AND PROGRAMMABLE VOLTAGE REFERENCE

DESCRIPTION

The UTC UM604/A 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.

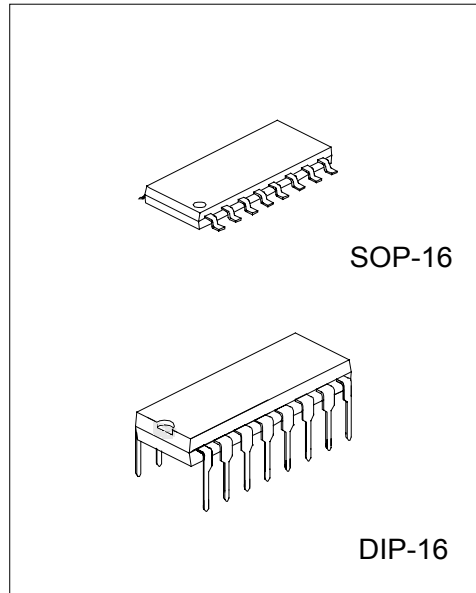
FEATURES

OPERATIONAL AMPLIFIER

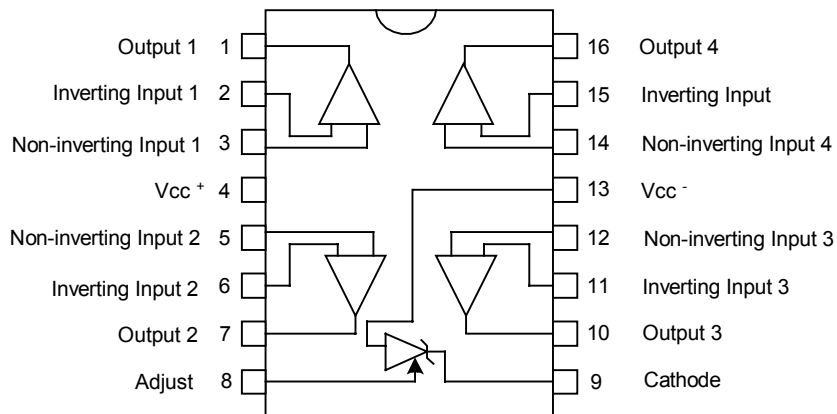
- *Low supply current : $375 \mu A/op.$ (@ $V_{cc} = 5V$)
- *Low input bias current : $20nA$
- *Medium speed : $0.9MHz$
- *Low input offset voltage : $0.5mV$ typ for UM604
- *Wide power supply range: ± 1.5 to $\pm 15V$

VOLTAGE REFERENCE

- *Adjustable output voltage : V_{ref} to $36V$
- * 0.4% and 1% voltage precision
- *Sink current capability : 1 to $100mA$
- *Typical output impedance : 0.2Ω



PIN CONFIGURATION



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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V _{cc}	36	V
Differential Input Voltage	V _{id}	36	V
Input Voltage	V _i	-0.3 ~ +36	V
Output Short-circuit Duration		Infinite	
Operating Free-air Temperature Range	T _{oper}	-55 ~ +125	°C
Maximum Junction Temperature	T _j	150	°C
Thermal Resistance Junction to Ambient(SOP package)	R _{thja}	150	°C/W

ELECTRICAL CHARACTERISTICS

V_{cc}⁺=5V, V_{cc}⁻=0V, T_{amb}=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 _{amb} <T _{max.}	1.4		2.4	mA
		V _{CC} ⁺ =30V, no load, T _{min.} <T _{amb} <T _{max.}			4	

ELECTRICAL CHARACTERISTICS

V_{cc}⁺=5V, V_{cc}⁻=Ground, V_o=1.4V, T_{amb}=25°C (unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	UM604A	T _{amb} =25°C T _{min.} ≤ T _{amb} ≤ T _{max.}		0.5	3 4	mV
	UM604	T _{amb} =25°C T _{min.} ≤ T _{amb} ≤ T _{max.}		1	5 6	
Input Offset Voltage Drift	ΔV _{io}			7		μV/°C
Input Offset Current	I _{io}	T _{min.} ≤ T _{amb} ≤ T _{max.}		2	30 50	nA
Input Bias Current	I _{ib}	T _{min.} ≤ T _{amb} ≤ T _{max.}		20	150 200	nA
Large Signal Voltage Gain	A _{vd}	V _{cc} =15V, R _L =2k, V _o =1.4V ~11.4V T _{min.} ≤ T _{amb} ≤ T _{max.}	50 25	100		V/mV
Supply Voltage Rejection Ratio	SVR	V _{cc} =5V ~ 30V	65	100		dB
Input Common Mode Voltage Range	V _{icm}	V _{cc} =+30V(see note ¹) T _{min.} ≤ T _{amb} ≤ T _{max.}	0 0		(V _{cc} ⁺)-1.5 (V _{cc} ⁺)-2	V
Common Mode Rejection Ratio	CMR	T _{min.} ≤ T _{amb} ≤ T _{max.}	70 60	85		dB
Output Current Source	I _{source}	V _o =2V, V _{cc} =+15V, V _{jd} =+1V	20	40		mA
Output Short Circuit to Ground	I _o	V _{cc} =+15V		40	60	mA
Output Current Sink	I _{sink}	V _{id} = -1V, V _{cc} =+15V, V _o =+2V	10	20		mA
High Level Output Voltage	V _{OH}	R _L =10k, V _{cc} ⁺ =30V T _{amb} =25°C T _{min.} ≤ T _{amb} ≤ T _{max.}	27 27	28		V

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PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Low Level Output Voltage	VoL	RL=10k Tmin. ≤ Tamb ≤ Tmax.		5	20 20	mV
Slew Rate at Unity Gain	SR	Vi=0.5 to 3V, Vcc=15V RL=2k Ω, CL=100pF, unity gain	0.1	0.3		V/μs
Gain Bandwidth Product	GBP	Vcc=30V, RL=2K, CL=100pF f=100kHz, Vin=10mV	0.5	0.9		MHz
Total Harmonic Distortion	THD	f=1kHz Av=20dB, RL=2, Vcc=30V CL=100pF, Vo=2Vpp		0.02		%
Equivalent Input Noise Voltage	en	F=1kHz, Vcc=30V, Rs=100 Ω		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

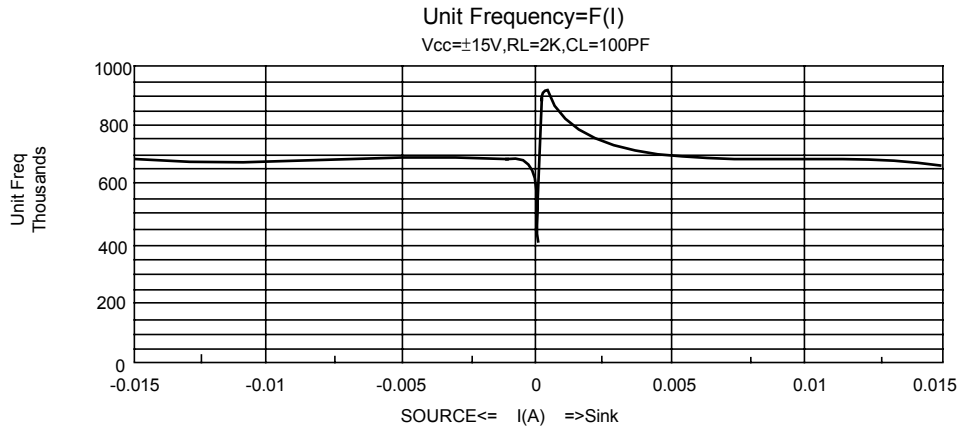
PARAMETER	SYMBOL	VALUE	UNIT
Cathode Current	Ik	1 ~ 100	mA

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Reference Input Voltage	UM604A	Vref ±0.4%, Tamb=25℃ Tmin. ≤ Tamb ≤ Tmax.	2.49 2.48	2.5	2.51 2.52	V
	UM604		2.475 2.45	2.5	2.525 2.55	
Reference Input Voltage Deviation Over Temperature Range	ΔVref	VKA=Vref, Ik=10mA Tmin. ≤ Tamb ≤ Tmax.		7	30	mV
Ratio of Change in Reference Input Voltage to Change in Cathode to Anode Voltage	$\frac{\Delta Vref}{\Delta VKA}$	Ik=10mA, ΔVKA=36V to 3V	-2	-1.1		MV/V
Reference Input Current	Iref	Ik=10mA Tmin ≤ Tamb ≤ Tmax		1.5	2.5 3	μA
Reference Input Current Deviation over T° Range				0.8	1.2	μA
Minimum Cathode Current for Regulation	Imin	VKA=Vref		0.5	1	mA
Off-State Cathode current	Ioff			180	500	nA
Dynamic Impedance-note ¹⁾	[ZKA]	VKA=Vref, ΔIk=1 to 100mA, f<1kHz		0.2	0.5	Ω

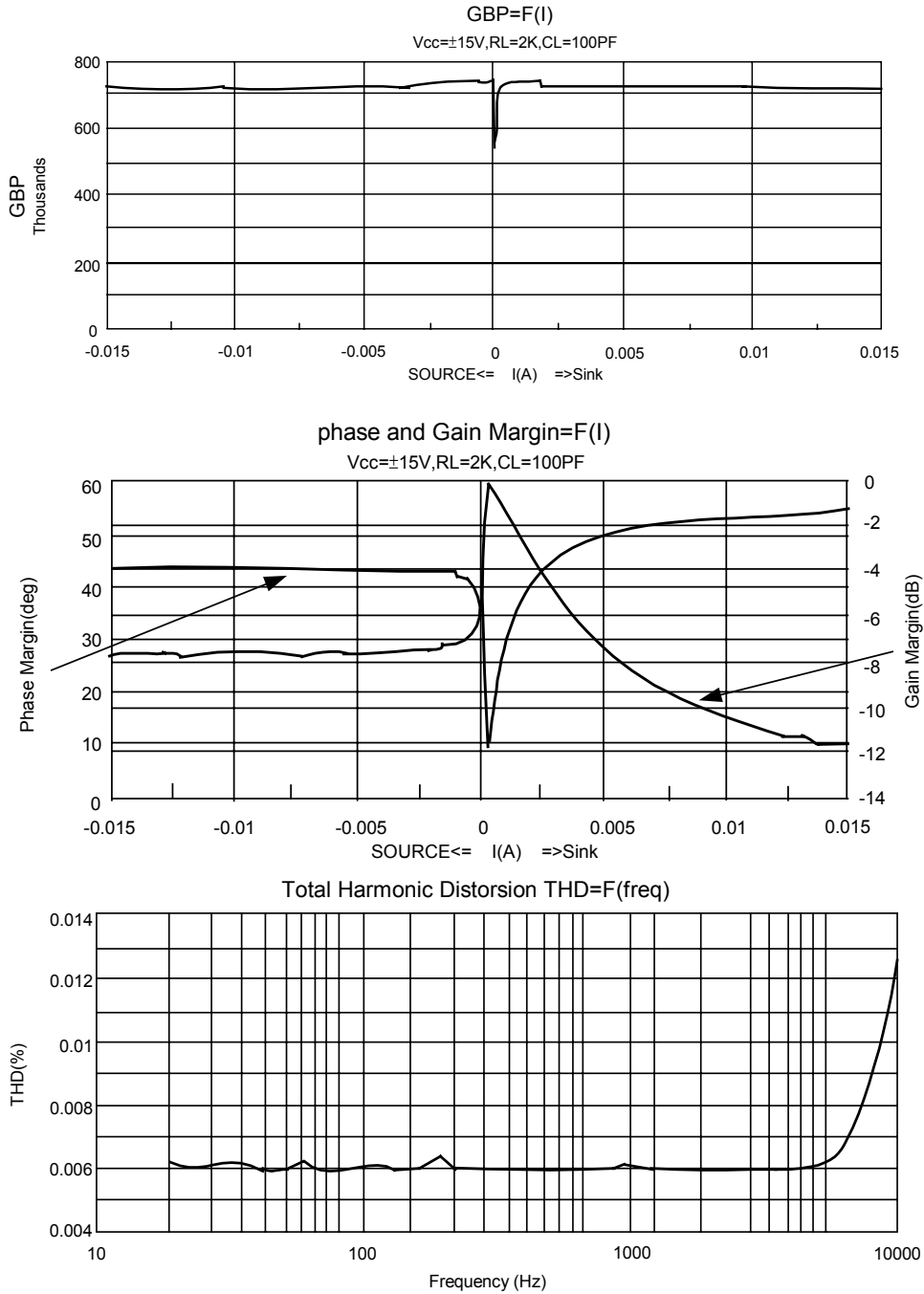
1. The dynamic impedance is defined as $[ZKA] = \frac{\Delta VKA}{\Delta VIk}$

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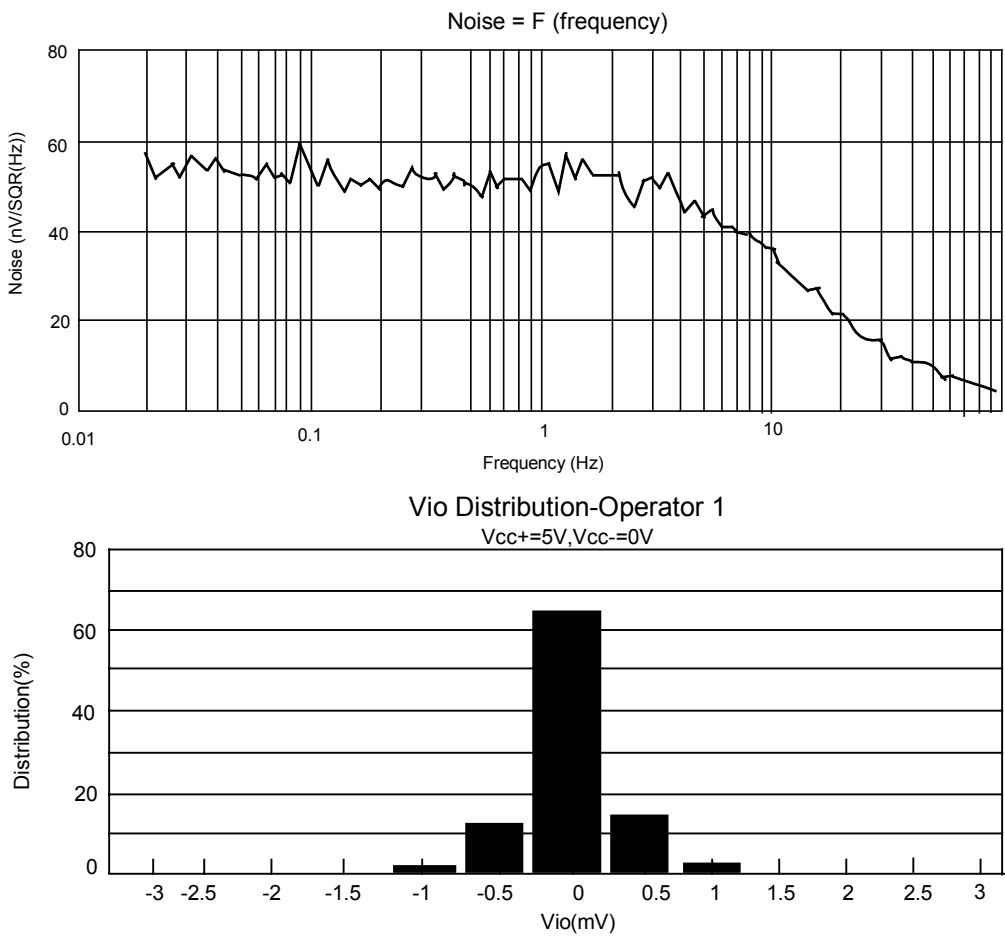
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