



UM609A

LINEAR INTEGRATED CIRCUIT

DUAL OPERATIONAL AMPLIFIER AND CURRENT CONTROLLER

■ DESCRIPTION

The UTC **UM609A** is a monolithic IC that includes one independent op-amp and another op-amp for which the non inverting input is wired to a 2.5V fixed voltage reference. This device is offering space and cost saving in many applications like power supply management or switching battery chargers.

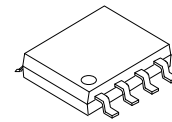
■ FEATURES

OPERATIONAL AMPLIFIER

- * Low supply current: 75uA/Per OP AMP.(@ $V_{CC}=5V$)
- * Medium bandwidth(unity gain): 1MHz
- * Large output voltage swing: $0V \sim (V_{CC}-1.5V)$
- * Wide power supply range: 3V~36V

VOLTAGE REFERENCE

- * Fixed output voltage reference 2.5V
- * Reference voltage tolerance
 - UM609A-1: $\pm 0.4\%$
 - UM609A-2: $\pm 1\%$
- * Sink current capability: 0.05~80mA
- * Typical output impedance: 0.2Ω



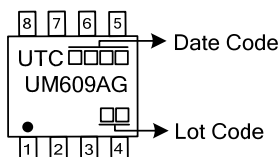
SOP-8

■ ORDERING INFORMATION

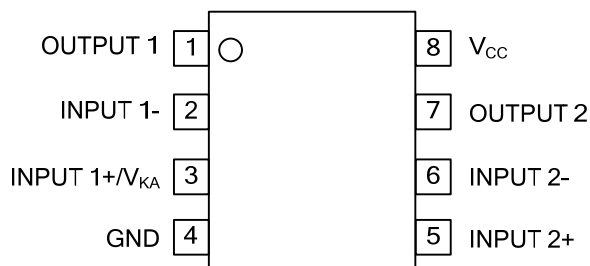
Ordering Number	Package	Packing
UM609AG-S08-R	SOP-8	Tape Reel

UM609AG-S08-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free
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■ MARKING



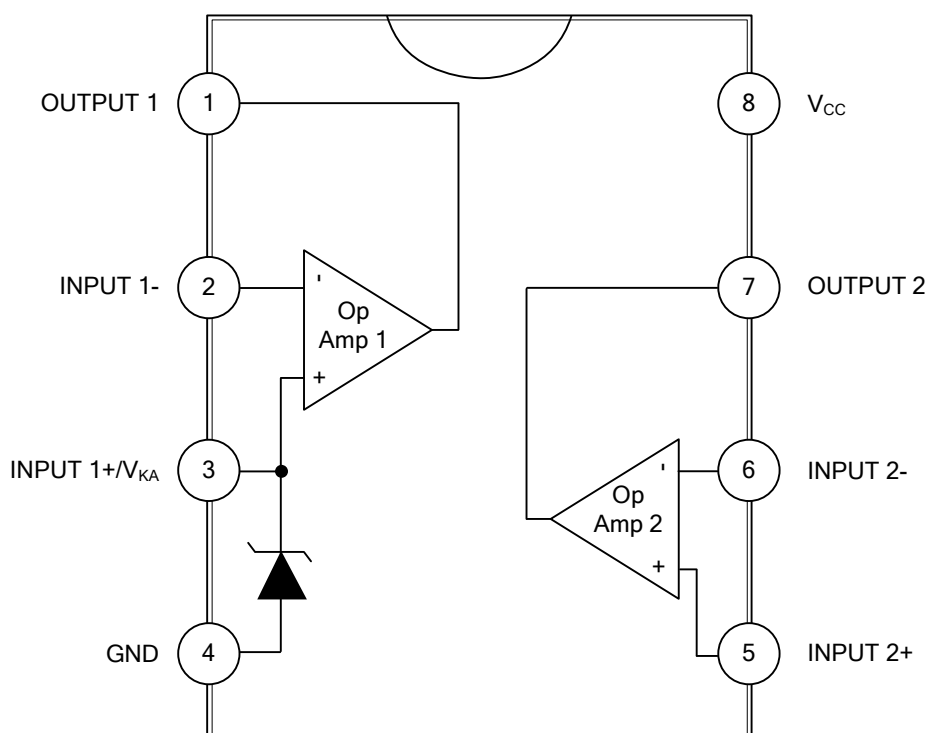
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUTPUT 1	Output of Channel 1
2	INPUT 1-	Inverting Input of Channel 1
3	INPUT 1+/V _{KA}	Non-Inverting Input of Channel 1 / Cathode of the Zener voltage
4	GND	Ground
5	INPUT 2+	Non-Inverting Input of Channel 2
6	INPUT 2-	Inverting Input of Channel 2
7	OUTPUT 2	Output of Channel 2
8	V _{CC}	Supply Voltage

BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Power Supply Voltage (V_{CC} to GND)	V_{CC}	40	V
Op Amp 1 and 2 Input Voltage Range (Pins 2, 5, 6)	V_{IN}	$-0.3 \sim V_{CC}+0.3$	V
Op Amp 2 Input Differential Voltage (Pins 5, 6)	V_{ID}	40	V
Voltage Reference Cathode Current (Pin 3)	I_K	100	mA
Power Dissipation ($T_A=25^\circ\text{C}$)	P_D	500	mW
Operating Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	$-65 \sim 150$	$^\circ\text{C}$
Lead Temperature (Soldering 10s)	T_{LEAD}	260	$^\circ\text{C}$

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.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	3~36	V
Ambient Temperature	T_A	$-40 \sim 105$	$^\circ\text{C}$

■ ELECTRICAL CHARACTERISTICS

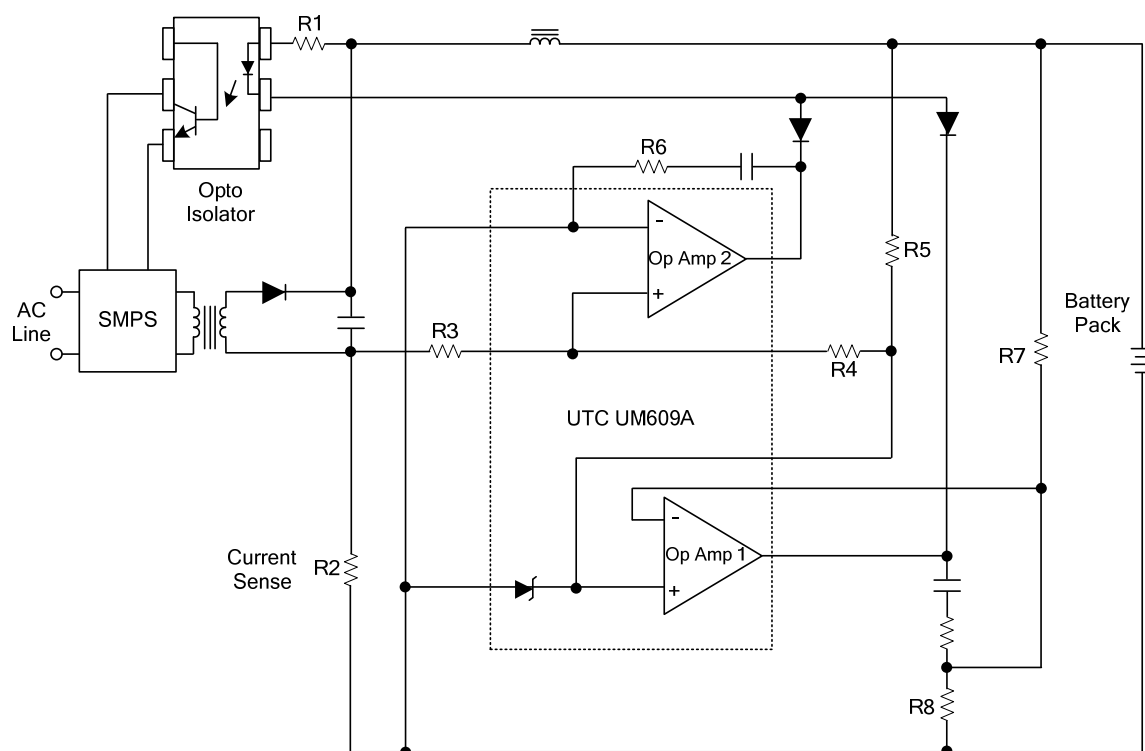
(Operating Conditions: $V_{CC}=+5\text{V}$, $T_A=25^\circ\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT	
Total Supply Current, Excluding Current in Voltage Reference	I _{CC}	V _{CC} =5V, no load, -40°C≤T _A ≤105°C		0.17	0.25	mA	
		V _{CC} =30V, no load, -40°C≤T _A ≤105°C		0.24	0.30	mA	
Voltage Reference Section							
Reference voltage tolerance	UM609A-1	V _{REF} I _K =10mA	T _A =25°C	2.49	2.50	2.51	V
	-40°C≤T _A ≤105°C		2.48	2.50	2.52	V	
	UM609A-2		T _A =25°C	2.475	2.50	2.525	V
	-40°C≤T _A ≤105°C		2.45	2.50	2.55	V	
Reference Voltage Deviation Over Full Temperature Range		I _K =10mA, T _A =-40~105°C		5	24	mV	
Minimum Cathode Current for Regulation				0.01	0.05	mA	
Dynamic Impedance		I _K =1.0~80mA, f<1kHz		0.2	0.5	Ω	
Op Amp 1 Section (V _{CC} =5V, V _O =1.4V, T _A =25°C, unless otherwise noted)							
Input Offset Voltage	V _{i(OFF)}	T _A =25°C		0.5	3	mV	
		T _A =-40~105°C			5	mV	
Input Offset Voltage Temperature Drift	DV _{i(OFF)}	T _A =-40~105°C		7		μV/°C	
Input Bias Current (Inverting Input Only)	I _{I(BIAS)}	T _A =25°C		20	150	nA	
Large Signal Voltage Gain	A _{VD}	V _{CC} =15V, R _L =2kΩ, V _O =1.4~11.4V	85	100		dB	
Power Supply Rejection Ratio	PSRR	V _{CC} =5~30V	70	95		dB	
Output Current	Source	I _{SOURCE} V _{CC} =15V, V _{ID} =1V, V _O =2V	20	28		mA	
	Sink	I _{SINK} V _{CC} =15V, V _{ID} =-1V, V _O =2V	7	12		mA	
Output Voltage Swing (High)	V _{OH}	V _{CC} =30V, R _L =10kΩ, V _{ID} =1V	27	28		V	
Output Voltage Swing (Low)	V _{OL}	V _{CC} =30V, R _L =10kΩ, V _{ID} =-1V		17	100	mV	
Slew Rate	SR	V _{CC} =18V, R _L =2kΩ, A _v =1, V _{IN} =0.5~2V, C _L =100pF	0.2	1.0		V/μs	
Unity Gain Bandwidth	GBP	V _{CC} =30V, R _i =2kΩ, C _L =100pF	0.7	1.0		MHz	

■ ELECTRICAL CHARACTERISTICS (Cont.)

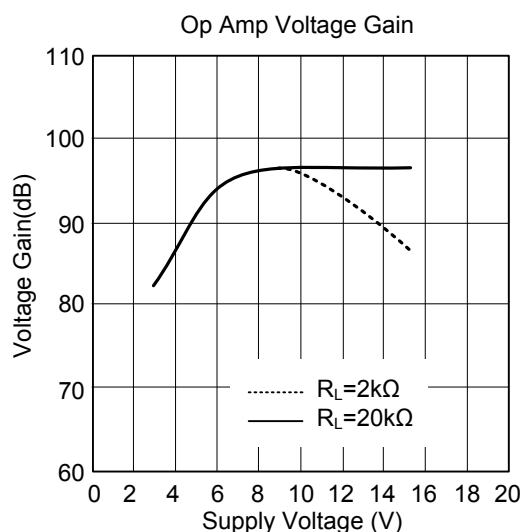
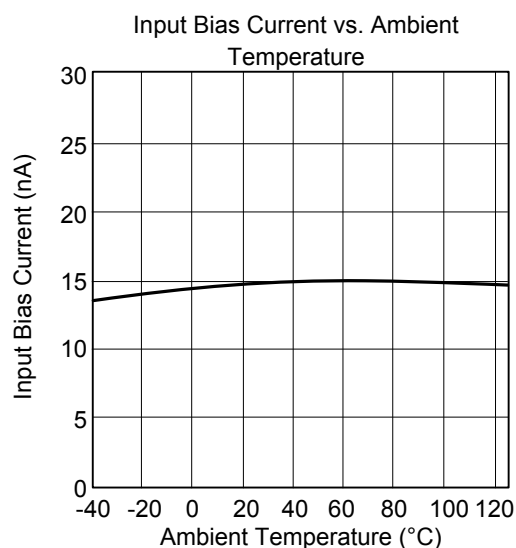
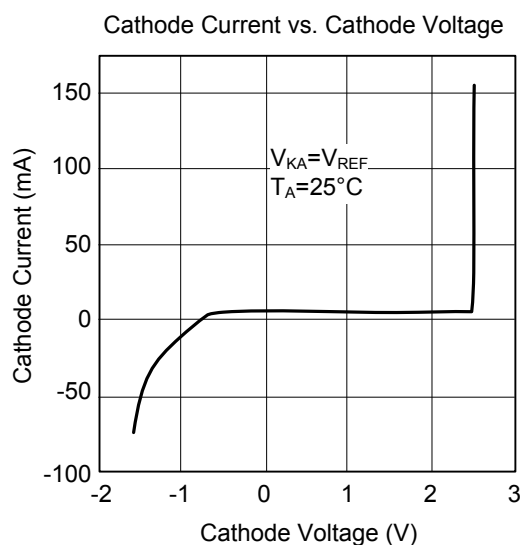
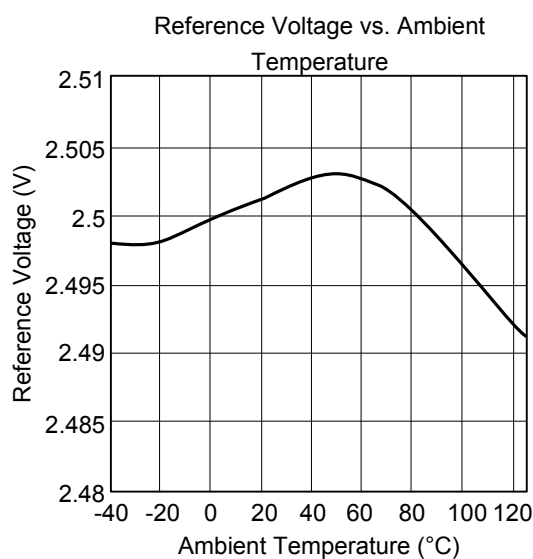
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
Op Amp 2 Section ($V_{CC}=5V$, $V_O=1.4V$, $T_A=25^{\circ}C$, unless otherwise noted)						
Input Offset Voltage	$V_{I(OFF)}$	$T_A=25^{\circ}C$		0.5	3	mV
		$T_A=-40\sim105^{\circ}C$			5	mV
Input Offset Voltage Temperature Drift	$DV_{I(OFF)}$	$T_A=-40\sim105^{\circ}C$		7		$\mu V/^{\circ}C$
Input Offset Current	$I_{I(OFF)}$	$T_A=25^{\circ}C$		2	30	nA
Input Bias Current	$I_{I(BIAS)}$	$T_A=25^{\circ}C$		20	150	nA
Input Voltage Range	V_I	$V_{CC}=0\sim36V$	0		$V_{CC}-1.5$	V
Common Mode Rejection Ratio	CMRR	$T_A=25^{\circ}C$, $V_{CM}=0\sim3.5V$	70	85		dB
Large Signal Voltage Gain	AVD	$V_{CC}=15V$, $R_L=2k\Omega$, $V_O=1.4\sim11.4V$	85	100		dB
Power Supply Rejection Ratio	PSRR	$V_{CC}=5\sim30V$	70	95		dB
Output Current	Source	I_{SOURCE} $V_{CC}=15V$, $V_{ID}=1V$, $V_O=2V$	20	28		mA
	Sink	I_{SINK} $V_{CC}=15V$, $V_{ID}=-1V$, $V_O=2V$	7	12		mA
Output Voltage Swing (High)	V_{OH}	$V_{CC}=30V$, $R_L=10k\Omega$, $V_{ID}=1V$	27	28		V
Output Voltage Swing (Low)	V_{OL}	$V_{CC}=30V$, $R_L=10k\Omega$, $V_{ID}=-1V$		17	100	mV
Slew Rate	SR	$V_{CC}=18V$, $R_L=2k\Omega$, $A_V=1$, $V_{IN}=0.5\sim2V$, $C_L=100pF$	0.2	1.0		V/ μs
Unity Gain Bandwidth	GBP	$V_{CC}=30V$, $R_L=2k\Omega$, $C_L=100pF$	0.7	1.0		MHz

■ TYPICAL APPLICATION CIRCUIT



Application of UTC UM609A in a Constant Current and Constant Voltage Charger

TYPICAL CHARACTERISTICS



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