

**UM609**

Preliminary

LINEAR INTEGRATED CIRCUIT**DUAL OPERATIONAL
AMPLIFIER AND CURRENT
CONTROLLER****■ DESCRIPTION**

The UTC **UM609** 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 input offset voltage: 0.5mV typ. for UTC **UM609**
- * Low supply current: 75uA/Per OP AMP.(@ $V_{CC}=5V$)
- * Medium bandwidth(unity gain): 1MHz
- * Large output voltage swing: 0V ~ ($V_{CC}-1.5V$)
- * Wide power supply range: 3V~36V

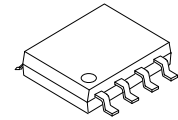
VOLTAGE REFERENCE

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

■ ORDERING INFORMATION

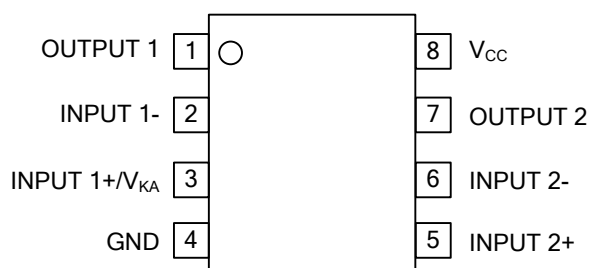
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UM609L-S08-T	UM609G-S08-T	SOP-8	Tube
UM609L-S08-R	UM609G-S08-R	SOP-8	Tape Reel

UM609L-S08-T (1)Packing Type (2)Package Type (3)Halogen Free		(1) T: Tube, R: Tape Reel (2) S08: SOP-8 (3) L: Lead Free, G: Halogen Free
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SOP-8

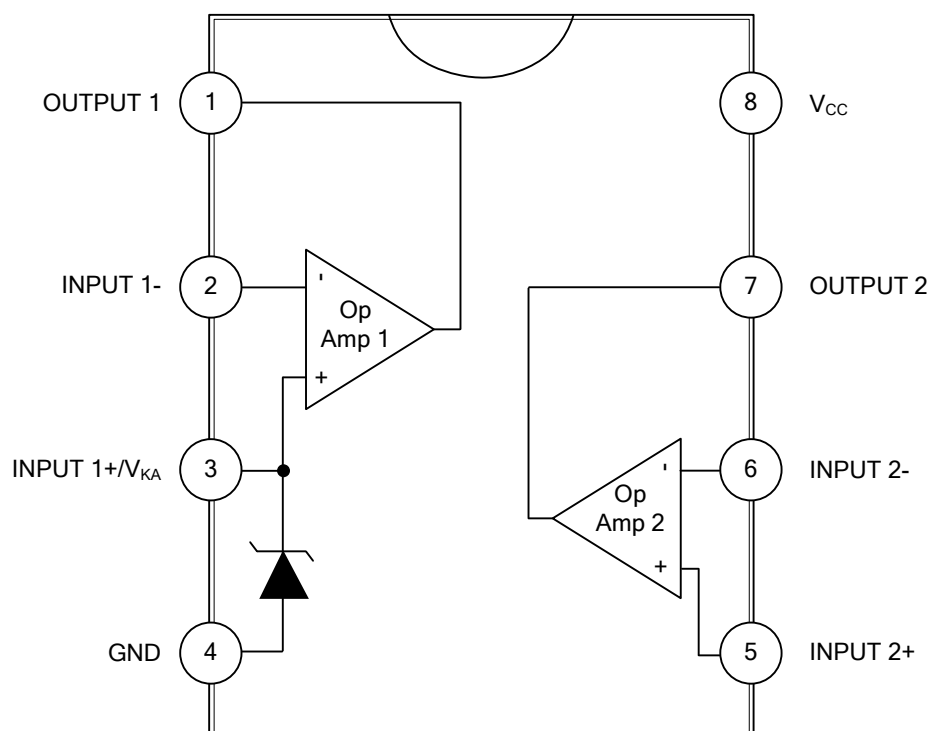
PIN CONFIGURATION



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.)

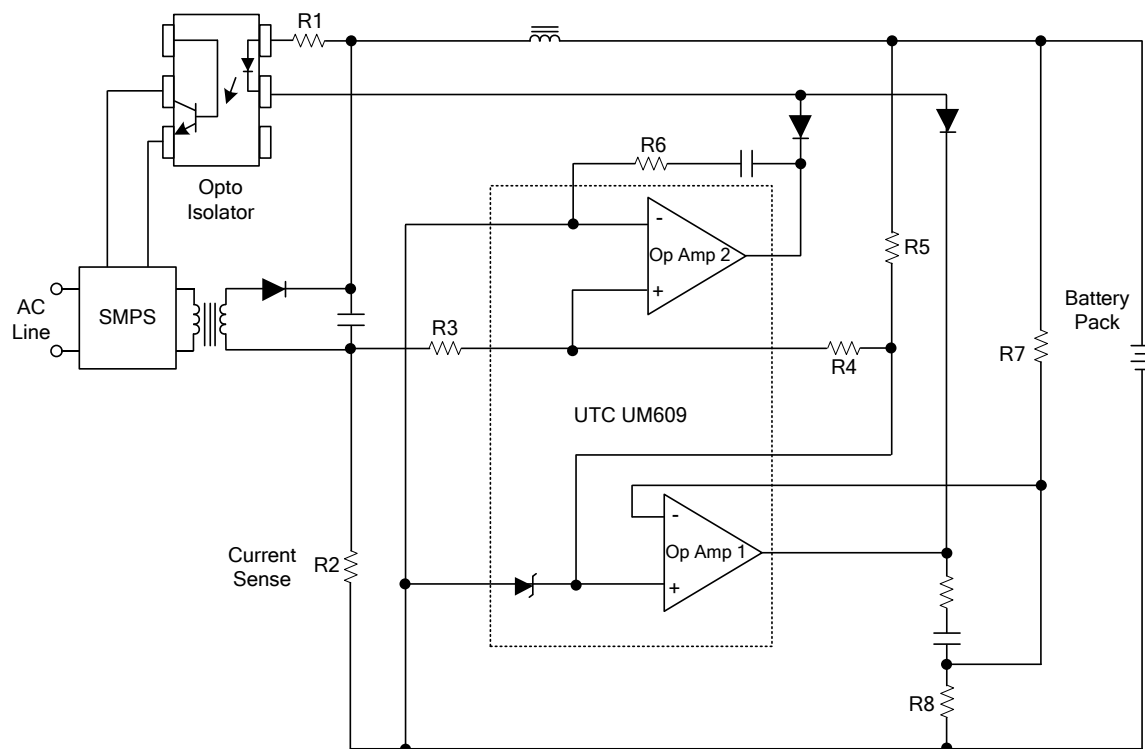
PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP.	MAX	UNIT
Total Supply Current, Excluding Current in Voltage Reference	I _{CC}	V _{CC} =5V, no load, -40°C≤T _A ≤105°C			0.15	0.25	mA
		V _{CC} =30V, no load, -40°C≤T _A ≤105°C			0.20	0.30	mA
Voltage Reference Section							
Reference Voltage	V _{REF}	I _K =10mA	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	90		dB
Output Current	Source	I _{SOURCE}	V _{CC} =15V, V _{ID} =1V, V _O =2V	20	40		mA
	Sink	I _{SINK}	V _{CC} =15V, V _{ID} =-1V, V _O =2V	7	20		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	0.5		V/μs
Unity Gain Bandwidth	GBP	V _{CC} =30V, R _L =2kΩ, C _L =100pF		0.7	1.0		MHz
Op Amp 2 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

■ ELECTRICAL CHARACTERISTICS

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

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
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	$V_{CC}=0\sim 36V$	0		$V_{CC}-1.5$	V
Common Mode Rejection Ratio		CMRR	$T_A=25^{\circ}C$, $V_{CM}=0\sim 3.5V$	70	85		dB
Large Signal Voltage Gain		AVD	$V_{CC}=15V$, $R_L=2k\Omega$, $V_O=1.4\sim 11.4V$	85	100		dB
Power Supply Rejection Ratio		PSRR	$V_{CC}=5\sim 30V$	70	90		dB
Output Current	Source	I_{SOURCE}	$V_{CC}=15V$, $V_{ID}=1V$, $V_O=2V$	20	40		mA
	Sink	I_{SINK}	$V_{CC}=15V$, $V_{ID}=-1V$, $V_O=2V$	7	20		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	$V_{CC}=18V$, $R_L=2k\Omega$, $A_v=1$, $V_{IN}=0.5\sim 2V$, $C_L=100pF$	0.2	0.5		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 UM609 in a Constant Current and Constant Voltage Charger

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