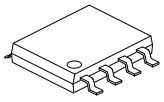
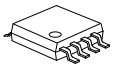
UM609A

LINEAR INTEGRATED CIRCUIT

DUAL OPERATIONAL AMPLIFIER AND CURRENT CONTROLLER



SOP-8



MSOP-8

■ DESCRIPTION

The UTC **UM609A** is a monolithic IC that includes one independent op-amp and another op-amp for witch 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 ~ (V_{CC}-1.5V)
* Wide power supply range: 3V~36V

VOLTAGE REFERENCE

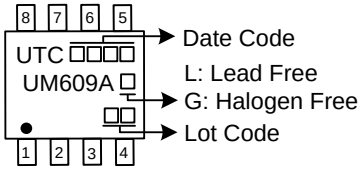
* Fixed output voltage reference 2.5V
* Reference voltage tolerance
  UM609A-1: ±0.4%
  UM609A-2: ±1%
* Sink current capability: 0.05~80mA
* Typical output impedance: 0.2Ω

■ ORDERING INFORMATION

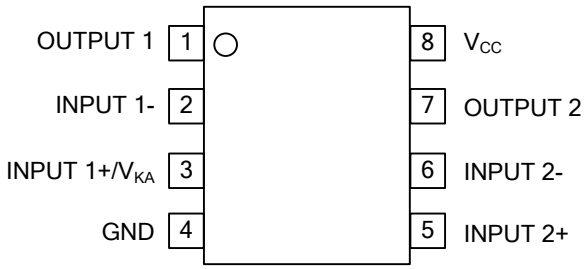
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UM609AL-S08-R	UM609AG-S08-R	SOP-8	Tape Reel
UM609AL-SM1-R	UM609AG-SM1-R	MSOP-8	Tape Reel

UM609AG-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8, SM1: MSOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



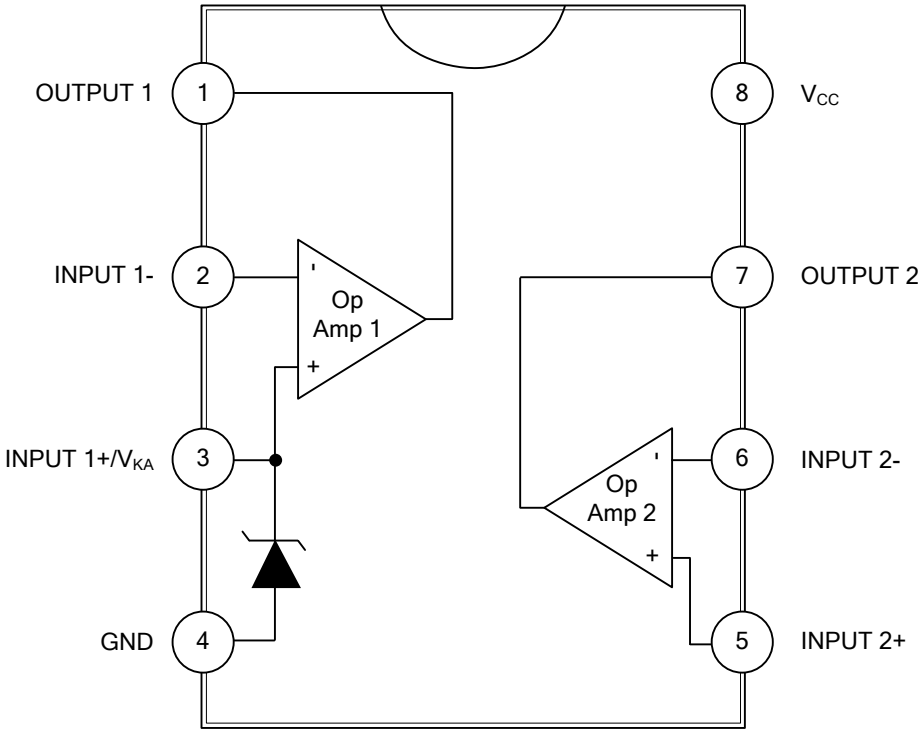
PIN CONFIGURATION



■ 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~ 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°C)	SOP-8	P_D	500	mW
	MSOP-8		350	mW
Operating Junction Temperature		T_J	+150	°C
Storage Temperature Range		T_{STG}	-65 ~ +150	°C
Lead Temperature (Soldering 10s)		T_{LEAD}	260	°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 ~ +105	°C

■ ELECTRICAL CHARACTERISTICS

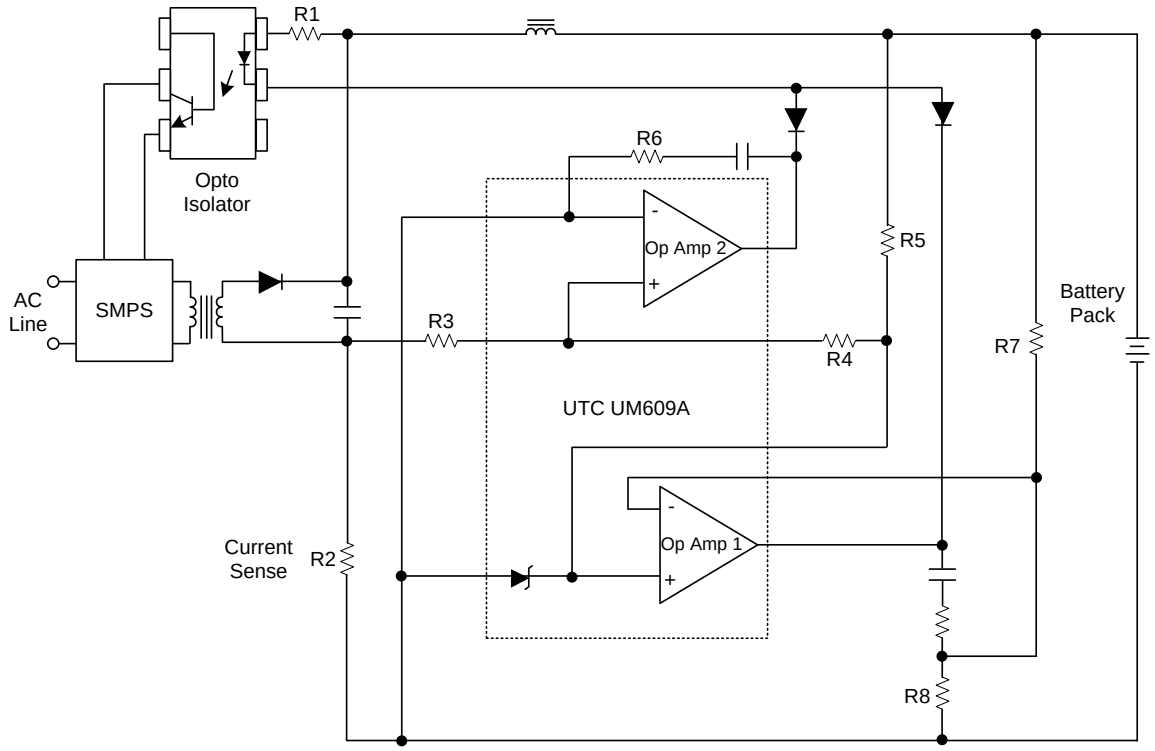
(Operating Conditions: V_{CC}=+5V, T_A=25°C unless otherwise specified)

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_L=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°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 Offset Current		II(OFF)	T_A=25°C		2	30	nA
Input Bias Current		II(BIAS)	T_A=25°C		20	150	nA
Input Voltage Range		VI	V_{CC}=0~36V	0		V_{CC}-1.5	V
Common Mode Rejection Ratio		CMRR	T_A=25°C, V_{CM}=0~3.5V	70	85		dB
Large Signal Voltage Gain		AVD	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_L=2kΩ, C_L=100pF	0.7	1.0		MHz

■ TYPICAL APPLICATION CIRCUIT



$$V_{OUT} = V_{REF} \times \frac{R_7 + R_8}{R_8}$$

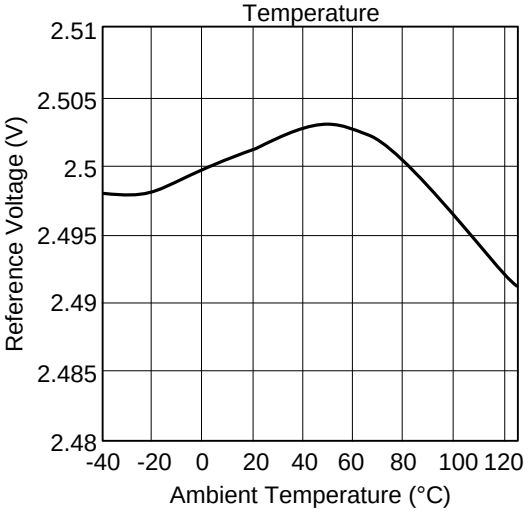
$$V_{SENSE} = V_{REF} \times \frac{R_3}{R_3 + R_4} (Pin\ 5)$$

$$\text{Current Limie} = \frac{V_{SENSE}}{R_2}$$

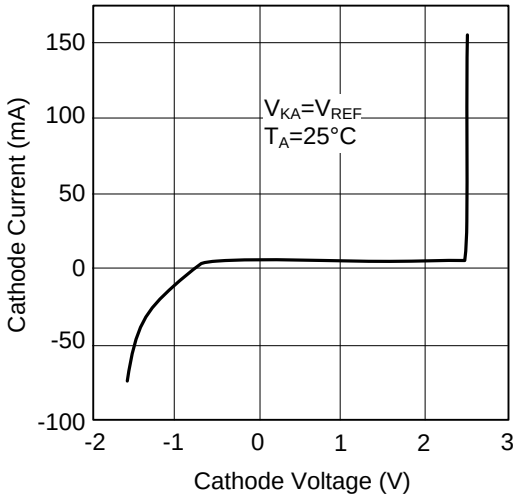
Application of UTC UM609A in a Constant Current and Constant Voltage Charger

■ TYPICAL CHARACTERISTICS

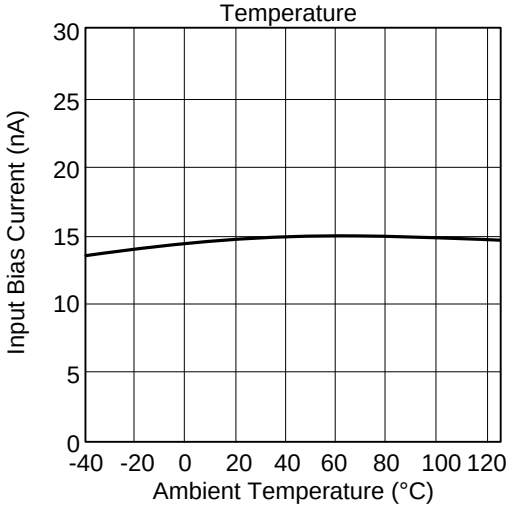
Reference Voltage vs. Ambient Temperature



Cathode Current vs. Cathode Voltage



Input Bias Current vs. Ambient Temperature



Op Amp Voltage Gain