

# UTC UM601/A LINEAR INTEGRATED CIRCUIT

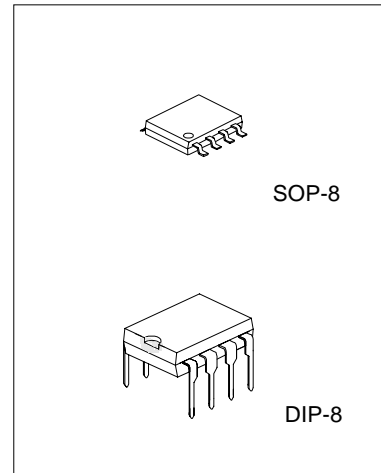
## VOLTAGE AND CURRENT CONTROLLER

### DESCRIPTION

The UTC UM601/A integrated circuit incorporates a high stability series band gap voltage reference, two ORed operational amplifiers and a current source.

This IC compares the DC voltage and the current level at the output of a switching power supply to an internal reference. It provides a feedback through an optocoupler to the PWM controller IC in the primary side.

The controlled current generator can be used to modify the level of current limitation by offsetting the information coming from the current sensing resistor.



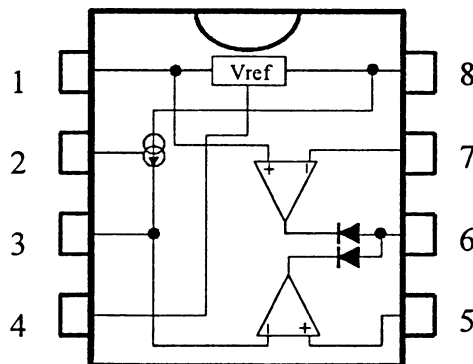
### FEATURES

- \*1.24V series voltage reference with 10mA output current and 1% precision (UM601A)
- \*Two operational amplifiers with ORed output and 1MHz gain bandwidth product
- \*Built-in current generator with enable / disable function
- \*4.5 to 32V supply voltage range

### APPLICATION

- \*Battery charger with a constant voltage and a limited output current
- \*Every types of application requiring a precision voltage regulation and current limitation
- \*Voltage supervisors
- \*Over voltage protection

### PIN CONFIGURATION



# UTC UM601/A LINEAR INTEGRATED CIRCUIT

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                              | SYMBOL            | VALUE                      | UNIT |
|--|-------------------|----------------------------|------|
| DC Supply Voltage (note 1)             | V <sub>cc</sub>   | 36                         | V    |
| Output Current (note 2)                | I <sub>out</sub>  | 20                         | mA   |
| Power Dissipation                      | P <sub>d</sub>    | 200                        | mW   |
| Input Voltage (note 3)                 | V <sub>in</sub>   | -0.3, V <sub>cc</sub> -1.5 | V    |
| Input Current                          | I <sub>in</sub>   | ±1                         | mA   |
| Storage Temperature                    | T <sub>stg</sub>  | -40 to +125                | °C   |
| Maximum Junction Temperature           | T <sub>j</sub>    | 150                        | °C   |
| Thermal Resistance Junction to Ambient | T <sub>thja</sub> | 130 to 200                 | °C/W |

## OPERATING CONDITIONS

| PARAMETER                      | SYMBOL           | VALUE                                  | UNIT |
|--------------------------------|------------------|--|------|
| Supply Voltage                 | V <sub>cc</sub>  | 4.5 to 32                              | V    |
| Operating Free Air Temperature | T <sub>opr</sub> | T <sub>min.</sub> to T <sub>max.</sub> | °C   |

## ELECTRICAL CHARACTERISTICS( T<sub>a</sub>=25°C , V<sub>cc</sub>=15V, unless otherwise specified)

| PARAMETER                      | SYMBOL            | TEST CONDITIONS  | MIN           | TYP. | MAX                  | UNIT |
|--------------------------------|-------------------|--|---------------|------|----------------------|------|
| Total Supply Current           | I <sub>cc</sub>   | V <sub>cc</sub> =15V   |               |      | 2                    | mA   |
| Input Voltage                  | V <sub>i</sub>    |  | 0             |      | V <sub>cc</sub> -1.5 | V    |
| Input Offset Voltage           | V <sub>io</sub>   | 25°C<br>T <sub>min.</sub> <T <sub>amb.</sub> <T <sub>max.</sub>  | -5<br>-7      | 1    | 5<br>7               | mV   |
| Input Bias Current             | I <sub>ib</sub>   | @ V <sub>in</sub> =1.2V on pin 7 and<br>V <sub>in</sub> =0V on pin5<br>25°C<br>T <sub>min.</sub> <T <sub>amb.</sub> <T <sub>max.</sub> | -700<br>-1000 | -300 | 0<br>0               | nA   |
| Output Sink Current            | I <sub>sink</sub> | V <sub>o1</sub> =2.5V<br>25°C<br>T <sub>min.</sub> <T <sub>amb.</sub> <T <sub>max.</sub>   | 8             | 15   |                      | mA   |
| Large Signal Voltage Gain      | A <sub>vo</sub>   | R <sub>L</sub> =2kΩ<br>T <sub>min.</sub> <T <sub>amb.</sub> <T <sub>max.</sub>   | 15            |      |                      | V/mV |
| Supply Voltage Rejection Ratio | SVR               | T <sub>min.</sub> <T <sub>amb.</sub> <T <sub>max.</sub>  | 65            | 90   |                      | dB   |
| Common Mode Rejection Ratio    | CMR               | T <sub>min.</sub> <T <sub>amb.</sub> <T <sub>max.</sub>  |               | 80   |                      | dB   |
| Gain Bandwidth Product         | GBP               | V <sub>cc</sub> =15V, F=100kHz,<br>V <sub>in</sub> =10mV, R <sub>L</sub> =2kΩ,<br>C <sub>L</sub> =100pF                                |               | 1    |                      | MHz  |
| Output Leakage Current         | I <sub>oh</sub>   | 25°C<br>T <sub>min.</sub> <T <sub>amb.</sub> <T <sub>max.</sub>  |               |      | 2<br>7               | μA   |

## ELECTRICAL CHARACTERISTICS( T<sub>a</sub>=25°C , V<sub>cc</sub>=15V, unless otherwise specified)

### VOLTAGE REFERENCE: UM601

| PARAMETER             | SYMBOL            | TEST CONDITIONS   | MIN  | TYP  | MAX  | UNIT   |
|-----------------------|-------------------|---|------|------|------|--------|
| Reference Voltage     | V <sub>ref</sub>  | I <sub>out</sub> =1mA, T <sub>amb.</sub> =25°C          | 1.21 | 1.24 | 1.27 | V      |
| Temperature Stability | K <sub>vt</sub>   | T <sub>min.</sub> <T <sub>amb.</sub> <T <sub>max.</sub> |      | 30   | 100  | ppm/°C |
| Load Regulation       | Reg <sub>lo</sub> | 1<I <sub>out</sub> <10mA                                |      | 5    | 15   | mV     |
| Line Regulation       | Reg <sub>li</sub> | 5<V <sub>in</sub> <32V                                  |      | 3.5  | 10   | mV     |

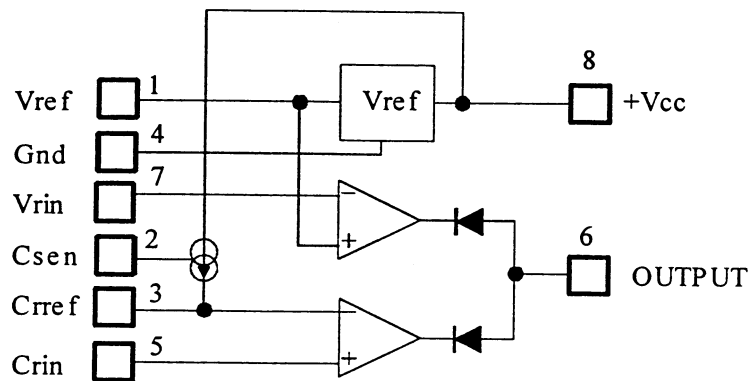
# UTC UM601/A LINEAR INTEGRATED CIRCUIT

## VOLTAGE REFERENCE: UM601A

| PARAMETER             | SYMBOL | TEST CONDITIONS  | MIN   | TYP   | MAX   | UNIT   |
|-----------------------|--------|--|-------|-------|-------|--------|
| Reference Voltage     | Vref   | I <sub>out</sub> =1mA, T <sub>amb</sub> =25°C            | 1.227 | 1.240 | 1.252 | V      |
| Temperature Stability | Kvt    | T <sub>min</sub> .<T <sub>amb</sub> .<T <sub>max</sub> . |       | 30    | 100   | ppm/°C |
| Load Regulation       | Reglo  | 1<I <sub>out</sub> <10mA                                 |       | 5     | 15    | mV     |
| Line Regulation       | Regli  | 5<V <sub>in</sub> <32V                                   |       | 3.5   | 10    | mV     |

## CURRENT GENERATOR UM601/UM601A

| PARAMETER   | SYMBOL              | TEST CONDITIONS   | MIN | TYP   | MAX   | UNIT   |
|---|---------------------|---|-----|-------|-------|--------|
| Current Source  | I <sub>o</sub>      |   |     | 1.4   |       | mA     |
| Temperature Stability                                   | Kcgt                | T <sub>min</sub> .<T <sub>amb</sub> .<T <sub>max</sub> .                        |     | 500   |       | ppm/°C |
| Line Regulation   | Cglir               | 4.5V<V <sub>cc</sub> <32V   |     | 0.003 | 0.030 | mA     |
| Voltage at the enable pin to have I <sub>o</sub> =1.4mA | V <sub>csen</sub>   | T <sub>min</sub> .<T <sub>amb</sub> .<T <sub>max</sub> .                        |     |       | 0.6   | V      |
| Voltage at the enable pin to have I <sub>o</sub> =0mA   | V <sub>csdis</sub>  | T <sub>min</sub> .<T <sub>amb</sub> .<T <sub>max</sub> .                        | 2   |       |       | V      |
| Input Current on the Csen pin                           | I <sub>csen</sub>   | T <sub>min</sub> .<T <sub>amb</sub> .<T <sub>max</sub> .                        |     |       | 30    | μA     |
| Leakage Current   | I <sub>csleak</sub> | V <sub>cs</sub> =2V<br>T <sub>min</sub> .<T <sub>amb</sub> .<T <sub>max</sub> . |     | 0.5   | 2     | μA     |



## DESCRIPTION

| PIN | NAME   | TYPE   | FUNCTION  |
|-----|--------|--------|---|
| 1   | Vref   | OUTPUT | Voltage Reference Output 1.24V, 10mA max. Do not short circuit  |
| 7   | Vrin   | INPUT  | Voltage Regulation Loop Input   |
| 5   | Crin   | INPUT  | Current Limitation Loop Input, connected to the sense resistor  |
| 3   | Crref  | INPUT  | Current Limitation Reference Input  |
| 2   | Csen   | INPUT  | Current source enable input. This current source can be used to offset the voltage measurement on the sense resistor and therefore to modify the charge current. The current source is enabled when the input voltage on pin 2 is lower than 0.8V |
| 6   | OUTPUT | OUTPUT | Output pin common to the voltage regulation and current limitation loops. This output can drive the primary side (LED) of an optocoupler  |
| 8   | Vcc    | INPUT  | Power Supply Input (4.5 to 32VDC)   |
| 4   | GND    | INPUT  | Ground  |