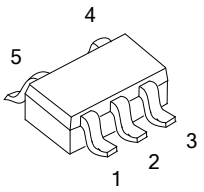
# BIDIRECTIONAL PRECISION HIGH-SIDE CURRENT MONITOR




SOT-25

## ■ DESCRIPTION

The UTC **UCM101** is a bidirectional precision high-side current sense monitor. It uses UTC's advanced technology to provide customers with a minimum operating current, high accuracy, high side voltage and a fixed gain of 10, etc.

The UTC **UCM101**'s output voltage is proportional to the differential input voltage. Direction of current flow is indicated by the Flag pin.

The UTC **UCM101** is suitable for widely voltage range applications and portable battery equipment.

## ■ FEATURES

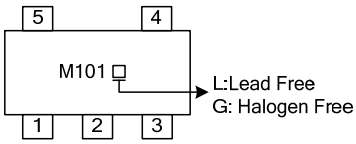
* Low operating current
* High side voltage (2.7~20V)
* A fixed gain of 10
* High accuracy (typ=1%)

## ■ ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| UCM101L-AF5-R | UCM101G-AF5-R | SOT-25 | Tape Reel |

| | |
|---|---|
| UCM101L-AF5-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Lead Free | (1) R: Tape Reel<br>(2) AF5: SOT-25<br>(3) L: Lead Free, G: Halogen Free |

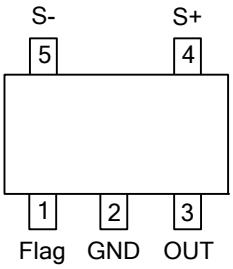
## ■ MARKING





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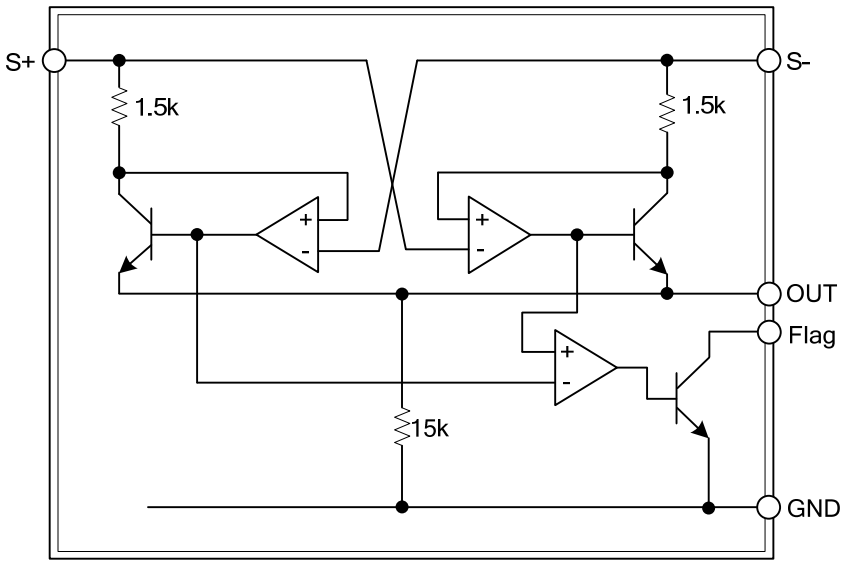
## ■ PIN CONFIGURATION




## ■ PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION |
|---|---|---|
| 1 | Flag | This is the current direction pin. It is open collector and allows the logic high level to be set independent of $V_{S+}$ voltage. Low indicates $V_{S+}$ is greater than $V_{S-}$ |
| 2 | GND | Ground pin |
| 3 | OUT | Output voltage pin |
| 4 | S+ | This is the positive input of the current monitor. It also acts as the supply voltage pin providing current for internal circuitry. The current through this pin varies with differential sense voltage |
| 5 | S- | This is the negative input of the current monitor. The current through this pin varies with differential sense voltage |

## ■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Voltage on $V_{S-}$ and $V_{S+}$ | | | -0.6~20 | V |
| Voltage on all Other Pins | | | -0.6~($V_{S+}$ or $V_{S-}$)+0.6 | V |
| $V_{sense}$ [($V_{S+}$) - ($V_{S-}$)] | | | +/-6 | V |
| Package Power Dissipation | at $T_A$=25°C<br>(De-rate to zero at 150°C) | $P_D$ | 300 | mW |
| Operating Temperature | | $T_A$ | -40~125 | °C |
| Storage Temperature | | $T_{STG}$ | -55~150 | °C |
| Maximum Junction Temperature | | $T_J$ | 150 | °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 OPERATIONG CONDITIONS

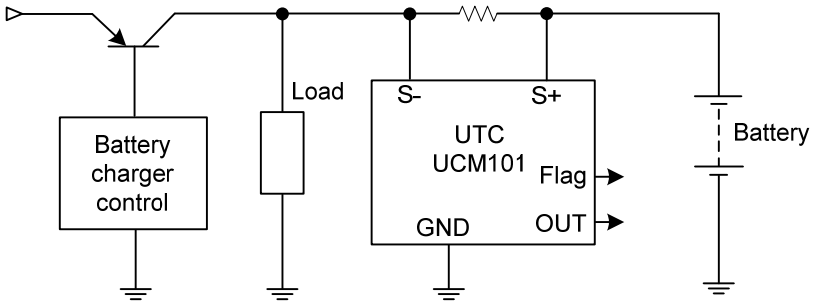
| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Common-Mode Sense Input Range | $V_{S\pm}$ | 2.7~20 | V |
| Current Direction Flag Output | Flag | 0~$V_{S\pm}$ | V |
| Differential Sense Input Voltage Range | $V_{SENSE}$ | 0~±0.8 | V |
| Output Voltage Range | $V_{OUT}$ | 0~$V_{S\pm}$-1.5 | V |
| Ambient Temperature Range | $T_A$ | -40~125 | °C |

## ■ ELECTRICAL CHARACTERISTICS (Test conditions $T_A$=25°C, $V_{S+}$=10V, $V_{SENSE}$=100mV)

| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Ground Pin Current | | $I_Q$ | | 15 | 35 | 50 | µA |
| $V_{S+}$ Input Current | | $I_{S+}$ | $V_{SENSE}$=0V | 10 | 17 | 24 | µA |
| $V_{S-}$ Input Current | | $I_{S-}$ | $V_{SENSE}$=0V | 10 | 17 | 24 | µA |
| Output Voltage | | $V_{OUT}$ | $V_{SENSE}$=+150mV | 1.55 | 1.5 | 1.45 | V |
| | Flag High | | $V_{SENSE}$=+100mV | 1.02 | 1 | 0.98 | V |
| | | | $V_{SENSE}$=+30mV | 309 | 300 | 291 | mV |
| | | | $V_{SENSE}$=0V | 0 | | 15 | mV |
| | Flag Low | | $V_{SENSE}$=-30mV | 285 | 300 | 315 | mV |
| | | | $V_{SENSE}$=-100mV | 0.95 | 1 | 1.05 | V |
| | | | $V_{SENSE}$=-150mV | 1.42 | 1.50 | 1.58 | V |
| $V_{OUT}$ Variation with Temperature | | $V_{OUT}$ TC | $V_{SENSE}$=±100mV | | 30 | | ppm/ºC |
| $V_{OUT}/V_{SENSE}$ | | Gain | | | 10 | | |
| Total Output Error (Gain + Offset) | | Accuracy | $V_{SENSE}$=100mV | | | ±2 | % |
| | | | $V_{SENSE}$=-100mV | | | ±5 | % |
| Bandwidth | | BW | $V_{SENSE(DC)}$=100mV<br>$V_{SENSE(AC)}$=63m$V_{PP}$ | | 300 | | kHz |
| $V_{S+}$ Common Mode Rejection Ratio | | CMRR | $V_{IN}$=2.7~20V | | 60 | | dB |
| Flag Trip Point | | Flag TP | Referred to $V_{SENSE}$ | -2.5 | | +2.5 | mV |
| Flag Low Output Voltage | | $V_{FL}$ | $I_{SINK}$=100µA | | 60 | 200 | mV |
| Flag High Leakage Current | | $I_{FH}$ | $V_{OH}$=5V | | | 1 | µA |

## ■ APPLICATION INFORMATION

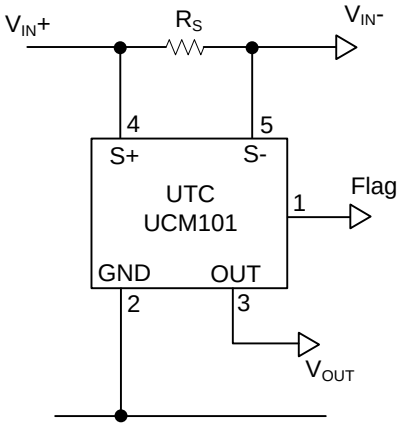
A common application for micro-power current monitors is measuring the discharge current of a rechargeable lithium ion/polymer battery. The UTC **UCM101** enables measuring both the charge and discharge current into the battery and with its wide operating voltage of 2.5~20V enables it to measure the currents in to/ out of up to 4 cells connected in series.




When choosing appropriate values for $R_{SENSE}$ a compromise must be reached between in-line signal loss (including potential power dissipation effects) and small signal accuracy.

Higher values for $R_{SENSE}$ gives better accuracy at low load currents by reducing the inaccuracies due to internal offsets. For best operation the UTC **UCM101** has been designed to operate with $V_{SENSE}$ of the order of 50mV~150mV.

## ■ TYPICAL APPLICATION CIRCUIT




UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.