

Features

- High efficiency (min. 90% On $I_O=300mA \sim 600mA$)
- Using external P and N channel MOSFET
- Maximum Duty 100%
- Oscillation frequency 300KHz or 600KHz
- Soft Start by an external capacity
- Output voltage accuracy $\pm 2\%$
- Built-in ON/OFF Function
- Built-in Short-circuit Protection
- Stand-by current max. 10 μA
- Quiescent Current 1.5mA
- Built-in Power Good reset circuit
- Input voltage: 2.5V ~7.0V

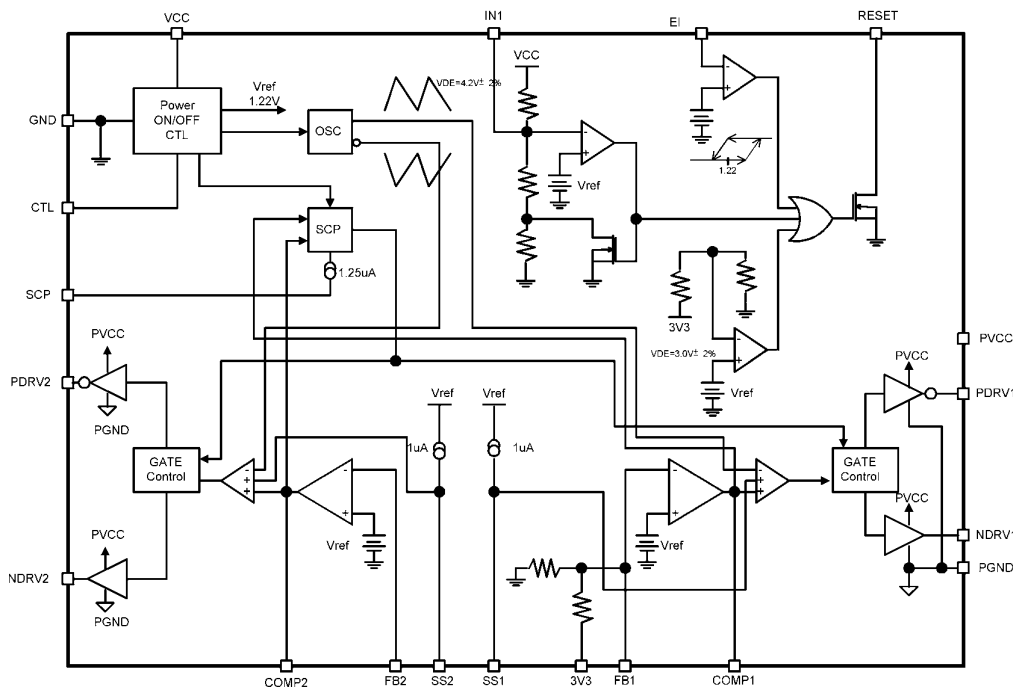
Applications

- Slim-Type CD-ROM/DVD-ROM/CD-RW
- Power Supply for portable devices

General Description

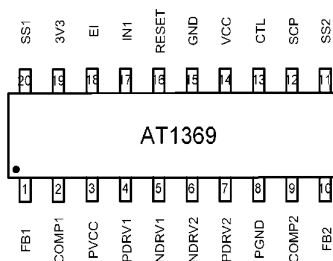
The AT1369 provides complete control and protection for a DC/DC converter optimized for high-performance microprocessor applications. It is designed to drive one P-Channel and one N-Channel MOSFETs in a synchronous-rectified buck topology. The AT1369 integrates all of the control, output adjustment, monitoring and protection functions into a single package. The output voltage of the converter can be precisely regulated with a maximum tolerance of $\pm 2\%$ over temperature and line voltage variations. The AT1369 is a family of low-noise synchronous step-down DC/DC converters that is ideally suited for systems powered from a 1-cell Li-ion battery or from a 3-cell to 4-cell NiCd, NiMH, or alkaline battery. It can also be used to USB-Based power system.

Block Diagram



Aimtron reserves the right without notice to change this circuitry and specifications.

Pin Configuration



Ordering Information

| Part number | Package | Marking |
|--------------|--------------|--|
| AT1369AR | SSOP20 | AT1369AR |
| AT1369AR GRE | SSOP20,Green | AT1369AR, Date Code with one bottom line |
| AT1369BR | SSOP20 | AT1369BR |
| AT1369BR GRE | SSOP20,Green | AT1369BR, Date Code with one bottom line |

A: fosc =300KHz B: fosc =600KHz

Pin Description

| Symbol | Pin No. | Descript | Symbol | Pin No.(A/B) | Descript |
|--------|---------|--------------------------------------|--------|--------------|--|
| FB1 | 1 | Inverting input to error amplifier 1 | SS2 | 11 | Soft-start 2 |
| COMP1 | 2 | Error amplifier1 output | SCP | 12 | Short-Circuit protection |
| PVCC | 3 | Power blocks power supply | CTL | 13 | Chip enable, high active |
| PDRV1 | 4 | Output1 for Pch-MOSFET | VCC | 14 | Control blocks power supply |
| NDRV1 | 5 | Output1 for Nch-MOSFET | GND | 15 | Control blocks ground |
| NDRV2 | 6 | Output2 for Nch-MOSFET | RESET | 16 | Power Good indicator |
| PDRV2 | 7 | Output2 for Pch-MOSFET | IN1 | 17 | VCC monitor voltage adjustable input pin |
| PGND | 8 | Power blocks ground | EI | 18 | Adjustable Reset input |
| COMP2 | 9 | Error amplifier1 output | 3V3 | 19 | Output voltage 3.3V |
| FB2 | 10 | Inverting input to error amplifier 2 | SS1 | 20 | Soft-start 1 |

Absolute Maximum Ratings

| Parameter | Condition | Rated Value | | Unit |
|--|--------------------------------|-------------|------|------|
| | | Min. | Max. | |
| Power Supply Voltage | — | - | +8 | V |
| Source Average Current of PDRV1,NDRV1 PDRV2,NDRV2 | — | - | -50 | mA |
| Sink Average Current of PDRV1,NDRV1, PDRV2,NDRV2 | — | - | 50 | mA |
| Source Peak Current of PDRV1,NDRV1, PDRV2,NDRV2 | — | - | -200 | mA |
| Sink Peak Current of PDRV1,NDRV1, PDRV2,NDRV2 | — | - | 200 | mA |
| Input Voltage to Error Amplifier | — | - | 6.5 | V |
| Continuous power dissipation | SSOP20 (T _a =+25°C) | - | 560 | mW |
| Operating temperature | — | -30 | +85 | °C |
| Storage temperature | — | -55 | +125 | °C |

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Recommended Operating Conditions

(T_a=+25°C)

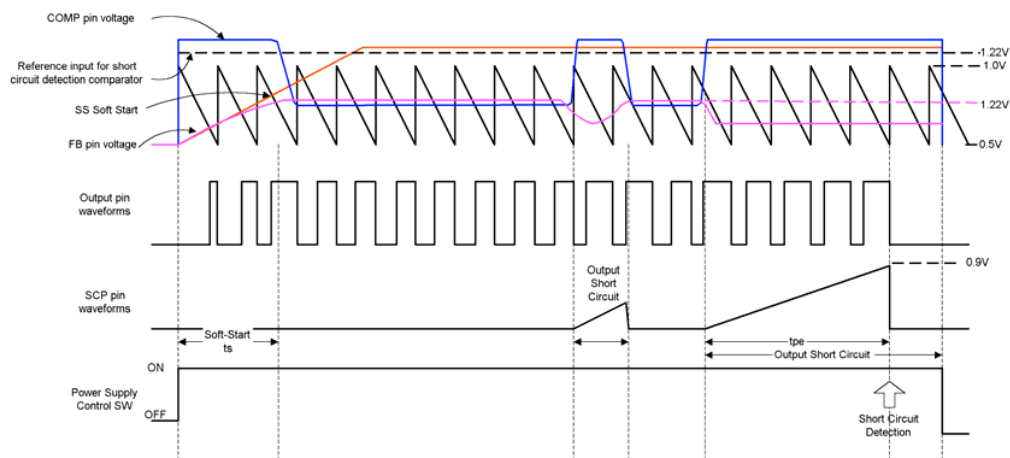
| Parameter | Symbol | Values | | | Unit |
|-----------------------|------------------|--------|------|------|------|
| | | Min. | Typ. | Max. | |
| Power supply voltage | V _{CC} | 2.5 | -- | 7 | V |
| Control input voltage | V _{CTL} | 0 | -- | 7 | V |
| Operating temperature | T _{OP} | -20 | +25 | +85 | °C |

Electrical Characteristics

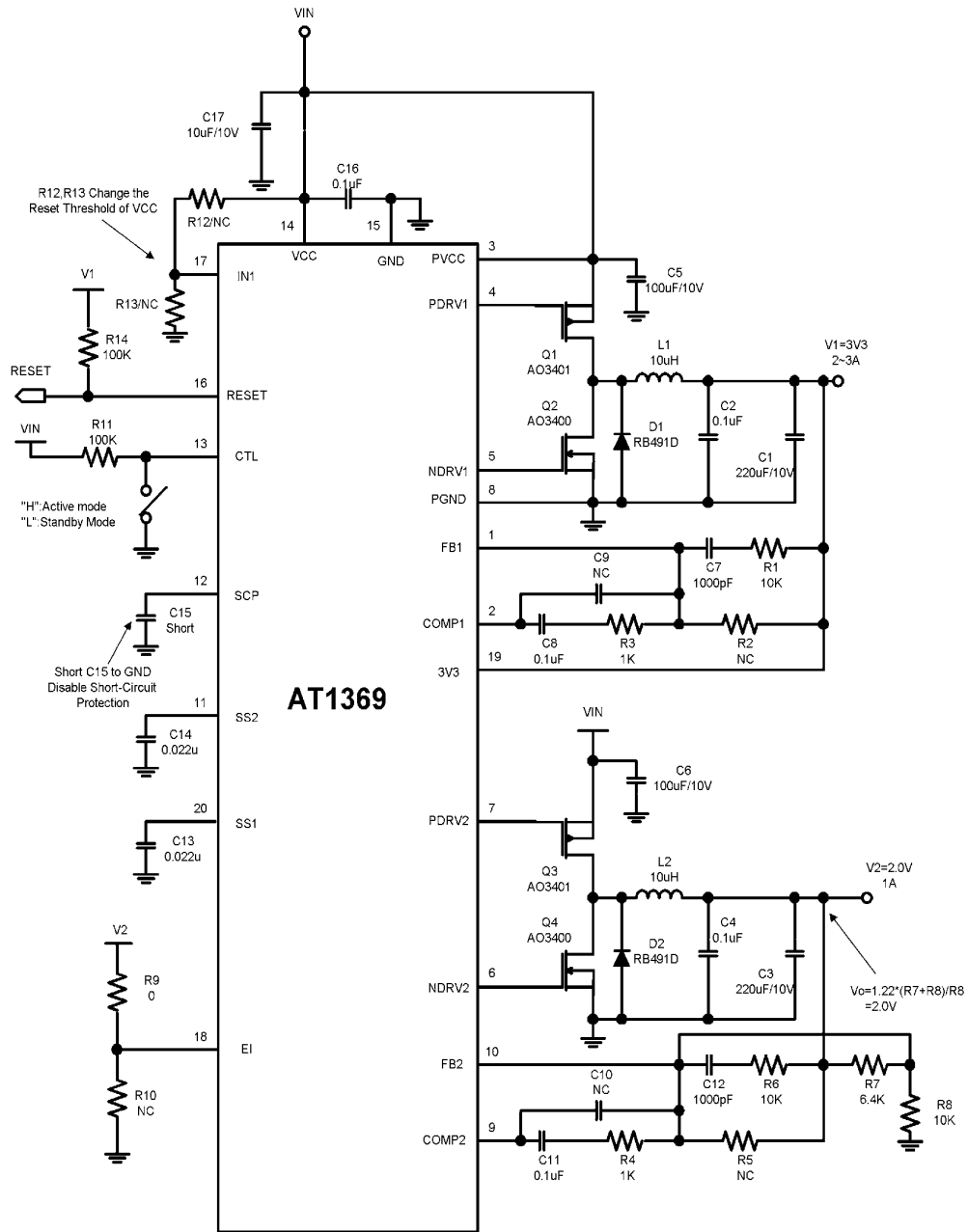
(VCC = 5V, Ta = +25°C , unless otherwise noted.)

| Parameter | Symbol | Condition | Values | | | Unit | |
|--------------------------------|---|-----------------------|--|------|-------|------|-----|
| | | | Min. | Typ. | Max. | | |
| Entire device | Input Supply Range | V _{CC} | 2.5 | -- | 7.0 | V | |
| | Quiescent Current | I _{CC} | | 1.5 | 2.0 | mA | |
| | Current in standby mode | I _{ST} | CTL=0V | | | 10 | μA |
| | Reference Voltage | V _{REF} | Ta = -20°C to +85°C | 1.20 | 1.22 | 1.24 | V |
| | Reference Voltage line-regulation | V _{REF-Line} | VCC=2.5V to 7.0V | | 1 | 10 | mV |
| | Reference Variation with Temperature | | Ta = -20°C to +85°C | | 0.5 | 1.5 | % |
| Error amplifier | Input Offset Voltage | V _{IO} | | | 10 | mV | |
| | Source Current | I _{OH} | V _{COMP} = V _{REF} -0.5V | -1.0 | -1.5 | -2.0 | mA |
| | Sink Current | I _{OL} | V _{COMP} = 0.5V | 160 | 120 | 80 | μA |
| | Source current Variation with temperature | | Ta = -20°C to +85°C | | | 20 | % |
| | Sink current Variation with temperature | | Ta = -20°C to +85°C | | | 20 | % |
| | Unity Gain Bandwidth | f _T | | | 10.0 | | MHz |
| | Common Mode Input Voltage Range | V _{COM} | | 0.2 | | 1.5 | V |
| | DC Open Loop Gain | A _V | | | 110 | | dB |
| Sawtooth wave oscillator (OSC) | Frequency | f _{osc} | AT1369A | 250 | 300 | 350 | KHz |
| | | f _{osc} | AT1369B | 500 | 600 | 700 | KHz |
| | High Level Voltage | | | | 1.0 | | V |
| | Low Level Voltage | | | | 0.5 | | V |
| | Variation with Power Supply | | Vcc=2.5V to 7V | | | 2 | % |
| | Variation with temperature | | Ta = -20°C to +85°C | | | 7 | % |
| Soft-Start | Charge Current of SS1,2 | I _{CSS1,2} | | -1.5 | -1.0 | -0.8 | μA |
| | Invalid threshold voltage of SS1,2 | | | | 1.0 | | V |
| Short-Circuit | Charge Current of SCP | I _{CSCP} | | -1.7 | -1.25 | -1.0 | μA |
| | Threshold Voltage of SCP | | | | 0.9 | | V |

| | | | | | | | |
|----------------------|-----------------------|------------------|-------------------------|------------|------|------------|----------|
| PDRV1,2 Output Block | Output source current | I_{source} | Duty \geq 95% PDRV=0V | - | -130 | -80 | mA |
| | Output sink current | I_{sink} | Duty \leq 5% PDRV=5V | 65 | 100 | | mA |
| | Output ON resistor | R_{OH} | PDRV=-15mA | | 10 | 20 | Ω |
| | | R_{OL} | PDRV=15mA | | 10 | 20 | Ω |
| NDRV1,2 Output Block | Output source current | I_{source} | Duty \geq 95% NDRV=0V | - | -130 | -80 | mA |
| | Output sink current | I_{sink} | Duty \leq 5% NDRV=5V | 65 | 100 | | mA |
| | Output ON resistor | R_{OH} | NDRV=-15mA | | 10 | 20 | Ω |
| | | R_{OL} | NDRV=15mA | | 10 | 20 | Ω |
| Control Block | CTL input voltage | V_{IH} | Active mode | $V_{CC}-1$ | | V_{CC} | V |
| | | V_{IL} | Standby mode | 0 | | $V_{CC}/2$ | V |
| | CTL input Current | I_{CTL} | CTL=5.0V | | | 20 | μ A |
| RESET Monitor Block | VCC reset ON voltage | V_{RSTON1} | | 4.10 | 4.20 | 4.30 | V |
| | VCC reset hysteresis | $V_{RSTON1 hys}$ | | -100 | | 100 | mV |
| | 3V3 reset ON voltage | V_{RSTON2} | | 2.94 | 3.0 | 3.06 | V |
| | 3V3 reset hysteresis | $V_{RSTON2 hys}$ | | -60 | | 60 | mV |
| | EI reset ON voltage | V_{RSTON3} | | 1.12 | 1.22 | 1.32 | V |
| | EI reset hysteresis | $V_{RSTON hys}$ | | -100 | - | 100 | MV |
| | Reset output voltage | V_{OL} | $I_L = 1mA$ | | | 0.4 | V |
| | Reset leakage current | I_{Leak} | | | | 2.0 | μ A |



Typical Application Circuit: 3V3 and 2V Output



2F, No.10, Prosperity RD. II, Science-Based Industrial Park, Hsinchu 300, Taiwan, R.O.C.

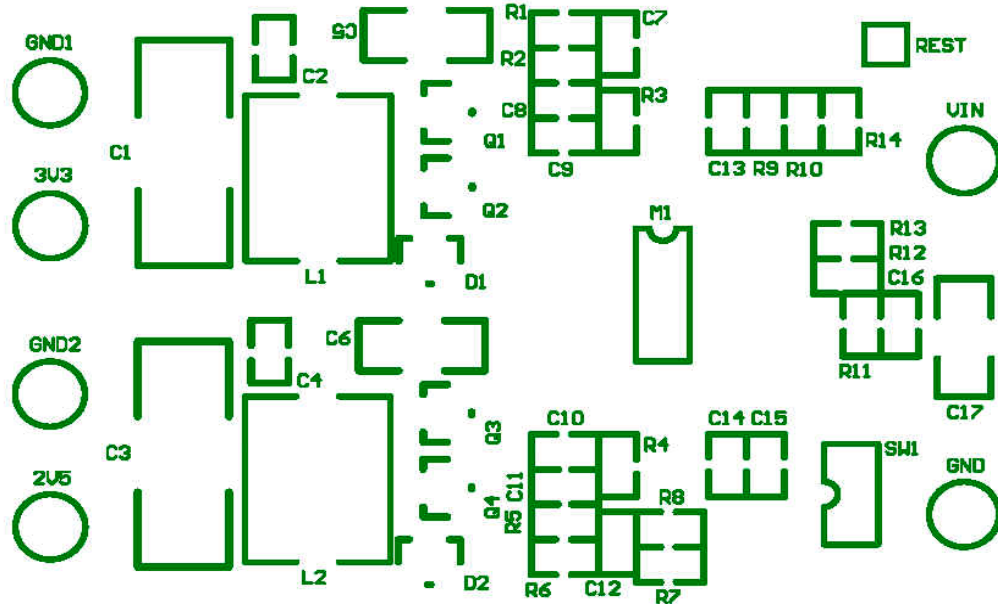
Tel: 886-3-563-0878

Fax: 886-3-563-0879

WWW: <http://www.aimtron.com.tw>

Email: service@aimtron.com.tw

Aimtron AT1369 EV BOARD



CH1:PDRV2 CH2:NDRV2 CH3:Output 2.0V/1A(AC ripple)

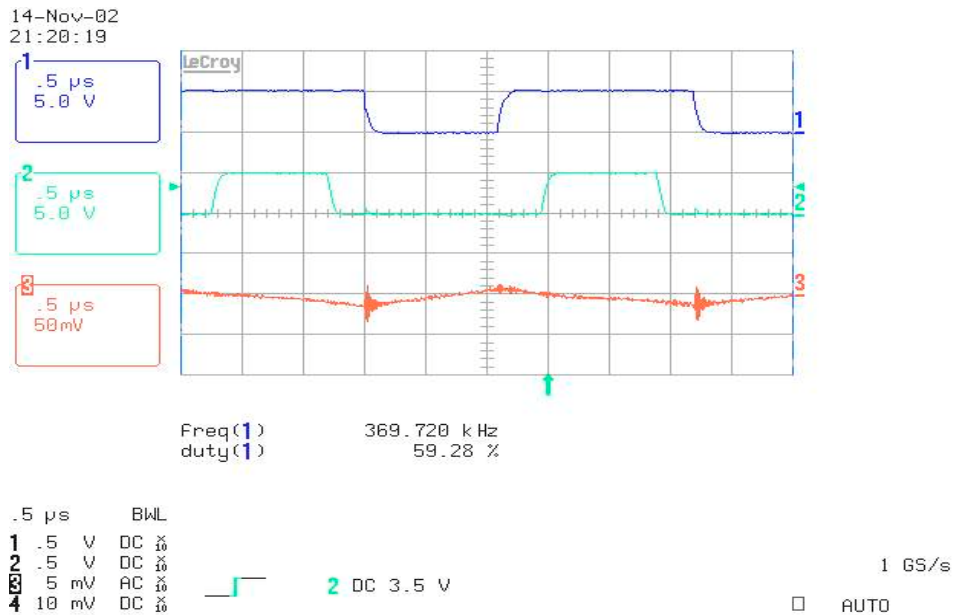


Fig1. Input 5V, Output 2.0V/1A

CH1:PDRV1 CH2:NDRV1 CH3:Output 3.3V/2A(AC ripple)

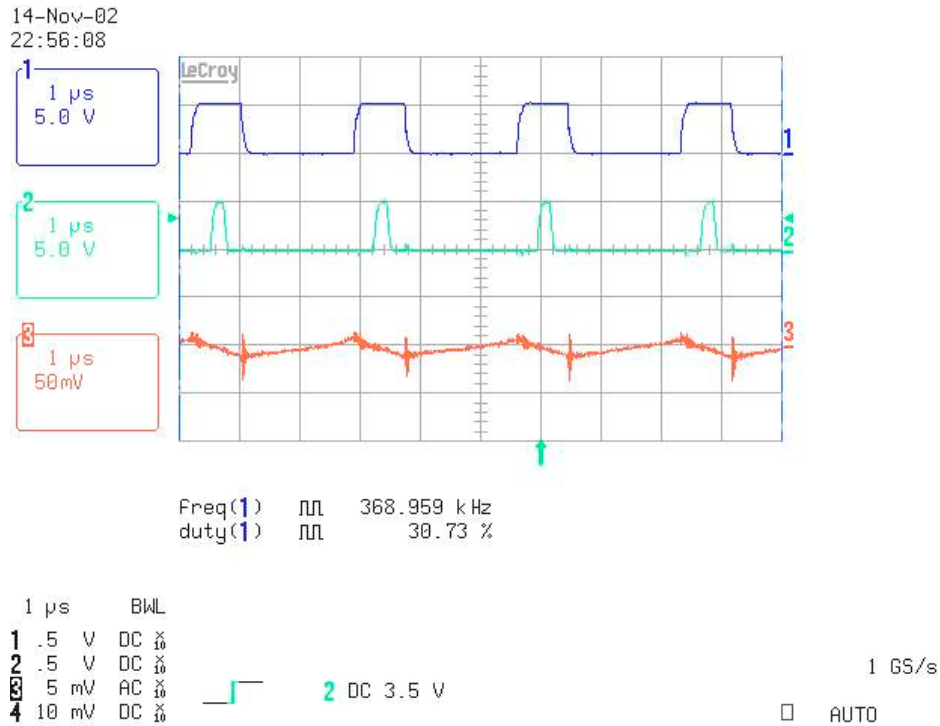
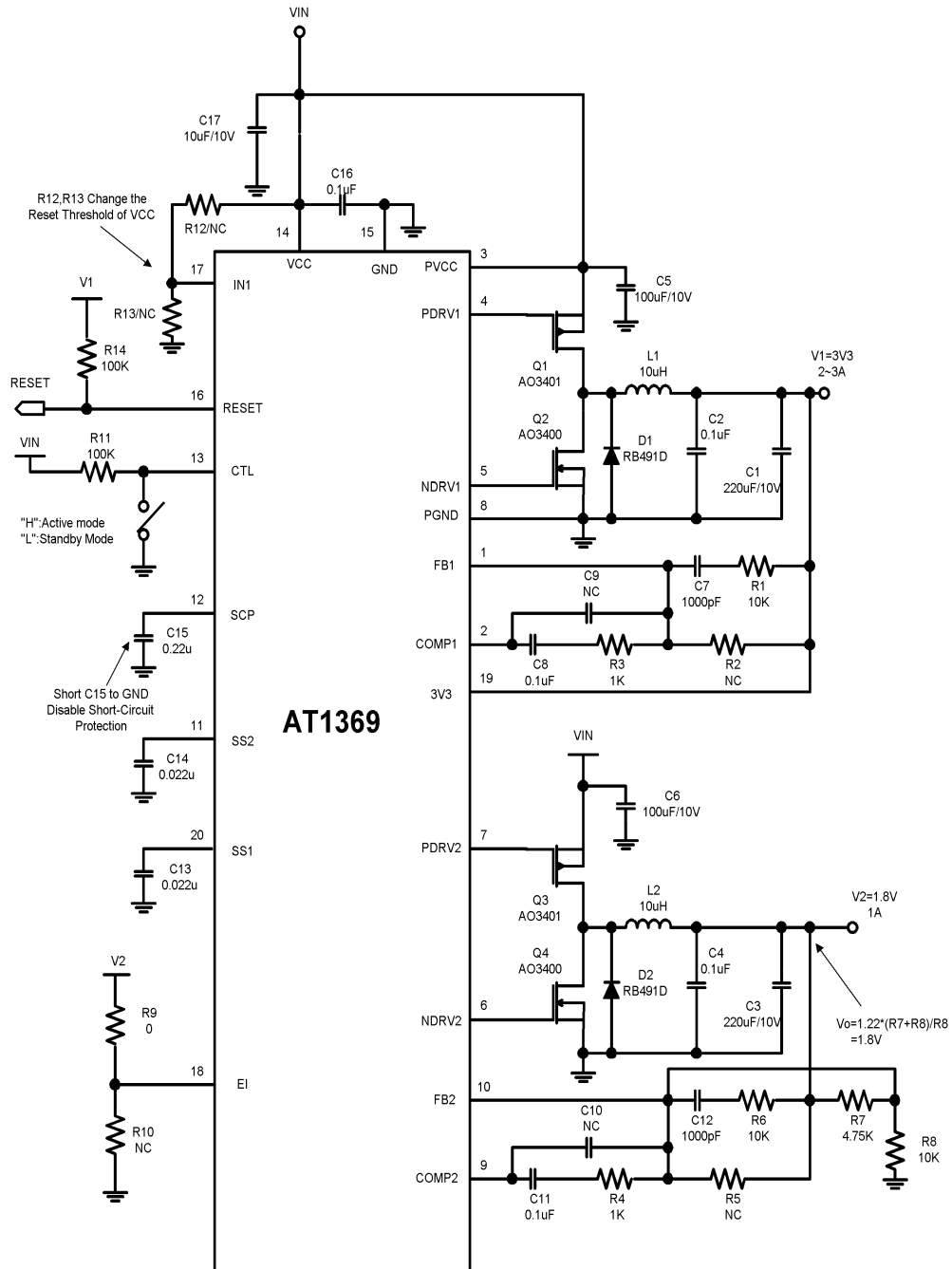


Fig2. Input 5V, Output 3.3V/2A



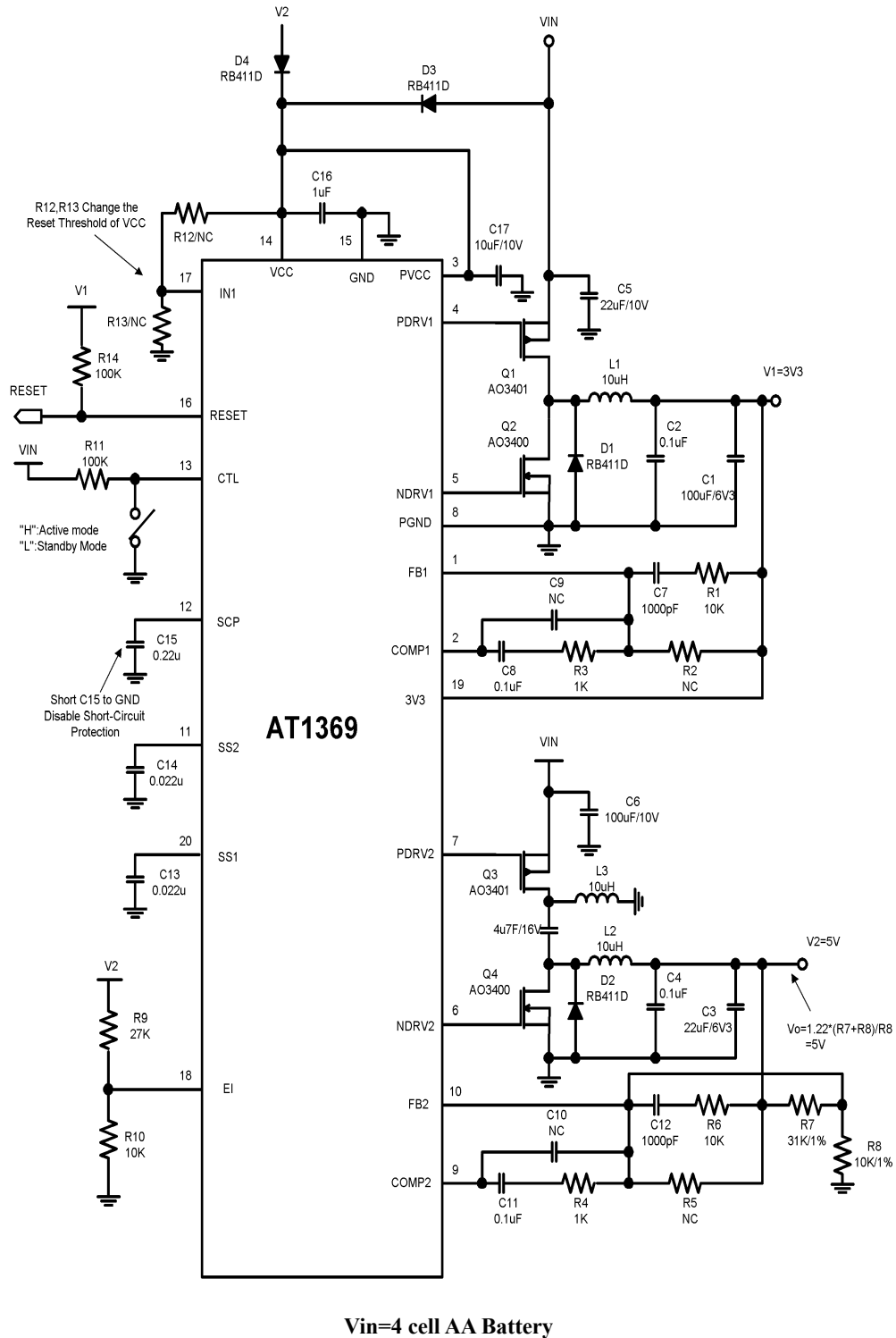
2F, No.10, Prosperity RD. II, Science-Based Industrial Park, Hsinchu 300, Taiwan, R.O.C.

Tel: 886-3-563-0878

Fax: 886-3-563-0879

WWW: <http://www.aimtron.com.tw>

Email: service@aimtron.com.tw



2F, No.10, Prosperity RD. II, Science-Based Industrial Park, Hsinchu 300, Taiwan, R.O.C.

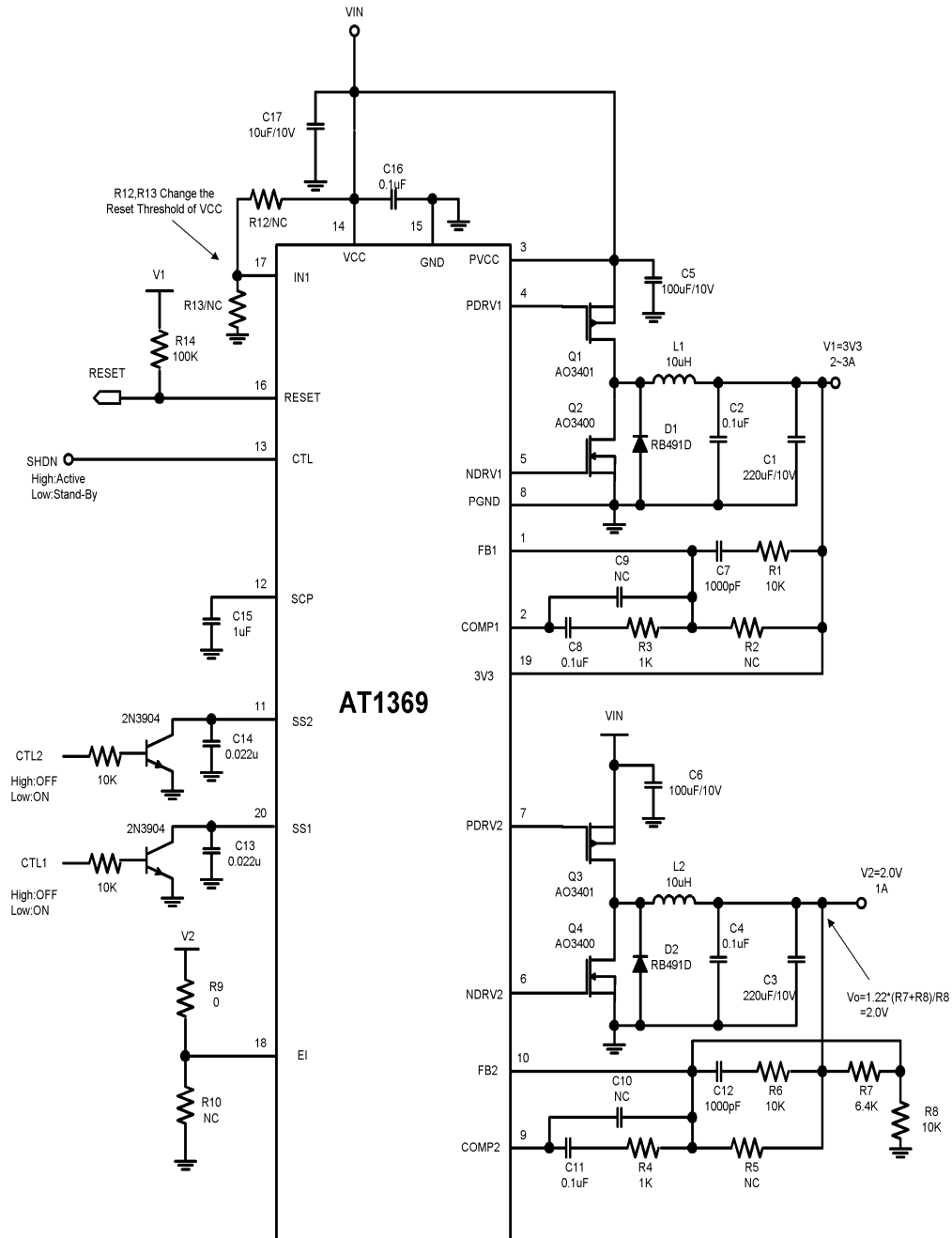
Tel: 886-3-563-0878

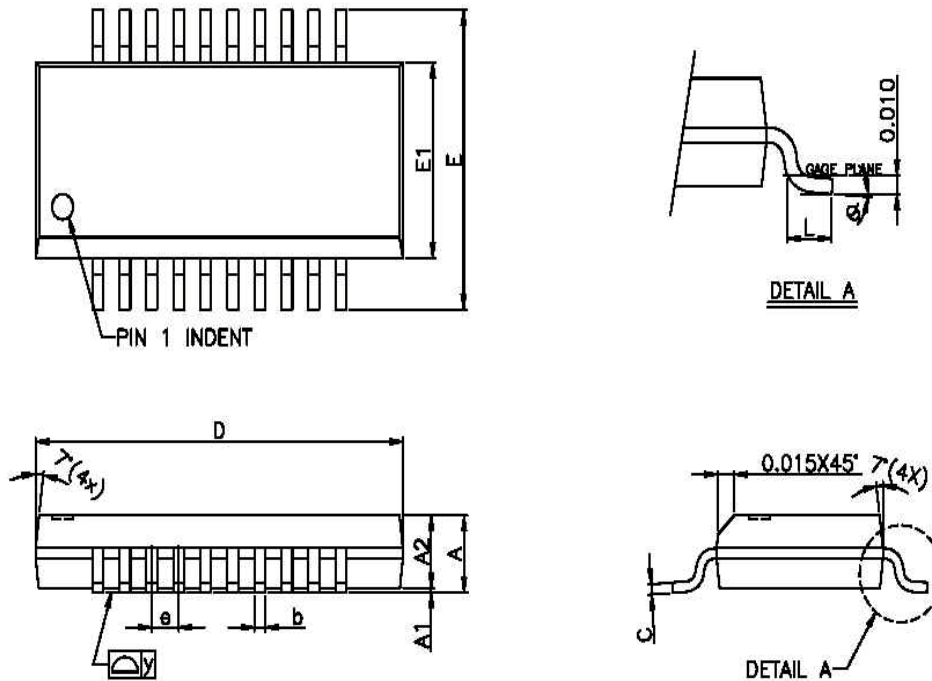
Fax: 886-3-563-0879

WWW: <http://www.aimtron.com.tw>

Email: service@aimtron.com.tw

How to control CH1 and CH2 ON/OFF:



Package Outline 20-pin SSOP


| SYMBOL | MILLIMETERS | | |
|----------|-------------|-------|-------|
| | MIN | TYP | MAX |
| A | 1.35 | 1.63 | 1.75 |
| A1 | 0.10 | 0.15 | 0.25 |
| A2 | - | - | 1.50 |
| b | 0.20 | - | 0.30 |
| C | 0.18 | - | 0.25 |
| D | 8.56 | 8.66 | 8.74 |
| E | 5.79 | 5.99 | 6.20 |
| E1 | 3.81 | 3.91 | 3.99 |
| L | 0.41 | 0.635 | 1.27 |
| e | - | 0.635 | - |
| y | - | - | 0.076 |
| θ | 0° | | 8° |