



圓創科技股份有限公司

AT1369

Preliminary Product Information

**2-Channel Synchronous Buck PWM Controller
with Power Good Reset**

Features

- High efficiency (min. 90% On $I_O=300\text{mA}$ ~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. $10\mu\text{A}$
- Quiescent Current 1.5mA
- Built-in Power Good reset circuit
- Input voltage: $2.5\text{V} \sim 7.0\text{V}$

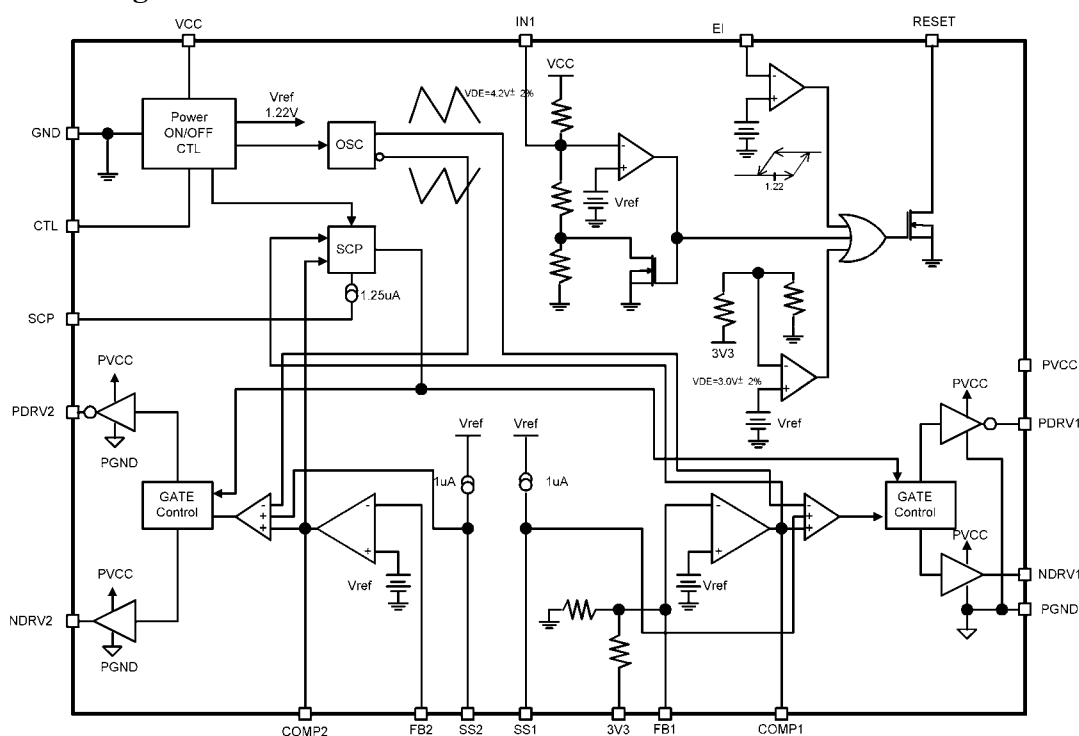
Applications

- 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.

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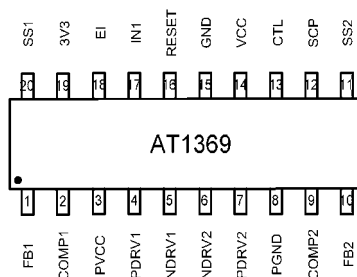
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Pin Configuration



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



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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)

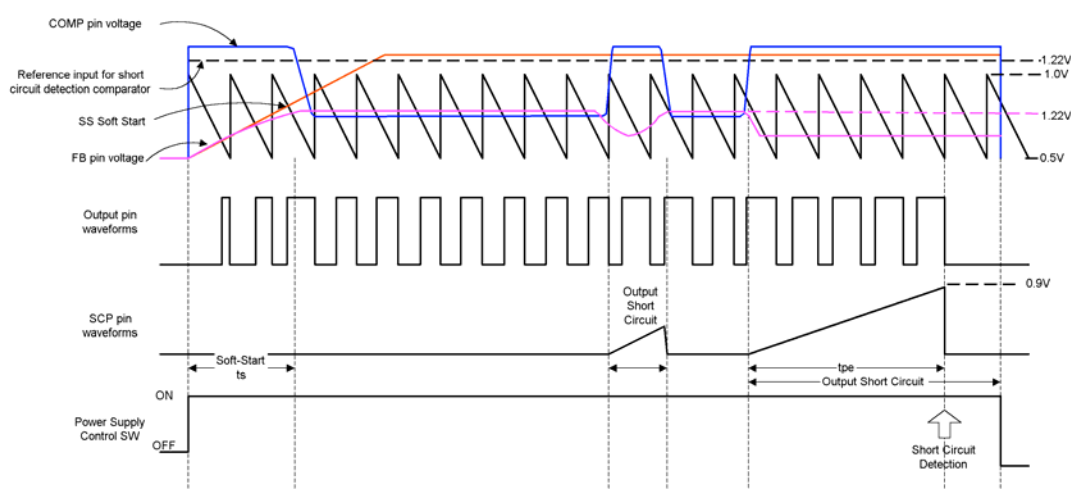
Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Power supply voltage	V _{CC}	2.5	--	7	V
Control input voltage	V _{CTL}	0	--	7	V
Operating temperature	T _{OP}	-20	+25	+85	°C

Electrical Characteristics

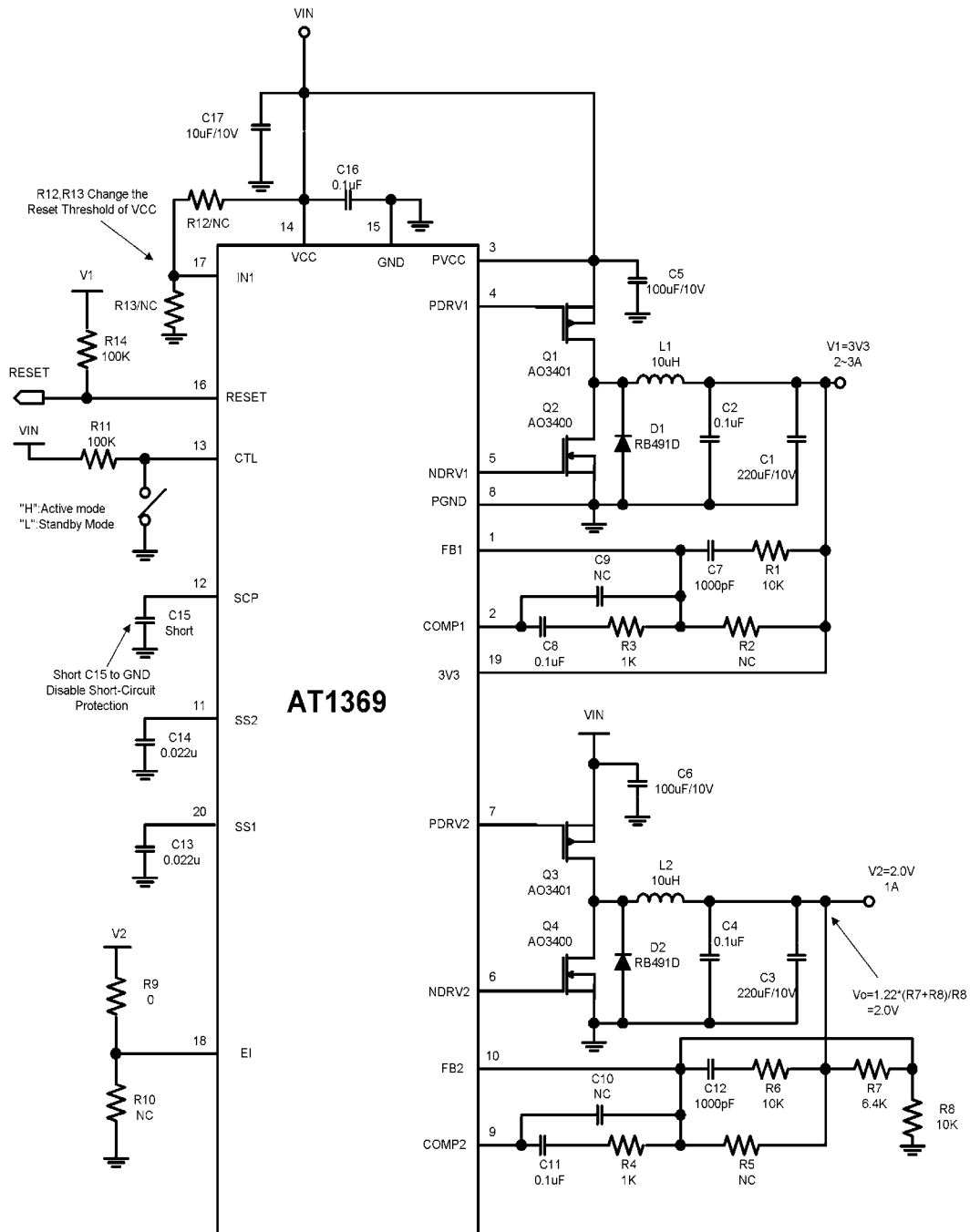
(VCC = 5V, T_a = +25°C, unless otherwise noted.)

Parameter		Symbol	Condition	Values			Unit
				Min.	Typ.	Max.	
Entire device	Input Supply Range	V _{CC}		2.5	--	7.0	V
	Quiescent Current	I _{CC}	Duty=50%, f _{OSC} =600KHz PDRV/NDRV No Load		1.5	2.0	mA
	Current in standby mode	I _{ST}	CTL=0V			10	μA
	Reference Voltage	V _{REF}	T _a = -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		T _a = -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		T _a = -20°C to +85°C			20	%
	Sink current Variation with temperature		T _a = -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		T _a = -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

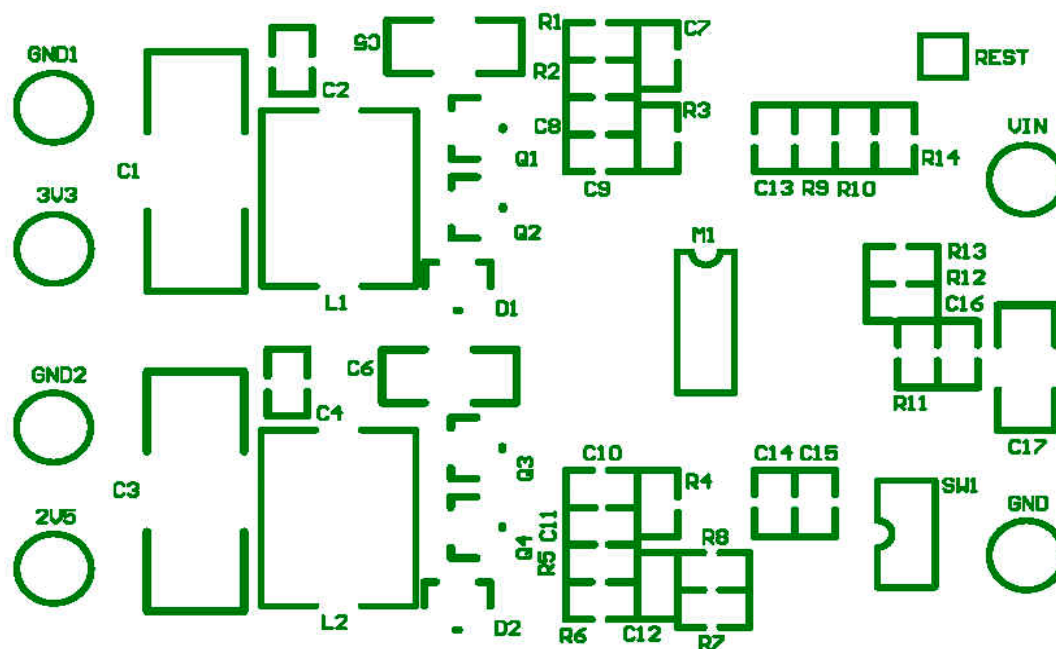
PDRV1,2 Output Block	Output source current	I_{source}	Duty $\geq$ 95% PDRV=0V	-	-130	-80	mA
	Output sink current	I_{sink}	Duty $\leq$ 5% PDRV=5V	65	100		mA
	Output ON resistor	R_{OH}	PDRV=-15mA		10	20	Ω
		R_{OL}	PDRV=15mA		10	20	Ω
NDRV1,2 Output Block	Output source current	I_{source}	Duty $\geq$ 95% 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	VCC-1		VCC	V
		V_{IL}	Standby mode	0		VCC/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 hysteresi	$V_{RSTON hys}$		-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



Aimtron AT1369 EV BOARD



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

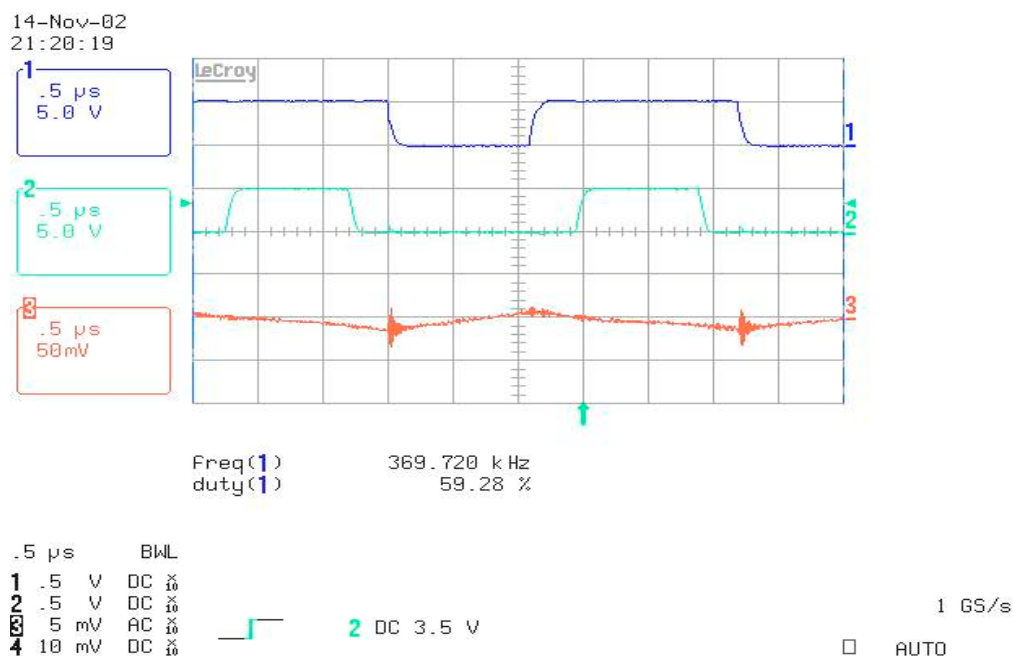
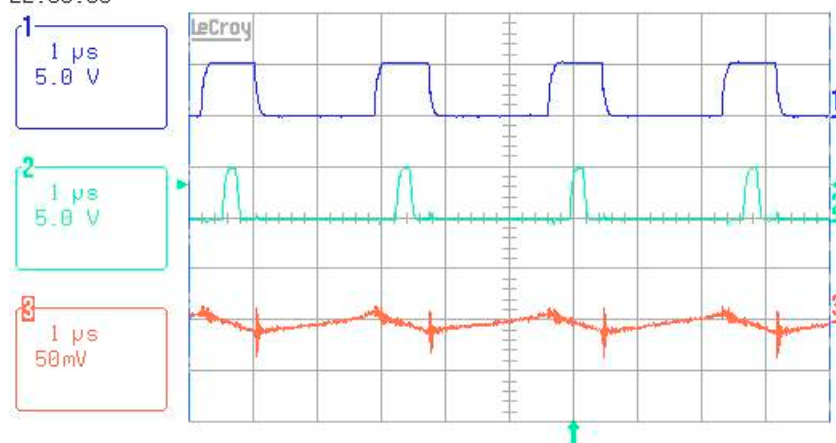


Fig1. Input 5V, Output 2.0V/1A

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

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Freq(1) 368.959 kHz
duty(1) 30.73 %

1 μs BWL
1 .5 V DC 10
2 .5 V DC 10
3 5 mV AC 10
4 10 mV DC 10

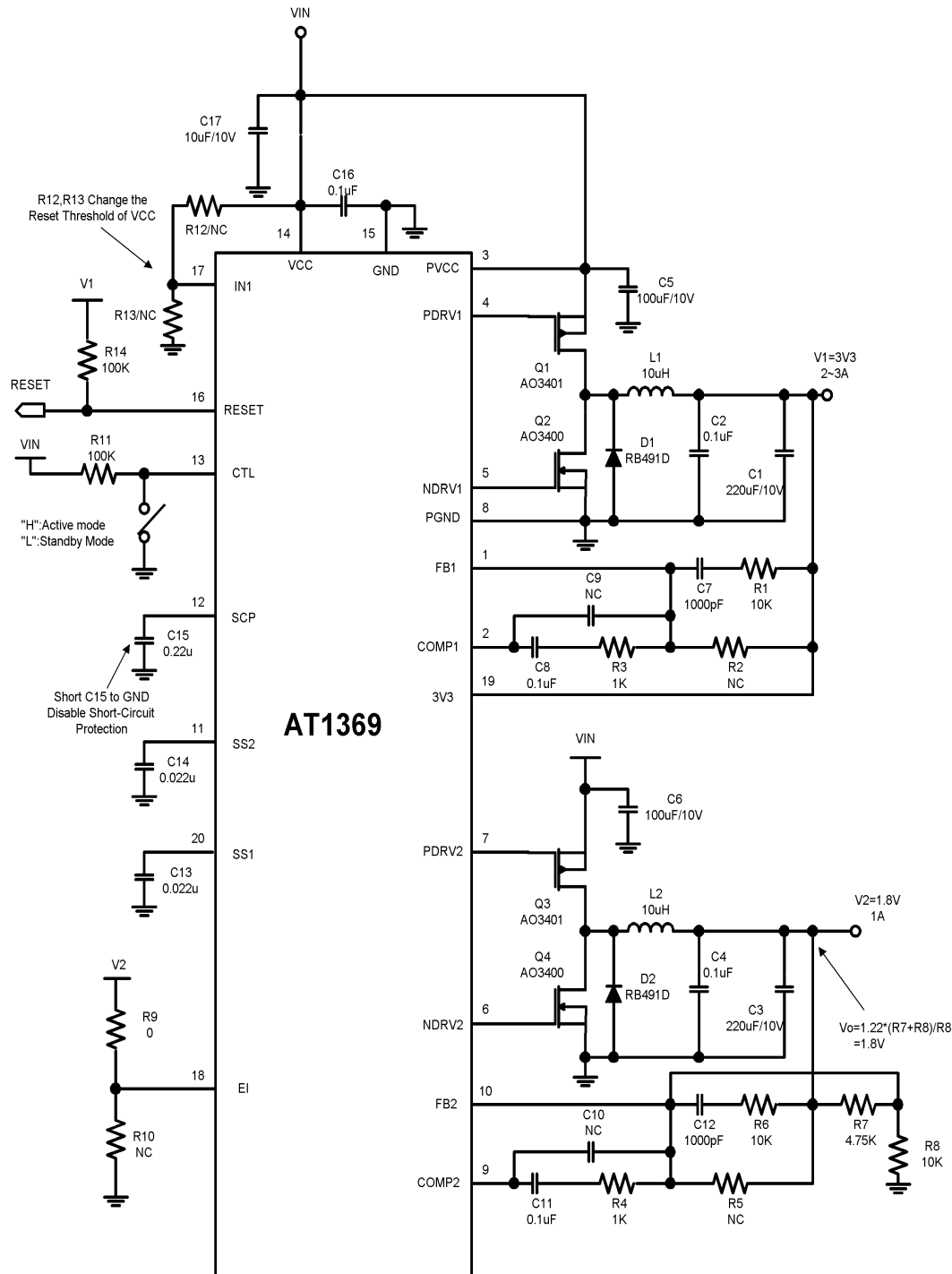


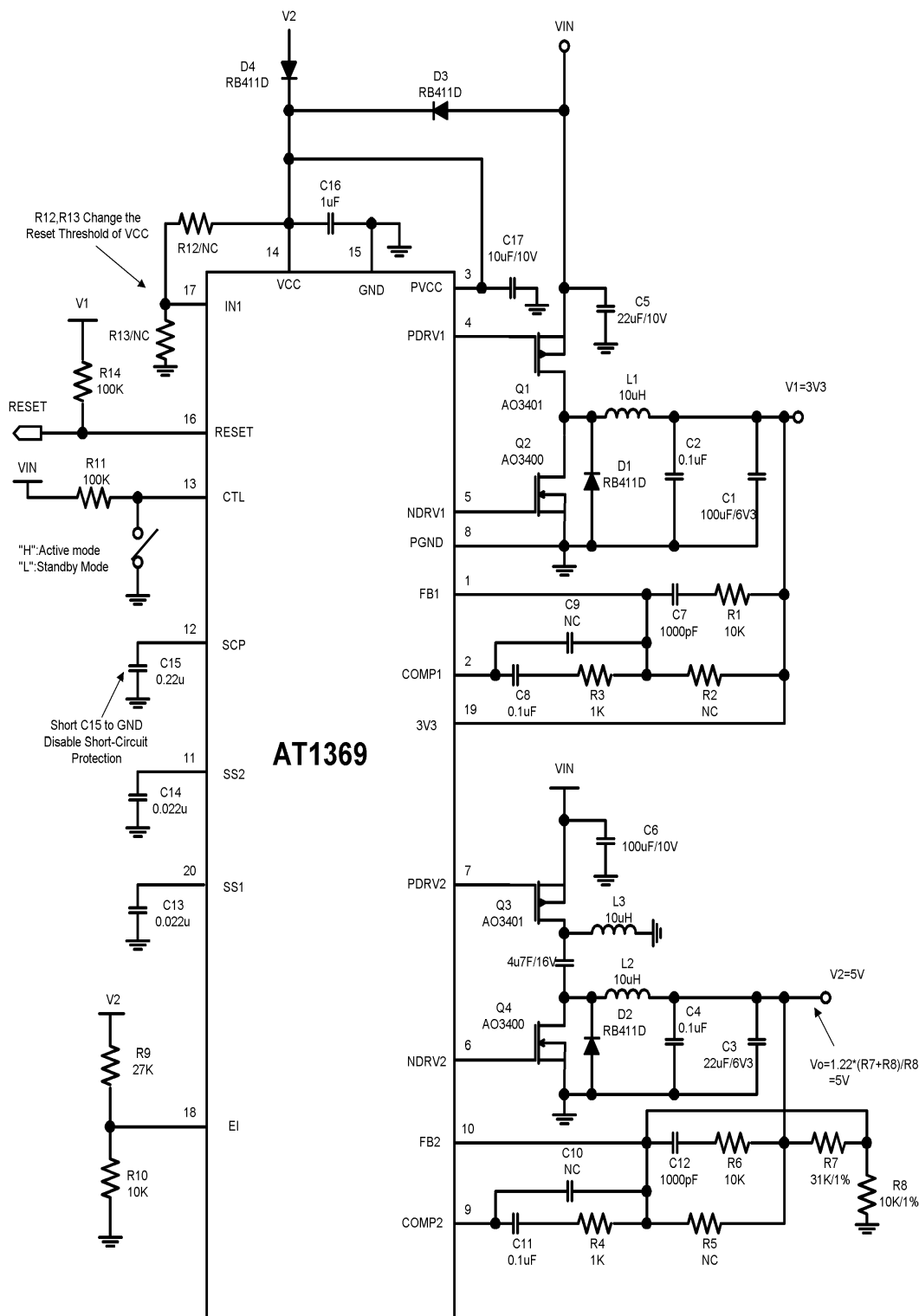
2 DC 3.5 V

1 GS/s

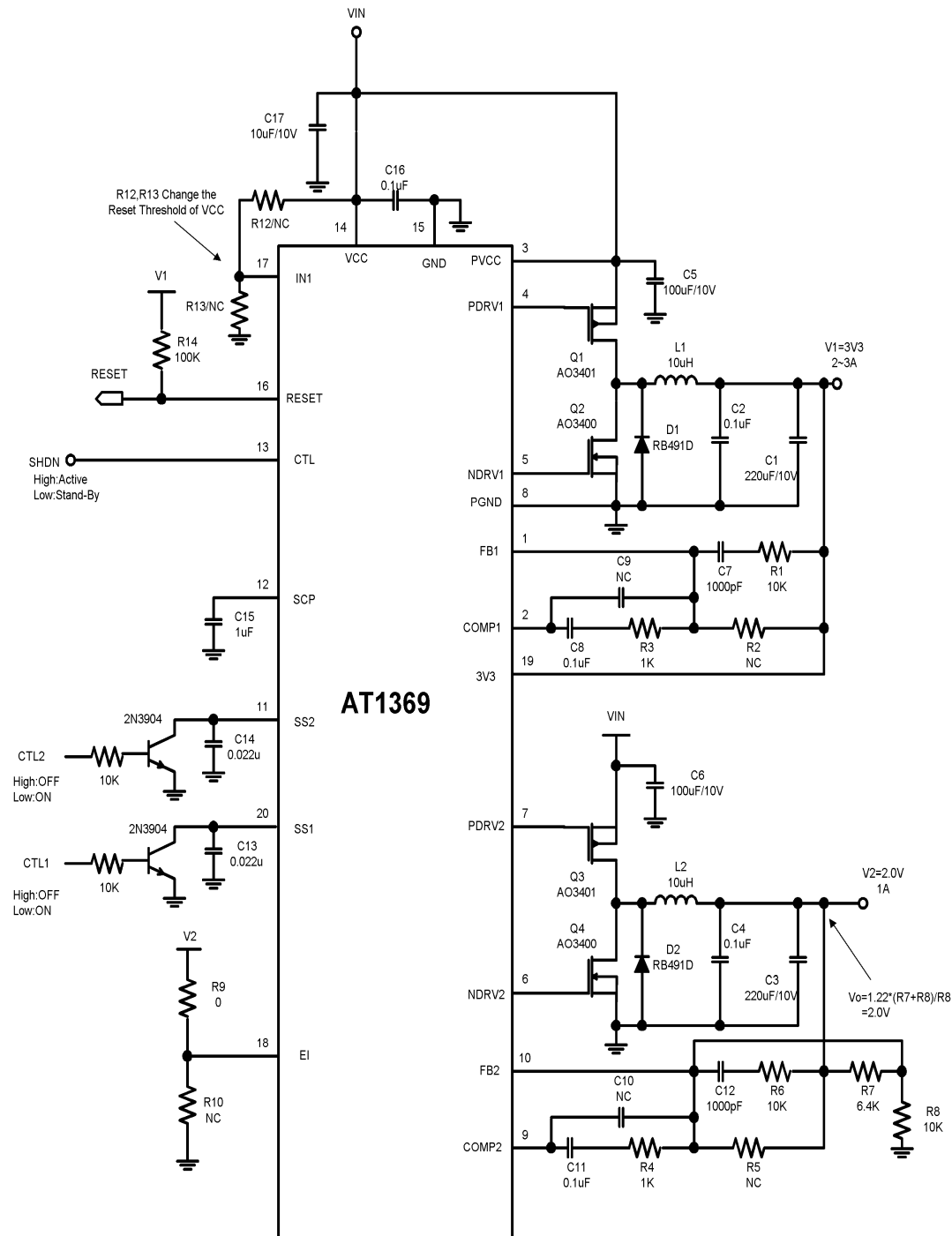
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Fig2. Input 5V, Output 3.3V/2A

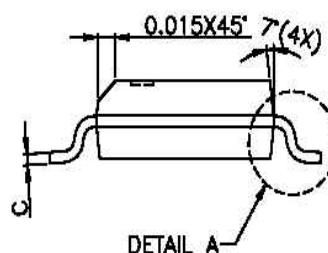
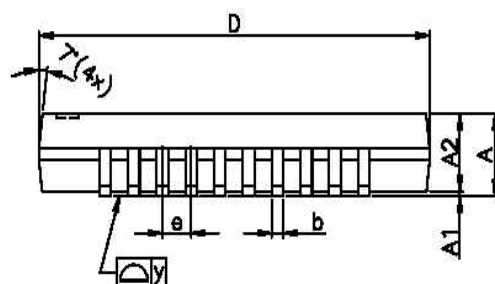
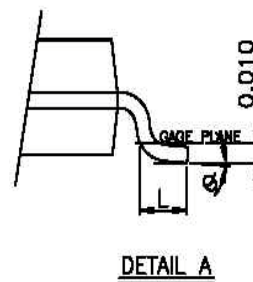
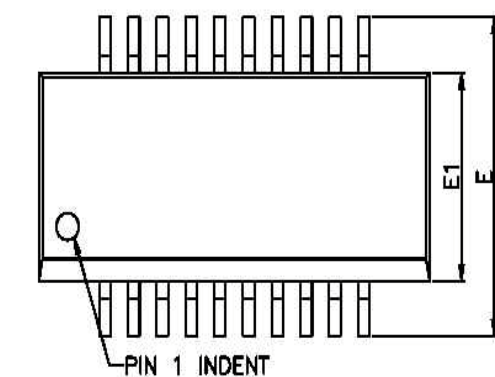




How to control CH1 and CH2 ON/OFF:



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°