

■ FEATURES

- Operation Voltage up to 15V
- Voltage-Mode Operation
- Fast Transient Response
- Built In Accurate 1.3V Voltage Reference
- Adjustable Over Current Protection using $R_{DS(ON)}$ No External Current Sense Resistor Required
- Low Shutdown Current
- 200KHz Free-Running Oscillator
- Built in Soft Start.

■ APPLICATIONS

- Notebook PC
- Advanced PC Mboards
- Information PCs
- Servers and Workstations
- PC Add-On Cards

■ DESCRIPTION

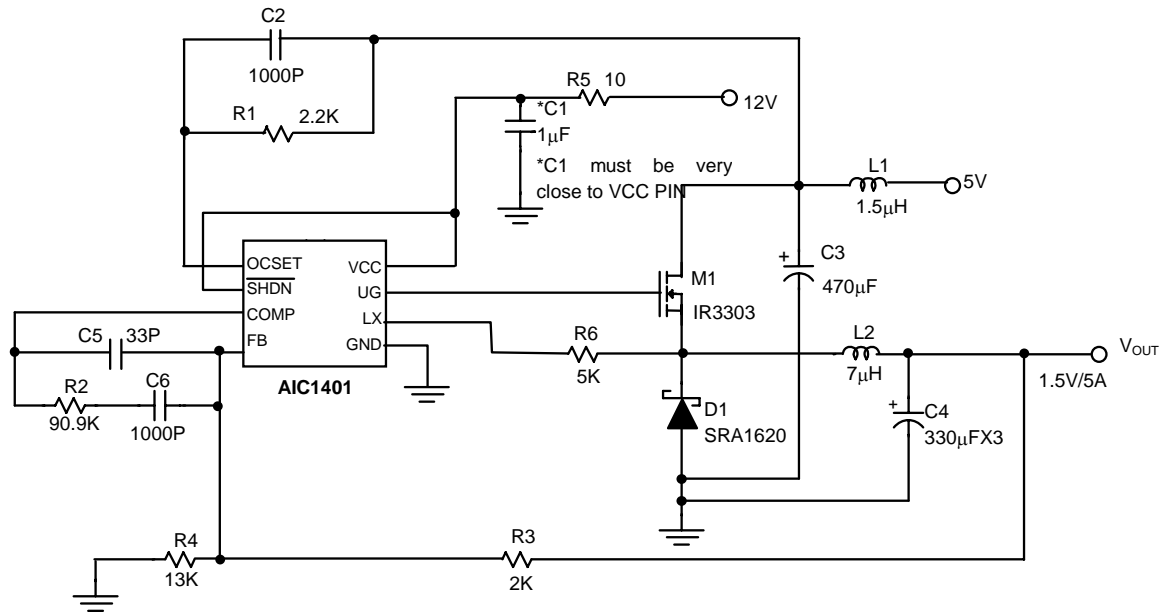
The AIC1401 is a high efficiency, PWM step-down, voltage-mode, switching controller. It is suitable for IA, Notebook, LCD PC and LCD monitor main power applications.

The built-in high voltage CMOS driver drives an external N-channel MOSFET for replacing the higher cost P-channel MOSFET in a standard buck topology.

The 200KHz switching frequency allows using smaller external components while maintaining high conversion efficiency. The 11MHz bandwidth and 6V/ μ s slew rate of the error amplifier ensures the higher converter bandwidth and the fast transient response.

The AIC1401 also features over current protection. It provides adjustable over current trigger point and short-circuit protections by sensing the output current across the on resistance of the external N-channel MOSFET rather than an expensive external low value sense resistor.

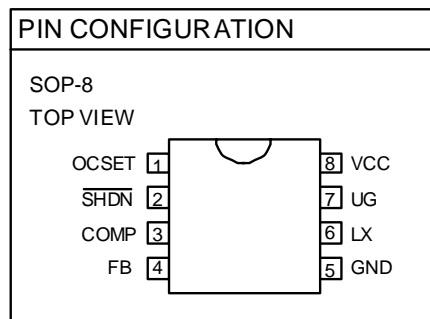
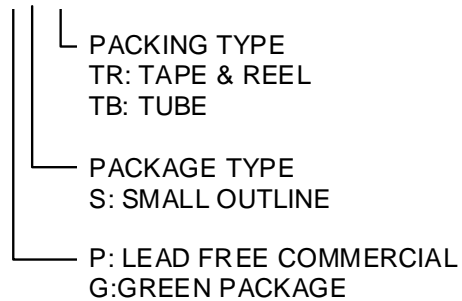
■ TYPICAL APPLICATION CIRCUIT



DC/DC Converter

■ ORDERING INFORMATION

AIC1401XXXX



Example: AIC1401PSTR

→ in SOP-8 Lead Free Package & Taping & Reel Packing Type

AIC1401GSTR

→ in SOP-8 Green Package & Taping & Reel Packing Type

■ ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC}	15V
Input, Output, or I/O Voltage.....	GND -0.3V ~ VCC+0.3V
Thermal Resistance, θ_{JA}	
SOIC Package.....	100°C/W
SOIC Package (with 3 in ² of Copper).....	90°C/W
Operating Temperature Range.....	-40°C ~ 85°C
Junction Temperature Range.....	125°C
Storage Temperature Range.....	-65°C ~ 150°C
Lead Temperature (Soldering 10 Sec).....	260°C

Absolute Maximum Ratings are those values beyond which the life of a device may be Impaired.

■ TEST CIRCUIT

Refer to TYPICAL APPLICATION CIRCUIT.

ELECTRICAL CHARACTERISTICS

 (V_{CC}= 12V, T_A=25°C, unless otherwise specified.) (Note 1)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
VCC Supply Current						
Nominal Supply	UGATE Open	I _{VCC}		2		mA
Power-On Reset						
V _{CC} Threshold	V _{OCSET} =4.5V			9.5		V
Oscillator						
Frequency				200		KHz
Duty Cycle				88		%
Internal Reference Voltage						
Reference Voltage			1.27	1.30	1.33	V
Error Amplifier						
DC Gain				76		dB
Gain-Bandwidth Product		GBW		11		MHz
Slew Rate		SR		6		V/μS
Gate Driver						
Upper Gate Source		R _{UGATE}		7		Ω
Upper Gate Sink		R _{UGATE}		5		Ω
Protection						
OCSET Current Source	V _{OCSET} =4.5VDC	I _{OCSET}		200		μA
SS Current		I _{SS}		10		μA
Shutdown						
Shutdown Low Input		V _{INL}		0.35		V
Shutdown High Input		V _{INH}	2			V
Shutdown Mode Current					1	μA

Note 1 : Specifications are production tested at T_A = 25°C. Specifications over the -40°C to 85°C operating Temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

TYPICAL PERFORMANCE CHARACTERISTICS

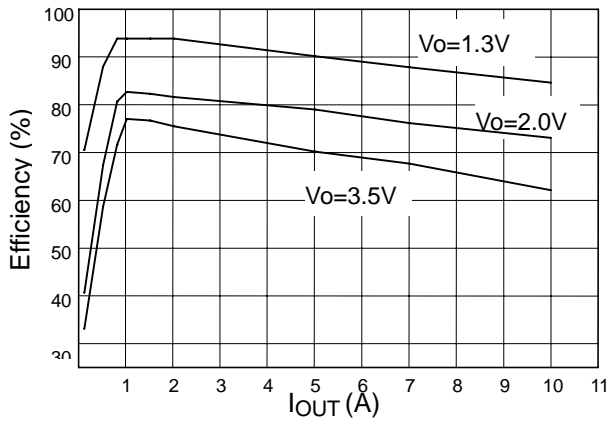


Fig. 1 Efficiency vs. Load Current

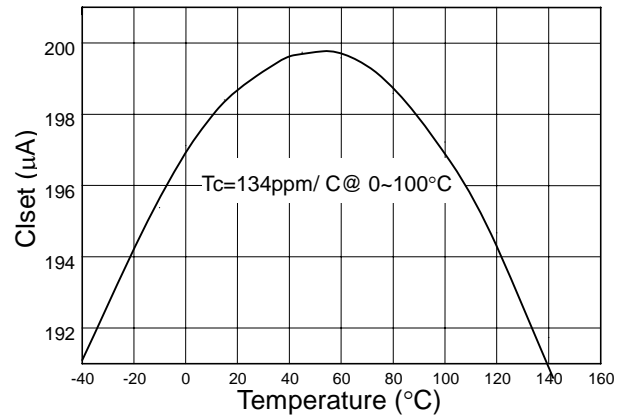


Fig. 2 OCSET Current vs. Temperature

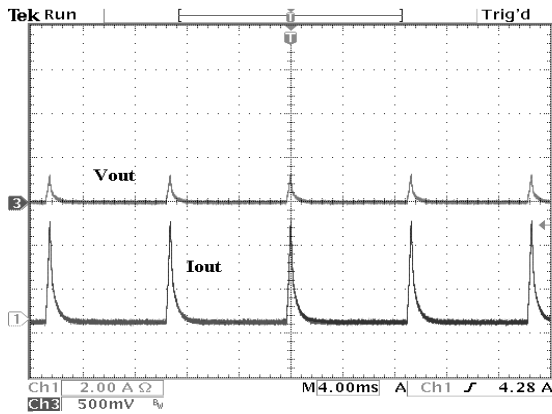


Fig. 3 Over-Current Operation

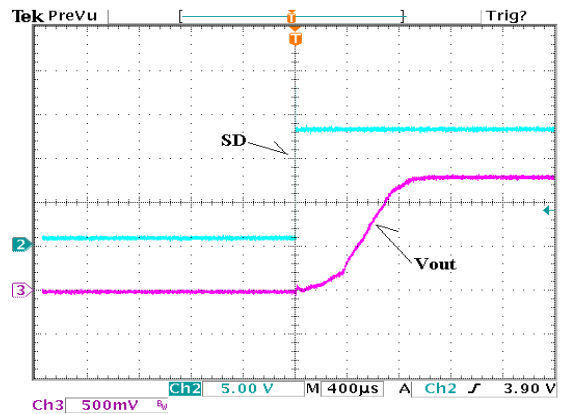


Fig. 4 Output Clamped by Built-In Soft

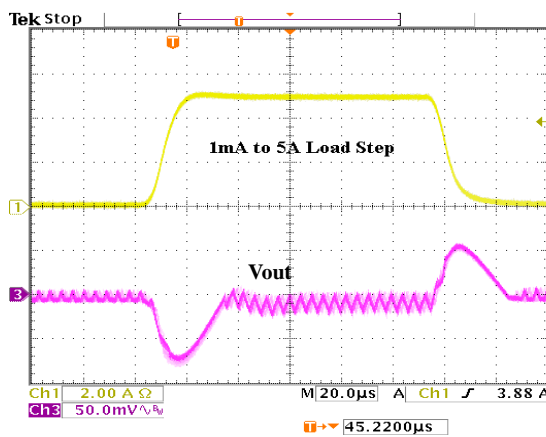
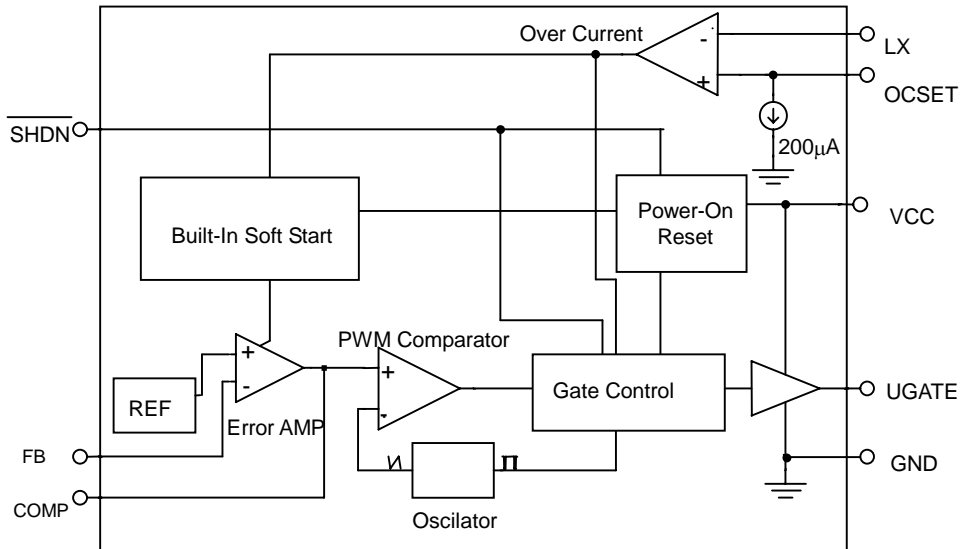


Fig. 5 Transient Response

■ BLOCK DIAGRAM



■ PIN DESCRIPTIONS

PIN 1: OCSET - Current limit sense pin. Connect a resistor R_{OCSET} from this pin to the drain of the external MOSFET. R_{OCSET} , an internal $200\mu\text{A}$ current source (I_{OCSET}), and the external MOSFET on-resistance ($R_{DS(ON)}$) jointly set the overcurrent trip point according to the following equation:

$$I_{PEAK} = \frac{I_{OCSET}}{R_{DS(ON)}}$$

PIN 2: $\overline{\text{SHDN}}$ - Shutdown pin. Connect this pin to ground for shutdown.

PIN 3: COMP - External compensation pin. This pin is connected to error amplifier output and PWM comparator. A RC network is connected to FB pin to compensate the voltage-control

feedback loop of the converter.

PIN 4: FB - The error amplifier inverting input pin. The FB pin and COMP pin are used to compensate the voltage-control feedback loop.

PIN 5: GND - Ground pin.

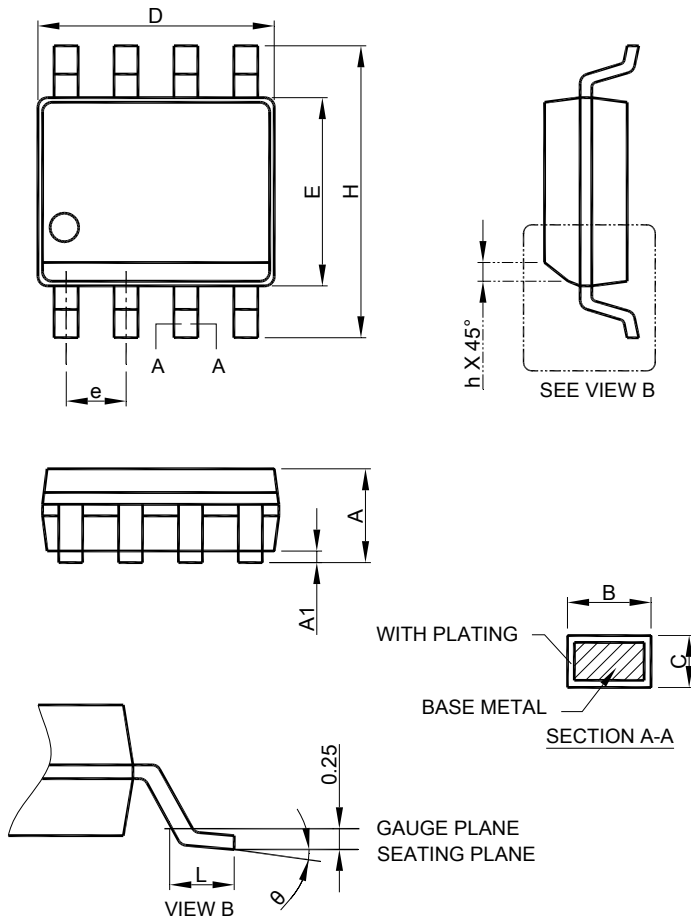
PIN 6: LX - Overcurrent detection pin. Connect the LX pin to source of the external N-MOSFET. This pin detects the voltage drop across the MOSFET $R_{DS(ON)}$ for overcurrent protection.

PIN 7: UG - External MOSFET gate drive pin. Connect this pin to gate of the external MOSFET.

PIN 8: VCC - The chip power supply pin. Recommended supply voltage is 12V.

■ PHYSICAL DIMENSIONS (unit: mm)

● SOP-8



SYMBOL	SOP-8	
	MILLIMETERS	
	MIN.	MAX.
A	1.35	1.75
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.27
θ	0°	8°

- Note: 1. Refer to JEDEC MS-012AA.
 2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.
 3. Dimension "E" does not include inter-lead flash or protrusions.
 4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

Note:

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