GENERAL DESCRIPTION

The ACP2816 are monolithic buck DC/DC converter which can provide 3A continuous load current over 6.5V to 30V wide input voltage range. The devices are set with 33V input over-voltage protection and 6.5V under-voltage Lockout protection. They have peak current mode control provides fast transient responses and cycle-by-cycle current limiting. Other features include programmable soft-start and over temperature protection. The device is available in general SOP8-EP package.

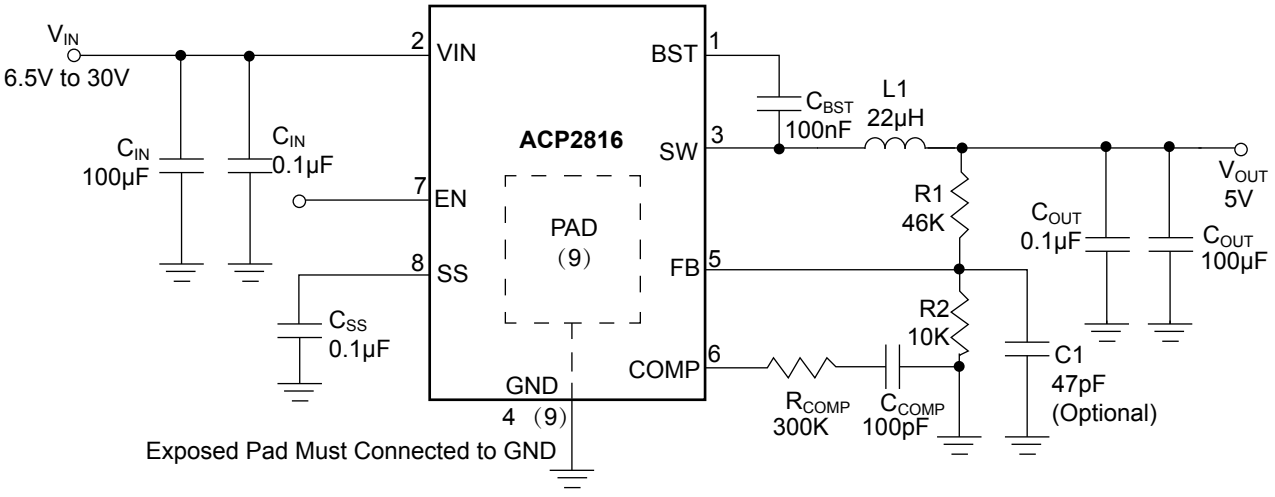
APPLICATION

- Sweep Robot
- Car Power System
- Datacom, XDSL modems

FEATURES

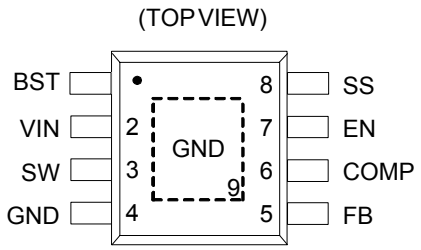
- Up to 95% Efficiency
- Wide input voltage: 6.5V ~ 30V
- Continuous 3A Current Load Capability
- Integrated 40V Power MOSFET Switches
- Fixed 300KHz Switching Frequency
- 0.9V Voltage Reference with ±2% Accuracy
- Maximum 10μA Shutdown Current
- Light Load Sleep Operation
- Programmable Soft-Start Limits
- Input Under-Voltage Lockout
- Input Over-Voltage protection
- Output Over Voltage Protection
- Output Short Protection
- Over Temperature Protection
- General SOP8-EP package.

APPLICATION CIRCUIT



Typical ACP2816 Application Circuit

PIN CONFIGURATION

Pin Configuration	Pin Description		
SOP8-EP	**Pin#**	**Symbol**	**Function**
	1	BST	Boot-Strap Pin
	2	VIN	Power Input
	3	SW	Power Switching Pin
	4	GND	Ground
	5	FB	Feedback Input
	6	COMP	Compensation Node
	7	EN	Enable Input
	8	SS	Soft-Start Control Input
	9	EXPOSED PAD	Exposed Pad Must Connected to GND

ORDERING INFORMATION

Standard Part NO.	Package	Packing	Min. Quantity
ACP2816-THAR	SOP8-EP	Tape & Reel	4000PCS

ABSOLUTE MAXIMUM RATINGS(T_A = +25°C)

Parameter	Symbol	Rating	Unit
Input Supply Voltage	V_{IN}	-0.3 to 40	V
Others Pins		-0.3 to 6	V
Lead Temperature	T_L	260	°C
Storage Temperature	T_S	-55 to 150	
Operating Junction Temperature	T_J	160	
Human Body Model	HBM	2000	V
Charged Device Model	CDM	400	
Junction to Ambient	θ_{JA}	56	°C/W
Junction to Case	θ_{JC}	45	

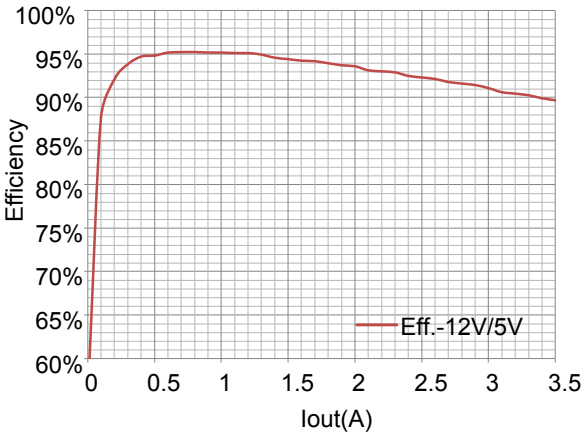
RECOMMENDED WORK CONDITIONS

Parameter	Symbol	Rating	Unit
Input Voltage Range	V_{IN}	6.5 to 30	V
Maximum Output Current	$I_{OUT(MAX)}$	3.0	A
Operating Junction Temperature	T_J	-40 to 125	°C

ELECTRICAL CHARACTERISTICS(T_A = +25°C)

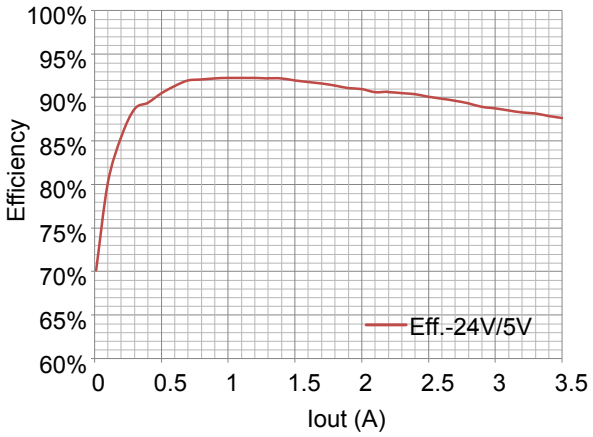
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Minimum Input Voltage for Startup	V_{UVLO_up}				6.5	V
Minimum Input Voltage at Down	V_{UVLO_dn}		6.0			V
Operating Quiescent Current	$I_{Q-NONSW}$			1	1.5	mA
High Side Switch On-Resistance	$R_{DS(ON)\_H}$	I_{OUT} = 1A, V_{OUT} = 3.3V		79		mΩ
Low Side Switch On-Resistance	$R_{DS(ON)\_L}$	I_{OUT} = 1A, V_{OUT} = 3.3V		62		
High Side SW Current Limit	I_{LIMIT}	V_{SW} =0V,V_{EN} =0V			10	μA
Buck Oscillator Frequency	F_{OSC}			300		KHz
Maximum Duty Cycle	D_{MAX}			94		%
Feedback Voltage	V_{FB}	4.5V ≤ V_{IN} ≤ 36V	0.886	0.900	0.914	V
Feedback Over Voltage Threshold	V_{FB_OVP}			0.990		V
Minimum On Time	T_{ON}			100		ns
EN High Voltage	V_{EN_H}		1.2			V
EN Low Voltage	V_{EN_L}				1.1	
Input Over Voltage Protection	V_{IN_OVP}			33		V
EN Input Current	I_{EN}			1.6		μA
Soft Start Charge Current	I_{SS}			2.3		
Comp Source Current	I_{COMP_SRC}	V_{FB} = 1V		5.2		
Comp Sink Current	I_{COMP_SNK}	V_{FB} = 0.8V		3.2		
Thermal Shutdown	T_{SD}			155		°C
Thermal Shutdown Hysteresis	T_{Hys}			15		

PERFORMANCE CHARACTERISTIC



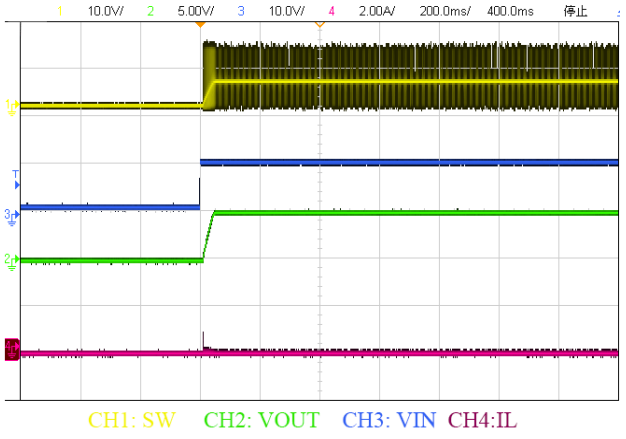
Vin = 12V, Vout = 5V

Efficiency



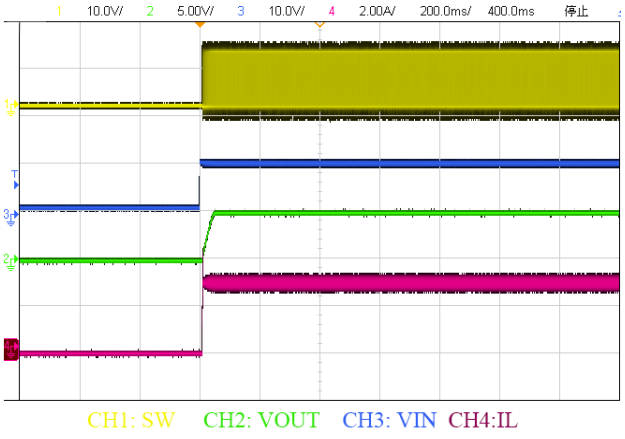
Vin = 24V, Vout = 5V

Efficiency



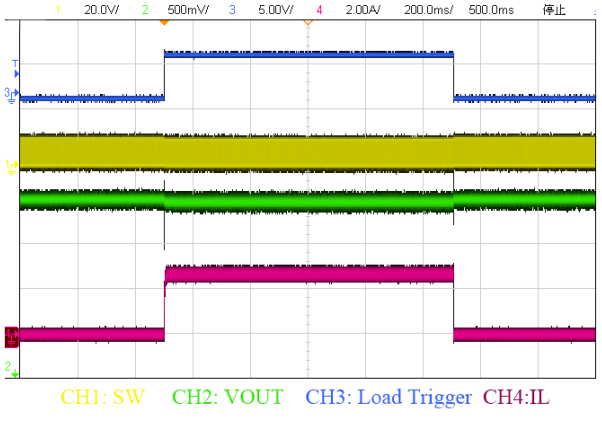
Vin = 12V, Vout = 5V

Startup waveform, Iout = 0A



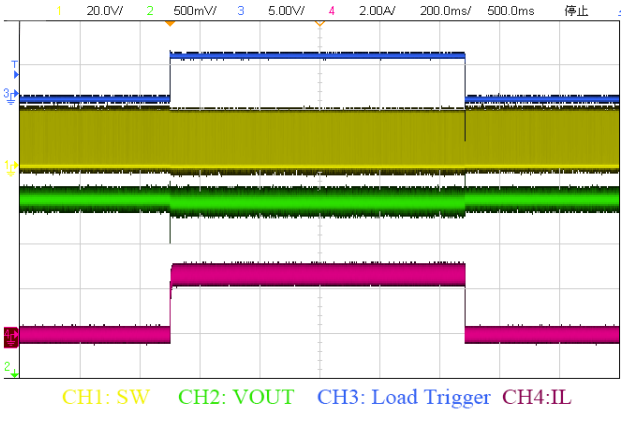
Vin = 12V, Vout = 5V

Startup waveform, Iout = 3A



Vin = 12V, Vout = 5V

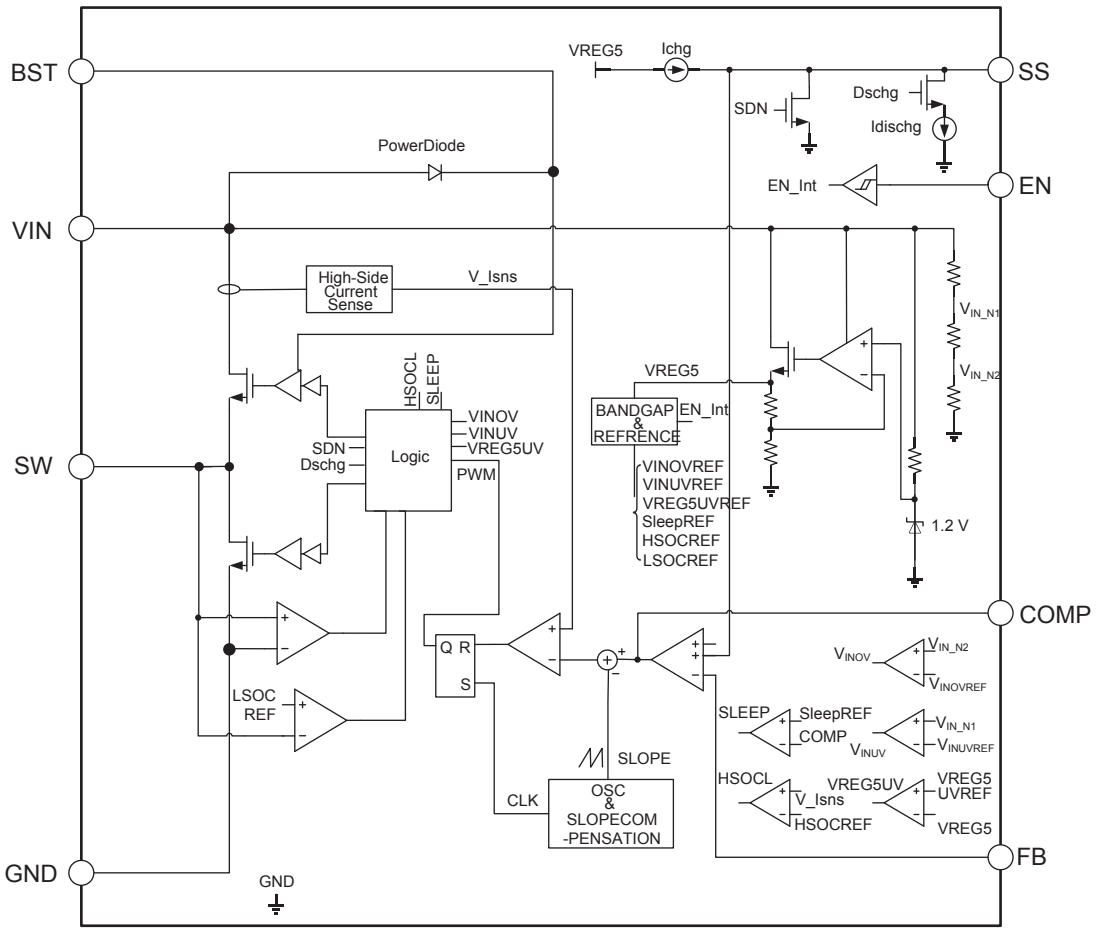
Load transient 0.3A to 3A



Vin = 24V, Vout = 5V

Load transient 0.3A to 3A

FUNCTION BLOCK

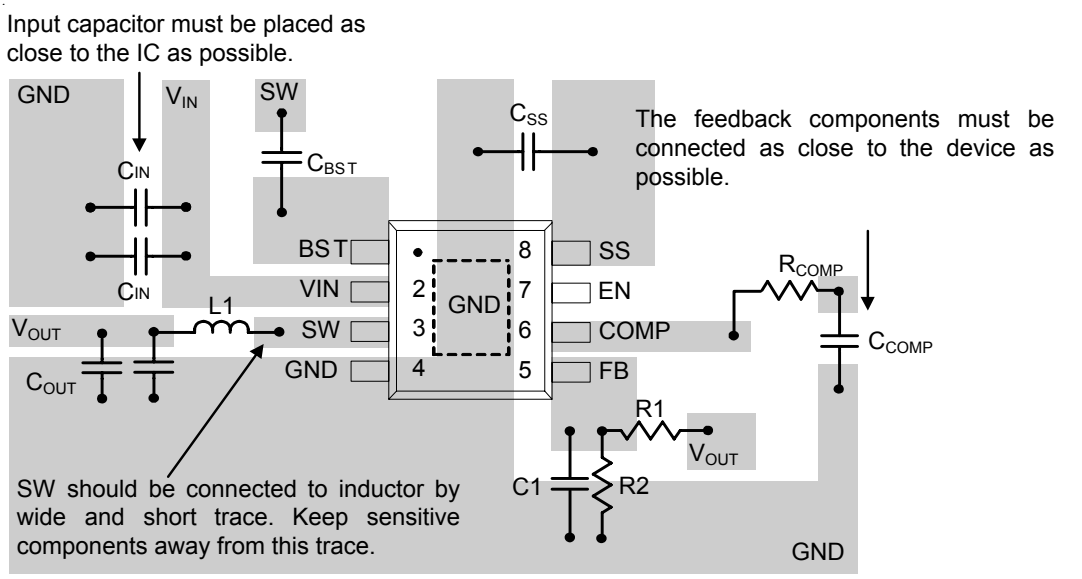


Functional Block Diagram

Layout Consideration

Follow the PCB layout guidelines for optimal performance of the ACP2816.

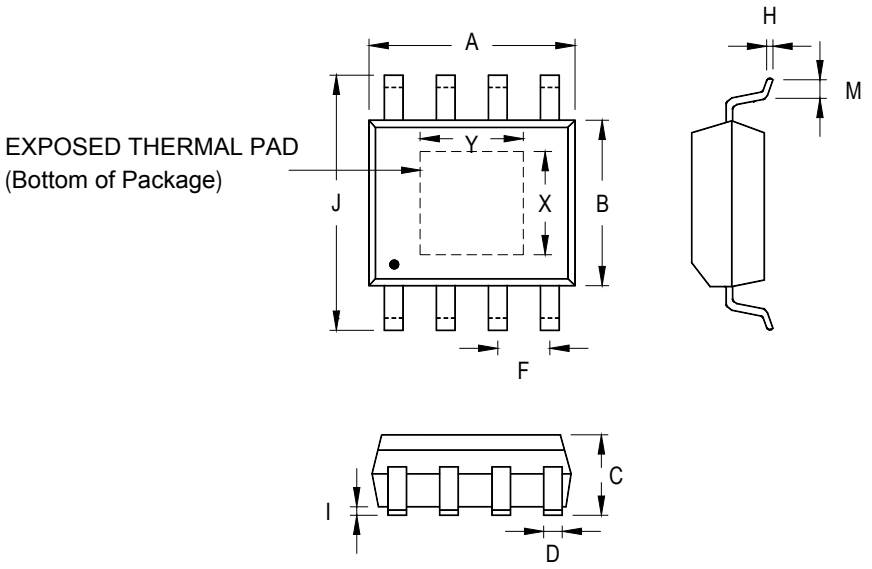
- Keep the traces of the main current paths as short and wide as possible.
- Put the input capacitor as close as possible to the device pins (VIN and GND).
- SW node is with high frequency voltage swing and should be kept at small area. Keep sensitive components away from the SW node to prevent stray capacitive noise pick-up.
- Place the feedback components to the FB pin and COMP pin as close as possible
- The GND pin and Exposed Pad should be connected to a strong ground plane for heat sinking and noise protection.



PCB Layout Guide

PACKAGE INFORMATION

- **SOP8-EP**



Symbol		Dimensions In Millimeters		Dimensions In Inches	
		Min	Max	Min	Max
A		4.801	5.004	0.189	0.197
B		3.810	4.000	0.150	0.157
C		1.346	1.753	0.530	0.069
D		0.330	0.510	0.013	0.020
F		1.197	1.346	0.047	0.053
H		0.170	0.254	0.007	0.010
I		0.000	0.152	0.000	0.006
J		5.791	6.200	0.228	0.244
M		0.406	1.270	0016	0.050
Option 1	X	2.000	2.300	0.079	0.091
	Y	2.000	2.300	0.079	0.091
Option 2	X	2.100	2.500	0.083	0.098
	Y	3.000	3.500	0.118	0.138