

GENERAL DESCRIPTION

The ACP2835 is high efficiency, 500kHz frequency, 3A current capability, synchronous buck converters with an input voltage range of 6V to 30V and an output voltage range of 1.2V to 20V. ACP2835 is a good product with well performance and easy to use, the devices have the characteristics of simple peripheral circuit, stable loop, multiple protection functions and high efficiency.

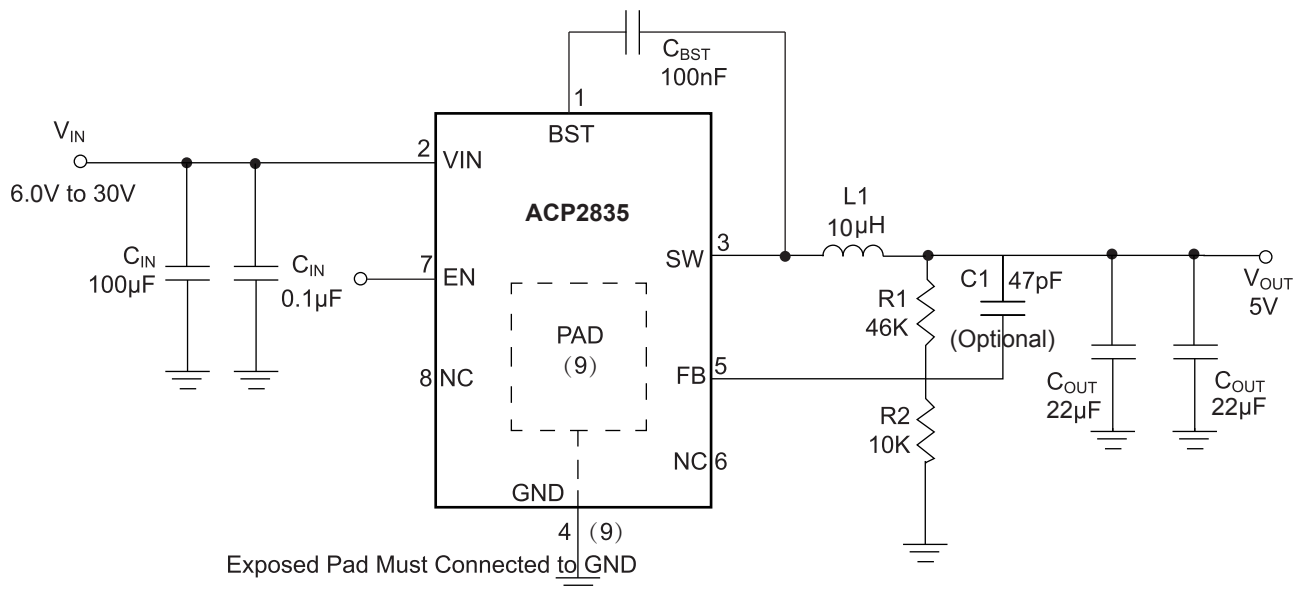
APPLICATION

- Car Power Systems
- Sweep Robot
- Security Monitoring Camera
- Printer Systems
- Data Comm
- Power Saving Application

FEATURES

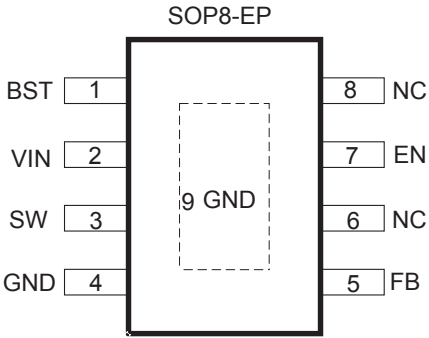
- Wide 6.0V~30V Input Voltage Range
- Continuous 3A Output Current Capability
- Typical 500kHz Fixed Switching Frequency
- 0.925V Voltage Reference with $\pm 1\%$ Accuracy
- Typical 100 μ A Low Quiescent Current
- Typical 2 μ A Shutdown Current
- Light-Load High Efficiency
- Up to 95% High Efficiency
- Integrated 40V Power MOSFET Switches
- Internal 1.5-ms Soft-Start Function
- Hic-cup Mode Output Short Circuit Protection
- Input Under-Voltage Lockout
- Input 30V Over-Voltage protection
- Output Over Current Protection
- Output Short Circuit Protection
- Over Temperature Protection
- General SOP8-EP package

TYPICAL APPLICATION CIRCUIT



Typical ACP2835 Application Circuit

▼ PIN CONFIGURATION

Pin Configuration	Pin Description		
SOP8-EP	Pin	NAME	DESCRIPTION
	1	BST	Boot-Strap Pin. Decouple this pin to SW pin with 100nF ceramic cap.
	2	VIN	Supply Voltage. Connect using a wide PCB trace.
	3	SW	Switch Output. Connect using a wide PCB trace.
	4	GND	System Ground. requires extra care during PCB layout. Connect to GND with copper traces and vias.
	5	FB	Output Feedback Pin. Connect this pin to program the output voltage.
	6	NC	No Connected Pin, Floating
	7	EN	Enable Pin, Active High. For automatic start-up, connect EN to IN using a resistor. Do not float.
	8	NC	No Connected Pin, Floating
	9	GND	Ground and EPAD. Recommend to Connect to GND

▼ ORDERING INFORMATION

Standard Part NO.	Package	Packing	Min. Quantity
ACP2835-THAA	SOP8-EP	Tape & Reel	3000PCS

▀ ABSOLUTE MAXIMUM RATINGS

PARAMETER	MIN	MAX	UNIT
Supply Input Voltage	-0.3	40	V
SW,EN Voltage	-0.3	$V_{IN} + 0.3$	V
FB, BS-SW Voltage	-0.3	4	V
Junction Temperature Range	-40	150	°C
Lead Temperature (Soldering, 10 sec.)		260	°C
Storage Temperature Range	-65	150	°C
Dynamic SW Voltage in 10ns Duration	GND-5V	$V_{IN} + 3V$	V
Package Thermal Resistance θ_{JA}		43	°C/W
Package Thermal Resistance θ_{JC}		51	°C/W
HBM(Human Body Mode)		3000	V
MM(Machine Mode)		400	V

▀ RECOMMENDED OPERATING CONDITIONS

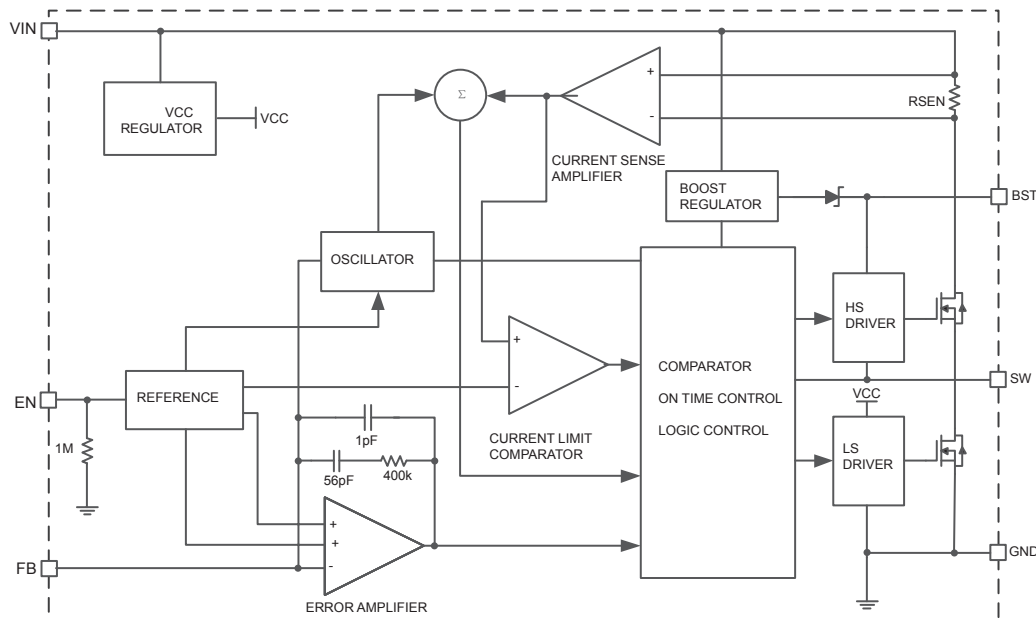
PARAMETER	MIN	MAX	UNIT
Supply Input Voltage	6	30	V
Junction Temperature Range	-40	125	°C
Ambient Temperature Range	-40	85	°C

▼ ELECTRICAL CHARACTERISTICS

($V_{IN}=12V$, $V_{OUT}=5V$, $L=10\mu H$, $C_{OUT}=44\mu F$, $T_A=20^{\circ}C$, $I_{OUT}=1A$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		6		30	V
Input OVP Threshold	V_{OVP}				30	
Input OVPHysteresis	V_{HYS}			3		
Input UVP Threshold	V_{UVP}				5.3	
Input UVP Hysteresis	V_{HYS}			0.6		
Standby Supply Current	I_Q	$I_{OUT}=0$, $V_{FB}=V_{REF}\times 105\%$		110		μA
Shutdown Supply Current	I_{SHDN}	$V_{EN}=0$		2		
EN Rising Threshold	V_{EN_R}			1.2		V
EN Falling Threshold	V_{EN_F}			1		
Feedback Voltage	V_{REF}			0.925		
FB Input Current	I_{FB}	$V_{FB}=3.3V$	-50		50	nA
Top FET RON	$R_{DS(on)}$			90		m Ω
Bottom FET RON	$R_{DS(on)}$			65		
Min ON Time	T_{ON_MIN}			50		ns
Min OFF Time	T_{OFF_MIN}			100		
Turn On Delay	T_{ON_DLY}	from EN high to SW start switching		180		μs
Soft-start Time	T_{SS}	V_{OUT} from 0 to 100%		1.5		ms
Switching Frequency	F_{SW}	$V_{OUT}=3.3V$, CCM		500		kHz
Top FET Current Limit	I_{LIM_TOP}			4.5		A
Bottom FET Current Limit	I_{LIM_BOT}			4.5		
Thermal Shutdown Temperature	T_{SD}			150		$^{\circ}C$
Thermal Shutdown Hysteresis	T_{HYS}	Duty = 30%		15		

FUNCTION BLOCK



FUNCTIONAL DESCRIPTION

• Soft Start Function

ACP2835 has an internal soft-start circuit that limits the in-rush current during startup. This allows the converters to gradually reach the steady-state operating point, thus reducing startup stresses and surges. During startup, the switch current limit is increased in steps. The typical soft-start time is 1.5ms.

• Bootstrap Capacitor Selection

Connect a 100nF ceramic capacitor between the SW and BS pins for proper operation. Recommend using a ceramic capacitor with X5R or better-grade dielectric. The capacitor should have a 6.3V or higher voltage rating.

• Over Current Protection and Short Circuit Protection

If the high side power FET current gets higher than peak current limit threshold, the high side power FET will turn off and the low side power FET will turn on. If the low side FET current gets higher than valley current limit threshold, the low side FET will keep turning on until low side FET current decreases below the valley current limit threshold. So both peak and valley current are limited. If the load current continues to increase in these conditions, the output voltage will drop. When the output voltage falls below 33% of the regulation level, the output short is detected and the IC will operate in hic-cup mode. The hic-cup on time is 2.5ms and hic-cup off time is 9ms. If the hard short is removed, the IC will return to normal operation.

• Enable and Adjusting UVLO

The EN pin has accurate rising and falling threshold, it provides programmable ON/OFF control by connecting an external resistor divider. Once the EN pin voltage exceeds the rising threshold, the device will start operation. If the EN pin voltage is pulled below the falling threshold, the regulator will stop switching and enter shutdown state.

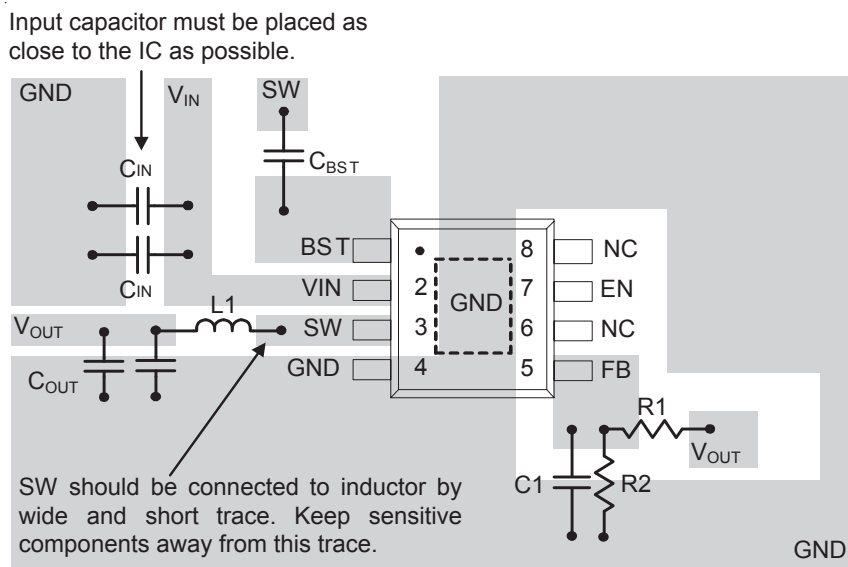
• Adjusting the Output Voltage

A resistor divider from the output node to the feedback pin sets the output voltage. Recommend using 1% tolerance or better divider resistors. Start with fixed value for the R1 resistor and use Equation to calculate R2. To improve efficiency at light loads, consider using larger-value resistors. If the values are too high, the regulator is more susceptible to noise, and voltage errors from the feedback input current are noticeable.

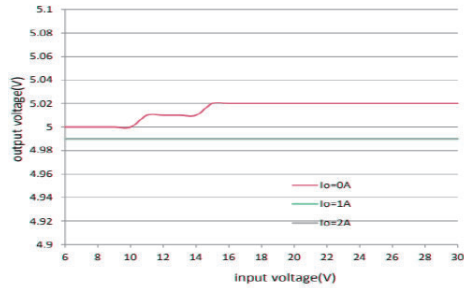
$$V_{OUT} = 0.925 \times \frac{R1 + R2}{R2}$$

▮ LAYOUT CONSIDERATION

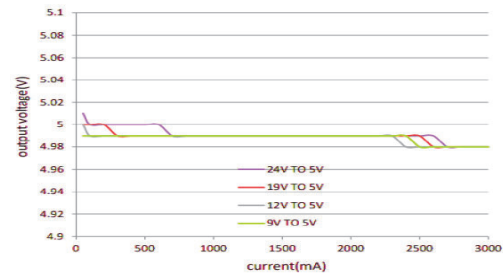
- Keep the traces of the main current paths as short and wide as possible.
- Put the input capacitor as close as possible to the device pins (VIN and GND).
- SW node is with high frequency voltage swing and should be kept at small area. Keep sensitive components away from the SW node to prevent stray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



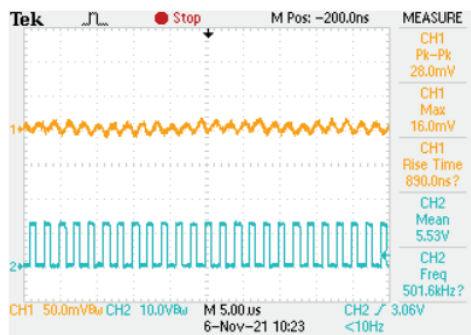
PCB Layout Guide

PERFORMANCE CHARACTERISTICS


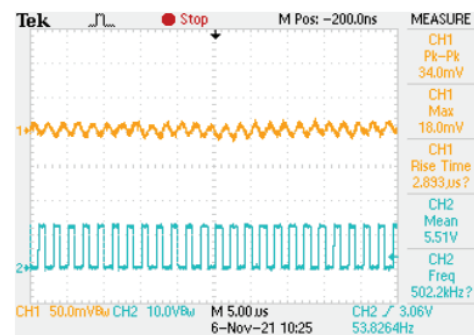
- line regulation



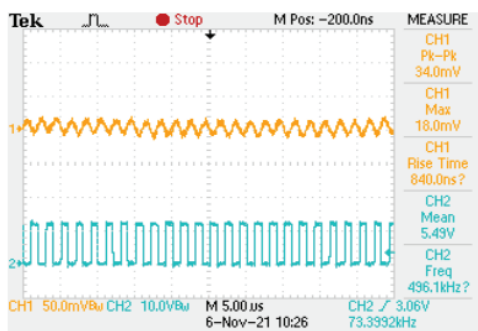
- load regulation



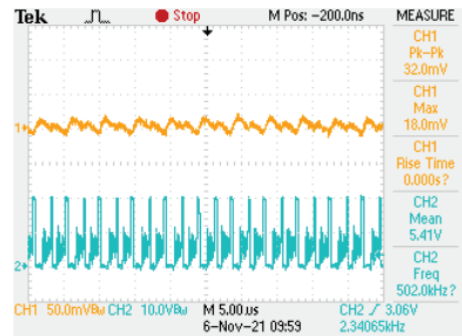
- $V_{IN}=12V, I_{OUT}=100mA$



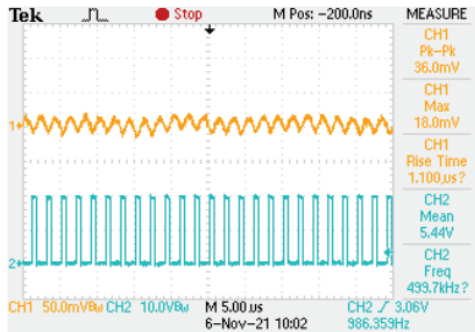
- $V_{IN}=12V, I_{OUT}=1500mA$



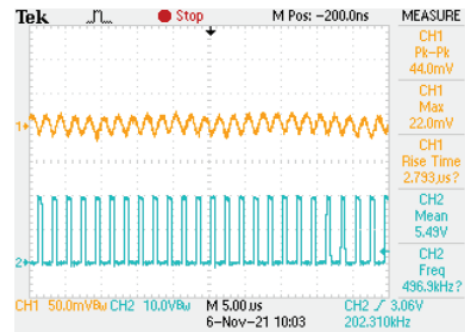
- $V_{IN}=12V, I_{OUT}=3000mA$



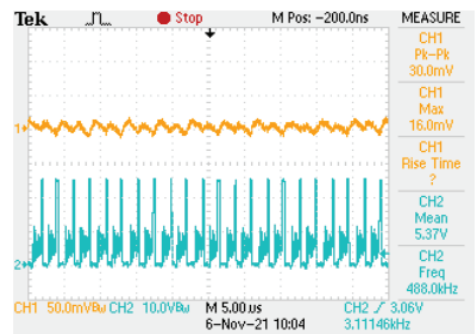
- $V_{IN}=19V, I_{OUT}=100mA$

PERFORMANCE CHARACTERISTICS (Continued)


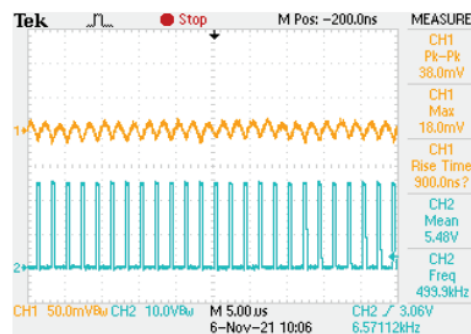
- $V_{IN}=19V, I_{OUT}=1500mA$



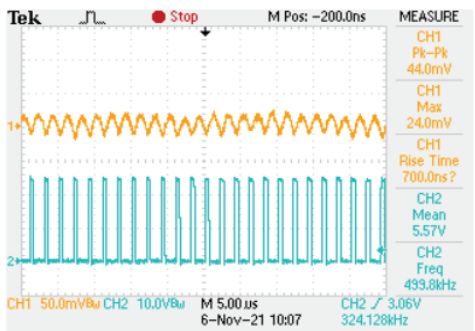
- $V_{IN}=19V, I_{OUT}=3000mA$



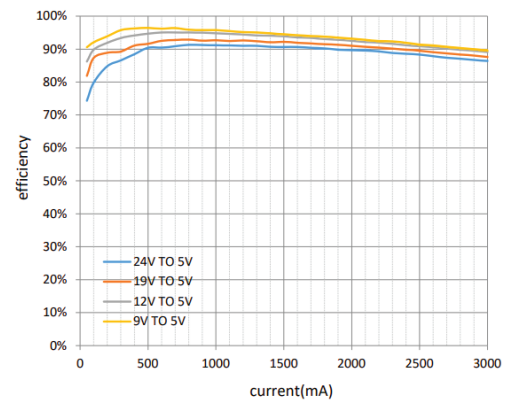
- $V_{IN}=24V, I_{OUT}=100mA$



- $V_{IN}=24V, I_{OUT}=1500mA$

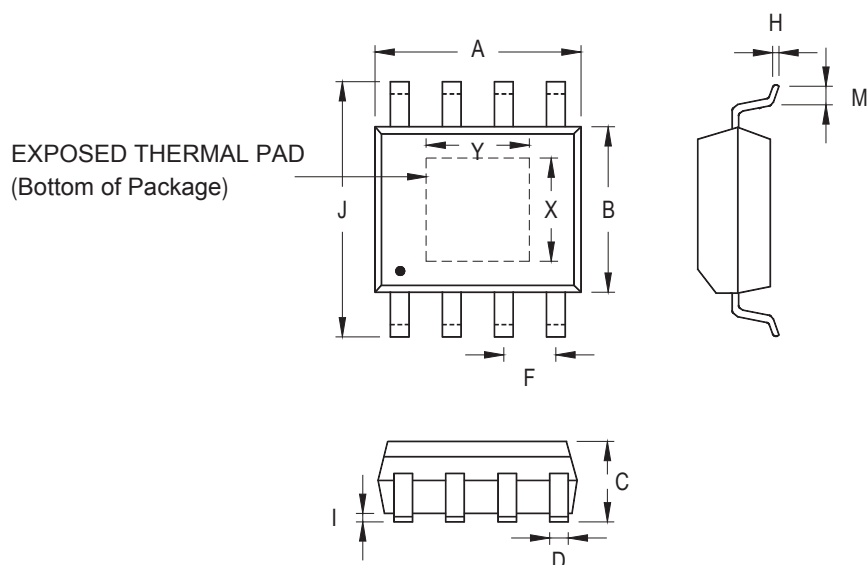


- $V_{IN}=24V, I_{OUT}=3000mA$



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	0.016	0.050
Option 1	X	2.000	0.079	0.091
	Y	2.000	0.079	0.091
Option 2	X	2.100	0.083	0.098
	Y	3.000	0.118	0.138