

### GENERAL DESCRIPTION

The ACP2829 is a 2A, synchronous buck converter with a wide input voltage range of 4.2V to 18V. The device fully integrates a 90mΩ high-side power MOSFET and a 65mΩ low-side power MOSFET to provide high-efficiency step down DC-DC conversion. The ACP2829 device is easily used by minimizing the external component count due to its adoption of Constant On-Time (COT) control to achieve fast transient response, easy loop stabilization, and low output voltage ripple.

The ACP2829 design is optimized for Electromagnetic Interference (EMI) reduction. The device has a proprietary gate driver scheme to resist switching node ringing without sacrificing MOSFET turn-on and turn-off times, which reduces high frequency radiated EMI noise caused by MOSFET switching. The device is available in SOT563 and TSOT26 packages.

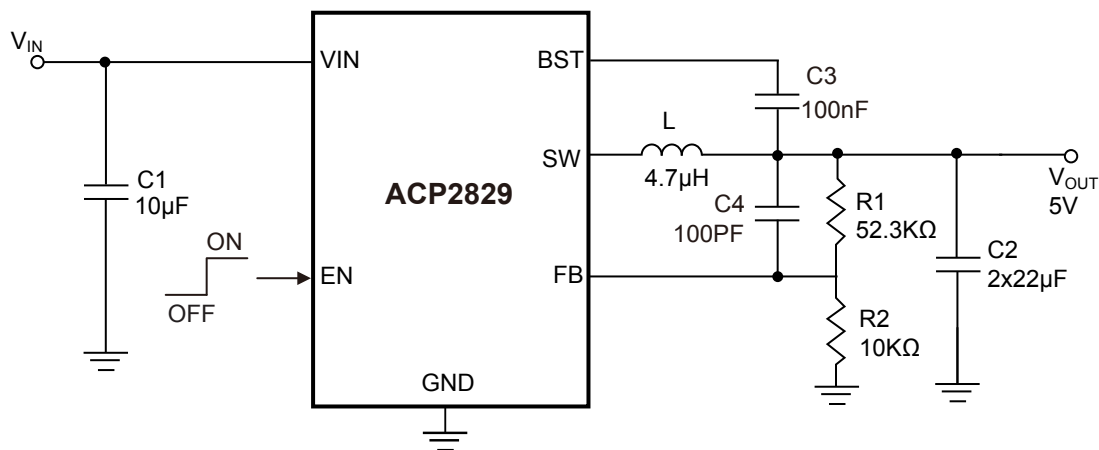
### FEATURES

- $V_{IN}$  : 4.2V to 18V
- Output Voltage ( $V_{OUT}$ ) : 0.8V to 7V
- 2A Continuous Output Current
- $0.8V \pm 1\%$  Reference Voltage
- 150μA Low Quiescent Current
- 750KHz Switching Frequency ( $V_{IN} = 12V, V_{OUT} = 5V$ )
- Typically 85% Efficiency at 5mA Light Load
- Proprietary Gate Driver Design for Best EMI Reduction
- Under Voltage Lockout (UVLO)
- Cycle-by-Cycle Valley Current Limit
- Thermal Shutdown

### APPLICATION

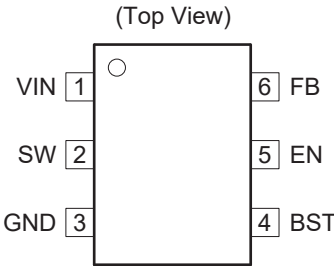
- Home Audio
- Network Systems
- FPGA, DSP, and ASIC Supplies
- 5V and 12V Distributed Power Bus Supplies
- Flat Screen TV Sets and Monitors
- White Goods and Small Home Appliances

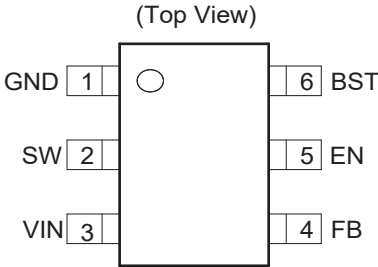
### APPLICATION CIRCUIT



Typical ACP2829 Application Circuit

**▼ PIN CONFIGURATION**

Pin Configuration	Pin Description		
<b>SOT563</b>	<b>Pin#</b>	<b>Symbol</b>	<b>Function</b>
 <p>(Top View)</p>	1	VIN	Voltage Supply Input
	2	SW	Power Switching Output
	3	GND	Ground
	4	BST	High-Side Gate Drive Boost Input
	5	EN	Enable Pin
	6	FB	Feedback sensing terminal for the output voltage

Pin Configuration	Pin Description		
<b>TSOT26</b>	<b>Pin#</b>	<b>Symbol</b>	<b>Function</b>
 <p>(Top View)</p>	1	GND	Ground
	2	SW	Power Switching Output
	3	VIN	Voltage Supply Input
	4	FB	Feedback sensing terminal for the output voltage
	5	EN	Enable Pin
	6	BST	High-Side Gate Drive Boost Input

**▼ ORDERING INFORMATION**

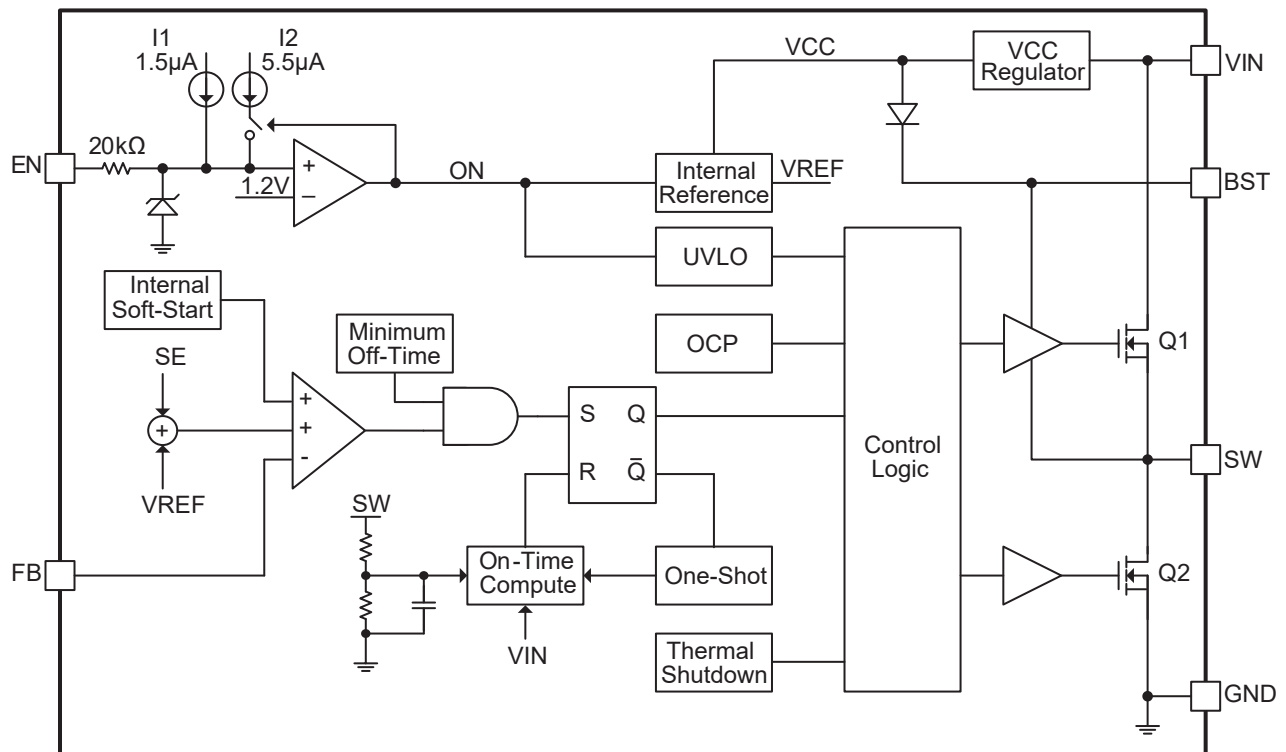
Standard Part NO.	Package	Packing	Min. Quantity
ACP2829-AQAA	SOT563	Tape & Reel	3000PCS
ACP2829-EAA	TSOT26	Tape & Reel	3000PCS

**▼ RECOMMENDED OPERATING CONDITIONS**

Parameter	Symbol	Rating	Unit
Input Voltage Range	$V_{IN}$	4.2 to 18	V
Output Voltage	$V_{OUT}$	0.8 to 7	
Operating Ambient Temperature	$T_A$	-40 to 85	°C
Operating Junction Temperature	$T_J$	-40 to +125	

**ABSOLUTE MAXIMUM RATINGS**

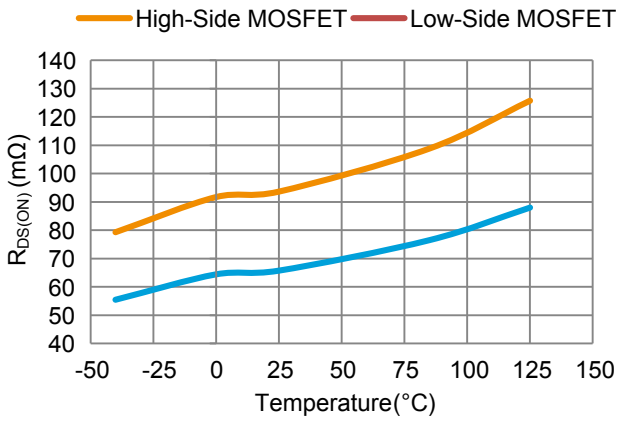
Parameter	Symbol	Rating	Unit	
Supply Pin Voltage	$V_{IN}$	-0.3 to +20(DC)	V	
Switch Pin Voltage	$V_{SW}$	-1 to $V_{IN} + 0.3$ (DC)		
Enable/UVLO and Feedback Pins Voltages	$V_{EN}, V_{FB}$	-0.3 to +6		
Bootstrap Pin Voltage	$V_{BST}$	$V_{SW} - 0.3$ to $V_{SW} + 6$		
Storage Temperature	$T_S$	-65 to +150	°C	
Junction Temperature	$T_J$	+160		
Lead Temperature	$T_L$	+260		
Human Body Model	HBM	±2000	V	
Charged Device Model	CDM	±500		
Junction to Ambient	SOT563	$\theta_{JA}$	110	°C/W
	TSOT26		70	
Junction to Case	SOT563	$\theta_{JC}$	8	
	TSOT563		12	

**FUNCTION BLOCK**


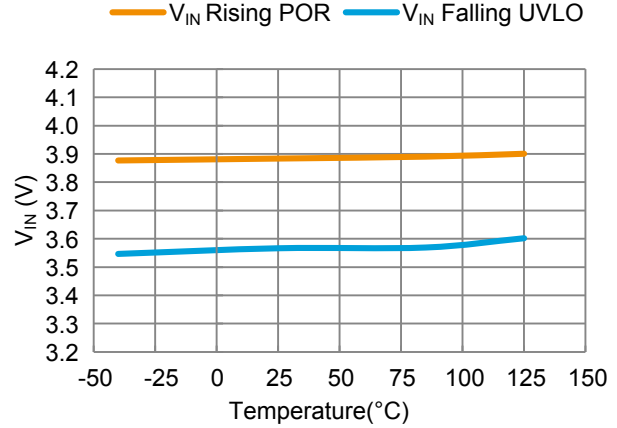
**▼ ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C, unless otherwise noted.)**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Shutdown Supply Current	I <sub>SHDN</sub>	V <sub>EN</sub> = 0V		1.3		μA
Input Quiescent Current	I <sub>Q</sub>	V <sub>FB</sub> = 0.85V		135	150	
V <sub>IN</sub> Power-on Reset Rising Threshold	POR			3.9	4.15	V
V <sub>IN</sub> Undervoltage Lockout Falling Threshold	UVLO			3.6		
High-Side Power MOSFET On-Resistance	R <sub>DS(ON)1</sub>			90		mΩ
Low-Side Power MOSFET On-Resistance	R <sub>DS(ON)2</sub>			65		
LS Valley Current Limit	I <sub>VALLEY_LIMIT</sub>	From Source to Drain	2	2.4	2.8	A
Oscillator Frequency	f <sub>SW</sub>	V <sub>OUT</sub> = 5V, CCM		750		KHz
Minimum On-Time	t <sub>ON_MIN</sub>			90		ns
Minimum Off-Time	t <sub>OFF_MIN</sub>			220		
Feedback Voltage	V <sub>FB</sub>	T <sub>A</sub> = +25°C, CCM	0.792	0.8	0.808	V
		CCM	0.784	0.8	0.816	
EN Logic High Threshold	V <sub>EN_H</sub>			1.2	1.25	V
EN Logic Low Threshold	V <sub>EN_L</sub>		1.04	1.1		
EN Input Current	I <sub>EN</sub>	V <sub>EN</sub> = 1.5V		7		μA
		V <sub>EN</sub> = 1V	1	1.5	2	
Soft-Start Time	t <sub>SS</sub>			2.5		ms
Thermal Shutdown	T <sub>SD</sub>			+160		°C
Thermal Shutdown Hysteresis	T <sub>Hys</sub>			+20		

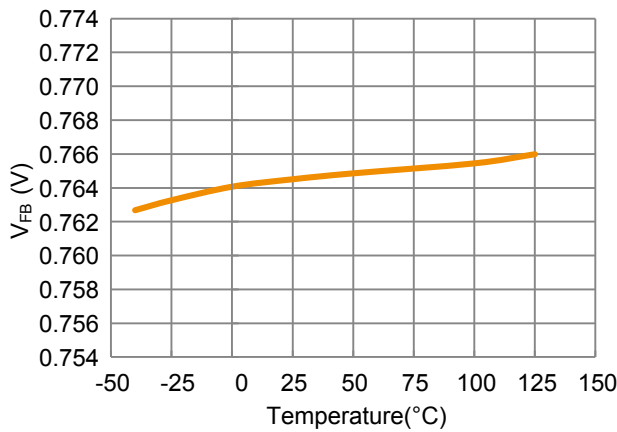
PARAMETER MEASUREMENT INFORMATION



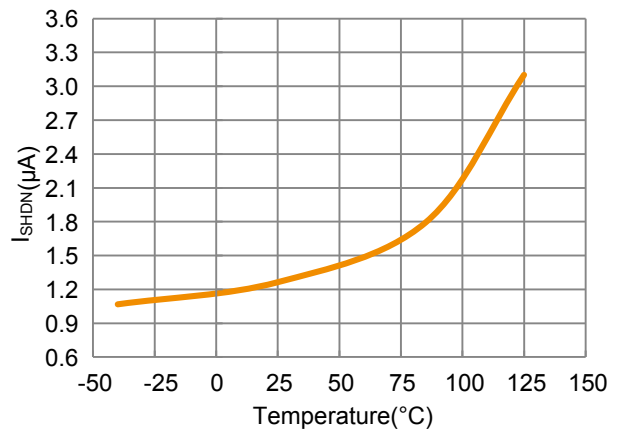
Power MOSFET  $R_{DS(ON)}$  vs. Temperature



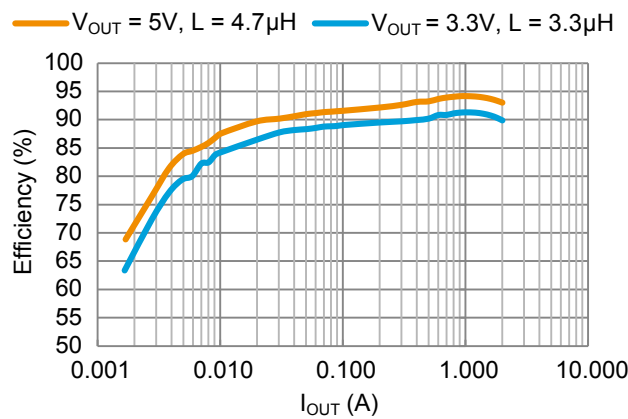
$V_{IN}$  Power-On Reset and UVLO vs. Temperature



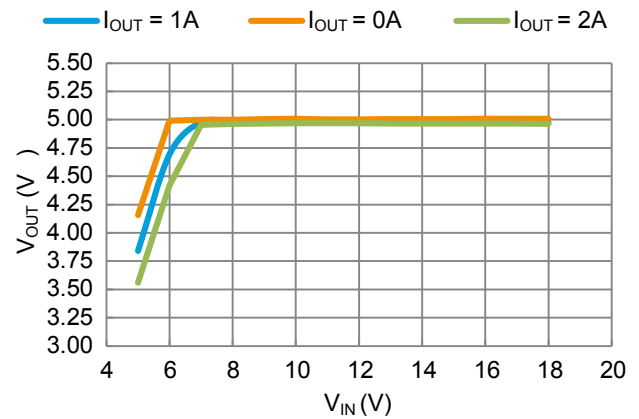
Feedback Voltage vs. Temperature



$I_{SHDN}$  vs. Temperature

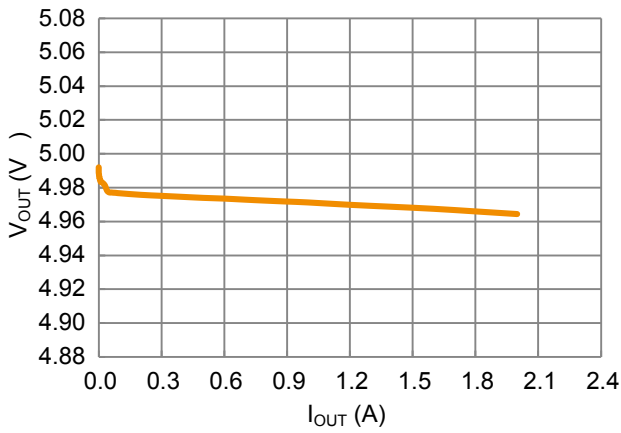


Efficiency vs. Output Current,  $V_{IN} = 12V$

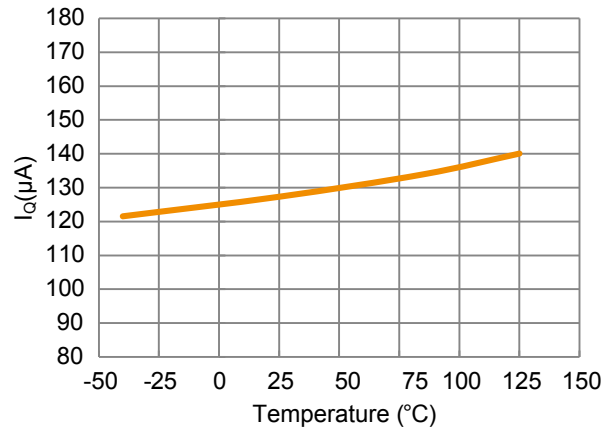


Line Regulation

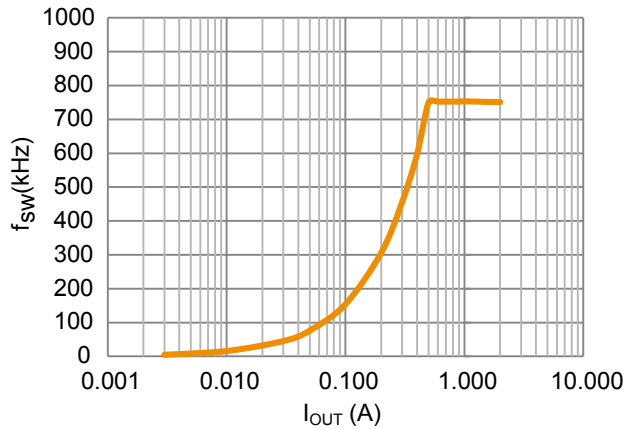
▼ **PERFORMANCE CHARACTERISTIC(Continued)**



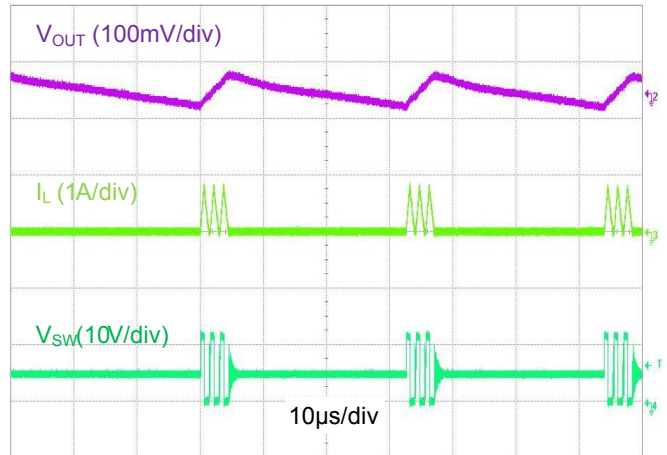
**Load Regulation**



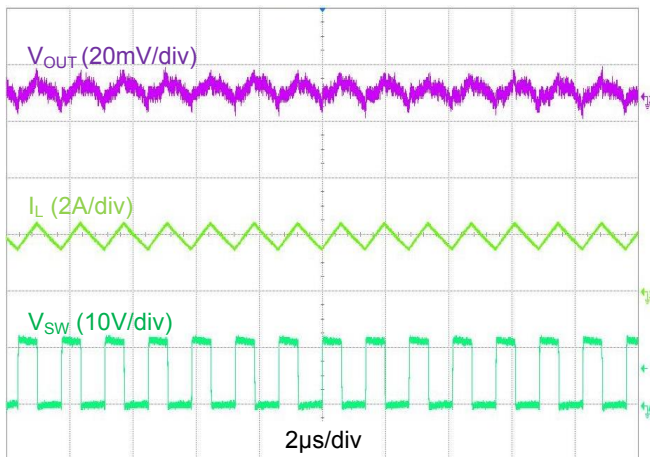
**$I_Q$  vs. Temperature**



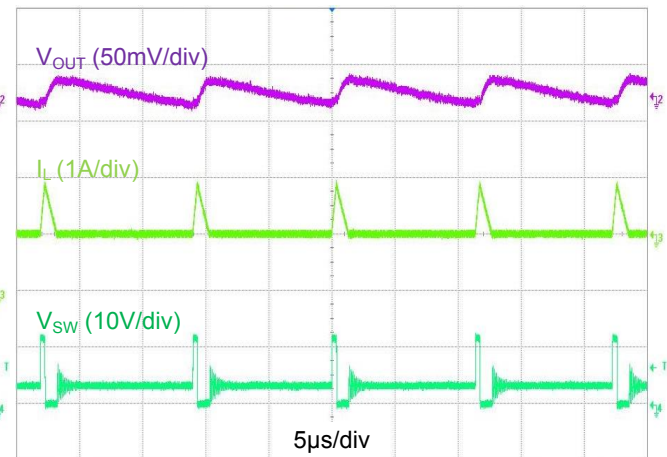
**fsw vs. Load**



**Output Voltage Ripple,  $V_{OUT} = 5V$ ,  $I_{OUT} = 50mA$**

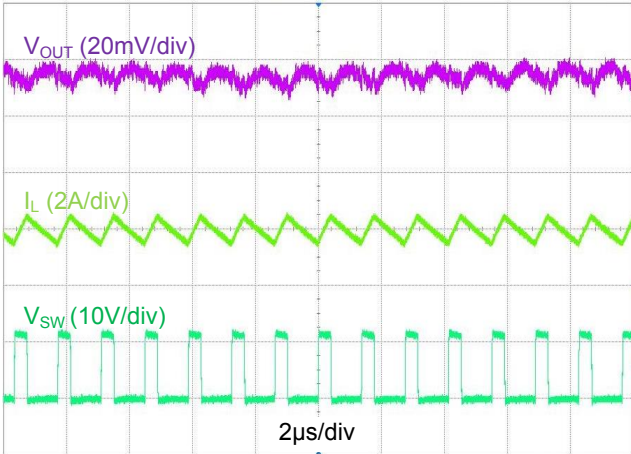


**Output Voltage Ripple,  $V_{OUT} = 5V$ ,  $I_{OUT} = 2A$**

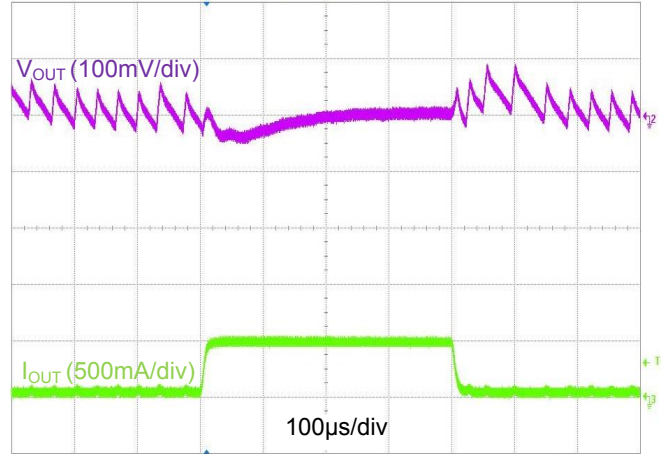


**Output Voltage Ripple,  $V_{OUT} = 3.3V$ ,  $I_{OUT} = 50mA$**

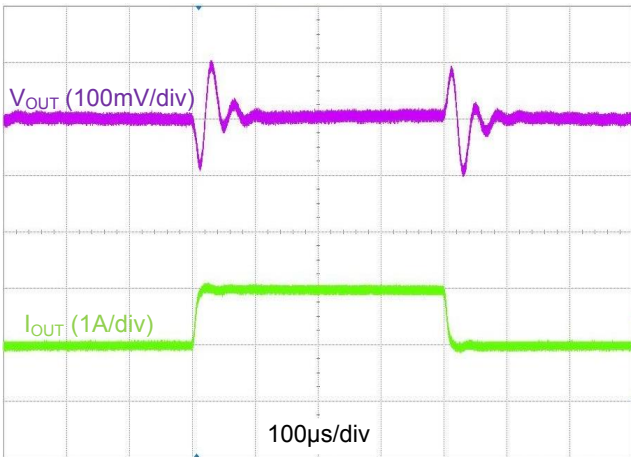
▼ **PERFORMANCE CHARACTERISTIC(Continued)**



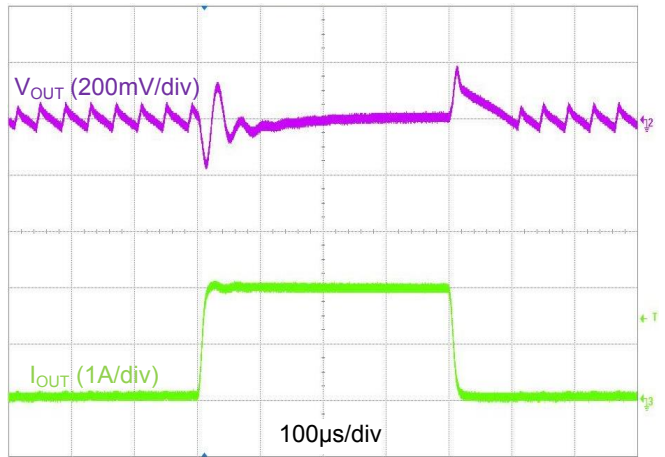
**Output Voltage Ripple,  $V_{OUT} = 3.3V$ ,  $I_{OUT} = 2A$**



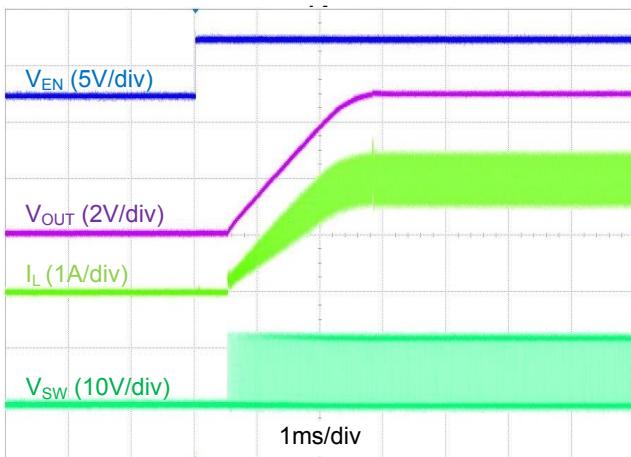
**Load Transient,  $I_{OUT} = 50mA$  to  $500mA$  to  $50mA$**



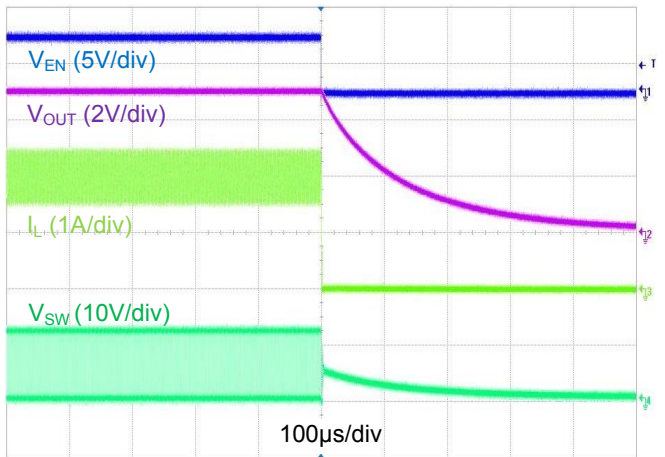
**Load Transient,  $I_{OUT} = 1A$  to  $2A$  to**



**Load Transient,  $I_{OUT} = 50mA$  to  $2A$  to**



**Startup Using EN,  $I_{OUT} = 2A$**

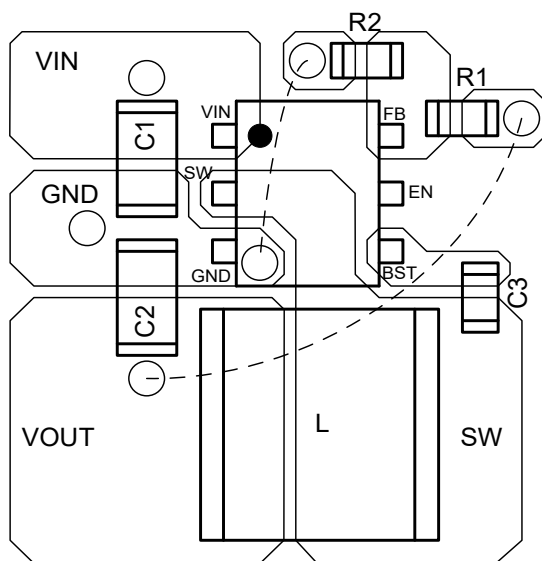


**Shutdown Using EN,  $I_{OUT} = 2A$**

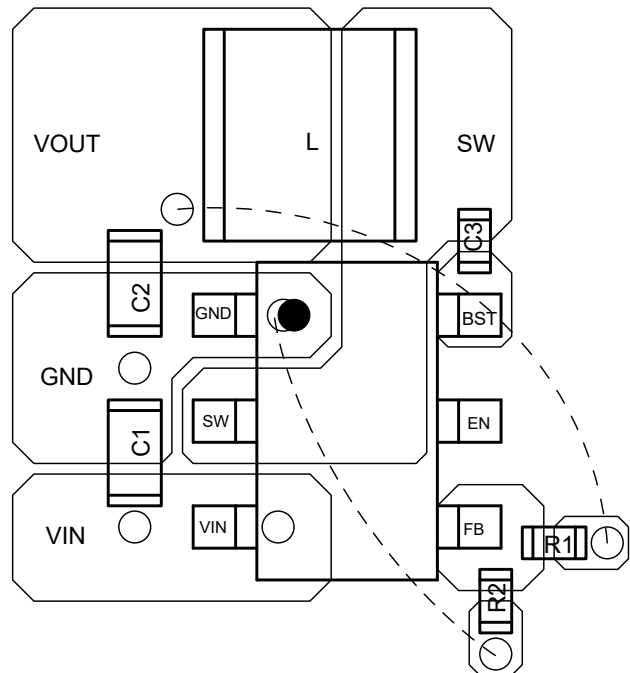
### Layout Consideration

Follow the PCB layout guidelines for optimal performance of the ACP2829.

- When working at 2A full load current, 2oz copper for both the top and bottom layers is recommended for heat dissipation.
- Place the input capacitors as closely across VIN and GND as possible.
- Place the inductor as close to SW as possible.
- Place the output capacitors as close to GND as possible.
- Place the feedback components as close to FB as possible.
- If using four or more layers, use at least the 2<sup>nd</sup> and 3<sup>rd</sup> layers as GND to maximize thermal performance.
- Add as many vias as possible around both the GND pin and under the GND plane for all GND heat dissipation.
- Add as many vias as possible around both the VIN pin and under the VIN plane for all VIN heat dissipation.



Recommended PCB Layout, SOT563 Package

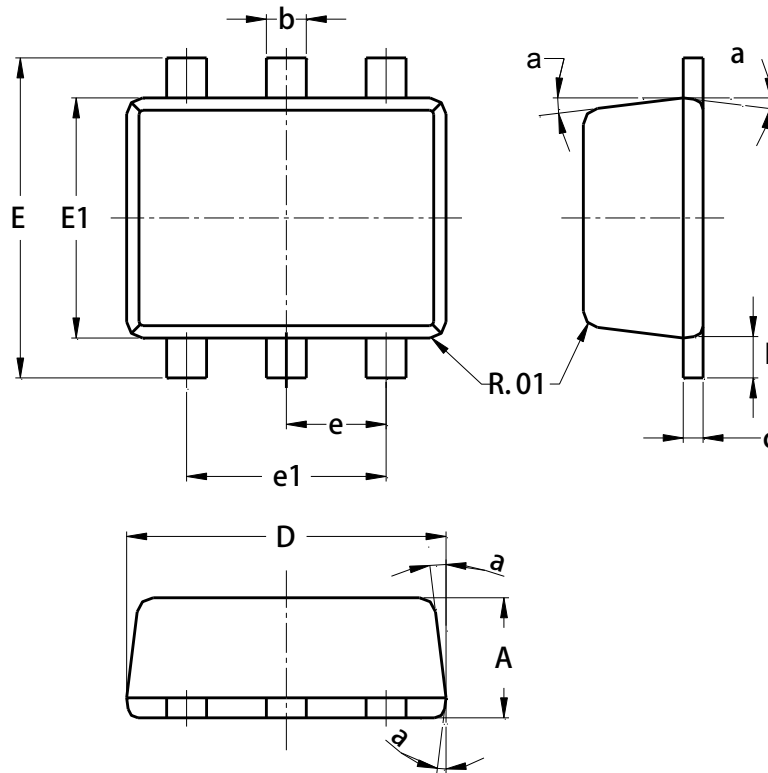


Recommended PCB Layout, TSOT26 Package



**PACKAGE INFORMATION**

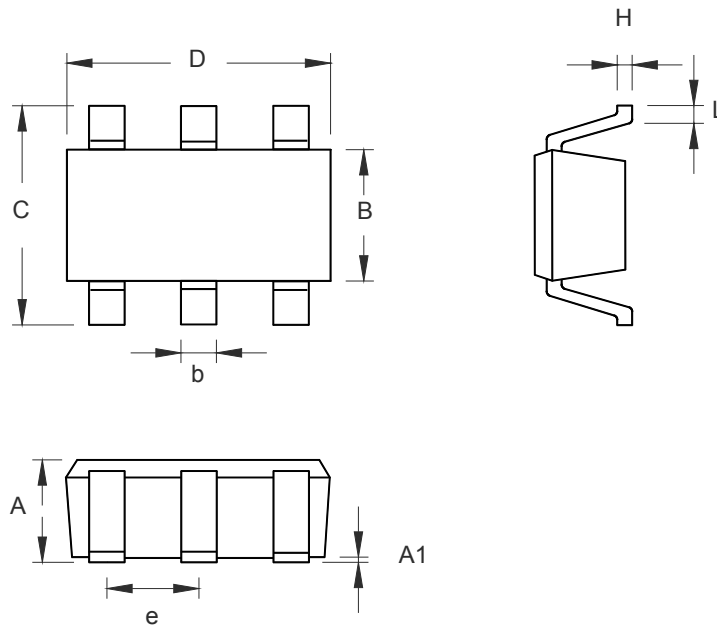
- SOT563



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.550	0.600	0.021	0.023
b	0.150	0.300	0.005	0.011
c	0.100	0.180	0.003	0.007
D	1.500	1.700	0.059	0.066
E	1.550	1.700	0.061	0.066
E1	1.100	1.250	0.043	0.049
e	0.000	0.500	0.000	0.019
e1	0.900	1.100	0.035	0.043
L	0.100	0.300	0.003	0.011
a	8°	9°	8°	9°

**PACKAGE INFORMATION**

- TSOT26



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	1.000	0.028	0.039
A1	0.000	0.100	0.000	0.004
B	1.397	1.803	0.055	0.071
b	0.300	0.559	0.012	0.022
C	2.591	3.000	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024