

General Description

The SY20815A incorporates an ultra-low $R_{DS(ON)}$ switch with a dedicated ON pin, enabling independent ON/OFF control.

The SY20815A features a low quiescent current of 300nA in the ON state, and it drops to 100nA in shutdown mode. This ultra-low current consumption significantly extends battery life, making the SY20815A an ideal choice for IoT applications.

Features

- Low $R_{DS(ON)}$: 80m Ω
- 1.5A Continuous Load Current Capability
- 300nA Quiescent Current
- 100nA Shutdown Current
- Independent ON/OFF Control Input
- Ultra Compact CSP0.79x0.79-4 0.3mm Package
- RoHS Compliant and Halogen Free

Applications

- Smartphones, Tablet PCs
- MIDs, E-Books
- Storage, DSLR, and Portable Devices

Typical Application

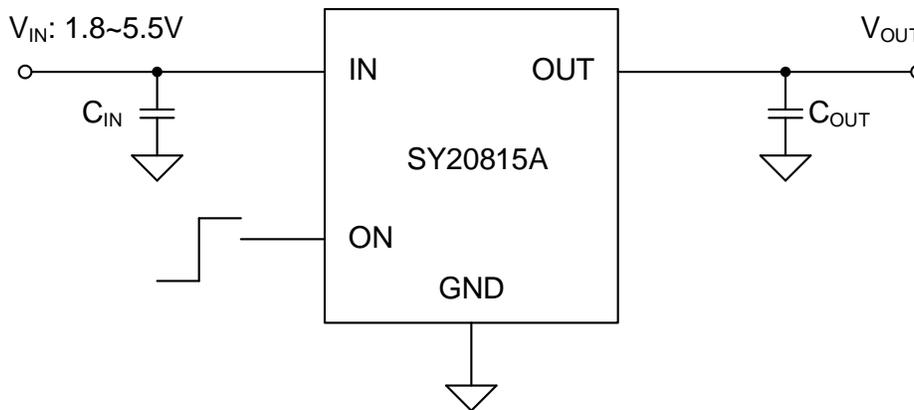


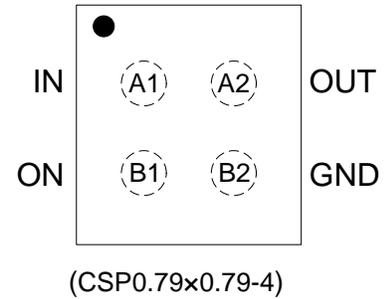
Figure 1. Schematic Diagram

Ordering Information

Ordering Number	Package Type	Top Mark
SY20815APRC	CSP0.79x0.79-4 RoHS Compliant and Halogen Free	eRxyz

Device code: eR
x=year code, y=week code, z= lot number code

Pinout (Top View)



Pin Name	Pin Number	Pin Description
IN	A1	Input pin. Decouple this pin to GND with at least a 4.7μF ceramic cap.
OUT	A2	Output pin. Decouple this pin to GND with at least a 4.7μF ceramic cap.
GND	B2	Ground pin.
ON	B1	ON/OFF control. Active high. Do not leave it floating.

Block Diagram

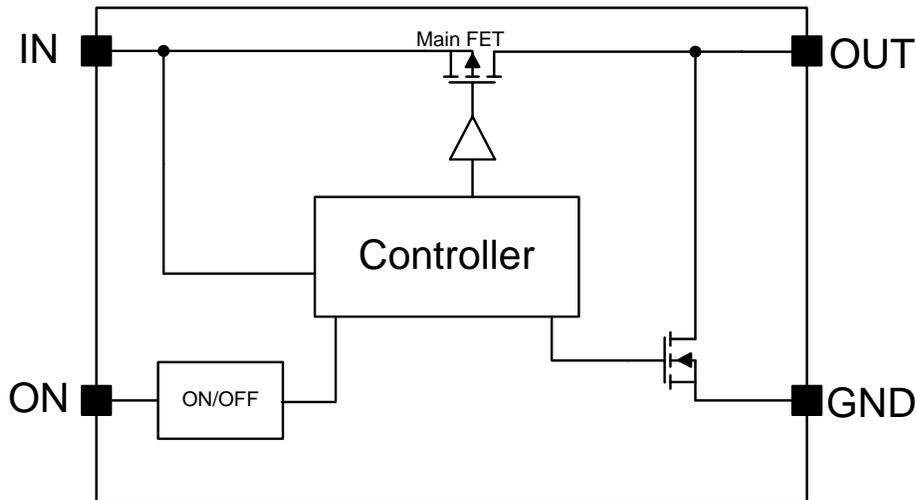


Figure 2. Block Diagram



Absolute Maximum Ratings

Parameter (Note 1)	Min	Max	Unit
IN, OUT, ON		6	V
Lead Temperature (Soldering, 10s)		260	°C
Junction Temperature, Operating	-40	150	
Storage Temperature	-65	150	

Thermal Information

Parameter (Note 2)	Typ	Unit
θ_{JA} Junction-to-Ambient Thermal Resistance	188	°C/W
θ_{JC} Junction-to-Case Thermal Resistance	2	
P_D Power Dissipation $T_A = 25^\circ\text{C}$	0.66	W

Recommended Operating Conditions

Parameter (Note 3)	Min	Max	Unit
IN	1.8	5.5	V
ON, OUT	0	5.5	
Junction Temperature, Operating	-40	125	°C
Ambient Temperature	-40	85	

Electrical Characteristics

($V_{IN} = 3.3\text{V}$, $T_A = 25^\circ\text{C}$ unless otherwise specified)

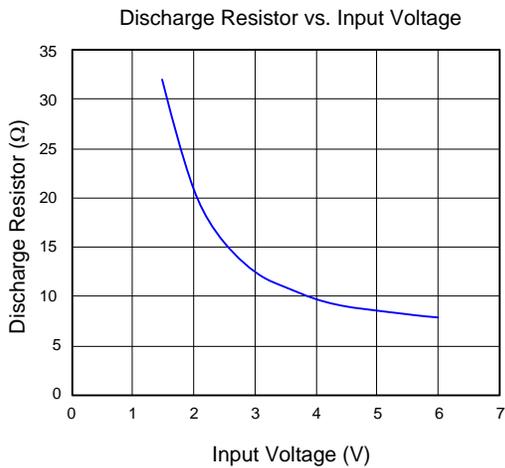
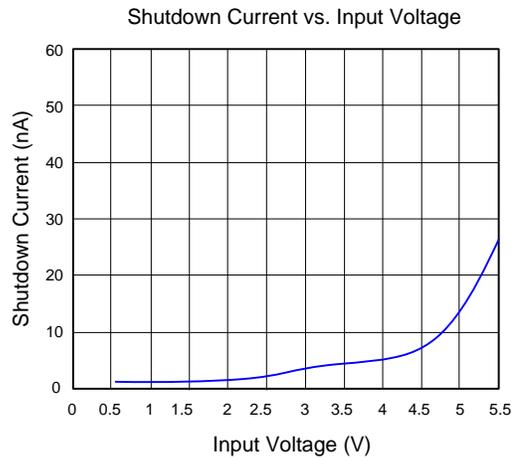
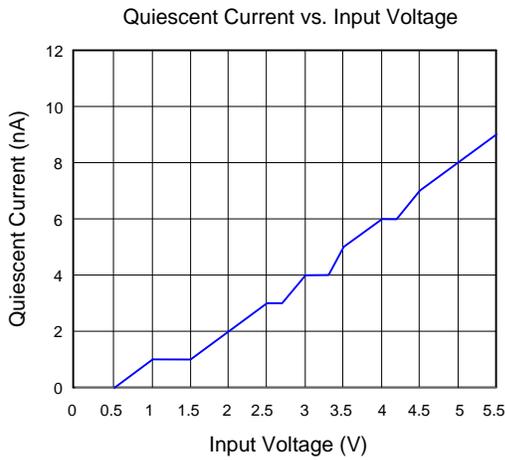
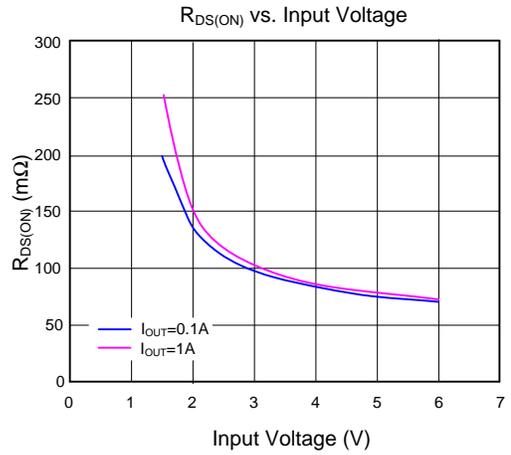
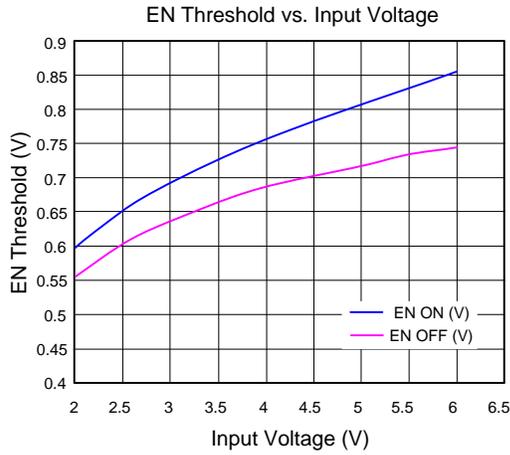
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		1.8		5.5	V
Shutdown Current	I_{SHDN}	ON=low			100	nA
Quiescent Current	I_Q	$I_{OUT}=0$			300	nA
FET R_{ON}	$R_{DS(ON)}$	$V_{IN}=5\text{V}$		80		m Ω
		$V_{IN}=3.3\text{V}$		95		m Ω
		$V_{IN}=1.8\text{V}$		155		m Ω
Output Voltage Rise Time	t_{RISE}	$V_{IN}=3.3\text{V}$, measure time V_{OUT} rise from 10% of V_{IN} to 90% of V_{IN}	55	85	115	μs
Turn On Delay Time	t_{DELAY}	$V_{IN}=3.3\text{V}$, measure time from EN rise edge to 10% of V_{IN}	45	75	105	μs
ON Input Logic High	V_{IH}		1.0			V
ON Input Logic Low	V_{IL}				0.4	V
Output Discharge Resister	R_{DIS}	$V_{IN}=5\text{V}$, ON=Low		8.5		Ω

Note 1: Stresses beyond the “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Note 2: θ_{JA} is measured in the natural convection at $T_A = 25^\circ\text{C}$ on a low effective single-layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

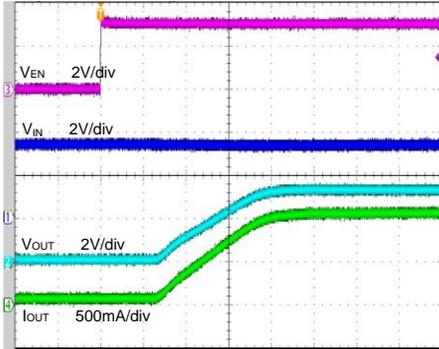
Note 3: The device is not guaranteed to function outside its operating conditions.

Typical Performance Characteristics



Startup from Enable

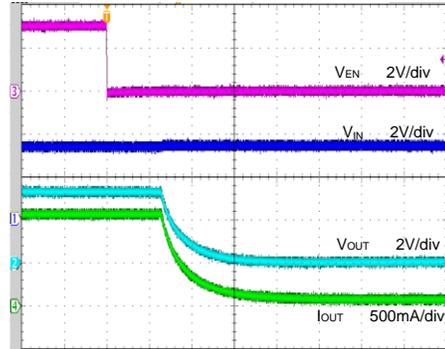
($V_{IN}=3.3V$, $C_{IN}=C_{OUT}=4.7\mu F$, $I_{OUT}=1A$)



Time (40µs/div)

Shutdown from Enable

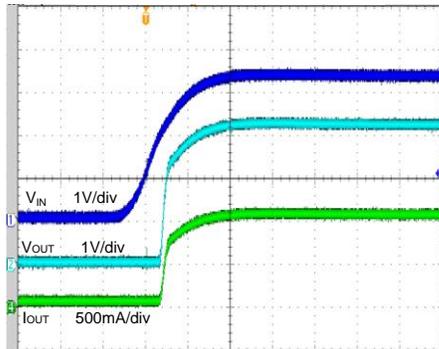
($V_{IN}=3.3V$, $C_{IN}=C_{OUT}=4.7\mu F$, $I_{OUT}=1A$)



Time (20µs/div)

Startup from V_{IN}

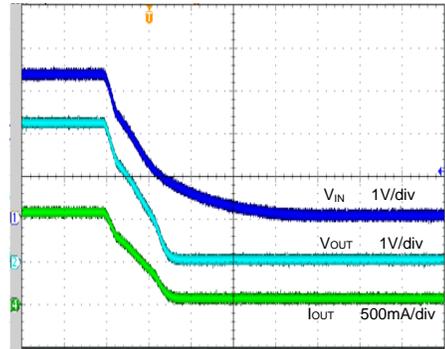
($V_{IN}=EN=3.3V$, $C_{IN}=C_{OUT}=4.7\mu F$, $I_{OUT}=1A$)



Time (400µs/div)

Shutdown from V_{IN}

($V_{IN}=EN=3.3V$, $C_{IN}=C_{OUT}=4.7\mu F$, $I_{OUT}=1A$)



Time (4ms/div)

Operation Information

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The SY20815A features a low quiescent current of 300nA in the ON state, and it drops to 100nA in shutdown mode. This ultra-low current consumption significantly extends battery life, making the SY20815A an ideal choice for IoT applications.

Input Capacitor C_{IN} :

To minimize device inrush current, it is recommended to use a 1 μ F ceramic capacitor, C_{IN} . Using a higher value of C_{IN} can further decrease the voltage drop as the switch is turned on with a large capacitive load. To minimize potential noise issues, it is essential to place C_{IN} close to the IN and GND pins.

Output Capacitor C_{OUT} :

A 4.7 μ F ceramic output capacitor is recommended to prevent parasitic board inductance from forcing V_{OUT} below GND when switching off.

Output Discharge:

The SY20815B integrates an 8.5 Ω pull-down resistor for quick output discharge. The resistor is activated when the switch is turned off.

PCB Layout Design:

For best performance of the SY20815A, the following guidelines must be followed:

1. Keep all power traces as short and wide as possible. It's recommended to use a 2-layer or 4-layer board for thermal performance and better capability of current flow. These power pins include IN and OUT.
2. Input and output capacitors should be placed close to the device and connected to the ground plane to reduce noise coupling.

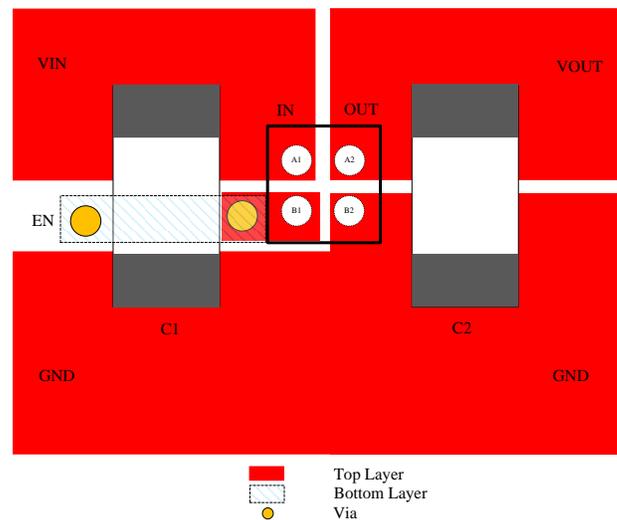


Figure 3. PCB Layout Suggestion

Schematic

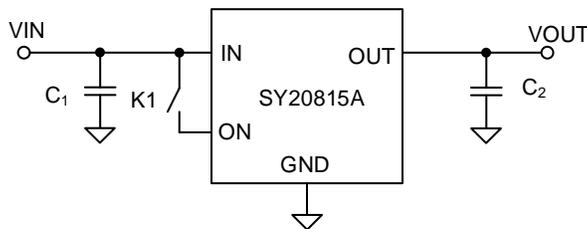
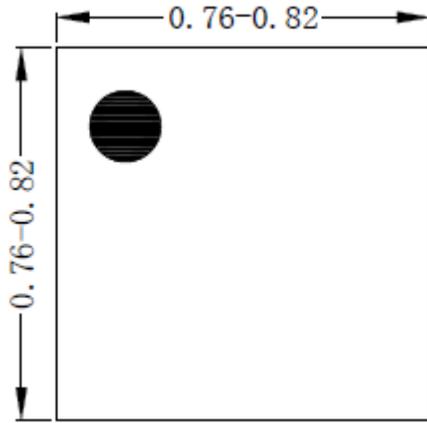


Figure 4. Schematic Diagram

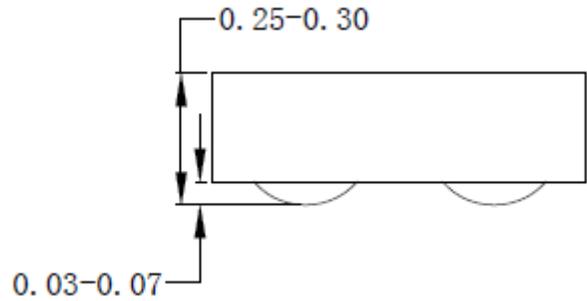
BOM List

Designator	Description	Part Number	Manufacturer
C ₁	4.7 μ F/16V, 0603, X5R	GRM185R61C475K	Murata
C ₂	4.7 μ F/16V, 0603, X5R	GRM185R61C475K	Murata

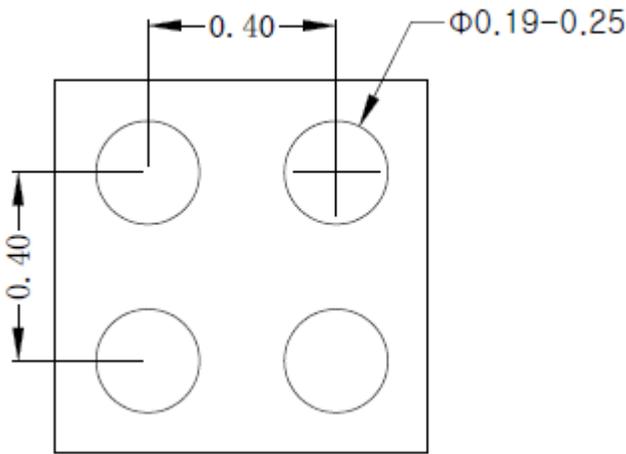
CSP0.79x0.79-4 Package Outline Drawing



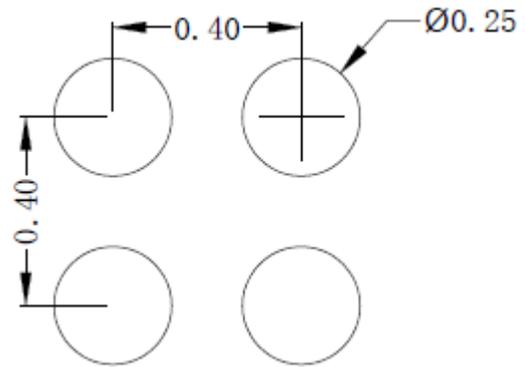
Top View



Side View



Bottom View

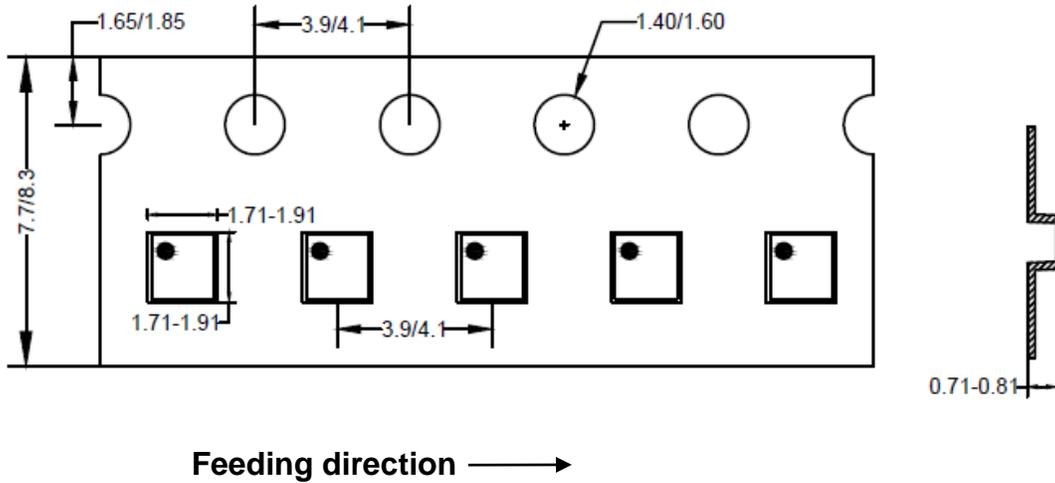


**Recommended PCB Layout
(Reference Only)**

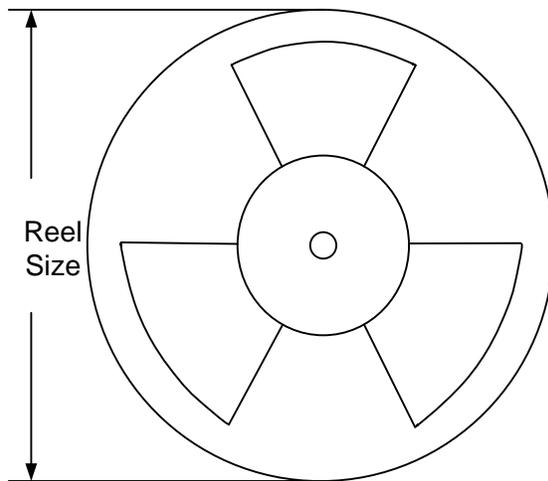
Note: All dimensions are in millimeters and exclude mold flash and metal burr.

Taping & Reel Specification

CSP0.79x0.79 Taping Orientation



Carrier Tape & Reel Specification for Packages



Package type	Tape width (mm)	Pocket pitch (mm)	Reel size (Inch)	Trailer length (mm)	Leader length (mm)	Qty per reel
CSP0.79x0.79	8	4	7"	400	160	10000



Revision History

The revision history provided is for informational purpose only and is believed to be accurate, however, not warranted. Please make sure that you have the latest revision.

Date	Revision	Change
Jan.12, 2024	Revision 1.0	Language improvements for clarity.
Jul.09, 2018	Revision 0.9A	"Features" page1: Change from "1A Continuous Load Current Capability" to "1.5A Continuous Load Current Capability".
Mar.09, 2018	Revision 0.9	Initial Release



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