

Low ON-Resistance, Slew-Rate-Controlled Load Switch

General Description

The SY20814 incorporates an ultra-low $R_{DS(ON)}$ load switch. The controlled ramp up speed avoids the inrush current during turn on. It can operate under the input voltage range from 1.05V to 1.95V.

The SY20814 is available in a compact CSP0.9×0.9-4 package.

Features

- Input Voltage Range: 1.05V to 1.95V
- Low $R_{DS(ON)}$ for Internal Pass Switch:
 - 45mΩ at $V_{IN}=1.2V$
 - 35mΩ at $V_{IN}=1.8V$
- 1A Continuous Load Current Capability
- ON/OFF Control Input
- Output Capacitor Auto Discharge Function.
- RoHS Compliant and Halogen Free
- Ultra Small CSP-4 Package 0.9 mm × 0.9mm, 0.5-mm Pitch, 0.5-mm Height
- ESD Protected:
 - Human Body Mode: 2kV
 - Machine Mode: 200V

Applications

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

Typical Application

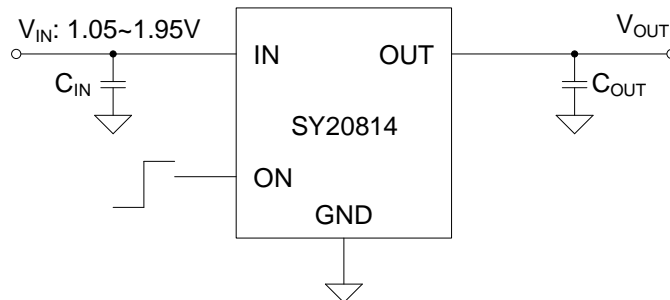


Figure 1. Schematic Diagram

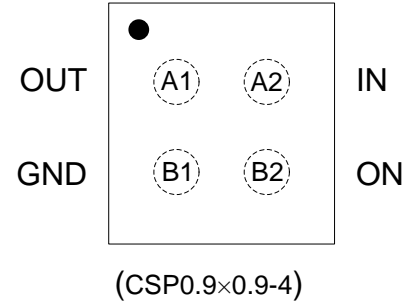
Ordering Information

Ordering Number	Package Type	Top Mark
SY20814PDC	CSP0.9×0.9-4 RoHS Compliant and Halogen Free	Tlxyz

Device code: Tl

x=year code, y=week code, z= lot number code

Pinout (Top view)



Pin Name	Pin Number	Pin Description
IN	A2	Input pin. Decouple this pin to GND with at least a 1μF ceramic capacitor.
OUT	A1	Output pin. Decouple this pin to GND with at least a 1μF ceramic capacitor.
GND	B1	Ground pin.
ON	B2	ON/OFF control. Active high. Do not leave it floating.

Block Diagram

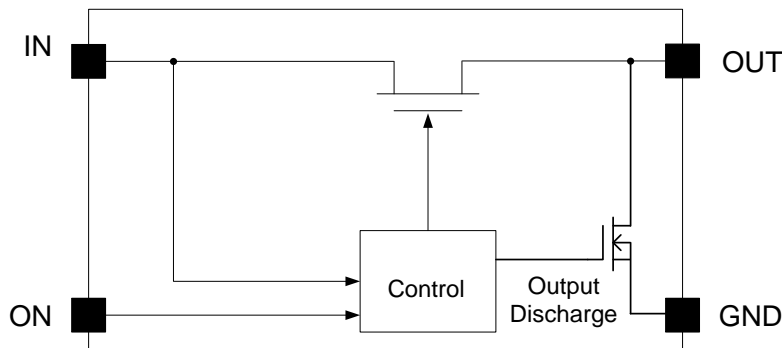


Figure 2. Block Diagram



Absolute Maximum Ratings

Parameter (Note 1)	Min	Max	Unit
IN, OUT		2.0	V
EN		6.0	
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	1.05	1.95	V
OUT	0	1.95	
EN	0	5.5	
Junction Temperature, Operating	-40	125	°C
Ambient Temperature	-40	85	

Electrical Characteristics

($V_{IN} = 1.2\text{V}$, $T_A = 25^\circ\text{C}$ unless otherwise specified)

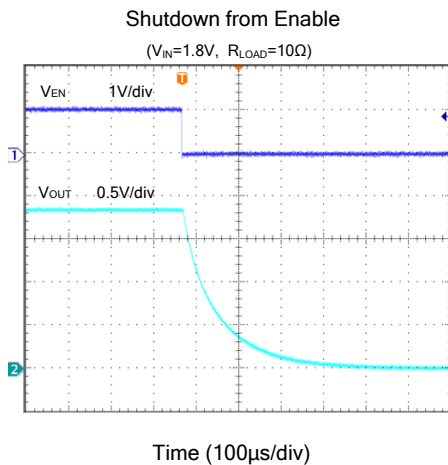
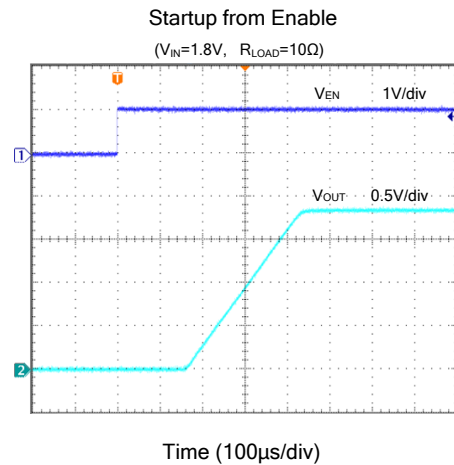
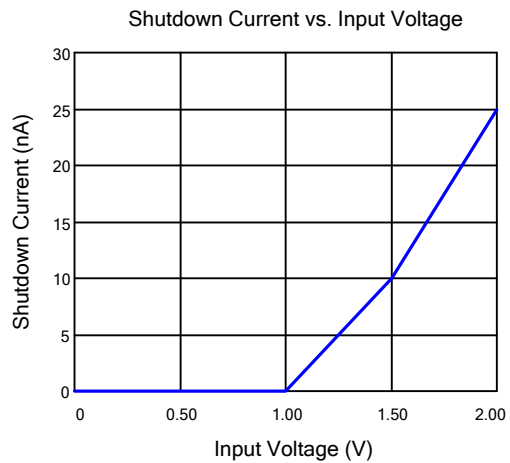
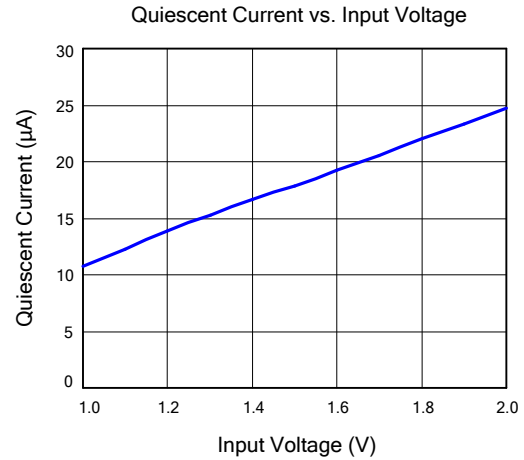
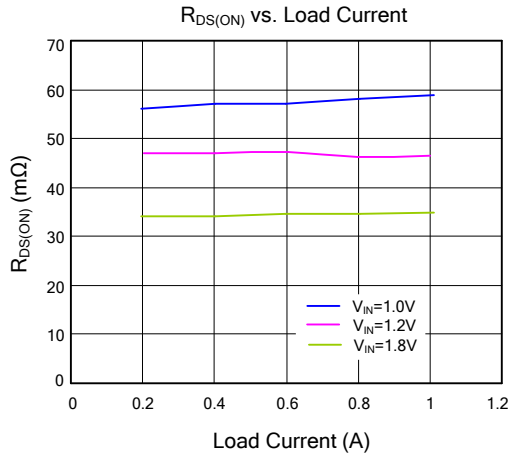
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		1.05		1.95	V
Shutdown Current	I_{SHDN}	ON=Low			1	μA
Quiescent Current	I_Q	$I_{OUT}=0$		13		μA
FET R_{ON}	$R_{DS(ON)}$	$V_{IN}=1.2\text{V}$		45		$\text{m}\Omega$
		$V_{IN}=1.8\text{V}$		35		$\text{m}\Omega$
ON Input Logic High	V_{IH}		1			V
ON Input Logic Low	V_{IL}				0.4	V
Turn On Rise Time	t_{RISE}	$V_{IN}=1.2\text{V}$, $C_{OUT}=1\mu\text{F}$, $R_{LOAD}=10\Omega$		150		μs
		$V_{IN}=1.8\text{V}$, $C_{OUT}=1\mu\text{F}$, $R_{LOAD}=10\Omega$		225		μs
Output discharge resistor	R_{DIS}			200		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 Operating Characteristics



Operation Information

The SY20814 incorporates an ultra-low $R_{DS(ON)}$ load switch. The controlled ramp up speed avoids the inrush current during turn on. It can operate under the input voltage range from 1.05V to 1.95V.

The SY20814 is available in a compact CSP0.9×0.9-4 package.

Input Capacitor

To reduce device inrush current, a 1 μ F ceramic capacitor, C_{IN} , is recommended. A higher value of C_{IN} can be used to reduce the voltage drop experienced as the switch is turned on into large capacitive load. To minimize the potential noise problem, place C_{IN} really close to the IN and GND pins.

Output Capacitor

A 1 μ F ceramic output cap is recommended to prevent parasitic board inductance from forcing VOUT below GND when switching off

Output Discharge

SY20814 integrate a 200 Ω pull down resistor for quick output discharge. The resistor is activated when the switch is turned off.

PCB Layout Guide

For best performance of the SY20814, the following guidelines must be strictly followed:

- Keep all power traces as short and wide as possible and use at least 1 ounce copper for

all power traces.

- Place a ground plane under all circuitry to lower both resistance and inductance and improve DC and transient performance.
- Locate the output capacitors as close to the connectors as possible to lower the impedance (mainly inductance) between the port and the capacitor and improve transient performance.
- Input and output capacitors should be placed close to the IC and connected to the ground plane to reduce noise coupling.

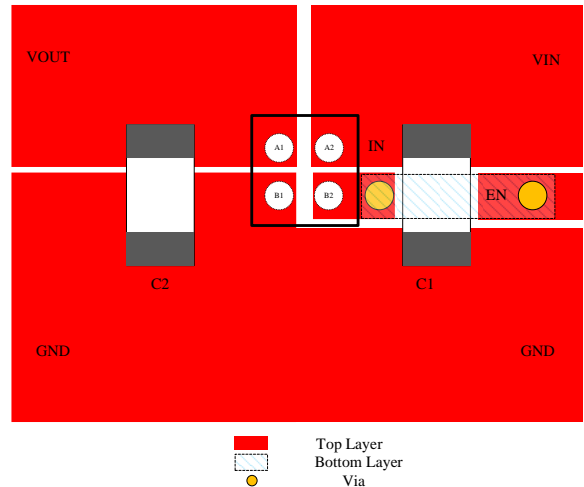
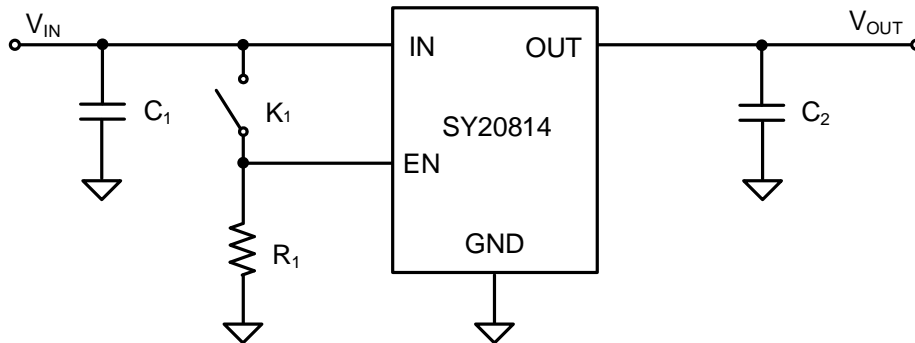


Figure3. PCB Layout Suggestion

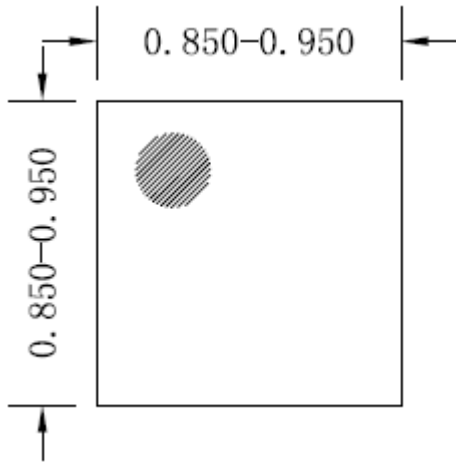
Schematic



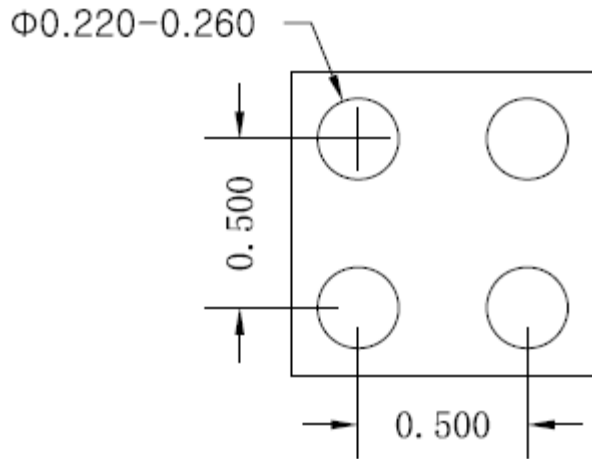
BOM List

Designator	Description	Part Number	Manufacturer
C ₁	1μF/25V, 0603, X5R	C1608X5R1E105K	TDK
C ₂	1μF/25V, 0603, X5R	C1608X5R1E105K	TDK
R ₁	100kΩ, 1%, 0603		

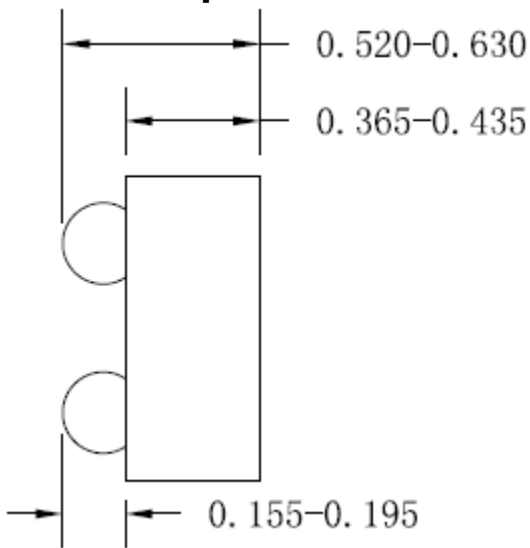
CSP0.9×0.9-4 Outline Drawing



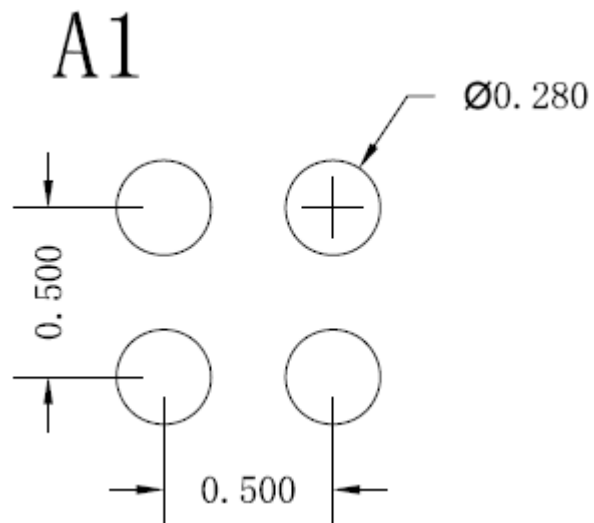
Top View



Bottom View



Side View

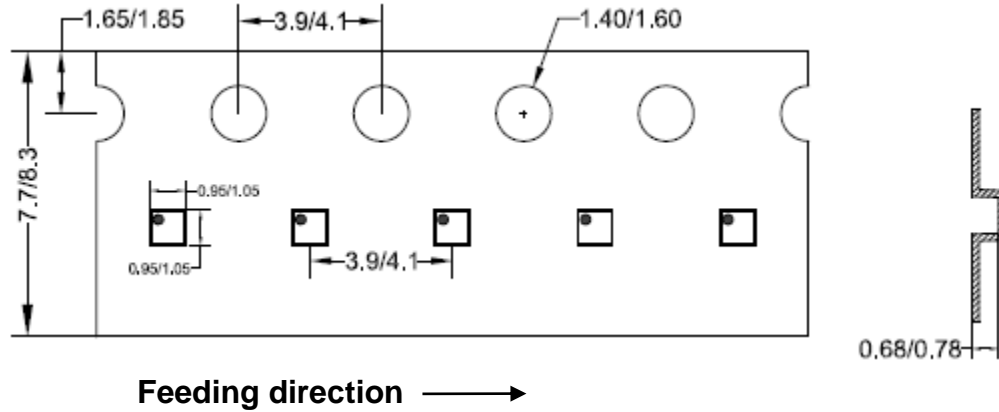


**Recommended PCB layout
(Reference Only)**

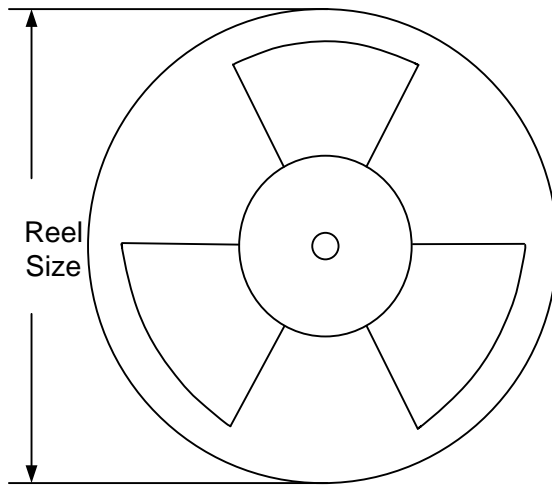
Notes: All dimension in millimeter and exclude mold flash & metal burr

Taping & Reel Specification

1. CSP0.9×0.9 taping orientation



2. Carrier Tape & Reel specification for packages



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Trailer length(mm)	Leader length (mm)	Qty per reel
CSP0.9×0.9	8	4	7"	400	160	3000

3. Others: NA



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