SY6861A1/A2/B1/B2

5.5V, 3A Low Loss Power Distribution Switch With Reverse Block Rating Up to 28V

General Description

SY6861A1/A2/B1/B2 is an ultra-low $R_{DS(ON)}$, 3A low loss power distribution switch with current limit to protect the power source from over current and short circuit conditions.

SY6861A1/A2/B1/B2 has over voltage protection and the output pin can withstand 28V. It incorporates the over-temperature protection and reverse blocking functions.

Features

- Input Voltage: 2.5V to 5.5V
- Output Voltage Withstanding 28V
- Extremely Low Power Path Resistance: 45mΩ (typ.)
- 3A Load Current Capability
- Reverse Blocking in Normal Operation or Shutdown
- Fault Flag (OCB) Output For Over Current and Fault Conditions
- Compact Package: SOT23-5/SOT23-6
- RoHS Compliant and Halogen Free
- UL Certification NO. E491480

Ordering Information

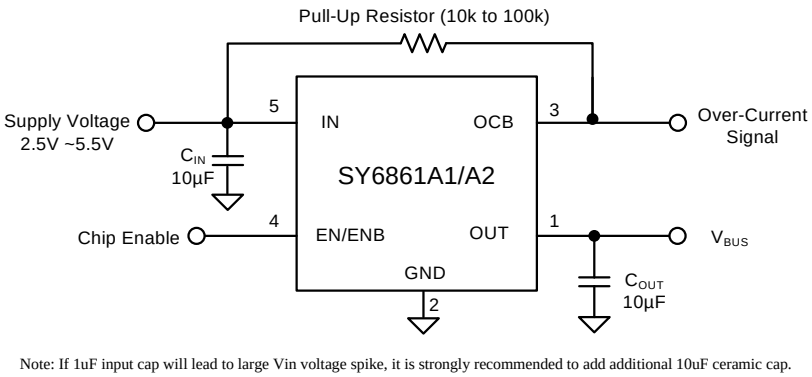
SY6861 □(□□)□
- Temperature Code
- Package Code
- Optional Spec Code

Ordering Number	Package Type	Note
SY6861A1AAC	SOT23-5	Active High
SY6861A2AAC	SOT23-5	Active Low
SY6861B1ABC	SOT23-6	Active High
SY6861B2ABC	SOT23-6	Active Low

Applications

- USB 3.1 Application
- USB 3G Datacard
- USB Dongle
- MiniPCI Accessories
- USB Charger
- Public Place Multi-USB Charger

Typical Applications



Note: If 1uF input cap will lead to large Vin voltage spike, it is strongly recommended to add additional 10uF ceramic cap.

Figure 1. SY6861A1/A2 Schematic Diagram

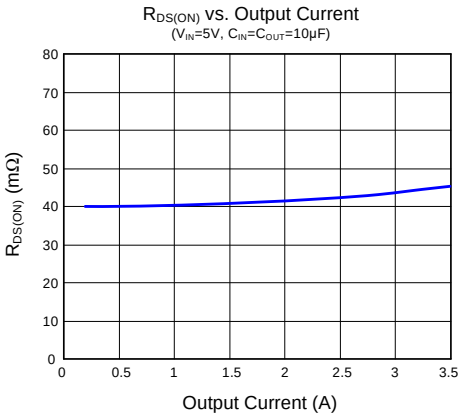
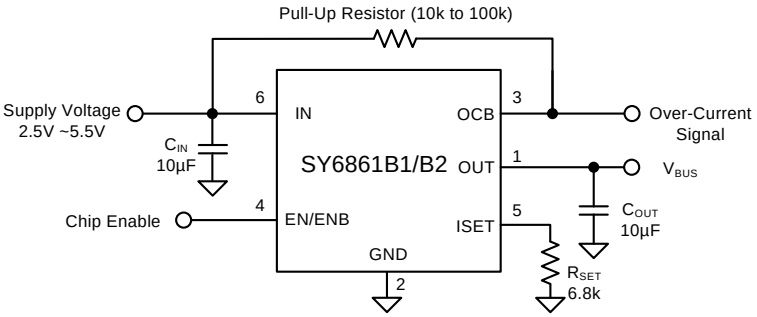


Figure 2. $R_{DS(ON)}$ vs. Output Current



Note: If 1uF input cap will lead to large Vin voltage spike, it is strongly recommended to add additional 10uF ceramic cap.

Figure 3. SY6861B1/B2 Schematic Diagram

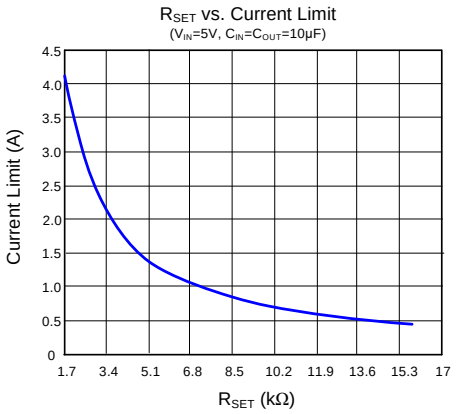
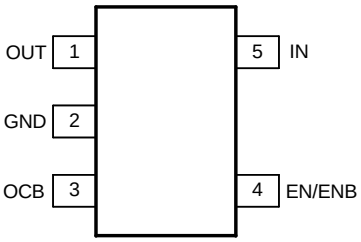
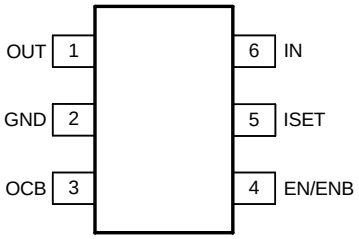


Figure 4. R_{SET} vs. Current Limit

Pinout (top view)



(SOT23-5)



(SOT23-6)

Top Mark: **Td*xyz*** for SY6861A1AAC **(**Device code: Td; ***x=year code, y=week code, z= lot number code*****)**
Vg*xyz* for SY6861A2AAC **(**Device code: Vg; ***x=year code, y=week code, z= lot number code*****)**
Te*xyz* for SY6861B1ABC **(**Device code: Te; ***x=year code, y=week code, z= lot number code*****)**
Vh*xyz* for SY6861B2ABC **(**Device code: Vh; ***x=year code, y=week code, z= lot number code*****)**

Pin Name	Pin number		Pin Description
	SOT23-5	SOT23-6	
OUT	1	1	Output pin.
GND	2	2	Ground pin.
OCB	3	3	Fault Flag. Open drain under normal conditions, grounded under fault operation.
EN/ENB	4	4	ON/OFF control. Do not leave it floating. EN: Active high. ENB: Active low.
IN	5	6	Input pin.
ISET	--	5	Current limit programming pin. Connect a resistor R_{SET} from this pin to ground to program the current limit: I_{LIM} (A)=6800/R_{SET} (Ω)

Block Diagram

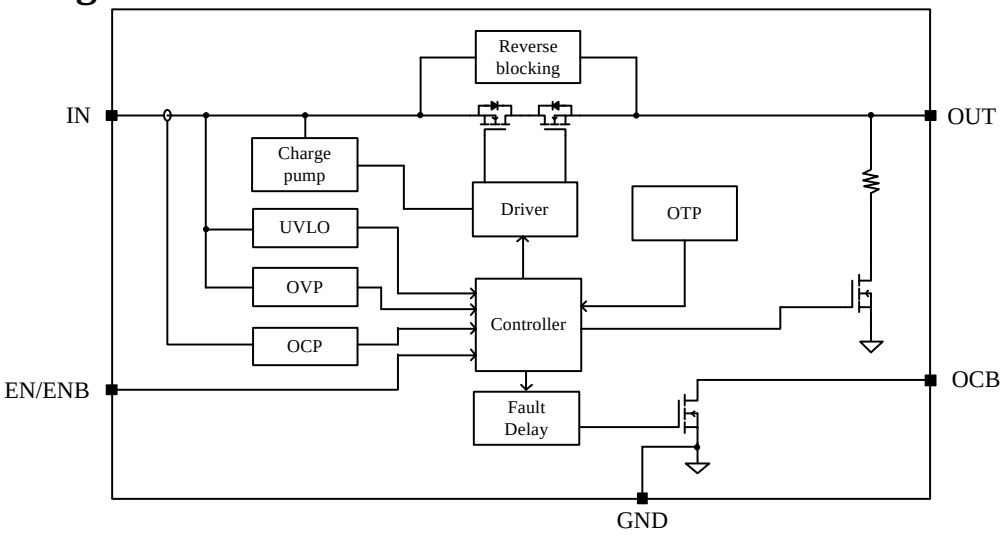


Figure 5. SY6861A1/A2 Block Diagram

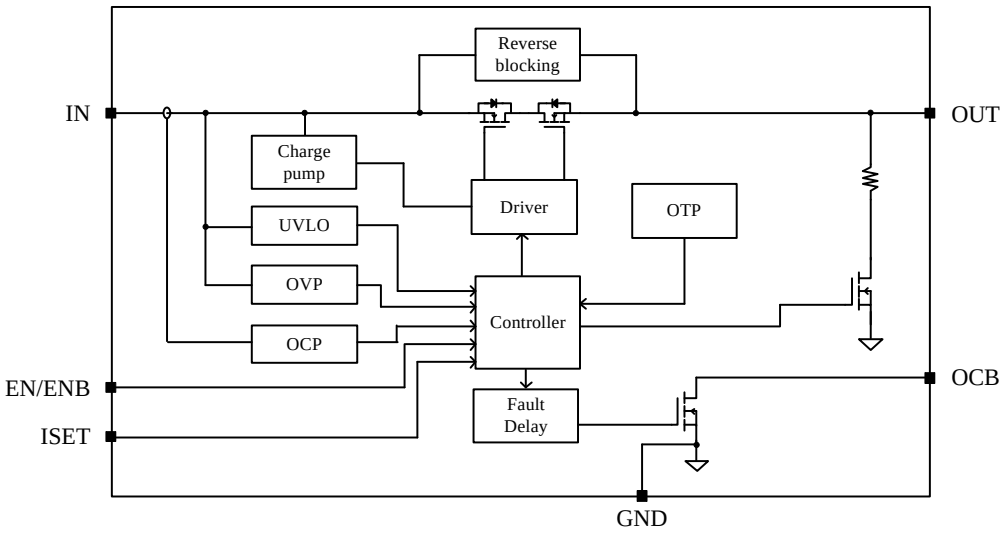


Figure 6. SY6861B1/B2 Block Diagram

Absolute Maximum Ratings (Note 1)

IN---------- -0.3V to 7V
ISET ---------- -0.3V to 3.6V
OCB, EN, ENB, OUT ---------- -0.3V to 28V
Power Dissipation, P_D @ T_A = 25°C SOT23-5/SOT23-6---------- 1.2W/1.2W
Package Thermal Resistance (Note 2)
θ_{JA}, SOT23-5/SOT23-6---------- 83°C/W/81°C/W
θ_{JC}, SOT23-5/SOT23-6 ---------- 17°C/W/14°C/W
Junction Temperature---------- 150°C
Lead Temperature (Soldering, 10 sec.) ---------- 260°C
Storage Temperature Range ---------- -65°C to 150°C
ESD Susceptibility
HBM (Human Body Mode) ---------- 2kV
CDM (Charged Device Mode) ---------- 500V

Recommended Operating Conditions (Note 3)

IN---------- 2.5V to 5.5V
ISET ---------- 0V to 3.3V
All other pins ---------- 0V to 22V
Junction Temperature Range ---------- -40°C to 125°C
Ambient Temperature Range ---------- -40°C to 85°C

Electrical Characteristics

(V_{IN} = 5V, C_{OUT}=10μF, T_A = 25°C unless otherwise specified)

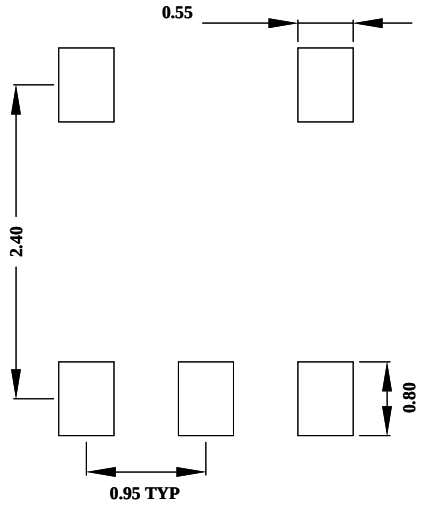
Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range		V_{IN}		2.5		5.5	V
Input Over Voltage Protection		V_{OVP}			5.6		V
OVP Hysteresis		V_{OVP_HYS}			0.1		V
Shutdown Input Current		I_{SHDN}	Open load, switch OFF		5	30	μA
			Output grounded, switch OFF		5	30	μA
Quiescent Supply Current		I_Q	Open load, switch ON		65		μA
FET $R_{DS(ON)}$		$R_{DS(ON)}$	V_{IN}=5V, I_{OUT}=0.3A		45	50	mΩ
Current Limit		I_{LIM}	SY6861A1/A2, V_{IN}=5V, V_{OUT}=4.5V	3.2	3.76	4.43	A
			SY6861B1/B2 R_{SET}=1.878k, V_{IN}=5V, V_{OUT}=4.75V	3.0	3.62	4.16	
Programmable Current Limit Range		I_{LIM_RANGE}	SY6861B1/B2	0.4		4	A
EN/ $\overline{EN}$ Threshold	Logic-Low Voltage	V_{IL}				0.4	V
	Logic-High Voltage	V_{IH}		1.0			V
IN UVLO Threshold		$V_{IN,UVLO}$				2.45	V
IN UVLO Hysteresis		$V_{IN,HYS}$			0.1		V
Rise Time		t_{RISE}	V_{IN}=3.3V, R_L=10Ω, C_L=1μF, V_{OUT}=10%~90%V_{IN}	1.0	1.9	3.0	ms
			V_{IN}=5.0V, R_L=10Ω, C_L=1μF, V_{OUT}=10%~90%V_{IN}	1.5	3.0	4.5	ms
OCB Low Resistance		R_{OCB}			125		Ω
OCB Delay Time		t_{OCB_Delay}			15		ms
OUT Shutdown Discharge Resistance		R_{DSG}		90	115	140	Ω
Discharge Time		t_{DSG}			130		ms
Thermal Shutdown Temperature		T_{SD}			150		°C
Thermal Shutdown Hysteresis		T_{HYS}			20		°C

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.

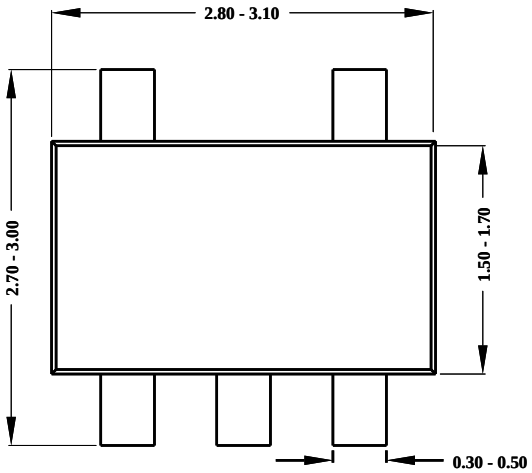
Note 2: θ_{JA} is measured in the natural convection at T_A = 25°C on a Silergy's test board. Pin 2 of SOT23-5/SOT23-6 package is the case position for θ_{JC} measurement.

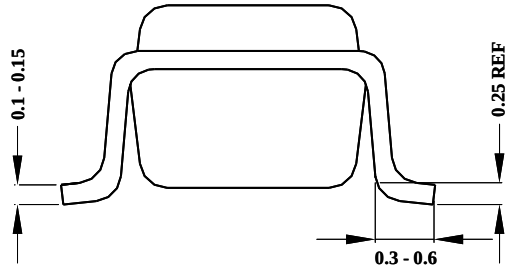
Note 3: The device is not guaranteed to function outside its operating conditions.

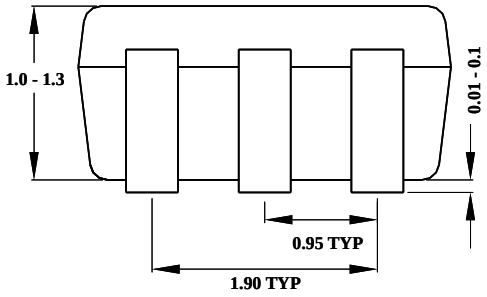
SOT23-5 Package Outline & PCB Layout Design



Recommended Pad Layout

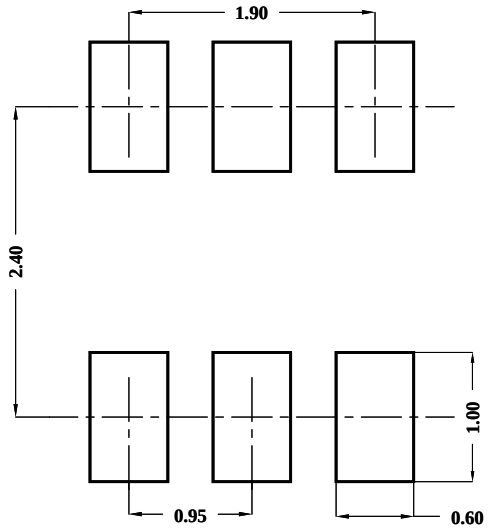




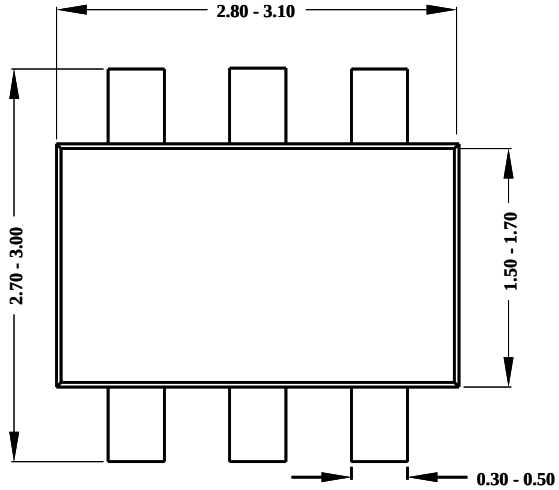


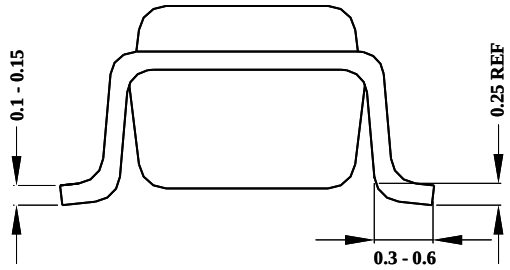
Notes: All dimensions are in millimeters.
All dimensions don't include mold flash & metal burr.

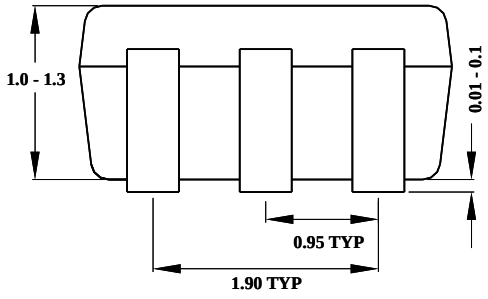
SOT23-6 Package Outline & PCB Layout Design



Recommended Pad Layout





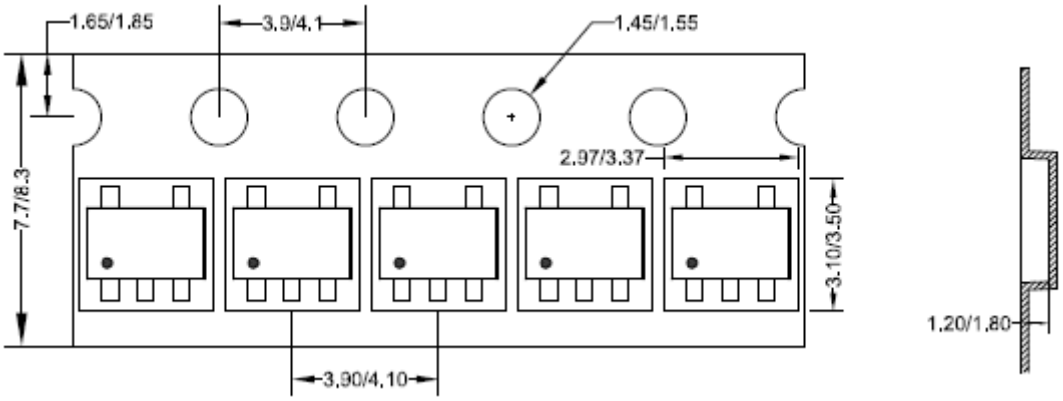


Notes: **All dimensions are in millimeters.**
All dimensions don't include mold flash & metal burr.

Taping & Reel Specification

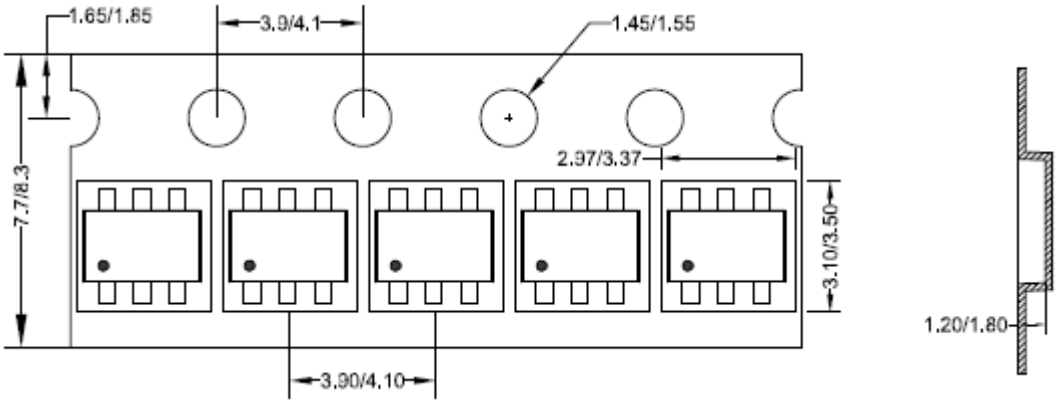
1. Taping orientation

SOT23-5



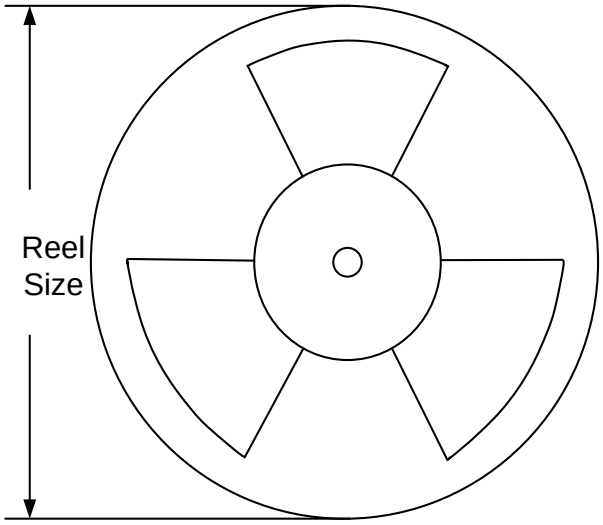
Feeding direction ⟶

SOT23-6



Feeding direction ⟶

2. 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
SOT23-5	8	4	7"	280	160	3000
SOT23-6	8	4	7"	280	160	3000

3. Others: NA