85V Input Voltage, 80mA, Very High Voltage Linear Regulator

Description

The AS58XX is a very high voltage tolerant linear regulator in SOT89-3 package and is able to withstand continuous DC or transient input voltages of up to 85V.

The AS58XX is stable with any output capacitance greater than 1uF and any input capacitance greater than 1uF, therefore AS58XX only require minimal board space, the internal thermal shutdown and current limiting to protect the system during fault conditions.

In addition, the AS58XX is ideal for battery applications. It can also withstand and maintain regulation during very high and fast voltage transients. And only draw 3uA from input.

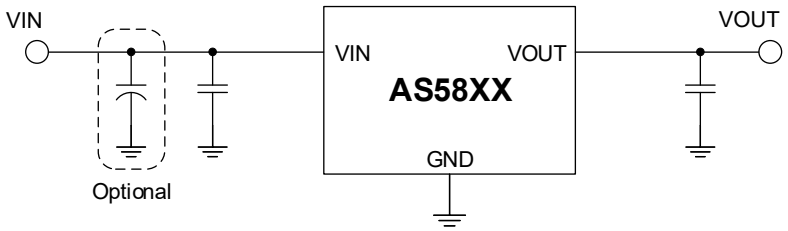
Features

- Very High Maximum Input Voltage: 85V
- Wide Input Voltage Range: 4V to 85V
- Output Accuracy: ±2%
- Low Quiescent Current: 3uA
- Maximum Output Current: 80mA
- Output Voltage: 3.3V/5.0V/12V
- Stable with Small Capacitance
- Input Capacitance ≥1uF
- Output Capacitance≥1uF
- Built in Current Limit
- Built in Thermal Regulator
- Available in SOT89-3 Package

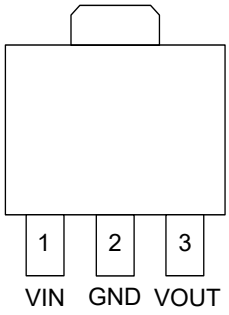
Applications

- Automotive
- Power over Ethernet
- Battery Powered Systems
- Bias Power Supplies
- Home Appliance
- Smoke detector and sensor
- Microcontroller Applications

Typical Application



Pin Configuration



SOT89-3

Pin Descriptions

SOT89-3	Name	Description
1	VIN	Power Input
2	GND	Ground
3	VOUT	Output

Ordering Information

PART No.	Package	Logo	Tape&Reel
AS58XXBTS	SOT89-3	AS58XXBTS	3000pcs/reel

Absolute Maximum Ratings (at TA = 25°C)

Characteristics	Symbol	Rating	Unit
VIN to GND		-0.3 to 95	V
VOUT to GND		-0.3 to 15	V
EN, PG to GND		-0.3 to 7	V
Power Dissipation	PD	2.3	°C/W
Operating Junction Temperature		-40 to 150	°C
Storage Junction Temperature		-55 to 150	°C
Thermal Resistance from Junction to case	θJC	14.6	°C/W
Thermal Resistance from Junction to ambient	θJA	44	°C/W

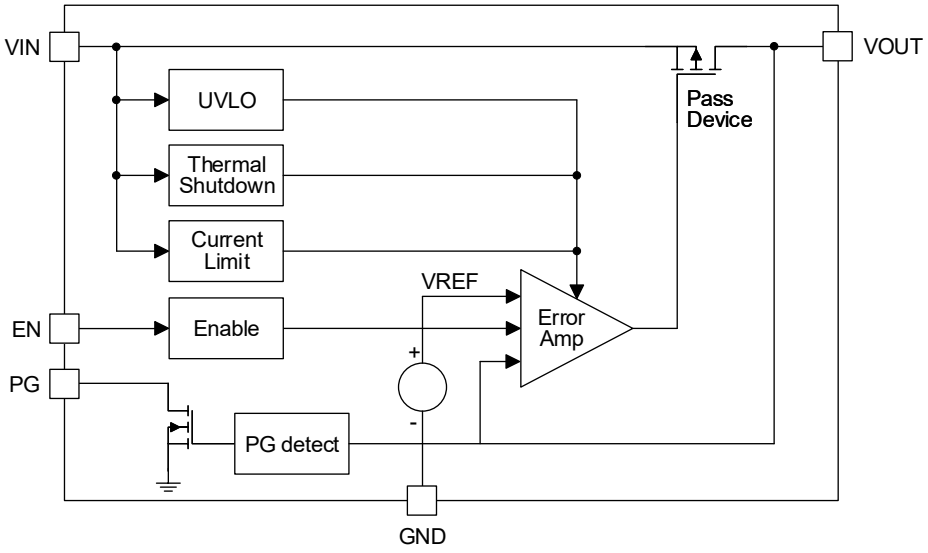
Note: PD, θJA Tested with the exposed GND pad on 50mm * 50mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.

Electrical Characteristics

TJ = 25°C , V_{IN} = 48V , Unless otherwise noted.

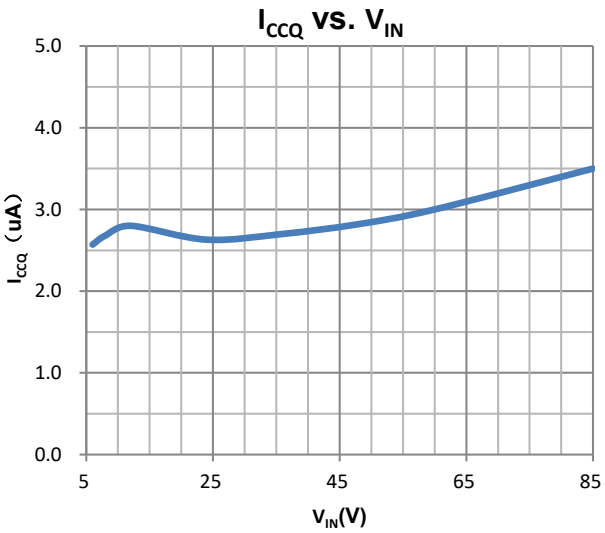
Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Input Voltage	V_{IN}		4	-	85	V
Output Voltage	V_{OUT}	33 Device, I_{OUT} = 5mA	3.234	3.3	3.366	V
		50 Device, I_{OUT} = 5mA	4.90	5	5.10	V
		12 Device, I_{OUT} = 5mA	11.76	12	12.24	V
UVLO Voltage	V_{UVLO}	V_{IN} Rising		3.8	3.9	V
UVLO Hysteresis				0.4		V
Quiescent Current	I_{CCQ}	No Load		3.0	5.0	μA
Shutdown Current	I_{SD}	V_{EN} = 0V		1.1	1.5	μA
Power Supply Rejection Ratio	P_{SRR}	I_{OUT} = 15mA, C_{OUT} = 10uF, f = 100Hz		60		dB
Maximum Output Current	I_{MAX}	V_{IN} = 24V		80		mA
Current Limit	I_{LIMIT}			100		mA
Short Circuit Current	I_{SHORT}	V_{OUT} = 0V		100		mA
Dropout Voltage	V_{DROP}	33 Device, I_{OUT} = 50mA		400		mV
		50 Device, I_{OUT} = 50mA		40		mV
		12 Device, I_{OUT} = 50mA		40		mV
Enable Internal Pull Up Voltage	V_{EN}			3.5		V
Enable On Voltage	V_{EN_H}	V_{EN} Rising	1			V
Enable Off Voltage	V_{EN_L}	V_{EN} Droping			0.3	V
PG Output Low Voltage	V_{PG_L}	I_{PG} = 5mA		30		mV
PG Pull Down Off Voltage	V_{OUT_PGH}	33 Device, V_{OUT} Droping		2.8		V
		50 Device, V_{OUT} Droping		4.3		V
		12 Device, V_{OUT} Droping		10		V
Thermal Shutdown Temperature	T_{SD}			150		°C
Thermal Shutdown Hysteresis Temperature	T_{SH}			30		°C

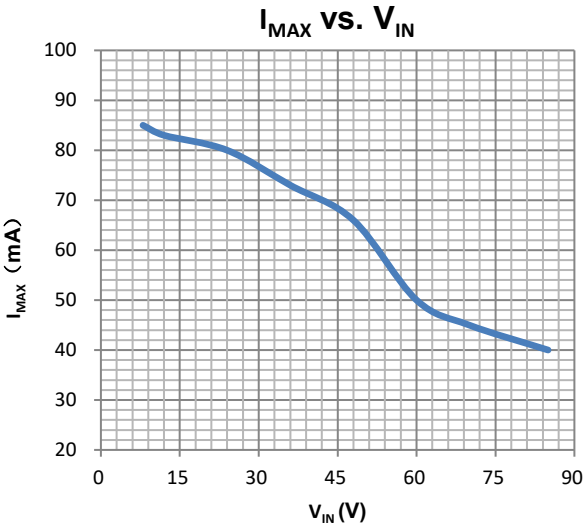
Block Diagram

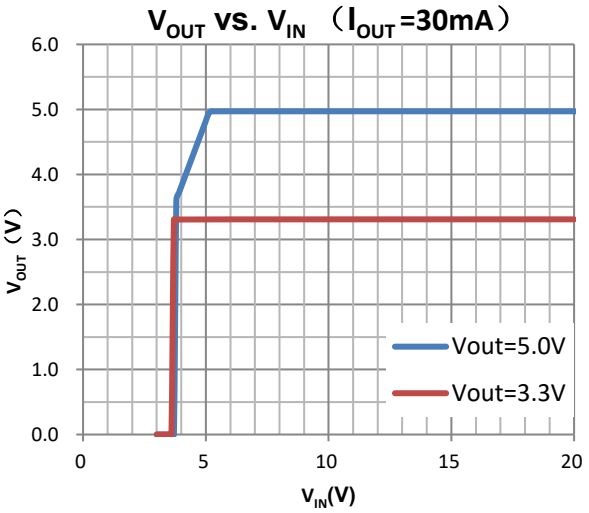


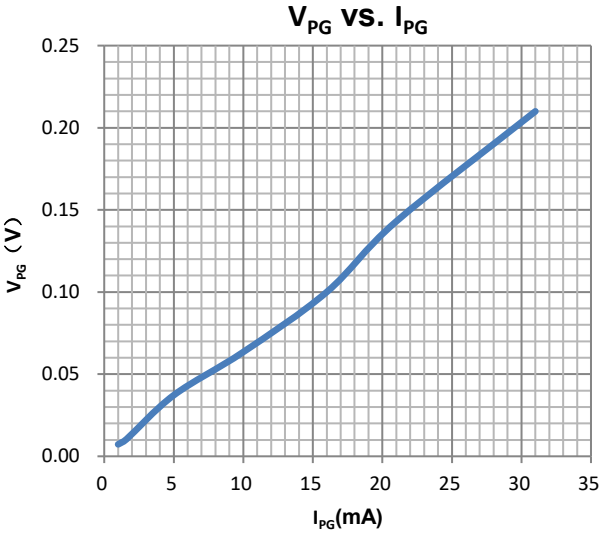
Typical Performance Characteristics

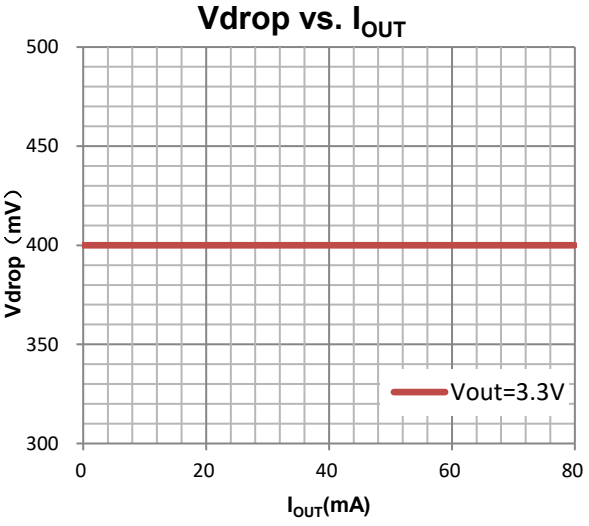
TJ = 25°C, V_{IN} = 48V , Unless otherwise noted.

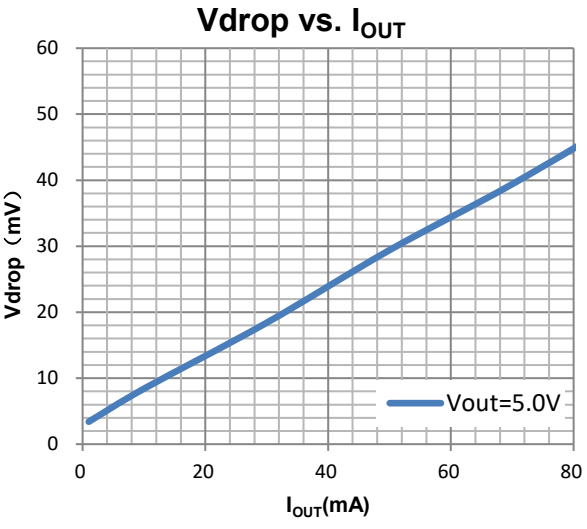


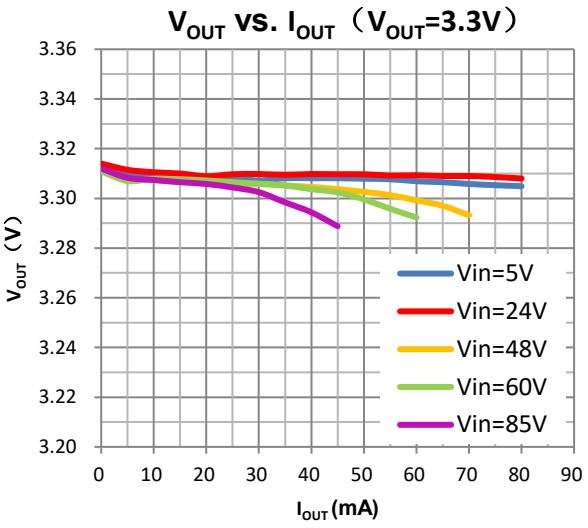


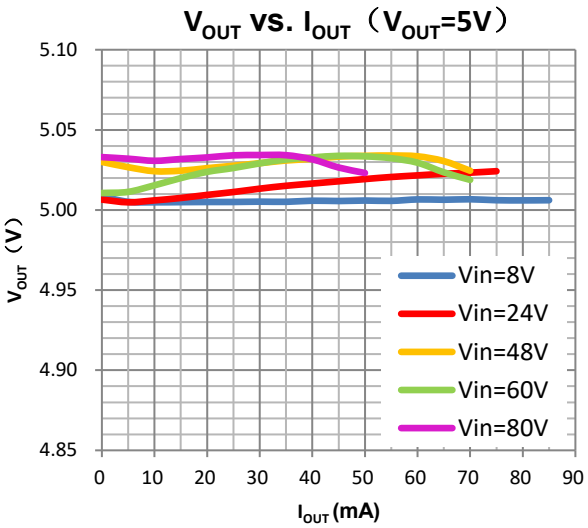


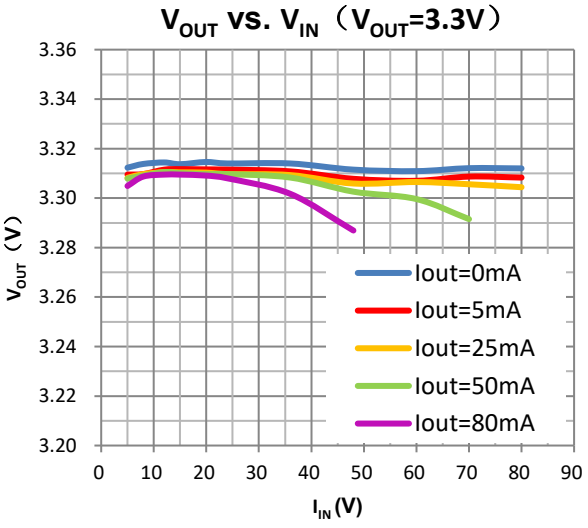


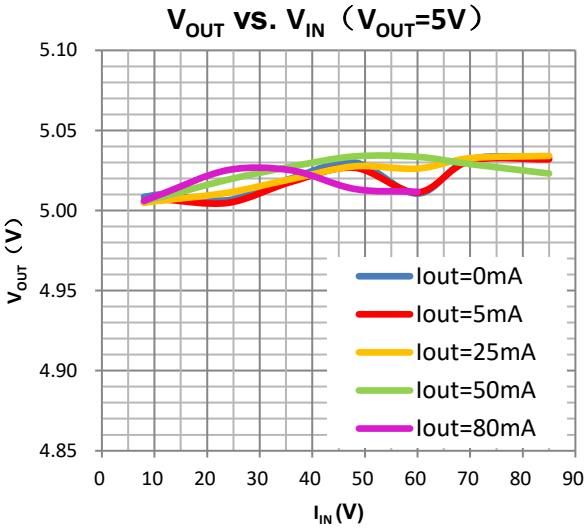


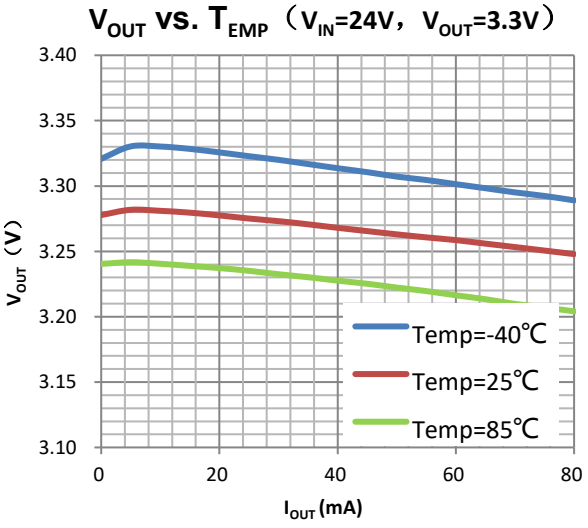


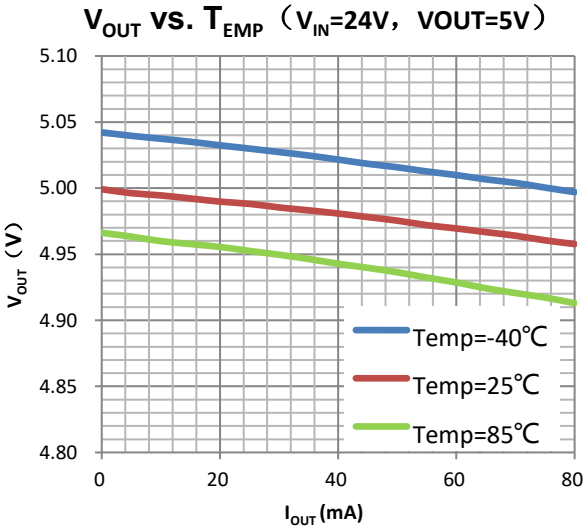

VOUT vs. IOUT（VOUT=3.3V）
VOUT（V）
IOUT (mA)
Vin=5V
Vin=24V
Vin=48V
Vin=60V
Vin=85V

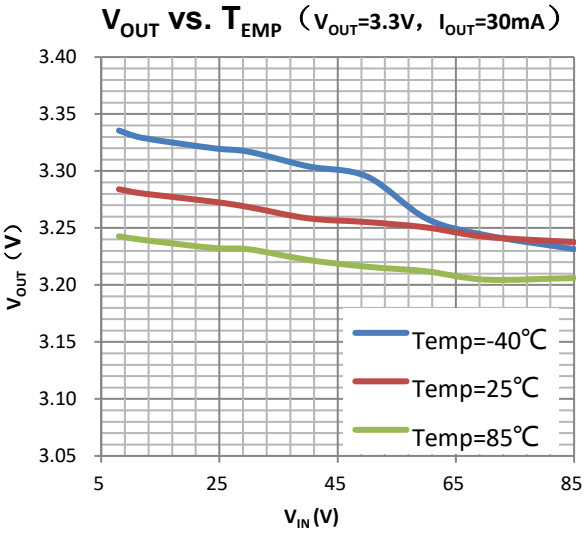

VOUT vs. IOUT（VOUT=5V）
VOUT（V）
IOUT (mA)
Vin=8V
Vin=24V
Vin=48V
Vin=60V
Vin=80V

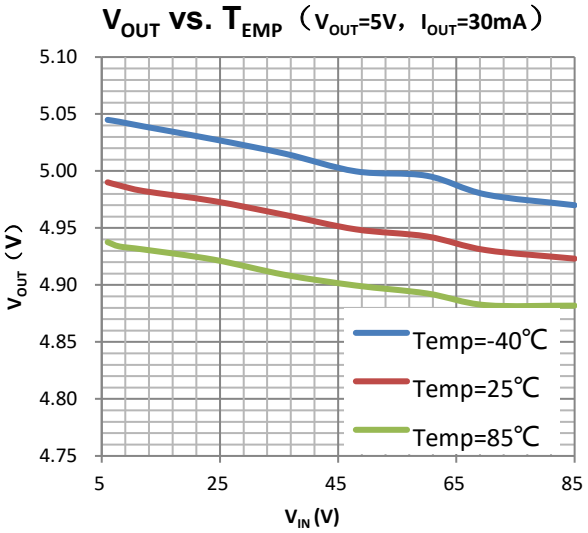

VOUT vs. VIN（VOUT=3.3V）
VOUT（V）
IIN (V)
Iout=0mA
Iout=5mA
Iout=25mA
Iout=50mA
Iout=80mA

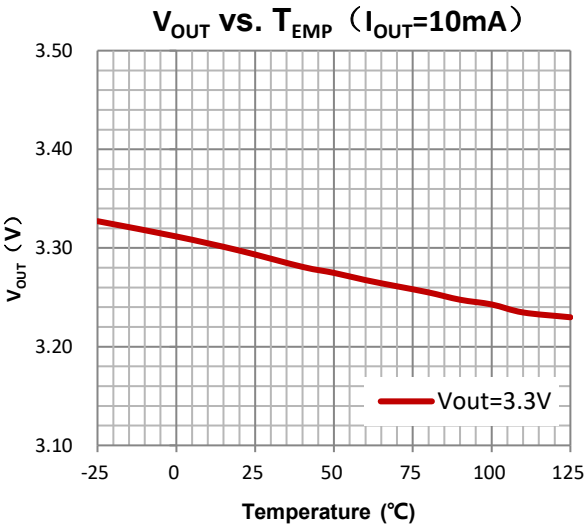

VOUT vs. VIN（VOUT=5V）
VOUT（V）
IIN (V)
Iout=0mA
Iout=5mA
Iout=25mA
Iout=50mA
Iout=80mA

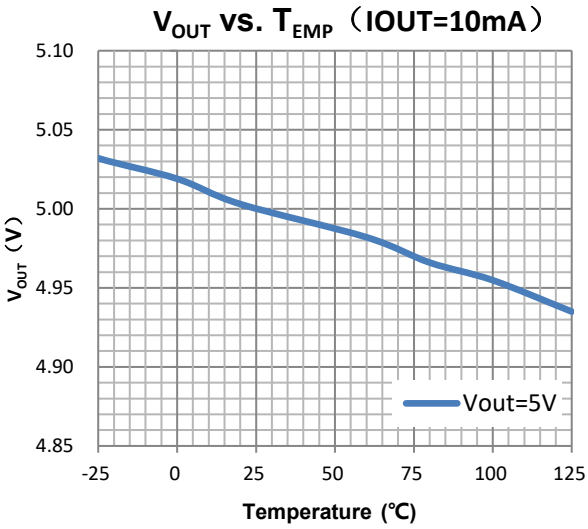

VOUT vs. TEMP（VIN=24V，VOUT=3.3V）
VOUT（V）
IOUT (mA)
Temp=-40℃
Temp=25℃
Temp=85℃


VOUT vs. TEMP（VIN=24V，VOUT=5V）
VOUT（V）
IOUT (mA)
Temp=-40℃
Temp=25℃
Temp=85℃


VOUT vs. TEMP（VOUT=3.3V，IOUT=30mA）
3.40
3.35
3.30
3.25
3.20
3.15
3.10
3.05
VOUT（V）
5
25
45
65
85
VIN (V)
Temp=-40℃
Temp=25℃
Temp=85℃


VOUT vs. TEMP（VOUT=5V，IOUT=30mA）
5.10
5.05
5.00
4.95
4.90
4.85
4.80
4.75
VOUT（V）
5
25
45
65
85
VIN (V)
Temp=-40℃
Temp=25℃
Temp=85℃


VOUT vs. TEMP（IOUT=10mA）
3.50
3.40
3.30
3.20
3.10
VOUT（V）
-25
0
25
50
75
100
125
Temperature (℃)
Vout=3.3V


VOUT vs. TEMP（IOUT=10mA）
5.10
5.05
5.00
4.95
4.90
4.85
VOUT（V）
-25
0
25
50
75
100
125
Temperature (℃)
Vout=5V

Operation

The AS58XX serious is a very high voltage tolerant linear regulator，it is designed for use in high-voltage applications where standard linear regulators cannot be used. This function is fully integrated into a SOT89 package, minimizing PCB area and reducing number of components when compared with a multi-chip discrete solution.

Current Limit

The fixed internal current limit of the AS58XX device helps protect the regulator during fault conditions. The maximum amount of current the device can source is the current limit (80mA, typical). For reliable operation, the device does not operate in current limit for extended periods of time.

Dropout Operation

If the input voltage is lower than the nominal output voltage plus the specified dropout voltage, but all other conditions are met for normal operation, the device operates in dropout mode. In this mode of operation, the output voltage is the same as the input voltage minus the dropout voltage. The transient performance of the device is significantly degraded because the pass device is in saturation and no longer controls the current through the LDO. Line or load transients in dropout can result in large output voltage deviations.

Power Good Instructions

PG is an open-collector flag that indicates output voltage regulation. PG pulls down if output voltage is above 0.85*VOUT. If the power good functionality is not needed, float the PG pin.

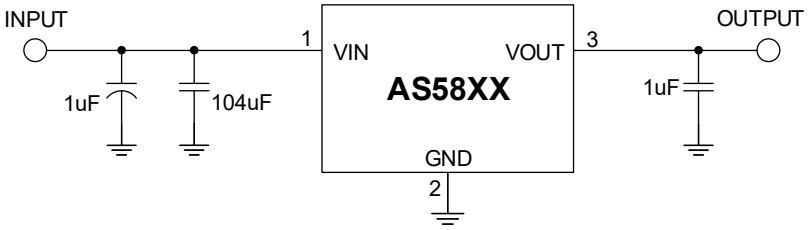
Input / Output Capacitor Requirements

The AS58XX device linear regulator achieves stability with a minimum output capacitance of 10μF and input capacitance of 1μF. Low equivalent series resistance (ESR) capacitors should be used for the input, output, and bypass capacitors. Ceramic capacitors with X7R and X5R dielectrics are required. Ceramic X7R capacitors offer improved voltage and temperature coefficients, while ceramic X5R capacitors are the most cost-effective and are available in higher values.

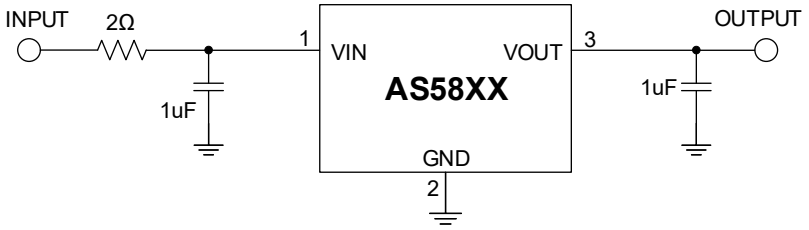
Thermal Protection

Thermal protection disables the output when the junction temperature rises to approximately 150°C, allowing the device to cool. When the junction temperature cools to approximately 120°C, the output circuitry is enabled. Depending on power dissipation, thermal resistance, and ambient temperature, the thermal protection circuit may cycle on and off. This cycling limits the dissipation of the regulator, protecting it from damage as a result of overheating.

Typical Applications



SOP89-3 Typical Application NO.1

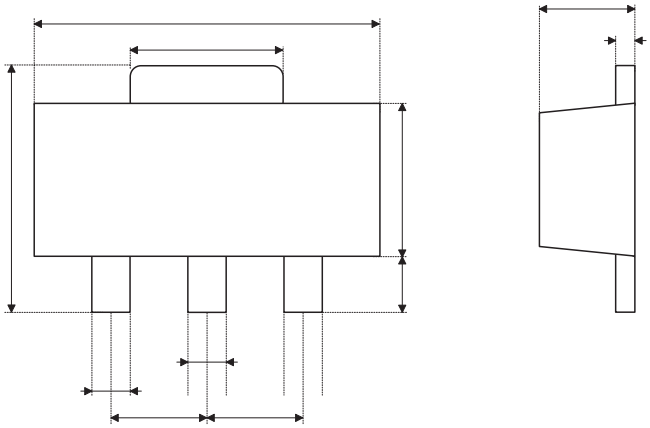


SOP89-3 Typical Application NO.2

Note: When using a solid or ceramic input cap make sure the transient input voltage does not exceed 85V.

Package Description

SOT89-3



符号	尺寸 (单位：inch)		
	最小	正常	最大
A	0.173	—	0.181
B	0.059	—	0.072
C	0.090	—	0.102
D	0.035	—	0.047
E	0.155	—	0.167
F	0.014	—	0.019
G	0.017	—	0.022
H	—	0.059	—
I	55	—	63
J	14	—	17

符号	尺寸 (单位：mm)		
	最小	正常	最大
A	4.39	—	4.60
B	1.50	—	1.83
C	2.29	—	2.59
D	0.89	—	1.19
E	3.94	—	4.24
F	0.36	—	0.48
G	0.43	—	0.56
H	—	1.50	—
I	1.40	—	1.60
J	0.36	—	0.43