HL82XX Series150mA
High Voltage Low Power Consumption LDO
CMOS Voltage Regulator

HL82XX is a high voltage (up to 40V) low power low dropout voltage regulator (LDO) manufactured in CMOS processes. It can deliver up to 150mA of current while consuming only 2.5μA of quiescent current. It consists of a reference voltage generator, an error amplifier, a current foldback circuit, and a phase compensation circuit plus a driver transistor.

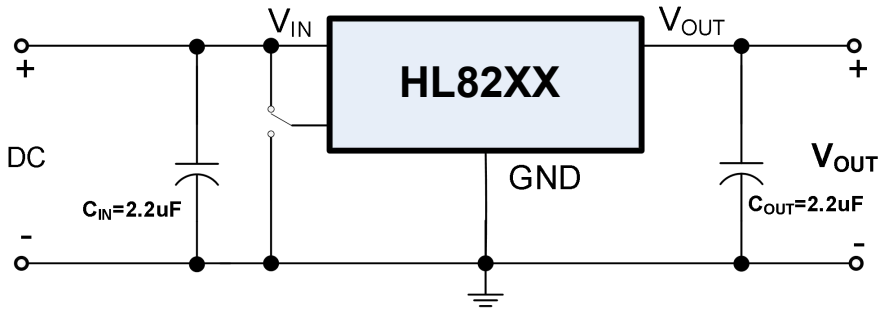
■ Features

- Ultra-low Quiescent Current: 2.5μA
- Maximum Input Voltage: 40V
- Output Voltage Highly Accurate: ±2%
- Maximum Output Current: 150mA
- Dropout Voltage: 8mV@I_{OUT}=1mA
- Temperature Stability: ±50ppm/℃
- Protections Circuits: Current Limiter, Thermal shutdown
- Output Capacitor: Low ESR Ceramic Capacitor Compatible

■ Applications

- Automotive electronics
- Long-life battery-powered devices
- Portable mobile devices, such as mobile phones, cameras, and so on
- Wireless communication equipment
- Smart electric meter
- Industrial control

■ Typical Applications

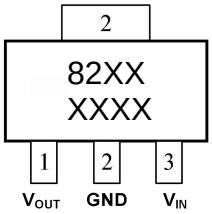


■ Notes on Use

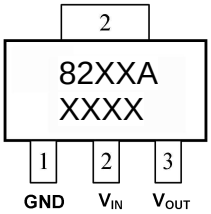
1.Input Capacitor (C_{IN}): 2.2μF above.
2.Output Capacitor (C_{OUT}): 2.2μF above.

■ Pin Configuration and Functions

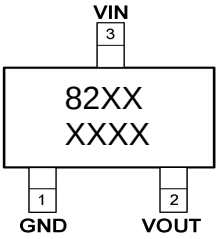
SOT89-3L
Top View



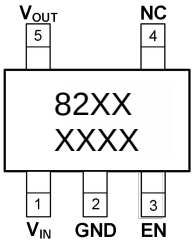
SOT89-3L(A_Type)
Top View



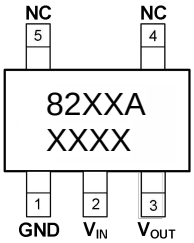
SOT23-3L
Top View



SOT23-5L
Top View



SOT23-5L
Top View



■ Product Selections

Product Name	V_{OUT} (V)	Package	Ordering Name	Marking	Package Information
HL8233	3.3	SOT23-5L	HL82E33QC3	8233 XXXX	Tape and Reel, 3000pcs
HL8250	5.0	SOT23-5L	HL82E50QC3	8250 XXXX	
HL8233A	3.3	SOT23-5L	HL82A33QC3	8233A XXXX	
HL8250A	5.0	SOT23-5L	HL82A50QC3	8250A XXXX	
HL8225	2.5	SOT23-3L	HL82E25QA3	8225 XXXX	
HL8230	3.0	SOT23-3L	HL82E30QA3	8230 XXXX	
HL8233	3.3	SOT23-3L	HL82E33QA3	8233 XXXX	
HL8244	4.4	SOT23-3L	HL82E44QA3	8244 XXXX	
HL8250	5.0	SOT23-3L	HL82E50QA3	8250 XXXX	
HL8255	5.5	SOT23-3L	HL82E55QA3	8255 XXXX	
HL8233	3.3	SOT89-3L	HL82E33PA1	8233 XXXX	
HL8236	3.6	SOT89-3L	HL82E36PA1	8236 XXXX	

Product Name	V_{OUT} (V)	Package	Ordering Name	Marking	Package Information
HL8240	4.0	SOT89-3L	HL82E40PA1	8240 XXXX	Tape and Reel, 1000pcs
HL8244	4.4	SOT89-3L	HL82E44PA1	8244 XXXX	
HL8250	5.0	SOT89-3L	HL82E50PA1	8250 XXXX	
HL8253	5.3	SOT89-3L	HL82E53PA1	8253 XXXX	
HL8257	5.7	SOT89-3L	HL82E57PA1	8257 XXXX	
HL8225A	2.5	SOT89-3L	HL82A25PA1	8225A XXXX	
HL8230A	3.0	SOT89-3L	HL82A30PA1	8230A XXXX	
HL8233A	3.3	SOT89-3L	HL82A33PA1	8233A XXXX	
HL8236A	3.6	SOT89-3L	HL82A36PA1	8236A XXXX	
HL8240A	4.0	SOT89-3L	HL82A40PA1	8240A XXXX	
HL8244A	4.4	SOT89-3L	HL82A44PA1	8244A XXXX	
HL8250A	5.0	SOT89-3L	HL82A50PA1	8250A XXXX	

Notes: 1* Customer can request to customize the output voltage ranged from 2V to 5V if desired voltage is not found in the selections.

2* Customer can request customization of package choice.

3* Please pay attention to the MARKING of the product package type

■ Absolute Maximum Ratings (Unless otherwise indicated: T_a=25℃)

PARAMETER	SYMBOL	RATINGS		UNITS
Input Voltage	V_{IN}	-0.3 ~ 45		V
Output Voltage	V_{OUT}	Vss-0.3 ~ VIN+0.3V		
Power Dissipation	P_D	SOT23-3L	250	mW
		SOT23-5L	250	
		SOT89-3L	1000	
Thermal Resistance	$R_{\theta JA}$	SOT23-3L	200	℃/W
		SOT23-5L	180	
		SOT89-3L	100	
Operating Ambient Temperature	T_{opr}	-40 ~ +85		℃
Storage Temperature	T_{stg}	-40 ~ +125		
ESD Protection	ESD HBM	4500		V
	ESD CDM	1000		

Note: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

■ Pin Configuration and Functions

HL82XXSeries (Unless otherwise indicated：T_a=25℃)

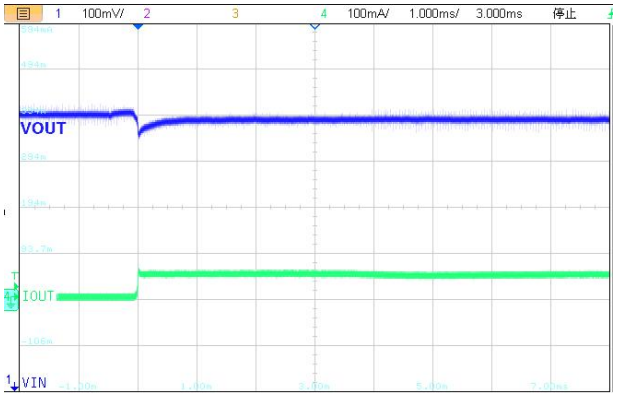
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{OUT(S)}$*1	$V_{IN}=V_{OUT(S)}+2V$ I_{OUT}=10mA	$V_{OUT(S)}\times0.98$	$V_{OUT(S)}$	$V_{OUT(S)}\times1.02$	V
Dropout Voltage*2	V_{DROP}	$V_{IN}=V_{OUT(S)}+2V$ I_{OUT}=1mA		8		mV
		$V_{IN}=V_{OUT(S)}+2V$ I_{OUT}=150mA		1200	1800	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN}\bullet V_{OUT(S)}}$	$V_{OUT(S)}+2V\leq V_{IN}\leq40V$ I_{OUT}=1mA		0.01	0.1	%/V
Load Regulation	ΔV_{OUT2}	$V_{EN}=V_{IN}=V_{OUT(S)}+2V$ 1mA≤I_{OUT}≤150mA		40	80	mV
Temperature Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN}\bullet V_{OUT(S)}}$	$V_{IN}=V_{OUT(S)}+2V$ I_{OUT}=1mA -40℃≤T_a≤125℃		±50		ppm/℃
GND Current	I_{GND}	no load		2.5	4	μA
Input Voltage	V_{IN}	---	2.2		40	V
Maximum Output Current	I_{OUTMAX}	$V_{IN}=V_{OUT(S)}+2.0V$	150			mA
Current Limit*3	I_{LIM}	$V_{IN}=V_{OUT(S)}+2.0V$ V_{OUT} = 0.9 ×$V_{OUT(S)}$		250		mA
Power Supply Rejection Ratio	PSRR	f=100Hz, I_{OUT}=10mA		70		dB
		f=1kHz, I_{OUT}=10mA		73		
		f=10kHz, I_{OUT}=10mA		77		
		f=100kHz, I_{OUT}=10mA		72		
EN"H"Level Voltage	V_{ENH}		1.5		40	V
EN"L"Level Voltage	V_{ENL}		0		0.3	
EN"H"Level Current	I_{ENH}	V_{IN}=40.0，$V_{EN}=V_{IN}$	-0.1		0.1	μA
EN"L"Level Current	I_{ENL}	V_{IN}=40.0，V_{EN} = 0V	-0.1		0.1	
Over Temperature Protection	OTP	I_{OUT}=1mA		170		℃

Notes:

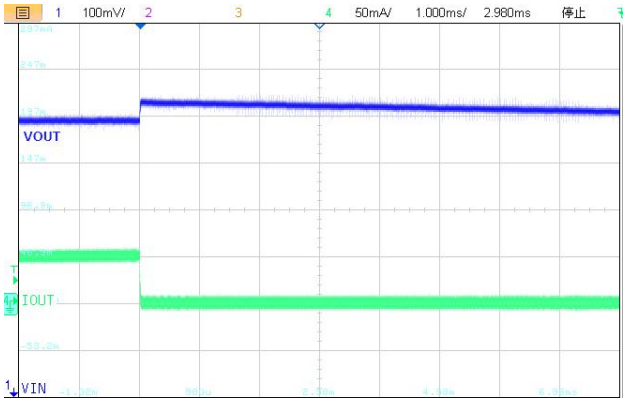
1. $V_{OUT(S)}$: Output voltage when $V_{IN}=V_{OUT}+2V$, I_{OUT}=1mA.
2. $V_{DROP}=V_{IN1}$ -（$V_{OUT(S)}\times0.98$）where V_{IN1} is the input voltage when $V_{OUT}=V_{OUT(S)}\times0.98$.
3. I_{LIM}: Output current when $V_{IN}=V_{OUT(S)}+2V$ and $V_{OUT}=0.95*V_{OUT(S)}$.

■ Typical Performance Characteristics

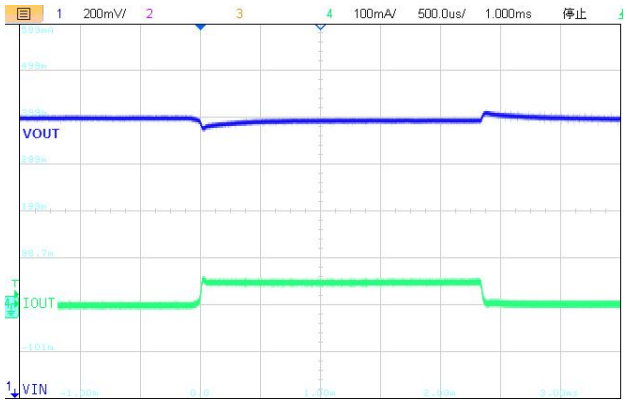
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, Ta=25℃, unless otherwise indicated.



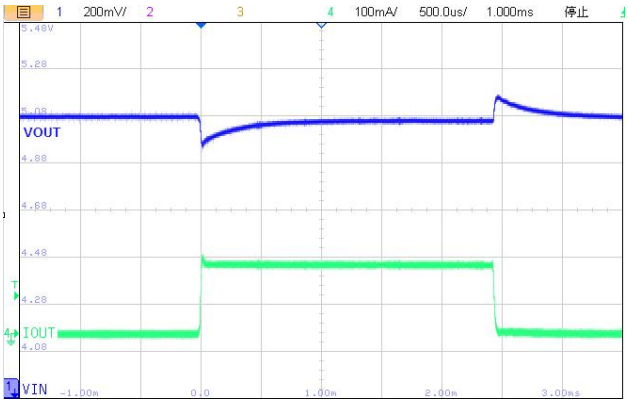
Load Transient at V_{OUT}=5.0V:
(I_{OUT}=0mA~50mA)



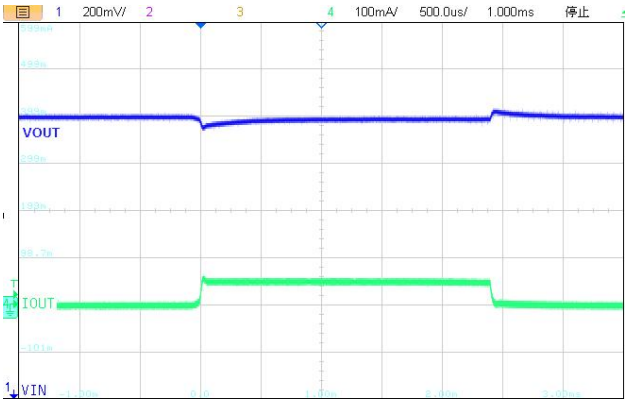
Load Transient at V_{OUT}=5.0V:
(I_{OUT}=50mA~0mA)



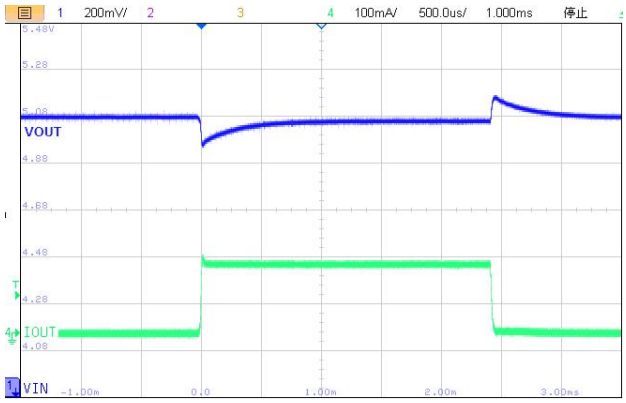
Load Transient at V_{OUT}=5.0V:
(I_{OUT}=1mA~50mA~1mA)



Load Transient at V_{OUT}=5.0V:
(I_{OUT}=1mA~150mA~1mA)



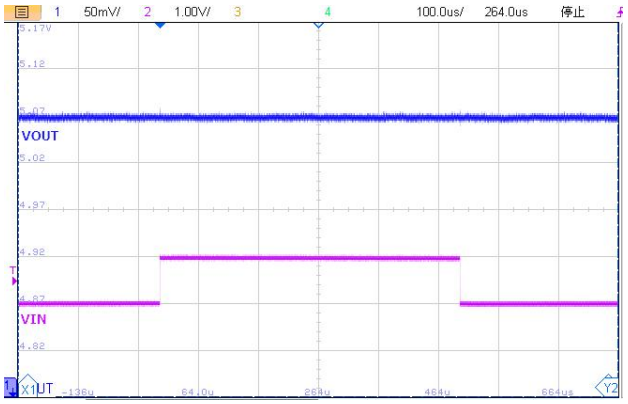
Load Transient at V_{OUT}=5.0V:
(I_{OUT}=0mA~50mA~0mA)



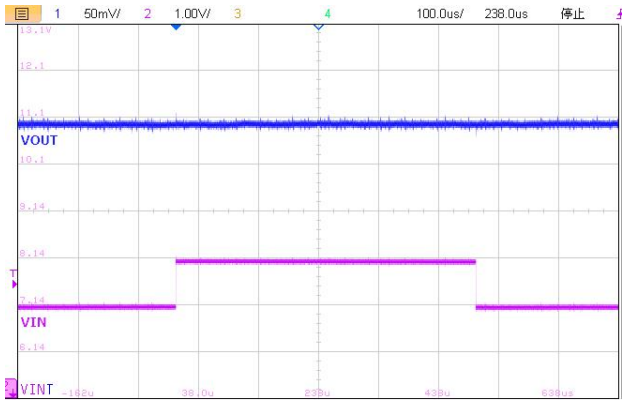
Load Transient at V_{OUT}=5.0V:
(I_{OUT}=0mA~150mA~0mA)

■ Typical Performance Characteristics (Continued)

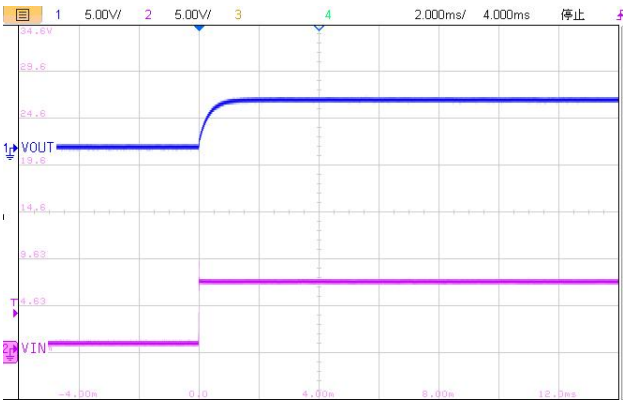
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, Ta=25℃, unless otherwise indicated.



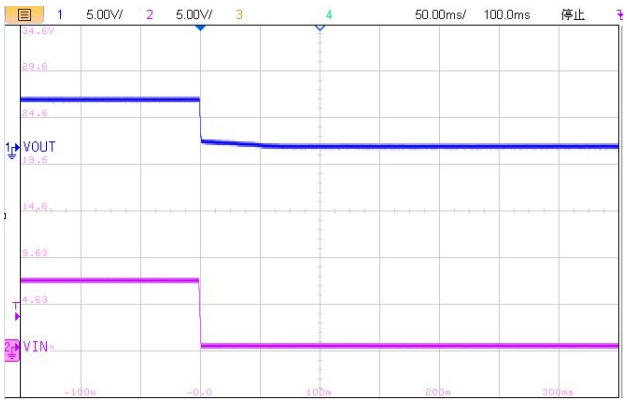
Line Transient at V_{OUT}=5.0V:
(I_{OUT}=1mA)



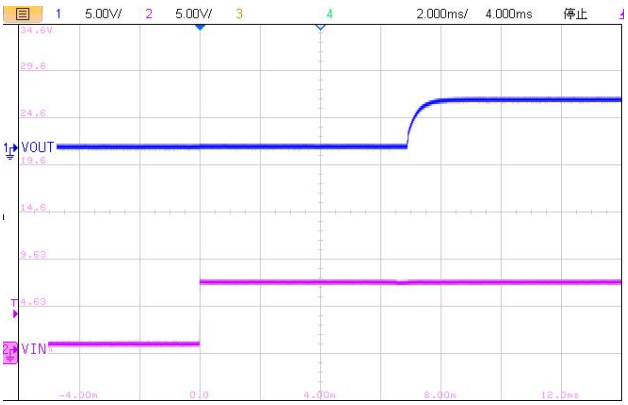
Line Transient at V_{OUT}=5.0V:
(I_{OUT}=10mA)



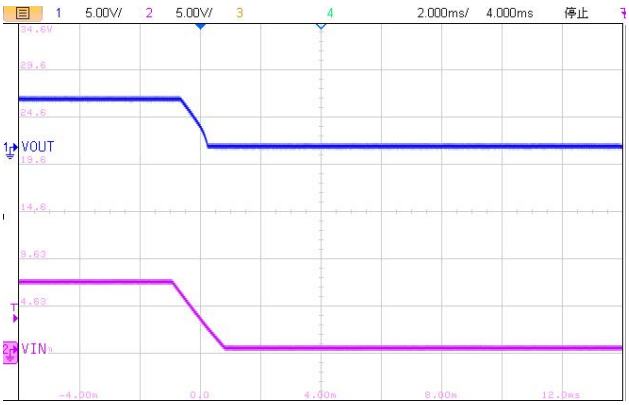
Power-Up at V_{OUT}=5.0V:
(I_{OUT}=1mA)



Power-Down at V_{OUT}=5.0V:
(I_{OUT}=1mA)



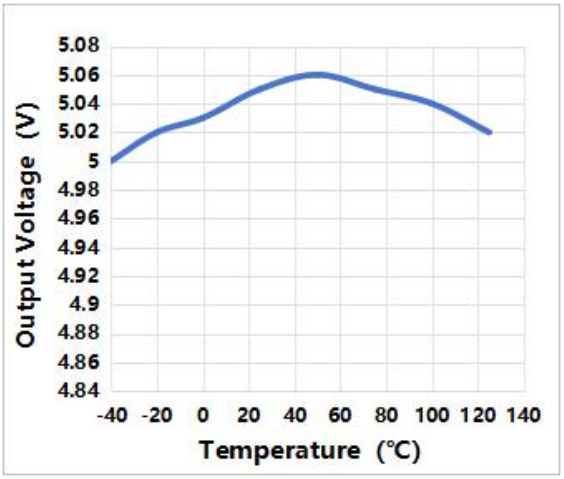
Power-Up at V_{OUT}=5.0V:
(I_{OUT}=150mA)



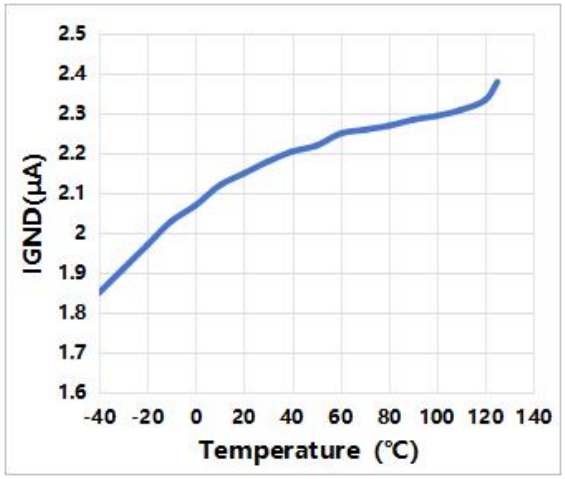
Power-Down at V_{OUT}=5.0V:
(I_{OUT}=150mA)

■ Typical Performance Characteristics (Continued)

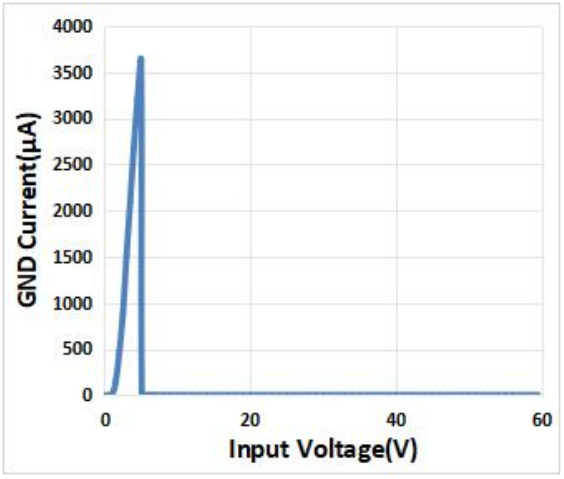
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, T_A=25℃, unless otherwise indicated.



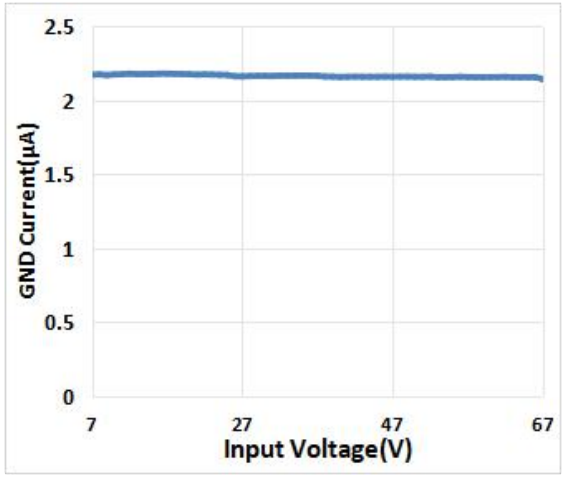
Output Voltage vs. Temperature at V_{OUT}=5.0V



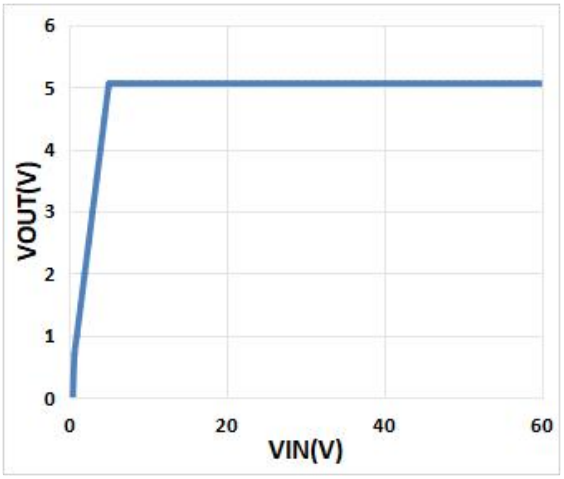
GND Current vs. Temperature atV_{OUT}=5.0V



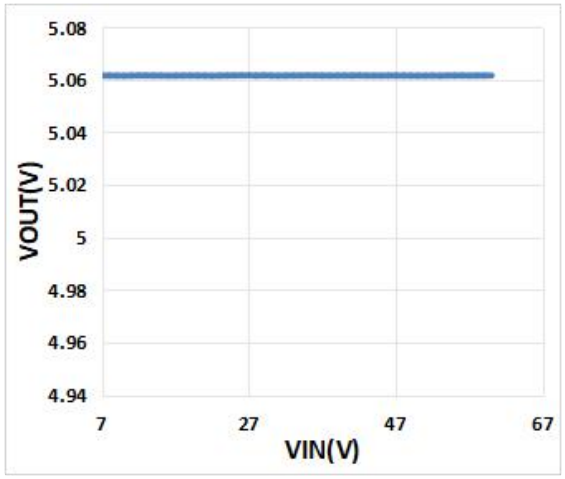
GND Current vs. Input Voltage at V_{OUT}=5.0V



GND Current vs. Input Voltage at V_{OUT}=5.0V



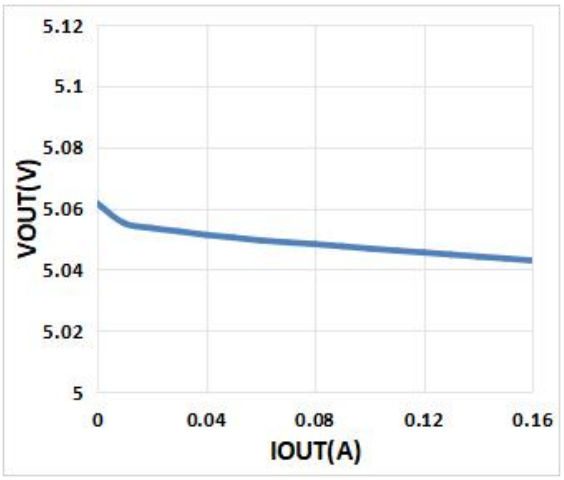
Output Voltage vs. Input Voltage at V_{OUT}=5.0V



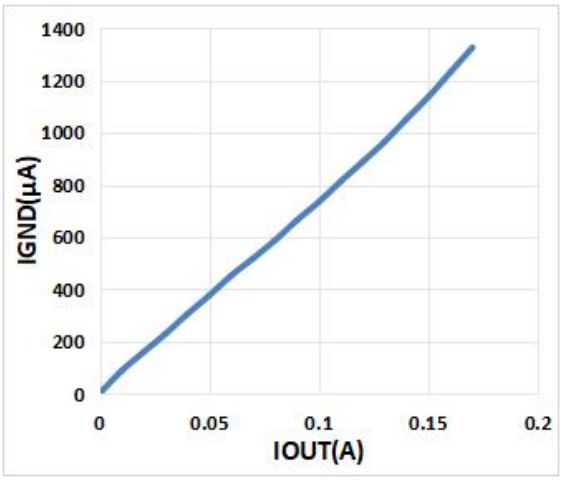
Output Voltage vs. Input Voltage at V_{OUT}=5.0V

■ Typical Performance Characteristics (Continued)

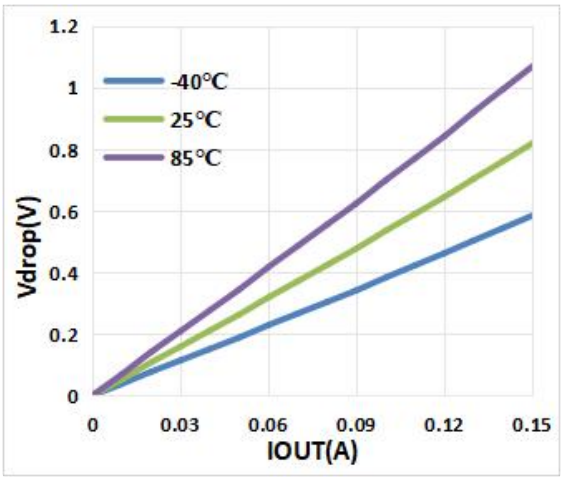
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, T_A=25℃, unless otherwise indicated.



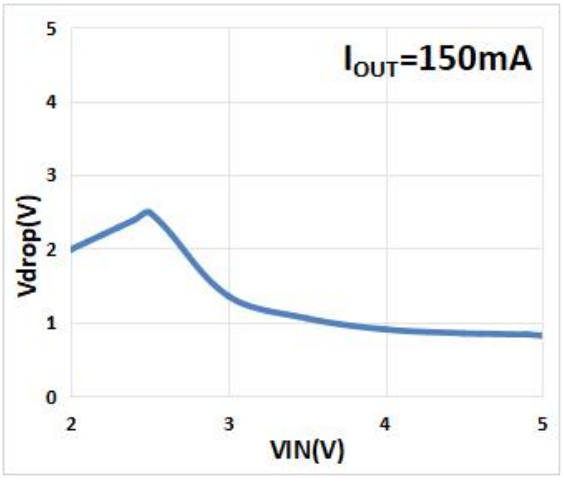
Output Voltage vs Output Current at VOUT=5.0V



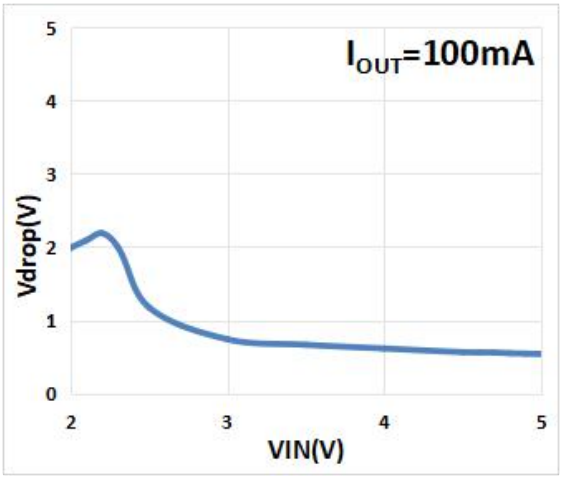
GND Current vs Output Current at VOUT=5.0V



Dropout Voltage vs. Output Current at VOUT=5.0V



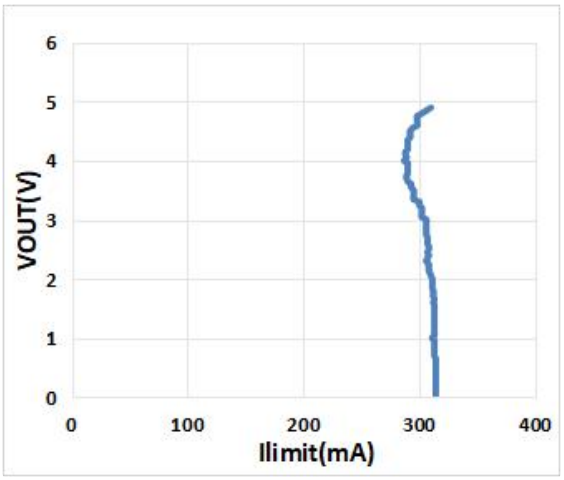
Vdrop vs. Input Voltage at VOUT=5.0V



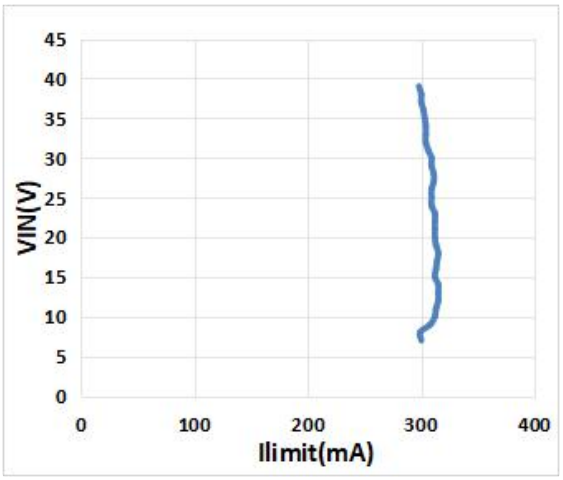
Vdrop vs. Input Voltage at VOUT=5.0V

■ Typical Performance Characteristics (Continued)

Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, T_A=25℃, unless otherwise indicated.



V_{OUT} vs. Ilimit at V_{OUT}=5.0V

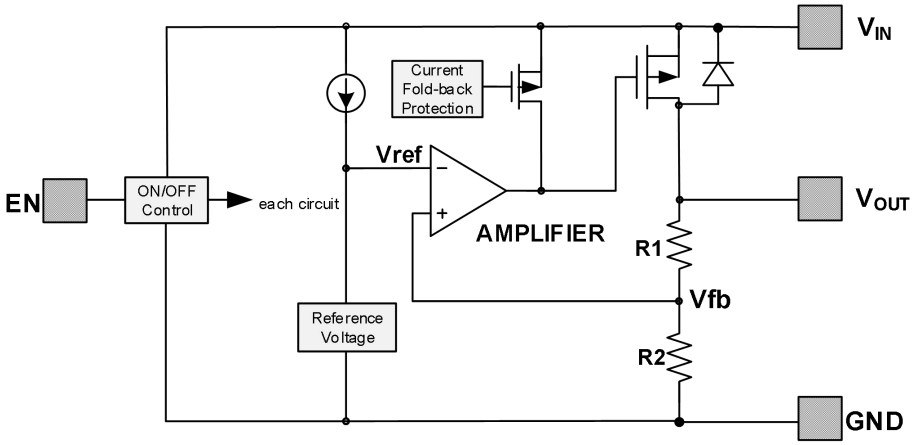


V_{IN} vs. Ilimit at V_{OUT}=5.0V

■ Operational Explanation

1.Output voltage control

The voltage divided by resistors R1 and R2 is compared with the internal reference voltage by the error amplifier. The amplifier output then drives the P-channel MOSFET connected to the V_{OUT} pin. The output voltage at the V_{OUT} pin is regulated by this negative feedback system. The current limit circuit and short protect circuit operate in relation to output current level.



2.Pass transistor

The pass transistor with low turn-on resistance used in HL82XXis a P-channel MOSFET. If the potential on V_{OUT} pin is higher than V_{IN}, it is possible that IC will be destroyed due to reverse current which is caused by parasitic diodes between V_{IN} and V_{OUT}. Therefore, the V_{OUT} pin potential exceeds V_{IN}+0.3V is not allowed.

3.Current Limiter, over temperature protection

The HL82XXseries has the option of current limiting protection to protect the output transistors in the event of a short circuit between the V_{OUT} and GND terminals. The guard can inhibit the output current by about 300mA (typical), even in the case of a short circuit between the V_{OUT} and GND terminals. In this case, it is easy to make the chip temperature rise beyond the heat dissipation limit, and the overtemperature protection circuit triggers and turns off the output current until the chip temperature. The chip automatically restarts after the degree drops to a certain value.

Special attention should be paid to that the product of the dropout voltage on the chip and the output current must be smaller than the heat dissipation. If power consumption on the chip is more than the heat dissipation, OTP will protect the chip from damaging due to over temperature.

4.Input capacitance(C_{IN})

Stable input voltage: Provide a stable input current for the converter to ensure that the input voltage (V_{IN}) remains constant when the load changes, avoiding voltage fluctuations caused by transient current surges.

Improve response speed: By quickly charging and discharging to respond to sudden load changes, shorten the adjustment time of the control loop, and enhance system stability.

Input Capacitor (C_{IN}): 2.2μF above.

5.Output capacitance(C_{OUT})

Suppress output ripple: Absorb the current fluctuations caused by high-frequency switching operations, and control the output voltage ripple within a safe range.

Support transient response: When the load switches from standby to full-speed operation, quickly release or store charges to compensate for the response delay of the control loop, preventing voltage drops or overshoots.

Output Capacitor (C_{OUT}): 2.2μF above.

■ Notes:

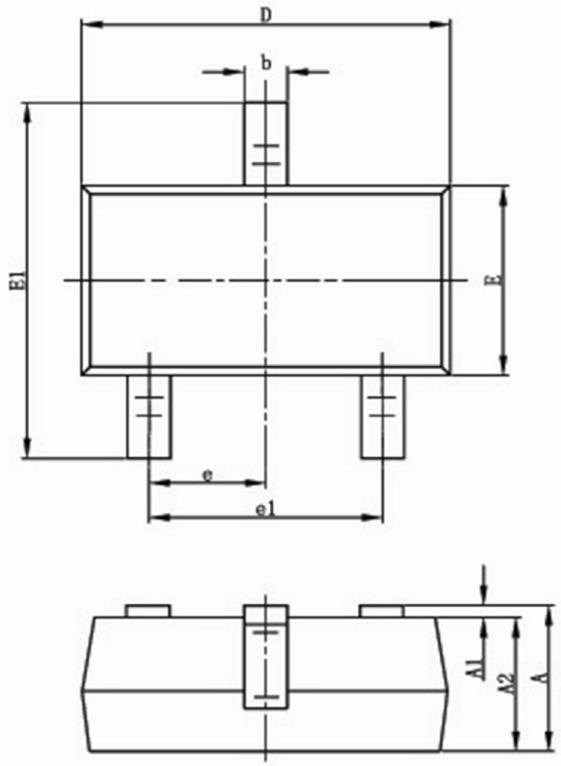
1. The input and output capacitors should be placed as close as possible to the IC.
2. If the impedance of the power supply is high, which is caused by forgetting installing input capacitor or installing too small value capacitor, the oscillation may occur.
3. Pay attention to the operation conditions of input and output voltage and load current, such that the power consumption in the IC should not exceed the allowable power consumption of the package even though the chip has short circuit protection.
4. IC has a built-in anti-static protection (ESD) circuit, but please do not add excessive stress to the IC.

■ Revision History:

VERSION	Change Date	Change Item
Rev.1.0	2025/08/01	1.Update Marking
Rev.1.1	2025/09/17	1.Update the pin definition of SOT23-3

■ Packaging Information

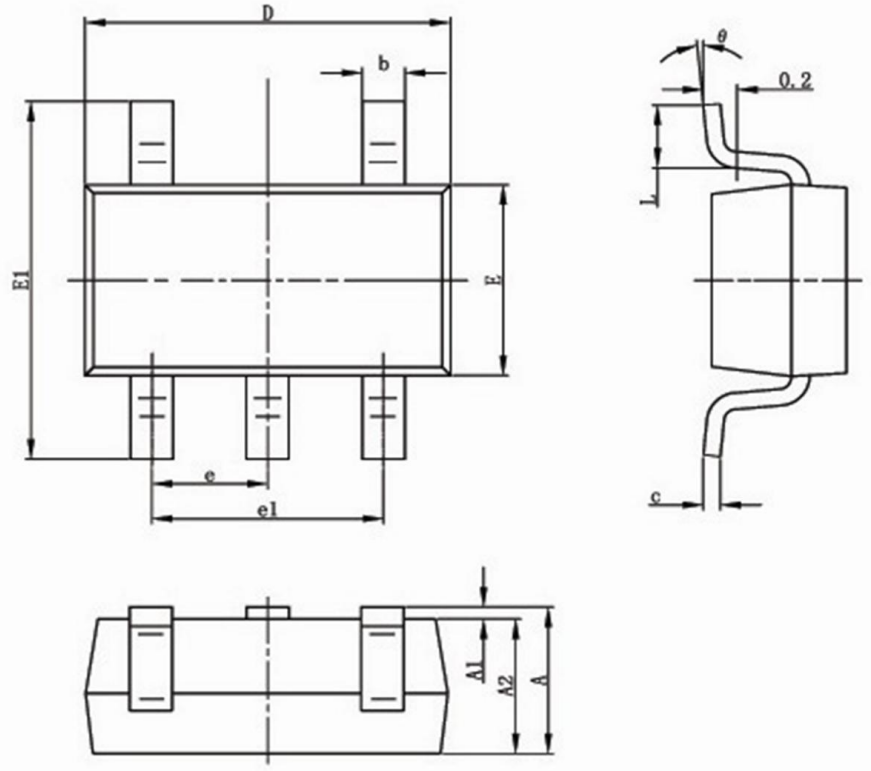
SOT-23-3L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

■ Packaging Information (Continued)

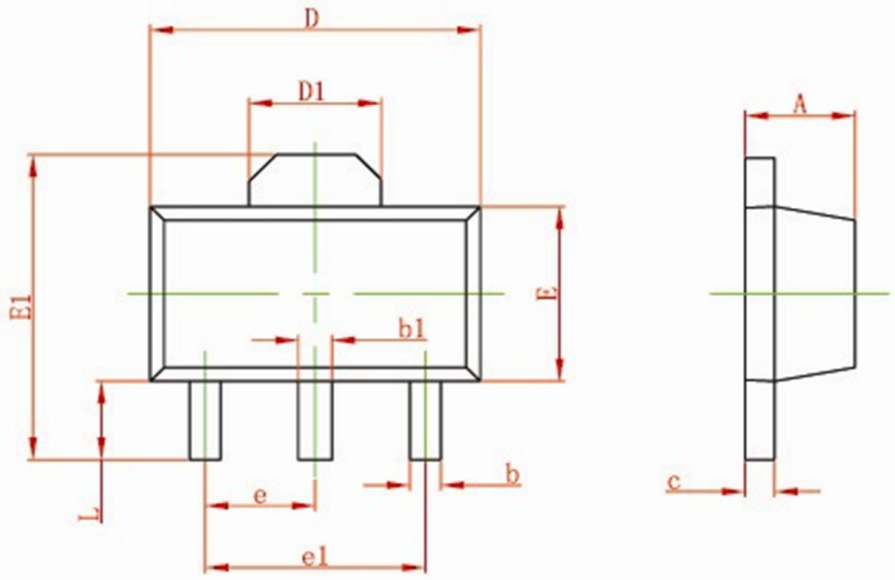
SOT-23-5L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

■ Packaging Information (Continued)

SOT-89-3L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.200	0.035	0.047

For the newest datasheet, please see the website:

Version Rev.1.1 20250917