HL85XXSeries300mA
High Voltage Low Power Consumption LDO
CMOS Voltage Regulator

HL85XXis a high voltage low power low dropout voltage regulator (LDO) manufactured in CMOS processes. It can deliver up to 300mA of current while consuming only 2.4μA of quiescent current , at the same time with high input voltage capacity it can be up to 40V, suitable for applications which requires higher voltage circuit.

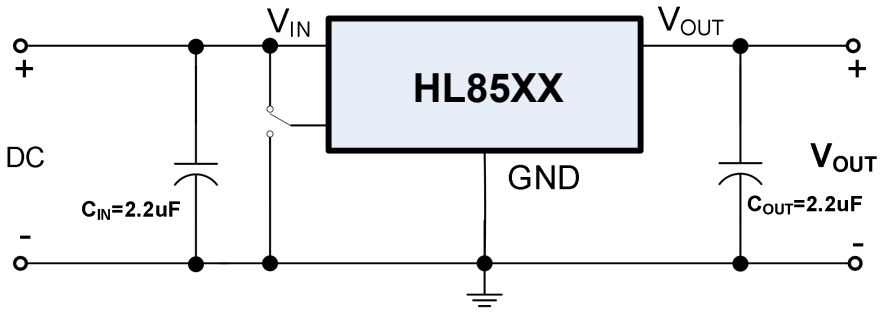
■ Features

- Output Voltage Highly Accurate: ±2%
- Dropout Voltage:4.5mV@I_{OUT}=1mA
- Low Quiescent Current: 2.4μA
- Temperature Stability: ±100ppm/℃
- Maximum Input Voltage: 40V
- Current Limit Protection
- Thermal Shutdown Protection

■ Applications

- Automotive electronics
- Intelligent meters and instruments
- Industrial control

■ Typical Applications

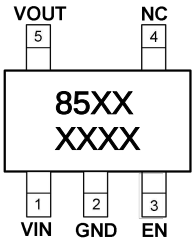


■ Notes on Use

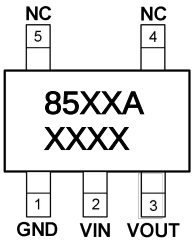
1.Input Capacitor (C_{IN}): 2.2μF above.
2.Output Capacitor (C_{OUT}): 2.2μF above.

■ Pin Configuration and Functions

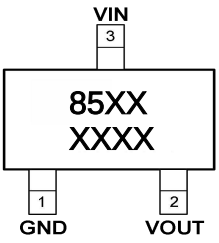
SOT23-5L
Top View



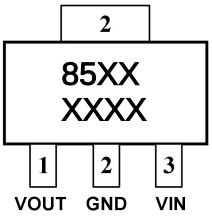
SOT23-5L(A_Type)
Top View



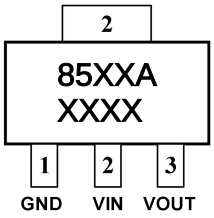
SOT23-3L
Top View



SOT89-3L
Top View



SOT89-3L(A_Type)
Top View



Note: "XXXX" in the second line of the silk print indicates the product batch number.

■ Product Selections

Product Name	V_{OUT} (V)	Package	Ordering Name	Marking	Package Information
HL8530	3.0	SOT23-5L	HL85E30QC3	8530 XXXX	Tape and Reel, 3000pcs
HL8533	3.3	SOT23-5L	HL85E33QC3	8533 XXXX	
HL8536	3.6	SOT23-5L	HL85E36QC3	8536 XXXX	
HL8550	5.0	SOT23-5L	HL85E50QC3	8550 XXXX	
HL8580	8.0	SOT23-5L	HL85E80QC3	8580 XXXX	
HL8530A	3.0	SOT23-5L	HL85A30QC3	8530A XXXX	Tape and Reel, 3000pcs
HL8533A	3.3	SOT23-5L	HL85A33QC3	8533A XXXX	
HL8536A	3.6	SOT23-5L	HL85A36QC3	8536A XXXX	
HL8550A	5.0	SOT23-5L	HL85A50QC3	8550A XXXX	
HL8530	3.0	SOT23-3L	HL85E30QA3	8530 XXXX	Tape and Reel, 3000pcs
HL8533	3.3	SOT23-3L	HL85E33QA3	8533 XXXX	
HL8535	3.5	SOT23-3L	HL85E35QA3	8535 XXXX	
HL8536	3.6	SOT23-3L	HL85E36QA3	8536 XXXX	

HL8550	5.0	SOT23-3L	HL85E50QA3	8550 XXXX	
HL8530	3.0	SOT89-3L	HL85E30PA1	8530 XXXX	Tape and Reel, 1000pcs
HL8533	3.3	SOT89-3L	HL85E33PA1	8533 XXXX	
HL8536	3.6	SOT89-3L	HL85E36PA1	8536 XXXX	
HL8540	4.0	SOT89-3L	HL85E40PA1	8540 XXXX	
HL8544	4.4	SOT89-3L	HL85E44PA1	8544 XXXX	
HL8550	5.0	SOT89-3L	HL85E50PA1	8550 XXXX	
HL8553	5.3	SOT89-3L	HL85E53PA1	8553 XXXX	
HL8557	5.7	SOT89-3L	HL85E57PA1	8557 XXXX	
HL85C0	12.0	SOT89-3L	HL85EC0PA1	85C0 XXXX	
HL85F0	15.0	SOT89-3L	HL85EF0PA1	85F0 XXXX	
HL8530A	3.0	SOT89-3L	HL85A30PA1	8530A XXX	Tape and Reel, 1000pcs
HL8533A	3.3	SOT89-3L	HL85A33PA1	8533A XXX	
HL8536A	3.6	SOT89-3L	HL85A36PA1	8536A XXXX	
HL8540A	4.0	SOT89-3L	HL85A40PA1	8540A XXXX	
HL8544A	4.4	SOT89-3L	HL85A44PA1	8544A XXXX	
HL8550A	5.0	SOT89-3L	HL85A50PA1	8550A XXXX	
HL8553A	5.3	SOT89-3L	HL85A53PA1	8553A XXX	
HL8557A	5.7	SOT89-3L	HL85A57PA1	8557A XXXX	
HL85C0A	12.0	SOT89-3L	HL85AC0PA1	85C0A XXXX	
HL85F0A	15.0	SOT89-3L	HL85AF0PA1	85F0A XXXX	

Notes:

1* Customer can request to customize the output voltage ranged from 1.8V to 15V 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: Ta=25℃）

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	VIN	-0.3 ~ 45	V
Output Voltage	VOUT	Vss-0.3 ~ VIN+0.3V	
Power Dissipation	P_D	SOT89-3 1000	mW
		SOT23-3 250	
		SOT23-5 250	
Thermal Resistance	θ_{JC}	SOT89-3 100	℃/W
		SOT23-3 200	
		SOT23-5 180	
Operating Ambient Temperature	Topr	-40 ~ +125	℃
Storage Temperature	Tstg	-55 ~ +150	
ESD Protection	ESD HBM	3000	V
	ESD CDM	2000	

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

■ Pin Configuration and Functions

HL85XX （Unless otherwise indicated: Ta=25℃）

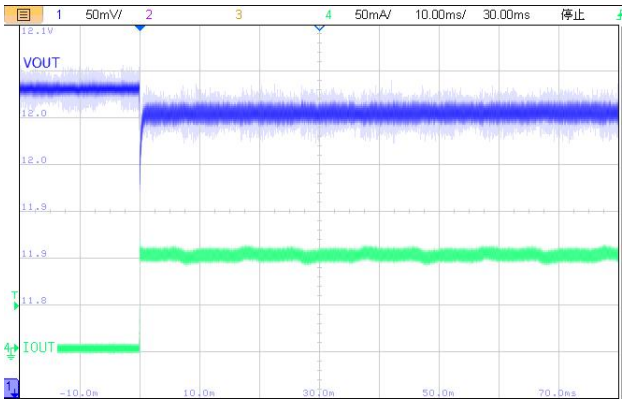
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage*1	$V_{OUT(S)}$	$V_{IN}=V_{OUT(S)}+2V$, $I_{OUT}=1mA$	$V_{OUT(S)}$* 0.98	$V_{OUT(S)}$	$V_{OUT(S)}$* 1.02	V
Output Current	I_{OUT}	$V_{IN} = V_{OUT(S)} +2V$	300			mA
Dropout Voltage*2	V_{drop}	$V_{IN}=V_{OUT(S)}+2V$ $I_{OUT}=1mA$		4.5	6	mV
		$V_{IN}=V_{OUT(S)}+2V$ $I_{OUT}=300mA$		1100	1400	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \bullet V_{OUT(S)}}$	$V_{OUT(S)}+2V \le V_{IN} \le 40V$ I_{OUT} =1mA		0.01	0.15	%/V
Load Regulation	ΔV_{OUT2}	$V_{IN} = V_{OUT(S)}+2V$ $1mA \le I_{OUT} \le 300mA$		50	70	mV
Temperature Stability		$V_{IN} = V_{OUT(S)}+2V$, $I_{OUT}=10mA$ $-40℃ \le T_a \le 125℃$			±100	ppm/℃
Quiescent Current	I_{SS}	V_{IN} =40V, no load		2.4	4	uA
Input Voltage	VIN_{max}	---	2.2		40	V
Power Supply Rejection Ratio	PSRR	f=100Hz, I_{OUT}=10mA		66		dB
		f=1kHz, I_{OUT}=10mA		72		
		f=10kHz, I_{OUT}=10mA		80		
		f=100kHz, I_{OUT}=10mA		62		
Current Limit *3	I_{LIM}	$V_{IN}= V_{OUT(S)}+3V$, $V_{OUT}= 0.9*V_{OUT(S)}$		370		mA
Over Temperature Protection	OTP	I_{OUT}=1mA		170		℃

Notes:

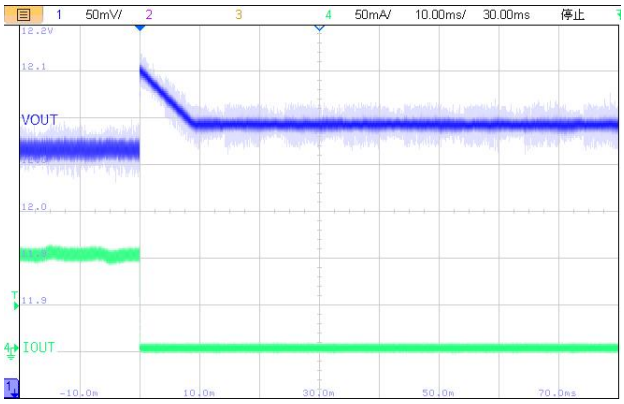
1. $V_{OUT(S)}$: Output voltage when $V_{IN}=V_{OUT}+2V$, I_{OUT}=1 mA.
2. $V_{DROP}=V_{IN1}$ -（$V_{OUT(S)}$× 0.98）where V_{IN1} is the input voltage when $V_{OUT} = V_{OUT(S)}$× 0.98.
3. I_{LIM}: Output current when $V_{IN}=V_{OUT(S)}+3V$ and V_{OUT} = 0.95*$V_{OUT(S)}$.

■ Typical Performance Characteristics:

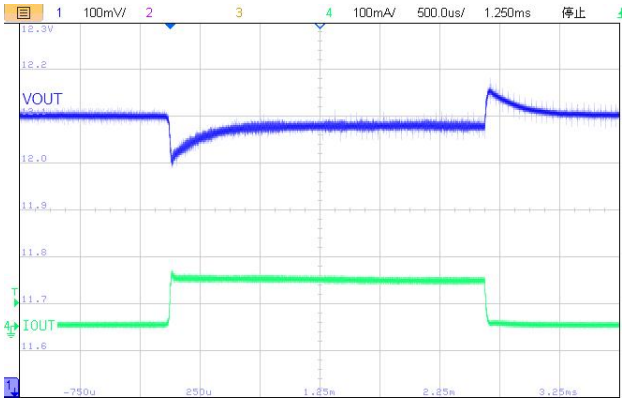
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, Ta=25℃, unless otherwise indicated.



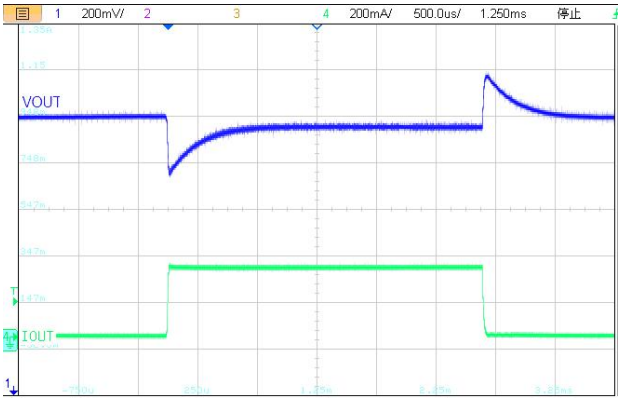
Load Transient at V_{OUT}=12V:
(I_{OUT}=0mA~100mA)



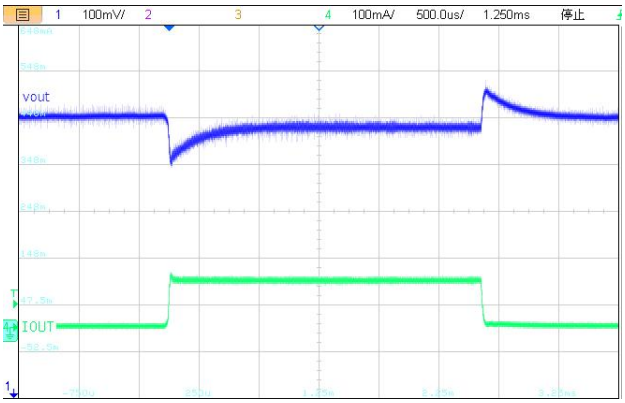
Load Transient at V_{OUT}=12V:
(I_{OUT}=100mA~0mA)



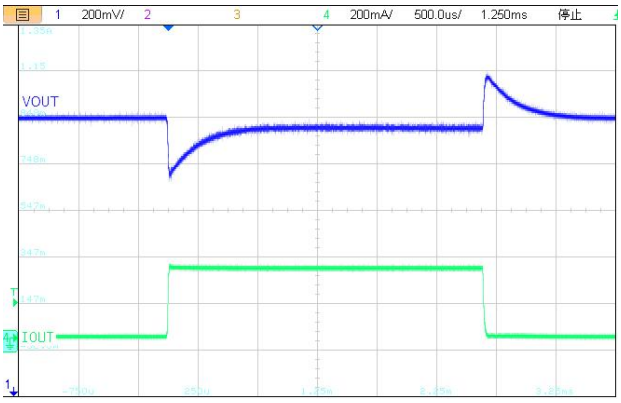
Load Transient at V_{OUT}=12V:
(I_{OUT}=1mA~100mA~1mA)



Load Transient at V_{OUT}=12V:
(I_{OUT}=1mA~300mA~1mA)



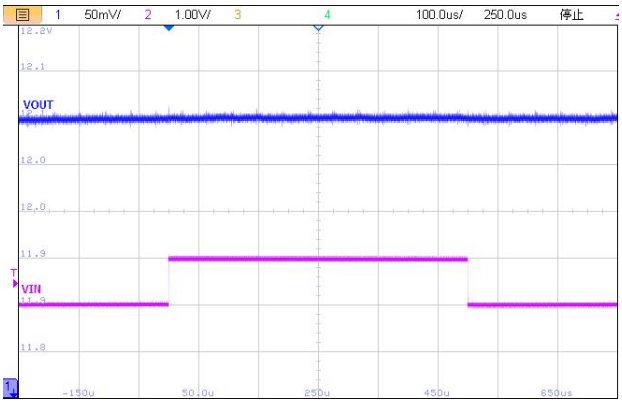
Load Transient at V_{OUT}=12V:
(I_{OUT}=0mA~100mA~0mA)



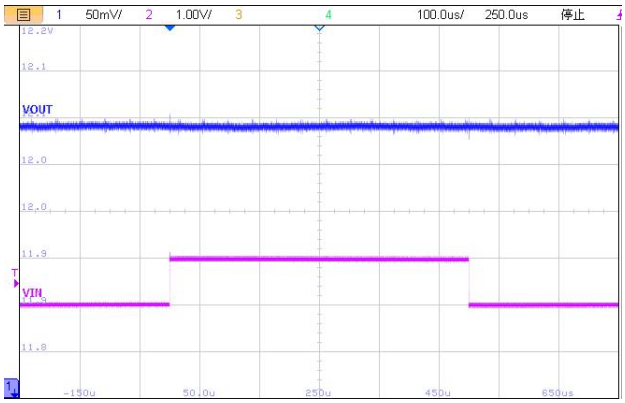
Load Transient at V_{OUT}=12V:
(I_{OUT}=0mA~300mA~0mA)

■ Typical Performance Characteristics(Continued):

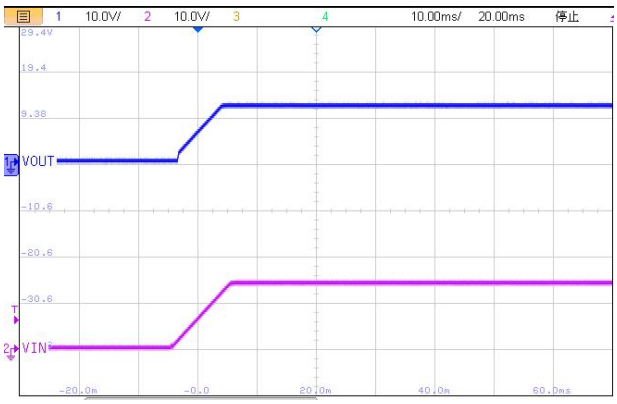
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, Ta=25℃, unless otherwise indicated.



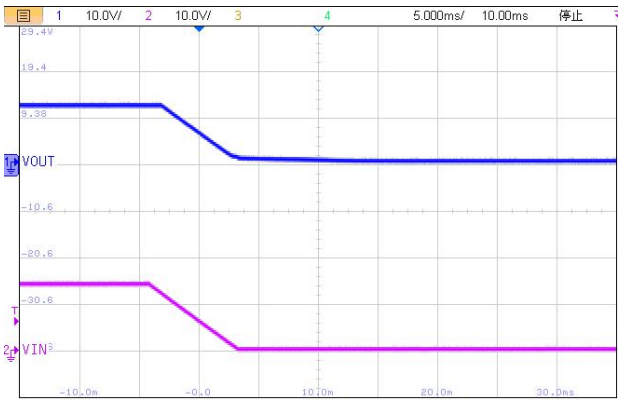
Line Transient at V_{OUT}=12V:
(I_{OUT}=1mA)



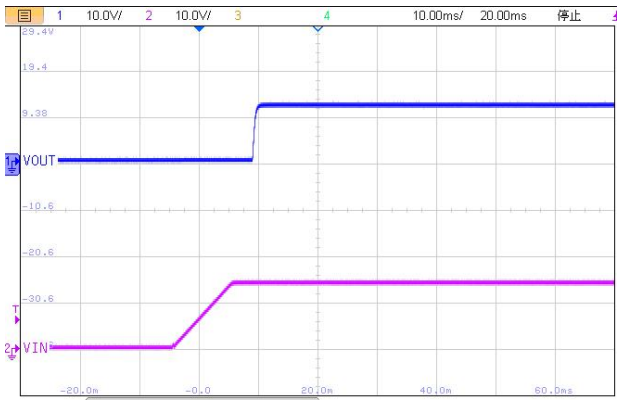
Line Transient at V_{OUT}=12V:
(I_{OUT}=10mA)



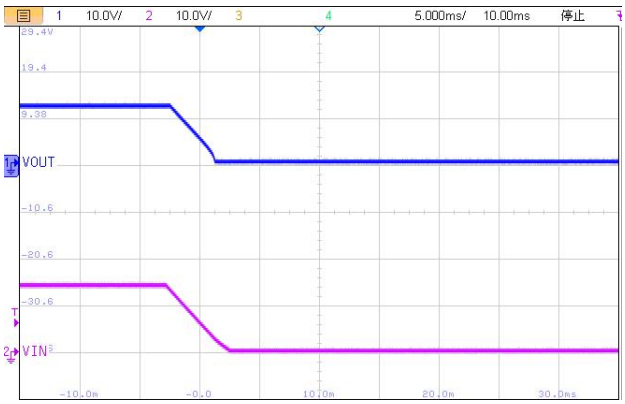
Power-Up at V_{OUT}=12V:
(I_{OUT}=1mA)



Power-Down at V_{OUT}=12V:
(I_{OUT}=1mA)



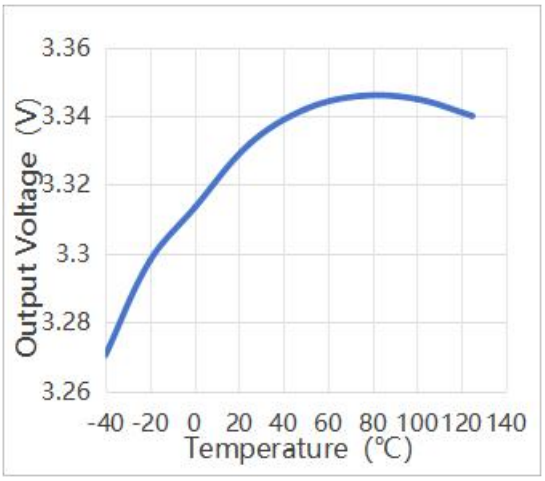
Power-Up at V_{OUT}=12V:
(I_{OUT}=300mA)



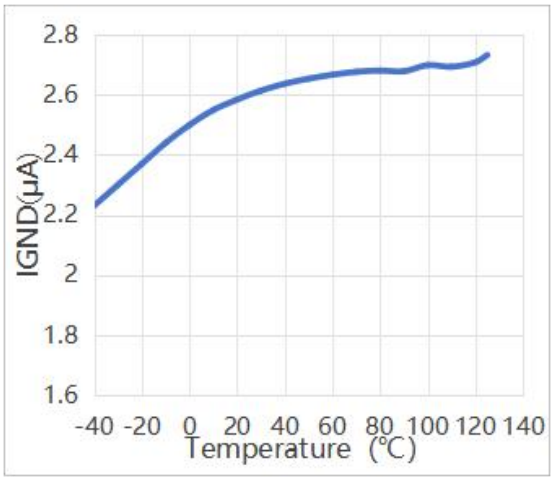
Power-Down at V_{OUT}=12V:
(I_{OUT}=300mA)

Typical Performance Characteristics(Continued):

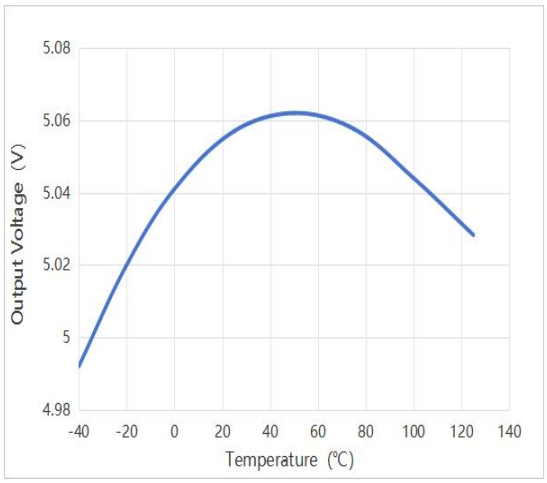
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, Ta=25℃, unless otherwise indicated.



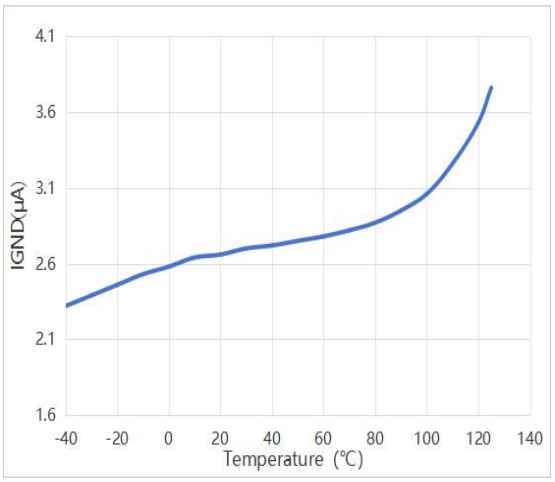
Output Voltage vs. Temperature at V_{OUT}=3.3V



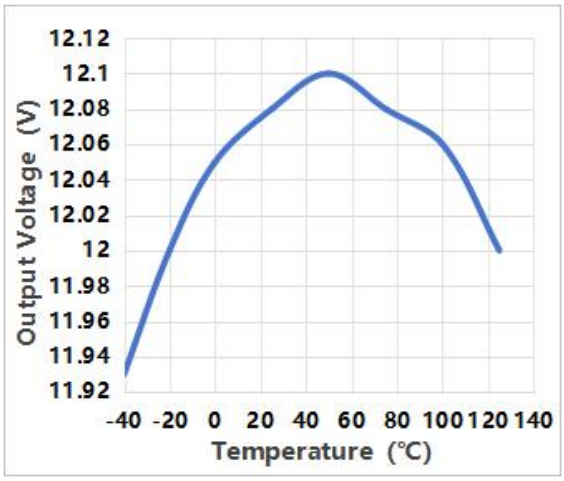
GND Current vs. Temperature at V_{OUT}=3.3V



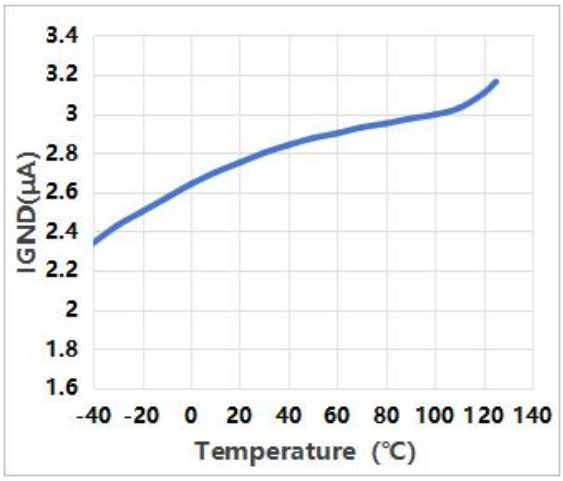
Output Voltage vs. Temperature at V_{OUT}=5.0V



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



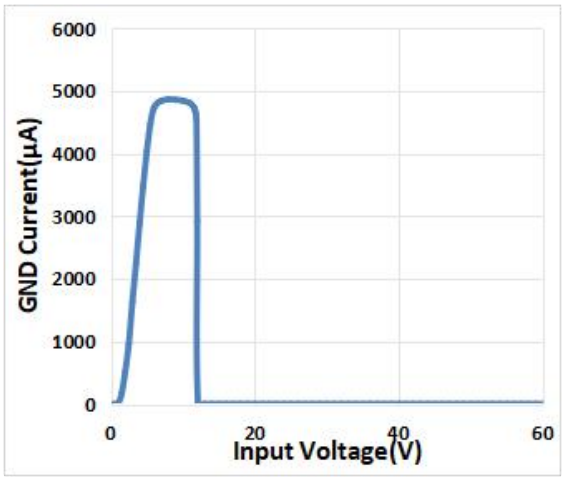
Output Voltage vs. Temperature at V_{OUT}=12.0V



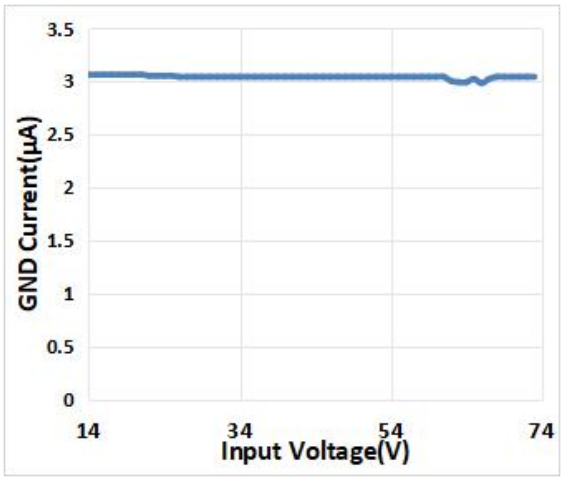
GND Current vs. Temperature at V_{OUT}=12.0V

■ Typical Performance Characteristics (Continued):

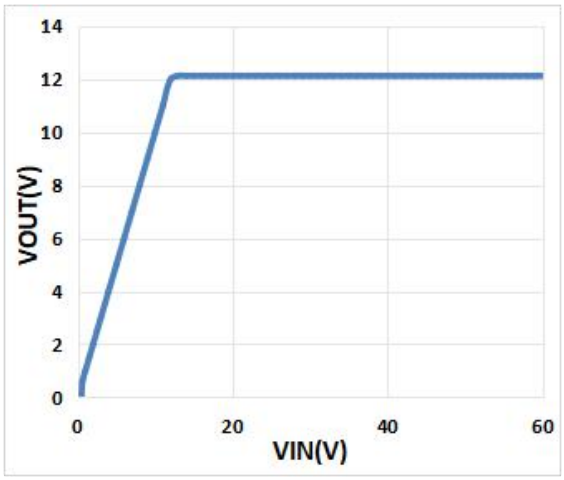
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, Ta=25℃, unless otherwise indicated.



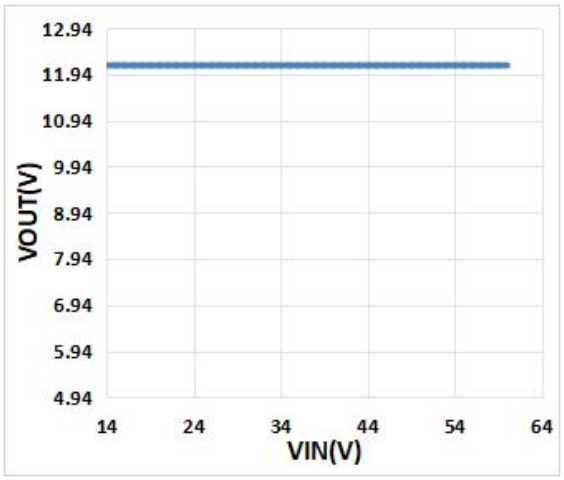
GND Current vs. Input Voltage at V_{OUT}=12.0V



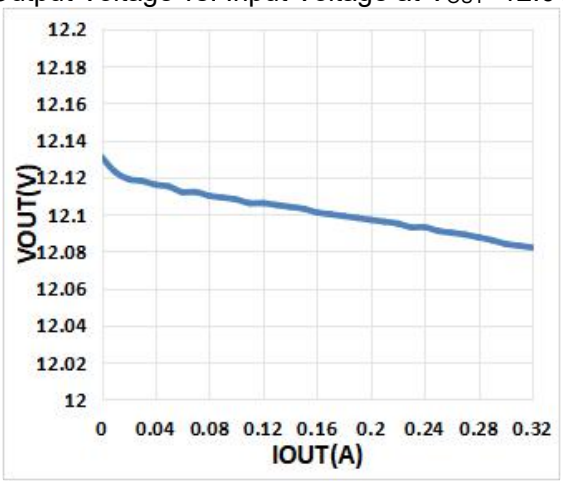
GND Current vs. Input Voltage at V_{OUT}=12.0V



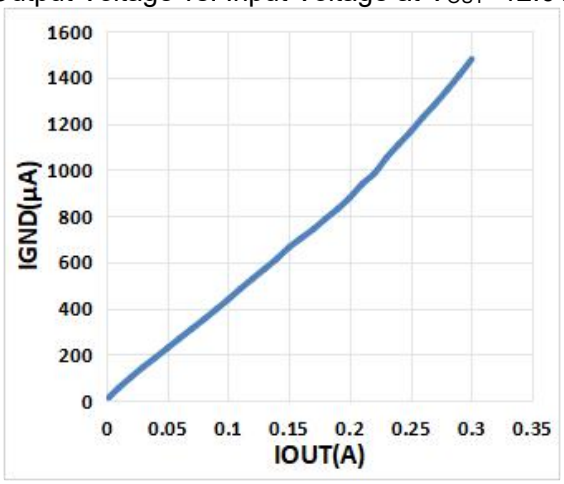
Output Voltage vs. Input Voltage at V_{OUT}=12.0V



Output Voltage vs. Input Voltage at V_{OUT}=12.0V



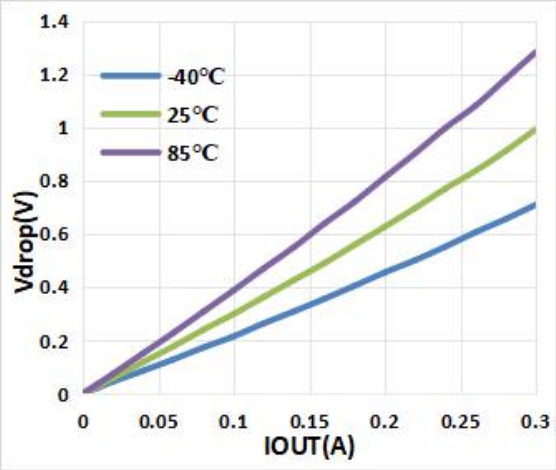
Output Voltage vs Output Current at V_{OUT}=12.0V



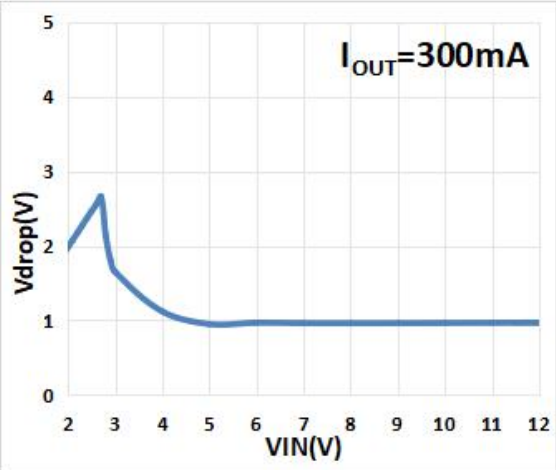
GND Current vs Output Current at V_{OUT}=12.0V

■ Typical Performance Characteristics (Continued):

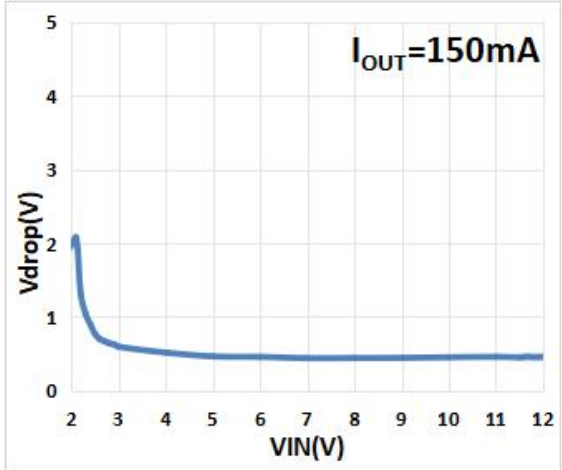
Test Conditions: V_{IN}=V_{OUT}+2.0V, C_{IN}=2.2μF, C_{OUT}=2.2μF, T_A=25℃, unless otherwise indicated.



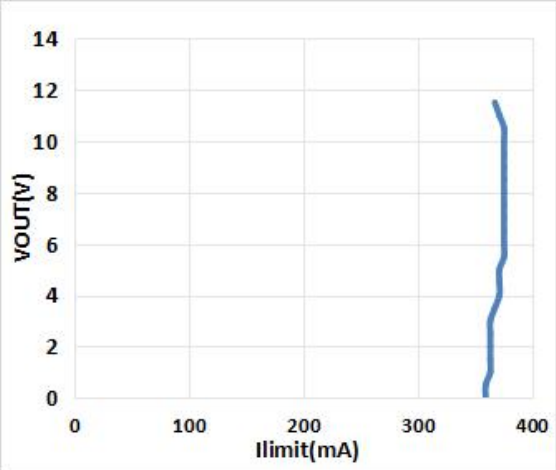
Dropout Voltage vs. Output Current at V_{OUT}=12.0V



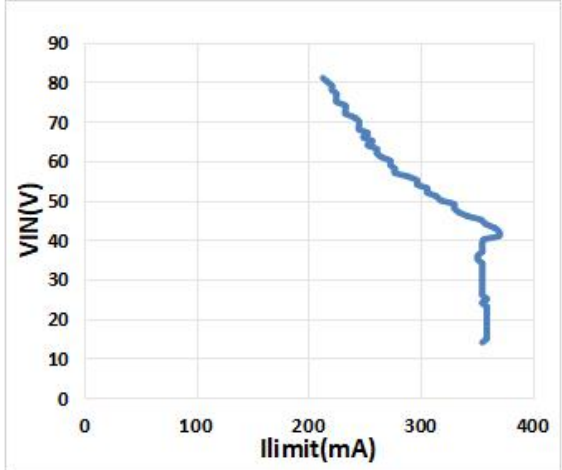
Vdrop vs. Input Voltage at V_{OUT}=12.0V



Vdrop vs. Input Voltage at V_{OUT}=12.0V



V_{OUT} vs. Ilimit at V_{OUT}=12.0V

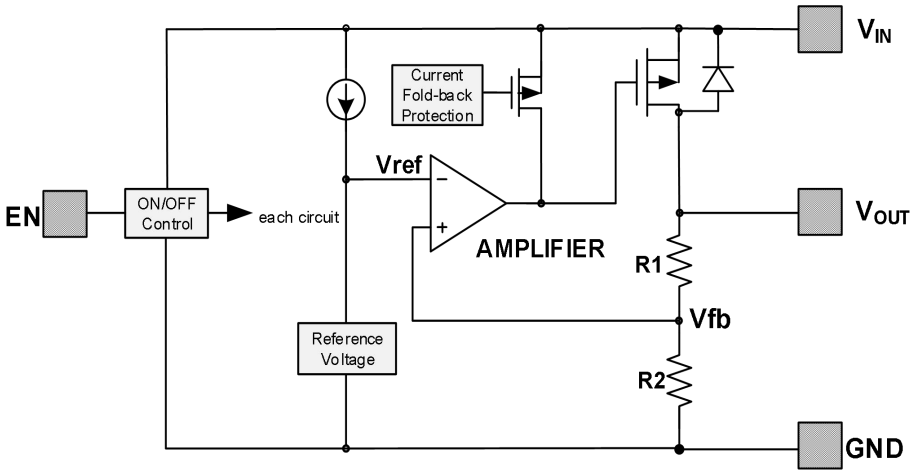


V_{IN} vs. Ilimit at V_{OUT}=12.0V

■ Operational Explanation

1.Output voltage control

The following diagram is a block diagram of HL85XX.The voltage divided by resistors Rf and Rs is compared with the internal reference voltage by the error amplifier. The amplifier output then drives the P-channel MOSFET connected to the VOUT pin. The output voltage at the VOUT pin is regulated by this negative feedback system. The current limit circuit operates in relation to output current level.



2.Pass transistor

The pass transistor with low turn-on resistance used in HL85XXis a P-channel MOSFET. If the potential on VOUT pin is higher than VIN, it is possible that IC will be destroyed due to reverse current which is caused by parasitic diodes between VIN and VOUT. Therefore, the VOUT pin potential exceeds VIN+0.3V is not allowed.

3.Current Limiter, over temperature protection

The HL85XXincludes current limit protection feature. If the output is overloaded or shorted to ground,it can inhibit the current of 370mA(typical value),therefore,the chip can avoid damage. In this case, it is easy to make the chip temperature rise and exceed the heat dissipation limit, then OTP circuit is triggered and the output current is turned off, the chip will restart automatically after the chip temperature 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 (VIN) remains constant when the load changes, avoiding voltage fluctuations caused by transient current surges. Improve response spee d: 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:

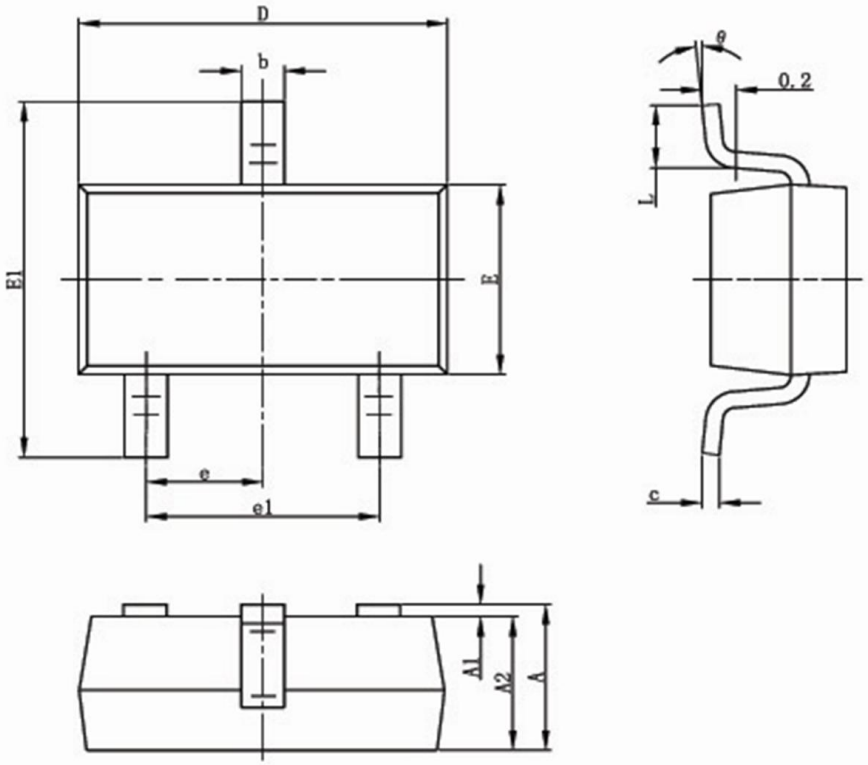
1. The input and output capacitors should be placed as close as possible to the IC.
2. If the impedance of the power supply is high, which is caused by forgetting installing input capacitor or installing too small value capacitor, the oscillation may occur.

■ Revision History:

VERSION	Change Date	Change Item
Rev.1.0	2025/09/12	1.Update Marking
Rev.1.1	2025/11/20	1.Change the Operating Ambient Temperature and Storage Temperature
Rev.1.2	2025/12/19	1.Add Ordering Name HL85E35QA3
Rev.1.3	2026/01/20	1.Add Description for Silk Print "XXXX"
Rev.1.4	2026/03/13	1.Add 8V Output Voltage

■ Packaging Information

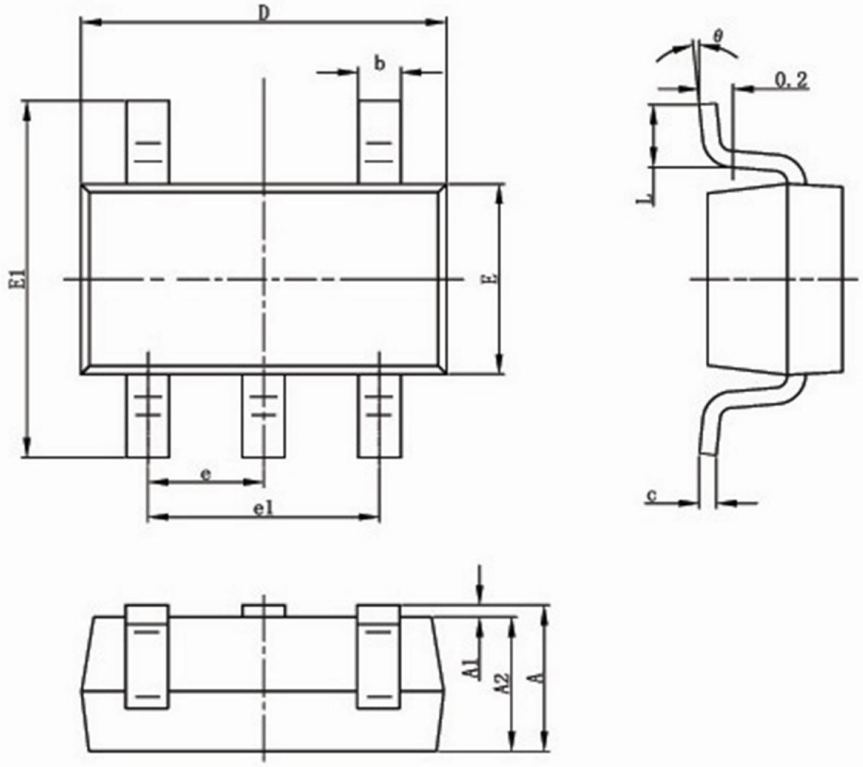
SOT-23-3L PACKAGE OUTLINE DIMENSIONS



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

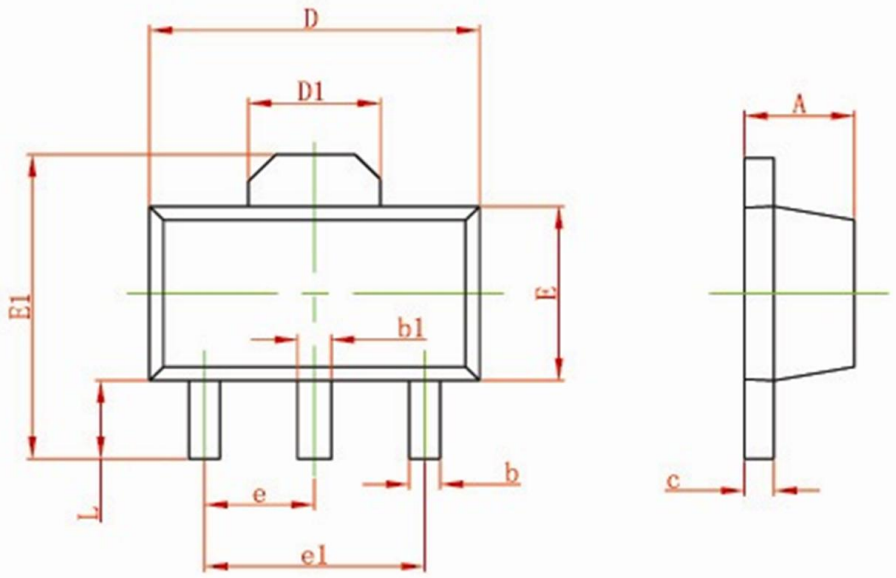
SOT-23-5L PACKAGE OUTLINE DIMENSIONS



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

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.1.4 20260313