40V 500mAUltra Low Current Consumption CMOS Voltage Regulator

General Description

The HL65xx is ultra-low quiescent current regulator features and low dropout voltage. With 2 μA quiescent current at no load. The HL65xx retains all of the features that are common to low dropout regulators including a low dropout PMOS pass device, foldback current limiter, and thermal shutdown.

The **HL65xx** has 40V maximum operating voltage, excellent load transient response, and -40°C to 125°C operating temperature range, and ±2% output voltage tolerance over the entire output current, input voltage, and temperature range.

The HL65xx regulators are available in standard SOT23-3, SOT89-3 packages.

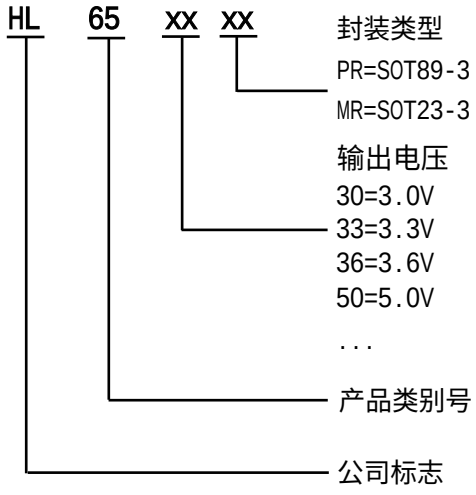
Features

- Vin Range Up to 40V
- Output Range: 2.6V～5.0V
- Maximum Output Current: 500mA
- PSRR: 75dB@1KHz
- Dropout Voltage: 200mV@I_{OUT} =100mA
- Ultra Low Quiescent Current: 2μA Typ.
- Output Voltage Tolerances of ±2% Over the Temperature Range
- Internal Thermal Overload Protection
- Built-in Foldback Current Limit

Applications

- Fire Alarm, Smoke Detector
- Appliances and White Goods
- E-meters, Water Meters and Gas Meters
- Cellphones, Radiophone, Digital Cameras

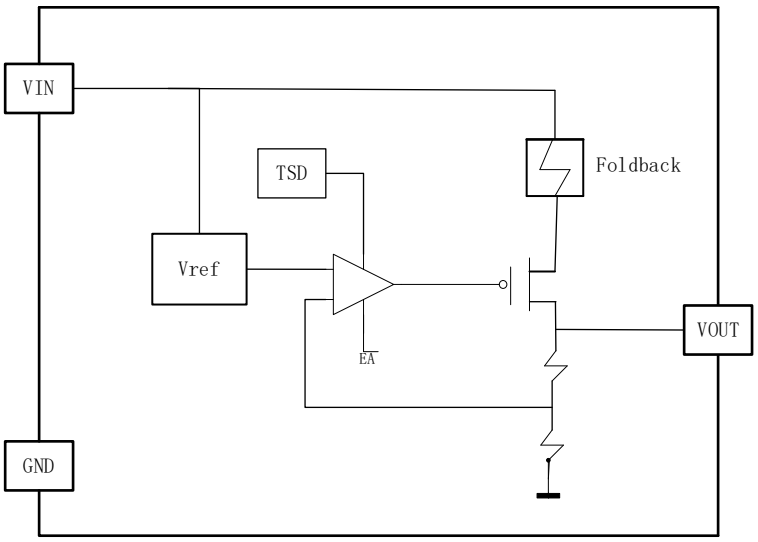
Selection Guide



Selection Instructions

产品型号	封装	丝印
HL65xxPR	SOT89-3 1000pcs/盘	HL65xxP
HL65xxMR	SOT23-3 3000pcs/盘	HL65xx

Block Diagram



Pin Assignment

SOT23-3 (Top View)

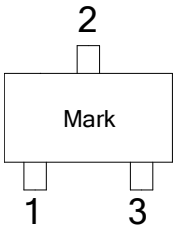


Table1：**HL65xxMR** series (SOT23-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	GND	GND pin
2	VIN	Input voltage pin
3	VOUT	Output voltage pin

SOT89 (Top View)

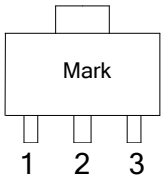


Table2：**HL65xxPR** series (SOT89-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	GND	GND pin
2	VIN	Input voltage pin
3	VOUT	Output voltage pin

Absolute Maximum Ratings

Input Voltage……-0.3V to 45V

V_{EN}……-0.3V to VIN

V_{OUT}……-0.3V to 12V

ESD Rating……5.5kV

Storage Temperature ....-55℃ to 150℃

Lead Temperature(Soldering, 10 sec.). .....260℃

Junction Temperature…… -40℃ to 125℃

Note: These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Electrical Characteristics

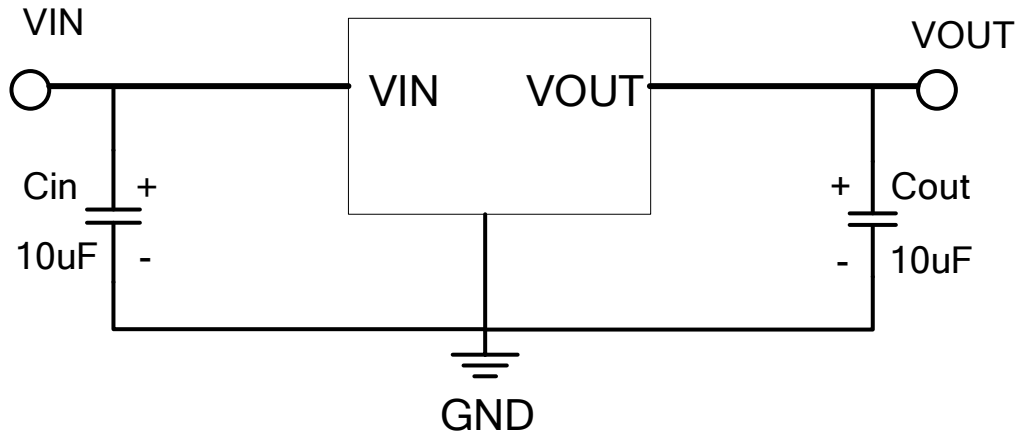
The following specifications apply for V_{IN}=12V, I_{OUT}=1mA, C_{IN}=C_{OUT}=10uF, T_J=25℃, unless specified otherwise.

SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage		2.7		40	V
V_{OUT}	Output Range		2.6		5.0	V
ΔV_{OUT}	Output Voltage Accuracy		-2	V_{OUT}	2	%
I_Q	Quiescent Current	V_{IN} = V_{OUT} + 1V	--	2	--	μA
V_{DROP}	Dropout Voltage	I_{OUT}=100mA	--	0.45	--	V
		I_{OUT}=300mA	--	0.75	--	
$\triangle V_{LINE}$	Line Regulation	V_{IN} = V_{OUT} + 1V to 40V, or V_{IN} = 5V to 40V, if V_{OUT} < 4V	--	30	--	mV
$\triangle V_{LOAD}$	Load Regulation	I_{OUT} = 1mA to 100mA	--	20	--	mV
		I_{OUT} = 1mA to 250mA	--	30	--	
PSRR	Power Supply Rejection Rate VIN=VOUT+1V Ripple=0.2Vp-p IOUT=10mA	Freq.=1kHz	--	75	--	dB
		Freq.=100kHz	--	45	--	
I_{SHORT}	I_{OUT} @ V_{OUT} Short to Ground	VIN=6V, VOUT=0V	--	50	--	mA
T_{SD}	Thermal Shutdown		--	150	--	℃
T_{HY}	Thermal Shutdown Hysteresis		--	130	--	℃

Note1: The parameters of Cin and Cout must be greater than 4.7uF.

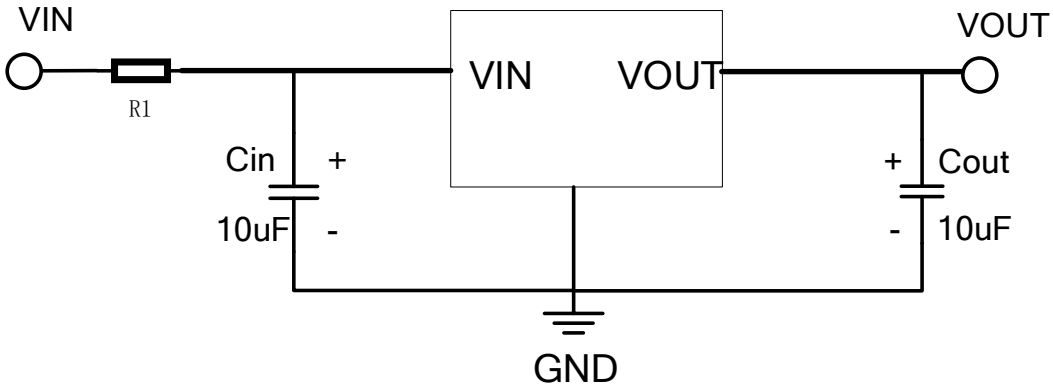
Application Circuits

Typical Application Circuits



Note1: The parameters of Cin and Cout must be greater than 4.7uF.

External Power Dissipation

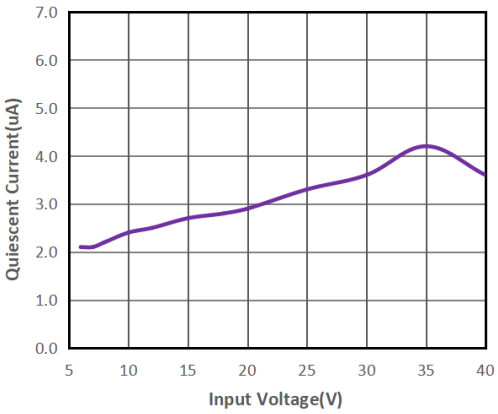


Note2: The resistance value of R1 should be set to 0.25Ω.

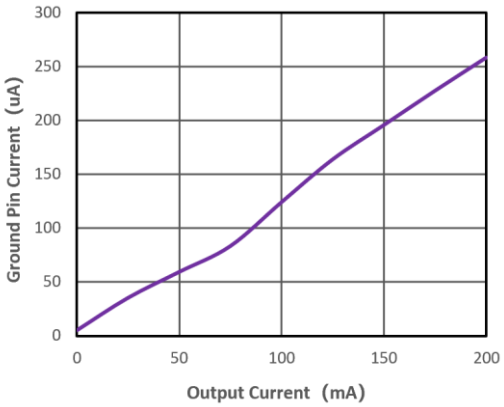
Typical Performance Characteristics

C_{IN}=10uF, C_{OUT}=10uF, T_J=25°C, unless specified otherwise

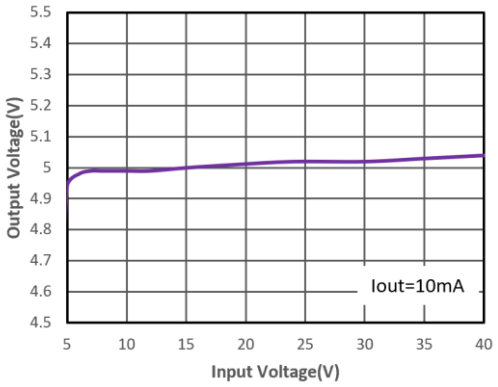
(1) Quiescent Current vs Input Voltage



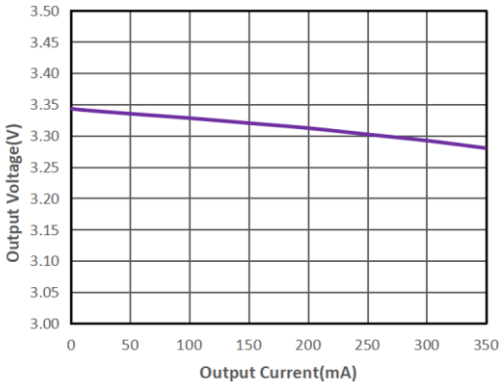
(2) Ground Pin Current vs Output Current



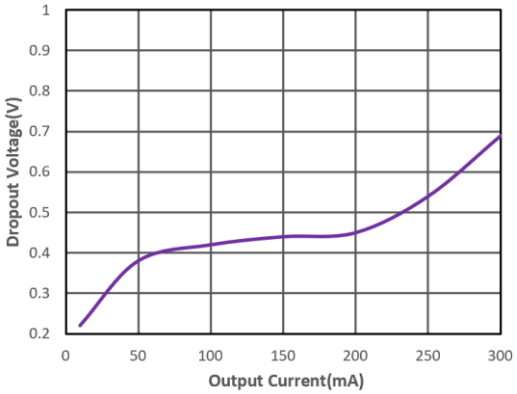
(3) Output Voltage vs Input Voltage



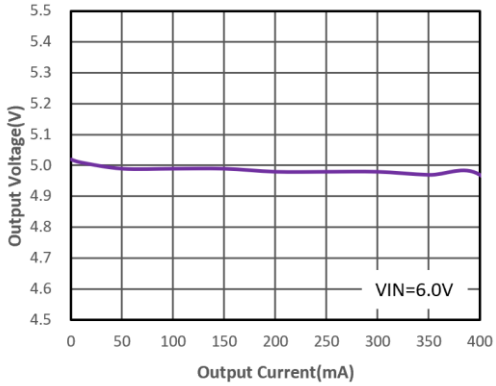
(4) Output Voltage vs Output Current



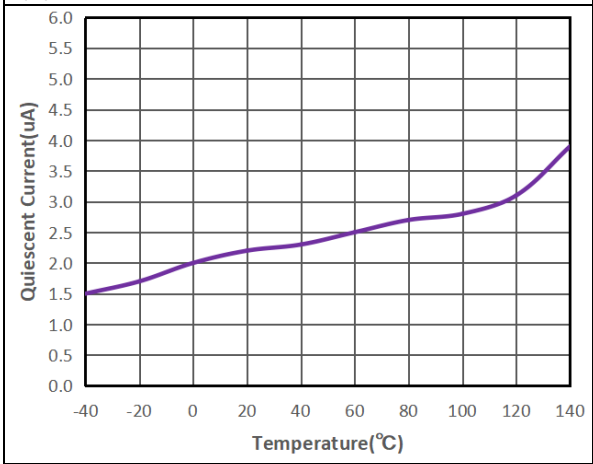
(5) Dropout Voltage vs Output Current



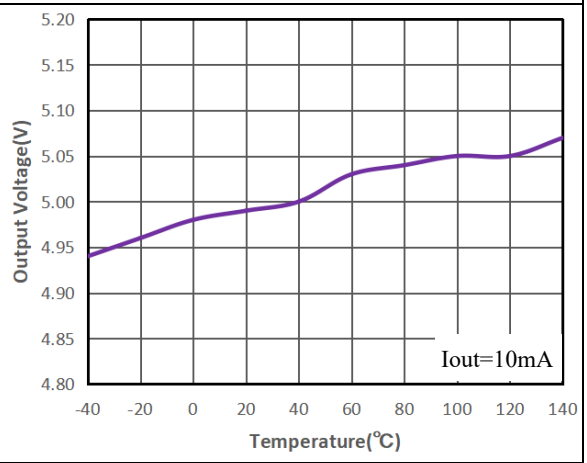
(6) Output Voltage vs Output Current



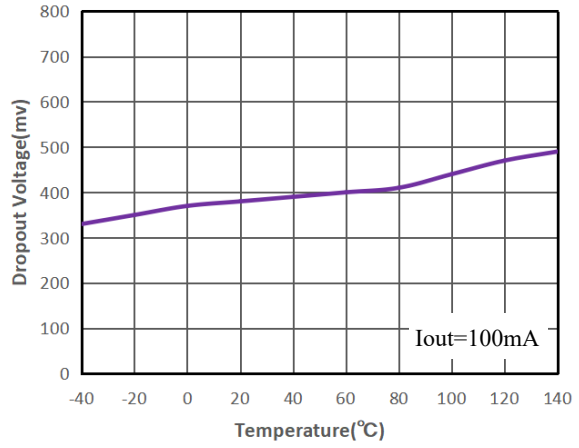
(7) Quiescent Current vs Temperature



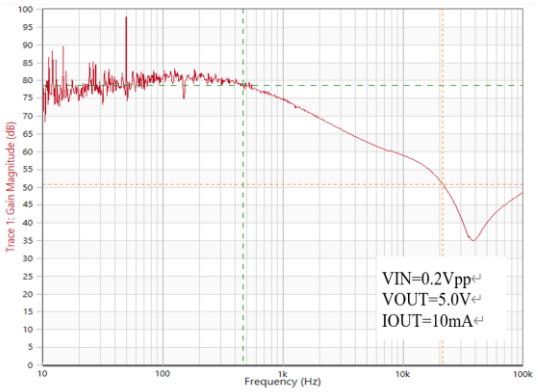
(8) Output Voltage vs Temperature



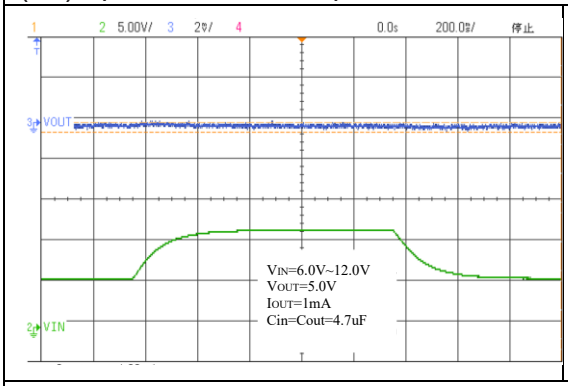
(9) Dropout Voltage vs Temperature

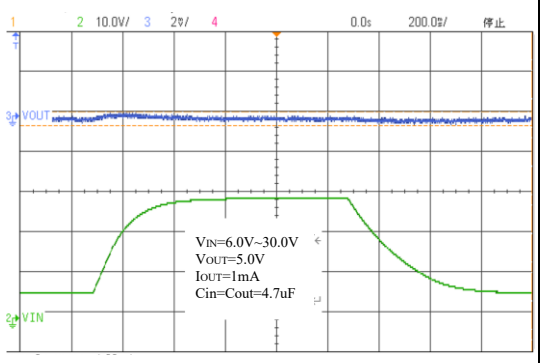


(10) PSRR VS Frequency

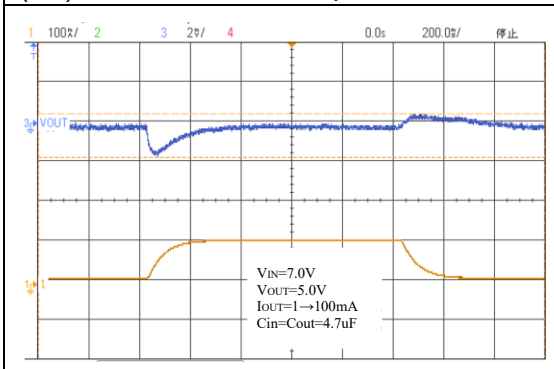


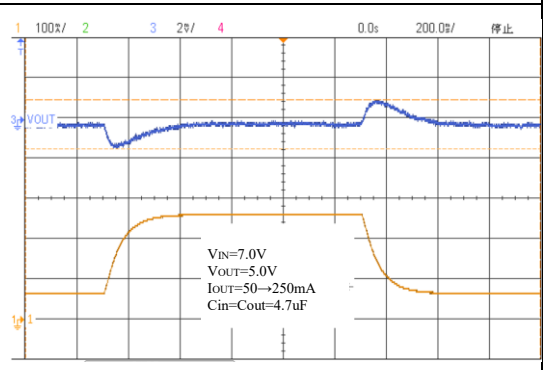
(11)Input Transient Response



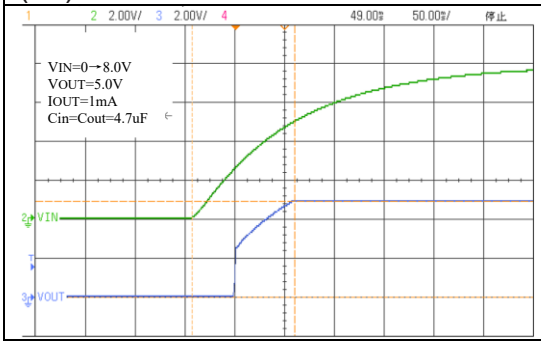


(12)Load Transient Response

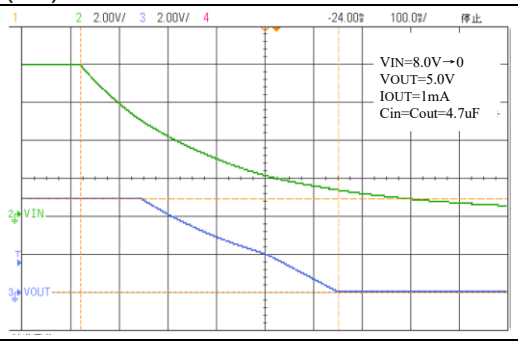




(13)Power ON

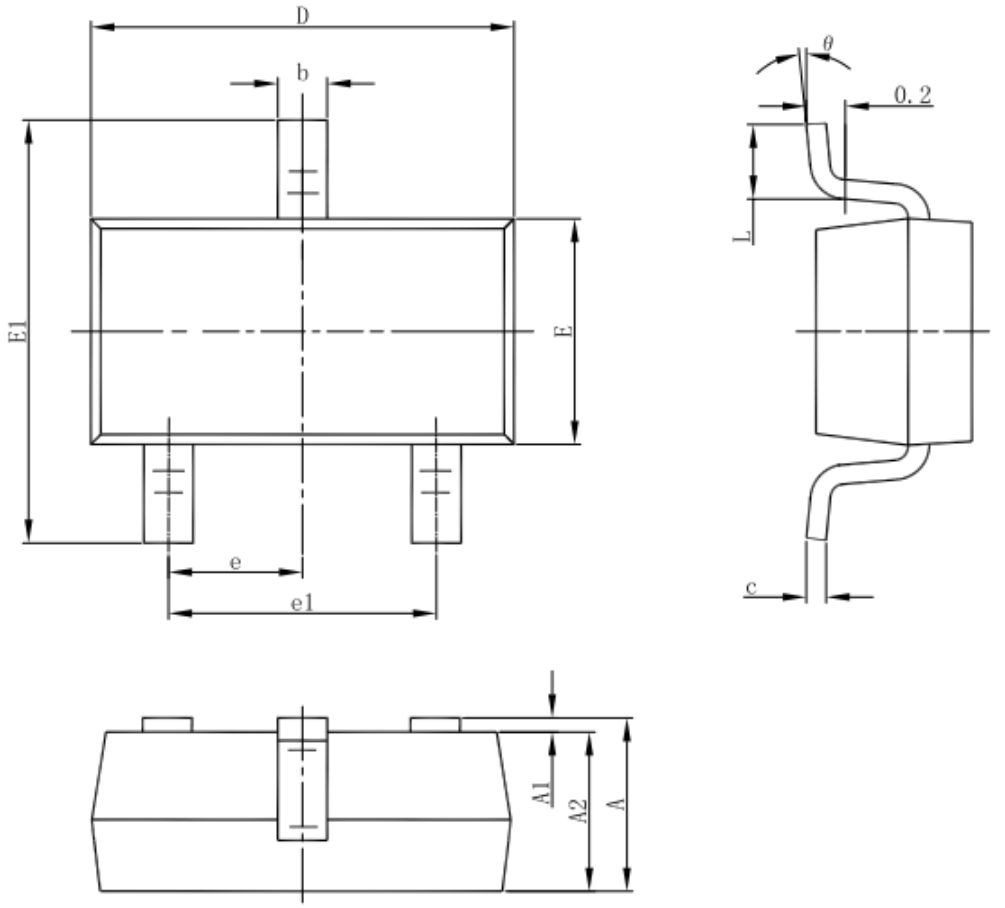


(14)Power OFF



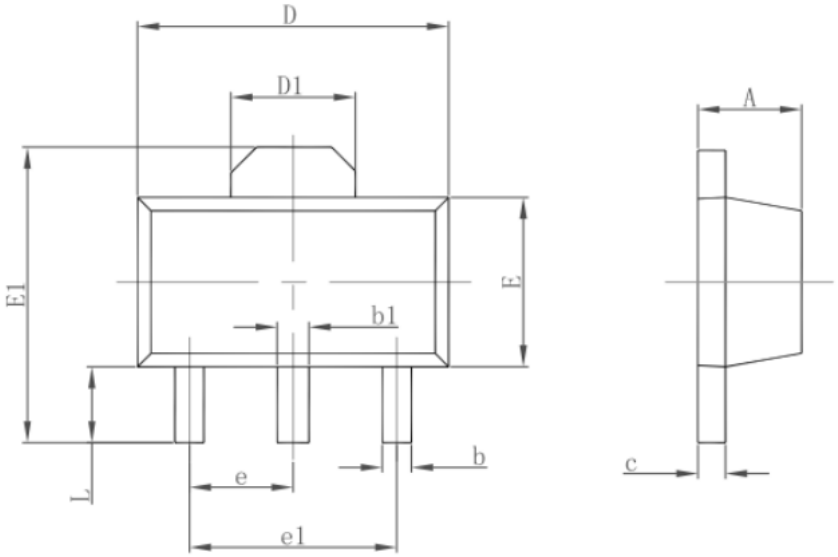
Package Information

3-pin SOT23-3 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°

SOT89-3L 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	0.020
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.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

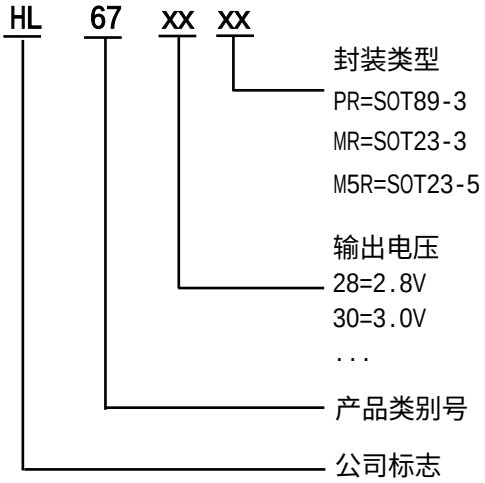
SOT23-3 的引脚

序号	符号	功能描述
1	VSS	地端
2	VIN	输入端
3	VOUT	输出端

SOT23-5 的引脚

序号	符号	功能描述
1	VIN	输入端
2	VSS	地端
3	CE	使能端
4	NC	空脚
5	VOUT	输出端

选型指南



选型说明

产品型号	封装	丝印
HL67xxPR	SOT89-3 1000pcs/盘	HL67xxP
HL67xxMR	SOT23-3 3000pcs/盘	HL67xx
HL67xxM5R	SOT23-5 3000pcs/盘	HL67xxM