FEATURES

- Maximum output current : 600mA
- Highly accurate: Output voltage ±2%
- Stability with Low ESR Capacitors
- Low power consumption
- On-chip Protections: Thermal, Short Circuit
- Small input/output differential: 600mV at 600mA
- Adjustable version

APPLICATION

- Battery-Operated Systems
- Portable Computers
- Portable Cameras and Video Recorders
- Reference Voltage Sources
- Instrumentation
- Pagers

DESCRIPTION

The LM8805 series is a low-dropout linear regulator. There are devices designed specifically for battery-operated systems. Ground current is very small (50uA-Typ), that significantly extending battery life. Low power consumption and high accuracy is achieved through CMOS and programmable fuse technologies. Output voltage: 1.5V to 6.0V.

SOT-23 5L PKG

SOT-89 3L PKG

ORDERING INFORMATION

Device	Package
LM8805SF5-XX	SOT-23-5L
LM8805F-XX	SOT-89

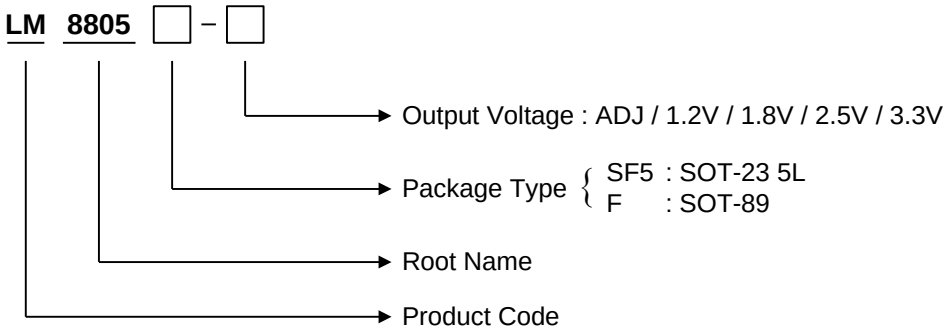
XX = Output Voltage = ADJ, 1.2V, 1.8V, 2.5V, 3.3V

Absolute Maximum Ratings

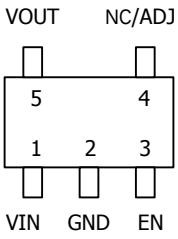
CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Input Voltage	V_{IN}	-	7	V
Output Current	I_{OUT}	-	1	A
Output Voltage	V_{OUT}	V_{SS} -0.3	V_{IN} +0.3	V
Storage Temperature Range	T_{STG}	-40	125	℃
Operating Ambient Temperature	T_A	-40	85	℃

Ordering Information

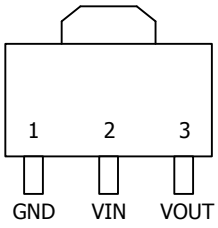
V_{OUT}	Package	Order No.	Description	Package Marking	Supplied As	Status
ADJ	SOT-23-5L	LM8805SF5-ADJ	600mA, Enable, Adjustable	AAAM	Reel	Active
1.2 V	SOT-23-5L	LM8805SF5-1.2	600mA, Fixed	AABS	Reel	Active
	SOT-89-3L	LM8805F-1.2	600mA, Fixed	8805 1.2 Yww	Reel	Contact us
1.8V	SOT-23-5L	LM8805SF5-1.8	600mA, Fixed	AABT	Reel	Active
2.5 V	SOT-23-5L	LM8805SF5-2.5	600mA, Fixed	AAAL	Reel	Active
	SOT-89-3L	LM8805F-2.5	600mA, Fixed	8805 2.5 Yww	Reel	Contact us
3.3 V	SOT-23-5L	LM8805SF5-3.3	600mA, Fixed	AAAA	Reel	Active
	SOT-89-3L	LM8805F-3.3	600mA, Fixed	8805 3.3 Yww	Reel	Contact us



PIN CONFIGURATION



SOT-23 5L



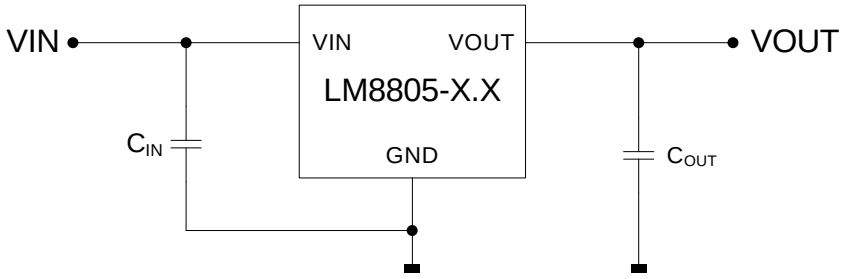
SOT-89 3L

PIN DESCRIPTION

Pin No.	SOT-23-5L		SOT-89-3L	
	Name	Function	Name	Function
1	V_{IN}	Input Supply	GND	Ground
2	GND	Ground	V_{IN}	Input Supply
3	EN	Enable	V_{OUT}	Output Voltage
4	NC/ADJ	Bypass for Fixed output or Output adjust for Adjustable output	-	-
5	V_{OUT}	Output Voltage	-	-

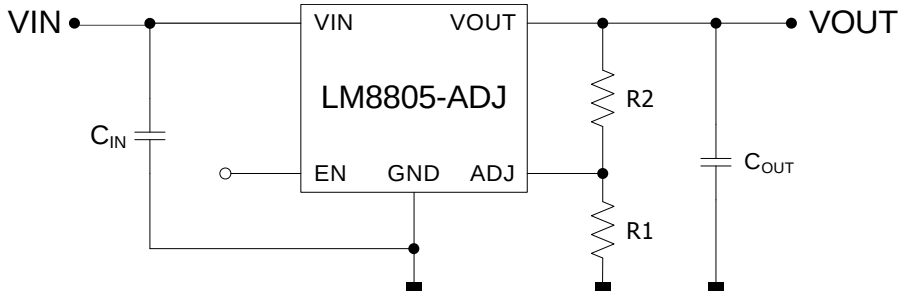
TYPICAL APPLICATION

Typical 3 Pin Application Circuit

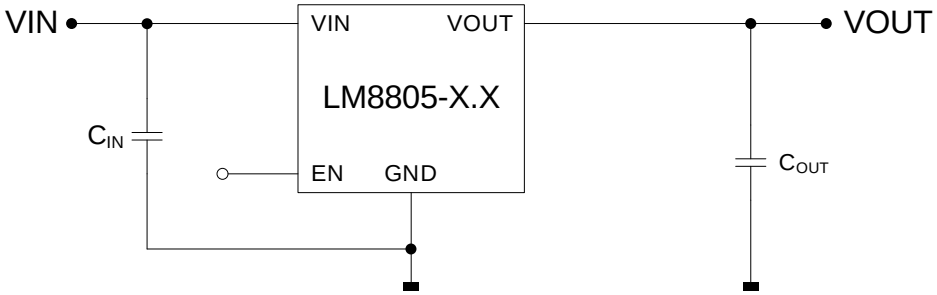


Typical 5 Pin Application Circuit

- Output Adjustment (Adjustable version)



- Fixed Voltage Application



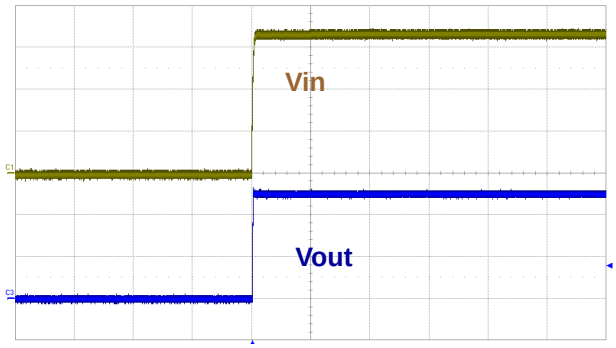
Electrical Characteristics

(V_{IN} =5V, V_{EN} = 5V T_A=25°C unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Supply Voltage	V_{IN}			1.2	--	5.5	V
DC Output Voltage Accuracy		I_{LOAD} =0.1mA		-2		2	%
ADJ Input Current	I_{ADJ}	ADJ = V_{OUT}			0.5		μA
Dropout Voltage (I_{LOAD} =600mA) (Note 3)	V_{DROP_3V}	V_{OUT} ≥ 3V			0.36		V
	$V_{DROP\_2.8V}$	V_{OUT} = 2.8V			0.45		
	$V_{DROP\_2.5V}$	V_{OUT} = 2.5V			0.45		
	$V_{DROP\_1.8V}$	V_{OUT} = 1.8V			0.57		
	$V_{DROP\_1.5V}$	V_{OUT} = 1.5V			0.71		
	$V_{DROP\_1.2V}$	V_{OUT} = 1.2V			0.9		
Ground Current	I_Q	I_{LOAD} = 0mA			2		μA
Shutdown Ground Current	I_{SD}	V_{EN} = 0V, V_{OUT} = 0V			0.1	0.5	μA
Enable Threshold Voltage	V_{IH}	EN Rising		1.0			V
	V_{IL}	EN Falling				0.4	
EN Input Current	I_{EN}	V_{EN} = 5V			10	100	nA
Line Regulation	ΔLINE	I_{LOAD} =30mA, 1.5V ≤ V_{IN} ≤ 5.5V or (V_{OUT} + 0.2V) ≤ V_{IN} ≤ 5.5V			0.2		%
Load Regulation	ΔLOAD	10mA ≤ I_{LOAD} ≤ 0.3A			0.2		%
Output Current Limit	I_{LIM}	V_{OUT} =0V		601	1100		mA
Power Supply Rejection Ratio (I_{LOAD} =5mA)	PSRR	V_{OUT} =1.2V, V_{IN} = 2V	f = 100Hz	--	80	--	dB
			f = 1kHz	--	75	--	
Output Voltage Noise (BW = 10Hz to 100kHz, C_{OUT} =1μF,)		V_{IN} = 3.5V I_{LOAD} =0.1A	V_{OUT} =1.2V	--	80	--	$μV_{RMS}$
			V_{OUT} =2.8V	--	120	--	
Thermal Shutdown Temperature	T_{SD}	I_{LOAD} =10mA		--	155	--	°C
Thermal Shutdown Hysteresis	$ΔT_{SD}$			--	15	--	°C
Discharge Resistance	R_{DC}	EN = 0V , V_{OUT} = 0.1V		--	30	--	Ω

TYPICAL OPERATING CHARACTERISTICS

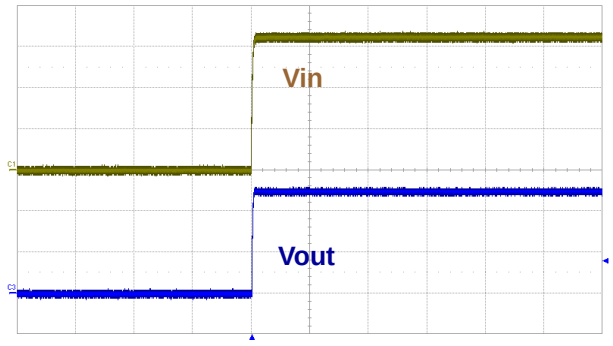
- VIN = 3.3V, VOUT = 2.5V



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=0.3A

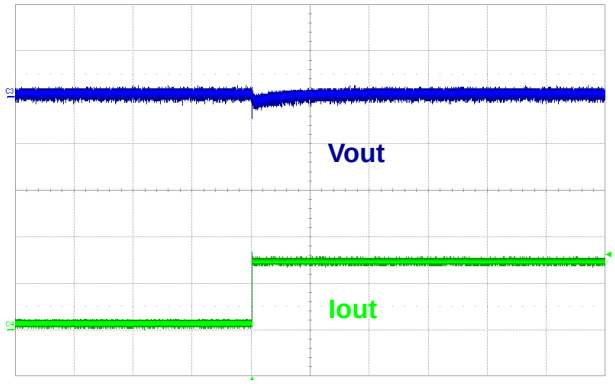
(Cin=10uF, Cout=10uF, R2=36KΩ, R1=35KΩ)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=0.6A

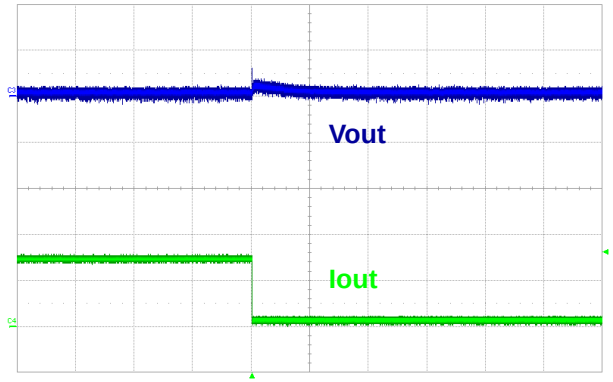
(Cin=10uF, Cout=10uF, R2=36KΩ, R1=35KΩ)



VOUT : 50mV/div, IOUT : 0.2A/div, Time : 50ms/div

Load Transient Response

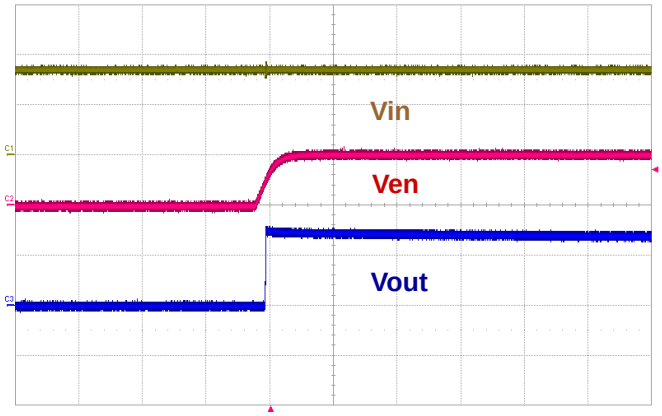
(Cin=10uF, Cout=10uF, R2=36KΩ, R1=35KΩ)



VOUT : 50mV/div, IOUT : 0.2A/div, Time : 50ms/div

Load Transient Response

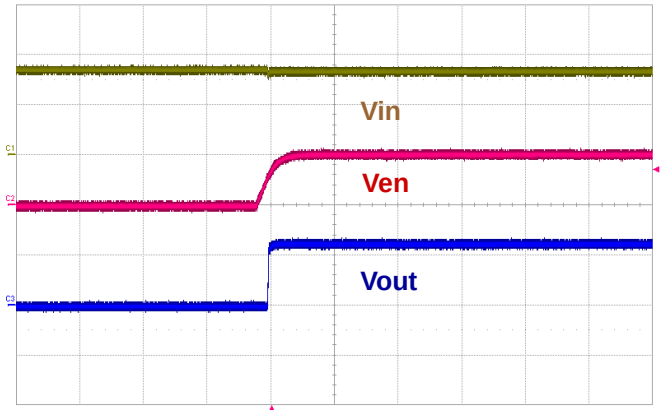
(Cin=10uF, Cout=10uF, R2=36KΩ, R1=35KΩ)



VIN : 2.0V/div, VEN : 2.0V, VOUT : 2.0V/div, Time : 1m/div

Start Up by external VEN @ Iout=0A

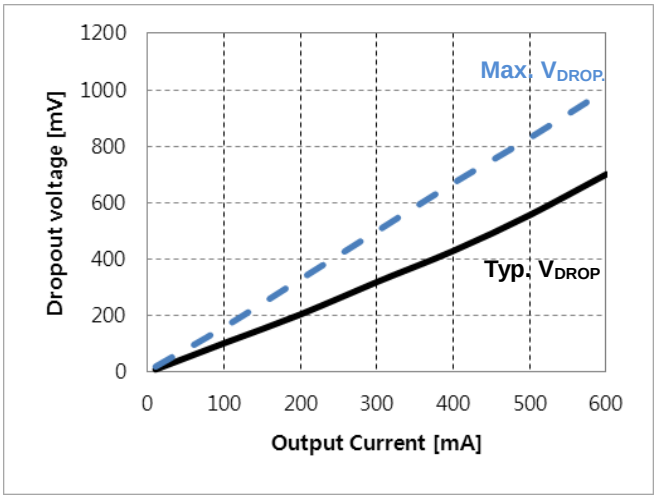
(Cin=10uF, Cout=10uF, R2=36KΩ, R1=35KΩ)



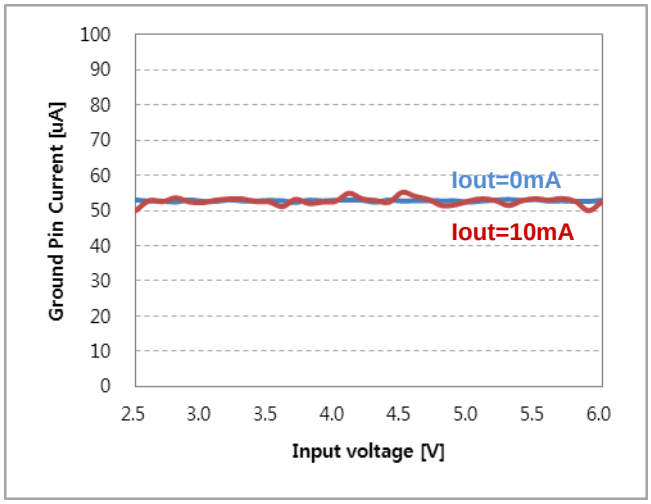
VIN : 2.0V/div, VEN : 2.0V, VOUT : 2.0V/div, Time : 1ms/div

Start Up by external VEN @ Iout=0.6A

(Cin=10uF, Cout=10uF, R2=36KΩ, R1=35KΩ)



Dropout Voltage @ Vout=3.3V



Ground Currnet @ Iout=0A / 10mA

(Cin=10uF, Cout=10uF, R2=36KΩ, R1=35KΩ))

Application Guideline

Input and Output Capacitor Requirements

The external input and output capacitors of LM8805 series must be properly selected for stability and performance. Use a 1μF or larger input capacitor and place it close to the IC's V_{IN} and GND pins. Any output capacitor meeting the minimum 1mΩ ESR (Equivalent Series Resistance) and effective capacitance between 1μF and 22μF requirement may be used. Place the output capacitor close to the IC's V_{OUT} and GND pins. Increasing capacitance and decreasing ESR can improve the circuit's PSRR and line transient response.

Current Limit

The LM8805 series contain the current limiter of output power transistor, which monitors and controls the transistor, limiting the output current to 1000mA (typical).

The output can be shorted to ground indefinitely without damaging the part.

Dropout Voltage

The LM8805 series use a PMOS pass transistor to achieve low dropout. When (V_{IN} – V_{OUT}) is less than the dropout voltage (V_{DROP}), the PMOS pass device is in the linear region of operation and the input-to-output resistance is the $RDS_{(ON)}$ of the PMOS pass element. V_{DROP} scales approximately with the output current because the PMOS device behaves as a resistor in dropout condition.

As any linear regulator, PSRR and transient response are degraded as (V_{IN} – V_{OUT}) approaches dropout condition.

Adjustable Output Voltage Application

The LM8805 by ADJ pin also can work as an adjustable output voltage LDO. Figure 1 gives the connections for the adjustable output voltage application. The resistor divider from V_{OUT} to ADJ sets the output voltage when in regulation.

The voltage on the ADJ pin sets the output voltage and is determined by the values of R1 and R2. To keep a good temperature coefficient of output voltage, the values of R1 and R2 should be selected carefully to ignore the temperature effect of input current at the ADJ pin. A current greater than 50μA in the resistor divider is recommended to meet the above requirement. The adjustable output voltage can be calculated using the formula given in equation 1:

$$V_{OUT} = \frac{R1+R2}{R2} \times V_{ADJ} \qquad (1)$$

where V_{ADJ} is determined by the output voltage selections in the ordering information of LM8805.

The minimum recommended 50μA in the resistor divider makes the application no longer a 2μA low quiescent LDO.

OTP (Over Temperature Protection)

The over temperature protection function of LM8805 series will turn off the P-MOSFET when the junction temperature exceeds 155°C (typ.). Once the junction temperature cools down by approximately 15°C, the regulator will automatically resume operation.

Thermal Application

For continuous operation, do not exceed the absolute maximum junction temperature. The maximum power dissipation depends on the thermal resistance of the IC package, PCB layout, rate of surrounding airflow, and difference between junction and ambient temperature. The maximum power dissipation can be calculated as below:

T_A=25°C, VCC PCB,

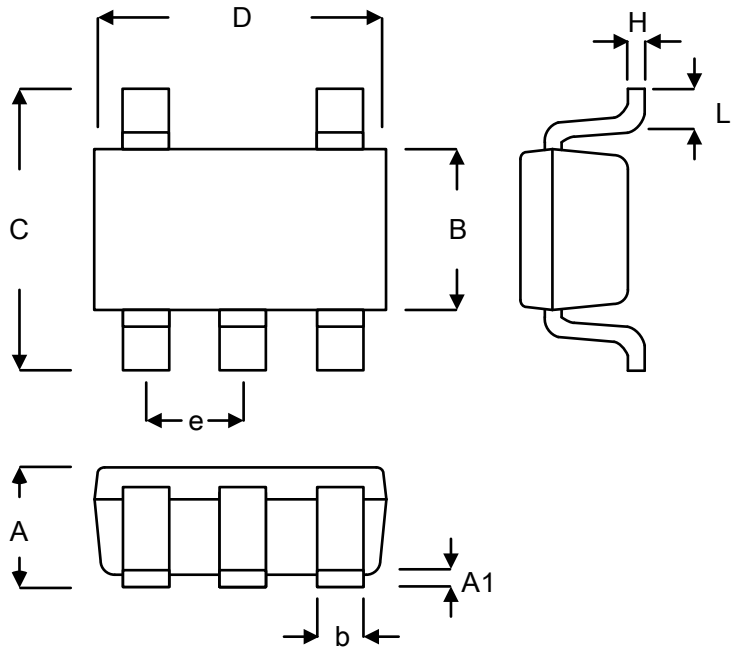
The max PD (Max) = (125°C − 25°C) / (200°C/W) =
0.5W for SOT-23-3 / SOT-23-5 packages.
0.6W for SOT-89-3 packages.

Power dissipation (PD) is equal to the product of the output current and the voltage drop across the output pass element, as shown in the equation below:

PD = (VIN – VOUT) × IOUT

Layout Consideration

By placing input and output capacitors on the same side of the PCB as the LDO, and placing them as close as is practical to the package can achieve the best performance. The ground connections for input and output capacitors must be back to the LM8805 ground pin using as wide and as short of a copper trace as is practical.
Connections using long trace lengths, narrow trace widths, and/or connections through via must be avoided. These add parasitic inductances and resistance that results in worse performance especially during transient conditions.

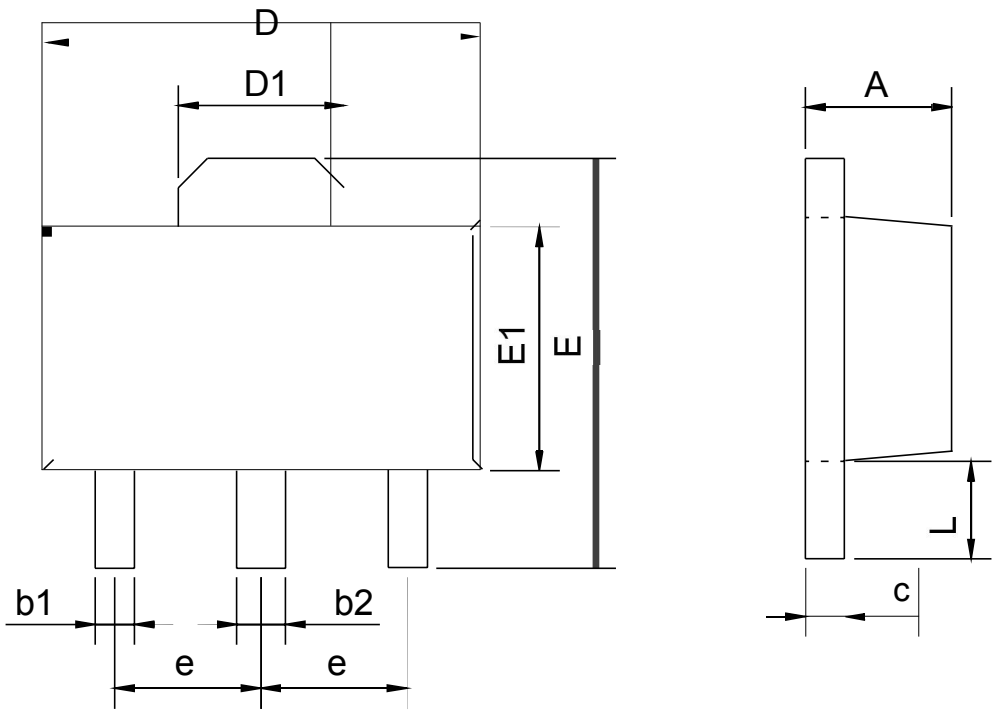


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.889	1.295	0.035	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.250	0.560	0.010	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024

SOT-23-5L

封装外形及尺寸图

SOT89-3



SYMBOL	mm	
	min	max
A	1.40	1.60
b1	0.35	0.50
b2	0.45	0.60
c	0.36	0.46
D	4.30	4.70
D1	1.40	1.80
E	4.00	4.40
E1	2.30	2.70
e	1.50BSC	
L	0.80	1.20