

# 1 $\mu$ A Quiescent Current, 150mA LDO Regulator

## DESCRIPTION

The EUP7180 is CMOS-based voltage regulator IC with extremely low supply current which is typically 1 $\mu$ A. Dropout voltage is also very low. The EUP7180 has output short circuit and over current protection features.

The EUP7180 is available in 1.5V, 2.3V, 2.5V and 3.0V versions.

## FEATURE

- Low Ground Current at 1 $\mu$ A
- Low Dropout Voltage of 230mV at Output Current 100mA
- Guaranteed 150mA Output Current
- Stable with low ESR Ceramic Capacitors
- Current-limiting
- SOT23 3-pin and SOT89 Package
- RoHS Compliant and 100% Lead (Pb)-Free

## APPLICATIONS

- Stable Voltage reference.
- Power source for electrical appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment

## Block Diagram

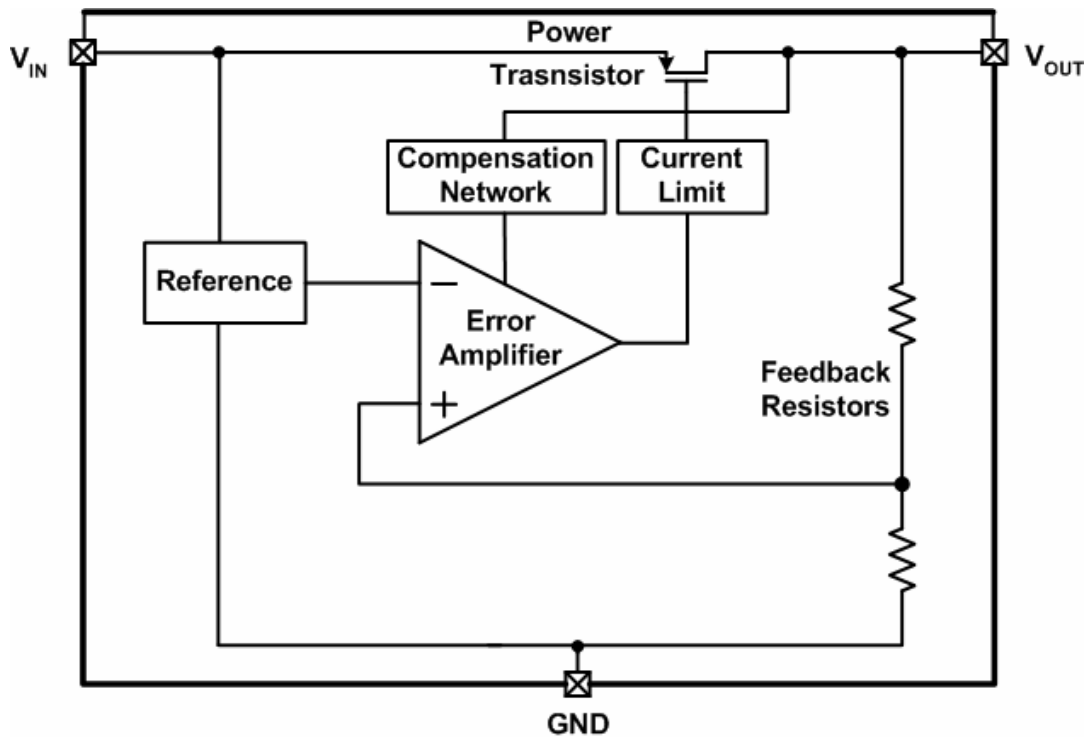


Figure 1.

Typical Application Circuit

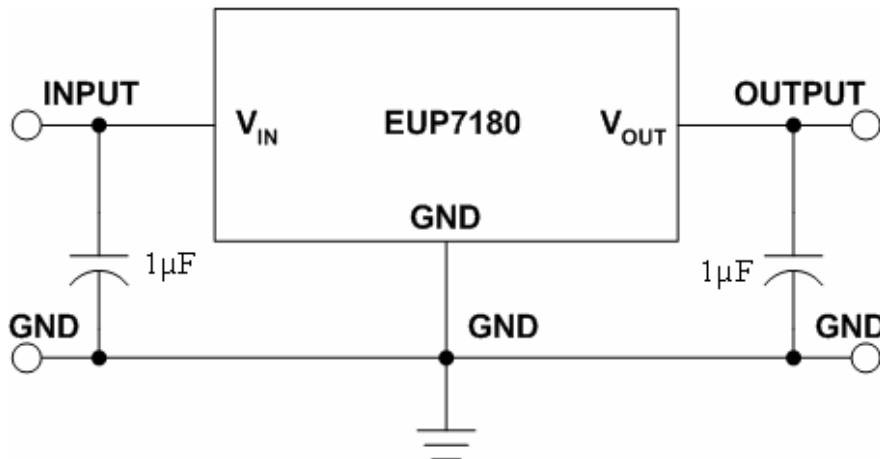


Figure 2.




Pin Configurations

Package Type	Pin Configurations	Package Type	Pin Configurations
SOT23-3		SOT89-3	

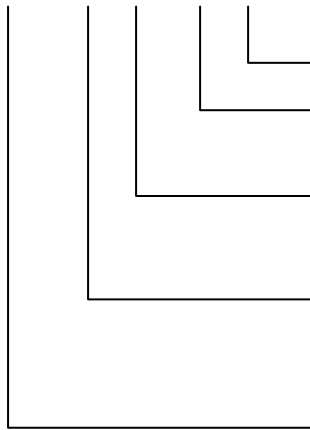
Pin Description

PIN	SOT23-3	SOT89-3	DESCRIPTION
V <sub>IN</sub>	3	2	Input voltage of the LDO
GND	1	1	Common Ground
V <sub>OUT</sub>	2	3	Output voltage of the LDO

## Ordering Information

Order Number	Package Type	Marking	Operating Junction Temperature range
EUP7180-15VIR1	SOT23-3	KC xxxx	-40°C to 150°C
EUP7180-23VIR1	SOT23-3	KS xxxx	-40°C to 150°C
EUP7180-25VIR1	SOT23-3	KB xxxx	-40°C to 150°C
EUP7180-30VIR1	SOT23-3	KG xxxx	-40°C to 150°C
EUP7180-23CIR1	SOT89-3	 xxxxx P7180S	-40°C to 150°C
EUP7180-25CIR1	SOT89-3	 xxxxx P7180B	-40°C to 150°C
EUP7180-30CIR1	SOT89-3	 xxxxx P7180G	-40°C to 150°C

EUP7180 -



Lead Free Code

1: Lead Free 0: Lead

Packing

R: Tape & Reel

Operating temperature range

I: Industry Standard

Package Type

V: SOT-23

C: SOT-89

Output Voltage

15: 1.5V

23: 2.3V

25: 2.5V

30: 3.0V

## Absolute Maximum Ratings

■	Input Voltage -----	-0.3V to 6V
■	Operating Junction Temperature Range -----	-40°C to 150°C
■	Storage Temperature Range -----	-65°C to 150°C
■	Power Dissipation , $P_D$ @ $T_A=25^\circ\text{C}$	
	SOT-23 -----	0.4W
	SOT-89 -----	0.57W
■	Package Thermal Resistance	
	SOT-23, $\theta_{JA}$ -----	250°C/W
	SOT-89, $\theta_{JA}$ -----	175°C/W
■	ESD Rating	
	Human Body Mode -----	2kV

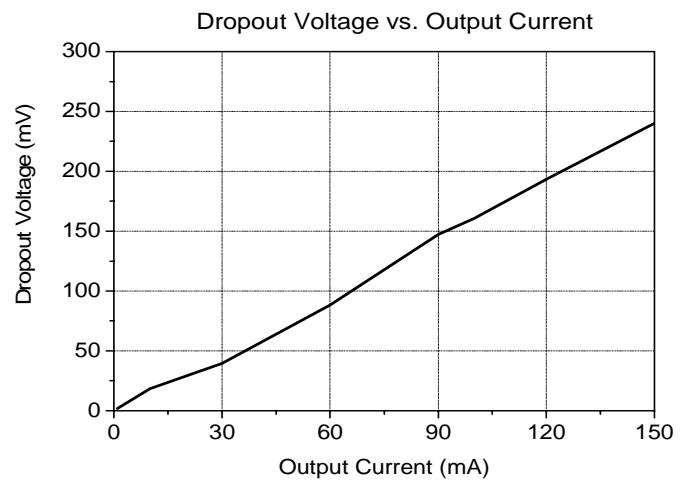
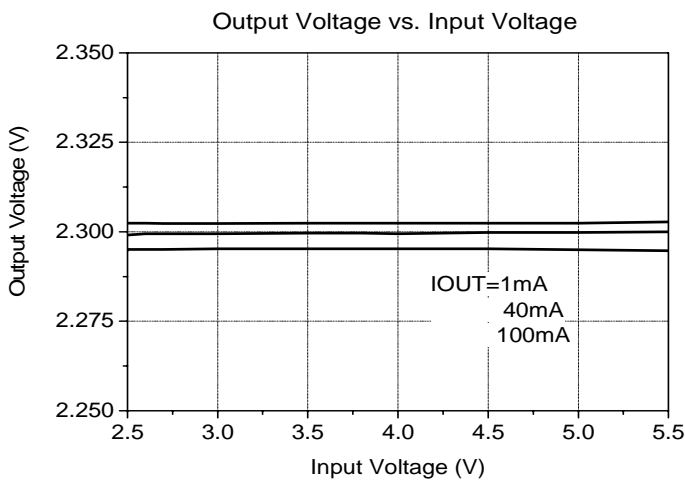
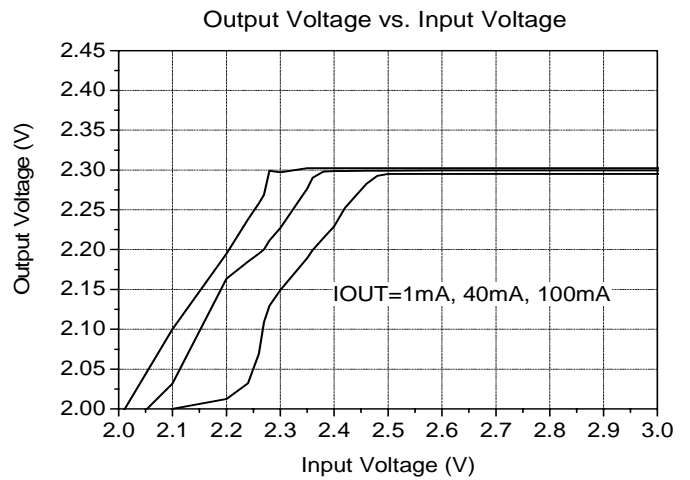
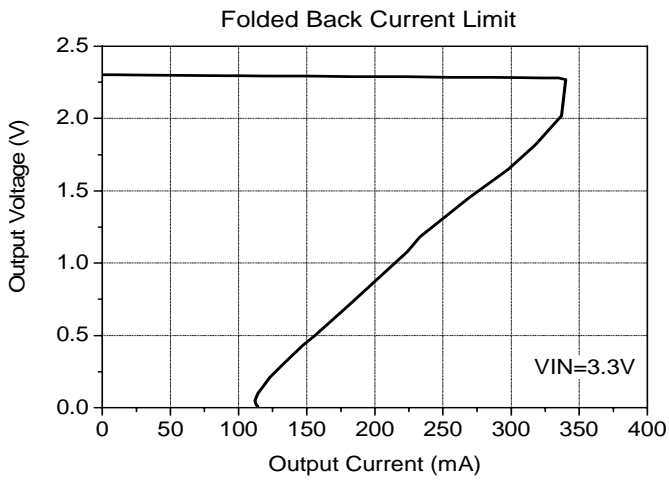
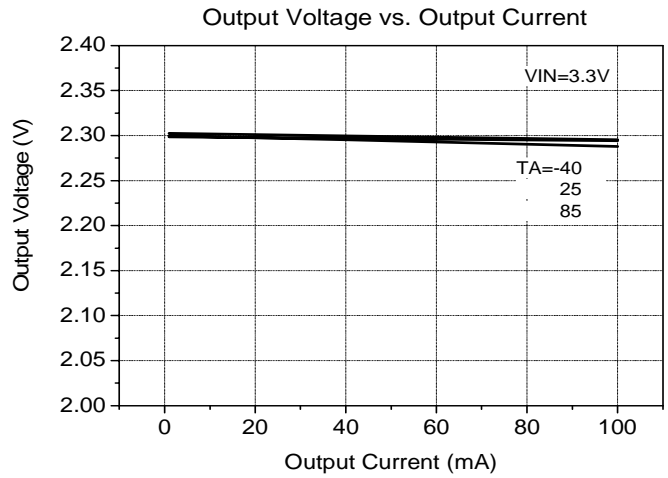
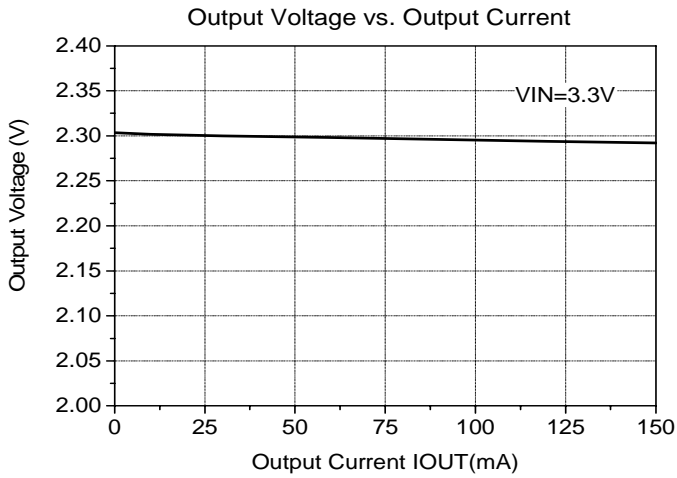
## Electrical Characteristics

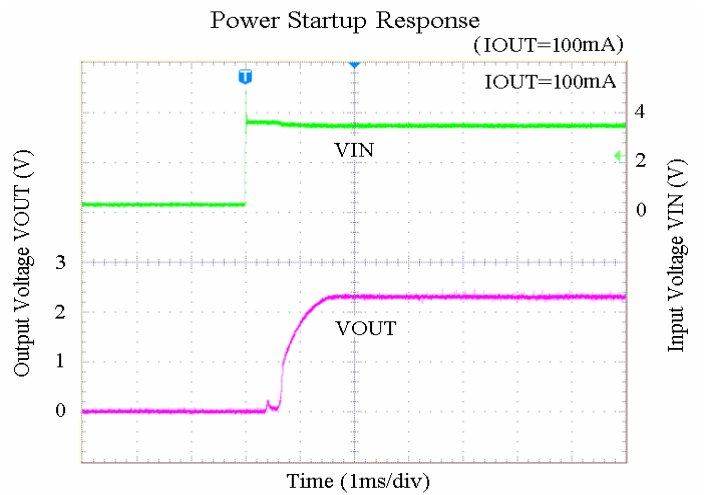
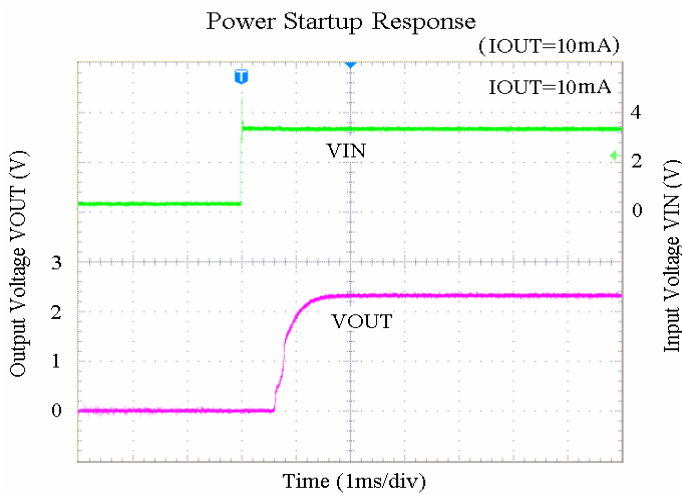
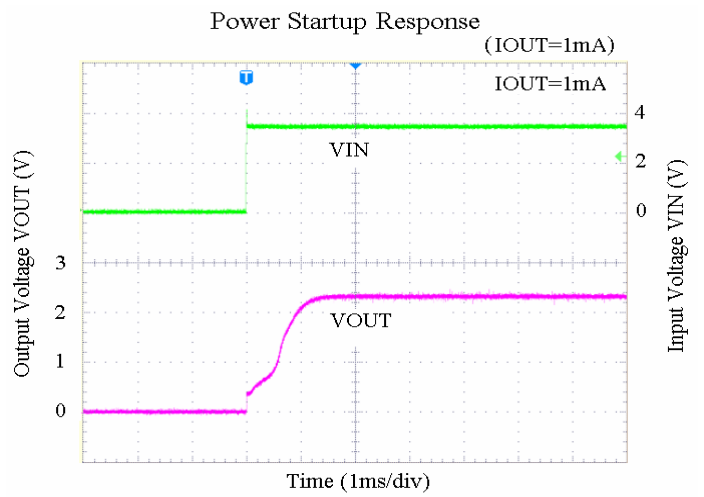
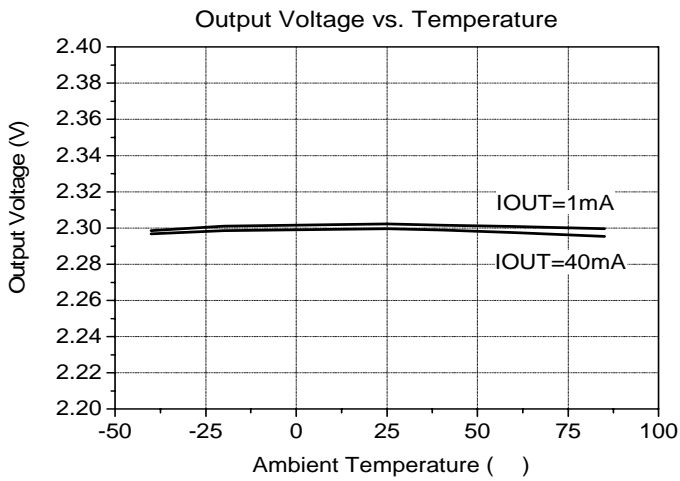
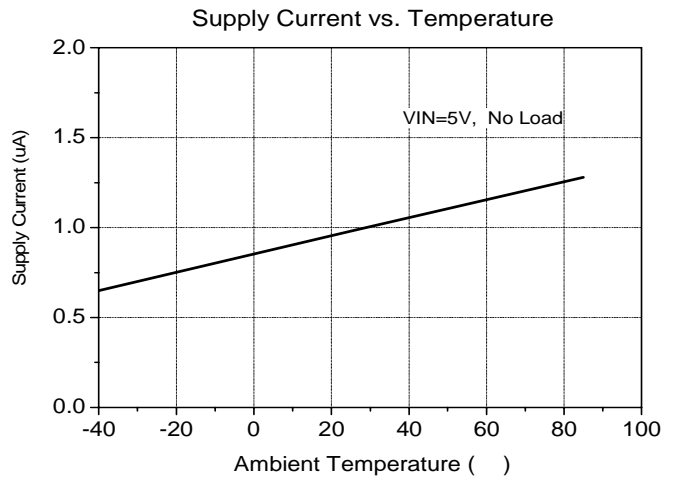
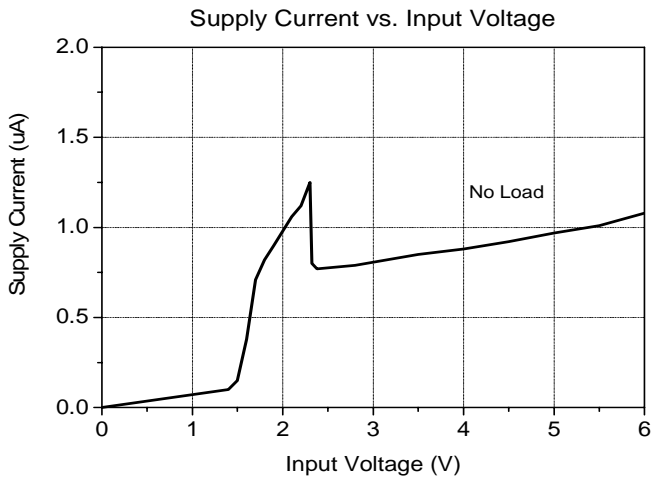
$V_{IN}=V_{OUT}+1V, C_{IN}=1\mu\text{F}, C_{OUT}=1\mu\text{F}$  (Ceramic),  $T_A=25$  , Unless otherwise specified.

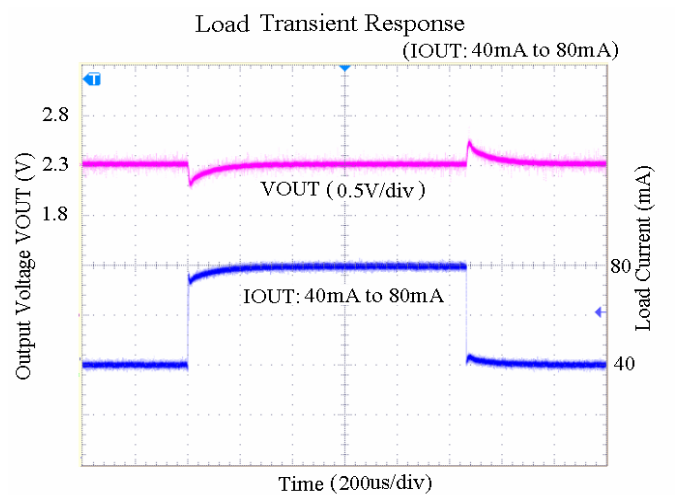
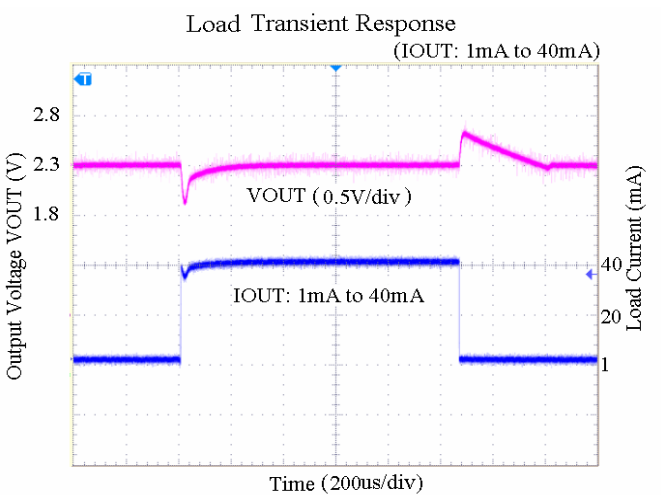
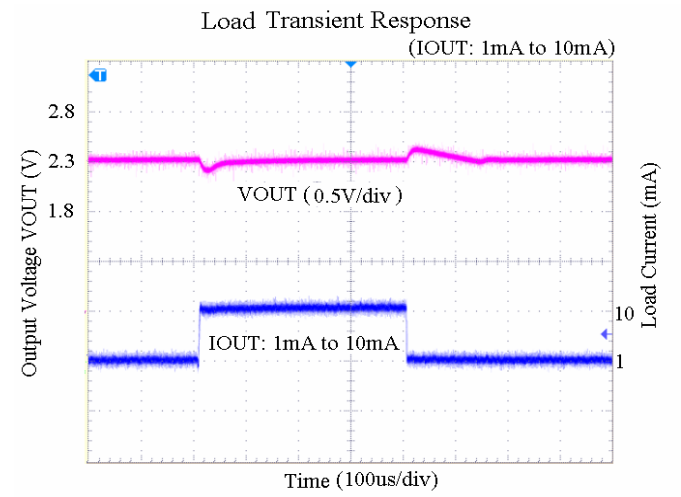
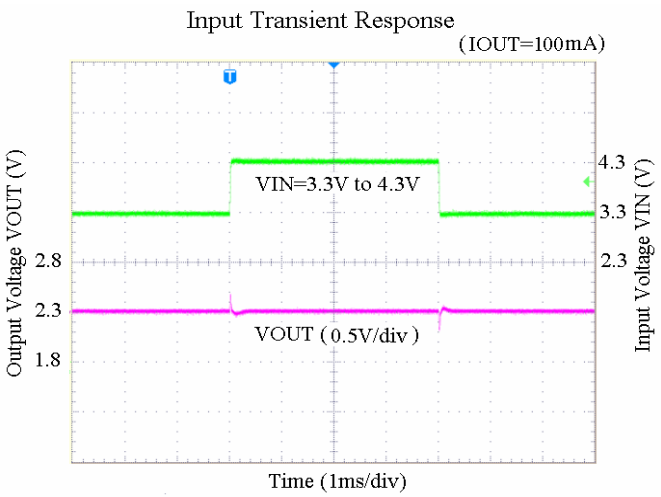
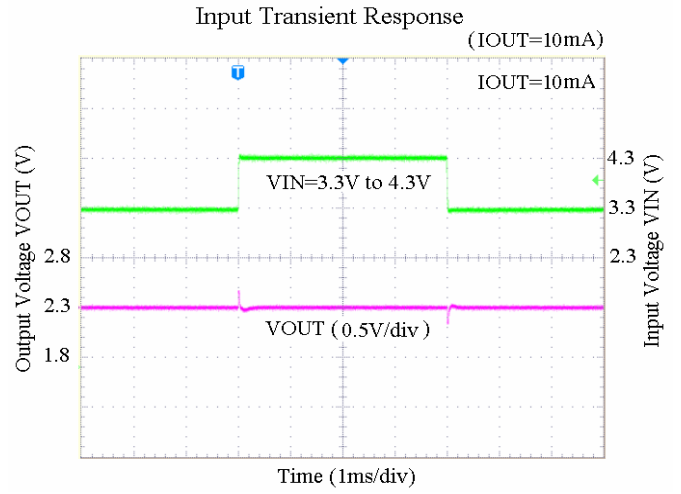
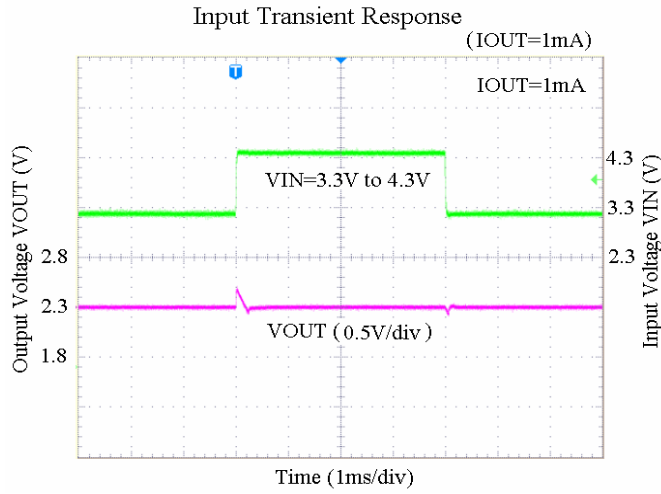
Symbol	Parameter	Conditions	EUP7180			Unit
			Min	Typ	Max.	
	Input Voltage		2.3		5.5	V
$\Delta V_{OUT}$	Output Voltage Accuracy	$I_{OUT}=1\text{mA}$	-3		3	%
$I_{OUTMAX}$	Output Current		150			mA
$V_{LDR}$	Load Regulation	$1\text{mA} \leq I_{OUT} \leq 100\text{mA}$		10	25	mV
$V_{DRO1}$	Dropout Voltage (Note1)	$I_{OUT}=30\text{mA}$		70	140	mV
$V_{DRO2}$		$I_{OUT}=100\text{mA}$		230	400	
$I_Q$	Ground Current	No Load		1	1.7	$\mu\text{A}$
		$I_{OUT}=150\text{mA}$		2.5		
$V_{LNR}$	Line Regulation	$V_{IN}=(V_{OUT}+1V)$ to 5.5V, $I_{OUT}=1\text{mA}$		0.06	0.2	%/V
$TC_{OUT}$	$V_{OUT}$ Temp. Coeff.	$I_{OUT}=1\text{mA}, T_A=-40$ to 85		70		ppm/
Ishort	Short Circuit Current	$V_{OUT}=\text{GND}$		100		mA

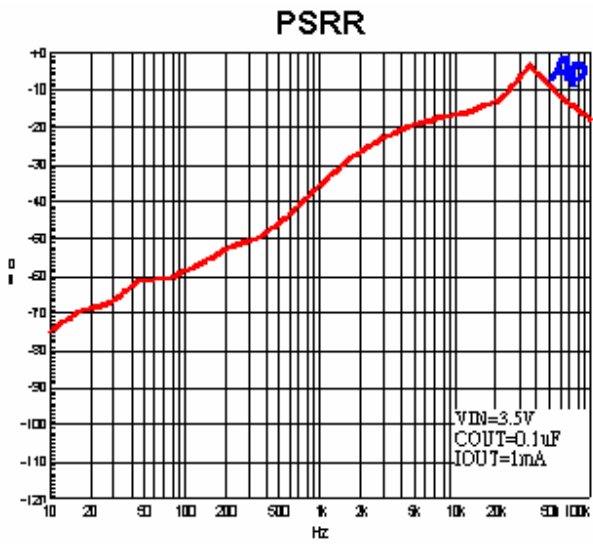
Note 1: Dropout is defined as  $V_{IN}-V_{OUT}$  when  $V_{OUT}$  is 2% below the value of  $V_{OUT}$  for  $V_{IN}=V_{OUT}+1V$ . This characteristics is suitable for  $V_{OUT} \geq 2.3V$ .

Typical Operating Characteristics











## **Application Information**

### **External Capacitors**

Like any low-dropout regulator, the EUP7180 requires external capacitors for regulator stability. The EUP7180 is specifically designed for portable applications requiring minimum board space and smallest components. These capacitors must be correctly selected for good performance.

### **Input Capacitor**

A minimum input capacitance of 1 $\mu$ F is required between the EUP7180 input pin and ground (the amount of the capacitance may be increased without limit). This capacitor must be located a distance of not more than 1cm from the input pin and returned to a clean analog ground.

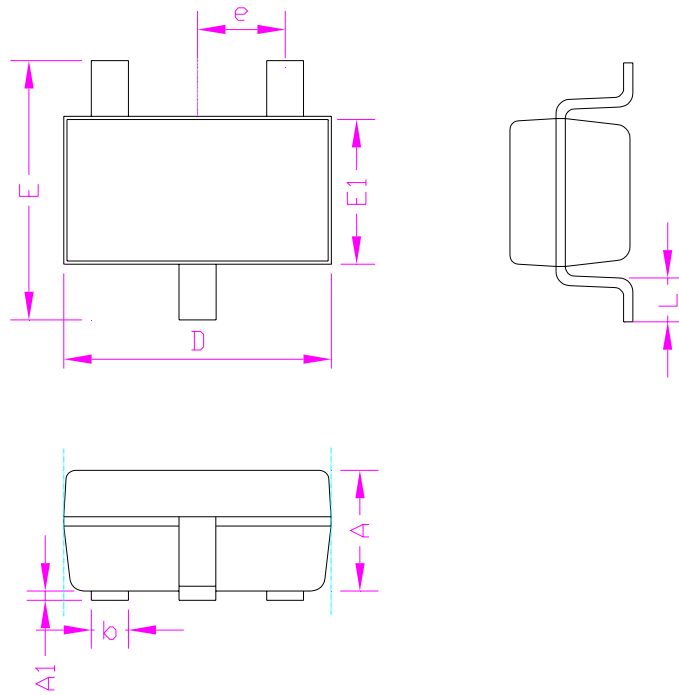
Any good quality ceramic, tantalum, or film capacitor may be used at the input. If a tantalum capacitor is used at the input, it must be guaranteed by the manufacturer to have a surge current rating sufficient for the application.

### **Output Capacitance**

The EUP7180 is specifically designed to employ ceramic output capacitors as low as 1 $\mu$ F. Ceramic capacitors below 10 $\mu$ F offer significant cost and space savings, along with high frequency noise filtering. Higher values and other types and of capacitor may be used, but their equivalent series resistance (ESR) should be maintained below 0.5 $\Omega$ . Ceramic capacitor of the value required by the EUP7180 are available in the following dielectric types: Z5U, Y5V, X5R, and X7R. The Z5U and Y5V types exhibit a 50% or more drop in capacitance value as their temperature increase from 25 $^{\circ}$ C, an important consideration. The X5R generally maintain their capacitance value within  $\pm$  20%. The X7R type are desirable for their tighter tolerance of 10% over temperature.

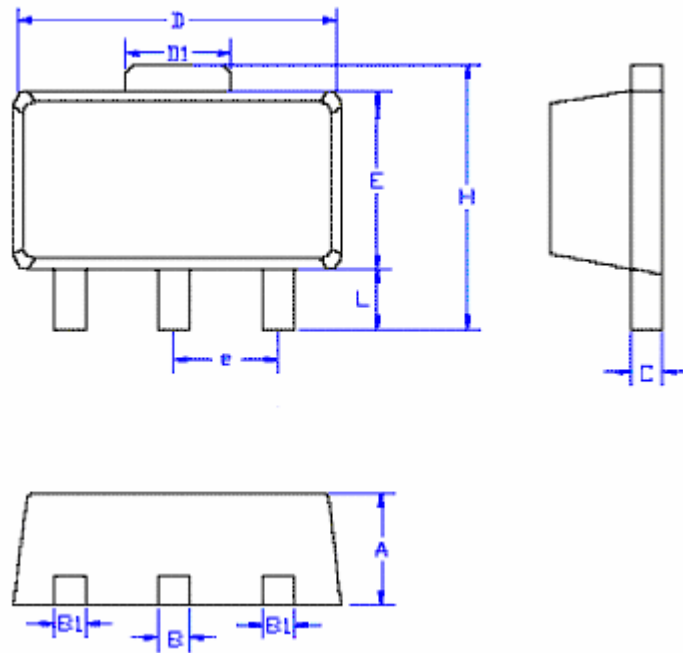
Packaging Information

SOT23-3



SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.30	-	0.052
A1	0.00	0.15	0.000	0.006
D	2.90		0.114	
E1	1.60		0.063	
E	2.60	3.00	0.102	0.118
L	0.30	0.60	0.012	0.024
b	0.30	0.50	0.012	0.020
e	0.95		0.037	

## SOT89-3



SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.40	1.60	0.055	0.063
L	0.89	1.20	0.035	0.047
B1	0.36	0.48	0.014	0.019
B	0.44	0.56	0.017	0.022
C	0.35	0.44	0.014	0.017
D	4.40	4.60	0.173	0.181
D1	1.35	1.83	0.053	0.072
H	3.94	4.25	0.155	0.167
E	2.29	2.60	0.090	0.102
e	1.50		0.059	