



## General Description

UA78LxxAIPK is three-terminal positive regulators. One of these regulators can deliver up to 150mA of output current. The internal limiting and thermal-shutdown features of the tegulator make them essentially immune to overload. When used as a replacement for a zener diode-resistor Combination, an effective improvement in output impedance can be obtained, together with lower quiescent current.

## Features

- Output Current of 150mA
- Thermal Overload Protection
- Short Circuit Protection
- Output transistor safe area protection
- No external components
- Package: SOT-89
- Output Voltage Accuracy: tolerance  $\pm 5\%$

## Pin Configuration And Descriptions

SOT-89



Table1:UA78LxxAIPK series(SOT-89 PKG)

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

## Order Information

Orderable Device	Package	Output Voltage	Packing Option
78LxxG-AB3-R	SOT-89	3.3V,5.0V,6.0V,8.0V,9.0V, 12V,15V,18V,24V	1000/Reel

xx:From 33,05,06,08,09,12,15,18,24

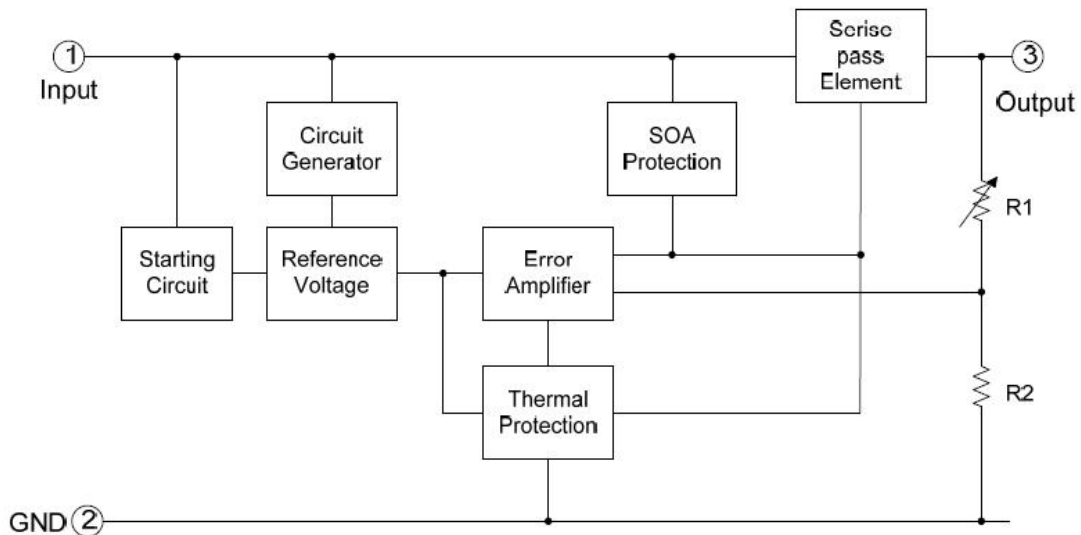


## Absolute Maximum Ratings

Description	Symbol	Value Range	Unit
Input supply voltage	$V_{IN\ MAX}$	30	V
MAX. Output current	$I_{OUT}$	150	mA
MAX Power	$P_{max}$	0.5	W
Junction temperature	$T_j$	-55~+150	°C
Operation temperature	$T_{opr}$	-40~+125	°C
Storage temperature	$T_{str}$	-55~+155	°C
Soldering temperature and time		+260	°C
ESD Rating, (HBM)	ESD	2	KV

Note: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

## Block Diagram





### DC Characteristics (unless otherwise noted $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V <sub>out</sub>	I <sub>o</sub> =40mA, V <sub>IN</sub> =10V	0.964v <sub>out</sub>	v <sub>out</sub>	1.036v <sub>out</sub>	V
		I <sub>o</sub> =1mA~40mA V <sub>IN</sub> =7V~18V	0.96v <sub>out</sub>	v <sub>out</sub>	1.04v <sub>out</sub>	
		I <sub>o</sub> =1mA~10mA V <sub>IN</sub> =10V	0.95v <sub>out</sub>	v <sub>out</sub>	1.05v <sub>out</sub>	
Line Regulation	LNR	V <sub>IN</sub> =7V~18V, I <sub>o</sub> =20mA	-150	-	150	mV
		V <sub>IN</sub> =8V~18V, I <sub>o</sub> =20mA	-100	-	100	
Load Regulation	LDR	V <sub>IN</sub> =10V, I <sub>o</sub> =1mA~100mA	-100	-	100	mV
		V <sub>IN</sub> =10V, I <sub>o</sub> =1mA~40mA	-30	-	30	
Dropout Voltage	V <sub>DIF</sub>	T <sub>a</sub> =25°C, I <sub>o</sub> =100mA	-	2	-	V
Output noise Voltage	V <sub>N</sub>	F=10Hz to 100KHz	-	40	-	uV/V <sub>o</sub>
Ripple Rejection	PSRR	T <sub>a</sub> =25°C, f=120Hz, I <sub>o</sub> =40mA, V <sub>IN</sub> =8V~20V	-	80	-	dB
Quiescent Current	I <sub>q</sub>	V <sub>IN</sub> =10V, I <sub>O</sub> UT=40mA	-	-	5.5	mA
Quiescent Current Change	ΔI <sub>q</sub>	V <sub>IN</sub> =8V~18V, I <sub>o</sub> =20mA	-1.5	-	1.5	mA
		V <sub>IN</sub> =10V, I <sub>O</sub> UT=1mA~40mA,	-0.1	-	0.1	

LNR: Line Regulation. The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

LDR: Load Regulation. The change in output voltage for a change in load current at constant chip temperature.



## Application Circuit

### Basic Circuits

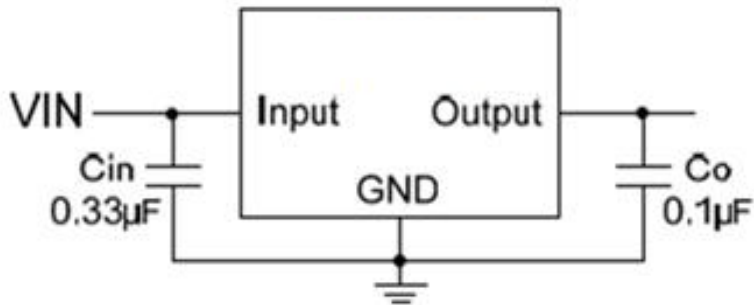


Fig.1 Typical Application

A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

Cin is required if regulator is located an appreciable distance from power supply filter.

Co is not needed for stability; however, it does improve transient response.

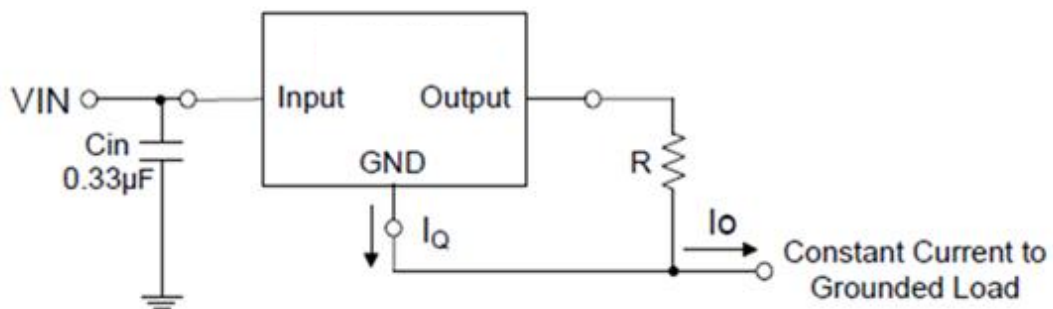


Fig.2 Constant Current Regulator

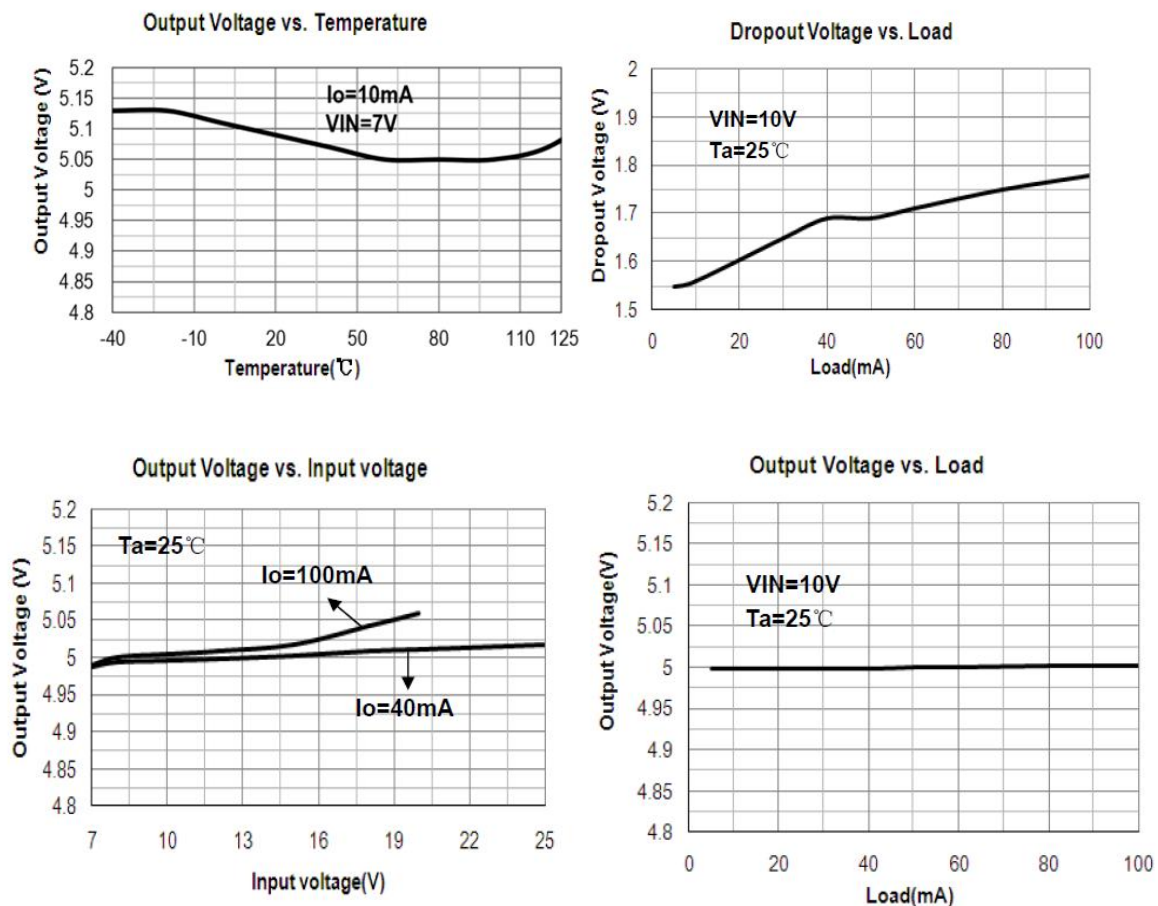


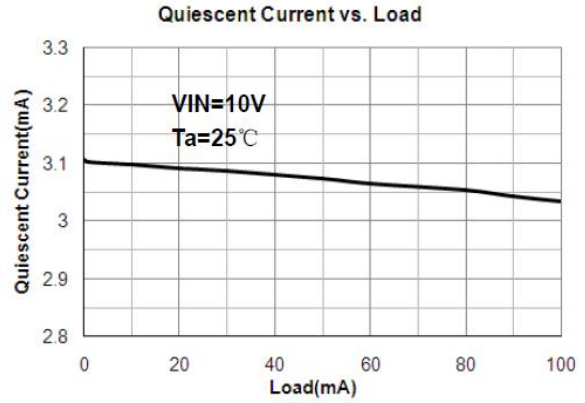
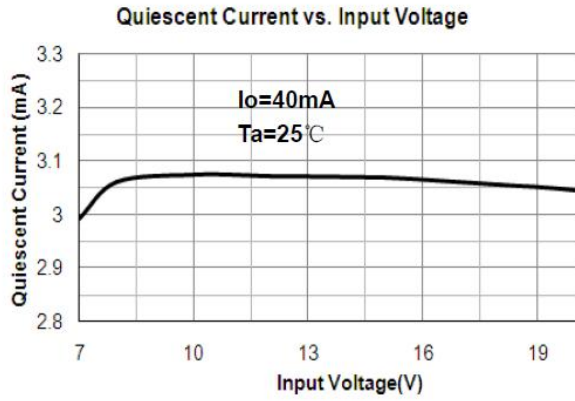
## Function Description

UA78LxxAIPK is designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, and Output Transistor Safe-Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

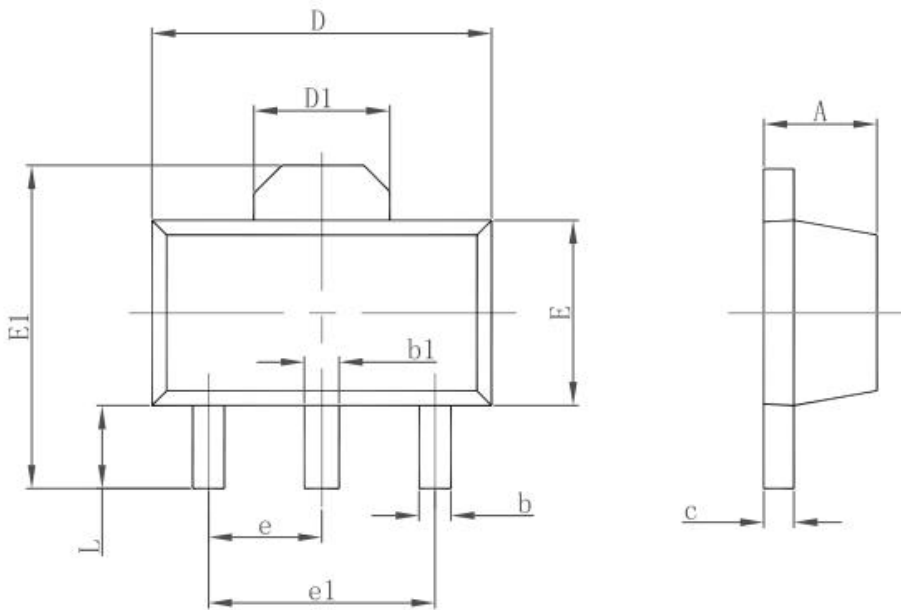
In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33  $\mu$ F or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

## Typical Characteristics





### Package Outline Dimensions SOT-89



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



### Attention

- Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.
- HUA XUAN YANG ELECTRONICS assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein.
- Specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all HUA XUAN YANG ELECTRONICS products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of HUA XUAN YANG ELECTRONICS CO.,LTD.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the HUA XUAN YANG ELECTRONICS product that you intend to use.