Ordering number:ENN1187E

Monolithic Linear IC

LA5000 Series

2 to 5V 60mA Low Saturation Voltage Regulators

Overview

The LA5002, 5003, 5004, 5005 are voltage regulators having a small input-output voltage drop (0.2V typ). They are especially suited for use in battery-powered low voltage equipment and commercial or industrial equipment having a large voltage regulation.

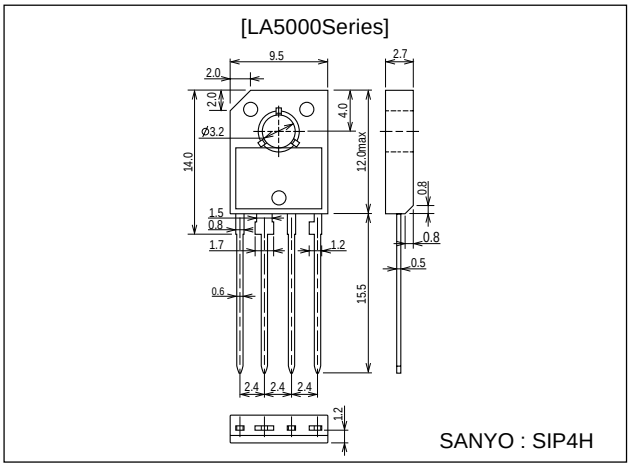
Features

- Small input-output voltage drop (0.2V/I_{OUT}=20mA typ).
- Minimum number of external parts required.
- Highly resistant against load short.
- Radio noise (radiation) control pin.

Package Dimensions

unit:mm

3027A-SIP4H



Specifications

Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Input supply voltage	V_{IN} max		12	V
Output current	I_{OUT} max		60	mA
Allowable power dissipation	Pd max	Ta=80˚C	560	mW
Operating temperature	Topr		–20 to +80	˚C
Storage temperature	Tstg		–30 to +125	˚C

Electrical Characteristics at Ta = 25˚C, C_{OUT}=10µF, I_{OUT}=20mA, V_{IN}=3V [LA5002], V_{IN}=4V [5003], V_{IN}=5V [5004], V_{IN}=6V [LA5005]

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O	LA5002	1.85	2.0	2.15	V
		LA5003	2.8	3.0	3.2	V
		LA5004	3.75	4.0	4.25	V
		LA5005	4.75	5.0	5.25	V
Line regulation	$V_O$line	LA5002 : 2.5V<V_{IN}<8V			50	mV
		LA5003 : 3.5V<V_{IN}<9V			50	mV
		LA5004 : 4.5V<V_{IN}<10V			50	mV
		LA5005 : 5.5V<V_{IN}<11V			50	mV
Load regulation	$V_O$load	1mA<I_{OUT}<40mA			20	mV
		1mA<I_{OUT}<50mA			25	mV

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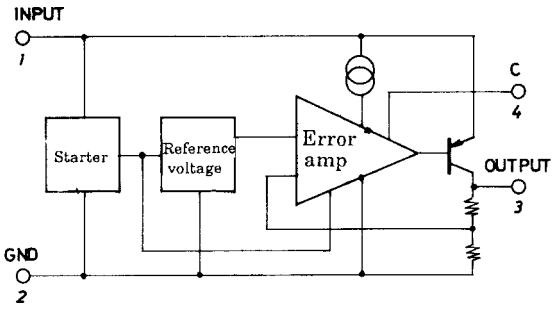
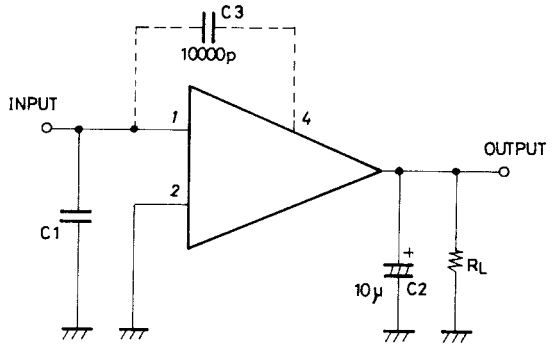
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO}	LA5002		1.2	2.0	mA
		LA5003		1.4	2.0	mA
		LA5004		1.5	2.3	mA
		LA5005		1.7	2.5	mA
Ripple voltage	R_r	LA5002, LA5004, LA5005 : f=120Hz	40			dB
		LA5003 : f=120Hz	43			dB
Input/output voltage drop	V_{drop}			0.2	0.3	V
Temperature coefficient of output voltage	$K\Delta v_O/\Delta T$		–1		+1	mV/°C
Output noise voltage	V_N	10Hz<f<100kHz		30		μV

Equivalent Circuit Block Diagram



Sample Application Circuit

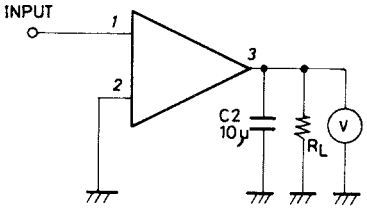


Unit (capacitance: F)

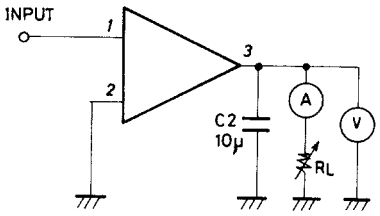
Note : Capacitor C3 is not required unless radio noise is a problem.

Test Circuits

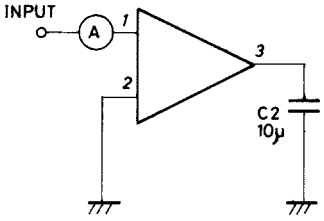
• V_{OUT}, Line Reg.



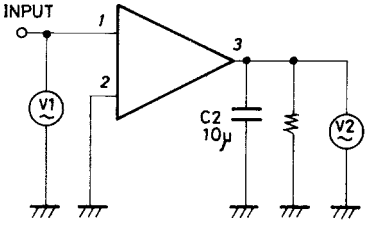
• Load Reg.



• ICC

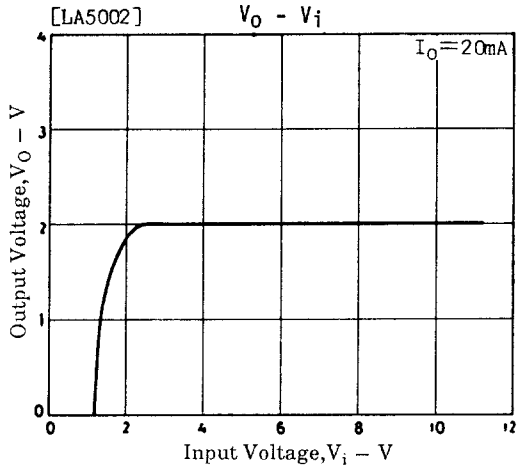


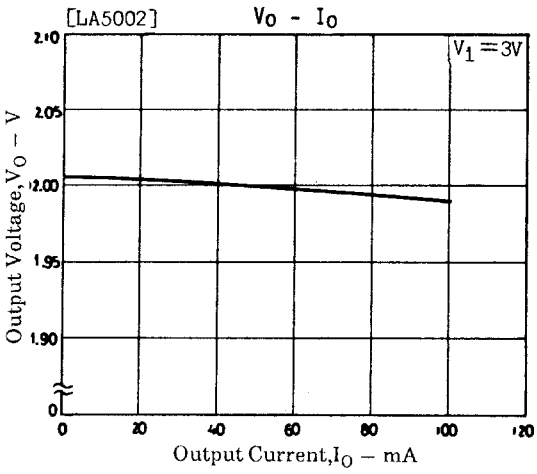
• Ripple Rej.

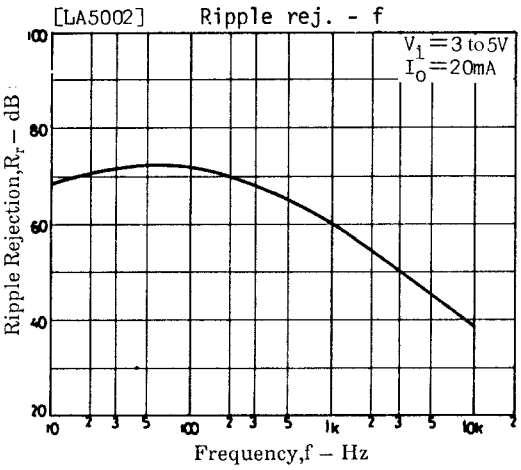


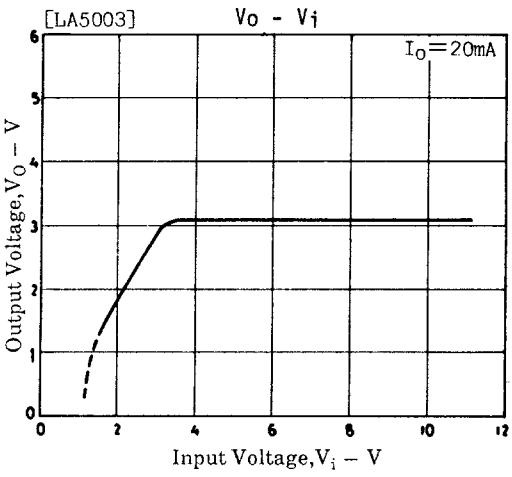
$$\text{Ripple Rej} = \frac{V1}{V2}$$

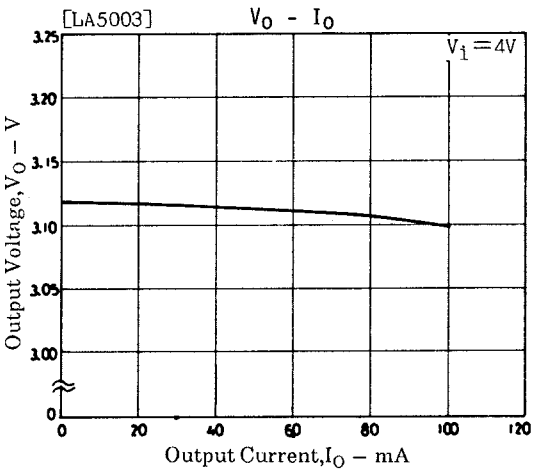
Unit (capacitance: F)

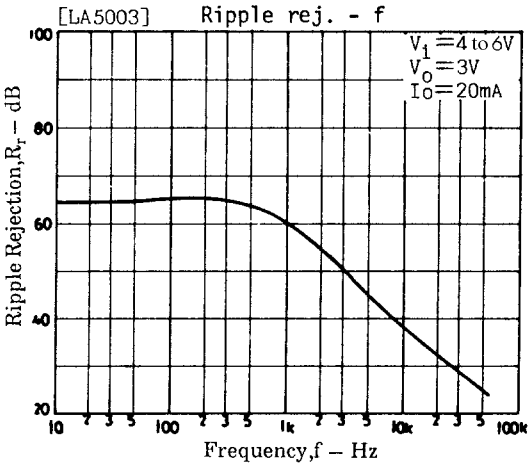

[LA5002] Vo - Vi
Io=20mA
Output Voltage,Vo – V
Input Voltage,Vi – V

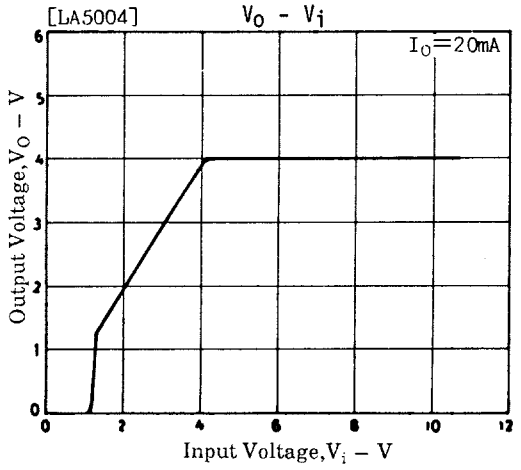

[LA5002] Vo - Io
V1=3V
Output Voltage,Vo – V
Output Current,Io – mA

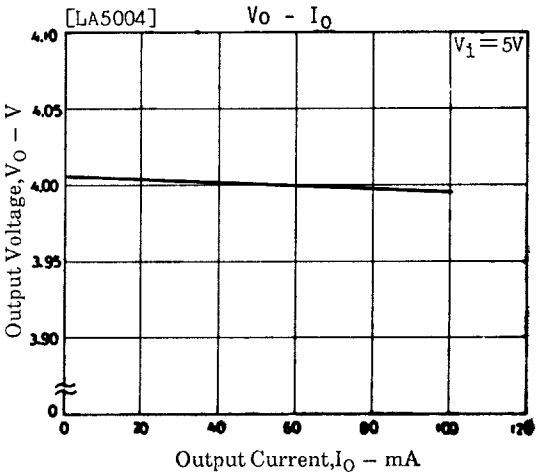

[LA5002] Ripple rej. - f
V1=3 to 5V
Io=20mA
Ripple Rejection,Rr – dB
Frequency,f – Hz

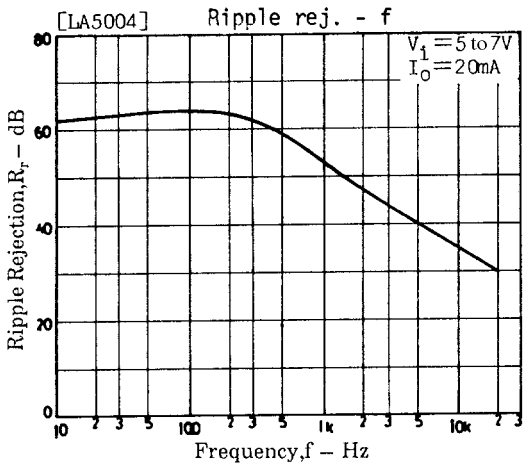

[LA5003] Vo - Vi
Io=20mA
Output Voltage,Vo – V
Input Voltage,Vi – V

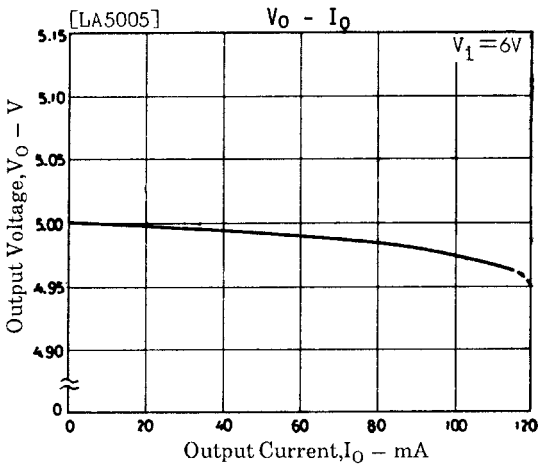

[LA5003] Vo - Io
V1=4V
Output Voltage,Vo – V
Output Current,Io – mA

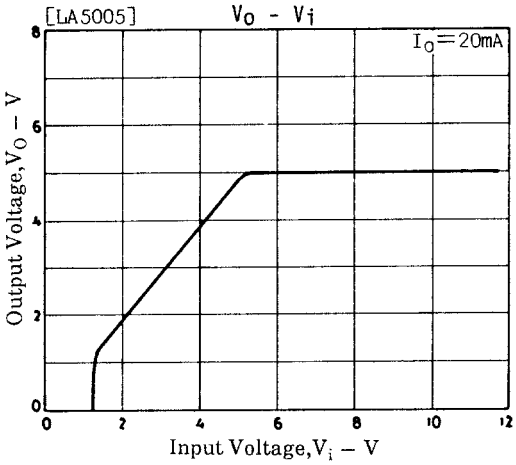

[LA5003] Ripple rej. - f
V1=4 to 6V
Vo=3V
Io=20mA
Ripple Rejection,Rr – dB
Frequency,f – Hz

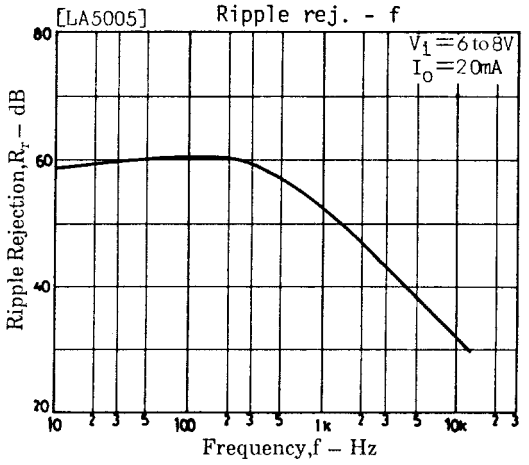

[LA5004] Vo - Vi
Io=20mA
Output Voltage,Vo – V
Input Voltage,Vi – V

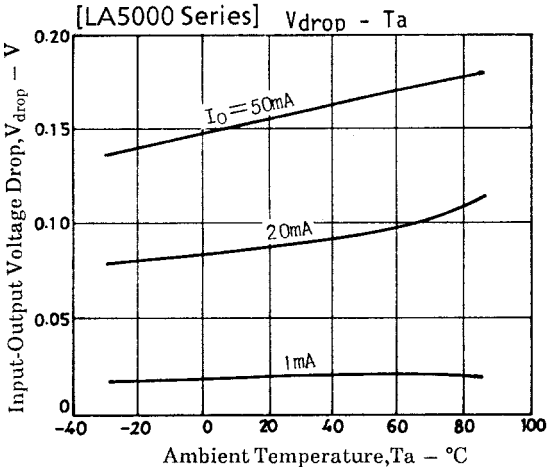

[LA5004] Vo - Io
V1=5V
Output Voltage,Vo – V
Output Current,Io – mA

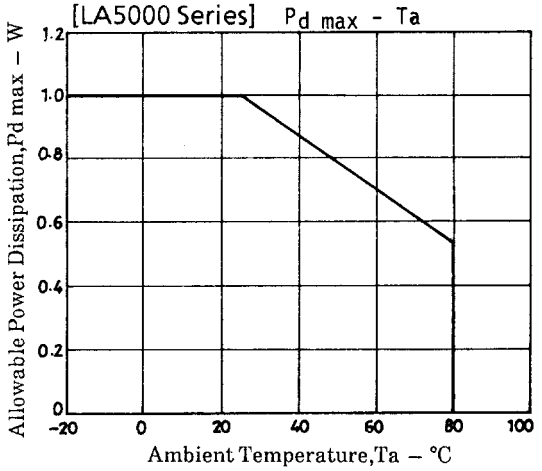

[LA5004] Ripple rej. - f
V_i=5 to 7V
I_O=20mA
Ripple Rejection, R_r – dB
Frequency, f – Hz


[LA5005] V_O - I_O
V_i=6V
Output Voltage, V_O – V
Output Current, I_O – mA


[LA5005] V_O - V_i
I_O=20mA
Output Voltage, V_O – V
Input Voltage, V_i – V


[LA5005] Ripple rej. - f
V_i=6 to 8V
I_O=20mA
Ripple Rejection, R_r – dB
Frequency, f – Hz


[LA5000 Series] Vdrop - Ta
I_O=50mA
20mA
1mA
Input-Output Voltage Drop, V_{drop} – V
Ambient Temperature, Ta – °C


[LA5000 Series] Pd max - Ta
Allowable Power Dissipation, Pd max – W
Ambient Temperature, Ta – °C

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