

AN79Lxx/AN79LxxM Series

3-pin negative output voltage regulator (100 mA type)

■ Overview

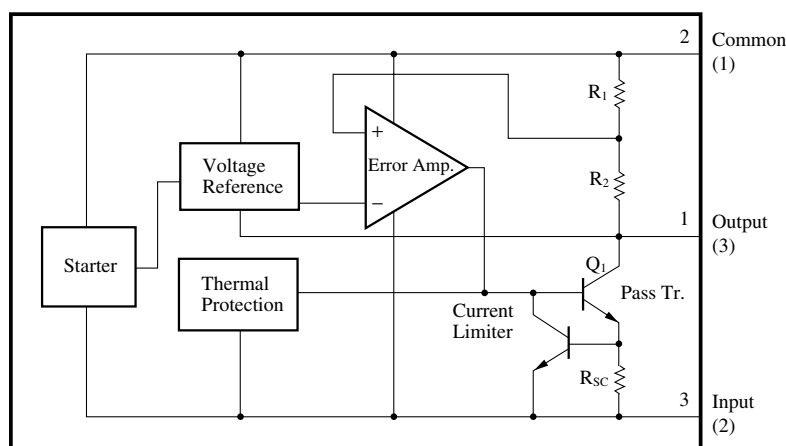
The AN79Lxx series and the AN79LxxM series are 3-pin, fixed negative output type monolithic voltage regulators.

Stabilized fixed output voltage is obtained from unstable DC input voltage without using any external components. 12 types of output voltage are available: -5V , -7V and -10V . They can be used widely in power circuits with current capacity of up to 100mA.

■ Features

- No external components
- Output voltage: -5V , -7V , -10V
- Built-in overcurrent limit circuit
- Built-in thermal overload protection circuit

■ Block Diagram (AN79Lxx series)



Note) The number in () shows the pin number for the AN79LxxM series.

■ Pin Descriptions

Pin No.	Description	
	AN79Lxx series	AN79LxxM series
1	Output	Common
2	Common	Input
3	Input	Output

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter		Symbol	Rating	Unit
Input voltage		V_i	-35	V
Power dissipation		P_D	650 *	V
Operating ambient temperature		T_{opr}	-20 to +80	mW
Storage temperature	AN79Lxx series	T_{stg}	-55 to +150	$^\circ\text{C}$
	AN79LxxM series		-55 to +125	

* Follow the derating curve. When T_j exceeds 150°C , the internal circuit cuts off the output.
AN79LxxM series is mounted on a standard board (glass epoxy: $20\text{mm} \times 20\text{mm} \times t1.7\text{mm}$ with Cu foil of²

Electrical Characteristics at $T_a = 25^\circ\text{C}$

• AN79L05M (-5V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	V_O	$T_j = 25^\circ\text{C}$	-4.8	-5	-5.2	V
Output voltage tolerance	V_O	$V_i = -8$ to -20V , $I_O = 1$ to 70mA	-4.75	—	-5.25	V
Line regulation	REG_{IN}	$V_i = -7$ to -21V , $T_j = 25^\circ\text{C}$	—	—	100	mV
		$V_i = -8$ to -18V , $T_j = 25^\circ\text{C}$	—	—	50	mV
Load regulation	REG_L	$I_O = 1$ to 100mA , $T_j = 25^\circ\text{C}$	—	11	60	mV
		$I_O = 1$ to 40mA , $T_j = 25^\circ\text{C}$	—	5	30	mV
Bias current	I_{Bias}	$T_j = 25^\circ\text{C}$	—	3	5	mA
Bias current fluctuation to input	$\Delta I_{Bias(IN)}$	$V_i = -8$ to -20V , $T_j = 25^\circ\text{C}$	—	—	0.5	mA
Bias current fluctuation to load	$\Delta I_{Bias(L)}$	$I_O = 1$ to 40mA , $T_j = 25^\circ\text{C}$	—	—	0.1	mA
Output noise voltage	V_{no}	$f = 10\text{Hz}$ to 100kHz , $T_a = 25^\circ\text{C}$	—	40	—	μV
Ripple rejection ratio	RR	$V_i = -8$ to -18V , $f = 120\text{Hz}$, $T_a = 25^\circ\text{C}$	55	—	—	dB
Minimum input/output voltage difference	$V_{DIF(min)}$	$T_j = 25^\circ\text{C}$	—	0.8	—	V
Output short-circuit current	$I_{O(Short)}$	$V_i = -35\text{V}$, $T_j = 25^\circ\text{C}$	—	200	—	mA
Output voltage temperature coefficient	$\Delta V_O/T_a$	$I_O = 5\text{mA}$	—	-0.4	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition $T_j = 25^\circ\text{C}$ means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified, $V_i = -10\text{V}$, $I_O = 40\text{mA}$, $C_i = 2\mu\text{F}$, $C_O = 1\mu\text{F}$, $T_j = 0$ to 100°C

■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

• AN79L07, AN79L07M (–7V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	V_O	$T_j = 25^\circ\text{C}$	–6.72	–7	–7.28	V
Output voltage tolerance	V_O	$V_I = -10$ to -22V , $I_O = 1$ to 70mA	–6.65	—	–7.35	V
Line regulation	REG_{IN}	$V_I = -9$ to -23V , $T_j = 25^\circ\text{C}$	—	—	140	mV
		$V_I = -10$ to -20V , $T_j = 25^\circ\text{C}$	—	—	70	mV
Load regulation	REG_L	$I_O = 1$ to 100mA , $T_j = 25^\circ\text{C}$	—	13	70	mV
		$I_O = 1$ to 40mA , $T_j = 25^\circ\text{C}$	—	6	40	mV
Bias current	I_{Bias}	$T_j = 25^\circ\text{C}$	—	3	5	mA
Bias current fluctuation to input	$\Delta I_{\text{Bias(IN)}}$	$V_I = -10$ to -22V , $T_j = 25^\circ\text{C}$	—	—	0.5	mA
Bias current fluctuation to load	$\Delta I_{\text{Bias(L)}}$	$I_O = 1$ to 40mA , $T_j = 25^\circ\text{C}$	—	—	0.1	mA
Output noise voltage	V_{no}	$f = 10\text{Hz}$ to 100kHz , $T_a = 25^\circ\text{C}$	—	48	—	μV
Ripple rejection ratio	RR	$V_I = -10$ to -20V , $f = 120\text{Hz}$, $T_a = 25^\circ\text{C}$	54	—	—	dB
Minimum input/output voltage difference	$V_{\text{DIF(min)}}$	$T_j = 25^\circ\text{C}$	—	0.8	—	V
Output short-circuit current	$I_{\text{O(Short)}}$	$V_I = -35\text{V}$, $T_j = 25^\circ\text{C}$	—	200	—	mA
Output voltage temperature coefficient	$\Delta V_O/T_a$	$I_O = 5\text{mA}$	—	–0.5	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition $T_j = 25^\circ\text{C}$ means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified, $V_I = -12\text{V}$, $I_O = 40\text{mA}$, $C_I = 2\mu\text{F}$, $C_O = 1\mu\text{F}$, $T_j = 0$ to 125°C (AN79L07) and $T_j = 0$ to 100°C (AN79L07M)

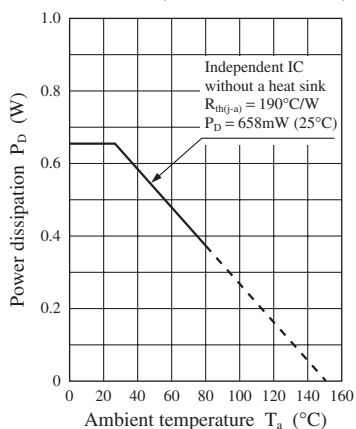
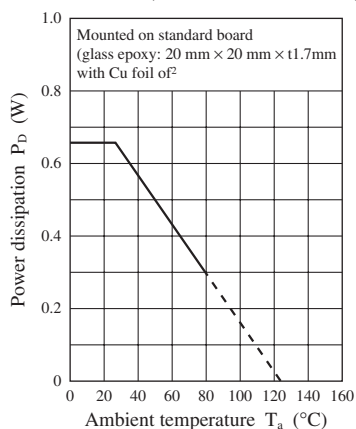
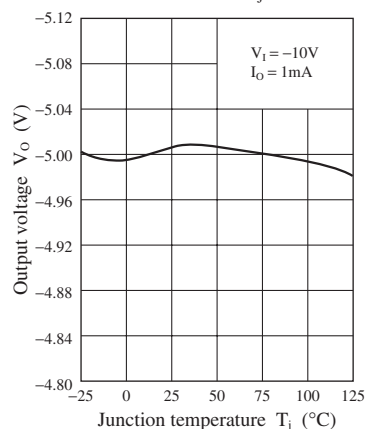
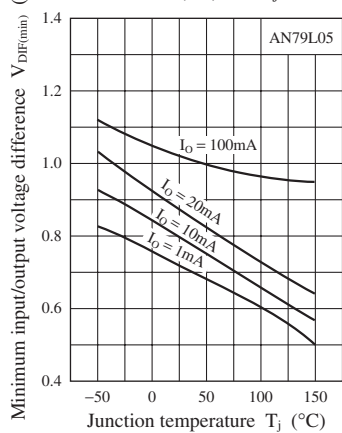
• AN79L10, AN79L10M (–10V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	V_O	$T_j = 25^\circ\text{C}$	–9.6	–10	–10.4	V
Output voltage tolerance	V_O	$V_I = -13$ to -25V , $I_O = 1$ to 70mA	–9.5	—	–10.5	V
Line regulation	REG_{IN}	$V_I = -12$ to -26V , $T_j = 25^\circ\text{C}$	—	—	160	mV
		$V_I = -13$ to -23V , $T_j = 25^\circ\text{C}$	—	—	80	mV
Load regulation	REG_L	$I_O = 1$ to 100mA , $T_j = 25^\circ\text{C}$	—	17	100	mV
		$I_O = 1$ to 40mA , $T_j = 25^\circ\text{C}$	—	9	50	mV
Bias current	I_{Bias}	$T_j = 25^\circ\text{C}$	—	3	5	mA
Bias current fluctuation to input	$\Delta I_{\text{Bias(IN)}}$	$V_I = -13$ to -25V , $T_j = 25^\circ\text{C}$	—	—	0.5	mA
Bias current fluctuation to load	$\Delta I_{\text{Bias(L)}}$	$I_O = 1$ to 40mA , $T_j = 25^\circ\text{C}$	—	—	0.1	mA
Output noise voltage	V_{no}	$f = 10\text{Hz}$ to 100kHz , $T_a = 25^\circ\text{C}$	—	65	—	μV
Ripple rejection ratio	RR	$V_I = -13$ to -23V , $f = 120\text{Hz}$, $T_a = 25^\circ\text{C}$	53	—	—	dB
Minimum input/output voltage difference	$V_{\text{DIF(min)}}$	$T_j = 25^\circ\text{C}$	—	0.8	—	V
Output short-circuit current	$I_{\text{O(Short)}}$	$V_I = -35\text{V}$, $T_j = 25^\circ\text{C}$	—	200	—	mA
Output voltage temperature coefficient	$\Delta V_O/T_a$	$I_O = 5\text{mA}$	—	–0.7	—	$\text{mV}/^\circ\text{C}$

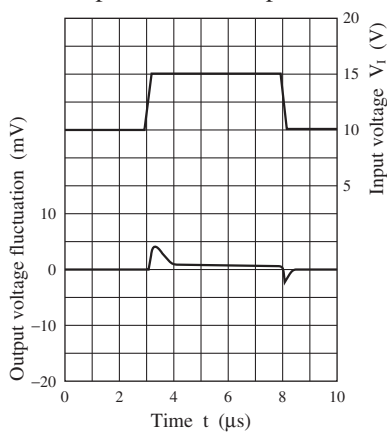
Note 1) The specified condition $T_j = 25^\circ\text{C}$ means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified, $V_I = -16\text{V}$, $I_O = 40\text{mA}$, $C_I = 2\mu\text{F}$, $C_O = 1\mu\text{F}$, $T_j = 0$ to 125°C (AN79L10) and $T_j = 0$ to 100°C (AN79L10M)

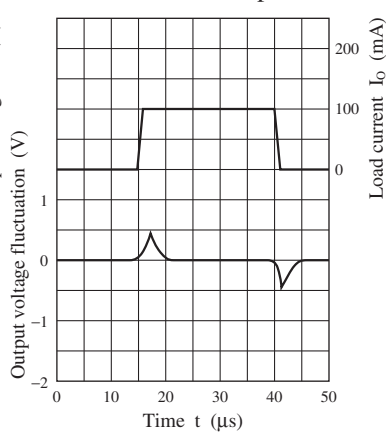
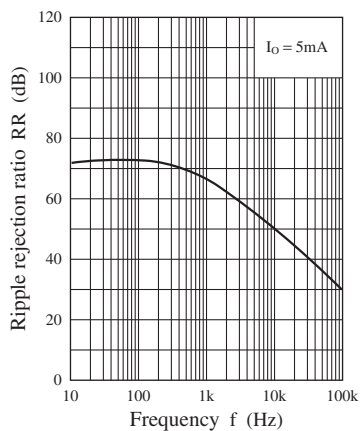
■ Main Characteristics

 $P_D - T_a$ (AN79Lxx series) $P_D - T_a$ (AN79LxxM series) $V_O - T_j$  $V_{DIF(min)} - T_j$ 

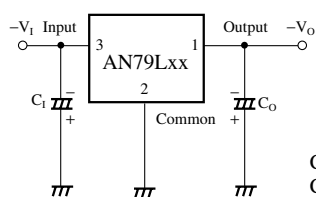
Input transient response



Load transient response

 $RR - f$ 

■ Basic Regulator Circuit



Connect C_I of 2 μ F when the input line is long.
 C_O improves the transient response. 1 μ F

■ Usage Notes

1. Cautions for a basic circuit

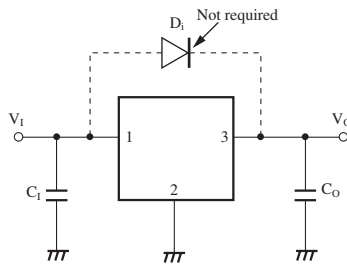


Figure 1

C_I : When a wiring from a smoothing circuit to a three-pin regulator is long, it is likely to oscillate at output. A capacitor of $0.1\mu\text{F}$ to $0.47\mu\text{F}$ should be connected near an input pin.

C_O : Deadly needed to prevent from oscillation ($0.33\mu\text{F}$ to $1.0\mu\text{F}$). It is recommended to use a capacitor of a small internal impedance (ex. tantalum capacitor) when using it under a low temperature.

When any sudden change of load current is likely to occur, connect an electrolytic capacitor of $10\mu\text{F}$ to $100\mu\text{F}$ to improve a transitional response of output voltage.

D_I : Normally unnecessary. But add it in the case that there is a residual voltage at the output capacitor C_O even after switching off the supply power because a current is likely to flow into an output pin of the IC and damage the IC.

2. Other caution items

1) Short-circuit between the input pin and GND pin

If the input pin is short-circuited to GND or is cut off when a large capacitance capacitor has been connected to the IC's load, a voltage of a capacitor connected to an output pin is applied between input/output of the IC and this likely results in damage of the IC. It is necessary, therefore, to connect a diode, as shown in figure 2, to counter the reverse bias between input/output pins.

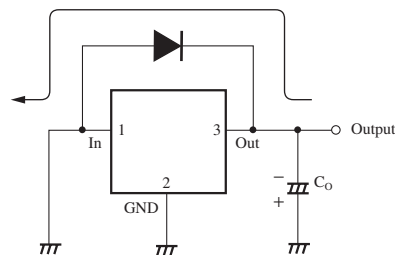
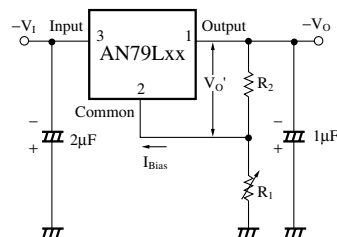


Figure 2

2) Floating of GND pin

If a GND pin is made floating in an operating mode, an unstabilized input voltage is outputted. In this case, a thermal protection circuit inside the IC does not normally operate. In this state, if the load is short-circuited or overloaded, it is likely to damage the IC.

■ Application Circuit Example

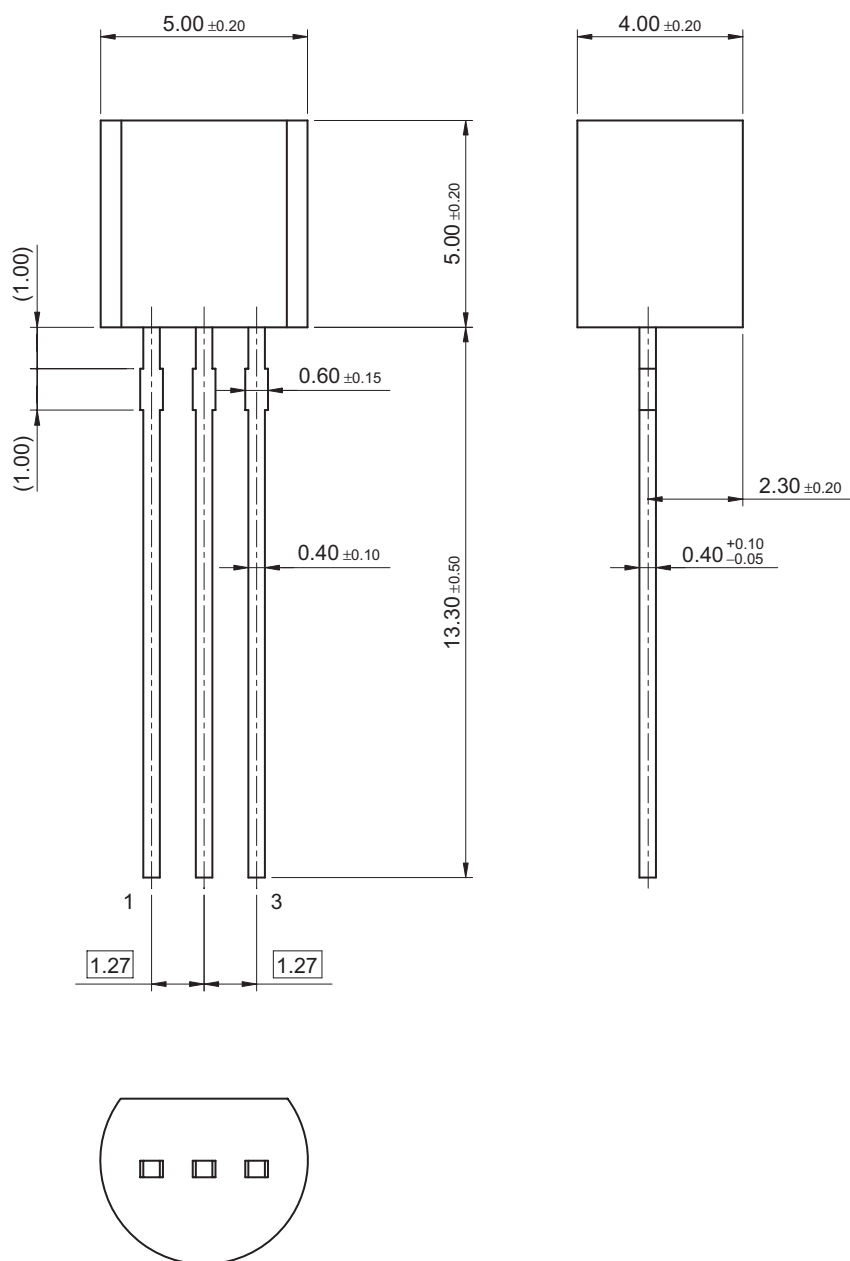


$$|V_O| = V_O' \left(1 + \frac{R_1}{R_2} \right) + I_Q R_1$$

Note) V_O varies due to sample to sample variation of I_{Bias} .
Never fail to adjust individually with R_1 .

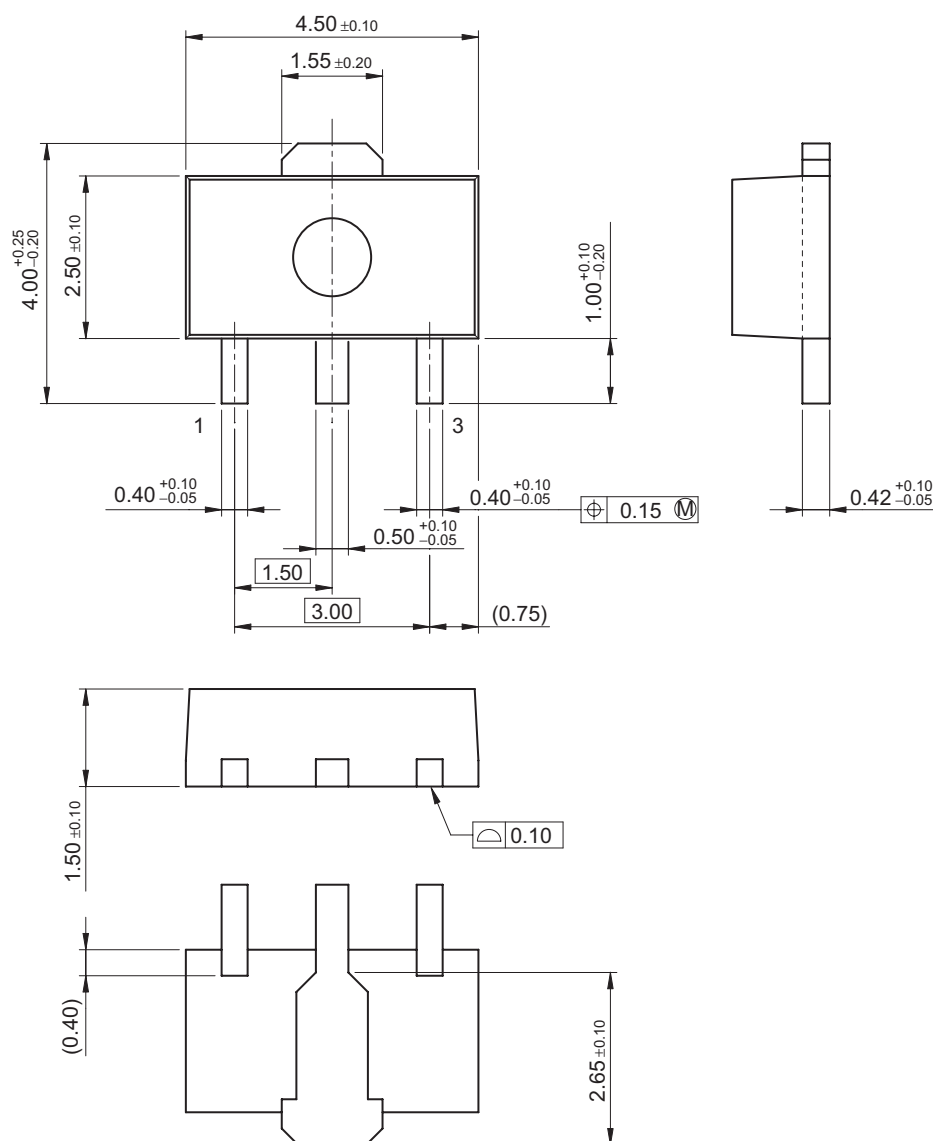
■ Package Dimensions (Unit: mm)

- SSIP003-P-0000S



■ Package Dimensions (Unit: mm)

- HSIP003-P-0000Q



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