GL79XX Series

NEGATIVE VOLTAGE REGULATOR

Description

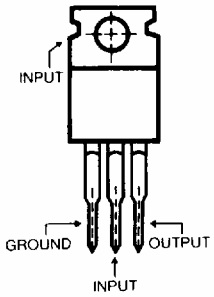
The GL79XX series of fixed output negative voltage regulators are intended as complements to the popular GL78XX series devices. Available in fixed output voltage options from −5 to −24 Volts, these regulators employ internal current limiting, thermal shutdown, and safe-area compensation-making them remarkably rugged under most operating conditions With adequate heat-sinking they can deliver output currents in excess of 1.0A.

Features

- High Line Regulation
- High Load Regulation
- Good Ripple Rejection (70dB)
- Low Temperature Coefficient of Output (−1.0mV/°C)
- Wide Range Input Voltage
- Low Input Bias Current
- Low Output Noise
- Output Current in Exess of 1A

Pin Configuration

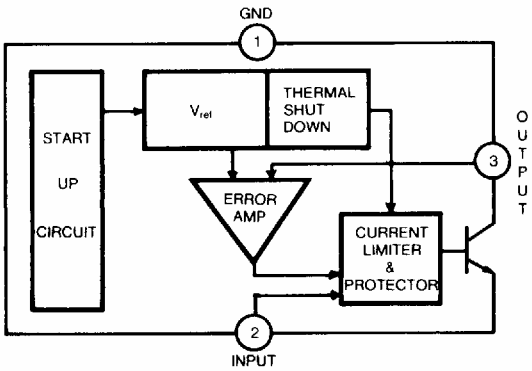
(Top View)



Type No/Voltage

GL7905	−5.0 Volts
GL7909	−9.0 Volts
GL7912	−12.0 Volts
GL7915	−15.0 Volts
GL7924	−24.0 Volts

Block Diagram



Maximum Ratings (T_A = 25°C)

• Input Voltage (−5V Through −15V)	−35V
(−24V)	−40V
• Output Current	2.2A
• Power Dissipation	Internally Limitted
• Operating Junction Temp.	0°C to +150°C
• Storage Temp.	−65°C to +150°C
• Lead Temp. (Soldering, 10S)	230°C

GL7905 Electrical Characteristics ($T_A = 25°C$)

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES MIN.	VALUES MAX.	UNIT
Output Voltage (1)	V_{01}	$T_j=25°C$, $V_{in}=-10V$, $I_o=500mA$		−5.2	−4.8	V
Output Voltage (2)	V_{02}	$-20V \leqslant V_{in} \leqslant -7V$, $5.0mA \leqslant I_o \leqslant 1.0A$		−5.25	−4.75	V
Line Regulation	ΔV_{01}	$T_j=25°C$	$-25V \leqslant V_{in} \leqslant -7V$, $I_o=100mA$		50	mV
	ΔV_{02}		$-12V \leqslant V_{in} \leqslant -8V$, $I_o=100mA$		25	mV
	ΔV_{03}		$-25V \leqslant V_{in} \leqslant -7V$, $I_o=500mA$		100	mV
	ΔV_{04}		$-12V \leqslant V_{in} \leqslant -8V$, $I_o=500mA$		50	mV
Load Regulation	ΔV_{05}	$T_j=25°C$	$5.0mA \leqslant I_o \leqslant 1.5A$, $V_{in}=-10V$		100	mV
	ΔV_{06}		$250mA \leqslant I_o \leqslant 750mA$, $V_{in}=-10V$		50	mV
Quiescent Current	I_Q	$T_j=25°C$, $V_{in}=-10V$, $I_o=500mA$			2.0	mA
Quiescent Current Change	ΔI_{Q1}	$-25V \leqslant V_{in} \leqslant -17V$, $I_o=500mA$			1.3	mA
	ΔI_{Q2}	$V_{in}=-10V$, $5mA \leqslant I_o \leqslant 1.5A$			0.5	mA
Output Noise Voltage	N_o	$V_{in}=-10V$, $I_o=500mA$ $10Hz \leqslant f \leqslant 100KHz$			80	μV
Ripple Rejection	R_R	$T_j=25°C$, $V_i=1V_{(rms)}$, 120Hz, $I_o=20mA$, $-18V \leqslant V_{in} \leqslant -8V$		54		dB
Input-Output Voltage Differential	V_d	$T_j=25°C$, $I_o=1.0A$			1.1(TYP)	V

GL7909 Electrical Characteristics ($T_A = 25°C$)

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES MIN.	VALUES MAX.	UNIT
Output Voltage (1)	V_{01}	$T_j=25°C$, $V_{in}=-15V$, $I_o=500mA$		−9.35	−8.65	V
Output Voltage (2)	V_{02}	$-24V \leqslant V_{in} \leqslant -11.5V$, $5.0mA \leqslant I_o \leqslant 1.0A$		−9.55	−8 55	V
Line Regulation	ΔV_{01}	$T_j=25°C$	$-26V \leqslant V_{in} \leqslant -11.5V$, $I_o=100mA$		90	mV
	ΔV_{02}		$-18V \leqslant V_{in} \leqslant -12V$, $I_o=100mA$		45	mV
	ΔV_{03}		$-26V \leqslant V_{in} \leqslant -11.5V$, $I_o=500mA$		180	mV
	ΔV_{04}		$-18V \leqslant V_{in} \leqslant -12V$, $I_o=500mA$		90	mV
Load Regulation	ΔV_{05}	$T_j=25°C$	$5.0mA \leqslant I_o \leqslant 1.5A$, $V_{in}=-15V$		180	mV
	ΔV_{06}		$250mA \leqslant I_o \leqslant 750mA$, $V_{in}=-15V$		90	mV
Quiescent Current	I_Q	$T_j=25°C$, $V_{in}=-15V$, $I_o=500mA$			3	mA
Quiescent Current Change	ΔI_{Q1}	$-26V \leqslant V_{in} \leqslant -11\ 5V$, $I_o=500mA$			1.0	· mA
	ΔI_{Q2}	$V_{in}=-15V$, $5mA \leqslant I_o \leqslant 1.5A$			0.5	mA
Output Noise Voltage	N_o	$V_{in}=-15V$, $I_o=500mA$ $10Hz \leqslant f \leqslant 100KHz$			120	μV
Ripple Rejection	R_R	$T_j=25°C$, $V_i=1V_{(rms)}$, 120Hz, $I_o=20mA$, $-22V \leqslant V_{in} \leqslant -12V$		54		dB
Input-Output Voltage Differential	V_d	$T_j=25°C$, $I_o=1.0A$			1.1(TYP)	V

GL7912 Electrical Characteristics (T_A = 25°C)

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNIT
				MIN.	MAX.	
Output Voltage (1)	V_{01}	T_j=25°C, V_{in}=−19V, I_o=500mA		−12 5	−11 5	V
Output Voltage (2)	V_{02}	−27V≤V_{in}≤−14.5V, 5.0mA≤I_o≤1.0A		−12 5	−11 4	V
Line Regulation	ΔV_{01}	T_j=25°C	−30V≤V_{in}≤−14 5V, I_o=100mA		120	mV
	ΔV_{02}		−22V≤V_{in}≤−16V, I_o=100mA		60	mV
	ΔV_{03}		−30V≤V_{in}≤−14 5V, I_o=500mA		240	mV
	ΔV_{04}		−22V≤V_{in}≤−16V, I_o=500mA		120	mV
Load Regulation	ΔV_{05}	T_j=25°C	5 0mA≤I_o≤1 5A, V_{in}=−19V		240	mV
	ΔV_{06}		250mA≤I_o≤750mA, V_{in}=−19V		120	mV
Quiescent Current	I_Q	T_j=25°C, V_{in}=−19V, I_o=500mA			3	mA
Quiescent Current Change	ΔI_{Q1}	−30V≤V_{in}≤−14 5V, I_o=500mA			1 0	mA
	ΔI_{Q2}	V_{in}=−19V, 5mA≤I_o≤1 5A			0 5	mA
Output Noise Voltage	N_o	V_{in}=−19V, I_o=500mA 10Hz≤f≤100KHz			150	μV
Ripple Rejection	R_R	T_j=25°C, V_i=1$V_{(rms)}$, 120Hz, I_o=20mA, −25V≤V_{in}≤−15V		54		dB
Input-Output Voltage Differential	V_d	T_j=25°C, I_o=1 0A			1.1(TYP)	V

GL7915 Electrical Characteristics (T_A = 25°C)

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNIT
				MIN	MAX	
Output Voltage (1)	V_{01}	T_j=25°C, V_{in}=−23V, I_o=500mA		−15.6	−14.4	V
Output Voltage (2)	V_{02}	−30V≤V_{in}≤−17.5V, 5 0mA≤I_o≤1.0A		−15.75	−14.25	V
Line Regulation	ΔV_{01}	T_j=25°C	−30V≤V_{in}≤−17.5V, I_o=100mA		150	mV
	ΔV_{02}		−26V≤V_{in}≤−20V, I_o=100mA		75	mV
	ΔV_{03}		−30V≤V_{in}≤−17.5V, I_o=500mA		300	mV
	ΔV_{04}		−26V≤V_{in}≤−20V, I_o=500mA		150	mV
Load Regulation	ΔV_{05}	T_j=25°C	5.0mA≤I_o≤1 5A, V_{in}=−23V		300	mV
	ΔV_{06}		250mA≤I_o≤750mA, V_{in}=−23V		150	mV
Quiescent Current	I_Q	T_j=25°C, V_{in}=−23V, I_o=500mA			3	mA
Quiescent Current Change	ΔI_{Q1}	−30V≤V_{in}≤−17 5V, I_o=500mA			1.0	mA
	ΔI_{Q2}	V_{in}=−23V, 5mA≤I_o≤1.5A			0.5	mA
Output Noise Voltage	N_o	V_{in}=−23V, I_o=500mA 10Hz≤f≤100KHz			180	μV
Ripple Rejection	R_R	T_j=25°C, V_i=1$V_{(rms)}$, 120Hz, I_o=20mA, −28.5V≤V_{in}≤−18.5V		54		dB
Input-Output Voltage Differential	V_d	T_j=25°C, I_o=1.0A			1.1(TYP)	V

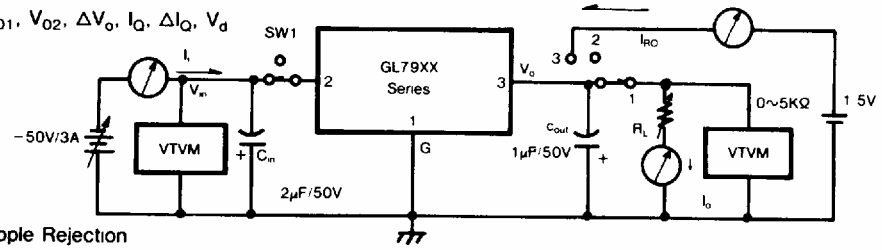
GL7924 Electrical Characteristics ($T_A = 25°C$)

$C_{in}=2\mu F$, $C_{out}=1\mu F$

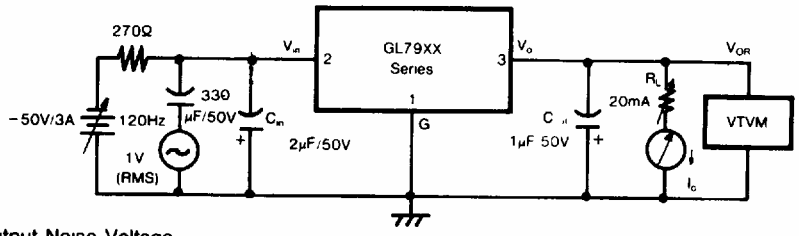
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNIT
				MIN	MAX.	
Output Voltage (1)	V_{01}	$T_J=25°C$, $V_{in}=-33V$, $I_o=500mA$		−25	−23	V
Output Voltage (2)	V_{02}	$-38V \leqslant V_{in} \leqslant -27V$, $5\ 0mA \leqslant I_o \leqslant 1.0A$		−25 2	−22 8	V
Line Regulation	ΔV_{01}	$T_J=25°C$	$-38V \leqslant V_{in} \leqslant -27V$, $I_o=100mA$		240	mV
	ΔV_{02}		$-36V \leqslant V_{in} \leqslant -30V$, $I_o=100mA$		120	mV
	ΔV_{03}		$-38V \leqslant V_{in} \leqslant -27V$, $I_o=500mA$		480	mV
	ΔV_{04}		$-36V \leqslant V_{in} \leqslant -30V$, $I_o=500mA$		240	mV
Load Regulation	ΔV_{05}	$T_J=25°C$	$5.0mA \leqslant I_o \leqslant 1.5A$, $V_{in}=-33V$		480	mV
	ΔV_{06}		$250mA \leqslant I_o \leqslant 750mA$, $V_{in}=-33V$		240	mV
Quiescent Current	I_Q	$T_J=25°C$, $V_{in}=-33V$, $I_o=500mA$			3	mA
Quiescent Current Change	ΔI_{Q1}	$-38V \leqslant V_{in} \leqslant -27V$, $I_o=500mA$			1.0	mA
	ΔI_{Q2}	$V_{in}=-33V$, $5mA \leqslant I_o \leqslant 1.5A$			0.5	mA
Output Noise Voltage	N_o	$V_{in}=-33V$, $I_o=500mA$ $10Hz \leqslant f \leqslant 100KHz$			270	μV
Ripple Rejection	R_R	$T_J=25°C$, $V_i=1V_{(rms)}$, 120Hz, $I_o=20mA$, $-38V \leqslant V_{in} \leqslant -28V$		54		dB
Input-Output Voltage Differential	V_d	$T_J=25°C$, $I_o=1\ 0A$			1 1(TYP)	V

*GL79XX Series Test Circuit (AC & DC)

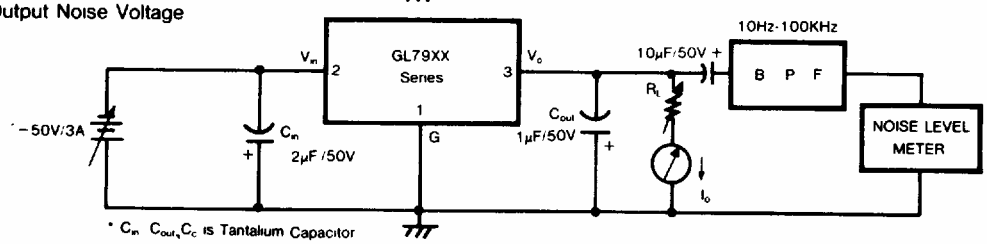
1 V_{01}, V_{02}, ΔV_o, I_Q, ΔI_Q, V_d



2. Ripple Rejection



3. Output Noise Voltage



* C_{in} C_{out}, C_C is Tantalum Capacitor

TYPICAL CHARACTERISTICS
(T_A = +25°C unless otherwise noted.)

FIGURE 1 – AVERAGE CASE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE (TO-220)

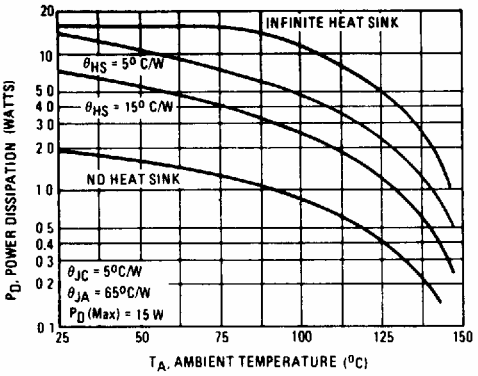


FIGURE 2 – PEAK OUTPUT CURRENT AS A FUNCTION OF INPUT-OUTPUT DIFFERENTIAL VOLTAGE

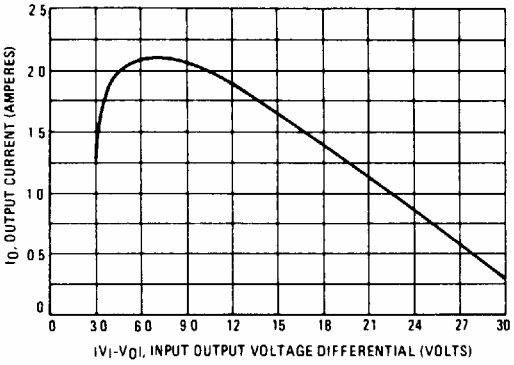


FIGURE 3 – RIPPLE REJECTION AS A FUNCTION OF FREQUENCY

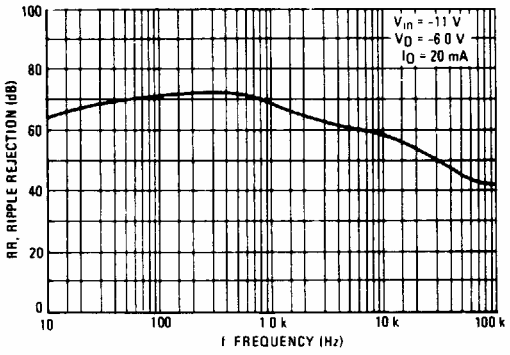


FIGURE 4 – RIPPLE REJECTION AS A FUNCTION OF OUTPUT VOLTAGES

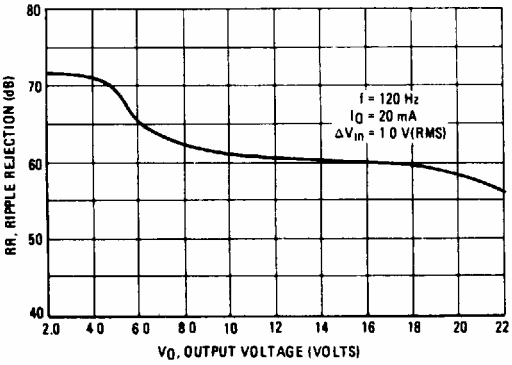


FIGURE 5 – OUTPUT VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE