GoldStar Semiconductor. Ltd.

GL79XX Series
NEGATIVE VOLTAGE REGULATOR

Description

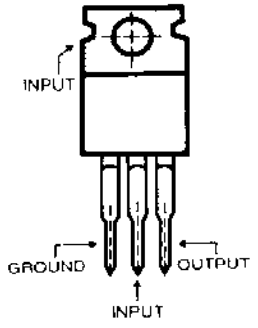
The GL79XX series of fixed output negative voltage regulators are intended as complements to the popular GL78XX series devices. Available in fixed output voltage options from −5 to −24 Volts, these regulators employ internal current limiting, thermal shutdown, and safe-area compensation-making them remarkably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

Features

- No External Components Required
- 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

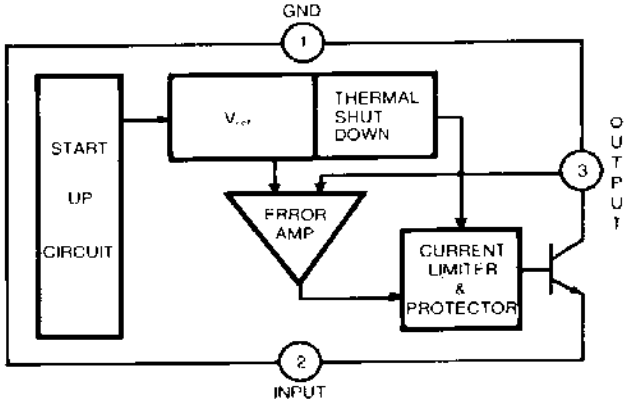
(Top View)



Type No/Voltage

032906	GL7905	−5.0 Volts
032912	GL7906	−6.0 Volts
032916	GL7908	−8.0 Volts
032917	GL7909	−9.0 Volts
032915	GL7912	−12.0 Volts
032921	GL7915	−15.0 Volts
032924	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	15W
• Operating Junction Temp.	0°C to +150°C
• Storage Temp.	−65°C to +150°C
• Lead Temp. (Soldering, 10S)	230°C

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

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNIT
				MIN.	MAX.	
Output Voltage (1)	V_{O1}	$T_j=25°C$, $V_{in}=-10V$, $I_o=500mA$		−5.2	−4.8	V
Output Voltage (2)	V_{O2}	$-20V \leq V_{in} \leq -7V$, $5.0mA \leq I_o \leq 1.0A$		−5.25	−4.75	V
Line Regulation	ΔV_{O1}	$T_j=25°C$	$-25V \leq V_{in} \leq -7V$, $I_o=100mA$		50	mV
	ΔV_{O2}		$-12V \leq V_{in} \leq -8V$, $I_o=100mA$		25	mV
	ΔV_{O3}		$-25V \leq V_{in} \leq -7V$, $I_o=500mA$		100	mV
	ΔV_{O4}		$-12V \leq V_{in} \leq -8V$, $I_o=500mA$		50	mV
Load Regulation	ΔV_{O5}	$T_j=25°C$	$5.0mA \leq I_o \leq 1.5A$, $V_{in}=-10V$		100	mV
	ΔV_{O6}		$250mA \leq I_o \leq 750mA$, $V_{in}=-10V$		50	mV
Quiescent Current	I_Q	$T_j=25°C$, $V_{in}=-10V$, $I_o=500mA$			8	mA
Quiescent Current Change	ΔI_{Q1}	$-25V \leq V_{in} \leq -17V$, $I_o=500mA$			1.3	mA
	ΔI_{Q2}	$V_{in}=-10V$, $5mA \leq I_o \leq 1.5A$			0.5	mA
Output Noise Voltage	N_o	$V_{in}=-10V$, $I_o=500mA$ $10Hz \leq f \leq 100KHz$			80	μV
Ripple Rejection	R_R	$T_j=25°C$, $V_i=1V_{(rms)}$, 120Hz, $I_o=20mA$, $-18V \leq V_{in} \leq -8V$		54		dB
Input-Output Voltage Differential	V_d	$T_j=25°C$, $I_o=1.0A$			4.0	V

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

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNIT
				MIN.	MAX.	
Output Voltage (1)	V_{O1}	$T_j=25°C$, $V_{in}=-15V$, $I_o=500mA$		−9.35	−8.65	V
Output Voltage (2)	V_{O2}	$-24V \leq V_{in} \leq -11.5V$, $5.0mA \leq I_o \leq 1.0A$		−9.55	−8.55	V
Line Regulation	ΔV_{O1}	$T_j=25°C$	$-26V \leq V_{in} \leq -11.5V$, $I_o=100mA$		90	mV
	ΔV_{O2}		$-18V \leq V_{in} \leq -12V$, $I_o=100mA$		45	mV
	ΔV_{O3}		$-26V \leq V_{in} \leq -11.5V$, $I_o=500mA$		180	mV
	ΔV_{O4}		$-18V \leq V_{in} \leq -12V$, $I_o=500mA$		90	mV
Load Regulation	ΔV_{O5}	$T_j=25°C$	$5.0mA \leq I_o \leq 1.5A$, $V_{in}=-15V$		180	mV
	ΔV_{O6}		$250mA \leq I_o \leq 750mA$, $V_{in}=-15V$		90	mV
Quiescent Current	I_Q	$T_j=25°C$, $V_{in}=-15V$, $I_o=500mA$			8	mA
Quiescent Current Change	ΔI_{Q1}	$-26V \leq V_{in} \leq -11.5V$, $I_o=500mA$			1.0	mA
	ΔI_{Q2}	$V_{in}=-15V$, $5mA \leq I_o \leq 1.5A$			0.5	mA
Output Noise Voltage	N_o	$V_{in}=-15V$, $I_o=500mA$ $10Hz \leq f \leq 100KHz$			120	μV
Ripple Rejection	R_R	$T_j=25°C$, $V_i=1V_{(rms)}$, 120Hz, $I_o=20mA$, $-22V \leq V_{in} \leq -12V$		54		dB
Input-Output Voltage Differential	V_d	$T_j=25°C$, $I_o=1.0A$			4.0	V

GL7912 Electrical Characteristics ($T_A = 25°C$)

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES MIN.	VALUES MAX.	UNIT
Output Voltage (1)	V_{O1}	$T_J = 25°C$, $V_{in} = -19V$, $I_O = 500mA$		−12.5	−11.5	V
Output Voltage (2)	V_{O2}	$-27V \leq V_{in} \leq -14.5V$, $5.0mA \leq I_O \leq 1.0A$		−12.5	−11.4	V
Line Regulation	ΔV_{O1}	$T_J = 25°C$	$-30V \leq V_{in} \leq -14.5V$, $I_O = 100mA$		120	mV
	ΔV_{O2}		$-22V \leq V_{in} \leq -16V$, $I_O = 100mA$		60	mV
	ΔV_{O3}		$-30V \leq V_{in} \leq -14.5V$, $I_O = 500mA$		240	mV
	ΔV_{O4}		$-22V \leq V_{in} \leq -16V$, $I_O = 500mA$		120	mV
Load Regulation	ΔV_{O5}	$T_J = 25°C$	$5.0mA \leq I_O \leq 1.5A$, $V_{in} = -19V$		240	mV
	ΔV_{O6}		$250mA \leq I_O \leq 750mA$, $V_{in} = -19V$		120	mV
Quiescent Current	I_Q	$T_J = 25°C$, $V_{in} = -19V$, $I_O = 500mA$			8	mA
Quiescent Current Change	ΔI_{Q1}	$-30V \leq V_{in} \leq -14.5V$, $I_O = 500mA$			1.0	mA
	ΔI_{Q2}	$V_{in} = -19V$, $5mA \leq I_O \leq 1.5A$			0.5	mA
Output Noise Voltage	N_O	$V_{in} = -19V$, $I_O = 500mA$ $10Hz \leq f \leq 100KHz$			150	μV
Ripple Rejection	R_R	$T_J = 25°C$, $V_i = 1V_{(rms)}$, 120Hz, $I_O = 20mA$, $-25V \leq V_{in} \leq -15V$		54		dB
Input-Output Voltage Differential	V_d	$T_J = 25°C$, $I_O = 1.0A$			4.0	V

GL7915 Electrical Characteristics ($T_A = 25°C$)

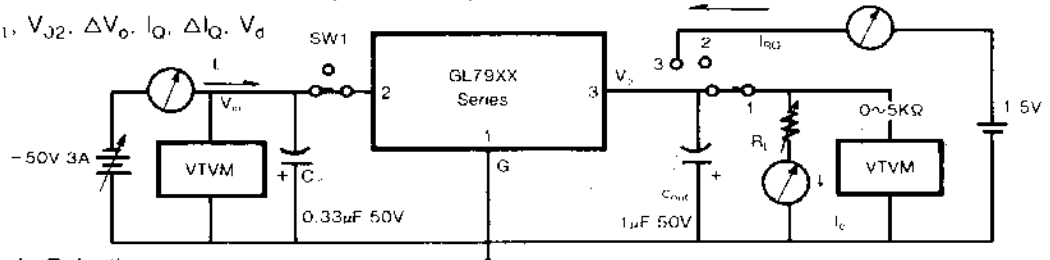
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES MIN.	VALUES MAX.	UNIT
Output Voltage (1)	V_{O1}	$T_J = 25°C$, $V_{in} = -23V$, $I_O = 500mA$		−15.6	−14.4	V
Output Voltage (2)	V_{O2}	$-30V \leq V_{in} \leq -17.5V$, $5.0mA \leq I_O \leq 1.0A$		−15.75	−14.25	V
Line Regulation	ΔV_{O1}	$T_J = 25°C$	$-30V \leq V_{in} \leq -17.5V$, $I_O = 100mA$		150	mV
	ΔV_{O2}		$-26V \leq V_{in} \leq -20V$, $I_O = 100mA$		75	mV
	ΔV_{O3}		$-30V \leq V_{in} \leq -17.5V$, $I_O = 500mA$		300	mV
	ΔV_{O4}		$-26V \leq V_{in} \leq -20V$, $I_O = 500mA$		150	mV
Load Regulation	ΔV_{O5}	$T_J = 25°C$	$5.0mA \leq I_O \leq 1.5A$, $V_{in} = -23V$		300	mV
	ΔV_{O6}		$250mA \leq I_O \leq 750mA$, $V_{in} = -23V$		150	mV
Quiescent Current	I_Q	$T_J = 25°C$, $V_{in} = -23V$, $I_O = 500mA$			8	mA
Quiescent Current Change	ΔI_{Q1}	$-30V \leq V_{in} \leq -17.5V$, $I_O = 500mA$			1.0	mA
	ΔI_{Q2}	$V_{in} = -23V$, $5mA \leq I_O \leq 1.5A$			0.5	mA
Output Noise Voltage	N_O	$V_{in} = -23V$, $I_O = 500mA$ $10Hz \leq f \leq 100KHz$			180	μV
Ripple Rejection	R_R	$T_J = 25°C$, $V_i = 1V_{(rms)}$, 120Hz, $I_O = 20mA$, $-28.5V \leq V_{in} \leq -18.5V$		54		dB
Input-Output Voltage Differential	V_d	$T_J = 25°C$, $I_O = 1.0A$			4.0	V

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

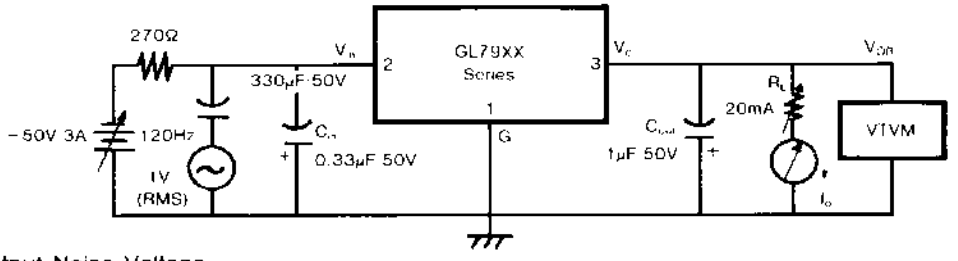
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES MIN.	VALUES MAX.	UNIT
Output Voltage (1)	V_{O1}	$T_J = 25°C$, $V_{in} = -33V$, $I_O = 500mA$		−25	−23	V
Output Voltage (2)	V_{O2}	$-38V \leq V_{in} \leq -27V$, $5.0mA \leq I_O \leq 1.0A$		−25.2	−22.8	V
Line Regulation	ΔV_{O1}	$T_J = 25°C$	$-38V \leq V_{in} \leq -27V$, $I_O = 100mA$		240	mV
	ΔV_{O2}		$-36V \leq V_{in} \leq -30V$, $I_O = 100mA$		120	mV
	ΔV_{O3}		$-38V \leq V_{in} \leq -27V$, $I_O = 500mA$		480	mV
	ΔV_{O4}		$-36V \leq V_{in} \leq -30V$, $I_O = 500mA$		240	mV
Load Regulation	ΔV_{O5}	$T_J = 25°C$	$5.0mA \leq I_O \leq 1.5A$, $V_{in} = -33V$		480	mV
	ΔV_{O6}		$250mA \leq I_O \leq 750mA$, $V_{in} = -33V$		240	mV
Quiescent Current	I_Q	$T_J = 25°C$, $V_{in} = -33V$, $I_O = 500mA$			8	mA
Quiescent Current Change	ΔI_{Q1}	$-38V \leq V_{in} \leq -27V$, $I_O = 500mA$			1.0	mA
	ΔI_{Q2}	$V_{in} = -33V$, $5mA \leq I_O \leq 1.5A$			0.5	mA
Output Noise Voltage	N_O	$V_{in} = -33V$, $I_O = 500mA$, $10Hz \leq f \leq 100KHz$			270	μV
Ripple Rejection	R_R	$T_J = 25°C$, $V_I = 1V_{(rms)}$, 120Hz, $I_O = 20mA$, $-38V \leq V_{in} \leq -28V$		54		dB
Input-Output Voltage Differential	V_d	$T_J = 25°C$, $I_O = 1.0A$			4.0	V

*GL79XX Series Test Circuit (AC & DC)

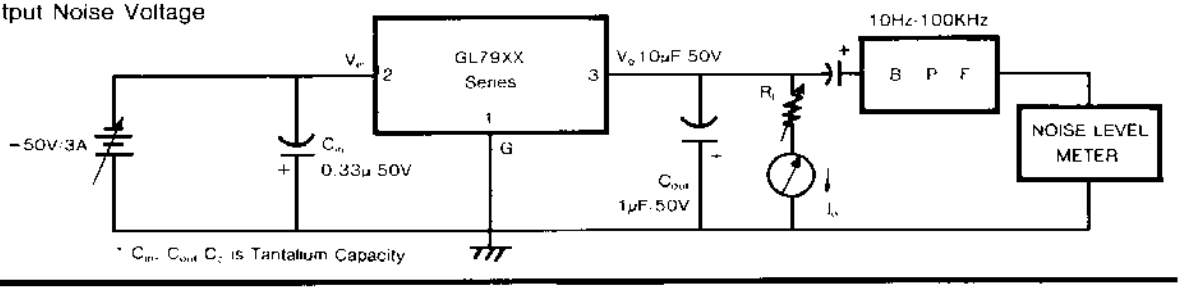
1. V_{O1}, V_{O2}, ΔV_O, I_Q, ΔI_Q, V_d



2. Ripple Rejection



3. Output Noise Voltage



* C_{in}, C_{out} C_2 is Tantalium Capacity