

## GI79XX

### 3-TERMINAL NEGATIVE VOLTAGE REGULATORS

#### Description

The GI79XX series of fixed-voltage monolithic integrated-circuit voltage regulators are designed to complement Series GI78XX in a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.0 amperes of output current. The internal current limiting and thermal shutdown features of these regulators make them essentially immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltage and current and also as the power pass element in precision regulators.

#### Features

- -5V, -6V, -8V, -9V, -12V, -15V, -18V, -24V output voltage available
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limiting
- No External Components
- Output Transistor Safe-Area Compensation

#### Package Dimensions

**TO-251**

**Marking :**

Vout  
5V:05  
6V:06  
8V:08  
9V:09  
12V:12  
15V:15  
18V:18  
24V:24

Gnd    Vin    Vout

REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	6.40	6.80	G	0.50	0.70
B	5.20	5.50	H	2.20	2.40
C	6.80	7.20	J	0.45	0.60
D	7.20	7.80	K	0.45	0.60
E	2.30 REF.		L	0.90	1.50
F	0.60	0.90	M	5.40	5.80

#### Absolute Maximum Ratings (Ta=25°C)

Parameter		Ratings	Unit
Input voltage	GI7905 ~ 18	-35V	V
	GI7924	-40V	V
Output current		1.0	A
Operating junction temperature range		0 ~ 150	°C
Storage temperature range		-55 ~ 150	°C
Thermal resistance junction-air (RθJA)		125	°C/W
Thermal resistance junction-cases (RθJC)		12.5	°C/W

## Electrical Characteristics

**GI7905** (Refer to the test circuits,  $T_j=0\sim 125^\circ\text{C}$ ,  $I_o=500\text{mA}$ ,  $V_{in}=-10\text{V}$ ,  $C_{in}=2.2\mu\text{F}$ ,  $C_o=1\mu\text{F}$  unless otherwise specified)

Symbol		Min.	Typ.	Max.	Unit	Test Conditions
VO	A-Rank (3%)	-4.85	-5.0	-5.15	V	$V_{in}=-10\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$ $-7\text{V} \leq V_{in} \leq -20\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$ , $PD \leq 15\text{W}$
	B-Rank (5%)	-4.75	-	-5.25		
$\Delta\text{VO}$ (Line Regulation)		-	10	50	mV	$-7\text{V} \leq V_{in} \leq -25\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$
		-	-	25		$-8\text{V} \leq V_{in} \leq -12\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$
$\Delta\text{VO}$ (Load Regulation)		-	10	100	mV	$V_{in}=-10\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$ , $T_j=25^\circ\text{C}$
		-	3	50		$V_{in}=-10\text{V}$ , $250\text{mA} \leq I_o \leq 750\text{mA}$ , $T_j=25^\circ\text{C}$
IQ		-	-	6.0	mA	$V_{in}=-10\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$
$\Delta\text{IQ}$		-	-	0.5	mA	$V_{in}=-10\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$
		-	-	1.3		$-7\text{V} \leq V_{in} \leq -25\text{V}$ , $I_o=500\text{mA}$
Vn		-	100	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$ , $T_a=25^\circ\text{C}$
RR	54	-	-	-	dB	$-8\text{V} \leq V_{in} \leq -18\text{V}$ , $f=120\text{Hz}$ , $T_j=25^\circ\text{C}$
VD	-	2	-	-	V	$I_o=1\text{A}$ , $T_j=25^\circ\text{C}$
Ipk	-	2.2	-	-	A	$T_j=25^\circ\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.4	-	-	$\text{mV}/^\circ\text{C}$	$I_o=5\text{mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$

**GI7906** (Refer to the test circuits,  $T_j=0\sim 125^\circ\text{C}$ ,  $I_o=500\text{mA}$ ,  $V_{in}=-11\text{V}$ ,  $C_{in}=2.2\mu\text{F}$ ,  $C_o=1\mu\text{F}$  unless otherwise specified)

Symbol		Min.	Typ.	Max.	Unit	Test Conditions
VO	A-Rank (3%)	-5.82	-6.0	-6.18	V	$V_{in}=-11\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$ $-8\text{V} \leq V_{in} \leq -21\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$ , $PD \leq 15\text{W}$
	B-Rank (5%)	-5.70	-	-6.30		
$\Delta\text{VO}$ (Line Regulation)		-	10	120	mV	$-8\text{V} \leq V_{in} \leq -25\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$
		-	5	60		$-9\text{V} \leq V_{in} \leq -13\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$
$\Delta\text{VO}$ (Load Regulation)		-	10	120	mV	$V_{in}=-11\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$ , $T_j=25^\circ\text{C}$
		-	3	60		$V_{in}=-11\text{V}$ , $250\text{mA} \leq I_o \leq 750\text{mA}$ , $T_j=25^\circ\text{C}$
IQ		-	-	6.0	mA	$V_{in}=-11\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$
$\Delta\text{IQ}$		-	-	0.5	mA	$V_{in}=-11\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$
		-	-	1.3		$-8\text{V} \leq V_{in} \leq -25\text{V}$ , $I_o=500\text{mA}$
Vn		-	130	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$ , $T_a=25^\circ\text{C}$
RR	54	-	-	-	Db	$-9\text{V} \leq V_{in} \leq -19\text{V}$ , $f=120\text{Hz}$ , $T_j=25^\circ\text{C}$
VD	-	2	-	-	V	$I_o=1\text{A}$ , $T_j=25^\circ\text{C}$
Ipk	-	2.2	-	-	A	$T_j=25^\circ\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.5	-	-	$\text{mV}/^\circ\text{C}$	$I_o=5\text{mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$

**GI7908** (Refer to the test circuits, Tj=0~125°C, Io=500mA, Vin=-14V, Cin=2.2μF, Co=1μF unless otherwise specified)

Symbol		Min.	Typ.	Max.	Unit	Test Conditions
VO	A-Rank (3%)	-7.76	-8.0	-8.24	V	Vin=-14V, Io=500mA, Tj=25°C -10.5V ≤ Vin ≤ -23V, 5mA ≤ Io ≤ 1A, PD ≤ 15W
	B-Rank (5%)	-7.60	-	-8.40		
ΔVO (Line Regulation)		-	10	160	mV	-10.5V ≤ Vin ≤ -25V, Io=500mA, Tj=25°C
		-	5	80		-11.5V ≤ Vin ≤ -17V, Io=500mA, Tj=25°C
ΔVO (Load Regulation)		-	12	160	mV	Vin=-14V, 5mA ≤ Io ≤ 1A, Tj=25°C
		-	4	80		Vin=-14V, 250mA ≤ Io ≤ 750mA, Tj=25°C
IQ		-	-	6.0	mA	Vin=-14V, Io=500mA, Tj=25°C
ΔIQ		-	-	0.5	mA	Vin=-14V, 5mA ≤ Io ≤ 1A
		-	-	1.0		-11.5V ≤ Vin ≤ -25V, Io=500mA
Vn		-	175	-	μV	10Hz ≤ f ≤ 100KHz, Ta=25°C
RR		54	-	-	dB	-11.5V ≤ Vin ≤ -21.5V, f=120Hz, Tj=25°C
VD		-	2	-	V	Io=1A, Tj=25°C
Ipk		-	2.2	-	A	Tj=25°C
ΔVo / ΔTj		-	-0.6	-	mV/°C	Io=5mA, 0°C ≤ Tj ≤ 125°C

**GI7909** (Refer to the test circuits, Tj=0~125°C, Io=500mA, Vin=-15V, Cin=2.2μF, Co=1μF unless otherwise specified)

Symbol		Min.	Typ.	Max.	Unit	Test Conditions
VO	A-Rank (3%)	-8.73	-9.0	-9.27	V	Vin=-15V, Io=500mA, Tj=25°C -11.5V ≤ Vin ≤ -23V, 5mA ≤ Io ≤ 1A, PD ≤ 15W
	B-Rank (5%)	-8.55	-	-9.45		
ΔVO (Line Regulation)		-	10	180	mV	-11.5V ≤ Vin ≤ -26V, Io=500mA, Tj=25°C
		-	5	90		-12V ≤ Vin ≤ -18V, Io=500mA, Tj=25°C
ΔVO (Load Regulation)		-	12	180	mV	Vin=-15V, 5mA ≤ Io ≤ 1A, Tj=25°C
		-	4	90		Vin=-15V, 250mA ≤ Io ≤ 750mA, Tj=25°C
IQ		-	-	6.0	mA	Vin=-15V, Io=500mA, Tj=25°C
ΔIQ		-	-	0.5	mA	Vin=-15V, 5mA ≤ Io ≤ 1A
		-	-	1.0		-11.5V ≤ Vin ≤ -26V, Io=500mA
Vn		-	175	-	μV	10Hz ≤ f ≤ 100KHz, Ta=25°C
RR		54	-	-	dB	-12.5V ≤ Vin ≤ -22.5V, f=120Hz, Tj=25°C
VD		-	2	-	V	Io=1A, Tj=25°C
Ipk		-	2.2	-	A	Tj=25°C
ΔVo / ΔTj		-	-0.6	-	mV/°C	Io=5mA, 0°C ≤ Tj ≤ 125°C

**GI7912** (Refer to the test circuits, Tj=0~125°C, Io=500mA, Vin=-19V, Cin=2.2μF, Co=1μF unless otherwise specified)

Symbol		Min.	Typ.	Max.	Unit	Test Conditions
VO	A-Rank (3%)	-11.64	-12.0	-12.36	V	Vin=-19V, Io=500mA, Tj=25°C -14.5V ≤ Vin ≤ -27V, 5mA ≤ Io ≤ 1A, PD ≤ 15W
	B-Rank (5%)	-11.40	-	-12.60		
ΔVO (Line Regulation)		-	12	240	mV	-14.5V ≤ Vin ≤ -30V, Io=500mA, Tj=25°C
		-	6	120		-16V ≤ Vin ≤ -22V, Io=500mA, Tj=25°C
ΔVO (Load Regulation)		-	12	240	mV	Vin=-19V, 5mA ≤ Io ≤ 1A, Tj=25°C
		-	4	120		Vin=-19V, 250mA ≤ Io ≤ 750mA, Tj=25°C
IQ		-	-	6.0	mA	Vin=-19V, Io=500mA, Tj=25°C
ΔIQ		-	-	0.5	mA	Vin=-19V, 5mA ≤ Io ≤ 1A
		-	-	1.0		-14.5V ≤ Vin ≤ -30V, Io=500mA
Vn		-	200	-	μV	10Hz ≤ f ≤ 100KHz, Ta=25°C
RR		54	-	-	dB	-15V ≤ Vin ≤ -25V, f=120Hz, Tj=25°C
VD		-	2	-	V	Io=1A, Tj=25°C
Ipk		-	2.2	-	A	Tj=25°C
ΔVo / ΔTj		-	-0.8	-	mV/°C	Io=5mA, 0°C ≤ Tj ≤ 125°C

**GI7915** (Refer to the test circuits, Tj=0~125°C, Io=500mA, Vin=-23V, Cin=2.2μF, Co=1μF unless otherwise specified)

Symbol		Min.	Typ.	Max.	Unit	Test Conditions
VO	A-Rank (3%)	-14.55	-15.0	-15.45	V	Vin=-23V, Io=500mA, Tj=25°C -17.5V ≤ Vin ≤ -30V, 5mA ≤ Io ≤ 1A, PD ≤ 15W
	B-Rank (5%)	-14.25	-	-15.75		
ΔVO (Line Regulation)		-	12	300	mV	-17.5V ≤ Vin ≤ -30V, Io=500mA, Tj=25°C
		-	6	150		-20V ≤ Vin ≤ -26V, Io=500mA, Tj=25°C
ΔVO (Load Regulation)		-	12	300	mV	Vin=-23V, 5mA ≤ Io ≤ 1A, Tj=25°C
		-	4	150		Vin=-23V, 250mA ≤ Io ≤ 750mA, Tj=25°C
IQ		-	-	6.0	mA	Vin=-23V, Io=500mA, Tj=25°C
ΔIQ		-	-	0.5	mA	Vin=-23V, 5mA ≤ Io ≤ 1A
		-	-	1.0		-17.5V ≤ Vin ≤ -30.5V, Io=500mA
Vn		-	250	-	μV	10Hz ≤ f ≤ 100KHz, Ta=25°C
RR		54	-	-	dB	-18.5V ≤ Vin ≤ -28.5V, f=120Hz, Tj=25°C
VD		-	2	-	V	Io=1A, Tj=25°C
Ipk		-	2.2	-	A	Tj=25°C
ΔVo / ΔTj		-	-0.9	-	mV/°C	Io=5mA, 0°C ≤ Tj ≤ 125°C

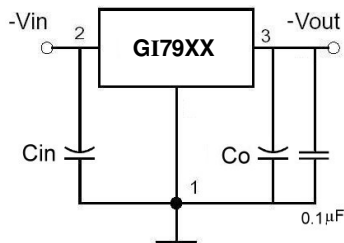
**GI7918** (Refer to the test circuits,  $T_j=0\sim 125^\circ\text{C}$ ,  $I_o=500\text{mA}$ ,  $V_{in}=-27\text{V}$ ,  $C_{in}=2.2\mu\text{F}$ ,  $C_o=1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions	
VO	A-Rank (3%)	-17.46	-18.0	-18.54	V	$V_{in}=-27\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$ $-21\text{V} \leq V_{in} \leq -33\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$ , $\text{PD} \leq 15\text{W}$
	B-Rank (5%)	-17.10	-	-18.9		
$\Delta\text{VO}$ (Line Regulation)	-	15	360	mV	$-21\text{V} \leq V_{in} \leq -33\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$	
	-	8	180		$-24\text{V} \leq V_{in} \leq -30\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$	
$\Delta\text{VO}$ (Load Regulation)	-	15	360	mV	$V_{in}=-27\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$ , $T_j=25^\circ\text{C}$	
	-	5	180		$V_{in}=-27\text{V}$ , $250\text{mA} \leq I_o \leq 750\text{mA}$ , $T_j=25^\circ\text{C}$	
IQ	-	-	6.0	mA	$V_{in}=-27\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$	
$\Delta\text{IQ}$	-	-	0.5	mA	$V_{in}=-27\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$	
	-	-	1.0		$-21\text{V} \leq V_{in} \leq -33\text{V}$ , $I_o=500\text{mA}$	
Vn	-	300	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$ , $T_a=25^\circ\text{C}$	
RR	54	-	-	dB	$-22\text{V} \leq V_{in} \leq -32\text{V}$ , $f=120\text{Hz}$ , $T_j=25^\circ\text{C}$	
VD	-	2	-	V	$I_o=1\text{A}$ , $T_j=25^\circ\text{C}$	
Ipk	-	2.2	-	A	$T_j=25^\circ\text{C}$	
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-1.0	-	mV/ $^\circ\text{C}$	$I_o=5\text{mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	

**GI7924** (Refer to the test circuits,  $T_j=0\sim 125^\circ\text{C}$ ,  $I_o=500\text{mA}$ ,  $V_{in}=-33\text{V}$ ,  $C_{in}=2.2\mu\text{F}$ ,  $C_o=1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions	
VO	A-Rank (3%)	-23.28	-24.0	-24.72	V	$V_{in}=-33\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$ $-27\text{V} \leq V_{in} \leq -38\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$ , $\text{PD} \leq 15\text{W}$
	B-Rank (5%)	-22.80	-	-25.20		
$\Delta\text{VO}$ (Line Regulation)	-	15	480	mV	$-27\text{V} \leq V_{in} \leq -38\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$	
	-	8	240		$-30\text{V} \leq V_{in} \leq -36\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$	
$\Delta\text{VO}$ (Load Regulation)	-	15	480	mV	$V_{in}=-33\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$ , $T_j=25^\circ\text{C}$	
	-	5	240		$V_{in}=-33\text{V}$ , $250\text{mA} \leq I_o \leq 750\text{mA}$ , $T_j=25^\circ\text{C}$	
IQ	-	-	6.0	mA	$V_{in}=-33\text{V}$ , $I_o=500\text{mA}$ , $T_j=25^\circ\text{C}$	
$\Delta\text{IQ}$	-	-	0.5	mA	$V_{in}=-33\text{V}$ , $5\text{mA} \leq I_o \leq 1\text{A}$	
	-	-	1.0		$-27\text{V} \leq V_{in} \leq -38\text{V}$ , $I_o=500\text{mA}$	
Vn	-	400	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$ , $T_a=25^\circ\text{C}$	
RR	54	-	-	dB	$-28\text{V} \leq V_{in} \leq -38\text{V}$ , $f=120\text{Hz}$ , $T_j=25^\circ\text{C}$	
VD	-	2	-	V	$I_o=1\text{A}$ , $T_j=25^\circ\text{C}$	
Ipk	-	2.2	-	A	$T_j=25^\circ\text{C}$	
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-1.0	-	mV/ $^\circ\text{C}$	$I_o=5\text{mA}$ , $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$	

## Typical Application



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