

Three Terminal Fixed Voltage Negative Regulators

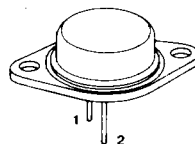
FEATURES

- Output Current to 1.5A
- One External Component
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe Area Compensation
- Available in TO-3, TO-220, TO-257, and isolated TO-257
- Output Voltages of -5V, -12V and -15V
(For Other Voltages, Please Contact the Factory)

DESCRIPTION

These three terminal monolithic negative voltage regulators employ internal current limiting, thermal shutdown and safe area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A of output current. They are intended as fixed voltage regulators in a wide range of applications including local (on card) regulation for elimination of distribution problems associated with single point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents. The 7900 and 7900C series have output tolerances of $\pm 4\%$. The 7900A and 7900AC series offer $\pm 1\%$ tolerances on initial output voltage and, in addition, are specified to provide better regulator performance.

K(TO-3)



Pin 1. Adjust
2. Input
Case: Output

G, IG (TO-257)



Non-isolated
Pin 1. Adjust
2. Input
3. Output
4. Output

Isolated
Pin 1. Adjust
2. Input
3. Output
4. No Connection

ABSOLUTE MAXIMUM RATINGS

Input Voltage	-35V
Input-Output Voltage Differential	30V
Power Dissipation	Internally limited
Operating Junction Temperature Range	
UC7900A SERIES	-55°C to +150°C
UC7900AC SERIES	0°C to +125°C
UC7900 SERIES	-55°C to +150°C
UC7900C SERIES	0°C to +125°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10 seconds)	
K (TO-3), G, IG, (TO-257) package	300°C
T (TO-220) package	230°C
Power/Thermal Characteristics	

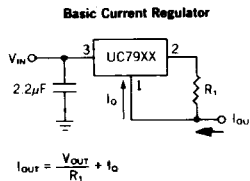
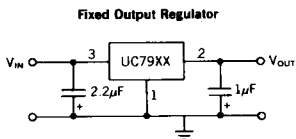
	K (TO-3) Package	T (TO-220) Package	G (TO-257) Package	IG (Isolated TO-257)
Rated Power @ 25°C				
T _c	20W	15W	15W	15W
T _A	4.3W	2W	3W	3W
Thermal Resistance				
θ _{JC}	3°C/W	5°C/W	3.5°C/W	4.2°C/W
θ _{JA}	35°C/W	60°C/W	42°C/W	42°C/W

Note: When ordering, add suffix "K" (for TO-3 package), "T" (for TO-220 package), "G" (for non-isolated TO-257) and "IG" (for isolated TO-257) to the part number.

TYPICAL APPLICATIONS

Input bypass capacitors are recommended for stable operation of the UC7900 series of regulators over the input voltage and output current ranges. Output bypass capacitors will improve the transient response of the regulator.

The bypass capacitors, (2.2µF on the input, 1µF on the output) should be ceramic or solid tantalum which have good high frequency characteristics. If aluminum electrolytics are used, their values should be 10µF or larger. The bypass capacitors should be mounted with the shortest leads, and if possible, directly across the regulator terminals.



ELECTRICAL CHARACTERISTICS TA=TJ

PARAMETER	TEST CONDITIONS	UC7905			UC7905C			UNITS
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Output Voltage	Tj = 25°C, VIN = -10V, Io = 5mA	-5.20		-4.80	-5.20		-4.80	V
	Tj = 25°C, -25V ≤ VIN ≤ -8V 5mA ≤ Io ≤ 1.0A, P ≤ Po	-5.20		-4.80	-5.23		-4.77	V
	Over Temperature, Tmin ≤ Tj ≤ Tmax	-5.25		-4.75	-5.25		-4.75	V
Line Regulation	Tj = 25°C, -25V ≤ VIN ≤ -7V, Io = 5mA		25	50		25	50	mV
Load Regulation	Tj = 25°C, VIN = -10V, 5mA ≤ Io ≤ 1.5A (Note 1)			50			100	mV
Quiescent Current	Tj = 25°C, VIN = -10V, Io = 500mA		1	2.5		1	2.5	mA
	Over Temperature, Tmin ≤ Tj ≤ Tmax			3			3	mA
Quiescent Current Change	Tj = 25°C, VIN = -10V, 5mA ≤ Io ≤ 1.5A			1.0			1.0	mA
	Tj = 25°C, -25V ≤ VIN ≤ -8V, Io = 500mA			.5			.5	mA
Ripple Rejection	Tj = 25°C, -18V ≤ VIN ≤ -8V, Io = 500mA	54			54			dB
Output Noise Voltage	f = 10Hz to 100KHz, Cl = 1µf Tj = 25°C, VIN = -10V, Io = 500mA		100			100		µV
Dropout Voltage	Tj = 25°C, Io = 1A		2.0			2.0		V
Short Circuit Current	Tj = 25°C, VIN = -10V		1.8			1.8		A
Peak Output Current	Tj = 25°C		2.0			2.0		A
Avg. Temp. Variation of VOUT	0°C ≤ Tj ≤ Tmax, VIN = -10V, Io = 5mA		-4			-4		mV/°C
Long Term Stability	1000 Hrs. @ Tj = 125°C, VIN = -10V, Io = 5mA		20			20		mV
Thermal Shutdown	VIN = -10V, Io = 5mA		175			175		°C
	Tmax		125			125		°C
	Tmin		-55			0		°C

Note: All characteristics except noise voltage and ripple rejection are measured using pulse techniques (tw ≤ 10ms, duty-cycle ≤ 5%). Output voltage changes due to changes in internal temperature must be taken into account separately. Po = 20W for TO-3 (K) and 15W for TO-220 (T), non-isolated TO-257 (G) and isolated TO-257 (IG) Min |Vo - VIn| @ -55°C = 2.5V.

1) Measurement taken at 0.180 inches from case for G and IG Packages.

ELECTRICAL CHARACTERISTICS $T_A=T_J$

PARAMETER	TEST CONDITIONS	UC7912			UC7912C			UNITS
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Output Voltage	$T_J = 25^\circ\text{C}$, $V_{IN} = -17\text{V}$, $I_O = 5\text{mA}$	-12.48		-11.52	-12.48		-11.52	V
	$T_J = 25^\circ\text{C}$, $-32\text{V} \leq V_{IN} \leq -14\text{V}$ $5\text{mA} \leq I_{OUT} \leq 1.0\text{A}$, $P \leq P_D$	-12.48		-11.52	-12.54		-11.46	V
	Over Temperature, $T_{MIN} \leq T_J \leq T_{MAX}$	-12.60		-11.40	-12.60		-11.40	V
Line Regulation	$T_J = 25^\circ\text{C}$, $-32\text{V} \leq V_{IN} \leq -14\text{V}$, $I_O = 5\text{mA}$		30	80		30	80	mV
Load Regulation	$T_J = 25^\circ\text{C}$, $V_{IN} = -17\text{V}$, $5\text{mA} \leq I_O \leq 1.5\text{A}$ (Note 1)			120			240	mV
Quiescent Current	$T_J = 25^\circ\text{C}$, $V_{IN} = -17\text{V}$, $I_O = 500\text{mA}$		3			3		mA
	Over Temperature, $T_{MIN} \leq T_J \leq T_{MAX}$			4			4	mA
Quiescent Current Change	$T_J = 25^\circ\text{C}$, $V_{IN} = -17\text{V}$, $5\text{mA} \leq I_O \leq 1.5\text{A}$.8			.8	mA
	$T_J = 25^\circ\text{C}$, $-32\text{V} \leq V_{IN} \leq -14\text{V}$, $I_O = 500\text{mA}$.5			.5	mA
Ripple Rejection	$T_J = 25^\circ\text{C}$, $-25\text{V} \leq V_{IN} \leq -15\text{V}$, $I_O = 500\text{mA}$	56			56			dB
Output Noise Voltage	$f = 10\text{Hz}$ to 100kHz , $C_L = 1\mu\text{f}$ $T_J = 25^\circ\text{C}$, $V_{IN} = -17\text{V}$, $I_O = 500\text{mA}$		200			200		μV
Dropout Voltage	$T_J = 25^\circ\text{C}$, $I_O = 1\text{A}$		1.1			1.1		V
Short Circuit Current	$T_J = 25^\circ\text{C}$, $V_{IN} = -17\text{V}$		1.3			1.3		A
Peak Output Current	$T_J = 25^\circ\text{C}$		2.0			2.0		A
Avg. Temp. Variation of V_{OUT}	$0^\circ\text{C} \leq T_J \leq T_{MAX}$, $V_{IN} = -17\text{V}$, $I_O = 5\text{mA}$		-9			-9		mV/ $^\circ\text{C}$
Long Term Stability	1000 Hrs. @ $T_J = 125^\circ\text{C}$, $V_{IN} = -17\text{V}$, $I_O = 5\text{mA}$		48			48		mV
Thermal Shutdown	$V_{IN} = -17\text{V}$, $I_O = 5\text{mA}$		175			175		$^\circ\text{C}$
	T_{MAX}		125			125		$^\circ\text{C}$
	T_{MIN}		-55			0		$^\circ\text{C}$

Note: All characteristics except noise voltage and ripple rejection are measured using pulse techniques ($t_w \leq 10\text{ms}$, duty-cycle $\leq 5\%$). Output voltage changes due to changes in internal temperature must be taken into account separately.

$P_D = 20\text{W}$ for TO-3 (K) and 15W for TO-220 (T), non-isolated TO-257 (G) and isolated TO-257 (IG) Min | $V_O - V_{IN}$ | @ $-55^\circ\text{C} = 2.5\text{V}$.

1) Measurement taken at 0.180 inches from case for G and IG Packages.

ELECTRICAL CHARACTERISTICS $T_A=T_J$

PARAMETER	TEST CONDITIONS	UC7915			UC7915C			UNITS
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Output Voltage	$T_J = 25^\circ\text{C}$, $V_{IN} = -20\text{V}$, $I_O = 5\text{mA}$	-15.60		-14.40	-15.60		-14.40	V
	$T_J = 25^\circ\text{C}$, $-35\text{V} \leq V_{IN} \leq -17\text{V}$ $5\text{mA} \leq I_{OUT} \leq 1.0\text{A}$, $P \leq P_D$	-15.60		-14.40	-15.68		-14.32	V
	Over Temperature, $T_{MIN} \leq T_J \leq T_{MAX}$	-15.75		-14.25	-15.75		-14.25	V
Line Regulation	$T_J = 25^\circ\text{C}$, $-35\text{V} \leq V_{IN} \leq -17\text{V}$, $I_O = 5\text{mA}$		35	100		35	100	mV
Load Regulation	$T_J = 25^\circ\text{C}$, $V_{IN} = -20\text{V}$, $5\text{mA} \leq I_O \leq 1.5\text{A}$ (Note 1)			150			300	mV
Quiescent Current	$T_J = 25^\circ\text{C}$, $V_{IN} = -20\text{V}$, $I_O = 500\text{mA}$		3			3		mA
	Over Temperature, $T_{MIN} \leq T_J \leq T_{MAX}$			4			4	mA
Quiescent Current Change	$T_J = 25^\circ\text{C}$, $V_{IN} = -20\text{V}$, $5\text{mA} \leq I_O \leq 1.5\text{A}$.8			.8	mA
	$T_J = 25^\circ\text{C}$, $-35\text{V} \leq V_{IN} \leq -17\text{V}$, $I_O = 500\text{mA}$.5			.5	mA
Ripple Rejection	$T_J = 25^\circ\text{C}$, $-28\text{V} \leq V_{IN} \leq -18\text{V}$, $I_O = 500\text{mA}$	56			56			dB
Output Noise Voltage	$f = 10\text{Hz}$ to 100kHz , $C_L = 1\mu\text{f}$							
	$T_J = 25^\circ\text{C}$, $V_{IN} = -17\text{V}$, $I_O = 500\text{mA}$		250			250		μV
Dropout Voltage	$T_J = 25^\circ\text{C}$, $I_O = 1\text{A}$		1.1			1.1		V
Short Circuit Current	$T_J = 25^\circ\text{C}$, $V_{IN} = -20\text{V}$		1.1			1.1		A
Peak Output Current	$T_J = 25^\circ\text{C}$		2.0			2.0		A
Avg. Temp. Variation of V_{OUT}	$0^\circ\text{C} \leq T_J \leq T_{MAX}$, $V_{IN} = -20\text{V}$, $I_O = 5\text{mA}$		-1.0			-1.0		mV/ $^\circ\text{C}$
Long Term Stability	1000 Hrs. @ $T_J = 125^\circ\text{C}$, $V_{IN} = -20\text{V}$, $I_O = 5\text{mA}$		60			60		mV
Thermal Shutdown	$V_{IN} = -20\text{V}$, $I_O = 5\text{mA}$		175			175		$^\circ\text{C}$
	T_{MAX}		125			125		$^\circ\text{C}$
	T_{MIN}		-55			0		$^\circ\text{C}$

Note: All characteristics except noise voltage and ripple rejection are measured using pulse techniques ($t_w \leq 10\text{ms}$, duty-cycle $\leq 5\%$). Output voltage changes due to changes in internal temperature must be taken into account separately.
 $P_D = 20\text{W}$ for TO-3 (K) and 15W for TO-220 (T), non-isolated TO-257 (G) and isolated TO-257 (IG) Min $|V_O - V_{IN}| @ -55^\circ\text{C} = 2.5\text{V}$.

1) Measurement taken at 0.180 inches from case for G and IG Packages.

ORDERING INFORMATION

OUTPUT VOLTAGE	PACKAGE SUFFIX		
	K (TO-3)	G (TO-257)	IG (ISOLATED TO-257)
-5V	UC7905AK UC7905ACK	UC7905G UC7905CG	UC7905IG UC7905CIG
-12V	UC7912AK UC7912ACK	UC7912G UC7912CG	UC7912IG UC7912CIG
-14V	UC7915AK UC7915ACK	UC7915G UC7915CG	UC7915IG UC7915CIG