

THOMSON SEMICONDUCTORS

UA7900 SERIES

THREE-TERMINAL FIXED NEGATIVE VOLTAGE REGULATORS

The UA7900M, UA7900I, and UA7900C series are three-terminal negative regulators with a fixed output voltage of -5 V , -5.2 V , -12 V and -15 V and up to 1.5 A load current capability.

The UA7900M, UA7900I, and UA7900C series have current limiting which is independent of temperature, combined with thermal overload protection. Internal current limit protection against momentary faults while thermal shut down prevents junction temperature exceeding safe limits during prolonged overloads.

These circuits can deliver over 1.0 A if adequate heatsink is provided. Even with over 1.0 A of output current available, the regulators are essentially blow-out proof. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistor is provided to limit internal power dissipation. If internal power dissipation becomes too high for the heatsink provided, the thermal shutdown circuit takes over preventing the IC from overheating.

These devices need only one external component: a compensation capacitor at the output, making them easy to apply. Worst case guarantees on output voltage deviation due to any combination of line, load or temperature variation assure satisfactory system operation.

The UA7900M, UA7900I and UA7900C series of three terminal regulators are available with several fixed output voltages making them useful in a wide range of applications. One of these is local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow these regulators to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipments. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

The UA7900M series are available in metal TO-3.

The UA7900I, C are available in plastic TOP-3 and in metal TO-3 packages.

- Output voltage tolerance without external trimming: UA7900C, I series: $+4\%$; 7900M series: $\pm 2\%$.
- Preset current limit
- Output current in excess of 1 A
- Internal thermal shut down
- Operates with input-output voltage differential down to 2 V
- Load regulation:
 - UA7900C, I: 80 mV
 - UA7900M: 50 mV

ORDERING INFORMATION

Hi-Rel versions available - See chapter 14

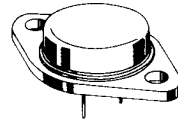
PART NUMBER	TEMPERATURE RANGE	PACKAGE	
		K	SP3
UA7905C	0°C to $+150^{\circ}\text{C}$	•	•
UA7905I	-25°C to $+150^{\circ}\text{C}$	•	•
UA7905I	-40°C to $+150^{\circ}\text{C}$	•	•
UA7905M	-55°C to $+150^{\circ}\text{C}$	•	•
UA7912C	0°C to $+150^{\circ}\text{C}$	•	•
UA7912I	-25°C to $+150^{\circ}\text{C}$	•	•
UA7912I	-40°C to $+150^{\circ}\text{C}$	•	•
UA7912M	-55°C to $+150^{\circ}\text{C}$	•	•
UA7915C	0°C to $+150^{\circ}\text{C}$	•	•
UA7915I	-25°C to $+150^{\circ}\text{C}$	•	•
UA7915I	-40°C to $+150^{\circ}\text{C}$	•	•
UA7915M	-55°C to $+150^{\circ}\text{C}$	•	•

Example: UA7905CK, UA7905CSP3

THREE-TERMINAL FIXED NEGATIVE VOLTAGE REGULATORS

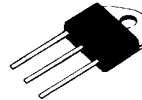
CASES

CB-19
(TO-3)



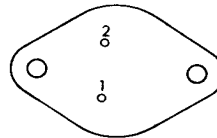
K SUFFIX
STEEL CAN

CB-244
(TOP-3)



SP3 SUFFIX
PLASTIC PACKAGE

PIN ASSIGNMENTS



CB-19
(Bottom view)

- 1 - Ground
- 2 - Output

Case connected to input



CB-244
(Front view)

- 1 - Ground
- 2 - Output
- 3 - Input

Heatsink surface connected to ground

THOMSON SEMICONDUCTORS

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THOMSON
COMPONENTS

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input voltage UA7915 UA7905 - UA7912	V_I	-40 -35	V
Input-output voltage differential	$ V_I - V_O $	35	V
Output current	I_O	Internally limited	A
Power dissipation	P_{tot}	Internally limited	W
Operating ambient temperature range UA7900C UA7900I, (CB-19) UA7900I, (CB-244) UA7900M	T_{oper}	0 to +150 -25 to +150 -40 to +150 -55 to +150	°C
Storage temperature range	T_{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Typ	Max	Unit
Junction-case thermal resistance CB-19 CB-244	$R_{th(j-c)}$	-	4 2.5	°C/W
Junction-ambient thermal resistance CB-19 CB-244	$R_{th(j-a)}$	35	- 55	°C/W

ELECTRICAL CHARACTERISTICS (Note 1)

UA7905C : $0^\circ\text{C} \leq T_j \leq +150^\circ\text{C}$ UA7905ISP3 : $-40^\circ\text{C} \leq T_j \leq +150^\circ\text{C}$

UA7905I : $-25^\circ\text{C} \leq T_j \leq +150^\circ\text{C}$ UA7905M : $-55^\circ\text{C} \leq T_j \leq +150^\circ\text{C}$

$V_I = -10\text{ V}$, $I_O = -0.5\text{ A}$, $I_{O(max)} = -1\text{ A}$

(Unless otherwise specified)

Characteristic	Symbol	7905I, C			7905M			Unit
		Min	Typ	Max	Min	Typ	Max	
Output voltage range $T_j = +25^\circ\text{C}$ $T_{min} \leq T_j \leq T_{max}$, $-25\text{ V} \leq V_I \leq -7\text{ V}$, $-5\text{ mA} \leq I_O \leq -1.5\text{ A}$	V_O	-5.2 -5.25	-5 -	-4.8 -4.75	-5.1 -5.2	-5 -	-4.9 -4.8	V
Line regulation $(T_j = +25^\circ\text{C}$, $-25\text{ V} \leq V_I \leq -7\text{ V}$, $I_O = -0.5\text{ A}$) - Note 2	K_{VI}	-	10	50	-	10	25	mV
Load regulation $(T_j = +25^\circ\text{C}$, $-5\text{ mA} \leq I_O \leq -1.5\text{ A}$) - Note 2	K_{VO}	-	50	100	-	50	75	mV
Quiescent current ($-25\text{ V} \leq V_I \leq -7\text{ V}$)	I_{IB}	-	1	2	-	1	2	mA
Quiescent current change $(T_j = +25^\circ\text{C}$, $-25\text{ V} \leq V_I \leq -7\text{ V}$, $-5\text{ mA} \leq I_O \leq -1.5\text{ A}$)	ΔI_{IB}	-	0.1	0.4	-	0.1	0.4	mA
Output noise voltage $(T_{amb} = +25^\circ\text{C}$, $C_L = 1\text{ }\mu\text{F}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$)	V_{NO}	-	40	-	-	40	-	μV_{rms}
Long term stability	K_{VH}	-	-	20	-	-	20	mV

Note 1 : Although power dissipation is internally limited, electrical specifications apply only for power levels up to $P_{max} = 20\text{ W}$

Note 2 : Load and line regulation are specified at constant junction temperature. Changes in output voltage due to heating effects must be taken into account separately. To ensure constant junction temperature, pulse testing with a low duty cycle is used.

ELECTRICAL CHARACTERISTICS (Note 3)

UA7912C : $0^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$ **UA7912ISP3** : $-40^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$
UA7912I : $-25^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$ **UA7912M** : $-55^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$
 $V_I = -17\text{ V}$, $I_O = -0.5\text{ A}$, $I_{O(\text{max})} = -1\text{ A}$
 (Unless otherwise specified)

Characteristic	Symbol	7912I, C			7912M			Unit
		Min	Typ	Max	Min	Typ	Max	
Output voltage range $T_j = +25^{\circ}\text{C}$ $T_{\text{min}} \leq T_j \leq T_{\text{max}}$, $-32\text{ V} \leq V_I \leq -14\text{ V}$, $-5\text{ mA} \leq I_O \leq -1\text{ A}$	V_O	-12.4 -12.6	-12 —	-11.6 -11.4	-12.3 -12.5	-12 —	-11.7 -11.5	V
Line regulation $(T_j = +25^{\circ}\text{C})$, $-32\text{ V} \leq V_I \leq -14\text{ V}$ - Note 4	K_{VI}	—	4	20	—	4	10	mV
Load regulation $(T_j = +25^{\circ}\text{C})$, $-5\text{ mA} \leq I_O \leq -1.5\text{ A}$ - Note 4	K_{VO}	—	30	80	—	30	80	mV
Quiescent current ($-32\text{ V} \leq V_I \leq -14\text{ V}$)	I_{IB}	—	2	4	—	2	4	mA
Quiescent current change $(T_j = +25^{\circ}\text{C})$, $-32\text{ V} \leq V_I \leq -14\text{ V}$, $-5\text{ mA} \leq I_O \leq -1.5\text{ A}$	ΔI_{IB}	—	0.1	0.4	—	0.1	0.4	mA
Output noise voltage $(T_{\text{amb}} = +25^{\circ}\text{C})$, $C_L = 1\text{ }\mu\text{F}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	V_{NO}	—	75	—	—	75	—	μV_{rms}
Long term stability	K_{VH}	—	—	48	—	—	48	mV

Note 3 : Although power dissipation is internally limited, electrical specifications apply only for power levels up to $P_{\text{max}} = 20\text{ W}$

Note 4 : Load and line regulation are specified at constant junction temperature. Changes in output voltage due to heating effects must be taken into account separately. To ensure constant junction temperature, pulse testing with a low duty cycle is used.

ELECTRICAL CHARACTERISTICS (Note 5)

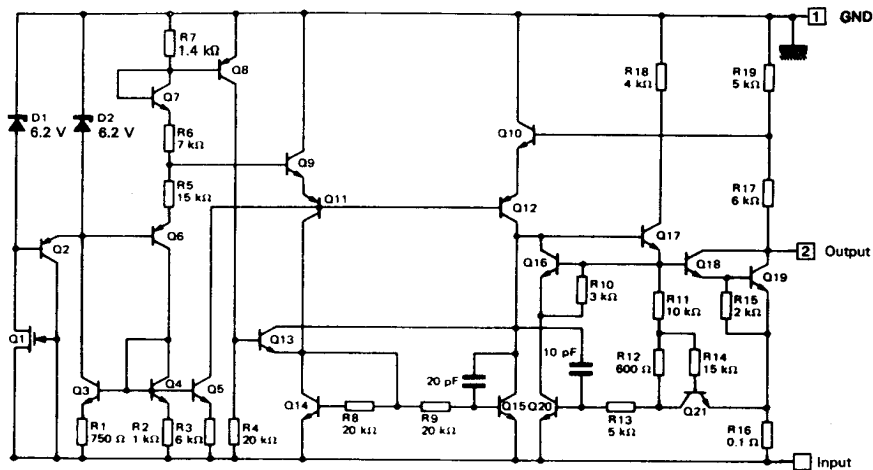
UA7915C : $0^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$ **UA7915ISP3** : $-40^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$
UA7915I : $-25^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$ **UA7915M** : $-55^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$
 $V_I = -20\text{ V}$, $I_O = -0.5\text{ A}$, $I_{O(\text{max})} = -1\text{ A}$
 (Unless otherwise specified)

Characteristic	Symbol	7915I, C			7915M			Unit
		Min	Typ	Max	Min	Typ	Max	
Output voltage range $T_j = +25^{\circ}\text{C}$ $T_{\text{min}} \leq T_j \leq T_{\text{max}}$, $-35\text{ V} \leq V_I \leq -17\text{ V}$, $-5\text{ mA} \leq I_O \leq -1\text{ A}$	V_O	-15.4 -15.6	-15 —	-14.6 -14.4	-15.3 -15.5	-15 —	-14.7 -14.5	V
Line regulation $(T_j = +25^{\circ}\text{C})$, $-35\text{ V} \leq V_I \leq -17\text{ V}$, $I_O = -0.5\text{ A}$ - Note 6	K_{VI}	—	5	20	—	5	10	mV
Load regulation $(T_j = +25^{\circ}\text{C})$, $-5\text{ mA} \leq I_O \leq -1.5\text{ A}$ - Note 6	K_{VO}	—	30	80	—	30	80	mV
Quiescent current ($-35\text{ V} \leq V_I \leq -17\text{ V}$)	I_{IB}	—	2	4	—	2	4	mA
Quiescent current change $(T_j = +25^{\circ}\text{C})$, $-35\text{ V} \leq V_I \leq -17\text{ V}$, $-5\text{ mA} \leq I_O \leq -1.5\text{ A}$	ΔI_{IB}	—	0.1	0.4	—	0.1	0.4	mA
Output noise voltage $(T_{\text{amb}} = +25^{\circ}\text{C})$, $C_L = 1\text{ }\mu\text{F}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$	V_{NO}	—	90	—	—	90	—	μV_{rms}
Long term stability	K_{VH}	—	—	60	—	—	60	mV

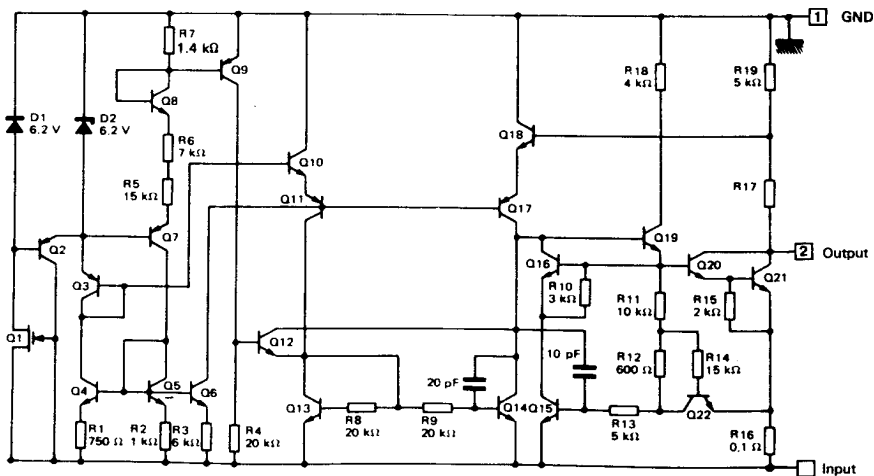
Note 5 : Although power dissipation is internally limited, electrical specifications apply only for power levels up to $P_{\text{max}} = 20\text{ W}$

Note 6 : Load and line regulation are specified at constant junction temperature. Changes in output voltage due to heating effects must be taken into account separately. To ensure constant junction temperature, pulse testing with a low duty cycle is used.

SCHEMATIC DIAGRAM

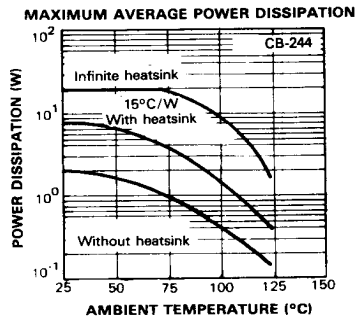
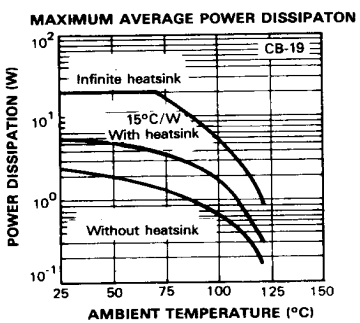
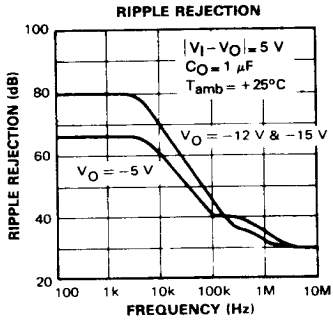
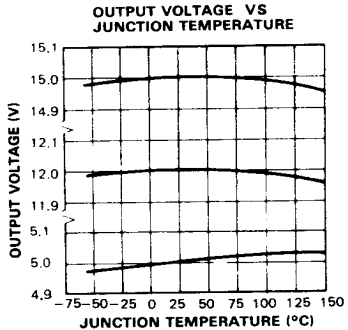
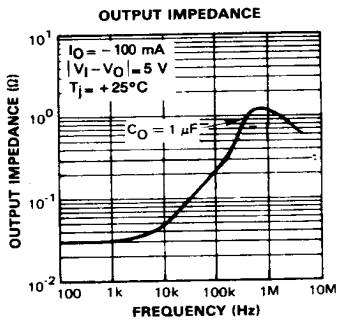


-5 V



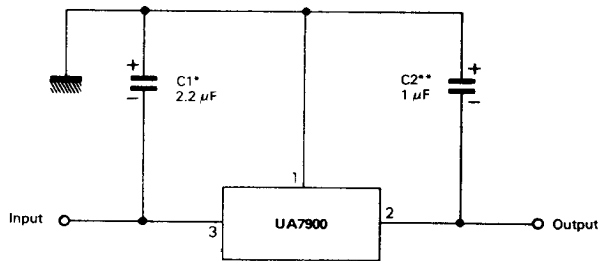
-12 V & -15 V

Case	GND	Output	Input
CB-19	1	2	Case
CB-244	1	2	3



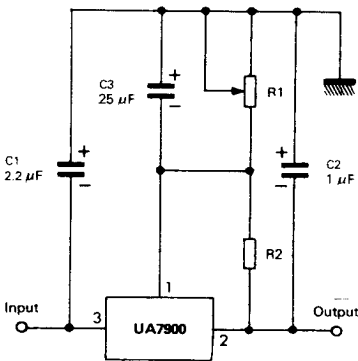
TYPICAL APPLICATIONS

FIXED OUTPUT REGULATOR



- * Required if regulator is located an appreciable distance from power supply filter.
 - ** Required for stability for value given.
- For output capacitance in excess of 100 μF, a high current diode from input to output (1N4001) will protect the regulator from momentary input shorts.

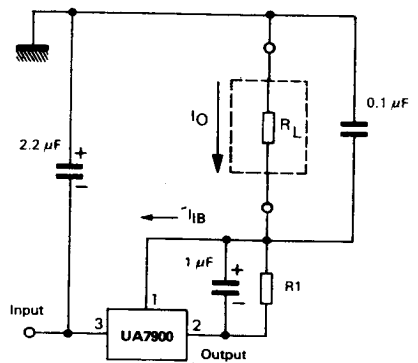
ADJUSTABLE OUTPUT REGULATOR



$$V_O = V_{set} \frac{R_1 + R_2}{R_2}$$

UA7905 : R2 = 300 Ω
 UA7912 : R2 = 750 Ω
 UA7915 : R2 = 1 kΩ

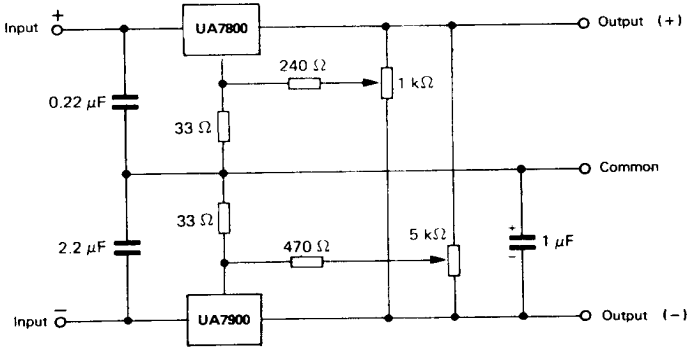
CURRENT REGULATOR



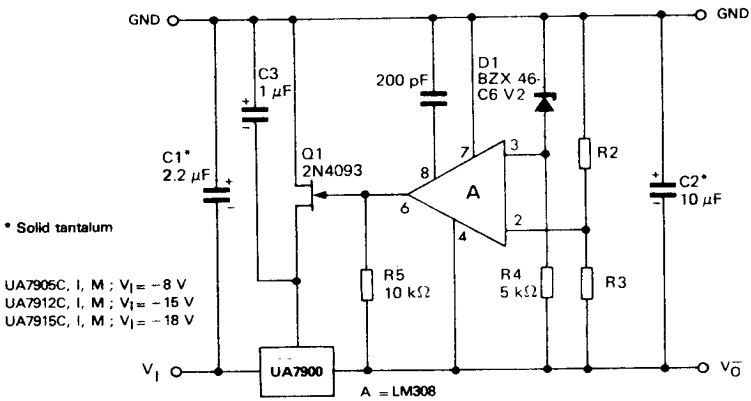
$$I_O = \frac{V(2-1)}{R_1} + I_{IB}$$

TYPICAL APPLICATIONS (continued)

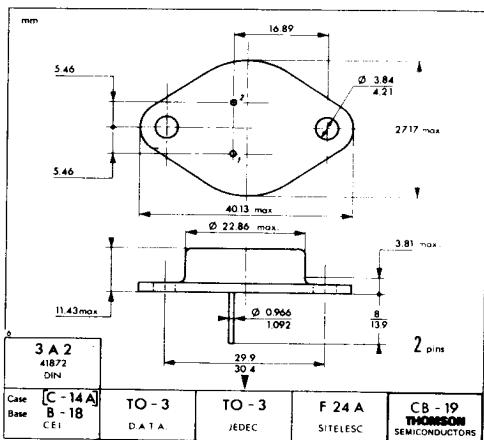
DUAL TRIMMED SUPPLY



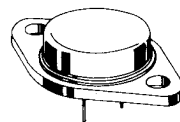
HIGH STABILITY 1 A REGULATOR



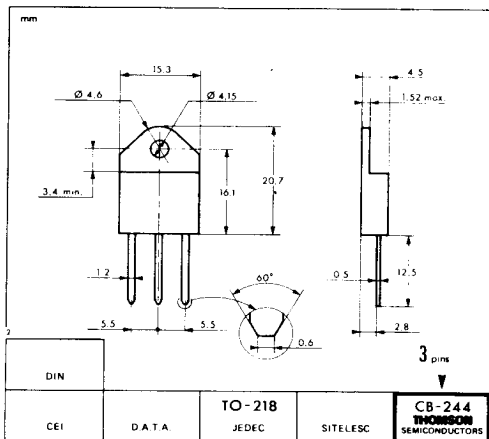
Load and line regulation < 0.01 %
 Temperature stability < 0.1 %



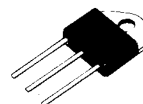
CB-19
(TO-3)



K SUFFIX
STEEL CAN



CB-244
(TO-3)



SP3 SUFFIX
PLASTIC PACKAGE

These specifications are subject to change without notice.
Please inquire with our sales offices about the availability of the different packages.