

# THOMSON SEMICONDUCTORS

**UA7800C  
UA7800BI  
SERIES**

## THREE-TERMINAL FIXED POSITIVE VOLTAGE REGULATORS

This series of three terminal regulators is 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 voltage available allow these regulators to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipment. Although designed primarily as fixed voltage regulators these devices can be used with external components to obtain adjustable voltages and currents.

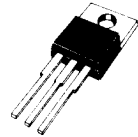
This series is available in TO-220 plastic package (CB-117) which allows these regulators to deliver over 1.0 A if adequate heat sinking is provided. Even with over 1.0 A of output current available the regulators are essentially blow-out proof. Current limiting is included to limit the peak output current 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 heat sinking provided, the thermal shutdown circuit takes over preventing the IC from over-heating.

Considerable effort was expended to make this series of regulators easy to use and minimize the number of external components. It is not necessary to bypass the output, although this does improve transient response. Input bypassing is needed only if the regulator is located far from the filter capacitor of the power supply.

- Output current in excess of 1 A.
- Internal thermal overload protection.
- No external components for adjustment.
- Output transistor safe area protection.
- Internal short-circuit current limit.
- Output voltage tolerance without external trimming for BI version.
  - ± 2% @  $T_{amb} = +25^{\circ}C$
  - ± 4% @  $-40^{\circ}C < T_{amb} < +150^{\circ}C$

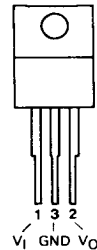
## THREE-TERMINAL FIXED POSITIVE VOLTAGE REGULATORS

**CASE CB-117  
(TO-220)**



**SP SUFFIX  
PLASTIC PACKAGE**

## PIN ASSIGNMENT (Front view)



Heatsink surface connected to ground

## ORDERING INFORMATION

PART NUMBER	TEMPERATURE RANGE	PACKAGE
		SP
UA7805C	0°C to +150°C	•
UA7805BI	-40°C to +150°C	•
UA7806C	0°C to +150°C	•
UA7808C	0°C to +150°C	•
UA7812C	0°C to +150°C	•
UA7812BI	-40°C to +150°C	•
UA7815C	0°C to +150°C	•
UA7815BI	-40°C to +150°C	•
UA7818C	0°C to +150°C	•
UA7824C	0°C to +150°C	•

Examples : UA7805CSP, UA7805BISP

## THOMSON SEMICONDUCTORS

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45, av. de l'Europe - 78140 VELIZY - FRANCE  
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**THOMSON  
COMPONENTS**

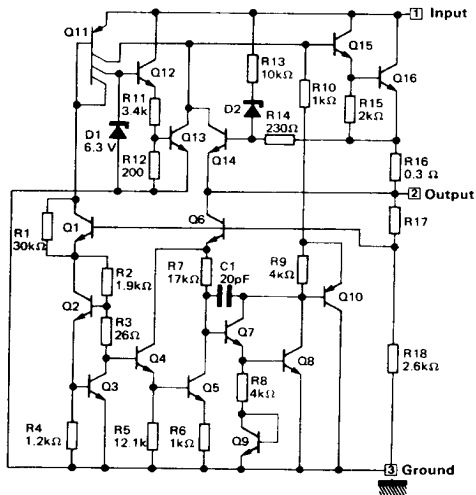
**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Input voltage UA7824CSP UA7805/7806/7808/7812/7815/7818 and BISP series	$V_I$	40 35	V
Output current	$I_O$	Internally limited	A
Power dissipation	$P_{tot}$	Internally limited	W
Junction temperature	$T_j$	+150	°C
Operating free-air temperature range UA7800CSP UA7800BISP	$T_{oper}$	0 to +150 -40 to +150	°C
Storage temperature range	$T_{stg}$	-65 to +150	°C

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Value	Unit
Maximum junction-case thermal resistance	$R_{th(j-c)}$	3	°C/W
Maximum junction-ambient thermal resistance	$R_{th(j-a)}$	70	°C/W

**SCHEMATIC DIAGRAM**



CASE	$V_I$	$V_O$	GND
CB-117	1	2	3

**ELECTRICAL CHARACTERISTICS (Note 1)**

**UA7805CSP** :  $0^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

**UA7805BISP** :  $-40^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

$I_O = 0.5 \text{ A}$ ,  $V_I = +10 \text{ V}$

(Unless otherwise specified)

Characteristic	Symbol	UA7805CSP			UA7805BISP			Unit
		Min	Typ	Max	Min	Typ	Max	
Output voltage range $T_j = +25^{\circ}\text{C}$ $T_{\min} \leq T_j \leq T_{\max}$ , $5 \text{ mA} \leq I_O \leq 1 \text{ A}$ , $+7 \text{ V} \leq V_I \leq +20 \text{ V}$ $+8 \text{ V} \leq V_I \leq +20 \text{ V}$	$V_O$	4.8 4.75 —	5.0 — —	5.2 5.25 —	4.9 — 4.8	5.0 — —	5.2 — 5.2	V
Line regulation ( $T_j = +25^{\circ}\text{C}$ ) $+8 \text{ V} \leq V_I \leq +12 \text{ V}$ $+7 \text{ V} \leq V_I \leq +25 \text{ V}$	$K_{Vl}$	—	—	50 100	—	—	25 50	mV
Load regulation ( $T_j = +25^{\circ}\text{C}$ ) $5 \text{ mA} \leq I_O \leq 1.5 \text{ A}$ $250 \text{ mA} \leq I_O \leq 750 \text{ mA}$	$K_{VO}$	—	—	100 50	—	—	50 25	mV
Quiescent current ( $T_j = +25^{\circ}\text{C}$ )	$I_{lB}$	—	6	10	—	5.5	8	mA
Quiescent current change $+8 \text{ V} \leq V_I \leq +25 \text{ V}$ $+7 \text{ V} \leq V_I \leq +25 \text{ V}$ $5 \text{ mA} \leq I_O \leq 1 \text{ A}$	$\Delta I_{lB}$	—	—	—	—	—	0.8 — 0.5	mA
Output noise voltage ( $T_{\text{amb}} = +25^{\circ}\text{C}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ )	$V_{NO}$	—	40	—	—	40	—	$\mu\text{V}_{\text{rms}}$
Long term stability	$K_{VH}$	—	—	20	—	—	20	mV
Ripple rejection ( $I_O = 20 \text{ mA}$ , $f = 100 \text{ Hz}$ )	$R_{vf}$	—	60	—	—	78	—	dB
Input-output voltage differential ( $T_j = +25^{\circ}\text{C}$ , $I_O = 1 \text{ A}$ )	$V_I - V_O$	—	2	—	—	2	—	V

**Note 1** : Although power dissipation is internally limited, electrical characteristics apply only for power levels up to  $P_{\text{max}} = 15 \text{ W}$

**ELECTRICAL CHARACTERISTICS (Note 2)**

**UA7806CSP** :  $0^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

$I_O = 0.5 \text{ A}$ ,  $V_I = +11 \text{ V}$

(Unless otherwise specified)

Characteristic	Symbol	UA7806CSP			Unit
		Min	Typ	Max	
Output voltage range $T_j = +25^{\circ}\text{C}$ $T_{\min} \leq T_j \leq T_{\max}$ , $5 \text{ mA} \leq I_O \leq 1 \text{ A}$ , $+8 \text{ V} \leq V_I \leq +21 \text{ V}$	$V_O$	5.75 5.65	6 —	6.25 6.35	V
Line regulation ( $T_j = +25^{\circ}\text{C}$ ) $+9 \text{ V} \leq V_I \leq +13 \text{ V}$ $+8 \text{ V} \leq V_I \leq +25 \text{ V}$	$K_{Vl}$	—	—	30 60	mV
Load regulation ( $T_j = +25^{\circ}\text{C}$ ) $5 \text{ mA} \leq I_O \leq 1.5 \text{ A}$ $250 \text{ mA} \leq I_O \leq 750 \text{ mA}$	$K_{VO}$	—	—	60 30	mV
Quiescent current ( $T_j = +25^{\circ}\text{C}$ )	$I_{lB}$	—	5.5	8	mA
Quiescent current change $+9 \text{ V} \leq V_I \leq +25 \text{ V}$ $5 \text{ mA} \leq I_O \leq 1 \text{ A}$	$\Delta I_{lB}$	—	—	0.8 0.5	mA
Output noise voltage ( $T_{\text{amb}} = +25^{\circ}\text{C}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ )	$V_{NO}$	—	45	—	$\mu\text{V}_{\text{rms}}$
Long term stability	$K_{VH}$	—	—	24	mV
Ripple rejection ( $I_O = 20 \text{ mA}$ , $f = 100 \text{ Hz}$ )	$R_{vf}$	—	75	—	dB
Input-output voltage differential ( $T_j = +25^{\circ}\text{C}$ , $I_O = 1 \text{ A}$ )	$V_I - V_O$	—	2	—	V

**Note 2** : Although power dissipation is internally limited, electrical characteristics apply only for power levels up to  $P_{\text{max}} = 15 \text{ W}$

**ELECTRICAL CHARACTERISTICS (Note 3)**

**UA7808CSP** :  $0^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

$I_O = 0.5 \text{ A}$ ,  $V_I = +14 \text{ V}$

(Unless otherwise specified)

Characteristic	Symbol	UA7808CSP			Unit
		Min	Typ	Max	
Output voltage range $T_j = +25^{\circ}\text{C}$ $T_{\min} \leq T_j \leq T_{\max}$ , $5 \text{ mA} \leq I_O \leq 1 \text{ A}$ , $+10.5 \text{ V} \leq V_I \leq +23 \text{ V}$	$V_O$	7.7 7.6	8 —	8.3 8.4	V
Line regulation ( $T_j = +25^{\circ}\text{C}$ ) $+11 \text{ V} \leq V_I \leq +17 \text{ V}$ $+10.5 \text{ V} \leq V_I \leq +25 \text{ V}$	$K_{VI}$	— —	— —	40 80	mV
Load regulation ( $T_j = +25^{\circ}\text{C}$ ) $5 \text{ mA} \leq I_O \leq 1.5 \text{ A}$ $250 \text{ mA} \leq I_O \leq 750 \text{ mA}$	$K_{VO}$	— —	— —	80 40	mV
Quiescent current ( $T_j = +25^{\circ}\text{C}$ )	$I_{IB}$	—	5.5	8	mA
Quiescent current change $+11.5 \text{ V} \leq V_I \leq +25 \text{ V}$ $5 \text{ mA} \leq I_O \leq 1 \text{ A}$	$\Delta I_{IB}$	— —	— —	0.8 0.5	mA
Output noise voltage ( $T_{\text{amb}} = +25^{\circ}\text{C}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ )	$V_{NO}$	—	52	—	$\mu\text{V}_{\text{rms}}$
Long term stability	$K_{VH}$	—	—	32	mV
Ripple rejection ( $I_O = 20 \text{ mA}$ , $f = 100 \text{ Hz}$ )	$R_{vf}$	—	72	—	dB
Input-output voltage differential ( $T_j = +25^{\circ}\text{C}$ , $I_O = 1 \text{ A}$ )	$V_I - V_O$	—	2	—	V

**Note 3** : Although power dissipation is internally limited, electrical characteristics apply only for power levels up to  $P_{\text{max}} = 15 \text{ W}$

**ELECTRICAL CHARACTERISTICS (Note 4)**

**UA7812CSP** :  $0^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

**UA7812BISP** :  $-40^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

$I_O = 0.5 \text{ A}$ ,  $V_I = +19 \text{ V}$

(Unless otherwise specified)

Characteristic	Symbol	UA7812CSP			UA7812BISP			Unit
		Min	Typ	Max	Min	Typ	Max	
Output voltage range $T_j = +25^{\circ}\text{C}$ $T_{\min} \leq T_j \leq T_{\max}$ , $5 \text{ mA} \leq I_O \leq 1 \text{ A}$ , $+14.5 \text{ V} \leq V_I \leq +27 \text{ V}$ $+15.5 \text{ V} \leq V_I \leq +27 \text{ V}$	$V_O$	11.5 11.4 —	12 — —	12.5 12.6 —	11.76 — 11.5	12 — —	12.24 — 12	V
Line regulation ( $T_j = +25^{\circ}\text{C}$ ) $+16 \text{ V} \leq V_I \leq +22 \text{ V}$ $+14.5 \text{ V} \leq V_I \leq +30 \text{ V}$	$K_{VI}$	— —	— —	120 240	— —	— —	60 120	mV
Load regulation ( $T_j = +25^{\circ}\text{C}$ ) $5 \text{ mA} \leq I_O \leq 1.5 \text{ A}$ $250 \text{ mA} \leq I_O \leq 750 \text{ mA}$	$K_{VO}$	— —	— —	240 120	— —	— —	120 60	mV
Quiescent current ( $T_j = +25^{\circ}\text{C}$ )	$I_{IB}$	—	6	10	—	5.5	8	mA
Quiescent current change $+15 \text{ V} \leq V_I \leq +30 \text{ V}$ $+14.5 \text{ V} \leq V_I \leq +30 \text{ V}$ $5 \text{ mA} \leq I_O \leq 1 \text{ A}$	$\Delta I_{IB}$	— — —	— — —	— 1.3 0.5	— — —	— — —	0.8 — 0.5	mA
Output noise voltage ( $T_{\text{amb}} = +25^{\circ}\text{C}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ )	$V_{NO}$	—	75	—	—	75	—	$\mu\text{V}_{\text{rms}}$
Long term stability	$K_{VH}$	—	—	48	—	—	48	mV
Ripple rejection ( $I_O = 20 \text{ mA}$ , $f = 100 \text{ Hz}$ )	$R_{vf}$	—	61	—	—	71	—	dB
Input-output voltage differential ( $T_j = +25^{\circ}\text{C}$ , $I_O = 1 \text{ A}$ )	$V_I - V_O$	—	2	—	—	2	—	V

**Note 4** : Although power dissipation is internally limited, electrical characteristics apply only for power levels up to  $P_{\text{max}} = 15 \text{ W}$

**ELECTRICAL CHARACTERISTICS (Note 5)**

**UA7815CSP** : 0°C ≤ T<sub>j</sub> ≤ +150°C

**UA7815BISP** : -40°C ≤ T<sub>j</sub> ≤ +150°C

I<sub>O</sub> = 0.5 A, V<sub>I</sub> = +23 V

(Unless otherwise specified)

Characteristic	Symbol	UA7815CSP			UA7815BISP			Unit
		Min	Typ	Max	Min	Typ	Max	
Output voltage range T <sub>j</sub> = +25°C T <sub>min</sub> ≤ T <sub>j</sub> ≤ T <sub>max</sub> , 5 mA ≤ I <sub>O</sub> ≤ 1 A, +17.5 V ≤ V <sub>I</sub> ≤ +30 V +18.5 V ≤ V <sub>I</sub> ≤ +30 V	V <sub>O</sub>	14.4 14.25	15 —	15.6 15.75 —	14.7 14.4	15.0 — —	15.3 — 15.6	V
Line regulation (T <sub>j</sub> = +25°C) +20 V ≤ V <sub>I</sub> ≤ +26 V +17.5 V ≤ V <sub>I</sub> ≤ +30 V	K <sub>VL</sub>	— —	— —	150 300	— —	— —	75 150	mV
Load regulation (T <sub>j</sub> = +25°C) 5 mA ≤ I <sub>O</sub> ≤ 1.5 A 250 mA ≤ I <sub>O</sub> ≤ 750 mA	K <sub>VO</sub>	— —	— —	300 150	— —	— —	150 75	mV
Quiescent current (T <sub>j</sub> = +25°C)	I <sub>IB</sub>	—	6	10	—	5.5	8	mA
Quiescent current change +18.5 V ≤ V <sub>I</sub> ≤ +30 V +17.5 V ≤ V <sub>I</sub> ≤ +30 V 5 mA ≤ I <sub>O</sub> ≤ 1 A	ΔI <sub>IB</sub>	— — —	— — —	— 1 0.5	— — —	— — —	0.8 — 0.5	mA
Output noise voltage (T <sub>amb</sub> = +25°C, 10 Hz ≤ f ≤ 100 kHz)	V <sub>NO</sub>	—	90	—	—	90	—	μV <sub>rms</sub>
Long term stability	K <sub>VH</sub>	—	—	60	—	—	60	mV
Ripple rejection (I <sub>O</sub> = 20 mA, f = 100 Hz)	R <sub>vf</sub>	—	60	—	—	70	—	dB
Input-output voltage differential (T <sub>j</sub> = +25°C, I <sub>O</sub> = 1 A)	V <sub>I</sub> - V <sub>O</sub>	—	2	—	—	2	—	V

**Note 5** : Although power dissipation is internally limited, electrical characteristics apply only for power levels up to P<sub>max</sub> = 15 W

**ELECTRICAL CHARACTERISTICS (Note 6)**

**UA7818CSP** : 0°C ≤ T<sub>j</sub> ≤ +150°C

I<sub>O</sub> = 0.5 A, V<sub>I</sub> = +27 V

(Unless otherwise specified)

Characteristic	Symbol	UA7818CSP			Unit
		Min	Typ	Max	
Output voltage range T <sub>j</sub> = +25°C T <sub>min</sub> ≤ T <sub>j</sub> ≤ T <sub>max</sub> , +21 V ≤ V <sub>I</sub> ≤ +33 V, 5 mA ≤ I <sub>O</sub> ≤ 1 A	V <sub>O</sub>	17.3 17.1	18 —	18.7 18.9	V
Line regulation (T <sub>j</sub> = +25°C) +24 V ≤ V <sub>I</sub> ≤ +30 V +21 V ≤ V <sub>I</sub> ≤ +33 V	K <sub>VL</sub>	— —	— —	180 360	mV
Load regulation (T <sub>j</sub> = +25°C) 5 mA ≤ I <sub>O</sub> ≤ 1.5 A 250 mA ≤ I <sub>O</sub> ≤ 750 mA	K <sub>VO</sub>	— —	— —	360 180	mV
Quiescent current (T <sub>j</sub> = +25°C)	I <sub>IB</sub>	—	6	10	mA
Quiescent current change +21 V ≤ V <sub>I</sub> ≤ +33 V 5 mA ≤ I <sub>O</sub> ≤ 1 A	ΔI <sub>IB</sub>	— —	— —	1 0.5	mA
Output noise voltage (T <sub>amb</sub> = +25°C, 10 Hz ≤ f ≤ 100 kHz)	V <sub>NO</sub>	—	110	—	μV <sub>rms</sub>
Long term stability	K <sub>VH</sub>	—	—	72	mV
Ripple rejection (I <sub>O</sub> = 20 mA, f = 100 Hz)	R <sub>vf</sub>	—	59	—	dB
Input-output voltage differential (T <sub>j</sub> = +25°C, I <sub>O</sub> = 1 A)	V <sub>I</sub> - V <sub>O</sub>	—	2	—	V

**Note 6** : Although power dissipation is internally limited, electrical characteristics apply only for power levels up to P<sub>max</sub> = 15 W

**ELECTRICAL CHARACTERISTICS (Note 7)**

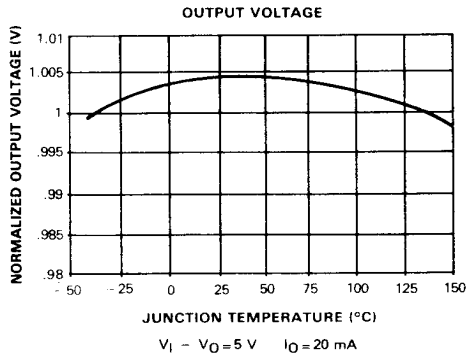
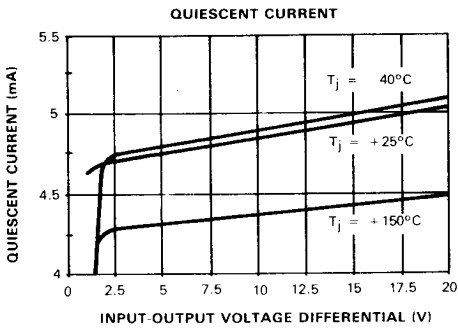
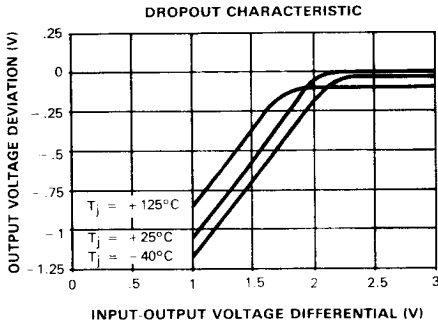
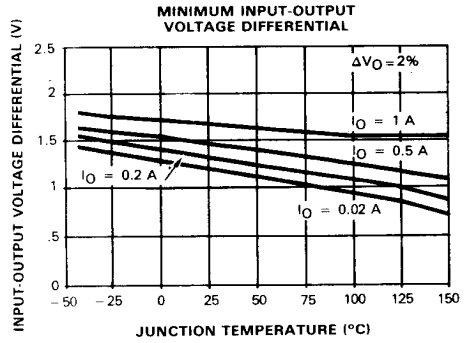
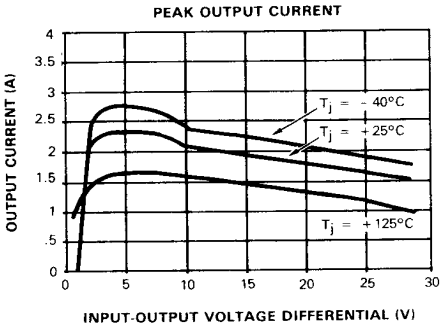
**UA7824CSP** :  $0^{\circ}\text{C} \leq T_j \leq +150^{\circ}\text{C}$

$I_O = 0.5 \text{ A}$ ,  $V_I = +33 \text{ V}$

(Unless otherwise specified)

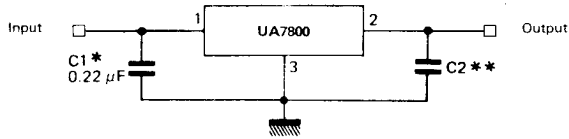
Characteristic	Symbol	UA7824CSP			Unit
		Min	Typ	Max	
Output voltage range $T_j = +25^{\circ}\text{C}$ $T_{\text{min}} \leq T_j \leq T_{\text{max}}$ , $+27 \text{ V} \leq V_I \leq +38 \text{ V}$ , $5 \text{ mA} \leq I_O \leq 1 \text{ A}$	$V_O$	23 22.8	24 —	25 25.2	V
Line regulation ( $T_j = +25^{\circ}\text{C}$ ) $+30 \text{ V} \leq V_I \leq +38 \text{ V}$ $+27 \text{ V} \leq V_I \leq +38 \text{ V}$	$K_{V_I}$	— —	— —	240 480	mV
Load regulation ( $T_j = +25^{\circ}\text{C}$ ) $5 \text{ mA} \leq I_O \leq 1.5 \text{ A}$ $250 \text{ mA} \leq I_O \leq 750 \text{ mA}$	$K_{V_O}$	— —	— —	480 240	mV
Quiescent current ( $T_j = +25^{\circ}\text{C}$ )	$I_{IB}$	—	6	10	mA
Quiescent current change $+27 \text{ V} \leq V_I \leq +38 \text{ V}$ $5 \text{ mA} \leq I_O \leq 1 \text{ A}$	$\Delta I_{IB}$	—	—	1 0.5	mA
Output noise voltage ( $T_{\text{amb}} = +25^{\circ}\text{C}$ , $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ )	$V_{NO}$	—	170	—	$\mu\text{V}_{\text{rms}}$
Long term stability	$K_{V_H}$	—	—	96	mV
Ripple rejection ( $I_O = 20 \text{ mA}$ , $f = 100 \text{ Hz}$ )	$R_{Vf}$	—	56	—	dB
Input-output voltage differential ( $T_j = +25^{\circ}\text{C}$ , $I_O = 1 \text{ A}$ )	$V_I - V_O$	—	2	—	V

**Note 7** : Although power dissipation is internally limited, electrical characteristics apply only for power levels up to  $P_{\text{max}} = 15 \text{ W}$



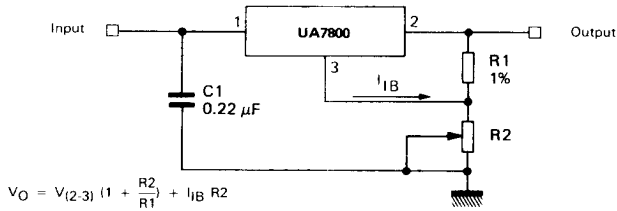
TYPICAL APPLICATIONS

FIXED OUTPUT REGULATOR

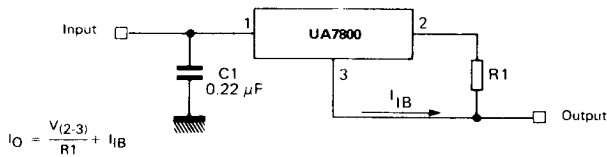


- \* Required if regulator is located an appreciable distance from power supply filter
- \*\* Although no output capacitor is needed for stability it does improve transient response

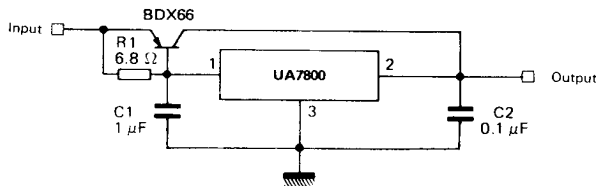
ADJUSTABLE OUTPUT REGULATOR



CURRENT REGULATOR

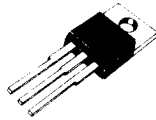


HIGH-CURRENT VOLTAGE REGULATOR

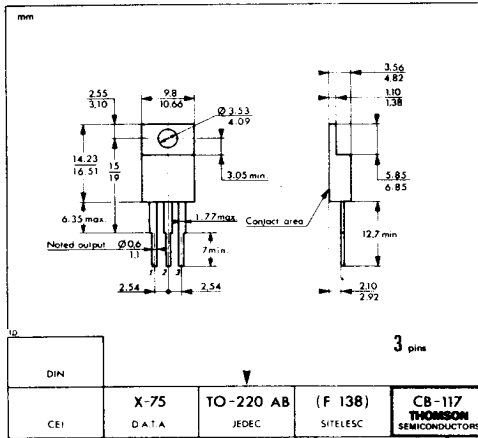




CB 117  
(TO-220)



SP SUFFIX  
PLASTIC PACKAGE



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