

Selection of Equivalents for Monolithic Voltage Regulators, Darlington Transistors, Rectifiers and Switching Transistors

LAMBDA TYPE (*)	EQUIVALENTS					
LAS723A	--	--	--	--	--	--
LAS723B	--	--	--	--	--	--
LAS1000	--	--	--	--	--	--
LAS1100	--	--	--	--	--	--
LAS1405	LM123K	LM223K	LM323K	SH0323	--	--
LAS1406	--	--	--	--	--	--
LAS1408	--	--	--	--	--	--
LAS1410	--	--	--	--	--	--
LAS1412	--	--	--	--	--	--
LAS1415	--	--	--	--	--	--
LAS14U	--	--	--	--	--	--
LAS1505	LM7805KC	LM340K-5	7805DA	UA7805CK	MC7805CK	SG7805KC
LAS1506	LM7806KC	LM340K-6	7806DA	UA7806CK	MC7806CK	SG7806KC
LAS1508	LM7808KC	LM340K-8	7808DA	UA7808CK	MC7808CK	SG7808KC
LAS1510	--	--	--	--	--	--
LAS1512	LM7812KC	LM340K-12	7812DA	UA7812CK	MC7812CK	SG7812KC
LAS1515	LM7815KC	LM340K-15	7815DA	UA7815CK	MC7815CK	SG7815KC
LAS1518	LM7818KC	LM340K-18	7818DA	UA7818CK	MC7818CK	SG7818KC
LAS1520	--	--	--	--	--	--
LAS1524	LM7824KC	LM340K-24	7824DA	UA7824CK	MC7824CK	SG7824KC
LAS1528	--	--	--	--	--	--
LAS15U	--	LM117 (3 pin only)	--	--	--	--
LAS1802	--	--	--	--	--	--
LAS1805	--	LM320K-5	--	UA7905CK	MC7905CK	SG320-05K
LAS1805-2	--	LM320K-5.2	--	--	MC7905-2CK	--
LAS1806	--	LM320K-6	--	--	--	--
LAS1808	--	LM320K-8	--	--	--	--
LAS1810	--	--	--	--	--	--
LAS1812	--	LM320K-12	--	UA7912CK	MC7912CK	SG320-12K
LAS1815	--	LM320K-15	--	UA7915CK	MC7915CK	SG320-15K
LAS1818	--	LM320K-18	--	UA7918CK	MC7918CK	--
LAS1820	--	--	--	--	--	--
LAS1824	--	LM320K-24	--	UA7924CK	MC7924CK	--
LAS1828	--	--	--	--	--	--
LAS18U	--	--	--	--	--	--
LAS1905	--	--	78H05CK	--	--	--
PMD-10K-40	--	--	--	--	--	--
PMD-10K-60	2N6057	MJ3000	MJ4033	TIP640	--	BDX87A
PMD-10K-80	2N6058	MJ3001	MJ4034	TIP641	--	BDX87B
PMD-10K-100	2N6059	--	MJ4035	--	--	BDX87C
PMD-11K-40	--	--	--	--	--	--
PMD-11K-60	2N6050	MJ2500	MJ4030	TIP645	--	BDX88A
PMD-11K-80	2N6051	MJ2501	MJ4031	TIP646	--	BDX88B
PMD-11K-100	2N6052	--	MJ4032	--	--	BDX88C
PMD-12K-40	--	--	--	--	2N6383	--
PMD-12K-60	2N6055	MJ1000	--	--	2N6384	BDX85A
PMD-12K-80	2N6056	MJ1001	--	--	2N6385	BDX85B
PMD-12K-100	--	--	--	--	--	--
PMD-13K-40	--	--	--	--	--	--
PMD-13K-60	2N6053	MJ900	--	--	--	BDX86A
PMD-13K-80	2N6054	MJ901	--	--	--	BDX86B
PMD-13K-100	--	--	--	--	--	BDX86C
PMD-16K-40	--	--	--	--	--	--
PMD-16K-60	2N6282	--	--	--	--	--
PMD-16K-80	2N6283	--	--	--	DTS1010	DTS1020
PMD-16K-100	2N6284	--	--	--	--	--
PMD-17K-40	--	--	--	--	--	--
PMD-17K-60	2N6285	--	--	--	--	--
PMD-17K-80	2N6286	--	--	--	--	--
PMD-17K-100	2N6287	--	--	--	--	--
PMD-20K-120	--	--	--	--	--	--
PMD-20K-150	--	--	--	--	--	--
PMD-20K-200	--	--	--	--	--	--
PMD-25K-120	--	--	--	--	--	--
PMD-25K-150	--	--	--	--	--	--
PMD-25K-200	--	--	--	--	--	--
PM-26K-380	2N6545	--	--	--	2N6513	2N6584
PMR-27K-50	IN3208 (2 required)	--	--	--	--	--
PMR-27K-100	IN3209 (2 required)	--	--	--	--	--
PMR-27K-200	IN3210 (2 required)	--	--	--	--	--
PM-29K-380	--	--	--	--	--	--
PMR-31K-50	IN3208 (2 required)	--	--	--	--	--
PMR-31K-100	IN3209 (2 required)	--	--	--	--	--
PMR-31K-200	IN3210 (2 required)	--	--	--	--	--
PMR-35K-50	IN3659 (2 required)	--	--	--	--	--
PMR-35K-100	IN3660 (2 required)	--	--	--	--	--
PMR-35K-200	IN3661 (2 required)	--	--	--	--	--
PMR-36K-50	IN3659 (2 required)	--	--	--	--	--
PMR-36K-100	IN3660 (2 required)	--	--	--	--	--
PMR-36K-200	IN3661 (2 required)	--	--	--	--	--

*All PMD devices meet 2N number specifications and have guaranteed improved performance on many specifications. Lambda regulators offer guaranteed improved specifications on many basic parameters.



LAS 1500, 15U, 1800, 18U voltage regulators

- Guaranteed input-output differential at 1A 2.4V pos. and 2.1V neg.
- Guaranteed output noise voltage 10 μ V/volt of output

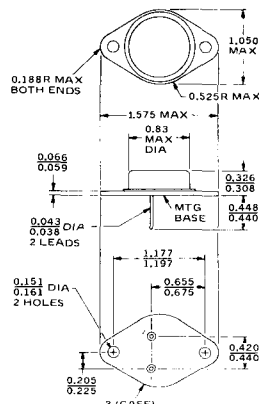
Performance specifications for LAS 1500, 15U, 1800 and 18U voltage regulators

Parameter	Symbol	V _{IN} (volts)	I _o	T _j	LAS 1500 Test Limits		LAS 15U Test Limits		LAS 1800 Test Limits		LAS 18U Test Limits		Units
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Input Voltage	V _{IN}	—	5mA	0-125°C	V _O +2.4V	35 [40] (2)	V _O +2.4V	35 [40] (2)	-35 [-40] (2)	V _O -2.1(1)	-35 [-40] (2)	V _O -2.1(1)	Volts
Output Voltage ⁽³⁾	V _O	V ₁ to V ₂	5mA to 1.0A	25°C	0.95 V _O (4)	1.05 V _O (4)	4(5)	30	0.95 V _O (4)	1.05 V _O (4)	-30	-2.6(5)	Volts
Input Output Differential	V _{IN} -V _O	—	1.0A	0-125°C	2.4	—	2.4	—	2.1	—	2.1	—	Volts
Output Current	I _o	—	—	25°C	1.5	—	1.5	—	1.5	—	1.5	—	Amps
Standby Current	I _Q	V ₁	—	25°C	10	—	10	—	10	—	10	—	mA
Standby Current Change with input (6)	Δ I _Q	V ₁ to V ₂	5mA	25°C	—	1.3	—	1.3	—	1.3	—	1.3	mA
Standby Current Change with Load	Δ I _Q	V ₁	5mA to 1.5A	25°C	—	0.75	—	0.5	—	0.5	—	0.75	mA
Maximum Current Limit	I _{LIM}	V ₁	—	0-125°C	—	2.8	—	2.8	—	2.8	—	2.8	Amps
Short Circuit Current (7)	I _s	20V [-20V]	—	0-125°C	—	1.6	—	1.6	—	1.6	—	1.6	Amps
Short-Circuit Current (8)	I _s	30V [-30V]	—	0-125°C	—	0.8	—	0.8	—	0.8	—	0.8	Amps
Power Dissipation (10)	PD	—	—	—	—	15	—	15	—	15	—	15	Watts
Thermal Resistance Junction-to-case	θ_{JC}	—	—	—	—	3	—	3	—	3	—	3	°C per watt
Storage Temperature	T _s	—	—	—	-65	+150	-65	+150	-65	+150	-65	+150	°C
Maximum Operating Junction Temperature	T _j	—	—	—	-55	+150	-55	+150	-55	+150	-55	+150	°C
Regulation -- Load (9)	(REG) _L	V ₁	5mA to 1.5A	25°C	—	0.6	—	0.6	—	0.6	—	0.6	%V _O
Regulation -- Line (9)	(REG) _{IN}	V ₁ to V ₃	0.1A	25°C	—	1.0	—	1.0	—	1.0	—	1.0	%V _O
		V ₁ to V ₃	0.5A	25°C	—	2.0	—	2.0	—	2.0	—	2.0	%V _O
		V ₁ to V ₂	1.0A	25°C	—	2.0	—	2.0	—	2.0	—	2.0	%V _O
Temperature Coefficient	T _C	V ₁	0.1A	0-125°C	—	0.03	—	0.03	—	0.03	—	0.03	%V _O per °C
Output Noise Voltage (11)	V _N	V ₁	0.1A	0-125°C	—	10	—	10	—	10	—	10	μ Vrms/V
Ripple Attenuation	RA	V _O -10V	1.0A	0-125°C	58(12)	—	58(12)	—	59(13)	—	59(13)	—	dB
Control Voltage	V _C	V ₁ to V ₂	5mA	25°C	—	—	3.50	4.0	—	—	-2.6	-2.25	V

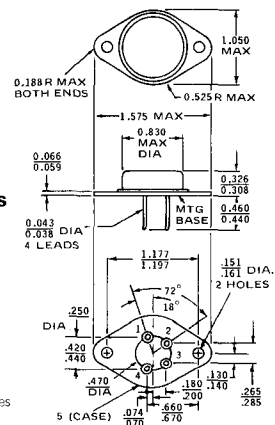
NOTES

- Maximum input voltage is -6 volts.
- Values of 35V (-35V) applies to V_O 4V to 12V for 1500 Series and -2V to -12V for 1800 Series. Values of 40V (-40V) applies to V_O of +15 to +30 volts.
- For positive regulator V₁ = V_O + 5V, V₂ = V_O + 15V or the maximum input voltage whichever is less. For negative regulators V₁ = V_O - 5V, V₂ = V_O - 15V or the minimum value of input voltage whichever is smaller in magnitude.
- Nominal output voltage are specified under ordering information.
- V_O = V_C { 1 + $\frac{R_1}{R_2}$ }. R₁ - resistance from output to control, R₂ - resistance from control to common.
- For positive regulator V₃ = V_O + 20V or the maximum input voltage whichever is less. For negative regulator V₃ = V_O - 20V or the minimum value of input voltage whichever is smaller in magnitude.
- Applies to those devices with |V_O| = 2V to 18V.
- Applies to those devices with |V_O| = 20V to 30V.
- Instantaneous regulation.
- Derate above T_C = 105°C 333mW per °C.
- Specified in μ Vrms/volt output. BW = 10HZ - 100K HZ.
- Ripple attenuation is specified for a 1 Vrms, 120 HZ input ripple. Ripple attenuation is a minimum of 58 db at 5 volts output and is 1 db less for each volt increase in output voltage.
- Ripple attenuation is specified for a 1 Vrms, 120 HZ input ripple. Ripple attenuation is a minimum of 59 db at -2 volts output and is 1 db less for each volt increase in output voltage.

Outline drawings - fixed output LAS 1500-1528, 1802-1828



Outline drawings - variable output LAS 15U, 18U



Connections

- LAS 1500**
1. Input
 2. Output
 3. Common (Case)
- LAS 1800**
1. Common
 2. Output
 3. Input (Case)
- Note: Dimensions in inches

Connections

- LAS 15U**
1. Common
 2. Control
 3. Output
 4. Input
 5. Common (Case)
- LAS 18U**
1. Input
 2. Control
 3. Output
 4. Common
 5. Input (Case)

Ordering information - Monolithic voltage regulators

15 watt 1.5A positive regulators LAS 1500 Series - fixed output

Type	Output Voltage (Vdc)	£	£
LAS 1500	+5	2.43	1.94
LAS 1506	+6	2.43	1.94
LAS 1508	+8	2.43	1.94
LAS 1510	+10	2.43	1.94
LAS 1512	+12	2.43	1.94
LAS 1515	+15	2.43	1.94
LAS 1518	+18	2.43	1.94
LAS 1520	+20	2.43	1.94
LAS 1524	+24	2.43	1.94
LAS 1528	+28	2.43	1.94

LAS 15U - variable output

Type	Output Voltage (Vdc)	£	£
LAS 15U	+4 to +30	4.03	3.22

15 watt 1.5A negative regulators LAS 1800 Series - fixed output

Type	Output Voltage (Vdc)	£	£
LAS 1802	-2	3.22	2.57
LAS 1805	-5	3.22	2.57
LAS 1805-2	-5.2	3.22	2.57
LAS 1806	-6	3.22	2.57
LAS 1808	-8	3.22	2.57
LAS 1810	-10	3.22	2.57
LAS 1812	-12	3.22	2.57
LAS 1815	-15	3.22	2.57
LAS 1818	-18	3.22	2.57
LAS 1820	-20	3.22	2.57
LAS 1824	-24	3.22	2.57
LAS 1828	-28	3.22	2.57

LAS 18U - variable output

Type	Output Voltage (Vdc)	£	£
LAS 18U	-4 to -30	5.30	4.25

Absolute maximum ratings

- Input Voltage (V_O = 5V to 12V)
(V_O = 15V to 30V)
- Internal Power Dissipation
- Operating Junction Temperature Range
- Storage Temperature Range
- Terminal Temperature (1/16" from case)
- Thermal Resistance, junction-to-case
- Derate above T_C = 105°C
- 35 volts or - 35 volts
40 volts or -40 volts
Internally Limited
-55°C to +150°C
-65°C to +150°C
+300°C for 10 sec.
3°C per watt
333mW per °C

Please contact Lambda (High Wycombe 36386) or our distributors for higher quantity prices. Device configurations, specifications and prices are subject to change without notice.

Prices do not include V.A.T.

- Guaranteed 0.6% load regulation at 1.5A
- Thermal and safe area protection

LAS 1500, 15U, 1800, 18U voltage regulators



Operational Data LAS1500 and LAS15U series — Positive Regulators

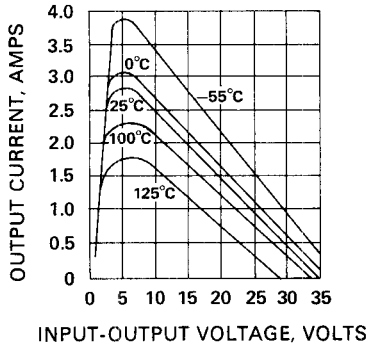


Fig. 1. Typical current limit specifications.

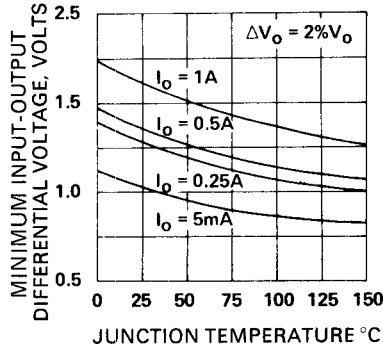


Fig. 2. Typical minimum input-output differential voltage VS temperature.

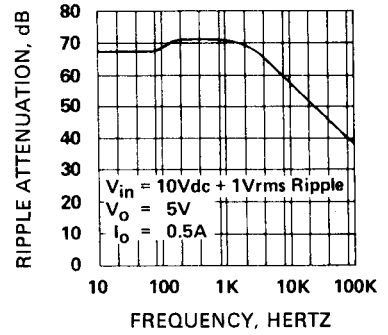


Fig. 3. Typical ripple attenuation VS frequency.

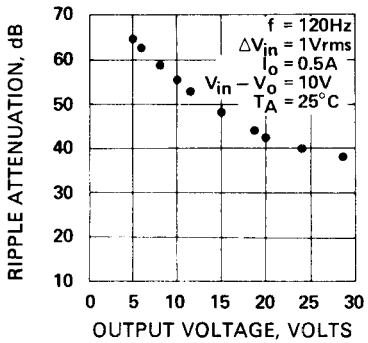


Fig. 4. Typical ripple attenuation VS output voltage.

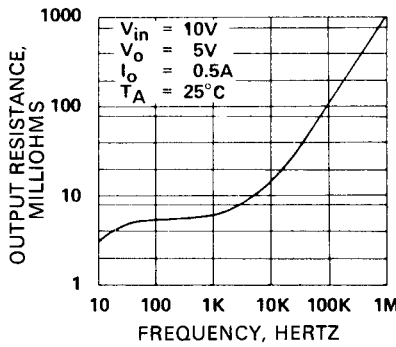


Fig. 5. Typical output resistance VS frequency.

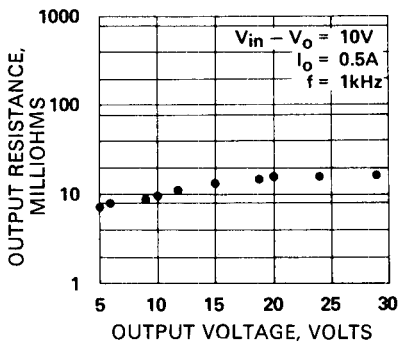


Fig. 6. Typical output resistance VS voltage.

Operational Data LAS1800 and LAS18U series — Negative regulators

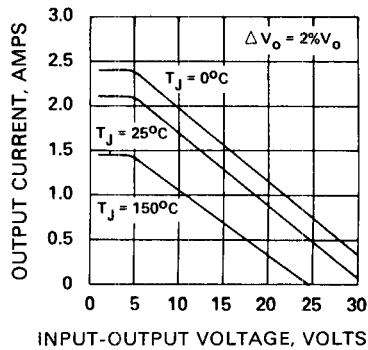


Fig. 7. Typical current limit specifications.

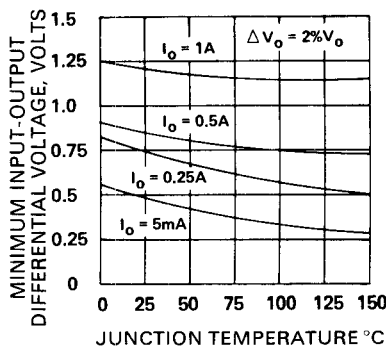


Fig. 8. Typical minimum input-output differential voltage VS temperature.

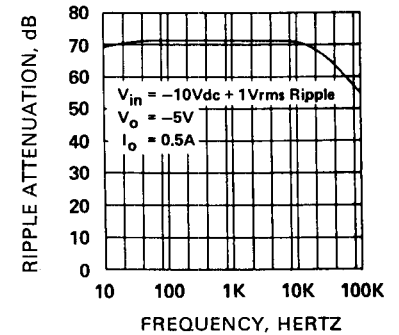


Fig. 9. Typical ripple attenuation VS frequency.

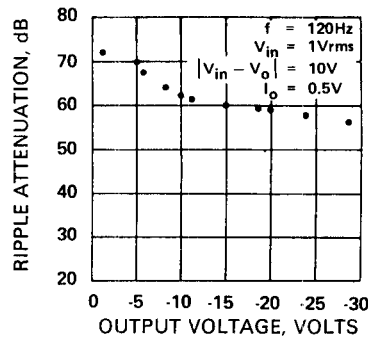


Fig. 10. Typical ripple attenuation VS output voltage.

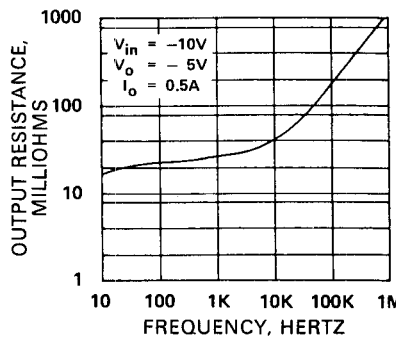


Fig. 11. Typical output resistance VS frequency.

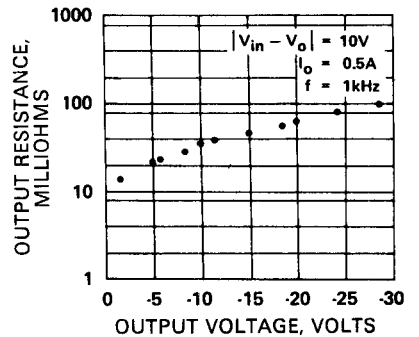


Fig. 12. Typical output resistance VS voltage.

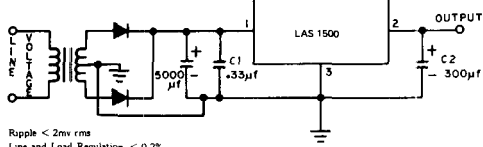


LAS 1500, 15U, 1800, 18U voltage regulators

- 4 to 30V output (positive),
- 2 to 30V output (negative)

Typical applications- 1.5 A regulators

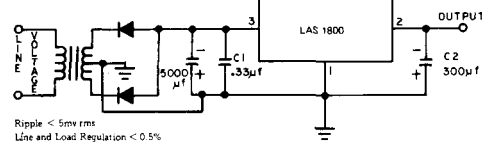
Positive



Ripple < 2mv rms
Line and Load Regulation < 0.2%

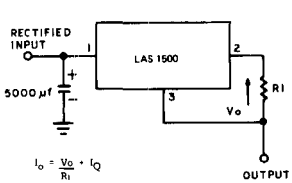
Fig. 1. 1.5 Amp power supply fixed output.

Negative



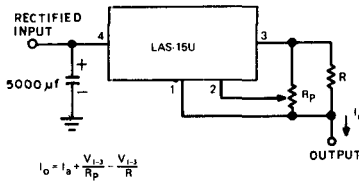
Ripple < 5mv rms
Line and Load Regulation < 0.5%

Fig. 7. 1.5 Amp power supply fixed output.



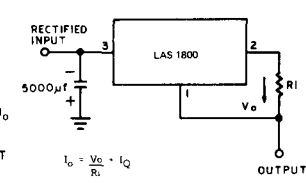
$$I_o = \frac{V_o}{R_1} + I_Q$$

Fig. 2. Current regulator fixed output.



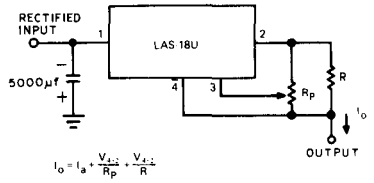
$$I_o = I_a + \frac{V_{i2}}{R_p} + \frac{V_{i3}}{R}$$

Fig. 3. Current regulator variable output.



$$I_o = \frac{V_o}{R_1} + I_Q$$

Fig. 8. Current regulator fixed output.



$$I_o = I_a + \frac{V_{i2}}{R_p} + \frac{V_{i3}}{R}$$

Fig. 9. Current regulator variable output.

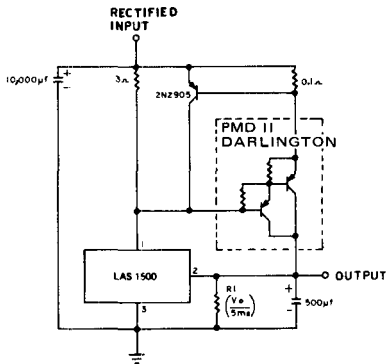


Fig. 4. 5 Amp voltage regulator fixed output.

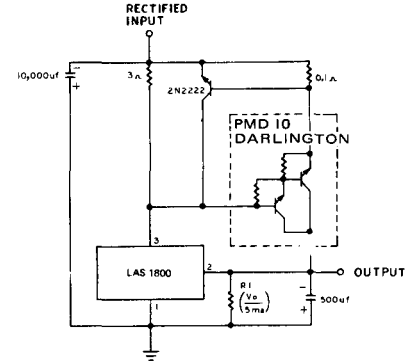
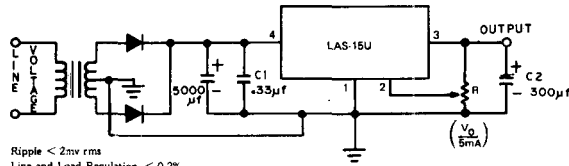
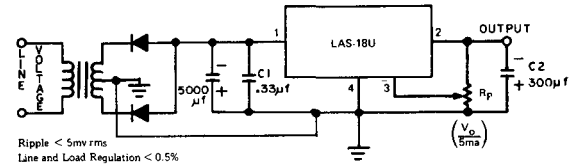


Fig. 10. 5 Amp voltage regulator fixed output.



Ripple < 2mv rms
Line and Load Regulation < 0.2%

Fig. 5. 1.5 Amp adjustable power supply.



Ripple < 5mv rms
Line and Load Regulation < 0.5%

Fig. 11. 1.5 Amp adjustable power supply.

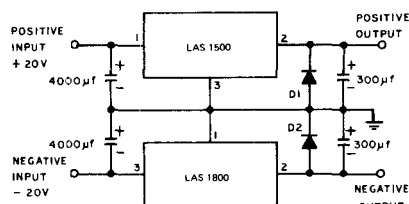


Fig. 6. ±15 Volt regulators fixed output.

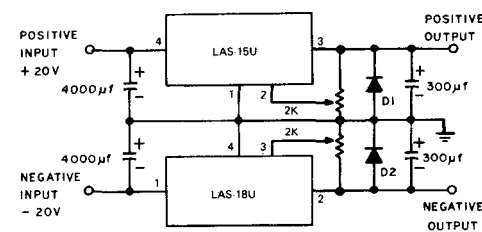


Fig. 12. ±15 Volt adjustable regulators.