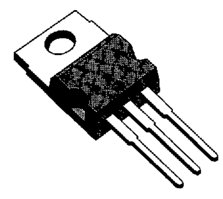
± 2% NEGATIVE VOLTAGE REGULATORS

- OUTPUT CURRENT UP TO 1.5A
- OUTPUT VOLTAGES OF – 5; – 5.2; -6; – 8; –12; –15; – 18; – 20; – 22; – 24V
- THERMAL CIRCUIT PROTECTION
- OUTPUT TRANSISTOR SOA PROTECTION



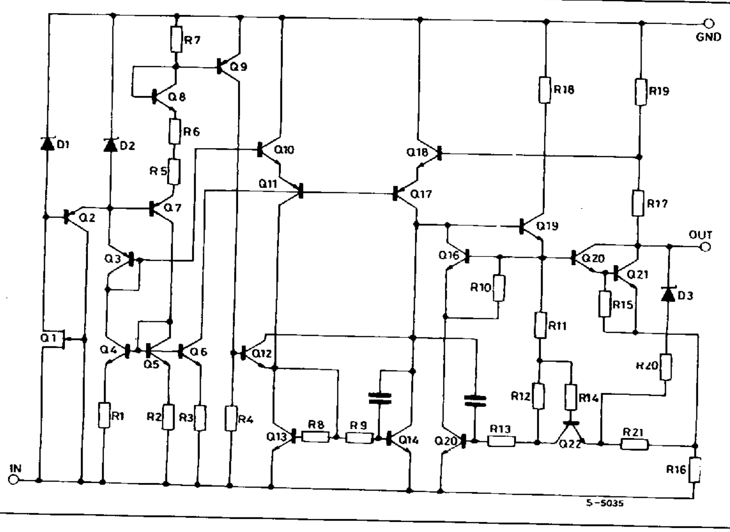
TO-220

DESCRIPTION

The L7900A series of three-terminal negative regulators is available in TO-220 package and with several output voltage. They can provide local on-card regulation, eliminating the distribution problems associated with single point regulation ; furthermore, having the same voltage options as the L7800 positive standard series, they are particularly suited for split power supplies. In addition, the -5.2V is also available for ECL system.

If adeguate heatsinking is provided, the L7900A series can deliver an output current in excess of 1.5A. Although designed primarly as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

SCHEMATIC DIAGRAM



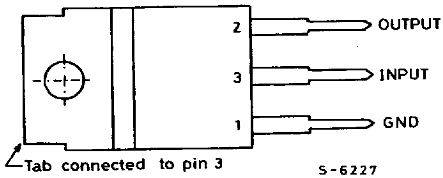
ABSOLUTE MAXIMUM RATING

Symbol	Parameter		Value	Unit
V_i	DC Input VOltage	(for V_o = -5 to -18 V) (for V_o = -20, -24)	-35 -40	V V
I_o	Output Current		Internally Limited	
P_{tot}	Total Power Dissipation		Internally Limited	
T_{op}	Operating Junction Temperature	for L7900AC for L7900AB	0 to 125 -40 to 125	°C
T_{stg}	Storage Temperature		-65 to 150	°C

THERMAL DATA

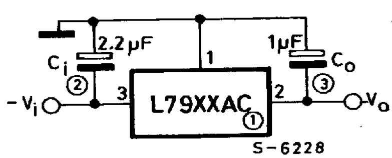
$R_{thj-case}$	Thermal Resistance Junction-Case	Max	3	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-Ambient	Max	50	°C/W

CONNECTION DIAGRAM AND ORDERING NUMBERS (top views)



TYPE	TO-220 T_j = -40 to 125 °C	TO-220 T_j = 0 to 125 °C	OUTPUT VOLTAGE
L7905A	L7905ABV	L7905ACV	-5 V
L7952A	L7952ABV	L7952ACV	-5.2 V
L7906A	L7906ABV	L7906ACV	-6 V
L7908A	L7908ABV	L7908ACV	-8 V
L7912A	L7912ABV	L7912ACV	-12 V
L7915A	L7915ABV	L7915ACV	-15 V
L7818A	L7818ABV	L7818ACV	-18 V
L7920A	L7920ABV	L7920ACV	-20 V
L7922A	L7922ABV	L7922ACV	-22 V
L7924A	L7924ABV	L7924ACV	-24 V

APPLICATION CIRCUIT



ELECTRICAL CHARACTERISTICS FOR L7905A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -10V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-4.9	-5	-5.1	V
V_o	Output Voltage	I_o = -5 mA to -1 A P_o ≤ 15 W V_i = -8 to -20 V	-4.8	-5	-5.2	V
ΔV_o*	Line Regulation	V_i = -7 to -25 V T_j = 25 °C V_i = -8 to -12 V T_j = 25 °C			100 50	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			100 50	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -8 to -25 V			1.3	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-0.4		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		100		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.4		V
I_{sc}	Short Circuit Current			2.1		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.5		A

ELECTRICAL CHARACTERISTICS FOR L7952A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -10V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-5.1	-5.2	-5.3	V
V_o	Output Voltage	I_o = -5 mA to -1 A P_o ≤ 15 W V_i = -9 to -21 V	-5	-5.2	-5.4	V
ΔV_o*	Line Regulation	V_i = -8 to -25 V T_j = 25 °C V_i = -9 to -13 V T_j = 25 °C			105 52	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			105 52	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -9 to -25 V			1.3	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-0.5		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		125		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.4		V
I_{sc}	Short Circuit Current			2.1		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.5		A

* Load and line regulation are specified at constant junction temperature. Changes in V_o due to heating effects must be taken into account separately. Pulce testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS FOR L7906A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -11V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-5.88	-6	-6.12	V
V_o	Output Voltage	I_o = -5 mA to -1 A $P_o \leq$ 15 W V_i = -9.5 to -21.5 V	-5.76	-6	-6.24	V
ΔV_o*	Line Regulation	V_i = -8.5 to -25 V T_j = 25 °C V_i = -9 to -15 V T_j = 25 °C			120 60	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			120 60	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -9.5 to -25 V			1.3	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-0.6		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		144		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.4		V
I_{sc}	Short Circuit Current			2		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.5		A

ELECTRICAL CHARACTERISTICS FOR L7908A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -14V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-5.1	-5.2	-5.3	V
V_o	Output Voltage	I_o = -5 mA to -1 A $P_o \leq$ 15 W V_i = -11.5 to -23 V	-5	-5.2	-5.4	V
ΔV_o*	Line Regulation	V_i = -10.5 to -25 V T_j = 25 °C V_i = -11 to -17 V T_j = 25 °C			160 80	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			160 80	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -11.5 to -25 V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-0.8		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		175		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.5		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.5		A

* Load and line regulation are specified at constant junction temperature. Changes in V_o due to heating effects must be taken into account separately. Pulce testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS FOR L7912A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -19V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-11.75	-12	-12.75	V
V_o	Output Voltage	I_o = -5 mA to -1 A $P_o \leq$ 15 W V_i = -15.5 to -27 V	-11.5	-12	-12.5	V
ΔV_o*	Line Regulation	V_i = -14.5 to -30 V T_j = 25 °C V_i = -16 to -22 V T_j = 25 °C			240 120	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			240 120	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -15 to -25 V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-0.8		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		200		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			2.1		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.5		A

ELECTRICAL CHARACTERISTICS FOR L7915A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -23V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-14.7	-15	-15.3	V
V_o	Output Voltage	I_o = -5 mA to -1 A $P_o \leq$ 15 W V_i = -18.5 to -30 V	-14.4	-15	-15.6	V
ΔV_o*	Line Regulation	V_i = -17.5 to -30 V T_j = 25 °C V_i = -20 to -26 V T_j = 25 °C			300 150	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			300 150	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -18.5 to -30 V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-0.9		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		250		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.3		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.2		A

* Load and line regulation are specified at constant junction temperature. Changes in V_o due to heating effects must be taken into account separately. Pulce testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS FOR L7918A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -27V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-17.64	-18	-18.36	V
V_o	Output Voltage	I_o = -5 mA to -1 A $P_o \leq$ 15 W V_i = -22 to -33 V	-17.3	-18	-18.7	V
ΔV_o*	Line Regulation	V_i = -21 to -33 V T_j = 25 °C V_i = -24 to -30 V T_j = 25 °C			360 180	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			360 180	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -22 to -33 V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-1		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		300		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.1		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.2		A

ELECTRICAL CHARACTERISTICS FOR L7920A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -29V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-19.6	-20	-20.4	V
V_o	Output Voltage	I_o = -5 mA to -1 A $P_o \leq$ 15 W V_i = -24 to -35 V	-19.2	-20	-20.8	V
ΔV_o*	Line Regulation	V_i = -23 to -35 V T_j = 25 °C V_i = -26 to -32 V T_j = 25 °C			400 200	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			400 200	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -24 to -35 V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-1.1		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		350		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			0.9		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.2		A

* Load and line regulation are specified at constant junction temperature. Changes in V_o due to heating effects must be taken into account separately. Pulce testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS FOR L7922A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -31V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-21.5	-22	-22.5	V
V_o	Output Voltage	I_o = -5 mA to -1 A $P_o \leq$ 15 W V_i = -26 to -37 V	-21.1	-22	-22.9	V
ΔV_o*	Line Regulation	V_i = -25 to -37 V T_j = 25 °C V_i = -28 to -34 V T_j = 25 °C			440 220	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			440 220	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -26 to -37 V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-1.1		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		375		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.1		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.2		A

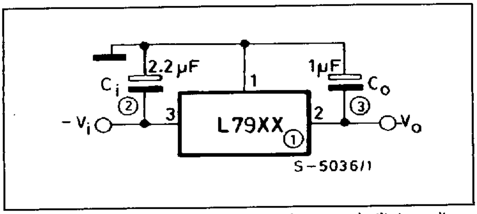
ELECTRICAL CHARACTERISTICS FOR L7924A (refer to the test circuits, T_j = 0 to 125 °C, V_i = -33V, I_o = 500 mA, C_i = 2.2 µF, C_o = 1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	-23.5	-24	-24.5	V
V_o	Output Voltage	I_o = -5 mA to -1 A $P_o \leq$ 15 W V_i = -27 to -38 V	-23	-24	-25	V
ΔV_o*	Line Regulation	V_i = -27 to -38 V T_j = 25 °C V_i = -30 to -36 V T_j = 25 °C			480 240	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			480 240	mV mV
I_d	Quiescent Current	T_j = 25 °C			3	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = -27 to -38 V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-1		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		400		µV
SVR	Supply Voltage Rejection	ΔV_i = 10 V f = 120 Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.1		A
I_{scp}	Short Circuit Peack Current	T_j = 25 °C		2.2		A

* Load and line regulation are specified at constant junction temperature. Changes in V_o due to heating effects must be taken into account separately. Pulce testing with low duty cycle is used.

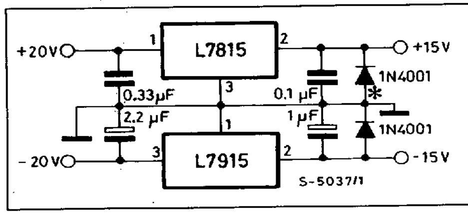
APPLICATION INFORMATION

Figure 1 : Fixed Output Regulator.



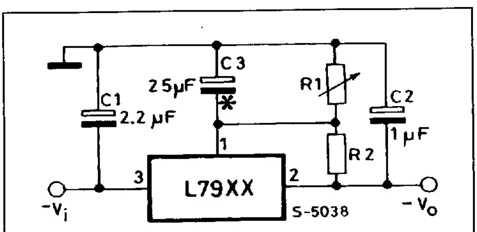
Notes :
1. To specify an output voltage, substitute voltage value for "XX".
2. Required for stability. For value given, capacitor must be solid tantalum. If aluminium electrolitics are used, at least ten times value shown should be selected, C_i is required if regulator is located an appreciable distance from power supply filter.
3. To improve transient response. If large capacitors are used, a high current diode from input to output (1N4001 or similar) should be introduced to protect the device from momentary input short circuit.

Figure 2 : Split Power Supply (± 15V/1A).



* Against potential latch-up problems.

Figure 3 : Circuit for Increasing Output Voltage.



$$V_O \cong V_{XX} \cdot \frac{R1 + R2}{R2} \qquad \frac{V_{XX}}{R2} > 3I_d$$

* C3 Optional for improved transient response and ripple rejection.

Figure 4 : High Current Negative Regulator (– 5V/4A with 5A current limiting).

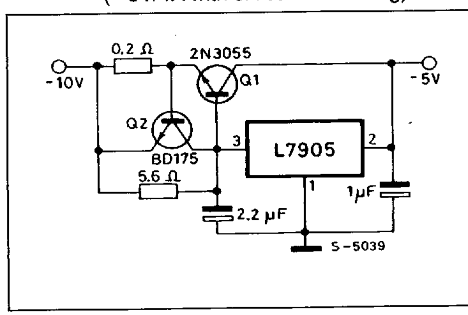
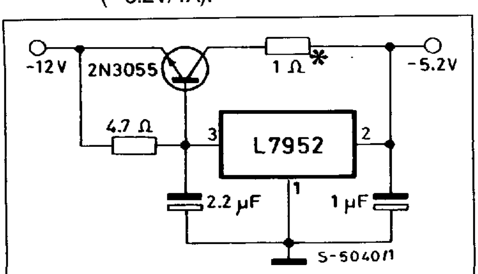


Figure 5 : Typical ECL System Power Supply (– 5.2V/4A).



* Optional dropping resistor to reduce the power dissipated in the boost transistor.