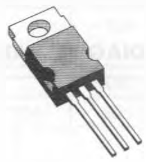
SGS-THOMSON
MICROELECTRONICS

L7900AC SERIES

± 2% NEGATIVE VOLTAGE REGULATORS

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



TO-220

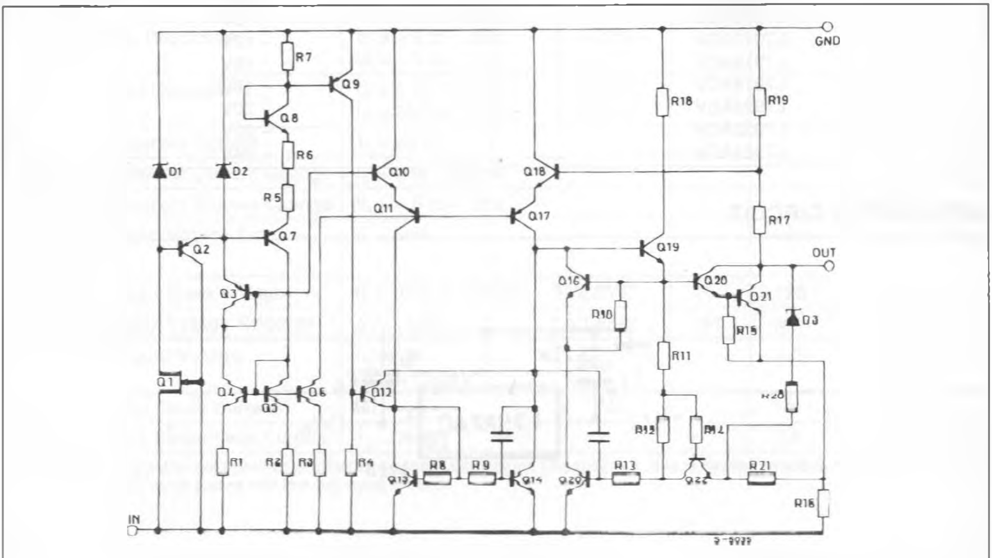
DESCRIPTION

The L7900AC 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 L7900AC series can deliver an output current in excess of 1.5A. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

SCHEMATIC DIAGRAM



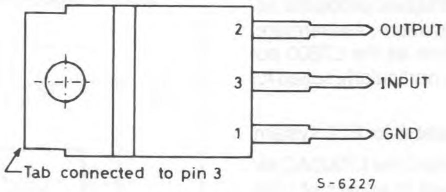
ABSOLUTE MAXIMUM RATINGS

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

THERMAL DATA

$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	3	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	50	°C/W

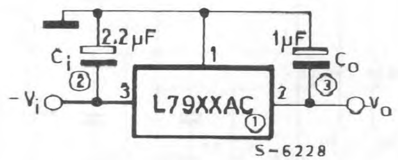
CONNECTION DIAGRAM AND ORDERING NUMBERS (top views)



TO-220

OrderingNumbers	OutputVoltage
L7905ACV	– 5V
L7952ACV	– 5.2V
L7908ACV	– 8V
L7912ACV	– 12V
L7915ACV	– 15V
L7918ACV	– 18V
L7920ACV	– 20V
L7922ACV	– 22V
L7924ACV	– 24V

APPLICATION CIRCUIT



ELECTRICAL CHARACTERISTICS FOR L7905AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 10V, I_o = 500mA, C_i = 2.2µF, C_o = 1µF 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 = – 5mA to – 1A $P_o \leq$ 15W V_i = – 8 to – 20V	– 4.8	– 5	– 5.2	V
ΔV_o*	Line Regulation	V_i = – 7 to – 25V T_j = 25°C V_i = – 8 to – 12V T_j = 25°C			100 50	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500mA T_j = 25°C I_o = 250 to 750mA T_j = 25°C			100 50	mV mV
I_d	Quiescent Current	T_j = 25°C			2	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = – 8 to – 25V			1.3	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5mA		– 0.4		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25°C		100		µV/V_o
SVR	Supply Voltage Rejection	ΔV_i = 10V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1A T_j = 25°C ΔV_o = 100mV		2		V
I_{sc}	Short Circuit Current			2.1		A
I_{scp}	Short Circuit Peak Current	T_j = 25°C		2.5		A

ELECTRICAL CHARACTERISTICS FOR L7952AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 10V, I_o = 500mA, C_i = 2.2µF, C_o = 1µF 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 = – 5mA to – 1A $P_o \leq$ 15W V_i = – 9 to – 21V	– 5	– 5.2	– 5.4	V
ΔV_o*	Line Regulation	V_i = – 8 to – 25V T_j = 25°C V_i = – 9 to – 13V T_j = 25°C			105 52	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500mA T_j = 25°C I_o = 250 to 750mA T_j = 25°C			105 52	mV mV
I_d	Quiescent Current	T_j = 25°C			2	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = – 9 to – 25V			1.3	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5mA		– 0.5		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25°C		125		µV/V_o
SVR	Supply Voltage Rejection	ΔV_i = 10V f = 120Hz	54	50		dB
V_d	Dropout Voltage	I_o = 1A T_j = 25°C ΔV_o = 100mV		1.8		V
I_{sc}	Short Circuit Current			2		A
I_{scp}	Short Circuit Peak 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 L7908AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 14V, I_o = 500mA, C_i = 2.2µF, C_o = 1µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25°C	– 7.84	– 8	– 8.16	V
V_o	Output Voltage	I_o = – 5mA to – 1A $P_o \leq$ 15W V_i = – 11.5 to – 23V	– 7.7	– 8	– 8.3	V
ΔV_o*	Line Regulation	V_i = – 10.5 to – 25V T_j = 25°C V_i = – 11 to – 17V T_j = 25°C			160 80	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500mA T_j = 25°C I_o = 250 to 750mA T_j = 25°C			160 80	mV mV
I_d	Quiescent Current	T_j = 25°C			2	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = – 11.5 to – 25V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5mA		– 0.6		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25°C		175		µV/V_o
SVR	Supply Voltage Rejection	ΔV_i = 10V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1A T_j = 25°C ΔV_o = 100mV		1.1		V
I_{sc}	Short Circuit Current			1.5		A
I_{scp}	Short Circuit Peak Current	T_j = 25°C		2.5		A

ELECTRICAL CHARACTERISTICS FOR L7912AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 19V, I_o = 500mA, C_i = 2.2µF, C_o = 1µF 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 = – 5mA to – 1A $P_o \leq$ 15W V_i = – 5.5 to – 27V	– 11.5	– 12	– 12.5	V
ΔV_o*	Line Regulation	V_i = – 14.5 to – 30V T_j = 25°C V_i = – 16 to – 22V T_j = 25°C			240 120	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500mA T_j = 25°C I_o = 250 to 750mA 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 1000mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = – 15 to – 30V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5mA		– 0.8		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25°C		200		µV/V_o
SVR	Supply Voltage Rejection	ΔV_i = 10V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1A T_j = 25°C ΔV_o = 100mV		1.1		V
I_{sc}	Short Circuit Current			1.5		A
I_{scp}	Short Circuit Peak 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 L7915AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 23V, I_o = 500mA, C_i = 2.2µF, C_o = 1µF 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 = – 5mA to – 1A $P_o \leq$ 15W V_i = – 18.5 to – 30V	– 14.4	– 15	– 15.6	V
ΔV_o*	Line Regulation	V_i = – 17.5 to – 30V T_j = 25°C V_i = – 20 to – 26V T_j = 25°C			300 150	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500mA T_j = 25°C I_o = 250 to 750mA 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 1000mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = – 18.5 to – 30V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5mA		– 0.9		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25°C		250		µV/V_o
SVR	Supply Voltage Rejection	ΔV_i = 10V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1A T_j = 25°C ΔV_o = 100mV		1.1		V
I_{sc}	Short Circuit Current			1.3		A
I_{scp}	Short Circuit Peak Current	T_j = 25°C		2.2		A

ELECTRICAL CHARACTERISTICS FOR L7918AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 27V, I_o = 500mA, C_i = 2.2µF, C_o = 1µF 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 = – 5mA to – 1A $P_o \leq$ 15W V_i = – 22 to – 33V	– 17.3	– 18	– 18.7	V
ΔV_o*	Line Regulation	V_i = – 21 to – 33V T_j = 25°C V_i = – 24 to – 30V T_j = 25°C			360 180	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500mA T_j = 25°C I_o = 250 to 750mA 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 1000mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = – 22 to – 33V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5mA		– 1		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25°C		300		µV/V_o
SVR	Supply Voltage Rejection	ΔV_i = 10V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1A T_j = 25°C ΔV_o = 100mV		1.1		V
I_{sc}	Short Circuit Current			1.1		A
I_{scp}	Short Circuit Peak 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. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS FOR L7920AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 29V, I_o = 500mA, C_i = 2.2µF, C_o = 1µF 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 = – 5mA to – 1A $P_o \leq$ 15W V_i = – 24 to – 35V	– 19.2	– 20	– 20.8	V
ΔV_o*	Line Regulation	V_i = – 23 to – 35V T_j = 25°C V_i = – 26 to – 32V T_j = 25°C			400 200	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500mA T_j = 25°C I_o = 250 to 750mA 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 1000mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = – 24 to – 35V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5mA		– 1.1		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25°C		350		µV/V_o
SVR	Supply Voltage Rejection	ΔV_i = 10V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1A T_j = 25°C ΔV_o = 100mV		1.1		V
I_{sc}	Short Circuit Current			0.9		A
I_{scp}	Short Circuit Peak Current	T_j = 25°C		2.2		A

ELECTRICAL CHARACTERISTICS FOR L7922AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 31V, I_o = 500mA, C_i = 2.2µF, C_o = 1µF 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 = – 5mA to – 1A $P_o \leq$ 15W V_i = – 26 to – 37V	– 21.1	– 22	– 22.9	V
ΔV_o*	Line Regulation	V_i = – 25 to – 37V T_j = 25°C V_i = – 28 to – 34V T_j = 25°C			440 220	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500mA T_j = 25°C I_o = 250 to 750mA 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 1000mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = – 26 to – 37V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5mA		– 1.1		mV/°C
e_N	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25°C		375		µV/V_o
SVR	Supply Voltage Rejection	ΔV_i = 10V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_o = 1A T_j = 25°C ΔV_o = 100mV		1.1		V
I_{sc}	Short Circuit Current			1.1		A
I_{scp}	Short Circuit Peak 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.

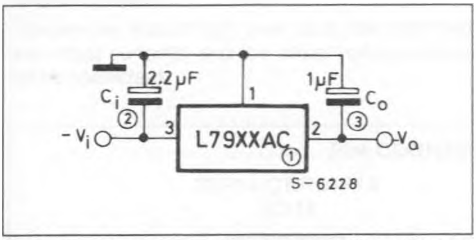
ELECTRICAL CHARACTERISTICS FOR L7924AC (refer to the test circuits, T_j = 0 to 150°C V_i = – 33V, I_o = 500mA, C_i = 2.2μF, C_o = 1μF unless otherwise specified)

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

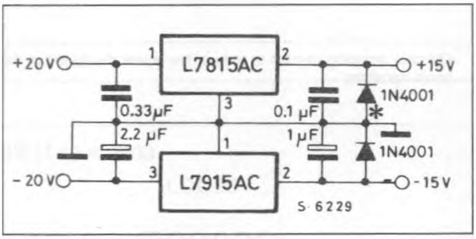
APPLICATION INFORMATION

Figure 1 : Fixed Output Regulator.



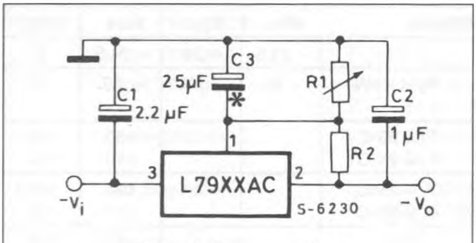
Notes : 1. To specify an output voltage, substitute voltage value for "XX".
2. Required for stability. For value given, capacitor must be solid tantalum. If aluminium electrolitics are used, at least ten times value shown should be selected. C_i is required if regulator is located an appreciable distance 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).

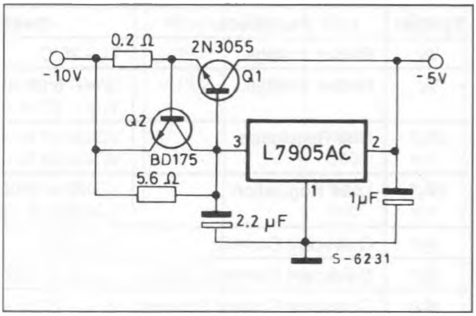
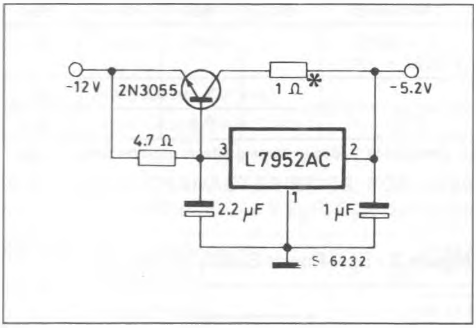


Figure 5 : Typical ECL System Power Supply (– 5.2V/4A).



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

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