L7900 Series

LINEAR INTEGRATED CIRCUITS

PRELIMINARY DATA

3-TERMINAL NEGATIVE VOLTAGE REGULATORS

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

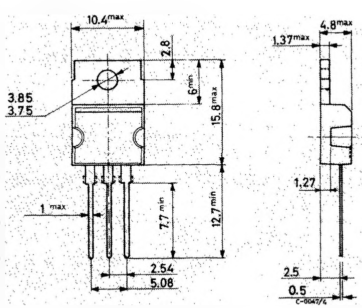
The L7900 series of three-terminal negative regulators is available in TO-220 and TO-3 packages and with several output voltages. They can provide local on-card regulation, eliminating the distribution problems associated with single point regulation; furthermore, having the same voltage options as the L7800 positive standard series, they are particularly suited for split power supplies. In addition, the -5.2V is also available for ECL system.
If adequate heatsinking is provided, the L7900 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.

ABSOLUTE MAXIMUM RATINGS

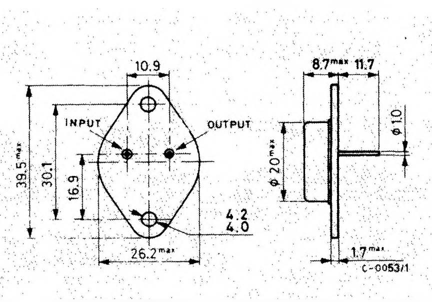
V_i	DC input voltage (for V_o = -5 to -18V)	-35	V
	(for V_o = -20, -24V)	-40	V
I_o	Output current	Internally limited	
P_{tot}	Total power dissipation	Internally limited	
T_{op}	Operating junction temperature	0 to +150	°C
T_{stg}	Storage temperature	-65 to +150	°C

MECHANICAL DATA

Dimensions in mm

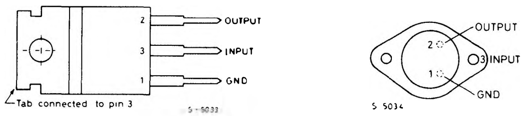


TO-220



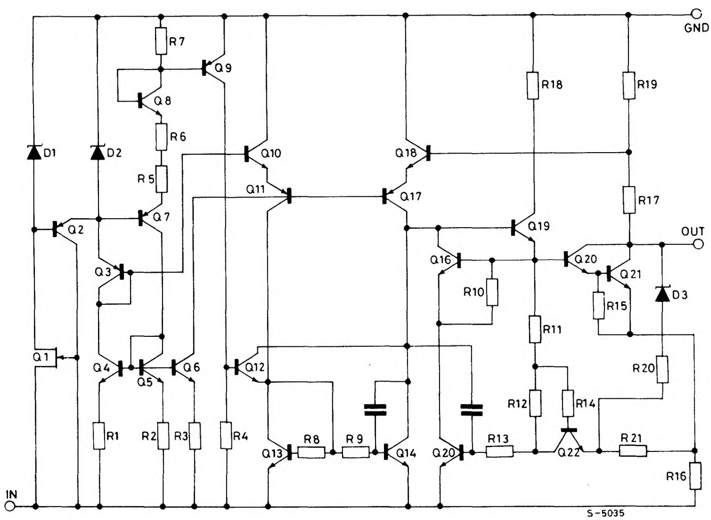
TO-3

CONNECTION DIAGRAMS AND ORDERING NUMBERS
(top views)



Type	TO-220	TO-3	Output Voltage
L7905C	L7905CV	L7905CT	-5V
L7952C	L7952CV	L7952CT	-5.2V
L7908C	L7908CV	L7908CT	-8V
L7912C	L7912CV	L7912CT	-12V
L7915C	L7915CV	L7915CT	-15V
L7918C	L7918CV	L7918CT	-18V
L7920C	L7920CV	L7920CT	-20V
L7924C	L7924CV	L7924CT	-24V

SCHEMATIC DIAGRAM



THERMAL DATA

			TO-220	TO-3
$R_{th\ j\text{-}case}$	Thermal resistance junction-case	max	3 °C/W	4 °C/W
$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	50 °C/W	35 °C/W

ELECTRICAL CHARACTERISTICS L7900C (C_i = 2.2 μF, C_o = 1 μF, T_j = 0 to 125°C, I_o = 500 mA unless otherwise specified)

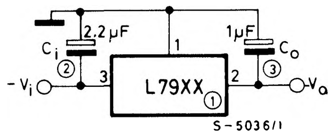
OUTPUT VOLTAGE			-5			-5.2			-8			-12			Unit
INPUT VOLTAGE (Unless otherwise specified)			-10			-10			-14			-19			
Parameter		Test conditions	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
V_o	Output voltage	T_j = 25°C	-4.8	-5	-5.2	-5	-5.2	-5.4	-7.7	-8	-8.3	-11.5	-12	-12.5	V
		I_o = 5 mA to 1A, P_o < 15W	-4.75	-5	-5.25	-4.95	-5.2	-5.45	-7.6	-8	-8.4	-11.4	-12	-12.6	V
				(V_i = -8 to -20V)			(V_i = -9 to -21V)			(V_i = -11.5 to -23V)			(V_i = -15.5 to -27V)		
ΔV_o	Line regulation	T_j = 25°C			100 (V_i = -7 to -25V)			105 (V_i = -8 to -25V)			160 (V_i = -10.5 to -25V)			240 (V_i = -14.5 to -30V)	mV
					50 (V_i = -8 to -12V)			52 (V_i = -9 to -13V)			80 (V_i = -11 to -17V)			120 (V_i = -16 to -22V)	mV
ΔV_o	Load regulation	T_j = 25°C, I_o = 5 mA to 1.5A			100			105			160			240	mV
		T_j = 25°C, I_o = 250 to 750 mA			50			52			80			120	mV
I_d	Quiescent current	T_j = 25°C			2			2			2			3	mA
ΔI_d	Quiescent current change	I_o = 5 mA to 1A			0.5			0.5			0.5			0.5	mA
					1.3 (V_i = -8 to -25V)			1.3 (V_i = -9 to -25V)			1 (V_i = -11.5 to -25V)			1 (V_i = -15 to -30V)	mA
$\frac{\Delta V_o}{\Delta T}$	Output voltage drift	I_o = 5 mA		-0.4			-0.5			-0.6			-0.8		mV/°C
e_N	Output noise voltage	B = 10Hz to 100KHz, T_j = 25°C		100			125			175			200		μV
SVR	Supply voltage rejection	f = 120 Hz, ΔV_i = 10V	54	60		54	60		54	60		54	60		dB
V_{i-o}	Dropout voltage	T_j = 25°C, I_o = 1A, ΔV_o = 100 mV		2			1.8			1.1			1.1		V
I_{sc}	Short circuit current			2.1			2			1.5			1.5		A
I_{scp}	Short circ. peak current	T_j = 25°C		2.5			2.5			2.5			2.5		A

ELECTRICAL CHARACTERISTICS L7900 (continued)

OUTPUT VOLTAGE			-15			-18			-20			-24			Unit
INPUT VOLTAGE (Unless otherwise specified)			-23			-27			-29			-33			
Parameter		Test conditions	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
V_o	Output voltage	T_j = 25°C	-14.4	-15	-15.6	-17.3	-18	-18.7	-19.2	-20	-20.8	-23	-24	-25	V
		I_o= 5 mA to 1A P_o < 15W	-14.3	-15 (V_i=-18.5 to -30V)	-15.7	-17.1	-18 (V_i= -22 to -33V)	-18.9	-19	-20 (V_i= -24 to -35V)	-21	-22.8	-24 (V_i= -27 to -38V)	-25.2	V
ΔV_o	Line regulation	T_j = 25°C			300 (V_i=-17.5 to -30V)			360 (V_i= -21 to -33V)			400 (V_i= -23 to -35V)			480 (V_i= -27 to -38V)	mV
					150 (V_i= -20 to -26V)			180 (V_i= -24 to -30V)			200 (V_i= -26 to -32V)			240 (V_i= -30 to -36V)	mV
ΔV_o	Load regulation	T_j= 25°C I_o= 5 mA to 1.5A			300			360			400			480	mV
		T_j= 25°C I_o= 250 to 750 mA			150			180			200			240	mV
I_d	Quiescent current	T_j= 25°C			3			3			3			3	mA
ΔI_d	Quiescent current change	I_o= 5 mA to 1A			0.5			0.5			0.5			0.5	mA
					1 (V_i=-18.5 to -30V)			1 (V_i= -22 to -33V)			1 (V_i= -24 to -35V)			1 (V_i= -27 to -38V)	mA
$\frac{\Delta V_o}{\Delta T}$	Output voltage drift	I_o= 5 mA		-0.9			-1			-1.1			-1		mV/°C
e_N	output noise voltage	B= 10Hz to 100KHz T_j= 25°C		250			300			350			400		µV
SVR	Supply voltage rejection	f = 120 Hz ΔV_i= 10V	54	60		54	60		54	60		54	60		dB
V_{i-o}	Dropout voltage	T_j= 25°C I_o= 1A ΔV_o= 100 mV		1.1			1.1			1.1			1.1		V
I_{sc}	Short circuit current			1.3			1.1			0.9			1.1		A
I_{scp}	Short circ. peak current	T_j= 25°C		2.2			2.2			2.2			2.2		A

APPLICATION INFORMATION

Fig. 1 - Fixed output regulator



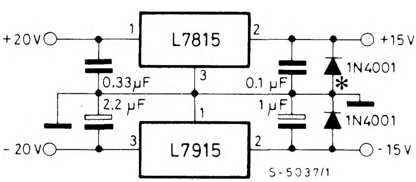
Notes:

(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.

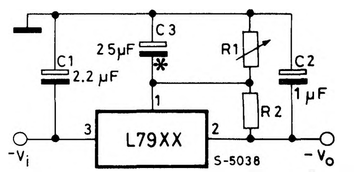
(3) To improve transient response. If large capacitors are used, a high current diode from input to output (1N4001 or similar) should be introduced to protect the device from momentary input short circuit.

Fig. 2 - Split power supply (± 15V/1A)



* Against potential latch-up problems.

Fig. 3 - Circuit for increasing output voltage



$$V_o \cong V_{xx} \cdot \frac{R1 + R2}{R2} \qquad \frac{V_{xx}}{R2} > 3\, I_d$$

* C3 optional for improved transient response and ripple rejection.

Fig. 4 - High current negative regulator (-5V/4A with 5A current limiting)

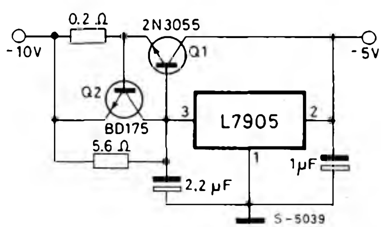
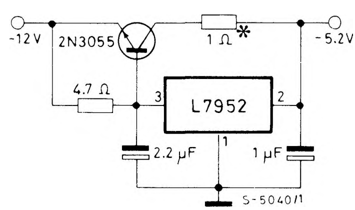


Fig. 5 - Typical ECL system power supply (-5.2V/ 4A)



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