

LM217L LM317L

LOW CURRENT 1.2 TO 37V ADJUSTABLE VOLTAGE REGULATOR

- OUTPUT VOLTAGE RANGE: 1.2 TO 37V
- OUTPUT CURRENT IN EXCESS OF 100 mA
- LINE REGULATION TYP. 0.01%
- LOAD REGULATION TYP. 0.1%
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSISTOR SAFE AREA COMPENSATION
- FLOATING OPERATION FOR HIGH VOLTAGE APPLICATIONS

DESCRIPTION

The LM217L/LM317L are monolithic integrated circuit in SO-8 and TO-92 packages intended for use as positive adjustable voltage regulators.

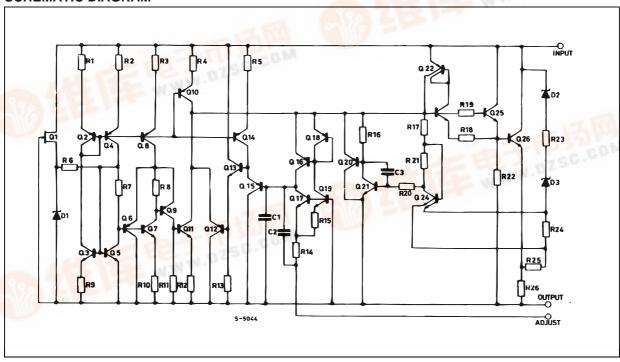
They are designed to supply until 100 mA of load current with an output voltage adjustable over a 1.2 to 37V range.

The nominal output voltage is selected by means of only a resistive divider, making the device



exceptionally easy to use and eliminating the stocking of many fixed regulators

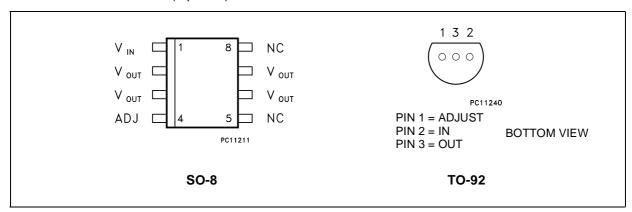
SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter ²		Value	Unit	
V _{I -} V _O	Input-Output Differential Voltage		40	V	
P _d	Power Dissipation		Internally Limited		
т	Operating Junction Temperature	for LM217L	-40 to 125	°C	
lopr	Range	for LM317L	0 to 125	C	
T _{stg}	Storage Temperature Range		-55 to 150	°C	

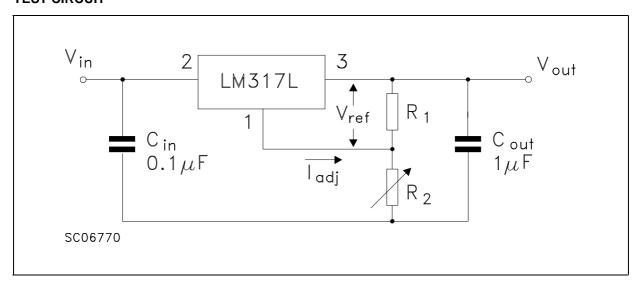
CONNECTION DIAGRAM (top view)



ORDERING CODES

TYPE	SO-8	TO-92
LM217L	LM217LD	LM217LZ
LM317L	LM317LD	LM317LZ

TEST CIRCUIT



ELECTRICAL CHARACTERISTICS OF LM217L (refer to the test circuits, $T_J = -40$ to 125°C, $V_I - V_O = 5$ V, $I_O = 40$ mA, unless otherwise specified).

Symbol	Parameter	Test Conditions		Min.	Тур.	Max.	Unit
ΔV _O	Line Regulation	$V_{I} - V_{O} = 3 \text{ to } 40 \text{ V}$	T _J = 25°C		0.01	0.02	%/V
		I _L < 20 mA			0.02	0.05	
ΔV_{O}	Load Regulation	$V_O \le 5 V$	T _J = 25°C		5	15	mV
		$I_0 = 5 \text{ to } 100 \text{ mA}$			20	50	
		$V_O \ge 5 \text{ V}$	T _J = 25°C		0.1	0.3	%
		$I_0 = 5 \text{ to } 100 \text{ mA}$			0.3	1	
I_{ADJ}	Adjustment Pin Current				50	100	μΑ
ΔI_{ADJ}	Adjustment Pin Current	$V_1 - V_O = 3 \text{ to } 40 \text{ V}$ $I_O = 5 \text{ to } 100 \text{ mA}$ $P_d < 625 \text{ mW}$			0.2	5	μA
V_{REF}	Reference Voltage	$V_1 - V_O = 3 \text{ to } 40 \text{ V}$ $I_O = 10 \text{ to } 500 \text{ mA}$ $P_d < 625 \text{ mW}$		1.2	1.25	1.3	V
$\Delta V_{O}/V_{O}$	Output Voltage Temperature Stability				0.7		%
I _{O(min)}	Minimum Load Current	$V_{I} - V_{O} = 40 \text{ V}$			3.5	5	mA
I _{O(max)}	Maximum Output Current	$V_1 - V_0 = 3 \text{ to } 13 \text{ V}$		100	200		mA
		$V_I - V_O = 40 \text{ V}$			50		
eN	Output Noise Voltage	B = 10 Hz to 10 KHzT _J = 25°C			0.003		%
SVR	Supply Voltage Rejection (*)	T _J = 25°C	$C_{ADJ} = 0$		65		dB
		f = 120 Hz	$C_{ADJ} = 10 \mu F$	66	80		

^(*) CADJ is connected between Adjust pin and Ground.

ELECTRICAL CHARACTERISTICS OF LM317L (refer to the test circuits, $T_J = 0$ to 125°C, $V_I - V_O = 5$ V, $I_O = 40$ mA, unless otherwise specified).

Symbol	Parameter	Test Co	Min.	Тур.	Max.	Unit	
ΔV_{O}	Line Regulation	$V_1 - V_0 = 3 \text{ to } 40 \text{ V}$	T _J = 25°C		0.01	0.04	%/V
		I _L < 20 mA			0.02	0.07	
ΔV_{O}	Load Regulation	$V_O \le 5 \text{ V}$	T _J = 25°C		5	25	mV
		$I_{O} = 5 \text{ to } 100 \text{ mA}$			20	70	
		$V_O \ge 5 \text{ V}$	$T_J = 25^{\circ}C$		0.1	0.5	%
		$I_{O} = 5 \text{ to } 100 \text{ mA}$			0.3	3 1.5	
I_{ADJ}	Adjustment Pin Current				50	100	μΑ
ΔI_{ADJ}	Adjustment Pin Current	$V_1 - V_O = 3 \text{ to } 40 \text{ V}$ $I_O = 5 \text{ to } 100 \text{ mA}$ $P_d < 625 \text{ mW}$			0.2	5	μA
V _{REF}	Reference Voltage	$V_1 - V_O = 3 \text{ to } 40 \text{ V}$ $I_O = 5 \text{ to } 100 \text{ mA}$ $P_d < 625 \text{ mW}$		1.2	1.25	1.3	V
$\Delta V_{O}/V_{O}$	Output Voltage Temperature Stability				0.7		%
I _{O(min)}	Minimum Load Current	$V_{I} - V_{O} = 40 \text{ V}$			3.5	5	mA
I _{O(max)}	Maximum Output Current	$V_1 - V_O = 3 \text{ to } 13 \text{ V}$ $V_1 - V_O = 40 \text{ V}$		100	200		mA
					50		
eN	Output Noise Voltage	B = 10 Hz to 10 KHzT _J = 25°C			0.003		%
SVR	Supply Voltage Rejection (*)	$T_J = 25^{\circ}C$	$C_{ADJ} = 0$		65		dB
		f = 120 Hz	$C_{ADJ} = 10 \mu F$	66	80		

 $^{(\}mbox{\ensuremath{^{'}}})$ CADJ is connected between Adjust pin and Ground.



Figure 1: Current Limit

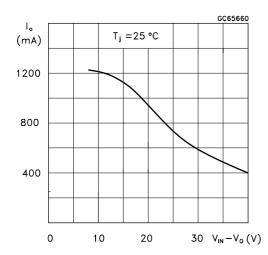
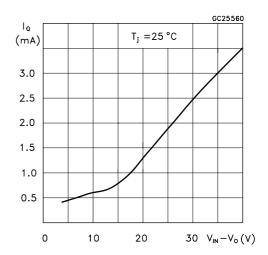


Figure 2: Minimum Operating Current



APPLICATION INFORMATION

The LM317L provides an internal reference voltage of 1.25V between the output and adjustments terminals. This is used to set a constant current flow across an external resistor divider (see fig. 4), giving an output voltage V_O of:

 $V_O = V_{REF} (1 + R_2/R_1) + I_{ADJ} R_2$

The device was designed to minimize the term I_{ADJ} (100 μ A max) and to maintain it very constant with line and load changes. Usually, the error term $I_{ADJ} \times R_2$ can be neglected. To obtain the previous requirement, all the regulator quiescent current is returned to the output terminal, imposing a minimum load current condition. If the load is insufficient, the output voltage will rise.

Since the LM317L is a floating regulator and "sees" only the input-to-output differential voltage, supplies of very high voltage with respect to ground can be regulated as long as the maximum input-to-output differential is not exceeded. Furthermore, programmable regulator are easily obtainable and, by connecting a fixed resistor between the adjustment and output, the device can be used as a precision current regulator. In order to optimize the load regulation, the current set resistor R_1 (see fig. 4) should be tied as close as possible to the regulator, while the ground terminal of R_2 should be near the ground of the load to provide remote ground sensing.

Figure 3: Basic Adjustable Regulator

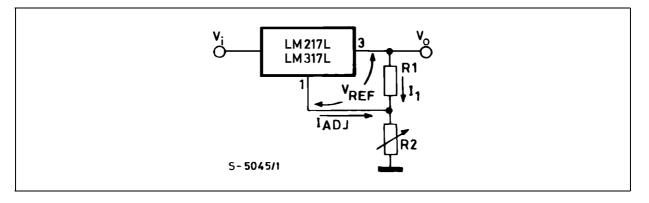


Figure 4: Voltage Regulator with Protection Diodes

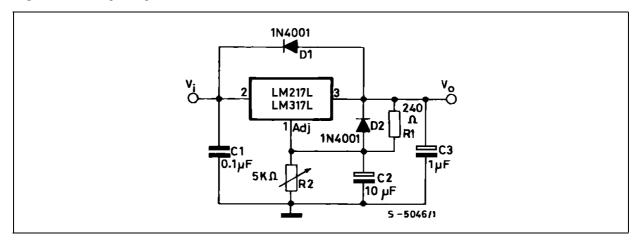


Figure 5 : Slow Turn-on 15V Regulator

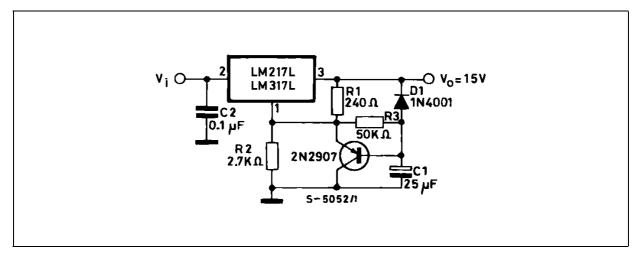


Figure 6 : Current Regulator

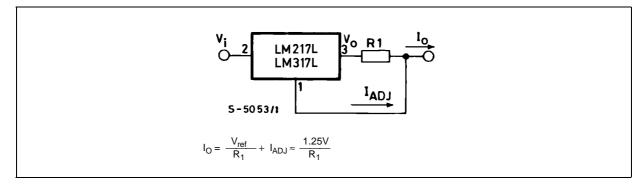


Figure 7:5V Electronic Shut-down Regulator

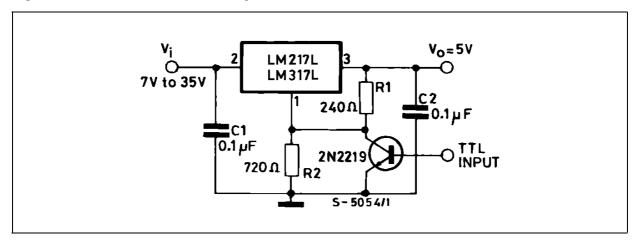
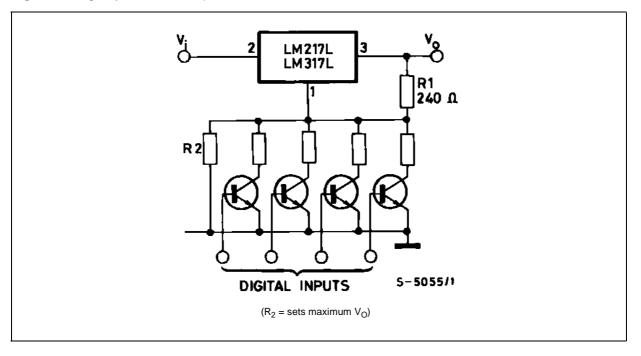
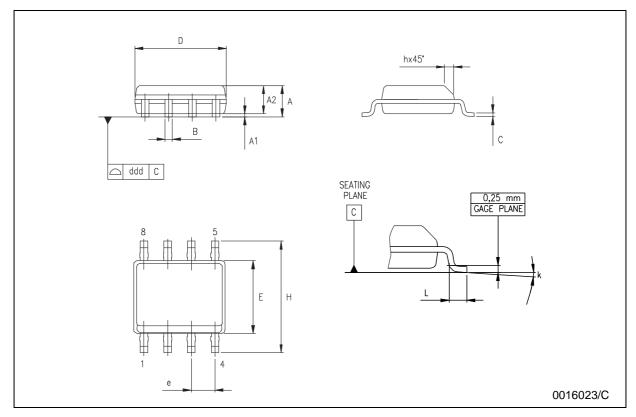


Figure 8: Digitally Selected Outputs



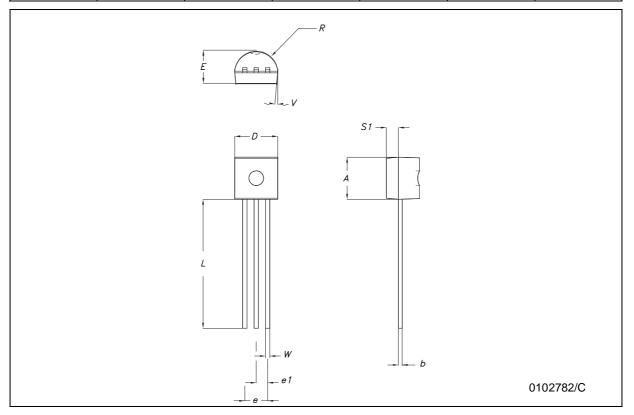
SO-8 MECHANICAL DATA

DIM		mm.				
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
В	0.33		0.51	0.013		0.020
С	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
Е	3.80		4.00	0.150		0.157
е		1.27			0.050	
Н	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



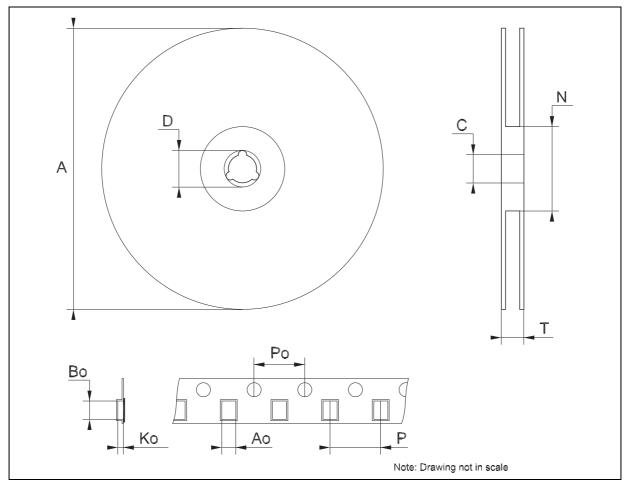
TO-92 MECHANICA DATA

DIM.		mm.		mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А	4.32		4.95	170.1		194.9
b	0.36		0.51	14.2		20.1
D	4.45		4.95	175.2		194.9
E	3.30		3.94	129.9		155.1
е	2.41		2.67	94.9		105.1
e1	1.14		1.40	44.9		55.1
L	12.7		15.49	500.0		609.8
R	2.16		2.41	85.0		94.9
S1	0.92		1.52	36.2		59.8
W	0.41		0.56	16.1		22.0



Tape & Reel SO-8 MECHANICAL DATA

DIM		mm.			inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А			330			12.992
С	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
Т			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Во	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
Р	7.9		8.1	0.311		0.319



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