



LM217L LM317L

LOW CURRENT 1.2 TO 37V ADJUSTABLE VOLTAGE REGULATOR

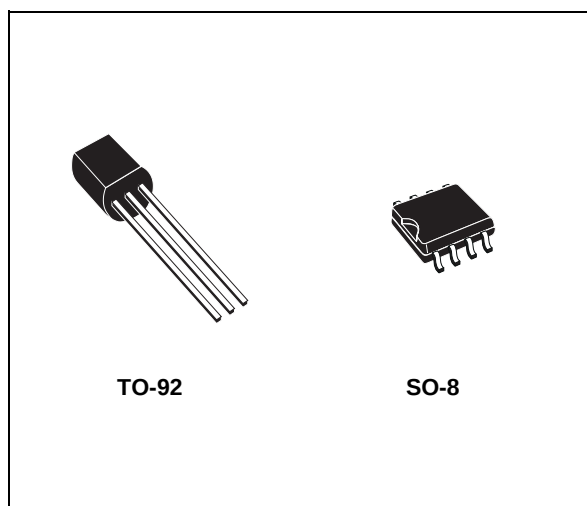
- OUTPUT VOLTAGE RANGE: 1.2 TO 37V
- OUTPUT CURRENT IN EXCESS OF 100 mA
- LINE REGULATION TYP. 0.01%
- LOAD REGULATION TYP. 0.1%
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSISTOR SAFE AREA COMPENSATION
- FLOATING OPERATION FOR HIGH VOLTAGE APPLICATIONS

DESCRIPTION

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

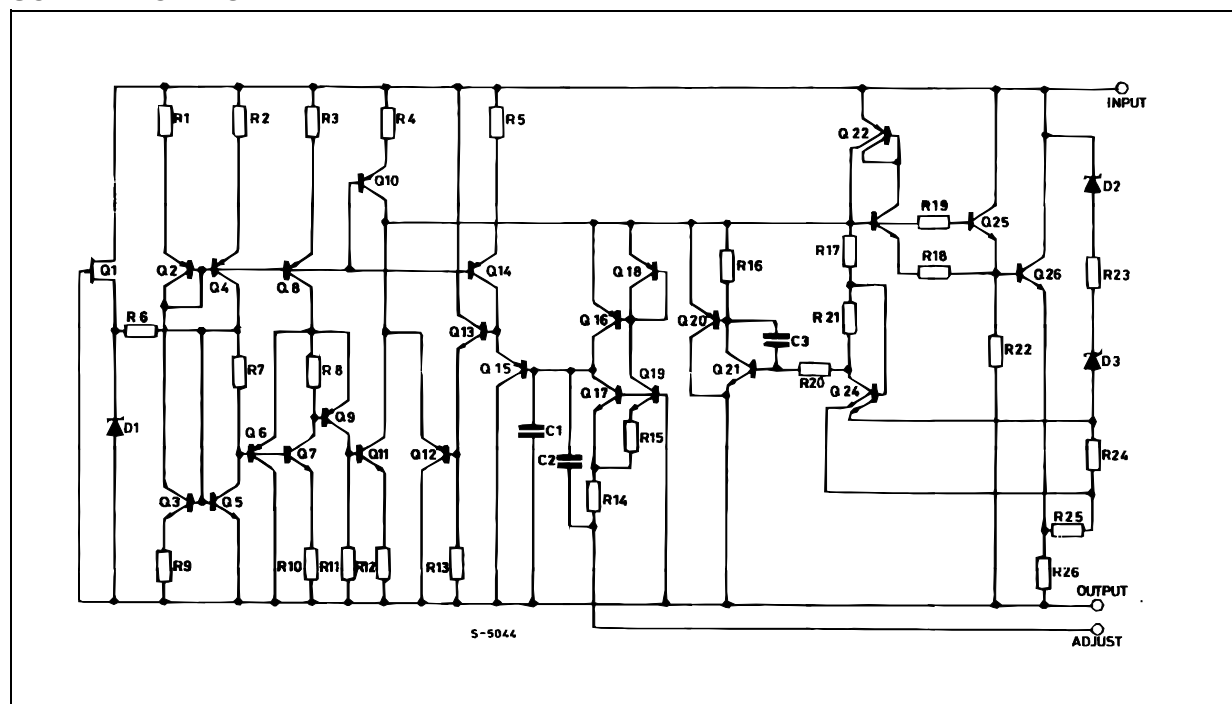
They are designed to supply until 100 mA of load current with an output voltage adjustable over a 1.2 to 37V range.

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

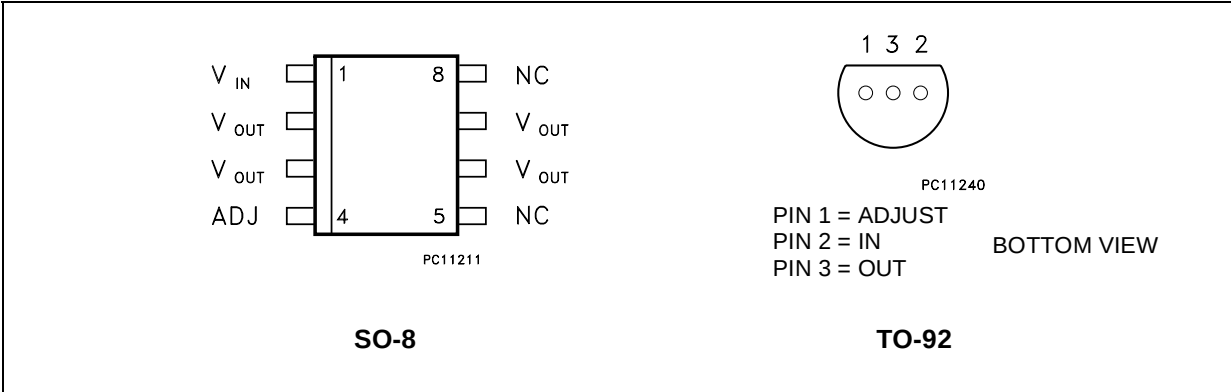


LM217L/LM317L

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter ²		Value	Unit
$V_I - V_O$	Input-Output Differential Voltage		40	V
P_d	Power Dissipation		Internally Limited	
T_{opr}	Operating Junction Temperature Range	for LM217L	-40 to 125	°C
		for LM317L	0 to 125	
T_{stg}	Storage Temperature Range		-55 to 150	°C

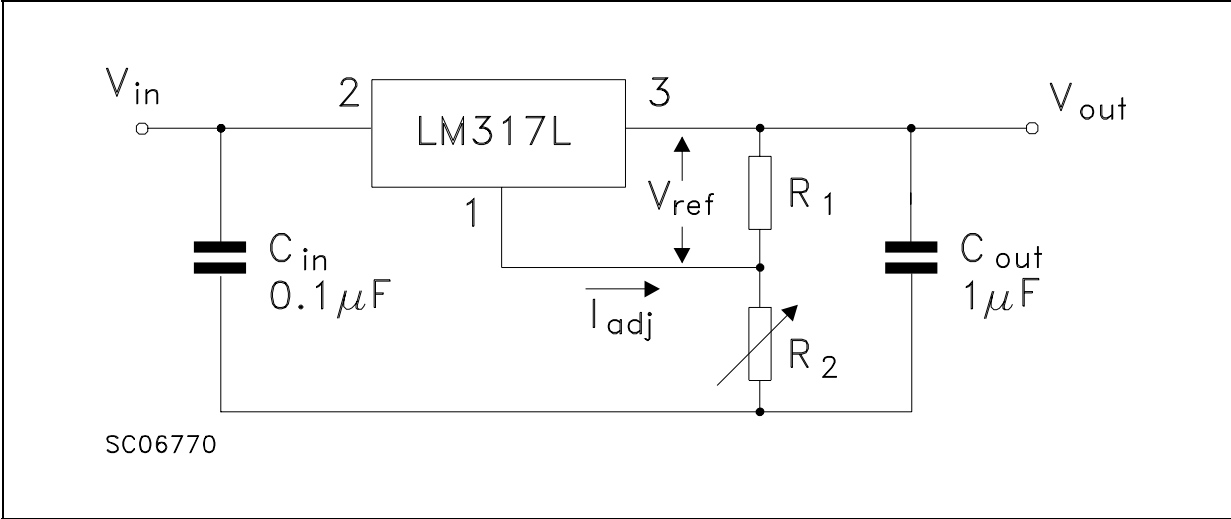
CONNECTION DIAGRAM (top view)



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 , $V_I - V_O = 5\text{ V}$, $I_O = 40\text{ mA}$, unless otherwise specified).

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit	
ΔV_O	Line Regulation	$V_I - V_O = 3$ to 40 V $I_L < 20\text{ mA}$	$T_J = 25^\circ\text{C}$		0.01	0.02	%V	
					0.02	0.05		
ΔV_O	Load Regulation	$V_O \leq 5\text{ V}$ $I_O = 5$ to 100 mA	$T_J = 25^\circ\text{C}$		5	15	mV	
					20	50		
		$V_O \geq 5\text{ V}$ $I_O = 5$ to 100 mA	$T_J = 25^\circ\text{C}$		0.1	0.3	%	
					0.3	1		
I_{ADJ}	Adjustment Pin Current					50	100	μA
ΔI_{ADJ}	Adjustment Pin Current	$V_I - V_O = 3$ to 40 V $I_O = 5$ to 100 mA $P_d < 625\text{ mW}$				0.2	5	μA
V_{REF}	Reference Voltage	$V_I - V_O = 3$ to 40 V $I_O = 10$ to 500 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	$V_I - V_O = 3$ to 13 V			100	200		mA
		$V_I - V_O = 40\text{ V}$				50		
eN	Output Noise Voltage	$B = 10\text{ Hz}$ to 10 KHz $T_J = 25^\circ\text{C}$				0.003		%
SVR	Supply Voltage Rejection (*)	$T_J = 25^\circ\text{C}$ $f = 120\text{ Hz}$	$C_{ADJ} = 0$		65		dB	
			$C_{ADJ} = 10\text{ }\mu\text{F}$	66	80			

(*) C_{ADJ} is connected between Adjust pin and Ground.

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

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

(*) C_{ADJ} is connected between Adjust pin and Ground.

Figure 1 : Current Limit

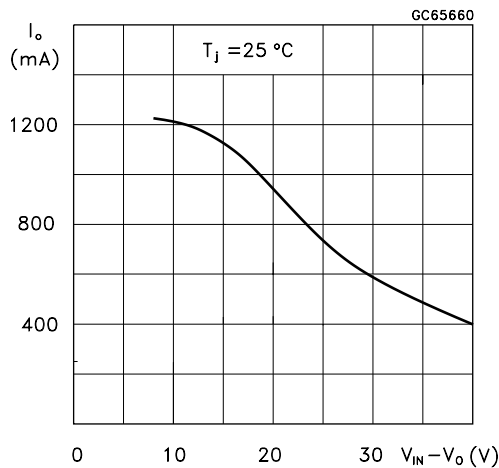
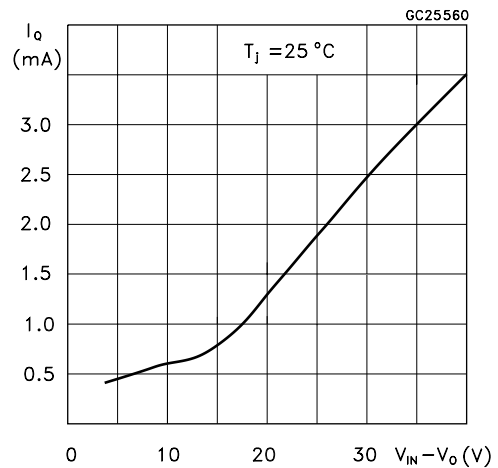


Figure 2 : Minimum Operating Current



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 μA 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

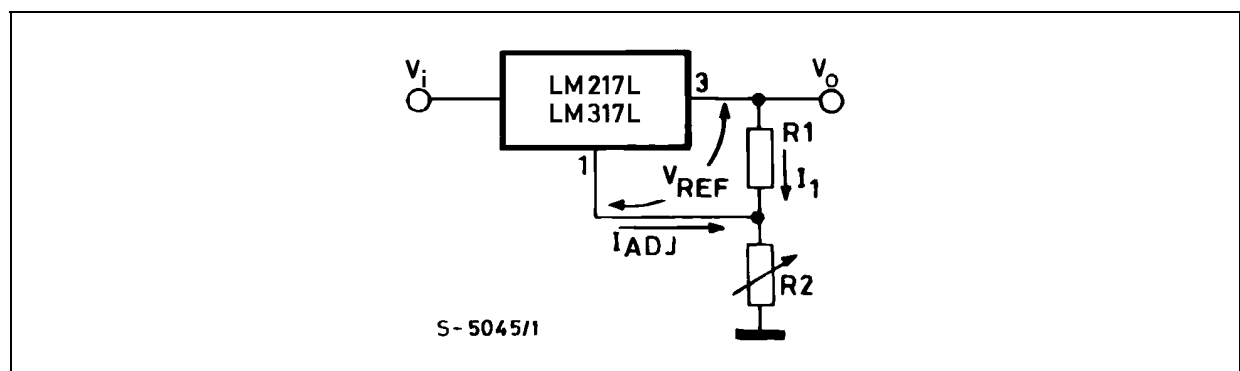


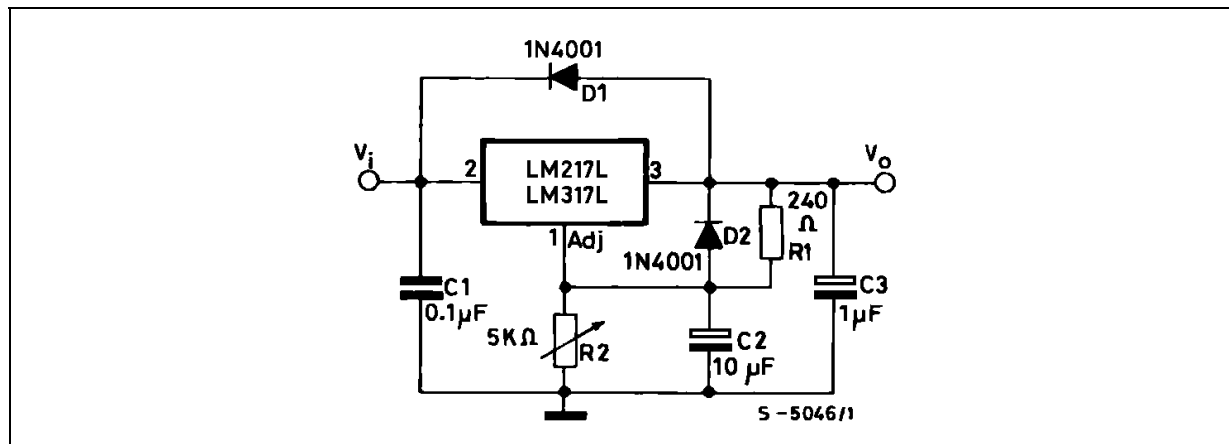
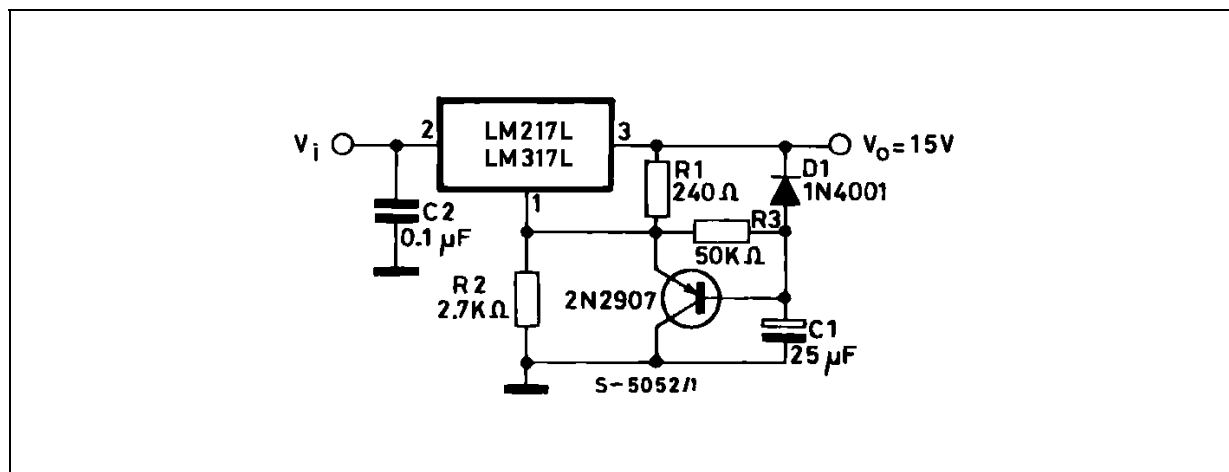
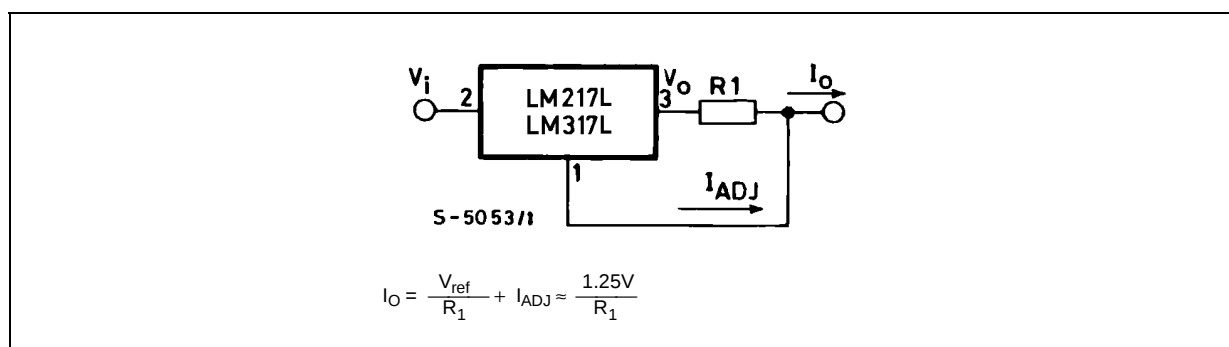
Figure 4 : Voltage Regulator with Protection Diodes**Figure 5 : Slow Turn-on 15V Regulator****Figure 6 : Current Regulator**

Figure 7 : 5V Electronic Shut-down Regulator

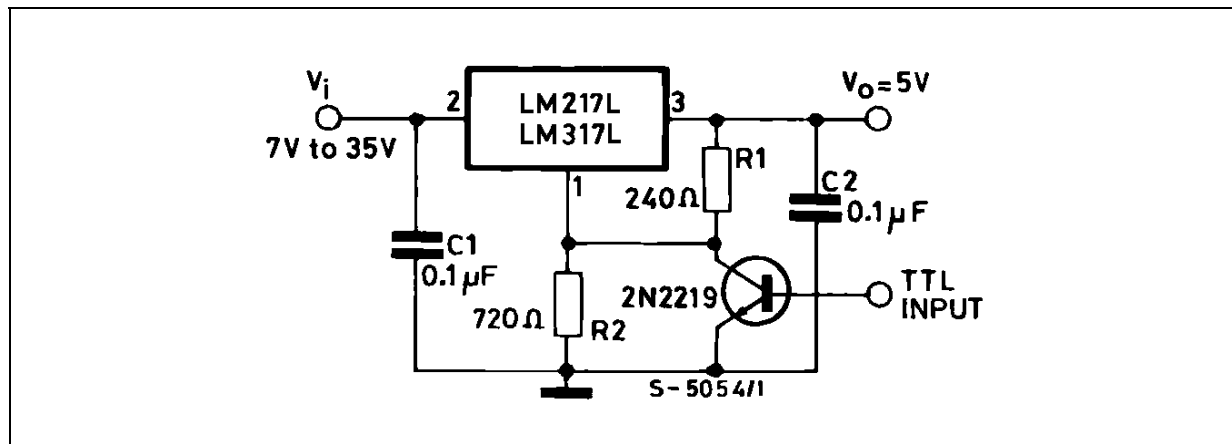
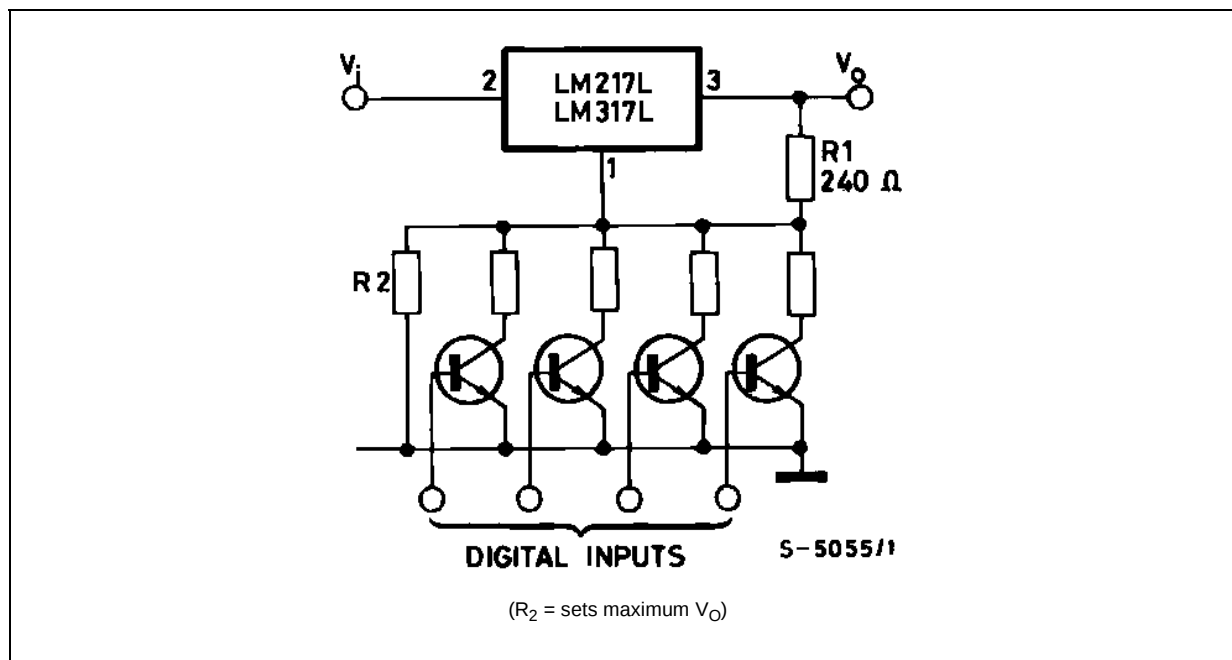
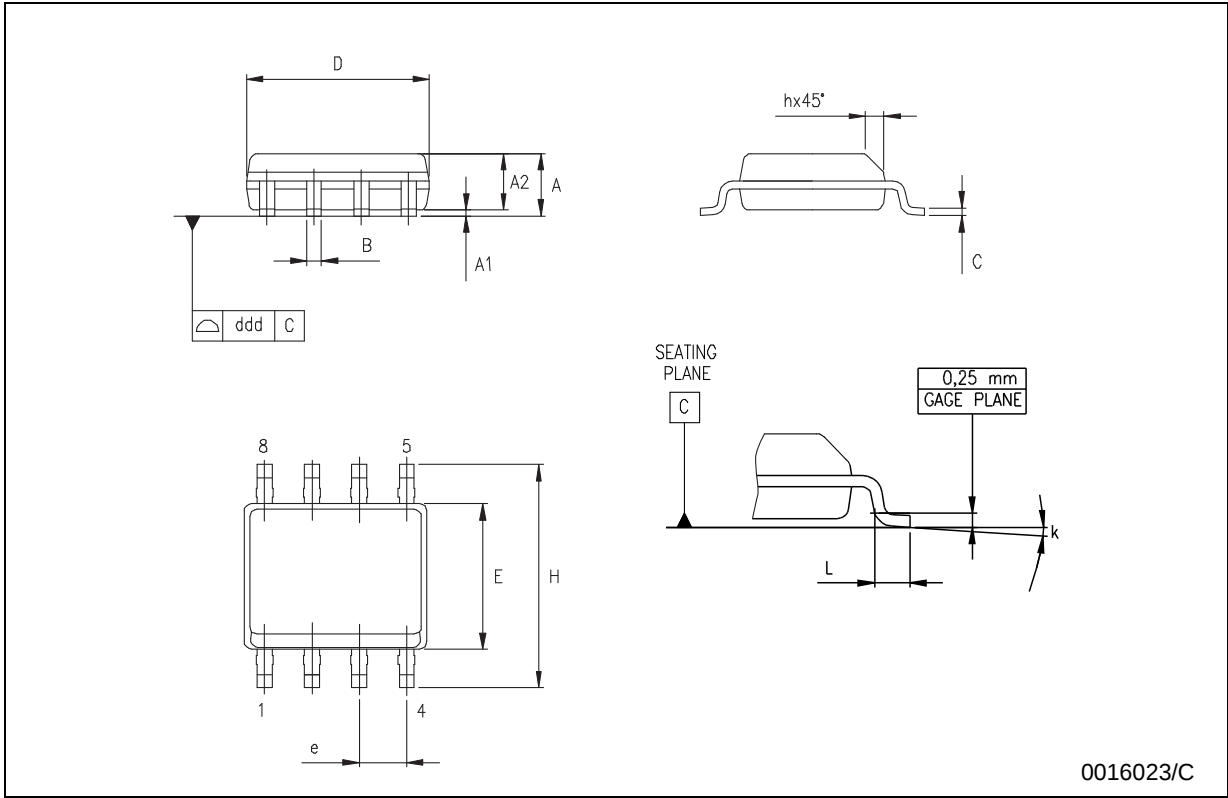


Figure 8 : Digitally Selected Outputs



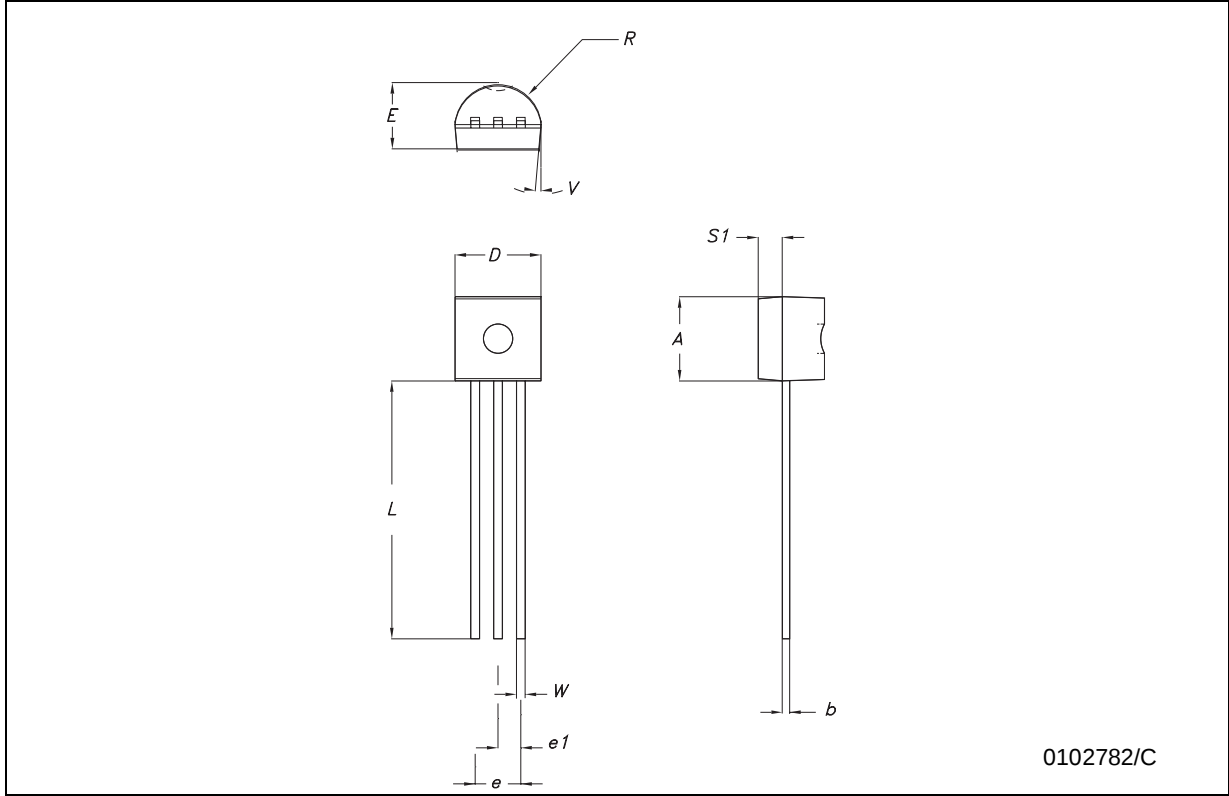
SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	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
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	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



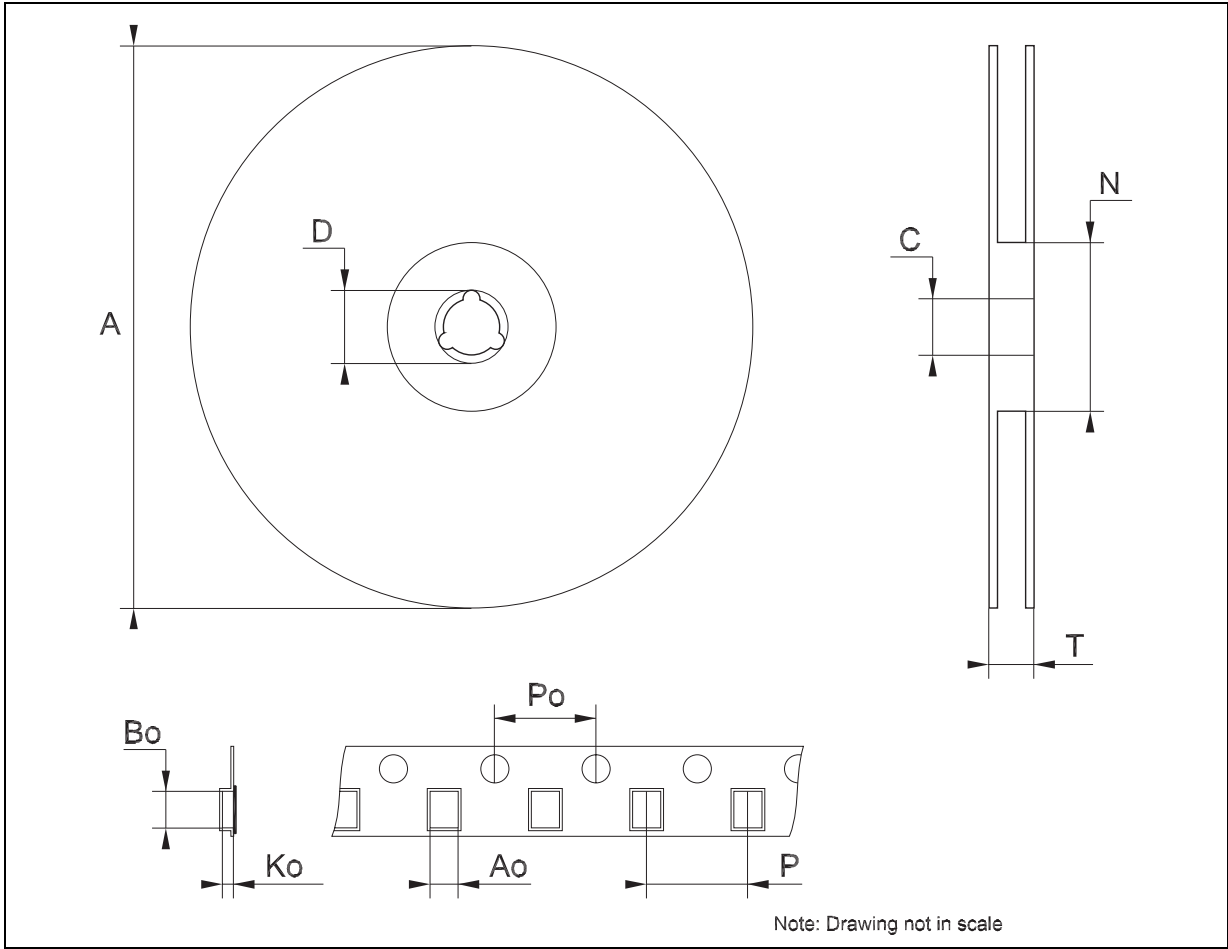
TO-92 MECHANICA DATA

DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	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
e	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		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	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
P	7.9		8.1	0.311		0.319



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>