

勝	特	力	材	料	886-3-5753170
胜华	侍力	电	子(上	海)	86-21-54151736
胜华	時力	电	子(深	[圳)	86-755-83298787
	Htt	<b>p</b> :	//ww	ww.	100y. com. tw

# LM217L LM317L

# LOW CURRENT 1.2 TO 37V ADJUSTABLE VOLTAGE REGULATOR

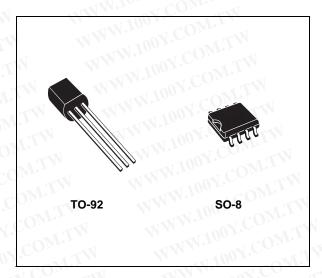
- OUTPUT VOLTAGE RANGE: 1.2 TO 37V
- OUTPUT CURRENT IN EXCESS OF 100 mA
- LINE REGULATION TYP. 0.01%
- LOAD REGULATION TYP. 0.1%
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSISTOR SAFE AREA COMPENSATION
- FLOATING OPERATION FOR HIGH VOLTAGE APPLICATIONS

#### DESCRIPTION

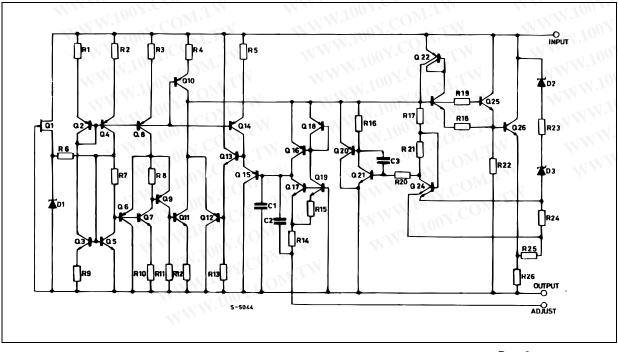
The LM217L/LM317L are monolithic integrated circuit in SO-8 and TO-92 packages intended for use as positive adjustable voltage regulators. They are designed to supply until 100 mA of load

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

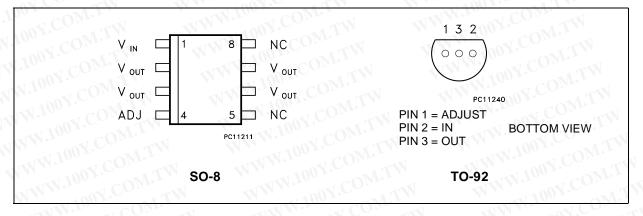


#### Figure 1: Schematic Diagram

#### Symbol Parameter Value Unit VI-VO Input-Output Differential Voltage 40 V $P_d$ **Power Dissipation** Internally Limited -40 to 125 **Operating Junction Temperature** for LM217L T<sub>opr</sub> °C Range for LM317L 0 to 125 T<sub>stg</sub> Storage Temperature Range -55 to 150 °C

#### Table 1: Absolute Maximum Ratings

#### Figure 2: Pin Connection (top view)

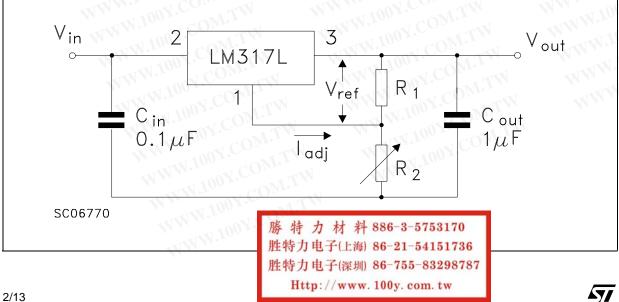


#### **Table 2: Order Codes**

ТҮРЕ	SO-8 (TUBE) (*)	TO-92 (BAG) (#)
LM217L	LM217LD	LM217LZ
LM317L	LM317LD	LM317LZ

(\*) Available in Tape & Reel with the suffix "-TR". (#) Available in Tape & Reel with the suffix "-TR" and in Ammopak with the suffix "-AP". Please note that in these cases pins are shaped according to Tape & Reel specifications.

#### **Figure 3: Test Circuit**



Symbol	Parameter	Test Co	onditions	Min.	Тур.	Max.	Uni
ΔVO	Line Regulation	$V_{I} - V_{O} = 3 \text{ to } 40 \text{ V}$	T <sub>J</sub> = 25°C	N.C.	0.01	0.02	%/\
	WW.IV	l <sub>L</sub> < 20 mA	WWW.L	O.V.	0.02	0.05	
$\Delta V_{O}$	Load Regulation	$V_{O} \le 5 V$	$T_J = 25^{\circ}C$		5	15	mV
	UN WW	I <sub>O</sub> = 5 to 100 mA		1001.	20	50	
	WWW WWW	$V_{O} \ge 5 V$	T <sub>J</sub> = 25°C	11008	0.1	0.3	%
- CO	M.I.	I <sub>O</sub> = 5 to 100 mA	WW. Kr	N.2	0.3	1	
I <sub>ADJ</sub>	Adjustment Pin Current	N.100 1. COM.		W.100	50	100	μA
ΔI <sub>ADJ</sub>	Adjustment Pin Current	$V_{I} - V_{O} = 3 \text{ to } 40 \text{ V}$ $P_{d} < 625 \text{ mW}$	l <sub>O</sub> = 5 to 100 mA	VW.10	0.2	5	μA
V <sub>REF</sub>	Reference Voltage	$V_{l} - V_{O} = 3 \text{ to } 40 \text{ V}$ $P_{d} < 625 \text{ mW}$	l <sub>O</sub> = 10 to 500 mA	1.2	1.25	1.3	V
$\Delta V_0 / V_0$	Output Voltage Temperature Stability	WW.100Y.C	OM.TW	N WW	0.7	COM	%
I <sub>O(min)</sub>	Minimum Load Current	$V_{I} - V_{O} = 40 V$	COMIT		3.5	5	mA
I <sub>O(max)</sub>	Maximum Output Current	$V_{I} - V_{O} = 3 \text{ to } 13 \text{ V}$	M.T.W	100	200	1.0	mA
	N.COMITW	$V_{I} - V_{O} = 40 V$	I.CO. TW	N	50	01.0	- 11
eN	Output Noise Voltage	B = 10 Hz to 10 KHz	:T <sub>J</sub> = 25°C	~	0.003	O.V.C	%
SVR	Supply Voltage Rejection (*)	T <sub>J</sub> = 25°C	$C_{ADJ} = 0$		65		dB
	T100Y.COMTIN	f = 120 Hz	C <sub>ADJ</sub> = 10 μF	66	80	100 .	c01

Table 3: Electrical Characteristics Of LM217L (refer to the test circuits, T<sub>J</sub> = - 40 to 125°C, W100Y.CO  $V_{I} - V_{O} = 5 V$ ,  $I_{O} = 40 mA$ , unless otherwise specified). MT.Wo

(\*) CADJ is connected between Adjust pin and Ground. ыс. 1001: И И И WWW.100Y.COM.

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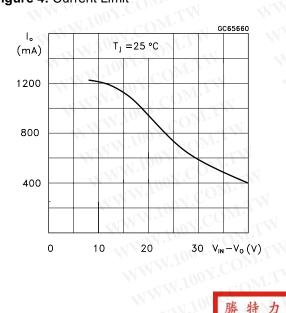
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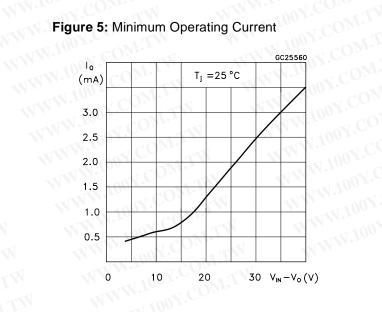
	<b>Table 4: Electrical Characteristics Of LM317L</b> (refer to the test circuits, $T_J = 0$ to 125°C,
	$V_{I} - V_{O} = 5 \text{ V}, I_{O} = 40 \text{ mA}, \text{ unless otherwise specified}).$
$\mathbf{N}$	

Symbol	Parameter	Test Co	onditions	Min.	Тур.	Max.	Uni
ΔVO	Line Regulation	$V_{I} - V_{O} = 3 \text{ to } 40 \text{ V}$	$T_J = 25^{\circ}C$	NY.CC	0.01	0.04	%/\
	WW.10	I <sub>L</sub> < 20 mA	WWW.	O.V.	0.02	0.07	
$\Delta V_{O}$	Load Regulation	$V_{O} \le 5 V$	$T_J = 25^{\circ}C$	Jun -1 (	5	25	mV
	TH WW	I <sub>O</sub> = 5 to 100 mA		1001.	20	70	
	TW WWW	$V_{O} \ge 5 V$	$T_J = 25^{\circ}C$	1001	0.1	0.5	%
	N.I.	I <sub>O</sub> = 5 to 100 mA	WW W	N	0.3	1.5	
I <sub>ADJ</sub>	Adjustment Pin Current	N.100 T. COM.		W.100	50	100	μA
ΔI <sub>ADJ</sub>	Adjustment Pin Current	$V_{I} - V_{O} = 3 \text{ to } 40 \text{ V}$ $P_{d} < 625 \text{ mW}$	l <sub>O</sub> = 5 to 100 mA	WW.10	0.2	5	μA
V <sub>REF</sub>	Reference Voltage	V <sub>I</sub> - V <sub>O</sub> = 3 to 40 V P <sub>d</sub> < 625 mW	l <sub>O</sub> = 5 to 100 mA	1.2	1.25	1.3	V
$\Delta V_0 / V_0$	Output Voltage Temperature Stability	WWW.100Y.C	OM.TW	WWW	0.7	COM	%
I <sub>O(min)</sub>	Minimum Load Current	$V_{I} - V_{O} = 40 V$	CONT		3.5	5	mA
I <sub>O(max)</sub>	Maximum Output Current	$V_{I} - V_{O} = 3 \text{ to } 13 \text{ V}$	WT.IN	100	200	1.0	mA
	N.COM. TW	$V_{I} - V_{O} = 40 V$	I.CO. TW	N	50	01.00	
eN	Output Noise Voltage	B = 10 Hz to 10 KHz	zT <sub>J</sub> = 25°C	N	0.003	O.V.O	%
SVR	Supply Voltage Rejection (*)	T <sub>J</sub> = 25°C	$C_{ADJ} = 0$		65	100 -	dB
	100Y.C. M.TW	f = 120 Hz	C <sub>ADJ</sub> = 10 μF	66	80	100 *	

#### Figure 4: Current Limit



# N.COM.T Figure 5: Minimum Operating Current



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#### **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:  $V_O = V_{REF} (1 + R_2/R_1) + I_{AD,I} R_2$ 

The device was designed to minimize the term  $I_{ADJ}$  (100µA 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.

Figure 6: Basic Adjustable Regulator

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.

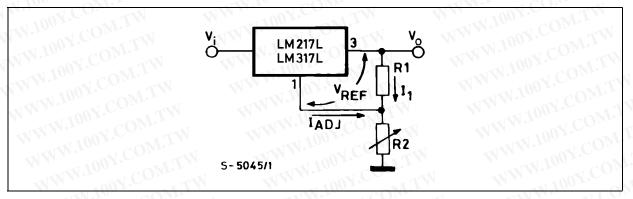
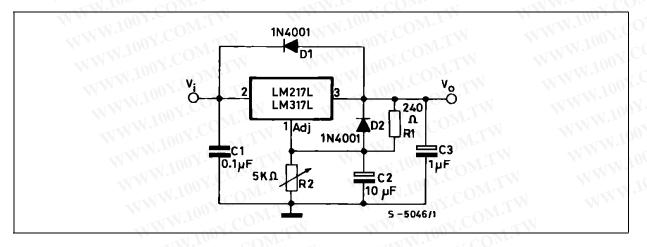


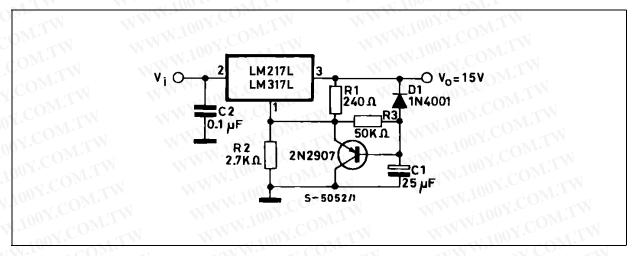
Figure 7: Voltage Regulator with Protection Diodes





#### LM217L/LM317L

#### Figure 8: Slow Turn-on 15V Regulator



#### Figure 9: Current Regulator

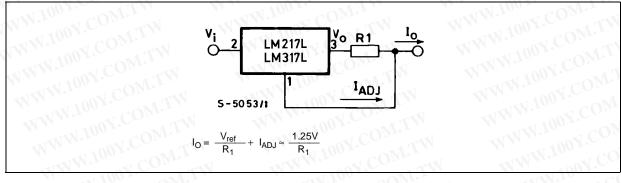
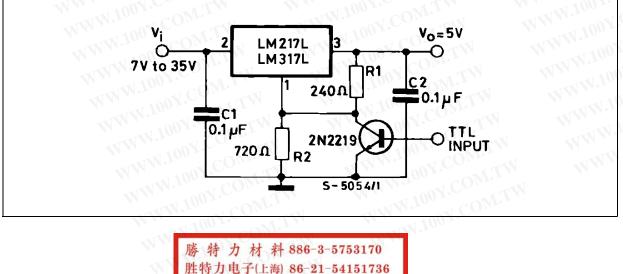
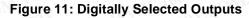


Figure 10: 5V Electronic Shut-down Regulator



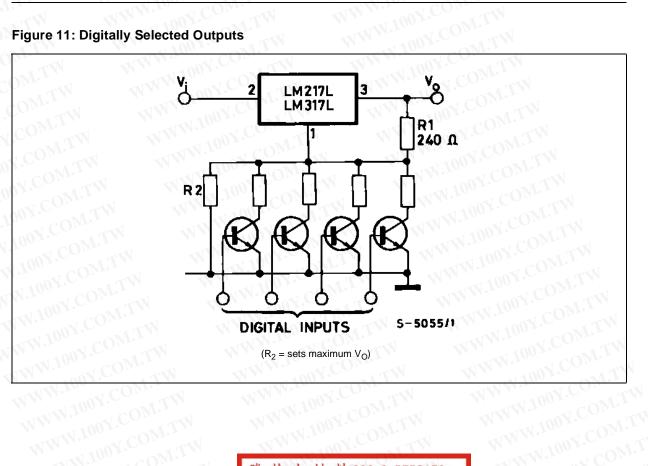
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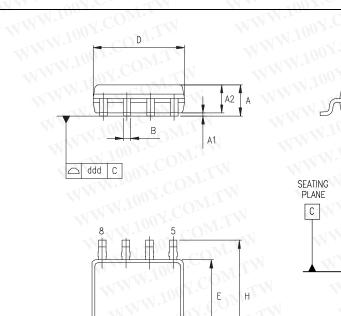
#### LM217L/LM317L

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## SO-8 MECHANICAL DATA

DIM		mm.		100	inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX
A	1.35	100Y.CO	1.75	0.053	ON.COM.T	0.069
A1	0.10	100Y.C	0.25	0.04	100Y.COM.	0.010
A2	1.10	N.100Y.C	1.65	0.043	V100X.COM	0.065
O' B	0.33	W.100Y	0.51	0.013	W.1001. CO	0.020
00 C M	0.19	WW.100	0.25	0.007	NN.1001.CC	0.010
100 D 001	4.80	WW.101	5.00	0.189	WW.100 X.C	0.197
V.100E COM	3.80	NWW.I	4.00	0.150	WW.IOON.	0.157
e co	1.1	1.27	ON.COM	WT	0.050	COMP
NN.H CC	5.80	WWW	6.20	0.228	WWW.L	0.244
WW h	0.25	WW	0.50	0.010	WWW.	0.020
NWY	0.40	WW	1.27	0.016	WWW	0.050
k	COM TW	W	100 8°	(max.)	WWW	100X.C.
ddd	N.COMIT	V V	0.1	WT.M	WW	0.04

DM.TW

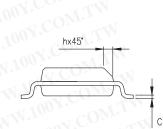


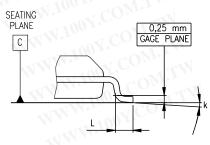
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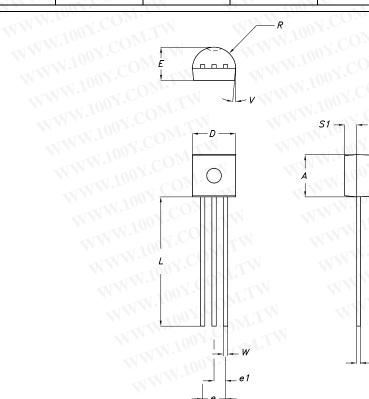
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### **TO-92 MECHANICAL DATA**

DIM.	WW	100 mm.		WW.100	mils	
M	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.32	W.100 Y.CC	4.95	170.1	OV.COM.	194.9
СЪ	0.36	VW.100Y.C	0.51	14.2	100Y.COM	20.1
D	4.45	W 100Y.	4.95	175.2	V.100Y.CON	194.9
ECOM	3.30	WW.1007	3.94	129.9	W.100 X.CO	155.1
e co	2.41	M.M.M.100	2.67	94.9	NW.100Y.C	105.1
e1	1.14	WWW.	1.40	44.9	WW.100Y.	55.1
N.190Y.C	12.7	WWW	15.49	500.0	NWW.1003	609.8
NR <sup>001</sup>	2.16	WW	2.41	85.0	WWW.100	94.9
S1	0.92	WW	1.52	36.2	WWW.1	59.8
W	0.41	1 W	0.56	16.1	WWW.	22.0
α	DOX.COM.T	5°	W.100X.	COM.TW	5°	1001.



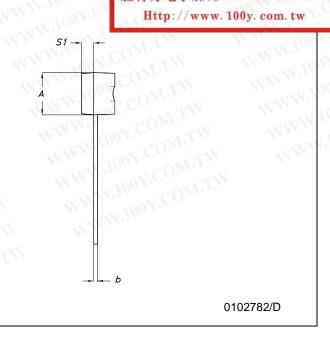
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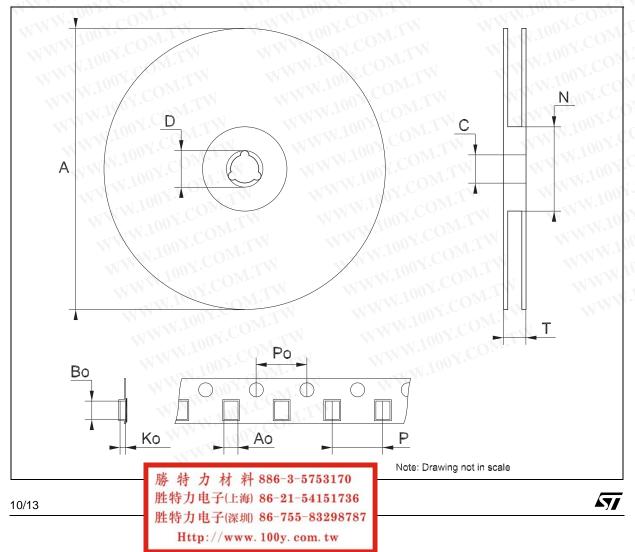
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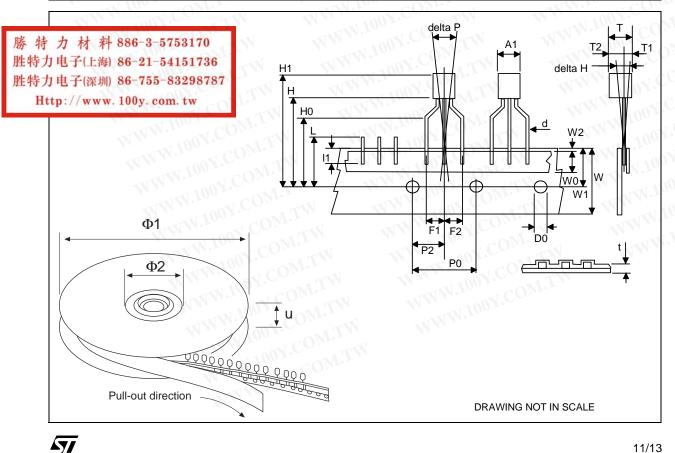
DIM.	W Y	100 mm.	TN 1		inch	
DINI.	MIN.	ТҮР	MAX.	MIN.	TYP.	MAX.
A		NW.1001.CC	330	WWW.10	N.COM.	12.992
C	12.8	WW.100 Y.C	13.2	0.504	NON.COM	0.519
CDW.	20.2	NWW.100Y	CONT	0.795	10°.COM	WTJ
NOM	60	WWW.IOON	CONTRA	2.362	.100Y.CO	WTN
VICON	WT	WWW.100	22.4	WW	N.LOOY.C	0.882
Ao	8.1	WWW.10	8.5	0.319	1004.	0.335
Во	5.5	WWW.	5.9	0.216 💉	N 100Y	0.232
Ко	2.1	WWW.	2.3	0.082	1100	0.090
Po	3.9	WWW	4.1	0.153	WW.10	0.161
P	7.9	WW	8.1	0.311	WW	0.319



# Tape & Reel SO-8 MECHANICAL DATA

## Tape & Reel for TO-92 MECHANICAL DATA

DIM.	WW	mm.		W . 100X.	inch	
DINI.	MIN.	ТҮР	MAX.	MIN. 00	TYP.	MAX.
A1	WIT	4.80	W	WWW.	0.189	
J.I.		3.80	M.	.10	0.150	
T1	NV N	1.60	WTA		0.063	
T2		2.30	DVr.	WW.	0.091	- N
d		0.48	WI.M.		0.019	T.C.
P0	12.5	NN. SI	12.9	0.492	N.Co.	0.508
P2	5.65	100 ×	7.05	0.222	100 - 00	0.278
F1, F2	2.44	2.54	2.94	0.096	0.100	0.116
delta H		±2	- CON		0.079	N
W	17.5	18.00	19.0	0.689	0.709	0.748
W0	5.7	ANN N.	6.3	0.224	N.C.	0.248
W1	8.5	10	9.25	0.335	W.100	0.364
W2	WT.	0.50	N.Co.	10 10	0.20	TI
JUH CO	M.	18.50	18.70	- 51	0.728	0.726
HO	15.50		16.50	0.610	1003	0.650
H1	OW	25.00	A CON		0.984	1.00
D0	3.8		4.2	0.150	. In.	0.165
t	CONTRACT	0.90	N.CO.	WT .	0.035	N.C.
L1	COM	3	N.I.	NI.	0.118	
delta P	NT.	±1	11001.0	T.I.	0.039	101.
u	- COM-	50	W. T. C	One all	1.968	N.CC
Φ1	T.M.	360	100 2.	- No	14.173	Ino.
Ф2	N COM	30 🔨	WWW.	NT N	1.181	



# Table 5: Revision History

Date	Revision	Description of Changes
16-Mar-2005	2	Add Tape & Reel for TO-92.
23-Dec-2005	3	Mistake on Ordering Table in Header.
N.I.	WW.100	CONFERENCE AND

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