

## 3-Terminal Regulators

### DESCRIPTION

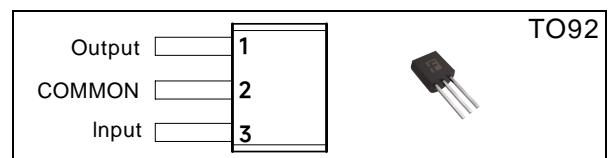
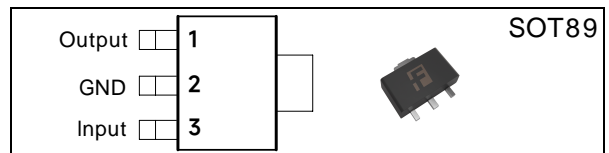
This series of fixed-voltage monolithic integrated circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high-current voltage regulators. Each of these regulators can deliver up to 100mA of output current. The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload. When used as a replacement for a Zener diode-resistor Combination, an effective improvement in output impedance can be obtained together with lower-bias current.

### Features

- 3-Terminal Regulators
- Output Current Up to 100mA
- No External Components
- Internal Thermal Overload Protection
- Internal Short-Circuit Limiting
- Direct Replacement for Fairchild uA78LXX Series

Nominal output voltage	Regulator
3.0V	78L03nd3
3.3V	78L33nd3
5.0V	78L05nd3
6.0V	78L06nd3
8.0V	78L08nd3
9.0V	78L09nd3
10V	78L10nd3
12V	78L12nd3
15V	78L15nd3
18V	78L18nd3
24V	78L24nd3

### Pin Configuration



## 3-Terminal Regulators

Absolute maximum ratings over operating temperature range (unless otherwise noted)

	78L03nd3 thru 78L10nd3	78L12nd3 thru 78L18nd3	78L24nd3	UNIT
Input voltage	30	35	40	V
Operating free-air, case or virtual junction temperature range	-40 to 125	-40 to 125	-40 to 125	°C
Storage temperature range	-65 to 150	-65 to 150	-65 to 150	
Lead temperature 1.6mm(1/16inch) from case for 10 seconds	260	260	260	

### Recommended operating conditions

Parameter		MIN	MAX	UNIT
Input voltage (Vin)	78L03nd3	5.5	18	V
	78L33nd3	5.5	18	
	78L05nd3	7	20	
	78L06nd3	8	20	
	78L08nd3	10.5	23	
	78L09nd3	11.5	24	
	78L10nd3	12.5	25	
	78L12nd3	14.5	27	
	78L15nd3	17.5	30	
	78L18nd3	20.5	33	
	78L24nd3	26.5	39	
Output current(Io)			100	mA
Operating virtual junction temperature (Tj)		0	125	°C

### 78L03nd3 electrical characteristics at specified virtual junction temperature, Vi=8V, Io=40mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L03nd3			UNIT	
			MIN	TYP	MAX		
Output voltage**		25°C	2.8	3.0	3.2	V	
	Io=1mA to 40mA VI=5.5v to 18v	0 to 125°C	2.8	3.0	3.2		
	Io=1mA to 70mA		2.8	3.0	3.2		
Input regulation	VI=5.5v to 18v	25°C		28	120	mV	
	VI=6v to 18v			23	80		
Ripple rejection	VI=6v to 16v f=120Hz		43	51		dB	
Output regulation	Io=1mA to 100mA			13	50	mV	
	Io=1mA to 40mA			7	35		
Output no-load voltage	F=10-100Hz			40		uV	
Dropout voltage				1.7		V	
Bias current			125°C		2.4	6.0	mA
						5.5	
Bias current change	VI=6v to 18v		0 to 125°C			1.5	
	Io=1mA to 40mA				0.1		

## 3-Terminal Regulators

78L33nd3 electrical characteristics at specified virtual junction temperature,  $V_i=8.5V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L33nd3			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	3.1	3.3	3.5	V
	$I_o=1mA$ to 40mA $V_i=5.5v$ to 18v	0 to 125°C	3.1	3.3	3.5	
	$I_o=1mA$ to 70mA		3.1	3.3	3.5	
Input regulation	$V_i=5.5v$ to 18v	25°C		30	130	mV
	$V_i=7v$ to 18v			25	90	
Ripple rejection	$V_i=7v$ to 16v $f=120Hz$		42	50		dB
Output regulation	$I_o=1mA$ to 100mA			14	55	mV
	$I_o=1mA$ to 40mA			7	35	
Output noltage voltage	$F=10-100Hz$			41		uV
Dropout voltage				1.7		V
Bias current		125°C		2.5	6	mA
					5.5	
Bias current change	$V_i=7v$ to 18v	0 to 125°C			1.5	
	$I_o=1mA$ to 40mA				0.1	

78L05nd3 electrical characteristics at specified virtual junction temperature,  $V_i=10V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L05nd3			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	4.8	5.0	5.2	V
	$I_o=1mA$ to 40mA $V_i=7v$ to 20v	0 to 125°C	4.7	5.0	5.3	
	$I_o=1mA$ to 70mA		4.7	5.0	5.3	
Input regulation	$V_i=7v$ to 20v	25°C		32	150	mV
	$V_i=8v$ to 20v			26	100	
Ripple rejection	$V_i=8v$ to 18v $f=120Hz$		41	49		dB
Output regulation	$I_o=1mA$ to 100mA			15	60	mV
	$I_o=1mA$ to 40mA			8	30	
Output noltage voltage	$F=10-100Hz$			42		uV
Dropout voltage				1.7		V
Bias current		125°C		2.6	6	mA
					5.5	
Bias current change	$V_i=8v$ to 20v	0 to 125°C			1.5	
	$I_o=1mA$ to 40mA				0.1	

## 3-Terminal Regulators

78L06nd3 electrical characteristics at specified virtual junction temperature,  $V_i=11V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L06nd3			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	5.7	6.0	6.3	V
	$I_o=1mA$ to 40mA $V_i=8v$ to 20v	0 to 125°C	5.7	6.0	6.3	
	$I_o=1mA$ to 70mA		5.7	6.0	6.3	
Input regulation	$V_i=8v$ to 20v	25°C		35	175	mV
	$V_i=9v$ to 20v			29	125	
Ripple rejection	$V_i=9v$ to 19v $f=120Hz$		40	48		dB
Output regulation	$I_o=1mA$ to 100mA			16	80	mV
	$I_o=1mA$ to 40mA			9	40	
Output noltage voltage	$F=10-100Hz$			46		uV
Dropout voltage				1.7		V
Bias current		125°C		2.7	6	mA
					5.5	
Bias current change	$V_i=9v$ to 20v	0 to 125°C			1.5	
	$I_o=1mA$ to 40mA				0.1	

78L08nd3 electrical characteristics at specified virtual junction temperature,  $V_i=14V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L08nd3			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	7.7	8.0	8.3	V
	$I_o=1mA$ to 40mA $V_i=10.5v$ to 23v	0 to 125°C	7.6	8.0	8.4	
	$I_o=1mA$ to 70mA		7.6	8.0	8.4	
Input regulation	$V_i=10.5v$ to 23v	25°C		42	175	mV
	$V_i=11v$ to 23v			36	125	
Ripple rejection	$V_i=13v$ to 23v $f=120Hz$		37	46		dB
Output regulation	$I_o=1mA$ to 100mA			18	80	mV
	$I_o=1mA$ to 40mA			10	40	
Output noltage voltage	$F=10-100Hz$			54		uV
Dropout voltage				1.7		V
Bias current		125°C		2.8	6	mA
					5.5	
Bias current change	$V_i=11v$ to 23v	0 to 125°C			1.5	
	$I_o=1mA$ to 40mA				0.1	

## 3-Terminal Regulators

78L09nd3 electrical characteristics at specified virtual junction temperature,  $V_i=16V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L09nd3			UNIT	
			MIN	TYP	MAX		
Output voltage**		25°C	8.6	9.0	9.4	V	
	$I_o=1mA$ to 40mA $V_i=12v$ to 24v	0 to 125°C	8.5	9.0	9.5		
	$I_o=1mA$ to 70mA		8.5	9.0	9.5		
Input regulation	$V_i=12v$ to 24v	25°C		45	175	mV	
	$V_i=13v$ to 24v			40	125		
Ripple rejection	$V_i=15v$ to 25v $f=120Hz$		38	45		dB	
Output regulation	$I_o=1mA$ to 100mA			19	90	mV	
	$I_o=1mA$ to 40mA			11	40		
Output noltage voltage	$F=10-100Hz$			58		uV	
Dropout voltage				1.7		V	
Bias current			125°C		2.9	6.0	mA
						5.5	
Bias current change	$V_i=13v$ to 24v		0 to 125°C			1.5	
	$I_o=1mA$ to 40mA				0.1		

78L10nd3 electrical characteristics at specified virtual junction temperature,  $V_i=17V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L10nd3			UNIT	
			MIN	TYP	MAX		
Output voltage**		25°C	9.6	10	10.4	V	
	$I_o=1mA$ to 40mA $V_i=13v$ to 25v	0 to 125°C	9.5	10	10.5		
	$I_o=1mA$ to 70mA		9.5	10	10.5		
Input regulation	$V_i=13v$ to 25v	25°C		51	175	mV	
	$V_i=14v$ to 25v			42	125		
Ripple rejection	$V_i=15v$ to 25v $f=120Hz$		37	44		dB	
Output regulation	$I_o=1mA$ to 100mA			20	90	mV	
	$I_o=1mA$ to 40mA			11	40		
Output noltage voltage	$F=10-100Hz$			62		uV	
Dropout voltage				1.7		V	
Bias current			125°C		3.0	6.0	mA
						5.5	
Bias current change	$V_i=14v$ to 25v		0 to 125°C			1.5	
	$I_o=1mA$ to 40mA				0.1		

## 3-Terminal Regulators

78L12nd3 electrical characteristics at specified virtual junction temperature,  $V_i=19V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L12nd3			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	11.5	12	12.5	V
	$I_o=1mA$ to 40mA $V_i=14v$ to 27v	0 to 125°C	11.4	12	12.6	
	$I_o=1mA$ to 70mA		11.4	12	12.6	
Input regulation	$V_i=14v$ to 27v	25°C		55	250	mV
	$V_i=16v$ to 27v			49	200	
Ripple rejection	$V_i=15v$ to 25v $f=120Hz$		37	42		dB
Output regulation	$I_o=1mA$ to 100mA			22	100	mV
	$I_o=1mA$ to 40mA			13	50	
Output noltage voltage	$F=10-100Hz$			70		uV
Dropout voltage				1.7		V
Bias current		125°C		3.1	6.5	mA
		0 to 125°C			6.0	
Bias current change	$V_i=16v$ to 27v				1.5	
	$I_o=1mA$ to 40mA			0.1		

78L15nd3 electrical characteristics at specified virtual junction temperature,  $V_i=23V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L15nd3			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	14.4	15	15.6	V
	$I_o=1mA$ to 40mA $V_i=17.5v$ to 30v	0 to 125°C	14.2	15	15.8	
	$I_o=1mA$ to 70mA		14.2	15	15.8	
Input regulation	$V_i=17.5v$ to 30v	25°C		65	300	mV
	$V_i=19v$ to 30v			58	250	
Ripple rejection	$V_i=18.5v$ to 28.5v $f=120Hz$		34	39		dB
Output regulation	$I_o=1mA$ to 100mA			25	150	mV
	$I_o=1mA$ to 40mA			15	75	
Output noltage voltage	$F=10-100Hz$			82		uV
Dropout voltage				1.7		V
Bias current		125°C		3.4	6.5	mA
		0 to 125°C			6.0	
Bias current change	$V_i=19v$ to 30v				1.5	
	$I_o=1mA$ to 40mA			0.1		

## 3-Terminal Regulators

78L18nd3 electrical characteristics at specified virtual junction temperature,  $V_i=26V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L18nd3			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	17.3	18	18.7	V
	$I_o=1mA$ to 40mA $V_i=20.5v$ to 33v	0 to 125°C	17.1	18	18.9	
	$I_o=1mA$ to 70mA		17.1	18	18.9	
Input regulation	$V_i=20.5v$ to 33v	25°C		70	360	mV
	$V_i=22v$ to 33v			64	300	
Ripple rejection	$V_i=21.5v$ to 31.5v $f=120Hz$		32	36		dB
Output regulation	$I_o=1mA$ to 100mA			27	180	mV
	$I_o=1mA$ to 40mA			19	90	
Output noltage voltage	$F=10-100Hz$			89		uV
Dropout voltage					1.7	V
Bias current		125°C		3.5	6.5	mA
					6.0	
Bias current change	$V_i=22v$ to 33v	0 to 125°C			1.5	
	$I_o=1mA$ to 40mA				0.1	

78L24nd3 electrical characteristics at specified virtual junction temperature,  $V_i=32V$ ,  $I_o=40mA$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		78L24nd3			UNIT
			MIN	TYP	MAX	
Output voltage**		25°C	23	24	25	V
	$I_o=1mA$ to 40mA $V_i=26.5v$ to 39v	0 to 125°C	22.8	24	25.2	
	$I_o=1mA$ to 70mA		22.8	24	25.2	
Input regulation	$V_i=26.5v$ to 39v	25°C		95	480	mV
	$V_i=29v$ to 39v			78	400	
Ripple rejection	$V_i=27.5v$ to 37.5v $f=120Hz$		30	33		dB
Output regulation	$I_o=1mA$ to 100mA			41	240	mV
	$I_o=1mA$ to 40mA			28	120	
Output noltage voltage	$F=10-100Hz$			97		uV
Dropout voltage					1.7	V
Bias current		125°C		3.6	6.5	mA
					6.0	
Bias current change	$V_i=28v$ to 39v	0 to 125°C			1.5	
	$I_o=1mA$ to 40mA				0.1	

\*Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

\*\*This specification applies only for dc power dissipation permitted by absolute maximum ratings.

## 3-Terminal Regulators

### APPLICATION INFORMATION

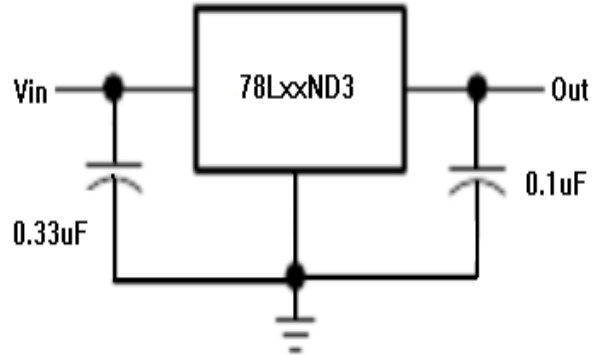


Figure 1. Fixed Output Regulator

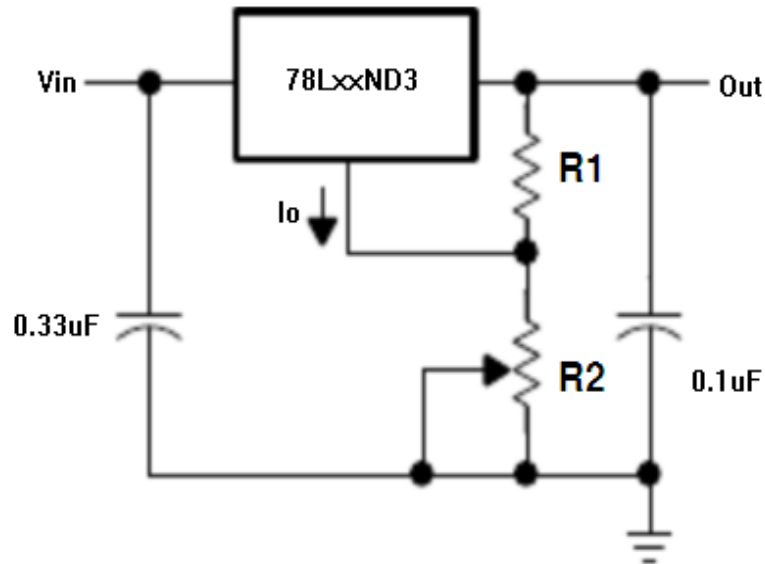


Figure 2. Adjustable OutPut Regulator

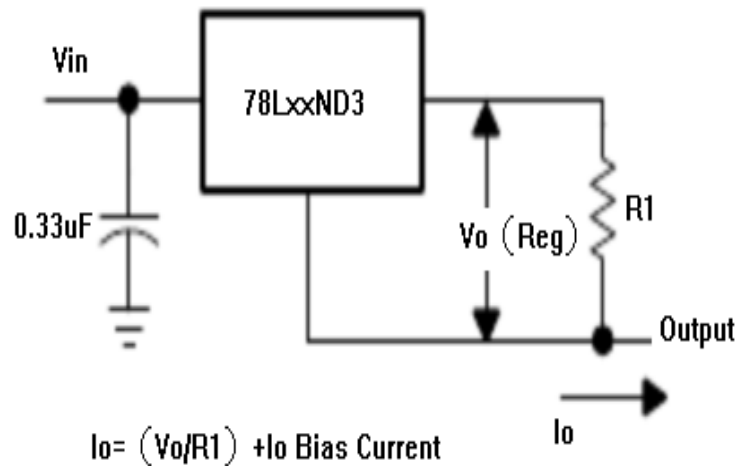
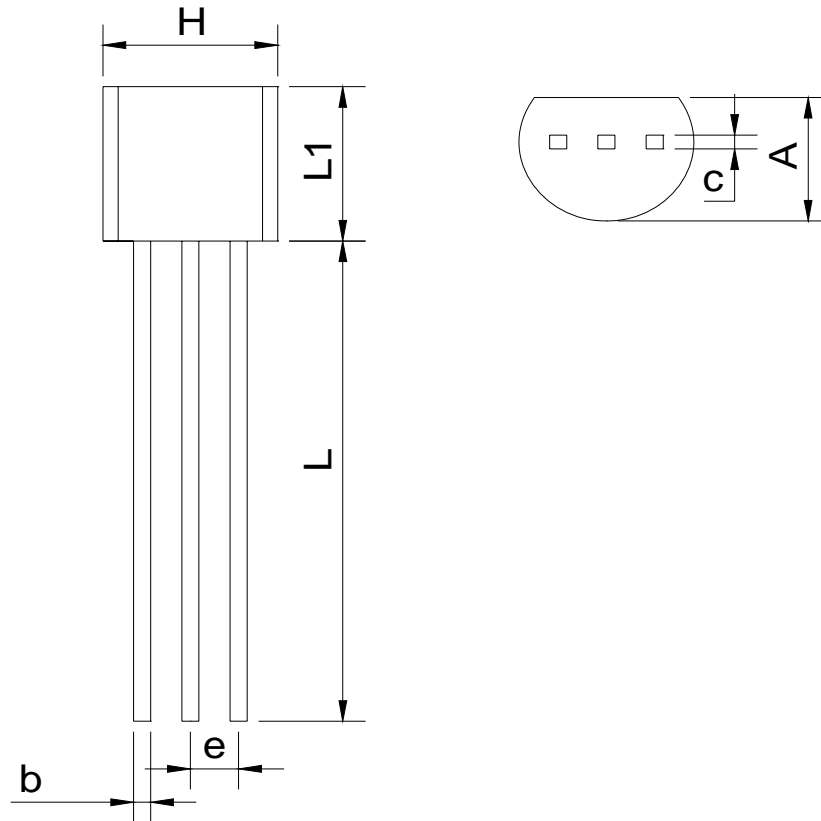


Figure 3. Current Regulator

## 3-Terminal Regulators

### Package Outline Dimensions

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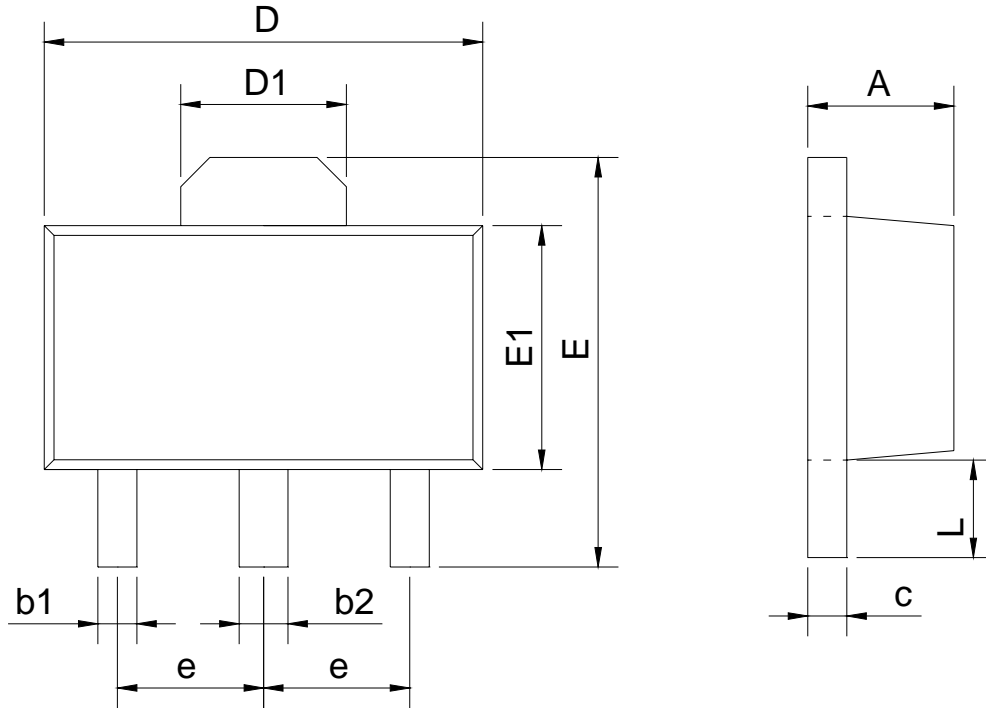


SYMBOL	mm	
	min	max
A	3.40	3.80
b	0.40	0.50
c	0.35	0.45
e	1.27BSC	
H	4.40	4.80
L	13.00	15.00
L1	4.30	4.70

## 3-Terminal Regulators

### Package Outline Dimensions

SOT89



SYMBOL	mm	
	min	max
A	1.40	1.60
b1	0.35	0.50
b2	0.45	0.60
c	0.36	0.46
D	4.30	4.70
D1	1.40	1.80
E	4.00	4.40
E1	2.30	2.70
e	1.50BSC	
L	0.80	1.20