

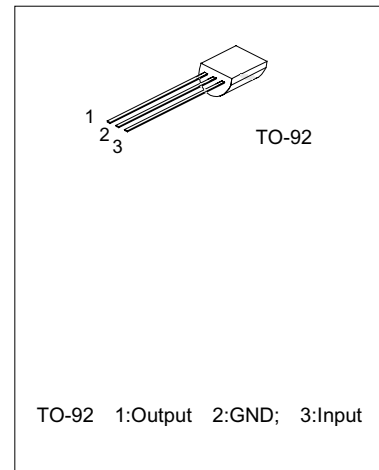
LR78L00 Series 3-Terminal 0.1A Positive Voltage Regulators

DESCRIPTION

The LRC LR78LXX family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 100mA.

FEATURES

- *Output current up to 100mA
- *Fixed output voltage of 5V, 6V, 8V, 9V, 12V, 15V, 18V and 24V available
- *Thermal overload shutdown protection
- *Short circuit current limiting

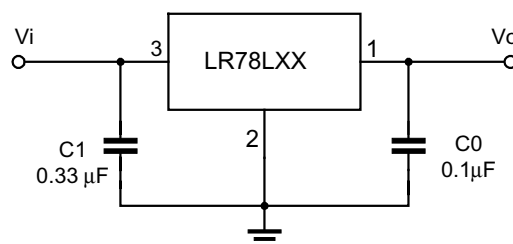


ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Input voltage (for $V_o=5\sim 9V$) (for $V_o=12\sim 24V$)	V_i		30	V
	V_i		35	V
Output Current	I_o		100	mA
Power Dissipation	PD			mW
		TO-92	625	
SOT-89	350			
Operating Junction Temperature Range	T_{OPR}	0	+150	°C
Storage Temperature Range	T_{STG}	-55	+150	°C

APPLICATION CIRCUIT



Note 1: To specify an output voltage, substitute voltage value for "XX".

Note 2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

LR78L00 Series 3-Terminal 0.1A Positive Voltage Regulators

LR78L05 ELECTRICAL CHARACTERISTICS

($V_I=10V$, $I_o=40mA$, $0^\circ C < T_j < 125^\circ C$, $C_1=0.33\mu F$, $C_o=0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
Output Voltage	V_o	$T_j=25^\circ C$	4.80	5.0	5.20	V
		$7V \leq V_I \leq 20V, I_o=1mA-40mA$	4.75		5.25	V
		$7V \leq V_I \leq V_{MAX}, I_o=1mA-70mA$	4.75		5.25	V (note 2)
Load Regulation	V_o	$T_j=25^\circ C, I_o=1mA-100mA$		11	60	mV
		$T_j=25^\circ C, I_o=1mA-40mA$		5.0	30	mV
Line regulation	V_o	$7V \leq V_I \leq 20V, T_j=25^\circ C$		32	150	mV
		$8V \leq V_I \leq 20V, T_j=25^\circ C$		26	100	mV
Quiescent Current	I_q	$V_I=10V, I_o=0mA, T_j=25^\circ C$		3.8	6.1	mA
Quiescent Current Change	ΔI_q	$8V \leq V_I \leq 20V$			1.5	mA
	ΔI_q	$1mA \leq V_I \leq 40mA$			0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$		42		μV
Ripple Rejection	RR	$8V \leq V_I \leq 20V, f=120Hz, T_j=25^\circ C$	41	49		dB
Dropout Voltage	V_d	$T_j=25^\circ C$		1.7		V

LR78L06 ELECTRICAL CHARACTERISTICS

($V_I=12V$, $I_o=40mA$, $0^\circ C < T_j < 125^\circ C$, $C_1=0.33\mu F$, $C_o=0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
Output Voltage	V_o	$T_j=25^\circ C$	5.76	6.0	6.24	V
		$8.5V \leq V_I \leq 20V, I_o=1mA-40mA$	5.70		6.30	V
		$8.5V \leq V_I \leq V_{MAX}, I_o=1mA-70mA$	5.70		6.30	V (note 2)
Load Regulation	V_o	$T_j=25^\circ C, I_o=1mA-100mA$		12.8	80	mV
		$T_j=25^\circ C, I_o=1mA-70mA$		5.8	40	mV
Line regulation	V_o	$8.5V \leq V_I \leq 20V, T_j=25^\circ C$		64	175	mV
		$9V \leq V_I \leq 20V, T_j=25^\circ C$		54	125	mV
Quiescent Current	I_q	$V_I=12V, I_o=0mA, T_j=25^\circ C$		3.9	6.0	mA
Quiescent Current Change	ΔI_q	$9V \leq V_I \leq 20V$			1.5	mA
	ΔI_q	$1mA \leq V_I \leq 40mA$			0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$		49		μV
Ripple Rejection	RR	$10V \leq V_I \leq 20V, f=120Hz, T_j=25^\circ C$	40	46		dB
Dropout Voltage	V_d	$T_j=25^\circ C$		1.7		V

LR78L00 Series 3-Terminal 0.1A Positive Voltage Regulators

LR78L00 ELECTRICAL CHARACTERISTICS

($V_I=14V, I_O=40mA, 0^\circ C < T_j < 125^\circ C, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	7.68	8.0	8.32	V
		10.5V ≤ Vi ≤ 23V, Io=1mA-40mA	7.60		8.40	V
		10.5V ≤ Vi ≤ VMAX, Io=1mA-70mA	7.60		8.40	V (note 2)
Load Regulation	Vo	Tj=25°C, Io=1mA-100mA		15	80	mV
		Tj=25°C, Io=1mA-70mA		8.0	40	mV
Line regulation	Vo	10.5V ≤ Vi ≤ 23V, Tj=25°C		10	175	mV
		11V ≤ Vi ≤ 23V, Tj=25°C		8	125	mV
Quiescent Current	Iq	VIN=14V, Io=0mA, Tj=25°C		2.0	5.5	mA
Quiescent Current Change	ΔIq	11V ≤ Vi ≤ 23V			1.5	mA
	ΔIq	1mA ≤ Vi ≤ 40mA			0.1	mA
Output Noise Voltage	VN	10Hz ≤ f ≤ 100kHz		49		uV
Ripple Rejection	RR	11V ≤ Vi ≤ 23V, f=120Hz, Tj=25°C	39	70		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

LR78L09 ELECTRICAL CHARACTERISTICS

($V_I=15V, I_O=40mA, 0^\circ C < T_j < 125^\circ C, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	8.64	9.0	9.36	V
		11.5V ≤ Vi ≤ 24V, Io=1mA-40mA	8.55		9.45	V
		11.5V ≤ Vi ≤ VMAX, Io=1mA-70mA	8.55		9.45	V (note 2)
Load Regulation	Vo	Tj=25°C, Io=1mA-100mA		20	90	mV
		Tj=25°C, Io=1mA-40mA		11	45	mV
Line regulation	Vo	11.5V ≤ Vi ≤ 24V, Tj=25°C		90	200	mV
		13V ≤ Vi ≤ 24V, Tj=25°C		100	150	mV
Quiescent Current	Iq	VIN=15V, Io=0mA, Tj=25°C		4.1	6.0	mA
Quiescent Current Change	ΔIq	13V ≤ Vi ≤ 24V			1.5	mA
	ΔIq	1mA ≤ Vi ≤ 40mA			0.1	mA
Output Noise Voltage	VN	10Hz ≤ f ≤ 100kHz		58		UV
Ripple Rejection	RR	12V ≤ Vi ≤ 23V, f=120Hz, Tj=25°C	38	44		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

LR78L00 Series3-Terminal 0.1A Positive Voltage Regulators

LR78L12 ELECTRICAL CHARACTERISTICS

($V_I=19V, I_O=40mA, 0^\circ C < T_J < 125^\circ C, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	11.5	12.0	12.5	V
		14.5V<=Vi<=27V, Io=1mA-40mA	11.40		12.60	V
		14.5V<=Vi<=VMAX, Io=1mA-70mA	11.40		12.60	V (note 2)
Load Regulation	Vo	Tj=25°C, Io=1mA-100mA		25	150	mV
		Tj=25°C, Io=1mA-40mA		12	75	mV
Line regulation	Vo	14.5V<=Vi<=27V, Tj=25°C		55	250	mV
		16V<=Vi<=27V, Tj=25°C		49	200	mV
Quiescent Current	Iq	VIN=19V, Io=0mA, Tj=25°C		4.3	6.5	mA
Quiescent Current Change	ΔIq	16V<=Vi<=27V			1.5	mA
	ΔIq	1mA<=Vi<=40mA			0.1	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		70		uV
Ripple Rejection	RR	15V<=Vi<=25V, f=120Hz, Tj=25°C	37	42		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

LR78L15 ELECTRICAL CHARACTERISTICS

($V_I=23V, I_O=40mA, 0^\circ C < T_J < 125^\circ C, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C	14.40	15.0	15.60	V
		17.5V<=Vi<=30V, Io=1mA-40mA	14.25		15.75	V
		17.5V<=Vi<=VMAX, Io=1mA-70mA	14.25		15.75	V (note 2)
Load Regulation	Vo	Tj=25°C, Io=1mA-100mA		20	150	mV
		Tj=25°C, Io=1mA-70mA		25	150	mV
Line regulation	Vo	17.5V<=Vi<=30V, Tj=25°C		25	150	mV
		20V<=Vi<=30V, Tj=25°C		15	75	mV
Quiescent Current	Iq	VIN=23V, Io=0mA, Tj=25°C		4.6	6.5	mA
Quiescent Current Change	ΔIq	20V<=Vi<=30V			1.5	mA
	ΔIq	1mA<=Vi<=40mA			0.1	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		82		uV
Ripple Rejection	RR	18.5V<=Vi<=28.5V, f=120Hz, Tj=25°C	34	39		dB
Dropout Voltage	Vd	Tj=25°C		1.7		V

LR78L00 Series3-Terminal 0.1A Positive Voltage Regulators

LR78L18 ELECTRICAL CHARACTERISTICS

($V_I=27V, I_o=40mA, 0^\circ C < T_j < 125^\circ C, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_o	$T_j=25^\circ C$	17.30	18.0	18.70	V
		$21V \leq V_I \leq 33V, I_o=1mA-40mA$	17.10		18.90	V
		$21V \leq V_I \leq V_{MAX}, I_o=1mA-70mA$	17.10		18.90	V (note 2)
Load Regulation	V_o	$T_j=25^\circ C, I_o=1mA-100mA$		30	180	mV
		$T_j=25^\circ C, I_o=1mA-40mA$		19	90	mV
Line regulation	V_o	$21V \leq V_I \leq 33V, T_j=25^\circ C$		70	360	mV
		$22V \leq V_I \leq 33V, T_j=25^\circ C$		60	300	mV
Quiescent Current	I_q	$V_{IN}=27V, I_o=0mA, T_j=25^\circ C$		4.7	6.5	mA
Quiescent Current Change	ΔI_q	$21V \leq V_I \leq 33V$			1.5	mA
	ΔI_q	$1mA \leq V_I \leq 40mA$			0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$		150		μV
Ripple Rejection	RR	$23V \leq V_I \leq 33V, f=120Hz, T_j=25^\circ C$	32	36		dB
Dropout Voltage	V_d	$T_j=25^\circ C$		1.7		V

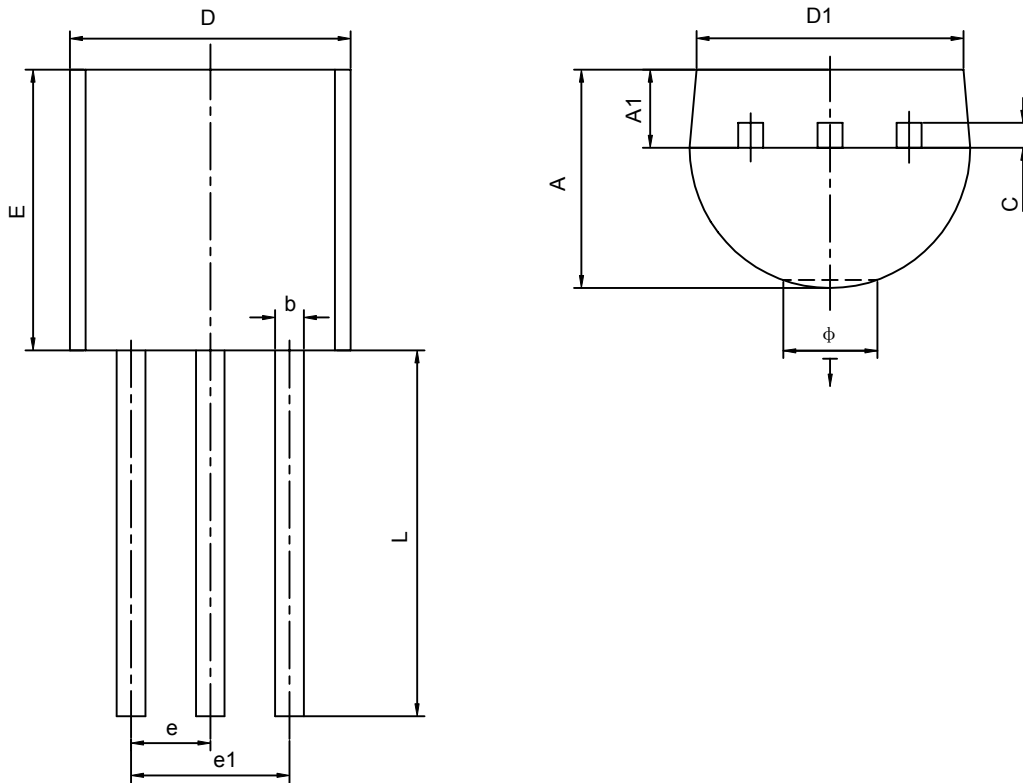
LR78L24 ELECTRICAL CHARACTERISTICS

($V_I=33V, I_o=40mA, 0^\circ C < T_j < 125^\circ C, C_1=0.33\mu F, C_o=0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_o	$T_j=25^\circ C$	23.04	24.0	24.96	V
		$27V \leq V_I \leq 38V, I_o=1mA-40mA$	22.8		25.2	V
		$27V \leq V_I \leq V_{MAX}, I_o=1mA-70mA$	22.8		25.2	V (note 2)
Load Regulation	V_o	$T_j=25^\circ C, I_o=1mA-100mA$		40	200	mV
		$T_j=25^\circ C, I_o=1mA-40mA$		20	100	mV
Line regulation	V_o	$27V \leq V_I \leq 38V, T_j=25^\circ C$		160	360	mV
		$28V \leq V_I \leq 38V, T_j=25^\circ C$		150	300	mV
Quiescent Current	I_q	$V_{IN}=33V, I_o=0mA, T_j=25^\circ C$		4.7	6.5	mA
Quiescent Current Change	ΔI_q	$27V \leq V_I \leq 38V$			1.5	mA
	ΔI_q	$1mA \leq V_I \leq 40mA$			0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$		200		μV
Ripple Rejection	RR	$27V \leq V_I \leq 38V, f=120Hz, T_j=25^\circ C$	34	45		dB
Dropout Voltage	V_d	$T_j=25^\circ C$		1.7		V

Note 1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB. The data above represent pulse test conditions with junction temperatures specified at the initiation of test.

Note 2: Power dissipation < 0.5W

TO-92 PACKAGE OUTLINE DIMENSIONS


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.400	4.700	0.173	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270TYP		0.050TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Ö		1.600		0.063
↓	0.000	0.380	0.000	0.015