



78LXXS

LINEAR INTEGRATED CIRCUIT

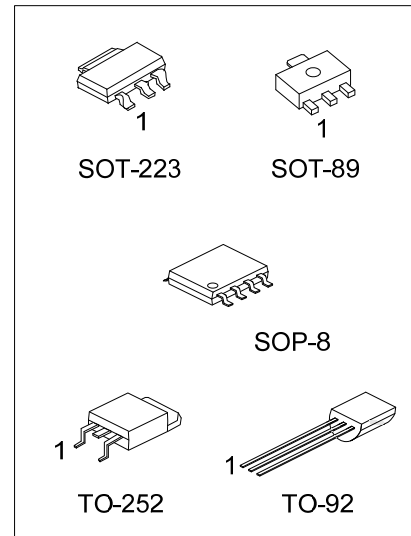
3-TERMINAL 0.1A POSITIVE VOLTAGE REGULATOR

DESCRIPTION

The UTC **78LXXS** 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, 10V, 12V and 15V available
- * Thermal overload shutdown protection
- * Short circuit current limiting



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment				Packing
Lead Free	Halogen Free		Pin Code	1	2	3	
78LXXSL-AA3-x-R	78LXXSG-AA3-x-R	SOT-223	A	G	O	I	Tape Reel
78LXXSL-AB3-x-R	78LXXSG-AB3-x-R	SOT-89	B	O	G	I	
78LXXSL-TN3-x-R	78LXXSG-TN3-x-R	TO-252	C	G	I	O	
			D	I	G	O	
78LXXSL-S08-R	78LXXSG-S08-R	SOP-8	OGGNNGGI				Tape Reel
78LXXSL-T92-B	78LXXSG-T92-B	TO-92	OGI				Tape Box
78LXXSL-T92-K	78LXXSG-T92-K	TO-92	OGI				Bulk

Note: 1. XX: Output Voltage, refer to Marking Information.

2. Pin Assignment: O: Output G: GND I: Input

<p>78LXXSG-AA3-x-R</p>	<p>(1) R: Tape Reel, B: Tape Box, K: Bulk (2) refer to Pin Assignment (3) AA3: SOT-223, AB3: SOT-89, TN3: TO-252 S08: SOP-8, T92: TO-92 (4) G: Halogen Free and Lead Free, L: Lead Free (5) XX: refer to Marking Information</p>
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MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-223	05: 5.0V 06: 6.0V 08: 8.0V 09: 9.0V 10: 10V 12: 12V 15: 15V	
SOT-89		
TO-252		
SOP-8		
TO-92		

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage	V _{OUT} =5~9V	V _{IN}	30	V
	V _{OUT} =10~18V		35	V
	V _{OUT} =24V		40	V
Output Current		I _{OUT}	100	mA
Power Dissipation	SOT-223	P _D	600	mW
	SOT-89		550	mW
	TO-252		890	mW
	SOP-8		660	mW
	TO-92		625	mW
Junction Temperature		T _J	+150	°C
Operating Temperature (Note 2)		T _{OPR}	-40 ~ +125	°C
Storage Temperature		T _{STG}	-55 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. It is guarantee by design, not 100% be tested.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	SOT-223	θ _{JA}	165	°C/W
	SOT-89		180	°C/W
	TO-252		112	°C/W
	SOP-8		150	°C/W
	TO-92		160	°C/W
Junction to Case	SOT-223	θ _{JC}	15	°C/W
	SOT-89		50	°C/W
	TO-252		12	°C/W
	SOP-8		20	°C/W
	TO-92		83	°C/W

■ ELECTRICAL CHARACTERISTICS

For UTC78L05S (V_{IN}=10V, I_{OUT}=40mA, 0°C<T_J<150°C, C1=0.33μF, Co=0.1μF, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V _{OUT}	T _J =25°C	4.80	5.0	5.20	V
		7V≤V _{IN} ≤20V, I _{OUT} =1mA-40mA	4.75		5.25	V
		7V≤V _{IN} ≤V _{MAX} , I _{OUT} =1mA-70mA	4.75		5.25	V(Note 2)
Load Regulation	ΔV _{OUT}	T _J =25°C, I _{OUT} =1mA-100mA		15	60	mV
		T _J =25°C, I _{OUT} =1mA-40mA		8	30	mV
Line regulation	ΔV _{OUT}	7V≤V _{IN} ≤20V, T _J =25°C		8	150	mV
		8V≤V _{IN} ≤20V, T _J =25°C		6	100	mV
Quiescent Current	I _Q	V _{IN} =10V, I _{OUT} =0mA, T _J =25°C		2.0	5.5	mA
Quiescent Current Change	ΔI _Q	8V≤V _{IN} ≤20V			1.5	mA
		1mA≤I _{OUT} ≤40mA			0.1	mA
Output Noise Voltage	e _N	10Hz≤f≤100kHz		40		μV
Temperature coefficient of V _{OUT}	ΔV _O /ΔT	I _{OUT} =5mA		1.0		mV/°C
Ripple Rejection	RR	8V≤V _{IN} ≤20V, f=120Hz, T _J =25°C		50		dB
Dropout Voltage	V _D	T _J =25°C		1.7		V

■ ELECTRICAL CHARACTERISTICS

For UTC78L06S ($V_{IN}=12V$, $I_{OUT}=40mA$, $0^{\circ}C < T_J < 150^{\circ}C$, $C1=0.33\mu F$, $C0=0.1\mu F$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	5.76	6.0	6.24	V
		$8.5V \leq V_{IN} \leq 20V$, $I_{OUT}=1mA-40mA$	5.70		6.30	V
		$8.5V \leq V_{IN} \leq V_{MAX}$, $I_{OUT}=1mA-70mA$	5.70		6.30	V(Note 2)
Load Regulation	ΔV_{OUT}	$T_J=25^{\circ}C$, $I_{OUT}=1mA-100mA$		16	80	mV
		$T_J=25^{\circ}C$, $I_{OUT}=1mA-40mA$		9	40	mV
Line regulation	ΔV_{OUT}	$8.5V \leq V_{IN} \leq 20V$, $T_J=25^{\circ}C$		10	175	mV
		$9V \leq V_{IN} \leq 20V$, $T_J=25^{\circ}C$		8	125	mV
Quiescent Current	I_Q	$V_{IN}=12V$, $I_{OUT}=0mA$, $T_J=25^{\circ}C$		2.0	5.5	mA
Quiescent Current Change	ΔI_Q	$9V \leq V_{IN} \leq 20V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		49		μV
Temperature coefficient of V_{OUT}	$\Delta V_O/\Delta T$	$I_{OUT}=5mA$		1.3		$mV/^{\circ}C$
Ripple Rejection	RR	$10V \leq V_{IN} \leq 20V$, $f=120Hz$, $T_J=25^{\circ}C$		50		dB
Dropout Voltage	V_D	$T_J=25^{\circ}C$		1.7		V

For UTC78L08S ($V_{IN}=14V$, $I_{OUT}=40mA$, $0^{\circ}C < T_J < 150^{\circ}C$, $C1=0.33\mu F$, $C0=0.1\mu F$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	7.68	8.0	8.32	V
		$10.5V \leq V_{IN} \leq 23V$, $I_{OUT}=1mA-40mA$	7.60		8.40	V
		$10.5V \leq V_{IN} \leq V_{MAX}$, $I_{OUT}=1mA-70mA$	7.60		8.40	V(Note 2)
Load Regulation	ΔV_{OUT}	$T_J=25^{\circ}C$, $I_{OUT}=1mA-100mA$		18	80	mV
		$T_J=25^{\circ}C$, $I_{OUT}=1mA-40mA$		10	40	mV
Line regulation	ΔV_{OUT}	$10.5V \leq V_{IN} \leq 23V$, $T_J=25^{\circ}C$		12	175	mV
		$11V \leq V_{IN} \leq 23V$, $T_J=25^{\circ}C$		10	125	mV
Quiescent Current	I_Q	$V_{IN}=14V$, $I_{OUT}=0mA$, $T_J=25^{\circ}C$		2.0	5.5	mA
Quiescent Current Change	ΔI_Q	$11V \leq V_{IN} \leq 23V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		49		μV
Temperature coefficient of V_o	$\Delta V_O/\Delta T$	$I_{OUT}=5mA$		1.5		$mV/^{\circ}C$
Ripple Rejection	RR	$11V \leq V_{IN} \leq 23V$, $f=120Hz$, $T_J=25^{\circ}C$		50		dB
Dropout Voltage	V_D	$T_J=25^{\circ}C$		1.7		V

For UTC78L09S ($V_{IN}=15V$, $I_{OUT}=40mA$, $0^{\circ}C < T_J < 150^{\circ}C$, $C1=0.33\mu F$, $C0=0.1\mu F$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	8.64	9.0	9.36	V
		$11.5V \leq V_{IN} \leq 24V$, $I_{OUT}=1mA-40mA$	8.55		9.45	V
		$11.5V \leq V_{IN} \leq V_{MAX}$, $I_{OUT}=1mA-70mA$	8.55		9.45	V(Note 2)
Load Regulation	ΔV_{OUT}	$T_J=25^{\circ}C$, $I_{OUT}=1mA-100mA$		20	90	mV
		$T_J=25^{\circ}C$, $I_{OUT}=1mA-40mA$		10	40	mV
Line regulation	ΔV_{OUT}	$11.5V \leq V_{IN} \leq 24V$, $T_J=25^{\circ}C$		15	200	mV
		$13V \leq V_{IN} \leq 24V$, $T_J=25^{\circ}C$		10	150	mV
Quiescent Current	I_Q	$V_{IN}=15V$, $I_{OUT}=0mA$, $T_J=25^{\circ}C$		2.0	6.0	mA
Quiescent Current Change	ΔI_Q	$13V \leq V_{IN} \leq 24V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		70		μV
Temperature coefficient of V_{OUT}	$\Delta V_O/\Delta T$	$I_{OUT}=5mA$		1.6		$mV/^{\circ}C$
Ripple Rejection	RR	$12V \leq V_{IN} \leq 24V$, $f=120Hz$, $T_J=25^{\circ}C$		50		dB
Dropout Voltage	V_D	$T_J=25^{\circ}C$		1.7		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For UTC78L10S ($V_{IN}=16V$, $I_{OUT}=40mA$, $0^{\circ}C < T_J < 150^{\circ}C$, $C1=0.33\mu F$, $C0=0.1\mu F$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	9.6	10	10.4	V
		$12.5V \leq V_{IN} \leq 25V$, $I_{OUT}=1mA-40mA$	9.5		10.5	V
		$12.5V \leq V_{IN} \leq V_{MAX}$, $I_{OUT}=1mA-70mA$	9.5		10.5	V(Note 2)
Load Regulation	ΔV_{OUT}	$T_J=25^{\circ}C$, $I_{OUT}=1mA-100mA$		20	90	mV
		$T_J=25^{\circ}C$, $I_{OUT}=1mA-40mA$		10	45	mV
Line regulation	ΔV_{OUT}	$12.5V \leq V_{IN} \leq 25V$, $T_J=25^{\circ}C$		25	200	mV
		$14V \leq V_{IN} \leq 25V$, $T_J=25^{\circ}C$		20	170	mV
Quiescent Current	I_Q	$V_{IN}=17V$, $I_{OUT}=0mA$, $T_J=25^{\circ}C$		2.0	6.0	mA
Quiescent Current Change	ΔI_Q	$12.5V \leq V_{IN} \leq 25V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		74		μV
Temperature coefficient of V_{OUT}	$\Delta V_O/\Delta T$	$I_{OUT}=5mA$		1.7		$mV/^{\circ}C$
Ripple Rejection	RR	$15V \leq V_{IN} \leq 25V$, $f=120Hz$, $T_J=25^{\circ}C$		50		dB
Dropout Voltage	V_D	$T_J=25^{\circ}C$		1.7		V

For UTC78L12S ($V_{IN}=19V$, $I_{OUT}=40mA$, $0^{\circ}C < T_J < 150^{\circ}C$, $C1=0.33\mu F$, $C0=0.1\mu F$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	11.52	12	12.48	V
		$14.5V \leq V_{IN} \leq 27V$, $I_{OUT}=1mA-40mA$	11.40		12.60	V
		$14.5V \leq V_{IN} \leq V_{MAX}$, $I_{OUT}=1mA-70mA$	11.40		12.60	V(Note 2)
Load Regulation	ΔV_{OUT}	$T_J=25^{\circ}C$, $I_{OUT}=1mA-100mA$		25	100	mV
		$T_J=25^{\circ}C$, $I_{OUT}=1mA-40mA$		12	50	mV
Line regulation	ΔV_{OUT}	$14.5V \leq V_{IN} \leq 27V$, $T_J=25^{\circ}C$		25	300	mV
		$16V \leq V_{IN} \leq 27V$, $T_J=25^{\circ}C$		20	250	mV
Quiescent Current	I_Q	$V_{IN}=19V$, $I_{OUT}=0mA$, $T_J=25^{\circ}C$		2.0	6.5	mA
Quiescent Current Change	ΔI_Q	$16V \leq V_{IN} \leq 27V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		80		μV
Temperature coefficient of V_{OUT}	$\Delta V_O/\Delta T$	$I_{OUT}=5mA$		1.8		$mV/^{\circ}C$
Ripple Rejection	RR	$15V \leq V_{IN} \leq 25V$, $f=120Hz$, $T_J=25^{\circ}C$		50		dB
Dropout Voltage	V_D	$T_J=25^{\circ}C$		1.7		V

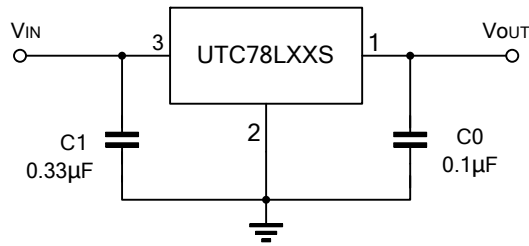
For UTC78L15S ($V_{IN}=23V$, $I_{OUT}=40mA$, $0^{\circ}C < T_J < 150^{\circ}C$, $C1=0.33\mu F$, $C0=0.1\mu F$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	14.40	15	15.60	V
		$17.5V \leq V_{IN} \leq 30V$, $I_{OUT}=1mA-40mA$	14.25		15.75	V
		$17.5V \leq V_{IN} \leq V_{MAX}$, $I_{OUT}=1mA-70mA$	14.25		15.75	V(Note 2)
Load Regulation	ΔV_{OUT}	$T_J=25^{\circ}C$, $I_{OUT}=1mA-100mA$		25	150	mV
		$T_J=25^{\circ}C$, $I_{OUT}=1mA-40mA$		15	75	mV
Line Regulation	ΔV_{OUT}	$17.5V \leq V_{IN} \leq 30V$, $T_J=25^{\circ}C$		25	150	mV
		$20V \leq V_{IN} \leq 30V$, $T_J=25^{\circ}C$		15	75	mV
Quiescent Current	I_Q	$V_{IN}=23V$, $I_{OUT}=0mA$, $T_J=25^{\circ}C$		2.2	6.5	mA
Quiescent Current Change	ΔI_Q	$20V \leq V_{IN} \leq 30V$			1.5	mA
		$1mA \leq I_{OUT} \leq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leq f \leq 100kHz$		90		μV
Temperature Coefficient of V_{OUT}	$\Delta V_O/\Delta T$	$I_{OUT}=5mA$		2.0		$mV/^{\circ}C$
Ripple Rejection	RR	$18.5V \leq V_{IN} \leq 28.5V$, $f=120Hz$, $T_J=25^{\circ}C$		50		dB
Dropout Voltage	V_D	$T_J=25^{\circ}C$		1.7		V

Notes: 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.

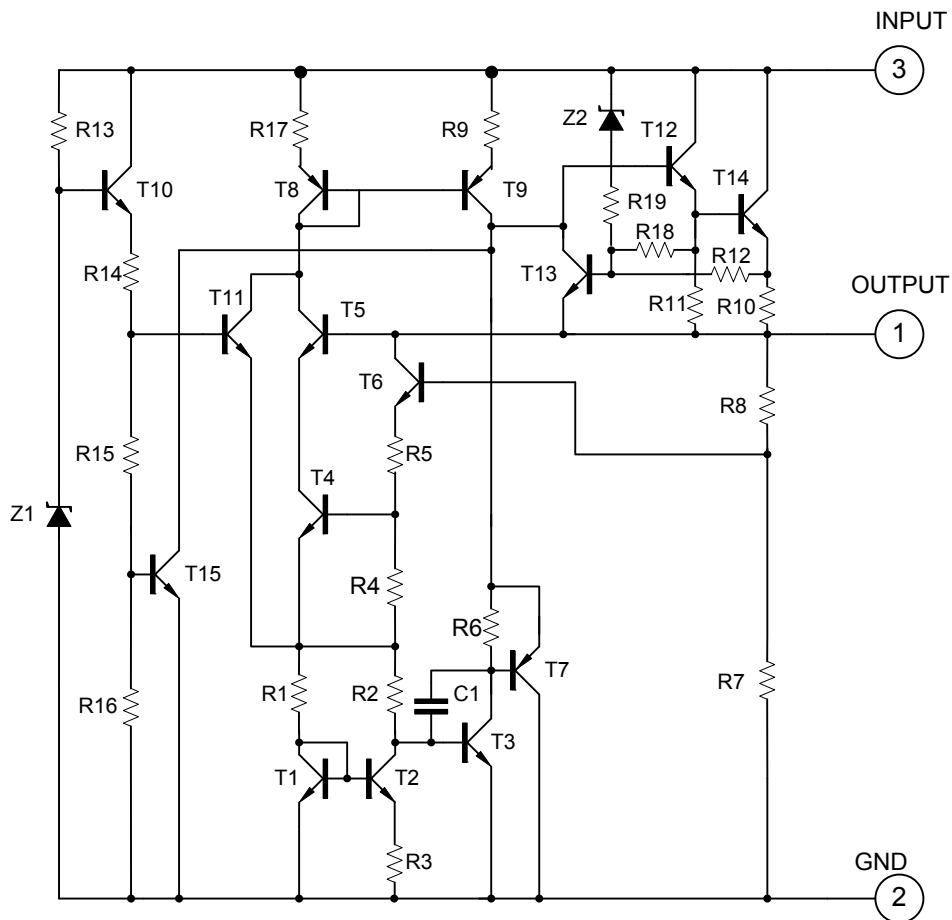
2. Power dissipation $< 0.5W$.

APPLICATION CIRCUIT



- Notes:
1. To specify an output voltage, substitute voltage value for "XX".
 2. Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

TEST CIRCUIT



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