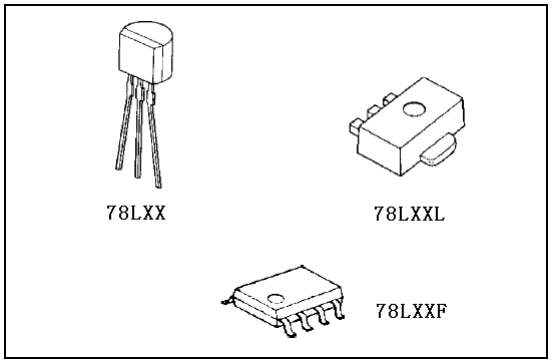
3-TERMINALS POSITIVE VOLTAGE REGULATOR SERIES BL78LXX

DESCRIPTION

The BL78LXX series of fixed voltage monolithic integrated circuit voltage regulators are suitable for applications that required supply up to 100mA.

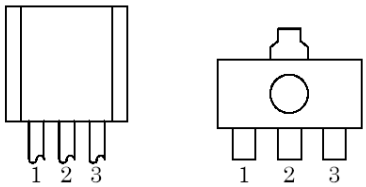
Outline Drawing



FEATURE

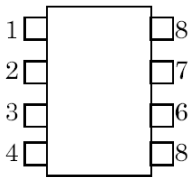
- Maximum output current of 100mA
- Output voltage of 5V, 6V, 8V, 9V, 10V, 12V, 15V and 24V
- Thermal overload protection
- Short circuit current limiting

PIN CONNECTION



PIN FUNCTION:

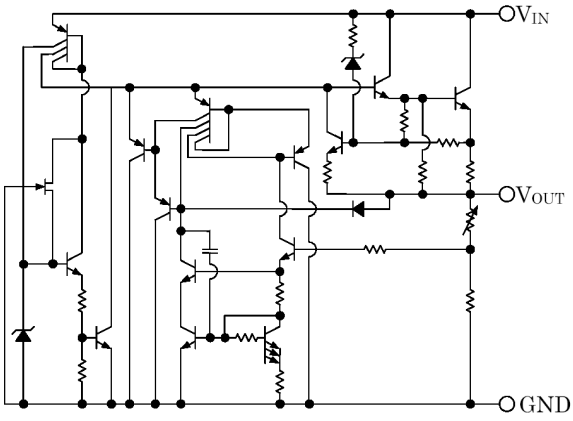
1. OUT
2. GND
3. IN



PIN FUNCTION

1. OUT
2. GND
3. GND
4. NC
5. NC
6. GND
7. GND
8. IN

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

Characteristic		Symbol	Value	Unit
Input Voltage	Vo=5V~8V	Vi	20	V
	Vo=9V~15V		30	
Power Dissipation	TO-92	Pd	625	mW
	SOT-89		350	
	SOP8		300	
Operating Junction Temperature Range		Topr	-20~120	°C
Storage Temperature Range		Tstg	-55~150	°C

BL78L05 ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vi=10V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions		Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	A	Vo	4.90	5.0	5.10	V
		B1		4.80		4.90	
		B2		5.10		5.20	
	7V≤Vi≤20V;Io=1mA~40mA			4.80		5.20	V
	7V≤Vi≤Vmax; Io=1mA~70mA			4.80		5.20	V (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA		ΔVo		11	60	mV
	Tj=25°C; Io=1mA~40mA				5.0	30	mV
Line Regulation	Tj=25°C; 7V≤Vi≤20V		ΔVo		8	150	mV
	Tj=25°C; 8V≤Vi≤20V				6	100	mV
Quiescent Current			Iq		2.0	5.5	mA
Quiescent Current Change	8V≤Vi≤20V		ΔIq			1.5	mA
	1mA≤Io≤40mA					0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz		VN		40		μV
Temperature Coefficient of Vo	Io=5mA		ΔVo/ΔT		-0.65		mV/°C
Ripple Rejection	10V≤Vi≤20V; f=120Hz; Tj=25°C		RR	41	80		dB
Dropout Voltage	Tj=25°C		Vd		1.7		V

BL78L06 ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vi=12V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	Vo	5.75	6.0	6.25	V
	8.5V≤Vi≤20V;Io=1mA~40mA		5.7		6.3	V
	8.5V≤Vi≤Vmax; Io=1mA~70mA		5.7		6.3	V (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA	ΔVo		12.8	80	mV
	Tj=25°C; Io=1mA~40mA			5.8	40	mV
Line Regulation	Tj=25°C; 8.5V≤Vi≤20V	ΔVo		64	175	mV
	Tj=25°C; 9V≤Vi≤20V			54	125	mV
Quiescent Current		Iq		3.9	6.0	mA
Quiescent Current Change	9V≤Vi≤20V	ΔIq			1.5	mA
	1mA≤Io≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	VN		49		μV
Temperature Coefficient of Vo	Io=5mA	ΔVo/ΔT		-0.75		mV/°C
Ripple Rejection	10V≤Vi≤20V; f=120Hz; Tj=25°C	RR	40	46		dB
Dropout Voltage	Tj=25°C	Vd		1.7		V

BL78L08 ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vi=14V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	Vo	7.7	8.0	8.3	V
	10.5V≤Vi≤23V;Io=1mA~40mA		7.6		8.4	V
	10.5V≤Vi≤Vmax; Io=1mA~70mA		7.6		8.4	V (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA	ΔVo		15	80	mV
	Tj=25°C; Io=1mA~40mA			8.0	40	mV
Line Regulation	Tj=25°C; 10.5V≤Vi≤23V	ΔVo		10	175	mV
	Tj=25°C; 11V≤Vi≤23V			8	125	mV
Quiescent Current		Iq		2.0	5.5	mA
Quiescent Current Change	11V≤Vi≤23V	ΔIq			1.5	mA
	1mA≤Io≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	VN		49		μV
Temperature Coefficient of Vo	Io=5mA	ΔVo/ΔT		-0.75		mV/°C
Ripple Rejection	11V≤Vi≤23V; f=120Hz; Tj=25°C	RR	39	70		dB
Dropout Voltage	Tj=25°C	Vd		1.7		V

BL78L09 ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vi=15V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	Vo	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 (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA	ΔVo		20	90	mV
	Tj=25°C; Io=1mA~40mA			10	45	mV
Line Regulation	Tj=25°C; 11.5V≤Vi≤24V	ΔVo		90	200	mV
	Tj=25°C; 13V≤Vi≤24V			100	150	mV
Quiescent Current		Iq		2.0	6.0	mA
Quiescent Current Change	13V≤Vi≤24V	ΔIq			1.5	mA
	1mA≤Io≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	VN		49		μV
Temperature Coefficient of Vo	Io=5mA	ΔVo/ΔT		-0.75		mV/°C
Ripple Rejection	12V≤Vi≤23V; f=120Hz; Tj=25°C	RR	38	44		dB
Dropout Voltage	Tj=25°C	Vd		1.7		V

BL78L10 ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vi=16V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	Vo	9.6	10	10.4	V
	12.5V≤Vi≤23V;Io=1mA~40mA		9.5		10.5	V
	12.5V≤Vi≤Vmax; Io=1mA~70mA		9.5		10.5	V (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA	ΔVo		20	94	mV
	Tj=25°C; Io=1mA~40mA			10	47	mV
Line Regulation	Tj=25°C; 12.5V≤Vi≤23V	ΔVo		100	220	mV
	Tj=25°C; 14V≤Vi≤23V			200	170	mV
Quiescent Current		Iq		4.2	6.5	mA
Quiescent Current Change	12.5V≤Vi≤23V	ΔIq			1.5	mA
	1mA≤Io≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	VN		74		μV
Temperature Coefficient of Vo	Io=5mA	ΔVo/ΔT		-0.95		mV/°C
Ripple Rejection	15V≤Vi≤23V; f=120Hz; Tj=25°C	RR	38	43.		dB
Dropout Voltage	Tj=25°C	Vd		1.7		V

BL78L12 ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vi=19V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	Vo	11.5	15	15.6	V
	14.5V≤Vi≤27V;Io=1mA~40mA		11.4		12.6	V
	14.5V≤Vi≤Vmax; Io=1mA~70mA		11.4		12.6	V (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA	ΔVo		25	150	mV
	Tj=25°C; Io=1mA~40mA			12	75	mV
Line Regulation	Tj=25°C; 14.5V≤Vi≤27V	ΔVo		25	300	mV
	Tj=25°C; 16V≤Vi≤27V			20	250	mV
Quiescent Current		Iq		2.0	6.0	mA
Quiescent Current Change	16V≤Vi≤27V	ΔIq			1.5	mA
	1mA≤Io≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	VN		80		μV
Temperature Coefficient of Vo	Io=5mA	ΔVo/ΔT		-1.0		mV/°C
Ripple Rejection	15V≤Vi≤25V; f=120Hz; Tj=25°C	RR	37	65		dB
Dropout Voltage	Tj=25°C	Vd		1.7		V

BL78L15 ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vi=23V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	Vo	14.4	15	15.6	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 (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA	ΔVo		20	150	mV
	Tj=25°C; Io=1mA~40mA			25	150	mV
Line Regulation	Tj=25°C; 17.5V≤Vi≤30V	ΔVo		25	150	mV
	Tj=25°C; 20V≤Vi≤30V			15	75	mV
Quiescent Current		Iq		2.2	6.5	mA
Quiescent Current Change	20V≤Vi≤30V	ΔIq			1.5	mA
	1mA≤Io≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	VN		90		μV
Temperature Coefficient of Vo	Io=5mA	ΔVo/ΔT		-1.3		mV/°C
Ripple Rejection	18.5V≤Vi≤28.5V; f=120Hz; Tj=25°C	RR	34	63		dB
Dropout Voltage	Tj=25°C	Vd		1.7		V

BL78L18 ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Vi=27V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	Vo	17.3	18	18.7	V
	21V≤Vi≤33V;Io=1mA~40mA		17.1		18.9	V
	21V≤Vi≤Vmax; Io=1mA~70mA		17.1		18.9	V (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA	ΔVo		30	170	mV
	Tj=25°C; Io=1mA~40mA			15	85	mV
Line Regulation	Tj=25°C; 21V≤Vi≤33V	ΔVo		145	300	mV
	Tj=25°C; 22V≤Vi≤33V			135	250	mV
Quiescent Current		Iq		2.0	6.0	mA
Quiescent Current Change	21V≤Vi≤33V	ΔIq			1.5	mA
	1mA≤Io≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	VN		150		μV
Temperature Coefficient of Vo	Io=5mA	ΔVo/ΔT		-1.8		mV/°C
Ripple Rejection	23V≤Vi≤33V; f=120Hz; Tj=25°C	RR	34	48		dB
Dropout Voltage	Tj=25°C	Vd		1.7		V

BL78L24 ELECTRICAL CHARACTERISTICS

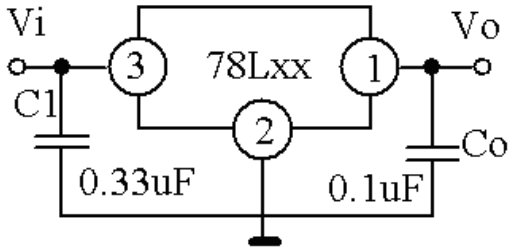
(Unless otherwise specified: Vi=33V; Io=40mA; C1=0.33μF; Co=0.1μF, 0<Tj<125°C)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	Tj=25°C	Vo	23	24	25	V
	27V≤Vi≤38V;Io=1mA~40mA		22.8		25.2	V
	27V≤Vi≤Vmax; Io=1mA~70mA		22.8		25.2	V (note2)
Load Regulation	Tj=25°C; Io=1mA~100mA	ΔVo		40	200	mV
	Tj=25°C; Io=1mA~40mA			20	100	mV
Line Regulation	Tj=25°C; 27V≤Vi≤38V	ΔVo		160	300	mV
	Tj=25°C; 28V≤Vi≤38V			150	250	mV
Quiescent Current		Iq		2.2	6.0	mA
Quiescent Current Change	27V≤Vi≤38V	ΔIq			1.5	mA
	1mA≤Io≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	VN		200		μV
Temperature Coefficient of Vo	Io=5mA	ΔVo/ΔT		-2.0		mV/°C
Ripple Rejection	27V≤Vi≤38V; f=120Hz; Tj=25°C	RR	34	45		dB
Dropout Voltage	Tj=25°C	Vd		1.7		V

Note 1: The Maximum steady state usable output current and input voltage are very dependent on the heating sinking and/or lead temperature length of the package. The date above respresent pulse test conditions with junction temperatures as indicated at the initiation of test.

Note 2:Power dissipation<0.75W

TYPICAL APPLICATION CIRCUIT

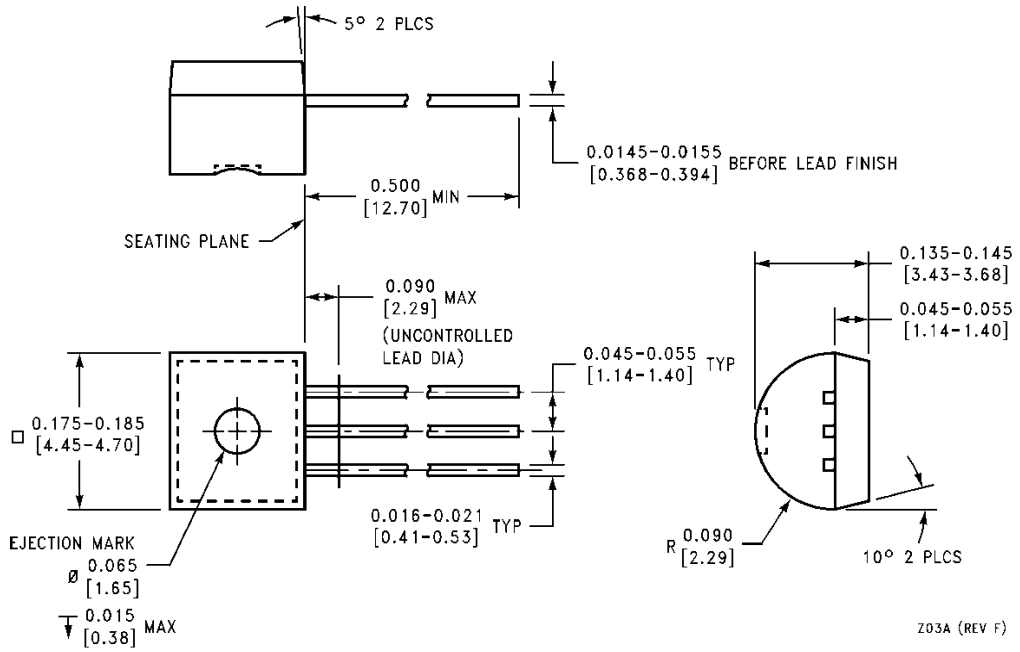


Note 1: To specify an output voltage, substitue voltage value for "xx".

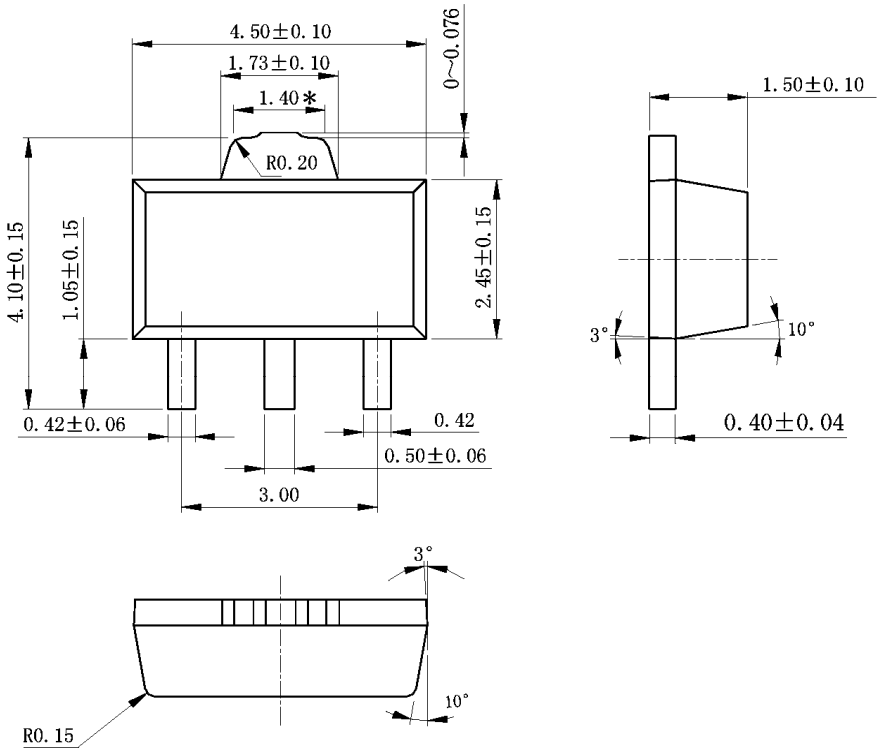
Note 2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

OUTLINE DRAWING

TO-92 Unit:mm



SOT-89 Unit:mm



SOP8 Unit:mm