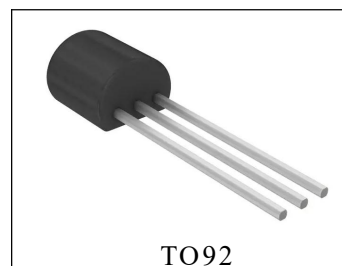


General Description

The W78LXX series of fixed voltage monolithic integrated circuit voltage regulators are suitable for applications that required supply up to 100mA.



Features

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

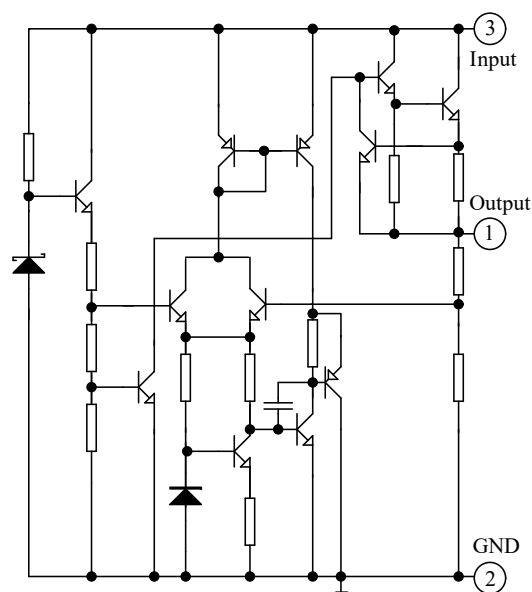
Package Information

Part NO.	Package Description	Package Marking	Package Option
W78LXX	TO92	CHMC 78LXX SXXXX	1000/Bag 2000/Tape

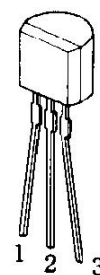
CHMC:Trademark SXXXX:Lot NO. 78LXX:Part NO. (XX: Output Voltage)

XX(Output Voltage): 05(5.0V)/06(6.0V)/08(8.0V)/09(9.0V)/10(10V)/12(12V)/15(15V)/24(24V)

Equivalent Circuit



Pin Connection



1.OUT
2.GND
3.IN

W78LXX(TO92)

Absolute Maximum Ratings

(Operating temperature range applies unless otherwise specified)

Characteristic		Symbol	Value	Unit
Input Voltage	$V_o=5V\sim 8V$	V_i	20	V
	$V_o=9V\sim 15V$		30	
Operating Temperature Range		T_{opr}	-40~125	°C
Storage Temperature Range		T_{stg}	-55~150	°C

W78L05 Electrical Characteristics

(Unless otherwise specified: $V_i=10V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	4.9	5.0	5.1	V
	$7V\leq V_i\leq 20V; I_o=1mA\sim 40mA$		4.85		5.15	V
	$7V\leq V_i\leq V_{max}; I_o=1mA\sim 70mA$		4.85		5.15	V (note2)
Load Regulation	$T_j=25^\circ C; I_o=1mA\sim 100mA$	ΔV_o		11	60	mV
	$T_j=25^\circ C; I_o=1mA\sim 40mA$			5.0	30	mV
Line Regulation	$T_j=25^\circ C; 7V\leq V_i\leq 20V$	ΔV_o		8	150	mV
	$T_j=25^\circ C; 8V\leq V_i\leq 20V$			6	100	mV
Quiescent Current		I_q		2.0	5.5	mA
Quiescent Current Change	$8V\leq V_i\leq 20V$	ΔI_q			1.5	mA
	$1mA\leq I_o\leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz\leq f\leq 100kHz$	V_N		40		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-0.65		mV/°C
Ripple Rejection	$10V\leq V_i\leq 20V; f=120Hz; T_j=25^\circ C$	RR	41	80		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		1.7		V

W78L06 Electrical Characteristics

(Unless otherwise specified: $V_i=12V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	5.75	6.0	6.25	V
	$8.5V \leq V_i \leq 20V$; $I_o=1mA \sim 40mA$		5.7		6.3	V
	$8.5V \leq V_i \leq V_{max}$; $I_o=1mA \sim 70mA$		5.7		6.3	V (note2)
Load Regulation	$T_j=25^\circ C$; $I_o=1mA \sim 100mA$	ΔV_o		12.8	80	mV
	$T_j=25^\circ C$; $I_o=1mA \sim 40mA$			5.8	40	mV
Line Regulation	$T_j=25^\circ C$; $8.5V \leq V_i \leq 20V$	ΔV_o		64	175	mV
	$T_j=25^\circ C$; $9V \leq V_i \leq 20V$			54	125	mV
Quiescent Current		I_q		3.9	6.0	mA
Quiescent Current Change	$9V \leq V_i \leq 20V$	ΔI_q			1.5	mA
	$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz \leq f \leq 100kHz$	V_N		49		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-0.75		$mV/^\circ C$
Ripple Rejection	$10V \leq V_i \leq 20V$; $f=120Hz$; $T_j=25^\circ C$	RR	40	46		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		1.7		V

W78L08 Electrical Characteristics

(Unless otherwise specified: $V_i=14V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	7.7	8.0	8.3	V
	$10.5V \leq V_i \leq 23V$; $I_o=1mA \sim 40mA$		7.6		8.4	V
	$10.5V \leq V_i \leq V_{max}$; $I_o=1mA \sim 70mA$		7.6		8.4	V (note2)
Load Regulation	$T_j=25^\circ C$; $I_o=1mA \sim 100mA$	ΔV_o		15	80	mV
	$T_j=25^\circ C$; $I_o=1mA \sim 40mA$			8.0	40	mV
Line Regulation	$T_j=25^\circ C$; $10.5V \leq V_i \leq 23V$	ΔV_o		10	175	mV
	$T_j=25^\circ C$; $11V \leq V_i \leq 23V$			8	125	mV
Quiescent Current		I_q		2.0	5.5	mA
Quiescent Current Change	$11V \leq V_i \leq 23V$	ΔI_q			1.5	mA
	$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz \leq f \leq 100kHz$	V_N		49		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-0.75		$mV/^\circ C$
Ripple Rejection	$11V \leq V_i \leq 23V$; $f=120Hz$; $T_j=25^\circ C$	RR	39	70		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		1.7		V

W78L09 Electrical Characteristics

(Unless otherwise specified: $V_i=15V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	8.64	9.0	9.36	V
	$11.5V \leq V_i \leq 24V$; $I_o=1mA \sim 40mA$		8.55		9.45	V
	$11.5V \leq V_i \leq V_{max}$; $I_o=1mA \sim 70mA$		8.55		9.45	V (note2)
Load Regulation	$T_j=25^\circ C$; $I_o=1mA \sim 100mA$	ΔV_o		20	90	mV
	$T_j=25^\circ C$; $I_o=1mA \sim 40mA$			10	45	mV
Line Regulation	$T_j=25^\circ C$; $11.5V \leq V_i \leq 24V$	ΔV_o		90	200	mV
	$T_j=25^\circ C$; $13V \leq V_i \leq 24V$			100	150	mV
Quiescent Current		I_q		2.0	6.0	mA
Quiescent Current Change	$13V \leq V_i \leq 24V$	ΔI_q			1.5	mA
	$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz \leq f \leq 100kHz$	V_N		49		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-0.75		mV/ $^\circ C$
Ripple Rejection	$12V \leq V_i \leq 23V$; $f=120Hz$; $T_j=25^\circ C$	RR	38	44		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		1.7		V

W78L10 Electrical Characteristics

(Unless otherwise specified: $V_i=16V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	9.6	10	10.4	V
	$12.5V \leq V_i \leq 23V$; $I_o=1mA \sim 40mA$		9.5		10.5	V
	$12.5V \leq V_i \leq V_{max}$; $I_o=1mA \sim 70mA$		9.5		10.5	V (note2)
Load Regulation	$T_j=25^\circ C$; $I_o=1mA \sim 100mA$	ΔV_o		20	94	mV
	$T_j=25^\circ C$; $I_o=1mA \sim 40mA$			10	47	mV
Line Regulation	$T_j=25^\circ C$; $12.5V \leq V_i \leq 23V$	ΔV_o		100	220	mV
	$T_j=25^\circ C$; $14V \leq V_i \leq 23V$			200	170	mV
Quiescent Current		I_q		4.2	6.5	mA
Quiescent Current Change	$12.5V \leq V_i \leq 23V$	ΔI_q			1.5	mA
	$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz \leq f \leq 100kHz$	V_N		74		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-0.95		mV/ $^\circ C$
Ripple Rejection	$15V \leq V_i \leq 23V$; $f=120Hz$; $T_j=25^\circ C$	RR	38	43.		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		1.7		V

W78L12 Electrical Characteristics

(Unless otherwise specified: $V_i=19V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	11.5	15	15.6	V
	$14.5V \leq V_i \leq 27V$; $I_o=1mA \sim 40mA$		11.4		12.6	V
	$14.5V \leq V_i \leq V_{max}$; $I_o=1mA \sim 70mA$		11.4		12.6	V (note2)
Load Regulation	$T_j=25^\circ C$; $I_o=1mA \sim 100mA$	ΔV_o		25	150	mV
	$T_j=25^\circ C$; $I_o=1mA \sim 40mA$			12	75	mV
Line Regulation	$T_j=25^\circ C$; $14.5V \leq V_i \leq 27V$	ΔV_o		25	300	mV
	$T_j=25^\circ C$; $16V \leq V_i \leq 27V$			20	250	mV
Quiescent Current		I_q		2.0	6.0	mA
Quiescent Current Change	$16V \leq V_i \leq 27V$	ΔI_q			1.5	mA
	$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz \leq f \leq 100kHz$	V_N		80		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-1.0		$mV/^\circ C$
Ripple Rejection	$15V \leq V_i \leq 25V$; $f=120Hz$; $T_j=25^\circ C$	RR	37	65		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		1.7		V

W78L15 Electrical Characteristics

(Unless otherwise specified: $V_i=23V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	14.4	15	15.6	V
	$17.5V \leq V_i \leq 30V$; $I_o=1mA \sim 40mA$		14.25		15.75	V
	$17.5V \leq V_i \leq V_{max}$; $I_o=1mA \sim 70mA$		14.25		15.75	V (note2)
Load Regulation	$T_j=25^\circ C$; $I_o=1mA \sim 100mA$	ΔV_o		20	150	mV
	$T_j=25^\circ C$; $I_o=1mA \sim 40mA$			25	150	mV
Line Regulation	$T_j=25^\circ C$; $17.5V \leq V_i \leq 30V$	ΔV_o		25	150	mV
	$T_j=25^\circ C$; $20V \leq V_i \leq 30V$			15	75	mV
Quiescent Current		I_q		2.2	6.5	mA
Quiescent Current Change	$20V \leq V_i \leq 30V$	ΔI_q			1.5	mA
	$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz \leq f \leq 100kHz$	V_N		90		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-1.3		$mV/^\circ C$
Ripple Rejection	$18.5V \leq V_i \leq 28.5V$; $f=120Hz$; $T_j=25^\circ C$	RR	34	63		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		1.7		V

W78L18 Electrical Characteristics

(Unless otherwise specified: $V_i=27V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	17.3	18	18.7	V
	$21V \leq V_i \leq 33V$; $I_o=1mA \sim 40mA$		17.1		18.9	V
	$21V \leq V_i \leq V_{max}$; $I_o=1mA \sim 70mA$		17.1		18.9	V (note2)
Load Regulation	$T_j=25^\circ C$; $I_o=1mA \sim 100mA$	ΔV_o		30	170	mV
	$T_j=25^\circ C$; $I_o=1mA \sim 40mA$			15	85	mV
Line Regulation	$T_j=25^\circ C$; $21V \leq V_i \leq 33V$	ΔV_o		145	300	mV
	$T_j=25^\circ C$; $22V \leq V_i \leq 33V$			135	250	mV
Quiescent Current		I_q		2.0	6.0	mA
Quiescent Current Change	$21V \leq V_i \leq 33V$	ΔI_q			1.5	mA
	$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz \leq f \leq 100kHz$	V_N		150		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-1.8		mV/ $^\circ C$
Ripple Rejection	$23V \leq V_i \leq 33V$; $f=120Hz$; $T_j=25^\circ C$	RR	34	48		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		1.7		V

W78L24 Electrical Characteristics

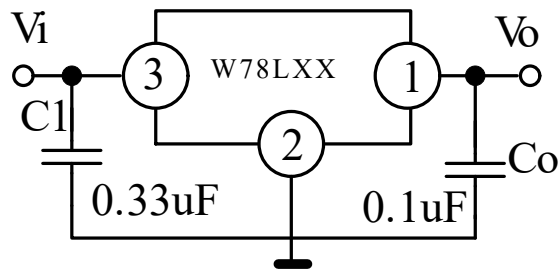
(Unless otherwise specified: $V_i=33V$; $I_o=40mA$; $C_i=0.33\mu F$; $C_o=0.1\mu F$)(Note 1)

Characteristics	Test conditions	Symbol	Min.	Typ.	Max.	Unit
Output Voltage	$T_j=25^\circ C$	V_o	23	24	25	V
	$27V \leq V_i \leq 38V$; $I_o=1mA \sim 40mA$		22.8		25.2	V
	$27V \leq V_i \leq V_{max}$; $I_o=1mA \sim 70mA$		22.8		25.2	V (note2)
Load Regulation	$T_j=25^\circ C$; $I_o=1mA \sim 100mA$	ΔV_o		40	200	mV
	$T_j=25^\circ C$; $I_o=1mA \sim 40mA$			20	100	mV
Line Regulation	$T_j=25^\circ C$; $27V \leq V_i \leq 38V$	ΔV_o		160	300	mV
	$T_j=25^\circ C$; $28V \leq V_i \leq 38V$			150	250	mV
Quiescent Current		I_q		2.2	6.0	mA
Quiescent Current Change	$27V \leq V_i \leq 38V$	ΔI_q			1.5	mA
	$1mA \leq I_o \leq 40mA$				0.1	mA
Output Noise Voltage	$10Hz \leq f \leq 100kHz$	V_N		200		μV
Temperature Coefficient of V_o	$I_o=5mA$	$\Delta V_o/\Delta T$		-2.0		mV/ $^\circ C$
Ripple Rejection	$27V \leq V_i \leq 38V$; $f=120Hz$; $T_j=25^\circ C$	RR	34	45		dB
Dropout Voltage	$T_j=25^\circ C$	V_d		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 data above represent 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, 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.

Outline Dimensions

TO92		Unit: mm		
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.420	1.620	0.056	0.064
A1	0.660	0.860	0.026	0.034
A2	0.350	0.480	0.014	0.019
D	3.050	3.250	0.120	0.128
E	0.350	0.550	0.014	0.022
E1	3.900	4.100	0.154	0.161
e	1.270 (BSC)		0.050 (BSC)	

Statements

- Silicore Technology reserves the right to make changes without further notice to any products or specifications herein. Before customers place an order, customers need to confirm whether datasheet obtained is the latest version, and to verify the integrity of the relevant information.

- Failure or malfunction of any semiconductor products may occur under particular conditions, customers shall have obligation to comply with safety standards when customers use Silicore Technology products to do their system design and machine manufacturing, and take corresponding safety measures in order to avoid potential risk of failure that may cause personal injury or property damage.

- The product upgrades without end, Silicore Technology will wholeheartedly provide customers integrated Circuits that have better performance and better quality.