

Positive Voltage Regulator

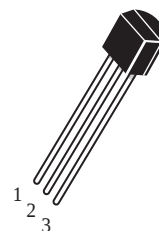
(Pb) Lead(Pb)-Free

Features:

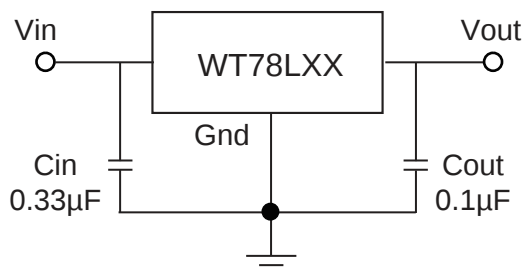
- * Maximum Output current I_o : 0.1 A
- * Output voltage V_o : 5V~18V
- * Continuous total dissipation: P_D : 0.625 W ($T_a = 25^\circ\text{C}$)

TO-92

1. OUT
2. GND
3. IN



Typical Application



Absolute Maximum Ratings

Parameter		Ratings	Unit
Input Voltage	WT78L05~09	30	V
	WT78L12~18	35	
Output Current		100	mA
Power Dissipation		625	mW
Operating Junction Temperature Range		0 ~ +125	°C
Storage temperature range		-55 ~ +150	°C

Electrical Characteristics at Specified Virtual Junction Temperature

WT78L05 (Refer to the test circuits, $T_j=0\sim125^\circ\text{C}$, $I_O=40\text{mA}$, $V_{in}=10\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage $T_j=25^\circ\text{C}$ $7\text{V}\leq V_{in}\leq 20\text{V}$, $I_O=1\text{mA}\sim 40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$ $I_O=1\text{mA}\sim 70\text{mA}$, $T_j=0\sim 125^\circ\text{C}$	V_O	4.8 4.75 4.75	5.0 5.0 5.0	5.2 5.25 5.25	V
Load Regulation $I_O=1\sim 100\text{mA}$, $T_j=25^\circ\text{C}$ $I_O=1\sim 40\text{mA}$, $T_j=25^\circ\text{C}$	ΔV_O	- -	15 8	60 30	mV
Line Regulation $7\text{V}\leq V_{in}\leq 20\text{V}$ $8\text{V}\leq V_{in}\leq 20\text{V}$, $T_j=25^\circ\text{C}$	ΔV_O	- -	32 26	150 100	mV
Quiescent Current $T_j=25^\circ\text{C}$	I_Q	-	3.8	6.0	mA
Quiescent Current Change $8\text{V}\leq V_{in}\leq 20\text{V}$, $T_j=0\sim 125^\circ\text{C}$ $1\text{mA}\leq I_O\leq 40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$	ΔI_Q	- -	- -	1.5 0.1	mA
Output Noise Voltage $10\text{Hz}\leq f\leq 100\text{KHz}$, $T=25^\circ\text{C}$	V_n	-	42	-	μV
Ripple Rejection $8\text{V}\leq V_{in}\leq 20\text{V}$, $f=120\text{Hz}$, $T_j=0\sim 125^\circ\text{C}$	RR	41	49	-	dB
Dropout Voltage $T=25^\circ\text{C}$	V_D	-	1.7	-	V

WT78L06 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_O=40\text{mA}$, $V_{in}=11\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage $T_j=25^\circ\text{C}$ $8\text{V}\leq V_{in}\leq 20\text{V}$, $I_O=1\text{mA}\sim 40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$ $I_O=1\text{mA}\sim 70\text{mA}$, $T_j=0\sim 125^\circ\text{C}$	V_O	5.75 5.7 5.7	6.0 6.0 6.0	6.25 6.3 6.3	V
Load Regulation $I_O=1\sim 100\text{mA}$, $T_j=25^\circ\text{C}$ $I_O=1\sim 40\text{mA}$, $T_j=25^\circ\text{C}$	ΔV_O	- -	16 9	80 40	mV
Line Regulation $8\text{V}\leq V_{in}\leq 20\text{V}$, $T_j=25^\circ\text{C}$ $9\text{V}\leq V_{in}\leq 20\text{V}$, $T_j=25^\circ\text{C}$	ΔV_O	- -	35 29	175 125	mV
Quiescent Current $T_j=25^\circ\text{C}$	I_Q	-	3.9	6.0	mA
Quiescent Current Change $9\text{V}\leq V_{in}\leq 20\text{V}$, $T_j=0\sim 125^\circ\text{C}$ $1\text{mA}\leq I_O\leq 40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$	ΔI_Q	- -	- -	1.5 0.1	mA
Output Noise Voltage $10\text{Hz}\leq f\leq 100\text{KHz}$, $T=25^\circ\text{C}$	V_n	-	46	-	μV
Ripple Rejection $9\text{V}\leq V_{in}\leq 19\text{V}$, $f=120\text{Hz}$, $T_j=0\sim 125^\circ\text{C}$	RR	40	48	-	dB
Dropout Voltage $T=25^\circ\text{C}$	V_D	-	1.7	-	V

WT78L08 (Refer to the test circuits, $T_j=0\sim125^{\circ}\text{C}$, $I_O=40\text{mA}$, $V_{in}=14\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage $T_j=25^{\circ}\text{C}$ $10.5\text{V}\leq V_{in}\leq 23\text{V}$, $I_O=1\text{mA}\sim 40\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$ $I_O=1\text{mA}\sim 70\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$	V_O	7.7 7.6 7.6	8.0 8.0 8.0	8.3 8.4 8.4	V
Load Regulation $I_O=1\sim 100\text{mA}$, $T_j=25^{\circ}\text{C}$ $I_O=1\sim 40\text{mA}$, $T_j=25^{\circ}\text{C}$	ΔV_O	- -	18 10	80 40	mV
Line Regulation $10.5\text{V}\leq V_{in}\leq 23\text{V}$ $11\text{V}\leq V_{in}\leq 23\text{V}$, $T_j=25^{\circ}\text{C}$	ΔV_O	- -	42 36	175 125	mV
Quiescent Current $T_j=25^{\circ}\text{C}$	I_Q	-	4	6.0	mA
Quiescent Current Change $11\text{V}\leq V_{in}\leq 23\text{V}$, $T_j=0\sim 125^{\circ}\text{C}$ $1\text{mA}\leq I_O\leq 40\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$	ΔI_Q	- -	- -	1.5 0.1	mA
Output Noise Voltage $10\text{Hz}\leq f\leq 100\text{KHz}$, $T=25^{\circ}\text{C}$	V_n	-	54	-	μV
Ripple Rejection $13\text{V}\leq V_{in}\leq 23\text{V}$, $f=120\text{Hz}$, $T_j=0\sim 125^{\circ}\text{C}$	RR	37	46	-	dB
Dropout Voltage $T=25^{\circ}\text{C}$	V_D	-	1.7	-	V

WT78L09 (Refer to the test circuits, $T_j=0\sim125^{\circ}\text{C}$, $I_O=40\text{mA}$, $V_{in}=16\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage $T_j=25^{\circ}\text{C}$ $12\text{V}\leq V_{in}\leq 24\text{V}$, $I_O=1\text{mA}\sim 40\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$ $I_O=1\text{mA}\sim 70\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$	V_O	8.64 8.55 8.55	9.0 9.0 9.0	9.36 9.45 9.45	V
Load Regulation $I_O=1\sim 100\text{mA}$, $T_j=25^{\circ}\text{C}$ $I_O=1\sim 40\text{mA}$, $T_j=25^{\circ}\text{C}$	ΔV_O	- -	19 11	90 40	mV
Line Regulation $12\text{V}\leq V_{in}\leq 24\text{V}$, $T_j=25^{\circ}\text{C}$ $13\text{V}\leq V_{in}\leq 24\text{V}$, $T_j=25^{\circ}\text{C}$	ΔV_O	- -	45 40	175 125	mV
Quiescent Current $T_j=25^{\circ}\text{C}$	I_Q	-	4.1	6.0	mA
Quiescent Current Change $13\text{V}\leq V_{in}\leq 24\text{V}$, $T_j=0\sim 125^{\circ}\text{C}$ $1\text{mA}\leq I_O\leq 40\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$	ΔI_Q	- -	- -	1.5 0.1	mA
Output Noise Voltage $10\text{Hz}\leq f\leq 100\text{KHz}$, $T=25^{\circ}\text{C}$	V_n	-	58	-	μV
Ripple Rejection $15\text{V}\leq V_{in}\leq 25\text{V}$, $f=120\text{Hz}$, $T_j=0\sim 125^{\circ}\text{C}$	RR	-	45	-	dB
Dropout Voltage $T=25^{\circ}\text{C}$	V_D	-	1.7	-	V

WT78L12 (Refer to the test circuits, $T_j=0\sim125^\circ\text{C}$, $I_O=40\text{mA}$, $V_{in}=19\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage $T_j=25^\circ\text{C}$ $14\text{V}\leq V_{in}\leq 27\text{V}$, $I_O=1\text{mA}\sim 40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$ $I_O=1\text{mA}\sim 70\text{mA}$, $T_j=0\sim 125^\circ\text{C}$	V_O	11.5 11.4 11.4	12 12 12	12.5 12.6 12.6	V
Load Regulation $I_O=1\sim 100\text{mA}$, $T_j=25^\circ\text{C}$ $I_O=1\sim 40\text{mA}$, $T_j=25^\circ\text{C}$	ΔV_O	- -	22 13	100 50	mV
Line Regulation $14.5\text{V}\leq V_{in}\leq 27\text{V}$, $T_j=25^\circ\text{C}$ $16\text{V}\leq V_{in}\leq 27\text{V}$, $T_j=25^\circ\text{C}$	ΔV_O	- -	55 49	250 200	mV
Quiescent Current $T_j=25^\circ\text{C}$	I_Q	-	4.3	6.5	mA
Quiescent Current Change $16\text{V}\leq V_{in}\leq 27\text{V}$, $T_j=0\sim 125^\circ\text{C}$ $1\text{mA}\leq I_O\leq 40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$	ΔI_Q	- -	- -	1.5 0.1	mA
Output Noise Voltage $10\text{Hz}\leq f\leq 100\text{KHz}$, $T=25^\circ\text{C}$	V_n	-	70	-	μV
Ripple Rejection $15\text{V}\leq V_{in}\leq 25\text{V}$, $f=120\text{Hz}$, $T_j=0\sim 125^\circ\text{C}$	RR	37	42	-	dB
Dropout Voltage $T=25^\circ\text{C}$	V_D	-	1.7	-	V

WT78L15 (Refer to the test circuits, $T_j=0\sim125^\circ\text{C}$, $I_O=40\text{mA}$, $V_{in}=23\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

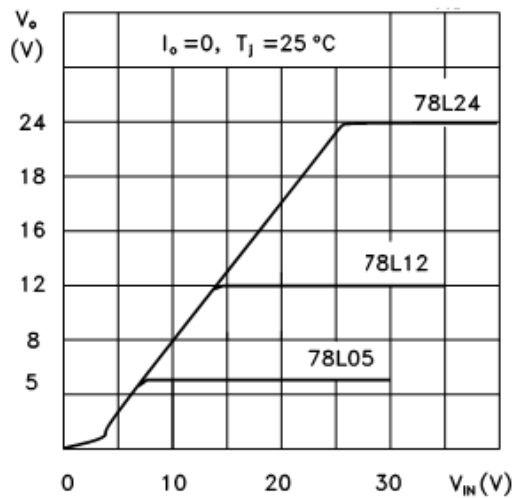
Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage $T_j=25^\circ\text{C}$ $17.5\text{V}\leq V_{in}\leq 30\text{V}$, $I_O=1\text{mA}\sim 40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$ $V_{in}=23\text{V}$, $I_O=1\text{mA}\sim 70\text{mA}$, $T_j=0\sim 125^\circ\text{C}$	V_O	14.4 14.25 14.25	15 15 15	15.6 15.75 15.75	V
Load Regulation $V_{in}=23\text{V}$, $I_O=1\sim 100\text{mA}$, $T_j=25^\circ\text{C}$ $V_{in}=23\text{V}$, $I_O=1\sim 40\text{mA}$, $T_j=25^\circ\text{C}$	ΔV_O	- -	25 15	150 75	mV
Line Regulation $17.5\text{V}\leq V_{in}\leq 30\text{V}$, $I_O=40\text{mA}$, $T_j=25^\circ\text{C}$ $19\text{V}\leq V_{in}\leq 30\text{V}$, $I_O=40\text{mA}$, $T_j=25^\circ\text{C}$	ΔV_O	- -	65 58	300 250	mV
Quiescent Current $T_j=25^\circ\text{C}$	I_Q	-	4.6	6.5	mA
Quiescent Current Change $19\text{V}\leq V_{in}\leq 30\text{V}$, $I_O=40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$ $1\text{mA}\leq I_O\leq 40\text{mA}$, $T_j=0\sim 125^\circ\text{C}$	ΔI_Q	- -	- -	1.5 0.1	mA
Output Noise Voltage $10\text{Hz}\leq f\leq 100\text{KHz}$, $T=25^\circ\text{C}$	V_n	-	82	-	μV
Ripple Rejection $18.5\text{V}\leq V_{in}\leq 28.5\text{V}$, $f=120\text{Hz}$, $T_j=0\sim 125^\circ\text{C}$	RR	34	39	-	dB
Dropout Voltage $T=25^\circ\text{C}$	V_D	-	1.7	-	V

WT78L18 (Refer to the test circuits, $T_j=0\sim 125^{\circ}\text{C}$, $I_O=40\text{mA}$, $V_{in}=26\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

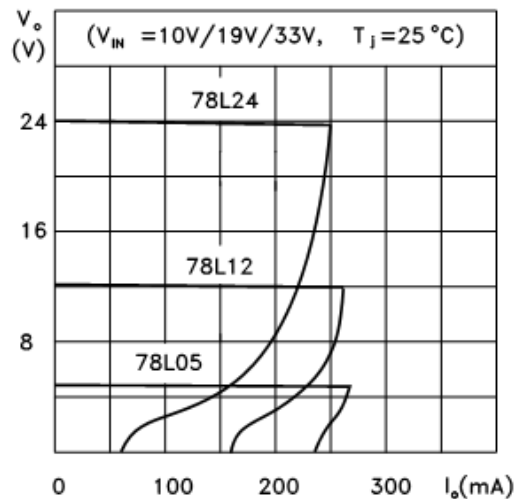
Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage $T_j=25^{\circ}\text{C}$ $20.5\text{V}\leq V_{in}\leq 33\text{V}$, $I_O=1\text{mA}\sim 40\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$ $I_O=1\text{mA}\sim 70\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$	V_O	17.3 17.1 17.1	18 18 18	18.7 18.9 18.9	V
Load Regulation $I_O=1\sim 100\text{mA}$, $T_j=25^{\circ}\text{C}$ $I_O=1\sim 40\text{mA}$, $T_j=25^{\circ}\text{C}$	ΔV_O	- -	27 19	180 90	mV
Line Regulation $20.5\text{V}\leq V_{in}\leq 33\text{V}$, $T_j=25^{\circ}\text{C}$ $22\text{V}\leq V_{in}\leq 33\text{V}$, $T_j=25^{\circ}\text{C}$	ΔV_O	- -	70 64	360 300	mV
Quiescent Current $T_j=25^{\circ}\text{C}$	I_Q	-	4.7	6.5	mA
Quiescent Current Change $22\text{V}\leq V_{in}\leq 33\text{V}$, $T_j=0\sim 125^{\circ}\text{C}$ $1\text{mA}\leq I_O\leq 40\text{mA}$, $T_j=0\sim 125^{\circ}\text{C}$	ΔI_Q	- -	- -	1.5 0.1	mA
Output Noise Voltage $10\text{Hz}\leq f\leq 100\text{KHz}$, $T=25^{\circ}\text{C}$	V_n	-	89	-	μV
Ripple Rejection $21.5\text{V}\leq V_{in}\leq 31.5\text{V}$, $f=120\text{Hz}$, $T_j=0\sim 125^{\circ}\text{C}$	RR	32	36	-	dB
Dropout Voltage $T=25^{\circ}\text{C}$	V_D	-	1.7	-	V

Typical Performance Characteristics

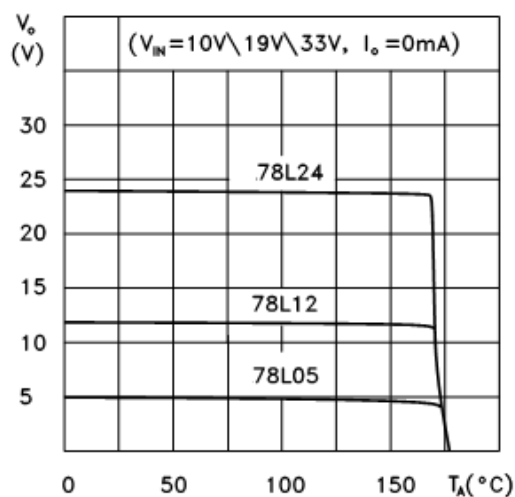
78L05/12/24 Output Characteristics



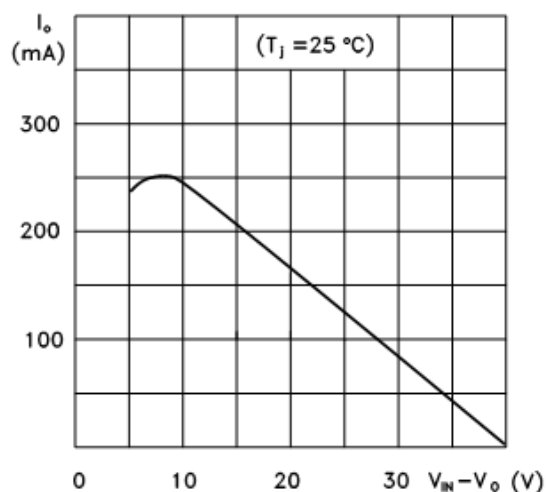
78L05/12/24 Load Characteristics



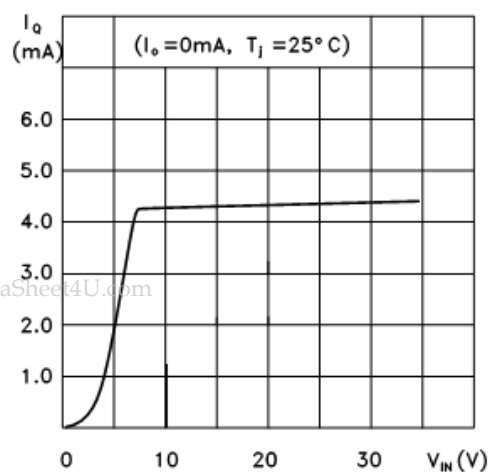
78L05/12/24 Thermal Shutdown



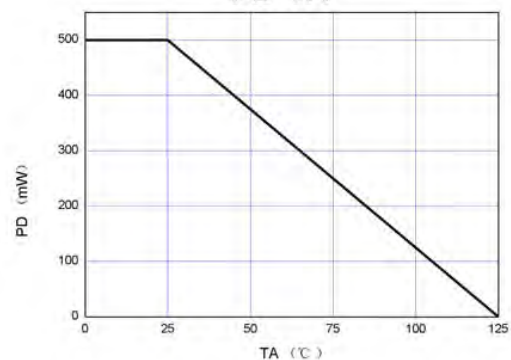
78L00 Series Short Circuit Output Current



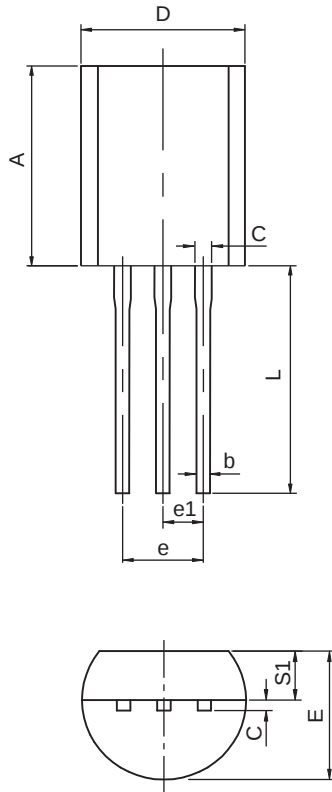
78L05 Quiescent Current vs Input Voltage



PD-TA



TO-92 PACKAGE OUTLINE DIMENSIONS(Unit:mm)



TO-92		
Dim	Min	Max
A	4.45	4.70
C	0.36	0.51
D	4.44	4.70
E	3.30	3.81
L	12.70	-
b	0.36	0.51
b1	0.36	0.76
e	2.42	2.66
e1	1.15	1.39
S1	1.02	-