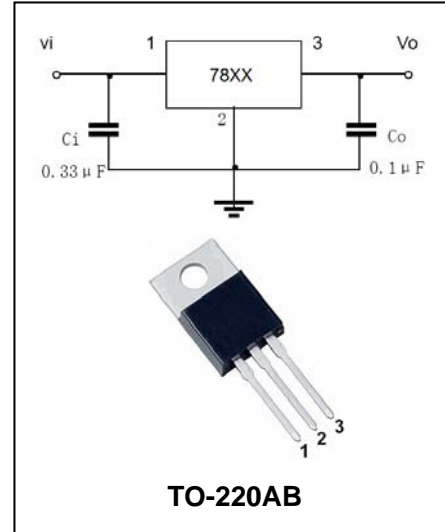


## Three-Terminal Low Current Positive Voltage Regulators BL78XX

### FEATURES

- Internal Thermal Overload Protection.
- Internal Short Circuit Current Limiting.
- Output Current up to 1.5A.
- Satisfies IEC-65 Specification.  
(International Electrotechnical Commission).
- MSL 3



### APPLICATIONS

- Three-terminal positive voltage regulator.

### MAXIMUM RATING @ Ta=25°C unless otherwise specified

Symbol	Parameter	Value	Units
V <sub>I</sub>	Input voltage	(7805--7815)	35
		(7818--7824)	40
P <sub>D</sub>	Power dissipation-1	(No Heatsink)	1.9
	Power dissipation-2	(Infinite Heatsink)	30
T <sub>j</sub>	Operating junction temperature	-40 to +150	°C
T <sub>stg</sub>	Storage temperature range	-55 to +150	°C

## Three-Terminal Low Current Positive Voltage Regulators BL78XX

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=10V, I_O=500mA, 0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

Parameter	Symbol	Test conditions	7805			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}C, I_O=100mA$	4.8	5.0	5.2	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}C, I_O=5mA-1.5A$ $T_j=25^{\circ}C, I_O=250mA-750mA$		15 5	100 50	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}C, 7V \leq V_i \leq 25V$ $T_j=25^{\circ}C, 8V \leq V_i \leq 12V$		3 1	100 50	mV
Output voltage	$V_O$	$7.0V \leq V_i \leq 20V$	4.75		5.25	V
Quiescent Current	$I_B$	$T_j=25^{\circ}C, I_O=5mA$		4.2	8.0	mA
Quiescent Current Change	$\Delta I_B$	$7.0V \leq V_i \leq 25V$			1.3	mA
Output noise voltage	$V_N$	$T_a=25^{\circ}C, 10Hz \leq f \leq 100KHz$		50		$\mu V$
Ripple rejection	RR	$8V \leq V_i \leq 18V, f=120Hz$	62	78		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}C, I_O=1.0A$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}C$		1.6		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}C \leq T_j \leq 125^{\circ}C, I_O=5mA$		-0.6		mv/ $^{\circ}C$

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=11V, I_O=500mA, 0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

Parameter	Symbol	Test conditions	7806			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}C, I_O=100mA$	5.75	6.0	6.25	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}C, I_O=5mA-1.5A$ $T_j=25^{\circ}C, I_O=250mA-750mA$		15 5	120 60	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}C, 8V \leq V_i \leq 25V$ $T_j=25^{\circ}C, 9V \leq V_i \leq 13V$		4 2	120 60	mV
Output voltage	$V_O$	$8.0V \leq V_i \leq 21V$	5.7		6.3	V
Quiescent Current	$I_B$	$T_j=25^{\circ}C, I_O=5mA$		4.3	8.0	mA
Quiescent Current Change	$\Delta I_B$	$8.0V \leq V_i \leq 25V$			1.3	mA

## Three-Terminal Low Current Positive Voltage Regulators BL78XX

Output noise voltage	$V_N$	$T_a=25^{\circ}\text{C}, 10\text{Hz} \leq f \leq 100\text{KHz}$		55		$\mu\text{V}$
Ripple rejection	RR	$9\text{V} \leq V_i \leq 19\text{V}, f=120\text{Hz}$	61	77		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}\text{C}, I_o=1.0\text{A}$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}\text{C}$		1.5		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}, I_o=5\text{mA}$		-0.7		$\text{mV}/^{\circ}\text{C}$

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=12\text{V}, I_o=500\text{mA}, 0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$ )

Parameter	Symbol	Test conditions	7807			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}\text{C}, I_o=100\text{mA}$	6.72	7.0	7.28	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}\text{C}, I_o=5\text{mA}-1.5\text{A}$ $T_j=25^{\circ}\text{C}, I_o=250\text{mA}-750\text{mA}$		15 5	140 70	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}\text{C}, 9\text{V} \leq V_i \leq 25\text{V}$ $T_j=25^{\circ}\text{C}, 10\text{V} \leq V_i \leq 14\text{V}$		5 2	140 70	mV
Output voltage	$V_O$	$9.0\text{V} \leq V_i \leq 22\text{V}$	6.65		7.35	V
Quiescent Current	$I_B$	$T_j=25^{\circ}\text{C}, I_o=5\text{mA}$		4.3	8.0	mA
Quiescent Current Change	$\Delta I_B$	$9.0\text{V} \leq V_i \leq 25\text{V}$			1.3	mA
Output noise voltage	$V_N$	$T_a=25^{\circ}\text{C}, 10\text{Hz} \leq f \leq 100\text{KHz}$		60		$\mu\text{V}$
Ripple rejection	RR	$10\text{V} \leq V_i \leq 20\text{V}, f=120\text{Hz}$	59	75		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}\text{C}, I_o=1.0\text{A}$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}\text{C}$		1.3		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}, I_o=5\text{mA}$		-0.8		$\text{mV}/^{\circ}\text{C}$

## Three-Terminal Low Current Positive Voltage Regulators BL78XX

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=14V, I_O=500mA, 0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

Parameter	Symbol	Test conditions	7808			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}C, I_O=100mA$	7.7	8.0	8.3	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}C, I_O=5mA-1.5A$ $T_j=25^{\circ}C, I_O=250mA-750mA$		12 4	160 80	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}C, 10.5V \leq V_i \leq 25V$ $T_j=25^{\circ}C, 11V \leq V_i \leq 17V$		6 2	160 80	mV
Output voltage	$V_O$	$10.5V \leq V_i \leq 23V$	7.6		8.4	V
Quiescent Current	$I_B$	$T_j=25^{\circ}C, I_O=5mA$		4.3	8.0	mA
Quiescent Current Change	$\Delta I_B$	$10.5V \leq V_i \leq 25V$			1.0	mA
Output noise voltage	$V_N$	$T_a=25^{\circ}C, 10Hz \leq f \leq 100KHz$		70		$\mu V$
Ripple rejection	RR	$11.5V \leq V_i \leq 21.5V, f=120Hz$	58	74		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}C, I_O=1.0A$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}C$		1.1		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}C \leq T_j \leq 125^{\circ}C, I_O=5mA$		-1.0		mv/ $^{\circ}C$

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=15V, I_O=500mA, 0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

Parameter	Symbol	Test conditions	7809			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}C, I_O=100mA$	8.64	9.0	9.36	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}C, I_O=5mA-1.5A$ $T_j=25^{\circ}C, I_O=250mA-750mA$		12 4	180 90	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}C, 11.5V \leq V_i \leq 26V$ $T_j=25^{\circ}C, 13V \leq V_i \leq 19V$		7 2.5	180 90	mV
Output voltage	$V_O$	$11.5V \leq V_i \leq 26V$	8.55		9.45	V
Quiescent Current	$I_B$	$T_j=25^{\circ}C, I_O=5mA$		4.3	8.0	mA
Quiescent Current Change	$\Delta I_B$	$11.5V \leq V_i \leq 26V$			1.0	mA

## Three-Terminal Low Current Positive Voltage Regulators BL78XX

Output noise voltage	$V_N$	$T_a=25^{\circ}\text{C}, 10\text{Hz}\leq f\leq 100\text{KHz}$		75		$\mu\text{V}$
Ripple rejection	RR	$12.5\text{V}\leq V_i\leq 22.5\text{V}, f=120\text{Hz}$	56	72		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}\text{C}, I_o=1.0\text{A}$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}\text{C}$		1.0		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}\text{C}\leq T_j\leq 125^{\circ}\text{C}, I_o=5\text{mA}$		-1.1		$\text{mV}/^{\circ}\text{C}$

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=16\text{V}, I_o=500\text{mA}, 0^{\circ}\text{C}\leq T_j\leq 125^{\circ}\text{C}$ )

Parameter	Symbol	Test conditions	7810			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}\text{C}, I_o=100\text{mA}$	9.6	10.0	10.4	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}\text{C}, I_o=5\text{mA}-1.5\text{A}$ $T_j=25^{\circ}\text{C}, I_o=250\text{mA}-750\text{mA}$		12 4	200 100	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}\text{C}, 12.5\text{V}\leq V_i\leq 27\text{V}$ $T_j=25^{\circ}\text{C}, 14\text{V}\leq V_i\leq 20\text{V}$		8 2.5	200 100	mV
Output voltage	$V_O$	$12.5\text{V}\leq V_i\leq 25\text{V}$	9.5		10.5	V
Quiescent Current	$I_B$	$T_j=25^{\circ}\text{C}, I_o=5\text{mA}$		4.3	8.0	mA
Quiescent Current Change	$\Delta I_B$	$12.5\text{V}\leq V_i\leq 27\text{V}$			1.0	mA
Output noise voltage	$V_N$	$T_a=25^{\circ}\text{C}, 10\text{Hz}\leq f\leq 100\text{KHz}$		80		$\mu\text{V}$
Ripple rejection	RR	$13.5\text{V}\leq V_i\leq 23.5\text{V}, f=120\text{Hz}$	55	72		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}\text{C}, I_o=1.0\text{A}$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}\text{C}$		0.9		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}\text{C}\leq T_j\leq 125^{\circ}\text{C}, I_o=5\text{mA}$		-1.3		$\text{mV}/^{\circ}\text{C}$

## Three-Terminal Low Current Positive Voltage Regulators BL78XX

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=19V, I_O=500mA, 0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

Parameter	Symbol	Test conditions	7812			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}C, I_O=100mA$	11.5	12.0	12.5	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}C, I_O=5mA-1.5A$ $T_j=25^{\circ}C, I_O=250mA-750mA$		12 4	240 120	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}C, 14.5V \leq V_i \leq 30V$ $T_j=25^{\circ}C, 16V \leq V_i \leq 22V$		10 3	240 120	mV
Output voltage	$V_O$	$14.5V \leq V_i \leq 27V$	11.4		12.6	V
Quiescent Current	$I_B$	$T_j=25^{\circ}C, I_O=5mA$		4.3	8.0	mA
Quiescent Current Change	$\Delta I_B$	$14.5V \leq V_i \leq 30V$			1.0	mA
Output noise voltage	$V_N$	$T_a=25^{\circ}C, 10Hz \leq f \leq 100KHz$		90		$\mu V$
Ripple rejection	RR	$15V \leq V_i \leq 25V, f=120Hz$	55	71		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}C, I_O=1.0A$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}C$		0.7		A
Average temperature coefficient Of Output voltage	$TC_{V_O}$	$0^{\circ}C \leq T_j \leq 125^{\circ}C, I_O=5mA$		-1.6		mv/ $^{\circ}C$

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=23V, I_O=500mA, 0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

Parameter	Symbol	Test conditions	7815			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}C, I_O=100mA$	14.4	15.0	15.6	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}C, I_O=5mA-1.5A$ $T_j=25^{\circ}C, I_O=250mA-750mA$		12 4	300 150	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}C, 17.5V \leq V_i \leq 30V$ $T_j=25^{\circ}C, 20V \leq V_i \leq 26V$		11 3	300 150	mV
Output voltage	$V_O$	$17.5V \leq V_i \leq 30V$	14.25		15.75	V
Quiescent Current	$I_B$	$T_j=25^{\circ}C, I_O=5mA$		4.4	8.0	mA
Quiescent Current Change	$\Delta I_B$	$17.5V \leq V_i \leq 30V$			1.0	mA

## Three-Terminal Low Current Positive Voltage Regulators BL78XX

Output noise voltage	$V_N$	$T_a=25^{\circ}\text{C}, 10\text{Hz} \leq f \leq 100\text{KHz}$		110		$\mu\text{V}$
Ripple rejection	RR	$18.5\text{V} \leq V_i \leq 28.5\text{V}, f=120\text{Hz}$	54	70		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}\text{C}, I_o=1.0\text{A}$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}\text{C}$		0.5		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}, I_o=5\text{mA}$		-2.0		$\text{mv}/^{\circ}\text{C}$

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=27\text{V}, I_o=500\text{mA}, 0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$ )

Parameter	Symbol	Test conditions	7818			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}\text{C}, I_o=100\text{mA}$	17.3	18.0	18.7	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}\text{C}, I_o=5\text{mA}-1.5\text{A}$ $T_j=25^{\circ}\text{C}, I_o=250\text{mA}-750\text{mA}$		12 4	360 180	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}\text{C}, 21\text{V} \leq V_i \leq 33\text{V}$ $T_j=25^{\circ}\text{C}, 24\text{V} \leq V_i \leq 30\text{V}$		13 4	360 180	mV
Output voltage	$V_O$	$21\text{V} \leq V_i \leq 33\text{V}$	17.1		18.9	V
Quiescent Current	$I_B$	$T_j=25^{\circ}\text{C}, I_o=5\text{mA}$		4.5	8.0	mA
Quiescent Current Change	$\Delta I_B$	$21\text{V} \leq V_i \leq 33\text{V}$			1.0	mA
Output noise voltage	$V_N$	$T_a=25^{\circ}\text{C}, 10\text{Hz} \leq f \leq 100\text{KHz}$		125		$\mu\text{V}$
Ripple rejection	RR	$22\text{V} \leq V_i \leq 32\text{V}, f=120\text{Hz}$	52	68		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}\text{C}, I_o=1.0\text{A}$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}\text{C}$		0.4		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}, I_o=5\text{mA}$		-2.5		$\text{mv}/^{\circ}\text{C}$

## Three-Terminal Low Current Positive Voltage Regulators BL78XX

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=29V, I_O=500mA, 0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

Parameter	Symbol	Test conditions	7820			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}C, I_O=100mA$	19.2	20.0	20.8	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}C, I_O=5mA-1.5A$ $T_j=25^{\circ}C, I_O=250mA-750mA$		12 4	400 200	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}C, 23V \leq V_i \leq 35V$ $T_j=25^{\circ}C, 26V \leq V_i \leq 32V$		15 5	400 200	mV
Output voltage	$V_O$	$23V \leq V_i \leq 35V$	19.0		21.0	V
Quiescent Current	$I_B$	$T_j=25^{\circ}C, I_O=5mA$		4.6	8.0	mA
Quiescent Current Change	$\Delta I_B$	$23V \leq V_i \leq 35V$			1.0	mA
Output noise voltage	$V_N$	$T_a=25^{\circ}C, 10Hz \leq f \leq 100KHz$		135		$\mu V$
Ripple rejection	RR	$24V \leq V_i \leq 34V, f=120Hz$	50	66		dB
Dropout voltage	$V_D$	$T_j=25^{\circ}C, I_O=1.0A$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^{\circ}C$		0.4		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^{\circ}C \leq T_j \leq 125^{\circ}C, I_O=5mA$		-3.0		mv/ $^{\circ}C$

### ELECTRICAL CHARACTERISTICS ( $V_{IN}=33V, I_O=500mA, 0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

Parameter	Symbol	Test conditions	7824			UNIT
			MIN	TYP	MAX	
Output voltage	$V_O$	$T_j=25^{\circ}C, I_O=100mA$	23.0	24.0	25.0	V
Load regulation	$Reg_{load}$	$T_j=25^{\circ}C, I_O=5mA-1.5A$ $T_j=25^{\circ}C, I_O=250mA-750mA$		12 4	480 240	mV
Input regulation	$Reg_{Input}$	$T_j=25^{\circ}C, 27V \leq V_i \leq 38V$ $T_j=25^{\circ}C, 30V \leq V_i \leq 36V$		18 6	480 240	mV
Output voltage	$V_O$	$27V \leq V_i \leq 38V$	22.8		25.2	V
Quiescent Current	$I_B$	$T_j=25^{\circ}C, I_O=5mA$		4.6	8.0	mA
Quiescent Current Change	$\Delta I_B$	$27V \leq V_i \leq 38V$			1.0	mA



## Three-Terminal Low Current Positive Voltage Regulators BL78XX

Output noise voltage	$V_N$	$T_a=25^\circ\text{C}, 10\text{Hz} \leq f \leq 100\text{KHz}$		150		$\mu\text{V}$
Ripple rejection	RR	$28\text{V} \leq V_i \leq 38\text{V}, f=120\text{Hz}$	50	66		dB
Dropout voltage	$V_D$	$T_j=25^\circ\text{C}, I_o=1.0\text{A}$		2.0		V
Short Circuit Current Limit	$I_{SC}$	$T_j=25^\circ\text{C}$		0.3		A
Average temperature coefficient Of Output voltage	$TC_{VO}$	$0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}, I_o=5\text{mA}$		-3.5		$\text{mv}/^\circ\text{C}$

### TYPICAL CHARACTERISTICS @ $T_a=25^\circ\text{C}$ unless otherwise specified

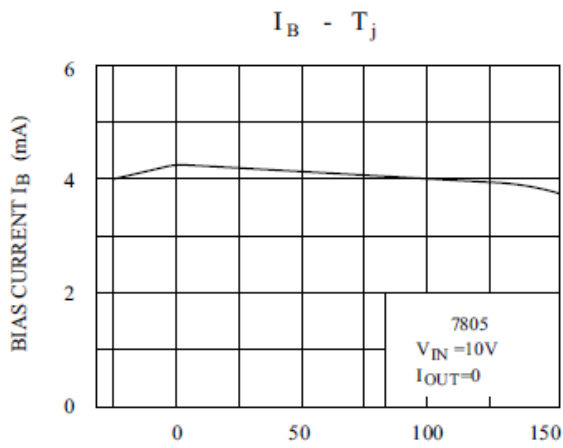


Fig.1 JUNCTION TEMPERATURE  $T_j$  ( $^\circ\text{C}$ )

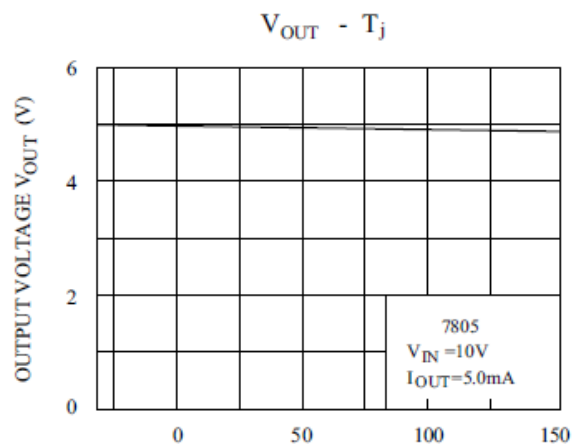


Fig.2 JUNCTION TEMPERATURE  $T_j$  ( $^\circ\text{C}$ )

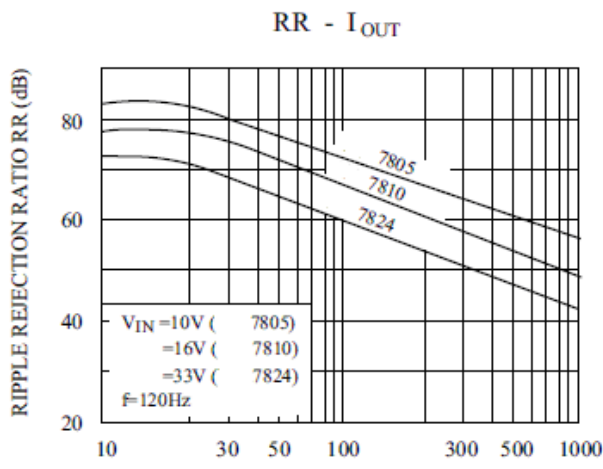


Fig.3 OUTPUT CURRENT  $I_{OUT}$  (mA)

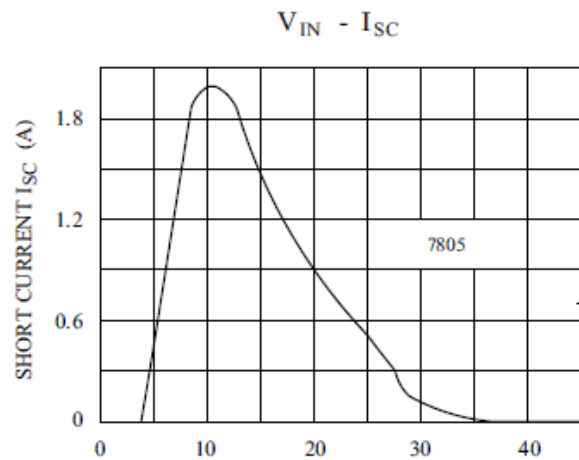
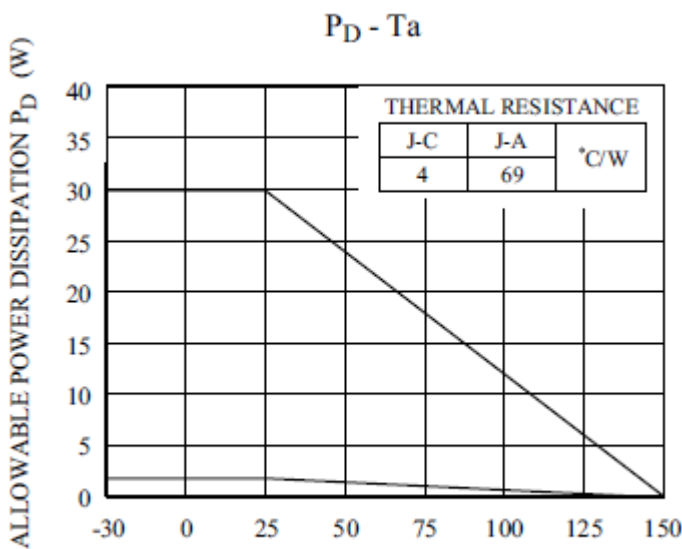
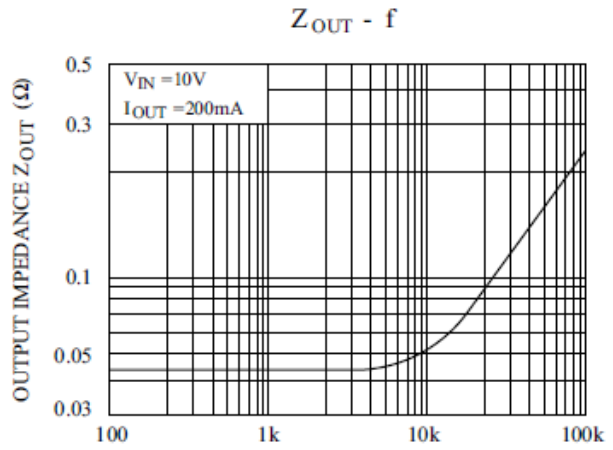
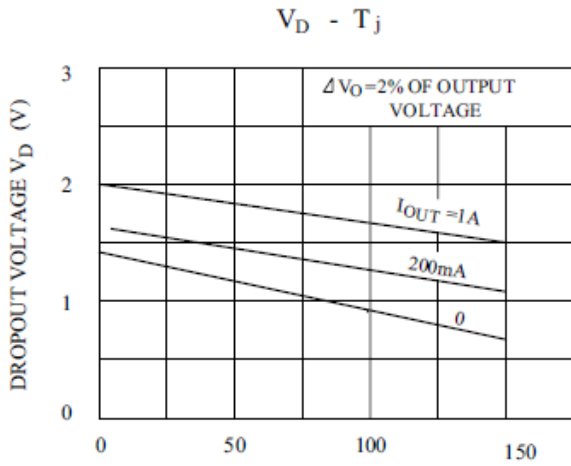


Fig.4 INPUT VOLTAGE  $V_{IN}$  (V)

# Three-Terminal Low Current Positive Voltage Regulators

## BL78XX



## Three-Terminal Low Current Positive Voltage Regulators BL78XX

### PACKAGE OUTLINE

Plastic surface mounted package

TO-220AB

