

**3-TERMINAL POSITIVE LINEAR REGULATORS****AZ78XX****General Description**

The AZ78XX series are monolithic integrated circuits designed as fixed-voltage regulators for a wide variety of applications including local, on-card regulation.

This series of regulators are complete with internal current limiting, thermal shutdown protection, and safe-area compensation which make them virtually immune from output overload. If adequate heat sinking are provided, these regulators can deliver output currents up to 1.0A.

The AZ78XX series are available in two standard plastic packages: TO-220 and TO-252.

**Features**

- Output Current up to 1.0A
- Fixed Output Voltages of 5V, 6V, 8V, 9V and 12V
- Output Voltage Tolerances of  $\pm 5\%$  over the Full Temperature Range
- Internal Short Circuit Current-limiting
- Internal Thermal Overload Protection

**Applications**

- Consumer Electronics
- Microprocessor Power Supply
- Mother Board I/O Power Supply

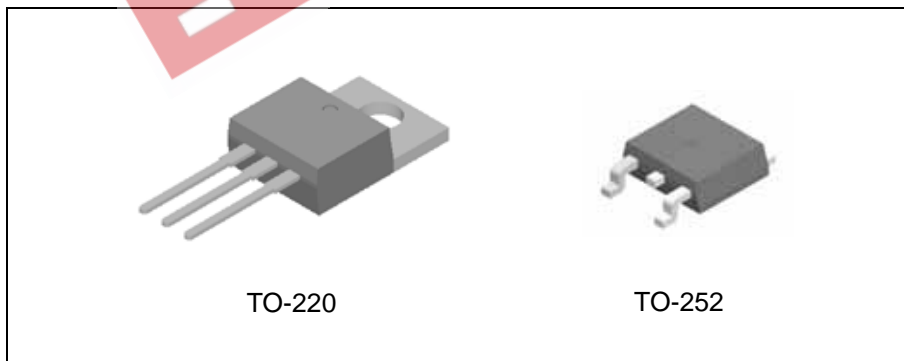


Figure 1. Package Types of AZ78XX



**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Pin Configuration**

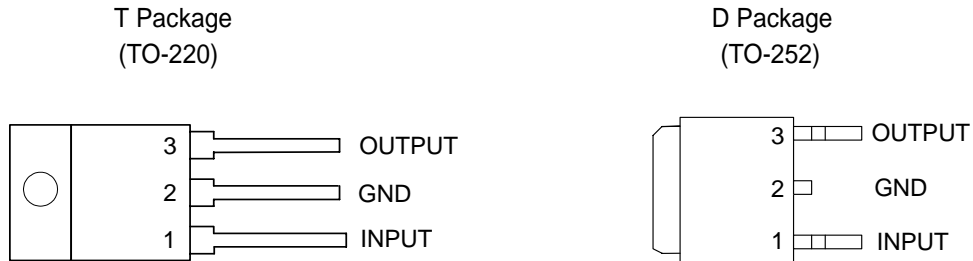


Figure 2. Pin Configuration of AZ78XX (Top View)



**Pin Description**

Pin Number	Pin Name	Function
1	INPUT	Voltage Input
2	GND	Ground
3	OUTPUT	Voltage Output



**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Functional Block Diagram**

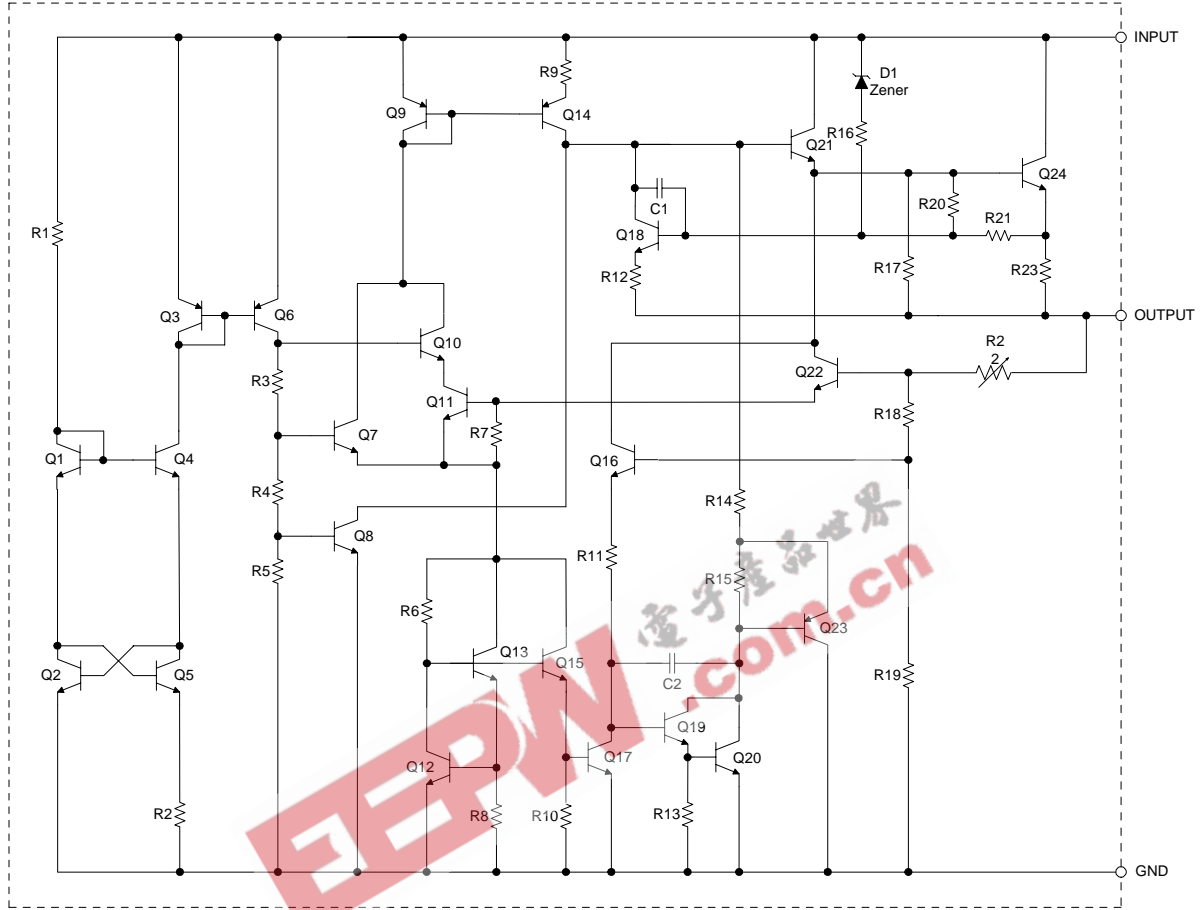


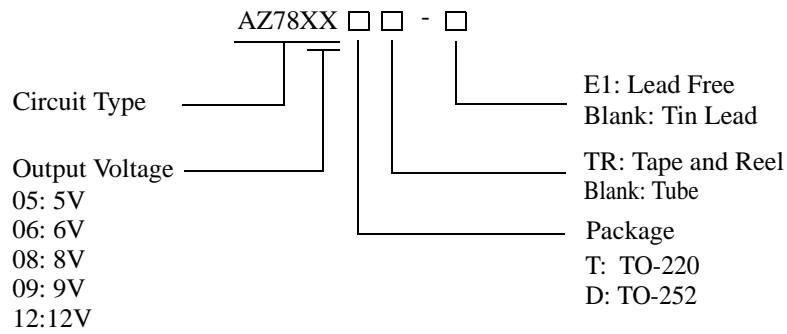
Figure 3. Functional Block Diagram of AZ78XX



**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Ordering Information**



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
TO-220	-40 to 125°C	AZ7805T	AZ7805T-E1	AZ7805T	AZ7805T-E1	Tube
		AZ7806T	AZ7806T-E1	AZ7806T	AZ7806T-E1	Tube
		AZ7808T	AZ7808T-E1	AZ7808T	AZ7808T-E1	Tube
		AZ7809T	AZ7809T-E1	AZ7809T	AZ7809T-E1	Tube
		AZ7812T	AZ7812T-E1	AZ7812T	AZ7812T-E1	Tube
TO-252	-40 to 125°C	AZ7805D	AZ7805D-E1	AZ7805D	AZ7805D-E1	Tube
		AZ7805DTR	AZ7805DTR-E1	AZ7805D	AZ7805D-E1	Tape & Reel
		AZ7806D	AZ7806D-E1	AZ7806D	AZ7806D-E1	Tube
		AZ7806DTR	AZ7806DTR-E1	AZ7806D	AZ7806D-E1	Tape & Reel
		AZ7808D	AZ7808D-E1	AZ7808D	AZ7808D-E1	Tube
		AZ7808DTR	AZ7808DTR-E1	AZ7808D	AZ7808D-E1	Tape & Reel
		AZ7809D	AZ7809D-E1	AZ7809D	AZ7809D-E1	Tube
		AZ7809DTR	AZ7809DTR-E1	AZ7809D	AZ7809D-E1	Tape & Reel
		AZ7812D	AZ7812D-E1	AZ7812D	AZ7812D-E1	Tube
AZ7812DTR	AZ7812DTR-E1	AZ7812D	AZ7812D-E1	Tape & Reel		

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

**3-TERMINAL POSITIVE LINEAR REGULATORS****AZ78XX****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value	Unit
Input Voltage	$V_{IN}$	20	V
Lead Temperature (Soldering, 10sec)		300	°C
Power Dissipation	$P_D$	Internally Limited	
Storage Temperature Range	$T_{STG}$	-65 to 150	°C
ESD (Machine Model)	ESD	500	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

**Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Supply Voltage	$V_{CC}$	7.5	18	V
Operating Junction Temperature Range	$T_J$	-40	125	°C



**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Electrical Characteristics**

**AZ7805** ( $V_I=10V$ ,  $I_O=1A$ ,  $T_J=-40$  to  $125$  °C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	$V_O$	$T_J=25^\circ C$	4.9	5.0	5.1	V
		$I_O=5mA$ to $1A$ , $V_I=7.5$ to $15V$ , $P_D \leq 15W$	4.8	5.0	5.2	
Line Regulation	$V_{RLINE}$	$V_I=8V$ to $15V$ , $I_O=1A$ , $T_J=25^\circ C$		1	20	mV
Load Regulation	$V_{RLOAD}$	$V_I=10V$ , $I_O=5mA$ to $1A$ , $T_J=25^\circ C$		10	35	mV
Quiescent Current	$I_Q$	$V_I=10V$		3.2	6.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_I=8V$ to $15V$ , $I_O=500mA$ , $T_J=25^\circ C$		0.3	0.8	mA
		$I_O=5mA$ to $1A$ , $T_J=25^\circ C$		0.08	0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	$V_I=8V$ to $15V$ , $f=120Hz$ , $I_O=300mA$	63	73		dB
Dropout Voltage	$V_I-V_O$	$\Delta V_O/V_O=1\%$ , $I_O=1A$ , $T_J=25^\circ C$		2.0		V
Output Noise Voltage	$N_O$	$f=10Hz$ to $100KHz$ , $T_A=25^\circ C$		10		$\mu V/V_O$
Output Resistance	$R_O$	$f=1.0kHz$		10		$m\Omega$
Short Circuit Current	$I_{PK}$	$V_I=15V$ , $T_A=25^\circ C$		0.8		A
Peak Output Current	$I_{MAX}$	$V_I=10V$ , $T_J=25^\circ C$		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			-0.3		$mV/^\circ C$

**AZ7806** ( $V_I=11V$ ,  $I_O=1A$ ,  $T_J=-40$  to  $125$  °C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	$V_O$	$T_J=25^\circ C$	5.88	6.0	6.12	V
		$I_O=5mA$ to $1A$ , $V_I=8.6$ to $15V$ , $P_D \leq 15W$	5.76	6.0	6.24	
Line Regulation	$V_{RLINE}$	$V_I=9V$ to $15V$ , $I_O=1A$ , $T_J=25^\circ C$		1.6	25	mV
Load Regulation	$V_{RLOAD}$	$V_I=11V$ , $I_O=5mA$ to $1A$ , $T_J=25^\circ C$		20	37	mV
Quiescent Current	$I_Q$	$V_I=11V$		3.3	6.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_I=9V$ to $15V$ , $I_O=500mA$ , $T_J=25^\circ C$		0.3	0.8	mA
		$I_O=5.0mA$ to $1A$ , $T_J=25^\circ C$		0.08	0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	$V_I=9V$ to $15V$ , $f=120Hz$ , $I_O=300mA$	58	65		dB
Dropout Voltage	$V_I-V_O$	$\Delta V_O/V_O=1\%$ , $I_O=1A$ , $T_J=25^\circ C$		2.0		V
Output Noise Voltage	$N_O$	$f=10Hz$ to $100KHz$ , $T_A=25^\circ C$		10		$\mu V/V_O$
Output Resistance	$R_O$	$f=1.0kHz$		10		$m\Omega$
Short Circuit Current	$I_{PK}$	$V_I=15V$ , $T_A=25^\circ C$		0.8		A
Peak Output Current	$I_{MAX}$	$V_I=11V$ , $T_J=25^\circ C$		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			-0.3		$mV/^\circ C$



**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Electrical Characteristics (Continued)**

**AZ7808** ( $V_I=14V$ ,  $I_O=1A$ ,  $T_J=-40$  to  $125$  °C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	$V_O$	$T_J=25^\circ C$	7.8	8.0	8.2	V
		$I_O=5mA$ to $1A$ , $V_I=10.6$ to $15V$ , $P_D \leq 15W$	7.7	8.0	8.3	
Line Regulation	$V_{RLINE}$	$V_I=11V$ to $15V$ , $I_O=1A$ , $T_J=25^\circ C$		2	26	mV
Load Regulation	$V_{RLOAD}$	$V_I=14V$ , $I_O=5mA$ to $1A$ , $T_J=25^\circ C$		15	37	mV
Quiescent Current	$I_Q$	$V_I=14V$		3.3	6.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_I=10.6V$ to $15V$ , $I_O=500mA$ , $T_J=25^\circ C$			0.8	mA
		$I_O=5.0mA$ to $1A$ , $T_J=25^\circ C$			0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	$V_I=11V$ to $15V$ , $f=120Hz$ , $I_O=300mA$	56	62		dB
Dropout Voltage	$V_I-V_O$	$\Delta V_O/V_O=1\%$ , $I_O=1A$ , $T_J=25^\circ C$		2.0		V
Output Noise Voltage	$N_O$	$f=10Hz$ to $100KHz$ , $T_A=25^\circ C$		10		$\mu V/V_O$
Output Resistance	$R_O$	$f=1.0kHz$		10		$m\Omega$
Short Circuit Current	$I_{PK}$	$V_I=15V$ , $T_A=25^\circ C$		0.8		A
Peak Output Current	$I_{MAX}$	$V_I=13V$ , $T_J=25^\circ C$		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			-0.4		$mV/^\circ C$

**AZ7809** ( $V_I=15V$ ,  $I_O=1A$ ,  $T_J=-40$  to  $125$  °C, unless otherwise specified. )

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	$V_O$	$T_J=25^\circ C$	8.65	9.0	9.35	V
		$I_O=5mA$ to $1A$ , $V_I=11.5$ to $15V$ , $P_D \leq 15W$	8.55	9.0	9.45	
Line Regulation	$V_{RLINE}$	$V_I=11.5V$ to $15V$ , $I_O=1A$ , $T_J=25^\circ C$		1.8	24	mV
Load Regulation	$V_{RLOAD}$	$V_I=15V$ , $I_O=5mA$ to $1A$ , $T_J=25^\circ C$		14	36	mV
Quiescent Current	$I_Q$	$V_I=15V$		3.4	8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_I=11.5V$ to $15V$ , $I_O=500mA$ , $T_J=25^\circ C$			1.0	mA
		$I_O=5.0mA$ to $1A$ , $T_J=25^\circ C$			0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	$V_I=12V$ to $15V$ , $f=120Hz$ , $I_O=300mA$	56	61		dB
Dropout Voltage	$V_I-V_O$	$\Delta V_O/V_O=1\%$ , $I_O=1A$		2.0		V
Output Noise Voltage	$N_O$	$f=10Hz$ to $100KHz$ , $T_A=25^\circ C$		10		$\mu V/V_O$
Output Resistance	$R_O$	$f=1.0KHz$		12		$m\Omega$
Short Circuit Current	$I_{PK}$	$V_I=15V$ , $T_A=25^\circ C$		0.8		A
Peak Output Current	$I_{MAX}$	$V_I=14V$ , $T_J=25^\circ C$		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			-0.5		$mV/^\circ C$



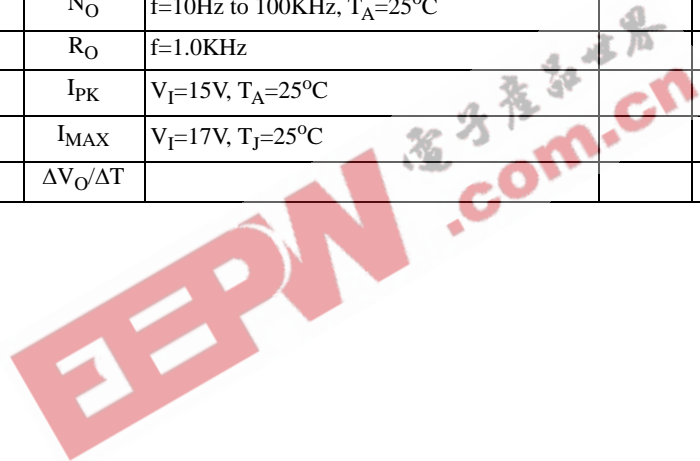
**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Electrical Characteristics (Continued)**

**AZ7812** ( $V_I=17V$ ,  $I_O=1A$ ,  $T_J=-40$  to  $125$  °C, unless otherwise specified.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	$V_O$	$T_J=25^\circ C$	11.5	12	12.5	V
		$I_O=5mA$ to $1A$ , $V_I=14.8$ to $17V$ , $P_D \leq 15W$	11.4	12	12.6	
Line Regulation	$V_{RLINE}$	$V_I=14.5$ to $18V$ , $I_O=1A$ , $T_J=25^\circ C$		2.2	20	mV
Load Regulation	$V_{RLOAD}$	$V_I=17V$ , $I_O=5mA$ to $1A$ , $T_J=25^\circ C$		8.1	60	mV
Quiescent Current	$I_Q$	$V_I=17V$		3.4	6.5	mA
Quiescent Current Change	$\Delta I_Q$	$V_I=14.5$ to $17V$ , $I_O=1A$ , $T_J=25^\circ C$			0.7	mA
		$I_O=5.0mA$ to $1A$ , $T_J=25^\circ C$			0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	$V_I=15V$ to $17V$ , $f=120Hz$ , $I_O=300mA$	55	60		dB
Dropout Voltage	$V_I-V_O$	$\Delta V_O/V_O=1\%$ , $I_O=1A$ , $T_A=25^\circ C$		2.0		V
Output Noise Voltage	$N_O$	$f=10Hz$ to $100KHz$ , $T_A=25^\circ C$		10		$\mu V/V_O$
Output Resistance	$R_O$	$f=1.0KHz$		13		$m\Omega$
Short Circuit Current	$I_{PK}$	$V_I=15V$ , $T_A=25^\circ C$		0.8		A
Peak Output Current	$I_{MAX}$	$V_I=17V$ , $T_J=25^\circ C$		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			-0.8		$mV/^\circ C$







**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Typical Performance Characteristics**

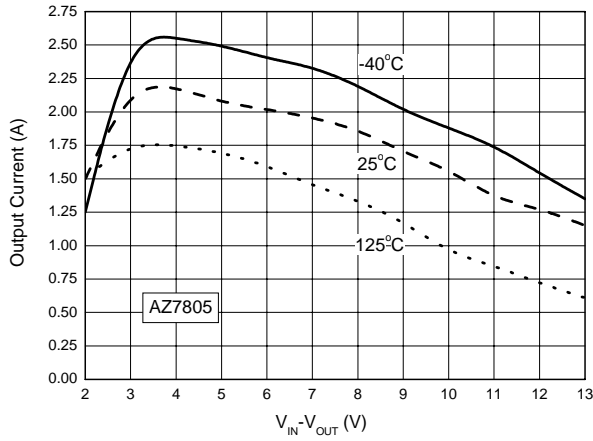


Figure 4. Peak Output Current vs. Input / Output Differential Voltage

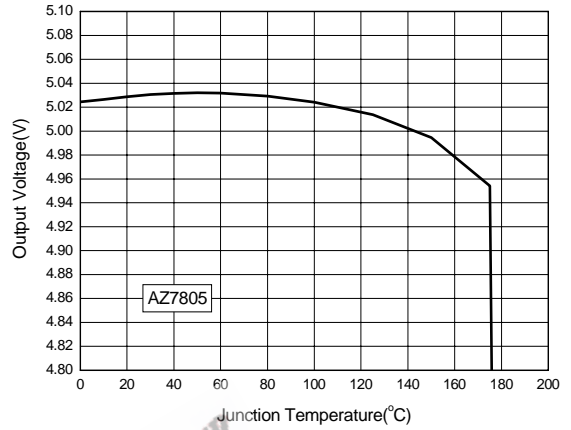


Figure 5. Output Voltage vs. Junction Temperature

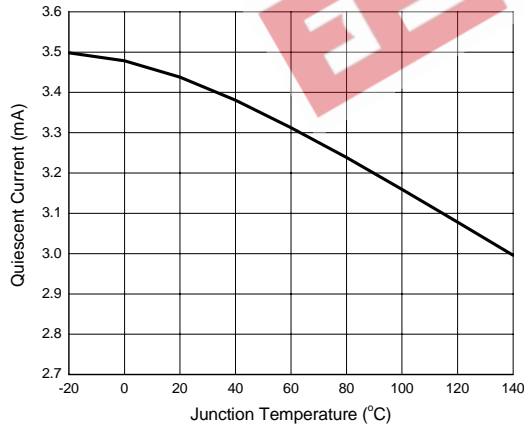


Figure 6. Quiescent Current vs. Junction Temperature

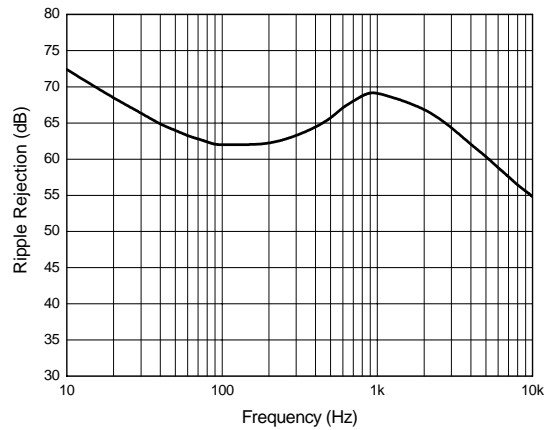


Figure 7. Ripple Rejection vs. Frequency



**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Typical Application**

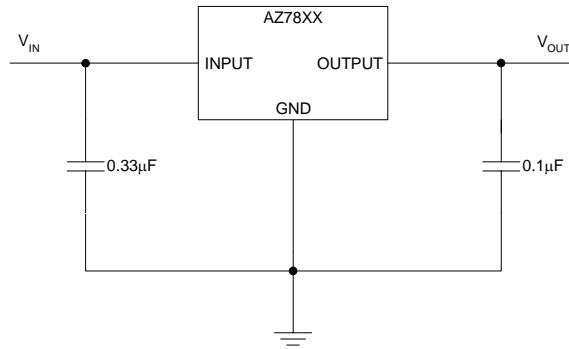


Figure 8. Fixed Output Regulator of AZ78XX

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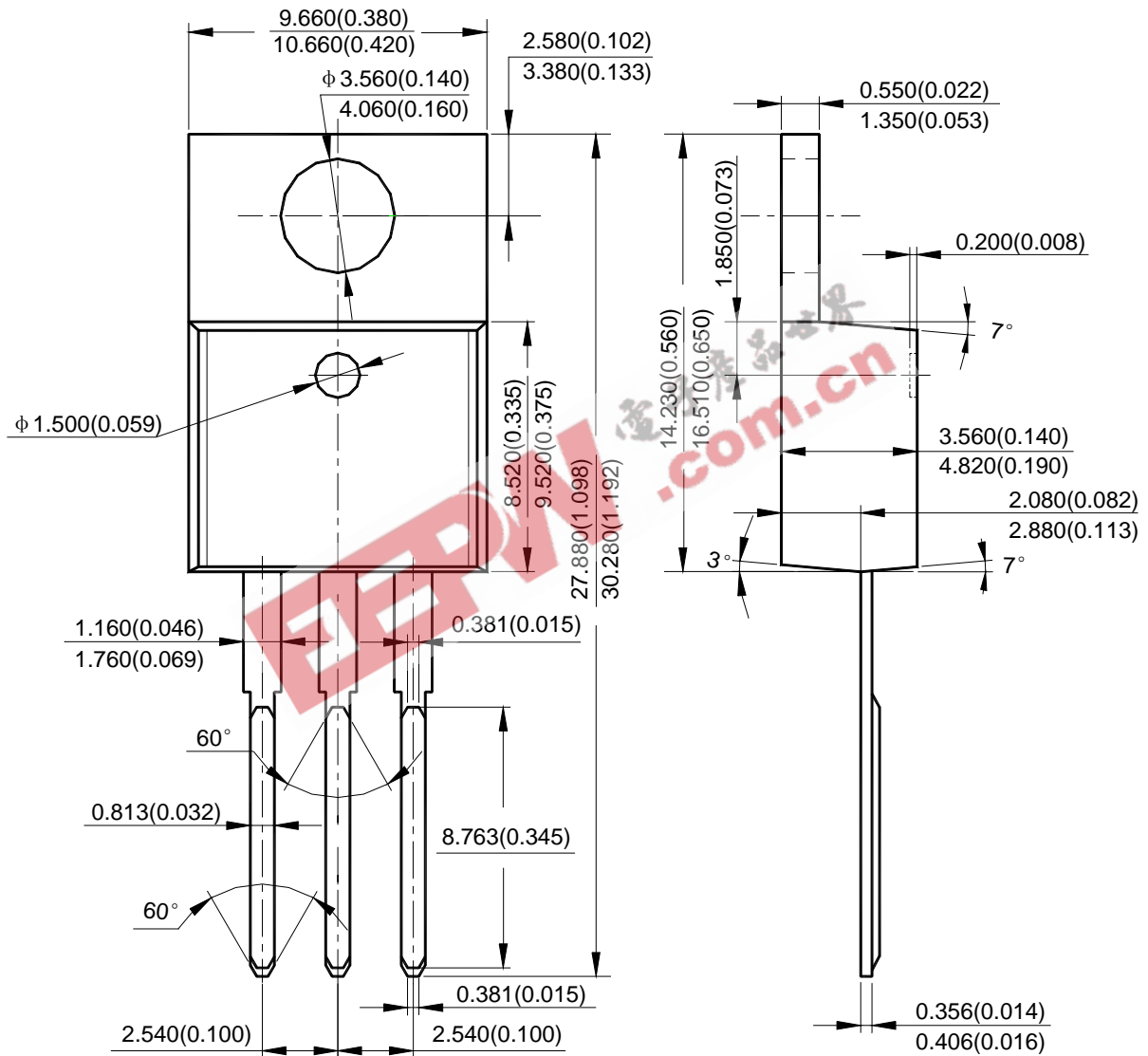
**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Mechanical Dimension**

**TO-220**

**Unit: mm(inch)**





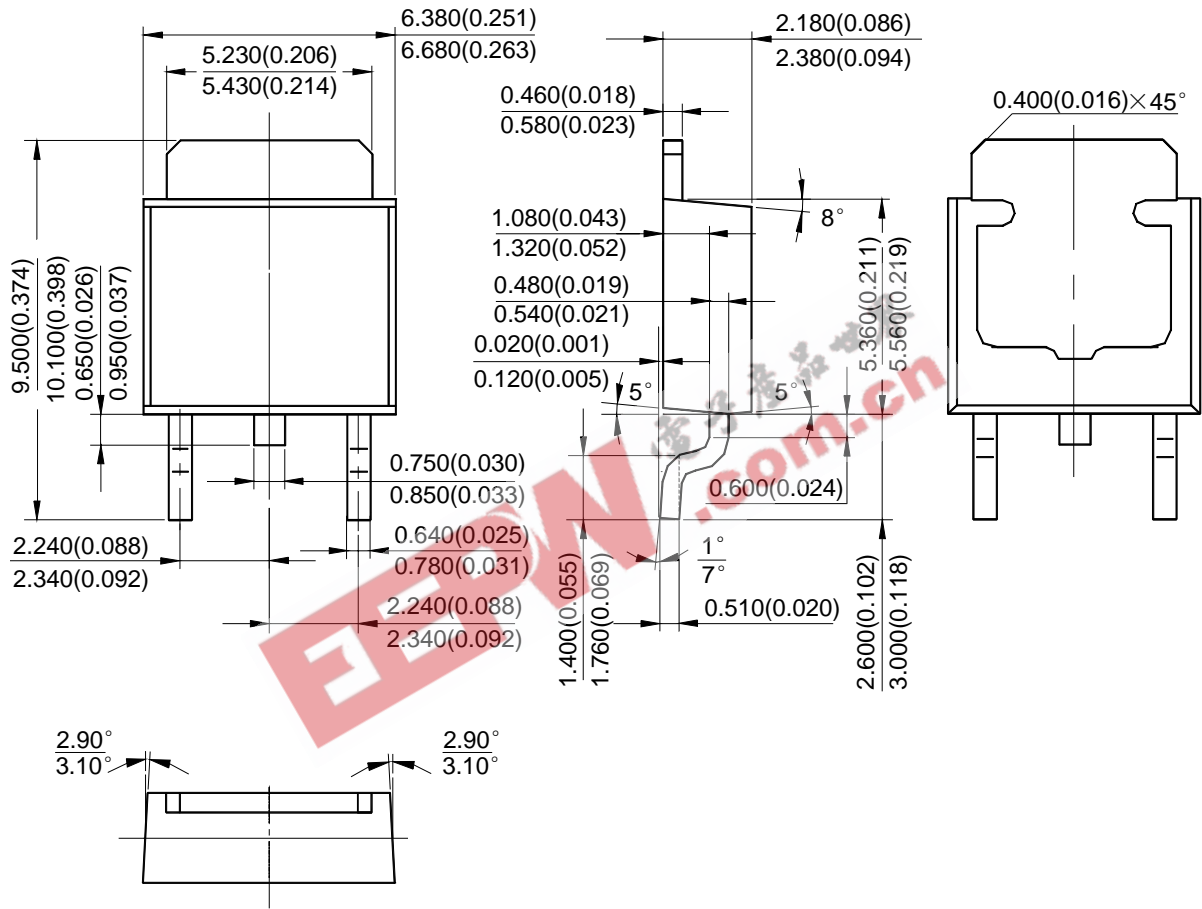
**3-TERMINAL POSITIVE LINEAR REGULATORS**

**AZ78XX**

**Mechanical Dimension (Continued)**

**TO-252**

**Unit: mm(inch)**





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