

1A 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-220-3 and TO-252-2 (1).

Features

- Constant 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

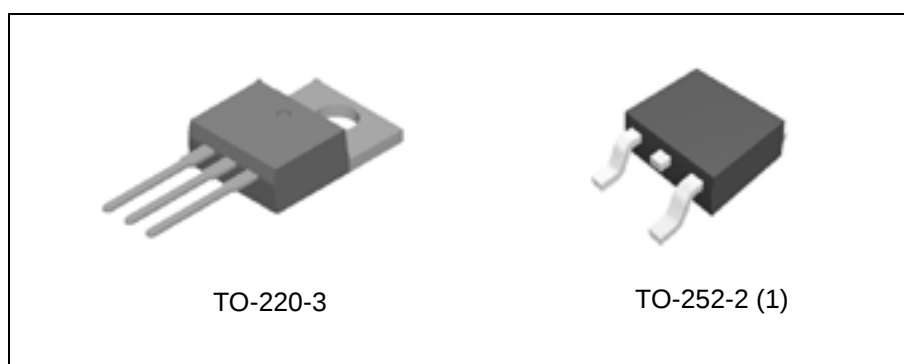


Figure 1. Package Types of AZ78XX

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Pin Configuration

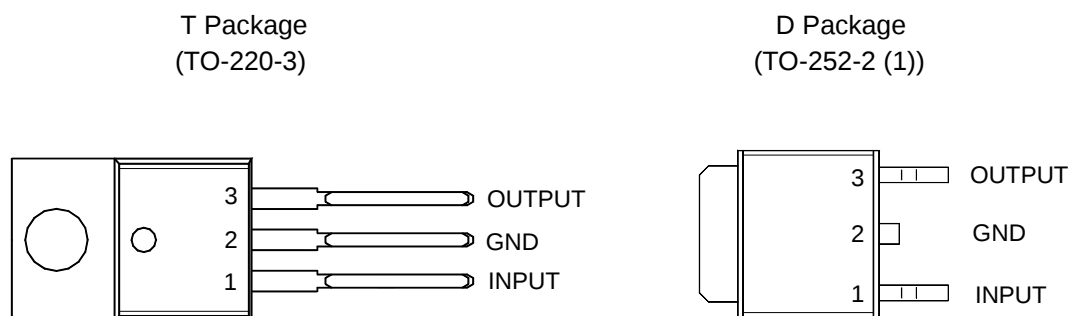


Figure 2. Pin Configuration of AZ78XX (Top View)

Pin Description

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

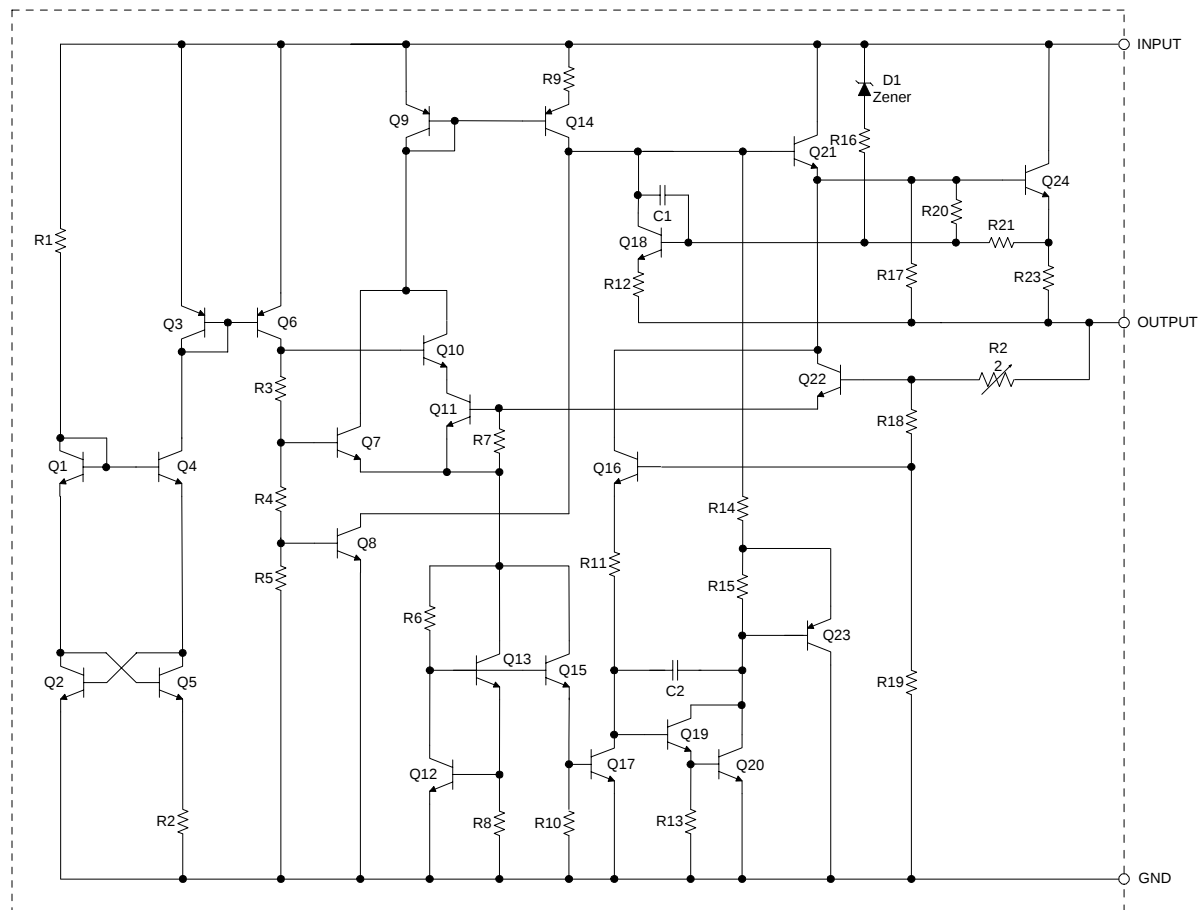
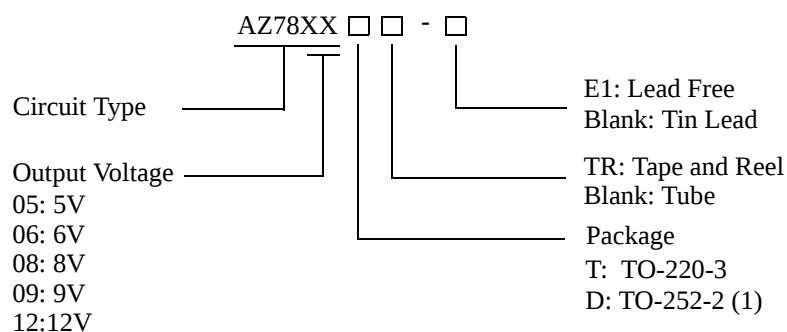
**1A 3-TERMINAL POSITIVE LINEAR REGULATORS****AZ78XX****Functional Block Diagram**

Figure 3. Functional Block Diagram of AZ78XX

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Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
TO-220-3	-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-252-2 (1)	-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.

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Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value		Unit
Input Voltage	V_{IN}	20		V
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260		°C
Power Dissipation	P_D	Internally Limited		W
Operating Junction Temperature	T_J	150		°C
Storage Temperature Range	T_{STG}	-65 to 150		°C
Thermal Resistance	θ_{JA}	TO-220-3	60	°C/W
		TO-252-2 (1)	100	
ESD (Human Body Model)	ESD	3500		V
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
Input Voltage	AZ7805	V_{IN}		15	V
	AZ7806			15	
	AZ7808			15	
	AZ7809			15	
	AZ7812			17	
Operating Junction Temperature Range		T_J	-40	125	°C

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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	30	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	$V_I=10V$, $I_O=0$		3.2	6.0	mA
Quiescent Current Change	ΔI_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_{DROP}	$\Delta V_O/V_O=1\%$, $I_O=1A$, $T_J=25^{\circ}C$		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_{SC}	$V_I=15V$, $T_A=25^{\circ}C$		0.8		A
Peak Output Current	I_{PK}	$V_I=10V$, $T_J=25^{\circ}C$		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	30	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	$V_I=11V$, $I_O=0$		3.3	6.0	mA
Quiescent Current Change	ΔI_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_{DROP}	$\Delta V_O/V_O=1\%$, $I_O=1A$, $T_J=25^{\circ}C$		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_{SC}	$V_I=15V$, $T_A=25^{\circ}C$		0.8		A
Peak Output Current	I_{PK}	$V_I=11V$, $T_J=25^{\circ}C$		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			0.3		$mV/^{\circ}C$

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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	30	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	$V_I=14V$, $I_O=0$		3.3	6.0	mA
Quiescent Current Change	ΔI_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_{DROP}	$\Delta V_O/V_O=1\%$, $I_O=1A$, $T_J=25^{\circ}C$		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_{SC}	$V_I=15V$, $T_A=25^{\circ}C$		0.8		A
Peak Output Current	I_{PK}	$V_I=13V$, $T_J=25^{\circ}C$		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	30	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	$V_I=15V$, $I_O=0$		3.4	8.0	mA
Quiescent Current Change	ΔI_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_{DROP}	$\Delta V_O/V_O=1\%$, $I_O=1A$		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_{SC}	$V_I=15V$, $T_A=25^{\circ}C$		0.8		A
Peak Output Current	I_{PK}	$V_I=14V$, $T_J=25^{\circ}C$		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			0.5		$mV/^{\circ}C$



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Electrical Characteristics (Continued)

AZ7812 ($V_I=17V$, $I_O=1A$, $T_J=-40$ to $125^\circ C$, 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	30	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	$V_I=17V$, $I_O=0$		3.4	6.5	mA
Quiescent Current Change	ΔI_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_{DROP}	$\Delta V_O/V_O=1\%$, $I_O=1A$, $T_A=25^\circ C$		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_{SC}	$V_I=15V$, $T_A=25^\circ C$		0.8		A
Peak Output Current	I_{PK}	$V_I=17V$, $T_J=25^\circ C$		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			0.8		$mV/^\circ C$

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Typical Performance Characteristics

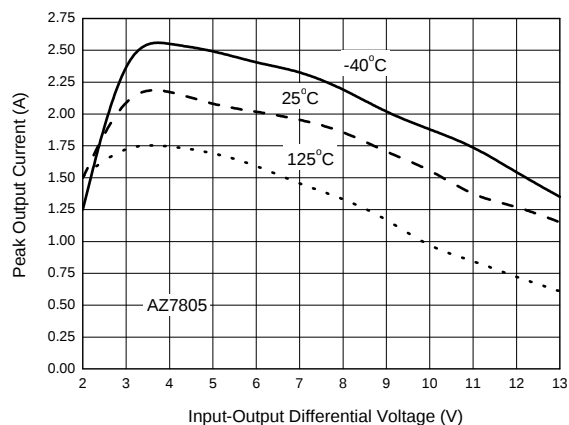


Figure 4. Peak Output Current vs. Input-Output Differential Voltage

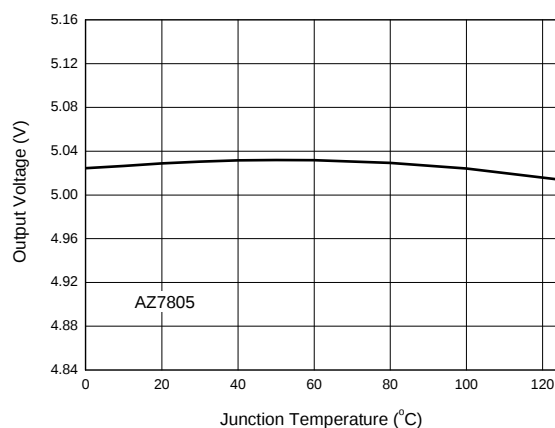


Figure 5. Output Voltage vs. Junction Temperature

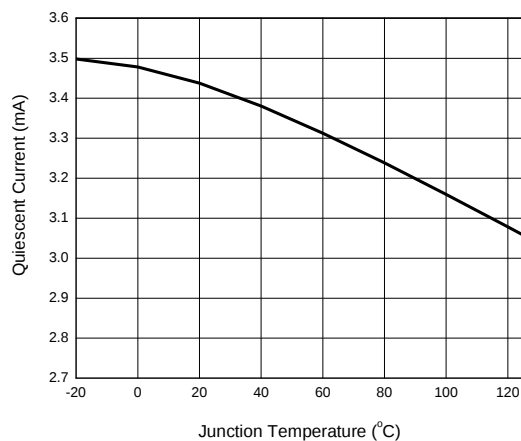


Figure 6. Quiescent Current vs. Junction Temperature

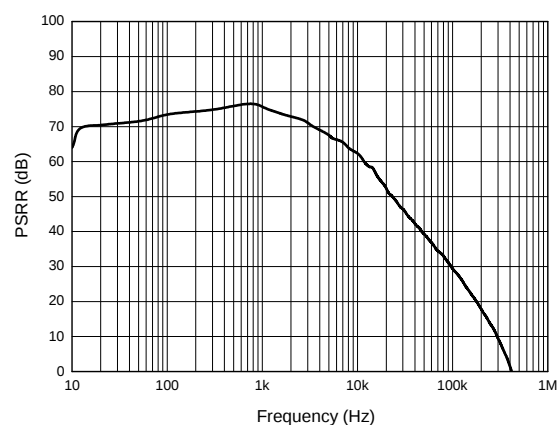


Figure 7. PSRR vs. Frequency

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Typical Performance Characteristics (Continued)

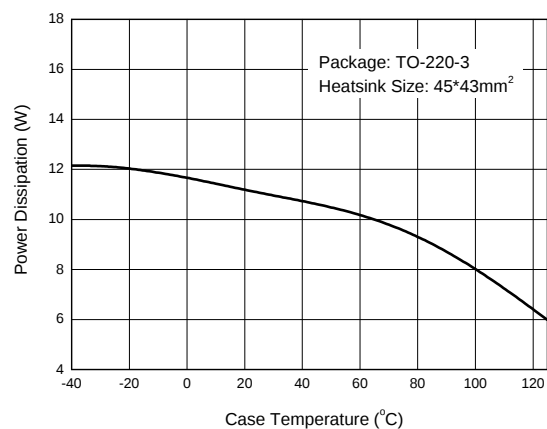


Figure 8. Power Dissipation vs. Case Temperature

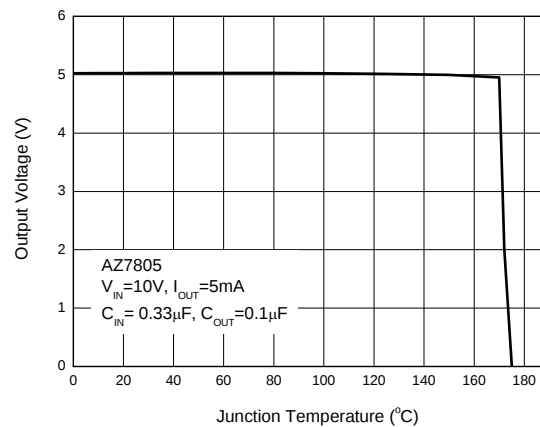


Figure 9. Thermal Shutdown Protection

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Typical Application

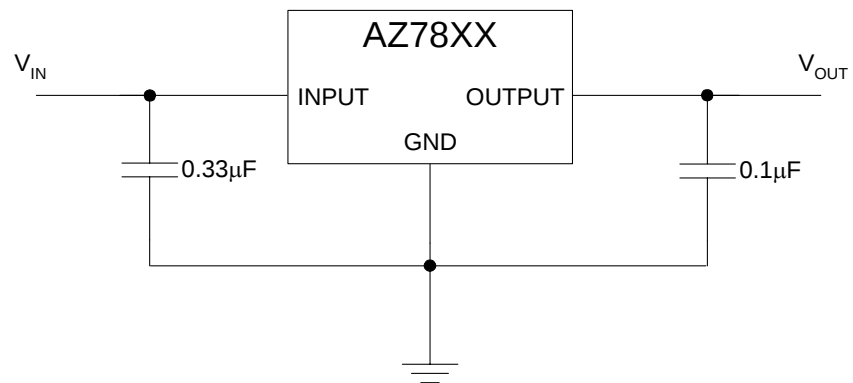
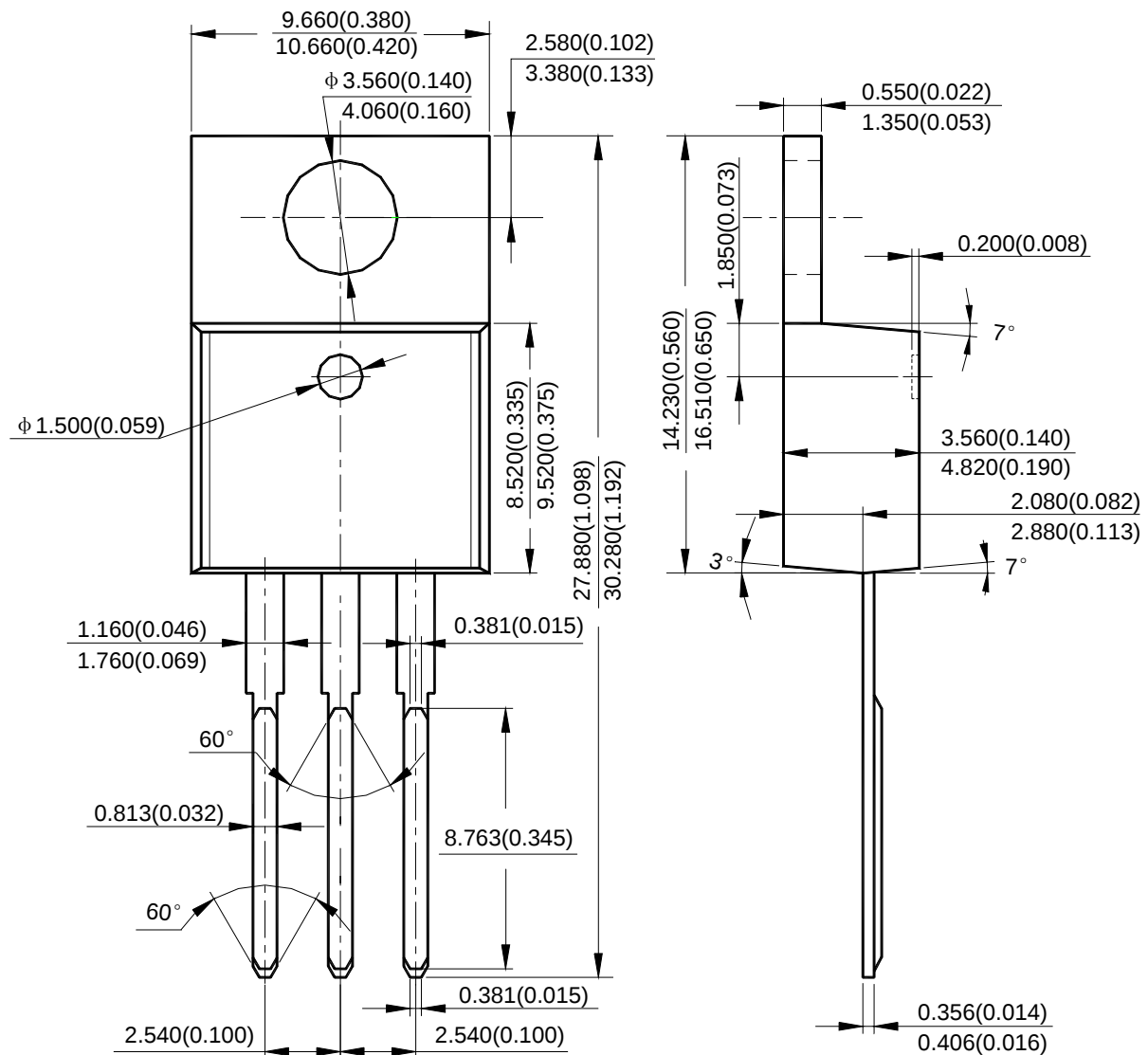
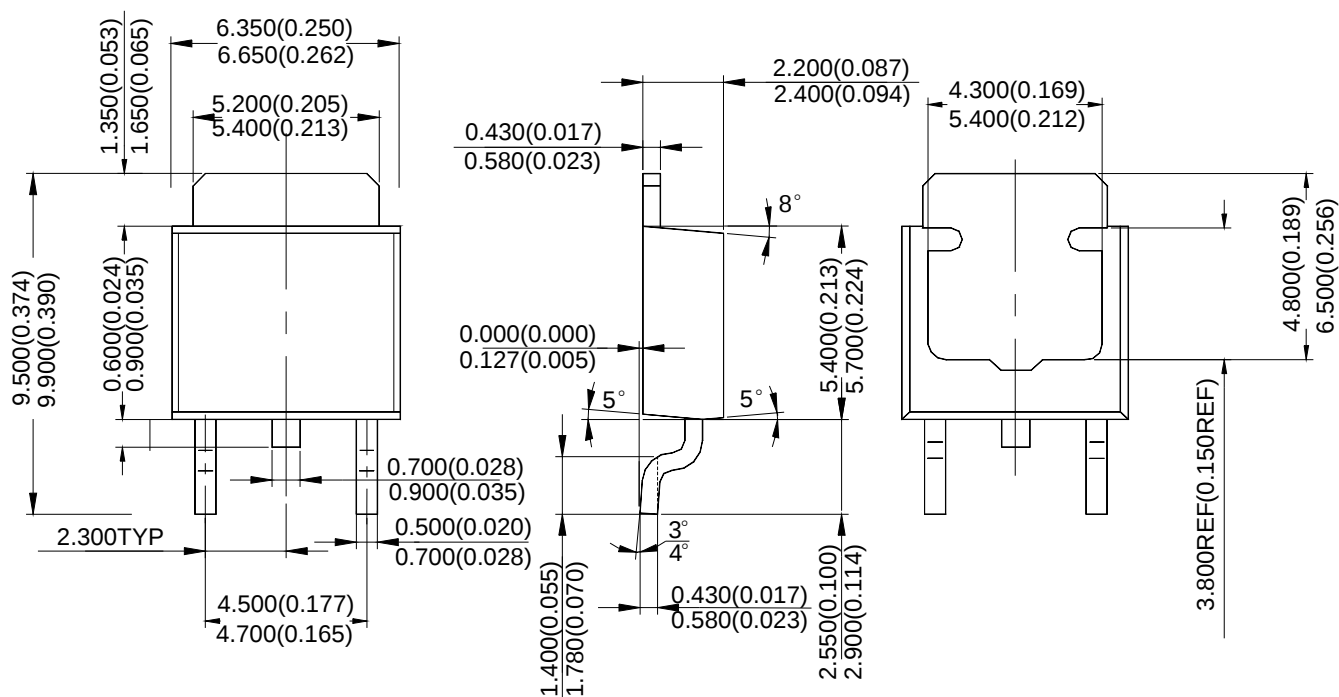


Figure 10. Typical Application of AZ78XX

**1A 3-TERMINAL POSITIVE LINEAR REGULATORS****AZ78XX****Mechanical Dimensions****TO-220-3****Unit: mm(inch)**

**1A 3-TERMINAL POSITIVE LINEAR REGULATORS****AZ78XX****Mechanical Dimensions (Continued)****TO-252-2(1)****Unit: mm(inch)**



BCD Semiconductor Manufacturing Limited

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