

3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR

AS78XX

General Description

The AS78XX series are three terminal positive regulators designed for a wide variety of applications including local, on-card regulation.

The AS78XX 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 1A.

The AS78XX are available in TO-220-3 and TO-252-2 packages.

Features

- Output Current up to 1A
- Fixed Output Voltages of 5V, 12V and 15V
- Output Voltage Accuracy of $\pm 4\%$ over the Full Temperature Range
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components
- Output Transistor Safe-area Protection

Applications

- High Efficiency Linear Regulator
- Post Regulation for Switching Supply
- Microprocessor Power Supply
- Mother Board

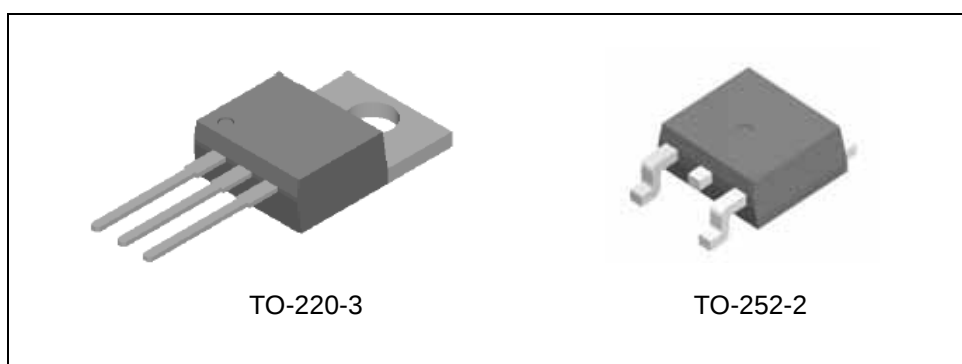


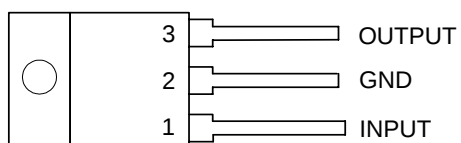
Figure 1. Package Types of AS78XX

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Pin Configuration

T Package
(TO-220-3)



D Package
(TO-252-2)

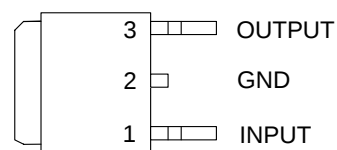


Figure 2. Pin Configuration of AS78XX (Top View)

Pin Description

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

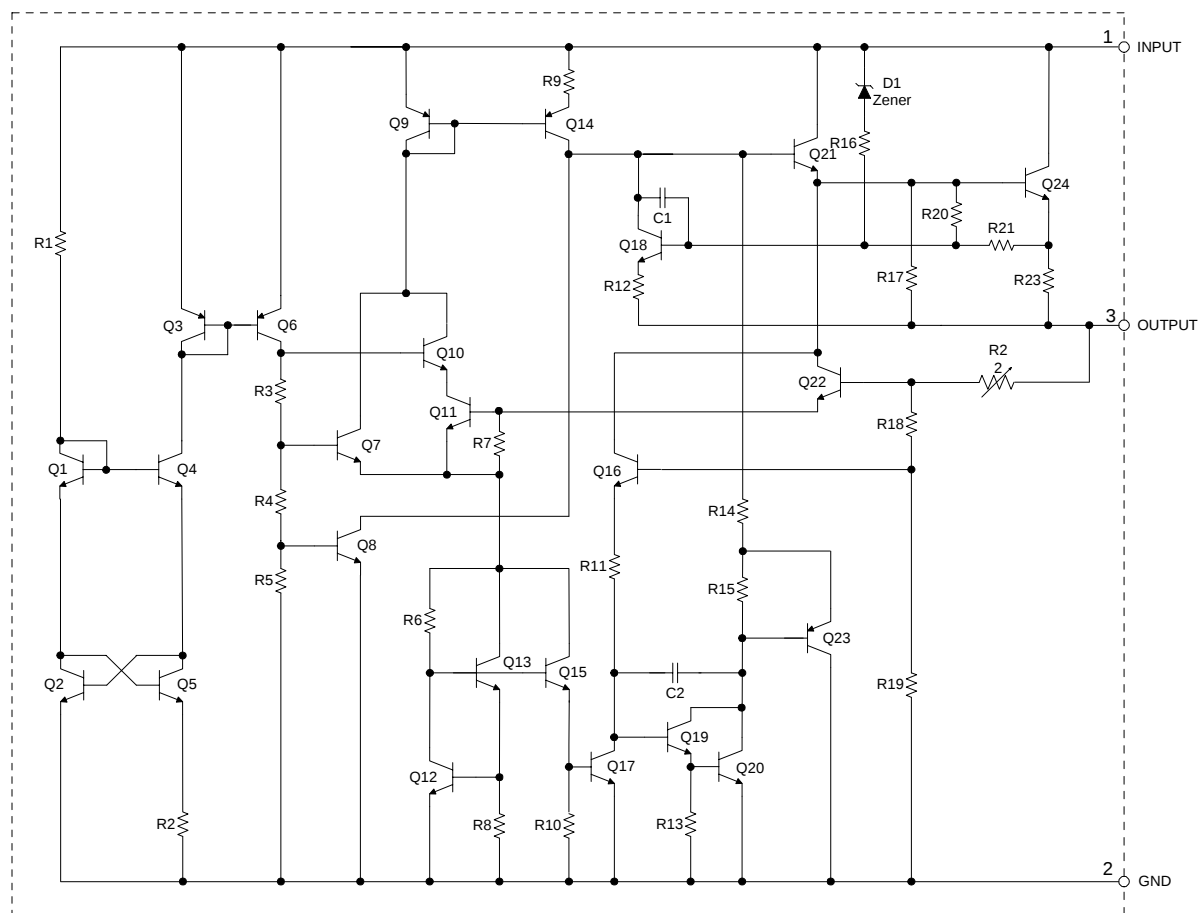
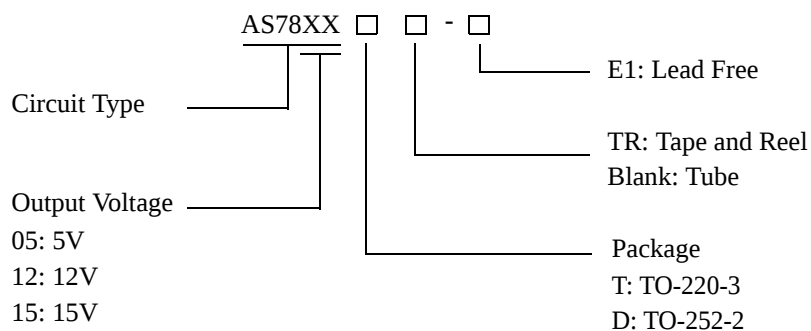
**3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR****AS78XX****Functional Block Diagram**

Figure 3. Functional Block Diagram of AS78XX

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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		AS7805T-E1		AS7805T-E1	Tube
			AS7812T-E1		AS7812T-E1	Tube
			AS7815T-E1		AS7815T-E1	Tube
TO-252-2	-40 to 125°C		AS7805D-E1		AS7805D-E1	Tube
			AS7805DTR-E1		AS7805D-E1	Tape & Reel
			AS7812D-E1		AS7812D-E1	Tube
			AS7812DTR-E1		AS7812D-E1	Tape & Reel
			AS7815D-E1		AS7815D-E1	Tube
			AS7815DTR-E1		AS7815D-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}	35	V
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260	°C
Power Dissipation	P_D	Internally Limited	W
Storage Temperature Range	T_{STG}	-65 to 150	°C
ESD (Machine Model)	ESD	400	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
Operating Junction Temperature Range	T_J	-40	125	°C

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Electrical Characteristics

AS7805 ($V_{IN}=10V$, $I_{OUT}=1A$, $T_J=-40$ to $125^{\circ}C$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	4.9	5	5.1	V
		$I_{OUT}=5mA$ to $1A$, $V_{IN}=7.5V$ to $20V$, $P_D \leq 15W$	4.8		5.2	
Line Regulation	V_{RLINE}	$V_{IN}=7.5$ to $20V$, $I_{OUT}=1A$, $T_J=25^{\circ}C$		7	50	mV
Load Regulation	V_{RLOAD}	$V_{IN}=10V$, $I_{OUT}=5mA$ to $1A$, $T_J=25^{\circ}C$		25	100	mV
Quiescent Current	I_Q	$V_{IN}=10V$		3.2	6	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=8$ to $25V$, $I_{OUT}=500mA$, $T_J=25^{\circ}C$		0.3	0.8	mA
		$I_{OUT}=5mA$ to $1A$, $T_J=25^{\circ}C$		0.08	0.5	
Ripple Rejection	PSRR	$V_{IN}=8$ to $18V$, $f=120Hz$, $I_{OUT}=500mA$		73		dB
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1A$, $T_J=25^{\circ}C$		2		V
Output Noise Voltage	N_O	$f=10Hz$ to $100kHz$, $T_A=25^{\circ}C$		10		$\mu V/V_O$
Output Resistance	R_O	$f=1kHz$		10		$m\Omega$
Short Circuit Current		$V_{IN}=35V$, $T_A=25^{\circ}C$		0.2		A
Peak Output Current	I_{PK}	$V_{IN}=10V$, $T_J=25^{\circ}C$		2.2		A
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$			0.4		$mV/^{\circ}C$
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			80		ppm/ $^{\circ}C$

AS7812 ($V_{IN}=19V$, $I_{OUT}=1A$, $T_J=-40$ to $125^{\circ}C$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	11.75	12	12.25	V
		$I_{OUT}=5mA$ to $1A$, $V_{IN}=14.8V$ to $27V$, $P_D \leq 15W$	11.5		12.5	
Line Regulation	V_{RLINE}	$V_{IN}=14.8$ to $27V$, $I_{OUT}=1A$, $T_J=25^{\circ}C$		16	120	mV
Load Regulation	V_{RLOAD}	$V_{IN}=19V$, $I_{OUT}=5mA$ to $1A$, $T_J=25^{\circ}C$		25	100	mV
Quiescent Current	I_Q	$V_{IN}=19V$		3.4	6	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=15$ to $30V$, $I_{OUT}=500mA$, $T_J=25^{\circ}C$		0.3	0.8	mA
		$I_{OUT}=5mA$ to $1A$, $T_J=25^{\circ}C$		0.08	0.5	
Ripple Rejection	PSRR	$V_{IN}=15$ to $25V$, $f=120Hz$, $I_{OUT}=500mA$		60		dB
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1A$, $T_J=25^{\circ}C$		2		V
Output Noise Voltage	N_O	$f=10Hz$ to $100kHz$, $T_A=25^{\circ}C$		10		$\mu V/V_O$
Output Resistance	R_O	$f=1kHz$		11		$m\Omega$
Short Circuit Current		$V_{IN}=35V$, $T_A=25^{\circ}C$		0.2		A
Peak Output Current	I_{PK}	$V_{IN}=19V$, $T_J=25^{\circ}C$		2.2		A
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$			0.96		$mV/^{\circ}C$
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			80		ppm/ $^{\circ}C$



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Electrical Characteristics (Continued)

AS7815 ($V_{IN}=23V$, $I_{OUT}=1A$, $T_J=-40$ to $125^{\circ}C$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	14.7	15	15.3	V
		$I_{OUT}=5mA$ to $1A$, $V_{IN}=17.9$ to $30V$, $P_D \leq 15W$	14.4		15.6	
Line Regulation	V_{RLINE}	$V_{IN}=17.9$ to $30V$, $I_{OUT}=1A$, $T_J=25^{\circ}C$		18	150	mV
Load Regulation	V_{RLOAD}	$V_{IN}=22V$, $I_{OUT}=5mA$ to $1A$, $T_J=25^{\circ}C$		25	100	mV
Quiescent Current	I_Q	$V_{IN}=23V$		3.4	6	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=17.5$ to $30V$, $I_{OUT}=500mA$, $T_J=25^{\circ}C$		0.3	0.8	mA
		$I_{OUT}=5mA$ to $1A$, $T_J=25^{\circ}C$		0.08	0.5	
Ripple Rejection	PSRR	$V_{IN}=18.5$ to $28.5V$, $f=120Hz$, $I_{OUT}=500mA$		58		dB
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1A$, $T_J=25^{\circ}C$		2		V
Output Noise Voltage	N_O	$f=10Hz$ to $100kHz$, $T_A=25^{\circ}C$		10		$\mu V/V_O$
Output Resistance	R_O	$f=1kHz$		12		$m\Omega$
Short Circuit Current		$V_{IN}=35V$, $T_A=25^{\circ}C$		0.2		A
Peak Output Current	I_{PK}	$V_{IN}=23V$, $T_J=25^{\circ}C$		2.2		A
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$			1.2		$mV/^{\circ}C$
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			80		ppm/ $^{\circ}C$

3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR

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Typical Performance Characteristics

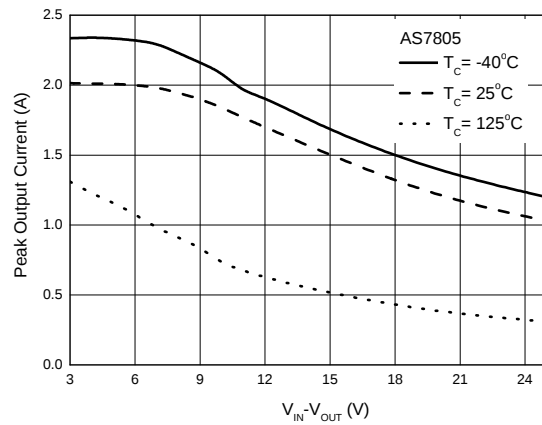


Figure 4. Peak Output Current vs. Input/Output Differential Voltage

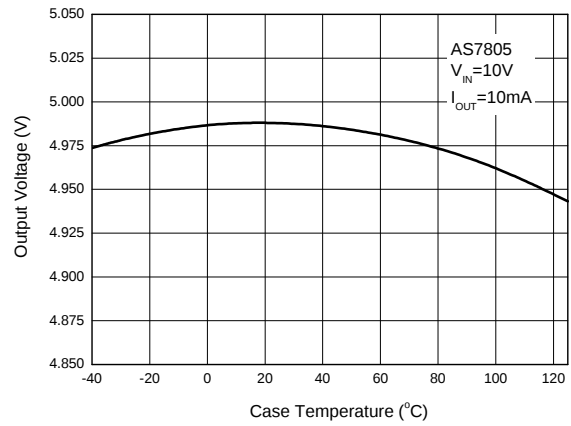


Figure 5. Output Voltage vs. Case Temperature

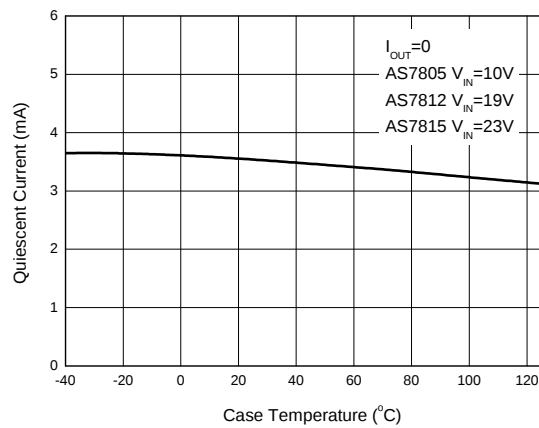


Figure 6. Quiescent Current vs. Case Temperature

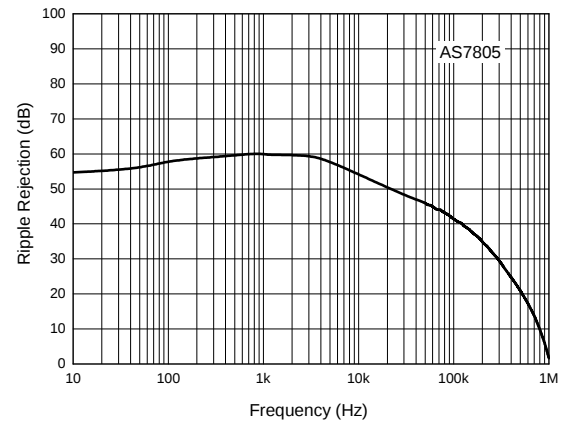


Figure 7. Ripple Rejection vs. Frequency

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Typical Performance Characteristics (Continued)

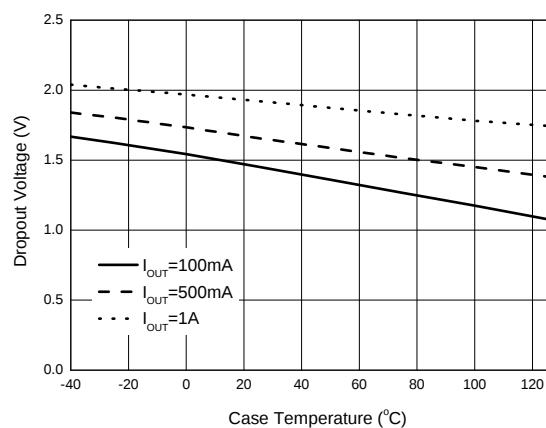


Figure 8. Dropout Voltage vs. Case Temperature

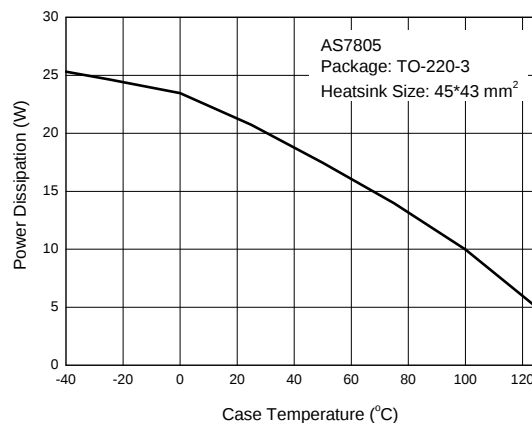


Figure 9. Power Dissipation vs. Case Temperature

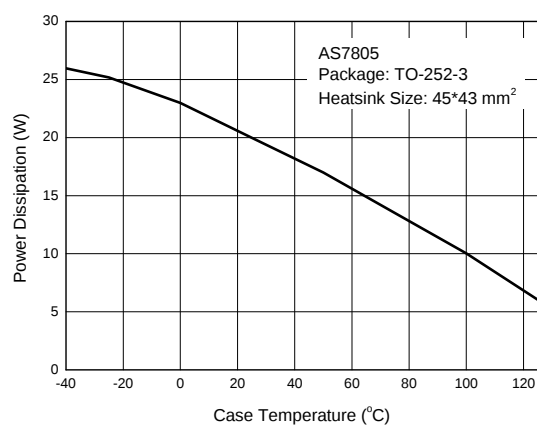


Figure 10. Power Dissipation vs. Case Temperature

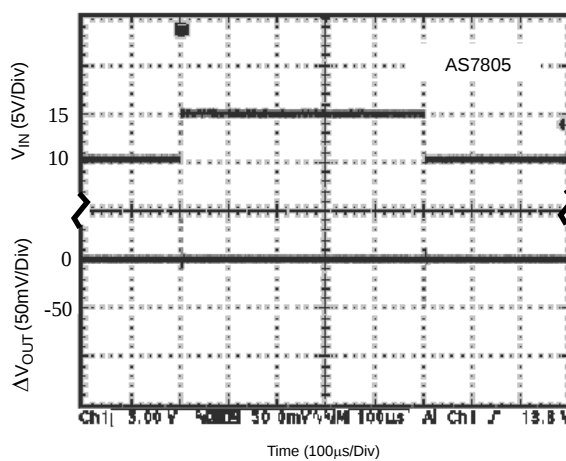


Figure 11. Line Transient
(Conditions: $I_{OUT}=500mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$)

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Typical Performance Characteristics (Continued)

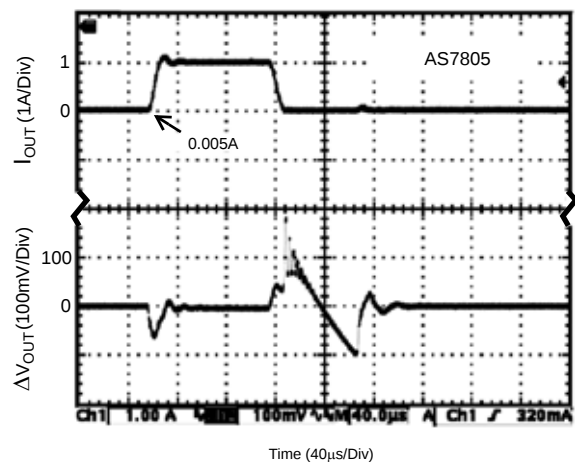


Figure 12. Load Transient
(Conditions: $V_{IN}=10V$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$)

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Typical Application

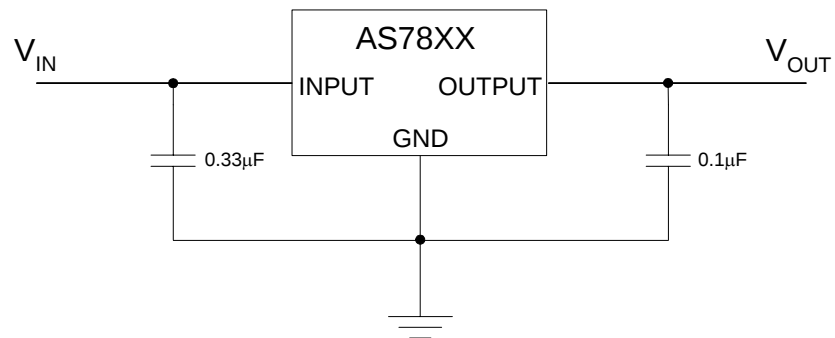
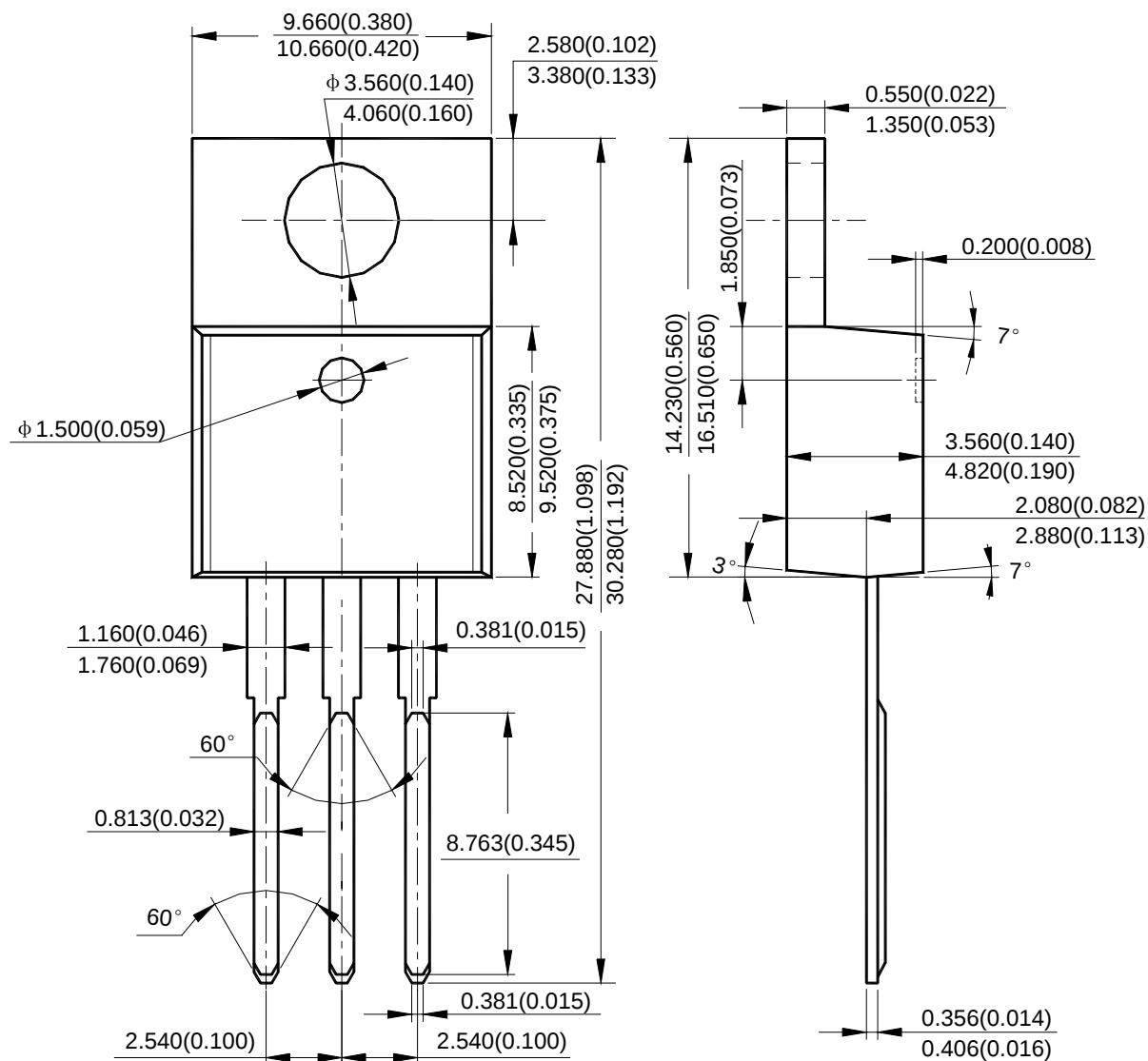
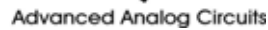


Figure 13. Fixed Output Regulator of AS78XX

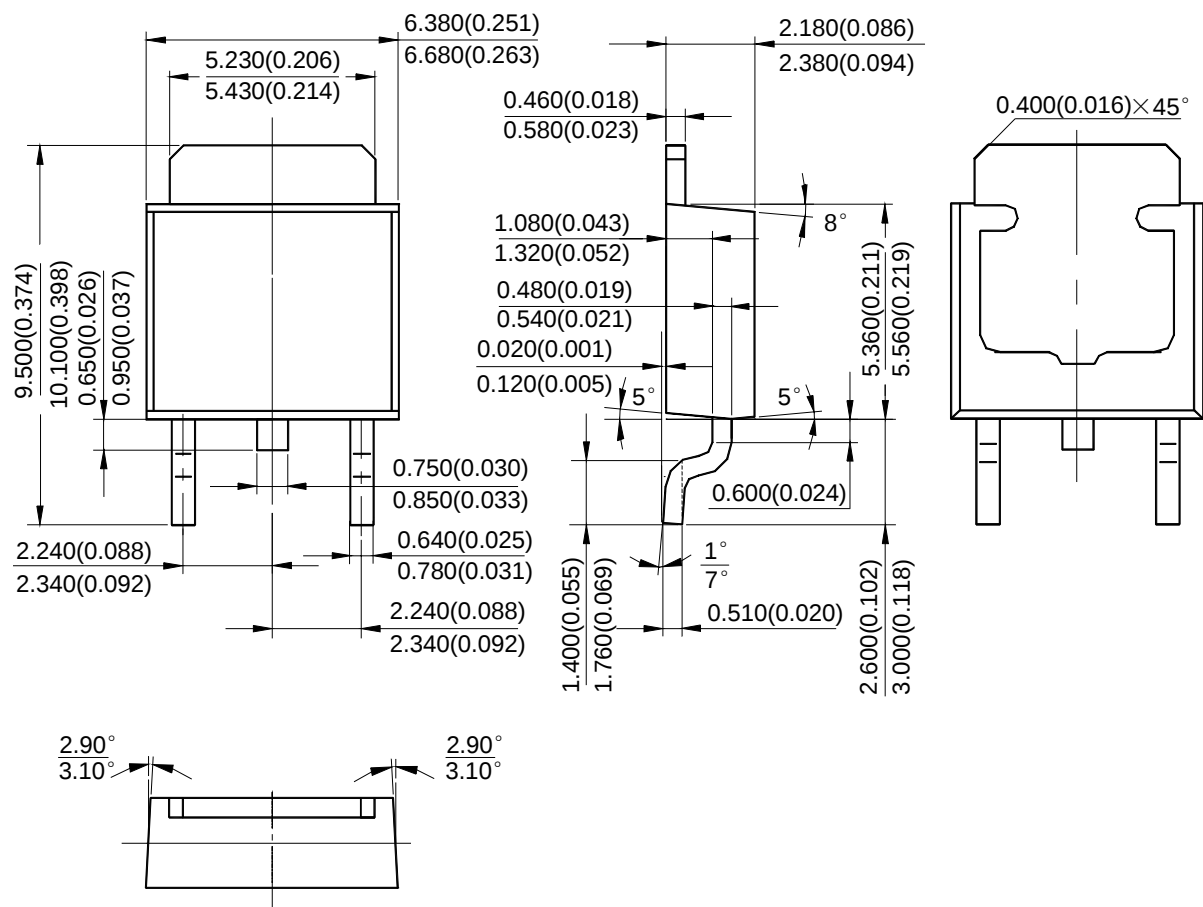
**3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR****AS78XX****Mechanical Dimensions****TO-220-3****Unit: mm(inch)**



Mechanical Dimensions (Continued)

TO-252-2

Unit: mm(inch)





BCD Semiconductor Manufacturing Limited

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