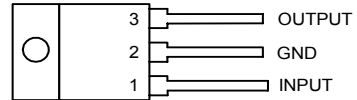


## 500mA 3-Terminal Positive Voltage Regulator

### Features

- Output Current up to 0.5A
- Fixed Output Voltages of 5V and 12V
- Output Voltage Tolerances of  $\pm 5\%$  over the Full Temperature Range
- Internal Short Circuit Current-Limiting
- Internal Thermal Overload Protection
- Available in Lead Free, RoHS Compliant Packaging

### TO-220 Package



### Applications

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

### General Description

The SP78MXX 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 0.5A.

The SP78MXX series are available in two standard plastic packages: TO-220 and TO-252.

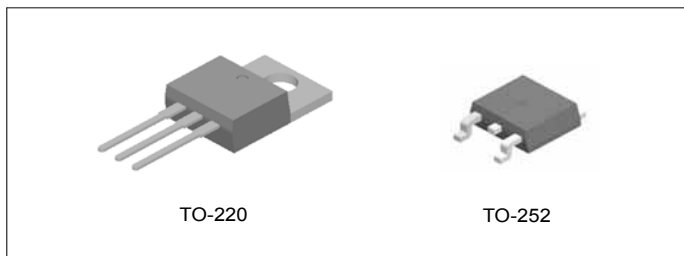


Figure 1. Package Types of SP78MXX

## Pin Configuration

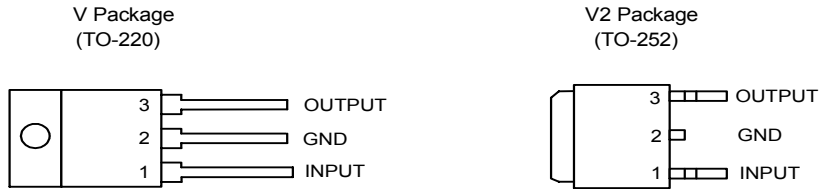


Figure 2. Pin Configuration of SP78MXX (Top View)

## Pin Description

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

## Functional Block Diagram

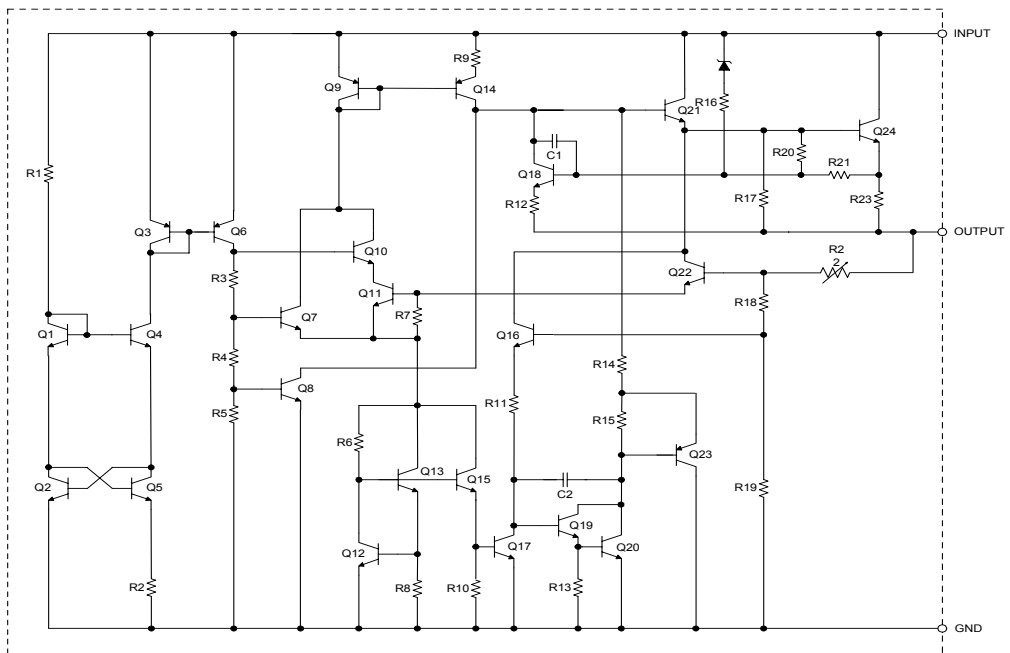


Figure 3. Functional Block Diagram of SP78MXX

## Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Input Voltage	$V_{IN}$	20	V
Lead Temperature (Soldering, 10 sec.)		300	°C
Power Dissipation	$P_D$	Internally Limited	
Storage Temperature Range	$T_{STG}$	-65 to 150	°C
ESD (Machine Model)	ESD	450	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

## Electrical Characteristics

**SP78M05** ( $V_{IN}=10V$ ,  $I_{OUT}=350mA$ ,  $T_J=-40^{\circ}C$  to  $125^{\circ}C$ ,  $P_D \leq 5W$ , unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	4.8	5	5.2	V
		$V_{IN}=7V$ to $15V$ , $I_{OUT}=5mA$ to $350mA$	4.75	5	5.25	V
Line Regulation	$V_{RLINE}$	$T_J=25^{\circ}C$ , $V_{IN}=7V$ to $15V$ , $I_{OUT}=200mA$		3	50	mV
Load Regulation	$V_{RLOAD}$	$T_J=25^{\circ}C$ , $I_{OUT}=5mA$ to $500mA$		20	100	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3.2	6	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=8V$ to $15V$ , $I_{OUT}=200mA$			0.8	mA
		$I_{OUT}=5mA$ to $350mA$			0.5	
Ripple Rejection	$\Delta V_{IN}/\Delta V_{OUT}$	$V_{IN}=8V$ to $15V$ , $f=120Hz$ , $I_{OUT}=200mA$	62	73		dB
Dropout Voltage	$V_{IN}-V_{OUT}$	$\Delta V_{OUT}=1\%$ , $T_J=25^{\circ}C$		2		V
Output Noise Voltage	$N_O$	$T_A=25^{\circ}C$ , $f=10Hz$ to $100KHz$		40		$\mu V$
Short Circuit Current	$I_{SC}$	$T_J=25^{\circ}C$ , $V_{IN}=15V$		350		mA
Peak Output Current	$I_{PK}$	$T_J=25^{\circ}C$		700		mA
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		$\pm 0.2$		$mV/^{\circ}C$

**SP78M12** ( $V_{IN}=17V$ ,  $I_{OUT}=350mA$ ,  $T_J=-40^{\circ}C$  to  $125^{\circ}C$ ,  $P_D \leq 5W$ , unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$	11.5	12	12.5	V
		$V_{IN}=14.5V$ to $17V$ , $I_{OUT}=5mA$ to $350mA$	11.4	12	12.6	V
Line Regulation	$V_{RLINE}$	$T_J=25^{\circ}C$ , $V_{IN}=14.5V$ to $17V$ , $I_{OUT}=200mA$		8	50	mV
Load Regulation	$V_{RLOAD}$	$T_J=25^{\circ}C$ , $I_{OUT}=5mA$ to $500mA$		25	240	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$		3.2	6	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=14.5V$ to $17V$ , $I_{OUT}=200mA$			0.8	mA
		$I_{OUT}=5mA$ to $350mA$			0.5	
Ripple Rejection	$\Delta V_{IN}/\Delta V_{OUT}$	$V_{IN}=15V$ to $17V$ , $f=120Hz$ , $I_{OUT}=200mA$	55	60		dB
Dropout Voltage	$V_{IN}-V_{OUT}$	$\Delta V_{OUT}=1\%$ , $T_J=25^{\circ}C$		2		V
Output Noise Voltage	$N_O$	$T_A=25^{\circ}C$ , $f=10Hz$ to $100KHz$		75		$\mu V$
Short Circuit Current	$I_{SC}$	$T_J=25^{\circ}C$ , $V_{IN}=17V$		350		mA
Peak Output Current	$I_{PK}$	$T_J=25^{\circ}C$		700		mA
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		$\pm 0.3$		$mV/^{\circ}C$

# Typical Performance Characteristics

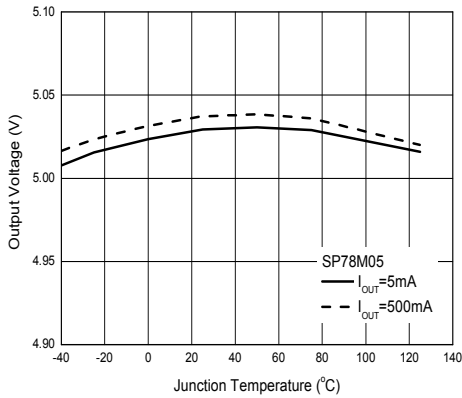


Figure 4. Output Voltage vs. Junction Temperature

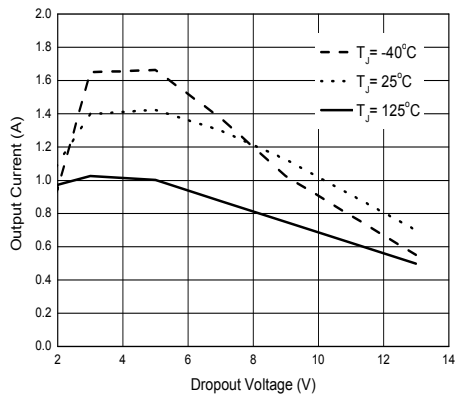


Figure 5. Peak Output Current vs. Dropout Voltage

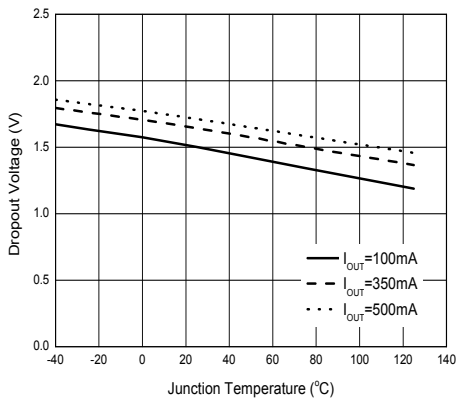


Figure 6. Dropout Voltage vs. Junction Temperature

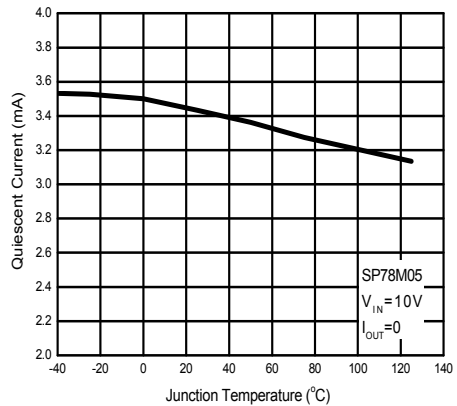


Figure 7. Quiescent Current vs. Junction Temperature

## Typical Performance Characteristics (Continued)

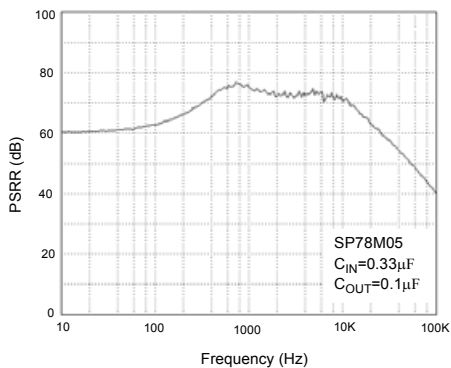


Figure 8. PSRR vs. Frequency

## Typical Application

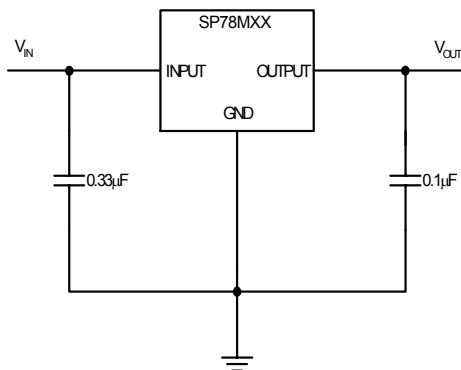
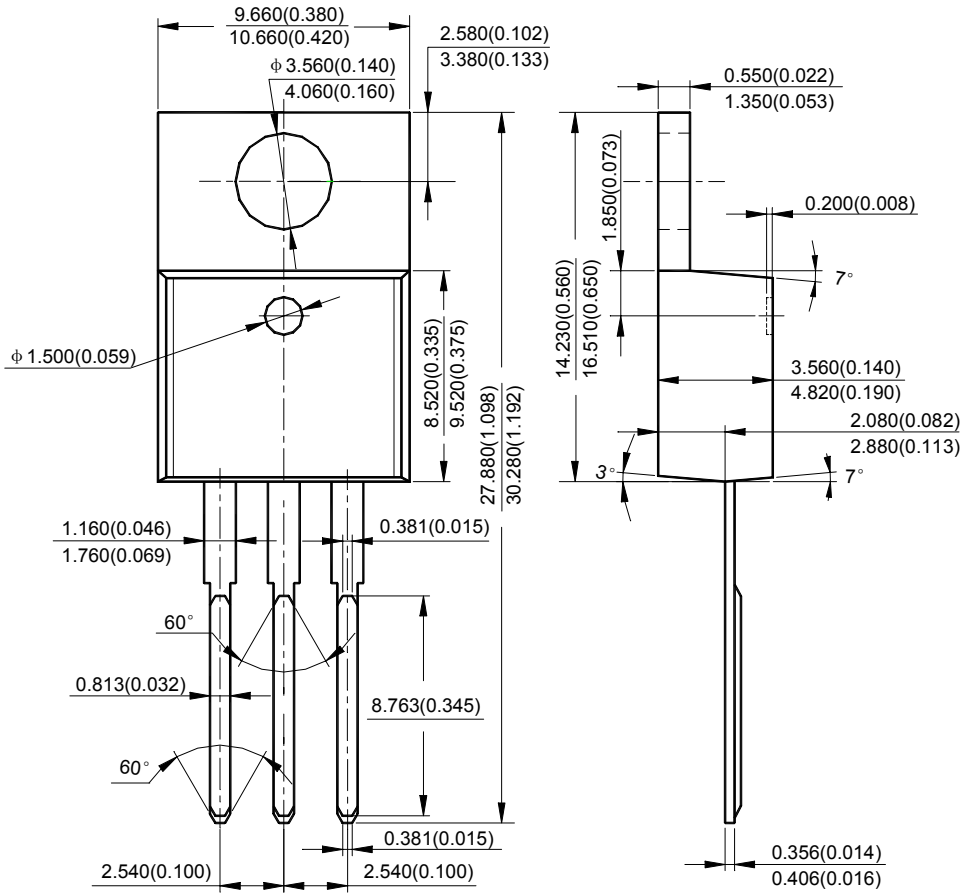


Figure 9. Typical Application of SP78MXX

Mechanical Dimensions

TO-220

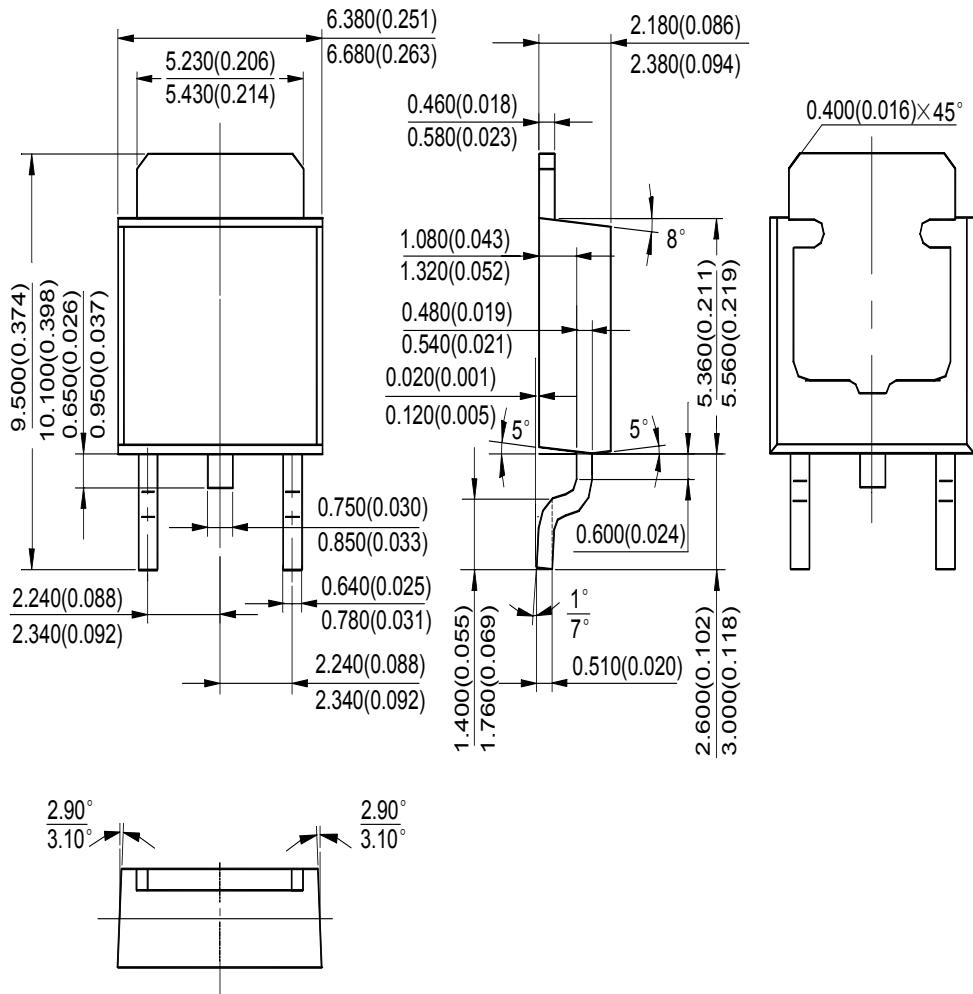
Unit: mm(inch)



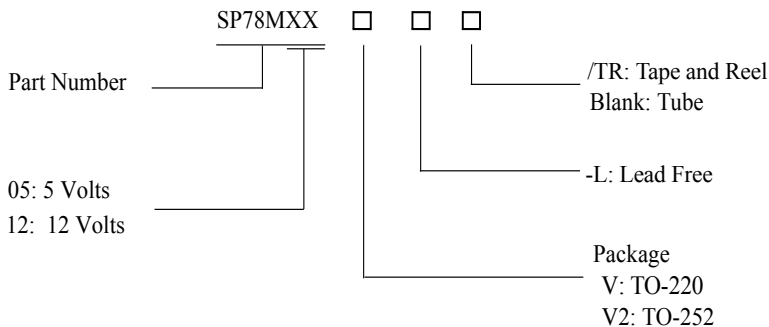
Mechanical Dimensions (Continued)

TO-252

Unit: mm(inch)







Sipex Corporation's Pb-free products, as designated with "-L" suffix in the part number, are RoHS compliant.

Part Number	Temperature Range	Voltage Tolerance	Output Voltage	Package	Pin Count	Packing Type
SP78M05V-L	-40°C to +125°C	±5%	5V	TO-220	3	50/TUBE
SP78M12V-L	-40°C to +125°C	±5%	12V	TO-220	3	50/TUBE
SP78M05V2-L/TR	-40°C to +125°C	±5%	5V	TO-252	3	2,500/TR
SP78M12V2-L/TR	-40°C to +125°C	±5%	12V	TO-252	3	2,500/TR



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