

78M00 SERIES 500mA 3-TERMINAL POSITIVE LINEAR REGULATOR

General Description

The 78M00 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 78M00 series are available in two standard plastic packages: TO-220-3 and TO-252-2 (1).

Features

- Output Current up to 0.5A
- 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

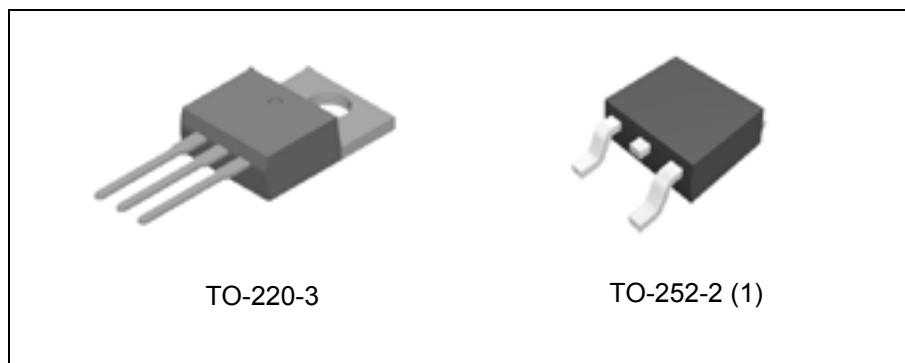


Figure 1. Package Types of 78M00

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Pin Configuration

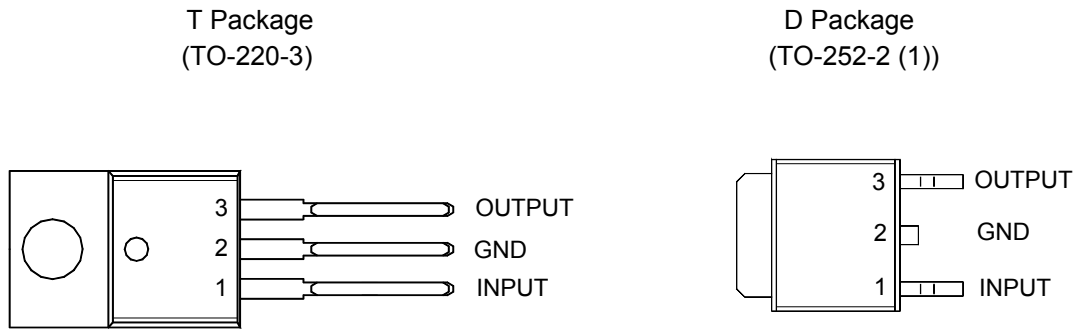


Figure 2. Pin Configuration of 78M00 (Top View)

Pin Description

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

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Functional Block Diagram

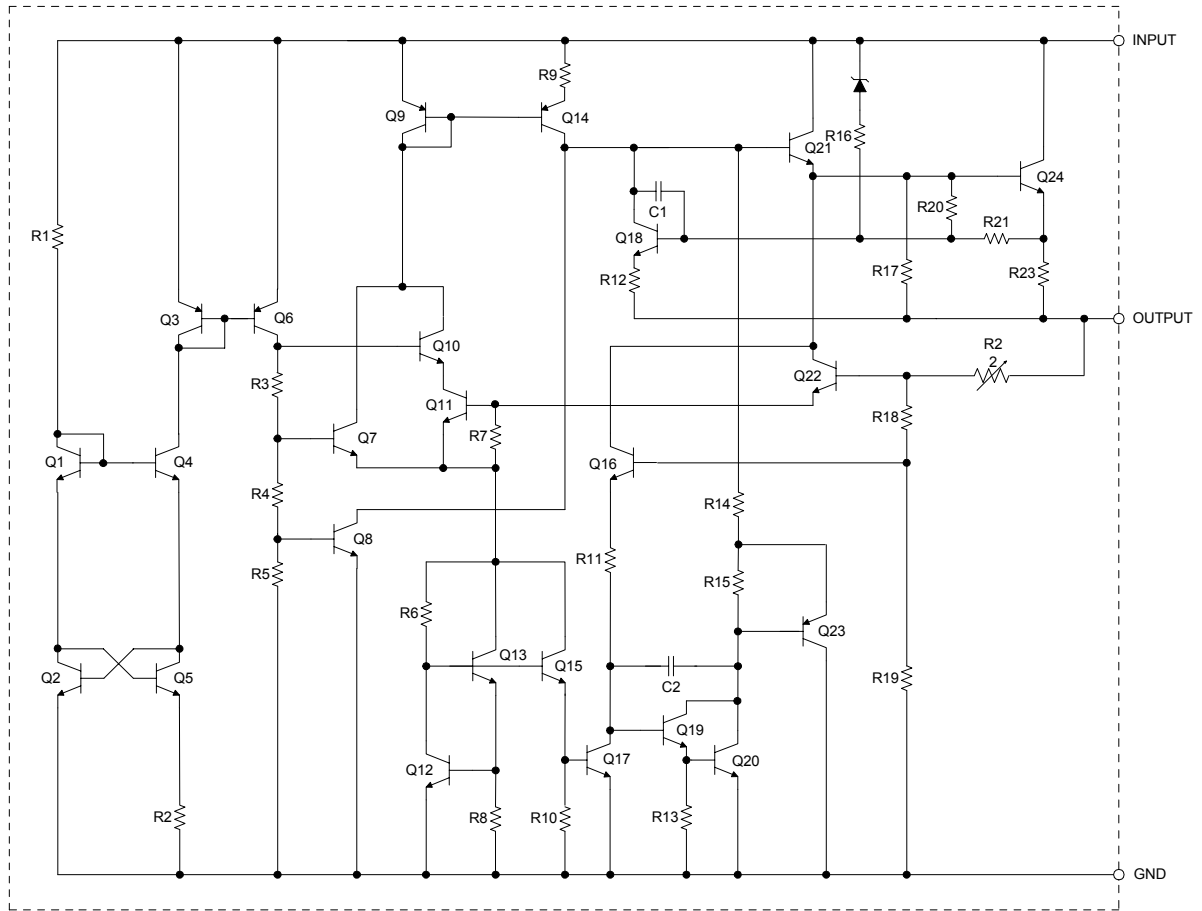


Figure 3. Functional Block Diagram of 78M00



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Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit	
Input Voltage	V_{IN}	35	V	
Operating Junction Temperature	T_J	150	°C	
Lead Temperature (Soldering, 10sec.)	T_{LEAD}	260	°C	
Power Dissipation	P_D	Internally Limited	W	
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	2500	V	
ESD (Machine Model)	ESD	250	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	V_{IN}		35	V
Operating Junction Temperature Range	T_J	-40	125	°C



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Electrical Characteristics

78M05 ($V_{IN}=10V$, $I_{OUT}=350mA$, $T = -40^{\circ}C$ 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 $20V$, $I_{OUT}=5mA$ to $350mA$	4.75	5	5.25	V
Line Regulation	V_{RLINE}	$T_J=25^{\circ}C$, $V_{IN}=7V$ to $25V$, $I_{OUT}=200mA$		3	100	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	ΔI_Q	$V_{IN}=8V$ to $25V$, $I_{OUT}=200mA$			0.8	mA
		$I_{OUT}=5mA$ to $350mA$			0.5	
Ripple Rejection	$\Delta V_{IN}/\Delta V_{OUT}$	$V_{IN}=8V$ to $18V$, $f=120Hz$, $I_{OUT}=200mA$	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		μV
Short Circuit Current	I_{SC}	$T_J=25^{\circ}C$, $V_{IN}=35V$		50		mA
Peak Output Current	I_{PK}	$T_J=25^{\circ}C$		700		mA
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		0.2		mV/ $^{\circ}C$

78M06 ($V_{IN}=11V$, $I_{OUT}=350mA$, $T = -40^{\circ}C$ to $125^{\circ}C$, $P_D \leq 5W$, unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	5.75	6	6.25	V
		$V_{IN}=8V$ to $21V$, $I_{OUT}=5mA$ to $350mA$	5.7	6	6.3	V
Line Regulation	V_{RLINE}	$T_J=25^{\circ}C$, $V_{IN}=8V$ to $25V$, $I_{OUT}=200mA$		5	100	mV
Load Regulation	V_{RLOAD}	$T_J=25^{\circ}C$, $I_{OUT}=5mA$ to $500mA$		20	120	mV
Quiescent Current	I_Q	$T_J=25^{\circ}C$		3.2	6	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=9V$ to $25V$, $I_{OUT}=200mA$			0.8	mA
		$I_{OUT}=5mA$ to $350mA$			0.5	
Ripple Rejection	$\Delta V_{IN}/\Delta V_{OUT}$	$V_{IN}=9V$ to $19V$, $f=120Hz$, $I_{OUT}=200mA$	59	65		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 $100KHz$		45		μV
Short Circuit Current	I_{SC}	$T_J=25^{\circ}C$, $V_{IN}=35V$		50		mA
Peak Output Current	I_{PK}	$T_J=25^{\circ}C$		700		mA
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		0.2		mV/ $^{\circ}C$



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Electrical Characteristics (Continued)

78M08 ($V_{IN}=14V$, $I_{OUT}=350mA$, $T = -40^{\circ}C$ to $125^{\circ}C$, $P_D \leq 5W$, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	7.7	8	8.3	V
		$V_{IN}=10.5V$ to $23V$, $I_{OUT}=5mA$ to $350mA$	7.6	8	8.4	V
Line Regulation	V_{RLINE}	$T_J=25^{\circ}C$, $V_{IN}=10.5V$ to $25V$, $I_{OUT}=200mA$		6	100	mV
Load Regulation	V_{RLOAD}	$T_J=25^{\circ}C$, $I_{OUT}=5mA$ to $500mA$		25	160	mV
Quiescent Current	I_Q	$T_J=25^{\circ}C$		3.2	6	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=10.5V$ to $25V$, $I_{OUT}=200mA$			0.8	mA
		$I_{OUT}=5mA$ to $350mA$			0.5	
Ripple Rejection	$\Delta V_{IN}/\Delta V_{OUT}$	$V_{IN}=11.5V$ to $21.5V$, $f=120Hz$, $I_{OUT}=200mA$	56	62		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 $100KHz$		52		μV
Short Circuit Current	I_{SC}	$T_J=25^{\circ}C$, $V_{IN}=35V$		50		mA
Peak Output Current	I_{PK}	$T_J=25^{\circ}C$		700		mA
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		0.2		mV/ $^{\circ}C$

78M09 ($V_{IN}=15V$, $I_{OUT}=350mA$, $T = -40^{\circ}C$ to $125^{\circ}C$, $P_D \leq 5W$, unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	$T_J=25^{\circ}C$	8.65	9	9.35	V
		$V_{IN}=11.5V$ to $24V$, $I_{OUT}=5mA$ to $350mA$	8.55	9	9.45	V
Line Regulation	V_{RLINE}	$T_J=25^{\circ}C$, $V_{IN}=11.5V$ to $25V$, $I_{OUT}=200mA$		6	100	mV
Load Regulation	V_{RLOAD}	$T_J=25^{\circ}C$, $I_{OUT}=5mA$ to $500mA$		25	180	mV
Quiescent Current	I_Q	$T_J=25^{\circ}C$		3.2	6	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=11.5V$ to $25V$, $I_{OUT}=200mA$			0.8	mA
		$I_{OUT}=5mA$ to $350mA$			0.5	
Ripple Rejection	$\Delta V_{IN}/\Delta V_{OUT}$	$V_{IN}=12.5V$ to $22.5V$, $f=120Hz$, $I_{OUT}=200mA$	56	61		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 $100KHz$		52		μV
Short Circuit Current	I_{SC}	$T_J=25^{\circ}C$, $V_{IN}=35V$		50		mA
Peak Output Current	I_{PK}	$T_J=25^{\circ}C$		700		mA
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		0.2		mV/ $^{\circ}C$



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Electrical Characteristics (Continued)

78M12 ($V_{IN}=17V$, $I_{OUT}=350mA$, $T_J=-40^{\circ}C$ 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 $27V$, $I_{OUT}=5mA$ to $350mA$	11.4	12	12.6	V
Line Regulation	V_{RLINE}	$T_J=25^{\circ}C$, $V_{IN}=14.5V$ to $30V$, $I_{OUT}=200mA$		8	100	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	ΔI_Q	$V_{IN}=14.5V$ to $30V$, $I_{OUT}=200mA$			0.8	mA
		$I_{OUT}=5mA$ to $350mA$			0.5	
Ripple Rejection	$\Delta V_{IN}/\Delta V_{OUT}$	$V_{IN}=15V$ to $25V$, $f=120Hz$, $I_{OUT}=200mA$	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		μV
Short Circuit Current	I_{SC}	$T_J=25^{\circ}C$, $V_{IN}=35V$		50		mA
Peak Output Current	I_{PK}	$T_J=25^{\circ}C$		700		mA
Output Voltage Drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		0.3		mV/ $^{\circ}C$

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Typical Performance Characteristics

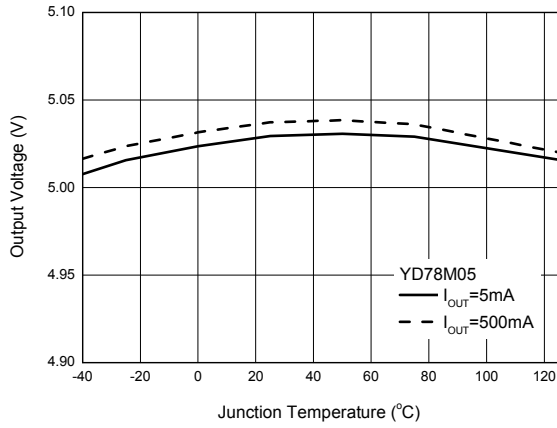


Figure 4. Output Voltage vs. Junction Temperature

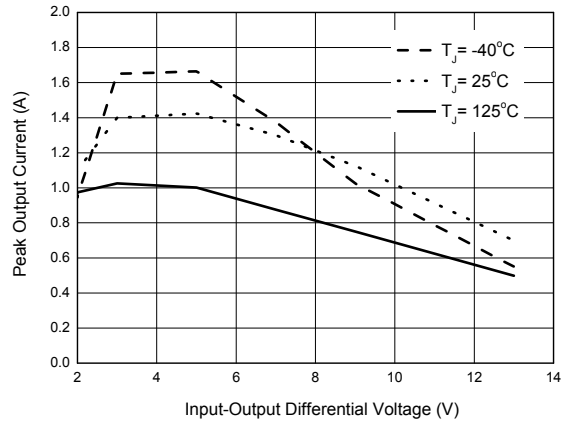


Figure 5. Peak Output Current vs. Input-Output Differential Voltage

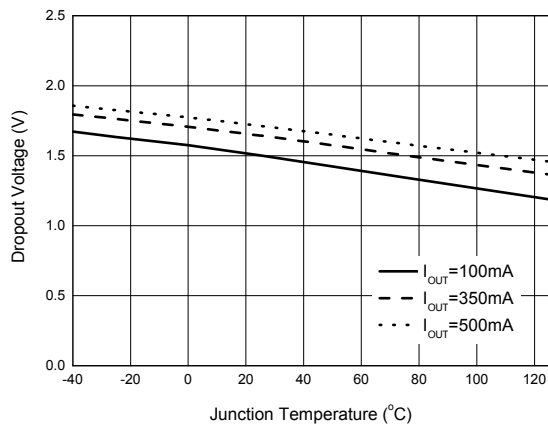


Figure 6. Dropout Voltage vs. Junction Temperature

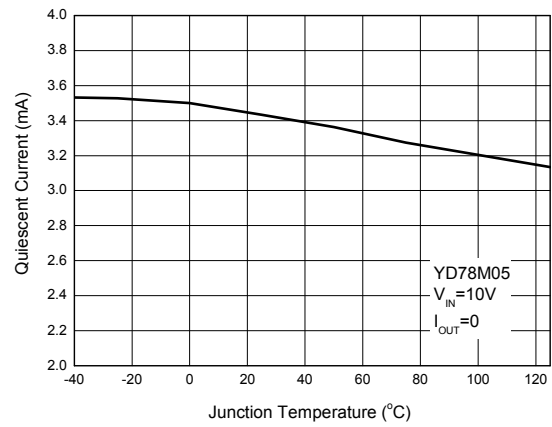


Figure 7. Quiescent Current vs. Junction Temperature

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Typical Performance Characteristics (Continued)

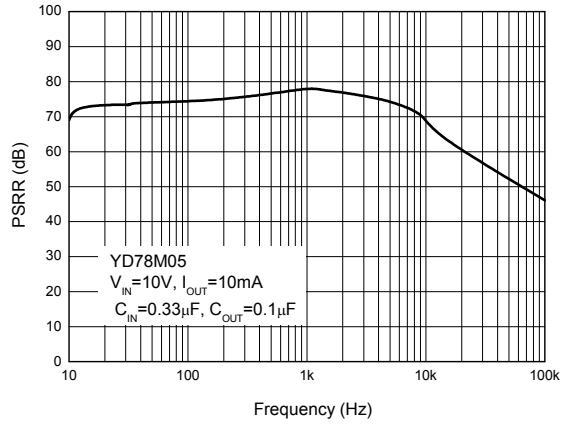


Figure 8. PSRR vs. Frequency

Typical Application

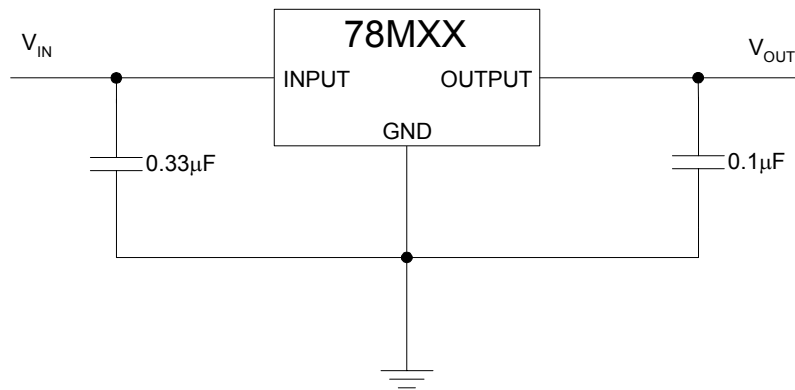


Figure 9. Typical Application of 78M00

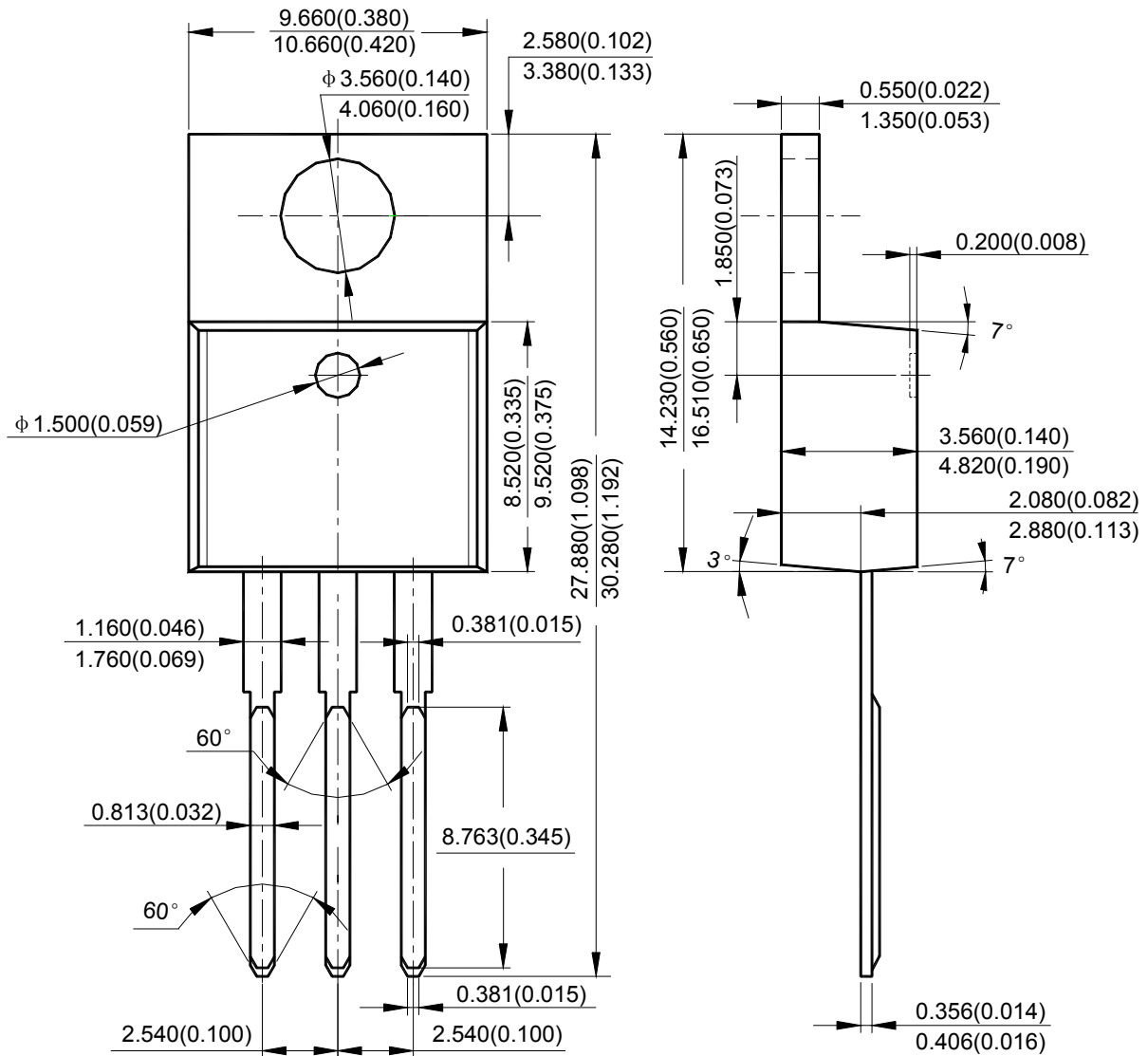
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Mechanical Dimensions

TO-220-3

Unit: mm(inch)



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Mechanical Dimensions (Continued)

TO-252-2(1)

Unit: mm(inch)

