General Description

The 7800 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.

The7800 series are available in two standard plas- tic packages: TO-220-3 and TO-252-2 .

Features

- Constant Output Current up to 1.0A
- Fixed Output Voltages of 5V, 6V, 8V, 9V and 12V
- Output Voltage Tolerances of ±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

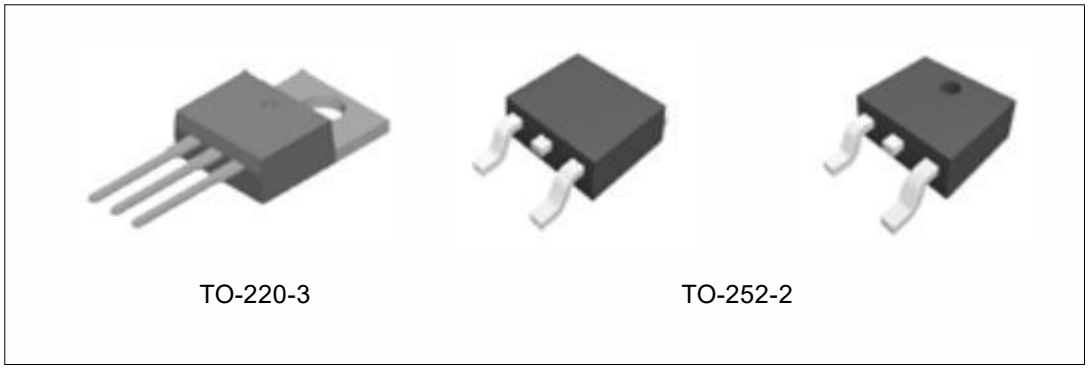


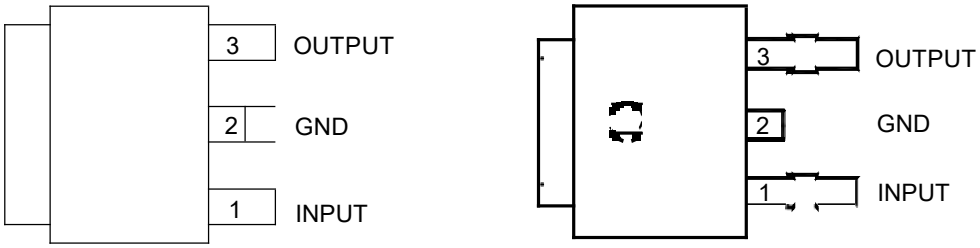
Figure 1. Package Types of 7800

Data Sheet

1A 3-TERMINAL POSITIVE LINEAR REGULATOR 7800

Pin Configuration

D Package
(TO-252-2)



T Package
(TO-220-3)

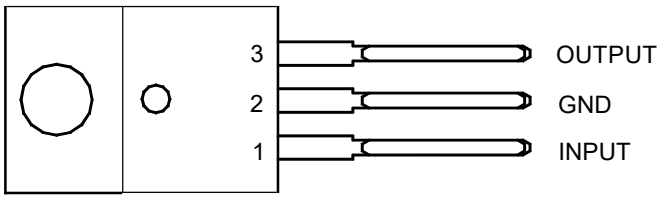


Figure 2. Pin Configuration of 7800 (Top View)

Pin Description

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

1A 3-TERMINAL POSITIVE LINEAR REGULATOR 7800

Functional Block Diagram

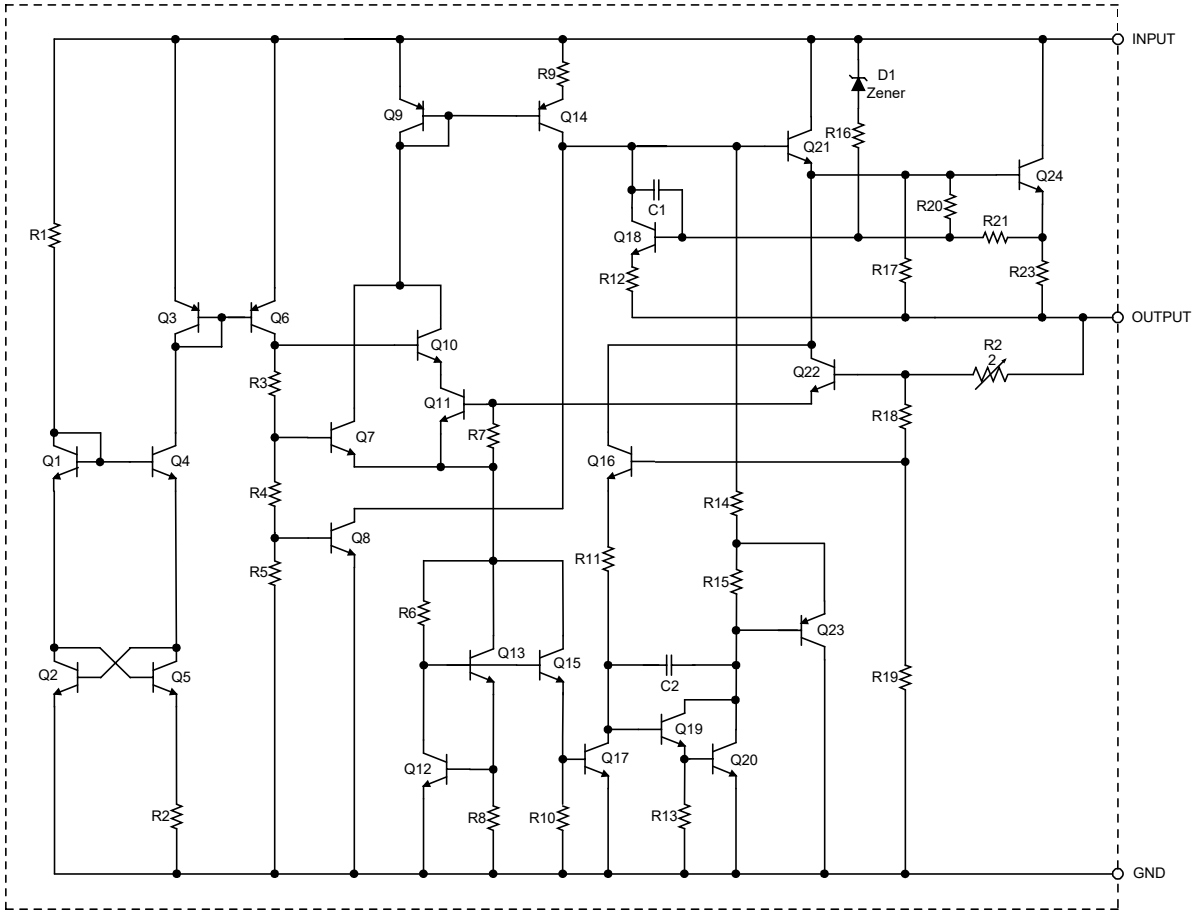


Figure 3. Functional Block Diagram of 7800

1A 3-TERMINAL POSITIVE LINEAR REGULATOR 7800

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
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	100	
ESD (Human Body Model)	ESD	2500		V
ESD (Machine Model)	ESD	2500		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	7805	V_{IN}		28	V
	7806			28	
	7808			28	
	7809			28	
	7812			30	
Operating Junction Temperature Range		T_J	-40	125	°C

1A 3-TERMINAL POSITIVE LINEAR REGULATOR 7800

Electrical Characteristics

7805 (V_I=10V, I_O=500mA, T_J=-40 to 125 °C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_O	T_J=25°C	4.8	5.0	5.2	V
		I_O=5mA to 1A, V_I=7 to 20V, P_D ≤ 15W	4.75	5.0	5.25	
Line Regulation	V_{RLINE}	V_I=7V to 25V, I_O=1A, T_J=25°C		5	100	mV
Load Regulation	V_{RLOAD}	V_I=10V, I_O=5mA to 1.5A, T_J=25°C		5	100	mV
Quiescent Current	I_Q	V_I=10V		3.2	6.0	mA
Quiescent Current Change	ΔI_Q	V_I=7V to 25V, I_O=500mA, T_J=25°C		0.3	1.1	mA
		I_O=5mA to 1A, T_J=25°C		0.08	0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	V_I=8V to 18V, f=120Hz	62	73		dB
Dropout Voltage	V_{DROP}	$\Delta V_O/V_O$=1%, I_O=1A, T_J=25°C		2.0		V
Output Noise Voltage	N_O	f=10Hz to 100KHz, T_A=25°C		10		μV/V_O
Output Resistance	R_O	f=1.0kHz		10		mΩ
Short Circuit Current	I_{SC}	V_I=35V, T_A=25°C		0.2		A
Peak Output Current	I_{PK}	V_I=10V, T_J=25°C		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			0.3		mV/°C
Thermal Resistance	θ_{JC}	TO-220-3		8.8		°C/W
		TO-252-2		15.7		

7806 (V_I=11V, I_O=500mA, T_J=-40 to 125 °C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_O	T_J=25°C	5.75	6.0	6.25	V
		I_O=5mA to 1A, V_I=8 to 21V, P_D ≤ 15W	5.7	6.0	6.3	
Line Regulation	V_{RLINE}	V_I=8V to 25V, T_J=25°C		6	120	mV
Load Regulation	V_{RLOAD}	V_I=11V, I_O=5mA to 1.5A, T_J=25°C		2	120	mV
Quiescent Current	I_Q	V_I=11V		3.3	6.0	mA
Quiescent Current Change	ΔI_Q	V_I=8V to 25V, I_O=500mA, T_J=25°C		0.3	1.3	mA
		I_O=5.0mA to 1A, T_J=25°C		0.08	0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	V_I=9V to 19V, f=120Hz	58	65		dB
Dropout Voltage	V_{DROP}	$\Delta V_O/V_O$=1%, I_O=1A, T_J=25°C		2.0		V
Output Noise Voltage	N_O	f=10Hz to 100KHz, T_A=25°C		10		μV/V_O
Output Resistance	R_O	f=1.0kHz		10		mΩ
Short Circuit Current	I_{SC}	V_I=35V, T_A=25°C		0.2		A
Peak Output Current	I_{PK}	V_I=11V, T_J=25°C		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			0.3		mV/°C
Thermal Resistance	θ_{JC}	TO-220-3		8.8		°C/W
		TO-252-2		15.7		

Electrical Characteristics (Continued)

7808 (V_I=14V, I_O=500mA, T_J=-40 to 125 °C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_O	T_J=25°C	7.7	8.0	8.3	V
		I_O=5mA to 1A, V_I=10.5 to 23V, P_D ≤ 15W	7.6	8.0	8.4	
Line Regulation	V_{RLINE}	V_I=10.5V to 25V, I_O=1A, T_J=25°		6	160	mV
Load Regulation	V_{RLOAD}	V_I=14V, I_O=5mA to 1.5A, T_J=25°C		1.4	160	mV
Quiescent Current	I_Q	V_I=14V		3.3	6.0	mA
Quiescent Current Change	ΔI_Q	V_I=10.5V to 25V, I_O=500mA, T_J=25°			1	mA
		I_O=5.0mA to 1A, T_J=25°C			0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	V_I=11.5V to 18V, f=120Hz	56	62		dB
Dropout Voltage	V_{DROP}	$\Delta V_O/V_O$=1%, I_O=1A, T_J=25°C		2.0		V
Output Noise Voltage	N_O	f=10Hz to 100KHz, T_A=25°C		10		μV/V_O
Output Resistance	R_O	f=1.0kHz		10		mΩ
Short Circuit Current	I_{SC}	V_I=35V, T_A=25°C		0.2		A
Peak Output Current	I_{PK}	V_I=13V, T_J=25°C		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			0.4		mV/°C
Thermal Resistance	θ_{JC}	TO-220-3		8.8		°C/W
		TO-252-2		15.7		

7809 (V_I=15V, I_O=500mA, T_J=-40 to 125 °C, unless otherwise specified.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	V_O	T_J=25°C	8.65	9.0	9.35	V
		I_O=5mA to 1A, V_I=11.5 to 24V, P_D ≤ 15W	8.55	9.0	9.45	
Line Regulation	V_{RLINE}	V_I=11.5V to 27V, I_O=1A, T_J=25°C		6	180	mV
Load Regulation	V_{RLOAD}	V_I=15V, I_O=5mA to 1.5A, T_J=25°C		2	180	mV
Quiescent Current	I_Q	V_I=15V		3.4	8.0	mA
Quiescent Current Change	ΔI_Q	V_I=11.5V to 27V, I_O=500mA, T_J=25°C			1.0	mA
		I_O=5.0mA to 1A, T_J=25°C			0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	V_I=11.5V to 21.5V, f=120Hz	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°C		10		μV/V_O
Output Resistance	R_O	f=1.0KHz		12		mΩ
Short Circuit Current	I_{SC}	V_I=35V, T_A=25°C		0.2		A
Peak Output Current	I_{PK}	V_I=14V, T_J=25°C		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			0.5		mV/°C
Thermal Resistance	θ_{JC}	TO-220-3		8.8		°C/W
		TO-252-2		15.7		

1A 3-TERMINAL POSITIVE LINEAR REGULATOR 7800

Electrical Characteristics (Continued)

7812 (V_I=19V, I_O=500mA, T_J=-40 to 125 °C, unless otherwise specified.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	V_O	T_J=25°C	11.5	12	12.5	V
		I_O=5mA to 1A, V_I=14.5 to 27V, P_D ≤ 15W	11.4	12	12.6	
Line Regulation	V_{RLINE}	V_I=14.5 to 30V, T_J=25°C		8	240	mV
Load Regulation	V_{RLOAD}	V_I=19V, I_O=5mA to 1.5A, T_J=25°C		6	240	mV
Quiescent Current	I_Q	V_I=19V		3.4	6.5	mA
Quiescent Current Change	ΔI_Q	V_I=14.5 to 30V, I_O=500mA, T_J=25°			1	mA
		I_O=5.0mA to 1A, T_J=25°C			0.5	
Ripple Rejection	$\Delta V_I/\Delta V_O$	V_I=15V to 25V, f=120Hz	55	60		dB
Dropout Voltage	V_{DROP}	$\Delta V_O/V_O$=1%, I_O=1A, T_A=25°C		2.0		V
Output Noise Voltage	N_O	f=10Hz to 100KHz, T_A=25°C		10		μV/V_O
Output Resistance	R_O	f=1.0KHz		13		mΩ
Short Circuit Current	I_{SC}	V_I=35V, T_A=25°C		0.2		A
Peak Output Current	I_{PK}	V_I=17V, T_J=25°C		2.2		A
Output Voltage Drift	$\Delta V_O/\Delta T$			0.8		mV/°C
Thermal Resistance	θ_{JC}	TO-220-3		8.8		°C/W
		TO-252-2		15.7		

Typical Performance Characteristics

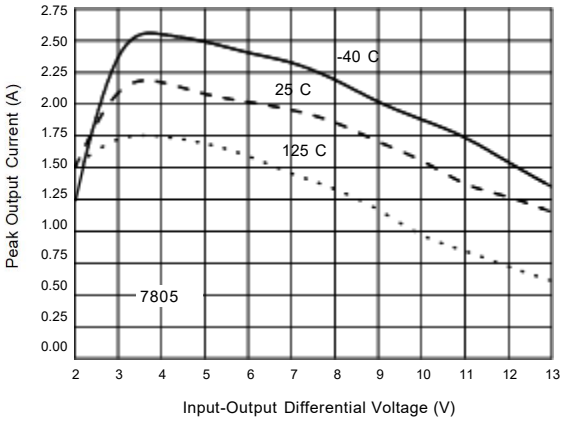


Figure 4. Peak Output Current vs. Input-Output Differential Voltage

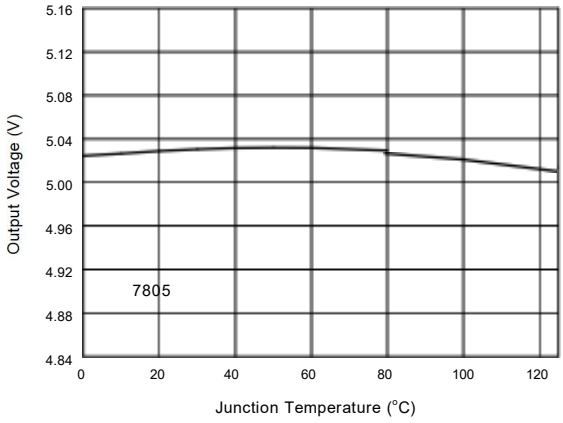


Figure 5. Output Voltage vs. Junction Temperature

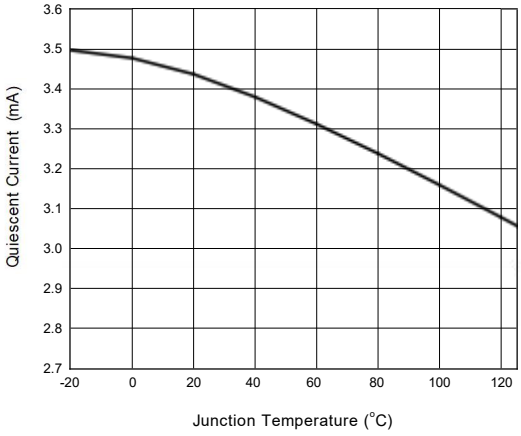


Figure 6. Quiescent Current vs. Junction Temperature

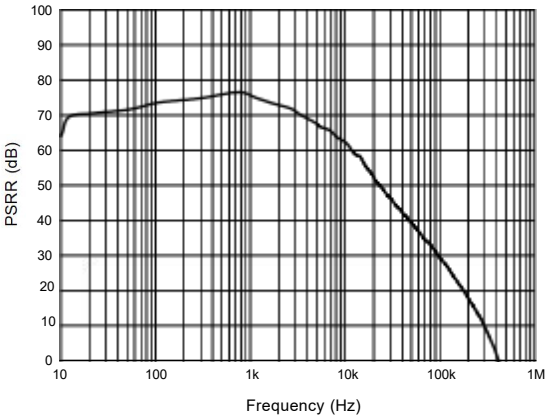


Figure 7. PSRR vs. Frequency

1A 3-TERMINAL POSITIVE LINEAR REGULATOR 7800

Typical Performance Characteristics (Continued)

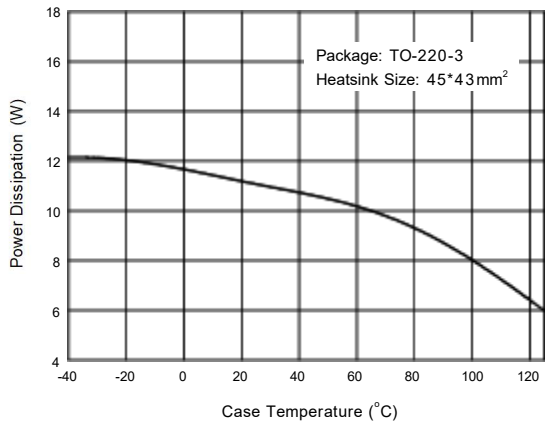


Figure 8. Power Dissipation vs. Case Temperature

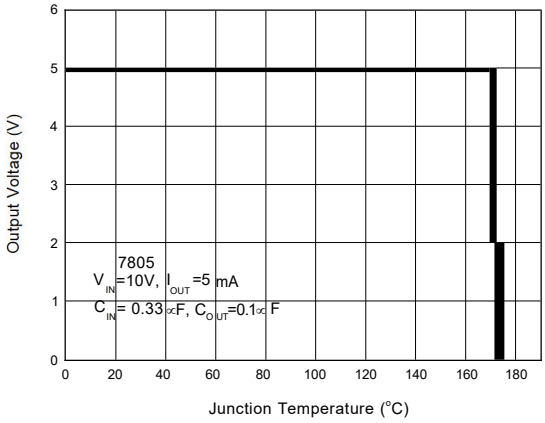


Figure 9. Thermal Shutdown Protection

Typical Application

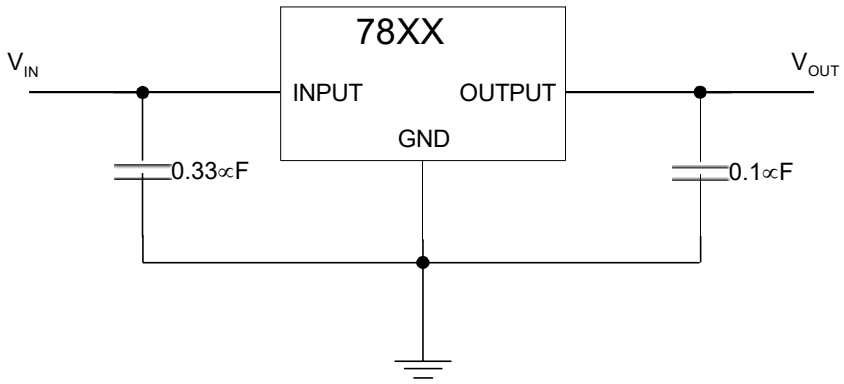
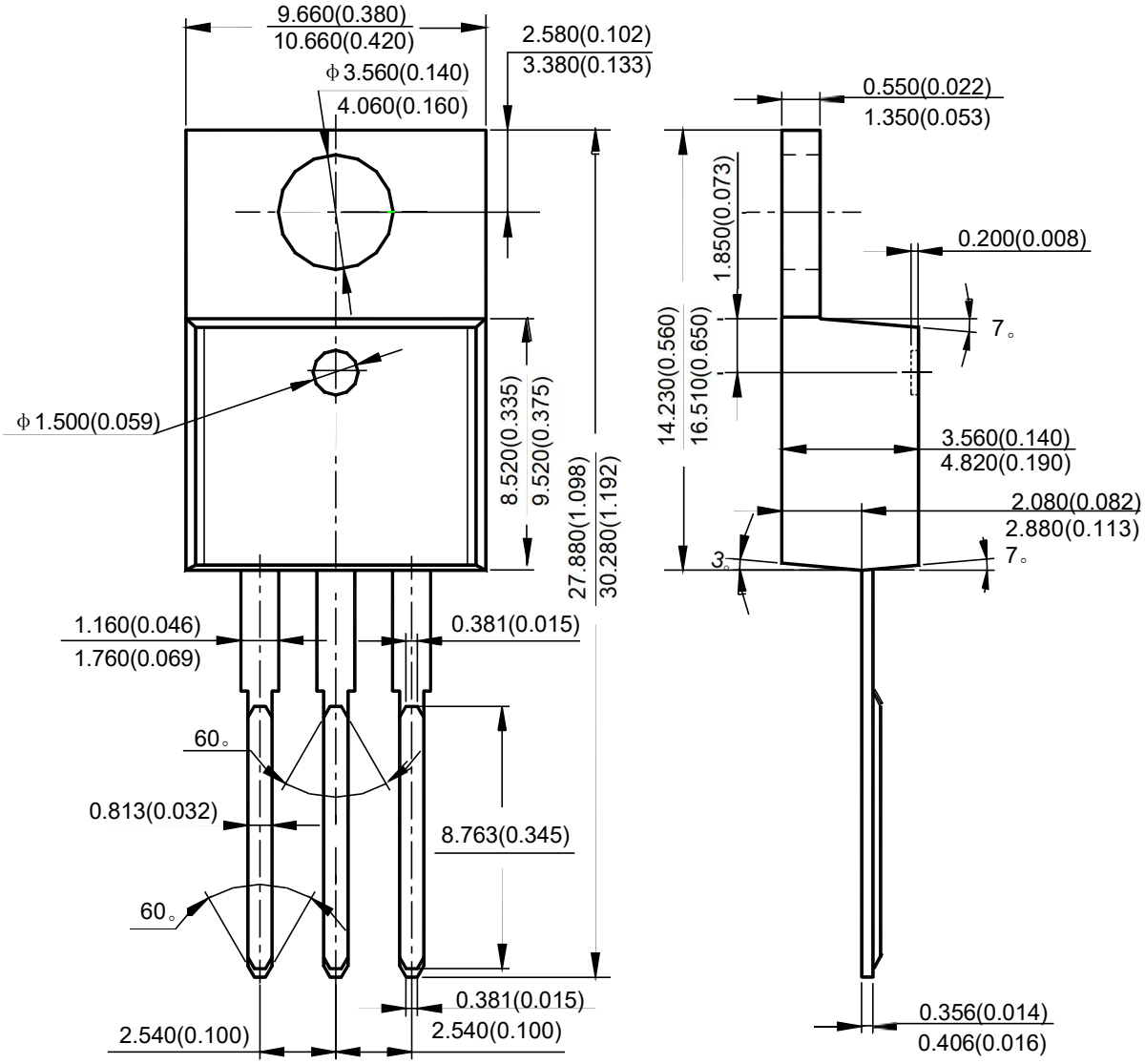


Figure 10. Typical Application of 7800

1A 3-TERMINAL POSITIVE LINEAR REGULATOR 7800

Mechanical Dimensions

TO-220-3 **Unit: mm(inch)**

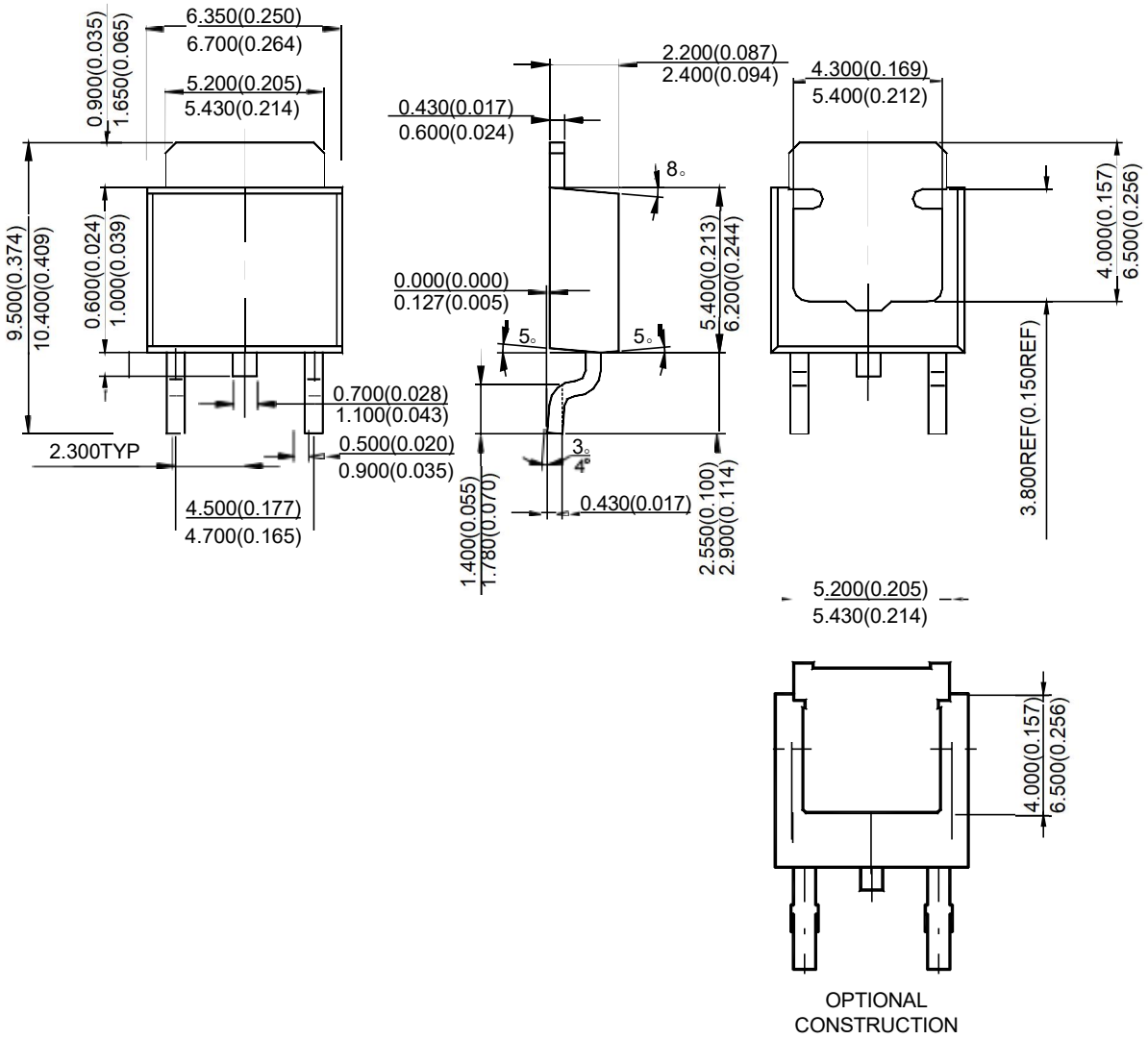


Data Sheet

1A 3-TERMINAL POSITIVE LINEAR REGULATOR 7800

Mechanical Dimensions (Continued)

TO-252-2 **Unit: mm(inch)**



Sales Office: