

Three-Terminal Positive Voltage Regulators

FEATURES

- Output Current in Excess of 1.0A
- No External Components Required
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Output Voltage Offered in 2% Tolerance
- Available in Surface Mount DPAK and Standard 3-Lead Transistor Packages
- Previous Commercial Temperature Range has been Extended to a Junction Temperature Range of -40°C to $+125^{\circ}\text{C}$

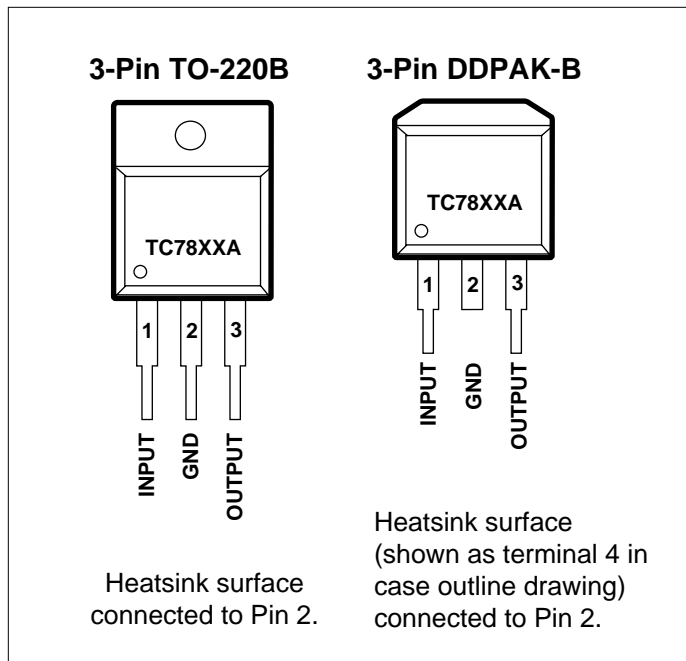
GENERAL DESCRIPTION

These voltage regulators are monolithic integrated circuits designed as fixed-voltage regulators for a wide variety of applications including local, on-card regulation. These regulators employ internal current limiting, thermal shut-down, and safe-area compensation. With adequate heatsinking they can deliver output currents in excess of 1.0A. Although designed primarily as a fixed voltage regulator, these devices can be used with external components to obtain adjustable voltages and currents.

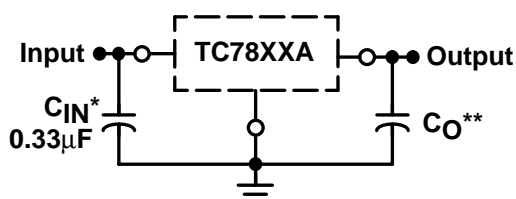
ORDERING INFORMATION

Part Number*	Package	Temperature Range
TC7805A-5.0VBB	3-Pin TO-220B	-40° to $+125^{\circ}\text{C}$
TC7812A-12.0VBB	3-Pin TO-220B	-40° to $+125^{\circ}\text{C}$
TC7815A-15.0VBB	3-Pin TO-220B	-40° to $+125^{\circ}\text{C}$
TC7805A-5.0VRB	3-Pin DPAK-B	-40° to $+125^{\circ}\text{C}$
TC7812A-12.0VRB	3-Pin DPAK-B	-40° to $+125^{\circ}\text{C}$
TC7815A-15.0VRB	3-Pin DPAK-B	-40° to $+125^{\circ}\text{C}$
TC7824A-24.0VRB	3-Pin DPAK-B	-40° to $+125^{\circ}\text{C}$

Note: Contact company about other voltage and package options.



STANDARD APPLICATION



A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

XX, These two digits of the type number indicate nominal voltage.

* C_{IN} is required if regulator is located an appreciable distance from power supply filter.

** C_O is not needed for stability; however, it does improve transient response. Values of less than $0.1\mu\text{F}$ could cause instability.

Three-Terminal Positive Voltage Regulators

TC7800A Series

ABSOLUTE MAXIMUM RATINGS*

($T_A = 25^\circ\text{C}$, unless otherwise noted.)

Input Voltage (5.0 – 18V)	$V_{IN} = 35V_{DC}$
(24V)	$V_{IN} = 40V_{DC}$
Power Dissipation ($T_A = 25^\circ\text{C}$) .. $P_D =$ Internally Limited W	
Case TO-220B	
Thermal Resistance, Junction-to-Ambient	$\theta_{JA} = 65^\circ\text{C/W}$
Junction-to-Case	$\theta_{JC} = 5.0^\circ\text{C/W}$

Power Dissipation ($T_A = 25^\circ\text{C}$) $P_D =$ Internally Limited W
DDPAK-B

Thermal Resistance,
Junction-to-Ambient

$\theta_{JA} =$ (See Figure 13) $^\circ\text{C/W}$
Junction-to-Case

$\theta_{JC} = 5.0^\circ\text{C/W}$
Storage Junction
Temperature Range

$T_{STG} = -65^\circ\text{C}$ to $+150^\circ\text{C}$
Operating Junction Temperature

$T_J = +150^\circ\text{C}$

*Note: ESD Data Available upon request.

ELECTRICAL CHARACTERISTICS: ($V_{IN} = 10V$, $I_{OUT} = 1.0A$, $T_J = T_{LOW}$ to T_{HIGH} [Note 1], unless otherwise noted.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
TC7805A						
V_{OUT}	Output Voltage	$T_J = 25^\circ\text{C}$	4.9	5.0	5.1	V_{DC}
V_{OUT}	Output Voltage	$5.0\text{mA} \leq I_{OUT} \leq 0.1A$, $P_D \leq 15W$ $7.5V_{DC} \leq V_{IN} \leq 20V_{DC}$	4.8	5.0	5.2	V_{DC}
REG_{LINE}	Line Regulation	Note 2 $7.5V_{DC} \leq V_{IN} \leq 25V_{DC}$, $I_{OUT} = 500\text{mA}$ $8.0V_{DC} \leq V_{IN} \leq 12V_{DC}$, $I_{OUT} = 1.0A$ $8.0V_{DC} \leq V_{IN} \leq 12V_{DC}$, $I_{OUT} = 1.0A$, $T_J = 25^\circ\text{C}$ $7.3V_{DC} \leq V_{IN} \leq 20V_{DC}$, $I_{OUT} = 1.0A$, $T_J = 25^\circ\text{C}$	—	0.5 0.8 1.3 4.5	10 12 4.0 10	mV
REG_{LOAD}	Load Regulation	Note 2 $5.0\text{mA} \leq I_{OUT} \leq 1.5A$, $T_J = 25^\circ\text{C}$ $5.0\text{mA} \leq I_{OUT} \leq 1.0A$ $250\text{mA} \leq I_{OUT} \leq 750\text{mA}$	—	1.3 0.8 0.53	25 25 15	mV
I_B	Quiescent Current		—	3.2	6.0	mA
ΔI_B	Quiescent Current Change	$8.0V_{DC} \leq V_{IN} \leq 25V_{DC}$, $I_{OUT} = 500\text{mA}$ $7.5V_{DC} \leq V_{IN} \leq 20V_{DC}$, $T_J = 25^\circ\text{C}$ $5.0\text{mA} \leq I_{OUT} \leq 1.0A$	—	0.3 — 0.08	0.8 0.8 0.5	mA
RR	Ripple Rejection	$8.0V_{DC} \leq V_{IN} \leq 18V_{DC}$, $f = 120\text{Hz}$, $I_{OUT} = 500\text{mA}$	68	83	—	dB
$V_{IN} - V_{OUT}$	Dropout Voltage	$I_{OUT} = 1.0A$, $T_J = 25^\circ\text{C}$	—	2.0	—	V_{DC}
V_N	Output Noise Voltage	$T_A = 25^\circ\text{C}$ $10\text{Hz} \leq f \leq 100\text{kHz}$	—	10	—	$\mu\text{V}/V_{OUT}$
R_{OUT}	Output Resistance	$f = 1.0\text{kHz}$	—	0.9	—	$\text{m}\Omega$
I_{SC}	Short Circuit Current Limit	$T_A = 25^\circ\text{C}$ $V_{IN} = 35V_{DC}$	—	0.2	—	A
I_{MAX}	Peak Output Current	$T_J = 25^\circ\text{C}$	—	2.2	—	A
TCV_{OUT}	Average Temperature Coefficient of Output Voltage		—	-0.3	—	$\text{mV}/^\circ\text{C}$

NOTES: 1. $T_{LOW} = -40^\circ\text{C}$ for TC78XXA, $T_{HIGH} = +125^\circ\text{C}$ for TC78XX

2. Load and line regulation are specified at constant junction temperature. Changes in V_{OUT} due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

Three-Terminal Positive Voltage Regulators

TC7800A Series

ELECTRICAL CHARACTERISTICS: ($V_{IN} = 19V$, $I_{OUT} = 1.0A$, $T_J = T_{LOW}$ to T_{HIGH} [Note 1], unless otherwise noted.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
TC7812A						
V_{OUT}	Output Voltage	$T_J = 25^{\circ}C$	11.75	12	12.25	V_{DC}
V_{OUT}	Output Voltage	$5.0mA \leq I_{OUT} \leq 0.1A$, $P_D \leq 15W$ $14.8V_{DC} \leq V_{IN} \leq 27V_{DC}$	11.5	12	12.5	V_{DC}
REG_{LINE}	Line Regulation	Note 2 $14.8V_{DC} \leq V_{IN} \leq 30V_{DC}$, $I_{OUT} = 500mA$ $16V_{DC} \leq V_{IN} \leq 22V_{DC}$, $I_{OUT} = 1.0A$ $14.5V_{DC} \leq V_{IN} \leq 27V_{DC}$, $T_J = 25^{\circ}C$	—	3.8	18	mV
REG_{LOAD}	Load Regulation	Note 2 $5.0mA \leq I_{OUT} \leq 1.5A$, $T_J = 25^{\circ}C$ $5.0mA \leq I_{OUT} \leq 1.0A$	—	—	25	mV
I_B	Quiescent Current		—	3.4	6.0	mA
ΔI_B	Quiescent Current Change	$15V_{DC} \leq V_{IN} \leq 30V_{DC}$, $I_{OUT} = 500mA$ $14.8V_{DC} \leq V_{IN} \leq 27V_{DC}$, $T_J = 25^{\circ}C$ $5.0mA \leq I_{OUT} \leq 1.0A$, $T_J = 25^{\circ}C$	—	—	0.8	mA
RR	Ripple Rejection	$15V_{DC} \leq V_{IN} \leq 25V_{DC}$, $f = 120Hz$, $I_{OUT} = 500mA$	55	60	—	dB
$V_{IN} - V_{OUT}$	Dropout Voltage	$I_{OUT} = 1.0A$, $T_J = 25^{\circ}C$	—	2.0	—	V_{DC}
V_N	Output Noise Voltage	$T_A = 25^{\circ}C$ $10Hz \leq f \leq 100kHz$	—	10	—	$\mu V/V_{OUT}$
R_{OUT}	Output Resistance	$f = 1.0kHz$	—	1.1	—	$m\Omega$
I_{SC}	Short Circuit Current Limit	$T_A = 25^{\circ}C$ $V_{IN} = 35V_{DC}$	—	0.2	—	A
I_{MAX}	Peak Output Current	$T_J = 25^{\circ}C$	—	2.2	—	A
TCV_{OUT}	Average Temperature Coefficient of Output Voltage		—	-0.8	—	$mV/^{\circ}C$

NOTES: 1. $T_{LOW} = -40^{\circ}C$ for TC78XXA, $T_{HIGH} = +125^{\circ}C$ for TC78XX

2. Load and line regulation are specified at constant junction temperature. Changes in V_{OUT} due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

Three-Terminal Positive Voltage Regulators

TC7800A Series

ELECTRICAL CHARACTERISTICS: ($V_{IN} = 23V$, $I_{OUT} = 1.0A$, $T_J = T_{LOW}$ to T_{HIGH} [Note 1], unless otherwise noted.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
TC7815A						
V_{OUT}	Output Voltage	$T_J = 25^\circ C$	14.7	15	15.3	V_{DC}
V_{OUT}	Output Voltage	$5.0mA \leq I_{OUT} \leq 0.1A$, $P_D \leq 15W$ $17.9V_{DC} \leq V_{IN} \leq 30V_{DC}$	14.4	15	15.6	V_{DC}
REG_{LINE}	Line Regulation	Note 2 $17.9V_{DC} \leq V_{IN} \leq 30V_{DC}$, $I_{OUT} = 500mA$ $20V_{DC} \leq V_{IN} \leq 26V_{DC}$ $17.5V_{DC} \leq V_{IN} \leq 30V_{DC}$, $I_{OUT} = 1.0A$, $T_J = 25^\circ C$	—	8.5 3.0 7.0	20 22 20	mV
REG_{LOAD}	Load Regulation	Note 2 $5.0mA \leq I_{OUT} \leq 1.5A$, $T_J = 25^\circ C$ $5.0mA \leq I_{OUT} \leq 1.0A$ $250mA \leq I_{OUT} \leq 750mA$	—	1.8 1.5 1.2	25 25 15	mV
I_B	Quiescent Current		—	3.5	6.0	mA
ΔI_B	Quiescent Current Change	$17.5V_{DC} \leq V_{IN} \leq 30V_{DC}$, $I_{OUT} = 500mA$ $17.5V_{DC} \leq V_{IN} \leq 30V_{DC}$, $I_{OUT} = 1.0A$, $T_J = 25^\circ C$ $5.0mA \leq I_{OUT} \leq 1.0A$	—	—	0.8 0.8 0.5	mA
RR	Ripple Rejection	$18.5V_{DC} \leq V_{IN} \leq 28.5V_{DC}$, $f = 120Hz$, $I_{OUT} = 500mA$	60	80	—	dB
$V_{IN} - V_{OUT}$	Dropout Voltage	$I_{OUT} = 1.0A$, $T_J = 25^\circ C$	—	2.0	—	V_{DC}
V_N	Output Noise Voltage	$T_A = 25^\circ C$ $10Hz \leq f \leq 10kHz$	—	10	—	$\mu V/V_{OUT}$
R_{OUT}	Output Resistance	$f = 1.0kHz$	—	1.2	—	$m\Omega$
I_{SC}	Short Circuit Current Limit	$T_A = 25^\circ C$ $V_{IN} = 35V_{DC}$	—	0.2	—	A
I_{MAX}	Peak Output Current	$T_J = 25^\circ C$	—	2.2	—	A
TCV_{OUT}	Average Temperature Coefficient of Output Voltage		—	-1.0	—	$mV/^\circ C$

NOTES: 1. $T_{LOW} = -40^\circ C$ for TC78XXA, $T_{HIGH} = +125^\circ C$ for TC78XX

2. Load and line regulation are specified at constant junction temperature. Changes in V_{OUT} due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

Three-Terminal Positive Voltage Regulators

TC7800A Series

ELECTRICAL CHARACTERISTICS: ($V_{IN} = 33V$, $I_{OUT} = 1.0A$, $T_J = T_{LOW}$ to T_{HIGH} [Note 1], unless otherwise noted.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
TC7824A						
V_{OUT}	Output Voltage	$T_J = 25^\circ C$	23.5	24	24.5	V_{DC}
V_{OUT}	Output Voltage	$5.0mA \leq I_{OUT} \leq 0.1A$, $P_D \leq 15W$ $27.3V_{DC} \leq V_{IN} \leq 38V_{DC}$	23.2	24	25.8	V_{DC}
REG_{LINE}	Line Regulation	Note 2 $27V_{DC} \leq V_{IN} \leq 38V_{DC}$, $I_{OUT} = 500mA$ $30V_{DC} \leq V_{IN} \leq 36V_{DC}$, $I_{OUT} = 1.0A$ $30V_{DC} \leq V_{IN} \leq 36V_{DC}$, $T_J = 25^\circ C$ $26.7V_{DC} \leq V_{IN} \leq 38V_{DC}$, $I_{OUT} = 1.0A$, $T_J = 25^\circ C$	—	11.5	25	mV
REG_{LOAD}	Load Regulation	Note 2 $5.0mA \leq I_{OUT} \leq 1.5A$, $T_J = 25^\circ C$ $5.0mA \leq I_{OUT} \leq 1.0A$ $250mA \leq I_{OUT} \leq 750mA$	—	2.1	15	mV
I_B	Quiescent Current		—	3.6	6.0	mA
ΔI_B	Quiescent Current Change	$27.3V_{DC} \leq V_{IN} \leq 38V_{DC}$, $I_{OUT} = 500mA$ $27V_{DC} \leq V_{IN} \leq 38V_{DC}$, $T_J = 25^\circ C$ $5.0mA \leq I_{OUT} \leq 1.0A$	—	—	0.8	mA
RR	Ripple Rejection	$28V_{DC} \leq V_{IN} \leq 38V_{DC}$, $f = 120Hz$, $I_{OUT} = 500mA$	45	54	—	dB
$V_{IN} - V_{OUT}$	Dropout Voltage	$I_{OUT} = 1.0A$, $T_J = 25^\circ C$	—	2.0	—	V_{DC}
V_N	Output Noise Voltage	$T_A = 25^\circ C$ $10Hz \leq f \leq 100kHz$	—	10	—	$\mu V/V_{OUT}$
R_{OUT}	Output Resistance	$f = 1.0kHz$	—	1.4	—	$m\Omega$
I_{SC}	Short Circuit Current Limit	$T_A = 25^\circ C$ $V_{IN} = 35V_{DC}$	—	0.2	—	A
I_{MAX}	Peak Output Current	$T_J = 25^\circ C$	—	2.2	—	A
TCV_{OUT}	Average Temperature Coefficient of Output Voltage		—	-2.0	—	$mV/^\circ C$

NOTES: 1. $T_{LOW} = -40^\circ C$ for TC78XXA, $T_{HIGH} = +125^\circ C$ for TC78XX

2. Load and line regulation are specified at constant junction temperature. Changes in V_{OUT} due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

Three-Terminal Positive Voltage Regulators

TC7800A Series

APPLICATIONS INFORMATION

Design Considerations

The TC7800A Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short Circuit Protection that limits the maximum current the circuit will pass, and Output Transistor Safe-Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

In many low current applications, compensation capacitors are not required. However, it is recommended that the

regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high-frequency characteristics to insure stable operation under all load conditions. A 0.33µF or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulators input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

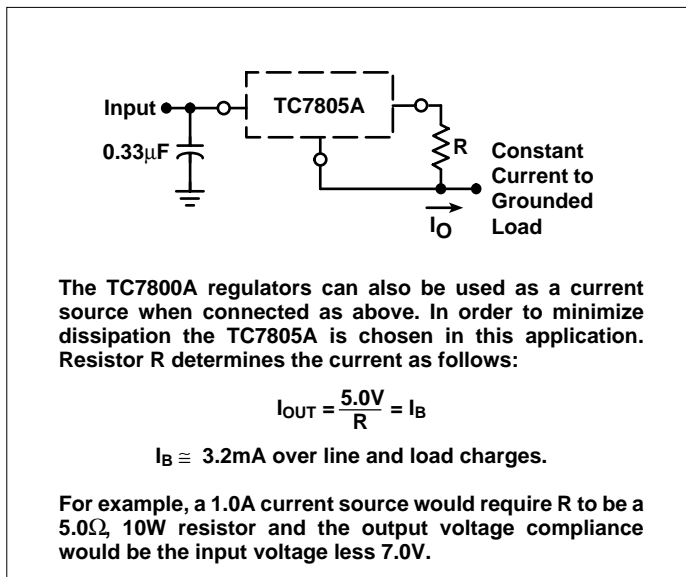


Figure 1. Current Regulator

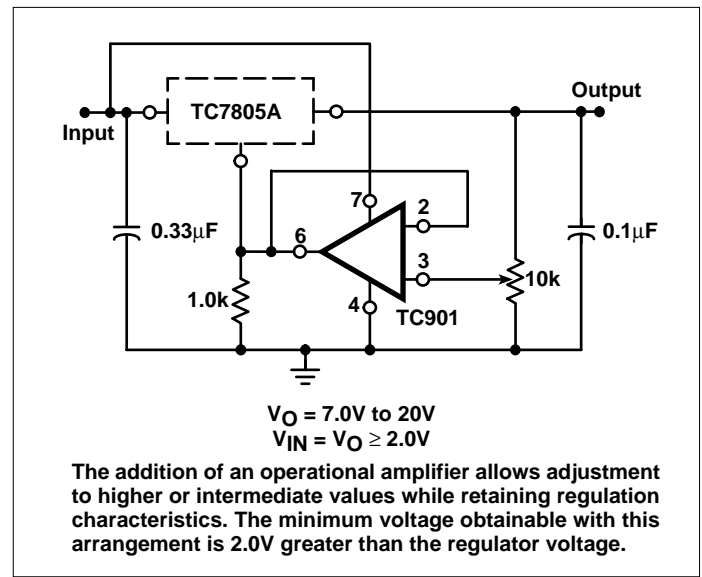


Figure 2. Adjustable Output Regulator

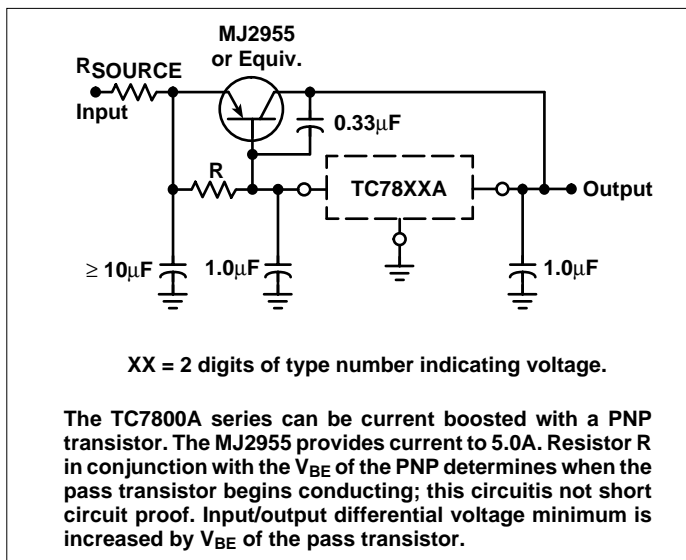


Figure 3. Current Boost Regulator

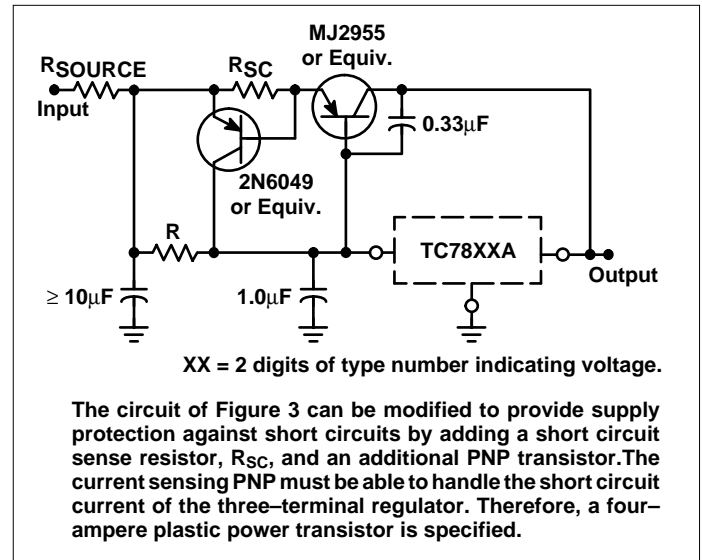


Figure 4. Short Circuit Protection

TYPICAL CHARACTERISTICS

Figure 5. Peak Output Current as a Function of Input/Output Differential Voltage

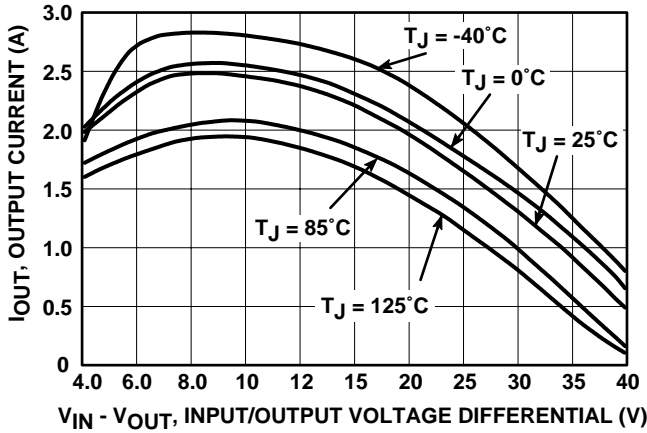


Figure 6. Ripple Rejection as a Function of Output Voltages

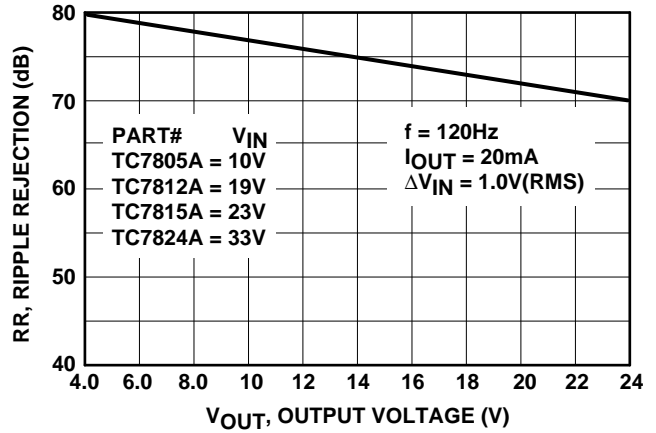


Figure 7. Ripple Rejection as a Function of Frequency

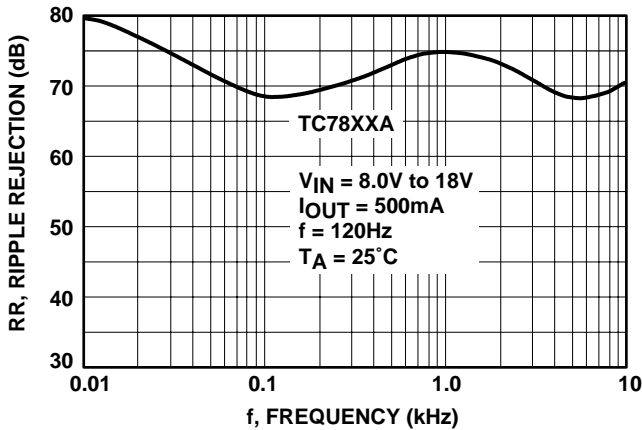


Figure 8. Output Voltage as a Function of Junction Temperature (TC7805A)

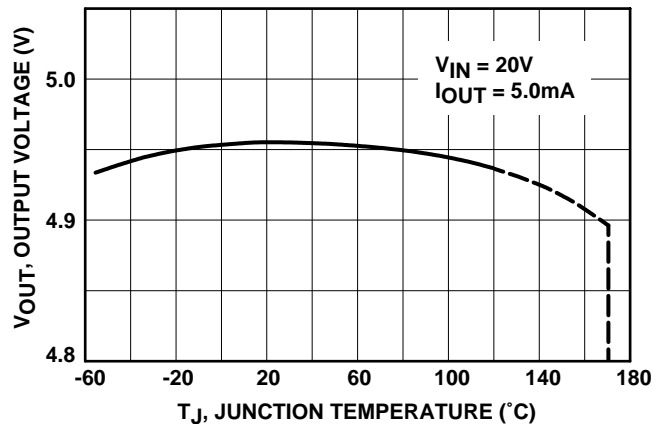


Figure 9. Output Impedance as a Function of Output Voltage

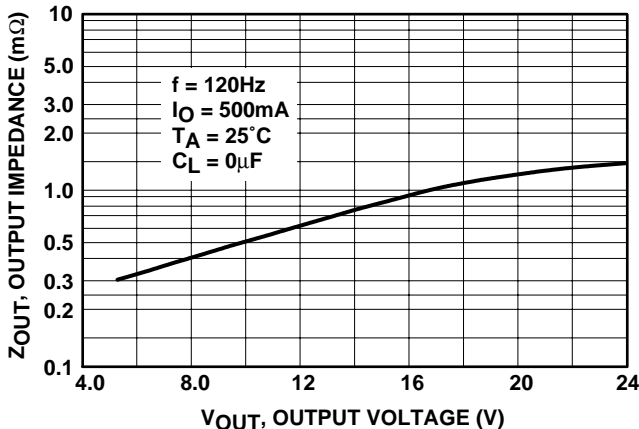
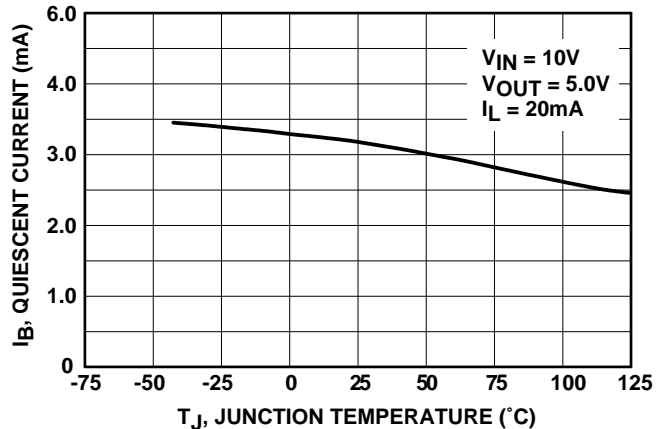


Figure 10. Quiescent Current as a Function of Temperature



TC7800A Series

Figure 11. Worst Case Power Dissipation versus Ambient Temperature (TO-220B)

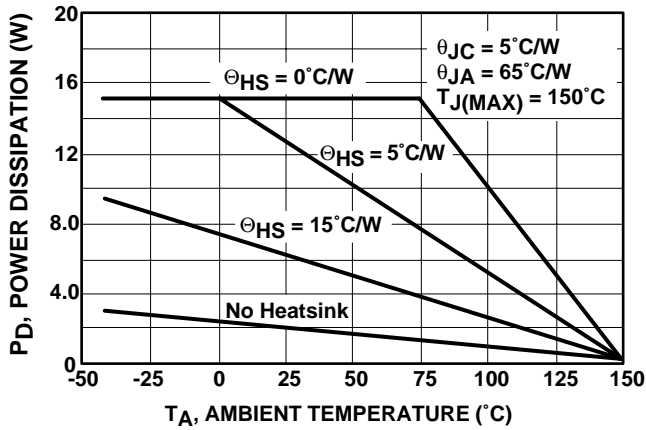


Figure 12. Input Output Differential as a Function of Junction Temperature

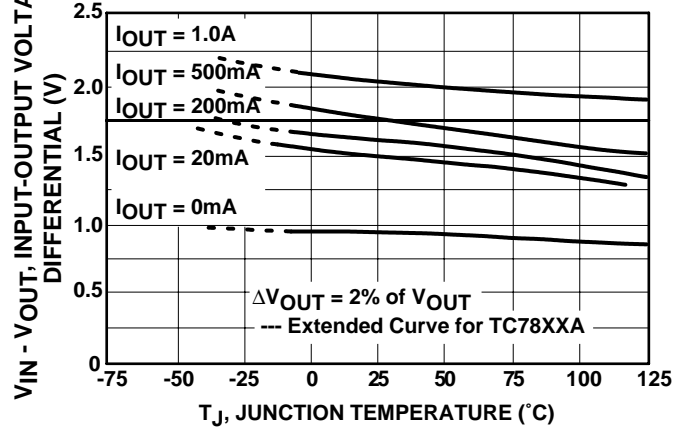
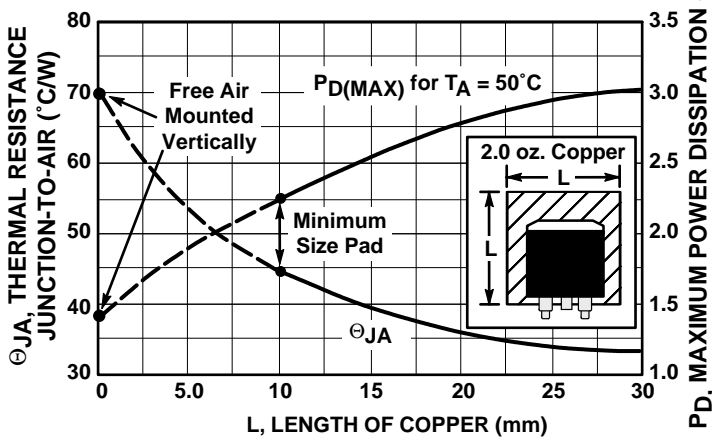


Figure 13. DPAK Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length



DEFINITIONS

Line Regulation – The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

Load Regulation – The change in output voltage for a change in the load current at constant chip temperature.

Maximum Power Dissipation – The maximum total device dissipation for which the regulator will operate within specifications.

Quiescent Current – That part of the input current that is not delivered to the load.

Output Noise Voltage – The rms AC voltage at the output, with constant load and no input ripple, measured over a specified frequency range.

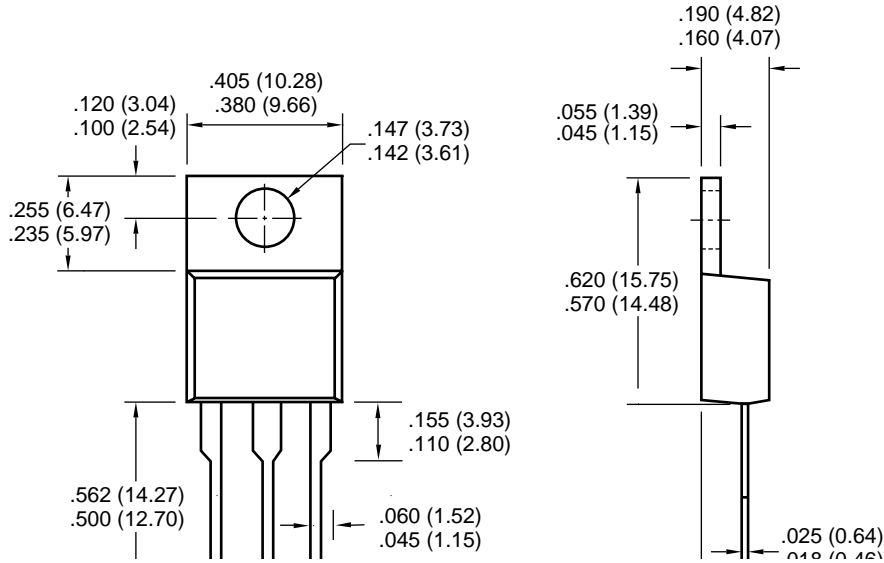
Long Term Stability – Output voltage stability under accelerated life test conditions with the maximum rated voltage listed in the devices' electrical characteristics and maximum power dissipation.

Three-Terminal Positive Voltage Regulators

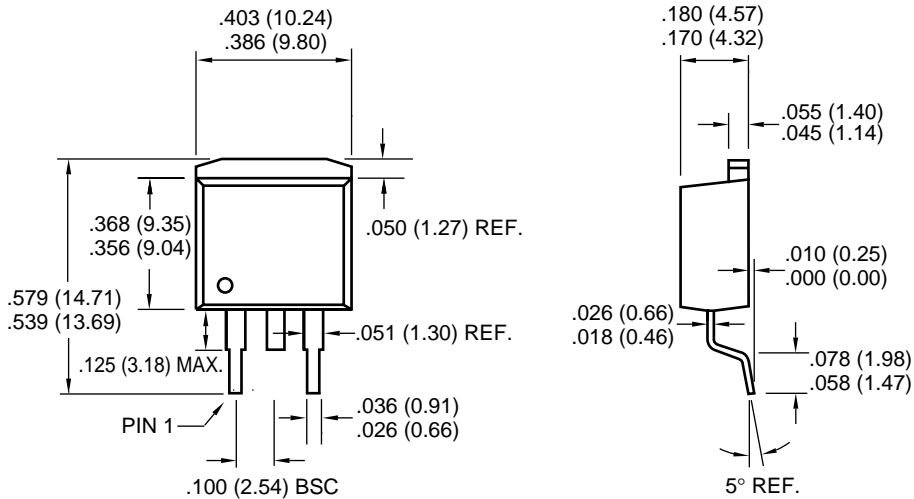
TC7800A Series

PACKAGE DIMENSIONS

3-Pin TO-220B



3-Pin DPAK-B





WORLDWIDE SALES AND SERVICE

AMERICAS

Corporate Office

2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200 Fax: 480-792-7277
Technical Support: 480-792-7627
Web Address: <http://www.microchip.com>

Rocky Mountain

2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7966 Fax: 480-792-7456

Atlanta

500 Sugar Mill Road, Suite 200B
Atlanta, GA 30350
Tel: 770-640-0034 Fax: 770-640-0307

Austin

Analog Product Sales
8303 MoPac Expressway North
Suite A-201
Austin, TX 78759
Tel: 512-345-2030 Fax: 512-345-6085

Boston

2 Lan Drive, Suite 120
Westford, MA 01886
Tel: 978-692-3848 Fax: 978-692-3821

Boston

Analog Product Sales
Unit A-8-1 Millbrook Tarry Condominium
97 Lowell Road
Concord, MA 01742
Tel: 978-371-6400 Fax: 978-371-0050

Chicago

333 Pierce Road, Suite 180
Itasca, IL 60143
Tel: 630-285-0071 Fax: 630-285-0075

Dallas

4570 Westgrove Drive, Suite 160
Addison, TX 75001
Tel: 972-818-7423 Fax: 972-818-2924

Dayton

Two Prestige Place, Suite 130
Miamisburg, OH 45342
Tel: 937-291-1654 Fax: 937-291-9175

Detroit

Tri-Atria Office Building
32255 Northwestern Highway, Suite 190
Farmington Hills, MI 48334
Tel: 248-538-2250 Fax: 248-538-2260

Los Angeles

18201 Von Karman, Suite 1090
Irvine, CA 92612
Tel: 949-263-1888 Fax: 949-263-1338

Mountain View

Analog Product Sales
1300 Terra Bella Avenue
Mountain View, CA 94043-1836
Tel: 650-968-9241 Fax: 650-967-1590

New York

150 Motor Parkway, Suite 202
Hauppauge, NY 11788
Tel: 631-273-5305 Fax: 631-273-5335

San Jose

Microchip Technology Inc.
2107 North First Street, Suite 590
San Jose, CA 95131
Tel: 408-436-7950 Fax: 408-436-7955

Toronto

6285 Northam Drive, Suite 108
Mississauga, Ontario L4V 1X5, Canada
Tel: 905-673-0699 Fax: 905-673-6509

ASIA/PACIFIC

China - Beijing

Microchip Technology Beijing Office
Unit 915
New China Hong Kong Manhattan Bldg.
No. 6 Chaoyangmen Beidajie
Beijing, 100027, No. China
Tel: 86-10-85282100 Fax: 86-10-85282104

China - Shanghai

Microchip Technology Shanghai Office
Room 701, Bldg. B
Far East International Plaza
No. 317 Xian Xia Road
Shanghai, 200051
Tel: 86-21-6275-5700 Fax: 86-21-6275-5060

Hong Kong

Microchip Asia Pacific
RM 2101, Tower 2, Metroplaza
223 Hing Fong Road
Kwai Fong, N.T., Hong Kong
Tel: 852-2401-1200 Fax: 852-2401-3431

India

Microchip Technology Inc.
India Liaison Office
Divyasree Chambers
1 Floor, Wing A (A3/A4)
No. 11, OIShaughnessey Road
Bangalore, 560 025, India
Tel: 91-80-2290061 Fax: 91-80-2290062

Japan

Microchip Technology Intl. Inc.
Benex S-1 6F
3-18-20, Shinyokohama
Kohoku-Ku, Yokohama-shi
Kanagawa, 222-0033, Japan
Tel: 81-45-471-6166 Fax: 81-45-471-6122

Korea

Microchip Technology Korea
168-1, Youngbo Bldg. 3 Floor
Samsung-Dong, Kangnam-Ku
Seoul, Korea
Tel: 82-2-554-7200 Fax: 82-2-558-5934

ASIA/PACIFIC (continued)

Singapore

Microchip Technology Singapore Pte Ltd.
200 Middle Road
#07-02 Prime Centre
Singapore, 188980
Tel: 65-334-8870 Fax: 65-334-8850

Taiwan

Microchip Technology Taiwan
11F-3, No. 207
Tung Hua North Road
Taipei, 105, Taiwan
Tel: 886-2-2717-7175 Fax: 886-2-2545-0139

EUROPE

Australia

Microchip Technology Australia Pty Ltd
Suite 22, 41 Rawson Street
Epping 2121, NSW
Australia
Tel: 61-2-9868-6733 Fax: 61-2-9868-6755

Denmark

Microchip Technology Denmark ApS
Regus Business Centre
Lautrup høj 1-3
Ballerup DK-2750 Denmark
Tel: 45 4420 9895 Fax: 45 4420 9910

France

Arizona Microchip Technology SARL
Parc d'Activite du Moulin de Massy
43 Rue du Saule Trapu
Batiment A - 1er Etage
91300 Massy, France
Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79

Germany

Arizona Microchip Technology GmbH
Gustav-Heinemann Ring 125
D-81739 Munich, Germany
Tel: 49-89-627-144 0 Fax: 49-89-627-144-44

Germany


Analog Product Sales
Lochhamer Strasse 13
D-82152 Martinsried, Germany
Tel: 49-89-895650-0 Fax: 49-89-895650-22

Italy

Arizona Microchip Technology SRL
Centro Direzionale Colleoni
Palazzo Taurus 1 V. Le Colleoni 1
20041 Agrate Brianza
Milan, Italy
Tel: 39-039-65791-1 Fax: 39-039-6899883

United Kingdom

Arizona Microchip Technology Ltd.
505 Eskdale Road
Winnersh Triangle
Wokingham
Berkshire, England RG41 5TU
Tel: 44 118 921 5869 Fax: 44-118 921-5820

All rights reserved. © 2001 Microchip Technology Incorporated. Printed in the USA. 1/01  Printed on recycled paper.

01/09/01

Information contained in this publication regarding device applications and the like is intended through suggestion only and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. No representation or warranty is given and no liability is assumed by Microchip Technology Incorporated with respect to the accuracy or use of such information, or infringement of patents or other intellectual property rights arising from such use or otherwise. Use of Microchip's products as critical components in life support systems is not authorized except with express written approval by Microchip. No licenses are conveyed, implicitly or otherwise, except as maybe explicitly expressed herein, under any intellectual property rights. The Microchip logo and name are registered trademarks of Microchip Technology Inc. in the U.S.A. and other countries. All rights reserved. All other trademarks mentioned herein are the property of their respective companies.