L7800 Series

3028

Monolithic Linear IC

5 to 24V 1A 3-Pin Voltage Regulator

Use

- General-purpose voltage regulators.

Features

- Output voltage L7805:5V L7806:6V L7807:7V L7808:8V
  L7809:9V L7810:10V L7812:12V L7815:15V
  L7818:18V L7820:20V L7824:24V
- 1A output.
- On-chip thermal protector
- On-chip overcurrent limiter
- On-chip ASO protector
- The JEDEC TO-220AB package facilitates easy mounting and thermal design as in case of transistor.

[Common to L7800 series]

Maximum Ratings at Ta=25°C

				unit
Maximum Supply Voltage	V_{CC} max	Pin 1	35	V
Allowable Power Dissipation	Pd max		1.75	W
	Pd max	Tc=25°C	20	W
Operating Temperature	Topg		-20 to +80	°C
Storage Temperature	Tstg		-40 to +150	°C
Thermal Resistance	θj-c		5	°C/W

[L7805]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	7.5 to 20	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=10V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	4.8	5.0	5.2	V
Line Regulation	ΔV_{oline}	Tj=25°C, 7V≦V_{IN}≦25V		3.0	50	mV
		" 8V≦V_{IN}≦20V		1.0	25	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			100	mV
		" 250mA≦I_{OUT}≦750mA			50	mV

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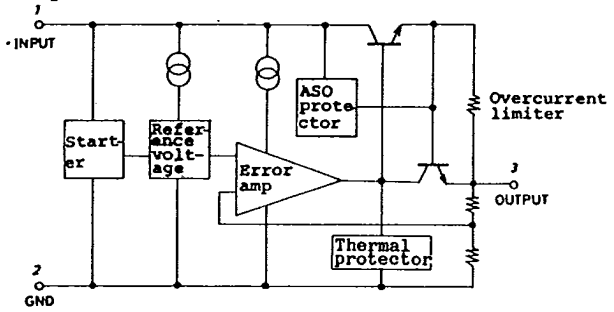
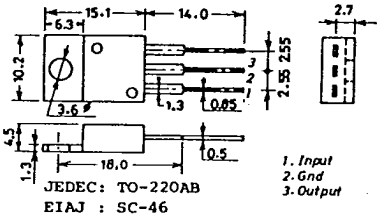
Equivalent Circuit



Case Outline 3028-S3TR
(unit:mm)



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			min	typ	max	unit
Output Voltage	V_{OUT}	$7V \leqq V_{IN} \leqq 20V, 5mA \leqq I_{OUT} \leqq 1A$	4.75		5.25	V
Current Dissipation	I_{CC}	$Tj=25^{\circ}C$			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	$7V \leqq V_{IN} \leqq 25V$			1.3	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	$5mA \leqq I_{OUT} \leqq 1A$			0.5	mA
Output Noise Voltage	V_{NO}	$10Hz \leqq f \leqq 100kHz$		40		uV
Ripple Rejection	R_{rej}	$f=120Hz$, $8V \leqq V_{IN} \leqq 19V$, $Tj=25^{\circ}C$	62	80		dB
Minimum Input-Output Voltage Drop	V_{drop}	$I_{OUT}=1A$		2.0		V
Short Current	I_{OS}	$Tj=25^{\circ}C, V_{IN}=35V$, to GND		300		mA
Peak Output Current	I_{op}	$Tj=25^{\circ}C$		2.2		A

[L7806]

Recommended Operating Conditions at $Ta=25^{\circ}C$

			unit
Input Voltage	V_{IN}	8.5 to 21	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at $Ta=25^{\circ}C, V_{IN}=11V, I_{OUT}=500mA$, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	$Tj=25^{\circ}C$	5.75	6.0	6.25	V
Line Regulation	ΔV_{oline}	$Tj=25^{\circ}C, 8V \leqq V_{IN} \leqq 25V$		5.0	60	mV
		" $9V \leqq V_{IN} \leqq 20V$		1.5	30	mV
Load Regulation	ΔV_{oload}	$Tj=25^{\circ}C, 5mA \leqq I_{OUT} \leqq 1.5A$			120	mV
		" $250mA \leqq I_{OUT} \leqq 750mA$			60	mV
Output Voltage	V_{OUT}	$8V \leqq V_{IN} \leqq 21V, 5mA \leqq I_{OUT} \leqq 1A$	5.7		6.3	V
Current Dissipation	I_{CC}	$Tj=25^{\circ}C$			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	$8V \leqq V_{IN} \leqq 25V$			1.3	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	$5mA \leqq I_{OUT} \leqq 1A$			0.5	mA
Output Noise Voltage	V_{NO}	$10Hz \leqq f \leqq 100kHz$		45		uV
Ripple Rejection	R_{rej}	$f=120Hz$, $9V \leqq V_{IN} \leqq 20V$, $Tj=25^{\circ}C$	59	80		dB
Minimum Input-Output Voltage Drop	V_{drop}	$I_{OUT}=1A$		2.0		V
Short Current	I_{OS}	$Tj=25^{\circ}C, V_{IN}=35V$, to GND		300		mA
Peak Output Current	I_{op}	$Tj=25^{\circ}C$		2.2		A

[L7807]

Recommended Operating Conditions at $Ta=25^{\circ}C$

			unit
Input Voltage	V_{IN}	9.5 to 22	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=12V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	6.72	7.0	7.28	V
Line Regulation	ΔV_{oline}	Tj=25°C, 9V≦V_{IN}≦25V		6.0	60	mV
		" 10V≦V_{IN}≦20V		2.0	30	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			140	mV
		" 250mA≦I_{OUT}≦750mA			70	mV
Output Voltage	V_{OUT}	9V≦V_{IN}≦22V, 5mA≦I_{OUT}≦1A	6.6		7.4	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	9V≦V_{IN}≦25V			1.3	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		48		uV
Ripple Rejection	R_{rej}	f=120Hz, 10V≦V_{IN}≦21V, Tj=25°C	58	80		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.2		A

[L7808]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	10.5 to 23	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=15V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	7.7	8.0	8.3	V
Line Regulation	ΔV_{oline}	Tj=25°C, 10.5V≦V_{IN}≦25V		6.0	60	mV
		" 11V≦V_{IN}≦20V		2.0	30	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			160	mV
		" 250mA≦I_{OUT}≦750mA			80	mV
Output Voltage	V_{OUT}	10.5V≦V_{IN}≦23V, 5mA≦I_{OUT}≦1A	7.6		8.4	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	10.5V≦V_{IN}≦25V			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		50		uV
Ripple Rejection	R_{rej}	f=120Hz, 11.5V≦V_{IN}≦22V, Tj=25°C	56	80		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.2		A

[L7809]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	12 to 25	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=16V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	8.6	9.0	9.4	V
Line Regulation	ΔV_{oline}	Tj=25°C, 11.5V≦V_{IN}≦25V		6.0	100	mV
		" 12V≦V_{IN}≦20V		2.0	50	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			180	mV
		" 250mA≦I_{OUT}≦750mA			90	mV
Output Voltage	V_{OUT}	11.5V≦V_{IN}≦24V, 5mA≦I_{OUT}≦1A	8.5		9.5	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	11.5V≦V_{IN}≦25V			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		60		uV
Ripple Rejection	R_{rej}	f=120Hz, 12V≦V_{IN}≦23V, Tj=25°C	56	80		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.2		A

[L7810]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	13 to 25	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=17V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	9.6	10.0	10.4	V
Line Regulation	ΔV_{oline}	Tj=25°C, 12.5V≦V_{IN}≦25V		7.0	100	mV
		" 13V≦V_{IN}≦22V		2.0	50	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			200	mV
		" 250mA≦I_{OUT}≦750mA			100	mV
Output Voltage	V_{OUT}	12.5V≦V_{IN}≦25V, 5mA≦I_{OUT}≦1A	9.5		10.5	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	12.5V≦V_{IN}≦25V			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		65		uV
Ripple Rejection	R_{rej}	f=120Hz, 13V≦V_{IN}≦25V, Tj=25°C	55	80		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.2		A

[L7812]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	15 to 25	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=19V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	11.5	12.0	12.5	V
Line Regulation	ΔV_{oline}	Tj=25°C, 14.5V≦V_{IN}≦30V		8.0	100	mV
		" 16V≦V_{IN}≦25V		2.0	50	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			240	mV
		" 250mA≦I_{OUT}≦750mA			120	mV
Output Voltage	V_{OUT}	14.5V≦V_{IN}≦27V, 5mA≦I_{OUT}≦1A	11.4		12.6	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	14.5V≦V_{IN}≦30V			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		75		uV
Ripple Rejection	R_{rej}	f=120Hz, 15V≦V_{IN}≦25V, Tj=25°C	55	80		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.2		A

[L7815]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	18 to 30	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=23V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	14.4	15.0	15.6	V
Line Regulation	ΔV_{oline}	Tj=25°C, 17.5V≦V_{IN}≦30V		10.0	100	mV
		" 19V≦V_{IN}≦30V		3.0	50	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			300	mV
		" 250mA≦I_{OUT}≦750mA			150	mV
Output Voltage	V_{OUT}	17.5V≦V_{IN}≦30V, 5mA≦I_{OUT}≦1A	14.25		15.75	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	17.5V≦V_{IN}≦30V			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		90		uV
Ripple Rejection	R_{rej}	f=120Hz, 18.5V≦V_{IN}≦28.5V, Tj=25°C	54	70		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.1		A

[L7818]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	21 to 33	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=27V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	17.3	18.0	18.7	V
Line Regulation	ΔV_{oline}	Tj=25°C, 21V≦V_{IN}≦35V		10.0	100	mV
		" 22V≦V_{IN}≦35V		5.0	50	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			360	mV
		" 250mA≦I_{OUT}≦750mA			180	mV
Output Voltage	V_{OUT}	21V≦V_{IN}≦33V, 5mA≦I_{OUT}≦1A	17.1		18.9	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	21V≦V_{IN}≦33V			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		100		uV
Ripple Rejection	R_{rej}	f=120Hz, 22V≦V_{IN}≦33V, Tj=25°C	53	70		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.1		A

[L7820]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	23 to 35	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=29V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	19.2	20.0	20.8	V
Line Regulation	ΔV_{oline}	Tj=25°C, 23V≦V_{IN}≦35V		10.0	100	mV
		" 24V≦V_{IN}≦35V		5.0	50	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			400	mV
		" 250mA≦I_{OUT}≦750mA			200	mV
Output Voltage	V_{OUT}	23V≦V_{IN}≦35V, 5mA≦I_{OUT}≦1A	19.0		21.0	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	23V≦V_{IN}≦35V			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		110		uV
Ripple Rejection	R_{rej}	f=120Hz, 24V≦V_{IN}≦34V, Tj=25°C	53	70		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.1		A

[L7824]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	27 to 35	V
Output Current	I_{OUT}	5 to 1000	mA

Operating Characteristics at Ta=25°C, V_{IN}=33V, I_{OUT}=500mA, See specified Test Circuit.

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	23.0	24.0	25.0	V
Line Regulation	ΔV_{oline}	Tj=25°C, 27V≦V_{IN}≦35V		10.0	100	mV
		" 28V≦V_{IN}≦35V		5.0	50	mV
Load Regulation	ΔV_{oload}	Tj=25°C, 5mA≦I_{OUT}≦1.5A			480	mV
		" 250mA≦I_{OUT}≦750mA			240	mV
Output Voltage	V_{OUT}	27V≦V_{IN}≦35V, 5mA≦I_{OUT}≦1A	22.8		25.2	V
Current Dissipation	I_{CC}	Tj=25°C			8.0	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	27V≦V_{IN}≦35V			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA≦I_{OUT}≦1A			0.5	mA
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz		170		uV
Ripple Rejection	R_{rej}	f=120Hz, 28V≦V_{IN}≦35V, Tj=25°C	50	70		dB
Minimum Input-Output Voltage Drop	V_{drop}	I_{OUT}=1A		2.0		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=35V, to GND		300		mA
Peak Output Current	I_{op}	Tj=25°C		2.1		A

Test Circuit (Common to L7800 Series)