

L7800ML Series



3100

Monolithic Linear IC

5 to 24V 1A 3-Pin Voltage Regulator

E2608

Features

- Output voltage L7805ML:5V L7806ML:6V L7807ML:7V L7808ML:8V
L7809ML:9V L7810ML:10V L7812ML:12V L7815ML:15V
L7818ML:18V L7820ML:20V L7824ML:24V
- Output current 1A
- On-chip overheat protector
- On-chip overcurrent limiter
- On-chip ASO protector
- TO-220ML package facilitating easy mounting and thermal design
- Micaless version that insulates the package from each pin, requiring no insulation for mounting

[Common to L7800ML series]

Maximum Ratings at Ta=25°C

				unit
Maximum Supply Voltage	V _{CC} max	Pin1	35	V
Allowable Power Dissipation	Pd max		2	W
	Pd	(Tc=25°C)	15	W
Operating Temperature	Topg		-20 to +80	°C
Storage Temperature	Tstg		-40 to +150	°C

[L7805ML]

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

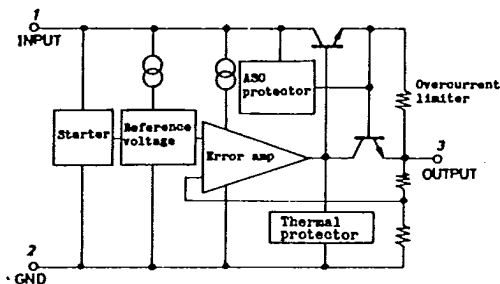
Operating Characteristics at Ta=25°C, V_{IN}=10V, I_{OUT}=500mA,

See specified Test Circuit.

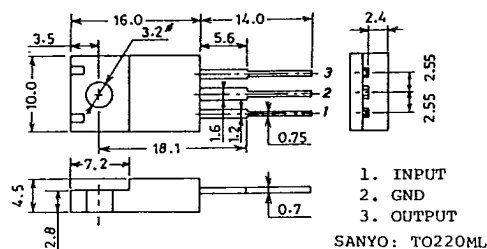
			min	typ	max	unit
Output Voltage	V _{OUT}	Tj=25°C	4.8	5.0	5.2	V
Line Regulation	ΔV _{oline}	Tj=25°C, 7V ≤ V _{IN} ≤ 25V		3.0	50	mV
		" 8V ≤ V _{IN} ≤ 20V		1.0	25	mV
Load Regulation	ΔV _{oload}	Tj=25°C, 5mA ≤ I _{OUT} ≤ 1.5A			100	mV
		" 250mA ≤ I _{OUT} ≤ 750mA			50	mV

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Equivalent Circuit



Case Outline 3100-S3TR (unit:mm)



7017TA, TS No.2608-1/7

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

[L7806ML]

Recommended Operating Conditions at $T_a = 25^\circ C$

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

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

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

[L7807ML]

Recommended Operating Conditions at $T_a = 25^\circ C$

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

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Operating Characteristics at $T_a=25^\circ\text{C}$, $V_{IN}=12\text{V}$, $I_{OUT}=500\text{mA}$,
See specified Test Circuit.

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

[L7808ML]

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

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

Operating Characteristics at $T_a=25^\circ\text{C}$, $V_{IN}=15\text{V}$, $I_{OUT}=500\text{mA}$,
See specified Test Circuit.

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

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[L7809ML]**Recommended Operating Conditions at Ta=25°C**

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

[L7810ML]**Recommended Operating Conditions at Ta=25°C**

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

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[L7812ML]**Recommended Operating Conditions at Ta=25°C**

Input Voltage	V _{IN}	15 to 25	unit
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		μV
Ripple Rejection	R _{rej}	f=120Hz	55	80		dB
		15V ≤ V _{IN} ≤ 25V				
		Tj=25°C				
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

[L7815ML]**Recommended Operating Conditions at Ta=25°C**

Input Voltage	V _{IN}	18 to 30	unit
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		μV
Ripple Rejection	R _{rej}	f=120Hz	54	70		dB
		18.5V ≤ V _{IN} ≤ 28.5V				
		Tj=25°C				
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

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[L7818ML]**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}	$T_j=25^\circ C$	17.3	18.0	18.7	V
Line Regulation	ΔV_{oline}	$T_j=25^\circ C, 21V \leq V_{IN} \leq 35V$		10.0	100	mV
		" $22V \leq V_{IN} \leq 35V$		5.0	50	mV
Load Regulation	ΔV_{oload}	$T_j=25^\circ C, 5mA \leq I_{OUT} \leq 1.5A$			360	mV
		" $250mA \leq I_{OUT} \leq 750mA$			180	mV
Output Voltage	V_{OUT}	$21V \leq V_{IN} \leq 33V, 5mA \leq I_{OUT} \leq 1A$	17.1		18.9	V
Current Dissipation	I_{CC}	$T_j=25^\circ C$			8.0	mA
Current Dissipation	ΔI_{CCline}	$21V \leq V_{IN} \leq 33V$			1.0	mA
Variation (Line)						
Current Dissipation	ΔI_{CCload}	$5mA \leq I_{OUT} \leq 1A$			0.5	mA
Variation (Load)						
Output Noise Voltage	V_{NO}	$10Hz \leq f \leq 100kHz$		100		uV
Ripple Rejection	R_{rej}	$f=120Hz$	53	70		dB
		$22V \leq V_{IN} \leq 33V$				
		$T_j=25^\circ C$				
Minimum Input-Output	V_{drop}	$I_{OUT}=1A$		2.0		V
Voltage Drop						
Short Current	I_{OS}	$T_j=25^\circ C, V_{IN}=35V, \text{to GND}$		300		mA
Peak Output Current	I_{op}	$T_j=25^\circ C$		2.1		A

[L7820ML]**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}	$T_j=25^\circ C$	19.2	20.0	20.8	V
Line Regulation	ΔV_{oline}	$T_j=25^\circ C, 23V \leq V_{IN} \leq 35V$		10.0	100	mV
		" $24V \leq V_{IN} \leq 35V$		5.0	50	mV
Load Regulation	ΔV_{oload}	$T_j=25^\circ C, 5mA \leq I_{OUT} \leq 1.5A$			400	mV
		" $250mA \leq I_{OUT} \leq 750mA$			200	mV
Output Voltage	V_{OUT}	$23V \leq V_{IN} \leq 35V, 5mA \leq I_{OUT} \leq 1A$	19.0		21.0	V
Current Dissipation	I_{CC}	$T_j=25^\circ C$			8.0	mA
Current Dissipation	ΔI_{CCline}	$23V \leq V_{IN} \leq 35V$			1.0	mA
Variation (Line)						
Current Dissipation	ΔI_{CCload}	$5mA \leq I_{OUT} \leq 1A$			0.5	mA
Variation (Load)						
Output Noise Voltage	V_{NO}	$10Hz \leq f \leq 100kHz$		110		uV
Ripple Rejection	R_{rej}	$f=120Hz$	53	70		dB
		$24V \leq V_{IN} \leq 34V$				
		$T_j=25^\circ C$				
Minimum Input-Output	V_{drop}	$I_{OUT}=1A$		2.0		V
Voltage Drop						
Short Current	I_{OS}	$T_j=25^\circ C, V_{IN}=35V, \text{to GND}$		300		mA
Peak Output Current	I_{op}	$T_j=25^\circ C$		2.1		A

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[L7824ML]

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

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

Operating Characteristics at $T_a=25^\circ\text{C}$, $V_{IN}=33\text{V}$, $I_{OUT}=500\text{mA}$,

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

Test Circuit (Common to L7800ML Series)

