



L1186

CMOS IC

600mA CMOS LDO

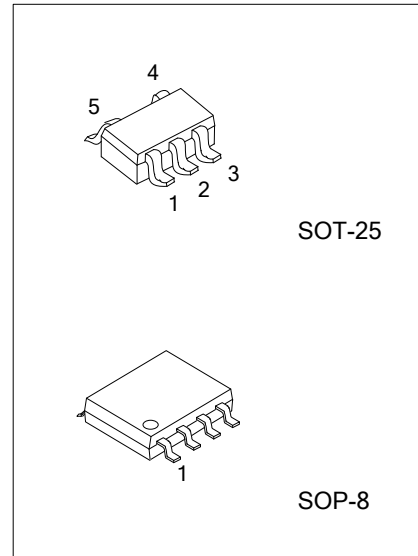
DESCRIPTION

The UTC **L1186** is a CMOS positive linear regulator. One of its features is the very low quiescent current typical as low as 30µA and its dropout voltage is extremely low with 600mA output current.

The internal circuit includes thermal shutdown and current fold-back to prevent device failure when the circuit is operated in the bad conditions.

In application, the UTC **L1186** needs a low noise, regulated supply. For stable operation, the output capacitance value should be 2.2µF or more.

The UTC **L1186** is an ideal for battery applications, such as instrumentations, portable electronics, wireless devices, cordless phones, PC peripherals, and battery powered widgets.



FEATURES

- * Accurate to Within 1.5%
- * Quiescent Current: 30µA
- * Internal Over-Temperature Shutdown
- * With Current Limiting
- * Internal Short Circuit Current Fold-Back
- * With Noise Reduction Bypass Capacitor
- * Has Power-Saving Shutdown Mode
- * Very Low Temperature Coefficient

ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
L1186L-xx-AF5-R	L1186G-xx-AF5-R	SOT-25	Tape Reel
L1186L-xx-S08-A-R	L1186G-xx-S08-A-R	SOP-8	Tape Reel
L1186L-xx-S08-A-T	L1186G-xx-S08-A-T	SOP-8	Tube
L1186L-xx-S08-B-R	L1186G-xx-S08-B-R	SOP-8	Tape Reel
L1186L-xx-S08-B-T	L1186G-xx-S08-B-T	SOP-8	Tube

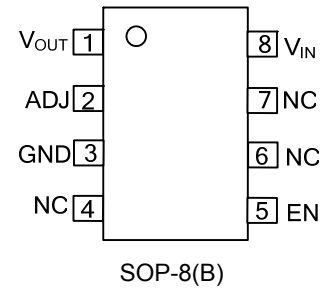
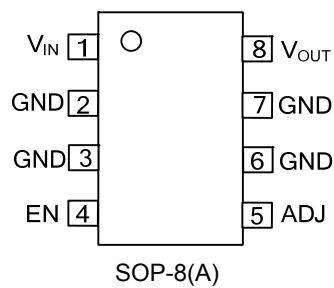
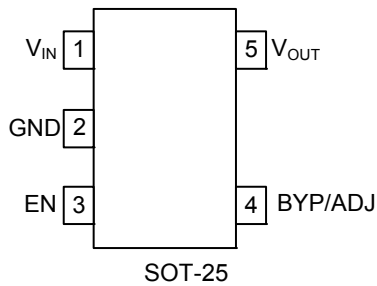
Note: xx: Output Voltage, refer to Marking Information.

<p>L1186L-xx-AF5-X-R</p> <p>(1)Packing Type (2)Pin Assignment (3)Package Type (4)Output Voltage Code (5)Lead Free</p>	<p>(1) R: Tape Reel (2) refer to Pin Configuration (FOR SOP-8) (3) AF5: SOT-25, S08: SOP-8 (4) xx: Refer to Marking Information (5) G: Halogen Free L:Lead Free</p>
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MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-25	15 :1.5V 28 :2.8V	<p>L: Lead Free G: Halogen Free Voltage Code</p>
SOP-8	AD:ADJ	<p>DATE CODE L: Lead Free G: Halogen Free Lot Code Voltage Code</p>

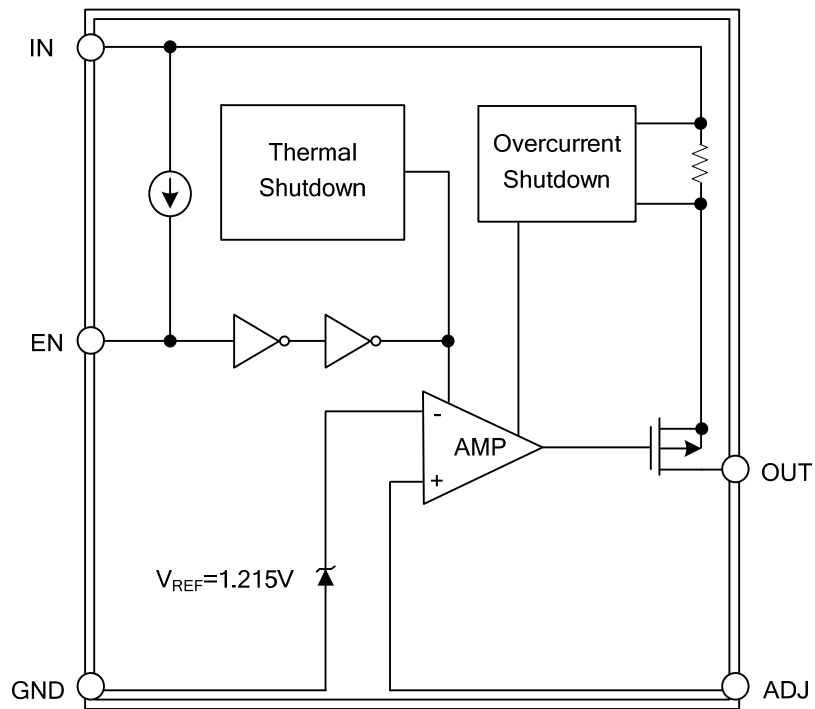
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO			PIN NAME	DESCRIPTION
SOT-25	SOP-8(A)	SOP-8(B)		
1	1	8	V _{IN}	Input for voltage input.
2	2,3,6,7	3	GND	Ground.
3	4	5	EN	Enable pin.
4	5	2	BYP/ADJ	Noise Reduction Bypass Capacitor/ Adjusted Voltage
5	8	1	V _{OUT}	Output voltage pin
		4,6,7	NC	No connection

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING ($T_A = 25^\circ\text{C}$, unless otherwise specified.)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	8	V
Output Voltage	V_{OUT}	GND-0.3 ~ $V_{IN}+0.3$	V
Output Current	I_{OUT}	$\frac{P_D}{V_{IN} - V_{OUT}}$	A
Power Dissipation	SOT-25	400	mW
	SOP-8	600	
Junction Temperature	T_J	150	$^\circ\text{C}$
Operating Temperature	T_{OPR}	-40~+85	$^\circ\text{C}$
Storage Temperature	T_{STG}	-65~+150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-25	260	$^\circ\text{C/W}$
	SOP-8	200	
Junction to Case (Note)	SOT-25	81	$^\circ\text{C/W}$
	SOP-8	65	

Note: θ_{JC} on center of molding compound if IC has on tab

■ ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified.)

Fixed Voltage

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage	V_{IN}		Note1		7	V
Output Voltage Accuracy	V_{OUT}	$I_{OUT}=1\text{mA}$	-1.5		1.5	%
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	$I_{OUT}=1\text{mA}$ $V_{IN}=V_{OUT}+1-V_{OUT}+2$	1.4V < $V_{OUT} \leq 2.0\text{V}$	-0.15	0.15	%
			2.0V < $V_{OUT} < 4.0\text{V}$	-0.1	0.02	0.1
Load Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	$I_{OUT}=1\text{mA} \sim 600\text{mA}$		0.2	1	%
Output Current	I_{OUT}	$V_{OUT} > 1.2\text{V}$	600			mA
Current Limit	I_{LIMIT}	$V_{OUT} > 1.2\text{V}$	600	800		mA
Short Circuit Current	I_{SC}	$V_{OUT} < 0.8\text{V}$		300	600	mA
Quiescent Current	I_Q	$I_{OUT}=0\text{mA}$		30	50	μA
Ground Pin Current	I_{GND}	$I_{OUT}=1\text{mA} \sim 600\text{mA}$		35		μA
Dropout Voltage	V_D	$I_{OUT} = 600\text{mA}$ $V_{OUT} = V_{O(NOM)} - 2.0\%$	1.4V < $V_{O(NOM)} \leq 2.0\text{V}$		1400	mV
			2.0V < $V_{O(NOM)} \leq 2.8\text{V}$		800	mV
Over Temperature Shutdown	OTS			150		$^\circ\text{C}$
Over Temperature Hysteresis	OTH			30		$^\circ\text{C}$
Temperature Coefficient of Output Voltage	$T_C V_O$			30		ppm/ $^\circ\text{C}$
Power Supply Rejection	PSRR	$I_{OUT} = 100\text{mA}$ $C_{OUT} = 2.2\mu\text{F}$ ceramic $C_{BYP} = 0.01\mu\text{F}$	f=1kHz	75		dB
			f=10kHz	55		dB
			f=100kHz	30		dB
Output Voltage Noise	eN	f=10Hz~100kHz, $I_{OUT} = 10\text{mA}$ $C_{OUT} = 2.2\mu\text{F}$, $C_{BYP} = 0.1\mu\text{F}$		30		μVrms
EN Input Threshold	V_{EH}	$V_{IN} = 2.7\text{V} \sim 7\text{V}$	2.0		V_{IN}	V
	V_{EL}	$V_{IN} = 2.7\text{V} \sim 7\text{V}$	0		0.4	V
EN Input Bias Current	I_{EH}	$V_{EN} = V_{IN}$, $V_{IN} = 2.7\text{V} \sim 7\text{V}$			0.1	μA
	I_{EL}	$V_{EN} = 0\text{V}$, $V_{IN} = 2.7\text{V} \sim 7\text{V}$			0.5	μA
Shutdown Supply Current	I_{SD}	$V_{IN} = 5\text{V}$, $V_{OUT} = 0\text{V}$, $V_{EN} < V_{EL}$		0.5	1	μA
PG Leakage Current	I_{LC}	$V_{PG} = 7\text{V}$			1	μA

■ ELECTRICAL CHARACTERISTICS (Cont.)

Adjusted Voltage

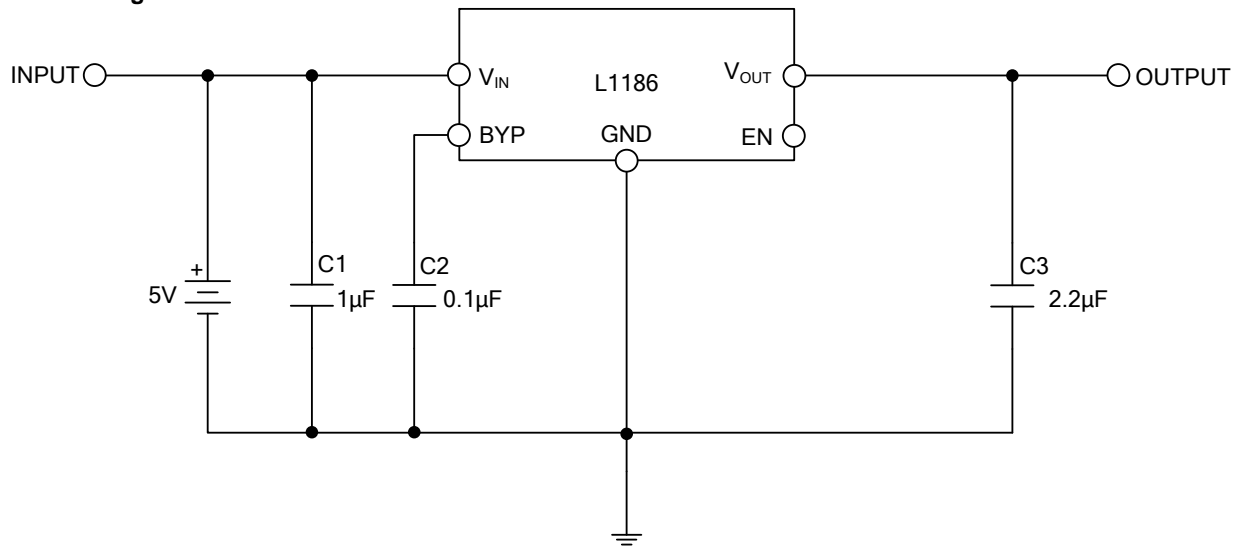
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage	V_{IN}		Note1		7	V
Reference Voltage	V_{REF}		1.196	1.215	1.234	V
Output Voltage Accuracy	V_{OUT}	$I_{OUT}=1mA$	-1.5		1.5	%
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	$V_{IN}=V_{OUT}+V_D \sim 7V, I_{OUT}=1mA$	-0.15		0.15	%
Load Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	$I_{OUT}=1mA$				%
		$V_{IN}=V_{OUT}+1 \sim V_{OUT}+2$	$1.4V < V_{OUT} \leq 2.0V$	-0.15		
			-0.1	0.02	0.1	
Output Current	I_{OUT}	$V_{OUT} > 1.3V$	600			mA
Current Limit	I_{LIMIT}	$V_{OUT} > 1.3V$	600	800		mA
Short Circuit Current	I_{SC}	$V_{OUT} < 0.8V$		300	600	mA
Adjusted Current	I_{ADJ}	$I_{OUT}=0mA$		30	50	μA
Ground Pin Current	I_{GND}	$I_{OUT}=1mA \sim 600mA$		35		μA
Dropout Voltage	V_D	$V_{OUT}=V_{O(NOM)}-2.0\%, I_{OUT}=600mA$			600	mV
Over Temperature Shutdown	OTS			150		$^{\circ}C$
Over Temperature Hysteresis	OTH			30		$^{\circ}C$
Temperature Coefficient of Output Voltage	$T_C V_O$			30		ppm/ $^{\circ}C$
Power Supply Rejection	PSRR	$I_{OUT}=100mA$			40	dB
		$C_{OUT}=2.2\mu F$ ceramic	$f=1kHz$		20	
		$C_{BYP}=0.01\mu F$	$f=10kHz$		15	
		$f=100kHz$				
Output Voltage Noise	eN	$f=10Hz \sim 100kHz, I_{OUT}=10mA$ $C_{OUT}=2.2\mu F, C_{BYP}=0.1\mu F$		30		μV_{rms}
EN Input Threshold	V_{EH}	$V_{IN}=2.7V \sim 7V$	2.0		V_{IN}	V
	V_{EL}	$V_{IN}=2.7V \sim 7V$	0		0.4	V
EN Input Bias Current	I_{EH}	$V_{EN}=V_{IN}, V_{IN}=2.7V \sim 7V$			0.1	μA
	I_{EL}	$V_{EN}=0V, V_{IN}=2.7V \sim 7V$			0.5	μA
Shutdown Supply Current	I_{SD}	$V_{IN}=5V, V_{OUT}=0V, V_{EN} < V_{EL}$		0.5	1	μA
PG Leakage Current	I_{LC}	$V_{PG}=7V$			1	μA

Notes: 1. $V_{IN(MIN)}=V_{OUT}+V_D$

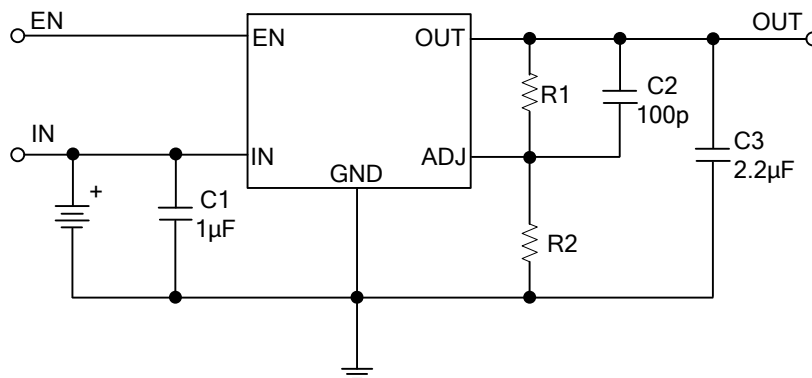
2. To prevent the Short Circuit Current protection feature from being prematurely activated, the input voltage must be applied before a current source load is applied.

■ TYPICAL APPLICATION CIRCUIT

Fixed Voltage



Adjusted Voltage

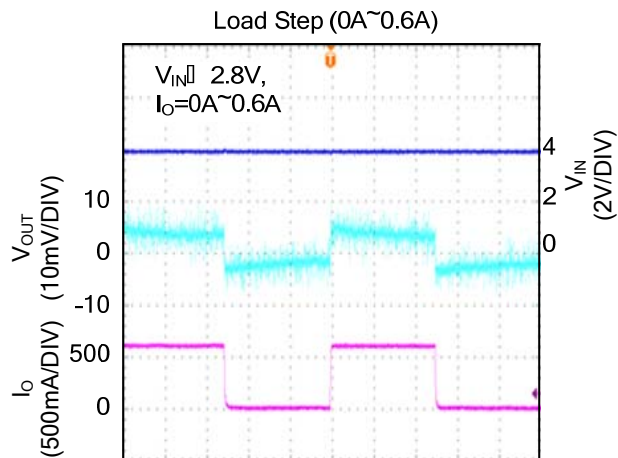


$$V_{OUT} = 1.215 (R_1/R_2 + 1)$$

C2 is unnecessary if R_1 or $R_2 < 20 \text{ K}\Omega$

R_1 and R_2 use resistance value within 1% accuracy for correct for correct V_{OUT}

■ TYPICAL CHARACTERISTICS



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