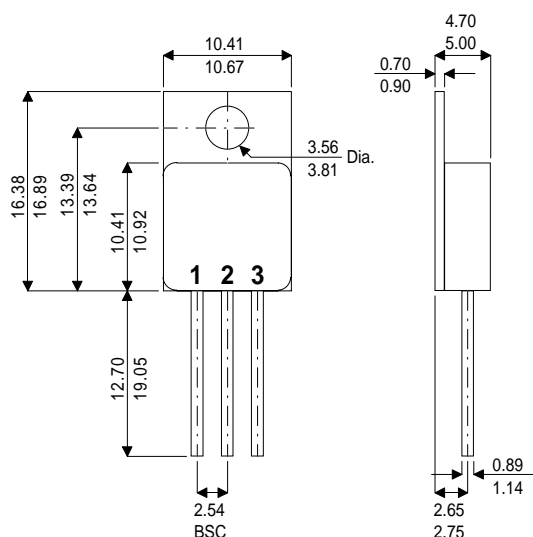


# TO-220 Isolated Metal Package

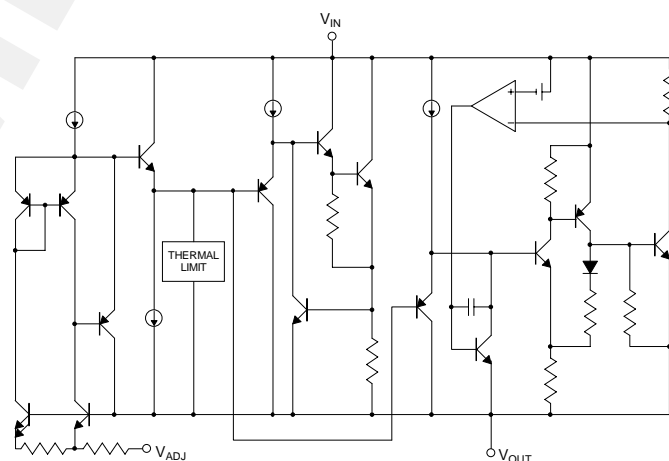


## LOW DROPOUT 1.5 AMP POSITIVE VOLTAGE REGULATOR

### FEATURES

- Low Dropout Performance
- Fixed or Adjustable Voltages
- Fixed Output Voltages of 5V & 12V
- Output Current 1.5A
- Line Regulation 0.015% / V Typical.
- Load Regulation 0.1% Typical.
- Military Temperature Range (-55 to +150°C)

### BLOCK DIAGRAM



### Pinouts

Pin	Fixed	Adjustable
1	GROUND	ADJUST
2	OUTPUT	OUTPUT
3	INPUT	INPUT
Case is ISOLATED		

### Ordering Information

LT1086-220M	Positive Adjustable Regulator
LT1086-05-220M	Fixed +5V Regulator
LT1086-12-220M	Fixed +12V Regulator

## ABSOLUTE MAXIMUM RATINGS ( $T_{case} = 25^{\circ}C$ unless otherwise stated)

$V_{IN}$	Input Voltage *	30V
$P_D$	Power Dissipation	Internally limited
$V_{IN}$	Operating Input Voltage	Adjustable 5 Volt 12 Volt
$T_J$	Operating Junction Temperature Range	Control Power -55 to 150°C -55 to 200°C
$T_{STG}$	Storage Temperature Range	-65 to 150°C
$T_{LEAD}$	Lead Temperature (for 10 sec.)	300°C

\* Although the devices' maximum operating voltage is limited (20V for the 5V device, and 25V for the 12V and adjustable devices) the devices are guaranteed to withstand transient input voltages up to 30V. For input voltages greater than the maximum operating input voltage, some degradation of specifications will occur. For 5V and 12V devices operating at input-output voltage differentials >15V, a minimum external load of 5mA is required to maintain regulation.

## DESCRIPTION

The LT1086 is designed to provide 1.5A with higher efficiency than currently available devices. All internal circuitry is designed to operate down to 1V input to output differential and the dropout voltage is fully specified as a function of load current. Dropout is guaranteed at a maximum of 1.5V at maximum output current, decreasing at lower load currents. On-chip trimming adjusts the reference output voltage to 1%. Current limit is also trimmed, minimising the stress on both the regulator and power source circuitry under overload conditions.

The LT1086 is pin compatible with older 3 terminal adjustable regulators. A 10 $\mu$ F output capacitor is required on these new devices; however, this is usually included in most regulator designs.

Unlike PNP regulators, where up to 10% of the output current is wasted as quiescent current, the LT1086 quiescent current flows into the load, increasing efficiency.

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Output Voltage	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$ Output Voltage	5	$V_{IN} = 6.5 \text{ to } 20\text{V}$ $T_J = -55 \text{ to } 150^\circ\text{C}$ $I_O = 0 \text{ to } 1.5\text{A}$	4.90	5	5.10	V
	12	$V_{IN} = 13.5\text{V to } 25\text{V}$ $T_J = -55 \text{ to } 150^\circ\text{C}$ $I_O = 0 \text{ to } 1.5\text{A}$	11.76	12	12.24	
$V_{REF}$ Reference Voltage	ADJ.	$V_{IN} - V_{OUT} = 1.5 \text{ to } 15\text{V}$ $T_J = -55 \text{ to } 150^\circ\text{C}$ $I_O = 10\text{mA to } 1.5\text{A}$	1.225	1.25	1.270	
$REG_{(LINE)}$ Line Regulation	5	$V_{IN} = 6.5 \text{ to } 20\text{V}$ $I_O = 0$ $T_J = -55 \text{ to } 150^\circ\text{C}$		0.5	10	mV
				1	10	
	12	$V_{IN} = 13.5 \text{ to } 25\text{V}$ $I_O = 0$ $T_J = -55 \text{ to } 150^\circ\text{C}$		1	25	
				2	25	
$REG_{(LOAD)}$ Load Regulation  See notes 1,2	5	$V_{IN} - V_{OUT} = 1.5 \text{ to } 15\text{V}$ $I_{LOAD} = 10\text{mA}$ $T_J = -55 \text{ to } 150^\circ\text{C}$		0.015	0.2	%
				0.035	0.2	
	12	$V_{IN} = 8\text{V}$ $I_O = 0 \text{ to } 1.5\text{A}$ $T_J = -55 \text{ to } 150^\circ\text{C}$		5	20	
				10	35	
$V_D$ Dropout Voltage  See note 3	5	$V_{IN} = 15\text{V}$ $I_O = 0 \text{ to } 1.5\text{A}$ $T_J = -55 \text{ to } 150^\circ\text{C}$		12	36	mV
				24	72	
	ADJ.	$V_{IN} - V_{OUT} = 3\text{V}$ $I_O = 10\text{mA to } 1.5\text{A}$ $T_J = -55 \text{ to } 150^\circ\text{C}$		0.1	0.3	
				0.2	0.4	
$V_D$ Dropout Voltage  See note 3	5	$\Delta V_{OUT} = 50\text{mV}$ $I_{OUT} = 1.5\text{A}$ $T_J = -55 \text{ to } 150^\circ\text{C}$		1.3	1.5	V
	12	$\Delta V_{OUT} = 120\text{mV}$ $I_{OUT} = 1.5\text{A}$ $T_J = -55 \text{ to } 150^\circ\text{C}$		1.3	1.5	
	ADJ.	$\Delta V_{REF} = 1\%$ $I_{OUT} = 1.5\text{A}$ $T_J = -55 \text{ to } 150^\circ\text{C}$		1.3	1.5	

## ELECTRICAL CHARACTERISTICS ( $T_J = -55$ to $+150^\circ\text{C}$ unless otherwise stated)

Parameter	Output Voltage	Test Conditions		Min.	Typ.	Max.	Unit
$I_{CL}$ Current Limit		$V_{IN} - V_{OUT} = 5\text{V}$	$T_J = -55$ to $150^\circ\text{C}$	1.5	1.6	2.5	A
		$V_{IN} - V_{OUT} = 25\text{V}$	$T_J = -55$ to $150^\circ\text{C}$	0.075	0.15		
$I_Q$ Quiescent Current	5	$V_{IN} \leq 20\text{V}$	$T_J = -55$ to $150^\circ\text{C}$		5	10	mA
	12	$V_{IN} \leq 25\text{V}$	$T_J = -55$ to $150^\circ\text{C}$		5	10	
Minimum Load Current <sup>4</sup>	ADJ.	$V_{IN} - V_{OUT} = 25\text{V}$	$T_J = -55$ to $150^\circ\text{C}$		5	10	
$REG_{(THERM)}$ Thermal Regulation		$T_P = 30\text{ms}$	$T_A = 25^\circ\text{C}$		0.008	0.04	%/W
$R_A$ Ripple Rejection	5	$T_J = -55$ to $150^\circ\text{C}$	$V_{IN} = 8\text{V}$	60	68		dB
	12	$C_{OUT} = 25\mu\text{F}$ Tantalum	$V_{IN} = 15\text{V}$	54	60		
	ADJ.	$f = 120\text{Hz}$ $I_O = 1.5\text{A}$	$V_{IN} - V_{OUT} = 3\text{V}$ $C_{ADJ} = 25\mu\text{F}$	60	75		
$I_{PIN}$ Adjust Pin Current					55		$\mu\text{A}$
		$T_J = -55$ to $150^\circ\text{C}$				120	
$\Delta I_{PIN}$ Adjust Pin Current Change		$V_{IN} - V_{OUT} = 1.5$ to $15\text{V}$ $I_O = 10\text{mA}$ to $1.5\text{A}$	$T_J = -55$ to $150^\circ\text{C}$		0.2	5	$\mu\text{A}$
$T_S$ Temperature Stability		$T_J = -55$ to $150^\circ\text{C}$			0.5		%
Long Term Stability		$T_A = 125^\circ\text{C}$	$T = 1000$ Hrs		0.3	1	%
$V_N$ RMS Output Noise		$f = 10\text{Hz}$ to $10\text{kHz}$	$T_A = 25^\circ\text{C}$		0.003		%
$R_{\theta JC}$ Thermal Resistance Junction – Case		Control Circuitry			TBA		$^\circ\text{C/W}$
		Power Transistor			TBA		

### Notes:

- See thermal regulation specifications for changes in output voltage due to heating effects. Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead  $\approx 1/8$ " from the package.
- Line and load regulation are guaranteed up to the maximum power dissipation of 15W. Power dissipation is determined by the input - output differential and the output current. Guaranteed maximum power dissipation will not be available over the full input - output voltage range.
- Dropout voltage is specified over the full output current range of the device.
- Minimum load current is defined as the minimum output current required to maintain regulation. At 25V input-output differential the device is guaranteed to regulate if the output current is greater than 10mA.