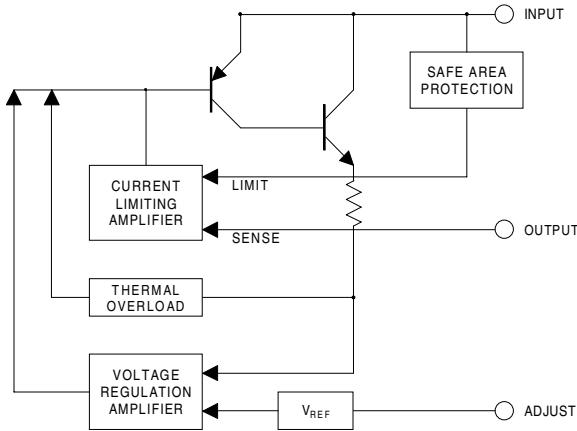


## **5 AMP POSITIVE VOLTAGE REGULATOR**

### **FEATURES**

- Low Dropout Performance
- Fixed or Adjustable Voltages
- Fixed Output Voltages of 3.3V, 5V & 12V
- Adjustable Output Voltage Range From 1.2V
- Line Regulation 0.015% / V Typical.
- Load Regulation 0.01% Typical.
- Available in Hermetically Sealed TO-3, SMD1 and TO-257 (isolated & non-isolated) Packages.
- Military Temperature Range (-55 to +150°C)



### **DESCRIPTION**

The LT1084 voltage regulators are monolithic integrated circuits designed for use in applications requiring a well regulated positive output voltage with low input-output differential voltage.

Features include full power usage of up to 5A load current, internal current limiting and thermal shutdown. Safe area protection on the die is also included, providing protection of the series pass Darlington transistor under most conditions.

The hermetically sealed TO-3 packages are utilised for high reliability and low thermal resistance, whilst the SMD1 package is designed for surface mount applications.

### **ABSOLUTE MAXIMUM RATINGS (T<sub>case</sub> = 25°C unless otherwise stated)**

V <sub>IN</sub>	Input – Output Voltage Differential				35V
P <sub>D</sub>	Power Dissipation				Internally limited *
R <sub>θJC</sub>	Thermal Resistance Junction To Case	TO-3	Control	0.76°C / W	
		TO-3	Power	2.3°C / W	
R <sub>θJC</sub>	Thermal Resistance Junction To Case	SMD1	Control	0.79°C / W	
		SMD1	Power	4.0°C / W	
R <sub>θJC</sub>	Thermal Resistance Junction To Case	TO-257	Control	0.79°C / W	
		TO-257	Power	4.0°C / W	
T <sub>J</sub>	Operating Junction Temperature Range		Control	-55 to 150°C	
			Power	-55 to 200°C	
T <sub>STG</sub>	Storage Temperature Range			-65 to 150°C	
T <sub>LEAD</sub>	Lead Temperature (for 10 sec.)			300°C	

\* These ratings are only applicable for power dissipations of 30 Watts over a limited range of V<sub>IN</sub> – V<sub>OUT</sub>.

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Document Number 6386

Issue 1

**ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  Unless otherwise stated) **LM1084MK & LM1084MSM**

Parameter	Output Voltage	Test Conditions 1,2	Min.	Typ.	Max.	Unit
$V_O$ <sup>4</sup>	3.3	$V_{IN} - V_{OUT} = 6.3\text{V}$ $I_O = 10\text{mA}$	3.267	3.3	3.333	V
		$I_O = 10\text{mA}$ to $5\text{A}$ $T_J = \text{Over Temp }^3$	3.234	3.3	3.366	
	5	$V_{IN} - V_{OUT} = 8\text{V}$ $I_O = 10\text{mA}$	4.95	5	5.05	
		$I_O = 10\text{mA}$ to $5\text{A}$ $T_J = \text{Over Temp }^3$	4.90	5	5.10	
	12	$V_{IN} - V_{OUT} = 15\text{V}$ $I_O = 10\text{mA}$	11.88	12	12.12	
		$I_O = 10\text{mA}$ to $5\text{A}$ $T_J = \text{Over Temp }^3$	11.76	12	12.24	
$V_{REF}$ <sup>4</sup>	ADJ.	$V_{IN} - V_{OUT} = V_O + 3\text{V}$ $I_O = 10\text{mA}$	1.238	1.25	1.262	V
		$I_O = 10\text{mA}$ to $5\text{A}$ $T_J = \text{Over Temp }^3$	1.225	1.25	1.270	
$REG_{(LINE)}$ <sup>4</sup>		$V_{IN} - V_{OUT} = 1.5$ to $15\text{V}$ $T_J = 25^\circ\text{C}$		0.015	0.2	%
		$I_O = 10\text{mA}$ $T_J = \text{Over Temp }^3$		0.035		
		$V_{IN} - V_{OUT} = 1.5$ to $35\text{V}$ $I_O = 10\text{mA}$ $T_J = \text{Over Temp }^3$		0.05	0.5	
$REG_{(LOAD)}$ <sup>4</sup>		$V_{IN} - V_{OUT} = 3\text{V}$ $T_J = 25^\circ\text{C}$		0.1	0.3	%
		$V_{IN} - V_{OUT} = 3\text{V}$ $T_J = \text{Over Temp }^3$		0.2	0.4	
$V_D$	Dropout Voltage	$\Delta V_{OUT}$ , $\Delta V_{REF} = 1\%$ $T_J = \text{Over Temp }^3$		1.3	1.5	V
$I_{CL}$	Current Limit	$V_{IN} - V_{OUT} = 5\text{V}$ $T_J = \text{Over Temp }^3$	5.5	6.5		A
		$V_{IN} - V_{OUT} = 25\text{V}$ $T_J = \text{Over Temp }^3$	0.3		0.6	
$I_Q$	Quiescent Current	$V_{IN} - V_{OUT} = 35\text{V}$ $T_J = \text{Over Temp }^3$			10	mA
$REG_{(THERM)}$	Thermal Regulation	$t_p = 30\text{ms}$ $T_J = 25^\circ\text{C}$		0.002	0.01	% / W
$I_{PIN}$	Adjust Pin Current	$T_J = 25^\circ\text{C}$		55		$\mu\text{A}$
		$T_J = \text{Over Temp }^3$			120	
$\Delta I_{PIN}$	Adjust Pin Current Change	$T_J = \text{Over Temp }^3$		0.2	5	$\mu\text{A}$
$T_S$	Temperature Stability	$V_{IN} - V_{OUT} = 5\text{V}$ $I_O = 0.5\text{A}$		0.5		%
		$T_J = \text{Over Temp }^3$				
$I_O$	Minimum Load Current	$V_{IN} - V_{OUT} = 25\text{V}$ $I_O = 0.5\text{A}$		5	10	mA
		$T_J = \text{Over Temp }^3$				
$V_N$	RMS Output Noise <sup>5</sup>	$T_J = 25^\circ\text{C}$		0.003		% $V_O$
$R_A$	Ripple Rejection Ratio <sup>6</sup>	$V_{IN} - V_{OUT} = 3\text{V}$ $I_O = 3\text{A}$ $T_J = \text{Over Temp }^3$	60	75		dB

1. Test Conditions unless otherwise stated:  $V_{IN} = 1.5$  to  $35\text{V}$ , or Maximum Input, whichever is less.  
 $I_O = 10\text{mA}$  to  $5\text{A}$ .

- These specifications are only applicable for power dissipations of 45 Watts over a limited range of  $V_{IN} - V_{OUT}$ .
- Over Temp. = Over specified Junction Temperature Range (See Absolute Maximum Ratings).
- Low duty cycle pulse test with Kelvin connections required. Changes in output voltage are covered under the specification for thermal regulation.
- Bandwidth of 10Hz to 10kHz.
- 120Hz input ripple,  $15\text{V} = 64\text{dB}$  min.  $C_{ADJ} = 25\mu\text{F}$ .

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Document Number 6386

Issue 1

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

**LM1084MG**

Parameter	Output Voltage	Test Conditions 1,2	Min.	Typ.	Max.	Unit
$V_O$ <sup>4</sup>	3.3	$V_{IN} - V_{OUT} = 6.3\text{V}$ $I_O = 10\text{mA}$	3.267	3.3	3.333	V
		$I_O = 10\text{mA}$ to $5\text{A}$ $T_J = \text{Over Temp }^3$	3.234	3.3	3.366	
	5	$V_{IN} - V_{OUT} = 8\text{V}$ $I_O = 10\text{mA}$	4.95	5	5.05	
		$I_O = 10\text{mA}$ to $5\text{A}$ $T_J = \text{Over Temp }^3$	4.90	5	5.10	
	12	$V_{IN} - V_{OUT} = 15\text{V}$ $I_O = 10\text{mA}$	11.88	12	12.12	
		$I_O = 10\text{mA}$ to $5\text{A}$ $T_J = \text{Over Temp }^3$	11.76	12	12.24	
$V_{REF}$ <sup>4</sup>	ADJ.	$V_{IN} - V_{OUT} = V_O + 3\text{V}$ $I_O = 10\text{mA}$	1.238	1.25	1.262	V
		$I_O = 10\text{mA}$ to $5\text{A}$ $T_J = \text{Over Temp }^3$	1.225	1.25	1.270	
$REG_{(LINE)}$ <sup>4</sup>		$V_{IN} - V_{OUT} = 1.5$ to $15\text{V}$ $T_J = 25^\circ\text{C}$		0.015	0.2	%
		$I_O = 10\text{mA}$ $T_J = \text{Over Temp }^3$		0.035		
		$V_{IN} - V_{OUT} = 1.5$ to $35\text{V}$ $I_O = 10\text{mA}$ $T_J = \text{Over Temp }^3$		0.05	0.5	
$REG_{(LOAD)}$ <sup>4</sup>		$V_{IN} - V_{OUT} = 3\text{V}$ $T_J = 25^\circ\text{C}$		0.4	0.5	%
		$V_{IN} - V_{OUT} = 3\text{V}$ $T_J = \text{Over Temp }^3$		0.7	0.6	
$V_D$	Dropout Voltage	$\Delta V_{OUT}$ , $\Delta V_{REF} = 1\%$ $T_J = \text{Over Temp }^3$		1.3	1.5	V
$I_{CL}$	Current Limit	$V_{IN} - V_{OUT} = 5\text{V}$ $T_J = \text{Over Temp }^3$	5.5	6.5		A
		$V_{IN} - V_{OUT} = 25\text{V}$ $T_J = \text{Over Temp }^3$	0.3		0.6	
$I_Q$	Quiescent Current	$V_{IN} - V_{OUT} = 35\text{V}$ $T_J = \text{Over Temp }^3$			10	mA
$REG_{(THERM)}$	Thermal Regulation	$t_p = 30\text{ms}$ $T_J = 25^\circ\text{C}$		0.002	0.01	% / W
$I_{PIN}$	Adjust Pin Current	$T_J = 25^\circ\text{C}$		55		$\mu\text{A}$
		$T_J = \text{Over Temp }^3$			120	
$\Delta I_{PIN}$	Adjust Pin Current Change	$T_J = \text{Over Temp }^3$		0.2	5	$\mu\text{A}$
$T_S$	Temperature Stability	$V_{IN} - V_{OUT} = 5\text{V}$ $I_O = 0.5\text{A}$		0.5		%
		$T_J = \text{Over Temp }^3$				
$I_O$	Minimum Load Current	$V_{IN} - V_{OUT} = 25\text{V}$ $I_O = 0.5\text{A}$		5	10	mA
		$T_J = \text{Over Temp }^3$				
$V_N$	RMS Output Noise <sup>5</sup>	$T_J = 25^\circ\text{C}$		0.003		% $V_O$
$R_A$	Ripple Rejection Ratio <sup>6</sup>	$V_{IN} - V_{OUT} = 3\text{V}$ $I_O = 3\text{A}$ $T_J = \text{Over Temp }^3$	60	75		dB

1. Test Conditions unless otherwise stated:  $V_{IN} = 1.5$  to  $35\text{V}$ , or Maximum Input, whichever is less.  
 $I_O = 10\text{mA}$  to  $5\text{A}$ .

- These specifications are only applicable for power dissipations of 45 Watts over a limited range of  $V_{IN} - V_{OUT}$ .
- Over Temp. = Over specified Junction Temperature Range (See Absolute Maximum Ratings).
- Low duty cycle pulse test with Kelvin connections required. Changes in output voltage are covered under the specification for thermal regulation.
- Bandwidth of 10Hz to 10kHz.
- 120Hz input ripple,  $15\text{V} = 64\text{dB}$  min.  $C_{OUT}$  ( $C_{ADJ}$ ) =  $25\mu\text{F}$ .

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Document Number 6386

Issue 1

**ELECTRICAL CHARACTERISTICS** (T<sub>J</sub> = 25°C Unless otherwise stated) **LM1084MIG**

Parameter	Output Voltage	Test Conditions 1,2	Min.	Typ.	Max.	Unit
V <sub>O</sub> <sup>4</sup>	3.3	V <sub>IN</sub> - V <sub>OUT</sub> = 6.3V I <sub>O</sub> = 10mA	3.267	3.3	3.333	V
		I <sub>O</sub> = 10mA to 5A T <sub>J</sub> = Over Temp <sup>3</sup>	3.234	3.3	3.366	
	5	V <sub>IN</sub> - V <sub>OUT</sub> = 8V I <sub>O</sub> = 10mA	4.95	5	5.05	
		I <sub>O</sub> = 10mA to 5A T <sub>J</sub> = Over Temp <sup>3</sup>	4.90	5	5.10	
	12	V <sub>IN</sub> - V <sub>OUT</sub> = 15V I <sub>O</sub> = 10mA	11.88	12	12.12	
		I <sub>O</sub> = 10mA to 5A T <sub>J</sub> = Over Temp <sup>3</sup>	11.76	12	12.24	
V <sub>REF</sub> <sup>4</sup>	ADJ.	V <sub>IN</sub> - V <sub>OUT</sub> = V <sub>O</sub> + 3V I <sub>O</sub> = 10mA	1.231	1.25	1.268	V
		I <sub>O</sub> = 10mA to 5A T <sub>J</sub> = Over Temp <sup>3</sup>	1.219	1.25	1.281	
REG <sub>(LINE)</sub> <sup>4</sup>		V <sub>IN</sub> - V <sub>OUT</sub> = 1.5 to 15V T <sub>J</sub> = 25°C		0.015	0.2	%
		I <sub>O</sub> = 10mA T <sub>J</sub> = Over Temp <sup>3</sup>		0.035		
		V <sub>IN</sub> - V <sub>OUT</sub> = 1.5 to 35V I <sub>O</sub> = 10mA		0.05	0.5	
REG <sub>(LOAD)</sub> <sup>4</sup>		T <sub>J</sub> = Over Temp <sup>3</sup>				%
		V <sub>IN</sub> - V <sub>OUT</sub> = 3V T <sub>J</sub> = 25°C		0.7	1.25	
		V <sub>IN</sub> - V <sub>OUT</sub> = 3V T <sub>J</sub> = Over Temp <sup>3</sup>		0.8	1.65	
V <sub>D</sub>	Dropout Voltage	ΔV <sub>OUT</sub> , ΔV <sub>REF</sub> = 1% T <sub>J</sub> = Over Temp <sup>3</sup>		1.3	1.5	V
I <sub>CL</sub>	Current Limit	V <sub>IN</sub> - V <sub>OUT</sub> = 5V T <sub>J</sub> = Over Temp <sup>3</sup>	5.5	6.5		A
		V <sub>IN</sub> - V <sub>OUT</sub> = 25V T <sub>J</sub> = Over Temp <sup>3</sup>	0.3		0.6	
I <sub>Q</sub>	Quiescent Current	V <sub>IN</sub> - V <sub>OUT</sub> = 35V T <sub>J</sub> = Over Temp <sup>3</sup>			10	mA
REG <sub>(THERM)</sub>	Thermal Regulation	t <sub>p</sub> = 30ms T <sub>J</sub> = 25°C		0.002	0.01	% / W
I <sub>PIN</sub>	Adjust Pin Current	T <sub>J</sub> = 25°C		55		μA
		T <sub>J</sub> = Over Temp <sup>3</sup>			120	
ΔI <sub>PIN</sub>	Adjust Pin Current Change	T <sub>J</sub> = Over Temp <sup>3</sup>		0.2	5	μA
T <sub>S</sub>	Temperature Stability	V <sub>IN</sub> - V <sub>OUT</sub> = 5V I <sub>O</sub> = 0.5A		0.5		%
		T <sub>J</sub> = Over Temp <sup>3</sup>				
I <sub>O</sub>	Minimum Load Current	V <sub>IN</sub> - V <sub>OUT</sub> = 25V I <sub>O</sub> = 0.5A		5	10	mA
		T <sub>J</sub> = Over Temp <sup>3</sup>				
V <sub>N</sub>	RMS Output Noise <sup>5</sup>	T <sub>J</sub> = 25°C		0.003		%V <sub>O</sub>
R <sub>A</sub>	Ripple Rejection Ratio <sup>6</sup>	V <sub>IN</sub> - V <sub>OUT</sub> = 3V I <sub>O</sub> = 3A	60	75		dB
		T <sub>J</sub> = Over Temp <sup>3</sup>				

1. Test Conditions unless otherwise stated: V<sub>IN</sub> = 1.5 to 35V, or Maximum Input, whichever is less.  
I<sub>O</sub> = 10mA to 5A.

- These specifications are only applicable for power dissipations of 45 Watts over a limited range of V<sub>IN</sub> - V<sub>OUT</sub>.
- Over Temp. = Over specified Junction Temperature Range (See Absolute Maximum Ratings).
- Low duty cycle pulse test with Kelvin connections required. Changes in output voltage are covered under the specification for thermal regulation.
- Bandwidth of 10Hz to 10kHz.
- 120Hz input ripple, 15V = 64dB min. C<sub>OUT</sub> (C<sub>ADJ</sub>) = 25μF.

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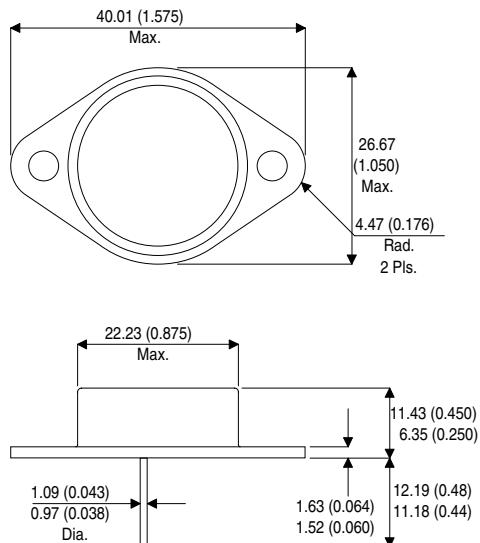
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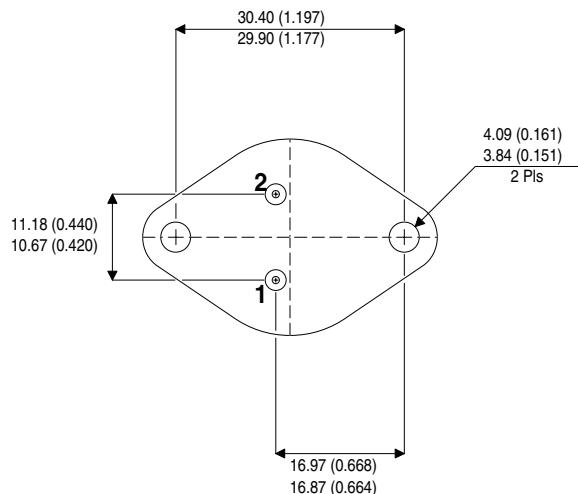
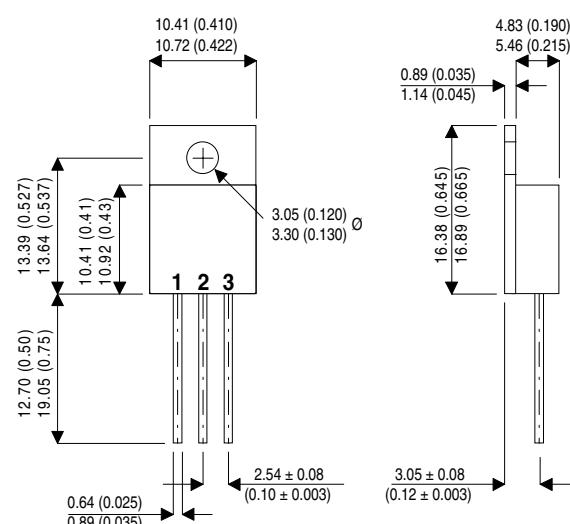
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Issue 1

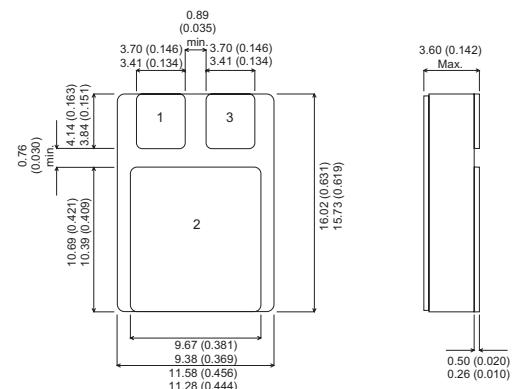
**K Package (TO-3)**



**G & IG Packages (TO-257)**



**SMD1 Package**



**LM1084MK**

Pin	Fixed	Adjustable
1	COMMON	ADJUST
2	INPUT	INPUT
Case is OUTPUT		

**LM1084MSM**

Pin	Fixed	Adjustable
1	COMMON	ADJUST
2	OUTPUT	OUTPUT
3	INPUT	INPUT

**LM1084MG**

Pin	Fixed	Adjustable
1	COMMON	ADJUST
2	OUTPUT	OUTPUT
3	INPUT	INPUT
Case is OUTPUT		

**LM1084MIG**

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

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