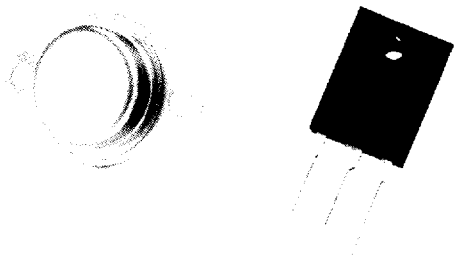
3 AMP POSITIVE ADJUSTABLE VOLTAGE REGULATORS

**LLM 150,
LLM 350,
LLM 350P**



FEATURES

- Adjustable output down to 1.2V
- Line regulation typically 0.005%/V
- Load regulation typically 0.1%
- Current limit constant with temperature
- Standard 3-terminal, TO-3 or cost-effective TO-247 packages
- MIL-Temperature performance

DESCRIPTION

The LLM 150, LLM 350 and LLM 350P voltage regulators are monolithic integrated circuits designed for use in applications requiring a well regulated positive output voltage. Outstanding features include full power usage up to 3.0 amperes of load current, internal current limiting, thermal shutdown, and safe area protection on the die, providing protection of the series pass Darlington, under most operating conditions. Hermetically sealed steel TO-3 packages are available for high reliability and low thermal resistance. A TO-247 plastic SIP package is offered for low cost applications.

The LLM 150, LLM 350 and LLM 350P, three terminal adjustable regulators, are available with an output range from +1.2 to +32 Volts. The output voltage is easily set by two external resistors. Since the regulator is "floating", higher output voltages can be obtained as long as the maximum input-output voltage differential is not exceeded.

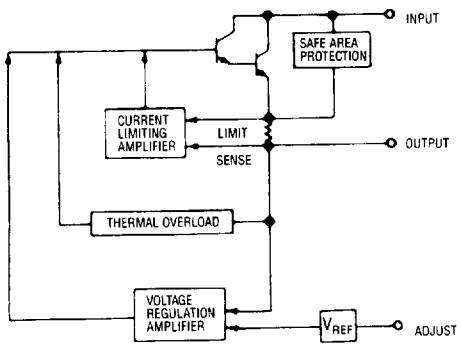
ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MINIMUM	MAXIMUM	UNITS
Input-Output Voltage Differential	$V_{IN} - V_{OUT}$		35	Volts
Power Dissipation	P_D		Internally Limited	
Thermal Resistance Junction to Case	θ_{JC}		1.5	°C/Watt
Operating Junction Temperature Range	T_J			°C
LLM 150		−55	150	
LLM 350		0	125	
LLM 350P				
Storage Temperature Range	T_{STG}	−65	150	°C
Lead Temperature (Soldering, 60 Seconds Time Limit)	T_{LEAD}			°C
LLM 150			300	
LLM 350			260	
LLM 350P				

DEVICE SELECTION GUIDE

DEVICE	OPERATING JUNCTION TEMPERATURE RANGE
LLM 150	−55 TO 150°C
LLM 350	0 TO 125°C
LLM 350P	0 TO 125°C

BLOCK DIAGRAM



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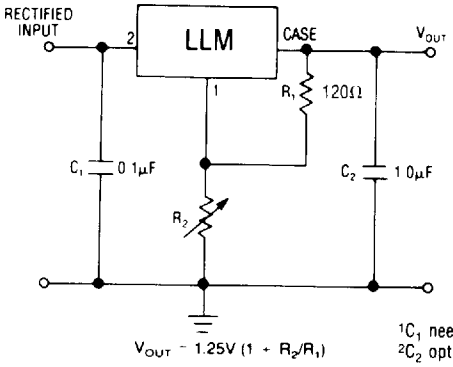
ELECTRICAL CHARACTERISTICS[6]

Parameter	Test Conditions[1]			Test Limits			Units
	V_{IN}-V_{OUT}	I_O	T_J	Min	Typ	Max	
Line Regulation[2]							
LLM 350	3V to 35V	1.5A	25°C		0.005	0.03	%/V
LLM 150			25°C		0.005	0.01	%/V
LLM 350					0.02	0.07	%/V
LLM 150					0.02	0.05	%/V
Load Regulation[2]							
LLM 350 $V_O \leq 5V$	5V	10mA to 3A	25°C		5	25	mV
LLM 150 $V_O \leq 5V$					5	15	mV
LLM 350 $V_O \geq 5V$			25°C		0.1	0.5	%
LLM 150 $V_O \geq 5V$					0.1	0.3	%
LLM 350 $V_O \leq 5V$					20	70	mV
LLM 150 $V_O \leq 5V$					20	50	mV
LLM 350 $V_O \geq 5V$					0.3	1.5	%
LLM 150 $V_O \geq 5V$					0.3	1.0	%
Thermal Regulation[3]							
LLM 350	5V	1.5A	25°C		0.002	0.03	%/W
LLM 150			25°C		0.002	0.01	%/W
Adjust Pin Current	5V	1.5A			50	100	μA
Adjust Pin Current Change							
LLM 350	3V to 35V	10mA to 3A			0.2	5	μA
LLM 150							
Reference Voltage	3V to 35V	10mA to 3A		1.20	1.25	1.30	V
Temperature Stability	5V	1.5A			1		%
Minimum Load Current							
LLM 350	35V				3.5	10.0	mA
LLM 150					3.5	5.0	mA
Current Limit							
LLM 350/LLM 150	≤10V			3.0	4.5		A
LLM 350	30V		25°C	0.25	1		A
LLM 150				0.3	1		A
RMS Output Noise[4]	5V	1.5A	25°C		0.001		$\%V_O$
Ripple Rejection Ratio[5] V_O = 10V, C_{ADJ} = 10μF	5V	1.5A		66	65 86		dB

(1) Although power dissipation is internally limited, these specifications are applicable for power dissipations of 30 Watts.
(2) Low duty cycle pulse testing with Kelvin connections required. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.
(3) 20mS pulse
(4) BW = 10Hz to 10kHz
(5) 120Hz input ripple
(6) Unless otherwise specified, the following T_J conditions apply:
LLM 150 — −55 TO 150°C
LLM 350 — 0 TO 125°C
LLM 350P — 0 TO 125°C

TYPICAL APPLICATION

ADJUSTABLE VOLTAGE REGULATOR[1,2]



$V_{OUT} = 1.25V\ (1 + R_2/R_1)$

[1] C_1 needed if device is far from filter capacitors.
[2] C_2 optional - improves transient response.

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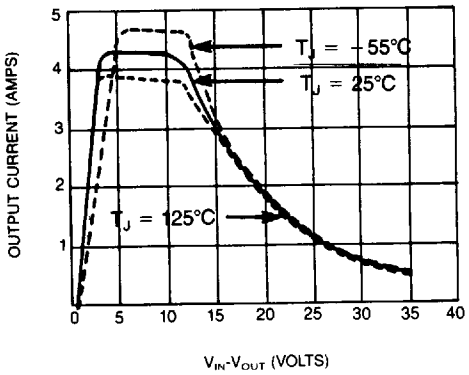
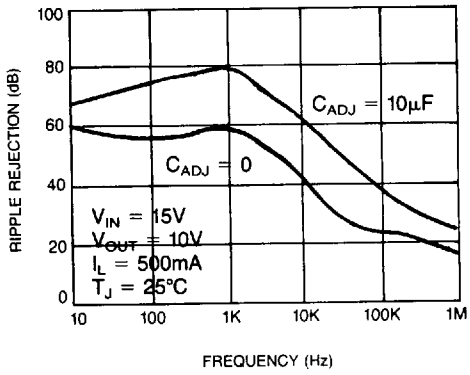
OPERATIONAL DATA

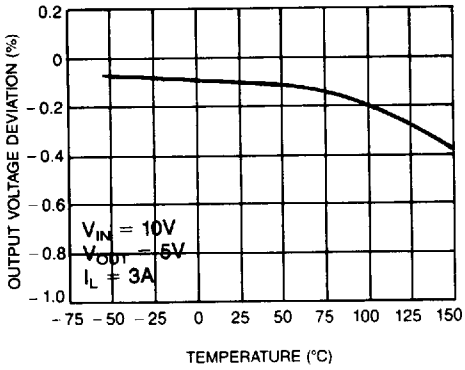
CURRENT LIMIT



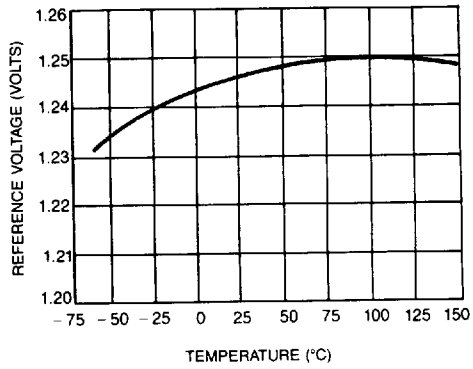
RIPPLE REJECTION



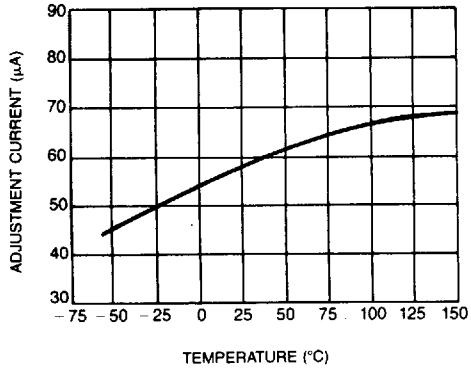
LOAD REGULATION



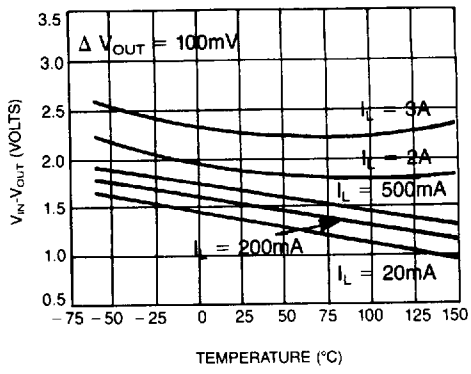
TEMPERATURE STABILITY



ADJUSTMENT CURRENT



DROPOUT VOLTAGE



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DEVICE OUTLINE

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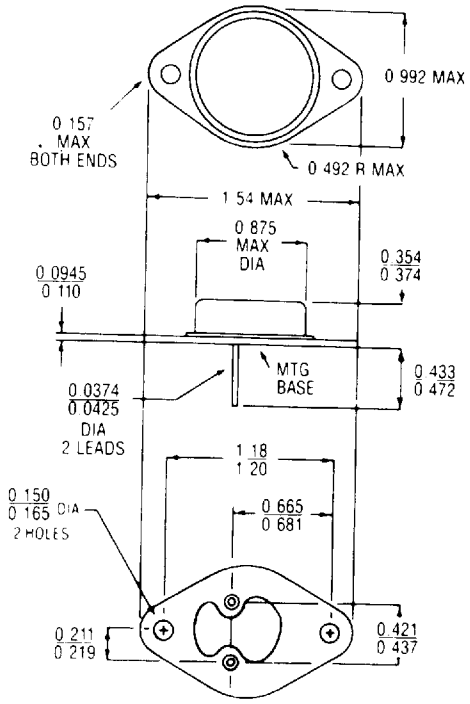
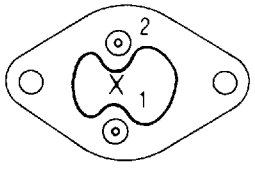
TO-3



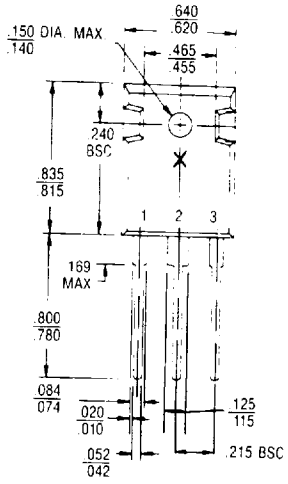
Bottom View



LLM 150, 350

1 – Adjust
2 – Input
Case is Output

TO-247



LLM 350P

1 — Adjust
2 — Output
3 — Input
Tab Is Output

NOTE: Case temperature measured at point X.
All dimensions are in inches.