

LM317S

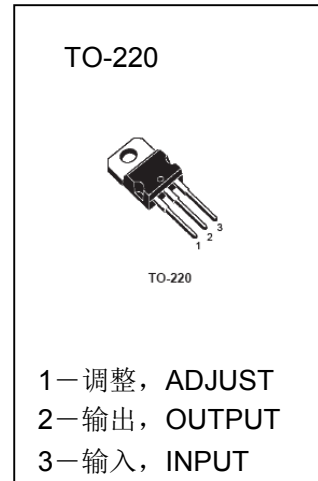
■ 概述

LM317S 为可调节 3 端正电压稳压器，在输出电压范围为 1.2V 到 37V 时能够提供超过 1.5A 的电流。该电路内置有内部限流、热关断、安全工作区补偿等。

■ 主要特点

- 输出电流超过 1.5A
- 输出在 1.2V 和 37V 之间可调节
- 内部热过载保护
- 不随温度变化的内部短路电流限制
- 输出晶体管 SOA 补偿
- 压应用浮空工作

■ 外形图及引脚排列



■ 极限值 (Ta=25°C)

| | |
|-----------------------------------|------------|
| $V_i - V_o$ ——输入输出电压差..... | 40V |
| T_{OPR} ——工作结温范围..... | 0~125°C |
| T_{STG} ——贮存温度范围..... | -65~150 °C |
| P_D —— 功耗 | 内部限制 W |
| $R_{\theta JC}$ ——热阻 (结到壳) | 5°C/W |
| $R_{\theta JA}$ ——热阻 (结到环境) | 80°C/W |

■ 功能框图

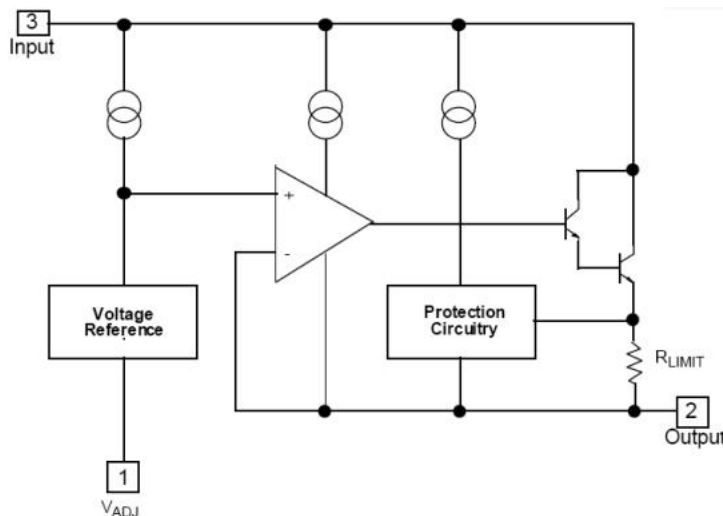


Figure 1. Block Diagram

电参数

($V_I - V_O = 5V$, $I_O = 500mA$, $0^\circ C \leq T_J \leq 125^\circ C$, $I_{MAX} = 1.5A$, $P_{MAX} = 20W$, 除非另有规定)

| 参数符号 | 符号说明 | 最小值 | 典型值 | 最大值 | 单位 | 测试条件 |
|------------------|------------------------------|-----|-------|------|------------------|--|
| R_{LINE} | 电源调整率 (注1) | | 0.01 | 0.04 | %/V | $T_A = 25^\circ C$, $3V \leq V_I - V_O \leq 40V$ |
| | | | 0.02 | 0.07 | | $3V \leq V_I - V_O \leq 40V$ |
| R_{LOAD} | 负载调整率 (注1) | | 18 | 25 | mV | $T_A = 25^\circ C$, $V_O < 5V$ |
| | | | 0.4 | 0.5 | %/V _O | $10mA \leq I_O \leq I_{MAX}$, $V_O \geq 5V$ |
| | | | 40 | 70 | mV | $V_O < 5V$ |
| | | | 0.8 | 1.5 | %/V _O | $10mA \leq I_O \leq I_{MAX}$, $V_O \geq 5V$ |
| I_{ADJ} | 调整脚电流 | | 46 | 100 | μA | |
| ΔI_{ADJ} | 调整脚电流变化 | | 2.0 | 5.0 | μA | $3V \leq V_I - V_O \leq 40V$, $10mA \leq I_O \leq I_{MAX}$, $P_D \leq P_{MAX}$ |
| V_{REF} | 参考电压 | 1.2 | 1.25 | 1.3 | V | $3V \leq V_I - V_O \leq 40V$, $10mA \leq I_O \leq I_{MAX}$, $P_D \leq P_{MAX}$ |
| TS | 温度稳定性 | | 0.7 | | %/V _O | |
| $I_{L(MIN)}$ | 最小负载电流以保持调整率 | | 5 | 12 | mA | $V_I - V_O = 40V$ |
| $I_{O(MAX)}$ | 最大输出电流 | 1.5 | 2.2 | | A | $T_A = 25^\circ C$, $V_I - V_O \leq 15V$, $P_D \leq P_{MAX}$ |
| | | | 0.3 | | | $T_A = 25^\circ C$, $V_I - V_O \leq 40V$, $P_D \leq P_{MAX}$ |
| N | RMS噪声, % of V _{OUT} | | 0.003 | 0.01 | %/V _O | $T_A = 25^\circ C$, $10Hz \leq f \leq 10kHz$ |
| RR | 纹波抑制比 | | 60 | | dB | $f = 120Hz$, $V_O = 10V$, 无C _{ADJ} |
| | | 66 | 75 | | | C _{ADJ} = 10 μF (注2) |
| ST | 长期稳定性 $T_J = T_{HIGH}$ | | 0.3 | 1 | % | $T_A = 25^\circ C$, 1000HR, 终点测量时 |

注:

1、电源和负载调整率在恒定结温时规定。热效应引起的 V_O 变化必须分别考虑。使用低占空比的脉冲测试 ($P_{MAX} = 20W$)

Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used ($P_{MAX} = 20 W$).

2、使用 C_{ADJ}时应连接在调整管脚和地之间。

C_{ADJ}, when used, is connected between the adjustment pin and ground.

■ 典型特性曲线

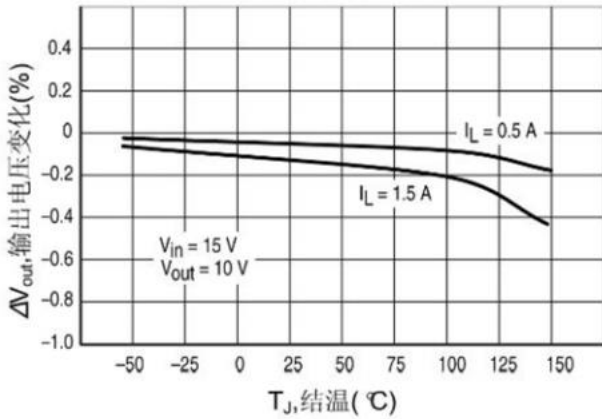


图 2. 负载调整率

Figure 2. Load Regulation

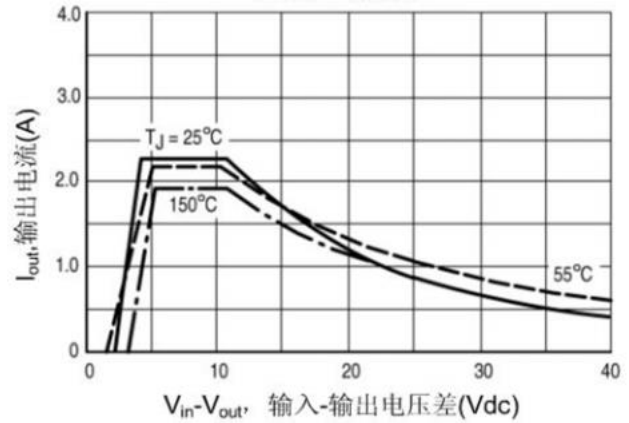


图 3. 电流限制

Figure 3. Current Limit

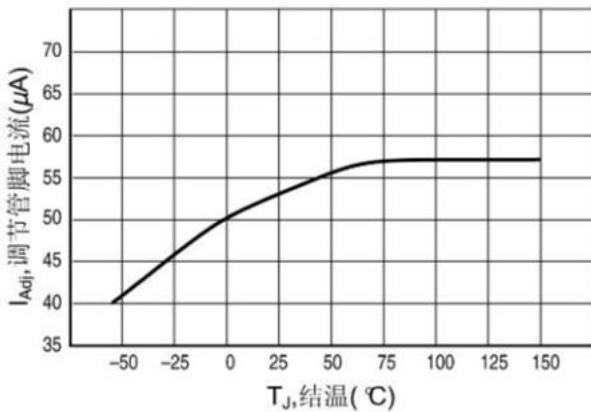


图 4. 调整管脚电流

Figure 4. Adjustment Current

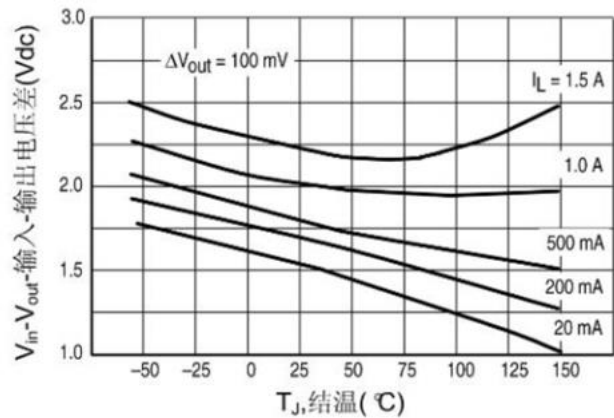


图 5. 电压压降

Figure 5. Drop out Voltage

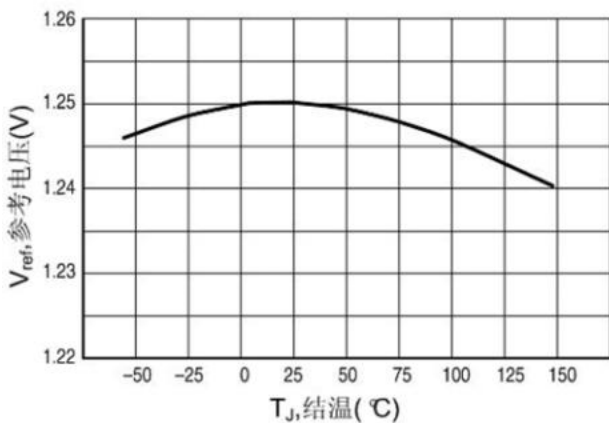


图 6. 参考电压

Figure 6. Reference Voltage

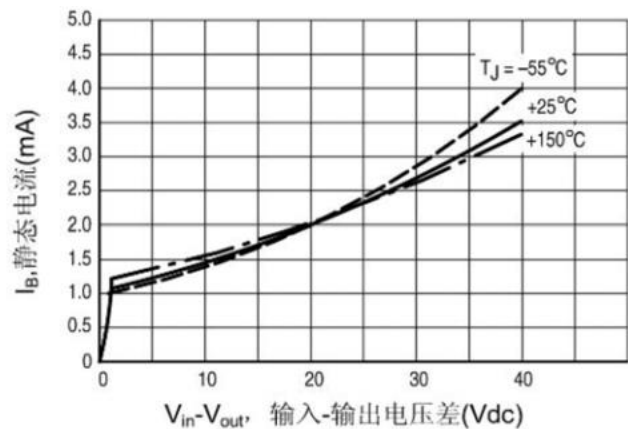
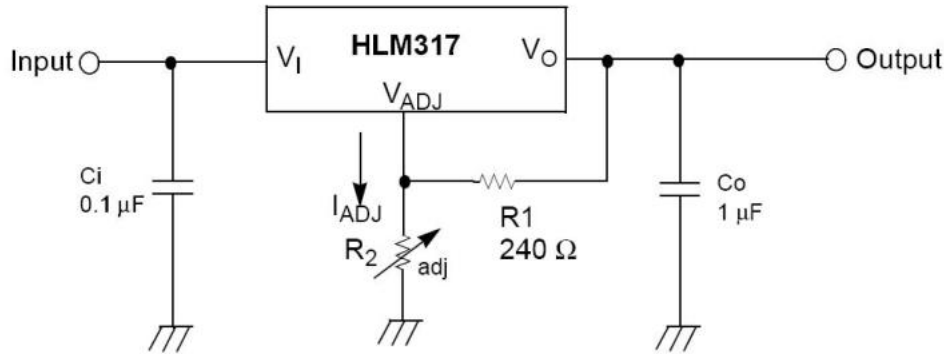


图 7. 最小工作电流

Figure 7. Minimum Operating Current

■ 典型应用电路



$$V_O = 1.25 V (1 + R_2 / R_1) + I_{ADJ} R_2$$

图 8. 典型应用线路
Figure 7. Typical Application

注:

当稳压器离电源滤波器有一定距离时, C_i 是必需的。 C_o 对稳定性而言不必要, 但可改进瞬态响应。因为 I_{ADJ} 控制小于 $100\mu A$, 这一项误差在多数应用中可忽略。

C_i is required when the regulator is located an appreciable distance from power supply filter. C_o is not needed for stability; however, it does improve transient response. Since I_{ADJ} is controlled to less than $100\mu A$, the error associated with this term is negligible in most applications.

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