



CM1086

1.5A Low DROPOUT VOLTAGE REGULATOR

GENERAL DESCRIPTION

The CM1086 is a high performance low dropout regulator rated for 1.5A output current with fixed 2.5V/3.3V and adjustable output. It is designed for use in applications requiring low dropout characteristics over the rated current range.

On chip trimming adjusts the reference voltage to 1%. These features are ideal for low voltage microprocessor applications requiring a regulated 2.5V to 3.6V power supply.

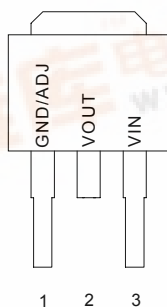
In addition, the CM1086 provides the device protections including over current and thermal shutdown. Also, reverse battery protection scheme limits the reverse current when the input voltage falls below the output.

APPLICATIONS

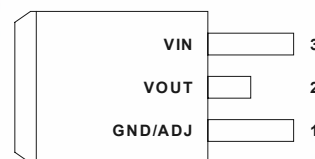
- ◆ Power Supplies
- ◆ Computer Add-On Cards
- ◆ Other Applications Requiring Low Dropout Voltage Over Rated Current

PIN CONFIGURATION

TO-252
Top View



TO-263
Top View



ORDERING INFORMATION

| Package Type | | Operating Temperature Range (T _A) | Output Voltage |
|--------------|--------------|---|----------------|
| TO-252 | TO-263 | | |
| CM1086KCN252 | CM1086KCN263 | 0°C ~ +70°C | 2.5V |
| CM1086SCN252 | CM1086SCN263 | 0°C ~ +70°C | 3.3V |
| CM1086CN252 | CM1086CN263 | 0°C ~ +70°C | ADJ. |





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ABSOLUTE MAXIMUM RATINGS

Input Voltage +13V
Operating Junction Temperature Range, T_J 0°C to +150°C
Storage Temperature -65°C to +150°C
Lead Temperature (10 sec.) 260°C

POWER DISSIPATION TABLE

| Package | Θ_{JA} (°C/W) | Derating factor (mW/°C) $T_A \geq 25^\circ\text{C}$ | $T_A \leq 25^\circ\text{C}$ Power rating (mW) | $T_A = 70^\circ\text{C}$ Power rating (mW) | $T_A = 85^\circ\text{C}$ Power rating (mW) |
|---------|----------------------|--|--|---|---|
| TO-252 | 80 | 12.5 | 1562 | 1000 | 812 |
| TO-263 | 45 | 22.2 | 2775 | 1776 | 1443 |

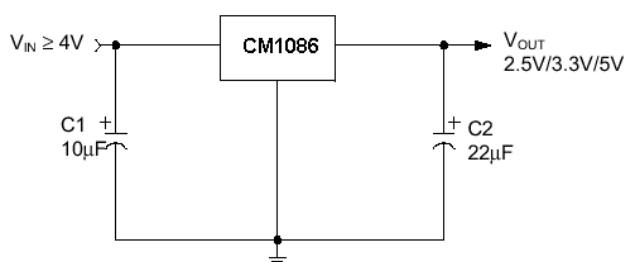
Note:

- Θ_{JA} : Thermal Resistance-Junction to Ambient, D_F : Derating factor, P_O : Power consumption.
Junction Temperature Calculation: $T_J = T_A + (P_D \times \Theta_{JA})$, $P_O = D_F \times (T_J - T_A)$
The Θ_{JA} numbers are guidelines for the thermal performance of the device/PC-board system.
All of the above assume no ambient airflow.
- Θ_{JT} : Thermal Resistance-Junction to Ambient, T_C : case (Tab) temperature, $T_J = T_C + (P_D \times \Theta_{JA})$

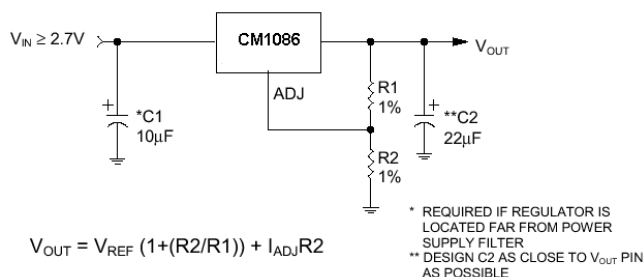
RESOMMENDED OPERATING CONDITIONS

| Parameter | Symbol | Min. | Typ. | Max | Units |
|---|----------|------|------|-----|---------------|
| Input Voltage | V_{IN} | 2.7 | | 12 | V |
| Load Current (with adequate heatsinking) | I_O | 10 | | | mA |
| Input Capacitor (V_{IN} to GND) | | 1.0 | | | μF |
| Output Capacitor with ESR of 10 Ω max. (V_{OUT} to GND) | | 10 | | | μF |
| Operating Ambient Temperature Range | | 0 | | 70 | °C |
| Junction Temperature | T_J | | | 125 | °C |

APPLICATION CIRCUIT

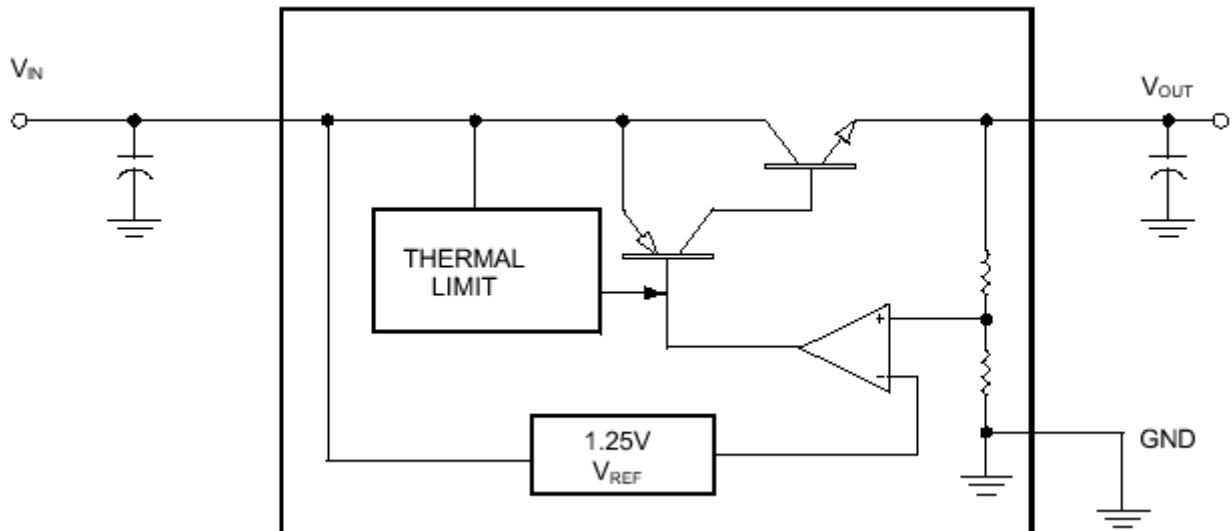


Fixed Output Voltage Regulator

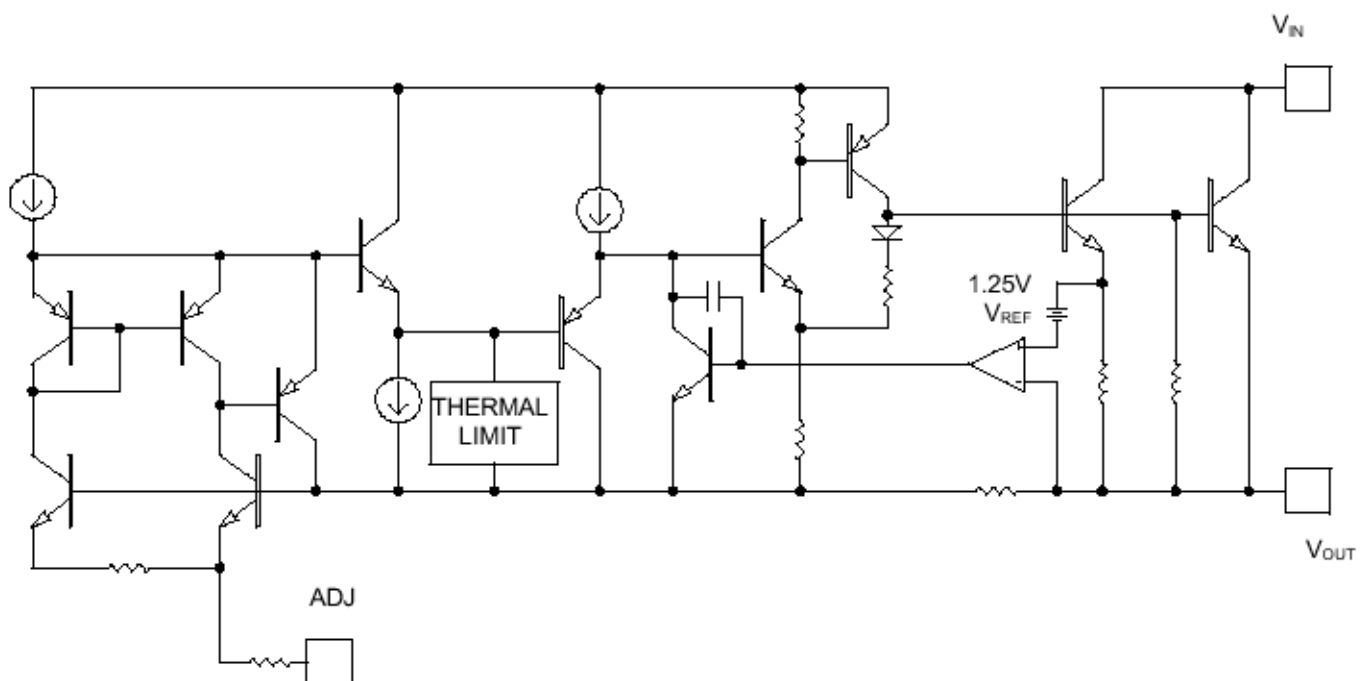


Adjustable Voltage Regulator

BLOCK DIAGRAM



Fixed Output Voltage Regulator Schematic



Adjustable Voltage Regulator Schematic



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ELECTRICAL CHARACTERISTICS

Electrical Characteristics at $I_{OUT} = 0\text{mA}$, and $T_J = +25^\circ\text{C}$; unless otherwise noted

| Parameter | Device | Test Conditions | CM1086 | | | Unit |
|----------------------------------|-----------|--|----------------|----------------|----------------|------|
| | | | Min. | Typ. | Max. | |
| Reference Voltage (Note 1) | CM1086 | (Note 1) $10\text{mA} \leq I_{OUT} \leq 1.5\text{A}$ | 1.238 1.230 | 1.250 1.250 | 1.262 1.270 | V |
| Output Voltage | CM1086K | $T_A = +25^\circ\text{C}$ | 2.475 | 2.500 | 2.525 | V |
| | CM1086S | | 3.267 | 3.300 | 3.333 | V |
| Output Voltage | CM1086K | $I_{OUT} = 10\text{mA to } 3\text{A}$ | 2.460 | 2.500 | 2.540 | V |
| | CM1086S | | 3.247 | 3.300 | 3.353 | V |
| Line Regulator (Note 1) | CM1086 | $1.5\text{V} + V_{OUT} \leq V_{IN} \leq 12\text{V}$ | | 0.04 | 0.20 | % |
| Load Regulation (Note 1) | CM1086 | $I_{OUT} = 10\text{mA to } 3\text{A}$ | | 0.08 | 0.3 | % |
| Dropout Voltage (Note 2) | | $I_{OUT} = 10\text{mA}$ | | 1.00 | 1.15 | V |
| | | $I_{OUT} = 3\text{A}$ | | 1.15 | 1.30 | |
| Current Limit | | $(V_{IN} - V_{OUT}) = 2\text{V}$ | 1.5 | 3 | | A |
| Minimum Load Current (Note 3) | | | | 5 | 10 | mA |
| Quiescent Current | CM1086K/S | $V_{IN} \leq 12\text{V}$, $I_{OUT} = 10\text{mA to } 3\text{A}$ | | 8 | 13 | mA |
| Ripple Rejection (Note 4) | | $f_O = 120\text{Hz}$, $V_{RIPPLE} = 1V_{PP}$, $I_{OUT} = 100\text{mA}$ | 60 | 80 | | dB |

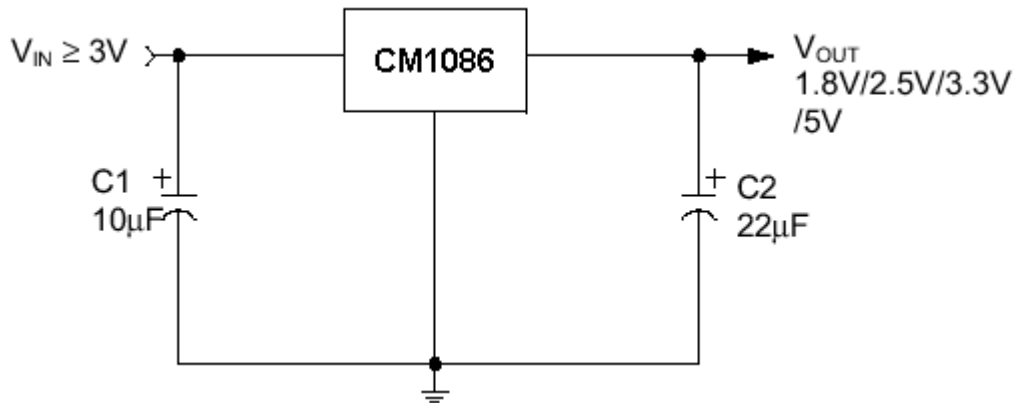
Note 1: Line and load regulations are guaranteed up to maximum power dissipation determined by input/output differential and the output current. However, the maximum power will not be available over the full input/output voltage range.

Note 2: The specifications represent the minimum input/output voltage required to maintain 1% regulation.

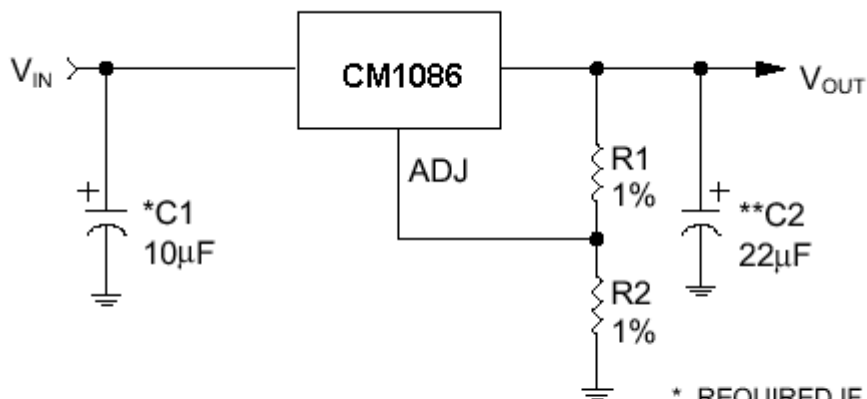
Note 3: The minimum load current is the minimum current required to maintain regulation. Normally the current in the resistor divider used to set the output voltage is selected to meet the minimum load current requirement.

Note 4: These parameters, although guaranteed, are not tested in production prior to shipment.

APPLICATION CIRCUIT



Fixed Output Voltage Regulator



$$V_{OUT} = V_{REF} (1 + (R2/R1)) + I_{ADJ}R2$$

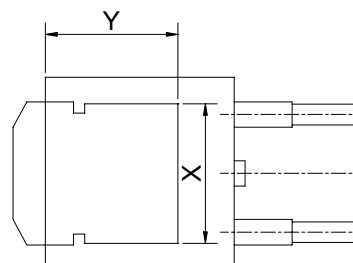
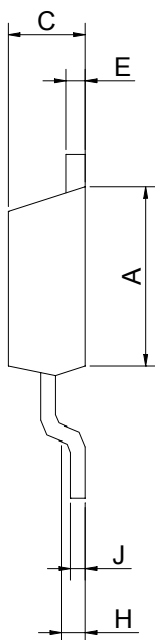
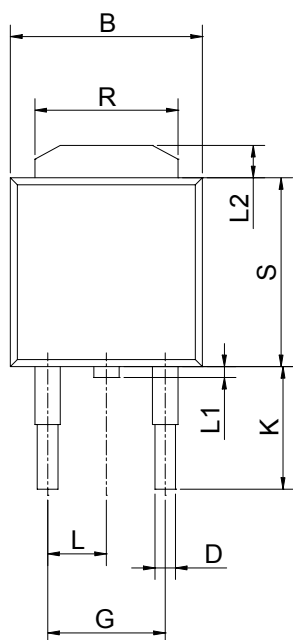
* REQUIRED IF REGULATOR IS LOCATED FAR FROM POWER SUPPLY FILTER

** DESIGN C2 AS CLOSE TO V_{OUT} PIN AS POSSIBLE

Adjustable Regulator

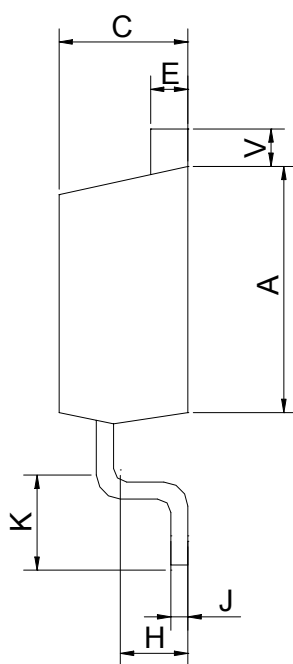
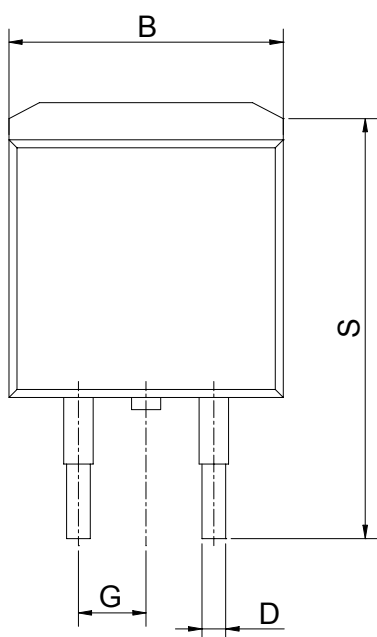
PACKAGE DIMENSION

TO-252 (N252)



| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---------|---------------------------|-----|------|----------------------|-----|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 5.97 | --- | 6.35 | 0.235 | --- | 0.250 |
| B | 6.35 | --- | 6.73 | 0.250 | --- | 0.265 |
| C | 2.19 | --- | 2.38 | 0.086 | --- | 0.094 |
| D | 0.69 | --- | 0.88 | 0.027 | --- | 0.035 |
| E | 0.46 | --- | 0.58 | 0.018 | --- | 0.023 |
| G | 4.58BSC | | | 0.180BSC | | |
| H | 0.87 | --- | 1.01 | 0.034 | --- | 0.040 |
| J | 0.46 | --- | 0.58 | 0.018 | --- | 0.023 |
| K | 2.60 | --- | 2.89 | 0.102 | --- | 0.114 |
| L | 2.29BSC | | | 0.090BSC | | |
| R | 4.45 | --- | 5.46 | 0.175 | --- | 0.215 |
| S | 5.33 | --- | 5.59 | 0.210 | --- | 0.220 |
| L1 | 0.64 | --- | 1.02 | 0.025 | --- | 0.040 |
| L2 | 1.52 | --- | 2.03 | 0.060 | --- | 0.080 |
| X | 4.12 | --- | 4.56 | 0.162 | --- | 0.179 |
| Y | 5.11 | --- | 5.72 | 0.201 | --- | 0.225 |

TO-263 (N263)



| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---------|---------------------------|-----|-------|----------------------|-----|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 8.64 | --- | 9.65 | 0.340 | --- | 0.380 |
| B | 9.65 | --- | 10.29 | 0.380 | --- | 0.405 |
| C | 4.06 | --- | 4.83 | 0.160 | --- | 0.190 |
| D | 0.51 | --- | 0.89 | 0.020 | --- | 0.035 |
| E | 1.14 | --- | 1.40 | 0.045 | --- | 0.055 |
| G | 2.54BSC | | | 0.100BSC | | |
| H | 2.03 | --- | 2.79 | 0.080 | --- | 0.110 |
| J | 0.46 | --- | 0.64 | 0.018 | --- | 0.025 |
| K | 2.29 | --- | 2.79 | 0.090 | --- | 0.110 |
| S | 14.60 | --- | 15.88 | 0.575 | --- | 0.625 |
| V | 1.14 | --- | 1.40 | 0.045 | --- | 0.055 |



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