

MB3310

DUAL OP AMP AND VOLTAGE REFERENCE

General Description

The MB3310 is a monolithic IC specifically designed to regulate the output current and voltage levels of switching battery chargers and power supplies.

The device contains two Op Amps and a 2.5V precision shunt voltage reference. Op Amp 1 is designed for voltage control with its non-inverting input internally connects to the output of the shunt regulator. Op Amp 2 is for current control with both inputs uncommitted. The IC offers the power converter designer a control solution that features increased precision with a corresponding reduction in system complexity and cost.

The MB3310 is available in standard packages of SOP-8 and DIP-8.

Features

Op Amp

- Input Offset Voltage: 0.5mV
- Supply Current: 75 μ A per Op Amp at 5.0V Supply Voltage
- Unity Gain Bandwidth: 1MHz
- Output Voltage Swing: 0 to ($V_{CC} - 1.5$) V
- Power Supply Range: 3 to 36V

Voltage Reference

- Fixed Output Voltage Reference: 2.5V
- Voltage Tolerance: $\pm 0.5\%$
- Sink Current Capability: 0.05 to 80mA
- Typical Output Impedance: 0.2 Ω

Applications

- Battery Charger
- Switching Power Supply



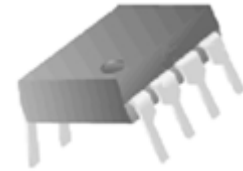
CBC Microelectronics
<http://www.cbcv.net>



SOP-8

Figure 1: Package Type of MB3310

Pin Configuration

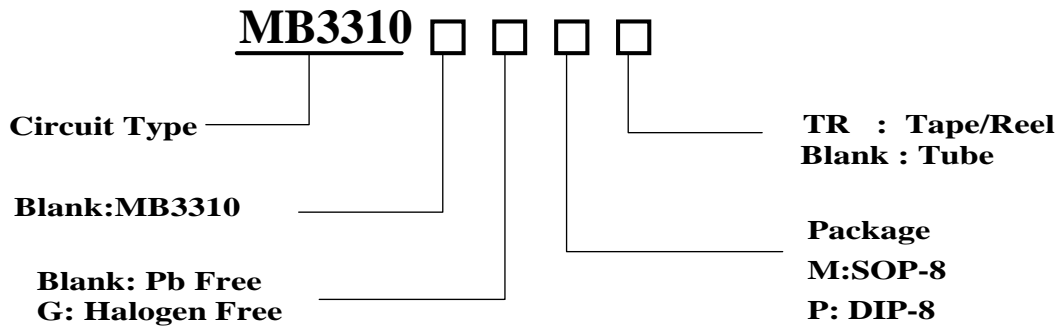


DIP-8

Figure 2: Package Type of MB3310

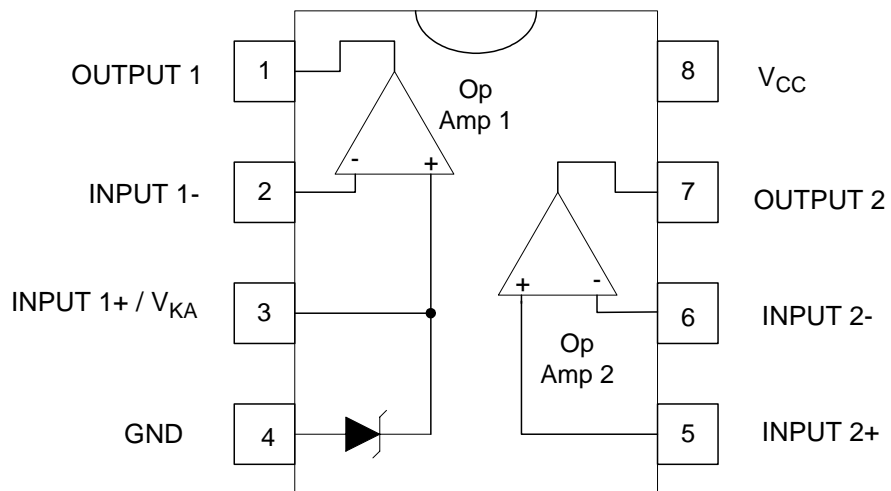
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Ordering Information



| Package | Temperature Range | Part Number | | Marking ID | | Packing Type |
|---------|-------------------|-------------|--------------|------------|--------------|--------------|
| | | Pb-Free | Halogen-Free | Pb-FreeTin | Halogen-Free | |
| SOP-8 | -40 to 85°C | MB3310M | MB3310GM | MB3310M | MB3310GM | Tube |
| | -40 to 85°C | MB3310MTR | MB3310GMTR | MB3310M | MB3310GM | Tape&Reel |
| DIP-8 | -40 to 85°C | MB3310P | MB3310GP | MB3310P | MB3310GP | Tube |

Functional Block Diagram



MB3310

Typical Application

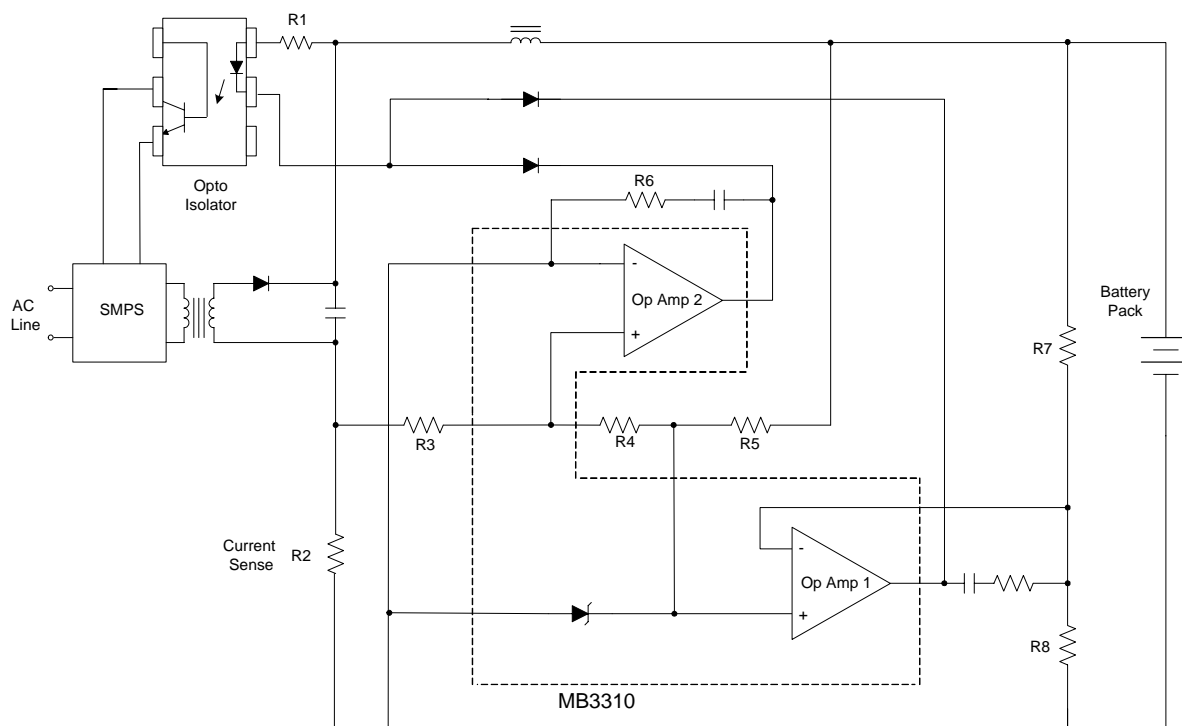


Figure4: Functional diagram of MB3310

Absolute Maximum Ratings (Note 1)

| Parameter | Symbol | Value | Unit |
|--|-------------------|------------------------------|------|
| Power Supply Voltage (VCC to GND) | V _{CC} | 40 | V |
| Op Amp 1 and 2 Input Voltage Range (Pins2,5,6) | V _{IN} | -0.3 to V _{CC} +0.3 | V |
| Op Amp 2 Input Differential Voltage (Pins5,6) | V _{ID} | 40 | V |
| Voltage Reference Cathode Current(Pin3) | I _K | 100 | mA |
| Power Dissipation (T _A =25°C) | P _D | DIP-8 800 | mW |
| | | SOIC-8 500 | |
| Operating Junction Temperature | T _J | 150 | °C |
| Storage Temperature Range | T _{STG} | -65 to 150 | °C |
| Lead Temperature (Soldering 10s) | T _{LEAD} | 260 | °C |

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

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Recommended Operating Conditions

| Parameter | Min | Max | Unit |
|---------------------|-----|-----|------|
| Supply Voltage | 3 | 36 | V |
| Ambient Temperature | -40 | 105 | °C |

Electrical Characteristics

Operating Conditions :V_{CC}=+5V, T_A=25°C, unless otherwise specified.

| Parameter | Conditions | Min | Typ | Max | Unit | |
|--|---|---|------|----------------------|-------|---|
| Total Supply Current, excluding Current in Voltage Reference | V _{CC} =5V, no load, -40 °C ≤ T _A ≤ 105 °C | | 0.15 | 0.25 | mA | |
| | V _{CC} =30V, no load, -40 °C ≤ T _A ≤ 105 °C | | 0.20 | 0.30 | | |
| Voltage Reference Section | | | | | | |
| Reference Voltage | MB3310 | I _K =10mA T _A =25 °C -40 °C ≤ T _A ≤ 105 °C | 2.49 | 2.50 | 2.51 | V |
| | | | 2.48 | 2.50 | 2.52 | |
| Reference Voltage Deviation Over Full Temperature Range | I _K =10mA, T _A =-40 to 105 °C | | 5 | 24 | mV | |
| Minimum Cathode Current for Regulation | | | 0.01 | 0.05 | mA | |
| Dynamic Impedance | I _K =1.0 to 80mA f < 1kHz | | 0.2 | 0.5 | Ω | |
| Op Amp 1 Section (V_{CC}=5V, V_O=1.4V, T_A=25 °C, unless otherwise noted) | | | | | | |
| Input Offset Voltage | T _A =25 °C | | 0.5 | 3 | mV | |
| | T _A =-40 to 105 °C | | | 5 | | |
| Input Offset Voltage Temperature Drift | T _A =-40 to 105 °C | | 7 | | μV/°C | |
| Input Bias Current (Inverting Input Only) | T _A =25 °C | | 20 | 150 | nA | |
| Large Signal Voltage Gain | V _{CC} =15V, R _L =2kΩ, V _O =1.4 to 11.4V | 85 | 100 | | dB | |
| Power Supply Rejection Ratio | V _{CC} =5 to 30V | | | | dB | |
| Output Current | Source | V _{CC} =15V, V _{ID} =1V, V _O =2V | | | mA | |
| | Sink | V _{CC} =15V, V _{ID} =-1V, V _O =2V | | | mA | |
| Output Voltage Swing (High) | V _{CC} =30V, R _L =10kΩ, V _{ID} =1V | | | | V | |
| Output Voltage Swing (Low) | V _{CC} =30V, R _L =10kΩ, V _{ID} =-1V | | | | mV | |
| Slew Rate | V _{CC} =18V, R _L =2kΩ, A _v =1, V _{IN} =0.5 to 2V, C _L =100pF | 0.2 | 0.5 | | V/μs | |
| Unity Gain Bandwidth | V _{CC} =30V, R _L =2kΩ, C _L =100pF | 0.7 | 1.0 | | MHz | |
| Op Amp 2 Section (V_{CC}=5V, V_O=1.4V, T_A=25°C, unless otherwise noted) | | | | | | |
| Input Offset Voltage | T _A =25 °C | | 0.5 | 3 | mV | |
| | T _A =-40 to 105 °C | | | 5 | | |
| Input Offset Voltage Temperature Drift | T _A =-40 to 105 °C | | 7 | | μV/°C | |
| Input Offset Current | T _A =25 °C | | 2 | 30 | nA | |
| Input Bias Current | T _A =25 °C | | 20 | 150 | nA | |
| Input Voltage Range | V _{CC} =0 to 36V | 0 | | V _{CC} -1.5 | V | |
| Output Current | Source | V _{CC} =15V, V _{ID} =1V, V _O =2V | 20 | 40 | mA | |
| | Sink | V _{CC} =15V, V _{ID} =-1V, V _O =2V | 7 | 20 | mA | |

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Electrical Characteristics (Continued)

Operating Conditions : $V_{CC}=+5V$, $T_A=25^{\circ}C$, unless otherwise specified.

| | | | | | |
|-----------------------------|---|-----|-----|-----|------------|
| Output Voltage Swing (High) | $V_{CC}=30V$, $R_L=10k\Omega$, $V_{ID}=1V$ | 27 | 28 | | V |
| Output Voltage Swing (Low) | $V_{CC}=30V$, $R_L=10k\Omega$, $V_{ID}=-1V$ | | 17 | 100 | mV |
| Slew Rate | $V_{CC}=18V$, $R_L=2k\Omega$, $A_v=1$, $V_{IN}=0.5$ to $2V$, $C_L=100pF$ | 0.2 | 0.5 | | V/ μs |
| Unity Gain Bandwidth | $V_{CC}=30V$, $R_L=2k\Omega$, $C_L=100pF$ | 0.7 | 1.0 | | MHz |

Typical Performance Characteristics

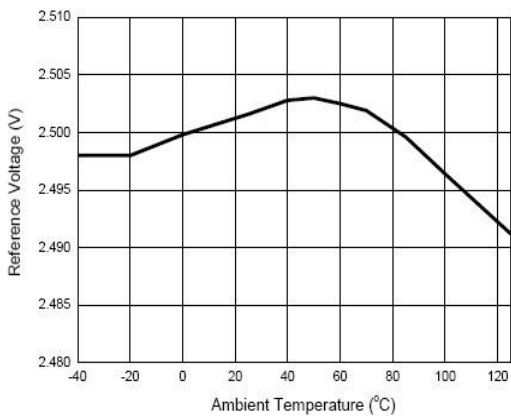


Figure 4: Reference Voltage vs. Ambient Temperature

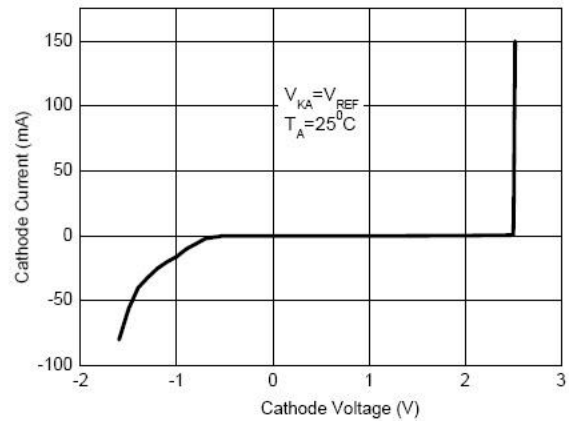


Figure 5: Cathode Current vs. Cathode

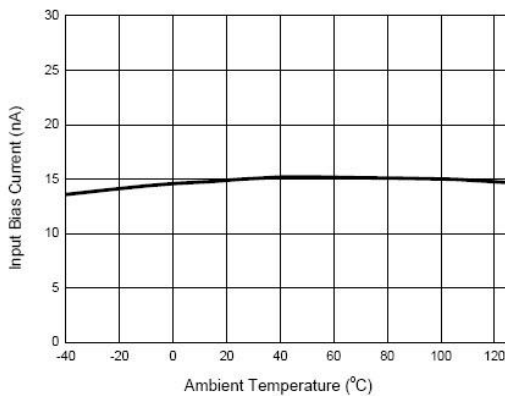


Figure 6: Input Bias Current vs. Ambient Temperature

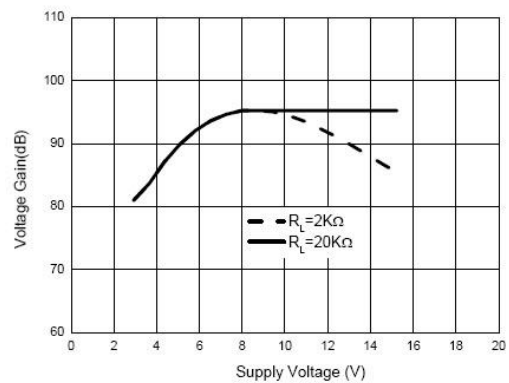


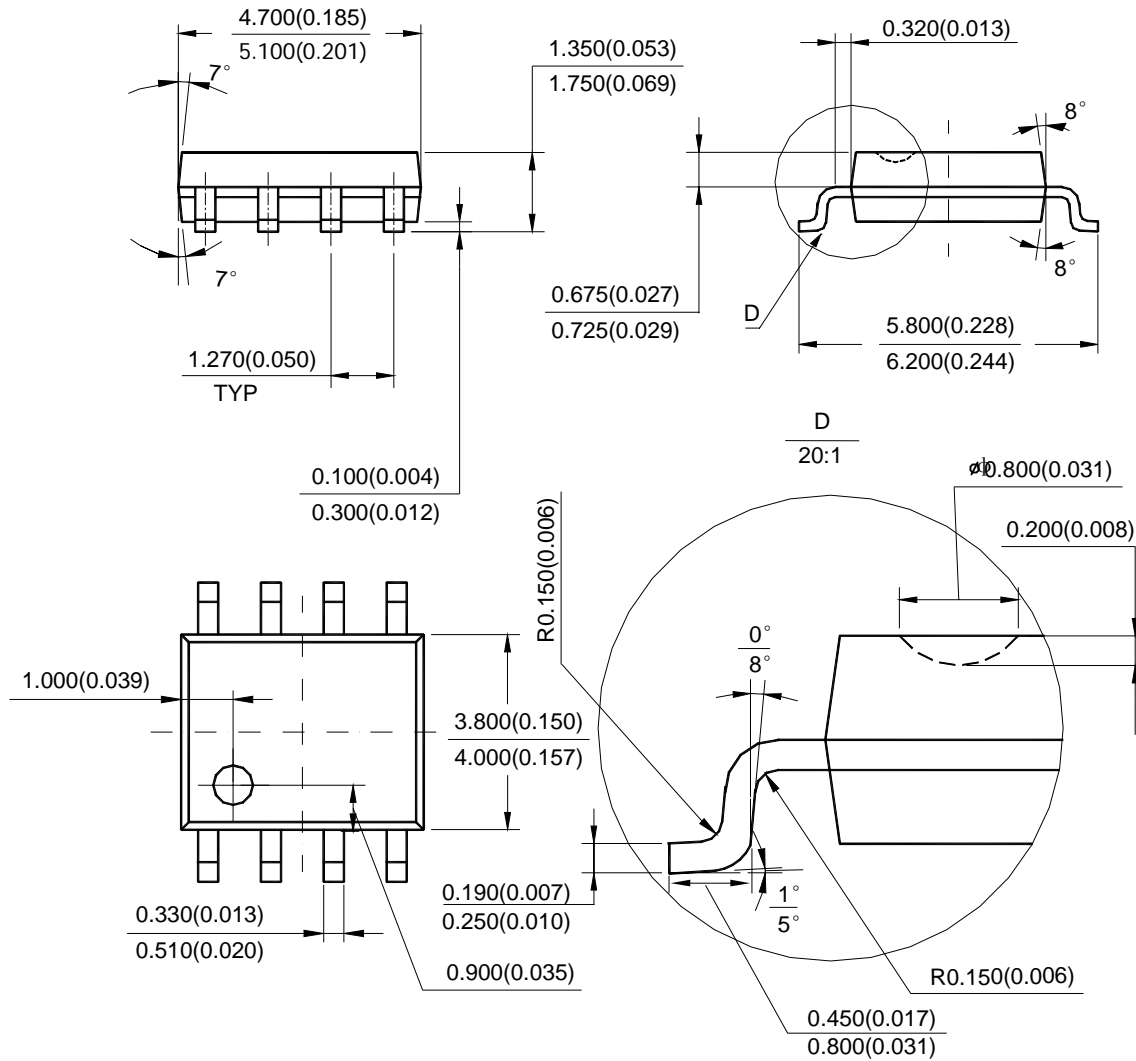
Figure 7: Op Amp Voltage Gain

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Mechanical Dimensions

SOP-8

Unit: mm(inch)

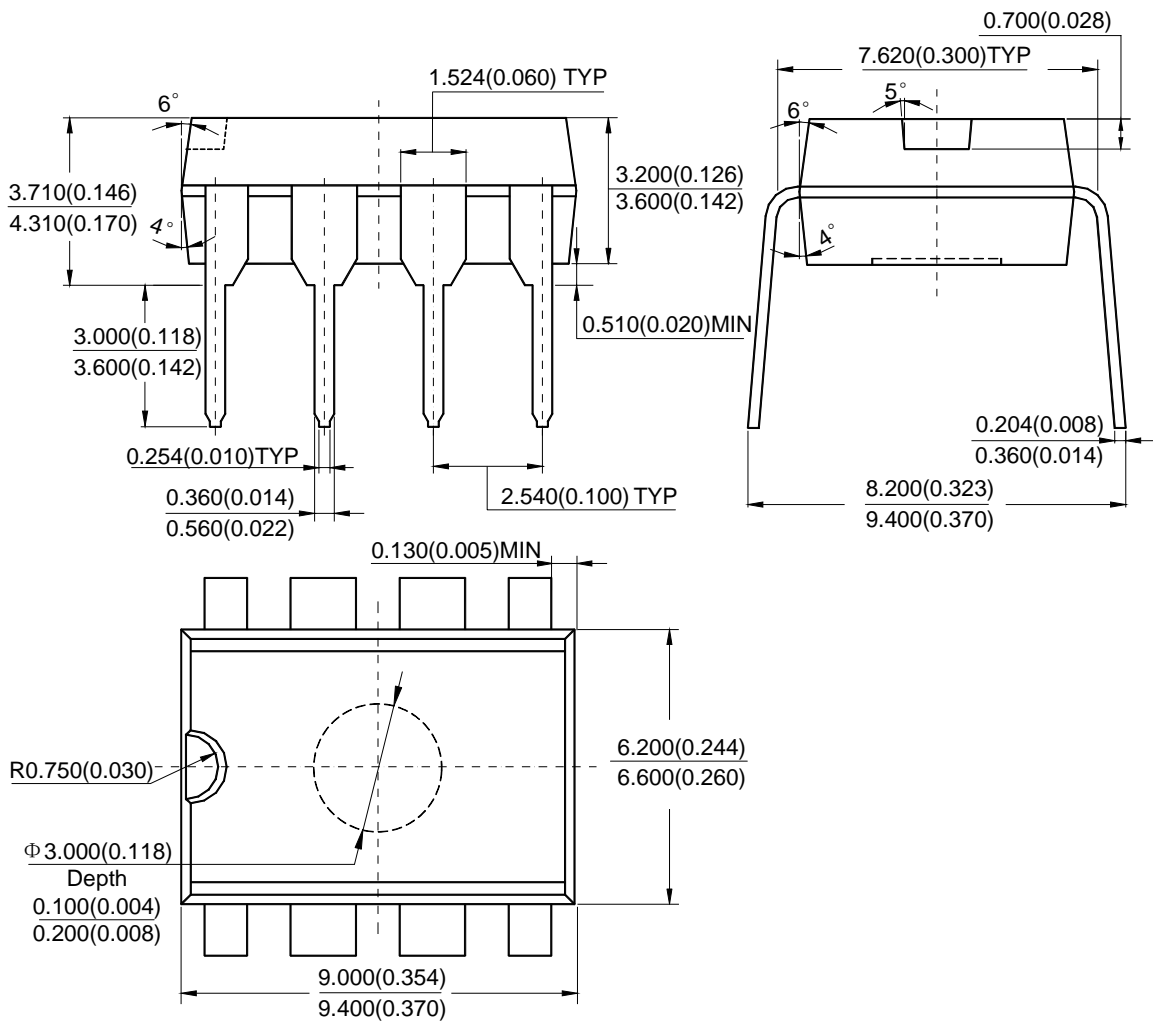


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Mechanical Dimensions (Continued):

DIP-8

Unit: mm(inch)



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