

Dual Operational Amplifiers and Voltage Reference

DESCRIPTION

The TS103 is a monolithic IC specifically designed to control the output current and voltage levels of switch mode battery chargers and power supplies. The device contains two operational amplifiers and a precision shunt regulator. OP AMP 1 is designed for voltage control, whose 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.

FEATURES

- Input Offset Voltage: 0.5mV
- Supply Current: 250µA per OP AMP @ 5V
- Unity Gain Bandwidth: 1MHz
- Output Voltage Swing: 0~(V_{CC} - 1.5) V
- Power Supply Voltage: 3~18V
- Fixed Output Voltage Reference: 2.5V±1%
- Sink Current Capability from 0.2~80mA
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC.
- Halogen-free according to IEC 61249-2-21

APPLICATION

- Battery chargers
- Switch-Mode Power Supplies
- Linear voltage regulation

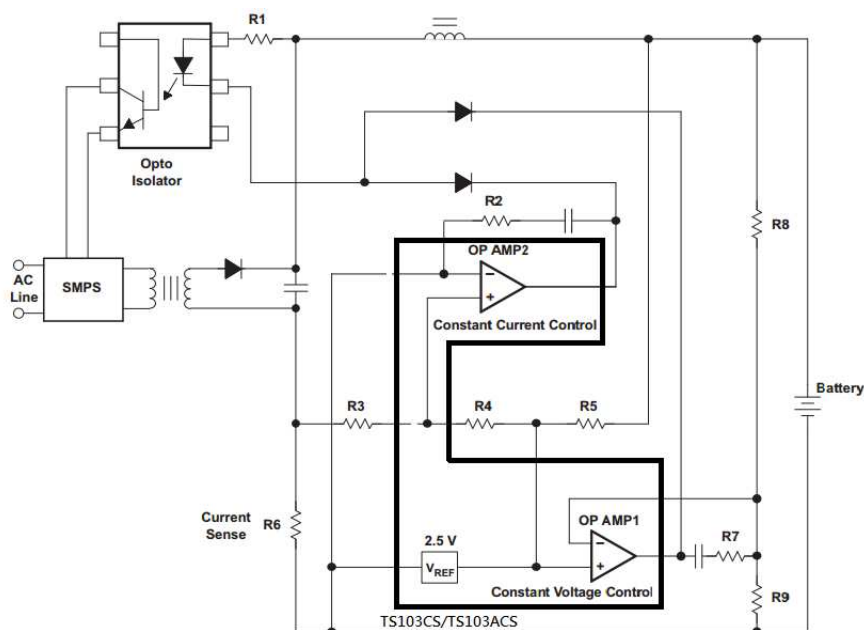


Pin Definition:

- | | |
|----------------------------------|--------------------|
| 1. Output A | 8. V _{CC} |
| 2. Input A (-) | 7. Output B |
| 3. Input A (+) / V _{KA} | 6. Input B (-) |
| 4. GND | 5. Input B (+) |

Note: MSL 3 (Moisture Sensitivity Level) per J-STD-020

TYPICAL APPLICATION CIRCUIT



| ABSOLUTE MAXIMUM RATINGS (Note 1) | | | |
|---|-----------|------------------------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Power Supply Voltage (V_{CC} to GND) | V_{CC} | 20 | V |
| Op Amp 1 and 2 Input Voltage Range (Pins 2,5,6) | V_{IN} | -0.3 to $V_{CC} + 0.3$ | V |
| Op Amp 2 Input Differential Voltage (Pins 5,6) | V_{ID} | 20 | V |
| Voltage Reference Cathode Current (Pin 3) | I_K | 100 | mA |
| Power Dissipation | P_D | 500 | mW |
| Storage Temperature Range | T_{STG} | -65 to 150 | °C |
| ESD Protection Voltage (Machine Model) | -- | ≥200 | V |

| RECOMMENDED OPERATING CONDITIONS (Note 3) | | | |
|--|-----------|------------|------|
| PARAMETER | SYMBOL | CONDITIONS | UNIT |
| Supply Voltage | V_{CC} | 3 ~ 18 | V |
| Operating Ambient Temperature Range | T_{OPA} | -40 to +85 | °C |

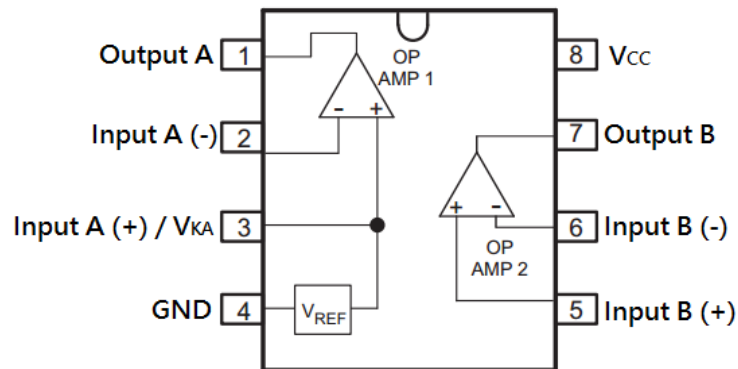
| ELECTRICAL SPECIFICATIONS ($V_{CC} = 18V$, $T_A = 25^\circ C$ unless otherwise noted) | | | | | | |
|---|---|--|-------|-------|-------|------------------|
| PARAMETER | CONDITIONS | | MIN | TYP | MAX | UNIT |
| Total Supply Current, excluding Current in Voltage Reference | $V_{CC} = 5V$, no load, $-40^\circ C \leq T_A \leq 85^\circ C$ | | -- | 0.5 | 0.8 | mA |
| | $V_{CC} = 18V$, no load, $-40^\circ C \leq T_A \leq 85^\circ C$ | | -- | 0.6 | 1.2 | |
| Voltage Reference Section | | | | | | |
| Reference Voltage | TS103 | $I_{KA} = 10mA$ | 2.475 | 2.500 | 2.525 | V |
| | | $I_{KA} = 10mA @ -40^\circ C \leq T_A \leq 85^\circ C$ | 2.45 | 2.500 | 2.55 | |
| | TS103A | $I_{KA} = 10mA$ | 2.490 | 2.500 | 2.510 | |
| | | $I_{KA} = 10mA @ -40^\circ C \leq T_A \leq 85^\circ C$ | 2.475 | 2.500 | 2.525 | |
| Reference Voltage Deviation Over Full Temperature Range | $I_{KA} = 10mA$, $T_A = -40$ to $85^\circ C$ | | -- | 5 | 24 | mV |
| Minimum Cathode Current for Regulation | | | -- | 0.2 | 1.0 | mA |
| Dynamic Impedance | $V_{CC} = 1.0$ to $80mA$, $f < 1kHz$ | | | 0.3 | 0.5 | Ω |
| OP AMP 1 Section ($V_{CC} = 5V$, $V_O = 1.4V$, $T_A = 25^\circ C$, unless otherwise noted) | | | | | | |
| Input Offset Voltage | $T_A = 25^\circ C$ (TS103) | | -- | 0.5 | 3 | mV |
| | $T_A = 25^\circ C$ (TS103A) | | -- | 0.5 | 2 | |
| | $T_A = -40$ to $85^\circ C$ | | -- | -- | 5 | |
| Input Offset Voltage Temperature Drift | $T_A = -40$ to $85^\circ C$ | | -- | 7 | -- | $\mu V/^\circ C$ |
| Input Bias Current (Inverting Input Only) | $T_A = 25^\circ C$ | | -- | 20 | 150 | nA |
| Large Signal Voltage Gain | $V_{CC} = 15V$, $R_L = 2k\Omega$, $V_O = 1.4$ to $11.4V$ | | 85 | 100 | -- | dB |

| ELECTRICAL SPECIFICATIONS ($V_{CC} = 18V, T_A = 25^\circ C$ unless otherwise noted) | | | | | | |
|---|---|--|-----|------|--------------|------------------|
| PARAMETER | CONDITIONS | | MIN | TYP | MAX | UNIT |
| Power Supply Rejection Ratio | $V_{CC} = 5$ to 18V | | 70 | 90 | -- | dB |
| Output Current | Source | $V_{CC} = 15V, V_{ID} = 1V, V_O = 2V$ | 20 | 40 | -- | mA |
| | Sink | $V_{CC} = 15V, V_{ID} = -1V, V_O = 2V$ | 10 | 20 | -- | mA |
| Output Voltage Swing (High) | $V_{CC} = 18V, R_L = 10k\Omega, V_{ID} = 1V$ | | 16 | 16.5 | -- | V |
| Output Voltage Swing (Low) | $V_{CC} = 18V, R_L = 10k\Omega, V_{ID} = -1V$ | | -- | 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 |
| Gain Bandwidth Product | $V_{CC} = 18V, R_L = 2k\Omega, C_L = 100pF$ $V_{IN} = 10mV, f = 100kHz$ | | 0.5 | 1 | -- | MHz |
| OP AMP 2 Section ($V_{CC} = 5V, V_O = 1.4V, T_A = 25^\circ C$, unless otherwise noted) | | | | | | |
| Input Offset Voltage | $T_A = 25^\circ C$ (TS103) | | -- | 0.5 | 3 | mV |
| | $T_A = 25^\circ C$ (TS103A) | | -- | 0.5 | 2 | |
| | $T_A = -40$ to $85^\circ C$ | | -- | -- | 5 | |
| Input Offset Voltage Temperature Drift | $T_A = -40$ to $85^\circ C$ | | -- | 7 | -- | $\mu V/^\circ C$ |
| Input Bias Current | $T_A = 25^\circ C$ | | -- | 20 | 150 | nA |
| Input Voltage Range | $V_{CC} = 0\sim 18V$ | | 0 | 00 | $V_{CC}-1.5$ | V |
| Large Signal Voltage Gain | $V_{CC} = 15V, R_L = 2k\Omega,$ $V_O = 1.4$ to 11.4V | | 85 | 100 | -- | dB |
| Power Supply Rejection Ratio | $V_{CC} = 5$ to 18V | | 70 | 90 | -- | dB |
| Output Current | Source | $V_{CC} = 15V, V_{ID} = 1V, V_O = 2V$ | 20 | 40 | -- | mA |
| | Sink | $V_{CC} = 15V, V_{ID} = -1V, V_O = 2V$ | 10 | 20 | -- | mA |
| Output Voltage Swing (High) | $V_{CC} = 18V, R_L = 10k\Omega, V_{ID} = 1V$ | | 16 | 16.5 | -- | V |
| Output Voltage Swing (Low) | $V_{CC} = 18V, R_L = 10k\Omega, V_{ID} = -1V$ | | -- | 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 |
| Gain Bandwidth Product | $V_{CC} = 18V, R_L = 2k\Omega, C_L = 100pF$ $V_{IN} = 10mV, f = 100kHz$ | | 0.5 | 1 | -- | MHz |

ORDERING INFORMATION

| PART NO. | PACKAGE | PACKING |
|--------------|---------|--------------------|
| TS103CS RLG | SOP-8 | 2,500pcs / 13"Reel |
| TS103ACS RLG | SOP-8 | 2,500pcs / 13"Reel |

BLOCK DIAGRAM

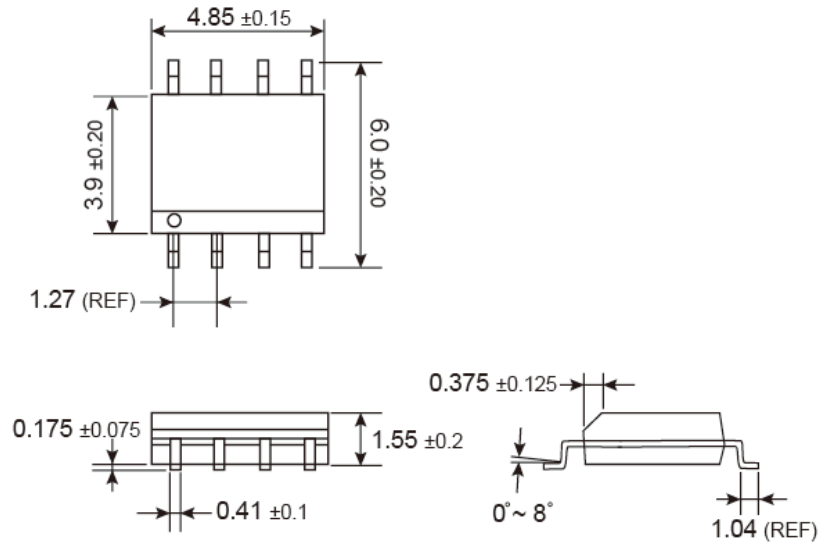


PIN DESCRIPTION

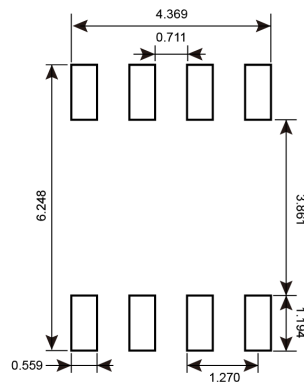
| PIN NO. | NAME | FUNCTION |
|---------|------------------------|---|
| 1 | Output A | OP AMP 1 output |
| 2 | Input A (-) | OP AMP 1 inverting input |
| 3 | Input A (+) / V_{KA} | OP AMP 1 non-inverting input and shunt reference cathode terminal |
| 4 | GND | Negative supply voltage |
| 5 | Input B (+) | OP AMP 2 output |
| 6 | Input B (-) | OP AMP 2 non-inverting input |
| 7 | Output B | OP AMP 2 output |
| 8 | V_{CC} | Positive supply voltage |

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

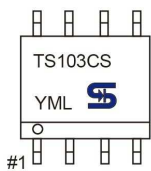
SOP-8



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



- Y** = Year Code
- M** = Month Code for Halogen Free Product
 - O** =Jan **P** =Feb **Q** =Mar **R** =Apr
 - S** =May **T** =Jun **U** =Jul **V** =Aug
 - W** =Sep **X** =Oct **Y** =Nov **Z** =Dec
- L** = Lot Code (1~9, A~Z)

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9