NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1060

2.5 V HIGH PRECISION REFERENCE VOLTAGE CIRCUIT

DESCRIPTION

The μPC1060 are high accuracy and low drift voltage references of 2.5 V output voltage.

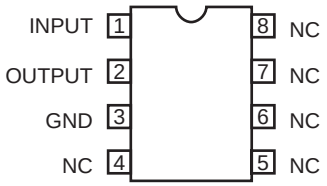
This IC can operate under wide range input voltage, and applied for 8 to 12 bits D/A converters.

★ FEATURES

- High Accuracy V_O = 2.5 V ± 1 %
- Low Temperature Coefficient $\Delta V_O/\Delta T \leq 40$ ppm/°C
- Low Supply Current $I_{CC} \leq 1.5$ mA
- Wide Supply Voltage Range 4.5 V ≤ V_{IN} ≤ 40 V
- Low Load Regulation $REG_L \leq 10$ mV

PIN CONFIGURATION

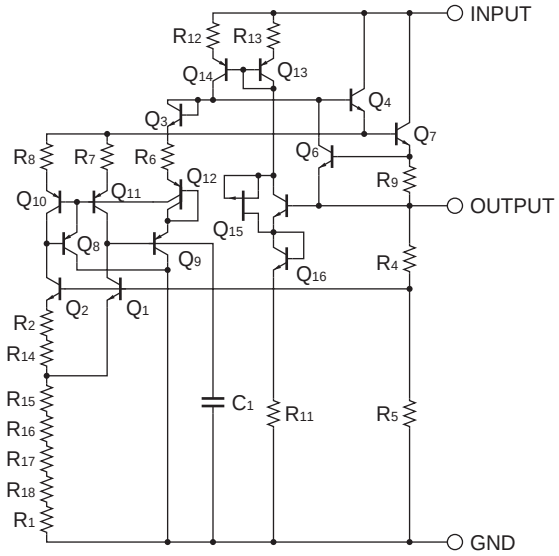
8-pin plastic DIP (7.62 mm (300))
μPC1060C



★ ORDERING INFORMATION

Part Number	Package
μPC1060C	8-pin plastic DIP (7.62 mm (300))

EQUIVALENT CIRCUIT



The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

Document No. G14607EJ4V0DS00 (4th edition)
(Previous No. IC-1537)
Date Published March 2000 NS CP (K)
Printed in Japan

The mark ★ shows major revised points.

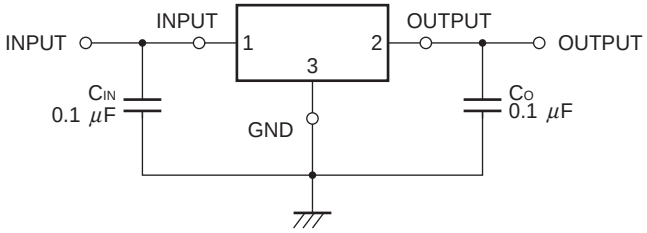
© NEC Corporation 2000

ABSOLUTE MAXIMUM RATINGS (T_A = +25 °C, unless otherwise specified.)

Parameter	Symbol	Ratings	Unit
Input Voltage	V_{IN}	−0.3 to +40	V
Total Power Dissipation	P_T	350	mW
Operating Ambient Temperature	T_A	−20 to +70	°C
Storage Temperature	T_{stg}	−55 to +125	°C

Caution Product quality may suffer if the absolute maximum rating is exceeded even momentarily for any parameter. That is the absolute maximum ratings are rated values at which the product is on the verge of suffering physical damage, and therefore the product must be used under conditions that ensure that the absolute maximum ratings are not exceeded.

TYPICAL CONNECTION



RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Input Voltage	V_{IN}	4.5		40	V
Output Current	I_O	0		10	mA
Internal Power Dissipation	P_D			270	mW
Operating Ambient Temperature	T_A	−20		+70	°C

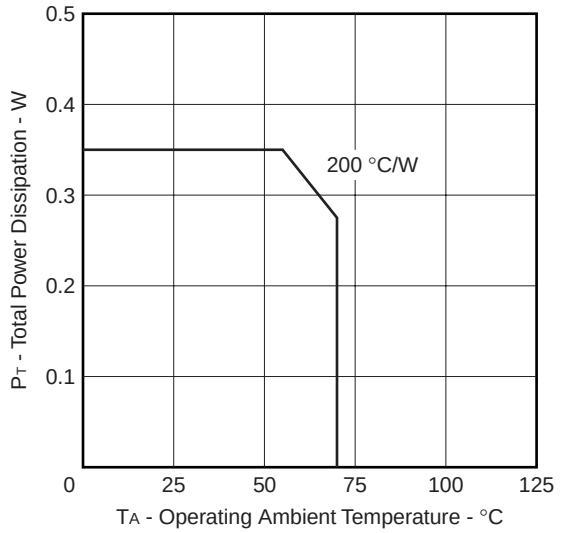
Caution The recommended operating range may be exceeded without causing any problems provided that the absolute maximum ratings are not exceeded. However, if the device is operated in a way that exceeds the recommended operating conditions, the margin between the actual conditions of use and the absolute maximum ratings is small, and therefore thorough evaluation is necessary. The recommended operating conditions do not imply that the device can be used with all values at their maximum values.

ELECTRICAL CHARACTERISTICS (V_{IN} = 15 V, I_O = 0 A, T_A = +25 °C, unless otherwise specified.)

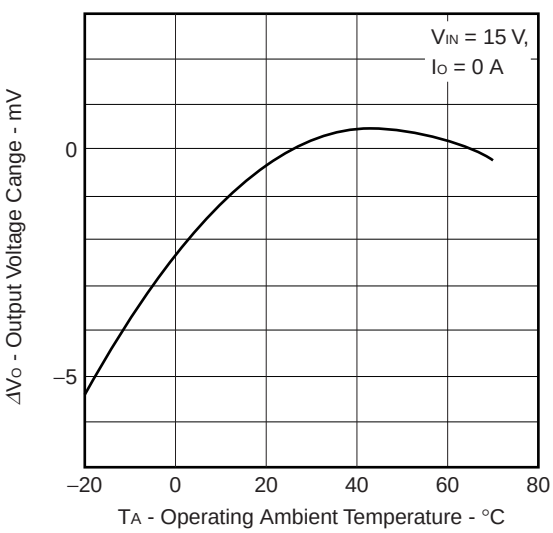
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		2.475	2.5	2.525	V
Output Voltage Change	ΔV_O	0 °C ≤ T_A ≤ 70 °C			7.0	mV
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_A ≤ 70 °C			40	ppm/°C
Line Regulation	REG_{IN}	15 V ≤ V_{IN} ≤ 40 V			4.5	mV
		4.5 V ≤ V_{IN} ≤ 15 V			3.0	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 10 mA			10	mV
Ripple Rejection	R•R	5 V ≤ V_{IN} ≤ 40 V, f = 120 Hz		90		dB
Output Noise Voltage	V_n	4.5 V ≤ V_{IN} ≤ 40 V, 0 A ≤ I_O ≤ 10 mA, P_T ≤ 350 mW		80		μV_{p-p}
Short Circuit Current	I_{Oshort}	V_O = 0 V		17		mA
Circuit Current	I_{CC}				1.5	mA

TYPICAL CHARACTERISTIC (T_A = +25 °C, unless otherwise specified. Nominal)

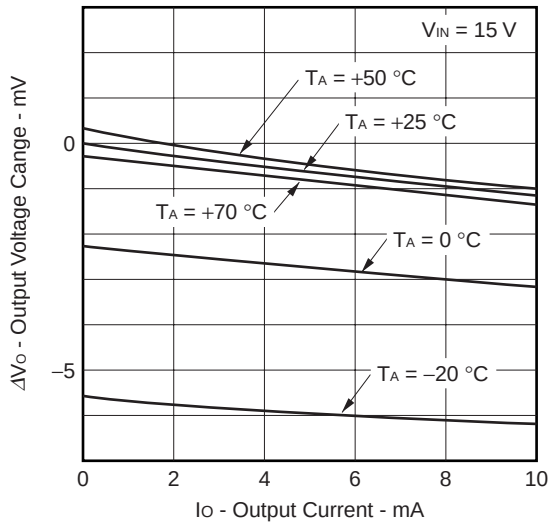
★ P_T vs T_A



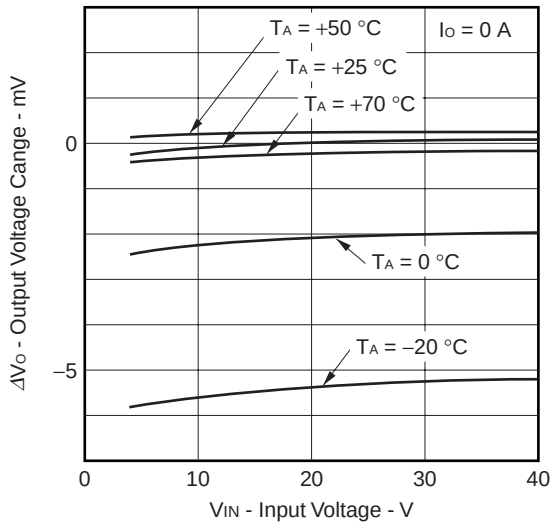
ΔV_O vs T_A



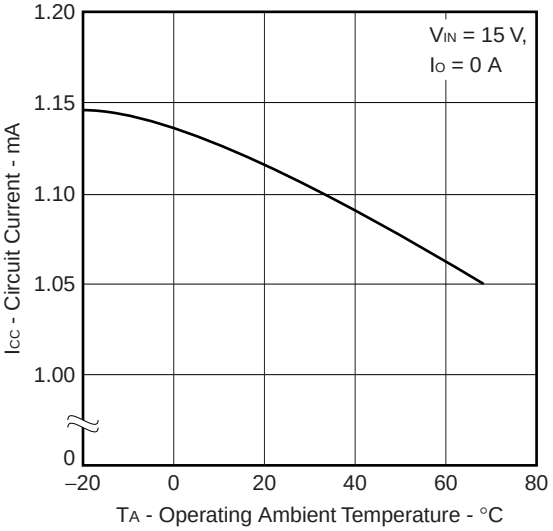
ΔV_O vs I_O



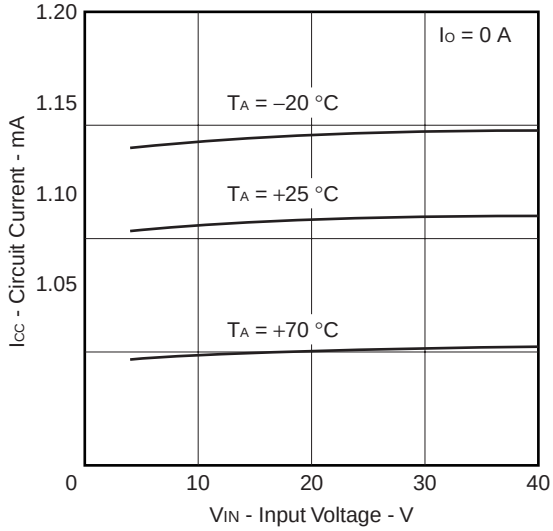
ΔV_O vs V_{IN}



I_{CC} vs T_A

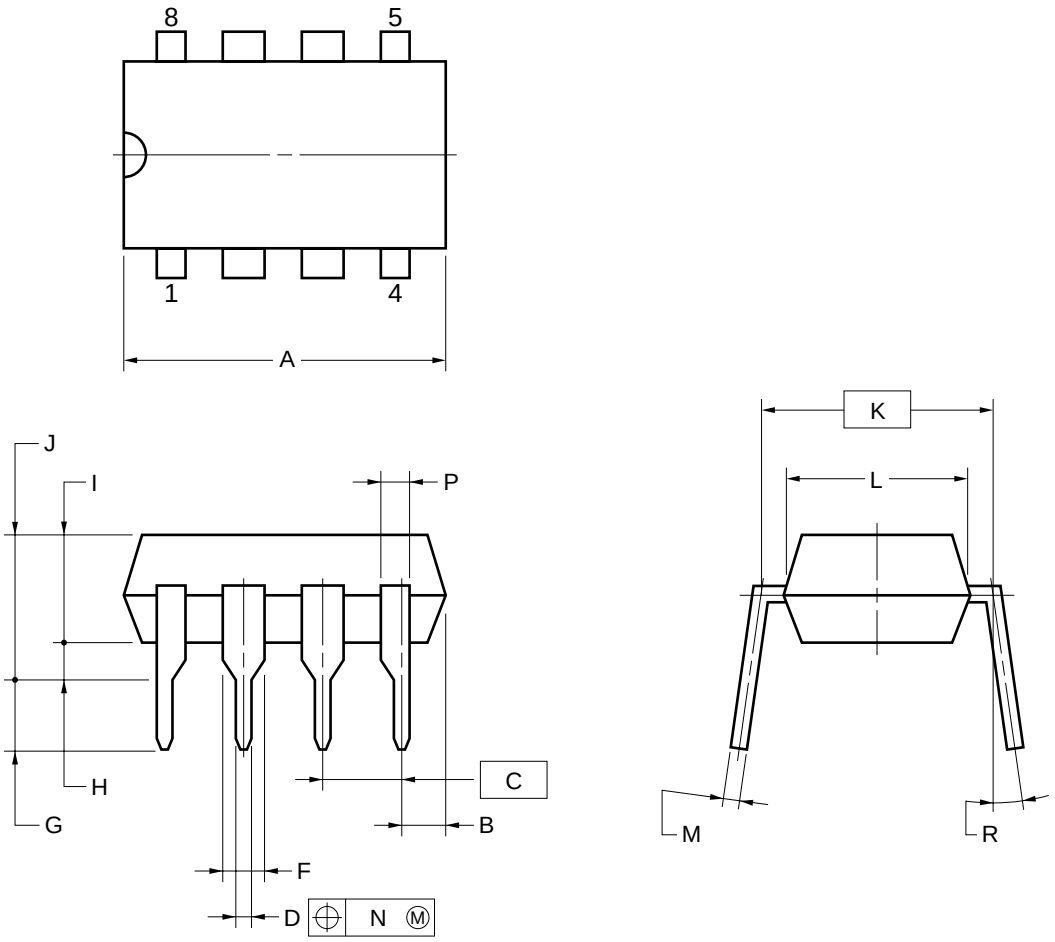


I_{CC} vs V_{IN}



PACKAGE DRAWING

8-PIN PLASTIC DIP (7.62mm(300))



NOTES

1. Each lead centerline is located within 0.25 mm of its true position (T.P.) at maximum material condition.

2. Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS
A	10.16 MAX.
B	1.27 MAX.
C	2.54 (T.P.)
D	0.50±0.10
F	1.4 MIN.
G	3.2±0.3
H	0.51 MIN.
I	4.31 MAX.
J	5.08 MAX.
K	7.62 (T.P.)
L	6.4
M	$0.25^{+0.10}_{-0.05}$
N	0.25
P	0.9 MIN.
R	0~15°

P8C-100-300B,C-2

★ RECOMMENDED SOLDERING CONDITIONS

When soldering this product, it is highly recommended to observe the conditions as shown below.

If other soldering processes are used, or if the soldering is performed under different conditions, please make sure to consult with our sales offices.

For more details, refer to our document **"Semiconductor Device Mounting Technology Manual" (C10535E)**.

Type of Through-hole Device

μPC1060C : 8-pin plastic DIP (7.62 mm (300))

Process	Conditions
Wave soldering (only to leads)	Solder temperature: 260°C or below, Flow time: 10 seconds or less.

Caution For through-hole device, the wave soldering process must be applied only to leads, and make sure that the package body does not get jet soldered.

REFERENCE DOCUMENTS

Semiconductor Device Mounting Technology Manual	C10535E
Semiconductor Selection Guide -Products and Packages-	X13769X

[MEMO]

[MEMO]

- **The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.**
- No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.
- NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.
- Descriptions of circuits, software, and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software, and information in the design of the customer's equipment shall be done under the full responsibility of the customer. NEC Corporation assumes no responsibility for any losses incurred by the customer or third parties arising from the use of these circuits, software, and information.
- While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.
- NEC devices are classified into the following three quality grades:
  "Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

  Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

  Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

  Specific: Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

  The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

M7 98.8