

Description

GMA103A is a monolithic IC that includes one independent op-amp and another op-amp, for which the non inverting input is wired to a 2.5V fixed Voltage Reference.

This device is offering space and cost saving in many applications like power supply management or data acquisition systems.

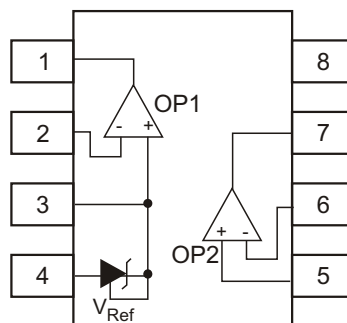
Application

Battery Charger
 Switch Mode Power Supply
 Linear Regulator

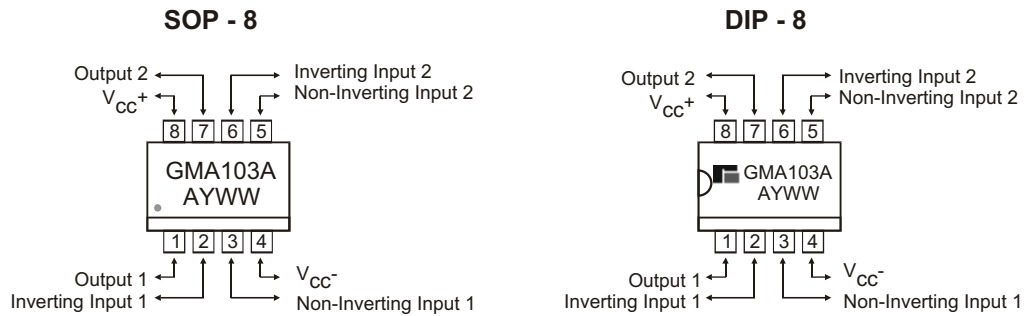
Features

- ◆ **Low Input Offset Voltage : 0.5mV typ.**
- ◆ **Low Supply Current : 350µA/op.**
 (@ $V_{CC} = 5V$)
- ◆ **Medium Bandwidth (unity gain) : 0.9MHz**
- ◆ **Large Output Voltage Swing : 0V to ($V_{CC} - 1.5V$)**
- ◆ **Input Common Mode Voltage Range Includes Ground**
- ◆ **Wide Power Supply Range : 3 to 32V ± 1.5 to $\pm 16V$**
- ◆ **Fixed Output Voltage Reference 2.5V**
- ◆ **0.4% and 1% Voltage Precision**
- ◆ **Sink Current Capability : 1 to 100mA**
- ◆ **Typical Output Impedance : 0.2**

TYPICAL APPLICATIONS



◆ MARKING INFORMATION & PIN CONFIGURATIONS (Top View)



A = Assembly Location
 Y = Year
 W W = Weekly

◆ ORDERING INFORMATION

Ordering Number	Package	Shipping
GMA103AS8T	SOP-8	100 Units / Tube
GMA103AS8R	SOP-8	2,500 Units / Tape & Reel
GMA103AD8T	DIP-8	60 Units / Tube

* For detail Ordering Number identification, please see last page.

◆ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	36	V
Differential Input Voltage	V_{id}	36	V
Input Voltage	V_i	-0.3 to +36	V
Operating Temperature Range	T_{oper}	-40 to +105	°C
Maximum Junction Temperature	T_J	150	°C

◆ ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit
Total Supply Current, Excluding Current in the Voltage Reference $V_{CC+}=5V$, No load $T_{min.} < T_{amb} < T_{max}$. $V_{CC+}=30V$, No load $T_{min.} < T_{amb} < T_{max}$	I_{CC}		0.7	1.2 2	mA

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◆ OPERATOR 1 (Independent op- amp)

$V_{CC+} = +5V$, $V_{CC} = \text{Ground}$, $V_O = 1.4V$, $T_{amb} = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input Offset Voltage $T_{amb} = 25^\circ\text{C}$ $T_{min.} \leq T_{amb} \leq T_{max.}$	V_{IO}		0.5	3 5	mV
Input Offset Current	DV_{IO}			7	$\mu\text{V}/^\circ\text{C}$
Input Offset Current $T_{min.} \leq T_{amb} \leq T_{max.}$	I_{IO}		2	30 50	nA
Input Bias Current $T_{min.} \leq T_{amb} \leq T_{max.}$	I_{IB}		20	150 200	nA
Large Signal Voltage Gain $V_{CC} = 15V$, $R_L = 2K$, $V_O = 1.4V$ to $11.4V$ $T_{min.} \leq T_{amb} \leq T_{max.}$	A_{vd}	50 25	100		V/ mV
Supply Voltage Rejection Ration $V_{CC} = 5V$ to $30V$	SVR	65	100		dB
Input Common Mode Voltage Range $V_{CC} = +30V$ (Note 1) $T_{min.} \leq T_{amb} \leq T_{max.}$	V_{icm}	0 0		$(V_{CC+}) - 1.5$ $(V_{CC+}) - 2$	V
Common Mode Rejection Ratio $T_{min.} \leq T_{amb} \leq T_{max.}$	CMR	70 60	85		dB
Output Current Source $V_{CC} = +15V$, $V_O = 2V$, $V_{id} = +1V$	I_{source}	20	40		mA
Short Circuit Ground $V_{CC} = +15V$	I_o		40	60	mA
Output Current Sink $V_{id} = -1V$ $V_{CC} = +15V$, $V_O = 2V$	I_{sink}	10	20		mA
High Level Output Voltage $V_{CC+} = 30V$ $T_{amb} = 25^\circ\text{C}$, $R_L = 10K$ $T_{min.} \leq T_{amb} \leq T_{max.}$	V_{OH}	27 27	28		V
Low Level Output Voltage $R_L = 10K$ $T_{min.} \leq T_{amb} \leq T_{max.}$	V_{OL}		5	20 20	mV
Slew Rate at Unity Gain $V_i = 0.5$ to $3V$, $V_{CC} = 15V$ $R_L = 2K$, $C_L = 100\text{pF}$, unity gain	SR	0.2	0.4		V/ μs
Gain Bandwidth Product $V_{CC} = 30V$, $R_L = 2K$, $C_L = 100\text{pF}$, $f = 100\text{kHz}$, $V_{IN} = 10\text{mV}$	GBP	0.5	0.9		Mhz
Total Harmonic Distortion $f = 1\text{kHz}$ $A_v = 20\text{dB}$, $R_L = 2K$, $V_{CC} = 30V$ $C_L = 100\text{pF}$, $V_O = 2V_{pp}$	THD		0.02		%

Note 1: The input common-mode voltage of either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is $V_{CC+} - 1.5V$. But either of both inputs can go to +36V without damage.

◆ **OPERATOR 2** (op-amp with non-inverting input connected to the internal Vref)

$V_{CC+} = +5V$, $V_{CC-} = \text{Ground}$, $T_{amb} = 25^{\circ}\text{C}$ (unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input Offset Voltage $T_{amb} = 25^{\circ}\text{C}$ $T_{min.} \leq T_{amb} \leq T_{max.}$	V_{IO}		0.5	3 5	mV
Input Offset Current	DV_{IO}			7	$\mu\text{V}/^{\circ}\text{C}$
Input Bias Current Negative Input	I_{IB}		20		nA
Large Signal Voltage Gain $V_{icm} = 0V$ $V_{CC} = 15V$, $R_L = 2K$	A_{vd}		100		V/mV
Supply Voltage Rejection Ratio $V_{icm} = 0V$ $V_{CC} = 5V$ to $30V$	SVR	65	100		dB
Output Current Source $V_O = 2V$, $V_{CC} = +15V$, $V_{id} = +1V$	I_{source}	20	40		mA
Short Circuit Ground $V_{CC} = +15V$	I_o		40	60	mA
Output Current Sink $V_{id} = -1V$ $V_{CC} = +15V$, $V_O = 2V$	I_{sink}	10	20		mA
High Level Output Voltage $V_{CC+} = 30V$ $T_{amb} = 25^{\circ}\text{C}$, $R_L = 10K$ $T_{min.} \leq T_{amb} \leq T_{max.}$	V_{OH}	27 27	28		V
Low Level Output Voltage $R_L = 10K$ $T_{min.} \leq T_{amb} \leq T_{max.}$	V_{OL}		5	20 20	mV
Slew Rate at Unity Gain $V_i = 0.5$ to $2V$, $V_{CC} = 15V$ $R_L = 2K$, $C_L = 100\text{pF}$, unity gain	SR	0.2	0.4		V/ μs
Gain Bandwidth Product $V_{CC} = 30V$, $R_L = 2K$, $C_L = 100\text{pF}$, $f = 100\text{kHz}$, $V_{IN} = 10\text{mV}$	GBP	0.5	0.9		Mhz
Total Harmonic Distortion $f = 1\text{kHz}$ $A_v = 20\text{dB}$, $R_L = 2K$, $V_{CC} = 30V$ $C_L = 100\text{pF}$, $V_O = 2V_{pp}$	THD		0.02		%

◆ VOLTAGE REFERENCE

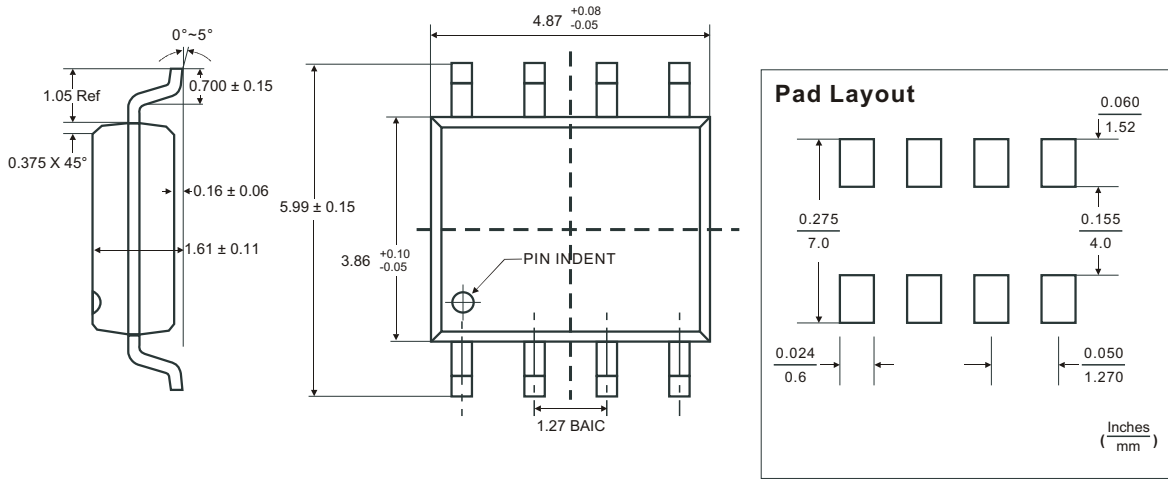
Parameter	Symbol	Value	Unit
Cathode Current	I_K	1 to 100	mA

Parameter	Symbol	Min.	Typ.	Max.	Unit
Reference Input Voltage Tamb= 25°C Tmin. ≤ Tamb ≤ Tmax.	V_{ref}	2.49 2.48	2.5	2.51 2.52	V
Reference Input Voltage Deviation Over Temperature Range $V_{KA} = V_{ref}$, $I_K = 10mA$ Tmin. ≤ Tamb ≤ Tmax.	V_{ref}		5	24	mV
Minimum Cathode Current for Regulation $V_{KA} = V_{ref}$	I_{min}		0.5	1	mA
Dynamic Impedance (Note 1) $V_{KA} = V_{ref}$, $I_K = 1$ to 100mA, $f < 1kHz$	$ Z_{KA} $		0.2	0.5	

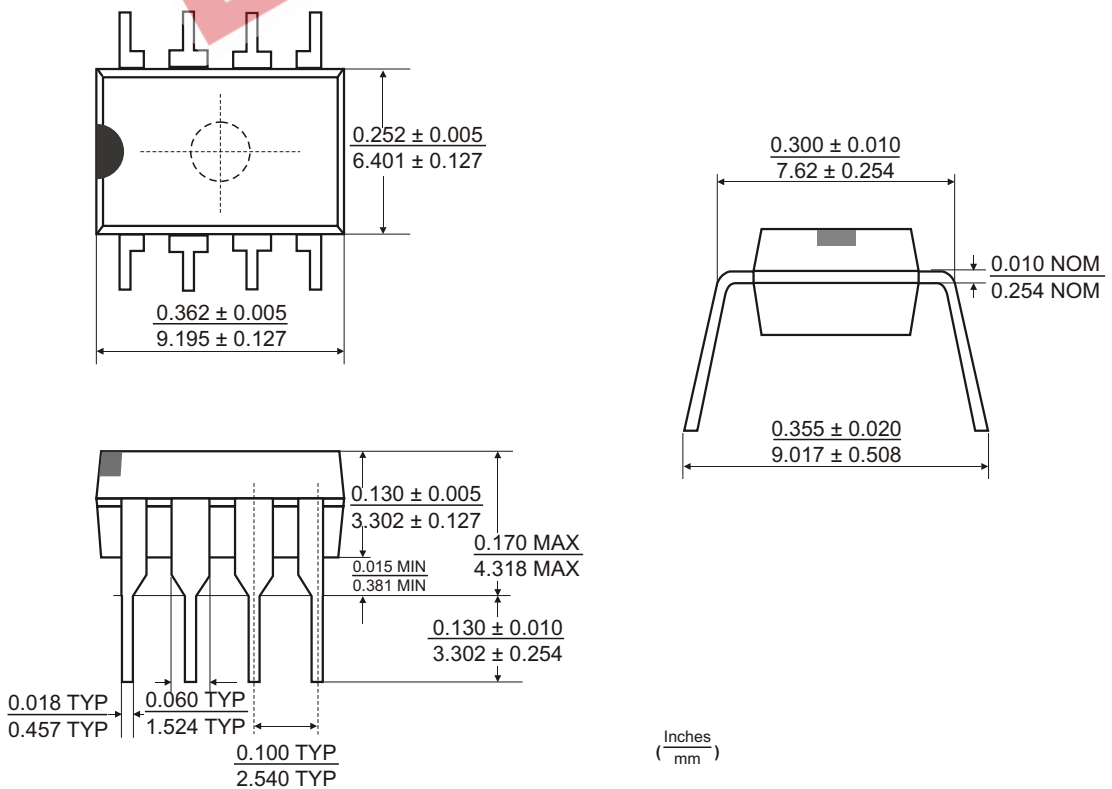
Note 1: The dynamic impedance is defined as $|Z_{KA}| = V_{KA} / I_K$

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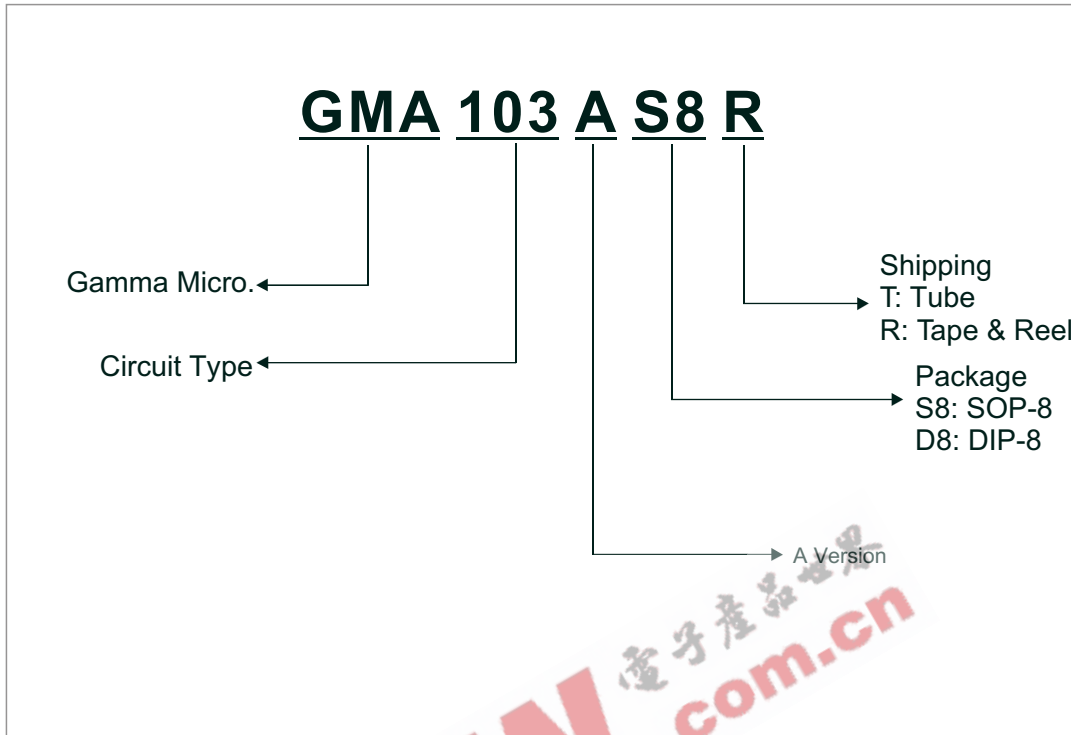
◆ SOP-8 PACKAGE OUTLINE DIMENSIONS





◆ DIP-8 PACKAGE OUTLINE DIMENSIONS



◆ ORDERING NUMBER



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