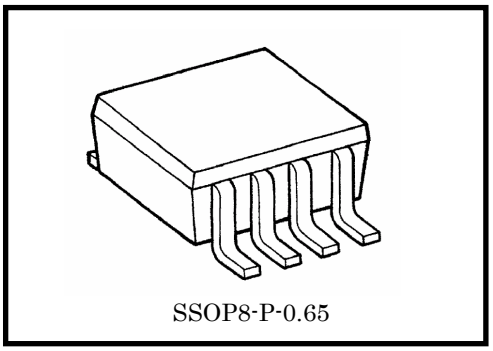
TOSHIBA Bi-CMOS Linear Integrated Circuit Silicon Monolithic

TB6078FUG

Shock Sensor IC

TB6078FUG detects " shock" through the external shock sensor and output Low-level signal at 7 pin.
It has so excellent characteristic in low noise, and is suitable for application of mechanical control systems of HDD.

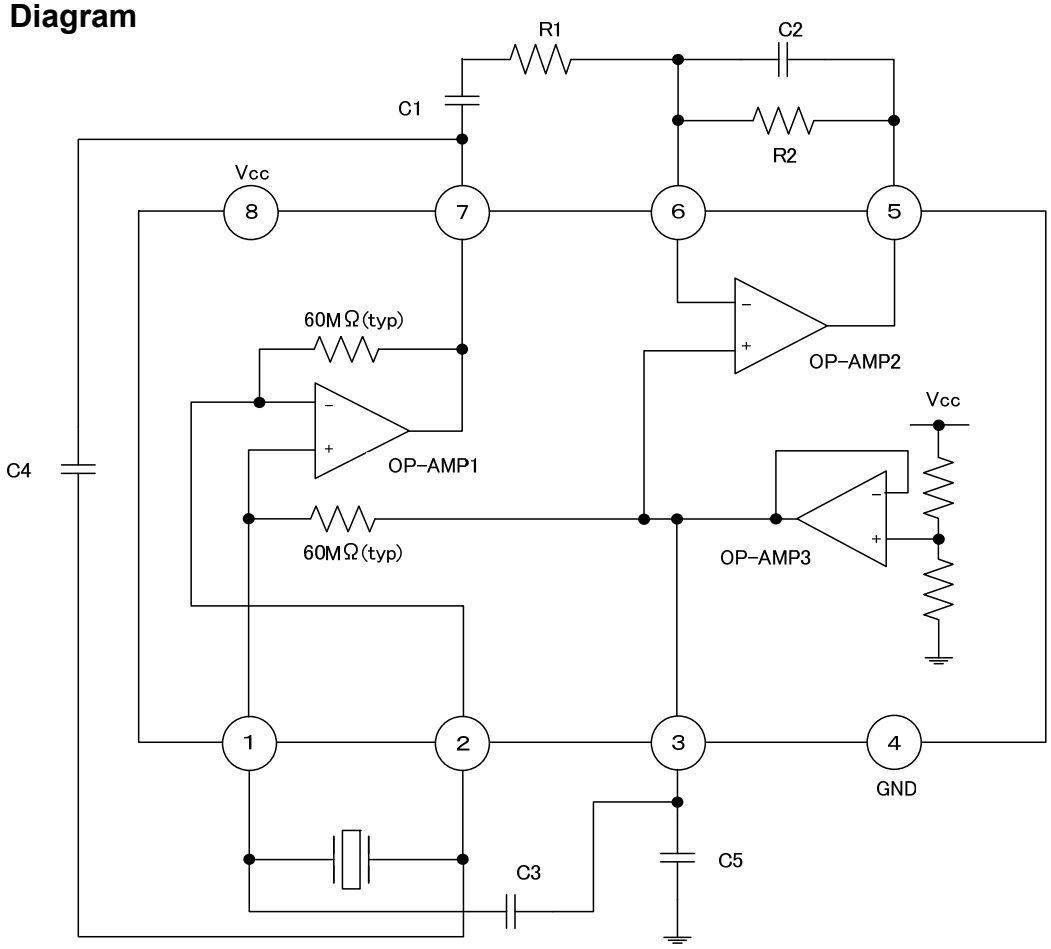


Weight: 0.02 g (typ.)

Features

- Single power supply: 2.7 V to 5.5 V single power supply operation
- Two Operatinal-Amplifier is built in for design flexibility.
  It is possible to adjust frequency characteristic and gain by changing external devices
- Super small package: SSOP8-P-0.65 (0.65 mm pitch)

Block Diagram

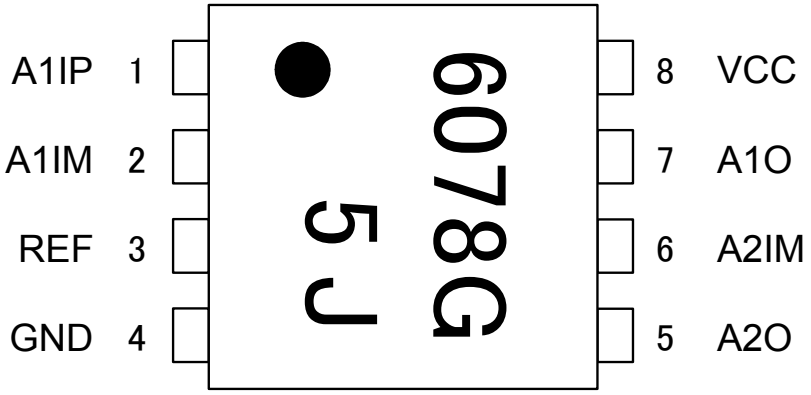


Note: Some of the functional blocks, circuits, or constants in the block diagram may be omitted or simplified for explanatory purpose.

Pin Function

Pin No.	Pin Name	Function
1	A1IP	OP-AMP1 non-inverting input
2	A1IM	OP-AMP1 inverting input
3	REF	Reference voltage output
4	GND	Ground
5	A2O	OP-AMP2 output
6	A2IM	OP-AMP2 inverting input
7	A1O	OP-AMP1 output
8	VCC	Power supply voltage

Pin Connection (top view)



(Marking example)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Power supply voltage	AV_{CC}	6	V
Input voltage	V_{IN}	−0.3 to V_{CC}+0.3	V
Output voltage	V_{OUT}	−0.3 to V_{CC}+0.3	V
Power dissipation	P_D	250	mW
Storage temperature	T_{stg}	−55 to 125	°C

Note: The absolute maximum ratings of a semiconductor device are a set of ratings that must not be exceeded, even for a moment. Do not exceed any of these ratings.
Exceeding the rating(s) may cause device breakdown, damage or deterioration, and may result injury by explosion or combustion.

Operating Condition

Characteristics	Symbol	Rating	Unit
Power supply voltage	V_{CC}	2.7 to 5.5	V
Operating temperature	T_{opr}	−25 to 85	°C

Note: The IC may be destroyed due to short circuit between adjacent pins, incorrect orientation of device's mounting, connecting positive and negative power supply pins wrong way round, air contamination fault, or fault by improper grounding.

Electrical Characteristics --- Guaranteed data
(unless otherwise specified, V_{CC} = 3.3 V, Ta = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Supply current	I_{CC}	(1)	V_{CC} = 3.3 V	—	2.1	3.6	mA
			V_{CC} = 5.0 V	—	2.2	3.9	

OP-AMP Characteristics

(OP-AMP1)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output DC voltage	V_{dc1}	(2)	No input signal	1.50	1.60	1.70	V
Output load change (source)	$V_{source1}$	(3)	Δ V when the source current is changed from 0 to 0.5 mA	−100	—	—	mV
Output load change (sink)	V_{sink1}	(4)	Δ V when the sink current is changed from 0 to 80 μA	—	—	100	mV

(OP-AMP2)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input current	I_{in}	(5)	—	−50	—	50	nA
Output DC voltage	V_{dc2}	(6)	—	1.57	1.65	1.73	V
Output voltage range (Low side)	V_{ol2}	(7)	—	—	—	0.3	V
Output voltage range (High side)	V_{oh2}	(8)	—	V_{CC}−0.3	—	—	V
Output source current	IA_{so2}	(9)	Voh = V_{CC} − 0.3 V	80	180	—	μA
Output sink current	IA_{si2}	(10)	Vol = 0.3 V	0.5	1.8	—	mA

(OP-AMP3)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Reference Voltage	V_{ref}	(11)	—	1.60	1.65	1.70	V
Output load change (source)	$V_{source3}$	(12)	Δ Vref when the source current is changed from 0 to 100 μA	−100	—	—	mV
Output load change (sink)	V_{sink3}	(13)	Δ Vref when the sink current is changed from 0 to 70 μA	—	—	100	mV

Electrical Characteristics--- Reference data for application (Note)

(OP-AMP1)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input bias voltage	V_{in}	(14)	No input signal	1.32	1.46	1.64	V
Input impedance	Z_{in}	(15)	—	—	60	—	MΩ
Offset voltage	V_{off1}	(16)	No input signal	−200	—	200	mV
GBW (Cut-off frequency)	f_{T1}	(17)	—	—	5.5	—	MHz

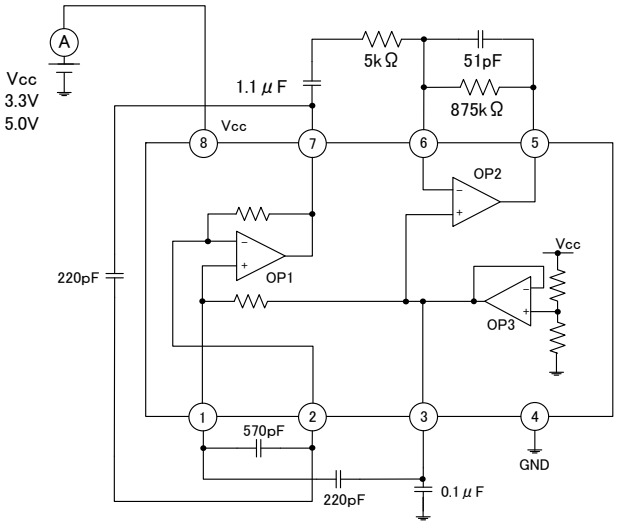
(OP-AMP2)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
GBW (Cut-off frequency)	f_{T2}	(18)	—	—	2.3	—	MHz
Offset voltage	V_{off2}	(19)	—	−20	—	20	mV

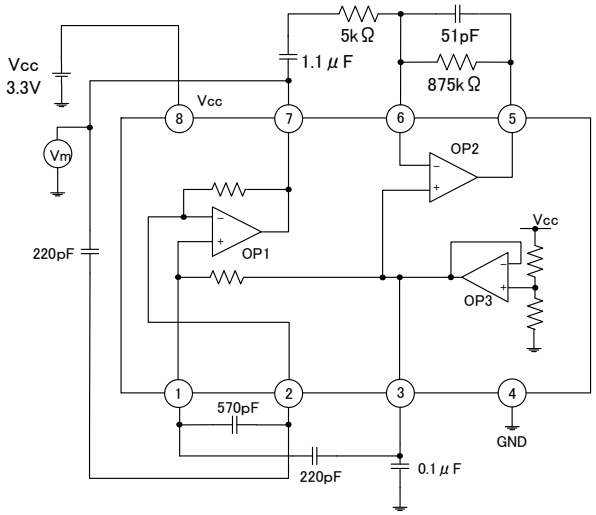
Note: The “reference data for application” shown in this document are provided for reference purposes only. Especially, thorough evaluation is required on the phase of mass production design.

Test Circuit

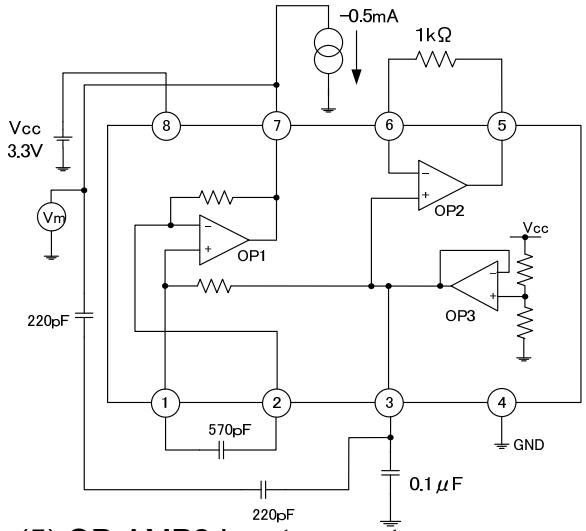
(1) Supply current: I_{CC}



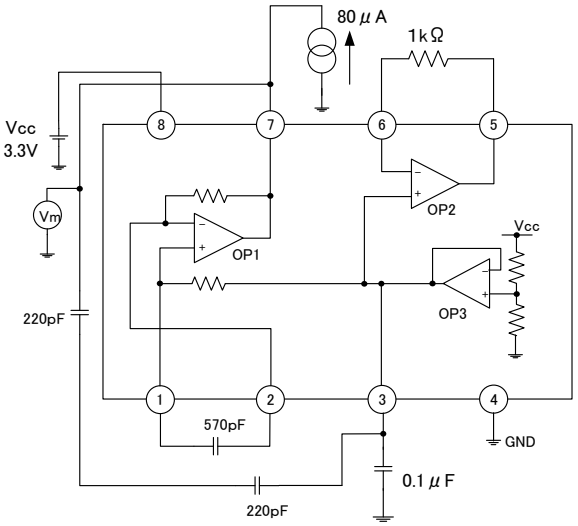
(2) OP-AMP1 Output DC voltage



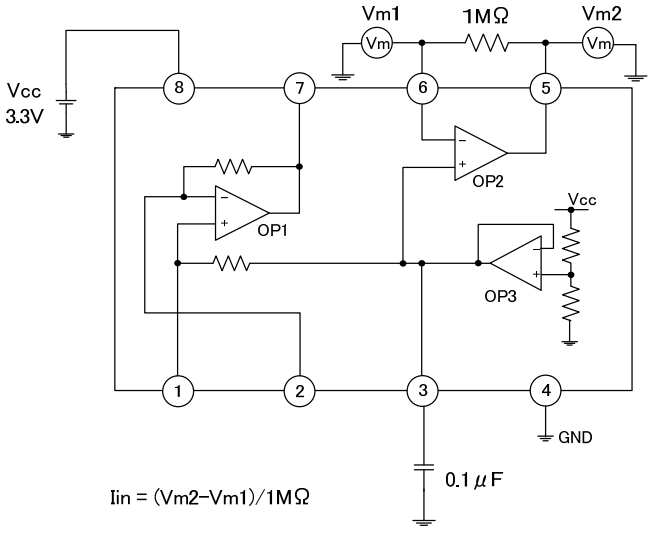
(3) OP-AMP1 Output load change (source)



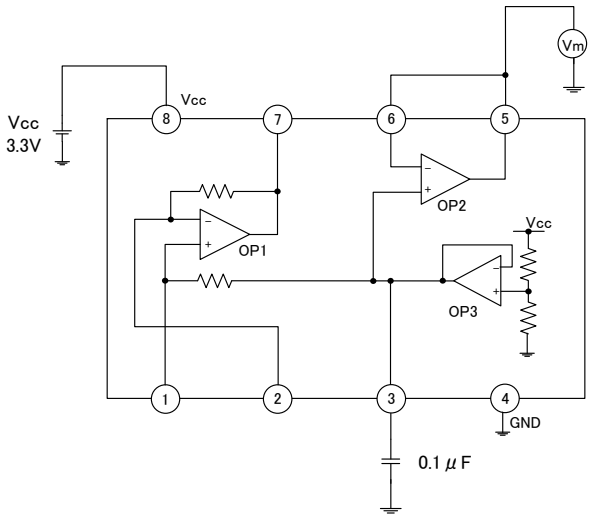
(4) OP-AMP1 Output load change (sink)



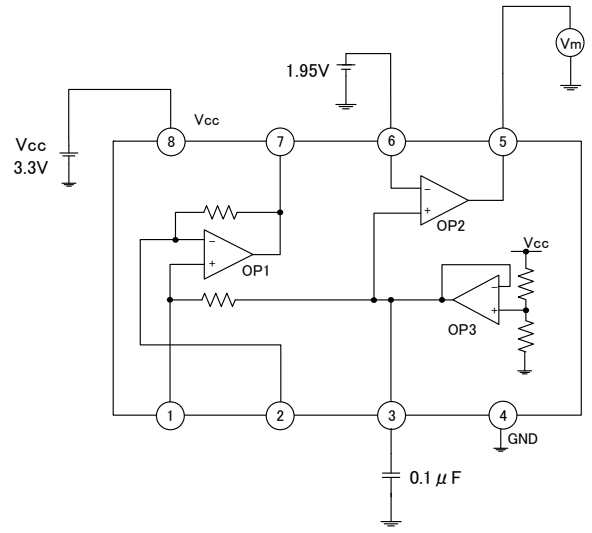
(5) OP-AMP2 Input current



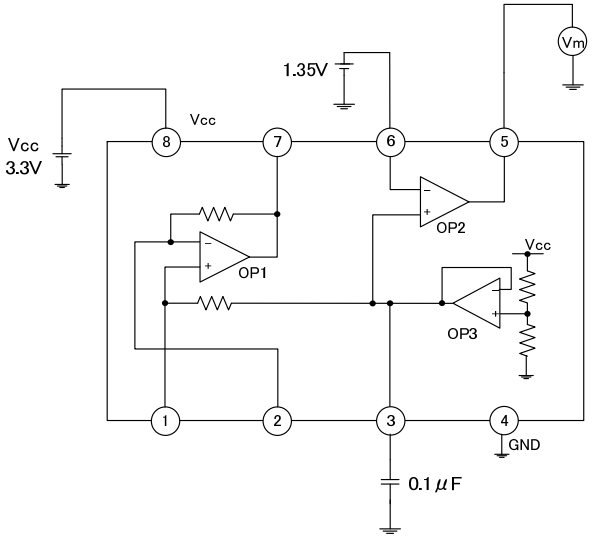
(6) OP-AMP2 Output DC voltage



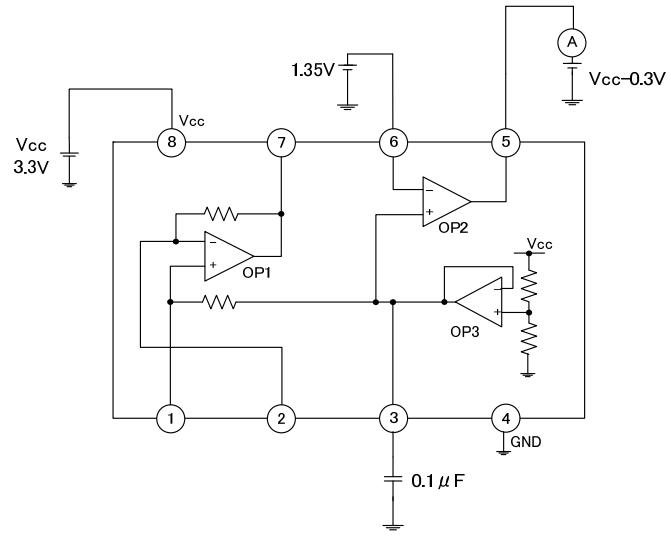
(7) OP-AMP2 Output voltage range (L side)



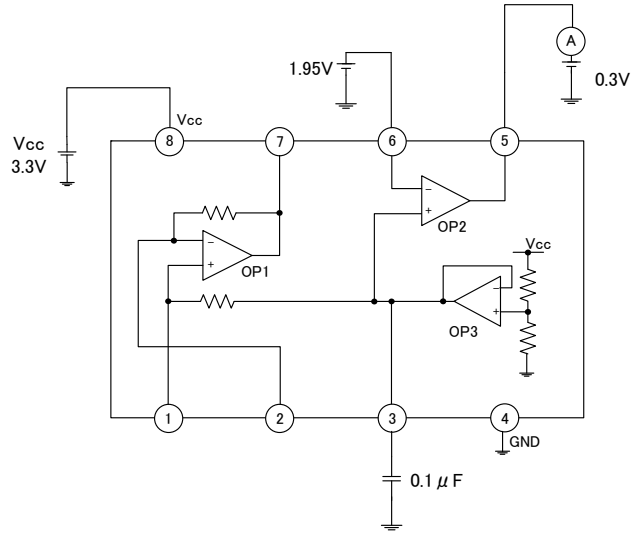
(8) OP-AMP2 Output voltage range (H side)



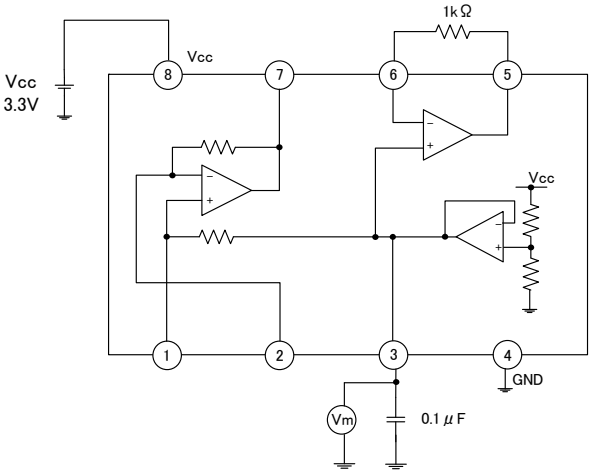
(9) OP-AMP2 Output source current



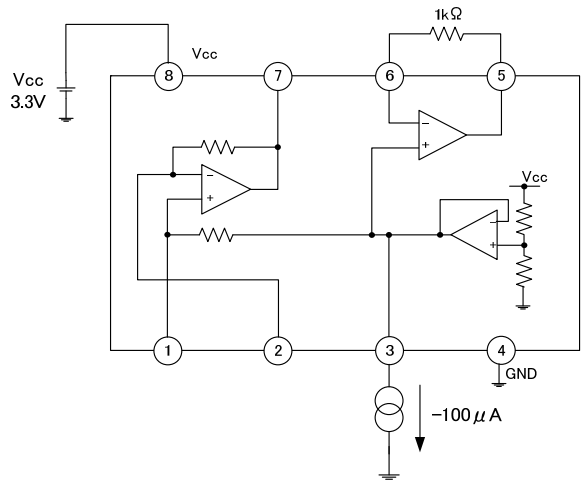
(10) OP-AMP2 Output sink current



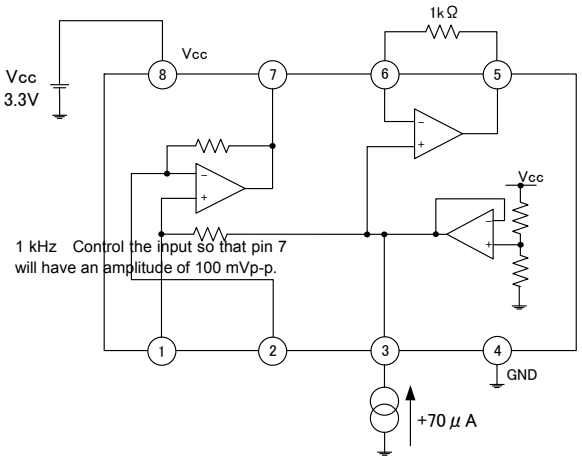
(11) OP-AMP3 Reference voltage (1/2Vcc)



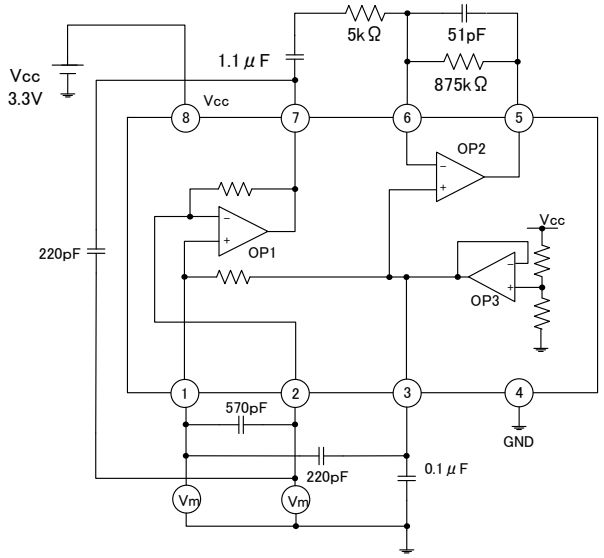
(12) OP-AMP3 Output load change (source)



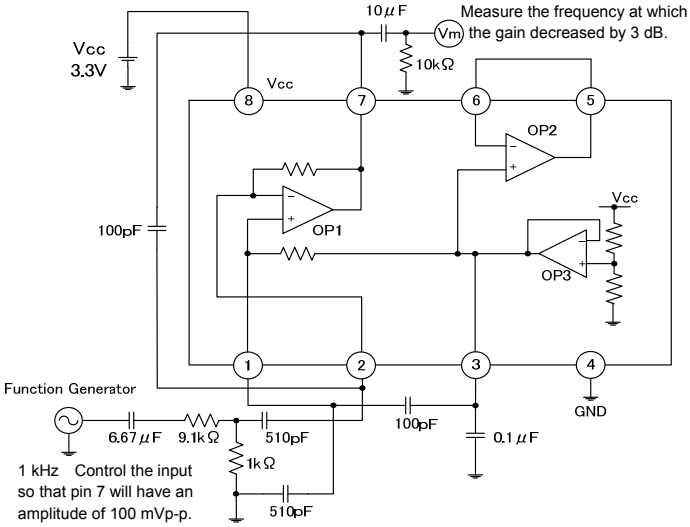
(13) OP-AMP3 Output load change (sink)



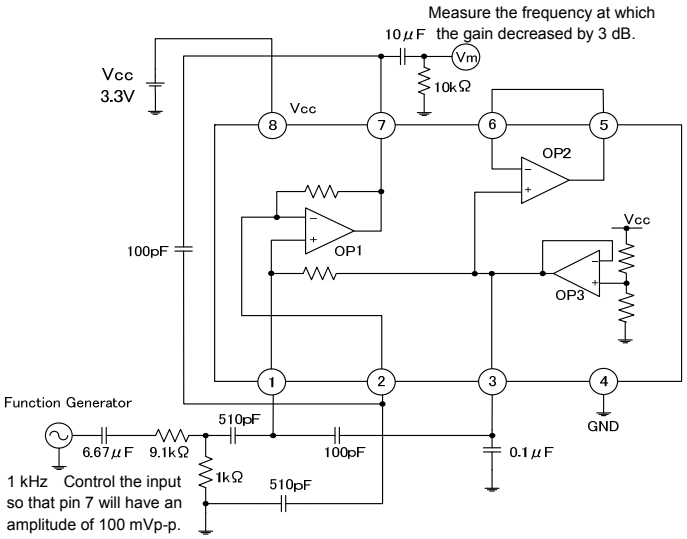
(14) OP-AMP1 Input bias voltage



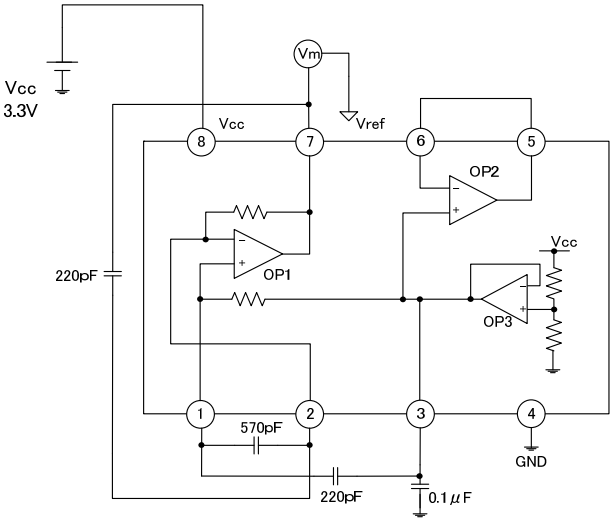
(15) OP-AMP1 Input impedance



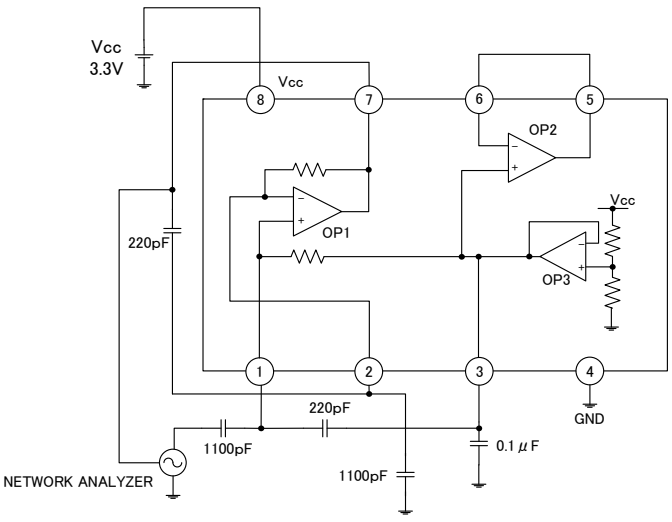
(15) OP-AMP1 Input impedance



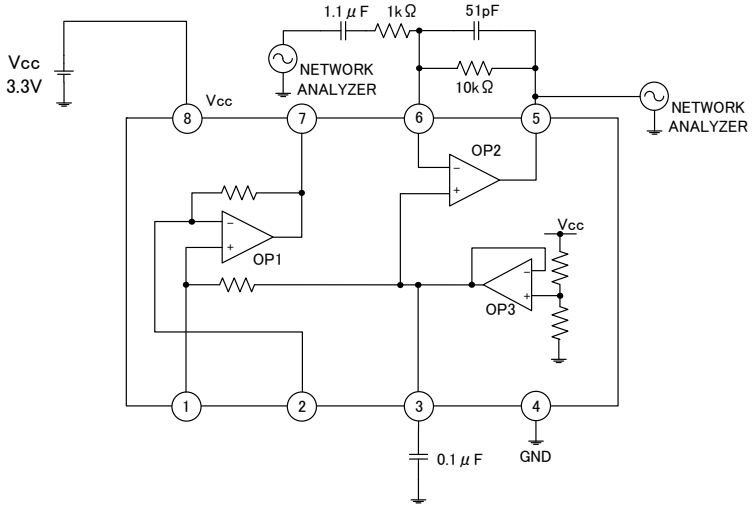
(16) OP-AMP1 Output offset voltage



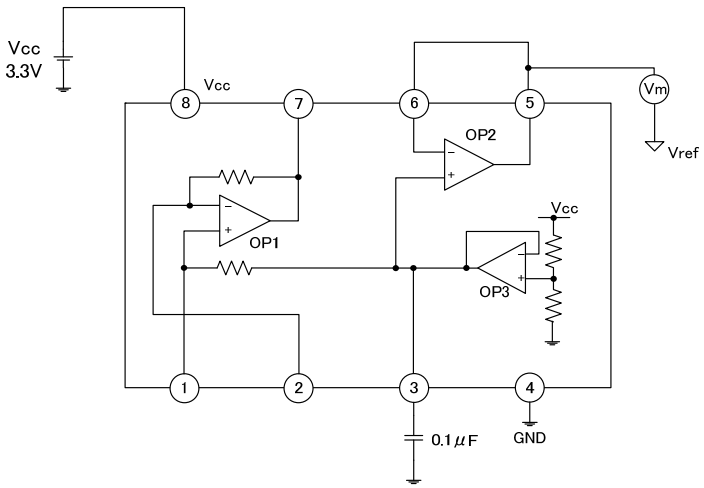
(17) OP-AMP1 GBW (cut-off frequency)



(18) OP-AMP2 GBW (cut-off frequency)



(19) OP-AMP2 Output offset voltage

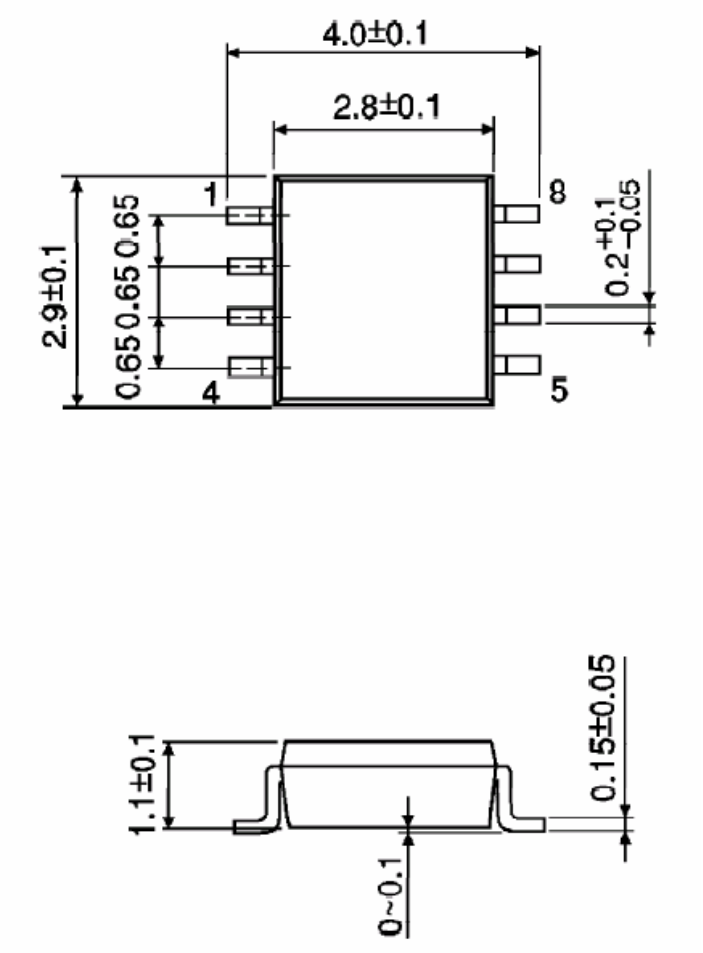


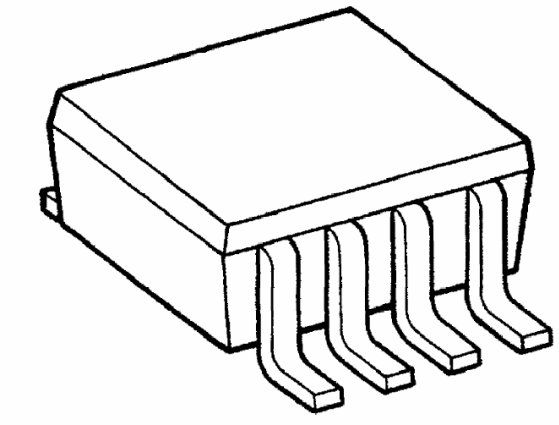
Note: Components in the test circuits are only used to obtain and confirm the device characteristics. These components and circuits do not warrant to prevent the application from malfunction from malfunction or failure.

Package Dimensions

SSOP8-P-0.65

Unit: mm





About solderability, following conditions were confirmed
*Solderability
(1)Use of Sn-37Pb solder Bath
*solder bath temperature = 230ºC
*dipping time = 5 seconds
*the number of times = once
*use of R-type flux
(2)Use of Sn-3.0Ag-0.5Cu solder Bath
*solder bath temperature = 245ºC
*dipping time = 5 seconds
*the number of times = once
*use of R-type flux

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20070701-EN GENERAL

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